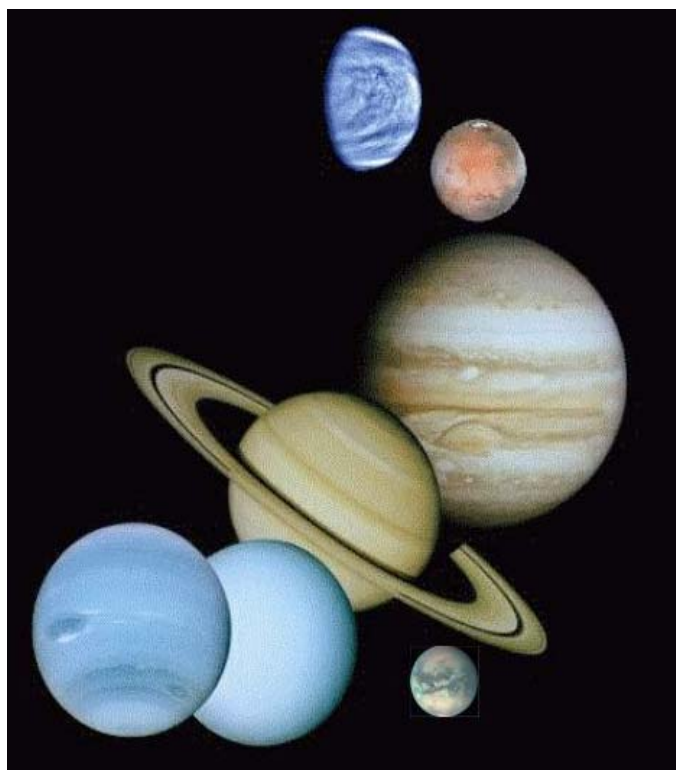




Planetary Data System Atmospheres Node

PDS MC F2F Report
Univ of Maryland
Mar 27, 2012

Reta Beebe
Lyle Huber
Nancy Chanover
Lynn Neakrase
Jim Murphy
Joni Johnson
Irma Trejo
Matias Roybal
Shannon Rees



Activities of Interest to Other Nodes

Transfer of data to NSSDC and the San Diego Super Computer Center

Completion of PDS Galileo and Cassini Jupiter data sets

Mars activity – Tie off of older Mars data sets – Retrieve atmospheric profiles from MRO radio science data

The need for bundling

Development for LADEE and MAVEN (see Lyle's presentation)

Improving Cassini Data Access

Transfer of data to NSSDC and San Diego Supercomputer Center

Joni Johnson has transferred NSSDC data to their data brick and has requested IDs for all sets. She encountered some transmission trouble transferring 158 Gb to SDSC

Completion of PDS Galileo and Cassini Jupiter data sets

We are assembling 2 high-order Jupiter Galileo and Cassini mapping data sets. Joni ran into problems with Vicar but has found Bob Dean/Imaging very helpful.

Tie off of older Mars data sets

Horizon Sensor MGS & Model assimilated reformatted TES data. Murphy is supervising.

Retrieve atmospheric profiles from MRO radio occultation experiments.

A significant quantity of radio occultation data has been collected with the MRO during the past 4 years. But no reduced data, such as atmospheric profiles, will be generated by the mission. In a small program Dave Hinson will modify software used on MGS and MEX and retrieve atmospheric profiles from a one month subset of MRO radio occultation data. He hopes to continue the effort in a DAP

PDS4 Development - The Need for Bundling

The nodes need to complete assembling a bundle to identify problems and allow migration to go forward.

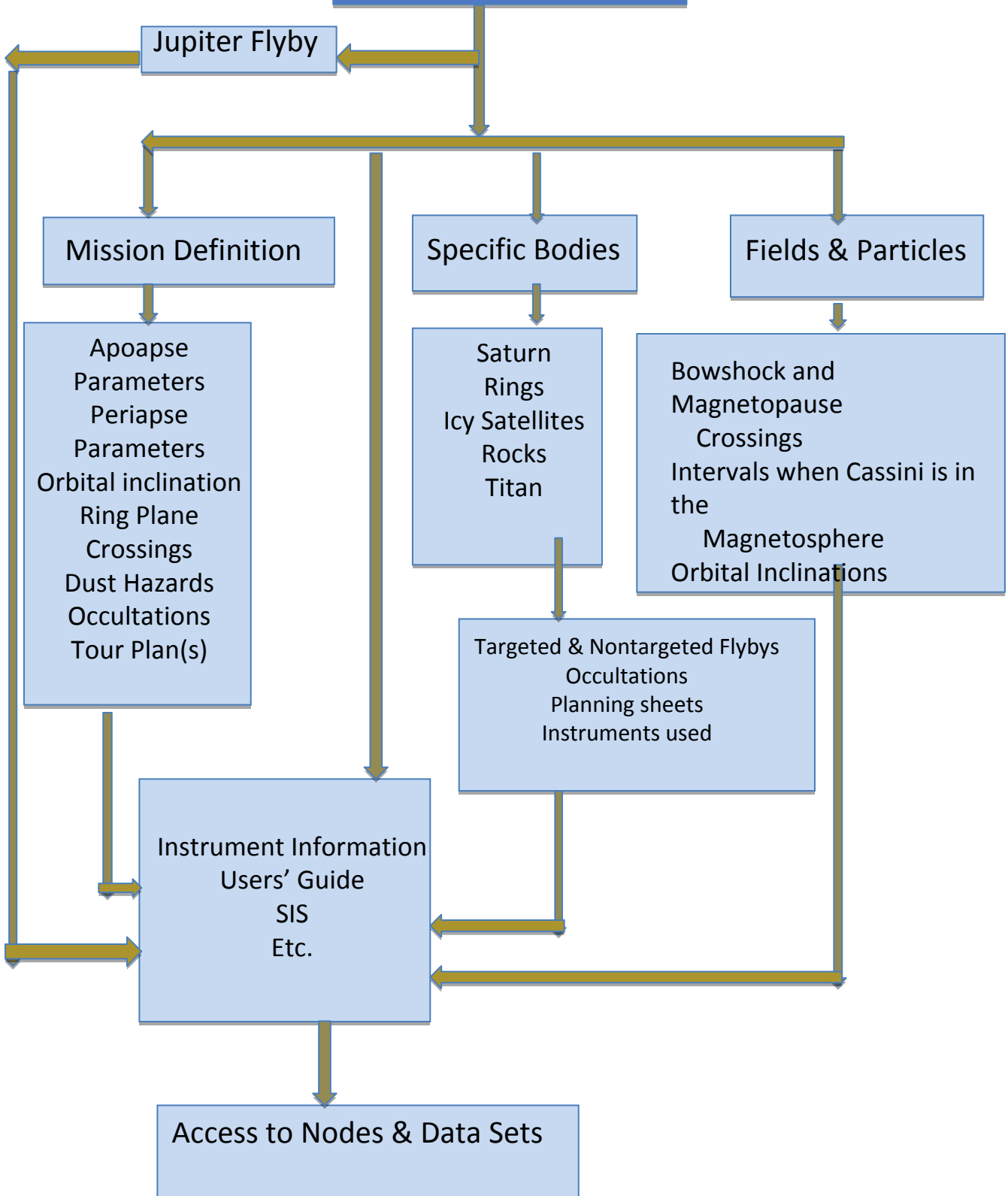
Development for LADEE and MAVEN

See Lyle's presentation

Improving Cassini data access

The flow-down scheme has been constructed on the assumption that Cassini team members should have direct access to instrument pages but novices should find resources that will allow them to slice and dice the data sets (See following slides).

Welcome to Cassini



Welcome to the Cassini Archive Page



PRIME

Mar 14, 2004 – July 1, 2008
S01 – S41

100% complete



July 1, 2008 – Oct. 11, 2010
S42 – S63

100% complete



Oct. 11, 2010 – Sept. 15, 2017
S64 – S101

1st installment delivered
October 1, 2011

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Finding Cassini Data. Although the data from the various instruments are archived within the appropriate discipline nodes, it is assumed that the user would be interested in a [specific body](#) or in [fields and particles](#) data; hence, these web pages are set up to facilitate searches of this sort.

Note: These pages would be formulated with consultation with the instrument teams and the appropriate nodes. Every effort will be made to access material that is already on line in the PDS.

Understanding the Instrument and the Archived Data.

In an effort to supplement the meager availability of higher-order reduced data products, the Cassini Instrument Teams are generating users' guides to supplement the original documentation. Access to the guides and other useful information can be found at the following pages.

[CAPS](#) - Cassini Plasma Spectrometer

[CDA](#) - Cosmic Dust Analyzer

[CIRS](#) - Composite Infrared Spectrometer

[INMS](#) - Ion and Neutral Mass Spectrometer

[ISS](#) - Imaging Science Subsystem

[MAG](#) - Magnetometer

[MIMI](#) - Magnetospheric Imaging Instrument

[RADAR](#) - a Radar instrument

[RPWS](#) - Radio and Plasma Wave Spectrometer

[RSS](#) - Radio Science Subsystem

[UVIS](#) - Ultraviolet Imaging Spectrograph

[VIMS](#) - Visual and Infrared Mapping Spectrometer

Navigation and pointing information can be obtained at the [NAIF](#) site.

Welcome to Cassini

Jupiter Flyby

Mission Definition

Specific Bodies

Fields & Particles

Apoapse
Parameters
Periapse
Parameters
Orbital inclination
Ring Plane
Crossings
Dust Hazards
Occultations
Tour Plan(s)

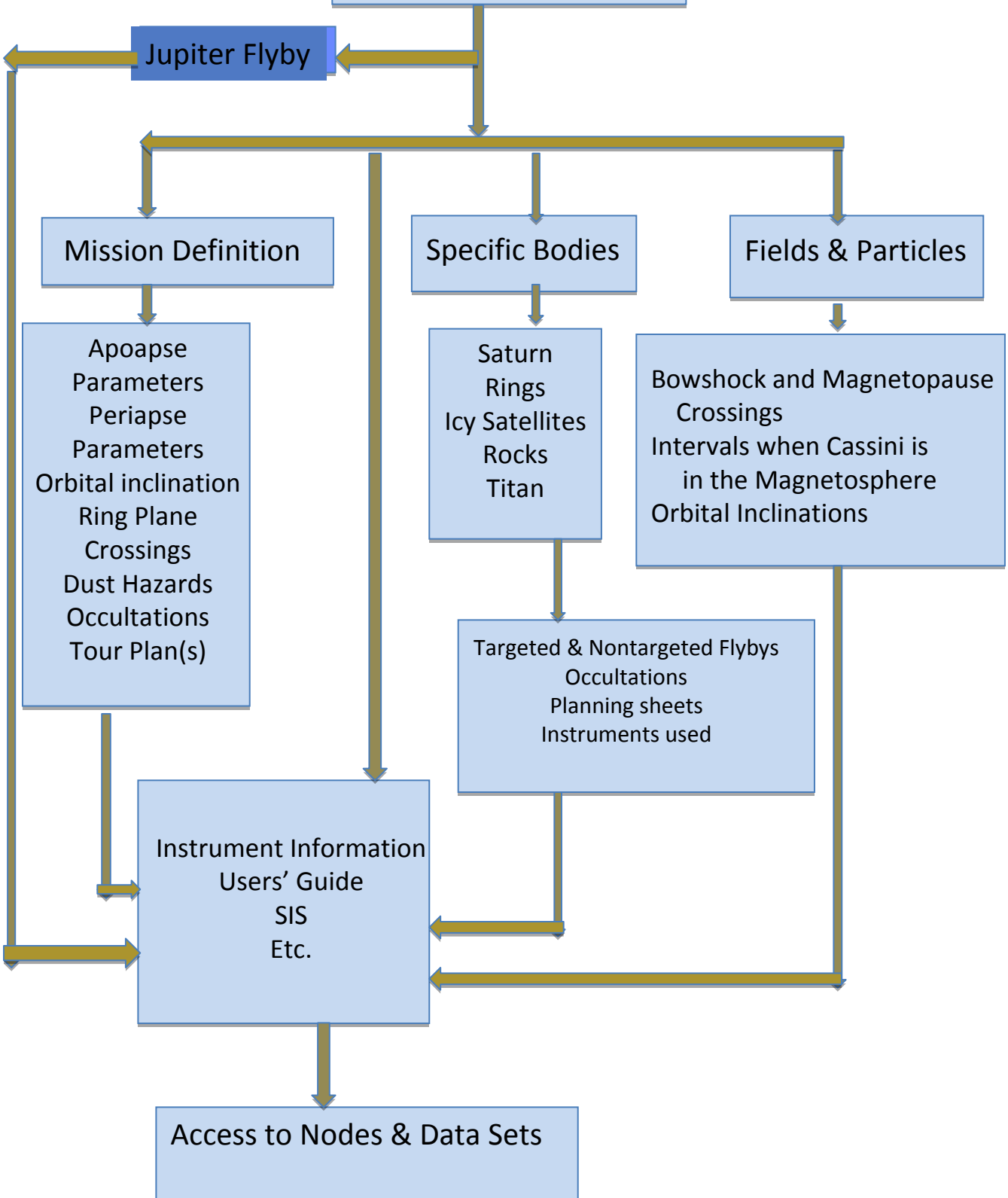
Saturn
Rings
Icy Satellites
Rocks
Titan

Bowshock and Magnetopause
Crossings
Intervals when Cassini is
in the Magnetosphere
Orbital Inclinations

Targeted & Nontargeted Flybys
Occultations
Planning sheets
Instruments used

Instrument Information
Users' Guide
SIS
Etc.

Access to Nodes & Data Sets



Welcome to the Cassini Archive Page



PRIME

Mar 14, 2004 – July 1, 2008
S01 – S41

100% complete



July 1, 2008 – Oct. 11, 2010
S42 – S63

100% complete



Oct. 11, 2010 – Sept. 15, 2017
S64 – S101

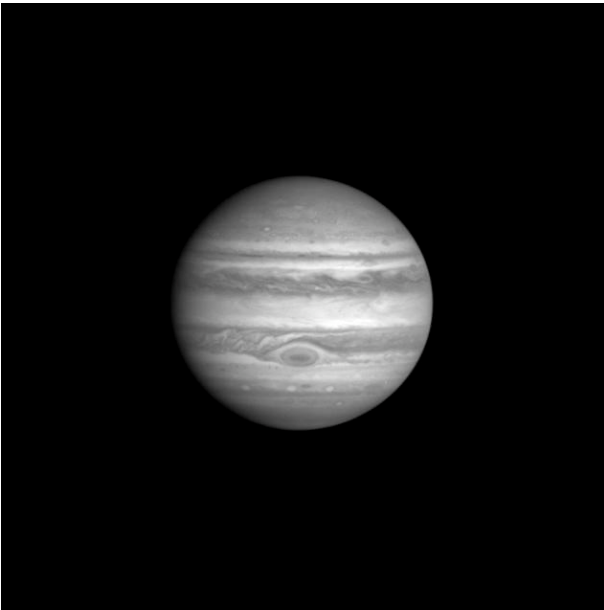
**1st installment delivered
October 1, 2011**

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Jupiter Cassini Flyby

The Cassini Jupiter flyby closest approach occurred on December 30, 2000 at a distance of 10 million km.



First Image PIA02666

<http://photojournal.jpl.nasa.gov/>

The first image was obtained on Oct 1, 2000 and the last on Mar 22, 2001 with IR and UV observations in the interval. Global mapping of Jupiter spanned a period from Oct 1-Dec 9, 2000, followed by a period of intense observations.

Observations were made of:

Jupiter
Rings
Io
Europa
Ganymede
Callisto



Last Image PIA03451

<http://photojournal.jpl.nasa.gov/>

Jupiter Observations

The Cassini Jupiter flyby spanned the interval from Sept 26 2000-Jan 15 2001. Targeted Jupiter data was near closest approach ([see log](#))

Observations were made by:

CIRS - Composite Infrared Spectrometer
see volume [cocirs_0306](#)

ISS - Imaging Science Subsystem
see Imaging Node [QuickSearch](#)

UVIS - Ultraviolet Imaging Spectrograph
see volumes [couvis_0001](#) & [couvis_0002](#)

VIMS – Visual and Infrared Mapping Spectrometer
see Imaging Node [QuickSearch](#)



Cassini Image PIA04866.jpg
<http://photojournal.jpl.nasa.gov/>

Additional Assistance is available at the [Rings Node](#)

A [log](#) of “as planned” observations during the intense period of observations

Data Types

Raw – for all 4 instruments

Reduced - CIRS

Higher Order Products – ISS – A dynamical map sequence

????Conditionally on line at ????

Jupiter Observing Log

Activity	UTC			UTC			SCET Start Time	SCET End Time
	Start Time	Year	DOY	End Time	Year	DOY		
ISS_C23JU_6ATM2X2085	2000	330	5:03:00	2000	330	13:48:36	975128580	975160116
ISS_C23JU_18ATM2X2097	2000	331	20:55:00	2000	333	1:40:36	975272100	975375636
ISS_C23JU_6ATM2X2091	2000	331	0:59:00	2000	331	9:44:36	975200340	975231876
ISS_C23JU_6ATM2X2115	2000	333	12:51:00	2000	333	21:36:36	975415860	975447396
ISS_C23JU_6ATM2X2121	2000	334	8:47:00	2000	334	17:32:36	975487620	975519156
ISS_C23JU_6ATM2X2127	2000	335	4:43:00	2000	335	13:28:36	975559380	975590916
ISS_C23JU_18ATM2X2139	2000	336	20:35:00	2000	338	1:20:36	975702900	975806436
ISS_C23JU_6ATM2X2133	2000	336	0:39:00	2000	336	9:24:36	975631140	975662676
ISS_C23JU_6ATM2X2157	2000	338	12:31:00	2000	338	21:16:36	975846660	975878196
ISS_C23JU_6ATM2X2163	2000	339	8:27:00	2000	339	17:12:36	975918420	975949956
ISS_C23JU_18ATM2X2181	2000	341	20:15:00	2000	343	1:00:36	976133700	976237236
ISS_C23JU_6ATM2X2175	2000	341	0:19:00	2000	341	9:04:36	976061940	976093476
ISS_C23JU_6ATM2X2199	2000	343	12:11:00	2000	343	20:56:36	976277460	976308996
ISS_C23JU_6ATM2X2205	2000	344	8:07:00	2000	344	16:52:36	976349220	976380756
VIMS_C23JU_ORISBLK1001	2000	345	20:00:00	2000	346	2:00:00	976478400	976500000
ISS_C23RI_RMOV000	2000	346	13:30:00	2000	348	4:38:00	976541400	976682280
UVIS_C23JU_AURORA001	2000	349	20:00:00	2000	350	7:15:00	976824000	976864500
CIRS_C23JU_NSMAP001	2000	351	19:30:00	2000	352	7:30:00	976995000	977038200
CIRS_C23JU_NSMAP002	2000	354	19:00:00	2000	355	14:15:00	977252400	977321700
CIRS_C23JU_NSMAP003	2000	356	3:00:00	2000	356	22:45:00	977367600	977438700
CIRS_C23JU_FEATURE002	2000	358	22:55:00	2000	359	1:25:00	977612100	977621100
CIRS_C23JU_FEATURE001	2000	358	17:50:00	2000	358	22:50:00	977593800	977611800
CIRS_C23JU_NSMAP004	2000	359	2:00:00	2000	359	10:59:00	977623200	977655540
CIRS_C23JU_NSMAP005	2000	359	22:00:00	2000	360	16:47:00	977695200	977762820
ISS_C23JU_ATMPHOTA	2000	361	21:20:00	2000	361	23:00:00	977865600	977871600
ISS_C23JU_ATMPHOTB	2000	363	11:15:00	2000	363	12:00:00	978002100	978004800
CIRS_C23JU_FEATURE003	2000	363	2:15:00	2000	363	7:15:00	977969700	977987700
ISS_C23JU_PORTRAIT000	2000	364	3:00:00	2000	364	6:45:00	978058800	978072300
CIRS_C23JU_FEATURE004	2000	365	20:00:00	2000	366	1:00:00	978206400	978224400
ISS_C23JU_ATMOS02A000	2000	366	17:37:00	2001	1	13:08:00	978284220	978354480
CIRS_C23JU_FEATURE005	2001	2	6:00:00	2001	2	11:00:00	978415200	978433200
ISS_C23JU_ATMOS02B000	2001	4	15:37:00	2001	5	11:08:00	978622620	978692880
UVIS_C23ST_OCCULT001	2001	7	5:00:00	2001	7	10:00:00	978843600	978861600
CIRS_C23JU_FEATURE006	2001	7	11:00:00	2001	7	16:00:00	978865200	978883200
UVIS_C23JU_HSTAUR001	2001	8	6:00:00	2001	9	2:00:00	978933600	979005600
ISS_C23JU_ATMOS02C000	2001	9	19:23:42	2001	10	10:02:44	979068222	979120964
ISS_C23JU_ATMOS02D000	2001	11	0:09:57	2001	11	14:48:59	979171797	979224539
UVIS_C23JU_HSTAUR002	2001	13	6:00:00	2001	14	2:00:00	979365600	979437600

Ganymede Observations

The Cassini Jupiter flyby spanned the interval from Sept 26 2000-Jan 15 2001. Targeted Ganymede data was near closest approach ([see log](#))

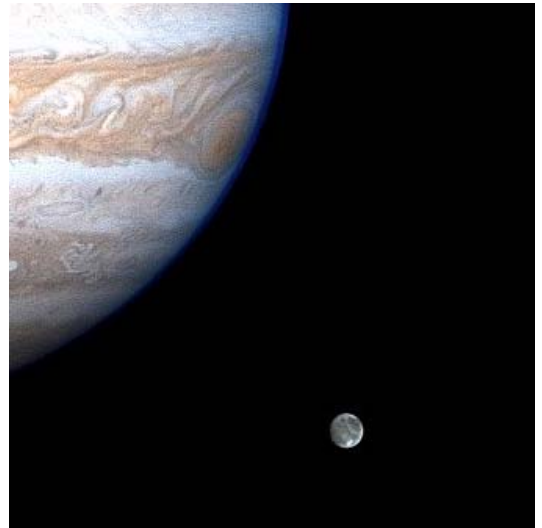
Observations were made by:

CIRS - Composite Infrared Spectrometer
see volume [cocirs_0306](#)

ISS - Imaging Science Subsystem
see Imaging Node [QuickSearch](#)

UVIS - Ultraviolet Imaging Spectrograph
see volumes [couvis_0001](#) & [0002](#)

VIMS – Visual and Infrared Mapping Spectrometer
see Imaging Node [QuickSearch](#)



Cassini Image
<http://ciclops.org>

Additional Assistance is available at the [Rings Node](#)

A [log](#) of “**as planned**” observations during the intense period of observations

Data Types

- Raw – for all 4 instruments
- Reduced - CIRS

Ganymede Observing Log

Description	UTC Start Time			UTC End Time			SCET Start	SCET End
	Year	DOY	hh:mm:ss	Year	DOY	hh:mm:ss	Time	Time
VIMS_C23GA_GAN1X1001	2000	356	2:00:00	2000	356	2:15:00	977364000	977364900
VIMS_C23GA_GAN1X1002	2000	361	5:20:00	2000	361	6:00:00	977808000	977810400
VIMS_C23GA_GAN1X1003	2000	362	17:05:00	2000	362	17:50:00	977936700	977939400
ISS_C23GA_GAECLPSA	2000	363	7:30:00	2000	363	10:25:00	977988600	977999100
VIMS_C23GA_GAN1X1004	2000	364	6:45:00	2000	364	7:30:00	978072300	978075000
VIMS_C23GA_GANLO001	2001	2	12:00:00	2001	2	12:45:00	978436800	978439500
VIMS_C23GA_GAN1X1005	2001	6	12:45:00	2001	6	13:30:00	978785100	978787800
VIMS_C23GA_GANLO002	2001	10	9:45:00	2001	10	10:30:00	979119900	979122600
ISS_C23GA_GAECLPSB	2001	11	15:30:00	2001	11	18:30:00	979227000	979237800

Welcome to Cassini

Jupiter Flyby

Mission Definition

Specific Bodies

Fields & Particles

Apoapse
Parameters
Periapse
Parameters
Orbital inclination
Ring Plane
Crossings
Dust Hazards
Occultations
Tour Plan(s)

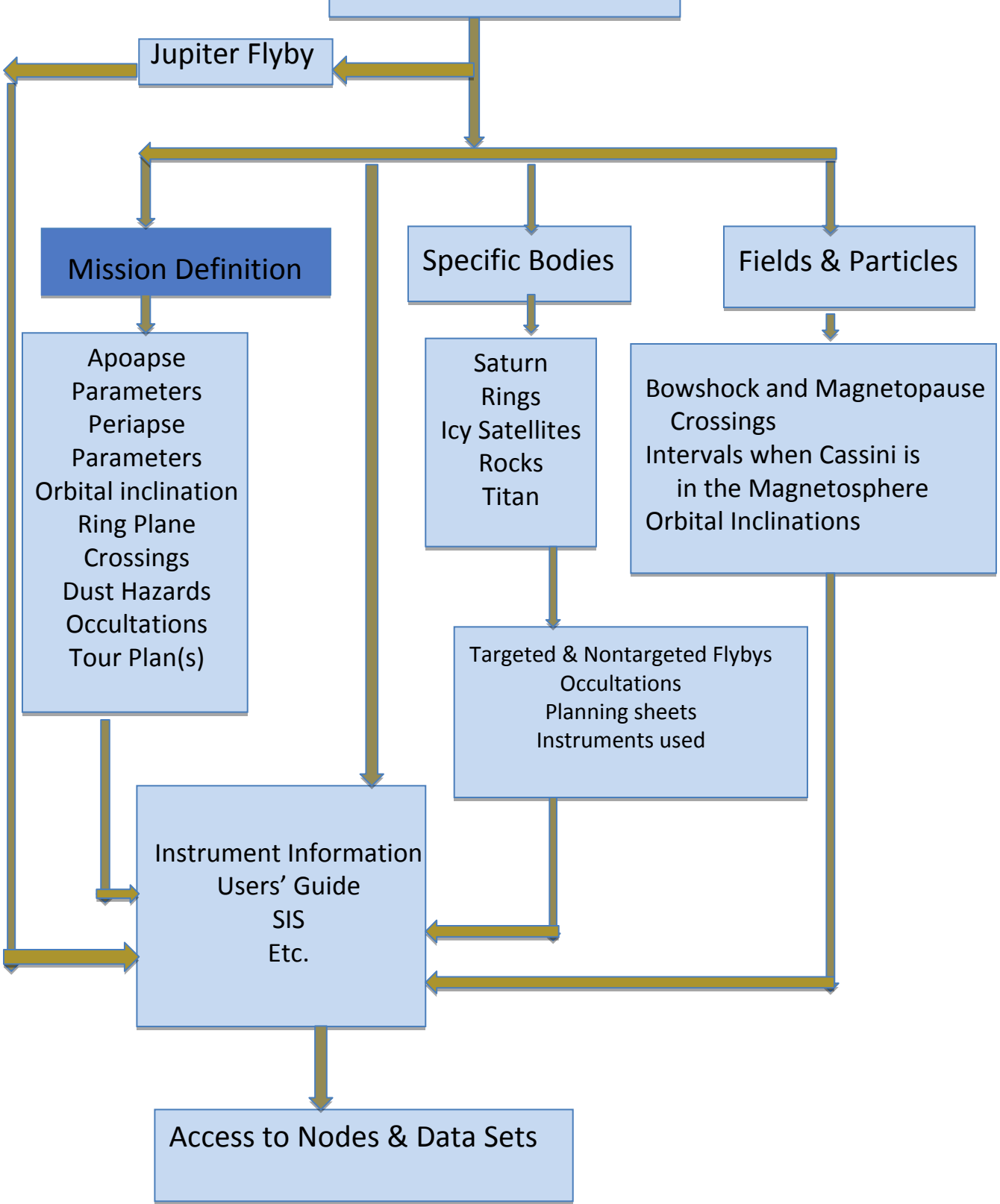
Saturn
Rings
Icy Satellites
Rocks
Titan

Bowshock and Magnetopause
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Intervals when Cassini is
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Orbital Inclinations

Targeted & Nontargeted Flybys
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Access to Nodes & Data Sets



Welcome to the Cassini Archive Page



PRIME

Mar 14, 2004 – July 1, 2008
S01 – S41

100% complete



July 1, 2008 – Oct. 11, 2010
S42 – S63

100% complete



Oct. 11, 2010 – Sept. 15, 2017
S64 – S101

**1st installment delivered
October 1, 2011**

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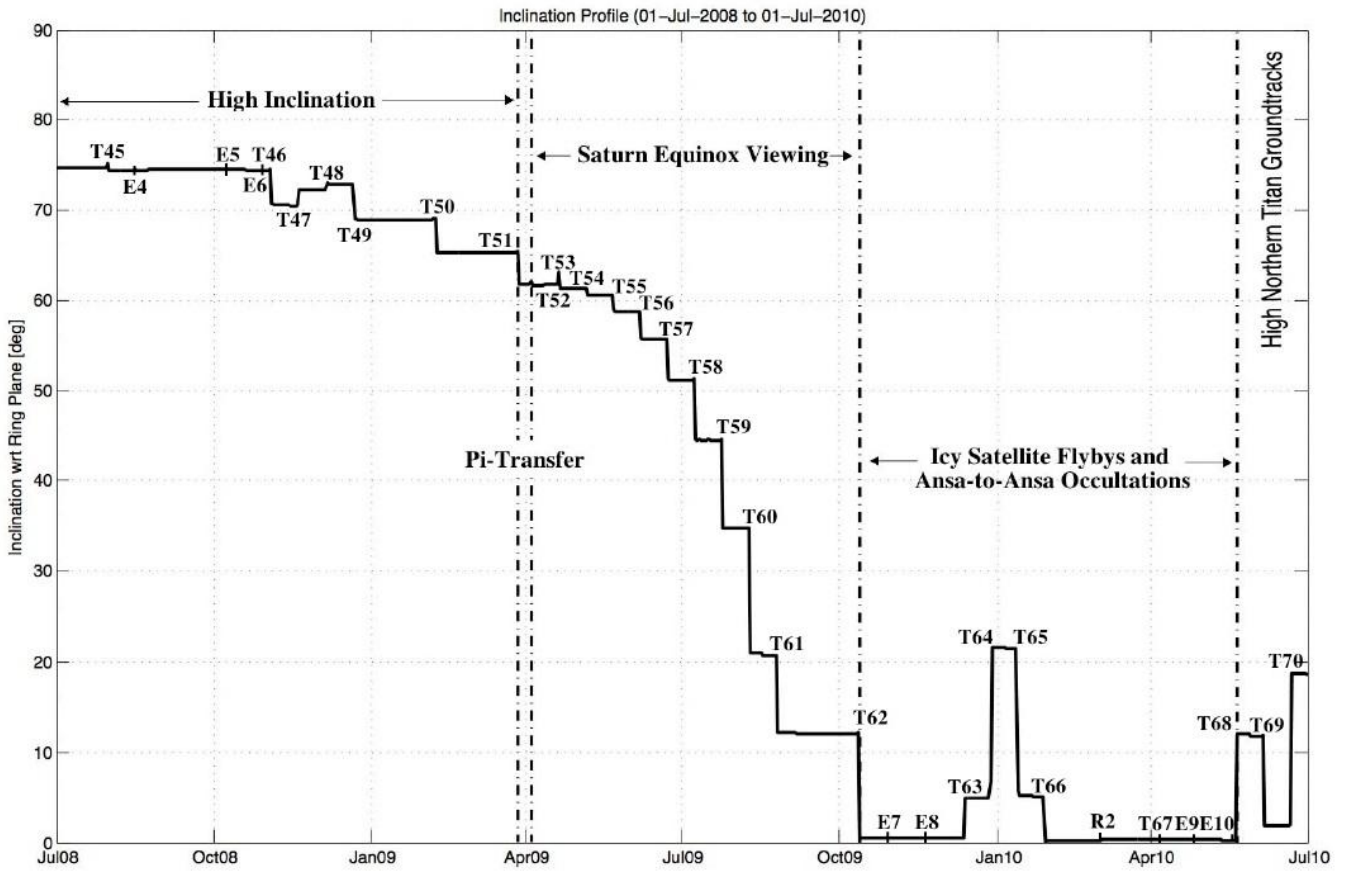
Organization of The Cassini Mission. The mission is divided into 4 phases: the Cruise Phase (including the [Jupiter Flyby](#) Dec 2000-Jan 2001), the Prime Mission, the Equinox Mission and the Solstice Mission. Data from all phases are stored sequentially in the PDS. Tables of times of [apoapses](#) and [periapses](#), [inclination](#) plots, times of [ring-plane](#) crossings, dust [hazards](#) and dust crossings, Sun and Earth occultations for [Saturn](#), [Rings](#), [Titan](#) and [Enceladus](#) and times of [conjunction](#) will help you scope the mission.

Cassini Tour of Events Summary

Apoapse Parameters

Rev	Epoch (SCET)	Date	Inclination (deg)	Range (Rs)
A	2004-240T08:57	Aug27	17.6	150.76
B	2004-326T08:41	Nov21	13.8	78.09
C	2004-366T07:02	Dec31	5.3	59.651
3	2005-032T03:26	Feb01	5.2	59.25
4	2005-058T06:20	Feb27	0.4	44.303
5	2005-078T17:35	Mar19	0.2	44.39
6	2005-096T23:32	Apr06	7.4	37.956
7	2005-113T23:30	Apr23	21.7	40.629
8	2005-132T03:52	May12	21.9	40.608
9	2005-150T08:21	May30	21.9	40.626
10	2005-168T13:12	Jun17	21.8	40.663
11	2005-186T18:57	Jul05	21.8	40.748
12	2005-205T01:57	Jul24	21.8	40.827
13	2005-223T08:29	Aug11	21.9	40.691
14	2005-240T12:02	Aug28	15.6	37.798
15	2005-257T16:50	Sep14	0.3	41.471
16	2005-275T23:34	Oct02	0.3	41.173
17	2005-294T00:00	Oct21	0.4	40.697
18	2005-317T04:57	Nov13	0.4	55.088
19	2005-345T04:27	Dec11	0.4	53.563
20	2006-005T14:09	Jan05	0.4	48.276
21	2006-036T20:58	Feb05	0.4	68.151
22	2006-068T03:35	Mar09	0.4	48.363
23	2006-099T10:05	Apr09	0.4	68.25
24	2006-130T16:31	May10	0.4	48.416
25	2006-161T23:07	Jun10	0.4	68.286
26	2006-193T05:18	Jul12	0.4	48.376
27	2006-216T21:22	Aug04	14.9	48.96
28	2006-240T19:16	Aug28	14.9	48.821
29	2006-260T17:10	Sep17	24.5	37.571
30	2006-276T19:04	Oct03	37.6	36.521
31	2006-292T22:17	Oct19	46.6	34.98
32	2006-307T00:05	Nov03	55	28.836
33	2006-318T23:31	Nov14	55	28.779
	ECT			

EXTENDED MISSION TRAJECTORY (EQUINOX MISSION)



Welcome to Cassini

Jupiter Flyby

Mission Definition

Specific Bodies

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Apoapse
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Parameters
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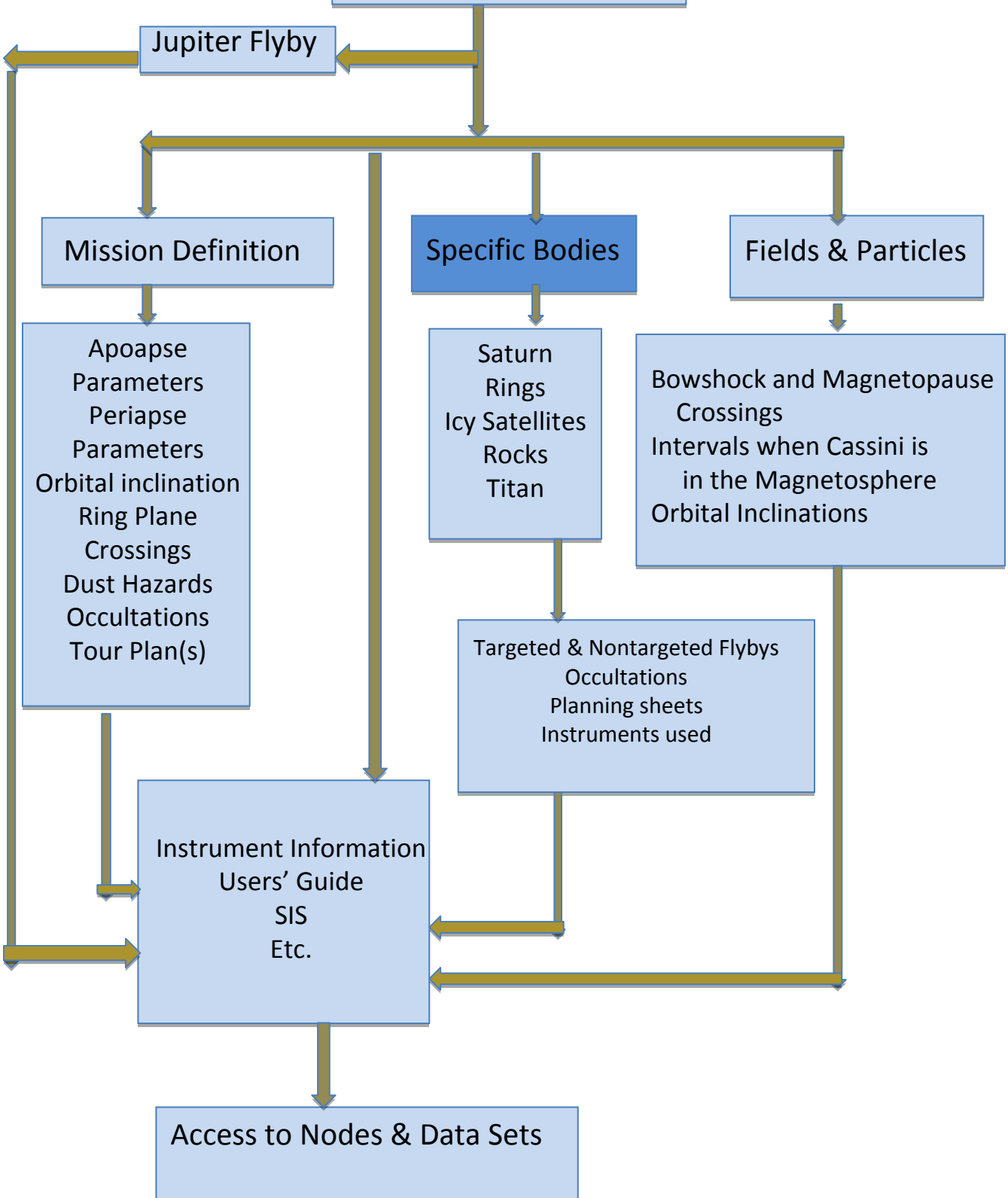
Saturn
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Access to Nodes & Data Sets



Specific Saturnian Bodies

SATURN

RINGS

TITAN

Icy Satellites

PHOEBE

ENCELADUS

HYPERION

IAPETUS

MIMAS

RHEA

THETHYS

DIONE

Small Satellites (rocks)

AEGAEON

ATLAS

CALYPSO

DAPHNIS

EPIMETHEUS

HELENE

JANUS

METHONE

PALLENE

PAN

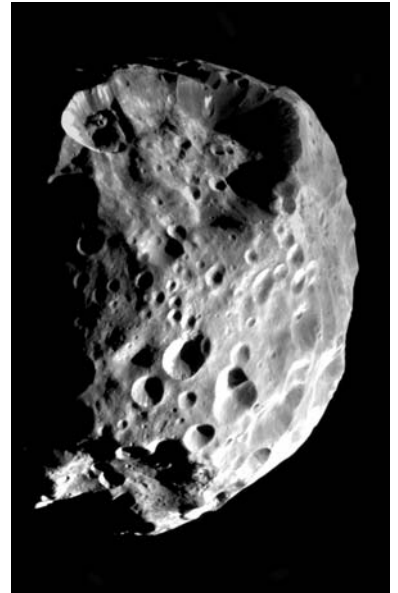
PANDORA

POLYDEUCES

TELESTO

Phoebe Observations

Cassini encountered Phoebe on approach to Saturn. Data was obtained from June 11 4:40 to June 12 11:26, 2004 ([observing log](#)). (day 163-4, 2004)



Observations were made by:

[CIRS](#) - Composite Infrared Spectrometer

[ISS](#) - Imaging Science Subsystem

[UVIS](#) - Ultraviolet Imaging Spectrograph

[VIMS](#) – Visual and Infrared Mapping Spectrometer

Image PIA06064.jpg
<http://photojournal.jpl.nasa.gov/>

Data types

[Raw](#) - description

[Reduced](#) - ????????

[Higher Order Products](#) - ????????

Note—The data type pages would be formulated in close conjunction with the appropriate nodes. You can find the data associated with a body, download the table (see Phoebe_S1 - a table of “as-planned”— we would like “as-flown) and slice and dice it and then go to the instrument page or data set --. Every effort will be made to access material that is already on line in the PDS.

Phoebe Observing Log (As Planned)

Request	Start Time	Duration	Data	
			Volume	SPASS Type
CIRS_000PH_FP13LTCRV004_PRIME	2004-163T04:40:00	000T00:43:00	0	Prime
UVIS_000PH_ICYMAP003_RIDER	2004-163T04:40:00	000T08:38:00	49.88	Rider
CIRS_000PH_LOWRES0001_ISS	2004-163T05:23:00	000T00:16:00	3.84	Rider
ISS_000PH_LOWRES0001_PRIME	2004-163T05:23:00	000T00:16:00	7.17	Prime
CIRS_000PH_FP13LTCRV005_PRIME	2004-163T05:39:00	000T02:52:00	41.28	Prime
CIRS_000PH_LOWRES1A001_ISS	2004-163T08:31:00	000T00:16:00	3.84	Rider
ISS_000PH_LOWRES1A001_PRIME	2004-163T08:31:00	000T00:16:00	6.69	Prime
CIRS_000PH_FP13LTCRV006_PRIME	2004-163T08:47:00	000T00:31:00	7.44	Prime
VIMS_000PH_PHOEBE031_CIRS	2004-163T08:47:00	000T00:31:00	7.3	Rider
CIRS_000PH_LOWRES1B001_ISS	2004-163T09:18:00	000T00:16:00	3.84	Rider
ISS_000PH_LOWRES1B001_PRIME	2004-163T09:18:00	000T00:16:00	32.65	Prime
VIMS_000PH_PHOEBE047_ISS	2004-163T09:18:00	000T00:16:00	5.48	Rider
CIRS_000PH_FP13LTCRV007_PRIME	2004-163T09:34:00	000T00:31:00	7.44	Prime
VIMS_000PH_PHOEBE033_CIRS	2004-163T09:34:00	000T00:31:00	7.3	Rider
CIRS_000PH_LOWRES1C001_ISS	2004-163T10:05:00	000T00:16:00	3.84	Rider
ISS_000PH_LOWRES1C001_PRIME	2004-163T10:05:00	000T00:16:00	6.69	Prime
VIMS_000PH_PHOEBE046_ISS	2004-163T10:05:00	000T00:16:00	5.48	Rider
CIRS_000PH_FP13LTCRV008_PRIME	2004-163T10:21:00	000T00:31:00	7.44	Prime
VIMS_000PH_PHOEBE008_CIRS	2004-163T10:21:00	000T00:31:00	8.76	Rider
CIRS_000PH_LOWRES1D001_ISS	2004-163T10:52:00	000T00:16:00	3.84	Rider
ISS_000PH_LOWRES1D001_PRIME	2004-163T10:52:00	000T00:16:00	32.7	Prime
VIMS_000PH_PHOEBE045_ISS	2004-163T10:52:00	000T00:16:00	5.48	Rider
RADAR_000PH_REUBITS001_RIDER	2004-163T11:03:37	000T04:31:00	3.74	Non-SPASS
RADAR_000PH_WARMDAT002_RIDE	2004-163T11:03:37	000T03:00:00	2.76	Rider
CIRS_000PH_FP13LTCRV009_PRIME	2004-163T11:08:00	000T00:31:00	7.44	Prime
VIMS_000PH_PHOEBE036_CIRS	2004-163T11:08:00	000T00:31:00	8.76	Rider
CIRS_000PH_LOWRES1E001_ISS	2004-163T11:39:00	000T00:16:00	3.84	Rider
ISS_000PH_LOWRES1E001_PRIME	2004-163T11:39:00	000T00:16:00	6.74	Prime
VIMS_000PH_PHOEBE044_ISS	2004-163T11:39:00	000T00:16:00	5.48	Rider
CIRS_000PH_FP13LTCRV010_PRIME	2004-163T11:55:00	000T00:31:00	7.44	Prime
VIMS_000PH_PHOEBE038_CIRS	2004-163T11:55:00	000T00:31:00	8.76	Rider
CIRS_000PH_LOWRES1F001_ISS	2004-163T12:26:00	000T00:16:00	3.84	Rider
ISS_000PH_LOWRES1F001_PRIME	2004-163T12:26:00	000T00:16:00	32.78	Prime
VIMS_000PH_PHOEBE043_ISS	2004-163T12:26:00	000T00:16:00	5.48	Rider
CIRS_000PH_FP13LTCRV011_PRIME	2004-163T12:42:00	000T00:31:00	7.44	Prime
VIMS_000PH_PHOEBE040_CIRS	2004-163T12:42:00	000T00:31:00	8.76	Rider
CIRS_000PH_LOWRES1G001_ISS	2004-163T13:13:00	000T00:05:00	1.2	Rider
ISS_000PH_LOWRES1G001_PRIME	2004-163T13:13:00	000T00:05:00	6.79	Prime
VIMS_000PH_PHOEBE042_ISS	2004-163T13:13:00	000T00:05:00	1.83	Rider
ETC				

Helene Observations

Helene is a co-orbital satellite that is located in Dione's leading L4 location .

It's dimensions are 43.4 X 38.2 X 26 km.

Considerable coverage has been obtained, with more opportunities in the Solstice mission. See [Tour Event Summary](#).

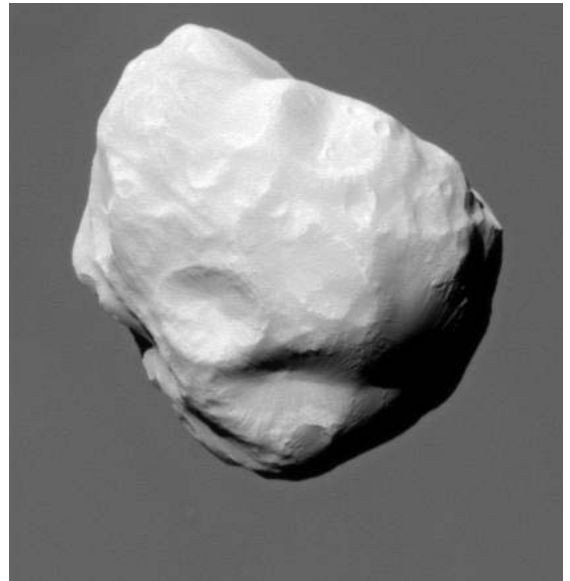


Image PIA12723.jpg
<http://photojournal.jpl.nasa.gov/>

Observations were made by:

CIRS - Composite Infrared Spectrometer

ISS - Imaging Science Subsystem

UVIS - Ultraviolet Imaging Spectrograph

VIMS – Visual and Infrared Mapping Spectrometer

HELENE - CASSINI TOUR EVENT SUMMARY

110818 Reference Trajectory V4

Rev	Epoch (SCET)	Date	Range(km)	Flyby Velocity (km/sec)	Phase (deg)	Comment
4	2005-068T04:33	Mar09	74490.5	6.5	67.0	Inbound
7	2005-122T19:19	May02	114174.6	9.9	107.0	Inbound
18	2005-331T14:37	Nov27	86435.4	5.5	87.0	Outbound
19	2005-359T01:45	Dec25	74718.3	5.4	90.0	Outbound
21	2006-056T04:48	Feb25	67546.3	7.1	92.0	Inbound
27	2006-229T03:29	Aug17	48728.2	7.7	122.0	Outbound
48	2007-201T17:18	Jul20	38261.9	4.7	55.0	Inbound
51	2007-297T00:33	Oct24	23943.1	7.7	76.0	Inbound
94	2008-329T08:27	Nov24	65571.0	14.3	14.0	Inbound
121	2009-324T22:04	Nov20	82627.3	6.6	105.0	Inbound
122	2009-343T22:28	Dec09	31766.1	9.6	73.0	Inbound
127	2010-062T13:41	Mar03	1856.2	9.1	106.0	Outbound
132	2010-154T00:39	Jun03	114183.0	11.7	85.0	Inbound
144	2011-031T10:17	Jan31	27644.1	7.5	92.0	Outbound
147	2011-107T13:39	Apr17	69498.4	5.2	81.0	Outbound
149	2011-169T19:32	Jun18	6972.3	4.6	102.0	Inbound
150	2011-191T10:46	Jul10	92958.0	5.6	40.0	Inbound
151	2011-213T00:39	Aug01	76572.3	9.6	129.0	Inbound
157	2011-327T21:05	Nov23	103250.1	11.4	134.0	Inbound
159	2012-004T05:38	Jan04	42191.9	8.1	112.0	Inbound
162	2012-069T18:49	Mar09	109820.5	11.6	121.0	Inbound
164	2012-105T09:37	Apr14	104848.6	11.5	121.0	Inbound
169	2012-204T21:21	Jul22	110967.7	6.0	91.0	Inbound
213	2015-073T11:09	Mar14	58238.0	5.4	80.0	Inbound
220	2015-230T08:33	Aug18	113493.0	9.4	46.0	Outbound
221	2015-252T04:53	Sep09	82941.2	8.6	45.0	Outbound
223	2015-287T20:59	Oct14	117105.0	6.0	102.0	Outbound
224	2015-301T19:26	Oct28	78794.5	11.1	77.0	Outbound
244	2016-277T21:56	Oct03	106506.7	12.5	128.0	Inbound

Titan Observations

Titan was systematically targeted throughout the Cassini mission.

Observations have been planned to span the period from July 2, 2004 to Apr 22, 2017. Tables are available containing information concerning targeted and non-targeted **flyby**, solar and earth **occultations** and graphics presenting information concerning observational sequences for the **prime**, **equinox** and **solstice** missions.

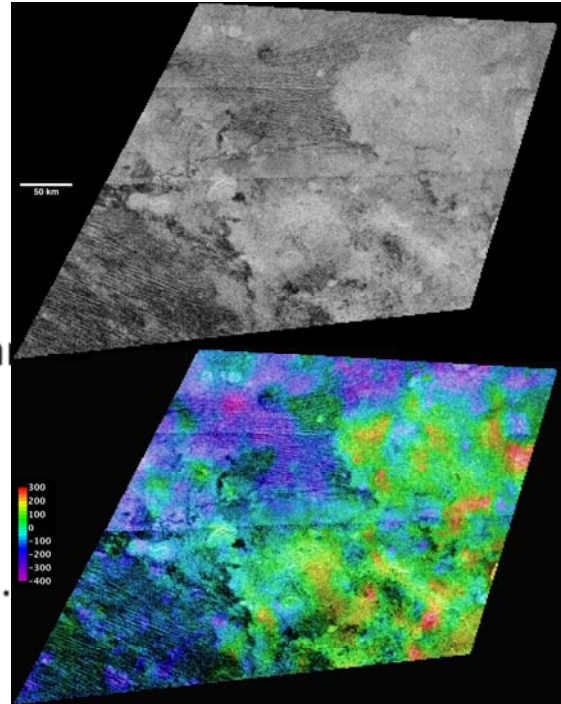


Image PIA11829.jpg
<http://photojournal.jpl.nasa.gov/>

Observations were made by:

CIRS - Composite Infrared Spectrometer

INMS – Ion and Neutral Mass Spectrometer

ISS - Imaging Science Subsystem

Radar - a Radar instrument

RSS – Radio Science

UVIS - Ultraviolet Imaging Spectrograph

VIMS - Visual and Infrared Mapping Spectrometer

Sun & Earth Occultations of Titan

CASSINI TOUR EVENT SUMMARY | 110818 Reference Trajectory | v4- Titan

Rev	Name	Epoch (SCET)	Date	
B	Sun OCC	2004-348T11:52	Dec13	Egress = 2004-348T12:15 (23 min)
6	Earth OCC	2005-106T19:12	Apr16	Egress = 2005-106T19:18 (7 min)
6	Sun OCC	2005-106T19:13	Apr16	Egress = 2005-106T19:20 (8 min)
17	Earth OCC	2005-301T04:24	Oct28	Egress = 2005-301T04:41 (17 min)
20	Earth OCC	2006-015T11:49	Jan15	Egress = 2006-015T12:03 (14 min)
20	Sun OCC	2006-015T11:50	Jan15	Egress = 2006-015T12:03 (13 min)
22	Sun OCC	2006-078T00:04	Mar19	Egress = 2006-078T00:19 (15 min)
22	Earth OCC	2006-078T00:06	Mar19	Egress = 2006-078T00:19 (14 min)
23	Sun OCC	2006-120T21:05	Apr30	Egress = 2006-120T21:21 (16 min)
23	Earth OCC	2006-120T21:11	Apr30	Egress = 2006-120T21:17 (7 min)
24	Sun OCC	2006-140T12:11	May20	Egress = 2006-140T12:24 (14 min)
24	Earth OCC	2006-140T12:12	May20	Egress = 2006-140T12:25 (14 min)
25	Sun OCC	2006-183T09:19	Jul02	Egress = 2006-183T09:34 (15 min)
25	Earth OCC	2006-183T09:20	Jul02	Egress = 2006-183T09:35 (15 min)
39	Earth OCC	2007-053T03:01	Feb22	Egress = 2007-053T03:17 (16 min)
39	Sun OCC	2007-053T03:01	Feb22	Egress = 2007-053T03:17 (16 min)
40	Earth OCC	2007-069T01:37	Mar10	Egress = 2007-069T01:52 (15 min)
40	Sun OCC	2007-069T01:37	Mar10	Egress = 2007-069T01:52 (16 min)
41	Sun OCC	2007-085T00:08	Mar26	Egress = 2007-085T00:25 (17 min)
41	Earth OCC	2007-085T00:09	Mar26	Egress = 2007-085T00:25 (16 min)
42	Sun OCC	2007-100T22:40	Apr10	Egress = 2007-100T22:59 (20 min)
42	Earth OCC	2007-100T22:41	Apr10	Egress = 2007-100T22:59 (18 min)
43	Sun OCC	2007-116T21:11	Apr26	Egress = 2007-116T21:33 (22 min)
43	Earth OCC	2007-116T21:12	Apr26	Egress = 2007-116T21:33 (21 min)
44	Sun OCC	2007-132T19:42	May12	Egress = 2007-132T20:08 (27 min)
44	Earth OCC	2007-132T19:44	May12	Egress = 2007-132T20:09 (25 min)
45	Sun OCC	2007-148T18:09	May28	Egress = 2007-148T18:41 (32 min)
45	Earth OCC	2007-148T18:10	May28	Egress = 2007-148T18:42 (32 min)
46	Earth OCC	2007-164T17:02	Jun13	Egress = 2007-164T17:41 (40 min)
ETC.				

Titan Planning Summary – Primary Mission

TIMING										REFERENCE TRAJECTORY 060323																				Orbit																						
Flt/By	REV	SEC	Date	CIA Time	gms	Alt	Inbound to c/a (hours)																				Outbound from c/a (hours)																				Bound	Dec-Hr	(deg)	Flt/By		
	sz		3-Jul-04	300715:20:33	341500	1174																																									IN	11.00	38.8	TA		
	sz		26-Oct-04	340715:20:33	1403	1174																																									IN	11.00	38.8	TA		
	sz		13-Dec-04	348111:38:13	140	1192																																									IN	10.47	59.1	TB		
	sz		19-Jan-05	XXXXXX:XXXXXX	69003																																										IN	10.47	0.1	TC		
	sz		15-Feb-05	046706:54:23	438	1579																																									IN	10.33	29.9	T3		
	sz		1-Apr-05	091119:55:12	2404																																										Out	5.27	33.4	T4		
	sz		16-Apr-05	106719:11:42	201	1927																																									Out	5.27	74	T5		
	sz		22-Aug-05	234708:53:37	3660																																										Out	5.00	-59	T6		
	sz		7-Sep-05	250720:50:26	223	1675																																									IN	4.93	-67	T7		
	sz		28-Oct-05	301103:58:00	1583	1353																																									IN	9.27	1.2	T8		
	sz		26-Dec-05	360718:54:15	10411																																										Out	3.00	-0.2	T9		
	sz		17-Jan-06	015114:11:27	2043																																										IN	UV	8.47	0.1	T10	
	sz		27-Feb-06	058708:25:10	1412																																										Out	1.13	0	T11		
	sz		19-Mar-06	078700:05:57	233	1549																																									IN	R	6.40	0.1	T12	
	sz		30-Apr-06	120220:53:31	1856																																										Out	U	23.13	0.1	T13	
	sz		24-May-06	250720:12:04	406	1000																																									IN	R	4.40	0.1	T14	
	sz		2-Jul-06	183709:12:10	1806																																										IN	Out	21.20	-0.4	T15	
	sz		22-Jul-06	203700:25:13	370	950																																									IN	U	2.40	85.2	T16	
	sz		26-Sep-06	250720:12:04	406	1000																																									IN	V	2.27	1	T17	
	sz		23-Sep-06	266718:58:40	323	960																																									IN	2.27	1	T18		
	sz		9-Oct-06	282717:23:23	338	890																																									IN	2.20	1	T19		
	sz		25-Oct-06	238715:58:07	236	1030																																									IN	2.13	1	T20		
	sz		12-Dec-06	346714:41:31	326	1000																																									IN	U	2.00	1	T21	
	sz		28-Dec-06	362710:05:22	1297																																										IN	1.93	1	T22		
	sz		13-Jan-07	013708:34:00	368	1000																																									IN	U	1.93	30.5	T23	
	sz		29-Jan-07	029707:15:50	2631																																										IN	V	1.87	32.8	T24	
	sz		22-Feb-07	053703:10:50	1030	1000																																									Out	13.80	1	T25		
	sz		10-Mar-07	069701:47:22	447	961																																									Out	UV	13.80	HM	T26	
	sz		28-Mar-07	085700:21:52	670	1010																																									Out	R	13.73	1	T27	
	sz		10-Apr-07	100722:58:00	312	991																																									Out	13.67	HM	50.4	T28	
	sz		26-Apr-07	116721:32:52	340	981																																									Out	13.67	1	T29		
	sz		12-May-07	132720:08:11	480	959																																									Out	13.60	HM	88.9	T30	
	sz		28-May-07	148718:51:27	2299																																										Out	R	13.60	76.8	T31	
	sz		13-Jun-07	164717:47:57	500	965																																									Out	UV	13.53	HM	84.5	T32
	sz		29-Jun-07	180716:59:46	1932																																										Out	13.53	8.1	T33		
	sz		19-Jul-07	200700:39:58	368	1832																																									IN	18.80	1	T34		
	sz		31-Aug-07	243708:34:25	3324																																										Out	UV	11.53	63.5	T35	
	sz		2-Oct-07	275704:49:50	290	973																																									Out	11.47	-60	T36		
	sz		19-Nov-07	329700:52:51	341.6	999																																									Out	11.40	-22	T37		
	sz		5-Dec-07	339700:07:37	1588																																										Out	11.40	-79	T38		
	sz		20-Dec-07	354722:56:41	334	970																																									Out	11.33	-70	T39		
	sz		5-Jan-08	005721:26:24	329.9	1014																																									Out	UV	11.33	-12	T40	
	sz		22-Feb-08	053717:39:08	850.3	1000																																									Out	U	11.20	-35	T41	
	sz		25-Mar-08	085714:36:12	373.2	999																																									Out	11.13	-27	T42		
	sz		12-May-08	133710:09:50	237.5	1001																																									Out	11.00	17.1	T43		
	sz		28-May-08	149708:33:21	891.3	1400																																									Out	10.93	12.4	T44		
Total Hydrazine Use	14628.03				UP Predict																																										Earth <td>R <td>INMS <td>I <td>Flank</td> </td></td></td>	R <td>INMS <td>I <td>Flank</td> </td></td>	INMS <td>I <td>Flank</td> </td>	I <td>Flank</td>	Flank	
Average hydrazine use :	428				As-Found																																										Solar <td>UV <td>+MAG</td> <td>+M</td> <td>Flank</td> </td>	UV <td>+MAG</td> <td>+M</td> <td>Flank</td>	+MAG	+M	Flank	
																																															Solar <td>UV <td>+MAG</td> <td>+M</td> <td>Flank</td> </td>	UV <td>+MAG</td> <td>+M</td> <td>Flank</td>	+MAG	+M	Flank	

Please direct questions or comments regarding this Summary to Kim Steadman (43-2403)

Titan Planning Summary Inset – Primary Mission

TIMING										REFERENCE TRA																					
		RANGE (KM)		Angular Diameter (degrees)				290k		200k		140k		81k		81k															
								0.5		0.7		1.1		1.6		50-degree @ 1															
Flyby	REV	SOC	Date	GA Time	Hyd	Air	Inbound to aia (hours)																								
					gms		-22	-21	-20	-19	-18	-17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	1	2	3
T0		82	3-Jul-04			241000																									
TA	A	85	26-Oct-04	300T15:20:33	1253	1174																									
TB	B	86	13-Dec-04	348T11:38:13	140	1192																									
TC	C	87	13-Jan-05	XXXXXX:XX:XX		60003																									
T3		3	88	15-Feb-05	046T06:54:21	203	1079																								
T4		5	89	1-Apr-05	091T19:55:12		3404																								
T6		6	810	16-Apr-05	106T19:11:46	201	1027																								
T8		13	813	22-Aug-05	234T08:53:37		3600																								
T7		14	814	7-Sep-05	250T07:50:26	223	1076																								
T8		17	815	28-Oct-05	301T03:58:05	1263	1328																								
T8		19	817	26-Dec-05	360T18:54:15		10411																								
T10		20	817	15-Jan-06	015T11:41:27		2048																								
T11		21	818	27-Feb-06	058T08:25:15		1812																								
T12		22	819	19-Mar-06	078T00:05:57	230.3	1948																								
T13		23	820	30-Apr-06	130T20:53:31		1908																								
T14		24	820	20-May-06	140T12:18:12	349	1879																								
T16		25	821	2-Jul-06	183T09:12:15		1908																								
T16		26	822	22-Jul-06	203T00:25:13	379	860																								
T17		28	823	7-Sep-06	250T20:12:04	406	1000																								
T18		29	824	23-Sep-06	266T18:58:45	323	860																								
T18		30	824	9-Oct-06	282T17:23:24	235	860																								
T20		31	825	25-Oct-06	298T15:58:07	235	1000																								

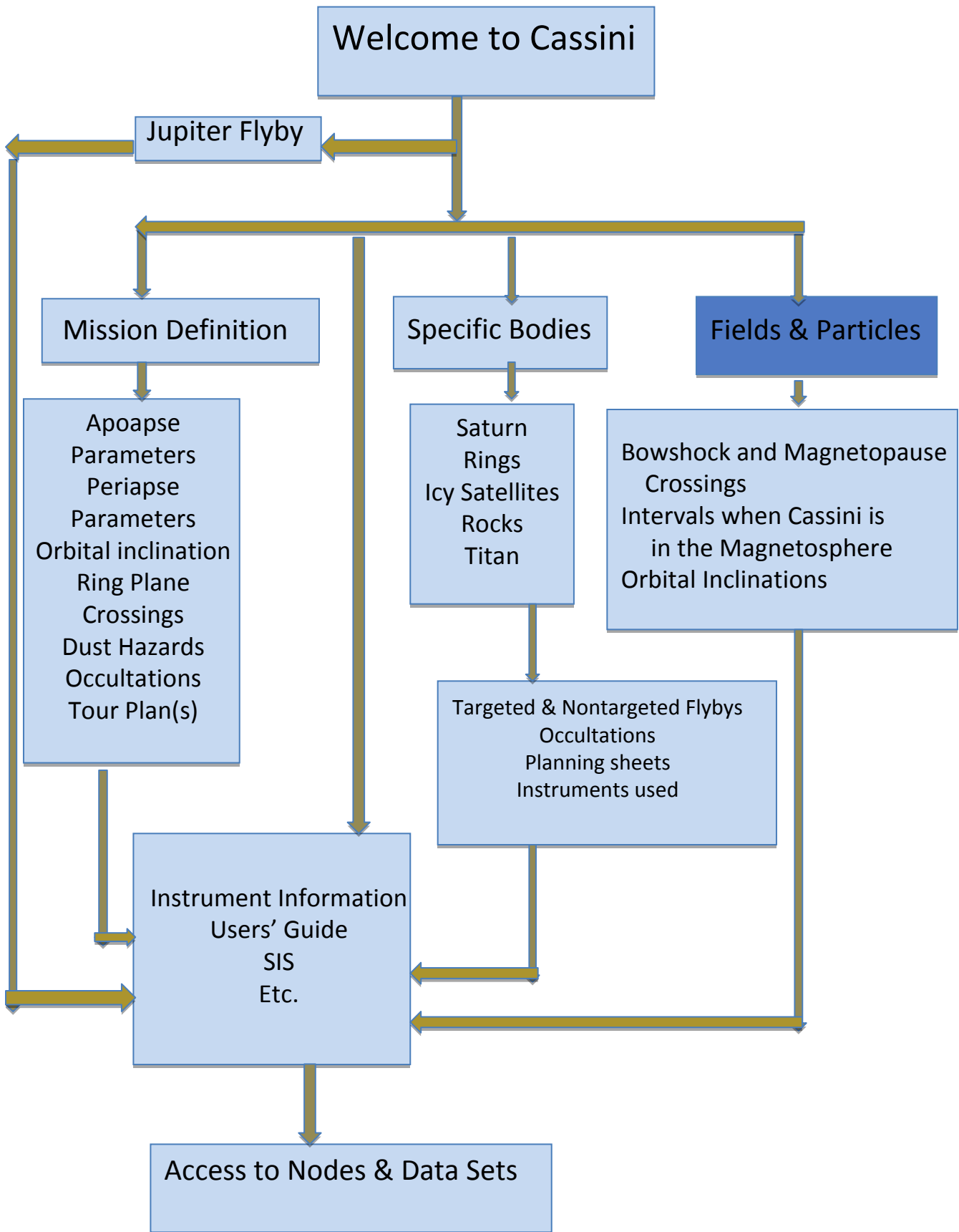
SOI Probe Release

Occultations / Magnetospheric Probe

"OR8 Option"

Titan Tour of Events Summary 110818 Reference Trajectory V4

Rev		Epoch (SCET)	Date	Range (km)	Flyby Velocity (km/sec)	Phase (deg)	Comment
A	(t) [TA]	2004-300T15:30	Oct26	1174	6.1	91	Inbound
B	(t) [TB]	2004-348T11:38	Dec13	1192.3	6.1	102	Inbound
C	(t) [TC]	2005-014T11:12	Jan14	60003.3	5.4	93	Inbound
3	(dt) [T3]	2005-046T06:58	Feb15	1579	6	99	Inbound
5	(t) [T4]	2005-090T20:05	Mar31	2403.5	5.9	66	Outbound
6	(t) [T5]	2005-106T19:12	Apr16	1027.4	6.1	127	Outbound
7	(nt)	2005-124T05:37	May04	864240.3	10.3	154	Outbound
9	(nt)	2005-157T19:05	Jun06	425570.4	5.8	83	Inbound
10	(nt)	2005-173T12:37	Jun22	920614.9	3.7	65	Inbound
10	(nt)	2005-177T07:10	Jun26	874592.4	7.7	111	Inbound
12	(nt)	2005-214T15:55	Aug02	939763.3	6.5	35	Outbound
12	(nt)	2005-218T12:33	Aug06	837687.8	3.8	62	Outbound
13	(t) [T6]	2005-234T08:54	Aug22	3660.2	5.9	44	Outbound
14	(dt) [T7]	2005-250T08:12	Sep07	1074.8	6.1	85	Outbound
15	(nt)	2005-267T22:47	Sep24	911727	10.7	149	Outbound
16	(nt)	2005-283T22:22	Oct10	776295.1	9.7	65	Inbound
17	(t) [T8]	2005-301T04:15	Oct28	1353	5.9	105	Inbound
19	(t) [T9]	2005-360T18:59	Dec26	10410.9	5.6	67	Outbound
20	(t) [T10]	2006-015T11:41	Jan15	2042.8	5.8	120	Inbound
21	(t) [T11]	2006-058T08:25	Feb27	1812	5.9	92	Outbound
22	(t) [T12]	2006-078T00:06	Mar19	1949.4	5.8	148	Inbound
23	(t) [T13]	2006-120T20:58	Apr30	1855.7	5.8	121	Outbound
24	(t) [T14]	2006-140T12:18	May20	1879.3	5.8	163	Inbound
25	(t) [T15]	2006-183T09:21	Jul02	1905.9	5.8	148	Outbound
26	(t) [T16]	2006-203T00:25	Jul22	949.9	6	105	Inbound
27	(nt)	2006-230T17:50	Aug18	339768.2	4.8	121	Outbound
28	(t) [T17]	2006-250T20:17	Sep07	999.5	6	45	Inbound
29	(t) [T18]	2006-266T18:59	Sep23	959.8	6	90	Inbound
30	(t) [T19]	2006-282T17:30	Oct09	979.7	6	81	Inbound
31	(t) [T20]	2006-298T15:58	Oct25	1029.5	6	75	Inbound
ETC							



Fields & Particles

1. Bowshock and Magnetopause Crossings

Working on this –There is part of this table in MAPS – Have contacted K.C. Hansen who is interacting with MAG to see if we can get an updated table.

2. Intervals when Cassini is in the Magnetosphere

If we get table 1. we can construct table 2.

3. Orbital Inclinations

Orbital inclination plots –[Primary](#), [Equinox](#) and [Solstice](#) Missions

[Apoapse](#) Table contains inclination and range

4. Times when Cassini is within 10 or 15 R_s

Sources of data for Jupiter Flyby

CIRS volume cocirs_0306 http://pds-atmospheres.nmsu.edu/cgi-bin/getdir.pl?volume=cocirs_0306&dir=DATA/APODSPEC

UVIS volumes

couvis_0001 http://pds-atmospheres.nmsu.edu/cgi-bin/getdir.pl?dir=index&volume=couvis_0001

couvis_0002 http://pds-atmospheres.nmsu.edu/cgi-bin/getdir.pl?dir=index&volume=couvis_0002

ISS and VIMS

Imaging QuickSearch - <http://pds-imaging.jpl.nasa.gov/search/search.html#QuickSearch>

Rings Node <http://pds-rings.seti.org/cassini/>