CCD Readout of Non Mystery Structure Devices - Notes

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Readout Clocking Parameters

- Clocking
  - Parallel overlap 20000 ns
  - Serial overlap 160 ns
  - Pre settle delay 1500 ns before first integration
  - Post settle delay 500 ns before second integration
  - SW delay 500 ns
  - Integration delay 5200 ns
  - Resulting pixel rate 70 kHz

- RC Clock Filtering
  - Parallel clocks: R = 50 Ω, C = 47 nF, RC = 2500 ns
  - Serial clocks: R = 100 Ω, C = 330 pF, RC = 33 ns
  - SW clocks: R = 100 Ω, C = 1000 pF, RC = 100 ns

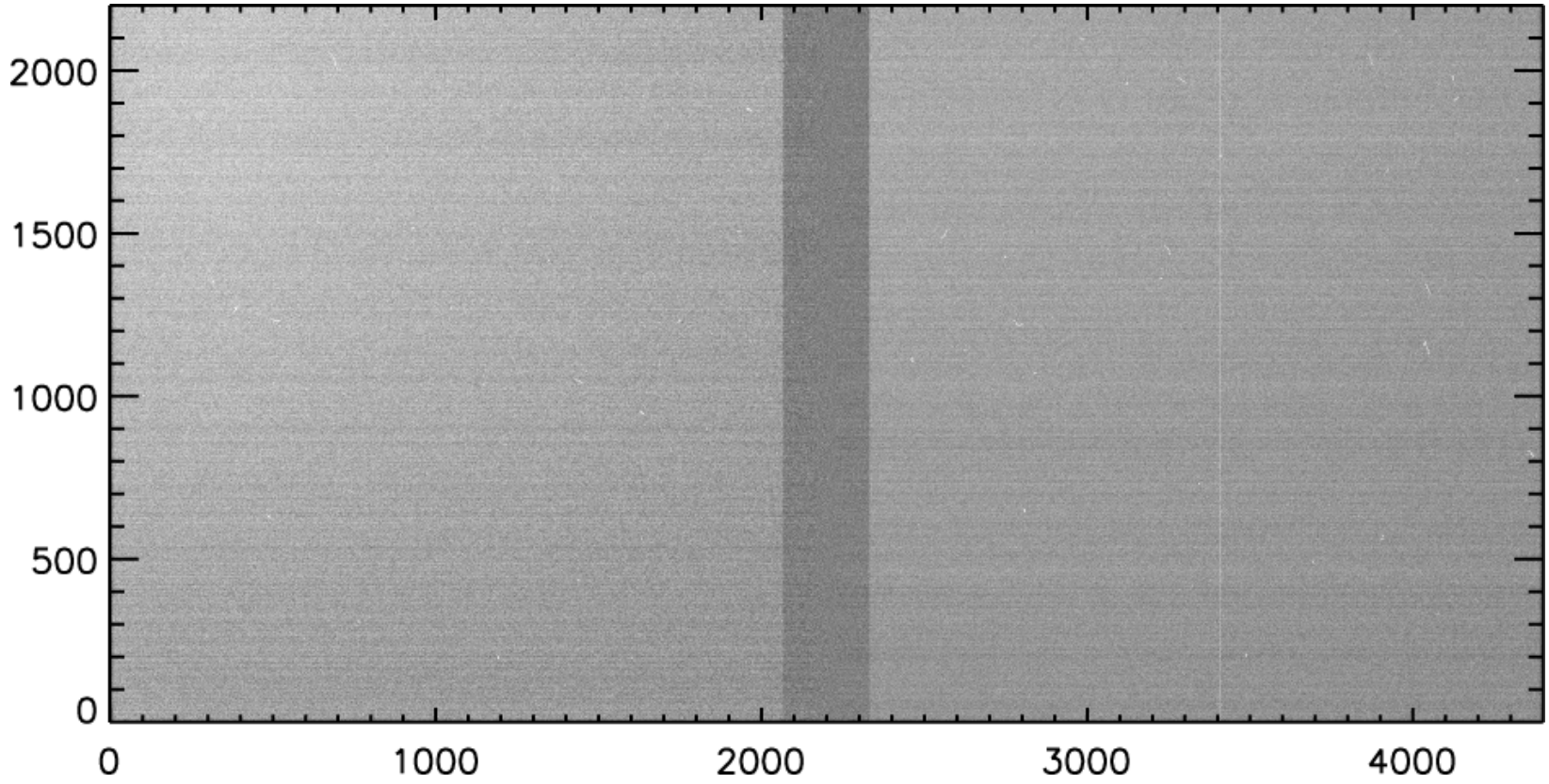
Image Readout Using E-purge Technique

- After erase, non-MS CCDs show an apparent noisy response looking a bit like spurious charge generation.
- To remove this effect, an e-purge procedure is used consisting of the following steps implemented in a script:
  - Do erase with V and FS clocks at 9V followed with several clear cycles.
  - Turn off idle clocking
  - Do additional clear
  - Do e-purge with V and FS clocks at -9V with a short delay before restoring them to normal values ([-3,5V])
  - Acquire new image with no additional pre-clear
  - Restore idle clocking

E-purge of 4kX2k CCD 118235-19-3

- The e-purge is illustrated in the next 3 slides using a 4kX2k device operated with a 2-amp readout.
- The slides show 10 s dark images (1) immediately after and erase (2) after a first e-purge and (3) after a second e-purge.
- All three images are displayed with identical span and offset and show the dramatic improvement attainable
- Similar results were obtained for the actual 4kX4k device used in our tests at Apache Point.

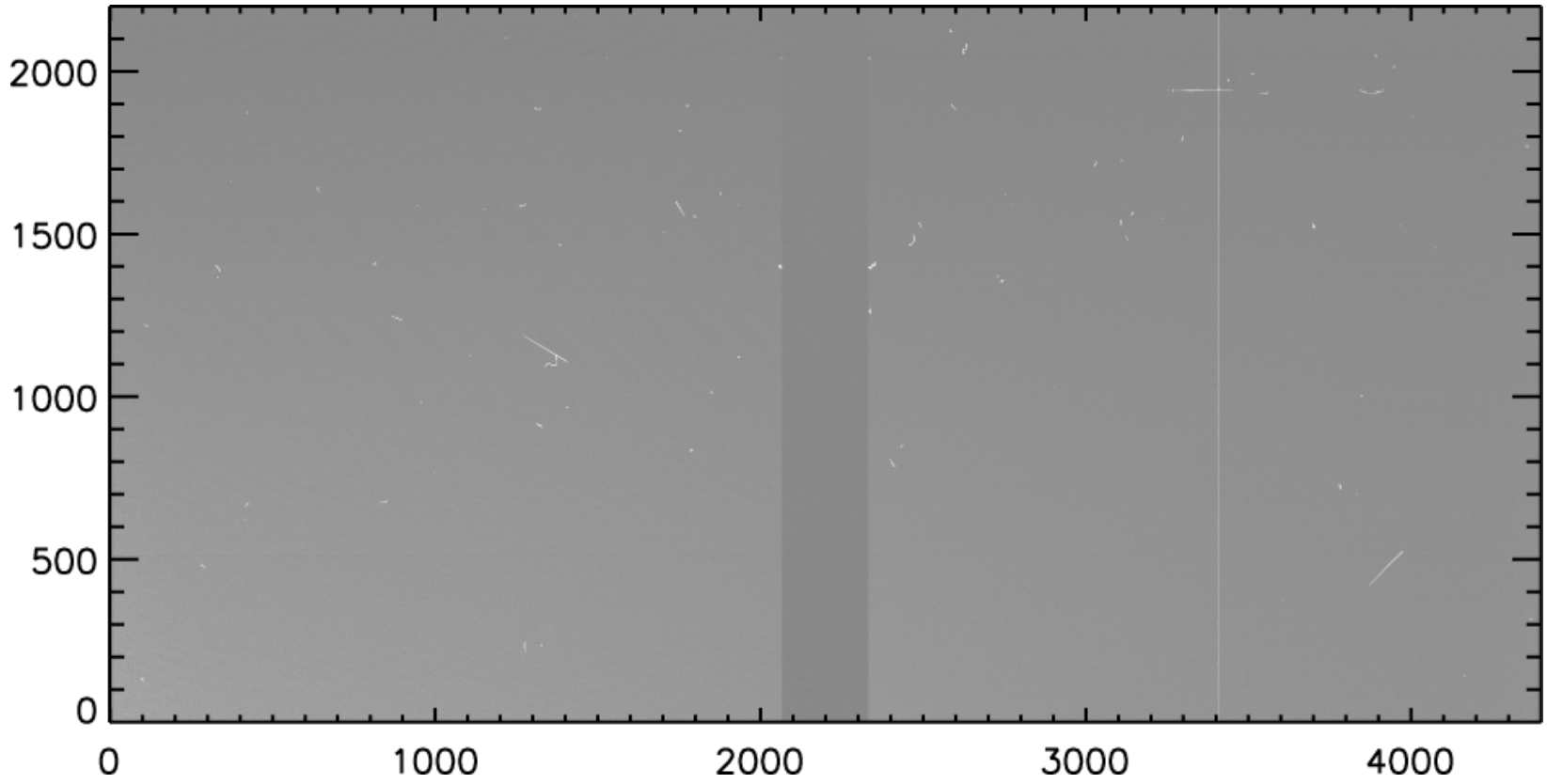
118235-19-3



This image was taken directly after erase/clear. It shows, as expected, the noise and elevated signal level in the image after erase but before e-purge.

Overscan read noise (ORN) 78.8 adu. Image signal level 67.5 adu above overscan.

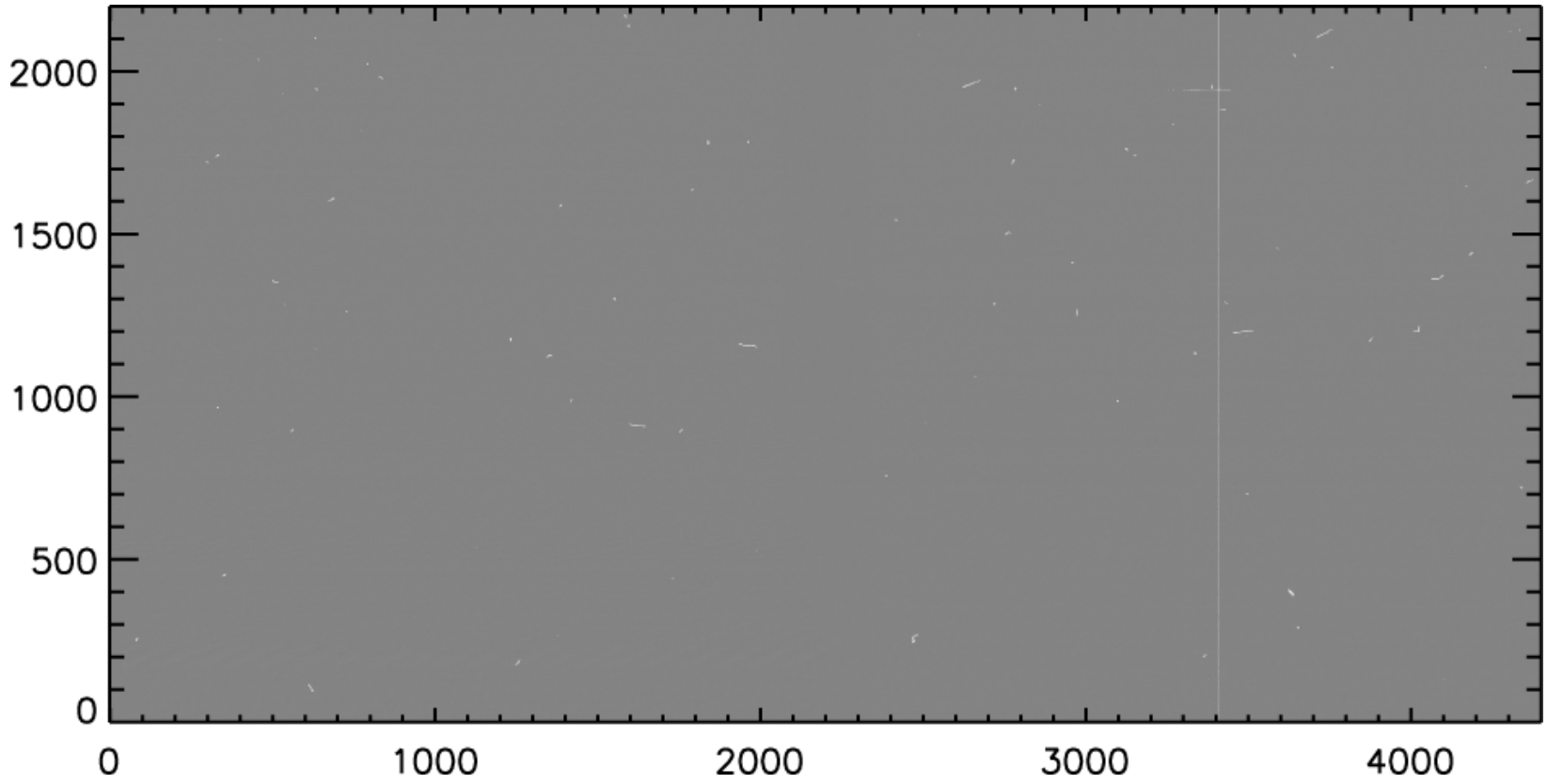
118235-19-3



After the e-purge the read noise is reduced but there is still an elevated signal level present.

Time of image 2 min after erase. Overscan read noise (ORN) 6.2 adu. Image signal level 30.5 adu

118235-19-3



The script was run a second time but this time without the erase portion. Now the signal level in the image is reduced to good value.

Time of image 2 min. Over scan read noise (ORN) 6.1 adu. Image signal level 0.5 adu