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Sea Level Rise In New Zealand: Vertical Land Motion from GPS, and Combined Satellite Altimetry And Tide Gauge Sea Level Records

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The determination and monitoring of vertical land motion is of crucial importance for the long term observation of sea level change and its reconstruction; but is one of the most challenging space geodesy tasks. We use two independent space based geodetic approaches to derive the vertical land motion of the nine longest-running tide gauges of New Zealand.
In the first, a decade of GPS data from 20 continuous stations, co-located with/or near by the tide gauges, are processed using GIPSY-OASIS II software package in its Precise Point positioning mode (PPP).
The second consisted of differencing 19 years of tide gauge sea level time series with an equivalent from satellite altimetry, while assuming that the difference will be dominated by vertical land motion at the tide gauge benchmark, provided that both instruments measure an identical ocean signal.
Results show good agreement between the two approaches, except at the Wellington site. The absolute sea level rise in New Zealand can be then averaged at 1.8 mm/yr, which is consistent with global sea level rise estimates.