

*Assessing Tracking Performance
of High Satellites at Mt Stromlo
SLR Station*

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Background

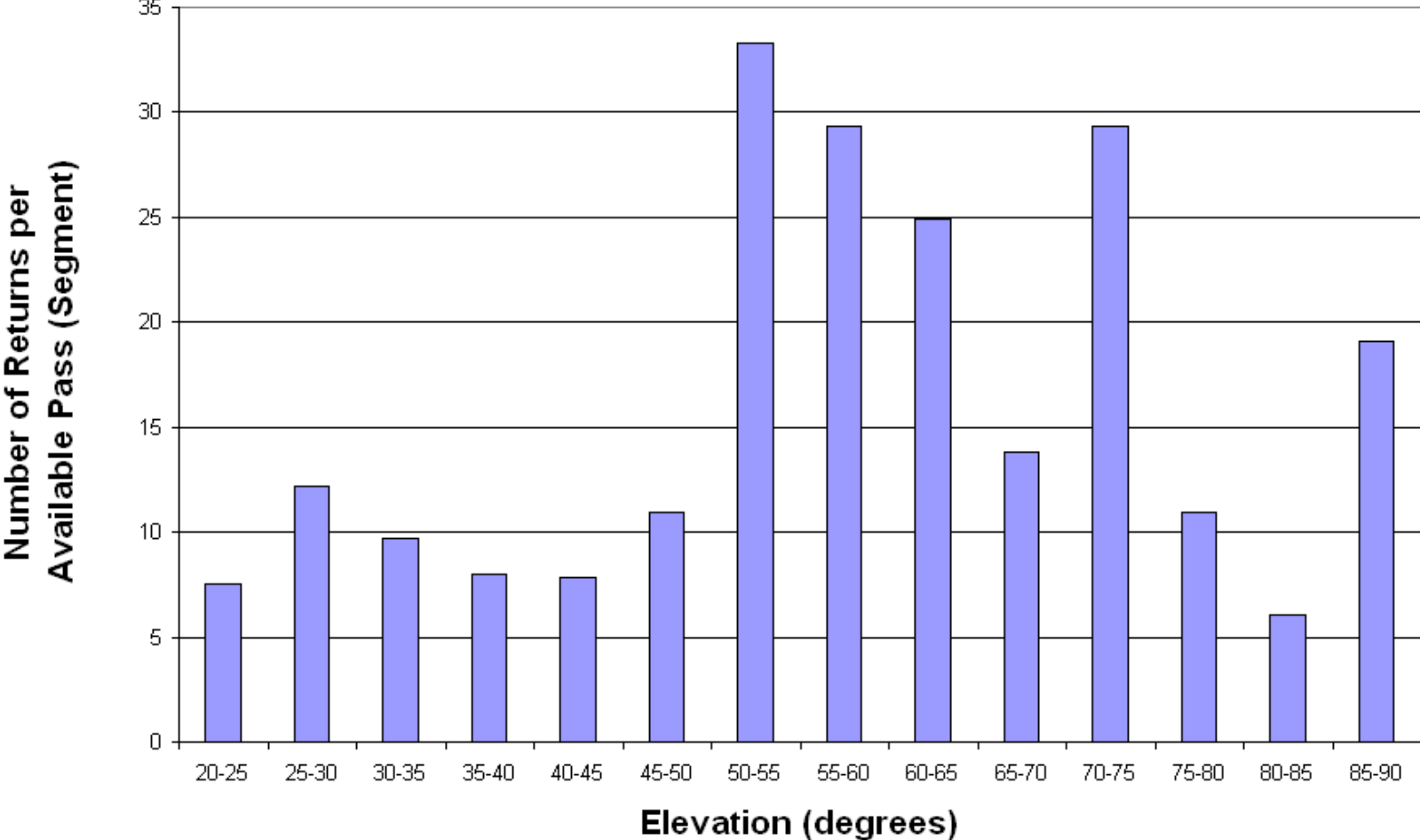
- Recent Changes to Mt Stromlo SLR Station
 - June/July 2007 – Laser power upgraded from approx 400 to 1200 mW. Pulse energy increased from approx 13 to 20 mJ and fire rate from approx 30 to 60Hz.
- Provide an Objective Analysis of Results of the Upgrade on Productivity
 - using Giove A tracking data.
 - using other HEO (Etalon, Glonass) tracking statistics.
 - using average productivities for all satellites
 - using geostationary satellite tracking.

Performance Factors

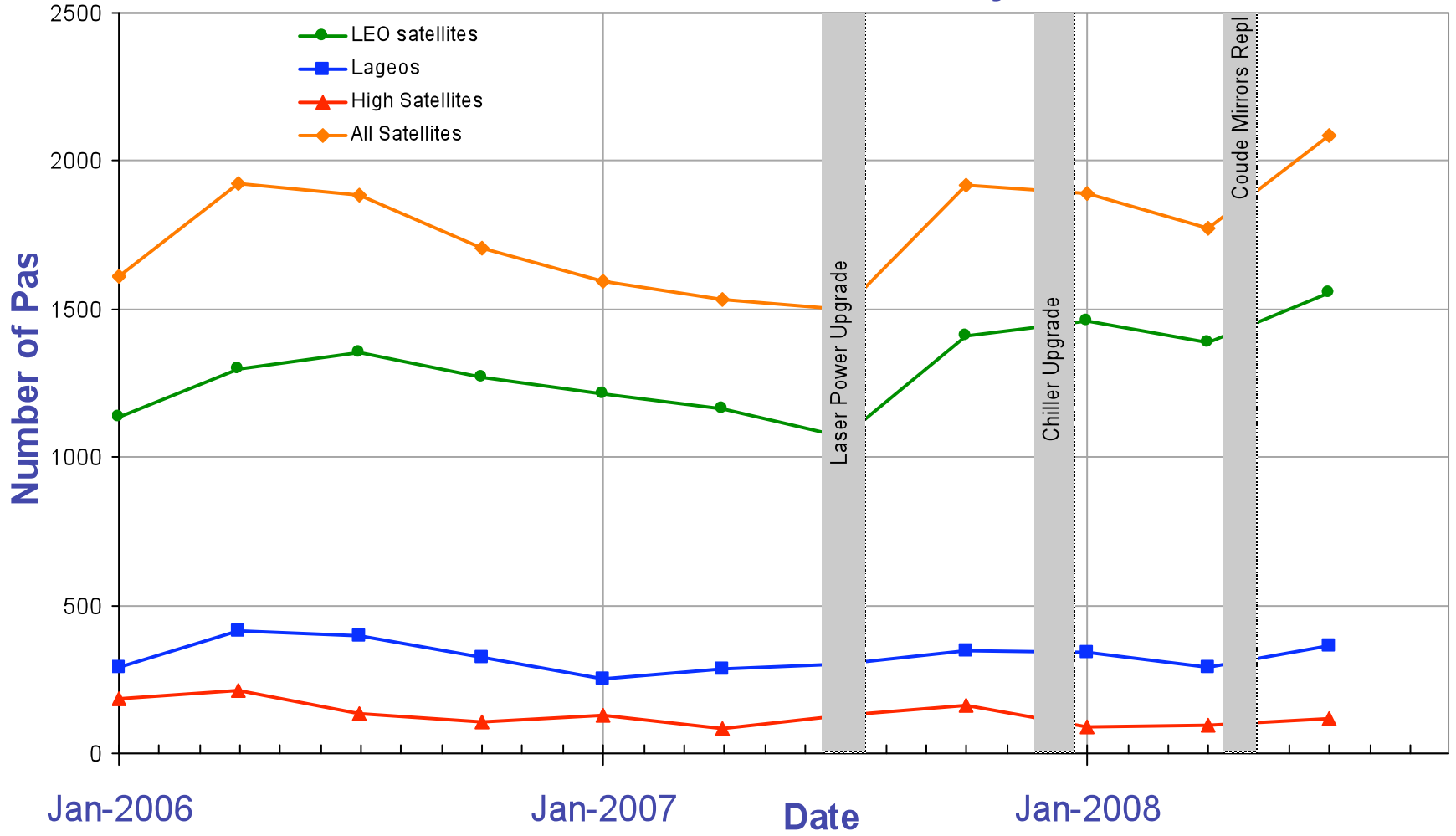
Primary changes in performance expected to result from increase in laser power, but assessment is affected by other factors including;

- *Changed operational mode* – before the upgrade tracking was operator (manual) control with no dome window. After the upgrade, tracking has been automatic through a glass dome window.
- *Coude mirror replacement* – Most mirrors in the coude path were replaced after the upgrade (coatings had significant degradation).
- *Effects of weather* – A very significant period of overcast weather experienced in months after the upgrade.
- *Changed tracking priorities* – fewer Giove A tracking periods to accommodate Giove B, Etalon, Glonass, ETS8 etc. passes.

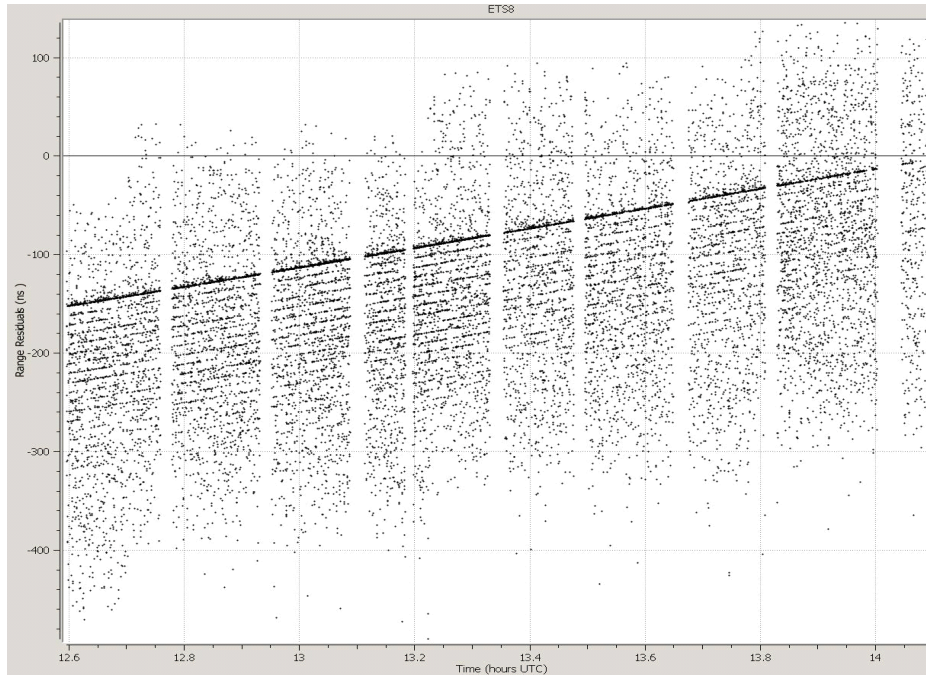
Giove A Normalized Productivity (2008) versus Elevation



Mt Stromlo SLR Productivity



Geostationary Satellite Tracking Capability



- Routine tracking of ETS8
- Signal detectable with 18mm glass dome window in laser path.
- Good signal with open dome aperture (including returns from pre-pulses)
- Return rates $\geq 0.6\%$
- Signal To Noise ratio $\geq 10\%$

Conclusions

- *Significant improvement in LEO productivity following laser power upgrade.*
- *HEO and Lageos productivity levels maintained, despite dome window in path and auto-tracking.*