CONSTRAINTS ON THE LOCATION OF THE EARTHQUAKE 1348 OF CARINTHIA / FRIULI / VILLACH DERIVED FROM ITS ESI-2007 ENVIRONMENTAL INTENSITY

DECKER, Kurt* (1); GANGL, Georg (1); REITNER, Jürgen (2)

1: Universität Wien, Austria; 2: Geologische Bundesanstatl, Austria

kurt.decker@univie.ac.at

1348 earthquake, environmental intensity, Carinthia, Villach, Friuli

The earthquake of 1348 is one of the strongest recorded earthquakes in the Alps with an epicentral intensity of I_0 = 9-10 (MCS) and an estimated macroseismic magnitude of Mw = 6.6-7.0. While most authors and catalogues agree on the epicentral intensity no agreement exists on the location of the epicenter. This is reflected by a variety of earthquake names such as Villach, Friuli, or Carinthia.

Assessments of the severity of the earthquake so far exclusively used historical descriptions of damage to buildings. This appears remarkable as the event triggered one of the largest rockfalls in the Eastern Alps and historical sources describe various earthquake effects to the natural environment. We explore these effects to provide an intensity assessment in terms of the ESI-2007 scale relying on secondary effects such as hydrological anomalies, ground cracks, and slope movements:

(a) Reported hydrological anomalies from Villach include both temporary (sulphureous emissions, water color, turbidity) and permanent changes (spring temperature, drying of springs, formation of new springs). (b) Ground cracks of dimensions that “a man would sink down to his belt” are reported from the urban area of Villach. (c) Historical and geological evidence exists for 10 earthquake-triggered rockfalls with volumes between 10^6 and 10^8 m³ which occurred on locations at Dobratsch, Gerlitzen, and Veliki vrh. In addition, rockfalls at two locations in the Southern Tyrol are associated with the 1348 event. Large rockfalls therefore occurred in an area of at least 3000 km².

The described effects support an assessment of the local intensity I(ESI-2007) = X at Villach. The assessment is supported by at least three sites where a single environmental effect has occurred. Comparison with the effects of the 1976 Friuli earthquake further shows that intensity strongly attenuates with increasing distance from the epicenter leading to a decrease of 2-3 intensity degrees at about 50 km distance. This comparison indicates that either the epicenter of the event must have been located close to Villach, or the epicentral intensity must have been significantly larger than I = X when assuming an epicenter at a larger distance from Villach, e.g., in Friuli.