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448 years after the event: quantifying the local-scale effects of a Vb cyclone hitting Central Europe in 1572 using a detailed historical damage inventory

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One of the most severe floods that has ever been registered in the catchment of the Upper Danube River in Central Europe is the one that took place in June/July 1572. This flood was caused by a prolonged precipitation event related to a so-called Vb cyclone. Such cyclones develop either over the Bay of Biscay or the Mediterranean (Genoa region), move eastward via Italy and the Adriatic Sea, and subsequently turn northeast. Vb cyclones bring extreme weather conditions with sustained precipitation over the northern side of the European Alps and Central Europe.

The impacts of the Vb cyclone in 1572 severely affected transport routes and local economies as indicated for instance by salt transport data from the Salzach River, one tributary stream (via the Inn River) of the Danube River. Different means of remembrance as historical flood level markers or memorial stones at several cities in Central Europe suggest that contemporaries considered the outcome of the cyclone as catastrophic. The modern quantification of the effects of such an extreme meteorological event helps to increase the understanding of the human-nature relationship in a period when manmade, modern changes of riverbeds and protection structures against floods or debris flows did not exist or did so only to a very limited extent. However, quantifying the effects of a historical regional-scale flood event in terms of degree of devastation at local-scale is normally outright impossible due to lack of detailed data.

In the Styrian Provincial Archive in Graz, Austria, a detailed damage inventory referring to the cyclone of 1572 exists. The purpose of the inventory was to reduce taxes for the Benedictine Abbey of Admont. The interdisciplinary analysis (historian, geographer) of the source enabled a local-scale insight into the effects of the cyclone at Admont. The inventory contains a list of 355 subjects of the abbey distributed over 12 administrative units that suffered minor to severe (complete destruction) damage related to flooding (main river or tributary creeks), debris-flows or landslides.

Further historical sources and geographical data such as land registers and cadastres allowed the localization of 150 damaged buildings at cadastral scale in the valley surrounding the abbey. Our analyses show that most of the properties were located near watercourses at alluvial fans or at slopes above the Enns valley bottom. A significantly greater amount of damage was revealed for properties, which would be nowadays located in moderate- and high-risk hazard zones (according

to the Austrian Federal Service for Torrent and Avalanche Control). However, only 18.7% of the properties damaged in 1572 are located inside modern hazard zones. Modern hazard zone maps are commonly based on runoff modelling using design flood events. Our analysis suggests, nevertheless, that previously undetected or unconsidered sources might contribute substantially to the understanding of the spatial pattern of potential damage in an entire valley region during an exceptional cyclone at a local and even cadastre scale. This achievement is possible despite obvious changes in geomorphological, hydrographical, building structure and protective measure conditions since 1572.