

# Tracking Statistics for High Performing SLR Stations: Performance from August 1 to September 30 for 2008 to 2014

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Operations (3166)

## Abstract

The recent SLR expansion of GNSS tracking provided an opportunity to test the current capacity of the network and to estimate the impact of the expanded GNSS tracking on LEO and LAGEOS data yield over the period 2008 – 2014. The study was motivated by the GNSS Campaign that was organized for the period 1 August - 30 September 2014, but many of these stations had already begun working an expanded GNSS mode of operation in early 2014. To allow for comparisons to be made, the study focuses on the 1 August – 30 September timeframe for each year.

The data from eleven of the highest performing stations was examined to see how the number of GNSS, LAGEOS and LEO passes and normal points changed over time and whether the data yield on LEO and LAGEOS satellites suffered as GNSS tracking was expanded. The results showed that most of these stations had no loss of LEO and LAGEOS data yield, in fact in some, it increased. However in a few stations LEO and LAGEOS data yield did fall off. This needs closer examination with the stations because the results may have been dominated by system related issues, including upgrades or station changes (STL3, WETL, and ZIML were quarantined for a period of the tracking campaign) and the weather.

## Results

From the data gathered, graphs showing the number of different satellites tracked and the number of passes taken for LEO, LAGEOS, and HEO were generated for the stations that obtained the highest number of GNSS normal points during the GNSS tracking campaign (a minimum of 1000 normal points). 11 stations met this requirement and graphs for each are displayed on the left.

From these graphs, we observed the following:

- The impact that increased tracking on GNSS satellites during the campaign had on the number of passes taken for LEO and LAGEOS satellites is minimal for most stations
- The number of GNSS satellites tracked during the campaign substantially increased compared to 2013 for four stations (GODL, GRSM, MATM, and STL3).
  - Increase in LEO and HEO Passes: GODL and STL3
  - Decrease in LEO and Increase in HEO Passes: GRSM and MATM
- The impact that increasing the tracking on GNSS satellites at other time periods show similar split results:
  - Increase in LEO and HEO Passes: CHAL (2011-12), GRZL (2010-11), ZIML (2010-11)
  - Decrease in LEO and Increase in HEO Passes: ALTL (2012-13), HERL (2009-10), WETL (2012-13), YARL (2010-11)
    - HERL: number of LEO passes taken in 2009 was exceptional compared to all other years
    - WETL and YARL: the decrease in LEO passes fall close to the mean of passes the station normally gets (the drop is not substantial)
- Potential change in priority: A few stations substantially decreased the number of LEO satellites they were tracking when they increased the number of HEO satellites resulting in a lower LEO pass count (ALTL, GRSM, MATM)

## Conclusions

Most of the top performers for the campaign were not affected by the campaign request. In fact, the main decrease in LEO passes seems to have occurred for stations that started tracking substantially fewer LEO satellites. Most other stations fell within a reasonable range. Three of the kHz stations (CHAL, GRZL, HERL) were in the top 11 but the other four had less than GNSS 100 passes during the campaign; this may be due to station changes or weather. The other top performers had varying repetition rates which may show that the laser equipment does not limit a station's tracking capability. In fact, STL3, WETL, and ZIML all are among the top performers although they had spent a part of the campaign in quarantine.

Additional Graphs were created and samples are shown to the immediate left.

A copy of the total results including tables with the number values will be made available on the ILRS website at a later time. Please contact [Justine.woo@exelisinc.com](mailto:Justine.woo@exelisinc.com) for further information.

