Potentially frozen sediments presenting mass-wasting processes in glacier forefields in mountain permafrost environments (Swiss Alps)

Wee, Julie*, Barboux, Chloé* & Delaloye, Reynald*

*Geography, Dept. Geosciences, University of Fribourg, Chemin du Musée 4, CH-1700 Fribourg (julie.wee@unifr.ch)

Little Ice Age (LIA) glacier forefield located within the belt of discontinuous permafrost are complex systems sitting astride the glacial, paraglacial, periglacial research frontier. These recently deglaciated environments have been characterized as transient systems pursuing a state of equilibrium by adjusting to non-glacial conditions, and are therefore subject to intense geomorphological activity, especially under the current conditions of a warming climate (Bosson et *al*., 2014). Present-day landforms existing in these systems are legacies of the interrelations between glacial and periglacial morphodynamics, and are therefore precious proxies for the understanding of the spatio-temporal evolution of permafrost in glacier forefield systems.

In this context, the aim of this study is to inventory potentially frozen sediments presenting mass-wasting processes located in glacier forefield within the belt of permafrost, as they serve as indicators of the kinematic and thermal evolution of these particular environments. For that purpose, existing, partly updated inventories of moving landforms in the Swiss Alps based on differential SAR interferometry (dInSAR) technique (Barboux et *al*., 2014) along with aerial photographs were used to detect and characterize the occurrence of mass-wasting processes such as permafrost creep or subsidence in glacier forefields within the belt of permafrost.

The results obtained from the inventory of potentially frozen sediments presenting mass-wasting processes located in glacier forefields within the belt of permafrost in the Swiss Alps reveal that the spatial configuration of mass-wasting frozen sediments in such particular environmental context strongly differs from a glacier forefield to another. This diversity is mainly a function of sediment yield, of ground ice distribution and of past and present glacier dynamics, driven by the topo-climatic context of each site. This implies different dynamical behaviour and evolution for each system, steered by site-specific processes such as permafrost creep (back-creeping) or ice melt induced subsidence (thawing ground ice).

REFERENCES

Barboux, C., Delaloye R. and Lambiel, C. (2014). Inventorying slope movements in an Alpine environment using DInSAR. *Earth Surface Processes and Landforms*, 39/15, 2087-2099.

Bosson, J.-B., Lambiel, C., Deline, P., Bodin, X., Schoeneich, P., Baron, L. and Gardent, M. (2014). The influence of ground ice distribution on geomorphic dynamics since the Little Ice Age in proglacial areas of two cirque glacier systems. Earth Surface Processes and Landforms, 40, 666-800.