

GNSS CORS Networks – The Impact of Solar Cycle 24 on Network RTK in Australia

Gavin Docherty, Australia

SUMMARY

Minimal research data has been gathered in a GPS network environment in Australia during a peak solar period. The current trend for the positioning and mapping industries in Australia is to develop regional CORS networks that provide real time, high accuracy positioning with the use of network RTK techniques such as virtual reference stations and the Master Auxiliary concept. The extent of the effects of solar activity on such networks in Australia is largely unknown and can only be speculated. This paper will examine some of the ionospheric disturbances that affect network RTK solutions in the mid latitudes of Europe and attempt to make some parallel predictions about similar effects in Australia in the upcoming solar peak period (Solar Cycle 24). The most prominent of these are Medium-Scale Travelling Ionospheric Disturbances (MSTIDs). MSTID's have been detected in the northern regions of Australia during a study undertaken in 2004 [Otsuka et al 2004] and are also likely to be detected in mid-latitudes in Australia during the upcoming solar maximum. Studies in Germany have found that the effect of MSTID's on the short baseline from a virtual reference station to a roving GPS receiver can cause ambiguity resolution to increasingly fail as either the MSTID's increase or the reference station distances increase [Wanninger,1999]. These adverse affects become more prevalent as the inter reference station distances increases to over 100km. Wavelengths of MSTID's are in the order of 100 – 300kms which will mean that a linear interpolation of the ionospheric errors will not be sufficient to mitigate this bias at a virtual receivers' location once inter-reference station distances exceed one MSTID wavelength. Efforts are being made to improve the detection and modelling of MSTID's as well as improve the global behavioural prediction methods [Hernandez-Pajares et al, 2008]. It has also been suggested, however, that," The next solar cycle may be the last one where we will have such genuine concern about the ionospheric activity." [Gakstatter 2009] due to the scheduled full operational capability (FOC) of Block IIF satellites transmitting the L2C and L5 navigation signals.

CONTACT

Mr. David Docherty

Trainer

Organization: Position Partners

Tel.: + 61 400354873

Email: gdocherty@positionpartners.com.au

Country: Australia