

Concept, Implementation and Testing of PRESTo: Real-time experimentation in Southern Italy and worldwide applications

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The past two decades have witnessed a huge progress in the development, implementation and testing of Earthquakes Early Warning Systems (EEWS) worldwide, as the result of a joint effort of the seismological and earthquake engineering communities to set up robust and efficient methodologies for the real-time seismic risk mitigation. This work presents an overview of the worldwide applications of the system PRESTo (PRobabilistic and Evolutionary early warning SysTem), which is the highly configurable and easily portable platform for Earthquake Early Warning developed by the RISSCLab group of the University of Naples Federico II.

In particular, we first present the results of the real-time experimentation of PRESTo in Suthern Italy on the data streams of the Irpinia Seismic Network (ISNet), in Southern Italy. ISNet is a dense high-dynamic range, earthquake observing system, which operates in true real-time mode, thanks to a mixed data transmission system based on proprietary digital terrestrial links, standard ADSL and UMTS technologies. Using the seedlink protocol data are transferred to the network center unit, running the software platform PRESTo which is devoted to process the real-time data streaming, estimate source parameters and issue the alert. The software platform PRESTo uses a P-wave, network-based approach which has evolved and improved during the time since its first release. In its original version consisted in a series of modules, aimed at the event detection/picking, probabilistic real-time earthquake location and magnitude estimation, prediction of peak ground motion at distant sites through ground motion prediction equations for the area.

In the recent years, PRESTo has been also implemented at the accelerometric and broad-band seismic networks in South Korea, Romania, North-East Italy, and Turkey and off-line tested in Iberian Peninsula, Israel, and Japan. Moreover, the feasibility of a PRESTo-based, EEWS at national scale in Italy, has been tested by evaluating its performance for the Italian Accelerometric Network. These testing experiments and the EEWS performance results will be summarized in the near-future perspective of building the next generation of early warning systems.