



Recent Advances of the CIVISA Seismic Monitoring Network in the Azores Islands

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The Centre for Seismovolcanic Information and Surveillance of the Azores (CIVISA) was founded in 2008 to ensure the surveillance of geological hazards on the Azores islands, in particular, the ones resulting from the seismo-volcanic systems in this North Atlantic region. The CIVISA seismic network currently locates about 3000 earthquakes in the Azores region every year. Since mid 2009, the previously existing analog seismic network has been going through updates towards reaching the standards of modern seismic networks.

The current network contains 37 short-period analog stations operating in seven of the nine islands of the archipelago. Digitalization is performed centrally at the CIVISA facilities towards where the data is telemetered from the stations through a heterogeneous analog and digital communications system.

To make full usage of existing resources, it has been necessary to reformulate the communications system; reassess instrument response, telemetry gains, and noise spectra; revise magnitude scales and attenuation factors; and update the data acquisition, processing and storage system.

In the case of the latter, Earthworm and some custom build applications have been selected to retrieve waveform data from heterogeneous sources. This data is stored on a miniSEED archive for manual processing using SEISAN, which has been improved during the course of the network upgrade to support integrated access to waveform data stored in miniSEED archives using SeisComP or Buffer of Uniform Data formats (see Luís, et al., 2011). Earthworm is also used for automated event detection and interacts with the alert software, EWQuakeAlert, specifically developed to generate email and sms alerts.

The network upgrade also involved the development of several applications to assist the configuration of Earthworm modules and improve regular operations using SEISAN. From these, one may highlight:

- PickEWAnalysis and PickStatistics. Graphical tools to assist the configuration of the Earthworm picker and evaluate its performance.
- GetPDE and ISC2SEISAN. Applications to periodically retrieve PDE and ISC event data and automatically update a SEISAN database with the retrieved information.