

PDS Data Review

New Horizons
LORRI & MVIC

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LORRI - RAW and CAL

LORRI Instrument

- Narrow angle, panchromatic camera
 - 0.29 degree square FOV
 - High resolution (5 μ rad/pixel)
 - 1024x1024 pixel CCD detector
 - Operates in 1x1 or 4x4 on-chip binning modes
- Raw data format
 - FITS files with 5 extensions
 - Primary image, Histogram, First 34 pixels, Image descriptor, Window mismatches
- Calibrated data format
 - FITS files with 3 extensions
 - Primary image (DN), Error map, Quality flag image
 - Do-it-yourself flux calibration: Radiance and Irradiance calibration coefficients are given in the header

General Comments

- Two Datasets:
 - KEM1 Encounter phase, V3.0, Raw and Calibrated (4731 images)
 - 15 Aug 2018 – 13 Jul 2019
- Extends the date over V2.0
 - Fills in additional downloaded data
 - Adds other KBO targets
- Overall, both data sets are in great shape
- Well documented with lots of description and information available

Various

- DATASET.CAT
 - Typos

2011 JA32, and 2014 OJ394. The approach field images were used for navigation and hazard avoidance purposes. During MU69's encounter LORRI did LightCurves, and Imaging.

- Remove comma after Lightcurves

The leapsecond adjustment ($\text{DELTA_ET} = \text{ET} - \text{UTC}$) was 65.184s at NH launch, and the first four additional leapseconds occurred in at the ends of 12/2009, 06/2012, 06/2015, and 12/2016. Refer to the NH SPICE data set, NH-J/P/SS-SPICE-6-V1.0, and the

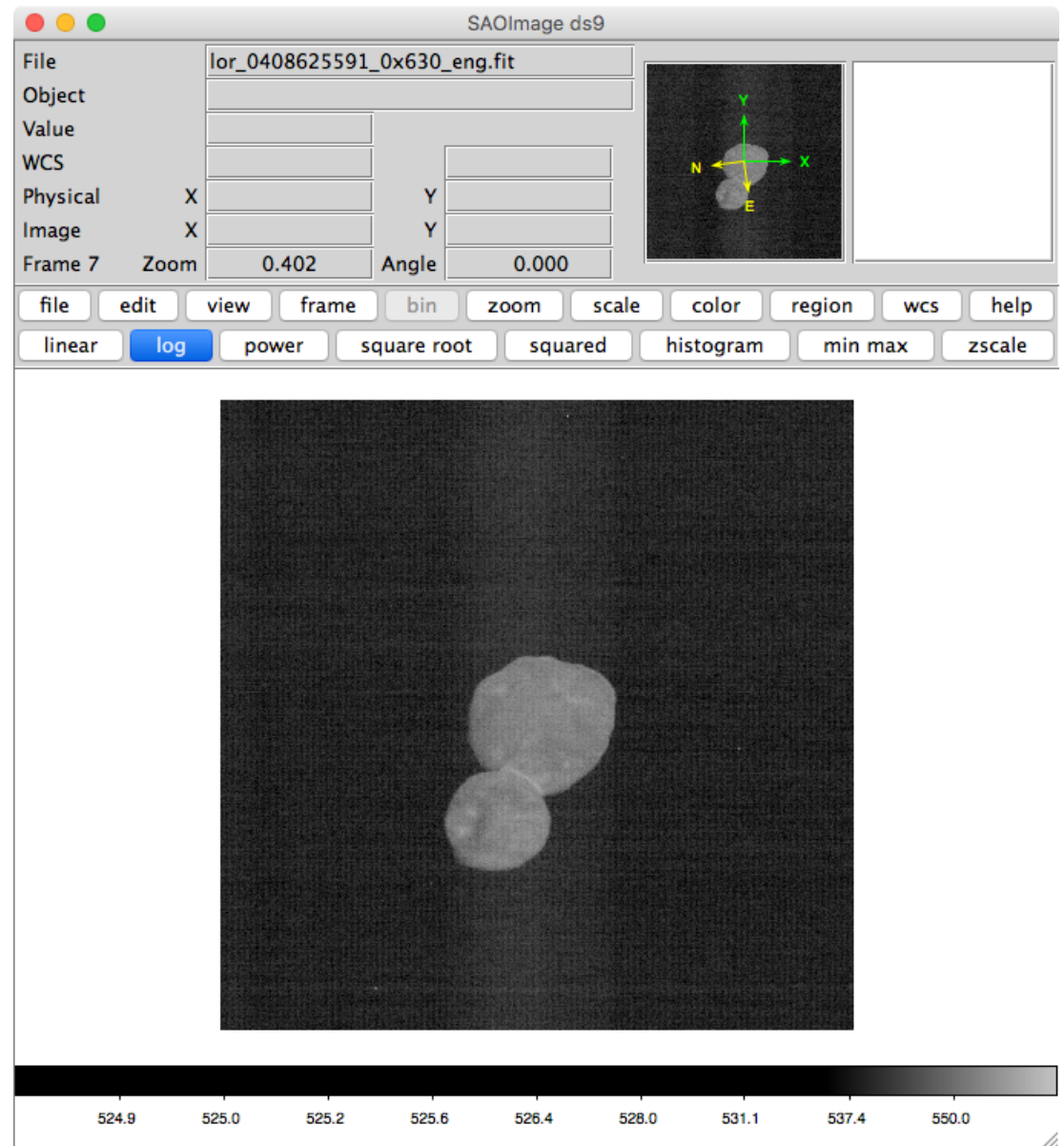
- “... occurred **in at** the end of ...”

It includes a number of distant Kuiper Belt Objects (DKBOs). It also includes images of the approach and departure field around MU69 (Arrokoth). The data also covers the actual MU69 encounter.

- “The data also cover the ...”

Data

- Data are in good shape
 - Read with IDL FITS readers, PDSREAD and NASAVIEW
 - Includes extensions
 - Read and displayed every image
 - Tested to make sure data could be manipulated and measured
- One-to-one correspondence between raw and calibrated files



SPICE

- Updated SPICE kernels were provided for the review, though they have not been reviewed themselves
 - Kernels cover the span of Start/End Dates (for the objects at those extremes)
 - Exception is the last data directory, which consists of exposure tests, etc., months after the last observations
- Tested several objects against the values given in the data labels
 - Focused on 2014 MU69 (pole is known, geometry changes quickly, etc)
- My computed values agree with the label/FITS header values to within a small fraction of a percent
 - Some differences in kernels (older versions are used in data files)
 - Not significantly different
- No problems with the geometry that is included.
- Relevant to both the LORRI and MVIC data

LORRI Status

- A couple typos in the DATASET.CAT file
- Data are Certifiable

MVIC - RAW and CAL

MVIC Instrument

- Part of the RALPH instrument
- PanFrame CCD
 - 5024x128 pixels sweep over the scene
 - 128 pixels per exposure time
 - Create an image cube 5024 x 128 x XXX pixels, where XXX is defined by scan rate and time
 - Not clear how these data are used, though there are not many of them
- Six other CCDs operate in TDI mode (different filters)
 - 5024x32 pixels sweep over the scene
 - The 32 pixels are clocked at the scan rate, so each exposure time gives a shift of 1 pixel
 - Creates an image 5024 x XXX
- Raw data format
 - FITS files with 3 extensions
 - Primary image, housekeeping, window mismatch table
- Calibrated data format
 - FITS files with 3 extensions
 - Primary image (DN), Error map, Quality flag image
 - Do-it-yourself flux calibration: Flux conversion coefficients are added to the header

General Comments

- Two datasets:
 - KEM1 Encounter phase, V3.0, Raw and calibrated (254 images)
 - 30 Aug 2018 – 20 Mar 2019
- Extends the date over V2.0
 - Adds additional downloaded data
- Overall, both data sets are in great shape
- Well documented with lots of description and information available

Catalog Files

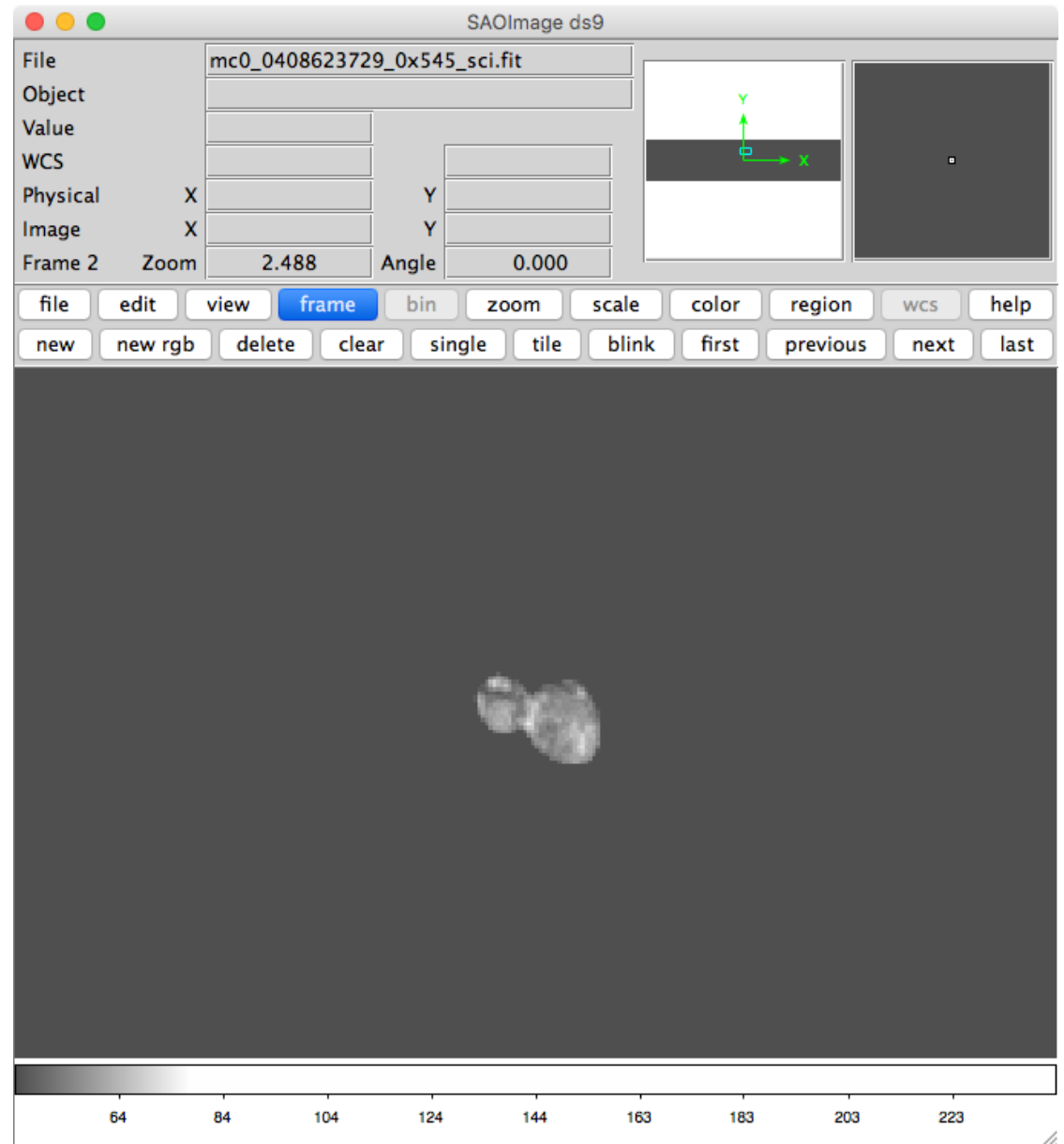
- DATASET.CAT
 - Typo

The leapsecond adjustment ($\text{DELTA_ET} = \text{ET} - \text{UTC}$) was 65.184s at NH launch, and the first four additional leapseconds occurred in at the ends of 12/2009, 06/2012, 06/2015, and 12/2016.

- “Occurred **in at** the ends of ...”

MVIC Data Files – RAW and CAL

- Data are in good shape
 - Read with IDL FITS readers, PDSREAD and NASAView
 - Includes extensions
 - Read and displayed every image (caveat on next slide)
 - Tested to make sure data could be manipulated and measured
- One-to-one correspondence between raw and calibrated files



MVIC Status

- A minor change in DATASET.CAT file
- Data are Certifiable