**Investigation of crustal structure in Seoul metropolitan area using a joint inversion analysis**

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The 2011 Mw9.0 Tohoku-Oki megathrust earthquake perturbed the stress field around the Korean Peninsula. The magnitude and frequency of earthquakes in the Korean Peninsula increased since the megathrust earthquake. Seoul metropolitan area is the central region of key infrastructures and an economy with a high population of about 25 million. A moderate-size or large earthquake in the Seoul metropolitan area may cause serious human and property damages. The crustal structure below the Seoul metropolitan area can provide useful information about the potential seismic hazards in the Seoul metropolitan area. We investigate the crustal shear-wave velocity structure using a joint inversion method that combines a receiver function analysis and surface-wave dispersion analysis. We collect seismic data from 77 stations that are densely-deployed seismic stations that are composed of 61 temporal broadband stations and 16 permanent seismic stations. We analyze the events with magnitudes greater than 6.0 and epicentral distances between 30° and 90° for receiver function analysis. An iterative time-domain deconvolution method is used for the calculation of the receiver function. We apply the Gaussian filter 1.0 and 2.5. We analyze the events with magnitudes greater than 5.0 and epicentral distances less than 30° for the Rayleigh-wave dispersion analysis. We obtain Rayleigh-wave group velocity dispersion data for a period of 10-60 s using a multiple filter technique. We determine the shear wave velocity structure using a linearized-iterative inversion. We find a low shear-wave velocity zone at depths of 6-12 km. The S-wave velocities in the northwestern and southern Seoul metropolitan area are relatively lower than those in the other regions. The S-wave velocities in the southern Seoul is relatively high at shallow crust. The $V_p/V_S$ ratios in the southern Seoul and western Seoul metropolitan area are relatively low. The Moho depth of the study area varies between 28 and 32 km. The Moho depth generally increases from NW to SE. We find shallow Moho depths in the northwestern Seoul metropolitan area and Seoul region. The shear-wave velocity structure may provide basic information for seismic hazard potentials in Seoul metropolitan area.