

Pliocene erosion and drainage evolution of the Alps: Constraints from Neogene sedimentary deposits

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This study is part of the Thermo-Europe project investigating coupled climatic/tectonic forcing of European topography based on thermochronometry. Our Individual Project will investigate the latest-stage exhumation history of the Alps by studying the sources and sinks of Pliocene erosion. While this project focuses on Alpine Pliocene depocentres, an associated project investigates the exhumation history of the source regions (Elfert et al., 2009).

During this study we focus on the main depocentres of Alpine debris, the Rhine Graben, the Bresse Graben, and the Rhône Graben. Especially the Bresse-Rhône region show strongly enhanced sedimentation discharge rates in Pliocene time (Kuhleemann et al., 2002). These variations may be triggered by climatic or tectonic changes, and are therefore of special interest.

Climate changes could be caused, for example, by the closure of the Panama Isthmus and the following formation of the modern Northern Atlantic circulation with an unknown regional effect in the area of the Alps. Additionally the development of the paleo-drainage network between the Alps, Rhine Graben and Rhône-Bresse Graben, especially during the change from orogen-perpendicular to orogen-parallel drainage, is of interest. The data from this study will be a vital contribution to this much discussed change towards the present drainage system from the Alps into the Rhine Graben.

On the basis of apatite fission track analyses we will have a closer look at the paleo-exhumation rates of the source areas and the changes of denudation rates. Furthermore results of the more temperature sensitive (U-Th-Sm)/He thermochronology will deepen the knowledge of the younger events of the Alps. With the aid of sediment petrography the provenance of the sediment will be determined. Overall, our analyses yield exhumation rates of the source areas, changes of paleo-denudation rates, and the provenance of the sediment itself. Based on all this data gained we will reconstruct the evolution of the drainage systems of the Alps, and try to correlate it with known climatic and tectonic events in the Neogene.

We already have sampled drillcores from the Upper Rhine Graben (including the Sundgau gravels) which are currently in preparation. Additionally we will sample wells from the Bresse Graben and the Rhône Graben. First results will be presented.

References:

- Kuhleemann A., Frisch W., Székely B., Dunkl I., Kázmér M. (2002). Post-collisional sediment budget of the Alps: tectonic versus climatic control. *Int J Earth Sci*, 91, 818-837.
Elfert S., Reiter W., Spiegel C. (this volume). Sources of Pliocene erosion of the Alps: The Lepontine Dome as a potential source area.