



Benchmark of Romanian Early Warning System

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The deep earthquakes generated in Vrancea area are particularly of interest for many countries in Europe since they cause destructive effects at large distances from Moscow to Roma. Main courses for specific actions to mitigate the seismic risks given by strong deep Vrancea earthquakes should be considered as key for development actions and one of them is Early Warning System (EWS) for industrial facilities and other installations of national interest. The early warning system developed at National Institute for Earth Physics from Bucharest, Romania is a tool to shut down the dangerous industrial processes before strong earthquakes arrives.

The early warning software permits us to minimize communication latencies present in other communication protocols and allows us a rapid magnitude determination for strong Vrancea earthquakes. This software was developed by us and is running in present at our institute.

Our purpose was to rapidly avoid false alarms and to estimate earthquake magnitude in the first seconds after detection, taking into account a warning time around 25 seconds for Bucharest capital city. A modified STA/LTA detector and a voting scheme were used in the detection phase.

The software was tested on nearly 3000 events recorded in the epicentre area at Muntele Rosu (MLR), Vranceaia (VRI) and Plostină (PLOR) stations. The events that we used are all available events with magnitude ranging from $M_w=1.9$ and $M_w=6.0$. Also a simulation with continuous data recorded at the same stations since 2004 was carried out using the real time software modules.

We obtained a relation between maximum acceleration of the P wave and magnitude which can be used in Vrancea to estimate rapidly the magnitude of earthquakes.