

New insight into the complex 3D subsurface structure under the Alps from the AlpArray experiment

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Under the framework of the European AlpArray project, a large number of European institutions have started a joint effort to better understand past and present tectonic processes in the Alps. Part of this framework is the German multi- and interdisciplinary 4DMB (Mountainbuilding in 4D) program which integrates research experts in geophysics, tectonics, petrology, geochronology, as well as basin and surface studies. A key effort was the emplacement of the AlpArray Seismic Network, comprising over 700 seismometers in the Alps and providing thus unprecedented array aperture and station density, both on land and sea. This is complemented by several local, even denser seismic experiments such as CIFALPS, Swath D or EASI. This huge collection of data allows us to study the seismicity and the deep Alpine structures at high resolution, and offers a unique opportunity to test concepts on mountainbuilding processes and develop new hypothesis.

In this presentation, a brief overview of published and preliminary results obtained in the 4DMB and AlpArray frameworks will be provided. The focus lies on results based on the seismic network data, including tomographic imaging, receiver functions and shear-wave splitting. These will be put in context to open questions on the collision history of the European and Adriatic plates such as the fate of the subducting slabs, the mantle flow pattern, the structure of the Moho and the related question of slab polarity reversal, or the reorganizations in the crust as expected from Adriatic indentation or the opening of the Pannonian basin.