Analytical chronology of past disasters in Arzino's catchment (1905-2005 ; Carnic Pre-Alps, Northeastern Italy)

GARLATTI F.(1,3)**, ALEXANDRE F.** (2,3)**, FORT M.** (1,3)

1. UMR 8586 PRODIG, CNRS, fgarlatti@wanadoo.fr , fort@univ-paris-diderot.fr

2. UMR 7533 LADYSS, CNRS

3. UFR GHSS, Case 7001, University Paris-Diderot (Paris 7)

Rainfall is a primary trigger of torrential phenomena (landslides, debris flow, flow and flood), yet there is no consensus on rainfall thresholds. In fact, thresholds are valid either for a limited area or for one type of soil: regarding debris flow, values ranging from some millimeters to several hundred millimeters are quoted, depending on the time span considered [Rodriguez, 1986; Woo *et al.,* 1997; Fort, 1997; Berti *et al.*, 1999; Buchroithner, 2002; Soja *et al.*, 2007; Canon, 2007; Wittenberg *et al.,* 2007]. A better estimate of these values constitutes one way to set up an effective alarm network. Nevertheless, this is not sufficient. Rainfall events triggering torrential phenomena should also be put back into a broader context, taking into account various temporal and spatial scales. Without this approach, the impact of rainfall on torrential system cannot be completely assessed or anticipated. We present here a geographical, historical (one-hundred year -1905-2005-) and sociological study of torrential disasters in a pre-alpine catchment located in the Carnic Pre-Alps and prone to torrential phenomena: the Arzino catchment (119.6 km^2). Our work aims to: 1) Identify the types of rainfall triggering disasters; 2) Deduct and discuss rainfall thresholds; 3) Identify the disasters that could be used as a point of reference in local and/or regional planning program. We applied a pluri-disciplinary and pluri-scalar approach in three steps. Firstly, we made a typology of heavy rain events ($\geq$ 100 mm/day) thanks to a multivariate statistical analysis. Secondly, a social and historical study allowed

identifying events that caused disasters. Finally, past disasters were summarized in a chronology and classified according to their degree of certainty, their spatial magnitude and their perception by local inhabitants. Two main results were obtained. (1) Disasters are caused by rainfall threshold greater than 125 mm/day and 190 mm cumulated in a few days. Yet, this relationship is not perfect: some events higher than these values did not cause any damage, a fact we explain by the spatial variation of rain intensity and by the varying availability of debris during the 98 events studied. (2) In the Arzino valley, disasters are sometimes local (1/6) and sometimes regional (1/3). Therefore, not only one but several disasters could be used as reference events. As a consequence, both types of disasters must be considered if we want to assess the degree of risk affecting these medium scale mountainous catchments.