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Towards Crustal Structure of Java Island (Sunda Arc) from Ambient Seismic Noise Tomography

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In our previous studies, P- and S-wave velocity structures beneath the Sunda Arc were successfully imaged using a global data set and a nested regional-global tomographic method was employed. To obtain more detailed P- and S-wave velocity structures beneath Java, in the central part of the Sunda Arc, we then used local data sets, i.e. newline from the MErapi AMphibious EXperiment (MERAMEX) and the Meteorological, Climatological and Geophysical Agency (MCGA), as well as employed a double-difference technique for tomographic imaging. The results of the imaging show e.g. that P- and S-wave velocities are significantly reduced in the uppermost mantle beneath central Java.

In order to obtain detailed crustal structure information beneath Java, the Ambient Noise Tomography (ANT) method was used. The application of this method to the MERAMEX data has produced a good crustal model beneath central Java. We continue our experiment to image crustal structure of eastern Java. We have used seismic waveform data recorded by 22 MCGA stationary seismographic stations and 25 portable seismographs installed for 2 to 8 weeks. The data were processed to obtain waveforms of cross-correlated noise between pairs of seismographic stations. Our preliminary results presented here indicate that the Kendeng zone, an area of low gravity anomaly, is associated with a low velocity zone. On the other hand, the southern mountain range, which has a high gravity anomaly, is related to a high velocity anomaly (as shown by our tomographic images).

In future work we will install more seismographic stations in eastern Java as well as in western Java to conduct ANT imaging for the whole of Java Island. The expected result combined with the mantle velocity models resulting from our body wave tomography will allow for accurate location of earthquake hypocenters and determination of regional tectonic structures. Both of these are valuable for understanding seismic hazard in Java, the most densely populated island in the world.