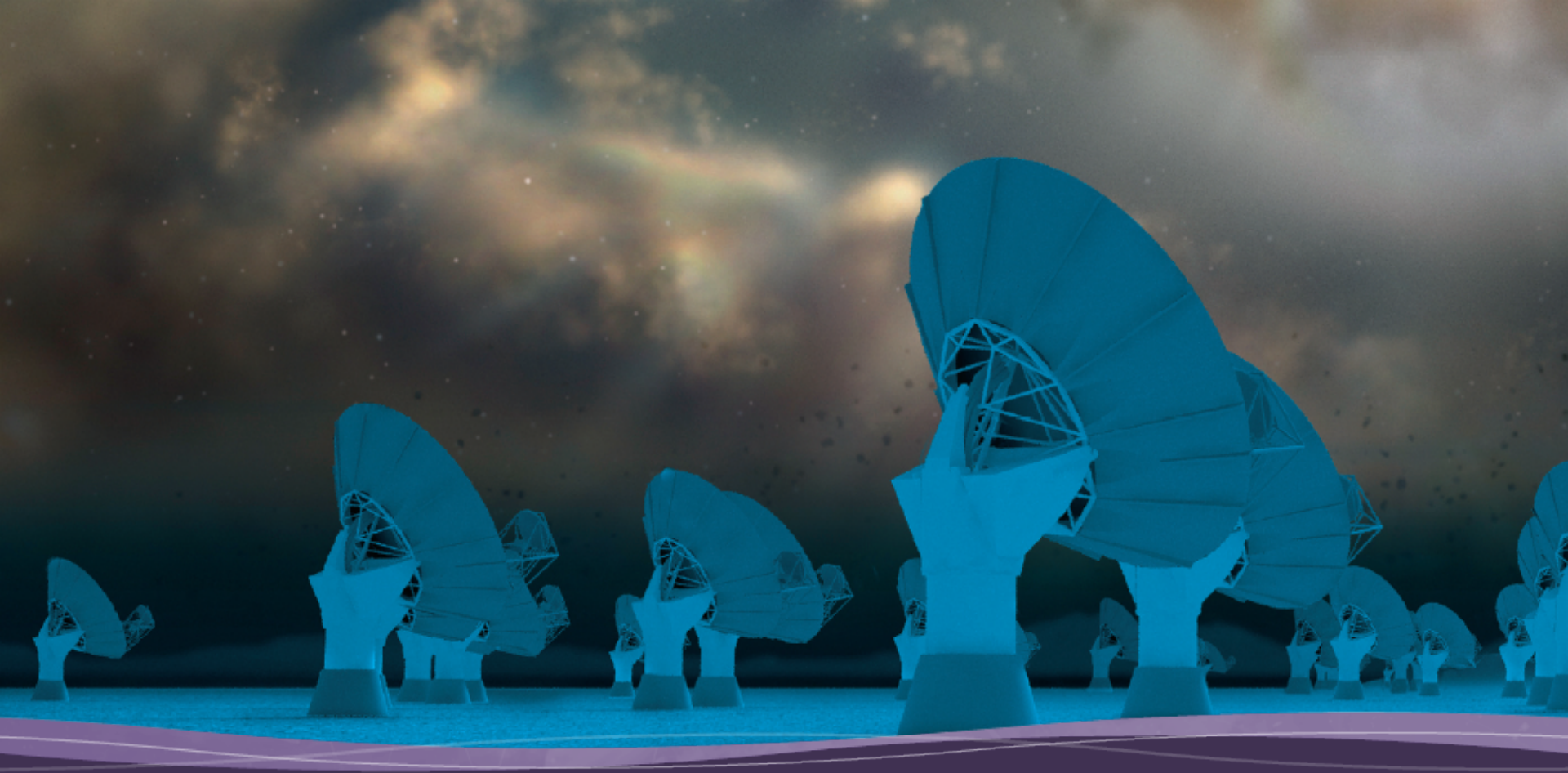


Science Ready Data Products

Author: John Tobin - SRDP Project Scientist

https://science.nrao.edu/srdp/

Overview

- Major NRAO initiative to provide higher quality data products to ALMA and VLA users
  - Current Capabilities
    - Quality Assurance for VLA pipeline calibration
      - Currently continuum projects, C-band and higher freq.
    - New NRAO archive interface serving data and images
    - Calibrated visibility download for ALMA[1] and VLA[1]
    - ALMA User-Defined Imaging
    - VLA Sky Survey - All-Sky S-band (10 cm) Survey
  - Planned
    - VLA User-Defined Imaging[2]

[1] For data successfully processed by calibration pipeline, manual calibration not supported

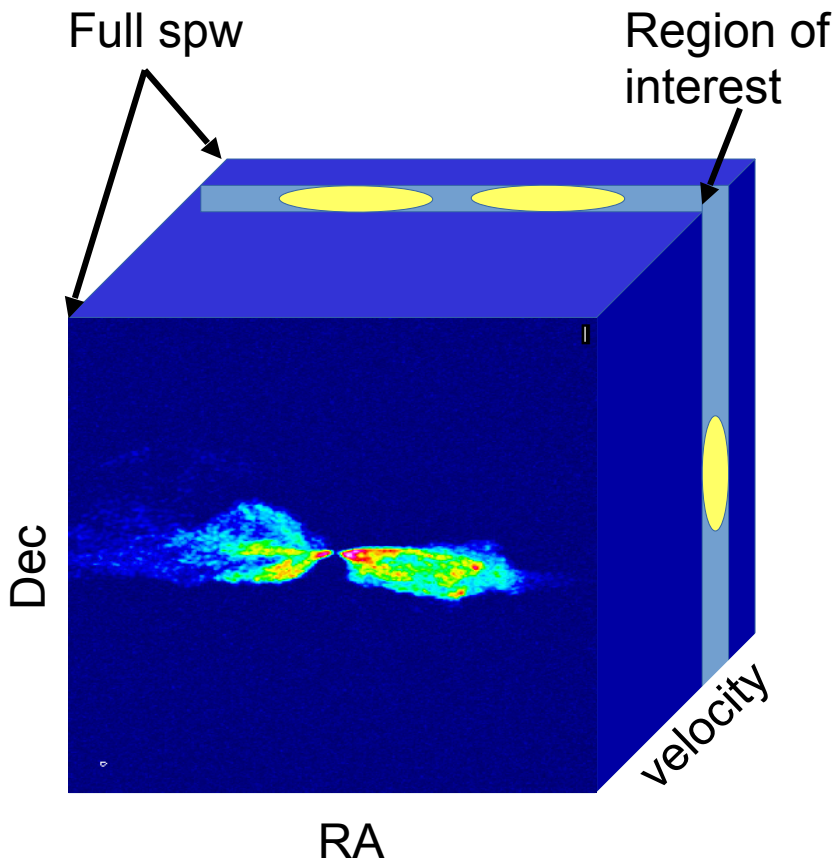
[2] Capability exists in pipeline, not yet used in operations nor available via NRAO archive

Caveats

- Focus is on pipeline-able features
  - Some user-defined settings, non-interactive execution
- ALMA Features supported for Cycle 5+ only; pipeline-calibrated data only
  - limitation of how data were archived previously
- Cycle 5 data sometimes need special settings
  - CASA 5.1.1 for restoration
  - Imaging will get re-run if necessary by DAs
- VLA data might have a calibration, but possibly not science quality
  - Science quality calibrations started ~June 2019 (select bands)
  - Still useful but some additional flagging likely needed
    - Images may still be ‘ok’ thanks to statwt task
- VLA data back to late 2016 supported for restoration

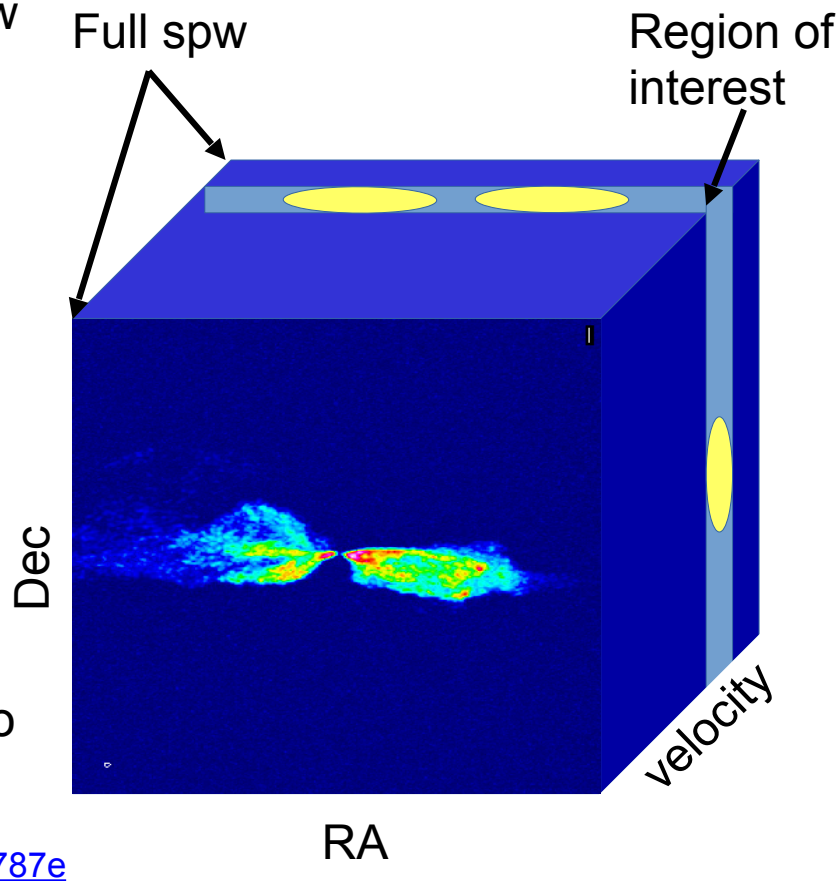
ALMA User Defined Imaging

- Make new ALMA images without downloading all the data or running CASA
- ALMA imaging pipeline with automasking becoming mature with science-quality output however...
  - Archived cubes are generated for full spw at native resolution
  - 10s of GB cubes possible/frequent
  - Size mitigation may prevent all sources/ spws from being imaged



ALMA User Defined Imaging

- User-triggered imaging enables creation of new images using archive interface
  - User specifies cube they want
    - Frequency/velocity
    - Rest Frequency
    - Spectral averaging
    - Angular resolution*
  - Calibrated measurement set restored
  - Imaging pipeline runs
  - Image is quality assured and ingested into NRAO archive
  - Video Demo: https://vimeo.com/513590322/81ee77787e



* The pipeline does the best it can within the limits of the data (i.e., no magic)

Future SRDP Developments

- Improved Flagging in VLA pipeline
- VLA spectral line calibration
- VLA Imaging Pipeline
  - Automasking
  - Cubes
- Large project support in archive
- SelfCal in ALMA/VLA Imaging Pipeline
- Multi-configuration imaging
- Recalibration of VLA and ALMA data
  - new pipelines on previous data
- Suggestions welcome
  - e-mail: jtobin@nrao.edu

Accessing SRDP Capabilities

- User-facing features accessed through NRAO archive
- https://data.nrao.edu
- New NRAO archive, distinct from legacy archive

Accessing SRDP Capabilities

We will now continue with a live demo ☺

science.nrao.edu
public.nrao.edu
ngvla.nrao.edu

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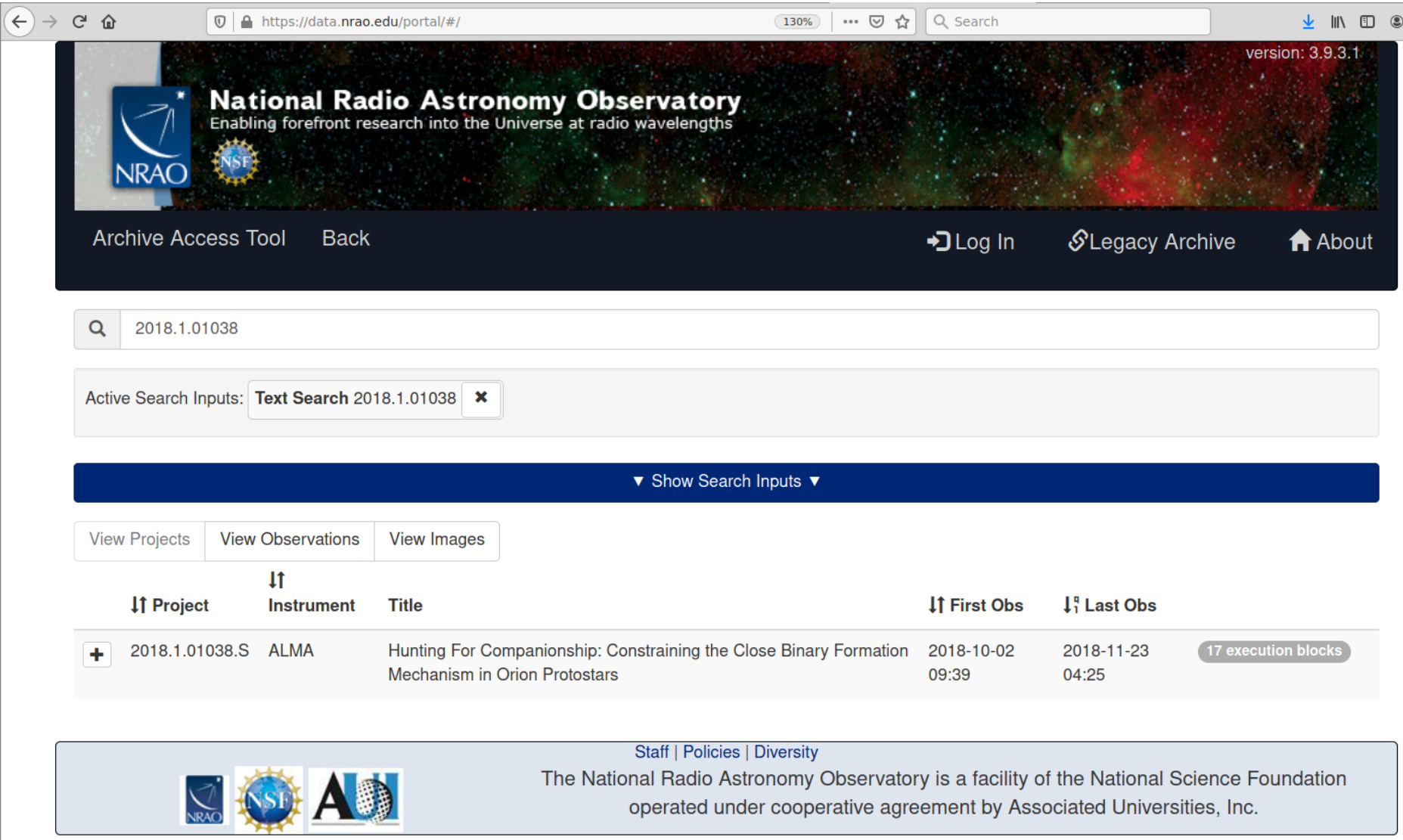
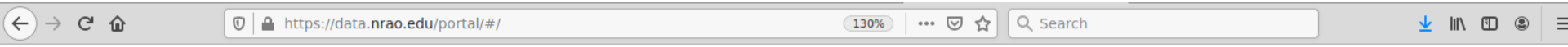
ALMA data served from NRAO archive





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	Project	Instrument	Title	First Obs	Last Obs	
−	2018.1.01038.S	ALMA	Hunting For Companionship: Constraining the Close Binary Formation Mechanism in Orion Protostars	2018-10-02 09:39	2018-11-23 04:25	17 execution blocks

Title: Hunting For Companionship: Constraining the Close Binary Formation Mechanism in Orion Protostars

Abstract: A significant fraction of all main-sequence star are found in binary/multiple systems, and this high fraction of multiplicity must manifest itself during the star formation process. Using ALMA in Cycle 3, we surveyed 331 protostars in the Orion molecular clouds at 0.08" (30 AU) resolution at 0.87mm and we have obtained complementary data with the VLA at 9mm toward the 102 youngest, Class 0 protostars. From this complete sample, we have identified 40 close multiple systems with companion protostars separated by < 500 AU, in addition to more widely separated companions. Close companion protostars are thought to form either directly at these < 500 AU scales via disk fragmentation, or they form on ~1000 AU scales via turbulent fragmentation and migrate. With this sample of 40 close multiples, we aim to determine the dominant mechanism for the formation of close companion stars by searching for Keplerian circum-multiple disks and aligned outflows toward these systems. This survey of a complete sample of close protostellar multiples in the most populous nearby star forming region will provide a definitive answer to the question of how most close multiple systems form.

PI: John Tobin

Co-Authors: Magnus Persson, Maria Schutte, Stella Offner, Michael Dunham, Dominique Segura-Cox, Patrick Sheehan, Nadia Murillo, Robert Harris, Rajeeb Sharma, Dan Watson, Brian Mazur, Lisa Patel, Lukasz Tychoniec, Marina Kounkel, Nickalas Reynolds, Claire Chandler, Nicole Karnath, Laura Perez, Amelia Stutz, Elise Furlan, William Fischer, Zhi-Yun Li, Merel van 't Hoff, Erin Cox, Mayra Osorio, Sarah Sadavoy, Leslie Looney, Tom Megeath, Mihkel Kama, Kaitlin Kratter, Friedrich Wyrowski, Ana Karla Diaz Rodriguez, Guillem Anglada, Hector Arce, James Di Francesco

MOUSes | Images

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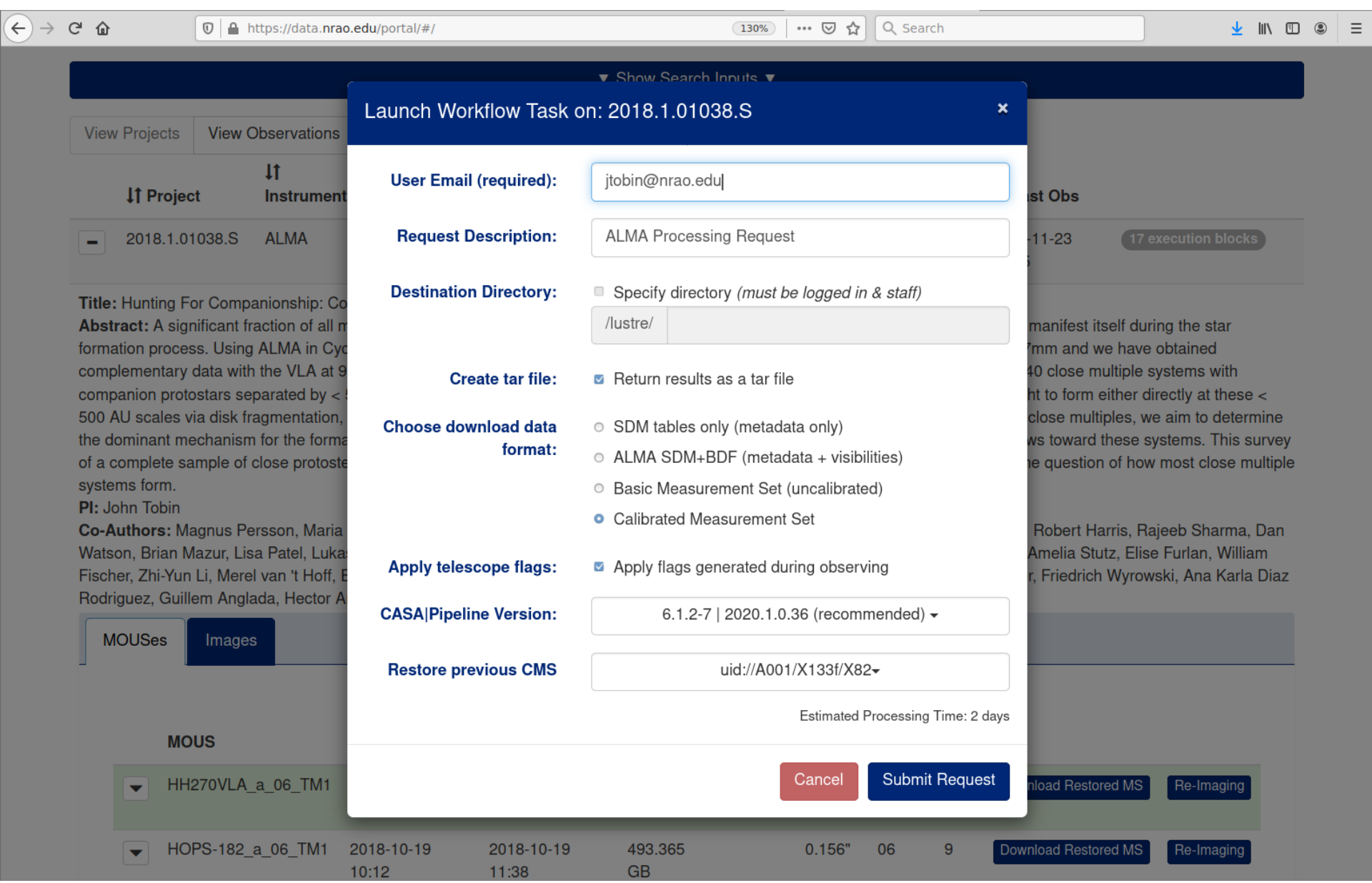
▼	HOPS-182_a_06_TM1	2018-10-19 10:12	2018-10-19 11:38	493.365 GB		0.156"	06	9	Download Restored MS	Re-Imaging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jtobin@nrao.edu
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ALMA Processing Request
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Specify directory (must be logged in & staff)
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Create tar file:
Return results as a tar file
Choose download data format:
SDM tables only (metadata only)
ALMA SDM+BDF (metadata + visibilities)
Basic Measurement Set (uncalibrated)
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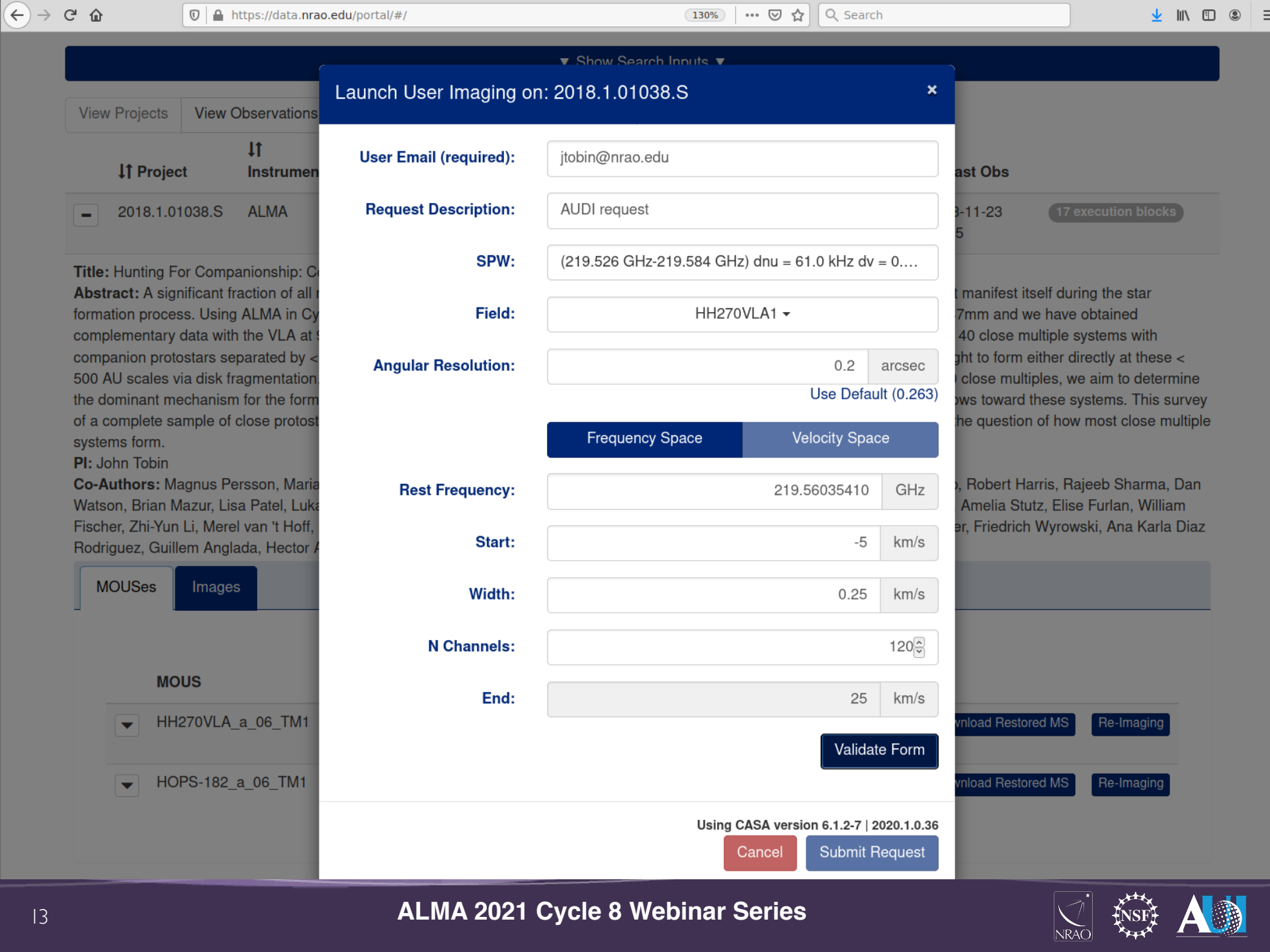
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500 AU scales via disk fragmentation
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of a complete sample of close protost
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PI: John Tobin
Co-Authors: Magnus Persson, Maria
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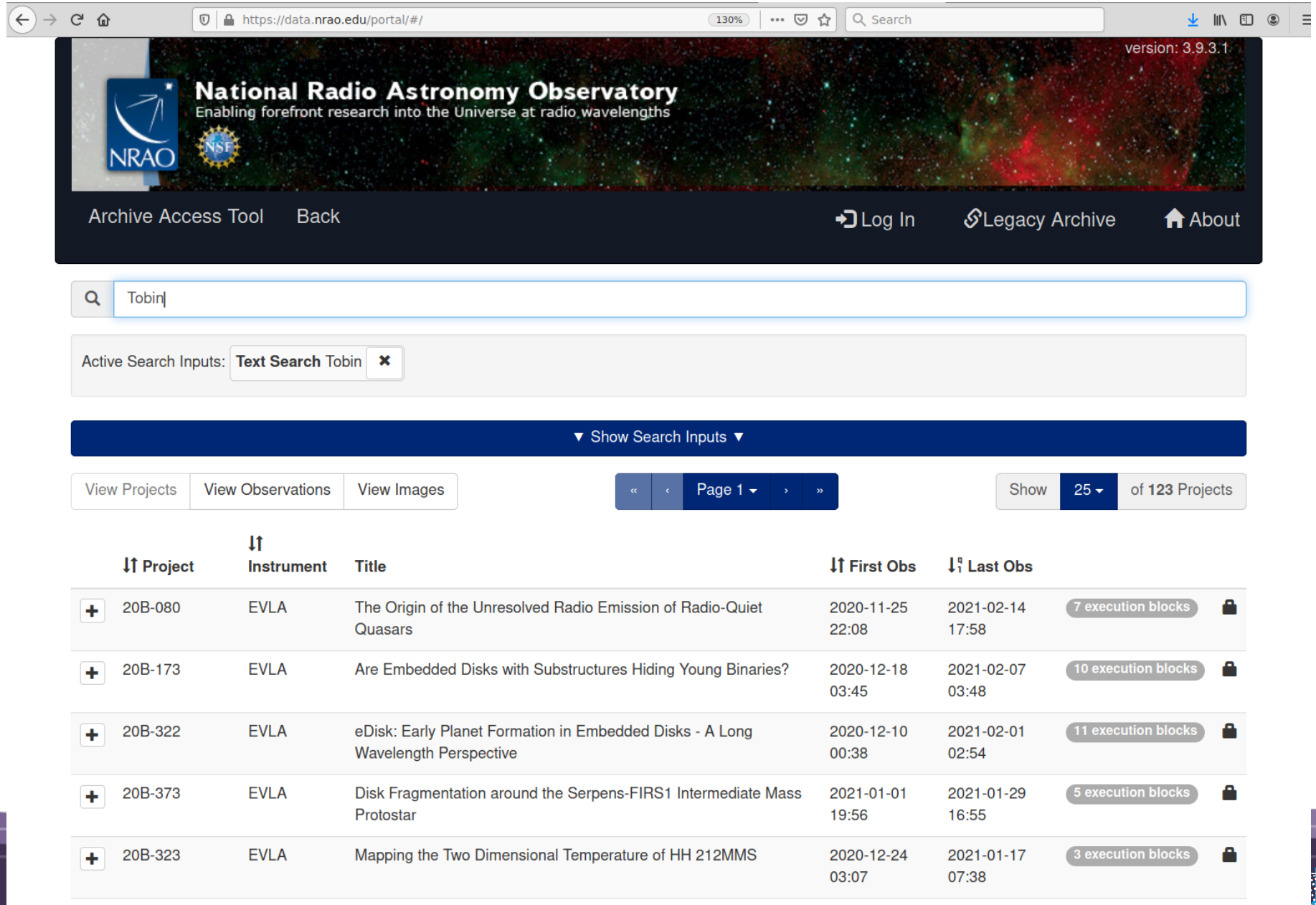
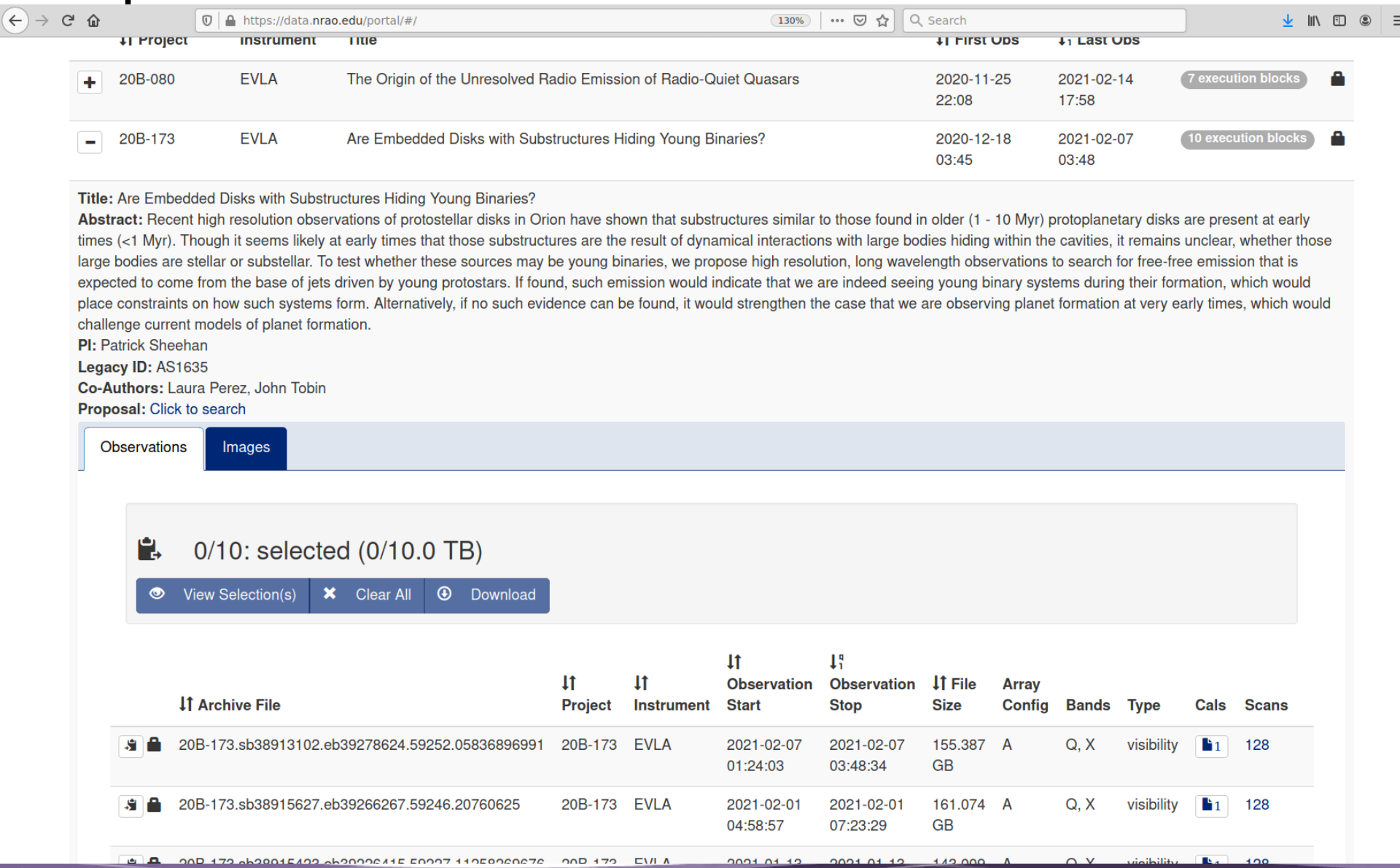
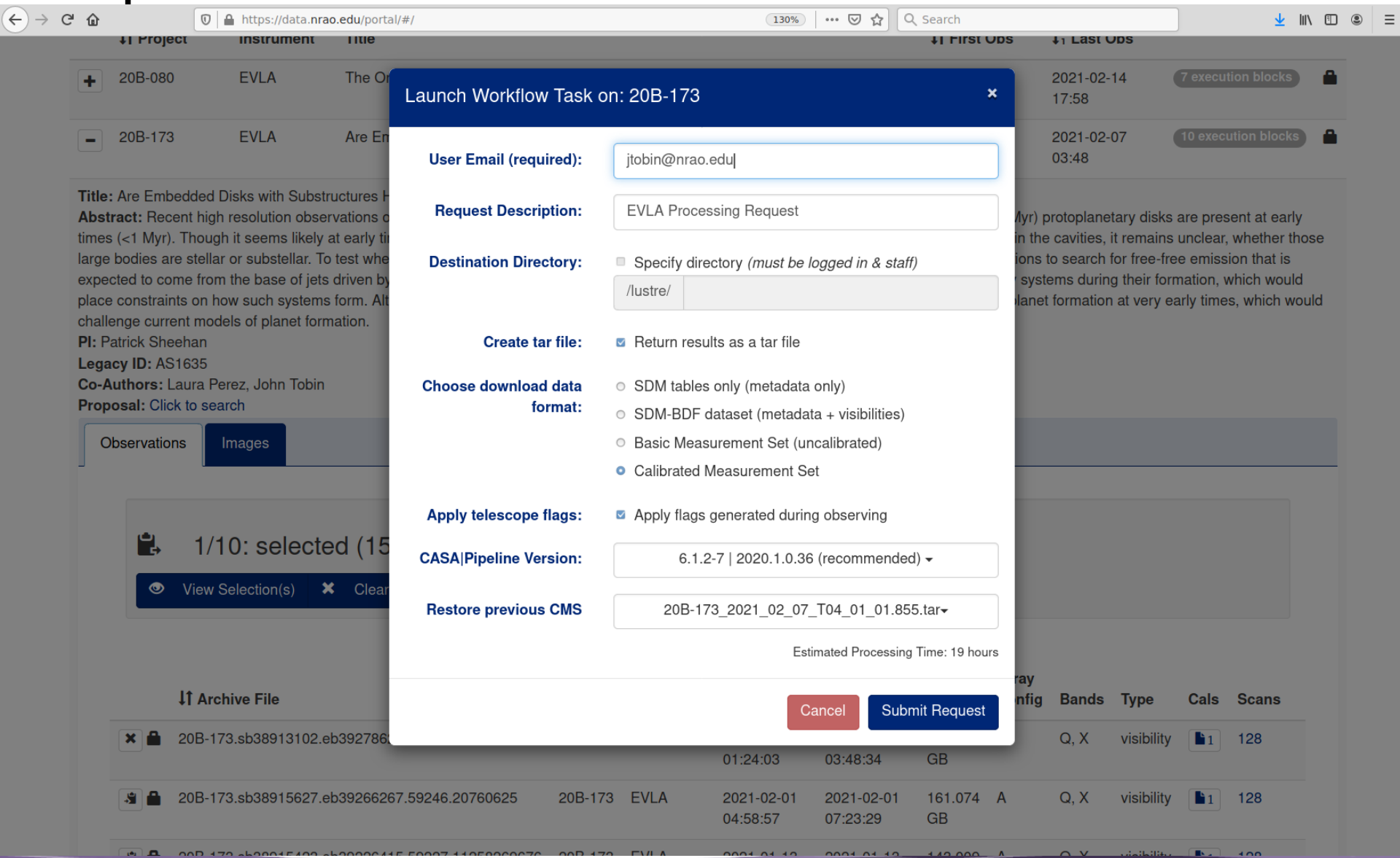
Improved interface to VLA data



Improved interface to VLA data



Improved interface to VLA data



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