International Journal of Geophysics

Special Issue on

New Technologies and Methods in Earthquake and Tsunami Early Warning

CALL FOR PAPERS

Large earthquakes and tsunamis are fairly infrequent compared to other geohazards. As a result local earthquake/tsunami early warning systems (EEW/TEWS) can be of a lower priority compared with other natural hazard early warning systems. Nonetheless, devastating earthquakes and tsunamis of the last decade (e.g., 2004 Sumatra tsunami, 2010 Chile tsunami, and 2011 Japan earthquake/tsunami) have shocked the international community and demonstrated that there is room for improvement in existing EEW/TEWSs algorithms and methodologies. In particular, for large tsunamigenic earthquakes, it has been recognized that traditional methodologies, which rely strictly on seismic measurements, systematically underestimated the event's magnitudes in the first minutes after rupture initiation.

Meanwhile, over the past decades, new technologies and methods that aim to overcome these limitations have been thoroughly researched. For example, rapid and substantial progress in GNSS (including GPS, GLONASS, BDS, Galileo, and QZSS) technology has enabled it to capture arbitrarily large coseismic ground motions with cm to mm accuracy in real time, which can provide valuable information to constrain earthquake source inversion for local TEWSs. However, compared with most strong motion sensors, the GPS-derived displacements are noisier while the sampling rates are much lower. New approaches that address this include the integration of low-cost MEMS accelerometer and GPS data. The advantages of both sensor types are complimentary. In addition, ocean-based instruments are playing an increasingly larger role in both EEW and TEW; sensors such as ocean bottom strong motion and pressure gauges record small amplitude p-waves as well as strong shaking and tsunami propagation directly and are valuable to local tsunami forecasting.

This coming special issue will be an assemblage of interdisciplinary research aiming to cover the whole processing chain related to this topic, from sensor technologies and data collection to high-level products.

Potential topics include, but are not limited to:

- Novel algorithms for measuring strong ground motion (displacement or velocity) based on raw GNSS observations
- Optimal combination of GNSS and seismic data, for example, low-cost MEMS accelerometers
- Rapid source products such as magnitudes, rupture areas, moment tensors and slip distribution from geodetic observations, seismic measurements, and ocean bottom sensors.
- Rapid forecasting of near-shore tsunami impacts derived from earthquake source products or from direct tsunami measurements
- Coupling between tsunami propagation and ionosphere disturbance retrieved from real-time GNSS signals.

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