



## **Making the New Zealand Plate Boundary: Signatures of Transient Tectonics**

**K.P. Furlong**

Geodynamics Research Group, Geosciences, Penn State Univ. (kevin@geodyn.psu.edu)

Although the plate boundary through New Zealand is one of the classic examples found in textbooks, its evolution is more complex and thus more information rich than often assumed in simple plate boundary evolution models. In particular, the transitions from subduction to translation (transpression) that occur at both ends of the Alpine Fault system show transient behavior that provides insight into the lithospheric-scale processes that drive the development of the plate boundary. The northern subduction-transpression transition from Hikurangi subduction to the northern Alpine Fault system is presently located in the northern South Island. This transition has been migrating southward since initiation about 25 Ma and has left in its wake a significantly modified lithospheric structure for the Australian (overriding) plate. One signature of the transient tectonics associated with the migration is a sequence of ephemeral sedimentary basins that form and invert over a period of 10 million years or less. The driver for this basin development is hypothesized to be the active delamination of the base of the Australian lithosphere by the chisel-like action of the advancing Pacific slab. The integration of seismicity, basin analysis, and plate kinematics analyses in conjunction with comparison with other migrating plate boundary systems help to constrain this model. The relatively spatially-fixed behavior of the southern subduction-translation transition in northern Fiordland combined with the migration of the northern transition leads to complexity in the lithospheric-scale tectonism of the Alpine Fault system. This results in a transient style of deformation along that dominantly translational plate boundary system as the shear zone must adjust to link the two subduction zones. The rapid rate of these plate boundary changes along a principal plate boundary structure implies that the tectonic record of many plate boundaries may reflect the superposition of multiple transient events rather than the steady-state tectonism often assumed.