OSIRIS

Optical, Spectroscopic, and Infrared Remote Imaging System

Rosetta-OSIRIS To Planetary Science Archive Interface Control Document

RO-RIS-MPAE-ID-015

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Document Change Record

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Draft	4 Nov. 2003 Stubbe Hviid	All	First draft
1a	29 Aug 2005 Stubbe Hviid	All	Fleshed out
1b	24 Jan 2006	All	Added science objectives General cleaning
2a	2 Nov 2006	All	Major cleaning and reorganization of document Added dataset overview covering the period until Comet encounter Changed the PDS file naming convention to be PDS compliant Simplified the data directory structure Moved most of the actual PDS label information to the EDR/SIS document.
3a	14/5-2009	All	Added data set ID's separated between NAC and WAC
3c	2/12-2010	All	Synchronized the EAICD with the actual archive generation process (several minor points) Added description of new EXTRAS directory used to store the BROWSE HTML files, thumbnail images and activity log
3d	28/1-2011		Added missing BROWSE directory description Corrected mistakes in the data set ID description Corrected various spelling errors
3e	3/3-2011	26	Change CAL description to reflect the non-zip based implementation required by the PDS
3f	20 Oct 2015 Pablo Gutiérrez-Marqués	1,2,9,26	Added explanation on the extent of the calibration database Updated PI and creator of the data
4-	16/01/2017 Cecilia Tubiana	All	Now uses OSIRIS document template Updated various figures & tables Updated Acronym list Removed "Scientific objectives" Updated Data Handling Process Updated Instrument Overview section for NAC & WAC Removed "Data Set and Data Product Overview" Updated The CALIB directory • Removed ADC, FILTERS, MIRRORS, QE, SHUTTER, SOLARFLUX sections • Added BADPIXELS, EXPOSURE sections • Descriptions of all CALIB sections have been updated Removed "Reference Systems" Removed "PDS Object and Keyword Definitions" Added OSIRIS Ancillary Data PDS Labels

4a	28/04/2017 Cecilia Tubiana	Sect. 1.5, Sect. 3.4, Sect. 4, and Sect. 4.1	Updated versions of reference documents Added Sec 4: The OSIRIS Science Data (.fts and .jpg) Detached Labels Added description of DATA_VERSION_ID Removed INSTRUMENT_NAME from ancillary labels Added description of BROWSE and .FTS data to Sect. 3.4 Section 4.2: added note in MEAN and STANDARD_DEVIATION: "this label is present only in CODMAC level 2 images.
4b	16/10/2017 Cecilia Tubiana		Sec 1.5: updated list of reference documents (replaced EDR+RDR SIS with OSIRIS SIS) Sec 3.3: updated ref to OSIRIS (merged) SIS Sec 3.4.3.1-3.4.3.6: updated description when needed Sec 3.4.5: Removed ASCII version available, and updated ref to (merged) SIS. Sec 3.5.1: Replaced the description of the OSIRIS naming convention with ref to OSIRIS SIS section.
4c	12/02/2018 Cecilia Tubiana	All	Added CT to Sec. 1.7 Added Sec. 1.5 Added RD4 to Sec. 1.6 Updated Sec. 3.3, 3.4, 3.5.2 Removed (former) Sec. 4: PDS detached labels for FITs and JPG (moved to OSIRIS SIS). Added DATA_SET_ID to Sec. 4.1. Removed RECORD_BYTES, FILE_RECORDS, and LABEL_RECORDS, NOTE, PROCESSING_HISTORY_TEXT, FILTER_NUMBER, SOFTWARE_* from Sec. 4.2. Added INSTRUMENT_ID to Sec. 4.2. General clean up

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1 General aspects

1.1 Scope

This document describes the data flow of the OSIRIS instrument on the Rosetta mission from the S/C until the insertion into the Planetary Science Archive (PSA) for ESA. It includes information on how data was processed, formatted, labelled and uniquely identified. The document discusses general naming schemes for data volumes, datasets, data and detached label files. Standards used to generate the product are explained, as well as software that may be used to access the products.

The design of the dataset structure and the data product is given Sec. 3.3 to 3.6.

1.2 Introduction

The purpose of this EAICD (Experimenter to (Science) Archive Interface Control Document) is twofold. First, it provides users of the OSIRIS instrument data with a detailed description of the product and a description of how it was generated, including data sources and destinations. Secondly, it is the official interface between the OSIRIS instrument team and the PSA archiving authority.

1.3 Archiving Authorities

The Planetary Data System Standard is used as archiving standard by:

- NASA for U.S. planetary missions, implemented by PDS
- ESA for European planetary missions, implemented by the Research and Scientific Support Department (RSSD) of ESA

ESA implements an online science archive, the PSA, to support and ease data ingestion to offer additional services to the scientific user community and science operations teams: e.g. search queries that allow searches across instruments, missions and scientific disciplines, several data delivery options as direct download of data products, linked files and datasets ftp download of data products, linked files and datasets.

The PSA aims for online ingestion of logical archive volumes and will offer the creation of physical archive volumes on request.

1.4 Intended Readership

The staff of the archiving authority (Planetary Science Archive, ESA, RSSD, design team) and any potential user of OSIRIS data.

1.5 Applicable Documents

no.	Document Name	Document Number, Iss./Rev.
AD1	Planetary Data System Standards Reference	JPL D-7669, Part 2, Version 3.8
AD2	Definition of the Flexible Image Transport System (FITS)	The FITS Standard Version 3.0: approved 2008 July 10 by the IAUFWG Document publication date: 2010 November 18

1.6 Reference Documents

no.	document name	document number, Iss./Rev.
RD1	Planetary Data System Preparation Workbook, February 1, 1995	Version 3.1, JPL, D-7669, Part1
RD2	Planetary Data System Standards Reference, June 1, 1999	Version 3.3, JPL, D-7669, Part 2
RD3	Software Interface Specifications for OSIRIS Science Products	RO-RIS-MPAE-ID-023
RD4	OSIRIS Calibration Pipeline OsiCalliope	RO-RIS-MPAE-MA-007
RD5	Determination of the absolute calibration coefficients to radiometrically calibrate OSIRIS images	RO-RIS-MPAE-TN-074
RD6	OSIRIS camera bad pixel list	RO-RIS-MPAE-TN-080
RD7	OSIRIS camera bias levels	RO-RIS-MPAE-TN-079
RD8	Osiris camera distortion correction parameters	RO-RIS-MPAE-TN-081
RD9	Shutter parameters for exposure time calculation	RO-RIS-MPAE-TN-073
RD10	Acquisition and processing of flat field images for OSIRIS calibration	RO-RIS-MPAE-TN-075
RD11	ROSETTA - Archive Conventions	RO-EST-TN-3372

1.7 Contact Names and Addresses

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2 Acronyms and Abbreviations

ASCII	American Standard Code for Information Interchange
ADC	Analog Digital Converter
CRB	CCD Readout Board
CCD	Charge Coupled Device
DDS	Data Distribution System
DPU	Data Processing Unit
DSP	Digital Signal Processor
EDR	Experiment Data Record
ESA	European Space Agency
HK	House Keeping data
IAA	Instituto de Astrofísica de Andalucía
IDA	Institut für Datentechnik und Kommunikationsnetze
INTA	Instituto Nacional de Técnica Aeroespacial
LAM	Laboratoire d'Astrophysique de Marseille
MCB	Motor Controller Board
MLI	Multi-Layer Insulation
MPS	Max Planck Institut für Sonnensystemforschung
NAC	Narrow Angle Camera
ODL	Object Description Language
OIOR	Orbiter Instrument Operational Request
OSIRIS	Optical, Spectroscopic, and Infrared Remote Imaging System
PCM	Power Converter Module
PDS	Planetary Data Systems
RDR	Reduced Data Record
RSSD	Research and Scientific Support Department (ESA)
RO	Rosetta Orbiter
PSA	Planetary Science Archive
SPICE	Spacecraft, Planet, Instrument, C-matrix, Event kernels
SIS	Software Interface Specification
SPIHT	Set Partitioning in Hierarchical Trees (Wavelet compression algorithm)
SSMM	Solid State Mass Memory (Rosetta spacecraft storage device)
TBC	To Be Considered

TBD	To Be Determined
TMI	TeleMetry Image
UPD	Università di Padova
UPM	Universidad Politécnica de Madrid
WAC	Wide Angle Camera

3 Overview of Instrument Design, Data Handling Process and Product Generation

3.1 Instrument Overview

The OSIRIS instrument was provided by the OSIRIS consortium led by the principal investigator Dr. Horst Uwe Keller at the Max Planck Institut für Sonnensystemforschung.

The OSIRIS camera system consists of a Narrow Angle Camera (NAC) and a Wide Angle Camera (WAC).

3.1.1 The Narrow Angle Camera (NAC)

The NAC (Figure 1) uses an off axis three mirror optical design. The off axis design was selected in order to minimize the straylight reaching the CCD (the NAC has a proven stray light attenuation of better than 10^{-9}). The optical beam is reflected by the three mirrors (M1, M2 and M3) before passing through a double filter wheel, a mechanical shutter mechanism and an anti-radiation plate (ARP) before reaching the CCD.

Figure 1: (left) The OSIRIS NAC flight unit in the lab. (right) The NAC Optical path

3.1.2 The Wide Angle Camera

The WAC (Figure 2) uses an off axis two mirror optical design. The off axis design was selected in order to minimize the stray light reaching the CCD (the WAC has a proven stray light attenuation of better than 10^{-8}).

The optical beam is reflected by the two mirrors (M1 & M2) before passing through a double filter wheel, a mechanical shutter mechanism, and an anti-radiation plate (ARP) before reaching the CCD.

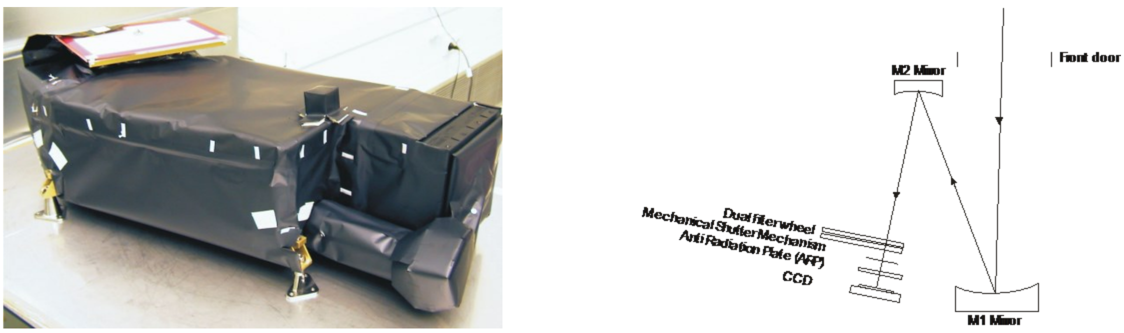

Figure 2: (left) The OSIRIS WAC flight unit in the lab. (right) The WAC Optical path

More detailed information about the design of the cameras, the filter wheels, the mechanical shutter mechanism and the CCD can be found in:

Keller, H. U. et al. OSIRIS -- The Scientific Camera System Onboard Rosetta, *Space Science Reviews*, 2007, **128**, 433-506.

3.2 Data Handling Process

OSIRIS Experiment Data Records (EDR) processing is overseen by OsiDRONE. OsiDRONE runs several processes, which handle the actual data processing. Each of these processes can be run independently as needed, but in general operational use, they are controlled by OsiDRONE. The following steps are performed when processing a dataset, with output logs generated for each step (Figure 3).

3.2.1 HERMES

HERMES downloads the raw telemetry data via the DDS interface from ESA, and saves the data to the OSIRIS TLM archive.

3.2.2 OsiTRAP

OsiTRAP generates both the OSIRIS level 0 (raw data & header) images and OSIRIS level 1 (raw data & calibrated header) images, which are then stored in the OSIRIS Primary Archive.

3.2.3 GETTY

GETTY determines where each image from the primary archive should be copied, and copies them to the correct location within the OSIRIS Secondary Archive.

3.2.4 OsiCALLIOPE

OsiCalliope calibrates the OSIRIS level 1 images, creating OSIRIS level 2 and higher images, which are stored in the OSIRIS Secondary Archive.

3.2.5 pds2Legacy

pds2Legacy generates FITs and JPEG from the PDS products.

3.2.6 TIMGAD

Additional tools are used in order to deliver the data products, along with supporting ancillary information, to the PSA archive (Figure 4).

TIMGAD packages the data products, along with supporting ancillary information (see Sec. 3.3), creating a data package for the CODMAC level being delivered. This data package is then uploaded to the PSA Archive.

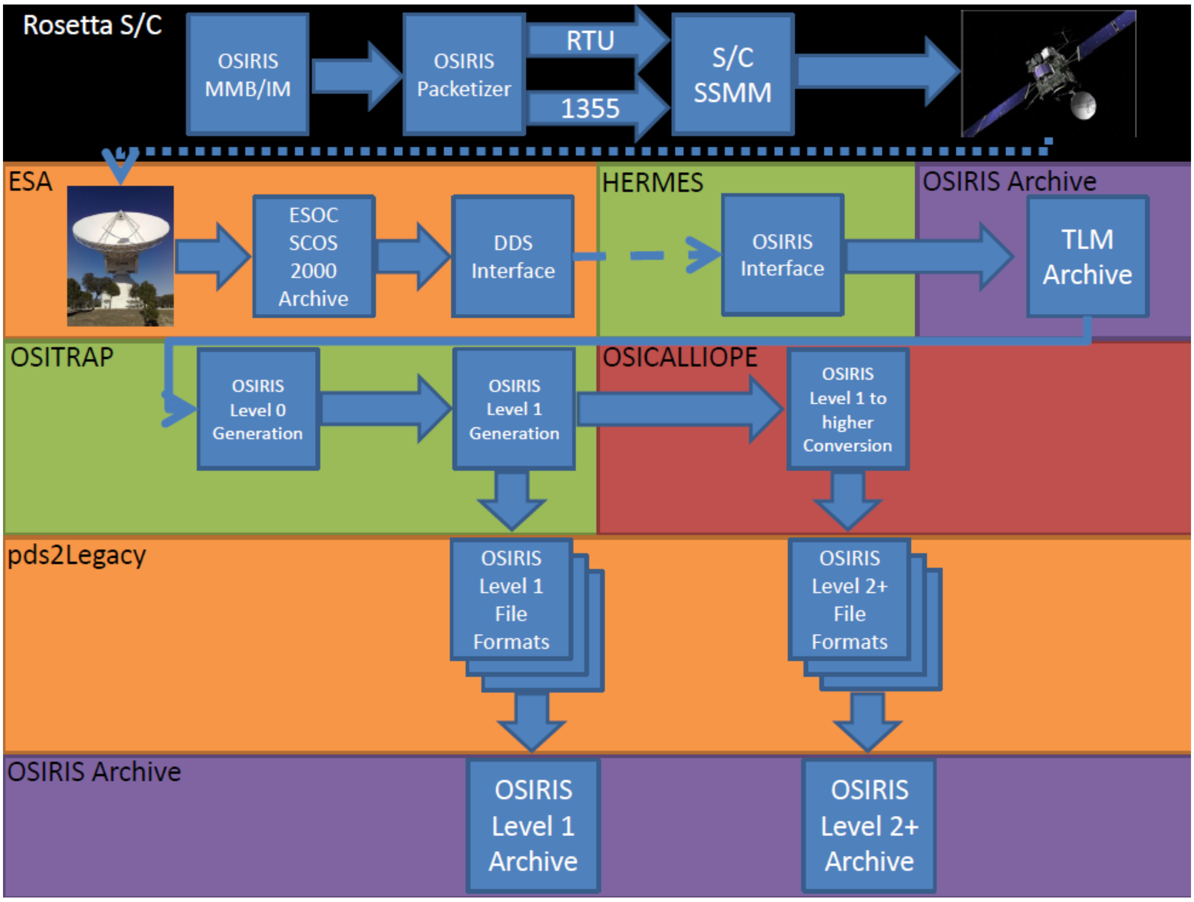

Figure 3: The OSIRIS data and processing flow

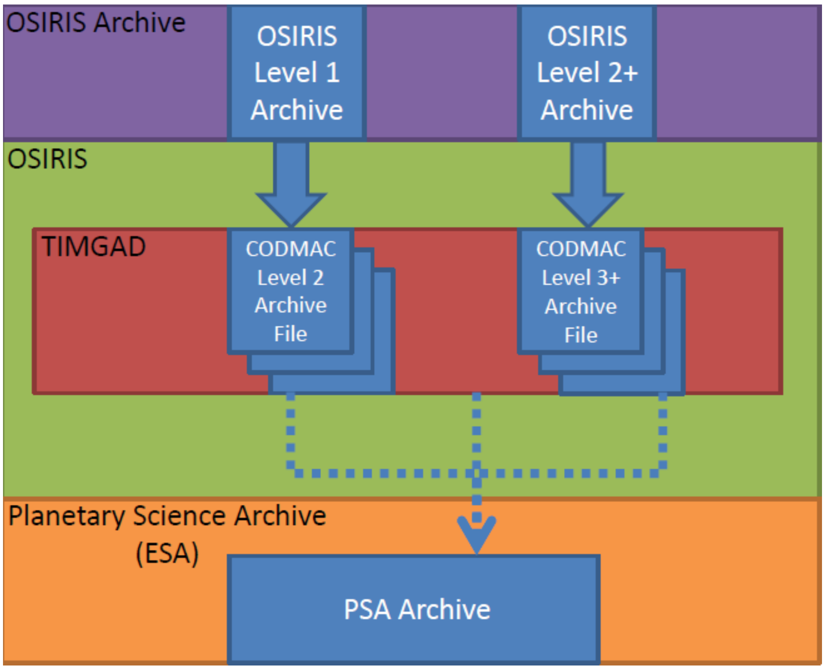

Figure 4: The data and processing flow from the OSIRIS Archive to PSA

The correspondence between OSIRIS and CODMAC levels is summarized in Table 1

OSIRIS Data Levels	CODMAC Levels	Description
Packet Data	1	Telemetry data stream as received at the ground station, with science and engineering data embedded.
0		PDS or TMI formatted data files. Uncalibrated header and uncalibrated image data
1	2	PDS compliant data files with calibrated header data and uncalibrated image data
2	3	PDS compliant data files with calibrated header data and radiometrically calibrated image data
3	4	PDS compliant data files with calibrated header data and radiometrically calibrated & geometric distortion corrected image data

Table 1: OSIRIS and CODMAC data levels

3.3 Overview of Data Products

For details on the OSIRIS PDS, FITs and JPG labels please see the OSIRIS SIS document [RD4] included in the dataset documentation folder (\DOCUMENT\SIS).

3.3.1 Instrument Calibrations

OSIRIS is archiving raw (COMAC level 2) and calibrated data (CODMAC levels 3 and higher). All the calibration steps applied to the data are described in the OsiCalliope document [RD4]. The database used by OsiCalliope to generate the calibrated data is included in the archived dataset structure. Moreover, routines in the programming language IDL are included in the dataset, which provide an interface to read and modify the images.

CALIB\	Contains the calibration database used by OsiCalliope to generate the calibrated data.
EXTRAS\SOFTWARE\FWPDSLIB.ZIP	Contains an IDL (Interactive Data Language) software library for reading and manipulating PDS images.

3.4 Dataset Organization

The OSIRIS datasets are organized using the subdirectories recommended by the PDS standards:

- BROWSE
- CALIB
- CATALOG
- DATA
- DOCUMENT

- EXTRAS
- INDEX

3.4.1 The BROWSE directory

The BROWSE directory contains JPEG for all the PDS images stored in the DATA directory of the dataset. The images are stored using the same organization as used for the DATA directory. Each file comprises a detached PDS label containing all relevant information present in the PDS image header. The detached label and details of the JPG files including size, compression, and orientation are described in the OSIRIS SIS document [RD4].

3.4.2 The DATA directory

The data directory contains the actual OSIRIS data files in .IMG and in .FIT format in DATA\IMG and DATA\FIT, respectively. The .IMG images have an attached PDS label (image header), while the FITs files comprise a detached PDS label that contains all the relevant information present in the PDS image header. For details see the OSIRIS SIS document [RD4].

3.4.3 The CALIB directory

The CALIB directory contains the calibration database used by OsiCalliope to generate the calibrated images. All information is readable using either a text editor (ASCII format) or a standard PDS data file reader.

Given that the calibration database is considered a single product even if it can be used separately to calibrate images from the NAC and the WAC, it is delivered in its entirety on the NAC and WAC datasets.

The calibration database has the following structure:

CALIB/		
	ABSCAL	Folder containing the [DN/s] to [W/m^2/sr/nm] conversion factors to radiometric calibrate the images.
	BADPIXELS	Folder containing a list of bad pixels on the CCDs and their correction method.
	BIAS	Folder containing the bias offsets for the various operational modes of OSIRIS.
	DISTORTION	Folder containing the geometric distortion correction parameters for the cameras.
	EXPOSURE	Folder containing data for exposure time correction.
	FLATFIELDS	Folder containing the flatfields for the various filter combinations
	THROUGHPUT	Folder containing the parameters used for the determination of the camera throughput.

3.4.3.1 ABSCAL

ABSCAL contains the absolute calibration coefficients to radiometric calibrate OSIRIS images.

The files have the format:

<camera>_<model>_ABSCAL_V<version>.TXT

The data files contain the PDS label description of the file, followed by the data.

General information about the correction method can be found in the OsiCalliope document [RD4] and about the calibration data in the absolute calibration coefficients document [RD5].

3.4.3.2 BADPIXELS

BADPIXELS contains the list of the NAC and WAC bad pixels and their correction method. The files have the format:

<camera>_<model>_BAD_PIXEL_V<version>.TXT

The data files contain the PDS label description of the file, followed by the data from inflight calibration.

General information about the correction method can be found in the OsiCalliope document [RD4] and about the calibration data in the bad pixels document [RD6].

3.4.3.3 BIAS

BIAS contains the bias offsets, introduced by the readout electronics, that has to be subtracted from the images. The files have the format:

<camera>_<model>_BIAS_V<version>.TXT

The data files contain the PDS label description of the file, followed by the data from the delta calibration in May 2014 and regular inflight bias observations.

General information about the correction method can be found in the OsiCalliope document [RD4] and about the calibration data in the bias document [RD7].

3.4.3.4 DISTORTION

DISTORTION contains the parameters to correct the NAC and WAC camera geometric distortion. The files have the format:

<camera>_<model>_DISTORTION_V<version>.TXT

The data files contain the PDS label description of the file, followed by the data.

General information about the correction method can be found in the OsiCalliope document [RD4] and about the calibration data in the geometric distortion correction document [RD8].

3.4.3.5 EXPOSURE

EXPOSURE contains the default exposure time corrections to be applied to the data. The files have the format:

<camera>_<model>_EXP_<suffix>_V<version>.TXT

<suffix> is either BAL or a date.

The data files contain the PDS label description of the file, followed by the data.

General information about the correction method can be found in the OsiCalliope document [RD4] and about the calibration data in the exposure time correction document [RD9].

3.4.3.6 FLATFIELDS

FLATFIELDS contains the high and low spatial frequency flatfields required to calibrate OSIRIS images. The files have the format:

<camera>_<model>_FLAT<type>_<filter number>_V<version>.IMG

<type> can be “HI” for high spatial frequency flatfield images or omitted for low spatial frequency flatfield images.

The data files are stored in a data format that can be read with a PDS image reader and include an attached label.

General information about the correction method can be found in the OsiCalliope document [RD4] and about the calibration data in the flatfield document [RD10].

3.4.3.7 THROUGHPUT

THROUGHPUT contains the parameters used for the determination of the camera throughput: quantum efficiency (QE) of the CCD, reflectivity of the mirror system (MIRROR), transmissivity of the anti-radiation plate (ARP). The files have the format:

<camera>_<model>_<type>_V<version>.TXT

<type> can be “ARP”, “MIRROR”, or “QE”.

The data files contain the PDS label description of the file, followed by the data.

General information about the correction method can be found in the OsiCalliope document [RD4] and about the calibration data in the absolute calibration coefficients document [RD5].

3.4.4 The CATALOG directory

The CATALOG directory contains the catalogue files required by the PDS standard.

DATASET.CAT	Description of the dataset
INSTHOST.CAT	Description of the Rosetta orbiter spacecraft
MISSION.CAT	Description of the Rosetta mission
OSINAC_INST.CAT or OSIWAC_INST	Description of the OSIRIS NAC or WAC instrument
PERSONNEL.CAT	Contact information
REFERENCE.CAT	References
SOFTWARE.CAT	Description of the included software packages
TARGETS.CAT	Description of the target object observed in the dataset

3.4.5 The DOCUMENT directory

The DOCUMENT directory contains supporting documentation for the dataset. The documents are organized in sub directories. Each subdirectory contains one or more versions of the same document, of which the latest (highest version number) is applicable.

[CALIB]	One document that describes the calibration process performed by OsiCalliope (OSIRIS_CAL_PIPELINE_V<version>.PDF) and

	several documents that describe the database, supporting the OsiCalliope main document.
[EAICD]	Experimenter to (Science) Archive Interface Control Document (this document)
[OSIRIS_SSR]	A Space Science Review paper by Keller et al. (2007), describing the OSIRIS cameras in detail.
[SIS]	The OSIRIS SIS document (detailed PDS label description)
[SCIENCE_USER_GUIDE]	Document describing the intention behind the acquisition of each image and its planned scientific purpose.

3.4.6 The EXTRAS directory

The EXTRAS directory contains a subdirectory SOFTWARE. This folder is used to store the software that can be used to read and modify the OSIRIS images. All routines are written in the programming language IDL (Interactive Data Language) and zipped into FWPDSLIB.ZIP, which contains a readme file explaining how to use the routines.

3.5 Data File Naming Conventions and Product IDs

3.5.1 File Naming Convention

For the OSIRIS image files naming convention please refer to the OSIRIS SIS [RD4].

3.5.2 The Dataset ID

The OSIRIS DATA_SET_ID follows the following convention:

DATA_SET_ID = RO-<target ID>-<instrument>-<CODMAC level>-<mission phase abbreviation>-<description>-<version>

Field	**Description**
RO-	The letters “RO-”
<target ID>	A single letter code for the target type observed (see the Rosetta Archive Convention document [RD11])
-	The letter “-”
<instrument>	Either OSINAC or OSIWAC
-	The letter “-”
<CODMAC level>	The CODMAC data level of the dataset
-	The letter “-”
<mission phase ID>	The mission phase abbreviation (see the Rosetta Archive Convention document [RD11])
-	The letter “-”

<mission phase abbreviation >	The mission phase name (see the Rosetta Archive Convention document [RD11])
<version>	The release version using the form: V<release>.<submission> Example. V2.1 means release 2, submission 1 The release number only increments if a dataset is resubmitted and made public. The submission number refers to deliveries of the same dataset from OSIRIS to the PSA (for example as part of the review process)

Example: RO-C-OSINAC-2-PRL-67PCHURYUMOV-M01-V2.1

3.6 Standards Used in Data Product Generation

3.6.1 PDS Standards

The OSIRIS archive is based on the PDS v3.8 specifications [AD1].

3.6.2 Time Standards

3.6.2.1 SCLK Time fields

SLCK time fields are specified using the following convention:

<reset number>/<time counter high value>:<time counter low value>

- <time counter high value> is approximately the number of seconds since Jan 1 2003
- <time counter low value> is counted in 1/65536 second ticks

Example: 1/37673377:42320

3.6.2.2 Calendar Time Fields

All time fields follow the ANSI time definition:

YYYY-MM-DDTHH:MM:SS.mmm

Where:

- YYYY is the year in 4 digits
- MM is the month in 2 digits
- DD is the day of month in 2 digits
- HH is the hour in 2 digits
- MM is the minute in 2 digits
- SS is the second in 2 digits
- mmm is millisecond

All time fields are given in UTC.

4 The OSIRIS Ancillary Data PDS Labels

4.1 Mandatory Labels

These labels should appear in all ancillary data products.

Label	*Group*	*Namespace*	*Datatype*	*Unit*	*Description*	*Source*
PDS_VERSION_ID			Label		PDS version identifier.	Fixed
LABEL_REVISION_NOTE			String		PDS label set version.	Fixed
RECORD_TYPE			Label		PDS System Label. For ASCII data files, this will be STREAM. For PDS data, this will be FIXED_LENGTH.	Data producer
FILE_NAME			String		Original filename.	Source file
PRODUCT_ID			String		Internal name of the data file.	Data producer
DATA_SET_ID			String		ID of the PDS dataset to which the data product belongs.	Data producer
INSTRUMENT_HOST_NAME			String		Name of mission.	Fixed
PRODUCT_CREATION_TIME			Time	UTC	Time when the data product was generated in UTC.	Data producer
START_VALID_PERIOD	ROSETTA		Time	UTC	Start of the mission period to which the data can be applied.	Data producer
START_VALID_PERIOD_SCLK	ROSETTA		SCLK	S/C clock count	Start of the mission period to which the data can be applied, in S/C seconds.	Data producer
END_VALID_PERIOD	ROSETTA		Time	UTC	End of the mission period to which the data can be applied.	Data producer
END_VALID_PERIOD_SCLK	ROSETTA		SCLK	S/C clock count	End of the mission period to which the data can be applied, in S/C seconds.	Data producer

4.2 Optional Labels

These labels are optional, in that they are not applicable to all ancillary data products.

Label	*Group*	*Namespace*	*Datatype*	*Unit*	*Description*	*Source*
DESCRIPTION			String		Text description of the data product.	Data producer
DATA_VERSION_ID		ROSETTA	String		The version of the data, specified as the unique document number and issue, which describes the acquisition of the data.	Data producer
INSTRUMENT_ID			String		Name of the instrument (OSINAC or OSIWAC)	TM
^OBJECT_NAME			Pointer		Pointer to filename for detached label.	Data producer

4.3 Pointer to File

One or more object pointers are following the standard PDS header, which come in the format:

```
^OBJECT_NAME = "Filename"
```

where OBJECT_NAME is a short reference name referred to in the OBJECT definition(s), which follow the pointer definition(s). An OBJECT is then defined in the following manner:

```
OBJECT       = OBJECT_NAME
  INTERCHANGE_FORMAT = <INTERCHANGE_FORMAT>
  DOCUMENT_FORMAT    = <DOCUMENT_FORMAT>
  DOCUMENT_TOPIC_TYPE = <DATA PRODUCT DESCRIPTION>
  DOCUMENT_NAME = <DOCUMENT_NAME>
  PUBLICATION_DATE   = <PUBLICATION_DATE>
END_OBJECT   = OBJECT_NAME
```

Value	*Description*
INTERCHANGE_FORMAT	This is the data format of the file. In the case of PDF documents, or PDS images, this will be BINARY. For text files, this will be ASCII.
DOCUMENT_FORMAT	This is the format of the document itself. For example, for a PDF document, this will be PDF, and for a text file, it will be TEXT.
DATA PRODUCT DESCRIPTION	This should contain a description of the data contained within the file.
DOCUMENT_NAME	This should contain the name of the document.
PUBLICATION_DATE	This will be present for data which has been published, for example in the case of a scientific publication.

4.4 Example

```
PDS_VERSION_ID                  = PDS3
LABEL_REVISION_NOTE             = "RO-RIS-MPAE-ID-015 4/b"

/* FILE CHARACTERISTICS */
RECORD_TYPE                     = STREAM
FILE_NAME                       = "NAC_FM_ABSCAL_V01.TXT"
DESCRIPTION                     = "Absolute calibration scaling parameters for various
                                   filter combination for the NAC FM camera:
                                   The data is stored in the following formats:
                                   ABS_CAL_<filter> : [(DN/s)/(W/m^2/nm/sr)] for <filter>
                                   ABS_CER_<filter> : Error in [(DN/s)/(W/m^2/nm/sr)]
                                   ABS_RWL_<filter> : The the reference (central) wavelength in [nm]
                                  ABS_SFX_<filter> : The Solar flux @ reference wavelength @ 1 AU from
                                 the Sun in [W/m^2/nm]

                                 General information about the calibration can be found in
                                 OSIRIS_CAL_PIPELINE_V??.PDF and about the data in
                                 RADIOMETRIC_CALIB_V??.PDF (latest version)."

/*   IMAGE IDENTIFICATION   */
PRODUCT_ID                      = "NAC_FM_ABSCAL"
ROSETTA:DATA_VERSION_ID                = "RO-RIS-MPAE-TN-074 1/a"
DATA_SET_ID  = "RO-C-OSINAC-2-PRL-67PCHURYUMOV-M01-V2.1"
```

```
/*   MISSION IDENTIFICATION   */
INSTRUMENT_HOST_NAME              = "ROSETTA-ORBITER"

/*   INSTRUMENT DESCRIPTION   */


/*   TIME IDENTIFICATION   */
PRODUCT_CREATION_TIME             = 2017-02-22
ROSETTA:START_VALID_PERIOD        = 2004-03-02T01:00:00
ROSETTA:START_VALID_PERIOD_SCLK = "1/0036809986.59225"
ROSETTA:END_VALID_PERIOD          = 2016-09-30T23:00:00
ROSETTA:END_VALID_PERIOD_SCLK     = "1/0433897110.29268"

OBJECT      = NAC_FM_ABSCAL_DOCUMENT
  INTERCHANGE_FORMAT  = ASCII
  DOCUMENT_FORMAT     = TEXT
  DOCUMENT_TOPIC_TYPE = "SENSOR CALIBRATION"
  DOCUMENT_NAME       = "NAC_FM_ABSCAL_V01.TXT"
  PUBLICATION_DATE    = 2017-02-22
END_OBJECT  = NAC_FM_ABSCAL_DOCUMENT

END
```