„Wrong-way“ subduction beneath the Alps

HANDY, M.R.,[1] USTASZEWSKI, K.,[1] KISSLING, E.,[2] ROSENBERG, C.L.,[3] & SCHMID, S.M.,[2]
[1] Freie Universität Berlin
[2] ETH Zürich
[3] Université Pierre & Marie Curie, Paris

Recent debates on subduction polarity reversals in the Alps have been fueled by seismic p-wave tomography, which suggests two oppositely dipping slabs: one beneath Western and Central Alps attached to Europe dipping southeast, another beneath the Eastern Alps attached to Adria dipping northeastward, the ?wrong way? for Alpine subduction. Kinematic reconstructions of the Alps-Apennines-Carpathians-Dinarides belt for 20, 35, 67 and 84 Ma suggest that following the break-off of the Penninic ocean slab and subsequent collision, northeastward subduction of fragmented Adriatic lithosphere beneath the Eastern Alps is viable and likely of Neogene age. The slab derived from part of the Alpine Tethys passive margin in the Southern Alps, where crust underwent Miocene N-S shortening by an amount corresponding to the slab length imaged beneath the Eastern Alps. Decoupling along a transfer fault that linked the Alpine and Dinaric subductions, as well as along the Giudicarie Fault at the junction of Central and Southern Alps allowed this rigid passive margin fragment to indent the Eastern Alps, while rotating counterclockwise and subducting northeastwards into the space vacated by late Eocene foundering of the European slab. This Miocene subduction marked a westward jump of northeast-directed Dinaric subduction into the Eastern Alps, where indentation enhanced exhumation and lateral escape of orogenic lithosphere, associated with rollback subduction in the Carpathians.

Developing a Decision-Support-System for slope stability assessment in permafrost-affected rock faces - Preliminary results and open questions from the MOREXPERT project, Kitzsteinhorn, Hohe Tauern Range, Austria

HARTMEYER, I.,[1,2] KEUSCHNIG, M.,[1,2] & SCHROTT, L.[2]
[1] alpS GmbH
[2] University of Salzburg

Stability of permafrost-affected rock faces is significantly influenced by their thermal state. Reason for that is the temperature-dependence of the mechanical properties of rock and cleft ice. Warming alters these mechanical properties and potentially causes temperature-related destabilization. Particularly within the context of climate change instability of high-alpine rock faces, thus, is becoming an increasingly important risk factor for man and infrastructure.
Numerous rock fall events in the European Alps (e.g. in the hot summers of 2003 and 2005) point to a possible increase of gravitational mass movements due to changing climate conditions. However, due to the lack of long-term data series on alpine permafrost conditions this assumption remains uncertain. The MOREXPERT project contributes to filling this gap by initiating a new long-term monitoring site focusing on permafrost and mass movement interaction at the Kitzsteinhorn (3.203 m), Hohe Tauern Range, Austria.
Within the MOREXPERT project a Decision-Support-System for slope stability assessment in steep bedrock will be developed which will consist of (i) a combination of the most appropriate methods and techniques, (ii) an assessment of required data and resolution, (iii) an efficient data analysis and documentation. The developed Decision-Support-System is intended to significantly improve the risk management process for permafrost-related natural hazards in steep rock faces.