Crustal structure of the Nankai subduction zone revealed by two decades of onshore-offshore and ocean-bottom seismometer data

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Subduction zones produce the largest and most hazardous earthquakes on Earth. Regional constraints on the structure and geometry of both the subducting and overthrusting plates, and of conditions at the plate interface, can improve knowledge of physical controls on fault slip behavior. It is, however, challenging to obtain a detailed synoptic view of subduction zones from seismic methods over areas comparable to those of the largest ruptures (10^5 km^3). Earthquake tomography studies provide 3-D images, but at low resolution (~30-50 km). Individual marine seismic experiments yeild higher resolution, but are often limited to 2-D profiles and shallower depths.

Our work seeks to bridge this imaging gap for the Nankai subduction zone by making use of the largest onshore-offshore and ocean-bottom seismometers (OBSs) dataset ever recorded: air gun sources from multiple offshore experiments passively recorded onshore by dense permanent networks of borehole seismometers, augmented by 3-D OBS experiments offshore and carefully selected Earthquake events from existing catalogs onshore. This dataset has accumulated over two-decades and includes over 45+ million source-receiver pairs with coverage of the entire Nankai subduction zone.

In this presentation, I will describe refined 3-D constraints on the geological architecture of the Nankai subduction zone and relationships with along-strike variations in geodetic locking, large earthquake occurrence and the distribution of slow earthquake phenomena at depth.

Keywords: Subduction, Nankai, Earthquakes, Crustal structure

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