Rings Node Report

PDSMC Presentation

Washington, DC
April 2, 2009

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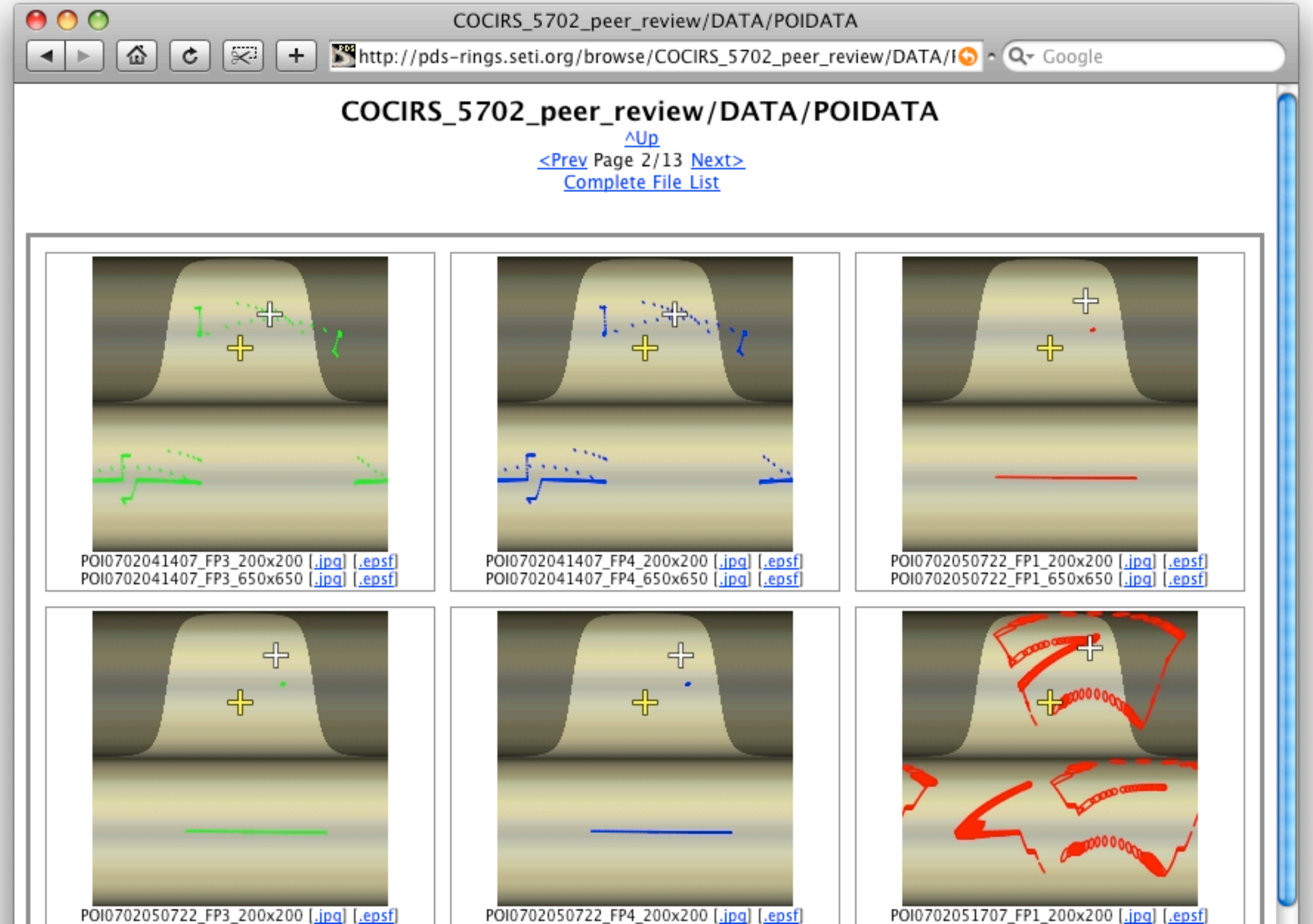
Mitchell K. Gordon

Cassini Tasks

- ISS
  - We have built and tested the calibration pipeline.
    - An updated pipeline was just released.
- VIMS
  - We are working to resolve problems with the published calibration pipeline.
- Occultations (UVIS, VIMS, RSS)
  - We are working with team members to archive derived products.
- CIRS
  - Re-formatting of released volumes continues.
  - A rewrite of the pipeline is in progress to resolve liens and address “quirks”.
  - Footprint diagrams for the rings and the planet are on line.

CIRS Ring Footprints

CIRS Atmospheric Footprints



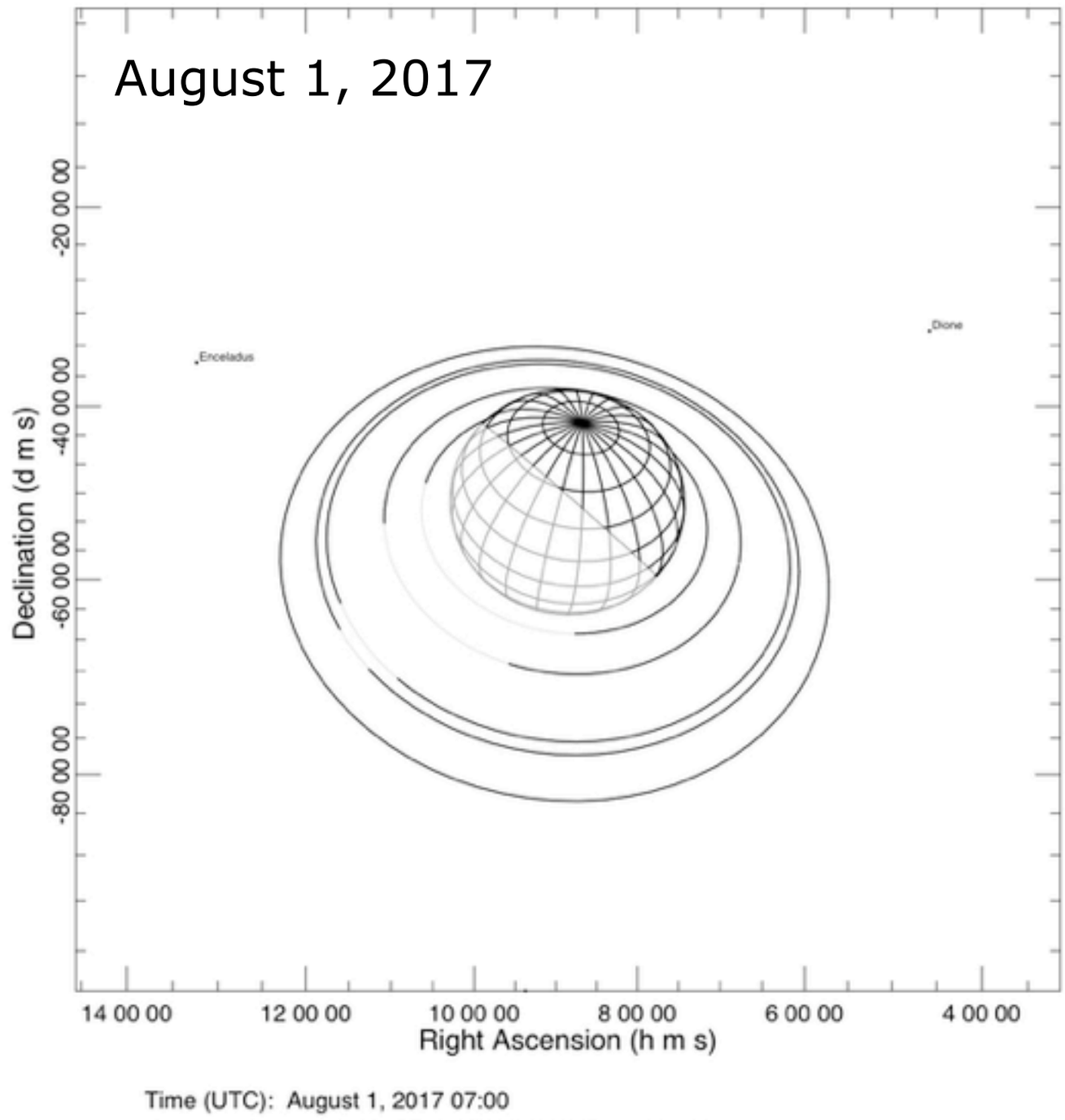
Cassini Planning Tools

- ALL on-line tools now incorporate the Cassini XXM tour!

August 1, 2017

Cassini Planning Tools

- ALL on-line tools now incorporate the Cassini XXM tour!



LORRI INDEX.TAB: Before

- VOLUME_ID
- PATH_NAME
- FILE_NAME
- DATA_SET_ID
- PRODUCT_ID
- PRODUCT_CREATION_TIME
- REDUCTION_LEVEL
- SPACECRAFT_CLOCK_START_COUNT
- SPACECRAFT_CLOCK_STOP_COUNT
- START_TIME
- STOP_TIME
- TARGET_NAME
- INSTRUMENT_HOST
- INSTRUMENT_ID
- INSTRUMENT_NAME
- TELEMETRY_APPLICATION_ID

LORRI INDEX.TAB: After

- VOLUME_ID
- FILE_SPECIFICATION_NAME
- PRODUCT_ID
- **SEQUENCE_ID**
- TARGET_NAME
- PRODUCT_CREATION_TIME
- START_TIME
- STOP_TIME
- SPACECRAFT_CLOCK_START_COUNT
- SPACECRAFT_CLOCK_STOP_COUNT
- TELEMETRY_APPLICATION_ID
- **EXPOSURE_DURATION**
- **INST_CMPRS_TYPE**
- **SC_TARGET_POSITION_VECTOR_X**
- **SC_TARGET_POSITION_VECTOR_Y**
- **SC_TARGET_POSITION_VECTOR_Z**
- **TARGET_CENTER_DISTANCE**
- **TARGET_SUN_POSITION_VECTOR_X**
- **TARGET_SUN_POSITION_VECTOR_Y**
- **TARGET_SUN_POSITION_VECTOR_Z**
- **SOLAR_DISTANCE**
- **SC_SUN_POSITION_VECTOR_X**
- **SC_SUN_POSITION_VECTOR_Y**
- **SC_SUN_POSITION_VECTOR_Z**
- **SPACECRAFT_SOLAR_DISTANCE**
- **SC_EARTH_POSITION_VECTOR_X**
- **SC_EARTH_POSITION_VECTOR_Y**
- **SC_EARTH_POSITION_VECTOR_Z**
- **SC_GEOCENTRIC_DISTANCE**
- **PHASE_ANGLE**
- **QUATERNIAN_1**
- **QUATERNIAN_2**
- **QUATERNIAN_3**
- **QUATERNIAN_4**

Voyager SPICE C Kernels

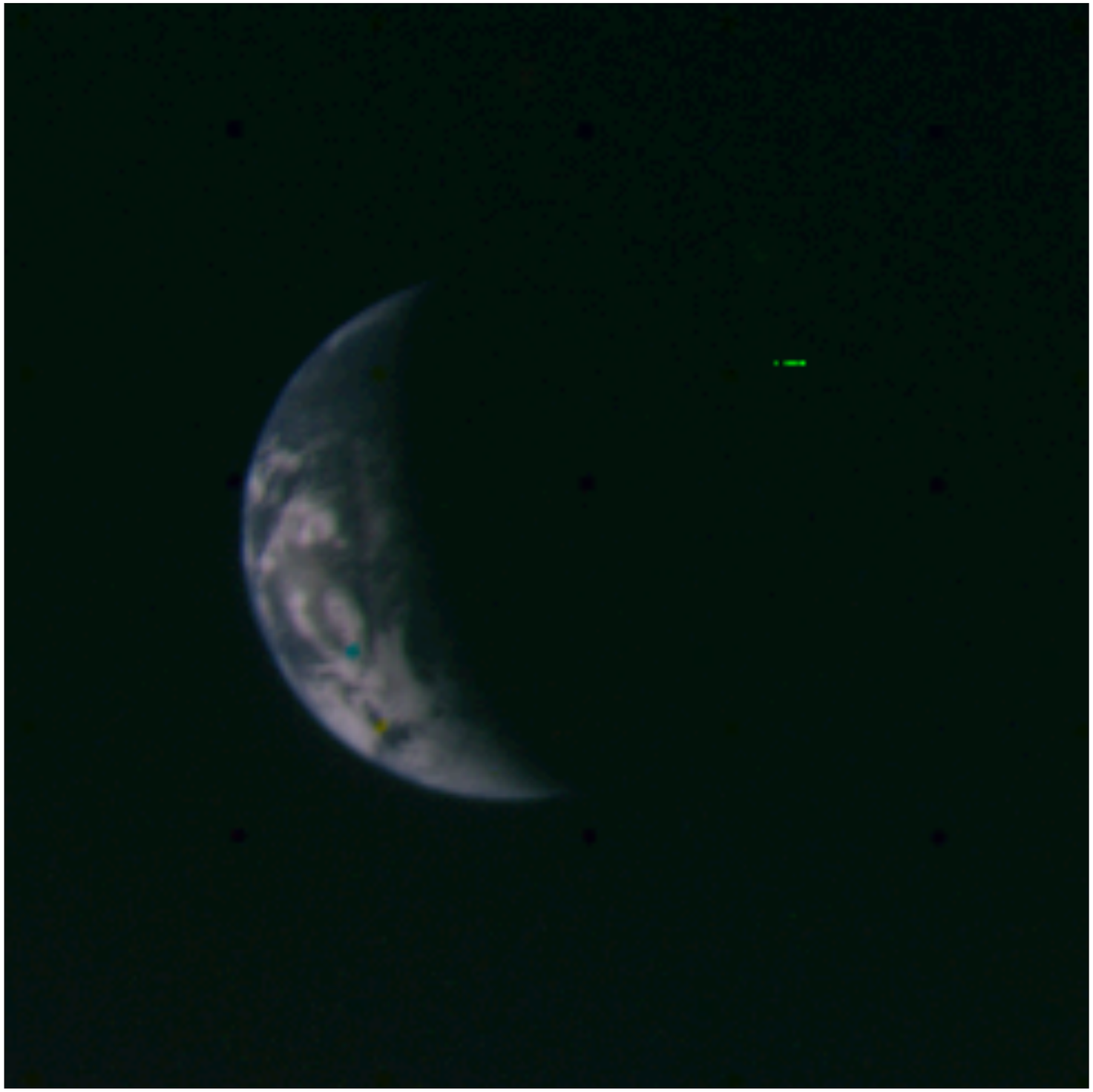
- We obtained the ISS SEDRs, updated them for obvious errors, and published "Type 1" (discrete) C kernels.
  - The wide/narrow-angle offset must be solved for each flyby.
  - Pointing accuracy is good, not great.
- We have used UVS SEDRs to interpolate through the gaps in the Voyager 2 Saturn encounter, yielding a "Type 3" (continuous) C kernel.
- This work is extremely labor-intensive.
  - PMDAP funding may be sought.

Voyager ISS

- The Voyager images were originally archived on CD-ROM in compressed, raw format.
- We are running the calibration pipeline while we still can.
  - The Voyager ISS Saturn images have been processed and are now in lien resolution.
    - Images are preserved at each step in the calibration process.
  - Data from the remaining encounters will be processed on a best-effort basis.

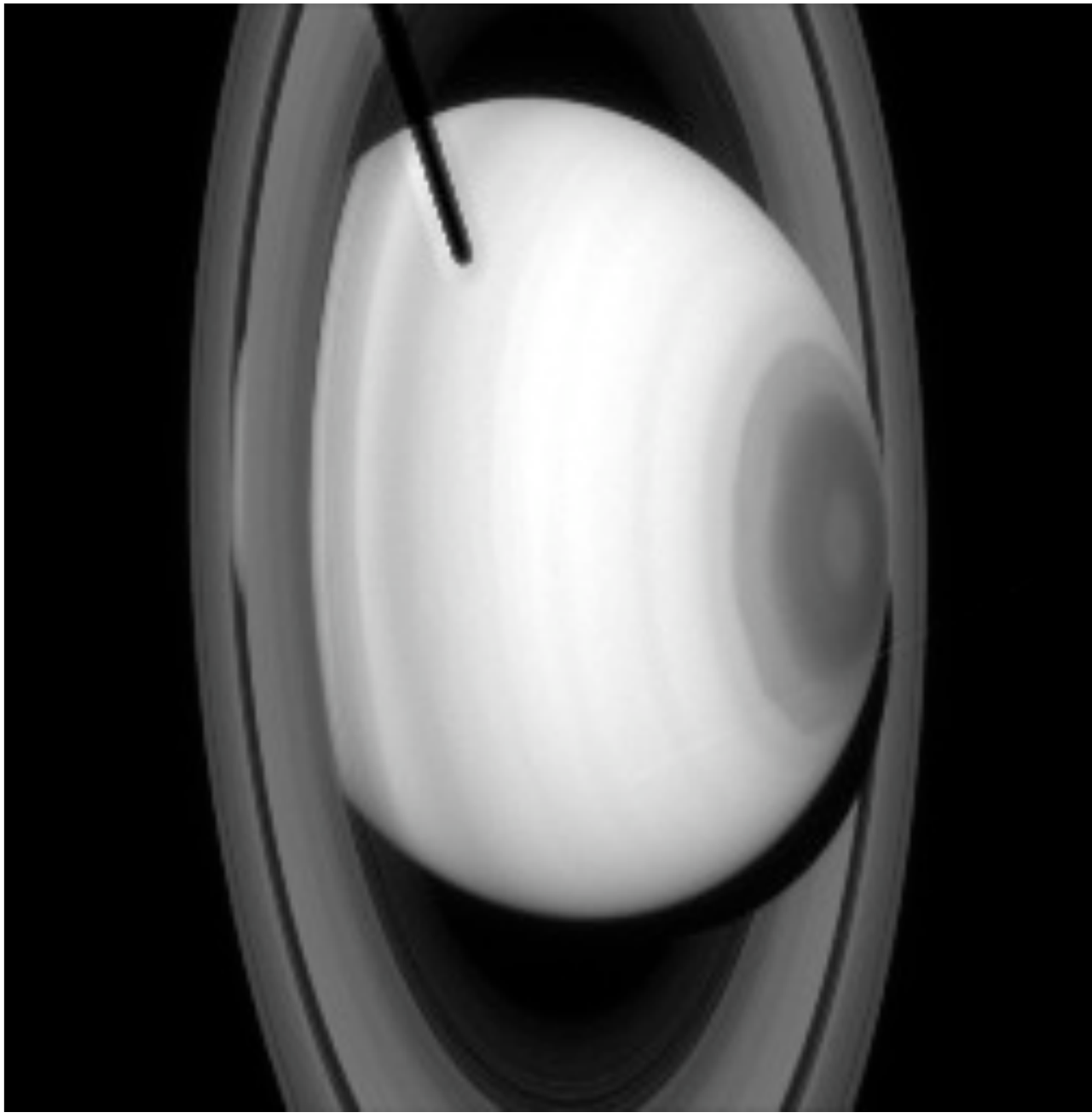
- At user request, we are working with Charlie Avis at JPL to recover the “cruise” images of Earth!

Voyager ISS



Hubble Space Telescope

- We are integrating the HST data sets into our catalogs and holdings.
  - We are searching the Hubble archive regularly for newly released data on the outer planets.
  - We have developed a pipeline to create PDS “wrappers” for data files from WFPC2, STIS, NICMOS and ACS.
  - 148 volumes are ready.
  - Metadata generation to follow shortly.



Multi-Mission Search Engine

- Can accommodate any/all types of data.
- Allows general searches across multiple data sets.
- Allows specific searches within a single data set.
- Allows the user to "drill down" if s/he does not know which data sets are available.
- Supports a rich selection of geometric metadata.
  ...and could support more.
- Supports "single-click" downloads, and "shopping carts" for larger requests.
- Shows previews of most data products.
- Builds associations between data products if multiple processing levels are available.
  - E.g., calibrated vs. raw.

Multi-Mission Search Engine

pds-rings.seti.org/search

Rings Node Search Tool

http://pds-rings.seti.org/search/

Rings Node Search Tool | about the data | contact us | start over | Result Count: | No Selections | View Results

save this query

General Constraints

Ring Geometry Constraints

Wavelength Constraints

General Constraints

- Planet
  - Jupiter, Saturn, Uranus, Neptune, Venus, Earth
- Nominal Target Name
- Nominal Target Class
- Mission
- Instrument Host Name
- Instrument Name
- Observation Time
- Target Intercept Time
- Observation Duration
- Observation Class
- Measurement Quantity
- Data Type
- Ring Observation ID
- Note
- Right Ascension
- Declination
- Volume ID
- File Name
- File Directory Path

Datasets available for searching are: COVIMS, COCIRS, COISS, GOSSI, NHJULO, VG1 and VG2.
View Included volume list

Rings Node Home | Browse Volumes Directly

PDS | Atmospheres | Geosciences | Imaging | NAIF | PPI | Rings | Small Bodies

SETI Institute
+ Carl Sagan Center

Curator: Mark Showalter
Webmaster: Neil Heather

Rings Node Search

Rings Node Search Tool

http://pds-rings.seti.org/search/

Rings Node Search Tool | about the data | contact us | start over | Result Count: 309,355 | View Results

save this query

General Constraints

Ring Geometry Constraints

Wavelength Constraints

General Constraints

Planet: Jupiter, Saturn, Uranus, Neptune, Venus, Earth

show alert

Nominal Target Name
Nominal Target Class
Mission
Instrument Host Name
Instrument Name
Observation Time
Target Intercept Time
Observation Duration
Observation Class
Measurement Quantity
Data Type
Ring Observation ID
Note
Right Ascension
Declination
Volume ID
File Name
File Directory Path

- Click on Saturn
- Result count updates immediately

Rings Node Home | Browse Volumes Directly

PDS | Atmospheres | Geosciences | Imaging | NAIF | PPI | Rings | Small Bodies

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save this query

General Constraints

Ring Geometry Constraints

Wavelength Constraints

General Constraints

Planet

Jupiter | Saturn | Uranus | Neptune | Venus | Earth

Nominal Target Name
Nominal Target Class
Mission
Instrument Host Name
Instrument Name
Observation Time
Target Intercept Time
Observation Duration
Observation Class
Measurement Quantity
Data Type
Ring Observation ID
Note
Right Ascension
Declination
Volume ID
File Name
File Directory Path

Result breakdown by Instrument:

Volume ID	Count
COCIRS	8,703
COISS	143,444
COVIMS	128,106
VGISS	29,102
Total:	**309,355**

- The "magnifying glass" tells you more.

Rings Node Home | Browse Volumes Directly

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save this query

General Constraints

Ring Geometry Constraints

Wavelength Constraints

General Constraints

Planet

Jupiter | Saturn | Uranus | Neptune | Venus | Earth

show alert

Nominal Target Name

Nominal Target Class

Mission

Cassini | Galileo | Earth Based | Voyager | New Horizons | Pioneer

Instrument Host Name

Instrument Name

Cassini ISS | Cassini CIRS | Cassini VIMS | Cassini UVIS | Galileo SSI | Hubble ACS | Voyager ISS | New Horizons LORRI

Hubble WFPC2 | Voyager IRIS

Observation Time

min: max: [x] [...] add range

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

Target Intercept Time

Observation Duration

Observation Class

Measurement Quantity

Data Type

Ring Observation ID

Note

Right Ascension

Declination

Volume ID

File Name

File Directory Path

- Open triangles to see options.
- Unavailable options are grayed out.

Rings Node Search

Rings Node Search Tool

http://pds-rings.seti.org/search/index.php?start_over=yes

Rings Node Search Tool | about the data | contact us | start over | Result Count: 309,355 | View Results

save this query

General Constraints

Ring Geometry Constraints

Wavelength Constraints

Ring Geometry Constraints

- Ring Radius
- J2000 Ring Longitude
- Sub Observer Ring Longitude
- Solar Hour Angle
- Ring Intercept Time
- Ring Plane Resolution
- Range to Ring Intercept
- Sub Observer Latitude
- Phase Angle
- Incidence Angle
- Emission Angle
- Planet Behind Ring Flag
- Ring Shadow Flag
- Edge-On Ring Resolution
- Edge-On Point Range
- Edge-On Ring Radius
- Edge-On Solar Hour Angle
- Edge-On J2000 Longitude
- Edge-On Ring Elevation

Geometry data is available for COISS volumes COISS_2001 through COISS_2025. Geometry data is not available for COVIMS X

- Tabs along left support additional constraints, including geometry & wavelength

Rings Node Home | Browse Volumes Directly

PDS | Atmospheres | Geosciences | Imaging | NAIF | PPI | Rings | Small Bodies

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Rings Node Search

Rings Node Search Tool

http://pds-rings.seti.org/search/index.php?start_over=yes

Rings Node Search Tool | about the data | contact us | start over | Result Count: 702 | View Results

save this query

General Constraints

Ring Geometry Constraints

Wavelength Constraints

Ring Geometry Constraints

Ring Radius

min: 140080 max: 140390 [x] [...] km add range

J2000 Ring Longitude

Sub Observer Ring Longitude

Solar Hour Angle

Ring Intercept Time

Ring Plane Resolution

min: max: 10 [x] [...] (km) add range

Range to Ring Intercept

Sub Observer Latitude

Phase Angle

Incidence Angle

Emission Angle

Planet Behind Ring Flag

Ring Shadow Flag

Edge-On Ring Resolution

Edge-On Point Range

Edge-On Ring Radius

Edge-On Solar Hour Angle

Edge-On J2000 Longitude

Edge-On Ring Elevation

Select F Ring standard values

show alert

Require < 10 km resolution

- We now have 702 hits

Rings Node Home | Browse Volumes Directly

PDS | Atmospheres | Geosciences | Imaging | NAIF | PPI | Rings | Small Bodies

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Gallery View

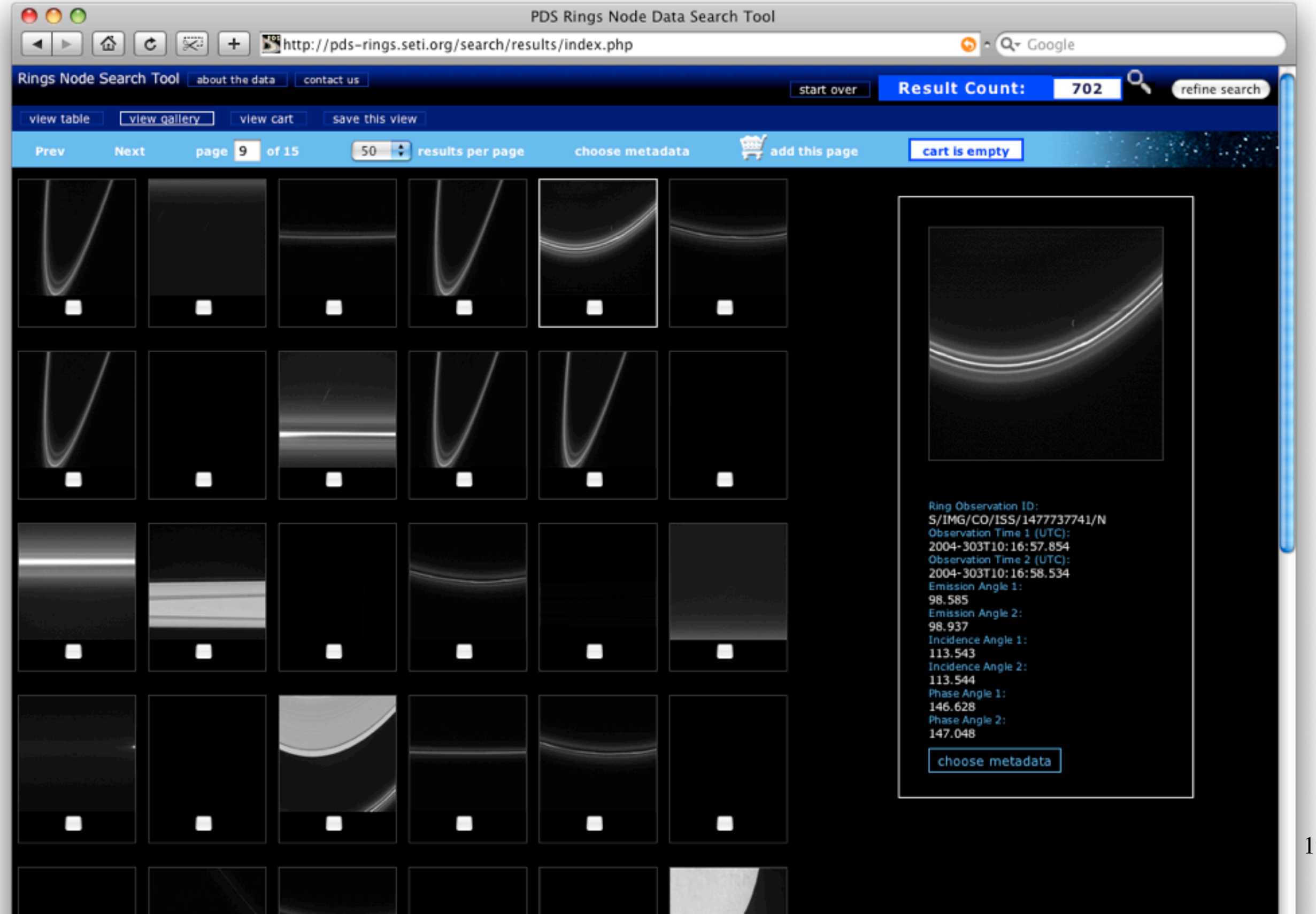


Table View

PDS Rings Node Data Search Tool

http://pds-rings.seti.org/search/results/index.php

Rings Node Search Tool | about the data | contact us | start over | Result Count: 702 | refine search

view table | view gallery | view cart | save this view

Prev | Next | page 9 of 15 | 50 results per page | choose columns | add this page | cart is empty

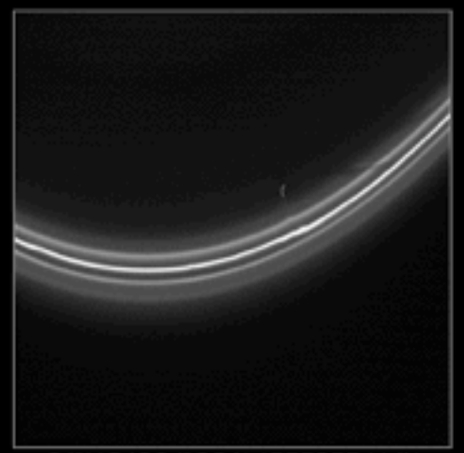
Ring Observation ID	Observation Time 1 (UTC)	Observation Time 2 (UTC)	Emission Angle 1	Emission Angle 2	Incidence Angle 1	Incidence Angle 2	Phase Angle 1	Phase Angle 2
S/IMG/CO/ISS/1477692077/N	2004-302T21:35:54.782	2004-302T21:35:54.832	91.374	91.794	113.547	113.549	154.608	155.006
S/IMG/CO/ISS/1540682564/N	2006-300T22:50:22.351	2006-300T22:50:37.351	NULL	NULL	NULL	NULL	10.104	10.104
S/IMG/CO/ISS/1503270548/N	2005-232T22:41:00.994	2005-232T22:41:01.074	76.517	76.996	110.668	110.668	159.699	160.083
S/IMG/CO/ISS/1477691897/N	2004-302T21:32:54.783	2004-302T21:32:54.833	91.325	91.745	113.547	113.549	154.666	155.066
S/IMG/CO/ISS/1477737741/N	2004-303T10:16:57.854	2004-303T10:16:58.534	98.585	98.937	113.543	113.544	146.628	147.048
S/IMG/CO/ISS/1503279192/N	2005-233T01:05:04.899	2005-233T01:05:05.019	77.330	77.699	110.666	110.667	152.180	152.623
S/IMG/CO/ISS/1477691717/N	2004-302T21:29:54.784	2004-302T21:29:54.834	91.276	91.696	113.547	113.549	154.724	155.125
S/IMG/CO/ISS/1537884316/N	2006-268T13:33:26.199	2006-268T13:33:27.199	139.096	139.591	105.718	105.719	84.219	84.702
S/IMG/CO/ISS/1540682398/N	2006-300T22:47:36.352	2006-300T22:47:51.352	NULL	NULL	NULL	NULL	10.516	10.516
S/IMG/CO/ISS/1477691537/N	2004-302T21:26:54.785	2004-302T21:26:54.835	91.228	91.648	113.547	113.549	154.779	155.182
S/IMG/CO/ISS/1477691357/N	2004-302T21:23:54.787	2004-302T21:23:54.837	91.179	91.599	113.547	113.549	154.835	155.239
S/IMG/CO/ISS/1537909452/N	2006-268T20:32:22.859	2006-268T20:32:23.039	101.188	101.614	105.713	105.714	41.624	42.091
S/IMG/CO/ISS/1541717903/N	2006-312T22:25:51.743	2006-312T22:26:09.743	NULL	NULL	NULL	NULL	13.711	13.711
S/IMG/CO/ISS/1521541389/N	2006-079T09:53:04.384	2006-079T09:53:04.474	90.301	90.653	108.178	108.183	22.665	23.153
S/IMG/CO/ISS/1537884185/N	2006-268T13:31:15.200	2006-268T13:31:16.200	138.762	139.257	105.719	105.719	84.630	85.115
S/IMG/CO/ISS/1503279435/N	2005-233T01:09:07.897	2005-233T01:09:08.017	77.370	77.748	110.666	110.667	151.960	152.397
S/IMG/CO/ISS/1521541268/N	2006-079T09:51:03.385	2006-079T09:51:03.475	90.301	90.653	108.178	108.183	22.686	23.175
S/IMG/CO/ISS/1541717751/N	2006-312T22:23:19.744	2006-312T22:23:37.744	NULL	NULL	NULL	NULL	14.073	14.073
S/IMG/CO/ISS/1531215801/N	2006-191T09:12:13.980	2006-191T09:12:14.800	89.352	89.704	106.736	106.765	163.130	163.576
S/IMG/CO/ISS/1537884053/N	2006-268T13:29:03.201	2006-268T13:29:04.201	138.427	138.921	105.719	105.719	85.036	85.521
S/IMG/CO/ISS/1477737857/N	2004-303T10:18:53.973	2004-303T10:18:54.533	98.595	98.947	113.543	113.544	146.557	146.979
S/IMG/CO/ISS/1503270428/N	2005-232T22:39:00.995	2005-232T22:39:01.075	76.544	77.021	110.668	110.668	159.727	160.104
S/IMG/CO/ISS/1503279679/N	2005-233T01:13:11.896	2005-233T01:13:12.016	77.409	77.796	110.666	110.667	151.741	152.171
S/IMG/CO/ISS/1537883920/N	2006-268T13:26:50.202	2006-268T13:26:51.202	138.089	138.583	105.719	105.719	85.444	85.930

Product View

S/IMG/CO/ISS/1477737741/N

http://pds-rings.seti.org/search/info_page/index.php?ring_obs_id=S/IMG/CO/ISS/1477737741/N

Rings Node Search Tool | about the data | contact us | start over | Result Count: 702 | Back to Results



S/IMG/CO/ISS/1477737741/N

add to cart:

Previous Page | Next Page

Products

1 Product Found:

FILE_SPECIFICATION_NAME:
data/1477737519_1477742589/N1477737741_1: LBL IMG FMT FMT
VOLUME_ID: COISS_2008
PRODUCT_TYPE: RAW_IMAGE
LABEL_TYPE: DETACHED
OBJECT_TYPE: IMG
FILE_FORMAT_TYPE: VICAR
INTERCHANGE_FORMAT: BINARY
note:

- Click to download individual files

General Constraints

Planet	Saturn
Nominal Target Name	S RINGS

Shopping Cart

PDS Rings Node Data Search Tool

http://pds-rings.seti.org/search/results/

Rings Node Search Tool | about the data | contact us | start over | Result Count: 702 | refine search

view table | view gallery | view cart

You have 50 observations in your cart

Total products: 50 Total files: 200 Total size: 70.70 MB

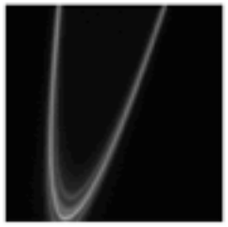
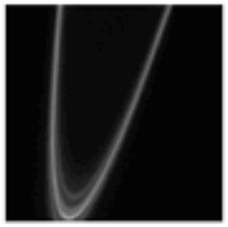
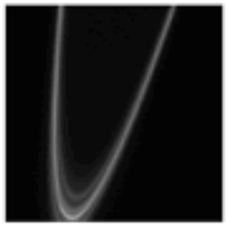
get CSV | Create ZIP File

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

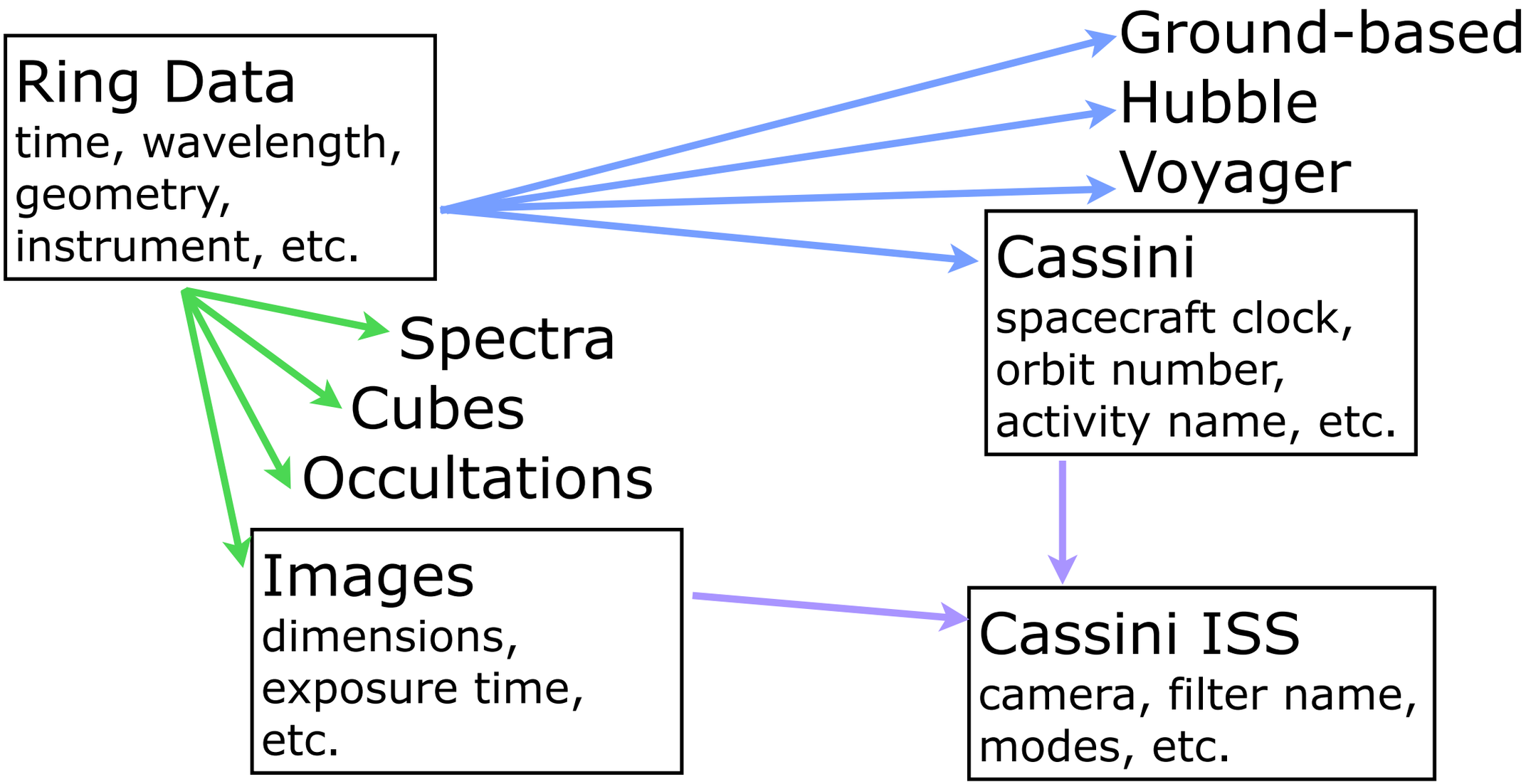
Empty Cart

- Download table or get zip file of all results

Prev Next page 1 of 1 100 results per page choose columns remove this page 50 items in cart

	Thumbnail	Products	Ring Observation ID	Ring Observation ID	Observation Time 1 (UTC)	Observation Time 2 (UTC)	Emission Angle 1	Emission Angle 2	In
☑		1 of 1	S/IMG/CO/ISS/1477691357/N	S/IMG/CO/ISS/1477691357/N	2004-302T21:23:54.787	2004-302T21:23:54.837	91.179	91.599	1
☑		1 of 1	S/IMG/CO/ISS/1477691537/N	S/IMG/CO/ISS/1477691537/N	2004-302T21:26:54.785	2004-302T21:26:54.835	91.228	91.648	1
☑		1 of 1	S/IMG/CO/ISS/1477691717/N	S/IMG/CO/ISS/1477691717/N	2004-302T21:29:54.784	2004-302T21:29:54.834	91.276	91.696	1

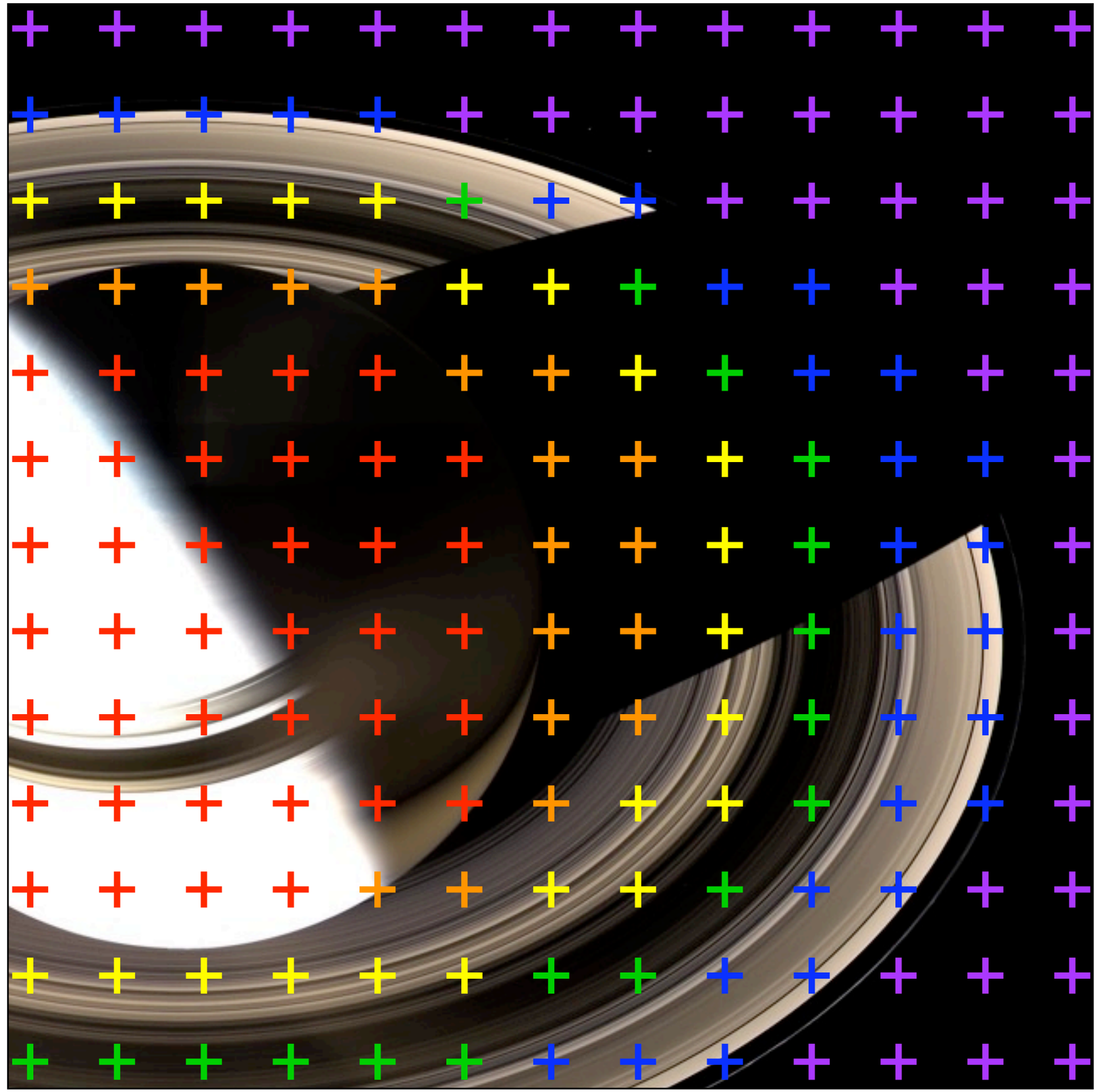
Multiple Inheritance



- Each data set inherits the properties it has in common with other data sets.
  - Each box corresponds to one or more search tabs.
- Search options appear based on the common traits of the user's selected products.

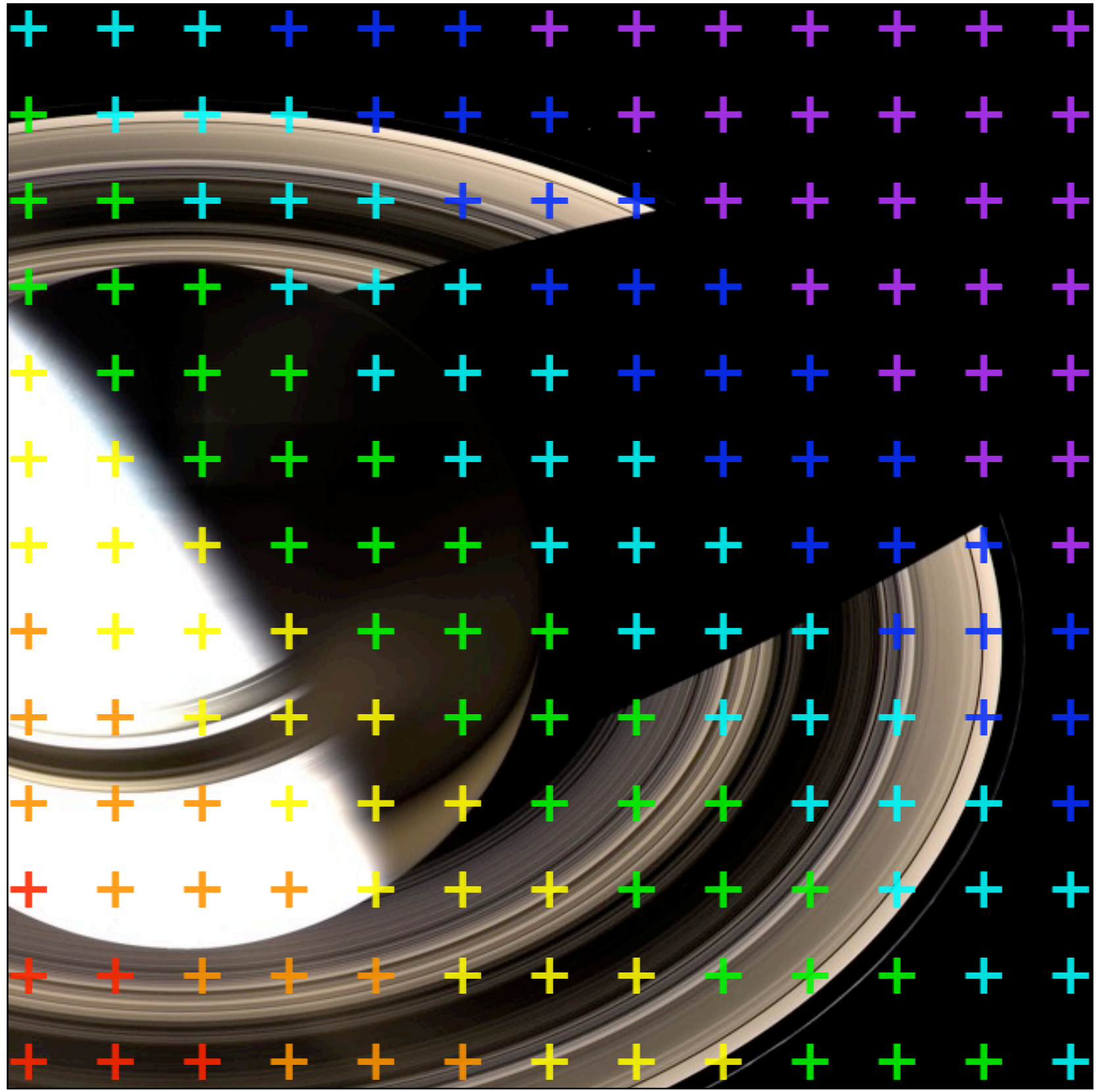
Sample Geometric Metadata

- Orbital radius
  - + NULL
  - + 80,000 km
  - + 100,000 km
  - + 120,000 km
  - + 140,000 km
  - + beyond



Sample Geometric Metadata

- Phase angle
  - + 77°
  - + 78°
  - + 79°
  - + 80°
  - + 81°
  - + 82°
  - + 83°



Geometric Metadata

- We are developing the capability to generate all relevant geometric metadata in-house.
  - Using SPICE tools of course!
- Our approach is to sample a field of view fully.
  - Most teams just provide information at the center or four corners (if that much).
- This assures consistency and makes searches across otherwise disparate data sets possible.
- Our tool could be used to reduce the workload on data our providers.
  - Some teams provide geometric metadata; others don't.
  - Quality is highly variable.