Hunting for Ocean Island Moho: The Snipe Bites Back

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The structure of oceanic crust conforms in general to a very simple model. However, fine scale variations of this structure in anomalous regions (such as beneath ocean islands) remain poorly resolved. We estimated teleseismic receiver functions (RFs) at three GSN stations (RAR, POHA, XMAS) and one Geoscope station (PPT) on islands in the Pacific region. The RF method is ideal for examining fine structure of the crust because it is sensitive to the interfaces between layers, though less sensitive to average wavespeed. RFs at these ocean island stations display a train of Ps conversions from shallow depths, rather than the isolated Moho conversion typically seen at continental stations. We find that a simple three-layer structure explains the main features of the RFs, with old oceanic crust sandwiched between an extruded volcanic layer and an underplated layer. GSN data indicate that ocean islands share a common structure, a principal feature of which is crustal underplating, with a total crustal thickness of 11-20 km.

Because new receiver function estimators resolve higher frequencies, more detail emerges...

V – bottom of the volcano
M – original oceanic Moho
U – underplated Moho

Matched amplitude variation for radial/trans RF on the V interface indicates interface dip or anistropy