

# KIC 007131515

## Q1-17 DR25 TCE Parameters

TCE	Run Type	KOI?	Period (Days)	Epoch (BKJD)	Depth (ppm)	Duration (Hours)	MES	SNR	$R_{\star}$ ( $R_{\odot}$ )	$T_{\star}$ (K)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007131515-01	OBS	No	473.144452	393.439069	771.8	4.103	15.9	2.2	0.61	3838	1.85	0.07
007131515-02	OBS	No	577.200600	407.602036	9650.8	16.845	14.0	22.4	0.61	3838	7.21	0.06
007131515-04	OBS	No	577.895819	209.085272	2898.9	15.668	11.9	8.2	0.61	3838	3.33	0.06
007131515-05	OBS	No	314.278701	328.888523	1207.0	6.263	10.7	4.2	0.61	3838	2.22	0.12
007131515-06	OBS	No	315.192673	219.225711	2649.6	7.659	12.0	7.2	0.61	3838	3.72	0.12
007131515-07	OBS	No	214.102497	329.331944	2065.9	3.462	12.6	8.5	0.61	3838	2.67	0.21
007131515-08	OBS	No	614.286037	305.165108	2458.8	10.768	11.9	7.0	0.61	3838	3.02	0.05

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007131515-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
007131515-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
007131515-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
007131515-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
007131515-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_TER_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
007131515-07	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—MOD_NONUNIQ_DV—MOD_POS_DV—HALO_GHOST
007131515-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS

**Notes:** OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

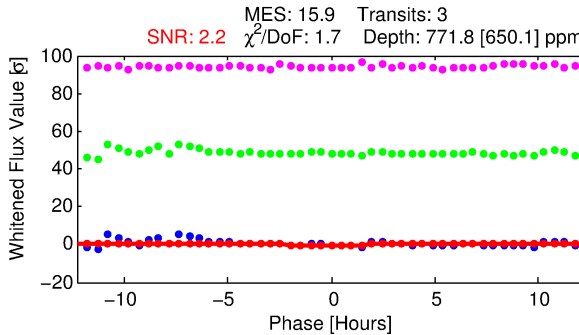
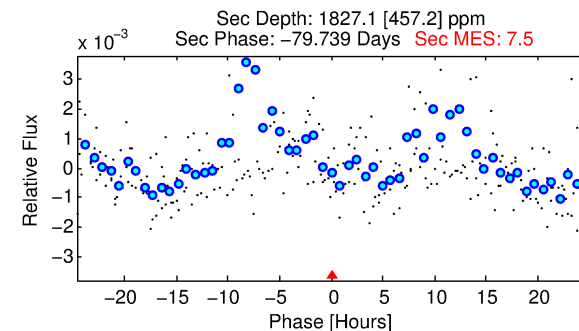
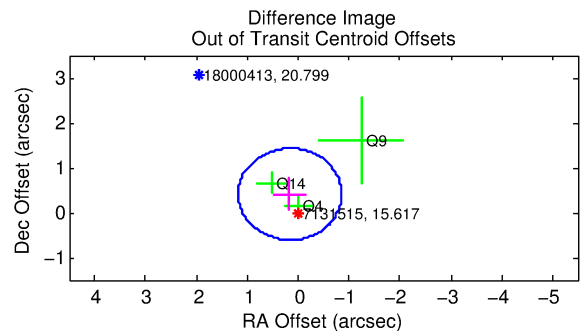
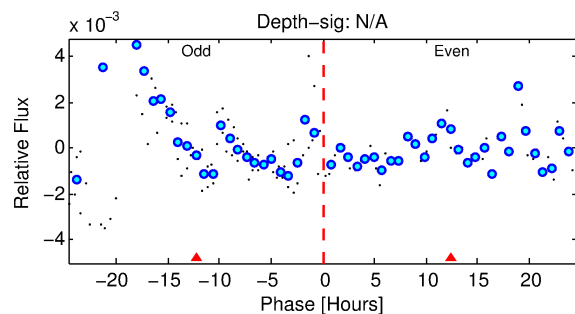
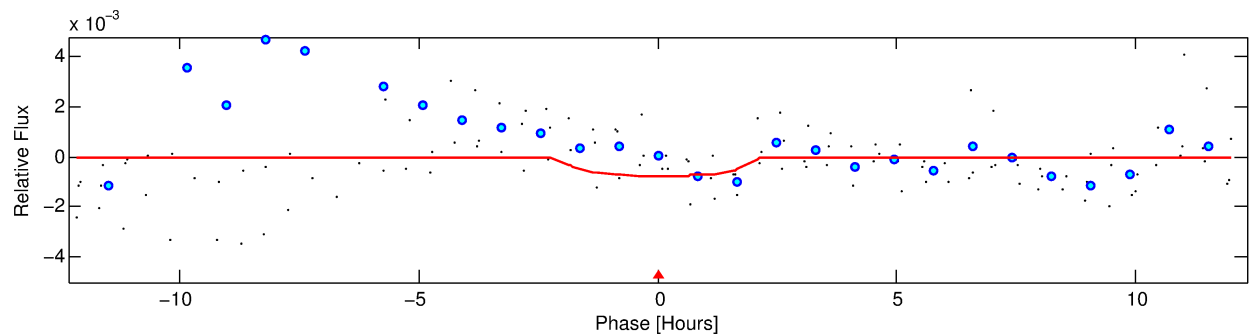
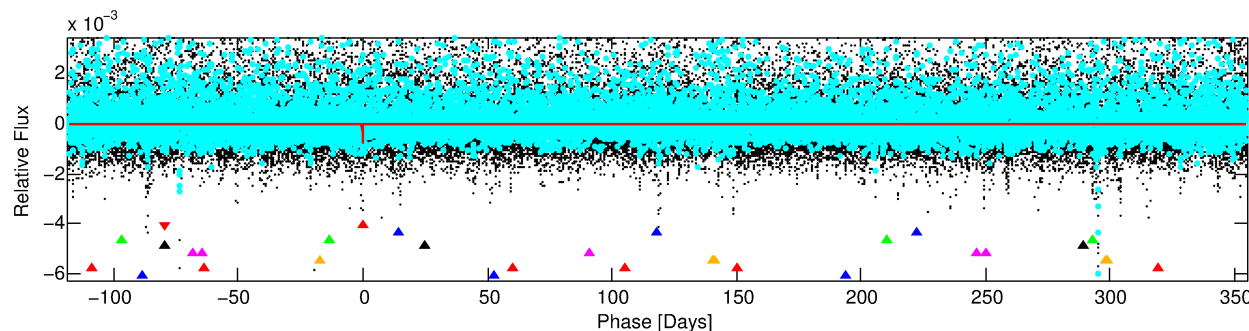
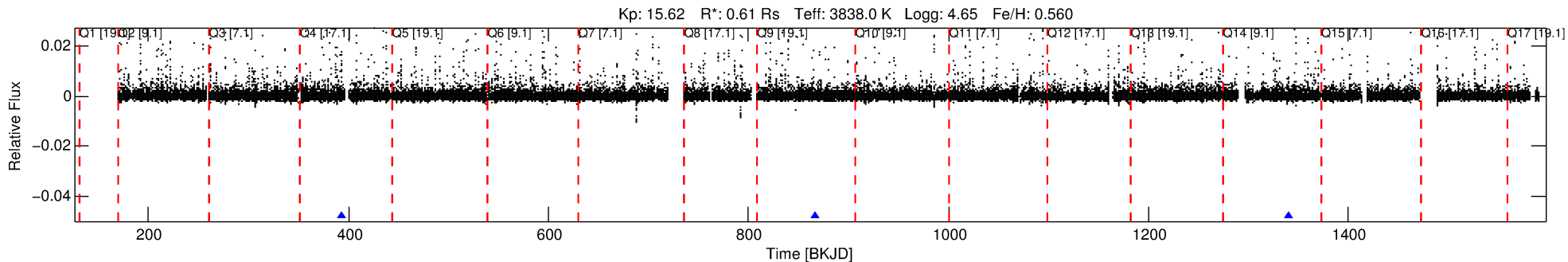
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 007131515-01

No Significant Match Found

# DV One-Page Summary

KIC: 7131515 Candidate: 1 of 8 Period: 473.144 d



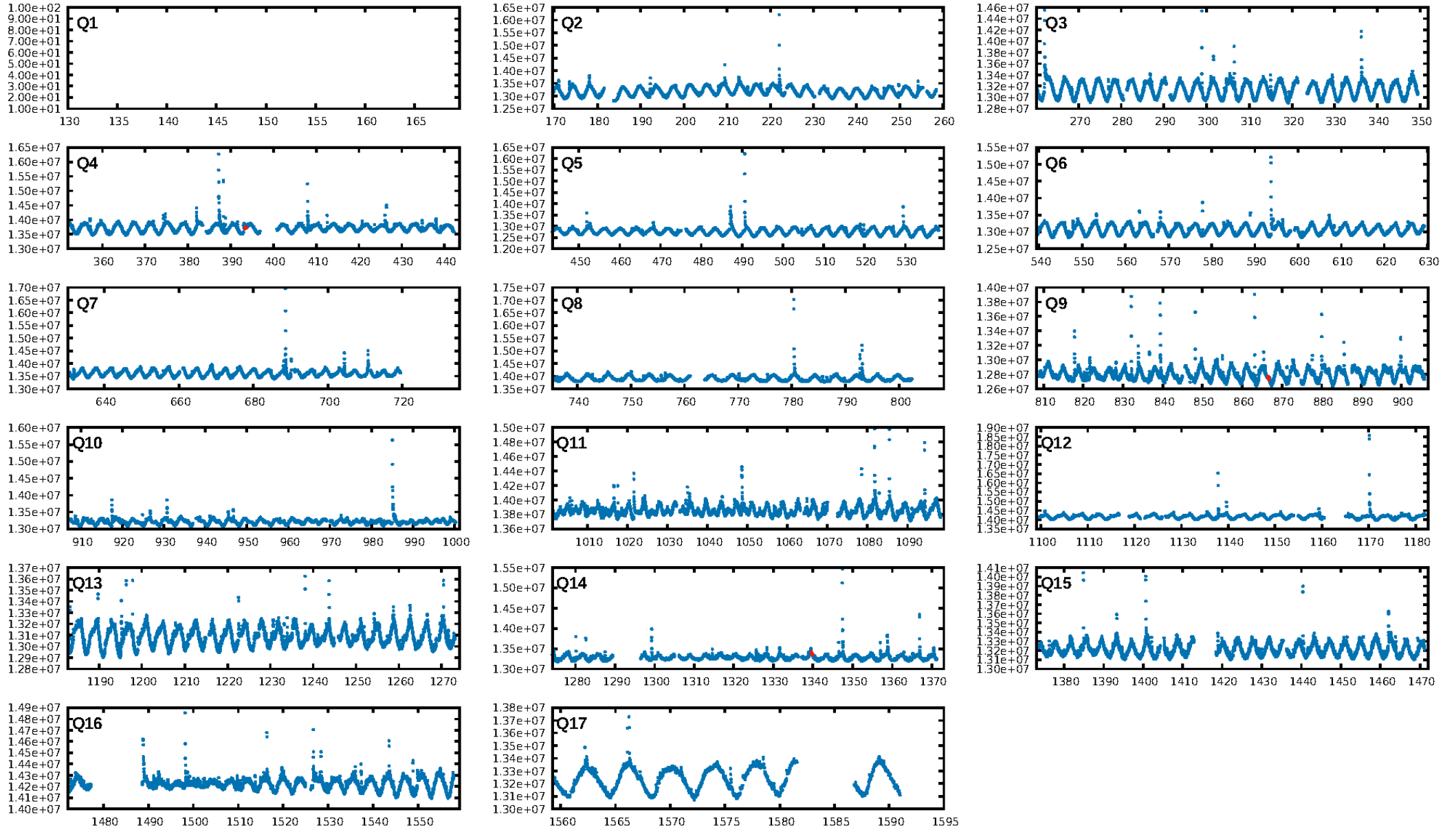
## DV Fit Results:

Period = 473.14445 [0.02755] d  
Epoch = 393.4391 [0.0421] BKJD  
Rp/R\* = 0.0278 [0.1506]  
a/R\* = 624.44 [10865.33]  
b = 0.74 [10.75]  
Seff = 0.07 [0.01]  
Teq = 132 [7] K  
Rp = 1.85 [10.04] Re  
a = 1.0078 [0.0928] AU  
Ag = 297543.51 [3225740.93] [0.09σ]  
Teffp = 4761 [12903] K [0.36σ]

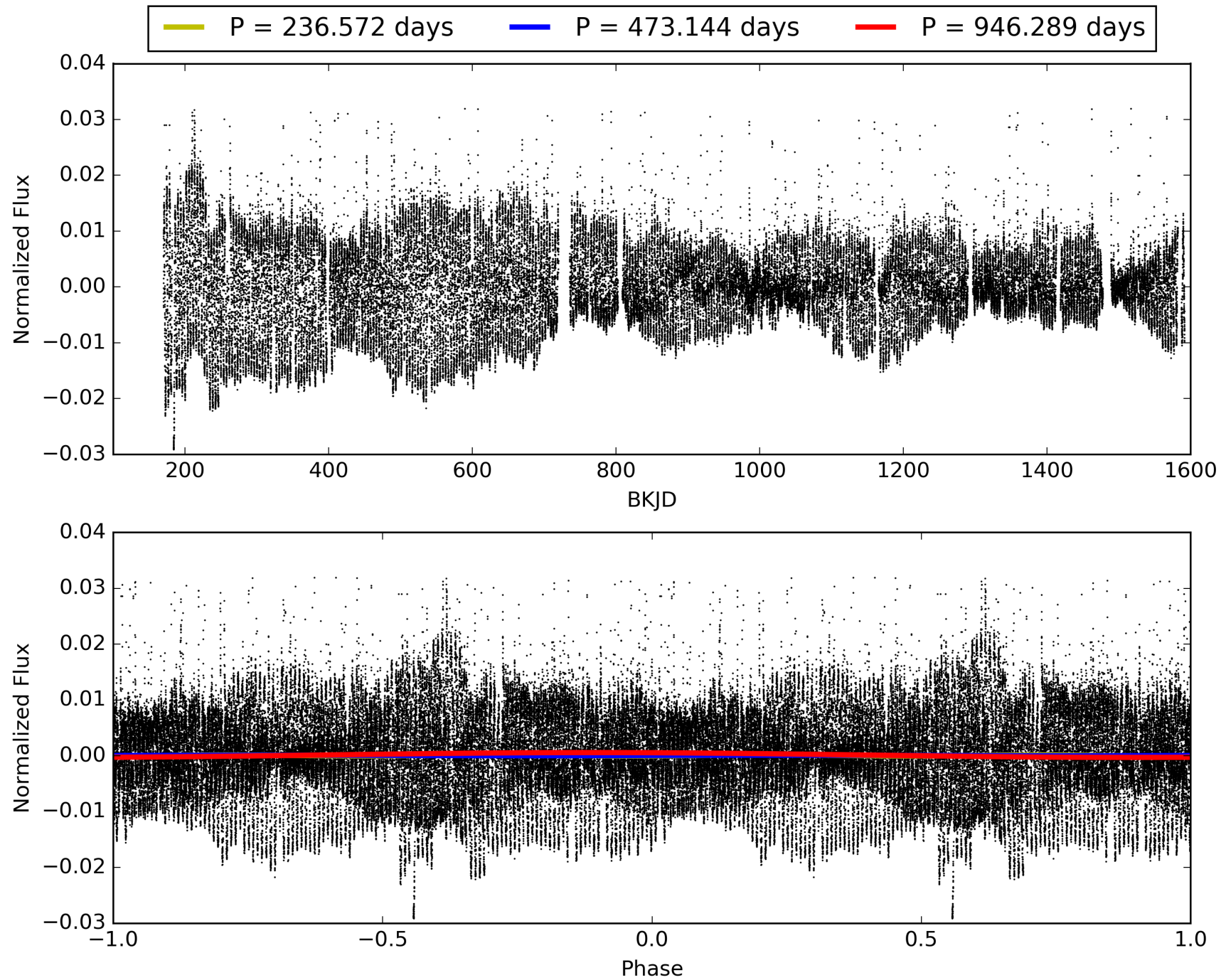
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [152.34σ]  
LongPeriod-sig: 100.0% [144.04σ]  
ModelChiSquare2-sig: 22.4%  
ModelChiSquareGof-sig: 79.7%  
Bootstrap-pfa: 1.62e-14  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -1.221  
Centroid-sig: 40.1%  
Centroid-so: 1.789 arcsec [0.78σ]  
OotOffset-rm: 0.441 arcsec [1.30σ]  
OotOffset-st: 1/0/1/1 [3]  
KicOffset-rm: 0.447 arcsec [1.10σ]  
KicOffset-st: 1/0/1/1 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 1.00 [3/3]

# TCE 007131515-01, PDC Light Curves



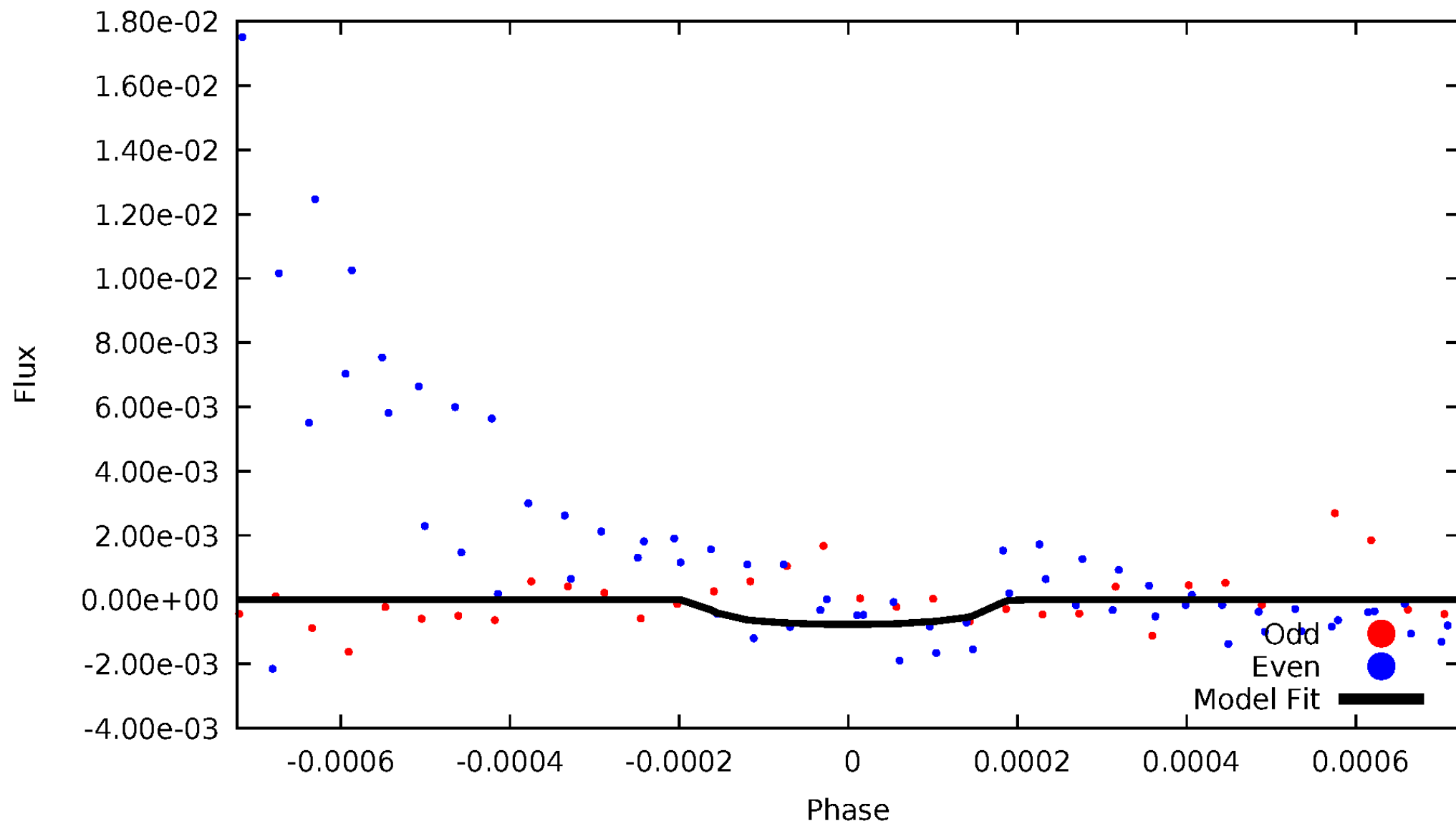
# TCE 007131515-01





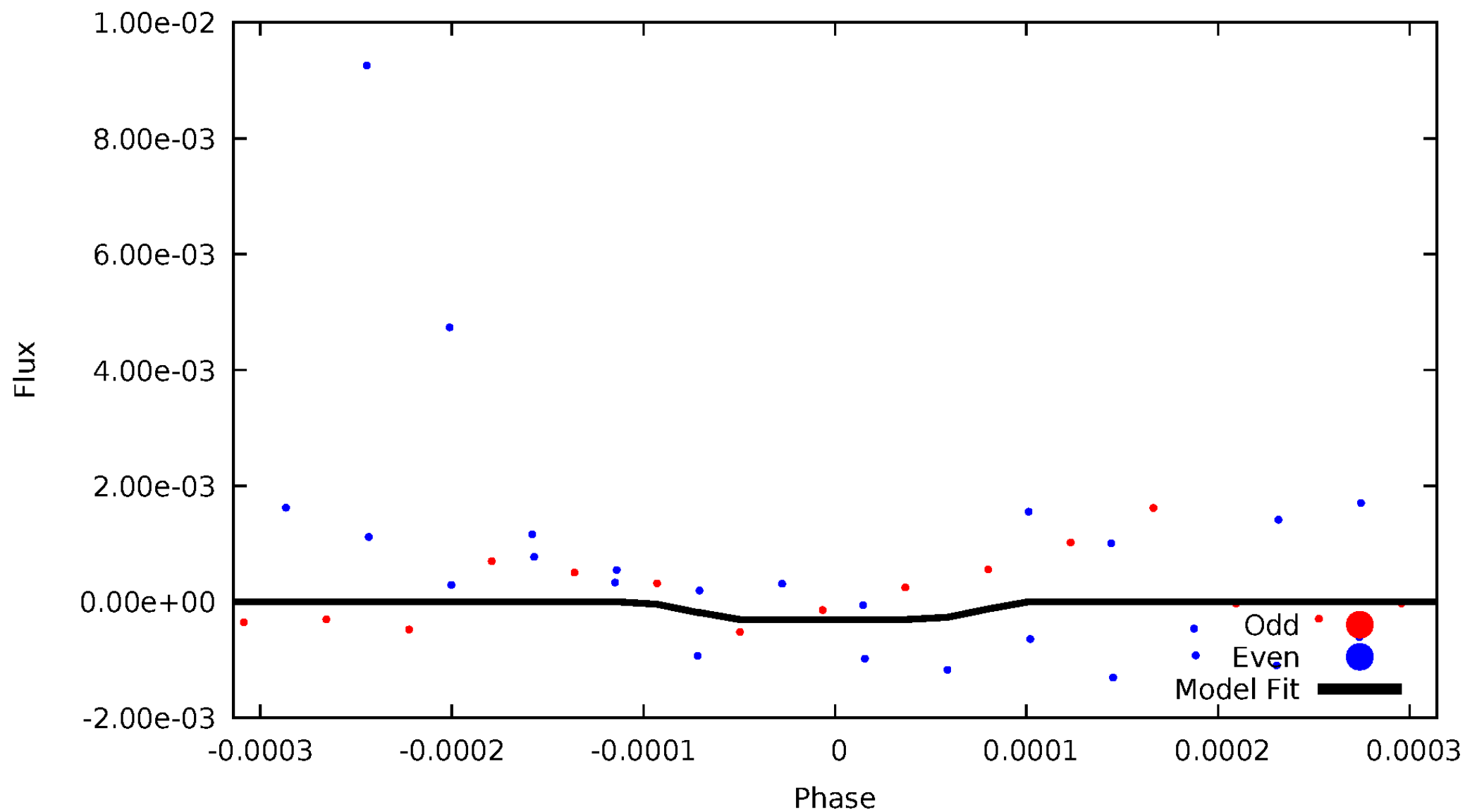
# DV Odd/Even

TCE 007131515-01



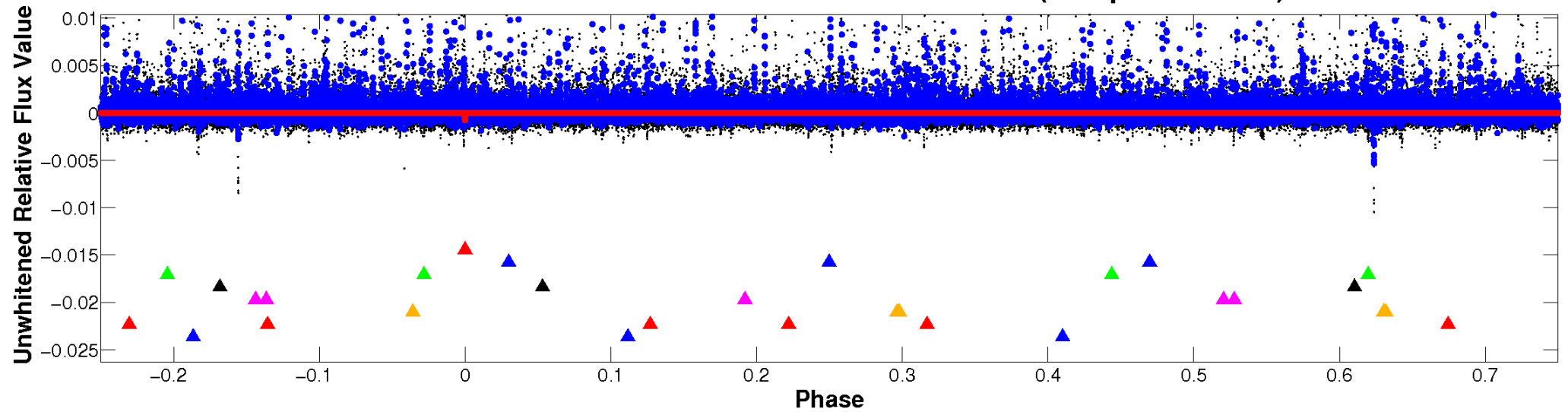
# ALT Odd/Even

TCE 007131515-01

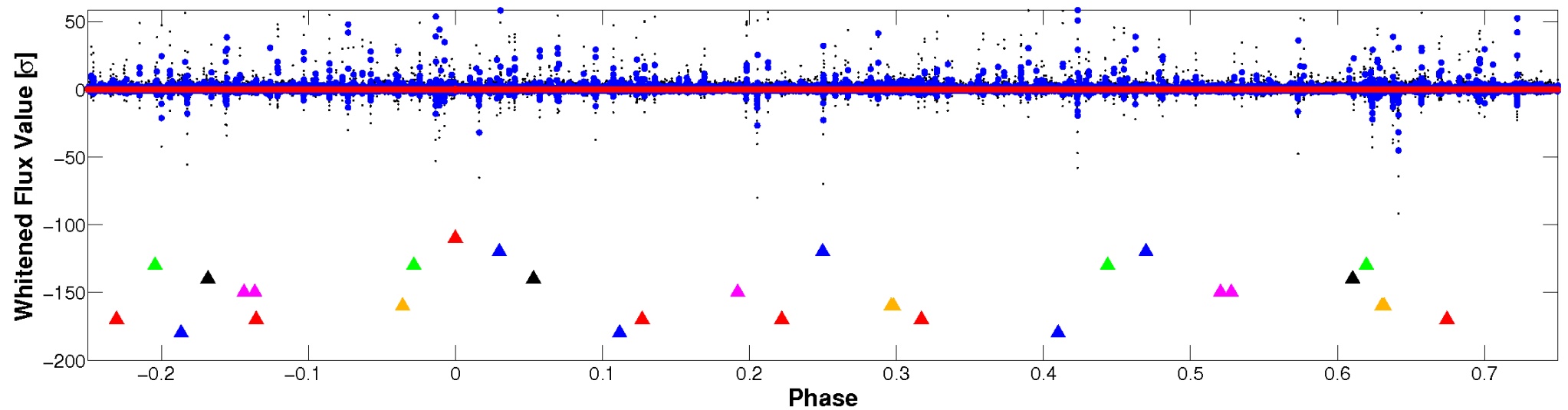


# Non-Whitened Vs. Whitened Light Curve

## Planet 1 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

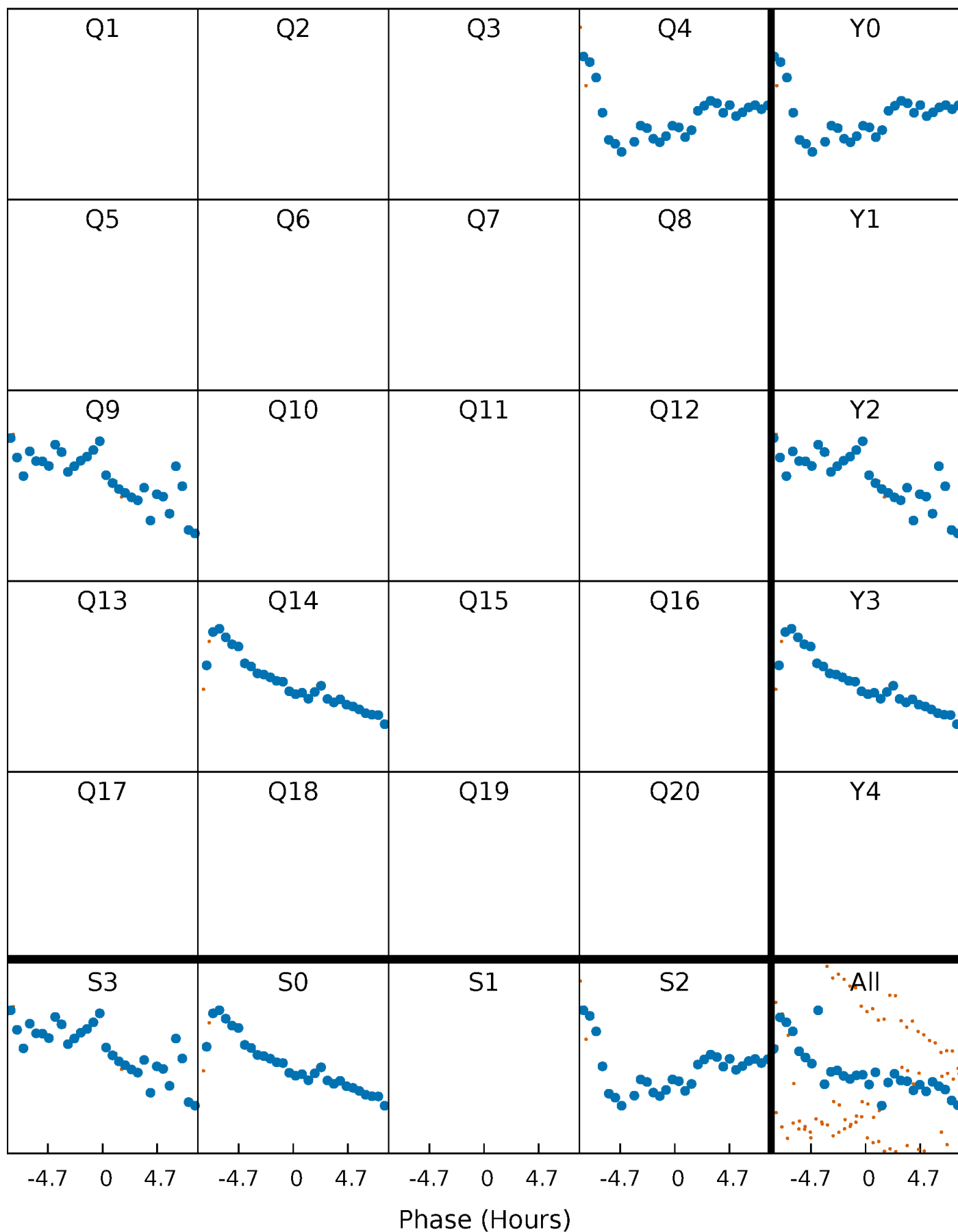


## Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



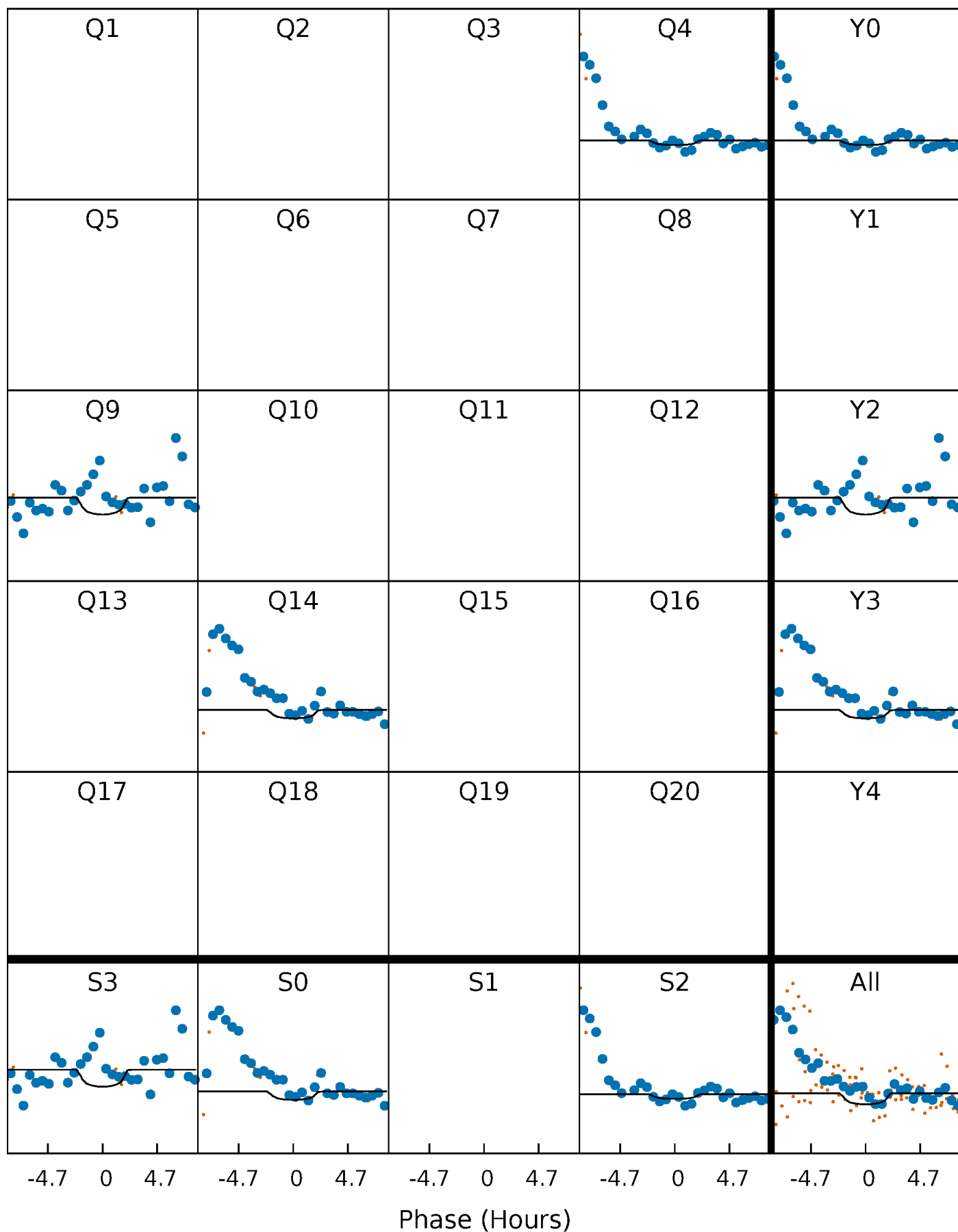
# PDC Quarter-Phased Transit Curves

TCE 007131515-01 P=473.144452 Days  $T_0=393.439069$  (BKJD)



# DV Quarter-Phased Transit Curves

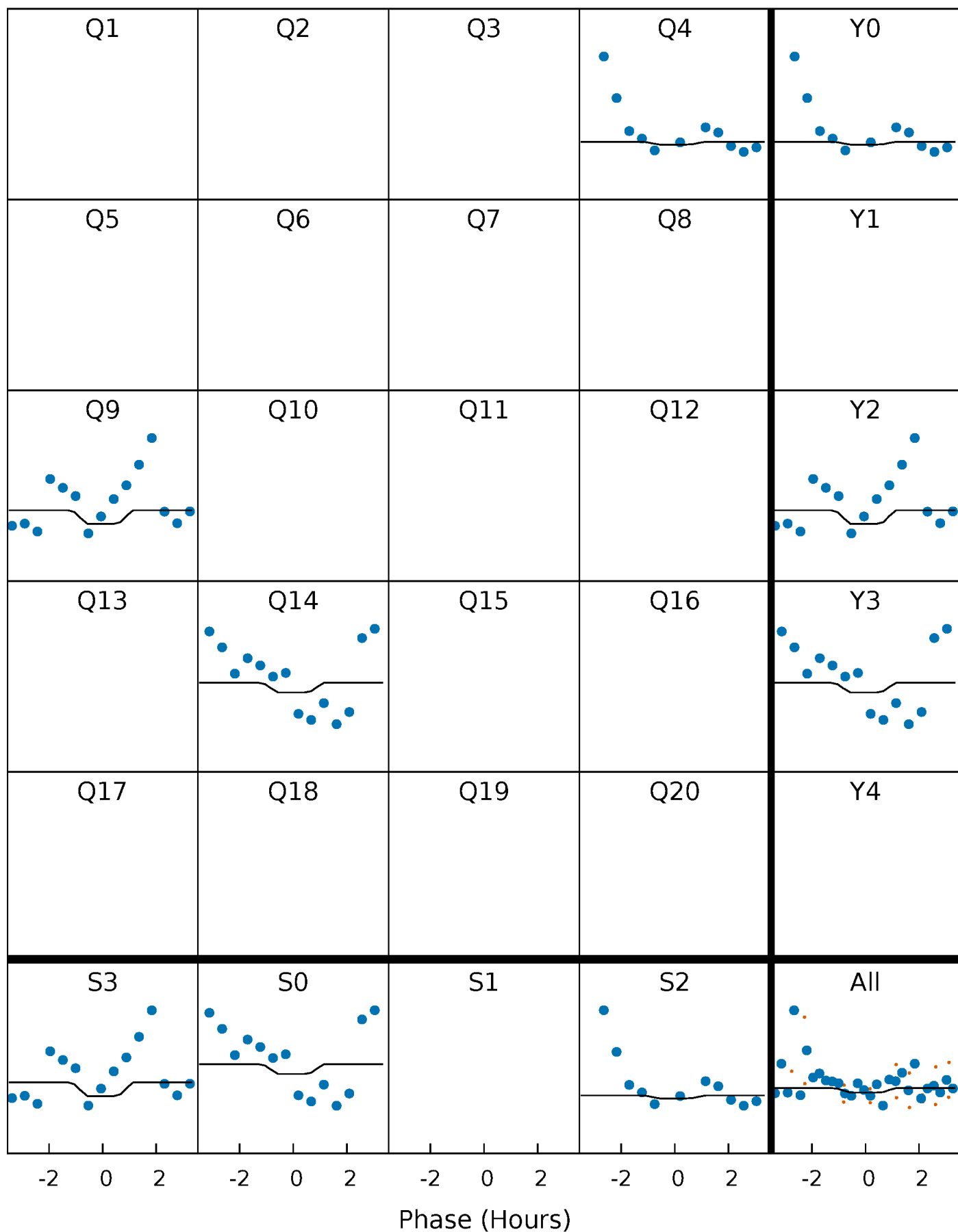
TCE 007131515-01 P=473.144452 Days  $T_0=393.439069$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

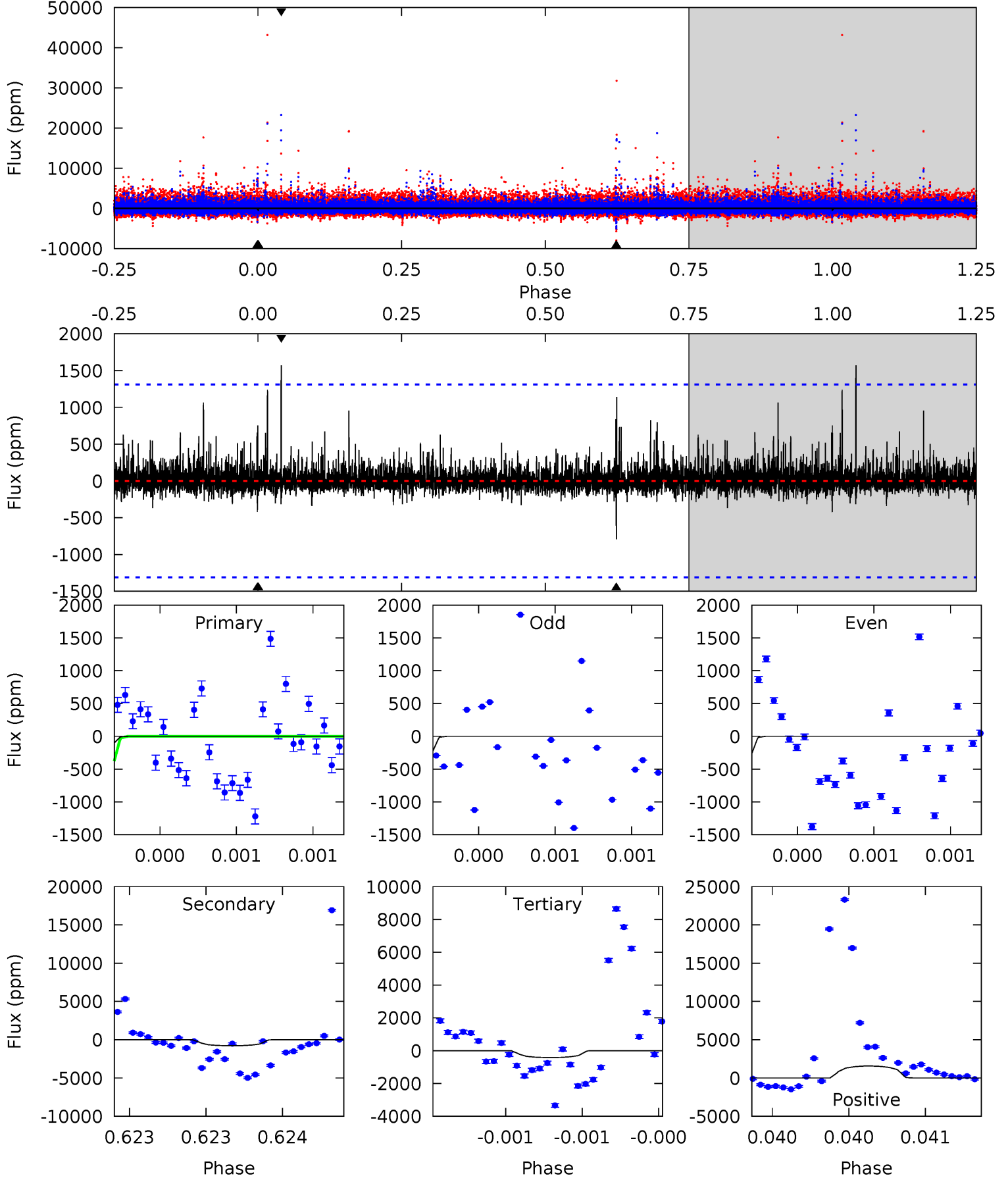
TCE 007131515-01 P=473.214005 Days  $T_0=393.276975$  (BKJD)



# DV Model-Shift Uniqueness Test

007131515-01, P = 473.144452 Days, E = 393.439069 Days

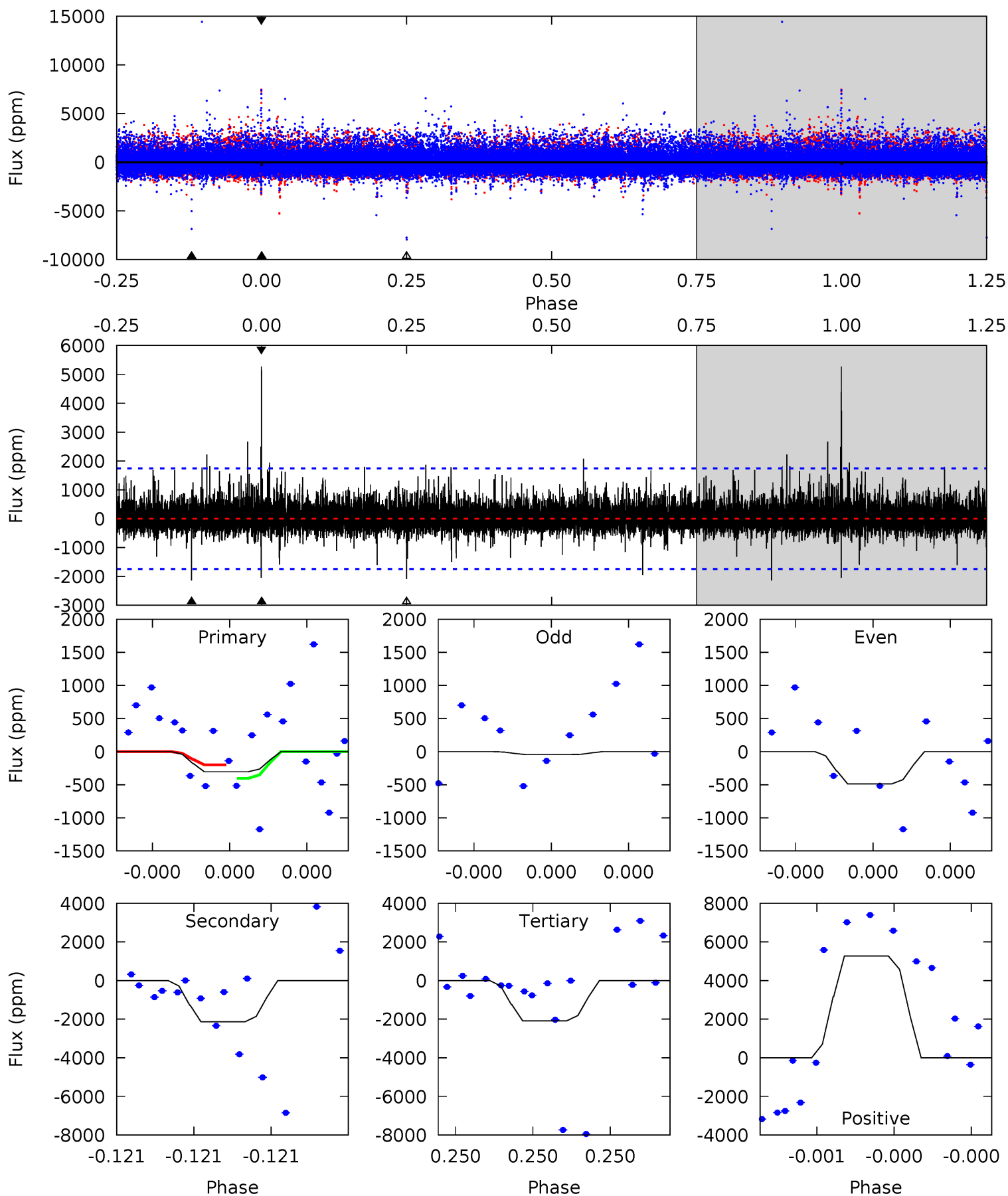
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0.86	3.39	1.81	6.74	5.62	3.55	0.56	-0.95	-5.87	1.58	-3.35	0.07	-2.04	0.67	0.72



# Alt Model-Shift Uniqueness Test

007131515-01, P = 473.214005 Days, E = 393.276975 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
1.01	7.07	6.91	17.4	5.78	3.79	1.11	-5.90	-16.4	0.17	-10.4	0.56	0.74	0.71	0.34



### Stellar Parameters For KIC 007131515

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3838^{+120}_{-147}$	$4.651^{+0.067}_{-0.018}$	$0.560^{+0.050}_{-0.300}$	$0.611^{+0.028}_{-0.070}$	$0.609^{+0.035}_{-0.060}$	$3.764^{+1.199}_{-0.268}$
	+3%/-4%	+1%/-0%	+9%/-54%	+5%/-11%	+6%/-10%	+32%/-7%
Source	KIC0	KIC0	KIC0	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 007131515-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-790 \pm 233$	$6.97^{+8.13}_{-4.76}$	$182^{+7}_{-7}$	$2574^{+1085}_{-430}$	$8631^{+87621}_{-6757}$
Alt.	$-2137 \pm 302$	$7.16^{+7.41}_{-5.02}$	$182^{+7}_{-7}$	$2962^{+1431}_{-524}$	$23685^{+240524}_{-18190}$

$T_{max}$  = Theoretical Maximum Planetary Temperature

$T_{obs}$  = Observed Planetary Temperature (Assuming A=0.3)

$A_{obs}$  = Observed Albedo (Assuming T=0)

If a secondary eclipse is present, the system is likely an EB if  $T_{obs} \gg T_{max}$  AND  $A_{obs} \gg 1.0$

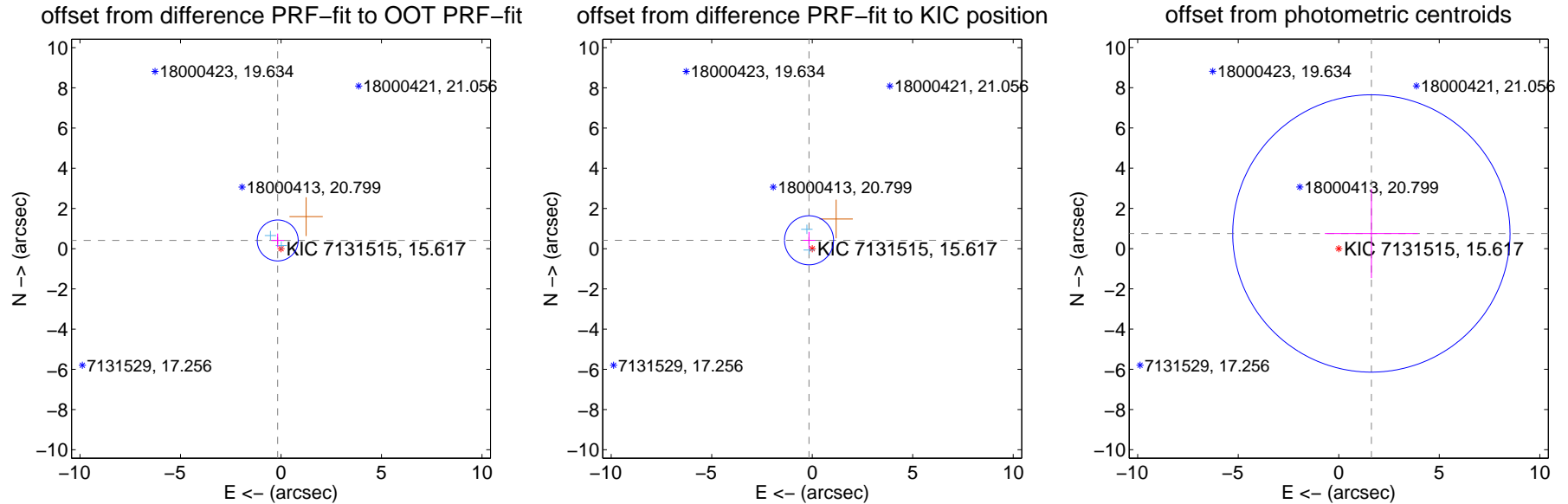
## DV Centroid Data

Supplemental centroid analysis for 007131515-01. Kepler magnitude: 15.62. Transit SNR 2.21

There are 2 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.40 arcsec

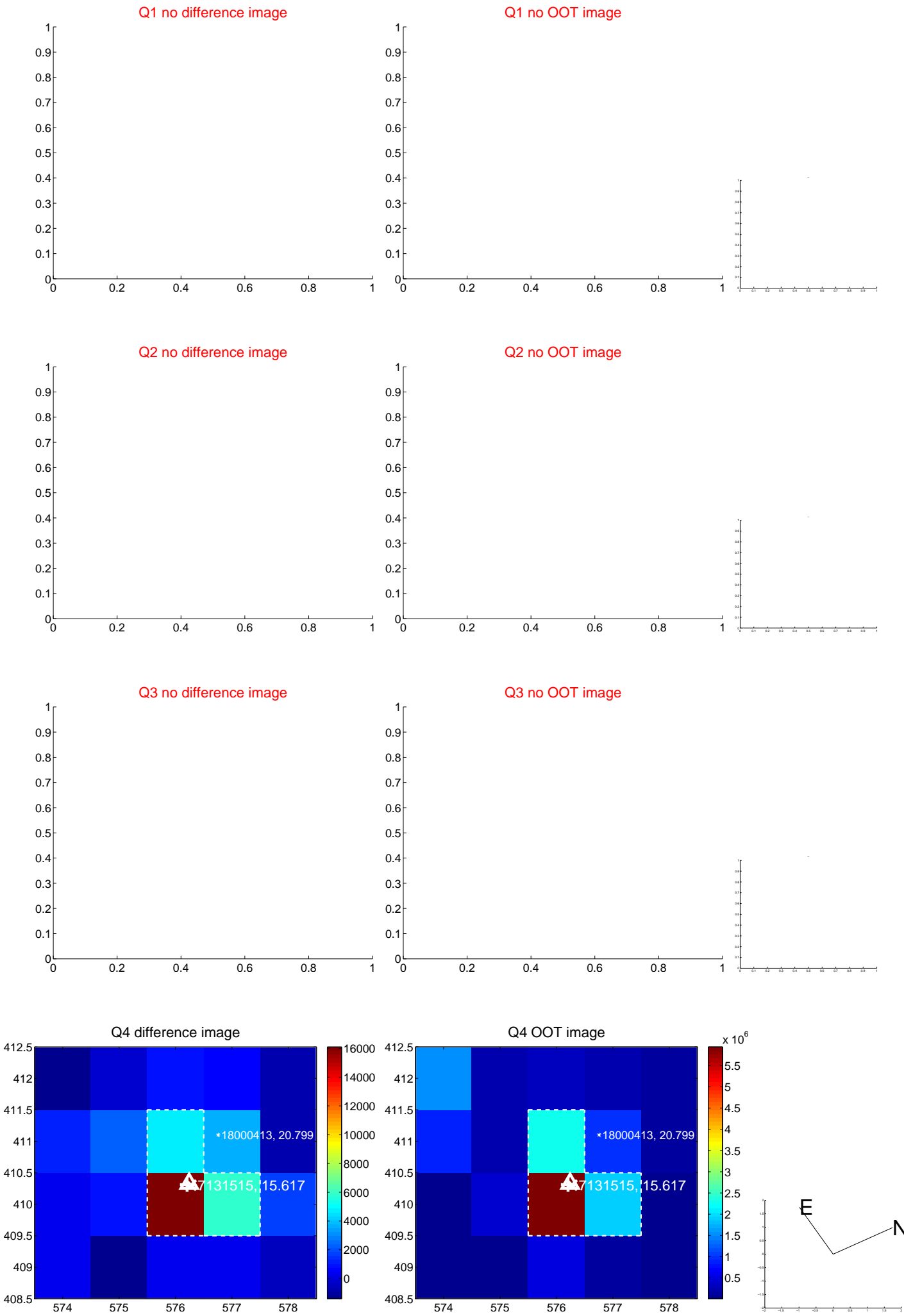
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.441 \pm 0.339$	1.30	$0.163 \pm 0.314$	$0.410 \pm 0.343$
PRF-fit source offset from KIC position	$0.447 \pm 0.407$	1.10	$0.159 \pm 0.302$	$0.418 \pm 0.420$
photometric centroid source offset	$1.79 \pm 2.30$	0.78	$-1.62 \pm 2.31$	$0.75 \pm 2.22$



Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.



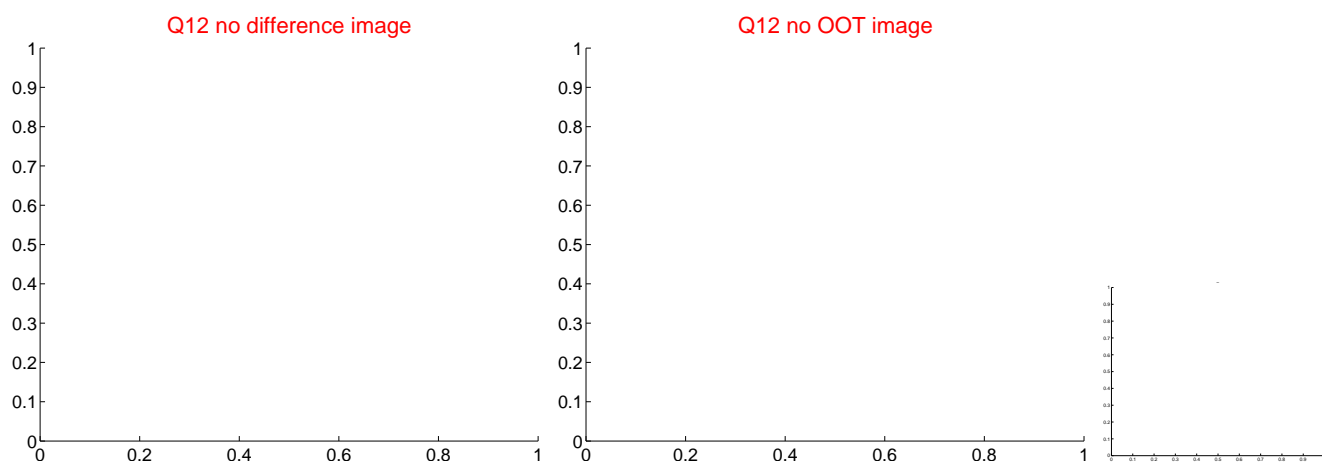
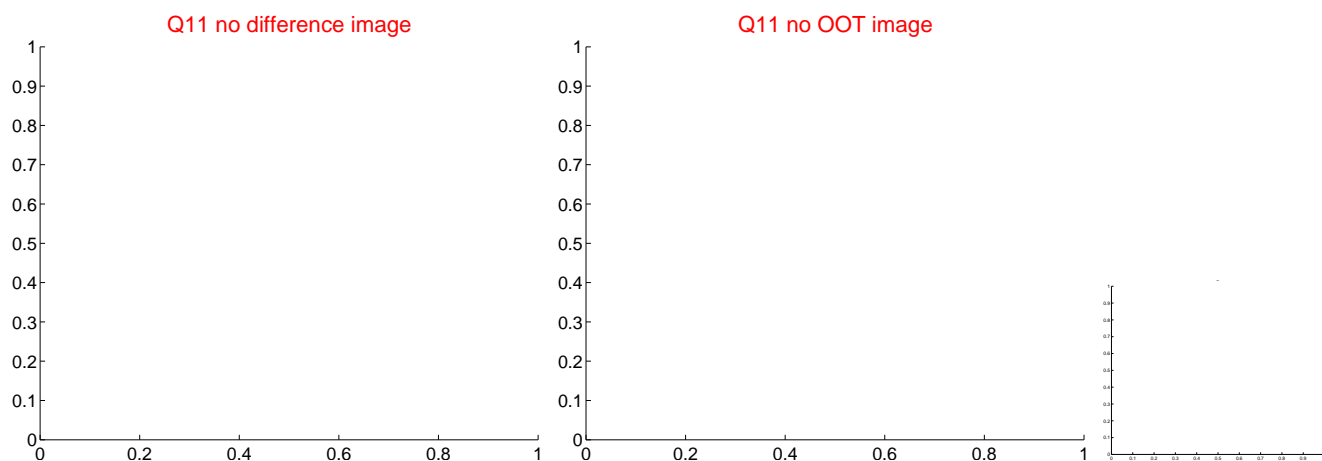
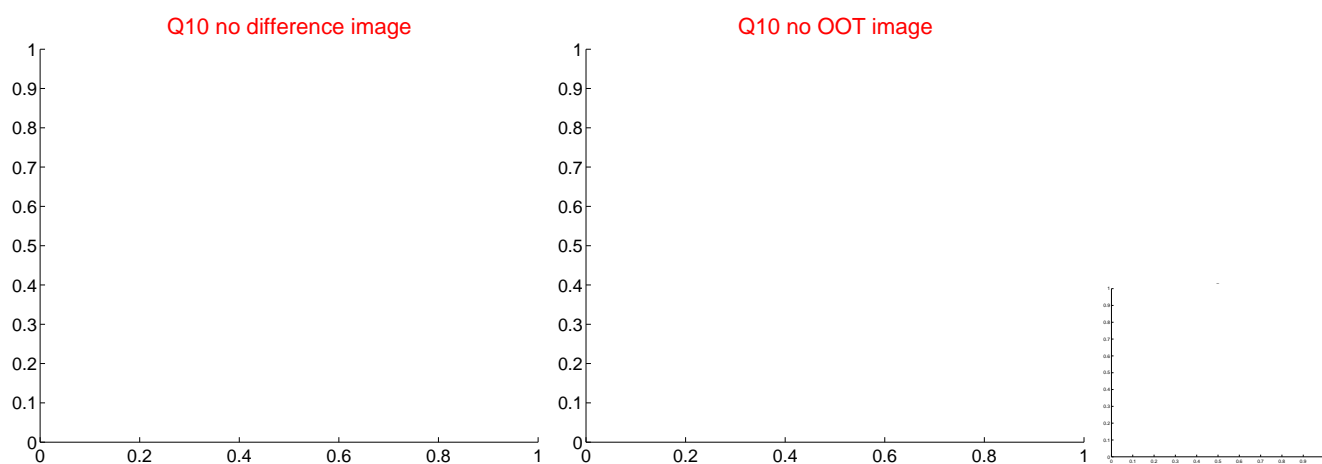
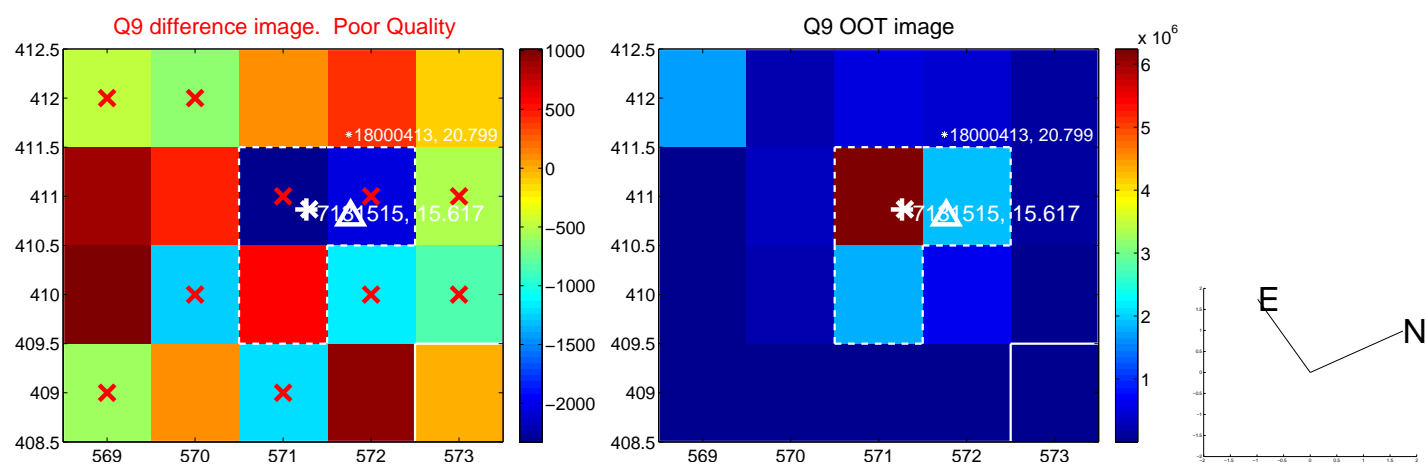
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.

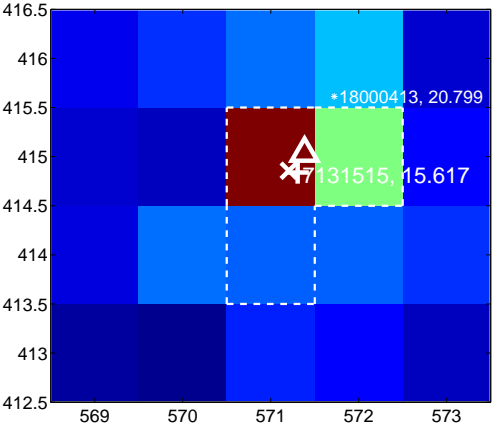
Q13 no difference image



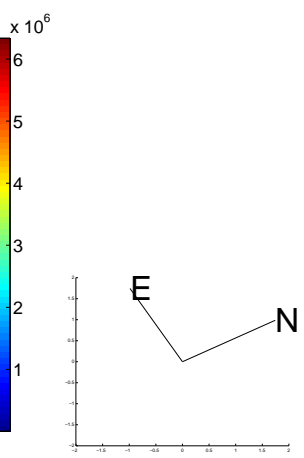
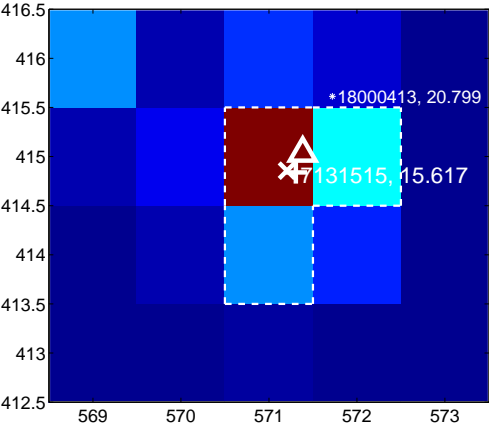
Q13 no OOT image



Q14 difference image



Q14 OOT image



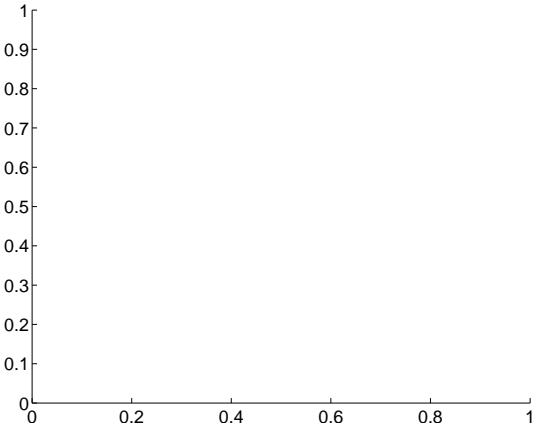
Q15 no difference image



Q15 no OOT image



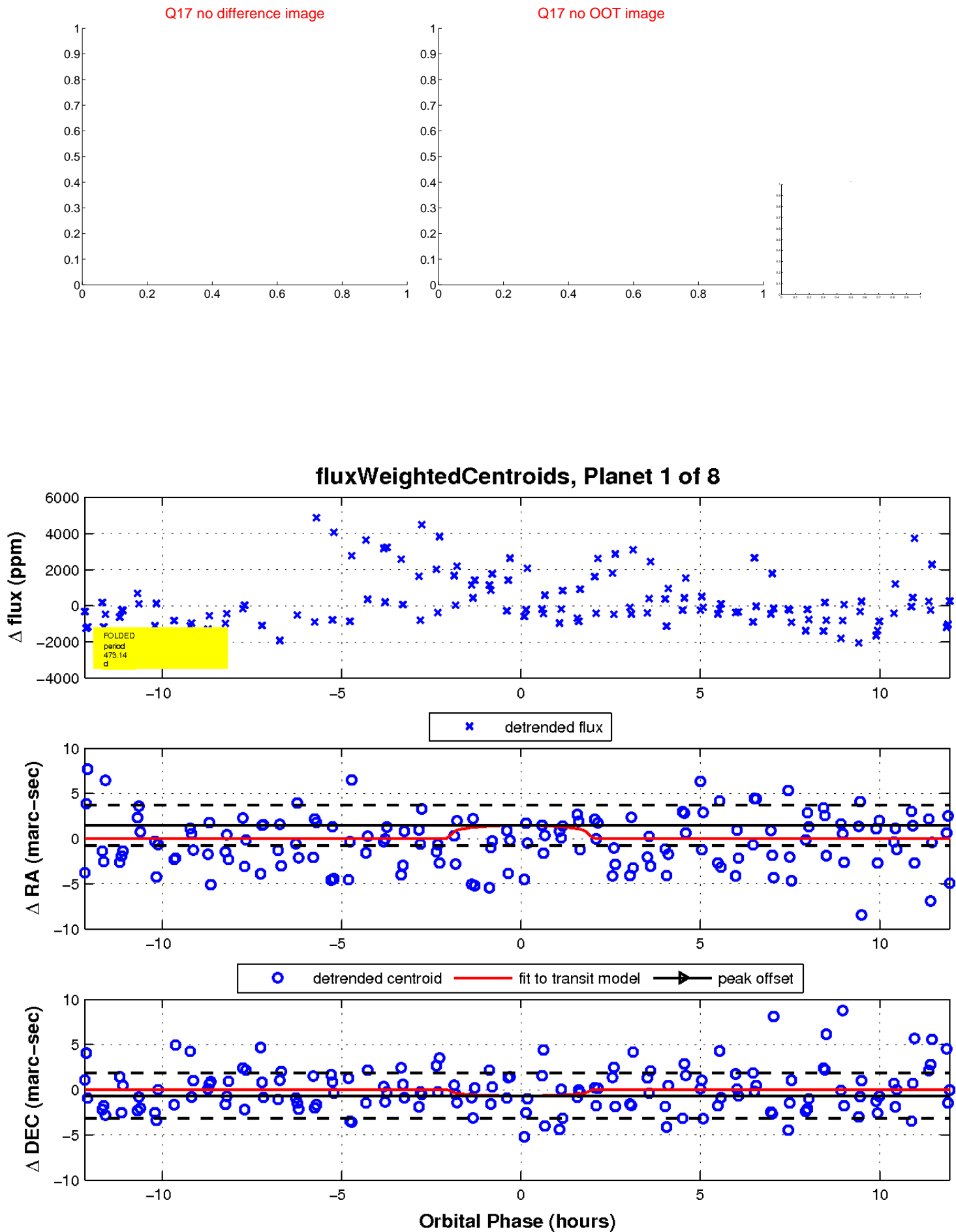
Q16 no difference image



Q16 no OOT image



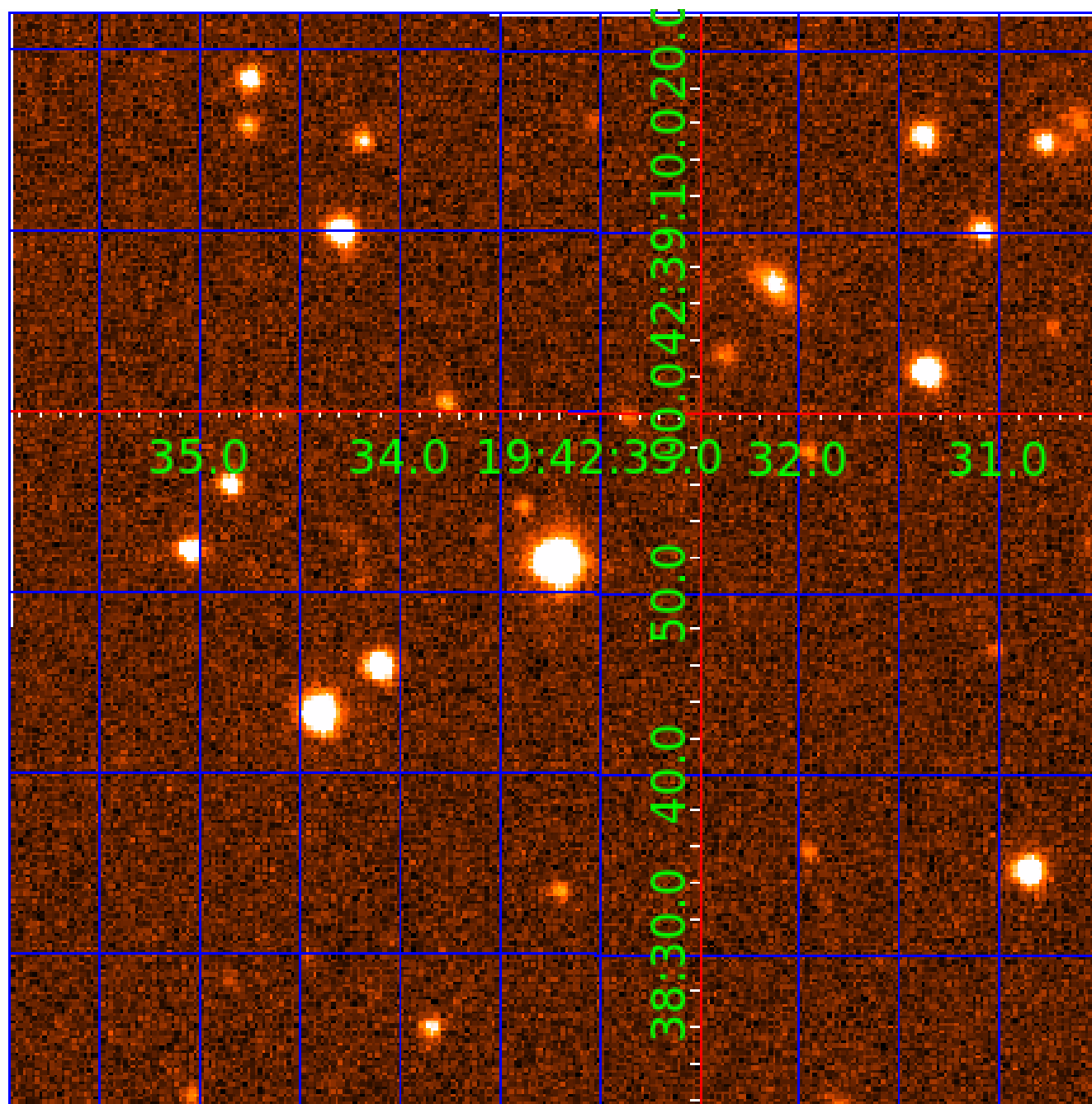
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image

Declination



# KIC 007131515

## Q1-17 DR25 TCE Parameters

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007131515-01	OBS	No	473.144452	393.439069	771.8	4.103	15.9	2.2	0.61	3838	1.85	0.07
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007131515-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
007131515-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
007131515-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
007131515-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_TER_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
007131515-07	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—MOD_NONUNIQ_DV—MOD_POS_DV—HALO_GHOST
007131515-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS

**Notes:** OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

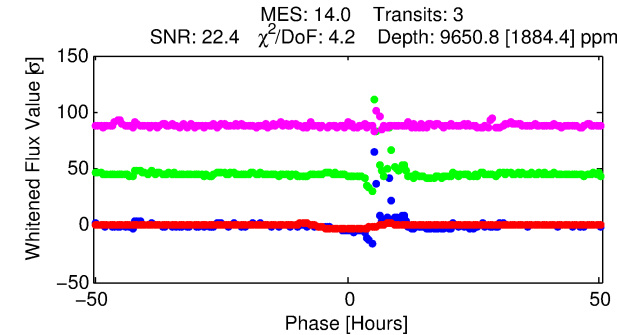
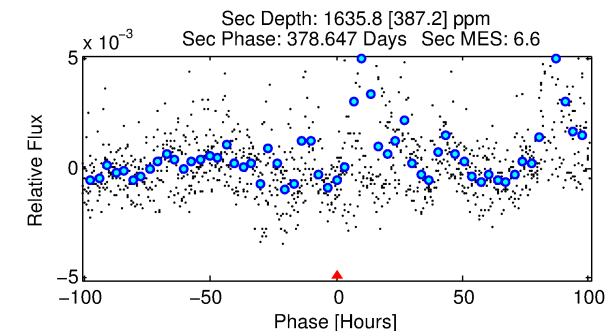
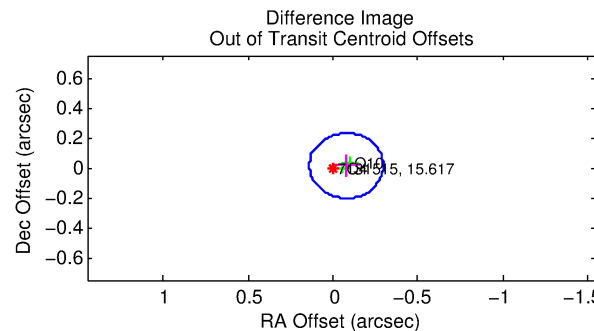
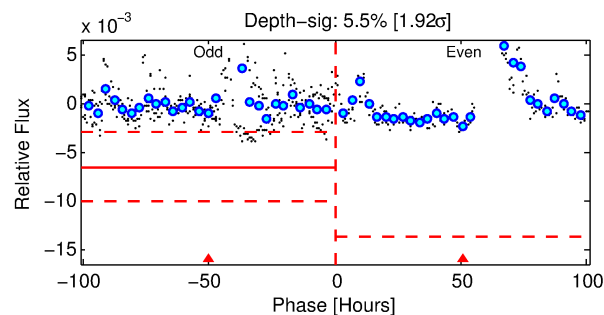
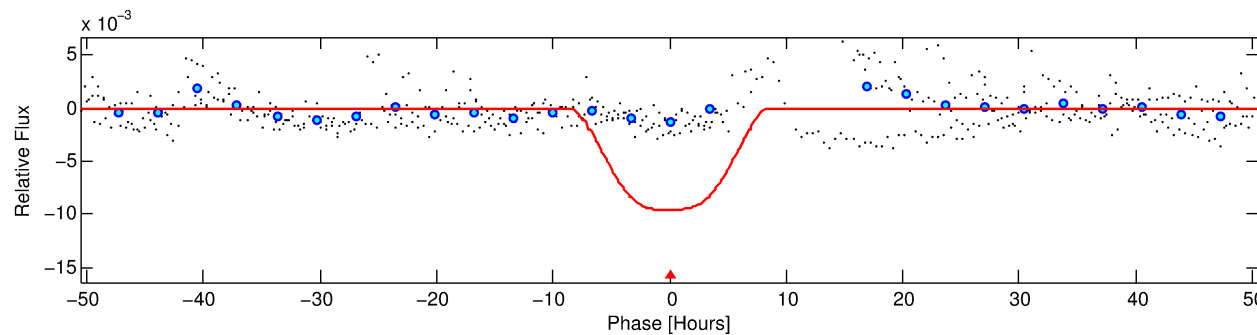
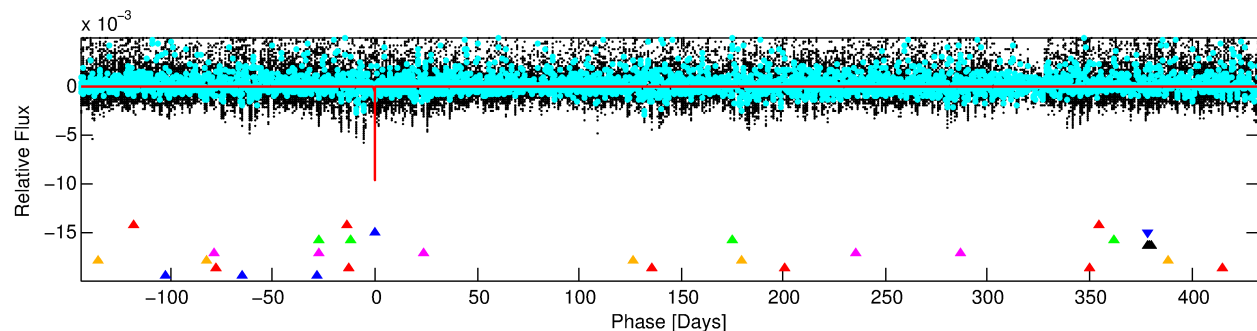
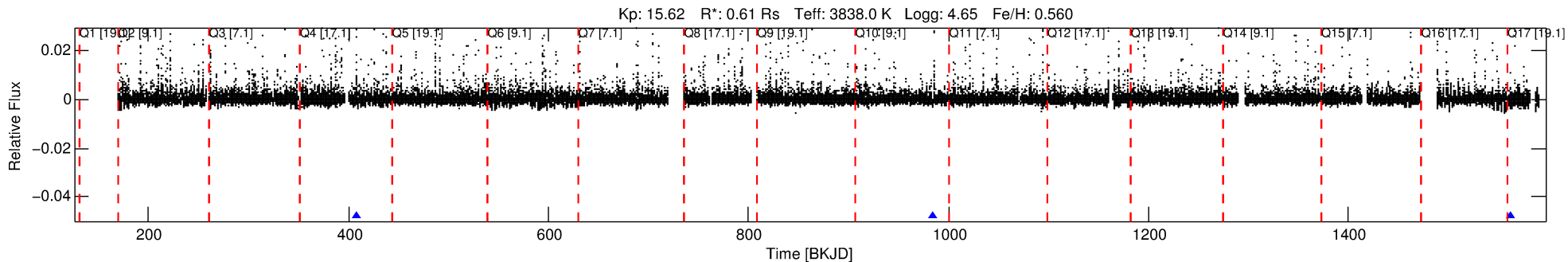
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 007131515-02

No Significant Match Found

# DV One-Page Summary

KIC: 7131515 Candidate: 2 of 8 Period: 577.201 d



## DV Fit Results:

Period = 577.20060 [0.03017] d  
Epoch = 407.6020 [0.0369] BKJD  
Rp/R\* = 0.1081 [0.0150]  
a/R\* = 179.99 [34.19]  
b = 0.87 [0.06]  
Seff = 0.05 [0.01]  
Teq = 123 [6] K  
Rp = 7.21 [1.30] Re  
a = 1.1506 [0.1059] AU  
Ag = 22937.11 [8871.67] [2.59 $\sigma$ ]  
Teffp = 2348 [232] K [9.57 $\sigma$ ]

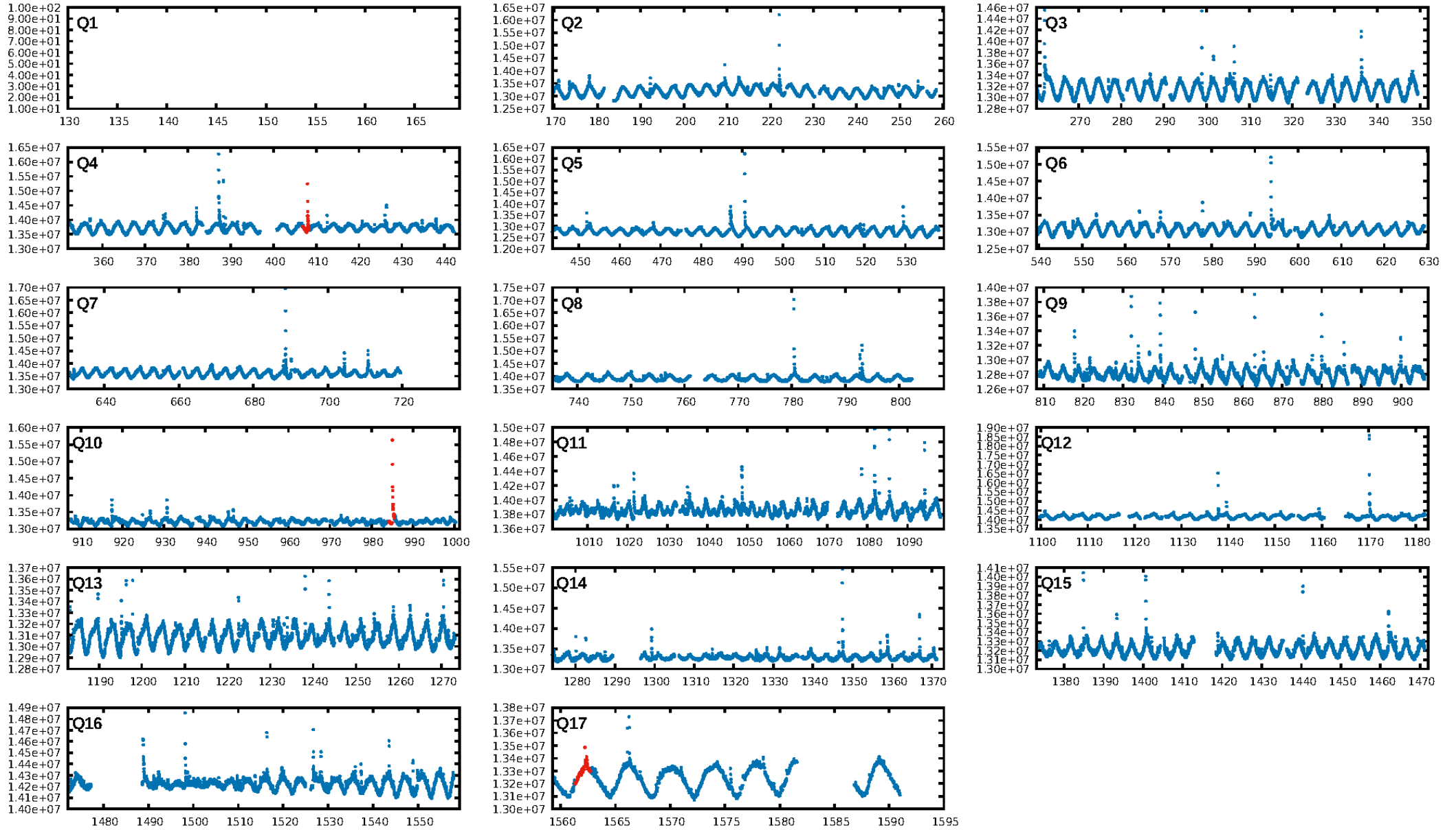
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [144.04 $\sigma$ ]  
LongPeriod-sig: 53.2% [0.73 $\sigma$ ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 0.0%  
Bootstrap-pfa: 2.57e-12  
RollingBand-fgt: 1.00 [2/2]  
GhostDiagnostic-chr: -19.01  
Centroid-sig: 40.0%  
Centroid-so: 0.209 arcsec [1.92 $\sigma$ ]  
OotOffset-rm: 0.078 arcsec [1.08 $\sigma$ ]  
KicOffset-rm: 0.129 arcsec [0.47 $\sigma$ ]  
OotOffset-st: 1/0/1/0 [2]  
KicOffset-st: 1/0/1/0 [2]  
DiffImageQuality-fgm: 1.00 [2/2]  
DiffImageOverlap-fno: 1.00 [2/2]

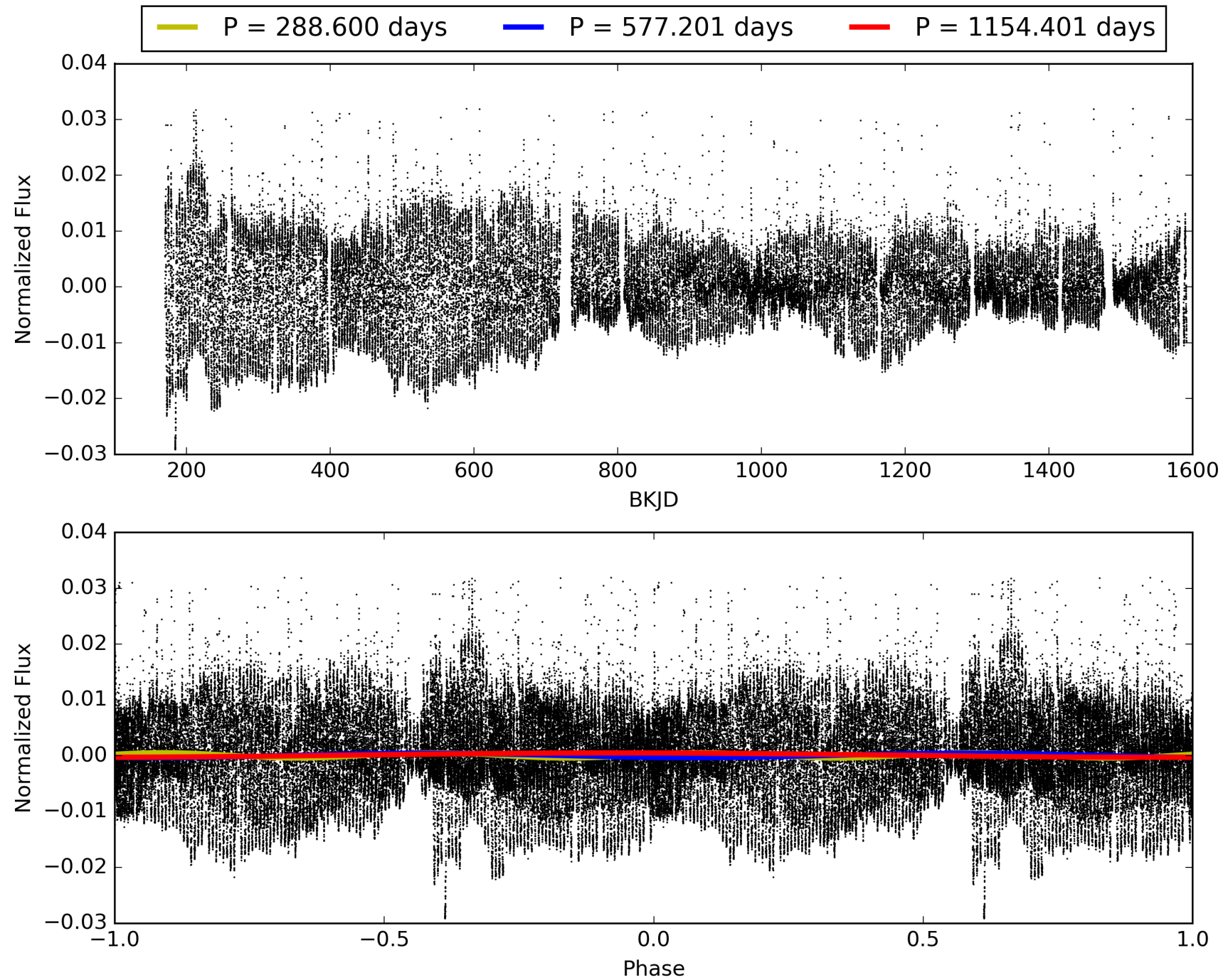
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 03-Feb-2016 08:36:09 Z

This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 007131515-02, PDC Light Curves



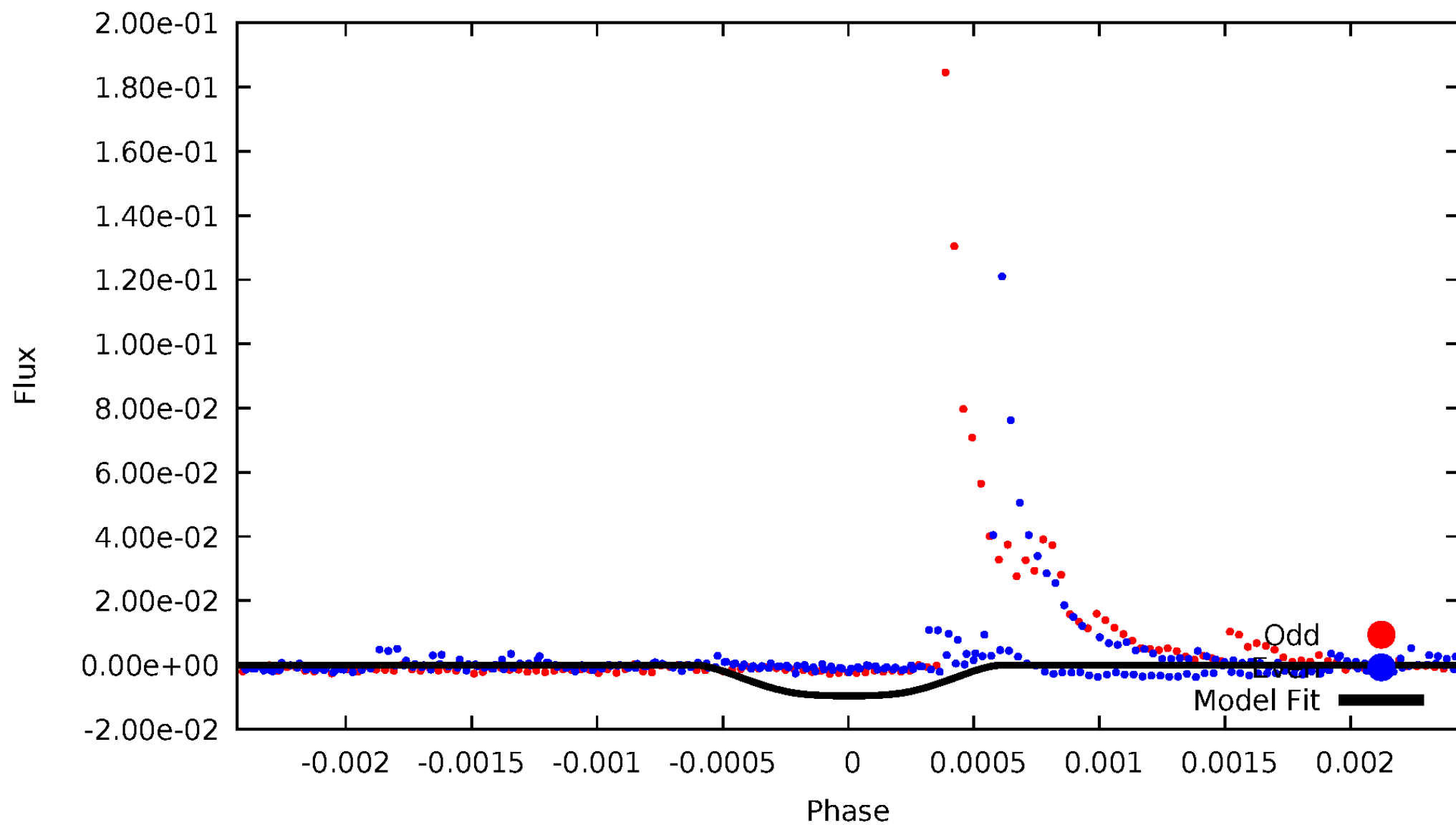
TCE 007131515-02





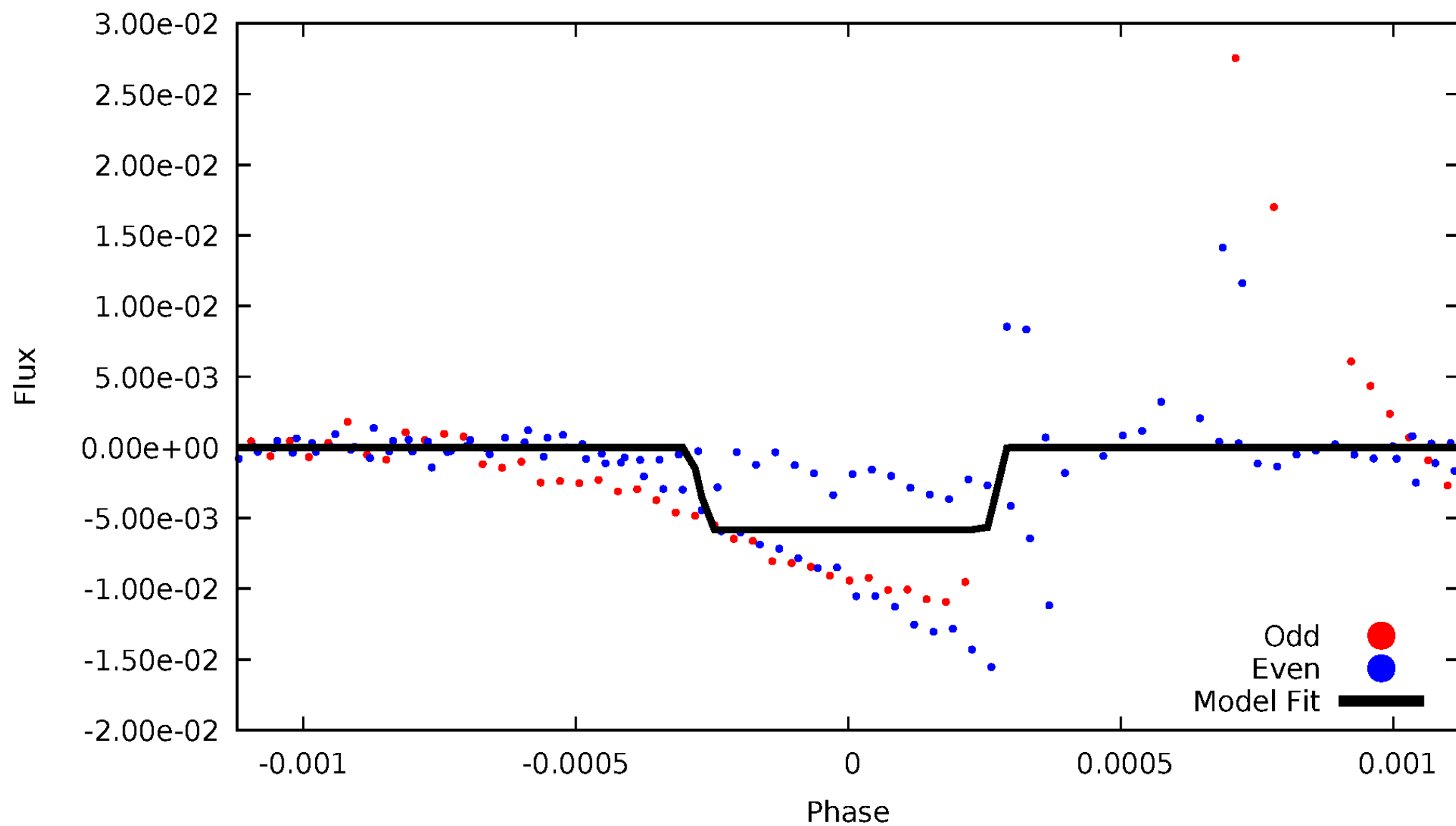
# DV Odd/Even

TCE 007131515-02



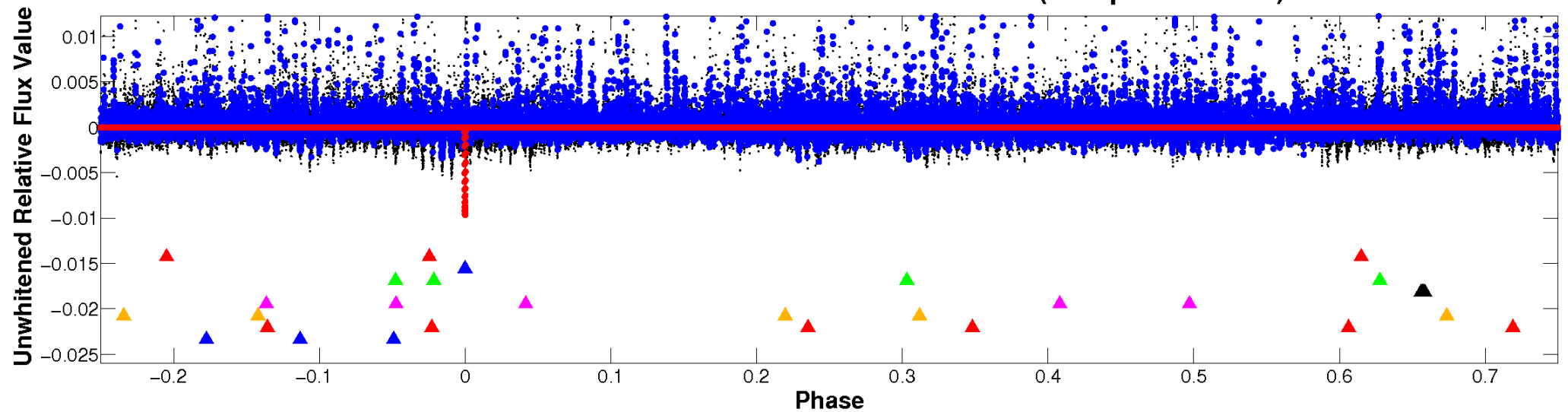
# ALT Odd/Even

TCE 007131515-02

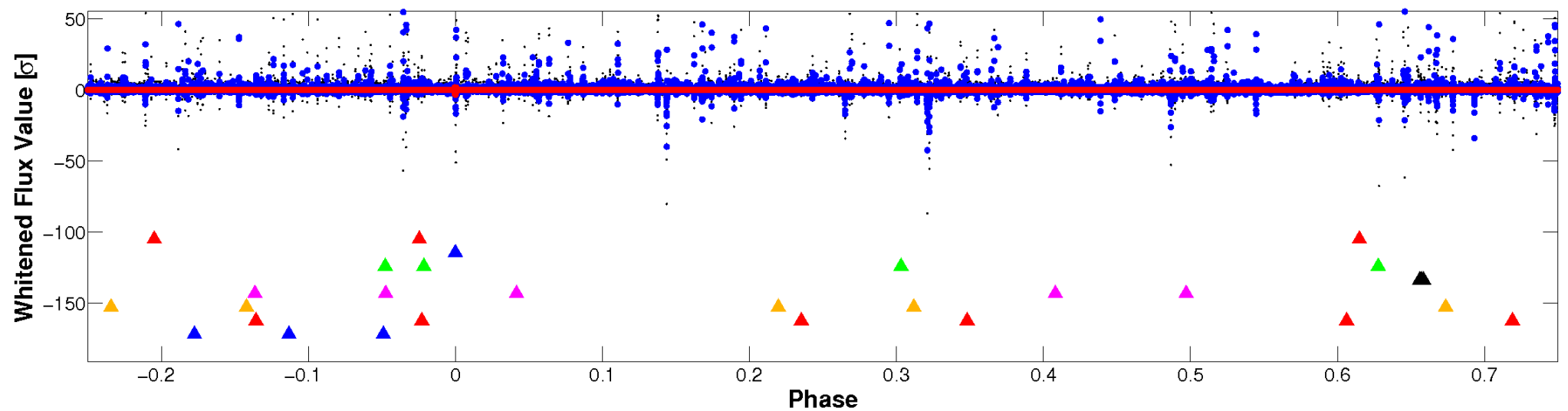


# Non-Whitened Vs. Whitened Light Curve

## Planet 2 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

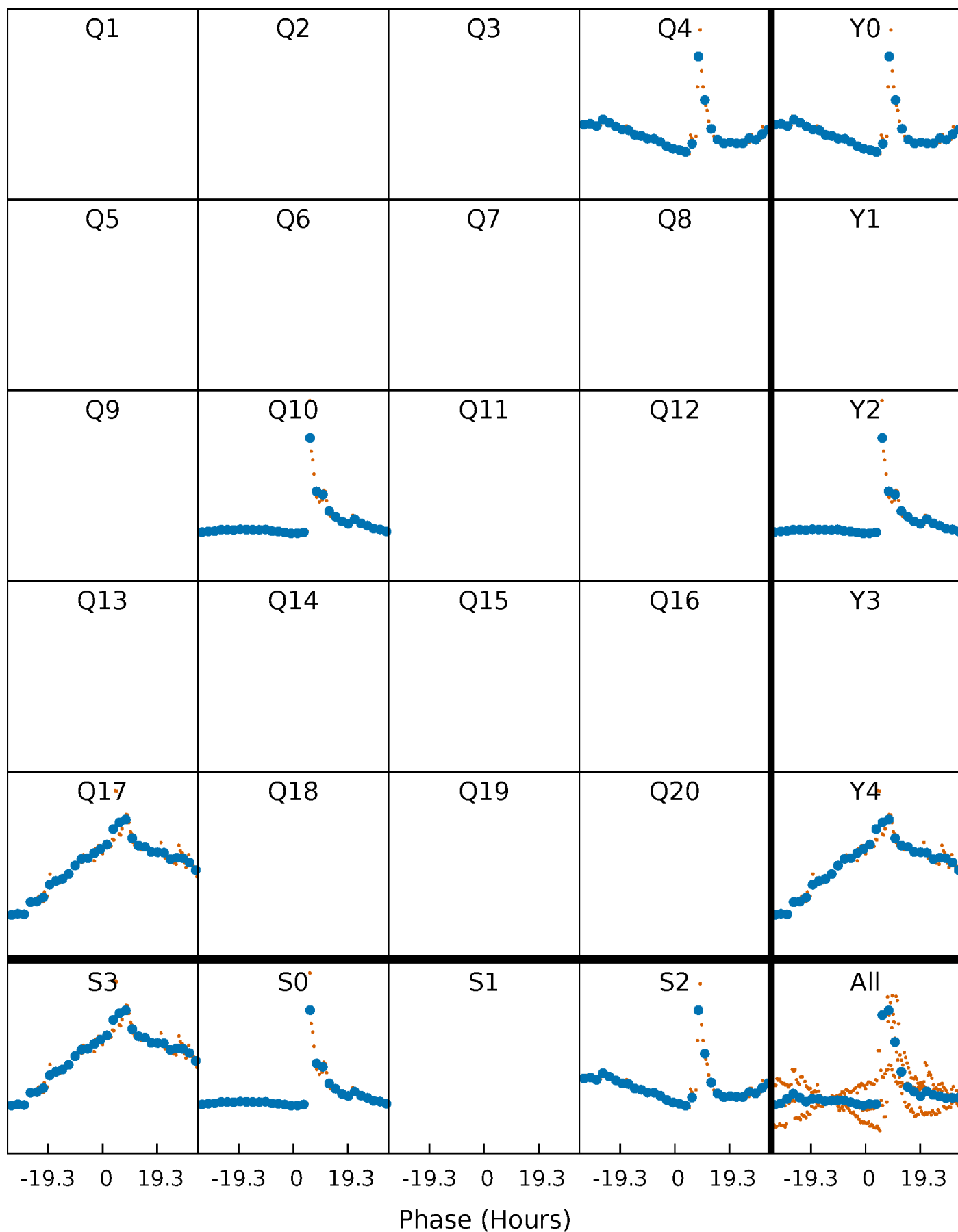


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



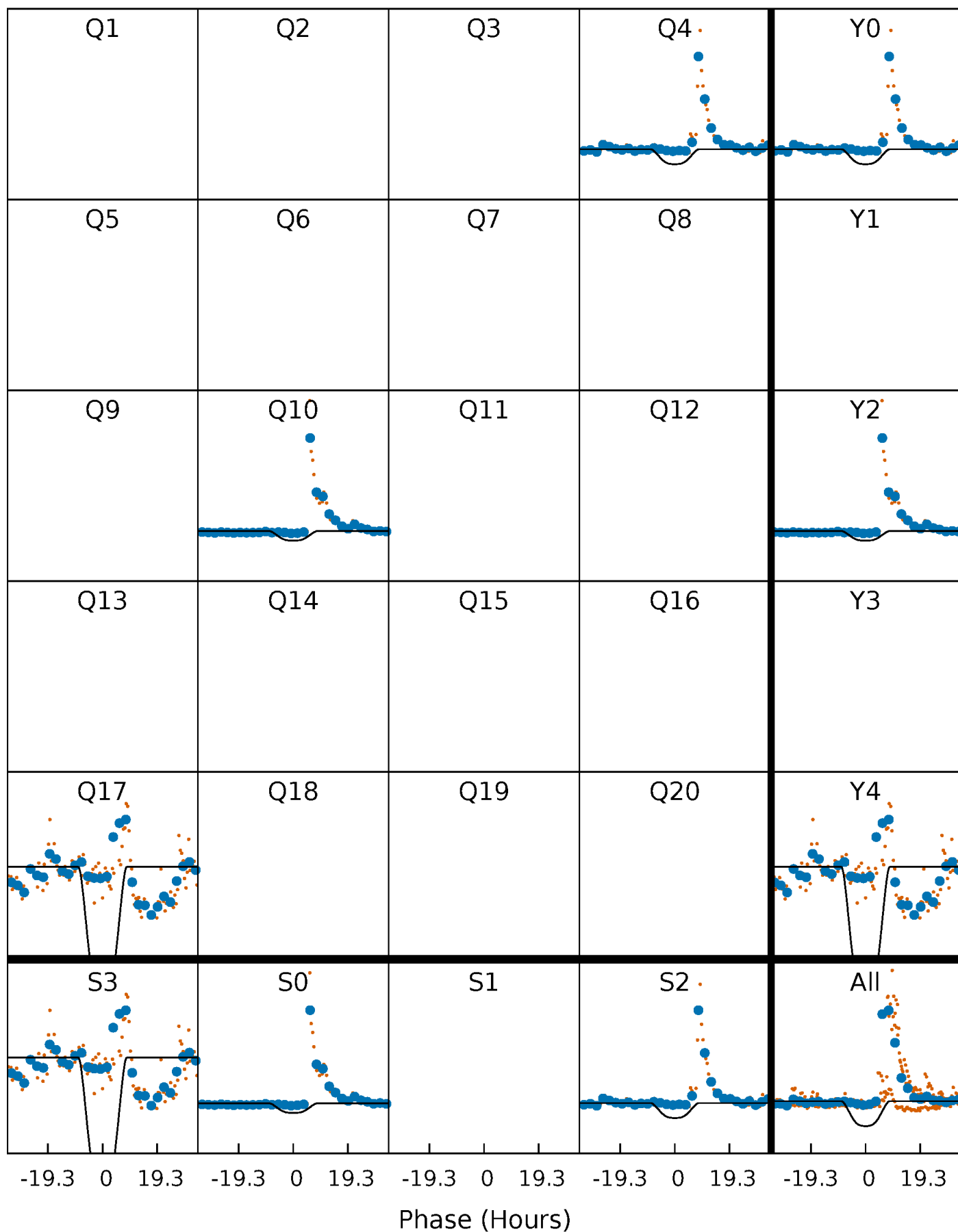
# PDC Quarter-Phased Transit Curves

TCE 007131515-02 P=577.200600 Days  $T_0=407.602036$  (BKJD)



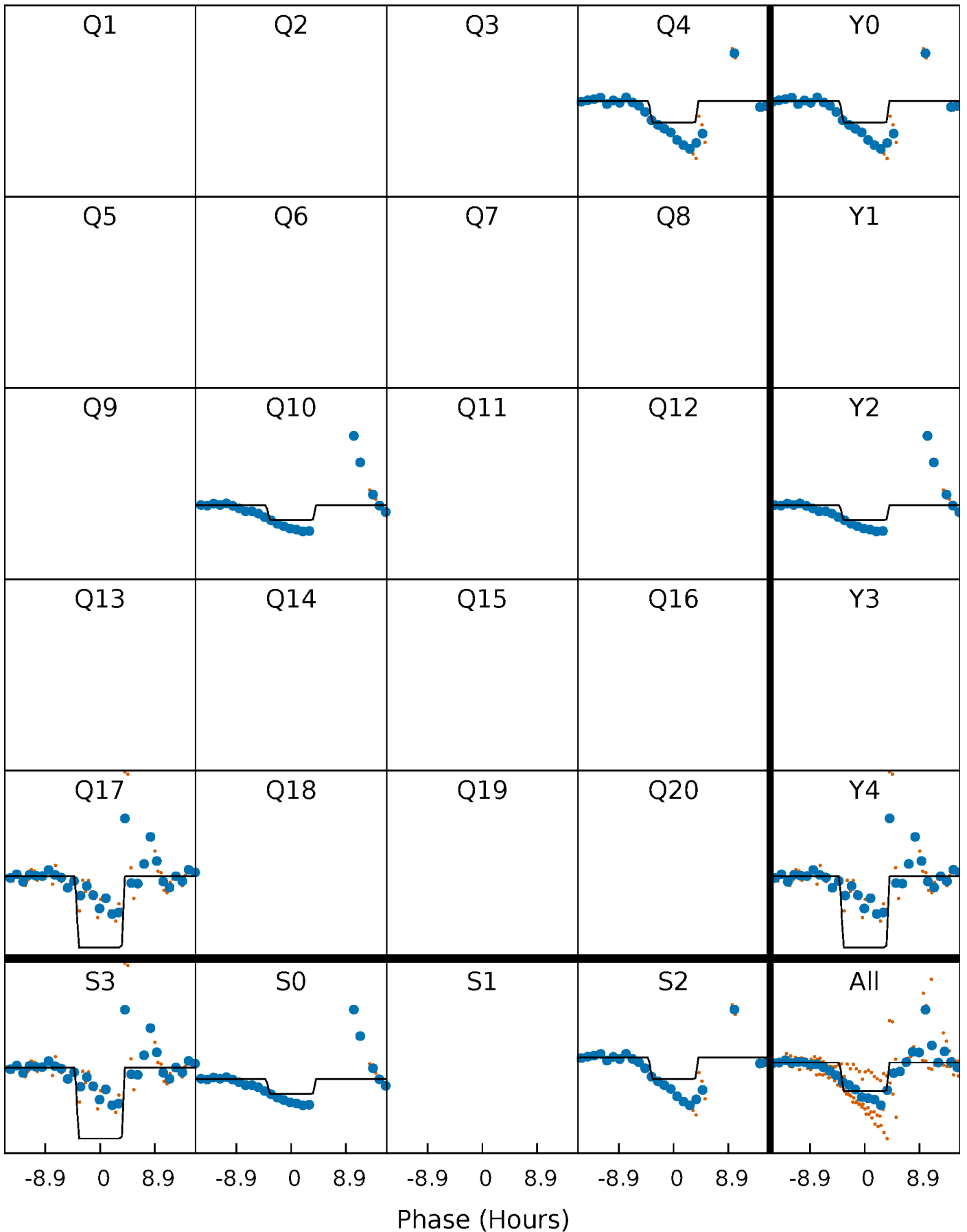
# DV Quarter-Phased Transit Curves

TCE 007131515-02 P=577.200600 Days  $T_0=407.602036$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

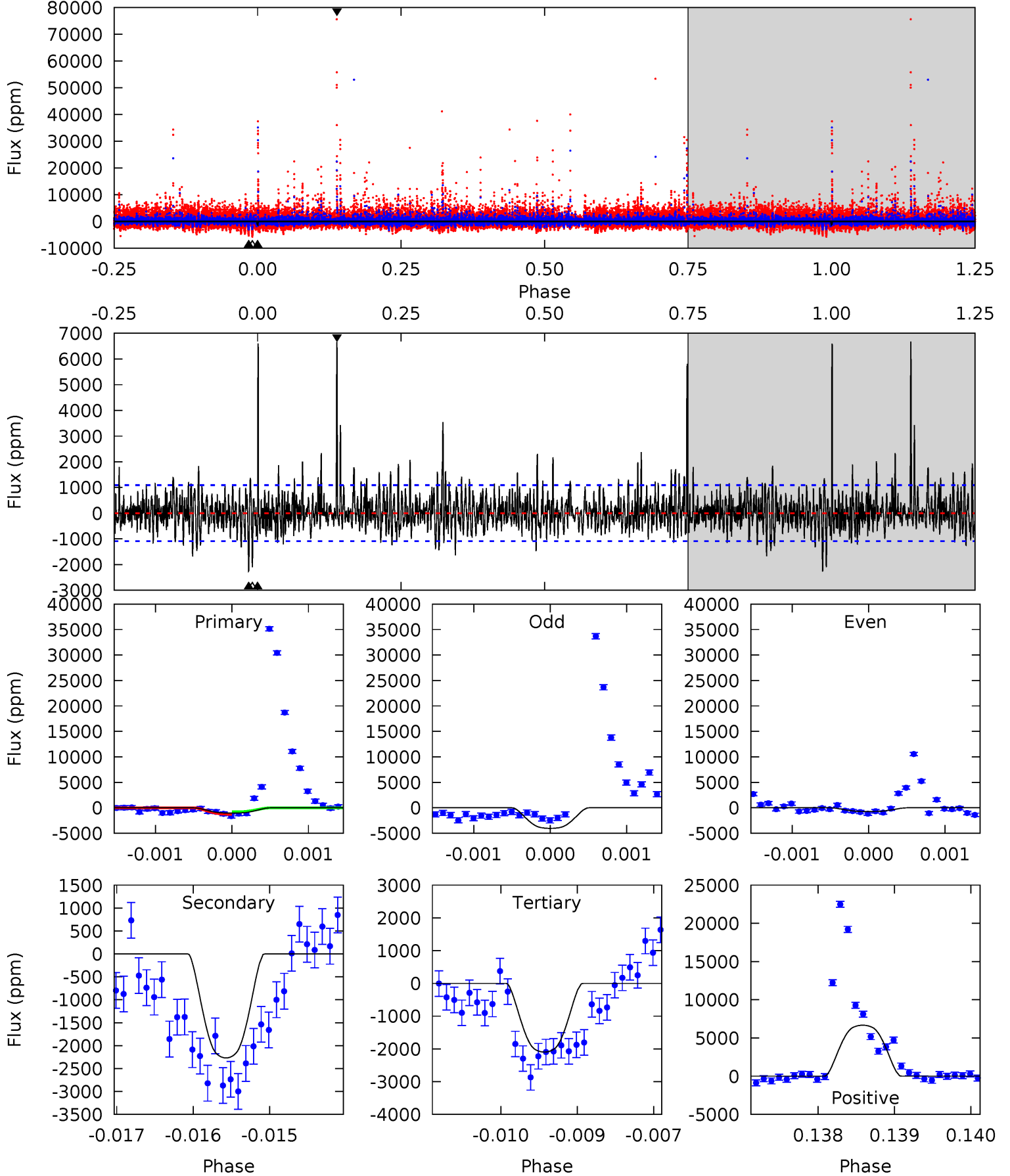
TCE 007131515-02 P=577.179958 Days  $T_0=407.660761$  (BKJD)



# DV Model-Shift Uniqueness Test

007131515-02, P = 577.200600 Days, E = 407.602036 Days

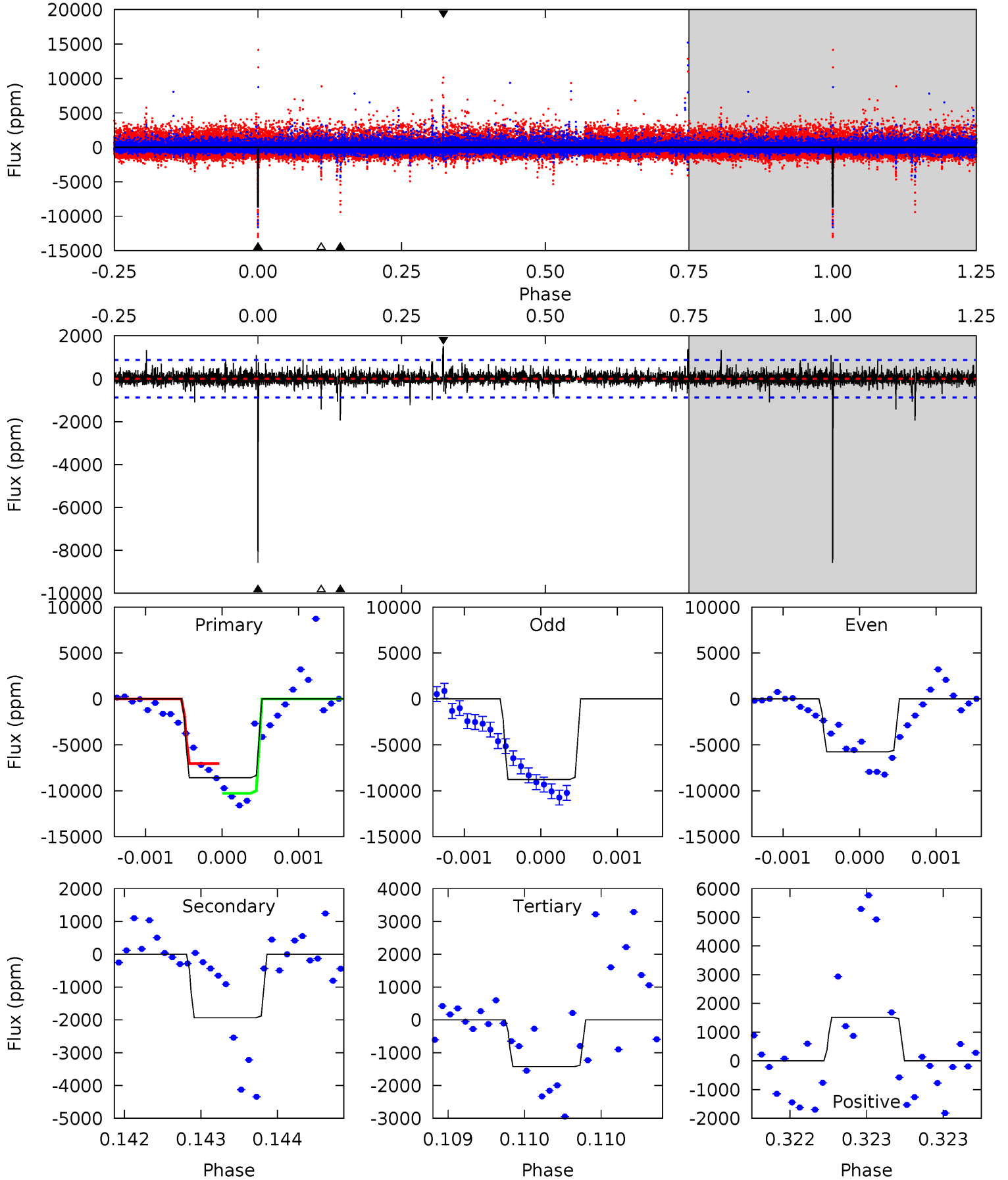
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.17	11.3	10.4	33.1	5.41	3.23	3.08	-5.25	-28.0	0.85	-21.9	4.72	22.7	0.75	1.12



# Alt Model-Shift Uniqueness Test

007131515-02, P = 577.179958 Days, E = 407.660761 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
54.4	12.3	9.03	9.60	5.55	3.44	1.15	45.3	44.8	3.25	2.68	8.80	0.79	0.15	10.1





### Stellar Parameters For KIC 007131515

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3838^{+120}_{-147}$	$4.651^{+0.067}_{-0.018}$	$0.560^{+0.050}_{-0.300}$	$0.611^{+0.028}_{-0.070}$	$0.609^{+0.035}_{-0.060}$	$3.764^{+1.199}_{-0.268}$
	+3%/-4%	+1%/-0%	+9%/-54%	+5%/-11%	+6%/-10%	+32%/-7%
Source	KIC0	KIC0	KIC0	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 007131515-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-2269 \pm 201$	$7.04^{+1.07}_{-0.95}$	$170^{+6}_{-7}$	$2973^{+162}_{-142}$	$33278^{+11326}_{-8410}$
Alt.	$-1937 \pm 158$	$4.93^{+1.09}_{-1.09}$	$171^{+6}_{-8}$	$3232^{+256}_{-208}$	$58211^{+37500}_{-18911}$

$T_{max}$  = Theoretical Maximum Planetary Temperature

$T_{obs}$  = Observed Planetary Temperature (Assuming A=0.3)

$A_{obs}$  = Observed Albedo (Assuming T=0)

If a secondary eclipse is present, the system is likely an EB if  $T_{obs} \gg T_{max}$  AND  $A_{obs} \gg 1.0$

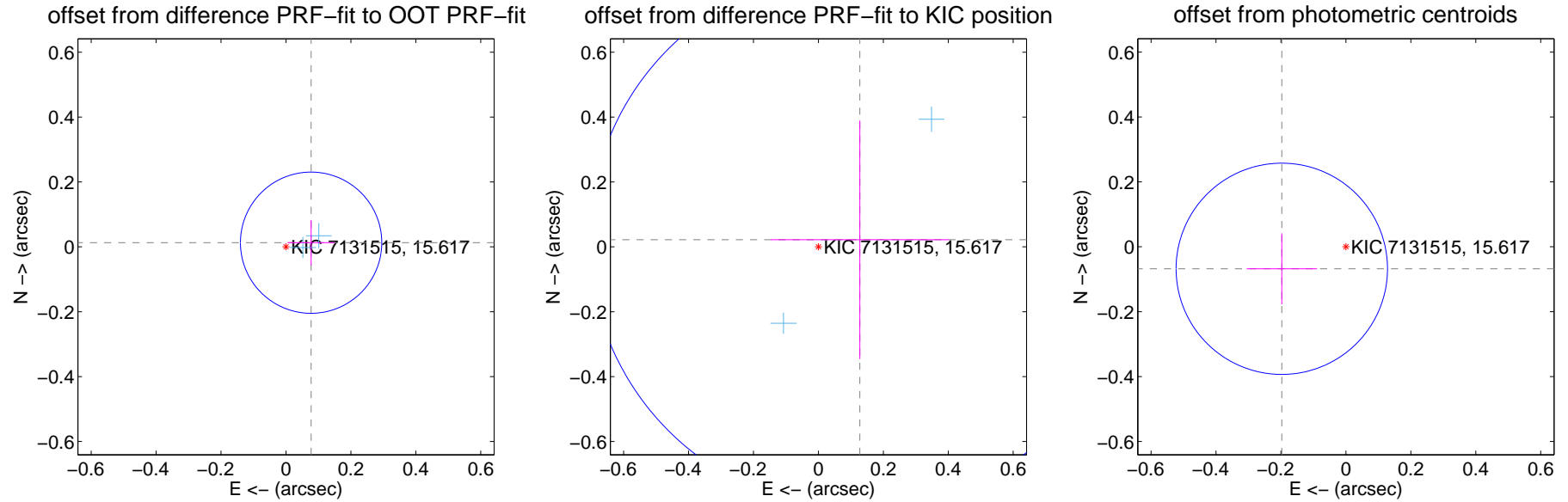
## DV Centroid Data

Supplemental centroid analysis for 007131515-02. Kepler magnitude: 15.62. Transit SNR 22.44

There are 2 quarters with good PRF difference image offsets

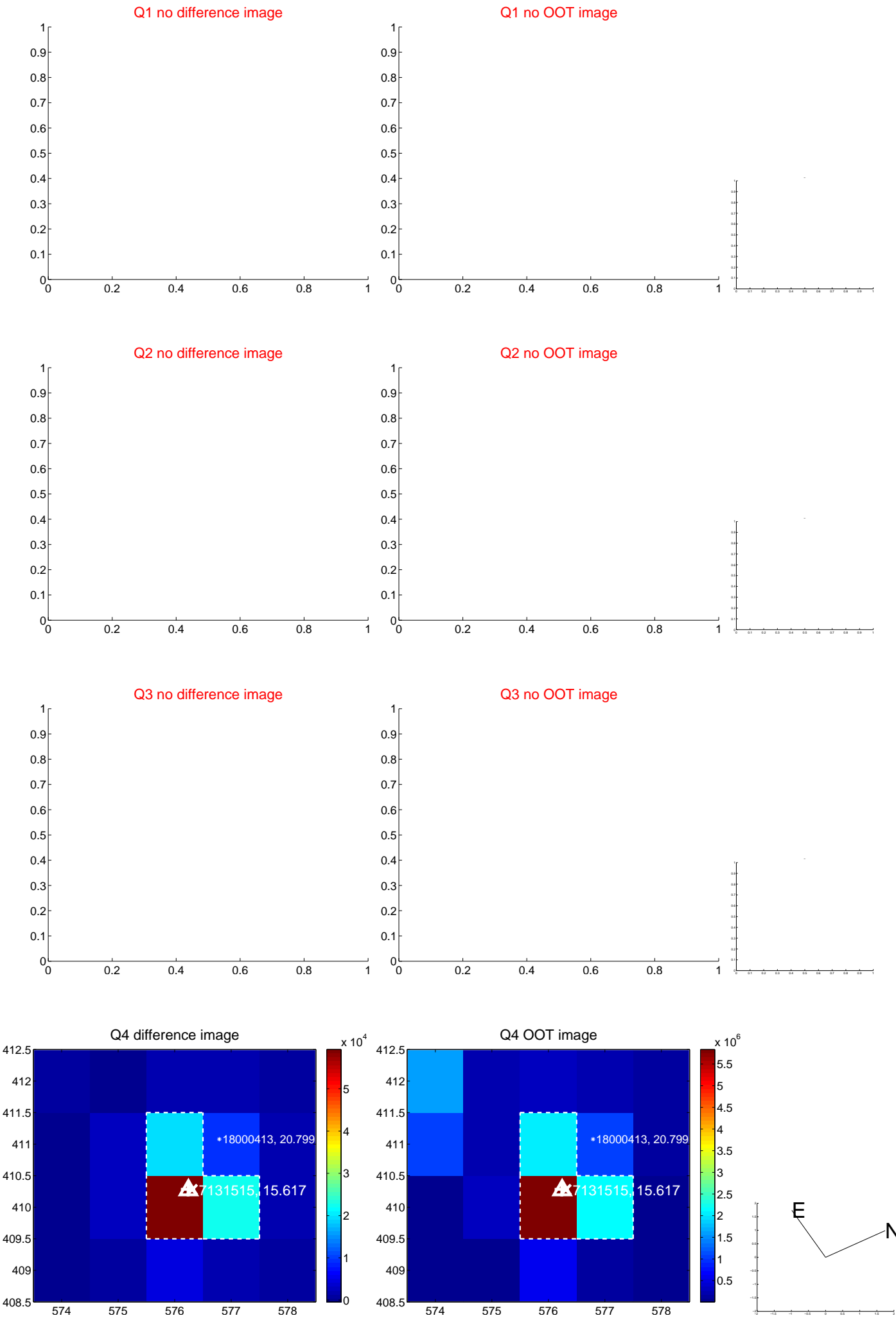
The direct PRF centroid is offset from the target star catalog position by about 0.44 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.078 \pm 0.073$	1.08	$-0.077 \pm 0.073$	$0.013 \pm 0.070$
PRF-fit source offset from KIC position	$0.129 \pm 0.278$	0.47	$-0.128 \pm 0.275$	$0.022 \pm 0.367$
photometric centroid source offset	$0.21 \pm 0.11$	1.92	$0.20 \pm 0.11$	$-0.07 \pm 0.11$



Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

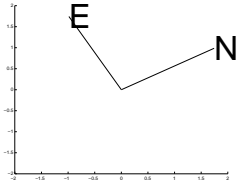
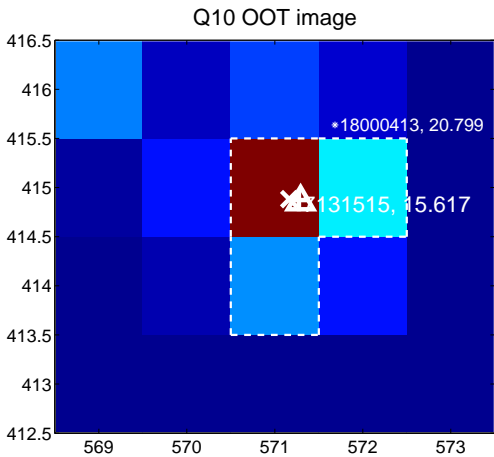
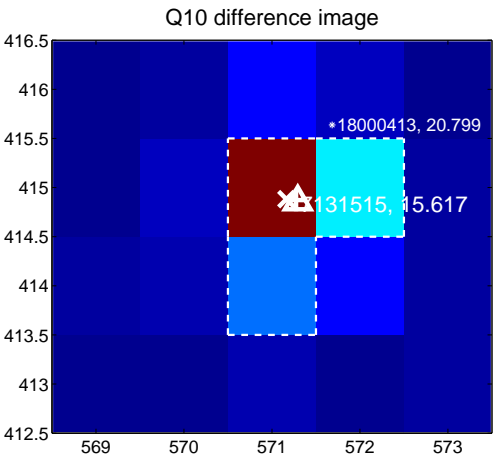
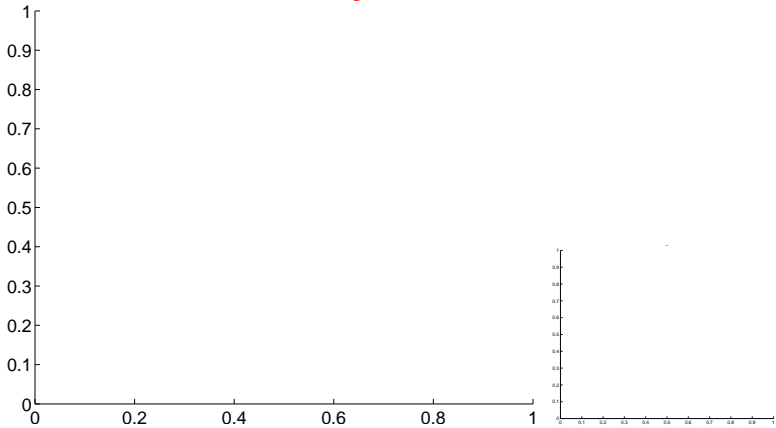


white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.

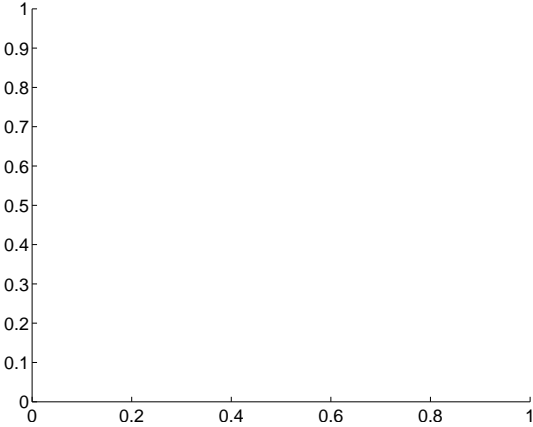
Q9 no difference image



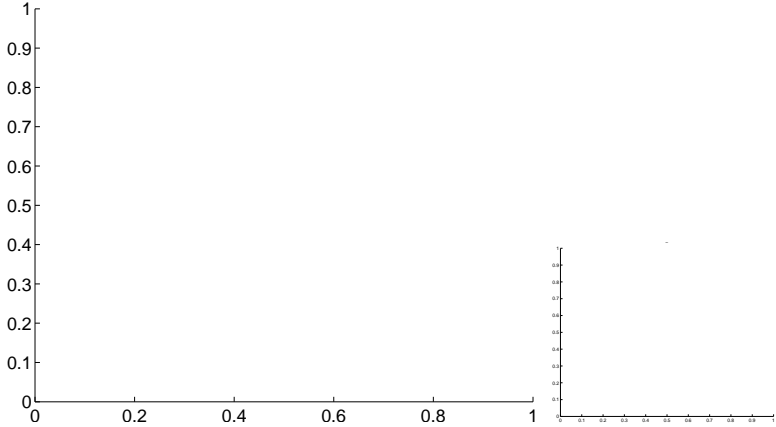
Q9 no OOT image



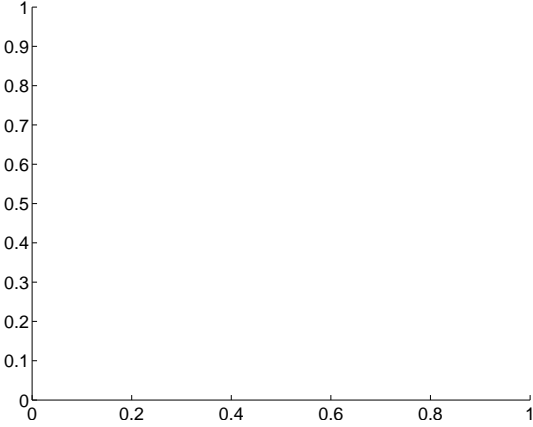
Q11 no difference image



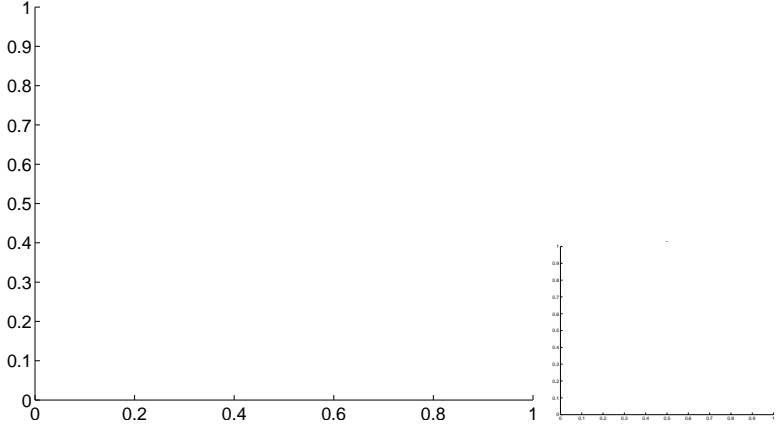
Q11 no OOT image



Q12 no difference image



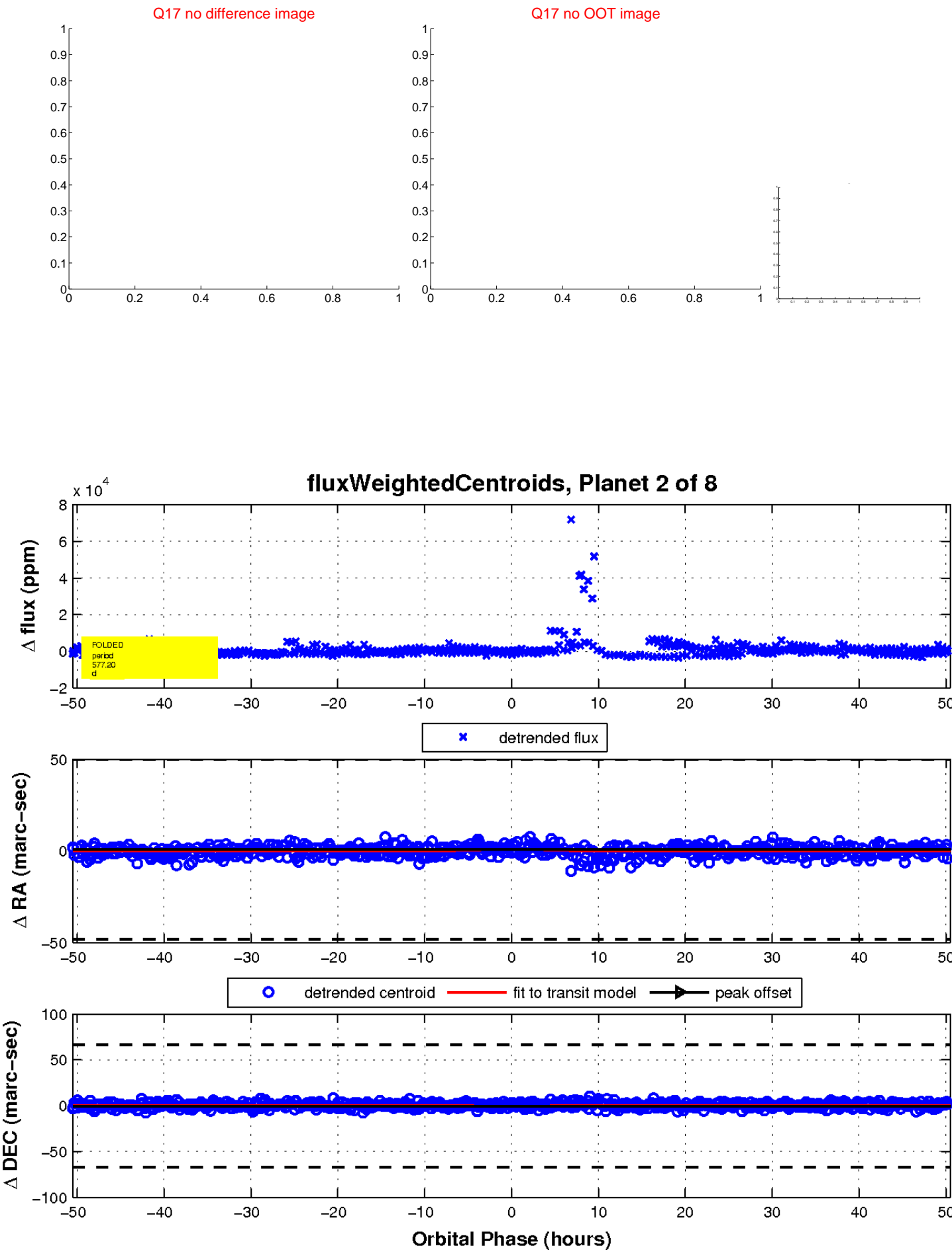
Q12 no OOT image



white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

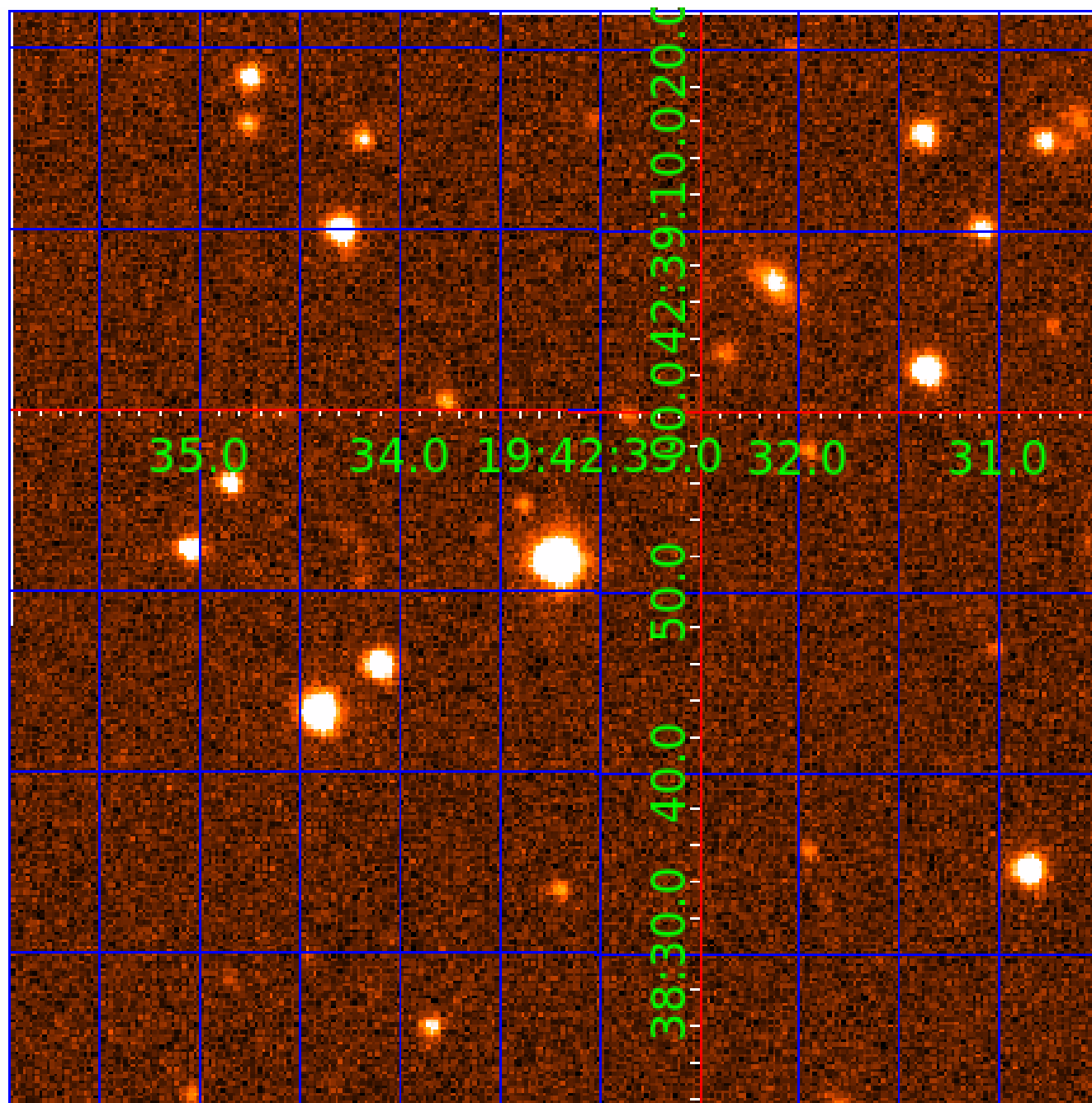


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 007131515

## Q1-17 DR25 TCE Parameters

TCE	Run Type	KOI?	Period (Days)	Epoch (BKJD)	Depth (ppm)	Duration (Hours)	MES	SNR	$R_{\star}$ ( $R_{\odot}$ )	$T_{\star}$ (K)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007131515-01	OBS	No	473.144452	393.439069	771.8	4.103	15.9	2.2	0.61	3838	1.85	0.07
007131515-02	OBS	No	577.200600	407.602036	9650.8	16.845	14.0	22.4	0.61	3838	7.21	0.06
007131515-04	OBS	No	577.895819	209.085272	2898.9	15.668	11.9	8.2	0.61	3838	3.33	0.06
007131515-05	OBS	No	314.278701	328.888523	1207.0	6.263	10.7	4.2	0.61	3838	2.22	0.12
007131515-06	OBS	No	315.192673	219.225711	2649.6	7.659	12.0	7.2	0.61	3838	3.72	0.12
007131515-07	OBS	No	214.102497	329.331944	2065.9	3.462	12.6	8.5	0.61	3838	2.67	0.21
007131515-08	OBS	No	614.286037	305.165108	2458.8	10.768	11.9	7.0	0.61	3838	3.02	0.05

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007131515-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
007131515-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
007131515-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
007131515-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
007131515-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_TER_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
007131515-07	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—MOD_NONUNIQ_DV—MOD_POS_DV—HALO_GHOST
007131515-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS

**Notes:** OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

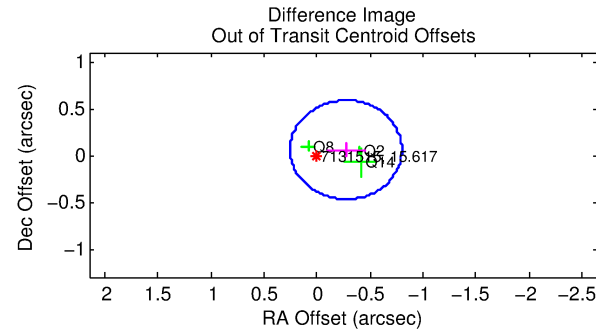
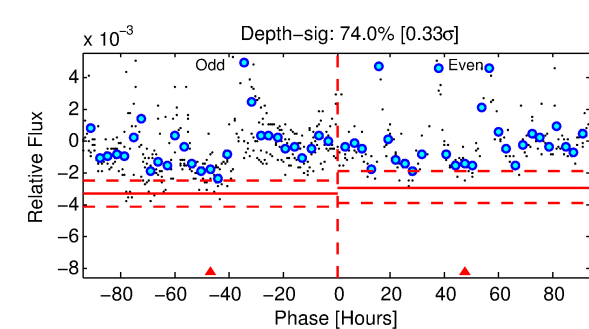
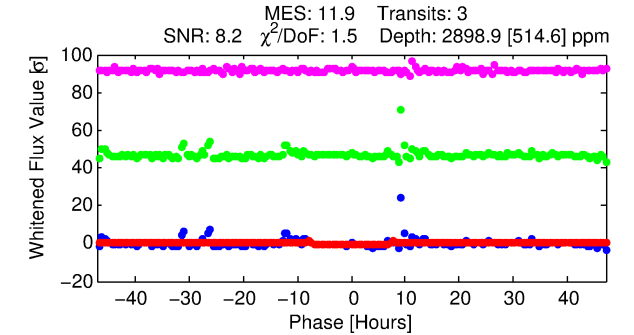
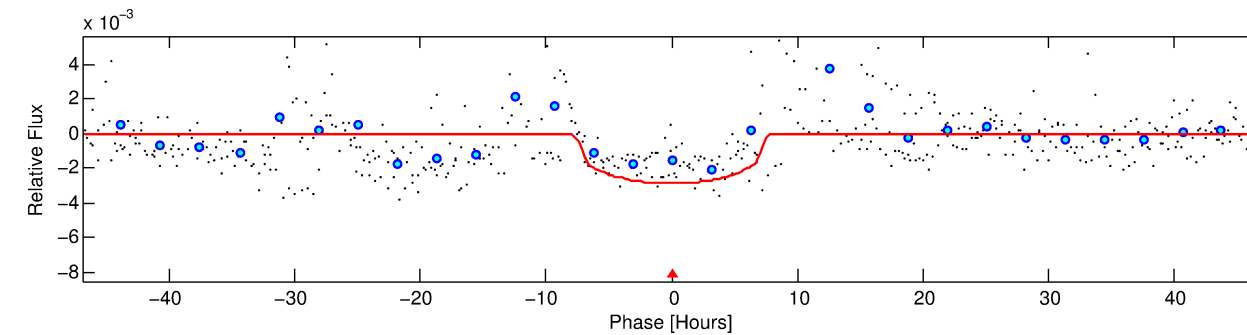
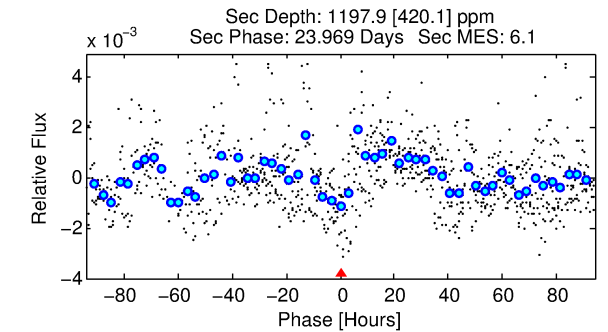
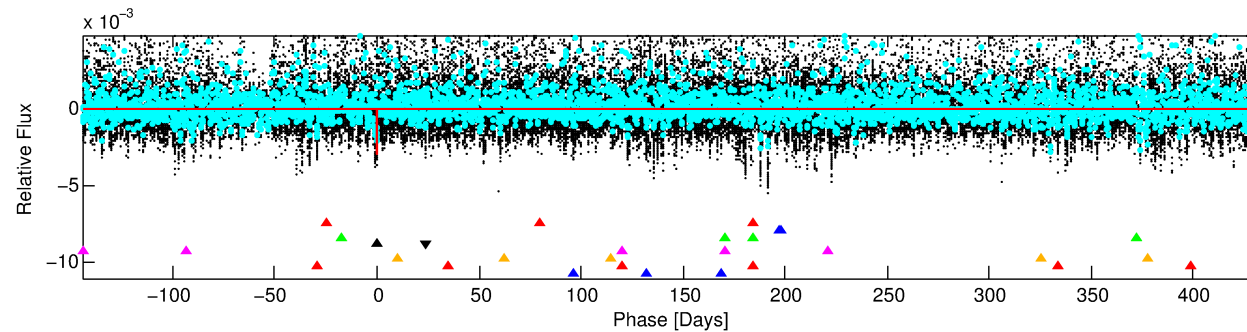
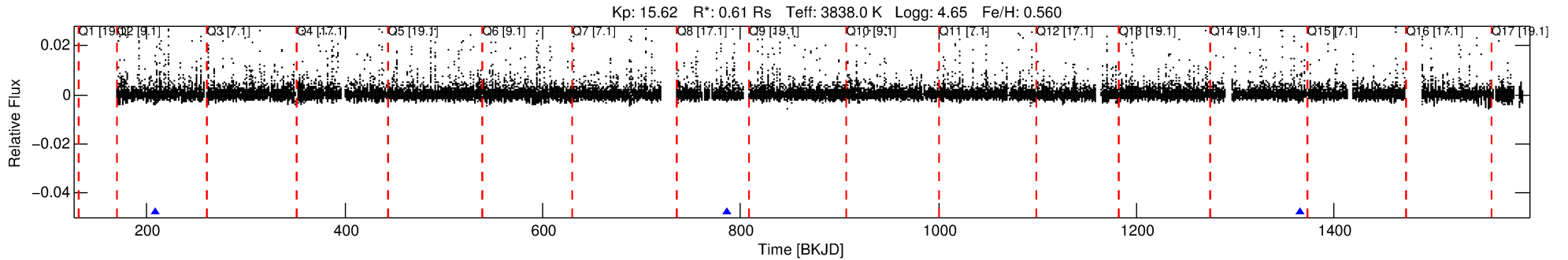
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 007131515-04

No Significant Match Found

# DV One-Page Summary

KIC: 7131515 Candidate: 4 of 8 Period: 577.896 d



## DV Fit Results:

Period = 577.89582 [0.01268] d  
Epoch = 209.0853 [0.0174] BKJD  
Rp/R\* = 0.0500 [0.0107]  
a/R\* = 252.88 [144.10]  
b = 0.54 [0.74]  
Seff = 0.05 [0.01]  
Teq = 123 [6] K  
Rp = 3.33 [0.81] Re  
a = 1.1516 [0.1060] AU  
Ag = 78662.63 [44609.40] [1.76σ]  
Teffp = 3193 [458] K [6.71σ]

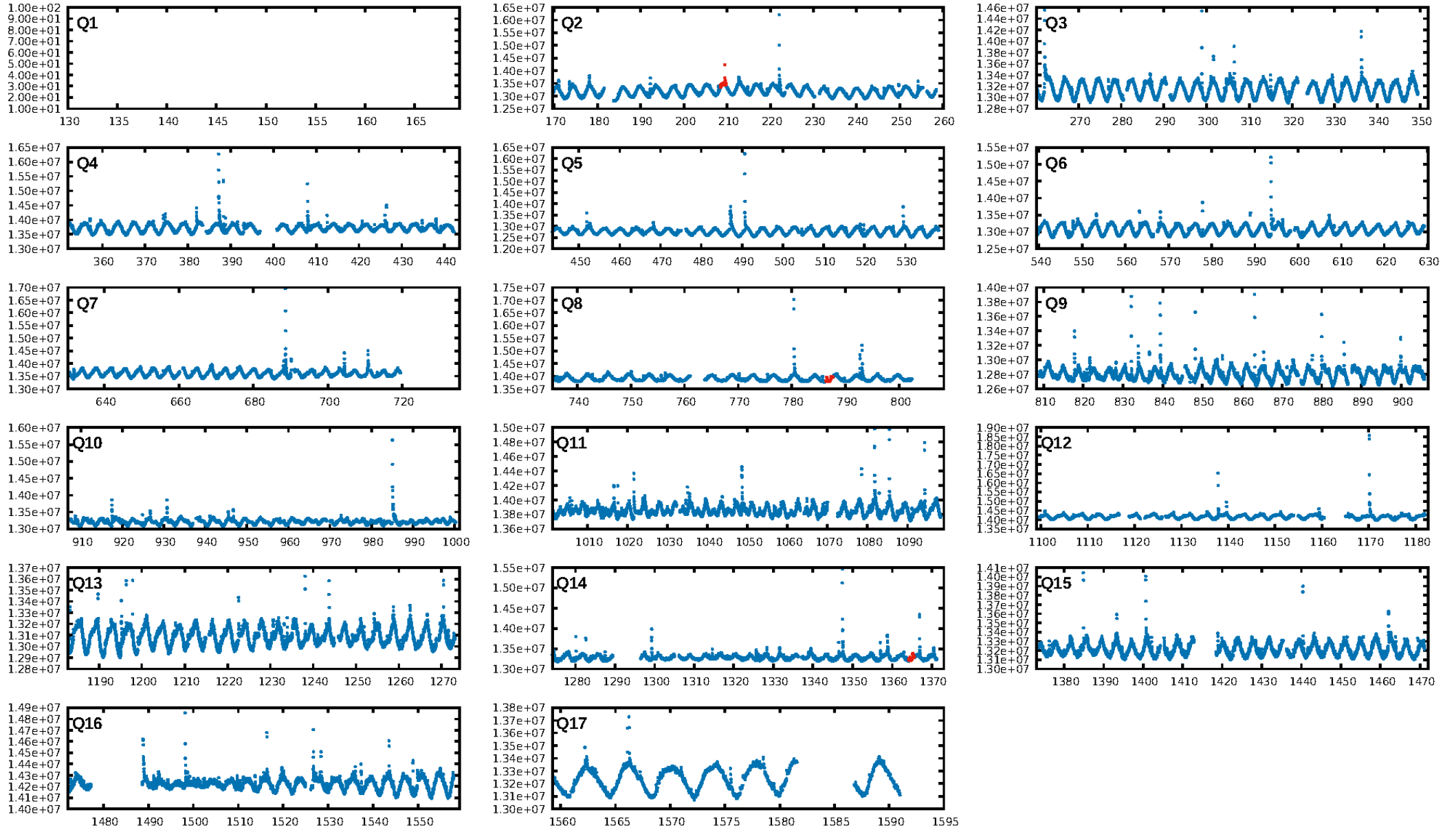
## DV Diagnostic Results:

ShortPeriod-sig: 53.2% [0.73σ]  
LongPeriod-sig: 100.0% [45.94σ]  
ModelChiSquare2-sig: 1.3%  
ModelChiSquareGof-sig: 99.6%  
**Bootstrap-pfa: 1.62e-09**  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 67.88  
Centroid-sig: 13.8%  
Centroid-so: 0.488 arcsec [1.49σ]  
OotOffset-rm: 0.278 arcsec [1.58σ]  
KicOffset-rm: 0.420 arcsec [1.44σ]  
OotOffset-st: 2/0/1/0 [3]  
KicOffset-st: 2/0/1/0 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 1.00 [3/3]

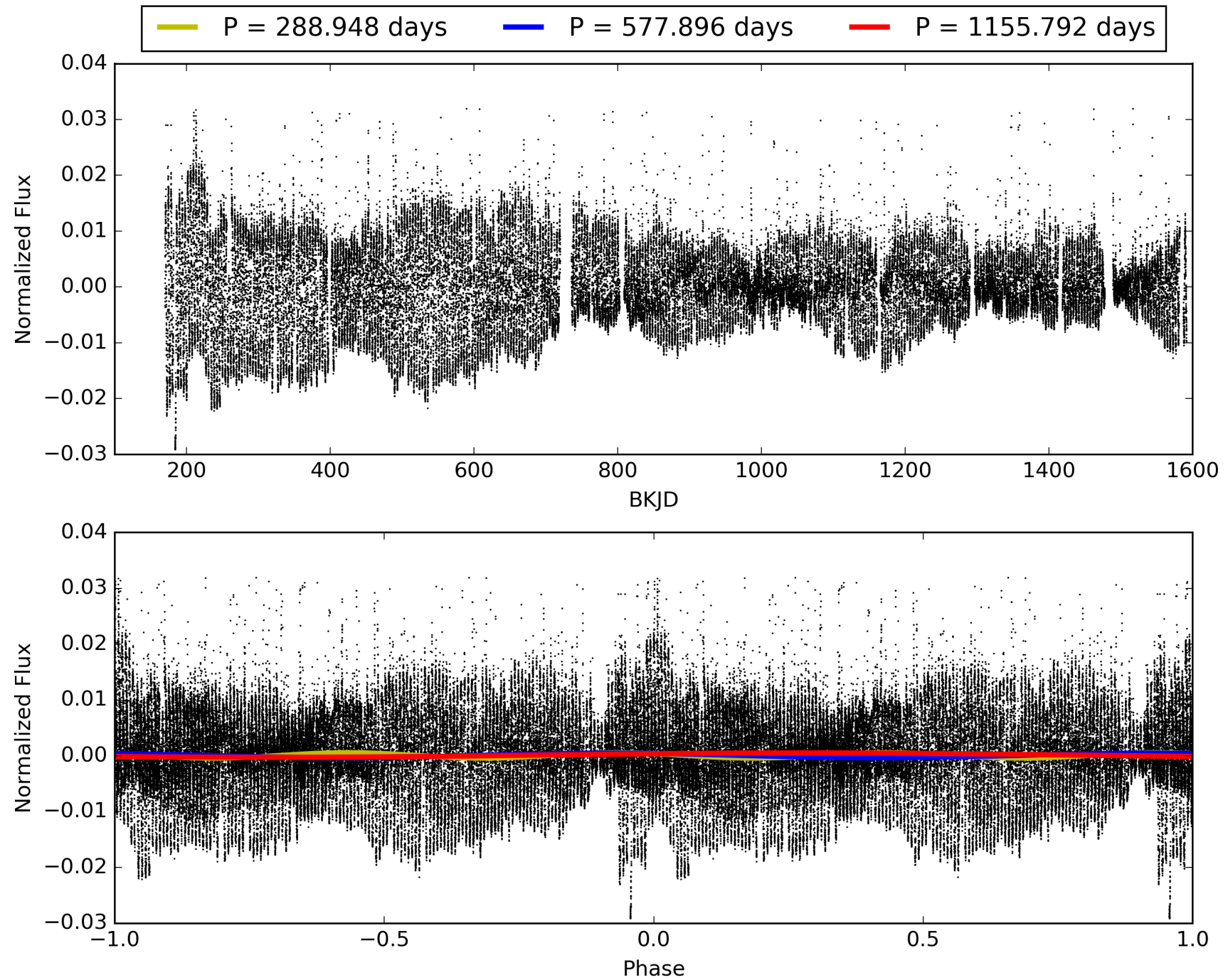
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 03-Feb-2016 08:36:27 Z

This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 007131515-04, PDC Light Curves

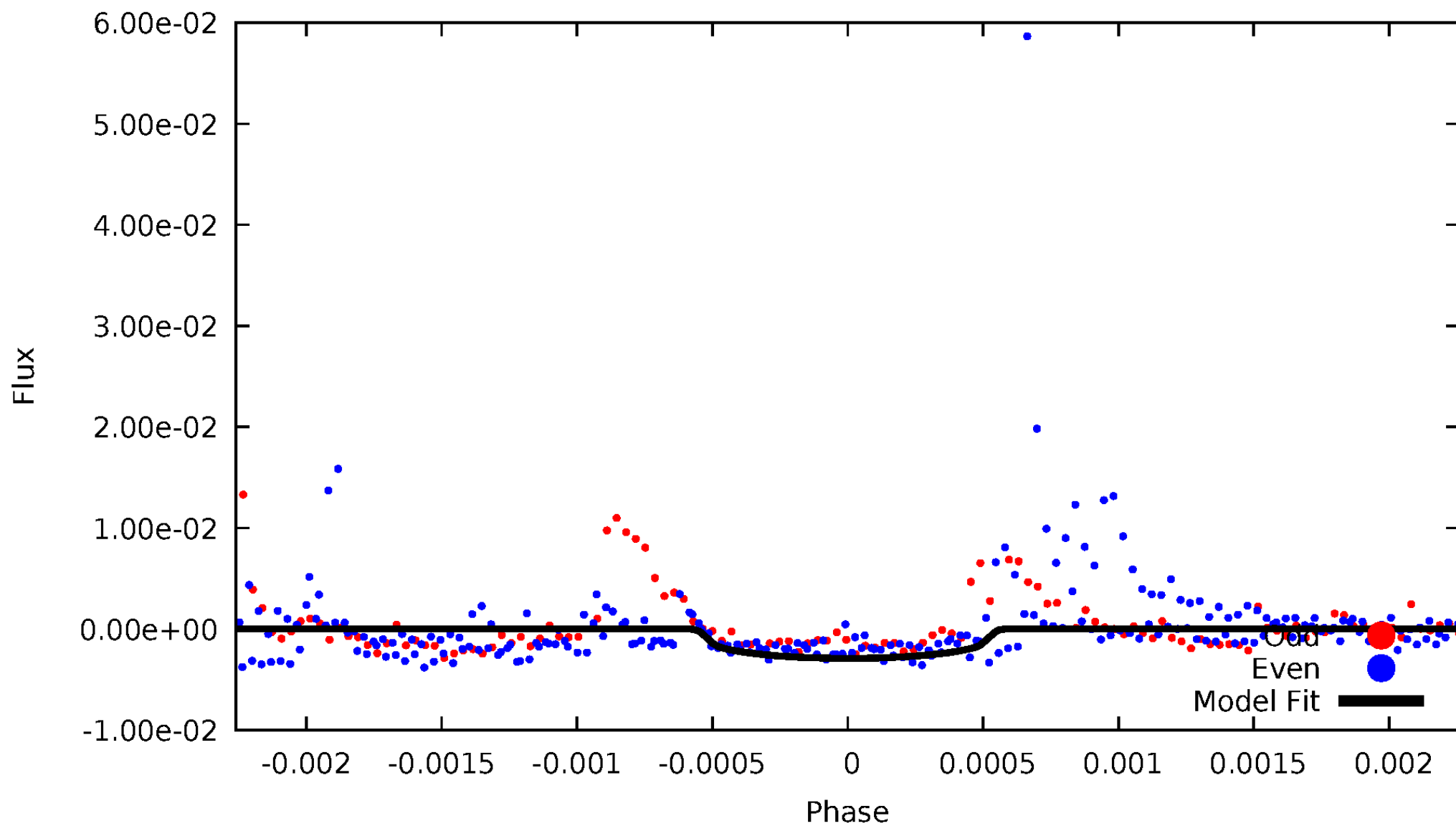


# TCE 007131515-04



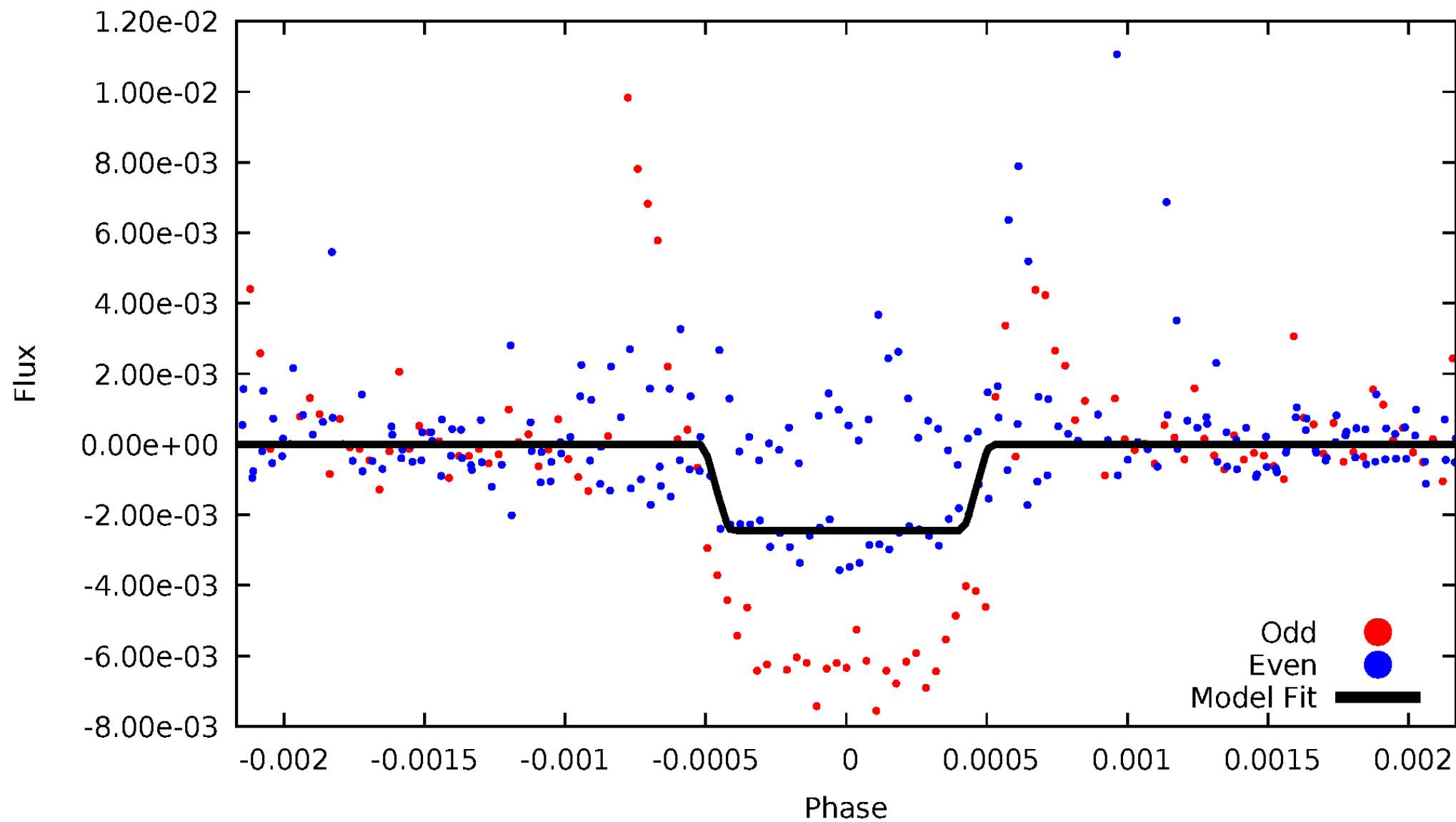
# DV Odd/Even

TCE 007131515-04



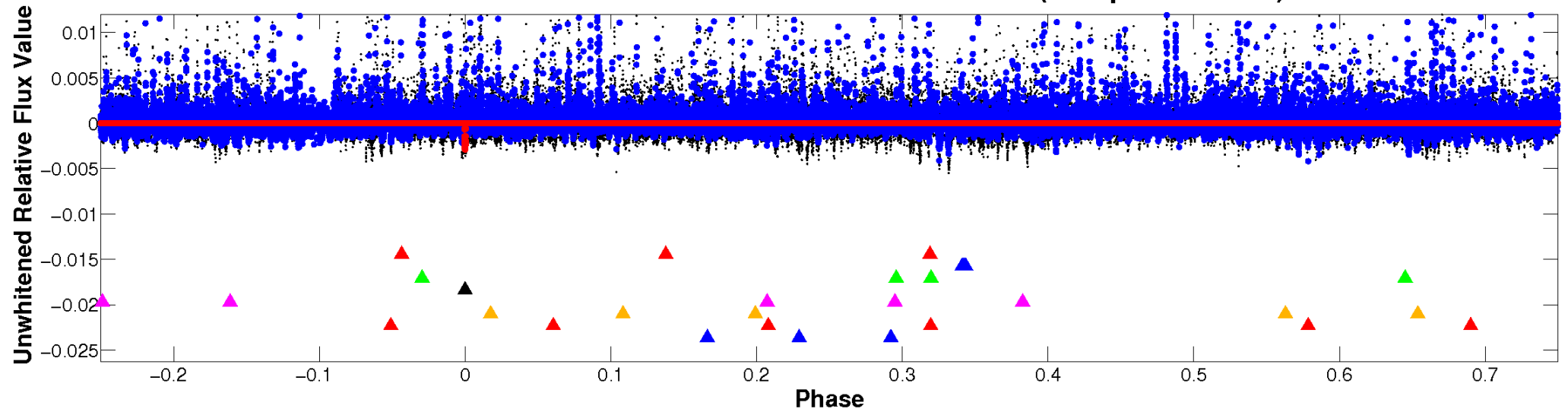
# ALT Odd/Even

TCE 007131515-04

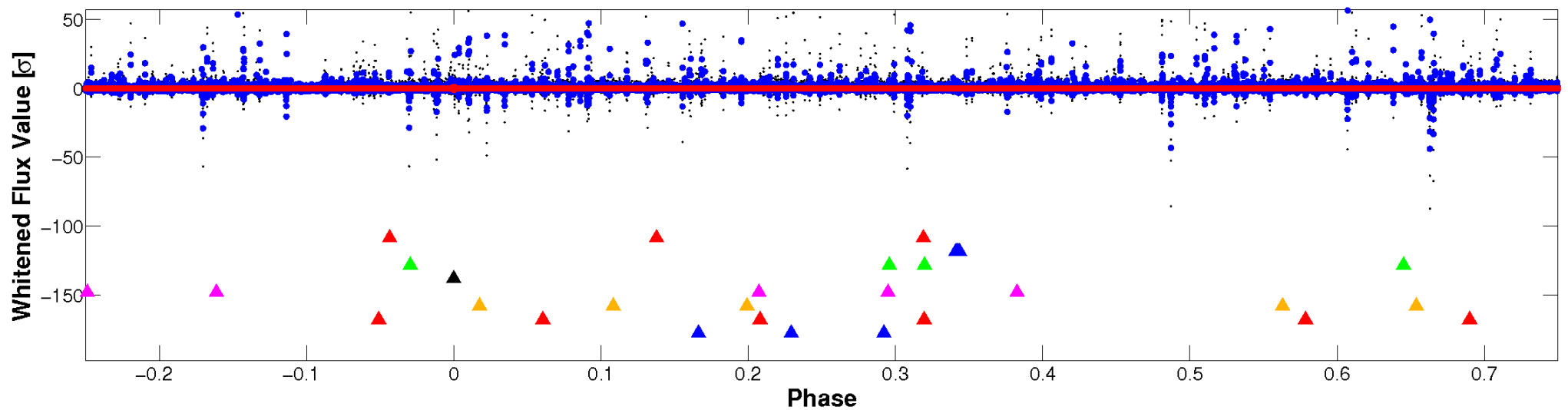


# Non-Whitened Vs. Whitened Light Curve

## Planet 4 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

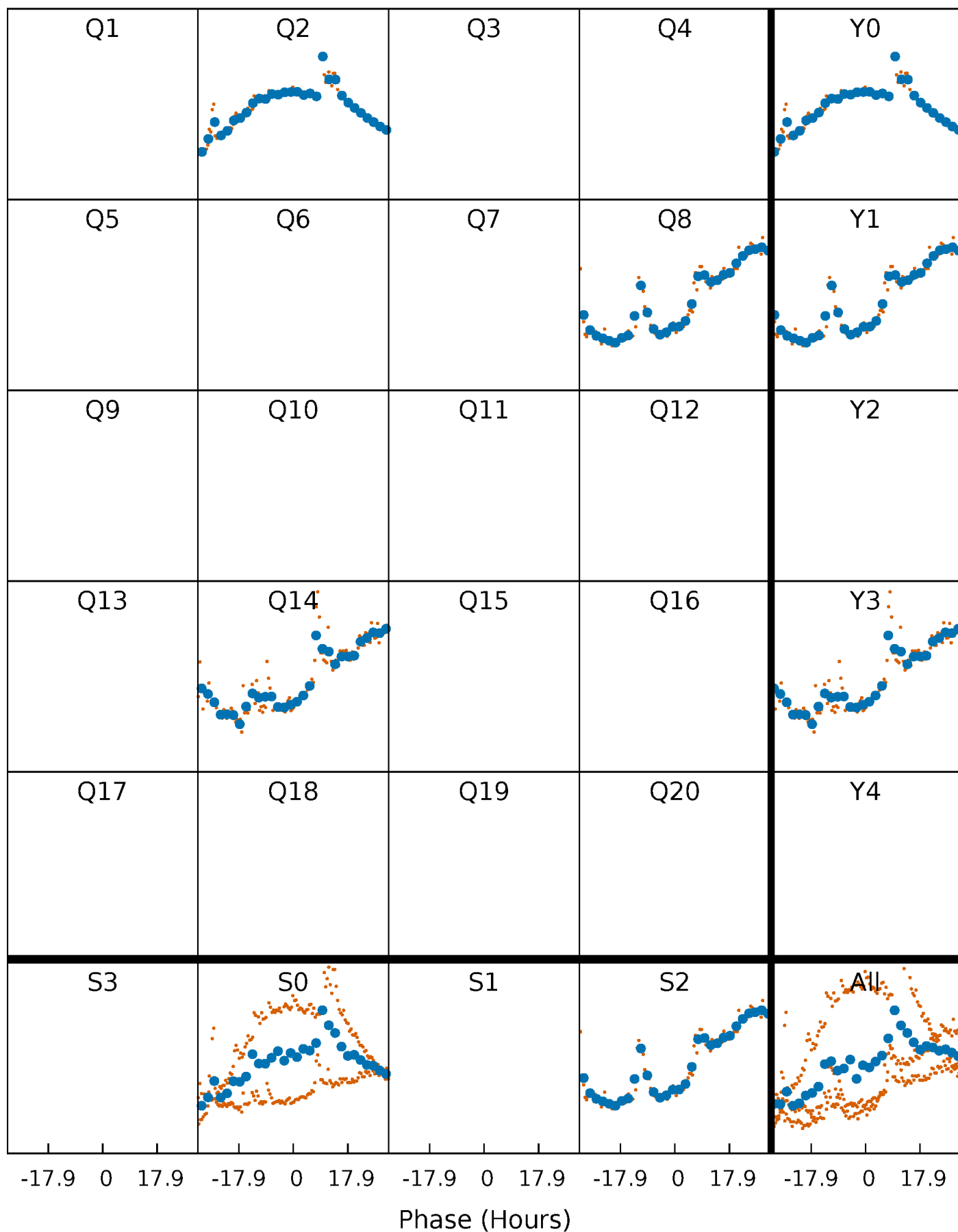


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

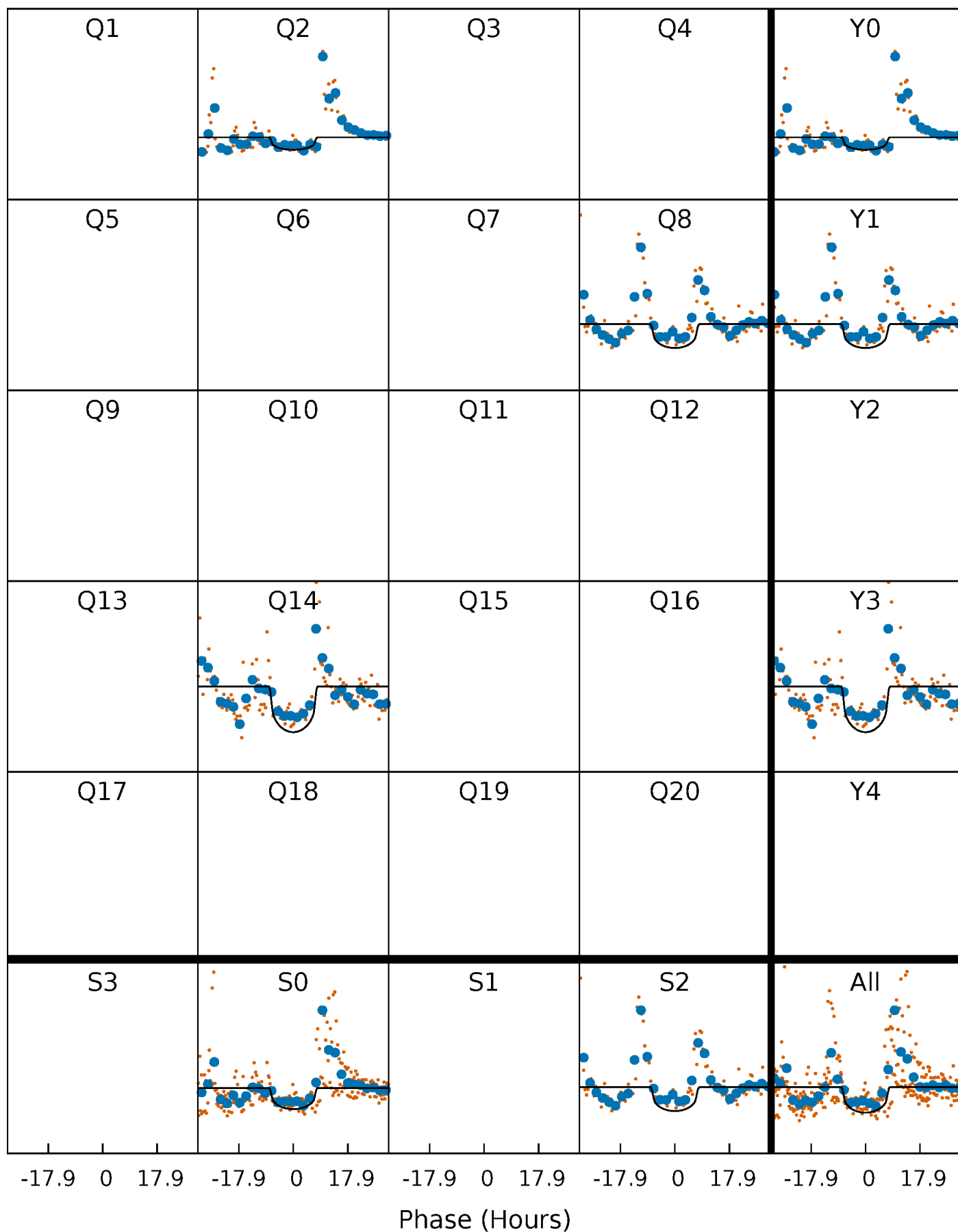
TCE 007131515-04 P=577.895819 Days  $T_0=209.085272$  (BKJD)





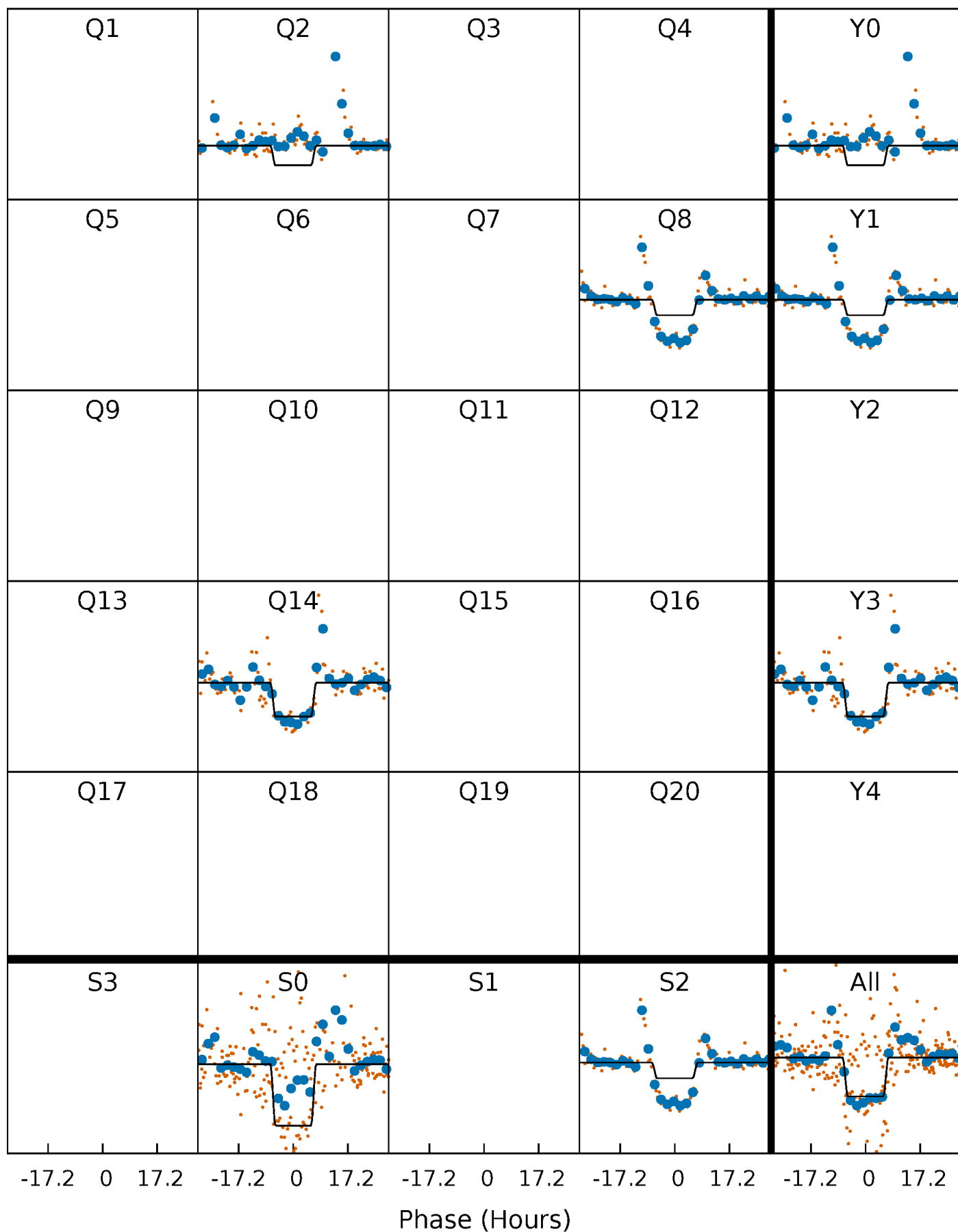
# DV Quarter-Phased Transit Curves

TCE 007131515-04 P=577.895819 Days  $T_0=209.085272$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

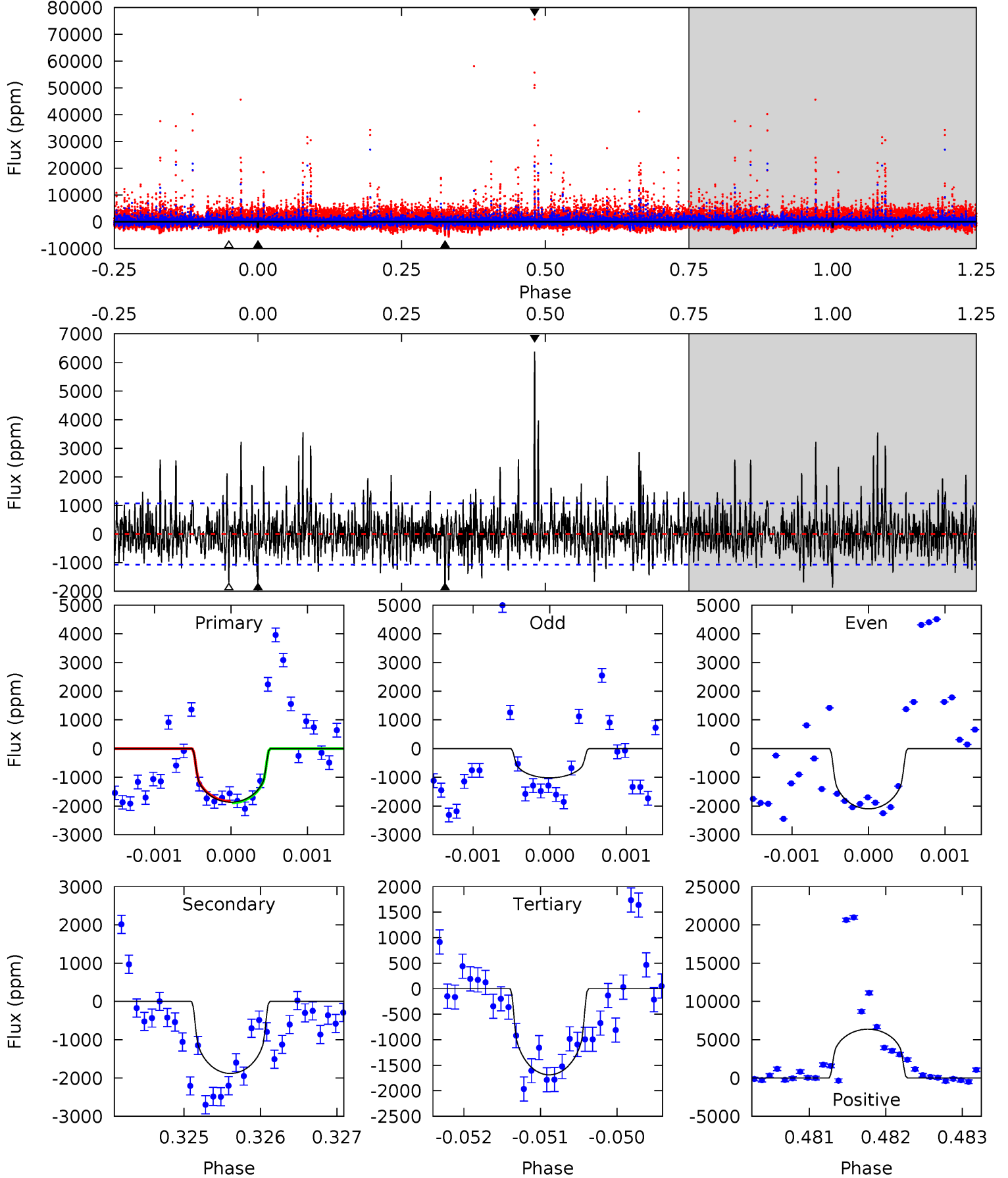
TCE 007131515-04 P=577.922378 Days  $T_0=209.014266$  (BKJD)



# DV Model-Shift Uniqueness Test

007131515-04, P = 577.895819 Days, E = 209.085272 Days

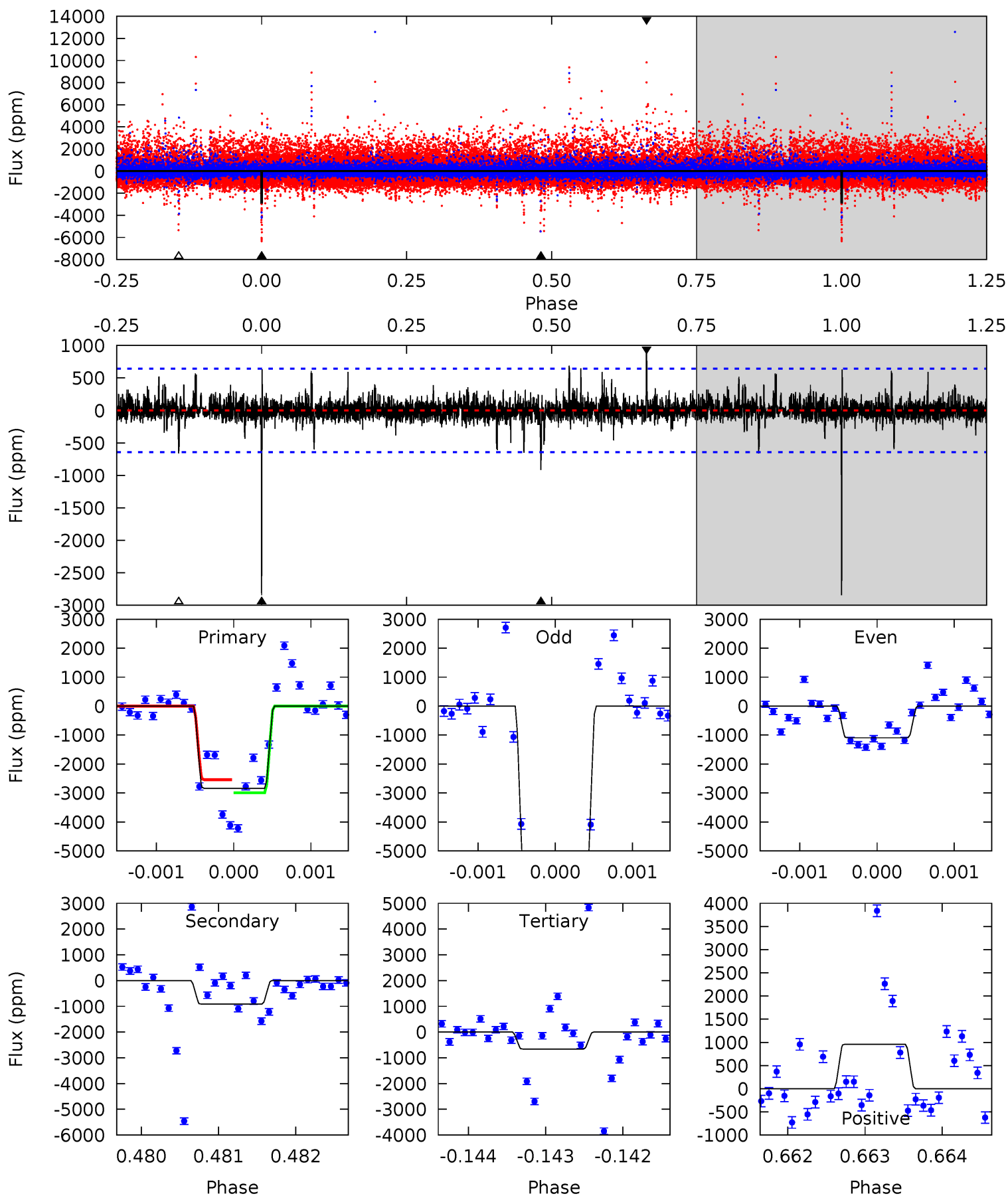
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.46	9.53	8.56	32.3	5.43	3.26	3.25	0.90	-22.9	0.98	-22.8	1.32	0.94	0.77	0.13



# Alt Model-Shift Uniqueness Test

007131515-04, P = 577.922378 Days, E = 209.014266 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
24.1	7.75	5.60	8.13	5.45	3.29	0.96	18.5	16.0	2.15	-0.38	20.1	1.01	0.25	1.89



### Stellar Parameters For KIC 007131515

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3838^{+120}_{-147}$	$4.651^{+0.067}_{-0.018}$	$0.560^{+0.050}_{-0.300}$	$0.611^{+0.028}_{-0.070}$	$0.609^{+0.035}_{-0.060}$	$3.764^{+1.199}_{-0.268}$
	+3%/-4%	+1%/-0%	+9%/-54%	+5%/-11%	+6%/-10%	+32%/-7%
Source	KIC0	KIC0	KIC0	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 007131515-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	-1881±197	$3.31^{+0.71}_{-0.68}$	$170^{+6}_{-7}$	$3625^{+350}_{-247}$	$125862^{+77039}_{-41119}$
Alt.	-914±118	$3.23^{+0.66}_{-0.61}$	$170^{+6}_{-7}$	$3258^{+264}_{-199}$	$64074^{+33512}_{-20659}$

$T_{max}$  = Theoretical Maximum Planetary Temperature

$T_{obs}$  = Observed Planetary Temperature (Assuming A=0.3)

$A_{obs}$  = Observed Albedo (Assuming T=0)

If a secondary eclipse is present, the system is likely an EB if  $T_{obs} \gg T_{max}$  AND  $A_{obs} \gg 1.0$

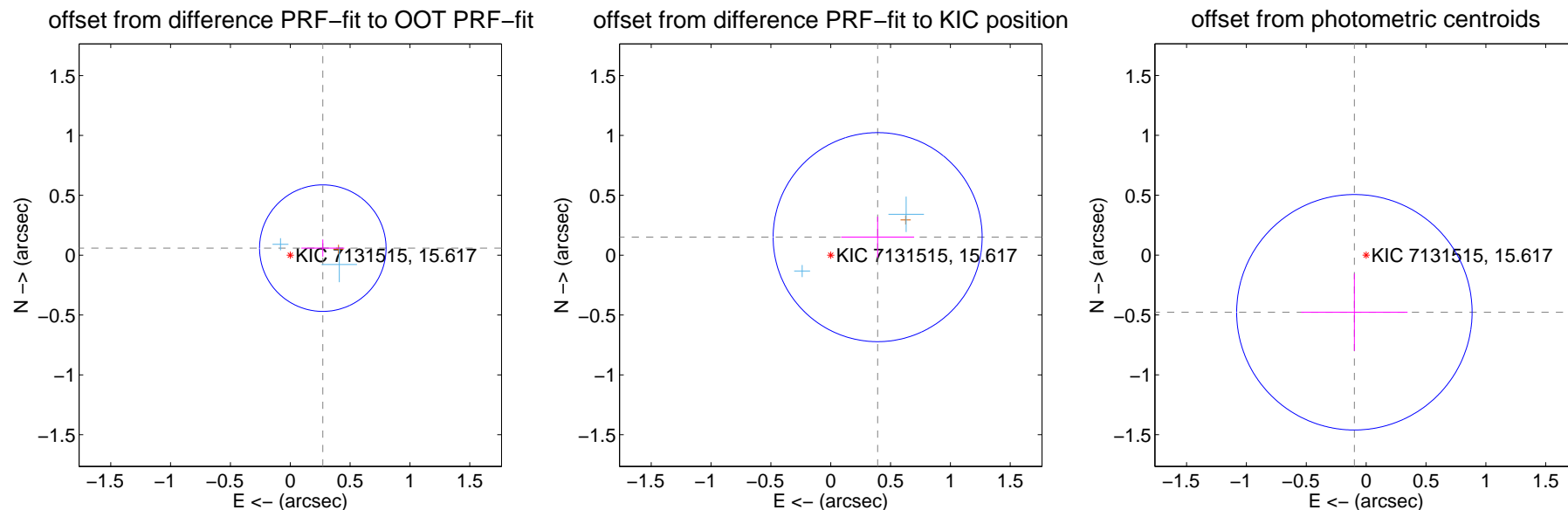
## DV Centroid Data

Supplemental centroid analysis for 007131515-04. Kepler magnitude: 15.62. Transit SNR 8.20

There are 2 quarters with good PRF difference image offsets

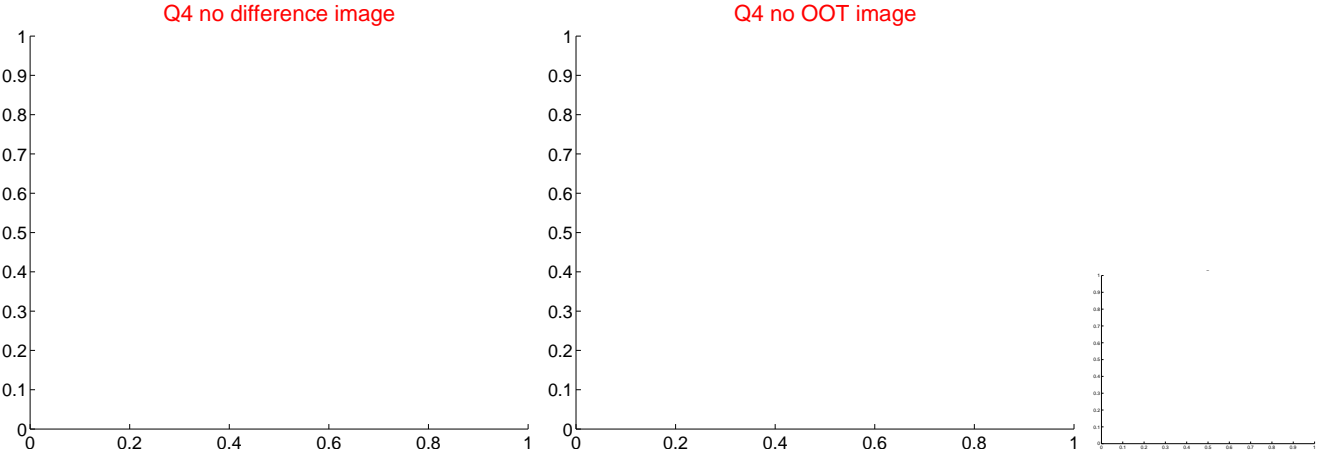
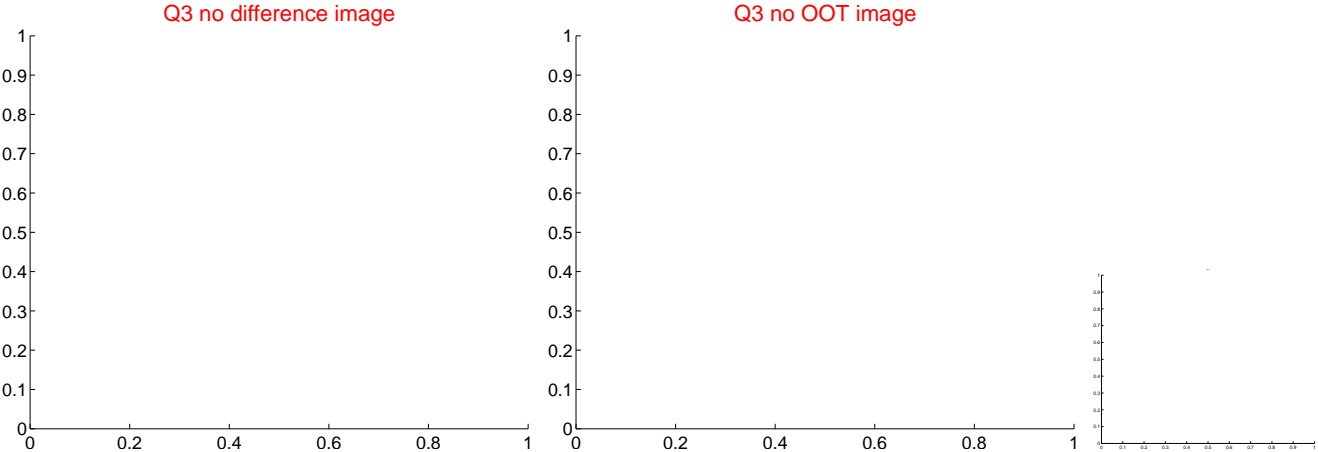
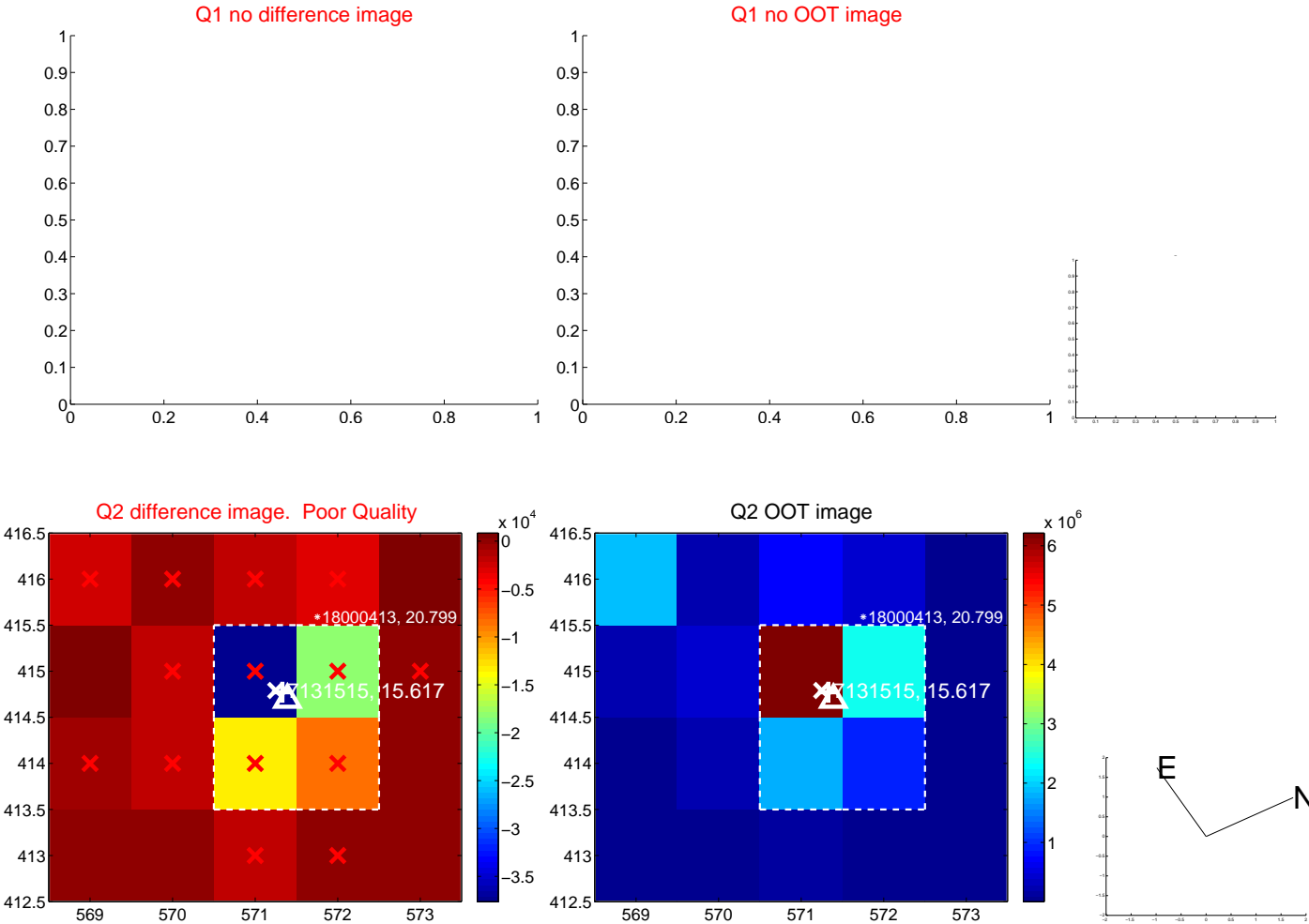
The direct PRF centroid is offset from the target star catalog position by about 0.47 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.278 \pm 0.176$	1.58	$-0.272 \pm 0.180$	$0.059 \pm 0.072$
PRF-fit source offset from KIC position	$0.420 \pm 0.291$	1.44	$-0.392 \pm 0.305$	$0.150 \pm 0.171$
photometric centroid source offset	$0.49 \pm 0.33$	1.49	$0.10 \pm 0.44$	$-0.48 \pm 0.32$

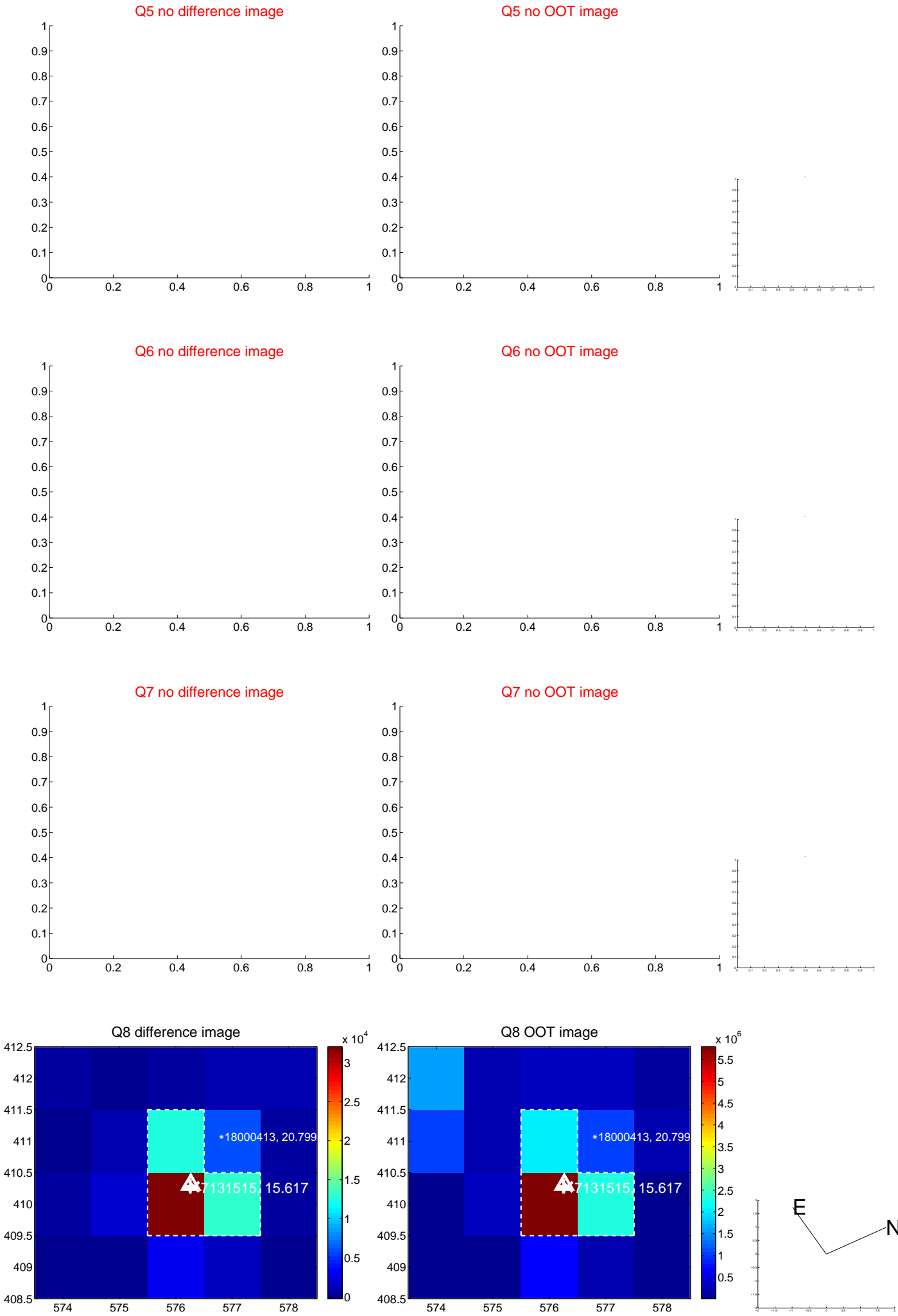


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.

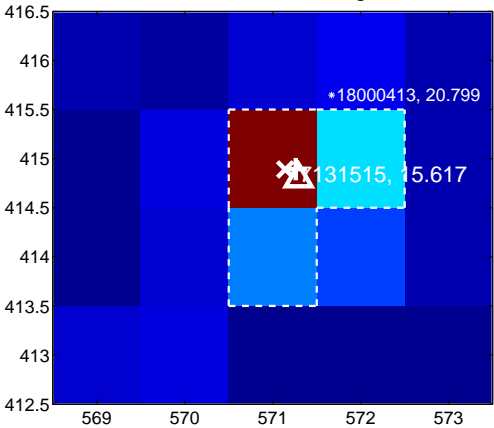
Q13 no difference image



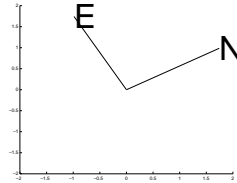
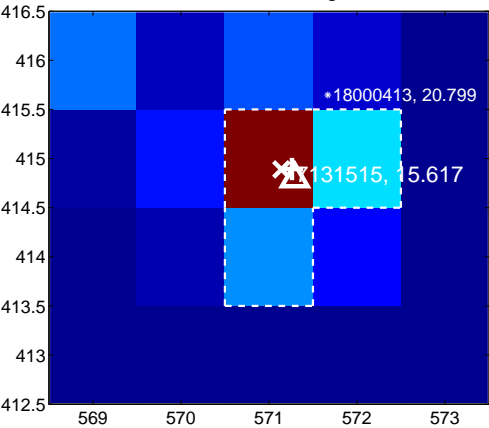
Q13 no OOT image



Q14 difference image



Q14 OOT image



Q15 no difference image



Q15 no OOT image



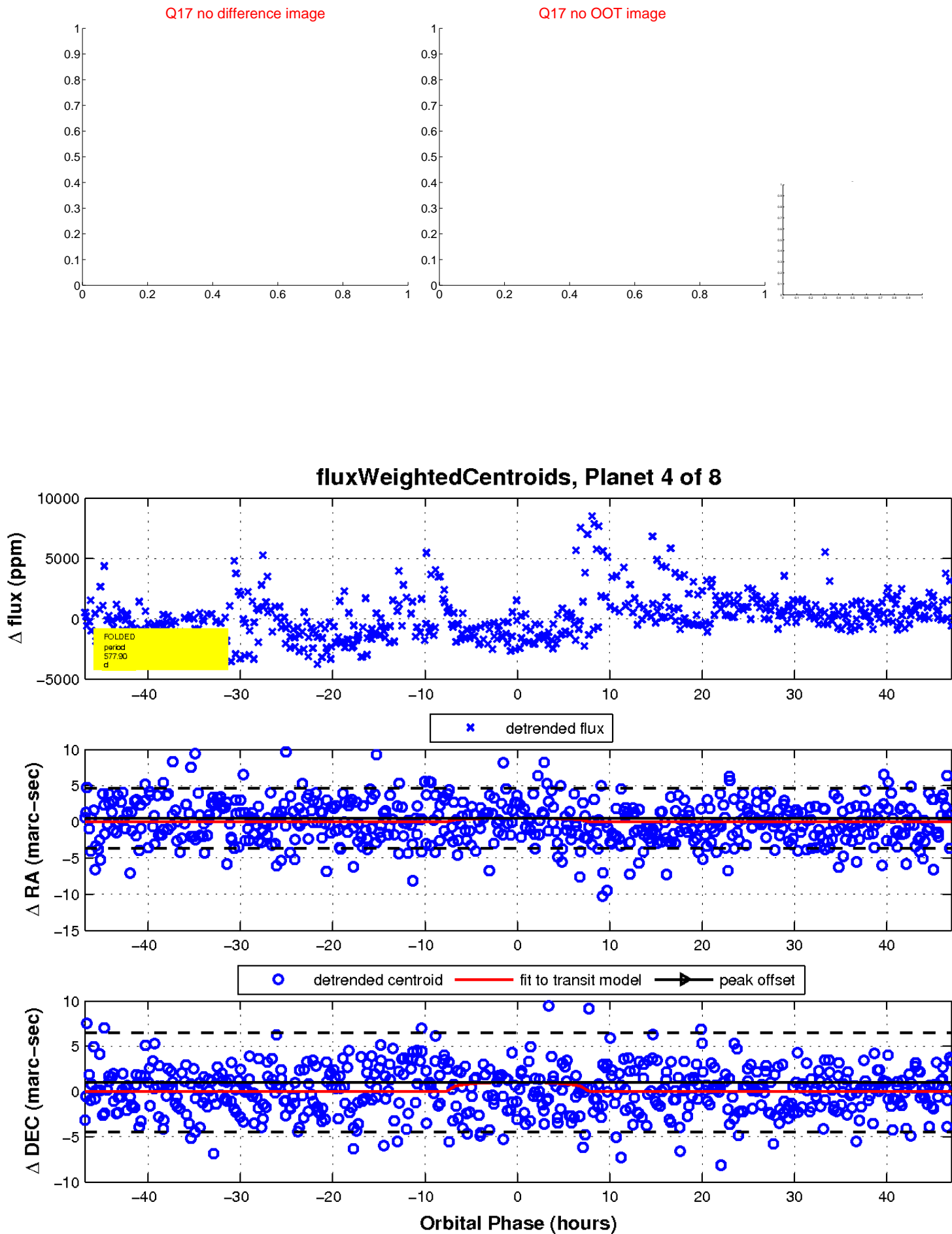
Q16 no difference image



Q16 no OOT image

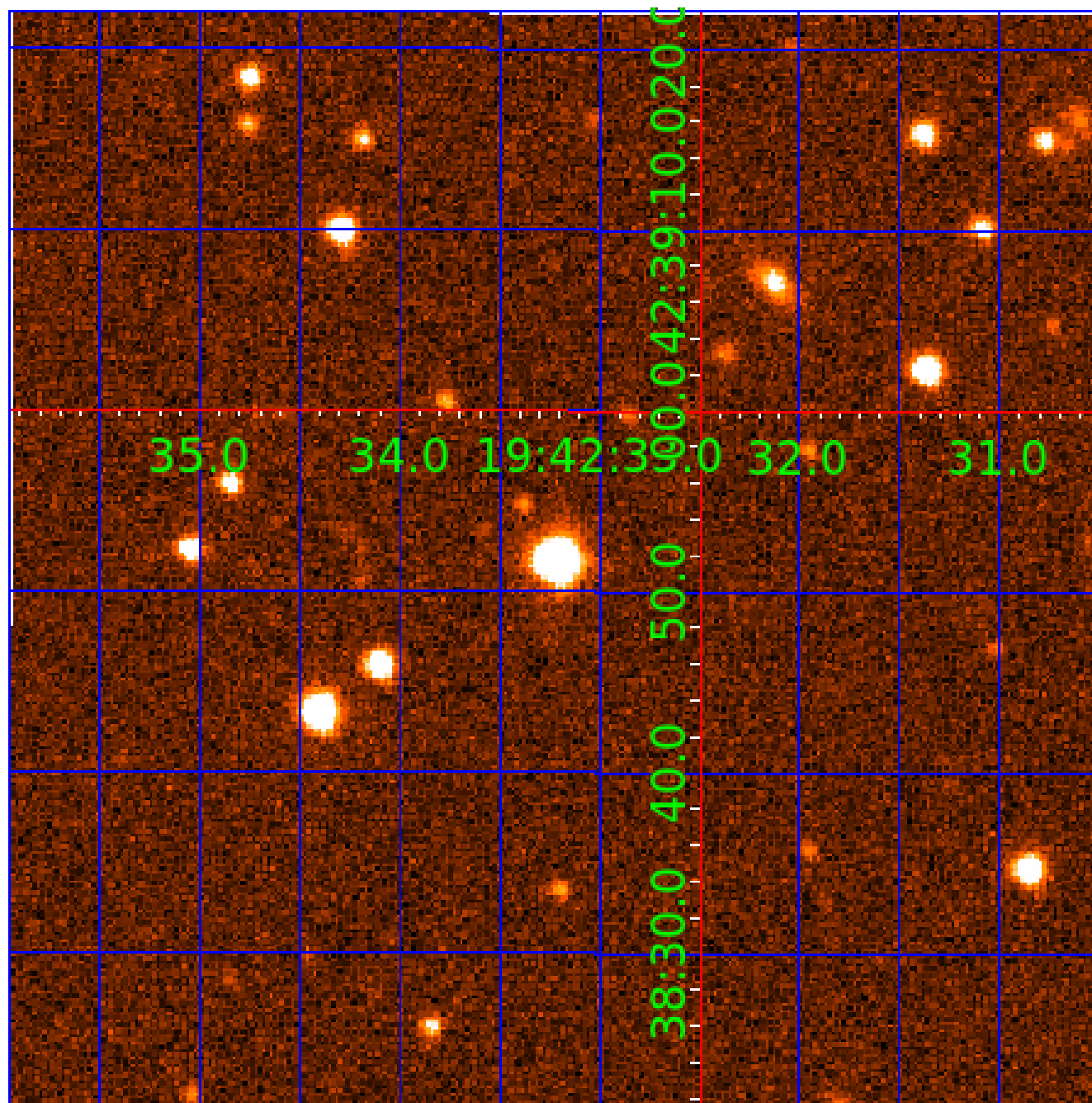


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 007131515

## Q1-17 DR25 TCE Parameters

TCE	Run Type	KOI?	Period (Days)	Epoch (BKJD)	Depth (ppm)	Duration (Hours)	MES	SNR	$R_{\star}$ ( $R_{\odot}$ )	$T_{\star}$ (K)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007131515-01	OBS	No	473.144452	393.439069	771.8	4.103	15.9	2.2	0.61	3838	1.85	0.07
007131515-02	OBS	No	577.200600	407.602036	9650.8	16.845	14.0	22.4	0.61	3838	7.21	0.06
007131515-04	OBS	No	577.895819	209.085272	2898.9	15.668	11.9	8.2	0.61	3838	3.33	0.06
007131515-05	OBS	No	314.278701	328.888523	1207.0	6.263	10.7	4.2	0.61	3838	2.22	0.12
007131515-06	OBS	No	315.192673	219.225711	2649.6	7.659	12.0	7.2	0.61	3838	3.72	0.12
007131515-07	OBS	No	214.102497	329.331944	2065.9	3.462	12.6	8.5	0.61	3838	2.67	0.21
007131515-08	OBS	No	614.286037	305.165108	2458.8	10.768	11.9	7.0	0.61	3838	3.02	0.05

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007131515-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
007131515-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
007131515-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
007131515-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
007131515-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_TER_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
007131515-07	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—MOD_NONUNIQ_DV—MOD_POS_DV—HALO_GHOST
007131515-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS

**Notes:** OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

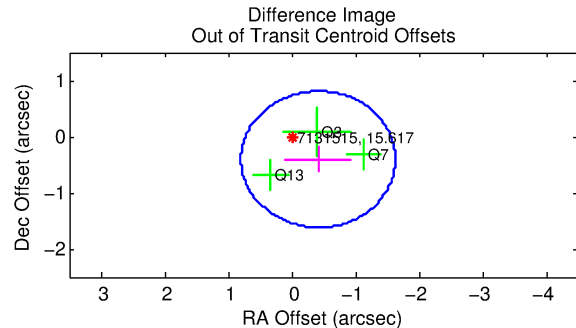
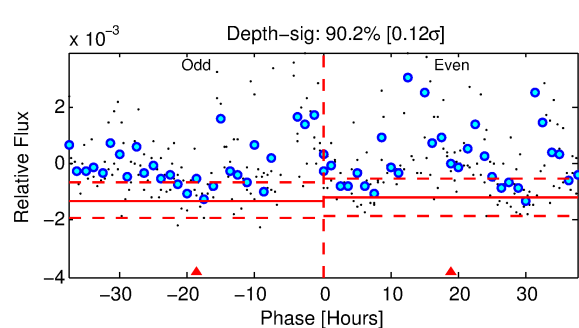
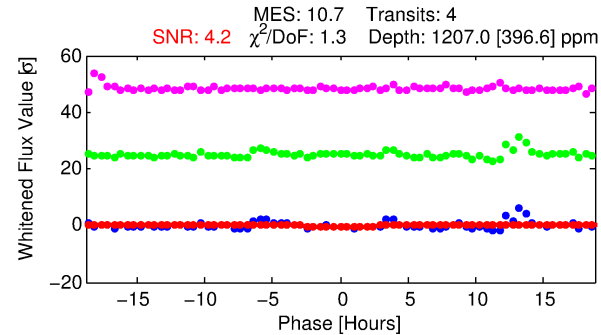
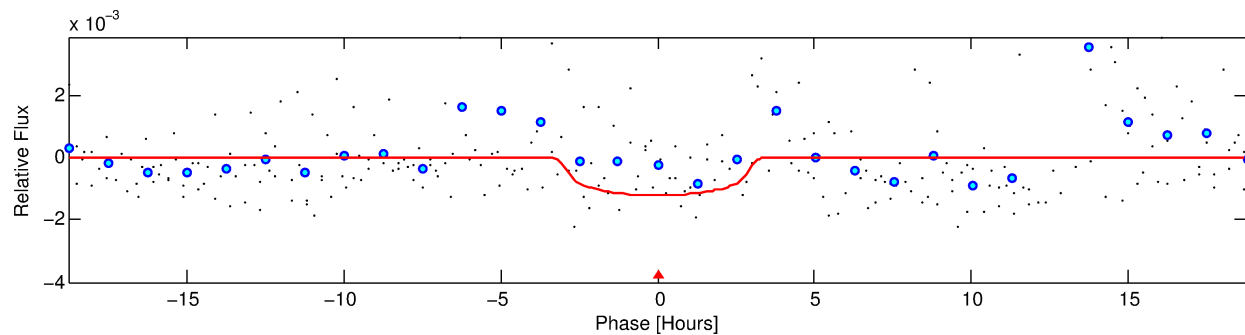
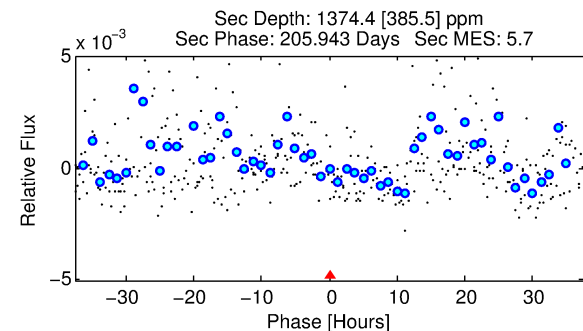
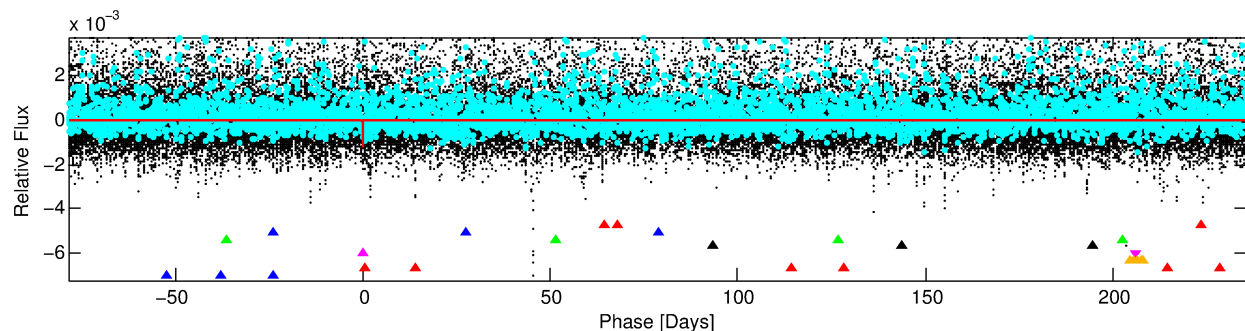
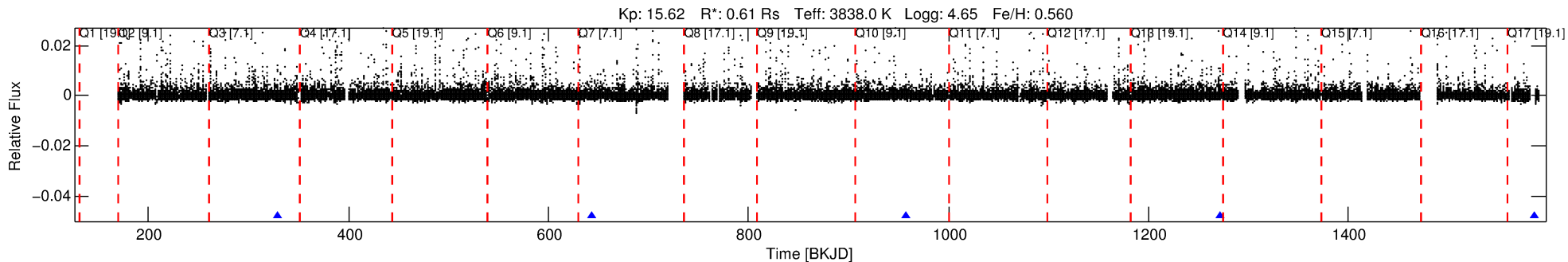
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 007131515-05

No Significant Match Found

# DV One-Page Summary

KIC: 7131515 Candidate: 5 of 8 Period: 314.279 d



## DV Fit Results:

Period = 314.27870 [0.01033] d  
Epoch = 328.8885 [0.0213] BKJD  
Rp/R\* = 0.0333 [0.0425]  
a/R\* = 307.86 [1214.07]  
b = 0.65 [3.57]  
Seff = 0.12 [0.02]  
Teq = 151 [8] K  
Rp = 2.22 [2.84] Re  
a = 0.7672 [0.0706] AU  
Ag = 90144.74 [231481.32] [0.39σ]  
Teffp = 4048 [2600] K [1.50σ]

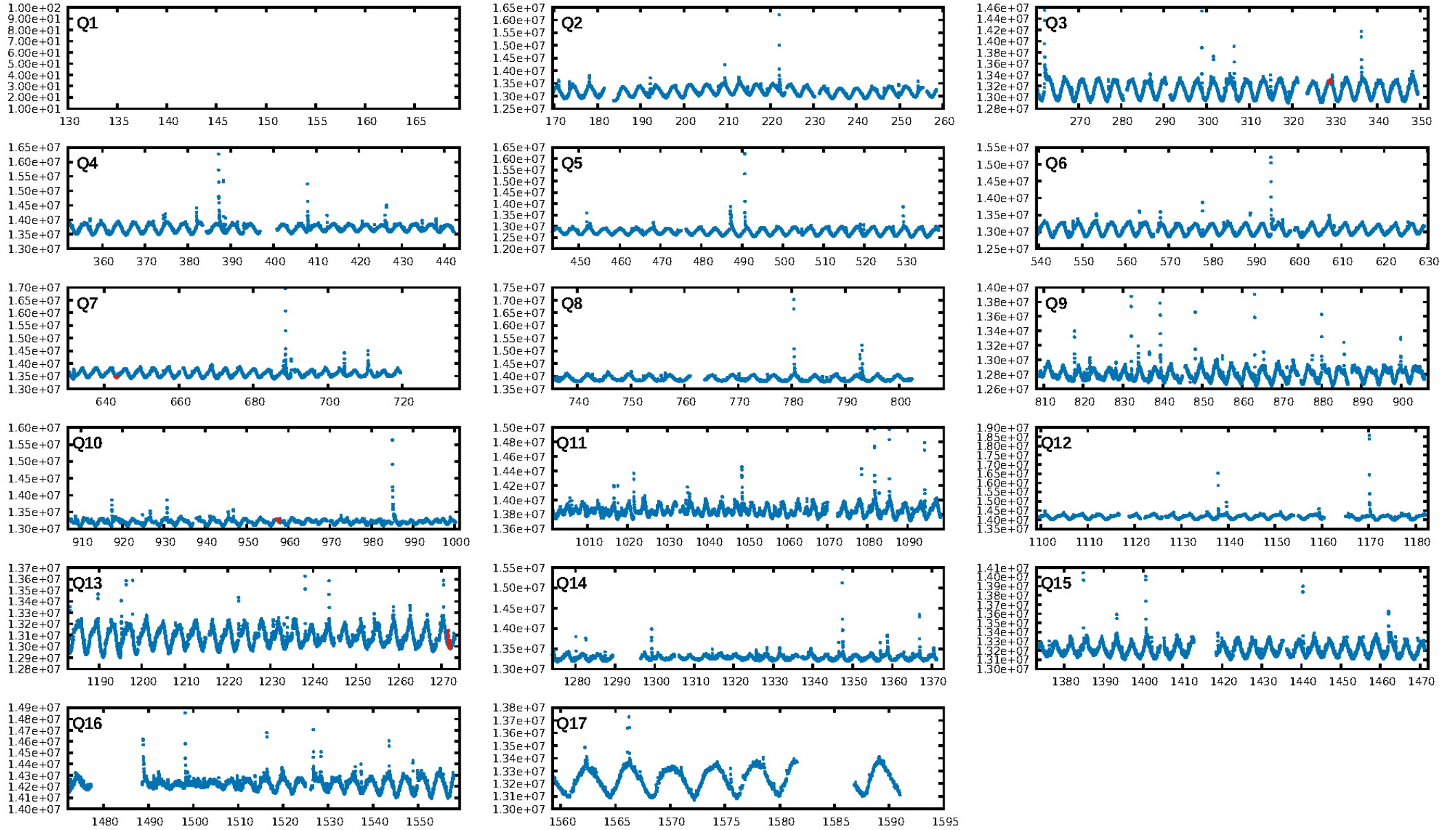
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [335.95σ]  
LongPeriod-sig: 97.3% [2.22σ]  
ModelChiSquare2-sig: 78.2%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 3.82e-09**  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: -5.855  
Centroid-sig: 10.0%  
Centroid-so: 1.339 arcsec [1.26σ]  
OotOffset-rm: 0.580 arcsec [1.43σ]  
KicOffset-rm: 0.538 arcsec [1.79σ]  
OotOffset-st: 0/2/0/1 [3]  
KicOffset-st: 0/2/0/1 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 0.75 [3/4]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 03-Feb-2016 08:36:37 Z

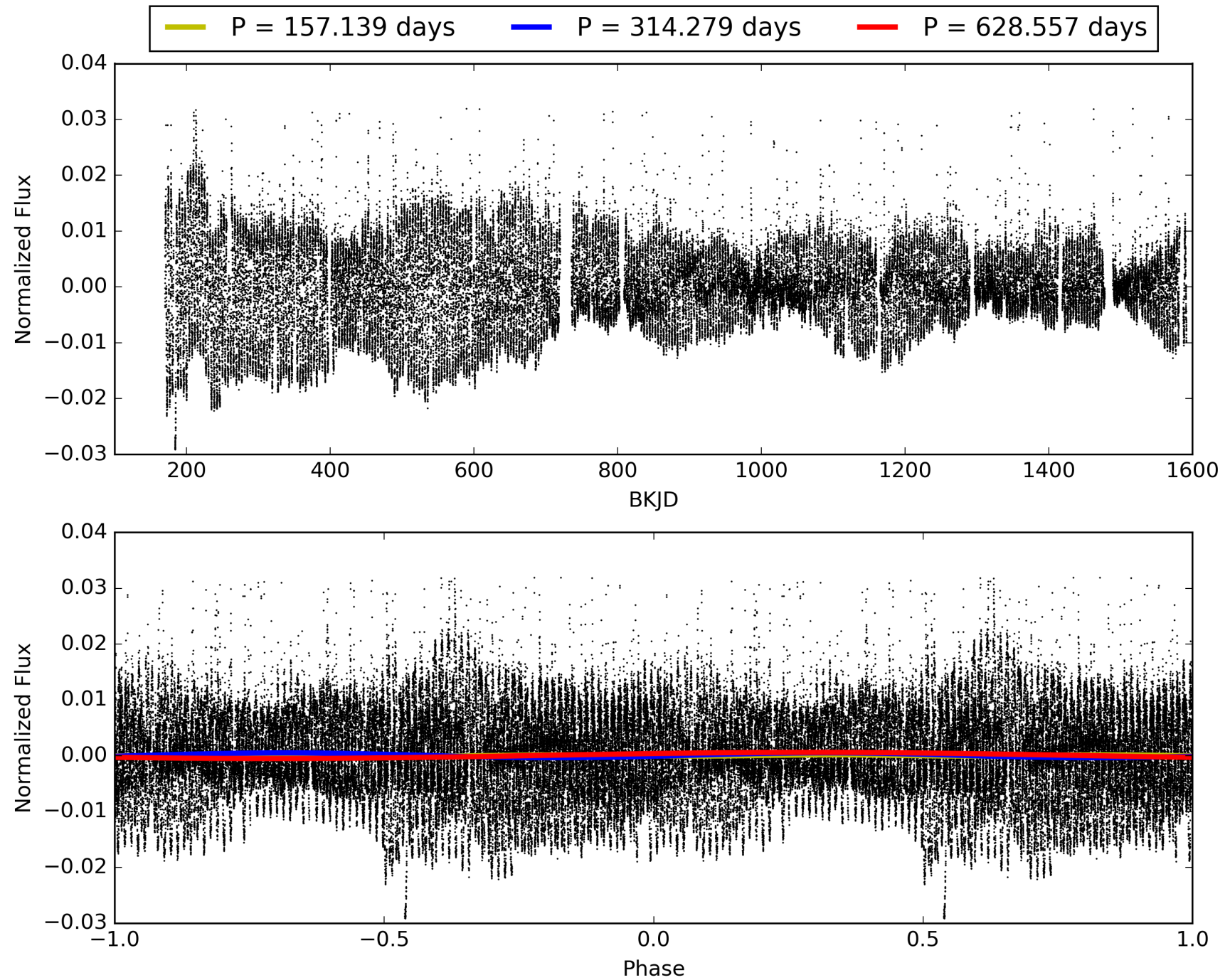
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 007131515-05, PDC Light Curves





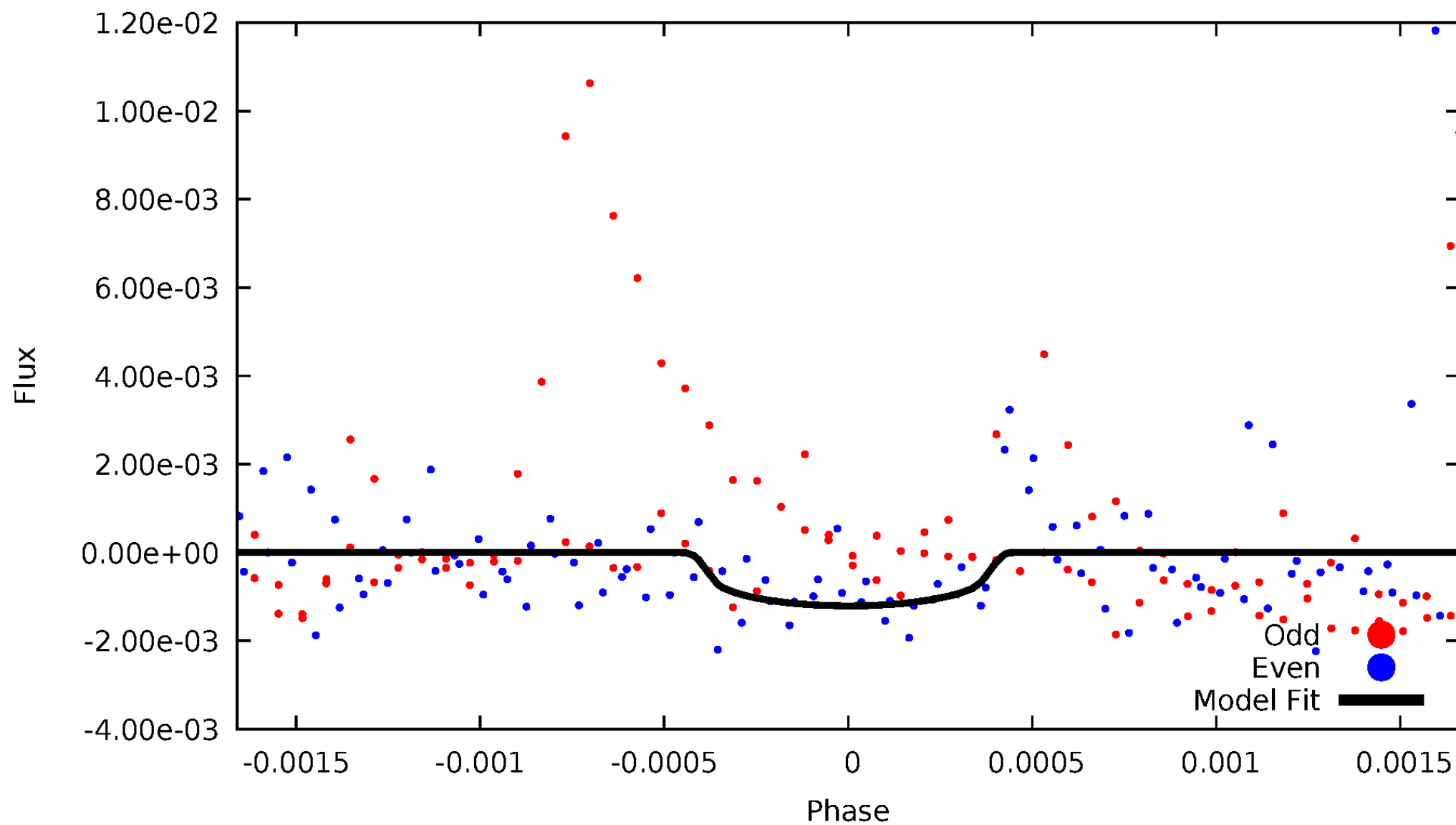
# TCE 007131515-05





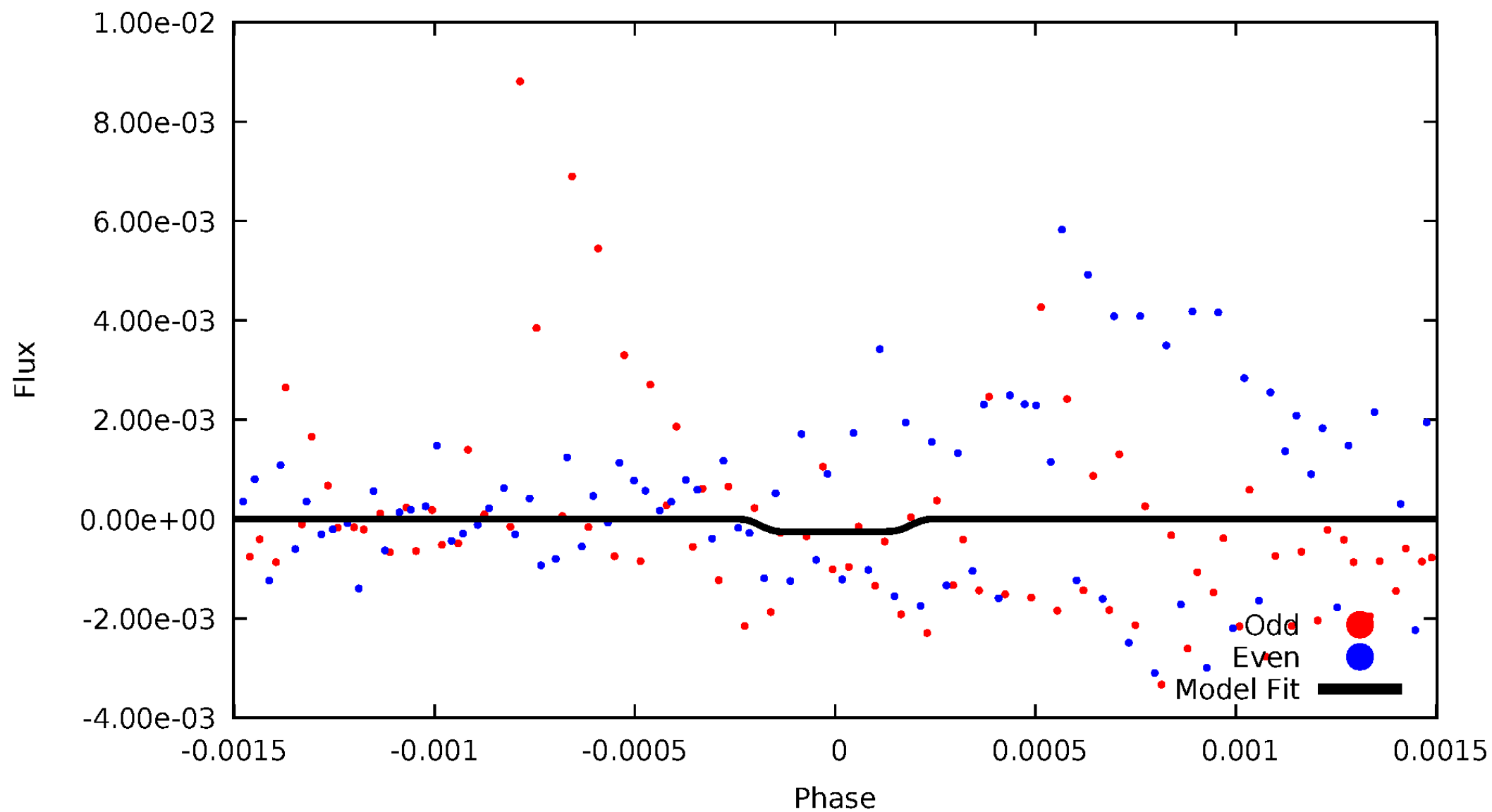
# DV Odd/Even

TCE 007131515-05



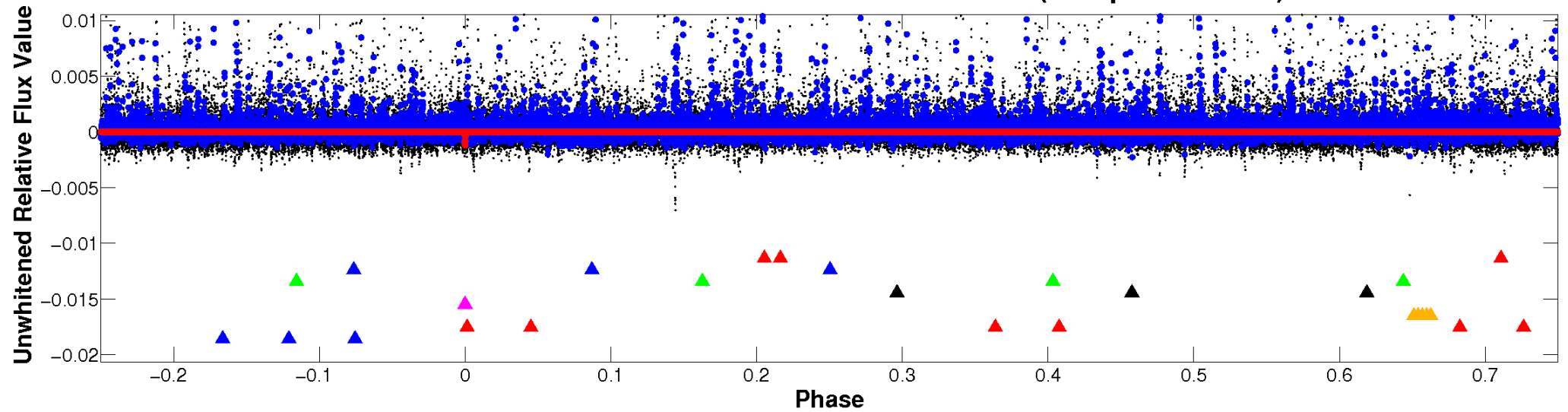
# ALT Odd/Even

TCE 007131515-05

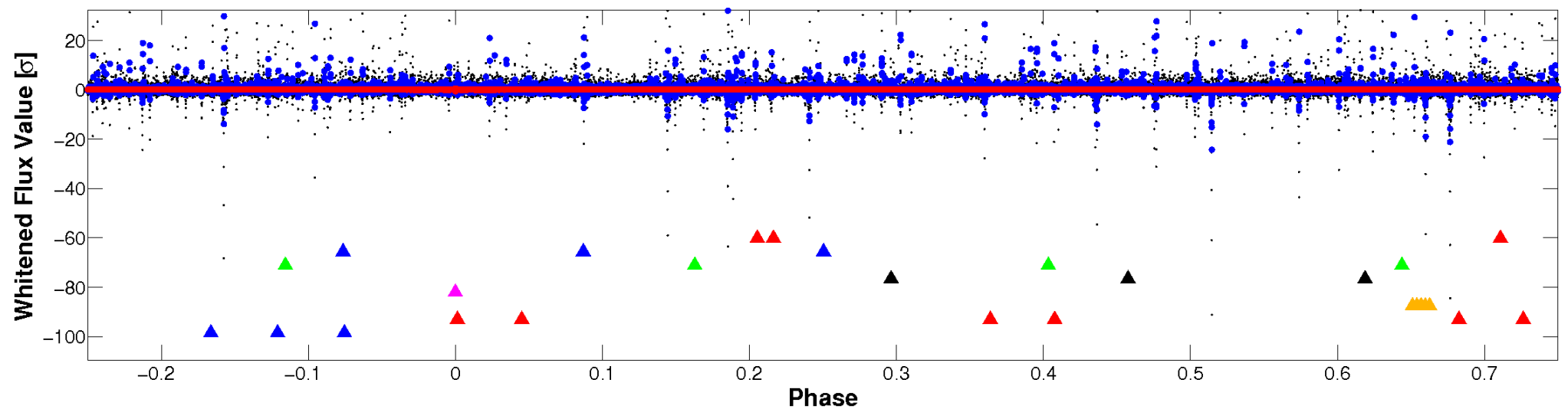


# Non-Whitened Vs. Whitened Light Curve

Planet 5 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

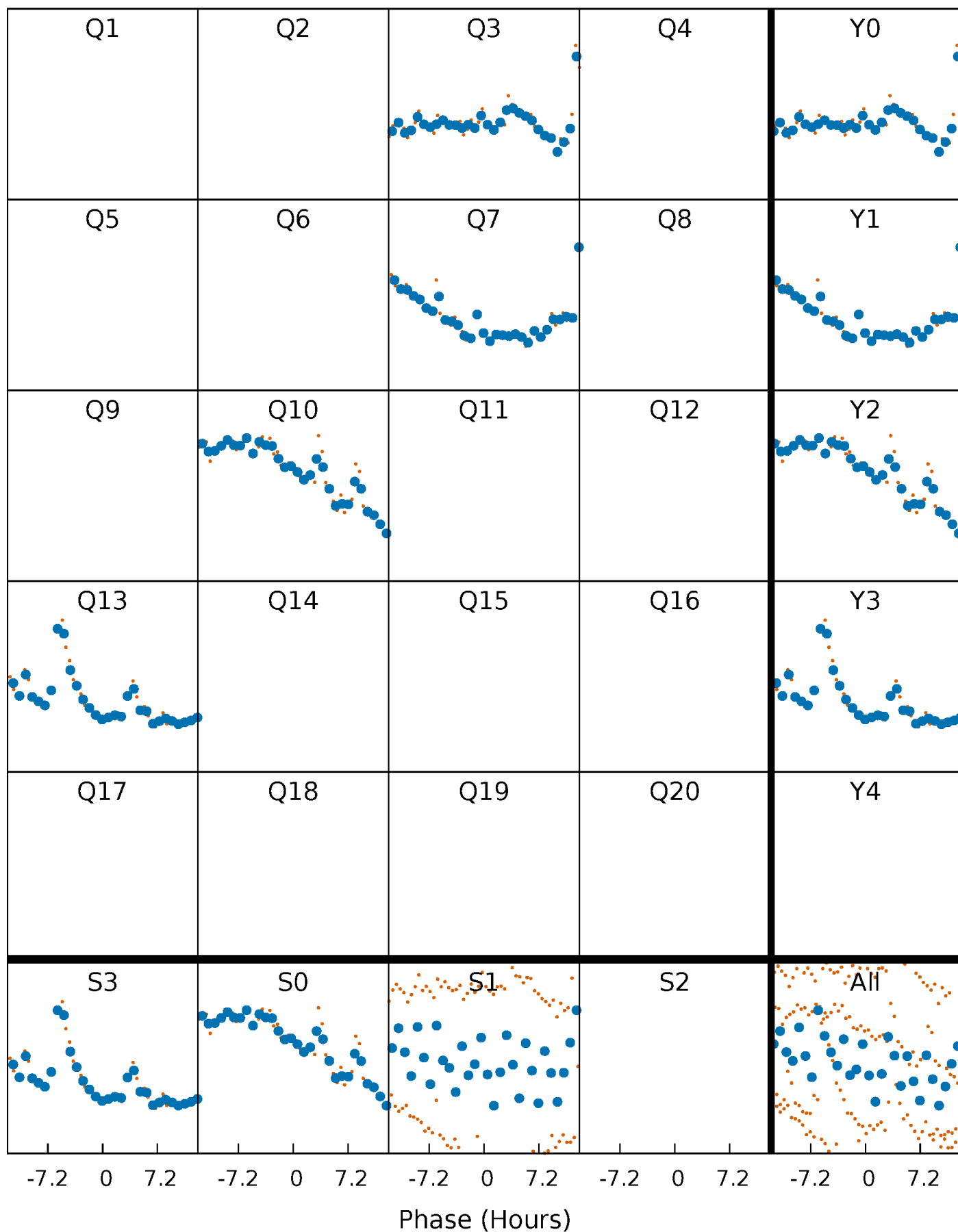


Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)



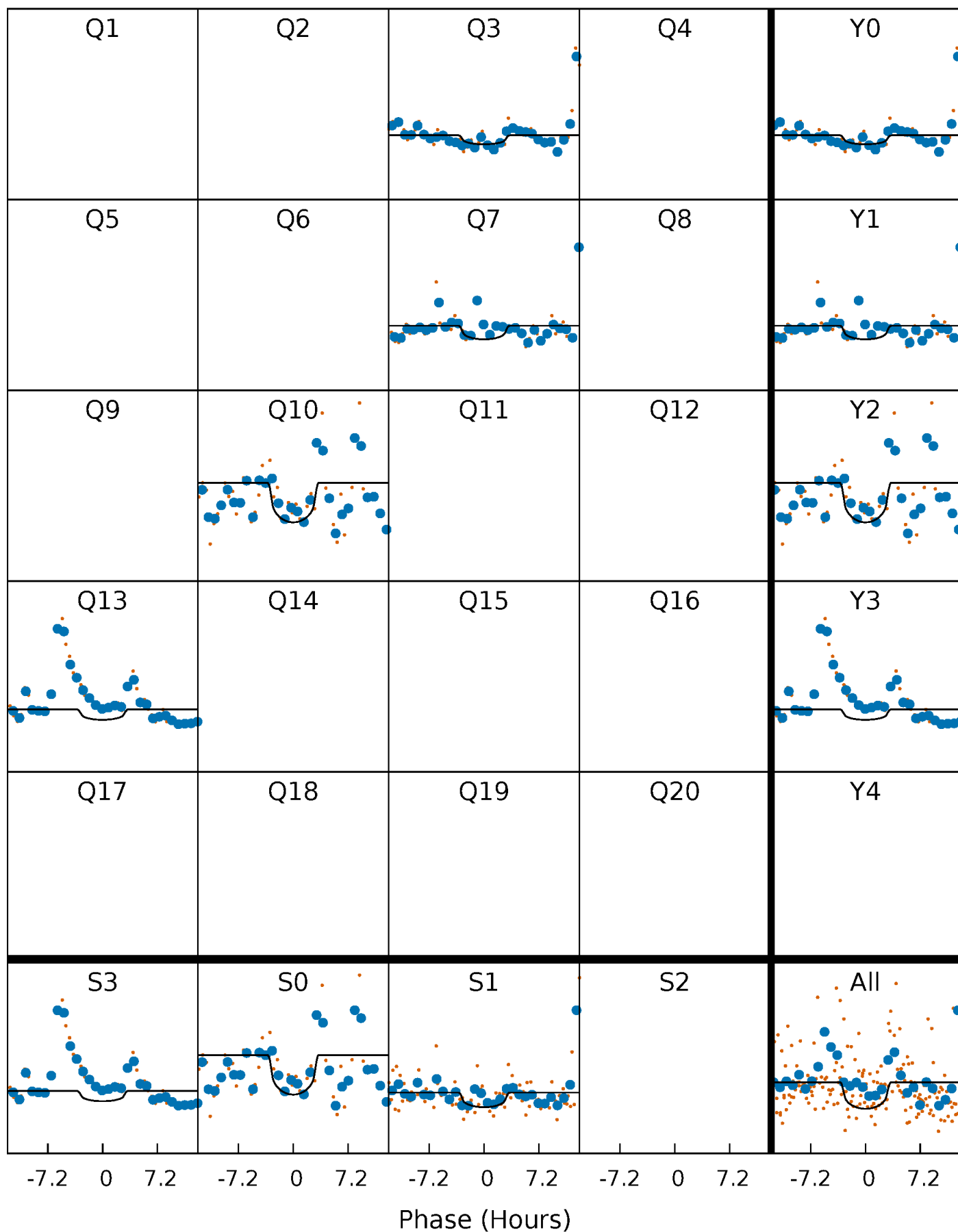
# PDC Quarter-Phased Transit Curves

TCE 007131515-05     $P=314.278701$  Days     $T_0=328.888523$  (BKJD)



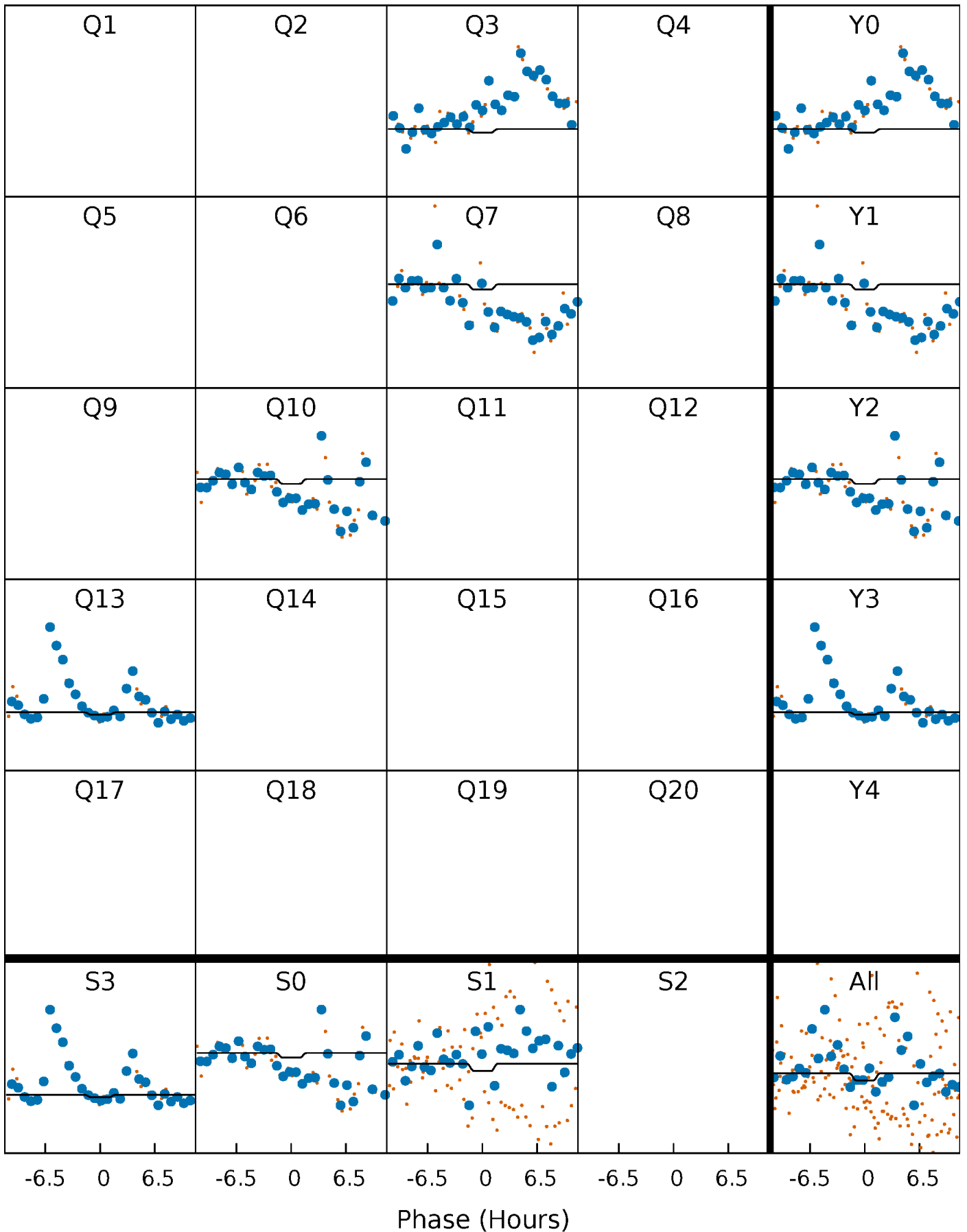
# DV Quarter-Phased Transit Curves

TCE 007131515-05     $P=314.278701$  Days     $T_0=328.888523$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

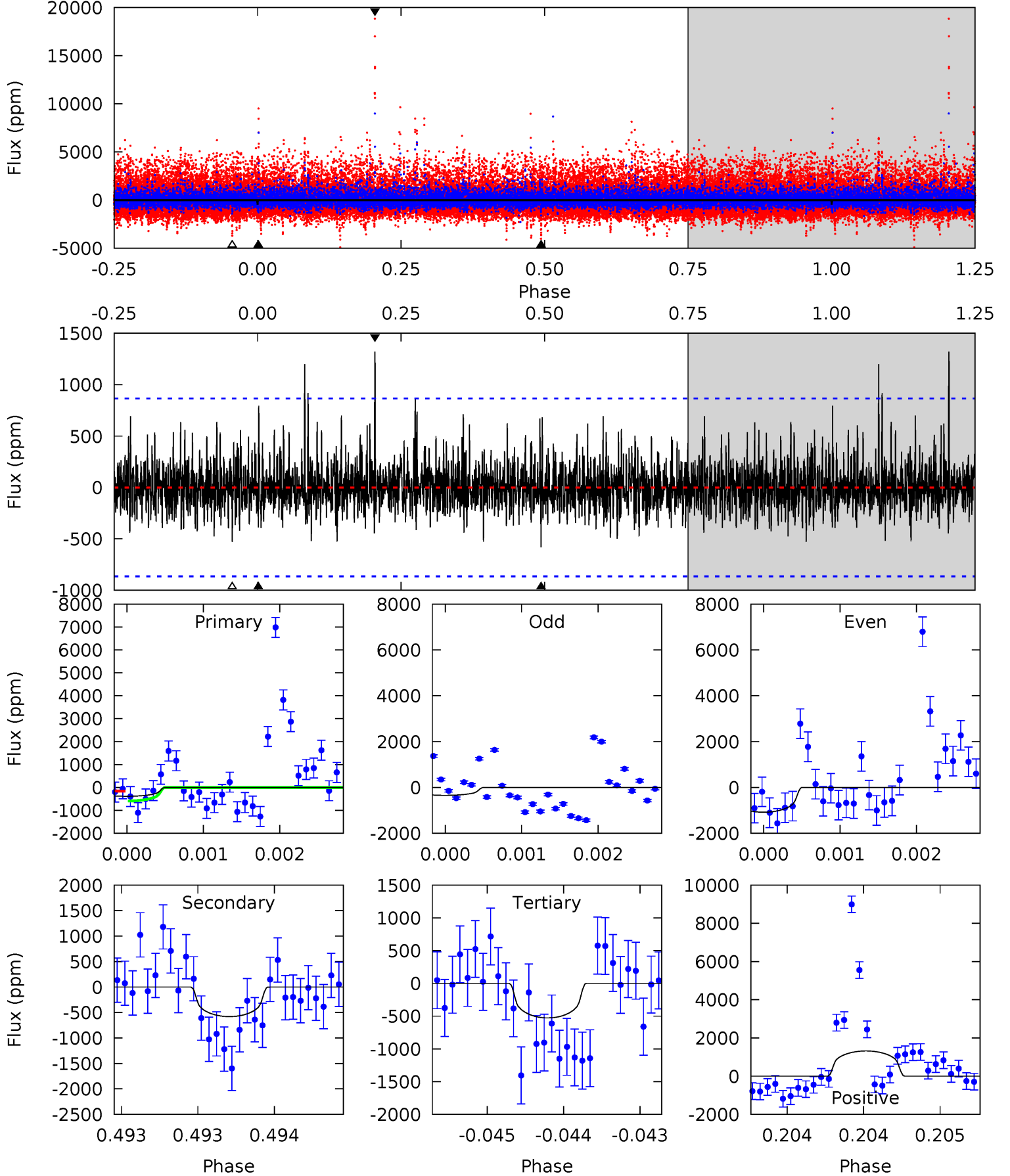
TCE 007131515-05     $P=314.295397$  Days     $T_0=328.844243$  (BKJD)



# DV Model-Shift Uniqueness Test

007131515-05,  $P = 314.278701$  Days,  $E = 14.609822$  Days

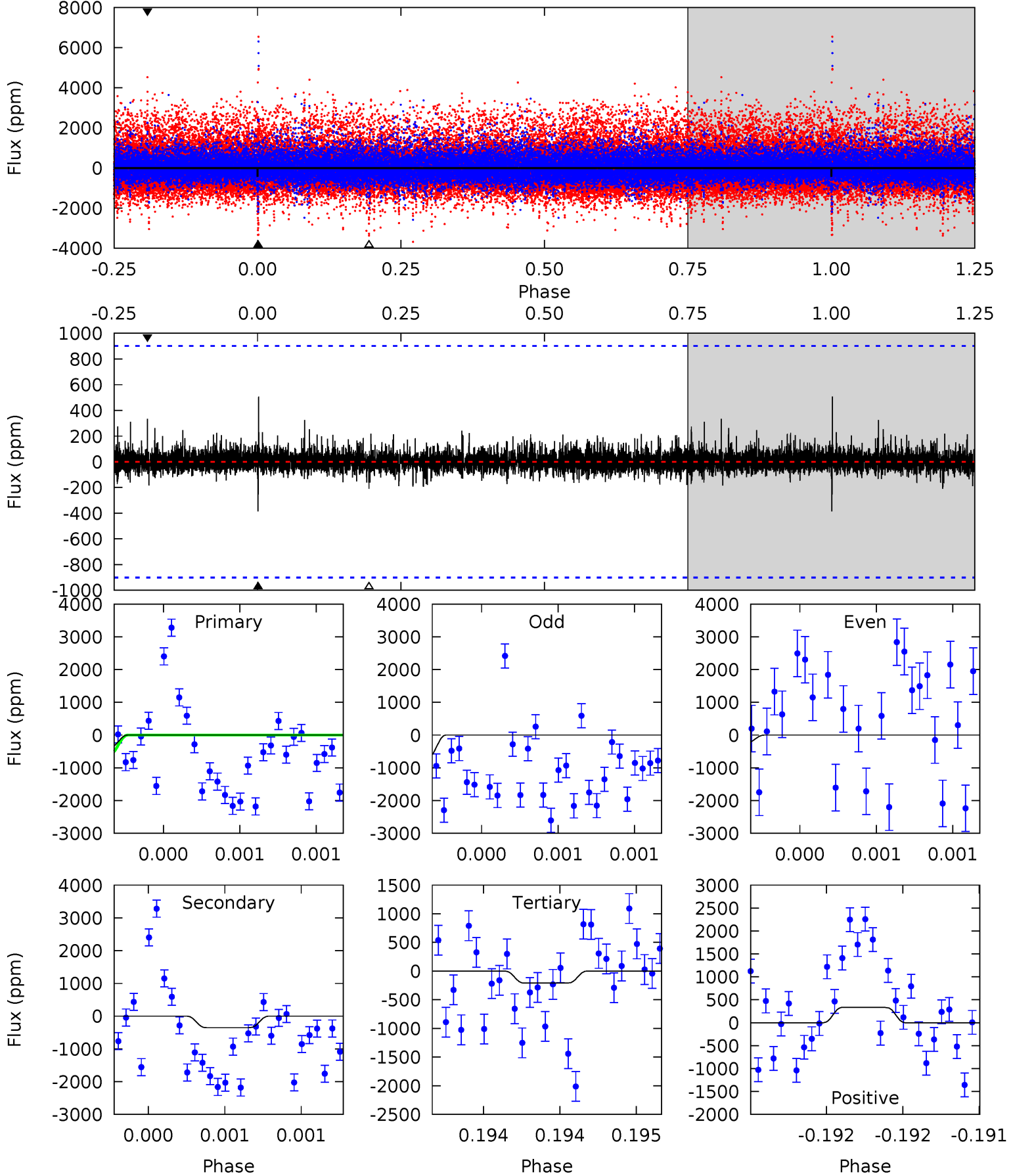
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
2.45	3.67	3.34	8.36	5.47	3.33	1.19	-0.89	-5.91	0.34	-4.69	1.67	0.75	0.69	1.38



# Alt Model-Shift Uniqueness Test

007131515-05,  $P = 314.295397$  Days,  $E = 14.548846$  Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
2.39	2.19	1.30	2.06	5.59	3.51	0.35	1.09	0.33	0.89	0.13	1.29	0.33	0.57	1.23





### Stellar Parameters For KIC 007131515

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3838^{+120}_{-147}$	$4.651^{+0.067}_{-0.018}$	$0.560^{+0.050}_{-0.300}$	$0.611^{+0.028}_{-0.070}$	$0.609^{+0.035}_{-0.060}$	$3.764^{+1.199}_{-0.268}$
	+3%/-4%	+1%/-0%	+9%/-54%	+5%/-11%	+6%/-10%	+32%/-7%
Source	KIC0	KIC0	KIC0	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 007131515-05 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	-581±158	$2.99^{+2.55}_{-1.94}$	$209^{+8}_{-9}$	$3118^{+1315}_{-502}$	$21588^{+154673}_{-15786}$
Alt.	-353±161	$2.33^{+2.11}_{-1.66}$	$209^{+8}_{-9}$	$3106^{+1694}_{-565}$	$19945^{+221743}_{-15223}$

$T_{max}$  = Theoretical Maximum Planetary Temperature

$T_{obs}$  = Observed Planetary Temperature (Assuming A=0.3)

$A_{obs}$  = Observed Albedo (Assuming T=0)

If a secondary eclipse is present, the system is likely an EB if  $T_{obs} \gg T_{max}$  AND  $A_{obs} \gg 1.0$

## DV Centroid Data

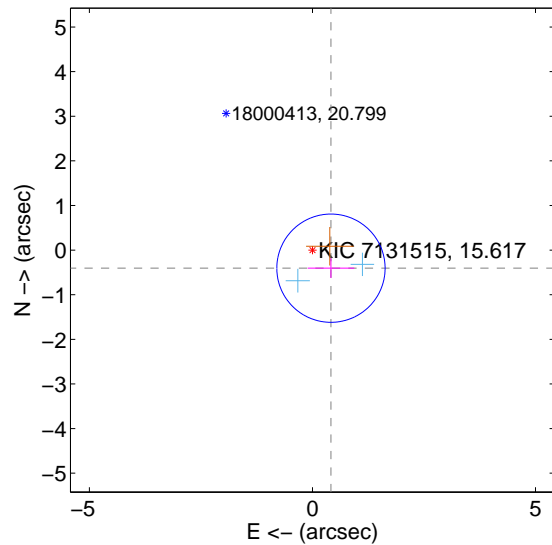
Supplemental centroid analysis for 007131515-05. Kepler magnitude: 15.62. Transit SNR 4.16

There are 2 quarters with good PRF difference image offsets

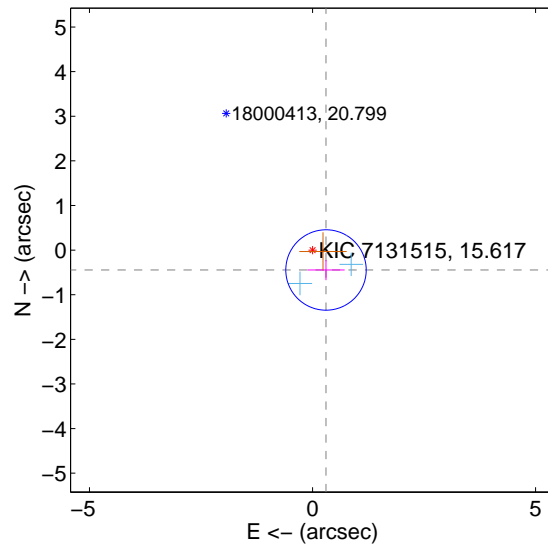
The direct PRF centroid is offset from the target star catalog position by about 0.08 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.580 \pm 0.404$	1.43	$-0.415 \pm 0.523$	$-0.406 \pm 0.221$
PRF-fit source offset from KIC position	$0.538 \pm 0.300$	1.79	$-0.302 \pm 0.417$	$-0.446 \pm 0.227$
photometric centroid source offset	$1.34 \pm 1.06$	1.26	$-0.48 \pm 1.03$	$-1.25 \pm 1.06$

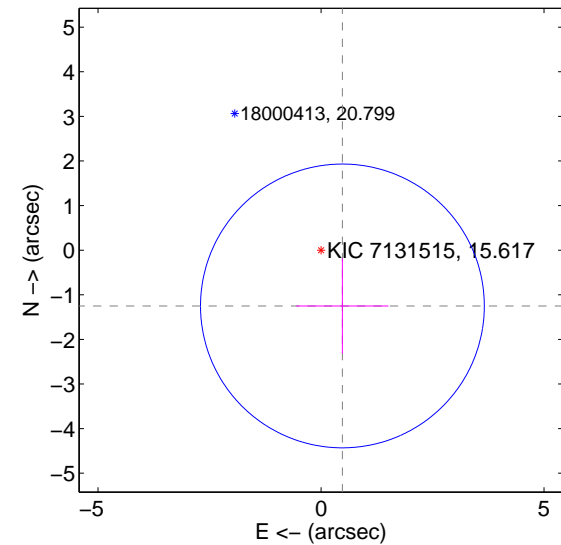
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



offset from photometric centroids



Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.

Q1 no difference image



Q1 no OOT image



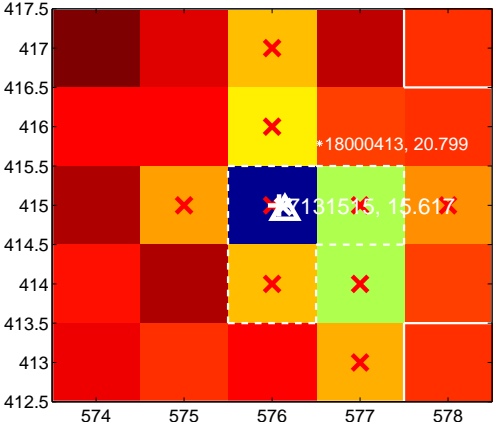
Q2 no difference image



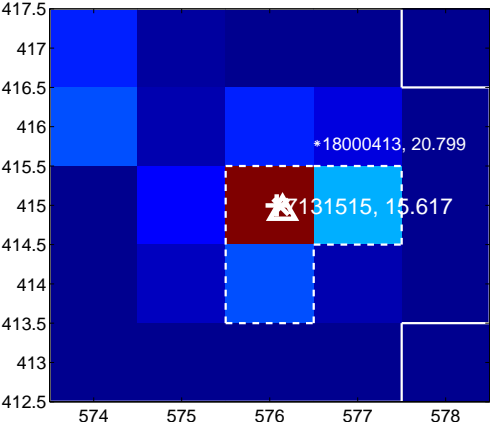
Q2 no OOT image



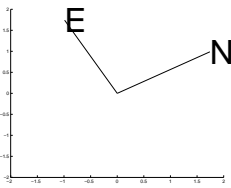
Q3 difference image. Poor Quality



Q3 OOT image



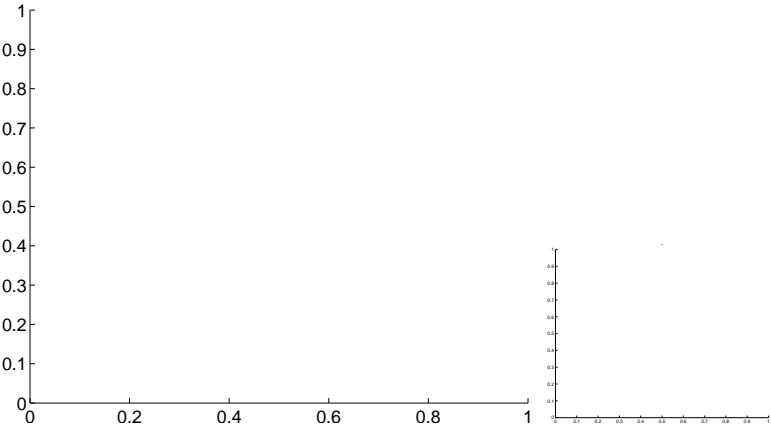
x 10<sup>6</sup>



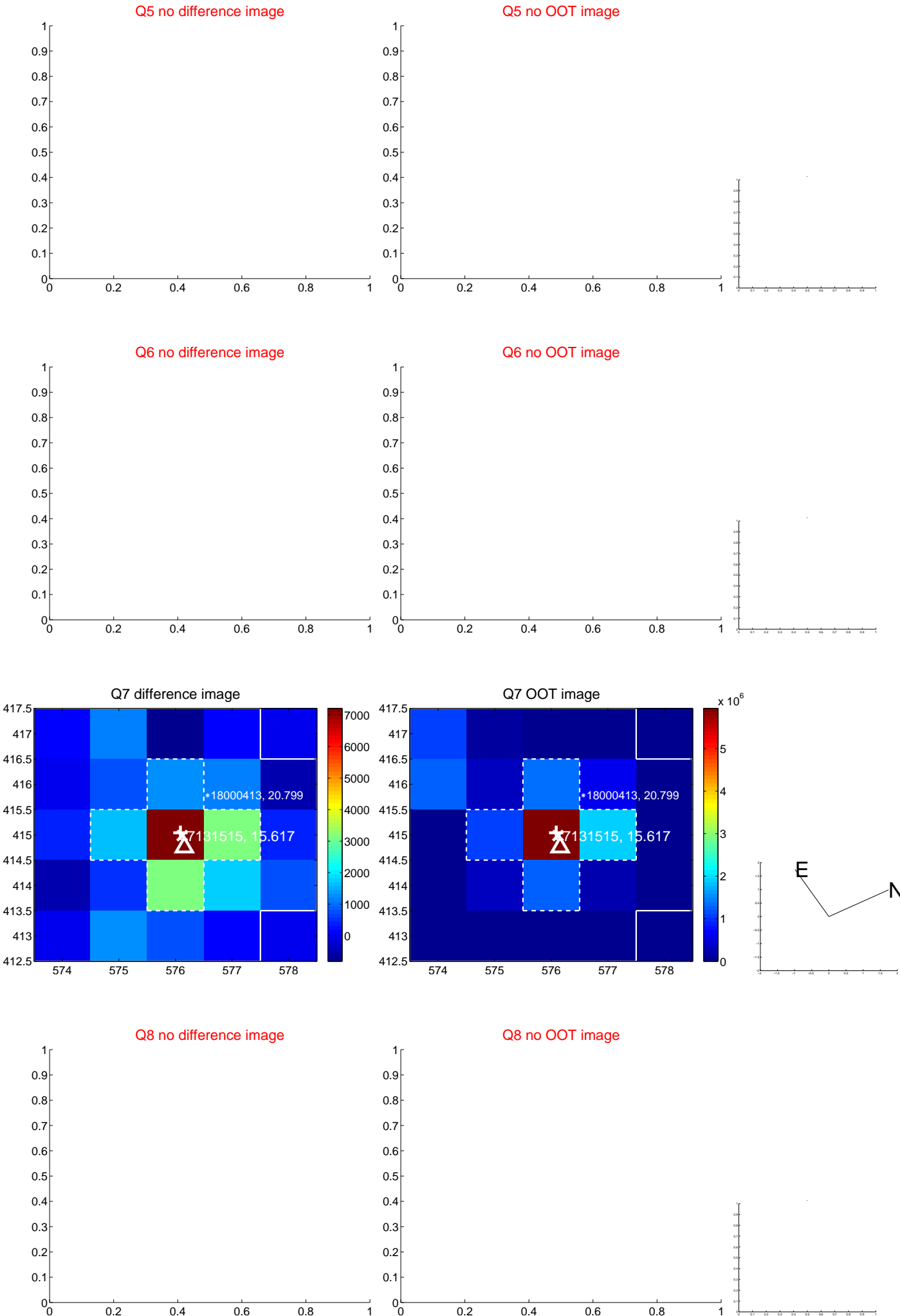
Q4 no difference image



Q4 no OOT image



white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.



white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.

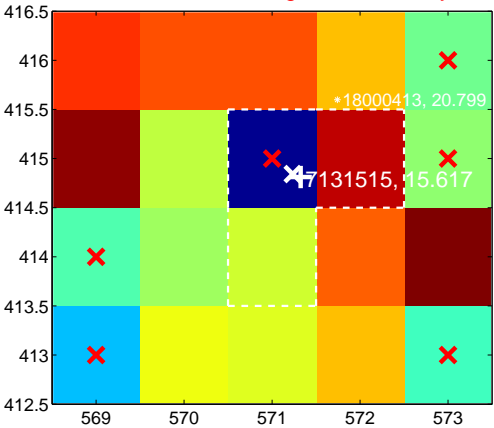
Q9 no difference image



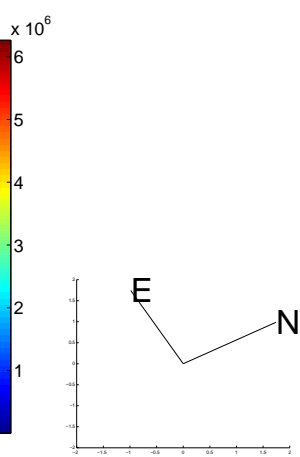
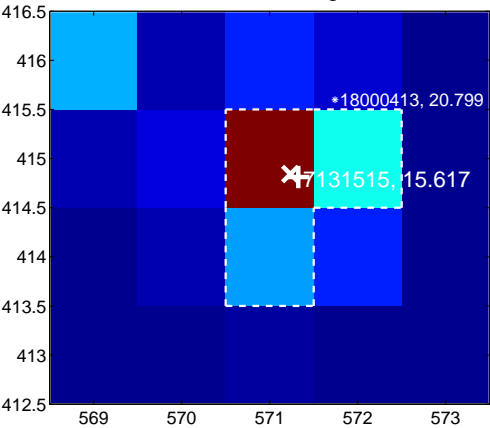
Q9 no OOT image



Q10 difference image. Poor Quality



Q10 OOT image



Q11 no difference image



Q11 no OOT image



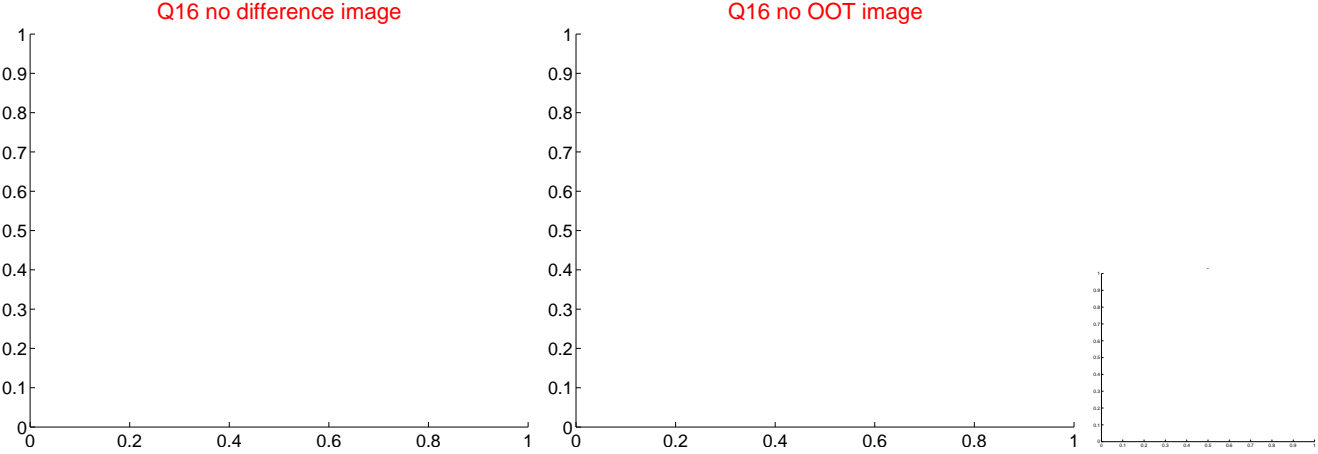
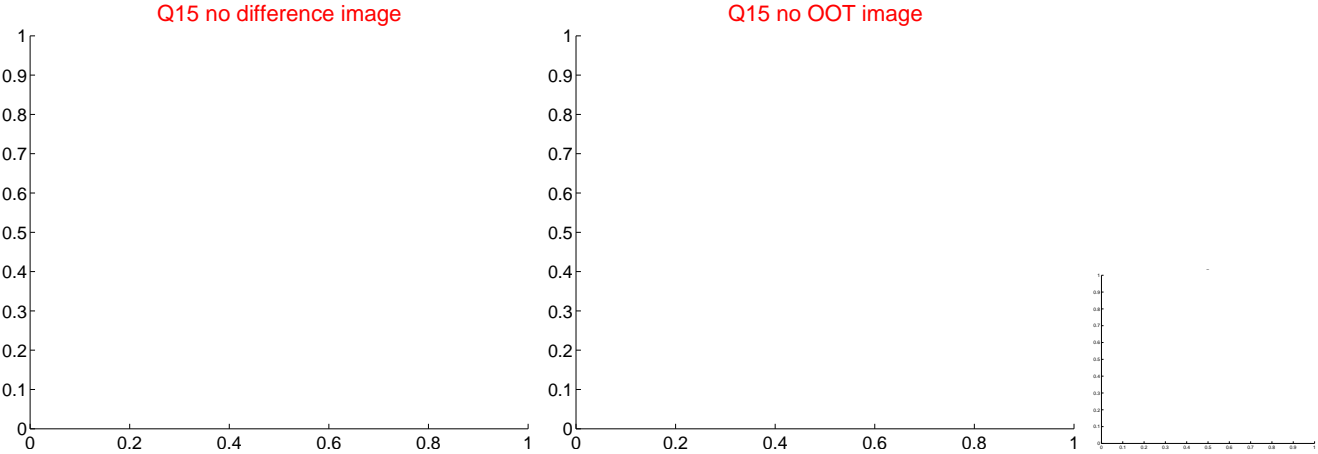
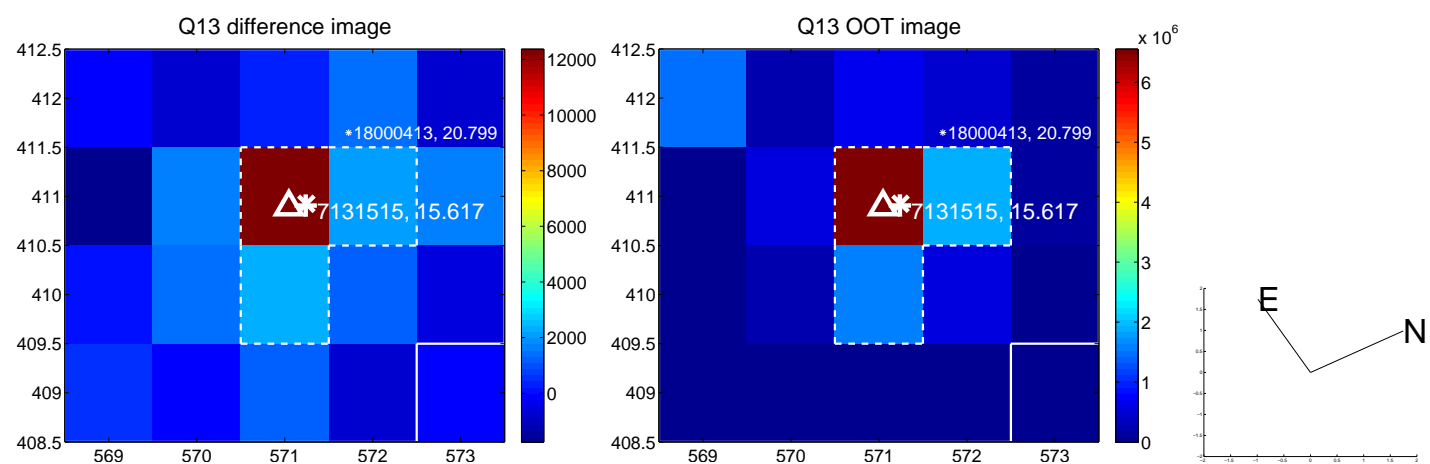
Q12 no difference image



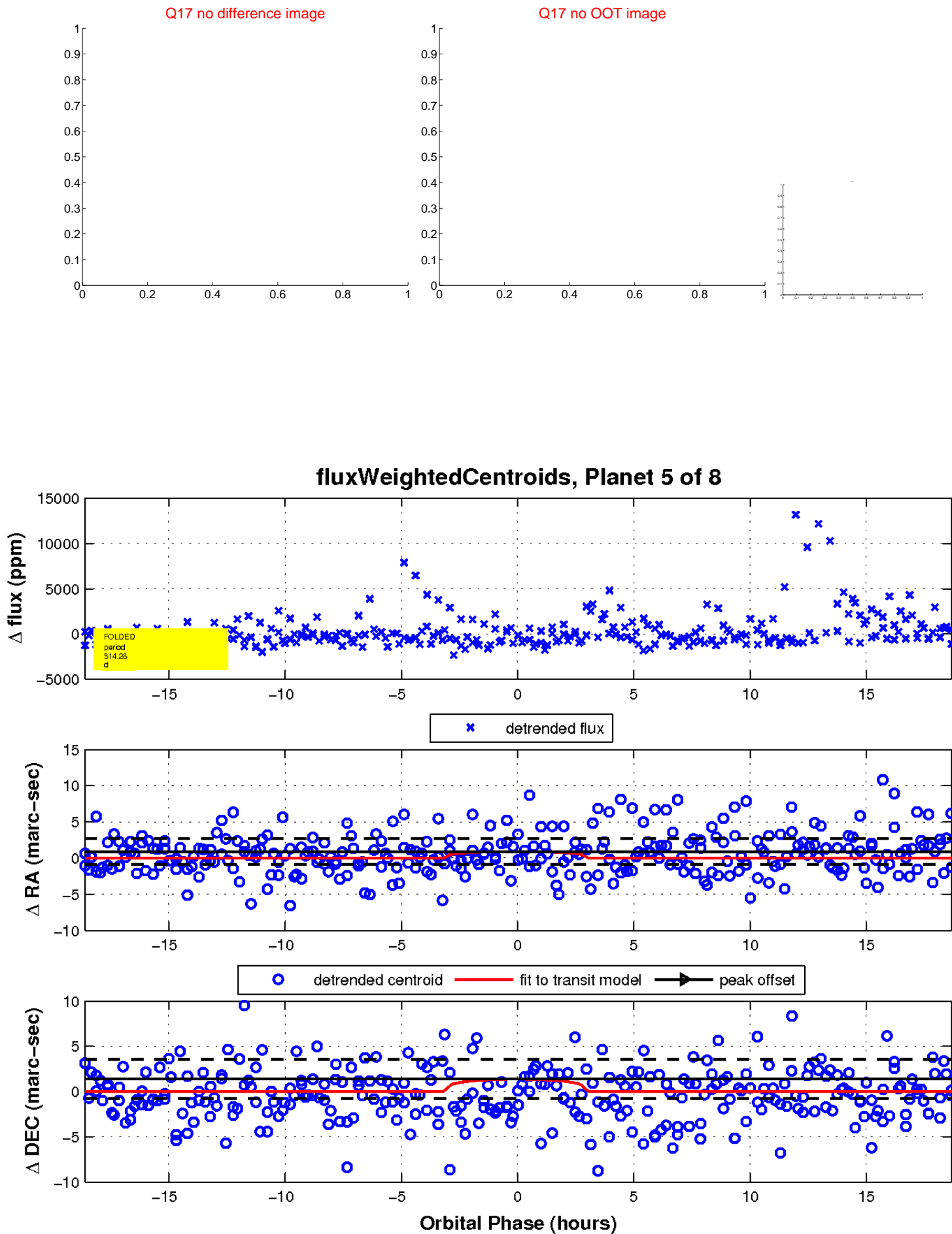
Q12 no OOT image



white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

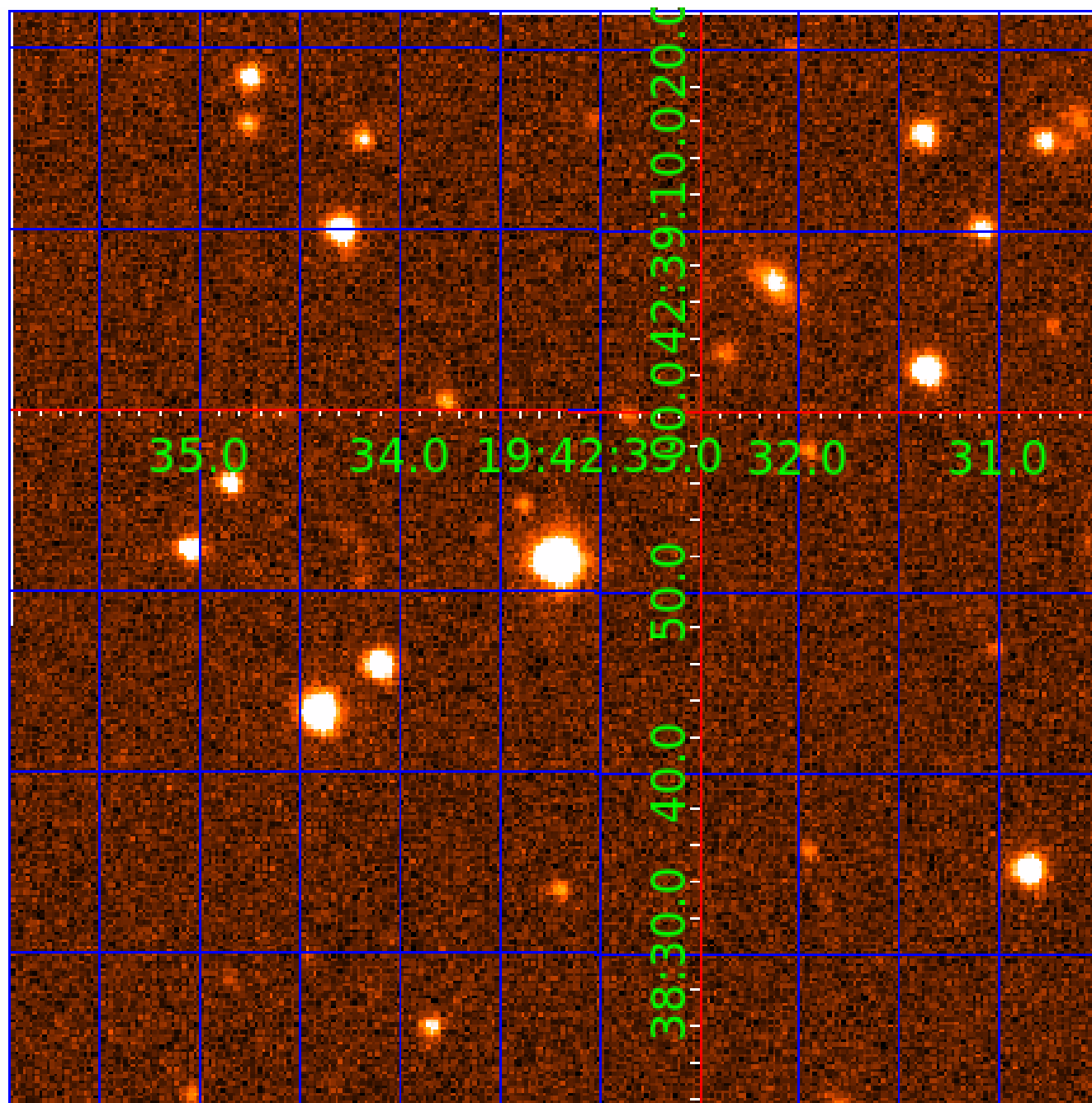


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 007131515

## Q1-17 DR25 TCE Parameters

TCE	Run Type	KOI?	Period (Days)	Epoch (BKJD)	Depth (ppm)	Duration (Hours)	MES	SNR	$R_{\star}$ ( $R_{\odot}$ )	$T_{\star}$ (K)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007131515-01	OBS	No	473.144452	393.439069	771.8	4.103	15.9	2.2	0.61	3838	1.85	0.07
007131515-02	OBS	No	577.200600	407.602036	9650.8	16.845	14.0	22.4	0.61	3838	7.21	0.06
007131515-04	OBS	No	577.895819	209.085272	2898.9	15.668	11.9	8.2	0.61	3838	3.33	0.06
007131515-05	OBS	No	314.278701	328.888523	1207.0	6.263	10.7	4.2	0.61	3838	2.22	0.12
007131515-06	OBS	No	315.192673	219.225711	2649.6	7.659	12.0	7.2	0.61	3838	3.72	0.12
007131515-07	OBS	No	214.102497	329.331944	2065.9	3.462	12.6	8.5	0.61	3838	2.67	0.21
007131515-08	OBS	No	614.286037	305.165108	2458.8	10.768	11.9	7.0	0.61	3838	3.02	0.05

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007131515-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
007131515-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
007131515-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
007131515-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
007131515-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_TER_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
007131515-07	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—MOD_NONUNIQ_DV—MOD_POS_DV—HALO_GHOST
007131515-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS

**Notes:** OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

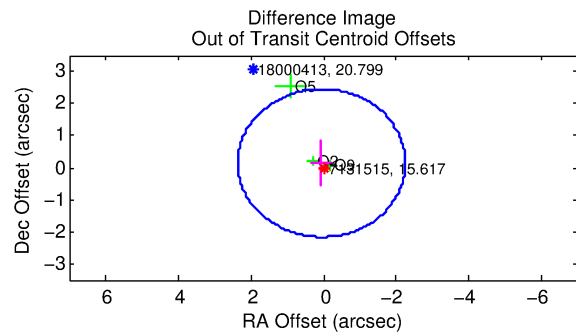
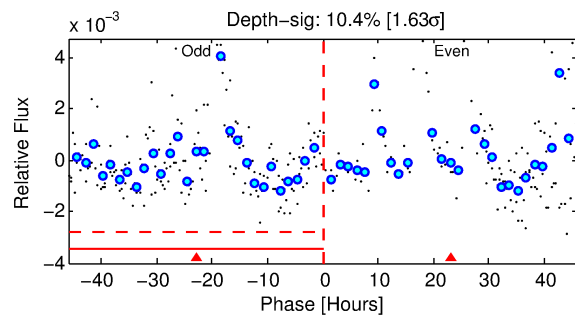
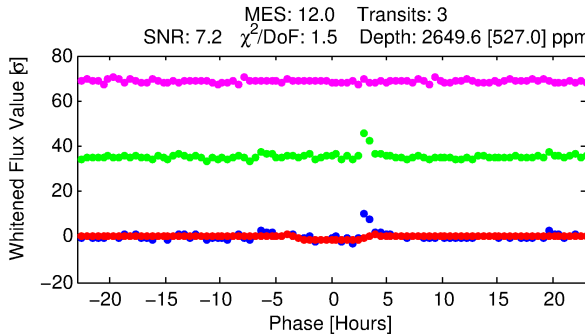
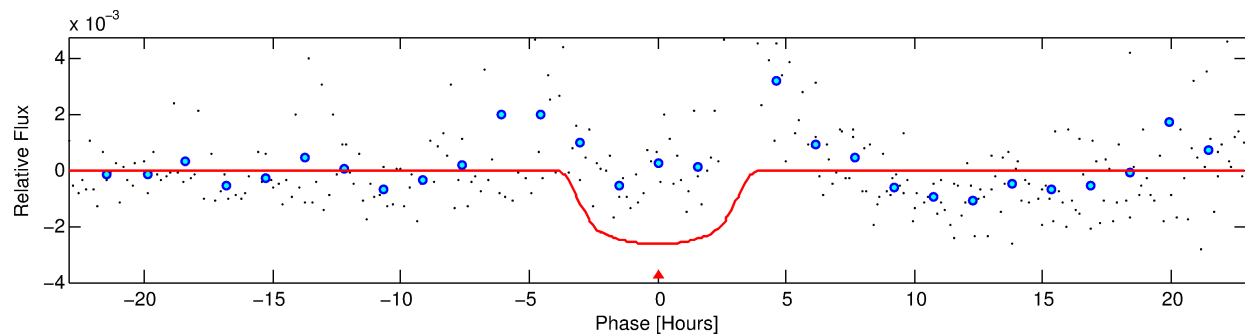
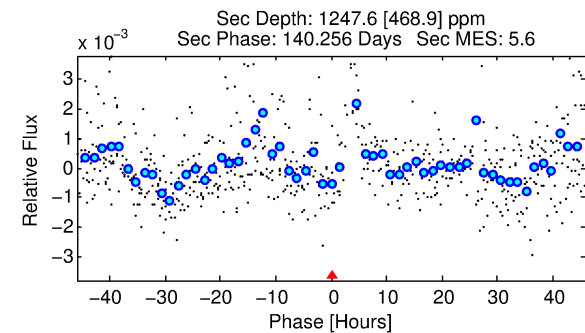
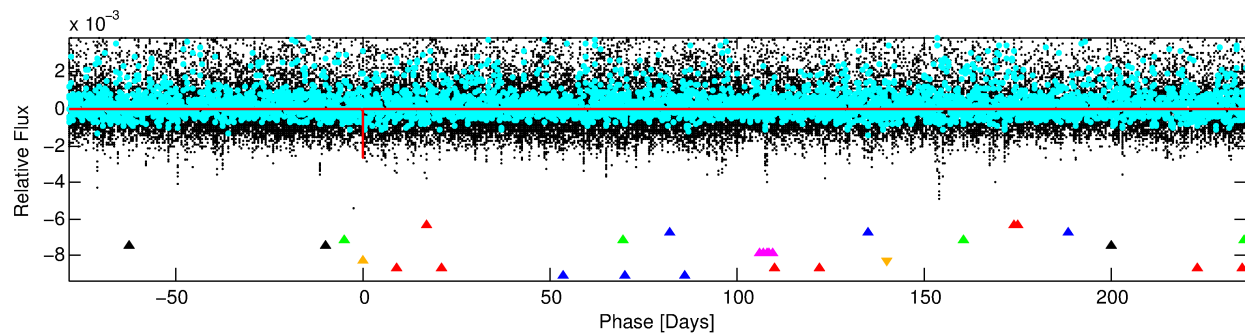
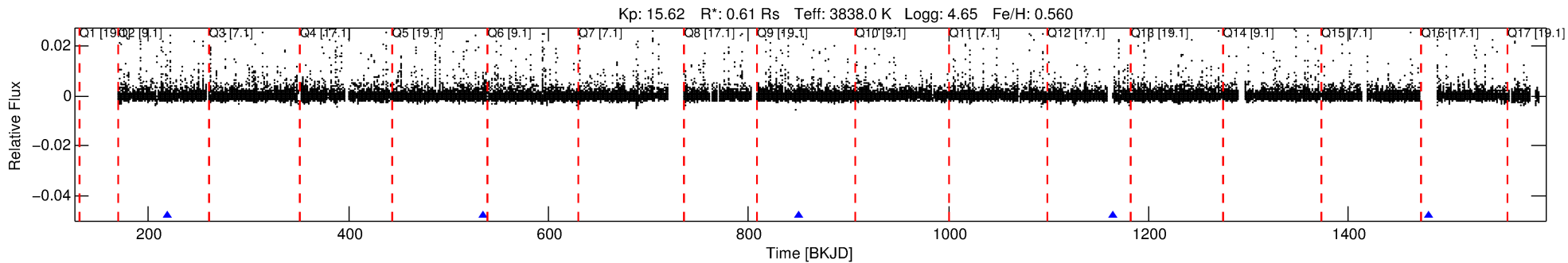
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 007131515-06

No Significant Match Found

# DV One-Page Summary

KIC: 7131515 Candidate: 6 of 8 Period: 315.193 d



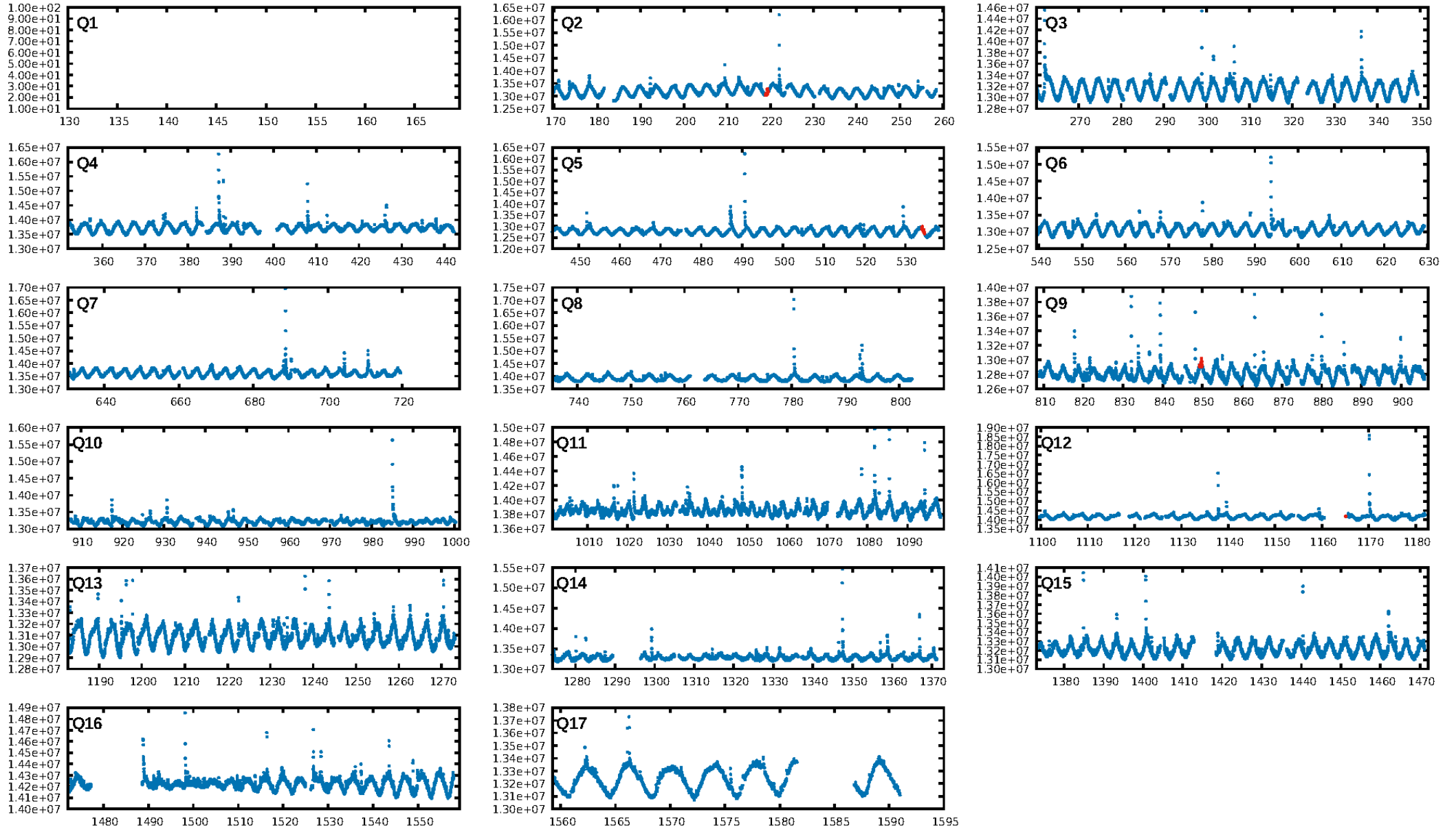
## DV Fit Results:

Period = 315.19267 [0.01237] d  
Epoch = 219.2257 [0.0169] BKJD  
Rp/R\* = 0.0557 [0.0084]  
a/R\* = 192.55 [64.89]  
b = 0.86 [0.11]  
Seff = 0.12 [0.02]  
Teq = 151 [8] K  
Rp = 3.72 [0.71] Re  
a = 0.7687 [0.0708] AU  
Ag = 29357.28 [14661.41] [2.00σ]  
Teffp = 3055 [387] K [7.51σ]

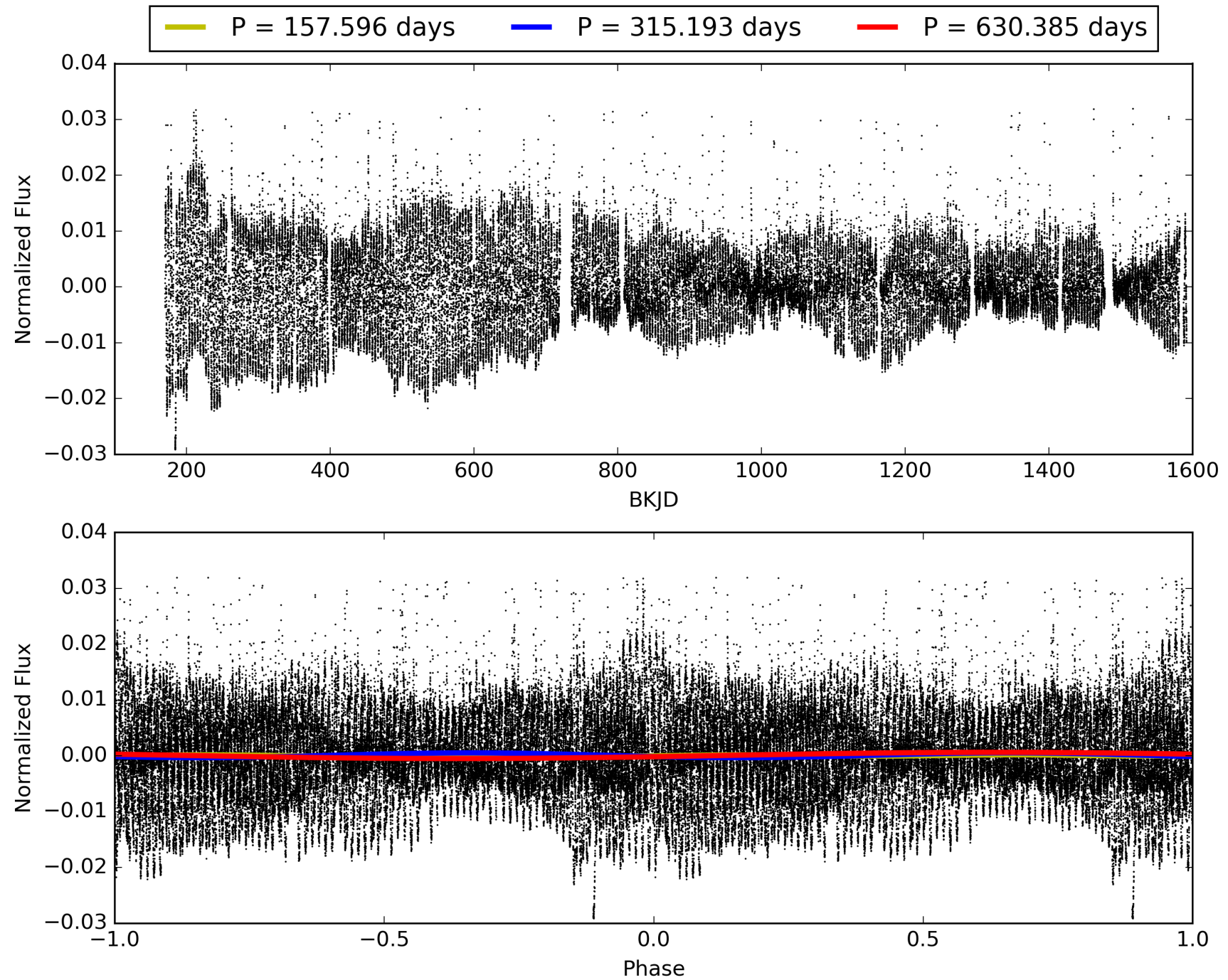
## DV Diagnostic Results:

ShortPeriod-sig: 97.3% [2.22σ]  
LongPeriod-sig: 100.0% [122.52σ]  
ModelChiSquare2-sig: 4.0%  
ModelChiSquareGof-sig: 42.5%  
**Bootstrap-pfa: 8.91e-11**  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 16.16  
Centroid-sig: 70.5%  
Centroid-so: 0.350 arcsec [0.66σ]  
OotOffset-rm: 0.154 arcsec [0.20σ]  
KicOffset-rm: 0.397 arcsec [0.74σ]  
OotOffset-st: 1/0/0/2 [3]  
KicOffset-st: 1/0/0/2 [3]  
DiffImageQuality-fgm: 0.33 [1/3]  
DiffImageOverlap-fno: 1.00 [3/3]

# TCE 007131515-06, PDC Light Curves

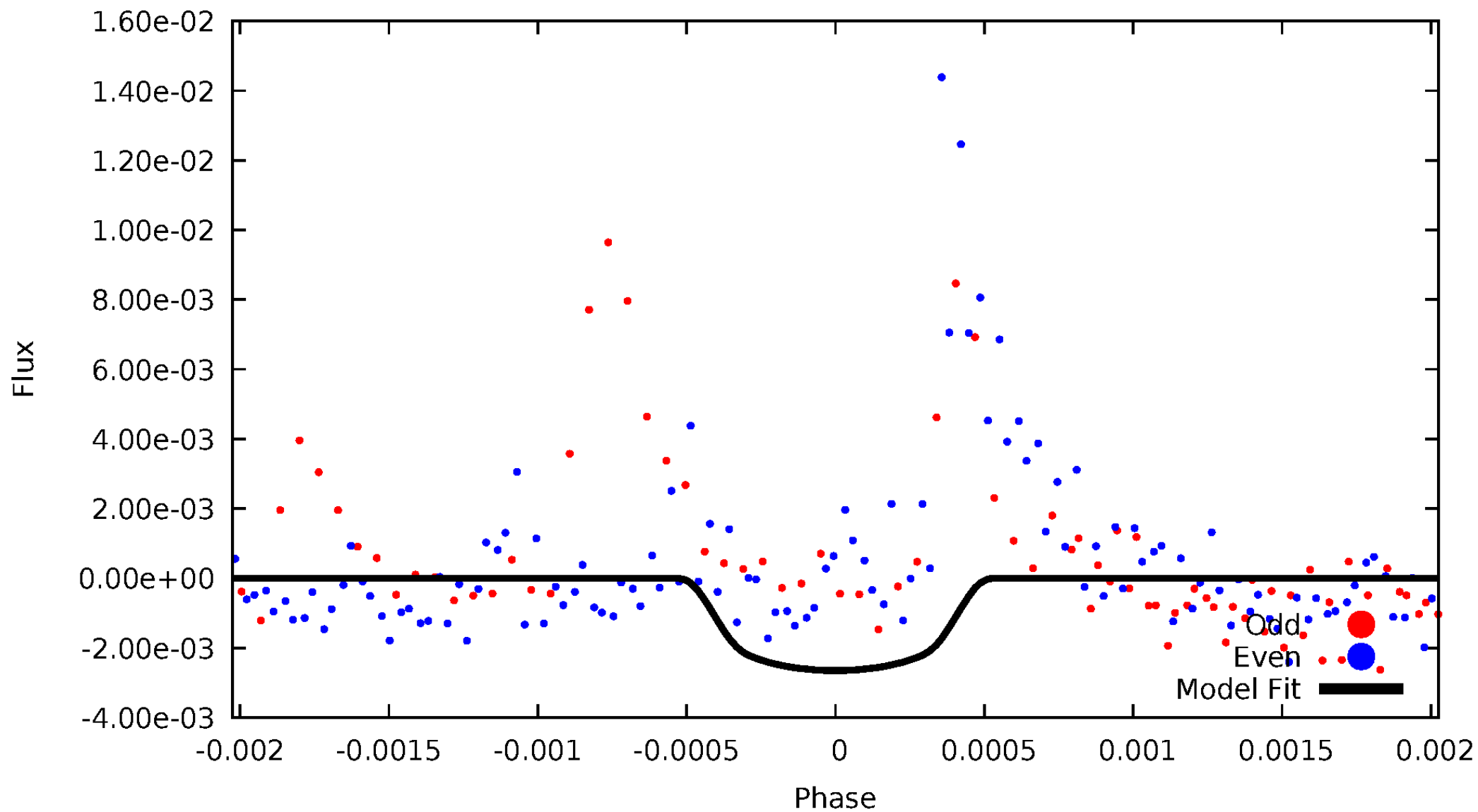


TCE 007131515-06



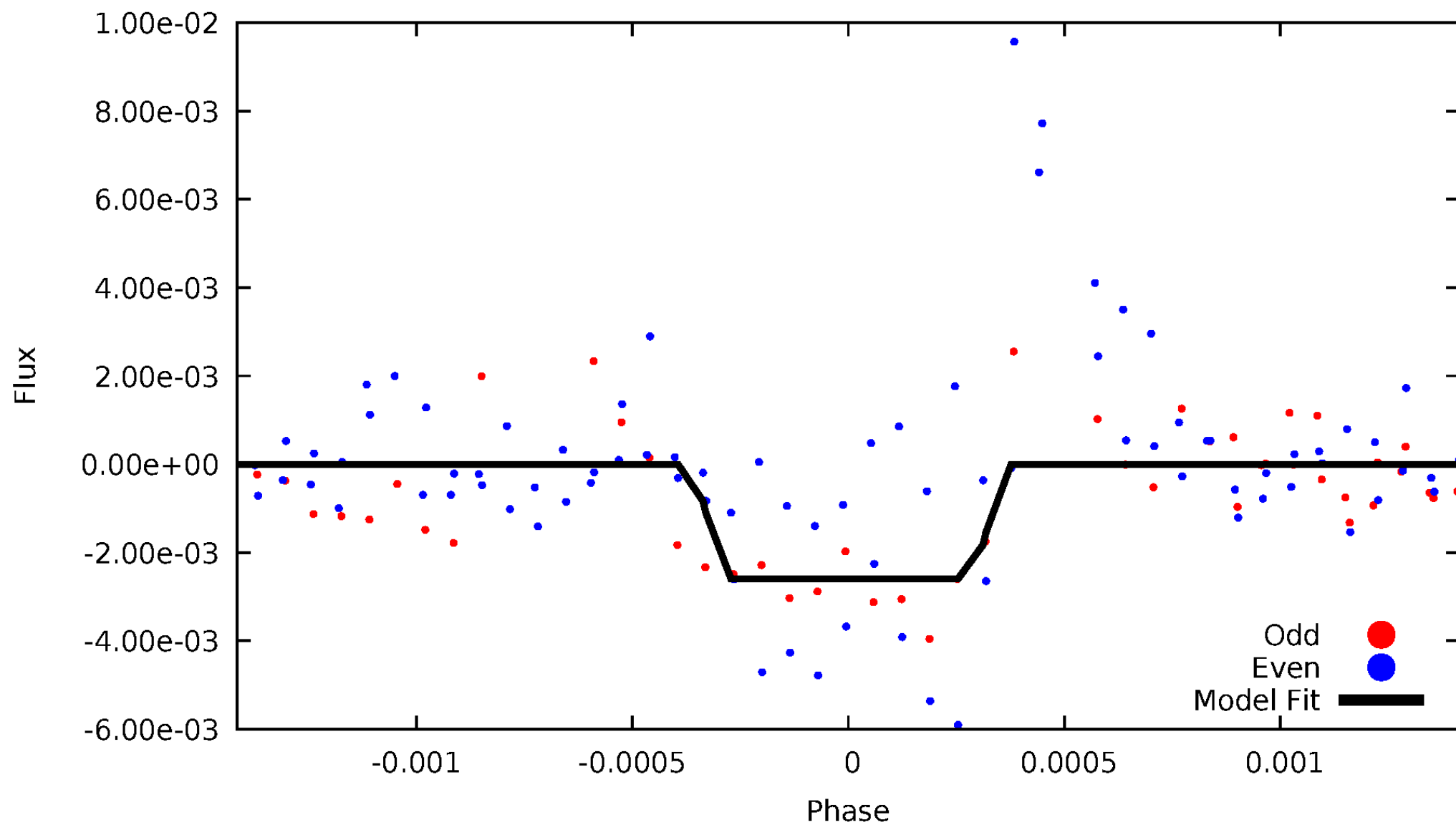
# DV Odd/Even

TCE 007131515-06



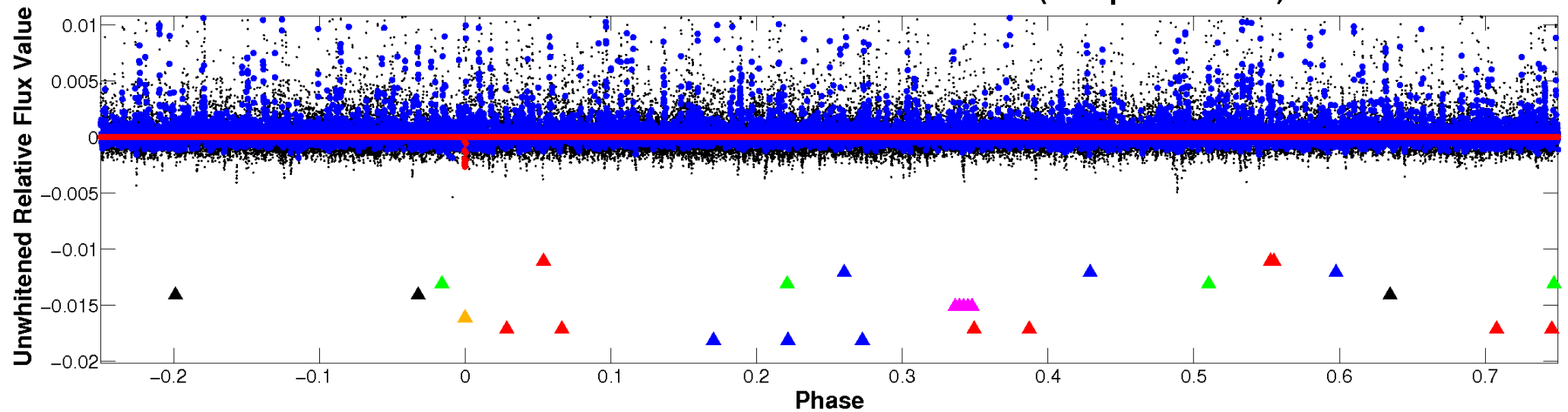
# ALT Odd/Even

TCE 007131515-06

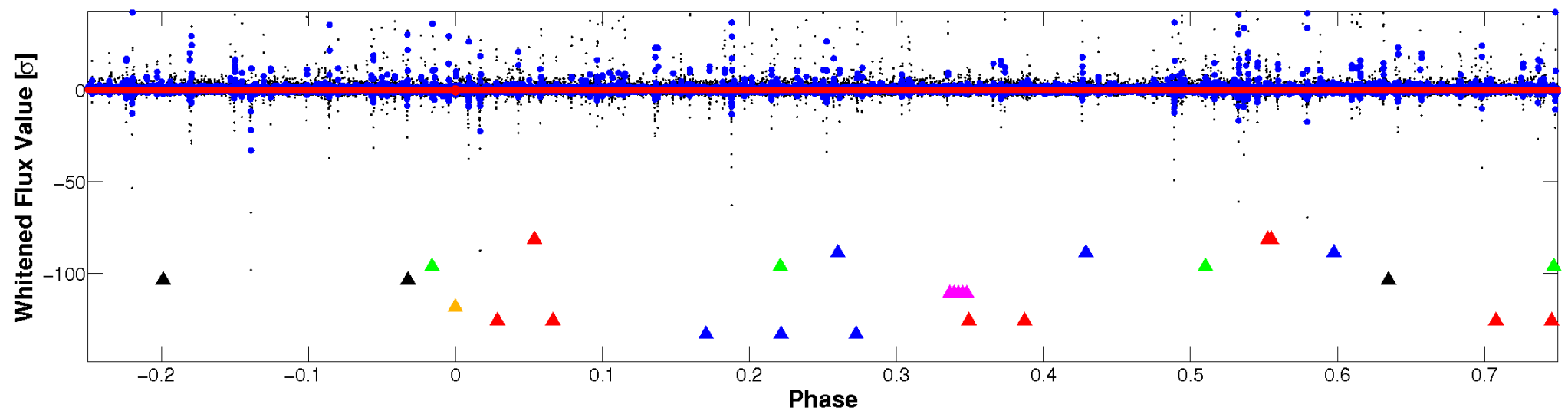


# Non-Whitened Vs. Whitened Light Curve

## Planet 6 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

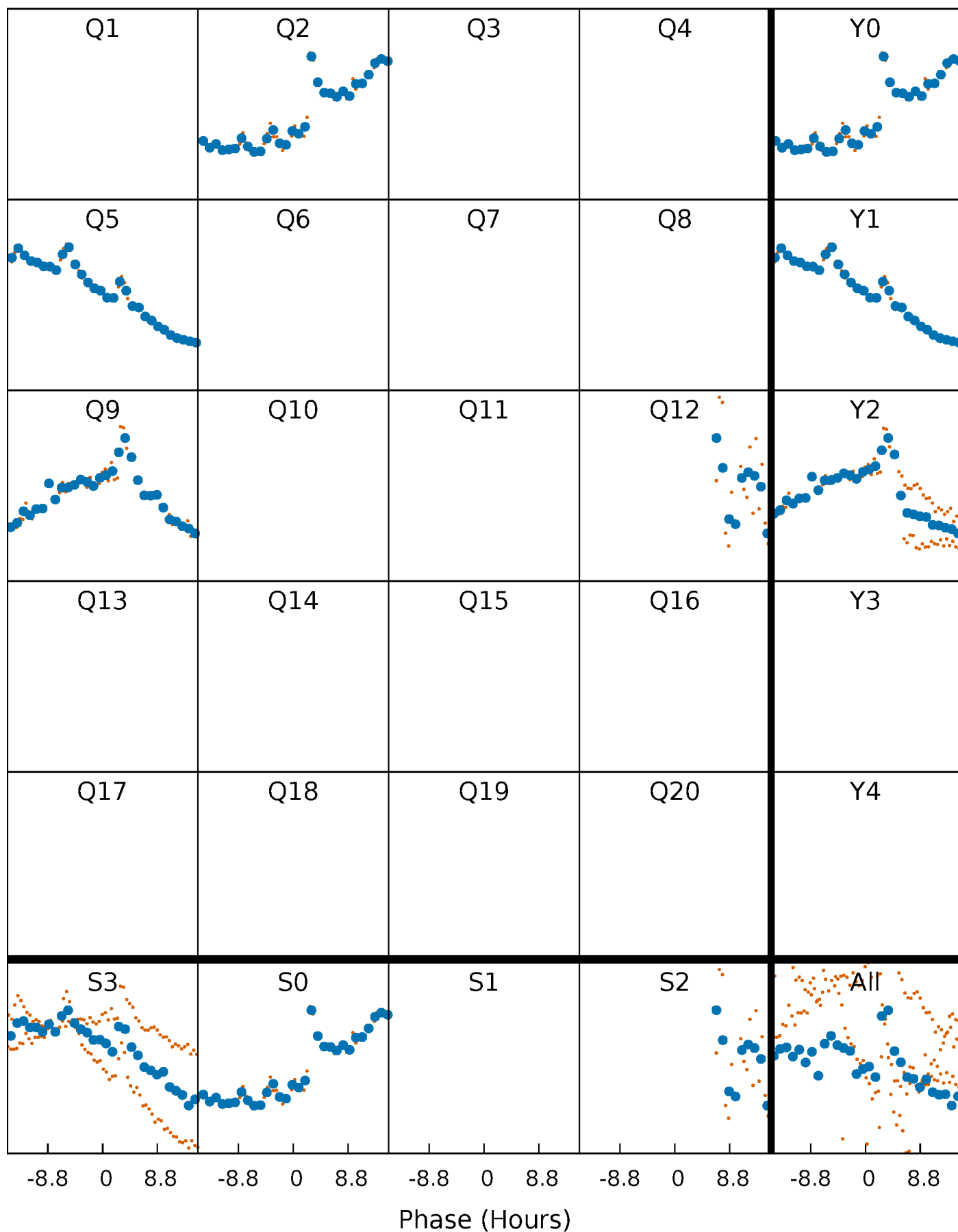


## Planet 6 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

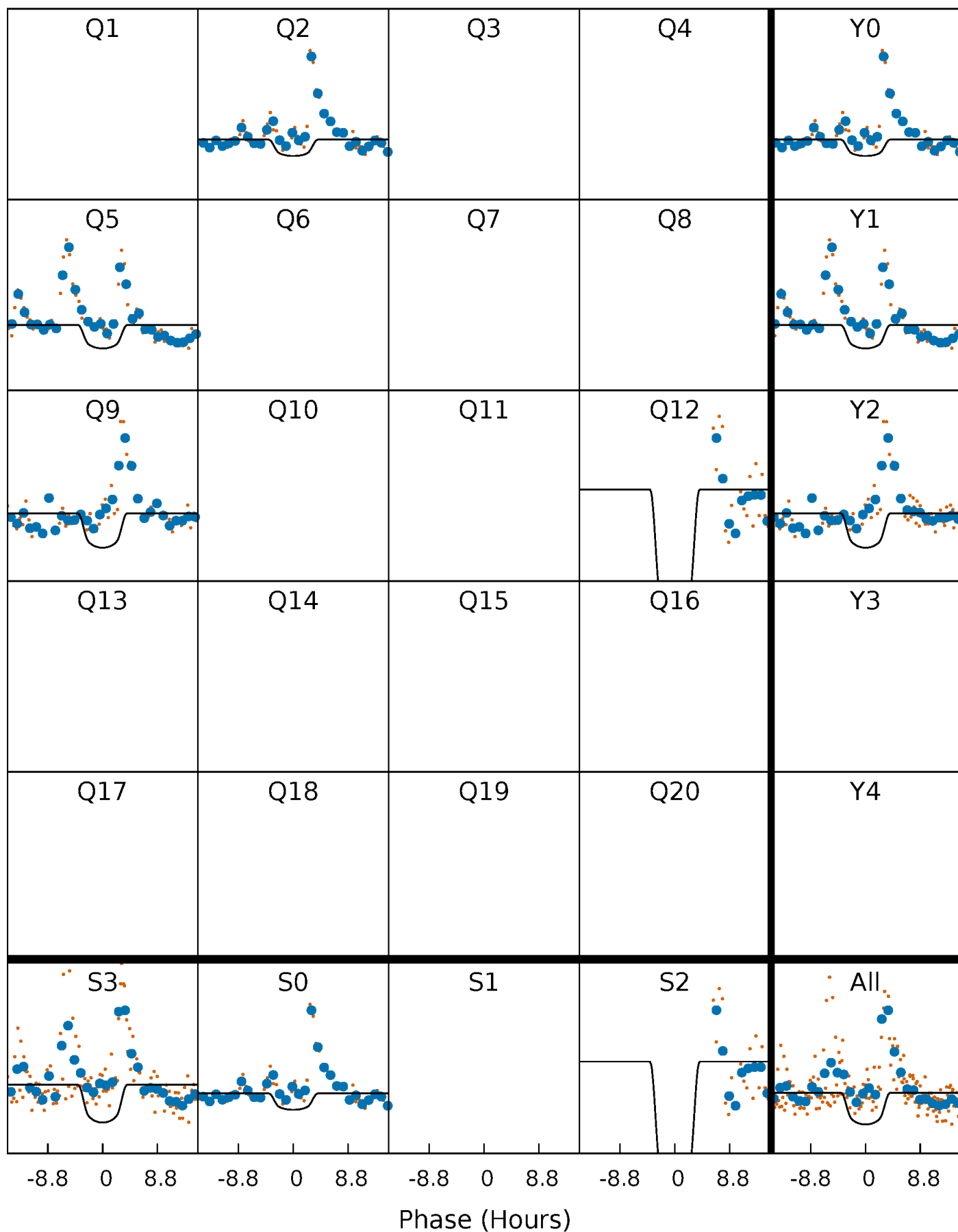
TCE 007131515-06 P=315.192673 Days  $T_0=219.225711$  (BKJD)





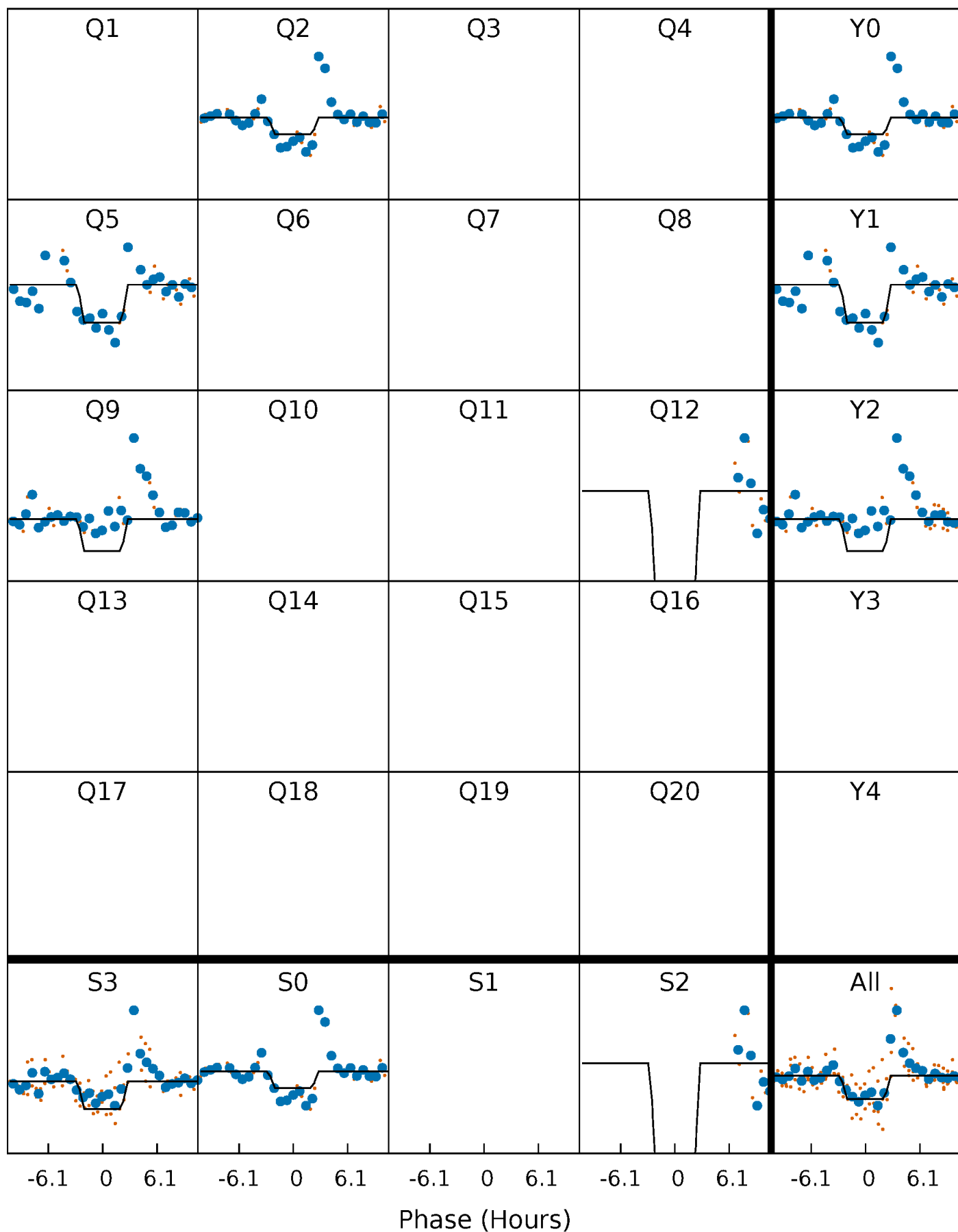
# DV Quarter-Phased Transit Curves

TCE 007131515-06 P=315.192673 Days  $T_0=219.225711$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

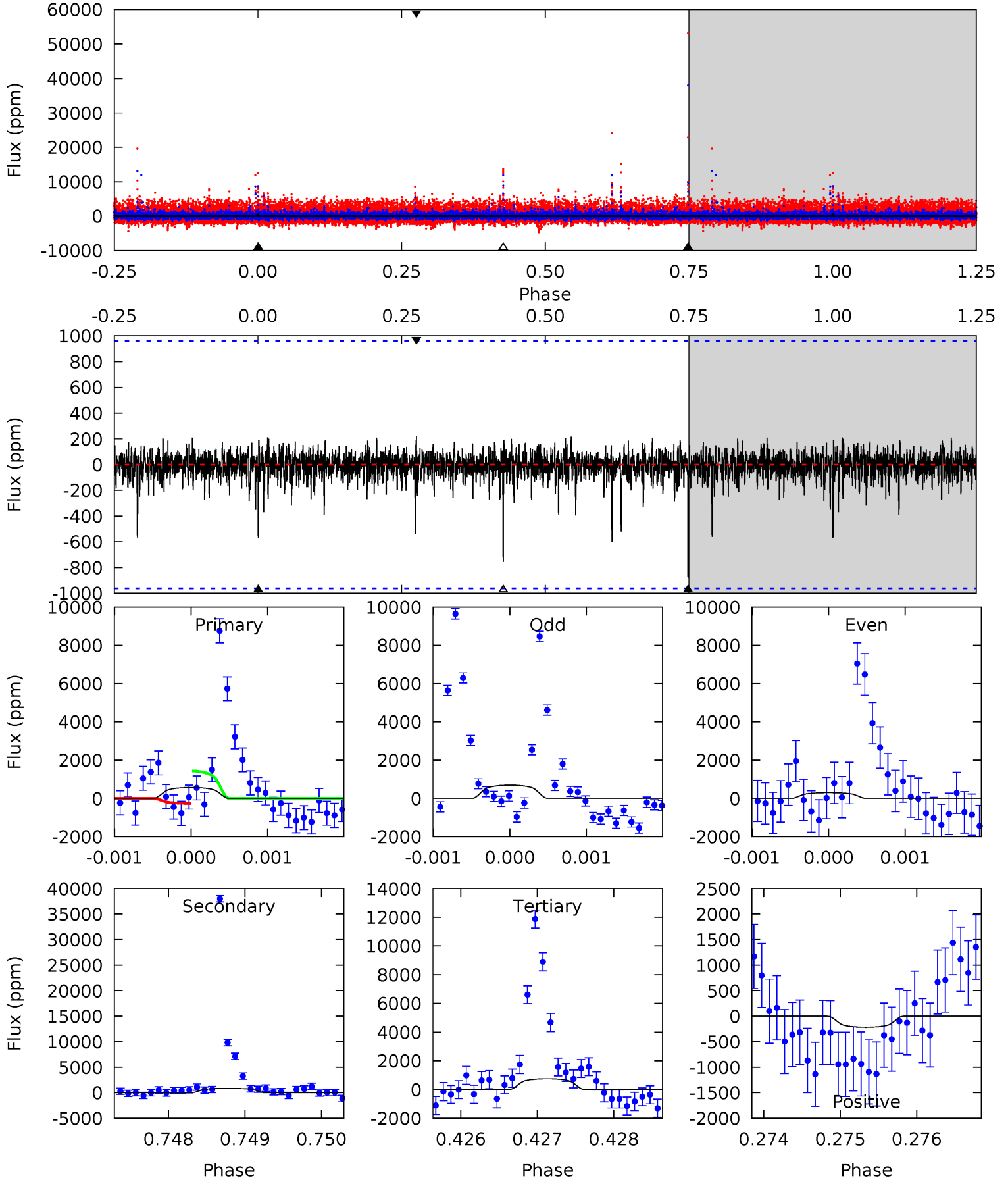
TCE 007131515-06 P=315.187663 Days  $T_0=219.217122$  (BKJD)



# DV Model-Shift Uniqueness Test

007131515-06, P = 315.192673 Days, E = 219.225711 Days

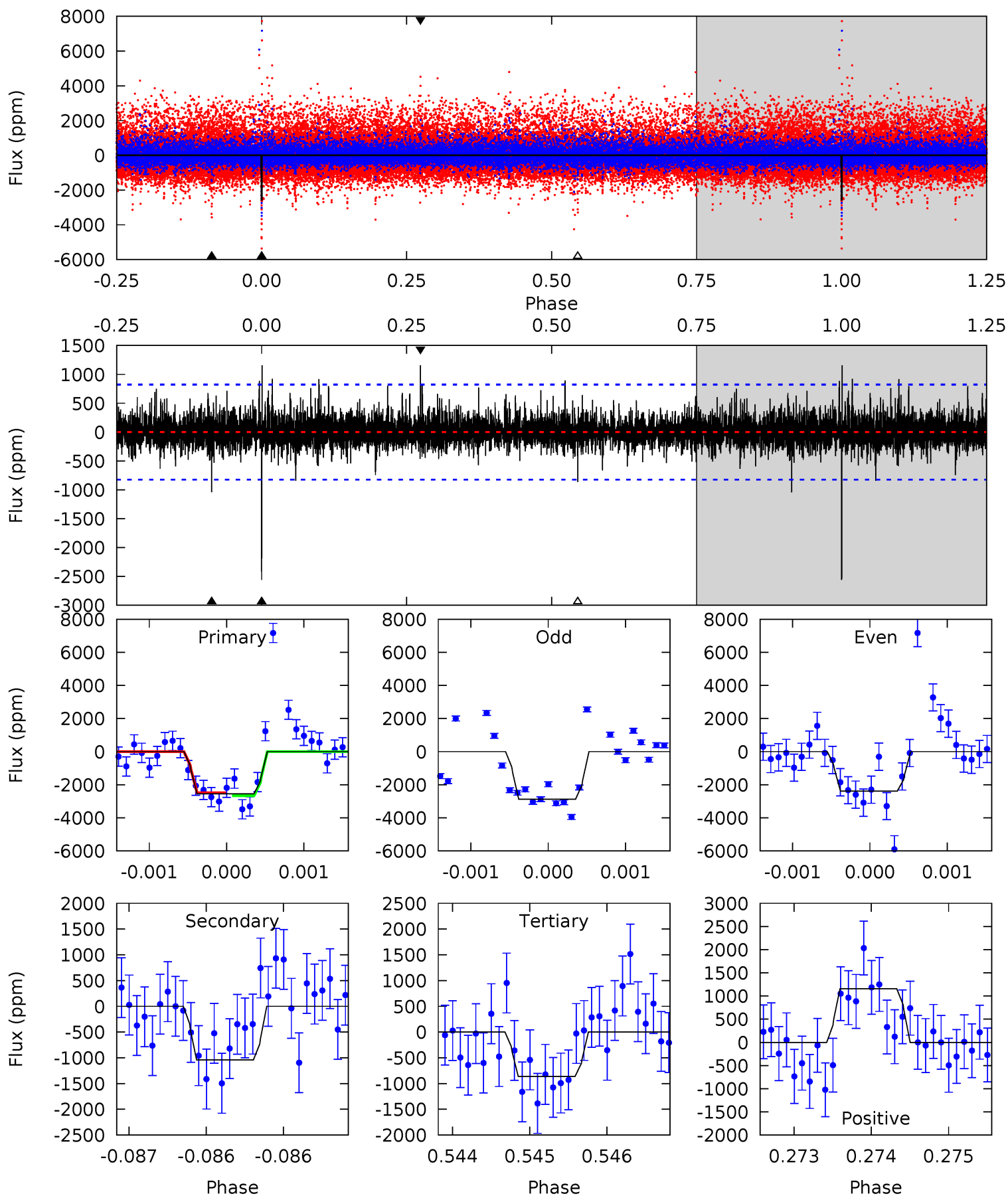
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
3.22	4.94	4.27	1.23	5.44	3.27	0.47	-1.05	1.99	0.67	3.72	0.76	1.26	0.20	3.32



# Alt Model-Shift Uniqueness Test

007131515-06, P = 315.187663 Days, E = 219.217122 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
17.1	6.96	5.76	7.72	5.51	3.38	1.26	11.3	9.38	1.19	-0.77	1.38	0.84	0.31	0.62



### Stellar Parameters For KIC 007131515

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3838^{+120}_{-147}$	$4.651^{+0.067}_{-0.018}$	$0.560^{+0.050}_{-0.300}$	$0.611^{+0.028}_{-0.070}$	$0.609^{+0.035}_{-0.060}$	$3.764^{+1.199}_{-0.268}$
	+3%/-4%	+1%/-0%	+9%/-54%	+5%/-11%	+6%/-10%	+32%/-7%
Source	KIC0	KIC0	KIC0	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 007131515-06 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-875 \pm 177$	$3.67^{+0.61}_{-0.60}$	$208^{+8}_{-8}$	$3135^{+199}_{-186}$	$21620^{+9458}_{-6775}$
Alt.	$-1040 \pm 150$	$3.32^{+0.57}_{-0.58}$	$209^{+7}_{-9}$	$3323^{+216}_{-193}$	$31103^{+14426}_{-9168}$

$T_{max}$  = Theoretical Maximum Planetary Temperature

$T_{obs}$  = Observed Planetary Temperature (Assuming A=0.3)

$A_{obs}$  = Observed Albedo (Assuming T=0)

If a secondary eclipse is present, the system is likely an EB if  $T_{obs} \gg T_{max}$  AND  $A_{obs} \gg 1.0$

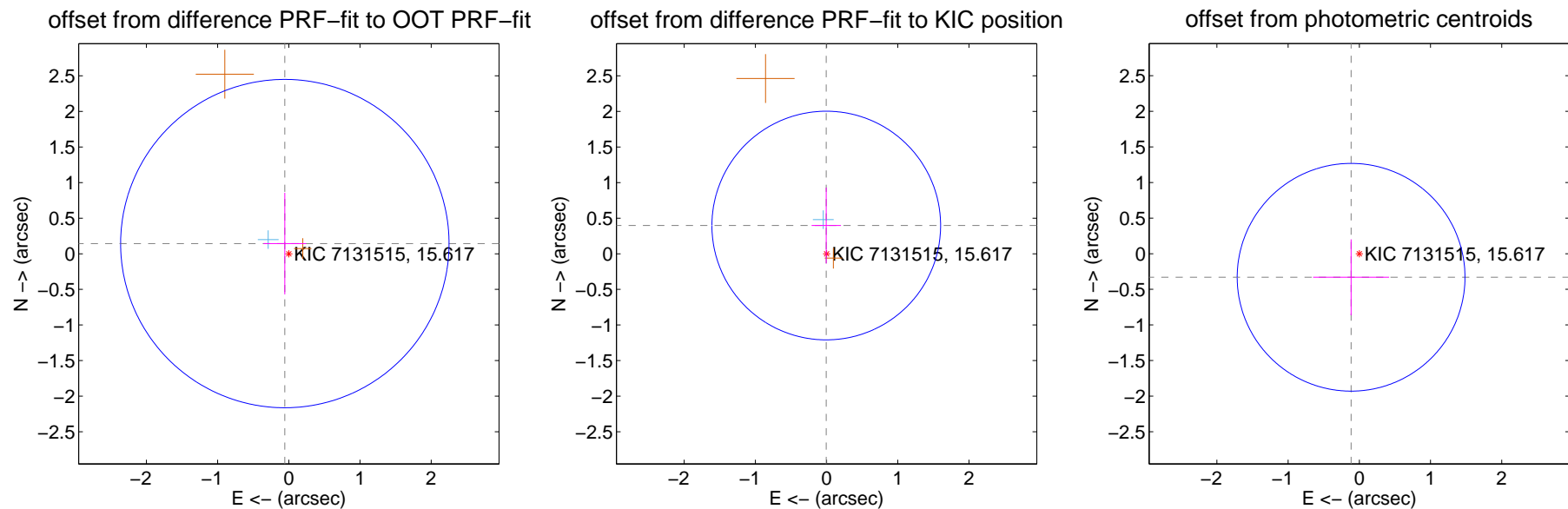
## DV Centroid Data

Supplemental centroid analysis for 007131515-06. Kepler magnitude: 15.62. Transit SNR 7.25

There are 1 quarters with good PRF difference image offsets

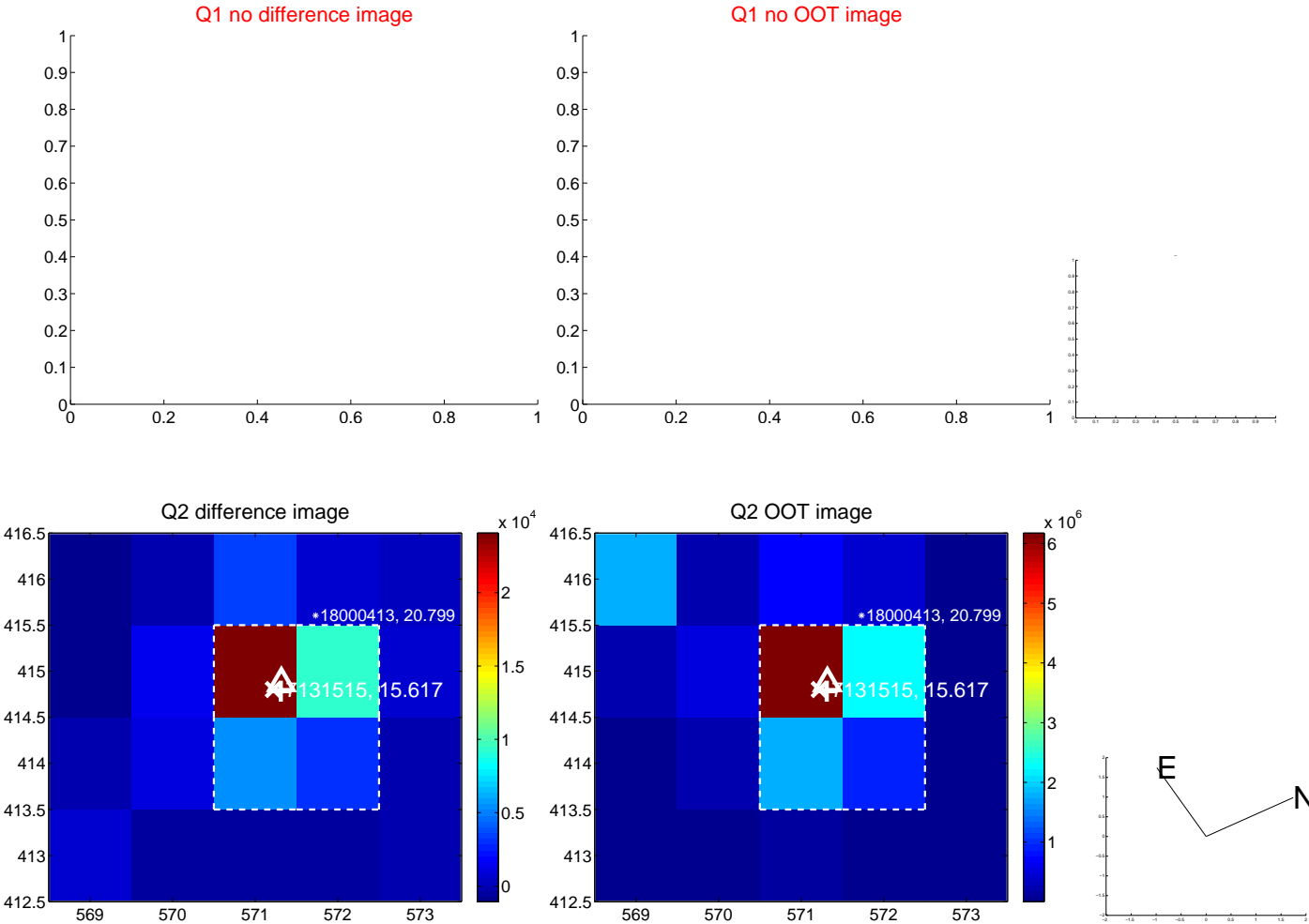
The direct PRF centroid is offset from the target star catalog position by about 0.17 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.154 \pm 0.769$	0.20	$0.056 \pm 0.300$	$0.143 \pm 0.714$
PRF-fit source offset from KIC position	$0.397 \pm 0.535$	0.74	$0.004 \pm 0.207$	$0.397 \pm 0.533$
photometric centroid source offset	$0.35 \pm 0.53$	0.66	$0.12 \pm 0.53$	$-0.33 \pm 0.53$

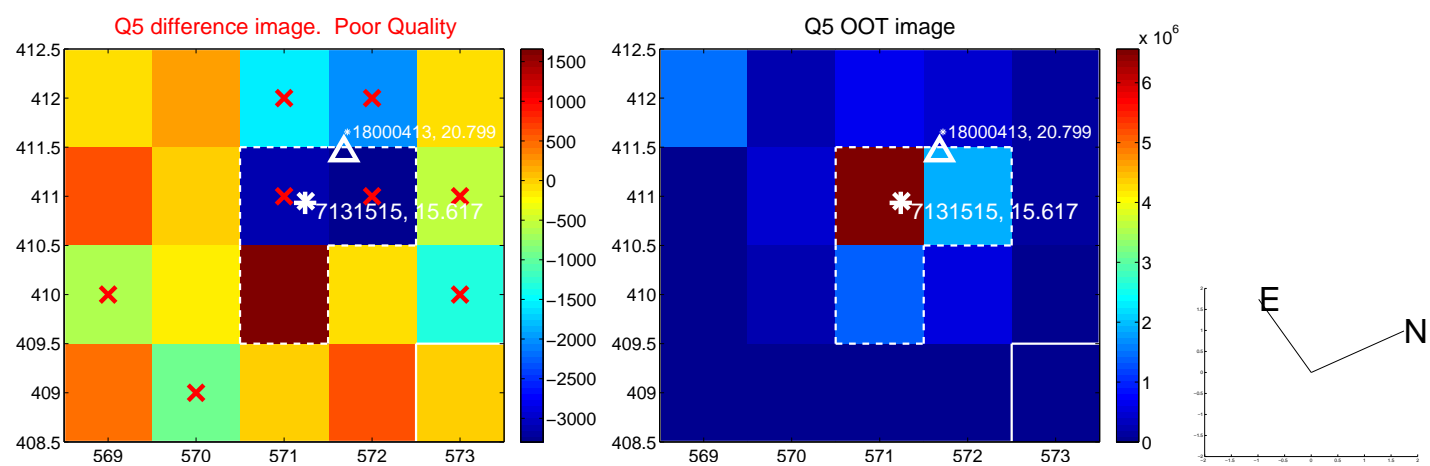


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

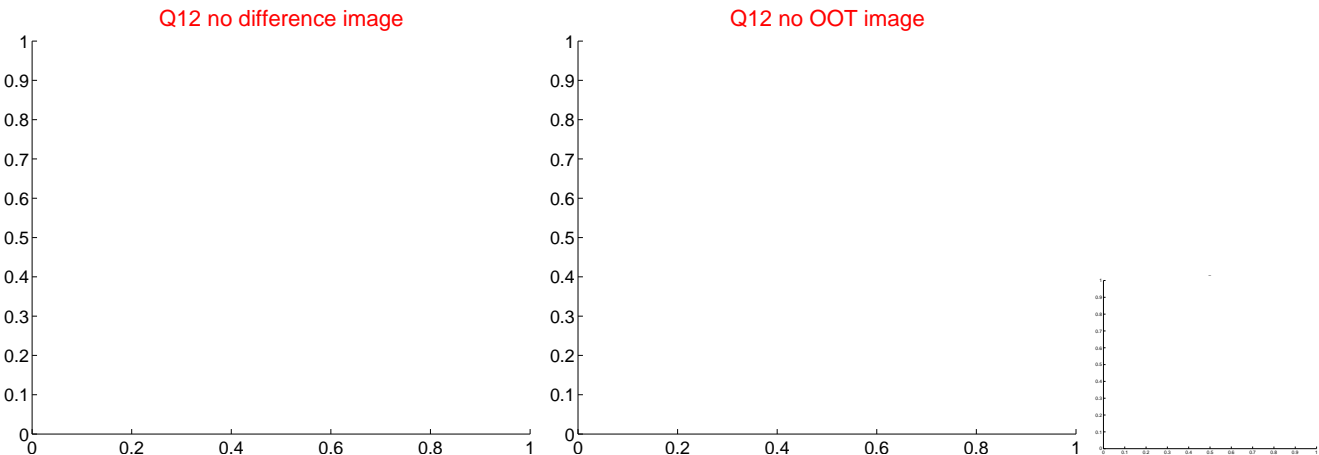
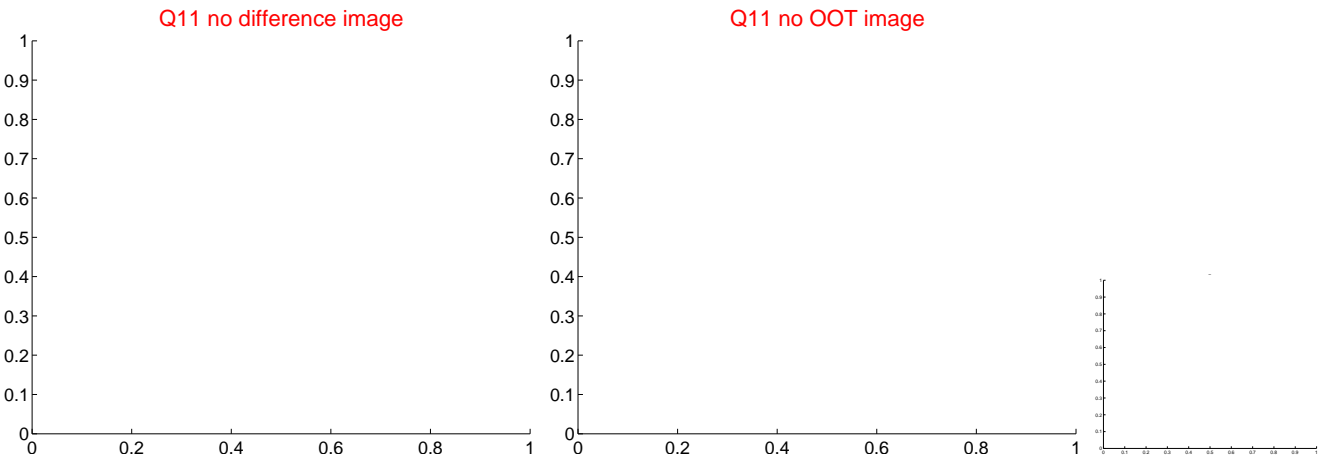
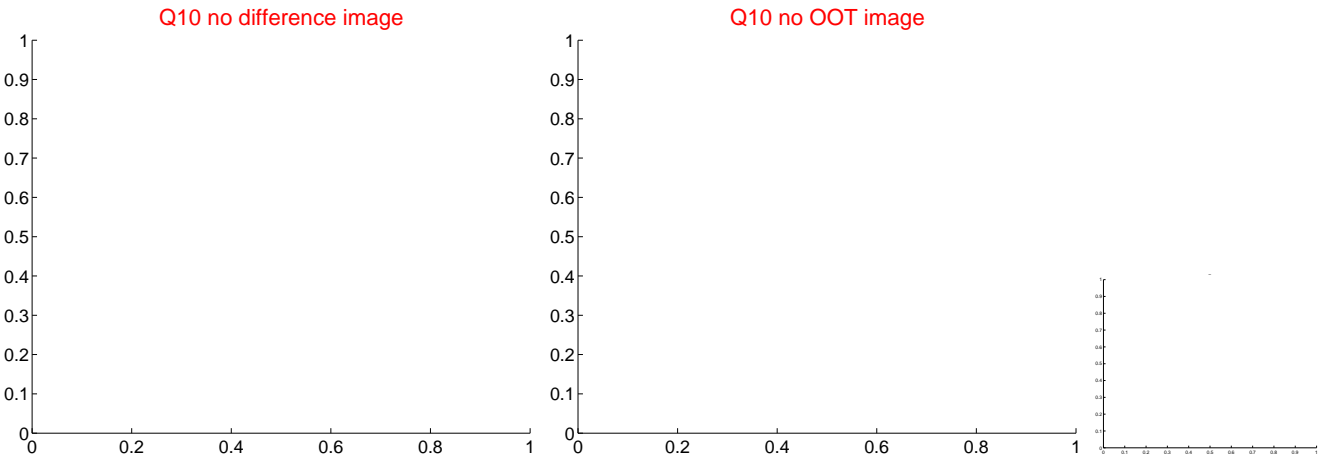
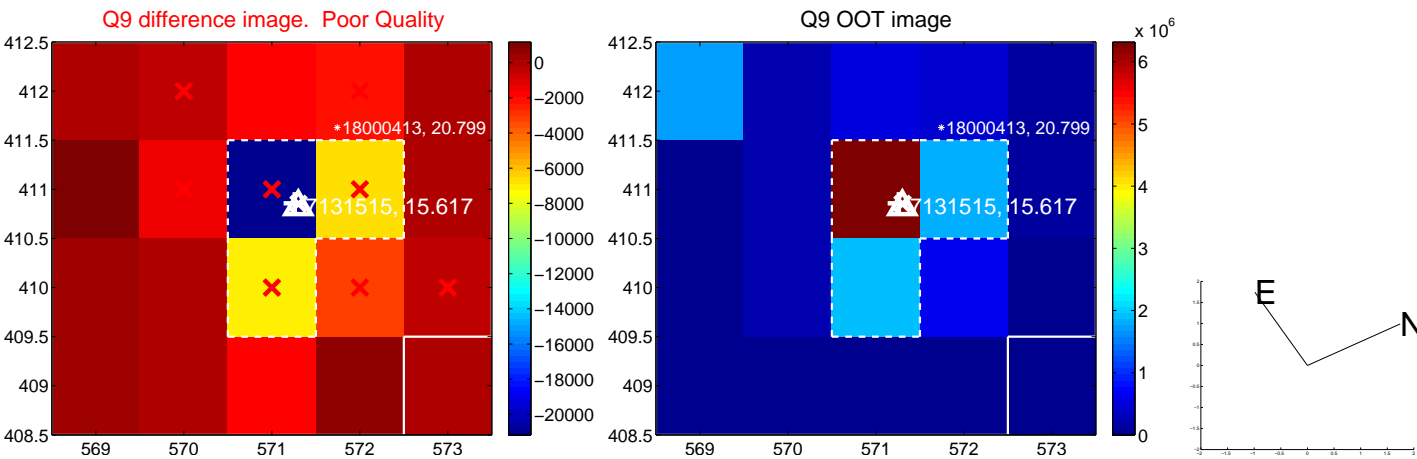


white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.





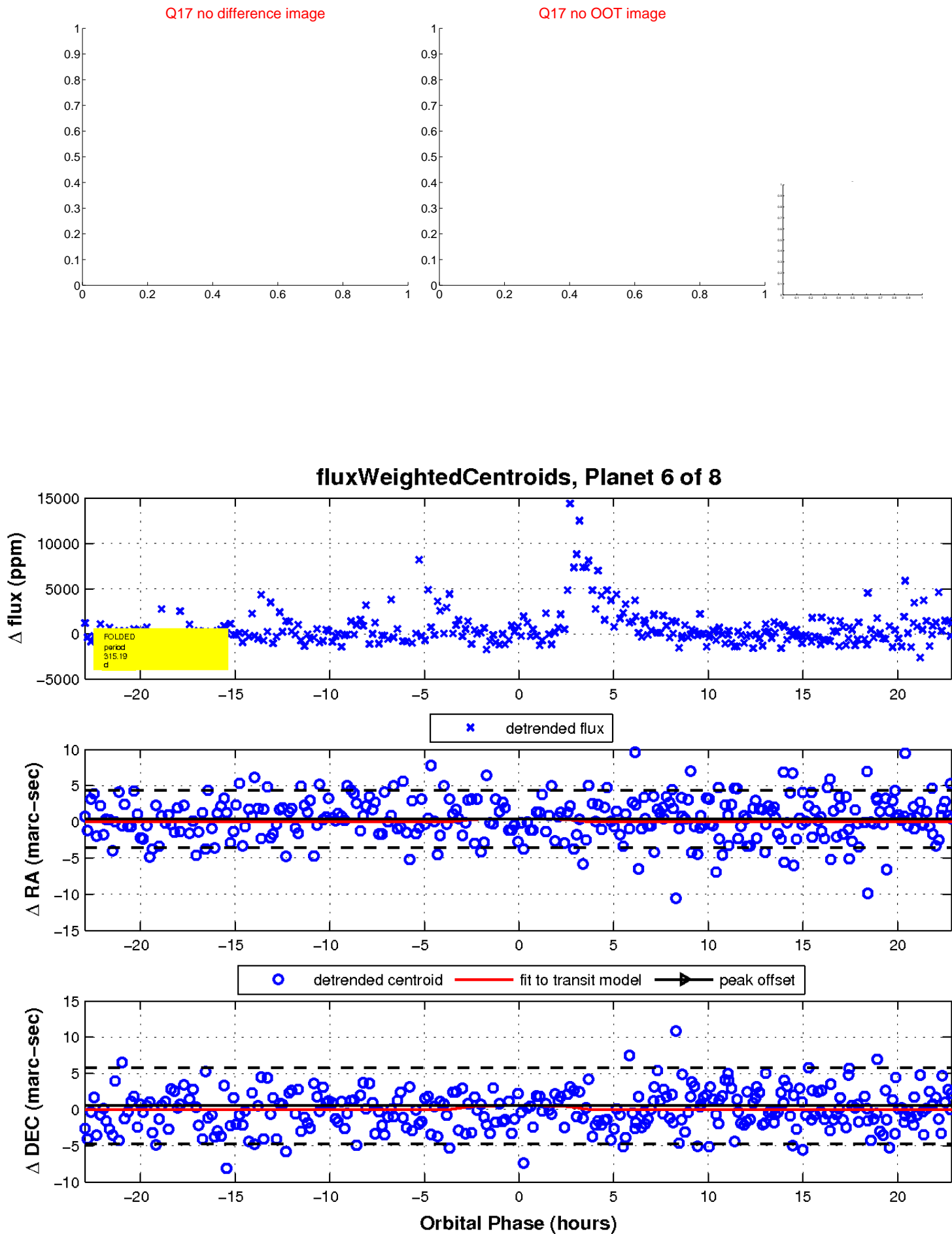
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

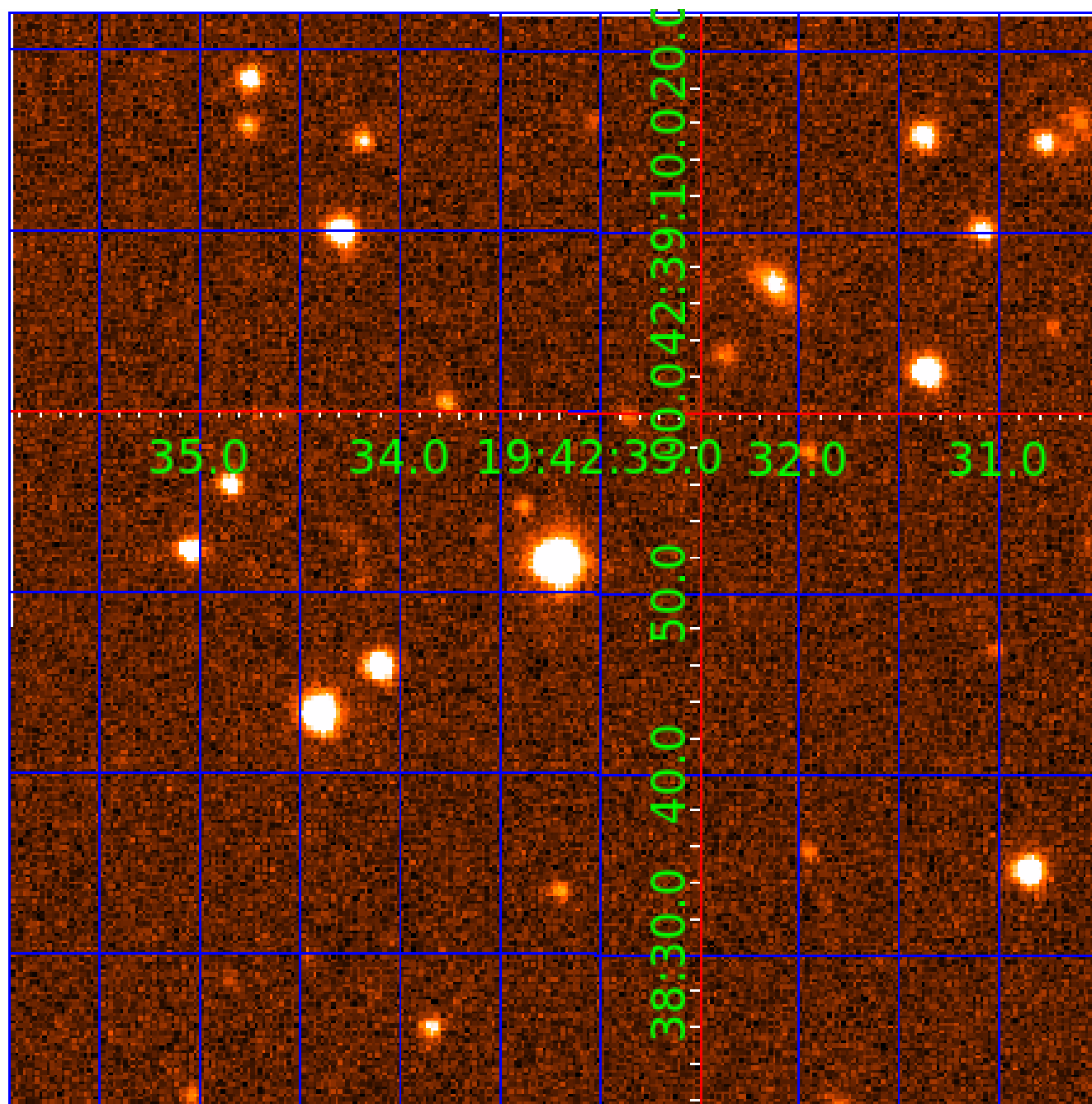


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 007131515

## Q1-17 DR25 TCE Parameters

TCE	Run Type	KOI?	Period (Days)	Epoch (BKJD)	Depth (ppm)	Duration (Hours)	MES	SNR	$R_{\star}$ ( $R_{\odot}$ )	$T_{\star}$ (K)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007131515-01	OBS	No	473.144452	393.439069	771.8	4.103	15.9	2.2	0.61	3838	1.85	0.07
007131515-02	OBS	No	577.200600	407.602036	9650.8	16.845	14.0	22.4	0.61	3838	7.21	0.06
007131515-04	OBS	No	577.895819	209.085272	2898.9	15.668	11.9	8.2	0.61	3838	3.33	0.06
007131515-05	OBS	No	314.278701	328.888523	1207.0	6.263	10.7	4.2	0.61	3838	2.22	0.12
007131515-06	OBS	No	315.192673	219.225711	2649.6	7.659	12.0	7.2	0.61	3838	3.72	0.12
007131515-07	OBS	No	214.102497	329.331944	2065.9	3.462	12.6	8.5	0.61	3838	2.67	0.21
007131515-08	OBS	No	614.286037	305.165108	2458.8	10.768	11.9	7.0	0.61	3838	3.02	0.05

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007131515-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
007131515-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
007131515-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
007131515-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
007131515-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_TER_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
007131515-07	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—MOD_NONUNIQ_DV—MOD_POS_DV—HALO_GHOST
007131515-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS

**Notes:** OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

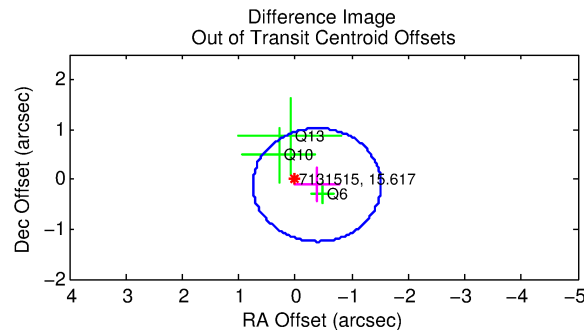
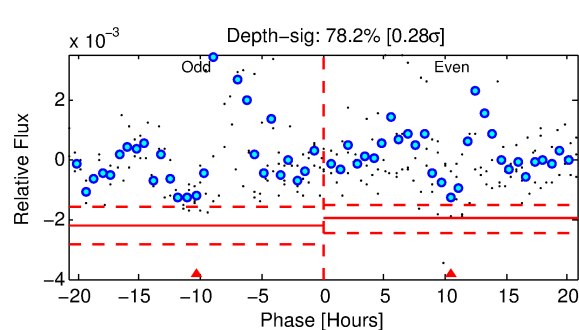
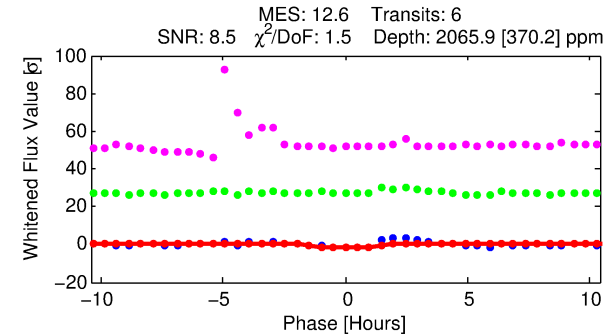
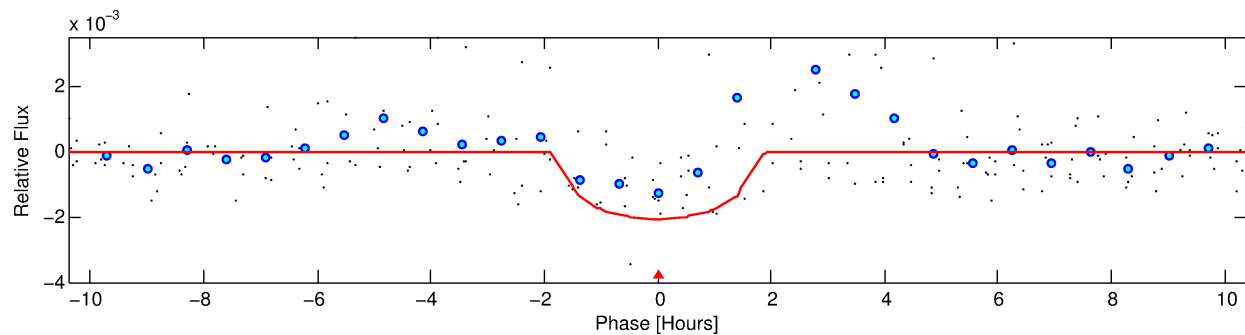
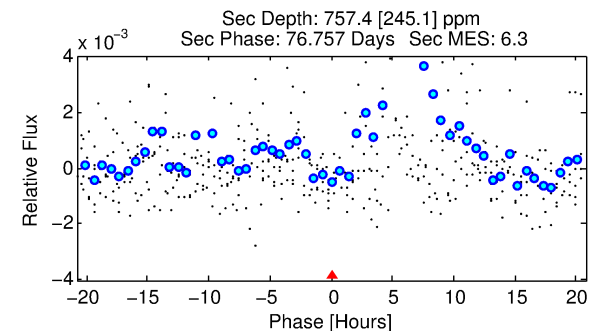
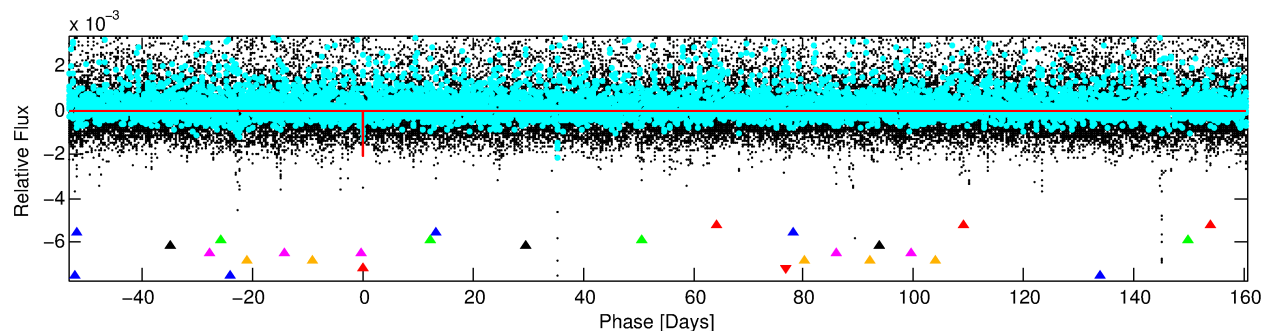
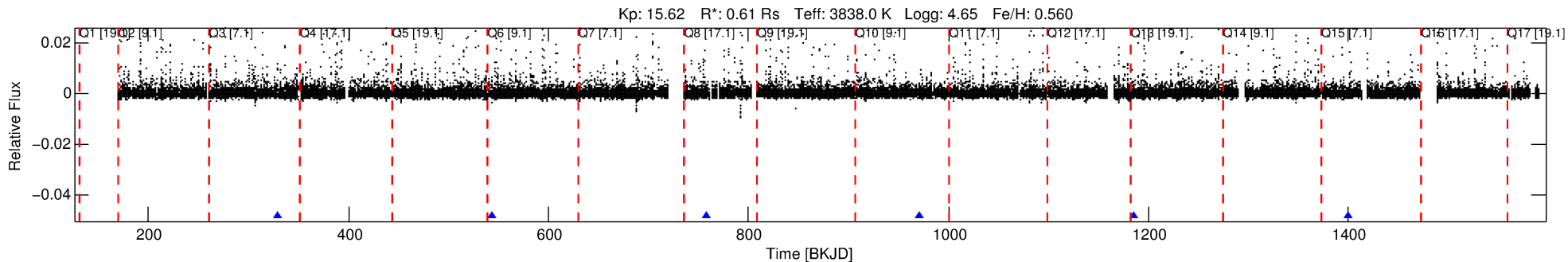
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 007131515-07

No Significant Match Found

# DV One-Page Summary

KIC: 7131515 Candidate: 7 of 8 Period: 214.102 d



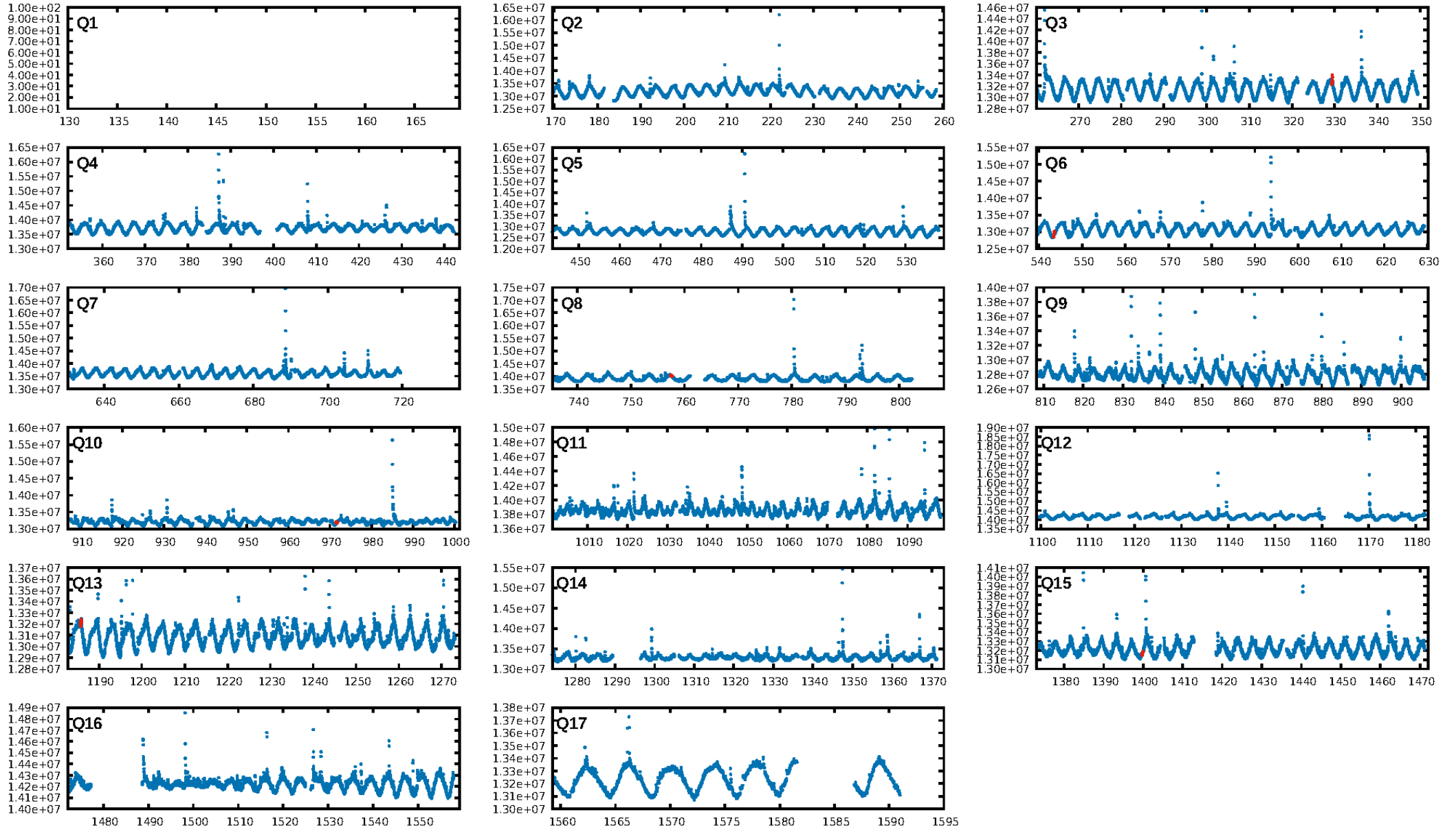
## DV Fit Results:

Period = 214.10250 [0.00307] d  
Epoch = 329.3319 [0.0098] BKJD  
Rp/R\* = 0.0400 [0.1020]  
a/R\* = 483.77 [3492.75]  
b = 0.18 [39.50]  
Seff = 0.21 [0.04]  
Teq = 172 [9] K  
Rp = 2.67 [6.81] Re  
a = 0.5940 [0.0547] AU  
Ag = 20658.29 [105536.43] [0.20 $\sigma$ ]  
Teffp = 3183 [4066] K [0.74 $\sigma$ ]

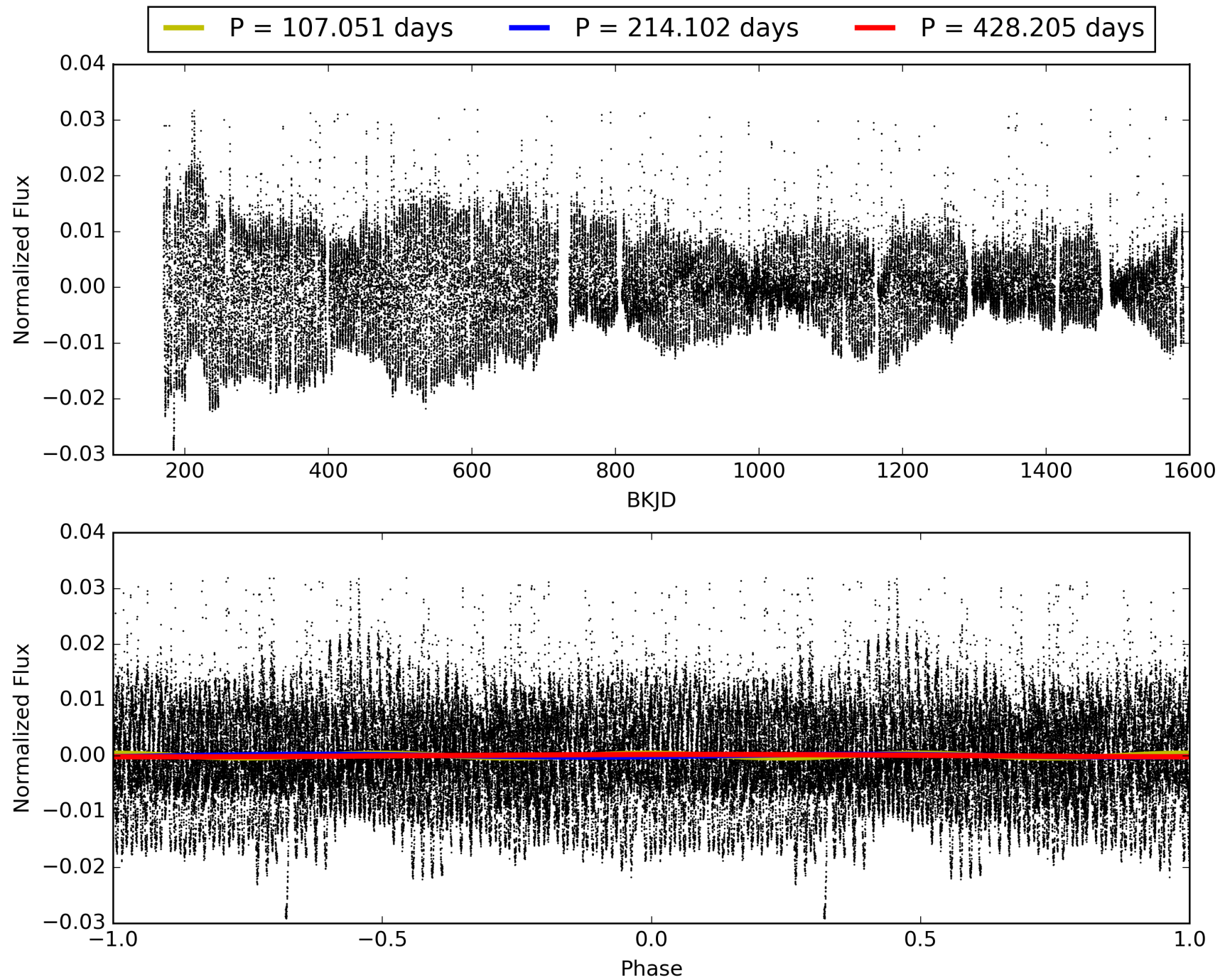
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [335.95 $\sigma$ ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 46.6%  
Bootstrap-pfa: 1.15e-11  
RollingBand-fgt: 1.00 [6/6]  
GhostDiagnostic-chr: -0.05416  
Centroid-sig: 2.3%  
Centroid-so: 0.767 arcsec [1.24 $\sigma$ ]  
OotOffset-rm: 0.400 arcsec [1.06 $\sigma$ ]  
KicOffset-rm: 0.517 arcsec [1.35 $\sigma$ ]  
OotOffset-st: 2/0/0/1 [3]  
KicOffset-st: 2/0/0/1 [3]  
DiffImageQuality-fgm: 1.00 [3/3]  
DiffImageOverlap-fno: 0.83 [5/6]

# TCE 007131515-07, PDC Light Curves



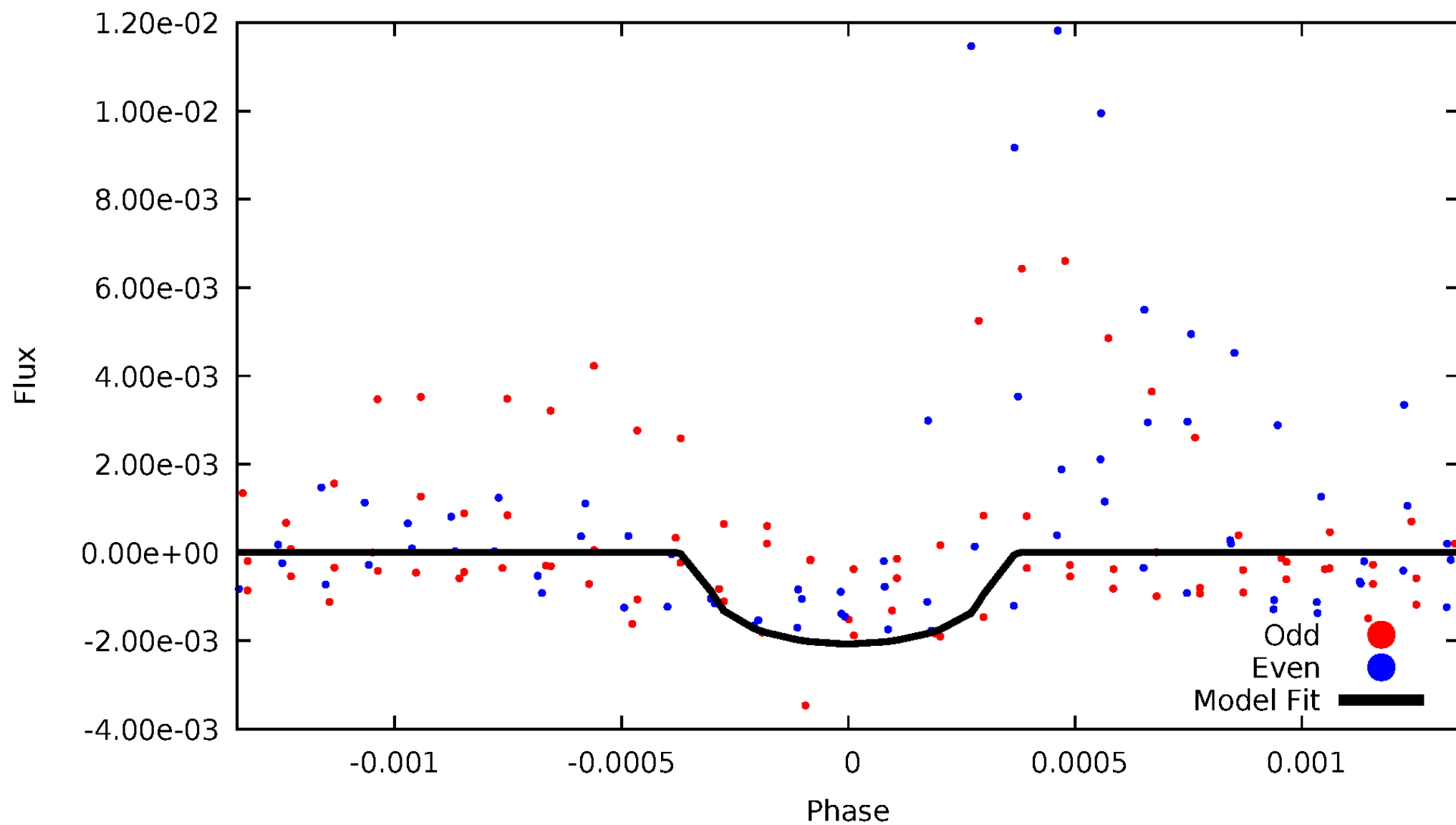
# TCE 007131515-07





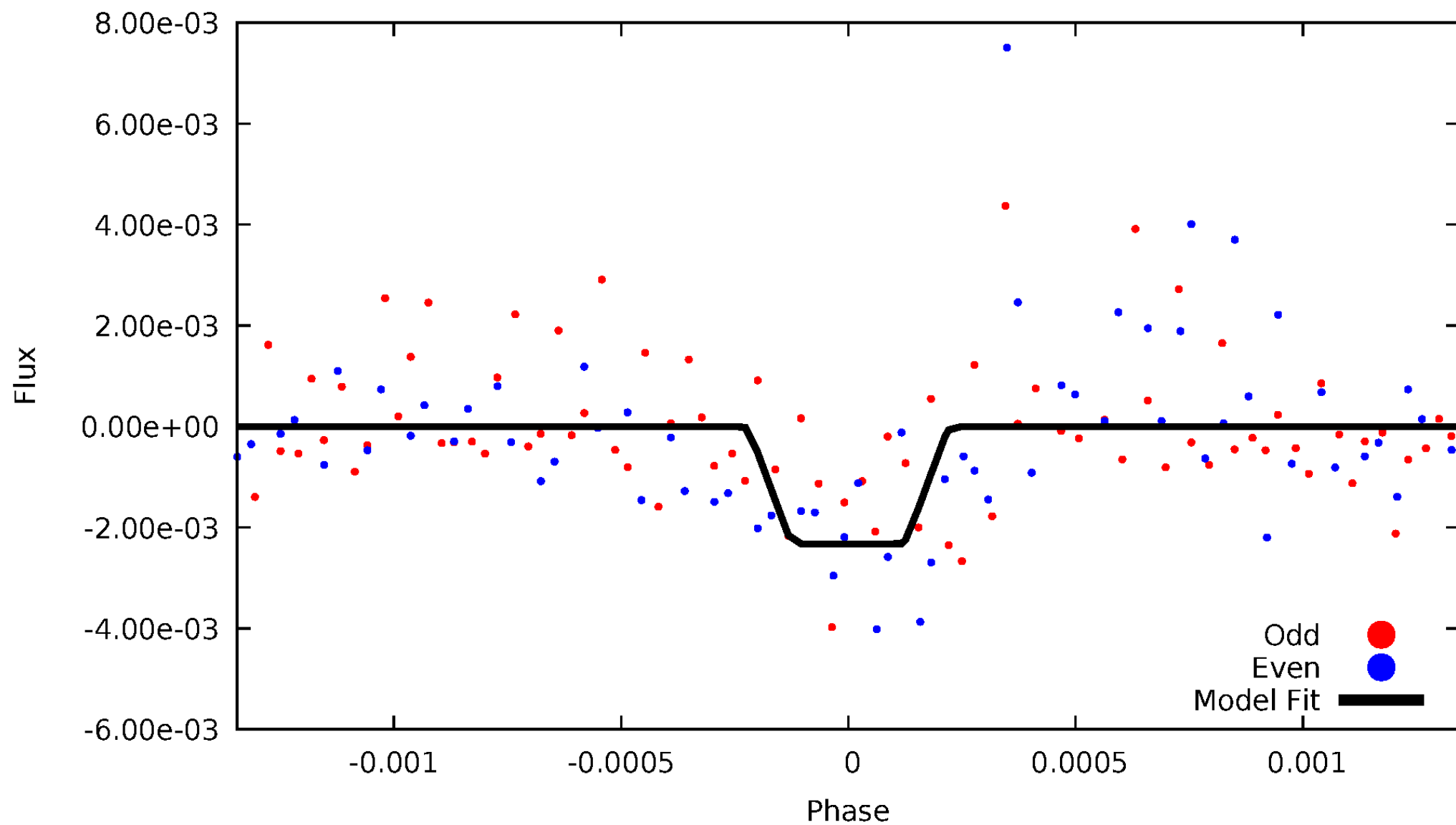
# DV Odd/Even

TCE 007131515-07



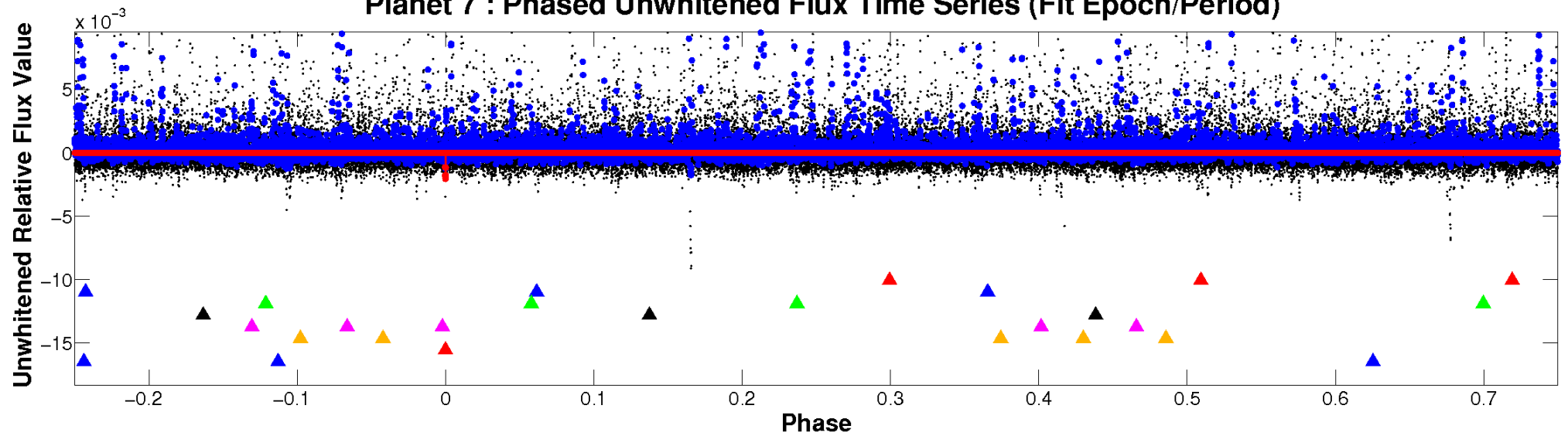
# ALT Odd/Even

TCE 007131515-07

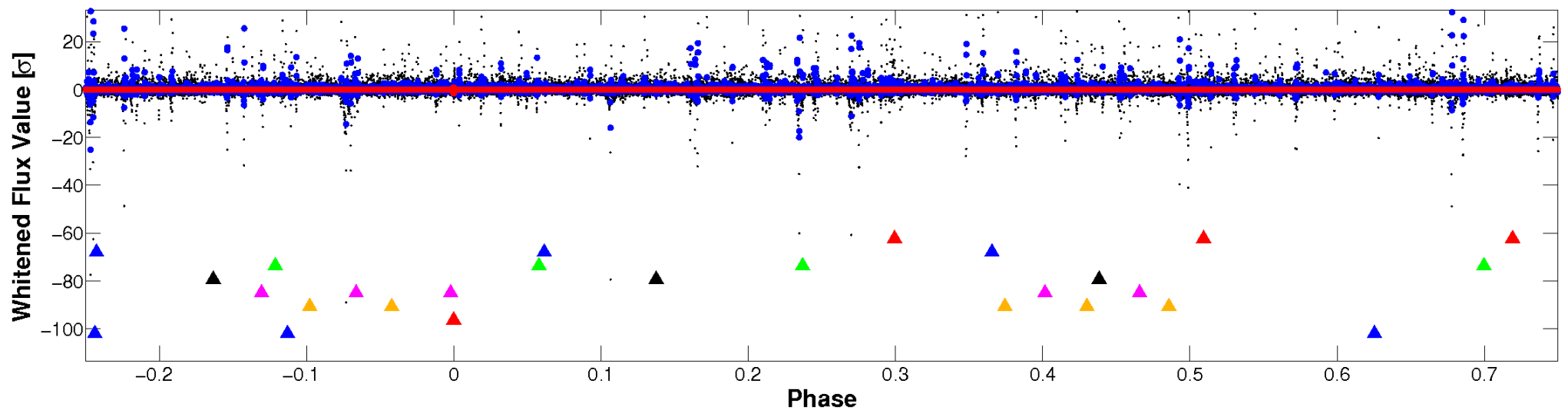


# Non-Whitened Vs. Whitened Light Curve

## Planet 7 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

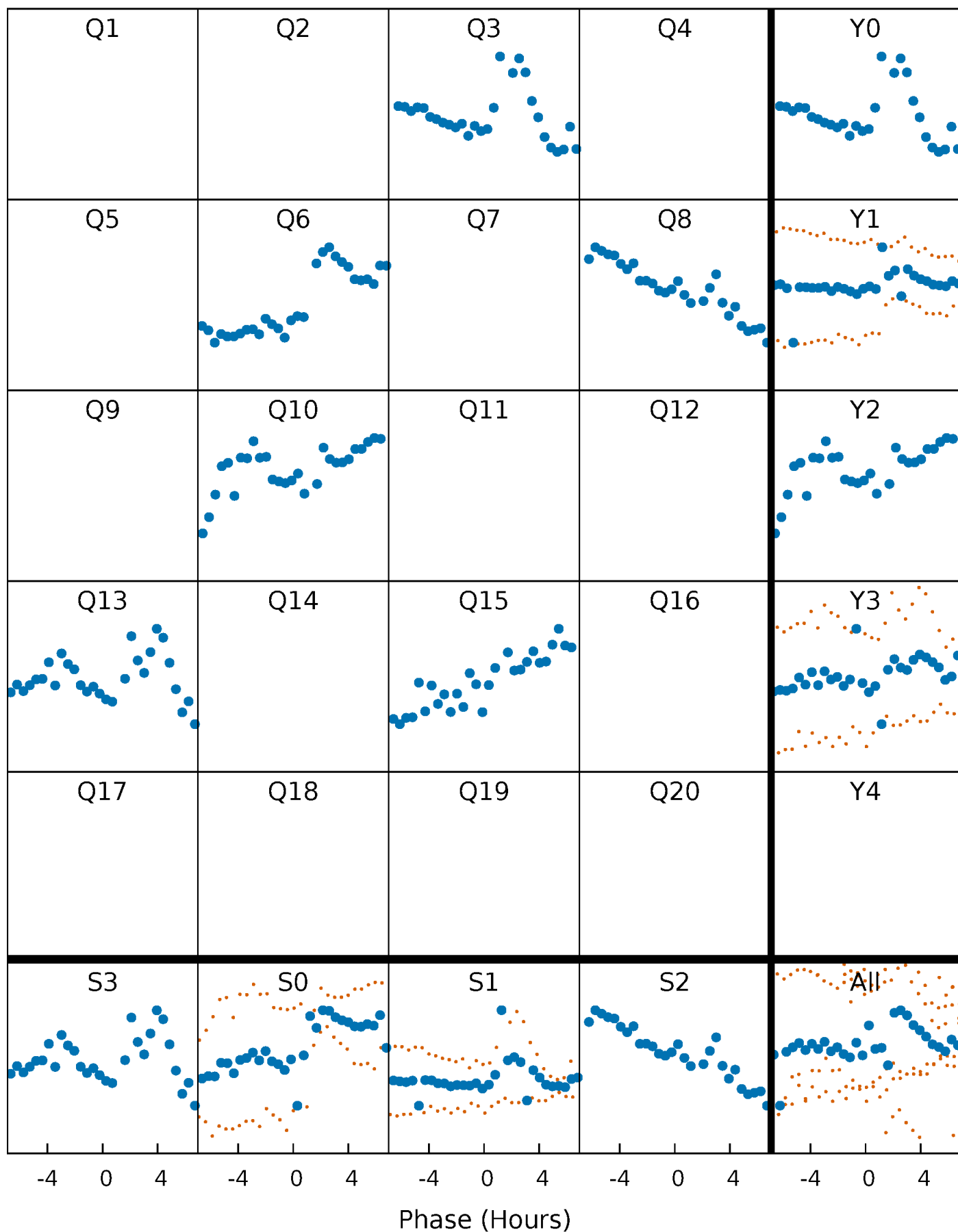


## Planet 7 : Phased Whitened Flux Time Series (Fit Epoch/Period)



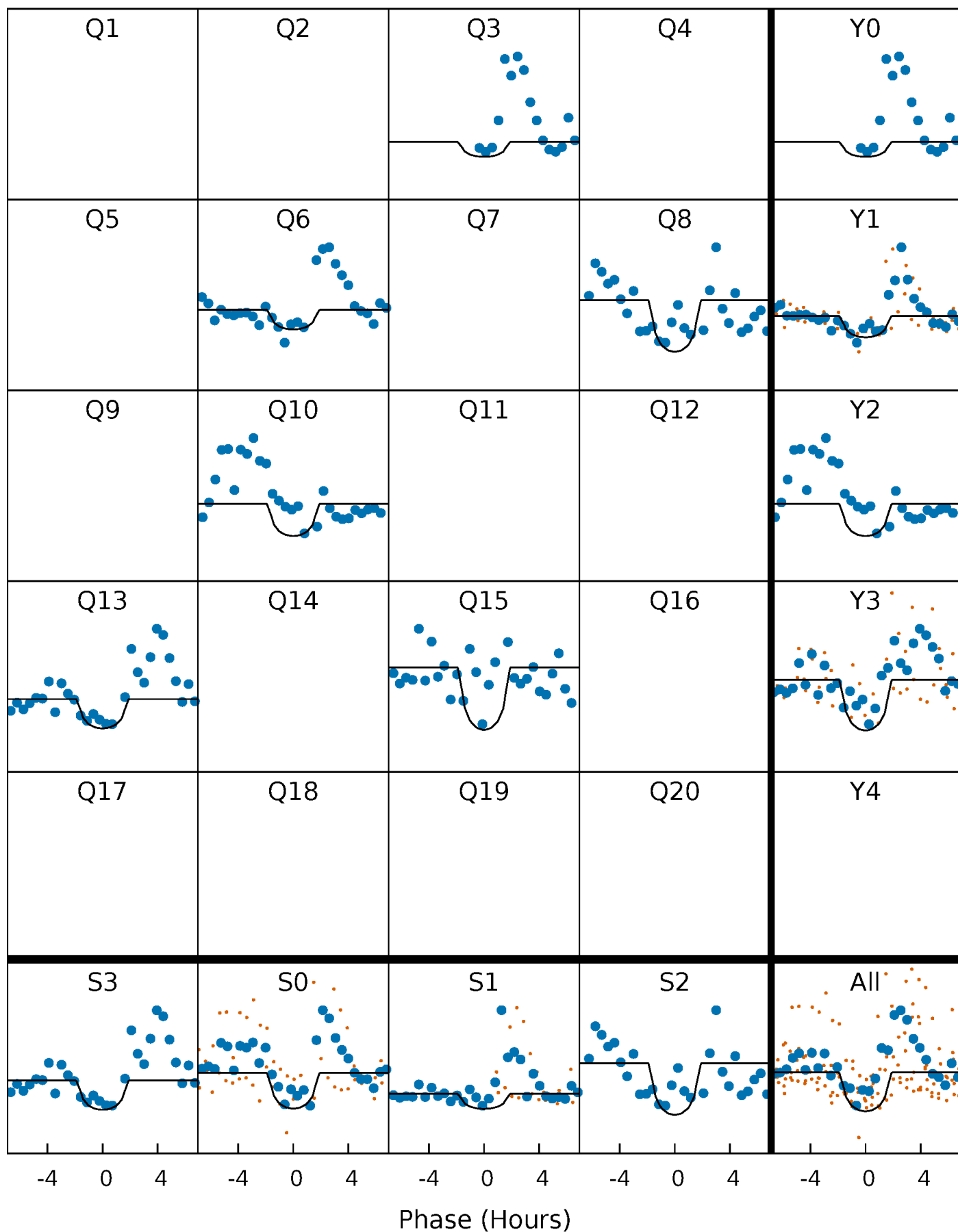
# PDC Quarter-Phased Transit Curves

TCE 007131515-07 P=214.102497 Days  $T_0=329.331944$  (BKJD)



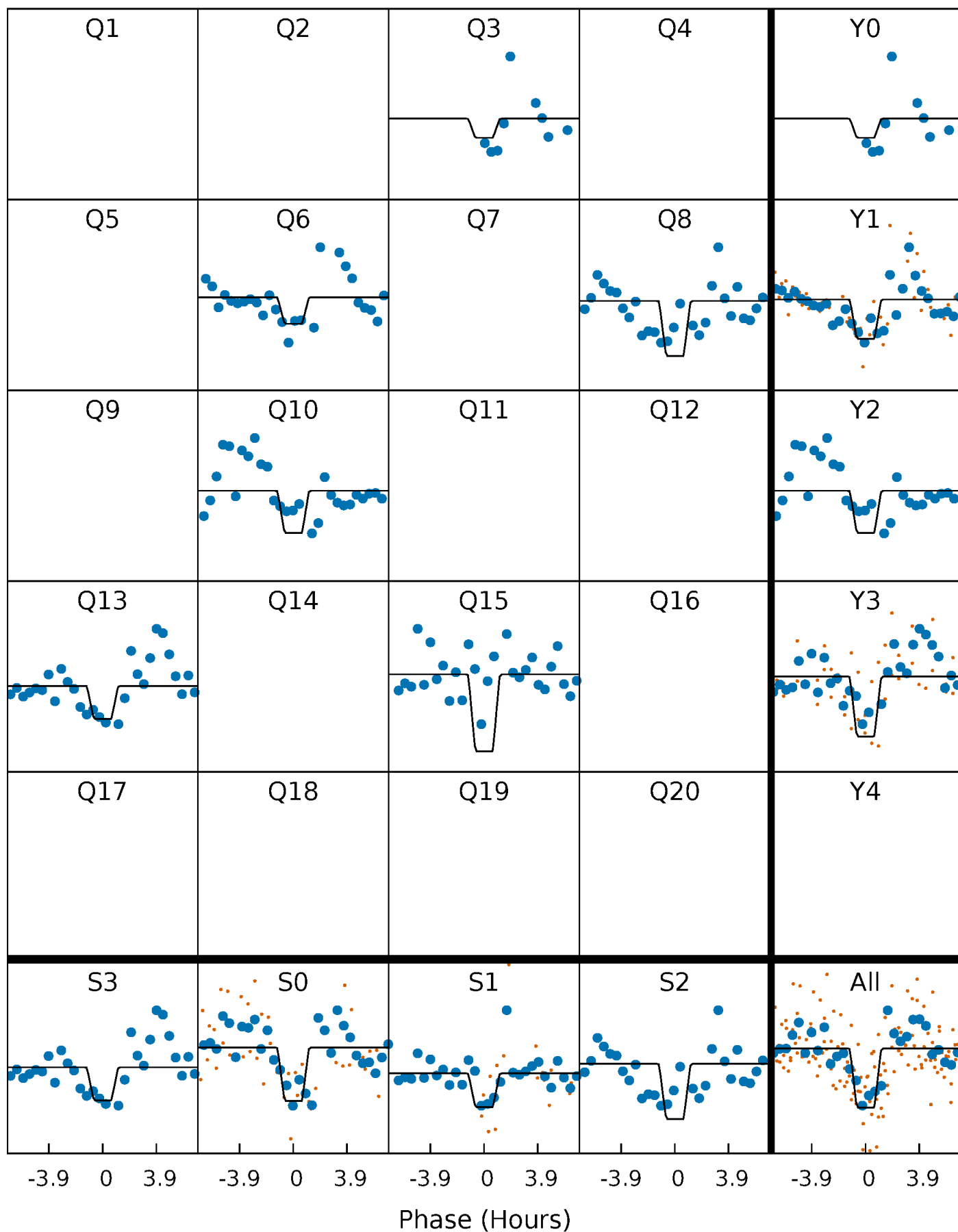
# DV Quarter-Phased Transit Curves

TCE 007131515-07 P=214.102497 Days  $T_0=329.331944$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

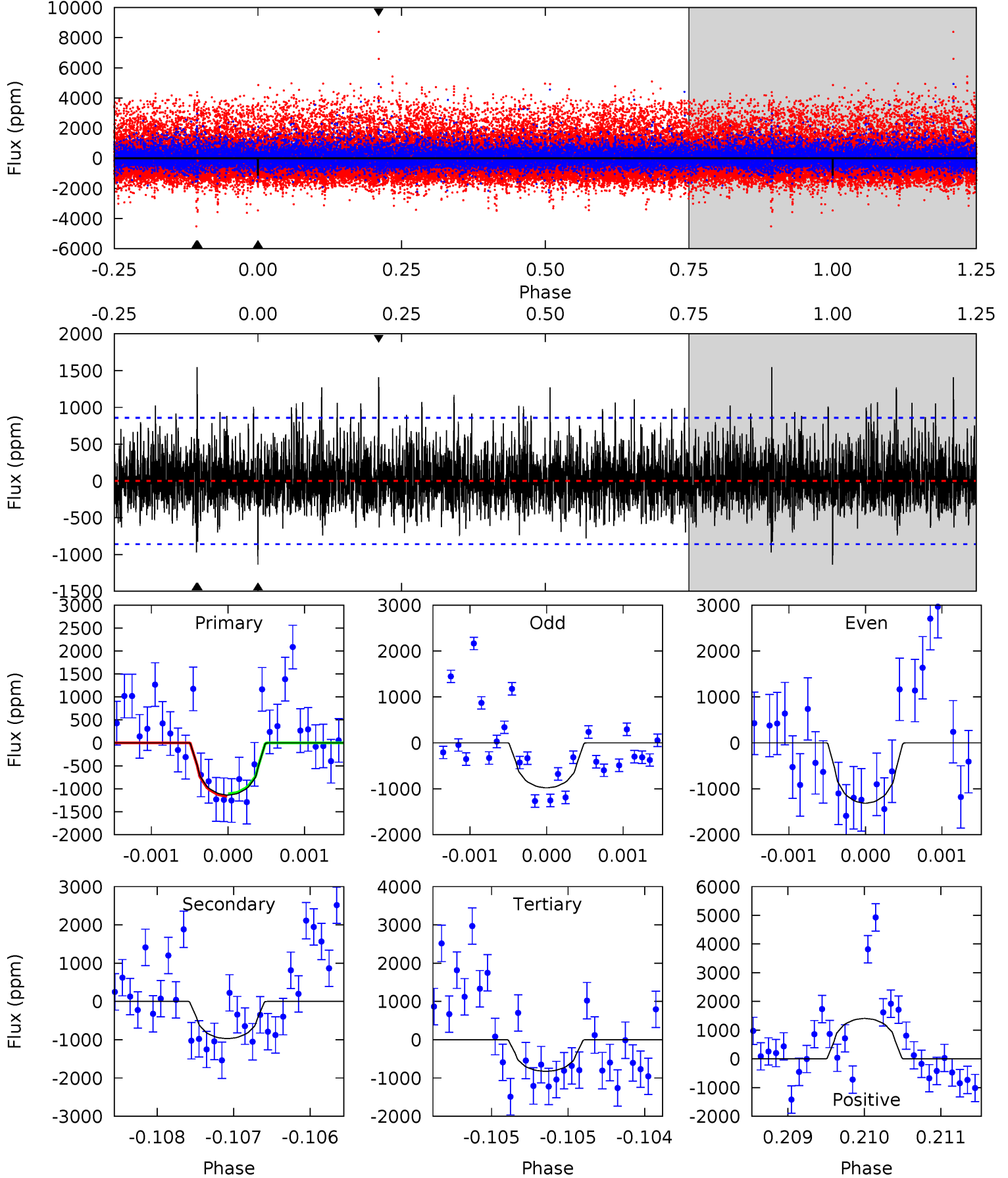
TCE 007131515-07 P=214.106722 Days  $T_0=329.315248$  (BKJD)



# DV Model-Shift Uniqueness Test

007131515-07, P = 214.102497 Days, E = 115.229447 Days

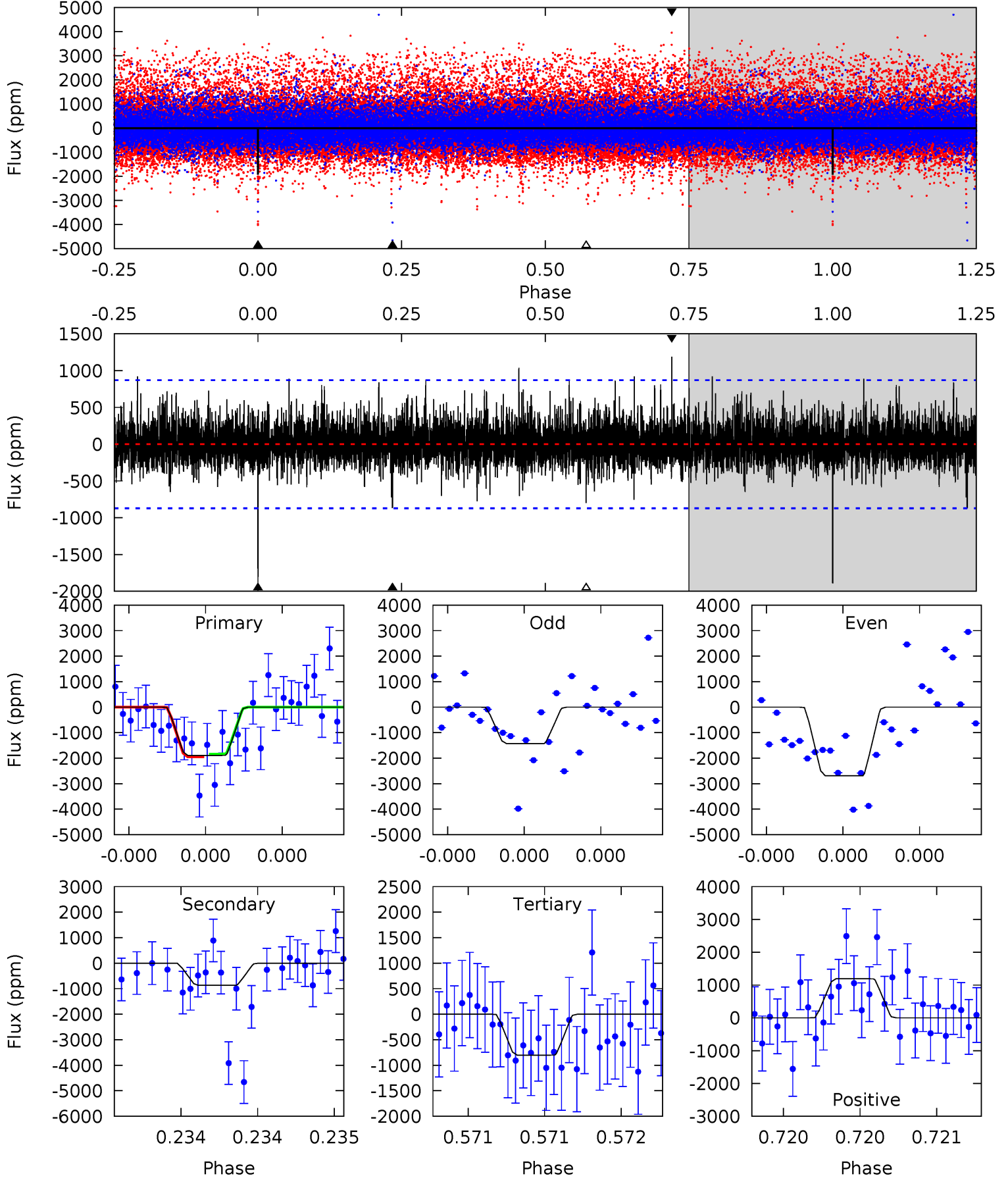
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.28	6.22	5.29	9.02	5.50	3.37	1.79	1.99	-1.74	0.93	-2.80	0.95	0.62	0.58	0.17



# Alt Model-Shift Uniqueness Test

007131515-07, P = 214.106722 Days, E = 115.208526 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.1	5.57	5.14	7.64	5.59	3.51	1.36	7.01	4.51	0.43	-2.07	3.89	1.07	0.39	0.34





### Stellar Parameters For KIC 007131515

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3838^{+120}_{-147}$	$4.651^{+0.067}_{-0.018}$	$0.560^{+0.050}_{-0.300}$	$0.611^{+0.028}_{-0.070}$	$0.609^{+0.035}_{-0.060}$	$3.764^{+1.199}_{-0.268}$
	+3%/-4%	+1%/-0%	+9%/-54%	+5%/-11%	+6%/-10%	+32%/-7%
Source	KIC0	KIC0	KIC0	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 007131515-07 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-971 \pm 156$	$5.44^{+6.03}_{-3.60}$	$237^{+9}_{-9}$	$2823^{+1157}_{-482}$	$6161^{+49088}_{-4740}$
Alt.	$-868 \pm 156$	$6.06^{+5.22}_{-4.20}$	$237^{+8}_{-9}$	$2713^{+1150}_{-384}$	$4470^{+44379}_{-3172}$

$T_{max}$  = Theoretical Maximum Planetary Temperature

$T_{obs}$  = Observed Planetary Temperature (Assuming A=0.3)

$A_{obs}$  = Observed Albedo (Assuming T=0)

If a secondary eclipse is present, the system is likely an EB if  $T_{obs} \gg T_{max}$  AND  $A_{obs} \gg 1.0$

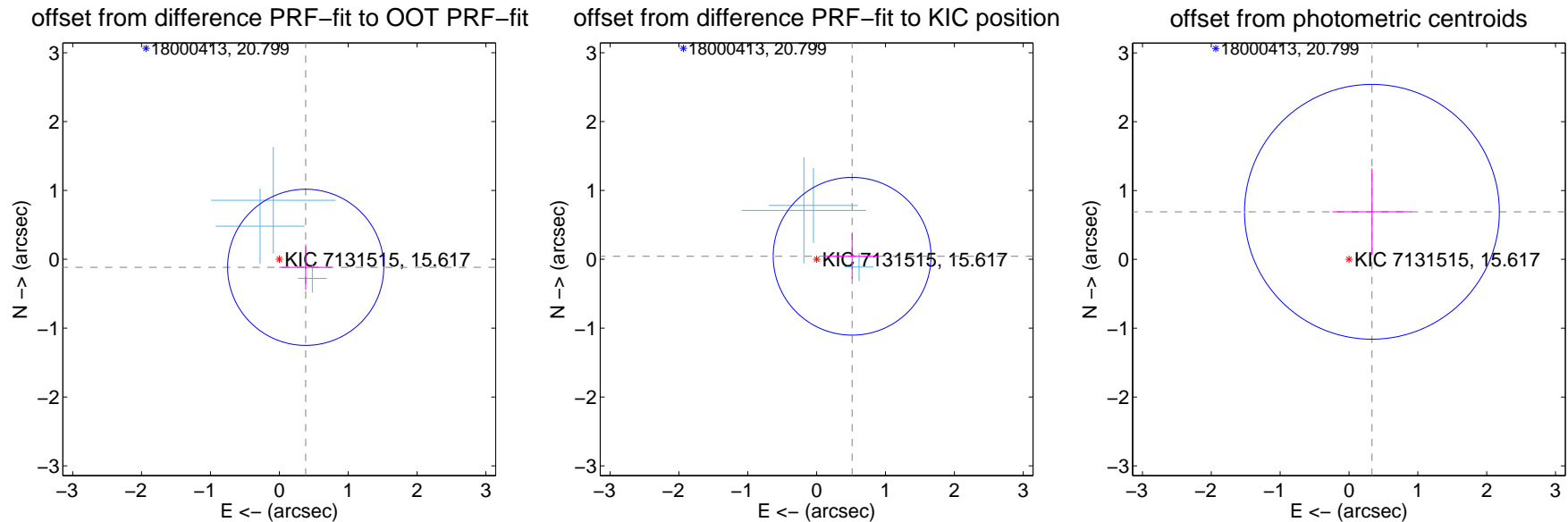
## DV Centroid Data

Supplemental centroid analysis for 007131515-07. Kepler magnitude: 15.62. Transit SNR 8.52

There are 3 quarters with good PRF difference image offsets

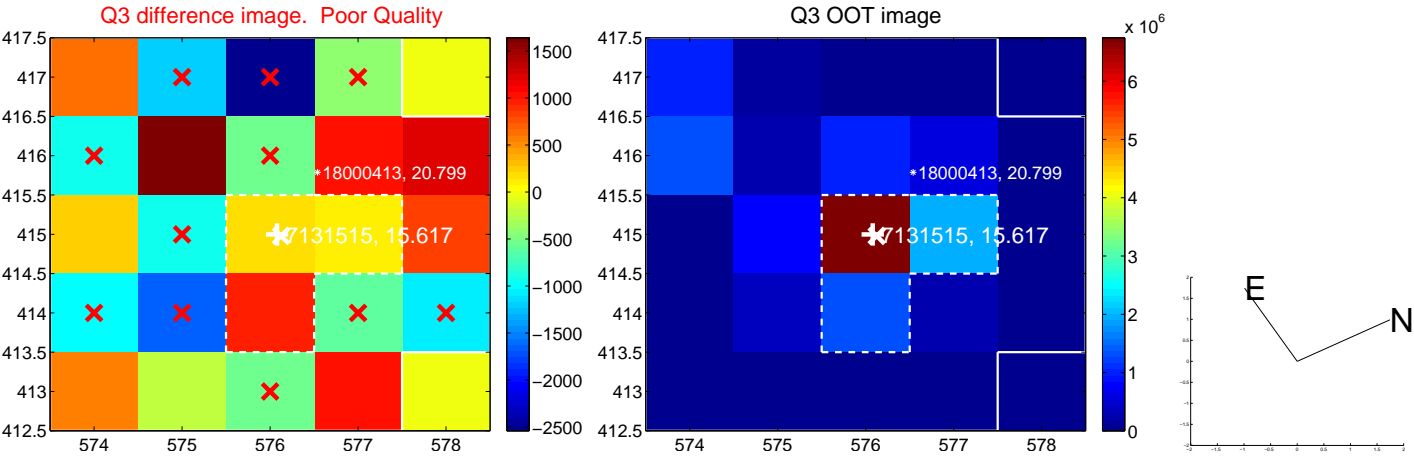
The direct PRF centroid is offset from the target star catalog position by about 0.18 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.400 \pm 0.378$	1.06	$-0.383 \pm 0.382$	$-0.116 \pm 0.329$
PRF-fit source offset from KIC position	$0.517 \pm 0.382$	1.35	$-0.515 \pm 0.382$	$0.044 \pm 0.329$
photometric centroid source offset	$0.77 \pm 0.62$	1.24	$-0.33 \pm 0.57$	$0.69 \pm 0.63$



Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.

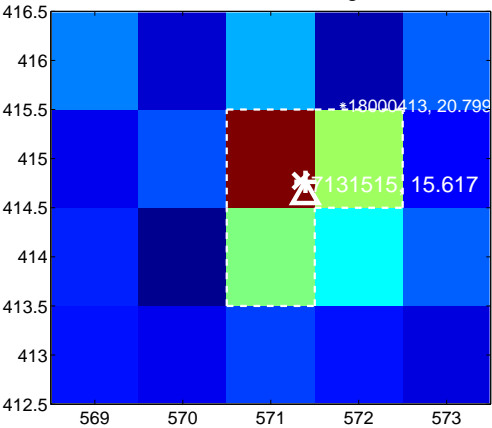
Q5 no difference image



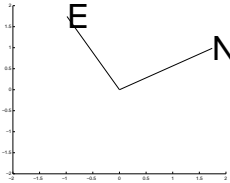
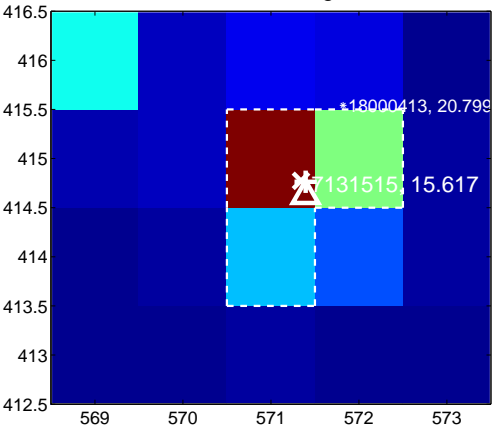
Q5 no OOT image



Q6 difference image



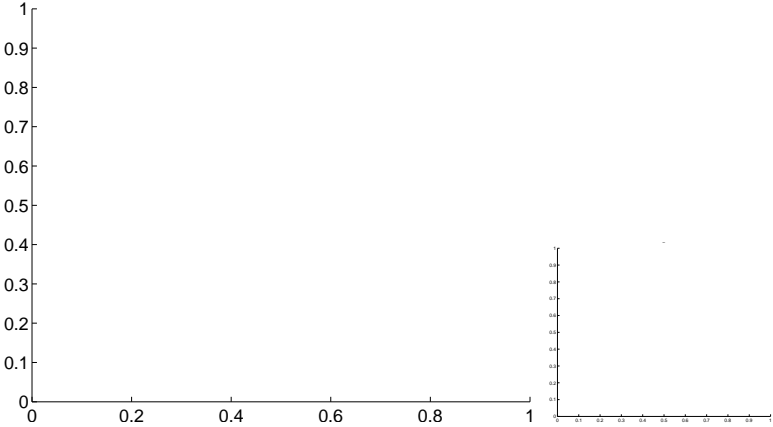
Q6 OOT image



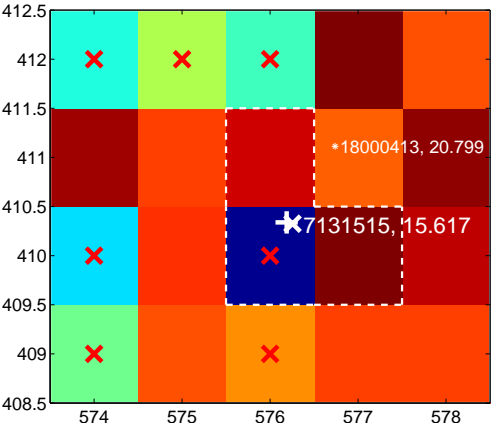
Q7 no difference image



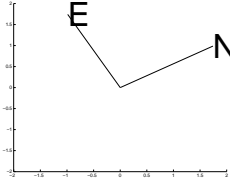
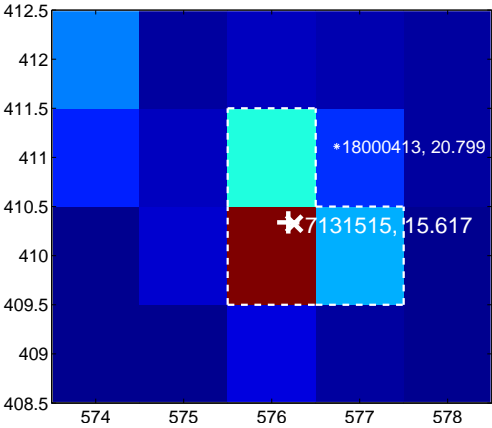
Q7 no OOT image



Q8 difference image. Poor Quality



Q8 OOT image



white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

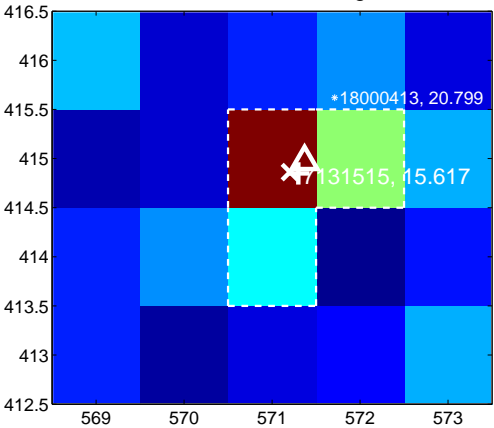
Q9 no difference image



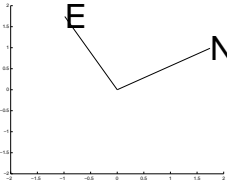
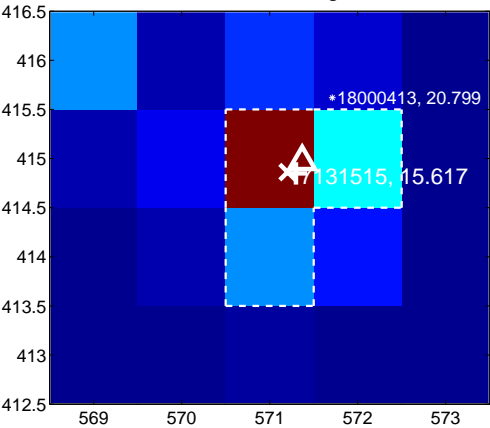
Q9 no OOT image



Q10 difference image



Q10 OOT image



Q11 no difference image



Q11 no OOT image



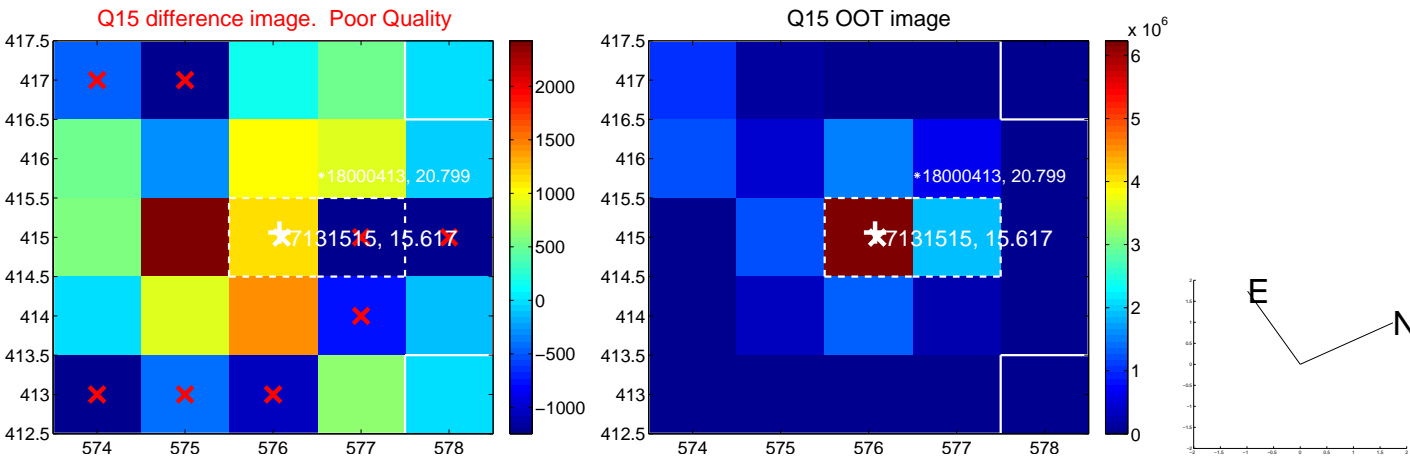
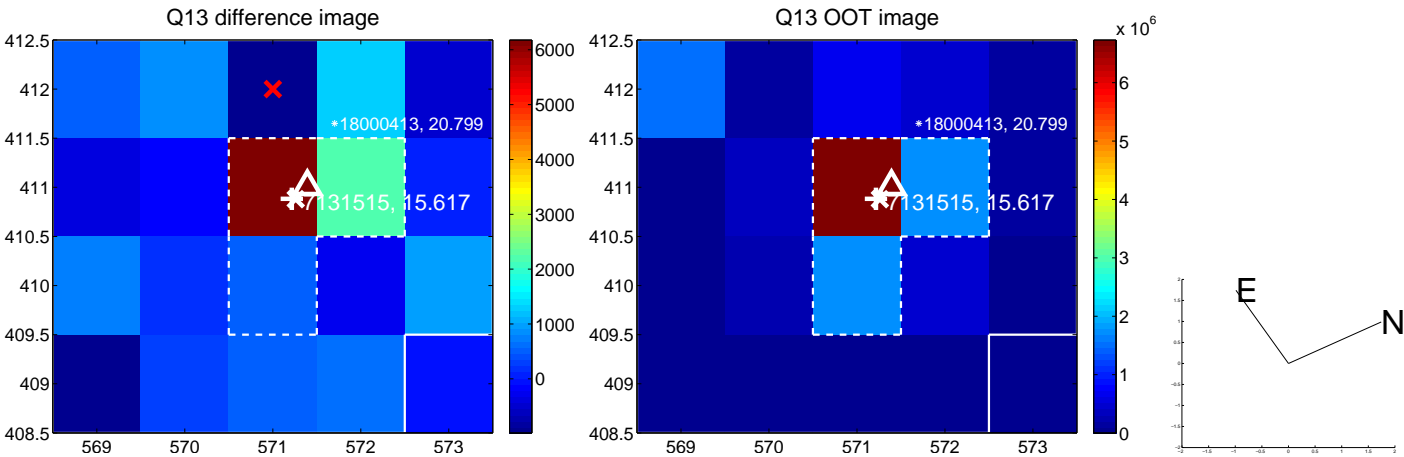
Q12 no difference image



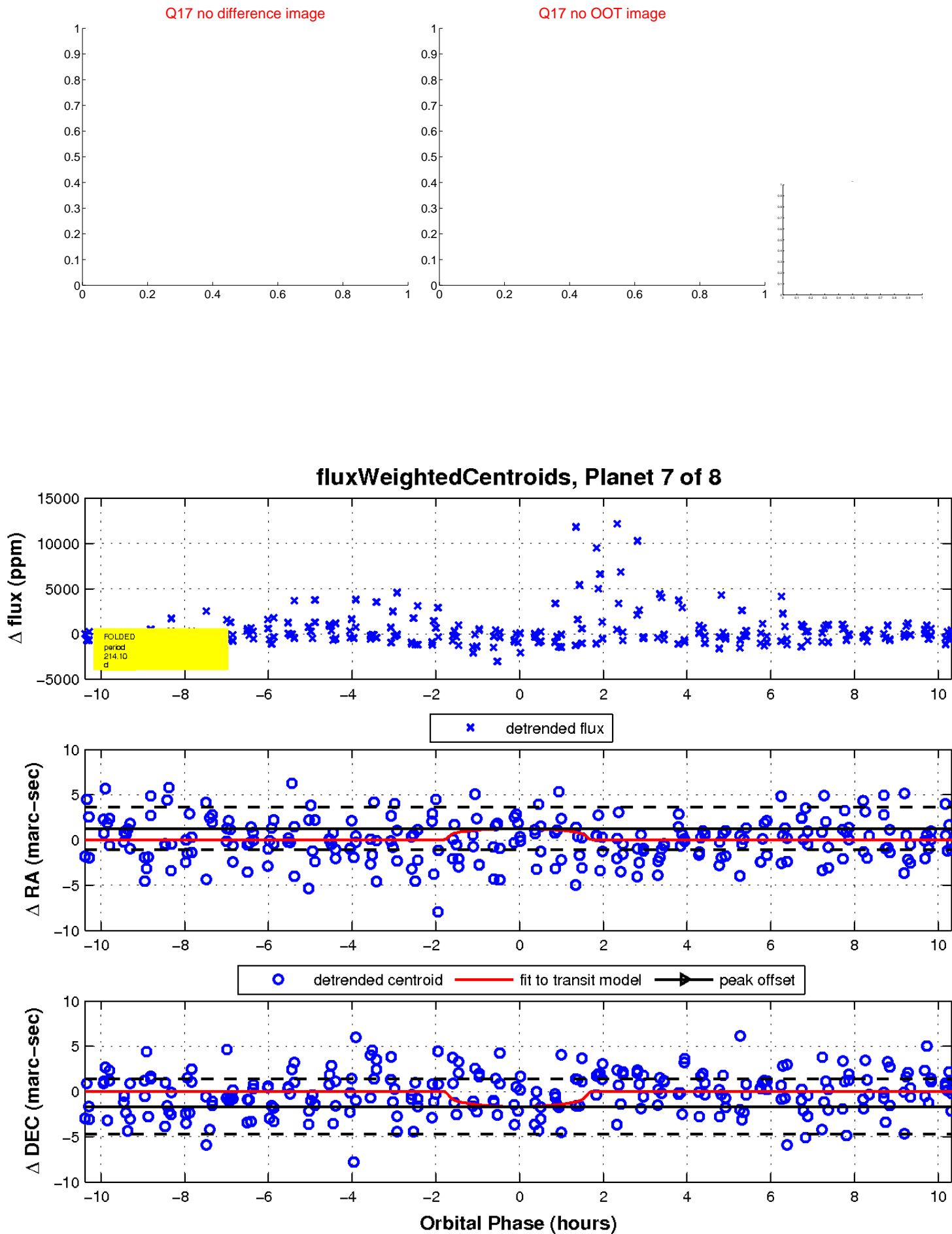
Q12 no OOT image



white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.

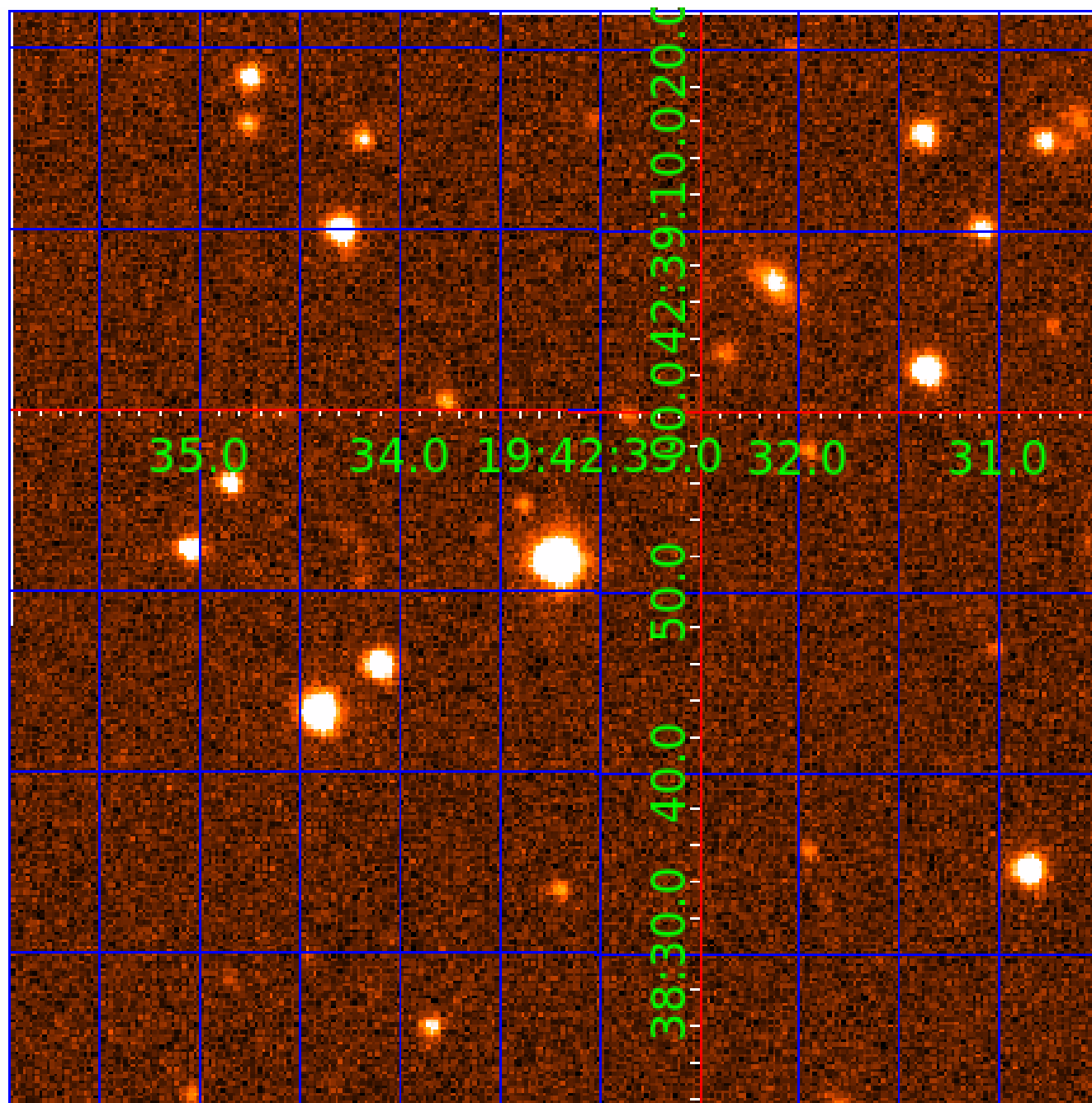


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 007131515

## Q1-17 DR25 TCE Parameters

TCE	Run Type	KOI?	Period (Days)	Epoch (BKJD)	Depth (ppm)	Duration (Hours)	MES	SNR	$R_{\star}$ ( $R_{\odot}$ )	$T_{\star}$ (K)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007131515-01	OBS	No	473.144452	393.439069	771.8	4.103	15.9	2.2	0.61	3838	1.85	0.07
007131515-02	OBS	No	577.200600	407.602036	9650.8	16.845	14.0	22.4	0.61	3838	7.21	0.06
007131515-04	OBS	No	577.895819	209.085272	2898.9	15.668	11.9	8.2	0.61	3838	3.33	0.06
007131515-05	OBS	No	314.278701	328.888523	1207.0	6.263	10.7	4.2	0.61	3838	2.22	0.12
007131515-06	OBS	No	315.192673	219.225711	2649.6	7.659	12.0	7.2	0.61	3838	3.72	0.12
007131515-07	OBS	No	214.102497	329.331944	2065.9	3.462	12.6	8.5	0.61	3838	2.67	0.21
007131515-08	OBS	No	614.286037	305.165108	2458.8	10.768	11.9	7.0	0.61	3838	3.02	0.05

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007131515-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
007131515-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
007131515-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
007131515-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
007131515-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_TER_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
007131515-07	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—MOD_NONUNIQ_DV—MOD_POS_DV—HALO_GHOST
007131515-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS

**Notes:** OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

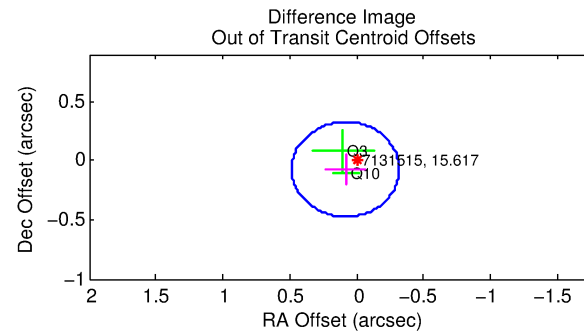
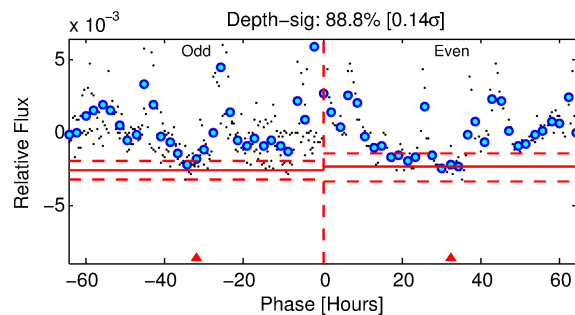
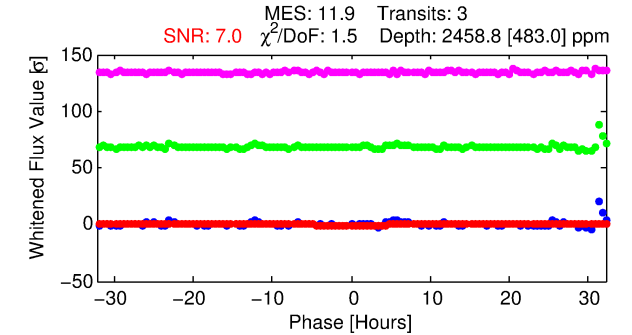
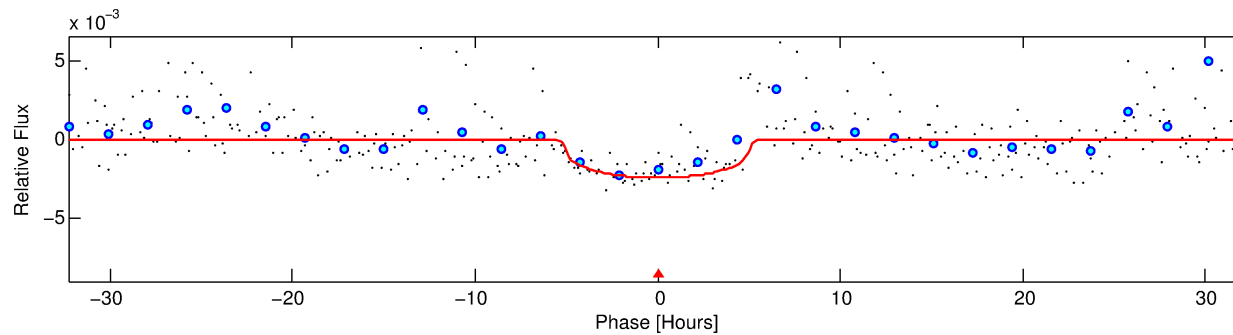
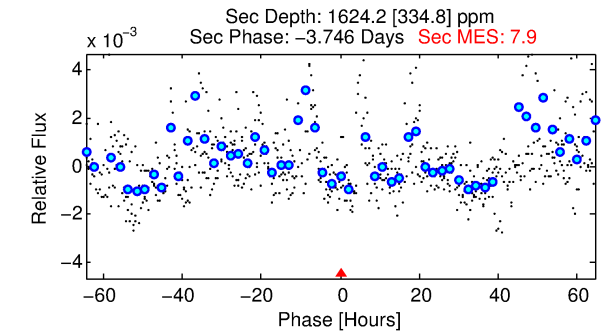
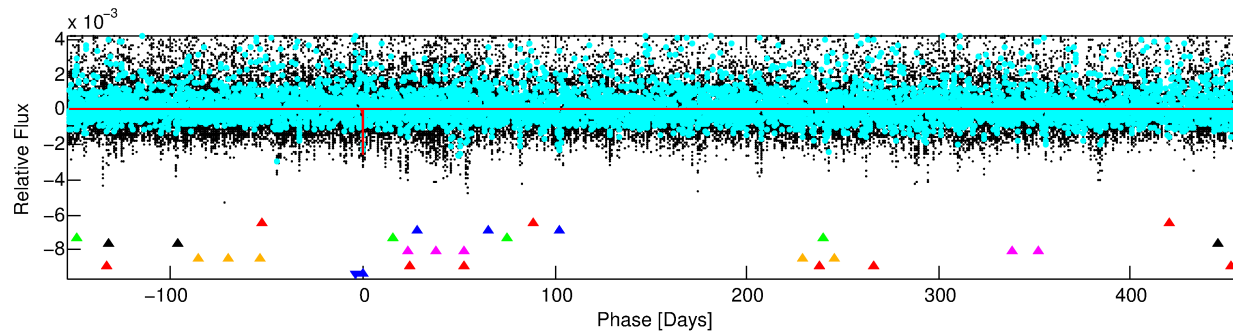
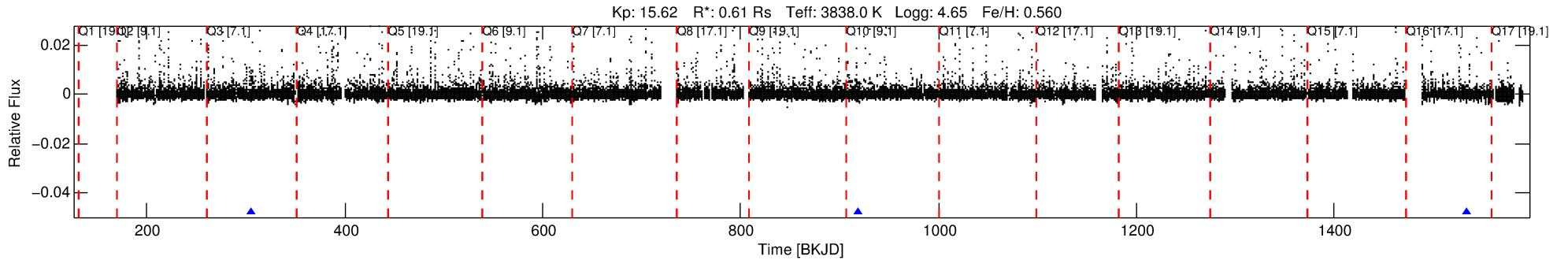
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 007131515-08

No Significant Match Found

# DV One-Page Summary

KIC: 7131515 Candidate: 8 of 8 Period: 614.286 d



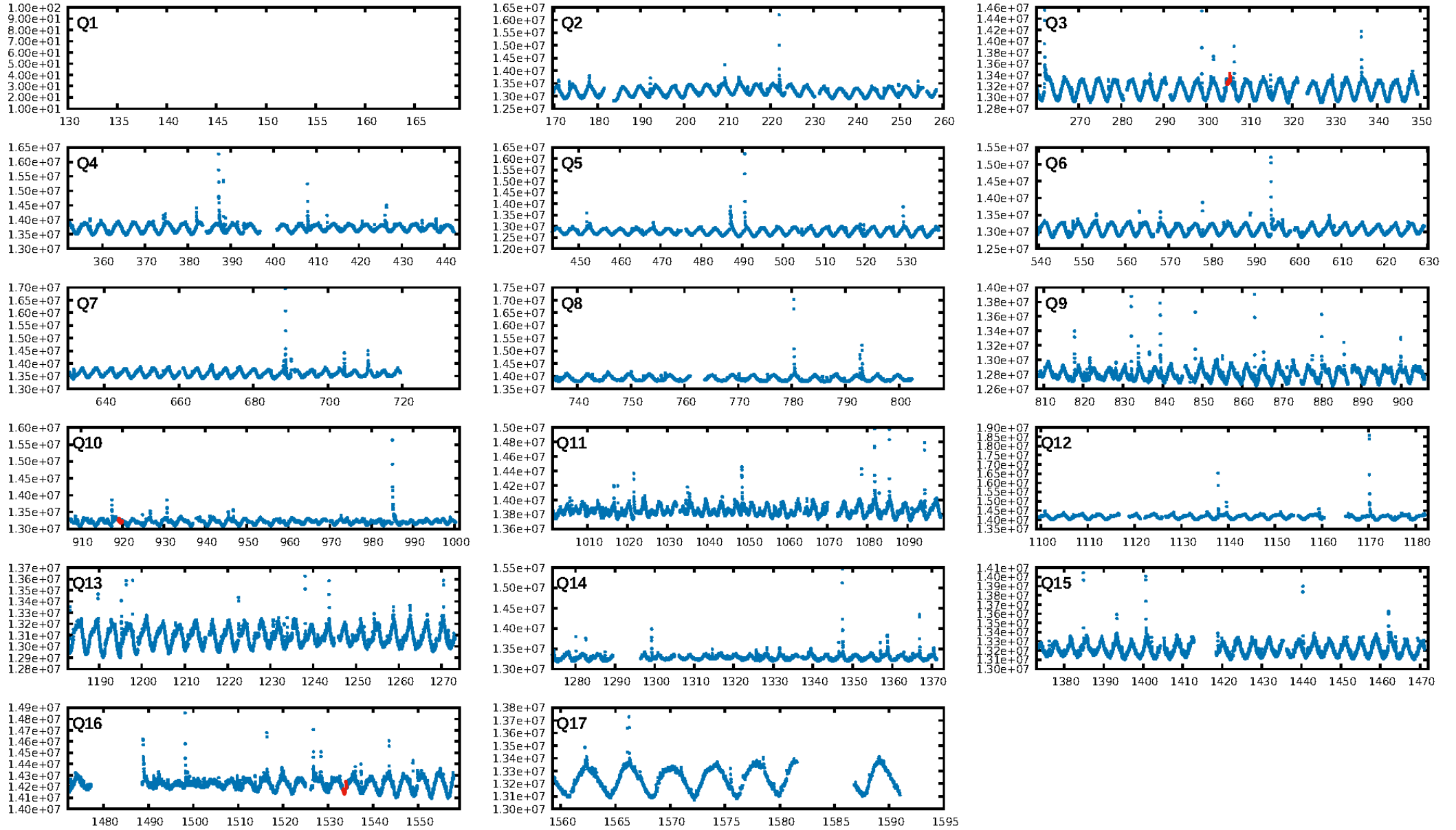
## DV Fit Results:

Period = 614.28604 [0.01165] d  
Epoch = 305.1651 [0.0171] BKJD  
Rp/R\* = 0.0453 [0.0210]  
a/R\* = 406.20 [537.32]  
b = 0.47 [2.20]  
Seff = 0.05 [0.01]  
Teq = 121 [6] K  
Rp = 3.02 [1.44] Re  
a = 1.1994 [0.1104] AU  
Ag = 141021.55 [135040.16] [1.04σ]  
Teffp = 3621 [870] K [4.02σ]

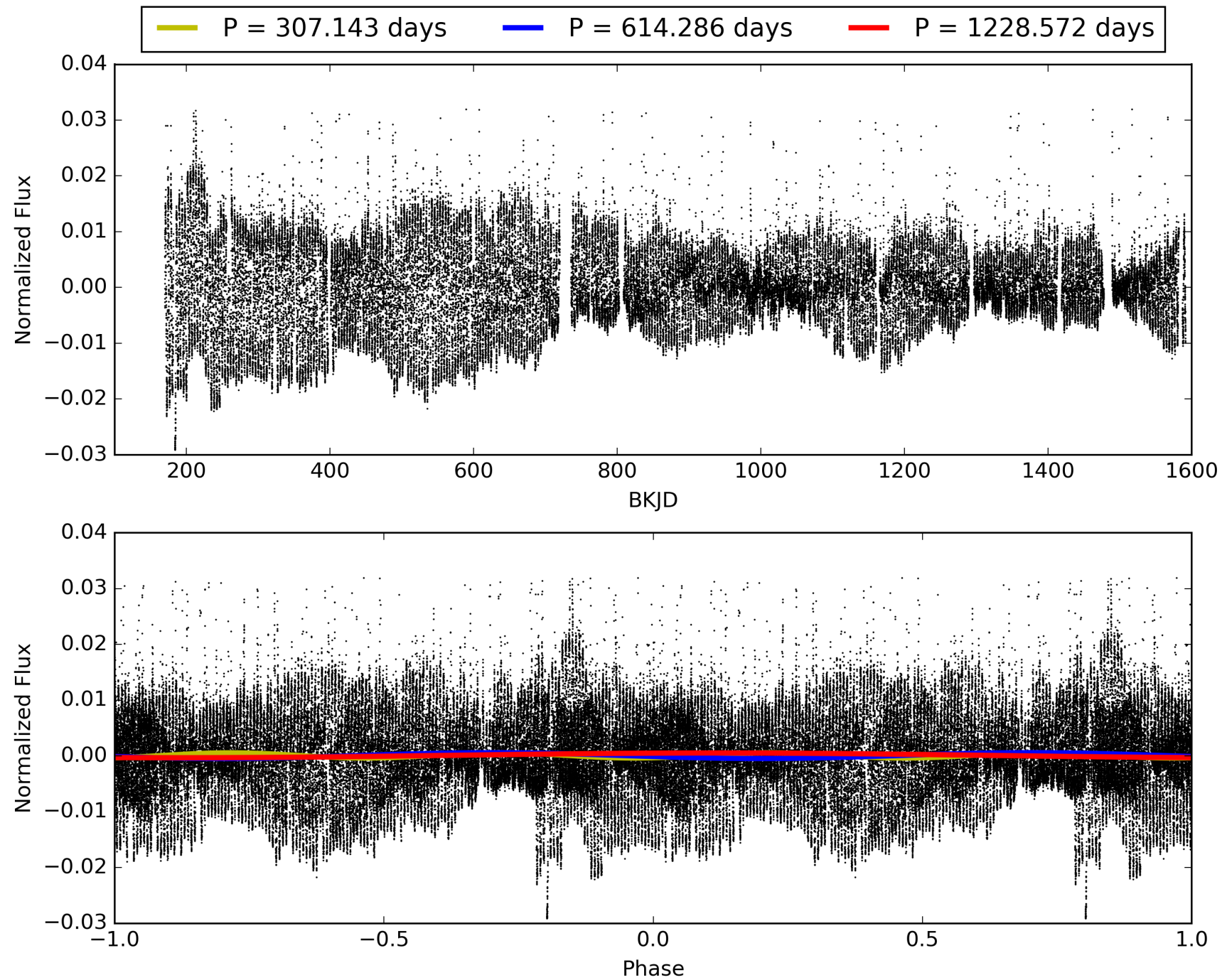
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [45.94σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 77.0%  
ModelChiSquareGof-sig: 98.1%  
Bootstrap-pfa: 3.92e-09  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 1.494  
Centroid-sig: 62.4%  
Centroid-so: 0.390 arcsec [0.90σ]  
OotOffset-rm: 0.113 arcsec [0.84σ]  
KicOffset-rm: 0.041 arcsec [0.32σ]  
OotOffset-st: 1/1/0/0 [2]  
KicOffset-st: 1/1/0/0 [2]  
DiffImageQuality-fgm: 0.50 [1/2]  
DiffImageOverlap-fno: 1.00 [2/2]

# TCE 007131515-08, PDC Light Curves

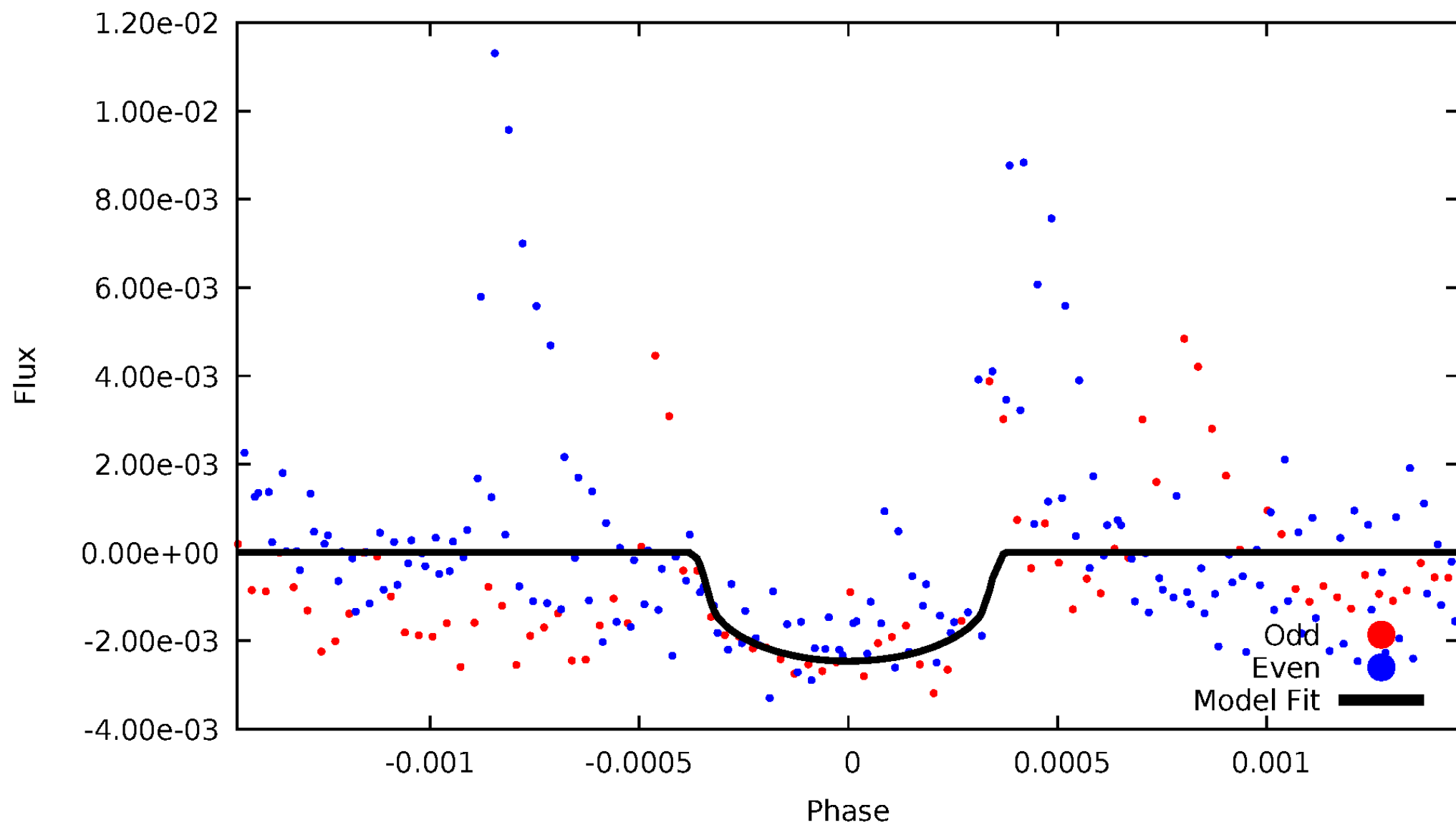


# TCE 007131515-08



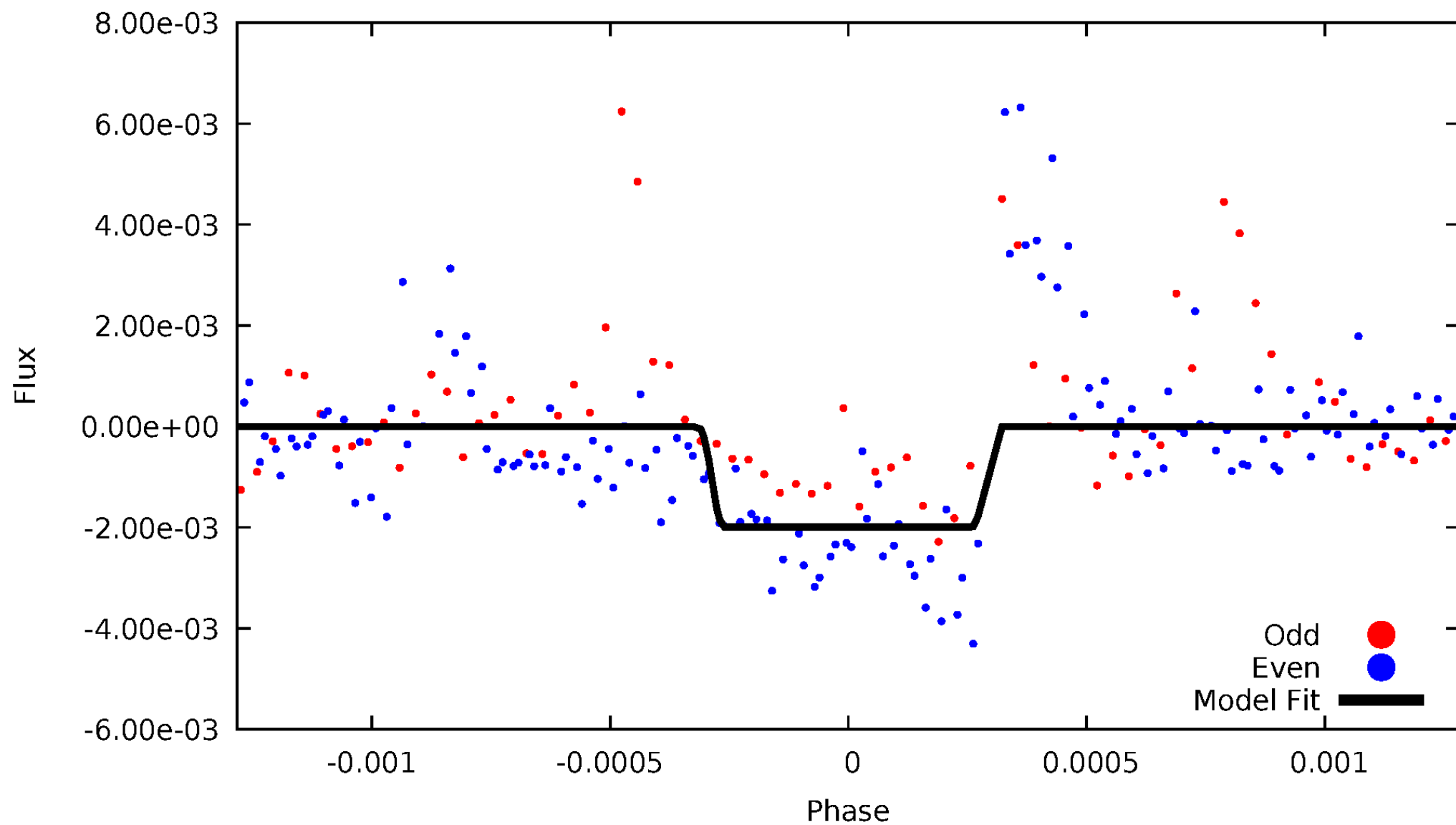
# DV Odd/Even

TCE 007131515-08



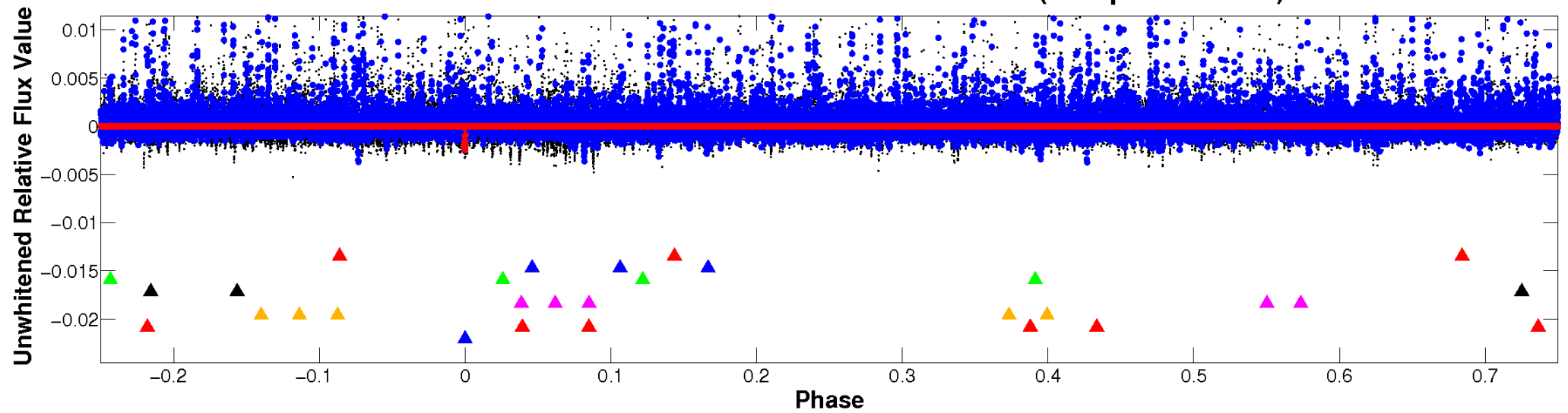
# ALT Odd/Even

TCE 007131515-08

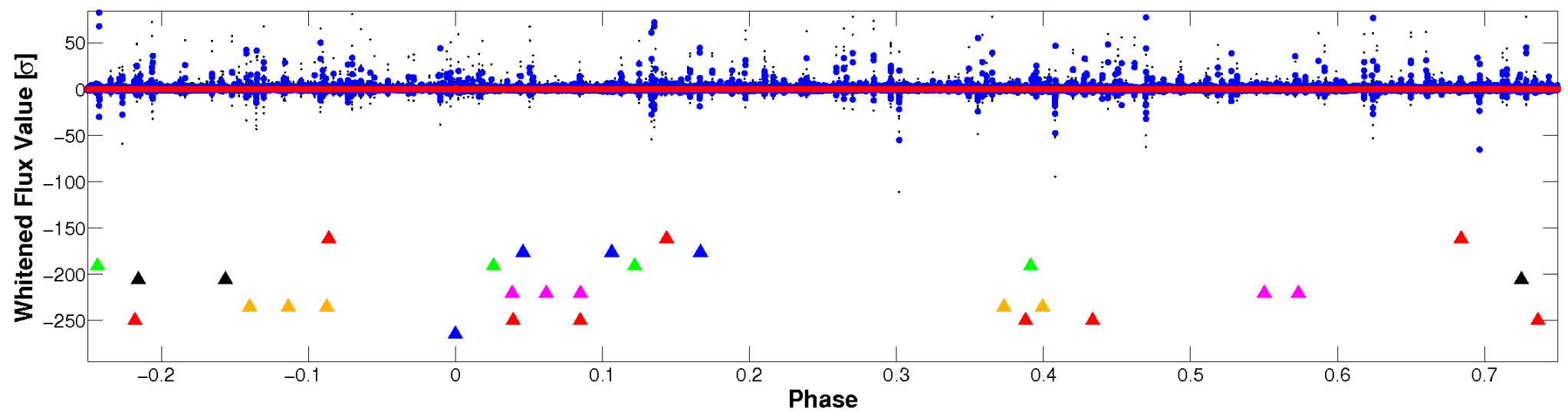


# Non-Whitened Vs. Whitened Light Curve

## Planet 8 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

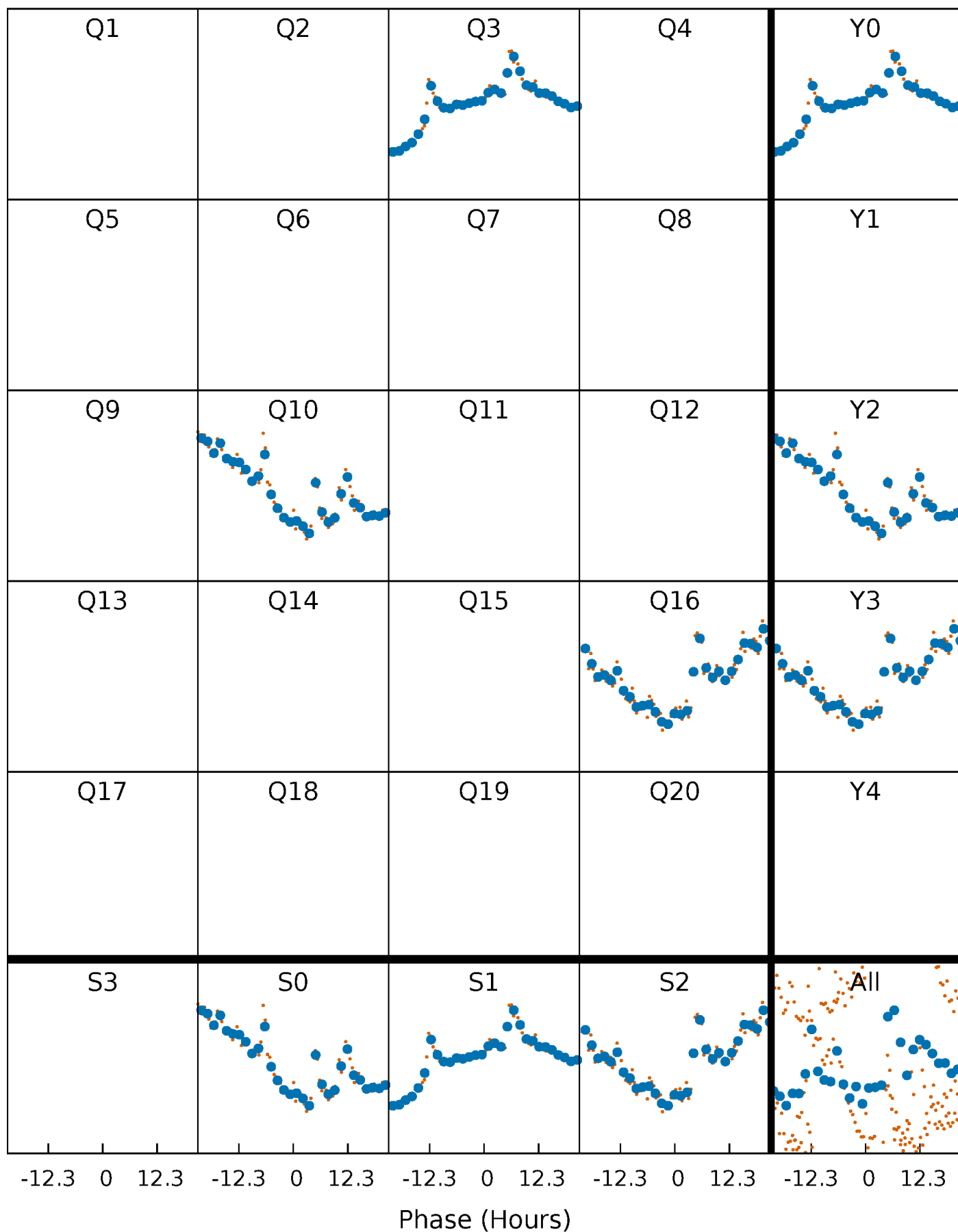


## Planet 8 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

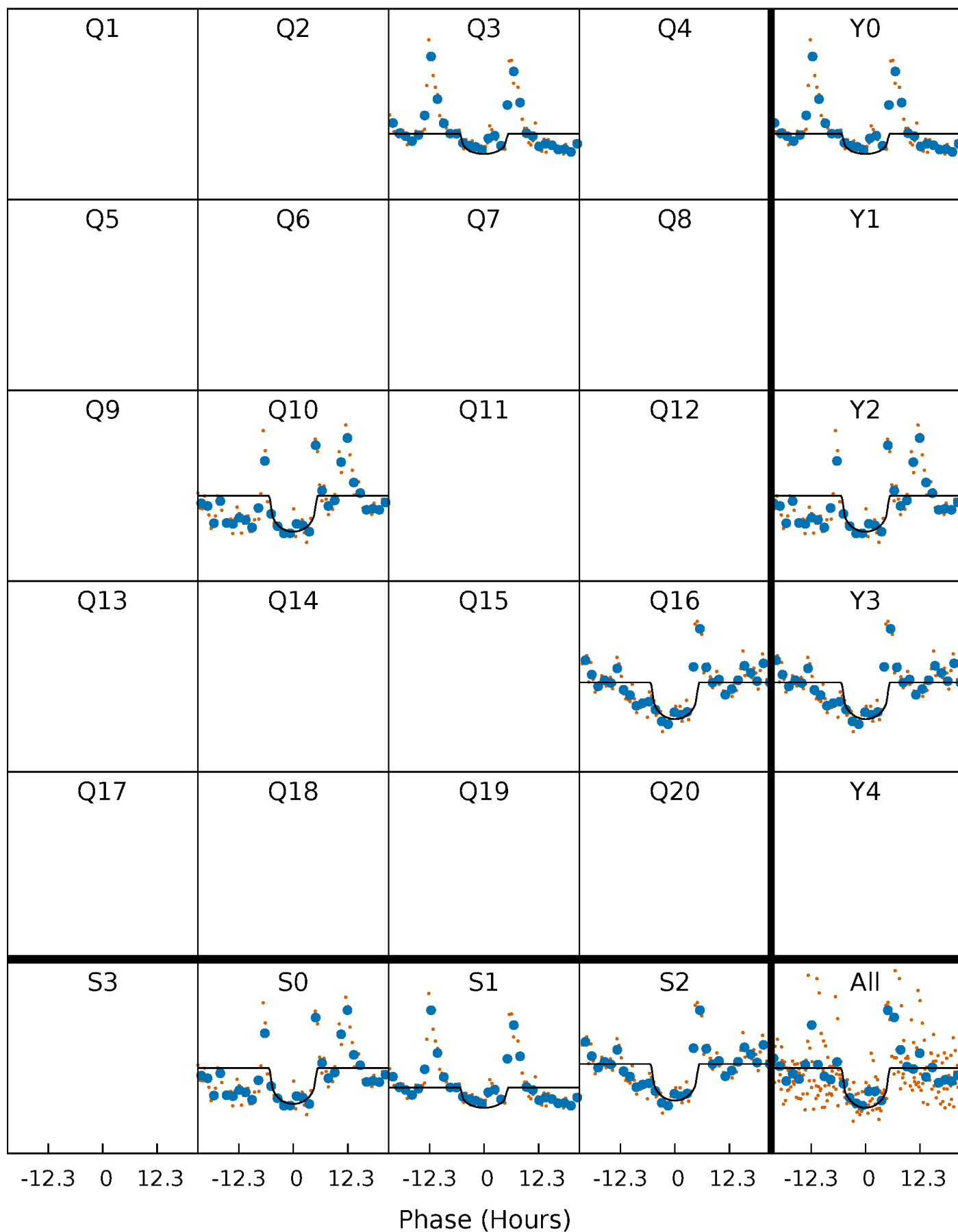
TCE 007131515-08 P=614.286037 Days  $T_0=305.165108$  (BKJD)





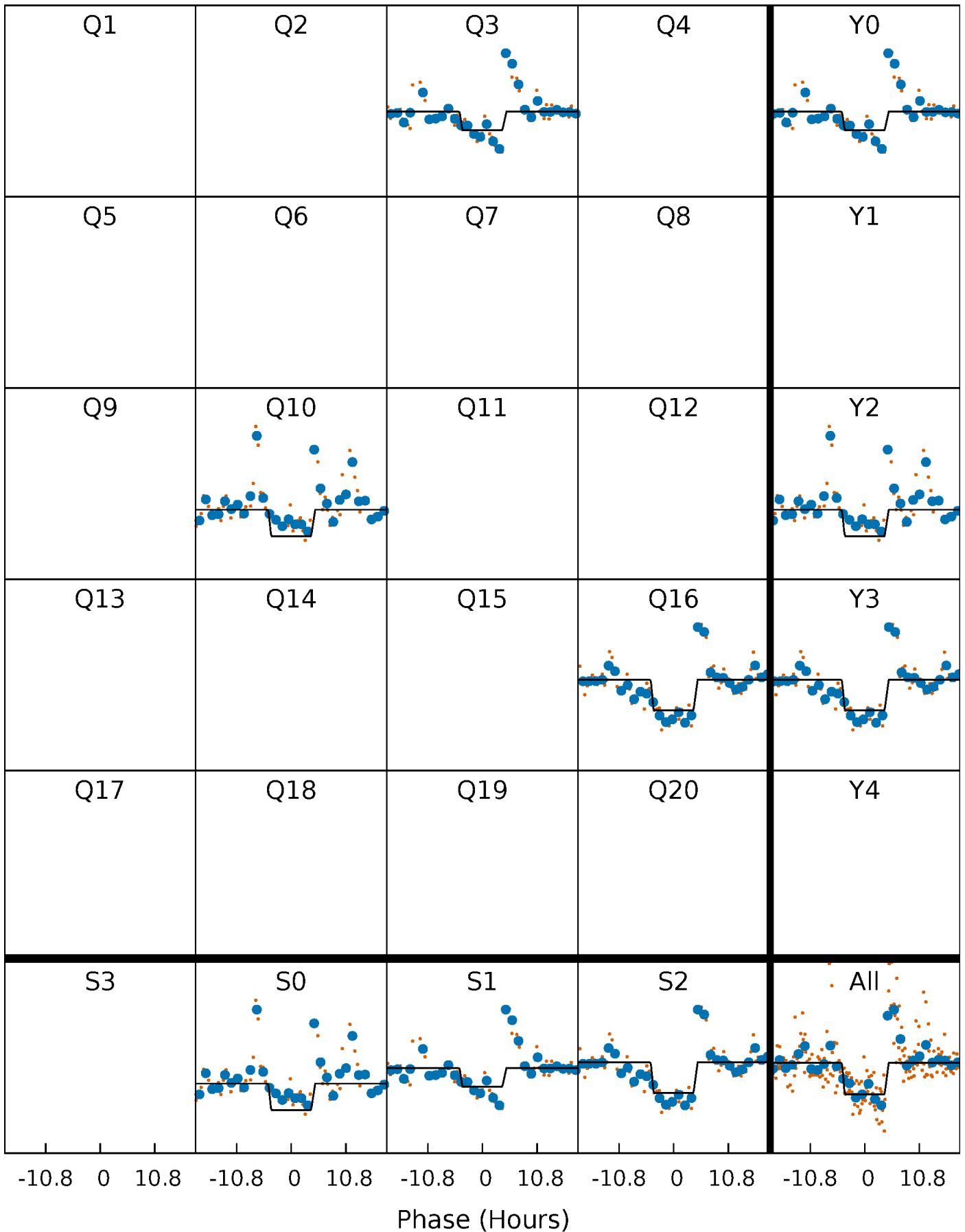
# DV Quarter-Phased Transit Curves

TCE 007131515-08 P=614.286037 Days  $T_0=305.165108$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

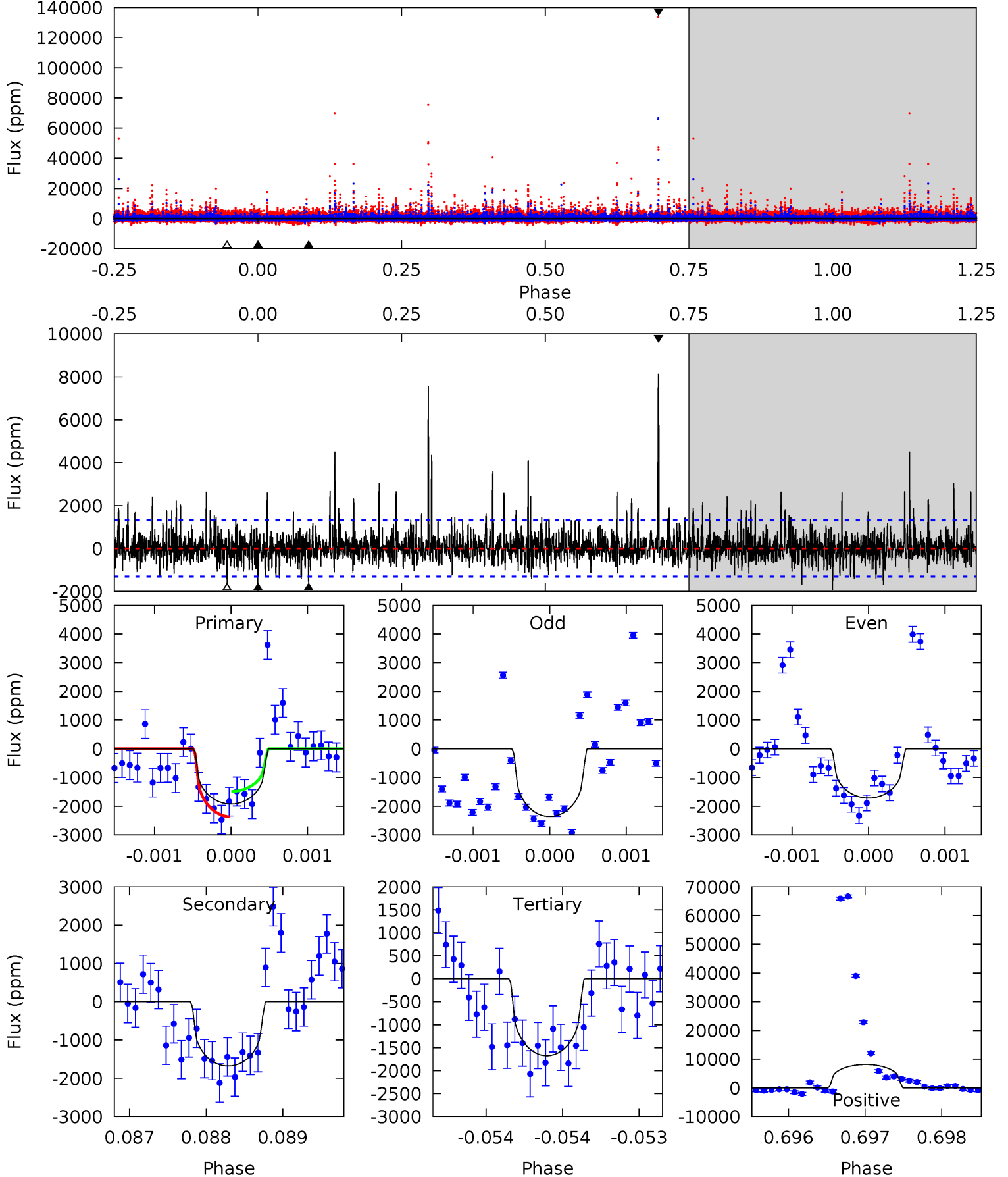
TCE 007131515-08     $P=614.260058$  Days     $T_0=305.200088$  (BKJD)



# DV Model-Shift Uniqueness Test

007131515-08, P = 614.286037 Days, E = 305.165108 Days

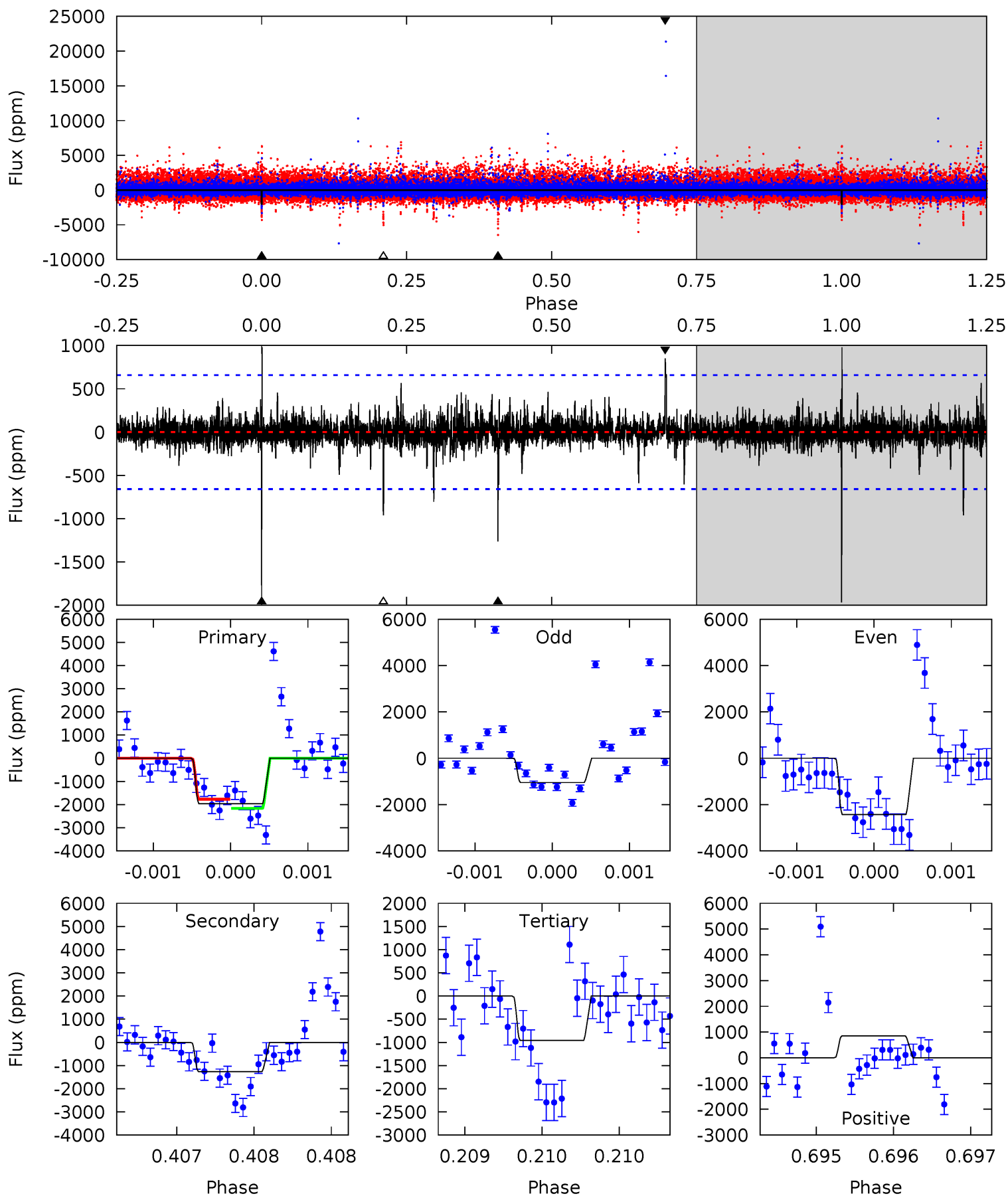
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.07	7.05	7.03	34.1	5.50	3.37	2.64	1.04	-26.1	0.01	-27.1	0.63	0.93	0.81	1.86



# Alt Model-Shift Uniqueness Test

007131515-08, P = 614.260058 Days, E = 305.200088 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
16.5	10.6	8.07	7.13	5.53	3.42	0.91	8.47	9.40	2.54	3.48	4.53	0.82	0.33	1.65



### Stellar Parameters For KIC 007131515

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3838^{+120}_{-147}$	$4.651^{+0.067}_{-0.018}$	$0.560^{+0.050}_{-0.300}$	$0.611^{+0.028}_{-0.070}$	$0.609^{+0.035}_{-0.060}$	$3.764^{+1.199}_{-0.268}$
	+3%/-4%	+1%/-0%	+9%/-54%	+5%/-11%	+6%/-10%	+32%/-7%
Source	KIC0	KIC0	KIC0	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 007131515-08 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-1679 \pm 238$	$2.92^{+1.44}_{-1.28}$	$167^{+6}_{-6}$	$3725^{+887}_{-460}$	$154417^{+342653}_{-84921}$
Alt.	$-1262 \pm 119$	$2.96^{+1.34}_{-1.34}$	$167^{+6}_{-7}$	$3556^{+836}_{-439}$	$114623^{+266360}_{-61717}$

$T_{max}$  = Theoretical Maximum Planetary Temperature

$T_{obs}$  = Observed Planetary Temperature (Assuming A=0.3)

$A_{obs}$  = Observed Albedo (Assuming T=0)

If a secondary eclipse is present, the system is likely an EB if  $T_{obs} \gg T_{max}$  AND  $A_{obs} \gg 1.0$

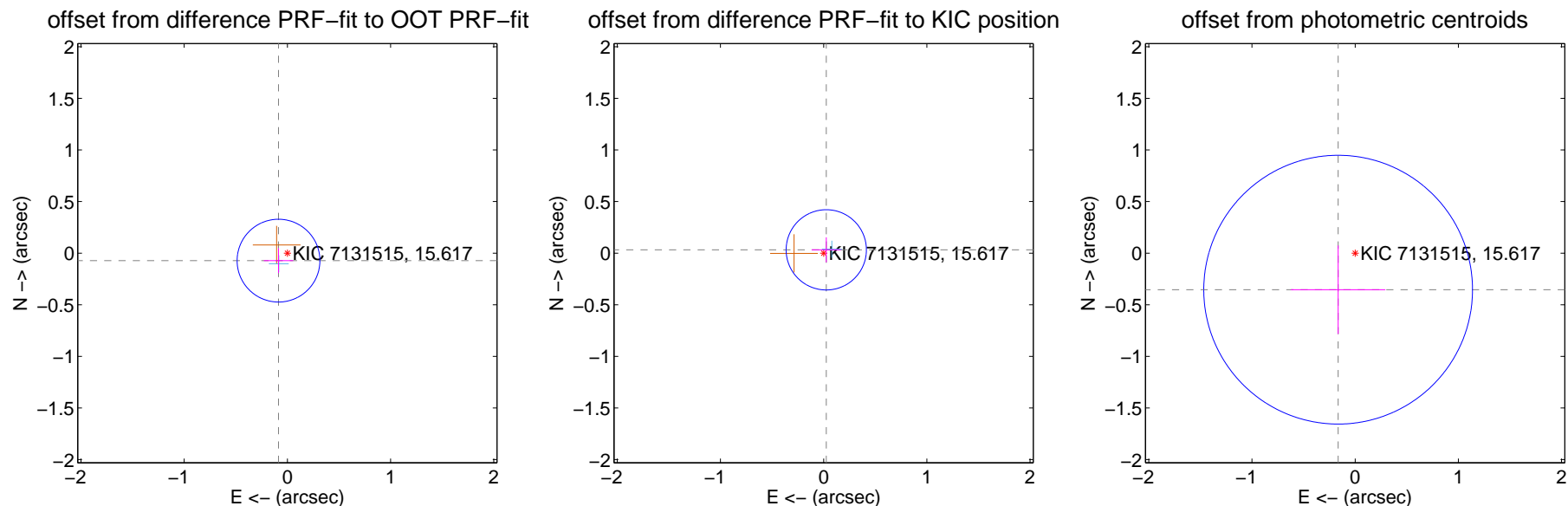
## DV Centroid Data

Supplemental centroid analysis for 007131515-08. Kepler magnitude: 15.62. Transit SNR 6.99

There are 1 quarters with good PRF difference image offsets

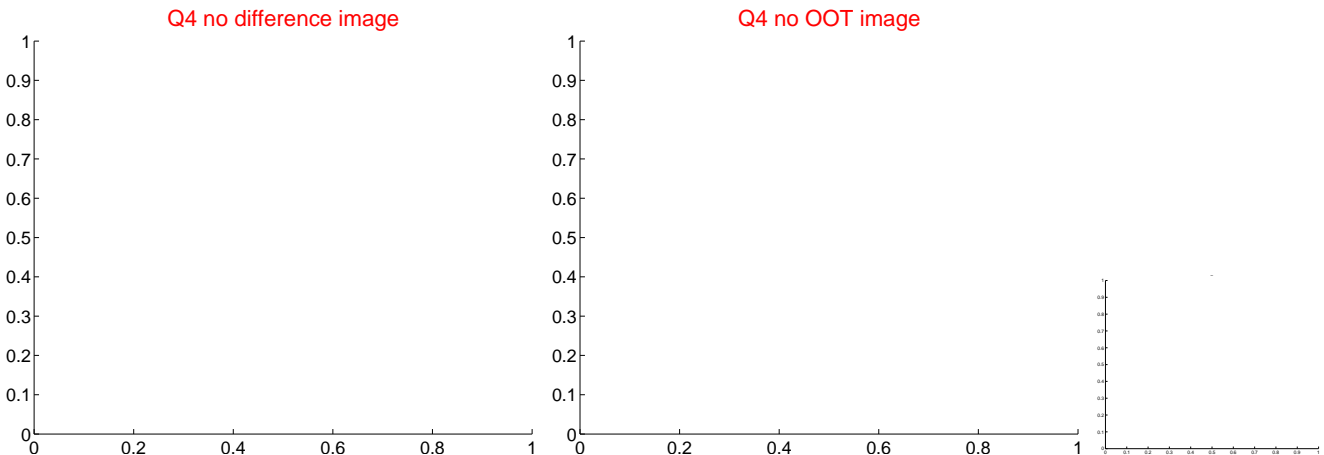
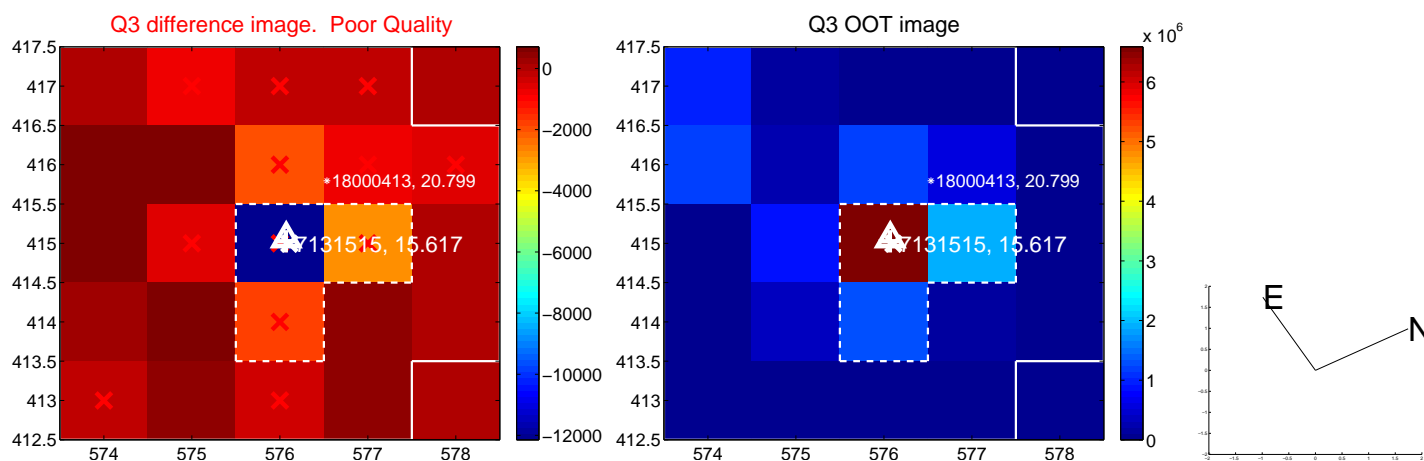
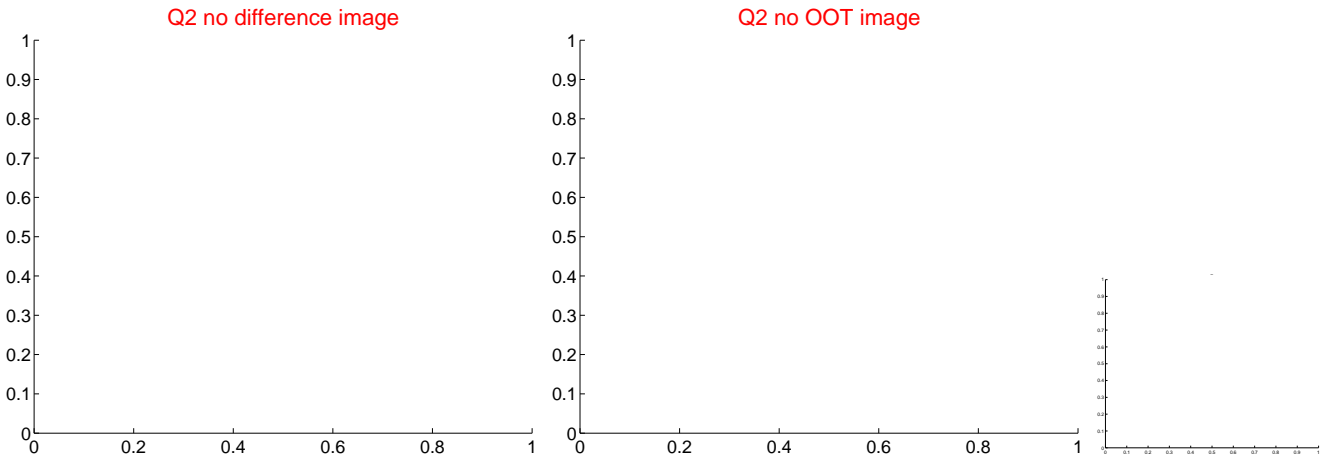
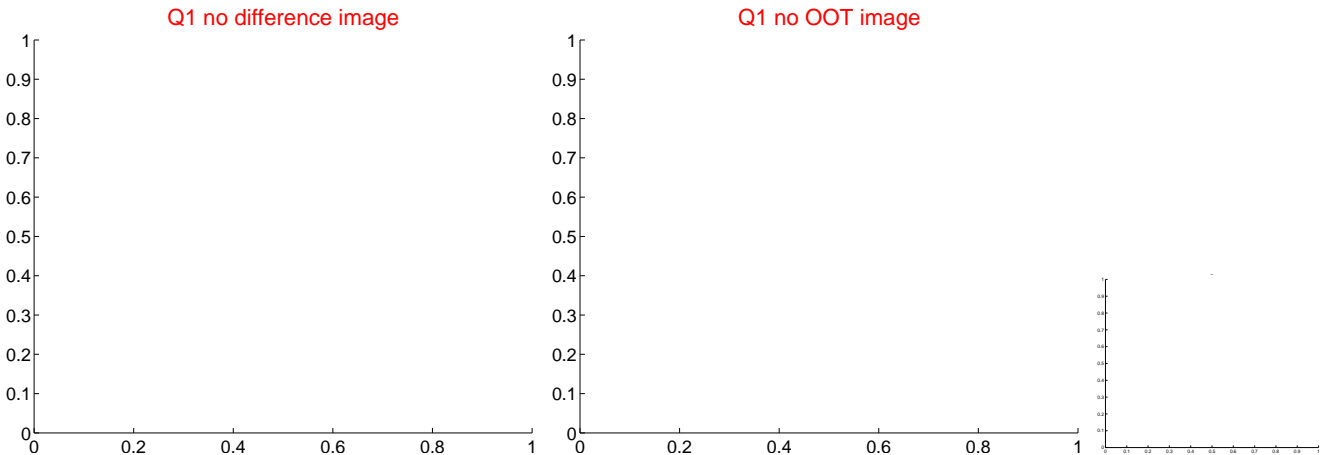
The direct PRF centroid is offset from the target star catalog position by about 0.22 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.113 \pm 0.134$	0.84	$0.086 \pm 0.142$	$-0.073 \pm 0.121$
PRF-fit source offset from KIC position	$0.041 \pm 0.130$	0.32	$-0.025 \pm 0.142$	$0.032 \pm 0.121$
photometric centroid source offset	$0.39 \pm 0.43$	0.90	$0.16 \pm 0.46$	$-0.35 \pm 0.43$



Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value

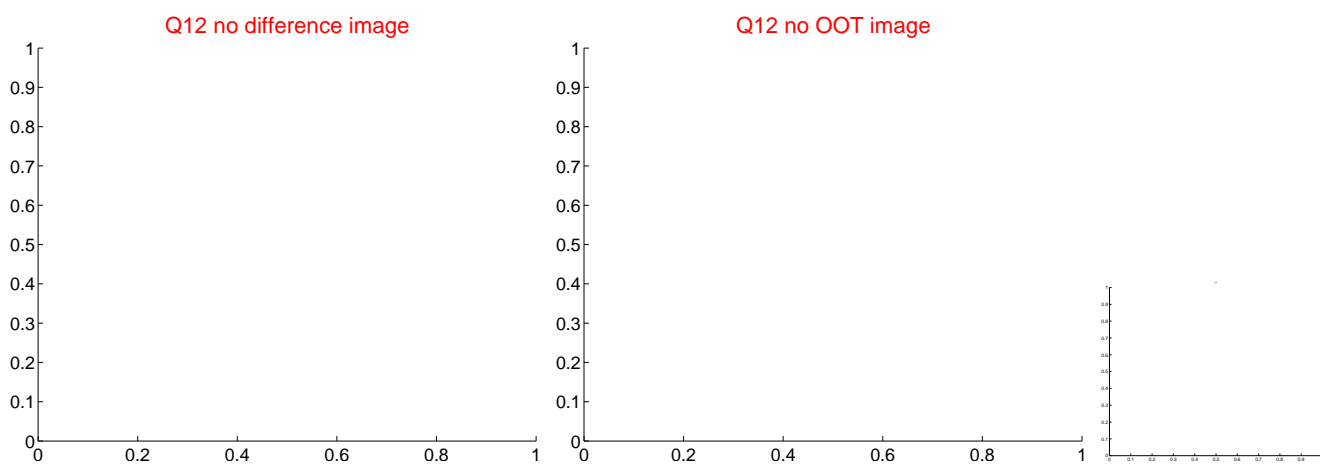
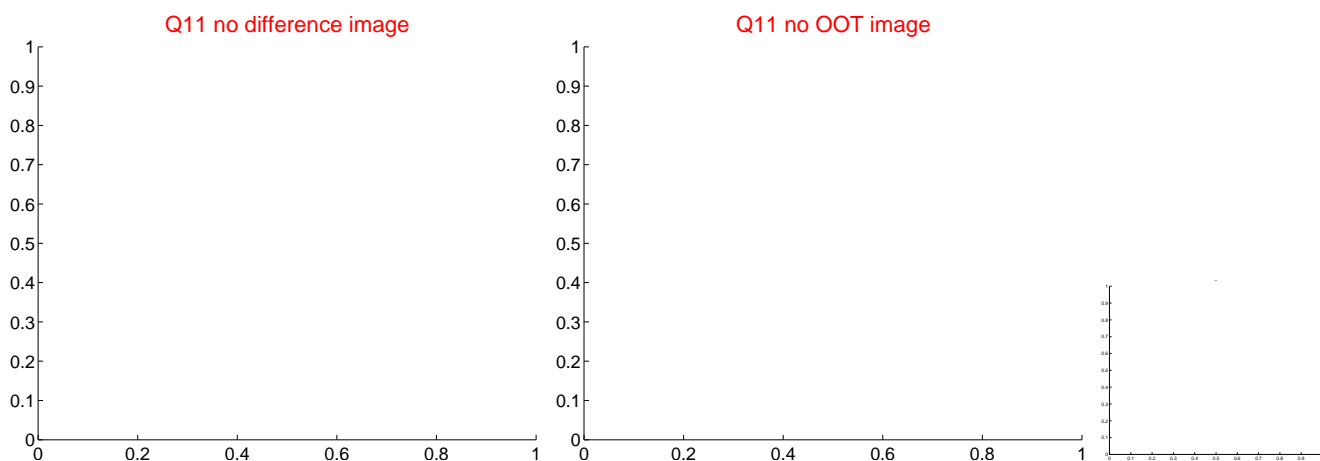
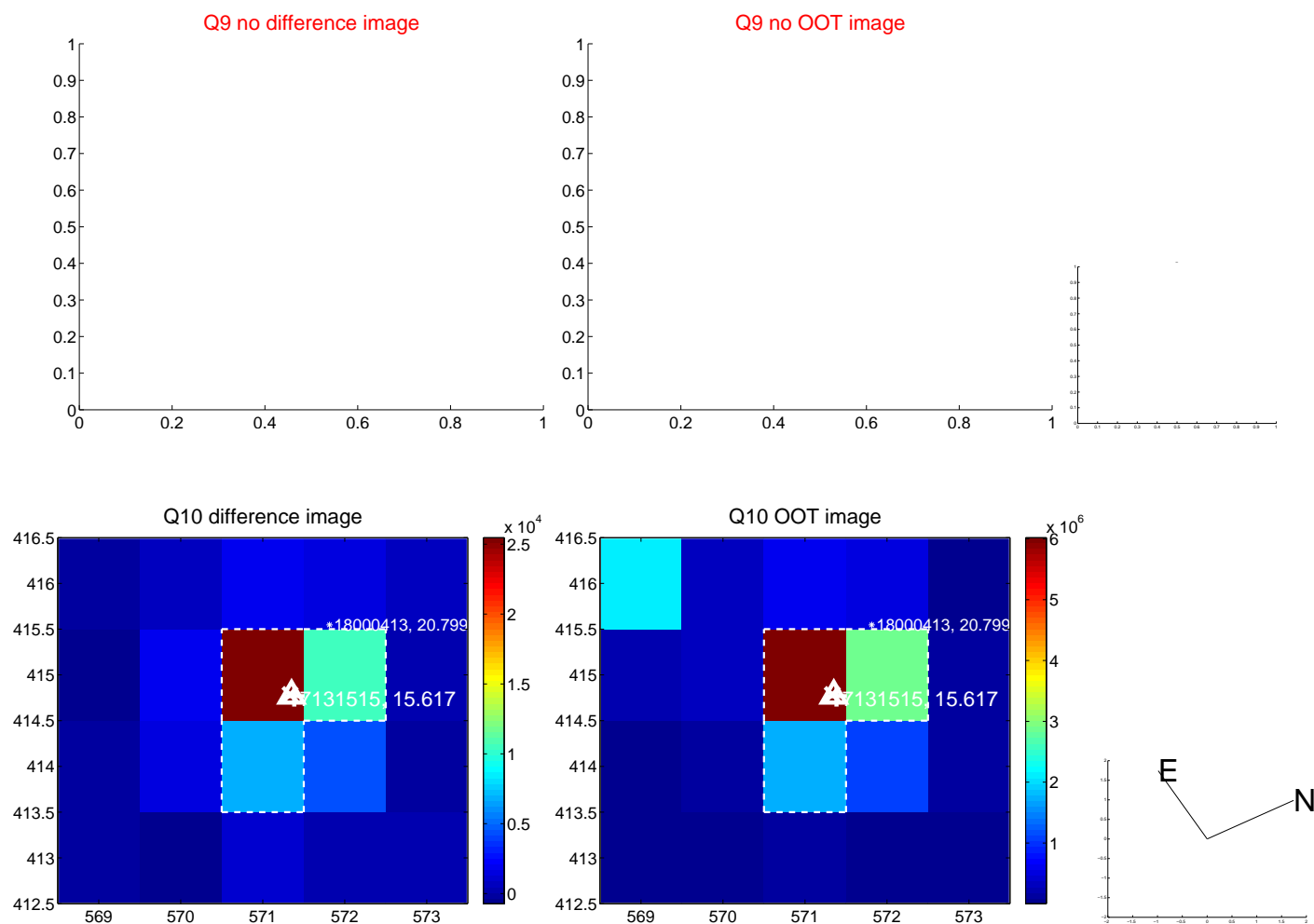


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





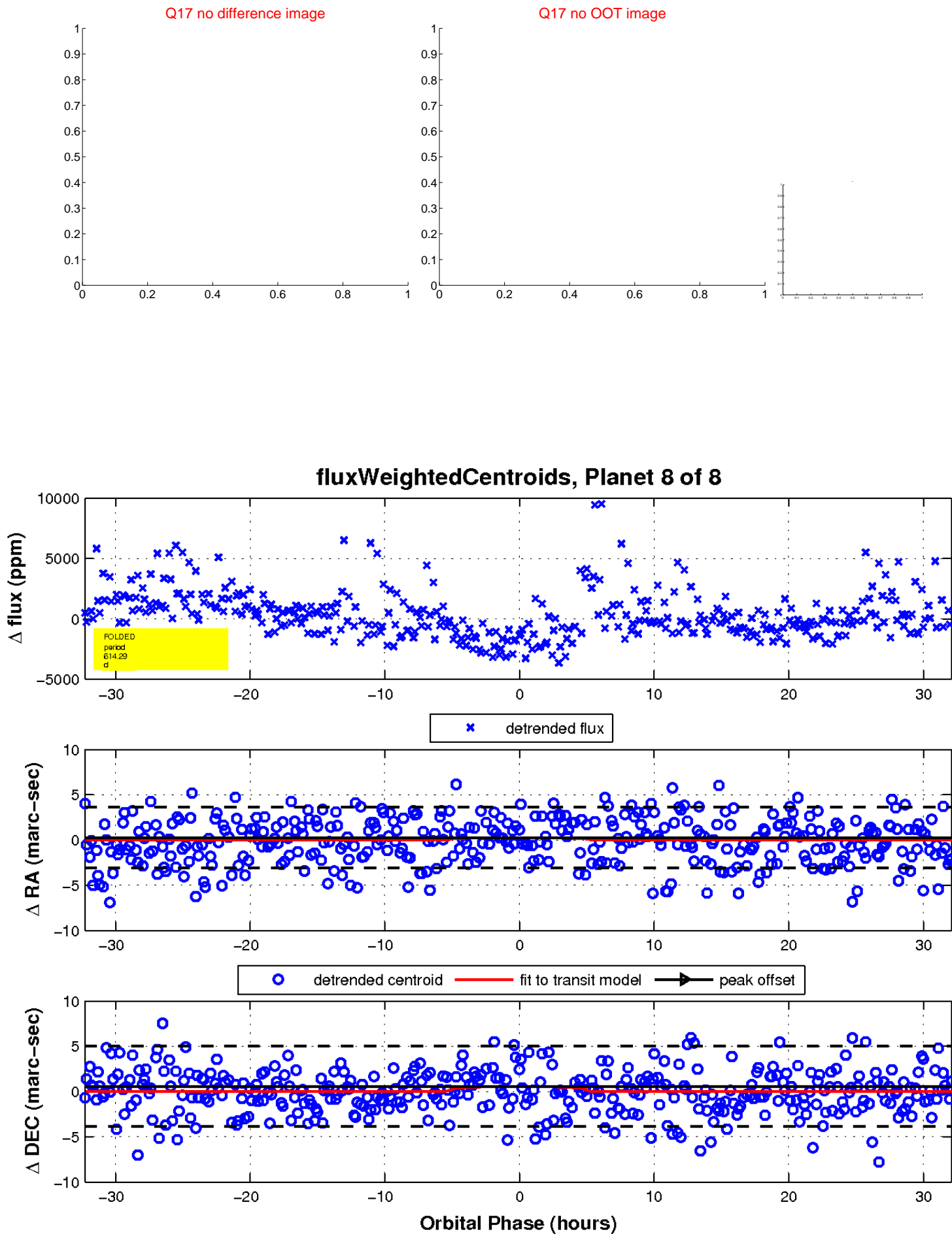
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination

