Regional-scale cross-correlation analysis of seismic ambient noise in the Central Indonesia.

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The central Indonesia has a complex tectonic structure which is characterized by several subduction zones (e.g., double subduction zones beneath Molucca Sea) and active faults (e.g., Palu Koro, Matano and Hamilton faults). However, due to the limitation of studies, the information of seismic velocity changes beneath the desired regions is needed for monitoring those structures. Currently, cross-correlation functions (CCFs) retrieved from ambient seismic noise are assumed as the representation of the surface wave green function that can show the response of the Earth. Based on this assumption, the asymmetrical signal of the ambient noise cross-correlation results and its spectral amplitude are investigated in order to figure out the propagation direction of surface waves and to understand the dominant frequency components of the CCF. In the present study, we used the vertical component of continuous and broadband (20 sps) seismograms recorded at five permanent stations in and around Sulawesi Island (station codes: BKB, LUWI, SANI, TNTI, and TOLI2). The data period encompasses 1 January to 30 April 2015 (four months). The data were divided into 20 minutes segments with time shift in every 5 minutes to enhance the signal to noise ratio (SNR). We applied taper, whitening, band-pass filter at the frequency band of 0.01 Hz - 1 Hz and binalization in each data segment as the preprocessing steps, then selected the feasible segments and calculated CCF between two contemporaneous segments from two stations. We further stacked the CCFs for 1 day to obtain day-averaged CCFs and finally stacked the day-averaged CCFs over 3 months to retrieve stabilized Rayleigh wave signals. Our preliminary results show that the SNR measurements are enhanced for several pairs after calculating 3-month-averaged CCFs and represent clear Rayleigh waves. The asymmetric shapes of the CCFs indicate that the Rayleigh waves propagated towards Sulawesi Island from the surrounding areas. The maximum spectral amplitudes of the CCFs also exist at frequency of 0.05 Hz - 0.2 Hz which suggest that the dominant energy of the ambient-noise Rayleigh waves are generated by microseisms.

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