Geophysical Research Abstracts
Vol. 12, EGU2010-11963, 2010
EGU General Assembly 2010


# The Self-Organising Seismic Early Warning Information Network

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The Self-Organising Seismic Early Warning Information Network (SOSEWIN) represents a new approach for Earthquake Early Warning Systems (EEWS), consisting in taking advantage of novel wireless communications technologies without the need of a planned, centralised infrastructure. It also sets out to overcome problems of insufficient node density, which typically affects present existing early warning systems, by having the SOSEWIN seismological sensing units being comprised of low-cost components (generally bought "off-the-shelf"), with each unit initially costing 100's of Euros, in contrast to 1,000's to 10,000's for standard seismological stations. The reduced sensitivity of the new sensing units arising from the use of lower-cost components will be compensated by the network's density, which in the future is expected to number 100's to 1000's over areas served currently by the order of 10's of standard stations. The robustness, independence of infrastructure, spontaneous extensibility due to a self-healing/self-organizing character in the case of removing/failing or adding sensors makes SOSEWIN potentially useful for various use cases, e.g. monitoring of building structures (as we could proof during the L'Aquila earthquake) or technical systems and most recently for seismic microzonation.

Nevertheless the main purpose SOSEWIN was initially invented for is the earthquake early warning and rapid response, for which reason the ground motion is continuously monitored by conventional accelerometers (3-component) and processed within a station. Based on this, the network itself decides whether an event is detected cooperatively in a two-level hierarchical alarming protocol.

Experiences and experiment results with the SOSEWIN-prototype installation in the Ataköy district of Istanbul (Turkey) are presented. The limited size of this installation with currently 20 nodes allows not answering certain questions regarding the useful or possible size of a SOSEWIN installation or its best geographical position. Therefore, model experiments with larger networks were performed and the results will be shown. For this, several simulators with different capabilities executed the same experiment sets, e.g. one experiment set is a variation of the epicentral distance to the detecting network. We present the results of comparing and evaluating the produced experiment results over several experiment sets.

We demonstrate also the graphical front-end of SOSEWIN in its usage for planning (model and real-world) experiments as well as visualizing the possible locations of stations in a planned real SOSEWIN installation. The same front-end is also able to visualize the time-dependent behaviour of the alarming protocol detecting an earthquake event and issuing an early warning. This front-end belongs to a management infrastructure based on GIS and database technologies and therefore coupling with existing infrastructures should be simplified.