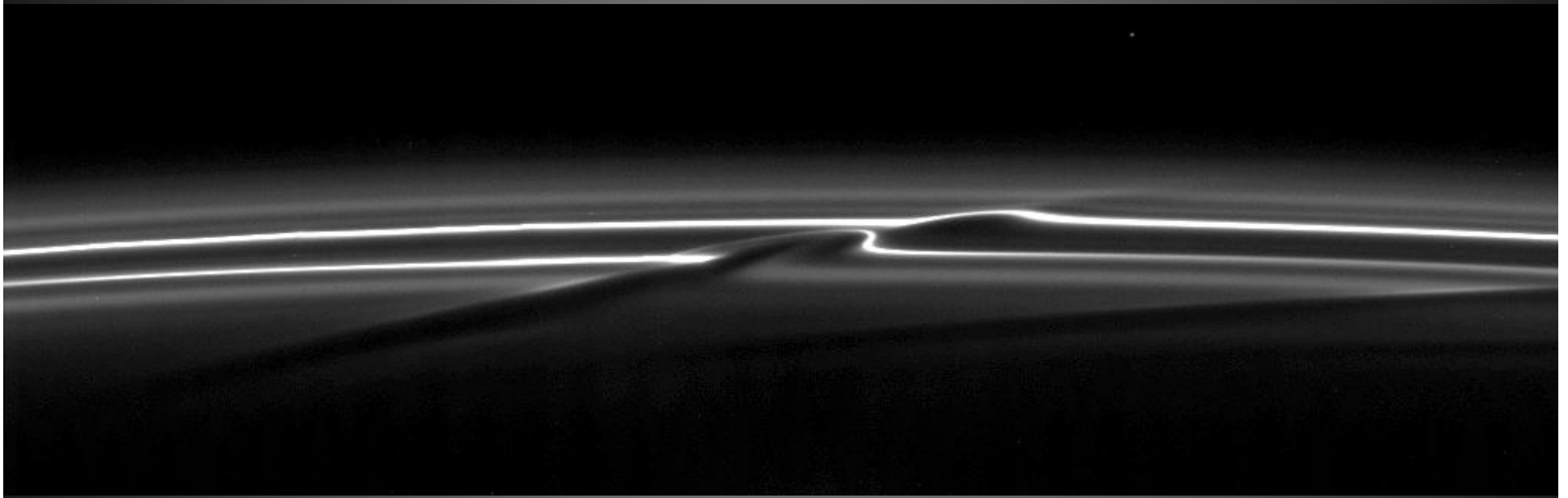


OPUS

Now with Enhanced Geometric Metadata for Cassini ORS Instruments



Mitch Gordon, Mark Showalter , Lisa Ballard, Neil Heather
PDS Rings Node, SETI Institute, Mountain View, CA

Rings Workshop 2014,

Laboratory of Atmospheric and Space Physics

The PDS Rings Node

Your first stop for

- Data
 - Tools
 - Information
-
- Unless you want
 - dust data (SBN)
 - Plasma, fields, particle data (PPI)

The screenshot shows a web browser window displaying the Planetary Rings Node website. The browser's address bar shows the URL `pds-rings.seti.org`. The website's header features a colorful image of a ringed planet and the title "Planetary Rings Node". A navigation sidebar on the left lists various categories such as "Rings Node Home", "Cassini News", "Ringed Planets", "Missions and Data", "Downloads", "Resources", and "Contacts". The main content area includes a search bar with a "Google Search" button and radio buttons for "Search the Rings Node" and "Search the Web". Below the search bar, there are several sections of text and links, including "OPUS - The Rings Node's Data Search Tool", "Research Proposal Support - ROSES 2014", "Ephemeris Tool Updates", "Visit our Enhanced Cassini Support page for links to:", and "Cassini Occultation Data Sets".

- Easy to find:
- Google pds rings

The Middle Part

- Research Proposal Support – ROSES 2014
 - CDAPS, PDART, SSW
- Enhanced Cassini Support
 - User's Guides
 - Geometric metadata
 - Browse product keys
 - Cassini occultation profiles

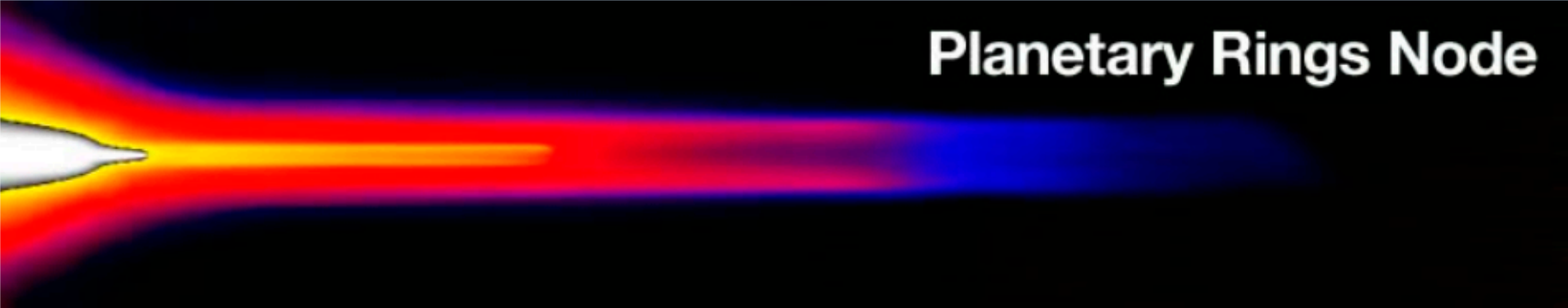
File Edit View History Bookmarks Tools Help

The Planetary Rings Node

pds-rings.seti.org

Rings Node TWC wx haines bsg wx lcl TWC bsg wx10 traffic orlando Google News Science Daily Space.com

Planetary Rings Node



Rings Node Home

Cassini News

Cassini Mission (JPL)
Press Release Images
Data and Information

Ringed Planets

Jupiter
Saturn
Uranus
Neptune

Missions and Data

Data Search . . .

The **Rings Node** of [NASA's Planetary Data System](#) is devoted to archiving, cataloging, and distributing scientific data sets relevant to planetary ring systems.

Google

Search the Rings Node Search the Web

OPUS - The Rings Node's Data Search Tool

- **Now with enhanced geometric metadata for Cassini ISS, UVIS, and VIMS Saturn data.**
 - Supports surface searches for the planet, satellites and rings (e.g., latitudes & longitudes).
 - Uses comprehensive target lists for Cassini ISS & VIMS.
 - Provides numerous viewing, illumination, spacecraft and instrument constraints.

File Edit View History Bookmarks Tools Help

The Planetary Rings Node

pds-rings.seti.org

Rings Node TWC wx haines bsg wx lcl TWC bsg wx10 traffic orlando Google News Science Daily Space.com

Planetary Rings Node

The **Rings Node** of [NASA's Planetary Data System](#) is devoted to archiving, cataloging, and distributing scientific data sets relevant to planetary ring systems.

Google Google Search

Search the Rings Node Search the Web

OPUS - The Rings Node's Data Search Tool

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 - Supports surface searches for the planet, satellites and rings (e.g., latitudes & longitudes).
 - Uses comprehensive target lists for Cassini ISS & VIMS.
 - Provides numerous viewing, illumination, spacecraft and instrument constraints.

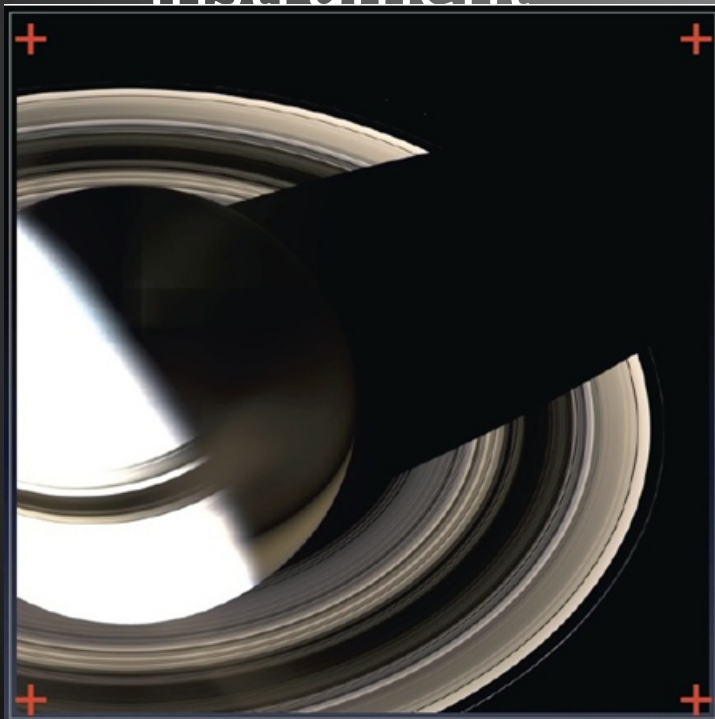
6

OPUS Features

- Large suite of searchable parameters
- Gallery view of search results
- Calibrated images for Cassini and Voyager
- Supports:
 - Cassini (CIRS*, ISS, UVIS, VIMS), Voyager ISS,
 - New Horizons LORRI, Galileo SSI*, HST (ACS, WFC3, WFPC2)
- Cassini enhanced metadata

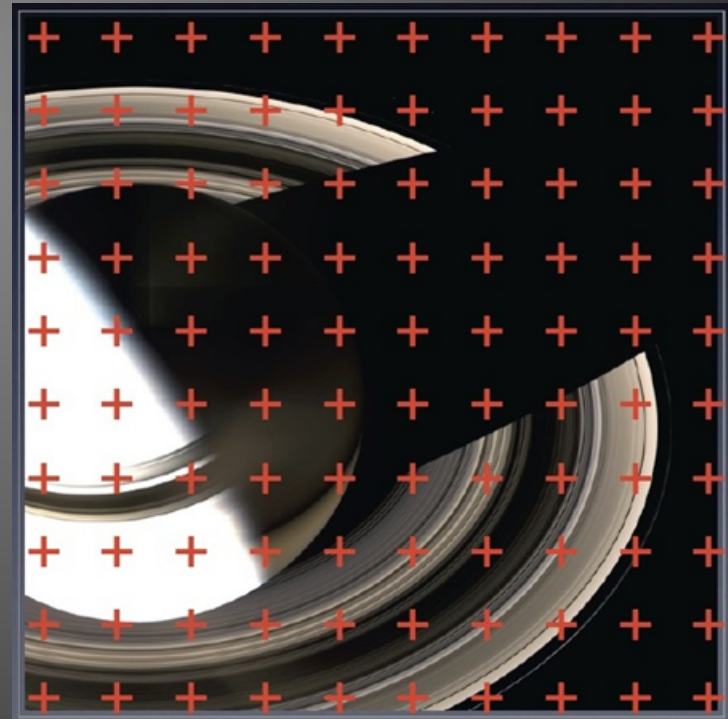
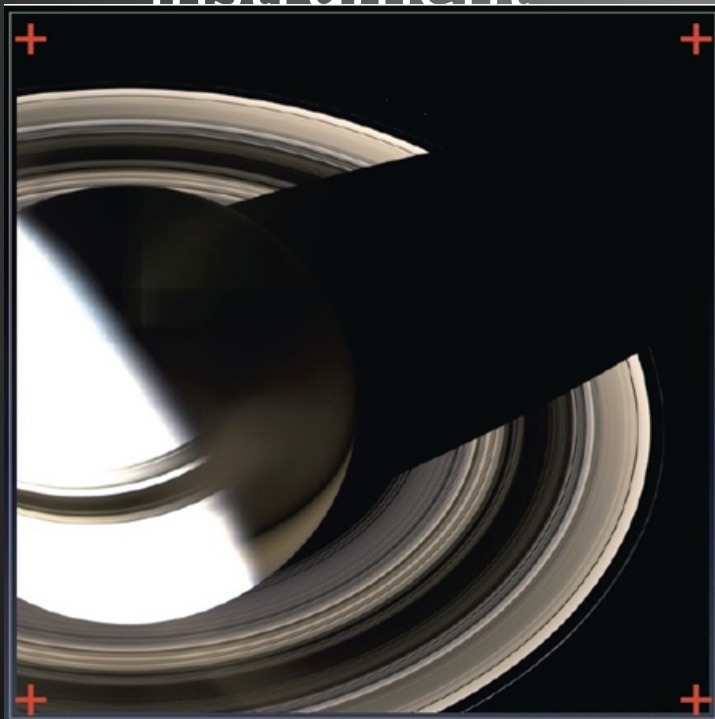
Metadata, Metadata, Metadata

- Mission Provided
 - Uneven
instrument to
instrument



Metadata, Metadata, Metadata

- Mission Provided
 - Uneven instrument to instrument
- Regenerated
 - More parameters
 - Current SPICE
 - Fine grid





General Constraints

Ring Geometry Constraints

NEW! Cassini Surface
Geometry beta test

Wavelength Constraints

General Constraints

▼ Planet ⓘ

- Jupiter
- Saturn
- Uranus
- Neptune
- Pluto
- Venus
- Earth
- Mars

▼ Intended Target Name ⓘ

- ▶ Saturn Targets
- ▶ Jupiter Targets
- ▶ Neptune Targets
- ▶ Uranus Targets
- ▶ Other Targets

▶ Mission ⓘ

▶ Instrument Host Name ⓘ

▼ Instrument Name ⓘ

- Cassini CIRS 22833
- Cassini ISS 346377
- Cassini UVIS 157815
- Cassini VIMS 525203
- Galileo SSI 3846
- Hubble ACS 3557
- Hubble WFC3 1117
- Hubble WFPC2 5117
- New Horizons LORRI 1114
- Voyager ISS 76669
- Voyager IRIS
- Hubble NICMOS

[show alert](#)

▶ Observation Time ⓘ

▶ Nominal Target Class ⓘ

▶ Measurement Quantity ⓘ

▶ Data Type ⓘ

▶ Note ⓘ

▶ Observation Class ⓘ

▶ Right Ascension ⓘ

▶ Declination ⓘ

▶ Observation Duration ⓘ

▶ Volume ID

▶ File Directory Path

• OPUS is a project of the [NASA PDS Rings Node](#) at [SETI Institute](#) • [Browse Volumes Directly](#)





- General Constraints**
- Ring Geometry Constraints
- NEW! Cassini Surface Geometry beta test
- Wavelength Constraints
- Cassini Mission Constraints
- Cassini ISS Constraints
- Image Constraints

General Constraints

Planet ⓘ

Jupiter **Saturn 16312** Uranus Neptune Pluto Venus Earth Mars

▶ Intended Target Name ⓘ

▶ Mission ⓘ

▶ Instrument Host Name ⓘ

Instrument Name ⓘ

Cassini CIRS **Cassini ISS 16312** Cassini UVIS 8123 Cassini VIMS 36853 Galileo SSI Hubble ACS Hubble WFC3
 Hubble WFC2 New Horizons LORRI Voyager ISS Voyager IRIS Hubble NICMOS

Observation Time ⓘ

min: max: nulls: 0

min: max: [] [] any ▼ [what's this?](#) [add range](#)

[show alert](#)

UTC Format, (you may omit the T):
YYYY-MM-DDTHH:MM:SS.sss or YYYY-DDDTHH:MM:SS.sss

▶ Nominal Target Class ⓘ

▶ Measurement Quantity ⓘ

▶ Data Type ⓘ

▶ Note ⓘ

▶ Observation Class ⓘ

▶ Right Ascension ⓘ

▶ Declination ⓘ

▶ Observation Duration ⓘ

▶ Volume ID

▶ File Directory Path

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- General Constraints
- Ring Geometry Constraints**
- NEW! Cassini Surface Geometry beta test
- Wavelength Constraints
- Cassini Mission Constraints
- Cassini ISS Constraints
- Image Constraints

Ring Geometry Constraints

Radius & Resolution

Observed Ring Radius ⓘ
min: 60,000.000 max: 2.996656e+6 nulls: 602
 min: max: [\[x\]](#) [\[...\]](#) km any [what's this?](#) [add range](#)

- ▶ **Observed Resolution** ⓘ
- ▶ **Projected Radial Resolution** ⓘ
- ▶ **Observed Range to Ring Intercept** ⓘ
- ▶ **Range to Ring Center** ⓘ

Longitude

- ▶ **Observed J2000 Longitude** ⓘ
- ▶ **Observed Solar Hour Angle** ⓘ
- ▶ **Longitude WRT Observer** ⓘ
- ▶ **Ring Azimuth WRT Observer** ⓘ
- ▶ **Sub-Solar J2000 Longitude** ⓘ
- ▶ **Sub-Observer J2000 Longitude** ⓘ

Elevation

- ▶ **Solar Ring Elevation** ⓘ
- ▶ **Observer Ring Elevation** ⓘ

Lighting Geometry

- ▶ **Observed Phase Angle** ⓘ
- ▶ **Observed Incidence Angle** ⓘ
- ▶ **Observed Emission Angle** ⓘ
- ▶ **North-Based Incidence** ⓘ
- ▶ **North-Based Emission** ⓘ
- ▶ **Ring Center Phase** ⓘ
- ▶ **Ring Center Incidence** ⓘ

OPUS [recent changes](#) [contact us](#) [start over](#) **Result Count: 318** [Refine Search](#)

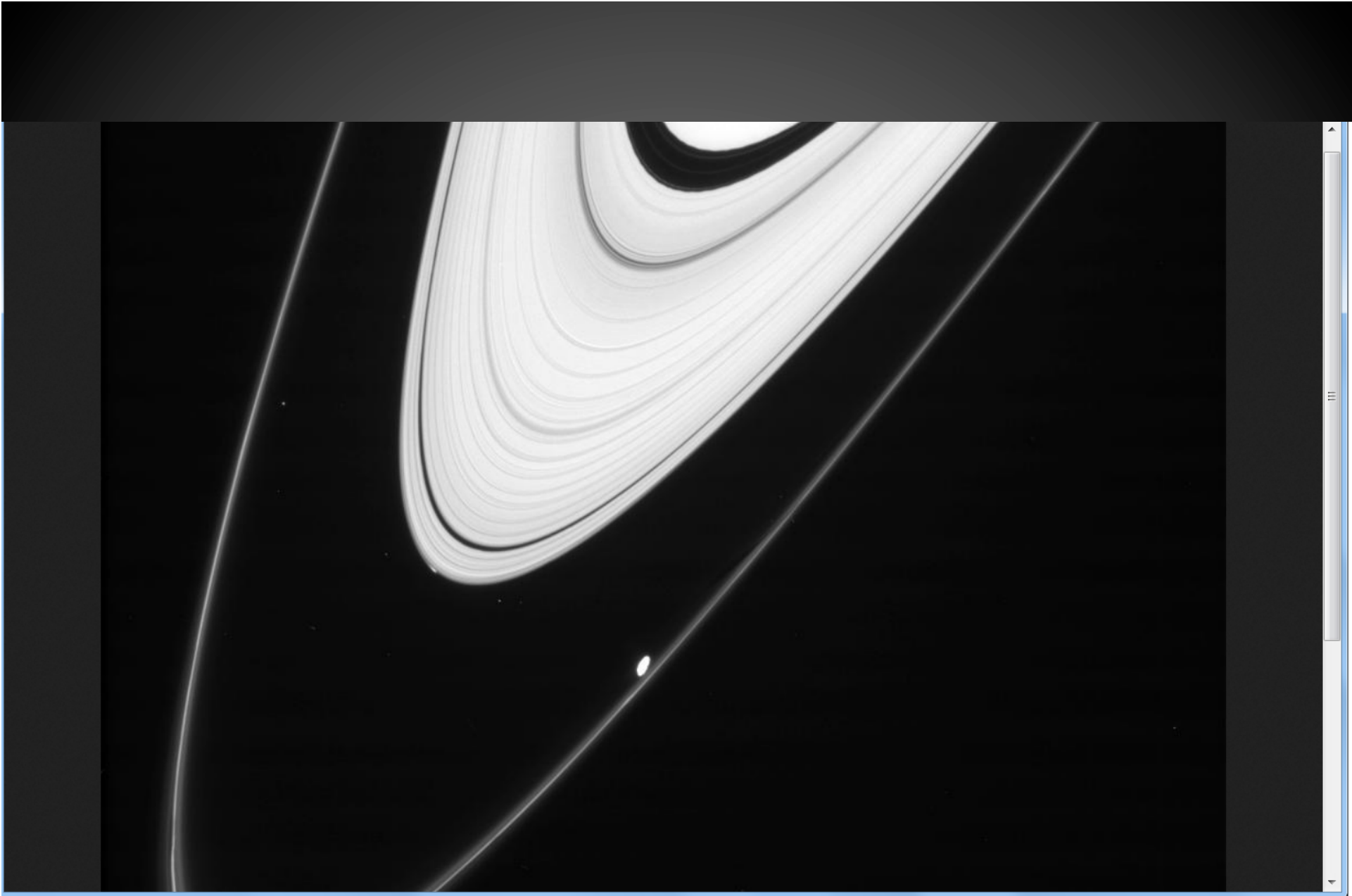
[view table](#) [view gallery](#) [view cart](#)

Prev Next page 1 of 1 500 results per page [choose metadata](#) [add this page](#) [add range](#) **1 Items in cart**

quick view larger image

S/IMG/CO/ISS/1744738746/N

Volume ID List:
COISS_2082
Ring Observation ID:
S/IMG/CO/ISS/1744738746/N
Primary File Spec:
COISS_2082/data/1744603525_1744748037/N1744738746_1.IMG
Observation Time 1 (UTC):
2013-105T16:44:09.780
Observation Time 2 (UTC):
2013-105T16:44:10.460
Observation Name:
ISS_186OT_SATELLORB003_PRIME
Intended Target Name:
PROMETHEUS
Observed Resolution:
6.978
Wavelength 1:
0.611
Wavelength Resolution 2:
NULL
Filter Name:
CL1 , CL2
Observed 12000 Longitude:







General Constraints

Ring Geometry Constraints

NEW! Cassini Surface Geometry beta test

Wavelength Constraints

Cassini Mission Constraints

Cassini VIMS Constraints

General Constraints

Planet ⁱ

Jupiter 32625 Saturn 435716 Uranus Neptune Pluto Venus 246 Earth Mars

▶ Intended Target Name ⁱ

▶ Mission ⁱ

▶ Instrument Host Name ⁱ

Instrument Name ⁱ

Cassini CIRS 22833 Cassini ISS 311397 Cassini UVIS 125716 Cassini VIMS 435716 Galileo SSI Hubble ACS 1603

Hubble WFC3 Hubble WFPC2 912 New Horizons LORRI Voyager ISS 29037 Voyager IRIS Hubble NICMOS

▶ Observation Time ⁱ

▶ Nominal Target Class ⁱ

▶ Measurement Quantity ⁱ

▶ Data Type ⁱ

▶ Note ⁱ

▶ Observation Class ⁱ

▶ Right Ascension ⁱ

▶ Declination ⁱ

▶ Observation Duration ⁱ

▶ Volume ID

▶ File Directory Path

Datasets available for searching are: COVIMS, COCIRS, COISS, COUVIS, GOSSI, NHJULO, VG1 and VG2. [View Included volume list](#)

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[PDS](#) [Atmospheres](#) [Geosciences](#) [Imaging](#) [NAIF](#) [PPI](#) [Rings](#) [Small Bodies](#)



SETI Institute
+ Carl Sagan Center

Curator: Mark Showalter
Webmaster: Neil Heather



NEW! Cassini Surface Geometry beta test

- General Constraints
- Ring Geometry Constraints
- NEW! Cassini Surface Geometry beta test**
- Wavelength Constraints
- Cassini Mission Constraints
- Cassini VIMS Constraints
- Enceladus Surface Geometry

▼ Target Name ?

- SATURN 340994 AEGAEON 4 ALBIORIX 40 ANTHE 20 ATLAS 2 BEBHIONN BERGELMIR BESTLA
- CALYPSO 52 DAPHNIS 8 DIONE 5115 **ENCELADUS 9908** EPIMETHEUS 143 ERRIAPUS HELENE 204
- HYPERION 1784 HYROKKIN IAPETUS 2788 IIRAQ JANUS 397 JUPITER KARI KIVIUQ LOGE
- METHONE 56 MIMAS 3258 MUNDILFARI 18 PAALIAQ PALLENE 122 PAN 86 PANDORA 101 PHOEBE 762
- POLYDEUCES PROMETHEUS 153 RHEA 8614 S12_2004 S13_2004 SIARNAQ SKATHI SKOLL
- SUTTUNGR TARQEQ TARVOS TELESTO 37 TETHYS 4712 TITAN 69165 YMIR 56 JARNSAXA 18 THRYMR 2

Please Note: We are beta testing surface geometries. Please provide feedback. CIRS metadata is incomplete at this time.

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- General Constraints
- Ring Geometry Constraints
- NEW! Cassini Surface Geometry beta test
- Wavelength Constraints
- Cassini Mission Constraints
- Cassini VIMS Constraints
- Enceladus Surface Geometry**

Planetocentric Latitude

- ▶ Observed Planetocentric Latitude [i](#)
- ▶ Sub-Solar Planetocentric Latitude [i](#)
- ▶ Sub-Observer Planetocentric Latitude [i](#)

Planetographic Latitude

- ▶ Observed Planetographic Latitude [i](#)
- ▶ Sub-Solar Planetographic Latitude [i](#)
- ▶ Sub-Observer Planetographic Latitude [i](#)

IAU West Longitude

- ▶ Observed IAU West Longitude [i](#)
- ▶ Longitude WRT Observer [i](#)
- ▶ Sub-Solar IAU West Longitude [i](#)
- ▶ Sub-Observer IAU West Longitude [i](#)

Resolution

- ▶ Finest Observed Resolution [i](#)
- ▶ Coarsest Observed Resolution [i](#)
- ▶ Body Center Resolution [i](#)

Lighting Geometry

- ▶ Observed Local Time [i](#)
- ▶ Observed Phase Angle [i](#)
- ▶ Phase Angle at Body Center [i](#)
- ▶ Observed Incidence Angle [i](#)
- ▶ Observed Emission Angle [i](#)

Distance

- ▶ Observed Distance to Surface [i](#)
- ▶ Body Center Distance [i](#)



- General Constraints
- Ring Geometry Constraints
- NEW! Cassini Surface Geometry beta test
- Wavelength Constraints
- Cassini Mission Constraints
- Cassini VIMS Constraints
- Image Constraints
- Enceladus Surface Geometry

Planetocentric Latitude

- ▶ [Observed Planetocentric Latitude](#) ⓘ
- ▶ [Sub-Solar Planetocentric Latitude](#) ⓘ
- ▶ [Sub-Observer Planetocentric Latitude](#) ⓘ

Planetographic Latitude

- ▼ [Observed Planetographic Latitude](#) ⓘ
min: -88.105 max: 88.633 nulls: 2349
 min: max: [\[x\]](#) [\[...\]](#) any ▼ [what's this?](#) [add range](#)
- ▶ [Sub-Solar Planetographic Latitude](#) ⓘ
- ▶ [Sub-Observer Planetographic Latitude](#) ⓘ

IAU West Longitude

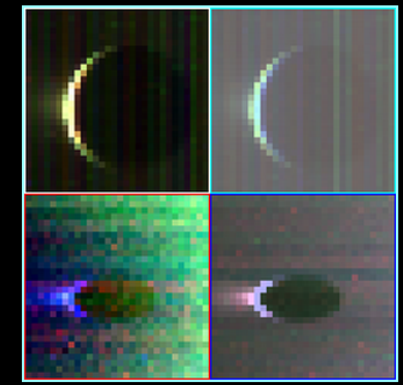
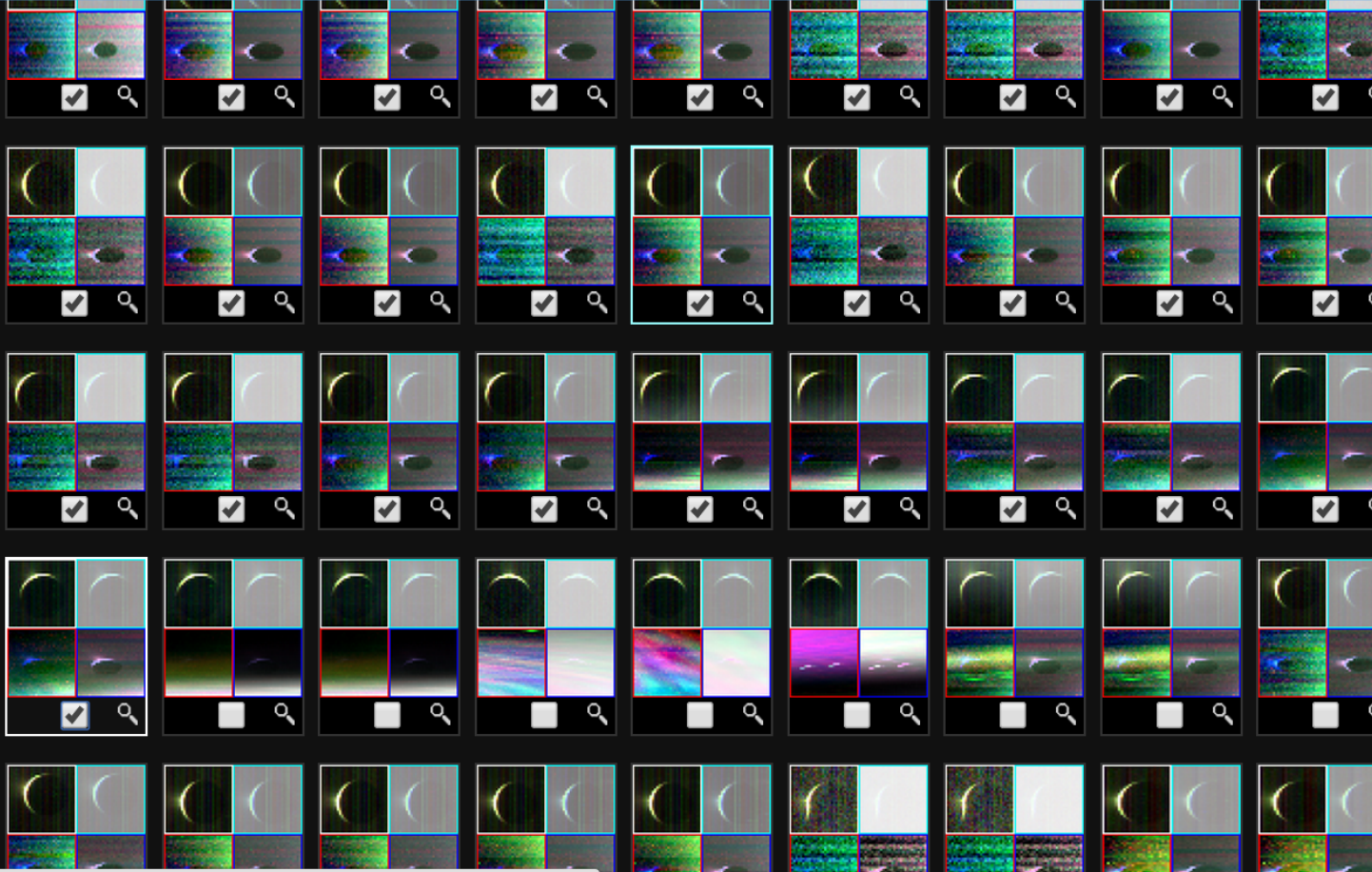
- ▶ [Observed IAU West Longitude](#) ⓘ
- ▶ [Longitude WRT Observer](#) ⓘ
- ▶ [Sub-Solar IAU West Longitude](#) ⓘ
- ▶ [Sub-Observer IAU West Longitude](#) ⓘ

Resolution

- ▶ [Finest Observed Resolution](#) ⓘ
- ▶ [Coarsest Observed Resolution](#) ⓘ
- ▶ [Body Center Resolution](#) ⓘ

Lighting Geometry

- ▶ [Observed Local Time](#) ⓘ
- ▼ [Observed Phase Angle](#) ⓘ
min: 0.539 max: 162.611 nulls: 0
 min: max: [\[x\]](#) [\[...\]](#) any ▼ [what's this?](#) [add range](#)
- ▶ [Phase Angle at Body Center](#) ⓘ
- ▶ [Phase Angle](#) ⓘ



[quick view larger image](#)

S/CUBE/CO/VIMS/1511803001/VIS

Observation Time 1 (UTC):
 2005-11-27T16:47:39.207
 Observation Time 2 (UTC):
 2005-11-27T16:57:57.232
 Observed Emission Angle:
 90.884
 Observed Emission Angle 2:
 91.183
 Observed Incidence Angle:
 70.456
 Observed Incidence Angle 2:
 70.456
 Observed Phase Angle:
 161.327
 Observed Phase Angle 2:
 161.612

[choose metadata](#)

You have 51 observations in your cart

Total products: 51 Total files: 255 Total size: 39.69 MB

[get CSV](#)


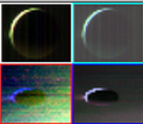
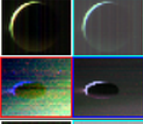
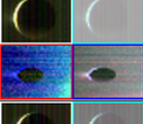
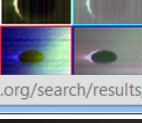
[Create ZIP File](#)

Filter by product type select: [all](#) [none](#)

- CALIBRATED
- CALIBRATED_IMAGE
- CALIBRATED_SPECTRUM
- CALIBRATED_SPECTRUM_PREFIX
- CLEANED_IMAGE
- COMPRESSED_RAW_IMAGE
- DECOMPRESSED_RAW_IMAGE
- FITS_HEADER_INFO
- FOOTPRINT_GEOMETRY
- GEOMETRICALLY_CORRECTED_IMAGE
- JPEG_PREVIEW_IMAGE
- RAW_IMAGE
- RAW_SPECTRAL_IMAGE_CUBE 51
- RAW_SPECTRUM
- RAW_TIME_SERIES
- RESEAU_TABLE
- RING_FOOTPRINT_GEOMETRY
- SYSTEM_GEOMETRY
- TARGET_TABLE
- TIEPOINT_TABLE
- TIFF_PREVIEW_IMAGE

Observations appear below in the order they were added.
 You can also view the thumbnails in your cart as a movie.
[Click here to make movie](#)

[Empty Cart](#)

	info	thumbnail	Observation Time 1 (UTC)	Observation Time 2 (UTC)	Observed Emission Angle	Observed Emission Angle 2	Observed Incidence Angle	Observed Incidence Angle 2	Observed Phase
<input checked="" type="checkbox"/>	view		2005-11-27T12:45:07.082	2005-11-27T12:57:36.620	90.299	90.845	70.450	70.452	156.140
<input checked="" type="checkbox"/>	view		2005-11-27T12:45:07.082	2005-11-27T12:57:36.620	90.514	90.857	70.451	70.452	156.063
<input checked="" type="checkbox"/>	view		2005-11-27T14:12:42.048	2005-11-27T14:16:34.945	90.634	91.031	70.452	70.453	160.520
<input checked="" type="checkbox"/>	view		2005-11-27T14:19:06.055	2005-11-27T14:32:53.673	90.432	91.040	70.452	70.453	160.546

On the Horizon: OPUS 2

- Same parameters
- New look
- Major changes under the hood
- Significantly faster
- Beta testing should begin by end of September

Post Beta Testing Projected Additions

- Occultations
- Moving target search

Questions, Comments, Suggestions?

Need Help, Have Comments or Suggestions

- Talk to or email Mark or me – links on web site
- Rings Node Advisory Council

Joe Burns

Doug Hamilton

Josh Colwell

Essam Marouf

Jeff Cuzzi

Phil Nicholson

Imke de Pater

Dick Simpson

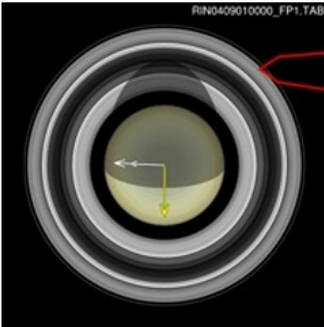
Luke Dones

Linda Spilker

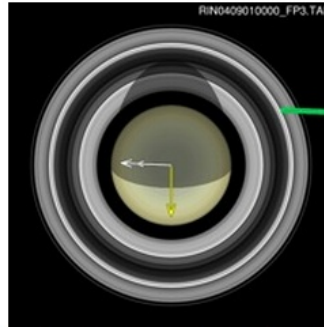
Dick French

COCIRS_5409/BROWSE/S_RINGS

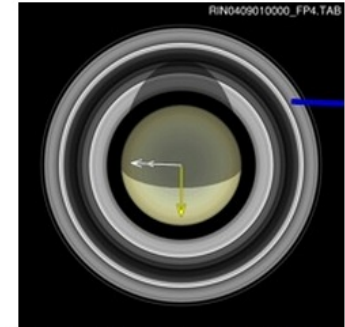
[^Up](#)



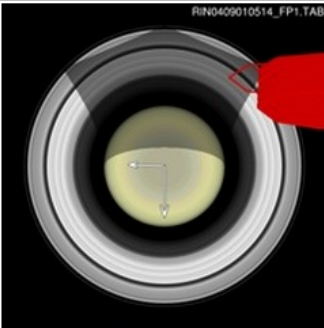
RIN0409010000_FP1. [\[med\]](#) [\[full\]](#) [\[LBL\]](#)



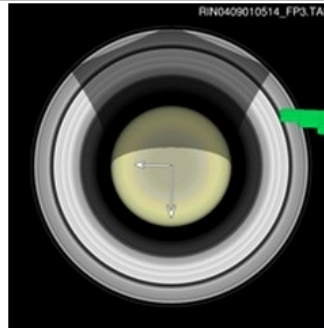
RIN0409010000_FP3. [\[med\]](#) [\[full\]](#) [\[LBL\]](#)



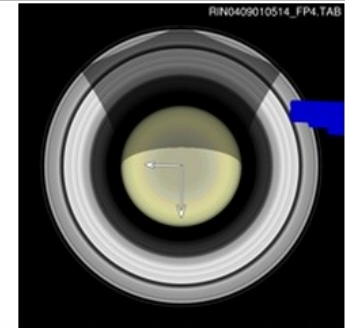
RIN0409010000_FP4. [\[med\]](#) [\[full\]](#) [\[LBL\]](#)



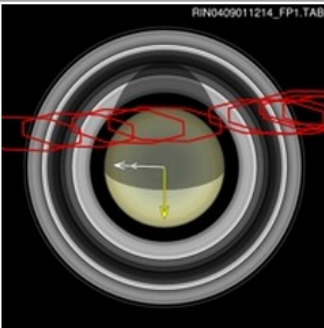
RIN0409010514_FP1. [\[med\]](#) [\[full\]](#) [\[LBL\]](#)



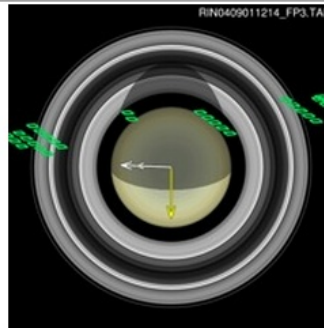
RIN0409010514_FP3. [\[med\]](#) [\[full\]](#) [\[LBL\]](#)



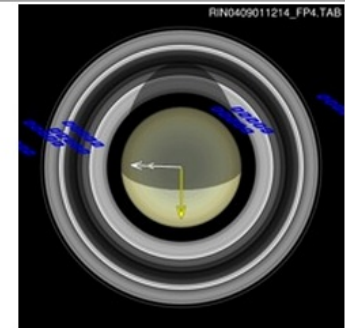
RIN0409010514_FP4. [\[med\]](#) [\[full\]](#) [\[LBL\]](#)



RIN0409011214_FP1. [\[med\]](#) [\[full\]](#) [\[LBL\]](#)



RIN0409011214_FP3. [\[med\]](#) [\[full\]](#) [\[LBL\]](#)



RIN0409011214_FP4. [\[med\]](#) [\[full\]](#) [\[LBL\]](#)