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Analysis of large slope instability in the French West Pyrenees: example of the Ossau valley

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While some large slope instabilities are well studied and identified in the Alps, some cases have been observed in the Pyrenees and inventoried on the different geological maps, especially in the Spanish and French Eastern Pyrenees. Few investigations have been engaged in the Western part of the Pyrenees. However, the lithological and structural features (shales, limestones and flyschs, strong weathered materials, tectonics, . . .) are favourable to this type of instability, which was emphasized in the Aspe and the Valentin valleys. Thus, despite a significant and proven role of these processes on the current landscape of the French Western Pyrenees, there is a lack of knowledge about: (1) large slope instabilities; (2) their past and recent dynamics; (3) their potential impacts on the stakes.

Recently, investigations about large slope instabilities were initiated in the Ossau valley from Laruns to Eaux-Bonnes. Several types of instabilities have been identified (e.g. shallow landslides, deep landslides, rotational landslides, translational landslides, rock-slides). If some areas had already been observed by the French Forests Office (ONF-RTM) and mentioned in various risk prevention maps (PPR), some slopes were understudied, especially the upstream slopes of Laruns (i.e. Geteu slope) presenting: (1) some geomorphological indices of large rock instabilities (counter-scarps, large cracks, local tension-crack topple and topple rock-slides, . . .); (2) multiple stakes such as housing and the road D3934 ensuring communication between the city of Pau and continuity of economic activities such as ski resorts like Gourette and Artouste.

The main objective of this research was to characterize the phenomena and the different slope processes on the site of Geteu. Thus, a multidisciplinary approach combining:(1) geomorphological analysis (photo-interpretation, detailed geomorphological mapping ...); (2) structural analysis; (3) geophysical measurements (electrical tomography and terrestrial radar measurements) has been initiated.
The results of these investigations show that: (1) the slope is subject to several types of geomorphological phenomena occurring at different time laps; (2) a large slope deformation, which can be described as a RSD (Rock Slope Deformation), in the upstream of Geteu. In addition, the geomorphological investigations allowed to reconstruct the slope history and seems to show a post-glacial deformation, which is continuous and knowing a recent activity.