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The Moho in Australia and New Zealand

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Australia and New Zealand share in part a history in the Gondwana supercontinent. Australia has a long and complex tectonic history with the last major accretion in the early Paleozoic, whereas New Zealand is still undergoing major plate boundary processes.

The Australian continent is relatively well covered with both active and passive seismic techniques. Multiple sources of information are therefore available for building a model of Moho depth. Results from on-shore and off-shore refraction experiments are supplemented by receiver functions from a large number of portable stations and the recently augmented set of permanent stations. Moho picks from more than 10500 km of full-crustal reflection profiles provide valuable additional constraints. The composite data set provides good sampling of much of Australia, though coverage remains low in some remote desert areas. The various datasets provide multiple estimates of the depth to Moho in many regions, and the consistency between the different techniques is high. Some of the thinnest crust lies beneath the Archean craton in the Pilbara, and in the neighbourhood of the Simpson desert. Thick crust is encountered beneath parts of the Proterozoic in Central Australia, and beneath the Paleozoic Lachlan fold belt in southeastern Australia. There are a number of zones of sharp contrast in depth to Moho, notably in the southern part of Central Australia.

Despite most of the continental material around New Zealand being submerged, Moho data for this region is mainly onshore concentrating on the Australia–Pacific plate boundary. Two major wide-angle reflection transects provide the bulk of the active source data with just a few traditional reflection profiles offshore. The plate boundary provides an abundance of local earthquakes for tomographic imaging and this data is supplemented with receiver functions from both portable and permanent networks.Onshore the combined coverage is as dense as that of Australia, although it could be argued that a higher spatial resolution is required to capture the nature of the Moho of tectonically active New Zealand. Three regions of thickened crust can be identified, one beneath the Southern Alps, another beneath Fiordland, and below the Wanganui Basin between the North and South Island. Thin crust is identified west of the volcanic arc, with extensive underplating below the back-arc region.