UNIBRA / DSEBRA – the German seismological contribution to AlpArray

Antje Schlömer[1], Wolfgang Friederich[2], Michael Korn[3], Thomas Meier[4], Georg Rümpker[5], Frederik Tilmann[6], Christine Thomas[7], Joachim Wassermann[1]

1. LMU München, Germany
2. Ruhr University Bochum, Germany
3. University of Leipzig, Germany
4. University of Kiel, Germany
5. Goethe University Frankfurt, Germany
6. GFZ Potsdam, Germany
7. Westfälische Wilhelms-Universität Münster, Germany

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UNIBRA was a joint initiative of German universities to install and maintain 74 seismic broadband stations at the beginning of the international AlpArray project in 2015 when the proposal for the 100 station broadband array DSEBRA was not yet approved by DFG. In this way, full participation of German teams in the AlpArray project could be secured. Most of these stations were deployed in southern Germany and a few in Austria. After approval in 2017 and installation of DSEBRA in 2018, the UNIBRA stations were replaced and further DSEBRA stations were deployed east of the SWATH-D array and also in Hungary. At that time, DSEBRA made up about one third of AlpArray's temporary stations. After deinstallation of SWATH-D in autumn 2019 DSEBRA stations were used to reoccupy some of SWATH_D's critical sites. In spring 2020, the Covid19 pandemic started in Europe and it became unfeasible to move the DSEBRA stations to new sites. Instead of deinstallation, DFG allowed us to use remaining investment funds to continue the operation of DSEBRA at the current sites. As collaboration partners from Austria, Czech Republic, Poland, Slovakia and Hungary had already relocated many of their AlpArray stations to new sites towards the north-east and east of the Alps before Covid19 started, DSEBRA became part of the PACASE deployment with 214 temporary stations operated by partners from these countries and University of Lausanne. In summer 2022, new funds from DFG could be acquired by RU Bochum and LMU München to move 42 DSEBRA stations to Greece and Northern Macedonia and further 19 stations to Albania, Kosovo and Montenegro as part of the new AdriaArray project. The remaining DSEBRA stations stayed in Austria and Hungary to form a major part of AdriaArray's backbone circling the Adriatic plate. With little exceptions, the DSEBRA stations have been in the field now without interruption for nearly 6 years. They massively contributed to the collection of a unique, large-scale and long-term seismological dataset which has enabled investigations into the structure of the crust and mantle beneath the greater Alpine area using receiver functions, shear-wave splitting, teleseismic body and surface wave tomography, local earthquake tomography and teleseismic full waveform inversion. Moreover, they allowed new insights into the seismic activity and hazard of active faults. DSEBRA will continue to do so in the framework of AdriaArray as part of an even larger seismic network comprising about 1300 permanent and temporary stations and doubling the size of AlpArray.

Noise at the DSEBRA stations on the vertical component stayed below the Peterson high noise model by 20 dB over the entire seismic frequency band. Noise on the horizontal components was partially higher, in particular at low frequencies below 1 Hz. Thanks to special measures to avoid failures of mobile communication and battery charging and efforts to keep the low-power data logger running as long as possible in case of power failures, data availability of the DSEBRA stations reached extremely high values of 98% to 100%. The data were archived and disseminated on the EIDA node at LMU München during the experiment and transferred to the GEOFON for long-term archiving.

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