Geophysical Research Abstracts
Vol. 14, EGU2012-2614-1, 2012
EGU General Assembly 2012

Improving identification of regional depth phases in sparse networks

M.-T. Apoloner and G. Bokelmann

Department of Meteorology and Geophysics, University of Vienna, Vienna, Austria (maria-theresia.apoloner@univie.ac.at)

Due to Austria's location in a seismogenic region, it is important to well characterize seismicity in and around the country. We are particularly interested in the Vienna Basin and its faults, due to the vicinity with Vienna, one of the most densely populated and developed areas in the region. Instrumental seismicity in the area is moderate, with a maximum recorded magnitude considerably stronger than 5. There are historical records of earthquakes with intensities equivalent to magnitudes around 6, and even larger even larger events have been suggested based on paleoseismicity.

The Austrian seismological network is built of very-high quality stations, but their station density is relatively sparse. Retrieving accurate earthquake location, including depth information and the relation with faults is important not only for understanding tectonic processes, but also for estimating seismic hazard. Therefore we attempt to optimize use of the network for locating earthquakes, and especially the hypocentral depths. Regional depth phases such as sPg, sPmP, and sPn are particularly promising for that purpose, since they require only few observations. In principle, a single station may be sufficient for accurately determining earthquake depth. The challenge lies in robustly detecting and identifying the phases, within the coda of the P-phase. Sedimentary basins, for example, may render these phases complex, and it may prove difficult or impossible to recover them from the seismic records, even using common methods like band pass filtering.

To increase the number of usable phases for depth estimation, several techniques were applied to three-component seismic data from the Vienna region. The first technique was stacking of recordings from different stations after moveout-correction. We also use a polarization filter presented by Schimmel & Gallart (2004), which was shown to increase signal-noise-ration substantially in refraction data. The filter is based on the assumption that noise is less polarized than the signal; polarization weighing can thus increase the number of identifiable phases.