VERA C. RUBIN OBSERVATORY

Data analysis for commissioning

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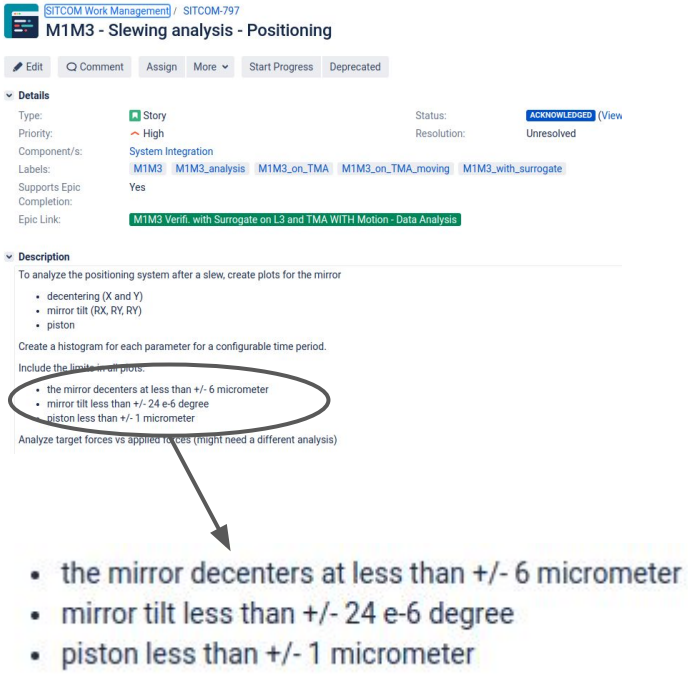
NSF AURA U.S. DEPARTMENT OF ENERGY SLAC CHARLES AND LISA SIMONYI FUND FOR ARTS AND SCIENCES LSST CORPORATION

Mirror positioning - SITCOM-797



Get time serie datasets using the **E**ngineering **F**acilities **D**atabase (InFluxDB)

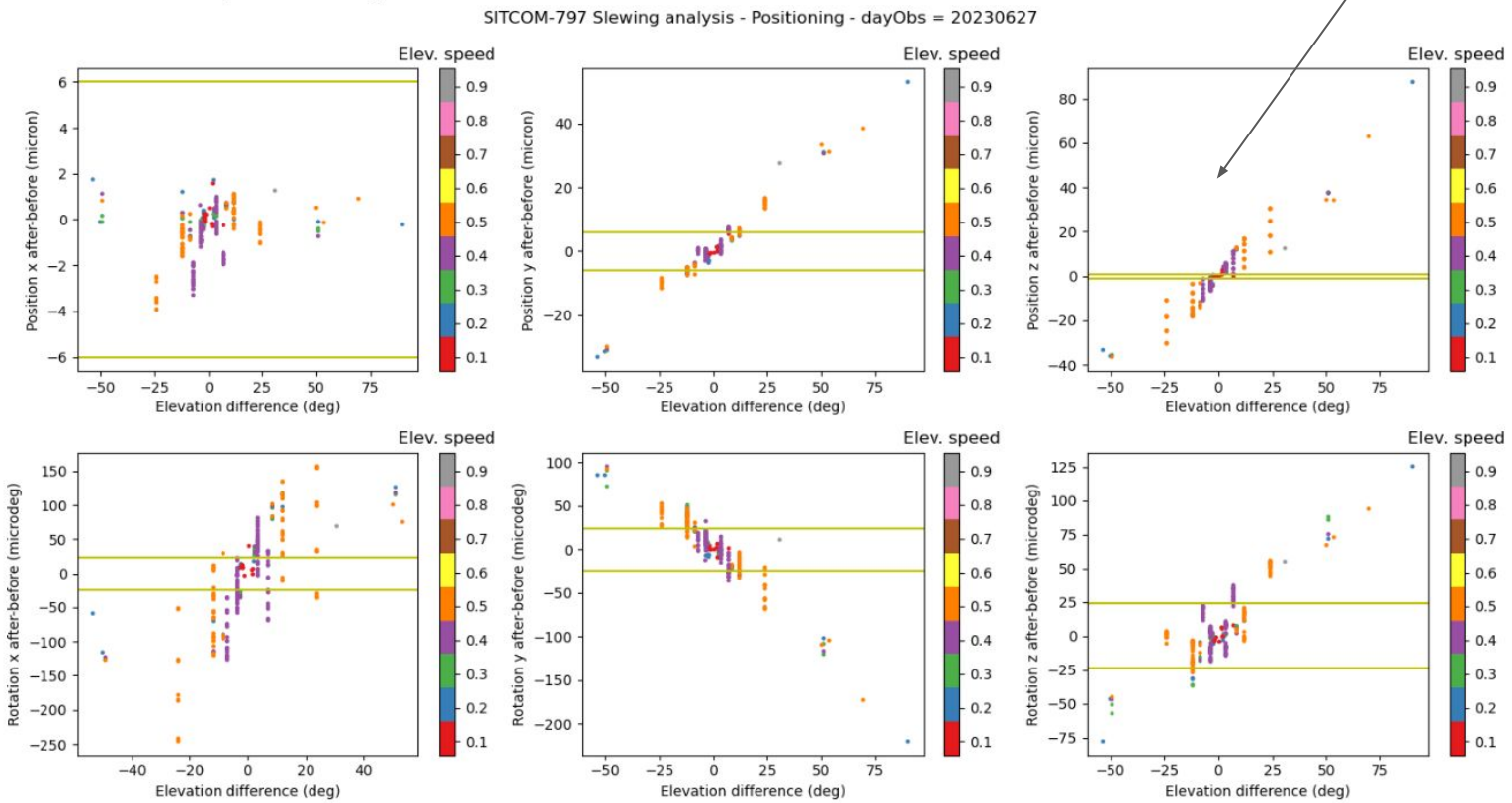
- Contains a number of "topics" - Collections of actuators and sensors data -
- Doc: https://ts-xml.lsst.io/sal_interfaces/MTM1M3.html
- Access through an API - no need to build complex queries
- Get results in a pandas Dataframe
- Merlin provides a very convenient set of tools to simplify data retrieval

For this study : use the datasets associated to TMA elevation slews

- M1M3 Test Logs: https://confluence.lsstcorp.org/display/LSSTCOM/M1M3+Test+Logs

Mirror positioning

+/- ~70 microns instead of +/- 1 micron



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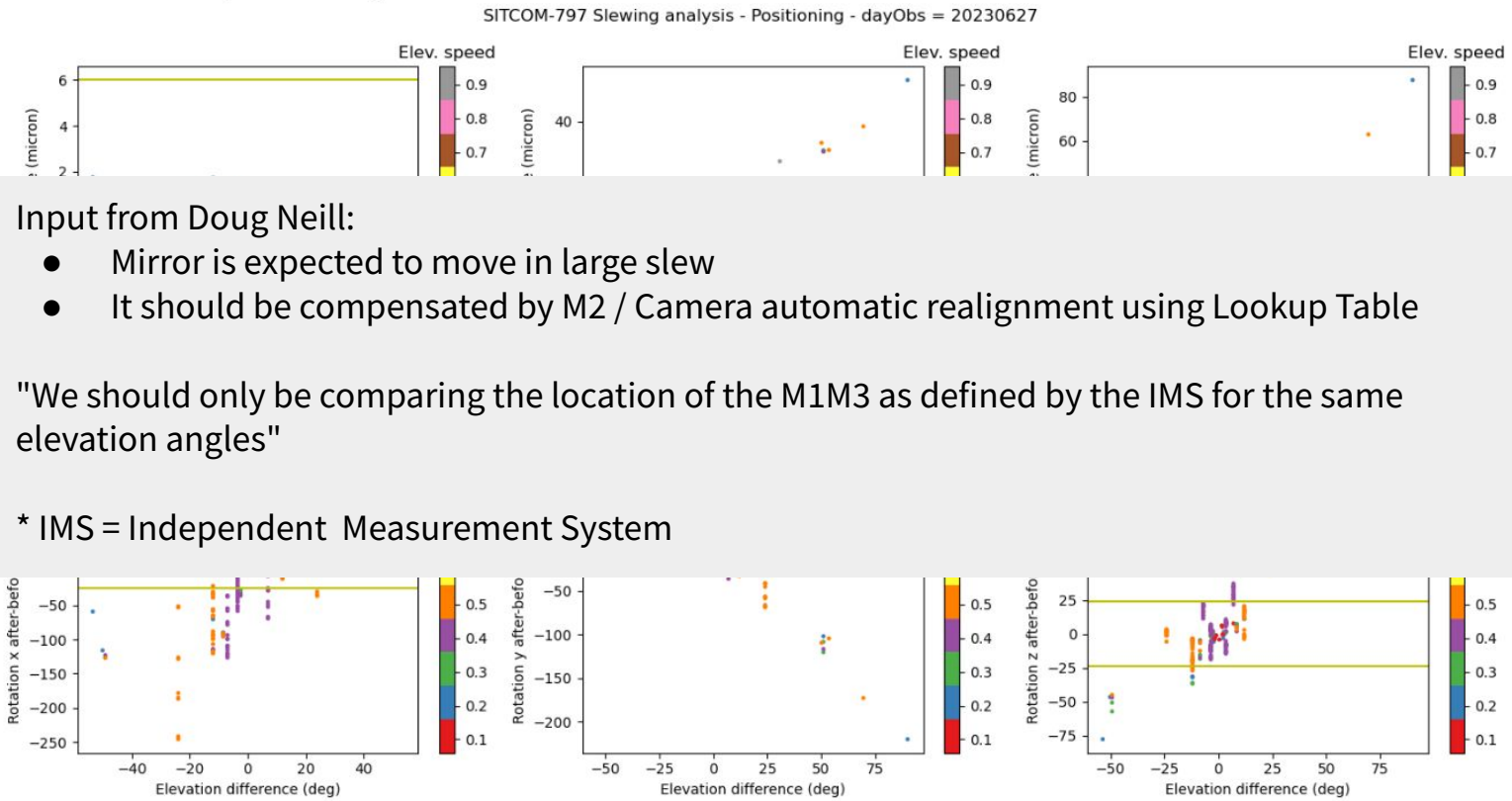


Input from Doug Neill:

- Mirror is expected to move in large slew
- It should be compensated by M2 / Camera automatic realignment using Lookup Table

"We should only be comparing the location of the M1M3 as defined by the IMS for the same elevation angles"

* IMS = Independent Measurement System

Mirror positioning

σ ~5 microns

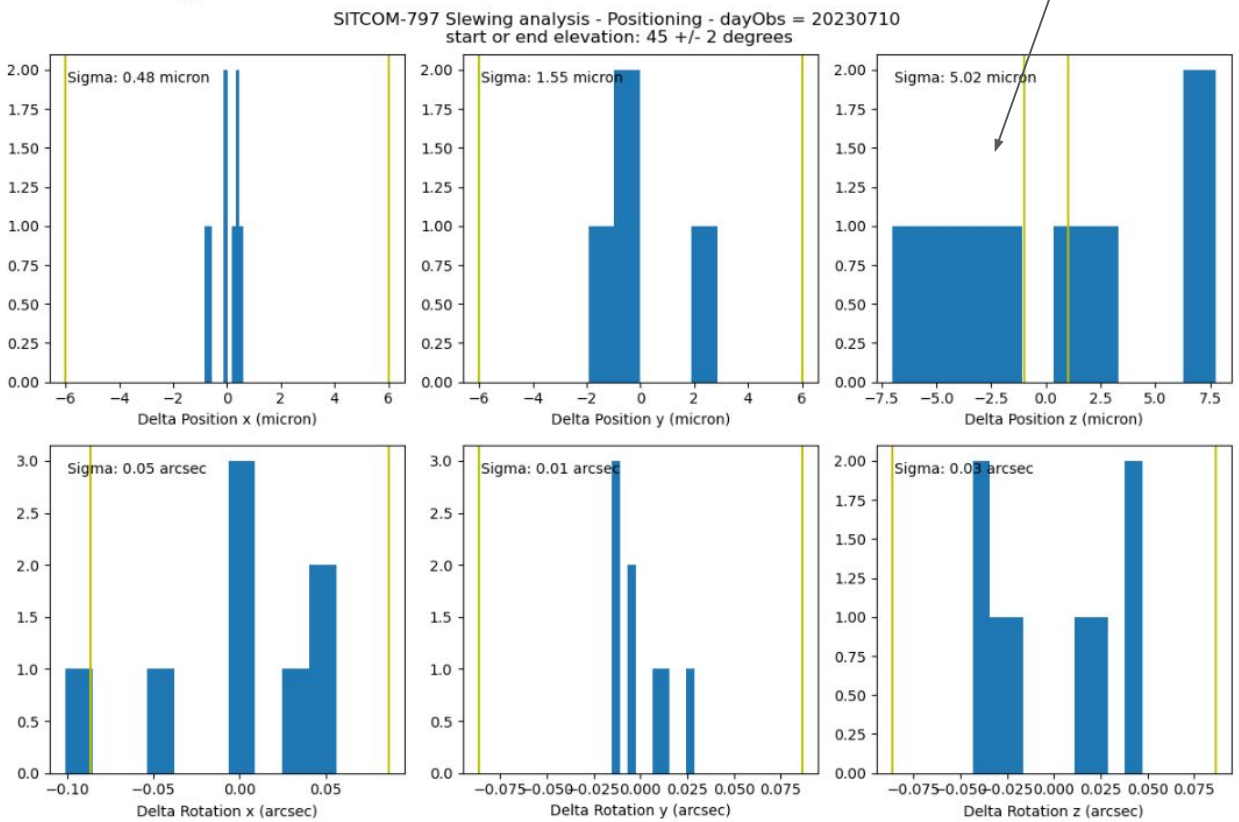
Repeat analysis for several slews ending at a given elevation angle

Much closer to the specs but still several things to understand

- Origin of outliers ?

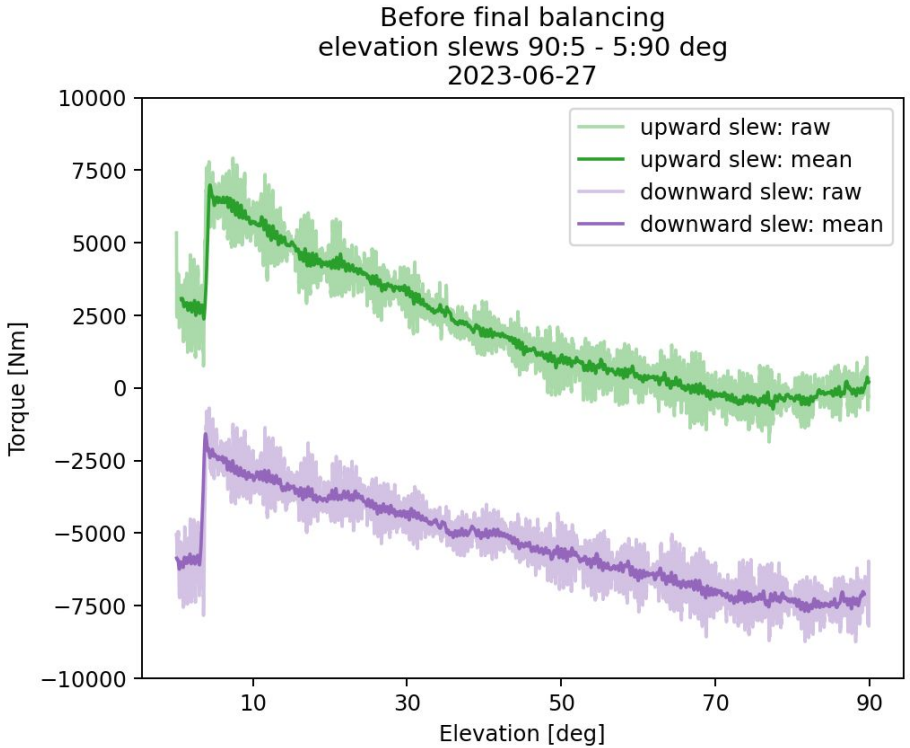
During this analysis with Craig Lage we discovered that a sensor is not working correctly (displacementLVDT4)

and others are probably incorrectly readout (breakawayLVDT)



TMA re-balancing with m1m3 cell (sitcomtn-80)

- Data identification/exploration done using chronograf
- Plots made in rsp using summit_utils to query efd data (analysis notebook here) running on usdf
- Unlike LVV tests (last presentation) this was a reactive analysis we did not plan to be doing
- Freddy Muñoz did most of the work for this



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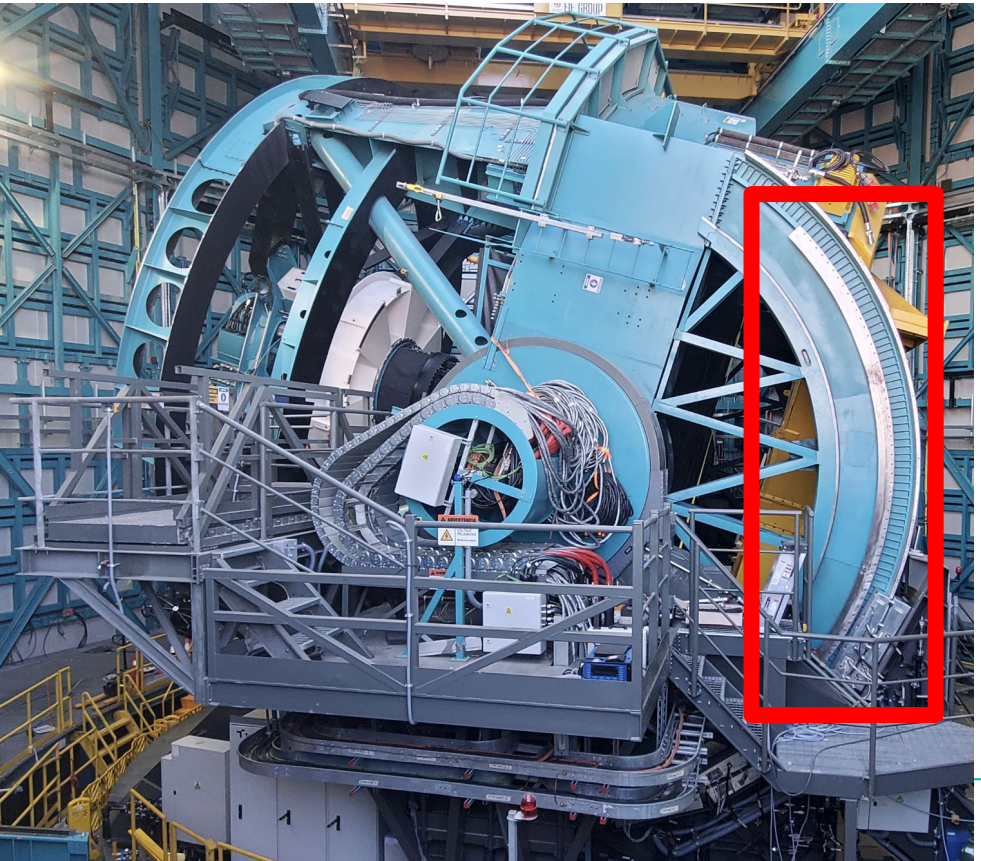

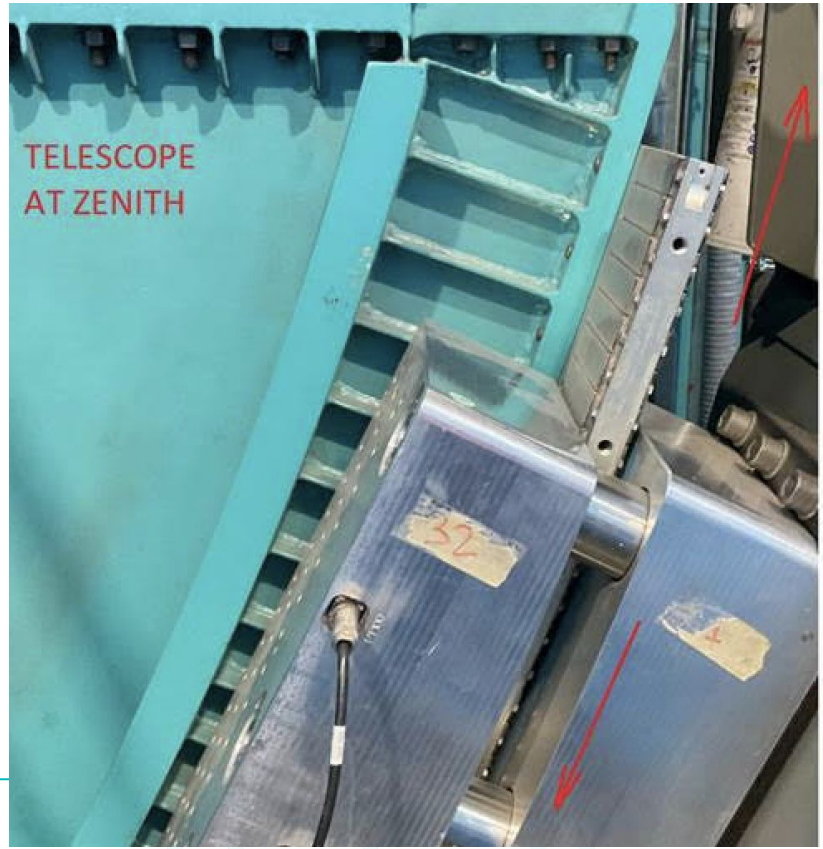

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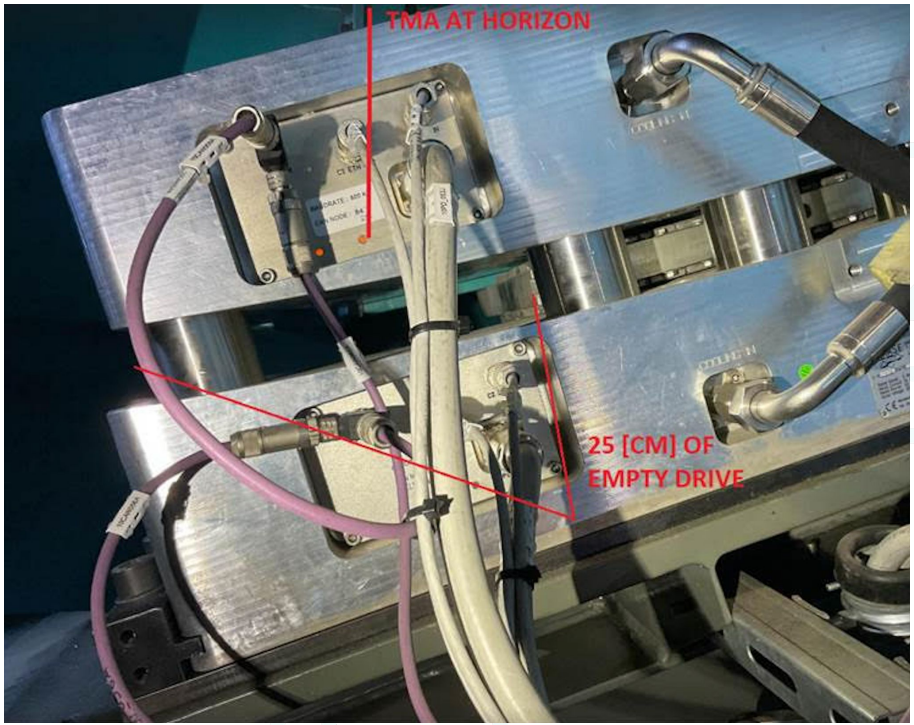
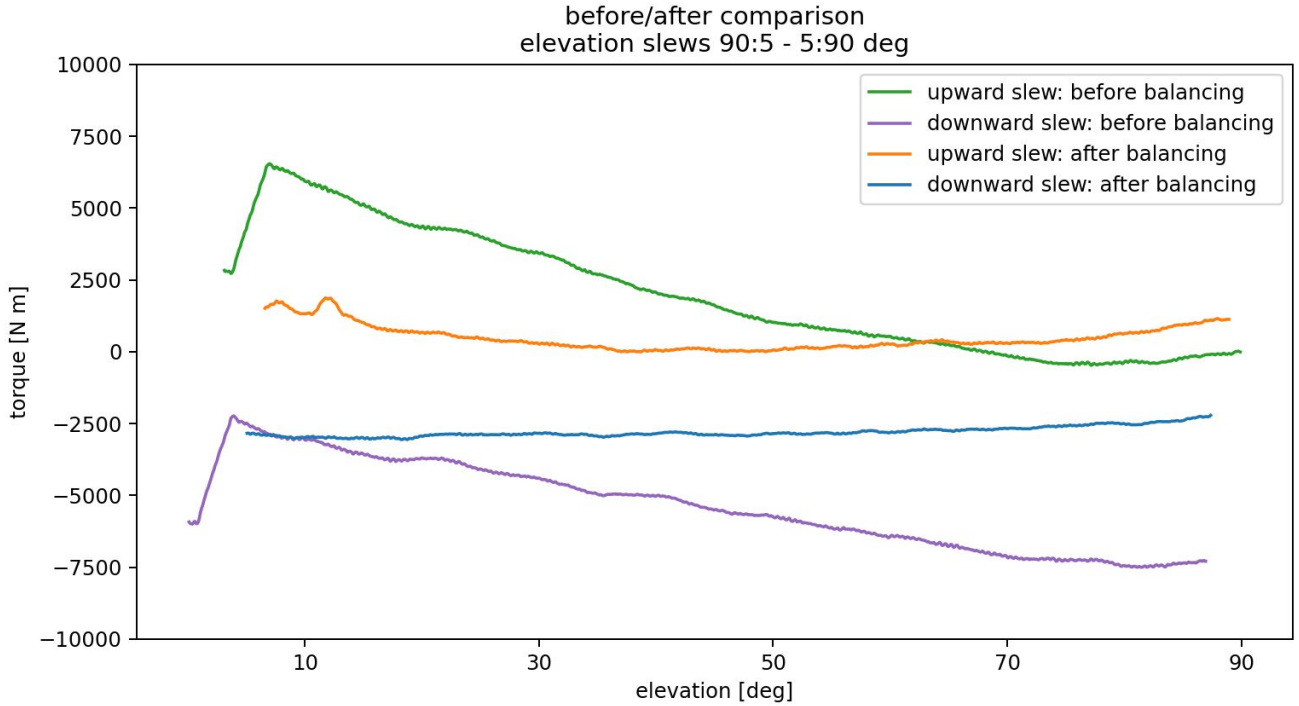


TMA re-balancing with m1m3 cell (sitcomtn-80)

TMA balancing must mask out the region where there is no magnetic rail on the elevation axis.

There is still slightly more hysteresis that we would expect, but torques are within tolerances.

we are in communication with UTE/Techniker to improve performance



Summary

There are regular opportunities to help with data analysis including

- planned LSST Verification and Validation analyses (LVV)
  - likely easier to onboard with due to less time pressure
- more reactive analyses (TMA balancing, M1M3 oscillations)
  - Where we need brain cycles quickly

Our analysis tools are becoming easier to use, which should make contributing easier

- Chronograf
- Summit utils
- Notebooks V&V

So far we have had tag up meetings twice a week to provide support (you can follow along m1m3 analysis at #rubinobs-m1m3-analysis)