Overheads for Moving Targets

Except for an additional overhead for guide star acquisition and tracking set-up, there are no overheads exclusive to moving targets. On this page, we provide examples of general overheads that apply to specific moving target observations.

Guide star acquisition and tracking

Main article: JWST Guide Stars

Guide star acquisition and initiation of tracking for moving targets will incur a 90-second overhead. An additional 30 seconds will be applied for each dither. These overheads are unavoidable for all moving target observations.

Time critical observations

Any observations specified to occur within a window of 1 hour or less are considered time critical and will incur a 1-hour (3600-second) overhead. Examples for Solar System targets include, but are not limited to, observing:

- an object at a specific date and time.
- an object at a specific rotational phase.
- an object at a particular phase angle.
- a satellite at a particular elongation or position angle.
- a satellite during a transit or when in shadow.

See Solar System Special Requirements and Timing Special Requirements for complete lists of constraints available for moving target observations in APT.

It is recommended that efforts be taken to avoid making your observations time critical, but in some cases the scientific program may require it. Below are some tips on how to avoid the 1-hour overhead.

Be careful when specifying a phase constraint or a central meridian longitude constraint. For example, Jupiter's rotation period is 10 hours, so providing a phase constraint between 0.0 and 0.11 (a range of ~40 degrees of longitude) will not incur the 1-hour overhead, but a phase constraint between 0.0 and 0.09 (a range of ~32 degrees of longitude) will incur the overhead. Careful consideration of science requirements can avoid this overhead.

If complete longitudinal coverage is desired for a quickly rotating body, remaining on the object during an entire rotational period is recommended. For example, full rotational coverage of Jupiter can be obtained in ~10 consecutive hours of observations and avoids the 1-hour overhead because specific phases are not required.

Observations of faster-moving objects (asteroids, NEAs, nearby comets, etc.) at specific phase angles are more likely to incur the 1-hour overhead than observations of slower-moving objects (Centaurs, KBOs, the giant planets, etc.).

Target of opportunity (ToO) observations

Main articles: JWST Target of Opportunity Observations, JWST Target of Opportunity Program Activation

There are two different categories for ToO observations: disruptive and non-disruptive. A non-disruptive ToO program activation is one that occurs 14 or more days prior to the planned observation. A disruptive ToO activation is one that occurs less than 14 days prior to the planned observation. Disruptive ToO activations that occur within 3 days of the planned observation will incur a 0.5-hour (1800-second) overhead. There are no overheads for ToO activations that occur 3 or more days before the planned observation; however, only a small number of disruptive ToO programs will be executed each cycle.

For more information on ToO observations see JWST Target of Opportunity Observations and JWST Target of Opportunity Program Activation.

Making use of smart accounting

Main article: JWST APT Smart Accounting

Smart accounting is available for planning moving target observations as of APT 25.1.1. The Smart Accounting tool looks at the full set of proposed observations in a proposal and decides which sub-groupings can logically be scheduled together to reduce the total amount of charged time for slewing; however, this does not guarantee that the observations will actually be scheduled together during execution. Without smart accounting, the slew time for each visit is set at 30 minutes (1800 seconds) by default. In reality, consecutive visits to the same target do not require 30 minutes of time to slew to the target because the observatory is already pointed at the target. Using smart accounting, the slew time overhead charged to the program can be significantly reduced. For example, an observation of Titan with the NIRSpec IFU followed right afterwards by an observation of Titan with the MIRI MRS would be charged 30 minutes for the initial slew to Titan for the NIRSpec observations and a significantly shorter time (<5 minutes) for switching instruments to MIRI, target acquisition, and re-acquiring a guide star.

To run smart accounting in APT, follow the instructions on the JWST APT Smart Accounting page.