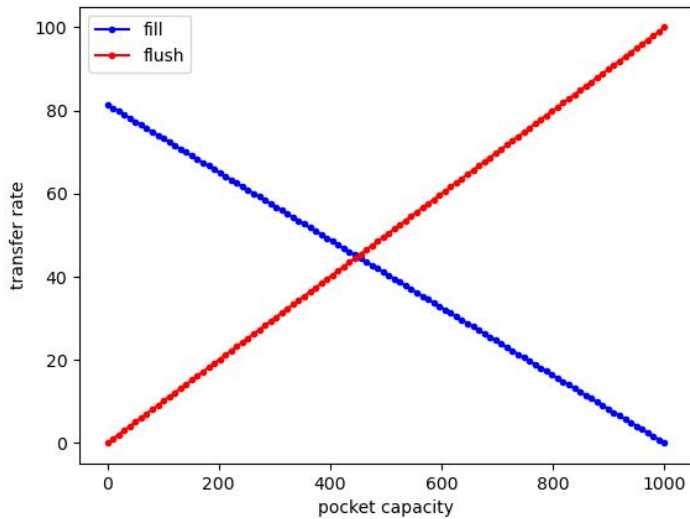
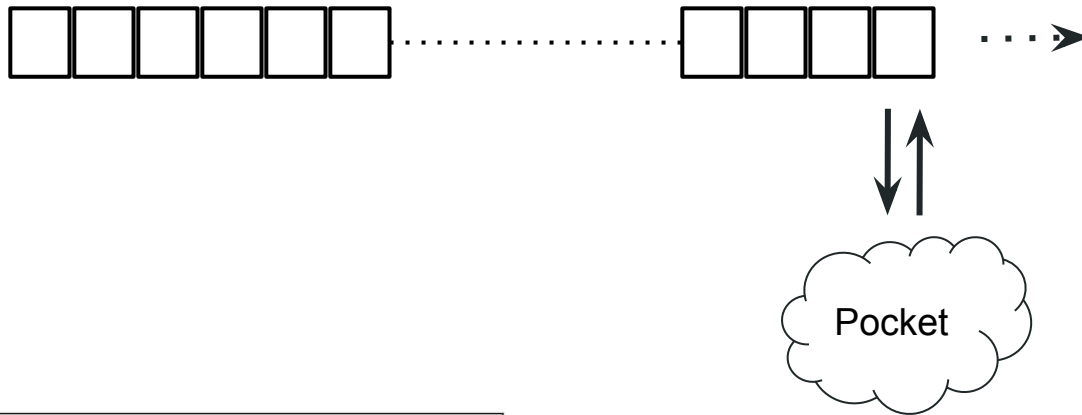


# Pocket effect

A work plan for DR2.5

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# Tentative model



$$\text{flush}(c) = c_{\max} \left( \frac{c}{c_{\max}} \right)^{\alpha}$$

$$\text{fill}(c, n) = c_{\max} \left( \frac{c}{c_{\max}} \right)^{\alpha} \left( \frac{n}{n_{\max}} \right)^{\beta}$$

$$\delta(c, n) = \text{flush}(c) - \text{fill}(c, n)$$

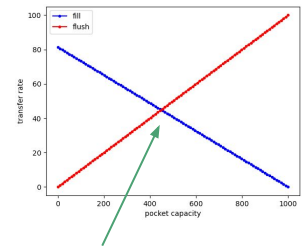
# Tracking the effect

- Simulating the effect at pixel level : line by line

$$\begin{pmatrix} s_i \\ q_i \end{pmatrix} = \begin{pmatrix} n_i + \delta(n_i, q_{i-1}) \\ q_{i-1} - \delta(n_i, q_{i-1}) \end{pmatrix}$$

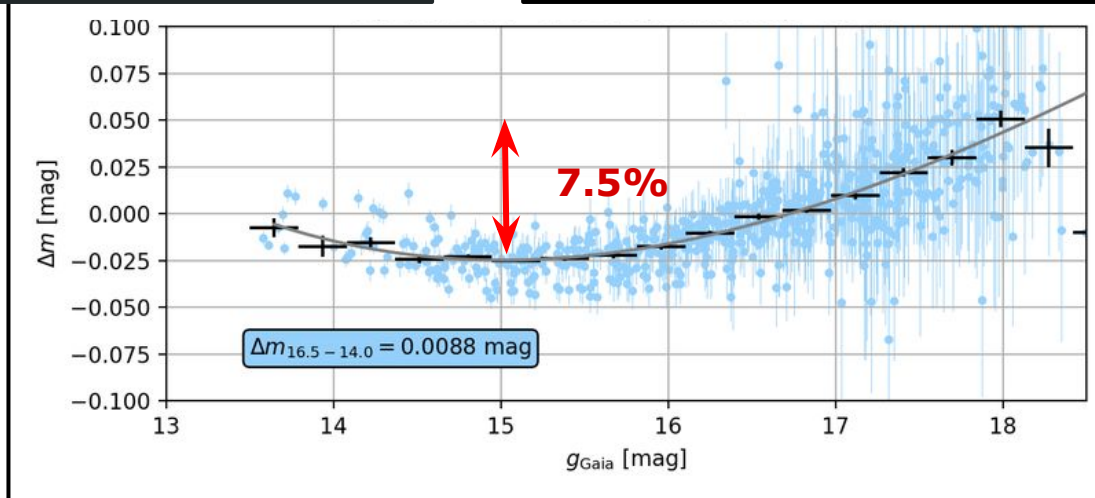
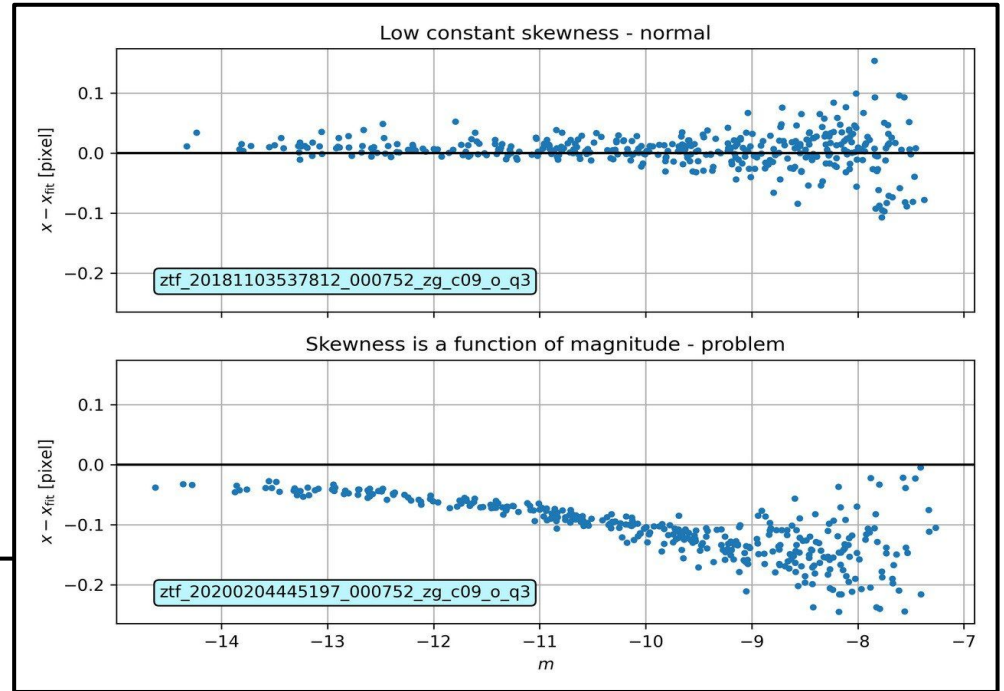
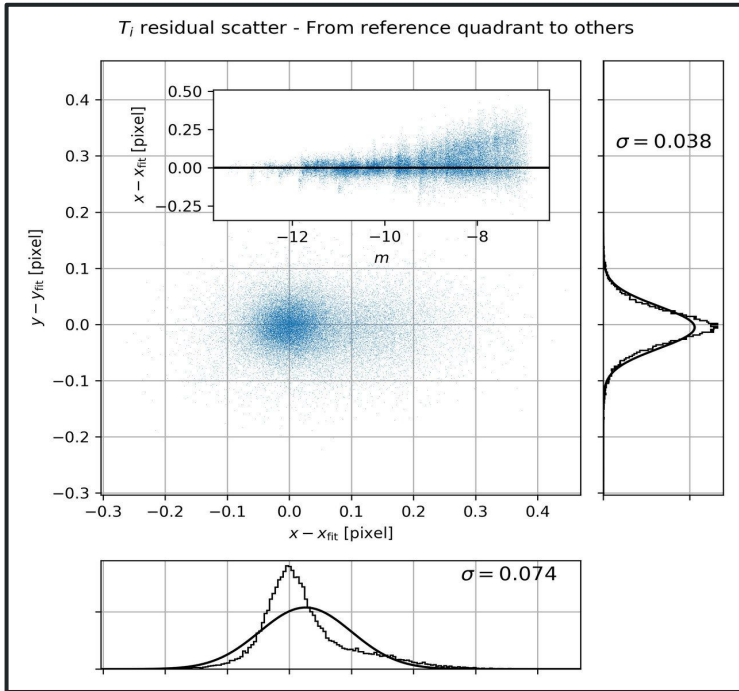
- Inverting the effect (non linear, unfortunately...)

- Need to linearize the model...
- Natural pivot point: pocket equilibrium for the image



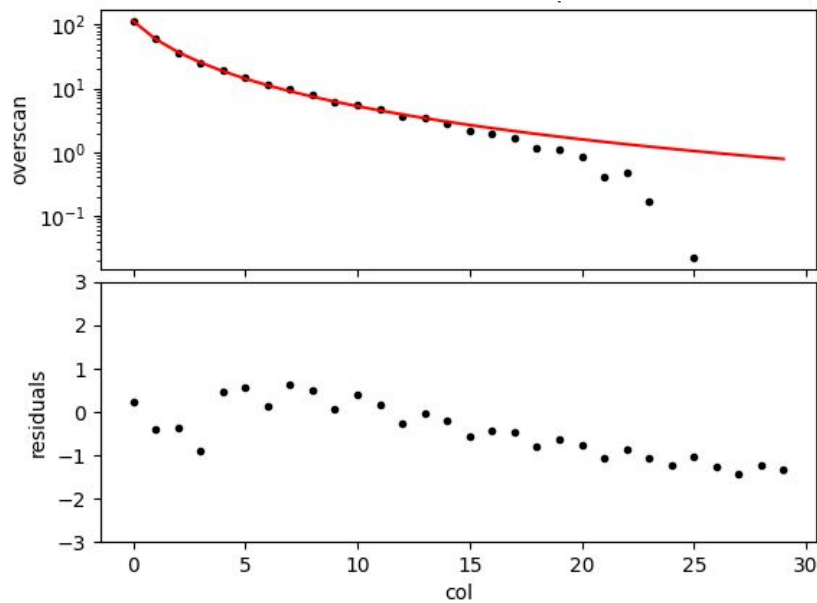
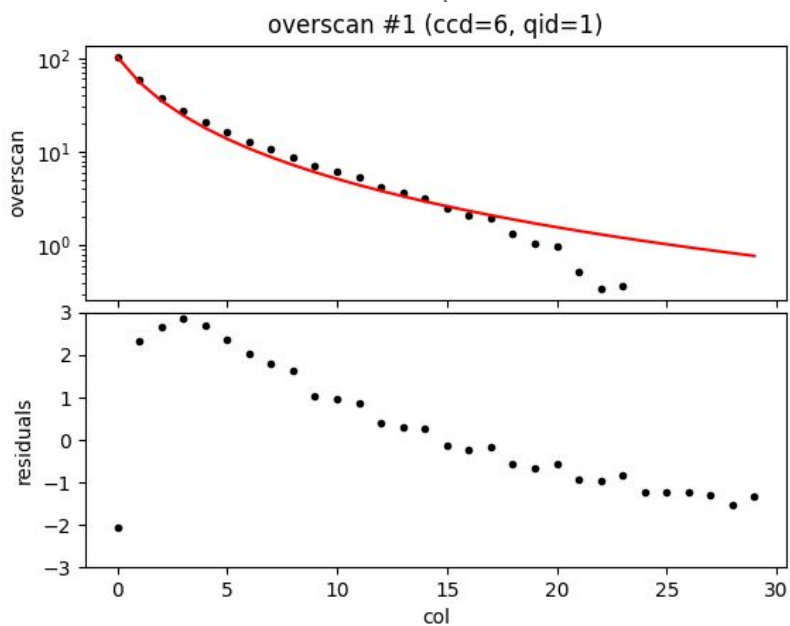
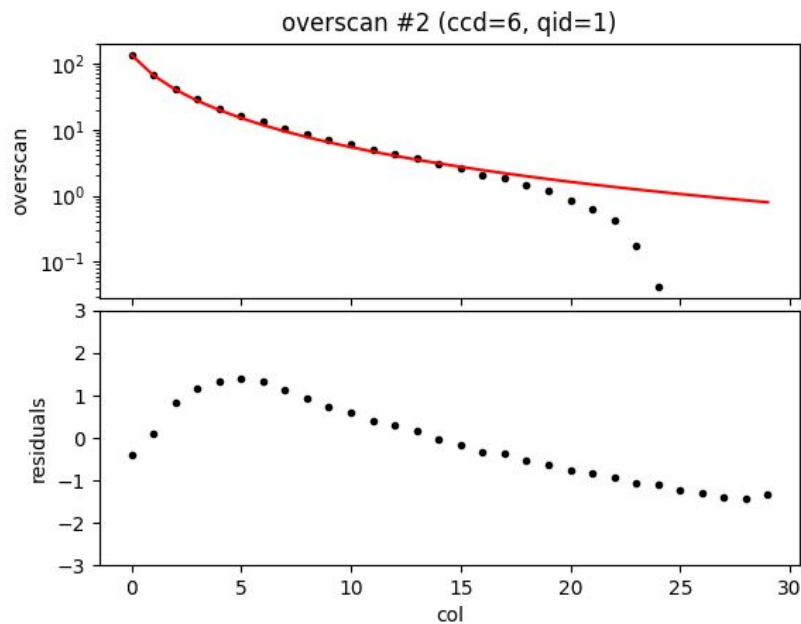
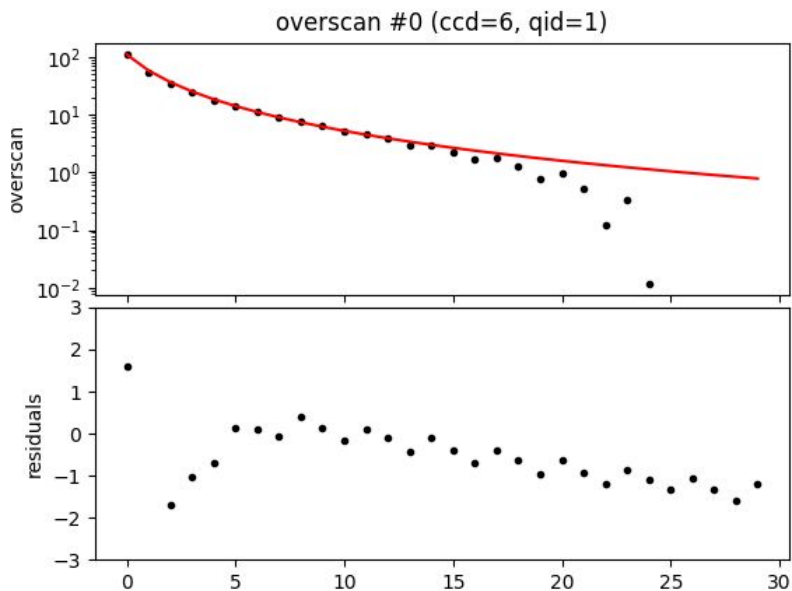
$$\begin{pmatrix} \Delta s_i \\ \delta n_i \\ \Delta q_i \end{pmatrix} = \begin{pmatrix} s_i - n_{eq} \\ n_i - n_{eq} \\ q_i - q_{eq} \end{pmatrix}$$
$$\begin{pmatrix} \Delta n_i \\ \Delta q_{i-1} \end{pmatrix} = \begin{pmatrix} 1 + \frac{\partial \delta}{\partial n} & \frac{\partial \delta}{\partial c} \\ -\frac{\partial \delta}{\partial n} & 1 - \frac{\partial \delta}{\partial c} \end{pmatrix}^{-1} \cdot \begin{pmatrix} \Delta s_i \\ \Delta c_i \end{pmatrix}$$

# Why not "Cosmology with DR2" ?



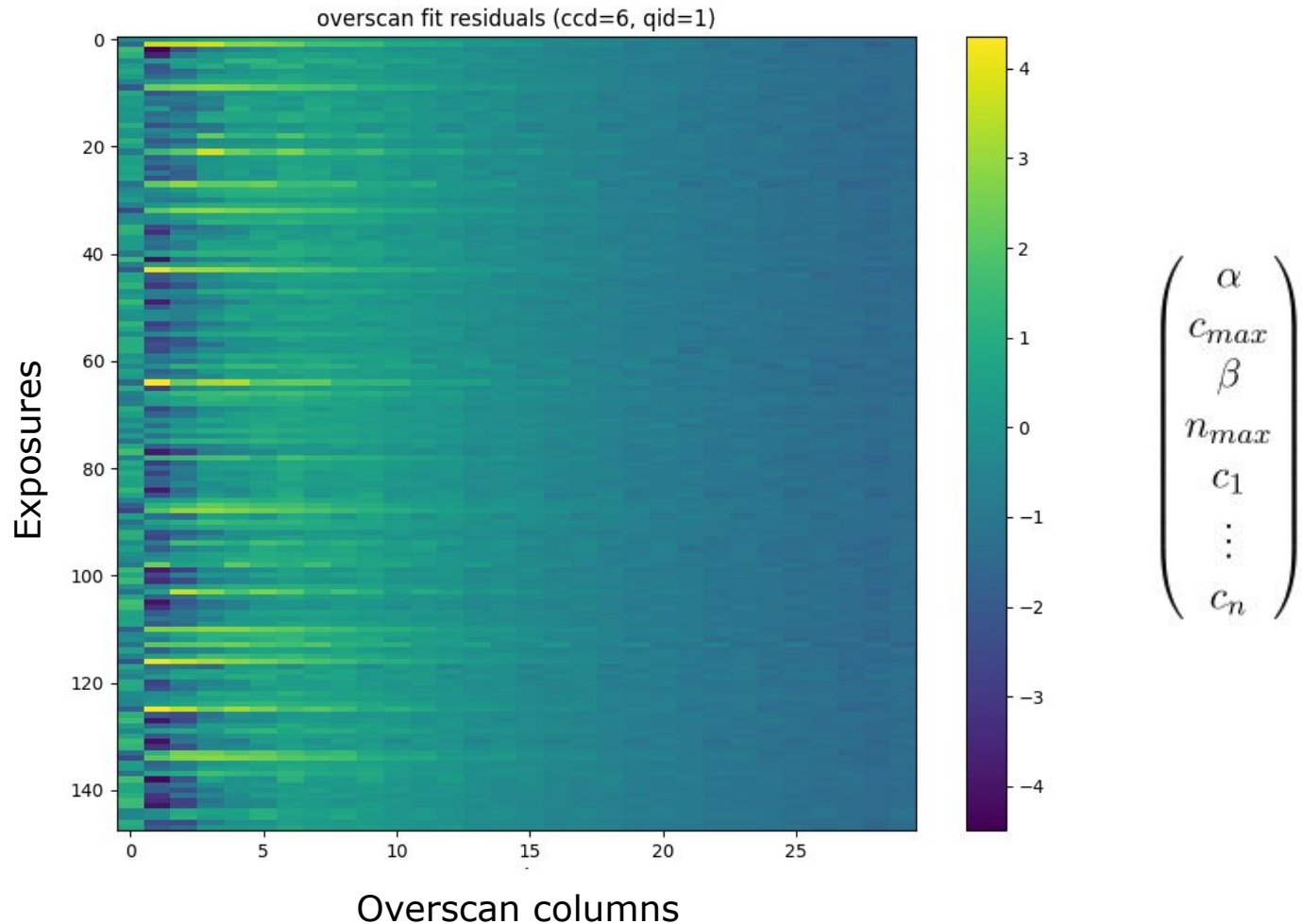
Lacroix &  
Regnault

# Constraining the flush function on overscans

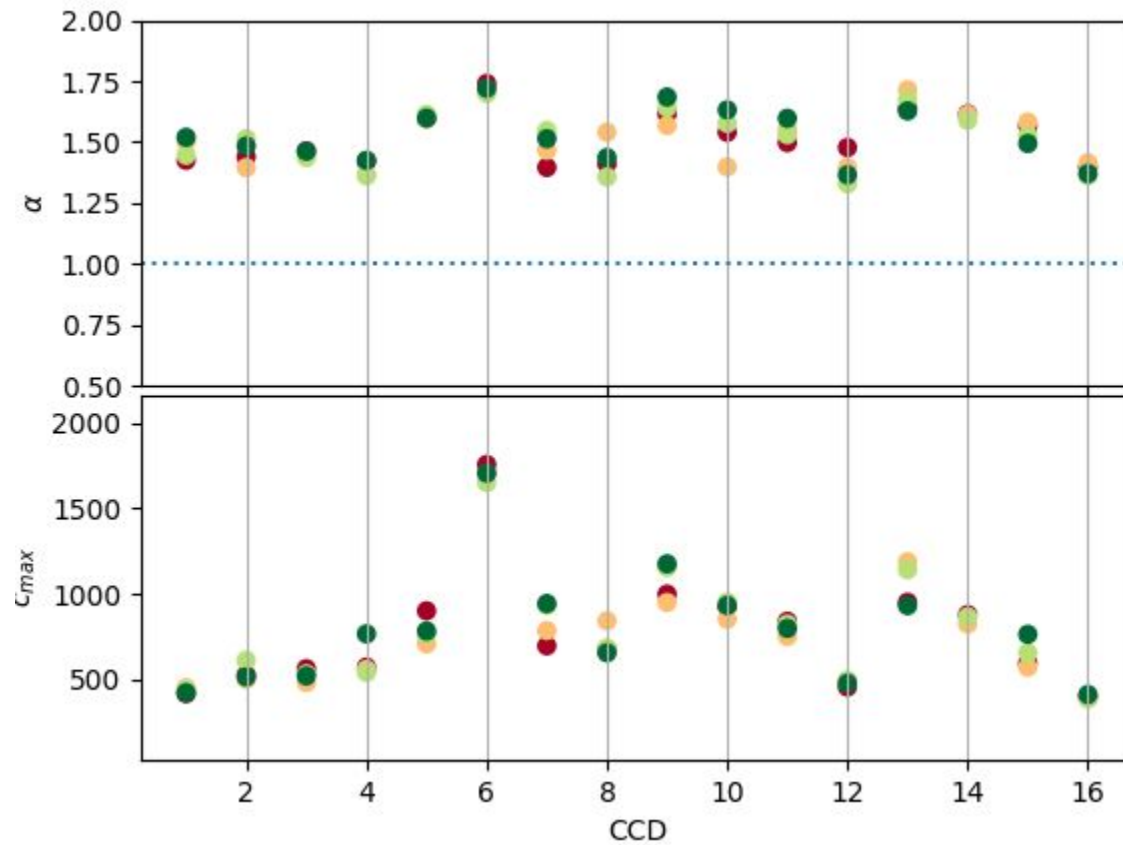


# Constraining the flush function on overscans

- 148 exposures of field #600, taken after 2019-12-01

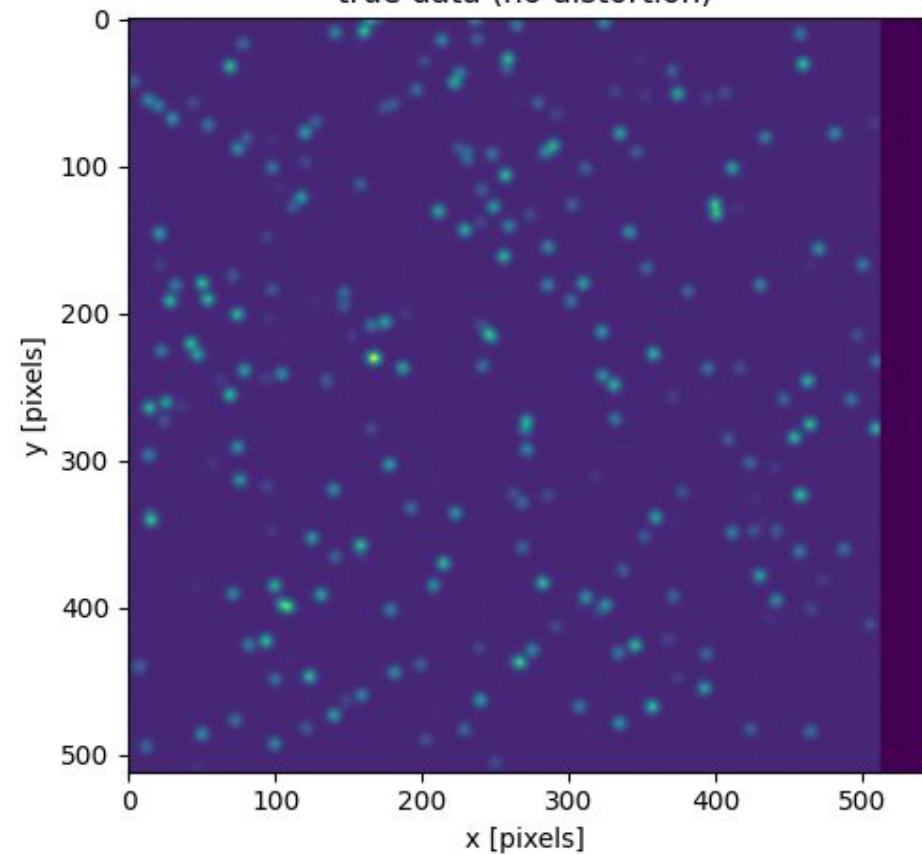


# Model parameters ( $\alpha$ and $c_{\max}$ )

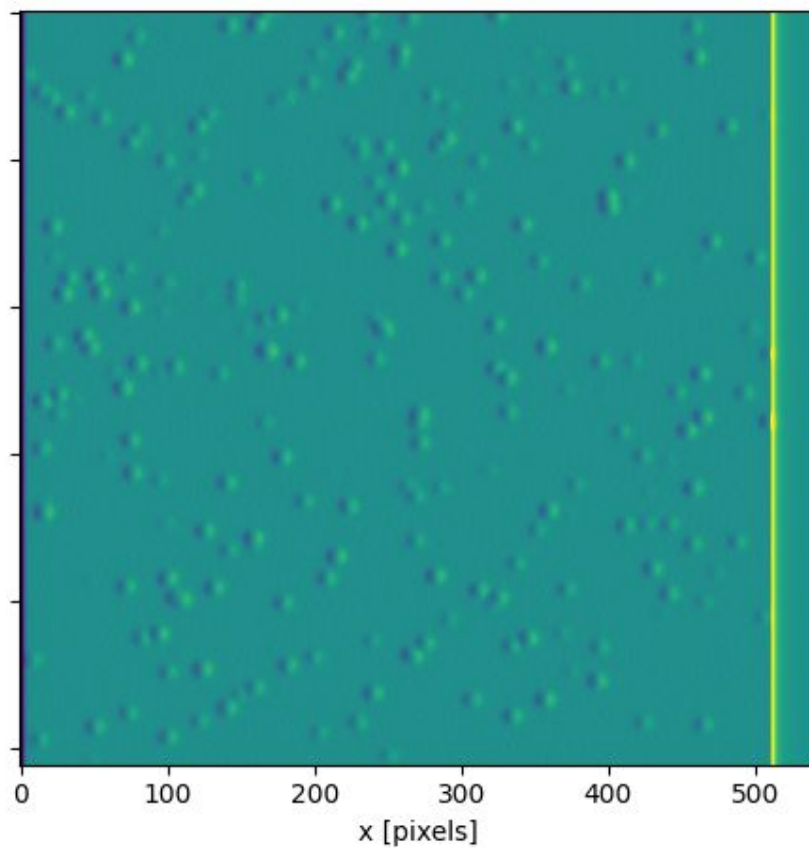


# How does it affect stars ?

true data (no distortion)



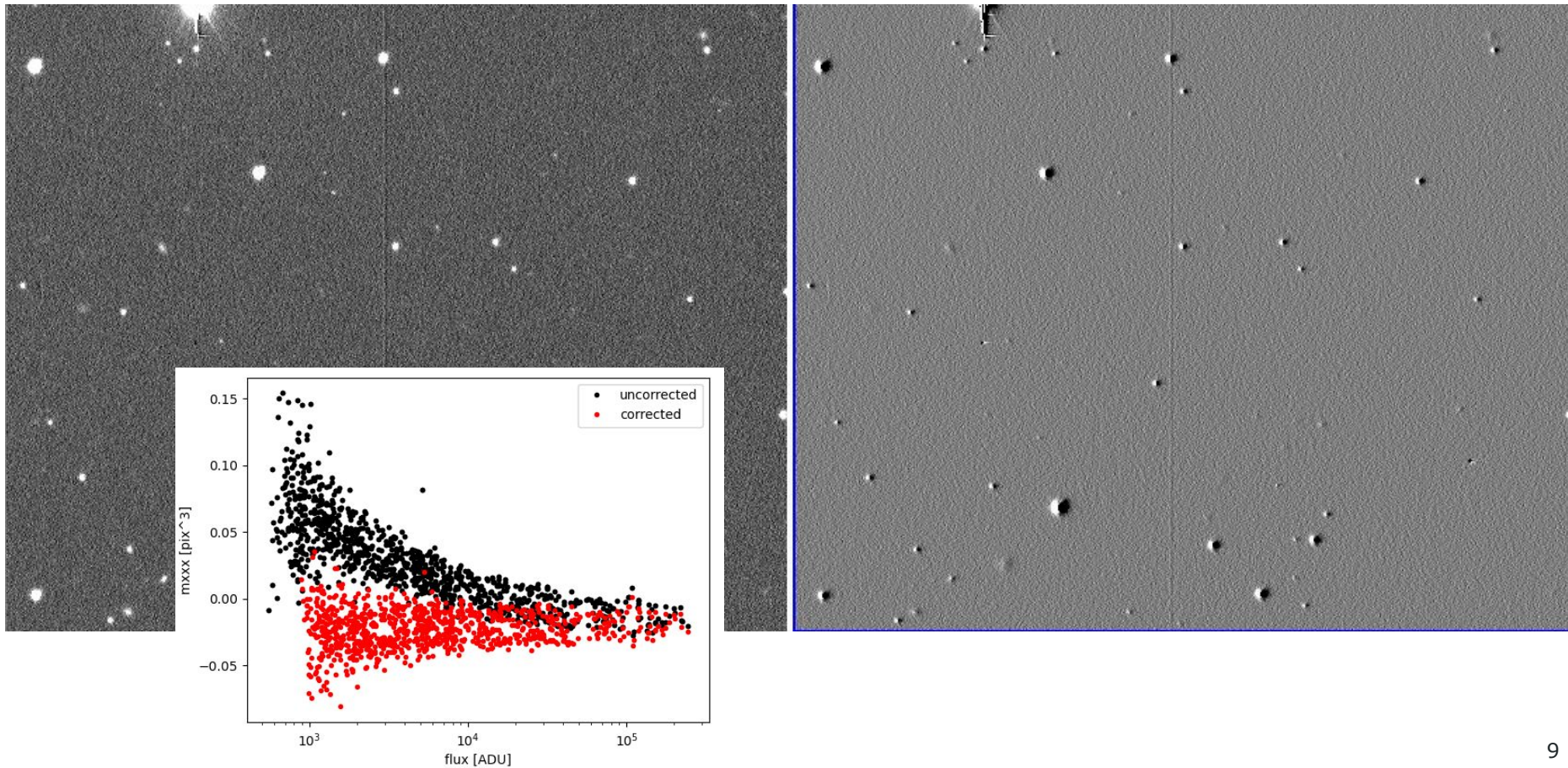
true - distorted





# Can we correct for it ?

Last attempts are promising



# Where to go from now ?

- We have
  - A tentative model of the effect
  - Measurements of the model free parameters
    - 64 parameters
    - 3 main epochs
  - Correction code
- We need to
  - Validate the correction of a large set of data (field #600)
  - Integrate the correction into ztfimage
  - Validate the full detrending code on the same set of data

# Proposal

- Here is a tentative work plan
  - I (NR) release a python module with model & correction code
    - (typically next week)
  - JMC uses this code on the field #600 dataset -> validate the correction on a large scale
    - Typically in 2 weeks from now
  - MR + SC + ... integrate correction code into ztfimg & validate the correction starting from the raw exposures
    - Can be started in //
    - Better to have full prod after JMC's prod
- Goal
  - Have a validation by mid-February

# Validation metrics

- Validation metrics
  - Star second and third moments
    - Should not depend on flux
  - Star aperture flux before / after correction
    - did we alter the fluxes ?
  - Star PSF - aperture fluxes on the same exposures
    - did we restore the linearity of PSF flux estimates ?
  - PSF residuals
    - Is the PSF homothetic again ?
  - Astrometry residuals
    - Should not observe bias as a function of flux

# Conclusion

Week	Jan 15	Jan 22	Jan 29	Feb 5	Feb 12	Feb 19	Feb 26
Model (NR)	X						
#600 Validation (JMC, NR)		X	X	X			
ztfimg integration (MR, SC, ...)			X	X	X		
Ztfimg validation (MR, SC, ...)				X	X	X	X