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Detection capabilities of the BURAR seismic array – contributions to the monitoring of regional and distant seismicity

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Abstract: Data recorded with the BURAR seismic array between January 2005 and December 2008 were analyzed to verify the monitoring capabilities of regional and distant seismicity. For this time interval nearly 35,000 events detected by BURAR and identified in seismic bulletins (Preliminary Determination of Epicenters (PDE) and Romanian Earthquake Catalogue) were investigated using parameters as backazimuth, epicentral distance and magnitude. A remarkably detection capability is emphasized for teleseismic observations ($\Delta > 20^\circ$). BURAR onsets could be associated to almost 60% of all events in the teleseismic distance, with a magnitude detection threshold of 4.5 (mb). When no threshold magnitude is applied, the full detection capability of BURAR is in the same order as the performance of GERES array, which is one of the most sensitive stations in Central Europe. For regional events, detection capability decreases to about 16% of all events within regional distance range. The site conditions (crustal structure and high frequency cultural noise) as well as array dimension, affect the signal coherency, and reduce the array detection capability for regional events. For both teleseismic and regional distances a monthly variation of BURAR detection capabilities has been found; the number of events detected during the summer time is diminished by the specific seasonal human activity and atmospheric conditions (thunderstorms). To prove the good detection capability of the BURAR for teleseismic distances, a comparison with the observations of the Romanian Real Time Network in terms of magnitude and epicentral distance was carried out. The higher signal detection capability of BURAR is due to the array techniques applied in data processing, which enhance the signal-to-noise ratio (SNR). The monitoring performed by the BURAR seismic array provides a good azimuthal coverage of the regional and distant seismicity, in a large range of epicentral distances.

Keywords: seismic array, detection capability, seismic monitoring, detection threshold