

Monitoring of seismic activity in Philippine and Indonesia regions

PULIDO, Nelson^{1*}, KUMAGAI, Hiroyuki¹, INOUE, Hiroshi¹, Renato U.Solidum², YAMASHINA, Tadashi³, Ishmael C. Narag², Baby Jane T. Punonbayan², Melquiades S. Figueroa II², Arnaldo A. Melosantos², Suhardjono⁴, MAEDA, Yuta¹

¹National Research Institute for Earth Science and Disaster Prevention, ²Philippine Institute of Volcanology and Seismology (PHIVOLCS), ³Kochi Univ., ⁴BMKG

In this study we describe the implementation of an automated system for estimations of earthquake source parameters in Philippines and Indonesia using regional broadband seismic waveform data. This system is an updated version of the automated CMT inversion system originally developed for Indonesia (Nakano et al., 2010). The updated system can receive continuously near real-time waveform data at NIED, from 7 broadband stations in the Philippines, operated by PHIVOLCS, as well as 143 broadband stations in Indonesia (122 operated by BMKG and 21 by GFZ). The broadband stations in the Philippines are being deployed within the framework of a five years SATREPS project (2010-2014) entitled, 'Enhancing Earthquake and Volcano Monitoring Capabilities and Promoting Effective Utilization of the Disaster Information in the Philippines', managed by NIED. The BMKG stations in Indonesia include 17 stations originally deployed by NIED (JISNET network).

The data acquisition system at NIED is based on the seedlink and SeisComP programs developed by GFZ, which allow us the near real-time collection of data feeds in miniSEED format, from seedlink servers in PHIVOLCS (Philippines) and BMKG (Indonesia). This system receives the data in a ring buffer, and then archives it periodically. After an e-mail alert with event information is received, the automatic centroid moment tensor inversion calculation is performed by SWIFT. Then a manual check of the events is performed in a daily basis. In the SWIFT system the inverse problem is solved in the frequency domain for efficient computation. A double couple focal mechanism is assumed in the inversion to stabilize the solution by using data from a small number of seismic stations (Nakano et al., 2008). The SWIFT system has been updated to be able to process data from miniSEED format, which is a convenient format for data exchange with networks abroad.

As an example of the performance of our system we present results of estimations of source parameters of the February 6, 2012 Negros earthquake in the Philippines and its major aftershocks (NIED, 2012). This shallow thrust earthquake with a moment magnitude (M_w) of 6.7 occurred in the Tanon strait, Central Philippines, in a region where no earthquakes shallower than 50 km and with magnitude (M_w) larger than 5 have occurred in the last 36 years, according to the Global CMT Project catalogue. The SWIFT CMT solutions of the mainshock and its major aftershocks are spread in a region of approximately 70 km along the Tanon strait. These events highlighted the importance of a combined use of stations in Philippines and Indonesia to improve the accuracy of event locations in the SWIFT system.

References

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