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AlpArray – an initiative to advance understanding of Alpine geodynamics

G. Hetényi (2) and the AlpArray Working Group (1)

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

AlpArray is a new initiative to study the greater Alpine area with a large-scale broadband seismological network. The interested parties (currently 32 institutes in 12 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 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 high-quality broadband seismometers by combining the ∼400 existing permanent stations with an additional 400+ instruments from mobile pools. In this way, we plan to achieve homogeneous and high resolution coverage while also deploying densely spaced stations along swaths across key parts of the Alpine chain. These efforts on land will be combined with deployments of ocean bottom seismometers in the Mediterranean Sea. We also aim to implement the best practice for synchronizing mobile pool operation procedures and data handling.

The main scientific goal of AlpArray is to investigate the structure and evolution of the lithosphere beneath the Alps, especially where the polarity of subduction is known to change, along with numerous regional questions. These targets will be imaged at several depths (e.g., near-surface structure to upper mantle anisotropy), scales (e.g., local seismicity to mantle transition zone thickness variations), using different methodologies in the sub-regions of interest. An overview of these in connection with the seismological measurements will be presented at the conference. The geodynamic interpretation of the acquired data will be complemented by other Earth Science subdisciplines such as 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.