# Cassini / Huygens Program
# Archive Plan
# for Science Data

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JPL D-15976

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Version 3


JPL

**National Aeronautics and Space Administration**
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# Change Record for 699-068

| Revision No. | Date | Changes | Sections Affected |
|---|---|---|---|
| Draft 1 | 7/15/98 | First version for review | All |
| Draft 2 | 8/1/98 | Minor updates,<br>Appendix A -- added definition of processing<br>Appendix C -- added Archive schedule | All |
| Draft 3 | 9/16/98 | New organization -- Updated signature page, replaced references to SO and DOI with the new "Instrument Operations Team", replaced references to MSO and Science Office with "Science Operations Office"<br>Section 2, item 2 -- states that Cassini provides volumes to PDS CN who in turn provides copies to the relevant PDS DNs. It should be noted that this is still listed as a TBD<br>Incorporated PDS comments | All |
| Draft 4 | 10/5/98 | Section 2, item 5 Added cruise archive policy & included in delivery of cruise science in Archive schedule<br>OTLs and MSOCs listed as archive contacts for each instrument | All |
| Preliminary | 4/1/99 | Changed document title<br>Revised signature page<br>Changed instances of "Cassini Project" to "Cassini Program"<br>Updated applicable document listing | All |
| Preliminary V1 | 12/27/99 | Updated Signature page<br>Major changes to Roles and Responsibility section 2.0<br>Some changes to policy section 3.0<br>Review and comment on To be Supplied list<br>Formatting changes | All |
| Preliminary V2 | 4/1/00 | Incorporated updates throughout the document as requested by reviewers. Incorporated Huygens data in the plan.<br>Updated distribution list.<br>Updated archive policies. | All |
| Initial Release, Version 0 | 4/25/00 | Clarified PDS CN and PDS DN roles and responsibilities throughout document.<br>Updated table 1.5.2 data product levels to reflect CODMAC and PDS definitions. (see unresolved list)<br>Clarified the project intent to archive level 1A and level 1B data products in section 6.<br>Reorganized data set tables in appendices.<br>Added new issues to unresolved issues list.<br>Added High-Level Catalog documents to schedule. | All |

| Revision No. | Date | Changes | Sections Affected |
|---|---|---|---|
| Initial Release, Version 1 | 8/3/00 | Higher level product archive. | 6.4 |
| Version 2 | 8/12/02 | Clarified Policies<br>Clarified Roles and Responsibilities<br>Updated products list<br>Updated archive contacts<br>Added Huygens archive contacts<br>Added Huygens Products list<br>Added Mission and instrument overview<br>Moved CODMAC data level to NASA levels table to appendix.<br>Removed data level references from document in lieu of descriptions of products.<br>Added Peer Review and Validation Process<br>Clarified archive terms<br>Removed Data Flow that appeared to cause confusion.<br>Added standard values for PDS High-Level Catalog files<br>Added PDS label keyword requirements section.<br>Added coordinate system designations.<br>Clarified roles and responsibilities.<br>Added a detailed data delivery schedule. | All. |
| **Version 3** | **2/4/03** | **Incorporate changes requested by reviewers of version 2:**<br>**Update Mission overview to correct tense wording with reality,**<br>**Update PI names in section 11.** | |

**Open Items**

**a) Volume validation software supplied by PDS.**

**b) What other PDS tools are needed. Like geometry calculator, index maker, etc..**

c) **The MIFT will periodically check volumes on TBD intervals.**

d) **Huygens Archive data volume.**

e) **Standard keywords for labels.**

Observable events would be interesting to archive. It may be that the tour atlas https://cassini.jpl.nasa.gov/sp/tour_atlas/T18-5/T18-5.html, is a source for some of this information and could be archived as an EKernel. I recommend that I carry this as an open item in the archive plan, so that it may be worked in the future.

# 1 Introduction

## 1.1 Purpose

The purpose of this document is to describe the Cassini / Huygens science data archive system, and provide a high level overview of the mission and instrumentation. The science data archive system includes policies, requirements, high-level PDS catalog files, roles and responsibilities, the method for data delivery, descriptions of science and SPICE data sets, and the data delivery schedule.

## 1.2 Scope

This document is applicable to all science and supplementary data resulting from the Cassini Orbiter and Huygens Probe investigations. This document is subordinate to the Cassini Program Data Management Plan and Science Management Plan.

Separate agreements, established through the Cassini Program Science Group (PSG) and Huygens Science Working Team (HSWT) address data sharing policies.

## 1.3 Applicable Documents

The Cassini / Huygens Archive Plan for Science Data (APSD) is responsive to the following program documents found on-line in the Master Controlled Document Library at https://cassini.jpl.nasa.gov/mcdl

Cassini Operations System Functional Requirements Document, 699-500-3-GS/R

Cassini Program Science Management Plan (SMP), D-9178, PD 699-006, July 1999.

Cassini Program Data Management Plan (PDMP), D-12560, PD 699-061, Rev.B, April 1999.

Cassini/Planetary Data System Interface Requirements Document (MSO - PDS IRD), PD 699-108, Rev. B, 14 April 1998.

The following PDS documentation, that is referred to in this document, is available on-line from the PDS Website at http://pds.jpl.nasa.gov/ .

Planetary Data System Data Preparation Workbook (PDS DPW), Version 3.1, 17 February 1995, JPL D-7669, part 1.

Planetary Data System Standards Reference, Version 3.4, June 15, 2001, JPL D-7669, Part 2

Planetary Science Data Dictionary Document, (For the most current information, use the on-line data dictionary provided on the PDS web page at: http://pdsproto.jpl.nasa.gov/Onlinecatalog/public.cfm

## 1.4 Document Change Control

The APSD is under change control once all parties sign it. All signatories must approve each revision.

## 2 Mission Overview

The Cassini spacecraft with the Huygens Probe was launched on 15 October 1997 using a Titan IV/Centaur launch vehicle with Solid Rocket Motor Upgrade (SRMU) strap-ons and a Centaur upper stage. The spacecraft used a 6.7-year Venus-Venus-Earth-Jupiter Gravity Assist (VVEJGA) trajectory to Saturn, during which cruise science was conducted to checkout, calibrate, and maintain the instruments as well as characterize the instruments and perform limited science observations. Cruise science was limited by flight software available on the spacecraft as well as cost, scheduling and workforce constraints. Limited science data collection occurred during the Venus flybys and science and calibration occurred during the Earth flyby. MAPS data were collected almost continuously beginning in February 2000. ~~As the spacecraft approached Jupiter in October 2000, science activities picked up and Jupiter observations through March 2001 served as preparation for the four-year tour of the Saturnian system.~~

The Cassini spacecraft is a combined Saturn orbiter and Huygens Titan atmospheric probe (delivered on the third flyby of Titan). The orbiter is a three-axis stabilized spacecraft equipped for 27 diverse science investigations with twelve orbiter and six Huygens probe instruments, one high gain and two low gain antennas, three Radioisotope ~~Thermal~~ **Thermoelectric** Generators (RTGs) for power, main engines, attitude thrusters, and reaction wheels.

During most of the early portion of cruise, the High Gain Antenna (HGA) was required to shield most of the spacecraft from the Sun and only low-rate communications via the spacecraft's Low Gain Antennas (LGAs) were possible. Six months after the Earth flyby, the spacecraft was far enough from the Sun to orient the High Gain Antenna (HGA) to Earth enabling much faster communications. Following the Jupiter flyby, the spacecraft attempted to detect gravitational waves using its Ka-band and X-band radio equipment. Instrument calibrations, checkouts, and other tour preparations ~~were also conducted~~**are planned** during the cruise between Jupiter and Saturn. In the six months preceding arrival at Saturn, ~~the spacecraft conducted more~~**more** intense science activities **are planned**, including observations of Phoebe on 11 June 2004, immediately before arrival at Saturn.

**During**~~During~~ Saturn Orbit Insertion (SOI) on 1 July 2004, the spacecraft ~~made~~ **will make** its closest approach to the planet's surface **during the entire mission** ~~during the entire mission~~ at an altitude of only 0.3 Saturn radii (18,000 km). Due to this unique opportunity, the approximately 90-minute SOI burn, required to place Cassini in orbit around Saturn, **will be** executed ~~sooner~~ **earlier** than its optimal point centered around periapsis, and instead end~~ed at~~ **near** periapsis, allowing science observations immediately after ~~closest approach~~**burn completion**.

The probe ~~was~~ **will be** released from the orbiter on 24 December 2004, 11 days after the second Titan flyby. Two days after probe **is** release**d**, ~~the orbiter performed~~ a**n orbit** deflection maneuver **will be performed by the oriter** to place itself on the proper trajectory for the next encounter. At the third Titan flyby, on 14 January 2005, the ESA Huygens probe **will** descend~~ed~~ through the atmosphere of Titan and relay~~ed~~ data to the orbiter for **up to** 2.5 hours during its descent to the surface.

The orbiter ~~then~~ **will then** continue~~d~~ on a tour of the Saturnian system, including multiple close Titan flybys for gravity assist and science acquisition. The Titan flybys and Saturn orbits ~~were~~ **are** designed to maximize science coverage while meeting resource and operations limitations. Targeted and non-targeted flybys of selected icy satellites ~~were~~ **are** also ~~-~~included to determine icy satellite surface compositions and geologic histories. Cassini's orbital inclination ~~varied~~ **will vary** widely to investigate the field, particle, and wave environment at high latitudes, including the hypothesized source of the unique Saturn kilometric radiation. High inclinations also permit~~ted~~ high-latitude Saturn radio occultations, viewing of Saturn polar regions, and more nearly vertical viewing of Saturn's rings. The baseline mission **is scheduled to end** ~~ended in~~ mid-2008, for a total mission duration of 10.7 years.

# 3 Science Instruments Overview

## 3.1 Cassini Orbiter Science Instruments

There are twelve science instrument subsystems on the Cassini spacecraft. They are listed below along with their measurement objectives. Three of the instruments, (CAPS, CDA, and MIMI LEMMS detector.), are capable of some limited movement independent of the spacecraft pointing.

| | |
|---|---|
| CASSINI PLASMA SPECTROMETER (CAPS) | in-situ study of plasma within and near Saturn's magnetosphere. |
| COMPOSITE INFRARED SPECTROMETER (CIRS) | spectral mapping to study temperature and composition of surfaces, atmospheres, and rings within the Saturn system. |
| COSMIC DUST ANALYZER (CDA) | in-situ study of dust grains in the Saturn system. |
| IMAGING SCIENCE SUBSYSTEM (ISS) | multispectral imaging of Saturn, Titan, rings, and icy satellites to observe their properties. |
| ION AND NEUTRAL MASS SPECTROMETER (INMS) | in-situ study of compositions of neutral and charged particles within the Saturn magnetosphere. |
| MAGNETOMETER (MAG) | study Saturn's magnetic field and interactions with the solar wind. |
| MAGNETOSPHERIC IMAGING INSTRUMENT (MIMI) | global magnetospheric imaging and in-situ measurements of Saturn's magnetosphere and solar wind interactions. |
| RADAR | synthetic aperture (SAR) imaging, altimetry, and radiometry of Titan's surface. |
| RADIO AND PLASMA WAVE SPECTROMETER RPWS) | study plasma waves, radio emissions, and dust in the Saturn system. |
| RADIO SCIENCE SUBSYSTEM (RSS) | study atmospheres and ionospheres of Saturn, Titan, rings, and gravity fields of Saturn and its satellites. During cruiseRSS also made investigations into solar plasma and relativity, and searched for gravitational waves. |
| ULTRAVIOLET IMAGING SPECTROGRAPH | investigate the chemistry, aerosols, clouds, and energy balance of the Titan and Saturn atmospheres; neutrals in the Saturn magnetosphere; the deuterium-to-hydrogen ratio for Titan and Saturn; icy satellite surface properties; and the structure and evolution of Saturn's rings. |
| VISIBLE AND INFRARED MAPPING SPECTROMETER (VIMS) | spectral mapping to study the composition and structure of surfaces, atmospheres, and rings. |

## 3.2 Huygens Probe Science Instruments

There are six science instrument subsystems on the Huygens Probe. The science instruments are listed below along with their measurement objectives,

| | |
|---|---|
| AEROSOL COLLECTOR PYROLSER (ACP) | collect aerosols for GCMS to analyze their chemical compositions. |
| DESCENT IMAGER SPECTRAL RADIOMETER (DISR) | multi-sensor optical instrument capable of imaging and making spectral measurements over a wide range of the optical spectrum. |
| DOPPLER WIND EXPERIMENT (DWE) | uses Probe-Orbiter radio link to measure wind direction and velocity. |
| GAS CHROMATOGRAPH MASS SPECTROMETER (GCMS) | gas chemical analyzer used to identify and quantify the abundance of the various atmospheric constituents. |
| HUYGENS ATMOSPHERIC STRUCTURE INSTRUMENT (HASI) | multi-sensor instrument, intended to measure the atmosphere's physical properties, including its electrical properties. |
| SURFACE SCIENCE PACKAGE (SSP) | a suite of rather simple sensors for determining the physical properties of the surface at the impact site and for providing unique information on the composition of the surface material. |

# 4 Archive Terms Defined

**Archive** - a preservation of data for future use. For this document, archive pertains only to long-term archives with the PDS.

**Archive medium** - a physical device for storing data such as CD, DVD, or tape. For PDS archives, the medium must be acceptable to PDS as described in the PDS standards reference.

**Archive System** – The archive system is comprised of hardware, software, procedures, interfaces, and personnel necessary to complete the archiving of science and ancillary data with the PDS.

**Data product** - labeled data resulting from a scientific observation. Examples of data products include planetary images, spectrum tables, and time series tables. A data product is a component of a data set.

**Data set** - a labeled grouping of data products, metadata, documentation, and algorithms for applying calibration or further processing data. Software may also be included.

**Data Object** - A data object is that portion of a data product that contains the actual data that is described in a data object definition within a PDS label. It is tangible, and can be physically accessed and manipulated. For example, if a PDS label contains the following lines,

```
^TABLE = "T142836.DAT"
...
OBJECT = TABLE
ROWS = 1028
...
END_OBJECT = TABLE
```

the data object for this table is in the file T142836.DAT. The actual data object is often classified as a primary data object or a secondary data object.

**Meta Data** - a label or file that describes one or more science data objects or products.

**MIFT** - Mission Interface Team. Members include project and PDS Node personnel. The central node data engineer assigned to the project leads the team and coordinates archive production and injestion into the PDS. Regular meetings are used to coordinate peer review and resolve issues.

**PDS** - Planetary Data System. The primary organization within NASA responsible for the archive of planetary science data obtained from NASA sponsored missions. The PDS consists of a Central Node located at JPL and several Discipline Nodes located around the country.

**SAWG** - The Science Archive Working Group includes instrument team, PDS Node, and project representatives. The group is chartered to develop the archive system.

**Science Data** – All data acquired which are used to accomplish primary science goals of the Cassini and Probe science teams.

**Supplementary Data** -Any data necessary to perform analysis of the science data. Sometimes referred to as ancillary data.

**Volume** - one or several in a series of media containing archive data.

# 5 Validation and Peer Review

## 5.1 Design Review

The initial design review provides an assessment of instrument archive designs and allows instruments to proceed with or complete production system development, or make necessary modifications to existing systems. This is a peer type review where instrument teams, interested members of the science community, and PDS meet to discuss in detail how the teams plan to produce their archive products. It is meant to provide an early critique on archive designs by knowledgeable and experienced peers. PDS DNs should help the instrument teams develop their presentations. A review board will reside to make recommendations. All instrument liens or waivers are documented by the project. Instrument teams respond to liens with resolution plans and schedule.

The review board will be asked to evaluate designs to determine if:

1. The correct list of data products are identified for archive.

2. Method of providing calibration data is described.

3. Mission consistent attributes are used in data labels. For example: time, latitude, longitude, coordinate systems, and reference frames.

4, Data labels provide searchable information for narrowing searches on data products.

5. Validation process is described and specifically assigns responsibilities.□

6. Delivery mechanism is understood.

7. Liens are identified with resolution plans.

## 5.2 Peer Review

Peer review of a sample volume is performed under the leadership of the PDS Discipline node and is used to ensure datasets produced conform to the SIS and can be used to perform science analysis. All liens or waivers resulting from the peer review are documented by the PDS DN and reported to the project. Members of the PSG will be asked to participate in the peer review of data sets.

Success Criteria:

1. Datasets produced are consistent with the SIS
2. The supporting documentation is comprehensive and complete
3. There are no additions required to the SIS

## 5.3 Pipe-line Production Validation

The validation process to be used duirng production of datasets will be developed by each team in coordination with the PDS DN.

# 6 Archive Policies and Requirements

Archive policies and requirements have been developed for Cassini / Huygens to ensure data products produced meet PDS standards, meet project requirements, and support collaborative studies using Cassini Orbiter and Huygens Probe data.

## 6.1 Policies

6.1.1 The PDS standards version that was in place at the time a dataset is peer reviewed, will be used for all subsequent volumes produced.

6.1.2 Each instrument team will be assigned to one primary PDS discipline node to design their archives. Primary nodes should work with secondary PDS nodes and instrument teams to ensure the requirements of the secondary node are met.

6.1.3 There is no intention for the program to distribute CD-ROM volumes of data during the mission. Data distribution will be done by PIs, TLs, or IDS's in support of their science team interfaces.

6.1.4 The Cassini validation period and delivery schedule to PDS is in accordance with the Cassini Science Management Plan, Section 5. Science Data products for all investigations generated during the cruise phase of the mission shall be delivered to the PDS no later than SOI+1 year. To meet this delivery date, the development of the archive data structures documented in detailed SIS's are required by the project for submission to PDS at SOI-2 years. This will allow time to accommodate possible changes in processing software due to PDS non-compliant formats and to validate the archive pipeline prior to the science approach phase of the mission which begins in January 2004.

6.1.5 SPICE files that are used in the processing of archive products may be included on archive volumes, but are not required if they are the standard products produced and delivered to the program database. A SPICE archive of files delivered to the program database will be produced by the Cassini Instrument Operations Team. If SPICE files are used in processing **that** are not delivered to the program database then those files shall be included on **instrument** archive volumes.

6.1.6 Although not required, higher-level products developed by PIs, TLs, and IDS's may be archived into the PDS, if resources are available to do so. The Cassini Program recognizes those higher-level products are valuable and should be preserved, however funding restrictions may preclude the complete archiving of these products.

6.1.7 Cassini -Huygens will provide a regular forum for discussing archive progress and issues with the PDS, PIs, and TLs.

## 6.2 Designation of Coordinates

A standard Cassini reference system should be used. This requires that uniform cartographic coordinates and rotational elements, radii and reference surfaces be consistently defined across the mission. The International Astronomical Union (IAU) establishes standards for planetary coordinates. The latest report, based on a J2000 reference system, is available at Seidelmann, et al., Celestial Mechanics and Dynamical Astronomy, **v. 82**, p. 83-111, 2002. The Cassini adaptation of these values is found in the Cassini PCK file. Values of the Saturn system may change as the mission progresses and will be documented in the latest Cassini PCK file.

Planetocentric coordinates are based on a right hand coordinate system and a spherical reference surface. Traditionally another system, designated as Planetographic Coordinates has been used for planetary data. The Planetographic system is based on the following assumptions. The origin of the reference surface is at the center of mass of the body. Planetographic latitude is the angle between the equatorial plane and a vector through the point of interest, where the vector is normal to the biaxial ellipsoid reference surface defined by specifying polar and equatorial radii. Planetographic longitude is defined as increasing with time relative to an observer fixed in space; thus, for bodies in the Saturnian and Jovian systems longitude increases westward (note: The IAU has not defined an east longitude for Jupiter or Saturn).

## 6.3 Requirements

6.3.1 The minimum science data archive is summarized below. For a complete description of archive requirements, please refer the Cassini Program Science Management Plan, D-9178.

- Uncalibrated full resolution data
- Calibration files
- Algorithms or documented source code to apply calibration data, along with complete documentation describing the process.
- Sample calibrated data files for future users to verify their application of calibration
- Metadata as specified by PDS Standards.
- Documentation

6.3.2 Filename and Directory name Maximum Lengths

The maximum length of a directory name is 31 characters.
The maximum length of a filename is 27.3 characters.

6.3.3 Volume Naming

**The following is a constant to be used across the mission.**
**VOLUME_SERIES_NAME = "MISSION TO SATURN"**

Volume IDs can contain up to 11 characters and will use the following convention:

COIIII_NNNN, for orbiter data.
HPIIII_NNNN, for probe data.

Where :

CO = Cassini Orbiter

HP = Huygens Probe

IIII = Instrument acronyms up to 4 characters in length (CAPS, CDA, CIRS, INMS, ISS, MAG, MIMI, RADR, RPWS, RS, UVIS, VIMS, ACP, DISR, DWE, GCMS, HASI, SSP)

NNNN = volume number

### 6.3.4 PDS Label Keywords

Describing data products in PDS labels enhances the usability of data by providing search criteria in the PDS catalog. ~~The following section describes the minimum label of common keywords and their standard values that should be part of each data product label. Additional instrument specific keywords may also be required by the DN.~~

~~This section is under construction.~~**There are a set of label keywords requested by PDS to facilitate searches within and across data sets. There are also a set of keywords needed to describe each dataset in a general sense. These keywords are under development at the time of this writing; and will be published in the next version of the APSD.**

### ~~6.3.4~~6.3.5 Time Standards

**PDS labels shall retain the native instrument generated spacecraft clock (SCLK) time tags that are included in instrument packets, (excluding MAG and RSS because the SCLK resolution is nondescriptive or nonexistent), and spacecraft UTC (coordinated universal time). Other time formats like ephemeris time (ET) may also be included.**

**UTC system format formation rule is: YYYY-MM-DDThh:mm:ss[.fff]**
**Or**
**UTC system format formation rule is: YYYY-DDDThh:mm:ss[.fff]**

# 7 Science Archive Data Sets

## 7.1 Raw Telemetry Data

There is no plan to archive raw telemetry data with PDS, other than what is required for Radio Science. The Cassini program has a requirement to store raw telemetry data (including engineering and housekeeping packets as well as science packets), in the form of raw telemetry frames, through End-of-Mission + 1 year, which is done by MSSO.

## 7.2 Science Data Products

Cassini-Huygens is committed to archiving full resolution uncalibrated data products, calibration files, algorithms for applying calibration, and sample calibrated data. See appendix A of this document for a complete breakdown of products planned for archive.

IO generates data products for VIMS, ISS, RS, and RADAR Facility Instruments. These products are produced by IO according to TL-approved Software Interface Specifications (SIS's) and Operational Interface Agreements (OIAs). TLs are encouraged to negotiate with IO to use PDS formats for these products. If non-PDS formats are used, the TL will be required to reformat to PDS standards for archive. Whatever format is negotiated, IO-produced products are delivered to the TL for validation and archive volume generation.

## 7.3 Higher Level Science Data Products

PIs and Tls teams, and Interdisciplinary Scientists (IDS's) generate higher-level science products.
Although not contractually required, it is expected that higher-level data products developed by PIs, TLs, and IDS's in the course of doing their data analysis will be archived with the PDS. The Cassini Program recognizes that higher-level products are valuable and should be preserved; therefore, a joint effort between the Cassini Program and PDS will be made to facilitate the generation of such products in PDS compliant formats, thereby minimizing any additional effort that might occur in accomplishing this objective.

## 7.4 Public Release Data Products

Public Release products will be generated during the Cassini mission in accordance with documented Cassini/JPL/NASA policies and procedures for public information and press releases. The JPL Photo lab will maintain press release products with copies distributed to the Regional Planetary Image Facility (RPIFs). The JPL Public Affairs Office will also maintain press-released products. **All public release data products will be archived with the PDS by the generating team.**

## 7.5 Data Delivery to PDS

Archive datasets will be provided to PDS by the instrument teams either electronically or on physical media. Due to the high data volume, the fact that PDS has not yet determined the hardware or software required to create DVD's in PDS compliant formats, and the implied cost of procuring hardware, software, and personnel needed to produce media ~~raining~~ once the DVD format is determined, electronic delivery is the preferred delivery method for most instruments. The delivery method will be negotiated between instrument teams, the program archive data engineer, and the PDS and documented in Volume Software Interface Specifications (SIS's). Deliveries will be organized as specified in Volume SIS's.

## 7.6 SPICE Data Products and Toolkit

Instrument Operations Team personnel are responsible for generating the archive of SPICE datasets. Final versions of SPICE (SPK, PCK, IK, FK, CK, EK, SCLK, and LSK) files will be archived on CD-WO discs, (or other appropriate medium, possibly DVD), in IEEE binary format with accompanying documentation. The SPICE toolkit will always be available on line from the NAIF node of the PDS, for all platforms supported by NAIF, including MAC, PC/Windows, PC/Linux, and Sun/Solaris. For safety purposes, copies of the toolkit are delivered to the NSSDC.

## 7.7 Documentation

Below is a list of documents that are typically relevant to understanding the archive and should be delivered to PDS.

a) Software Interface Specifications (SISs) which define the format and content of data files and volume organization.
b) Calibration algorithm
c) Instrument description file, which describes the instrument capabilities and operations. (INST.CAT)
d) Data set description files (DATASET.CAT)

## 7.8 Cassini Archive Data Volume

Cassini will generate approximately three terabytes (3TB) of archive science data products for the entire mission, including radio science.

## 7.9 Huygens Archive Data Volume

The raw data volume for Huygens is 173.1 Mb, for a mission of 180 minutes duration, however the volume of Huygens archive data is TBS.

# 8 PDS High-Level Catalog Files

Documents called PDS high-level catalog files will be included in the CATALOG directory of archive data sets. These files, which are defined in JPL D-7669, Planetary Data System Standards Reference, include Mission, Instrument host, Instrument, Dataset, Reference, and Personnel catalog files.

IO will provide a draft version of the Mission, Instrument Host, and Mission Reference files to PDS at SOI-1 year. Updates to these files will be provided at least every two years if new information is available. Final versions will be provided no later than two months prior to end of mission.

Archive producers will provide Instrument, Dataset, Personnel, and Reference documents with their archive submissions. The Cassini Archive Coordinator will maintain a central reference catalog file which can be used to extract specific references to include in the reference catalog file.

Keyword Values defined for the mission that should be used in PDS objects include:

**MISSION_NAME** = "CASSINI-HUYGENS"

**INSTRUMENT_HOST_ID** = "CO"
**INSTRUMENT_HOST_NAME** = "CASSINI ORBITER"

**INSTRUMENT_HOST_ID** = "HP"
**INSTRUMENT_HOST_NAME** = "HUYGENS PROBE"

**MISSION_ALIAS_NAME = "CASSINI"**
**MISSION_ALIAS_NAME = "HUYGENS"**

Keyword values for INSTRUMENT_ID and INSTRUMENT NAME are as follows:

| INSTRUMENT_ID | INSTRUMENT_NAME |
|---|---|
| CAPS | CASSINI PLASMA SPECTROMETER |
| CDA | COSMIC DUST ANALYZER |
| CIRS | COMPOSITE INFRARED SPECTROMETER |
| INMS | ION AND NEUTRAL MASS SPECTROMETER |
| ISSNA | IMAGING SCIENCE SUBSYSTEM NARROW ANGLE |
| ISSWA | IMAGING SCIENCE SUBSYSTEM WIDE ANGLE |
| MAG | DUAL TECHNIQUE MAGNETOMETER |
| MIMI | MAGNETOSPHERIC IMAGING INSTRUMENT |
| RADAR | RADAR |
| RPWS | RADIO AND PLASMA WAVE SCIENCE |
| RS | RADIO SCIENCE SUBSYSTEM |
| UVIS | ULTRAVIOLET IMAGIN SPECTROGRAPH |
| VIMS | VISUAL AND INFRARED MAPPING SPECTROMETER |
| ACP | AEROSOL COLLECTOR PYROLSER |
| DISR | DESCENT IMAGER SPECTRAL RADIOMETER |
| DWE | DOPPLER WIND EXPERIMENT |
| GCMS | GAS CHROMATOGRAPH MASS SPECTROMETER |
| HASI | HUYGENS ATMOSPHERIC STRUCTURE INSTRUMENT |
| SSP | SURFACE SCIENCE PACKAGE |

# 9 Roles and Responsibilities

## 9.1 Cassini and Huygens Project Scientists

Cassini and Huygens Project scientists will provide a forum, led by a member of the PSG, for program internal review of PI and TL proposed data sets to be archived in the PDS.

## 9.2 Principal Investigators (PIs), Team Leaders (TLs)

The following responsibilities apply, even if the data products are originally produced by another organization, like MIPS.

a) Work directly with assigned PDS discipline nodes to define data set content and format. (Discipline nodes have expertise in archiving specific types of data and will help define keywords and standard values for keywords in metadata such as a data set description file and data product label files.)
b) Provide PDS with archive science data sets that are validated for science content and format, and contain documentation, algorithms, and software used to apply calibration or further process data. (The list of these data sets can be found in appendix A)
c) Provide PDS with data sets that include data products (includes labels), other metadata that includes Instrument, Dataset, Reference, and Personnel high-level catalog files, and ancillary data necessary to understand the data.
d) Participate in Mission Interface Team (MIFT) meetings and Science Archive Working Group (SAWG) Meetings.
e) Report archive status to Instrument Operations (IO) by providing metadata that details submissions to PDS.

All of the above responsibilities can be delegated to various team members or Operations Team Leads (OTLs).

## 9.3 Interdisciplinary Scientists (IDS's)

a) Archive any significant new science data products and associated metadata and supplementary products created from the investigation. These will likely be higher-level products and few in number. IDS's will inform the Cassini Archive Coordinator of archive plans.
b) Participate as reviewers in the peer review process.

## 9.4 Instrument Operations (IO)

a) Coordinate archive data set production schedule and Archive Plan for Science Data (699-068)
b) Participate in peer reviews.
c) Act as agent between PDS, Project and PI and TL when necessary to resolve PDS format and delivery issues.
d) Participate in Mission Interface Team (MIFT) meetings and Science Archive Working Group (SAWG) Meetings.
e) Receive notification of archive submissions from instruments.
f) Track and report archive status to program monthly.
g) Produce and validate SPICE data product archive as specified in appendix A.
h) Produce Mission, Instrument Host, and reference catalog files and provide to PDS.

## 9.5 Spacecraft Operations (SCO)

Generate and validate certain SPICE data products as specified in appendix A.

## 9.6 Planetary Data System (PDS)

### Central Node (CN):

a) Coordinate the definition and production of the archives and ensure they are compatible with PDS standards.
b) Maintain a database of all PDS holdings, which will be updated after Cassini archive volumes have completed the peer review process.
c) Distribute archive volumes to the NASA-supported science community, as funding permits.
d) Provide archive volume validation tools, consultation, and review of validation reports.
e) Provide training materials and instruction to archive volume producers.
f) Participate in peer review of archive volumes.
g) Lead Mission Interface Team (MIFT) meetings to discuss archive and PDS issues.
h) Participate in Science Archive Working Group (SAWG) Meetings.
i) Provide copies of archive volumes to the NSSDC.

### Discipline Nodes (DN):

a) Work with archive producers to define archive format and content.
b) Lead the peer review of archive volumes.
c) Maintain archive of released Cassini products for access by the science community.
d) Provide additional archive volume validation tools as needed.
e) Participate in Mission Interface Team (MIFT) meetings and Science Archive Working Group (SAWG) Meetings.
f) Produce physical volumes, if negotiated with team to do so.

#### 9.6.1 PDS Online Services

PDS will provide web-based public access to Cassini and Huygens science data products. The system will provide search capability based upon TBD criteria and downloading in various formats.

## 9.7 National Space Science Data Center (NSSDC)

Maintain a “deep archive” of the data for long-term preservation. The NSSDC will also be responsible for filling large delivery orders to the science community, making data available to foreign investigators, educators, and the general public.

## 10 PDS Discipline Nodes Contacts

| PDS Node | Contact | Email | Phone Number |
|---|---|---|---|
| Central Node, JPL | Ron Joyner | Ronald.Joyner@jpl.nasa.gov | (818) 393-7166 |
| Atmospheres Node<br>Archive Manager<br><br>Atmospheres Node Manager<br>New Mexico State University in Las Cruces | Lyle Huber<br>Reta Beebe | Lhuber@NMSU.edu<br>Rbeebe@nmsu.edu | (505) 646-1862<br>(505) 646-1938 |
| Geosciences Node<br>Earth and Planetary Remote Sensing Laboratory at Washington University in St. Louis, Missouri | Ray Arvidson | arvidson@wunder.wustl.edu | (314) 935-5609 |
| USGS Imaging Subnode | Eric Eliason | eeliason@usgs.gov | (928)556-7113 |
| JPL Imaging Subnode | Sue Lavoie<br>Rafael Alanis | Susan.K.LaVoie@jpl.nasa.gov<br>Rafael.Alanis@jpl.nasa.gov | (818) 354-5677<br>(818) 354-8959 |
| Planetary Interactions (PPI)<br>Institute of Geophysics and Planetary Physics (IGPP) at the University of California, Los Angeles (UCLA). | Ray Walker<br>Steve Joy | rwalker@igpp.ucla.edu<br>sjoy@igpp.ucla.edu | (310) 825-7685<br>(310) 825-3506 |
| Rings Node<br>Ames Research Center | Mark Showalter<br>Mitch Gordon | showalter@ringside.arc.nasa.gov<br>mgordon@mail.arc.nasa.gov | (650) 604-3382<br>(650) 604-2529 |
| Small Bodies Node<br>University of Maryland | Mike A'Hearn | ma@astro.umd.edu | (301) 405-6076 |
| Navigation and Ancillary Information Facility (NAIF)<br>JPL | Lee Elson | Lee.Elson@jpl.nasa.gov | (818) 354-4223 |
| Radio Science Subnode<br>Stanford University | Dick Simpson | rsimpson@magellan.stanford.edu | (650) 723-3525 |

## 11 Cassini Principal Investigators and Team Leaders (PIs/TLs) Archive Contacts

| Instrument | Instrument Team Archive Representative(s) | Email | Phone Number | PI or TL |
|---|---|---|---|---|
| CAPS<br>Cassini Plasma Spectrometer | Charles Zinsmeyer<br>Judy Furman | CZinsmeyer@swri.edu<br>jdfurman@umich.edu | (210) 522-5018<br>(734) 763-6217 | David Young, PI |
| CDA<br>Cosmic Dust Analyzer | Sascha Kempf | Sascha.Kempf@mpi-hd.mpg.de | 49 6221 51 6247 | ~~Eberhard Grün~~**Ralf Srama**, PI |
| CIRS<br>Composite Infrared Spectrometer | Conor Nixon<br>Jim Tingley | nixon@cirsrss.gsfc.nasa.gov<br>James.S.Tingley@gsfc.nasa.gov | (301) 286-6757<br>(301) 286-4980 | ~~Virgil Kunde~~**Michael Flaser**, PI |
| INMS<br>Ion and Neutral Mass Spectrometer | Greg Fletcher | gfletch@umich.edu | (734) 763-8182 | Hunter Waite, TL |
| ISS<br>Imaging Science Subsystem | Leslie Pieri<br>Joe Peterson | Leslie@ciclops.swri.edu<br>joe@ciclops.swri.edu | (512) 276-7173<br>(303) 546-9677 | Carolyn Porco, TL |
| MAG<br>Magnetometer | Nick Achilleos<br>Steve Kellock | n.achilleos@ic.ac.uk<br>S.Kellock@ic.ac.uk | 44 1403 210 494 | ~~David Southwood~~**Michele Dougherty**, **Acting** PI |
| MIMI<br>Magnetospheric Imaging Instrument | Don Mitchell<br>Thomas Armstrong | Don.Mitchell@jhuapl.edu<br>Armstrong@FTECS.com | (240) 228-5981<br>(785) 840-0800 | Tom Krimigis, PI |
| RADAR | Brian Stiles<br>Rich West<br>Randy Kirk | Brian.Stiles@jpl.nasa.gov<br>Richard.D.West@jpl.nasa.gov<br>rkirk@usgs.gov | (818) 354-5329<br>(818) 354-6025<br>(520) 556-7020 | Charles Elachi, TL |
| RPWS<br>Radio and Plasma Wave Spectrometer | Bill Kurth | william-kurth@uiowa.edu | (319) 335-1926 | Don Gurnett, PI |

| Instrument | Instrument Team Archive Representative(s) | Email | Phone Number | PI or TL |
|---|---|---|---|---|
| RSS<br>Radio Science Subsystem | Operations:<br>Elias Barbinis<br>Gene Goltz<br>Science:<br>Dick French | <br>Elias.Barbinis@jpl.nasa.gov<br>Gene.Goltz@jpl.nasa.gov<br><br>rfrench@wellesley.edu | <br>(818) 393-0661<br>(818) 393-1142<br><br>(781) 283-3747 | Arv Kliore, TL |
| UVIS<br>Ultraviolet Imaging Spectrograph | David Judd | David.Judd@lasp.colorado.edu | (303) 492-8582 | Larry Esposito, PI |
| VIMS<br>Visual and Infrared Mapping Spectrometer | Rick McCloskey<br>John Ivens | rickm@lpl.arizona.edu<br>jivens@lpl.arizona.edu | (520) 626-3255<br>(520) 621-7301 | Robert Brown, TL |

## 12 SPICE Archive Contact

| Dataset | Team | Archive Representative |
|---|---|---|
| SPICE | SAUL/IO<br>Science and Uplink Office/<br>Instrument Operations | Diane Conner<br>Diane.Conner@jpl.nasa.gov<br>(818) 354-8586 |

## 13 Huygens Data Archive Working Group Membership and Archive Contacts

| | | | |
|---|---|---|---|
| **Chair** | Jean-Pierre Lebreton | Jean-Pierre.Lebreton@esa.int | 31 71 565 3600 |
| **Support** | Bobby Kazeminejad | kazeminejad@yahoo.com | 31 71 565 5540 |
| **Advisor** | Ralph Lorenz | rlorenz@lpl.arizona.edu | (520) 621-5585 |

**Huygens Teams representatives**

| Instrument | Instrument Team Archive Representative | Email | Phone Number | Principal Investigator |
|---|---|---|---|---|
| **Aerosol Collector and Pyrolyser (ACP)** | Michel Cabane<br>Jean-Francis Brun | michel.cabane@aero.jussieu.fr<br>jean-francis.brun@aerov.jussieu.fr | 33 1 4427 4970<br>33 1 6647 4281 | Guy Israel |
| **Descent Imager/Spectral Radiometer (DISR)** | Lisa McFarlane | lmcfar@hindmost.LPL.Arizona.EDU | | Martin Tomasko |
| **Doppler Wind Experiment (DWE)** | Robin Dutta-Roy | duttaroy@astro.uni-bonn.de | | Michael Bird |
| **Gas Chromatograph and Mass Spectrometer (GCMS)** | John Haberman | john.a.haberman.1@gsfc.nasa.gov | | Hasso Niemann |
| **Huygens Atmospheric StructureInst. (HASI)** | Giacomo Colombatti | hasi@dim.unipd.it | 39 4982 7698 | Marcello Fulchi~~e~~gnoni |
| **Surface Science Package (SSP)** | John Zarnecki | J.C.Zarnecki@open.ac.uk | 44 1980 65 9599 | John Zarnecki |

| | | | |
|---|---|---|---|
| **IDS investigations** | Jonthan Lunine<br>Francois Raulin<br>Daniel Gautier | jlunine@lpl.arizona.edu<br>raulin@univ-paris12.fr<br>daniel.gautier@obspm.fr | (520) 621-2789<br>33 1 4517 1560/50 |
| **Descent Trajectory** | Dave Atkinson | atkinson@ece.uidaho.edu | (208) 885-6870 |

## 14 PDS Discipline Nodes Responsible for Archiving Data by Instrument

| Instrument | Primary Node | Secondary Node |
|---|---|---|
| CAPS | PPI | N/A |
| CDA | Small Bodies | Rings, PPI |
| CIRS | Atmospheres | Rings |
| INMS | PPI | Atmospheres |
| ISS | Imaging / JPL | Rings, Geosciences, Atmospheres |
| MAG | PPI | N/A |
| MIMI | PPI | Atmospheres |
| RADAR | Imaging/ USGS | Geosciences, Rings |
| RPWS | PPI | N/A |
| RSS | Radio Science subnode | All |
| UVIS | Atmospheres | Rings |
| VIMS | Imaging / JPL | Rings, Atmospheres |
| Ancillary data, primarily SPICE | NAIF | |
| Huygens<br>ACP<br>DISR<br>DWE<br>GCMS<br>HASI<br>SSP | Atmospheres | |

## 15 Data Product Levels

CODMAC descriptions are from the "Issues and Recommendations Associated with Distributed Computation and Data Management Systems for Space Sciences", Committee on Data Management and Computation Space Science Board Commission on Physical Sciences, Mathematics, and Resources National Research Council, PB88-1884466, 1986.

| NASA Levels | Product Description | CODMAC Equivalent | CODMAC Description |
|---|---|---|---|
| Raw | Telemetry data stream as received at the ground station, with science and engineering data embedded. | Level 1 - Raw Data | Telemetry data with data embedded. |
| Level 0 | Instrument science data (e.g., raw voltages, counts) at full resolution, time ordered, with duplicates and transmission errors removed. | Level 2 - Edited Data | Corrected for telemetry errors and split or decommutated into a data set for a given instrument. Sometimes called Experimental Data Record. Data are also tagged with time and location of acquisition. |
| Level 1A | Level 0 data that have been located in space and may have been **reversibly** transformed (e.g., calibrated, rearranged) in a reversible manner and packaged with needed ancillary and auxiliary data (e.g., radiances with the calibration equations applied). No resampling. | Level 3 - Calibrated | Edited data that are still in units produced by instrument, but that have been corrected so that values are expressed in or are proportional to some physical unit such as radiance. No resampling, so edited data can be reconstructed. |
| Level 1B | **Irreversibly** transformed (e.g., resampled, remapped, calibrated) values of the instrument measurements (e.g., radiances magnetic field strength). | Level 4 - Resampled data | Data that have been resampled in the time or space domains in such a way that the original edited data cannot be reconstructed. Could be calibrated in addition to being resampled. |
| Higher levels | Geophysical parameters mapped into uniform space time grids. | Level 5 - Derived data | Derived results, as maps, reports, graphics, etc. NASA Levels 2 through 5. |
| | | Level 6 - Ancillary Data | Nonscience data needed to generate calibrated or resampled data sets. Consists of instrument gains, offsets; pointing information for scan platforms, etc |

# 16 Appendix A: Science and Ancillary Data Sets to be Archived with PDS by Instrument Teams

## 16.1 Cassini Data Products

| □ | Super Type | Product Type | Science Data Product Description | COMMENTS | Product Specification ID (SIS) | CODMAC Level | PDS Format IMG, etc.. | Prime PDS Node interface | Additional PDS node | Producer | Supplier to PDS | Estimated Data Set Size | Data Set ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | □ | CAPS_ACT | □ | □ | IO-AR-014 IO-AR-015 | □ | CDF | PPI | □ | □ | □ | 284MB/Year = 1.3 GB | □ |
| 2 | □ | CAPS_ELS | □ | □ | IO-AR-014 IO-AR-015 | □ | □ | PPI | □ | □ | □ | 15GB/Year = 67.5 GB | □ |
| 3 | □ | CAPS_HSK | □ | □ | IO-AR-014 IO-AR-015 | □ | □ | PPI | □ | □ | □ | 600MB/Year = 3 GB | □ |
| 4 | □ | CAPS_IBS | □ | □ | IO-AR-014 IO-AR-015 | □ | □ | PPI | □ | □ | □ | 12GB/Year = 54 GB | □ |
| 5 | □ | CAPS_IMS | □ | □ | IO-AR-014 IO-AR-015 | □ | □ | PPI | □ | □ | □ | 53GB/Year = 240 GB | □ |
| 6 | □ | CDA_PNT | J2000 Pointing vector of instrument as a function of time when CDA is on | CDA Pointing History | IO-AR-012 | 3 | table | SBN | Rings | S. Kempf | S. Kempf | 4 GB | CO-D-CDA-3/4/5-DUST-V1.0 |
| 7 | □ | CDA_CAL_AREA | The sensitive area of the CDA impact detector (IID) and chemical analyser (CAT) is tabulated as a function of the incident angle with respect to the instrument axis. | CDA Area Table | IO-AR-012 | 3 | table | SBN | Rings | S. Kempf | S. Kempf | 10 KB | CO-D-CDA-3/4/5-DUST-V1.0 |
| 8 | □ | CDA_STAT | Cassini mission and CDA configuration, tests and other events. Records are triggered by change in status affecting the sensitivity of the different CDA instruments and mission events that may affect the interpretation of the data. | CDA Status History | IO-AR-012 | 3 | table | SBN | Rings | S. Kempf | S. Kempf | 300 MB | CO-D-CDA-3/4/5-DUST-V1.0 |
| 9 | □ | CDA_DA_IMP | Detector responses and derived quantities from the Cassini dust detector as well as spacecraft geometry information for reliable impacts. | Dust Analyser Impacts Table | IO-AR-012 | 3 | table | SBN | Rings | S. Kempf | S. Kempf | 10 GB | CO-D-CDA-3/4/5-DUST-V1.0 |

| □ | Super Type | Product Type | Science Data Product Description | COMMENTS | Product Specification ID (SIS) | CODMAC Level | PDS Format IMG, etc.. | Prime PDS Node interface | Additional PDS node | Producer | Supplier to PDS | Estimated Data Set Size | Data Set ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | □ | CDA_SPECTRA | Time-of-flight mass spectra peaks for individual impact events. | CDA Spectra Table | IO-AR-012 | 3 | table | SBN | Rings | S. Kempf | S. Kempf | 1 GB | CO-D-CDA-3/4/5-DUST-V1.0 |
| 11 | □ | CDA_MS_IMPACT | Time-of-flight mass spectra for individual impacts, identified by their unique identifier number xxxxxx | [Individual Mass Spectra] | IO-AR-012 | 3 | table | SBN | Rings | S. Kempf | S. Kempf | 1 GB | CO-D-CDA-3/4/5-DUST-V1.0 |
| 12 | □ | CDA_CAL_SET | Table of voltages corresponding to voltage level codes and Coulomb threshold settings. | CDA Settings Table | IO-AR-012 | 3 | tables | SBN | Rings | S. Kempf | S. Kempf | 20 KB | CO-D-CDA-3/4/5-DUST-V1.0 |
| 13 | □ | CDA_DA_CTR | CDA impact counter time history file. | CDA Counter Table | IO-AR-012 | 6 | table | SBN | Rings | S. Kempf | S. Kempf | 1 GB | CO-D-CDA-3/4/5-DUST-V1.0 |
| 14 | □ | TBD | TBD | HRD data and ancillary files - HRD takes data only during Saturn ring plane crossings | IO-AR-012 | 3 | table | SBN | Rings | S. Kempf | S. Kempf | TBD | CO-D-CDA-3/4/5-DUST-V1.0 |
| 15 | TSDR | CIRS_IHSK | Resampled (interpolated) housekeeping data | Time Sequential Data Record (TSDR) | IO-AR-002, IO-AR-003 | 3 | table | Atmos | Rings | CIRS | CIRS PI | 3.5 MB/mon= 168 MB | CO-S-CIRS-2/4-TSDR-V1.0 |
| 16 | TSDR | CIRS_GEO | spacecraft orientation w.r.t. target, sun | Time Sequential Data Record (TSDR) | IO-AR-002, IO-AR-003 | 2 | table | Atmos | Rings | CIRS | CIRS PI | 41 MB/mon = 2.0 GB | CO-S-CIRS-2/4-TSDR-V1.0 |
| 17 | TSDR | CIRS_HSK | Housekeeping Data | Time Sequential Data Record (TSDR) | IO-AR-002, IO-AR-003 | 2 | table | Atmos | Rings | CIRS | CIRS PI | 18.5 MB/mon = 890 MB | CO-S-CIRS-2/4-TSDR-V1.0 |
| 18 | TSDR | CIRS_IFGM | uncompressed, raw interferogram data | Time Sequential Data Record (TSDR) | IO-AR-002, IO-AR-003 | 2 | table | Atmos | Rings | CIRS | CIRS PI | 682 MB/mon= 32.7 GB | CO-S-CIRS-2/4-TSDR-V1.0 |
| 19 | TSDR | CIRS_OBS | observation parameters | Time Sequential Data Record (TSDR) | IO-AR-002, IO-AR-003 | 2 | table | Atmos | Rings | CIRS | CIRS PI | 1 MB/mon = 48 MB | CO-S-CIRS-2/4-TSDR-V1.0 |
| 20 | TSDR | CIRS_POI | pointing information for detectors on target | Time Sequential Data Record (TSDR) | IO-AR-002, IO-AR-003 | 2 | table | Atmos | Rings | CIRS | CIRS PI | 236 MB/mon=11.3 GB | CO-S-CIRS-2/4-TSDR-V1.0 |
| 21 | TSDR | CIRS_RIN | pointing information for detectors on rings | Time Sequential Data Record (TSDR) | IO-AR-002, IO-AR-003 | 2 | table | Atmos | Rings | CIRS | CIRS PI | 200 MB/mon= 9.6 GB | CO-S-CIRS-2/4-TSDR-V1.0 |
| 22 | TSDR | CIRS_AIFM | averaged reference interferograms (deep space, warm shutter) | Time Sequential Data Record (TSDR) | IO-AR-002, IO-AR-003 | 4 | table | Atmos | Rings | CIRS | CIRS PI | 42.5 MB/mon = 2.0 GB | CO-S-CIRS-2/4-TSDR-V1.0 |
| 23 | TSDR | CIRS_ISPM | calibrated individual spectra | Time Sequential Data Record (TSDR) | IO-AR-002, IO-AR-003 | 4 | table | Atmos | Rings | CIRS | CIRS PI | 500 MB/mon = 24 GB | CO-S-CIRS-2/4-TSDR-V1.0 |

| □ | Super Type | Product Type | Science Data Product Description | COMMENTS | Product Specification ID (SIS) | CODMAC Level | PDS Format IMG, etc.. | Prime PDS Node interface | Additional PDS node | Producer | Supplier to PDS | Estimated Data Set Size | Data Set ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24 | □ | INMS_ESPEC | Energy Spectrum –Typically archive energy spectrum for 4 masses is taken. Using an average rate of 100 bps, a rough estimate of the data volume over the mission is about 1577 MB. | | IO-AR-016 IO-AR-017 | □ | TBD | PPI | □ | INMS | INMS | 1577 MB | □ |
| 25 | □ | INMS_SPEC | Spectrum – spectra every 2.2 seconds when at our full data rate (1498 bps). A rough estimation of the volume of this product over the nominal mission is 86.3 MB (bytes). | □ | IO-AR-016 IO-AR-017 | □ | TBD | PPI | □ | INMS | INMS | 86.3 MB | □ |
| 26 | □ | INMS_TS | Thermal Structure – For each Titan flyby where INMS is prime or has good ride along, we produce profiles of the thermal structure of the atmosphere. A ROUGH estimate of the data volume over the nominal mission is 10 MB. | □ | IO-AR-016IO-AR-017 | □ | TBD | PPI | □ | INMS | INMS | 10 MB | □ |
| 27 | □ | ISS_EDR | Raw, uncalibrated images | □ | DOIS-002, IO-AR-005 | 2 | IMG | Imaging (JPL) | Rings | IO/MIPL | ISS TL | 500 GB | CO-J-ISSNA/ISSWA-2-EDR-V1.0 CO-S-ISSNA/ISSWA-2-EDR-V1.0 |
| 28 | | □MAG_REDR | L1A data (duplicates removed, gaps filled, idiosyncrasies of onboard data processing unit fixed, data separated into files by type) | □ | IO-AR--020 | 3 | Time series binary TABLE | PPI | □ | MAG | MAG PI | 75 GB | □ |
| 29 | □ | MAG_CAL | Calibration files | □ | IO-AR--020 | 6 | binary TABLE | PPI | □ | MAG | MAG PI | 500 MB | □ |
| 30 | □ | MAG_SW | software to convert L1A to L1B | Mixture of text files (e.g. source code) and binary files (e.g. executables). Does not include spice libraries (assumed available elsewhere) | IO-AR--020 | 6 | TEXT, binary FILE | PPI | □ | MAG | MAG PI | 500 MB | □ |
| 31 | □ | MIMI_CHEMS_PHA | CHEMS Pulse Height Analysis data | □ | IO-AR-006 | 3 | ASCII | PPI | □ | MIMI | MIMI PI | 450 MB / Day Maximum = 722 GB | CO-E/J/S-MIMI-2-CHEMS-UNCALIBRATED-V1.0 |

| □ | Super Type | Product Type | Science Data Product Description | COMMENTS | Product Specification ID (SIS) | CODMAC Level | PDS Format IMG, etc.. | Prime PDS Node interface | Additional PDS node | Producer | Supplier to PDS | Estimated Data Set Size | Data Set ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 32 | □ | MIMI_CHEMS_ACC | CHEMS accumulation rate data | □ | IO-AR-006 | 3 | ASCII | PPI | □ | MIMI | MIMI PI | 7 MB / Day Maximum = 12 GB | CO-E/J/S-MIMI-2-CHEMS-UNCALIBRATED-V1.0 |
| 33 | □ | MIMI_CHEMS_SCI | CHEMS science rate data | □ | IO-AR-006 | □ | □ | □ | □ | □ | □ | □ | CO-E/J/S-MIMI-2-CHEMS-UNCALIBRATED-V1.0 |
| 34 | □ | MIMI_INCA_PHA | INCA Pulse Height Analysis data | □ | IO-AR-006 | 3 | ASCII | PPI | □ | MIMI | MIMI PI | 300 MB / Day Maximum = 482 GB | CO-E/J/S-MIMI-2-INCA-UNCALIBRATED-V1.0 |
| 35 | □ | MIMI_INCA_RAT | INCA accumulation rate data | □ | IO-AR-006 | 3 | ASCII | PPI | □ | MIMI | MIMI PI | 4 MB / Day Maximum = 6.5 GB | CO-E/J/S-MIMI-2-INCA-UNCALIBRATED-V1.0 |
| 36 | □ | MIMI_INCA_IMG | INCA image data | □ | IO-AR-006 | 3 | ASCII | PPI | □ | MIMI | MIMI PI | 110 MB / Day Maximum = 177 GB | CO-E/J/S-MIMI-2-INCA-UNCALIBRATED-V1.0 |
| 37 | □ | MIMI_LEMMS_PHA | LEMMS Pulse Height Analysis data | □ | IO-AR-006 | 3 | ASCII | PPI | □ | MIMI | MIMI PI | 30 MB / Day Maximum = 49 GB | CO-E/J/S-MIMI-2-LEMMS-UNCALIBRATED-V1.0 |
| 38 | □ | MIMI_LEMMS_ACC | LEMMS accumulation rate data | □ | IO-AR-006 | 3 | ASCII | PPI | □ | MIMI | MIMI PI | 35 MB / Day Maximum = 57 GB | CO-E/J/S-MIMI-2-LEMMS-UNCALIBRATED-V1.0 |
| 39 | □ | MIMI_LEMMS_FRT | LEMMS fine accumulation rate data | □ | IO-AR-006 | □ | □ | □ | □ | □ | □ | □ | CO-E/J/S-MIMI-2-LEMMS-UNCALIBRATED-V1.0 |
| 40 | □ | RADAR_BODP | Burst Ordered Data Product. File of this type consist of tabular data records in which rows correspond to consecutive bursts. Decommuntated, time-ordered, calibrated vector data from radiometry, scatterometry, altimetry modes w/associated metadata. Also geometric & processing metadata for each SAR burst. | | DORA-001 DORA-003 | 3 | TAB | Imaging1 | IO/RADAR | Radar TL | 800 MB | Product produced by IO (according to TL-approved SIS), delivered to RADAR TL, who in turn archives to PDS | ~~CO-SSA-RADAR-3-BODP-V1.0~~ **CO-V/E/J/S-RADAR-3-SBDR-V1.0 Short Burst Data Record CO-V/E/J/S-RADAR-3-LBDR-V1.0 Long Burst Data Record CO-V/E/J/S-RADAR-3-ABDR-V1.0 Altimeter Burst Data Record** |

| □ | Super Type | Product Type | Science Data Product Description | COMMENTS | Product Specification ID (SIS) | CODMAC Level | PDS Format IMG, etc.. | Prime PDS Node interface | Additional PDS node | Producer | Supplier to PDS | Estimated Data Set Size | Data Set ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 41 | □ | RADAR_BIDR | Basic Image Data Record. SAR data correlated, resampled to oblique cylindrical grid (different projection for each swath), looks summed | | DORA-002<br>DORA-003 | 4 | IMG | Imaging | IO/RADAR | Radar TL | 800 MB | Product produced by IO (according to TL-approved SIS), delivered to RADAR TL, who in turn archives to PDS. Includes lat-lon backplanes | ~~CO-SSA-RADAR-4-BIDR-V1.0~~<br>**CO-V/E/J/S-RADAR-5-BIDR-V1.0** |
| 42 | □ | RADAR_PRDR | Calibrated & gridded radiometer data | | IO-AR-012<br>IO-AR-018 | 5 | IMG | Imaging | USGS | Radar TL | 300 MB | Gridded maps containing single pass brightness temp data | CO-SSA-RADAR-5-PRDR-V1.0 |
| 43 | □ | RADAR_PSDR | Calibrated & gridded scatterometer data | | IO-AR-012<br>IO-AR-018 | 5 | IMG | Imaging | USGS | Radar TL | 300 MB | Gridded maps containing single pass echo parameter(s) | CO-SSA-RADAR-5-PSDR-V1.0 |
| 44 | □ | RADAR_GRDR | Mosaicked radiometer data | | IO-AR-012<br>IO-AR-018 | 5 | IMG | Imaging | USGS | Radar TL | 100 MB | Multipass radiom map | CO-SSA-RADAR-5-GRDR-V1.0 |
| 45 | □ | RADAR_GSDR | Mosaicked scatterometer data | | IO-AR-012<br>IO-AR-018 | 5 | IMG | Imaging | USGS | Radar TL | 50 MB | Multipass scatterom maps | CO-SSA-RADAR-5-GSDR |
| 46 | □ | RADAR_MIDR | Mosaicked SAR image data | | IO-AR-012<br>IO-AR-018 | 5 | IMG | Imaging | USGS | Radar TL | 6500 MB | Mosaics of SAR strips in common (nonobliqu e) projections | CO-SSA-RADAR-5-MIDR-V1.0 |

| □ | Super Type | Product Type | Science Data Product Description | COMMENTS | Product Specification ID (SIS) | CODMAC Level | PDS Format IMG, etc.. | Prime PDS Node interface | Additional PDS node | Producer | Supplier to PDS | Estimated Data Set Size | Data Set ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 47 | □ | RADAR_RIDR | Multilook SAR "cubes" | | IO-AR-012 IO-AR-018 | 5 | IMG | Imaging | USGS | Radar TL | 50 MB | Repeat SAR imaging of swath overlap areas, coregistered as layers in common projection | CO-SSA-RADAR-5-RIDR-V1.0 |
| 48 | □ | RADAR_DTM | Digital Topographic Models (DTMs) | | IO-AR-012 IO-AR-018 | 5 | IMG | Imaging | USGS | Radar TL | 10 MB | Produced by radarclinometry and/or stereoanalysis | CO-SSA-RADAR-5-DTM-V1.0 |
| 49 | □ | RADAR_SCI | Science analysis products | | TBD | 5 | IMG, (and…?) | Imaging | CRST | Radar TL | □ | Other products TBD, e.g. model emissivity from radiometry; model reflectivity/ roughness from scatterometry modeling | RADAR-TBD |
| 50 | KEY60S | RWPS_KEY | spectral information as a function of time | □ | IO-AR-019 | 4 | ascii | PPI | □ | RPWS | RPWS | □ | CO-V/E/J/S-RPWS-4-SUMM-KEY60S-V1.0 |
| 51 | □ | RPWS_ANCIL | Description of RPWS IEBs | □ | IO-AR-019 | 6 | asii | PPI | □ | RPWS | RPWS | □ | □ |
| 52 | WBRFULL | RPWS_WBFR | Wideband Full Resolution Uncalibrated | uncalibrated data sets will include with their metadata the algorithms and files necessary to calibrate the data. Special data sets will not be defined probably until after the beginning of tour. | IO-AR-019 | 2 | Time Series | PPI | □ | RPWS | RPWS | 10 GB | CO-V/E/J/S-RPWS-2-REFDR-WBRFULL-V1.0 |

| □ | Super Type | Product Type | Science Data Product Description | COMMENTS | Product Specification ID (SIS) | CODMAC Level | PDS Format IMG, etc.. | Prime PDS Node interface | Additional PDS node | Producer | Supplier to PDS | Estimated Data Set Size | Data Set ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 53 | WFRMFULL | RPWS_WVFR | Waveform Full Resolution Uncalibrated | uncalibrated data sets will include with their metadata the algorithms and files necessary to calibrate the data. Special data sets will not be defined probably until after the beginning of tour. | IO-AR-019 | 2 | Time Series | PPI | □ | RPWS | RPWS | 10 GB | C0-V/E/J/S-RPWS-2-REFDR-WFRMFULL-V1.0 |
| 54 | LRFULL | RPWS_LRFRC | Low Rate Full Resolution Calibrated | □ | IO-AR-019 | 3 | Time Serries | PPI | □ | RPWS | RPWS | 65 GB | CO-V/E/J/S-RPWS-3-RDR-LRFULL-V1.0 |
| 55 | LRFULL | RPWS_LRB | Low Rate Browse | Included in browse directory, not data | IO-AR-019 | 4 | PNG | PPI | □ | RPWS | RPWS | 6.5 GB | CO-V/E/J/S-RPWS-3-RDR-LRFULL-V1.0 |
| 56 | WBRFULL | RPWS_WB | Wideband Browse | Included in browse directory, not data | IO-AR-019 | 4 | PNG | PPI | □ | RPWS | RPWS | 1 GB | CO-V/E/J/S-RPWS-2-REFDR-WBRFULL-V1.0 |
| 57 | WFRMFULL | RPWS_WVB | Waveform Browse | Included in browse directory, not data | IO-AR-019 | 4 | PNG | PPI | □ | RPWS | RPWS | 1 GB | C0-V/E/J/S-RPWS-2-REFDR-WFRMFULL-V1.0 |
| 58 | □ | RPWS_SP | Special Data Sets | □ | IO-AR-019 | 4+ | □ | PPI | □ | RPWS | RPWS | 1 GB | □ |
| 59 | □ | RSS_DSP | Open-loop Radio Science Data (ODS), from DSP-R; digitized signal | * Produced by DSN, IO-RS makes product available to RST; PDS labels generated by RST (to be retired after end of FY'01) GWE, and SCE System Tests only | DSN-011 IO-AR-021 | 1 | Binary | RS Subnode | □ | IO-RS * | RST | 1 GB | □ |
| 60 | □ | RSS_RSR | Open-loop Radio Science Data (ODS), from RSR; digitized signal | * Produced by DSN, IO-RS makes product available to RST; PDS labels generated by RST. | DSN-026 IO-AR-021 | 1 | Binary | RS Subnode | □ | IO-RS * | RST | 200 GB | □ |
| 61 | □ | RSS_ATDF | Closed-loop Tracking Data (ATDF, and Ka-up/Ka-down "ATDF"); Doppler, range, and ramps | PDS labels generated by RST (no longer generated after NSP) | DSN-023 IO-AR-021 | 2 | Binary | RS Subnode | □ | Radio Metric Data Conditioning Team (RMDCT) | RST | 10 GB | □ |
| 62 | □ | RSS_ODF | Orbital Data File (ODF); Doppler, range, and ramps | PDS labels generated by RST (no longer generated after NSP) | DSN-001, IO-AR-021 | 4 | Binary | RS Subnode | □ | RMDCT | RST | 2 GB | □ |

| □ | Super Type | Product Type | Science Data Product Description | COMMENTS | Product Specification ID (SIS) | CODMAC Level | PDS Format IMG, etc.. | Prime PDS Node interface | Additional PDS node | Producer | Supplier to PDS | Estimated Data Set Size | Data Set ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 63 | □ | RSS_RING_OCCULT | complex signal amplitude A(f,r,lambda,t) for frequency f at ring plane radius r, longitude lambda, and time t (direct ray)(model-independent quantity)Fresnel scale Fr(f,r,lambda,t)(model-independent quantity)range to ring intercept pt of center of beam R(t)(model-independent quantity)transverse and radial velocity components of direct ray(model-independent quantity)normal and slant path optical depth tau(f,r,lambda,t) at multiple resolutions (derived quantities)Spectrograms of scattered signal as function of time(derived quantities) | Ancillary data includes:1. Saturn pole direction2. s/c ephemerides3. planetary ephemerides4. C kernels and planetary constants files5. list of raw data files used 6. DSN# and conditions (ex: rcvr temp) | IO-AR-022 | 5 | N/A | RS Subnode | Rings | Radio Science Team (RST) | RST | N/A | □ |

| □ | Super Type | Product Type | Science Data Product Description | COMMENTS | Product Specification ID (SIS) | CODMAC Level | PDS Format IMG, etc.. | Prime PDS Node interface | Additional PDS node | Producer | Supplier to PDS | Estimated Data Set Size | Data Set ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 64 | □ | RSS_ATMOS_OCCULT | complex signal amplitude A(f,r,lambda,t) for frequency f at ring plane (model-independent quantity)radius r, longitude lambda, and time t (direct ray) (model-independent quantity)Fresnel scale Fr(f,r,lambda,t) (model-independent quantity)range to ring intercept pt of center of beam R(t) (model-independent quantity)transverse and radial velocity components of direct ray (model-independent quantity)normal and slant path optical depth tau(f,r,lambda,t) at multiple resolutions (derived quantities)Spectrograms of scattered signal as function of time (derived quantities) | □ | IO-AR-022 | 5 | □ | RS Subnode | □ | Radio Science Team (RST) | RST | N/A | □ |
| 65 | □ | RSS_GRAV_FIELDS | frequency residuals vs time (model-independent quantity)<br><br>covariance matrix (derived)<br><br>reconstructed trajectory vs time (derived) | □ | IO-AR-022 | 5 | □ | RS Subnode | □ | Radio Science Team (RST) | RST | N/A | □ |
| 66 | □ | RSS_SC_GWE | sky frequency at 1 sec interval (90% level of completeness) for each observed frequency [1GB ascii file for 40 days of obs] | (model-independent quantity) | IO-AR-022 | 5 | □ | RS Subnode | □ | Radio Science Team (RST) | RST | N/A | □ |
| 67 | □ | RSS_AMCF | AMCF - Advanced Media Calibration Files | □ | DSN-005 IO-AR-021 | 6 | ASCII | RS Subnode | □ | IO-RS | RST | 1 GB | □ |
| 68 | □ | RSS_CK | C-Kernel | PDS labels generated by RST | NAV-005 IO-AR-021 | 6 | Binary | RS Subnode | □ | SCO | RST | 1 GB | □ |
| 69 | □ | RSS_EOP | EOP – Earth Orientation Parameters File | PDS labels generated by RST | DSN-004 IO-AR-021 | 6 | ASCII | RS Subnode | □ | TSAC | RST | 250 MB | □ |

| □ | Super Type | Product Type | Science Data Product Description | COMMENTS | Product Specification ID (SIS) | CODMAC Level | PDS Format IMG, etc.. | Prime PDS Node interface | Additional PDS node | Producer | Supplier to PDS | Estimated Data Set Size | Data Set ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 70 | □ | RSS_HGA_CAL | High Gain Antenna (HGA) Boresight Alignment reports | The HGA Boresight Alignment is part of the Frames kernel produced by IO. HGAC experiment only | N/A IO-AR-021 | 6 | ASCII | RS Subnode | □ | IO-RS | RST | N/A | □ |
| 71 | □ | RSS_HGA_PAT | High Gain Antenna (HGA) Pattern reports | HGAC experiement only | N/A IO-AR-021 | 6 | ASCII | RS Subnode | □ | IO-RS | RST | N/A | □ |
| 72 | □ | RSS_MCF | MCF - Media Calibration Files | PDS labels generated by RST | DSN-005 IO-AR-021 | 6 | ASCII | RS Subnode | □ | TSAC | RST | 2 MB | □ |
| 73 | □ | RSS_MON | Mission Monitor Data | PDS labels generated by RST | DSN-027 IO-AR-021 | 6 | ASCII | RS Subnode | □ | IO-RS | RST | 13 GB | □ |
| 74 | □ | RSS_SPK | SP-Kernel; spacecraft and planetary ephemeides | PDS labels generated by RST | NAV-009 IO-AR-021 | 6 | Binary | RS Subnode | □ | SCO | RST | 400 MB | □ |
| 75 | □ | RSS_TLM | RFS/RFIS engineering telemetry | □ | TLM-007 IO-AR-021 | 6 | ASCII | RS Subnode | □ | IO-RS | RST | 31 GB | □ |
| 76 | □ | RSS_USO_CAL | Ultrastable Oscillator Characterization reports | USOC experiment only | N/A IO-AR-021 | 6 | ASCII | RS Subnode | □ | IO-RS | RST | N/A | □ |
| 77 | □ | RSS_TDAF | Closed-loop Tracking Data (DSMS TDAF); uplink and downlink carrier and range phase | PDS labels generated by RST (begins with NSP implementation – assume ~SOI) | DSN-025 IO-AR-021 | 1 ,2,3,4 | Binary | RS Subnode | □ | Tracking Data Delivery Subsystem (TDDS) | RST | 3 GB | □ |
| 78 | □ | UVIS_1WAV | Image at one wavelength | uncalibrated | IO-AR-023 IO-AR-024 | 2 | Image | Atmos | Rings | UVIS | UVIS PI | 34 MB | CO-S-UVIS-2-WAV-V1.0s |
| 79 | □ | UVIS_CUBE | Spatial and spectral cubes | uncalibrated | IO-AR-023 IO-AR-024 | 2 | Qube | Atmos | Rings | UVIS | UVIS PI | 34 GB | CO-S-UVIS-2-CUBE-V1.0s |
| 80 | □ | UVIS_SPEC | Spectra | uncalibrated | IO-AR-023 IO-AR-024 | 2 | Spectrum | Atmos | Rings | UVIS | UVIS PI | 136 MB | CO-S-UVIS-2-SPEC-V1.0s |
| 81 | □ | UVIS_SSB | Solar and Stellar brightness time history | uncalibrated | IO-AR-023 IO-AR-024 | 2 | Time Series | Atmos | Rings | UVIS | UVIS PI | 2 MB | CO-S-UVIS-2-SSB-V1.0s |
| 82 | □ | UVIS_CAL | Calibration files & Algorthims | □ | IO-AR-023 IO-AR-024 | 6 | □ | Atmos | Rings | □ | UVIS | □ | CO-S-UVIS-2-CAL-V1.0s |
| 83 | □ | VIMS_EDR | Image cube of visible bands | □ | DOVI-002, IO-AR-009 | 2 | PDS Spectral Cube | Imaging (JPL) | Rings | IO/MIPS | VIMS Team | 125 GB | CO-X-VIMS-2-EDR-CRUISE-V1.0<br>CO-J-VIMS-2-EDR-V1.0<br>CO-S-VIMS-2-EDR-V1.0 |
| 84 | SPICE | SPICE_SPK | Spacecraft, Planet, satellite, and rock ephemerides | □ | NAV-009 | 6 | SPICE | NAIF | □ | NAVT & ISS | Instrument Ops | 5 GB in ascii | CO-S/J/E/V-SPICE-6-V1.0<br>HP-SSA-SPICE-6-V1.0 |
| 85 | SPICE | SPICE_PCK | Planetary Constants and basic models | □ | NAV-010 | 6 | SPICE | NAIF | □ | MP | Instrument Ops | 2 MB | CO-S/J/E/V-SPICE-6-V1.0 |
| 86 | SPICE | SPICE_IK | Instrument description and frame definitions | □ | DOI-002 | 6 | SPICE | NAIF | □ | NAIF | Instrument Ops | 2 MB | CO-S/J/E/V-SPICE-6-V1.0 |

| □ | Super Type | Product Type | Science Data Product Description | COMMENTS | Product Specification ID (SIS) | CODMAC Level | PDS Format IMG, etc.. | Prime PDS Node interface | Additional PDS node | Producer | Supplier to PDS | Estimated Data Set Size | Data Set ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 87 | SPICE | SPICE_CK | Pointing | □ | MSAS-005 | 6 | SPICE | NAIF | □ | SCO/ACS | Instrument Ops | 3.3 MB/Day = 6 GB in ascii | CO-S/J/E/V-SPICE-6-V1.0 |
| 88 | SPICE | SPICE_EK | Events | □ | DOI-001 | 6 | SPICE | NAIF | □ | Instrument Ops | Instrument Ops | 500 MB | CO-S/J/E/V-SPICE-6-V1.0 |
| 89 | SPICE | SPICE_LSK | Leapseconds | □ | MSAS-019 | 6 | SPICE | NAIF | □ | IO/NAIF | Instrument Ops | 5 KB | CO-S/J/E/V-SPICE-6-V1.0 |
| 90 | SPICE | SPICE_SCLK | spacecraft clock offset | □ | MSAS-017 | 6 | SPICE | NAIF | □ | SCO | Instrument Ops | 3 MB | CO-S/J/E/V-SPICE-6-V1.0 |
| 91 | SPICE | SPICE_FK | Frames | □ | DOI-035 | 6 | SPICE | NAIF | □ | Instrument Ops | Instrument Ops | 500 MB | CO-S/J/E/V-SPICE-6-V1.0 |

## 16.2 Huygens Data Products

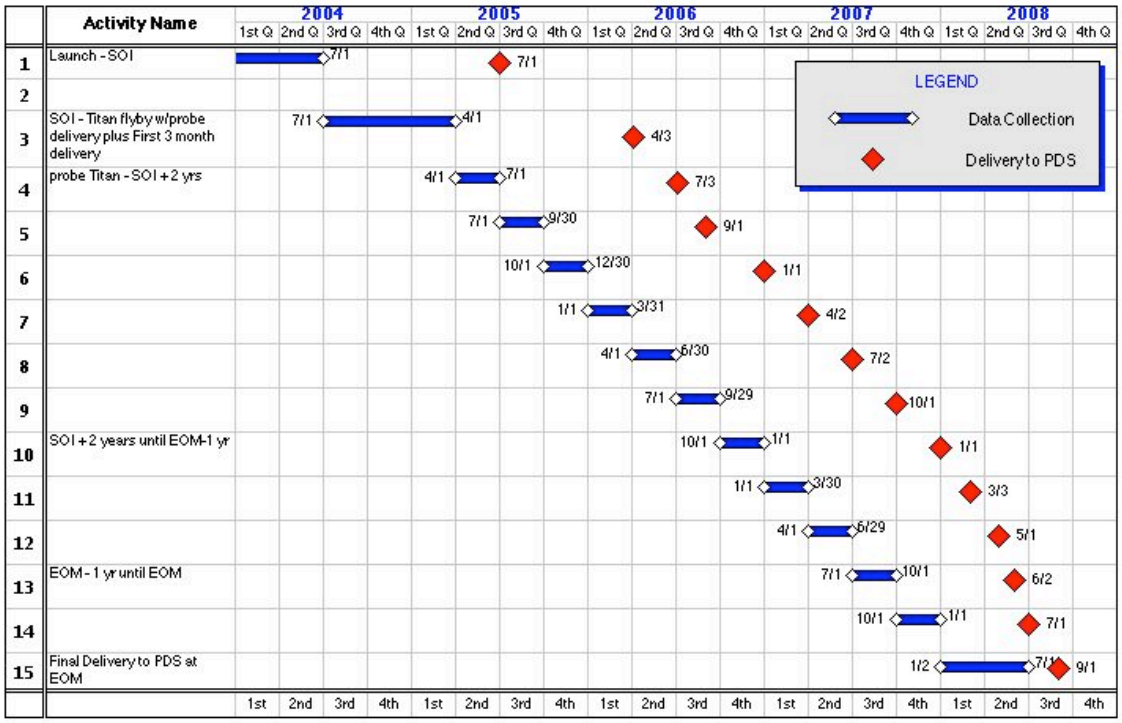
| □ | Product Type | Science Data Product Description | SIS ID | CODMAC Level | PDS Format IMG, etc.. | Primary PDS Discipline Node | Secondary PDS Discipline Node | Producer | Supplier to PDS (if not producer) | Estimated Data Set Size | COMMENTS | Data Set ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ACP_CAL | Baselines and sensitivity offsets | □ | □ | □ | Atmos | □ | □ | □ | □ | □ | □ |
| 2 | ACP-AEROSOL COMPOSITION | aerosols distribution and composition | □ | □ | □ | Atmos | □ | □ | □ | □ | □ | □ |
| 3 | ACP Housekiping data | Forward, Backward and Electronics Temperature Sensor Readings in degrees C, and in Counts ; Gain of XX Electronics; Contamination Channel Readings, Counts ; Scatter Data, Counts; Fitted Temperature profiles. | □ | □ | □ | Atmos | □ | □ | □ | □ | □ | □ |
| 4 | DISR-CAL | □ | □ | □ | □ | Imaging | Atmos, Rings | □ | □ | □ | □ | □ |
| 5 | DISR_SPECTRA | Spectra | □ | □ | □ | Imaging | Atmos, Rings | □ | □ | □ | □ | □ |
| 6 | DISR_CUBE | Spacial and spectral cubes | □ | □ | □ | Imaging | Atmos, Rings | □ | □ | □ | □ | □ |
| 7 | DISR_IMAGE | Images | □ | □ | □ | Imaging | Atmos, Rings | □ | □ | □ | □ | □ |
| 8 | DWE_CAL | □ | □ | □ | □ | Atmos | □ | □ | □ | □ | □ | □ |
| 9 | DWE_WIND | velocity and direction | □ | □ | □ | Atmos | □ | □ | □ | □ | □ | □ |
| 10 | DWE_RESID | time from entry, time from link lock, altitude, pressure, and frequency residuals after the wind retrieval. | □ | □ | □ | Atmos | □ | □ | □ | □ | □ | □ |
| 11 | DWE_RADIO | Probe NCO frequency vs. time from lock | □ | □ | □ | Atmos | □ | □ | □ | □ | □ | □ |
| 12 | DWE_PROBE_DYNAMICS | Probe spin rate and spin phase during descent, location and orientation during descent and after landing | □ | □ | □ | Atmos | □ | □ | □ | □ | □ | □ |
| 13 | GCMS_CAL | □ | □ | □ | □ | Atmos | □ | □ | □ | □ | □ | □ |
| 14 | GCMS_ATMOS_COMP | Atmospheric composition | □ | □ | □ | Atmos | □ | □ | □ | □ | □ | □ |
| 15 | HASI_CAL | Calibration | □ | □ | □ | Atmos | □ | □ | □ | □ | □ | □ |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16 | HASI_ACCEL | Entry sequence acceleration measurements | □ | □ | □ | Atmos | □ | □ | □ | □ | □ | □ |
| 17 | HASI_DESCENT | atmospheric density, pressure, and temperature | □ | □ | □ | Atmos | □ | □ | □ | □ | □ | □ |
| 18 | HASI_ALT | Atmospheric electric conductivity and DC electric fileds and lightning; acousitc noise due to turbulences or storms; radar echoes | □ | □ | □ | Atmos | □ | □ | □ | □ | □ | □ |
| 19 | HASI_SURFACE | Nature of Surface | □ | □ | □ | Atmos | □ | SSP PI | SSP PI | □ | □ | □ |
| 20 | SSP_CAL | Calibration | □ | □ | □ | Atmos | □ | SSP PI | SSP PI | □ | □ | □ |
| 21 | SSP_HK | Housekeeping / Engineering Data | □ | □ | □ | Atmos | □ | SSP PI | SSP PI | □ | □ | □ |
| 22 | SSP_DEN | □ | □ | □ | □ | Atmos | □ | SSP PI | SSP PI | □ | □ | □ |
| 23 | SSP_REF | □ | □ | □ | □ | Atmos | □ | SSP PI | SSP PI | □ | □ | □ |
| 24 | SSP_TIL | □ | □ | □ | □ | Atmos | □ | SSP PI | SSP PI | □ | □ | □ |
| 25 | SSP_APIS | □ | □ | □ | □ | Atmos | □ | SSP PI | SSP PI | □ | □ | □ |
| 26 | SSP_APIV | □ | □ | □ | □ | Atmos | □ | SSP PI | SSP PI | □ | □ | □ |
| 27 | SSP_ACCE | □ | □ | □ | □ | Atmos | □ | SSP PI | SSP PI | □ | □ | □ |
| 28 | SSP_ACCI | (Accelerometer - Internal) 1Hz sampling in Upper, mid, and lower atmosphere | □ | □ | □ | Atmos | □ | SSP PI | SSP PI | □ | □ | □ |
| 29 | SSP_THP | □ | □ | □ | □ | Atmos | □ | SSP PI | SSP PI | □ | □ | □ |
| 30 | SSP_PER | □ | □ | □ | □ | Atmos | □ | SSP PI | SSP PI | □ | □ | □ |

# 17 Appendix B: Archive Schedule

| Period of Data Collection | | Delivery contains data for dates coveraged (nominal) | Data Validated and Delivered to PDS DN by: |
|---|---|---|---|
| Some data collected between Launch and Jupiter encounter, or engineering model data, for the purpose of validating format and volume layout archive design. | | | Mar-03 |
| All Data Acquired prior to SOI | Launch - Jul 1, 2004 | Launch - Jul 1, 2004 | Jul-05 |
| SOI through completion of the Titan flyby that includes probe delivery | Jul 1, 2004 - Jan 14, 2005 | Jul 1, 2004 - Jan 14, 2005 | Apr-06 |
| Completion of Titan Flyby which includes Probe delivery until SOI + 2 years | Jan 14, 2005 - Jul 1, 2006 | Jan 14, 2005 - Apr 1, 2005 | Apr-06 |
| | | Apr 1,2005 - Jul 1, 2005 | Jul-06 |
| | | Jul 1, 2005 - Oct 1, 2005 | Oct-06 |
| | | Oct 1, 2005 - Jan 1, 2006 | Jan-07 |
| | | Jan 1, 2006 - Apr 1, 2006 | Apr-07 |
| Final delivery to PDS for data collected during period | | Apr 1, 2006 - Jul 1, 2006 | Jul-07 |
| SOI +2 years until EOM-1 year | Jul 1, 2006 - Jul 1, 2007 | Jul 1, 2006 - Oct 1, 2006 | Oct-07 |
| | | Oct 1, 2006 - Jan 1, 2007 | Jan-08 |
| | | Jan 1, 2007 - Apr 1, 2007 | Apr-08 |
| Final delivery to PDS for data collected during period | | Apr 1, 2007 - Jul 1, 2007 | May-08 |
| EOM-1year until EOM | Jul 1, 2007 - Jul 1, 2008 | Jul 1, 2007 - Oct 1, 2007 | Jun-08 |
| | | Oct 1, 2007 Jan 1, 2008 | Jul-08 |
| Final delivery to PDS for data collected during period | | Jan 1, 2008 Jul 1, 2008 | Sep-08 |

## Archive Delivery Schedule




MacintoshHD:Users:dconner:Cassini:archive:APSD:archive delivery schedule.fts

Friday, December 6, 2002

# 18 Appendix C: Acronyms

~~Open Items~~

~~a)Validation software provided by PDS will produce a summary of each data product including TBD fields.~~
~~b)Volume validation software supplied by PDS.~~
~~c)The MIFT will periodically check volumes on TBD intervals.~~
~~d)Huygens Archive data volume.~~
~~e)Coordinate Systems.~~
~~f)Standard keys for labels.~~
~~g)Observable events would be interesting to archive. It may be that the tour atlas https://cassini.jpl.nasa.gov/sp/tour_atlas/T18_5/T18_5.html, is a source for some of this information and could be archived as an EKernel. I recommend that I carry this as an open item in the archive plan, so that it may be worked in the future.~~

| | |
|---|---|
| APSD | Archive Plan for Science Data (formerly known as the Archive Policy and Data Transfer Plan, APDTP) |
| CAPS | Cassini Plasma Spectrometer |
| CDA | Cosmic Dust Analyzer |
| CDS | Command and Data Subsystem |
| CIRS | Composite Infrared Spectrometer |
| CK | SPICE spacecraft orientation data |
| Co-I | Co-Investigator |
| COS | Cassini Operations System |
| DN | Data Number |
| DN | Discipline Node |
| DSN | Deep Space Network |
| ECR | Engineering Change Request |
| EDR | Experiment Data Record |
| EEIS | End-to-End Information System |
| EI | Ephemeris Improvement |
| EK | SPICE events information |
| ESA | European Space Agency |
| EU | Engineering Unit |
| FDD | Functional Design Document |
| FI | Facility Instrument |
| FK | Frames Kernel |
| FRD | Functional Requirements Document |
| GM | Gravity Field and Mass Determination Measurements |
| GWE | Gravity Wave Experiment |
| HGAC | High Gain Antenna Calibration |
| HK | Housekeeping |
| HSWT | Huygens Science Working Team |
| ID | Identifier |
| IDR | Intermediate Data Record |
| IDS | Interdisciplinary Scientist |
| IEB | Instrument Expanded Block |
| IK | SPICE instrument Kernel |
| INMS | Ion and Neutral Mass Spectrometer |
| IO | Instrument Operations Team |
| IRD | Interface Requirements Document |
| ISS | Imaging Science Subsystem |
| JPL | Jet Propulsion Laboratory |
| LSK | SPICE leapseconds data |
| MAG | Magnetometer |

| | |
|---|---|
| MAPS | Magnetosphere and Plasma Science |
| MIFT | Mission Interface Team |
| MIMI | Magnetospheric Imaging Instrument |
| MIPS | Multimission Image Processing System |
| MO&DA | Mission Operations and Data Analysis |
| MOU | Memorandum of Understanding |
| MP | Mission Plan |
| MSOC | Mission and Science Office Coordinator |
| MSSO | Mission Science and Support Operations |
| NAIF | Navigation and Ancillary Information Facility |
| NASA | National Aeronautics and Space Administration |
| NSSDC | National Space Science Data Center |
| OM | Occulation Measurements |
| OSSA | Office of Space Science and Applications |
| OTL | Operations Team Leader |
| PCK | SPICE target (planet, etc.) size, shape and orientation |
| PDMP | Project Data Management Plan |
| PDS | Planetary Data System |
| PI | Principal Investigator |
| PPRD | Program Policies & Requirements Document |
| PSG | Program Science Group |
| RPIF | Regional Planetary Image Facility |
| RPWS | Radio and Plasma Wave Science Radio and Plasma Wave Spectrometer |
| RSS | Radio Science Subsystem |
| RST | Radio Science Team |
| S/C | Spacecraft |
| S/W | Software |
| SAUL | Science and Uplink Office |
| SAWG | Science Archive Working Group |
| SCLK | SPICE spacecraft clock coefficients |
| SFDU | Standard Formatted Data Unit |
| SIS | Software Interface Specification |
| SMP | Science Management Plan |
| SOI | Saturn Orbit Insertion |
| SPICE | Spacecraft, Planet, Instrument, C-matrix, Events |
| SPK | SPICE Spacecraft and target (planet, etc.) ephemeris |
| SWS | Solar Wind Scintillation |
| TL | Team Leader |
| TM | Team Member |
| UDR | Unprocessed Data Record |
| UTC | coordinated universal time |
| UVIS | Ultraviolet Imaging Spectrograph |
| VIMS | Visual and Infrared Mapping Spectrometer |

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