



## **ALERTES-SC3: an EEWS prototype for south Iberia peninsula.**

Antonio Pazos (1), Mireya Lopez de Mesa (1), José Martín Davila (1), Javier Gallego Carrasco (1), Carlos Rioja del Rio (2), Arturo Morgado (2), Winfried Hanka (3), Angelo Strollo (3), Angel Cibeira (1), Roberto Cabieces (1), and Marta Carranza (4)

(1) Royal Naval Observatory, Geophysical Department, San Fernando, Cadiz, Spain (pazos@roa.es), (2) Escuela Superior de ingeniería, Universidad de Cádiz, Cadiz, Spain, (3) Helmholtz Centre Potsdam, Geoforschungszentrum, Potsdam, Germany., (4) Departamento de Geofísica y Meteorología, Universidad Complutense, Madrid, Spain.

Since several decades Earthquake Early Warning Systems (EEWS) have been developed for different parts of the world based on the hypothesis of the earthquake characteristics can be derived from the analysis of the low energy P-wave prior to the arrival of more energetic S-waves and later phases. Thereby a time ("lead time") is available to evaluate a warning and perform automatic or semi-automatic actions on certain systems and deliver and alert to the authorities involved in emergency.

The South Iberia peninsula area, between SW San Vicente Cape to the East of the Alboran sea, is one of the most seismically active zones in the Ibero-Maghrebian region, with predominantly moderate and superficial seismicity, but also big events with associated tsunamis are well documented in the area, like the 1755 Lisbon earthquake. The main goal of the ALERT-ES (2011-2013) and ALERTES-RIM (2014-2016) Spanish projects has been to develop an EEWS for South Iberia region (ALERTES-SC3 EEWS) from a regional and also an on-site approach, and the study of the scaling laws for this area to estimate the moment magnitude ( $M_w$ ) and predict the expected PGV (peak ground velocity) and Pd (peak displacement) among other parameters.

The ALERTES-SC3 EEWS, regional approach, prototype has been developed at the Royal Spanish Navy Observatory (ROA) and is being tested in near real time for South Iberia area. This prototype, based on the SeisComP3 software package, is largely based on algorithms derived from the analysis of the first seconds of the P wave records. Calculation of several parameters are carried out, mainly the characteristic period ( $\tau_c$ ), Peak displacement and velocity (Pd, Pv) and maximum period ( $\tau_{Pm\acute{a}x}$ ), among others, from which correlations with corresponding earthquake magnitude, peak ground velocities, etc. are derived. Decision tables have been developed in order to deliver warnings (Bufo et al, 2012). The algorithms have been implemented by ROA in the seismic data system SeisComP3, in order to provide earthquake parameters estimation in a time window of a few seconds. This prototype is currently available running in real time, on a test phase, on a network of broad band stations from the WM (Western Mediterranean), IGN (Instituto Geográfico Nacional, Spain) and IMP (Portugal) seismic nets. It's also under development to study the feasibility to include warning parameters derived from ROA GPS geodynamic net which stations are deployed in the area.

From the above described characteristics, such as suitability of the available algorithms, software and hardware requirement, processing time required, lead times, etc., the prototype is presented as EEWS system available for earthquakes of south Iberia areas. In this work we present the current state of the development of the ALERTES-SC3 prototype.