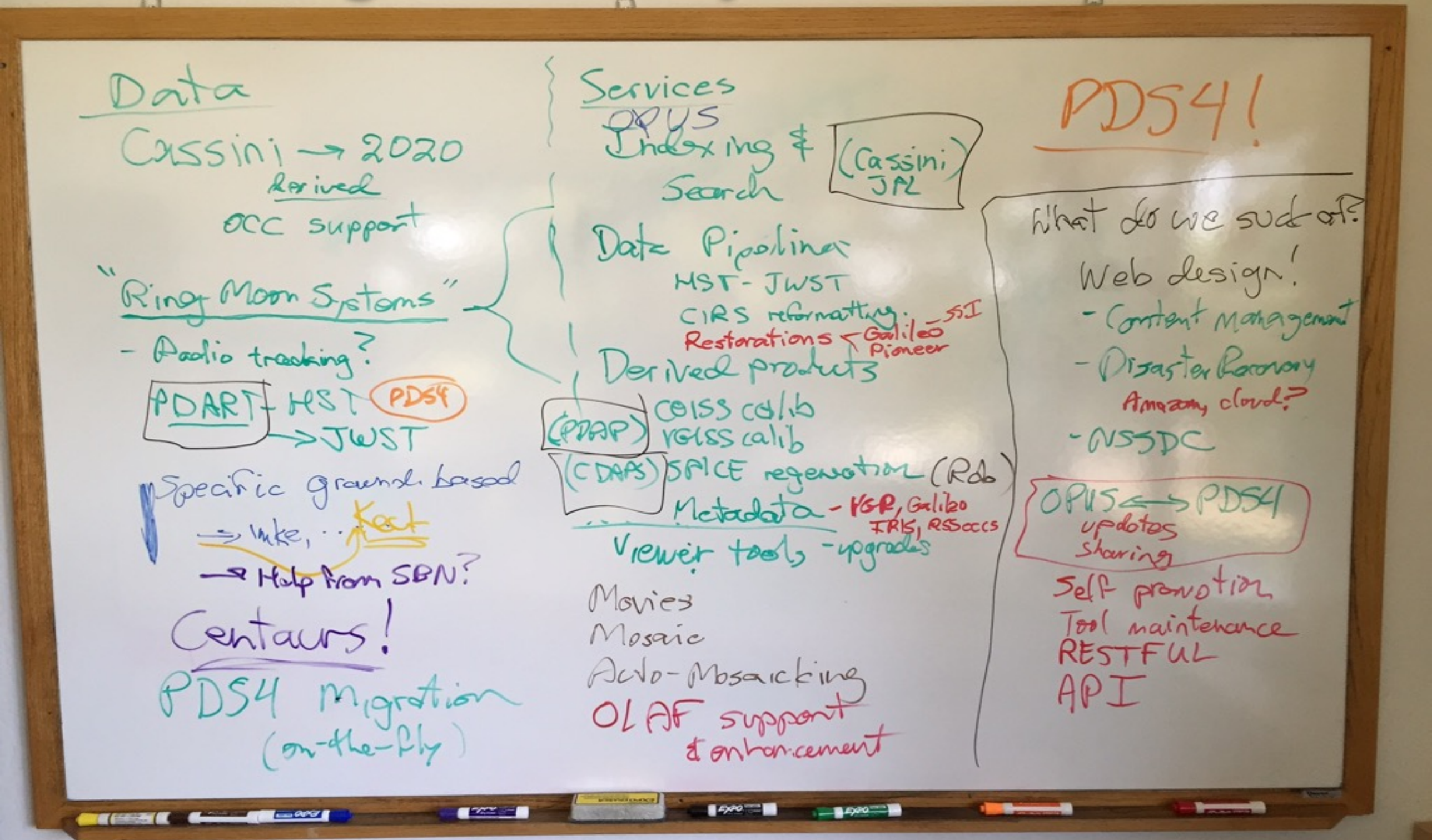
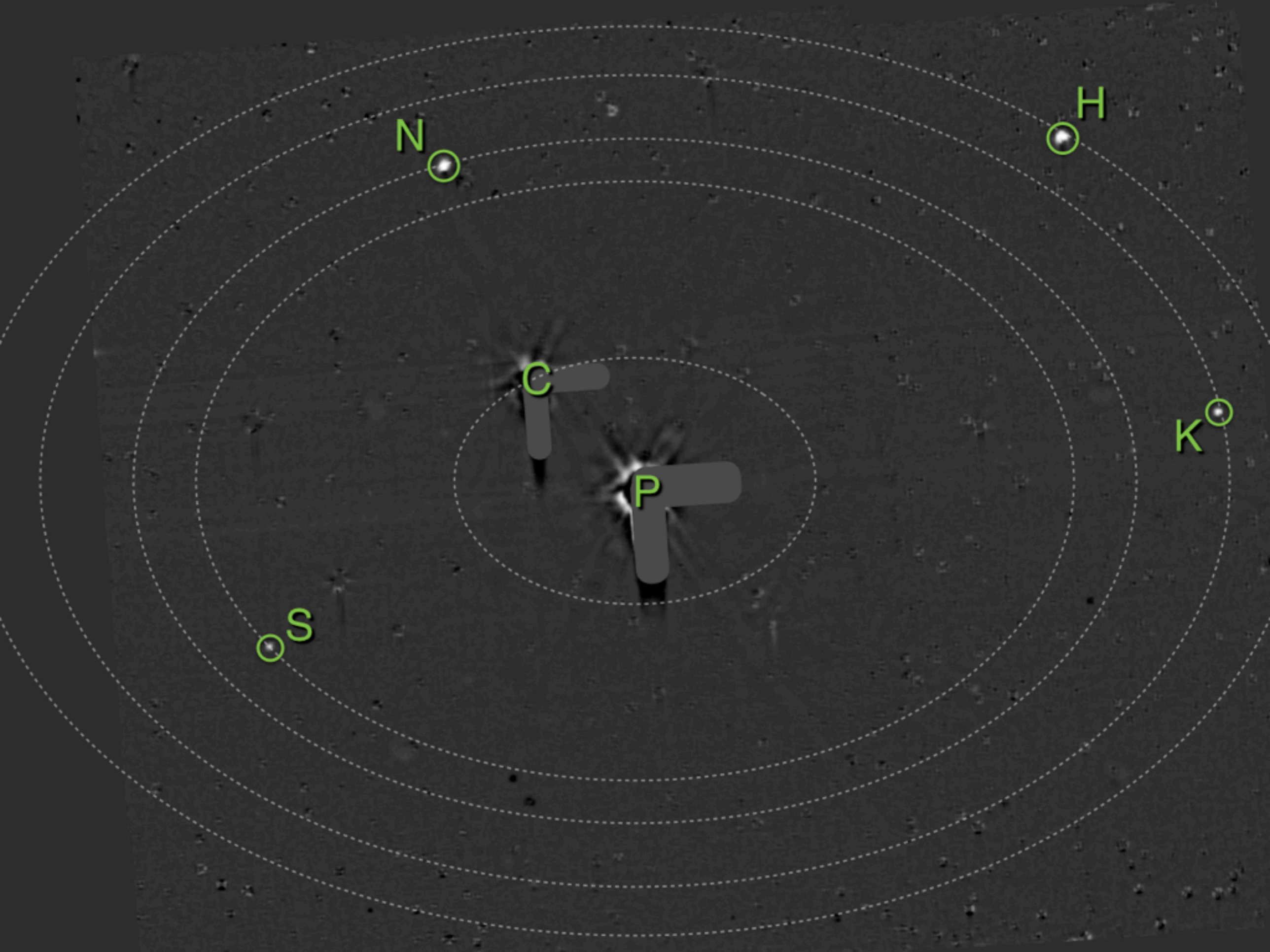
Introducing the Ring-Moon Systems Node



How I Spent My Summer Vacation


N
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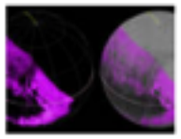
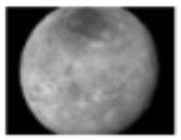
Latest | Related


Infrared Spectrometer on NASA's New Horizons Spacecraft...
2 days ago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Stunning Nightside Image Reveals Pluto's Hazy Skies
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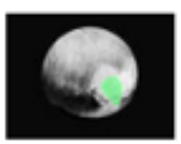
Frozen Carbon Monoxide in Pluto's 'Heart'
2 months ago


Frozen Plains in the Heart of Pluto's 'Heart'
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Pluto is Dominated by the Feature Informally Named the "Heart"
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New Horizons Spacecraft Displays Pluto's Big Heart
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The Women who Power NASA's New Horizons Mission to...
2 months ago

Women Make Up Approximately 25 Percent of the New...

Solar System and Beyond

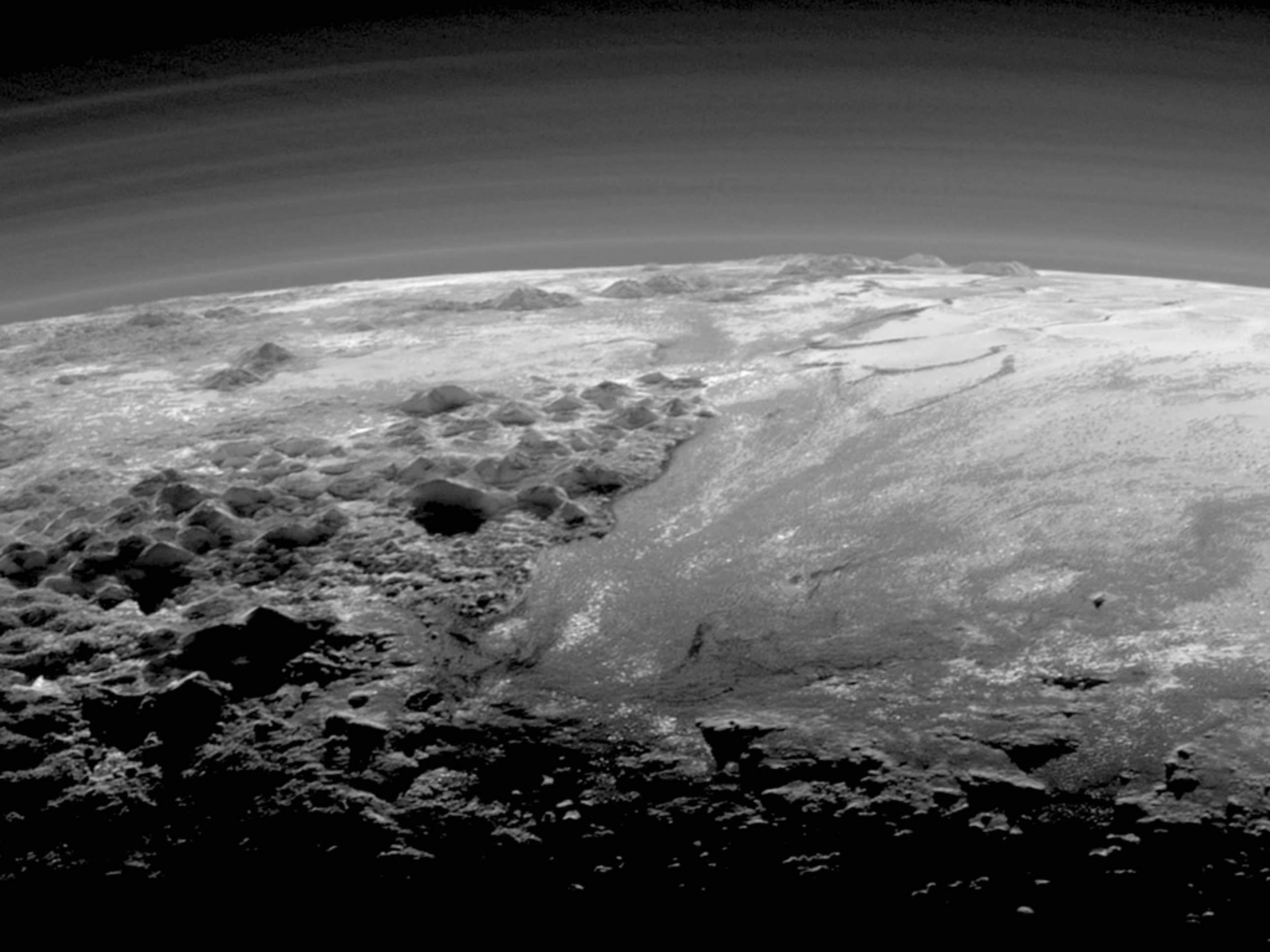
July 1, 2015

Styx Meets Styx

Legendary Band Starstruck by NASA's New Horizons Team

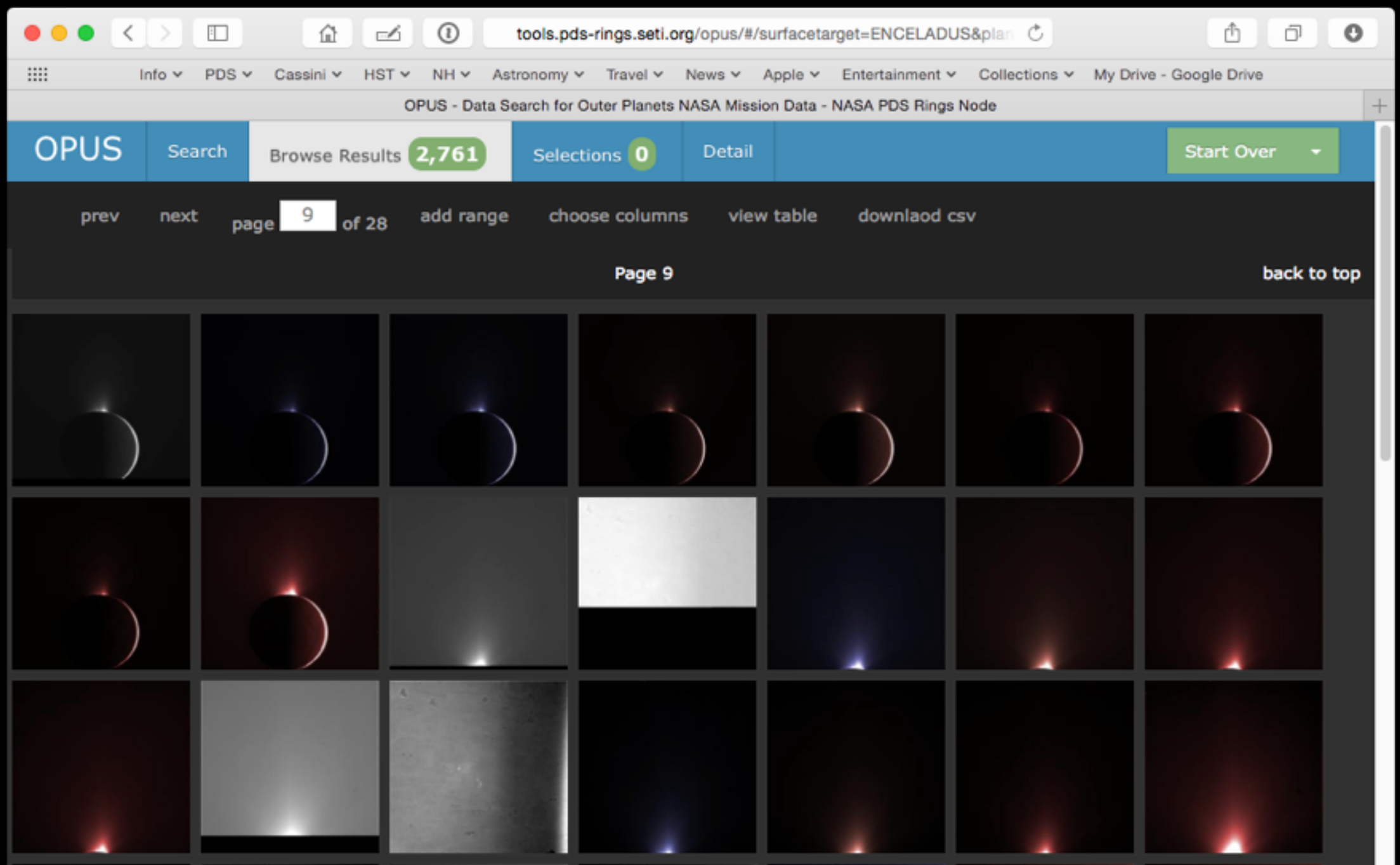
Styx band members share laughs with the scientist who discovered Styx, Pluto's moon. Left to right: Lawrence Gowan, Tommy Shaw, New Horizons' Mark Showalter, and Todd Sucherman
Credits: NASA/Joel Kowsky

What do a classic rock band and Pluto's smallest moon have in common? Answer: they both share the same name.



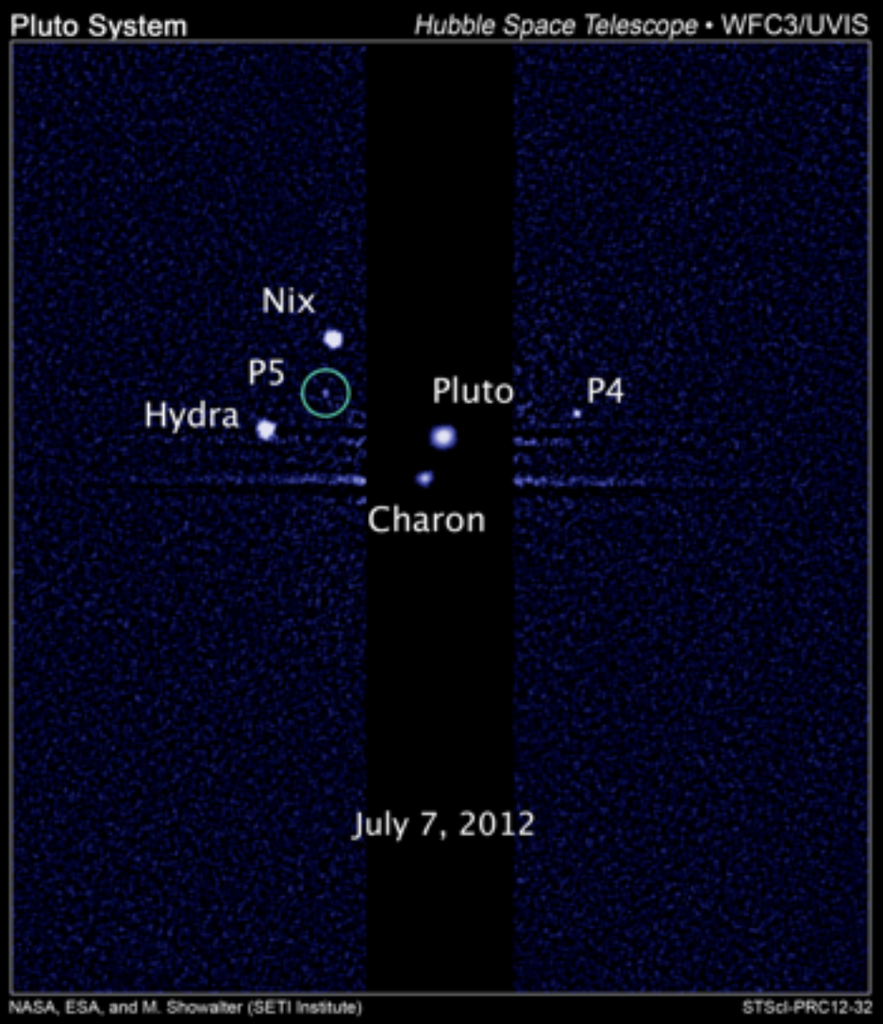
Why the Name Change?

- So users understand why we can help them find images of Enceladus (for example).



Why the Name Change?

- To provide a clear entry point to the PDS for planetary dynamicists.



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 . . .
Cassini
Voyager
New Horizons
Galileo
Occultations

Satellite Astrometry

The table below contains links to all of the available astrometric volumes and will be updated as new volumes are released. Satellites are identified by their NAIF IDs. A table of NAIF IDs for the inner Saturnian satellites is provided at the bottom of the page.

- Clicking on the VOLUME_ID will allow you to browse the volume.
- To download an entire volume, right click on that volume's "Bundled" link in the second column.

  The bundled volumes are provided in .tar.gz format. For information on opening files of this type, click here.

Saturn Satellite Astrometry

Volume	Bundle	Coverage Dates (UTC)	Satellites included (NAIF ID)
		1994-	

How Will the Ring-Moons Systems Node Fit?

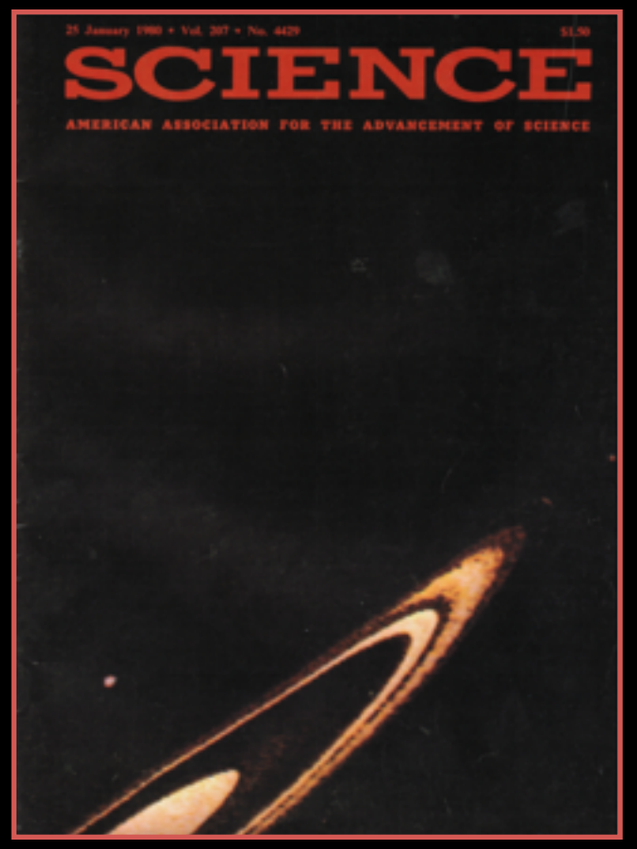
- Our work complements that of the other Discipline Nodes:
  - We focus on multi-target missions and instruments. (Generally not mappers, generally not *in situ* data.)
  - We care about <u>where</u> bodies are and <u>how</u> they move, but not so much what they look like.
- We are beginning a PDART-supported effort to bring the HST archive of Solar System data into the PDS4 system.
  - In effect, we are becoming the “lead node” for HST.

Potential Overlaps and Synergies

- Mars: We might play a more active role in Phobos and Deimos data.
- Small Bodies:
  - We can point to the SBN for general information about asteroid dynamics.
    - This is not within our scope but dynamicists may expect otherwise.
  - Our users are interested in data related to the rings and moons of small bodies. This can also be accomplished by pointing to SBN holdings.
    - Metadata and OPUS support will be considered.
  - We are very interested in the Pluto system.
    - For our purposes, New Horizons is a Voyager-like data set.
    - The Pluto system serves as an archetype for circumbinary planets.
    - Numerous astrometric and ring/moon search data sets also exist.
- Everybody:
  - Our metadata initiative can support multiple disciplines, both imaging and non-imaging data sets.

Missions & Data Sets

- **<u>Today</u>**
  - Cassini
    - ISS raw & calibrated
    - UVIS
    - VIMS
    - Occultations
    - (CIRS)
  - New Horizons LORRI
  - Voyager ISS
  - Galileo SSI
  - HST outer planets
    - WFPC2, ACS, WFC3, NICMOS
  - Astrometry
- **<u>Planned</u>**
  - Cassini
    - CIRS interferograms, derived maps
    - More occultations
  - New Horizons MVIC/LEISA
  - Voyager IRIS
  - HST (everything in the solar system)
  - Pioneer 10 & 11 IPP →
  - Earth-based...
    - Images
    - Occultations
    - Astrometry
  - <u>On-the-fly migration!</u>



HST-PDS Interface Project

- “Integrating Hubble Data Sets into the Planetary Data System” was selected for PDART support
- PI: Showalter
- Co-Is: Gordon, Tiscareno, Kolokolova
- Collaborators: A’Hearn, Beebe, Chanover, Crichton, Gaddis, Jon Giorgini (for Hubble SPKs), Guinness, Hardman

HST-PDS Interface Project

Instrument		Image	Spectra	Other
Advanced Camera for Surveys	ACS	3268	73	
Cosmic Origins Spectrograph	COS	65	97	
Fine Guidance Sensor	FGS			0*
Faint Object Camera	FOC	239	14	
Faint Object Spectrograph	FOS		1116	
Goddard High-Resolution Spectrograph	GHRS		873	
High-Speed Photometer	HSP			139*
Near Infrared Camera and Multi-Object	NICMOS	1475	79	
Space Telescope Imaging Spectrograph	STIS	1021	2941	
Wide Field Camera 3	WFC3	6388		
Wide-Field Planetary Camera 1	WF/	522		
Wide-Field Planetary Camera 2	WFPC2	11073		

HST-PDS Interface Project

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High-Speed Photometer	HSP			139*
Near Infrared Camera and Multi-Object	NICMOS	1475	79	
Space Telescope Imaging Spectrograph	STIS	1021	2941	
Wide Field Camera 3	WFC3	6388		
Wide-Field Planetary Camera 1	WF/	522		
Wide-Field Planetary Camera 2	WFPC2	11073		

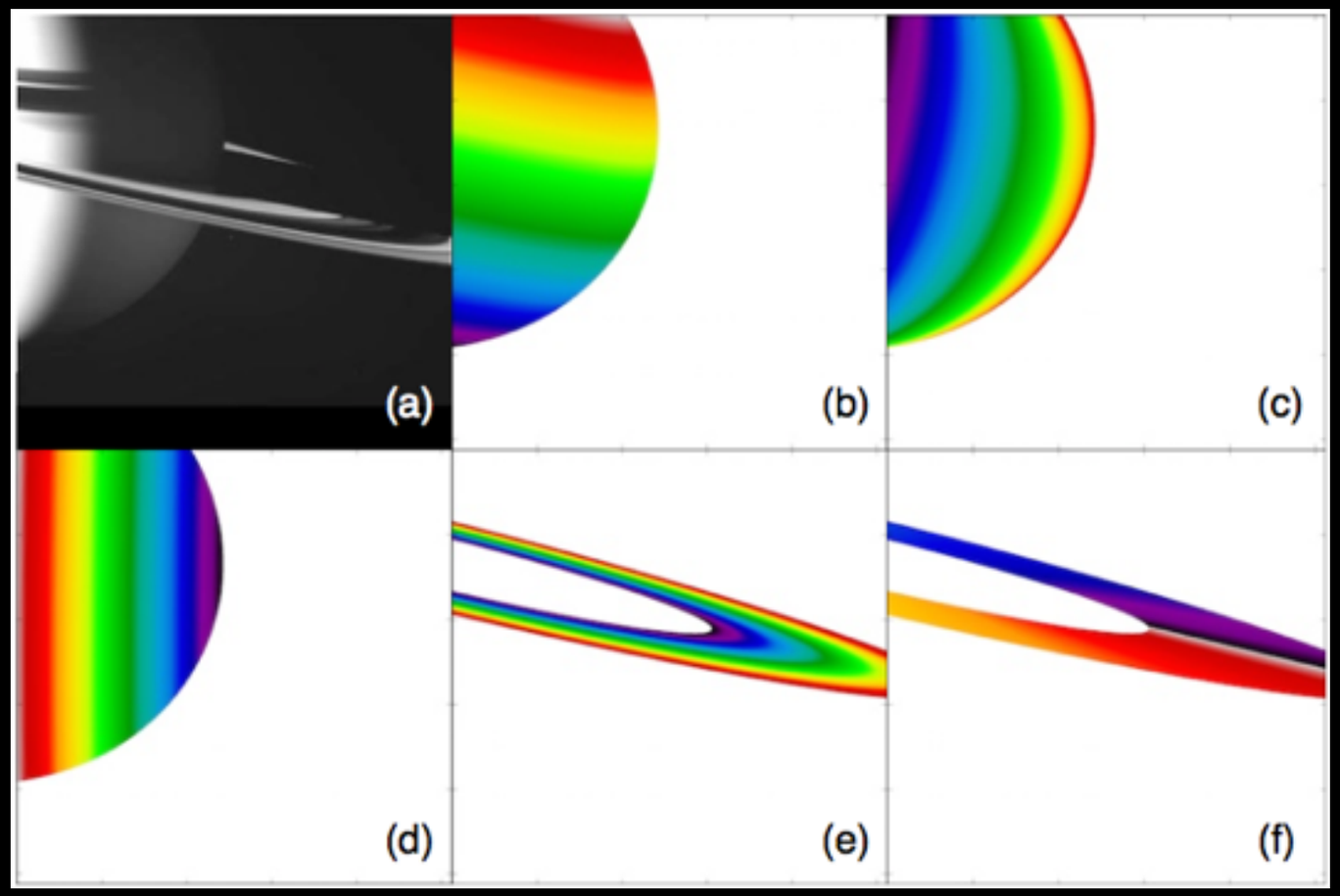
PDART Project Components

- Complete PDS4 integration including...
  - Raw & calibrated data.
  - Browse products.
  - Complete sets of SPICE kernels.
  - Target identifications.
  - Geometric metadata.
  - PDS-compliant versioning of products.
- Goal is to build an automated pipeline, which updates the PDS Registry with new MAST products nightly.
  - Work will be completed just in time for JWST!
- This effort will likely yield tools broadly useful across the PDS.
- The effort could become a significant driver behind PDS4 design and development.
- This is a holistic effort!

Recent Experience with DAPs

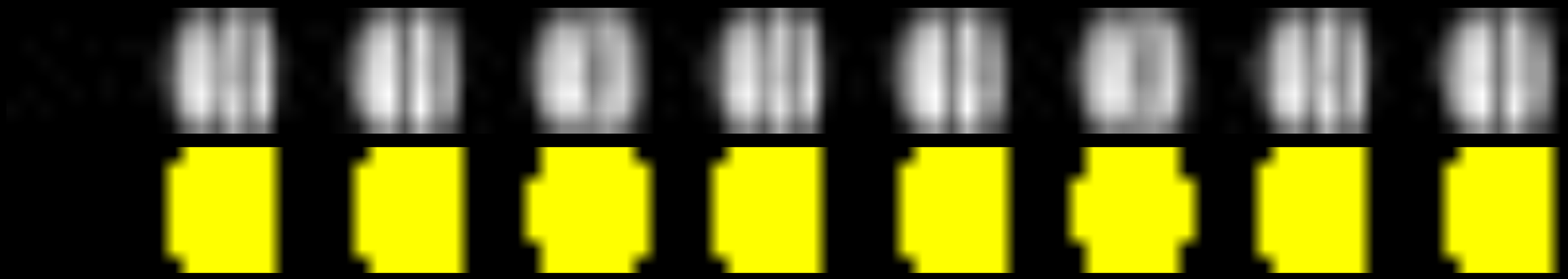
- Our own HST effort is the of course the largest.
- One PI hired Mitch as a co-I.
- Others have received one-on-one tutorials.
  - These are relatively few in number so far.
  - Data sets are also relatively small so far.

Metadata Initiative
1. Backplanes



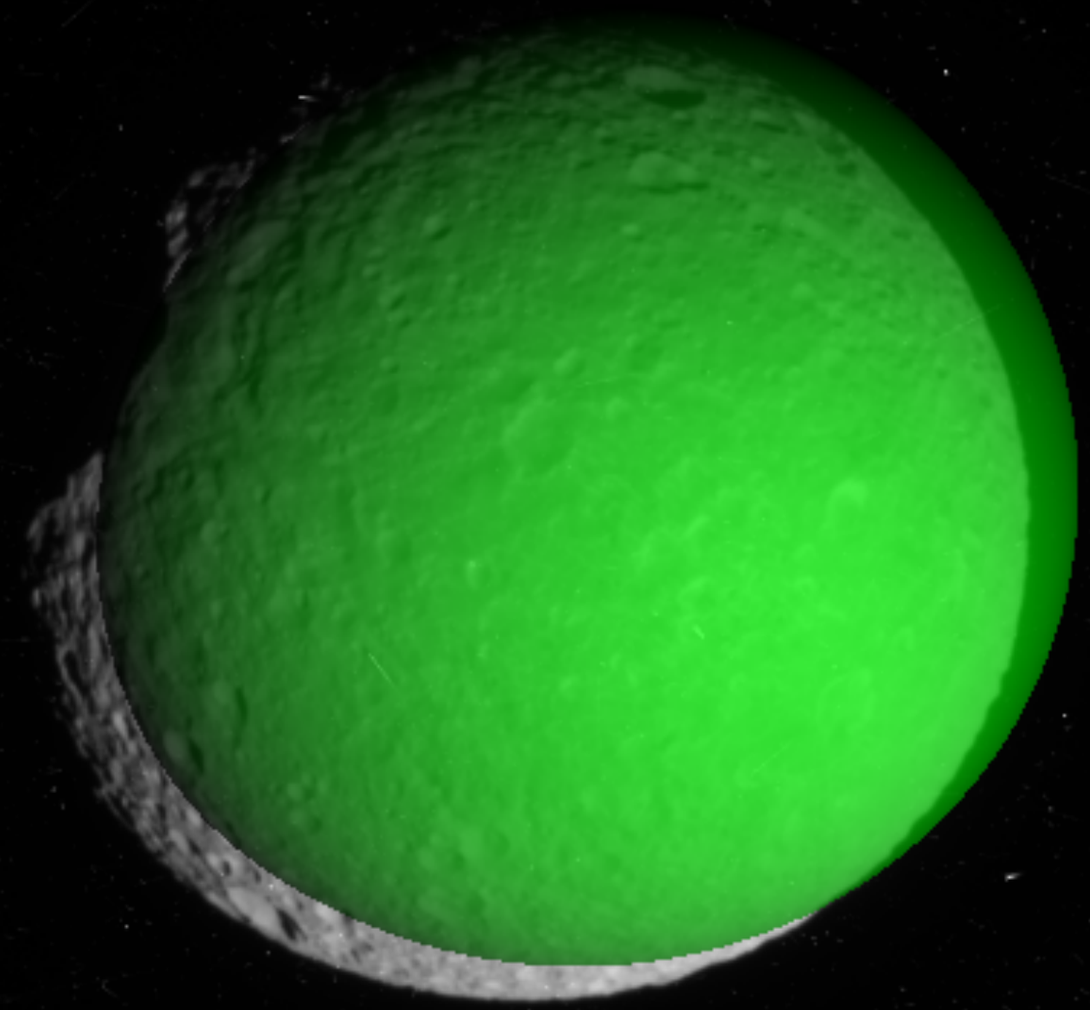
ISS Image of Saturn and its rings

North-south UVIS scans across Saturn



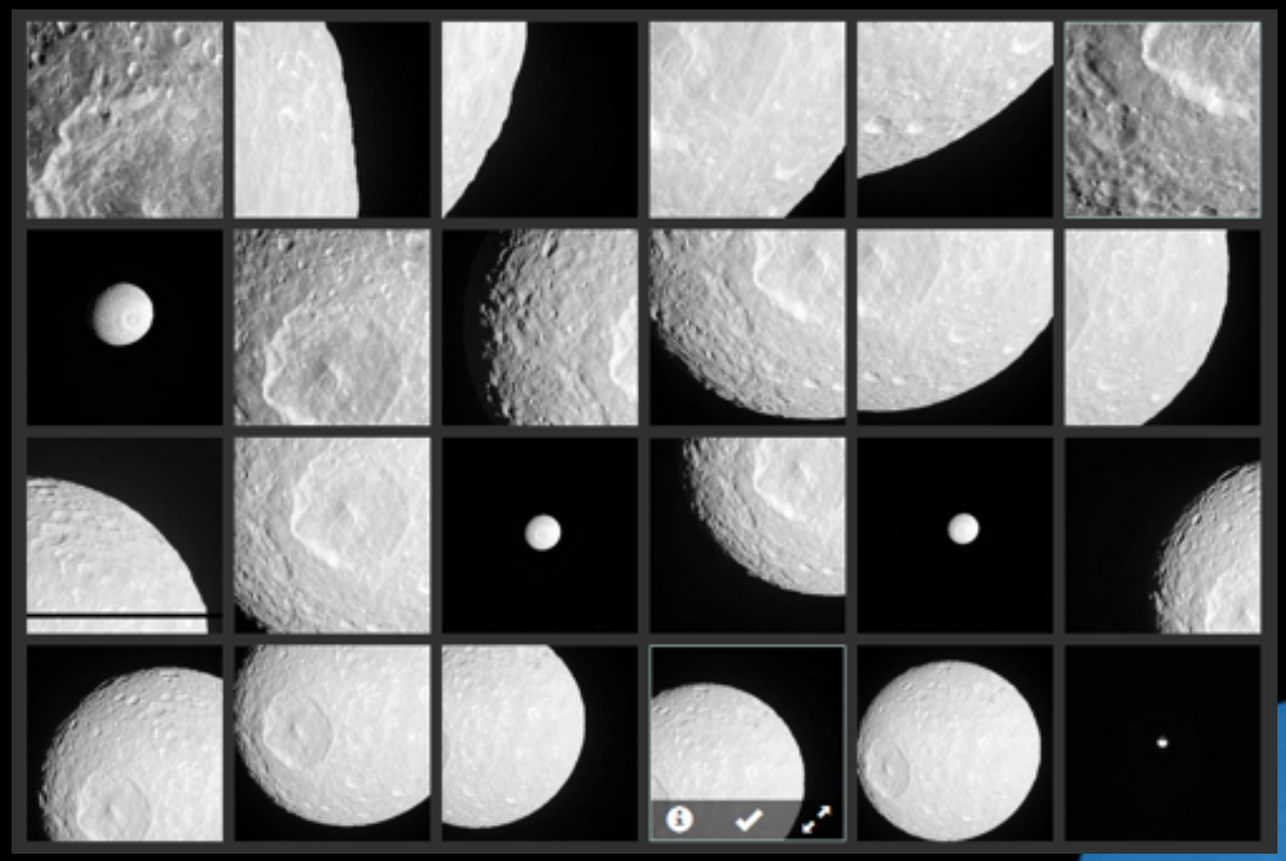
Metadata Initiative
2. C-Smithing

- Automated C-smithing
  - Currently in development under a CDAPS grant.
  - Could be extended to Voyager, Galileo, New Horizons, etc. upon completion.
  - Other Nodes may have additional applications.

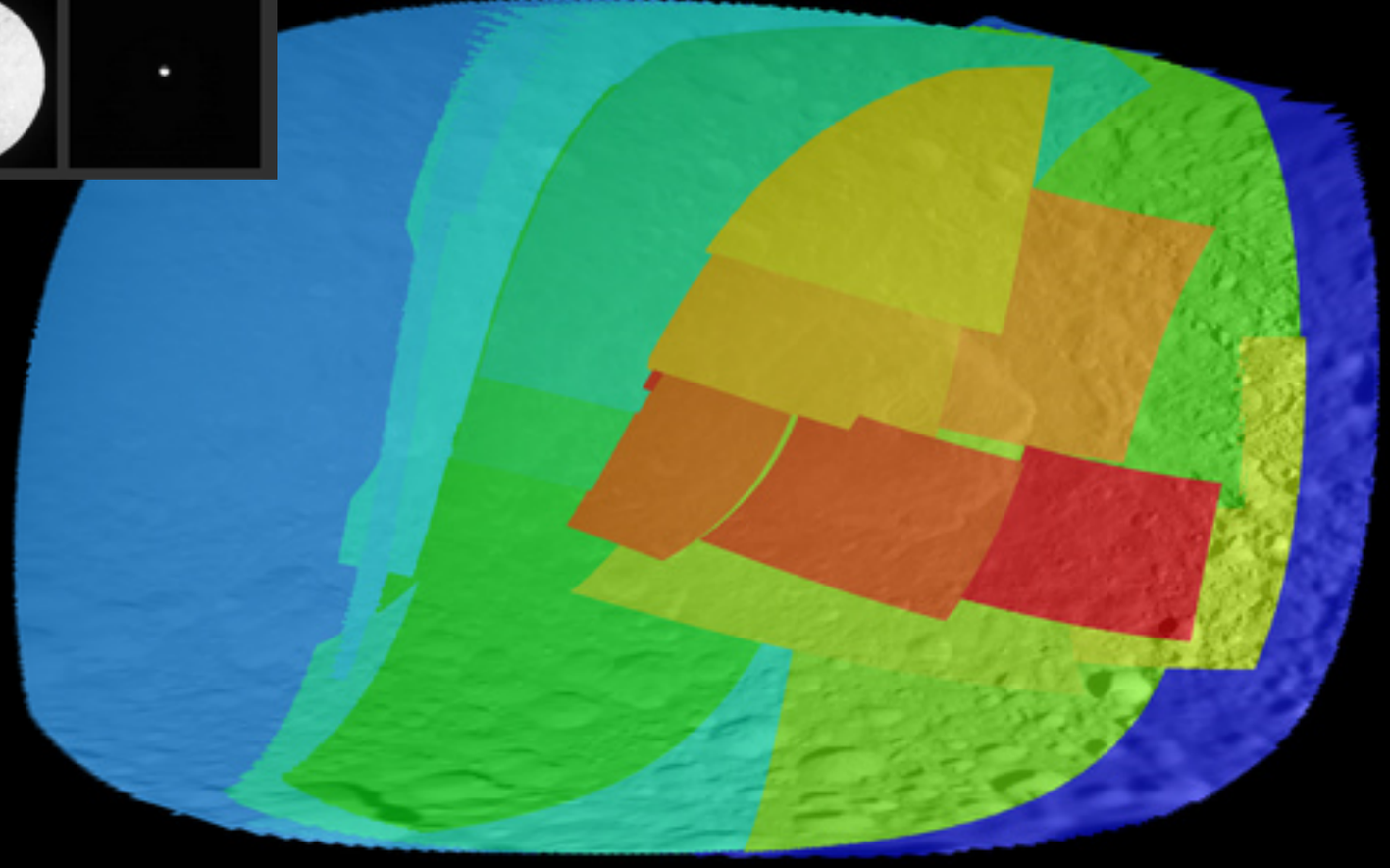


C-Smithing

C-Smithing

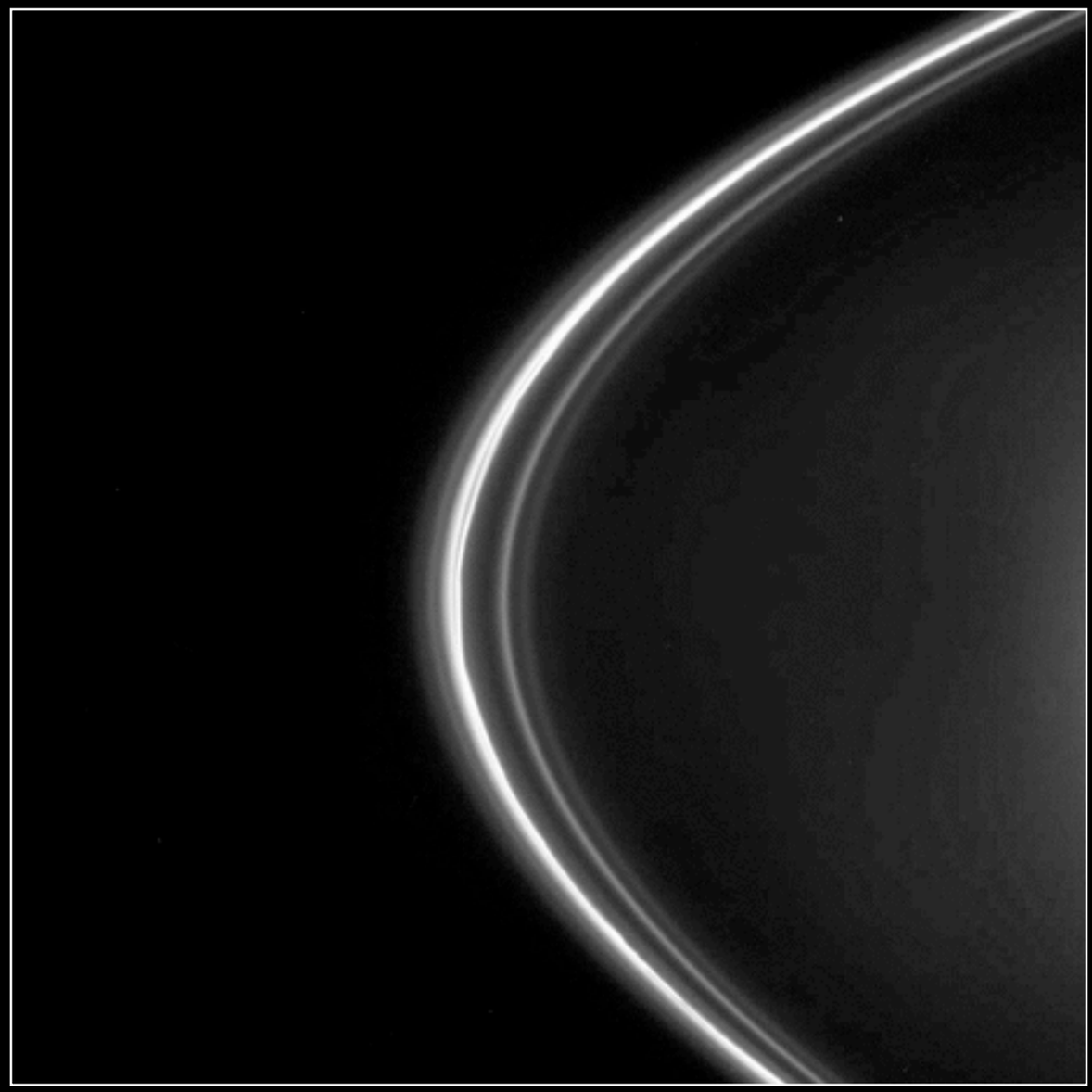


Mimas map and alignments constructed on-the-fly via “bootstrapping”



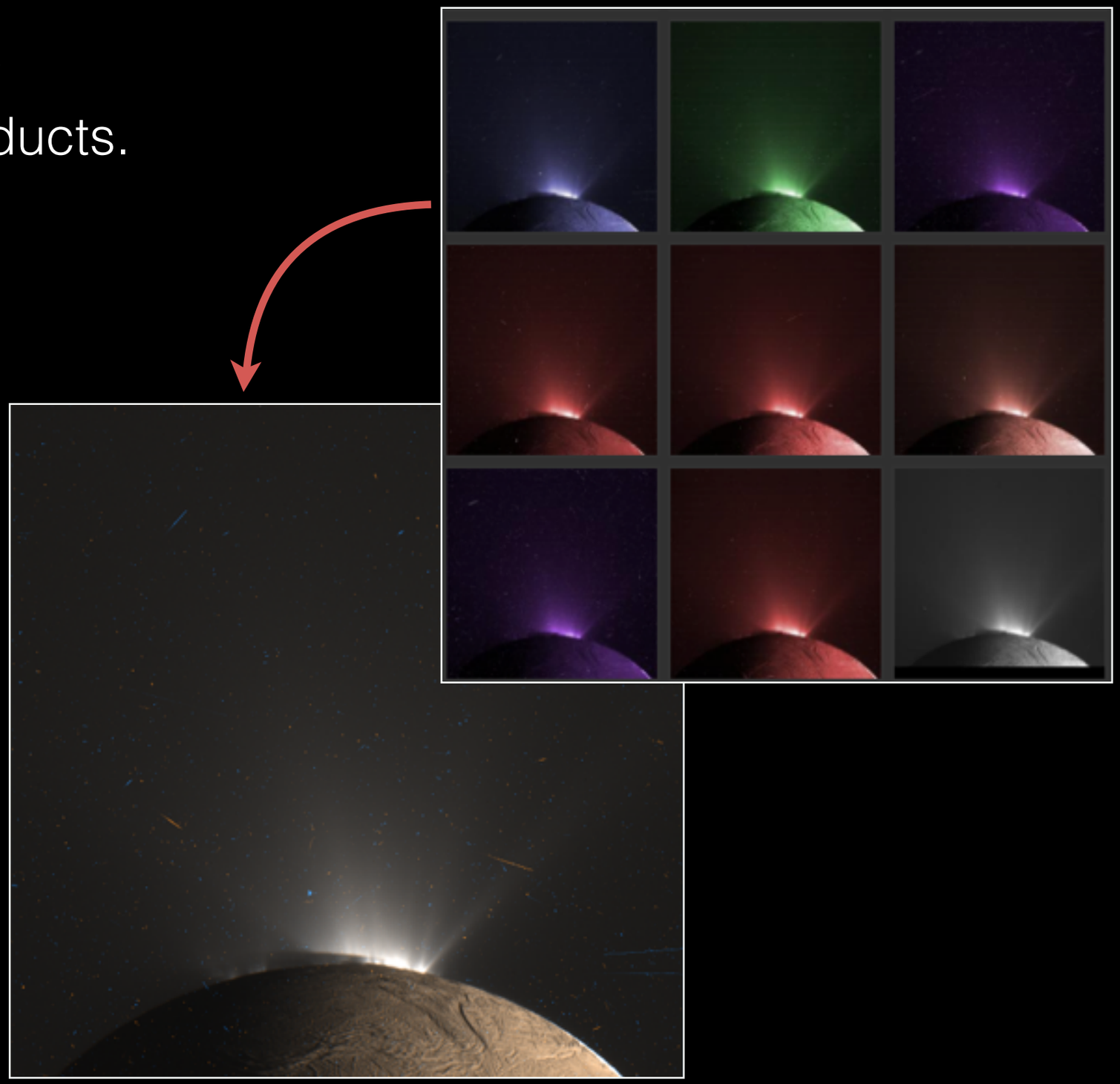
Metadata Initiative
3. Composite Products

- Allow searches defined by relationships between products.
  - Movie sequences.



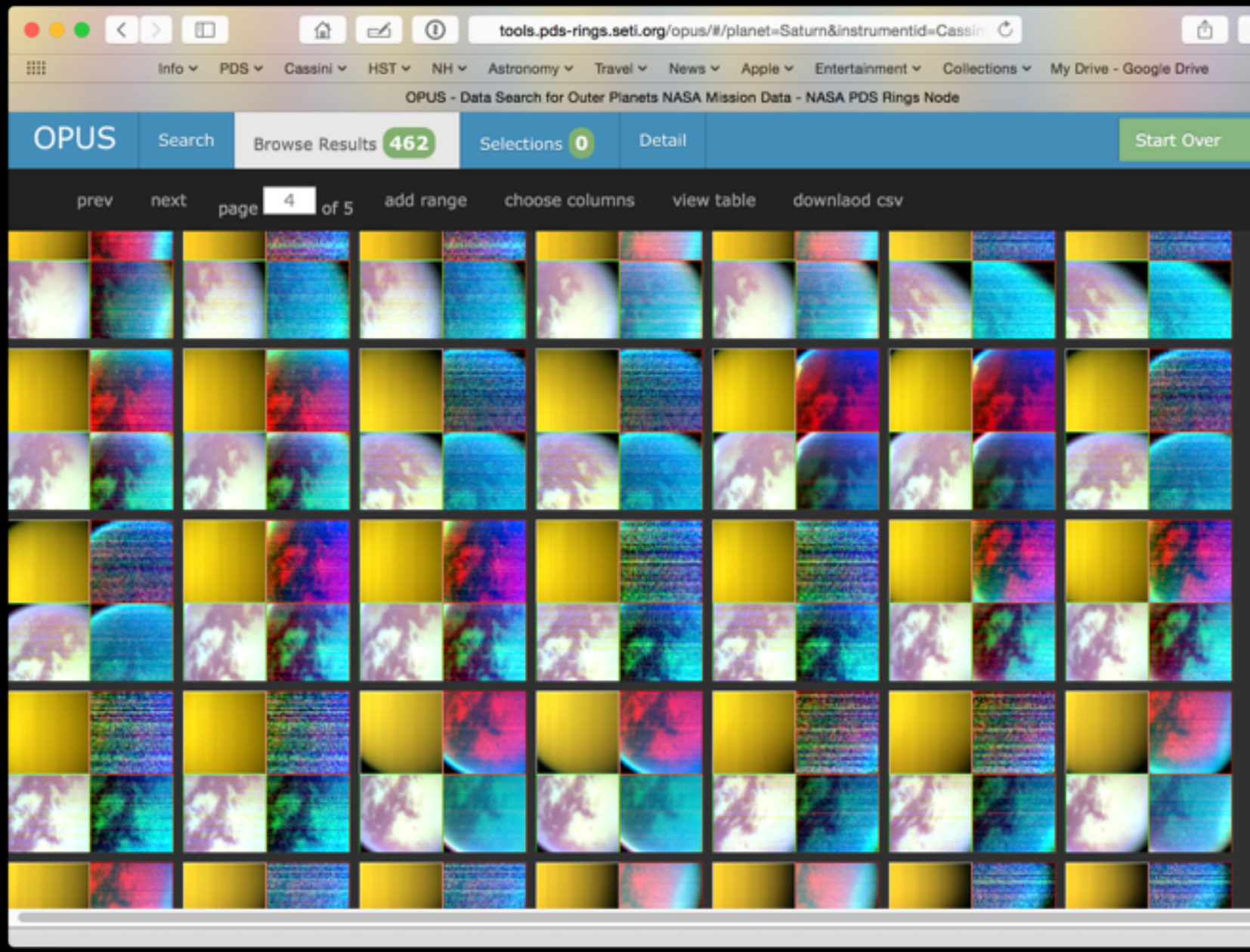
Metadata Initiative
3. Composite Products

- Allow searches defined by relationships between products.
  - Movie sequences.
  - Color sets.



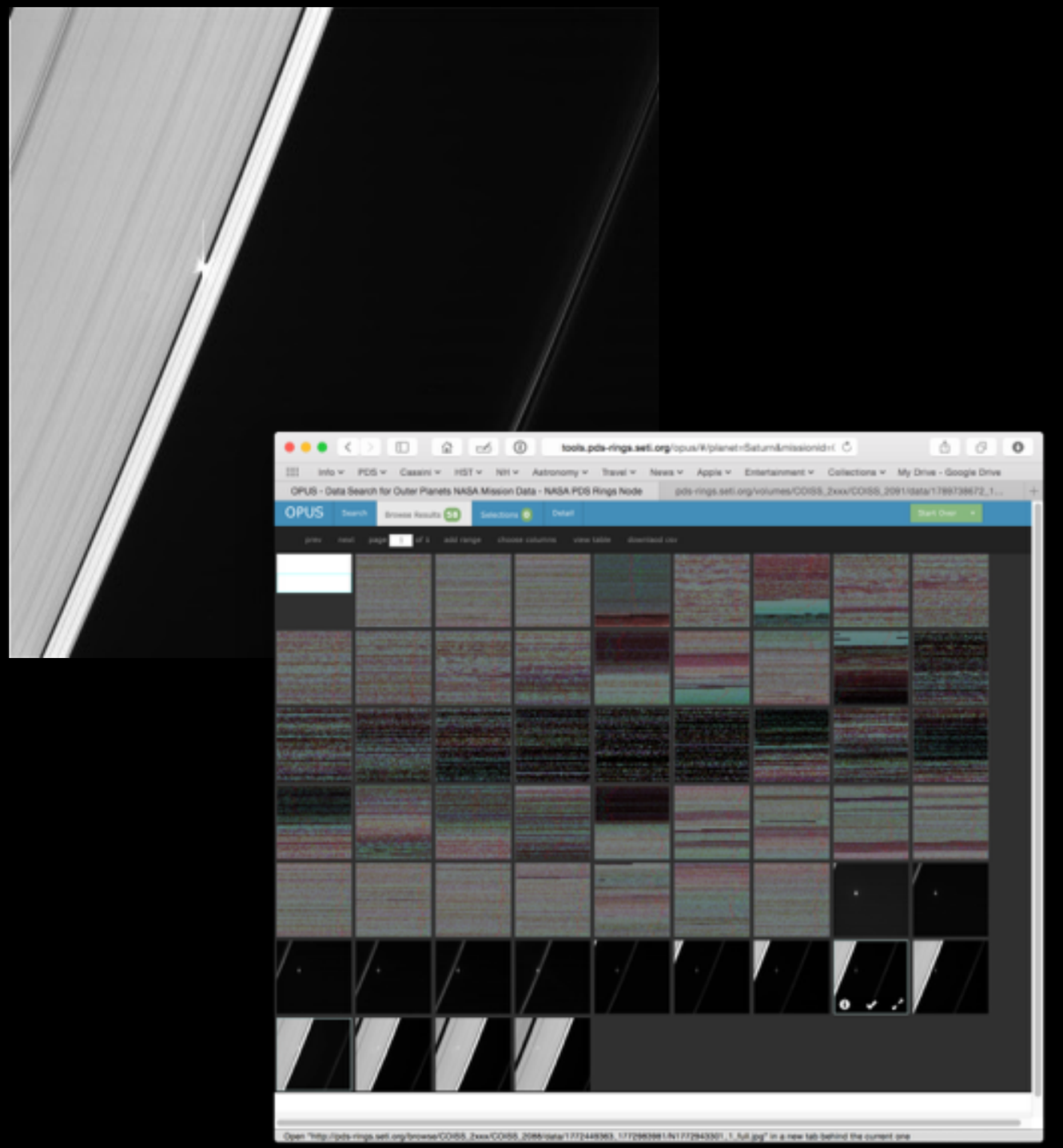
Metadata Initiative
3. Composite Products

- Allow searches defined by relationships between products.
  - Movie sequences.
  - Color sets.
  - Mosaics.



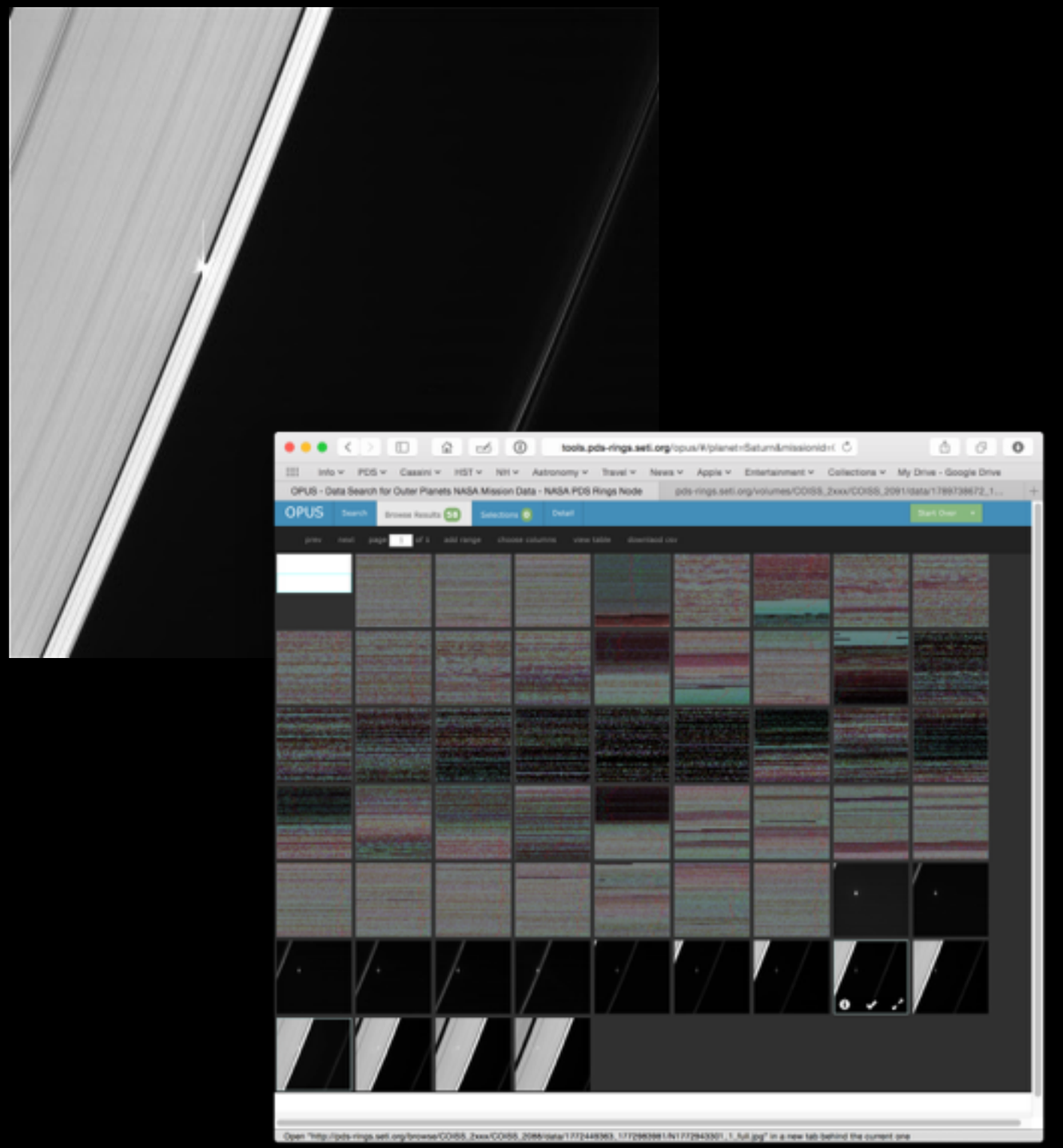
Metadata Initiative
3. Composite Products

- Allow searches defined by relationships between products.
  - Movie sequences.
  - Color sets.
  - Mosaics.
  - Planning sequences.

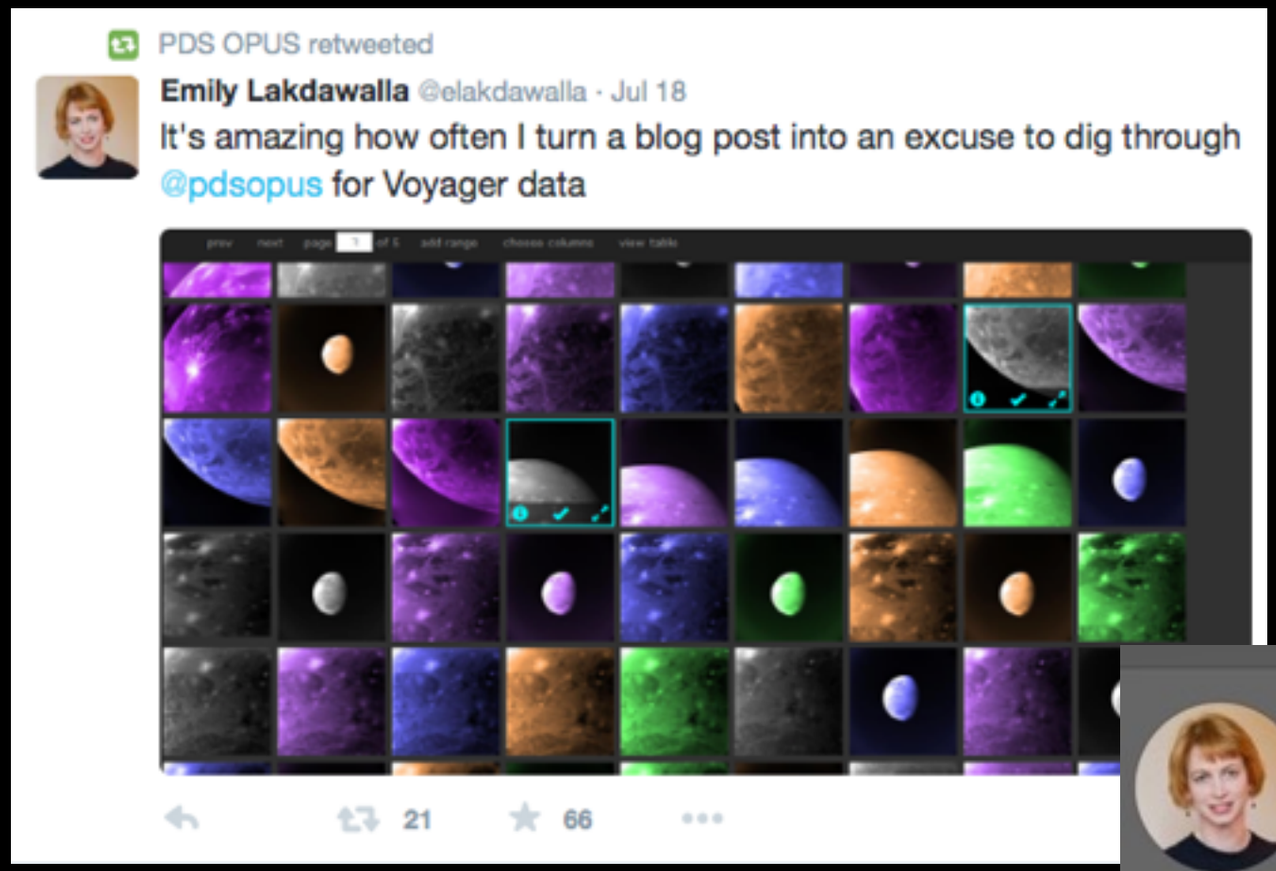


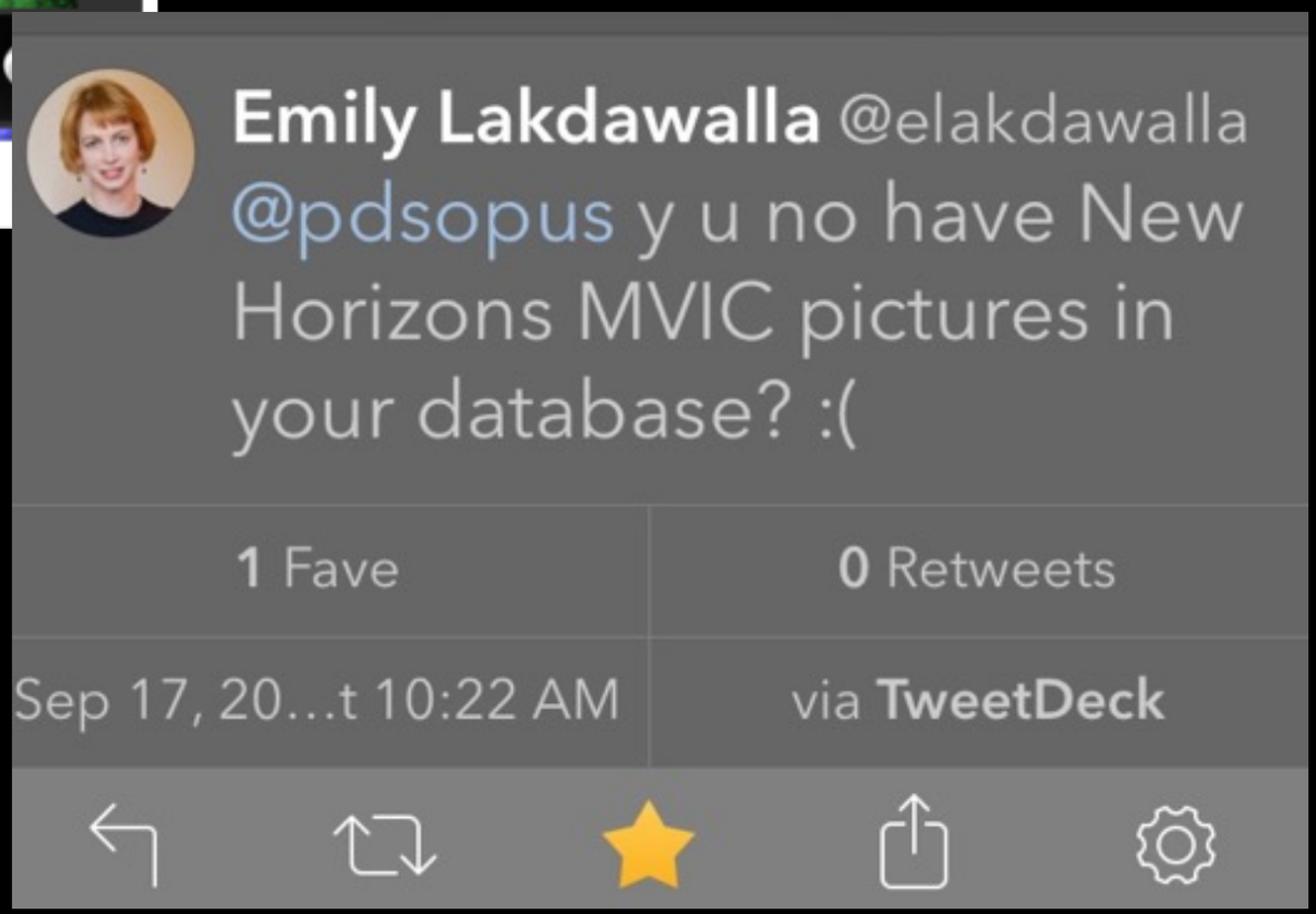
Metadata Initiative
3. Composite Products

- Allow searches defined by relationships between products.
  - Movie sequences.
  - Color sets.
  - Mosaics.
  - Planning sequences.
- Some PDS4 design work will be required so that a product can be defined in terms of other products.



OPUS News


PDS OPUS retweeted
Emily Lakdawalla @elakdawalla · Jul 18
It's amazing how often I turn a blog post into an excuse to dig through @pdsopus for Voyager data
21
66


Emily Lakdawalla @elakdawalla
@pdsopus y u no have New Horizons MVIC pictures in your database? :(
1 Fave
0 Retweets
Sep 17, 20…t 10:22 AM
via TweetDeck

OPUS News

Use case 1: Downloading

- Read about image number N1695760475_1 in paper
- Cassini images are available at http://tools.pds-rings.seti.org/opus/
- Would need to learn how interface works
  - not too hard, but want automation

```
In [4]: myiframe('http://tools.pds-rings.seti.org/opus')
```

Out[4]:

?

SciPy2015

OPUS News

A FILM FOR IMAX® AND GIANT SCREEN THEATERS IN MUSEUMS, ATTRACTIONS AND PLANETARIUMS

IN SATURN'S RINGS

TAKE THE JOURNEY

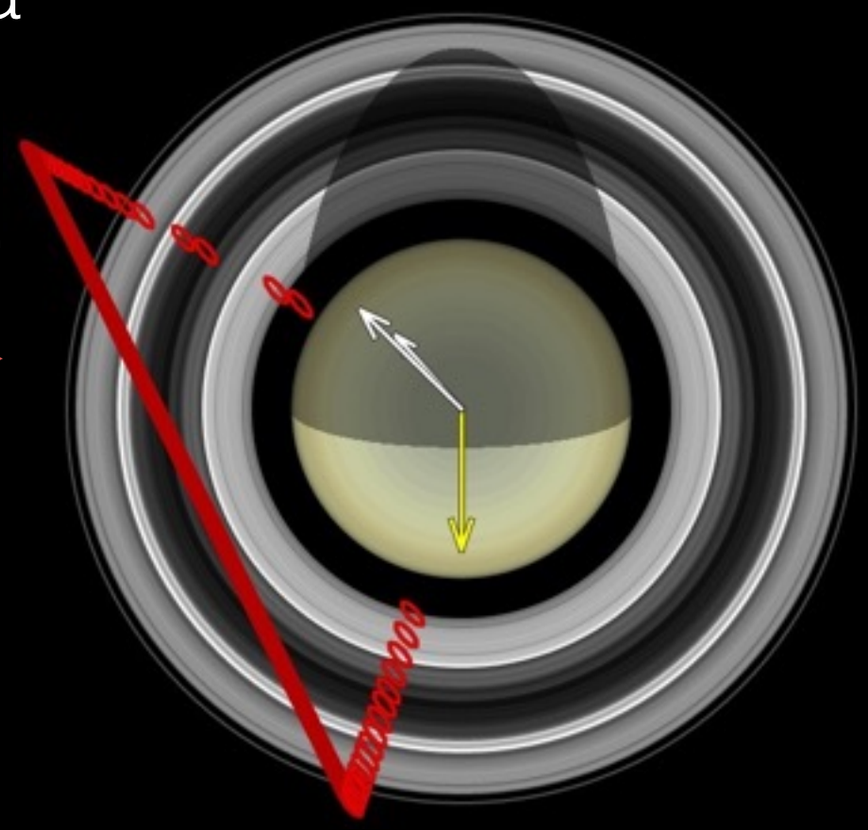
In Saturn's Rings Late Summer Teaser (4K)

"The result can only be described as spectacular."

George Dvorsky, io9.com

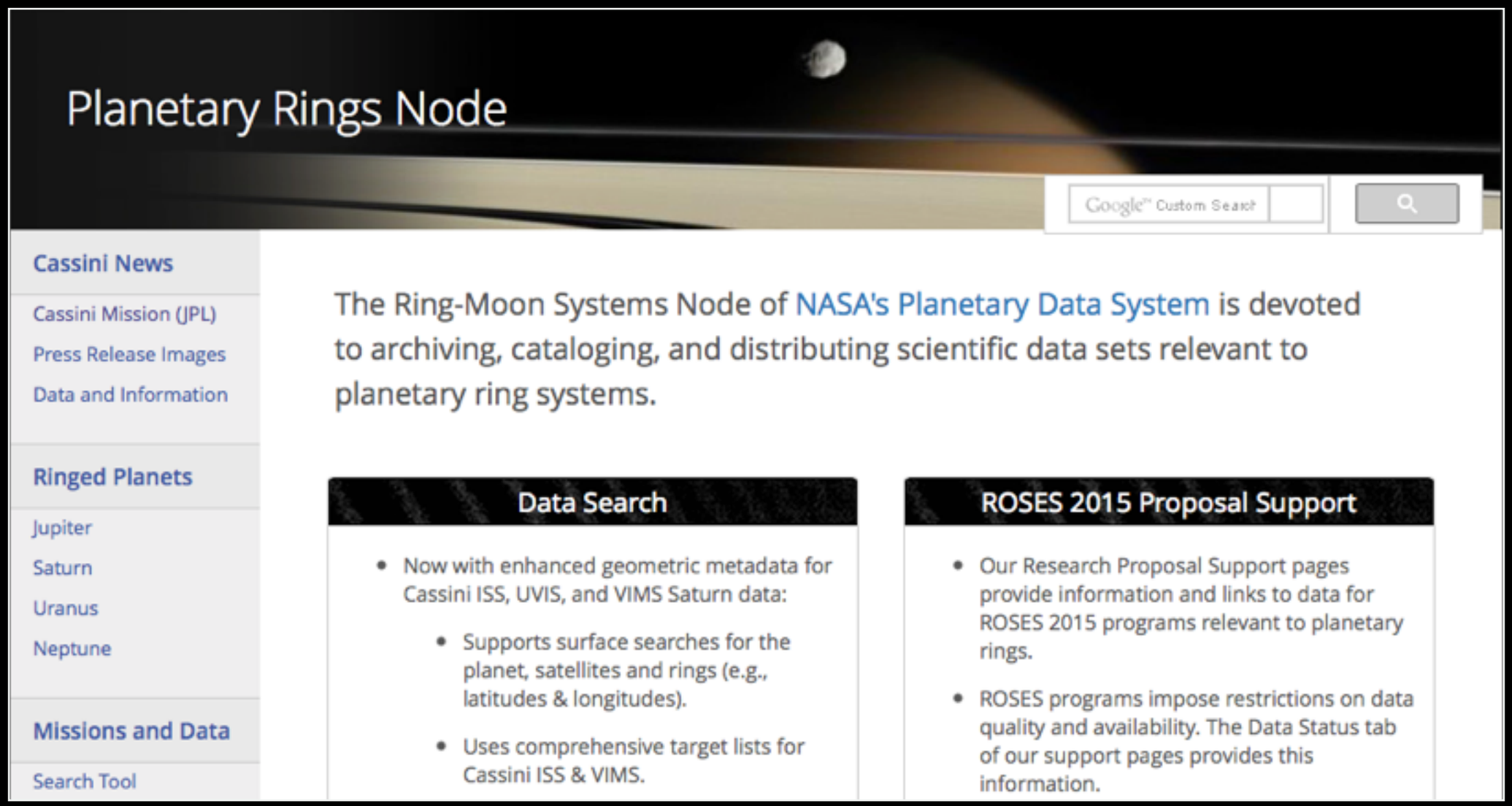
OPUS Development Plans

- OPUS is not currently configured for frequent updates.
  - Integrating it into the PDS Registry concept will take some design effort.
- Moving target search.
- Non-local data (e.g. external archives of astrometric data).
- Enhanced capabilities for examining data products prior to downloading.
  - Interactive image views, line plots, etc.
  - Observation footprint diagrams. →
- API enhancements.
- More data and metadata!



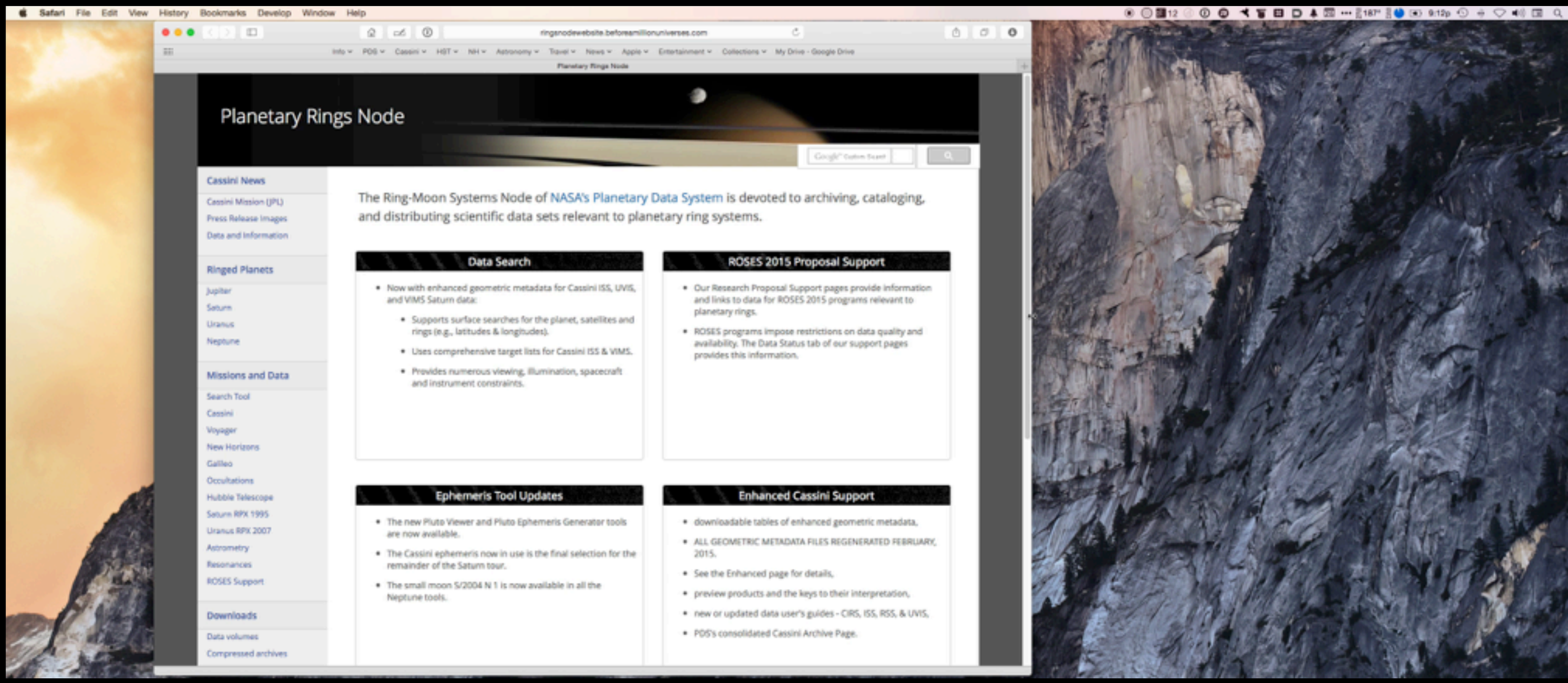
Web Site Design Approach

- Jekyll
  - Content Management System
  - Fully decouples site design from content
  - Content is managed by editing simple markup files.
  - Mock-ups are in progress.



Web Site Design Approach

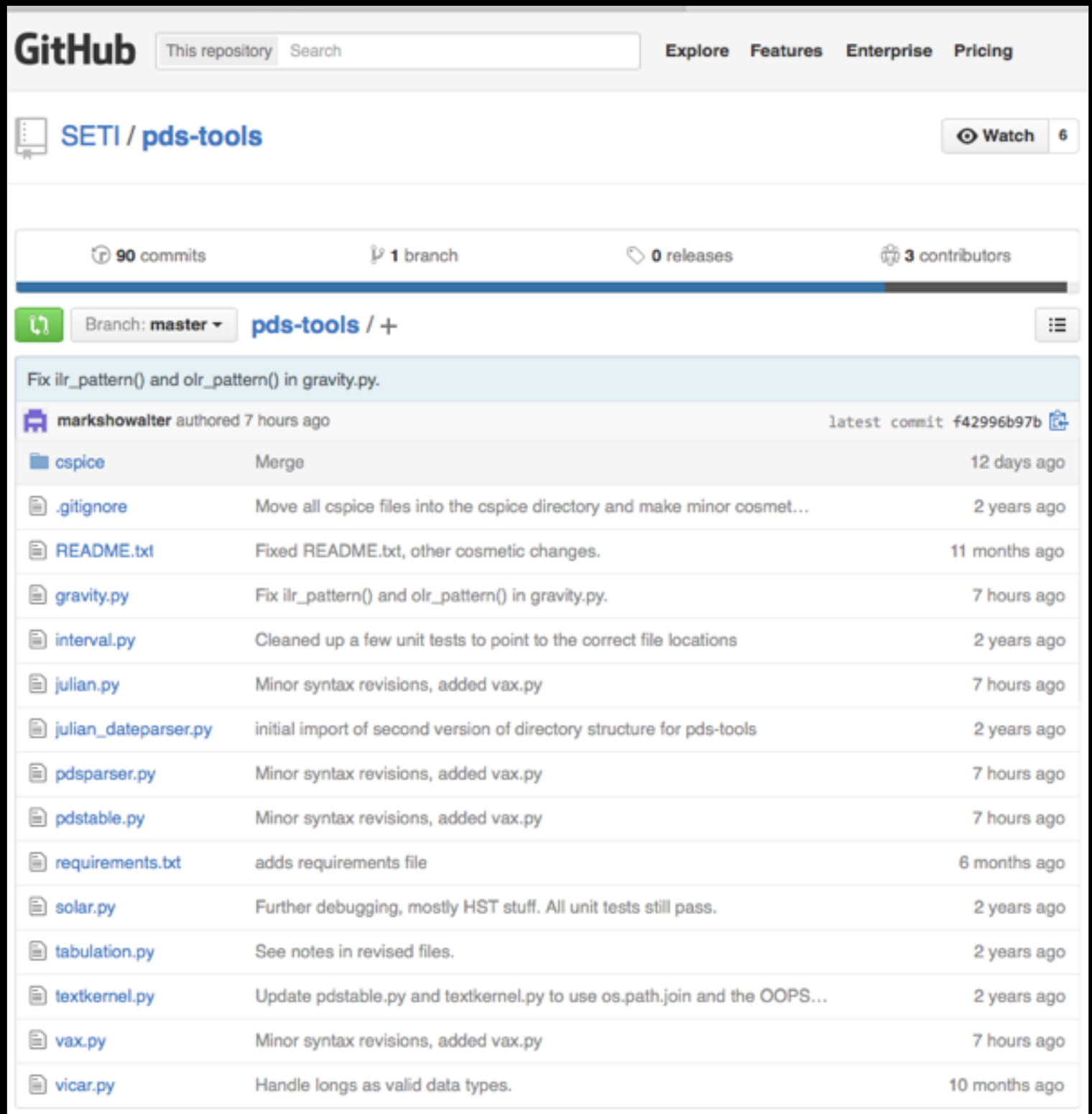
- Bootstrap Framework
  - Dynamic re-sizing of layout, down to phone screen sizes.
  - Google is now giving higher rankings to phone-optimized sites.
  - The primary value to us is that it makes more effective use of large screens.



Open Source

github.com/SETI/pds-tools

- We have released a few toolkits on GitHub.
- All are in Python.
- Our Python-CSPICE interface is receiving attention.
- Long-term goal: Make everything open source.
- Possible concern: Users requesting support.



Updated Backup Procedures

- The review panel regarded our current backup plan as a major weakness.
  - The remote backup site is 20 miles away but therefore potentially susceptible to a single natural disaster.
- We have created an additional backup using Google Cloud Services.
  - Cost is $10/TB/month for “nearline” storage.
  - Our holdings not (yet) at NSSDC amount to ~ 5 TB, so the cost is modest.
  - Uploads are free, downloads are not. Cost to recover holdings would be a few $K if ever needed.
- Cloud storage also opens up the possibility of implementing cloud-based data processing services.
- HOWEVER, costs could become significant as our holdings grow.