

Crustal thickness beneath Central Indonesia by the cross-correlation analysis of seismic ambient noise (2)

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Central Indonesia has complex tectonic structures where is characterized by several subduction zones at northern and eastern part and also active faults (e.g., Palu Koro, Matano and Hamilton faults). These complexities affect crustal structures around the region. In this study, we estimated spatial variation of crustal thickness and their relation with active tectonics. We used waveform data recorded at 10 BMKG broadband stations around Sulawesi Island. Firstly, the continuous data were divided into 20 minutes segments with time shift in every 5 minutes. Once the pre-processing steps for each segment were done, we calculated the CCFs between two contemporaneous segments from two stations and stacked the daily-averaged CCFs over 5 months. We further compressed the two-sided signal into one-sided signal by taking the average of positive and negative lag part of the CCFs in order to stabilize the dispersion curves of group velocities. To fit the synthetic and the observed group velocities, we adjusted the two layers crustal velocity model from CRUST 1.0 (Laske et al., 2013) corresponding to the observation group velocities. The velocity model that is faster than the observation was subtracted 5% and 10% to find the best crustal thickness with minimum RMS between observations and synthetics at period of 20s –30s. To confirm our procedure above, we currently apply the similar procedure to estimate the well-known Moho discontinuity in Tohoku region, Japan. We collected 5 months continuous waveform data from vertical components of 10 F-net stations around Tohoku region. The results showed that the slower velocity models makes the crustal thickness shallower. The estimated depth of Moho discontinuity beneath Tohoku region is about 20km –30km using subtracted velocity models. This is almost consistent with previous studies (e.g. Zhao et al., 1990). While the estimated depth of Moho discontinuity at eastern part of Central Indonesia is about 27km –35km which is related to the ocean crust, Batui and Sula thrust and at the continent of Sulawesi Island the estimated depth of Moho is about 35km –45km.

Keywords: Central Indonesia, Tohoku Region, Crustal structure