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# Studies of seismic velocities in subduction zones from continuous OBS data

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In recent years, Ocean Bottom Seismometers (OBSs) have become widely used to expand the coverage of seismic networks onto the ocean. This study takes advantage of offshore observations at the northern end of the Hikurangi margin and southwestern Okinawa Trough to study the tectonics in both regions.

In the Hikurangi subduction zone, slow slip events (SSEs) have been observed, which are caused by the subduction of the Pacific Plate under New Zealand. The behaviour of SSEs and how they influence the physical properties of Earth materials are open to question. From 2014 to 2015, 15 OBSs were deployed offshore Gisborne, New Zealand on the Hikurangi margin. Ambient noise data from the OBSs are used to study velocity changes related to SSEs. Single station cross-component correlations and auto-correlations are computed, from which coda waves are used to monitor the velocity changes before, during and after the SSEs in 2014 and 2015 to analyse the slow earthquake behaviour and its relation to stress changes. Different rotation on horizontal components is tested by rotating horizontal components to N-E direction and parallel-perpendicular to the coastline. The dv/v computed by different components or rotation show different changes. The averaged dv/v displays a 0.1% velocity decrease during the SSE in October 2014.

The southwestern Okinawa Trough tapers towards Taiwan. How the back-arc crust accommodates the narrowing processing remains to be understood. At various times between 2010 and 2017, 22 OBSs on a small scale (~0.2°×0.3°) were deployed in Southwestern Okinawa Trough offshore northeast Taiwan. Ambient noise recorded on vertical velocity and pressure sensors is used to retrieve Scholte waves for studying shear wave velocity structure. Phase velocities are forward-modeled according to a model proposed by Kuo et al. 2015 and shear strength and density results from ODP1202. Phase velocity dispersion curves are measured from cross-correlations and

unwrapped according to the modeled phase velocities. The fundamental mode phase velocities averaged from different station pairs are 0.62 km/s at 3 s period and 1.56 km/s at 6.5 s period. A 3D inversion will be conducted for a shear wave velocity structure from the basin center to the edge.