

Model describes New Zealand's complex tectonic environment

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At the Hikurangi fault, off the eastern coast of New Zealand's North Island, the Pacific tectonic plate sinks beneath the Australian plate. Farther south, in the Marlborough Fault System, which cuts through the country's larger South Island, the interaction between the two slabs turns such that the plates grind edge-on.

From north to south, over a relatively short length of the [plate boundary](#), the interaction switches from subduction to strike-slip. Though the fault systems near each of New Zealand's major islands have been studied extensively, the intervening region that harbors the transition between the two modes of interaction is much less well understood.

Exploring the subduction-to-strike-slip transition region could help explain how and whether the fault systems that populate the country are connected and potentially improve estimates of [seismic risk](#).

Seeking to fill out the picture of New Zealand's tectonic environment, Wallace et al. modeled the independent fragments of the Earth's crust that make up the larger plate boundary.

Using measurements of known fault locations and stresses, combined with recordings of ground velocity measurements drawn from 800 GPS ground stations distributed across the country, the authors reverse engineered the complex system of faults that crosses New Zealand.

The authors find that the switch from subduction in the north to strike-

slip in the south is due to what they describe as a kink in the Australian plate that cuts across the northern South Island.

They suggest that this deformation acts as a hinge about which the northern part of the Pacific plate takes on a clockwise rotation.

Further, the authors' model allowed them to estimate the slip rate deficit for each fault, a measure of the expected but as of yet unobserved plate motion that could indicate an ongoing buildup of energy within the fault.

More information: The kinematics of a transition from subduction to strike-slip: An example from the central New Zealand plate boundary, *Journal of Geophysical Research-Solid Earth*, [doi:10.1029/2011JB008640](https://doi.org/10.1029/2011JB008640) , 2012

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