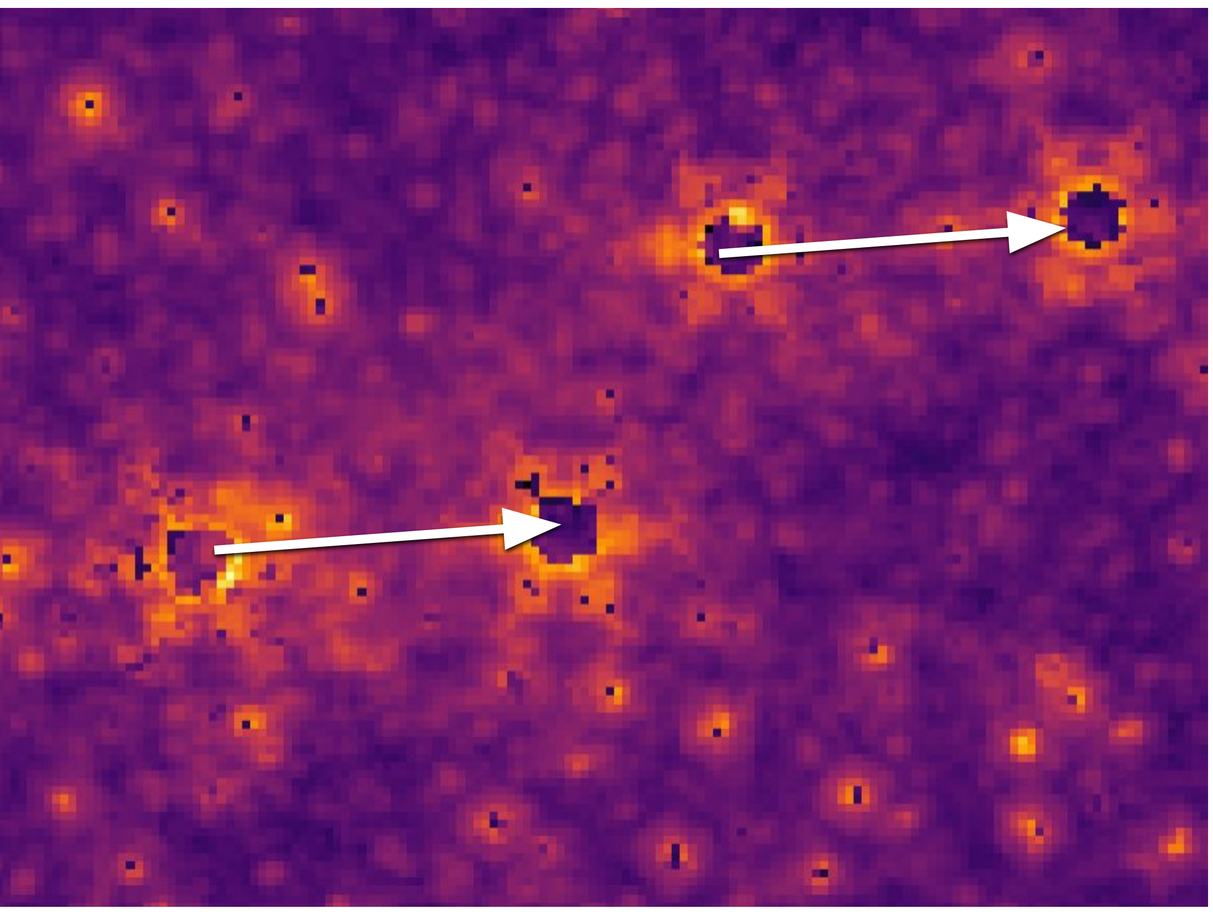
JWST Tweakreg Frame Misalignment

Savannah Gramze
University of Florida

Spitzer Glimpse 7.8 μm



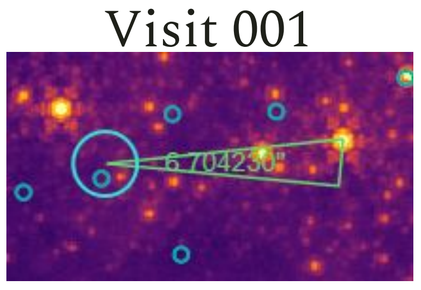
Tweakreg Fails to Align Frames

- Causes “double stars” in final image.
- When viewing output from `tweakreg`, star coordinates do not agree.
- How common is this issue? Happens often for high stellar density areas. Westerlund 1, Project 2221 of the Brick and Dust Ridge Cloud c.
- Related to several issues on JWST Pipeline Caveats page.

Possible Causes

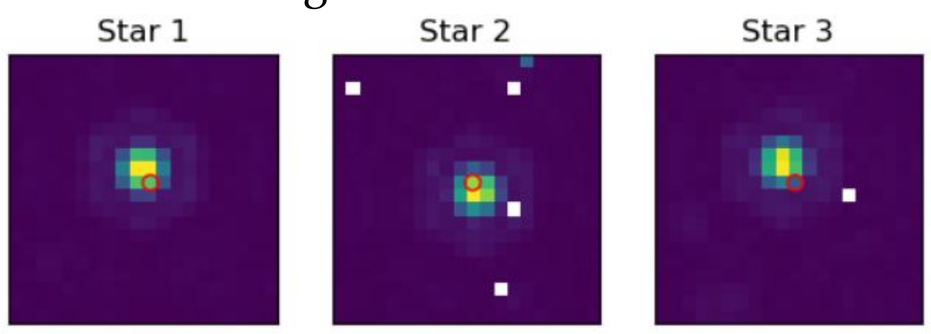
- Guiding on different stars between visits
- Frames across the field do not overlap
- Fundamental issue with calibrations and/or software

Visit 001



Visit 002

Refining Offset Correction

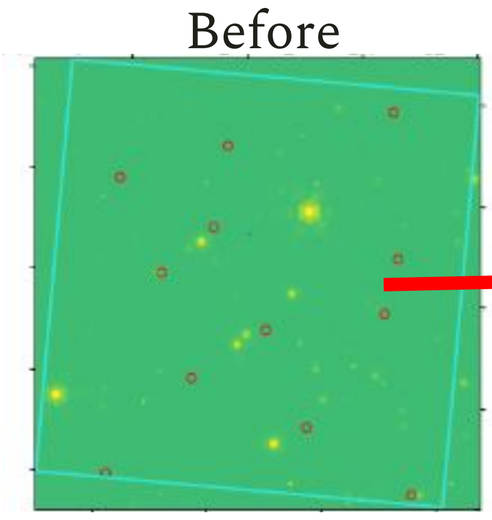


Possible Solutions

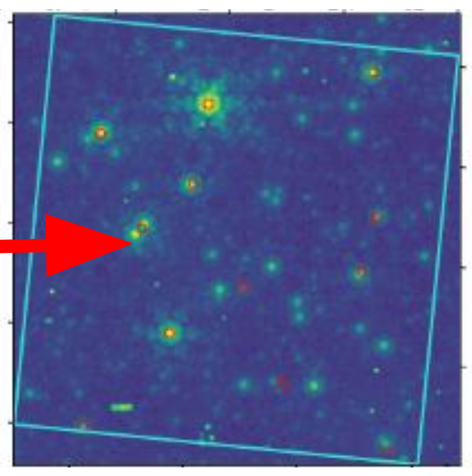
- Adjust `tweakreg` parameters - larger `searchrad`, changing `fit_geometry`, adjusting `separation` and `tolerance`.
- Run JHAT (see presentation by Armin Rest)
- Change the order of the frames as they are fed into `tweakreg`.
- Measure the offset of each frame from the reference catalog, `adjust_wcs` before running `tweakreg`.

```
from jwst.tweakreg.utils import adjust_wcs
```

Before



After



Manual Alignment

- Measure the pixel coordinates of a star with a known RA/Dec.
- Find the offset between the catalog position and the position using the frame’s WCS after Stage 2 of pipeline.
- Edit frames GWCS to account for the shift.
- Write change to ASDF.
- Run `tweakreg` on adjusted frames