

# Satellite Interleaving and Real-time Normal Point Data-Quantity/Quality Monitoring

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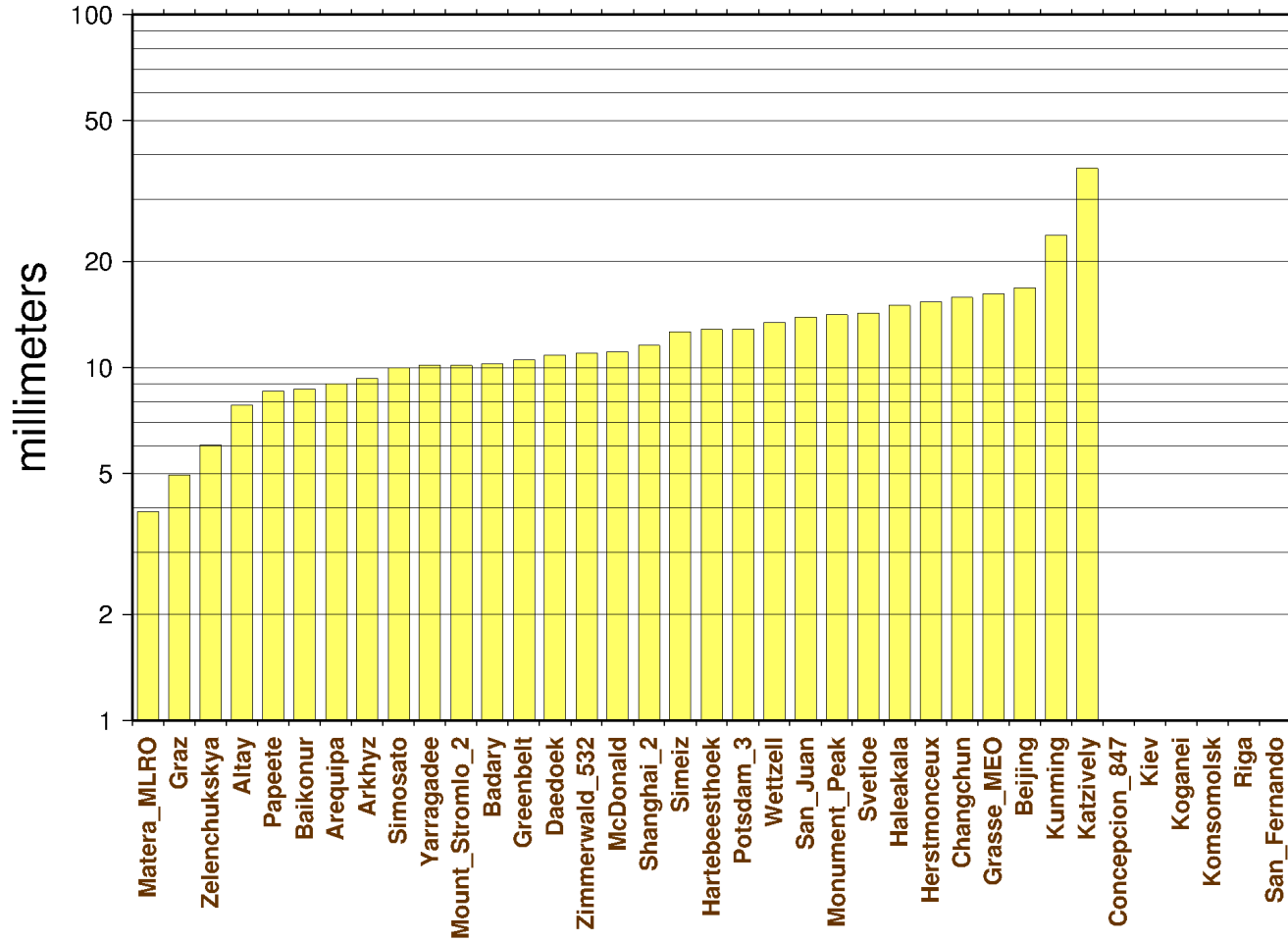
SGF Herstmonceux

# motivation

- The current ILRS recipe for NP population: Sufficient returns should be achieved such that a NP precision of 1mm is reached
- Or, for stations not able to assess precision: 1000 returns per NP should be the target
- Here we discuss implementation at Herstmonceux of real-time precision measurement towards 'quicker' NPs

# Single-shot precision on LAGEOS (ILRS)

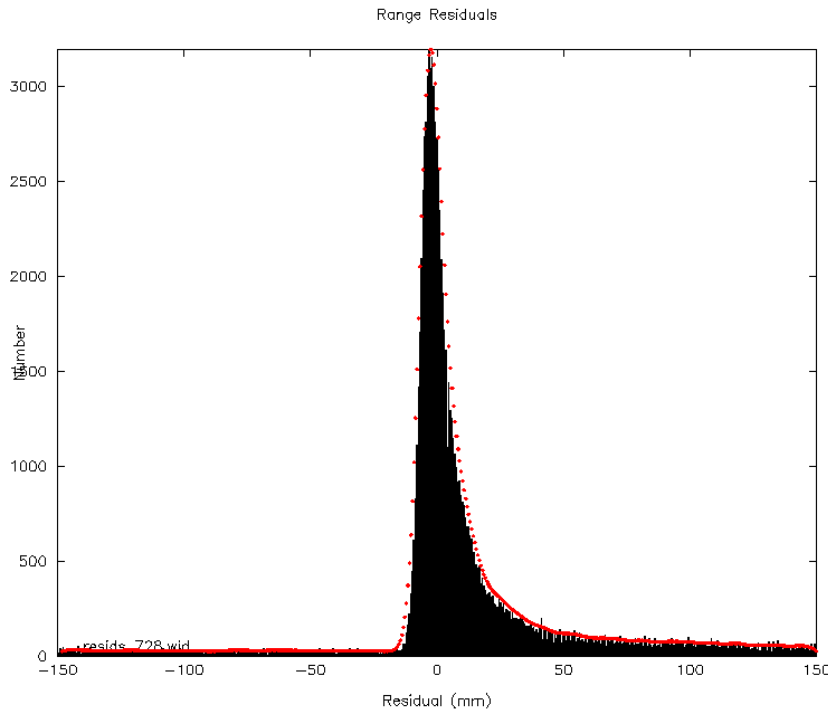
**LAGEOS RMS**  
from April 1, 2014 through June 30, 2014



20140701

# Some stats

- For Herstmonceux, working strictly at single photons, expect single-shot precision of  $\sim 10\text{-}15\text{mm}$  (from model, Otsubo & Appleby, 2003)



Real data distribution from a pass of LAGEOS at kHz rates; the red curve is the expected distribution. Sigma  $\sim 14\text{mm}$

**Thus to reach 1 mm precision NP, need**

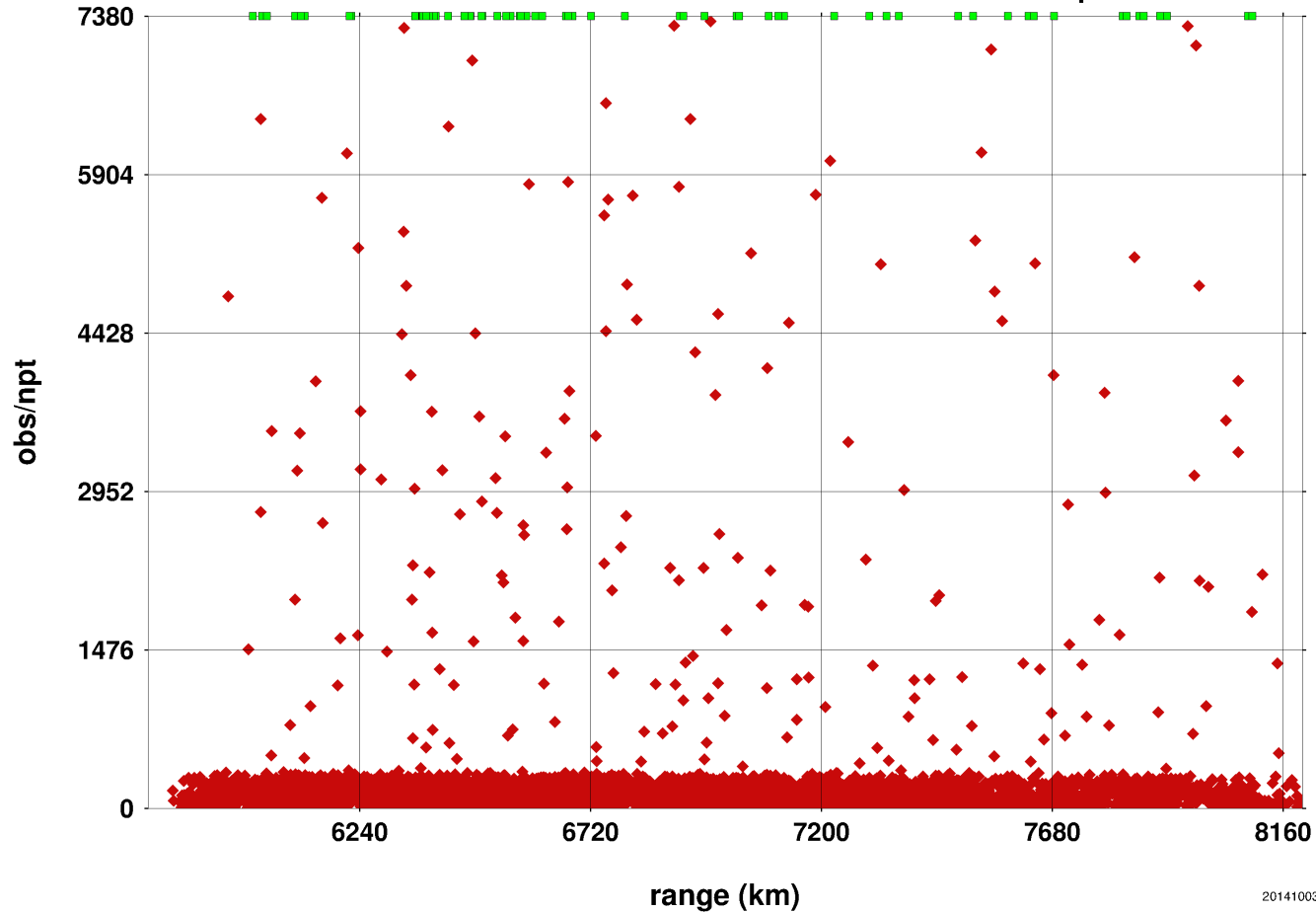
**$N = 14^2$  returns**

**$N \sim 200$**

# Actual numbers of returns/NP

## Herstmonceux, United Kingdom 7840

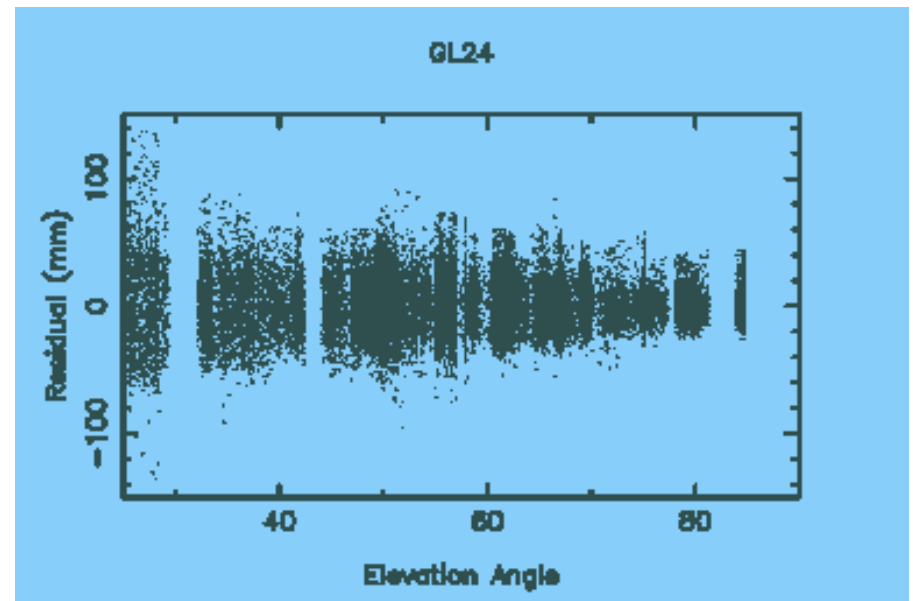
number of LAGEOS-1 full rate obs in a normal point, from 20131001 through 20140930  
ave 448.57±1732.74 max 21900.00 min 6.00 for 4091 data points



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# In general

- The discussion so far has been about LAGEOS
- Other satellites yield different single-shot precision when working at single-photons
- Especially the flat arrays on GNSS:
- Precision varies from  
~ 12 – 40 mm
  - Implies need  
1600 returns/NP
- Only possible at kHz! :

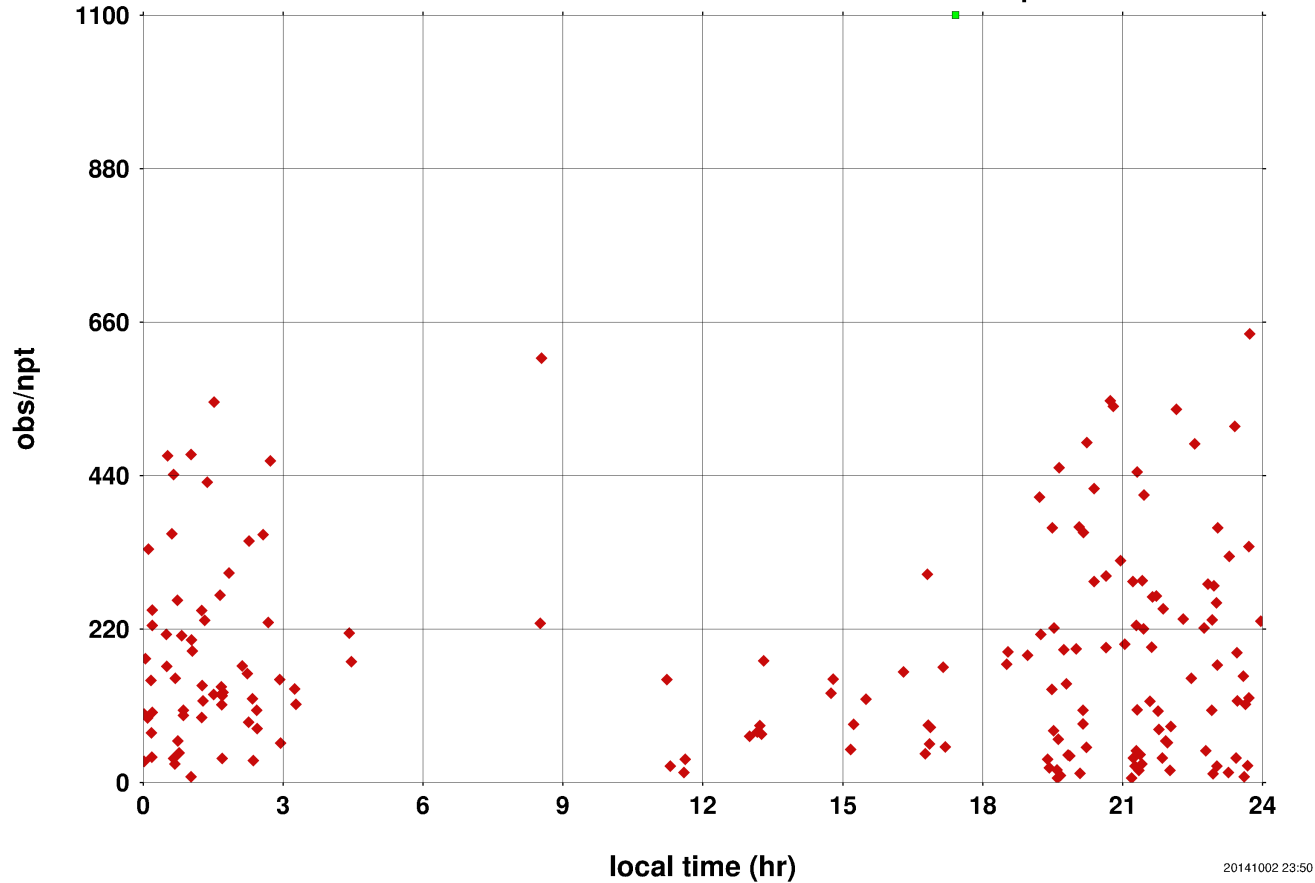


# Actual numbers of returns/NP

## Herstmonceux, United Kingdom 7840

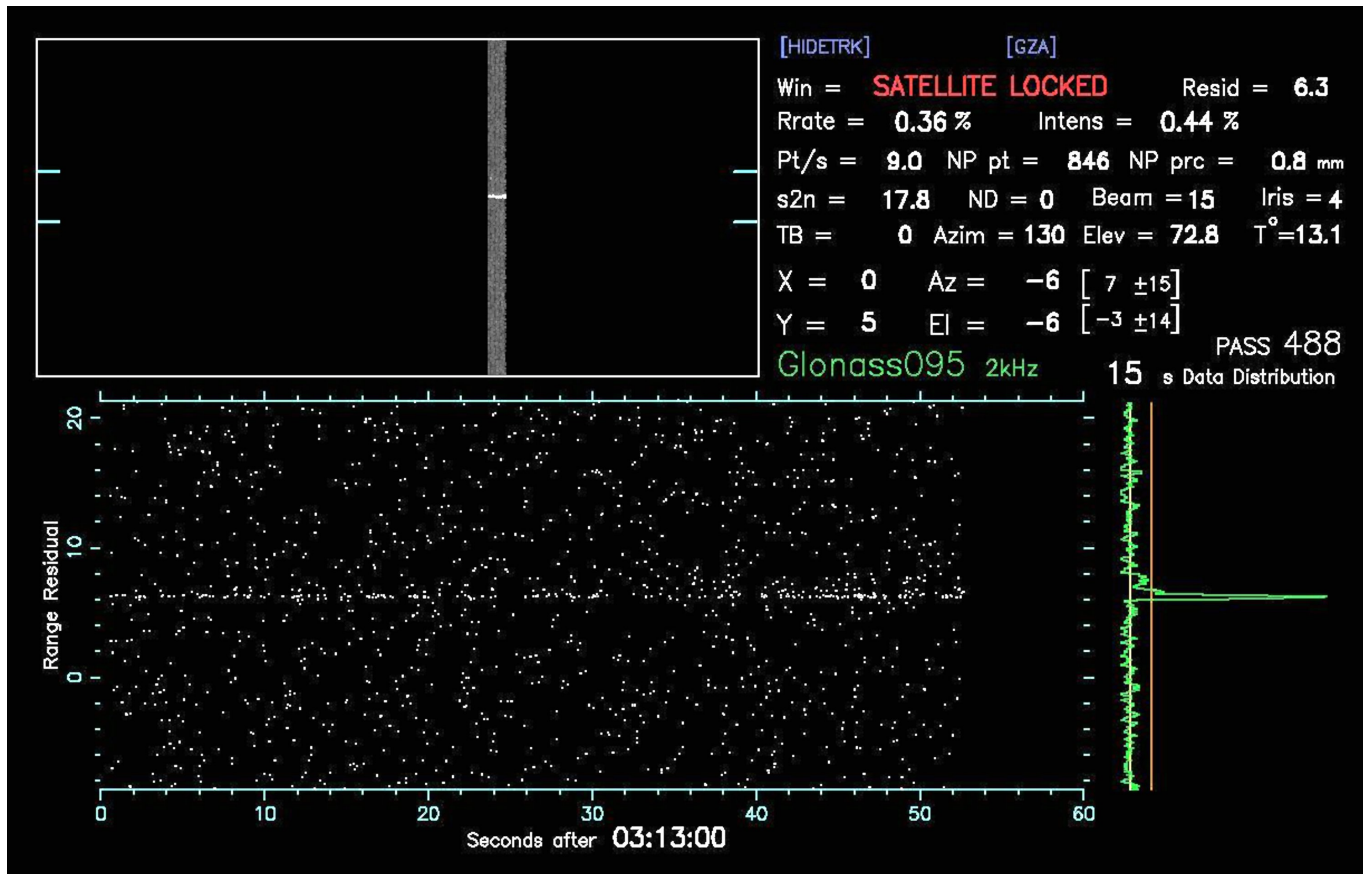
number of GLONASS-130 full rate obs in a normal point, from 20131001 through 20140930

ave 191.25±227.00 max 2518.00 min 6.00 for 177 data points



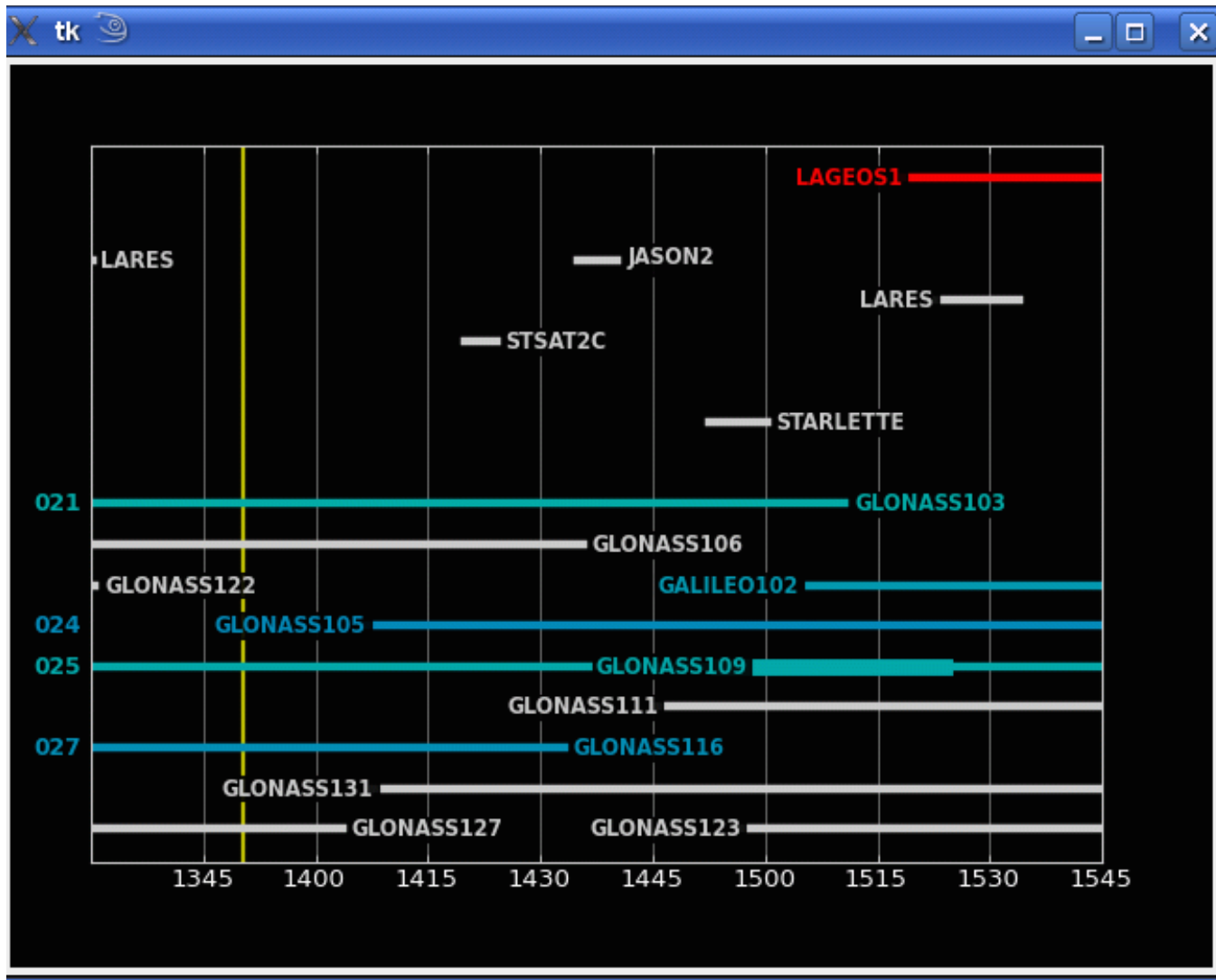
# Track detection

- So need real-time estimate of precision, not just numbers of returns
- Implies good track-detection capability:



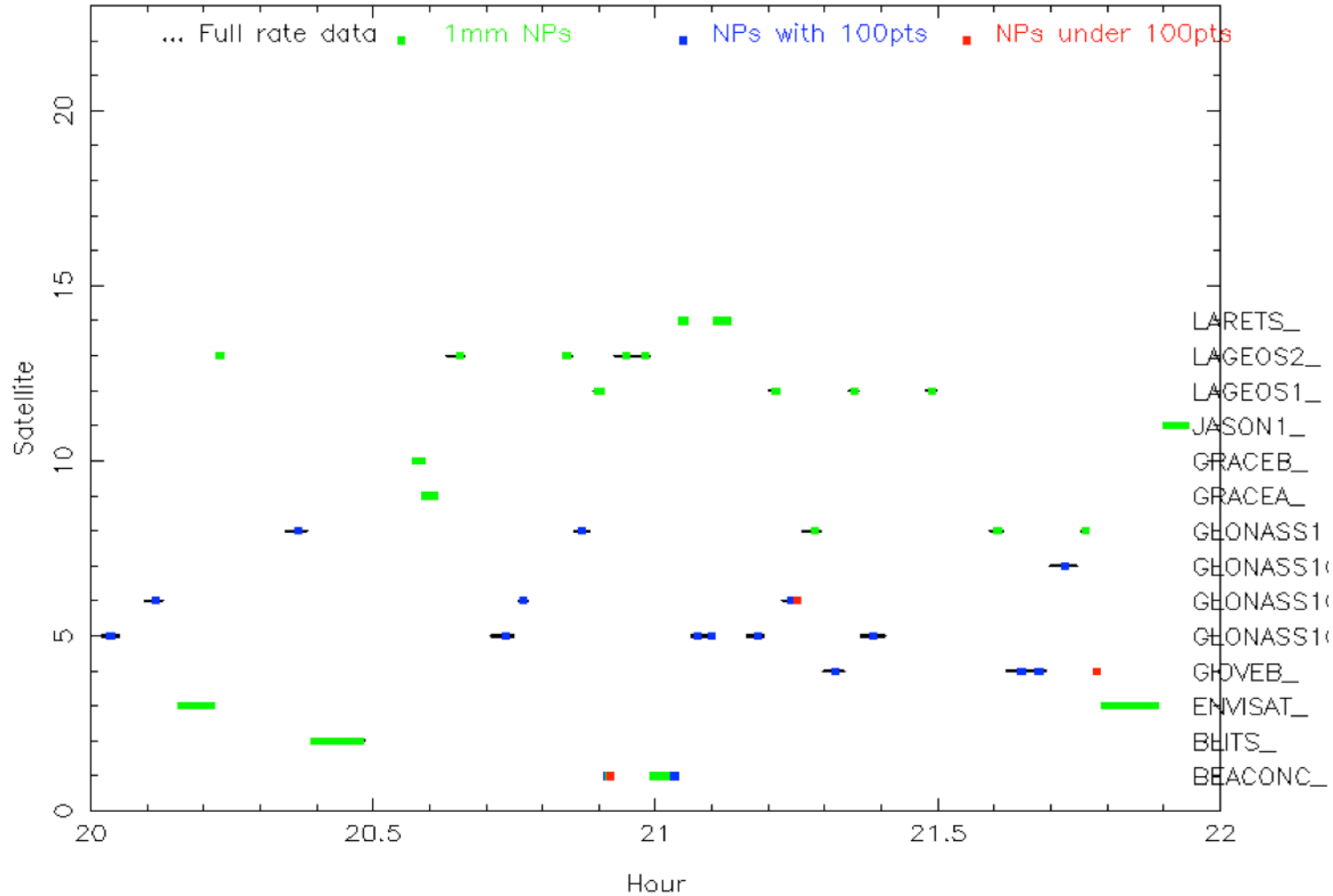


# And real-time display of availability



# Interleaving, with knowledge

Observing on April 14th with kHz



# Details

- To be discussed during the clinic sessions
- Will include a movie track detection!

# Track detection in (speeded-up) action

