New positioning technologies routinely acquire large, high precision three dimensional datasets. Integration of these datasets captured at different epochs requires a consistent underlying geodetic reference frame for representation and analysis of this data. Tectonic deformation is now impacting significantly on the consistency of precise point positioning (PPP) over time and delivery of Networked Real-Time Kinematic (NRTK) positioning.

This paper describes a schema for an absolute deformation model (ADM) that is required to transform point positions captured in the kinematic International Terrestrial Reference Frame (ITRF) and World Geodetic System 1984 (WGS84) to a reference epoch consistently over time. The ADM schema described includes models of rigid plate motion, plate boundary deformation and non-secular deformation (e.g. co-seismic and post-seismic effects or subsidence). Application of an ADM will enable consistent PPP over time and seamless integration of Continuously Operating Reference Station (CORS) networks within deforming zones. An ADM will also ensure consistency of spatial datasets (e.g. laser scanned point clouds and digital cadastral databases) and GIS within a kinematic environment. An ADM can also be used as the basis for static realisations of a national or regional semi-kinematic datum.

To demonstrate the application of an ADM, a New Zealand case study is described. New Zealand is a tectonically active nation which has implemented a semi-dynamic geodetic datum and relative deformation model since 2000.