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Monitoring Deep-Seated Gravitational Slope Deformations in the Alps by PSInSAR techniques

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Deep seated gravitational slope deformations (DSGSDs) involve wide areas of the Alpine chain and are considered relicts of past climatic and tectonic conditions. Nevertheless, very few data concerning the type and spatial distribution of these instabilities, the controlling parameters and the state of activity are available. This research is focused on the correlation between geomorphological evidences and displacement rates for such a type of phenomena provided by the PSInSAR technique. Large regional datasets available at the scale of the European Alps have been exploited for a combined blind test of two different techniques aimed at identifying unstable slopes on the basis of geomorphological features and remotely sensed observations. The DSGSDs inventory (see EGU2008-A-02709) has been performed by a single operator by repeatedly checking the entire dataset. This approach assured the respect of consistency criteria adopted for mapping and classifying features. This is important because of the wide variety of morphologies typical of these phenomena. The PSInSAR analyses have been independently carried out in the framework of a large project aimed at mapping unstable areas at regional scale through the entire Alpine area. Satellite radar images ($>$ 800) acquired since 1992 by ERS-1, ERS-2 and RADARSAT-1 missions, have been processed by means of the PSInSAR technique. For the purposes of this research, more advanced analyses have been performed later at local scale on some selected relevant sites. The displacement rates of DSGSDs and their variability at the scale of the entire western-central Alps are presented. The displacement rates vary from few millimetres up to some centimetres per year. Where possible they have been

compared with long term in situ geodetic measurements already available (Pejo, Valgrisanche, Padrio-Varadega, etc., Ambrosi and Crosta, 2006), showing a good agreement. The relative abundance of displacement data and geomorphological observations at the mountain belt scale allows to state that most of these phenomena are really active even if with low displacement rates. As suggested by some observed linear features (scarps, counterscarps) cutting glacial and periglacial deposits, such phenomena are probably active since the end of the last glaciation. From a methodological point of view the PSInSAR technique represents nowadays one of the most powerful and precise tools for monitoring the evolution of slow instability phenomena (Hilley et al., 2004; Burgmann et al., 2006) over large areas.

REFERENCES

Ambrosi, C., Crosta, G.B., 2006. Large sackung along major tectonic features in the Central Italian Alps. Engineering Geology, 83, 183-200

G. E. Hilley, R. Bürgmann, A. Ferretti, F. Novali and F. Rocca, 2004 Dynamics of Slow-Moving Landslides from Permanent Scatterer Analysis. Science, 2004, 304, 5679, 1952-1955

R. Burgmann, G. Hilley, A. Ferretti, F. Novali 2006. Resolving vertical tectonics in the San Francisco Bay Area from permanent scatterer InSAR and GPS analysis", Geology, 34, 3, 221-224