



ACIS Superbias Creation

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for the ACIS Instrument Team



Chandra Calibration Workshop
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Credits

Mark Bautz

Joe DePasquale

Peter Ford

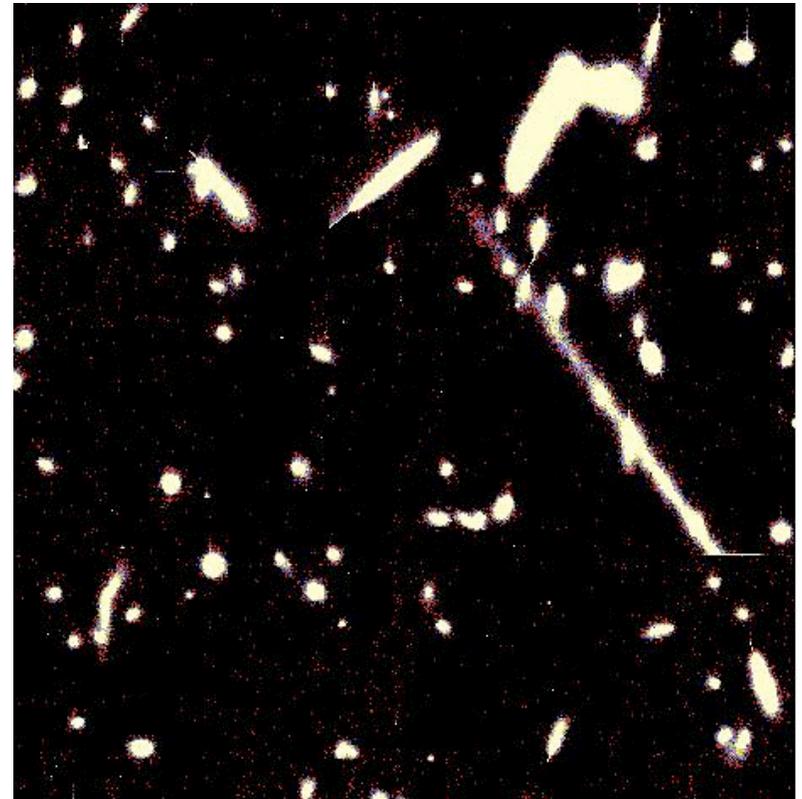
Catherine Grant

Paul Plucinsky

Gregory Prigozhin

The Raw Frames

- These are overclock corrected, raw images collected under the ACIS external calibration source.
- white is above 20 adu, black is below 3 adu (typical noise value), color is in between
- 1 adu \sim 4 eV \sim 0.3 PI



i1 Raw Exposures

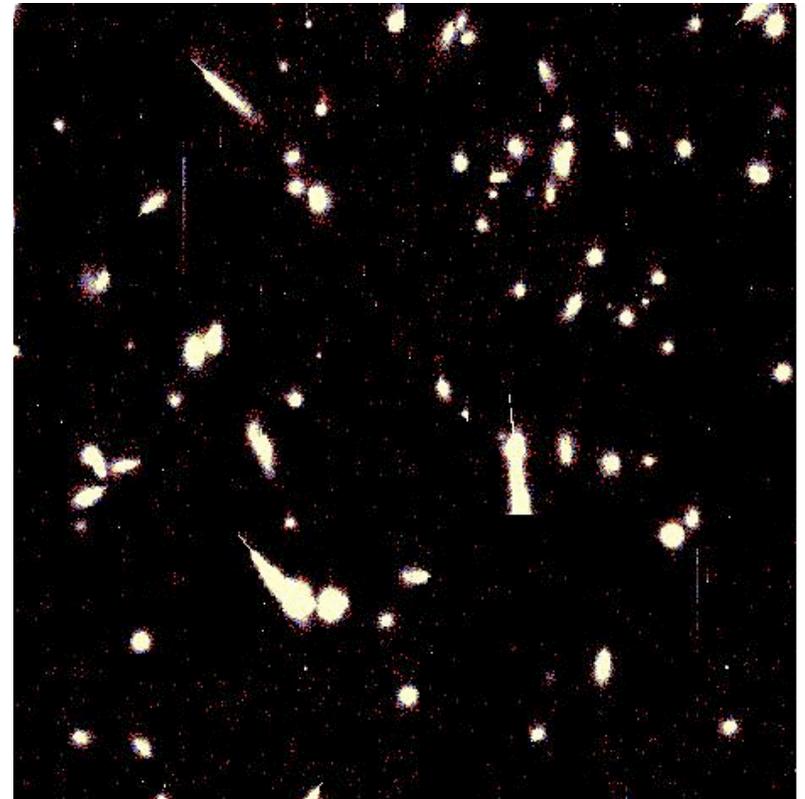


3

20

The Raw Frames

- Front Illuminated Devices are affected because they are thicker and because there is no electrical field in the bulk to draw the charge away.

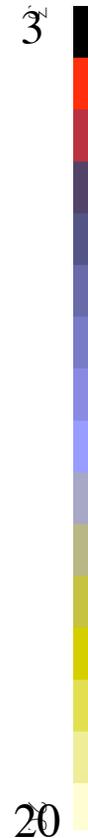
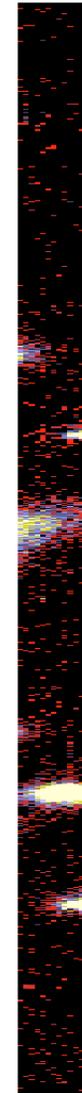


i0 Raw Exposures

Special Raw Frames

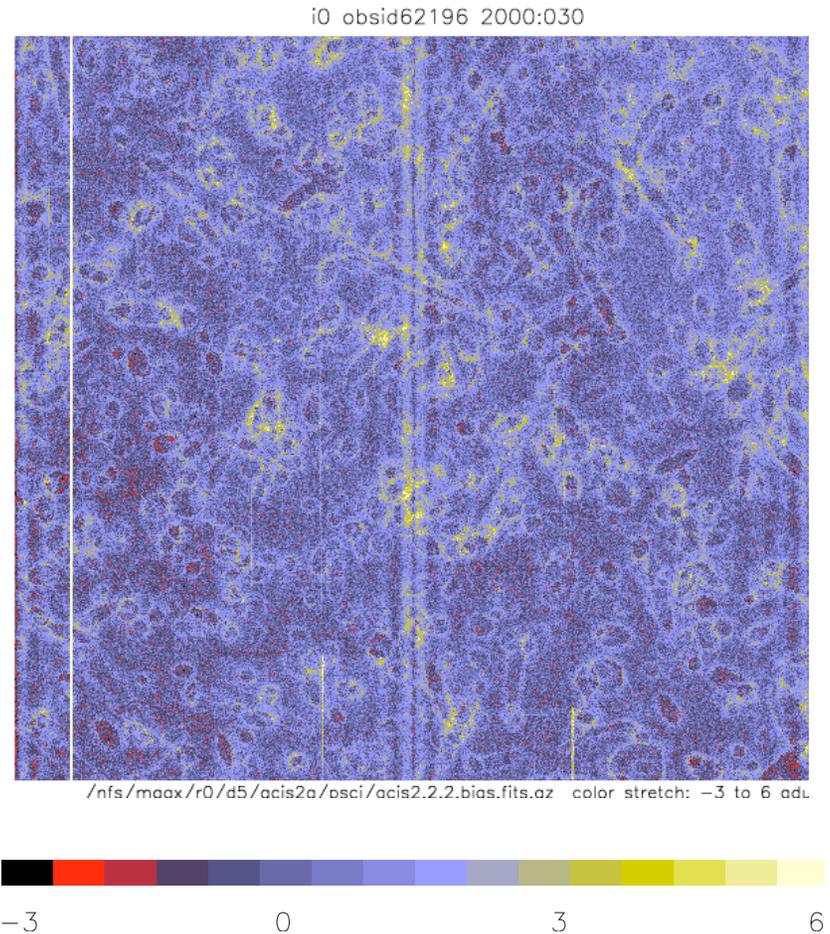
- Some particles deposit enough charge to escape the potential well and charge the traps on the surface. Some of these traps have very long time constants.
- In 2001 Obsid 61581, taken in the special “cuckoo” mode, caught one in the act.

-6.4 sec



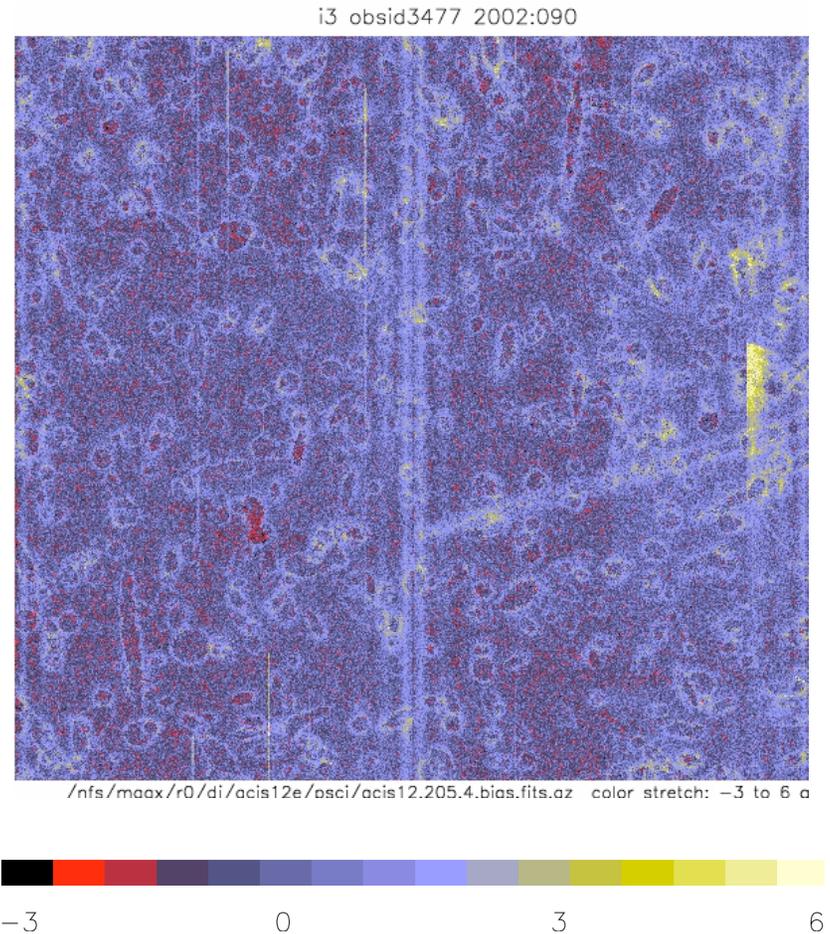
Bias Frames

- Here the color stretch is changed to better see the remnants from the cosmic rays.
- These are typical FI biases. The only selection applied was full frame with stable temperature.
- The images have been overclock corrected.



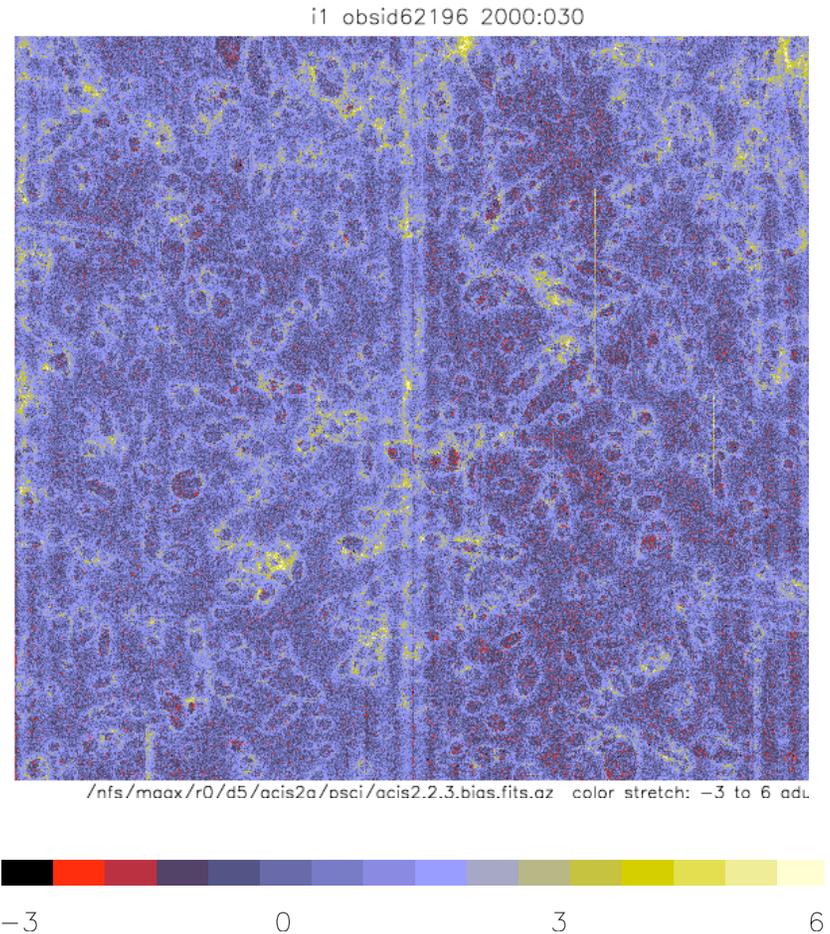
“Bias Anomalies”

- More striking artifacts appear when extra charge is present in several pixels over several frames.
- While about 72% of bias files have at least one column 3adu high, less than 4% have features at least 5 columns wide and less than 1% have features at least 10 columns wide.



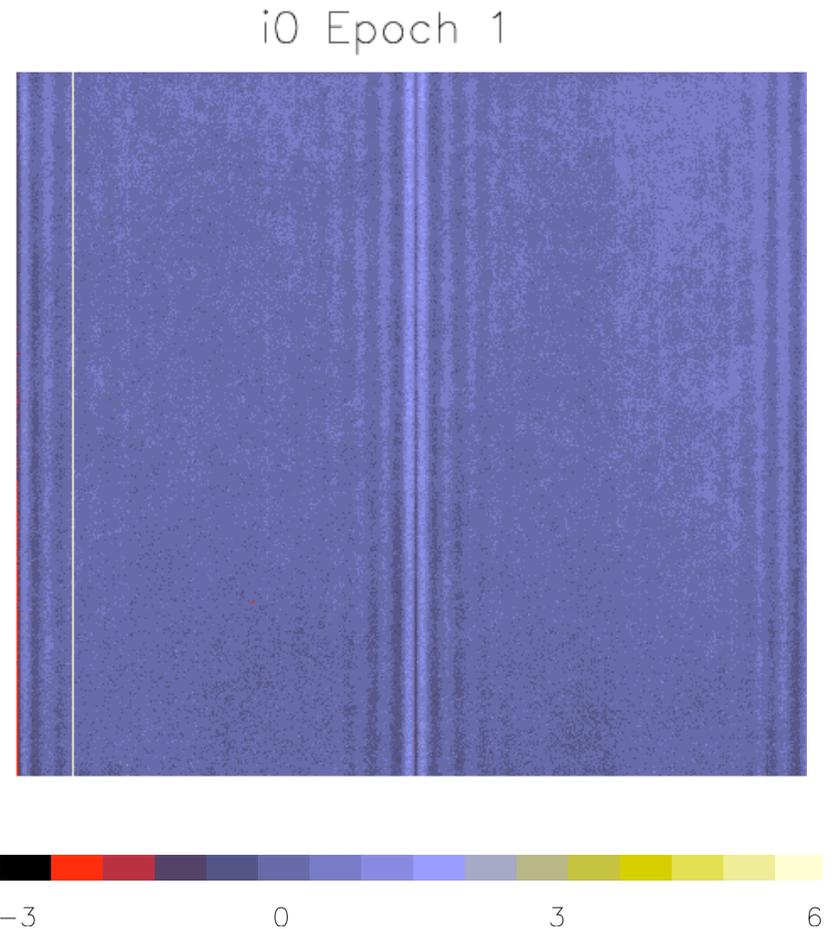
To Create a Superbias

- Use about three months, or one “Epoch”, worth of bias frames.
- For each pixel:
 - find the median value
 - find the standard deviation of values under the median, *sig*
 - find mean within 3 *sig* of the median value



The Superbiases

- Cosmic ray artifacts are suppressed.
- Electronics effects remain (as they should)



Summary

