The Evolution of Crustal Deformation Monitoring in New Zealand for Datum Definition

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SUMMARY

New Zealand lies across the obliquely convergent Australian and Pacific plate boundary. To the northeast of New Zealand the Pacific plate is subducted beneath the Australian plate and to the southwest of New Zealand the Australian plate is subducted beneath the Pacific plate. In addition to the plate motions, New Zealand experiences the effects of other deformation events such as large earthquakes, volcanic activity, and more localised effects such as landslides. Since the introduction of the first national geodetic datum in New Zealand, New Zealand Geodetic Datum 1949 (NZGD49), the effects of crustal deformation have resulted in a gradual degradation in the accuracy of the datum. A new datum introduced in 2000, New Zealand Geodetic Datum 2000 (NZGD2000), was defined to be a semi-dynamic datum and included a deformation model to accommodate the effects of crustal motions and enable coordinates to be generated at the reference epoch, 2000.0, from observations made at a time other than the reference epoch. Deformation monitoring in New Zealand to measure crustal motions began in earnest following the 1968 Inangahua earthquake to help better understand crustal dynamics. The methods adopted have evolved over the years and today in addition to supporting crustal dynamic studies they contribute to refining and providing deformation models for datum definition. These not only include models of plate tectonic motions but deformation models resulting for sudden events such as earthquakes. This presentation looks at the evolution of crustal deformation monitoring in New Zealand and how they contribute to datum definition.