

A Simplified Parameter Transformation Model from ITRF2005 to any Static Geocentric Datum (e.g. GDA94)

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ABSTRACT

The majority of PPP, global GNSS post-processing and RTK services (e.g. OmniStar, AUSPOS and OPUS) initially produce coordinates in either ITRF or WGS84 reference frames. Unless these services transform the coordinates into a local static geocentric datum such as GDA94 using a kinematic model, positional coordinates will also be kinematic, changing by up to several cm a year as a result of motion of the underlying tectonic plate. The precision of many GNSS systems currently in widespread use is sufficient to detect this movement over short periods of time. Unless this motion is modelled correctly, repeat surveys using the same technique over a span of a year or more will become misaligned.

This paper describes a strategy whereby ITRF or WGS84 coordinates can be transformed to a regional static geocentric datum by using a four parameter model derived from absolute rigid plate kinematic models. Within tectonically stable areas such as the Australian continent, this transformation strategy is shown to have a precision of 20 mm on decadal timescales, and is ideally suited for most surveying and positioning applications. A simplified parameterisation from ITRF2005 to GDA94 is described as an example of how this strategy can be applied in practice.

KEYWORDS: Kinematic Datums, transformation, plate models, PPP