



## Understanding Subduction Zone Structure

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Subduction zones are an important part of Earth's dynamics and the source of most earthquakes. The presence of the earthquakes aids the process of seismic imaging, and one of the major successes of seismic tomography has been the delineation of the morphology of the subducted slab. Abrupt changes in configuration and 'tears' occur as a result of the impact of features in the oceanic lithosphere on the subduction process.

Multi-wavespeed imaging of subduction zones reveals patterns of physical property variations, related in part to the age of the subducted material. Localised regions of changed properties can play an important role in the control of the behaviour of major earthquakes. The pauses in the seismic wave generation from the Mw 9.3 2004 Sumatra-Andaman earthquake can be correlated with patches whose properties differ from their surroundings.

For deep earthquakes there is efficient propagation up the slab in the high-Q, high-wavespeed material, even though energy would be expected to be largely lost from a simple slab. The explanation is the formation of a stochastic waveguide by slab heterogeneity with much shorter correlation lengths cross-slab than downdip. Such models provide a good explanation of the waveform patterns seen above the slab.