The seismic structure of the oldest Pacific: Preliminary results from the broadband Rayleigh-wave dispersion analysis of the Pacific Array, Oldest-1

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The international collaborative initiative, the Pacific Array, was launched in 2018. One of the aims of this initiative is to reveal the evolution process of the Pacific plate. To achieve this goal, the Oldest-1 array, situated on the 170 Ma seafloor of the Pacific Ocean off the Mariana trench, plays an essential role since its lithosphere-asthenosphere system is considered to record the entire evolution process of the Pacific plate from its birth to present. In November 2018, the Japan–South Korea joint team deployed 12 broadband ocean bottom seismometers and 7 ocean bottom electro-magnetometers that were successfully recovered a year later. We present the initial result of the seismic analysis of the uppermost mantle structure revealed by the Oldest-1 array via the broadband Rayleigh-wave dispersion analysis. At short periods (<30 s), we measure fundamental-mode and first-overtone Rayleigh-wave phase velocities using ambient noise cross-correlations. At long periods (>30 s), we measure the teleseismic Rayleigh-wave phase velocities. We then invert the broadband dispersion curves for a one-dimensional isotropic βv (Vsv) structure. A preliminary result using tilt-noise corrected data indicates that the structure shallower than 150 km is similar to the one obtained for the 140 Ma Northwestern Pacific seafloor by the NOMan project (Takeo et al., 2018, G-Cubed). We plan to incorporate compliance-noise corrected data for the teleseismic analysis of the deeper structure, as well as to measure azimuthal anisotropy.

Keywords: Lithosphere-asthenosphere system, Pacific Array, Broadband ocean bottom seismometer, Broadband dispersion analysis

