UG community input: OM fast mode

- Specific fast-mode issues raised:
  - Source at edge of window - OM Field Acquisition (FAQ) failure
  - Spurious periodicity
  - Drift during an observation

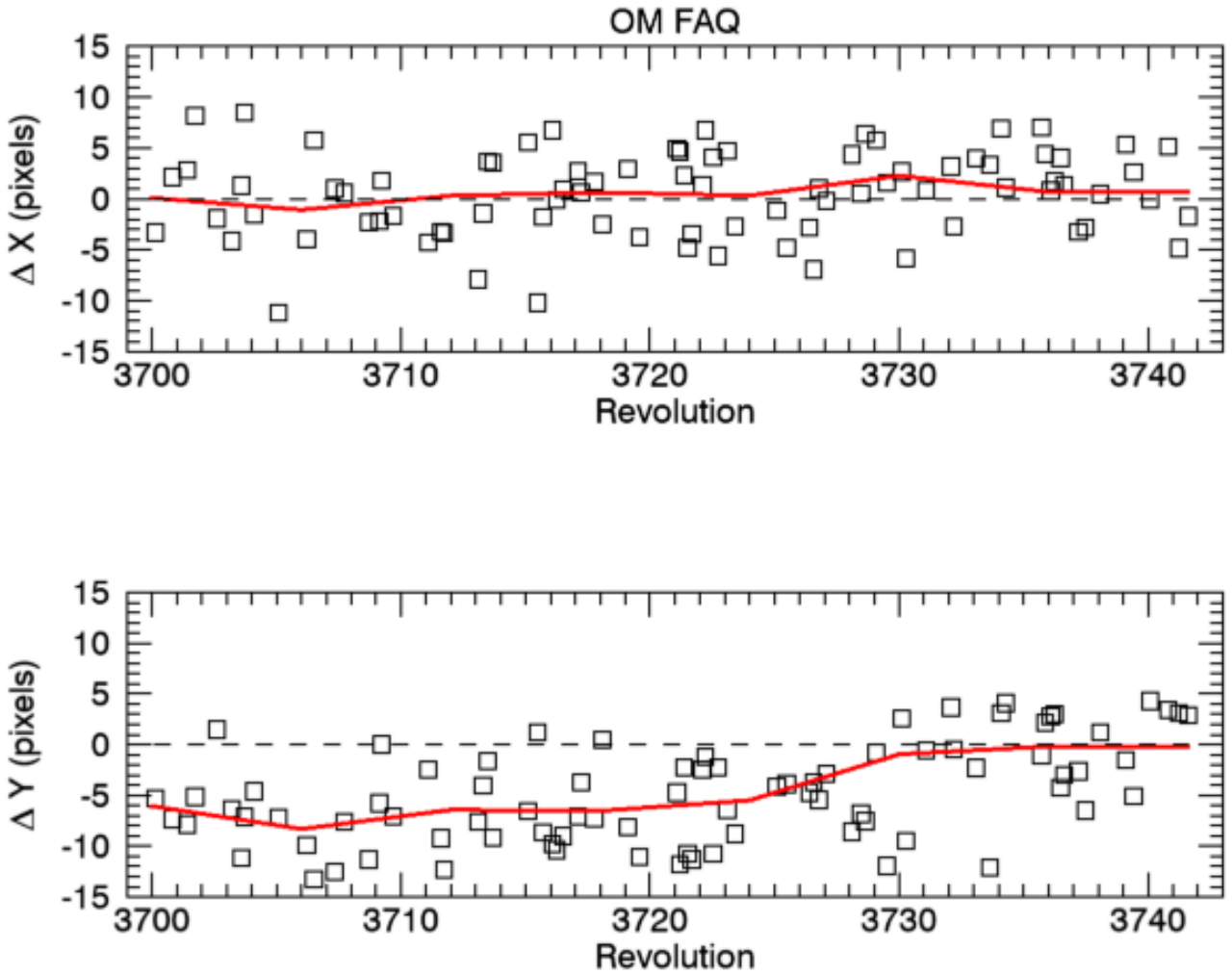
- Note:
  - Long observations with fast mode relatively rare/new
  - OM can involve a lot of commanding
  - OM fast mode window small (telemetry), only ~5 times FWHM of UV PSF
    - If source very off-centre, centroiding and PSF correction can become unreliable.
    - FAQ essential to centre target

FAQ Failure

- Fast window location pre-defined for targets at boresight
  - Long term drift of OM boresight wrt S/C star-tracker (updated in 2008)
  - Initial S/C pointing error up to 4”
  - Usually not a problem - FAQ shifts used to reposition window

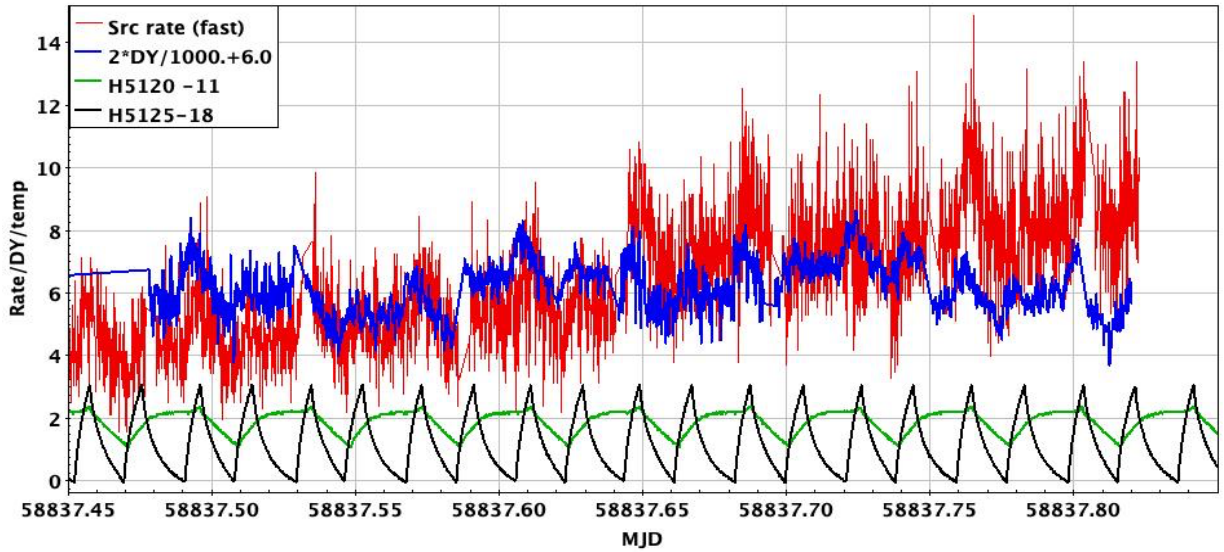
- If FAQ fails, window not adjusted. Source can be significantly mis-centred
  - Usually noted in OLB and screening reports (e.g. this user case)

- Planning system and operational database updated with latest mean boreight misalignment information in April 2020
  → average FAQ displacement substantially reduced
  → sources should be better centred in fast window, *on average*, when FAQ fails



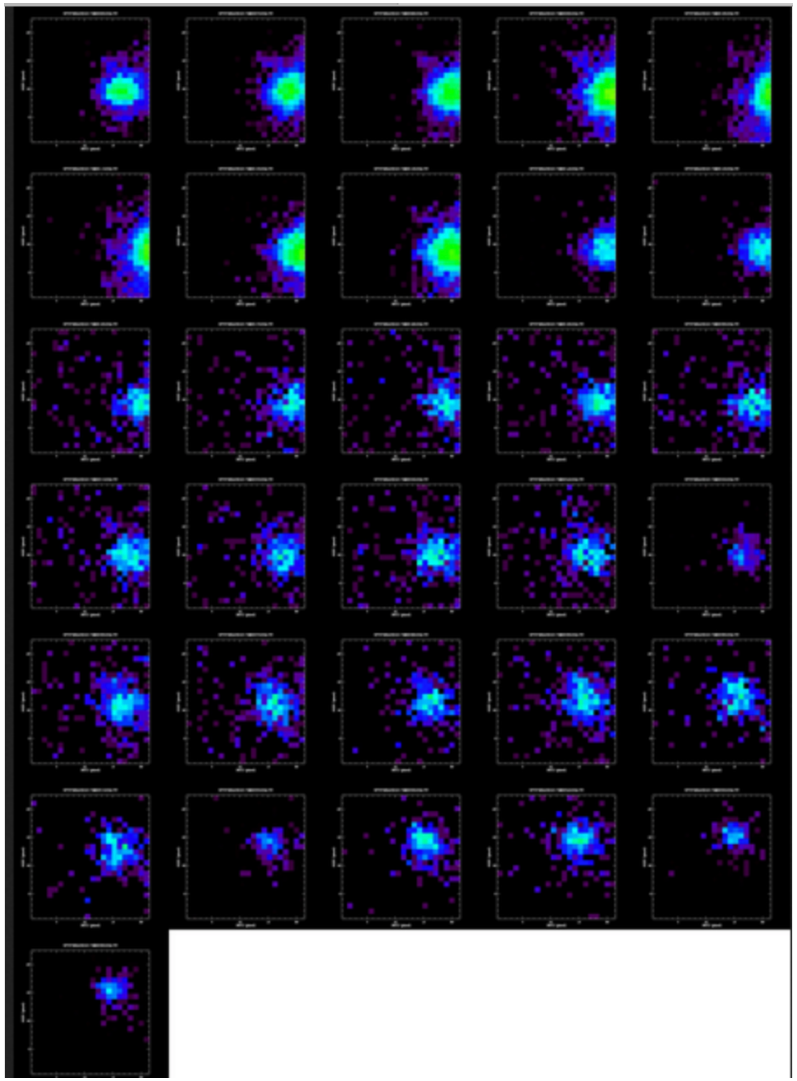
Spurious periodicity

- Sources near window edge can show spurious variations on ~1650/3300 s
- Spatial oscillation (up to ~ +/- 1 pixel) recently identified in OM tracking history data, on same timescales (Pedro)



- Appears correlated with temperature cycling in the instrument
- Oscillation affects fraction of PSF outside window
  - Very difficult to correct, reliably (*watchout to alert users*).
  - Updated boresight should reduce occurrence

Observation drift



- S/C drift (up to ~4”) in long observations
- PSF fractions outside window changes
- Difficult to predict – possibly related to orbital changes
- FD made changes in 2004 and 2018 - further improvements not anticipated

Summary of measures taken

Several measures have been taken over the years with regard to the OM, some of the most relevant for the OM fast mode follow:

- Boresight correction in 2008 and further correction in 2020
- Spacecraft drift correction (around 2004) and revision in 2018 (but with conclusion that further corrections unlikely)
- Automation of OM recovery procedures: implemented some time after SPACON merger to allow OM recovery during an on-going observation, hence recovery of the pending exposures of example (C. Jin) observation
- Default-fast mode (5 sub-exposures) is deprecated (affected by a timing problem, difficult to correct).