# Searching the Stars with Atlas IV

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Jet Propulsion Laboratory
California Institute of Technology

# Searching the Stars with Atlas IV

## Overview

Background Motivation Atlas IV Next steps References

https://bit.ly/39DJfZy

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**Background** *Motivation* *Atlas IV* *Next steps* *References*

# Searching the Stars with Atlas IV

## Background

- “PDS Imaging Node” = Cartography and Imaging Sciences Node of the Planetary Data System
- One node, two facilities – USGS & JPL
- Home to upwards of 1PB of planetary digital archives

PDS Cartography and Imaging Sciences Node
Jet Propulsion Laboratory U.S. Geological Survey

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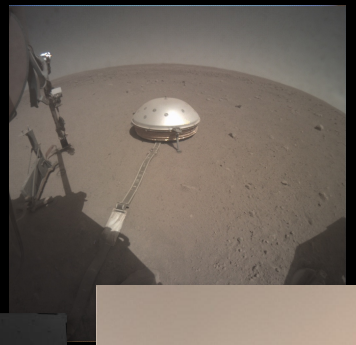
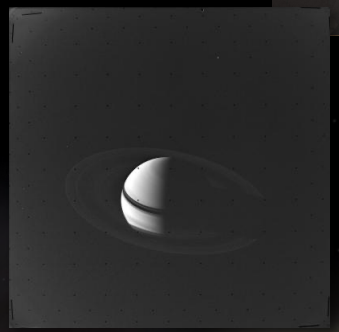
- Diverse collection of products
  - Landers, rovers, orbiters, and probes
  - PDS3 and PDS4
  - Imagery, maps, and other products





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  - PDS3 and PDS4
  - Imagery, maps, and other products
- Over 1.2M images across 5 missions enhanced by ML processes

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## Motivation

**Challenge**: Enable users to effectively locate data they need to do their research

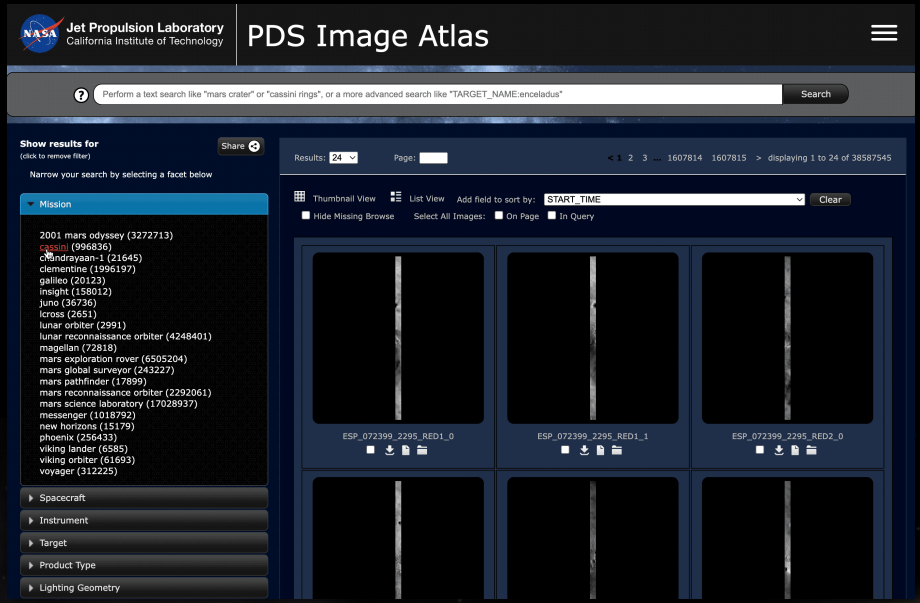
Partially solved with Atlas III

# Searching the Stars with Atlas IV

## Motivation

### Atlas III

- Faceted search on hundreds of PDS3 keywords from multiple missions

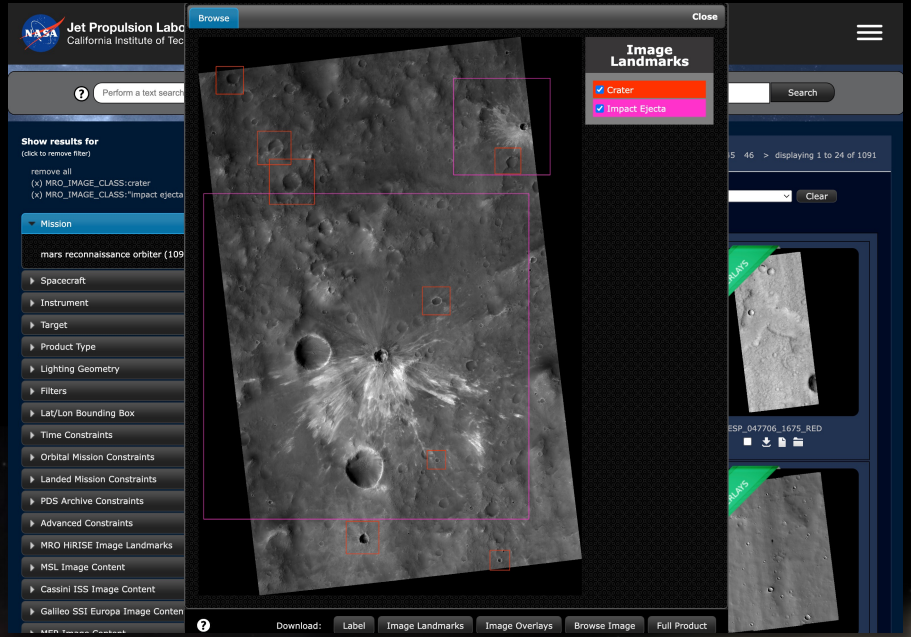


# Searching the Stars with Atlas IV

## Motivation

### Atlas III

- Faceted search on hundreds of PDS3 keywords from multiple missions
- Download original products, as well as their browse imagery and label
- Report generator
- Powered by ML (feature bounding boxes, class faceting)



# Searching the Stars with Atlas IV

## Motivation

It's great, *but…*

- Availability and scalability concerns
- Security and performance expectations
- Downloading lots of data at once is a hassle
- Doesn't work on a phone
- Built nearly a decade ago using technologies that have since become outdated

# Searching the Stars with Atlas IV

## Overview

# Searching the Stars with Atlas IV

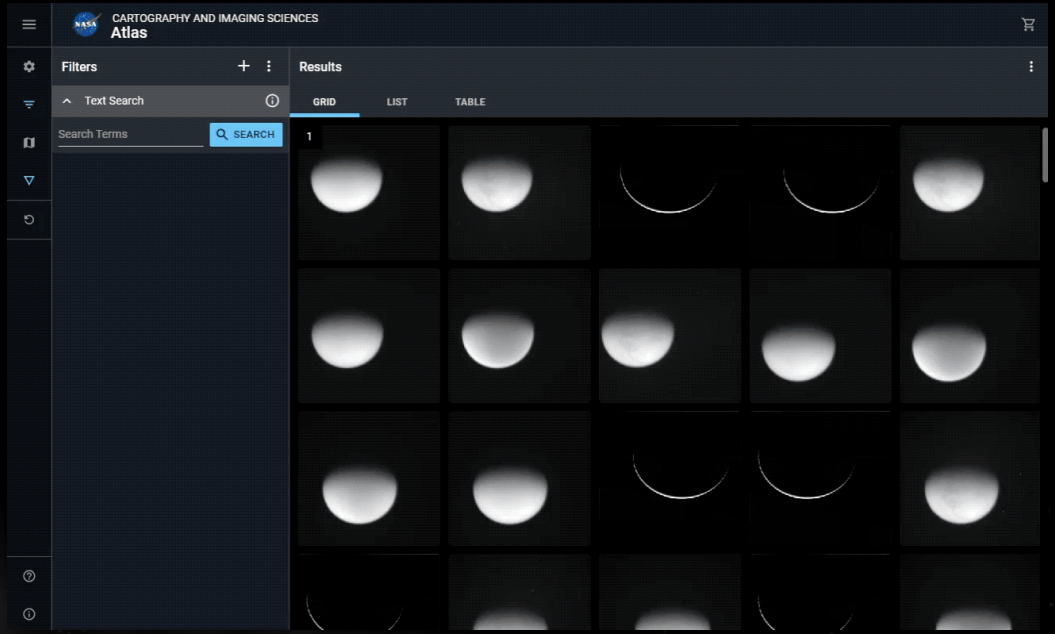
## Atlas IV

- Single-page NodeJS, React, Redux, Webpack application
- Material UI
- Mobile friendly
- Enhanced filtering
- Improved geospatial search support
- Expanded file exploration functionalities
- Streamlined download process
- Tighter integration with machine learning classifiers

# Searching the Stars with Atlas IV

## Atlas IV

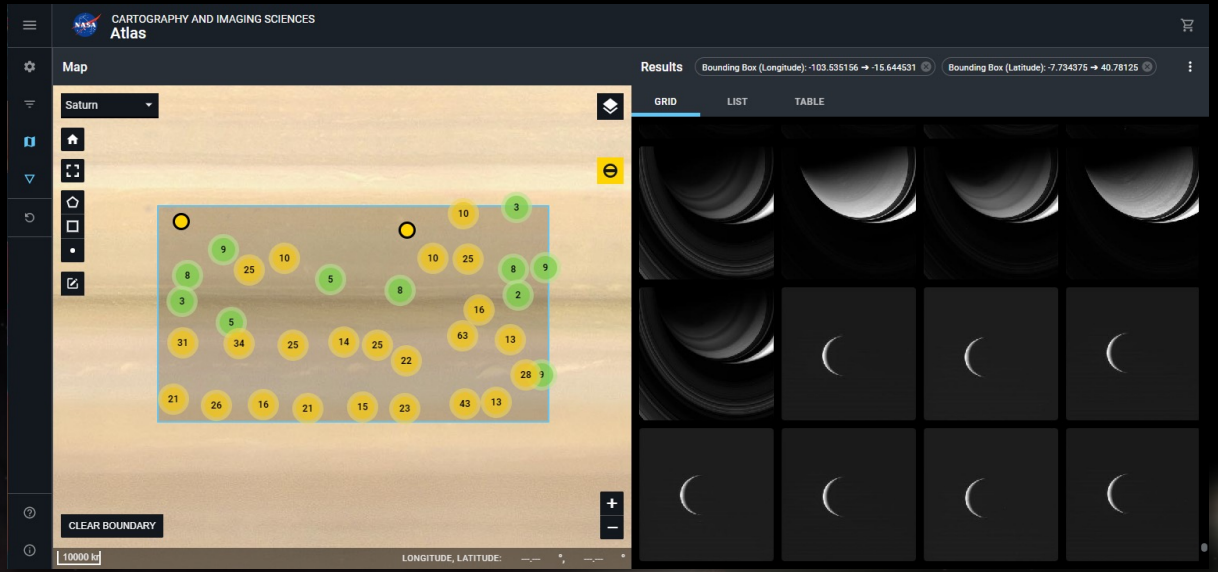
- Facets are addable
  - Scales better with the the 1k+ unique fields in our collection
  - Lowers cognitive load
- Facets are now categorized
  - Time
  - Spatial
  - Lighting
- Supporting documentation for fields parsed from PDS archival documentation
- Faceting is now powered by IMG's Search API



# Searching the Stars with Atlas IV

## Atlas IV

- Geospatial search enabled via integration with CartoCosmos[1]
- Supports
  - Bounding box drawing,
  - Nearly 30 planetary bodies,
  - Polar projections, and
  - A whole suite of basemaps and layers for each



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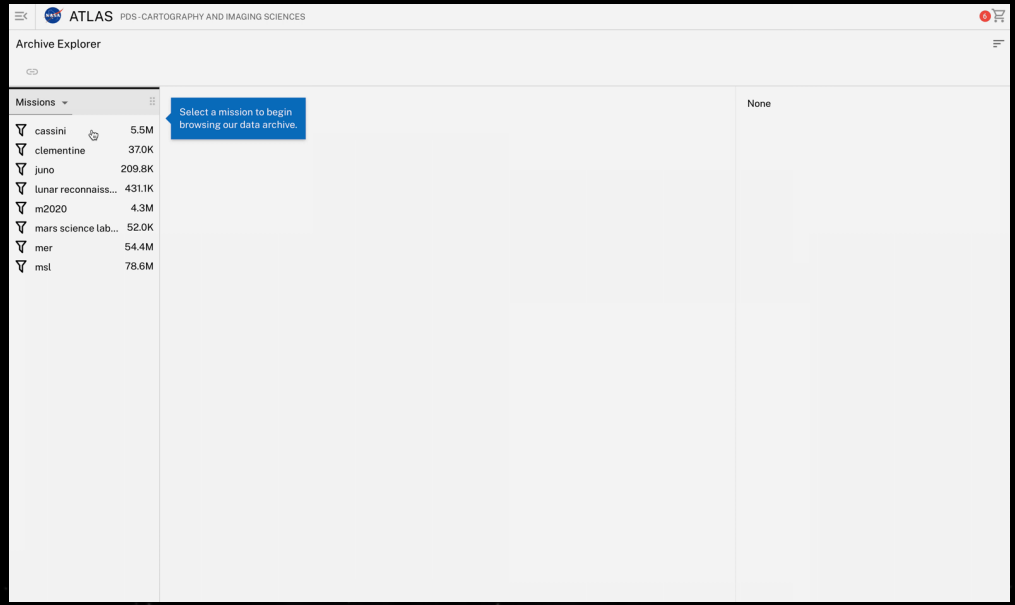
## Atlas IV




File directory view

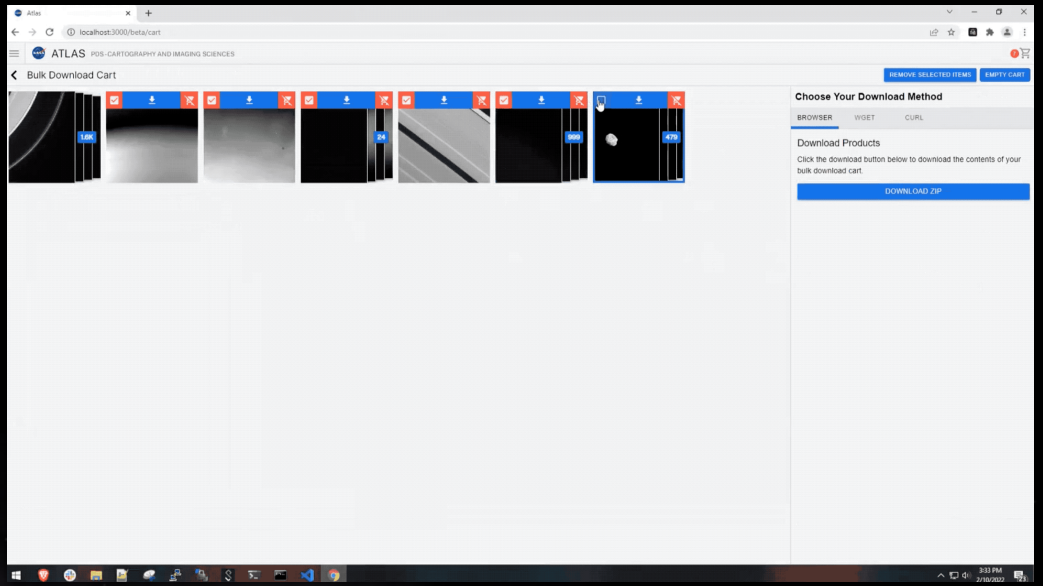
- Utilized IMG's Data Access API (virtualized paths)
- Provides a rich and reactive experience that integrates with the rest of Atlas IV
- Provides navigation, filtering, sorting, and basic search

# Searching the Stars with Atlas IV

## Atlas IV

### Shopping cart

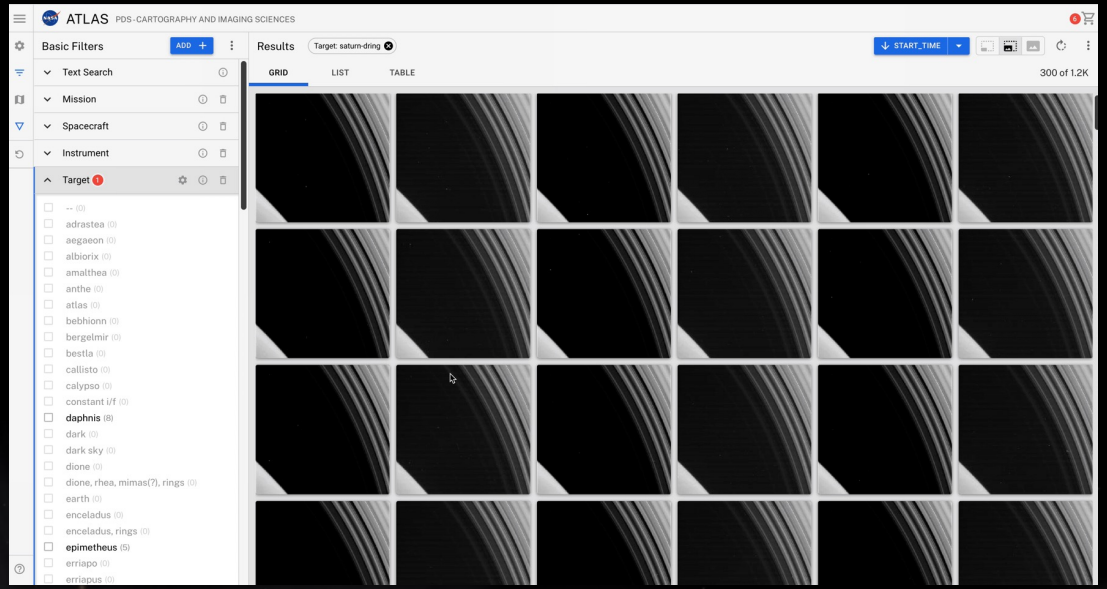
- Streamlines download of large counts of files
- Mark items as you're browsing, download later
- Remove items no longer wanted
- Streams to ZIP file (also curl and wget)
- Pause and resume transfer
- Status reporting
- JSON manifest



# Searching the Stars with Atlas IV

## Atlas IV

- Dedicated image pages
- Interactive zooming and panning
- Toggleable layers, including landmarks
- Simultaneous viewing of both image and label
- Interactive label with feedback loop



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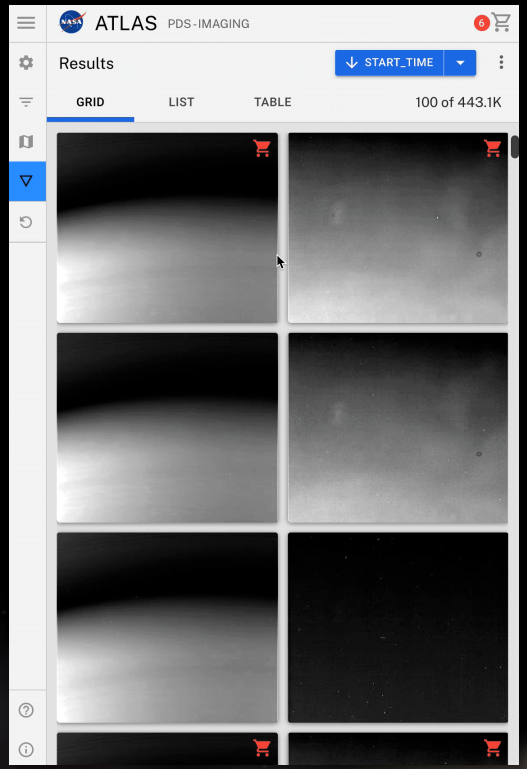
## Atlas IV

- Mobile friendly
- Extensive help for new users
- Closer integration with machine learning capabilities
- Highly extensible codebase for future improvement
- Virtualized, lazy-loaded, and infinite scrolling results
- Shared design system and tighter relationship with the main PDS Imaging site
- Light and dark mode



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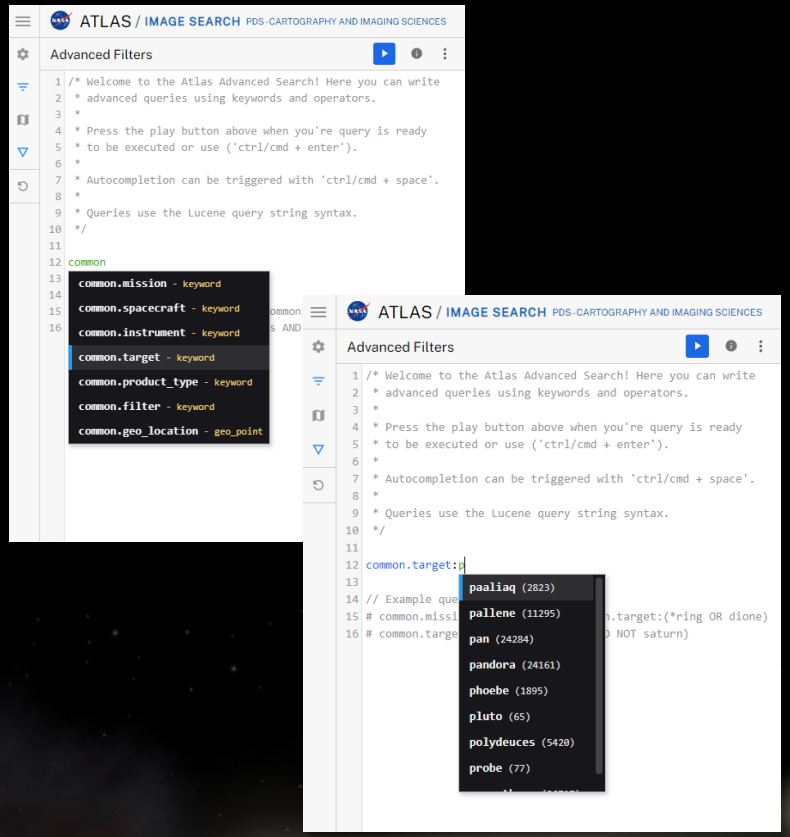
- Advanced search with syntax highlighting and autocomplete



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## Next steps

- Support all data from Atlas III
- Full integration with PDS API
- DEMUD$^2$ classifier integration (novelty)
- Generate tiled versions of our browse imagery

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😱 Public beta early FY23 😎

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- Cover slide graphic: “PIA23647: Tarantula Nebula Spitzer 3-Color Image”, retrieved from https://photojournal.jpl.nasa.gov/catalog/PIA23647
- Background graphic of all other slides: “PIA23647: Tarantula Nebula Spitzer 3-Color Image”, retrieved from https://photojournal.jpl.nasa.gov/catalog/PIA25161
- [1] https://github.com/PlanetMap/CartoCosmos
- [2] https://github.com/wkiri/DEMUD


More information on the IMG API and the cloud-first architecture it implements may be found here: https://bit.ly/3QDPxc1

Slides for this presentation: https://bit.ly/39DJfZy

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