



STScI | SPACE TELESCOPE
SCIENCE INSTITUTE

EXPANDING THE FRONTIERS OF SPACE ASTRONOMY

Post Pipeline Data Analysis Status

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JSTUC August 2022



JWST Archive

Data is available at MAST

- 75 TB in the JWST archive (as of Aug. 19, 2022)
- After initial data release (260 TB in 5 days) reach steady stream of ~5 TB/day
- Primary access is through the MAST portal
- Portal + Jdaviz provides quick look analysis of level-3 products





Early Release Science Summary

Program	Title	Completeness
1288	Radiative Feedback from Massive Stars	0% (All September)
1309	IceAge: Chemical evolution of ices during star formation	85%
1324	Through the Looking Glass: a JWST exploration of galaxy formation and evolution from cosmic dawn to present day	40%
1328	A JWST Study of the Starburst-AGN Connection in Merging LIRGs	50%
1334	The Resolved Stellar Populations Early Release Science Program	100%
1335	Q-3D: Imaging Spectroscopy of Quasar Hosts with JWST	10%
1345	The Cosmic Evolution Early Release Science (CEERS) Survey	20%
1349	Decoding Smoke Signals in the Glare of a Wolf-Rayet Binary	85%
1355	TEMPLATES: Targeting Extremely Magnified Panchromatic Lensed Arcs and Their Extended Star formation	40%
1364	Nuclear Dynamics of a Nearby Seyfert with NIRSpec IFS	80%
1366	The Transiting Exoplanet Community Early Release Science Program	84%
1373	ERS observations of the Jovian System	60%
1386	High Contrast Imaging of Exoplanets and Exoplanetary Systems	87%



JWST at MAST

Upcoming

- All Public JWST data in public AWS bucket – December 2022
- JWST focused interface for downloading data --- Spring 2023

Similar to HST search page, see <https://mast.stsci.edu/search/hst>

Search MAST Webb

API | HELP | ABOUT | MY ST

Work In Progress

Is this your first time using the Webb search form? Welcome! Please feel free to visit our [documentation](#) for help getting started.
This form is a filter - press SEARCH immediately to return all observations, or enter values to focus your results.

Object name(s) and/or RA and Dec pair(s), e.g. M1, 279.232 38.782, 14:03:12.5 54:20:56.2

Object(s)=

Search radius (max: 30 arcminutes)

3 arcminutes

Data Types= SPECTRUM TIME SERIES IMAGE CUBE

Instrument= MIRI NIRCAM NIRSPEC NIRISS FGS GUIDESTAR

Observing Mode, exposure type

Mode= ALL

Exposure duration in seconds, e.g. 1200

Exposure Time=

The filter, grating, pupil, channel, band, & coronasmk

Optical Element=

Object name(s) and/or RA and Dec pair(s), e.g. jw00736-o039_t001_miri_ch1-long

Dataset Name=

Principal Investigator

PI Surname=

Program (Proposal) number, ex:14657

Program ID=

Observation number within a program, ex:146

Observation=

Visit number within an observation, ex: 57

Visit=

Proposal Type= ALL

Cycle= ALL

Return Only Moving Targets

Find data observed on or between these dates

Obs Start Date= Time= to Obs Start Date= Time=

Find observations released publicly on or between these dates

Release Date= Time= to Release Date= Time=

Add or remove additional columns to filter results

Column Name= Condition= + ADD ANOTHER CONDITION

Spectral Pixel Search

Search on pixel values contained within the files to only return observations with those data products

Data Product= Extracted ID Spectra 2D Spectroscopic Image 3D Spectroscopic Image

Column Name= Condition= + Add Condition

Choose output columns by name, header keywords, or description

Output columns: Ang Sep (") Apertures Central Wavelength Dataset Dec (J2000) Exp Time Filters/Gratings High-Level Science Products Instrument Preview Name Proposal ID RA (J2000) Ref Release Date Scan Type Start Time Stop Time Target Name

CLEAR FORM SEARCH SHOW API QUERY

Object name(s) and/or RA and Dec pair(s). e.g. M1, 279.232 38.782, 14:03:12.5 54:20:56.2

RESOLVE

Search radius (max: 30 arcminutes)

Object(s)=

3

arcminutes

Data Types=

SPECTRUM

TIME SERIES

IMAGE

CUBE

Instrument=

MIRI

NIRCAM

NIRSPEC

NIRISS

FGS

GUIDESTAR

Observing Mode, exposure type

Mode=

ALL

Exposure duration in seconds, e.g. 1200

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Add or remove additional columns to filter results



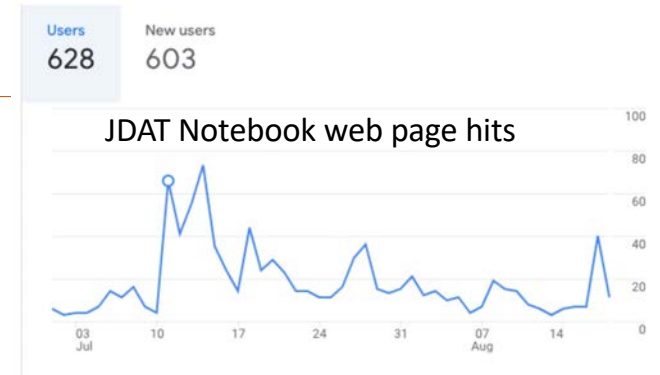
Data Analysis Tools

JDAT Notebooks

- Demonstrate 24 different workflows across all 4 instruments
- Improved installation instructions
- Improved notebook rendering for reading on web page
- Future: work to replace data with actual JWST data

Community Tools Status

- Data Analysis Advisory Group indicated enthusiasm for a handful of community tools
- Quick investigation of these tools for JWST analysis in December 2021
- No issue with: photutils, specutils, imexam, ds9, QFitsView, grizli, SExtractor and DAOPHOT
- T-PHOT and DOLPHOT had yet to be adapted.
 - Both set of developers saw no problems in adapting for JWST use, but required actual data.





Jdaviz – Visualization and Analysis Tool

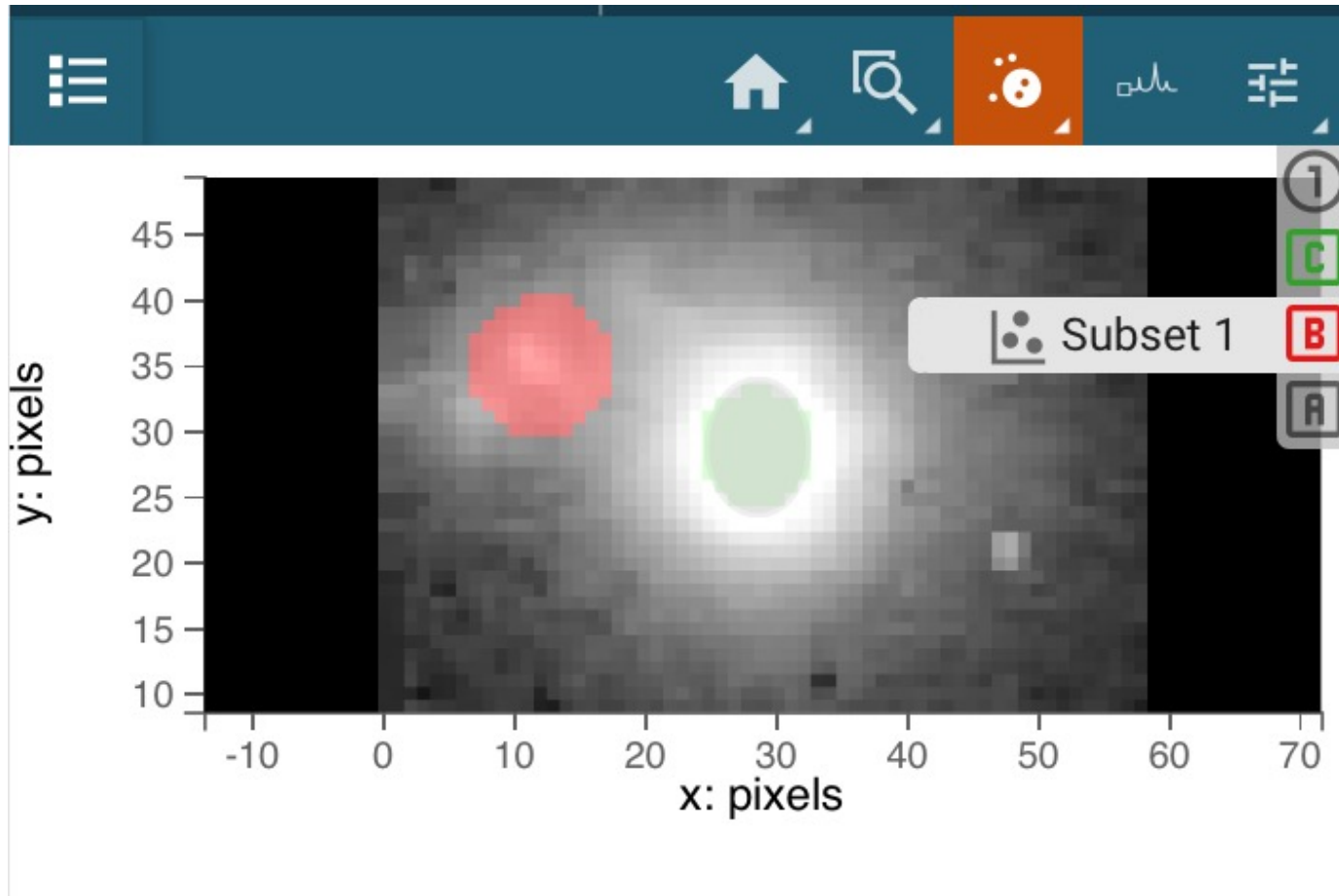
<https://jdaviz.readthedocs.io>

Recent Feature Updates in past 4 months (Screenshots to follow)

- General : Explore header, improved speed, pop-out window, layer labels
- Imviz
 - Aperture photometry, radial profiles, overplot catalogs
- Specviz
 - Spectral Extraction Plugin to trace and extract spectra
- Cubeviz
 - Spectra of individual spaxels
- Mosviz
 - Record redshifts, Updated parser for NIRISS data



Legend and Layering Labels





Catalog Search

The screenshot displays the Imviz web application interface. The main window, titled "imviz-0", shows a dark field of stars with numerous red dots indicating search results. A toolbar at the top includes icons for home, search, pan, zoom, and other navigation functions. On the right side, a control panel is visible with the following elements:

- Imviz Line Profiles (XY) [dropdown arrow]
- Imviz Simple Aperture Photometry [dropdown arrow]
- Catalog Search [dropdown arrow]
- Queries an area encompassed by the viewer using a specified catalog and marks all the objects found within the area. [help icon]
- [Learn More](#) [external link icon]
- Catalog: SDSS [dropdown arrow]
- Select a catalog to search with.
- CLEAR [button]
- SEARCH [button]
- Results: 205
- Export Plot [dropdown arrow]



Specviz Spectral Extraction Plugin

The interface is divided into three main sections:

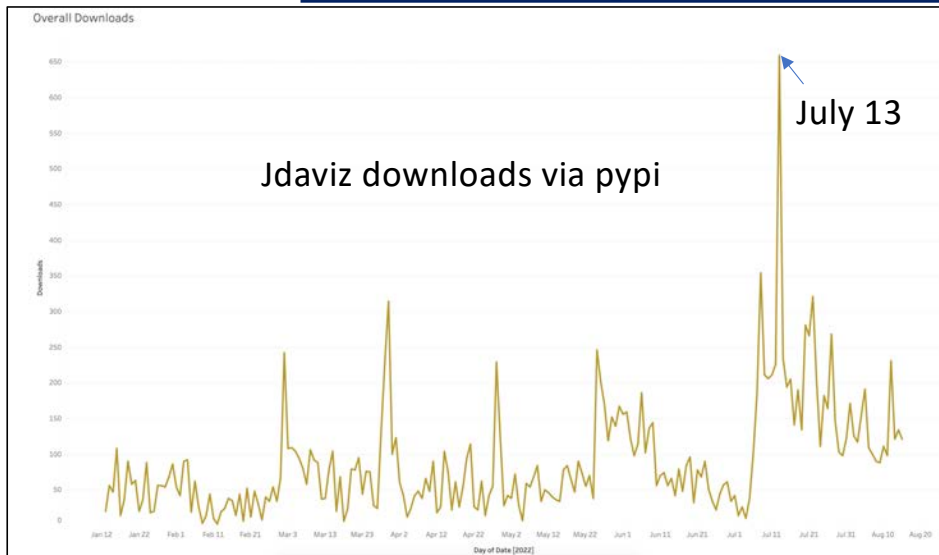
- Top Panel:** A 2D spectral image showing flux density as a function of pixel number (x-axis, 0 to 1200) and row number (y-axis, 0 to 26). A vertical trace is selected, and its position is indicated by a red dot in the top toolbar.
- Bottom Panel:** A 1D flux density plot showing the extracted spectrum. The y-axis is labeled "Flux density [DN]" and ranges from -4.0×10^9 to 1.8×10^{10} . The x-axis is labeled "pixel [pix]" and ranges from 100 to 1200. The plot shows several sharp emission lines, with the most prominent one at approximately 210 pixels.
- Right Panel:** Configuration options for background extraction:
 - Pixel number/column to start the trace:** A text input field.
 - Background:** A section for creating a background and/or background-subtracted image.
 - Background Type:** A dropdown menu set to "TwoSided".
 - Method to use for creating background:** A dropdown menu.
 - Separation:** A text input field set to "8".
 - Separation between trace and background window(s), in pixels:** A text input field set to "4".
 - Width:** A text input field set to "4".
 - Width of background window, in pixels:** A text input field.
 - Export Background** and **Export Subtracted** buttons with dropdown arrows.



Data Analysis Tools

User Engagement

- Led hack days with several ERS teams and addressed their feedback
- Dozen short videos to highlight capability of Jdaviz
- Used in JWebinars and JDAT Notebooks
- Increased interest in data analysis tools seen in download metrics (below)
 - Improving metrics and will include pipeline/data analysis on the yearly community survey.
- Users are encouraged to submit feature tickets through github and Help Desk.



JWST Help Desk Topics

Data Analysis Tools

- Jdaviz: (1) Installation
- Cubeviz: (1) spectrum not loading, (2) how to import region file
- Imviz: (1) assigning colors when creating multicolor image, (2) virtual server not displaying
- Specviz: (1) how to run specviz.app
- Mosviz: (1) loading NIRSpec MOS data, (2) region selection not working, (3) how to launch.
- JDAT_Notebooks: (1) problem, (2) NIRCam_Aperture_Photometry.ipynb
- specutils: (1) Memory error for template correlation of MSA spectra



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