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NICMOS Data Quality Control and Paper Products

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Abstract.

The HST pipeline routinely creates hardcopy products, or paper products, for all data. These products are used both to provide hardcopy output for the GOs and also by the Contact Scientists for data quality evaluation. The products must therefore be general enough to support both sets of users. This poster provides an introduction to the NICMOS paper products.

A set of paper products summarizes a set of exposures, typically a single visit in a proposal. The pages are separated into visit-level and exposure-level pages. The visit-level pages include the cover page, explanatory notes, and tables summarizing the details of the observations. These are followed by the exposure-level pages which include a picture of each calibrated (cal) exposure followed by a data quality summary and a calibration reference file summary for that exposure. For associated data, there is first a picture of the mosaicked (mos) image. For associations with a pattern, this is followed by a cartoon of the observing pattern and on-target and background individual images. All associated exposures also have stamp-sized pictures of each of the calibrated images in that association.

Sample images with possible data quality concerns are shown at the end.

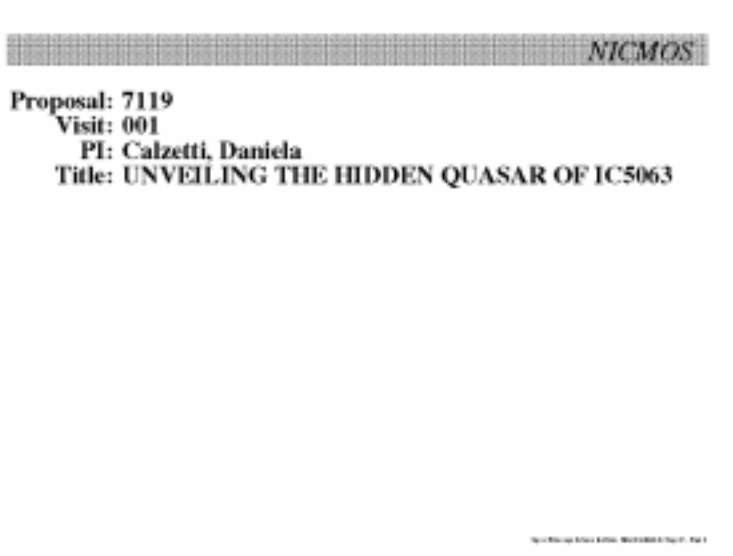

Figure 1. The Cover Page contains the proposal ID, visit numbers, PI's name, and proposal title. The second page consists of Explanatory Notes which explain the contents of the paper products. If you have questions about your data please send e-mail to your Contact Scientist.

[1]Deceased

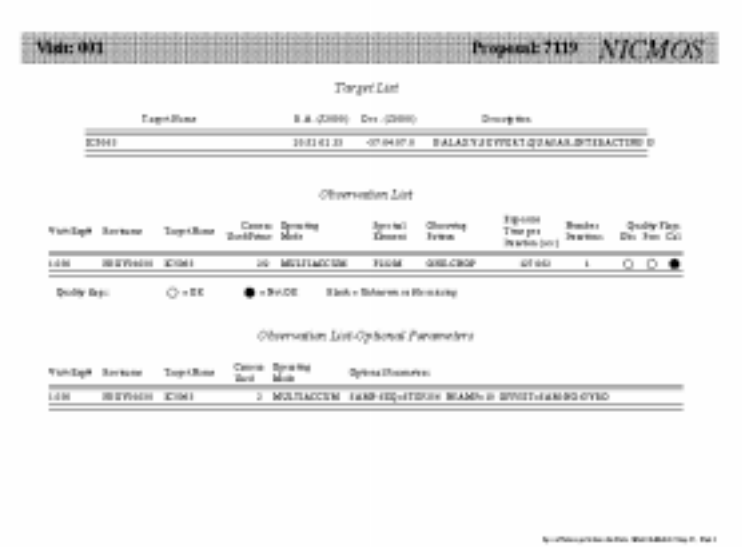

Figure 2. The Target List contains the name, predicted coordinates, and text description of each target. The Observation List has exposure information - camera, filter, mode, exposure time - as well as the status of the spacecraft and ground-system performance during execution of the observation. The Observation List-Optional Parameters lists the optional parameters, other than pattern related parameters, specified in the proposal.

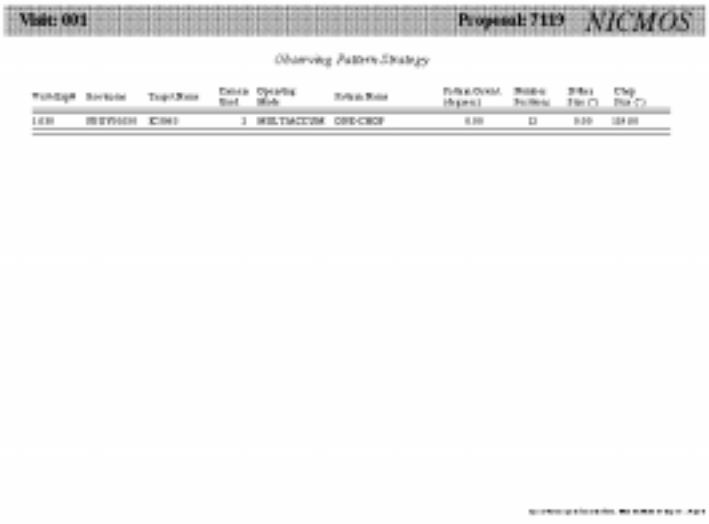

Figure 3. The Observing Pattern Strategy lists the optional parameters used to specify the dithering/chopping pattern for each exposure. These include the pattern name, pattern orient, number of positions, dither and chop sizes.

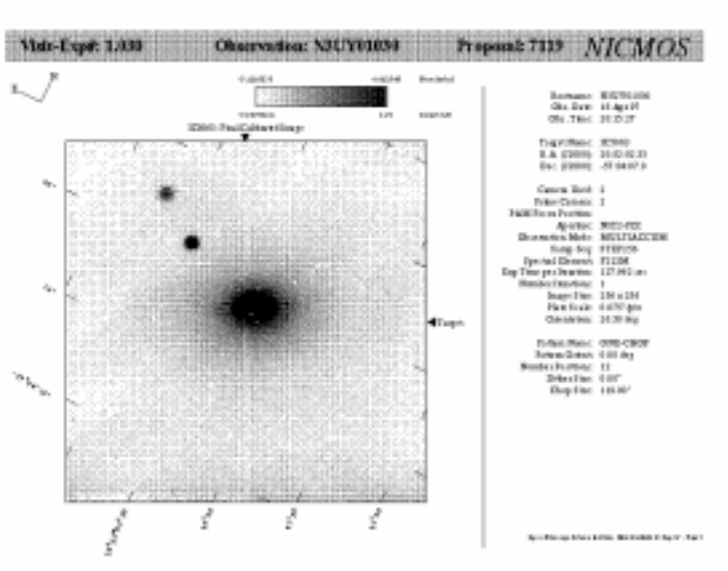

Figure 4. An image of each final calibrated exposure is included in the paper products. In this case the exposure is an association and the picture is of the final mosaicked (mos) image. Exposure information from the observation header are provided at the right. The PAM focus keyword, NPFOCUSP, was added to the headers 6 May 1997.

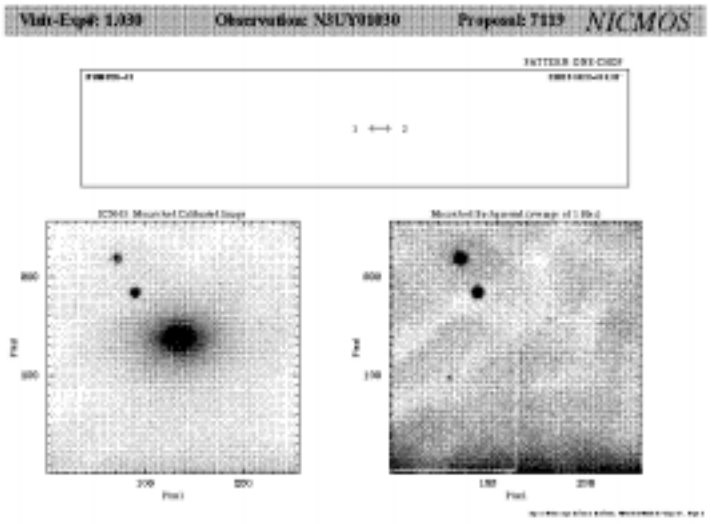

Figure 5. A cartoon of the pattern, in this case a ONE-CHOP, is shown at the top. On the left is the mosaicked calibrated image, the same as in the preceeding figure. At the right is a representation of the background created by averaging the individual output background mosaics from calnicb. Note that this averaged background image is not an output product of calnicb.

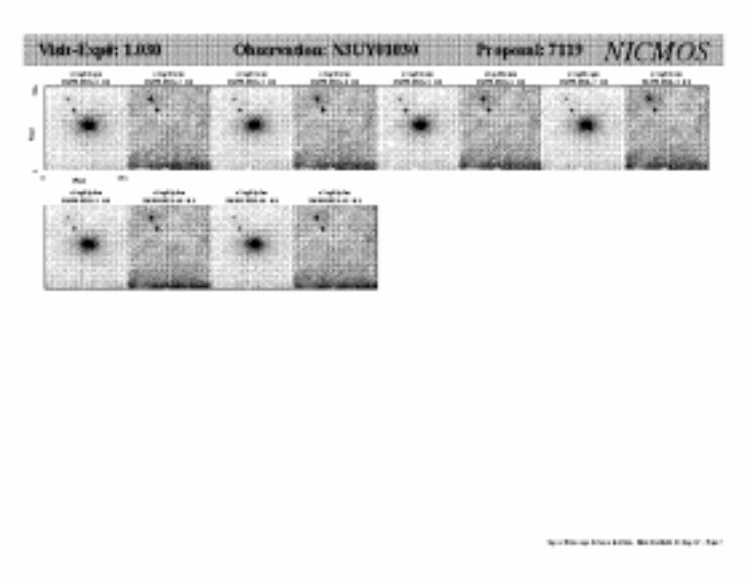

Figure 6. For associations with several positions or repeated observations in a single position, each individual image is shown in a stamp-size format. Above each one is the observation rootname, pattern position (at left, indicated by the PATT-POS number), and iteration number at that position. Note that this is the only place in the paper products to find the names of individual observations in an associated exposure.

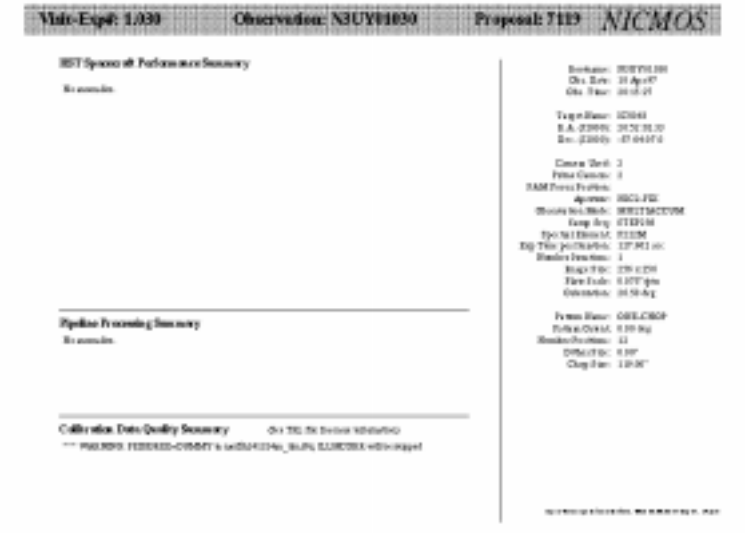

Figure 7. A Data Quality Summary for each exposure is provided and contains details of problems flagged by the data quality flags in the Observation List table. Additional information can be found in the pdq and trl files. Exposure information from the observation header are provided at right.

Figure 8. The Calibration Status Summary gives detailed information about the calibration of the observation. Calibration switch keywords are listed along with completion status and definition of the calibration step. Reference file name keywords are provided with the name and pedigree (DUMMY, GROUND, INFLIGHT, or MODEL) of the reference file used. Older data processed with DUMMY reference files are good candidates for recalibration. The exception are DUMMY ILLMFILEs used by the calnicb step, as no real data are yet available.

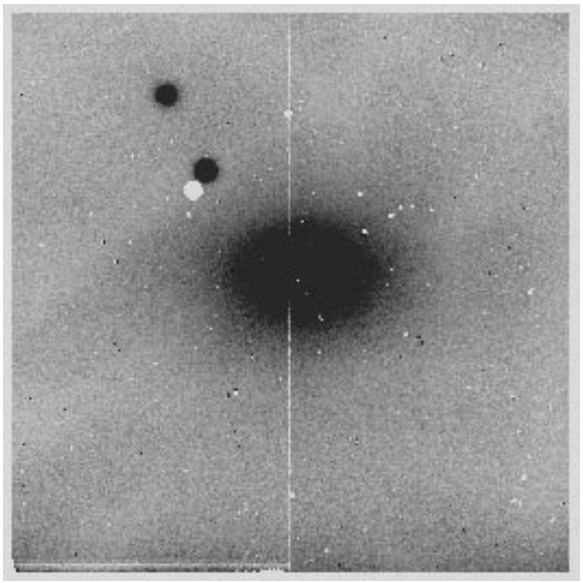

Figure 9. An example of the moving coronographic spot. The dark hole at the top was the current position of the coronographic spot when the image was taken. The white hole comes from the linearity file [dq] array. The dark hole above the white hole comes from the flatfield and shows the position of the coronographic spot when the flat was created. Newer reference files have employed patching to remove the spot.

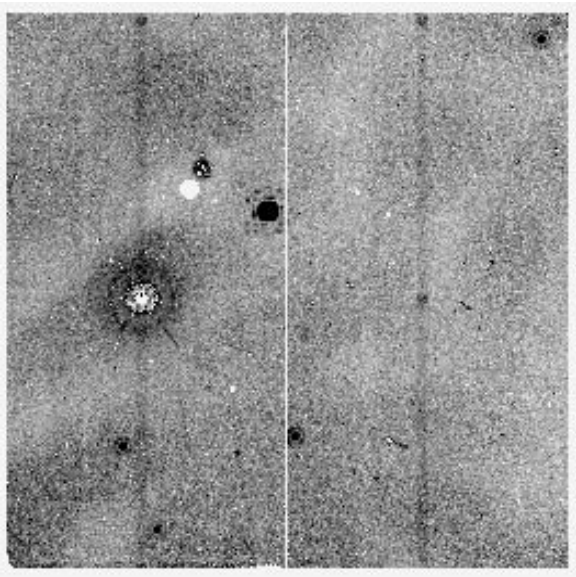

Figure 10. An example of "Mr. Staypuft", electrical ghosts. A bright pixel, in this case a large cosmic ray hit, at pixel 62,124 in the lower left quadrant has a faint "echo" at the same pixel location in the other 3 quadrants. In addition there are faint bands running through the ghosts along columns.

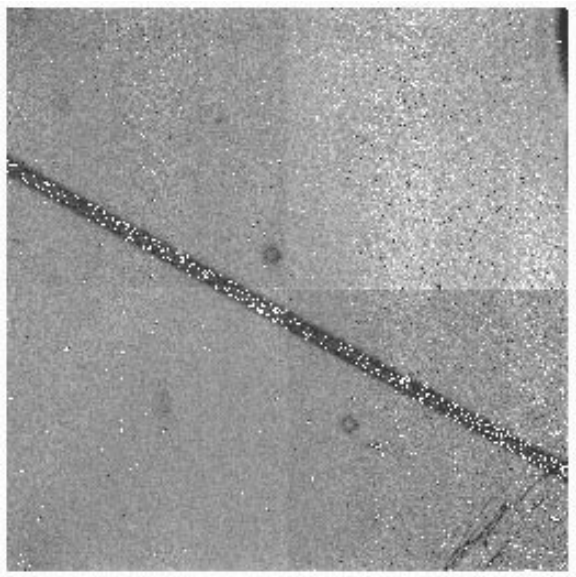

Figure 11. An image with a trail from space junk.

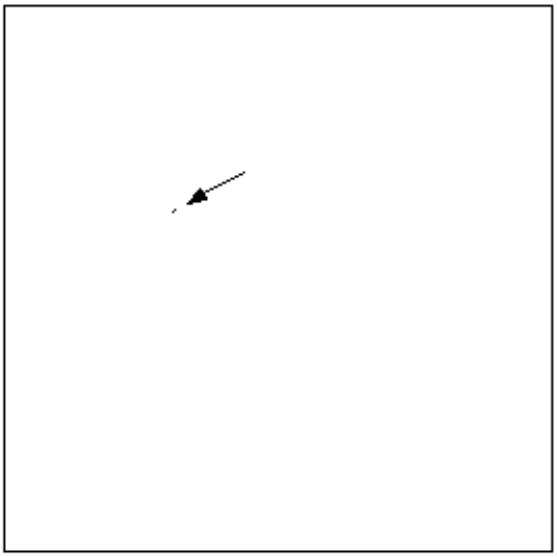

Figure 12. An image with a bad pixel set at E8. This occasionally happened with images processed before calnica3.0 due to a math roundoff error when attempting to perform a fit to only 1 good sample. Fixed in data with calnica3.0 and for paper products display purposes by PaperProducts2.9 which uses a different method of greyscale determination.

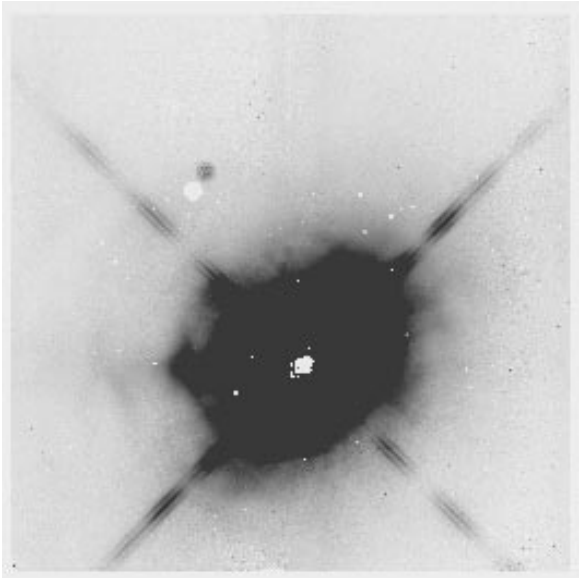

Figure 13. An image with saturated central pixels that aren't getting flagged properly. The use of calnica3.0 which makes a correction for non-zero signal in the zeroth read of a MULTIACCUM image along with new linearity files with the [ZSCI] and [ZERR] extensions will fix most pixels.

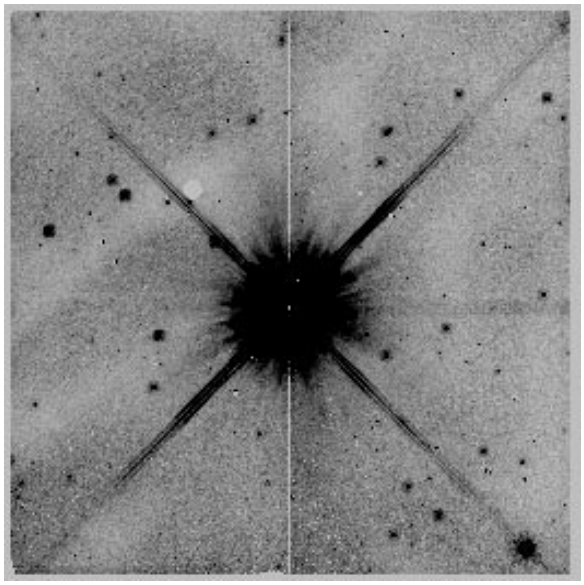

Figure 14. A NIC2 image showing dark current pedestal. This is a random, quadrant-dependent additive signal that appears whenever the detector's amplifiers are switched on. The pedestal is a uniform offset without any flatfield variations, and so the FLATCORR step in calnica will impose an inverted flatfield response in the final calibrated image.

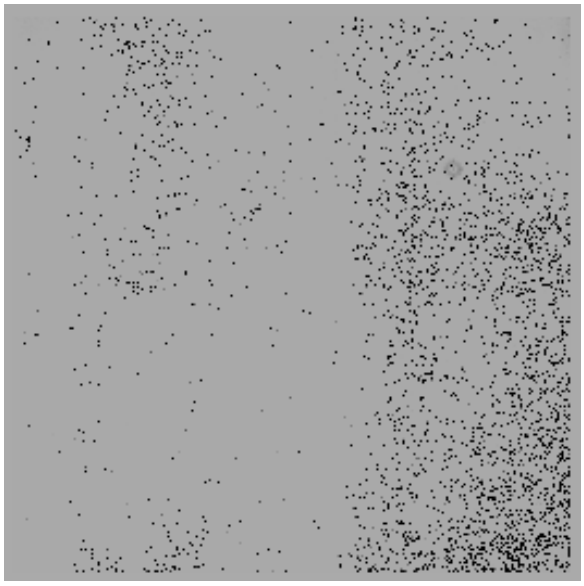

Figure 15. A NIC3 image from the public parallel program. Problems mostly due to the calnica CRIDCALC cosmic ray rejection algorithm. Readouts with good data are sometimes thrown out leaving only the first few reads with low, slightly negative signal. A new algorithm is being tested.

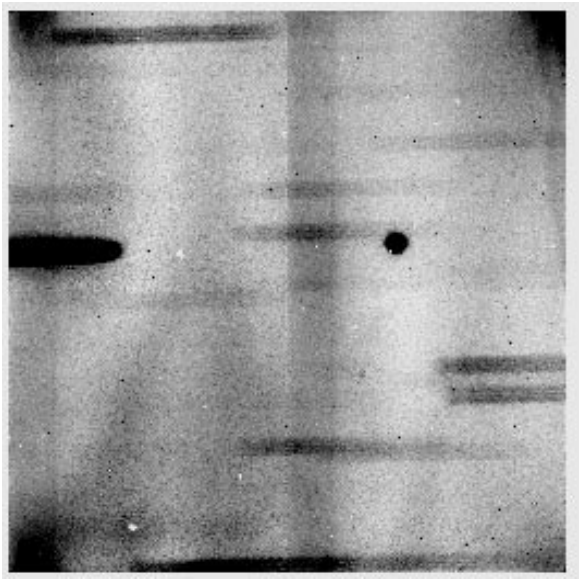

Figure 16. An example of a grism image. Nothing wrong with the horizontal bars, this is how it should look! At the time this image was processed only DUMMY darks were available, and the dark vertical bands (shading) and dark corners (amplifier glow) can be removed by recalibrating with the appropriate epoch INFLIGHT or MODEL dark. Grism data are not flatfielded and the NIC3 flatfield pattern can also be seen.

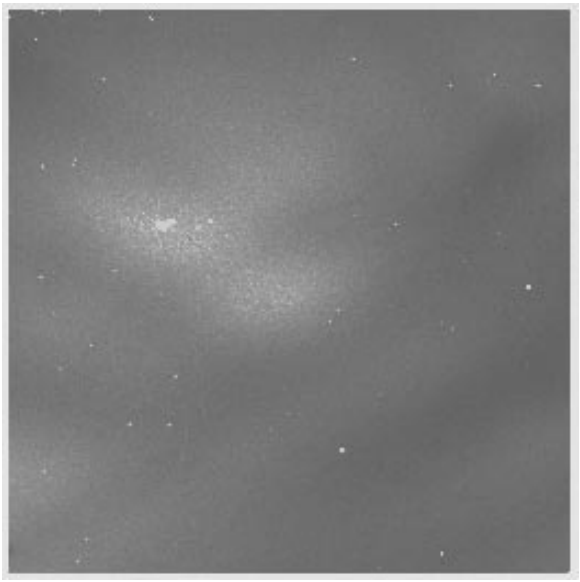

Figure 17. A NIC1 flatfield image showing "grot" and bad pixels. In addition to bad pixels which were already known from ground-based testing, more pixels have shown low measured quantum efficiency in orbit. These pixels are possibly affected by debris lying on top of the detectors. Paint flakes from the optical baffles are one possible source. The bad pixels are often clustered in groups and appear as spots in flatfield frames.

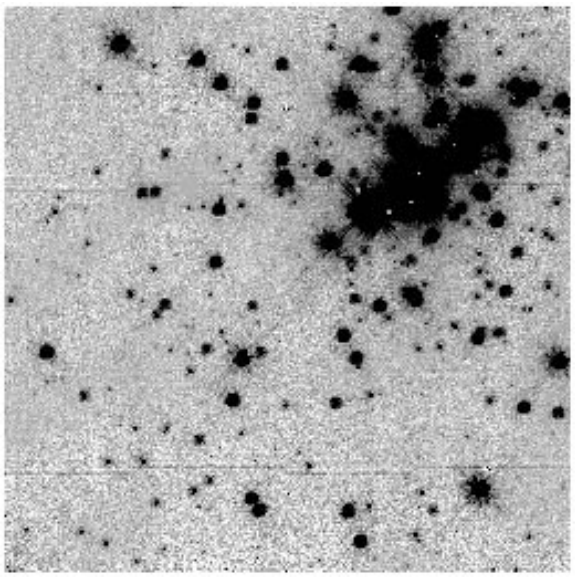

Figure 18. Bars in a NIC2 focus image. Cause unknown but may be related to onboard timing patterns.