Geophysical Research Abstracts,
Vol. 11, EGU2009-7874, 2009
EGU General Assembly 2009

Testing a time-domain regional momtent tensor inversion program for large worldwide earthquakes

G. Richter, M. Hoffmann, W. Hanka, J. Saul, and the GITEWS Team
Helmholtz Centre Potsdam GFZ German Research Centre for Geosciences (gudrun@gfz-potsdam.de)

After gaining an accurate source location and magnitude estimate of large earthquakes the direction of plate movement is the next important information for reliable hazard assessment. For this purpose rapid moment tensor inversions are necessary.
In this study the time-domain moment tensor inversion program by Dreger (2001) is tested. This program for regional moment tensor solutions is applied to seismic data from regional stations of the GEOFON net and international cooperating partner networks (InaTEWS, IRIS, GEOFON Extended Virtual Network) to obtain moment tensor solutions for large earthquakes worldwide. The motivation of the study is to have rapid information on the plate motion direction for the verification of tsunami generation hazard by earthquakes. A special interest lies on the application in the Indonesian archipelago to integrate the program in German-Indonesian Tsunami Early Warning System (GITEWS).
Performing the inversion on a single CPU of a normal PC most solutions are achieved within half an hour after origin time. The program starts automatically for large earthquakes detected by the seismic analysis tool SeisComP3 (Hanka et al, 2008). The data from seismic stations in the distance range up to 2000 km are selected, prepared and quality controlled. First the program searches the best automatic solution by varying the source depth. Testing different stations combinations for the inversion enables to identify the stability of the solution. For further optimization of the solution the interactive selection of available stations is facilitated. The results of over 200 events are compared to centroid moment tensor solutions from the Global CMT-Project, from MedNet/INGV and NEID to evaluate the accuracy of the results. The inversion in the time-domain is sensitive to uncertainties in the velocity model and in the source location. These resolution limits are visible in the waveform fits. Another reason for misfits are strong structural inhomogeneities. Structural inhomogeneities are typical features in subduction zone which result in systematic resolution problems. An approach to reduce these uncertainties is presented.