



## Present day vertical deformation in New Zealand

Sigrún Hreinsdóttir (1), Laura Wallace (2), Nicola Litchfield (1), Elisabetta D'Anastasio (1), Paul Denys (3), and Christopher Pearson (3)

(1) GNS Science, Lower Hutt 5040, New Zealand (s.hreinsdottir@gns.cri.nz), (2) Institute for Geophysics, University of Texas at Austin, Austin, Texas, USA, (3) School of Surveying, Otago University, Dunedin, New Zealand

New Zealand is tectonically very active. It lies along the oblique convergent plate boundary between the Pacific and Australian plate. In the North Island active tectonics is dominated by westward subduction of the Pacific Plate beneath the eastern North Island at the Hikurangi Trench, strike-slip faulting in the upper plate, and back-arc rifting in the central North Island. A series of very large strike-slip faults run through the South Island (Marlborough Fault System and the Alpine Fault) connecting with the Puysegur subduction zone in the south.

The present day uplift rates are evaluated by analyzing data from continuous GPS stations in New Zealand. The up to 20 years of continuous GPS gives us a snapshot into the deformation rate. The average velocity is corrected for significant coseismic offsets, but the data can also be influenced by postseismic deformation, slow slip events along the Hikurangi subduction zone, volcanic deformation, as well as none tectonic local affects such as water extraction. We evaluate the interseismic vertical rate. We exclude data significantly affected by postseismic deformation from recent earthquakes and provide vertical rates both with and without correcting for slow slip events. Outside the Taupo rift zone the vertical rates are range from -6 to +6 mm/yr with uplift observed across the Alpine fault, few mm/yr uplift around the Raukumara Peninsula, northeast North Island, and subsidence along the southeast North Island, reflecting variation in plate locking.

We compare the present day vertical deformation to the long-term motion along the coast determined primarily from 125,000 years old marine geological markers. The largest proportion of the New Zealand coastline (45%) is undergoing long-term tectonic uplift. Small stretches of the coastline (15%) are undergoing long-term subsidence. Areas farthest from the plate boundary (northern North Island and southeastern South Island) are assessed to be tectonically stable, in agreement with the continuous GPS data.