



Responses to Actions from previous meeting (SUG8)

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SOFIA Users Group #9

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SUG8 Recommended:

1. Synopsis of Cycle 3 exoplanet results at next SUG
2. Science teams for Directors Discretionary demo projects
3. Invest in staffing for pipeline and archive





1. Synopsis of Cycle 3 exoplanet results

- A document describing exoplanet capabilities was developed in 2015 and is distributed for reference at this SUG meeting.
- Not considering preplanetary or debris disks in this summary



SOFIA Exoplanet Projects through Cycle 4

PropID	GI	Title	Status	
01_0099	Mandell	Characterizing Transiting Exoplanets Using FLITECAM: An Exploratory Program [HD 189733b]	published	Paper: Confirmation of Rayleigh scattering in HD 189733 b with HIPO
01_0052 02_0019 03_0037	Swain	The Origin of non-LTE Emission on Dayside of a hot-Jupiter Exoplanet [HD 189733b]	Observed 10/2/2015	inquiry
02_0053 02_0084	Angerhausen Dreyer	Exoplanet transits with FLIPO: Is GJ 1214b a water-world Super Earth or a cloudy Mini-Neptune?	In prep	Teletalk https://www.sofia.usra.edu/Science/SCF/pdf/10-14-15_Dreyer.pdf
01_0155 03_0042	Huber	Do starspots inflate the exoplanet CoRoT-2b?	No data	N/A
03_0052	Angerhausen	Observation of the primary transit of GJ 3470b: Warm Uranus transmission spectrophotometry with FLIPO	Observed 9/29/2015	Detected but needs work
04_0024	Giampapa	Seeing SPOTS with SOFIA: Starspot Photometric Observations of Transiting Systems [HAT-P-11 HD 189733]	[Do if Time]	

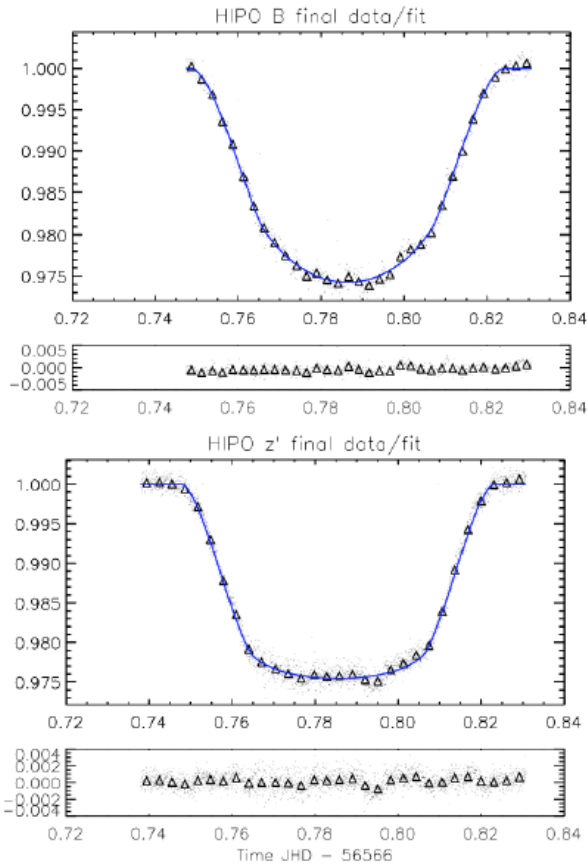
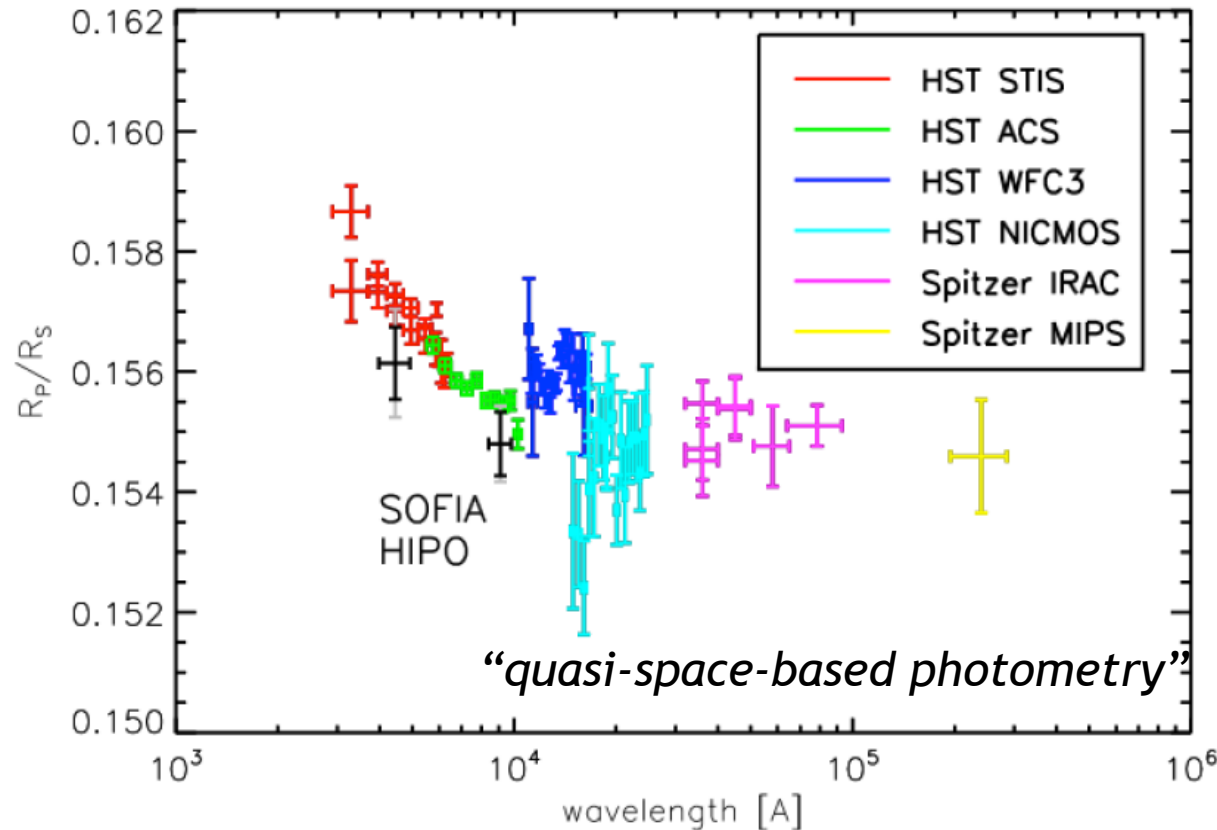
First exoplanet transit observation: HJ HD189733b

Copied from C. Dreyer teletalk

10/14/2015



Transmissionspectrum



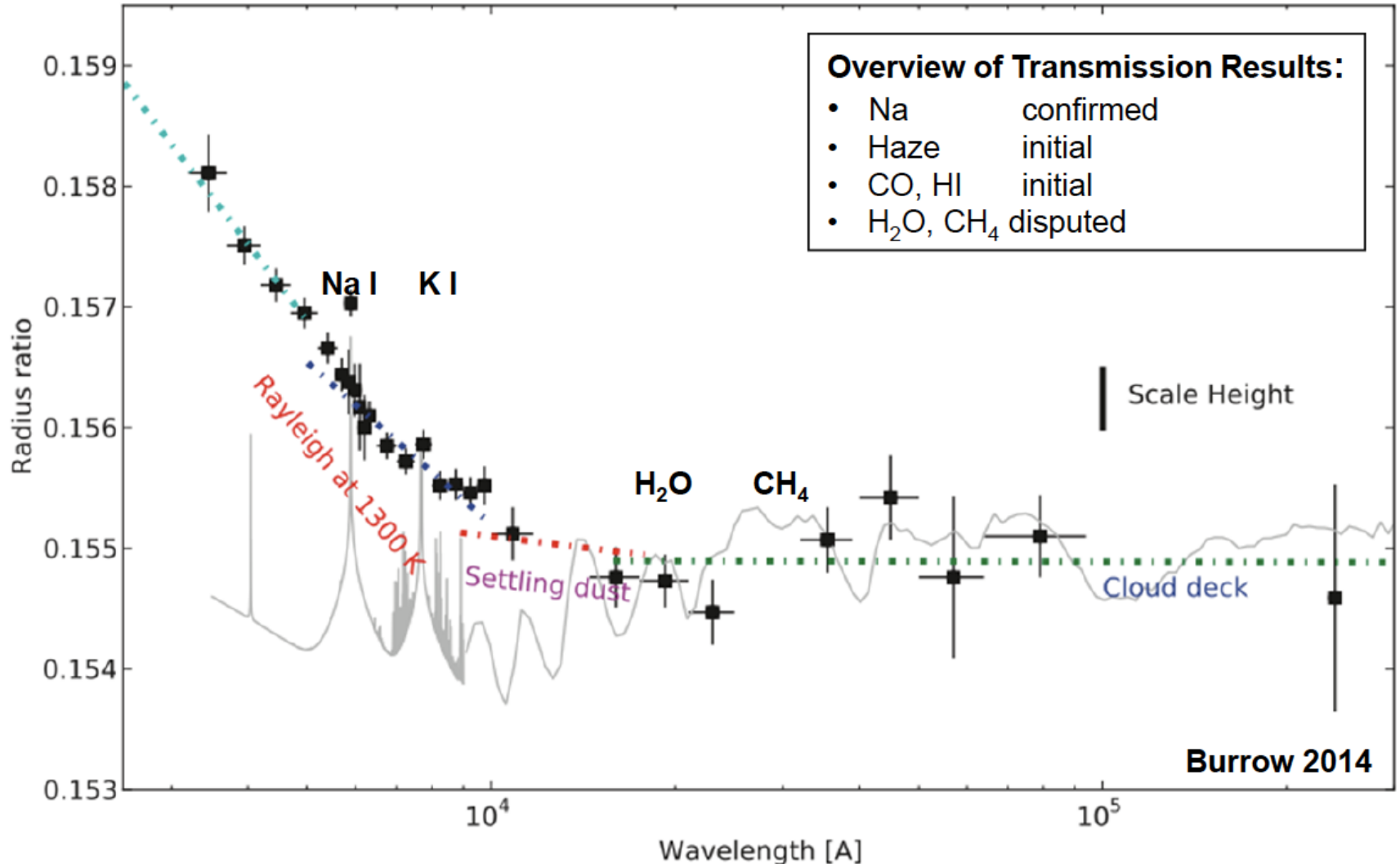
Final light curve in HIPO B & z'

Absolute photometry of a transit of HD 189733b observed by SOFIA/HIPO in the B (445 nm) and z' (905 nm) bands, corrected for extinction, flat field, and correlated noise

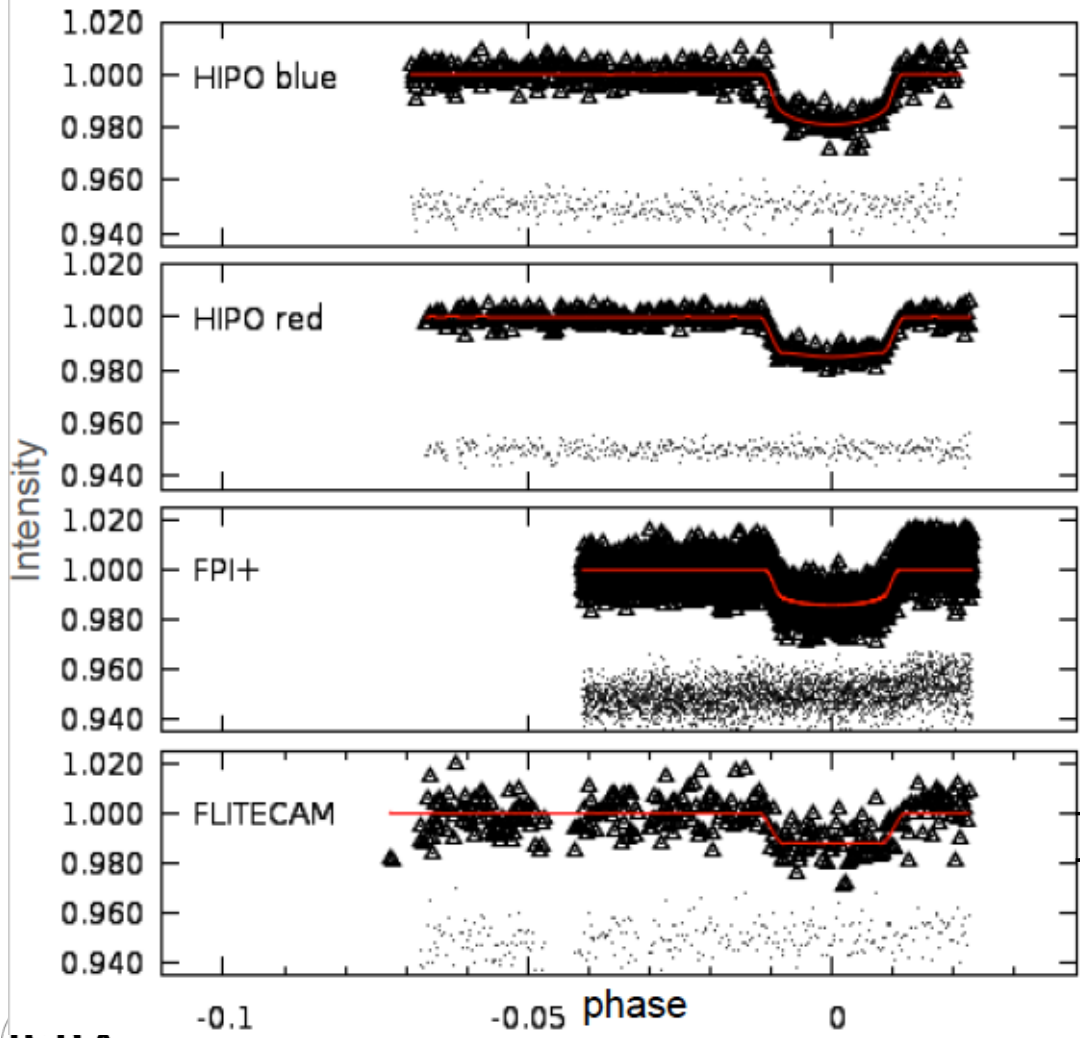
Angerhausen et al. 2015

Hot Jupiter HD 189733 b

Transmission spectrum of HD 189733b, showing the core of the sodium Na and potassium K lines, and the signature of aerosols



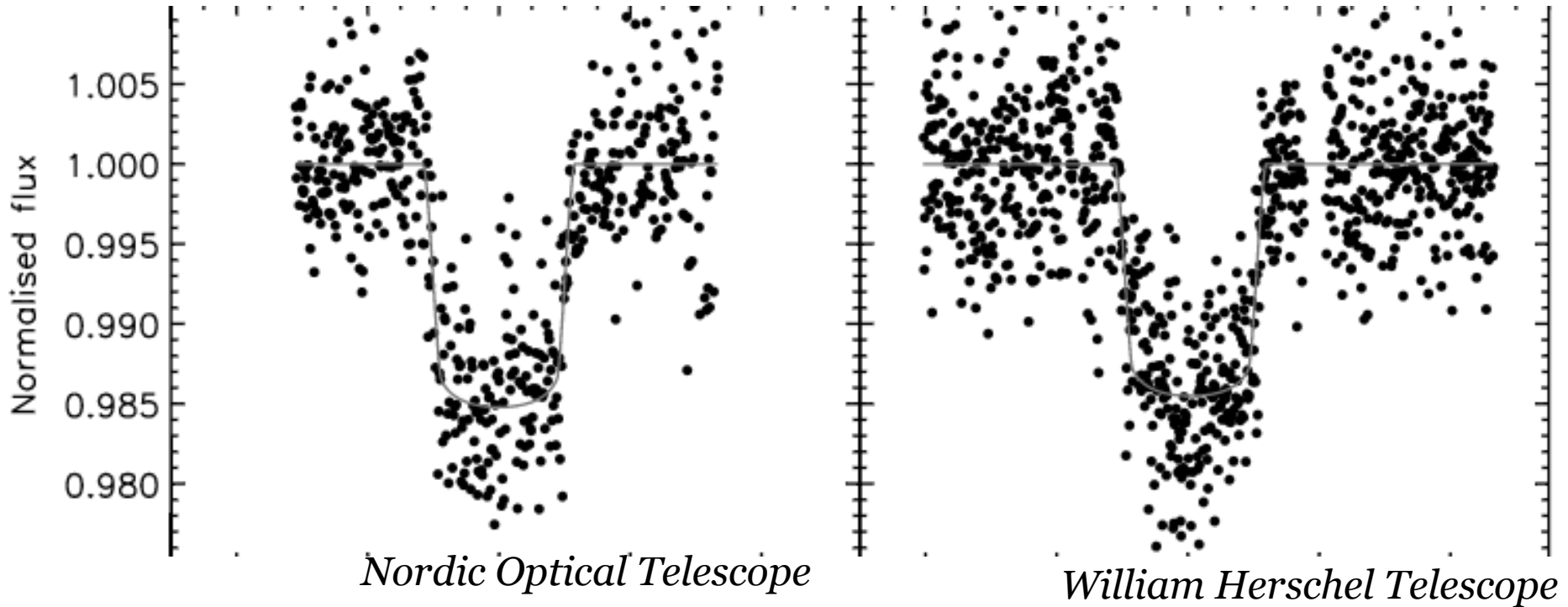
GJ1214b transits: SOFIA



*Copied from C. Dreyer teletalk
10/14/2015*

} 20,000 ppm
[my estimate:
accuracy approximately 5,000 ppm]

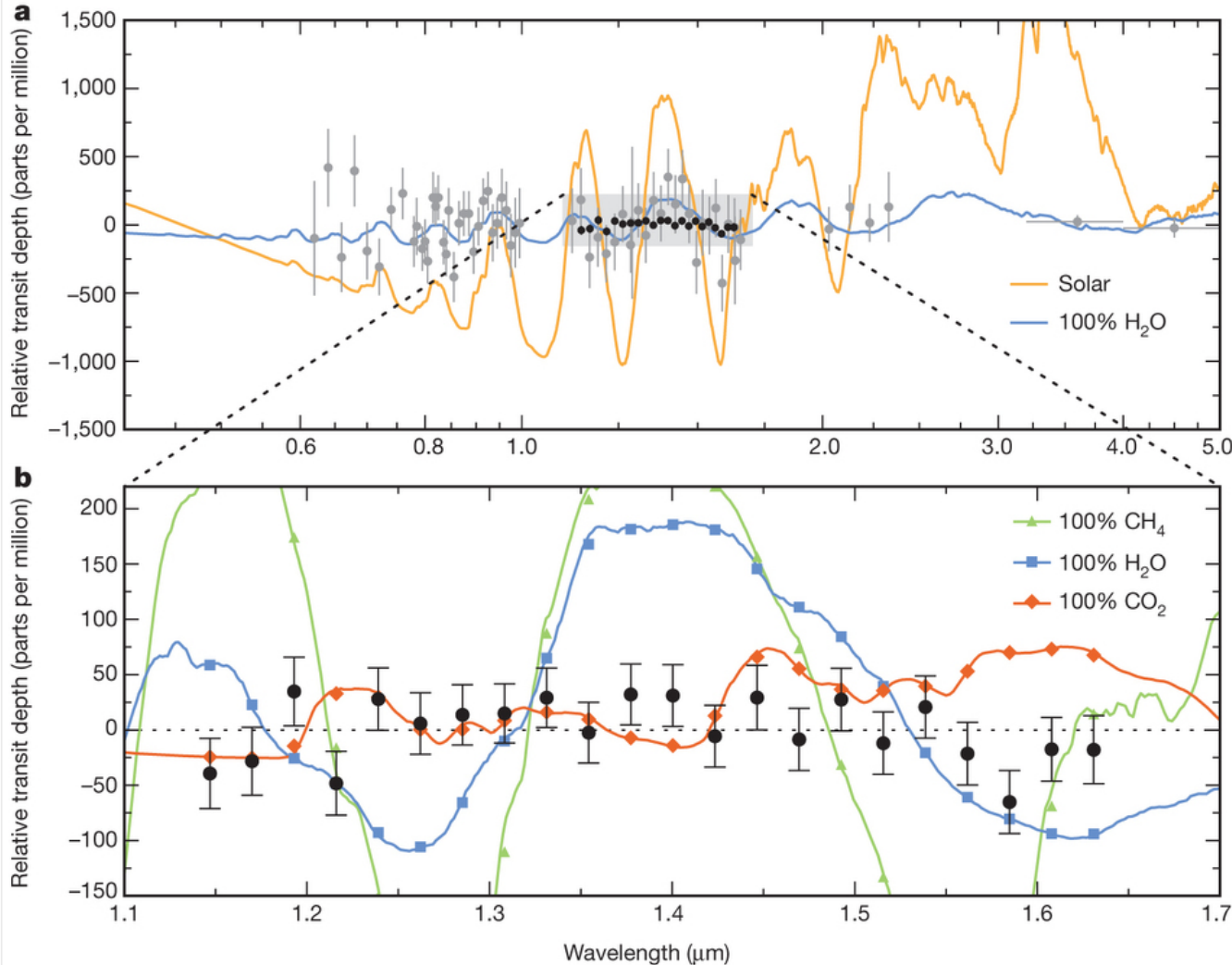
GJ 1214b transits: K-band from ground



Accuracy ~ 500 ppm (Bean et al.)

GJ 1214: transit from HST/WFC3

Kreidberg 2014 Nature 505, 69; Fig 2
[redact figure from online presentation]



[accuracy better than 50 ppm]

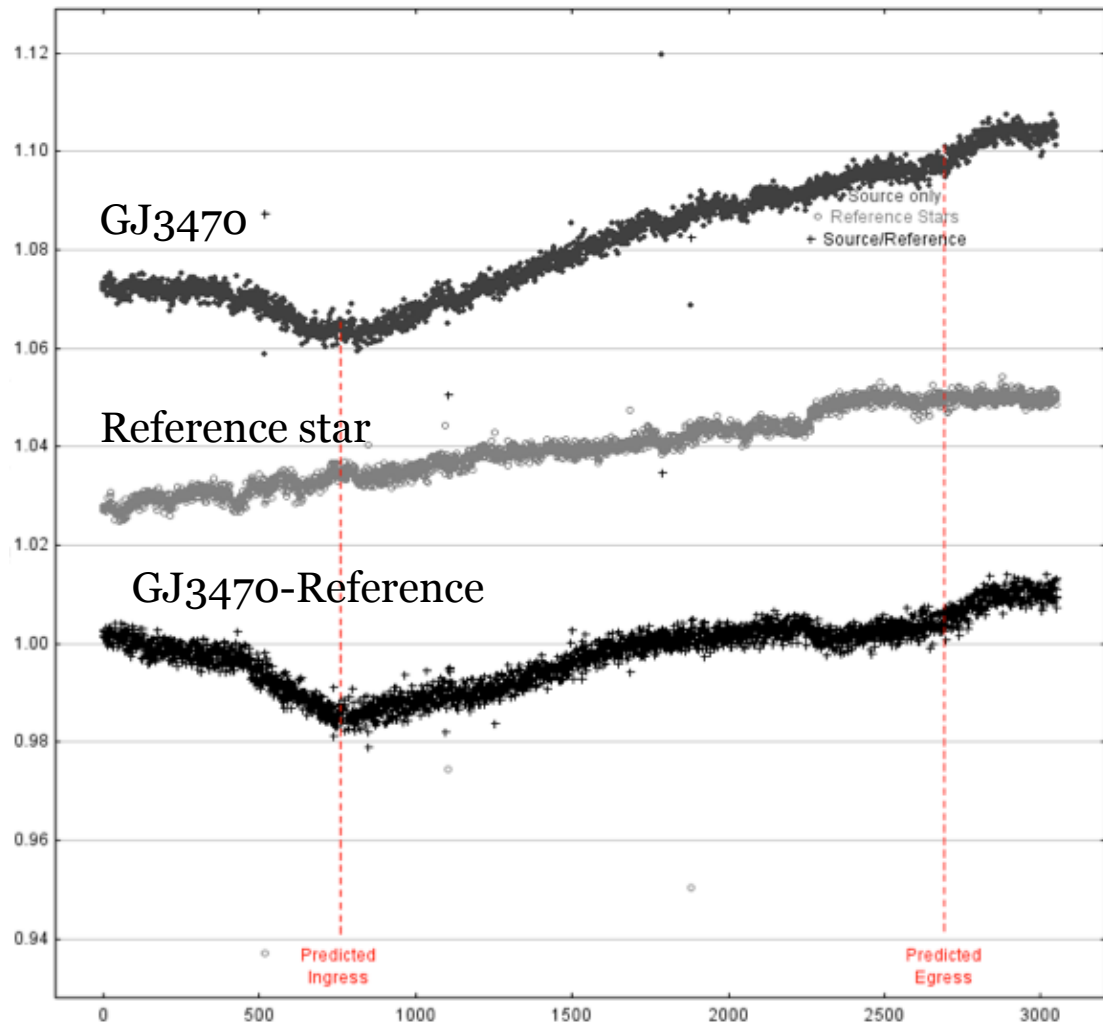
GJ 3470b transit from SOFIA 9/2015

Figure from C. Dreyer
teletalk in 10/14/2015

Transit clearly seen in
this “quick and dirty”
plot made during flight,
but needs work

Lack of pre-ingress/post-
egress baseline will
hamper the ultimate goal

- Night-time observations
limit the phase space of
exoplanets SOFIA can
address
- 2hr 40 min observation





Summary of exoplanet results

- HD 187933b
 - Published result confirming Rayleigh scattering
 - Error bars with SOFIA/HIPO about 5 times larger than HST
 - Secondary eclipse results being confirmed with high-R ground-based spectra
- GJ 1214b
 - Detected simultaneous transit 4 wavelengths
 - SOFIA/FLIPO NIR about 10 times less accurate than ground-based and 100 times less accurate than HST
 - HST result on featureless spectrum indicates exoplanet colors may not be as diagnostic as thought pre-2014



2. Science teams for Directors Discretionary demo projects

- So far, there has been one such project (on the Horsehead using GREAT). The experiment was designed by the SMO support scientist and GREAT PI.
- For future such demonstration projects, we will invite ad hoc team of experts as external advisors.
 - As a reminder: Individuals and teams are always welcome to propose for Directors Discretionary Time





3. Invest in staffing for pipeline and archive

- 2016 (Feb and Mar): added 2 staff
 - One scientist (D. Fadda) was a new hire to bolster data quality assessment team
 - One engineer (K. Shabun) was replacement for attrition
- 2017+:
 - Science Mission Operations authorized to increase staff by approximately 2 FTE