

New Zealand Geology: A Story of Contorted Crustal Edge Effects

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This address will highlight the current understanding of the geological construction and destruction of New Zealand, setting the scene for the proceedings of this the 11th IAGG. It will also draw attention to some of the latest developments in our thinking, some of our major hazard-related concerns (earthquakes, volcanism, tsunami, landslides), and some of the unique and/or outstanding geological features that New Zealand has to offer.

If we think of Zealandia as the continental parentage of New Zealand, then Gondwanaland is the grandparent. And as is so often the case, the likeness between child and grandparent is striking. Only now are we able to see the distinct attributes and histories of all three generations clearly: our Gondwanaland ancestry 510 to 83 Ma, our shorter Zealandia history 83 to 23 Ma, and our youthful New Zealand existence since 23 Ma. We shall consider the geology of New Zealand in terms of these three major phases of our history.

Today, New Zealand is an emergent part of the largely submerged eighth continent of Zealandia, as is clearly evident in our Late Cretaceous – Cenozoic stratigraphic record. As Zealandia slowly sank, marine transgression occurred. This process was reversed and led to marine regression as New Zealand rose. In a sense, New Zealand is up against its will, as a function of sustained vigorous plate collision since earliest Miocene time. The relative rate of collision between the westward moving Pacific Plate (to the east) and the northward moving Australian Plate (to the west) amounts to a modest but highly significant 40-50 mm per year. As if this collision was not enough, there is also continental rifting occurring to the immediate west of the subduction zone developed along the plate margin through the eastern North Island, giving rise to the Taupo Volcanic Zone.