



Preliminary results of an Earthquake Early Warning System for South Portugal and Southwest of Spain based on Earthworm

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The areas of Cape San Vicente (SV) and Gulf of Cádiz (GC), in the SW Iberian Peninsula, are characterized by a significant seismic activity being a source of destructive earthquakes, such as the 1755 Lisbon ($M_w=8.5$) and the 1969 Cape San Vicente ($M_w=7.8$).

This study presents the development and results of a prototype of an Earthquake Early Warning System (EEWS) applied to South Portugal and Southwest of Spain within the framework of the Alertes-Rim Spanish project. This EEWS, based on the Earthworm (USGS) tools, was implemented to automatically produce location scenarios with an optimized location and estimated magnitude that minimize the warning time.

Main functionalities of the system are: real-time data acquisition from broadband stations existing on the area of study, data processing (involving P-waves picking, P_d and τ_c proxies computation, hypocentral location and magnitude estimation) and data archiving. The last upgrade of the system also incorporates an algorithm to select the suitable proxies to estimate the magnitude and a specific configuration to avoid the detection of events coming from the surround of the study area. Finally, the system has been completed with a “monitoring module” that enables to visualize in real time the evolution of the Early Warning from the detection until the arrival of possible damaging waves.

The prototype has been in operation for a stable period launched in November 14, 2014. Since then, only one earthquake of interest (those with moment magnitude above 4) occurred. Location and magnitude results are favorable, comparing to Instituto Geográfico Nacional (IGN) catalog. Coherent results are also obtained for lead times, which are on the order of tens of seconds for most of targets, allowing the feasibility of a regional EEWS in the SW Iberia.