



## 6<sup>th</sup> YOUNG GEOMORPHOLOGISTS' DAY

Geomorphology for Society  
*from risk knowledge to landscape heritage*

Cagliari, 28-30 September 2015

### **FORNI GLACIER FLUCTUATIONS: INFLUENCE ON THE BIOLOGICAL SYSTEM IN THE GLACIER FORELAND**

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Glacier retreat is among the most evident impacts of the current climate change. The phases of glacier shrinkage can be reconstructed through geomorphological investigations conducted in the glacier foreland, a suitable site where to evaluate the relationship existing between glacier retreat, geomorphological processes and colonization of newly formed terrains performed by biological forms. The most recent studies conducted in one of the most representative recently deglaciated areas of the Italian Alps are here presented.

The expansion of the proglacial area of the Forni Valley (Stelvio National Park, Italy) was analyzed for the period comprised between the Little Ice Age (LIA) and nowadays, through the use of historical images, orthophotos and field data. In particular, the area and rate of expansion were estimated for the four time intervals defined by the dated moraines, and the results show that the expansion rate was nearly double in the last 88 years compared to the previous years, thus highlighting an acceleration in the expansion rate starting from the beginning of the 20<sup>th</sup> century.

As the glacier foreland expands, different organisms colonize progressively older terrain, including trees, if the area is located below the treeline. Tree ecesis time and germination year were estimated by means of dendrochronological approach and whorls branch counting, performed on living conifers growing in the most recent deglaciated area, close to the current position of the glacier front. The results of this study show an acceleration of the average ecesis in the last few years, with values ranging between 5 and 11 years, and with an average value of 7 years.

On the other hand, glacier advances destroy forests. The study of buried logs and peat (performed through radiocarbon dating and dendrochronological techniques) contribute to a better understanding of past glacier fluctuations and related climate change. In particular, a buried log found in the Forni Valley revealed information about the Subboreal climatic transition and the related glacier fluctuations.

Overall, these findings evidence some of the complex interactions between abiotic and biotic systems in glacial environments, and the precious contribution of arboreal vegetation in dating glacier changes and monitoring velocity of processes in the glacier foreland over time.

