T32C-04 - Seismic constraints on the hydrous state of the Tonga slab

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Abstract

The hydrous state of a slab is crucial for better understanding the Earth's deep water cycle. It can also help explain the generation of intermediate-depth earthquakes, which may be related to dehydration embrittlement or other sources of free fluids. The Tonga subduction zone is characterized by the fastest convergence speed and the coldest thermal condition. The hydrous minerals can be potentially brought to great depths and facilitate intermediate-depth earthquakes via dehydration reactions. However, the relatively thin layer of the hydrated oceanic crust and uppermost slab mantle is difficult to image by conventional tomography techniques using direct waves. Seismic phases such as PS waves converted at the slab surface are useful to refine the slab surface, and guided waves traveling long distance within the slab Moho are sensitive to the slab internal structure. We manually examine PS and guided P waves recorded at an amphibious seismic array in the Tonga subduction zone from 2009 to 2010. The new dataset will improve the resolution of the slab internal structure and provide a better estimation of the distribution of hydrous minerals in the Tonga slab.

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