



STScI | SPACE TELESCOPE
SCIENCE INSTITUTE

EXPANDING THE FRONTIERS OF SPACE ASTRONOMY

Data to Papers (D2P) Initiative

Jeff Valenti

JWST Mission Scientist @ STScI

JSTUC Meeting
2023 September 18



Community expressed frustration

In recent months, STScI received direct and indirect feedback from the community, expressing frustration that JWST data products have issues that impede science.

- Users expressed the following key concerns:
 - Documentation describing known issues with data products is inadequate
 - Information about how to work around issues is not available
 - Information about planned improvements is inadequate
 - Data products in the JWST archive are often not adequate to do science
 - Documentation describing calibration uncertainties is inadequate
 - Calibration reference data updates are lagging
 - MAST is difficult to use



STScI responded with D2P initiative

- STScI launched a new "Data to Papers" (D2P) initiative
- Goal: Prioritize communication, software development, and calibration activities that will best help users trying to do science with JWST data.
- Key elements of D2P include:
 - Create a [Known Issues with JWST Data Products](#) page
 - Make [JWST Operational Pipeline Build 9.3](#) operational
 - Create a JWST Calibration Uncertainties page
 - Prioritize calibration reference file updates
 - Deploy new JWST-specific MAST interface, analogous to [HST interface](#) (select HST)
 - Host an [Improving JWST Data Products](#) workshop to get help from the community



Data to Papers (D2P) focus areas

- Improve communication with science users
 - Gather feedback
 - Inform users
- Improve data products served by JWST archive
 - Calibration pipeline
 - Reference data
- Improve tools available to science users
 - Python notebooks
 - Data analysis tools



D2P focus area – Improve communication

- Gather feedback
 - Publish [Observer News](#) items encouraging user questions and feedback
 - Request feedback from JSTUC on user issues and practical mitigation
 - Address actionable feedback from the User Survey from early 2023
 - Gather feedback at [Improving JWST Data Products](#) workshop at STScI
 - Gather feedback via another User Survey after the Cycle 3 proposal deadline
- Inform users
 - Create and maintain a single [Known Issues](#) page, ordered by observing mode
 - Create a single Calibration Uncertainty page, ordered by observing mode
 - Link to Known Issues and Calibrations Uncertainty pages in emails
 - Produce new [JWebinars](#) to teach community about JWST data analysis
 - Improve calibration pipeline documentation at jwst.readthedocs.io



Philosophy for known issues page

- List all issues on one page with links to supporting information
 - <https://jwst-docs.stsci.edu/jwst-calibration-pipeline-caveats/known-issues-with-jwst-data-products>
- Sort issues into sections to facilitate navigation on page
 - General issues
 - Instrument general issues, if any
 - Instrument mode issues
- Provide the following for each issue:
 - Symptoms from a user perspective. Issue ID (sortable)
 - Cause in terms a user would understand
 - Workaround, if any. May involve running pipeline or a python notebook
 - Mitigation plan including timeline to fix. Last status update (sortable)
- Keep information up to date!



Two examples of known issues

General issues

Symptoms	Cause	Workaround	Mitigation Plan
GI01: TARG_RA and TARG_DEC in the FITS primary header are not at the epoch of the JWST exposure. This is one reason the 1-D spectral extraction aperture can be offset from the target location in the 2-D extracted spectrum image (see relevant instrument modes below).	Initially, science data processing was not applying proper motion to the target coordinates specified by the user (PROP_RA, PROP_DEC). After a 23 May 2023 update, science data processing began applying a proper motion correction that was too small by a factor of 0.36533.	Download uncalibrated data. Update TARG_RA and TARG_DEC (see workaround). Rerun calibration pipeline.	24 Aug 2023 Updated operations pipeline Apply proper motion correctly. STScI will reprocess affected data products with an updated operations pipeline, planned for installation on 24 Aug 2023. Reprocessing of affected data typically takes 2-4 weeks after the update.

MIRI medium resolution spectroscopy (MRS)

Symptoms	Cause	Workaround	Mitigation Plan
MR-MRS02: The photon count rate and derived flux is lower than predicted at long wavelengths, with maximum deficit roughly a factor of 2 at 28 μm .	MRS sensitivity at long wavelengths is decreasing with time.	Use the new Science Calibration Pipeline software (jwst 1.11.0 onwards) to apply the time-dependent throughput correction, using new reference data (jwst_1094.pmap onwards). This is available as of 21 Jun 2023.	01 Aug 2023 Created issue Apply the new time-dependent throughput correction. STScI will reprocess affected data products with an updated operations pipeline, planned for installation on 24 Aug 2023. Reprocessing of affected data typically takes 2–4 weeks after the update. See JWST Observer.



D2P focus area – Improve data products

- Calibration pipeline
 - Make [pipeline build 9.3](#) and patch 9.3.1 operational
 - Reprocess existing data with build 9.3.1, which takes 2-4 weeks
 - Implement the best pipeline enhancements from the [workshop](#)
 - Develop pipeline build 10 with high-priority enhancements
- Reference data
 - Improve bad pixel flagging for NIRSpec subarrays and NIRISS
 - Provide valid uncertainties for NIRSpec 1D extracted spectra
 - Support field-dependent wavelength dispersion for NIRISS
 - Update NIRSpec darks and pixels masks based on Cycle 1 data
 - Update NIRCcam flux calibration for all modes
 - Update NIRCcam distortion maps for imaging and coronagraphy
 - Multiple updates every month...



Enhancing JWST Data Products workshop

- Web page, registration, and abstract submission are live!
 - <https://www.stsci.edu/contents/events/stsci/2023/november/improving-jwst-data-products-workshop>
- Harvest pipeline enhancements from experts in the community
 - Separate JWebinars will provide training for the broader community
- Nov 14-15 will be a plenary session
 - Community will summarize issues with STScI software/products and solutions
 - Recorded talks, presentations, and supplementary material will be posted online
- Nov 16-17 will be a hands-on session
 - Quantitatively compare community/STScI software/products
 - Relevant datasets will be made available before the event
 - Results will motivate pipeline enhancements



D2P focus area – Improve tools

- Python notebooks
 - Create new [repository](#) to host workaround notebooks for known issues
 - Populate new repository with ephemeral workaround notebooks
 - Publish and maintain notebooks that demonstrate data analysis [use cases](#)
 - Assess how notebooks should be organized from a user perspective
- Data analysis tools
 - Deploy new JWST-specific MAST interface, analogous to [HST interface](#) (select HST)
 - Assess [jdaviz](#) development priorities based on broad community needs
 - Maintain [community tools](#) web page



How can the JSTUC help?

- Encourage community to report new issues via the Help Desk
- Report new issues via the Help Desk
- Suggest experts who would help make the workshop a success
- Suggest approaches to gather better feedback from the community
 - Pervasive issues vs. vocal minorities