

Sequence of moderate-to-large deep focus earthquakes around Off Ogasawara Islands on 23th June 2015

*Shunsuke Takemura¹, Tatsuhiko Saito¹, Katsuhiko Shiomi¹

1.National Research Institute for Earth Science and Disaster Prevention

Large deep-focus earthquake with Mw 6.5 occurred around Off Ogasawara (Bonin) Islands, at 21:18 (JST) on 23th June 2015. Observed seismograms of Hi-net, which contain several *P* and *S* waves arrivals during 10 minutes from 21:18 (JST), indicate that relatively large earthquakes sequentially occurred around Japan. In this study, using velocity seismograms of F-net and Hi-net, we investigate seismic wave propagation during sequential earthquakes and estimate the magnitude of each event.

To clarify how seismic waves propagate across Japan during earthquake sequence, we made snapshots of seismic energy propagation by using mean-square (MS) envelopes of Hi-net waveforms. MS envelopes were calculated by sum of three-component filtered seismograms with passed frequency of 1-32 Hz. Then, we took spatial interpolation of amplitudes of MS envelopes at each time step to make smooth spatial distribution of seismic energy at each time step. Snapshots of seismic energy propagation visually show that one earthquake occurred around Sea of Japan and then three earthquakes occurred around Off Ogasawara Islands. Second Off Ogasawara event was not listed in the JMA PDE catalogue. Since the propagation patterns of seismic energy of three earthquakes around Off Ogasawara are very similar, we consider that these earthquakes have similar hypocenter locations. Then, to evaluate magnitude of detected events, we measured maximum *S* wave amplitudes of each earthquake from MS envelopes at F-net station and calculated amplitude ratio with maximum *S* wave amplitude of first earthquake, which has a seismic moment of 5.47×10^{18} Nm (Mw6.5) referred from CMT solution of F-net. Amplitudes ratio and estimated seismic moment are 0.462 ± 0.023 and $2.52 \pm 0.13 \times 10^{18}$ Nm (Mw6.2 \pm 0.1) for second earthquake, respectively, and 0.106 ± 0.004 and $5.80 \pm 0.22 \times 10^{17}$ Nm (Mw5.8 \pm 0.1) for third earthquake, respectively.

Acknowledgement

We use the Preliminary Determined Earthquake catalogue provided by the Japan Meteorological Agency.

Keywords: deep focus earthquake, seismic wave propagation, seismogram envelope, Izu-Bonin arc