

Seismic velocity transition inside the subducting Mariana slab near the deepest earthquake foci.

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A prominent seismic anomaly is detected in the vicinity of deep earthquake foci inside the subducted Pacific plate at northern Mariana near the depth of cessation of deep seismicity. We observe arrivals of S-to-P converted waves in the P wave coda and an anomalous differential P wave slowness between nearby two events. We interpret these observations by steeply dipping (60 degrees or more) seismic wave velocity transition by about 4 % at depths from 600 to 640 km. The transition completes within several kilometers and deep earthquakes tend to occur within about 10 km in the lower velocity side of the transition. The highly localized seismic anomaly in the slab could represent one of the edge of a metastable wedge of olivine inside the surrounding ringwoodite. Alternative mechanisms would include: the presence of hydrated rocks, a large volume of dehydrated free water, and former oceanic crust.