

Black Death and Abrupt Earth Changes in the 14th century

1290-1350: Abrupt Earth changes, astronomical, tectonic and meteorological events leading up to and culminating at the Black Death period at 1348

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Fig. 1 14th Century engraving of the Black Death, depicting extreme lightning? Or fire from the sky devastating a town, a victim of plague? with spots distributed over the entire body. Image: <http://www.historytoday.com>

- (In the years before the Black Death in Europe), "between Cathay and Persia there rained a vast rain of fire, falling in flakes like snow and burning up mountains and plains and other lands, with men and women; and then arose vast masses of smoke; and whoever beheld this died within the space of half an hour; and likewise any man or woman who looked upon those who had seen this(..)".¹

--Philip Ziegler writing about the years before the out break of the Black Death

"The middle of the fourteenth century was a period of extraordinary terror and disaster to Europe. Numerous portents, which sadly frightened the people, were followed by a pestilence which threatened to turn the continent into an unpeopled wilderness. For year after year there were signs in the sky, on the earth, in the air, all indicative, as men thought, of some terrible coming event. In 1337 a great comet appeared in the heavens, its far-extending tail sowing deep dread in the minds of the ignorant masses. During the three succeeding years the land was visited by enormous flying armies of locusts, which descended in myriads upon the fields, and left the shadow of famine in their track. In 1348 came an earthquake of such frightful violence that many men deemed the end of the world to be presaged. Its devastations were widely spread. Cyprus, Greece, and Italy were terribly visited, and it extended through the Alpine valleys as far as Basle. Mountains sank into the earth. In Carinthia thirty villages and the tower of Villach were ruined. The air grew thick and stifling. There were dense and frightful fogs. Wine fermented in the casks. Fiery meteors appeared in the skies. A gigantic pillar of flame was seen by hundreds descending upon the roof of the pope's palace at Avignon. In 1356 came another earthquake, which destroyed almost the whole of Basle. What with famine, flood, fog, locust swarms, earthquakes, and the like, it is not surprising that many men deemed the cup of the world's sins to be full, and the end of the kingdom of man to be at hand."

--Morris, C,1893: *Historical Table* ²

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¹ Ziegler, Philip, 1998: *The Black Death*, Faber Finds

² Morris, C,1893: *Historical Table: The Romance of Reality*; Lippincott p. 162f

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Introduction:

The period from 1310-1350 saw the death of between 50 and 70% of the population of Europe and Asia, in some areas, the accumulated death toll of the years of the Black Death alone is believed to be in the 75 % range. It took more than 200 years for the population of Europe to recover to the previous numbers of the late 13th century.³ Already in 1315 -1320, the decline in population coincided with natural disasters that led to crop failure, abandonment of farm land, and the Great Famine that killed about 30% of the European population.

The greatest loss of life is of course attributed to the Black Death pandemic of 1348-51, which is commonly believed to be the result of a contagious disease imported from the far east. Traditional models contend it to be bubonic plague, others suggest pneumonic plague, anthrax or small pox.

The period from 1290 onward saw severe climate change and astronomical anomalies, which culminated in the 1348 crisis. The events at this climax involved comet/meteor sightings, earthquakes, noxious gases from the air, from the ground and the sea.

In this investigation, we'll examine the evidence for a wide range of geological and astronomical irregularities and their effects on society. It seems appropriate to distinguish between decades- long perturbations and the culminating abrupt changes directly before and during the pandemic.

-First, the changes that began to take place in the late 13th century, roughly from the 1280s to the 1340s, including cold, wet seasons and floods, alternating with droughts, the first cold spell that ushered in the Little Ice Age, meteor activity, earthquakes, decreased sun spot activity, reduction in tree growth, crop failure, agricultural collapse, famine, locust invasions, wars.

All of this was preceded by recorded volcanic activity in the mid and late 1200s.

Then I'd like to direct the attention to the changes that took place directly before and during the pandemic, and the sudden ramping up of some of the before mentioned phenomena: earthquakes, noxious gases, storms, meteor/ comet sightings, "fire from the sky", floods, lightning events and other atmospheric electrical phenomena, erratic human behavior. You might be able to get an impression on why many people at the time believed the Biblical End Times had begun.

Dendrochronologist Mike Bailey caused an uproar in the scientific community pointing to the cometary activity in his excellent 2009 *New Light on the Black Death*. He had identified a global climate event in the form of a reduction in tree growth at the time. A comet was seen over Paris in August 1348 over Paris. In this text I will present many additional historical sources for celestial and geological upheaval in the immediate years of the 1348 crisis, but I will focus on the long term Earth changes and their astronomical connections including solar activity. Surely one comet or a comet swarm alone did not alter the solar emission? Clube and Napier note the mid 14th century as a period of high meteoritic activity.⁴

Meteorite impacts versus "invisible cosmically induced" changes

If cosmic factors are considered in connection with abrupt earth changes, the focus usually lies on kinetic impacts of meteorites or dust clouds. And indeed, for the Black Death period the eye-witness accounts are strongly indicative that celestial fall out was the main instigator of the climax in the human crisis of 1348.

³ Langer William, 1964 L.: *Black Death*, The Plague that Killed a Quarter of the People of Europe in the Years 1348-1350 is Still Studied to Shed Light on Human Behavior Under Conditions of Universal Catastrophe p. 45

⁴ Napier, B, Clube, V. 1990; *The Cosmic Winter*; Oxford p. 43

But there are other sources of cosmic perturbations that leave much less of a finger print. Changes in solar magnetic field, modulating galactic cosmic rays, leave no craters, but can impact the stability of the biosphere dramatically, e.g. low sunspot counts and thus more cosmic ray influx are directly correlated to volcanic eruptions.⁵ Johannes Nohl (1926) spoke of the Black Death as a turning point that ushered in the renaissance.

It was only in 1980, when Luis Alvarez and his son provided the evidence for their hypothesis of a comet impact in the Yucatan peninsula that ended the era of the dinosaurs c. 65 million years ago, which is now well accepted knowledge.

As far as more recent episodes are concerned: the Younger Dryas Boundary event of c.10,900 BC - and the extinction of most large mammals in North America - is revealing its greater importance as new scientific findings have emerged (particularly since 2007, when new evidence for the Younger Dryas Impact hypothesis was presented)⁶. We are becoming aware, that this cosmically induced global catastrophe and its implications is of significance for the people of the present and the future as well.

Thus, the timespan around the Black Death may also serve as a demonstration of how public awareness of widespread extreme Earth changes (including coinciding anomalies in the skies) can be lost and forgotten in a few generations, and alternative explanations and theoretical models provided by academic consensus, are accepted as historical fact. At the same time, the eyewitness testimonies and chronicles are still publically available (backed up by geological data), making it possible to reconstruct much of the events of the time. For instance, geologist Christian Pfister explains how, after decades of severe cooling and extreme weather, wet and cool conditions led to “the absence of summer” in three consecutive years” before the onset of the Black Death.⁷ Indeed, the people across Europe were referring not just to the three, but the four years leading up to the Black Death as the ‘four years without summer’ (see 3.1.2).

We will examine scientific data to demonstrate that many of the eye-witness accounts, however outlandish they may seem to the modern ear, can be backed up by empirical evidence such as climatological and geological data. Recorded anomalies include reduction of solar magnetic field and sunspot activity, increased volcanic activity, anomalous sedimentation, increase in CO₂, increase in biomass burning (wildfires) and much more.

Symptoms of the disease(s) of 1348

Even at the time of the Black Death pandemic, a range of various possible causes were proposed, almost all of them were based on the perception of poisons, foul odors and ‘contaminated winds’ coming from the sky, from the ground and from the sea. These were said to be directly related to earthquakes and/ or meteors. The observation of “foul” drinking water supplies is most likely what led to the idea that ‘someone’ had poisoned the wells, which would only have been possible in some cities, considering the poisons available at the time. The Jews were accused of having done so, and executed in large numbers after confessions were extorted under torture.

In the early years of the pandemic, few seemed to have been concerned with person to person transmission of the disease, although there is an abundance of reports of people abandoning their sick loved ones. But this was apparently not because they were afraid of direct physical contagion. The idea of quarantine was introduced only at a later stage of the

⁵ Toshikazu E. et al; 2011 Elsevier Gondwana Research

⁶ Firestone, Bunch, Kennet, 2013 Evidence for deposition of 10 million tonnes of impact spherules across four continents 12,800 y ago PNSA

⁷ Pfister, Christian; Veränderungen der Sommerwitterung im südlichen Mitteleuropa von 1270-1400 als Auftakt zum Gletscherhochstand der Neuzeit;1985, Geographica Helvetica

pandemic. However, Doctors did advise to stay away from corpses and to refrain from eating fish.

From the dozens of eyewitnesses and contemporary writers I present in this text, I found only one source that is believed to be unaltered, who explicitly claims the victims had ulcers under their armpits, others only describe ulcers or buboes distributed over the body.

Then we can compare these events to some well documented modern day examples of cosmically and geologically induced health effects. One is a meteor impact in Peru that caused a local health crisis from toxic fumes - fortunately only on a small scale (see 6.3.3) - and then there was the death of hundreds by outgassing from a lakebed in Cameroon (see 6.2.4). These events left almost no physical traces.

The study of this material may also serve to illustrate some aspects of the phenomenon which I call *trauma induced collective amnesia*, the tendency of societies to expel from conscious memory the awareness of an extremely dramatic, world altering event. The chronicles and historical accounts of severe Earth changes and natural disasters at the period in question are still publically available, yet most people cannot bring themselves to entertain the thought, that geologically and astronomically induced changes were responsible - either primarily or exclusively - for a dramatic population reduction by 50% or more in 35 years⁸, and that this happened barely 700 years ago. After going through this text, some of the readers may ask themselves, how it is that they've never heard of these facts in the context of the Black Death? Or even, how is it they have never heard of these facts in the context of the current debate on climate change?

The many natural disasters of the time and their implications are simply brushed under the rug of history or at most they are believed to be mere co-factors that facilitated the spread of the disease. I will not provide an alternative single interpretation for the disease or diseases. Below we'll see, we don't even need a contagious microorganism to explain the health related high death toll considering the severity of geological and climatological upheaval. It seems that not only historians but also the public are far more comfortable with the concept of mass casualties by a single bacterium or virus than mass casualties by heavenly disturbances, geological and climatic upheaval. I'm not suggesting there were no bacteria involved; bacterial infections are expected as public health and standard of living declined abruptly, but the distinction between cause and effect, correlation and coincidence is by no means settled. The assumption of a single contagious agent as the main cause for a world altering crisis seems to be more comforting as it leaves some vague (even unfounded) hope that some day scientists will find a cure for all these transmittable diseases. In contrast, the prospect of a calamity that is primarily caused by a cosmic disturbance as the main instigator of a population reduction event, is far less comforting and few people are willing and able to deal with such things rationally and productively. But in fact, a well informed and responsible society would indeed be capable of preparing for potential repetitions of similar calamities and mitigate the effects thereof. And *only* a well informed and responsible society could. In the interest of the concept of the '*Renewal of life*', at the end of this text, I will touch on the exploration in the question, whether some if these phases of change, however directly devastating they turn out to be for many individuals at the time, could have an overall beneficial effect for the evolution of life and even human consciousness.

⁸ "The Black Death is estimated to have killed 30% – 60% of Europe's population", Kohn, George C. (2008). *Encyclopedia of plague and pestilence: from ancient times to the present*. Infobase Publishing. p. 31

1 1300- 1350, the decades preceding the Black Death

1.1.1 The onset of the Little Ice Age

The early 1300's did coincide with the first downward spike in temperature and the beginning of Alpine glacier expansion. The exact duration of the cold period known as the Little Ice Age is not settled. Climatologists generally refer to two dates of cooling associated with the Little Ice Age. Sirocko (2010) places the earlier event at the beginning of the 1310's⁹. A more widely used time frame for the first cold phase is the coinciding solar minimum called Wolf minimum from 1280-1350¹⁰. There were repeated cold snaps and advancing glaciers and sea ice from that time onward, but it was not until the early 1600's that the most devastating effects of the Little Ice Age began to set in, which is the more commonly used date for its beginning.

Various authorities propose up to seven different dates as the beginning of this cold period (See Fig. 13). What is agreed on, however, is that the Little Ice Age was the coldest period of time within the last 10,000 years (Holocene), we are still in the process of re-approaching average temperatures, that is, global temperatures are still below the baseline of the Holocene. In short, modern day global warming – if it continued, and continued gradually – would constitute an approach to more “normal” temperatures.

Shin Kim, (2007) wrote on the effects of the early climate downturn at around 1300: *“Agriculture was greatly affected by increasingly irregular and excessive rainfalls. Half a century after the catastrophe of the Black Death, i.e. the late 14th century, trade routs were interrupted by an increase of sea storminess, and northern sea routs were restricted or completely cut off by increasing appearance of drift ice”*.¹¹ This increased sea storminess has remained until today and thus at least some of the changes altered the Earth permanently.

Reconstructing weather and climate conditions

First, when we think of climate, we primarily think of temperature and precipitation over a certain time scale. This is a gross simplification, but it is usually suitable to measure and compare general long term trends. But to get the real picture, we must also take into account: short term distribution of precipitation, storms, variability of wind, cloud coverage and so on. For instance: a fertile, temperate region, with regular, moderate rain fall and an ambient temperature is in general suitable for human habitation including agriculture, but not if it is hit by ten severe hailstorms every year. Therefore, weather stability is just as important as the mean temperature and rainfall. But, available climate data sets usually show limited resolution and smoothed curves, this is true especially for reconstructed climate data from as far back as the 14th century, in times before exact instrumental temperature measurements were recorded. The weather conditions for these years are reconstructed from anthropologic data such as weather records, harvest records, indirectly confirmed by food commodity prices but also from tree ring data, geological data such as glacial conditions.¹² Not all of these markers allow for high resolution curves in temperature and precipitation; not all disasters such as storms and floods show up in this data and must be added from anthropogenic records. So, if the temperature and precipitation curves only show, for instance 5-year-means, the climate and weather in that time may appear relatively moderate

⁹ Sirocko, Frank; Wetter, Klima und Menschheitsgeschichte, 2010; Darmstadt p.12

¹⁰ Spektrum Akademischer Verlag, 2000, Heidelberg Lexikon der Geowissenschaften
http://www.geodsz.com/deu/d/Kleine_Eiszeit

¹¹ Shin Kim, 2007: Early Years of the Little Ice Age in Northern Europe, 1300-1500, Korean Minjok Leadership Academy International Program

¹² Glaser, Rüdiger, Klimgeschichte Mitteleuropa, 1200 Jahre Wetter, Klima, Katastrophen. Darmstadt, 2008 p. 60

when compared with other periods. But when there is enough high resolution data to reveal enormous variability and fluctuations in weather patterns, this smoothed curve of a 5-year-period may reveal itself as a time of turbulent and destructive weather. If there is a year of drought followed by a year of flooding, this will not show in a smoothed long term rain fall curve. And indeed, in decade by decade temperature graphs, the early 14th century does not show as an obvious extreme climatic downturn and is seldom used as an example for extreme climate change in pre-industrial times.

1.1.2 End of the Medieval Climate Optimum

Europe had been flourishing, agricultural and economical conditions were very stable at the time of the Medieval Climate Optimum.

Especially in northern Europe, *"the period between 1150 and 1300 was truly a flowering period, for population reached unprecedented levels that were never to be seen again until the late 18th century in many countries; the English population experienced a staggering threefold increase in its population during the last century since the Domesday Survey in 1086"*.¹³

This climate optimum (also called a climate anomaly) coincided with a period of increased solar activity (see below). Farming of various crops extended hundreds of kilometers farther north than it is possible today.

However, toward the end of this Climate Optimum, warm temperatures alone could not guarantee economic stability, as the weather became more erratic. *"The warm period that had lasted for over two hundred years, also led to glacier ice melting and a slight rise in sea levels of up to 0,5 meters, which then contributed to a series of devastating floods in the Netherlands in the later 13th century"*.¹⁴ Storms and floods left a bigger impact on the coastline geography when the waters were higher, not to mention that storms were more frequent during this period.¹⁵

By the mid 14th century, grain production in northern Europe had dramatically fallen due to a *"climatic cooling that had been under way from 1250 onwards" which eventually led to the "permanence of the cessation of farming after the Black Death in Norway"*.¹⁶

In 2000, a well preserved cog was excavated in Belgium, its construction date was set at AD 1325/ 26.¹⁷ It is unclear when exactly it was buried under several meters of sediment but the state of preservation suggests that the accumulation of sediment took place in a short time, which indicates a tsunami or extreme flood event such as the Great Flood of 1361.

1.2 The Great Famine 1315-1320

The favorable conditions and stable climate during the Climate Optimum led to agricultural expansion, forcing over- exploitation of the land when weather conditions started to worsen rapidly. Already beginning in the 1290s, farm land began to be abandoned and resources became scarce. The Great Famine had its most devastating impact in Europe from 1315 - 1320, it was primarily the result of crop failure due to excessive rainfall and cold temperatures. To make matters worse, cool and rainy summers were alternating with summers of droughts. The physical evidence of an increase in biomass burning is recorded for the years 1313-1319.¹⁸ (See also Chapter 5.1.3).

Early agricultural crisis

¹³ Fagan, Brian. *The Little Ice Age: How Climate Made History, 1300-1850* p 33.

¹⁴ Kim, Shin, 2007: Early Years of the Little Ice Age in Northern Europe, 1300-1500, Korean Minjok Leadership Academy International Program

¹⁵ Wagret, P. 1968.: *Polderlands*. London: Meuthen, p 56.

¹⁶ Lamb, Hubert H. *Climate, History and the Modern World*. p 332.

¹⁷ Kristof H. et al. 2013: Tree-Rings, Timbers and Trees: a dendrochronological survey of the 14th-century cog.

¹⁸ Thompson et al. (2000) A High-Resolution Millennial Record of the South Asian Monsoon from Himalayan Ice Cores

Many scholars still hold on to the concept that it was the Black Death and the coinciding enormous population reduction that cause the agricultural crisis, starting in the second half of the 14th century. But as Kim Shin established in a dissertation about land desertion in Scandinavia¹⁹, drastic changes, not only in climate conditions but also in population distribution, had been taking place long before. So, as the climate began to turn more erratic shortly before 1300, this was accompanied by one humanitarian crisis after another. Here are some direct statements from Shin:

“(...) even though the Black Death is thought to be a primary factor that triggered the agrarian crisis, the Black Death in itself cannot explain the desertion of farmland that began in the early 14th century before (in England) the Black Death hit northern Europe in 1348.”

“(...) the Black Death, which was a single incident, in itself cannot explain the lengthy perpetuation of the deserted settlements and stagnating population considering how the population and settlements were exploding in the period right before 1300.”²⁰

From Lamb, 1972: (...) *“The consequences were severe not only in the northernmost Scandinavian countries but in other areas as well; populations in Oxfordshire and Northamptonshire, during the period **before** the Black Death, 1300-1350, seem to have decimated over **twice the number of the people that had been killed by the Black Death**”²¹*

*“In parts of Denmark and Norway, the desertion seems to have **begun around 1320** and continued for two centuries.”²²*

Pollen studies in sediments provide further clues on agriculture development when pollen of agricultural plants disappear and pollen of wild plants and non-cultivated trees regain dominance.

“In Scandinavia, and Norway in particular, a reduction in grain pollen has been recognized in the late Middle Ages”. A study conducted in Central Norway, clearly shows that corn cultivation experienced an abrupt crisis **around 1300** while spruce pollen data seem relatively stable at the same time.

1.2.1 Death toll of the 1300-1350 crisis

In 1969, Philip Ziegler accepted an average plague death toll in Europe of about 33 percent, or between 20,000,000 and 25,000,000,

The period from 1300-1350 saw the death of at least 50% of the population of Europe. In China, where the Black Death is said to have originated, a loss around half of the population is attributed just to the Black Death alone (going from around 123 million to around 65 million). In the early 2000s, Benedictow presented an overall European population of around 80,000,000 and plague death toll of about 60 percent overall in Europe, which is a total of about 48,000,000 dead.²³

We note, that the ultimate death toll is still controversial, most historians agree that the Great Famine of 1315 already claimed at least 30% of Europe's population and then the Great Plague from 1347 onward, claimed at least another 30%. Assuming that the population couldn't recover in just 35 years after the famine, the second event of mass casualties would take then 30% of the remaining 70%, amounting to a death toll of at least 51%; if we use Benedictow numbers, we arrive *at 72% within just 35 years*. In Southern Europe, specially

¹⁹ Kim, Shin, 2007: Early Years of the Little Ice Age in Northern Europe, 1300-1500, Korean Minjok Leadership Academy International Program. Chap.V.2

²⁰ Shin, V, 2007: Chapter: Land Desertion in Scandinavia

²¹ Lamb, Hubert 1972, 1977 (2 vols), H. Climate: Present, Past and Future. London: Methuen, Vol. 2. p 455.

²² Ibid 456.

²³ Byrne J.P, 2012 Black Death p. 108

along the coastlines, the situation was even worse. Speaking only of the 4 years of the Black Death, some scholars believe that *“In Mediterranean Europe, where the plague ran for about four years consecutively, it was probably between 70 and 75% of the total population”*.²⁴ In England, the death rate was estimated at between 45- 60%.²⁵

A musician at the papal Court in Avignon, Louis Heylingen (sanctus) of Beeringen, writes about an even greater mortality in Avignon and the neighboring parts:

*“(...) for at Marseilles all the gates of the city, with the exception of two small ones, are now closed, for there, **four- fifths** of the inhabitants are dead.”*²⁶

We'll examine below what the proximity to the sea and the various accounts of foul odors emitted from the sea have to do with this distribution pattern. Also in Palestine, (costal) Gaza seems to have been hardest hit, Ibu Battuta, Abu Abdullah (1304-1368) reports he found Gaza *“depopulated due to the prior outbreak there(...) only 60 to 80 notaries remained alive.”*²⁷

To put these numbers into perspective: WW II caused the greatest loss of human life in recent history. According to conservative estimates, about 60 million people were killed in World War II, which was about 3% of the 1940 world population (of about 2.3 billion). The German population suffered the greatest loss of people in proportion to population, the death toll is disputed to be between 4.2 million²⁸ and 7.3 million²⁹ civilians and military death, amounting to 6 – 10% of the German population.

So, proportionally, **the Great Famine of 1315- 1320 alone killed 3 to 10 times** as many people of the European population as did all of WW II. We may ask ourselves how the enormous death toll of the 1315 Famine is usually only marginally taken into account in the discussion of the Black Death period.

1.2.2 Two comets, famine and deluge

Geologist Rüdiger Glaser gives us the descriptions in the chronicles of Bad Windsheim (Germany, 1315) about unfavorable weather leading to crop failure and starvation in the years 1312-1315:

*“Two comets were seen, and it was a wet Summer, great famine, so that in many places the people were forced to eat dogs, horses and even **thieves from the gallows**(...)”*

*The writer goes on to report the high price of cereal in the Waitland and exclaims that “it rained all Summer, great damage was done to humans, cattle and crop, to the memory of this great famine and Deluge, these verses were made(...)”*³⁰

Glaser makes no further mention of the ‘two comets’ as if they could not possibly be of any interest in the context of extreme weather events.

Climate disruption and starvation had a drastic effect on the population density of Europe:

“The number of founding of European cities per year remained very high until 1310. After this date, city founding ceased abruptly. Several wet-cold summers, including harvest failures in sequence made the population suffer and led to the first large, wide spread famine in 1315 and a pronounced population decline. In the north Atlantic, for the first time, sea ice was seen in front of Iceland, indicating the Golf Stream was weakening. After this, in large parts

²⁴ Dr. Amanda Laoupi. Centre for the Assessment of Natural Hazards & Proactive Planning – NTUA: Fires from Heaven. Comets and diseases in circum-Mediterranean Disaster Myths

²⁵ Hatcher, John; 2010: The Black Death: An Intimate History; Hachette UK2008 p.180

²⁶ Breve Chronicon clerici anonymi^ in De Smet, Recueil des Chroniques de Flandre 1856 iii, pp. 14-18.

https://archive.org/stream/blackdeathand00gasqgoog/blackdeathand00gasqgoog_djvu.txt

²⁷ Byrne J.P, 2012: Black Death. p.182

²⁸ War chronicles archives. <http://warchronicle.com/numbers/WWII/deaths.htm>

²⁹ In 2005 the German government Suchdienste (Search Service) put the total combined German military and civilian war dead at 7,375,800, including persons of German ancestry who lived outside of the borders of Germany and Austria.

³⁰ Glaser, Rüdiger, 2008: Klimageschichte Mitteleuropa, 1200 Jahre Wetter, Klima, Katastrophen. Darmstadt, p.66

of Europe, cereal harvest declined markedly until 1318 and starvation dominated Europe from 1315 – 1320."³¹

More comets

Already in the early 14th century, comets were reported and mentioned in connection with famine. The chronicler Thomas Short notes:

*„In December (of 1312) a **Comet**, which continued a Month. (Functius places this Comet in [13]12.) Hunger compelled some to eat their own Children, and some stole other People to eat.*"³²

It becomes apparent that the event around the time of the outbreak of the plague cannot be investigated in isolation from astronomical and meteorological anomalies of not only the previous years but decades. A worsening of the weather in Europe can be identified beginning in the 1290's, starting to escalate at the turn of the century. As we'll see below, these weather anomalies correspond well with the reduction in solar magnetic output and an increase in volcanic eruptions.

Meteor swarm 1296

The volcanic eruptions also roughly coincide with the great meteor swarm impact in Velikii Usting (Russia) of 1296, as reported by the astronomer Krinow. But the stark increase in volcanic sulfur in the atmosphere (see 5.1.7) was preceding this event. At any rate, in the Velikii Usting event, eye-witnesses report that:

*“there appeared over the town a dark cloud, and it was dark as the night (...) lighting kept flashing ceaselessly...Even the ground seemed to shake and sway continuously (...) clouds of fire arose and collided with one another, great heat coming from the **lightening and thunder**”.*³³

Further, Johann Nohl tells us of much cometary activity in the same years: in *'The Black Death, A Chronicle of the Plague'*, we learn that:

*'seven great comets' between 1298 and 1314 were seen over Europe; one was of "awe-inspiring blackness". Many reports of **foul smelling "mists"** appeared continually after seeing **bright lights** in the sky, followed by an outbreak of the plague.*³⁴ Here "the plague" does apparently not mean the Black Death, but a previous pandemic or health crisis of whatever origin, that would coincide with the Great Famine of 1315- 1320.

1.2.3 1315 wars

Such dire times, that involve great population reduction events, are, needless to say, accompanied by war. Some of the battles in these conflicts are even historically connected to **extreme weather**. In retrospect, the easy conclusion is that starvation leads to struggle for resources and war. But the relationship between cause and effect turns out to be much more complicated.

The main conflict of the century, the Hundred Year's War, was not to begin until 1337, but already in the 1310s, conflicts raged in Flanders, where Flemish cities rebelled against the French administration and took the count of Flanders hostage.

A military campaign against the Flemish rebels was initiated by Louis X of France in 1315, but excessively heavy **rains of this summer** forced him to retreat on reaching the Flemish border.³⁵

³¹ Lamp H. H, Klima und Kulturgeschichte 1969 Hamburg

³² Short, Thomas; 1744; A General Chronological History of the Air, Weather, Seasons, Meteors, &c. in Sundry Places and Different Times: More Particularly for the Space of 250 Years : Together with Some of Their Most Remarkable Effects on Animal (especially Human) Bodies and Vegetables, Volume 2, p.161

³³ Krinow E.L., 1960: Principles of Meteoritics: International Series of Monographs on Earth Sciences. Oxford, New York. p. 2.

³⁴ Johannes Nohl, 1926, *The Black Death, A Chronicle of the Plague*, London, George Allen & Unwin Ltd., p. 56

³⁵ Fagan, Brian. The Little Ice Age: How Climate Made History, 1300-1850. pp 31-32

Meanwhile in the British Isles, the Scottish, under the rule of Robert I, known as Robert the Bruce, rebelled against the English crown. He campaigned against Edward I, and defeated Edward II at the famous battle of Bannockburn in 1314. He re-established Scotland as a separate kingdom. It had only been in 1298 when William Wallace was defeated and executed by Edward I. If you happen to have seen the movie 'Brave Heart' (1998) you may recall that many scenes were shot in rainy weather. It turns out it wasn't only a dramaturgical tool or proverbial Scottish weather, but the early 1300s indeed marked a time in which political and social upheaval coincided with increasingly erratic rainfalls and cooling. Further, throughout the time of the Great Famine, Norway, Sweden and Denmark were involved in complicated power struggles.

In 1314, Ludwig of Bavaria and Duke Frederick of Austria went to war over the "double election" to the German throne.³⁶

The members of the Swiss founding cantons gained independence from the Habsburg rulers in the decisive battle of Morgarten on November 15th, 1315.

The Swiss Confederation had only been founded in 1291. Earlier that same year, the Knights Templar lost their last strongholds in Israel and Syria and were forced to move their headquarters to Limassol on the island of Cyprus, and in 1303 they abandoned the Holy Land and returned to Europe.³⁷ In 1307, on a Friday the 13th, they were famously persecuted and arrested by the king of France.

Frank Sirocko, (2010) describes how *'The large increase in population in the High mediaeval period led to exploitation of the soil, thus the yield of grains declined drastically from 7:1 (7 grains of harvest per 1 grain of seed) to 1:3. This period in Europe was viewed by contemporary researchers as the most significant climate event in the 2nd millennium. The Little Ice Age had begun. However, in the 1320s, Europe recovered to some extent from this shock, but the weather remained cool, even though without extreme anomalies. In the 1330's, reports of **severe earthquakes and increasing drought** in China and the Mediterranean region became the norm. The years 1336 to 1338 brought huge swarms of locusts from Asia across Hungary into central Europe, they finally reached as far as the Rhine.*'³⁸

With earthquakes, flood, locusts, and falling stars, the people of the time connected the plague not only with Biblical end time prophecies, which does not require too much imagination, but also with the Ten Plagues of Egypt. The concept of poisons in the atmosphere was present in the minds of the people. In the words of J. P. Byrne: *"The final Book of the Christian Bible, known as the Apocalypse (Catholic) or the Revelations of St. John (Protestant) is a vivid and frightening description of the end of time, or eschaton. Much of the human race alive at the time is to be destroyed, not least by war, famine, and death, while seven angels pour vials of **poison into the earth's atmosphere**. Coincidentally, the chief explanation for the plague from the 13th through the 19th centuries was "**corrupted or poisoned air**." (...) "Well before the Black Death, people generated and read reports of unnatural (supernatural?) events including **hailstorms and "rains" of fire**, poisonous amphibians and reptiles, and **deadly earthquakes and floods that leveled entire cities**. Reports of – and then the appearance of – plague in 1347 seemed to fill out the picture."*³⁹

While all of this upheaval is going on in the 1310s, including the Great Famine, Dante Alighieri completes his monumental *Divine Comedy* (Italian: *Divina Commedia*) it is a long

³⁶ Jordan, William Chester. *The Great Famine: Northern Europe in the Early Fourteenth Century*. p 19.

³⁷ Nicholson, Helen (2001). *The Knights Templar: A New History*. Stroud: Sutton, p. 201. "

³⁸ Sirocko, Frank; Wetter, *Klima und Menschheitsgeschichte*, 2010; Darmstadt

³⁹ Byrne J. P., 2012: *Encyclopedia of Black Death* p.16

narrative poem which he begun c. 1308 and completed in 1320, a year before his death in 1321. Roy Barzilai, author of "The Testosterone Hypothesis, writes:

*"The global cooling of the fourteenth century, which caused mass starvation and the Black Plague, was preceded by Dante's famous Divine Comedy, describing his journey through Hell (the Inferno) and Purgatory and finally to Paradise. This story, written in the early 1300s, is famous in world literature for its vivid portrayal of the punishment of sins in hell with an emphasis on poetic justice and the sin of sexual lust"*⁴⁰

By the way, Dante envisioned hell to be in a cavity that had formed when Lucifer fell onto the Earth, in the southern hemisphere, on the opposite of Jerusalem, crashed through the center and out the other side.

The later two parts of the book, Purgatorio and Paradiso, both end with the same word as Inferno: *stele*, or the **stars**.

It turns out, Dante did not have to look far for inspiration to envision horrific scenes of starvation, even though Italy - Dante died in Ravenna - was not hit as hard as central and northern Europe by the Great Famine. Hell was just outside his doorstep!

*" See BUONAGIUNTA there, from LUCCA's Plains,
And yon' pale Skeleton, with wasted veins,
By hollow Hunger wasted to a Shade(...).
(Purgatorio - Canto 24,V)*

1.2.4 Arrows

The most consistent metaphor for plague was the arrow.

It was not by accident that Italian notary Gabriele de' Mussis described plague as "*sharp arrows of sudden death*": or that Flemish Abbot Gilles li Muisis celebrated the **heaven-sent arrows** that decimated the Mongol Tartars before striking Europe. Some Muslim poets also pictured plague as jinn-fired arrows.⁴¹

The Umbrian physician Gentile da Foligna (c. 1275-1348) suggested a celestial connection to the plague and claimed that among sin and retribution, '**poisonous darts of God**' (as first described by Homer) lay behind the plague.⁴²

Already seven centuries earlier, in the Justinian plague in 590 CE, Honorius of Autun described the Justinian Plague as "*arrows falling from heaven*."⁴³

If you have seen a large shooting star or small fireball streaking across the night sky, you might get the idea that someone who doesn't know what it is, may call it an arrow from heaven or a dragon even.



⁴⁰ Barzilai, Roy; 2015: *The Testosterone Hypothesis*. Dibra Publishing p. 159

⁴¹ Ibid p. 23

⁴² Fleming, James Rodger, Johnson, Ann. 2014: *Toxic Airs: Body, Place, Planet in Historical Perspective*; University of Pittsburgh Press p. 9

⁴³ Byrne J. P. 2012: *Black Death* p. 23

Fig. 2 Black Death illustrated as an calamity involving arrows being fired by mystical beings (angels) from the sky (lightning?) and liquids being poured down by (God?) Image: <http://slideplayer.com/slide/3517893/>



Fig. 3 "The notion of arrows representing a plague can be seen in a curious wall painting dating from 1355, in Lavaudieu, Haute Loire, in the Auvergne region of France. Image from: Mormando, F. 2007: *Piety and Plague: From Byzantium to the Baroque*. Thomas Truman State Univ. Press.

The many references of fire and poison from the sky, the population reduction and the reluctance of today's writers to take these accounts seriously, evokes the phrases from Plato's *Timaeus* discourse, in which Egyptian priests told the Greek Lawmaker Solon:

*"(...) The fact is, that wherever the extremity of winter frost or of summer sun does not prevent, the human race is always increasing at times, and at other times diminishing in numbers. And whatever happened either in your country or in ours, or in any other region of which we are informed (...) all that has been written down of old, and is preserved in our temples (...) and then, at the usual period, the stream from heaven descends like a pestilence, and leaves only those of you who are destitute of letters and education; and thus you have to begin all over again as children, and know nothing of what happened in ancient times, either among us or among yourselves."*⁴⁴

To avoid confusion, this quote does not refer to the 14th century, but to the legend of Atlantis, the date for its sinking given by the priests is 9,600 BC, which happens to be the date of the extremely abrupt end of the before mentioned Younger Dryas cooling period, involving a extremely sudden rise of sea levels of dozens of meters. But let's return to the 1300s.

2 Culminating Earth changes in the 1340s

The decades of natural disasters in China and India were recorded in chronicles as recounted by Hecker and Ziegler, among others, and we will look at more detailed evidence for such Earth changes below. It is generally agreed upon that the pandemic had first spread in the far east, but was for some reason confined to this continent for 15 years until suddenly erupting into Europe. This is peculiar for a contagious disease; trade routes were not interrupted during this time.

⁴⁴ (All quotes are from the Jowett Translation, 1892) sacredgeometryinternational.com

*"In China, already the 13th century Mongol conquest disrupted farming and trading, and led to widespread famine starting in 1331 with plague arriving soon after. The population dropped from approximately 120 to 60 million."*⁴⁵

*"The 14th century- plague killed an estimated 25 million Chinese and other Asians during the 15 years before it entered Constantinople in 1347."*⁴⁶

In the Far East we find more eye- witness accounts of abrupt Earth changes that proceeded the Plague in Europe.

"The tenth Yuan emperor, Kublai Khan's great-great-grandson Toghon Temur, sat on the Chinese throne. He had been crowned in 1333, aged thirteen. For eleven years he had been the passive ruler of a top-heavy, bureaucratic-stuffed, unevenly taxed empire, run for him by Ho's chancellors.

Five years after his coronation, an obscure little village below Lake Issyk-Kul began to die. We know this only from the headstones found in the village graveyard; hundreds of them date from the years 1338 and 1339. "This is the grave of Kuthuk," one reads. He died of the plague with his wife."

No contemporary account traces the spread of the illness in the next six years, but plenty of chroniclers record other disasters: drought and famine in the Huai river valley, torrential flooding rains in the province at Canton and Houkouang, locusts in Honan, an earthquake that carved a new lake into the Ki-Ming-Chan mountain range.⁴⁷

(The last statement is based on Ziegler, who said the lake was 100 leagues long (500 km).

At the same time in India, great geological changes were recorded. From Wikipedia we learn:

*"In the year 1341 (day unknown) the great flood in the river Periyar in modern-day southern India led to the river changing its course, closing off Muziris, opening up Kochin (Kochi) harbor, it submerged some islands and gave birth to some new islands."*⁴⁸

More land desertion and tax reduction in 1340s

Meanwhile in Europe, we see additional land desertion in Norway: According to a map constructed by Shin (2008), already in 1340, taxes and rents were reduced and/or land was deserted in a large number of estates in the parishes north of Jostedalbreen (After Grove). Both cases *"would strongly suggest the expansion of the glacier. Judging from these kinds of indirect evidence and scientific evidence, it can be concluded that glaciers and permafrost of Norway, Iceland, and the Alps started to advance in the 13th century"*.⁴⁹

And at the same time, rents and taxes had to be reduced in England. Later, during the Black Death pandemic, tax reliefs had to be granted to the fishing industry.

"Though this seems to be a seemingly sound explanation, and it is very likely that the desertion gained considerable momentum due to the Black Death, the Plague could not have been the real initiator because land desertion was a phenomenon that started to be observed as early as the second decade of the 14th century. Studies in Denmark also indicate that records of deserted farms go back to as early as 1334."

(...) "Rent, the price of land, was nothing like it used to be in the early 1300s. (...) In the interiors of Norway the rent fell to as little as one-fifth of what it used to be. Areas that experienced falling rent usually also witnessed reductions in tax and decreasing capital

⁴⁵ Ping-ti Ho, "An Estimate of the Total Population of Sung-Chin China", in *Études Song*, Series 1, No 1, (1970) pp. 33–53.

⁴⁶ Kohn, George C. (2008). *Encyclopedia of plague and pestilence: from ancient times to the present*. Infobase Publishing. p. 31.

⁴⁷ Wise Bauer Susan; 2013: *The History of the Renaissance World: from the Rediscovery of Aristotle to the Conquest of Constantinople*. Hardcover

⁴⁸ https://en.wikipedia.org/wiki/1341#cite_note-2. The Hindu. 2013.

⁴⁹ Shin, Kim, 2008 *Early Years of the Little Ice Age in Northern Europe, 1300-1500*, Korean Minjok Leadership Academy International Program Chapter V.3.5.

interests. As usual, Norway was the extreme case; by 1387 production and tax yields in some Norwegian districts were as little as 12% of what they had been around **1300.**"⁵⁰

Extreme Weather and harvest failure

For the 1340s, weather anomalies are recorded in various European chronicles.

Here an excerpt from R. Glaser, concerning the north of the Alps region:

"1346 was described as a cold year, in which there were almost no warm intervals until June. Only at the end of June it was hot according to reports from Lindau. The wine bloom was delayed respectively. Also 1347 was a year of much precipitation, in which bloom and harvest were delayed. The entire summer it rained, the harvest again turned out very poor. For instance, barley could not be harvested at all and wine harvest was undertaken very late, as late as November. But even then, there was only a very poor quality of vine, that no one could drink". The following description is from a contemporary writer by the name of Zettl: *"In the same year, the entire summer was so cold and rainy that all the fruits of the land grew late and were harvested with delay and thus all the fruits remained unripe. Also the fruits of wine, the grapes were so hard, that they could not be eaten."*⁵¹

Greenland

In the far north-west, at the onset of the Black Death, the Greenland colonies were abandoned abruptly and rather mysteriously. The commonly held view, still persisting with some historians today, maintains that the bacterial plague had spread to the island and the survivors attempted to flee to the American mainland. But the increasing drift ice had made it extremely difficult to maintain contact to the European continent and as even Iceland struggled to have trade relations at least once a year in these decades, it is most likely that no ships made it to Greenland at all during the Black Death. H.C.J. Hecker also claims that they didn't (see below).

Greenland had been a prospering colony during the Medieval Climate Optimum. There was a Bishop of Greenland established on the west coast of that island in AD 1329 by Pope John XXII⁵² This also suggests the probability of it being a trade outpost to the American mainland even at that time.

There were three different Settlements. The main Eastern Settlement was on the southern tip of the island, the Western Settlement 300 km to the north, near today's Nuuk. There were overall 600 known Norse farm sites, many were recently dug up from underneath permafrost. *"In Greenland, the Norse (Icelandic) settlers had sustained themselves for 400 years. They arrived in either 985 or 986 AD under Eric the Red. Then, a cooling period erupted and farming ended abruptly, the coldest winter in 800 years occurred sometime between 1350 and 1355, the later date lies beyond the Black Death time frame. Around 1350 AD, the Norse Settlement known as the Western Settlement vanished."*⁵³

A 2011 thesis claims the Western Settlement was suddenly abandoned even as early as in 1342:

*"The Western Norse Settlement in Greenland disappeared suddenly, probably in 1342. Research in the area includes medieval sources, archeological studies of the ruins, climatic data from the Greenlandic icecap, oral stories from the Inuit in Greenland and Canada, and possible sightings of ancestors of the Norse in the Canadian Arctic."*⁵⁴

Chambers and Olge (2002) note (for Greenland), 'two very cold winters' in 1352 A.D. and 1355 A.D., as they were recorded in the GISP2 Ice cores. Other researchers point out that both the summers of 1351 and 1352 were "evidently very cold" and led to the abandonment

⁵⁰ Shin, Kim, 2008: Chp.V.2

⁵¹ Glaser (2008). p .67

⁵² Knight C., Lomas, R. 1999: *Uriel's Machine* p.123

⁵³ Conservap Henry T. 2001.: *Earth Tales: New Perspectives on Geography and History* AuthorHouse p.82

⁵⁴ Carol S. Francis, 2011: *THE LOST WESTERN SETTLEMENT OF GREENLAND, 1342; HISTORY* CALIFORNIA STATE UNIVERSITY, SACRAMENTO

of the Western Settlements.⁵⁵ Keep in mind that Ice core dating does not allow for absolute dates, so the exact years given may be corrected over time. According to J. Guiot, (2010), the ice cores of Greenland have a low resolution, of at best 5–10 years. At any rate, the Greenland settlers abandoned their colonies in these years after farming collapsed and glaciers and sea ice expanded.

So rather than being killed by plague, the settlers were driven away by cold weather and finally hindered by drift ice from evacuating to Europe, and trying to sustain themselves in the Americas.

Whatever the fate of the western settlers was, after 1350, there were still survivors in the south. The Church abandoned Greenland including the Eastern Settlement in 1378 out of practicality for no ships could get through the sea ice between Iceland and Greenland safely. Bishop Árni died in 1347, it took a long time for the next bishop to arrive, Bishop Álfur was ordained in 1368 and served as last bishop of Garðar until 1378. Documentary evidence about the Garðar estate ends in 1409.⁵⁶

As mentioned above, J.F.C. Hecker tells us that during the Black Death: *“In Denmark and Norway, people were so occupied with their own misery, that the accustomed voyages to Greenland ceased. Towering icebergs formed at the same time on the coast of East Greenland, in consequence of the general concussion of the earth's organism; and no mortal, from that time forward, has ever seen that shore or its inhabitants.”*⁵⁷ Indeed, the northern and eastern shores of Greenland, which had been mapped in detail by the Norse during their settlement era, are still covered in glacier ice to this day.

Meanwhile in the British Isles, there seems to have been an early awareness of a pending health crisis. One year before the Black Death broke out in Europe (in Sicily), Edward III proclaimed in 1346, *“that anyone proven leprous must leave within 15 days, whatever their station in life and betake themselves to places in the country, solitary and notably distant from the city and suburbs.”*⁵⁸

He considered health risks for the general public, after the same law of isolating lepers from the population had been applied more or less unchanged over centuries.

Did the king anticipate a sudden public health crisis in England before there were any reasons to believe that Europe would be struck with an epidemic? Or were there already ‘outbreaks’ of unexplained diseases in the city at the time?

The above mentioned 19th century author J.F.C. Hecker was one of the most important authorities on the Black Death, and I add that he does represent the official doctrine of the mono-causal, bacterial cause of the pandemic. Here is an extended excerpt from his *Black Death and the Dancing Mania*:

*“Probably few places escaped, perhaps not any; for the annuals of contemporaries’ report that throughout the land only a tenth part of the inhabitants remained alive. In Poland the affected were attacked with spitting blood, and died in a few days in such vast numbers, that, as it has been affirmed, scarcely a fourth of the inhabitants were left”*⁵⁹

As alluded to above, no reliable numbers are available for Asia, outside of China. But descriptive accounts of natural disasters and famines in Asia lead to assume that the

⁵⁵ Chambers, Frank. Ogle, Michael. 2002: *Climate Change: Critical Concepts in the Environment*, Taylor & Francis, Volume 2, p.219

⁵⁶ Buckland, Paul C. (2009): *The Holocene*, 19,1 pp. 105–116

⁵⁷ Hecker J.F.C., 1834: *The Black Death and The Dancing Mania*, p.14

⁵⁸ Richards, Peter, 1977: *The Medieval Leper and His Northern Heirs* p.50

⁵⁹ Hecker, J.F.C.; 1888; *The Black Death and the Dancing Mania*, London

situation was not better than in Europe. Rather worse, considering the numerous accounts of a corrupted atmosphere and foul winds coming from the east. The numbers for the world outside of Eurasia can only be estimated by indirect means. However, records of natural disasters and abrupt climate change in the Americas demonstrate that the pandemic was connected to a global climate event (page 70).

To continue with Hecker:

“In thousands of places chasms were formed, from whence arose noxious vapors; and as at that time natural occurrences were transformed into miracles, it was reported, that a fiery meteor, which descended on the earth far in the East, had destroyed everything within a circumference of more than a hundred leagues⁶⁰, infecting the air far and wide. The consequences of innumerable floods contributed to the same effect; vast river districts had been converted into swamps; foul vapors arose everywhere, increased by the odor of purified locusts, which had never perhaps darkened the sun in thicker swarms, and of countless corpses, which even in the well-regulated countries of Europe, they knew not how to remove quickly enough out of the sight of the living. It is probable, therefore, that the atmosphere contained foreign, and sensibly perceptible, admixtures to a great extent, which, at least in the lower regions, could not be decomposed, or rendered ineffective by separation.”

Again, these descriptions are generally viewed by academics as either merely allegorical or in other ways irrelevant in the context of the Black Death.

Climate change in the 6th century

Let's go further back in time another 800 years or so for a moment. We find that the period 535- 536 A.D. is today well excepted as a time of abrupt climate change. These series of events are conservatively rated as the “most severe and protracted short-term episodes of cooling in the Northern Hemisphere in the last 2,000 years”.⁶¹ The historical evidence of this episode of extreme climate events, having lasted well into the 540's, will be dealt with in a future chapter of my 'Renewal of Earth' series. The first Plague Pandemic began in the 520's or 530's during Justinian's reign (thus the Justinian Plague). The decline and fall of the Roman Empire played out in this period.

In this era also, heavenly anomalies were strongly indicated to have played a role not only in Earth changes but in the plague, as we saw in Honorius of Autun's description of the Justinian Plague in 590 as “arrows falling from heaven.” We find the same theme of 'Arrows from heaven' in the context of “hail or fire from the sky”, intermingled with analogies of the 'punishment from God', in the 1348 plague pandemic.

In comparison to the 5th and 6th century crisis, the astronomical and meteorological events of the early 1300's, the decades of extreme Earth changes and weather downturn in Europe and Asia preceding the Black Death, are largely ignored today or at the most considered as mere co-factors.

Clube and Napier concluded that there was an increase in meteorite activity not only within the decades after 450 AD, but also in the decades around the 1350s.⁶²

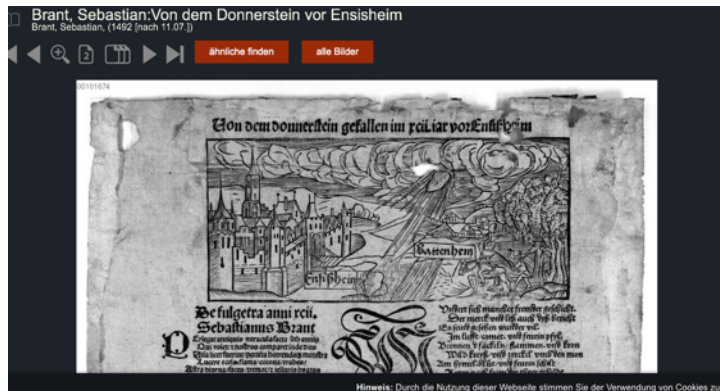
No evidence for solid surface impact(s) in the 14th century

The climate disruption in Europe and in other parts of the world went along with comet sightings and other celestial anomalies which were frequently reported. Witting the past millennia, there have been many incidents of isolated surface impacts, some of which will be narrated in the course of this text. The more recent ones are well documented, however not widely discussed. For instance, one impact was called the Donnerstein (thunderstone) of Ensisheim, Germany in 1492. (The date is November 7th, again near the peak of the Taurid meteor stream.)

⁶⁰ 1 English League= 5.556 Kilometers

⁶¹ Abbott, D. H.; Biscaye, P.; Cole-Dai, J.; Breger, D.; Biscaye; Cole-Dai; Breger (December 2008). "Magnetite and Silicate Spherules from the GISP2 Core at the 536 A.D. Horizon". AGU Fall Meeting Abstracts. 41: 1454.

⁶² C Napier, B, Clube, V. 1990; The Cosmic Winter; Oxford p.43



Another incident was the impact the destroyed much of Budapest on May 19th 1578, this was described as explosions, lightning and fire from the sky, which desolated the castles and buildings on both sides of the river.

Coincidentally only in February of the same year, chronicles reported a "gigantic monster near Budapest, that kills animals, throws stones with its four hands and spews fire from its eyes." ⁶³

There were also impact events that left well documented physical evidence on the ground in the geological record, for instance the Tunguska meteor impact of 1908 in Siberia.

Then there were much more devastating abrupt events that clearly coincided with massive cosmic impacts, such as the Younger Dryas Boundary Event of 10,900 BC (since the impacts took place on the ice caps of North America and northern Europe only few surface craters on solid rock are visible), the Barringer Crater Impact about 50,000 years ago, and the most famous Yucatan impact(s) that ended the dinosaur area.

But in comparison to those episodes, it can be anticipated here, that for the 1300's there is as of yet no geological, physical evidence for a major kinetic impact or impacts on Earth's surface in the form of an astrobleme (wound from the stars). The changes in Europe in the decades before the pandemic could best be described as a "disaster in slow motion", the decades- long effect of severe fluctuations in temperatures and precipitation, including flood, droughts, storm damage, frost damage as well as earthquakes, left a devastating impact on the population and the rest of the biosphere, without leaving craters. All of this coincided with anomalies in the skies such as meteor sightings, foul mists and vapors emerging from the ground, noxious rains and lightning discharges. The general academic approach is to dismiss these comet sightings as coincidence, and the general believe of the people of the time, that comets and meteors may have anything to do with a mass die-off, is by today's society regarded as superstitious nonsense.

Twisting the testimony

The way the scholars deal with these eye witness reports from the time of the "outbreak" of the Plague, is more or less the following: The people were so terrified and overwhelmed by the disease, that they imagined it was the punishment of god for sin, and in turn they hallucinated on seeing heavenly anomalies and mountains caving in, they imagined non-existing fireballs and comets in the sky. For they believed that the End of Days had come, the biblical Revelations were to be fulfilled. And then, at the end of the 1350's, the naïve and illiterate people had finally come to accept the fact of a contagious disease as the single cause for all the misery and then they stopped reporting these extraordinary events. This false picture is based on the presumption that only because most people couldn't read, means they were primitive in thinking. We recall Hecker's remarks:

*"...and as at that time natural occurrences **were transformed into miracles**, it was reported, that a fiery meteor (...) had destroyed everything within a circumference of more than a hundred leagues"*

⁶³ From Johann Jakob Wick: Sammlung von Nachrichten zur Zeitgeschichte aus den Jahren 1560-87 (mit älteren Stücken), Handschrift

So, the people only 'believed' that a lake had formed as a consequence of a meteor impact, but that could not really happen, could it?

Also, historians would like us to believe that the normal people were unable to perceive the contagious nature of the plague and thus the germs were able to propagate across the population. But in fact it would be very obvious even to uneducated people that those in close contact to the infected are much more likely to become ill as well. So then lets briefly consider some of the inconsistencies in traditional pandemic patterns.

2.1.1 Flaws in the germ theory:

The bacterial cause of the Black Death pandemic is disputed. These days, other theories for causes are debated in academia, but among these only other types of contagious agents (virus's, even fungi) are considered, the many alternative candidates are pneumonic plague, small pox and anthrax. In recent years, new studies claimed that bacterial DNA, found in 14th century mass graves, were proof for 'the plague bacterium'. But we should keep in mind that even today, it is difficult to distinguish individual bacteria even in vitro or in the living organism. And DNA alone does not equal behavior of any organism, so the causal relationship is not settled at all.

Even alternative theories of infectious contagious agents such as virus' or fungi have failed to give a coherent picture.

According to conservative believe, the plague started some where in Asia, probably China where it apparently 'lingered' for a decade or more. No pattern or model of human-to-human or of human-to-animal-to-human contagion can explain such a prolonged isolation of a pathogen, followed by sudden spreading to Europe and around the world within a few months. The trade routs between Europe and Asia were not interrupted in the early years of the pandemic. Again, environmental toxins, famine and Earth changes are generally either neglected or seen as the results (or at the most, as mere co-factors) of the plague, rather than vice versa.

The pattern of spreading of the plague from 1346 onward was reconstructed by Mike Baillie and shows a picture consistent with the influence of environmental factors, such as atmospheric toxins that were introduced into the air from space and/ or emitted from the ground (see below).⁶⁴

Again, when looking at climate data, it is important to keep in mind, that there is no high resolution data of reconstructed temperatures and precipitation of the time from 1300-1350 available. Therefore, climate anomalies do not show up in extreme year by year fluctuations in these graphs. But we do have detailed anthropological data. A collection and analysis of descriptive records of these values for central Europe, reconstructed from anthropogenic data is provided by Gabriela Schwarz- Zanetti⁶⁵ and by Christian Pfister,⁶⁶ but no detailed year-to-year plotted graphs are available to illustrate the drastic temperature- and precipitation fluctuations. This makes it hard to compare the weather data objectively to the rate of variability in other, more "normal" periods. The data that is provided for past centuries and is also often frequently used in the current-day debate on anthropogenic climate change, is smoothed out and does not show the short term year-to-year variability in any given period.

According to Pfister, *"the decade 1310 to 1319 was extremely wet and rainy, whereas the previous years had been of relatively benevolent weather. Later, in the 1330's, three benevolent summers with high density value in tree growth are separated by two 'Ice Age*

⁶⁴ Baillie, Mike, New Light on The Black Death p. 194

⁶⁵ "Gabriela Schwarz- Zanetti; Grundzüge der Klima- und Umweltgeschichte des Hoch - und Spätmittelalter in Mitteleuropa

⁶⁶ Pfister, Christian; Veränderungen der Sommerwitterung im südlichen Mitteleuropa von 1270-1400 als Auftakt zum Gletscherhochstand der Neuzeit;1985; Band 40; Geographica Helvetica

summers' (1330-1335). ⁶⁷ We'll return to this study in the context of Glacier expansion and the onset of the little Ice Age.

Also in the chronicles of Thomas Short we read: *'very great rains' in 1335.*

In the year 1341 (day unknown) the great flood in the river Periyar in modern-day southern India led to the river changing its course, closing off Muziris, opening up Cochin (Kochi) harbor, it submerged some islands and gave birth to some new islands.⁶⁸

2.1.2 Comets in the 1340s

For the year 1347 - the year before the first outbreak of the epidemic in Europe - the chronicler Thomas Short notes : *a "column of fire" over the Pope's palace at Avignon, France.*⁶⁹

C. Morris referred to this as a *"gigantic pillar of flame was seen by hundreds descending upon the roof of the pope's palace at Avignon."* And *"Fiery meteors appeared in the skies."* What exactly could be meant by a *column of fire*? Sprites, aurorae, a meteor trail? The next best comparison by description that comes to my mind from modern day observations might be the never before seen streak of light named Steve that was seen reaching into the sky in an aurora display on April 21st 2017 during a solar storm as reported by ESA.⁷⁰ Roger Haagmans of the ESA said: "(...) It turns out that Steve is actually remarkably common, but we hadn't noticed it before." Which raises the question: How did they know it's common?

Short also recorded many apparitions of comets of which he explicitly states that some of them were **directly followed by plague, famine and/or war**. One comet was seen in August of 1347 over France. It is not clear whether this was seen at the same time as the 'column of fire'.⁷¹

The Comet of 1348

This heavenly anomaly, probably indeed a comet, was seen over Paris in August of 1348, just a few months before the outbreak of the plague in that country but six months *after* the Great Earthquake of Friuli. The object was seen lingering in the western evening sky at sunset (indicating it was moving eastwards in the night sky), then splitting up into 'rays'. The timing is what led researchers to suggest that the Black Death was brought about by this comet. But it could only have been one of the more prominent co-factors. The description comes from Jean Fillon, called Jean de Venette († after 1368), a French poet, historian and chronicler:

" (...)pestilence and its attendant tribulations appeared again in various parts of the world. In the month of August, 1348, after Vespers when the sun was beginning to set, a big and very bright star appeared above Paris, toward the west. It did not seem, as stars usually do, to be very high above our hemisphere but rather very near. As the sun set and night came on, this star did not seem to me or to many other friars who were watching it to move from one place. At length, when night had come, this big star, to the amazement of all of us who were watching, broke into many different rays and, as it shed these rays over Paris toward the east, totally disappeared and was completely annihilated. Whether it was a comet or not, whether it was composed of airy exhalations and was finally resolved into vapor, I leave to the decision of astronomers. It is, however, possible that it was a presage of the amazing pestilence to come, which, in fact, followed very shortly in Paris and throughout France and

⁶⁷ Pfister, Christian; Veränderungen der Sommerwitterung im südlichen Mitteleuropa von 1270-1400 als Auftakt zum Gletscherhochstand der Neuzeit;1985, Geographica Helvetica p.198.

⁶⁸ "More studies needed at Pattanam". The Hindu. 2013.

⁶⁹ Thomas Short,1744, A General Chronological History of the Air, Weather, Seasons, Meteors, &c. in Sundry Places and Different Times. Volume 2, p. 174

⁷⁰ <http://www.bbc.com/news/world-us-canada-39686055>

⁷¹ *ibid.* p. 236

*elsewhere, as I shall tell. All this year and the next, the mortality of men and women, of the young even more than of the old.*⁷²

A ‘bright, new star’ can also be a supernova, but this would be seen for several weeks. If the description is accurate, it is interesting to note the breaking up of the object. since the object was seen in the sky apparently for hours, then to be dispersed towards the east, this is not consistent with a meteor that lights up and breaks up at entering the atmosphere: for this would last only seconds. The breaking up into rays suggests it was an object similar to Schumacher Levy 9, but if it is seen even at dusk with the naked eye, then it must have been extraordinarily large and/ or close.

Aurora borealis

Further, Thomas Short recorded memorable Aurora Borealis in 1347. The location in which it was seen is not mentioned, so we don’t know whether this was associated to the ‘column of fire’ and the comet. It’s one of only six aurora entries in 400 years in his chronicles.⁷³

Here is a comparison to strange signs in the skies in recent history: Extreme aurora borealis and australis were sighted before and during the so-called Carrington event of 1859, when a solar flare disrupted the telegraph system globally, an event which, were it to happen today, would cripple our modern day power grid and disrupt civilization as we know it.

Comets are vile stars

It is evidently not just a product of superstition that comets were associated throughout history with upheaval and the fate of the human race, changes on our planet that are not just metaphorical but literal. Even 800 years earlier, Chinese astronomers had a clear understanding of connecting comets to terrestrial upheaval of any description and also to pandemics. In the Record of the World’s change, LI CH’UN FENG, 602-667A.D. of the Imperial Astronomical Bureau, 648, A.D, we read that:

*“Comets are vile stars. Every time they appear in the south, something happens to **wipe out the old and establish the new.**”(...)*

...When a comet appears in the Constellation Andromeda, there are floods and migrations of people. (...)

*Many rise up and the country is divided by civil war. When a comet appears in the Constellation Pisces there is first drought and later flooding. Rice is expensive. Domesticated animals die and **an epidemic** strikes the army.*⁷⁴

The modern scientific community constantly reassures us, that comets have no tangible effect on the human experience (apart from a few extremely rare impact events). But at least the physicists and administrators at CERN seem to be interested in ancient comet descriptions along with Copernican solar system models and other stepping stones of “enlightened” science.

⁷² Newhall, Richard A., ed., Jean Birdsall, trans., The Chronicle of Jean de Venette (New York: Columbia University Press, 1953), pp. 48-51

⁷³ Thomas Short, 1744, A General Chronological History of the Air, Weather, Seasons, Meteors, &c. in Sundry Places and Different Times Volume 2, p. 178

⁷⁴ Sagan, Carl. Duyran, Ann, 1997: Comet. Ballantine Books



Fig. 4 Left: CERN, Switzerland Geneva; Chinese Comet drawings on Higgs Boson Monument. Image: Sacha Dobler AbruptEarthChanges.com Right: The Mawangdui silk, a 'textbook' of cometary forms and the various disasters associated with them, was compiled sometime around 300 B.C., but the knowledge it encompasses is believed to date as far back as 1500 B.C. Image: NASA Solar System Explorer.

Panspermia?

In 1984, Graham Twigg suggested that bubonic plague as a culprit for the Black Death made no sense, the killer had to be something else, possibly anthrax.

The idea of an environmental and even cosmic origin of the Black Death pandemic existed before the work of dendrochronologist Mike Baillie. In the 1990s, Fred Hoyle and Chandra Wickramasinghe proposed that the spread of the pandemic bore more resemblance to something spreading through the air. They went so far as to suggest that the disease actually entered the atmosphere from space in the form of a virus, descending at different rates and thus spreading over a few years.⁷⁵

Several other researchers have suggested that the Black Death was (at least in parts) caused or facilitated by the influx of toxins brought into the atmosphere by a comet, for instance the comet seen in August 1348, just before the Great Earthquake of Friuli and the outbreak of the plague in Central Europe. But surely, one single comet passing by or even fragments impacting Earth could not account for the climate chaos in Europe and Asia for 70 years prior to the plague? And how would these effects suddenly intensify and culminate within a few years? As we'll see, we are dealing with a complex series of events that influenced the Earth and its biosphere at that time.

I hope it will be apparent in the course of this text, that the Black Death pandemic was indeed directly related to astronomical changes. As far as pathological virus from space are concerned, it would have to be demonstrated how these RNA structures would survive the entry into the earth atmosphere, even though amino acids are apparently capable of surviving in space conditions.⁷⁶ But then again, amino acids are not DNA, and neither RNA nor DNA alone are equal to life, they alone do not manifest in behavior or structure of an organism. More promising is the pursuit of the inquiry in epigenetics and the influence of electromagnetic fields or even chemical stimulants on the genetic expression of organisms. Since no one has been able to prove a mono-causal contagious nature of what are believed to be virus' even on Earth, caution is warranted. In short we don't know is biological

⁷⁵ Hoyle Fred, Wickramasinghe Chandra, 1993: *Our Planet and the Cosmos*; London

⁷⁶ Ehrenfreund, P. et al, 2001 The Photostability of Amino Acids in Space. The American Astronomical Society

pathogenic agent can come from space. We 'll get back to possible causes for these biological changes. At this point, let's just keep in mind the most obvious factors:

- chemical toxins can be released from space or from the biosphere.
- and changes in electromagnetic radiation and electric fields can drastically influence life.

3 Climate havoc and War

As we saw above, already at the onset of climate worsening shortly before and after 1300, wars, climate havoc and crop failure went hand in hand. Andrew McKillop notes in the context of the Great Famine that:

*"Failing food supplies quite rapidly caused or triggered armed invasions and war for control of remaining croplands. The 1315 Flanders campaign of Louis X (see above), who ruled large parts of today's France, was an example. While 1315 was disastrous, the previous year had been almost as bad for farming output across much of Europe, due to **persistent cold and torrential rains**."*⁷⁷

Even in Persia, the dynastic rulers were defeated and a chaotic struggle for power that lasted until 1381.

"The death of Ilkhans Abu As id 1335 ended the reign of the Mongolian dynasty in Iran, which was descending from the grandson of Genggis Khan's Hülegü."

After this, a phase begins, in which regional rulers and warring parties are competing for power. For the next half of a century the course of history is complicated.

"Only TImur was finally able with his Conquests in Iran (from 1381 onward) to establish a new Imperial power." However, the author doesn't mention Earth changes or crop loss in the course of events.

3.1.1 Beginning of the Hundred Years' War (1337–1360)

Whenever general chaos ensues, there are wars to accompany it. The exact relationship between cause and effect then often gets construed by the victors of war who, as we know, write the history books. Enemy armies burning down fields and towns certainly *does* lead to population reduction, but surely human warfare or a pandemic did not cause increased fireball activity, floods and earthquakes for decades in advance.

Even before the war, economic decline demanded its toll. *"In Europe, the second half of the 1330's saw a period of gradual economic decline, which followed the end of the Medieval Warm Period and the start of the Little Ice Age in the 1300s. This secular decline, often mistitled a "depression", affected most of Western Europe, with the exception of a few Italian city-states."*⁷⁸

During the Re-conquest of Spain, on March 26th, 1341 the Siege of Algeciras comes to an end. This event is pointed out by historians as one of the first European military engagements, in which gunpowder- firearms were used. However, we'll see below that the used of cannons in battle was much older. I will postulate that the emphasis on the sudden importance of the use of gunpowder in the late 1340s is connected at least in parts) to the effort to explain the unprecedented seemingly mindless destruction of towns and countryside by fire.

The following summary of the war is given by Laura Knight-Jadczyk:

"The Hundred Years War covers the 116-year period from 1337 to 1453. It was primarily a conflict between France and England, over claims by the English kings to the French throne.

⁷⁷ Global Cooling and The Great Mandrake <http://www.marketoracle.co.uk/Article41182.html>

⁷⁸ Wikipedia

*The war was punctuated by several brief and two lengthy periods of peace before it finally ended in the expulsion of the English from France, with the exception of the Calais Pale.*⁷⁹ “Five cannons” are said to have been used by the English at the Siege of Calais in 1346⁸⁰ (only months after the battle of Crécy) as depicted in a post fact illustration (date unknown). We see a heavy piece of artillery on wheels. Earlier, contemporary illustrations of the siege that lasted an entire year, make no references to cannons. Neither are cannons mentioned in the history of the siege by C Morris.

We notice that this state of conflict was already in motion about ten years before the Black Death fell on Europe.

Albert A. Nofi and James F. Dunnigan give the following account of the beginning of the conflict:

“For the first few years of the war there wasn't much happening except English raids into France and Flanders. Then, in the 1340s, England and France took opposite sides in the long-running civil war over who should be the duke of Brittany. In 1346 this resulted in a French invasion of Gascony and the shattering French defeat at Crecy. The English then rampaged through western France, until a truce was signed in 1354 (brought on by the devastation of the Plague, which hit France heavily in 1347-48)”.

We find accounts of the various battles and sieges of this war that involve total destruction of enemy infrastructure, especially, but not exclusively, for the early years of the war. (see e.g. Fig. 5). Fortified cities were not just sacked or burnt to the ground, but they were wiped off the map. Even in strongholds and towns that lay in regions already controlled by the English, the occupiers were not satisfied by just exterminating the occupants and use the town as a strategic outpost for their own troops, but they apparently destroyed each place beyond recognition. One is reminded of the accepted theories about the destruction of Mycenaean towns during the Bronze Age Collapse around 1200 BC, all attributed to mysterious invaders called the *Sea People*, for whom no evidence exists. This makes me wander whether we are looking at an attempt by the writers of history (the winners of wars) to explain the extraordinary degree of destruction in the region mostly by fire and reattribute it to purely human causes. Were some of the fortresses or towns damaged or devastated by fire from comet debris, fireballs, lightning and earthquakes? Earthquakes were reported in nearby Italy in increased numbers at the same time.

Gunpowder and cannons had been used already in the 1200's in warfare, but it is only explicitly pointed out to have been used for the first time in 1334 in the above mentioned battle. A sudden increase in its importance is ascribed to the early battles of the Hundred Year's War, when towns were burnt to the ground and mindlessly destroyed beyond recognition. Some of these accounts of towns obliterated by fire may also remind us of the Chicago fires and the coinciding Peshtigo fires at the time of precipitation of comet dust by comet Biela in 1871.⁸¹

The ruling elite, then represented by Church and state, as a rule, have a much better position in defending their legitimation when they blame destruction and mass die-off events to human perpetrators and foreign nations, against whom a new war can always be waged as opposed to natural disasters and heavenly instabilities or 'the wrath of God'. At the time, the church especially found itself helpless in the face of natural disasters. One would imagine they had some explaining to do on why the church infrastructure and clergy themselves were suffering from fires, drought, flood and harvest failure. After all, they were God's chosen representatives, weren't they?

In the past, fires often followed not only lightning and meteor dust precipitation, but also strong earthquakes, due to overturned lanterns and fireplaces. Fires ultimately destroyed Lisbon after an earthquake and tsunami in 1755, on November 1st. The city was devastated

⁷⁹ Knight-Jadczyk, Laura; *The Apocalypse, Witches, Comets and Planetary Cataclysms*; p. ?

⁸⁰ Time line of the Hundert Year's War, <http://www.maisonstclair.org>

⁸¹ Knight-Jadczyk, Laura, Comet Biella and Mrs. O'Leary's Cow. www.Sott.net, 03 Feb 2008

almost entirely (note the date coincides with Halloween and the zenith of the Taurid Meteor Showers). However, no overhead explosions or fire ball was recorded, but the philosopher Immanuel Kant wrote in 1755 that there were warning signs preceding the earthquake of Lisbon, that was so strong that it made church bells sound in Sweden. *“Eight days before the quake the ground near Cadiz was covered with earth worms”*.⁸² In recent years, a fireball was filmed shortly before a magnitude 7.8 earthquake in Ecuador on April 16th 2016.⁸³ Sometimes, fires are reported in connection with earthquakes without a clear understanding of cause and effect.

Earthquake lights

‘Earthquake lights’ - and sometimes even ball lightning before or during earthquakes - are reported and are now better understood as geo-electrical effects:

Friedemann Freund, and adjunct professor of physics at San Jose State University, says *“common forms of earthquake lights include bluish flames that appear to come out of the ground at ankle height; orbs of light called ball lightning that float in the air for tens of seconds or even minutes; and quick flashes of bright light that resemble regular lightning strikes, except they come out of the ground instead of the sky and can stretch up to 650 feet (200 meters)”*.⁸⁴

Whether these lights or the energy releases that cause them, can also trigger fires on the ground, is not clear, but fireball activity and earthquakes were reported at the same time repeatedly throughout history.



Fig. 5 Battle of Caen in 1346, soldier apparently torch every building in sight. "Edward III and his army arrive at Caen. The Constable, Raoul d'Eu, and the lord of Tancarville decide to make their defense on the

We continue with Laura Knight-Jadczyk for more descriptions of apparently mindless destruction in the course of the Hundred Year's War even though we momentarily reach out beyond the 1350's:

“This would be a war of devastation.

Villages and crops were burned, orchards were felled, livestock seized and residents harried. On Edward's entry into

*France, he spent a week torching Cambrai and its environs. More than 1,000 villages were destroyed. France did what it could in England, at the war's onset seamen ventured to the southeastern coast of England to burn and ravage there. Much plunder was taken back to England and the thought of acquiring ill-gotten gain enticed many to support the war. Cruelty abounded. After the city of Limoges was captured and burned, Edward ordered the townsmen executed. Much of Artois, Brittany, Normandy, Gascony and other provinces were reduced to desolation (circa 1355 to 1375) and France did the same to the provinces that sided with England.”*⁸⁵

⁸² Alberto Enriquez, 2003; the Shining. <https://www.newscientist.com/article/mg17924024-500-the-shining/>

⁸³ Video: FIREBALL AT ECUADOR SKY BEFORE EARTHQUAKE April 16, 2016

<https://www.youtube.com/watch?v=DtaxwT04P8A>

⁸⁴ National Geographic, January 7, 2014, Bizarre Earthquake Lights Finally Explained

⁸⁵ Cheney, Edward P. 1936: The Dawn of a New Era. (1250-1435.)

We return to the topic of war and fire on page 76.

Let's continue with the 1340 floods:

As far as flooding and precipitation are concerned, 1342 was an extraordinary year: The flood of July 1342 (known as the most famous 'Magdalena flood') in large parts of Central Europe, is also referred to as the millennial flood event. Residues of this flood are recorded in the freeze core sediments of the Schalkenmeerener Maar.⁸⁶

This flood, caused by excessive rainfall, attracted great attention: causes and consequences, such as soil erosion and short-term impacts on society, were discussed in a number of studies, for instance in the following paper by the Austrian Technological University:

*"In our presentation we would like to draw the attention to the extraordinary character of the entire year of 1342, and also of 1343 with providing an overview of the flood and sea surge events and flood waves that occurred during these two extraordinary years in Europe. In many parts of Europe, not only 1342, but also the year of 1343, was rather humid and wet with a great number of flood events: in these two years, floods were reported from northern Greece through North-Italy, the Carpathian Basin (almost in every season) to the south German territories. 1342 and 1343 were rich in floods even in some of those areas where the July 1342 event could not be detected. The results of this first comprehensive European overview show that at least 3 (but maybe even 4) flood waves occurred which were of millennial level, and repeated extreme floods occurred especially in Central Europe, but parts of West-Europe as well as the North-Mediterranean were also badly hit by extreme floods or sea surges in these two years."*⁸⁷

3.1.2 Climate variability from 1342 – 1347 and the expansion of Alpine Glacier.

As the lower territories of Central Europe were alternately subjected to years of flooding and years of drought, Alpine glaciers began to encroach on villages. The reconstruction of Alpine glacier development can also be used to confirm historical climate data.

With that, let's return to Christian Pfister. Using anthropogenic and geophysical data, Pfister published an article in the Swiss Geographica Helvetica titled: *The summer weather pattern in southern central Europe from 1270 to 1400 at the onset of the modern era's glaciation peak.*

Here are a few excerpts from Pfister to point out the severity of some of the climate fluctuations at the time (translation from German is mine):

*"The years 1346 and 1347 are very distinct in terms of the magnitude of cold anomalies: in 1346, the wine blossom in Lindau had not been finished after August 2nd. The retardation of vegetation to this extent later occurred only twice in the time span between the early 16th century and the present day, namely in 1528 and in 1816 (Pfister 1984b). In the following year (1347), the wine had not been out of blossom as late as early September. This indicates a cold anomaly in July and August that is **unique within the last five centuries**. Further, also the patterns of wood density levels of the years 1345-1347 are unique within the entire series of Lauenen. In particular, the values are: 1345: (-3), 1346: (-3) 1347: (-2)." (the minus or plus signs represent the deviation from the annual mean wood growth rate on a scale from -3 to +3). **This means the "absence of summer" in three consecutive years.**"⁸⁸*

And indeed, the people across Europe were referring not just to the three, but the four years leading up to the Black Death as the 'four years without summer'.

"The conditions of the years 1342-1347, torrential precipitation in the summers of 1342 and 1343 are believed to have been sufficient to trigger a first episode of the alpine

⁸⁶ Sirocko, Frank; Wetter, Klima und Menschheitsgeschichte, 2010; Darmstadt

⁸⁷ Kiss, A; et al, 2015, Hidden behind Magdalena: extreme floods in Europe in 1342 and 1343, Vienna technical University. <http://adsabs.harvard.edu/abs/2015EGUGA..1713985K>

⁸⁸ Pfister, Christian, 1985: Veränderungen der Sommerwitterung im südlichen Mitteleuropa von 1270-1400 als Auftakt zum Gletscherhochstand der Neuzeit; Geographica Helvetica

glaciers expansion. This then culminated in the little ice age after the extremely wet year of 1538. In this year, Europe seems to have been almost continuously in the Atlantic Current".⁸⁹

4 Earthquakes in diverse places

Let's continue with the 1340's: One of the earliest tectonic events that was recorded in Italy to usher in the devastating series of earthquakes in this decade took place in 1341.

In November 25th, 1341,

*"a tsunami, apparently caused by an earthquake, devastates the Maritime Republic of Amalfi, among other places."*⁹⁰

Only months before, on January 1st, 1341 a severe earthquake affects Crimea, Ukraine with a magnitude of 6.0 and a maximum Mercalli intensity of VIII.⁹¹

We remember that Kaffa lies on the Crimea peninsula and is the city from which the Black Death was believed to have spread to Europe after the Siege of Kaffa in 1345-46.

4.1.1 The earthquake of Friuli, 25th of January 1348 (also Villach Earthquake)

Centered in the South Alpine region of Friuli, the quake was felt across almost all of Europe. The quake hit in the same year that the plague situation escalated in Italy, the outbreak followed only months later. About 200 contemporary sources mention this event. It caused considerable damage to structures; churches and houses collapsed, villages were destroyed. Interestingly, witnesses also reported that **foul odors emanated from the earth.**⁹²

It was a rather extraordinary type of earthquake, with a wide spread impact region, causing structural damage throughout Upper Italy and Austria, and caused minor damage as far away as Naples, throughout all of Bavaria, Bohemia, Hungary and today's Slovenia. In Carinthia, the town of Villach and numerous surrounding villages were largely destroyed by a major landslide followed by a flood of the Gail River. Even as far away as Rome, the earthquake allegedly took its toll: considerable damage was sustained by the Basilica of Santa Maria Maggiore; in the Torre delle Milizie, an upper floor crumbled, and the structure assumed the slight tilt it retains today.

Now, if we combine the affected regions, we find the quake's impact range adds up to about **1400 km**. In comparison, the magnitude is estimated at 6.8-6.9, which is relatively modest compared with usual earthquakes of such a wide impact area. Striking in the early afternoon, the earthquake caused hundreds of casualties, but not tens of thousands (at least not according to standard history) as would be expected compared with the wide range. In Udine, the castle and the cathedral were severely damaged.⁹³

From what we can observe today, even a larger magnitude earthquake of for instance 7.0 is usually not felt at a distance of more than 500 km.⁹⁴

In comparison, according to the USGS, the magnitude of the 1994 Northridge earthquake (Los Angeles) was 6.7. The intensities ranged from IX (violent) close to the epicenter, to V's (moderate) at distances of about 60 - 200 miles away, it was not felt at distances farther than 360 km.⁹⁵ A more recent example, in December of 2015, a very shallow earthquake with a depth of only 30 km hit Tajikistan. The magnitude was 7.1. (note that the shallower an earthquake, the more destructive its forces on the surface). It was not felt farther than 250

⁸⁹ Pfister, C., 1985, p.198

⁹⁰ Wikipedia

⁹¹ National Geophysical Data Center / World Data Service (NGDC/WDS), Significant Earthquake Database, NOAA

⁹² Baillie, Mike, 2006; New Light on the Black Death p.?

⁹³ wikipedia.org/wiki/1348_Friuli_earthquake

⁹⁴ Coburn, Andrew; Spence Robin; 2003; Earthquake Protection; Wiley & Sons

⁹⁵ <http://earthquake.usgs.gov/research/dyfi/>

km away, which is considered an average distance.⁹⁶ Keep in mind that in the 14th century, earthquakes had to be felt directly by people, or they were not registered and documented at all. That is not to be confused with today's detection of earthquakes with sensitive seismometers over very large distances, where the slightest tremor can be picked up and recorded.

The Friuli earthquake, did not obliterate all the towns in the immediate area as would be expected by a quake affecting such a wide area. Although the damage was greatest in the proposed epicenter region, the exact epicenter is still controversial. The event used to be called the Villach Earthquake, throughout the centuries, many believed the epicenter was in the Italian province of Friuli where most of the destruction was reported. The main quake began in the afternoon of January, 25th and lasted probably for about one minute. Aftershocks occurred until March, 5th of the same year. Given the wide range of 1400 kilometers and the inability of the contemporary population to determine and compare the exact minute of each tremor in different regions, I'm proposing an earthquake swarm of thus far unexplained nature, rather than one single shock with several aftershocks.

Earthquake swarm 1456

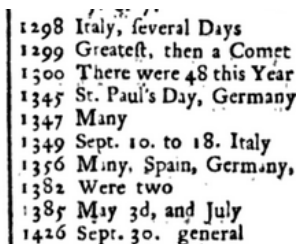
At this point we note that a hundred years later, in 1456, a similar event took place throughout Southern and Central Italy. It is described as multiple earthquakes or an earthquake swarm which occurred in December 5th, 1456, affecting a large area of central and southern Italy. It is recorded to be the largest earthquake - in fact, a sequence of multiple, sub-contemporary earthquakes - to have ever occurred in Italy.⁹⁷

With this I'd like to refer to a mysterious chronicle entry in the reputable Luzerner Schilling. The incident of two comets in the sky, earthquakes and "rain of blood" in Italy and an outbreak of plague, is dated to 1406 in the manuscript, but for some unknown reasons historians falsely dated the incident to 1456. The latter date would then agree well with this earthquake swarm in central and southern Italy. We return to this story on page 88.

To return to the 1340's, an incident of 'blood rain' is recorded in the chronicles of Thomas Short for the year 1346 in France:

*'It rained Toads and Rain mix'd...In Burgundy a Shower of Blood.'*⁹⁸

As the mid 14th century is concerned, Short lists several earthquakes in Europe at the time of the Black Death without providing details. From the seven quakes he listed in the 14th century, four lay within the immediate years of the Plague (4 years before or after).⁹⁹ One of the entries names a quake series in Italy from September 10th to 18th. 1349:



1298	Italy, several Days
1299	Greatest, then a Comet
1300	There were 48 this Year
1345	St. Paul's Day, Germany
1347	Many
1349	Sept. 10. to 18. Italy
1356	Many, Spain, Germany,
1382	Were two
1385	May 3d, and July
1426	Sept. 30. general

Fig. 6 Chronicles of Thomas Short; From the seven earthquakes he listed in the 14th century, four lay within the immediate years of the plague:

⁹⁶ <http://thewatchers.adorraeli.com/category/earth-changes/>

⁹⁷ Camassi, Romano. 2004. "Catalogues of historical earthquakes in Italy." *Annals of Geophysics*, Vol. 47.

⁹⁸ Thomas Short, 1744, *A General Chronological History of the Air, Weather, Seasons, Meteors, &c. in Sundry Places and Different Times: Volume 2*, p. 181

⁹⁹ Short, Thomas; 1744, *A General Chronological History of the Air, Weather, Seasons, Meteors, &c. in Sundry Places and Different Times: More Particularly for the Space of 250 Years : Together with Some of Their Most Remarkable Effects on Animal (especially Human) Bodies and Vegetables, Volume 2*, p. 168

The September 9th 1349 Earthquake, corroborated by other sources, is most likely connected to the before mentioned series:

In the midst of the devastation of the Black Death in Italy, this earthquake or earthquake series does not receive the appropriate attention.

*“The September 9th, 1349 earthquake was one of the most catastrophic events experienced along the Apennines. At least three main shocks struck a vast area of the Molise–Latium–Abruzzi regions, and damage was even sustained by the distant monumental buildings of Rome. The southern-most shock (Mw: 6.7) occurred at the border between southern Latium and western Molise, razing to the ground the towns of Isernia, Venafrò and Cassino, amongst others, and devastating Montecassino Abbey. As with other Medieval catastrophic sequences (e.g., in December 1456, Mw: 6.5–7.0), this earthquake has not yet been associated to any seismogenic source; thus, it still represents a thorn in the flesh of earthquake geologists”.*¹⁰⁰

Further, also in 1349, an earthquake in Rome is reported to have caused extensive damage, including the collapse of the southern exterior facade of the Colosseum.¹⁰¹

The source gives no day or month and thus it is not clear whether we are dealing with the same earthquake (-swarm) or a related aftershock as above.

4.1.2 Nepal Earthquake of 1344

A recent study of the devastating earthquake that struck Nepal, concentrating in the Kathmandu region in 2015, was connected to tectonic activities in 1344.

*“The Earthquake of Nepal, April 2015, that struck to the north-west of Kathmandu, was anticipated by Laurent Bollinger, from the CEA research agency in France, on account to a historical pattern, regarding the great earthquake of 1344.”*¹⁰²

The 2015 quake had a magnitude of 7.8. As world-press reported, the last time the fault ruptured at this location was back in 1344. It was preceded in 1255 by a big event to the east of Kathmandu. *“The 2015 quake follows that pattern with a gap between events of 80 years or so”*¹⁰³

4.2 Lightning and plague

The siege of the city of Kaffa in 1345-6 is said to have played an important role in the Black Death. Some Historian suggested that the plague spread to Europe from Asia after the siege of the city of Kaffa. Allegedly, corpses of plague victims were catapulted over the wall into enemy lines.

“For several years, the Mongols had allowed a group of merchants from Genoa to control Kaffa, a bustling seaport on the Crimean Peninsula. This was highly advantageous for the Mongols as it provided a direct link to Italy’s largest commercial center and encouraged trade across all corners of their vast empire. Tensions and disagreements, however, were a common feature of this commercial relationship, arising primarily from their religious differences; the Italians were devoutly Christian and the Mongols had been practicing Muslims since the 1200s.”

In 1343, these tensions began to escalate, and the Mongols ended up besieging the city. *“In 1345-6 While laying siege to the city, the Mongol army became infected with the Black Death. Gabriele de’ Mussi tells us what happened next:*

*Whereupon the Tartars (Mongols), worn out by this pestilential disease, and **falling on all sides as if thunderstruck**, and seeing that they were perishing hopelessly, ordered the corpses to be placed upon their engines and thrown into the city of Kaffa. Accordingly, were*

¹⁰⁰ Galli, P. A. C.; Naso J. A., 2008: Unmasking the 1349 earthquake source (southern Italy): paleoseismological and archaeoseismological indications from the Aquae Iuliae fault

¹⁰¹ <https://en.wikipedia.org/wiki/1349>

¹⁰² BBC. <http://www.bbc.com/news/science-environment-32472310>

¹⁰³ rdpress.com <https://weatheraction.wordpress.com/2015/04/27/nepal-earthquake-similar-pattern-seen-at-start-of-little-ice-age/>

the bodies of the dead hurled over the walls, so that the Christians were not able to hide or protect themselves from this danger, although they carried away as many as possible and threw them into the sea."¹⁰⁴

However, academia holds that plague does not spread via dead bodies. More interesting than the assumption of the spread of the disease is the "analogy" of the attackers **falling on all sides as if thunderstruck**. Even though the Black Death is believed to have killed quickly, how would dying soldiers still be engaged in combat and then instantly drop dead from the disease? Or were many soldiers literally struck by lightning in these days?

One of the many atmospheric disturbances recognized by the writers of the time were extraordinary lightning strikes and unexplained electric discharge events. Coincidentally, only a decade later, in the context of a further presumed outbreak of the plague in 1361, during the Pestis Secunda, extreme strikes of lightning were described as having killed many in England:

*"(...) In the 35th year (of Edward III's reign, corresponding to 1361): "And in that same year, men beasts, trees and houses were smitten violently with lightning and suddenly perished. And fiends in the likeness of men accosted men as they went their way."*¹⁰⁵

B. Sloane (2011) notes that: *"In 1350 the physician and poet Simon de Covino listed heavy mists, clouds, **lightning**, and falling stars. Modern historian Dominick Palazzotto studied dozens of plague tracts by physicians and others written between 1348 and 1350 and found the following portents: **comets, lightning and "fiery drakes" (meteors?) in the sky;** storms and rains of snakes of frogs; floods, famine, earthquake, and locusts; strangely deformed snakes, worms, toads, and badgers; animal deaths and human spontaneous abortions; fungi and crop failures, changes in animal behavior; fish die-offs; withering of trees; and in general seasons not being what they should be."*¹⁰⁶

James Fraser, 1832, speaks of earthquakes throughout Europe, even in Germany and Austria, countries that were "not liable to this calamity" (...) *"These earthquakes were generally attended with storms of thunder and lightning, wind and hail. In the year 1348, according to Lampadius, it rained blood in Germany, and meteors and other coruscations appeared in the air. **Mock suns** were seen, and the heavens sometimes seemed on fire."*¹⁰⁷

Even the church spoke about the effects of lightning and thunder, but surely this was to be understood only allegorically.

In 1349 the plague reached northern France, in the same year, as it arrived in southern England, the following letter from the Bishop of London was distributed to be read aloud to all the parishioners in England:

*"Almighty God **uses thunder, lightning** and other blows which issue from his throne to scourge the sons whom he wishes to redeem. Accordingly, since a catastrophic pestilence from the East has arrived in a neighboring kingdom, it is very much to be feared that, unless we pray devoutly and incessantly, a similar pestilence will stretch its poisonous branches into this realm, and strike down and consume the inhabitants."*¹⁰⁸

This report of the Paris Medical Faculty of October 1348 is one of the most comprehensive contemporary attempt to determine the nature of the plague and to find remedies.

As would be expected, philosophers sought for astrological explanations in planetary alignments for explanations. However superstitious this may seem to the modern reader, the many accounts of fireballs, columns of fire, falling stars and the like suggests they had good

¹⁰⁴ HISTORY IN AN HOUR <http://www.historyinanhour.com/2011/08/05/the-siege-of-kaffa-and-the-black-death/>

¹⁰⁵ Sloane, Barnie. 2011: *The Black Death in London*. The History Press,

¹⁰⁶ Byrne 2006 p. 54

¹⁰⁷ Fraser, James; 1832: *Fraser's Magazine for Town and Country*, Band 5 London

¹⁰⁸ Hatcher, John; 2010: *The Black Death: An Intimate History*; Hachette UK

reasons to look to the heavens for answers. At the same time, the described effects on Earth such as **lightning sparks, noxious vapours and fires throughout the air** were not of a speculative nature, since they could be observed by everyone on Earth. Here is an unbridged excerpt:

*“And this is found in ancient philosophers, and Albertus Magnus in his book, Concerning the causes of the properties of the elements (treatise 2, chapter 1) says that the conjunction of Mars and Jupiter causes a great pestilence in the air, especially when they come together in a hot, wet sign, as was the case in 1345. For Jupiter, being wet and hot, draws up evil vapours from the earth and Mars, because it is immoderately hot and dry, then ignites the vapours, and as a result there were **lightning, sparks, noxious vapours and fires throughout the air.**”*

*“However, in the judgment of astrologers (who follow Ptolemy on this) plagues are likely, although not inevitable, because so many exhalations and inflammations have been observed, such as **a comet and shooting stars**. Also the sky has looked yellow and the air reddish because of the burnt vapours. There has also been **much lightning and flashes and frequent thunder**, and winds of such violence and strength that they have carried dust storms from the south. These things, and in particular the powerful earthquakes, have done universal harm and left a trail of corruption. There have been masses of dead fish, animals and other things along the sea shore, and in many places trees covered in dust, and some people claim to have seen a multitude of frogs and reptiles generated from the corrupt matter; and all these things seem to have come from the great corruption of the air and earth. All these things have been noted before as signs of plague by numerous wise men who are still remembered with respect and who experienced them themselves.”¹⁰⁹*

Petrarch, who was a friend of Louis Heylingen, uses additional terminology of natural disasters to describe how he lost almost all his friends, and he does so in a way that makes it hard to believe he is using these descriptions only allegorically. In a letter from Parma, a year and a half after he returned to Italy, he laments:

*“Where are our dear friends now? Where are the beloved faces? Where are the affectionate words, the relaxed and enjoyable conversations? What **lightning** bolt devoured them? What **earthquake** toppled them? What tempest drowned them? What abyss swallowed them? There was a crowd of us, now we are almost alone.”¹¹⁰*

Also Gabriele di Mussis, a lawyer from Piacenza, picks up the allegory of lightning and poisonous arrows in his *Historia de Morbo*. He seems to connect this to heavenly justice or the punishment from god.

*“(…) Religion, turned out of doors, will grieve. The treacherous and maleficent fellowship of priests and clergy, imperiled by their own failings, will be destroyed. No one will be given rest, **poisoned arrows** will strike everyone, fevers will throw down the proud, and incurable disease will **strike like lightning**.”¹¹¹*

Today, the notion of lightning as a serious hazard in everyday life in our astronomically and atmospherically relatively quiet times is underestimated. The probability of being struck by lightning is even used proverbially for the low likelihood of rare events. What are the chances...? Well, in recent years, the number of lightning injuries has increased. Lightning appears to be killing and injuring increasing numbers of people in developing countries, meteorologists and experts say.

“The frequency of lightning has somehow increased from what it used to be,” says Michael Nkalubo, commissioner at Meteorological Department of Uganda, a country where lightning storms are common.¹¹²

¹⁰⁹ R. Hoeniger, Ed; 1882): *Der Schwarze Tod*; Berlin, appendix III, pp. 152-6

¹¹⁰ Petrarch, *Epistolae de Rebus Familiaribus et variae*, ed. Joseph Francassetti, Florence, 1859, I p. 13

¹¹¹ Horrox, Rosemay 1994: *The Black Death*, Manchester University Press. p. 16

¹¹² BBC.com <http://www.bbc.com/news/science-environment-26554974>

In August 2016, lightning killed 323 reindeer during a thunderstorm in Norway.¹¹³ And then, thirty-five people including the referee were injured after lightning struck a football pitch in Germany.¹¹⁴ The discharge came from cloudless, only lightly hazy skies. This happened on the same day as four children sustained life-threatening injuries after being struck by lightning at a birthday party in a park in Paris. In Chile in April 2014, 54 cows were killed by lightning in one range.

Lightning activity increases in frequency and intensity during a solar minimum, phenomena such as earthquake lightning and discharges through volcanic dust clouds are indicators of the electric connection between Earth and space. Discharges from atmospheric clouds upwards into space, known as sprites, are observed more and more often. Enhanced electric discharges from space through Earth's atmosphere are expected in connection with meteoritic dust, volcanic dust, comet debris, and electric potential gradients in the solar system. Just remember the small comet Siding Spring that had a close fly by encounter with Mars in 2014 and caused havoc in the magnetic field on that planet. "*Close comet flyby threw Mars' magnetic field into chaos*".¹¹⁵

4.2.1 Poisonous odors and fires

There is a vast amount of descriptions by chroniclers of poisonous gases and a corruption of the atmosphere, which were said to be the cause or at least the initial trigger for the pestilence. We revisit this problem in Chapter 6. At this point, I'm merely pointing out that at the time, it seems to have been beneficiary in the preventing or curing the illness, to be close to a fire: this would be a great benefit in the presence of certain organic volatile compounds in the air. but in the case of supposed pathogenic germs, in order to burn these from the air, too much of the oxygen in the air would have to be consumed and no positive effect could be achieved.

From Byrne we learn that the physician Guy de Chauliac (ca.1300-1367) later recalled that he suffered from the plague at the papal court for six weeks in 1348.

*"He refused to flee as a matter of pride, and perhaps because he was fairly new to the position. Other physicians did flee, he noted, which made little difference since they could not cure the sick if they had tried. Understanding plague to be caused in part by miasma, he had Clement sit **between two large fires** that were meant to cleanse the corrupted air. The prophylaxis worked, and Guy went on to serve the next two pontiffs".*¹¹⁶ Certainly we can't be sure whether the prophylaxis really 'worked' or whether the pope was spared for other beneficial circumstances. At any rate, in later outbreaks of the plague, large fires were kept burning in public places.

Da Foligno recommended purifying air by fumigation, by burning wood, aromatic substances or herbs.¹¹⁷

Another writer, Abbot Gilles (Le Muisist, 1271-1353) was 78 years old when the Black Death reached northeastern France in 1349. "*He **mentioned storms, an unhealthy air** and "great (sexual) immorality" as background to the epidemic*"¹¹⁸

Another member of the Court of Avignon, the musician Louis Heylingen of Beeringen, did plan to escape to the mountainous air, where the plague had not arrived at the time:

"(...) The Curia, however, preferred to remain at Avignon, (but) vacations have been proclaimed till the feast of St Michael All the auditors, advocates, and procurators have either

¹¹³ New York Times: https://www.nytimes.com/2016/08/31/science/lightning-strike-dead-reindeer.html?_r=0

¹¹⁴ Mirror.co.uk <http://www.mirror.co.uk/news/world-news/thirty-five-people-including-referee-8071284>

¹¹⁵ <https://phys.org/news/2016-03-comet-flyby-threw-mars-magnetic.html>

¹¹⁶ Byrne J.P. Black Death p 72

¹¹⁷ *ibid.* 159

¹¹⁸ Byrne J. P, 2012: Encyclopedia of Black Death .p. 213

left, intend to leave immediately, or are dead. I am in the hands of God, to whom I commend myself. My master will follow the Pope, so they say, and I with him, for there are some castles near the airy mountains where the mortality has not yet appeared, and it is thought that the best chance is there. To choose and to do what is best may the Omnipotent and merciful God grant us all. Amen."¹¹⁹

4.2.2 Hecker on poisonous odors after earthquakes

The devastating quake of Villach in 1348 occurred only a few weeks before the official date of the outbreak of the Black Death in Central Europe. Many contemporary sources saw a direct correlation. Which is not surprising considering the accounts of 'foul odors' coming from the ground and from the sea at the time.

The historian of medicine A.G. Carmichael observes:

*"The earthquake of 25th of January, 1348 is likely to have fuelled and focused specifically apocalyptic fears more than plague did."*¹²⁰

Earthquakes together with poisonous odors were also recorded in the east.

The following is again from J.F.C. Hecker, who is regarded as the founder of historical pathology. He studied disease in relation to the history of man, made his study yield to men outside his own profession; an important chapter in the history of civilization, and even took into account physical phenomena upon the surface of the globe as often affecting the movement and character of epidemics.

Hecker might have been one of the last pathologists adapting a rather holistic and reasoned approach in epidemiology. His colleagues of the late 19th century, such as Koch and Pasteur, were focusing exclusively on mono-causality of infectious agents such as bacteria and later on virus'.

*"On the island of Cyprus, the plague from the East had already broken out; when an earthquake shook the foundations of the island, and was accompanied by so frightful a hurricane, that the inhabitants had slain their Mahometan slaves, in order that they might not themselves be subjugated by them, they fled in dismay, in all directions. The sea overflowed- the ships were dashed to pieces on the rocks, and few outlived the terrific event, whereby this fertile and blooming island was converted into a desert. Before the earthquake, a **pestiferous wind spread so poisonous an odor**, that many, being overpowered by it, fell down suddenly and expired in dreadful agonies."*¹²¹

How could 'pestiferous winds' and earthquakes be directly correlated? We will investigate this further below. And "fertile and blooming island converted into a desert", speaks of natural environmental culprits, it is not consistent with a pandemic. It contradicts the notion that a great mortality of humans would mean nature would recover from human cultivation and land exploitation. On this notion, let's take a short outlook into early approaches of understanding human health in the context of environmental influences and even evolution.

4.2.3 Renewal of life?

Hecker's writings also reveal a more interdisciplinary approach on diseases and cycles of Earth changes than is accepted in modern academic thinking. His comments on the nature of catastrophic cycles and diseases are also somewhat reminiscent of Plato's Timaeus discourse. We'll have another look at the connection of Earth changes and evolution of life.

In 1888, Hecker wrote the following in "*The Black Death and the Dancing Mania*":

*"That Omnipotence which has called the world with all its living creatures into one animated being, especially reveals Himself in the desolation of **sultry dryness of the atmosphere; the subterranean thunders; the mist of overflowing waters, are the harbingers of***

¹¹⁹ Breve Chronicon clerici anonymi^a in De Smet, Recueil des Chroniques de Flandre^a iii, pp. 14-18.

¹²⁰ Carmichael, Ann G. (January 2008). "Universal and Particular: The Language of Plague, 1348–1500. Med Hist Suppl. 2008;(27):17-52.

¹²¹ Hecker, J.F.C.; 1888; The Black Death and the Dancing Mania, London, p.

destruction. *Nature is not satisfied with the ordinary alternations of life and death, and the destroying angel waves over man and beast his flaming sword."*

"These revolutions are performed in vast cycles, which the spirit of man, limited, as it is, to a narrow circle of perception, is unable to explore. They are, however, greater terrestrial events than any of those which proceed from the discord, the distress, or the passions of nations. By annihilations they awaken new life; and when the tumult above and below the earth is past, nature is renovated, and the mind awakens from torpor and depression to the consciousness of an intellectual existence."¹²²

Interestingly, he goes on to refer to a "cosmical commotion" of unknown causes:

*"To attempt, five centuries after that age of desolation, to point out the causes of a **cosmical commotion**, which has never recurred to an equal extent, to indicate scientifically the influences, which called forth so terrific a poison in the bodies of men and animals, exceeds the limits of human understanding".*

Further, he seemed have been aware of a phenomena of increased proliferation among the survivors after a mass extinction event or in this case a massive population reduction.

*"After the cessation of the Black Plague, a **greater fecundity in women was everywhere remarkable**— a grand phenomenon, which, from its occurrence after every destructive pestilence, proves to conviction, if any occurrence can do so, the prevalence of a higher power in the direction of general organic life."¹²³*

I have not been able to corroborate the observation of a greater fecundity with other sources. But it is likely to be true, since in Sweden, in the region of Lund, women were found to have grown **slightly taller (2.5 cm) in the generation after** the Black Death.¹²⁴ This was determined by examination of grave yards. Body height is an indicator for general health, nutrition, and standard of living, and women's health and nutrition is particularly important for fertility, fetal and maternal health and fertility rates.

Is it possible Hecker also anticipated what decades later would be discovered as an acceleration of formation of new species or an acceleration of evolution after mass extinction events? It has become clear that after an extinction level event, not only do previously non-dominant species emerge into more dominant positions in their environment, but they can undergo actual evolutionary 'bursts' or accelerated rates of change. Could it be that Hecker had recognized nothing short of a decades- long, global transformation process, that altered many aspects of the biosphere? Or was it only a failed transformation "attempt" by nature?

*"In the progress of connected natural phenomena from east to west, that great law of nature is plainly revealed which has so often and evidently manifested itself in the earth's organism, as well as in the state of nations dependent upon it. In the inmost depths of the globe that impulse was given **in the year 1333, which in uninterrupted succession for six and twenty years shook the surface of the Earth**, even to the western shores of Europe. From the very beginning the air partook of the **terrestrial concussion**, atmospherical waters overflowed the land, or its plants and animals perished under the scorching heat. The insect tribe was wonderfully called into life, as if animated beings were destined to complete the destruction which astral and telluric powers had begun. Thus did this dreadful work of nature advance from year to year; it was a progressive infection of the zones, which exerted a powerful influence **both above and beneath the surface of the Earth**; and after having*

¹²² Ibid. p. 2

¹²³ Ibid. P. 14

¹²⁴ Lagerås, Per, 2016: Environment, Society and the Black Death: An interdisciplinary approach to the late-medieval crisis in Sweden p.

been perceptible in slighter indications, at the commencement of the terrestrial commotions in China, convulsed the whole Earth"¹²⁵.

4.2.4 Philip Ziegler and natural disasters before the plague

Ziegler is one of the leading authorities on the subject of the Black Death. His book is based on the premise of germ theory and does not take in environmental factors as the main cause or important co-factors for the mass casualties, yet in his text we find numerous references of coinciding natural catastrophes on an epic scale.

First, Ziegler describes how the word of a great pandemic in the east was received in Europe:

*"It must have been at some time during 1346 that word first reached Europe of strange and tragic happenings far away in the East. Even in this age of easy travel and rapid spread of news, calamities in China tended to be accepted in the Occident with the polite but detached regret reserved for something infinitely remote. In the fourteenth century, Cathay, in China, was a never-never land; unheard of except by the most sophisticated and, even to them, a place of mystery which only a few merchants had visited and about which little was known. No story, however horrible, would seem altogether implausible if it came from such a source; but equally no savant medieval or merchant would have conceived that what happened so far away could have any possible relevance to his own existence. The travelers' tales were received with awed credulity but gave rise to no alarm."*¹²⁶

Ziegler dismisses the reports of a **black comet** seen before the arrival of the epidemic, but he does accept the many other strange disasters and anomalies reported at the same time. Here is a longer excerpt from his text. It could help to illustrate how reports of extreme Earth changes can be passed on until today, at the same time the obvious question, whether these catastrophes were correlated to or even primarily responsible for the subsequent mass die-off, is dismissed.

*"Certainly things seemed to have gone badly wrong. An imposing series of disasters studded the history of the previous years. (...) In 1333 parching **drought** with consequential famine had ravaged the plains watered by the rivers Kiang and Hoai. Then had come **floods** in which four hundred thousand were said to have died, as a result of which, presumably, mountain Tsincheou 'fell in', **causing great chaos in the Earth**. In 1334 there was drought in Houdouang and Honan followed by swarms of locusts, famine and pestilence."*

A few years later, swarms of locusts of almost Biblical proportions swept over Eastern Europe in three successive years, devastating the crops throughout Poland and as far as southern Germany. The most destructive invasion took place in 1338. Analysis of freeze-cores of sediment on lake floors in Germany's Eifel region show a distinct layer of insects of various species in the strata corresponding to the years 1336 to 1338.¹²⁷ This layer contains an anomalous concentration of insect remains, not only of locusts or grasshoppers, thus corroborating the historical accounts.

We continue with Ziegler's narrative:

*"An **earthquake** in the mountains of Ki-Ming-Chan formed a lake more than a hundred leagues (ca. 550 kilometers) in circumference. In Tche the dead were believed to number more than 5 million. **Earthquakes and flood continued** from 1337 to 1345; locusts had never been so destructive; there was '**subterranean thunder**' in Canton. But these were mere curtain-raisers for the real calamity. Several contemporary accounts exist of the earliest days of the Black Death, so similar in details as to suggest that they may well have come from the same source. Almost the only man known to have been at or near the spot, Ibn-*

¹²⁵ ibid. p. 9

¹²⁶ Philip Ziegler 1998, *Black Death*, Faber Finds. P. 9

¹²⁷ Sirocko, Frank; Wetter, Klima und Menschheitsgeschichte, 2010; Darmstadt

*Bätuta, 'The Traveler' is disappointingly reticent. An anonymous Flemish cleric, on the other hand, was fortunately unfettered by the restrictions imposed on those who have actually seen what they describe. Basing himself on a letter from a friend in the papal curia at Avignon he recounted how "In the East, hard by Greater India, in a certain province, horrors and **unheard of tempests** overwhelmed the whole province for the span of three days, on the first day there was a **rain of frogs, serpents, lizards, scorpions**, and many venomous beasts of that sort. On the second, thunder was heard and **lightning and sheets of fire fell upon the earth, mingled with hail stones of marvelous size**; which slew almost all from the greatest even to the least. On the third day **there fell fire from heaven and stinking smoke, which slew all that were left of men and beasts, and burning up all the cities and towns in those parts**. By these tempests the whole province was infected; and it is conjectured that, through the foul blast of wind that came from the south, **the whole seashore and surrounding lands were infected**, and are waxing more and more poisonous day by day..."*¹²⁸

Another chronicler, the Dominican friar Bartolomeo reports:

*"(...) massive rains of worms and serpents in parts of China, which devoured large numbers of people. Also in those parts fire rained from Heaven in the form of snow (ash), which burnt mountains, the land, and men. And from this fire arose a pestilential smoke that killed all who smelt it within twelve hours, as well as those who only saw the poison of that pestilential smoke (...)"*¹²⁹

Frogs, worms and lizards raining from the sky? Can we give any credibility to such texts if they include obvious impossibilities? The descriptions are reminiscent of the illustrated entry in the "Luzern Shilling" with its account of alleged blood rains and pieces of meat falling from the sky in 1406 in Switzerland (see Fig. 26).

At the same time, we might also look to contemporary comparison for explanations or interpretations: could raining serpents mean, it was raining serpent-like or string-like objects that formed in the skies? Or was it literally raining worms, as newspaper reports claim happened several times in Norway, the last time as recently as in 2015? In this recent report however, no accompanying extraordinary sights in the skies were reported. "*Earthworms rain down from skies over Norway, puzzling scientists*".¹³⁰ In similar incidents, strong waterspouts were believed to be the cause.

Hypothetically, some of the testimonies of the 1340s may be a result of confusing cause and effect. If severe thunderstorms, lightning, even the falling of meteoritic debris occur along with earthquakes and even 'subterranean thunders', these events in turn can cause masses of worms come out of the ground, and it was simply assumed that the worms had fallen from the sky during the extraordinary events. Indeed, worms not only emerge from the ground during heavy rains but also when a weak electric current is passed through the earth (fishermen use electric devices to make worms come to the surface). Emanuel Kant relates that days before the earthquake and tsunami of Lisbon in 1755, worms emerged from the

¹²⁸ Philip Ziegler 1998, Black Death, Faber Finds, p. 21

¹²⁹ De Smet. ' Breve Chronicon clerici anonymi.'Recueil des Chroniques de Flauders. Vol III p 14.

¹³⁰ The Independent, Thursday 16 April 2015, Luke Garratt: "Earthworms rain down from skies over Norway, puzzling scientists. Popular theories on how they got there include violent weather phenomena such as water spouts"...According to Erstad, it's not a new phenomenon, with reports of worms raining from skies above Norway dating back to the 1920s. This rain of worms isn't confined to Norway either, with a similar case reported at a Scottish Academy secondary school in 2011.

ground (see Chapter 6). Farther below, we'll discuss electric disturbances of the environment in the context of Earth changes, including anomalous animal behavior. We also know that frogs flee from wetlands and swamps in masses before or during lightning storms.

4.2.5 Meteors/ comet activity and volcanoes?

Ziegler himself does not mention comets or meteorites in particular, but incidences of fire and ash from the sky, which could also, in case they were confined local events, indicate volcanic eruptions. But as it was a large area event, we must look to an astronomical origin.

*“For the Chronicler of Este, however, this cloud of death owed nothing to the sea: between Cathay and Persia there rained a vast **rain of fire, falling in flakes like snow** and burning up mountains and plains and other lands, with men and women; and then arose vast masses of smoke; and whoever beheld this died within the space of half an hour; and likewise any man or woman who looked upon those who had seen this (...).By the end of 1346, therefore, it was widely known, at least in the major European seaports, that a plague of unparalleled fury was raging in the East, fearful rumors were heard of the disease's progress: India was depopulated, Tartary, Mesopotamia, Syria, Armenia were covered with dead bodies; the Kurds fled in vain to the mountains. In Caramania and Caesarea **none were left alive...**”¹³¹*

4.2.6 Konrad von Megenberg on ‘miracles’ during the earthquake and Black Death

Now, here is a curious account that has come down from one *Konrad von Megenberg*, writing in 1349, concerning the earthquake of the previous year (the earthquake of Friuli on Jan. 25th 1348)

On page 57, another excerpt from this writer's report will be presented, and the descriptions of some geological anomalies, which Konrad called ‘miracles’, which were “*caused by that earthquake*”. This apparently happened mostly in the Austrian Alps at the beginning of the calamities. The descriptions and in particular Konrad's interpretations are quickly dismissed by historians as allegories or religious metaphors. The ‘miracles’ include:

- Fires coming out of the earth burning towns
- During the earthquake sand and dust coming to the surface, so that a whole village becomes absorbed in it.
- The earth surface is raised and lowered again. Great gushes of water come out of mountains. My translation of the full chapter is on page 101.

But first, Konrad von Megenberg gave elaborate descriptions of poisons coming from the air, the sea and the ground. Like most writers he primarily pointed to coastal regions. But unlike the others, he included mountain regions as sources of these harmful gasses. Based in Bavaria and Austria, he is likely to have met many of the eye-witnesses he sites. Concerning the actual disease or diseases, Konrad is the only secured contemporary source, that is believed to be unaltered, who describes ulcers under the armpits and not ulcers or buboes all over the body as the other sources.

“Many things are indicative for the general mortality having come from the poisoned air. The first is, that the mortality began first and foremost in the mountains and in coastal cities, for there, the mists were the densest and the most poisonous. Because the oceans withheld the air in the Earth's veins near the oceans and there the air turns foul, and very much so, and thus also the water gets poisonous (...)

The third sign is, that the deadly mortality in the years after the earthquake, caused only little harm to the people that were in the vicinity of the mountains in the high places. The heavy poisoned air lifted up from the mountains and descended to the earth, and the higher air remains purer than the lower air.

*The fourth sign is, that in autumn and winter of the two years, many dense and very **scorching smelling vapors** were prevalent, because the earthly vapours in the air were*

¹³¹ Hecker. The Epidemics of the Middle Ages p.21

*transformed into mists and it was so dense that it descended to the earth. It was particularly dangerous for people who inhaled the mist in the morning before eating or drinking. Therefore, careful people remained in the dwellings in the morning, fumigated their rooms with pleasantly smelling and precious things and they ate early, before the harmful air could enter their empty bodies. They were also careful not to go to the ill people, so their poisonous breath and their deadly exhausts couldn't spread over to them.*¹³²

Later, Konrad contemplates astronomical causes of these earth changes and the great die-off, but in contrast to many other sources, he did not say the toxic fumes themselves originated in the sky and he made no references to the meteorites seen by others. But not only in the far East, a 'fiery meteor' was reported. Here are two more European chronicle entries for the years of the outbreak of the Black Death in Europe:

*"1347 January 25 -Vapor immense (immense vapor). A sporadic meteor moving from the north fell from the sky".*¹³³

1348 -"**Tres lapides maximi (three very big stones).** Three meteorites fell in Catalna, Spain. One of them was sent to the king on the back of a mule". Chronicon Estense: RIS2, xv, pt 3, 160.

"Ignis maximus (a very big fire). Another meteorite fell between Cathay and Persia causing great disasters and burning everything. It fell like "inflamed snow". Date uncertain.¹³⁴ This meteor was most certainly connected to the *rain of fire* in this region as given by Ziegler (see above).

And again on December 24th, from the records of the same source: 1348 December 24th: Ignis (fire). A sporadic meteor moving from east to west. Ibid.

1351 December 17th

Un grande bordone di fueco (a great staff of fire). It spread before dawn moving from north to south. Matthei Villani Historia: Muratori, RIS, xiv, 134, It could be the same object reported in Matthei Palmerii Liber der temporibus.¹³⁵

5 Geological and physical evidence of extreme Earth changes

5.1.1 Extreme summer temperature- and precipitation-conditions

Christian Pfister established the following reconstruction of summer temperature- and precipitation - conditions in the southern regions of Central Europe from 1270-1400 on the basis of radio- densitometric data and anthropogenic records. We note a sharp increase in precipitation and a corresponding trough in the temperature curve peaking in the 1340's, a testimony of wet and cold summers.¹³⁶

¹³² Konrad von Megenberg Franz Pfeiffer (editor) Das Buch der Natur, 1861 Stuttgart p.110

¹³³ Guillelmini Schiavinae Mon. hist, patriae, iv, p. 332.

¹³⁴ Ibid

¹³⁵ SAO/NASA Astrophysics Data System (ADS), Journal for the History of Astronomy, Vol. 9, p.123 Author dall'Olmo, U.

¹³⁶ Pfister, Christian,1985,; Veränderungen der Sommerwitterung im südlichen Mitteleuropa von 1270-1400 als Auftakt zum Gletscherhochstand der Neuzeit; Geographica Helvetica p. 13

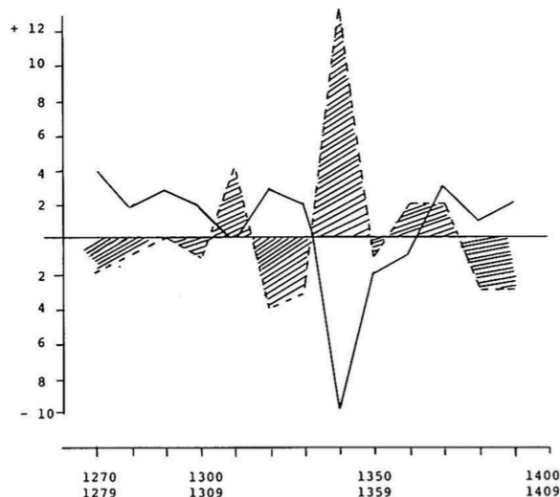


Fig. 7 Summer temperature- and precipitation- conditions in the southern areas of central Europe from 1270-1400 on the basis of radio- densitometric data and anthropogenic records. (line---) =temperature (by decades); (dotted line - - -) = Precipitation (by decades). Source: Christian Pfister 1985

5.1.2 Tree rings and environmental disruption

The work of dendrochronologist Mike Baillie demonstrates in great detail how the outbreak of the Black Death of 1348 went along with climate anomalies leading to a disruption of tree growth around the world. This is based on tree ring data from the corresponding years as well as ammonium signals from Greenland and Antarctic ice core data. Here is a brief summary on how his discovery developed: In the 1970's, Baillie and other dendrochronologists were sampling oak woods as part of a program aimed at constructing an overall 6000-year tree-ring chronology for radiocarbon calibration purposes. For example, archeological samples from the Viking and Norman levels in medieval Dublin had provided a chronology which, as it turned out, spanned AD 855- 1306. It did not seem to matter how many more timbers were sampled from the various Dublin excavation sites, that chronology in question could not be extended any further forward in time, this is the case still to this day. There remains a gap in the Dublin oak chronology from 1306- 1357. Only when samples from Ulster and other regions were used, that timespan could be bridged. It was clear to Baillie that there were fewer timbers whose ring patterns spanned the fourteenth century in Ireland compared to the time before or after. Whether this was due to less timbers being used in the fourteenth century or simply due to their survival rate was not altogether clear.¹³⁷ The technique of dendrochronology allows for absolute dating, which means one particular growth ring of a piece of wood can be assigned to an exact year, given a chronological series had been developed for this wood- type and a particular region. This accuracy is not given for radiocarbon dating. Ice core dating has an accuracy of about 5 years.

Global Wood growth patterns

Mike Baillie found a strong coincidence of reduced growth in European Oak and reduced temperatures in the time span 1320- 1350. Later on, it turned out that when the combined oak and pine temperature curves from the old world were plotted to an average New Zealand cedar chronology, a striking agreement in growth- and temperature patterns was evident. A reduction of tree growth in 1320-1350 had taken place in both continents and was indicative of a global environmental event.¹³⁸

¹³⁷ Baillie, Mike. 2006; *New light on the Black Death*, p..18

¹³⁸ Ibid. p.30

There is a notable gap in the number of available wood samples from construction objects made in the early 14th century. The broadly accepted conclusion is that the substantial reduction of the work force led to a decline in building activity and wood felling in correspondence with a general decline in population. In *“The great Transition”*, Bruce Campbell writes:

“The German oak dendrochronology similarly reveals a conspicuous cessation of building activity from 1347 (onwards). Further, when construction recovered at the end of the fifteenth century, many of the timbers then felled had begun growing in the immediate aftermath of the Black Death.”

However, wood harvest had already declined decades earlier (see agricultural crisis above). Campbell:

*‘In Slovakia, too, felling rates declined from the end of the thirteenth century and then slumped in the second quarter of the fourteenth century centering on the Black Death.’*¹³⁹

The 1348 pandemic and a resulting reduction in work force does not explain a reduction in felling rates already at the end of the 13th century. Climate disruption, on the other hand, provides answers to this problem.

5.1.3 Bio mass burning

Levoglucosan analysis reveals increased forest or brush fires. Levoglucosan is an organic compound with a six-carbon ring structure formed from the pyrolysis of carbohydrates, such as starch and cellulose. As a result, Levoglucosan is often used as a chemical tracer **for biomass burning in atmospheric chemistry studies, particularly with respect to airborne particulate matter**. A paper by Thompson et al. (2000) identified several anomalous events in the early 1300s¹⁴⁰:

-1313- 1319 the NEEM ice core revealed Levoglucosan levels; Thompson classify this time span as a “strong event”. (This event represents levoglucosan concentration above the threshold)

Thus, we have an increase in brush- or forest fires, or prairie fires in the very years of the Great Famine.

-for the years 1320–1370, high dust fall frequency was recorded for Northern China (reconstruction based on different palaeo- climate archives) flood/ drought index by Yang et al. (2007).

-For the 1330s, high dust and chloride concentrations are recorded. Further, a failure of monsoon precipitation in the corresponding seasons.

5.1.4 Freeze cores in the southern German Maars.

Now, let’s return to the freeze core samples in the sediments of the German Eifel Maars in which the insect remains of 1346 were found. The Maars in the southern German’s Eifel region are small, circular indentations in the landscape, some of them contain lakes with steep slopes, but most are filled with sediment and soil. They are believed to be remnants of volcanic activity; the region was volcanically active only 12,900 years ago.

Sediments in freeze cores of three of these Maars, by name the Ulmener-, the Schalkenmehrener-, and the Holz- Maar, were investigated by Frank Sirocko, and several layers were dated with radiocarbon and other dating methods. In the sediments of the second Maar (SMf), in a depth of 1.48 m, large numbers of insects were found.¹⁴¹ The depth

¹³⁹ Bruce M. S. *The Great Transition* Climate, Disease and Society in the Late-Medieval World; 2016; Campbell, Queen's University Belfast: p.313

¹⁴⁰ Thompson et al. (2000) A High-Resolution Millennial Record of the South Asian Monsoon from Himalayan Ice Cores

¹⁴¹ Sirocko, Frank; Wetter, Klima und Menschheitsgeschichte, 2010; Darmstadt p. 168

corresponds with the years 1336-1338, corroborating the historical records of devastating locust invasions into Central Europe in these years. The insects had migrated from Asia via Hungary and reached as far as the Rheine River.

The sediments on the bottom of the three Maars recorded devastating floods in 1342 (also referred to as the flood of the millennium) which confirms historical records. It had been raining throughout the entire region uninterrupted from July 2nd to 7th of 1342, 50% of the average annual rainfall fell in this week alone.¹⁴²

Stone bridges of several Southern German cities along the Rhine were destroyed by flooding.

Of the about 50 known Maars, most are filled with sediments to form swamps or wetlands, only a few of them remain as small, round lakes. The Dehner Trockenmaar (dry Maar) with a Diameter of 950 meters, for instance, is believed to be dry land since about 12,000 years (or roughly the onset of the Younger Dryas cooling event).

In the Schalkenermehrener freeze core, the appearance of the 1342 flood is marked as an exceptionally broad layer of grayish mud, in thickness comparable to decades of accumulation in “normal” periods. This flood is named ‘the flood of the millennium’. Other marks of environmental extremes are recorded in the sediments, giving testimony to many of the earth changes in the early and mid 14th century. 1315 – loss of the grain harvest (the Great Famine); 1318 famine extremely cold and wet summer; even the “Great Flood” in the North Sea, the *Grote Mandränke* of 1361 can be assigned to a particular layer in the sediments of this Eifel Maare. Fig. 8

Also in the Holzmaar, the 1342- mark is clearly visible as a striking dark band in the otherwise yellowish light brown homogenous sedimentation of the last 1000 years.

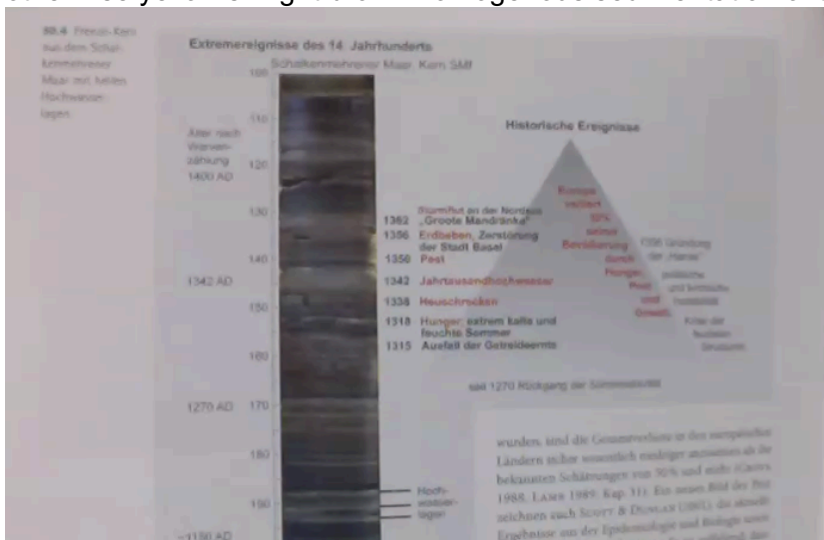


Fig. 8 In the Schalkenermehrener freeze core the appearance of the 1342 flood (named the flood of the millennium) is marked as an exceptionally broad layer of grayish mud, in thickness comparable to decades of accumulation in other periods. Other years of the 14th century crisis left their clear mark. (page 173)

The visual appearance of the flood layer is particularly anomalous in the Ulmener Maar. A sediment layer of bright orange-red color, not seen in any other period of the last 8,000 years of dated cores (See Fig. 26). What could have deposited this unique type of matter? Interestingly, although the layer is dated and labeled, the very distinct appearance of the 1342 sediment layer went unmentioned by the author of the relevant publication, Frank Sirocko. Without any access to chemical or microscopic analysis, we are confined to speculation as to the nature of this anomalous strata at this point. Such bright red depositions usually indicate concentrated iron oxides.

¹⁴² Ibid p. 166

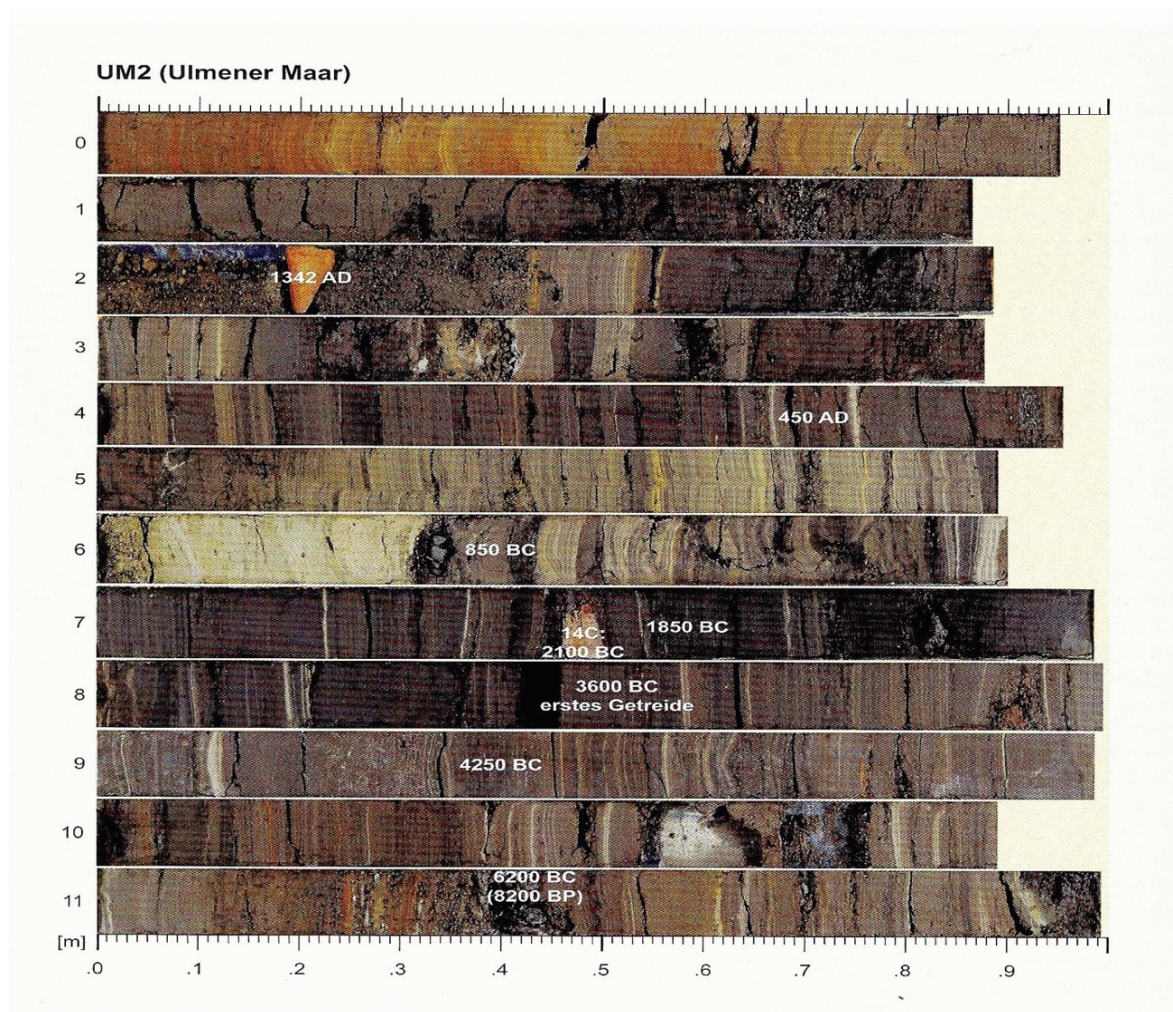


Fig. 9 Sediment core of the Ulmener Maar showing a distinct orange-red layer of unknown consistency in the flood year of 1342, the composition of the material has not been investigated. Image Sirocko, Frank; Wetter, Klima und Menschheitsgeschichte, 2010; Darmstadt p.42

A short excursion: Volcanos and/ or impact craters?

The geological features of this former volcanic region of the Eifel themselves are also interesting in the context of the cosmic double catastrophe which bracketed the Younger Dryas cooling period at about 10,900 BC and 9,600 BC. The 10,900 BC eruption of the caldera, that today contains 'Lake Laach' in the Eastern Eifel region was the largest volcanic eruption in Central Europe since the last Ice Age. The *Laach ash* (known as Laacher See Tephra, LST) has a distinct chemical and mineralogical composition and can be found over most of Central Europe from Finland to Switzerland.¹⁴³ With an estimated Volcanic Explosivity Index value of 6, this eruption was 250 times larger than the eruption of Mount St. Helens in 1980.

The Maars themselves are generally believed to be the results of volcanic eruptions, which is in part plausible since the Eifel Region is indeed a large plateau that was volcanically active until 12,900 years ago. However, researcher Dr. Wilhelm Pilgram presented compelling evidence that the Maars (or at least some of them) are in fact craters of impacts, which then triggered a new surge of volcanic activity. The Maars have no cone shaped volcano mounts, as almost all of the other confirmed extinct volcanoes in the Eifel region do. Further, the Maars have a general North-West to South-East alignment, which is not explained by

¹⁴³ Sirocko, Frank; Wetter, Klima und Menschheitsgeschichte, 2010; Darmstadt p. 40

volcanoes, but is somewhat similar to the alignments of the Carolina Bays, which were probably formed at around the same time.

The only plausible model for the formation of the Carolina Bays is a combination of soil liquefaction by impact shock waves as a result of (a) cosmic impact(s) into the ice sheet in the Great Lake region, and the subsequent secondary impacts of the ejected ice blocks into the destabilized soil, which then caused further soil liquefaction.¹⁴⁴

5.1.5 A spike in atmospheric CO2 concentration in the preceding century

Beginning at about 1150 and culminating around 1350, we see a sharp increase in the concentration of atmospheric CO2 that was preserved in the Antarctica ice. In the last 2000 years, the CO2 was higher only during the 5th and 6th century, which was a time dominated by extreme climate disruption, but not warming.

What was the exact relation of cause and effect of CO2 and climate at the time? In the long term observations of the last 400,000 years, which are also important in the current climate change debate, it has become clear that CO2 concentrations rise not before, but **after** the global temperature rises, with a delay of about 200- 600 years. However, it is important to keep in mind that past millennia were dominated by periods of high temperatures and low CO2 concentrations. For periods millions of years ago, we often observe this inverted correlation.¹⁴⁵ As far as the 13th and the first half of the 14th century are concerned, it leaves several questions unanswered. Since there was no considerable amount of human CO2 emissions, what was the source of CO2 that came about without an increase in global temperature? Volcanic outgassing is, just as today, the most prominent candidate. Or were the severe climate variability/ climate disruptions and the CO2 increase both a result of the same culprit?

As for the current day spike in CO2 on this graph, keep in mind discrepancies such as this: The main measurement station for global CO2 is located on the Mauna Loa volcano in Hawaii that releases CO2 at an increasing rate, according to the USGS.¹⁴⁶ Similar inconsistencies are observable in the measurement of temperatures. Not only the interpretation of climate data, modeling and predictions of future climate trends is highly politically charged, but also the actual measurement strategies. Most measurement stations for surface temperature were established on airports in the early 20th century, when these airports were small and surrounded by rural landscapes. These same locations are now surrounded by cities and thus became subject to the 'urban heat factor'.

¹⁴⁴ Zamora, Antonio; 2017: Origin of the Carolina Bays

¹⁴⁵ Nasif, Nahle. 2007: Cycles of Global Climate Change. Biology Cabinet Journal Online. Article no. 295.

¹⁴⁶ USGS http://hvo.wr.usgs.gov/volcanowatch/archive/2004/04_12_29.html

Black Death and abrupt Earth Changes in the 14th Century

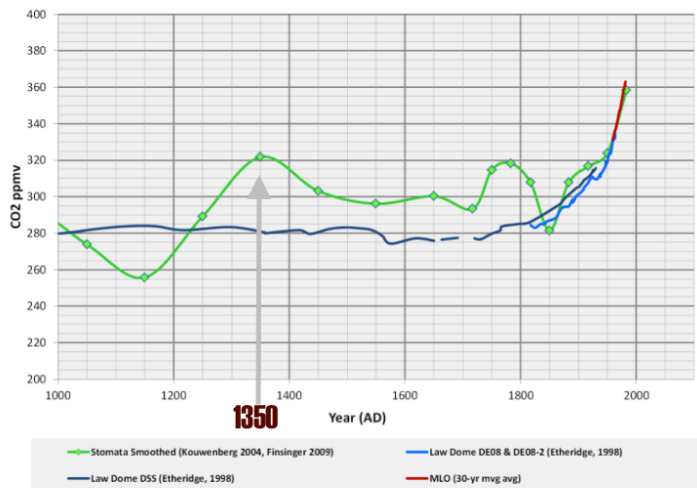


Fig. 10 CO₂ concentrations of the last 1000 years from ice core samples showing a steady rise in CO₂ from 1150 to 1350. Image source: <http://s90.photobucket.com/user/dhm1353/media/CO2-1.png.html>

5.1.6 Low sun spot activity, Wolf Minimum

The climate of the last 1200 years was dominated by four major solar minima, by names the Wolf, Spörer, Maunder and the Dalton minimum. Steinhilber and Beer from the Swiss Federal Institute of Aquatic Science and Technology point out that these four periods of low sun spot counts “occurred in a cluster, that coincided with the Little Ice Age (LIA), a period of cold climate conditions from about 1350 to 1850 AD”. (As mentioned above, the starting date of the LIA is a subject of controversial terminology). “Between the Oort and the Wolf Minimum, a period of high solar activity of approximately 200 years is evident. This period coincides with the Medieval Climate Anomaly (MCA), which is generally characterized by warmer and drier climate conditions.”¹⁴⁷

This is why this anomaly is also called the Medieval Climate Optimum. The term *optimum*, of course, describes better the ramifications for human development, whereas *anomaly* might give the impression that warmer and more regular weather is a bad thing. In this warm period, the population expanded, agriculture and civilization was thriving, this is the era for instance of the cathedral builders in Europe.

The first of the group of these four recent minima, the Wolf Minimum, was the period of sharply lowered sunspot activity that began in 1280 and persisted for 70 years until 1350. (see Fig. 11). However, 1280- 1350 is only when solar activity was in its lowest phase. But the decline in sunspot numbers began as early as **1150** and accelerated after **about 1230**. In addition to this, we see that in subsequent solar minima, sunspot activity declined rather sharply and continuously. In comparison, the onset of the Wolf Minimum was initiated with several up and down spikes.

The timespan owes its name to Rudolf Wolf, who developed the first reconstruction of solar activity in the 19th century.

Naked-eye observations of sun spots go back a long time. The first written record of sunspots was made by Chinese astronomers around 800 B.C. Very large sun spots can be observed with the naked eye through hazy skies or at sunset. But only telescope observations allow for accurate sun spot records. These records were made from 1610 AD onward.”¹⁴⁸

¹⁴⁷ Steinhilber, Friedhelm; Beer, Jürg; 2001: *Solar activity – the past 1200 years*; Swiss Federal Institute of Aquatic Science and Technology, Dübendorf, Switzerland

¹⁴⁸ Ibid. p. 4

For the time before these exact sunspot records, other proxies must be used to reconstruct solar activity. Presently, the only proxies capable of extending the record of solar activity beyond 1610 AD are *cosmogenic radionuclides*, such as ^{14}C and ^{10}Be . “The term “cosmogenic” points to the origin of the radionuclides; cosmogenic radionuclides are produced by nuclear reactions between cosmic ray particles and Earth’s atmospheric gases. Thus, cosmogenic radionuclides record the intensity of the cosmic ray influx on Earth”.¹⁴⁹ As far as the Wolf Minimum is concerned, the direct correlation of low sunspot counts and low temperatures is less strikingly obvious here than it is for the later Maunder Minimum, which coincided with the coldest period of the Little Ice Age from about 1600 to 1800.

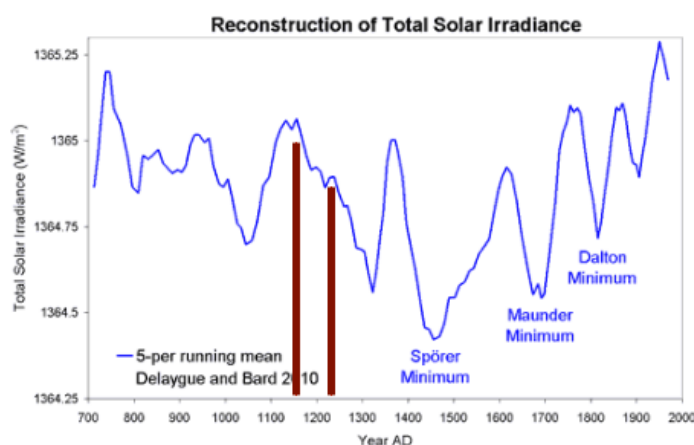


Fig. 11 Progression of the Wolf Minimum by total solar irradiance. The largest volcanic eruption in that period was in 1259, only 20 years before the lowest phase of the solar minimum (which is generally dated to 1280- 1350, this is when solar activity was in its lowest phase. However, the decline in sunspot count began as early as 1150 and accelerated after about 1230, see red lines. Graphic: Delaygue and Bard (2010) https://ase.tufts.edu/cosmos/print_images.asp?id=38

Traditional climatology still holds on to the simplified model that describes how solar radiation warms surface and atmosphere (taking into account ‘greenhouse gasses’, of course). Thus the sun in a more active state is believed to simply ‘warm’ the planet more than in a less active state by infrared radiation and the energy influx is measured in Watt per square meters. But interconnections turn out to be much more complicated:

As was shown in recent years for instance by Svensmark *et al*¹⁵⁰, low solar activity (and thus low numbers of sun spots) correlate with a weakened solar magnetic field. Cosmic ray particles are accelerated to high energies in the vicinity of supernova explosions in our galaxy. To reach the Earth, they have to propagate through the heliosphere, which is formed by the solar wind carrying the solar magnetic field. Incoming cosmic ray particles are charged and therefore get deflected by the solar magnetic field.

In periods of lowered sun spot activity and thus a weaker solar magnetic field, more cosmic rays strike the Earth’s atmosphere, where they act as condensation nuclei and propagate the formation of low altitude clouds, which causes climate instabilities, irregular precipitation and in the long run, global cooling.

Thus, during sunspot count minima, such as the Wolf minimum, the effect on climate is far greater than a simple decrease in infrared radiation from the sun could bring about.

“In addition to the solar magnetic field, the geomagnetic field also modulates the cosmic ray intensity. From archeointensity data it is known that the geomagnetic field has varied in time

¹⁴⁹ http://www.windows2universe.org/sun/activity/sunspot_history.html

¹⁵⁰ Svensmark. J, et al: 2016: The response of clouds and aerosols to cosmic ray decreases

(e.g., Knudsen et al., 2008) and therefore a part of the variation found in cosmogenic radionuclides is of geomagnetic origin.”¹⁵¹

In addition to the increase in galactic cosmic rays, there are also streams of solar cosmic rays, that can affect the cloud nucleation on Earth.¹⁵² Solar cosmic rays are primarily released through coronal holes (opening in the sun's magnetic field through which gas can easily escape into space). These holes are detectable only outside of the visible spectrum, so their occurrence were documented only since the 1970s.¹⁵³ Therefore, we don't know in what state the sun's corona was in the 14th century. The first very large coronal holes across the sun's equator were observed in 2005 and they are nowadays increasingly common and their relative size is also increasing. Coronal holes have been used as indicators not only for weather prediction (increased cloud formation), but for earthquake forecasts. “*There is an ebb and flow of above and below average activity*”. The research group SuspiciousObservers.org, claims that, “*using coronal holes as the primary factor, we have a +90% success rate in predicting those time periods (of high earthquake activity) in our daily news posted at SuspiciousObservers.org.*”

At the same time, we are currently seeing very weak short term sun spot minima (the troughs of the 11- year solar cycles). Judging only from the solar activity and the fact that there has not been any significant measured warming since 2002, it seems that we are moving towards another (mini) ice age, rather than a run away warming episode.

For future climate predictions, we will have to take into account all parameters of the sun, the heliosphere and our broader galactic environment, not just infrared radiation emissions (warmth). In addition to the state of the sun and its influence on how many galactic cosmic rays enter the Earth's atmosphere, the variations in actual cosmic ray flux from space, relevant supernovae etc. must be considered.

Global cooling is also predicted by a 2017 paper authored by seven scientists affiliated with the Russian Academy of Sciences, the authors dismiss both “greenhouse gases” and variations in the Sun's irradiance as significant climate drivers, and instead embrace cloud cover variations - which are modulated by cosmic ray flux - as a dominant contributor to climate change.¹⁵⁴

5.1.7 Volcanic sulfate aerosols during the late 13th century

A 2011 study found that, in regards to the last 304 years, during any inactive phases of solar magnetic activity (solar minimum), volcanoes with silica-rich and highly viscous magma tend to produce violent explosive eruptions that result in disasters in local communities and that strongly affect the global environment.¹⁵⁵

Solar magnetic activity is well indexed by the group sunspot number (see Fig. 13). The largest volcanic eruption in that period was in 1259, only 20 years before the lowest period of the solar minimum. Again, this solar minimum, called Wolf Minimum is generally dated to 1280- 1350 when solar activity was below base line. However, the decline in sunspot activity began as early as 1150 and accelerated after about 1230.

As it turns out, the first climate downturn that initiated the Little Ice Age, was preceded by excessive amounts of sulfate injections into the atmosphere, which is attributed to volcanoes.

¹⁵¹ Steinhilber, (2005) p.5

¹⁵² <http://principia-scientific.org/corona-hole-cloud-forming-cosmic-rays-set-hit-earth/>

¹⁵³ <http://www.sws.bom.gov.au/Educational/2/1/5>

¹⁵⁴ <http://notrickszone.com/2017/03/23/russian-scientists-dismiss-co2-forcing-predict-decades-of-cooling-connect-cosmic-ray-flux-to-climate/#sthash.RHlzn1d9.1dQADDhN.dpuf>

¹⁵⁵ Toshikazu Ebisuzaki et al; 2011 Explosive volcanic eruptions triggered by cosmic rays. Elsevier Gondwana Research

A study by Gao et al of 2008 connects **temperature, volcanic activity, sulfate emission and solar activity**, as they investigated one of the most important natural causes of climate change, volcanic eruptions. The researchers used 54 ice core records (more than double the number of cores ever used before) from both the Arctic and Antarctica.

A very pronounced peak in sulfate emission is noted in the year 1259, with almost double the amount of sulfate than in any other year of the last 1500 years, or roughly since the end of the Roman Warm Period.

“The largest volcanic perturbation was estimated to be that from the 1259 Unknown.” (Unknown meaning the location(s) of the volcano(es) is unknown.) *“Together with four other moderate to large sulfate injections during the century, 1228, 1268, 1275 and 1285, this particularly large eruption caused a clear temperature decrease of several tenths of a degree Celsius for the entire thirteenth century. This suggests the role of these temporal closely spaced eruptions may have in century-scale climate variation of that period.”¹⁵⁶*

“The cumulative volcanic sulfate flux in the thirteenth century was 2 to 10 times larger than that in any other century within the last millennium.”

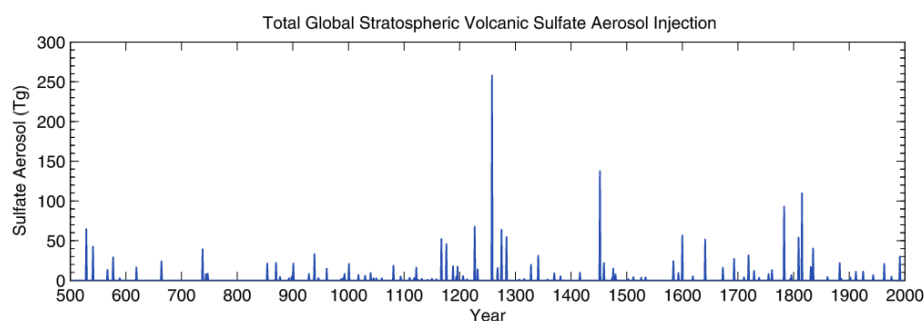


Fig. 12 Annual stratospheric volcanic sulfate aerosol injection for the past 1500 years global volcanic forcing of climate over the past 1500 years: An improved ice core-based index for climate models. The 1259 emission was almost twice as high as in any other year in the last 1500 years. Image: Chaochao Gao et al: 2008

However, there is more to the story:

“The model produced more cooling than the reconstructions for the 1259-Unknown eruption.”.

This would then refer us back to variability in solar and galactic energy influx.

The researchers used the global average volcanic forcing index together with solar and anthropogenic forcings to a model that balances the upwelling diffusion energy.

That is how they were able to simulate the temperature response for the past 1500 years.

The model’s results agree very well with both instrumental observations for the period 1850–2000 and the proxy reconstructions for the past millennium before 1850. (see Fig. 13)¹⁵⁷

“Several sharp cooling events mark the temperature response to large explosive volcanic perturbations, for example, the 1453 Kuwae, 1809 ‘Unknown’ and 1815 Tambora eruptions. The largest volcanic perturbation is measured at 1259.”

¹⁵⁶ Gao, Chaochao et al: 2008: Volcanic forcing of climate over the past 1500 years: An improved ice core-based index for climate models p.6

¹⁵⁷ Ibid. p.13

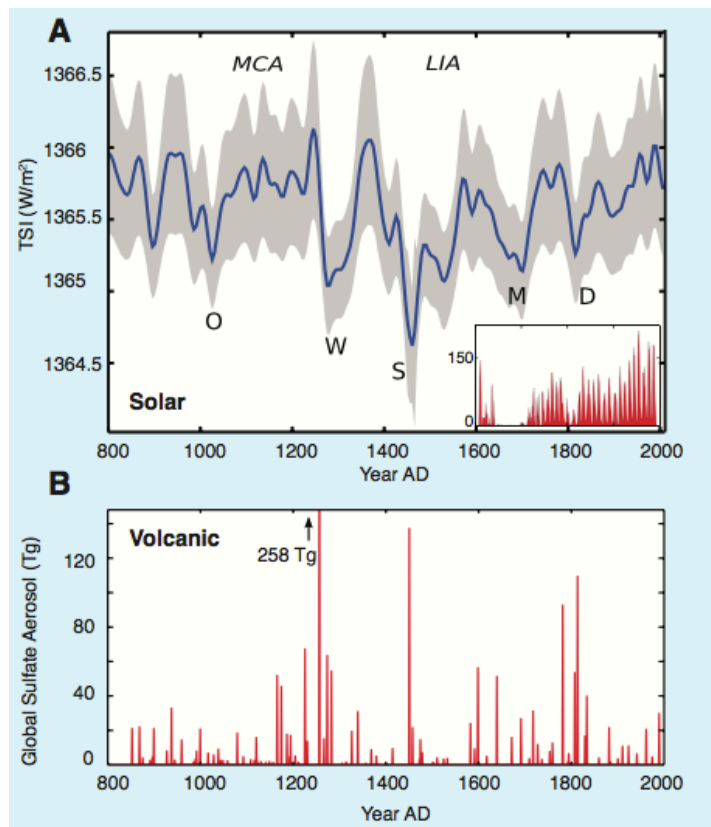


Fig. 13 A) Zoom-in on the 9300-year long total solar irradiance (TSI) reconstruction (Steinhilber et al., 2009) for the past 1200 years. The gray band is the 1 σ uncertainty. Inset shows the group sunspot number. MCA: Medieval climate anomaly; LIA: Little Ice Age. Capital letters mark grand solar minima: O=Oort, W=Wolf, S=Spörer, M=Maunder, D=Dalton. B) Total global stratospheric volcanic sulfate aerosol injection in teragram (Tg) (Gao et al., 2008), p. 13

So, a sun spot minimum means more galactic cosmic rays enter the atmosphere, which creates more low level clouds and thus cooling and more erratic weather, but over all it means LESS precipitation globally. Less total solar irradiation means less evaporation of sea water. (See Fig. 14). This also agrees well with the observations of droughts alternating with floods and wet seasons. As seen with temperature, also in regards to volcanoes we see that the sharp increase is not only a result of the grand solar minimum, since the later minima (especially the more intense Maunder Minimum) did not trigger comparable eruptions.

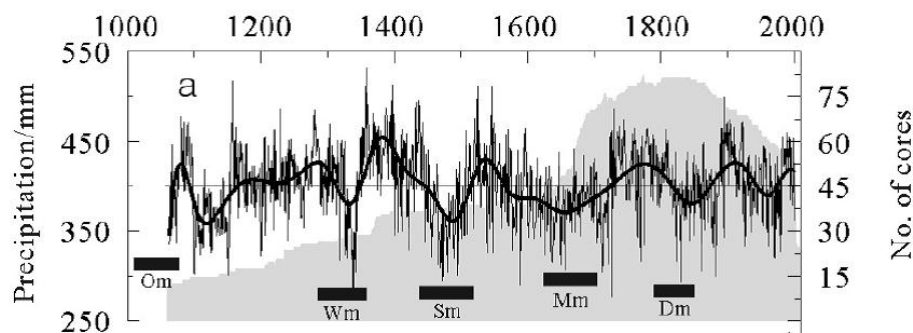


Fig. 14 solar minima correspond well with the low precipitation values

Half a century after the Black Death, a marked rise in sea storminess is registered. This condition is ongoing to this day (see Chapter 8). Thus, in respect to Earth's climate, it can be said, the world was never the same again after the 14th century.

5.1.8 Summary of Chapter 6

The short term, abrupt Earth changes of the 1330s and 1340s are documented in the geological record by bio mass burning, reduced tree ring growth, temperature and precipitation extremes and sediment deposits.

Considering the long term changes of the 13th and 14th century, the timing of low solar activity, volcanic activity, CO₂ and climate is striking. To recap:

-Wolf minimum

The Wolf minimum is generally dated to 1280- 1350, this is when solar activity was in its lowest phase.

However, the decline in sunspot numbers began as early as 1150 and accelerated after about 1230. The initial decline of solar magnetic output is marked by irregularities, whereas later, grand solar minima, such as the Maunder Minimum showed a more gradual, steep decline.

-Atmospheric CO₂ begins to rise sometimes after 1150. According to Siegenthaler et al (1988), this rise begins only at about 1180 and peaks at 1350. This does not correlate to an increase in temperature, so the increase is not due to warming of sea water.

-The largest volcanic atmospheric sulfur emission occurs in 1259. Most of the larger volcanic eruptions in this century take place after 1259. Several large eruptions occur in the the period of **1228 to 1285**. ***“The cumulative volcanic sulfate flux in the thirteenth century was 2 to 10 times larger than that in any other century within the last millennium.”***

The correlation of volcanic activity and the decreased solar activity is striking and agrees with the findings of Toshikazu et al, 2011; *“Explosive volcanic eruptions triggered by cosmic rays.”*
¹⁵⁸

As we see in Fig. 11, The total solar irradiation decreases at the time when the large volcanic eruptions occur. We know that during solar minimum, volcanic eruptions increase. The ejected dust can cause further cooling and - like galactic cosmic rays- more condensation nuclei (cloud seeding). The former, i.e. the blocking of sunlight by dust, is believed to cause cooling only for several years or decades.

For lack of high resolution data of the time span in question, it is not entirely clear to what extent the two circumstances (increase in dust particles and in cosmic rays) enforced each other. But they did coincide as is expected by the observations of other sunspot minima. As a sun spot minimum means more galactic cosmic rays in the atmosphere, it creates more low level cloud cover and thus cooling and more regionally erratic rainfall, but it also means globally, over all LESS precipitation. This is due to a decrease in sea water evaporation because of the decreased total solar irradiation. Regional droughts can also be a partial explanation for the recorded increase in bio mass burning.

CO₂

The connection to the increase in atmospheric CO₂ is another matter. The CO₂ increase from the late 12th century onwards does not coincide with a rise in temperature, so the increase in CO₂ was not caused by release of dissolved CO₂ from the oceans. Possible causes for the rise are: biomass burning, volcanic CO₂ (also today the main contributor), under sea outgassing and radio chemical reactions in the atmosphere.

It is clear that the grand solar minimum alone did not cause all of the climatic and geological disturbances in the 14th century, since the other sun spot minima did not have the same effect. The Maunder Minimum for instance, exhibited even lower solar activity, both in intensity and duration, and it brought about the coldest phase of the Little Ice Age. These other grand solar minima did bring about heightened volcanic eruptions (to a lesser extent) but as far as we can tell from the historical record, the geological climatological upheaval of the first half of the 14th century is unique. and non of the other recent grand solar minima were punctuated by a celestially induced calamity similar to the 1348 crisis.

5.1.9 More meteors in low solar activity

¹⁵⁸ Toshikazu E. et al; 2011 Elsevier Gondwana Research

We have many historical accounts of meteors and comet sightings before and during the Black Death.

A possible link between the meteor rate variability and the solar cycle has been first considered by Bumba, who studied meteor, fireball and meteorite fall activity in the years 1844–1943 and concluded that the highest frequency of meteor-related phenomena occurs in the years of minimum of solar activity (Bumba 1949)

A full analysis of radar-determined meteor rates from New Zealand and of meteors recorded by the National Research Council of Canada by C. Ellyett (1977) **confirms an inverse relationship between meteor rates and solar activity as measured by sunspot numbers**. Meaning in solar minima higher meteor frequencies are observed.

“This proven relationship of meteor rates with the solar cycle calls for a significant density gradient change over the solar cycle in the 70- to 120-km height range”.

Height of meteors in the atmosphere

A study by the Institute for Meteorology in Leipzig, Germany found that in the recent sunspot minimum (here meaning the troughs of the short term 11-year cycles), the height of meteors in the atmosphere decreased; they penetrate farther down into atmosphere than they do in the solar maximum.

From this we can deduce that during a long term, grand solar minimum such as the Wolf Minimum, not only meteor rates increase, but also the height to which they penetrate the atmosphere. Thus, independent from whether there is an increase in incoming “new” meteors, the ‘regular’ objects of long term meteor streams will be much more visible and have a greater influence in the atmosphere.

A study by B. A. Lindblad (1976) examined a worldwide increase in meteor echo rates in 1963 in New Zealand, Canada and Sweden. From radar observations in 1953–66 the researchers reported a long term variation in the echo count rate with a peak occurring in 1963 near the solar minimum.¹⁵⁹

The question whether a strong solar wind (and solar magnetic field) during solar maximum can deflect small particles and incoming space debris and actually prevent it from interacting with Earth’s atmosphere, is another matter. Certainly the objects of major short term meteor streams like the Taurid meteor stream are not deflected, since they are still present after millennia and many periods of high solar magnetic activity (such as the Mediaeval Climate Optimum for example).

And certainly, when a very large object approaches the Earth and the inner solar system, and this is strongly correlated to upheaval on Earth such as the great comet of January 25th of 1348, then the difference in solar wind and earth atmospheric pressure should play only a minor role in the effect of that object on Earth.

Here again it seems imperative to distinguish between the long-term disturbances of the decades before the 1350 and the climax of abrupt earth changes just before and during the Black Death event. In the former we notice minor meteor events, aurorae, worsening of weather. During the later we find a sudden culmination of these occurrences, and in particular an increase in reported meteor and comet sightings. For this, the only feasible explanation from what we know today, is the crossing of a denser part of a meteor stream that contains larger objects. The great mystery remains how this was announced in the form of long term changes that involved the sun itself

¹⁵⁹ https://www.researchgate.net/publication/232784875_Meteor_radar_rates_and_the_solar_cycle

6 Foul odors

An illustration in the Toggenburg-Bible of 1411 (see Fig. 17) is titled: “*Bubonic plague, that came over Egypt.*” Therefore, it’s not a direct reference to the 1348 Black Death, but it claims to illustrate *an* outbreak of bubonic plague. We saw in Chapter 1.2.2 that the allegory of plague as “poisonous arrows from the sky” was prevalent at the time. So were the “vials of poison poured down from heaven”.

We saw that many chroniclers of the time made bad smells responsible for the outbreak of the plague, particularly ‘foul vapors’ coming from the East. At the same time, we are aware that odors of human and animal waste and other sources of harmful substances in the streets were the norm. Even in decades without social and agricultural collapse, the hygiene standards of the late middle ages in Europe were intolerable, even during the High Mediaeval period in the mediaeval warm period, when the European population was thriving and prospering. Sanitary installations were non-existent, night pots were emptied into the alleys, where domestic pigs and goats were roaming freely, feeding of kitchen waste. Certainly, an event that left a large part of the population sick and people were dying in such numbers that “*there were hardly enough left alive to bury the dead*”, led to a further decline in public sanitation as biological toxins from decomposing corpses perpetuated the problem. But whatever smell it was that was described as having come from India and China (particularly along the Mediterranean shores), the initial source couldn’t have been man made; neither human waste nor decomposing bodies from plague victims can be smelt over thousands of kilometers. But clouds of noxious gases emitted from the air, from the water or the ground, on the other hand, can indeed be registered over large distances.

The population along the Mediterranean shores was impacted most severally and beyond that, apparently also fishermen on other coasts and inland waters.

The papal musician Louis Heylingen at Avignon provides some clues on the safety of open waters and coastal regions, which he believes to be a result of fishing boat traffic:

*“It is of interest also to note how greatly the coast towns generally appear to have suffered, as the contagion was very probably carried from one place to another by **the fishing boats**. Up some of the estuaries it would seem as if the passage of the disease could be traced by the dates of the institutions. Thus, to take one example, in March, 1349, there is an institution to a living at the mouth of the Fowey, in Cornwall ; a week later there is another at St Winnow’s Vicarage higher up, and on March 22nd the sickness had reached Bodmin, at no great distance from the river, and a place with which, in all probability, the passage up the estuary of the Fowey would be an ordinary and usual means of communication.”*¹⁶⁰

6.1.1 Jews accused of poisoning the wells

Jews were accused of having poisoned wells and, after some confessions were extorted under torture, thousands were rounded up and executed, most of them were burnt to death in Switzerland, there the epicenters were in the cities of Bern and Basel. At the Chillon Castle at Lake Geneva, the Jewish physician Blavignus made the first confession under torture on the 15th of September in 1348.

In other communities, also non-Jewish, unpopular people were accused of spreading infected powders, of smearing door jars with infected grease.¹⁶¹ Vague and un-disprovable accusations that gave of foretaste of the later witch persecutions of the 15th and 16th century.

Louis Heylingen: “Some wretched men have been caught with certain dust, and, whether justly or unjustly God only knows, they are accused of having poisoned the water, and men in fear do not drink the water from wells; for this many have been burnt and daily are burnt “

¹⁶⁰ Gasquet, Francis Aidan, 1908: The Black Death of 1348 and 1349, London George Bell and Sons p.102

¹⁶¹ Fürstenberger M. 1965 p.16

Also Konrad von Megenberg dismissed the notion that the Jews poisoned the wells. Even though Konrad himself made clearly anti-Semitic statements, calling the Jews the *enemies of our women and of Christians*. But he also points to the great mortality and suffering among the Jews themselves adding that it would have been a great foolishness for them to poison the wells. In Vienna, for instance, the Jewish community had to enlarge their cemetery and acquire two additional buildings to cope with the large body count.¹⁶²

From the many accounts of foul odors and “rotten waters” we can conclude that many drinking water sources were indeed contaminated with unknown toxins, but these substances must have come from the air, the rain or the ground.

Since there were no water treatment plants at the time, almost all drinking water outside of cities was provided by natural wells, springs, creeks or from rain water collection. Only low land towns, especially in southern Europe, depended on artificially dug ground water wells. There are too many such providers of running water, especially in mountainous regions, artificial poisons that were available at the time would have to be produced and secretly distributed in enormous quantities to not be diluted. And sources such as animal or human corpses would be quickly detected. Such an operation would have required a logistical monumental task. In cities, even river water was consumed (and this was a source of cholera and typhus pandemics until the separation of drinking- and waste- water in the 19th century). In the cities of Venice, without running freshwater, the citizen sustained themselves from rainwater collection from wells, *pozzi*, in the center of each square, until the 20th century. Only in such a setting, the deliberate poisoning of wells with known toxins such as arsenic would have been feasible.

From leprosy to plague, the victims and their treatment

The first of these Leprosy „hospitals“ was built in fourth-century Caesarea by St. Basil. Leprosaria, like the monasteries on which they were modeled, insisted on chastity among residents, who were taught that their physical suffering on Earth helped reduce their spiritual time in purgatory. “*Leprosaria, also called Lazarettos, leprosy houses, or lazarettos after biblical Lazarus, were provided by wealthy or communal patrons and located along roads outside city gates to facilitate the begging by which residents supported themselves. There may have been as many as 19,000 of these houses in 13th-Century Europe*”.¹⁶³

According to Byrne, plague was blamed on collective rather than on personal guilt for sin, but plague victim’s agony and awful disfigurement paralleled those suffered by lepers. Like lepers, plague victims were shunned and often abandoned even by family, for similar notions of contagion.

However, keep in mind that for the contemporaries of the Black Death pandemic, this seems to have been perceived more as a negative spiritual influence, as they were in general not afraid of physical transmission of germs. Few people at the time seem to have been concerned with physical contagion. Only few writers explicitly speak of danger of direct physical contact. One of them was Louis Heylingen at Avignon. However, it should be kept in mind this source is based on a letter sent from the papal court at Avignon, this was then copied into the chronicle by an unknown Flemish cleric in 1856 as part of his account of the plague. It is not entirely clear where paraphrase ends and direct quotation begins.¹⁶⁴ By the time of the later writer, the mid 19th century, the concept of physical, mono-causal contagion was deeply ingrained in the established thinking.

¹⁶² Konrad von Megenberg; Franz Pfeiffer (editor): Das Buch der Natur, 1861, Stuttgart p. 111

¹⁶³ Byrne, J.P. 2012: Encyclopedia of the Black Death. p.212

¹⁶⁴ Horrox, Rosemary 1994: The Black Death, Manchester University Press p. 41

In the Black Death crisis, across Europe, authorities transformed the idea of long-term leprosaria into the acute, short-term plague hospital or “pest house”. Even the name lazaretto stuck to the new care facilities, which eventually came to be associated with poor plague victims. In a sense Europeans’ experience with leprosy paved the way for their reactions to plague. I wrote an article called “*Leprosy in the Middle Ages, a social and political disease*” in which I postulate that most leprosy victims were just suffering from ergotism and or the consequences of poverty, without a contagious disease. No physical symptoms were needed for a person to be condemned to be a leper and to be expelled from society or even executed.¹⁶⁵

What factors other than poverty could play a role in selectivity of the Black Death given people were suffering, as the main- or as a co-factor, from atmospheric toxins, toxins in the water supply, harsh weather, malnutrition or the effects of atmospheric anomalies or lightning?

Co- factors: selectivity of Black Death: mortality with respect to preexisting health conditions

It is a well accepted idea that the Black Death killed primarily people in their primes, whereas the so-called ‘usual plague’ is believed to have killed first and foremost, children and the elderly. And apparently it had a greater impact on the poor, which is to be expected, but there might have been reasons for this that not everyone was privy to know about.

A Scottish chronicler, John of Fordun, stated flatly that the pest “*attacked especially the meaner sort and common people – seldom the magnates.*” Simon de Covino of Montpellier made the same observation. He ascribed it to “*the misery and want and hard lives that made the poor more susceptible*” (...).¹⁶⁶

These testimonies are corroborated by scientific research. A study published in the Proceedings of the National Academy of Sciences in January of 2008 details the research of Anthropologists Sharon N. DeWitte and James W. Wood. They examined the human remains of a Black Death cemetery in London and compared them with remains from cemeteries in Denmark, where the Black Death did not affect the local population. They found that:

*“Black Death killed more people who were starved of essential nutrients and already suffering from disease than it did well fed and healthy persons.”*¹⁶⁷

This alone is not surprising. Malnutrition, cold and exposure will obviously claim the poorest first. Below I will postulate that the wealthier people could have higher survival rates also because they were able to keep consistent fires in their homes, which would be an advantage in the presence of volatile organic gasses in the air.

Masks against bacteria?

The literature on later plague pandemics is saturated with illustrations of gravediggers and corps bearers who collected the dead wearing their iconic beak masks. In an edging about a later alleged plague outbreak in the city of Rome in 1656, titled ‘a garment against death’, a doctor treating plague victims is described as wearing the beak mask where the eyes are covered with “eye- mirrors made from crystals” and the beak is filled with “all sorts of pleasantly smelling things”. In case such a mask was filled with compacted high quality charcoal, which was available at the time (not activated charcoal), then the entire outfit would indeed provide some limited protection against volatile organic compounds in the air, the beak mask would serve as a limited gas mask. On the other hand, neither charcoal nor any natural ‘pleasantly smelling things’ that were available at the time could provide any

¹⁶⁵ article link

¹⁶⁶ Tuchman, Barbara W. 2011: A Distant Mirror: The Calamitous 14th Century; Random House Publishing Group p. 98

¹⁶⁷ DeWitte, Sharon N. et al, 2007: Selectivity of Black Death mortality with respect to preexisting health. Proceedings of the National Academy of Sciences of the United States of America 1436–1441, doi: 10.1073/pnas.0705460105

protection against an air born bacterium or virus. Some sources speak of doctors wearing cloth masks drenched in vinegar over their faces. Other illustrations show corpse carriers wearing the beak mask and smoking a pipe.

This begs the question: how did grave diggers and doctors, who had an exponentially greater risk of transmission due to their work not die in exponentially greater numbers than the rest of the population if the main problem was not environmental toxins to which everyone was more or less equally exposed? Writers on the Black Death do mention that nurses and corpse carriers did indeed have a shorter life expectancy, but the understanding that the latter were able to earn ample money and were at some point despised for their greed, does not match the concept of a contagion that was so aggressive that it killed victims in 1 -3 days.



Fig. 15 A plague doctor at a later ‘outbreak’ in Rome in 1656 (not the Black Death) “Dr. Schnabel von Rom. Ein Gewand wider den Tod” (Dr. Beak of Rome, a garment against death). Nürnberg artist unknown. Source: The Trustees of the British Museum.

6.2 Contemporary analyses

Fish die-off

Philip Ziegler refers to more reports of poisonous mists in the air: “*This concept of a corrupted atmosphere, visible in the form of mist of smoke, drifting across the world and overwhelming all whom it encountered, was one of the main assumptions on which the physicians of the Middle Ages based their efforts to check the plague. For one chronicler, the substance of the cloud was more steam than smoke. Its origin was to be found in a war which had taken place between the sea and the sun in the Indian Ocean. The waters of the ocean were drawn up as a vapor so corrupted by the multitude of dead and rotting fish that the sun was unable to consume it nor could it fall again as healthy rain. So it drifted away, and evil noxious mist, contaminating all it touched.*”

This final statement is reminiscent of the description of the 1986 gas cloud emerging from a Cameroon lake (see 6.2.4).

As mentioned above, Louis Heylingen described peoples concern with the safety of eating fish (even sea fish) as they became ill from eating it:

*"Fish, even sea fish, is commonly not eaten, as people say they have been infected by the bad air. Moreover, people do not eat, nor even touch spices, which have not been kept a year, since they fear they may have lately arrived in the aforesaid ships..."*¹⁶⁸

Furthermore, the entire fishing industry and the workforce thereof is said to have suffered so greatly, that tax exemptions were granted:

*(...) "Probably, also, at this time, Jersey and Guernsey, with which England was in constant communication, were decimated by the disease. So greatly did these islands suffer that the King's taxes, usually raised upon the fishing industries, could not be levied. " By reason," writes the English King to John Mautravers, the Governor, " of the mortality among the people and fishing folk of these islands, which here as elsewhere has been so great, our rent for the fishing, which has been yearly paid us, cannot be now obtained without the impoverishing and excessive oppression of those fishermen still left"*¹⁶⁹

It is not entirely clear whether the impact on the fishing industry was primarily due to the proportionally high mortality among the fishermen. Judging from the numerous other testimonies from the time, reports of foul odors from the sea and the warning from eating fish, it must be assumed that part of the problem was that the fish trade collapsed as the demand declined.

In 1351, the King gave way to tax releases for the town of Dunwich for the reason that *(...) " the said town, which before this time was completely inhabited by fisher-folk had been rendered desolate by the deadly plague late raging in those parts, and by our enemies the French seizing and killing the fishermen at sea, and still remained so."*¹⁷⁰

One Heinrich von Mügelin, in a chronicle titled "*Wer wil nu wissen das*", dated to about 1349-55), noted not only mutilated fish and vile odors, but he also points out how these events were said to be connected **to lightning**. The author insists that the fish were not killed by the lightning, but apparently some of his contemporaries were convinced that they were: *" (...) the same thing that happen to cattle, roe whenever a process of change takes place in the air, it is particularly harmful for the temperament of this type of animal. A trustworthy man informed me from the report of Christian merchants who had recently arrived at Almeria from the east, that in the lake opposite the Turkish coast, where this plague also raged, **mutilated and putrefied fish** were found floating upon the water, and that large quantities of them accumulated there, and the strong stench and **vile odors** spread. They thought that these fish were struck by lightning and thereby destroyed; however, that is absolutely wrong. Lightning is extinguished by the water. Even if we were to assume that lightning goes into the water, it would only destroy the fish it struck, and that would not play a major role (in the case of the Plague), even if many lightning bolts had struck."*¹⁷¹

So, however the exact connection of dead fish and lightning may be, lightning as a great environmental factor was again pointed out as a prominent concern.

6.2.1 Toxins in the air?

Only few writers of the time made suggestions of a physical contagious cause of the pestilence, and in most cases, in vague terms. In general, people's motivation to shun their loved ones (dead or alive) seems to have been the lack of empathy and fear of the judgment of god rather than fear of germs. Agnolo di Tura, a chronicler of Sienna wrote:

*"Father abandoned child, wife husband, (...) for this plague seemed to strike through the breath and sight. And so they died. And no one could be found to bury the dead for money or friendship.... And I, Angolo di Tura, called the fat, buried my five children with my own hands, and so did many others likewise."*¹⁷²

¹⁶⁸ Gasquet, Francis Aidan, 1908: *The Black Death of 1348 and 1349*, London George Bell and Sons p.48

¹⁶⁹ *Ibid* p.

¹⁷⁰ *ibid* p.

¹⁷¹ Byrne, Joseph Patric: 2004: *Black Death*, Greenwood, p.157

¹⁷² Tuchmann, Barbara W, 2011: *A Distant Mirror: The Calamitous 14th Century*. Random House p.96

The Umbrian physician Gentile da Foligna (c. 1275-1348), who himself became a victim of the Black Death of 1348, claimed 'foul air' was responsible for the mass die-off. He warned of bad odors that would enter the body to be transferred into toxins. These toxins could then infect others. He also suggested a celestial connection and claimed that among sin and retribution, '*poisonous darts of God*' (as first described by Homer) lay behind the plague.¹⁷³ We remember the recurring theme of 'darts from heaven'.

Further, Da Foligno recommended *purifying air by fumigation, by burning wood, aromatic substances or herbs*.¹⁷⁴

Alfonso de Cordoba maintained that cosmic forces began the pestilence, but its prolongation was due to deliberate poisoning of food, air and water by *evil people*.¹⁷⁵ He differentiated between three different plagues in 1348, and only the latest was caused artificially.

Isidore of Seville attributed the plague to the southerly winds, "*from which corrupted air is born*". In his *De Medicine*, however, he argues that while the plague "*arises from corrupt air, and by penetrating into the viscera settles there, and that this disease often springs up from air-borne potencies, nevertheless it can never come about without the will of the Almighty God*".

Brenda Gardenour Walter observes that "*Early authors in the Christian tradition embodied the supernatural agents responsible for the physical corruption of air in the form of serpents or dragons whose poisonous bodies and noxious breath were the simultaneous causes of human disease and death*."¹⁷⁶

6.2.2 Konrad von Megenberg about foul air

Here is what Konrad von Megenberg referred to as 'miracles' that happen during the earthquake of Friuli, on Jan 25th 1348:

"You should also know that the earthquake causes many miraculous things: a vapour coming out from the earth by the earthquake is responsible for transforming human beings and other animals into stone and in particular into stones of salt. This mostly happens in the mountains, where the people are digging for salt. This is because the vapour and the force become so great and so overwhelming that they transform animals in this way. This miracle is taught by the masters Avicenna and Albertus [Magnus]. I was told by master Pitroff, the chancellor of duke Friedrich in Austria, that on some alpine meadows, situated in the higher mountains of Carinthia, about 50 petrified men and cattle had been found (turned into stones). Even the milkers would sit beside the cows, both transformed into pillars of salt."

This first statement obviously challenges the credibility of the source. Surely the stones of salt are only a symbolical Bible reference to Sodom and Gomorra to emphasize the dramatic effects of the earthquake? This would then imply a reference to fire from the sky or meteor debris fall out in the course of the earthquake. I will return to the problem of accelerated mummification or petrification in Chapter 8.1.2). First, the remainder of the strange natural 'miracles'.

"Another miracle: due to the earthquake fires may come out of the earth, so that towns and villages will be consumed by it. This fact is caused by the fires inside the earth.

¹⁷³ Fleming, James Rodger, Johnson, Ann. 2014: Toxic Airs: Body, Place, Planet in Historical Perspective; University of Pittsburgh Press p. 9

¹⁷⁴ Byrne, J.P. Black Death. 2012 p.159

¹⁷⁵ Byrne, J.P. Black Death. 2012 p.236

¹⁷⁶ Fleming, James Rodger, Johnson, Ann. 2014 Toxic Airs. p. 9

*A third miracle: during the earthquake, sand and dust will come to the surface, so that a whole village becomes absorbed in it. That is because the earth's interior is sandy and on the surface is a solid strong crust, the retains the vapors, so they wont be released. The fourth is that the mist is often so sickening that the earth crust cannot hold it, is raised up and then lowered again. This often happens beneath the waters that have solid grounds, and thus the ground is raised, and the water runs out in great gusts without rainwater and snow water, from the wind and the mists, that rise up from underneath the water's springs in the mountains."*¹⁷⁷

These latter types of natural disasters are corroborated by statements of other writers at the time. And to some extent, similar events are observed in recent earthquakes. For instance, what is described as a town absorbed by sand and dust may be a result of the well known phenomena of soil liquefaction and the subsequent sinking of buildings and objects into the soil during earthquakes.¹⁷⁸ Soil liquefaction occurs when sandy soils with high ground water tables are shaken by prolonged tremors, this has recently caused modern houses to topple and cars to sink.

6.2.3 Dragons and astronomical events

Dragons and serpents are also present in almost every religion and legends as representations of evil coming from the sky or the sea, and they are associated with destruction by fire, floods, lightning, pestilences and storms. In the case of airborne dragons, fireballs, meteorites that light up in the atmosphere) seem to be good candidates for natural sources of inspiration for such myths: Dragons fly across the sky and sometimes make roaring sounds or thunder, they spit fire, leave noxious smells and where they land, there is a smoking hole in the ground. Could this have led to the conclusion that when many dragons are seen there are noxious gases not only directly spewed into the air but released from the depths of the Earth? Other possible explanations for myths and allegories of dragons or the 'feathered serpent' are comet tails or electric discharge events in the skies (as for instance postulated by David Talbot of the Thunderbolt Project). Further, the appearance of severe red sprite lightings in the sky might have been interpreted as fire spewing creatures. Only in Chinese traditions, dragons also have positive connotations. No evidence for flying elongated or snake-like animals can be found in the archeological record. And no evidence for any animal capable of spitting fire.

More accounts of foul smells

Reporting after the Black Death, the Venetian chronicler Lorenzo de Monachis (1351-1428) also claims that "*the **unbearable smell in the City (of Venice) was the main cause***" of the pandemic. Notice he did not assume the smell to be a mere co-effect of the pandemic. We remind ourselves that the first areas affected by the plague were Mediterranean coastal cities, particularly in Sicily, this is one major argument for the theory that a contagious disease was brought into Europe from the East by ship. The academic consensus that claims the death toll was the highest along the Mediterranean coast (up to 75%), does not necessarily mean that these coastal cities were the source of the outbreak of a contagious agent, it may simply mean that harmful substances could have come from the sea or sea air and the coastal population was affected most directly.

Methane

We learned that the Papal physician *Guy de Chauliac* had Pope Clement sit **between two large fires** that were meant to cleanse the corrupted air. And this prophylaxis is believed to have saved the pontiff.¹⁷⁹

¹⁷⁷ Konrad von Megenberg; Franz Pfeiffer (editor) *Das Buch der Natur*, 1861 Stuttgart p. 112

¹⁷⁸ <https://www.britannica.com/science/soil-liquefaction>

¹⁷⁹ Byrne J.P. *Black Death* p 72

Methane gas burns in low temperature flames. In low concentrations it burns without an explosion. Tectonic movements often trigger methane release, as has been seen in the case of recent formations of giant sinkholes in Siberia. In the same region, we see methane gas release from permafrost. This is then - by the proponents of the anthropogenic cause of climate change - declared to be a product of permafrost melting due to warming, even when the temperature in the region has not risen, as in the case of this study of 2016 in the Siberian tundra, where the temperature has not changed. But measurements taken by researchers on expeditions to the island found that after removing grass and soil from the 'bubbling' ground, the carbon dioxide (CO₂) concentration released was 20 times above the norm, while the methane (CH₄) level was **200 times** higher.¹⁸⁰

Natural release of methane from the ground is not necessarily associated with any smell so it can go undetected even in concentrations leading to health risks. The 'normal' atmosphere contains about 2.2 ppm by volume of methane.

It is beginning to dawn even to the bureaucrats of the IPCC that greenhouse gases such as CO₂ and methane are released not only by volcanoes and permafrost but also by earthquakes, as newspapers title; *'Earthquakes contribute to global warming by releasing greenhouse gas from the ocean floor'* *Scientists find methane released into North Arabian Sea by 1945 earthquake*¹⁸¹

There are several gases that can be naturally released from the ground which could lead to the following scenario: when the papal physician had two fires placed on either side of the pope at Avignon, could it be that the alleged success of this measure was due to the burning of volatile, poisonous and combustible compounds in the air, such as methane, hydrogen sulfide or benzenes, and thus reducing the concentrations of these gasses?

The methane gas levels are not known for the period of the Black Death. And increases thereof would not necessarily have to be registered in the Greenland or Antarctic ice sheets, if the emissions were local and concentrated around the Mediterranean, for instance.

CO₂ levels, on the other hand, were increasing in the century before the plague, but this compound does not have any direct health affects in the concentrations measured at the time, it is rather an indicator of broader atmospheric changes that were taking place at the time. More CO₂, for instance, is released by volcanoes in the current day. I repeat It is not without irony that the main measurement station for global CO₂ is on the Mauna Loa volcano in Hawaii, the same volcano that is reported by the USGS to be releasing CO₂ at an increasing rate.¹⁸²

As far as methane is concerned, miners used to place canaries in deep mines to check methane gas levels. *"Reportedly, canaries keeled over at about 16% oxygen indicating it was time to leave. Methane is extremely flammable and can explode at concentrations between 5% (lower explosive limit) and 15% (upper explosive limit)"*¹⁸³

From Wikipedia we learn that methane itself is nontoxic, yet it is extremely flammable and may form explosive mixtures with air. Methane is violently reactive with oxidizers, halogen, and some halogen-containing compounds. Methane is also an asphyxiant and may displace oxygen in an enclosed space. Asphyxia may result if the oxygen concentration is reduced to below about 16% by displacement, as most people can tolerate a reduction from 21% to 16% without ill effects. The concentration of methane at which asphyxiation risk becomes significant is much higher than the 5–15% concentration in a flammable or explosive mixture. Methane off-gas can penetrate the interiors of buildings near landfills and expose occupants to significant levels of methane. Some buildings have specially engineered recovery systems below their basements to actively capture this gas and vent it away from the building.

¹⁸⁰ The Siberian Times: Now the proof: permafrost 'bubbles' are leaking methane 200 times above the norm

¹⁸¹ <http://www.dailymail.co.uk/news/article-2380434/Earthquakes-contribute-global-warming-releasing-greenhouse-gas-ocean-floor.html>

¹⁸² Volcanic gas Measurements on Mauna Loa are an expanded challenge
https://hvo.wr.usgs.gov/volcanowatch/archive/2004/04_12_29.html

¹⁸³ Accredited Environmental Technology <http://aetinc.biz/newsletters/2010-insights/october-2010>

Radon Gas as earthquake precursor

Other gases emitted from the earth are very harmful to humans in only smaller concentrations and they are directly related to earthquake activity. In the case of toxic radon gas, radon-thoron isotope pairs are used as a reliable earthquake precursor.

Radon is a naturally occurring radioactive gas produced by the decay of uranium 238, which is present throughout the Earth's crust. It is an invisible, odorless gas that seeps out of the ground and causes an estimated 1,100 deaths from lung cancer every year only in the UK (that's in our currently tectonic relatively quiet times).

Yong Hwa Oh & Guebuem Kim (2015) monitored ²²⁰Rn together with ²²²Rn in air of a limestone-cave in Korea for one year. They concluded:

*“Unusually large ²²⁰Rn peaks were observed only in February 2011, preceding the 2011 M9.0 Tohoku-Oki (better known as Fukushima) Earthquake, Japan, while large ²²²Rn peaks were observed in both February 2011 and the summer. Based on the analyses, the researcher suggested that the anomalous peaks of ²²²Rn and ²²⁰Rn activities observed in February were precursory signals related to the Tohoku-Oki Earthquake”.*¹⁸⁴

If methane, radon gas and similar gasses emitted from the ground were part of the problem in the 1348 health crisis, it could partially explain why it was said, that in some households, whenever one person became ill, the other would soon follow. And despite of this, few people were afraid of physical contagion from person to person in public places.

Hydrogen sulfide

Another toxic gas that can be emitted from the ground is hydrogen sulfide, which is water soluble and thus would fit with the notion of poisoned wells. Further, in low concentrations it smells like rotten eggs, which may remind the reader of the reports of foul odors and rotten smells.

Hydrogen sulfide is emitted gradually from lakes and the sea by ancient anaerobic bacteria and archaea that pre-date oxygen-using life. As part of their life cycle these bacteria and archaea emit hydrogen sulfide. When these organisms become more dominant, the oceans, lakes and seas begin to plume increasing amounts of hydrogen sulfide into the atmosphere. Hydrogen sulfide is the likely culprit in many previous planetary extinction events.

Hydrogen sulfide is a deadly broad-spectrum poison. It is lethal to humans with one or two breaths in concentrations of 1 part per thousand. In other words, if the air you breathe is 99.9% clean and 0.1% hydrogen sulfide then it will kill a person after one or two breaths. It is also a water-soluble gas and will contaminate water. It is a heavier-than-air gas so it will tend to seek out low-lying areas such as rivers, lakes, seas, oceans, valleys, ravines, ditches, quays, bays, gorges, canyons, basements, underground facilities, etc. It is also highly flammable and is reactive with numerous substances, including (but not limited to) copper, rusty iron/steel, nitric acid, and sodium hydroxide.

At very low concentrations hydrogen sulfide is said to smell like 'rotten eggs'. **However, one should not count on being able to smell it at any concentration beyond the trivial as it paralyzes the olfactory sense and at the point at which one can smell it at all, then the smell will fade rapidly.** That does not mean the danger is gone. At medium-high concentrations, some people say that it can smell 'flowery' or 'sickeningly sweet'.¹⁸⁵

After long term emissions, once it is diluted in the air and dispersed into the stratosphere, it destroys ozone, which increases influx of harmful UV-radiation and subsequently, DNA and RNA damage and genetic defects.

¹⁸⁴ <https://www.nature.com/articles/srep13084>

¹⁸⁵ The Jumping Jack Flash Hypothesis: It's A Gas Gas
Gas! <http://jumpingjackflashhypothesis.blogspot.ch/2012/02/jumping-jack-flash-hypothesis-its-gas.html>

Further, hydrogen sulfide destroys hydroxyl radicals in the atmosphere; the loss of hydroxyl radicals means that atmospheric methane will last considerably longer in the atmosphere than it normally would, since hydroxyl radicals would normally mitigate the methane.

The Mediterranean Sea problem

The real distribution pattern of the spread of the plague is more consistent with harmful substances being emitted from the sea, or clouds of gases being blown in from the Eastern Mediterranean Sea, partially rained out into the sea and coast land to have a more-long term effect on the population.

Mike Baillie constructed an accurate corrected time laps map of the spreading of the plague that shows the actual contours of spread of the plague, which is consistent with concentric rings emanating from the eastern Mediterranean Sea. In this map, the area associated with January 1348 includes, roughly, western Anatolia, Greece, Italy and the Adriatic territories. From this initial patch, the disease spread in all directions, more rapidly in a south-, west- and east- direction and less rapidly in the northerly direction.¹⁸⁶

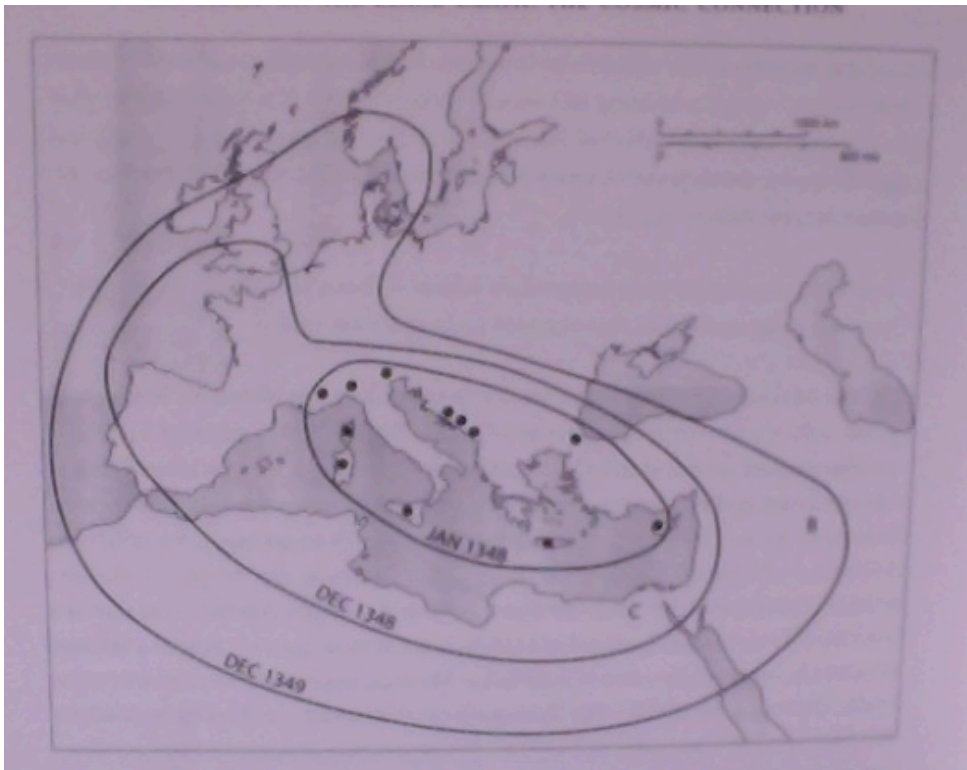


Fig. 16 Suggested contours of the spread of the plague assuming the true start was in January 1348, not late 1347 by Mike Baillie. This would be consistent with a pathogen descending through the atmosphere as first suggested by Sir Fred Hoyle and Chandra Wickramasinghe. The black dots are mostly from Peter Rasmussen's list of definite first occurrences. Graphic: Mike Baillie 2006

Even at the time of the ongoing pandemic, members of the Medical Faculty at the Paris University concluded a non-contagious origin of the pandemic. When an analysis on the plague was demanded from the scholars, already in October of 1348, they pointed to the "*overly humid and odorous air, that spread over Europe coming from India*", and this was declared to be the **cause** of the outbreak (*not a co-factor*).¹⁸⁷

¹⁸⁶ Baillie, Mike, 2006; *New Light on the Black Death*; p. 194

¹⁸⁷ Harald Kleinschmidt, 2013, *Wie die Nase zum Riechorgan wurde*, Berlin, p. 40

“(...) From air corrupted in its substance, and not charged in its attributes. By which we wish it be understood that air, being pure and clear by nature, can only become putrid or corrupt by being mixed with something else, that is to say, with evil vapours. What was that the many vapours which had been corrupted at the time of the conjunction were drawn up from the earth and water, and were then mixed with the air and spread abroad by frequent gusts of wind in the wild southern gales, and because of these alien vapours which they carried the winds corrupted the air in its substance, and are still doing so. And this corrupted air, when breathed in, necessarily penetrates to the heart and corrupts the substance of the spirit there and rots the surrounding moisture, and the heat thus caused destroys the life force, and this is the immediate cause of the present epidemic.”¹⁸⁸

The report does go on to include the danger of air from unburied corpses, and poisonous vapours from **swamps, lakes and chasms**.

*“Another possible cause of corruption, which needs to be borne in mind, is the escape of the **rottenness trapped in the canter of the earth as a result of earthquakes** – something which has indeed recently occurred. “*

And then there is the statement of the Florentine Chronicler Giovanni Villani, who became a victim of the plague himself. Before he had fallen ill, he concluded that the earthquake of Friuli (January 1348) had *released bad odors, **that caused the pestilence***.¹⁸⁹

For comparison, In AD 79, Pliny the Elder witnessed a vast fish die-off in the golf of Naples only days before the infamous and devastating Vesuvius eruption that destroyed Pompeii. Pliny himself became the most famous victim of this catastrophe. We don't know what exact mechanism was responsible but it can be safely assumed that the perishing of the fish was directly connected to the eruptions. As far as the 1340s are concerned, although no significant mass ejection eruption of a terrestrial volcano was recorded in the years of the Black Death in Europe, increased outgassing of undersea and volcanoes must be taken into account, but this would lead no traces on the ground. As we've seen, a surge in terrestrial volcanic eruptions had taken place in the later part of the previous century but not directly before the pandemic.

6.2.4 Toxins from the ground: A comparison to Africa 1986

We know from recent, modern day geological events, that natural gases emanating from the ground can kill large numbers of people without any noticeable tectonic movement. In this example, we are looking at a local single incident, not an intercontinental long term catastrophe. However, in periods of greater tectonic instabilities we would have to multiply the effects on the environment accordingly.

Lake Nyos, a Lake in Cameroon, naturally fills an ancient crater of an extinct volcano. It had long been quiet. Farmers and migratory herders knew the lake as large, still and blue. *“On the evening of Aug 21st, 1986, farmers living near the lake heard loud rumbling. At the same time, a “frothy spray” shot hundreds of feet out of the lake, and a white cloud collected over the water. The cloud was 100 meters tall and flowed across the land. Farmers near the lake, who left their houses to investigate the source of the noise, lost consciousness. The cloud of CO₂ killed 1,700 people in a range of up to 25 km distance.”¹⁹⁰* No earthquake or cracks in the surrounding ground were reported.

A silent and odorless killer mist, without any reports of 'foul' or 'noxious' gases even. So, in times when earthquake swarms travel over 1400 kilometers, could similar outgassing events accumulate at the same time? Such outgassing that directly affect the population on the ground, would not even have to leave any punctuated fingerprints in the ice core records as the gases would be dissipated over the years before they are trapped in the polar ice.

¹⁸⁸ Horrox Rosemay *The Black Death* p.161

¹⁸⁹ SAO/NASA Astrophysics Data System (ADS), Journal for the History of Astronomy, Vol. 9, Author dall' Olmo, U. p. 115

¹⁹⁰ Susan L. Nasr <http://science.howstuffworks.com>

In addition to this terrestrial/ geological event, we have a contemporary example of a meteorite impact in Peru in 2007, that caused the release of toxic fumes from a small crater, which led to people falling ill on the spot (see below).

6.2.5 Comets and foul odor

We recall Johannes Nohl's account of the events between 1298 and 1314: *seven large "comets" were seen over Europe; one was of "awe-inspiring blackness. Many reports of foul smelling "mists" appeared continually after seeing bright lights in the sky, followed by an outbreak of the plague*".¹⁹¹ In this case, "the plague" is not the Black Death, but an outbreak of "a" plague that coincided with the Great Famine in Europe decades before.

Returning to the Black Death, we read from the 'Medieval Treatise by practitioners of the Medical Faculty of Vienna':

*"The cause of the plague was seen as being contained in the spoiled Air (Miasma- theory), the poison of the Plague was said to come from the air (poisoned air can also be released by earthquakes from the interior of the Earth), the poison enters the body by absorption through the skin or by inhalation(...) another theory of the development of the plague was the iatro-astrological (...)"*¹⁹²

Even though our modern-day sophisticated doctors claim that the medieval physicians had insufficient knowledge using primitive techniques, it seems the latter, unknowingly, were on the right track to solving the problem by paying attention to environmental and cosmic factors.

6.3 Problems with transmission models for an infectious agent.

It is not my intention to provide an alternative explanation for the pandemic.

We don't even need a contagious, single disease to explain the drastic population reduction at the climax of the crisis in 1348-1351. The calamity seems to have involved many diseases or symptoms of transformation processes, of poisoning and/ or energetic changes.

Here is how 'the plague' in the context of the Biblical Exodus was viewed in the 15th century.

This Bible illustration was made in 1411 and is titled "*Plague, Ten Plagues of Egypt*" (the German word Beulenpest is used which means Buebonic Plague), just decades after the Black Death plague had devastated Europe. The corresponding lines are from Exodus 9:9: *"It will become fine dust over the whole land of Egypt, and festering boils will break out on people and animals throughout the land."*

"It" meaning a hand full of soot from a furnace that Moses threw in the air in the presence of Pharaoh. So, apparently it is understood when the biblical creator punished certain peoples with plague, what he had in mind, was **soot in the air, raining down** and making people (selectively?) sick, which would then chime in with the numerous references of foul mists and pestiferous winds in the 1340s.

The symptoms depicted in the manuscript are buboes distributed over the body, not concentrated in the groin, armpit or neck. As we saw above, such non-specific diagnoses of boils or other skin irregularities were used throughout the middle ages to persecute people under leprosy laws.

¹⁹¹ Johannes Nohl, 1926, *The Black Death, A Chronicle of the Plague*, London, George Allen & Unwin Ltd., pgs. 56-57;

¹⁹² Tuisl, Elisabeth: 2014: *Die Medizinische Fakultät der Universität Wien im Mittelalter: Bis zum Tod Kaiser Maximilian I. 1519*; , p.165

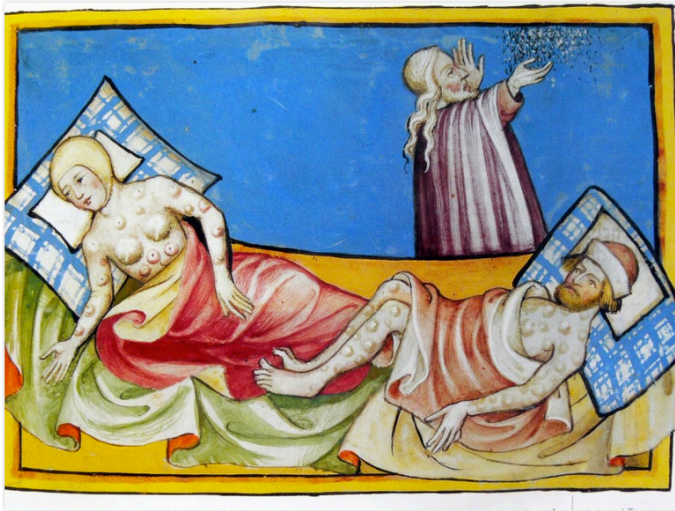


Fig. 17 “Toggenburg-Bibel (Switzerland) (“the Ten Plagues that came over Egypt) This illustration of the ten plagues of Egypt shows Moses tossing “soot” into the air, from which the people fell ill with boils on their skin. The title says “Bubonic Plague” (Beulenpest) but the distribution of the boils led to the reinterpretation of the disease being small pox. Toggenburg Bible in 1411.. © Foto: Kupferstichkabinett der Staatlichen Museen zu Berlin - Preußischer Kulturbesitz

6.3.1 Descriptions of symptoms of the 1348 crisis

Much was written by modern scholars about the real instigator of the Black Death pandemic, some suggested it was pulmonary instead of bubonic plague or anthrax. Others invoked fast mutating ‘virus’, for instance small pox. Hoyle and Wickramasinghe postulated a virus from space¹⁹³ It would be difficult to prove that a virus or the RNA thereof could penetrate on a high velocity bolide and still survive. So how could RNA or DNA in a dust cloud survive the cosmic rays. If that is possible it would mean, we either don’t understand space or biology or neither of the two. Indeed, we know much less than is generally believed. It is striking enough that we are still unable to prove the existence of pathogenic transmittable virus’ but take measures to fight them, as if we knew. On another note, an influx of particular electric energy from space could indeed very easily affect human health in such a way it could be perceived as a pandemic. We know that electromagnetic radiation in various ranges in the spectrum (x-ray, gamma rays and so on) or charged particle flux, can lead to genetic mutations much like nuclear radiation. Possible natural causes for such radiation input would be galactic gamma bursts or destruction of the protective ozone layer by comet explosions in the atmosphere, disturbances of Earth’s magnetic field.

However, the ‘primitive’ mediaeval doctors were certainly on the right track in as far as the main cause was closely related to disturbances in the skies and the ground that must have been cosmically induced.

Contemporary writers gave very different descriptions of symptoms and modern day editors had a lot of work to do in order to arrive at a consensus of what the victims suffered from. If I would have to give a condensed summary, I would say: Nobody really knows!

Hecker maintains that the characteristic buboes that are confined to the groin and armpits don’t appear in the primary sources written by doctors at the time:

“Only two medical descriptions of the malady have reached us, the one by the brave Guy de Chauliac, the other by Raymond Chalin de Vinario, a very experienced scholar, who was well versed in the learning of the time. The former takes notice only of fatal coughing of blood; the latter, besides this, notices epistaxis, hematuria, and fluxes of blood from the bowels, as symptoms of such decided and speedy mortality, that those patients in whom they were observed usually died on the same or the following day.”¹⁹⁴

As seen above, I did find only one contemporary source, Konrad von Megenberg, that can be reliably be considered unaltered, who explicitly describes buboes in the armpits (see page 101).

And then Hecker directly addresses atmospheric poisons involved:

¹⁹³ Hoyle Fred, Wickramasinghe Chandra, 1993: *Our Planet and the Cosmos*; London

¹⁹⁴ Hecker, *The Black Death and The Dancing Mania* p. 5

*"Now, if we go back to the symptoms of the disease, the ardent inflammation of the lungs points out, that the organs of respiration yielded to **the attack of an atmospheric poison**— a poison which, if we admit the independent origin of the Black Plague at any one place of the globe, which, under such extraordinary circumstances, it would be difficult to doubt, attacked the course of the circulation in as hostile a manner as that which produces inflammation of the spleen, and other animal contagions that cause swelling and inflammation of the lymphatic glands."*¹⁹⁵

C. Morris recounts of:

*"(...) **large black or deep-blue spots** over the body, from which came the name of "Black Death." Some of the victims became sleepy and stupid; others were incessantly restless. The tongue and throat grew black; the lungs exhaled a noisome odor; an insatiable thirst was produced."*¹⁹⁶

There is no safe way to confirm what percentage of the afflicted did actually have any buboes at all. Most sources speak of non-discriminate, 'boils; furuncles, cysts' distributed over the body, and /or black/ blue spots all over the body. Not all of them even mention the outward effect on the skin.

As a side note, black/blue spots would today likely be diagnosed as Kaposi Sarcoma which is believed to be a cause of HIV, but can be a simple result of chronic amyl nitrate poisoning (amyl nitrate are the main ingredients of the party drug poppers).

Any nitrites enhance neutrophil-induced DNA strand breakage in pulmonary epithelial.¹⁹⁷

Organic compounds similar to amyl nitrate can be created in high velocity impacts. Similar hydrocarbons are contained in comet tails, for instance CO, (carbon monoxide), and CN (cyanogen) are common in comet tails.

Buboes

The anonymous 19th century writer who edited Louis Heylingen's letter was one of the few who actually did explicitly point to certain 'aposthumes' appear under both arms" but calls this a second form of the sickness. The first stage he describes as such:

*"The disease," he writes, " is threefold in its infection; that is to say, firstly, men suffer in their lungs and breathing, and whoever have these corrupted, or even slightly attacked, cannot by any means escape nor live beyond two days. Examinations have been made by doctors in many cities of Italy, and also in Avignon, by order of the Pope, in order to discover the origin of this disease. Many dead bodies have been thus opened and dissected, and it is found that all who have died thus suddenly have had their **lungs infected and have spat blood.**"*¹⁹⁸

"There is another form of the sickness, however, at present running its course concurrently with the first; that is, certain aposthumes appear under both arms, and by these also people quickly die. A third form of the disease — like the two former, running its course at this same time with them — is that from which people of both sexes suffer from aposthumes in the groin."

Swollen lymph nodes are the best candidate for an explanation for the symptoms of the buboes in the characteristic locations, whenever they were present at all, the condition can be caused by a variety of toxins. According to medical textbooks, most cases of swollen lymph node in modern day diagnosis appear in the groin, armpits or on the neck.

Testimonies by physicians and illustrations in chronicles of the time almost exclusively describe dark spots (and in some cases buboes) distributed over the entire bodies.

¹⁹⁵ Ibid.: p.7

¹⁹⁶ Morris, C,1893: Historical Table: The Romance of Reality; Lippincott p. 162f

¹⁹⁷ Oxford academic <https://academic.oup.com/carcin/article/26/9/1642/2390940/Nitrite-enhances-neutrophil-induced-DNA-strand>

¹⁹⁸ Breve Chronicon clerici anonymi^a in De Smet, Recueil des Chroniques de Flandre^a iii, pp. 14-18.

There is a modern day medical term of Armpit lumps, caused by infections, lymph node swelling, cysts or abscesses under the skin may also produce large, painful lumps in the armpit.¹⁹⁹

Pulmonary plague, another popular proposed suspect for a culprit of the plague, cannot be diagnosed and unmistakably distinguished from other types of pulmonary diseases lung inflammation or pulmonary poisoning from inhalation of toxins, especially not post humanly after 700 years.



Fig. 18 English manuscript of ca. 1350. A bishop blesses a group of plague-stricken monks. Image: Campbell Dodgson, "The Invention of Wood-Engraving: A French Claim Considered," Burlington Magazine, Vol. 3, No. 8 (Nov. 1903), 209.

Cohn on the Black Death and bubonic plague

In the light of the above mentioned discrepancies, that question the participation of any contagious microorganism in the first place, let's have a look at additional problems in transmission models, whether it is human-to-human transmission or involving animals. Reading through the text of Samuel Cohn, I would like to point out that the 'bubonic plague' as a bacterial contagious disease even today is not understood, infection experiments give no coherent picture. Most of the details given by this Cohn not only dismiss bubonic plague as the culprit, but also support that no single mono-causal infectious agent could have created the rapidly spreading pandemic.

Samuel K. Cohn, quoted extensively by Baillie, also rebutted the theory (and that's really all it is, and a weak theory at that) that the Black Death was bubonic plague. In the Encyclopedia of Population, he points to five major weaknesses in this theory:

- *very different transmission speeds - the Black Death was reported to have spread 385 km in 91 days in 664, compared to 12-15 km per year for the modern Bubonic Plague, which has the assistance of trains and cars.*

*"The Black Death travelled 30 to 100 times faster over land than the bubonic plagues of the 20th century."*²⁰⁰

- *difficulties with the attempt to explain the rapid spread of the Black Death by arguing that it was spread by the rare pneumonic form of the disease - in fact this form killed less than 0.3% of the infected population in its worst outbreak in Manchuria in 1911.*

¹⁹⁹ <https://medlineplus.gov/ency/article/003099.htm>

²⁰⁰ [historyextra.com http://www.historyextra.com/article/international-history/10-things-you-probably-didnt-know-about-black-death](http://www.historyextra.com/article/international-history/10-things-you-probably-didnt-know-about-black-death)

- *different seasonality - the modern plague can only be sustained at temperatures between 50 and 78 °F (10 and 26 °C) and requires high humidity, while the Black Death occurred even in Norway and Iceland in the middle of the winter and in the Mediterranean in the middle of hot dry summers*

- *very different death rates - in several places (including Florence in 1348) over 75% of the population appear to have died; in contrast the highest mortality for the modern Bubonic Plague was 3% in Mumbai in 1903.*

- *the cycles and trends of infection were very different between the diseases - humans did not develop resistance to the modern disease, but resistance to the Black Death rose sharply, so that eventually it became mainly a childhood disease*

In reference of the images that I showed above, it is interesting that Cohn also points out that while the identification of the disease as having buboes relies on the account of Boccaccio and others, *“they described buboes, abscesses, **rashes and carbuncles occurring all over the body**, while the modern disease rarely has more than one bubo, most commonly in the groin, and is not characterized by abscesses, rashes and carbuncles which is what Boccaccio described.”*

Rats and flees

In the past, the feverish search for a contagious agent and a transmission model led to rats and flees. Some believe, rodents carry the bubonic plague even today. A number of records from between 1347 and the late 1600's speak of rodent infestations prior to several outbreaks of the Black Death, lending credence to the rodent theory. However, here again it is important not only to validate the sources, but to check the relationship between cause and effect. No explanation can be given how rats would run from village to village in the depth of winter in northern Europe or how fabric traders would transport flees at the speed of dozens of miles per day, in a crisis while half the population is dying. If people die in masses from pulmonary inflammation, fever and/ or swollen lymph nodes, and at the same time, rats are observed in the streets in houses in increased numbers, then this does not necessarily mean the rats carried a contagious agent. It may simply mean the rats are reacting with erratic behavior to the same cause that made people sick in the first place. Noxious terrestrial gasses or electric anomalies may drive rats from their underground dwelling places in sewage canals and cellars.

Animal behavior and tectonic activity

Seismic impulses, geological phenomena, that are as of yet not fully understood, electric anomalies in the atmosphere, are today all known to cause erratic animal behavior. For instance, bee populations fled in masses four days before the devastating rock fall in the town of Plurs in the southern Alps, of 1618, a disaster that killed 2000 villagers and left only 4 survivors.²⁰¹ Further, atmospheric upheaval or even simple weather changes are known to go along with unusual animal populations and their erratic behavior. Whatever caused the two unprecedented locust invasions into Western Europe just a few years prior to the Black Death, could it also have influenced the population and behavior of rats and flees?

As we saw, Pliny the elder reported dead fish in the Gulf of Naples only days before the Vesuvius eruption in 79 AD (see above). Centuries earlier, one of the earliest references we have to unusual animal behavior prior to a significant earthquake is from Greece in 373 BC. Rats, weasels, snakes, and centipedes reportedly left their homes and headed for safety several days before a destructive earthquake. Scientists of the USGS are aware of these connections, as research in earthquake predictions - using for instance lost pet reports - continues.

²⁰¹ <http://earthquakes.findthedata.com//789/Switzerland>

*“Anecdotal evidence abounds of animals, fish, birds, reptiles, and insects exhibiting strange behavior anywhere from weeks to seconds before an earthquake. However, consistent and reliable behavior prior to seismic events, and a mechanism explaining how it could work, still eludes us. Most, but not all, scientists pursuing this mystery are in China or Japan.”*²⁰²

As mentioned above, the philosopher Immanuel Kant wrote in 1755 that there were warning signs preceding the Earthquake of Lisbon, that was so strong that it made church bells sound in Sweden. Eight days before the quake the ground near Cadiz was covered with earth worms.²⁰³

We see it is difficult if not impossible to reach a definite conclusion on such interconnections and to differentiate cause and effects. But it is inevitable to keep in mind the coincidences of for instance: comet sightings and earthquakes, earthquakes and pandemics, earthquakes and volcanoes, comets and atmospheric disturbances and so on. It is apparent that in certain period of time, all of these phenomena have rapidly increased in frequency and severity. As I'm writing this in January 2017, the news come in: 'Earthquake triggers strong eruption at Sinabung volcano in Indonesia'.²⁰⁴ No prove for a causal relationship is presented in this case as of yet, but we now well know the two phenomena are often observed in conjunction.

We saw that, eye witness accounts from the time claimed that foul gasses released from the Earth were blamed for causing diseases. And we know that outgassing from natural grounds has caused mass casualties in recent years. Noxious gases can also be brought into the atmosphere from space or the gases can be generated by the forces of an impact.

No Impacts of the ground

Despite the many sightings of comets and fire balls, no major crater attributed to the exact period was found so far. But series of Tunguska type meteor explosion events could - without leaving craters - bring about these atmospheric disturbances and tectonic upheavals, which can then lead to more emission of harmful gasses. The 1994 impacts of the 19 fragments of comet Schumacher Levy 9 left large holes in Jupiter's atmosphere, each impact caused huge flashes of light in the size of planet Earth. At a 2007 press conference in Acapulco, Richard Firestone pointed out that, according to NASA, if the same fragments had struck Earth, they would not have left impact craters on the ground, they would have exploded in the atmosphere, much like the Tunguska object.

6.3.2 Nitric acid and nitrates (MINO3)

Several punctual ammonium NH_4^+ signals in the Greenland Ice Core are recorded within a few years of the Black Death, as was pointed out by Mike Baillie (2009).

Great changes in the atmosphere can be caused by high velocity bolide impacts into the atmosphere, whether they are asteroids or comets - although at this point the distinction between the two categories in terms of their material composition must be reevaluated, as both may turn out to be essentially of the same material and provenience.

Nitric acid rain fell following an extraterrestrial event and has been documented for the Tunguska event of 1908.²⁰⁵ The chemical signal is clearly registered in Ice core samples. But for the Black Death time frame no single nitric acid large peak is recorded.

The shock wave of a large object entering the atmosphere dissociates the N_2 in the atmosphere and the ozone in the stratosphere, and nitrate forms. This then rains out within

²⁰² USGS <http://earthquake.usgs.gov>

²⁰³ https://translate.googleusercontent.com/translate_c?depth=1&hl=de&prev=search&rurl=translate.google.ch&sl=en&u=https://www.newscientist.com/article/mg17924024-500-the-shining/&usg=ALkJrhgrZf-CSVPyYWXkHJIHWMsXk_0h9Q

²⁰⁴ <http://strangesounds.org>

²⁰⁵ Kolesnikov, E.M.et al, 1998. Isotopic anomaly in peat nitrogen is a probable trace of acid rain caused by 1908 Tunguska bolide. Planetary Space Science

months or years.²⁰⁶ For this process, the original chemical composition of the incoming body is of secondary importance.

Here is what we know about nitrate and nitrite poisoning from terrestrial sources:

Nitrogen is an important nutrient to plants and animals.

- Within soil and water, wastes from animals, humans, and fertilizer products are decomposed to form nitrates and nitrites.

Symptoms of nitrate/nitrite poisoning include:

- **Bluish skin** from a lack of oxygen (likely noticed around mouth/lips first). - Difficulty breathing - Nausea, diarrhea, vomiting - Dehydration (from loss of bodily fluids) - Fast pulse, dizziness, weakness, coma and/or convulsions.²⁰⁷

Compare these symptoms to the descriptions of plague victims by C. Morris, (1893), above:

*"(...) large black or deep-blue spots over the body, from which came the name of "Black Death." Some of the victims became sleepy and stupid; others were incessantly restless. The tongue and throat grew black; the lungs exhaled a noisome odor; an insatiable thirst was produced."*²⁰⁸

In everyday life of Europe's 14th century, poisoning by nitrate and nitrite from biological sources was a common health issue. Sources were primarily animal manure and human waste. However, as I said before, these emissions of toxins had been a steady health risk throughout the Middle Ages, they certainly have increased after the Great Famine and climate disruption and the subsequent general deterioration of living conditions in the early 1300's, but these biological sources themselves couldn't cause a sudden 'tipping point' for a mass poisoning event.

Ozone depletion of the upper atmosphere

High velocity atmospheric impacts also destroy ozone in the stratosphere and increase the influx of cosmic rays as less of this ionizing radiation is filtered out in the ozone layer. This can lead to increased cancer rates and genetic mutations, adding to the general decline in public health. Turco et al (1981) analyzed the event of the Tunguska meteor impact on the Earth's atmosphere:

*"In 1908, when the giant Tunguska meteor disintegrated in the earth's atmosphere over Siberia, it may have generated as much as 30 million metric tons of **nitric oxide (NO)** in the stratosphere and mesosphere.(...) Calculations indicate that up to **45 percent of the ozone** in the Northern Hemisphere may have been depleted by Tunguska's nitric oxide cloud early in 1909 and large ozone reductions may have persisted until 1912."*²⁰⁹

6.3.3 A comparison: Peru meteorite and toxins

Keeping in mind the various historical accounts of a corrupted atmosphere and anomalies in the sky at the onset of the Black Death, let's now compare this to one of the best documented contemporary examples of how an impact from space can directly cause respiratory illnesses in the local population. However, this incident, luckily, was moderate in scale, short lived and contained to a small area. The respiratory symptoms were attributed to arsenic fumes 'from the crater', released by the force of the impact:

On September 15th, 2007, a meteorite impacted near the village of Carancas in Peru, close to the Bolivian border and close to Lake Titicaca. The impact left a crater of about five meters in diameter and scorched earth around its location. Marco Limache, a local official, said that *"boiling water started coming out of the crater, and particles of rock and cinders were found nearby, as fetid, noxious gases spewed from the crater"*. The surface impact occurred

²⁰⁶ Prinn and Fegley 1987, Toon et al. 1997

²⁰⁷ Center for Disease Control. https://www.atsdr.cdc.gov/csem/nitrate_2013/docs/nitrate_patient-education.pdf

²⁰⁸ Morris C. 1893: Historical Table: The Romance of Reality; Lippincott p. 162f

²⁰⁹ Turco, R. P., et al, 1981: Tunguska Meteor Fall of 1908: Effects on Stratospheric Ozone. American Association for the Advancement of Science is collaborating with JSTOR to digitize, preserve and extend access to Science

above 3,800 m (12,467 ft) altitude.²¹⁰ National geography reported on health complications surrounding the incident:

“After the impact, villagers who had approached the impact site grew sick from a then-unexplained illness, with a wide array of symptoms. Two days later, Peruvian scientists confirmed that there had indeed been a meteorite strike, quieting widespread speculation that it may have been a geophysical rather than a celestial event. At that point, no further information on the cause of the mystery illness was known.”

*“Nearby residents who visited the impact crater complained of headaches and nausea, spurring speculation that the explosion was a subterranean geyser eruption or a release of noxious gas from decayed matter underground.”*²¹¹ But the illness was then declared to be the result of inhaling arsenic fumes, that apparently were released from the ground by the force of the impact.

No further studies are known to me at this point on how it was determined whether the arsenic gases had been present in the ground all along and were then released, or whether they were introduced by the impacting object itself. For the moment, I merely propose that both is possible. For the former option, we would have to ask, how it would then not be normal for toxic fumes to leak from soil and rocks in various places, whenever excavation work is done. It is reasonable to assume that locals would have found out after hundreds of years, that whenever someone digs a hole in this region, everyone nearby becomes ill. further, electric exchanges associated with impact events must be taken into account.

Meteor Crash in Peru Caused Mysterious Illness

José Orozco in Caracas, Venezuela
for National Geographic News
September 21, 2007

An object that struck the high plains of Peru on Saturday, causing a mysterious illness among local residents, was a rare kind of meteorite, scientists announced today.

A team of Peruvian researchers confirmed the origins of the object, which crashed near Lake Titicaca, after taking samples to a lab in the capital city of Lima (see Peru map).

Nearby residents who visited the impact crater complained of headaches and nausea, spurring speculation that the explosion was a subterranean geyser eruption or a release of noxious gas from decayed matter underground.

But the illness was the result of inhaling arsenic fumes, according to Luisa Macedo, a researcher for Peru's Mining, Metallurgy, and Geology Institute (INGEMMET), who visited the crash site.

Enlarge Photo

Printer Friendly

Fig. 19 Source: <http://news.nationalgeographic.com/news/2007/09/070921-meteor-peru.html>

7 Earth changes around the world

7.1.1 Americas

For continents other than Eurasia, we have limited anthropogenic records of events at the time and thus we can only make estimates about the impacts on human populations.

However, some of the climate anomalies of the time were reconstructed.

I've referred to Mike Baillie and the well defined reduction in tree growth even in New Zealand.

In the early 1300's, the South West of North America saw devastating climate variability, while the pacific coast of South America was affected by severe floods.

²¹⁰ wikipedia.org/wiki/2007_Carancas_impact_event

²¹¹ National Geographic News September 21, 2007

In North America, Andrew Douglas applied dendrochronology dating in the abandoned settlement of Arroyo Hondo in New Mexico. He first discovered that there was a severe drought between 1276- 1299, which almost certainly made it impossible to sustain agriculture in the region.

*“Arroyo Hondo was established about 1300 AD when precipitation was increasing after a 50-year-long period of mostly below average values. (...) the increased rainfall made this location attractive to settlers for the first time. Initially, a small group of farmers constructed an alignment of rooms along the edge of the canyon”.*²¹²

With (...) favorable climatic conditions, the pueblo grew to nearly a hundred times its original size in the first three decades of the 1300's. The settlement reached its greatest size around 1330, comprising 24 room blocks constructed around 10 enclosed plazas.

*At about **AD 1335** the pattern of precipitation shifted toward high annual variability, with severe droughts separated by brief wet intervals soon after 1335 the town's population began to decline even more drastically than it had increased **by about 1345** the pueblo was virtually abandoned (for the next 30 years). Then, sometime during the 1370s, a second phase of settlement began.*²¹³

Further, a sudden disturbance in tree growth of bristle cone pine is evident in dendrochronologies for the studies in the western USA with a notable negative peaks in growth in 1336 and 1350. These correspond well with tree-growth patterns in Europe. this is what led Mike Baillie to recognize this time frame as a global climate event.

South America

The climate changes at the beginning of the Little Ice Age clearly manifested in the Americas. An Argentinian study of 1990 on the Andes of northern Patagonia found comparable patterns of climate change as are known from Europe during the Little Ice Age:

*“Four main climatic episodes can be distinguished in this proxy paleoclimatic record. The first, a cold and moist interval from A.D. 900 to 1070, was followed by a warm-dry period from A.D. 1080 to 1250 correlative with the Medieval warm epoch of Europe. Afterwards, a long, cold-moist period followed from A.D. 1270 to 1670, peaking around **A.D. 1340** and 1650.”*²¹⁴

Miraflores flood

While the Millennial floods affected Europe, the Miraflores flood forced the decline of the Chiribaya culture ca. A.D. 1330 on the coasts of Chile and Peru.

„The catastrophic effects of large floods have been well documented, on both contemporary and paleo-timescales, especially for today's USA. Less is known, however, about extreme events in hyper-arid sub-tropical climates where synoptic scale meteorological causes, such as El Nino-Southern Oscillation events, are the driving atmospheric mechanism. This research documents the geomorphic effects of extreme floods in the Moquegua River valley of southern Peru, in the core of the Atacama Desert.”

*“Evidence for the regionally extensive Miraflores ENSO flood, ca. 1300 AD, exists in tributary and along mainstream sections. This flood has been documented along the coasts of Northern Chile to northern Peru, and has been evoked to explain significant social collapse. Our field evidence indicates that it catastrophically affected mid-elevation inland sections as well.”*²¹⁵

²¹² Rose, M.R., Dean, J.S. and Robinson, 1981, The past climate of Arroyo Hondo, New Mexico X-Xi

²¹³ Rose, M.R., Dean, J.S. and Robinson, 1981, The past climate of Arroyo Hondo, New Mexico Xi

²¹⁴ Villalba, Ricardo Climatic fluctuations in northern Patagonia during the last 1000 years as inferred from tree-ring records. Elsevier, Volume 34, Issue 3, November 1990, Pages 346-360

²¹⁵ http://www.researchgate.net/publication/252695231_Geomorphic_Effects_Chronologies_and_Archaeological_Significance_of_El_Nino_Floods_in_Southern_Peru

“This perspective has favored catastrophic interpretations for human responses to drastic climate events, such as the 14th century decline of the Chiribaya culture following the Miraflores flood dated to ca. A.D. 1330”.²¹⁶

8 After 1350

Earthquakes and storms calmed down to some extent and in Central Europe the harvest seasons partly normalized after 1350.²¹⁷

But the first cooling episode of the Little Ice Age had begun and throughout the years following the Black Death, the European continent experience further severe natural disasters, especially earthquakes.

Earthquake 1356 Basel, Switzerland

Only a few years after the great plague, the Great Earthquake of Basel occurred. It destroyed the city of Basel almost completely. Most of the buildings that didn't collapse in the quake, fell pray to the subsequent fires.

The Münster cathedral was one of the few buildings that remained standing only lightly damaged. The relatively low death toll of an estimated 2000 is regarded to be a result of an early tremor in the afternoon, which sent most people to flee the city, that was then destroyed by strong tremors late at night. However, keep in mind the enormous depopulation that had taken place in the decades before. Also, many survivors of the Earth changes period had fled from European cities to the countryside before and during the Plague.

During the Black Death alone in 1349, 14,000 residents are said to have died.²¹⁸

1361 saw a second outbreak of the plague in Central Europe and England, however less devastating than the Black Death.

Great flood in Flanders 15th -17th January, 1362

The *Grote Mandrenke*, which means “The Great Drowning” is named for the epic and massive flooding that occurred, more and more frequently in the Low Countries of Europe's North Sea region as Europe's Little Ice Age intensified beginning in the late 13th century. One of the first major flood events, the Grote Mandrenke flood of 1362, killed at least 100,000 people.²¹⁹

According to Andrew McKillop, such intense flooding in the low countries of Europe became “darkly repetitive” during the Little Ice Age. An estimated 400,000 people were killed in floods during the next 200 years. The cooling period itself lasted 450 years.

The flood devastated coastlines of Flanders, Germany and Denmark and also in England.

The ‘Great Wind’ of January 15th -17th 1362

The storm took its toll in England, however, the destruction came rather by wind than by flooding. The chronicle of Anonymous of Canterbury, Saturday, January 15th, reports of an extraordinary storm that left widespread devastation in England, not only in coastal regions:

²¹⁶ Magilligan, Francis J.: El Nino, floods and culture change: A late Holocene flood history for the Rio Moquegua, southern Peru, Department of Geography, Dartmouth College, Hanover, New Hampshire USA

²¹⁷ Pfister, Christian; Veränderungen der Sommerwitterung im südlichen Mitteleuropa von 1270-1400 als Auftakt zum Gletscherhochstand der Neuzeit; 1985, Geographica Helvetica

²¹⁸ Fürstenberger, M 1965: Die Pest in Alter Zeit. K. zum Schweizerischen Schulwandbilderwerk. Basel

²¹⁹ Andrew McKillop, 2013: Global Cooling And The Great Mandrake. <http://www.marketoracle.co.uk>

“(...) for church towers, windmills, and many dwelling-houses collapsed to the ground, although without much bodily injury.”²²⁰

8.1.1 Increase in sea storminess beginning around 1400

As we saw at the beginning, Viking colonies in Greenland were abruptly abandoned in the 1350's. A 1997 study by Kreutz et al indicates that meridional atmospheric circulation intensity increased in the polar South Pacific and North Atlantic at ~1400 A.D. The following graph tracks sodium levels over the past 1,200 years. The data was compiled from ice core samples from both poles (the data was collected at Siple Dome, West Antarctica and central Greenland). In times of climate disruption and global cooling, the temperature difference between the tropics and polar water is increased and more sodium, an indicator for sea salt, is deposited on polar ice sheets.

“Annually dated ice cores from Siple Dome, West Antarctica, and central Greenland indicate that meridional atmospheric circulation intensity increased in the polar South Pacific and North Atlantic at the beginning (~1400 A.D.) of the most recent Holocene rapid climate change event, the Little Ice Age (LIA). As deduced from chemical concentrations at these core sites, the Little Ice Age was characterized by substantial meridional circulation strength variability, and this variability persists today despite strong evidence for an end of the LIA cooling.²²¹ Thus, increased late 20th century storm variability may be in part a result of the continuation of these climatic fluctuations.”

Around 1400 AD, the ice cores at both poles clearly show a sharp rise in sodium, a time which some scientists say marks the onset of the Little Ice Age.

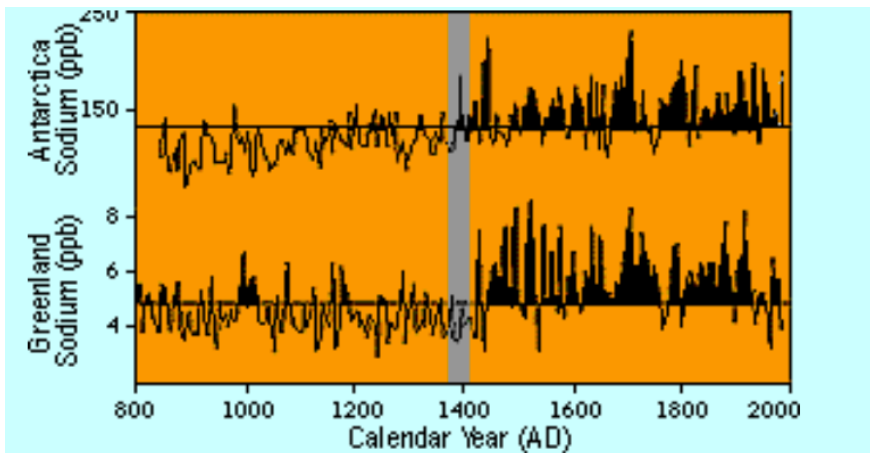


Fig. 20 Increase in sea storminess around 1400. In times of climate disruption and global cooling, the temperature difference between the tropics and polar water is increased and more sodium, and indicator for sea salt, is deposited on polar ice sheets. Graph modified from: Kreutz, K.J.et al.: in press 1997, Bipolar changes in atmospheric circulation during the Little Ice Age, Science.

The changes in global circulation patterns that began at 1400, are ongoing to this day.

Thus, it can be said, without exaggeration, that in terms of climate, the planet changed for ever at the end of the 14th century!

This data suggests that sea travel might have been generally safer and less challenging before the 1400's. When we also consider warmer temperatures and dryer conditions and

²²⁰ MEDIEVALISTS.NET February 8, 2015

²²¹ Kreutz, K.J. et al. 1997: Bipolar Changes in Atmospheric Circulation During the Little Ice Age, Science

thus better visibility for seafaring with primitive navigation instruments, it becomes not out of the range of possibilities that the northern sea route to Greenland and north America was managed before the 1400s (possibly long before that). In *Uriel's machine*, Knight and Lomas narrate how the route Orkneys- Shetland- Farcy- Iceland- Greenland can be managed with stretches of no more than 360 km between two landings. There are local records, held at the Bristol Customs and Excise archives, of a sailing master, called John Cabot trading with a land across the Atlantic, which we now call North America. These registers date from the early 15th century – well before Columbus.²²² Sailors claim the route to Iceland, from island to island, can be travelled without the sailors ever losing sight of land from the top of their masts. However, this would require extraordinary good conditions and the distances would require night sailing anyways, so good navigation skills were needed at any rate. Optical glass and telescopes were available only after 1600. Thus, the question whether or not the settlers of Greenland fled to the nearby American mainland in the 1350s when drift ice began to hinder the return to Europe, could have been settled much earlier, since this is very likely. With calmer seas and good visibility, a 360 km journey can be managed with good astro-navigation skills. Since the Vikings reached Iceland in the 900s, there is no reason why they wouldn't venture to the American mainland as well. The distance Iceland – Greenland is about the same distance as Greenland- Newfoundland. With warmer temperatures and calmer waters free of drift ice, this would be relatively easy during the Medieval Warm Period and hypothetically long before the above mentioned Cabot, even during the Roman Climate Optimum, or the Minoan Warm Period. The question whether someone did, is beyond this text, I'm just saying it's possible, since Thor Heyerdahl was able to cross the broad part of the Atlantic in an Egyptian reed boat even in today's ocean conditions, in 1969.

The sharp increase in sea storminess around 1400 is also confirmed by a 2005 study by the USGS²²³

8.1.2 Rapid mummification

Now let's return to the curious report of the contemporary Konrad von Megenberg. *"You should also know that the earthquake causes many miraculous things: a vapour coming out from the earth by the earthquake is responsible for transforming human beings and other animals into stone and in particular into stones of salt. This mostly happens in the mountains, where the people are digging for salt This is because the vapour and the force become so great and so overwhelming that they transform animals in this way. (...), that on some alpine meadows, situated in the higher mountains of Carinthia, about 50 petrified men and cattle had been found (turned into stones). Even the milkers would sit beside the cows, both transformed into pillars of salt."*

These statements appear to challenge the credibility of the source. It is easy to jump to the conclusion that Konrad just tried to invoke symbolical references to the Biblical account of Sodom and Gomorrah, although he didn't call the unlucky persons "pillars" of salt, as is written in other translations, but stones of salt. The reference to the Biblical story of the doomed cities would then hint to destruction by fire from the sky or more particularly, meteor debris fall-out. But, despite the many accounts of fire from the sky during the Black Death period, on the very day of the Friuli Earthquake, neither Konrad or other writer reported fire from the sky or hail of fire. Neither did they mention lightning discharges or similar.

²²² Knight C. Lomas, R. 1999: , *Uriel's Machine* p. 123

²²³ USGS; Frozen in time: ice and snow yield secrets from the past
https://hvo.wr.usgs.gov/volcanowatch/archive/2005/05_12_08.html

This subchapter is of a more speculative nature. So, what can quickly turn humans and animals into stone? Or were they only mummified?

We may get an idea that rapid mummification is not impossible when we take the story of the poor German sailor who made headlines in 2014, his mummified body was found in his damaged yacht, drifting in the Philippian sea. Police said the man had been dead only seven days. Germany's newspaper Bild daily also published pictures of the man's body, hunched over a table in the main cabin, and cited forensics experts who explained that a combination of tropical heat, dry wind and **salty sea air** can quickly preserve or mummify a corpse.²²⁴ Needless to say, this raises the question why this doesn't happen more often, since humans are lost at sea and found dead on their boats frequently. Could an electric discharge have anything to do with this?

At any rate, Konrad's details that the petrification happens in regions where salt is mined, this might be a hint.

Then there are the Inca children:

Although many bodies were preserved in constant sub zero temperatures and the high Andes mountains, the three bodies are in extraordinary good condition. The best preserved of the three, known as Lightning Girl, was at some point directly struck by lightning, the two nearby must have been almost equally affected.

The three Inca mummies included a 13-year-old known as the Llullaillaco Maiden," a boy "Llullaillaco Boy," and girl "Lightning Girl" whose remains were struck by lightning and charred. The mummified remains were entombed in a small chamber 1.5 meters underground near the summit of Volcán Llullaillaco in Argentina.²²⁵

Electric shocks can instantly dehydrate organic matter and mummify it, as allegedly happened in this tragic incident:

"Mummified remains found in manhole belong to man who was electrocuted more than a year ago, autopsy report concludes".²²⁶

Lightning can also turn organic matter into glass like substances:

There are two phenomena that are responsible for making natural glass on Earth: meteorites and lightning. Glass that is made as a result of the collision of a meteorite with the Earth's surface is called meteoritic glass or tektite. Glass (a glassy object, to be exact) that is made as a result of a cloud-to-ground lightning discharge is called a fulgurite (from the Latin "fulgur" which means lightning).

Other than instant mummification, organic materials can actually be petrified within minutes or hours by high voltage electric currents. As was witnessed when tree trunks were accidentally exposed to a high voltage power line:

Eric Milton describes his examination of a petrified tree trunk (essentially water and carbon) in Alberta, Canada:

"The piece was pure clear silica inside, it was coated with a rougher opaque crust of partially fused sand. The tree, whose stump was petrified, was alive five years ago! After the tree was cut down to accommodate the right of way for a new power transmission line, an accidental break allowed the live high-voltage wire to contact several tree stumps still in the ground. The power was cut off within hours of the break. All of the tree roots which contacted the broken wire were fossilized."²²⁷

²²⁴ Mummified Body Of German Sailor Found On Yacht A Week After His Death
<https://www.scoopwhoop.com/Mummified-Body-Of-German-Sailor-Found-On-Yacht-A-Week-After-His-Death/>

²²⁵ <http://www.natureworldnews.com/articles/3224/20130729/secret-last-moments-500-year-old-inca-mummified-children-revealed-drugged-freeze-to-death.htm>

²²⁶ The Daily Mail: <http://www.dailymail.co.uk/news/article-2668368/Mummified-man-manhole-likely-electrocuted.html#ixzz4hYFNz1s0>

²²⁷ <http://forums.canadiancontent.net/science-environment/122580-electric-fossilization.html>

9 Abrupt Earth changes and human behavior (madness, cruelty...)



Fig. 21. Franciscan Church of Göttingen, Altar piece (around 1424) illustrating the plague as a punishment from God. He sends deadly pestilence arrows, that are only partly intercepted by the praying Saints and the Virgin Mary. Original: Niedersächsisches Landesmuseum Hannover

9.1 Cannons and fire from the sky.

Let's take a closer look at the wars of the 14th century and human destructiveness. As we saw above, war was already plaguing Europe in the early 14th century around the time of the Great Famine beginning 1315, and then in a particularly devastating manner in the years before the onset of the Black Death, the early years of the Hundred Years War.

Wars and natural disasters have complicated interconnections. Simplified conclusions of historical accounts would lead us to assume that natural disasters lead to crop loss and starvation, so groups attack other groups to gain land and resources. But things turn out to be much more complicated.

Often in history, battles are said to have coincided with comet sightings, extreme lighting events, storms, even aurorae, these events are then later by the writers of history (the winners of wars) interpreted not as real and decisive factors for the outcome of a battle, but

as portents or 'acts of God'. Such relationships were most accurately pointed out by Laura Knight-Jadczyk in regards to the siege of Magdeburg in 1631.²²⁸

Another example, given by the same author, is the battle at the Milvian Bridge in the Apennine mountains. In AD 312 the Roman Emperor Constantine I allegedly saw a sign in the sky, converted to Christianity on the spot and led his army to victory against Maxentius under the new sign of the cross. The battle took place on an important route over the Tiber. Constantine won the battle and started on the path that led him to end the Tetrarchy and become the sole ruler of the Roman Empire. Maxentius drowned in the Tiber.

This incident did not involve the destruction of an entire city by fire or lightning from above. We know that military leaders throughout the ages often claimed to have seen portents in the skies to justify their claims of divine rule and to encourage their soldiers in battle. But could it be that sometimes they actually **did indeed** see something in the skies at the exact moment when for instance the entire opposing army was wiped out by a lightning strike?

Note the Battle of the Milvian Bridge took place on October 28th, which is within the time frame of the annual crossing of the Taurid meteor stream, in the calendar year only days before the Tunguska meteor event of 1908.

An other example, also not within the Black Death timeframe, but rather at the end of an earlier period of climate upheaval and in the early dark ages, is a fresco of the Moldovita monastery, Bucovina, Romania: It depicts the conquest of Constantinople in 626. The history books tell us that, after several months of siege by 80,000 Sassanid Persians and Avars, their ships were destroyed within a few days. The fresco depicts enormous tidal waves dashing enemy ships outside the defense walls as well as white and red flashes in the sky. Keeping in mind the dramatic Earth changes and celestial events in the 5th and 6th century, it remains to be determined whether this is one of the accounts that were written after the fact, and meteor showers were censored out of the history books, and the destructive action was later attributed solely to the actions of a mighty army.



Fig. 22 Moldovita monastery, Bucovina, Romania: It illustrates the conquest of Constantinople in 626. The fresco depicts enormous tidal waves dashing enemy ships outside the defense walls as well as white and red flashes in the sky.

Earlier in the text, we explored accounts from the Hundred Year's War (1337–1460) and I mentioned that, especially in the early decades of the conflict, seized cities were not used by conquering forces as new outposts for their campaign, but were burnt to the ground as a general practice, even if the surrounding territory was under control by the invading troops.

²²⁸ Laura knight-Jadczyk; The Apocalypse Comets, Asteroids and cyclical Catastrophes, 2012, Baltimore. p.153

Is it a mere coincidence that cannons in Europe are said to have been used for the first time in warfare in Algeciras in 1343? This battle was not part of the Hundred Year's War, but of the re-conquest of Spain. Was this novelty of cannons' importance assumed by historians in order to explain the sudden appearance of vast destruction by fire in the 1300's in the early years of the Hundred Year's War? Standard history of several battles explicitly point out the new phenomenon of European artillery in the 1340s. This is how Wikipedia recounts the chronology of firearm use:

"It was around the 1340's when the medieval cannon began to be used more widely in Europe, appearing in small numbers in several European states by the 1340s. "Thunder jar" weaponry utilizing gunpowder and other firearm technology spread to Spain in 1342 and to the city of Aachen in Northern Germany in 1346. "Ribaldis" were first mentioned in the English Privy Wardrobe accounts between 1345 and 1346, during preparations for the campaign in France. The effectiveness of these cannons was limited, as they are believed to have only shot large arrows and simple grapeshot, but they were so valuable that they were directly controlled by the Royal Wardrobe. Contemporary chroniclers such as the French Jean Froissart and the Florentine Giovanni Villani record their destructiveness on the field at the Battle of Crecy in 1346."

The same chronological pattern can be observed in China, the "birthplace" of gunpowder weapons. Although hand held cannons are confirmed already for the year 1288, we learn that in 1341, 'destructive' cannons were first discovered in ancient China. According to Zhang Xian, the cannon could

"pierce the heart or belly when it strikes a man or horse, and can even transfix several persons at once".

*"The earliest metal barrel guns were not designed for high-nitrate gunpowder and a bore-filling projectile; rather, they were designed for the low-nitrate flamethrower fire lance that shot small co-viative missiles. This was called the "bandit-striking penetrating gun" (ji zei bian chong), and was illustrated in a drawing in the Huolongjing. In the Islamic world, the fire lance first appears in a book of 1280 written by Hasan al-Rammah, and again appears in a manuscript of 1320. In Europe, the first representation of the fire lance is of a horse-mounted knight wielding the weapon in a Latin manuscript illustration dated to 1396, and also appeared in an illustration of Taccola's De Mechinis (1449)."*²²⁹

However, similar weapons were available already in the 13th century. Gun powder itself was invented already during the Tang Dynasty in China (9th century). Wikipedia:

"In the Middle East, the first use of the hand cannon is argued to be during the 1260 Battle of Ain Jalut between the Mamluks and Mongols".

The Heilongjiang hand cannon or hand-gun is a bronze hand cannon. (...) The passage on the 1288 battle is also the first to coin the name .²³⁰

So, after decades of limited application of firearms in battle, in the 1340s these weapons were suddenly emphasized by historians as having played an important role in wars for **German, English, French, Spanish, Chinese and Arab troops**.

But with cannons' "effectiveness still limited" in 1340²³¹, how is the sudden increase in historic references and their alleged importance to be explained? The ongoing devastation, explosions and widespread fires, along side the mindless torching of land, appears to be the actual novelty for the writers of the history of the early Hundred Years' War, when before that, cannons were rarely mentioned. Could it have to do with a sudden increase in incidents of cities being burnt to the ground and obliterated, without any military or strategic purpose? Considering the contemporary accounts of comet sightings, fireball activity, storms and lightning, we must assume that at least some of the extraordinary destruction was in later

²²⁹ Infogalactic, Huolongjing: <https://infogalactic.com/info/Huolongjing>

²³⁰ http://wikivisually.com/wiki/Heilongjiang_hand_cannon

²³¹ Lorge 2008, p. 32.

times falsely attributed to actions of war. For comparison, just imagine the accounts of fire storms raining from the sky during the Peshtigo and Chicago Fires of 1871 (see below).

It was only in 1341, two years before the Battle of Algeciras (in the Re-conquest of Spain), when the Chinese poet Zhang Xian writes the '*Iron Cannon Affair*' and warns of the destructive use of gunpowder and the cannon.

As we look at the state of the Earth today, it turns out we should have taken his warnings seriously.

"Five cannons" are said to have been used by the English at the Siege of Calais in 1346²³² (only months after the battle of Crécy). Here is a post fact illustration (date unknown) depicting a heavy piece of artillery on wheels. Earlier, contemporary illustrations of the same siege make no reference to cannons.

According to C. Morris, the siege of Calais lasted for a whole year, the inhabitants were starved out until their surrender. He makes no mention to firearms.

"Terrible and long-enduring had been the siege of Calais. For a whole year it had continued, and still the sturdy citizens held the town. Outside was Edward III., with his English host, raging at the obstinacy of the French and at his own losses during the siege. Inside was John de Vienne, the unyielding governor, and his brave garrison. Outside was plenty; inside was famine;"

Why were the fortifications not attacked and breached within a year with these marvelous new weapons, even if their powers were limited?



Fig. 23 Siege guns were used by the English in the siege of Calais in 1346 Image: illustration by unknown artist - H. W. Koch: *Illustrierte Geschichte der Kriegszüge im Mittelalter*, P. 127, Bechtermünz Verlag,

Modern day instances of fire 'from the sky'.

Now, let's read some eye-witness accounts of the Great Peshtigo Fire of 1871 that coincided with the Great Chicago Fire. The passages are taken from another article by Laura Knight-Jadczyk, *Comet Biela and Mrs. O'Leary's Cow*. The author details how the series of devastating fires, including "fire tornadoes" were caused by the disintegration products and outgassing of comet Biela, some of the damage was caused by unexplained electric phenomena, it seems that some people and objects were affected by what appeared to be

²³² Time line of the Hundred Year's War, <http://www.maisonstclair.org>

“radiation influx” from the sky. some details of description sound as if some objects on the ground were ‘microwaved’. Metals melting, while fabrics remained intact in the same spot. Here are some eye-witness reports:

*“A spectator of the terrible scene says the fire did not come upon them gradually from burning trees and other objects to the windward, but the first notice they had of it was a whirlwind of flame in great clouds from above the tops of the trees, which fell upon and entirely enveloped everything. The poor people inhaled it, or the intensely hot air, and fell down dead. This is verified by the appearance of many of the corpses. They were found dead in the roads and open spaces, where there were no visible marks of fire near by, with not a trace of burning upon their bodies or clothing. At the Sugar Bush, which is an extended clearing, in some places four miles in width, corpses were found in the open road, between fences only slightly burned. **No mark of fire was upon them;** they lay there as if asleep. This phenomenon seems to explain the fact that so many were killed in compact masses. They seemed to have huddled together, in what were evidently regarded at the moment the safest places, far away from buildings, trees, or other inflammable material, and there to have died together.”²³³*

*“Much has been said of the intense heat of the fires which destroyed Peshtigo, Menekaune, Williamsonville, etc., but all that has been said can give the stranger but a faint conception of the reality. The heat has been compared to that engendered by a flame concentrated on an object by a blow-pipe; but even that would not account for some of the phenomena. For instance, we have in our possession a copper cent taken from the pocket of a dead man in the Peshtigo Sugar Bush, which will illustrate our point. This cent has been partially fused, but still retains its round form, and the inscription upon it is legible. Others, in the same pocket, were **partially melted, and yet the clothing and the body of the man were not even singed.** We do not know in what way to account for this, unless, as is asserted by some, the tornado and fire were accompanied **by electrical phenomena**.”²³⁴*
*“The intensity of the heat may be judged, and the thorough combustion of everything wooden may be understood, when we state that in the yard of one of the large agricultural-implement factories was stacked some hundreds of tons of pig-iron. This iron was two hundred feet from any building. To the south of it was the river, one hundred and fifty feet wide. No large building but the factory was in the immediate vicinity of the fire. Yet, so great was the heat, that this **pile of iron melted and run, and is now in one large and nearly solid mass**.”²³⁵*

Now, these are well documented reports by historians and news reports from the 19th century. In comparison, for the years of the Black Death, it is obviously more difficult to corroborate the sources and determine, what exactly it was that rained or even radiated from the skies, but we saw numerous accounts of “rain” or “hail” of fire, columns of fire and the like. So, it is probable that some of the scenarios of soldiers traversing the countryside and torching each and every house, as in the Illustrations below, were partial fabrications or at least distortions of history. The population is always more comfortable and more easily controllable, when a calamity is caused solely by other groups or their corrupt leaders, against whom a new war can be waged or a “revolution” can be started. The powers that be would rather instigate a controlled uprising against their own than to cause a panic by the notion of heavenly disruption. By the way, at the time of Copernicus, the term “Revolution” didn’t have a social/ political connotation. This secondary context came about in the English Revolutionary War (1642–1651). The terms revolt or revolution are derived from the Latin *revolver* meaning ‘roll back’ to restore, which clearly implies spinning in circles rather than creating original, new systems and a new beginning. It is a mystery how any revolutionary movement would not be wary of this detail after 400 years of ‘revolutions’ without asking the

²³³ Sheahan & Upton, 1871: the History of the Great Conflagration of Chicago, p. 372

²³⁴ Ibid. 373.

²³⁵ ibid p.121

question.” To what rulers or system do we want to return to?” The term was originally astronomical and/ or astrological in meaning: the revolution of heavenly bodies or recurring cyclical events. These events usually were preceded by or coincided with social and political unrest or - in case of benevolent and stable climate conditions - times of prosperity.

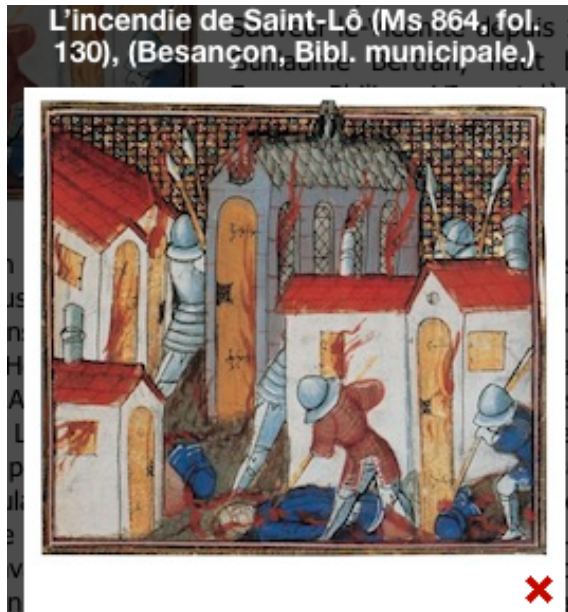


Fig. 24 1346. “The Sack of Caen by the English”. An illustration of the sack of Caen and the massacre of its citizens on July 26 1346, a church is torched by a soldier. Image source: Le manuscrit de Besançon. Bibl. Municipale. <http://www.patrimoine-normand.com/index-fiche-29874.html>

9.2 Madness, misery and energetic environment

The Hundred Year’s War not only began in decades of abrupt Earth changes, celestial anomalies, climate disruption and starvation. The war itself was also a conflict that involved extreme cruelty and destructiveness. The Black Death erupted little more than a decade after the onset of the war in Europe. In the same time period, there were reports of widespread fits of mental illness, cannibalism and phenomena such as the ‘*Dancing Mania*’.

As far as **cannibalism** is concerned, it is worth arguing whether starvation alone is enough or whether a greater collective disturbance of the human psyche is needed to exhibit such a behavior, from which even many mammals in life-or-death situations abstain. No reports of cannibalism during the immediate years of the plague are brought down to us, which is expected when people die of disease or poisoning. But such accounts are frequent from the time of the Great Famine decades before.²³⁶

More recently, cannibalism was widespread and well documented during the Russian famine of 1921–22, also known as Povolzhye famine, a severe famine in Bolshevik Russia which began in early spring of 1921 and lasted through 1922.

From Louis Heylingen we learn that many victims of the Black Death were even buried alive, much like it was done in previous centuries with lepers:

“Many related to him. For the father left his son, the son his father, on his sick bed. In any house when a person became sick with the infirmity and died it generally happened that all others there were attacked and quickly followed him to the grave; yea, even the animals in the place, such as dogs, cats, cocks, and hens also died. Hence those who had strength fled for fear of what had taken place, and, as a consequence, many who might otherwise have recovered perished through want of care. Many, too, who were seized with the sickness,

²³⁶ Glaser, Rüdiger, 2008, P. 66

being considered certain to die and without any hope of recovery, were carried off at once to the pit and buried. And in this way many **were buried alive.**"²³⁷

Further, various cases of religiously or otherwise believe-oriented passions or fits of "possession" and fanaticism were widespread in Europe during the years of the Black Death and beyond.



Fig. 25 Flagellants in Europe Photo: Kupferstichkabinett der Staatlichen Museen zu Berlin - Preußischer Kulturbesitz

https://commons.wikimedia.org/wiki/Category:Disease_in_medieval_miniature?uselang=en-gb#/media/File:The_flagellants_at_Doorik_in_1349.jpg

One of the groups of interest were the self-chastising **Flagellants** who first appeared in 1349 in Strasburg by the hundreds. *Flagellants* believed, as it was customary at the time, that the plague was a punishment from God for their sins, and their remedy would be achieved by proceeding through the streets with bare chests and barefooted, flogging themselves with whips (thus their name). The participants believed this had to be performed daily (Fig. 25). At their arrival in 1349 in Strasburg, they were first "hospitably lodged by the citizens. Above a thousand joined the brotherhood, which now separated into two bodies, for the purpose of journeying to the north and to the south. Adults and children left their families to accompany them; till, at length, their sanctity was questioned and the doors of houses and churches were closed against them."

Then there were different types of curious dancing fits.

"In Aamiens near Coucy," tannery workers, responding quickly to losses in the labor forces, combined to bargain for higher wages. In another place, villagers were dancing to drums and trumpets and on being asked the reason, answered that, seeing their neighbors die day by day while their village remained immune, they believed they could keep the plague from entering "by the jollity that is in us. That is why we dance."²³⁸

"Outbreaks" of a similar phenomenon, called the *Dancing Mania*, also appeared with the Black Death and continued well into the 15th century. The participants of these dancing excesses showed mostly non-aggressive, but often destructive, behavior, not only against themselves. Hecker dedicated a book called the *Dancing Mania* to this phenomena: "A few months after this dancing malady had made its appearance at Aix-la-Chapelle, it broke out at Cologne, where the number of those possessed amounted to more than five

²³⁷ Gasquet, Francis Aidan, 1908: *The Black Death of 1348 and 1349*, London George Bell and Sons p.44

²³⁸ Tuchman, Barbara W. A: 2011: *Distant Mirror: The Calamitous 14th Century*. Random House Publishing Group, p. 98

hundred, and about the same time at Metz, the streets of which place are said to have been filled with eleven hundred dancers."²³⁹

"Women have been seen to miscarry whilst suffering under the state of ecstasy and violent spasms into which they are thrown, and others have publicly stripped themselves and jumped into the rivers."

This far it sounds a little bit like Woodstock. But unfortunately, this is going on in the middle of an event that killed half the population. Needless to say, crawling in the filthy streets on bloodied knees while everybody is dying, did not improve general health.

"They have swooned away by hundreds, worn out with ravings and fits; and of the Barkers, who appeared among the convulsionnaires only here and there, in single cases of complete aberration of intellect, whole bands are seen running on all fours, and growling as if they wished to indicate, even by their outward form, the shocking degradation of their human nature."

*"At these camp-meetings the children are witnesses of this mad infatuation, and as their weak nerves are with the greatest facility affected by sympathy, they, together with their parents, fall into violent fits, though they know nothing of their import, and many of them retain for life some severe nervous disorder which, having arisen from fright and excessive excitement, will not afterwards yield to any medical treatment."*²⁴⁰

Further, there was general inhumane behavior such as abandoning sick and dying loved-ones. This is by modern day scholars explained by the terrible fear of infection, (despite the fact that contemporary commentators did rarely perceive a physical contagious connection to the plague):

"This utter abandonment of the infected was described by the Florentine writer Boccaccio in the introduction to his Decameron: "One man shunned another... kinsfolk held aloof, brother was forsaken by brother, oftentimes husband by wife; nay, what is more, and scarcely to be believed, fathers and mothers were found to abandon their own children to fate, untended, unvisited as if they had been strangers."

*The Pope's physician, Guy de Chauliac, reported on the same phenomenon: "A **father did not visit his son, nor the son his father. Charity was dead.**"*²⁴¹

A Bavarian chronicler of Neuberg an der Donau recorded that *"Men and Women (...) wondered around as if mad"* and let their cattle stray *because no one had any inclination to concern themselves about the future.*" One chronicler wrote: *" And in these days was burying without sorrowe and wedding without friendschippe."*²⁴²

Then there are the accounts of another example of erratic social behavior, however, more harmless, in the form of bold public appearances of apparently wealthy women against any patriarchic conventions. It was unheard of that women who possessed horses and jewelry would make public appearances without male company or permission. Is this the first outburst of a European feminist movement in the middle of the most devastating pandemic in history? The Leicester cloisterer Knighton writes:

"In those days (1348) there arose a huge rumour and outcry among the people, because when tournaments were held, almost in every place, a band of women would come as if to share the sport, dressed in divers and marvelous dresses of men- sometimes to the number of 40 or 50 ladies, of the fairest and comeliest (though I say not, of the best) among the whole kingdom. Thither they came in party- coloured tunics, one colour or pattern on the right side and another on the left, with short hoods that had pendent like ropes wound round their

²³⁹ Hecker J.F.C, 1834: The Black Death and The Dancing Mania. p.30

²⁴⁰ The Black Death and The Dancing Mania p.53

²⁴¹ Tuchman, Barbara W. 2011: A Distant Mirror: The Calamitous 14th Century; Random House Publishing Group p. 97

²⁴² Ibid. p. 99

necks, and belts thickly studded with gold or silver—nay, they even wore, in pouches slung across their bodies, those knives which are called daggers in the vulgar tongue; and thus they rode on choice war-horses or other splendid steeds to the place of tournament. There and thus they spent and lavished their possessions, and wearied their bodies with fooleries and wanton buffoonery, of popular report lie not...But God in this matter, as in all others, brought marvelous remedy; for He harassed the place and times appointed for such vanities by opening the floodgates of heaven with rain and thunder and lurid lightning, and by unwonted blasts of tempestuous winds....²⁴³

Again the lightning...!

What could cause widespread psychoses (other than starvation and misery)?

One of the many complications that people throughout the Middle Ages - not exclusively, but certainly more frequently in the 1340s - were faced with was ergotism or ergot poisoning, also known as St. Antony's fire. Among inflammation, fever, black spots, and necrosis, it causes psychoses and delusions.

I wrote about ergotism in the context of the social and political implications of leprosy throughout the Middle Ages.²⁴⁴

*From Wikipedia we learn "Ergotism is the effect of long term ergot poisoning, traditionally due to the ingestion of the alkaloids produced by the *Claviceps purpurea* fungus that infects rye and other cereals. It is also known as ergototoxicosis, ergot poisoning and Saint Anthony's Fire. Ergot poisoning is a proposed explanation of **bewitchment**."*

Long term, chronic ergot poisoning leads to necrosis in the periphery tissues, extremities die-off. In my article I had proposed that many alleged cases of leprosy in the early and high Middle Ages were simply sufferers of ergotism. The symptoms can hardly be distinguished from leprosy. Convulsive symptoms include painful seizures and spasms; mental effects of long term exposure include **mania or psychosis**.

The cereal fungus *Claviceps purpurea*, like other crop molds, grows particularly well in **wet and rainy** conditions. The larger cones of fungus or the most severely affected ears can be sorted out by a laborious process. But in times of famine, more compromises in food safety were made. All in all, crop failure due to wet seasons bears a particular extra danger as opposed to crop failure due to drought.

Which means in the decades before the Black Death, peasants were not only faced with smaller quantities of grain, but they were forced to take a greater risk of consuming ergot infested grains. Thus, an increase not only in malnutrition and starvation, but also in St. Antony's fire, including hallucinations, psychoses and necrosis of limbs, is expected in the cool and wet summers of the 1330s-1340s.

King Edwards III did not only explicitly expel all lepers from London just two years before the outbreak of the Black Death in that city, but other sources say during his entire reign (1312–77) he actually condemned at least some of them to death: "*Lepers, during his (Edward III) reign, were permitted the comforts of a Christian funeral. They were let down to the cemetery and buried alive.*"²⁴⁵

This last example is not out of the ordinary, as human life was regarded of little value throughout the Middle Ages.

All things considered, it does appear, the contemporaries of the Black Death were confronted with something that in popular culture might be described as a "zombie apocalypse."

²⁴³ Coulton, G. G, 2010: Medieval Panorama: The English Scene from Conquest to Reformation; Cambridge University Press. p. 490

²⁴⁴ abruptearthchanges.com

²⁴⁵ Brody, Saul N. 1974 "The disease of the soul" leprosy in the medieval literature, Cornell University Press

9.2.1 Natural changes affecting human behavior

Can electrical and meteorological perturbations in the Earth's environment drive masses of people collectively crazy?

Even in today's celestially relatively quiet days, common meteorological phenomena, are known to affect people's mental health and irritability. However, such weather phenomena are not observed to cause widespread severe mental illness or psychoses as described during the first half of the 14th century and other instances of upheaval. One would need to multiply the effects on our energetic environment, e.g. ionization of air, influence of electromagnetic long waves (very low frequency, VLF) or charged particles from space.

In "normal" conditions of recent decades, local downward winds on the leeward side of mountain ranges are often called "*Foehn, locally also known as Mistral, sirocco, harmattan, chinook, sukavei: they have a strong influence, wherever they blow, lives and even laws are arranged around them*". (sirocco in the Adriatic Sea, often used to be associated with outbreaks of epidemics of typhus and the like). In Southern California, the Santa Ana Winds have similar effects.

Marion Diamond, a retired historian, recounts that in the French Provence, the Mistral (a strong northerly wind blowing from the Alps) is said to have been a mitigating factor in legal cases in the past. "*If the Mistral blew for 9 days, then a murder committed on the 9th day was treated as a crime of passion, not as a cold blooded murder.*"²⁴⁶

W. Lechner et al of the Innsbruck University Clinic of Gynecology describe how the 'Föhn' as a warm, dry descending wind on the leeward side of mountain ranges, allegedly affects various medical phenomena. "*A correlation was found with the occurrence of thrombosis, lung embolism, heart attack, and other conditions. Further, Föhn is also made responsible for an increase in criminality and suicidal tendencies.*"²⁴⁷

"*In the study, the observed birth rates in Föhn regions was found to be 10 % higher during Föhn days. Among the proposed reasons are **changes in air pressure, changes in ionization balance, increase presence of exotic gasses (nitric oxides, radium emanation) as well as the influence of electromagnetic long waves (very low frequency, VLF)***".

At least 30% of the German population is weather sensitive.²⁴⁸

According to a 1981 study, researchers believe they have documented some psychological effects of positive ions. The experiments were described by Dr. Jonathan M. Charry of Rockefeller University and Dr. Frank B. W. of Hawkinshire N.Y.U. in an issue of the Journal of Personality and Social Psychology. The apparent effects of positive ions included increased tension and irritability as well as a slowing of reaction times.

"*Much of the early research on this subject was conducted in Israel, where the sharav has a marked effect. It has been reported that 30 percent of the population becomes ill with migraine, nausea, vomiting, **irritability, dimness of vision, respiratory symptoms and other effects.***

The symptoms are said to appear a day or two before heat and dryness become severe, but when air blowing in from the desert is already laden with positive ions."²⁴⁹

In 'The Testosterone Hypothesis', Roy Barzilai explores the connections between solar activity, testosterone levels and social/ political developments. In this excerpt we are concerned with geo-magnetic storms which can be quantified by the Kp-Index. A geomagnetic storm is a major disturbance of Earth's magnetosphere that occurs when there

²⁴⁶ Historians are Past Caring https://learnearnandreturn.wordpress.com/2014/05/17/and_they_call_the_wind/

²⁴⁷ Lechner W. et al; 1981: University Clinic of Gynecology, Innsbruck Austria.,

²⁴⁸ Zimmer, Dieter E; 1990.: „Der Mensch und sein Wetter“ (ZEIT magazin,)

²⁴⁹ New York Times, WALTER SULLIVAN October 6, 1981

<http://www.nytimes.com/1981/10/06/science/ions-created-by-winds-may-prompt-changes-in-emotional-states.html>

is a very efficient exchange of energy from the solar wind into the space environment surrounding Earth. These storms result from variations in the solar wind that produces major changes in the currents, plasmas, and fields in Earth's magnetosphere. The solar wind conditions that are effective for creating geomagnetic storms are sustained (for several to many hours) periods of high-speed solar wind, and most importantly, a southward directed solar wind magnetic field (opposite the direction of Earth's field) at the dayside of the magnetosphere. This condition is effective for transferring energy from the solar wind into Earth's magnetosphere.²⁵⁰

The direct relationship between sunspot count of the 11-years solar cycles or the grand solar minima on the one hand and the geo-magnetic perturbations on the other are not known exactly, and we don't have values of the Kp-index of the past, but proxies such as aurora activity can be used for indirect evidence.

Researchers studied the interconnections of motivation, depression, and bipolar disorder. *"A paper published by the Federal Reserve Bank of Atlanta asserts that geomagnetic storms exert a widespread effect on human social mood as reflected in perception of the risk level of stock market investments and valuations. The analysis confirmed that one week's "stormy" geomagnetic activity leads to the next week's negative stock returns in all US market indices. Conversely, quiescence in geomagnetic activity produces "substantially higher returns" across the globe. The abstract to this article explains a vital connection: An important finding of this literature is that people often attribute their feelings and emotions to the wrong source, leading to incorrect judgments. Specifically, people affected by geomagnetic storms may be more inclined to sell stocks on stormy days because they incorrectly attribute their bad mood to negative economic prospects rather than bad environmental conditions. Misattribution of mood and pessimistic choices can translate into a relatively higher demand for riskless assets, causing the price of risky assets to fall or to rise less quickly than otherwise."*²⁵¹

*"Another research endeavor inquiring about the influence of geomagnetic activity on motivation focused on five decades of well-documented activities of a religious group, the Jehovah's Witnesses. The outcome of that research was to recognize the high correlation between periods of solar activity and relative activity by the church members, indicating that "geomagnetic activity may affect certain brain areas involved in motivation..."*²⁵²

9.2.2 Aurorae

The above mentioned contemporary atmospheric events are relatively frequent and without extreme consequences on human behavior, given Earth and its environment is in its currently relatively quiet state. For extreme and widespread effects on the human psyche, the contributing factors would have to be multiplied accordingly.

Although the exact mechanisms of affecting humans are not known, it is obvious they involve electrical interactions, between Earth, its environment and the human organism, which itself is electric in nature. In extreme disturbances of the solar output and Earth's magnetic field, solar wind speeds and density can increase, aurorae may be seen in low latitudes. Examples of aurorae being seen over battle fields abound, even in recent centuries. As for instance at the Battle of Fredericksburg, in Virginia in 1862, during the US Civil War, when the northern lights appeared. Northern lights at such low latitudes are extremely rare, if that is what the soldiers really saw. Many soldiers noted it in their diaries. I'm not suggesting the battle or even the war was planned in anticipation of this natural phenomena or even that the conflict

²⁵⁰ NOAA.GOV Space Weather Prediction Center swpc.noaa.gov/phenomena/geomagnetic-storms

²⁵¹ Barzilai, Roy; 2015: The Testosterone Hypothesis. Dibra Publishing p. P. 149

²⁵² Ibid. P.150

was triggered by the energetic fluctuations in the Earth's environment. I'm just pointing out the many coincidences of war, collective madness and such heavenly anomalies. The aurora of January 25th 1938, an extremely rare appearance, sparked fears in Zurich, Switzerland, of invasion by Germany. The great aurora was seen over the whole of Europe and as far south as Sicily, Portugal and across the Atlantic to Bermuda and Southern California, in the southern hemisphere it reached well into Southern Australia.²⁵³ Different interpretations were circulated, some took it for a bad omen, while others were afraid the red glow over the horizon was from fires of actual warfare or burning cities in Germany. According to the late Father Malachi Martin, Hitler's architect Albert Speer recounts in his 'second book?', how Hitler saw the intense red hue over the night sky in the east on January 25th 1938 from his mountain retreat near Berchtesgarden. He took it as a sign, exclaiming "now it's time to shed blood". Father Martin claims Hitler interpreted the natural display as the fulfilment of the Second Secret of Fatima.²⁵⁴ The next year, in 1939, Hitler invaded Poland.

Another event involving aurorae that affected humans in a very direct, tangible sense, was the so-called **Carrington solar storm** of 1859. Extreme aurora Borealis and Australis were sighted before and during the Carrington event in August, 1859, when a solar flare disrupted the telegraph system globally, primarily in the Americas. Telegraph paper caught fire, lines melted down, some telegraph stations burn down, people were injured by electrocution. Since the global trade and infrastructure did not depend on the electricity grid and telecommunication, as it does today, the disruption did not create any major global chaos. Were the same solar eruption to occur today, it would cripple our modern day power grid and disrupt civilization as we know it. It would be the infamous "kill shot" or Coronal Mass ejection (CME), which former FEMA director Janet Napolitano named in 2011 among cyber attacks and Electro Magnetic Pulses (EMP, artificial or of cosmic origin) as the greatest threats to the power grid and national security.

Roy Barzilai, also pointed out the following interesting connection between geomagnetic storms, social mood, and human events: Darwin's *Origin of Species* was published in November 1859, after Darwin had postponed the publication for some years. (p. 151) The hypothesis of gradual evolution as a product of chance by random mutations and natural selection without purpose other than survival, has dominated academic thinking ever since. The Gradualist component of evolution has turned out to be erroneous, but it is still handled as a working hypothesis which is regarded as truth, and so, to put it drastically, it could be said that shortly after the Carrington Solar Storm, it was voted on that human life has no meaning!

More extreme relationships between human affairs and aurorae (including geo-electric disturbances) are found in Australia. In legends of indigenous peoples, aurorae are said to have a causal connection to human fate, here a legend from Lake Victoria Australia: *'Upon the Aurora's appearance, the Kurnai, of the Gippsland region, would be shouting such words as 'Send it away; do not let it burn us up.'* Far from being overly imaginative fantasies arising from the red hue of the Aurora Australis, such visceral reactions rooted in traumatic memories of a time when the aurora "filled the whole space between the earth and the sky", **precipitating floods, collective madness and the final departure of the creator from the Earth.**²⁵⁵

Even today, many aborigine tribes are terrified when aurorae appear over Australia. As you may have guessed, anthropologists have a simple explanation for this: they conclude that aurorae australis are often red in color, thus the illiterate native people think "blood" and

²⁵³ Schwarte, Wiebke; 1999: Nordlichter: Ihre Darstellung in der Wickiana, Waxmann München p.101

²⁵⁴ Malachi Martin in the Coast to Coast. Art Bell Show. April 4-5, 1997
<http://www.revisionisthistory.org/wire3.html>

²⁵⁵ Van der Sluijs, Rens: The Coming of the Sky Dancers; Apr 06, 2009, Thunderbolts.info
<http://www.thunderbolts.info/tpod/2009/arch09/090406skydancers.htm>

therefore death. But in fact the southern lights have the same color spectrum as their northern counterparts and native peoples are not ignorant at all, rather they carry on vivid ancestral memories of important events. By the way, red colored aurorae are at the lower end of the energy spectrum, whereas blue, white or purple displays are indicators of much more powerful high energy particles and therefore more liable to be seen at times of changes in the atmosphere, in weather and in human health. In recent times, in 2017, more high energy aurora in the blue and white spectrum are seen, as well as a new phenomena called Steve, which was seen for the second time in may only a month after its first appearance.²⁵⁶ No direct significant consequences for human health were reported so far.

9.2.3 Luzerner Schilling and two comets and plague in 1406

As a side note, I'm pointing to a mysterious entry in the respected chronicles called *Luzern Schilling* (page 124) which reports and illustrates, two comets in the sky, and earthquake in Naples and an outbreak of "plague".

I include this material here because historical institutions (falsely) dated this entry to 1456, which would agree well with the earthquake swarm of the same year in central Italy mentioned above.

At the time of the comets' apparition, there allegedly was "blood" raining, towns collapsing, fires, a double headed calf, pieces of "meat" raining down over Rome, people dying and "disfigured newborns" and an earthquake in Naples. The manuscript is owned by the *Korporation Luzern* (who is the leading authority on the chronicles and their interpretation which is stored in the archives of the Luzerne Central Library (see Fig. 26). As a whole, the remainder of the 400 illustrations and narratives in this manuscript are regarded as important historical facts of Swiss history, which are often referenced, but the extraordinary events involving the comets remain uncommented.

The catalogue published by the said foundation gives an erroneous date of 1456. This is often quoted and from this it was speculated that one of the two comets was Halley's. Now, here is a little discovery, as was already stated by historian Franz Schnyder in the 1970s,²⁵⁷ the date is 1406. And sure enough on deciphering the descriptive text in the chronicles it unmistakably says all of this happened in 1406. Here is the first part of my transcription. The title in red ink says:

"(Now?) I sont to tell of two comets, that were seen in the sky and what became thereof."

*"Before I address the right matter of these chronicles, I want to tell you about two comets or figures that were seen in the sky, and that were interpreted in many ways by wise and learned people, and many things then happened such as **war and great pestilences**. And as it was counted the **year thousand four hundred and six**, then in many countries strange things were seen (...) a calf with two heads ..(...) a child with a (...)"*

The writer describes how blood and "large pieces of meat" fell from the sky and the before mentioned two comets appeared in two years. all the monks were terrified. In the same year in December, (..?) at night, there was such a great earthquake in Naples. Many cloisters and castles collapsed, many houses fell down. Never was such and earthquake seen before.(...)"

Here's my uncompleted transcription of the original in the outdated German language of the time. (Fruehmittelhochdeutsch):

"(Nun?) will ich sagen von zweyen cometen so an dem hymel gesähen wurdend und wz darus entsparng"

²⁵⁶ for updates see for instance the YouTube.com / Adapt 2030

²⁵⁷ Schnyder, Franz: 1972: *Pest und Pestverordnungen im alten Luzern*, Der Geschichtsfreund: Mitteilungen des Historischen Vereins Zentralschweiz Band 87 p. 104

“Vor vnd e ich vff die rächten materie disser Croniken kumen will ich sagen von zweyen cometen oder figuure so am himmel gesähen vnd in mengerley wäg von wisen vnd gelerten lüten wurdend ussgeleit, was daruff künfftig wäre, alss ouch me dan in ein wäg durch krieg vnd gross **pestilenzen** beschach”.

Und alss man **zalt tusend vierhundert und säch** Jar da gesach mann in ettlich landen vil sältzam dingen (...)derlich im land ward ein kalb mit zweyen häptern und ein kind mit einem.....

Wält ouch rägnet es zü vom blut und an eitlichenende (...)

fielend grosse stuck fleisch vom hymel und erschinend die obgenanntenen cometen in zweien Jaren Dazub alle mönschen ser erschrackend indem selben jar und in dem Dezember umb die müden stund inder nacht amtag des selben monats war ein solch grosser erdbüdem im land von Napoli ouch .m e...achenand. lenden (tod) vil stert clöster und schloss verfielend und vil hüs verfielend ouch vast vil gütz verdarb manmeint ouch dazemal is me geläsen wär ward noch nie mer me (geschäched...) ein sollicher erdbüden nöchte (fomeit)²⁵⁸

Whatever the accuracy of the testimony, since the two comets are said to have appeared in 1406, none of them can be Halley's Comet.

I will not try to interpret the incredulous details of the report, other than 'rains of blood' are a recurring theme in the context of comets and earthquakes, it can be brought about by Earth's crossing of a meteor stream or comet tail rich in iron oxides.

The “great pestilence” is also of interest, even it is not the Black Death of 1348, but a later outbreak of “a pestilence”. A man or boy and a woman both are depicted clearly having buboes or swollen lymph nodes in the armpits and at the side of the neck (see Fig. 26), a direct description of symptoms that were later claimed to be characteristic of plague. But the buboes in these exact locations are found only in one original source that can reliably be assumed to be unaltered. Also it should be kept in mind that this illustration was made 110 years after the incident, at a time when an academic consensus had been formed on ‘what plague – and especially the Black Death - looked like’.



Fig. 26 left: Two Comets in 1406; Luzerner Chronik [Luzerner Schilling], 1513; fol. 61v; depicting disasters in connection with two comets sighted in 1406, reports of blood rains and pieces of meat falling from the sky, a calf with two heads, and a devastating earthquake in Naples, war and great **pestilence**. Right: Detail, two victims with characteristic bubos under the armpits and on the side of the neck.

²⁵⁸ Faksimile of the original manuscript: <http://www.e-codices.unifr.ch/en/kol/S0023-2/124/0/Sequence-1291>

Speaking of comets in the Luzern Schilling, among many battle scenes with burning towns in the late 14th and even 15th century, we find another illustration of a scene where two comet-like objects or explosion sources come from the daytime sky; this was by scholars assigned to the year 1472, (but again to be taken with caution) the text mentions “a” comet. (p.155). In the illustration, castles or cloisters and forests are depicted on fire. At the same time a funeral procession takes place.

10 Conclusions.

As far as the mortality of 1348 is concerned, no coherent picture for symptoms of the disease(s) exists today. The evidence suggests that most victims could have simply died of the effects of the earth changes, naturally introduced toxins in the air, water and food added to natural disasters, cosmic radiation, economic collapse. It is beyond the scope of this text to give an alternative single cause for the pandemic. No prove exists for mono-causal pathogenic organisms that were transmitted from person to person or via animals. Therefore, until this is proven, even the term pandemic, which implies just this, is technically incorrect and therefore preliminarily used only as a working hypothesis. All provided models of mono-causal contagion have failed. Alternative models that have been presented by academia all invoke a different contagious, physical pathogen of one sort or another. In the light of the environmental conditions we don't even need a particular single contagious disease to explain the drastic population reduction in 1348- 1351.

It seems appropriate to distinguish two periods of Earth changes in the first half of the 14th century.

First, the years roughly from the 1280s to the mid 1340s. And then the climax in the years immediately before and during the pandemic from 1345 to 1351, with the highest earthquake intensity and the outbreak of the Black Death in January 1348. The Earth changes taking place in these two periods are almost certainly directly related.

First the longer period: The grand solar minimum known as the Wolf Minimum led to irregular and increased precipitation, climate chaos and ultimately to global cooling and glaciation (Little Ice Age). A reduction in solar magnetic field strength and thus the increased influx of cosmic rays also trigger volcanic eruptions and earthquakes, this correlation is outlined for example in this 2011 paper: *Explosive volcanic eruptions triggered by cosmic rays*,²⁵⁹ But enormous eruptions already in the 13th century were many times as extensive as in any other grand solar minimum of the last 1500 years.

In comparison to the Wolf Minimum and the Black Death, the later grand solar minima and cooling phases were not punctuated by a comparable, sharp population reduction event and geological/celestial upheaval as far as we can tell from the historical and geological record. For a similar Earth altering event within the last two millennia, we would have to go as far back as the climate change events in the 5th and 6th century, which also saw the end of the Roman Climate Optimum, the final decline of the Roman Empire and the Justinian Plague. This was the only time span in the last two millennia with a coinciding increase in CO₂, that was even greater than the one that occurred in the century before the Black Death.

The ultimate trigger in the late 1340s

Secondly, there were the extreme perturbations in the years just before and after the Black Death, roughly the late 1340s, culminating of course in 1348-1351. For possible causes I have no conclusive solution, however, the manifestations on Earth are consistent with the crossing of a dens part of a meteor stream or the trail of a disintegrating comet. with dust and

²⁵⁹ Toshikazu E et al; 2011: Explosive volcanic eruptions triggered by cosmic rays: Volcano as a bubble chamber. Elsevier Gondwana Research

gas fall-out, possibly including one or more comets traversing the inner solar system without impact. Clube and Napier note the period around the mid 14th century as one of high meteoritic frequency.²⁶⁰ Mike Baillie proposed a close approach of a large comet.

The exact sequence of events of extreme Earth changes and climate disruption in the late 1340's are not understood as of yet. It is true that most of the symptoms observed by the contemporary people and the geological evidence could be explained by series of meteor impacts and/ or atmospheric explosions and electrical discharges from one or several comets. Could a hundred Tunguska type impacts do all of this? A thousand of smaller ones?

But the influx of a meteor stream alone could not explain how the solar activity started to decline already since the 1150s. And what caused the large series of volcanic eruptions in the 13th century and then the increase in weather anomalies beginning in the 1290s? These eruptions themselves are believed to have caused only short term cooling of years or decades by solar dimming. The crossing of a denser area of a meteor stream leads to a higher impact frequency, even if these are only atmospheric explosions of small objects or dust. But energetic changes in the heliosphere can also increase the visibility of short orbit comets and meteorites that were in Earth-crossing orbits all along. A decreased solar magnetic field can lead to a higher degree of electric discharging of a comet on approaching perihelion. An increase in reported sightings is not necessarily only due to the increased frequency of meteors. The close approach on a comet could have been only one of many factors.

Electricity

It is beyond the scope of this text to go into details on the nature of the electric universe. Let's just remind ourselves at this point that even standard astronomers hold that 99% of the universe consists of plasma. Newtonian motions based on gravity alone – if gravity is a force only dependent on mass – fail to explain the celestial mechanics. Dark matter and dark energy are only mathematical constructs with the attempt to make up for the contradictions in the standard models.

We should distinguish between meteorite impacts (solid objects) versus “invisible cosmically induced” changes. If cosmic factors are considered in connection with abrupt Earth changes, the focus usually lies on kinetic impacts of asteroids, comets or dust clouds from such comets. In particular, scientists often demand to see a surface impact crater, in order to except the possibility that an intruder from space could have had any influence on Earth. We are reminded that the Tunguska atmospheric meteor explosion left no substantial crater on the ground and thus almost slipped through the cracks of history.

But there are other sources of cosmic perturbations that leave even less of a finger print than an atmospheric meteor explosion. Changes in solar magnetic field - which modulate galactic cosmic rays - leave no craters, but can affect the stability of the biosphere dramatically and can trigger volcanic eruptions, earthquakes and climate perturbations. Then there are supernovae, solar flairs and a wide range of factors such as gamma ray bursts, disturbance or collapse of the geomagnetic field and thus additional influx of cosmic rays.

For a probable sequence of events during the climax of the pandemic in 1348, take a Carrington type solar flair, multiply it accordingly, add a number of Tunguska type comet explosions and some Peshtigo Fires from meteor dust fall out. Then, add to this an increase in cosmic rays (solar or galactic) strong enough to trigger large series of earth quakes.

Only Earthquakes and volcanoes are welcome

As indicated earlier, modern-day historians and archeologists are usually keen to attribute all events of abrupt Earth changes to either earthquakes or volcanoes, but not to cosmic impacts or cosmically induced electric events. In 1980, it took a long time for the scientific community to accept the reality of the Chicxulub impact(s) that ended the era of the

²⁶⁰ Napier, B, Clube, V. 1990; The Cosmic Winter; Oxford p.43

dinosaurs c. 65 million years ago, and mainstream scientists will take even longer to accept the Younger Dryas Impact Event, 10,900 BC, although the evidence for this cosmic impact series has not been seriously challenged, by anything other than the cries of the usual Pavlovian academic outrage. The psychological processes responsible for this are rather complex, but yet so simple at the same time.

For one, volcanic eruptions and earthquakes happen regularly even in our recent, relatively quiet times, so that's undeniable. Therefore, contemplations about whether the Santorini eruption in c.1600 BC. ended the Minoan era, are welcomed. But who dares to claim that the eruption itself was only one aspect of a global celestially induced catastrophe leading to the collapse of all the major Mesopotamian and Mediterranean empires, will be met with the said standard Pavlovian outrage of the academic establishment.

Further, there is a limited promise of successfully forecasting volcanic eruptions; in a few cases, lives have indeed been saved by evacuations, although it is mostly the physical early forewarnings by nature itself, that sets people to flight in anticipation of a volcanic eruption, rather than scientific forecasts. As far as earthquakes are concerned, to a limited extent, an increased probability for earthquakes can be predicted even before the first shocks for a certain geographical region - say a country or province - but this has not led to known major successful evacuations that saved lives in recorded history. Predictions on the basis of solar activity and planetary alignments have an increasingly solid track record, see the correlation of earthquake predictions and coronal holes by the amateur research group Suspicious Observers. (above).

Thus, in the face of such uncertainty, in a shortsighted society dominated by fear, the population at large prefers not to know and to live in the mantra of 'carpe diem' and "after me the deluge". Why would one worry about future earthquakes or super volcanoes, if for one, there is nothing we can do to stop them, and second, only vague, long-term predictions can be made. We all can see this type of mindset in our everyday life. Everyone living in an active earthquake-, volcano-, flood- or tsunami- region knows that they will get hit again at some point in the near or distant future, or at least their descendants will, but few are consciously concerned about it and take any actions.

And whenever such a disaster indeed recurs, the survivors can hardly blame their governments for not having saved them. (but some do it anyways, of course).

And then there are the effects of long term climate change, as they happened in the first half of the 14th century, leading to crop failure and starvation via floods, droughts and cold. For this type of scenario, as we seem to be approaching it again in a grand solar minimum, exact predictions are even more difficult to make. But the trends - such as the current (2017) decline in solar activity and the increase in cosmic ray influx - can guide us to make long term adjustments, for instance reinforce all infrastructure and emergency shelters, increase agricultural security and stockpile food and energy reserves.

Once the emergence of the next (short time?) ice age is recognized, it is also clear that it would cause more problems in colder regions in higher latitudes, and of course, regions that have frequent flooding are then at greater risk of more floods, proportionally (the same for earthquakes, landslides etc.)

The notion of chaos on Earth that is caused by impact of solid objects, is a different matter altogether.

As far as solid impact events are concerned (comets, asteroids): there is a general reluctance of authorities and the population to attribute abrupt Earth changes to meteoritic bombardment. Such events could (in theory) be predicted exactly, and then any possible preemptive measures are fully in the hands of governments. But would or could they really tell the public? Would anyone seriously try to evacuate, for instance, an entire country? Just imagine, if they would announce a very serious impact event with global consequences on a certain date. It would leave most people in a state of hopelessness and the status quo of the ruling elite could not maintain law and order. Would you go to work the next morning after the announcement? Victor Clube explored the following scenario:

*“An asteroid in a Taurid orbit, carrying 100,000 megatons of impact energy, coming out of the night sky, would be visible in binoculars for about six hours before impact. By the time it was a naked-eye object it would be at most half an hour from collision.”*²⁶¹

Meteor debris predictions

A much greater probability than a single large impact is the prospect of long term interaction with smaller debris. For this, no exact predictions can be made.

Clube and Napier (1984) predicted that, *“in the year 2000 and continuing for 400 years, Earth would enter another dangerous time in which the planet's changing orbit would bring us into a potential collision course with the densest parts of the clouds containing some very large pieces of debris”*.²⁶²

Calculations indicate that there is an invisible object at the heart of the Taurid stream that might be as much as 30 km in diameter. Moreover, it is thought likely that other larger fragments accompany it.²⁶³

According to Professor Emilio Spedicato of the University of Bergamo:

*“Tentative orbital parameters which could lead to its observation are estimated. It is predicted that in the near future (around the years 2030) we will cross again that part on the torus (of the Taurid Meteor Stream) that contains the fragments, an encounter that in the past has dramatically affected mankind.”*²⁶⁴

How many are going to react to this information rationally with preemptive measures? Who is going to be on alert for the next 400 years? Or even, how would governments try to sensitize and alert the public to adapt their way of life to a dramatically altering biosphere?

Some of the perils to the stability of civilization as we know it are non-kinetic cosmic events such as coronal mass ejections (CME), radiation storms and plasma discharges or the effects of a simple repetition of **a gran solar minimum**, as we currently seem to approach it: these are much harder to predict to an exact date, unless they are triggered by a solid incoming object on a stable orbit. If there is no predictable path of such a large object (moon- or planet- sized) at hand, then solar flairs, coronal hole streams or gamma ray bursts cannot be predicted exactly to the day. Predictions of regional and intermediate trends for earthquakes using solar activity data have an increasingly high track record.²⁶⁵ But no long term exact predictions in anticipation for global cosmic disturbances can be made and thus only few want to know about it and make preparations accordingly.

Twisting the testimonies of the late 1340s

Returning to the pandemic. Many of the historical records mention a ‘corrupted atmosphere’ and ‘noxious gases’ coming from the air, the oceans or the ground. In the early years of the pandemic, only one reliable primary source claimed that buboes were confined to groin, armpit and neck. And few seemed to have been concerned with physical person- to- person transmission of the disease or diseases. Doctors did advise to stay away from dead bodies, but the concept of being cautious of the ‘breath’ of ill people is rather ambiguous and is directly addressed only in later writings, or as in the case of Louis Heylingen, in works that were edited and rewritten in later times. Although there is an abundance of reports of people abandoning their sick loved ones, this was apparently not because they were afraid of direct physical contagion. The idea of quarantine was introduced only at a later stage.

²⁶¹ Clube V. Napier B. 1990: *Cosmic Winter* p. 275

²⁶² Richard Firestone, Allen West, Simon Warwick-Smith; 2006; *The Cycle of Cosmic Catastrophes: How a Stone-Age Comet Changed the Course of world Culture*

²⁶³ Hancock, *Magicians of the Gods*. P 438

²⁶⁴ Spedicato, Emilio, *Apollo Objects, Atlantis and other Tales*, Università degli studi di Bergamo 1997. p.12

²⁶⁵ suspiciousobservers.org

How can numerous authorities on the subject give such lively and detailed descriptions of heavenly and geological upheaval, and dismiss any real life causal connection to the health crisis, nevertheless?

Modern-day academics casually reinterpreted these observations and also the eye-witness accounts of comets, meteorites, lightning, strange lights in the skies and so on in the following attempt of rationalization: the illiterate, non-scientific people were emotionally overwhelmed by the mass casualties caused by the 'bacterial plague' so in the early stages of the pandemic, in their misery, they invented stories and tried to find extraordinary explanations for a simple problem, thus they kept rambling about strange things in the skies and strange earthquakes. Only after authorities allegedly started to find out about the infectious nature of the disease and then started to implement measures of quarantine, the panicked masses started coming to their senses and stopped talking about a corruption of the atmosphere. Indeed, there are fewer accounts of a corrupted atmosphere and anomalies in the sky in the surviving records from 1350 onwards. But the notion that the uneducated people should be unable to immediately recognize the infectious nature of a plague, defeats common sense. It would be very apparent that people in close contact to ill people are at much greater risk of infection, even in consideration of co-factors such as general health parameters, nutrition, sanitation. But only few writers of the immediate years of the pandemic indicated direct physical contagion. To put it simply: **if humans were that stupid in the face of highly infective deadly germs, nature would have long ejected us from the biosphere.**

We do find accounts that claim that whenever in one household one person became ill, the others would soon follow. But, this can also be the result of concentrated leaking of underground gasses such as radon, and methane, and of course the general living conditions of one family.

Electric evolution?

It is remarkable enough that we are still unable to prove the existence of pathogenic, transmittable virus', but take measures to fight them, as if we knew how they work. On the other hand, an influx of particular electric energy from space, even without an influx of particular matter, could indeed very easily cause a global health crisis which would likely be interpreted as a transmittable disease caused by germs. We know that electromagnetic radiation in various ranges in the spectrum (x-ray, gamma rays and so on) or charged particle flux, can lead to instant genetic mutations like nuclear radiation. Possible natural causes for ionizing radiation would be galactic gamma bursts, supernovae on the one hand, and on the other there are scenarios that diminish Earth's natural protection from such energy sources by destruction of the protective ozone layer by comet explosions in the atmosphere, a disruptions of the magnetosphere or an electro magnetic pulse (EMP). The function of genes in terms of evolution is a topic beyond this text. Let it suffice to say that genes themselves don't 'do' anything, they are just the blueprint for an organism. Genes need to be activated in order to be expressed in structure and behavior, cells in vitro can carry on their function after the cell nucleus – which contains the DNA- is removed.

From the Testosterone Hypothesis by Roy Barzilai: *"It is important to recall that the genetic code of the DNA, our information blueprint, is shared in common by all the cells in the human body. The level of functionality just above the genome is called epigenetics, and it is at this level that changes in gene expression take place. Chemical reactions either "turn off" or "turn on" genes and alter cellular function. Hormones that circulate through the blood system trigger epigenetic changes in the cell's gene expression."*²⁶⁶

What is not investigated sufficiently, is the influence of changes in the electromagnetic fields on the activation of genes.

As I touched on in the context of *Renewal of Life*, it is possible that such episodes of abrupt Earth changes are connected to evolutionary bursts. It is well accepted that after each of the last 5 mass extinctions, there was an upsurge in new species. And this is not only because -

²⁶⁶ Barzilai, Roy; 201:5 *the Testosterone Hypothesis*. Dibrah Publishing. p.11

for instance in the last extinction, the dinosaurs - disappeared as the most dominant animals and they left room for previously less dominant species to proliferate. But also evolutionary changes are accelerated after mass extinctions, new species spring up quickly.

*"In 1972, paleontologists Niles Eldredge and Stephen Jay Gould published a landmark paper, Punctuated Equilibria: An Alternative to Phyletic Gradualism. They proposed that the degree of gradualism commonly attributed to Charles Darwin is virtually nonexistent in the fossil record, and that it is actually stasis that dominates the history of most fossil species. Their new theory stated that most species will exhibit little net evolutionary change for most of their geological history, remaining in an extended state of stasis. When significant evolutionary change occurs, the theory proposes that it is generally restricted to rare and rapid (on a geologic time scale) events. These events are called cladogenesis, whereby a species splits into two distinct species, rather than one species gradually transforming into another".*²⁶⁷

Also New York University Geologist Michael Rampino concludes in an essay in the journal of Historical Biology, that Charles Darwin's theory of gradual evolution is not supported by geological history. In fact, Rampino notes that a more accurate theory of gradual evolution, positing that long periods of evolutionary stability are disrupted by catastrophic mass extinctions of life, was put forth by Scottish horticulturalist Patrick Matthew prior to Darwin's published work on the topic.

"Matthew discovered and clearly stated the idea of natural selection, applied it to the origin of species, and placed it in the context of a geologic record marked by catastrophic mass extinctions followed by relatively rapid adaptations," says Rampino, whose research on catastrophic events includes studies on **volcano eruptions and asteroid impacts**.²⁶⁸

These findings cannot be explained by gradualist models of spontaneous mutation and selection.

It seems plausible that so-called "junk DNA" can be activated by electromagnetic radiation and electric fields. All adaptation processes of any organism go along with symptoms of one type or another.

Human consciousness

This part is of rather speculative nature. If an event includes permanent changes in Earth's electric field and the ionosphere's pressure and charge, then it can even change the Schumann resonances. Since these resonances are apparently generated by lightning discharges, an increase in atmospheric electric activity would have to raise the intensity of the resonances, which means, the effect on the human brain frequencies is more notable. However, if the frequency remains on the levels of the last few decades, with the dominant resonance at 7.83 Hz, then increased intensity is likely not to have an advantageous effect on human consciousness, theoretically rather the opposite can be expected.

To back up, the main Schumann resonance of Earth, as long as it is being recorded, is at 7.83 Hertz, in exact synchronicity with the human alpha brain wave. This brain frequency corresponds with a relaxed slumber state. When humans are in an active, fully conscious, wake mode, the dominant brainwave frequency is at about 14 to 20 Hertz (impulses per second).

In the decades since the Schuman resonances are being monitored - first measurements were made by Balser and Wagner between 1960 and 1969 - the intensity of these frequencies is apparently not sufficient to influence all of humanity in a notable way. For instance, most people have no trouble staying physically awake most of the day, even if our energetic environment is "ticking in snooze mode". Some people however, including the author, directly react to changes in the Schuman resonances (these are monitored for instance on Space Observing System, Tomsk, Russia.) Therefore, from what I can tell, in order to generate a rise in human collective consciousness, an increase in *frequency as well*

²⁶⁷ Ibid p.49

²⁶⁸ Phys.org <https://phys.org/news/2010-11-darwin-theory-gradual-evolution-geological.html#jCp>

as in intensity would be necessary. If the main resonance were at a steady 14- 30 Hertz, the human organism and mind could be facilitated to perform in the same conscious brain wave frequency, with much less "effort". If, on the other hand, only the intensity is raised, then I daresay it would be harder to stay in a conscious state of mind and to function out of synchronicity with the current low frequency pulse of the Earth.

As I said the intensity can increase with more electric activity in the atmosphere, lightning and other electric phenomena may be indicators. For a rise in the actual frequency, theoretically, a permanent change in density and charge in the ionosphere would have to take place. By the way, sporadic increases in the Schumann resonances are observed since 2014.

Now, the Black Death crisis was followed by great social and economic changes, the renaissance followed soon after. Johannes Nohl argued that this could not have taken place without the Black Death. But unfortunately, also expressions of widespread inhumane behavior and cruelty followed in the centuries to come, witch persecution and the bloody conquests in the New World among the them.

If an evolutionary "burst" was what was underlying the 14th century drama, then it seems it was rather a failed evolution attempt by nature, at least as far as human consciousness is concerned.

Previous events

The 14th century is not an isolated event in regards to Earth changes in conjunction with meteorites. In *the Cosmic Winter*, (1990), Clube and Napier contend that

*"The climate of the last 10,000 years appears to be divided by relatively sharp global recessions into distinct periods (sub-Atlantic etc.) whose differing average conditions correlate with the frequency of meteoritic inputs in the range of sub-cometary mass. Thus it may be that the most intense meteoric inputs correlate with ice ages, capable in some instances of generating a dark age."*²⁶⁹

Many previous episodes of meteoritic interactions were experienced with the Taurid Meteor Stream. The 1348 crisis however, is unlikely to be directly connected to this stream, for encounters with its debris concentrate around November 1st and June 30th, at both dates within a window of a few days. None of the reported celestial sightings are assigned to one of these dates.

The Younger Dryas

The premise of the effects on Earth of the Taurid Meteor Stream is that a large comet entered the inner solar system around 20,000 years ago and began a series of disintegrations, the remaining fragments are what now constitute the Taurid Meteor stream. Earth has been penetrating the denser regions of that stream on regular cycles which let to periods of frequent encounters, of which the lower Younger Dryas Boundary Event at c. 12,900 years ago was the one that left the biggest imprint on the biosphere and humans. The sudden melting of the Ice sheets, resulting in continental flooding, the extinction of 75% of all mega fauna in North America and Europe, the disappearance of the Clovis people, precipitation of spherules, nano-diamonds, iridium, platinum in the corresponding strata, widespread wild fires.

This extremely abrupt onset of the cooling period of 1200-year duration as well as the corresponding drop in methane, were anomalous for all the glaciation cycles of the last 800,000 years (Kennett, James, 2007). Thus, this was a unique event, and so was the abrupt end of the Younger Dryas:

James White from the Institute of Arctic and Alpine Research, at a presentation at the AGU Fall Meeting December 2014, presented the evidence of extremely abrupt global warming at the end of the Younger Dryas about 11,600 years ago as reconstructed from ice core data "5 degrees of warming in 5 years, then stagnation for about 30 years followed by another 5 degrees in 5 years".

²⁶⁹ Napier, B, Clube, V. 1990; *The Cosmic Winter*; Oxford p.43

This extreme rise in temperature computes to global **warming 100 times the rate of warming** of the 1980-1990s. This led to flooding events, tsunamis and ultimately resulted in sea level rise of 140 meters as compared to the Ice Age levels.

Questions remain about the relationship of meteors and solar activity:

-Can changes in the energetic balance in the solar system and its environment cause an increased influx of meteors into the inner solar system? Or vice versa:

-Can meteor streams themselves disrupt the earth and even the inner solar system enough to cause a long term disturbance, even of the solar output?

At any rate, with regards to long-term changes, meteor impacts can cause long term climate disruption, but no prove exists that they can also cause long term changes in solar output.

The available evidence suggests that the two tend to go together. We know from recent observations that comets impacting the sun can trigger very large CME's in the direction of the comet BEFORE impact. But nothing suggests that such isolated events did affect long term solar emission in any range of the spectrum. It is beyond the scope of this text to evaluate whether this is possible. If there was a sufficient bombardment of the sun, it is hard to see how Earth nearby could be spared from a life ending impact.

The hypothesis of cosmic object(s) as the initiator of the YDB (as proposed by the YDB impact group) is as of yet not seriously contested, however ignored by academia or encountered with biased dismissal. But it still needs to be determined whether the long term cooling effect could maintain itself without simultaneous changes in the solar output.

Further events

I briefly mentioned the time frame around the Toba volcanic eruption 70,000 BC, when human population quickly went from an estimated 1 million to about 5,000 survivors in a very short time leaving a genetic bottleneck in the human gene pool. We nearly died out.

Stanley H. Ambrose, a professor of anthropology at the University of Illinois in Urbana, has suggested that this horrific volcanic winter 70,000 years ago, followed by the coldest thousand years of the last Ice Age, resulted in widespread famine and death in modern human populations around the world, such as the species Homo Neanderthalensis and Homo sapiens.²⁷⁰

From 11,600 onward, we encounter life alerting and history defining climatological and geological events every millennium or so, the most prominent – to name just a few –

-c. 5300 Global climate disruption

-1628 BC Collapse or disruption of almost all empires in Middle East, the Egyptian Empire. Santorini Eruption.

-1177 BC Bronze Age collapse.

-470-540 AD Fall of the Roman Empire, end of the Roma Climate Optimum. Abrupt cooling. Justinian Plague.

Traumatic induced Collective amnesia and Catastrophobia

In the 1950's, psychologist Immanuel Velikovsky wrote three books on celestial catastrophes which upset the scientific community with his analysis of ancient legends, he postulated a traumatic celestial calamity that had a devastating effect on humanity. One of the problems is that many of his astronomical conclusions could not be substantiated with any evidence (in particular the claim that the planet Venus was created in a collision of a rogue planet or comet with Jupiter, after which Venus and Mars run on erratic orbits in the solar system

²⁷⁰ Krehl, Peter O. K, 2009: History of Shock Waves, Explosion and Impacts.

during human existence). Such technical details made him an easy target for his establishment critics. Carl Sagan, for instance, made his career by picking on the writer and his intellectual followers, many of which were non-scientists. Clube and Napier (1990) gave a reasonable alternative explanation for the legends in question, which tell of planetary encounters, apparently playing out within the last few millennia: what the ancient described as “the planets”, were large active comet fragments as part of a debris trail in an elliptical orbit along the ecliptic, most likely of the Taurid meteor stream. These comets came near Earth at intervals in the last few millennia causing disasters on Earth, at times a bright comet could traverse the night sky in hours. Only after these comets had diminished, ceased to be active and became invisible in the sky along the ecliptic, then the actual planets of our solar systems were given the names and god-figure attributes of these comets in substitution. So it is no wonder why no modern humans saw the real planet Jupiter throw a literal lightning bolt at Earth, but active large comets in the Taurid stream would likely have had visible electrical interactions with Earth or with each other.

Another problem is this: Velikovsky was focused on one incident, the supposed entry and capture of the comet Venus, the transformation into planet Venus and its close encounters with Earth in the process. He assigns this to the Exodus out of Egypt story as recounted in the Book of Moses and thus including the Ten Plagues of Egypt and the natural disasters going along with them. Those who believe the narrative of the Exodus to be based on real events, most commonly assume it to have taken place around 1600-1300 BC. Velikovsky did include a later event about 700 BC, which he attributed to close encounters with the planet Mars.

But in all of this, the many additional population reducing events and celestial catastrophes are left out, for instance the Younger Dryas Event, the near extinction at the Toba eruption, and the repeating environmental/ celestial disasters that have been reducing the human population every millennium or so, including the 14th century crisis.

By what we can deduce from our observations, the capturing of an Earth sized comet would create much greater disturbances than local tsunamis and a little bit of locus plagues during the Exodus. It would have been an unimaginable *Renewal of Earth*, and nothing suggests that life on Earth would continue, let alone human civilization.

To be fair, some of the flaws in Velikovsky’s understanding of celestial mechanics – which he derived from mainstream science - have since been vindicated by the understanding of the electric nature of the universe, as indicated by the work of Hans Alvin, Halton Arp and Wal Thornhill. Ralf Juergens wrote in an article in magazine *Pensé* in 1972 with the title: *Reconciling Celestial Mechanics and Velikovskyan Catastrophism*: „The known characteristics of the interplanetary medium suggest not only that the sun and the planets are electrically charged, but that the sun itself is the focus of a cosmic electric discharge, the probable source of all its radiant energy. “

But despite the astronomical and chronological shortcomings, Velikovsky, who was a psychologist, was (in my humble opinion) absolutely accurate on his findings about human trauma and amnesia when it comes to these celestial /environmental catastrophes.

The clinical term for a non- ancestral equivalent condition is **dissociative amnesia**, formerly called psychogenic amnesia.

As far as inherited trauma is concerned, in a 2004 study, researchers at the Technical University in Zurich claim to have unmasked a piece in the puzzle of how the inheritance of traumas may be mediated.

“The phenomenon has long been known in psychology: traumatic experiences can induce behavioral disorders that are passed down from one generation to the next. It is only recently that scientists have begun to understand the physiological processes underlying hereditary

*trauma.*²⁷¹ Extreme and traumatic events can change a person - and often, years later, even affect their children.

A 2013 paper investigates the (epi)-genetically inherited trauma of descendants of Holocaust survivors and concludes that the children “*may have been marked epigenetically with a chemical coating upon their chromosomes, which would represent a kind of biological memory of what the parents experienced. As a result, some suffer from a general vulnerability to stress while others are more resilient. Previous research assumed that such transmission was caused by environmental factors, such as the parents' childrearing behavior. New research, however, indicates that these transgenerational effects may have been also (epi)-genetically transmitted to their children. Integrating both hereditary and environmental factors, epigenetics adds a new and more comprehensive psychobiological dimension to the explanation of transgenerational transmission of trauma.*”²⁷²

The term *Catastrophobia* was coined by Barbara Hand Clow. It is also the title of her 2001 Book, “*Awakening the Planetary Mind: Beyond the Trauma of the Past to a New Era of Creativity*”.²⁷³ Hand Clow proposes that modern humans are overly anxious about catastrophes as a result of a traumatic experience in the past.

In a radio interview with ‘*Earth Ancients*’ she explained that she is a Cherokee records keeper and her grand father past on the following information to her: She was told of a global cataclysm that occurred between 15,000, and 11,500 years ago.²⁷⁴ At the time, climatologists were, only to a limited extent, aware of the gravity of the temperature changes at the end of the Ice Age, the extreme temperature increase in the Bölling-Allerød warming at about 15,000 years ago, then the rapid fall back into Ice Age conditions (the Younger Dryas Boundary event) at about 13,000 years ago and the abrupt warming at c.11,500 years ago. But at the time of her writing, the extreme swiftness, by which these changes had taken place was not known, and therefore the notion of a catastrophic end of the Ice Age was dismissed by the academic establishment. Also Graham Hancock proposed a global cataclysm at roughly the same time period in his 1995 Bestseller *Fingerprints of the Gods*, where he suggested that the northern regions of Alaska and Siberia seem to have been worst hit by the murderous upheavals between 13,000 and 11,000 years ago. Hand Clow proposed that a series of catastrophic disasters, caused by a massive disturbance in the Earth’s crust 9,500 BC, rocked the world and left humanity’s collective psyche deeply scarred. We now know that this was the extremely abrupt end of the Younger Dryas cooling period at 9,600 BC, or Melt Water Pulse II (see above).

As Hand Clow examines these legendary catastrophes she claims that, “*contrary to many prophecies of doom, we are actually on the cusp of an era of incredible creative growth.*”

I do agree with this prediction of the positive long-term outcome, but I have yet to see any evidence that the transition into an age of peace and higher consciousness ever took place without any dramatic physical changes in the biosphere. And there is no evidence and no hypothetical reasons provided that these cycles in our cosmic environment would suddenly stop. Velikovsky believed the initiating global catastrophe to be a single, relatively recent event, whereas Hand Clow proposed as series of events at the Younger Dryas period. She explains that we are a wounded species, and this unprocessed fear is passed on from generation to generation, and is responsible for our constant expectation of apocalypse, from Y2K (new year 2000) to the famed end of the Mayan calendar in 2012.

²⁷¹ Gapp K. et al 2014 ETH Zurich: *Hereditary trauma: Inheritance of traumas and how they may be mediated.*

²⁷² Kellermann, N. P. 2013: *Epigenetic transmission of Holocaust trauma: can nightmares be inherited?* Israeli Journal Psychiatry and Related Sciences

²⁷³ Hand Clow, Barbara, 2011: *Awakening the Planetary Mind: Beyond the Trauma of the Past to a New Era of Creativity*; Rockester.

²⁷⁴ Barbara Hand Clow examines Ancient Cataclysms <https://www.youtube.com/watch?v=w2oYK7IzaH4>

*"Catastrophobia reveals the insidious global forces that have used these collective fears to control humanity for thousands of years."*²⁷⁵

I interject that the Younger Dryas Boundary Event was only one of many massive population reduction events. So, we are not just recovering from a one-time trauma or a few singular events, but from continuing repetitions.

Though it is true that paranoia and irrational fears run rampant in our society, I propose that the trauma of past catastrophes did not only leave us paranoid and overly fearful of changes in the skies, but that also some of the past calamities left us unable to deal with the reality of a sometimes unstable cosmic environment. These unaddressed fears make us psychologically easily controllable and very susceptible to predatory psychopath leaders. We subconsciously try to shut out the collective memory of such past events, and our problem-reaction-oriented mind leads us to focus our attention on apparently more immediate dangers, things which we feel we can control, like politics and economics. This is how traumatic induced collective amnesia gets hold of us and so we elect yet more charming liars into office and we maintain abusive relationships. (This can manifest in our desire to pay more CO2 taxes, for instance).

The reason why our ancestors were extremely conscious of anomalies in the skies, is not that they were paranoid and superstitious, but rather they had their rational reasons. This modern day head-in-the-sand mentality often manifests in what I call cosmic collective Stockholm syndrome confronting Earth changes. We see this even in trivial things: for instance, modern human adults don't have to learn how to not be afraid of things like firework displays, something that should set us instinctively in alarm and that is exactly what happens to many people subconsciously. But we stare at the firework displays with awe and excitement. In our ancestral memory, any exploding lights in the sky are either the signs of warfare or meteor showers or dangerous lighting storms.

The amnesia lets us ignore the prospect of future abrupt Earth changes, instead of preparing for them and embracing them.

So, the empirical evidence does not suggest that a transition into a new earth age and new era of human consciousness has come about without another population reduction.

Velikovsky's assessment of human trauma and amnesia is correct. He himself described his work on collective amnesia as follows:

"Mankind in Amnesia (1982) has to do not only with the past, like my other books - primarily it has to do with the future, a future not removed by thousands or tens of thousands of years, but the imminent future, on whose threshold we now stand".

Now, since we as a society can neglect the evidence and forget the fact that barely seven hundred years ago, environmental and climatological catastrophes killed 50 to 70 percent of the population, then we don't need to wonder if the next round of Earth changes will catch society completely unprepared. If, on the other hand, we manage to resolve our trauma and take advantage of the potential our human consciousness, we can prepare for the next event and mitigate or even neutralized that destructive aspects thereof and in the long run, even benefit from the renewed environment.

If solar activity continues to decline, we will soon be confronted with the more serious effects of the next grand solar minimum.

The End

²⁷⁵ radio interview with Barbara Hand Claw on Earth Ancient. 2015
<https://www.youtube.com/watch?v=w2oYK7IzaH4>

Sacha Dobler,
This is an updated version from June 25th, 2017

10.1.1 Postscript

Excerpt from Konrad von Megenberg, 1349 the Book of Nature, 2. Part: earthquake p. 110-112 English (translation by Sacha Dobler)

3ä. Vom Erdbeben. (about the earthquakes)

It happens often here and there, that earthquakes occur and make castles fall, and often one mountain crashes onto another. The common people don't know, what this comes from and thus old women who claim to have great wisdom, invent that there was a great fish called Celebrant, who has his tail in its mouth, and on this fish the Earth rests. When he moves and turns around, then the Earth is said to tremble. This is a giant fairytale and it's not true and it is reminiscent of the Jewish saga of the oxen Behemoth. We want to say how earthquakes in reality behave and what wondrous consequences they can have. Fore, earthquakes develop because in subterranean caverns and namely in the high mountains, much earthly vapours accumulate, at last in such quantities, that they can't stay in these caverns. Thus they push against all of the walls. They shift from one level to another and increase so much until they fill up an entire mountain range. The increase of the vapours is caused by the power of the Stars, especially of the war god called Mars' and of the help father Jupiter as well as Saturn, when they are in constellation. When the vapours rumble in the heights for a long time, then their pressure becomes so great, that they break to the outside with force, and tumble one mountain onto an other. If they don't manage to break free, they still cause a powerful earth trembling. Either the earthquake sways back and forth slowly like a ship, and such an earthquake is less devastating to castles and other edifices. The vapours push the earth along in powerful thrusts and they decrease in force, just as a person is pushing another person and then pulling him close again, so a movement is created like that on a swaying ship. Or the earth trembles in quick shocks, as if one man shakes the other with his hands. This is very dangerous for buildings, fore, from this they collapse.

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In such a case, one vapour follows the other and pushes it quickly from one side to the other. In this manner a man shakes after he released urine, as then the cold air steams into the body and pushed the warm spirits in his body back and fro, some much that he is shaking. We find clear indications that this is indeed so. First, before an earthquake, there is much hissing and buzzing within the earth as loud as a hundred thousand snakes or as the cries of terrible oxen. This is because the vapour in the earth is put into motion and is pushed through cracks in this way. It is like as if wine is running out of a sealed barrel, the air is sucked in through a thin crack and this causes a whistling sound. If the cracks in the earth are broad, then it sounds like large battle horns. Secondly, the sun become darkened during the day or is colored red, because the thick earthly smoke has moved between the sun and our point of view.

Third, before or after the earthquake, the air becomes poisoned so much, that many people died of it. when the earthly vapour was locked in under the earth for a long time, it turns foul and very toxic. We see this in wells that were sealed with lye. When they are reopened for cleaning, often the first workers die, who descended for the cleaning work. This was often seen. This also happens with minors, that they become dizzy and sway like drunkards when they descend into the mine, and this even though the vapour wasn't trapped long in one spot, for the shafts were open.

Enormous things were taking place because of the earthquake, which came over the town of Villack in Carinthia in the year 1348 after Christ on the day of Paul's Conversion. 1) in the city, many lost their lives, churches and houses collapsed, one mountain fell onto the other. The earthquake occurred at the Vesper time and was so strong and extensive, that it spread from the Danube as far as Maehren and to Bavaria and beyond Regensburg. It continued over 40 days, after the initial shock, there were many smaller tremors for days and weeks. One year later there was another clearly noticeable earthquake on St, Stephan Day in the same mountain range. Keep in mind, that the vapour had accumulated, as it was trapped inside the mountains! As it now broke out into the air, it was natural, that it poisoned everything on the other side of the mountains over hundreds of miles, and also on this side of the mountains to a great extent. It became clear early, that in the same and also in the following years, there would be the greatest mortality in the time after and possibly even before Christ. 2) In the cities on the coast, as in Venice, Marseille, throughout Apulia and at Avignon, endless numbers of people died. In the first year of the great earthquake, the griever was so great, that pope Clemens the sixth ordered a new mass of the death, to implore god to have pity with the people. The mass began with the words: Recordare Domine testamenti tui! In these years, a great many people died in the mountains as well and in the plains in a few cities. In the following year, the number of deaths was particularly high in Austria, in Vienna, so that from the summer solstice till St. Mary's Day, 40,000 bodies and more were counted. The mortality extended to Bavaria and over the city of Passau.

Many things indicated that the general mortality came from the poisoned air.

The first is, that the mortality began first and foremost in the mountains and in coastal cities, for there, the mists were the densest and the most poisonous. Because oceans withheld the air in the Earth's veins near the oceans and there turns foul and humid, and very much so, and thus also the waters were poisonous. The other thing is that the majority of the ill people that died, had ulcers under the armpits, and in the ulcers, maggots were found, or after the ulcers were present many days, there was found nothing but a vapour or an evil foulness in them. That was because the person had absorbed the evil air, and this remained in the flesh of the chest around the heart. Thus nature wanted to help the heart and trusted the poison under the armpits, so ulcers became of them and whenever nature couldn't expel the poisonous smoke, the heart was damaged by it and the person was suffocated. That is why mostly young people of tender nature died, and first and foremost young women. The third sign is, that the deadly mortality in the years after the earthquake, caused only little harm to the people that were in the vicinity of the mountains in the high places. As the heavy poisoned air was lifted from the mountains and descended soon to the earth, the higher air remained purer than the lower air.

The fourth sign is, that in autumn and winter of the two years, many dense and very scorched smelling vapors were prevalent, because the earthly vapours in the air were transformed into mists and it was so dense that it descended to the earth. It was particularly dangerous for people who inhaled the mist in the morning before eating or drinking.

Therefore, careful people remained in the dwellings in the morning, fumigated their rooms with pleasantly smelling and precious things and they ate early, before the harmful air could enter their empty bodies. They were also careful not to go to the ill people, so their poisonous breath and their deadly smells couldn't spread over to them.

Fifth, the pears floated in the water, but they sank down in other years. This was because the toxic vapours hollowed out the pears, so that they included a lot of air and thus floated in water. That's why the fruits were harmful if they weren't cooked well enough. Further, the bad air invested the hearths of the people, and by the time they noticed it, the tragedy was there.

The truth was concealed to many people, and some claimed that the **plague came from a certain star, and as long it was visible the mortality would continue.**

That was far from the truth. We know that everything, that occurs in the four elements depends on the power of the Stars. But one has to state in what manner they cause this or that, whether it is heat or cold.

(.....)

You should also know that the earthquake caused many miraculous things: **a vapour coming out from the earth by the earthquake** is responsible for transforming human beings and other animals into stone and in particular **into stones of salt**. This mostly happens in the mountains, where the people are digging for salt. ...

This miracle is taught by the masters Avicenna and Albertus [Magnus]. I was told by master Pitroff, the chancellor of duke Friedrich in Austria, that on some alpine meadows, situated in the higher mountains of Carinthia, about 50 petrified men and cattle had been found (turned into stones). Even the milkers would sit beside the cows, both transformed into pillars of salt.

Another miracle: due to the earthquake **fires may come out of the earth**, so that towns and villages will be consumed by it. This fact is caused by the fires inside the earth.

A third miracle: during the earthquake sand and dust will come to the surface, so that a whole village becomes absorbed in it.

That is because the earth's interior is sandy and on the surface is a solid strong crust, that retains the vapors, so they wont be released.

The fourth is that the mist is often so sickening that the earth crust cannot hold it, is raised up and then lowered again. This often happens beneath the waters that have solid grounds, and thus the ground is raised, and the water runs out. From this come great gushes of water without rainwater and snow melt water, but they come from the wind and the mists, that rise up from underneath the water's springs in the mountains.

Here the 2. part of the book ends.

From the original source: Konrad (von Megenberg) (1309- 1374). written in 1349
K. Aue, 1861 - Das Buch der Natur, von Konrad von Megenberg p. 112