MIRI contribution to the JSTUC

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On behalf of the MIRI Team.

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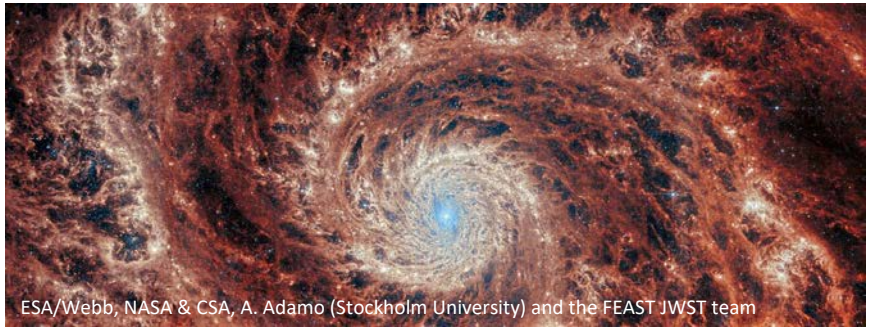
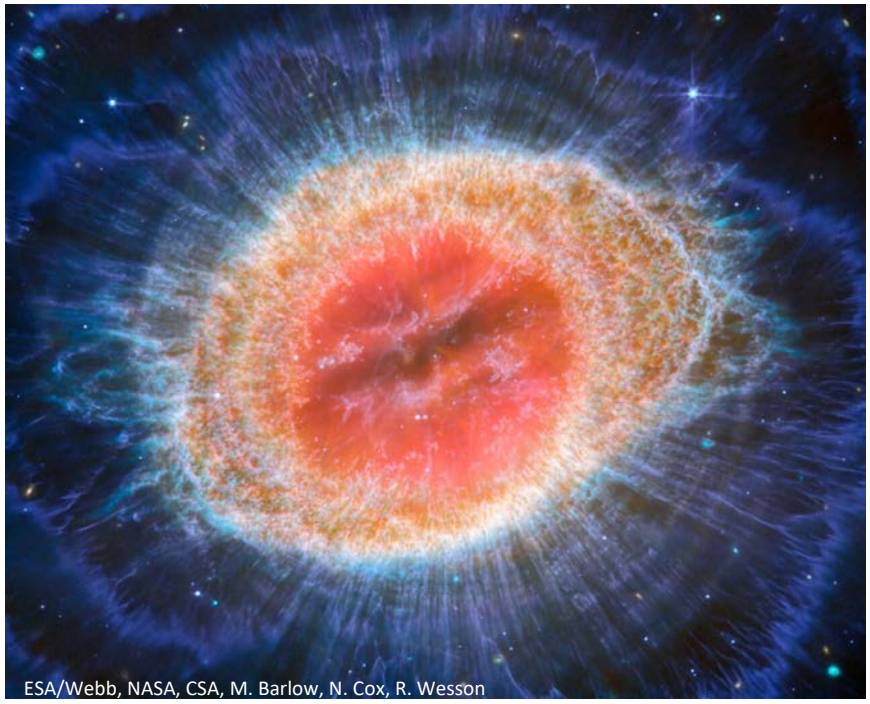
Summary

- MIRI is fully operational, delivering great data and good quality science products.
- MRS + Imager long-wavelength throughput issue
- Grating wheel monitoring continues
- Continuing to make valuable pipeline and reference file updates to improve the quality of our calibration & data products



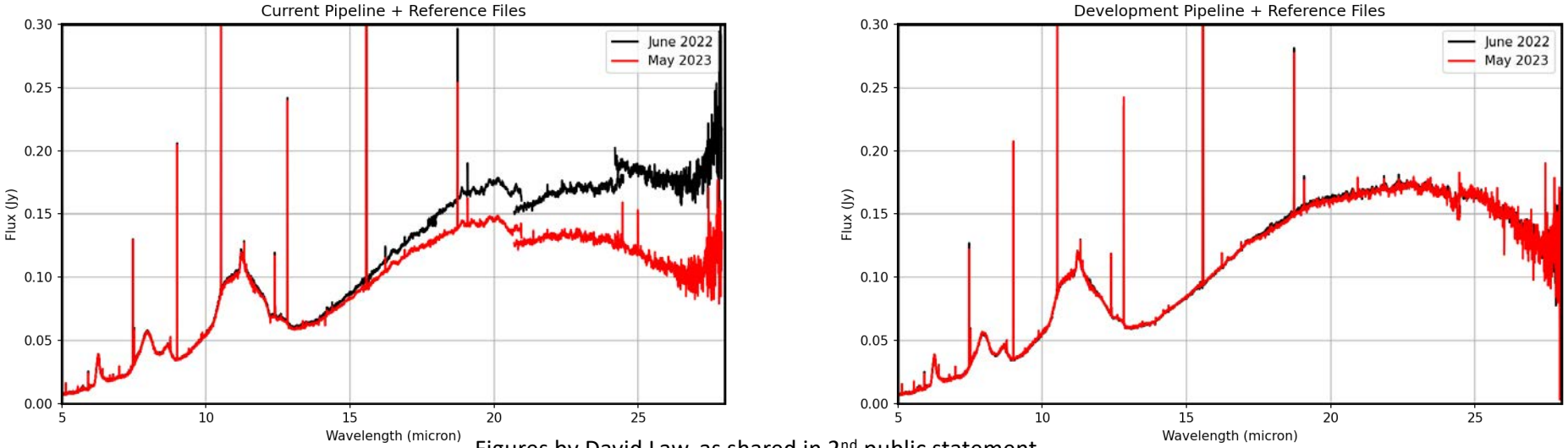


MRS + Imager long-wave count rate loss

- In April 2023, MRS team identified a drop in count rates at long wavelengths for flux standards, as well as in backgrounds counts.
    - Increasing with wavelength; most severe in Channel 4C (~50% count rate loss)
    - Exponential decline, appears to be stabilising
- In July 2023, new imager data revealed that a similar issue is visible in our long-wave imager filters
    - Effect is measurable in from F1280W onwards & increases with wavelength; F2550W shows a reduction of 18% in count rate
    - Temporal trend not very well constrained; additional observations are planned to address this.
- We have produced 3 public statements released via STScI (JWST Observer News) and NASA (Webb blog) with numbers, plots and advice for users.
- The root cause is under investigation

MRS + Imager long-wave count rate loss

- Mitigation: a time-dependent correction has been implemented in the calibration pipeline for MRS
  - Reference files updated in June, code updates part of B9.3; MAST data currently being reprocessed
  - Updated reference files for Imager to implement a similar correction are being prepared (delivery est. ~late September)
  - ETC was updated for Cycle 3, projecting the count rate loss forward to provide realistic SNR estimates for MRS
- Additional data is being taken + dedicated detector testing will take place in <u>September</u>



Figures by David Law, as shared in 2nd public statement

MRS DGA-A Grating wheel monitoring

- Continuing to progress to a “routine” state of operation for the MRS
- Diagnostic testing for friction torque & settle time of DGA-A is executed monthly & now analysed with a dedicated tool to aid with automation of the analysis
- The work on this issue includes detailed risk assessment and contingency planning. These are reviewed by Anomaly Review & Management Boards following outlined procedures.

Key calibration, reference file & pipeline updates

- MRS
  - Addressing time-dependent count rate loss issue (pipeline supported from B9.3)
  - Improvements to wavelength calibration & outlier detection
  - Better mitigation of the 12 μm spectral leak
  - Further improvement to the Channel 4 flux cal delivered in August
  - B9.3: move away from coordinate-based spectral extraction
- LRS (slit + slitless)
  - Changes focused on moving away from coordinate-based corrections – spectral extraction and path loss correction now providing better quality products & less prone to problems due to coordinate issues
  - New pixel replacement step (B9.3) interpolates over NaNs to remove spikes & divots in spectra
  - Much analysis into undesired features seen TSO data (390 Hz noise; persistence issues; issues with very bright targets)
- Coronagraphs
  - New reference files in support of FULL frame observations
- Detectors: implementation of wavelength-dependent gain

Focus areas for the coming months

- Characterization of the count rate loss issue for imager and MRS via “enhanced” flux calibration program, and continuing with root cause investigation
  - Making further pipeline updates in response to findings as needed
- Support to the community in understanding data quality, calibration accuracy, known and open issues
  - Continuing the trend started with the “D2P” initiative in supporting users via documentation, notebooks, Helpdesk.
- Calibration & algorithm improvements for the MIRI detectors, LRS (including TSOs)
- Further developing the operational concept for a low-resolution Wide-Field Slitless Spectroscopy mode