

Sources of Pliocene erosion of the Alps - The Lepontine Dome as a potential source area

Elfert, Simon¹; Reiter, Wolfgang¹; Spiegel, Cornelia¹

¹Geodynamics of the Polar Regions, University of Bremen, Klagenfurter Straße, 28359 Bremen

This study is part of the TOPO-EUROPE program, which researches the development of Europe's orogens and tectonics. The project "Sources and Sinks of Pliocene erosion" is part of the TOPO-EUROPE Collaborative Research Project (CRP) "Thermo-Europe", which concentrates on the evolution of the Alps in the latest Neogene applying thermochronological methods.

Previous studies identified several signals of accelerated exhumation in the external massifs, but could not unequivocally relate them to the deposition record in the Alpine foreland (GLOTZBACH et al. 2008, REINECKER et al. 2008). However there are strong exhumation signals of the eastern Lepontine Dome and the western Aar massif (DÖRR et al. in review) holding promise to be related to the sedimentation history in the basins. One main emphasis is to determine whether the latest accelerated exhumation is local, tectonically driven, or more regional due to climatic changes (i.e. the Messinian climate change).

To get a broad understanding of the processes we will research both potential source areas (as described here) and the sedimentation basins in the Alpine foreland (REITER et al. this volume). Thus transport paths for detritus and their changes over time will be identified.

As source area this study concentrates on the the Lepontine Dome and the Aar massive (Switzerland) using low-temperature thermochronology. To get a highly resolved picture of processes responsible for orogen evolution since the late Neogene we took 57 new samples along horizontal profiles (Maggia and Ticino valley) so far, which are currently processed. These will be complemented by another four vertical profiles.

Furthermore the relationship between the exhumation of the western Aar massif (REINECKER et al. 2008), the activity of the Rhône-Simplon Fault and the change of the stressfield of the Alps will be investigated. In addition it will be tested whether this change of stressfield is associated with the change of drainage-system to orogen-parallel river systems. Therefore we sampled a vertical profile (10 new samples) in the Rhône valley. Finally the influence of Alpine glaciation on the relief evolution will be explored.

The main emphasis will be placed on the analysis of apatites. Fission tracks (FT) and (U-Th)/He dating will be applied, as – due to their low closure temperature – they record the latest exhumation history and topography development. For selected samples ⁴He/³He dating will also be carried out. Zircons will be examined for selected samples (FT and (U-Th)/He dating). Moreover, the dated Apatite grains will be analysed using electron microprobe. The results will be fed in numerical models to verify the obtained exhumation history. First results will be presented.

References:

- DÖRR N., SPIEGEL C., DANIŠÍK M., GLOTZBACH C., RAHN M., FRISCH W. (in review): Neogene activity along the Forcola normal fault: implications for the late-stage exhumation history of the Central Alps (Switzerland). - *Tectonics*
- GLOTZBACH C., REINECKER J., DANIŠÍK M., RAHN M., FRISCH W., SPIEGEL C. (2008): Neogene exhumation history of the Mont Blanc massif, Western Alps. - *Tectonics*, 27, TC4011
- REINECKER J., DANIŠÍK M., SCHMID C., GLOTZBACH C., RAHN M., FRISCH W., SPIEGEL C. (2008): Tectonic control on the late stage exhumation of the Aar Massif (Switzerland): Constraints from apatite fission track and (U-Th)/He data. - *Tectonics*, 27, TC6009
- REITER W., ELFERT S., SPIEGEL C. (this volume): Pliocene erosion and drainage evolution of the Alps: Constraints from Neogene sedimentary deposits