

Characterizing Gas Giants with HWO

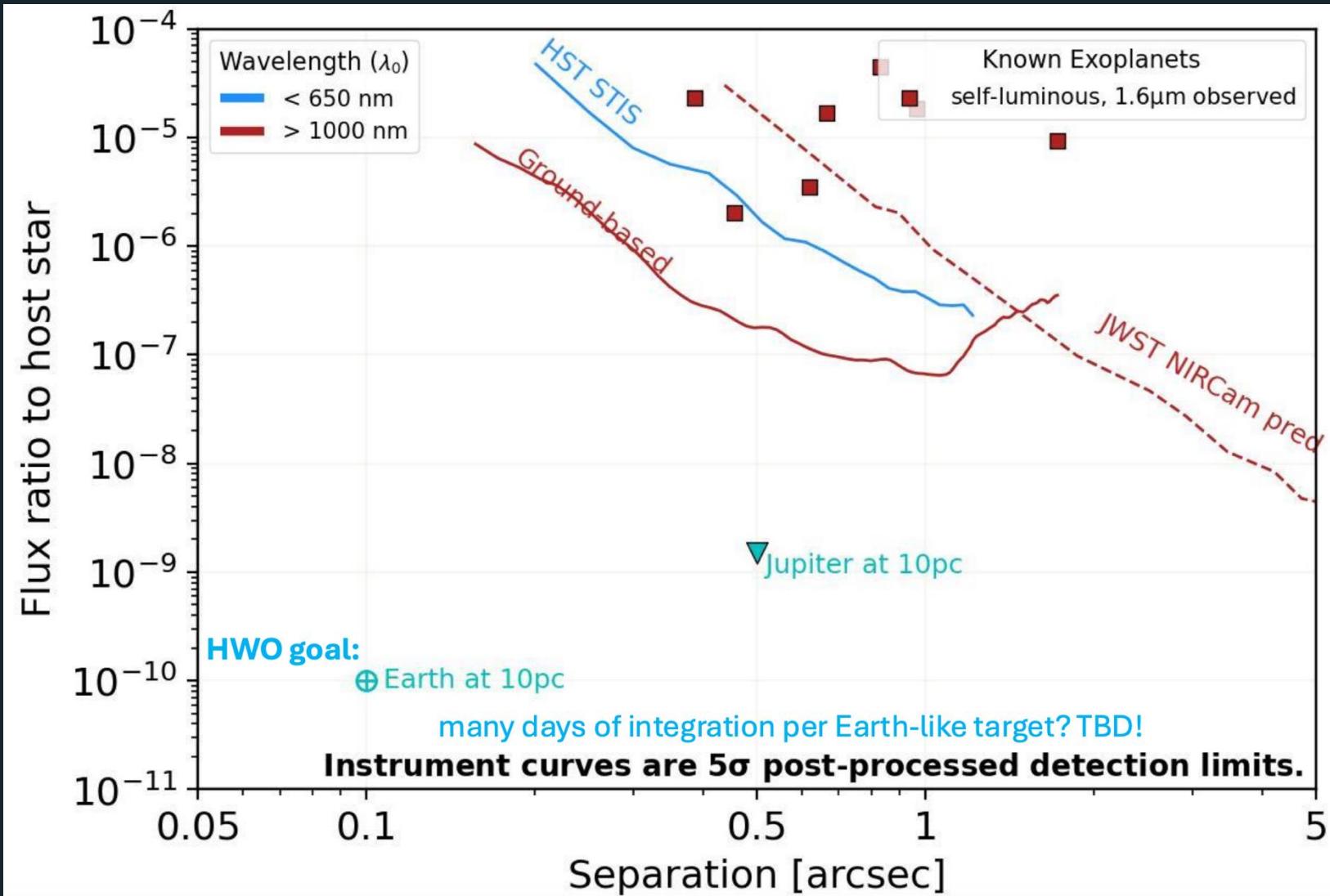
The Case for Low-Hanging Fruit

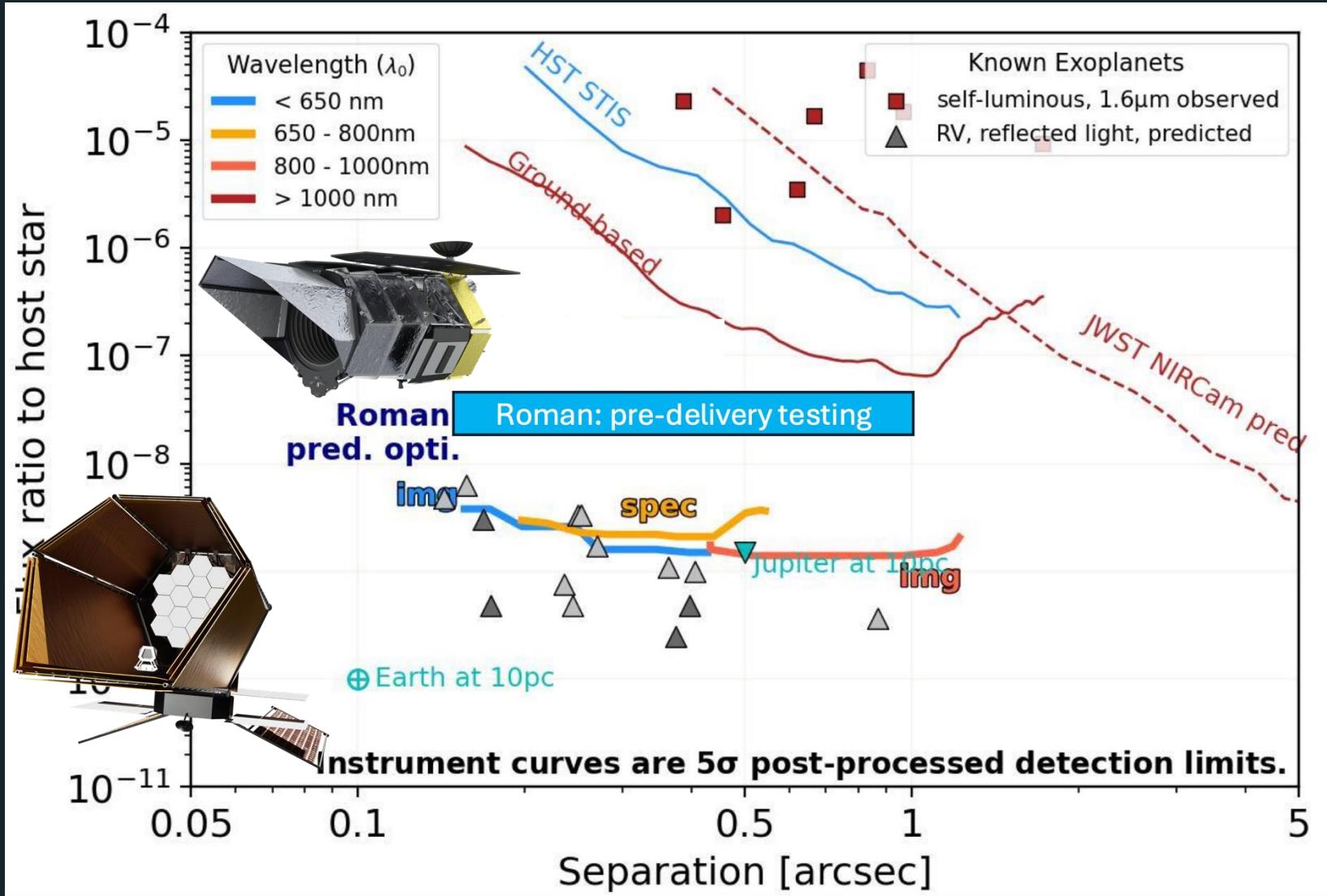


Beck Dacus

Advised by Jean-Baptiste Ruffio and Quinn Konopacky
University of California, San Diego

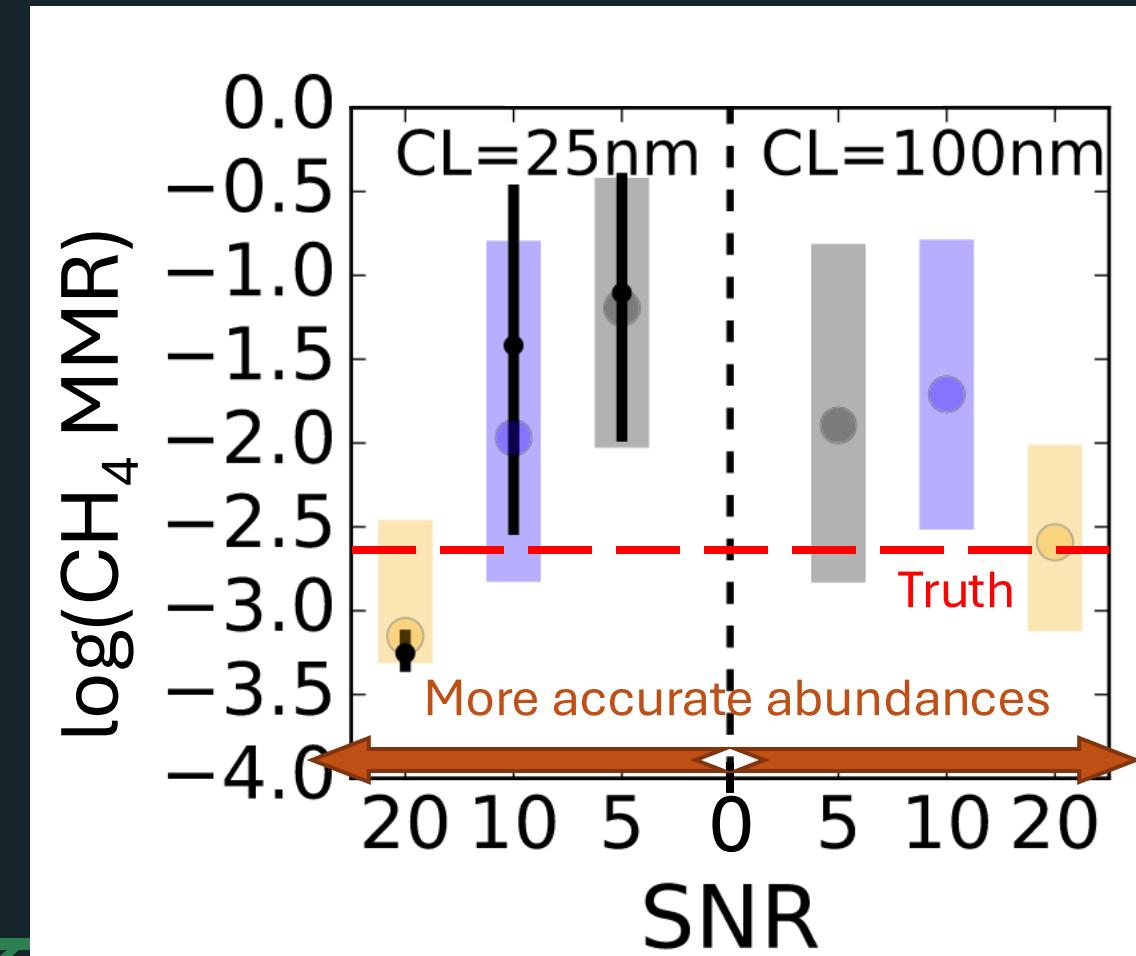
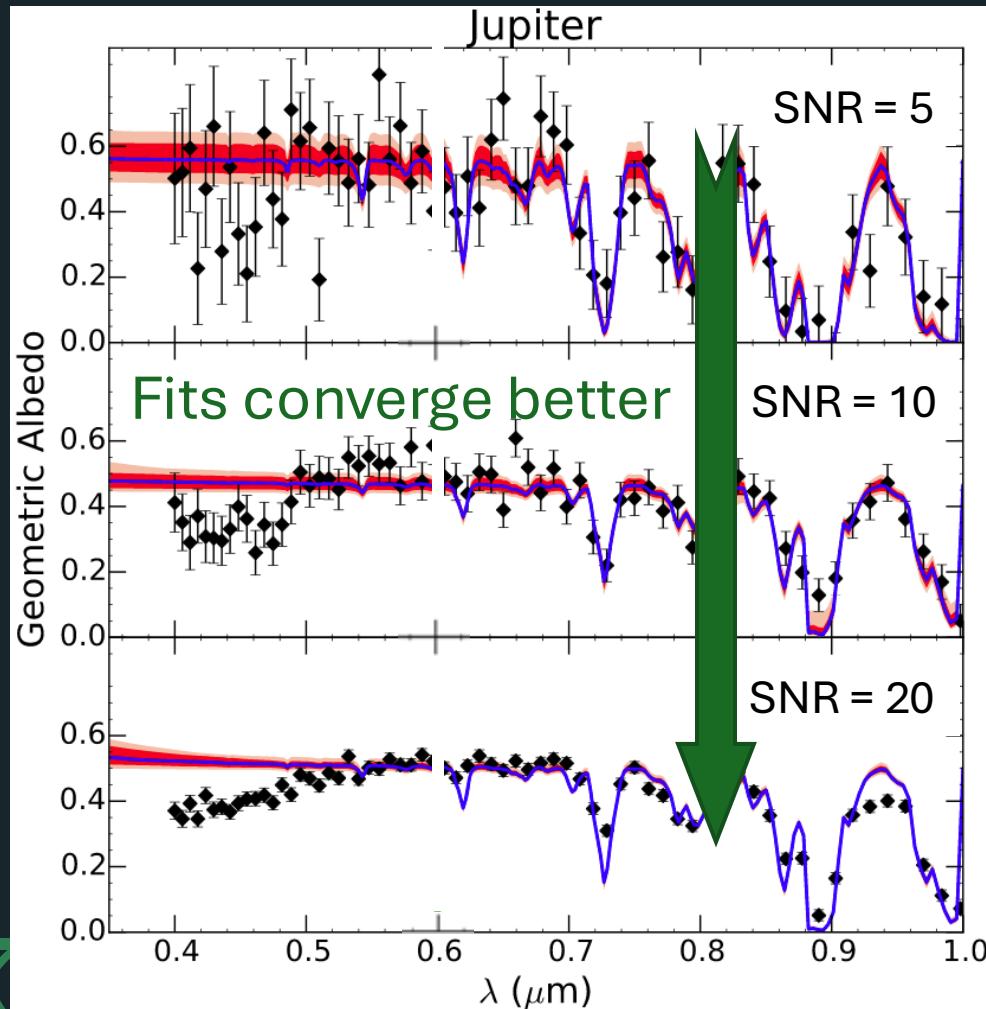




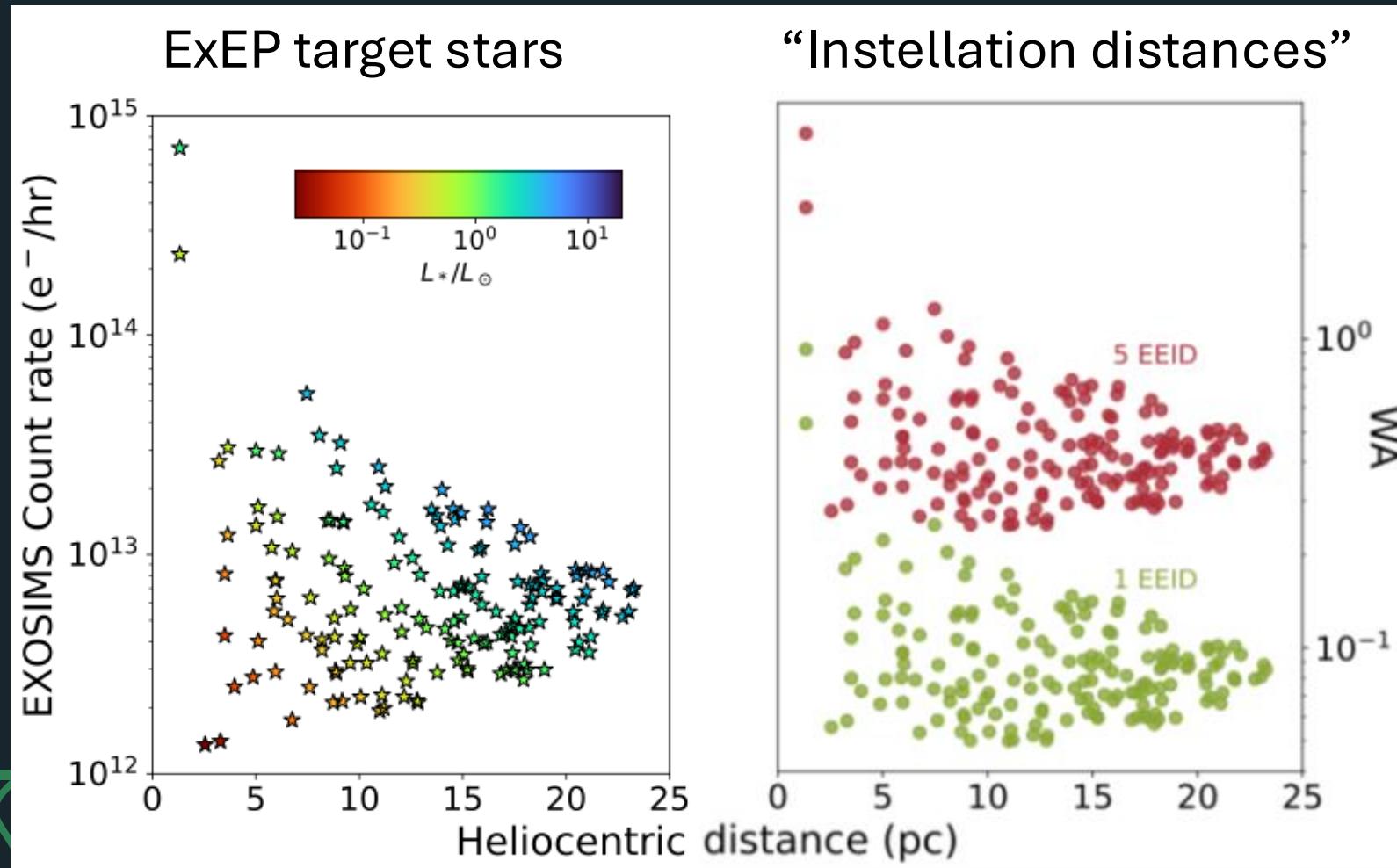


Vanessa Bailey

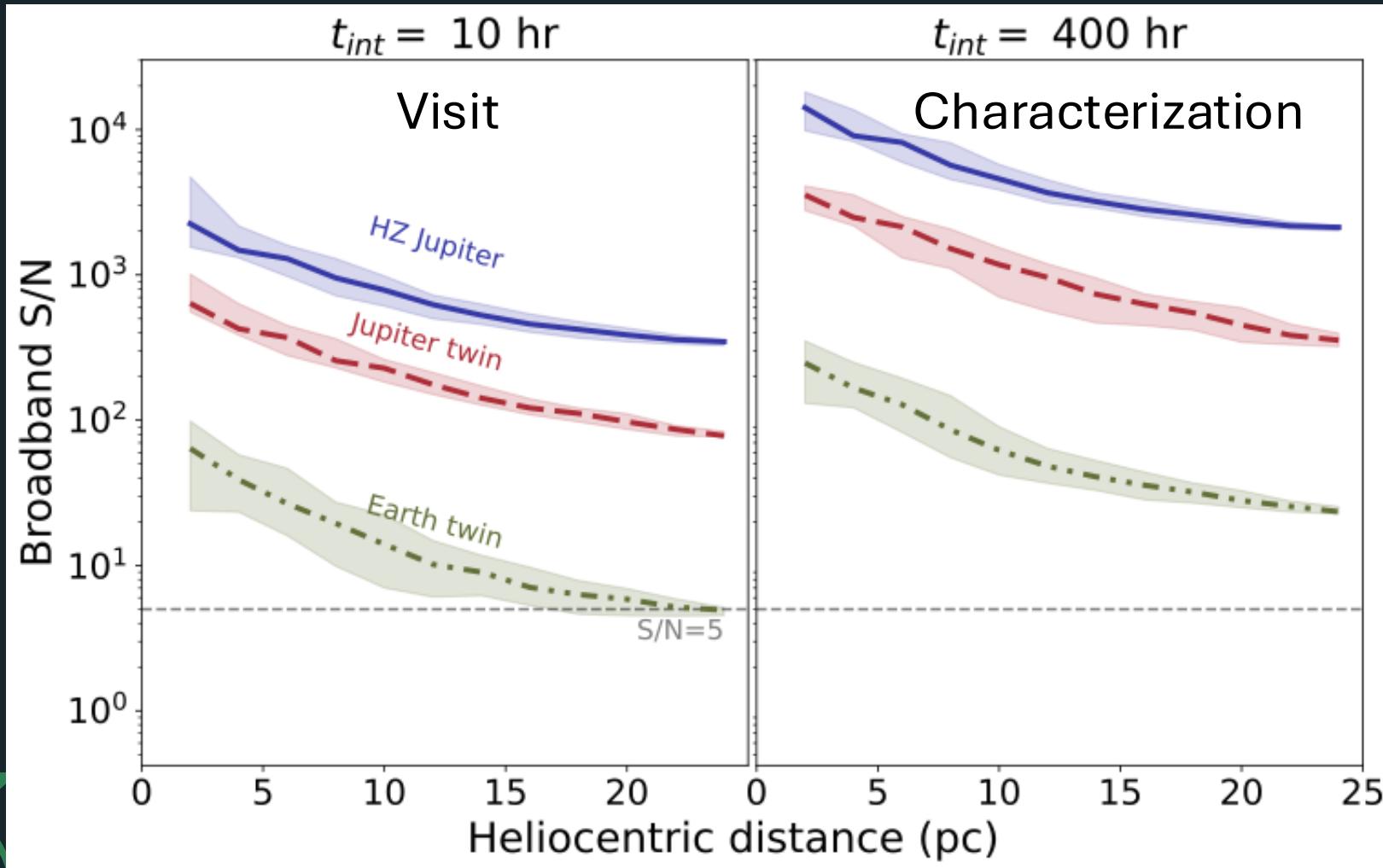
When fitting models, data quality matters!



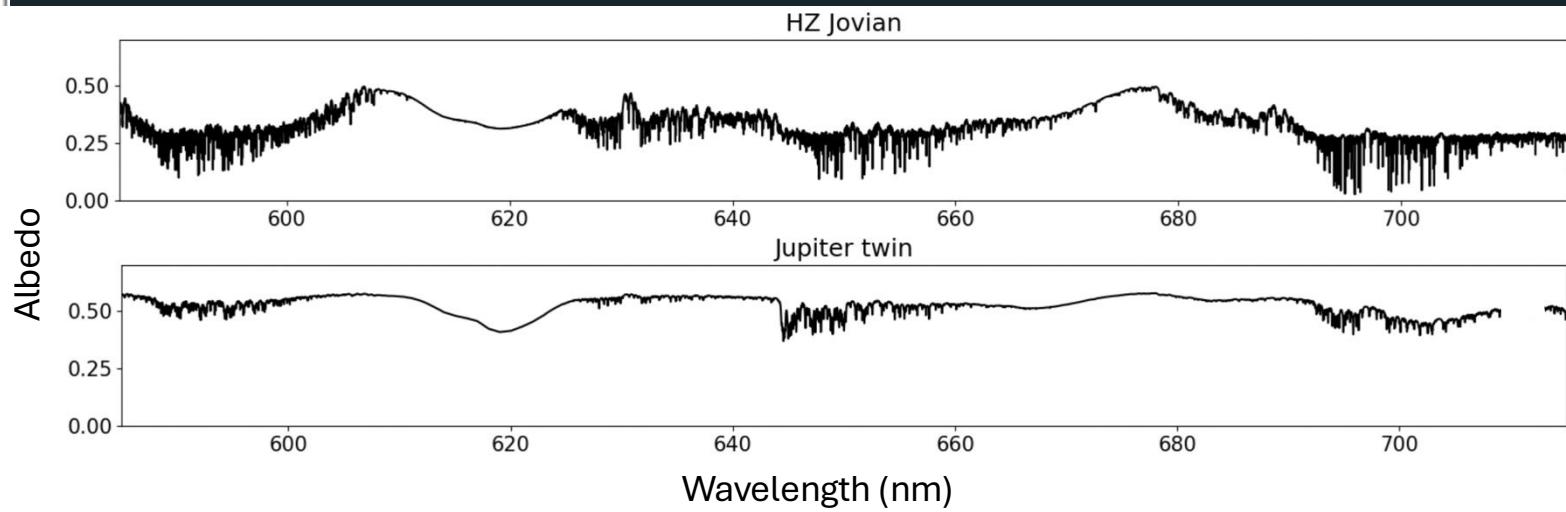
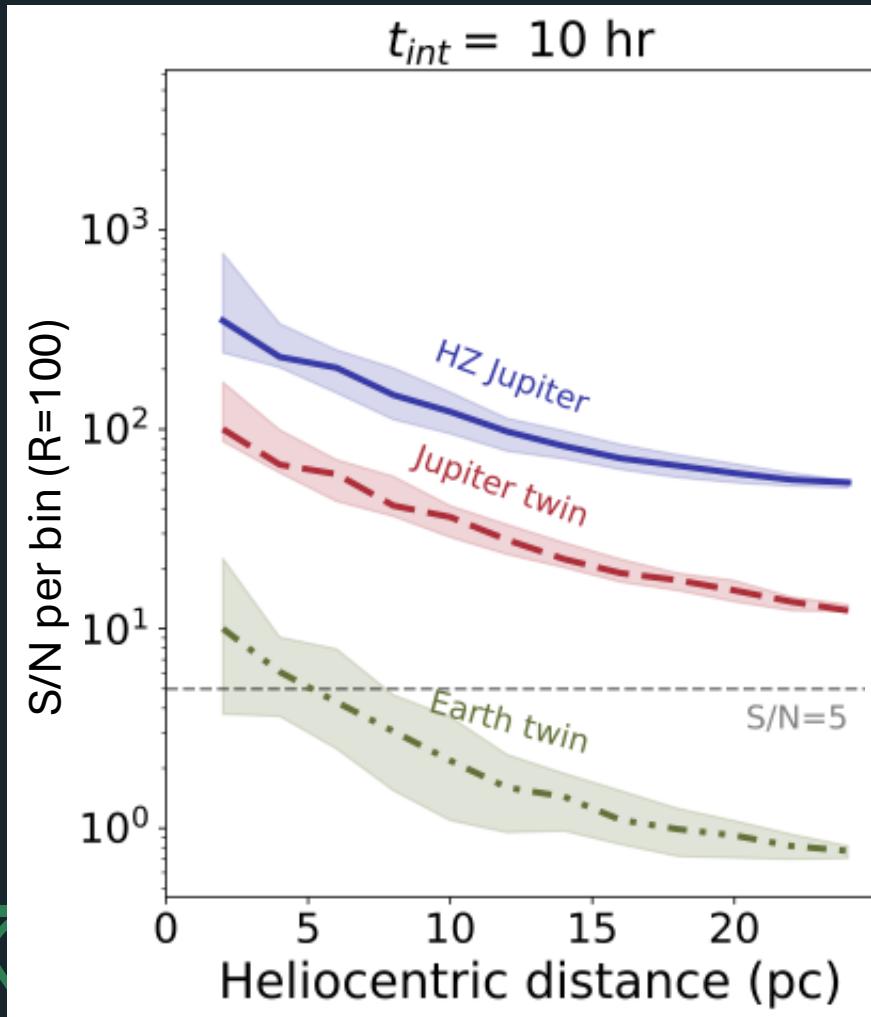
We use EXOSIMS to simulate gas giants around 164 candidate target stars



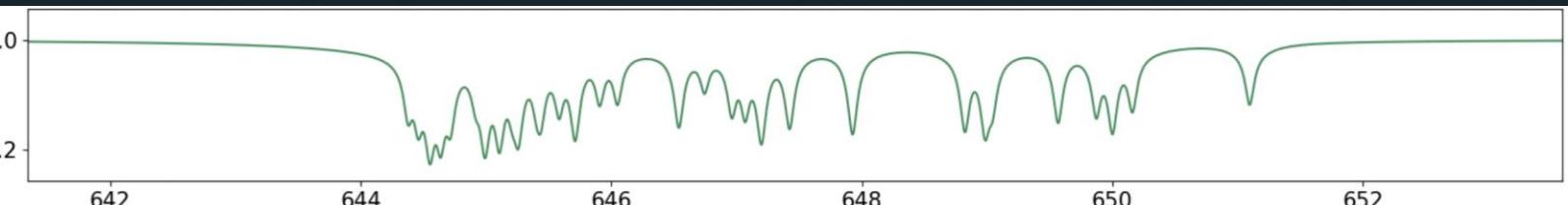
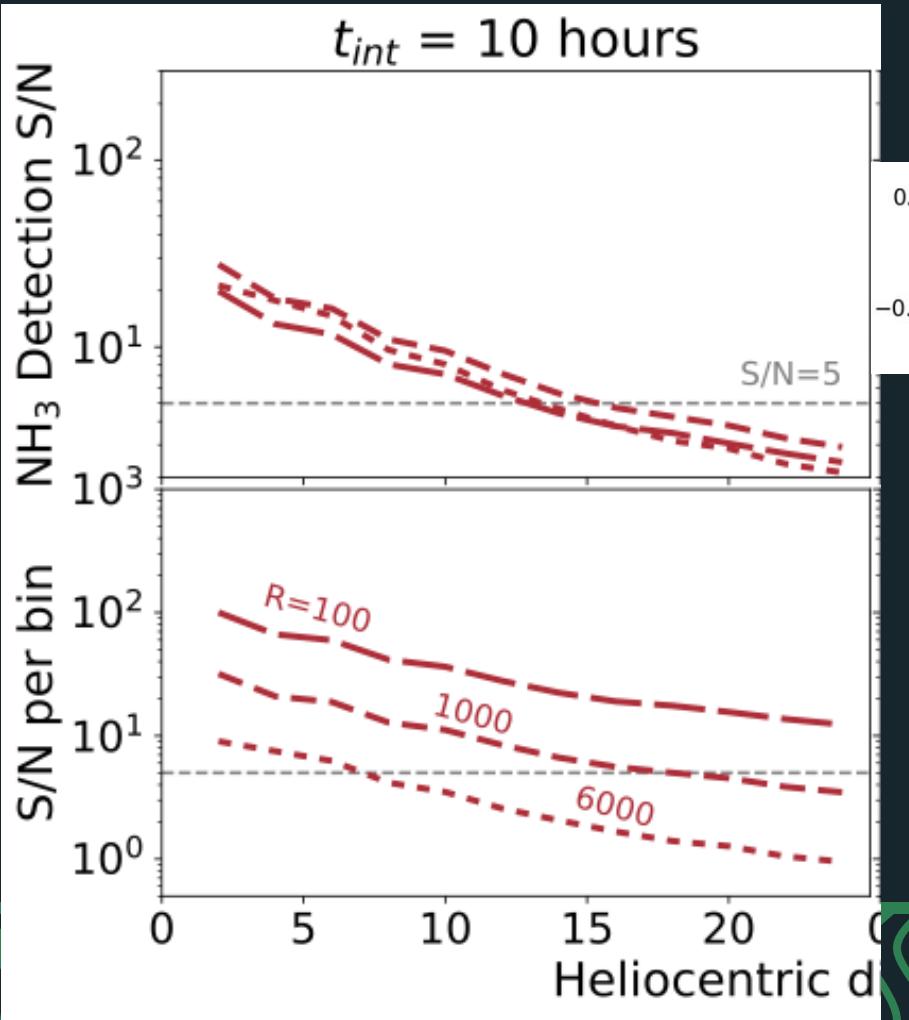
Very high S/N is achievable within the constraints of the Earth-finding mission



Small error bars on spectra, more accurate abundances



But higher spectral resolution adds something too!



Jupiter's Composition Suggests its Core Assembled Exterior to the N₂ Snowline

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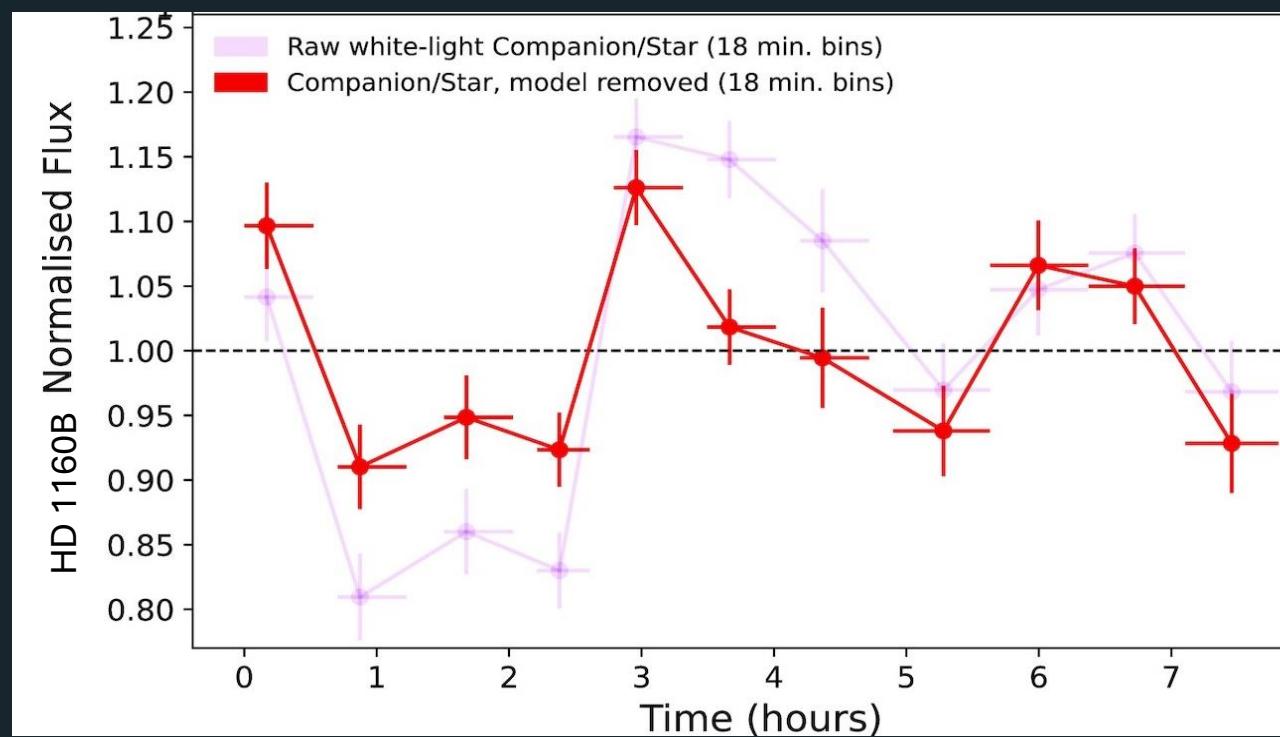
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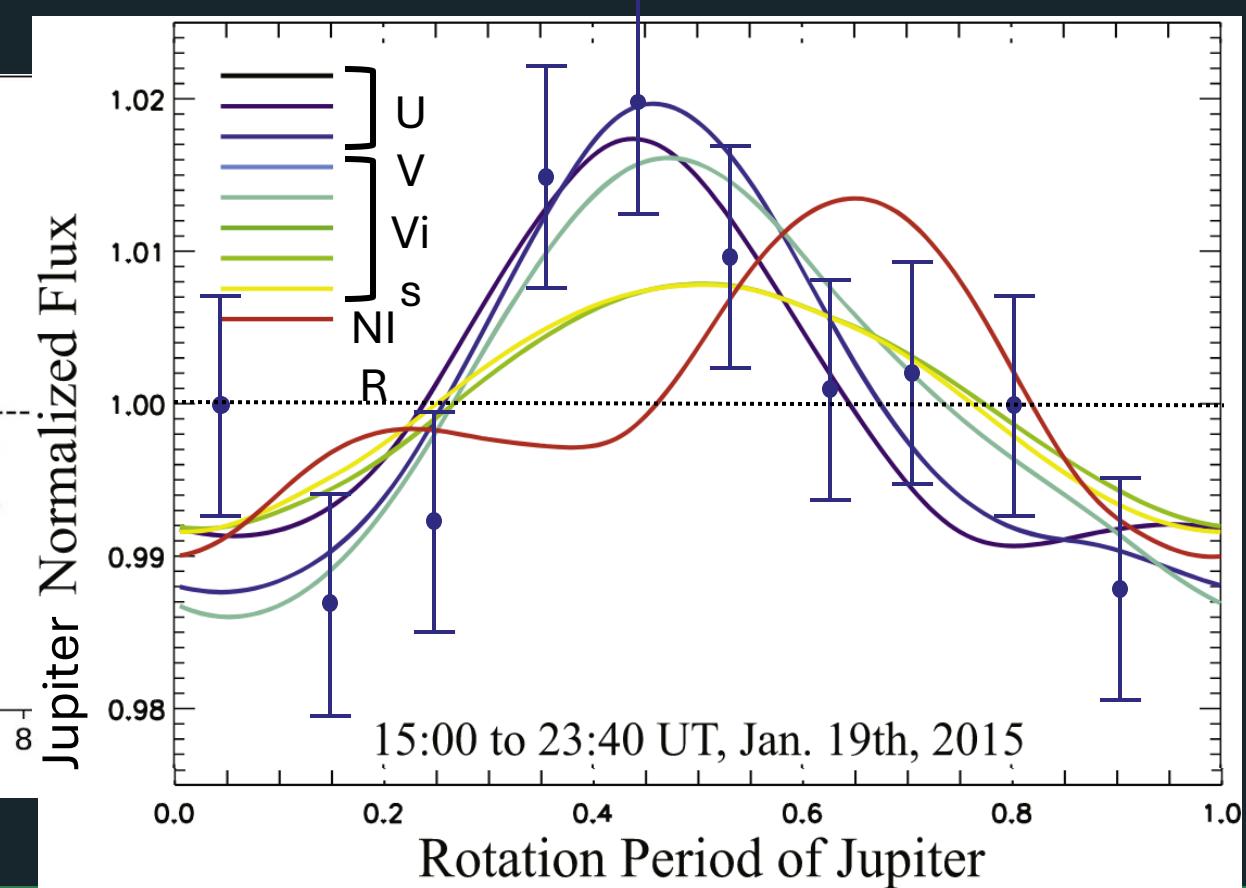
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What works in wavelength works in time

Ge+ 2019



Suttlief+ 2023



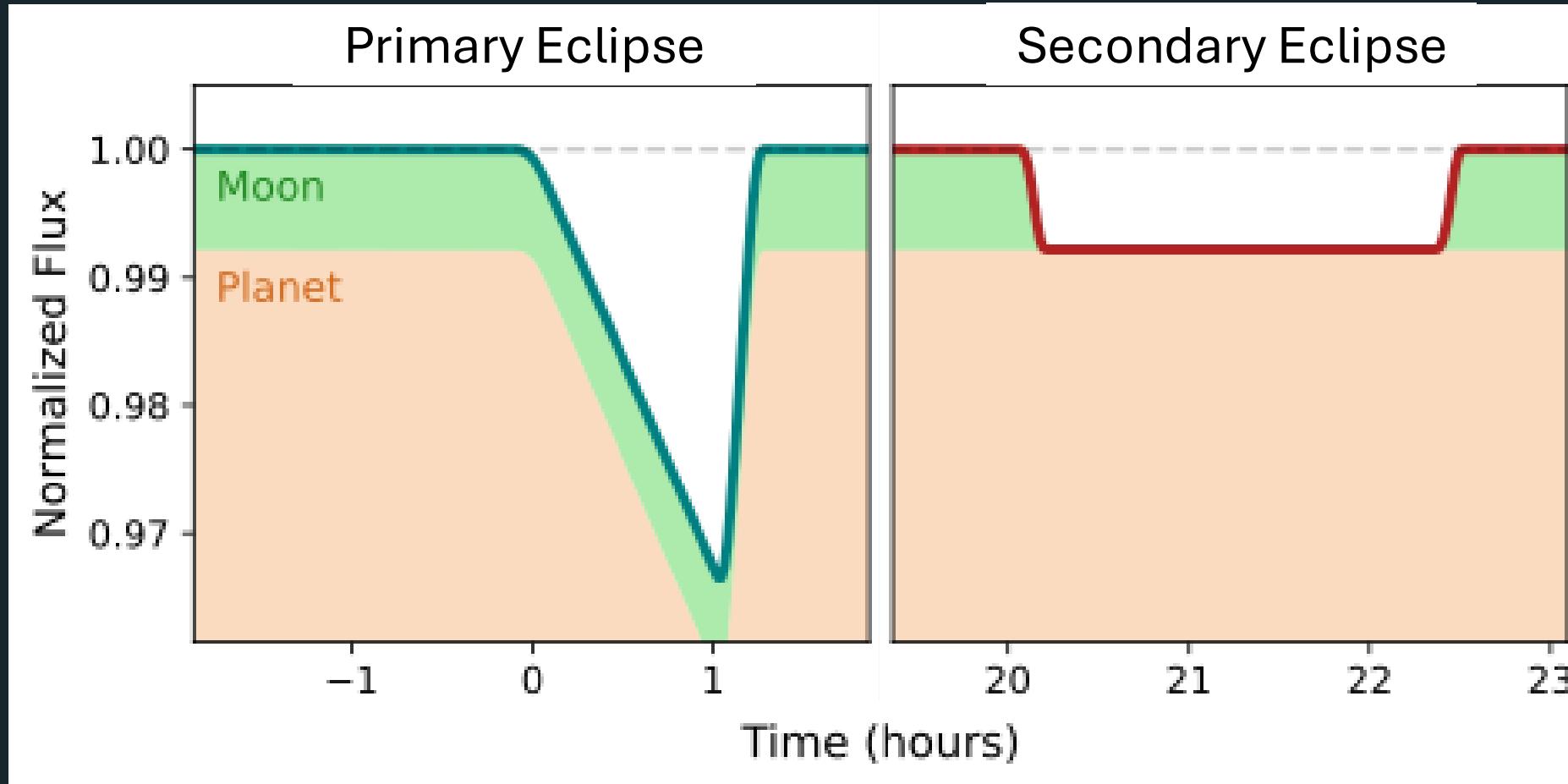
Using photometric variability to search for exomoons!



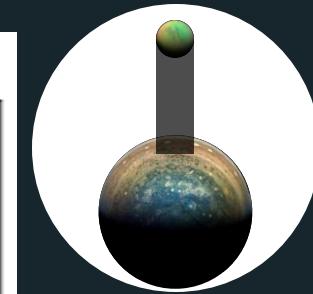
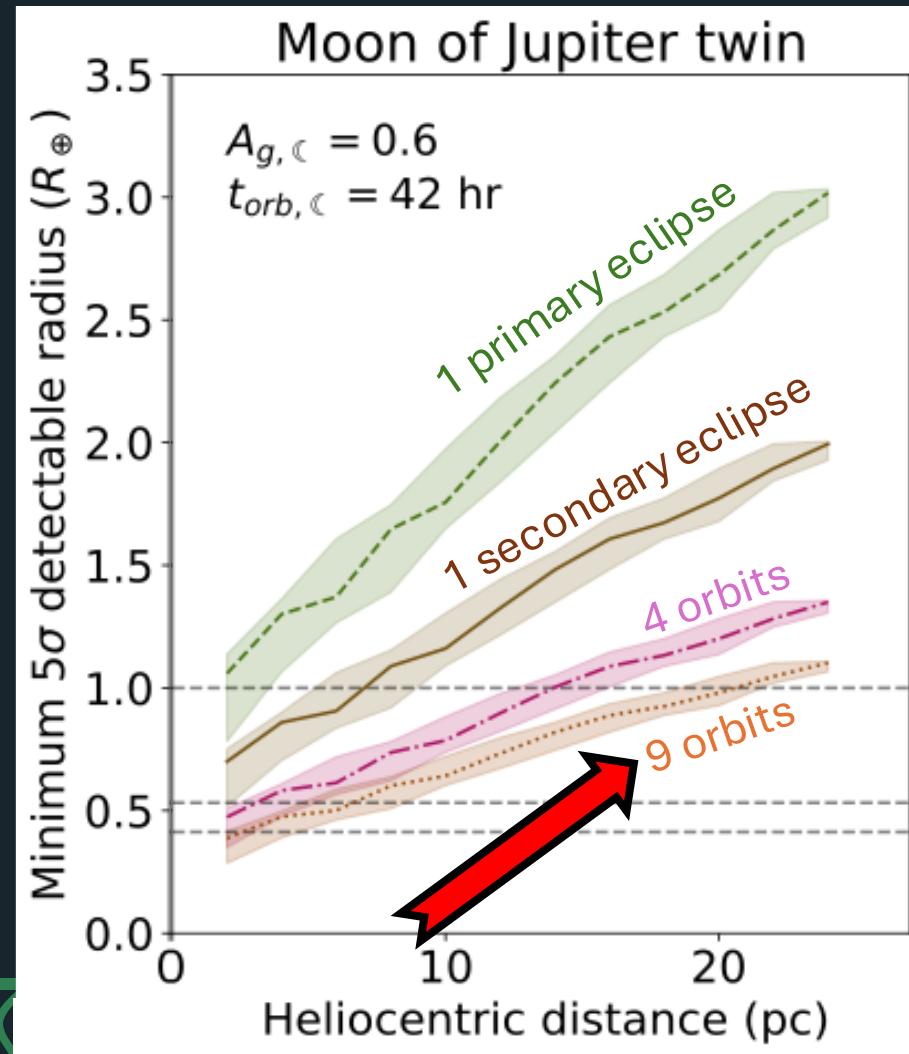
Voyager 1 (NASA, JPL, Caltech)



Modeling exomoon-induced variability



HWO might detect Solar System-like exomoons

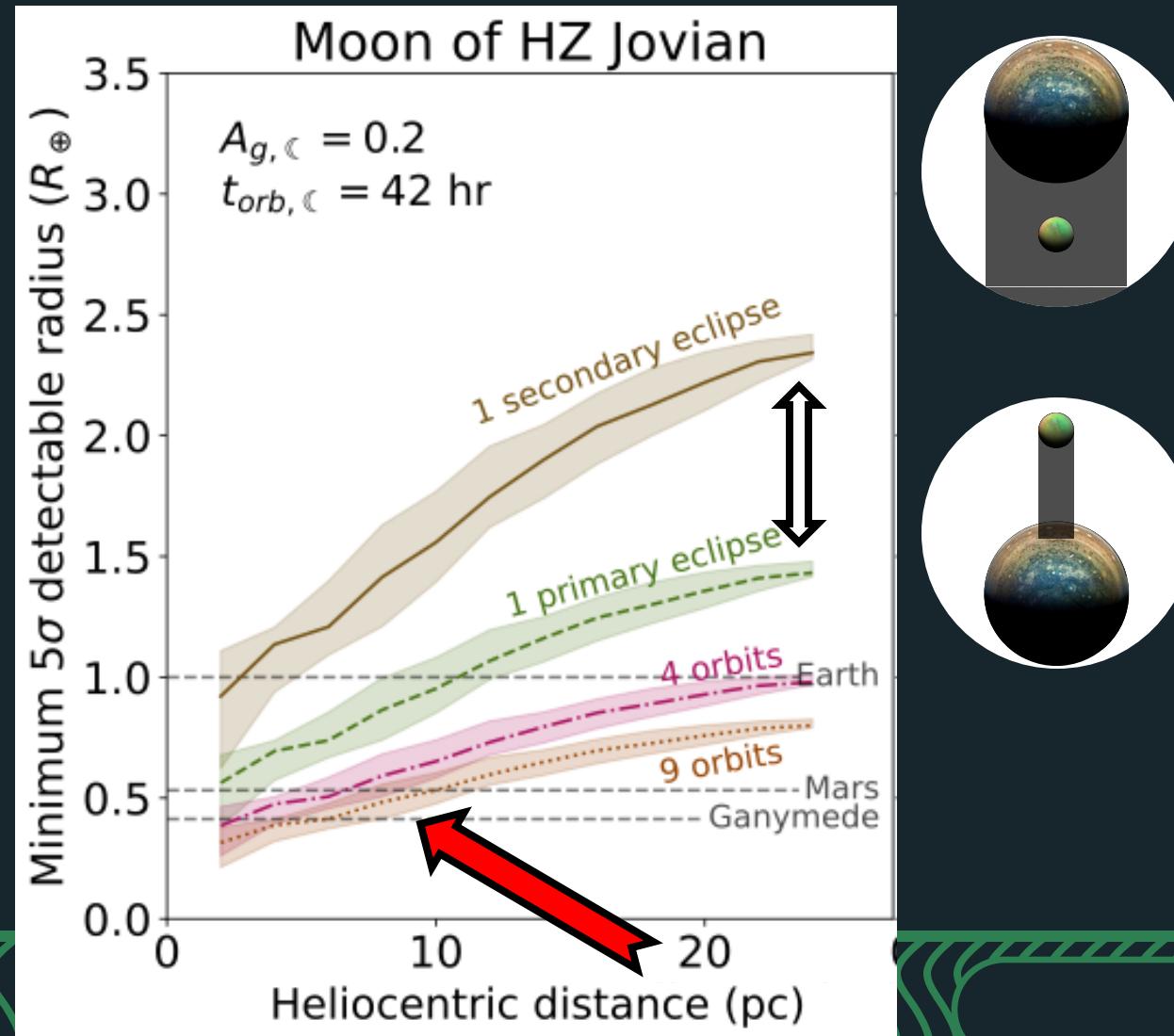


Earth

Mars

Ganymede

HWO might detect Solar System-like exomoons



To summarize...

- HWO's sensitivity is great news for gas giant science!
 - Spectra should have high enough S/N to constrain abundances of compounds like C, O, **and N**, constraining formation history
 - Photometric sensitivity could allow the detection of Solar System-like exomoons through time-variability monitoring
- A call to action:
 - This all hinges on the OWA of HWO's coronagraph!
 - We can accomplish great things during the Earth-finding mission, but dedicated gas giant monitoring could let us push the boundaries.

Thank you!