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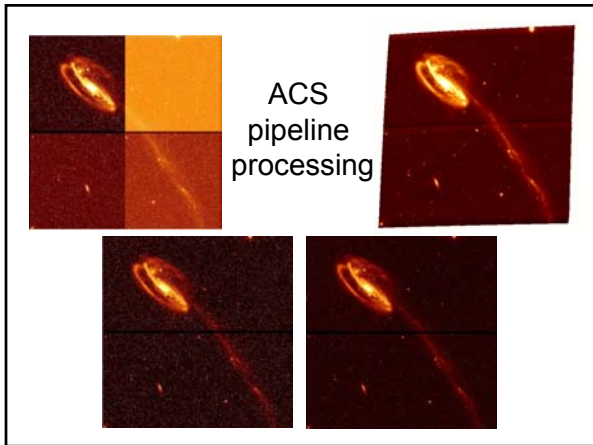
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### Acknowledgements and References

- ACS bias and dark calibration cohorts: Marco Sirianni, Ray Lucas (see posters)
- Reference file production and delivery: Mike Swam, Rossy Diaz-Miller
- CALACS+MultiDrizzle pipeline: Anton Koekemoer, Warren Hack, Chris Hanley
- ACS reference file webpages: [http://www.stsci.edu/hst/acs/analysis/reference\\_files](http://www.stsci.edu/hst/acs/analysis/reference_files)

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## Pipeline drizzling

- MultiDrizzle in the pipeline; uses a parameter table (MDRIZTAB)
- POS TARGs now also automatically associated (and drizzle-combined)
- Filter-dependent distortion solutions (polynomial) with residual correction (image)
- More in Anton's talk / splinter session...

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## Philosophy and Practices

- "Best" calibration reference files typically available within 2-3 weeks after any observation: quality vs timeliness
- Automated reference file production
- Production in native pipeline environment (SunFire)
- Consolidated deliveries to CDBS & archive
- Reference file quality control, and CCD trending

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## WFC and HRC bias calibration

- Bias *level* is measured from each frame's overscan (with some random variation!), and subtracted (by amplifier quadrant)
- Bias *features* are subtracted by the "superbias" reference file (BIASFILE)
- Bi-weekly superbias is a simple cleaned combination of 8 frames taken during each two-week period
- Bias structure (mainly bad columns) assigned flag 128 in each superbias data quality (DQ) array as of Oct 2004; was in a static bad pixel table (BPIXTAB); flags propagate to science data

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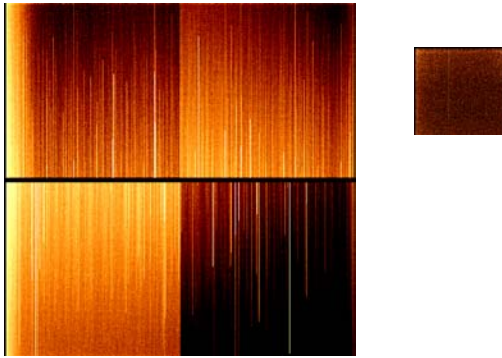
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## WFC and HRC bias features



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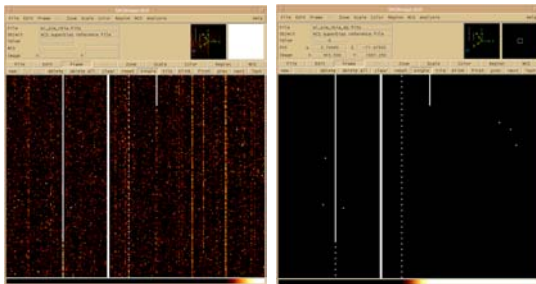
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## Bias structure and corresponding flagging (as of Oct 2004)



WFC bad columns

DQ flag 128

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## WFC and HRC dark calibration

- Monthly CCD annealing
- Four 1000-second dark frames now obtained every *other* day (was every day until Oct 2004), and just before/after each CCD annealing
- Superdark (DARKFILE) is a hybrid combination of a 2-week "basedark" (has less noise) and a 4-frame "daydark" (has daily warm and hot pixels)
- Residual bias level correction, so superdarks don't propagate one source of this problem
- Dark features (not just hot pixels anymore) flagged in superdark data quality (DQ) array. More later...

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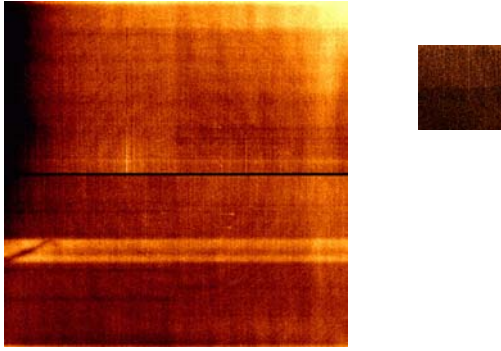
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### WFC and HRC dark features




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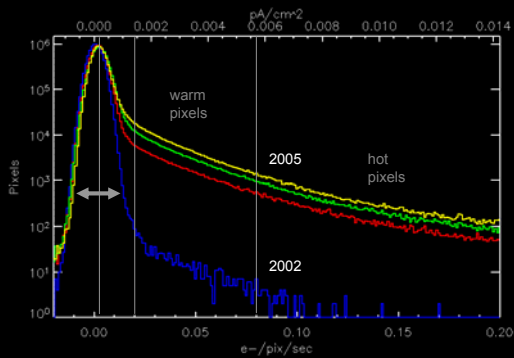
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### ACS / WFC dark current histogram 2002-2005




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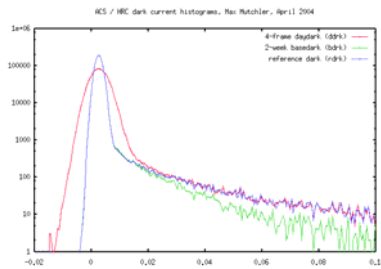
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Superdark reference files are hybrids, made from a 2-week "basedark", with warm and hot pixels from a 4-frame "daydark" added




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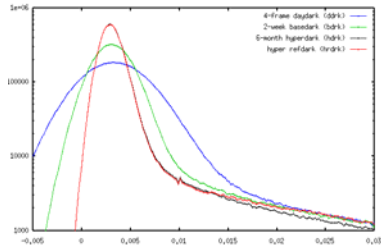
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## Make-your-own “hyperdark” – the UDF




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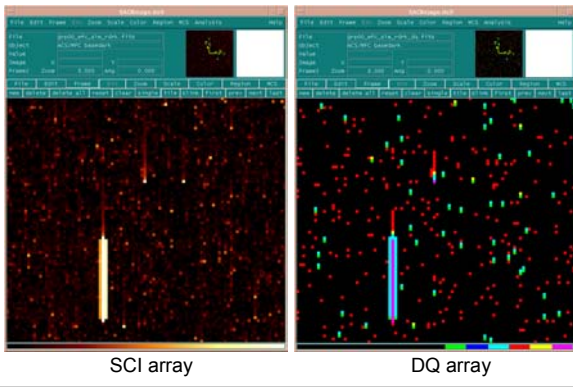
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## WFC superdark and corresponding data quality flagging




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## New ACS data quality flagging

- Starting Oct 2004, we redefined some redundant DQ flags for new use in reference file DQ arrays
- Use ref file DQ arrays more, use bad pixel table (BPIXTAB) less
- Flag 128 now used in superbias DQ (better trending)
- Flag 32 redefined as “hot pixel CTE tails” (just the first trailing pixel for now) in superdark DQ
- Flag 64 redefined as “warm pixels” between 0.02 and 0.08 e/sec (also gets more of the CTE tails) in superdark DQ
- New flags provide optional leverage: the pipeline ignores flags 32 and 64
- Must set bits=96 to ignore new flags in standalone drizzling, or leave bits=0 to exclude these pixels

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## Pipeline Calibrations of ACS data

### Abstract

Our strategies for collecting ACS calibration data, and converting it into reference files for use in the pipeline, have been continually evolving since the instrument was installed during Hubble Servicing Mission 3B in March of 2002.

This talk provides an historical overview of basic ACS pipeline calibrations, including the impact that some of the more recent changes have on downstream data processing (e.g. drizzling).

The emphasis will be on bias and dark calibrations, but significant changes in other calibrations will also be mentioned. I will describe the expected detector degradations that these calibrations are designed to track and correct, and also some unexpected anomalies we've encountered, and the steps we've taken to ameliorate them.

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## Overview

- History and recent improvements to ACS pipeline calibrations
- Emphasis on bias and dark calibrations
- Philosophy & practices: quality vs practicality and timeliness
- Reference file production and delivery
- Data quality flagging
- Monitoring detector trends
- Ramifications for downstream data reductions, e.g. drizzling

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