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Constraining the dynamics of the present-day Alps with 3D geodynamic inverse models - model version 0.2

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The ongoing formation of the alpine mountain belt is a major indicator of the active geological processes in the Mediterranean that for example causes volcanism in Italy as well as considerable hazard. To understand this complex system the European project AlpArray, with the German contribution 4D-MB, was funded in order to investigate the structure, dynamics and geology of the alpine area in more detail and through all scales. We focus on the large scale geodynamic processes that drive this complex system of multiple subduction zones, ranging from the surface to the mantle.

Here, preliminary geodynamic modeling results will be presented, which are based on recent seismic imaging of the AlpArray target area. The model has been extended to a larger depth and the geometries of the slabs have been adopted. Several instantaneous forward simulations will be presented that aim to reproduce the major present day GPS velocity patterns. Additionally, the fit to the data is refined using a steepest descent adjoint gradient based inverse technique. These gradients can also be used to highlight the pointwise sensitivity of the surface velocity to the material parameters at depth. In order to be able to compare the modeling results to additional observations a framework is presented on how seismic anisotropy can be calculated with the geodynamic modeling code LaMEM (Kaus et al., 2016).

This abstract is in co-operation with the whole AlpArray working group.