Lucy Mission LDD

Lucy Archive Team

Oct 02, 2024

USER GUIDE

The *Lucy* mission's local data dictionary is used to describe and enumerate *Lucy* mission specific classes and attributes in PDS4 labels. It also includes Lucy Instrumentation specific classes and attributes for those instruments that require instrument nuanced metadata.

{August 12, 2024}
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> Note to authors who use this outline: The outline is a suggestion only. It includes the minimum of content needed to inform the dictionary user. Authors are expected to tailor the outline to their particular purposes, elaborating and providing context as needed.

CHAPTER

ONE

INTRODUCTION

1. Purpose of this User's Guide
2. Audience
3. Applicable Documents

CHAPTER

TWO

OVERVIEW OF THE *LUCY* LOCAL DATA DICTIONARY

The *Lucy* mission's local data dictionary is used to describe and enumerate *Lucy* Mission specific classes and attributes in PDS4 labels. It also includes Lucy Instrumentation specific classes and attributes.

CHAPTER

THREE

ORGANIZATION OF CLASSES AND ATTRIBUTES

The *Lucy* mission dictionary is organized as set of four general classes and four instrument specific classes. The general classes are used to desribe either observational parameters common to all mission instruments, or general data processing parameters. The instrument specific classes are used to describe instrument specific metadata that does not easily fit into a discipline specific data dictionary due to a mission specific nuance.

The *Lucy* mission dictionary hierarchy is an alphabetical list of the eight main classes. There is not a genaric wrapper class. The eight main classes are as follows:

```
LEISA_Instrument_Parameters
LLORRI_Instrument_Parameters
LRalph_Instrument_Common_Parameters
Lucy_Observation_Planning
Lucy_Observation_Time_Information
Lucy_Product_Information
Lucy_Target_List
MVIC_Instrument_Parameters
```

General classes used for all Lucy products begin with the "Lucy_", whereas instrument specific classes begin with the instrument or instrument suite name. Instrument specific classes may contain sub-classes. Use case examples for each class can be found in the Examples section of this document.

3.1 Lucy_Observation_Time_Information

The Lucy_Observation_Time_Informtion class is used to record the observation indentification and timing information attached to each science observation sequence. The attributes in this class are listed below:

```
lucy:observation_id
lucy:observation_id_count
lucy:observation_complete
lucy:observation_missing_packets
lucy:start_sclk
lucy:mid_sclk
lucy:stop_sclk
lucy:mid_utc
lucy:mid_sclk_string
lucy:mid_utc_doy
lucy:mid_utc_jd
lucy:mid_ephemeris_time
lucy:ccsds_sclk_time
```

The observation_id attribute is the only required element.

3.2 Lucy_Observation_Planning

The Lucy_Observation_Planning class is a general *Lucy* class used to record the science planning metadata that describes how the observation sequence was planned and the status of the instruments during that observation. The attributes included in this class are as folllows:

```
lucy:load_identifier
lucy:mission_segment
lucy:sap_identifier
lucy:visit_name
lucy:instrument_side
lucy:llorri_status
lucy:lralph_status
lucy:ltes_status
lucy:ttcam_status
```

The mission_segment attribute is the only required element in this class.

3.3 Lucy_Target_List

The Lucy_Targt_List class and attributes describe the list of potential targets in a given science observation. This information is supplemental to the Target_Identification class found in all observational data products and is derived from SPICE calculations. The attributes included in this class are as follows:

```
lucy:target_fov_count
lucy:target_fov_name
```

The target_fov_count attribute is the only required element in the class.

3.4 Lucy_Product_Information

The Lucy_Product_Information class and attributes describe any *Lucy* data processing pipeline specific data product information. Attributes collected in this class do not have counterparts in any PDS4 discipline dictionary. For general data processing information the processing dictinary (proc:) is used. The attributes found in the Lucy_Product_Information are as follows:

lucy:internal_product_version_id

The internal_product_verion_id is the only element in this class and is required. It is possible that additional attributes could be added over the course of the mission.

3.5 LLORRI_Instrument_Parameters

The LLORRI_Instrument_Parameters class is the wrapper class for all L'LORRI instrument specific parameters. This class only appears in L'LORRI data products. The LLORRI_Instrument_Parameters class contians the attributes and sub-classes listed below:

```
lucy:attached_sync_marker_dec
lucy:attached_sync_marker_hex
lucy:latch_count
lucy:calibration_lamp_level_1
lucy:calibration_lamp_level_2
lucy:bias_level
lucy:read_noise
lucy:ccd_gain
lucy:bias_offset
lucy:frame_transfer_scrub_time
Radiometric_Conversion_Constants
```

The lucy:Radiometric_Conversion_Constants class provides the values needed to perform the conversion from the calibrated pixel values to physical units. This conversion is dependent on the spectral distribition of the source, the detector wavelength range, and whether or not the source is resolved. A description of how to convert from data values to physical units is provided in the LLORRI SIS document. The sub-class contians attributes and sub-sub-classes as follows:

```
lucy:pivot_wavelength
lucy:Diffuse_Source
lucy:Point_Source
lucy:photometric_zero_point
```

All attributes and classes are required for the Radiometric_Conversion_Constants class.

The lucy:Diffuse_Source sub-class presents radiometric conversion constants for converting calibrated pixel values into physical units for unresolved sources.

```
lucy:units_of_conversion_constants
lucy:solar_constant
lucy:red_trojan_constant
lucy:gray_trojan_constant
lucy:dinkinesh_constant
```

The units, solar, red and gray constant attribues are required. Target sepcific constants are not required and will be extended as the mission progresses.

The lucy:Point_Source sub-class presents radiometric conversion constants for converting calibrated pixel values into physical units for resolved/extended sources.

```
lucy:units_of_conversion_constants
lucy:solar_constant
lucy:red_trojan_constant
lucy:gray_trojan_constant
lucy:dinkinesh_constant
```

The units, solar, red and gray constant attribues are required. Target sepcific constants are not required and will be extended as the mission progresses.

3.6 LRalph_Instrument_Common_Parameters

The LRalph_Instrument_Common_Paramters class is a set of instrument attributes that are specific to the L'Ralph instrument suite which comprises the LEISA and MVIC components. This class only appears in LEISA or MVIC data products. The LRalph_Instrument_Common_Paramters class contains the following attributes:

```
lucy:playback_start
lucy:playback_end
lucy:playback_bad_pixel_mask_status
lucy:playback_truncation_status
lucy:playback_header_type
lucy:test_pattern_setting
lucy:hs_xtrack_start_row
lucy:scan_row_pixels
lucy:fpecrc_error_flag
lucy:m4_calibration_state
lucy:m4_blackbody_setting
lucy:m4_filament_setting
lucy:fpe_drop_frames
lucy:mce_scan_rate
lucy:first_packet_timestamp
lucy:last_packet_timestamp
lucy:xsum_error_flag_status
lucy:lr_acquisition_start_block
lucy:mce_start_postion
lucy:mce_end_postion
lucy:board_selection
lucy:blocks_allocated
```

None of the attributes are required for this class.

3.7 LEISA_Instrument_Parameters

The LEISA_Instrument_Parameters class contians attributes specific to the LEISA instrument and only appears in LEISA dt products. The attributes contained in this calss area as follows:

```
lucy:leisa_mode
lucy:leisa_observation_allocation
lucy:leisa_integration_time
lucy:leisa_atrack_start_channel
lucy:leisa_atrack_num_channels
lucy:leisa_xtrack_start_row
lucy:leisa_xtrack_num_rows
lucy:leisa_offset
lucy:leisa_fpa_temperature
```

None of the attributes are required.

3.8 MVIC_Instrument_Parameters

The MVIC_Instrument_Parameters class contians attributes specific to the MVIC instrument and only appears in LEISA dt products. The attributes contained in this calss area as follows:

```
lucy:mvic_ccd_list
lucy:mvic_actual_atrack_summing
lucy:mvic_actual_xtrack_summing
lucy:mvic_planned_atrack_summing
lucy:mvic_planned_xtrack_summing
lucy:mvic_summing_mode
lucy:actual_ccd1_tdi_configuration
lucy:actual_ccd2_tdi_configuration
lucy:actual_ccd3_tdi_configuration
lucy:actual_ccd4_tdi_configuration
lucy:actual_ccd5_tdi_configuration
lucy:actual_ccd6_tdi_configuration
lucy:planned_ccd1_tdi_configuration
lucy:planned_ccd2_tdi_configuration
lucy:planned_ccd3_tdi_configuration
lucy:planned_ccd4_tdi_configuration
lucy:planned_ccd5_tdi_configuration
lucy:planned_ccd6_tdi_configuration
lucy:mvic_fpe_vis_temperature
lucy:mvic_observation_allocation
lucy:mvic_tdi_row_integration_time
```

None of the attributes are required.

CHAPTER

FOUR

DEFINITIONS

Type	Name	Description
Class	Lucy_Observation_Time_Information	Lucy Mission observation identification and timing information.
Attribute	observation_id	The lucy:observation_id attribute appears in all mission science data product
Attribute	observation_id_count	The lucy:observation_id_count attribute appears in all mission science data p
Attribute	observation_complete	The lucy:observation_complete attribute appears in all mission science data
Attribute	observation_missing_packets	The lucy:observation_missing_packets attribute appears in all mission scienc
Attribute	start_sclk	The lucy:start_sclk attribute appears in all mission science data products and
Attribute	mid_sclk	The lucy:mid_sclk attribute appears in all mission science data products and
Attribute	stop_sclk	The lucy:stop_sclk attribute appears in all mission science data products and
Attribute	mid_utc	The lucy:mid_utc attribute appears in all mission science data products and r
Attribute	mid_sclk_string	The lucy:mid_sclk_string attribute appears in all mission science data produc
Attribute	mid_utc_doy	The lucy:mid_utc_doy attribute appears in all mission science data products
Attribute	mid_utc_jd	The lucy:mid_utc_jd attribute appears in all mission science data products ar
Attribute	mid_ephemeris_time	The lucy:mid_ephemeris_time attribute appears in all mission science data p
Attribute	ccsds_sclk_time	The lucy:ccsds_sclk_time attribute appears in all mission science data produ
Class	Lucy_Observation_Planning	The Lucy Mission observation planning class and attributes describe the obs
Attribute	load_identifier	The lucy:load_identifier attribute appears in all mission science data product
Attribute	mission_segment	The lucy:mission_segment attribute appears in all mission science data produ
Attribute	sap_identifier	The lucy:sap_identifier attribute appears in all mission science data products
Attribute	visit_name	The lucy:visit_name appears in all mission science data products and reports
Attribute	instrument_side	The lucy:instrument_side attribute appears in all mission science data produc
Attribute	llorri_status	The lucy:llorri_status attribute appears in all mission science data products a
Attribute	lralph_status	The lucy:lralph_status attribute appears in all mission science data products a
Attribute	ltes_status	The lucy:ltes_status attribute appears in all mission science data products and
Attribute	ttcam_status	The lucy:ttcam_status attribute appears in all mission science data products a
Class	Lucy_Target_List	The Lucy Mission class that contains the target list of potential targets in a gi
Attribute	target_fov_count	The lucy:target_fov_count attribute appears in all mission science data produ
Attribute	target_fov_name	The lucy:target_fov_name attribute appears in all mission science data produ
Class	Lucy_Product_Information	The Lucy Mission class that contains attributes specific to the labeled data pr
Attribute	internal_product_version_id	The lucy:internal_product_version_id attribute appears in all mission science
Class	LLORRI_Instrument_Parameters	The Lucy LORRI instrument class that contains instrument specific attribute
Attribute	attached_sync_marker_dec	The lucy:attached_sync_marker_dec attribute appears in L'LORRI science d
Attribute	attached_sync_marker_hex	The lucy:attached_sync_marker_hex attribute appears in L'LORRI science d
Attribute	latch_count	The lucy:latch_count attribute appears in L'LORRI science data products and
Attribute	calibration_lamp_level_1	The lucy:calibration_lamp_level_1 attribute appears in L'LORRI science dat
Attribute	calibration_lamp_level_2	The lucy:calibration_lamp_level_2 attribute appears in L'LORRI science dat
Attribute	bias_level	The lucy:bias_level attribute appears in calibrated L'LORRI data products an
Attribute	read_noise	The lucy:read_noise attribute appears in calibrated L'LORRI data products a
Attribute	ccd_gain	The lucy:ccd_gain attribute appears in calibrated L'LORRI data products and

Type	Name	Description
Attribute	bias_offset	The lucy:bias_offset attribute appears in calibrated L'LORRI data products a
Attribute	frame_transfer_scrub_time	The lucy:frame_transfer_scrub_time attribute appears in calibrated L'LORRI
Class	LRalph_Instrument_Common_Parameters	The Lucy LRalph instrument class that contains the common (LEISA and M
Attribute	playback_start	The lucy:playback_start attribute appears in L'Ralph (MVIC and LEISA) sci
Attribute	playback_end	The lucy:playback_end attribute appears in L'Ralph (MVIC and LEISA) scie
Attribute	playback_bad_pixel_mask_status	The lucy:playback_bad_pixel_masl_status attribute appears in L'Ralph (MVI
Attribute	playback_truncation_status	The lucy:playback_truncation attribute appears in L'Ralph (MVIC and LEIS
Attribute	playback_header_type	The lucy:playback_header_type attribute appears in L'Ralph (MVIC and LEI
Attribute	test_pattern_setting	The lucy:test_pattern_setting attribute appears in L'Ralph (MVIC and LEISA
Attribute	hs_xtrack_start_row	The lucy:hs_xtrack_start_row attribute appears in L'Ralph (MVIC and LEIS
Attribute	scan_row_pixels	The lucy:scan_row_pixels attribute appears in L'Ralph (MVIC and LEISA) s
Attribute	scan_row_pixels	The lucy:scan_row_pixels attribute appears in L'Ralph (MVIC and LEISA) s
Attribute	fpecrc_error_flag	The lucy:fpecrc_error_flag attribute appears in L'Ralph (MVIC and LEISA)
Attribute	m4_calibration_state	The lucy:m4_calibration_state attribute appears in L'Ralph (MVIC and LEIS
Attribute	m4_blackbody_setting	The lucy:m4_blackbody_state attribute appears in L'Ralph (MVIC and LEIS
Attribute	m4_filament_setting	The lucy:m4_filament_state attribute appears in L'Ralph (MVIC and LEISA)
Attribute	fpe_drop_frames	The lucy:fpe_drop_frames attribute appears in L'Ralph (MVIC and LEISA) s
Attribute	mce_scan_rate	The lucy:mce_scan_rate attribute appears in L'Ralph (MVIC and LEISA) sci
Attribute	first_packet_timestamp	The lucy:first_packet_timestamp appears in L'Ralph (MVIC and LEISA) scie
Attribute	last_packet_timestamp	The lucy:last_packet_timestamp attribute appears in L'Ralph (MVIC and LE
Attribute	xsum_error_flag_status	The lucy:xsum_error_flag_status attribute appears in L'Ralph (MVIC and LE
Attribute	lr_acquisition_start_block	The lucy:lr_acquisition_start_block attribute appears in L'Ralph (MVIC and
Attribute	mce_start_postion	The lucy:mce_start_postion attribute appears in L'Ralph (MVIC and LEISA)
Attribute	mce_end_postion	The lucy:mce_end_postion attribute appears in L'Ralph (MVIC and LEISA)
Attribute	board_selection	The lucy:board_selection attribute appears in L'Ralph (MVIC and LEISA) sc
Attribute	blocks_allocated	The lucy:blocks_allocated attribute appears in L'Ralph (MVIC and LEISA) s
Class	LEISA_Instrument_Parameters	The Lucy LRalph LEISA class that contains the instrument specific attribute
Attribute	leisa_mode	The lucy:leisa_mode attribute appears in LEISA science data products and re
Attribute	leisa_observation_allocation	The lucy:leisa_observation_allocation attribute appears in LEISA science da
Attribute	leisa_integration_time	The lucy:leisa_integration_time attribute appears in LEISA science data proc
Attribute	leisa_atrack_start_channel	The lucy:leisa_atrack_start_channel appears in LEISA science data products
Attribute	leisa_atrack_num_channels	The lucy:leisa_atrack_num_channels appears in LEISA science data product
Attribute	leisa_xtrack_start_row	The lucy:leisa_xtrack_start_row appears in LEISA science data products and
Attribute	leisa_xtrack_num_rows	The lucy:leisa_xtrack_num_row appears in LEISA science data products and
Attribute	leisa_offset	The lucy:leisa_offset appears in LEISA science data products and reports the
Attribute	leisa_fpa_temperature	The lucy:leisa_offset appears in LEISA science data products and reports the
Class	MVIC_Instrument_Parameters	The Lucy LRalph MVIC class that contains the instrument specific attributes
Attribute	mvic_ccd_list	The lucy:mvic_ccd_list attribute appears in MVIC science data products and
Attribute	mvic_actual_atrack_summing	The lucy:mvic_actual_atrack_summing attribute appears in MVIC science da
Attribute	mvic_actual_xtrack_summing	The lucy:mvic_actual_xtrack_summing attribute appears in MVIC science d
Attribute	mvic_planned_atrack_summing	The lucy:mvic_planned_atrack_summing attribute appears in MVIC science
Attribute	mvic_planned_xtrack_summing	The lucy:mvic_planned_xtrack_summing attribute appears in MVIC science
Attribute	mvic_summing_mode	The lucy:mvic_summing_mode attribute appears in MVIC science data prod
Attribute	actual_ccd1_tdi_configuration	The lucy:actual_ccd1_tdi_configuration attribute appears in MVIC science d
Attribute	actual_ccd2_tdi_configuration	The lucy:actual_ccd2_tdi_configuration attribute appears in MVIC science d
Attribute	actual_ccd3_tdi_configuration	The lucy:actual_ccd3_tdi_configuration attribute appears in MVIC science d
Attribute	actual_ccd4_tdi_configuration	The lucy:actual_ccd4_tdi_configuration attribute appears in MVIC science d
Attribute	actual_ccd5_tdi_configuration	The lucy:actual_ccd5_tdi_configuration attribute appears in MVIC science d
Attribute	actual_ccd6_tdi_configuration	The lucy:actual_ccd6_tdi_configuration attribute appears in MVIC science d
Attribute	planned_ccd1_tdi_configuration	The lucy:planned_ccd1_tdi_configuration attribute appears in MVIC science

Type	Name	Description
Attribute	planned_ccd2_tdi_configuration	The lucy:planned_ccd2_tdi_configuration attribute appears in MVIC science
Attribute	planned_ccd3_tdi_configuration	The lucy:planned_ccd3_tdi_configuration attribute appears in MVIC science
Attribute	planned_ccd4_tdi_configuration	The lucy:planned_ccd4_tdi_configuration attribute appears in MVIC science
Attribute	planned_ccd5_tdi_configuration	The lucy:planned_ccd5_tdi_configuration attribute appears in MVIC science
Attribute	planned_ccd6_tdi_configuration	The lucy:planned_ccd6_tdi_configuration attribute appears in MVIC science
Attribute	mvic_fpe_vis_temperature	The lucy:mvic_fpe_vis_temperature attribute appears in MVIC science data
Attribute	mvic_observation_allocation	The lucy:mvic_observation_allocation attribute appears in MVIC science da
Attribute	mvic_tdi_row_integration_time	The lucy:mvic_tdi_row_integration_time attribute appears in MVIC science
Class	Point_Source	The lucy:Point_Source class presents radiometric conversion constants for co
Attribute	units_of_conversion_constants	For resolved sources, the radiometric conversion produces data in units of ra
Attribute	solar_constant	The lucy:solar_constant attribute supplies the constant to be used for sources
Attribute	red_trojan_constant	The lucy:red_trojan_constant attribute supplies the constant to be used for so
Attribute	gray_trojan_constant	The lucy:gray_trojan_constant attribute supplies the constant to be used for s
Attribute	dinkinesh_constant	The lucy:dinkinesh_constant attribute supplies the constant to be used for sou
Class	Radiometric_Conversion_Constants	The lucy:Radiometric_Conversion_Constants class provides the values neede
Attribute	pivot_wavelength	The value contained in the lucy:pivot_wavelength attribute is used when con
Attribute	photometric_zero_point	The lucy:photometric_zero_point attribute supplies the photometric zero poi
Class	Diffuse_Source	The lucy:Point_Source class presents radiometric conversion constants for co
Attribute	units_of_conversion_constants	For resolved sources, the radiometric conversion produces data in units of ra
Attribute	solar_constant	The lucy:solar_constant attribute supplies the constant to be used for sources
Attribute	red_trojan_constant	The lucy:red_trojan_constant attribute supplies the constant to be used for so
Attribute	gray_trojan_constant	The lucy:gray_trojan_constant attribute supplies the constant to be used for s
Attribute	dinkinesh_constant	The lucy:dinkinesh_constant attribute supplies the constant to be used for sou

CHAPTER

FIVE

EXAMPLES

Note: the examples below reside within the `Mission_Area` section of their PDS4 labels.

5.1 Observational parameters common to all instruments

```
<lucy:Lucy_Observation_Planning>
  <lucy:load_identifier>22289 </lucy:load_identifier>
  <lucy:mission_segment>EGA_1</lucy:mission_segment>
  <lucy:sap_identifier>SAP.RA.C.013.v01__Earth_Radiometry</lucy:sap_identifier>
  <lucy:visit_name>22289.ega1.RA.C.013.v01.288ae__Earth_Radiometry</lucy:visit_name>
  <lucy:instrument_side>SIDE_1</lucy:instrument_side>
  <lucy:llorri_status>UNKNOWN</lucy:llorri_status>
  <lucy:lralph_status>ACTIVE</lucy:lralph_status>
  <lucy:ltes_status>ACTIVE</lucy:ltes_status>
  <lucy:ttcam_status>UNKNOWN</lucy:ttcam_status>
</lucy:Lucy_Observation_Planning>
<lucy:Lucy_Observation_Time_Information>
  <lucy:observation_id>2230</lucy:observation_id>
  <lucy:observation_complete>COMPLETE</lucy:observation_complete>
  <lucy:observation_missing_packets>0</lucy:observation_missing_packets>
  <lucy:start_sclk unit="s"> 719078053.248</lucy:start_sclk>
  <lucy:mid_sclk unit="s">719078082.0999761 </lucy:mid_sclk>
  <lucy:stop_sclk unit="s">719078110.9519521</lucy:stop_sclk>
  <lucy:mid_utc>2022-10-15T03:54:59.454Z</lucy:mid_utc>
  <lucy:mid_sclk_string>1/0719078082-06552</lucy:mid_sclk_string>
  <lucy:mid_utc_doy>2022-288T03:54:59.454Z</lucy:mid_utc_doy>
  <lucy:mid_utc_jd unit="julian day">JD 2459867.6631881</lucy:mid_utc_jd>
  <lucy:mid_ephemeris_time unit="s">719078168.6364158 </lucy:mid_ephemeris_time>
  <lucy:ccsds_sclk_time unit="s"> 71942620</lucy:ccsds_sclk_time>
</lucy:Lucy_Observation_Time_Information>
<lucy:Lucy_Target_List>
  <lucy:target_fov_count>1</lucy:target_fov_count>
  <lucy:target_fov_name>Earth</lucy:target_fov_name>
</lucy:Lucy_Target_List>
<lucy:Lucy_Product_Information>
  <lucy:internal_product_version_id>1</lucy:internal_product_version_id>
</lucy:Lucy_Product_Information>
```

5.2 L'LORRI instrument parameters

```
<lucy:LLORRI_Instrument_Parameters>
                <lucy:attached_sync_marker_dec>449838109</lucy:attached_sync_marker_dec>
                <lucy:attached_sync_marker_hex>0x1ACFFC1D</lucy:attached_sync_marker_hex>
                <lucy:latch_count>0</lucy:latch_count>
                <lucy:calibration_lamp_level_1 unit="DN">0</lucy:calibration_lamp_level_
↪1>
                <lucy:calibration_lamp_level_2 unit="DN">0</lucy:calibration_lamp_level_
↪2>
                <lucy:bias_level unit="DN">120.0531862745098</lucy:bias_level>
                <lucy:read_noise unit="DN">0.9</lucy:read_noise>
                <lucy:ccd_gain unit="electron/DN">21.1</lucy:ccd_gain>
                <lucy:bias_offset unit="DN">3.2</lucy:bias_offset>
                <lucy:frame_transfer_scrub_time unit="ms">11.7762</lucy:frame_transfer_
↪scrub_time>
                <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>
            </lucy:LLORRI_Instrument_Parameters>
```

5.3 L'Ralph common instrument parameters (shared between MVIC and LEISA)

```
<lucy:LRalph_Instrument_Common_Parameters>
  <lucy:playback_start unit="s">719548332</lucy:playback_start>
  <lucy:playback_end unit="s">719549015</lucy:playback_end>
  <lucy:playback_bad_pixel_mask_status>false</lucy:playback_bad_pixel_mask_status>
  <lucy:playback_truncation_status>true</lucy:playback_truncation_status>
  <lucy:playback_header_type>MVIC</lucy:playback_header_type>
  <lucy:test_pattern_setting>0</lucy:test_pattern_setting>
  <lucy:hs_xtrack_start_row>79</lucy:hs_xtrack_start_row>
  <lucy:scan_row_pixels>5024</lucy:scan_row_pixels>
  <lucy:fpecrc_error_flag>false</lucy:fpecrc_error_flag>
```

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```
  <lucy:m4_calibration_state>0</lucy:m4_calibration_state>
  <lucy:m4_blackbody_setting>0</lucy:m4_blackbody_setting>
  <lucy:m4_filament_setting>0</lucy:m4_filament_setting>
  <lucy:fpe_drop_frames>25</lucy:fpe_drop_frames>
  <lucy:mce_scan_rate unit="rad/s">0.004</lucy:mce_scan_rate>
  <lucy:first_packet_timestamp unit="s">719212908.1950001 </lucy:first_packet_timestamp>
  <lucy:last_packet_timestamp unit="s">719212919.048</lucy:last_packet_timestamp>
  <lucy:xsum_error_flag_status>false</lucy:xsum_error_flag_status>
  <lucy:lr_acquisition_start_block>2419</lucy:lr_acquisition_start_block>
  <lucy:mce_start_postion>-18200</lucy:mce_start_postion>
  <lucy:mce_end_postion>17000</lucy:mce_end_postion>
  <lucy:board_selection>FM 1</lucy:board_selection>
  <lucy:blocks_allocated>24</lucy:blocks_allocated>
</lucy:LRalph_Instrument_Common_Parameters>
```

5.4 L'Ralph/MVIC-specific instrument parameters

```
<lucy:MVIC_Instrument_Parameters>
  <lucy:mvic_ccd_list>2,3,4,5,6</lucy:mvic_ccd_list>
  <lucy:mvic_actual_atrack_summing>0</lucy:mvic_actual_atrack_summing>
  <lucy:mvic_actual_xtrack_summing>0</lucy:mvic_actual_xtrack_summing>
  <lucy:mvic_planned_atrack_summing>0</lucy:mvic_planned_atrack_summing>
  <lucy:mvic_planned_xtrack_summing>0</lucy:mvic_planned_xtrack_summing>
  <lucy:mvic_summing_mode>0</lucy:mvic_summing_mode>
  <lucy:actual_ccd1_tdi_configuration>NO_PLAYBACK</lucy:actual_ccd1_tdi_configuration>
  <lucy:actual_ccd2_tdi_configuration>TDI_4 </lucy:actual_ccd2_tdi_configuration>
  <lucy:actual_ccd3_tdi_configuration>TDI_4 </lucy:actual_ccd3_tdi_configuration>
  <lucy:actual_ccd4_tdi_configuration>TDI_4 </lucy:actual_ccd4_tdi_configuration>
  <lucy:actual_ccd5_tdi_configuration>TDI_4 </lucy:actual_ccd5_tdi_configuration>
  <lucy:actual_ccd6_tdi_configuration>TDI_4 </lucy:actual_ccd6_tdi_configuration>
  <lucy:planned_ccd1_tdi_configuration>NO_PLAYBACK</lucy:planned_ccd1_tdi_configuration>
  <lucy:planned_ccd2_tdi_configuration>4_ROWS </lucy:planned_ccd2_tdi_configuration>
  <lucy:planned_ccd3_tdi_configuration>4_ROWS </lucy:planned_ccd3_tdi_configuration>
  <lucy:planned_ccd4_tdi_configuration>4_ROWS </lucy:planned_ccd4_tdi_configuration>
  <lucy:planned_ccd5_tdi_configuration>4_ROWS </lucy:planned_ccd5_tdi_configuration>
  <lucy:planned_ccd6_tdi_configuration>4_ROWS </lucy:planned_ccd6_tdi_configuration>
  <lucy:mvic_fpe_vis_temperature unit ="degC">9.009289875250857</lucy:mvic_fpe_vis_
↪temperature>
  <lucy:mvic_observation_allocation unit ="s">10</lucy:mvic_observation_allocation>
  <lucy:mvic_tdi_row_integration_time unit ="microseconds">7250</lucy:mvic_tdi_row_
↪integration_time>
</lucy:MVIC_Instrument_Parameters>
```

5.5 L'Ralph/LEISA-specific instrument parameters

```
<lucy:LEISA_Instrument_Parameters>
  <lucy:leisa_mode>T</lucy:leisa_mode>
  <lucy:leisa_observation_allocation unit="s">59</lucy:leisa_observation_allocation>
  <lucy:leisa_integration_time unit="microseconds">26.640</lucy:leisa_integration_time>
  <lucy:leisa_atrack_start_channel>4</lucy:leisa_atrack_start_channel>
  <lucy:leisa_atrack_num_channels>23</lucy:leisa_atrack_num_channels>
  <lucy:leisa_xtrack_start_row>647</lucy:leisa_xtrack_start_row>
  <lucy:leisa_xtrack_num_rows>20</lucy:leisa_xtrack_num_rows>
  <lucy:leisa_offset>1111</lucy:leisa_offset>
  <lucy:leisa_fpe_ir_temperature unit="degC">-1.701436782829319</lucy:leisa_fpe_ir_
↪temperature>
</lucy:LEISA_Instrument_Parameters>
```

CHAPTER

SIX

LUCY MISSION LDD

REQUIRED

Submitter: M. Katherine Combie

class

6.1 class

REQUIRED

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attribute

6.1.1 Subheader 3

More details

Subheader 4

More Details