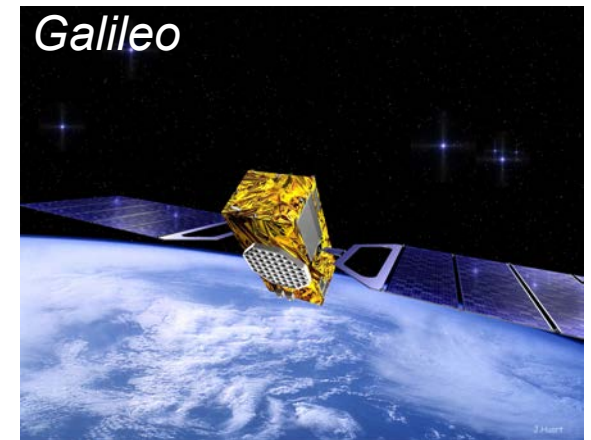
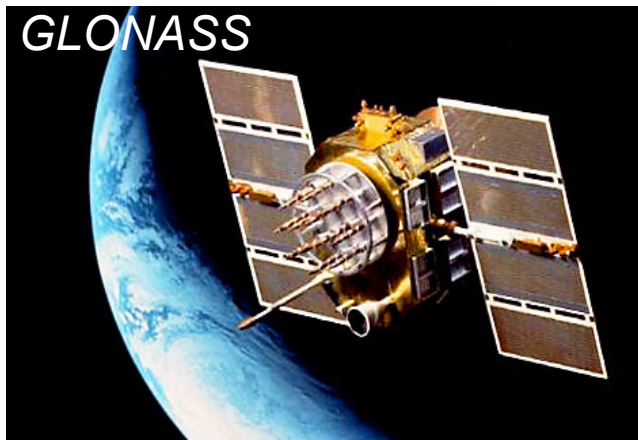




# Results from ILRS GNSS Tracking Campaigns



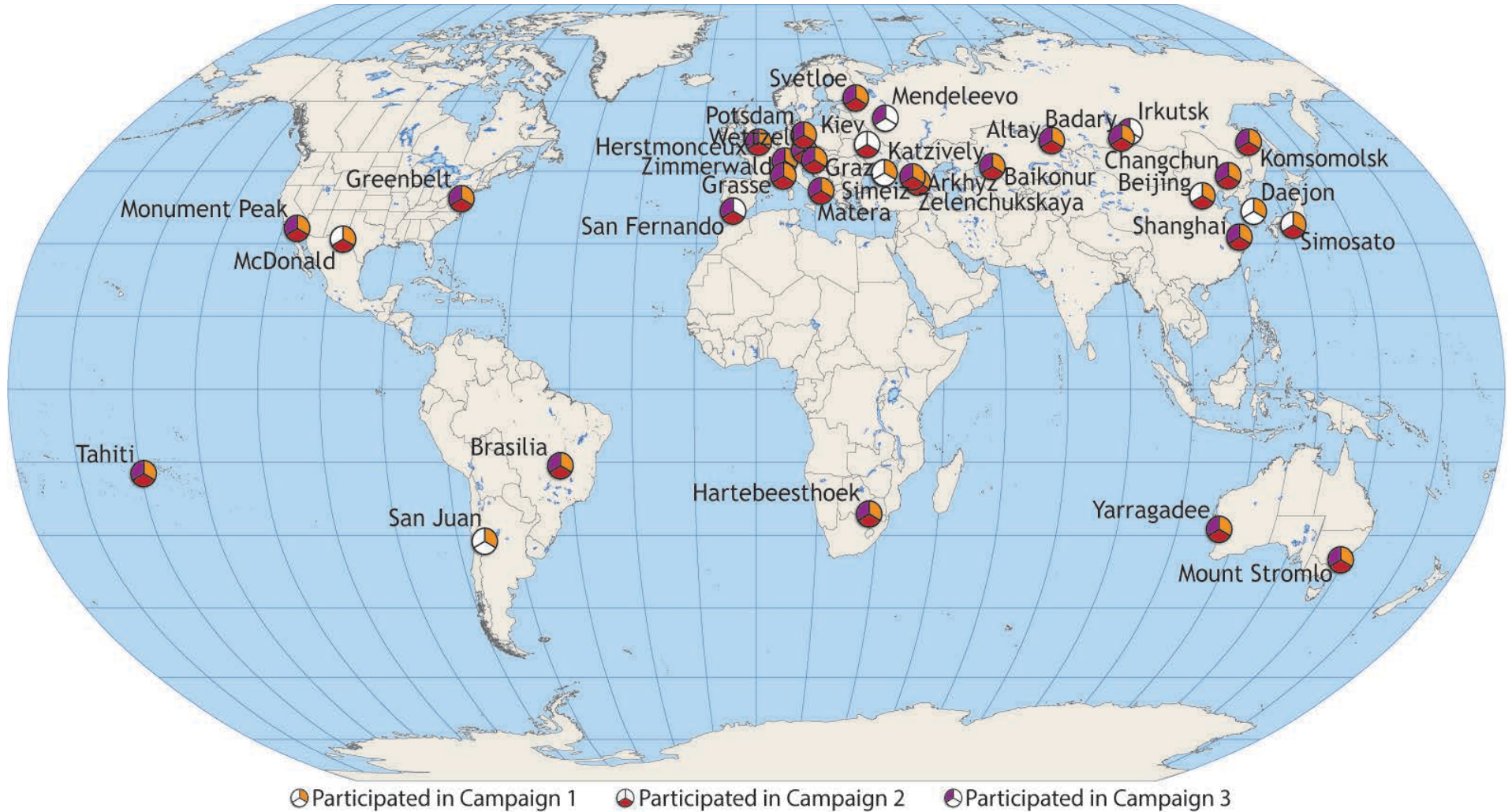
Mike Pearlman  
Carey Noll  
Mark Torrence  
NASA GSFC

2015 ILRS Technical Workshop  
October 26-30, 2015



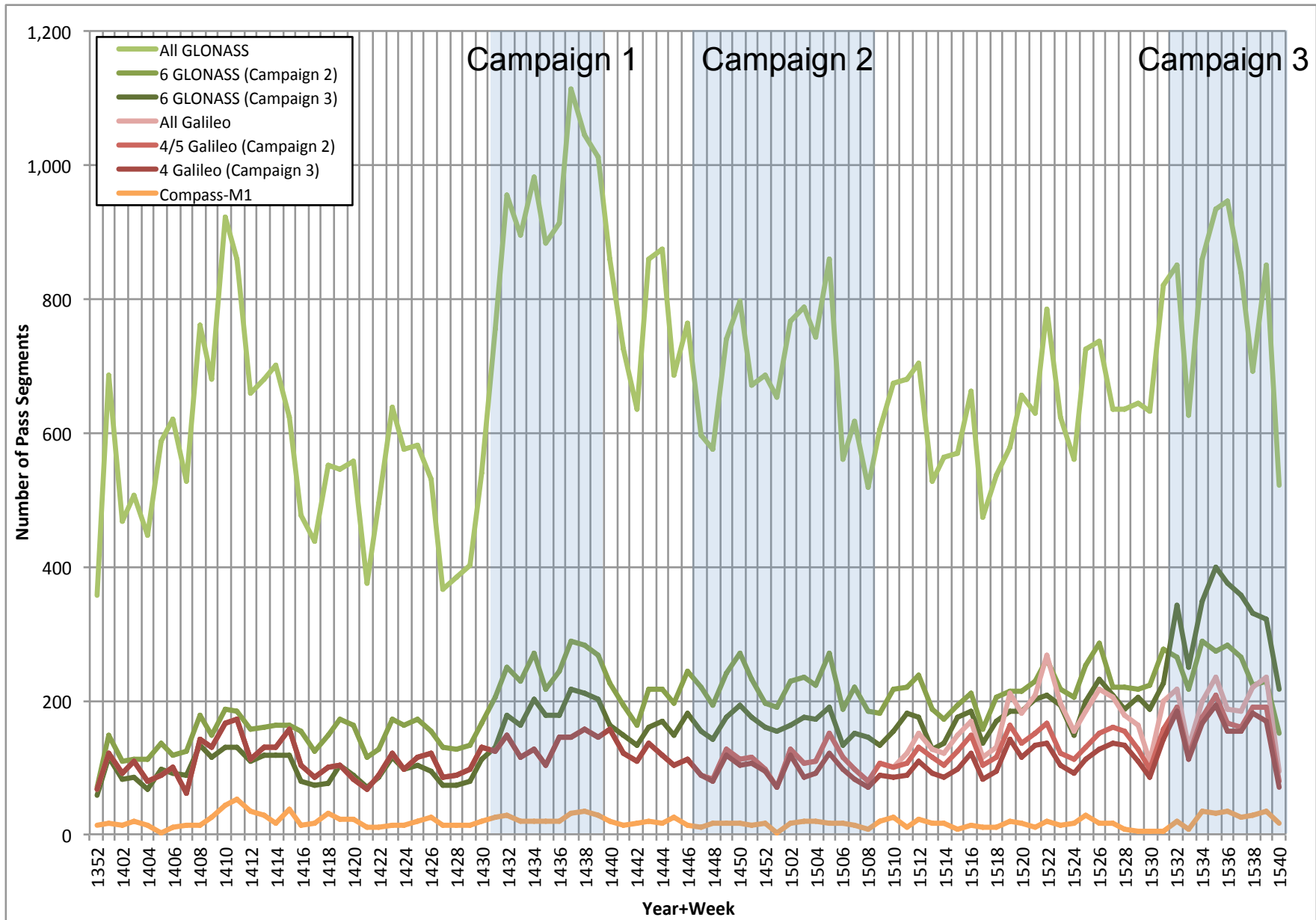
# ILRS Network Participation

## Campaigns 1, 2, 3





# Weekly GNSS Tracking by Campaign Constellation





# Campaign 1 Summary

August 01 – September 30, 2014 (2 months/8 weeks/61 days)

- Instructions:

- Track all GNSS satellites on current ILRS priority list (18 satellites); can track more if able (total of 33 satellites available, 24 GLONASS/5 Galileo/4 Beidou)
- Acquire three sets of two normal points distributed over that transit of each satellite; normal point includes 1000 FR points or last 5 minutes, whichever is shorter; no need to obtain more than 1000 FR points
- Cycle through all of the GNSS satellites (GLONASS, Galileo, and Beidou); and track the full cycle at least three times per week
- Attempt some daytime passes if conditions are favorable

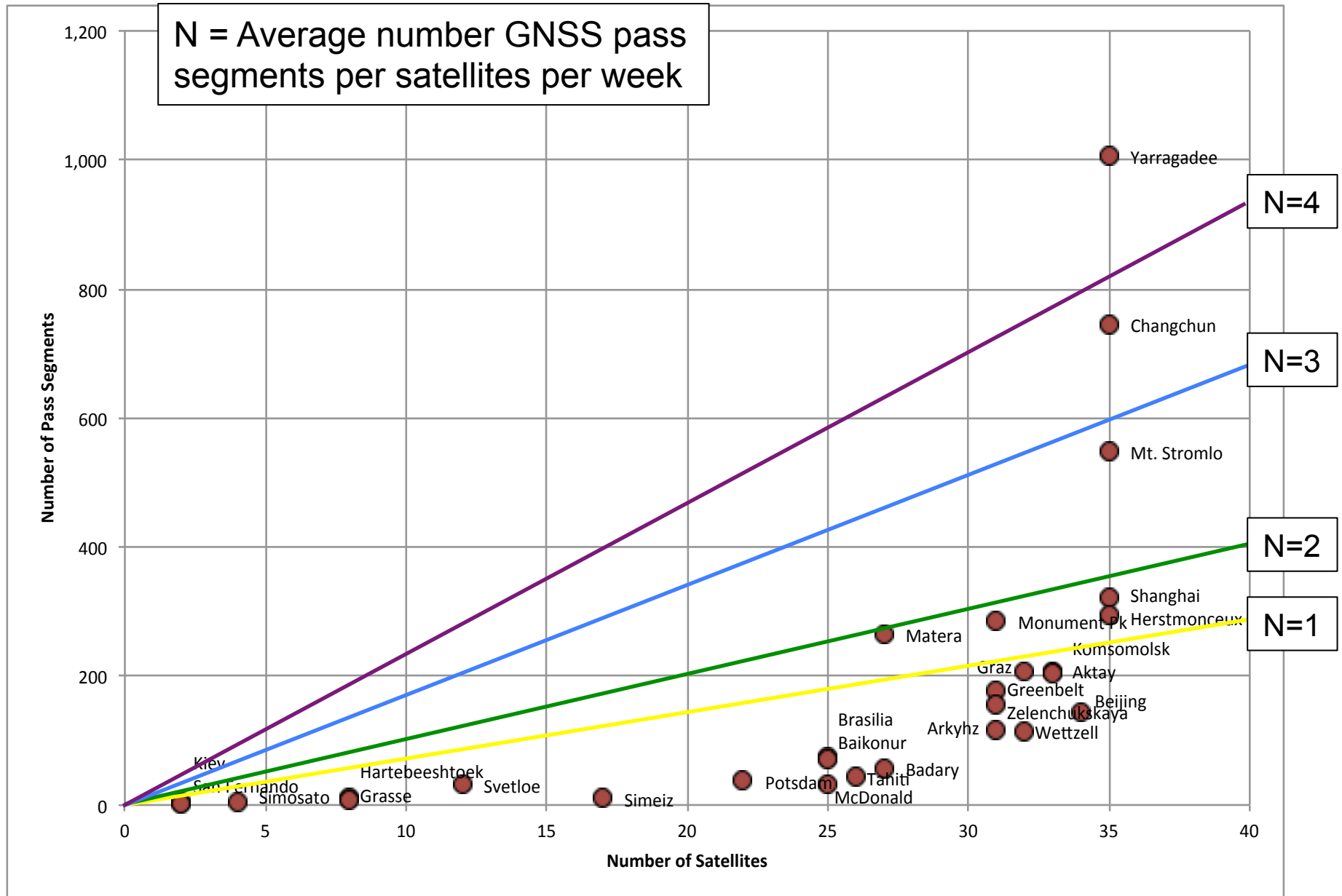
- Conclusions:

- Number of stations tracked all of the satellites
- Few stations tracked a thousand or more pass segments and a few thousand normal points
- Several stations averaged 2 – 4 passes a week on all of the satellites
- Largest data yield was achieved by the Yarragadee site
- Increased GNSS tracking did not appear to noticeably reduce LAGEOS and LEO data yield
- Few stations got more than one segment per pass
- Small amount of data in daylight



# Campaign 1

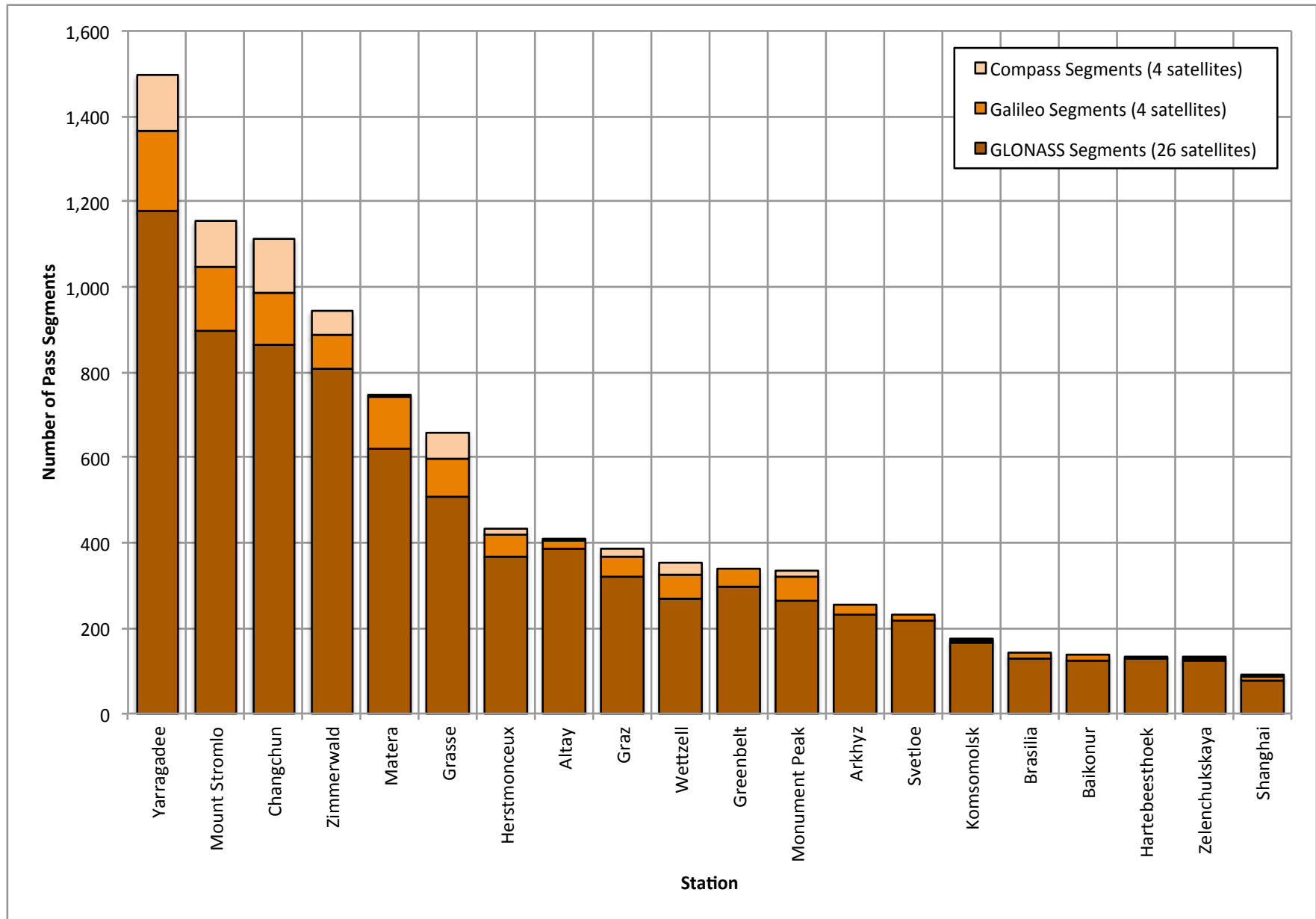
August 01 – September 30, 2014 (2 months/8 weeks/61 days)





# Campaign 1

August 01 – September 30, 2014 (2 months/8 weeks/61 days)





# Campaign 2 Summary

November 22, 2014 – February 28, 2015 (3 months/14 weeks/99 days)

- Instructions:

- Track six GLONASS only: GLONASS-123, -125, -129, -130, -131, and -132 (first priority)
- Track Beidou and Galileo as second priority
- Tracking remaining GLONASS satellites as third priority
- At minimum, stations obtain three segments along each pass, with three NPTs in each segment
- Include daylight data, even if it is just a couple of hours after sunrise and a couple of hours before sunset

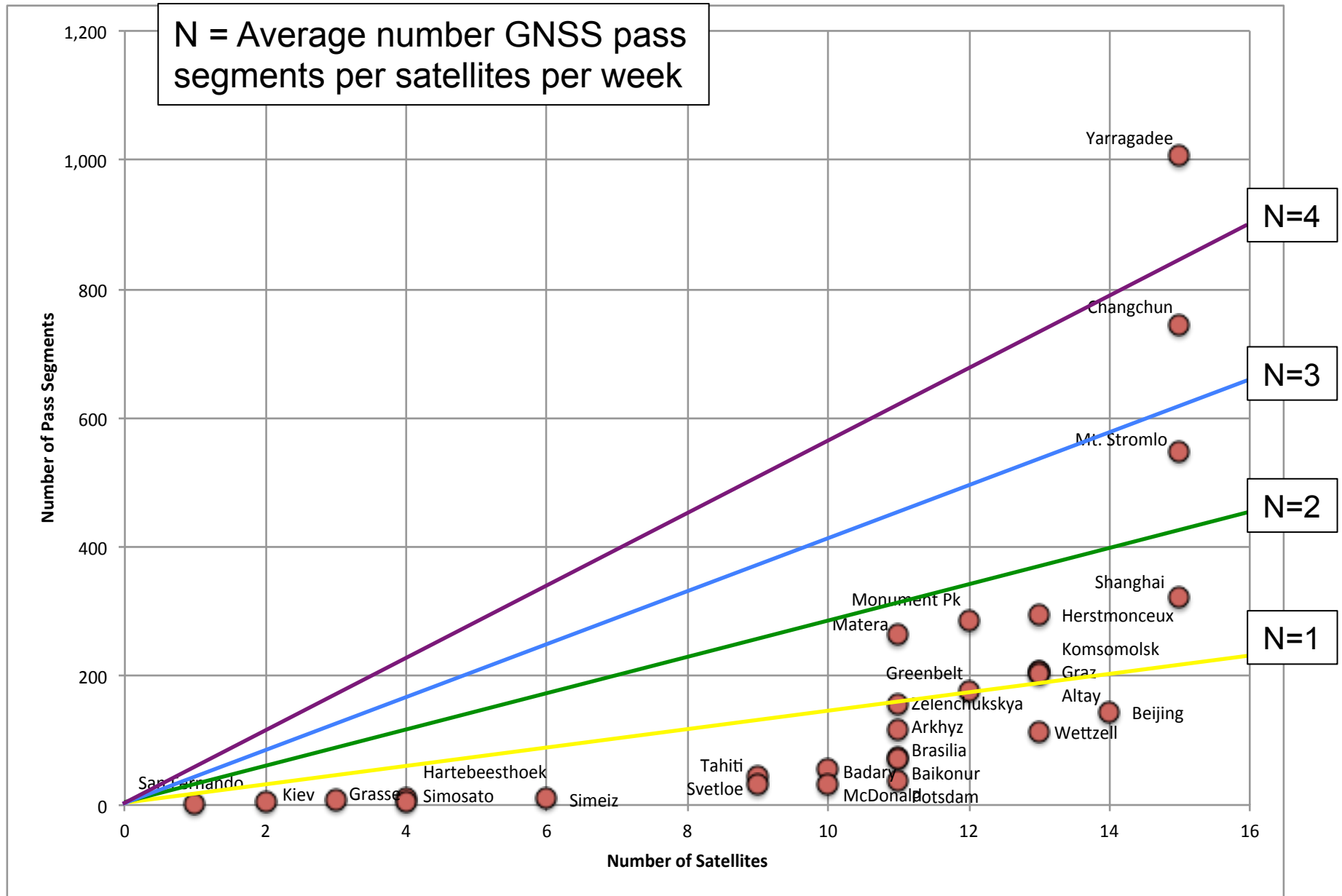
- Conclusions:

- Some stations obtained 2 and 3 segments and daylight data on some passes
- Need more sectors covered for the six higher priority GLONASS satellites and Galileo and M class Compass satellites. More important to get 2 and 3 sectors of data in the higher priority GLONASS satellites than to track the lower priority GLONASS satellites
- Need more data in daylight, or at least around sunrise and sunset



# Campaign 2

November 22, 2014 – February 28, 2015 (3 months/14 weeks/99 days)

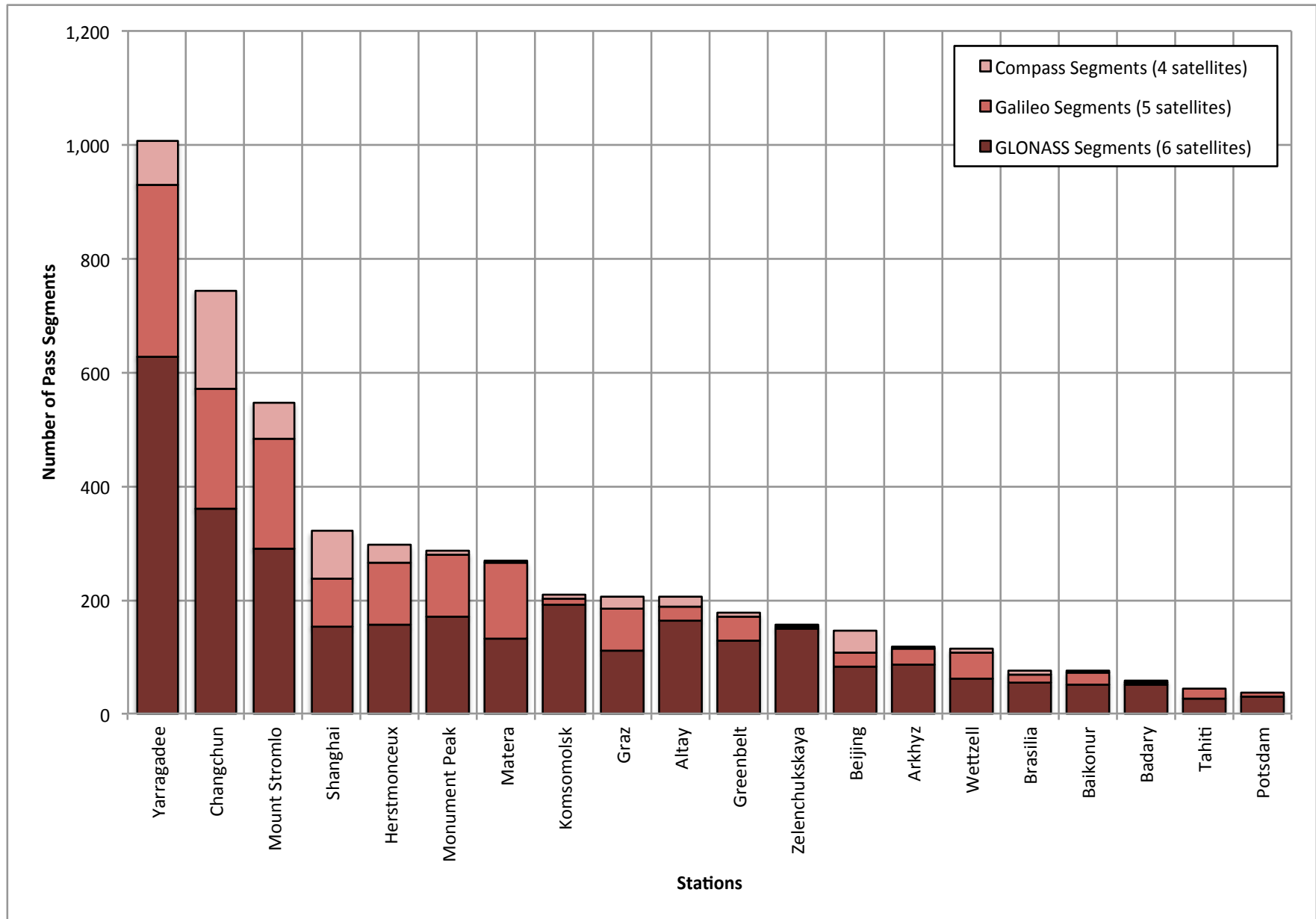






# Campaign 2

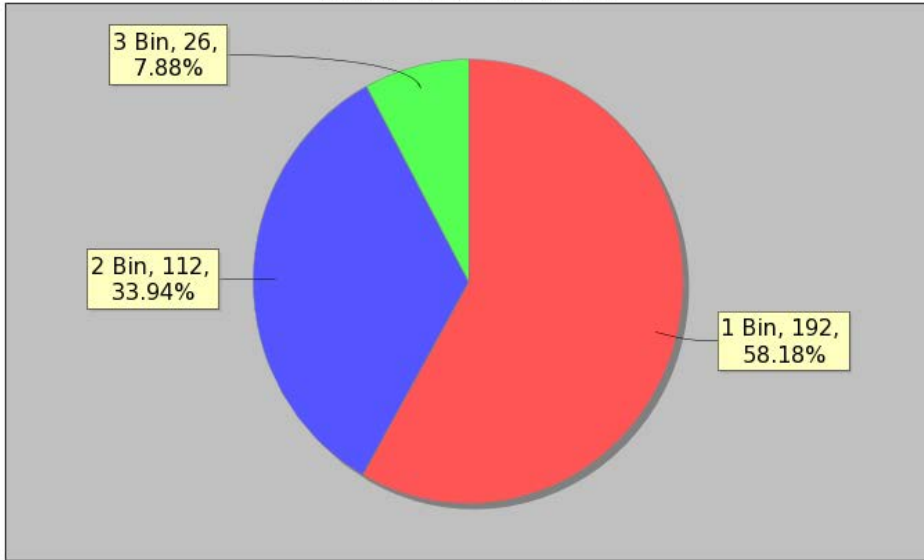
November 22, 2014 – February 28, 2015 (3 months/14 weeks/99 days)



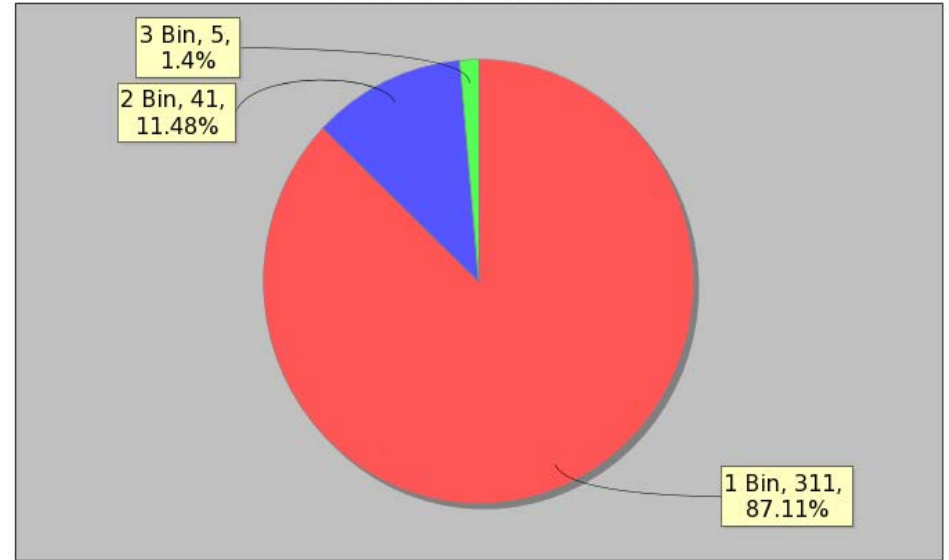


# Campaign 2: Pass Distribution Analysis

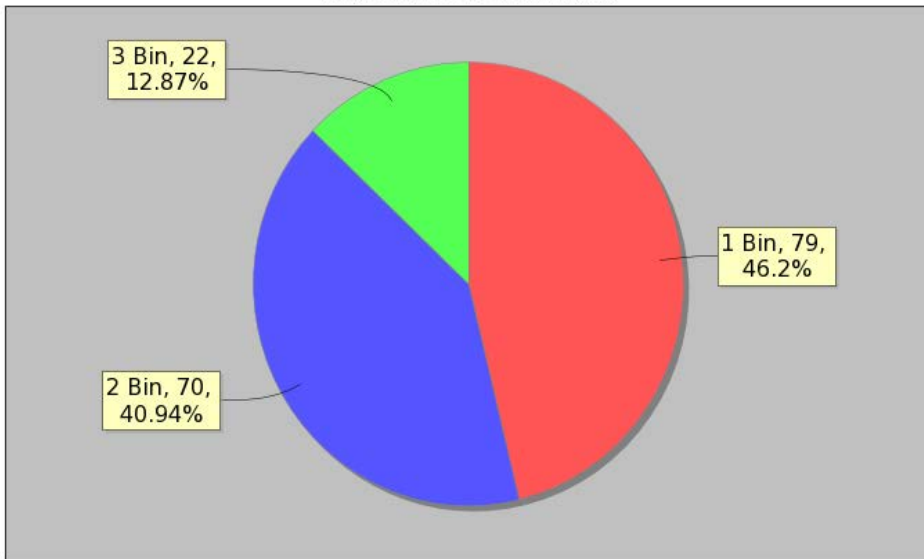
7090 YARL Glonass



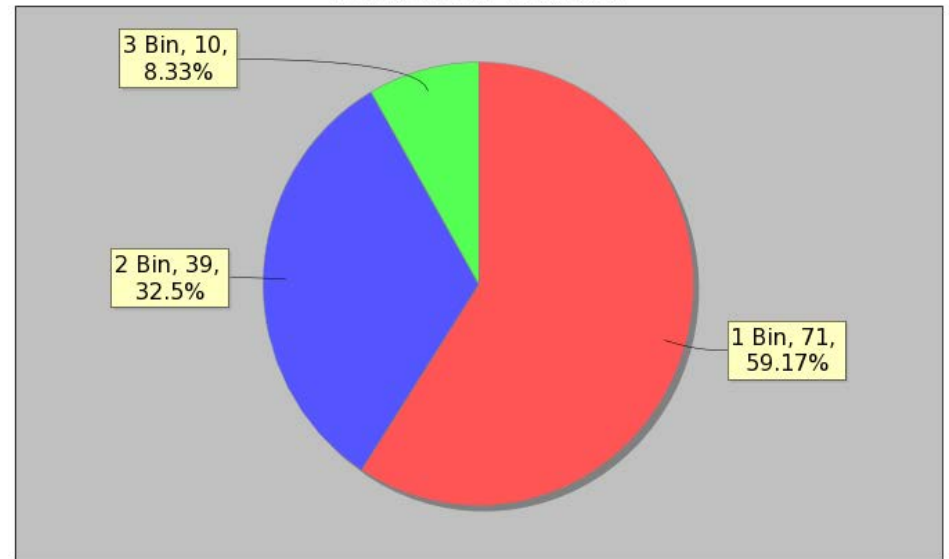
7237 CHAL Glonass



1879 ALTL Glonass



7839 GRZL Glonass

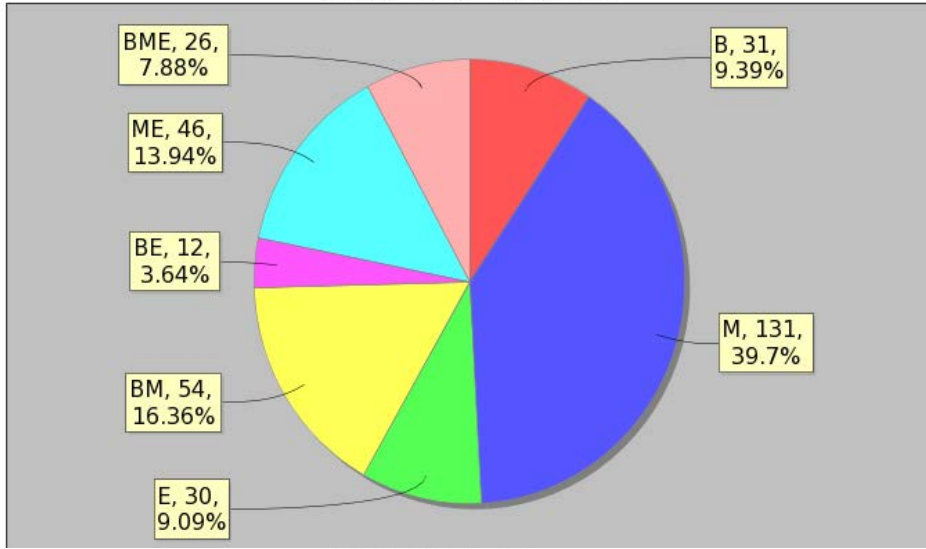


*Percentage of the passes tracked that included one, two, and three segments for GLONASS.*

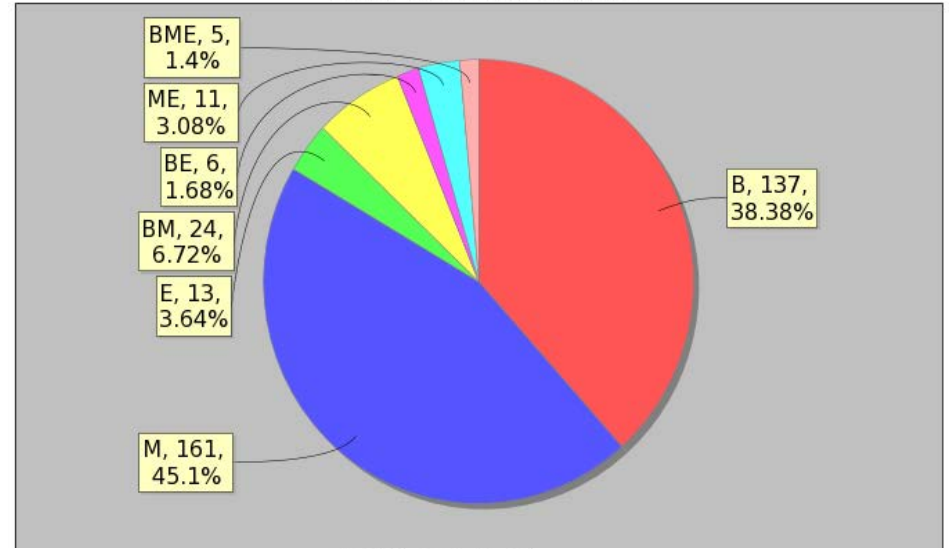


# Campaign 2: Pass Distribution Analysis

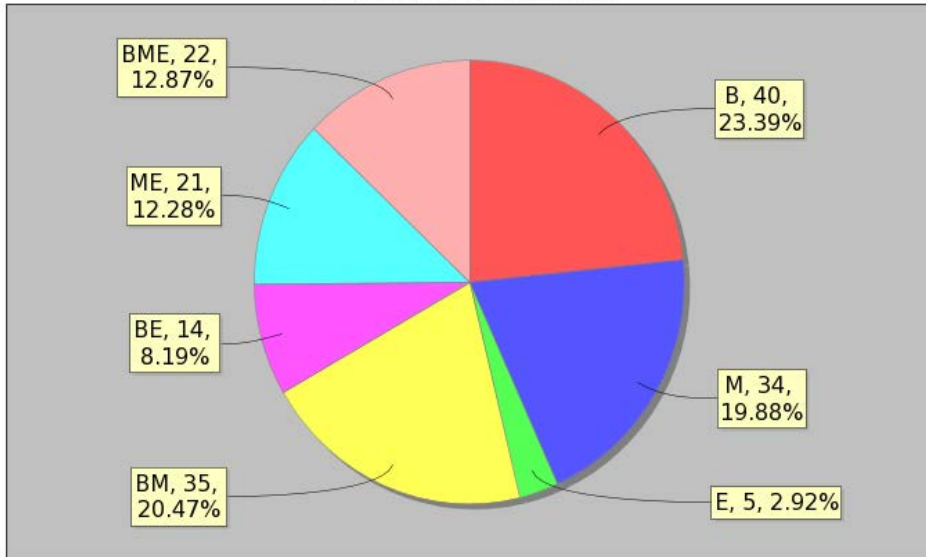
7090 YARL Glonass



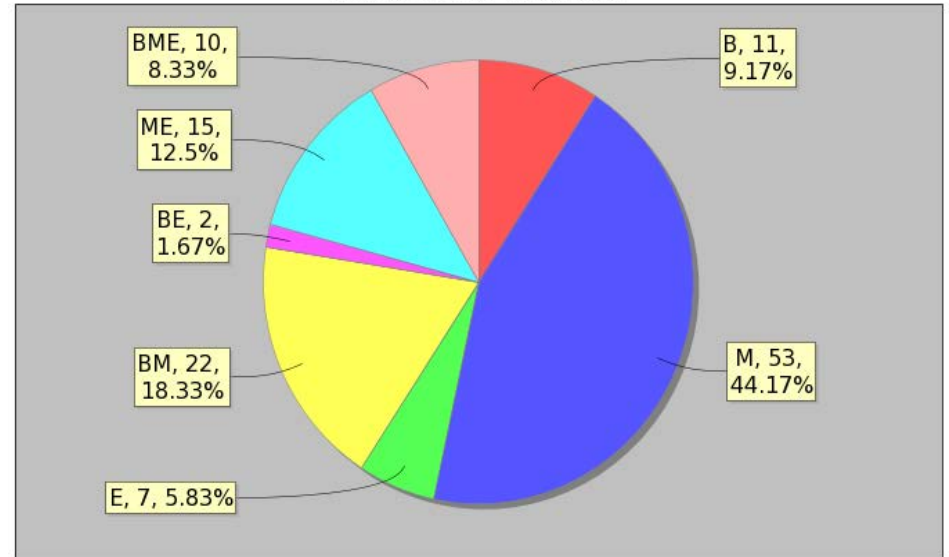
7237 CHAL Glonass



1879 ALTL Glonass



7839 GRZL Glonass



Percentage of the pass segments distributed within pass (B-beginning, M-middle, E-end)



# Campaign 3 Summary

August 20 – October 16, 2015 (2 months/8 weeks/58 days)

- Instructions:

- Track six GLONASS only: GLONASS-123, -125, -128, -129, -133, and -134 (first priority)
- Track Compass-M3 and Galileo-101, -102, -103, and -104 (second priority)
- Tracking remaining GLONASS satellites as third priority but less important
- Obtain nine NPTs over the pass;
  - 3 during the ascending or early region of the pass
  - 3 in the central region of the pass
  - 3 in the descending or late region of the pass
- NPTs in each region may be taken together or separately whichever is better for your operation
- Obtain more daylight ranging even if it is around sunrise and sunset

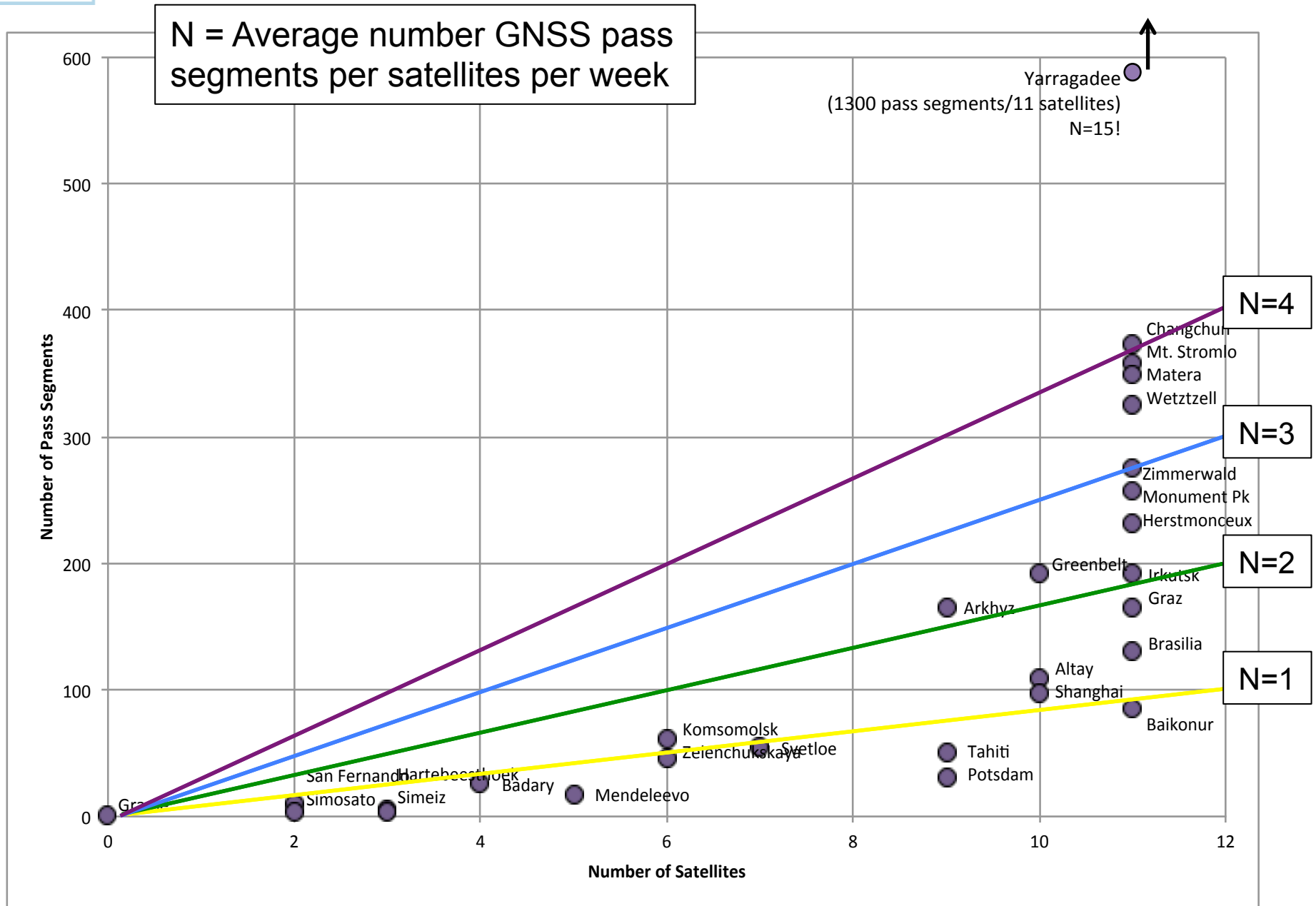
- Conclusions:

- TBD, but
- High data yields can be expected when conditions are very good
- Need more data in daylight, or at least around sunrise and sunset
- May have same issues as with previous campaigns



# Campaign 3

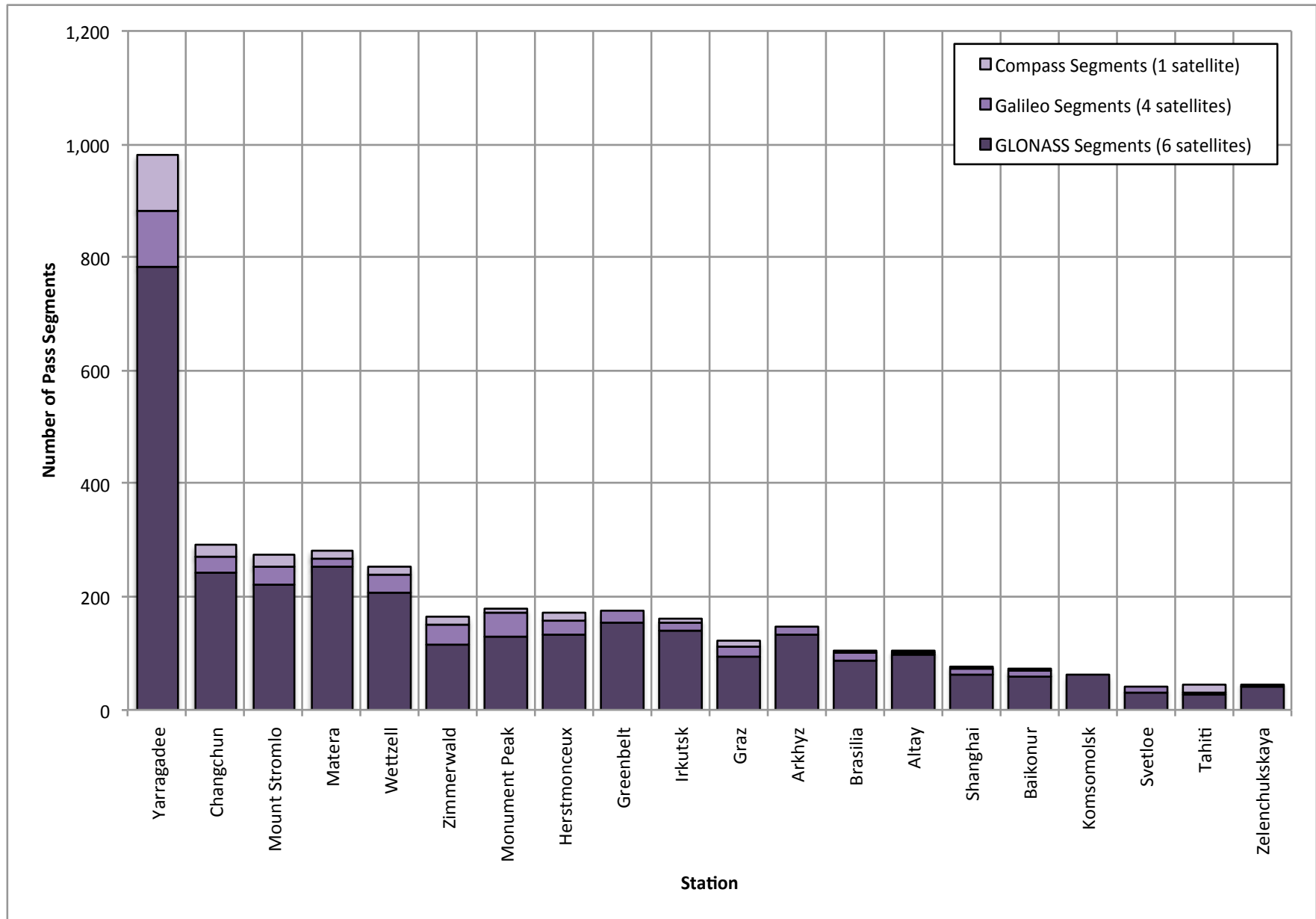
August 20 – October 16, 2015 (2 months/8 weeks/58 days)





# Campaign 3

August 20 – October 16, 2015 (2 months/8 weeks/58 days)

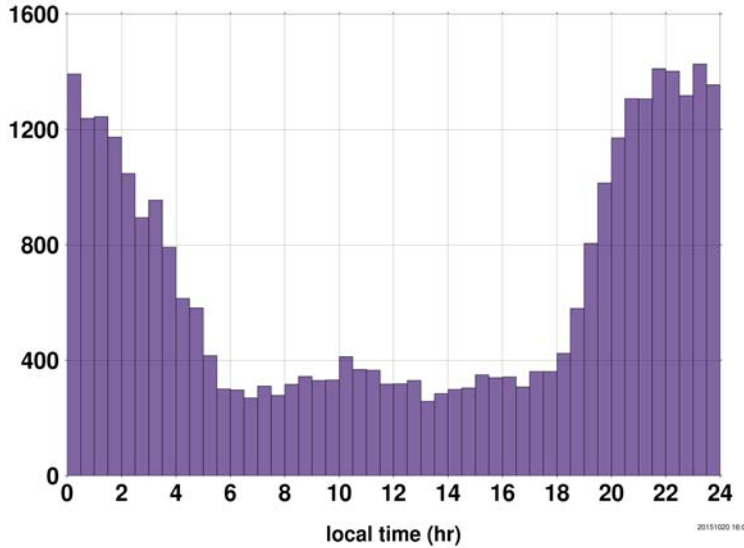




# Tracking: Campaign vs. No Campaign

**GNSS from 20150810 through 20151016**

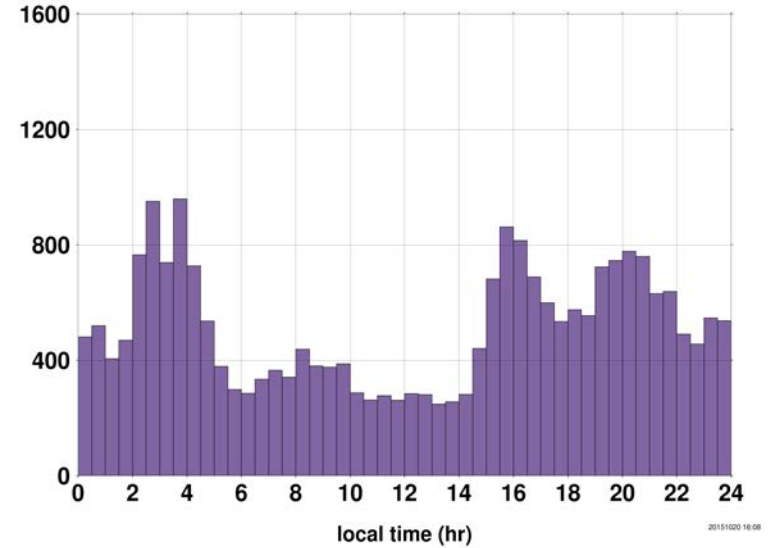
Number of normal points in half hour intervals. total points: 31,969



*GNSS Campaign 3*

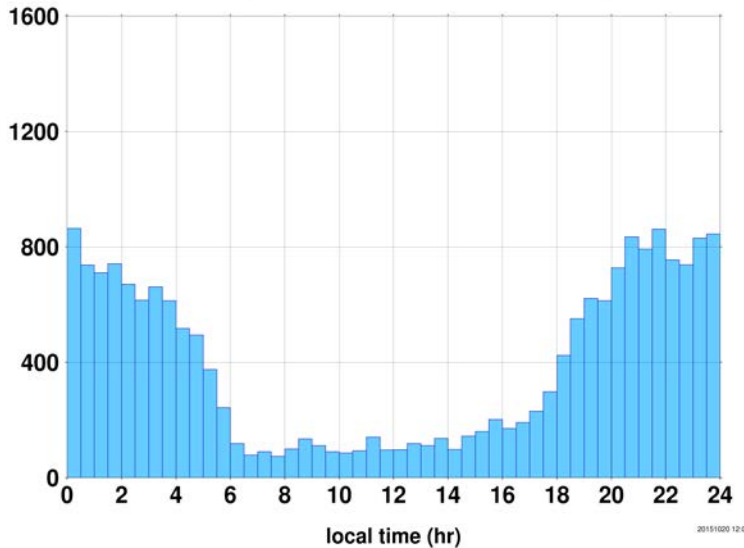
**LAGEOS from 20150810 through 20151016**

Number of normal points in half hour intervals. total points: 24,640



**GNSS from 20141001 through 20141127**

Number of normal points in half hour intervals. total points: 19,004



*Non GNSS Campaign period*

*It appears that a GNSS campaign yields more data for both GNSS and LAGEOS. This trend is consistent for all three GNSS campaigns.*

**LAGEOS from 20141001 through 20141127**

Number of normal points in half hour intervals. total points: 15,729

