Geophysical Research Abstracts,
Vol. 11, EGU2009-8424, 2009
EGU General Assembly 2009

The Irpinia Seismic Network (ISNet): hardware and data management

G. Iannaccone (1) and the RISSC-Lab A. Zollo (2), C. Satriano (3), L. Elia (3), V. Convertito (1), C. Martino (3), G. Festa (2), M. Lancieri (1), A. Bobbio (1), T. Stabile (3), M. Vassallo (3), M. Di Crosta (3), S. Guardato (1) Team

(1) INGV-Osservatorio Vesuviano, Naples, Italy (iannaccone@ov.ingv.it, 0039 0812420334), (2) Università di Napoli "Federico II", Dipartimento di Scienze Fisiche, Naples, Italy, (3) AMRA scarl, Naples, Italy

The Irpinia Seismic Network, operating in southern Italy, is primarily aimed at providing an alert for moderate to large earthquakes in selected target sites in the Campania Region, and it also provides data for rapid computation of regional ground-shaking maps. ISNet is deployed over the active seismic faults system of Irpinia, southern Italy. It features 28 seismic stations and 5 data processing sites (local control centers - LCC). All stations are equipped with a strong-motion accelerometer and a three component velocimeter, with a one second natural period, for a high dynamic recording range. Five stations host broadband sensors, for recording regional and teleseismic events. The recorded seismic data are sent from each station to the nearby LCC, through a Wi-Fi directional antenna, in SeedLink format. Each LCC runs: the SeisComP software, to relay the data to outside SeedLink clients; the Earthworm system, for real-time processing (e.g. to produce a bulletin of automatically detected events); the Winston software, for data storage and visualization.
To monitor and maintain all of the described ISNet instrumentation, and to access, analyze and edit the seismic data produced, we developed a software application, SeismNet Manager, that implements a web-based user interface to a database of all the ISNet information and data.
For early warning applications, a high bandwidth radio links backbone is being deployed, interconnecting the LCCs and the Network Control Center in Naples. We developed a software application that processes the live streams of 3-component acceleration from the stations and, while an energetic event is occurring, promptly performs picking, event detection, event location and magnitude estimation. The earthquake location uses an evolutionary, real-time technique based on an equal differential time (EDT) formulation, and a probabilistic approach for describing the hypocenter. This algorithm, at each time step, relies on both the information from triggered arrivals and not-yet-triggered stations. Magnitude estimation exploits an empirical relationship that correlates the final event magnitude with the logarithm of the filtered peak ground displacements, measured over the first $2 \div 4$ seconds of signal starting at the detected P-wave arrival and the estimated S-wave arrival. An alarm message containing the evolutionary estimate of the earthquake location and magnitude can thus reach a vulnerable structure before the destructive waves arrive there, enabling the recipient to initiate an automatic safety procedure.
Using the experience gathered with ISNet, a multiparametric seafloor module with continuous real-time data transmission has been developed, and installed in the Campi Flegrei area, close to Naples. The module is fully integrated into the geophysical land-based monitoring system that is managed by INGV, and it is the first off-shore station of the local network. An Earthworm-based system provides user-friendly data visualization and retrieval, seamlessy integrating all of the data acquired by the seafloor module with the land data, which is managed by a similar system.