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Crustal structure and seismicity of the far-eastern Eurasian continental margin around the Korean Peninsula

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The Korean Peninsula and its neighboring regions compose the far-eastern continental margin of the Eurasia plate, and have experienced complex tectonic evolutions including continental collisions and a rifting. Such complex tectonic evolutions accompanied significant crustal deformation. The crustal and upper mantle structures of this region have been poorly understood. We investigate seismic velocities on the Moho, seismic attenuation and shear-wave splitting in the crust of this region. We also present focal-mechanism solutions of the events in this region. We find strong correlation of seismic velocities and attenuation with the tectonic structures. The average Vp/Vs ratio is determined to be 1.69, which is lower than the value of Poisson solids. Also, the Vp/Vs ratios appear to vary with tectonic structures. The Conrad discontinuity is clearly identified from analyses of regional seismic waveforms, and is observed across the southern Korean Peninsula. The fast polarization directions of crustal shear waves appear to be highly correlated with the ambient stress field that is inferred from the focal-mechanism analysis. High-speed subductions of the Pacific and Philippine Sea plates beneath the Japanese islands make contraction in the region around the East Sea (Sea of Japan), causing reverse activation of paleo-tectonic structures. We find that regional-wave amplitudes are highly dependent on the crustal structures. We determine the body-wave magnitudes of events occurring around the Korean Peninsula.