

(Donaldjohanson Data v1.0)

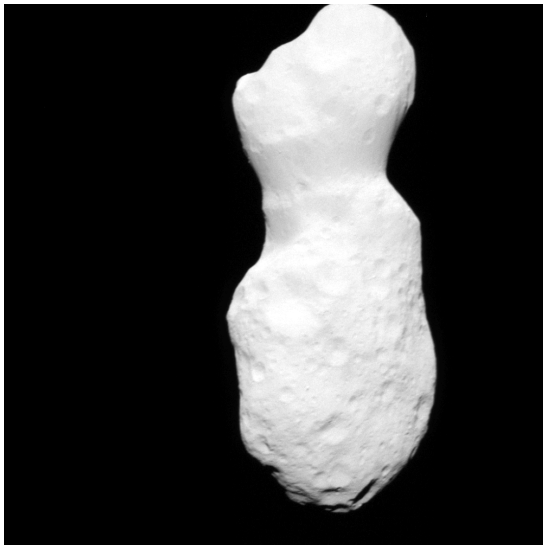
LUCY L'LORRI Data Review

Reviewer: Xiao-Duan Zou (Planetary Science Institute)

Oct 15 2025

1. Datasets overview

- PDS version: PDS4
- 3 sets from the high res cam L'LORRI.
lucy.lorri:calibration::3.0
lucy.lorri:data_donaldjohanson_raw::1.0
lucy.lorri:data_donaldjohanson_partially_processed::1.0
- Mission phases:
the Lucy Mission Donaldjohanson encounter mission phase
- Datasets comparison:
2259 raw images
2259 partially calibrated images
- Summary:



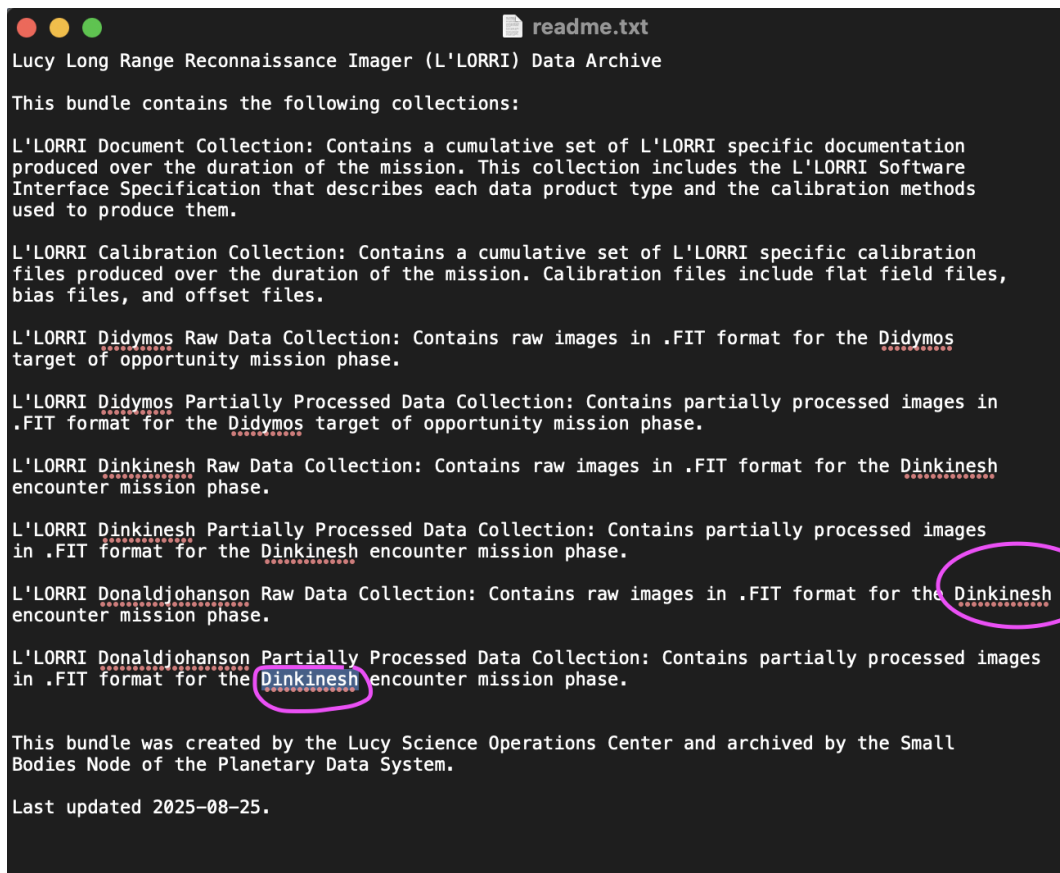
Data set in good shape, no obvious problem. Only a few small issues.

2. Review process

- Use astropy fits.open and DS9 exam some fits
- Test files with pds4_tools: Read **all** .fit and label files, save image to png and check all image content. (**all can be read correctly**)
- Check consistency between levels with tools:
Diff Files 23.1 and Beyond Compare 4.4.1
- Check the headers and compare the labels between sets
- Compare and review labels and sis file
- Compare and review document
- Collect aspect data from all images

3. Documents/Calibration

- Wrong mission phase for the Donaldjohanson sets:



```
readme.txt
Lucy Long Range Reconnaissance Imager (L'LORRI) Data Archive

This bundle contains the following collections:

L'LORRI Document Collection: Contains a cumulative set of L'LORRI specific documentation
produced over the duration of the mission. This collection includes the L'LORRI Software
Interface Specification that describes each data product type and the calibration methods
used to produce them.

L'LORRI Calibration Collection: Contains a cumulative set of L'LORRI specific calibration
files produced over the duration of the mission. Calibration files include flat field files,
bias files, and offset files.

L'LORRI Didymos Raw Data Collection: Contains raw images in .FIT format for the Didymos
target of opportunity mission phase.

L'LORRI Didymos Partially Processed Data Collection: Contains partially processed images in
.FIT format for the Didymos target of opportunity mission phase.

L'LORRI Dinkinesh Raw Data Collection: Contains raw images in .FIT format for the Dinkinesh
encounter mission phase.

L'LORRI Dinkinesh Partially Processed Data Collection: Contains partially processed images
in .FIT format for the Dinkinesh encounter mission phase.

L'LORRI Donaldjohanson Raw Data Collection: Contains raw images in .FIT format for the Dinkinesh
encounter mission phase.

L'LORRI Donaldjohanson Partially Processed Data Collection: Contains partially processed images
in .FIT format for the Dinkinesh encounter mission phase.

This bundle was created by the Lucy Science Operations Center and archived by the Small
Bodies Node of the Planetary Data System.

Last updated 2025-08-25.
```

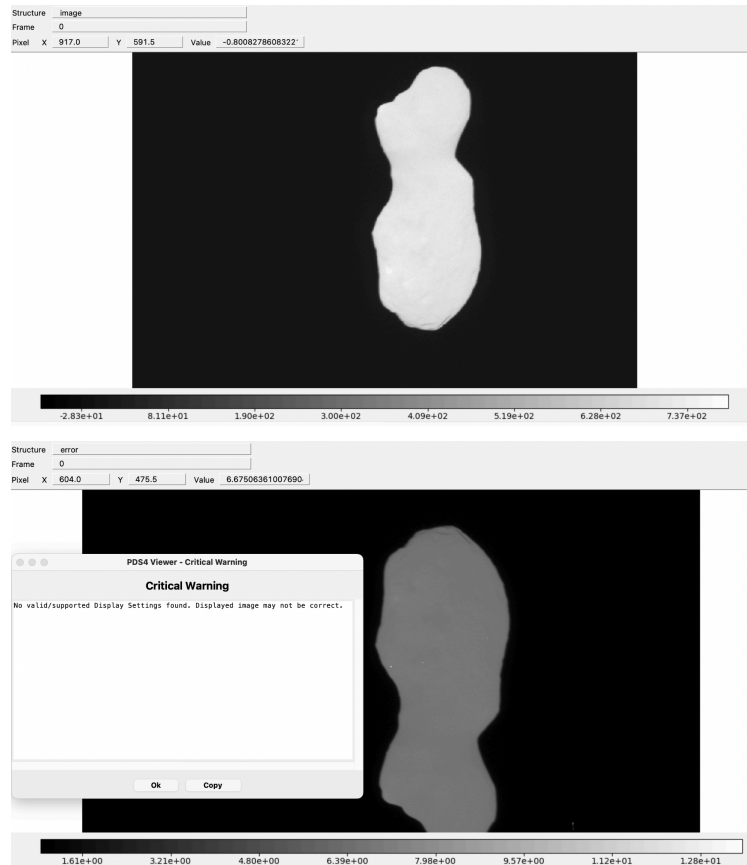
- Calibration/collection.xml and other .xml in the same folder
<start_date_time>2021Z</start_date_time>
<stop_date_time>2025Z</stop_date_time>
- Calibration collection_inventory.csv including other files other than the two files in the review bundle
- Both the calibration fits files readable with PDS4 tool

4. Data and Label

- Files can be correctly read by python, pds4 python tool and ds9.
- Error image added to the partially processed data, but the display support is not in the label. Same problem for quality flag.

Showing below a sample:

data_donaldjohanson_partially_processed/lor_0798443115_04765_00001_1x1_sci_03.xml



- SPICE data are available and included in the label completely, some non-L'LORRI IK kernels (lcy_ralph_v04.ti, lcy_tes_v01.ti, lcy_ttcam_v04.ti, lcy_struct_v00.ti) included
- All partially processed image extension unit, *image*, *error* and *quality flag* are DN/s ?

```

<Array_2D>
  <name>L'LORRI Quality Flag Image</name>
  <local_identifier>quality</local_identifier>
  <offset unit="byte">8426880</offset>
  <axes>2</axes>
  <axis_index_order>Last Index Fastest</axis_index_order>
  <description>Quality Flag Image</description>
  <Element_Array>
    <data_type>SignedMSB2</data_type>
    <unit>DN/s</unit>
    <scaling_factor>1</scaling_factor>
    <value_offset>32768</value_offset>
  </Element_Array>
  <Axis_Array>
    <axis_name>Line</axis_name>
    <elements>1024</elements>
    <sequence_number>1</sequence_number>
  </Axis_Array>
  <Axis_Array>
    <axis_name>Sample</axis_name>
    <elements>1024</elements>
    <sequence_number>2</sequence_number>
  </Axis_Array>
</Array_2D>

```

- For row data, in the label there is the unit for histogram as DN. It's a count too, but should not mix with DN.

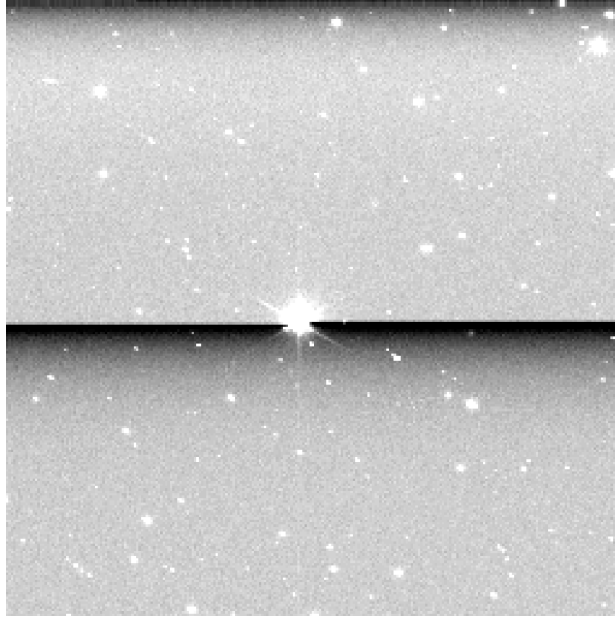
- Dinkinesh constant for Donaldjohanson phase?

```

<lucy:Radiometric_Conversion_Constants>
  <lucy:pivot_wavelength unit="Angstrom">6030.0</lucy:pivot_wavelength>
  <lucy:Diffuse_Source>
    <lucy:units_of_conversion_constants>(DN/s/pixel)/(erg/cm^2/s/Angstrom/sr)</lucy:units_of_conversion_constants>
    <lucy:solar_constant>271300.0</lucy:solar_constant>
    <lucy:red_trojan_constant>278400.0</lucy:red_trojan_constant>
    <lucy:gray_trojan_constant>271200.0</lucy:gray_trojan_constant>
    <lucy:dinkinesh_constant>286000.0</lucy:dinkinesh_constant>
  </lucy:Diffuse_Source>
  <lucy:Point_Source>
    <lucy:units_of_conversion_constants>(DN/s)/(erg/cm^2/s/Angstrom)</lucy:units_of_conversion_constants>
    <lucy:solar_constant>1.101e+16</lucy:solar_constant>
    <lucy:red_trojan_constant>1.13e+16</lucy:red_trojan_constant>
    <lucy:gray_trojan_constant>1.101e+16</lucy:gray_trojan_constant>
  </lucy:Point_Source>
  <lucy:photometric_zero_point>18.93</lucy:photometric_zero_point>
</lucy:Radiometric_Conversion_Constants>

```

- Some images are like this, why



5. Conclusion: Certifiable.