

HSC Workshop, Dec 14-18, 2009

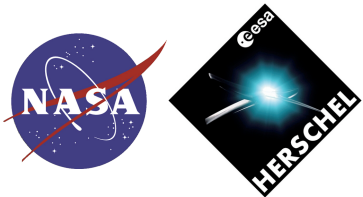


Title

Photometer Scan Map Processing --- Baseline Removal and Naïve/MADmap comparison

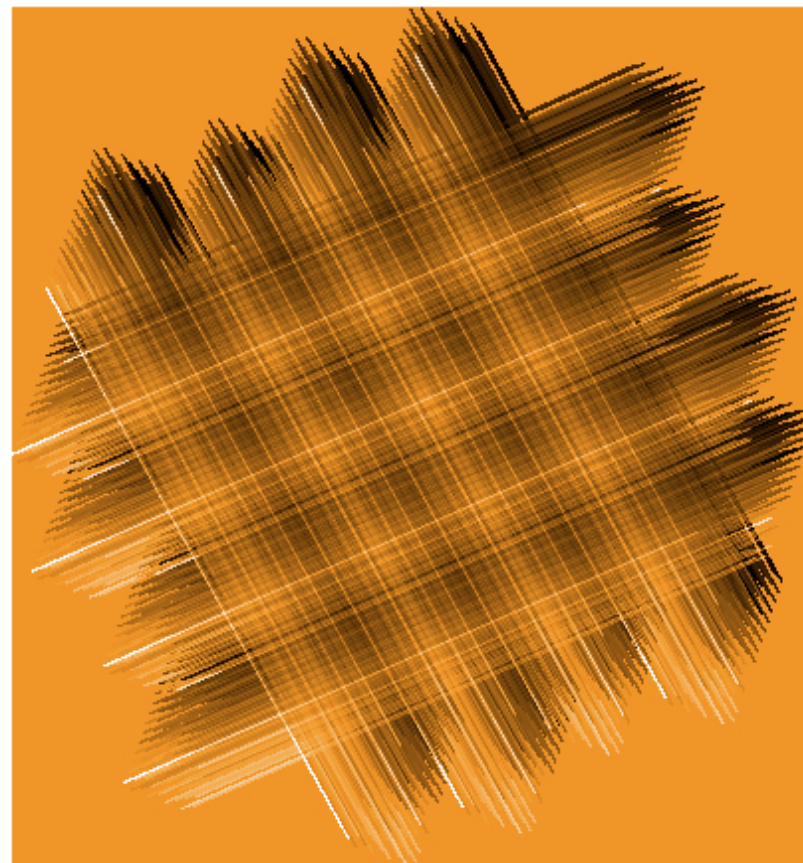
C. Kevin Xu (NHSC/IPAC)





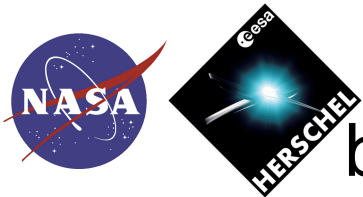
Why baseline removal is needed?

- offsets of individual detector channels on the order of $\sim 1\text{Jy}/\text{beam}$.
- caused by errors of Temperature Drift Correction (\sim a few % \times $\sim 30\text{Jy}/\text{beam}$).



PSW map without baseline removal

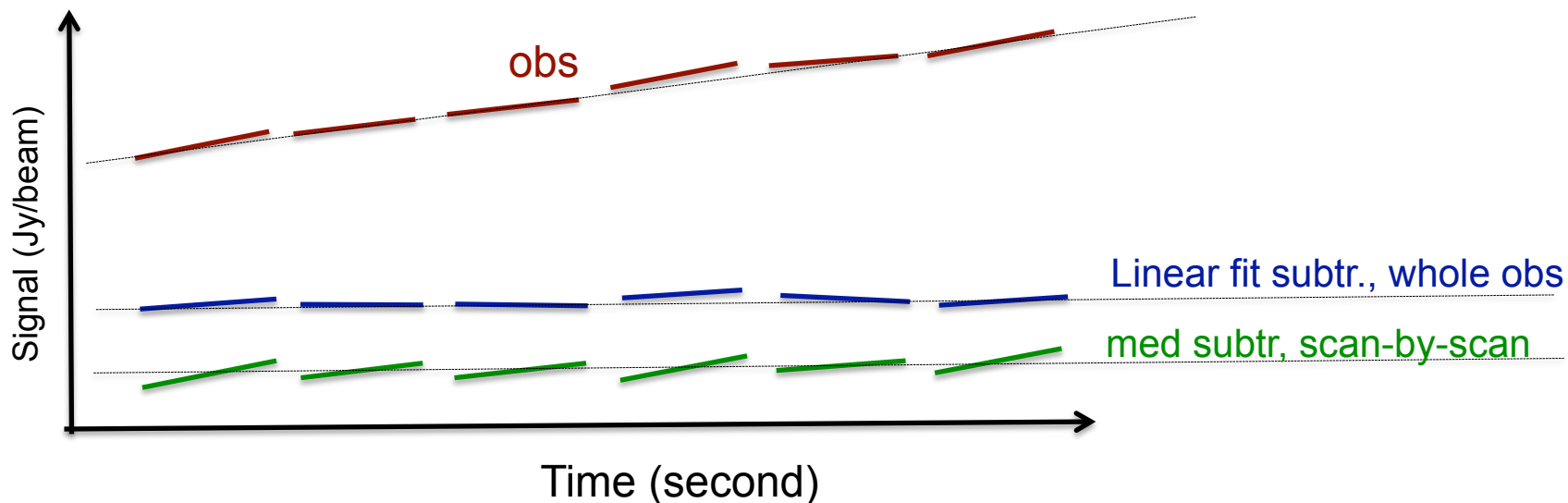




baseline removal modules in pipeline

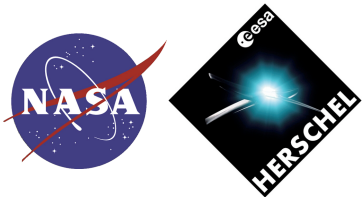
Two methods available in standard pipeline:

1. Subtract the median from the timeline of each channel, scan-by-scan (**default**).
2. Subtract a polynomial fit (default: linear) to the timeline of each channel over entire obs.



• Start the demo!

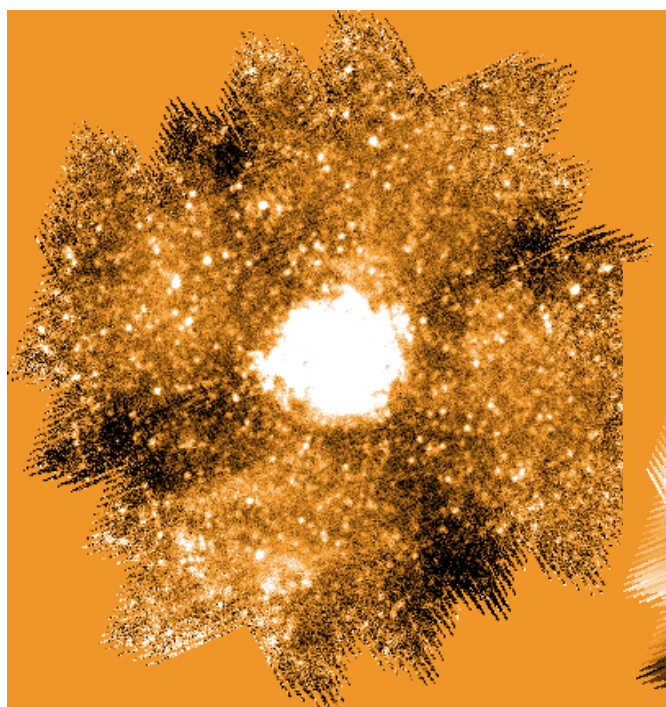




Comparison between two methods

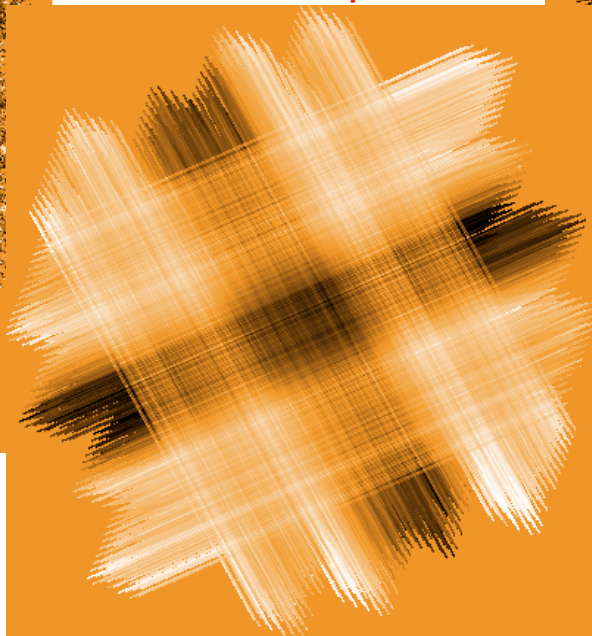
- For observations of point sources, there is little difference between the two.
- For obs of extended sources, method 2 (linear fit to the entire obs) is superior.

method1: scan med subtr.

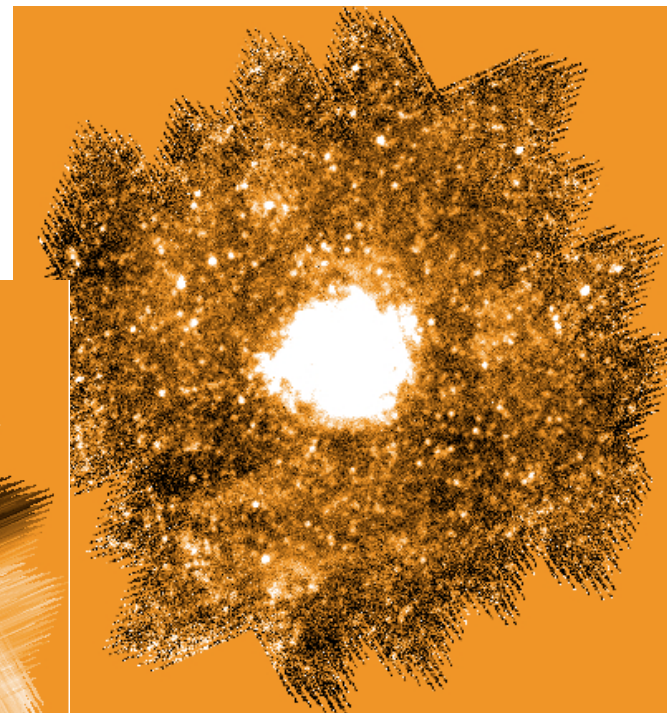


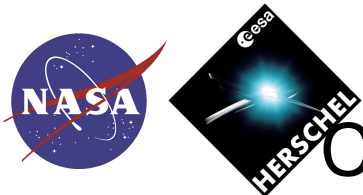
an example of
extended source:

diff. map



method2: obs linear fit subtr.

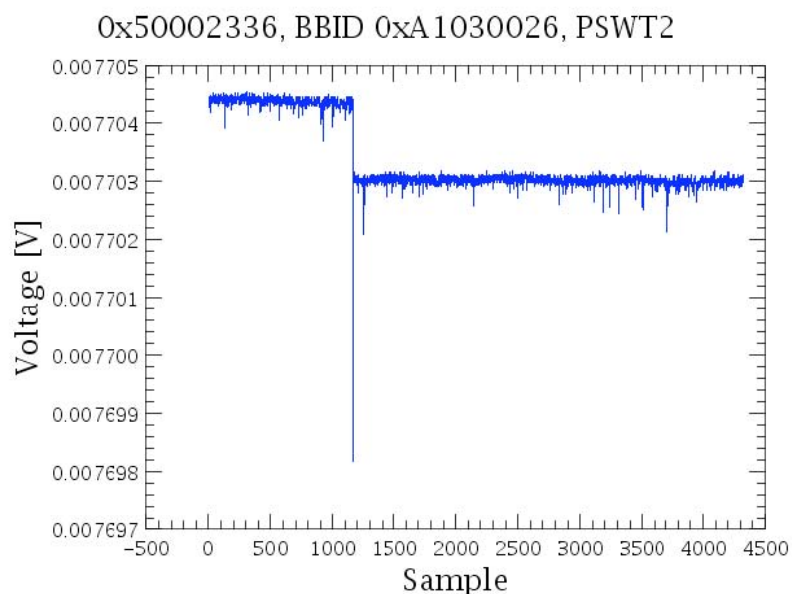




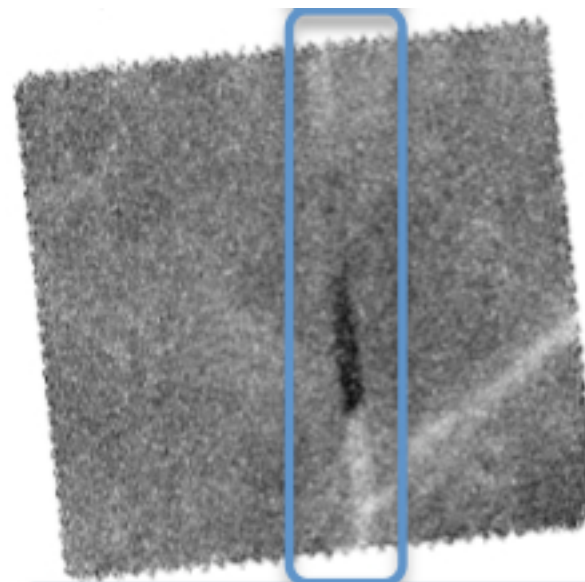
Comparison between two methods (2)

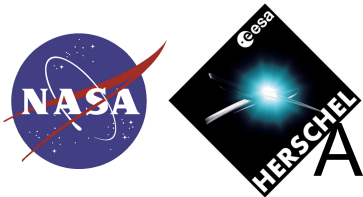
Weakness of method 2:

- vulnerable to jumps between scans due to switching thermistors in Temp. Drift Correction (to avoid saturated/bad-behaved thermistors).
- Example of effects due to a bad-behaved thermistor (a mysterious voltage jump in PSWT2):



Effect on the map (Temp. Drift Corrected):



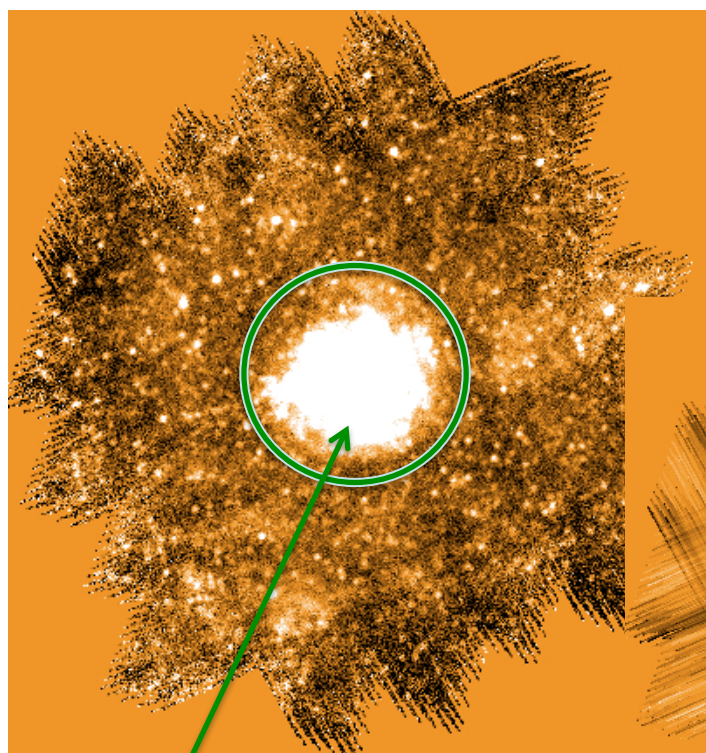


An off-line script for extended sources

- For well defined extended source, mask the source in the median subtraction (script by Pasquale; radius of the mask is an input parameter):

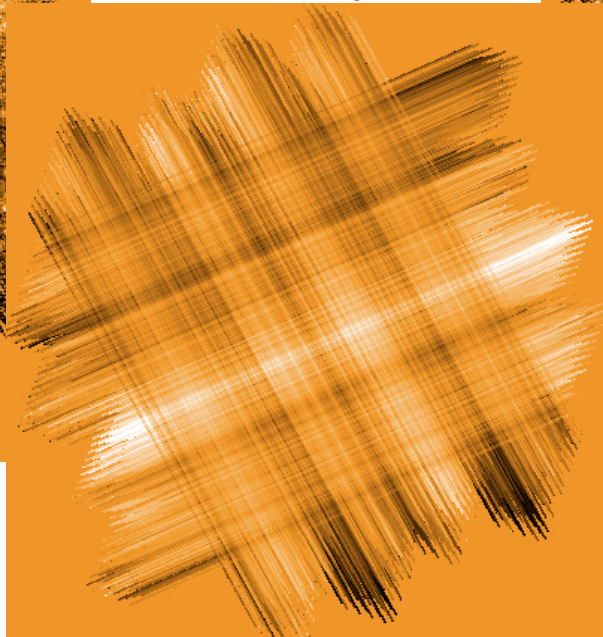
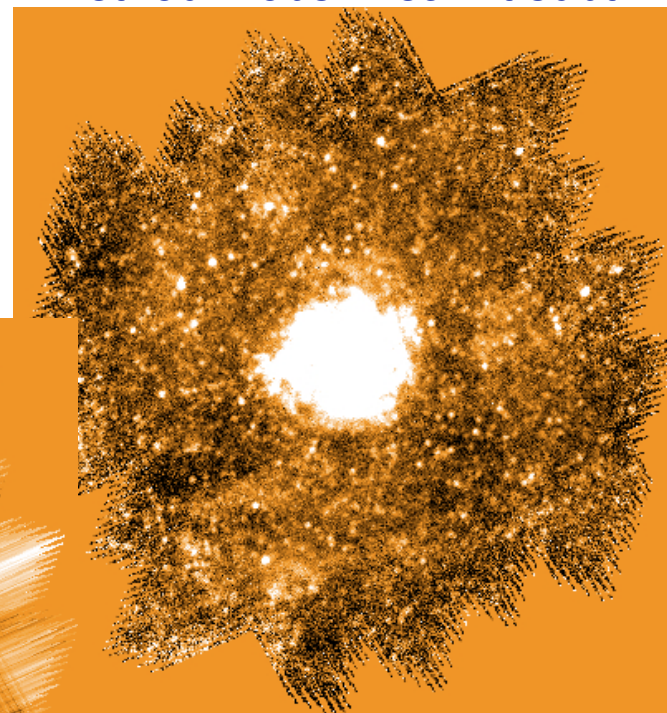
source-masked med subtr.

method2: obs linear fit subtr.

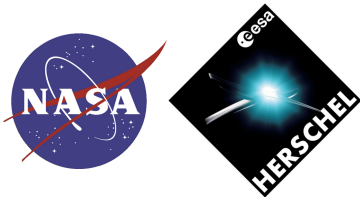


comparison with
method 2

diff. map



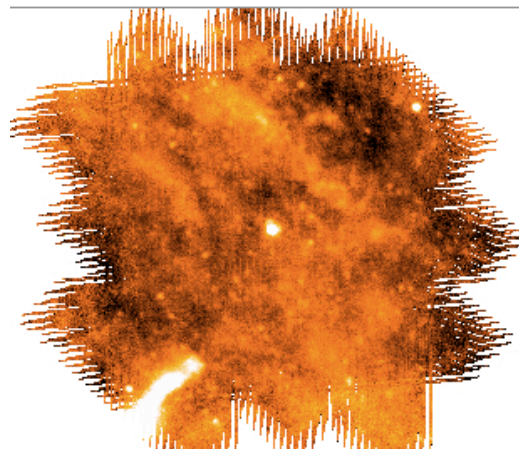
data inside the circle are
masked in med. calculation



Naïve/MADmap Comparison

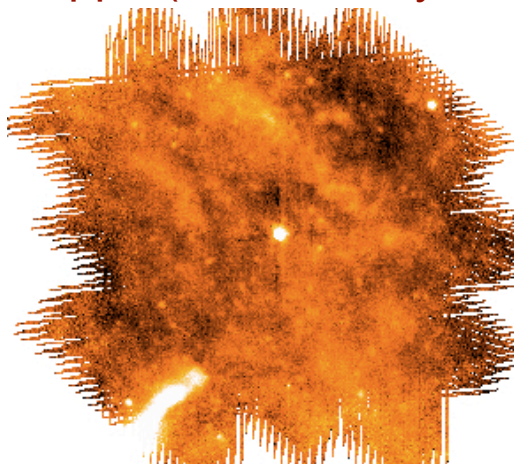
- `mapPlw=naiveScanMapper(scans, array="PLW")`

Naïve:
(simple average)

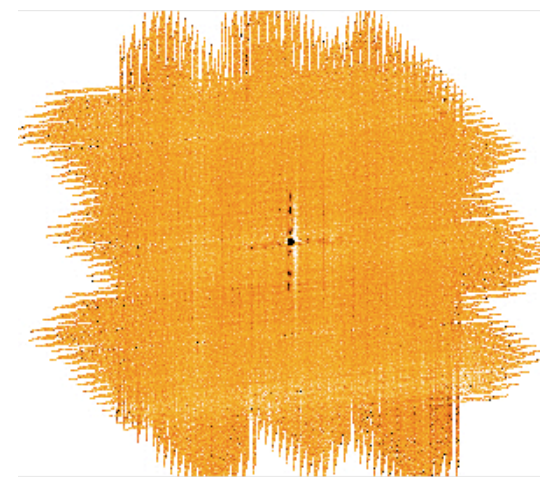


- `mapPlw=madScanMapper(scans, array="PLW")`

MADmap:
(ML, minimize
uncorr. 1/f noise)



Diff. map:



- MADmap is slightly smoother.
- **But:** shadows around the central source ($\sim 3Jy$).

