

# Status and Recent Upgrades at Yarragadee / MOBLAS-5

## Introduction

The MOBLAS-5 system at the Yarragadee Geodetic Observatory continues to perform at the highest level. Recent upgrades have focussed both on data quality - mainly involving the integration of an event timer in place of the HP5370B - and operator safety and efficiency. Newly installed permanent SAR calibration corner reflectors have also increased the number of co-located techniques at one of the world's most important geodetic observatories.

## Station Status

The fundamental geodetic observatory at Yarragadee in the mid-west of Western Australia, continues to operate on a 24x7 basis. The NASA SLR station – MOBLAS5, which has been in operation on this site continuously since 1979, is still easily the most productive station in the world and especially since switching to a modern event timer, is producing very high quality data as well. Our operations regime has remained the same since the last workshop ( 4 operator/technicians on 12 hour 4 days on, 4 off shifts ) and our tracking staff have remained the same. We have employed an extra person to fill the role of Deputy Station Manager however with the view of providing some degree of succession planning.



Figure # 1 The Team at Yarragadee Geodetic Observatory (L-R Peter Bargewell, Michael Wilson, Dave Essers, John Colley, Sandy Jones, Jack Paff and Randall Carman)

## Permanent Synthetic Aperture Radar Corner Reflectors at YGO

In August 2018 YGO joined Metsahovi and Wetzell as the only fundamental geodetic observatories to co-locate SAR calibration infrastructure along with the other four space geodesy techniques. Geoscience Australia mounted two permanent SAR CRs on deep concrete foundations between the SLR and VLBI facilities. One faces East to capture descending passes and one faces West for ascending passes. Preliminary analysis of Sentinel1 and TerraSAR-X data shows that the CRs are clearly detectable and performing as expected.



Figure # 2 Site Layout showing new SAR Corner Reflectors

## The Event Timer

The Cybioms Event Timer has been the prime ranging instrument for over twelve months (September 2017) . Our single shot RMS has improved dramatically over the HP5370-B ( see figure 3 below) however the full implementation plan has not been realised yet, meaning software and hardware restraints are stopping us using the maximum laser rep rate ( currently 10Hz). Consequently we still need to drop to lower fire rates because of the 51mS overhead in the system. It also means we cannot optimise the laser for 10Hz further restricting our efficiency. We expect the full software and hardware upgrade to be completed by NASA/SLR in the near future.

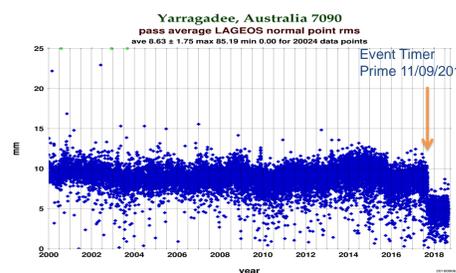


Figure # 3 Lageos NP RMS (CDDIS)

Range (2way mS)	Max PRF
>199	2Hz
149-199	4Hz
49-149	5Hz
<49	10Hz

Table # 1 Max fire rates

## New Safer NASA Van Access

Apart from the Event Timer upgrade, the biggest change at the observatory over the last two years, has been the installation of safety rated stair access to the NASA Vans and to the telescope platform. The latter, in particular, facilitates the safe two person carriage of the heavier telescope items such as the receive package. The original light aluminium steps were unstable and too narrow for two people to walk side by side thus making it very difficult to extricate heavy loads.



Figure # 4 The new safety rated access steps into the Instrument van (left) and mount area (right).

## Data Quality

While we continue to strive for maximum productivity at MOBLAS-5, we are becoming increasingly conscious of the requirement to improve the quality of our submitted data. Up until now our tracking technicians have concentrated on both NP quantity and Single Shot RMS as guidelines for submitting data. We are now trying to ensure we have both properly covered orbital arcs and adequately populated Normal Points for every pass where possible. This is currently done completely manually with the technician having to stay mindful of both these parameters. With increased satellite numbers and higher rates of interleaving, it is sometimes difficult to keep track of optimum pass segment scheduling. I hope to implement software tools in the near future to aid in the maximizing of both NP quality and pass coverage as some other stations currently utilize.

## Conclusions

With our totally committed staff, full event timer integration and excellent support given by Geoscience Australia and NASA/SLR , the future for Yarragadee Geodetic Observatory is extremely positive.

