

Characterizing Gas Giants with HWO

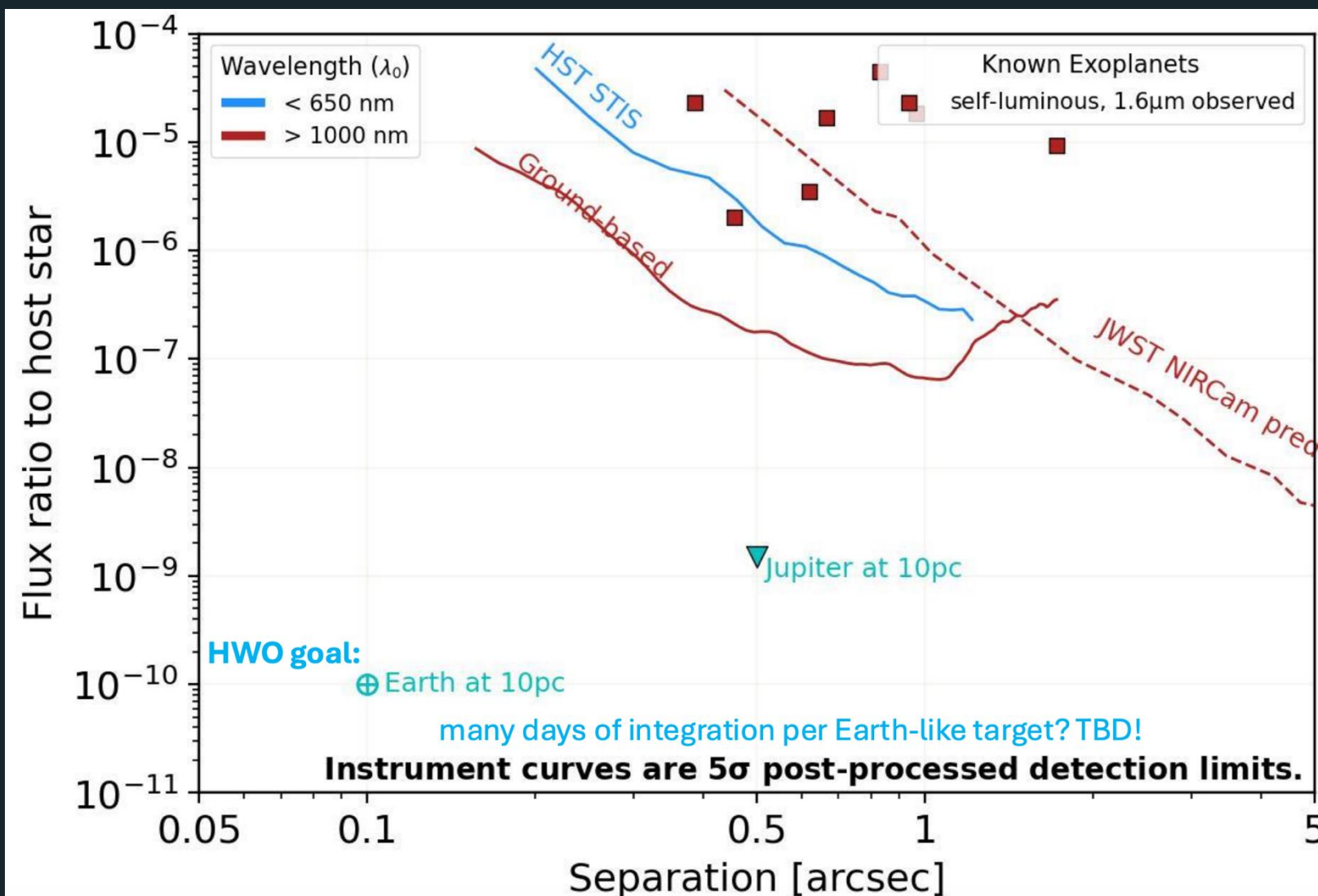
The Case for Low-Hanging Fruit

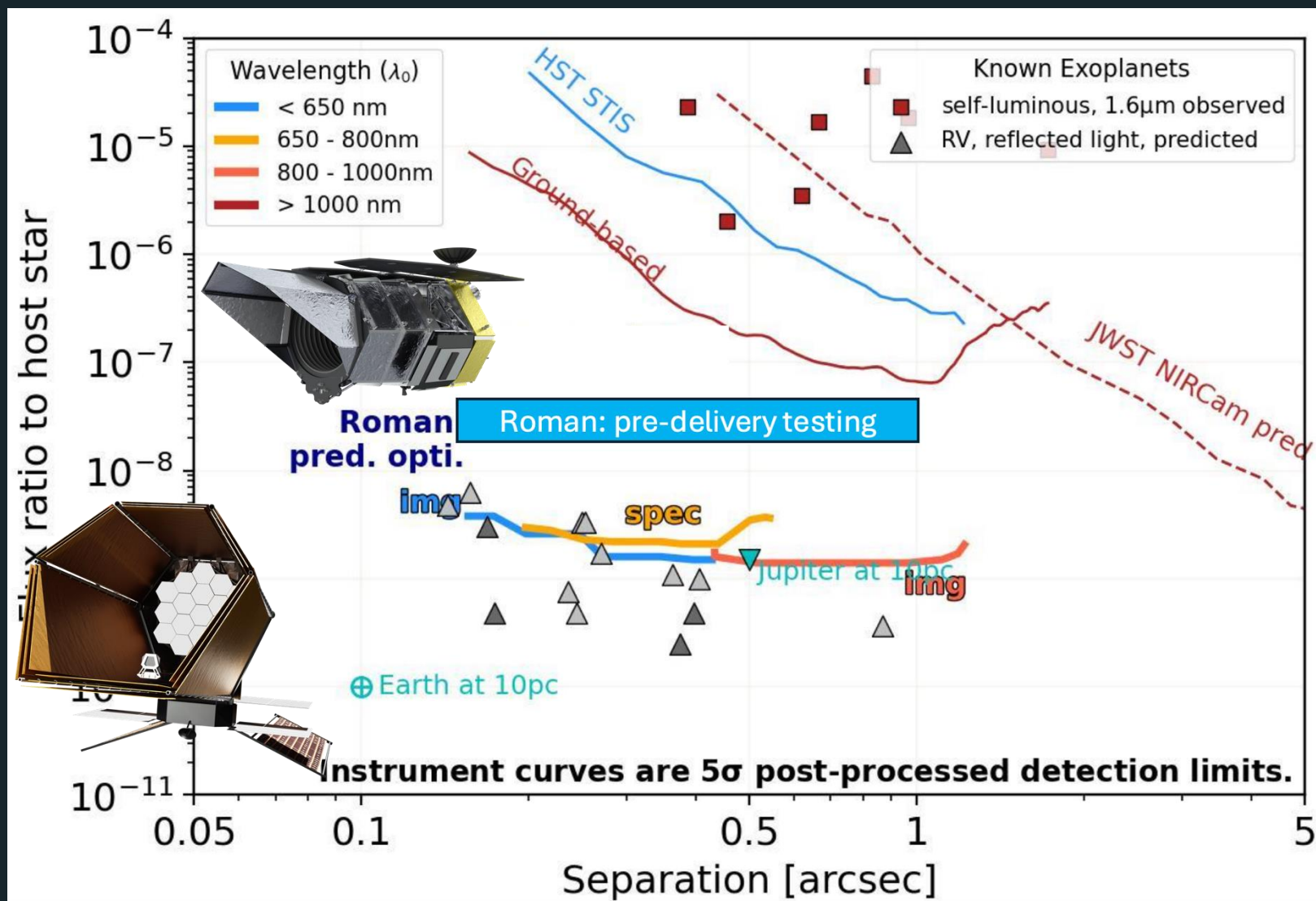


Beck Dacus

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

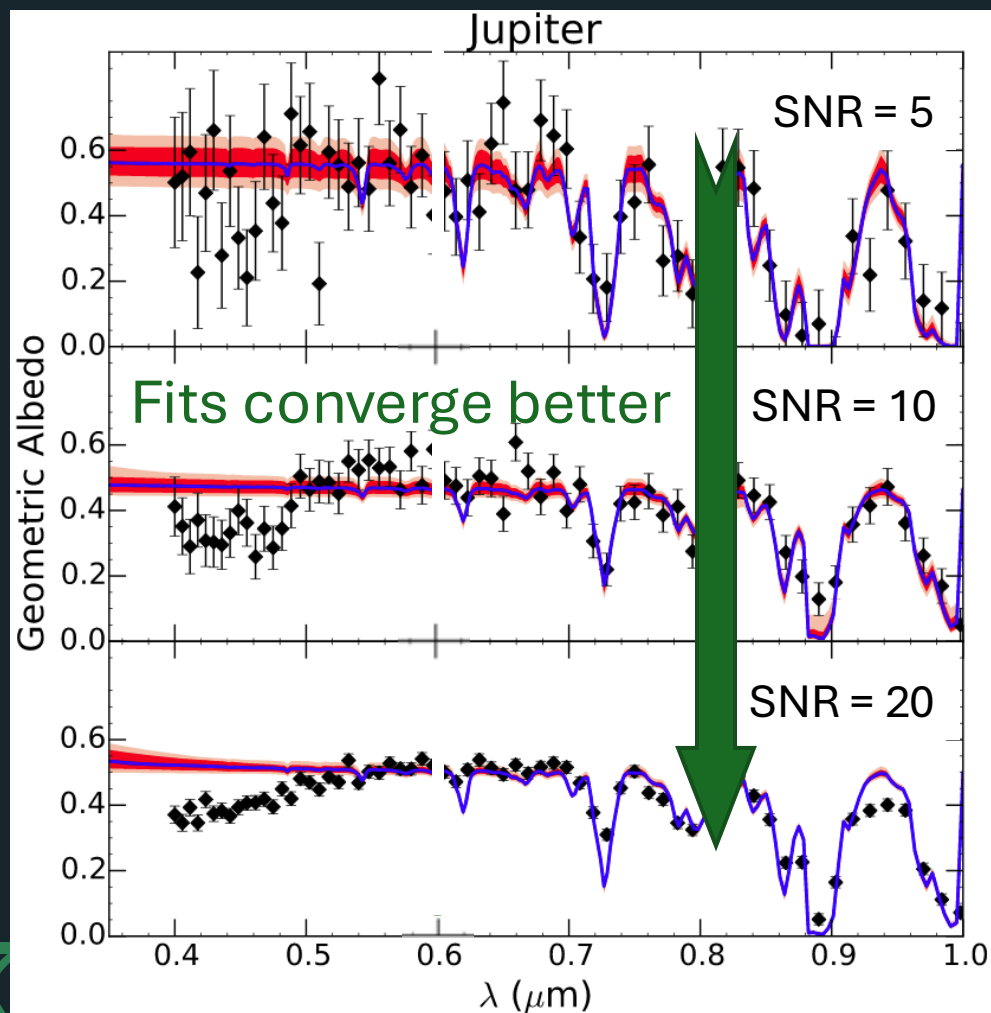




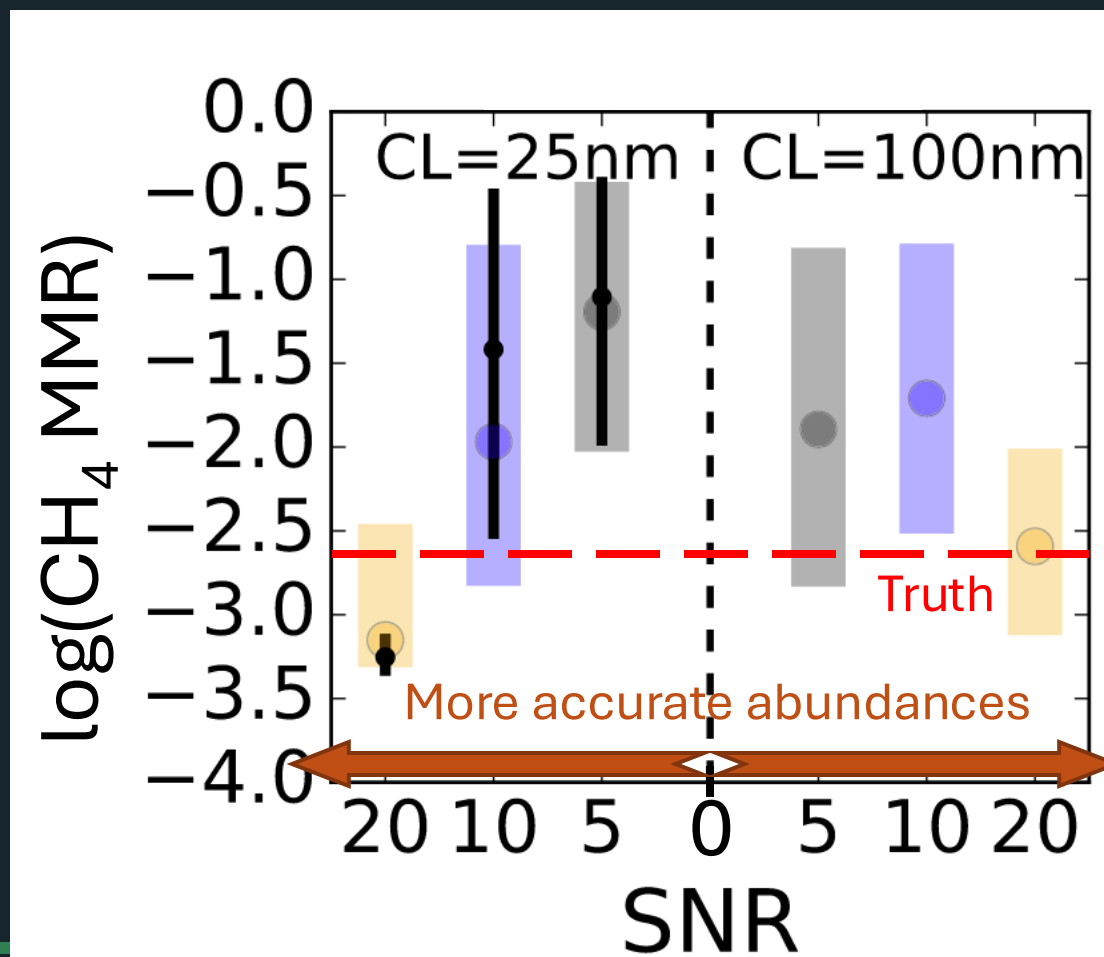


Vanessa Bailey

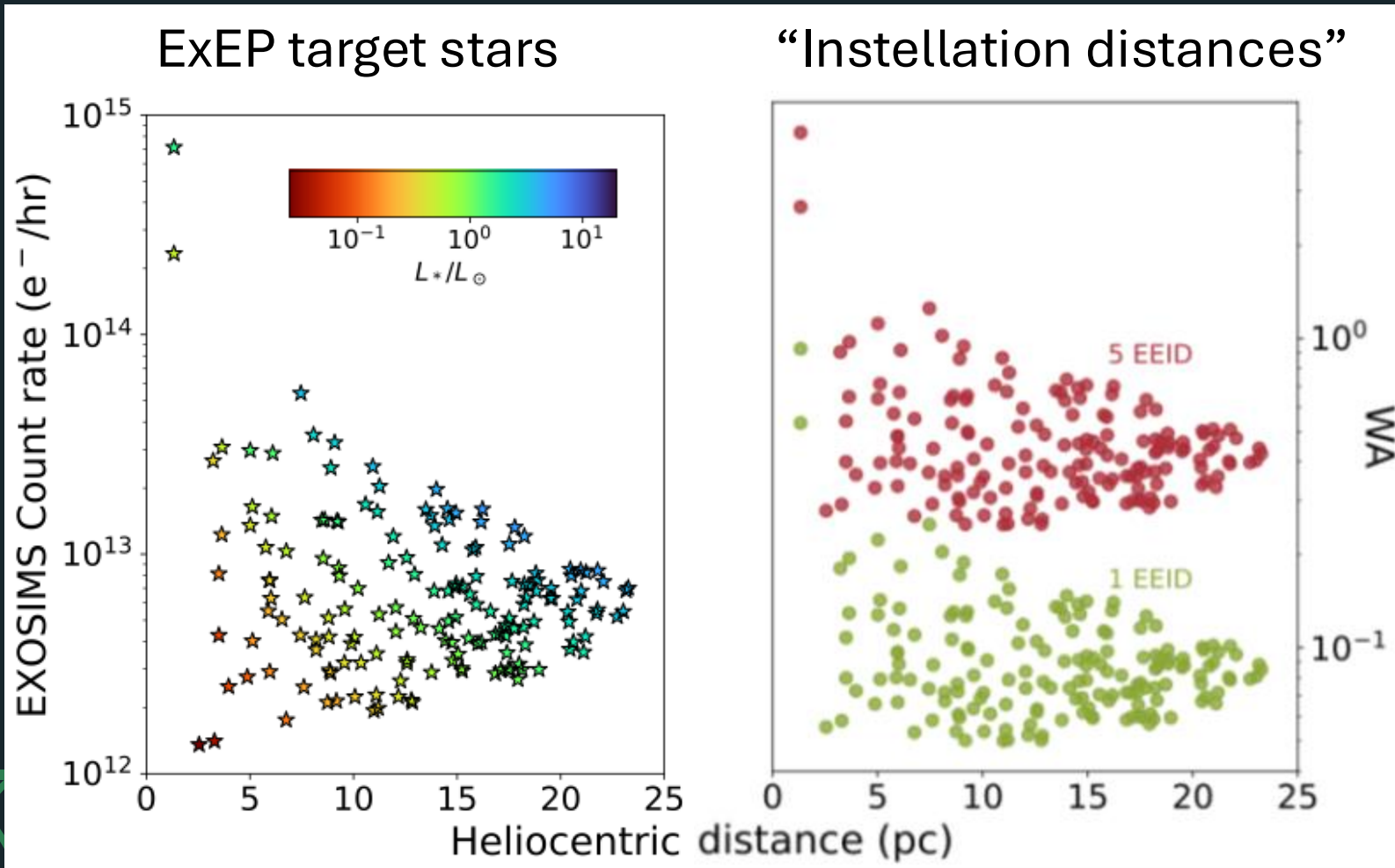
When fitting models, data quality matters!



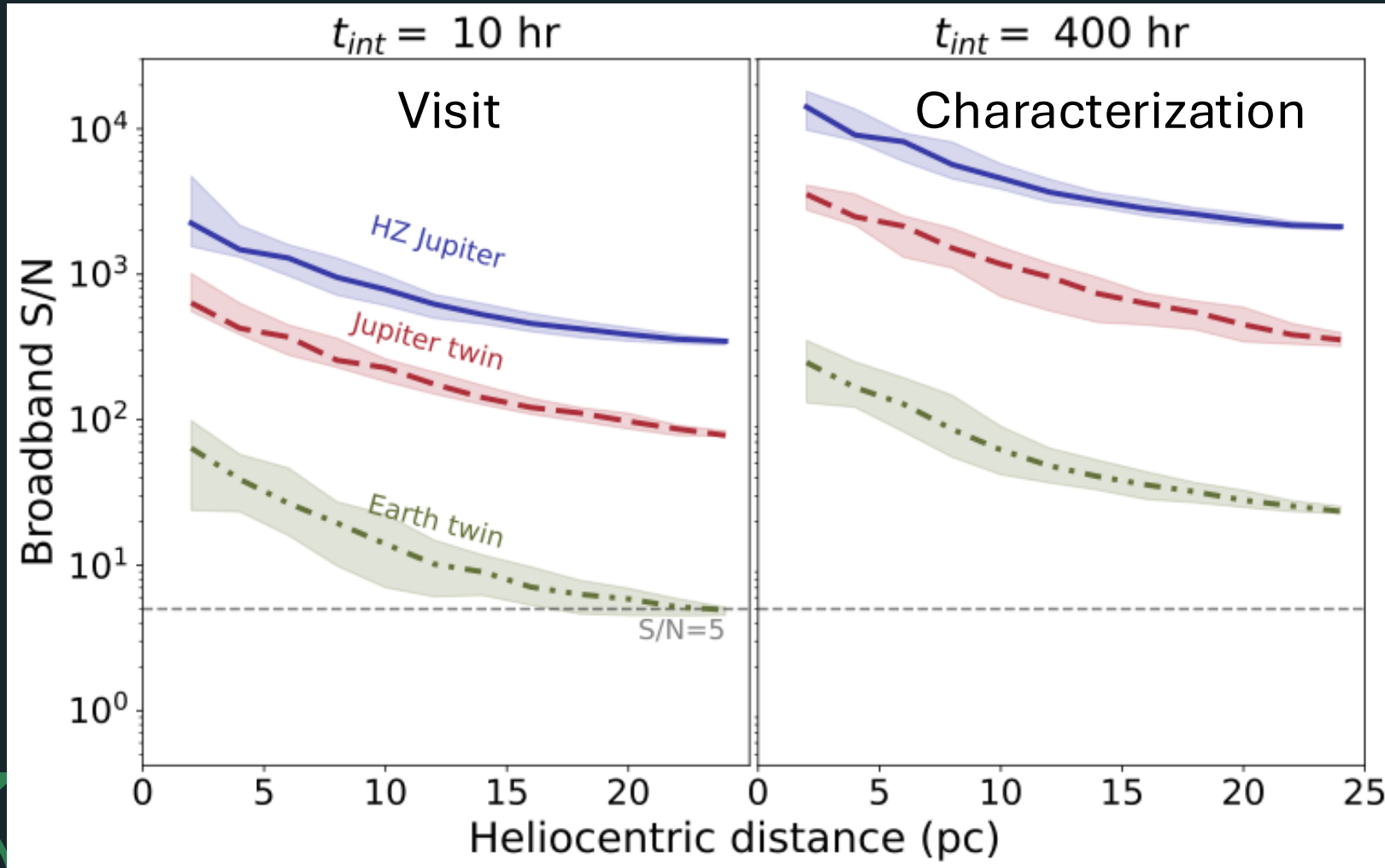
Lupu+ 2016



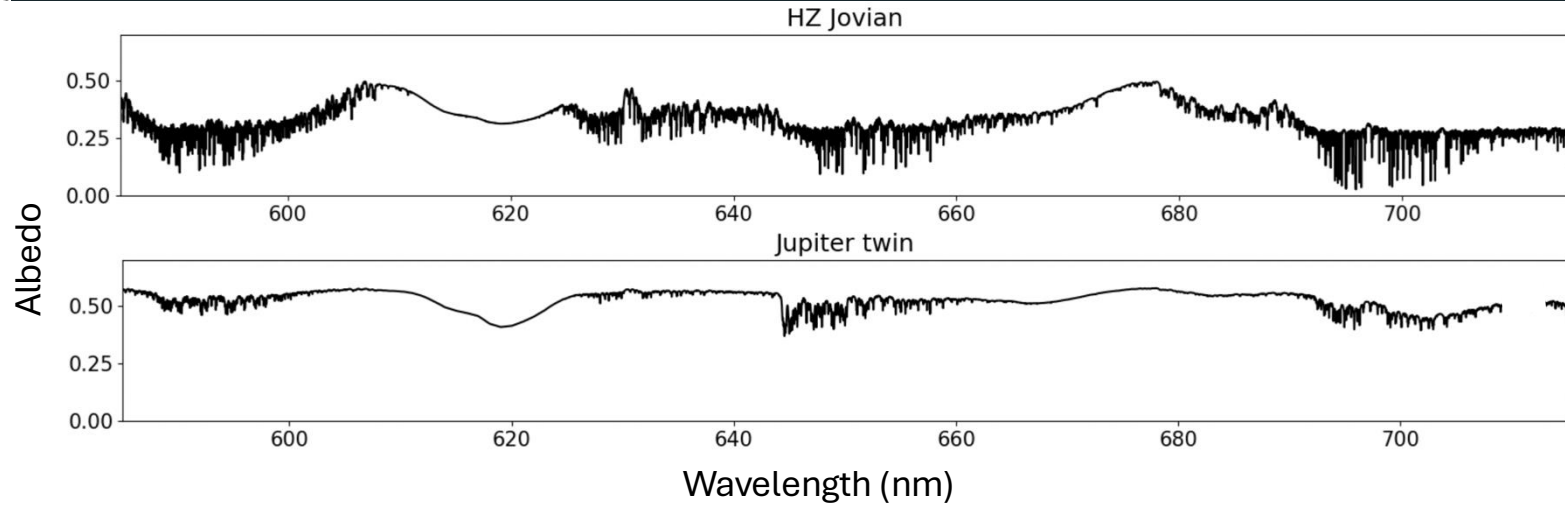
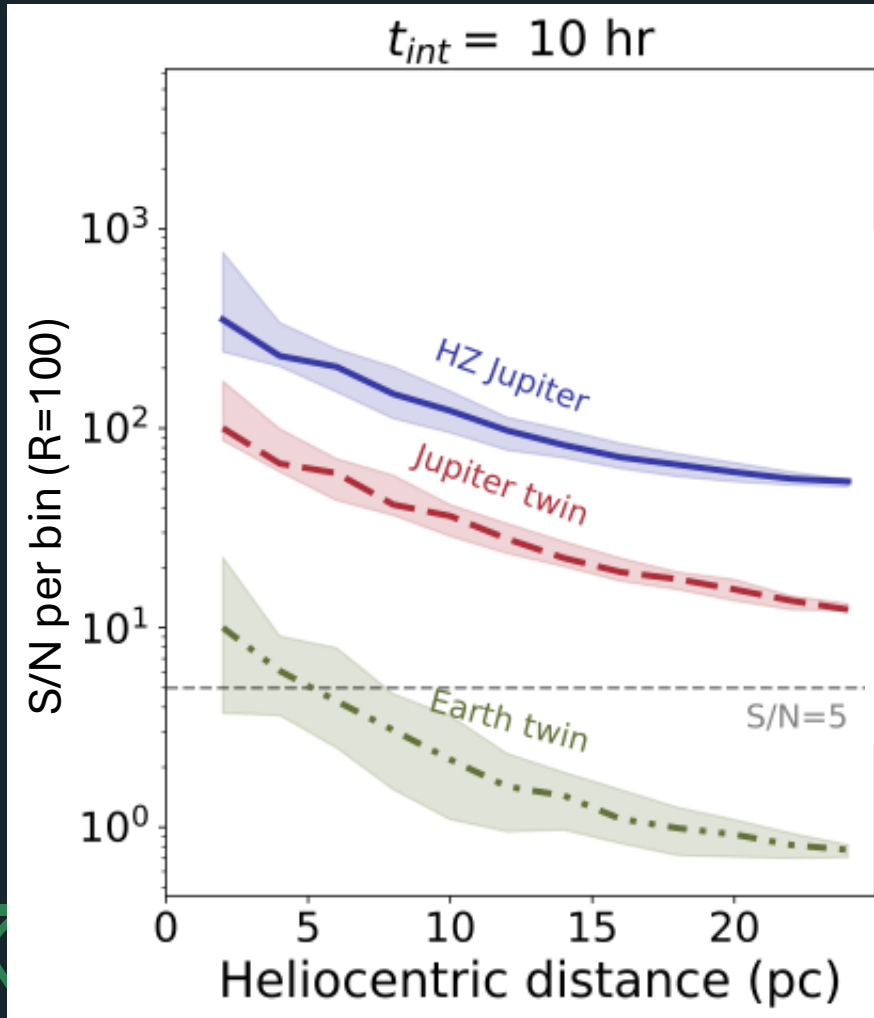
We use EXOSIMS to simulate gas giants around 164 candidate target stars



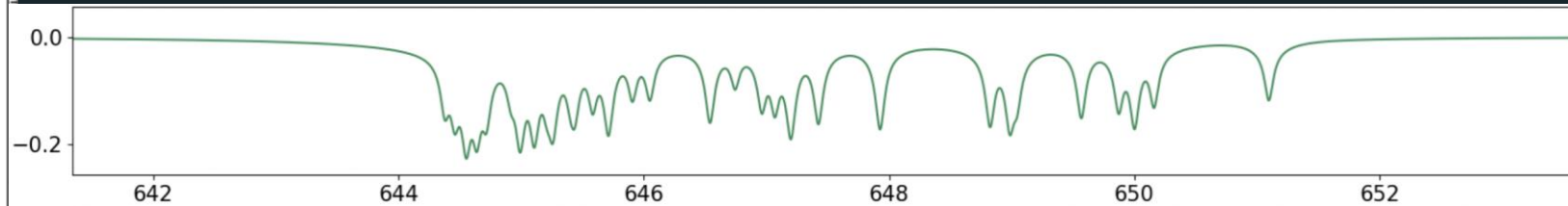
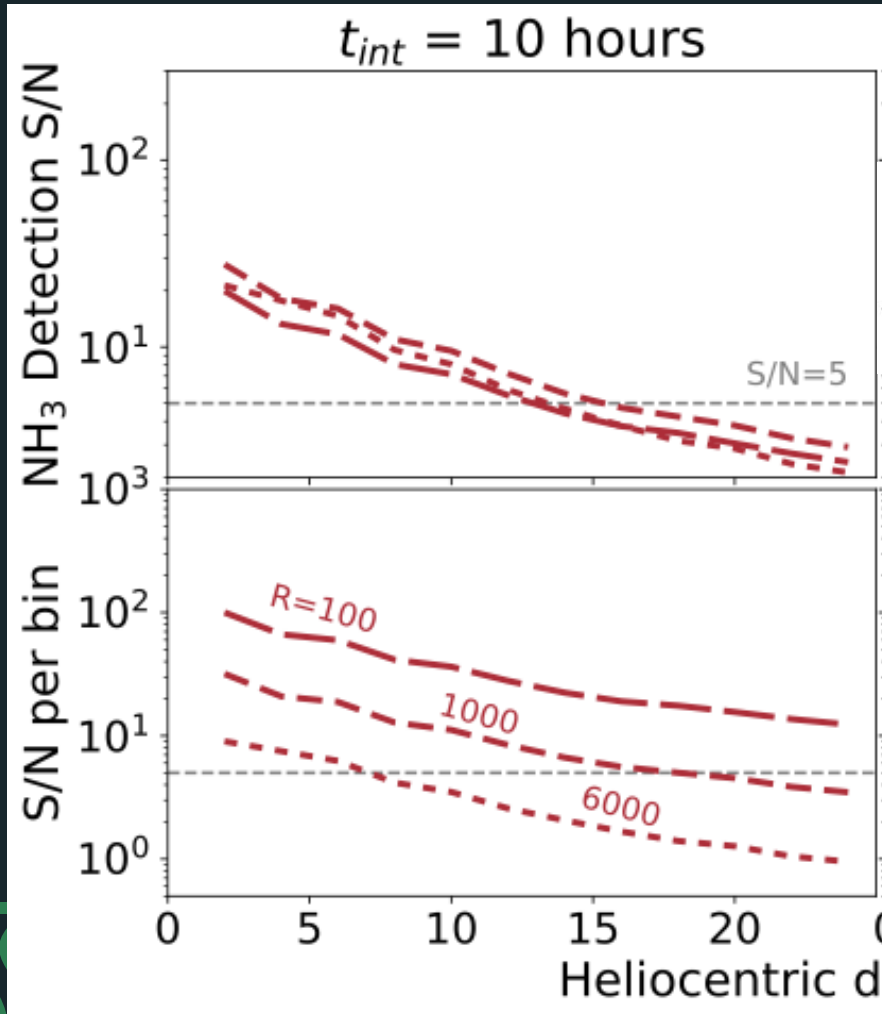
Very high S/N is achievable within the constraints of the Earth-finding mission



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 N_2 Snowline

Karin I Öberg¹  and Robin Wordsworth^{2,3}

¹ Harvard-Smithsonian Center for Astrophysics, 60 Garden St, Cambridge, MA 02138, USA; koberg@cfa.harvard.edu

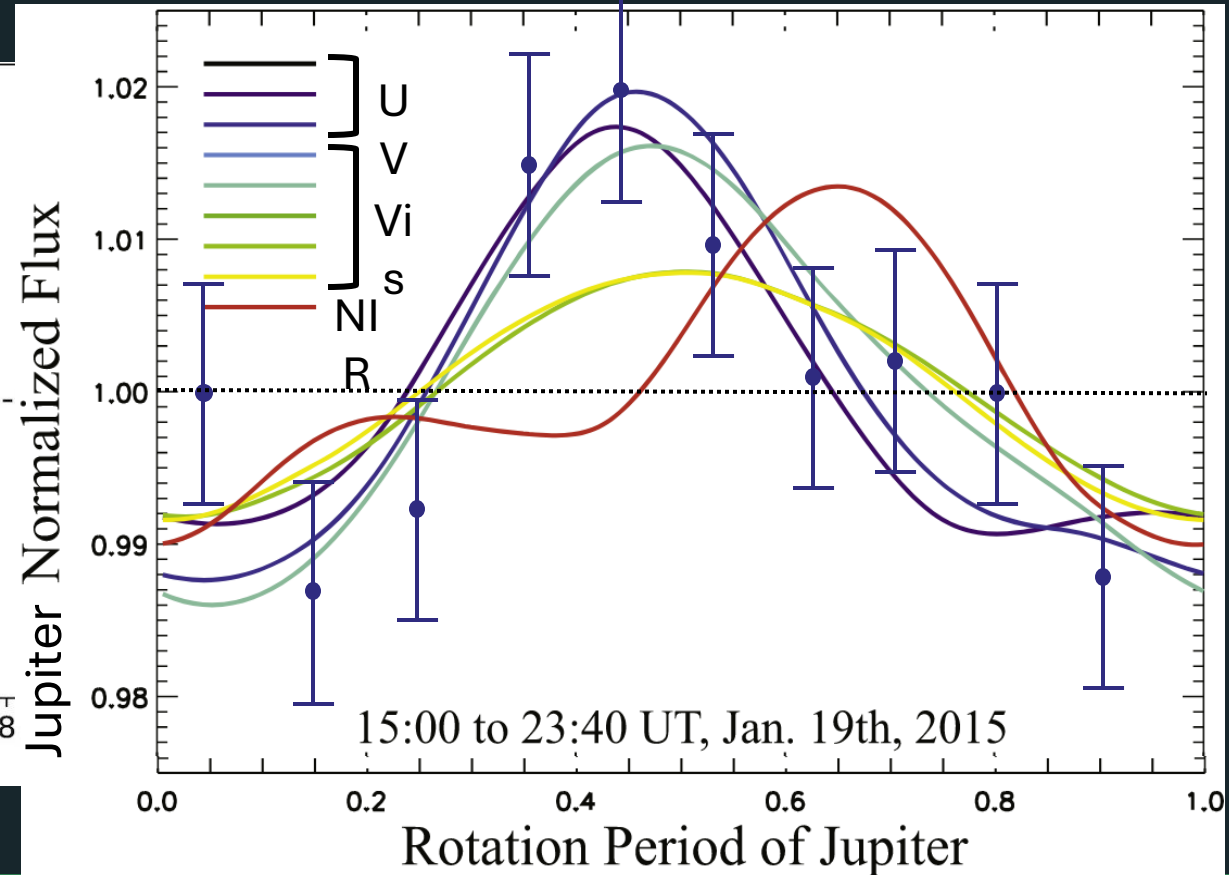
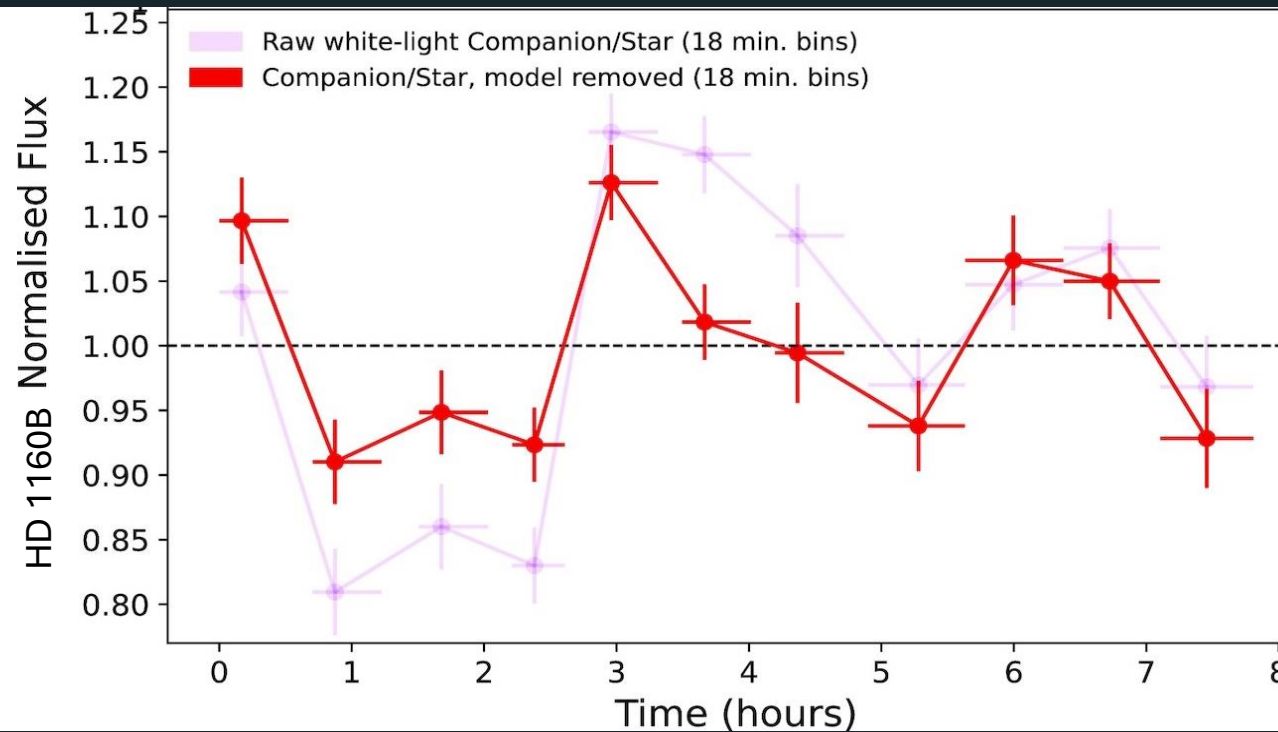
² Harvard Paulson School of Engineering and Applied Sciences, Harvard University, Cambridge, MA 02140, USA

³ Department of Earth and Planetary Sciences, Harvard University, Cambridge, MA 02140, USA

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What works in wavelength works in time

Ge+ 2019



Suttliet+ 2023

Using photometric variability to search for exomoons!

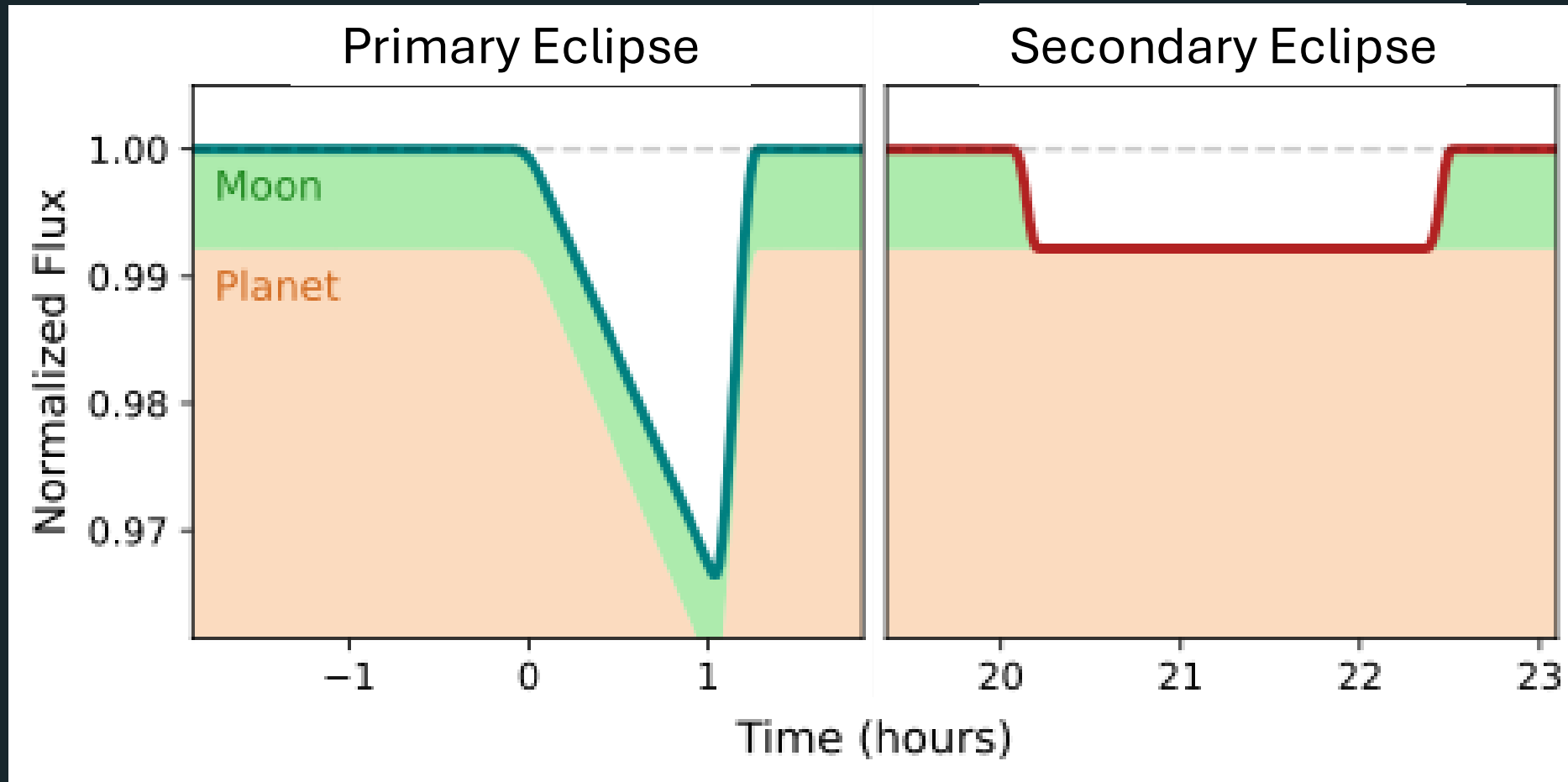


Voyager 1 (NASA, JPL, Caltech)

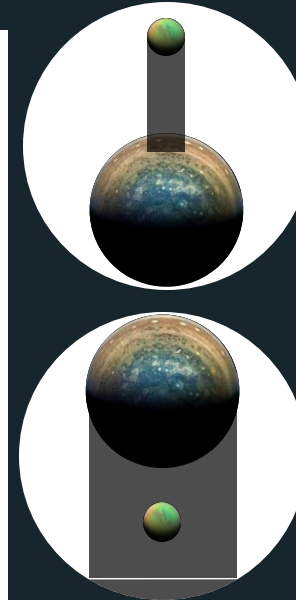
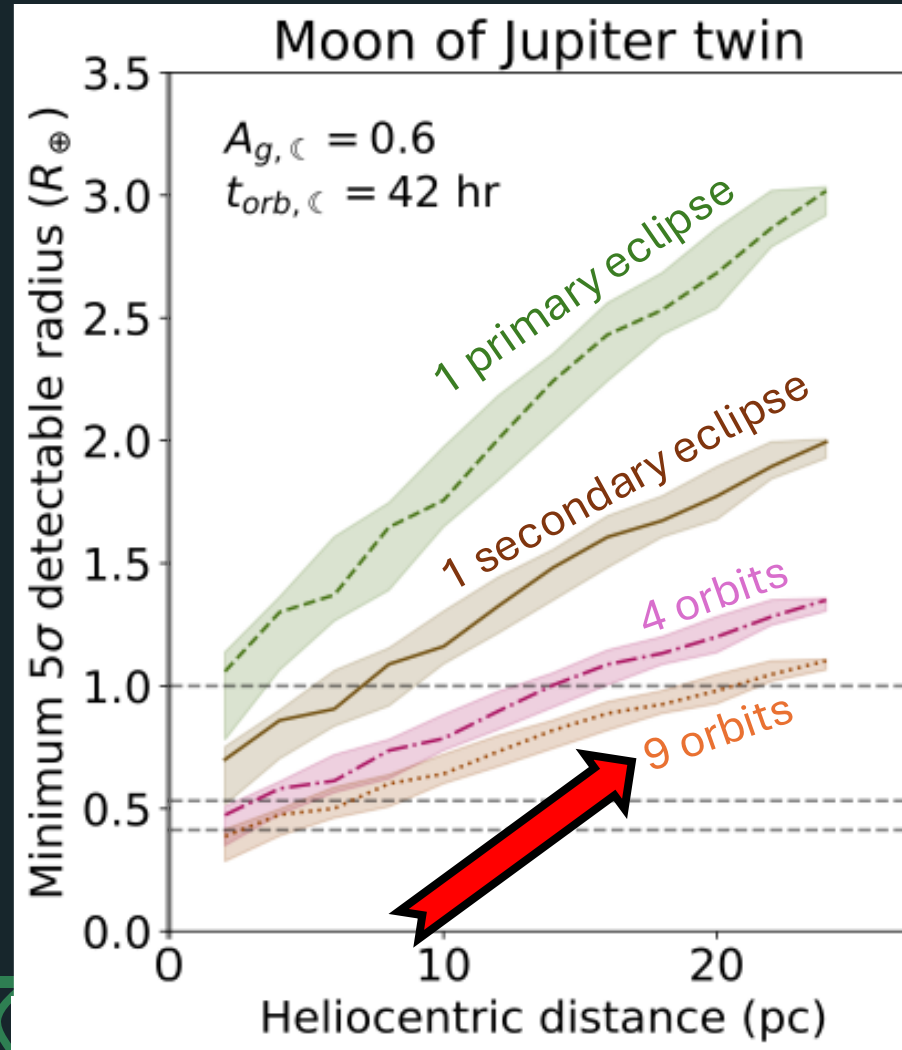


u/J3RRYLIKESCHEESE

Modeling exomoon-induced variability



HWO might detect Solar System-like exomoons

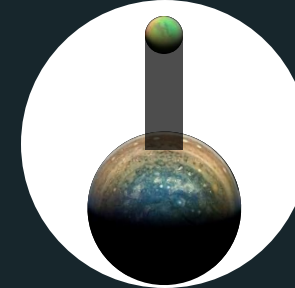
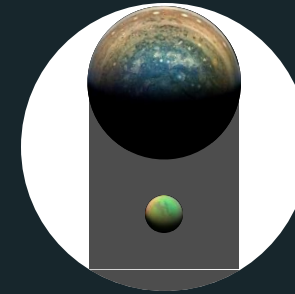
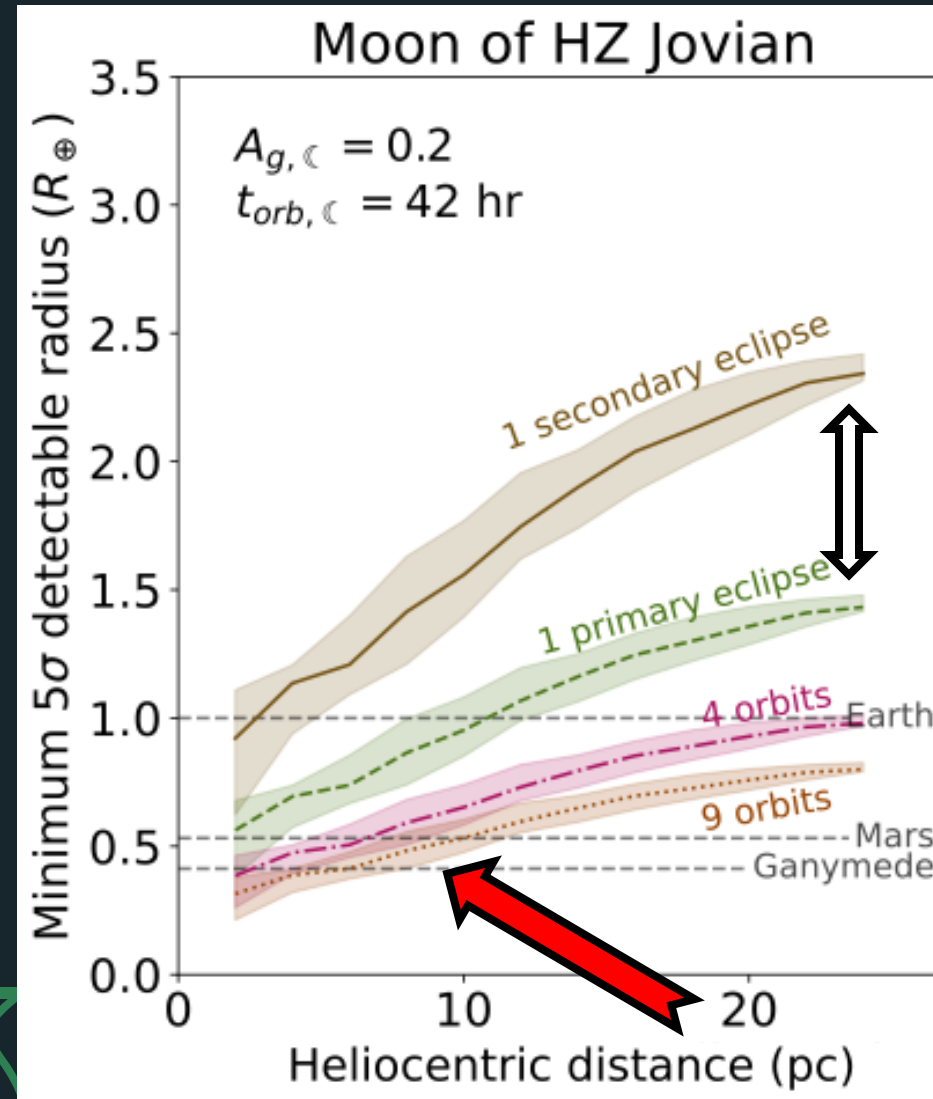


Earth

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!