



Weather and Natural Catastrophes in Medieval and Early Modern Europe: Storms, Floods, Fires, Earthquakes, and Pandemics

Albrecht Classen¹

¹ The University of Arizona, USA

Correspondence: Albrecht Classen, The University of Arizona, USA.

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Abstract

Ecocriticism and Medieval Natural Catastrophes Literary Evidence?

Ecocriticism in the Humanities has alerted us in the last few years to the considerable potentials of building significant bridges between the Sciences (Meteorology, Atmospheric Sciences, Vulcanism, etc.), on the one hand, and Literary and Historical Studies on the other, and to draw insights from both sides of the equation for an increased understanding of universal phenomena of great importance for all human societies.[1] Climate change, for instance, is not something we can understand today by simply looking at samples or data reflecting current conditions, as if our current situation had emerged only in the last fifty or so years. Major changes in our natural environment are mostly the result of long-term forces impacting our material and cultural world, and weather patterns and significant disruptions have had a huge impact on human society throughout time. Nevertheless, we can probably agree that the current situation of our physical conditions have dramatically deteriorated over the last decades because of human-made factors, if we consider the daunting global warming affecting us all right now in the twenty-first century as a result of the Industrial Revolution and the modern consume society which endangers the survival of our world (Anthropocene).

Long-term and short-term processes and phenomena must be taken into account when we want to pursue cultural-historical ecocriticism, especially within a medieval context. It has thus become mandatory to examine, for instance, the history of the forest or the history of water through a variety of lenses, one of which can be fruitfully provided by chronicles, especially those dating not only from the twentieth or nineteenth centuries, but also those which shed light on medieval and early modern conditions and events. [2] In fact, medieval approaches to ecocriticism prove to be eye-opening for the latest scientific investigations and can lay the foundation for a better understanding of the relationship between humans and their environment, and this already thousand and more years ago. [3] Both weather and natural catastrophes have always been highly impactful on human history and culture, but it continues to be a huge challenge to establish the concrete correlations, such as between the rise of the Gothic age or the Renaissance of the Twelfth Century with the Medieval Warming Period.

A late medieval example, however, might shed some light on this phenomenon, though I will not examine it here at great length. On July 2, 1505, when Martin Luther, the later famous founder of the Protestant Church, returned from his home in Mansfeld to Erfurt, where he was enrolled as a student of law at the university, he was surprised by a major thunderstorm in the hamlet of Stotternheim (a short distance north of Erfurt), which frightened him so deeply that he immediately changed his entire outlook toward life. He begged St. Anne to save him from the lightning, and since that was then the case, he fulfilled his pledge and turned into a monk, joining the Augustinians in Erfurt. As a monk, however, he began to recognize the evils of the Catholic Church and began with his efforts to reform it from within. This study will attempt to bring to light some parallel cases in the early and the high Middle Ages.

Keywords: Weather in the Middle Ages, natural catastrophes; flooding, earthquakes, fourteenth century, Medieval Warming Period, lessons from the past, history of natural environment

1. Historical Cases of Natural Catastrophes in the Middle Ages

In what follows, I intend to examine a larger number of relevant cases of dramatic weather phenomena that led to natural catastrophes mostly within the global framework of the Holy Roman Empire from the early to the late Middle Ages in order to examine to what extent natural disasters represent recurrent dangers and should be considered more closely within the context of significant historical events and developments. Climate history and the study of the natural environment have already gained much traction in recent research in a variety of ways. [4]

But a group of scholars has now argued that we would have to talk of a particular period determined by a whole series of natural catastrophes during the fourteenth century, as if the situation before and after was remarkably different because of those dramatic changes. [5] Martin Bauch and Gerrit Jasper Schenk go so far as to articulate the thesis that there was “an instable [sic] transition period between the different climate regimes of the Medieval Warm Period (about 950–1250) and the Little Ice Age (about 1450–1850). . . . [T]his period seems to have been characterized by climatic variations with increasingly frequent and dramatic extreme events.” [6]

There are, certainly, good reasons to recognize the fourteenth century as a period with particularly difficult circumstances and challenges, considering the outbreak of the Black Death in 1347, which lasted well into 1351 and beyond, then the early development of the Hundred Years’ War between England and France in 1337 (until 1453), the Babylonian Captivity of the Papacy in Avignon in 1309 (until 1377), and the Western Schism (1378–1417), plus a number of major problems in agriculture, such as the recurrent cattle plague in England (1318–1350). But can we view all those economic, military, and political events through the same lens? Or were they all somehow correlated, especially because the end of the Medieval Warming Period (ca. 950–ca. 1250) had already set in and led over the Little Ice Age (ca. 1450–ca. 1850), triggering, in its wake, a whole series of political, cultural, and medical unrests? [7] There is no doubt that the fourteenth century can be identified as a period when the emergence of a major crisis was felt most imminently, which ultimately led to the fundamental paradigm shift moving the Middle Ages into the early modern age. [8] Yet, would we be justified in identifying here a century with particularly life-threatening weather conditions and natural disasters? Was the time between roughly 1300 and 1400 more troubled by natural threats than before or after on the European continent?

To be sure, various scholars have pointed out major disruptions and catastrophic developments already in the twelfth and thirteenth centuries, which might move the starting point of this global crisis ca. hundred, if not two hundred years backwards despite the Medieval Warming Period. [9] But any climate-based study concerning historical developments faces the same problem that the various explanations rely on many different phenomena that occurred repeatedly and which do not necessarily allow us to create a consistent picture, if we contrast, for instance, western Europe with the eastern Mediterranean. [10]

There is a general consensus among climate historians who have demonstrated in a myriad of approaches and with many different methodologies that the high Middle Ages experienced a warming period, and the late Middle Ages fell into the little Ice Age. Both climate patterns had a huge influence, of course, on the cultural and economic developments, though the specific consequences remain rather unclear until today. However, if we examine the available data from previous or later centuries, we can easily recognize that the experiences with natural catastrophes were not at all exclusive to the fourteenth century. Instead, we can certainly confirm that human history has always been determined by severe dangers resulting from extreme weather conditions, floods, earthquakes, extreme winter or summer temperatures, storms, or fires.

All of these observations have sensitized us already to the great need to collect more data concerning natural disasters, which we subsequently would have to evaluate critically so that we could identify more specific conditions and causes of historical changes in human terms. My real purpose in this paper, however, is rather modest, and yet ambitious to some extent as well. Drawing on previous research, the intention is to bring to light a continuous line of catastrophic weather conditions and natural disasters from the tenth to the fifteenth centuries with neither date being necessarily a rigid chronological boundary. [11]

We would have to take the next step from here and examine more closely the correlation between those natural events and political and military history, which might help us to uncover the extent to which climate, weather conditions, and a variety of catastrophes impacted human society at large. But at the current moment this seems to be a too lofty goal, especially because it would require extensive analysis of the available data of temperatures in the air and in the oceans, of average rainfalls, cloud covers, changes in the sun, etc., along with a meticulous examination of how those factors might have impacted social and material conditions. [12]

Instead, following I will discuss representative or exemplary cases of natural catastrophes on the medieval Continent in order to illustrate how unstable human existence actually had been already then and that our common understanding of that past age suffers from a considerable ignorance of those terrifying and destructive events. However, we must always keep in mind several major factors that determine or rather hamper our investigation: first, the European continent is very large, and characterized by many different geophysical features; second, the communication among the various parts of Europe was not ideal, though many chroniclers obviously were informed well enough to report even of events that had taken place far away; third, many times, natural catastrophes affected primarily, say, the population of coastal regions, whereas the members of the courts or of the major cities inland paid hardly any attention to them, unless they were affected by it in economic terms (refugees,

loss of trade and commerce, etc.); fourth, natural disasters that struck primarily villagers might not have concerned chroniclers, and especially not poets and artists who produced their works for noble patrons. And fifth, even chroniclers could not know everything and yet intended, of course, to dramatize their accounts to attract readers. This all means that even though we have a lot of narrative data available for many different regions in pre-modern Europe, the impact of bad weather and natural catastrophes was probably very diverse and cannot be described automatically as having been of universal consequences, except for the Black Death, for instance. [13]

2. Case Studies of Natural Catastrophes

Instead of trying to be comprehensive, which would be impossible in the first place, especially because all reports about so-called natural disasters were subject already at that time to individual perspectives, I will examine representative cases to gain a better understanding of what we can hope to learn about in medieval chronicles, annals, letters, travelogues, and other reports.

3. Floods

The All Saints' Flood (*Allerheiligenvloed*) which took place on November 1 and 2, 1170 destroyed much of the land along the northern Dutch and Frisian coastline. It also created new islands by forming flowing waterways between certain areas and the firm land, transforming the entire coastline in dramatic terms. Many of the bodies of water changed from fresh water to salt water because of the influx from the sea. The flood was so extensive that even cities far south such as Utrecht were inundated, with the high and low tides being clearly noticeable. The Frisian island Bant, extending ca. 45 km, was cut into several parts, leaving behind the islands of Borkyn (or Borkum), Juist, Buise (which disappeared into the water in the seventeenth century), Oesterende (today Norderney), and Bant (which also disappeared in the seventeenth century). [14]

On Dec. 28, 1248, another major storm hit the western coast of Schleswig and Holstein, which separated the western Frisian islands from the mainland and destroyed parts of the newly erected dikes and dams. A large area of the so-called Haseldorfer Marsch was affected particularly hard, which created new islands, Altenwerder and Finkenwerder. And the struggle between people and the sea continued over the centuries, with chroniclers commenting regularly about ever-new catastrophes. Those, however, in turn motivated the local population to work intensively to build newer and better dams and to protect themselves against the dangerous sea with technical and building inventions. [15]

Several decades later, on August 10, 1191, after a period of intensive rainfall, in Oisans, part of the valley wall of the Romanche river (southeastern France) broke off and blocked ca. 1 km up-stream the natural flow, which created a natural barrier for some time. From this resulted a natural lake of ca. 15–20 km length up to the village Saint-Laurent (today, Le Bourg-d'Oisans). Twenty years later, during a strong storm on Sept. 14, 1219, the barrier broke, and the entire lake emptied out into the valley of the Romanche down to its estuary into the river Drac, and then to the river Isère. Grenoble to the east was mostly protected from the first wave because it was not yet extended to the Drac. But the water was accidentally damned in the Isère, which prevented people from fleeing to safety, leading to a major loss of lives. [16]

Could we thus claim that the twelfth and thirteenth centuries already witnessed major natural catastrophes? Of course, there is no doubt about it. Nevertheless, how impactful were those events along the shores of the North Sea and in the river valleys in eastern France on the larger historical and cultural events as they evolved at the aristocratic courts and in the urban centers? It might remain impossible to provide succinct and definitive answers here, but I propose to question whether the fourteenth century was plagued by more natural problems than other periods in the pre-modern world.

Some of the major natural catastrophes in the fourteenth century were the All Saints' Flood which hit the southwestern coast of the Baltic Sea on Nov. 1, 1304, affecting primarily Pomerania, [17] the Friaul earthquake on Jan. 25, 1348 with massive damages also in Carinthia, [18] the Basel earthquakes from Oct. 18, 1356, which destroyed much of the city and the wider surrounding territory, though with a fairly limited loss of human lives, [19] the two Dionysius floods along the coastline of the North Sea in 1374 (Oct. 9) and 1375 (Oct. 8–10) badly damaging Flanders and the lands up to the Wesel river.

In the fifteenth century, many more reports about floods along the various sea coasts were written, such as All Saints' Flood along the northwestern coastline of Schleswig and Frisia on Nov. 1, 1436, then the Saint Cecilia Flood of the lower river Elbe on Nov. 21, 1412, the Cosmas and Damian Flood of the northwestern coast of modern-day Belgium, the Netherlands, and Germany on Sept. 27, 1477. In 1480, a very rainy early Summer (May and June) was followed by an intensive heat period, which led to a massive melting of snow and ice in the Alps. Subsequently many rivers, especially the Aare in Switzerland and the lower Rhine, inundated and caused extensive

damage in a wide range along the river valley (St. Magdalen Flood). Virtually all bridges affected by this flood were destroyed.

A catastrophe of a similar origin had occurred already in Middle Europe in July of 1342, and it happened again along the Elbe river in Aug. of 2002 and in major parts of Middle Europe at the end of May and early June in 2013. [20] The sixteenth century also had its significant share of other catastrophes, which all mirror people's ongoing struggles against the forceful sea and their efforts to gain land by means of building dams. [21] However, many of those catastrophes can also be explained by the fact that there was discord among the people as to who was in charge of maintaining the dikes and dams, a costly and time-consuming task, that military conflict distracted people from the real dangers from their physical environment, and that natural forces increased and caught people unaware.

4. Earthquakes

Many earthquakes struck the Pyrenees, such as on Feb. 2, 1373, March 15, 1427, Feb. 2, 1428, Feb. 2, 1429, most commonly in the region of Olot at the very eastern point of the mountain range. [22] The medieval and early modern annals are actually filled with accounts of other minor and major earthquakes affecting various parts of Europe, such as in Verona on Jan. 3, 1117, [23] in Syracuse in 1169, in Katschberg, Austria, on May 4, 1202, [24] in Kindberg, Austria, on May 8, 1267, [25] in Gera (Saxony) on May 4, 1346, and so forth. [26]

5. The Black Death

In order to expand our database and to incorporate similar or even related catastrophic events, we could also incorporate a long list of devastating fires that destroyed farms, villages, towns and cities, castles, churches, and cathedrals from the Middle Ages until today, [27] many of them probably caused by people and not necessarily natural catastrophes. Major storms commonly disrupted ordinary life and affected many communities in drastic fashion. But the most impactful experience was, to be sure, the Black Death from ca. 1347 to 1351, which we can also categorize as a 'natural catastrophe' because the attack by the bacillus *Yersinia pestis* was a threat to all of humanity coming from the natural environment. However, this plague did not simply disappear and actually reemerged for a long time in ever new waves far into the late fifteenth century and beyond. Particularly bad periods were between 1360 and 1363, 1370 and 1374, 1382 and 1384, 1390 and 1391, 1399 and 1400, 1410 and 1412, 1422 and 1424, 1429 and 1430, 1338 and 1439, and so on. In fact, although the public focus turned to the syphilis since the early sixteenth century, the Black Death lingered on and returned to Marseille and western Europe in 1722, to Messina, Sicily, in 1743, to Russia in 1771 and 1772, to eastern and southeastern Asia in 1894, and to California in 1899. [28]

6. Was there Literary-Historical Evidence?

Unfortunately, however, medieval and early modern poets tended to present the events in their narratives as taking place in a stable, mostly ordinary natural environment, commonly during Spring (May) or Summer, only occasionally, or rather rarely, also including harsh weather conditions, though then without the rain, cold, or snow having any major impact on the protagonists. [29] In fact, we barely hear in literary texts about real external weather problems, or of natural catastrophes, such as earthquakes, floods, eruptions of volcanoes, forest fires, tornadoes or hurricanes, and the like. Those happened many times, of course, as the numerous chronicle accounts from throughout the Middle Ages and beyond richly confirm, but they did not enter much, if ever, the mental horizon of fictional writers who apparently did not want to pay much attention to weather and climate conditions. The common conflicts for the protagonists are, by contrast, war, fights with other knights or heroes, the pursuit of love, death, the quest for God, confrontations with monsters, or, on a much more mundane level, marital conflicts, the establishment of friendship, and the search for adventures. Nature, by contrast, especially when it threatens to disrupt ordinary life, does not seem to figure prominently in the literary context, unless poets observed a need to compare their figures with snow, storm, rain, etc. [30]

Even the experience of winter as an unpleasant and painful season was rarely discussed, if ever, with the late Middle High German romance *Diu Crône* by Heinrich von dem Türlin (ca. 1290), the Middle English alliterative romance of *Sir Gawain and the Green Knight* (ca. 1370), and William Dunbar's poem "In Winter" (ca. 1460) being remarkable exceptions. [31]

Only once, as far as I can tell, do we encounter a truly 'earth-shaking' natural catastrophe in a literary text which has a major impact on the protagonists, that is, in Marguerite de Navarre's *Heptaméron* (1558/1559), where the future story tellers are among those visitors of a spa in the Pyrenees who have to flee torrential rains that inundate all rivers and make all passages impassable: "But as they were preparing to leave, the rain came. It fell in such torrents and with such extraordinary force, you would have thought that God had quite forgotten that once He had promised to Noah never again to destroy the world by water." [32] Many people die in their efforts to escape from

that disaster, and only a small group of men and women make it to a monastery where they are safe from the floods. There they assemble, waiting for a bridge to be built that can take them across a gorge and allow them to return home, so they begin to tell each other stories, similar to the group of storytellers in Boccaccio's *Decameron* (ca. 1350), who had turned their backs to Florence to avoid the danger of the Black Death. [33]

At times, knights in chivalric romances from the high Middle Ages bring about a devastating storm themselves which destroys the entire forest, such as in Chrétien de Troyes's *Yvain* (ca. 1170; see also Hartmann von Aue's *Iwein*, ca. 1190). Early in the account, Calogrenant relates how he experienced a strange adventure in a forest where he poured water from a well onto the stones in order to provoke a tempest:

The moment I sprinkled some water from the basin on the hollowed stone, I would have been glad to repent, had I been able. I am afraid I poured too much, for I then saw the sky break open with such force that lightning from more than fourteen directions blinded my eyes and the clouds let loose, all at once, rain snow, and hail. The storm had such terrible force that a hundred times I thought I would be killed by lightning bolts falling about me and trees crashing to the ground. You can be certain that I was terrified until the storm abated. But God granted me such comfort that the storm did not last long and all the winds died down. As soon as God wished them to cease, they dared not blow. [34]

The contemporary audience must have well understood the concrete meanings of the words and the image conveyed, although Calogrenant caused this terrifying natural catastrophe himself in his quest for adventure, which then begins immediately following the storm with the lord of the forest, Ascalon, appearing and challenging the intruder.

Undoubtedly, medieval and early modern literature is also filled with accounts about shipwrecks as a result of mighty storms, but those examples do not serve us fully to establish evidence about actual natural catastrophes as they happened in the Middle Ages and beyond. [35] However, the literary imagination must have reflected some practical experiences. For instance, young Tristan in Gottfried von Straßburg's eponymous romance (ca. 1210) is set free by his kidnappers, the Norwegian merchants only after God has commanded such a strong storm on the open sea that

all the crew together were not able to maintain control. They had to let their ship drift wherever the violent winds blew it, and they lost all hope in saving their own limbs and lives . . . There was nothing else they could do except allow themselves to be carried by the waves up to the heavens and then back down again as if to hell . . . None of them could stay on their feet for a moment. This went on for a full eight days and night, and they were close to losing all their strength and their minds. [36]

Although Tristan will later go on several voyages, either alone or in company, he will never encounter any natural challenges, which might be typical of medieval literature since most poets or writers were less interested in the natural environment and more in the human interactions undisturbed by external, material influences.

We know also of a report concerning a major earthquake, such as the one on January 25, 1348, which the famous humanist Francesco Petrarca (1304–1374) commented on in a letter to the Archbishop of Genoa, Guido Sette:

... the day had nearly come to dusk, when vibrations arose so tremendously in large parts of Italy and Germany that a lot of people, who did not know about such tremors, thought the end of the world would be near. I was just sitting in my library in Verona at this time; although I knew something about such things I was dismayed at this sudden and unusual event. The pavement trembled under my feet; when the books crashed into each other and fell down I was frightened and hurried to leave the room. Outside I saw the servants and many other people running anxiously to and fro. All faces were pale. [37]

Most other documents, however, which contain reports about this and other earthquakes, or a diverse range of natural catastrophes, fall into the category of chronicles and similar accounts. [38] Indeed, Petrarca's letter belongs to a different, non-fictional genre, which explains the inclusion of the earthquake in his comments. We can generally affirm that heroic epics, courtly love poetry and courtly romances, entertaining verse narratives such as *fabliaux*, or religious plays usually do not engage with natural disasters or the natural world more than barely necessary. [39]

One entertaining though small exception, however, would be "The Knight with the Hazelnuts," an early-fourteenth-century Middle High German verse narrative which in turn was based on a variety of older texts such as Petrus Alphonsus's *Disciplina Clericalis* or Jean de Condé's Old French *fabliau* "Pliçon." Here, a noble lady has a love affair with a man who visits her while her husband is out in the forest hunting. Suddenly, a heavy rainstorm forces him to seek shelter, where he encounters a group of children who have collected hazelnuts and offer some of them to him for his nourishment. This means that the story takes place in Fall and at a time when

inclement weather impacts the events, though again, the cold rain does not amount to anything catastrophic. The protagonist then returns home, where he would have almost caught his wife *in flagrante*, but she manages to deceive him and help her lover to escape, while the marital couple consumes the hazelnuts. [40]

Of course, the first appearance of the Black Death in Italy in 1347, imported from the Black Sea, caused a huge shock and had devastating consequences almost all over Europe. Curiously, however, only Boccaccio responded more explicitly and extensively to this new pandemic in his literary works, in his famous collection of 100 tales, the *Decameron*, whereas most other contemporaries, such as the Dominican fable author from Bern, Ulrich Bonerius, did not seem to have cared that much about the pest. At least in his collection *The Gemstone*, which appeared at virtually the same time as Boccaccio's work (ca. 1350), Bonerius never comments on this pandemic, and he also does not engage much at all with natural phenomena, except, in one case, with the workings of the sun and the wind (no. 66; cf. also no. 83). [41] Late medieval literature, whether we think of Langland's *Piers Plowman* or any of the many religious plays, early prose novels, collections of verse narratives (Heinrich Kaufringer), or lyric poetry (Oswald von Wolkenstein) mostly left out the natural environment and concentrated instead on the social interactions, as if earthquakes, floods, extreme temperatures, or the Black Death, did not matter much for them, maybe because those would have sidetracked them from their central concerns, such as ethics, honor, God, friendship, virtues, etc.

7. Conclusion

In contrast to the literary sources, historiographical narratives lend themselves much better and extremely well for a critical examination of natural disasters throughout the entire pre-modern age. According to many different sources, humans were constantly in danger of being struck by floods, thunderstorms, earthquakes, and fires, and this throughout the entire Middle Ages both on the British Isles and on the Continent. In fact, we might go so far as to identify all history as a continuous struggle between people and their natural environment. However, as a side note, we must be clear about the fact that such a general statement should not have any bearing on the situation now in the twenty-first century with us facing global warming in most dramatic terms because human impact on nature has moved us dangerously from the Holocene to the Anthropocene. [42] Nevertheless, by the same token this should not blind us to the fact that the Middle Ages already witnessed many different natural catastrophes, a warning for our present and future, alerting us to the precariousness of human existence in an ever-changing natural environment, which can be rather hostile to us more often than not.

We can be certain that horrific changes in weather and natural catastrophes occurred quite frequently throughout the entire Middle Ages and the early modern age. The fourteenth century was no exception, though the number of reports about dramatic events increased, at least for some regions, while others were rather spared. As Heli Huhtamaa now demonstrates, for instance, dendrochronological evidence concerning northeastern Europe from the 1310s confirms that the dramatic decline in weather patterns badly affecting western Europe (extended rainfall, poor harvest, famines) did not reach the territories of modern-day Finland, the Baltic countries, and western Russia. [43]

We thus face the double challenge of recognizing dangerous changes in climate or the experience of earthquakes and storms on the one hand, and of establishing useful patterns based on those data, on the other. The most troubled regions were always, as expected, if we consider flood, the shorelines of the North Sea and the Atlantic, but also of the Baltic Sea. Both the Pyrenees and various part of the Alps experienced earthquakes throughout the centuries, which continues until today and is not surprising considering the fact that the African plate presses onto the European plate, causing massive tectonic pressures.

Considering the wealth of relevant documentation from written sources (chronicles) and now also from scientific research (dendrochronology, for instance), we could move on from here and reflect on the possible impacts of those natural catastrophes on political and cultural history. It remains, however, rather confounding that literary authors rarely, if ever, reflected on those dramatic events. Nevertheless, as we can now conclude, the European Middle Ages knew of its shares in natural catastrophes, and this in many of its various parts. The sea was a constant challenge of a great magnitude, but earthquakes also deeply scared people, causing vast damage and great losses of lives. Neither artists nor literary writers, however, seem to have taken much note of these phenomena.

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- [16] I have drawn the basic information from https://de.wikipedia.org/wiki/Lac_de_Saint-Laurent (last accessed on Aug. 17, 2021). But see also Marche, C. (2008). *Barrages: crues de rupture et protection civile*. Montréal: Presses internationales polytechnique.
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- [24] <https://www.zamg.ac.at/cms/de/geophysik/erdbeben/historische-erdbeben/historische-erdbebenforschung-oesterreich/erdbeben-im-raum-katschberg-freitag-den-4.-mai-1201-gegen-05-00-uhr-io> (last accessed on Aug. 17, 2021).
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- [26] Leydecker, G. (2011). Erdbebenkatalog für Deutschland mit Randgebieten für die Jahre 800 bis 2008. *Geologisches Jahrbuch* E 59: 1–198. He lists ca. 12,700 earthquakes from ca. 800 to 2008.
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- [28] Byrne, J. P. (2004). *The Black Death*. Greenwood Guides to Historic Events of the Medieval World. Westport, CT, and London: Greenwood Press, xxvii–xxx. See also the contributions to Meier, M. (2005). *Pest: Die Geschichte eines Menschheitstraumas*, ed. (Stuttgart: Klett-Cotta, 2005), such as the studies by Mauelshagen, F. Pest, Pestangst und Pestbekämpfung in der Neuzeit (237–265) and Kessel, M. Gebannte Gefahr? Die Pest im 19. und 20. Jahrhundert (266–282). See now also the contributions to Green, M. H. (Ed.). (2015). *Pandemic Disease in the Medieval World: Rethinking the Black Death*, The Medieval Globe. Kalamazoo, MI, and Bradford: ARC Medieval Press.
- [29] For a solid, though rather traditional approach, see Pearsall, D. and Salter, E. (1973). *Landscapes and Seasons of the Medieval World*. London: Paul Elek.
- [30] For lexicological analysis, see now Oberlin, A. (forthcoming). Weather, Metaphor, and the Lexicon: A Corpus Study of Medieval German. *Mediaevistik* 33.
- [31] Classen, A. (2011). Winter as a Phenomenon in Medieval Literature: A Transgression of the Traditional Chronotopos? *Mediaevistik* 24: 125–150. While Arthur celebrates Christmas, Gawain later suffers through a miserable time while traveling in a wintry landscape of Wales. For William Dunbar’s poem, see Douglas Gray, D. (Ed.). (1985). *The Oxford Book of Late Medieval Verse and Prose*. With a Note on Grammar and Spelling in the Fifteenth Century by Norman Davis. Oxford: Clarendon Press, 306–307.
- [32] Marguerite de Navarre (1984). *The Heptameron*. Trans with an intro. by P. A. Chilton. London: Penguin, 60.
- [33] Giovanni Boccaccio (1972/1997). *The Decameron*. Trans. with an Intro. and Notes by G. H. McWilliam. Sec. ed. London: Penguin.
- [34] Chrétien de Troyes (1990). *The Complete Romances of Chrétien de Troyes*. Trans. with an intro. by David Staines. Bloomington and Indianapolis: Indiana University Press, 262. Basically, the same story is told by Hartmann von Aue in his Middle High German ‘translation,’ *Iwein* (ca. 1190), but the dramatic effects of the storm are even more accentuated: “The storm grew so violent that it leveled the forest. If there was anywhere a tree so big that it remained standing, it was bare, as stripped of foliage as if it had gone up in flames. Whatever dwelt in the forest perished immediately if it did not make a quick escape.” Hartmann von Aue (2001). *The Complete Works of Hartmann von Aue*, trans. with commentary by Frank Tobin, Kim Vivian, and Richard H. Lawson. University Park, PA: The Pennsylvania State University Press, 144.
- [35] Classen, A. (2020). Sea Voyages in Medieval Romances as Symbolic Trails Through Life: Existential Experiences and Female Suffering on the Water. *Critical Literary Studies: Academic Journal* (University of Kurdistan) 2.2. Series 4: 27–46. http://cls.uok.ac.ir/article_61567.html; or: DOI 10.34785/J014.2020.367.

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- [37] Francesco Petrarca (1978). *Rerum senilium* 9 (10,2), in Francesco Petrarca, F. (1978). *Opere*, vol. 2: *Epistole*, ed. Ugo Dotti. Turin: Unione Tipografico-Editrice Torinese, 613-889; here quoted from Rohr, Ch. (2003). Man[-Made] and Natural Disaster in the Late Middle Ages: The Earthquake in Carinthia and Northern Italy on 25 January 1348 and its Perception. *Environment and History: Coping with the Unexpected – Natural Disasters and their Perception* 9.2: 127-149; here 134.
- [38] Berlioz, J. (1998). *Catastrophes naturelles et calamités au Moyen Age*. Micrologus' Library, 1. Florence: Sismel – Edizioni del Galluzzo.
- [39] For a valuable different perspective, see George, M. W. (2014). Adversarial Relationships between Humans and Weather in Medieval English Literature. *Essays in Medieval Studies* 30: 67–81; See online: <https://muse.jhu.edu/article/587613/pdf> (last accessed on Dec. 1, 2020). He cites my own previous article: Winter as a Phenomenon in Medieval Literature (see note 31), 74, in support of his argument. He points out that in Chaucer's "The Miller's Tale," the critical plot development is predicated on the fear of a new flood, as a repeat of the biblical flood. I would distinguish more between such topical imagery and real reactions to inclement weather, such as in the Wakefield *Second Shepherds' Pageant* from ca. 1500. See George:, Adversarial, 76–77. George also suggests that most of Chaucer's works with their glorification of marvelous Spring weather were influenced by the long period of above the norm weather conditions in late fourteenth-century England (78).
- [40] Quoted from Classen, A. (Ed.). (2009). *Erotic Tales of Medieval Germany*. Selected and trans. by Albrecht Classen. Medieval and Renaissance Texts and Studies, 328. Tempe, AZ: Arizona Center for Medieval and Renaissance Studies, no. 14, 91–94.
- [41] Bonerius, U. (2020). *The Fables of Ulrich Bonerius (ca. 1350): Masterwork of Late Medieval Didactic Literature*, trans. Albrecht Classen. Newcastle-Upon Tyne: Cambridge Scholars Publishing.
- [42] See, for instance, Schmidt, J. M. (2018). *Water and the Anthropocene: Abundance, Scarcity and Security in the Age of Humanity* (New Delhi: Sage, 2018); Harrison, R. and Sterling, C. (Eds.). (2020). *Deterritorializing the Future: Heritage in, of and after the Anthropocene* (London: Open Humanities Press, 2020). The literature on this critical topic is legion, of course.
- [43] Huhtamaa, H. (2020). Climate and the Crisis of the Early Fourteenth Century in Northeastern Europe. *The Crisis of the 14th Century* (see note 5), 80-99.

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