Automated Tracking at NGSLR (SLR2000): Nearing the Final Goal

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System Status

- **At night able to open-loop (hands-off) track LEO and LAGEOS**:
  - Point telescope ahead – no independent pointing of laser.
  - Open receiver field of view to 25 arcsec.
  - Signal processing appears to work well.

- **Need to close receiver field of view for daylight ranging:**
  - Point telescope behind and independently pointing laser ahead.
  - Risley prisms used to steer laser.
  - Have taken multiple passes in this mode with mixed success.
  - Re-analysis of system optics reveals alignment and offset issues which are being addressed.

- **Final goals for SLR2000 (2008):**
  - Get Risley Prisms working correctly.
  - Complete automated closed-loop tracking using quadrant detector.

Automation at NGSLR

- Star calibrations are automated:
  - Takes ~ 30-40 minutes to complete. RMS normally ~ 2 arcseconds.

- Satellite scheduling and selection are completely automated.

- Search (for both satellites and stars) is automated.

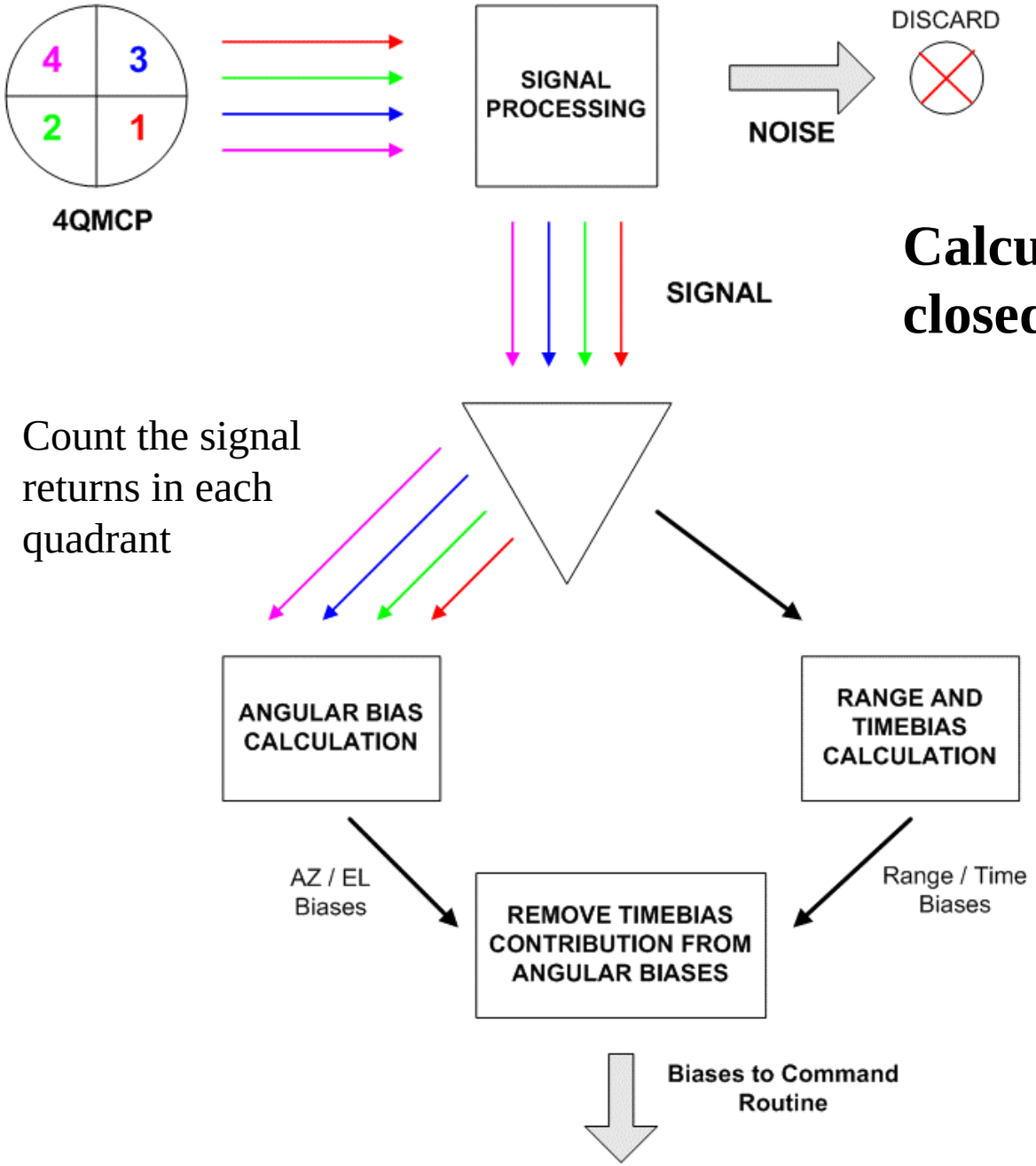
- Weather information, including visibility (and soon cloud cover) is regularly taken and archived by a background process.

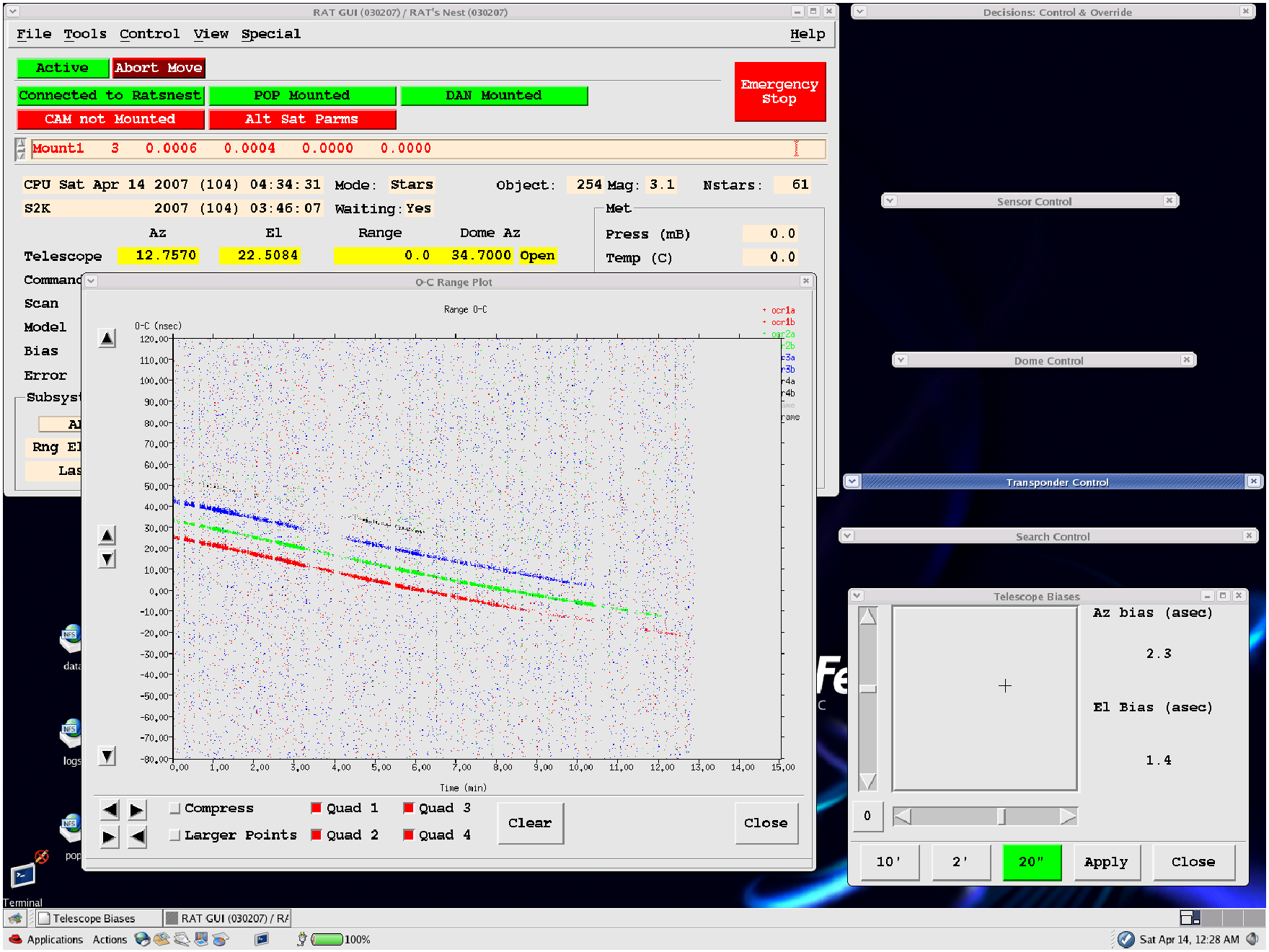
- Decision to stop tracking and move to secondary target based upon cloud cover is newly automated.

- Sun avoidance routine automatically prevents telescope from driving through sun.

- Signal processing provides starting point for automated Normal Point post-processing.

Calculating biases for the closed-loop-tracking




RAT GUI (030207) / RAT's Nest (030207)
File Tools Control View Special Help
Active
Abort Move
Connected to Ratsnest
POP Mounted
DAN Mounted
CAM not Mounted
Alt Sat Parms
Emergency Stop
Mount1 3 0.0006 0.0004 0.0000 0.0000
CPU Sat Apr 14 2007 (104) 04:34:31 Mode: Stars Object: 254 Mag: 3.1 Nstars: 61
S2K 2007 (104) 03:46:07 Waiting: Yes
Az El Range Dome Az
Telescope 12.7570 22.5084 0.0 34.7000 Open
Met
Press (mB) 0.0
Temp (C) 0.0
Scan
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Time (min)
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Larger Points
Quad 1
Quad 2
Quad 3
Quad 4
Clear
Close
Decisions: Control & Override
Sensor Control
Dome Control
Transponder Control
Search Control
Telescope Biases
Az bias (asec)
2.3
El Bias (asec)
1.4
0
10'
2'
20"
Apply
Close
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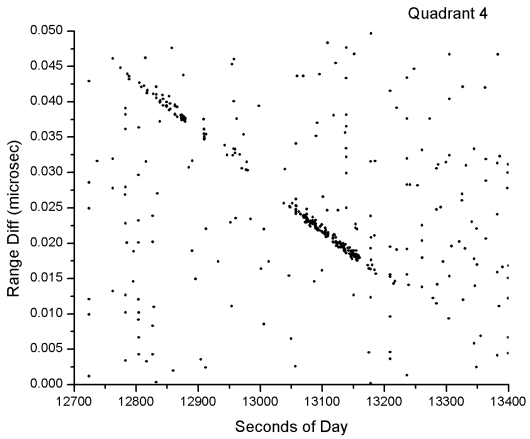
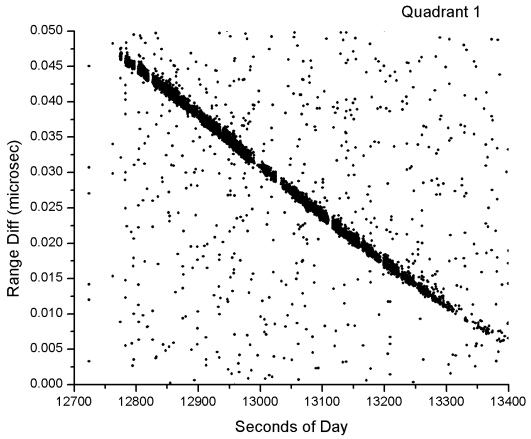
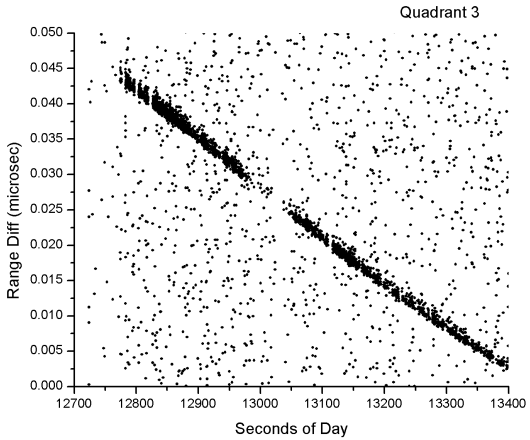
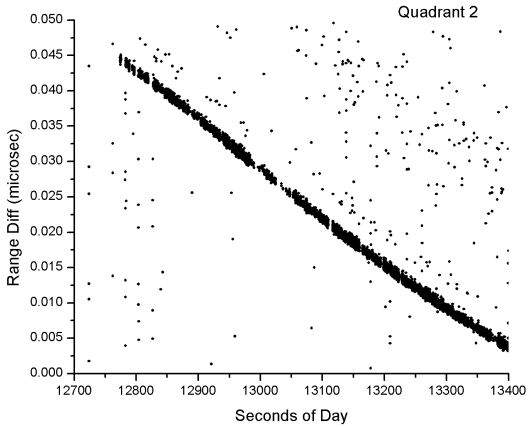
RAT GUI (030207) / RA
Applications Actions
100%
Sat Apr 14, 12:28 AM









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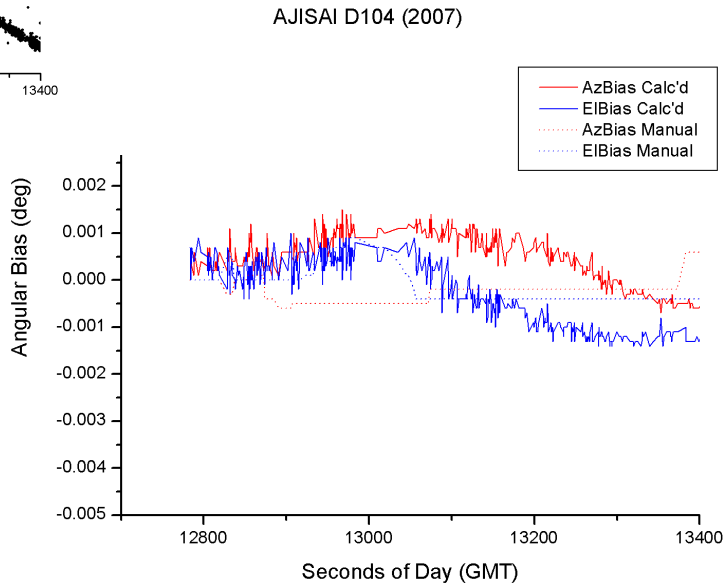
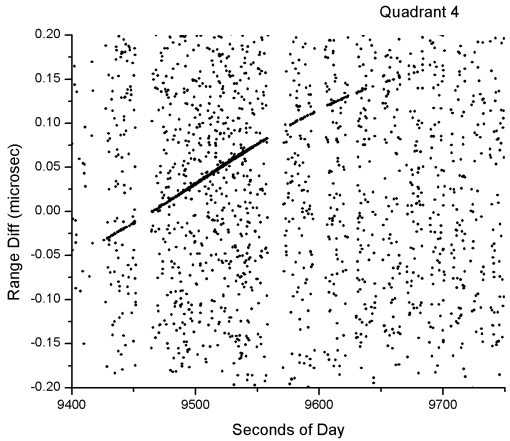
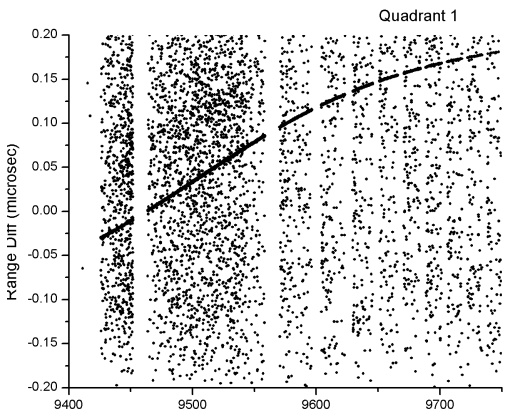
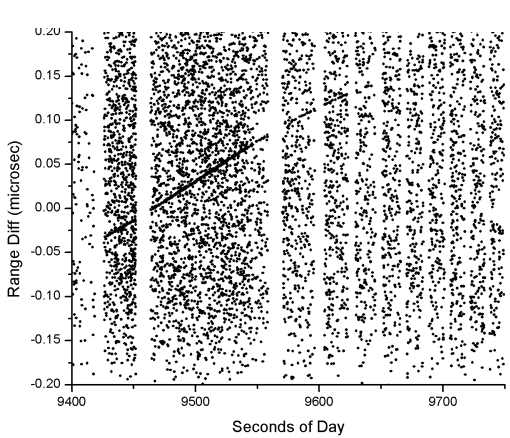
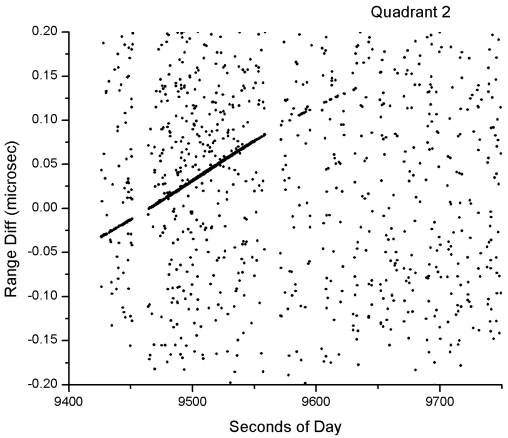
D107/2007



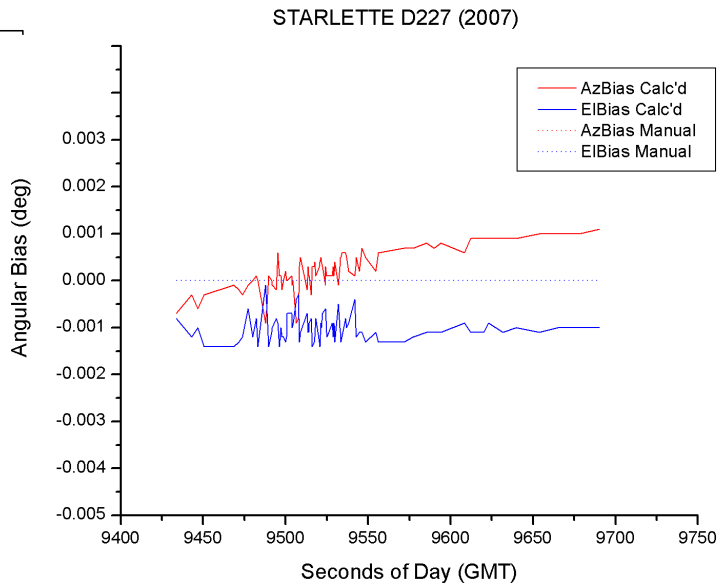


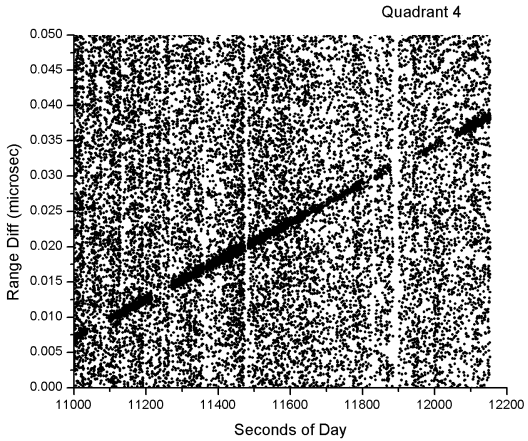


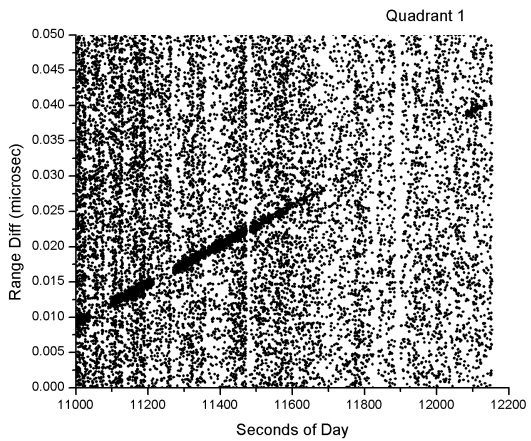


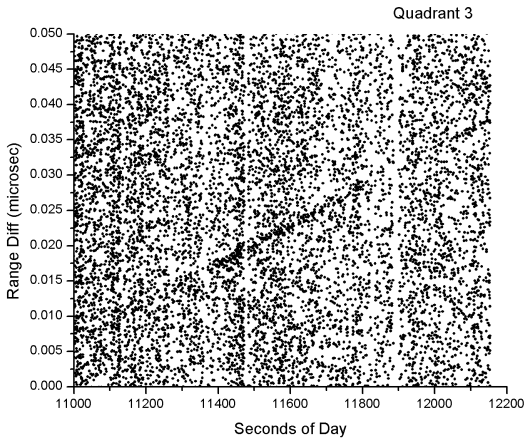


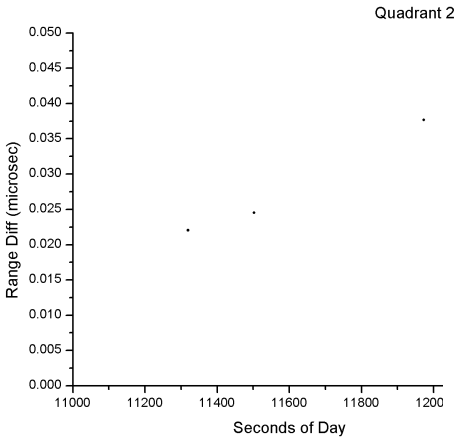
STARLETTE D227/2007



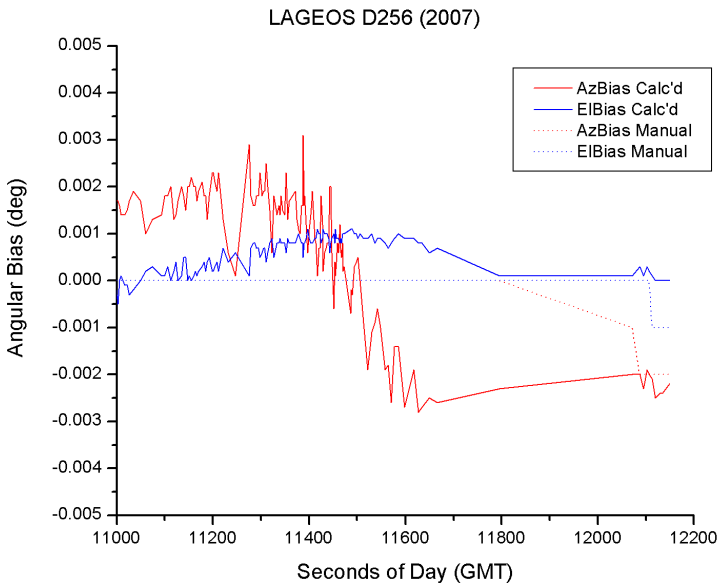








LAGEOS D256/2007



- Last major step to full tracking automation at NGSLR is Closed Loop Tracking.

- Must be completed before LRO-LR launch (Oct 2008)