

# Early Results from New Initiatives on SLR Tracking of GNSS and Synchronous Satellites

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## GNSS Action from the GNSS Study Group



- Recommend an operational strategy for expanded SLR tracking of the GNSS constellations taking into account the GLONASS, GGOS, and ILRS requirements and constraints, and the issues delineated in the note from the April 8, 2013 meeting (see Attachment 3);
- Evaluate the network performance based on data already acquired and new data flowing from the implementation of expanded strategies, including the informal campaign with expanded GNSS tracking which has been underway since October 2013;



# GNSS Campaign

## August 1 – September 30, 2014



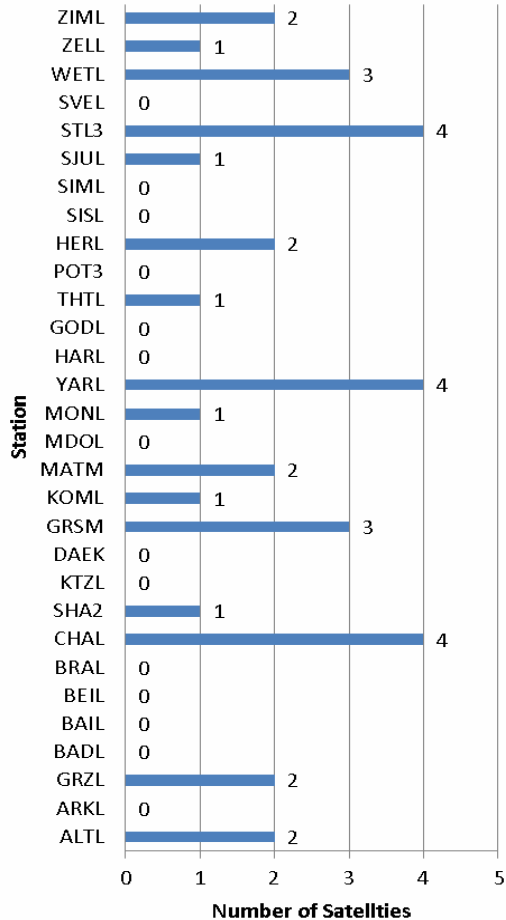
Campaign organized to test the capability of the ILRS network, using the full constellation of GNSS satellites with retroreflectors, inviting all stations to participate.

Plan:

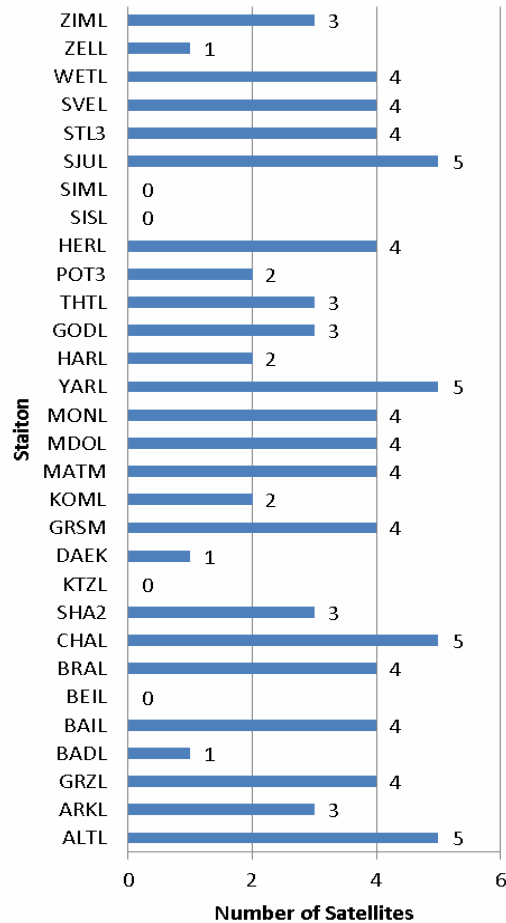
- The stations should make their best effort to acquire three sets of 3 normal points distributed over that transit of the satellite.
- The stations should try to cycle through all of the GNSS satellites on the updated roster;
- Those stations with high repetition rate lasers should try to use the 1000 FR/NP recipe to improve their yield and lessen the impact on other missions;

# Number of Satellites by Category Tracked During the GNSS Tracking Campaign (August 1 – September 30, 2014) By Station

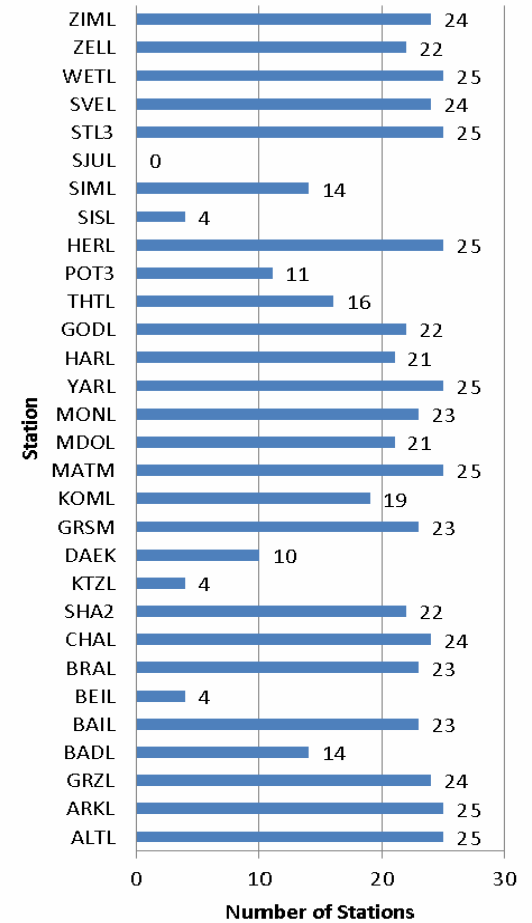
### Number of COMPASS Tracked



### Number of GALILEO and GIOVE Tracked

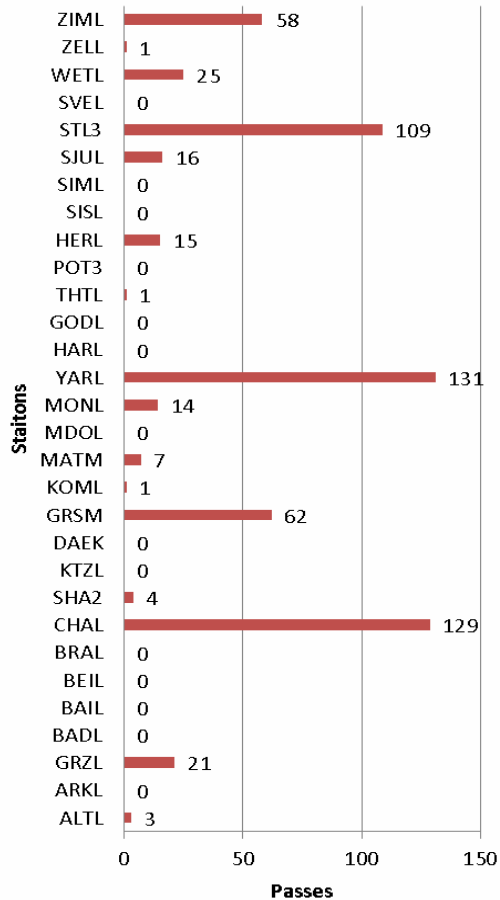


### Number of GLONASS Tracked

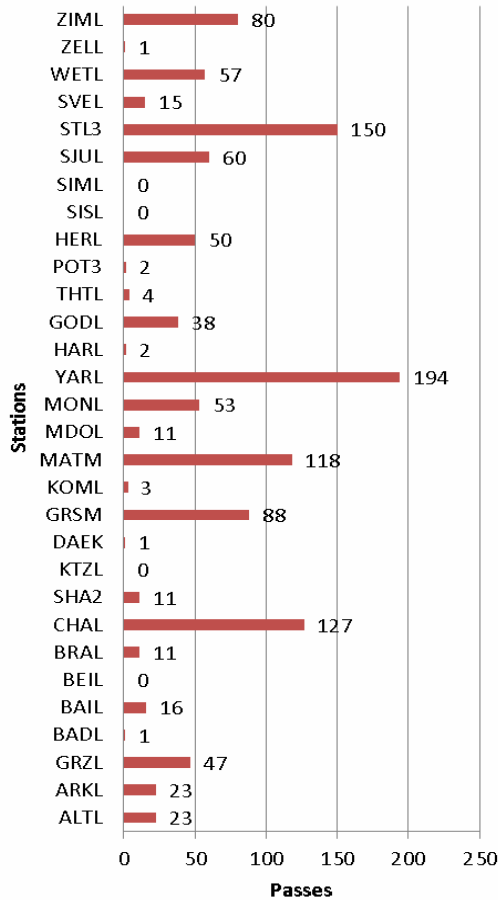


# Number of Passes by Category Tracked During the GNSS Tracking Campaign (August 1 – September 30, 2014) By Station

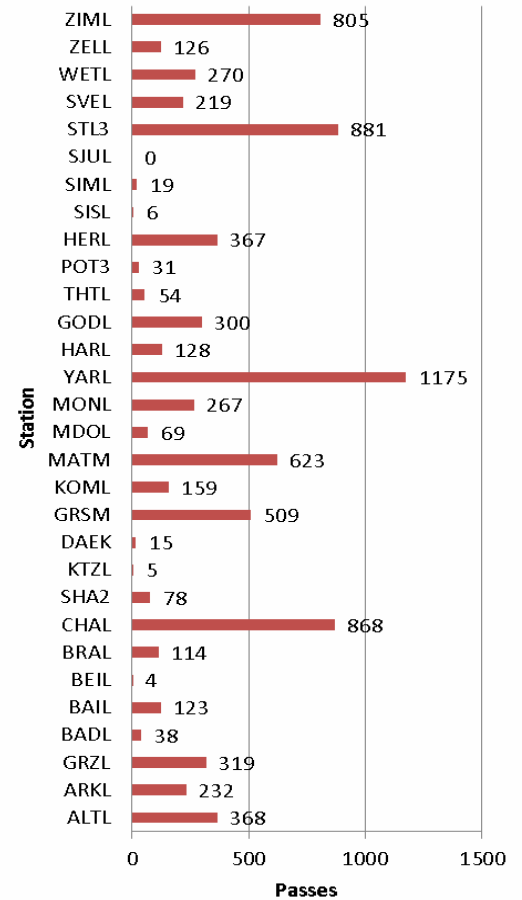
### Number of COMPASS Passes



### Number of GALILEO and GIOVE Passes

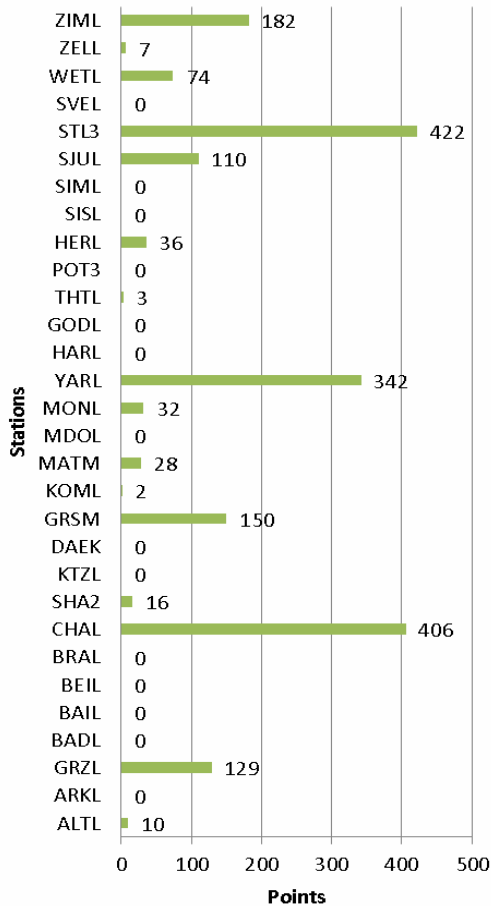


### Number of GLONASS Passes

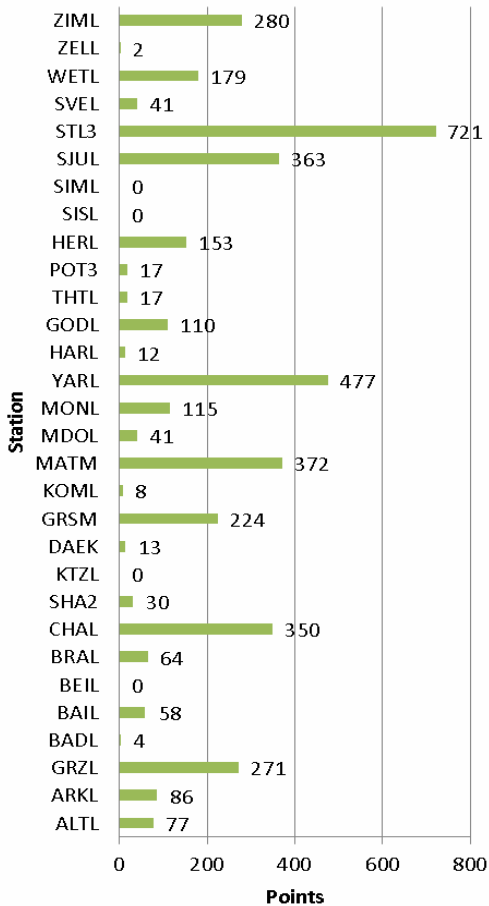


# Number of Points by Category Tracked During the GNSS Tracking Campaign (August 1 – September 30, 2014) By Station

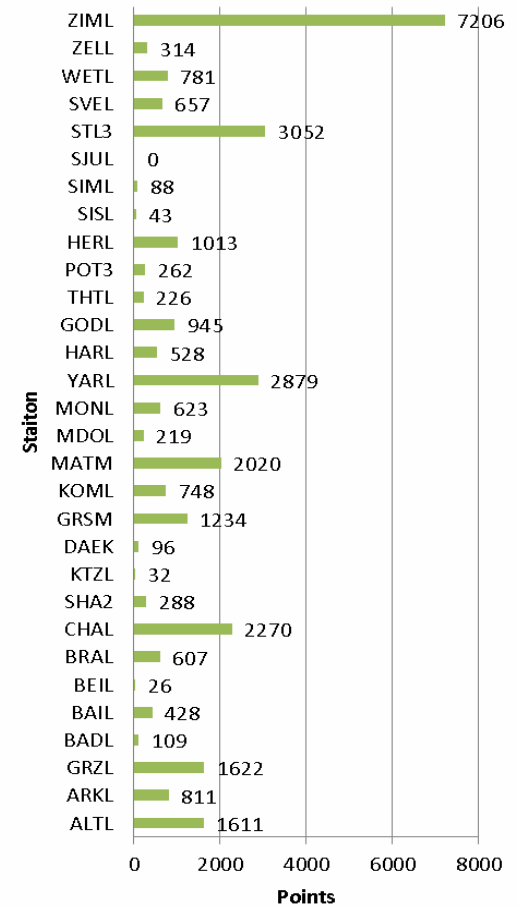
### Number of COMPASS Normal Points



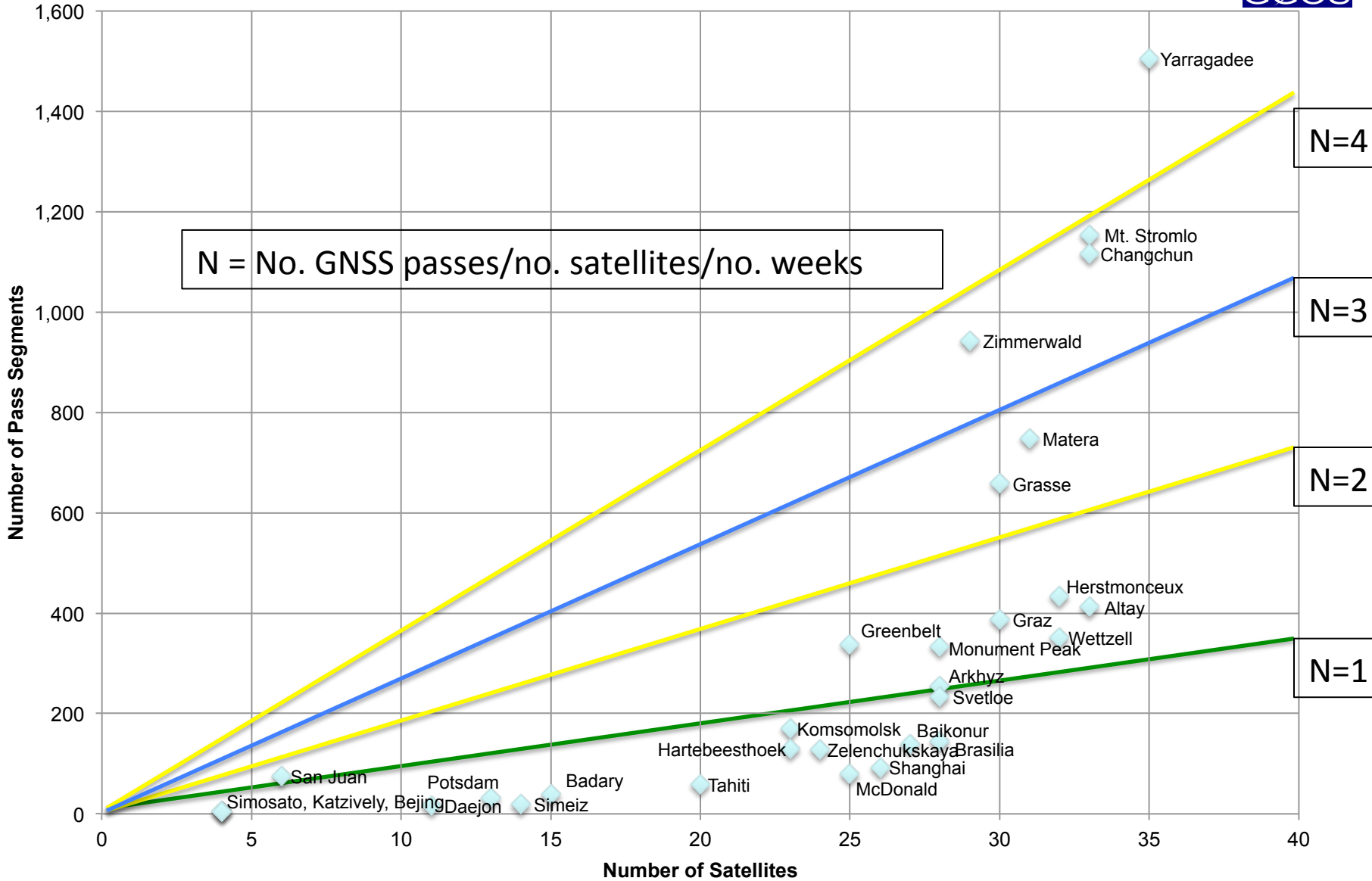
### Number of GALILEO and GIOVE Normal Points



### Number of GLONASS Normal Points

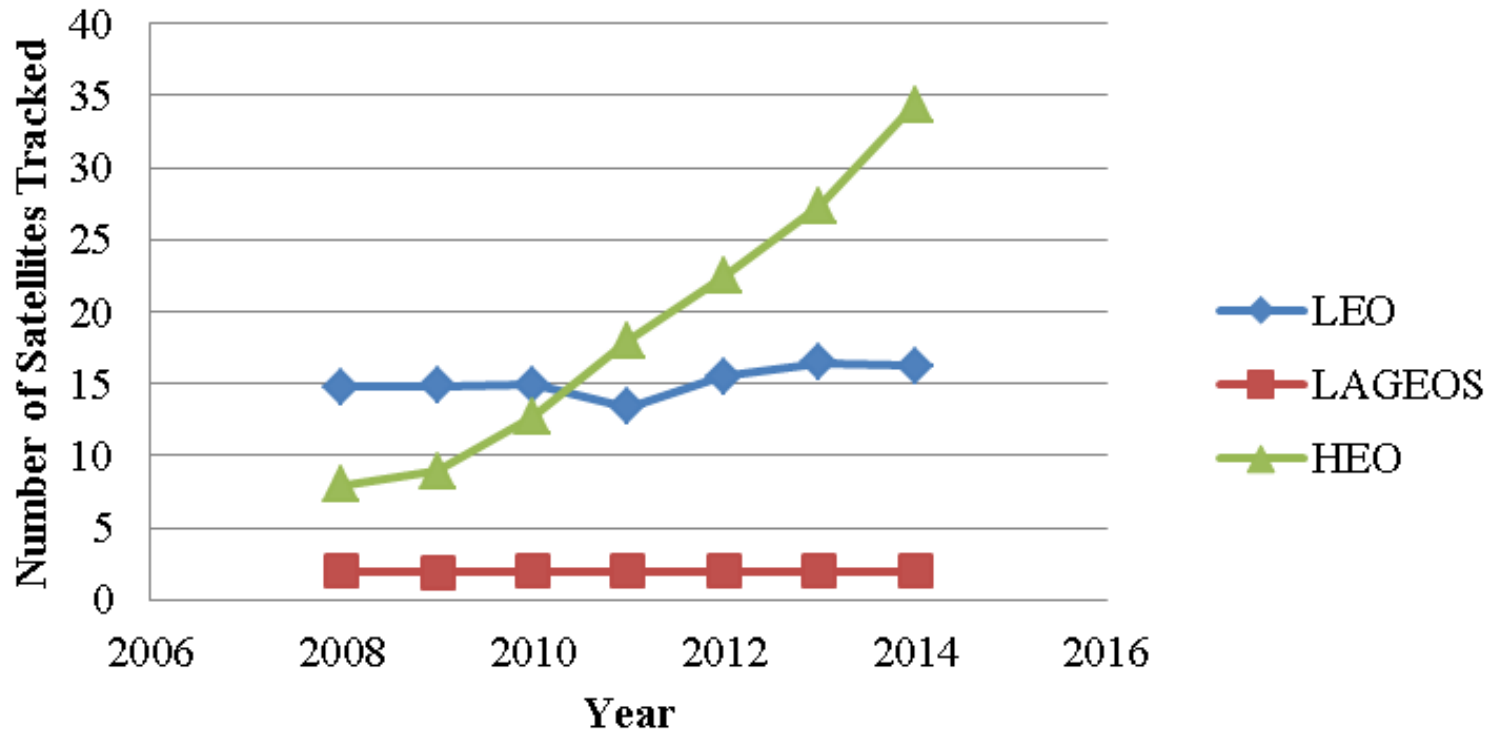


# GNSS Campaign Results



## Number of Satellites Tracking During the August – September Period

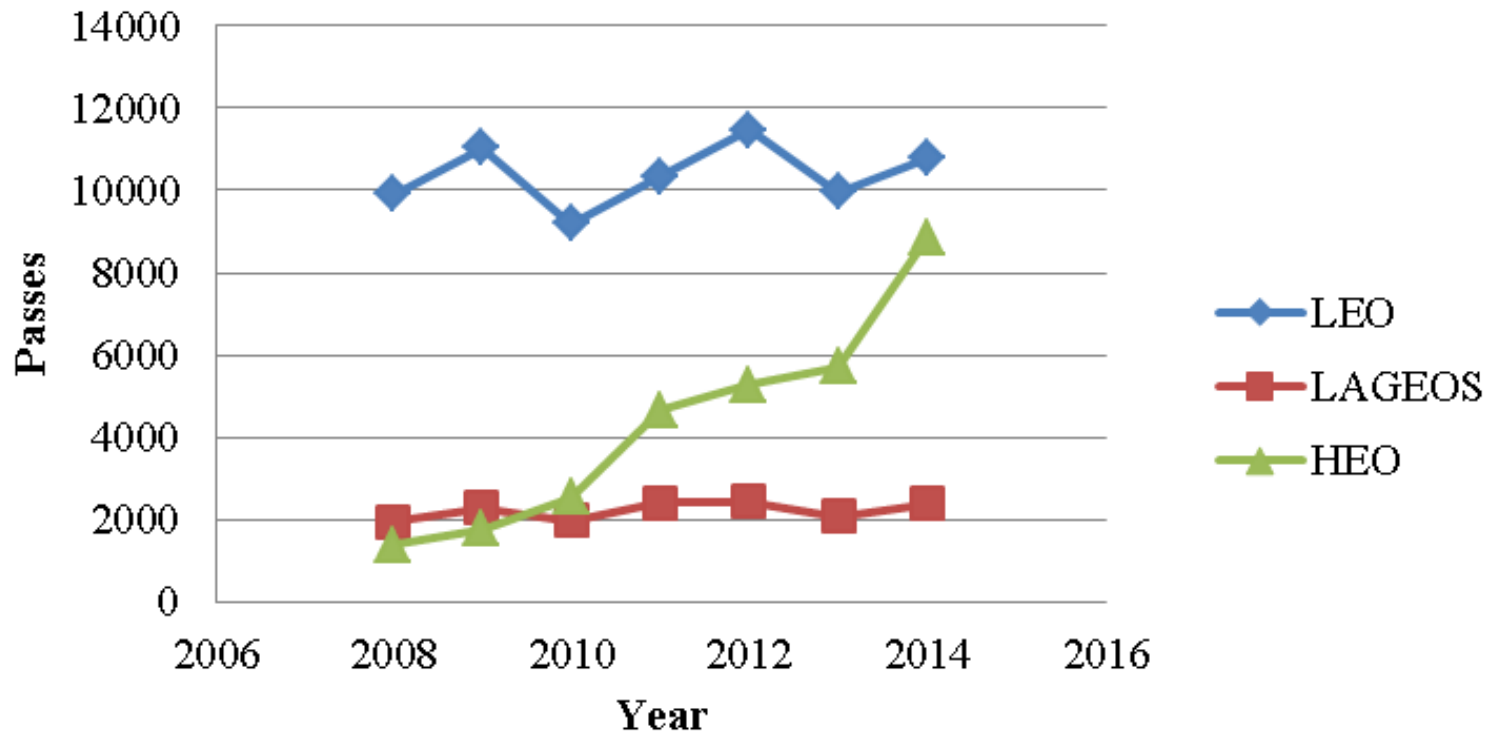
### Total - Satellites - Aug 1 to Sept 31



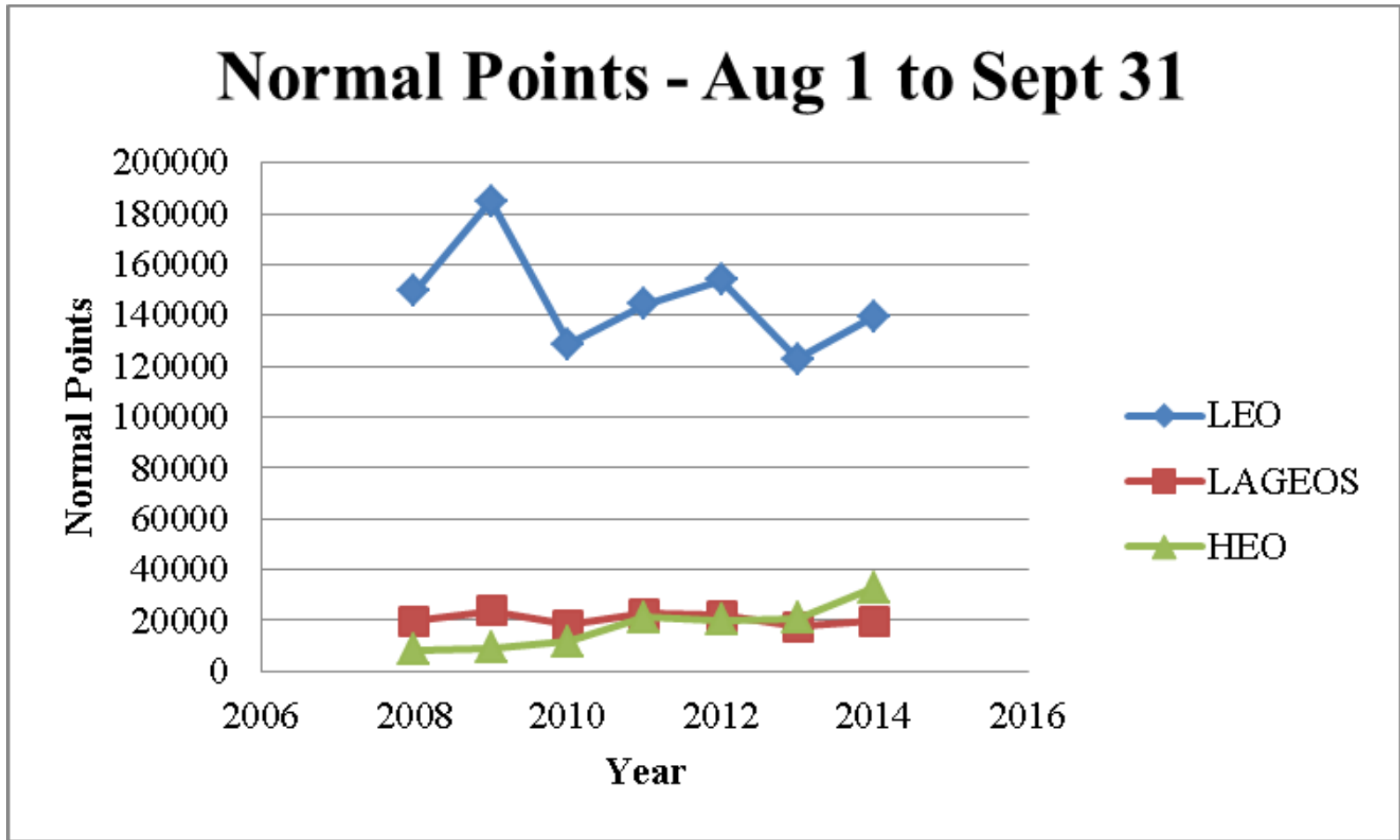


## Number of Passes Acquired During the August – September Period

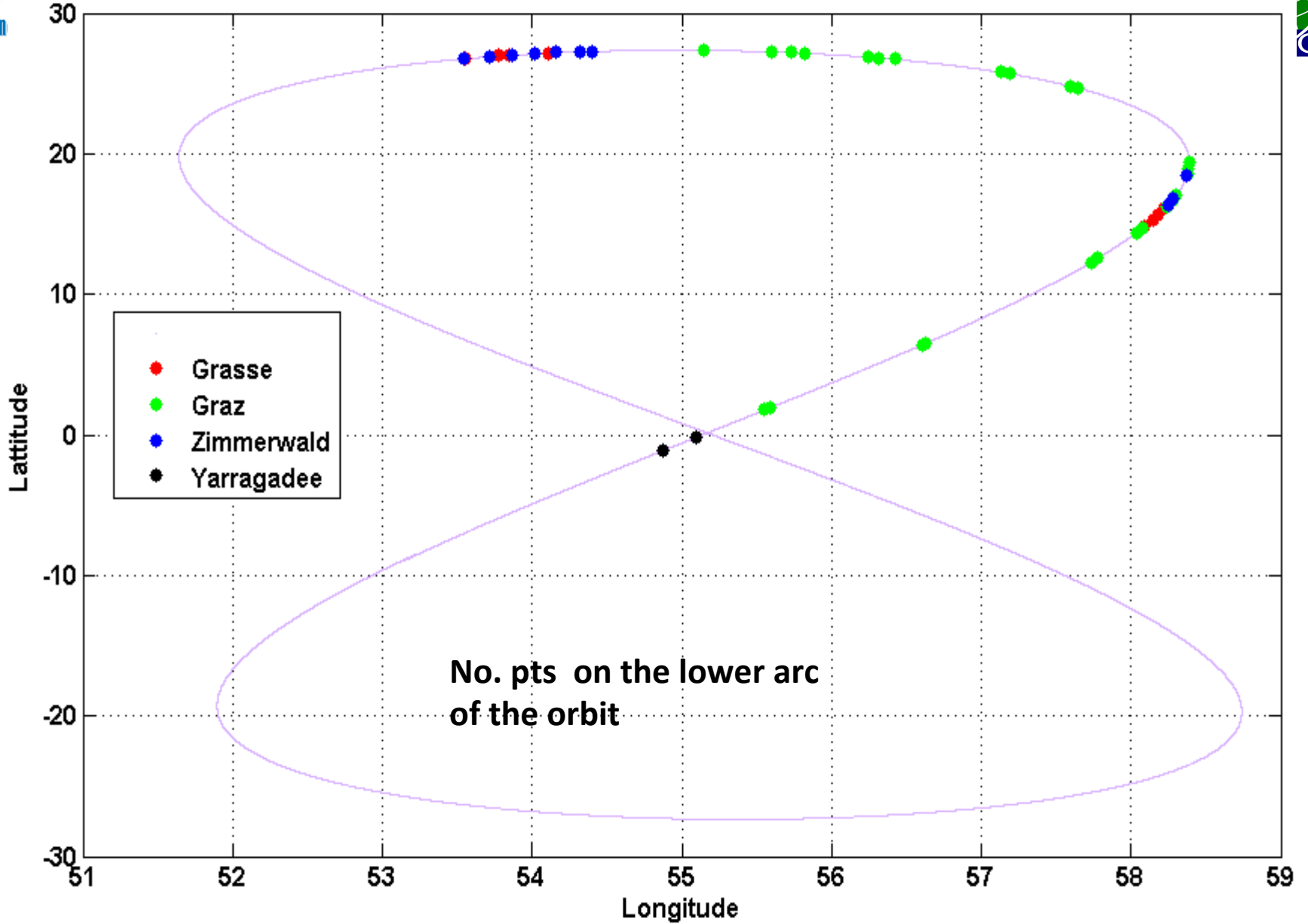
### Total - Passes - Aug 1 to Sept 31



# Number of NP's Acquired During the August – September Period

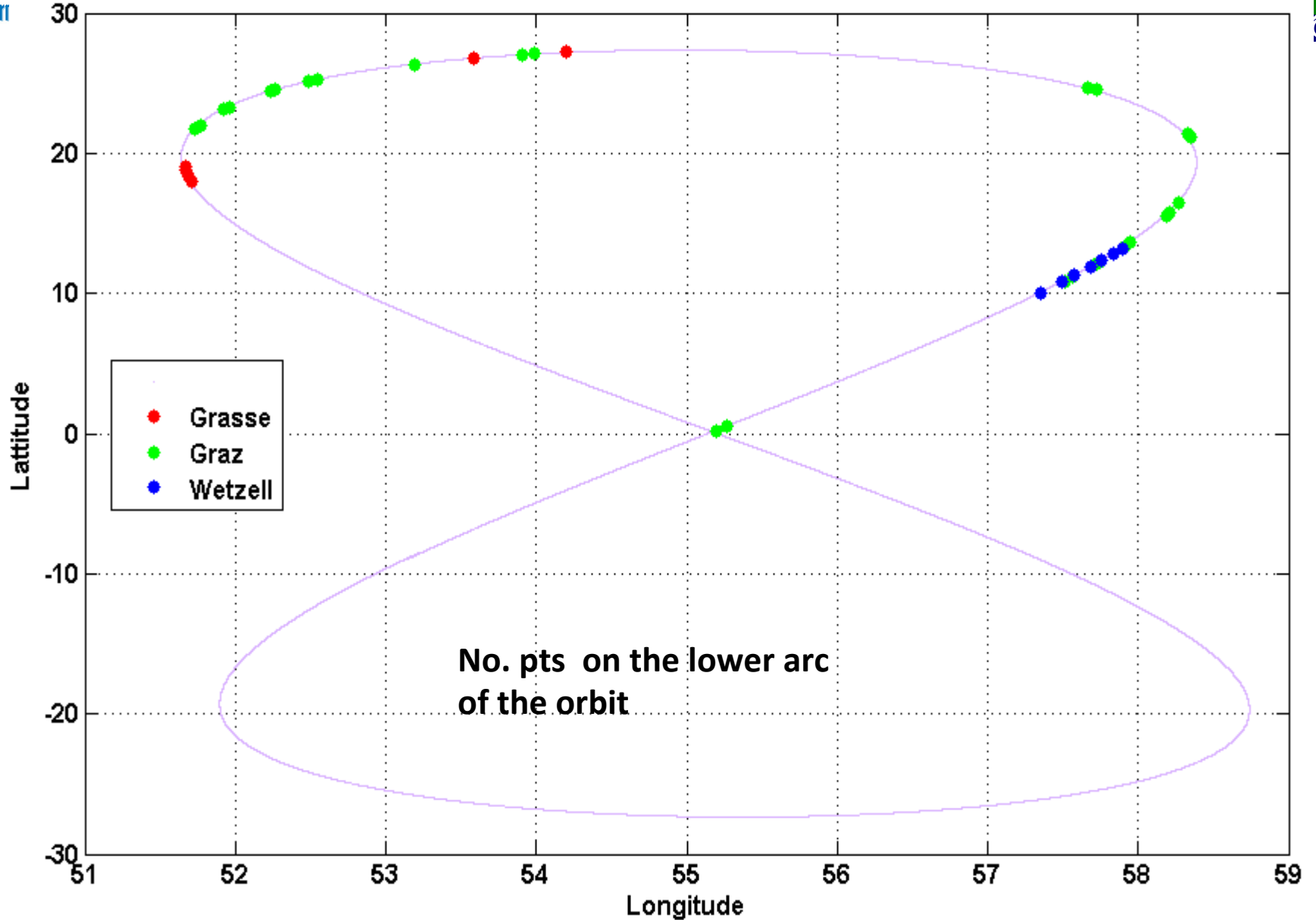


# SLR tracking campaign ground trace for IRNSS-1A on 30/06/2014

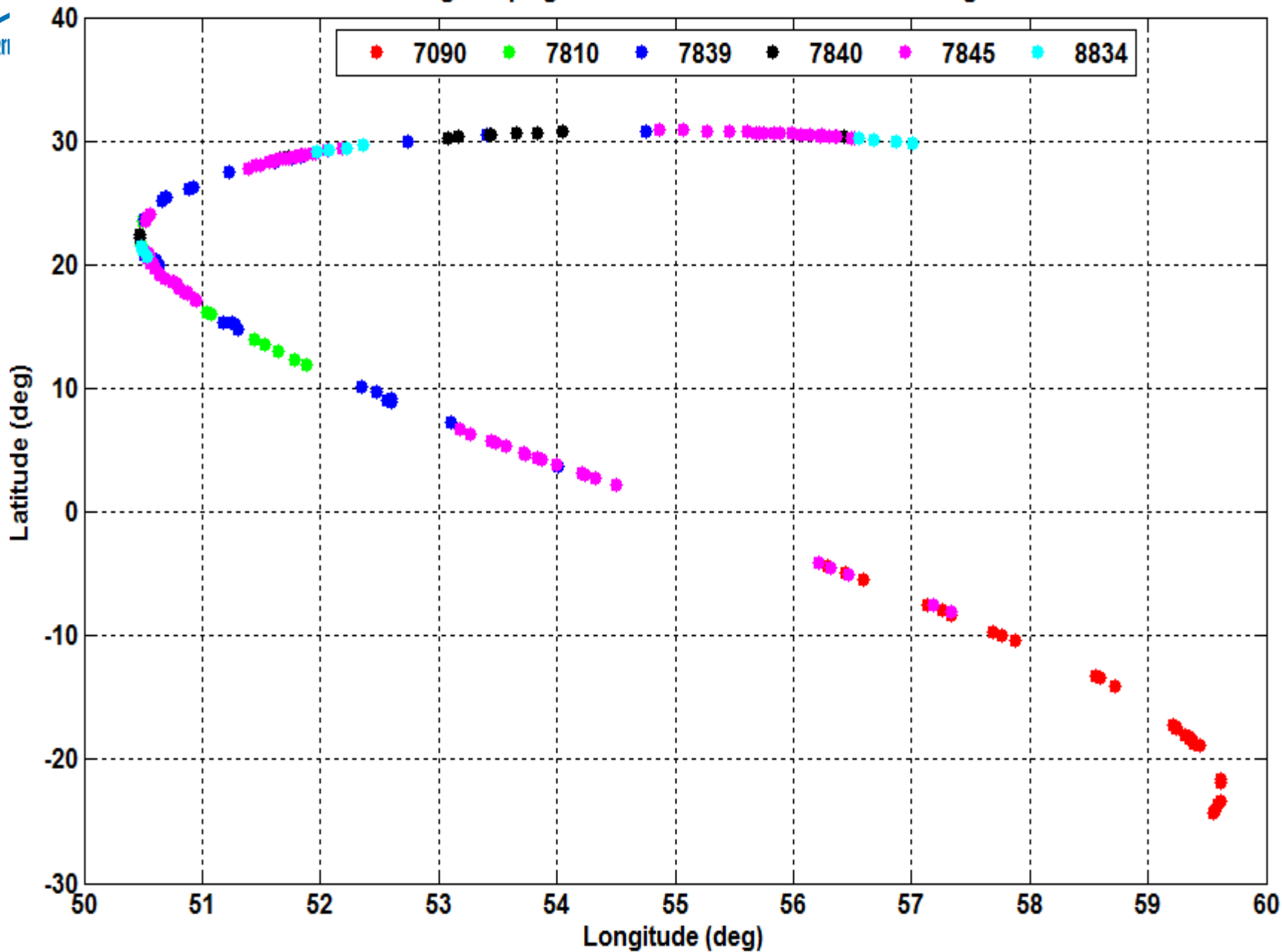




### SLR tracking campaign ground trace for IRNSS-1A on 01/07/2014

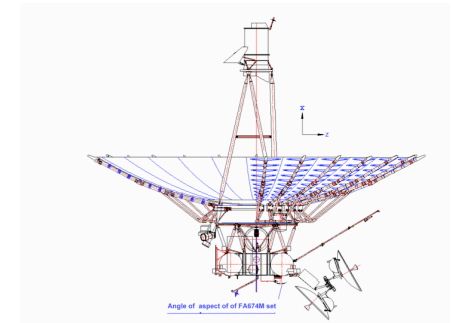


# SLR tracking campaign for IRNSS-1B from 10th to 18th Aug-2014



# RadioAstron

- The RadioAstron project (the Spectr-R project) is an international collaborative mission to launch a free flying satellite carrying a 10-meter radio telescope in high apogee ( $\sim 350,000$  km) orbit around the Earth. The aim of the mission is to use the space telescope to conduct interferometer observations in conjunction with the global ground radio telescope network in order to obtain images, coordinates, motions and evolution of angular structure of different radio emitting objects in the Universe with the extraordinary high angular resolution.
- Russian Radio Astronomy Satellite
- Altitude: 500 to 350,000 km
- Success – Only a few passes from Grasse



## Next Step with GNSS

- Cut back on the GNSS Tracking Constellation and try to expand satellite data yield
- Discussing this now with the customers



**Thank you**