Implementation of a Seismic Early Warning System in Portugal Mainland

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Portugal mainland is located near the border between the Eurasian and Nubian plates, whose interaction is the main responsible for a significant seismic activity in the area, with historical occurrence of several catastrophic events (e.g. Lisbon 1755 earthquake [Mag 8.7]), most of which haviguilhng epicenter rise in submerged area, located in the Cadiz Gulf and Southwest of San Vincent Cape. Early Warning Systems (EEWS) is presently a very effective concept to be applied in the mitigation of the effects caused by large earthquakes.

For the mentioned area a feasibility study of a EEWS was made in the ALERT-ES project. It was found that the system could be effective to protect cities and infrastructures located at larger distances (ex: Lisbon) from the areas, located south and southwest of PT mainland, where the larger earthquakes are expected to be originated. Considering the use of a new strong-motion network recently implemented in the south of PT mainland, we concluded that the lead-times could be improved.

We opted by the implementation of the well known computational platform PRESTO. In the adaptation of the mentioned platform to the local reality one of the challenges was the computation of fast moment magnitude estimates, because regional attenuation must be properly considered, and a specific study was made on this issue.

The several simulations that were performed showed a reasonably good performance of the system, both on magnitude evaluation and epicentre location. However we also noted that the problems in the acquisition instruments are a very important source of disturbance in the performance of the EEWS, pointing to a need of a very accurate quality control of the strong-motion network.

Considering end-users, we are also developing specific software for intensity estimation at the target places and to trigger visual and audio alerts in accordance to the expected level of shaking.