

# LUCY L'Ralph MVIC Data Review

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## 1. Datasets overview

- PDS version: PDS4
- 4 sets from L'Ralph MVIC.

Lucy.mvic:data\_dinkinesh\_raw::1.0

Lucy.mvic:data\_dinkinesh\_calibrated::1.0

Lucy.mvic:calibration::1.0

Lucy.mvic:document::1.0

- Data version: **mixed**

- Mission phases:

the Lucy Mission Dinkinesh Encounter

- Datasets comparison:

3 uncalibrated fits

3 calibrated fits

- Summary:

Filename: /data\_dinkinesh\_calibrated/mvi\_0752129246\_02297\_sci\_04.fit

No.	Name	Ver	Type	Cards	Dimensions	Format
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0	PRIMARY	1	PrimaryHDU	251	(5024, 1549, 6)	float32
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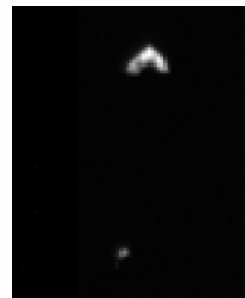
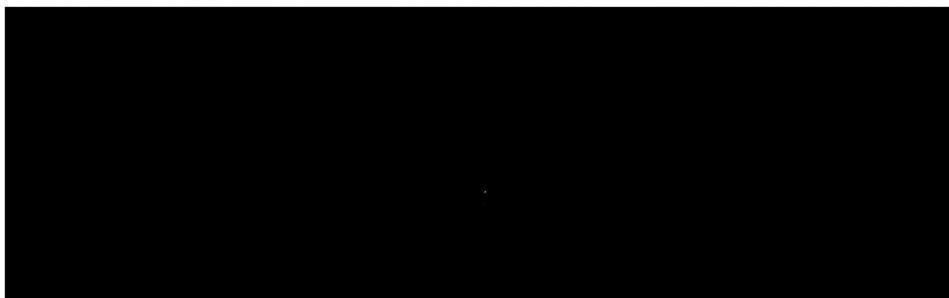
1	SUBTRACTED BACKGROUND	1	ImageHDU	11	(5024, 1549, 6)	float32
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2	CALIBRATION COEFFICIENTS	1	ImageHDU	10	(5024, 6)	float32
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Filename: /data\_dinkinesh\_raw/mvi\_0752129246\_02297\_eng\_04.fit

No.	Name	Ver	Type	Cards	Dimensions	Format
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0	PRIMARY	1	PrimaryHDU	250	(5024, 1549, 6)	int16 (rescales to uint16)
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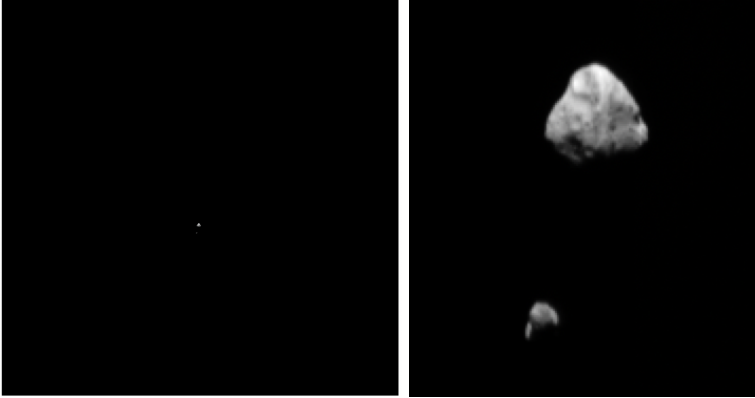


Filename: /data\_dinkinesh\_calibrated/mvi\_0752129547\_02299\_sci\_04.fit

No.	Name	Ver	Type	Cards	Dimensions	Format
0	PRIMARY	1	PrimaryHDU	251	(5024, 5008, 6)	float32
1	SUBTRACTED BACKGROUND	1	ImageHDU	11	(5024, 5008, 6)	float32
2	CALIBRATION COEFFICIENTS	1	ImageHDU	10	(5024, 6)	float32

Filename: /data\_dinkinesh\_raw/mvi\_0752129547\_02299\_eng\_04.fit

No.	Name	Ver	Type	Cards	Dimensions	Format
0	PRIMARY	1	PrimaryHDU	250	(5024, 5008, 6)	int16 (rescales to uint16)

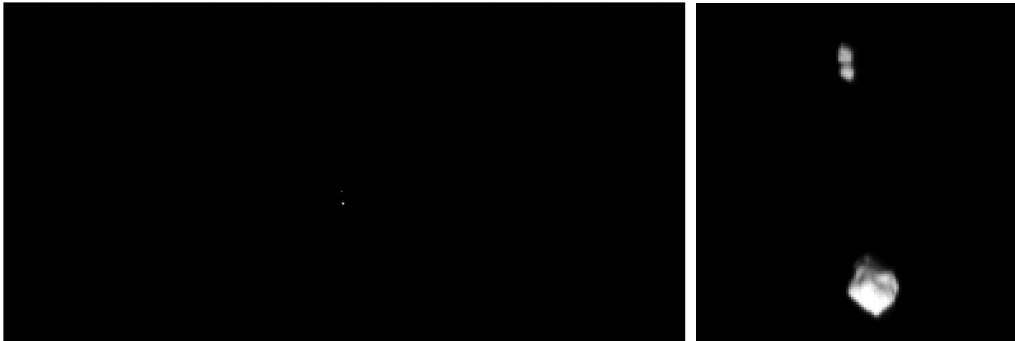


Filename: /data\_dinkinesh\_calibrated/mvi\_0752129862\_02301\_sci\_03.fit

No.	Name	Ver	Type	Cards	Dimensions	Format
0	PRIMARY	1	PrimaryHDU	251	(5024, 2493, 6)	float32
1	SUBTRACTED BACKGROUND	1	ImageHDU	11	(5024, 2493, 6)	float32
2	CALIBRATION COEFFICIENTS	1	ImageHDU	10	(5024, 6)	float32

Filename: /data\_dinkinesh\_raw/mvi\_0752129862\_02301\_eng\_03.fit

No.	Name	Ver	Type	Cards	Dimensions	Format
0	PRIMARY	1	PrimaryHDU	250	(5024, 2493, 6)	int16 (rescales to uint16)



Color images look good. But a few issues.

## 2. Review process

- Use astropy fits.open and DS9 exam all fits
- Test files with pds4\_tools: Read all .fit and label files to check 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
- Check error array and quality array, test if all are 0-arrays. **No error array and quality array found**

- Compare labels and sis file
- Compare documents
- Collect aspect data from all images,

## 3. Document/Calibration

- Many documents' labels contain this description of the mission and instrument, and need to be updated with appropriate tense and necessary details.

```
Observing_System
  name Lucy Spacecraft
  Observing_System Component
    name Lucy Spacecraft
    type Host
    description Lucy is over 14 meters (over 46 feet) from tip to tip, but most of
      that is the huge solar panels (each over 7 meters (almost 24 feet) in diameter)
      needed to power the spacecraft as it flies out to the orbit of Jupiter. All of
      the instruments, and the 2-meter (6.5 ft)-high gain antenna needed to communicate
      with Earth, will be located on the much smaller spacecraft body. Lucy's instrument
      pointing platform (IPP) carries four instruments for remote-sensing science, including
      L'Ralph (MVIC and LEISA), LLORRI, LTES, and the Terminal Tracking Camera (TTCam).
    description
  Internal Reference
    lid_reference urn:nasa:pds:context:instrument_host:spacecraft.lucy
    reference_type is_instrument_host
  Internal Reference
  Observing_System Component
  Observing_System Component
    name Lucy Ralph Multispectral Visible Imaging Camera (MVIC)
    type Instrument
    description L'Ralph MVIC provides both panchromatic and color imaging of the Trojan asteroids to address or contribute to 14 of Lucy's Level 1
science requirements and MVIC is solely responsible for the three color requirements.
  description
  Internal Reference
```

- The Calibration is described and well documented. Units are explained clearly. Suggestions:
  - **Add the table 2-1 a list of MVIC Channels to the Calibration description**
  - **Make it clear in the description that which values are in the extensions “dark subtraction data” and “radiometric coefficients”**

#### 4. Data

- Files can be correctly read by python, pds4 python tool and ds9.
- SPICE data are available and included in the label completely
- **Suggest adding extension as lorri: Error ImageHDU, QUALITY FLAG IMAGE, if possible.**
- The version number should be related to the pipeline version, I don't see any pipeline changes between these two versions, why is the later image is v3 but the earlier ones are v4?
- According to the data label, all data should be v1, and v3/4 are **internal versions**. This is confusing.
- Header are checked, and I checked ['NAXIS1', 'NAXIS2', 'EXPTIME', 'OBSID', 'STRTSCLK', 'STOPSCLK', 'VISTEMP', 'CCD', 'TARGETID', 'ALLOCBLK', 'BSRAMID', 'BSDCMID'] for all, looks fine.

	NAXIS1	NAXIS2	EXPTIME	OBSID	STRTSCLK	STOPSCLK	VISTEMP	CCD	TARGETID	ALLOCBLK	BSRAMID	BSDCMID
/mvi_0752129246_02297_sci_04.fit	5024	1549	[21600.0, 50400.0, 50400.0, 50400.0, 50400.0, 50400.0, 50400.0]	2297	752129246.196	752129257.3489830	-88.804863654217	[1, 2, 3, 4, 5, 6]	920152830	26	97.93305953671880	32.80202347271550
/mvi_0752129547_02299_sci_04.fit	5024	5008	[21600.0, 21600.0, 21600.0, 21600.0, 21600.0, 50400.0]	2299	752129547.196	752129583.2529450	-89.27980805530860	[1, 2, 3, 4, 5, 6]	920152830	82	147.6003734209560	21.75497012936570
/mvi_0752129862_02301_sci_03.fit	5024	2493	[21600.0, 21600.0, 21600.0, 21600.0, 21600.0, 50400.0]	2301	752129862.198	752129879.1479740	-88.61210106909910	[1, 2, 3, 4, 5, 6]	920152830	41	237.1479304174850	-26.71204423084080

#### 5. Conclusion: Certifiable.