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Warkworth geodetic station as a potential GGOS core site in New Zealand

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Auckland University of Technology (AUT) has constructed a 12-m radio telescope (WARK12M) in New Zealand near Warkworth, 60 km north of Auckland. It was launched October 2008 as New Zealand's first research capable radio telescope for the purpose of both astronomy and geodesy. Prior to that, GPS was the only space geodetic technique in New Zealand. WARK12M is collocated with GNSS station WARK belonging to the PositioNZ network operated by Land Information New Zealand. Warkworth is currently the only geodetic station in New Zealand that has the capability to become the national GGOS (the Global Geodetic Observing System) core site. Currently VLBI coverage of the Southern Hemisphere is low so Warkworth is an important new addition for the GGOS project.

The GGOS goal is an origin definition at 1mm accuracy or better and a temporal stability of the order of 0.1mm/yr, with similar numbers for the scale and orientation components. As a GGOS core site has to provide stable and high quality outputs, here we reconsider the geodetic analysis procedure at Warkworth, including ocean tide loading at the site. The displacements due to ocean tide loading calculated for Warkworth are up to +/-10mm for the horizontal components, and +/-40mm for the vertical component. A high-resolution land-sea data grid representation of the coastline is one of the important components for calculation of an accurate site-dependent ocean tidal coefficient. We compare the ocean tide loading displacements calculated using different grid data. One of the site-dependent coefficients was calculated by the Ocean Tide Loading Provider maintained by the Onsala Space Observatory. Another was calculated using GOTIC2 software with the Shuttle Radar Topography Mission data set, which provides 3 arc-second grid data all over the world. Differences between the ocean tide loading displacements in the two models were less than 1mm for the East-West component, +/-1mm for the North-South component, and +/-2mm for the vertical component. These differences are significant for the goal of 1mm target accuracy, demonstrating the importance of the right choice of coastline grid data.

Here we will discuss what is necessary to become a GGOS core site. In addition, we show the progress on the experiment we are conducting jointly with Japanese VLBI stations to provide ultra-rapid EOP result.

Keywords: VLBI, GNSS, GGOS, ocean tide loading