Geophysical Research Abstracts
Vol. 14, EGU2012-3924, 2012
EGU General Assembly 2012

Site effects in seismic data acquisition

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To enable an efficient use of seismic recordings at the Austrian Seismic Network (network code OE) and a possible optimization of our network in the future, an investigation is conducted for data from three co-located stations with different conditions at the Conrad-Observatory: CONA (in the tunnel), CSNA (free field) and a station located in the borehole. Data in the same time period are used to compare all three stations. To better understand how seismic signals depend on site effects, we group signals from distant, regional and local earthquakes, explosions and rockbursts for all studies.

Noise and signal are evaluated in both time and frequency domain. Average day and night noise levels and their dominant frequencies are analyzed and compared between the stations, as well as the amplitude and frequency dependence of seismic noise and signal. To ensure a good comparison, we separate signals of the P and S types for all studies.

In addition, dependence of station detection performance on the site effects is evaluated. Detection processing is re-run under the same condition for all stations. Station detection rates for different signal types will be discussed and compared. For all stations, ratios of correct and false detections are determined, and percentages of correctly detected signals will be estimated. The accuracy of onset time will be determined and discussed for each station, since this directly affects the localization accuracy. Seismic magnitude will be estimated and compared to see if any site-dependent influence on the magnitude calculation exists.