

GSC Atlantic SCIENCE HOUR

Earthquake monitoring: from waveform cross-correlation to machine- learning

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Earthquake monitoring is fundamental and crucial in seismology. Earthquakes have been routinely picked by seismic network analysts in monitoring room, but a significant number of small earthquakes are still missing, especially during intense earthquake sequence. Recently, cross-correlation based methods have played an important role in recovering missing events, which uses waveforms of existing events as templates to scan through continuous data for new events with high similarities. As the increasing of seismic data and well-documented earthquake catalogs, deep learning techniques have shown great promise in earthquake monitoring. In this talk I first report our group's recent efforts to develop the cross-correlation based earthquake detection and location method – Match&Locate and its application to various studies such as nuclear test monitoring, volcano eruption prediction, and induced earthquake monitoring. Next I introduce our group's recent progresses in applications of machine learning in earthquake monitoring, including discrimination between quarry blasts and earthquakes, rapid earthquake detection and location from raw data, and real-time earthquake early warning. Results show machine-learning has become the next generation tools in earthquake monitoring.