

CORS Network and Datum Harmonisation in the Asia-Pacific Region

Richard STANAWAY and Craig ROBERTS, Australia

Key words: Kinematic Datums, CORS, ITRF2005, APREF

ABSTRACT

It is anticipated that the roll-out of Continuously Operating Reference Station (CORS) networks in the Asia-Pacific Region will result in very significant improvements in the Positional Uncertainty (PU) attainable by surveyors using Global Navigation Satellite Systems (GNSS) positioning technology. Improvements will be noticeable in remote and under-developed areas, particularly with regard to cadastral (e.g. customary land) and resource sector surveys. The basis for any regional CORS network is usually the latest realisation of the International Terrestrial Reference Frame (ITRF). As ITRF coordinates are kinematic as a result of global plate tectonics and localised tectonic deformation, it is necessary to relate kinematic ITRF coordinates of the CORS monuments to a static datum using kinematic parameters that model this deformation. In rigid plate settings (e.g. Australia and the Pacific Plate), a simple parameterisation can be applied across a wide region while still maintaining precision on a decadal timescale. Many countries in the Asia-Pacific Region (e.g. the Pacific Rim), however, are subject to significant internal tectonic deformation across plate boundaries and active fault zones. As a consequence of this, rigid-plate models have limited application in these countries.

This paper presents a datum densification and transformation strategy that can be implemented in tectonically active regions that have a limited geodetic infrastructure. Such a strategy is important to maintain the integrity of a static datum and derived legal coordinates on a decadal timescale while at the same time accounting for regional tectonic and coseismic deformation.

Transformation strategies presented are derived from models of plate, microplate and rigid crustal block rotations; deformation models and episodic parameters that account for coseismic and postseismic deformation. Methods of implementation at both CORS operator and user levels are also described.