



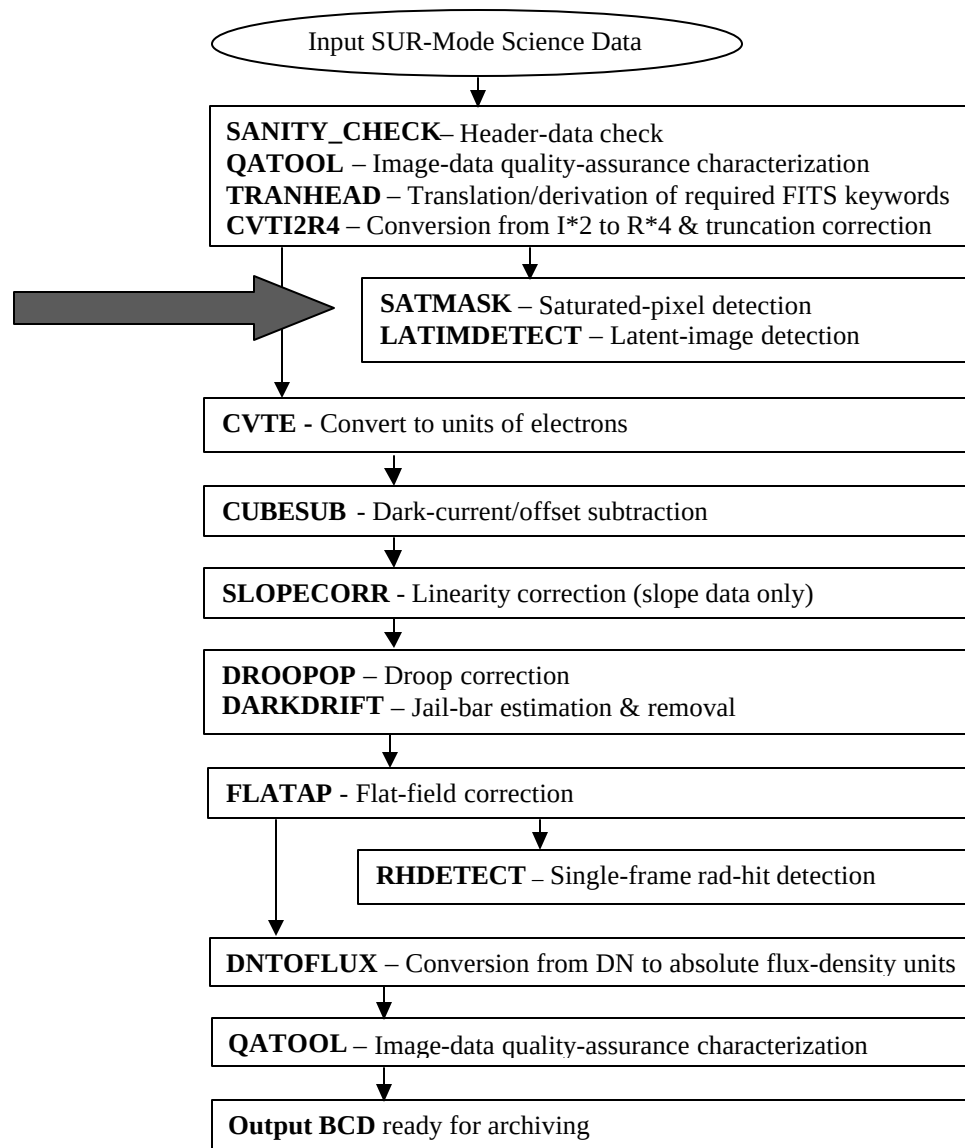
24 μ m SUR-mode Saturation Flagging: SATMASK

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Processing in Pipeline





Changes by Instrument Team

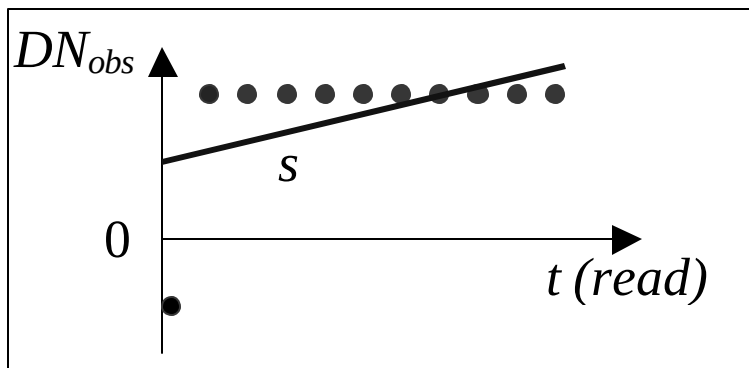
- SUR-mode FITS image:
 - *plane 1*: on-board slope-fit value
 - *plane 2*: difference between “first and second reads” in the ramp
- Introduced thresholding in the difference plane:
 - Save and return difference data when a pixel is suspected to saturate in the ramp.
 - Set all non-saturated pixels to zero.
 - This improves the data compression.
- Nominal saturation value of 50000 DN in a 30 sec. Integration:
 - ⇒ $50000 \text{ DN}/30\text{s} \approx 830 \text{ DN}/0.5\text{s} = \text{difference value threshold.}$
(Si Downlink Meeting 09/03/01).
- For comparison, bright sky gives $\approx 500 \text{ DN}/0.5\text{s}$ (SSC Web page).
- This change implies a slight modification to the SATMASK module which reports in a bit-mask image, saturated pixels and suspect slope values due to cosmic rad-hits.



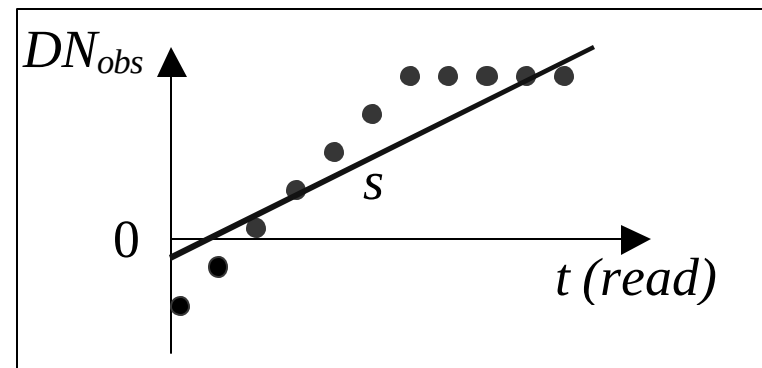
Changes to Algorithm

- Initial algorithm was recommended by the instrument team (Chad Engelbracht, University of Arizona).
- Since only non-zero (saturated) difference values are now returned, a pixel is flagged as saturated in a D-mask (DCE-mask) if:
 1. first difference $\geq THRESHOLD\ VALUE$
 2. If slope = 0 and difference = 0. This can arise if the ramp goes into “immediate saturation” and *Ignore Frames* parameter > 0 .

“immediate saturation”



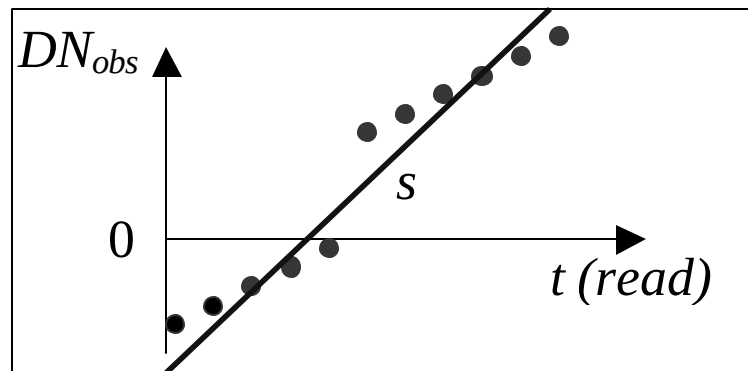
“mid-ramp saturation”





Cosmic Ray Flagging?

1. Rad-hits which occur in the middle of a ramp will give a slope-to-difference ratio >1 . But since a majority of pixels have zero difference values, we cannot use this ratio, such pixels are flagged as suspect if:
slope value $\geq THRESHOLD\ VALUE$



2. Cosmic rad-hits which occur exactly in the second read sample can “mimic” a saturated difference value.
- ➔ Overall, we will have to rely on a more robust rad-hit detection algorithm to flag rad-hits: in the slope plane for case **1** and, in the difference plane for case **2** where the dynamic range is greater.



Pixel Replacement

- Replacement of slope values by difference values is an optional feature of the software
- Data that truly go into saturation as indicated by a non-zero difference value will be more representative of the data. It will make sense to replace them.
- If the non-zero difference value is due to a rad-hit, it also makes sense to replace the slope value. It will be flagged later by the rad-hit detection algorithm.