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ACS Update

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1) ACS Considerations for MUG
   - WFC : CTE, polarizers, & geometric distortion
   - SBC : PSF calibration initiative

2) WFC Performance: Read Noise; Dark Current

3) Details of Ongoing ACS Team Projects:
   - WFC Subarray Overhaul: Planning & Testing
   - “Save the Pixels” Initiatives for WFC

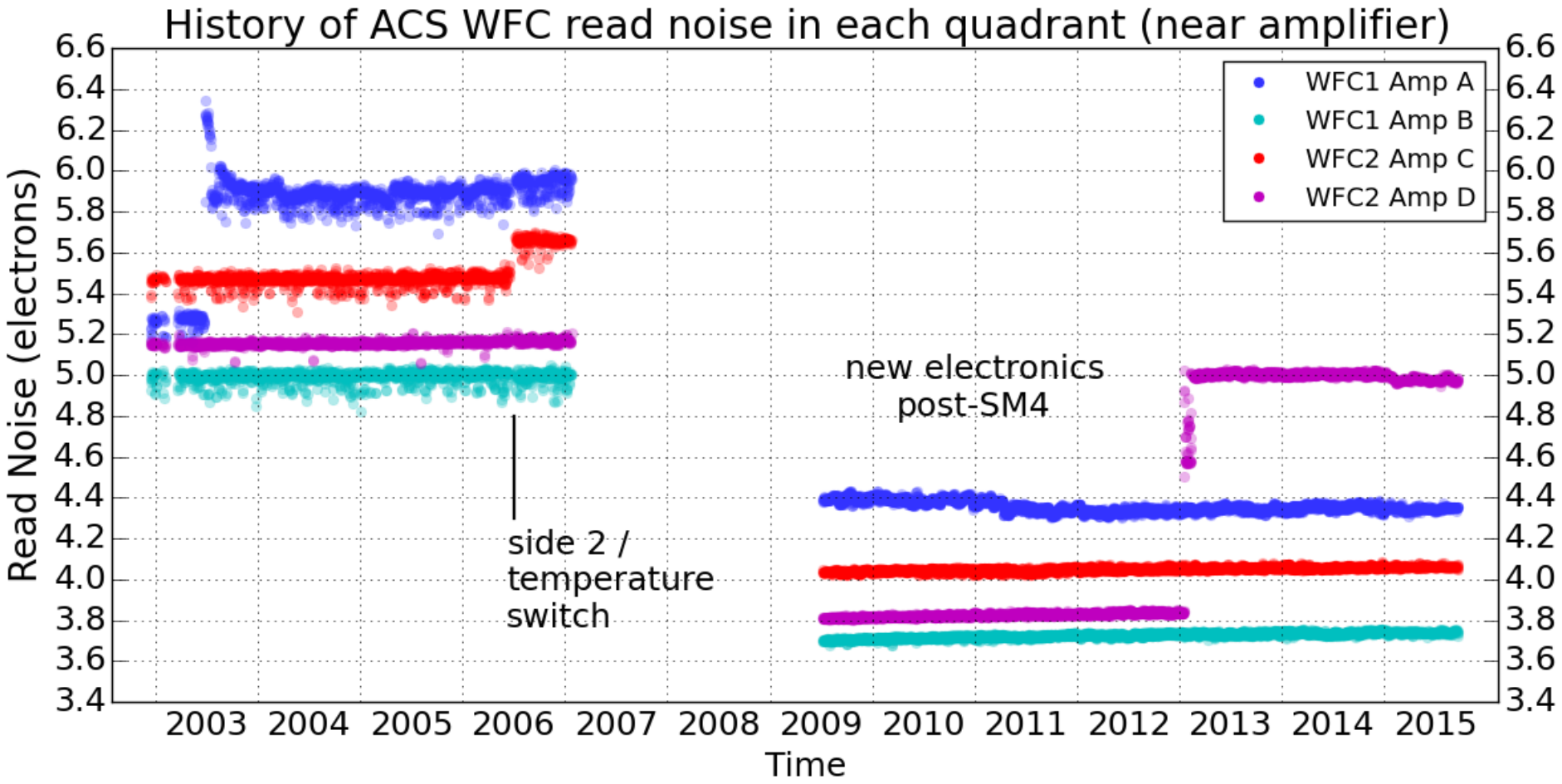
4) ACS Documentation Revisions & Additions

ACS News of Note for MUG

- WFC charge transfer efficiency (CTE)
  - Continues to degrade, though *less quickly* than pre-SM4 extrapolation
  - Pixel-based correction to be updated in CALACS (matching UVIS alg.) later in 2016
  - Revised post-SM4 time dependence will be validated with stars, hotpix, & EPER
  - Images with <20e- background can have severe, possibly unrecoverable, trailing
  - Calibration DARKs now being post-flashed (to boost background) since Jan'15
- WFC geometric distortion
  - Updated distortion model to be part of next OPUS build (early 2016)
  - Relative astrometry across DRZ images improving from ~0.1pix → ~0.02pix
  - Distortion model details and validation documented in ACS ISRs in 2015
- Cyc22&23 programs to calibrate WFC polarizers to <1%
- Cyc23 program to measure extended wings (out to 5") of SBC PSF

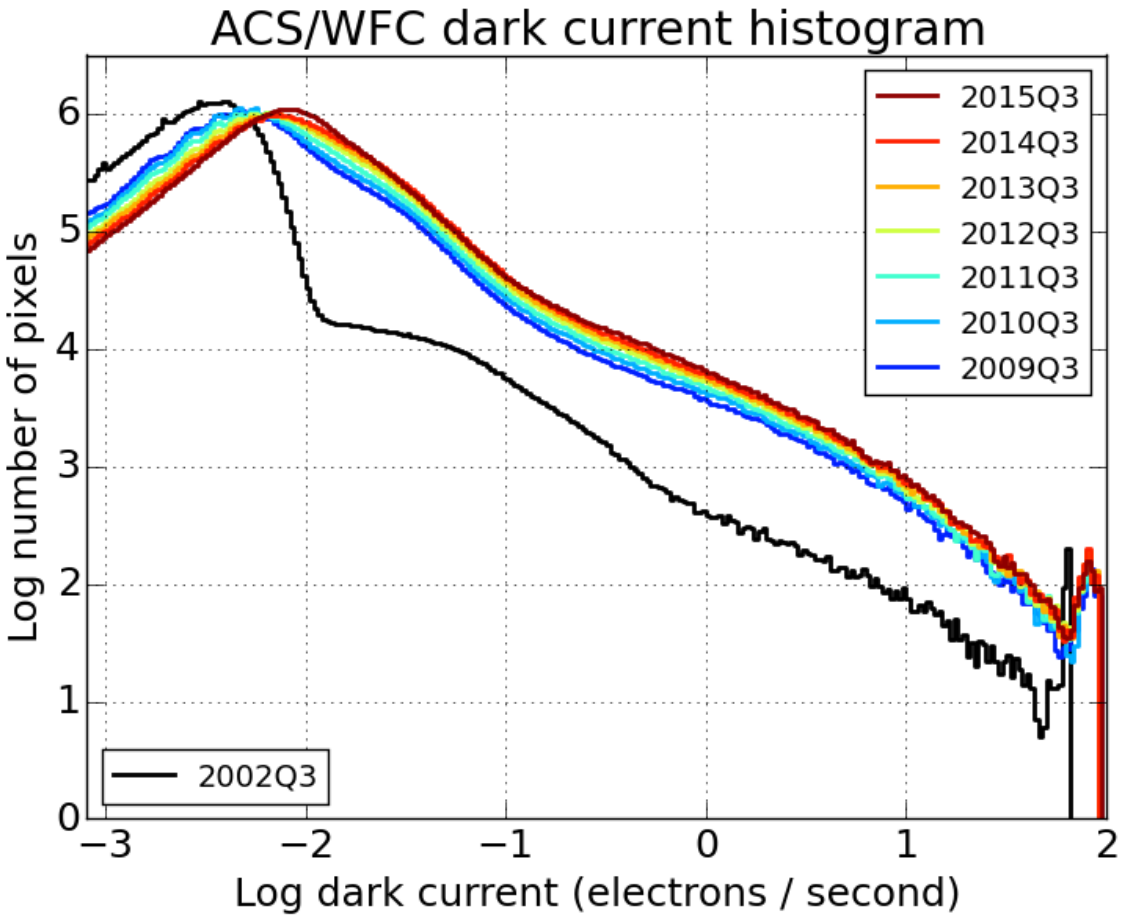
WFC Read Noise Monitoring

- All WFC amps' read noise have been stable since Jan'13 anomaly
- AmpB (lowest noise) still recommended for subarray obsvs.



WFC Dark Current Monitoring

- WFC dark current histogram is trending smoothly
- CTE-mitigating LED post-flash ongoing since mid-Cyc22
  - Exploring 4wk rather than 2wk “superdarks” b/c of increased noise



WFC Subarray Overhaul

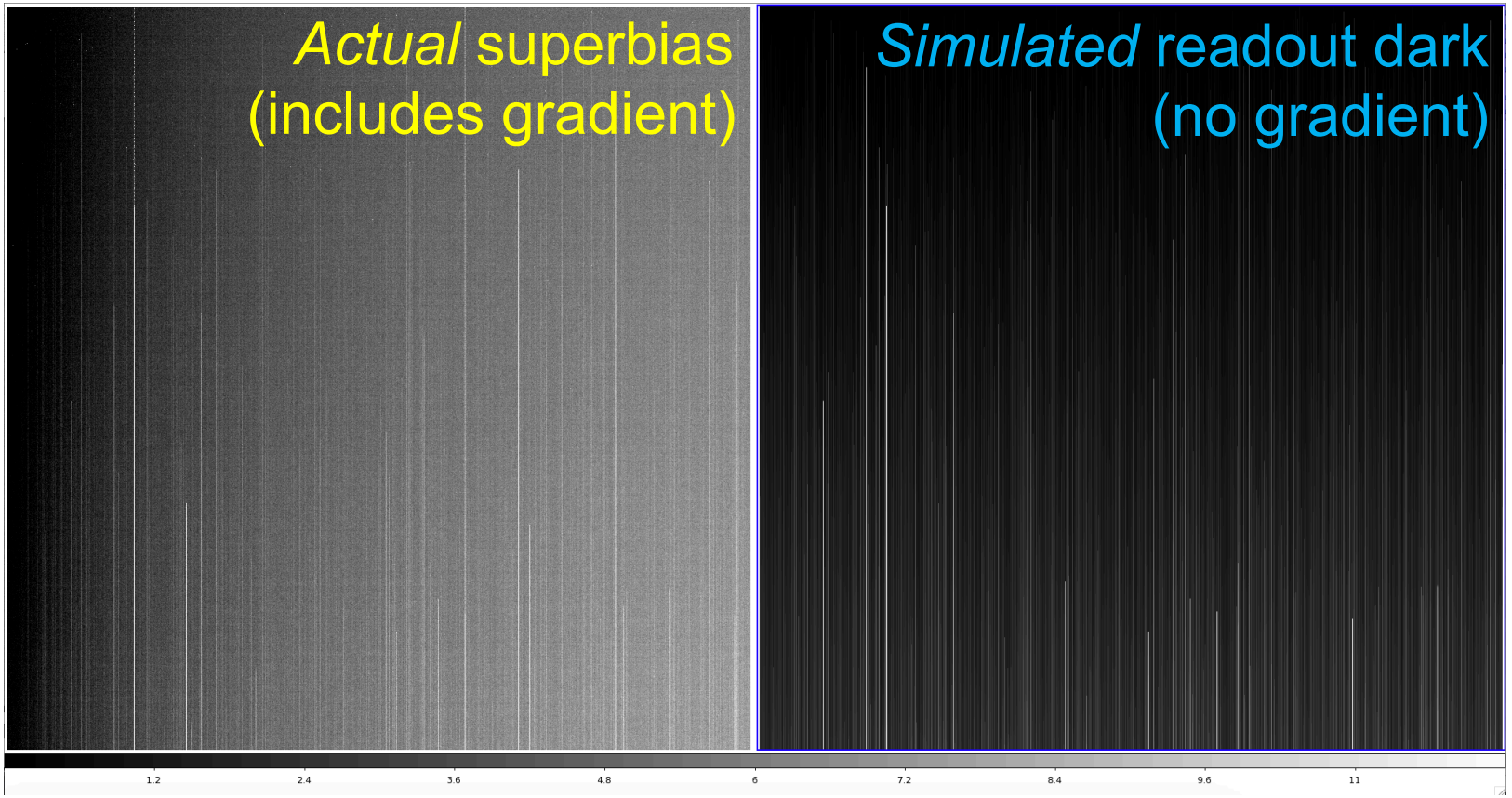
- Calibration headaches for post-SM4 ACS/WFC subarrays:
  - De-biasing post-SM4 subarray images
    - Post-SM4 bias structure varies with readout timing pattern (because of new ASIC & DSI)
    - Readout timing patterns, unchanged since pre-SM4, differ b/w subarrays and full-frame
    - Overhead in calibration orbits (~100 orbits/year) to obtain subarray-mode bias frames
    - Overhead in personnel resources to insure subarray biases are contemporaneous
  - Readout-timing Δ makes pixel-based CTE correction inapplicable to non-2K subarrays
  - Readout overheads *longer* than full-frame; <2K columns prevents bias-shift correction

- Solution: Re-define WFC subarray readouts to match full-frame timing
  - Twelve new subarray modes, all with 2K columns: (512,1K,2K) rows; all 4 quadrants
  - Subarray biases no longer needed (excerpt from full-frame); identical CALACS steps

- Implementation/Validation time-table:
  - GSFC ground-testing in Oct/Nov'15 validated; On-orbit test (23 Nov'15) validated
  - FSW change to enable regular use of new subarrays is planned for April/May'16
  - Necessary mods to OPUS, CALACS, APT will be in place well before FSW change
  - Existing subarray modes will transition to "available but unsupported" as of Cycle 24
  - Subarray changes documented in ACS IHB for Cycle 24 (and forthcoming STAN)

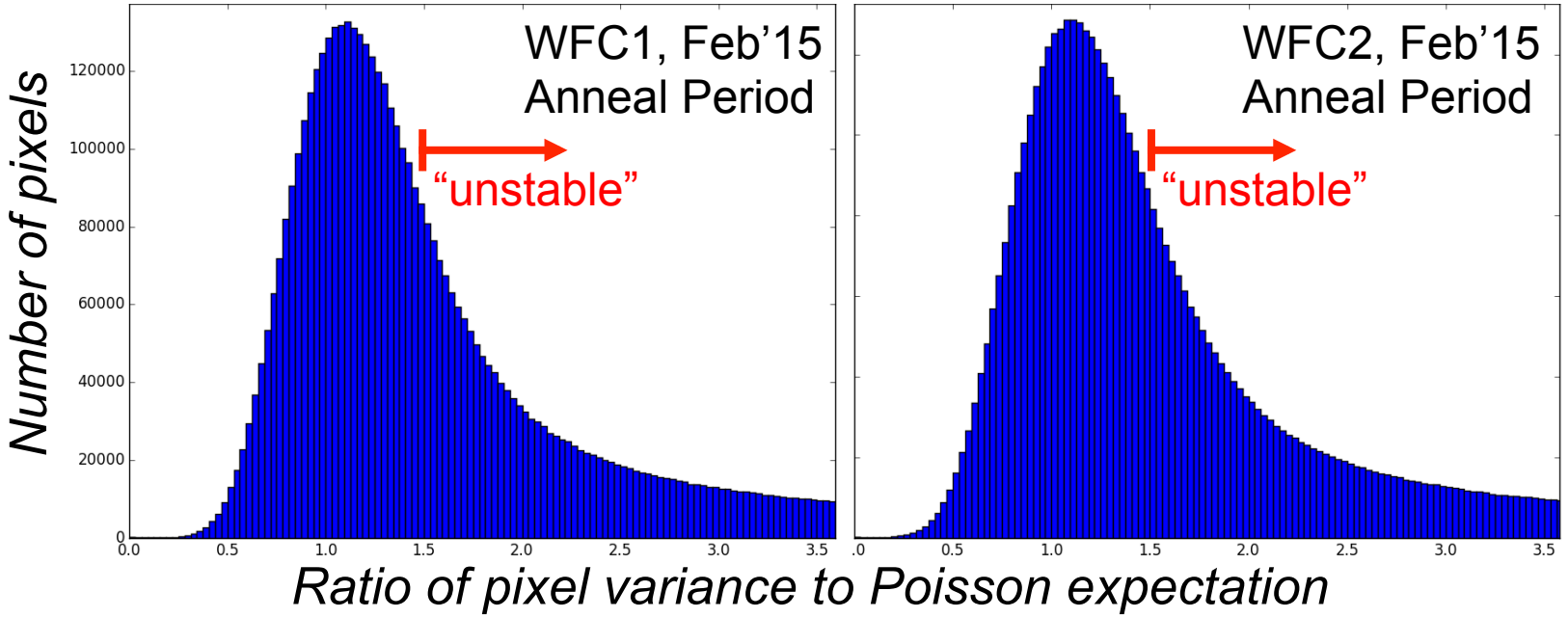
WFC "Save the Pixels" Initiatives. I.

- Eliminating "bad-column" DQ flagging from WFC superbiases
  - Ultrabright WFC hot-pixels → many "bad columns" from readout dark
  - WFC readout dark is accurately modeled from superdarks (see *below*)
  - Stable hotpix → stable "bad cols." : keep in ERR array but not in DQ



WFC "Save the Pixels" Initiatives. II.

- No warm- & hot-pixel DQ flagging from "stable" dark current
  - After 13.5 years, very many warm- & hot-pixels across WFC CCDs
  - Most warm/hot-pixels are not "healed" by monthly CCD anneals
  - Many warm/hot-pixels are stable during any given anneal interval
    - Such pixels can be accurately dark-subtracted; reflected in ERR array
  - Only DQ-flag the "unstable" pixels (variance significantly g.t. Poisson)



Documentation Updates

- Recent ACS Team Instrument Science Reports:
  - ACS ISR 2016-01 : "*Satellite Detection in Advanced Camera for Surveys/Wide Field Channel Images*"
  - ACS ISR 2015-07 : "*Flat Field Determinations Using an Isolated Point Source*"
  - ACS ISR 2015-06 : "*ACS/WFC Revised Geometric Distortion for DrizzlePac*"
  - ACS ISR 2015-04&05 : "*Basic Use of SExtractor Catalogs With TweakReg – I&II*"
- Instrument Handbook (Cycle 24): released Jan'16
- Data Handbook revision underway (ca. Mar'16)