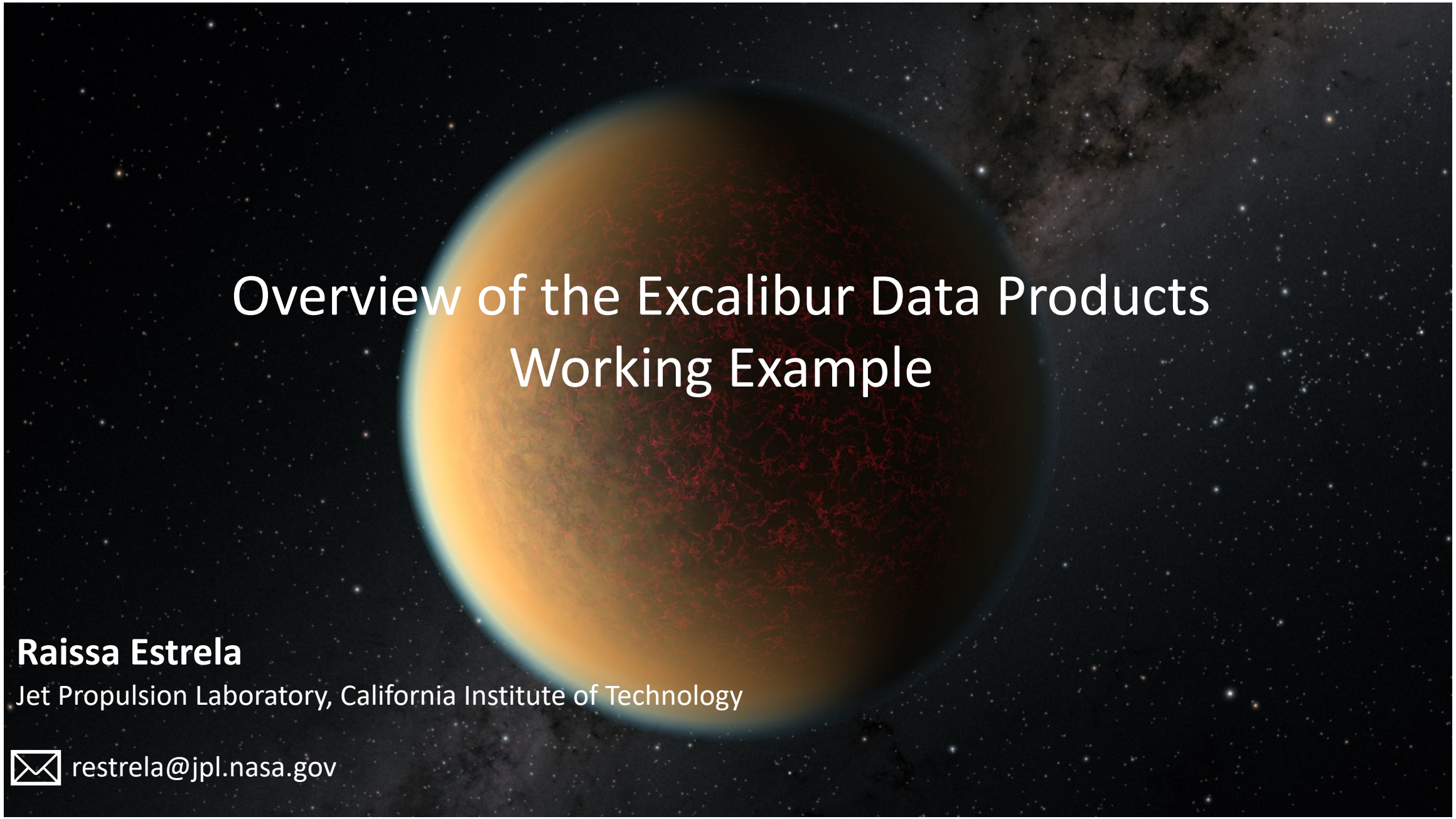
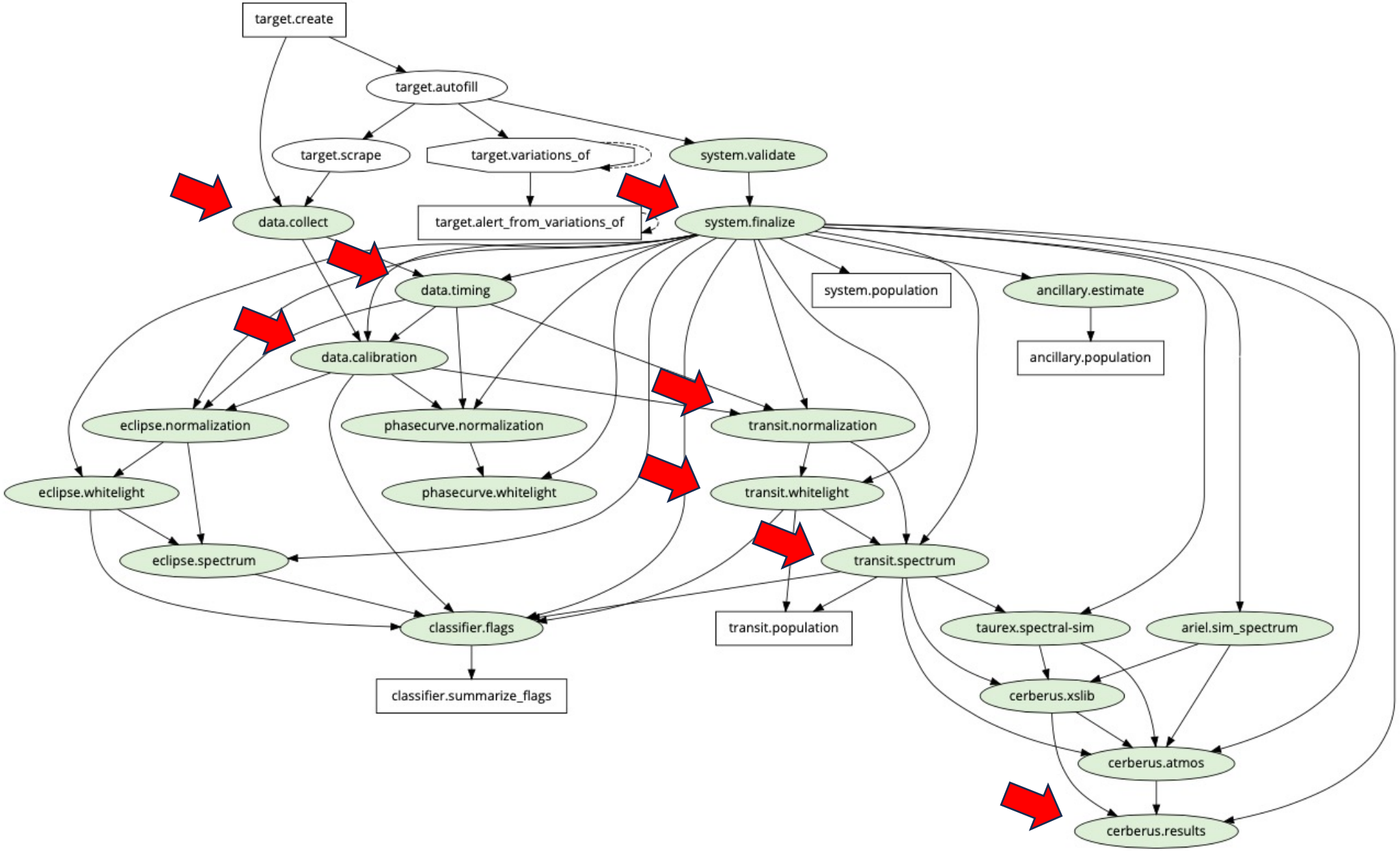


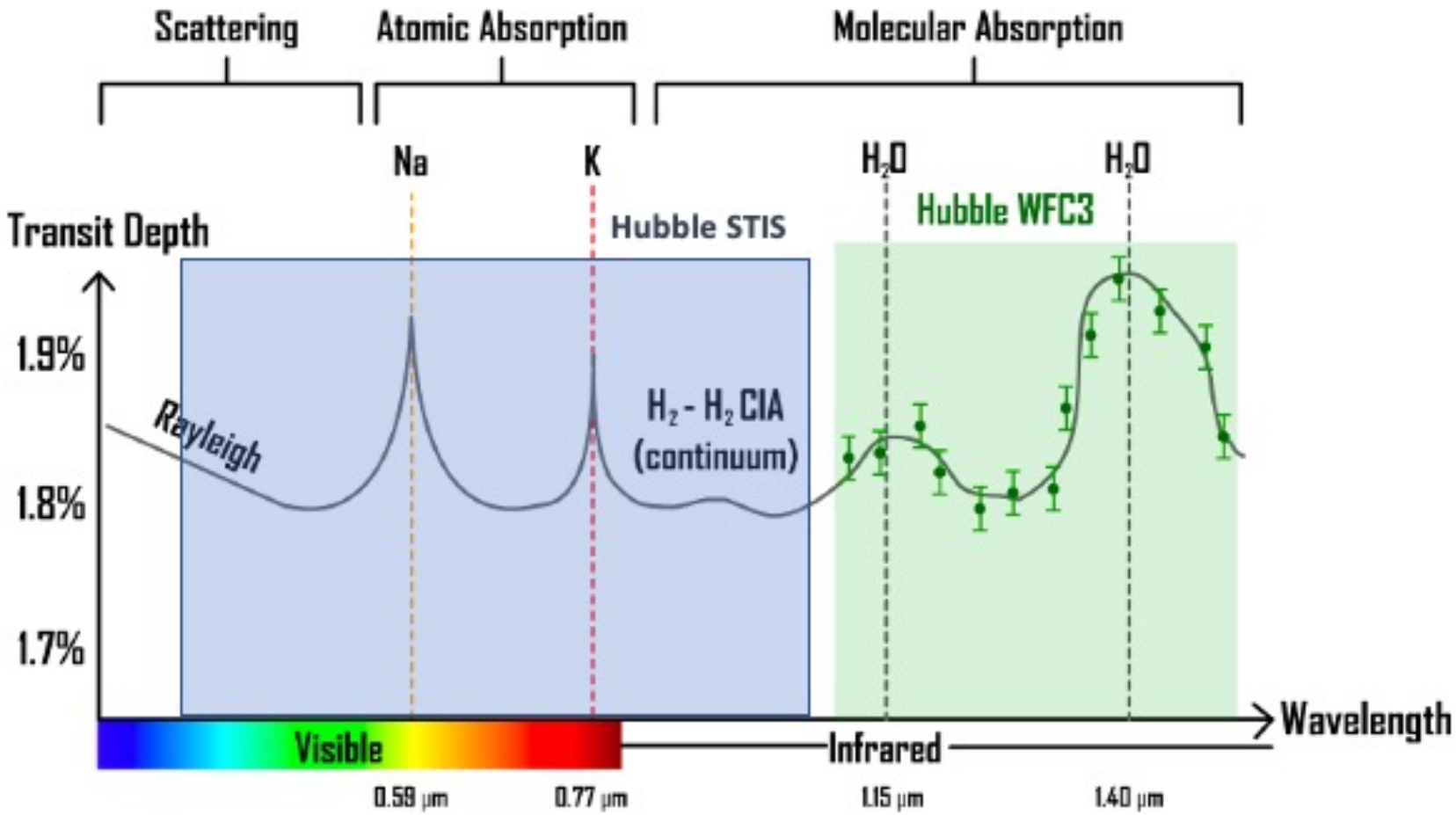
Overview of the Excalibur Data Products Working Example

Raissa Estrela
Jet Propulsion Laboratory, California Institute of Technology

restrela@jpl.nasa.gov

Current Algorithm Tree





Macdonald (2019)

Search Database

State Vector*

Search

Target Name*

K2-18

K2-18	
State Vector	**Run ID (display | download)**
cerberus.release.HST-WFC3-IR-G141-SCAN	591
data.calibration.HST-WFC3-IR-G141-SCAN	165
data.collect.frames	137
data.timing.HST-WFC3-IR-G141-SCAN	164
system.finalize.parameters	155
transit.normalization.HST-WFC3-IR-G141-SCAN	185
transit.spectrum.HST-WFC3-IR-G141-SCAN	187
transit.whitelight.HST-WFC3-IR-G141-SCAN	186

STAR	UPPER ERR	LOWER ERR	UNITS	REF
R*	R*_uperr	R*_lowerr	R*_units	R*_ref
0.41	0.04	-0.04	[Rsun]	Sarkis et al. 2018
T*	T*_uperr	T*_lowerr	T*_units	T*_ref
3457.0	39.0	-39.0	[K]	Sarkis et al. 2018
FEH*	FEH*_uperr	FEH*_lowerr	FEH*_units	FEH*_ref
0.12	0.16	-0.16	[Fe/H]	Sarkis et al. 2018
LOGG*	LOGG*_uperr	LOGG*_lowerr	LOGG*_units	LOGG*_ref
4.86	0.06	-0.06	log10[cm.s-2]	Crossfield et al. 2016

PLANET b	UPPER ERR	LOWER ERR	UNITS	REF
inc	inc_uperr	inc_lowerr	inc_units	inc_ref
89.579	0.008	-0.009	[degree]	Cloutier et al. 2017
period	period_uperr	period_lowerr	period_units	period_ref
32.939623	9.5e-05	-0.0001	[days]	Sarkis et al. 2018
ecc	ecc_uperr	ecc_lowerr	ecc_units	ecc_ref
0.2	0.08	-0.08	[]	Sarkis et al. 2018
rp	rp_uperr	rp_lowerr	rp_units	rp_ref
0.211	0.02	-0.02	[Jupiter radius]	Sarkis et al. 2018
t0	t0_uperr	t0_lowerr	t0_units	t0_ref
2457264.39144	0.00065	-0.00065	[Julian Days]	Sarkis et al. 2018
sma	sma_uperr	sma_lowerr	sma_units	sma_ref
0.1429	0.006	-0.0065	[AU]	Sarkis et al. 2018
mass	mass_uperr	mass_lowerr	mass_units	mass_ref
0.02807	0.00535	-0.00503	[Jupiter mass]	Sarkis et al. 2018

Search Database

State Vector*

Search

Target Name*

K2-18

K2-18	
State Vector	**Run ID (display | download)**
cerberus.release.HST-WFC3-IR-G141-SCAN	591
data.calibration.HST-WFC3-IR-G141-SCAN	165
data.collect.frames	137
data.timing.HST-WFC3-IR-G141-SCAN	164
system.finalize.parameters	155
transit.normalization.HST-WFC3-IR-G141-SCAN	185
transit.spectrum.HST-WFC3-IR-G141-SCAN	187
transit.whitelight.HST-WFC3-IR-G141-SCAN	186

Viewing State Vector:

Run ID: 137

Target: K2-18

Task: data

Algorithm: collect

State Vec: frames

Filter	Frames collected
HST-WFC3-IR-G141-SCAN	808

Search Database

State Vector*

Search

Target Name*

K2-18

K2-18	
State Vector	**Run ID (display | download)**
cerberus.release.HST-WFC3-IR-G141-SCAN	591
data.calibration.HST-WFC3-IR-G141-SCAN	165
data.collect.frames	137
data.timing.HST-WFC3-IR-G141-SCAN	164
system.finalize.parameters	155
transit.normalization.HST-WFC3-IR-G141-SCAN	185
transit.spectrum.HST-WFC3-IR-G141-SCAN	187
transit.whitelight.HST-WFC3-IR-G141-SCAN	186

Viewing State Vector:

Run ID: 164

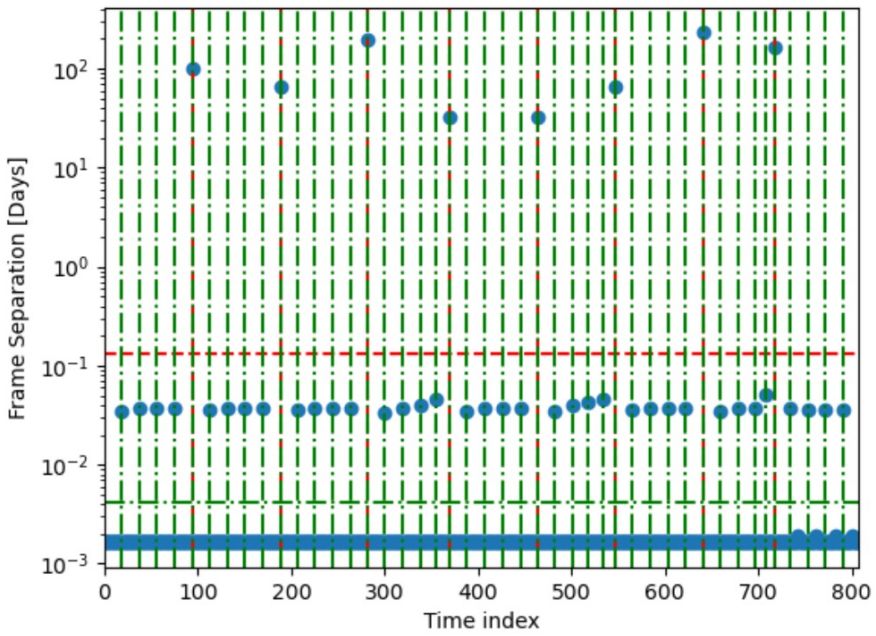
Target: K2-18

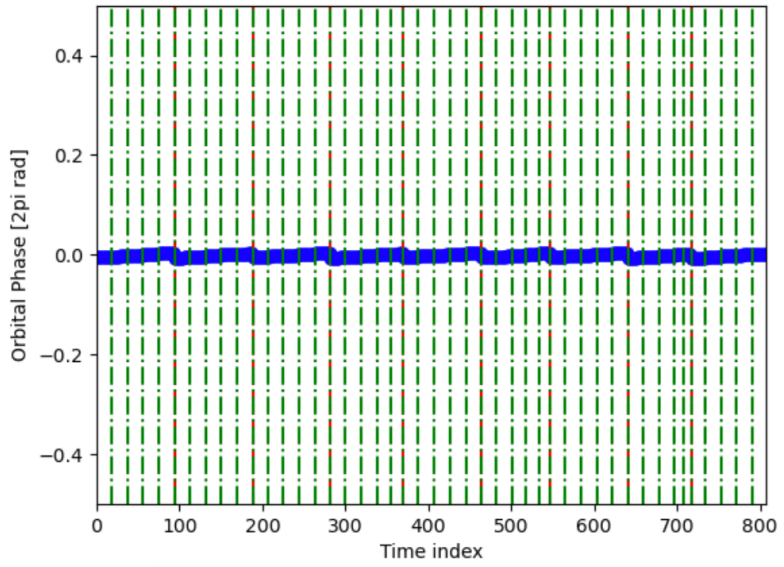
Task: data

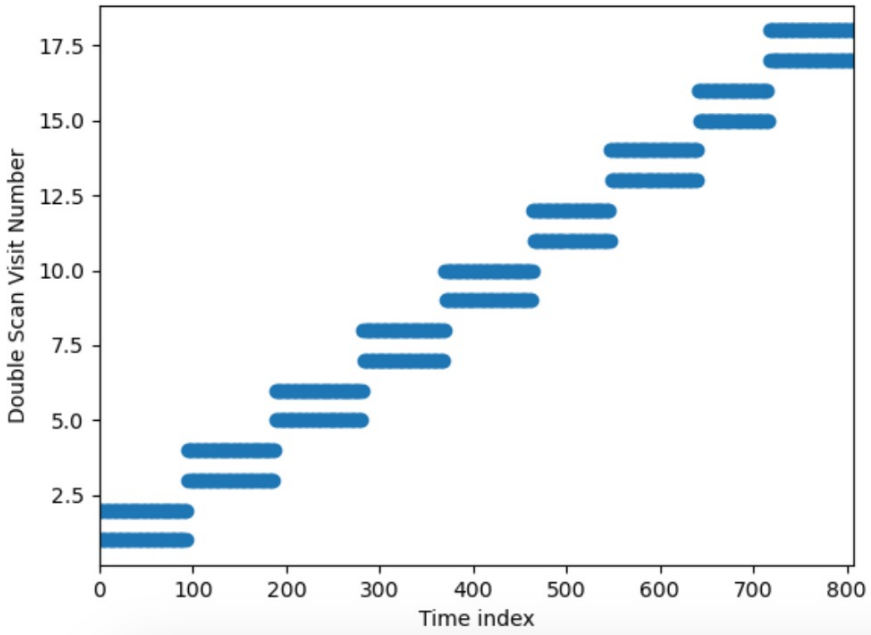
Algorithm: timing

State Vec: HST-WFC3-IR-G141-SCAN

PLANET: b	VISIT NUMBER
TRANSIT	[1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18]
ECLIPSE	[]
PHASE CURVE	[]







Search Database

State Vector*

Search

Target Name*

K2-18

K2-18	
State Vector	**Run ID (display | download)**
cerberus.release.HST-WFC3-IR-G141-SCAN	591
data.calibration.HST-WFC3-IR-G141-SCAN	165
data.collect.frames	137
data.timing.HST-WFC3-IR-G141-SCAN	164
system.finalize.parameters	155
transit.normalization.HST-WFC3-IR-G141-SCAN	185
transit.spectrum.HST-WFC3-IR-G141-SCAN	187
transit.whitelight.HST-WFC3-IR-G141-SCAN	186

Viewing State Vector:

Run ID: 165

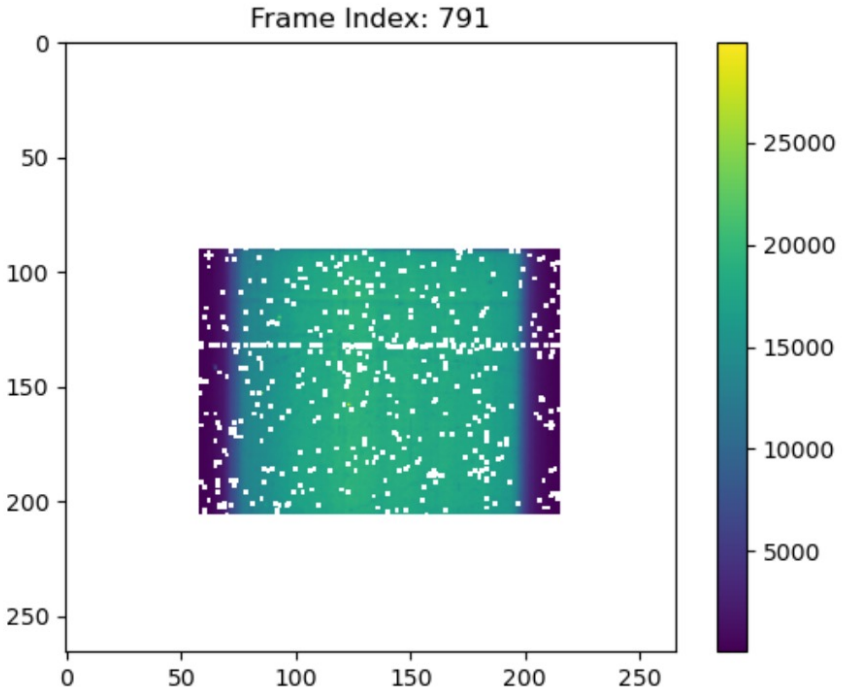
Target: K2-18

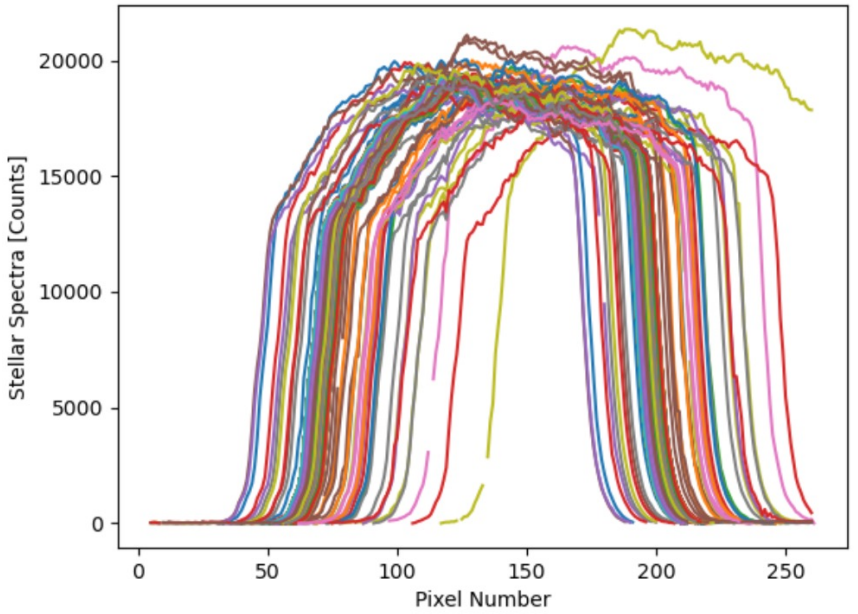
Task: data

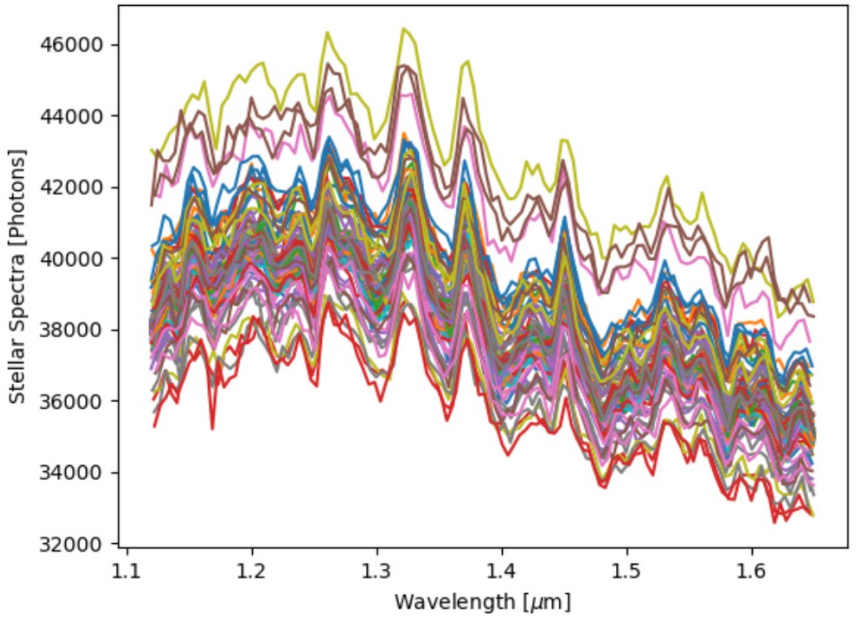
Algorithm: calibration

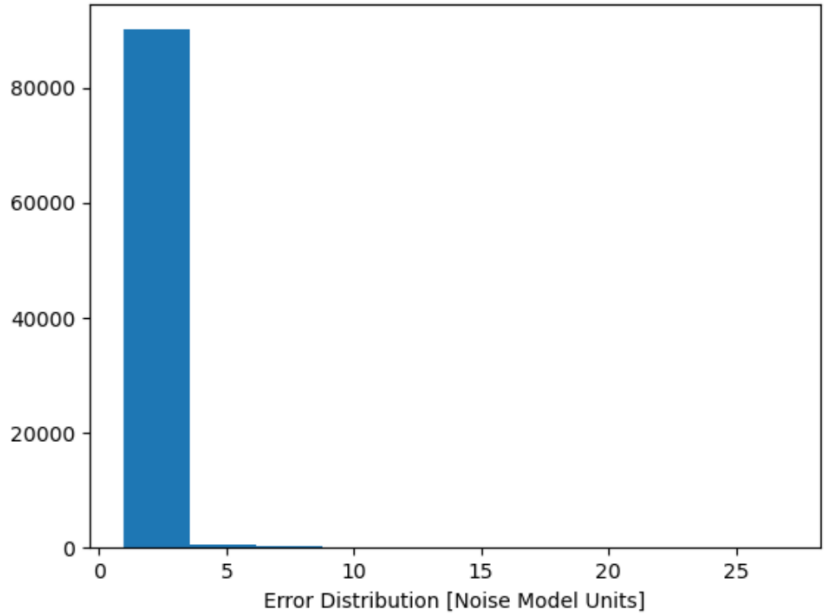
State Vec: HST-WFC3-IR-G141-SCAN

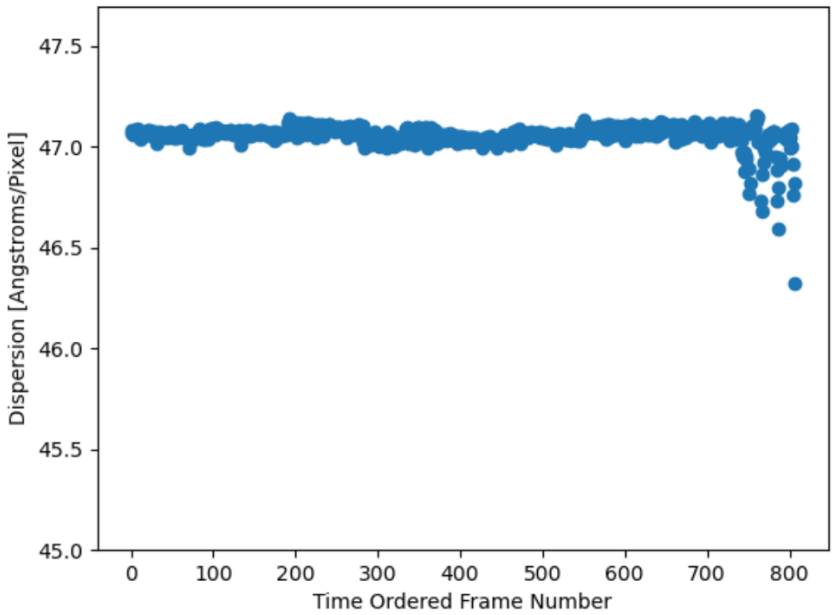
IGNORED: 0 / 808

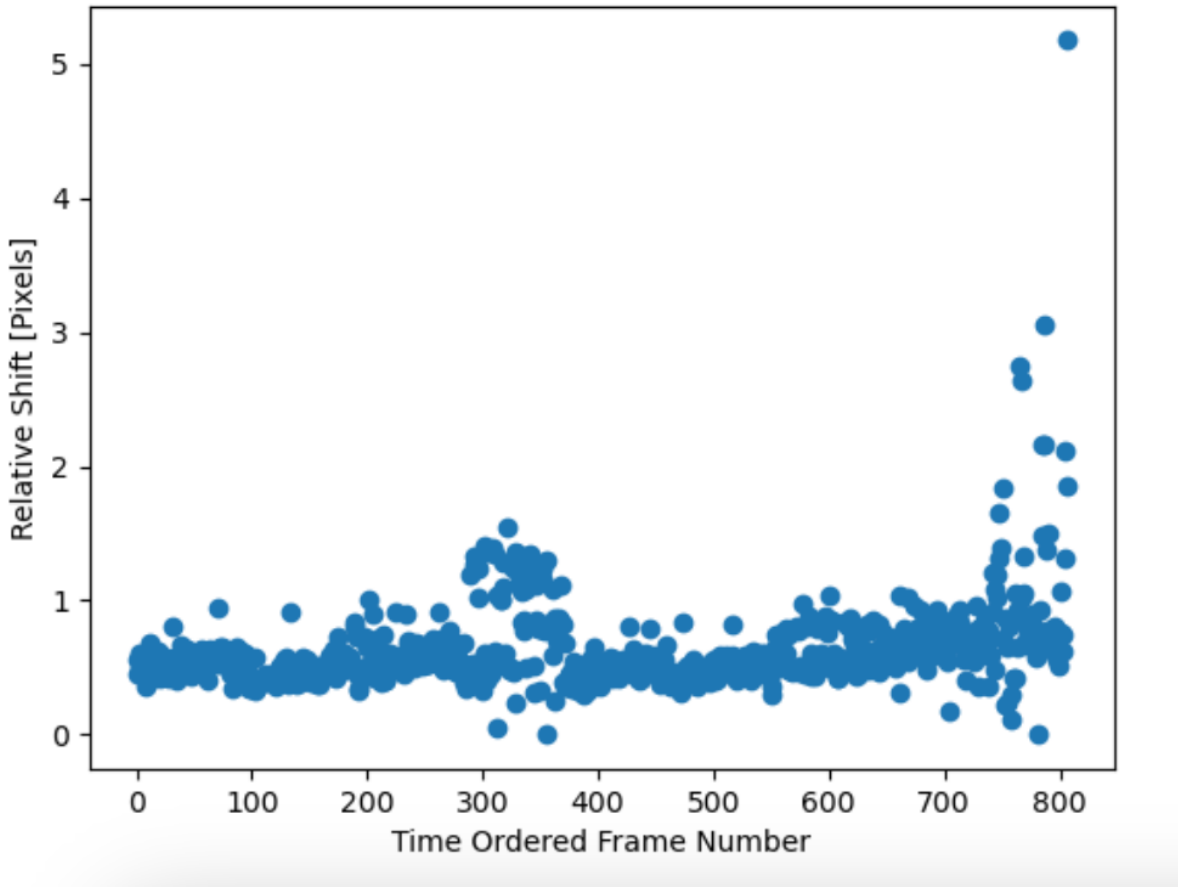







80000
60000
40000
20000
0
0
5
10
15
20
25
Error Distribution [Noise Model Units]


47.5
47.0
46.5
46.0
45.5
45.0
Dispersion [Angstroms/Pixel]
0
100
200
300
400
500
600
700
800
Time Ordered Frame Number


5
4
3
2
1
0
Relative Shift [Pixels]
0
100
200
300
400
500
600
700
800
Time Ordered Frame Number

Search Database

State Vector*

Search

Target Name*

K2-18

K2-18	
State Vector	**Run ID (display | download)**
cerberus.release.HST-WFC3-IR-G141-SCAN	591
data.calibration.HST-WFC3-IR-G141-SCAN	165
data.collect.frames	137
data.timing.HST-WFC3-IR-G141-SCAN	164
system.finalize.parameters	155
transit.normalization.HST-WFC3-IR-G141-SCAN	185
transit.spectrum.HST-WFC3-IR-G141-SCAN	187
transit.whitelight.HST-WFC3-IR-G141-SCAN	186

Viewing State Vector:

Run ID: 185

Target: K2-18

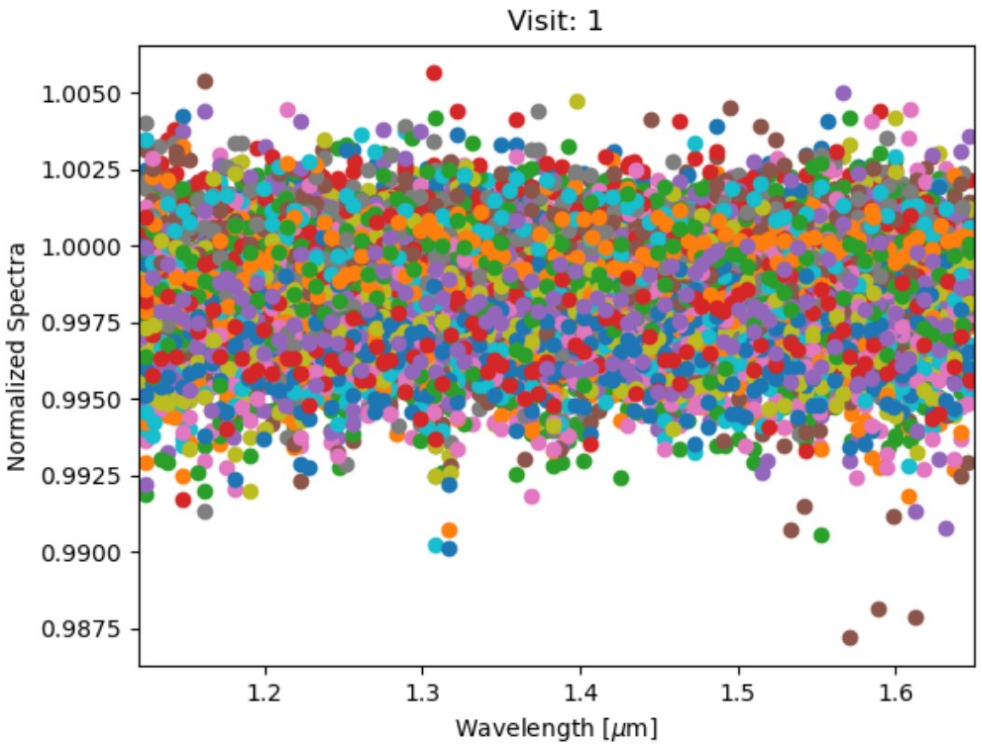
Task: transit

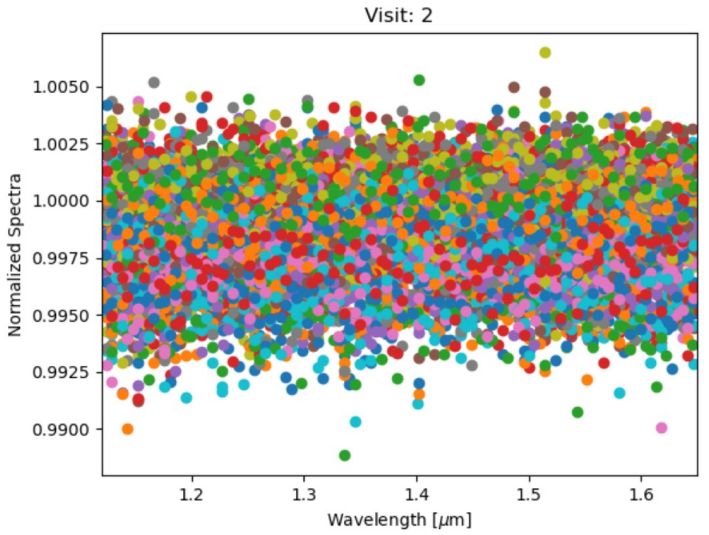
Algorithm: normalization

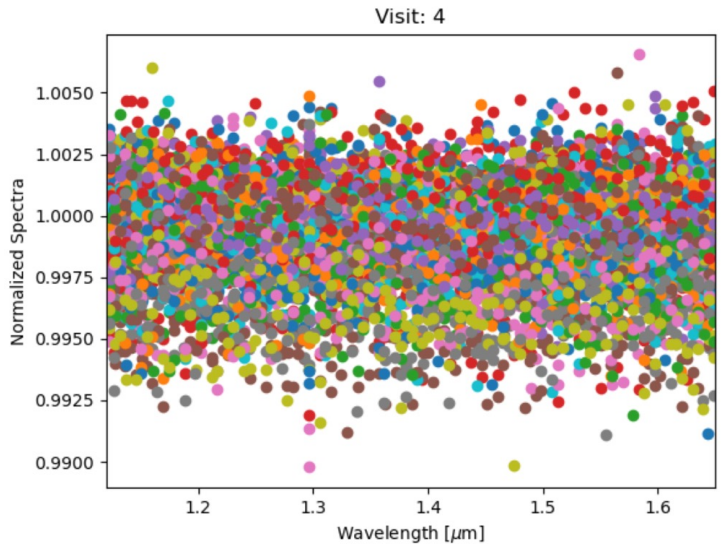
State Vec: HST-WFC3-IR-G141-SCAN

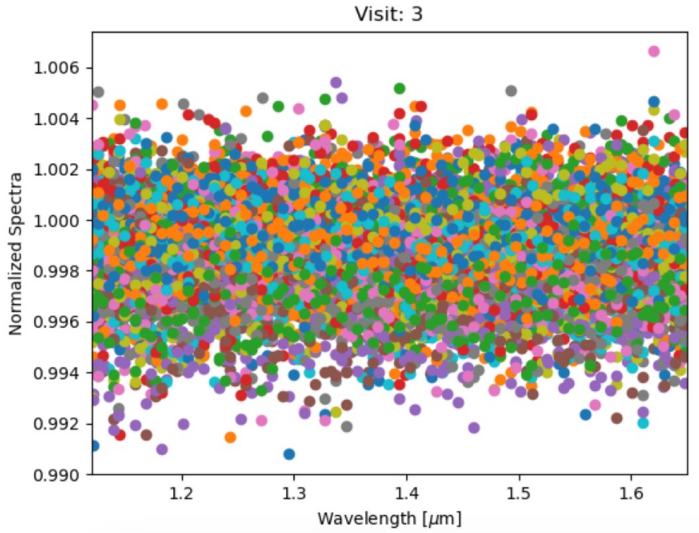
PLANET: b

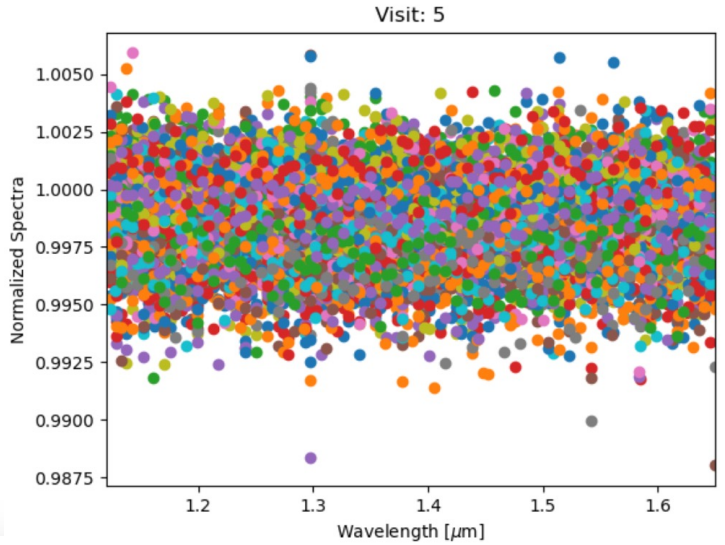
VISIT: 9 Missing IT Data











Visits 6, 7, 8....

Search Database

State Vector*

Search

Target Name*

K2-18

K2-18	
State Vector	**Run ID (display | download)**
cerberus.release.HST-WFC3-IR-G141-SCAN	591
data.calibration.HST-WFC3-IR-G141-SCAN	165
data.collect.frames	137
data.timing.HST-WFC3-IR-G141-SCAN	164
system.finalize.parameters	155
transit.normalization.HST-WFC3-IR-G141-SCAN	185
transit.spectrum.HST-WFC3-IR-G141-SCAN	187
transit.whitelight.HST-WFC3-IR-G141-SCAN	186

Viewing State Vector:

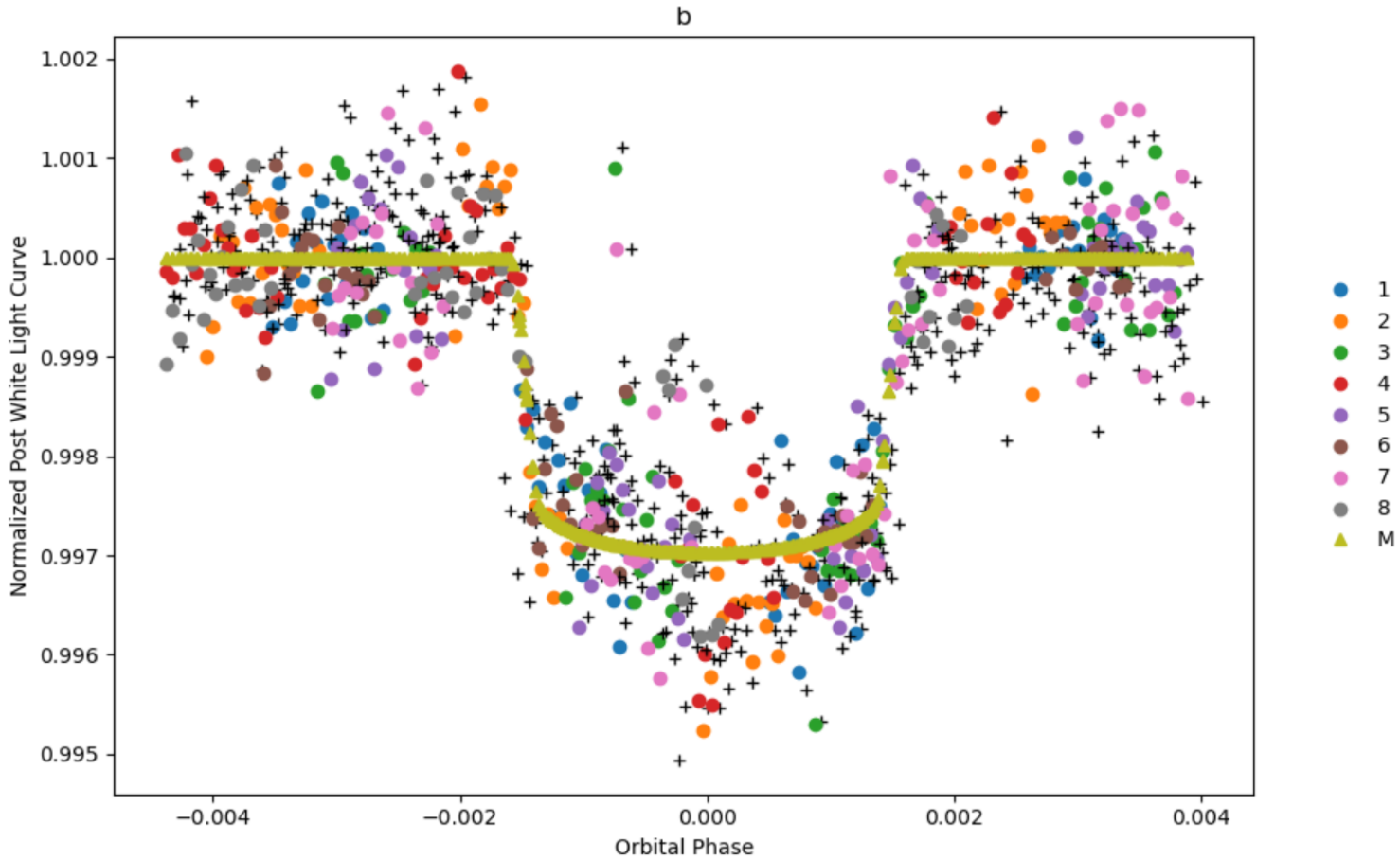
Run ID: 186

Target: K2-18

Task: transit

Algorithm: whitelight

State Vec: HST-WFC3-IR-G141-SCAN



Search Database

State Vector*

Search

Target Name*

K2-18

K2-18	
State Vector	**Run ID (display | download)**
cerberus.release.HST-WFC3-IR-G141-SCAN	591
data.calibration.HST-WFC3-IR-G141-SCAN	165
data.collect.frames	137
data.timing.HST-WFC3-IR-G141-SCAN	164
system.finalize.parameters	155
transit.normalization.HST-WFC3-IR-G141-SCAN	185
transit.spectrum.HST-WFC3-IR-G141-SCAN	187
transit.whitelight.HST-WFC3-IR-G141-SCAN	186

Viewing State Vector:

Run ID: 187

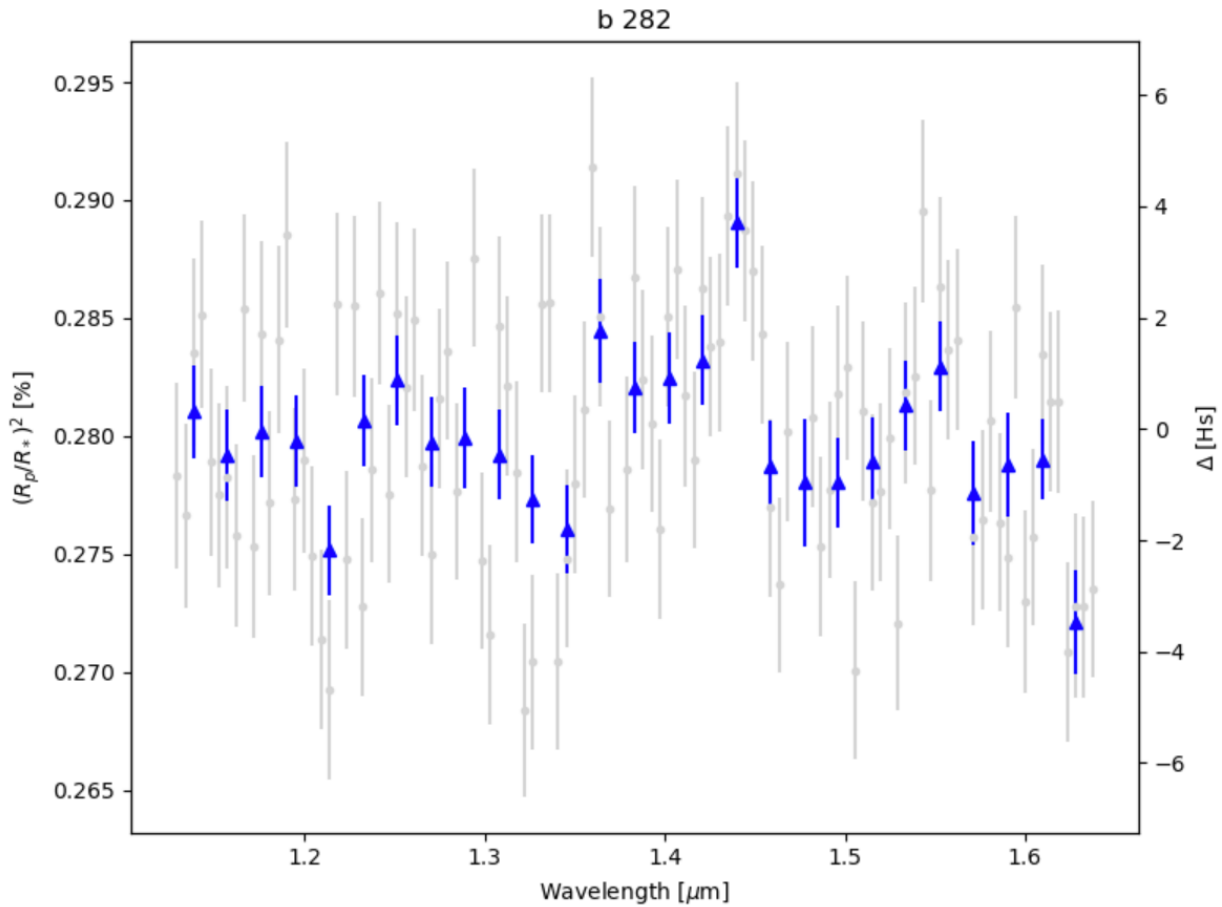
Target: K2-18

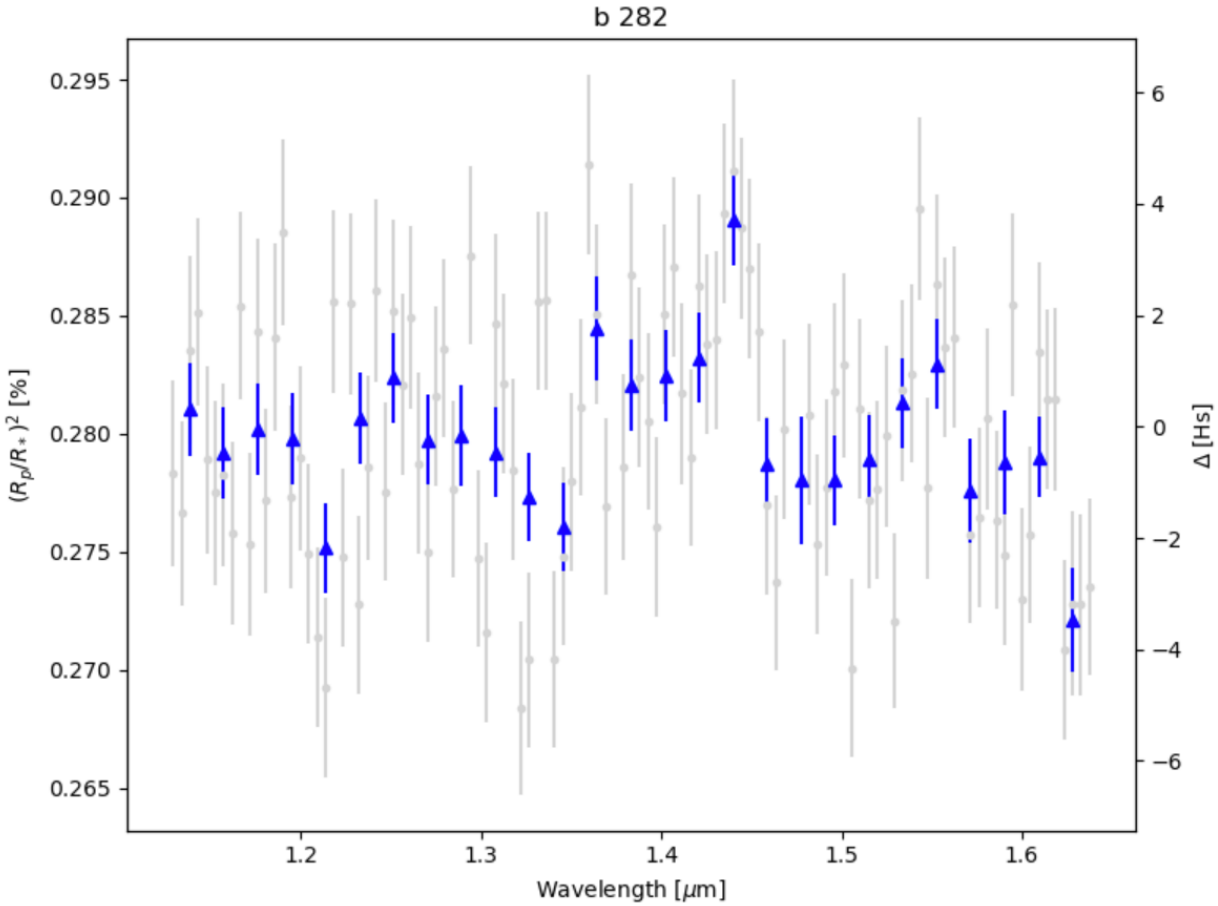
Task: transit

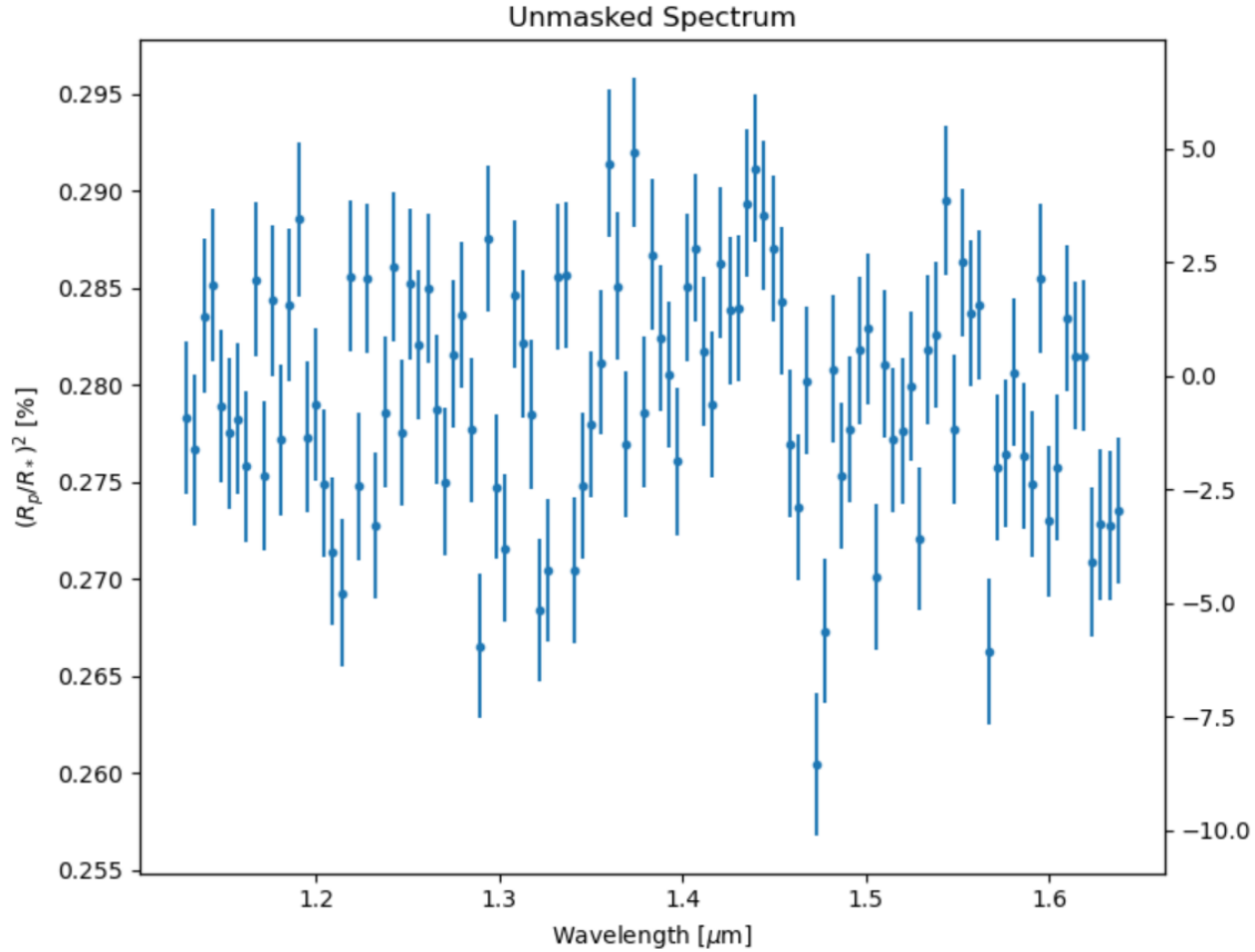
Algorithm: spectrum

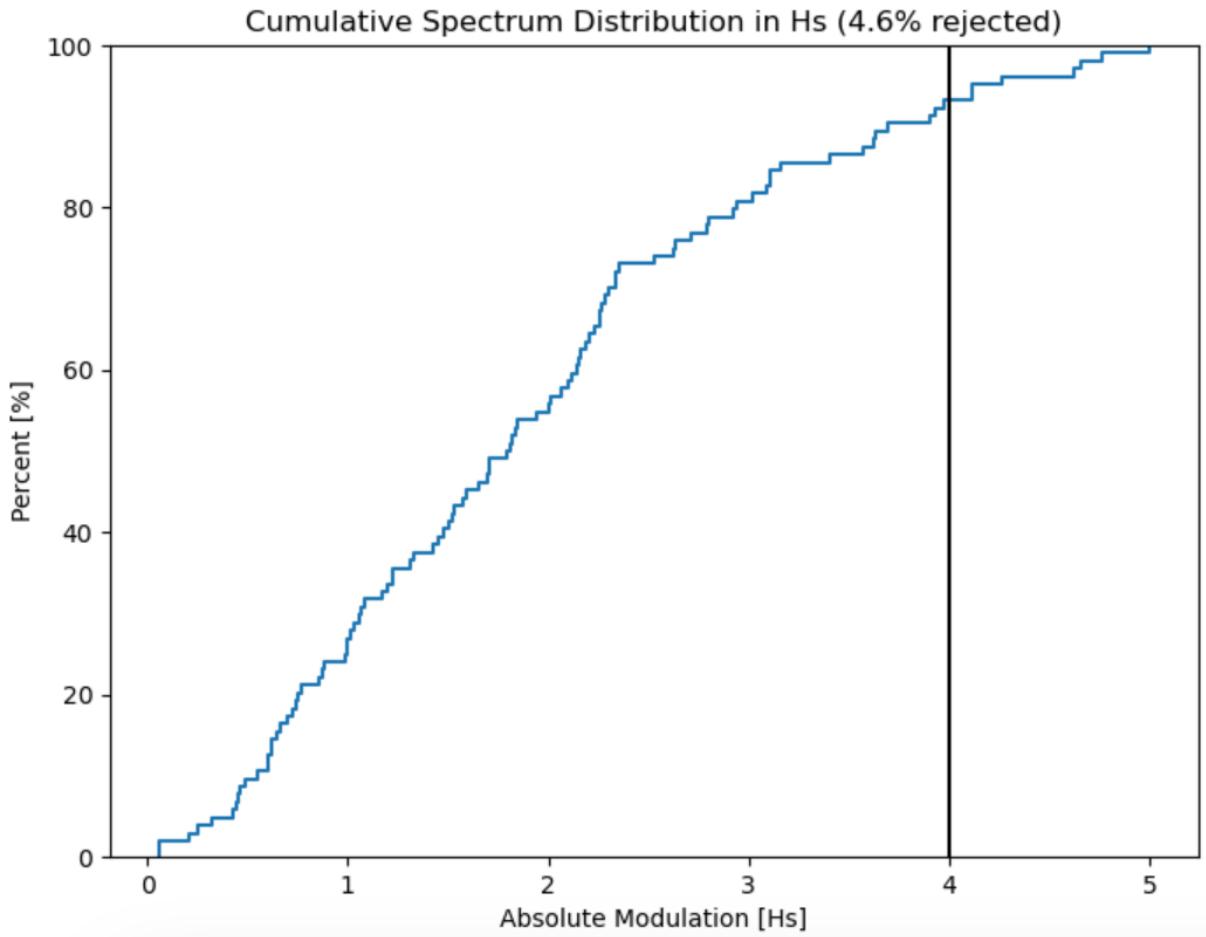
State Vec: HST-WFC3-IR-G141-SCAN

PLANET: b




b 282
$(R_p/R_*)^2$ [%]
Δ [Hs]
Wavelength [μm]
0.295
0.290
0.285
0.280
0.275
0.270
0.265
6
4
2
0
−2
−4
−6
1.2
1.3
1.4
1.5
1.6


Unmasked Spectrum
$(R_p/R_*)^2$ [%]
Δ [Hs]
Wavelength [μm]
0.295
0.290
0.285
0.280
0.275
0.270
0.265
0.260
0.255
5.0
2.5
0.0
−2.5
−5.0
−7.5
−10.0
1.2
1.3
1.4
1.5
1.6


Cumulative Spectrum Distribution in Hs (4.6% rejected)
Percent [%]
Absolute Modulation [Hs]
0
20
40
60
80
100
0
1
2
3
4
5

Search Database

State Vector*

Search

Target Name*

K2-18

K2-18	
State Vector	**Run ID (display | download)**
cerberus.release.HST-WFC3-IR-G141-SCAN	591
data.calibration.HST-WFC3-IR-G141-SCAN	165
data.collect.frames	137
data.timing.HST-WFC3-IR-G141-SCAN	164
system.finalize.parameters	155
transit.normalization.HST-WFC3-IR-G141-SCAN	185
transit.spectrum.HST-WFC3-IR-G141-SCAN	187
transit.whitelight.HST-WFC3-IR-G141-SCAN	186

Viewing State Vector:

Run ID: 591

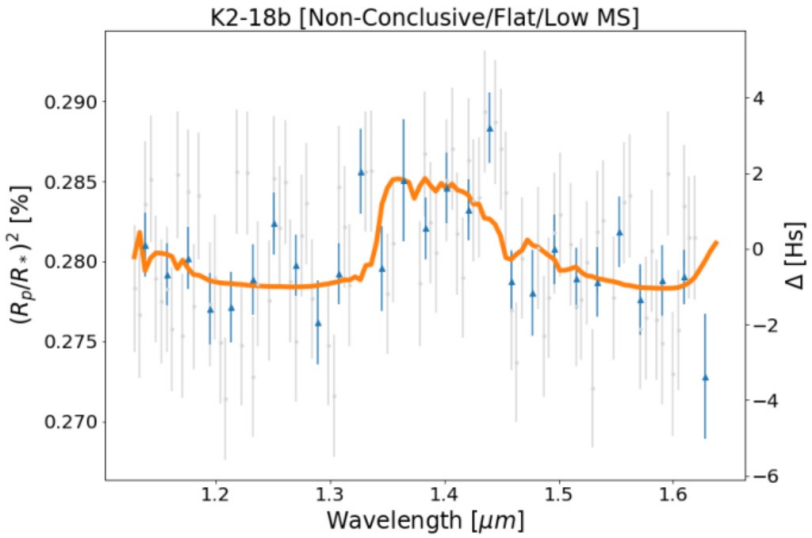
Target: K2-18

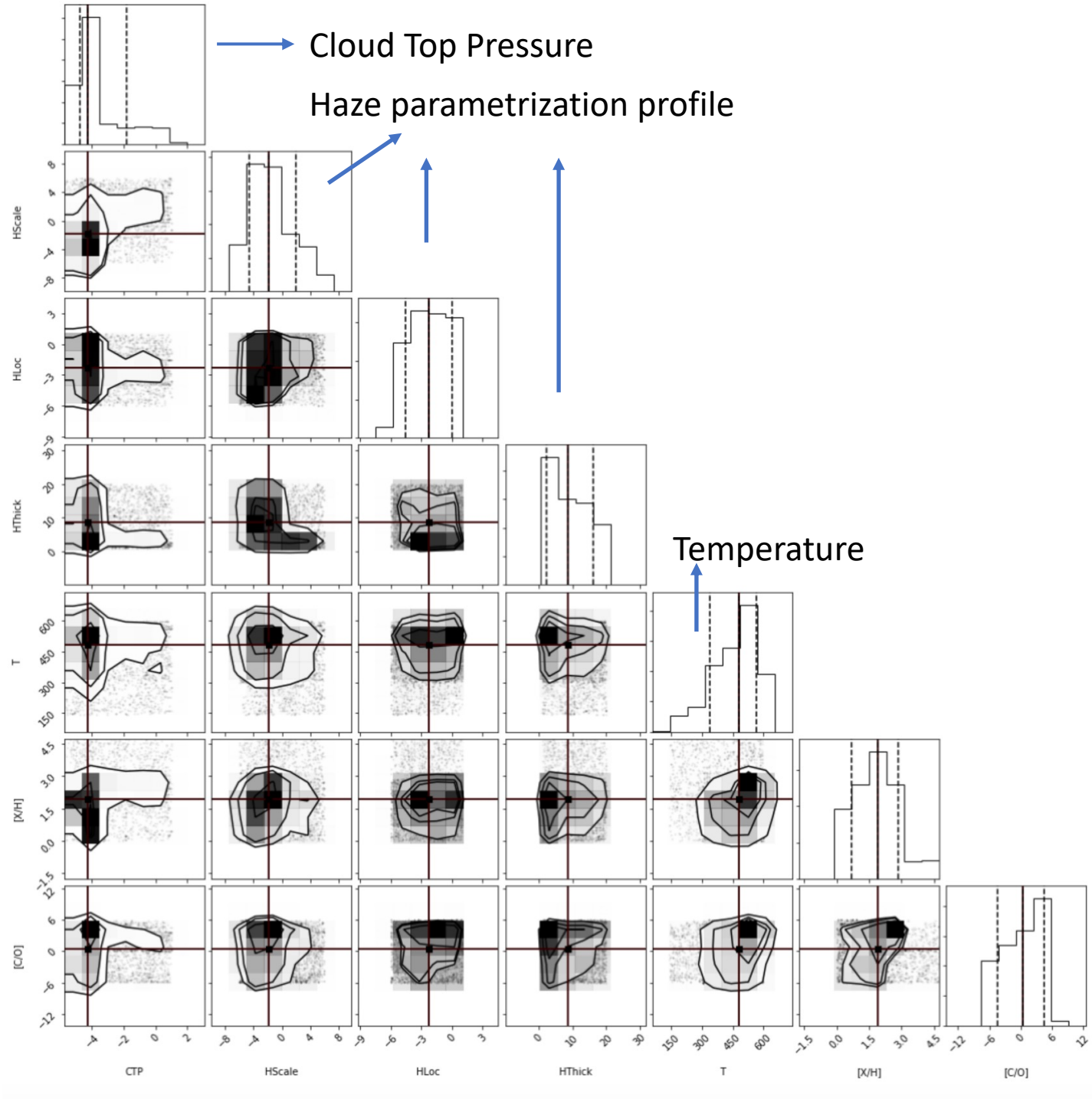
Task: cerberus

Algorithm: release

State Vec: HST-WFC3-IR-G141-SCAN

b: Atmos results





Search Database

State Vector*

Search

Target Name*

K2-18

K2-18		
State Vector	**Run ID (display | download)**	
cerberus.release.HST-WFC3-IR-G141-SCAN	591	-> Notebook
data.calibration.HST-WFC3-IR-G141-SCAN	165	
data.collect.frames	137	
data.timing.HST-WFC3-IR-G141-SCAN	164	
system.finalize.parameters	155	-> Notebook
transit.normalization.HST-WFC3-IR-G141-SCAN	185	
transit.spectrum.HST-WFC3-IR-G141-SCAN	187	-> Notebook
transit.whitelight.HST-WFC3-IR-G141-SCAN	186	