

Outer Planets Unified Search (OPUS)

Robert French

PDS Ring-Moon Systems Node

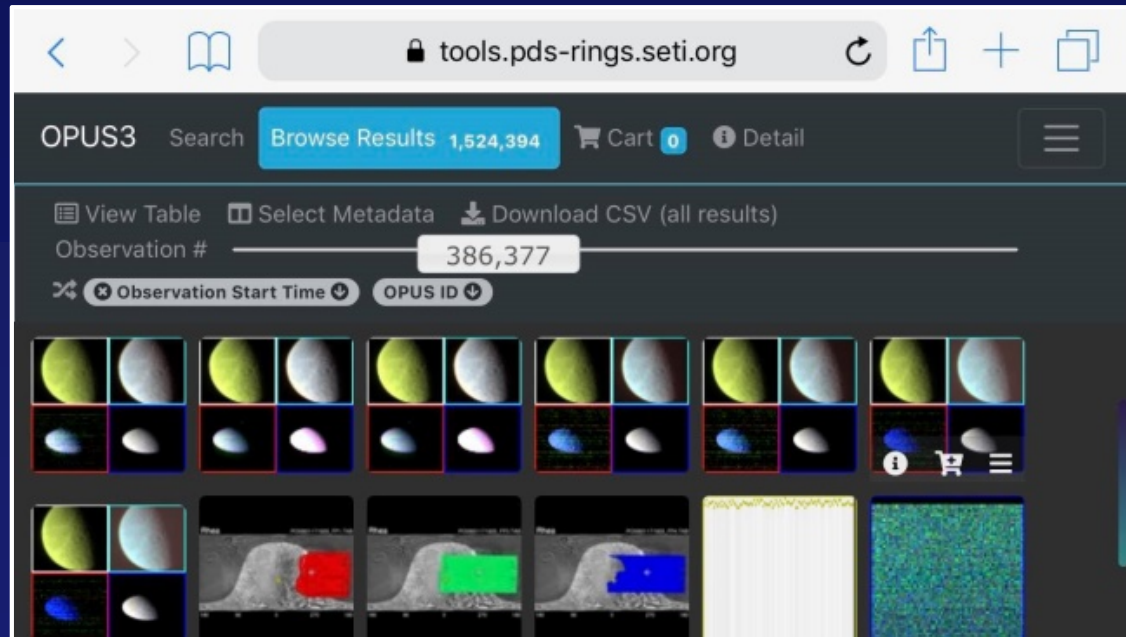
SETI Institute

`rfrench@seti.org`

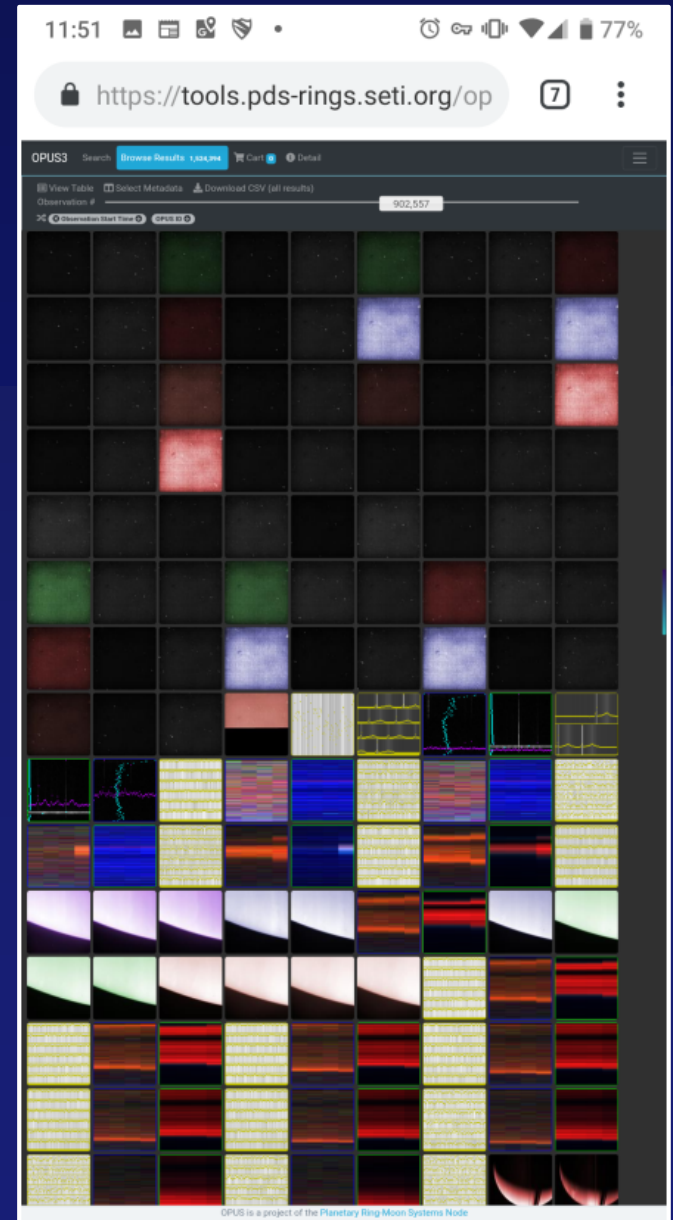
Outer Planets Unified Search (OPUS)

- OPUS is the web-based search engine of the Ring-Moon Systems Node
- Our goal is to make it easy to *search*, *discover*, and *explore* the available data, and then to *select* and *download* products
- Three things are necessary for a successful PDS user search experience:
 1. High-quality metadata
 2. A fast and flexible search engine
 3. A powerful but easy-to-use interface

Responsive Design Supports Mobile



iPhone 7



Pixel 3

OPUS User Interface

The screenshot shows the OPUS3 web interface. At the top, there is a search bar with the text "Browse Results 1,524,696" highlighted in red. Below the search bar, there are several filter categories: "Planet [General]", "Intended Target Name [General]", "PDS Constraints", "Image Constraints", "Wavelength Constraints", "Surface Geometry Constraints", and "Ring Geometry Constraints". The "Planet [General]" filter is expanded, showing a list of planets with their respective result counts: Venus 0, Earth 10, Mars 351, Jupiter 183932, Saturn 1299185, Uranus 9842, Neptune 11629, Pluto 10994, and Other 8753. The "Intended Target Name [General]" filter is also expanded, showing a list of target names: Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, Pluto, and Other. A vertical sidebar on the right contains a "Questions / Feedback" button.

Number of results if each option is selected

Planet	Count
Venus	0
Earth	10
Mars	351
Jupiter	183932
Saturn	1299185
Uranus	9842
Neptune	11629
Pluto	10994
Other	8753

Total number of results with current search

Default search terms used by most users

Universal fields applicable to all datasets

OPUS3 Search Browse Results 1,524,696 Cart 0 Detail Recent Announcements Help

Planet [General]

Intended Target Name [General]

The Intended Target Name represents the observer's intentions and is valid for all missions and instruments. To search for ANY body in the field of view (but only for some instruments), select Surface Geometry Target Name under Surface Geometry Constraints in the left menu. To search for observations containing rings, use the Ring Geometry Constraints menu.

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

Questions / Feedback

OPUS is a project of the PDS Ring-Moon Systems Node

Download Links History

Universal Fields: Ring Radius

OPUS3 Browse Results **16,553** **0** **New!** Recent Announcements

PDS Constraints ▶
Image Constraints ▶
Wavelength Constraints ▶
Surface Geometry Constraints ▶

Ring Geometry Constraints ▼
Supported instruments: Cassini ISS, UVIS, and VIMS, New Horizons LORRI, and Voyager ISS.
Radius & Longitude ▼

Distance & Resolution ▶
Lighting Geometry - Observed ▶
Lighting Geometry - Ring Center ▶
Edge-On Viewing Geometry ▶

Planet [General] | v x
 Venus 0 Earth 0 Mars 0 Jupiter 0 Saturn 16553 Uranus 15 Neptune 0
 Pluto 0 Other 0

Observed Ring Radius [Ring] (km)
Min: 184.812000 Max: 2.216420e+08 Nulls: 353631
Min: Max:

Instrument Name [General] | v x
 Cassini CIRS 0 Cassini ISS 3510 Cassini UVIS 786 Cassini VIMS 12248 Galileo SSI 0
 Voyager ISS 9 Hubble ACS 0 Hubble NICMOS 0 Hubble STIS 0 Hubble WFC3 0
 Hubble WFC2 0 New Horizons LORRI 0 New Horizons MVIC 0

Close-ups of the A Ring

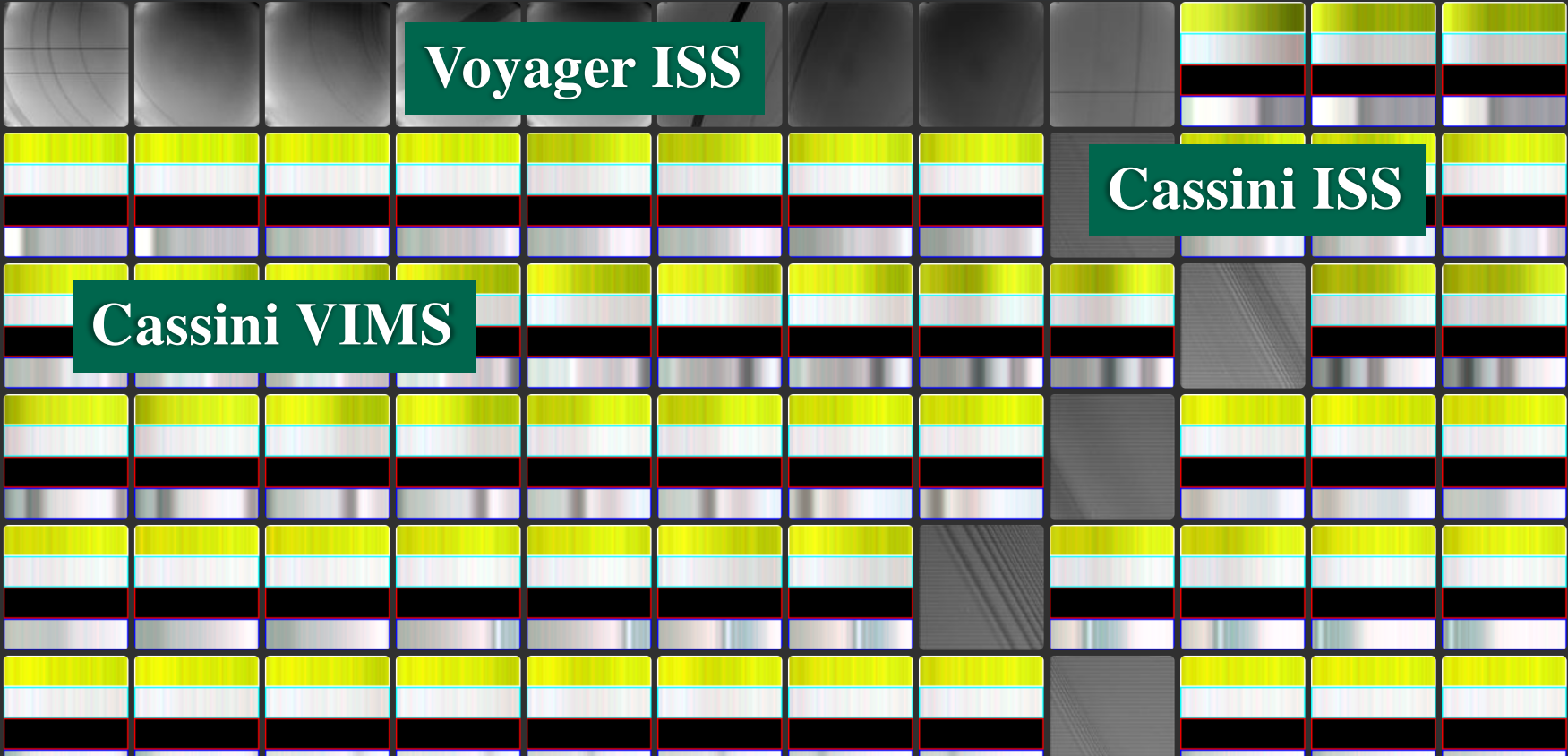
OPUS is a project of the [PDS Ring-Moon Systems Node](#)

Mixed-Instrument Results (Observations)

OPUS3 Search [Browse Results 16,553](#) [Cart 0](#) [Detail](#) New [Recent Announcements](#) [Help](#)

[View Table](#) [Select Metadata](#) [Download CSV \(all results\)](#) Observation #

[Observation Start Time](#) [OPUS ID](#)



OPUS is a project of the PDS Ring-Moon Systems Node [Twitter](#) [Download Links History](#)

Triggered Metadata Categories

OPUS3 Browse Results **1,524,696** Cart **0** Detail Recent Announcements Help ▾

General Constraints ▾

- Planet**
 - Intended Target Name
 - Nominal Target Class
- Mission**
 - Instrument Host Name
 - Instrument Name
 - Observation Type
 - Observation Time
 - Observation Duration
 - Measurement Quantity
 - Right Ascension
 - Declination

PDS Constraints ▸

Image Constraints ▸

Wavelength Constraints ▸

Surface Geometry Constraints ▸

Ring Geometry Constraints ▸

Planet [General] | ▾ ×

Venus 0 Earth 10 Mars 351 Jupiter 183932 Saturn 1299185 Uranus 9842

Neptune 11629 Pluto 10994 Other 8753

Mission [General] | ▾ ×


Cassini 1411270 Galileo 3846 Hubble 21265 New Horizons 11663 Voyager 76652

Questions / Feedback

OPUS is a project of the [PDS Ring-Moon Systems Node](#)

[Download Links History](#)

Select *Mission=Cassini*

OPUS3 [Search](#) [Browse Results](#) **1,411,270** [Cart](#) **0** [Detail](#)  [Recent Announcements](#) [Help](#)

- [Observation Duration](#)
- [Measurement Quantity](#)
- [Right Ascension](#)
- [Declination](#)

[PDS Constraints](#) ▶

[Image Constraints](#) ▶

[Wavelength Constraints](#) ▶

[Surface Geometry Constraints](#) ▶

[Ring Geometry Constraints](#) ▶

Cassini Mission Constraints ▼

- [Observation Name](#)
- [Activity Name](#)
- [Mission Phase](#)
- [Cassini Target Code](#)
- [Saturn Orbit Number \(By Checkbox\)](#)
- [Saturn Orbit Number \(By Range\)](#)
- [Primary Instrument](#)
- [Is Prime](#)
- [Sequence ID](#)
- [Spacecraft Clock Count](#)
- [Earth Received Time](#)

[Reset Search](#) [Reset Search and Metadata](#)

Planet [General] | v x

Venus 0 Earth 0 Mars 0 Jupiter 139571 Saturn 1265280 Uranus 0 Neptune 0


Pluto 0 Other 6419

Mission [General] | v x

Cassini 1411270 Galileo 3846 Hubble 21265 New Horizons 11663 Voyager 76652

Cassini mission constraints now available

[Questions / Feedback](#)

OPUS is a project of the [PDS Ring-Moon Systems Node](#) 

[Download Links History](#)

Triggered Metadata Categories II

OPUS3 Browse Results **1,524,696** Cart **0** Detail Recent Announcements Help

General Constraints ▾

- Planet
- Intended Target Name**
- Nominal Target Class
- Mission
- Instrument Host Name
- Instrument Name**
- Observation Type
- Observation Time
- Observation Duration
- Measurement Quantity
- Right Ascension
- Declination

PDS Constraints ▸

Image Constraints ▸

Wavelength Constraints ▸

Surface Geometry Constraints ▸

Ring Geometry Constraints ▸

Instrument Name [General] | ▾ ×

- Cassini CIRS **24950** Cassini ISS **443177** Cassini UVIS **203245** Cassini VIMS **739898**
- Galileo SSI **3846** Voyager ISS **76652** Hubble ACS **6926** Hubble NICMOS **2080**
- Hubble STIS **1814** Hubble WFC3 **4828** Hubble WFPC2 **5617** New Horizons LORRI **10106**
- New Horizons MVIC **1557**

Intended Target Name [General] | ▾ ×

The Intended Target Name represents the observer's intentions and is valid for all missions and instruments. To search for ANY body in the field of view (but only for some instruments), select Surface Geometry Target Name under Surface Geometry Constraints in the left menu. To search for observations containing rings, use the Ring Geometry Constraints menu.

- + Venus
- + Earth
- + Mars
- + Jupiter
- Saturn

- Aegaeon **1389** Albiorix **3426** Anthe **1684** Atlas **1649** Bebhionn **2204**
- Bergelmir **582** Bestla **2076** Calypso **1173** Daphnis **958** Dione **17550**
- Enceladus **45161** Epimetheus **2245** Erriapus **3080** Fornjot **951** Greip **563**

Questions / Feedback

OPUS is a project of the [PDS Ring-Moon Systems Node](#)

[Download Links History](#)

Select *Target=Daphnis*

OPUS3 Browse Results **958** **26** Recent Announcements

Observation Duration
 Measurement Quantity
 Right Ascension
 Declination

PDS Constraints ▶
Image Constraints ▶
Wavelength Constraints ▶
Surface Geometry Constraints ▶
Ring Geometry Constraints ▶

Cassini Mission Constraints ▼
 Observation Name
 Activity Name
 Mission Phase
 Cassini Target Code
 Saturn Orbit Number (By Checkbox)
 Saturn Orbit Number (By Range)
 Primary Instrument
 Is Prime
 Sequence ID
 Spacecraft Clock Count
 Earth Received Time

Instrument Name [General] | v x
 Cassini CIRS 0 Cassini ISS 735 Cassini UVIS 57 Cassini VIMS 166 Galileo SSI 0
 Voyager ISS 0 Hubble ACS 0 Hubble NICMOS 0 Hubble STIS 0 Hubble WFC3 0
 Hubble WFPC2 0 New Horizons LORRI 0 New Horizons MVIC 0

Intended Target Name [General] | v x
The Intended Target Name represents the observer's intentions and is valid for all missions and instruments. To search for ANY body in the field of view (but only for some instruments), select Surface Geometry Target Name under Surface Geometry Constraints in the left menu. To search for observations containing rings, use the Ring Geometry Constraints menu.
+ Venus
+ Earth
+ Mars
+ Jupiter
- Saturn
 Aegaeon 1389 Albiorix 3426 Anthe 1684 Atlas 1649 Bebhionn 2204
 Bergelmir 582 Bestla 2076 Calypso 1173 Daphnis 958 Dione 17550
 Enceladus 45161 Epimetheus 2245 Erriapus 3080 Fornjot 951 Greip 563
 Hati 704 Helene 2260 Hyperion 6495 Hyrrokkin 1271 Iapetus 16661 Ijiraq 3678

OPUS is a project of the [PDS Ring-Moon Systems Node](#)

[Download Links History](#)

Select *Observation Type=Image*

OPUS3 Browse Results **735** **24** Recent Announcements

Cassini Mission Constraints ▾

- Observation Name
- Activity Name
- Mission Phase
- Cassini Target Code
- Saturn Orbit Number (By Checkbox)
- Saturn Orbit Number (By Range)
- Primary Instrument
- Is Prime
- Sequence ID
- Spacecraft Clock Count
- Earth Received Time

Cassini ISS Constraints ▾

- Camera
- Filter
- Shutter Mode
- Shutter State
- Compression Type
- Data Conversion Type
- Gain Mode
- Instrument Mode
- Missing Lines
- Image Number
- Target Description
- Image Observation Type

Observation Type [General] | ▾ ×

Image **735** Spectrum 0 Spectral Image 0 Spectral Cube 204 Time Series 19
 Spectral Time Series 0

Instrument Name [General] | ▾ ×

Cassini CIRS 0 Cassini ISS 735 Cassini UVIS 0 Cassini VIMS 0 Galileo SSI 0
 Voyager ISS 0 Hubble ACS 0 Hubble NICMOS 0 Hubble STIS 0 Hubble WFC3 0
 Hubble WFC2 0 New Horizons LORRI 0 New Horizons MVIC 0

Intended Target Name [General] | ▾ ×

The Intended Target Name represents the observer's intentions and is valid for all missions and instruments. To search for ANY body in the field of view (but only for some instruments), select Surface Geometry Target Name under Surface Geometry Constraints in the left menu. To search for observations containing rings, use the Ring Geometry Constraints menu.

+ Venus
+ Earth

OPUS is a project of the [PDS Ring-Moon Systems Node](#)

[Download Links History](#)

User-Friendly Search Features

Observation Time [General] | v x

Min: 1978-12-11T00:29:22.640 Max: 2017-11-11T08:56:43.000 Nulls: 17

Min: Max: any i

Input validation gives feedback as you type and prevents illegal values

Observation Duration [General] (secs) | v x

Min: 0.0000 Max: 260280.0000 Nulls: 90

Min: Max:

Observation Time [General] | v x

Min: ? Max: ? Nulls: ?

Min: Max: any i

String searches give suggestions based on partial completion

Data Set ID [PDS] | v x

contains

Results from entire database, not current search constraints

- CO-E/V/J-**ISSNA/ISSWA**-2-EDR-V1.0
- CO-S-**ISSNA/ISSWA**-2-EDR-V1.0
- VG1/VG2-J-**ISS**-2/3/4/6-PROCESSED-V1.0
- VG1/VG2-S-**ISS**-2/3/4/6-PROCESSED-V1.0
- VG2-N-**ISS**-2/3/4/6-PROCESSED-V1.0
- VG2-U-**ISS**-2/3/4/6-PROCESSED-V1.0

Observed Ring Radius [Ring] (km) | v x

Min: 1.383000 Max: 1.009570e+09 Nulls: 510135

Min: Max: any i

Jupiter Rings

	Min (km)	Max (km)
Thebe Ring	122,400	221,900
Thebe Extension	221,900	270,000

Jupiter Inner Satellites

	Min (km)	Max (km)
Thebe	221,900	221,900

Ring Radius and Wavelength support preprogrammed ranges

Browse Results: Gallery View

OPUS3 Search **Browse Results 735** Cart 24 Detail **New!** Recent Announcements Help

View Table Select Metadata Download CSV (all results) Observation # **1**

Observation Start Time OPUS ID

OPUS is a project of the [PDS Ring-Moon Systems Node](#)

[Download Links History](#)

Selecting Metadata

Select Metadata

Available Metadata Fields

Click on a field name to include (or exclude) it from the Selected Metadata list. To show Surface Geometry Constraints, select a Surface Geometry Target Name on the Search tab.

Ring Geometry Constraints ▶

Cassini Mission Constraints ▶

Cassini ISS Constraints ▾

- Camera
- Filter
- Shutter Mode
- Shutter State
- Compression Type
- Data Conversion Type
- Gain Mode
- Instrument Mode
- Missing Lines
- Image Number
- Target Description
- Image Observation Type


Selected Metadata Fields

These fields will be shown in the Table View, Slideshow, and Detail tab and will be included in downloaded CSV files and archives. Fields can be reordered with drag-and-drop.

- OPUS ID
- Observation Start Time
- Observation Duration
- Observation Name [Cassini]
- Filter [Cassini ISS]
- Compression Type [Cassini ISS]
- Missing Lines [Cassini ISS]
- Target Description [Cassini ISS]

Reset to Default Save Changes Discard Changes


Browse Results: Table View

OPUS3 Search [Browse Results 735](#) [Cart 24](#) [Detail](#)  [Recent Announcements](#) [Help](#)

[View Gallery](#) [Select Metadata](#) [Download CSV \(all results\)](#) Observation #

[Observation Start Time](#) [OPUS ID](#)

	OPUS ID	Observation Start Time	Observation Duration (secs)	Observation Name [Cassini]	Filter [Cassini ISS]	Compression Type [Cassini ISS]	Missing Lines [Cassini ISS]	Target Description [Cassini ISS]
■ ≡	co-iss-n1521540615	2006-03-20T09:40:10.405	0.0900	ISS_022OT_RETHIEQPL002_PRIME	CLEAR	Lossless	0	Saturn-Rings
■ ≡	co-iss-n1521540651	2006-03-20T09:40:46.389	0.0900	ISS_022OT_RETHIEQPL002_PRIME	CLEAR	Lossless	0	Saturn-Rings
■ ≡	co-iss-n1521540684	2006-03-20T09:41:19.389	0.0900	ISS_022OT_RETHIEQPL002_PRIME	CLEAR	Lossless	0	Saturn-Rings
■ ≡	co-iss-n1521540724	2006-03-20T09:41:59.389	0.0900	ISS_022OT_RETHIEQPL002_PRIME	CLEAR	Lossless	0	Saturn-Rings
■ ≡	co-iss-n1521540757	2006-03-20T09:42:32.388	0.0900	ISS_022OT_RETHIEQPL002_PRIME	CLEAR	Lossless	0	Saturn-Rings
■ ≡	co-iss-n1521540797	2006-03-20T09:43:12.388	0.0900	ISS_022OT_RETHIEQPL002_PRIME	CLEAR	Lossless	0	Saturn-Rings
■ ≡	co-iss-n1521540830	2006-03-20T09:43:45.388	0.0900	ISS_022OT_RETHIEQPL002_PRIME	CLEAR	Lossless	0	Saturn-Rings
■ ≡	co-iss-n1521540870	2006-03-20T09:44:25.388	0.0900	ISS_022OT_RETHIEQPL002_PRIME	CLEAR	Lossless	0	Saturn-Rings
■ ≡	co-iss-n1521540903	2006-03-20T09:44:58.388	0.0900	ISS_022OT_RETHIEQPL002_PRIME	CLEAR	Lossless	0	Saturn-Rings
■ ≡	co-iss-n1521540943	2006-03-20T09:45:38.387	0.0900	ISS_022OT_RETHIEQPL002_PRIME	CLEAR	Lossless	0	Saturn-Rings
■ ≡	co-iss-n1521540976	2006-03-20T09:46:11.387	0.0900	ISS_022OT_RETHIEQPL002_PRIME	CLEAR	Lossless	0	Saturn-Rings
■ ≡	co-iss-n1521541016	2006-03-20T09:46:51.387	0.0900	ISS_022OT_RETHIEQPL002_PRIME	CLEAR	Lossless	0	Saturn-Rings
■ ≡	co-iss-n1521541049	2006-03-20T09:47:24.387	0.0900	ISS_022OT_RETHIEQPL002_PRIME	CLEAR	Lossless	0	Saturn-Rings
■ ≡	co-iss-n1521541089	2006-03-20T09:48:04.386	0.0900	ISS_022OT_RETHIEQPL002_PRIME	CLEAR	Lossless	0	Saturn-Rings
■ ≡	co-iss-n1521541122	2006-03-20T09:48:37.386	0.0900	ISS_022OT_RETHIEQPL002_PRIME	CLEAR	Lossless	0	Saturn-Rings
■ ≡	co-iss-n1521541162	2006-03-20T09:49:17.386	0.0900	ISS_022OT_RETHIEQPL002_PRIME	CLEAR	Lossless	0	Saturn-Rings

OPUS is a project of the [PDS Ring-Moon Systems Node](#)  [Download Links History](#)

Browse Results: Slideshow

OPUS3 Search **Browse Results 735** Cart 24 Detail  Recent Announcements Help

View Table Select Metadata Download CSV (all results) Observation #

Observed

```
N1553468588 1 2007-MAR-24-22:29:40 0.12s CL1+CL2  
Offset -10.00±1.03,10.00±3.12 pixels  
07048_07087py_as_flowm.bc 180628RU_SCPSE_04183_17258.bsp 070507R_SCPSE_07077_07094.bsp  
[MODEL/0.84 RINGS]
```



A Ring Outer Edge->
Keeler OEG->
Daphnis->
138065574
10.857 68
<-Encke Gap
Pan->

OPUS ID:
co-iss-n1553468588

Observation Start Time:
2007-03-24T22:29:40.156

Observation Duration (secs):
0.1200

Observation Name [Cassini]:
ISS_041OT_RETARGEMR002_PRIME

Filter [Cassini ISS]:
CLEAR

Compression Type [Cassini ISS]:
Lossless

Missing Lines [Cassini ISS]:
0

Target Description [Cassini ISS]:
Saturn-Rings

OPUS is a project of the PDS Ring-Moon Systems Node  [Download Links History](#)

Detail I: PDS Products

OPUS3

Search

Browse Results **735**

Cart **24**

i Detail



Recent Announcements

Help ▾

Observation Detail

OPUS ID: co-iss-n1553468588

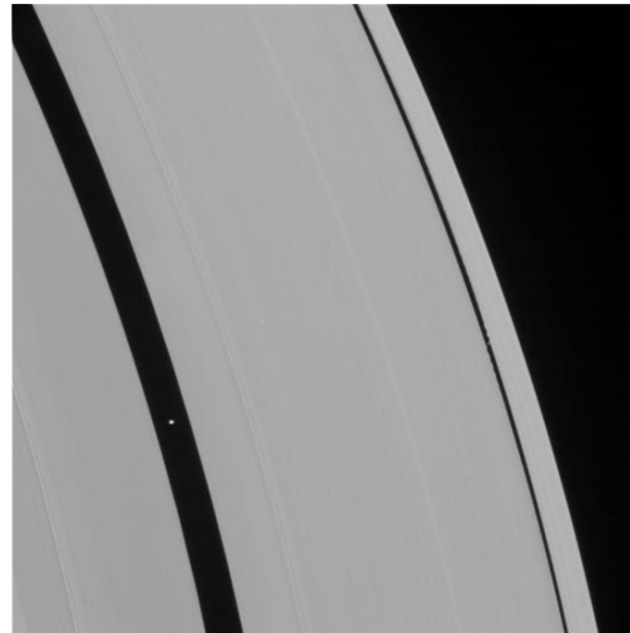
PDS Products

Download zipped [data archive](#) or [URL archive](#) for this observation (all products, current version only).

Click on any "Index" type to see the entry for this observation in that table.

Version: Current

- i** Target Body Inventory: [COISS_2030_inventory.tab](#) [COISS_2030_inventory.lbl](#)
- i** Planet Geometry Index: [COISS_2030_saturn_summary.tab](#)
[COISS_2030_saturn_summary.lbl](#)
- i** Moon Geometry Index: [COISS_2030_moon_summary.tab](#)
[COISS_2030_moon_summary.lbl](#)
- i** Ring Geometry Index: [COISS_2030_ring_summary.tab](#)
[COISS_2030_ring_summary.lbl](#)
- i** Browse Image (thumbnail): [N1553468588_1_thumb.jpg](#)
- i** Browse Image (small): [N1553468588_1_small.jpg](#)
- i** Browse Image (medium): [N1553468588_1_med.jpg](#)
- i** Browse Image (full-size): [N1553468588_1_full.png](#)
- i** Raw image: [N1553468588_1.IMG](#) [N1553468588_1.LBL](#) [prefix3.fmt](#)
[tlmtab.fmt](#)
- i** Calibrated image: [N1553468588_1_CALIB.IMG](#) [N1553468588_1_CALIB.LBL](#)
- i** Extra preview (thumbnail): [N1553468588_1.IMG.jpeg_small](#)
- i** Extra preview (medium): [N1553468588_1.IMG.jpeg](#)



Questions / Feedback

Detail II: Metadata

OPUS3 Search Browse Results **735** Cart **24** **Detail** **New!** Recent Announcements Help ▾

All OPUS Metadata for this Observation

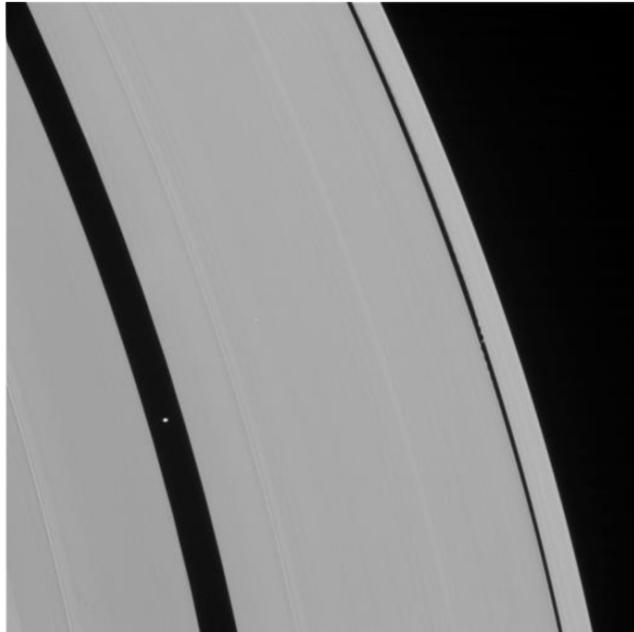
Download all metadata [as JSON](#)

General Constraints

- Planet: Saturn [Q](#)
- Intended Target Name: Daphnis [Q](#)
- Nominal Target Class: Regular Satellite [Q](#)
- Mission: Cassini [Q](#)
- Instrument Host Name: Cassini [Q](#)
- Instrument Name: Cassini ISS [Q](#)
- Observation Type: Image [Q](#)
- Observation Start Time: 2007-03-24T22:29:40.156
- Observation Stop Time: 2007-03-24T22:29:40.276
- Observation Duration (secs): 0.1200
- Measurement Quantity: Reflectivity [Q](#)
- Right Ascension (Min) (degrees): 163.134111
- Right Ascension (Max) (degrees): 163.591785
- Declination (Min) (degrees): 27.458276
- Declination (Max) (degrees): 27.863602

PDS Constraints

- Volume ID: COISS_2030 [Q](#)
- Data Set ID: CO-S-ISSNA/ISSWA-2-EDR-V1.0 [Q](#)
- Product ID: 1_N1553468588.122 [Q](#)
- Product Creation Time: 2007-03-25T06:33:17.000
- Primary File Spec:
COISS_2030/data/1553331600_1553532865/N1553468588_1.IMG [Q](#)
- OPUS ID: [co-iss-n1553468588](#) [Q](#)



[Questions / Feedback](#)

OPUS is a project of the [PDS Ring-Moon Systems Node](#) [TW](#) [Download Links History](#)

Selecting Observations (Cart)

The screenshot displays the OPUS3 web interface. At the top, there is a navigation bar with the following elements: "OPUS3", a search bar, a "Browse Results 735" button, a "Cart 26" icon, a "Detail" icon, a "New" star icon, and "Recent Announcements". On the right side of the navigation bar is a "Help" dropdown menu.

Below the navigation bar, there are several controls: "View Table", "Select Metadata", "Download CSV (all results)", and "Observation # 1". There are also two dropdown menus for "Observation Start Time" and "OPUS ID".

The main area of the interface is a grid of astronomical images. A context menu is open over one of the images, listing the following options:

- co-iss-n1521540615
- Add to cart
- Start add range to cart here
- Show detail
- Download CSV of selected metadata
- Download CSV of all metadata
- Download zipped data archive
- Download zipped URL archive

A tooltip is also visible over another image in the grid, containing the following text:

- #17: co-iss-n1521541195
- Click to enlarge (slideshow mode)
- Ctrl+click to toggle cart
- Shift+click to start/end range

At the bottom of the interface, there is a URL bar showing the current page address and a "Download Links History" button on the right.

Cart: Observations vs. Products

OPUS3 Search Browse Results 735 **Cart 26** Detail Recent Announcements Help

Download Options

Total Size (before zip): 182M Total Files: 316
Select which product types to include in downloads:

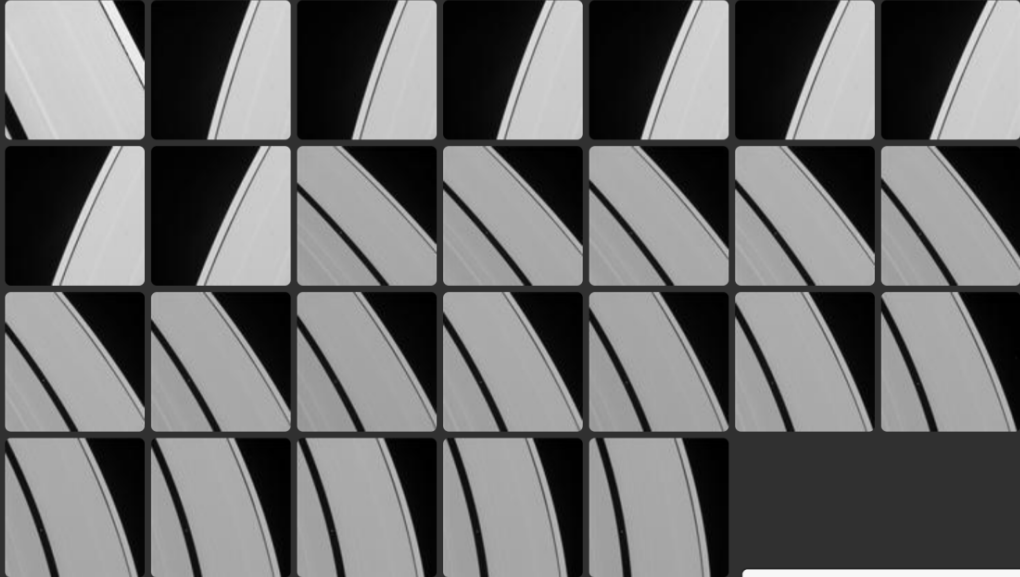
Select all product types Deselect all product types

Product Type	# Obs	# Files	Size
<input checked="" type="checkbox"/> Metadata Products			
<input checked="" type="checkbox"/> Target Body Inventory	26	6	917K
<input checked="" type="checkbox"/> Planet Geometry Index	26	6	4M
<input checked="" type="checkbox"/> Moon Geometry Index	26	6	2M
<input checked="" type="checkbox"/> Ring Geometry Index	26	6	6M
<input checked="" type="checkbox"/> Browse Products			
<input checked="" type="checkbox"/> Browse Image (thumbnail)	26	26	38K
<input checked="" type="checkbox"/> Browse Image (small)	26	26	123K
<input checked="" type="checkbox"/> Browse Image (medium)	26	26	330K
<input checked="" type="checkbox"/> Browse Image (full-size)	26	26	9M
<input checked="" type="checkbox"/> Cassini ISS-Specific Products			
<input checked="" type="checkbox"/> Raw image	26	58	26M
<input checked="" type="checkbox"/> Calibrated image	26	52	104M
<input checked="" type="checkbox"/> Extra preview (thumbnail)	26	26	20K
<input checked="" type="checkbox"/> Extra preview (medium)	26	26	126K
<input checked="" type="checkbox"/> Extra preview (full)	26	26	26M

View Table Select Metadata Observation #

Observation Start Time OPUS ID

[Download Metadata CSV](#) [Download Data Archive](#) [Download URL Archive](#)



Download Archive Links

- <https://tools.pds-rings.seti.org/downloads/pdsrms-url-n-2019-11-04T10-50-28.232508.zip>

[How to Cite OPUS](#)

OPUS is a project of the [PDS Ring-Moon Systems Node](#)

[Download Links History](#)

OPUS State Encoded in URL

How to Cite OPUS ✕



This QR code represents your current search parameters. Someone scanning this QR code will run the same search you are currently running, but not see your selection of metadata fields, sort order, etc.

(This encodes the URL <https://tools.pds-rings.seti.org/#/instrument=Cassini+ISS&planet=Saturn&RINGGEOringradius1=122050.000000&RINGGEOringradius2=136770.000000&COISSfilter=BL1%2BGRN,BL1&qtype-RINGGEOringradius=any>)



This QR code represents your complete current state. It includes search terms, sort order, metadata fields, which tab you are viewing (**Search**, **Browse Results**, **Cart**, or **Detail**), and which specific observations you are looking at. Someone scanning this QR code will see exactly what you were seeing before showing this Help panel (with the exception of minor changes due to browser size).

(This encodes your full current URL.)

User Experience Analysis

The image shows a screenshot of a user experience analysis tool. On the left is a list of search sessions, and on the right is a detailed view of a selected session.

Search Sessions List:

- 219.sub-174-204-6.myvzw.com (0:00:00)
 - 2019 Oct 03 04:02:21 (0:00:00)
- 2.152.103.57.dyn.user.ono.com (5:44:17)
 - 2019 Oct 03 08:30:37 (0:39:13)
 - 2019 Oct 04 07:05:34 (0:02:46)
 - 2019 Oct 05 11:34:13 (0:25:31)
 - 2019 Oct 05 13:15:08 (0:03:24)
 - 2019 Oct 06 09:25:11 (0:21:22)
 - 2019 Oct 06 11:09:43 (0:00:32)
 - 2019 Oct 06 13:17:35 (0:32:05)
 - 2019 Oct 06 14:50:29 (0:06:27)**
 - 2019 Oct 07 08:38:57 (0:12:59)
 - 2019 Oct 07 09:55:25 (0:07:53)
 - 2019 Oct 07 11:30:47 (0:08:28)
 - 2019 Oct 08 11:28:23 (0:43:16)
 - 2019 Oct 09 15:28:58 (0:00:23)
 - 2019 Oct 10 09:21:59 (0:01:13)
 - 2019 Oct 17 08:59:59 (0:11:45)
 - 2019 Oct 17 10:23:36 (0:21:16)
 - 2019 Oct 17 14:28:48 (0:33:05)
 - 2019 Oct 24 12:27:49 (1:12:39)
- home-nat.corp.oreilly.com (0:00:01)
 - 2019 Oct 14 10:32:40 (0:00:01)
- rrcs-72-45-130-46.nys.biz.rr.com (0:01:23)
 - 2019 Oct 26 15:46:30 (0:01:23)

Session Details (2.152.103.57.dyn.user.ono.com):

IP: 2.152.103.57.dyn.user.ono.com
IP (Numeric): (2.152.103.57) at 2019 Oct 06 14:50:29 -0700

Search Slugs: mission, planet, target, VGISScamera, VGISSfilter
Column Slugs: instrument, observationduration, opusid, planet, target, time1

Session Log:

- 0:00:00 • Begin New Search
 - Add Search: "Camera [Voyager ISS]" = "Narrow Angle"
 - Add Search: "Intended Target Name [General]" = "Triton"
 - Add Search: "Mission [General]" = "Voyager"
 - Add Search: "Planet [General]" = "Neptune"
- 0:00:00 • View Browse Gallery: Starting Observation 261
- 0:00:01 • Fetch Browse Gallery Starting Observation 196 Limit 65
- 0:00:06 • Refining Previous Search
 - Change Search: "Camera [Voyager ISS]" = "Narrow Angle", "Wide Angle"
- 0:00:12 • View Browse Gallery: Starting Observation 1
- 0:00:13 • Fetch Browse Gallery Starting Observation 91 Limit 65
- 0:00:15 • Fetch Browse Gallery Starting Observation 91 Limit 65
- 0:00:16 • Fetch Browse Gallery Starting Observation 91 Limit 65
- 0:00:22 • Refining Previous Search
 - Remove Search: "Intended Target Name [General]"
- 0:00:23 • Add Search: "Intended Target Name [General]" = "Neptune"
- 0:00:24 • View Browse Gallery: Starting Observation 1
- 0:00:26 • Fetch Browse Gallery Starting Observation 131 Limit 65
- 0:00:27 • Fetch Browse Gallery Starting Observation 196 Limit 65
- 0:00:28 • Fetch Browse Gallery Starting Observation 794 Limit 195
- 0:00:31 • Fetch Browse Gallery Starting Observation 989 Limit 65
- 0:00:35 • Fetch Browse Gallery Starting Observation 1054 Limit 65
- 0:00:37 • Fetch Browse Gallery Starting Observation 1119 Limit 65
- 0:00:49 • Refining Previous Search

OPUS API: Searching Example

- Search for any observation that satisfies
 - It's an Image
 - of Jupiter or Saturn
 - where the *PDS Note* field contains "ring" or "phase"
 - and the observed phase angle for every point in the image is *only* between 150 and 170 degrees
- URL <query string>:

```
... observationtype=Image&planet=Jupiter,Saturn&
note_01=ring&qtype-note_01=contains&
note_02=phase&qtype-note_02=contains&
RINGGEOphase1=150&RINGGEOphase2=170&
qtype-RINGGEOphase=only
```

Search Results (Data)

- Actual data for <query string> sorted in reverse order by ring phase angle. Fields requested are minimum and maximum ring phase angle, instrument name, exposure duration, image pixel size, minimum and maximum filter wavelength

```
/api/data.json?<query string>&  
order=-RINGGEOphase1,opusid&  
cols=RINGGEOphase1,RINGGEOphase2,instrument,duration,  
greaterpixelsize,wavelength1,wavelength2
```

```
[["165.488", "168.627", "Voyager ISS", "15.3600", "800", "0.2800", "0.6400"],  
["163.639", "167.120", "Voyager ISS", "15.3600", "800", "0.2800", "0.6400"],  
["160.312", "160.963", "Voyager ISS", "0.2400", "800", "0.2800", "0.6400"],  
["160.047", "160.383", "New Horizons LORRI", "9.9670", "1024", "0.3500", "0.8500"],  
["160.047", "160.382", "New Horizons LORRI", "9.9670", "1024", "0.3500", "0.8500"],  
["160.046", "160.382", "New Horizons LORRI", "9.9670", "1024", "0.3500", "0.8500"],  
["159.823", "160.159", "New Horizons LORRI", "9.9670", "1024", "0.3500", "0.8500"],  
["159.823", "160.159", "New Horizons LORRI", "9.9670", "1024", "0.3500", "0.8500"],  
["159.822", "160.158", "New Horizons LORRI", "9.9670", "1024", "0.3500", "0.8500"],  
["159.755", "160.087", "New Horizons LORRI", "9.9670", "1024", "0.3500", "0.8500"],  
["159.755", "160.087", "New Horizons LORRI", "9.9670", "1024", "0.3500", "0.8500"],
```

[...]

Search Results (Info)

- Number of results:

```
/api/meta/result_count.json?<query string>  
{"result_count": 117}
```

- Breakdown by mission:

```
/api/meta/mults/mission.json?<query string>  
{"New Horizons": 91, "Voyager": 26}
```

- Range of values available for ring radius:

```
/api/meta/range/endpoints/RINGGEOringradius1.json?  
<query string>  
{"min": "61082.725000", "max": "2999253.227000",  
  "nulls": 0}
```

Resources

- GitHub

`https://github.com/SETI/pds-opus`

- Twitter

`@pdsopus`

- Blog

`https://ringsnodesearchtool.blogspot.com/`

- `opus-users` mailing list coming soon