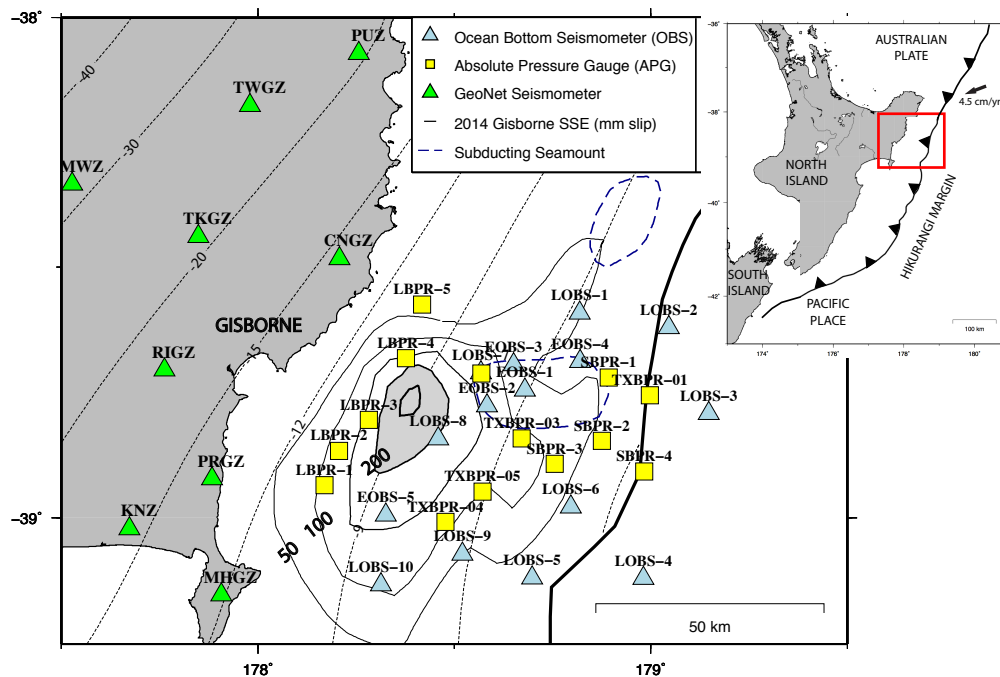


The Slip Behavior of the Shallow Megathrust from Seafloor Observations

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A large proportion of slow slip observations in subduction zones come from regions where slip occurs at depths of 20-50 km – typically beneath land, allowing a good characterization of slip. The behavior of the shallow, offshore portion of the subduction interface is often poorly resolved. The surprisingly large (>50 m) coseismic slip observed near the trench in the 2011 Japan earthquake emphasizes the need to understand the spectrum of slip behavior occurring on the shallowest portion of the subduction megathrust. Shallow slow slip events (SSE) are now recognized in several subduction zones, including New Zealand, Japan, Costa Rica, and Ecuador. Peninsular regions have allowed on-land geodetic instrumentation to detect these events, with limitations. However, detailed information about shallow slow slip has come from offshore geodetic and seismic data.

This talk will review the diverse offshore observations of shallow slow slip that have been made at the Nicoya Peninsula, Costa Rica and the Hikurangi, New Zealand subduction zones. The occurrence of tremor and low frequency earthquakes has been used to infer the presence of slow slip when the magnitude of slip is below the resolution detectable by GPS. Along with these well-established seismic proxies for slow slip, repeating earthquake sequences have been used to refine the evolution of slow slip during the 2014 Hikurangi SSE that was recorded by the Hikurangi Ocean Bottom Investigation of Tremor and Slow Slip (HOBITSS) experiment. These seismic proxies, revealed the importance of a subducted seamount and showed that slow slip migrated from the decollement to faults in the accretionary wedge. Following this success, a group of high school, undergraduate, and graduate students and I are using repeating earthquake sequences to search for shallow slow slip at the southernmost segment of the Cascadia subduction zone.



Map of HOBITSS array. Slow slip contours during the 2014 SSE (gray) are from Wallace et al., 2016.