

GRiD MT with W-phase monitoring system for tsunami early warnin

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The GRiD MT system (Tsuruoka et al., PEPI, 2009) is the real-time monitoring analysis system that continuously monitors long-period seismic wave field at a period of 20-50s recorded by broad-band seismometers. This analysis system automatically and simultaneously determines the origin time, location and moment tensor of seismic events within 3 min of their occurrence without earthquake information such as QED etc. This system has been in operation since April 2003 at the Earthquake Research Institute.

For tsunami early warning purposes, we have implemented a W-phase source inversion algorithm (Kanamori and Rivera, GJI, 2008) into the GRiD MT system (we call this system GRiD MT with W-phase monitoring system) using SeedLink software developed by GEOFON and later adopted by IRIS. W-phase is a very long-period (typically 200-1000s) phase starting after the P-wave arrival, and is suitable for fast source parameter determination for large ($M_w \geq 7$) earthquakes. When broad-band seismograms are available at distances (≤ 30 deg), we can detect seismic events and determine satisfactory mechanism solutions within 15 min after the earthquake occurrence.

We compared GRiD MT with W-phase monitoring results with W-phase source inversion results for events ($M_w \geq 7$) occurred from 2005 to 2011 in the World. From the results, (1) this system detects earthquakes and determines the source parameters with a high level of precision and complete automation within 15 min of the earthquake occurrence. (2) The origin time and locations are similar to those of PDE catalogue or GCMT catalogue. (3) The focal mechanism and moment magnitude obtained by two systems are very similar. The preliminary results suggest that this system provides rapid and reliable source parameters useful for tsunami warning purposes.

Keywords: realtime, earthquake analysis system, W-phase, Tsunami