What happened to the climate in Northern Europe mid-16th c. A.D.?

By: Dr. Nicholas J. Blondeel, St-Truiden, Belgium

Our dendrochronological study (ⁱ), as well as other reports suggest a fairly sudden deterioration of the climate in at least Western Europe starting abruptly around 1550 (see fig. 1: detail of dendrochronology – 'extended' - curve of oaken object from 1540 till 1574, own data).



In the past, the first preoccupation of the common people was to survive in a harsh world. Descriptions of the ambient climate had no priority. In addition the cost of paper and printing was high.

Exceptionally, an important first hand climate report came to us, written one year after a terrible winter in the year 1564, a real "**annus horribilis**". A local 'blogger', or chronicler 'Daniël Van Oesbroeck' reported in his *"Rijmkroniek van Merchtem"* (Rime Chronicle of Merchtem) in the form of rimes, unofficially all kinds of events relating to his community of Merchtem, including the winter of 1564.

Merchtem was at the time a small village on the road between Brussels and Antwerp, with maybe a few hundred inhabitants. Situated 50°57'N, 4°14'E, this was well within the temperate climate zone. It belonged to the Duchy of Brabant, now the province 'Flemish-Brabant' in northern Belgium, at the time belonging to the Low Countries under Spanish rule.

The chronicle was written in the local language, called "Diets" or "Dutch", old Flemish derived from the Frankish invaders and settlers some thousand years before. In higher circles, the main language was French or even Latin.

In passage 243, the writer reported (free translation): "I may not forsake my intention, but must add here in rimes, how badly the population has been hurt... in the year '64 by ...such a terrible harsh winter, never heard off". And he continued: "The winter set on suddenly and unexpectedly. In November people thought, they would have no problem, but in December, the cold came suddenly". Later, the chronicler reported

that the cold *"lasted about ten weeks, starting nine days before Christmas and lasting until Saint Matthews"* (24th of February).

The intensity of the cold:

According to the chronicle, the river "Schelde" (Scaldis) connecting the inland via Antwerp to the see, *was entirely frozen* (from 26th December till 6th January according to other sources), an extremely rare event. The inland therefore was shut off from all import of goods by sea. But *marketers set up a stand on the ice* and *sold all kind of things including beer and wine.*

Inside the homes *"the cold made the wine freeze in the glasses on the table...but it did not lose its power*!". Wine freezes at temperatures of -8 to -10° C (15 to 20° F.) related to its alcohol content. So, one can derive that temperatures outside may have been much colder, maybe around -20° C or more, as there was also a cold wind blowing!. The chronicler did not mention all the recipients filled with liquid which did not survive this freezing, which must in toto have caused a great loss.

Effect on vegetation.

Van Oesbroeck continued: " a lot of trees are completely frozen, so the fruit trees, the vineyards, big nut trees, even oaks, and many other trees".

These trees may die at very low temperatures. It may look somewhat odd, but our data show that some very cold years also happened the years before, such as in 1562 and 1563: hence trees got little chance to recuperate from previous damage. And after the cold winter, after Easter and begin May, *"the corn seemed to grow very*"

thin, and everybody feared a rise in prices".

Effect on the population

The writer was very much concerned with the poor, who were the first victims; Indeed, he writes, "they had no money to buy deadwood on the market for the open fire, and had no proper protective clothing. Therefore, many of them had to die from cold"

Some of them got drunk, and then, once outside, got confused or fell asleep, and were snowed under and died. Even their urine froze. Others were assisted by some rare outside passer-by, who helped them inside a home. But many of them lost frozen extremities, fingers, toes, ears, noses, with painful and poorly healing wounds and big scars. It is well known nowadays – but not then- that alcohol opens the blood vessels so that the exposed body parts loose warmth much faster, hence freeze much faster. The 'wooden hammer' after too many Christmas drinks is also well known nowadays.

Some of the poor *destroyed their wooden belongings, carriages, chairs, tables, baskets etc.*. in order to have fire. Some even *broke their house down* or pillaged the property of a landowner. Gathering deadwood in de property of landowners was normally forbidden and severely punished, but the landowners let be. Similar scenes happened also during World War I and II.

But the writer also remarked that the poor used every ruse to stay alive, and that there were so many of them and always will be!

Economic repercussions

The prices for goods in Antwerp increased suddenly, because goods had to arrive by horse and carriage as the harbour was frozen. Cloven wood blocks *('fasseelhout'*), vegetables and corn steadily increased in price.

Van Oesbroeck described the most extreme cold winter he ever experienced, but there were more cold winters, and even the summers were relatively cold. The following decades went into history as "the Litlle Ice Age", lasting well into the 17th c.

Thanks to this detailed historical chronicle, we could correlate climatological events with our dendrochronological findings.

Conclusion

But what started this unusual and fairly sudden deterioration in climate? How far south did it reach? Was it local or in the whole northern hemisphere? In this regard, an interesting dendrochronology dating study of a canoe, on the other side of the globe in the Northern hemisphere (ⁱⁱ) showed on a (compressed curve) a remarkable event period around 1560 of very reduced growth in eastern white pine!

ⁱ BLONDEEL Nicholas J.: Dendrochronology of oaken objects – a new method. To be published.

ⁱⁱ PICKARD F., Robichaud A., Laroque Colin P.: Using dendrochronology to date the Val Comeau canoe, New Brunswick and developing an eastern white pine chronology in the Canadian Maritimes. Dendrochronologia, 2011, vol. 29(1) pp 3-8.