

Positioning Regional Victoria - update

Photo: Emma Leonard

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Positioning Regional Victoria

Victoria is leading the way in the provision of a comprehensive, standardised GPS reference system.

In Victoria, individual on-farm, short range GPS base stations could rapidly be superseded by a multipurpose state-wide Global Navigation Satellite System (GNSS). In May 2008, the Victorian State Government committed \$4.9 million to extend 'GPSnet' a 'Continuously Operating Reference Station' (CORS) to cover Victoria in a five stage prioritised rollout from July 2008 to 2011. The project Positioning Regional Victoria is an addition to the \$1.67 million previously allocated by Department of Sustainability and Environment (DSE) toward building a reliable and robust system. By 2011 GPSnet will be complete

with an estimated 102 GNSS CORS enabling a nominal horizontal GNSS positioning accuracy of +/-2cm state-wide in real-time (Figure 1).

Victoria is leading Australia in delivering authentic networked based positioning, navigation and guidance systems

Victoria is currently leading Australia in the delivery of an authentic networked based positioning,

navigation and guidance system that uses international GNSS data protocols such as RTCM3 specifically designed for CORS networks and the official spatial datum, the Geocentric Datum of Australia (GDA). The use of international data protocols allows a range of distribution techniques to send satellite corrections to end users and avoid the issues associated with proprietary formats. GPSnet is also used by the Victorian State Government to underpin GDA in the State ensuring users of guidance relative to all official maps and other spatial data in the state and elsewhere around Australia.



Figure 1. Position Regional Victoria project – the expansion of GPSnet GNSS CORS network over the coming months and years.

Similar CORS networks are developing in Queensland, New South Wales and Western Australia, while in other states smaller schemes based around key urban areas are being established. Ultimately the GNSS CORS networks in each state can be expected to unify into an homogeneous, ubiquitous, national infrastructure and become the 'Next Utility' after electricity, telecommunications, water sewerage etc.

GPSnet will provide improved signal reliability. In addition, benefits will include high and consistent accuracy and running on standard protocols that will eventually be adopted nationally. This is being achieved by working in partnership with commercial companies to provide integrated network and communications systems as well as the provision of advanced

regional modelling of atmospheric disturbance that affects positioning quality.

The ability for GNSS CORS networks such as GPSnet to centralise and process all stations in the network and then model atmospheric disturbance, particularly in the ionosphere, is a key advantage over single purpose overlapping RTK base stations that are arranged into an array, and often erroneously referred to as 2cm RTK 'networks'. Currently only GNSS CORS networks can provide network RTK (NRTK) seamlessly over large regional areas, when CORS are spaced 70km apart.

GPSnet, which in recent months has added new CORS at Kerang, Echuca and Lake Bolac, views agriculture as an important user of the system. In recent months two major developments of importance to

agriculture have occurred: dynamic accuracy trials and the successful integration of GPSnet with Leica's mojoRTK unit.

Dynamic accuracy trials

During 2007, DSE in collaboration with industry tested the accuracy of automatically steering a moving tractor using the GPSnet NRTK corrections along an accurately defined and surveyed path. In the trials it was confirmed that the GPSnet NRKT service delivers better than +/-2cm accuracy time after time in a real time dynamic application.

These tests were believed to be a world first assessment of 'Virtual Reference Station' technology and use of correction rebroadcast techniques to broadcast the GPSnet corrections locally. For further information a technical paper is available for download from

www.land.vic.gov.au/GPSnet > GNSS Publications

In May 2008, GPSnet CORS network was successfully connected to Leica mojoRTK precision guidance system via low cost mobile phone networking. With no additional software or modifications this commercially available unit was able to use the GPSnet CORS network as the data correction reference system. By connecting the mojoRTK console to Victoria's growing CORS network, farmers will benefit from affordable RTK autosteer accuracy without the need to transmit, own or operate local base station correction signal.

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Farmer Ewan Peel (Director/Chairman Geelong Branch of the Southern Farming Systems), purchased a Leica mojoRTK GNSS base and rover to work with the GPSnet CORS network. Located at Inverleigh, Ewan's property was in range of two different privately owned GPS base stations with radio transmitters but neither had a standard format signal so were of no use to him.

Part of Ewan's motivation to try the Leica system was to take advantage of the GPSnet CORS network that would allow him to create consistent 'virtual' reference stations anywhere at both of his properties, without needing to enter new codes for local base stations or to purchase his own private stations.

There has been much discussion in agriculture about the provision of equipment that meets the IBUS standard, allowing different makes of equipment to automatically work with each other. However, there has been little discussion about consistency in the provision of correction signal.

The creation of the GPSnet CORS system has been paralleled to the establishment of the common electricity grid and centralised power generation sites across Australia. It is anticipated that in the next 10 years a uniform positioning grid and

centralised position generation sites will be established -- GPSnet is just the beginning.

In 2008, Ewan sowed over 500 hectares of barley using the Leica and GPSnet CORS system and was pleased with the accuracy achieved.

Once commercial arrangements specific to agriculture have been finalised a 'CORS ready' mojoRTK solution will be released (www.mojoRTK.com.au). It is expected that a wide range of commercial providers in the precision agriculture sector will access GPSnet and package solutions to farmers. In the meantime growers in Victoria wishing to know more about GPSnet should visit the Department of Sustainability and Environment's website (www.land.vic.gov.au/GPSnet).

Working together

At the end of 2008, discussions occurred between DSE's GPSnet team, OmniSTAR and the Cooperative Research Centre for Spatial Information (CRC-SI). The outcome will be a field test in regional Victoria, using a combination of GPSnet and OmniStar reference stations and the OmniSTAR satellite distribution service. The aim will be to assess the integrated system's accuracy and usability.

OmniSTAR provides high accuracy (nominal +/-10cm horizontal) real time positioning solutions with seamless coverage across Australia via satellite communications.

The combination of GPSnet and OmniSTAR infrastructures is expected to lead to the availability of ubiquitous higher accuracy positioning across Victoria using the additional

Remote management

GPSnet CORS when needed. This process will be especially valuable when 'conventional/terrestrial' communication links fail or are not available.

The tests plan to incorporate a GNSS satellite guided tractor located at the Birchip Cropping Group, in the Victorian Mallee.

Field tests and demonstrations of both the OmniSTAR and Leica systems are proposed for early 2009 and details will be reported in future issues of Precision Ag News.

This article is based on information sourced from the GNSS Technical Support Newsletter, to subscribe and to source back copies visit www.land.vic.gov.au/GPSnet

For more information

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