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Reporting on historical severe storms: Two examples of Utrecht (1674) and Abtenau (1796)

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ABSTRACT

The paper surveys written and pictorial sources on two examples of severe storms in the Netherlands and in Austria in Early Modern Times. A cultural-historical tool is proposed to investigate the human dimension of the storm consequences. The retrospective analysis of a tornado (1674, Utrecht) and a previously rediscovered hailstorm (1796, Abtenau) illustrate the approach.

1. Introduction

Research on natural hazards from a cultural-historical point of view has become popular during the last few years. This paper focuses on two historical severe storms in the Netherlands and in Austria. After a brief overview on the available historical sources, we present a new cultural-historical methodology that investigates the human dimension of severe storms and its consequences. We illustrate this methodology by two selected examples of historical severe storms.

Data on severe storms in Early Modern Times (1600–1800 AD) are sparse. In the Netherlands Buisman (2006a,b) wrote a history of the weather for this time period. However, no such source books exist for Austria. Many historical sources were destroyed: at the beginning of the Second World War all weather notes of the Central Meteorological Institute (ZAMG) of Vienna were transferred to Berlin, because the institute got affiliated to the German ministry of aviation. A fire destroyed most sources on April 7, 1945, and only the material from 1936 onwards could be saved (Hammerl et al., 2001, p. 168 and p. 176).

On November 19, 1942, the farmers association of Vienna ("Landesbauernschaft Wien") posed an urgent request to the director of the City Archive of Vienna, Dr. Leopold Sailer, in order to obtain observations for combating elementary calamities ("Elementarereignisse") in the Donau and Alpine region, with a special focus on Vienna. On the next day Sailer (1942) promptly responded with a letter by listing years – without the location – categorized by the calamities. His notes on damages caused by weather phenomena are restricted to floods. An exception are calamities caused by strokes of lightening in the three years 1452, 1720, and 1799, but there are no hints to severe storms contained in this letter.

Kretschmer and Tschulk (1995) report on a severe storm on the November 10, 1690, which "up roofed many houses and knocked over several ships on the [river] Donau" (p. 15).

The European Severe Weather Database (Dotzek et al., 2009) lists three entries pointing to severe storms in Austria during the time period 1600–1750:

- "in the year 1677 there was a dreadful hailstorm in Mattigtal and in Munderfing. All field crops were destroyed" (Munderfing, 1977)
- in the year 1711 "a tornado rages in Scheibbs [Lower Austria] and caused huge devastations" (Scheibbs)
- "because of a severe hailstorm the community made a vow to minister at this location [of the Donati-Chapel Stöttera

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Table 1
Mean observed and estimated frequencies of tornado occurrences over land in Austria and the Netherlands (Dotzek, 2003, p. 155). Standard deviations are not available.

	Austria	The Netherlands
Observed	3	20
Estimated	5	35

(Burgenland)] every year on every second Sunday of July in the year 1726" (Stöttera, 2009)

Wegener (1917) lists 244 tornadoes in the time period 1456 and 1913, one of them occurred in the Netherlands (1750 in "Berkoude", a small village in the province Zuid-Holland) but none in Austria. Wegener estimated that there are at least 100 tornadoes in Europe per year. Dotzek (2003) used this estimate and added more recent and systematic data to estimate the occurrence frequencies of tornadoes over land in Europe (see Table 1 for the estimates concerning Austria and the Netherlands). It is highly controversial whether the frequency and severity of extreme meteorological events like tornadoes has changed during the last centuries (Brázdil et al., 2005, p. 398). Assuming that the mean tornado frequency did not change very much over the last five centuries, these estimates highlight the lack of source material in Early Modern Times.

In this contribution, we focus on pictorial and written sources on damages caused by two selected examples of severe storms in the Netherlands and in Austria in Early Modern Times. Throughout the paper we understand by "the Netherlands" and "Austria" geographically the respective national state borders of 2000. After outlining the methodology, which is a cultural-historical one, we focus on examples that illustrate the cultural-historical approach.

A storm front was noticed first in Fontainbleu (Northern France, close to Paris), and it then tore over Antwerp and Utrecht and destroyed great parts of the cities in the Netherlands (van der Schrier and Groenland, 2007). Hauer et al. (submitted for publication) argue that most damages by the storm front were caused by straight line winds. However, because of the reported damages in Utrecht it is highly plausible to assume that they are caused by a tornado: There are reports of the punctual damage, extreme lift force, and the different directions in which towers of several churches in Utrecht fell. A drawing that depicts the punctual damage is discussed below.

Moreover, we present a previously rediscovered storm which tore over Abtenau (Salzburg, Austria) in July 1796. The focus is on how people (contemporaries and people today) perceived, interpreted, managed and remembered severe storms.

2. Methodology

This section presents the perception, interpretation, management and memory (PIMM)-square as a cultural-historical tool for analyzing historical events. By "tool" we understand a conceptual framework that makes the cultural-historical categories, their interrelations, the historical subject, and the various dimensions (e.g., temporal, causal and epistemological) explicit.

The methodological triad perception, interpretation, and management used by Hauer (2009) is generalized in this paper to a fourth category, called memory. The PIMM-square is used to investigate retrospectively the human dimension of historical calamities. Although it can be applied to any cultural-historically interesting event, we apply it to the study of historical severe storms in this paper.

Fig. 1 visualizes the PIMM-square consisting of the four cultural-historical categories, their presupposition relations, and the various dimensions of analysis. The dimensions involve several levels of analysis, including temporal (what is earlier/later?), causal (what is the cause/effect?) and epistemological (knowledge related issues) ones. Moreover, the analysis may focus on the contemporaries, people who heard about the event some time after it occurred, up to how people perceive and remember the event today. Without discussing all these distinctions in detail, we illustrate the application of the PIMM-square to historical severe storms in

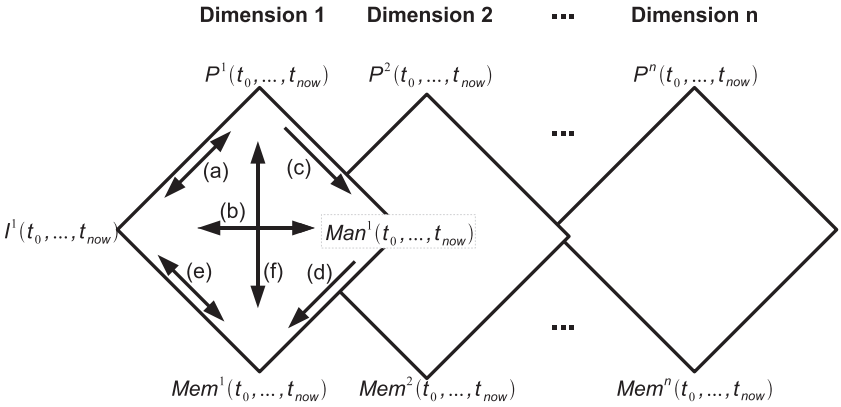

Fig. 1. PIMM-square consisting of the four cultural-historical categories perception, interpretation, management, and memory (see text). Superscripts indicate *n* dimensions of analysis, like temporal, causal, and epistemological ones. Each category can be analyzed from different view-points in time, from the contemporaries living while the event happened (t_0) until today (t_{now}). (a)–(f) denote the presupposition relations among the four categories. An arrow pointing from *X* to *Y* is read as "*Y* presupposes *X*".