# Auxtel Star-Flats

Due to delivery delays, the period of onsky commissioning for LSSTCam has been compressed.

This has lead us to look towards the Auxtel telescope for pre-emptive studies.

Auxtel is very similar to the main telescope (in some respects):
- it uses a single CCD which is identical to those on LSSTCam
- the data pipelines are being used as a test-bed for main telescope
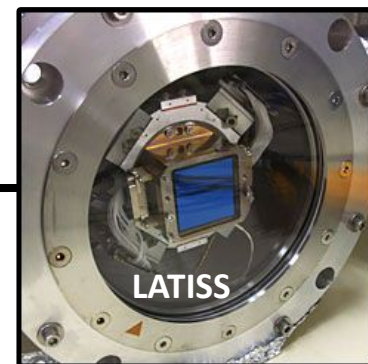
A simple study that can be done is building a **star-flat**.

*Flats* are typically used to calibrate out spatial structures in flux measurements across the CCD. However, it is difficult to construct something truly flat.

Stars are extremely stable objects[†] meaning that each time a star is observed on the CCD it should have the same brightness. By tracking their brightness at different points on the CCD we can build a "star-flat" to probe how flat the CCD really is.

This is, by design, made possible due to the dithering pattern used. Multiple small rotations/translations of the pointing causes the CCD position of stars to change from one visit to the next.

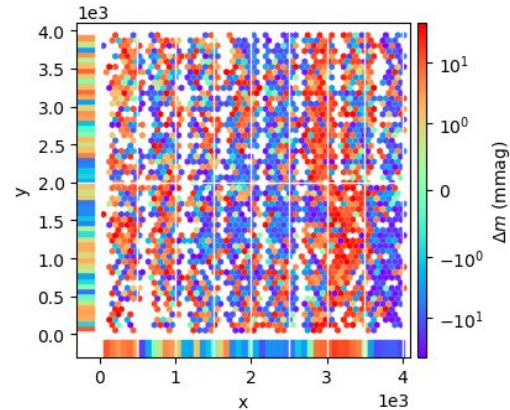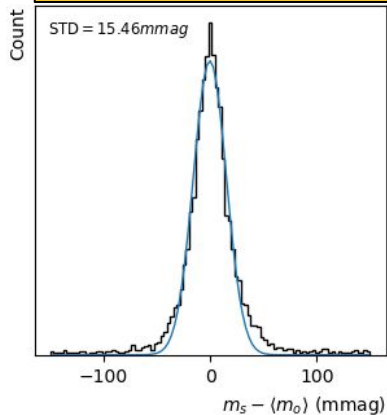After a while you can build up a fairly uniform sampling of the entire CCD.

[†] Flux variations in the Sun are of the order of 0.001% over a 100 year period.
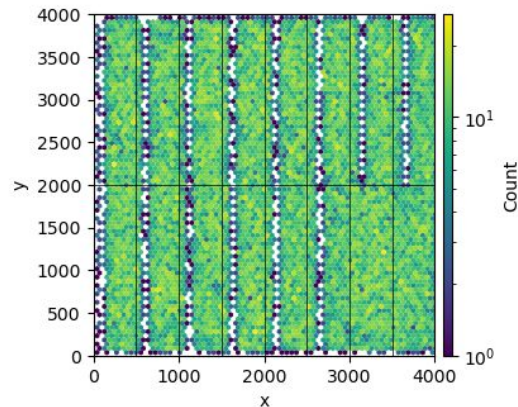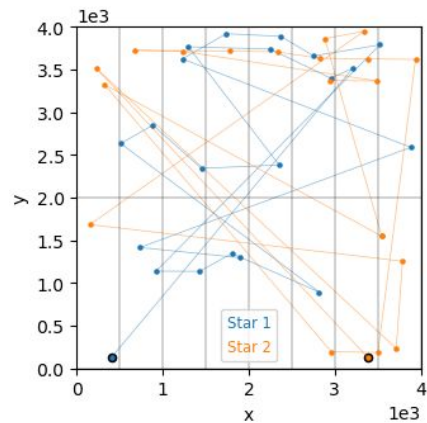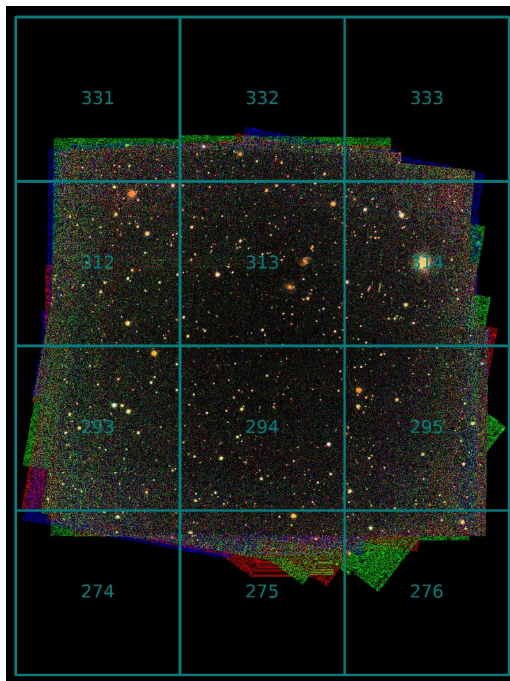
Here we are looking at one of the latest sets of calibrated measurements from Auxtel (PREOPS-4553). This covers
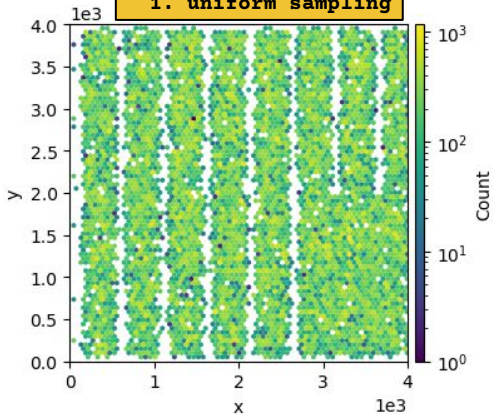
- 2 observing runs in May 2023
- 2 observing runs in July 2023
- 3 observing runs in August 2023
- 2 observing runs in September 2023
- 1 observing run in October 2023
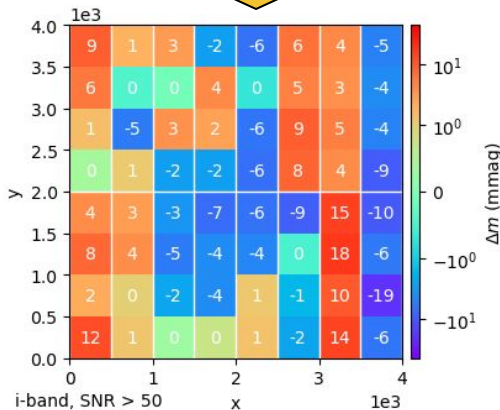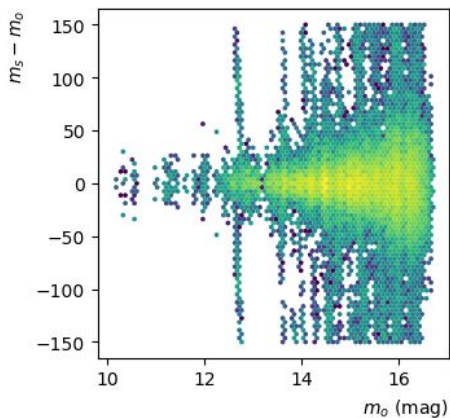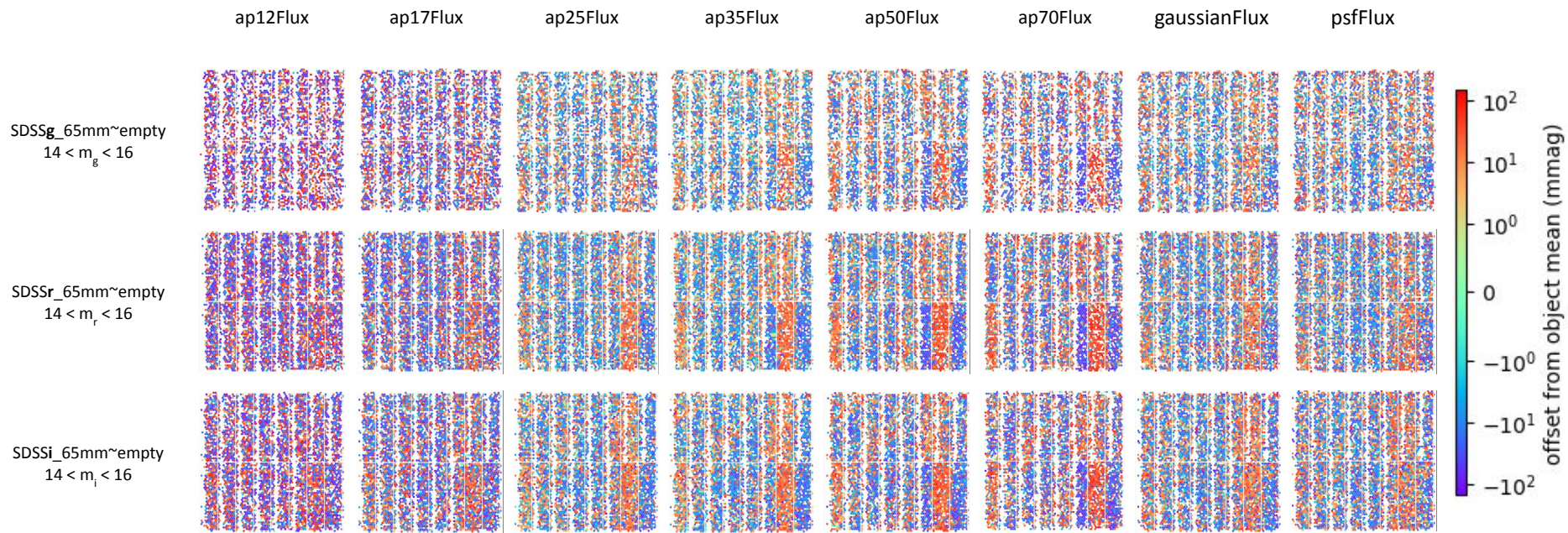- 1 observing run in November 2023



2. reasonable variability

STD = 15.46mmag

$m_s - \langle m_o \rangle$ (mmag)



$\Delta m$ (mmag)



1. uniform sampling

Count



3. mag. dependence

$m_s - m_o$

$m_o$ (mag)

4. but it ain't flat!



i-band, SNR > 50

$\Delta m$ (mmag)

➢ It is not known what is the cause of these structures and they are an order of magnitude higher than the goal for photometric repeatability.
➢ It would be nice to figure out the cause of this issue before we see it multiplied by 189 on the main focal plane.