



**STScI** | SPACE TELESCOPE  
SCIENCE INSTITUTE

EXPANDING THE FRONTIERS OF SPACE ASTRONOMY

# JWST Mosaicking Level 2 - Overview

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JWST Master Class

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## Outline of Mosaics Level 2 “hands-on” activity

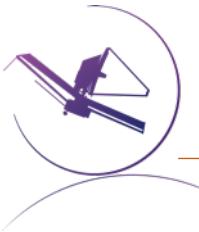
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Brief overview presentation (this)

Watch APT Mosaics video tutorial, which covers most of the basic functionality needed. [Specifying Mosaics in APT \(13:41\)](#)

Hands on Exercises (approx. 30 minutes for each)

- Exercise #1: Learning the Basics
- Exercise #2: Handling Limitations in position angle
- Exercise #3: Adding or removing individual tiles in a mosaic



## Mosaics Overview: Defining Mosaics

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- Mosaicking is a technique whereby multiple pointings of a field of view are used to cover a larger spatial region that can be observed with a single pointing.
- In APT a mosaic is defined by a single target position, and a “grid” of FoVs around that position.
  - Each “tile” of the mosaic is represented by an offset from the “target” coordinate, not a specific RA and Dec.
  - Hence, this grid rotates about the target position as a unit.
- A mosaic is generally a single observation. In most cases for the larger FoV instruments (like NIRCam and MIRI imaging), each tile of the mosaic will be in a separate visit.
  - Depends somewhat on the Visit splitting distance for a given target and tile overlap used.
  - In order for the mosaic to be “schedulable”, all of the individual tiles (visits) must have guide stars at the same time (i.e. at the same rotation angle).



## Specifying mosaics can require use of many aspects of APT

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Depending on the complexity of a given use case:

- APT -- Aladin visualization interface
  - Visualize mosaic on object
  - Investigate rotations and coverage
  - Coordinate changes and committing back into proposal
- Visit Planner and VP diagnostics
  - Mainly needed if position angle constraints or timing constraints are needed.
- Various Special Requirements
  - Again, primarily for cases where position angle or timing must be constrained.



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## Mosaics and Backgrounds – Things to consider

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The background matching step in the data processing pipeline matches fluxes in the overlapping regions.

The net result is that the zero flux/background level can get lost in the process.

- This is relevant if you want to measure surface brightnesses accurately.

When mosaicking extended objects, make sure one or more tiles really gets out to the background sky.

- Allows more accurate background subtraction.
- Sometimes this is not feasible (e.g. source too large). If that is the case it is advisable to review the background levels on individual exposures *before they are combined by the pipeline* and take note of the uncertainties.
- Time variability of backgrounds can also be a concern for mosaic “re-observations” 6 months apart.
  - Ex: Coordinated parallels where one wants both MIRI and NIRCam imaging.
- Not important for point sources, as you can subtract a region around the source that represents the sky.



## Ready, Get Set, Go!

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Watch APT Mosaics video tutorial: [Specifying Mosaics in APT \(13:41\)](#)

Distribute Exercises Handout and APT start files.

Get to work! (Work at your own pace. Questions? Raise hand and one of us will come around.)

Those helping in this session:

- Amber Armstrong, Program Coordinator (Monday session only)
- Douglas Long, RIA at STScI and Training coordinator for new hires.
- Weston Eck, Program Coordinator
- Elizabeth Nance, Program Coordinator
- Karla Peterson (Tuesday session only)

The background of the image is a deep, dark space filled with numerous small, white stars of varying sizes. In the center, there is a prominent, large nebula. This nebula is composed of wispy, translucent clouds of gas and dust that are illuminated from within, showing a vibrant palette of colors including shades of blue, green, yellow, orange, and red. The nebula's structure is complex, with many loops and dense clusters of gas.

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