AlpArray – an initiative to advance understanding of Alpine geodynamics

György Hetényi (2) and the AlpArray Working Group (1)

(1) www.seismo.ethz.ch/alparray, (2) Swiss Seismological Service, ETH Zürich, Switzerland (gyorgy.hetenyi@sed.ethz.ch)

AlpArray is an initiative to study the greater Alpine area with a large-scale broadband seismological network. The interested parties (currently 57 institutes in 16 countries) plan to combine their existing infrastructures into an all-out transnational effort that includes data acquisition, processing, imaging and interpretation. The experiment will encompass the greater Alpine area from the Black Forest and the Bohemian Massif in the north to the Northern Apennines in the south and from the Pannonian Basin in the east to the French Massif Central in the west. We aim to cover this region with a high-quality broadband seismometer backbone by combining the ca. 220 existing permanent stations with additional 300-340 instruments from mobile pools, all of them to be deployed from 2014-2015 until 2017. In this way, we plan to achieve homogeneous and high resolution coverage (ca. 40 km average station spacing). Furthermore, we also plan to deploy a few densely spaced targeted networks along swaths across – and in regions of – key parts of the Alpine chain on shorter time scales. These efforts on land will be combined with deployments of ca. 40-45 ocean bottom seismometers in the Mediterranean Sea. We also aim to implement the best practice for synchronizing mobile pool operation procedures and data handling: common data centre and data management procedure, free access to data to participants as soon as possible through EIDA. Data will be open to the public 3 years after the experiment ends.

The main scientific goal of AlpArray is to investigate the structure and evolution of the lithosphere beneath the Alps. A primary target is the geometry and configuration of subducting slabs and their polarity switch beneath the arc. Numerous regional questions such as seismic hazard will be tackled. Targets will be imaged at several depths (e.g., from near-surface structure down to upper mantle anisotropy), scales (e.g., from local seismicity to mantle transition zone thickness variations), using different methodologies in the sub-regions of interest. An overview of these targets and the methodologies intended to be applied in connection with the seismological measurements will be presented. The geodynamic interpretation of the acquired data will be complemented by other Earth Science disciplines such as state-of-the-art numerical and analogue modelling, gravity and magneto-telluric measurements, as well as structural geology. In conclusion, we hope to turn the strong community interest into a truly interdisciplinary and collaborative project in the key region for seismotectonic activity and dynamics of Europe.