

# Bad quality images triggering

C.Sirignano

# *Available tools for NISP monitoring*

- NISP Instrument HKTM
  - real-time plots using SOC archive through Webmust interface
  - daily/weekly/long term monitoring using root files (web interface with plots available)
- SC telemetry
  - real-time plots using SOC archive through Webmust interface (all parameters)
  - daily/weekly/long term monitoring using root files (selected parameters)
- QLA reports produced by SOC for each NISP image
  - real-time plots using SOC archive through Webmust interface
  - daily/weekly/long term monitoring using root files (web interface with plots available)
  - QLA reports contain a set of diagnostics computed from raw images, we are not accessing routinely raw images.
- GOES data (X-ray, proton fluxes)
  - real-time plots using SOC archive through Webmust interface
- SOC lists are made available every day to track bad FGS performances and timeline/satellite problems affecting science data taking

# *Problematic images can be identified through:*

- NISP Instrument HKTM
  - image (Science frame) and QF (chi2 frame) processing statistics are available in NISP HKTM
  - processing time, data transmission time, compression algorithm performance
  - instrument mis-configuration (FWA/GWA position, CU settings)
  - warning, error messages produced by OBSW (anomalous flow of warning messages i.e.)
- QLA reports diagnostics
  - signal instability on reference pixels (including channel instabilities)
  - anomalous signal in science pixels
  - basic PSF identification failing on a photo-field
  - number of bad QF pixels (photo=1 , spectro >50)
  - median QF value on spectro images

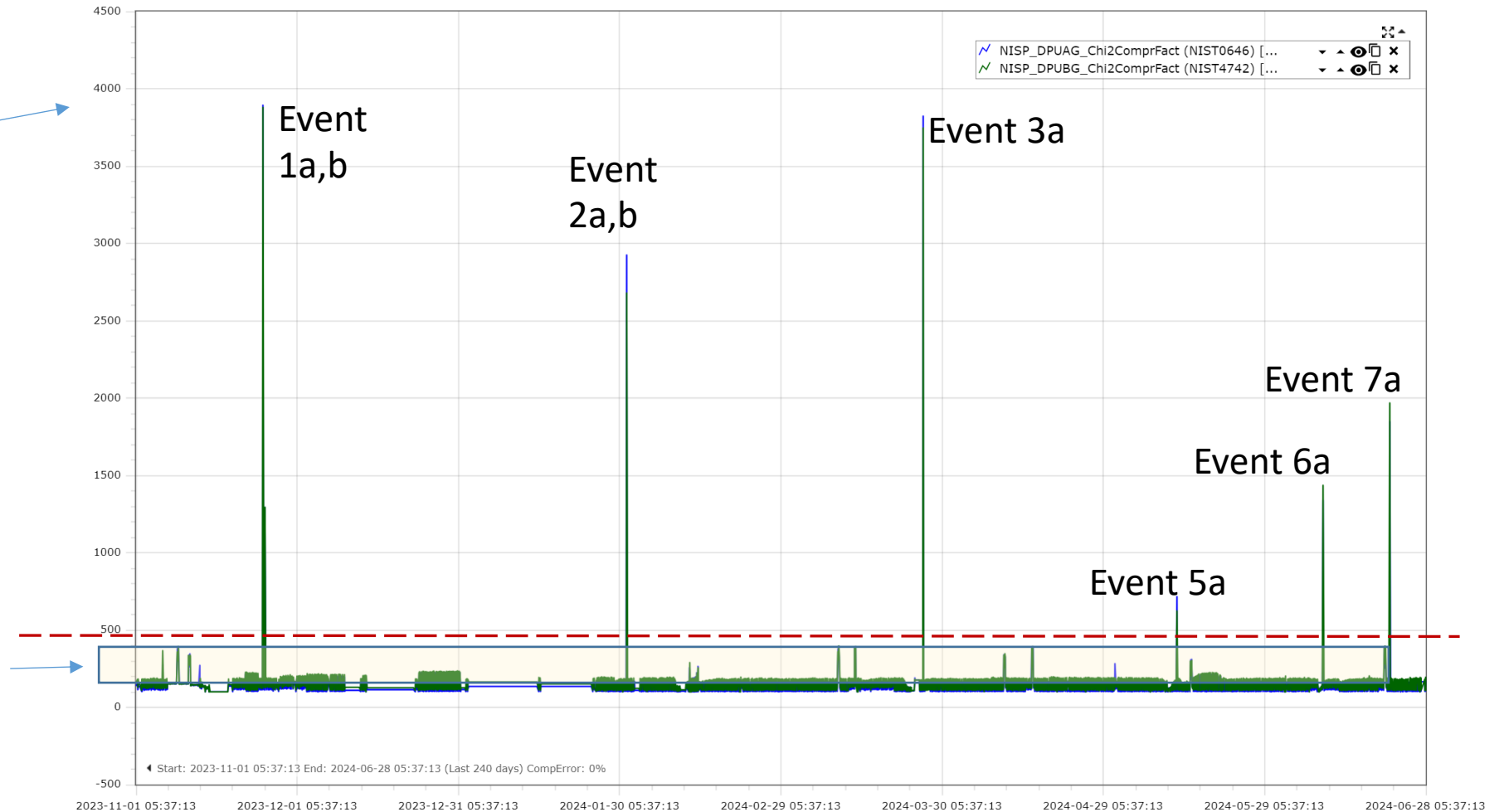
QF diagnostic proved to be very powerful, at least to identify very bad quality images.

# Example 1 : Event triggering in case of anomalous step signal

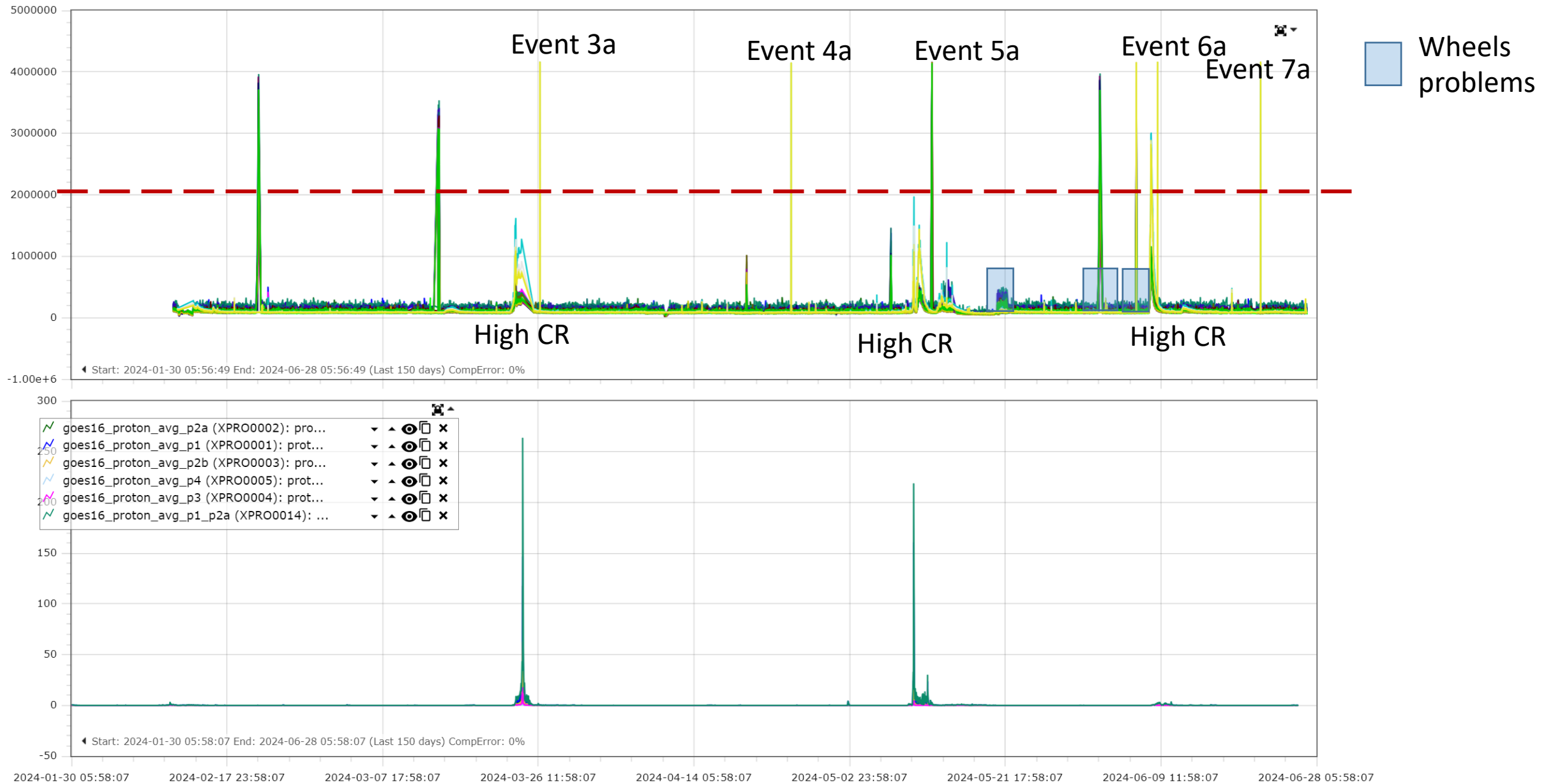
a) DPU HKTM – Chi2 frame compression factor, in case a large number of pixels has the same chi2 value the compression rate reported for such image is larger than usual (in the standard ROS we have 1.2 – 2.5).

Compression factor \*100 reported in HKTM

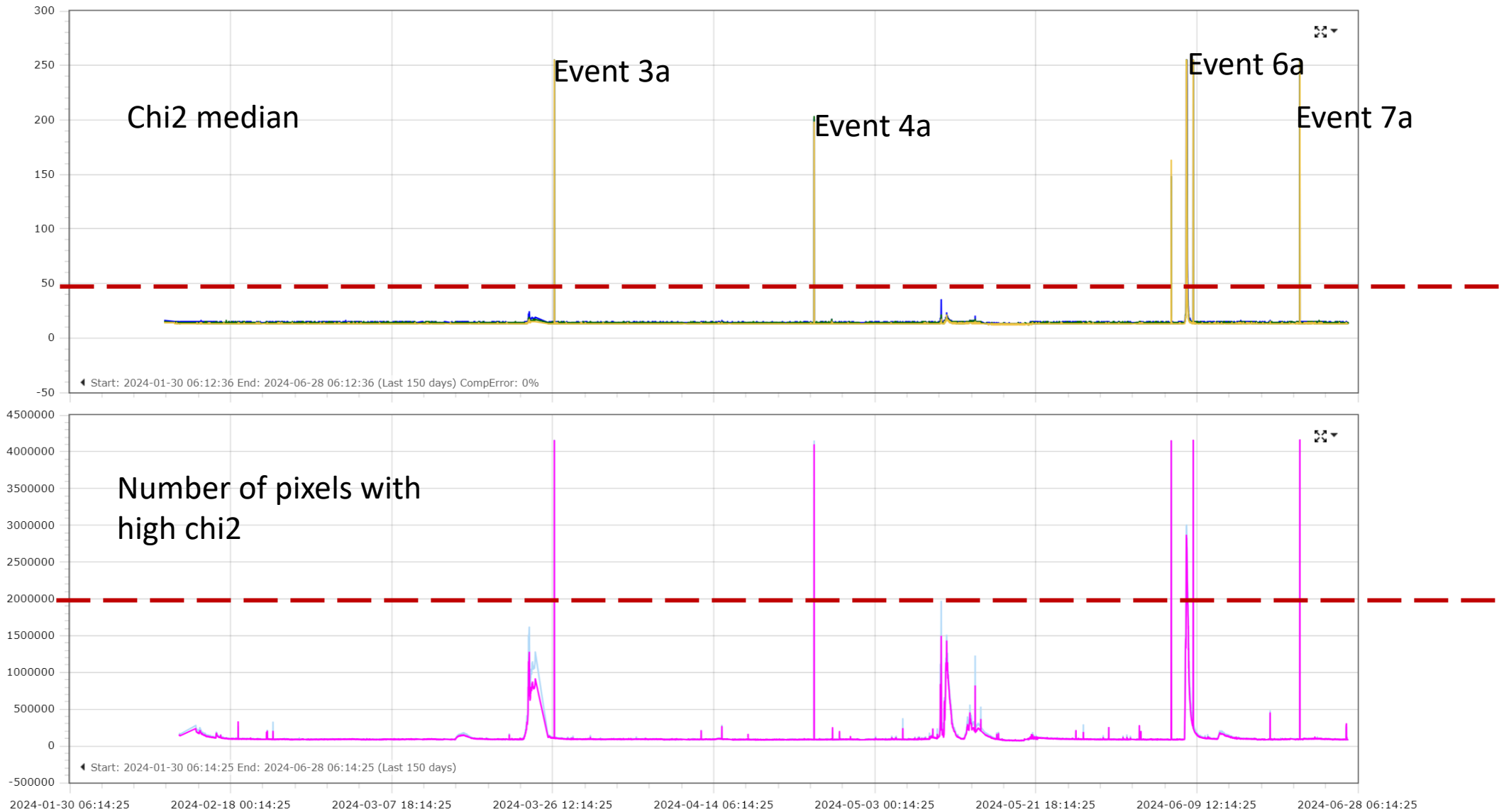
Calibrations with LED ON

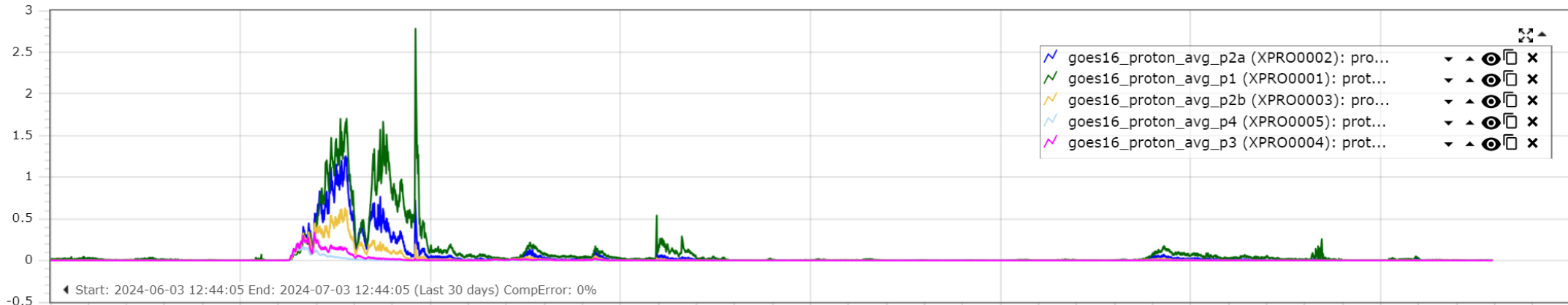
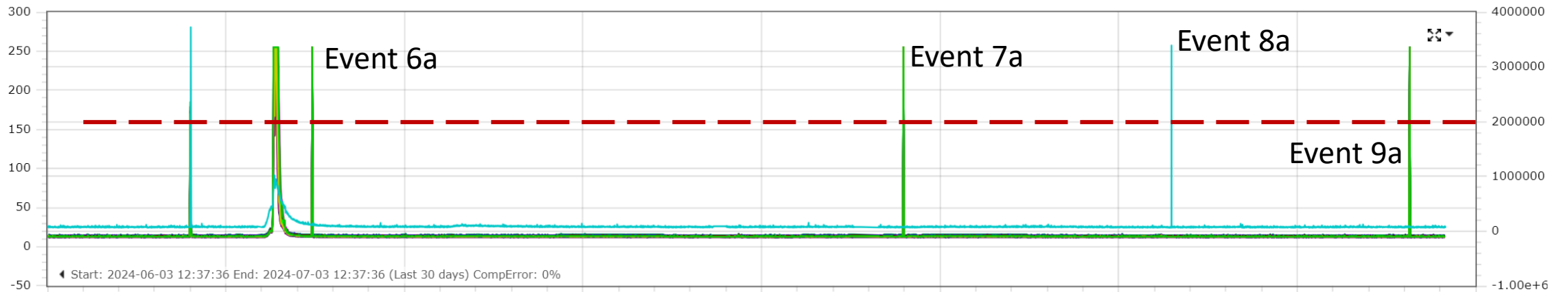


## b) chi2 statistics in QLA reports: number of pixels reporting bad QF (1 in Photo, > 50 in Spectro)



### C) Chi2 median value in spectro MACC (usual value is 14-16)





2024-06-03 12:45:08    2024-06-07 06:45:08    2024-06-11 00:45:08    2024-06-14 18:45:08    2024-06-18 12:45:08    2024-06-22 06:45:08    2024-06-26 00:45:08    2024-06-29 18:45:08    2024-07-03 12:45:08

## Current trigger

- Chi2 frame compression factor  $> 5$  (Spectro+Photo)
- Number of bad chi2 pixels larger than 2M (Spectro + Photo)
- Chi2 median value in spectro MACC  $> 50$  (Spectro)
- Number of detectors affected (Spectro + Photo)
- Isolated occurrence

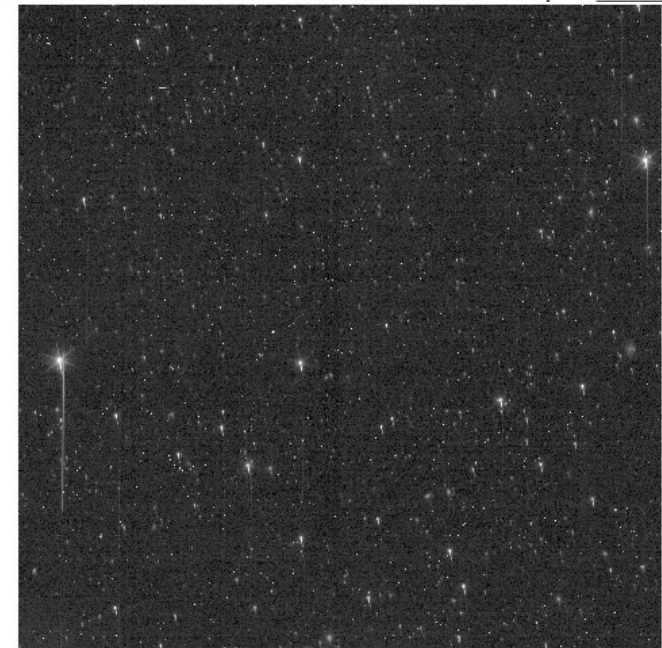
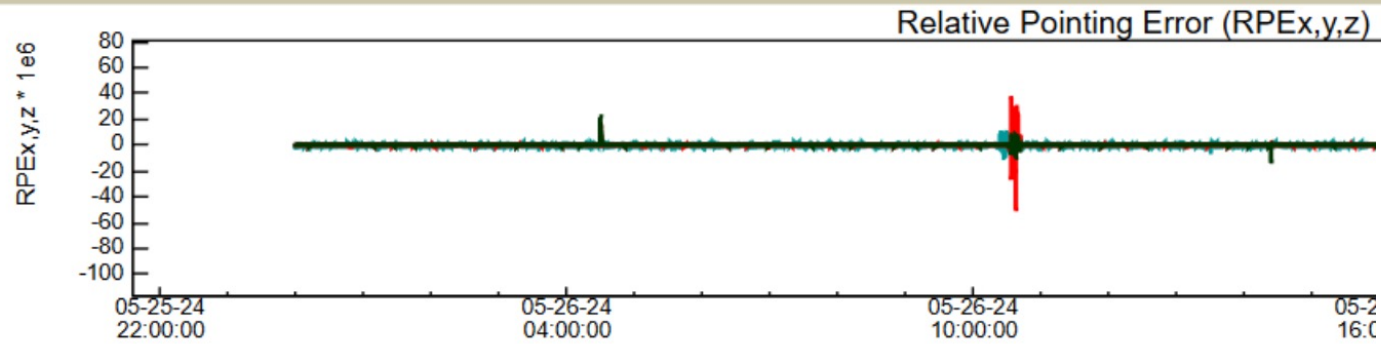
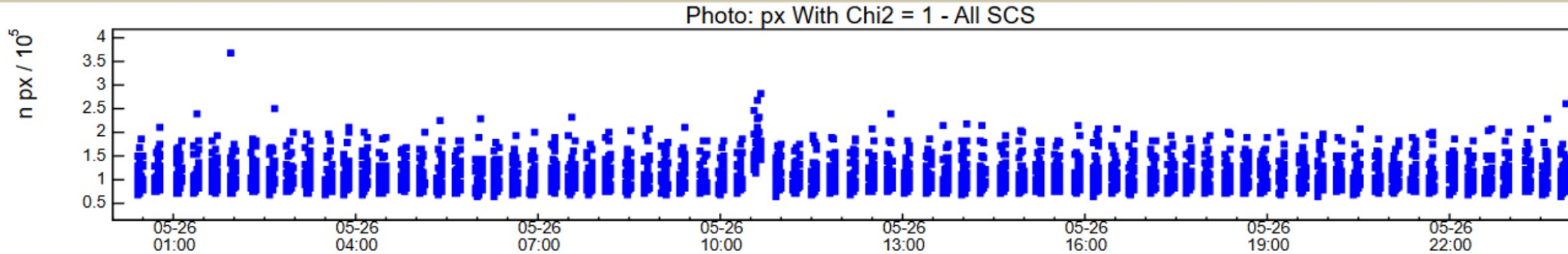


- No LED ON
- Check FGS guide scores

If there is no indication of bad guiding and all 16 detectors are affected we check Raw lines and up to now all triggered events turned out to be part of the sample showing an anomalous transient illumination.



## Example2 : FGS failure confirmed also in NISP images

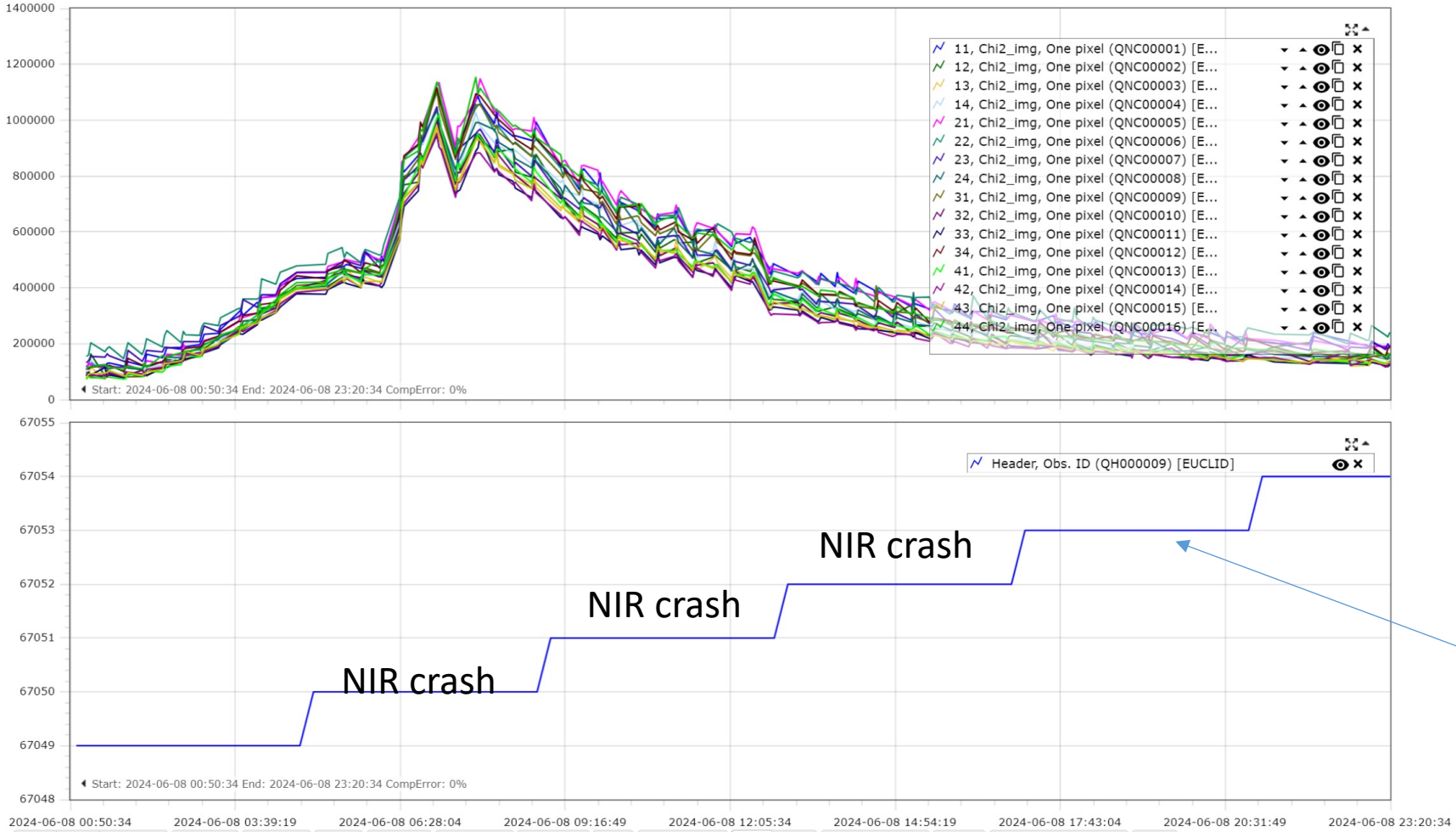


In this case the value of chi2=1 pixels is double (wrt the field we were observing) and clearly correlates with FGS failure also reported in SOC table, in this case NIR was not crashing.

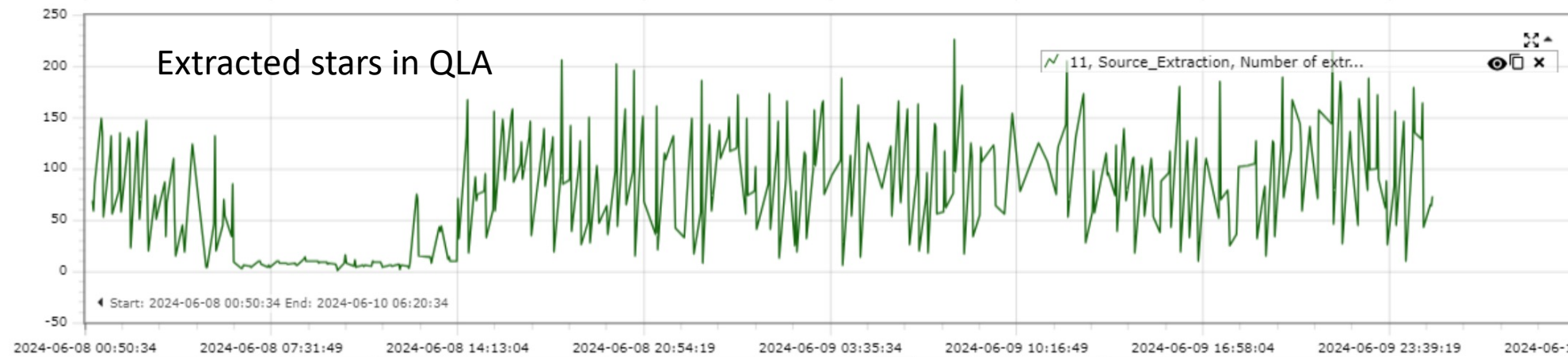
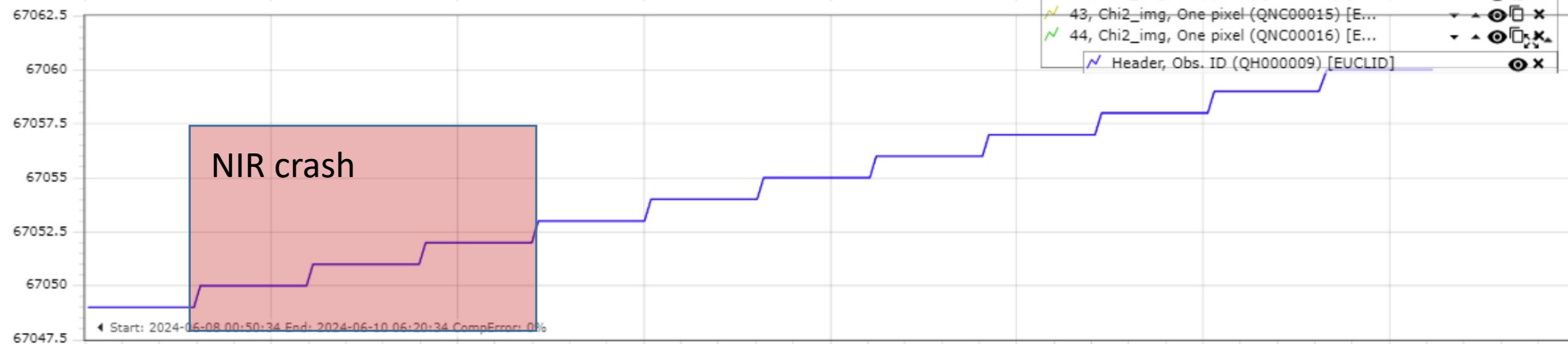
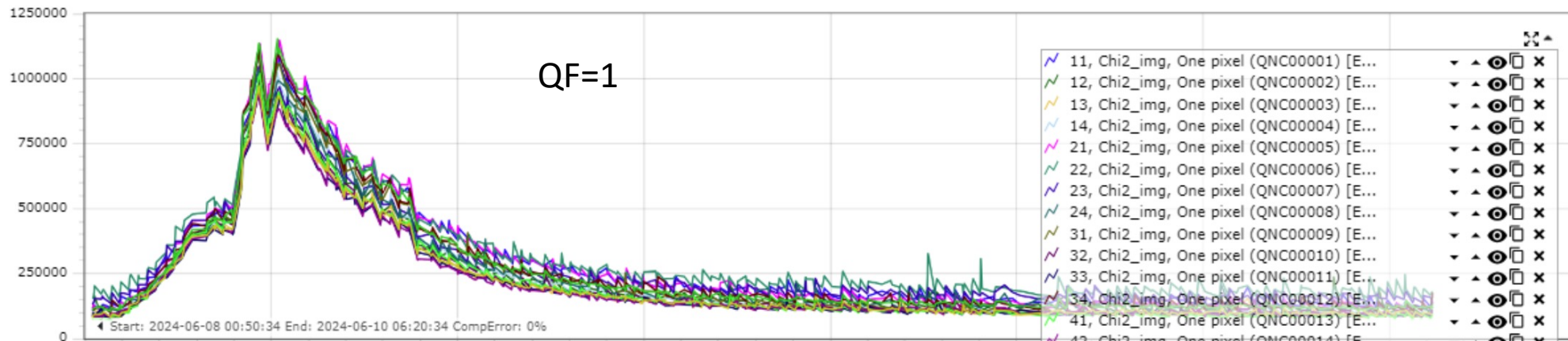
1.06e+03 1.07e+03 1.09e+03 1.13e+03 1.21e+03 1.38e+03 1.71e+03 2.37e+03 3.69e+03

# Example 3 : High solar activity

Nisp failed in taking data during solar flares in March and May, due to processing time longer than usual, after patching the ROS timing it was possible to take data during the solar flare in June.

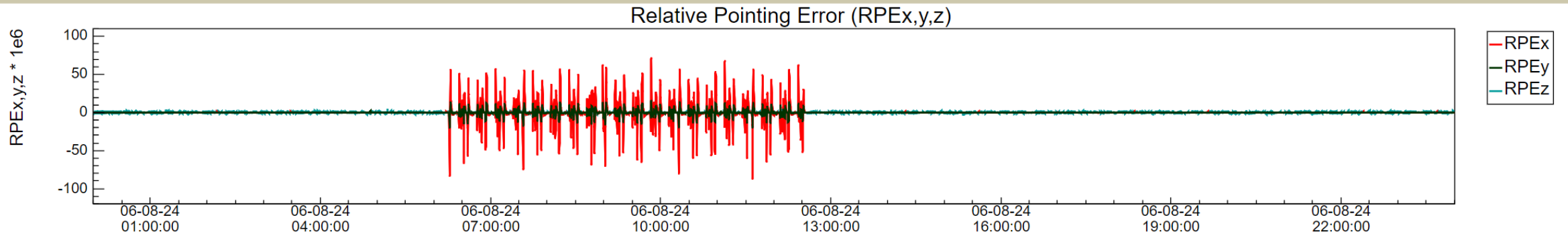
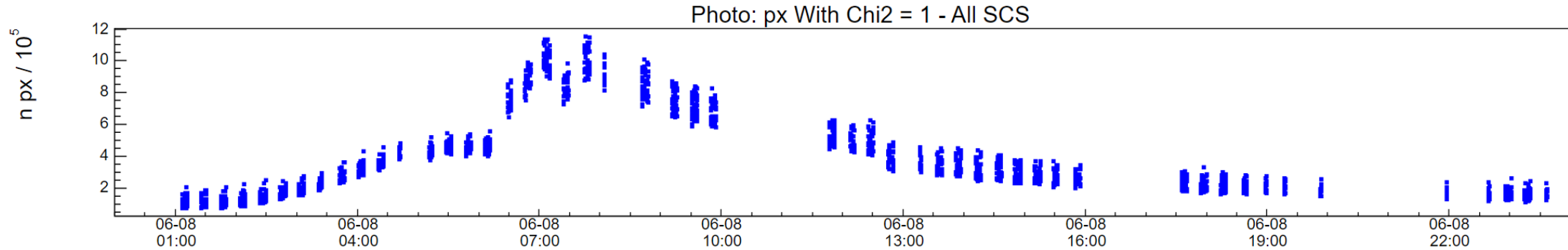


Processed reporting CR flux 3times larger than usual



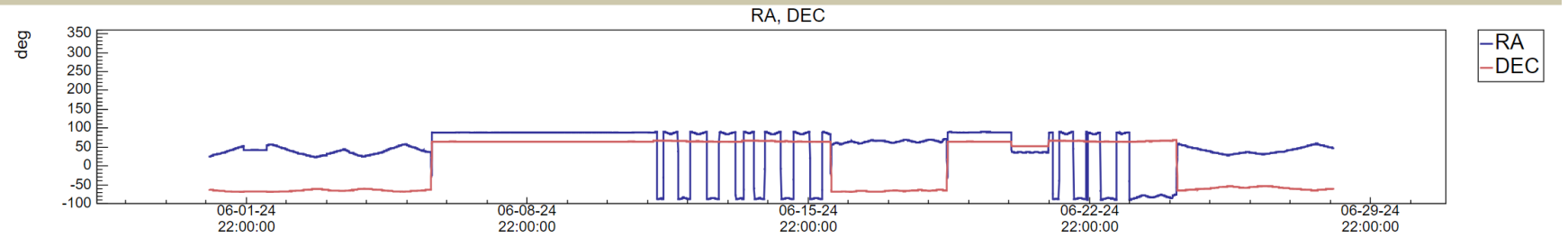
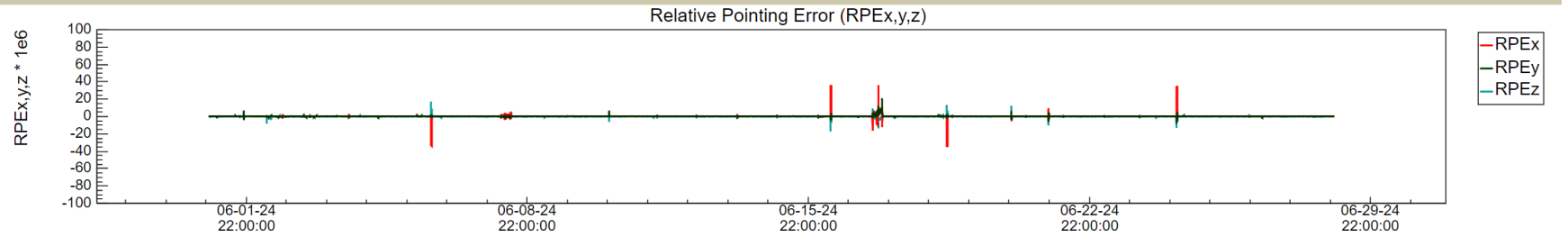
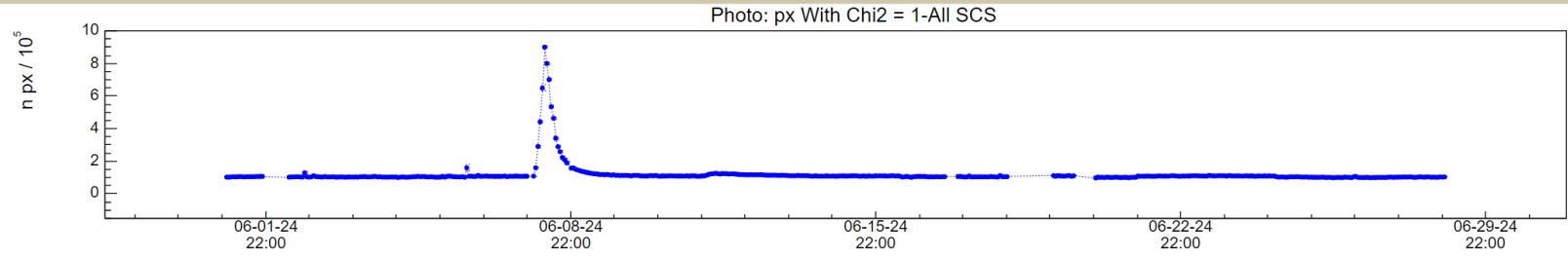
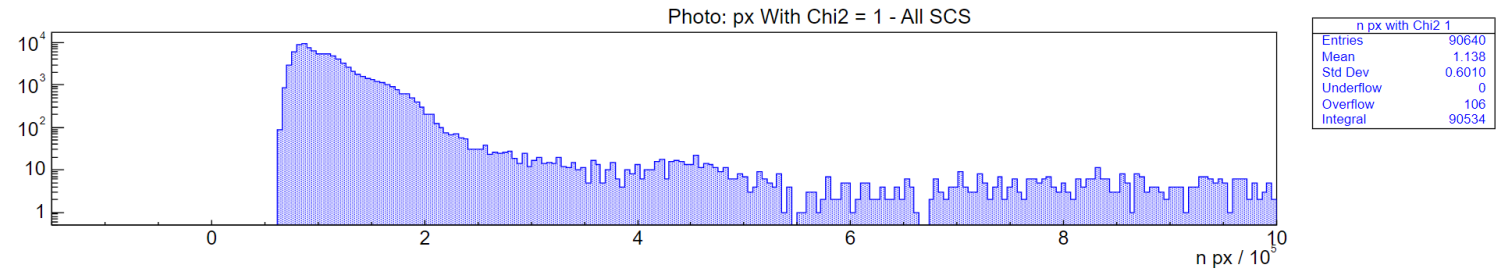
2024-06-08 00:50:34    2024-06-08 07:31:49    2024-06-08 14:13:04    2024-06-08 20:54:19    2024-06-09 03:35:34    2024-06-09 10:16:49    2024-06-09 16:58:04    2024-06-09 23:39:19    2024-06-10 06:20:34

- It worths mentioning that in case of Very High CR flux also FGS is not performing at its best.

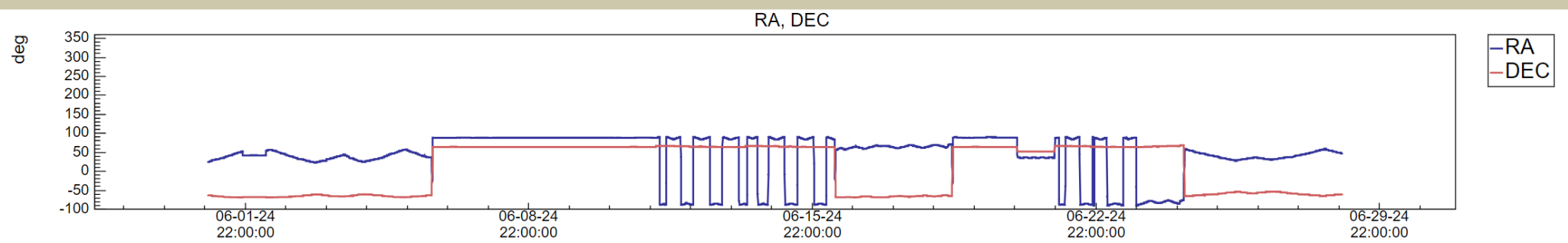
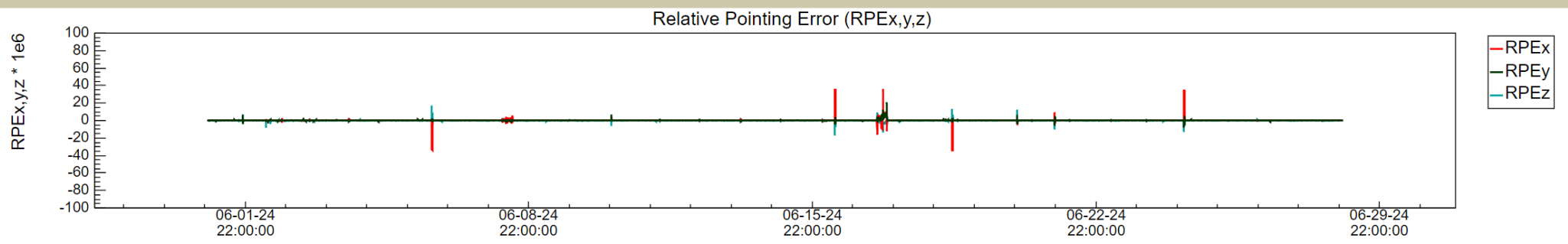
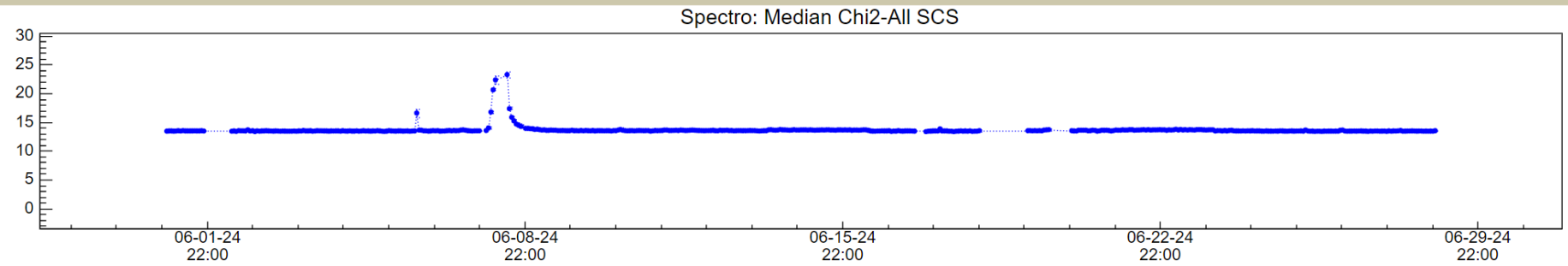
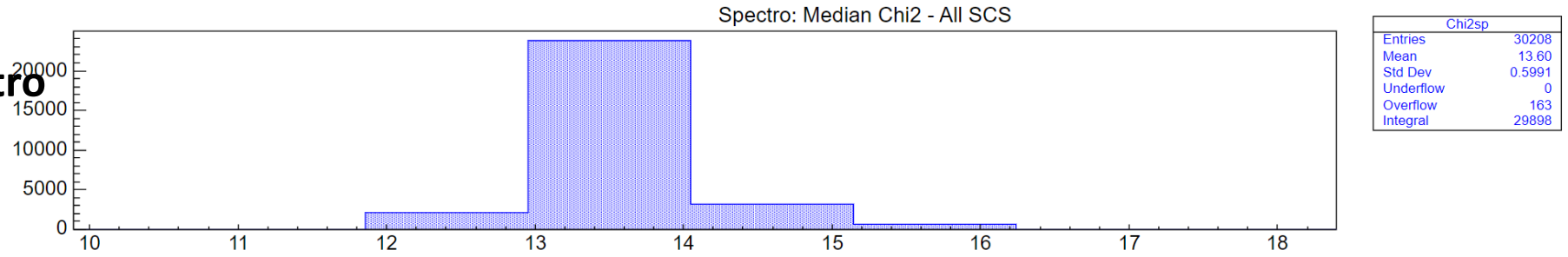


NIR crash – astrometry computation failure

# June 2024 : Photo

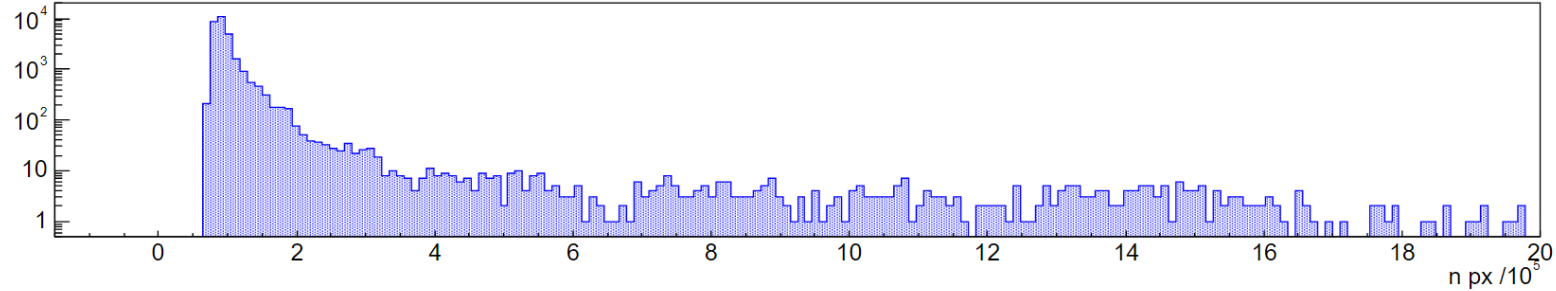


# June 2024 : Spectro



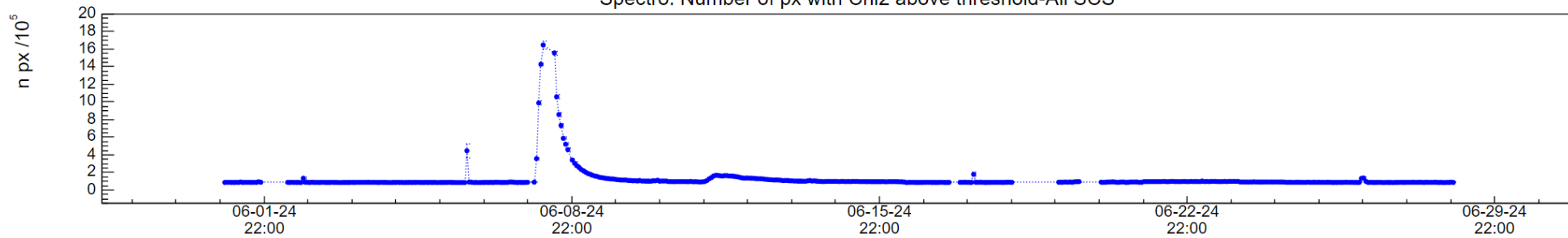
# June 2024 : Spectro

Spectro: Number of px with Chi2 above threshold - All SCS



| px above Chi2 th |       |
|------------------|-------|
| Entries          | 30208 |
| Mean             | 1.123 |
| Std Dev          | 1.225 |
| Underflow        | 0     |
| Overflow         | 152   |
| Integral         | 30056 |

Spectro: Number of px with Chi2 above threshold-All SCS



Relative Pointing Error (RPE<sub>x,y,z</sub>)

