

## Working Group A – Understanding the Neogene Orogenic (R)evolution

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This working group is devoted to the Neogene Orogenic Revolution in the Alps. The goal is to assess competing hypotheses on three key topics: (1) *subduction polarity and its reversals at the junctions of the Alps-Appennines and Alps-Carpathians-Dinarides*; (2) *shearing and decoupling within Alpine orogenic crust*; (3) *formation of the Alpine peripheral basins and their relationship to both deep-seated (slab bending, -tearing and -breakoff, nappe stacking) and surface processes (glaciation, erosion)*. These topics are multidisciplinary and linked to the two main themes of the SPP: lithospheric reorganization during mountain building (Theme 1) and the surface and crustal responses to changes in mountain structure (Theme 2).

The Neogene Orogenic Revolution involved a dramatic change in mountain-building style that coincided with a reorganization of microplate boundaries. It featured a switch from uniform-sense, SE-directed subduction of European lithosphere during Adria-Europe convergence in Paleogene time to variable-sense subduction of both Adriatic and European lithosphere in the Alps, Carpathians and Apennines. Anomalous features include pronounced orogenic arcuation, wholesale lithospheric decoupling, and laterally migrating subsidence and infill of foreland basins.

We seek to understand the processes underlying this astounding development. This will involve relating the present lithospheric structures imaged at high resolution by the AlpArray Seismological Network (AASN) and its complimentary experiments (SWATH-D, EASI) to the Neogene history of the Alpine chain gleaned from studies of its structure, kinematics, thermal history and basin dynamics.

### Proposals:

1. Andric-Tomasevic N, Ehlers T: *Stratigraphic & geodynamic modeling of basin architecture, NAFB.*
2. Grützner Ch, Reicherter K, Ustaszewski K: *Mountain-building in the Eastern and Southern Alps - large earthquakes and active faults.*
3. Handy MR, Bauer K, Bernhardt A: *Switching pro- and retro-wedges in the Eastern Alps and their peripheral basins - clues to a change in subduction polarity?*
4. v. Hagke C, Wellmann F: *ThinkALPS – Thermokinematic models including Uncertainty of Geometry in the Alps.*
5. Kaestle E: *Imaging the Alpine crust with Ambient Noise tomography – linking surface observations to deep structures.*
6. Kaus B, Le Breton E: *From plate tectonic reconstructions to 4D geodynamic models of the Alpine Orogeny.*
7. Lange D, Le Breton E, Kopp H: *Linking the deep structure to surface deformation: Body wave tomography of the Ligurian Sea and South-Western Alps.*
8. Meier T, Rumpker G, Kind R, Handy MR: *Joint Inversion of Receiver Function and Surface Wave Measurements for Seismic Anisotropy in the Eastern Alpine Domain.*
9. Metzger S: *Recent Kinematics of the Southern and Eastern Alps – From Uniform to Distributed Faulting).*
10. Pleuger J, John T: *How large are tectonic deviations from lithostatic pressure in a continent-derived, lithologically heterogeneous Alpine UHP nappe (Koralpe-Saualpe-Pohorje Complex, Austria and Slovenia)?*
11. Rietbrock A, Haberland Ch: *A comprehensive high resolution 3D P- and S-wave velocity model for the Alpine mountain chain using local earthquake data: Constraining crustal structure, lithologies and mountain-building processes.*

12. Scheck-Wenderoth M, Bott J, Cacace M, Götze H-J, Kaus B: *Deformation patterns in relation to the deep configuration of the lithosphere of the Alps and their forelands – DEFORM*).
13. Stipp M, Tanner D C, Brandes C, Kühn R: *The Brenner base tunnel (BBT) natural laboratory – From cross-section construction over fabric and elastic anisotropy analysis to 4D structural modeling (acronym: BBTlab)*
14. Tilmann F, Friedrich W, John T, Pleuger J: *Applying scattered wave tomography and joint inversion of high-density (Swath-D) geophysical and petrophysical datasets to unravel Eastern Alpine crustal structure.*

## Target areas WG-A

