Aligning the New Zealand National Datum with the International Terrestrial Reference Frame in the Face of Tectonic Deformation

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SUMMARY

The New Zealand National Datum NZGD2000 provides a local reference system for the geospatial information community. To do this it must account for the tectonic deformation occurring in New Zealand. The datum definition is therefore based on a deformation model – a time and position dependent model relating NZGD2000 coordinates to the International Terrestrial Reference Frame (ITRF) in such a way that they are substantially "ground fixed". Monitoring and maintaining this model in the face of ongoing secular deformation as well as episodic events such as earthquakes and slow slip events provides challenges for the national geodetic agency Land Information New Zealand (LINZ). There is a technical challenge in terms of measuring the deformation and maintaining models. There is also a practical challenge to minimize the impact of maintaining the datum on the user community. Key to the datum maintenance is routine analysis of data from the national network of continuously operating GNSS reference stations – the "PositioNZ" network. These are processed to generate time series of daily ITRF coordinates which are compared with the deformation model to identify significant discrepancies. The smoothed time series are also used by the LINZ online RINEX post processing service PositioNZ-PP to provide current local alignment with ITRF. The combination of the accurate ITRF coordinates at the PositioNZ stations and the deformation model allows the datum to provide a framework for high accuracy measurement in terms of ITRF as well as a practical spatial reference frame for the positioning community.

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