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Sediment and crustal structures in the Okinawa trough constrained from seafloor compliance inversion

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Seafloor compliance, the spectral ratio of vertical displacement over water pressure, measures how the seafloor deforms under the loading of ocean waves and thus reflects the elastic properties of the oceanic crust and mantle. Compliance functions have been constructed for 5 portable OBSs equipped with 120 s seismometers and differential pressure gauges (DPG) and one permanent, cabled OBS (station EOS1) equipped with a 360 s sensor and an absolute pressure gauge (APG) deployed offshore eastern Taiwan. The DPG and APG amplitude sensitivities were calibrated using the vertical acceleration and pressure data associated with Rayleigh waves. The compliance functions increase with frequency, implying the decreasing stiffness from mantle to sediment. We searched the best sediment/crustal model for each OBS by fitting the observed compliance function in a forward fashion. EOS1 is located on the Ryukyu arc 40 km offshore, and the portable OBSs S002 and S005 were deployed in the Okinawa trough 100 and 150 km away, respectively. The shear modulus of the sediment and shallow crust inverted from seafloor compliance at these sites may reflect effects of progressive rifting of the back-arc basin toward Taiwan or different source of sediment supply along the Okinawa trough.