Foreword

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During the last decade, many new arrays were built in and around Europe. Today, seismic data are available from about 20 permanent and numerous temporary seismic array installations in this region. Temporary array installations are e.g., increasingly used for ambient noise based investigations of shallow structures. Therefore, we invited during the XXXI General Assembly of the European Seismological Commission in Hersonissos, Crete Island, Greece in September 2008, to a special session on “Array Seismology in Europe - Status and Perspectives”. The call for this session was quite successful and in the end eight oral and ten poster contributions were presented under the conference.

After the meeting, all participants were invited to contribute to a special volume of Journal of Seismology. Not all participants were able to contribute to this special volume, but we are pleased to present here seven papers covering a quite wide spectrum of array method applications.

New, permanent array installations in Eastern Europe, their influence on seismic detection and location capabilities of national networks and their

calibration are presented by Borleanu et al. (2011), Ghica (2011) and Sanina et al. (2011). Ghica (2011) investigated the detection capabilities of the 9-element, small aperture seismic Bukovina array (BURAR) installed in 2002 in north-eastern Romania close to the Ukrainian border. She describes in detail the installed automatic data processing algorithms based on NORSAR’s array software (e.g., Schweitzer et al. 2002) and results of four years processing of BURAR data with respect to the regional and teleseismic detection capabilities of the array and the seasonal and azimuthal variance of these capabilities. Furthermore, she compares the array results with the capabilities of the Romanian national network of modern broadband, three-component seismic stations. Borleanu et al. (2011) investigated slowness and backazimuth observations at the same small aperture Bukovina array (BURAR). As for all arrays (e.g., Krüger and Weber 1992 or Schweitzer 2001), also the BURAR slowness and backazimuth observations show systematic deviations from theoretically estimated values. Such deviations contain information about the 3D velocity structure of the region around an array. In the case of BURAR, many observed deviations can be directly connected with the known slab subduction in the Vrancea area, Romania. Sanina et al. (2011) describe the small aperture, 12-element seismic Mikhnevo array (MHVAR) installed south of Moscow in 2004. The authors present results of relocation experiments for three earthquakes using observations from stations of the Russian national network with and without MHVAR. It becomes clear

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that MHVAR data enhance the location capabilities of the Russian network for seismic events in the wider region. In addition, it is shown that the MHVAR observation and single array location capabilities (see e.g., Schweitzer et al. 2002) are a very useful help in monitoring and discriminating explosions in the mines and quarries south and east of Moscow.

Pirli et al. (2011) applied cross-correlation techniques to analyze the earliest stages of the aftershock sequence of the 2003, Mw 6.2 Lefkada event. They used data observed at the temporary, small-aperture TRISAR array installed on the Peloponnese in Southern Greece, and at several three-component stations of the Hellenic Seismographic network. Despite the large extent of the aftershock region, which limited the waveform similarity level within the studied aftershock volume, cross-correlation analysis applied on a single array was proven a useful tool, especially for remote regions that cannot be adequately covered by a conventional, regional network (e.g., offshore areas).

Test and temporary array installations were used to investigate with H/V measurements the local sedimentary structure at a variety of different sites in Europe (Endrun 2011) and in particular the top of a salt dome (Kühn et al. 2011). Endrun (2011) applied array methods to investigate the influence of Love waves on H/V ratios determined from ambient noise measurements. For this she collected 12 data sets of ambient noise array measurements from nine European sites and analyzed the data by frequency dependent main propagation and polarization properties. Based on this analysis, she demonstrated that the relative Rayleigh wave content in ambient noise measurements can be determined and taken in consideration when modeling the site characteristics. Kühn et al. (2011) investigated the uppermost border of a known salt diapir in the city of Hamburg, Germany. In the past, this very shallow diapir caused several sinkholes due to local dissolution and subsidence, constituting a potential geohazard source. The authors performed a detailed mapping of the salt diapir morphology, based on 900 H/V measurements, and compared the results with Rayleigh wave dispersion curves measured with 15 temporarily deployed very small aperture arrays. Both methods show more or less identical results for the principle surface of the weathered gypsum caprocks or gypsum floaters on top of the diapir.

Evers and Schweitzer (2011) analyzed data from an experimental infrasound array installation in northern

Norway, co-located with the small aperture ARCES array. This co-location opens the possibility to compare background noise observations of infrasound with microseismic data. The high frequency infrasound signals can be correlated with known mining and quarry activities in the region. The low frequency infrasound background noise is presumably caused by stratospheric winds and oceanic activity, but a direct correlation of the latter with known sources of microseismic noise could not be established.

We hope that the studies presented herein provide some interesting insights in the newer developments of seismic and infrasound array applications, as well as information on the most recent array installations in Europe.

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