

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008315220-01	OBS	No	306.366968	238.002854	978.6	14.592	25.2	18.2	13.45	5172	72.09	66.75
008315220-02	OBS	No	367.177451	175.068533	144.9	15.000	31.5	-1.0	13.45	5172	15.78	52.43
008315220-03	OBS	No	367.826147	178.916856	582.1	16.110	18.5	18.2	13.45	5172	43.69	52.31
008315220-04	OBS	No	362.484543	185.462403	90.9	15.000	21.3	-1.0	13.45	5172	12.50	53.34
008315220-05	OBS	No	181.269349	193.563129	108.1	6.180	14.6	5.3	13.45	5172	16.33	134.38
008315220-06	OBS	No	183.715252	182.372967	347.0	16.910	17.2	18.0	13.45	5172	28.23	132.00
008315220-07	OBS	No	367.388598	172.555205	46.9	15.000	13.2	-1.0	13.45	5172	8.98	52.39
008315220-08	OBS	No	182.919583	182.566043	325.9	10.920	15.3	8.9	13.45	5172	25.79	132.76
008315220-09	OBS	No	534.460195	379.043140	118.9	7.500	16.0	-1.0	13.45	5172	14.30	31.78
008315220-10	OBS	No	122.022409	180.490237	52.5	15.000	11.2	-1.0	13.45	5172	9.50	227.78

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008315220-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV— INCONSISTENT_TRANS—CENT_SATURATED
008315220-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—NO_FITS—INCONSISTENT_TRANS—CENT_SATURATED
008315220-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_TER_DV—MOD_POS_DV—MOD_TER_ALT—MOD_POS_ALT— INCONSISTENT_TRANS—CENT_SATURATED
008315220-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
008315220-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_ZUMA—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT— MOD_POS_ALT—INCONSISTENT_TRANS—SAME_NTL_PERIOD—CENT_SATURATED
008315220-06	OBS	FP	0.00	1	0	1	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_SATURATED—HALO_GHOST
008315220-07	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—SAME_NTL_PERIOD—CENT_SATURATED
008315220-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV— CENT_SATURATED
008315220-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS— CENT_SATURATED
008315220-10	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED

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

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

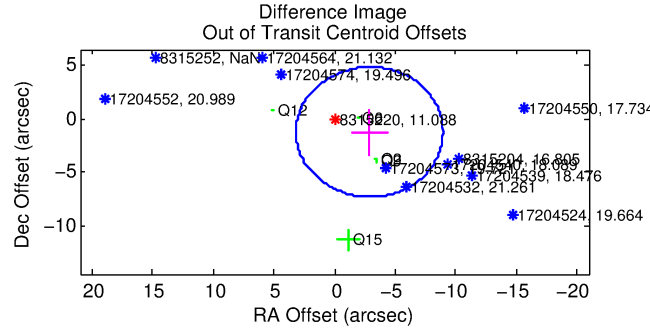
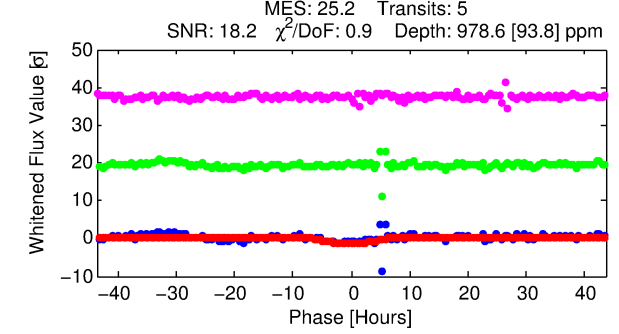
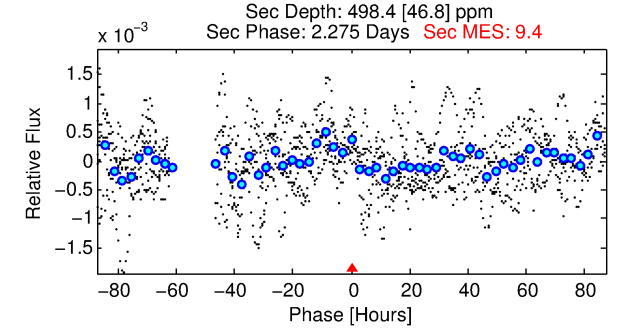
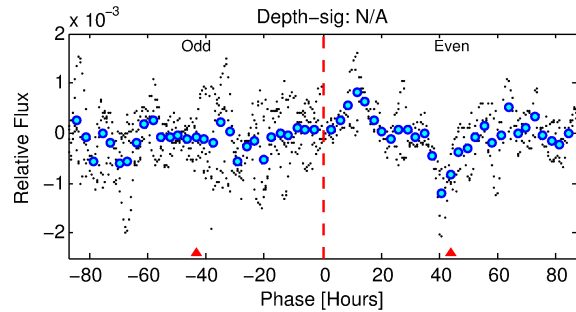
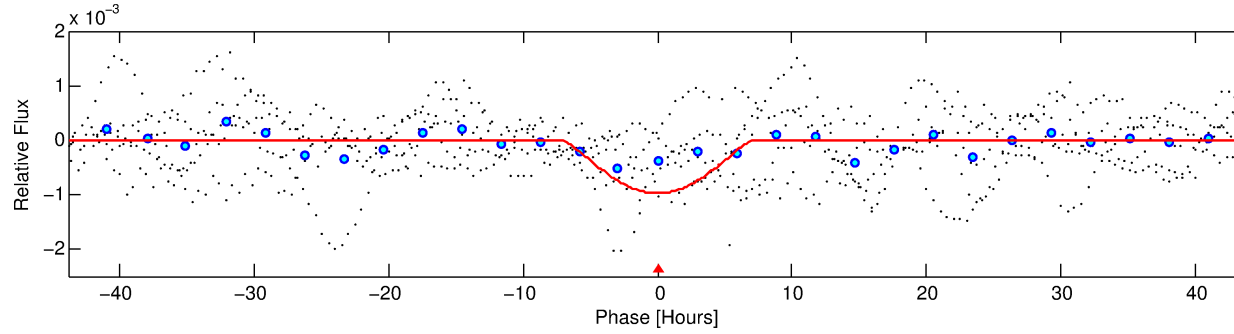
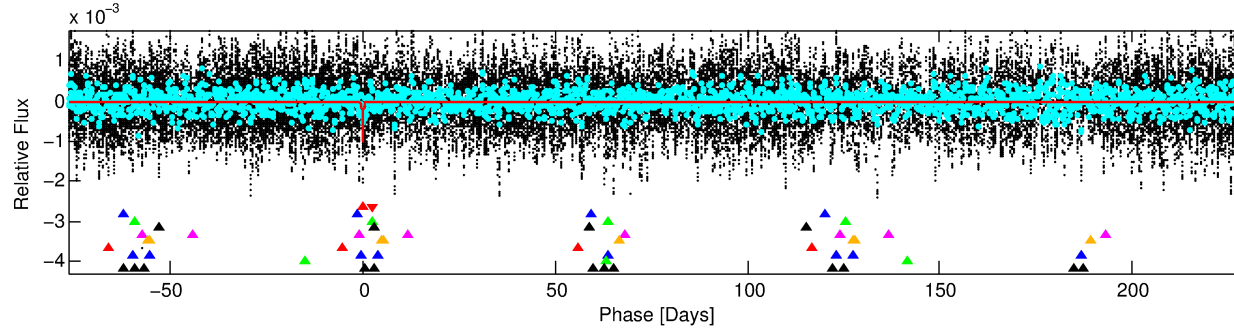
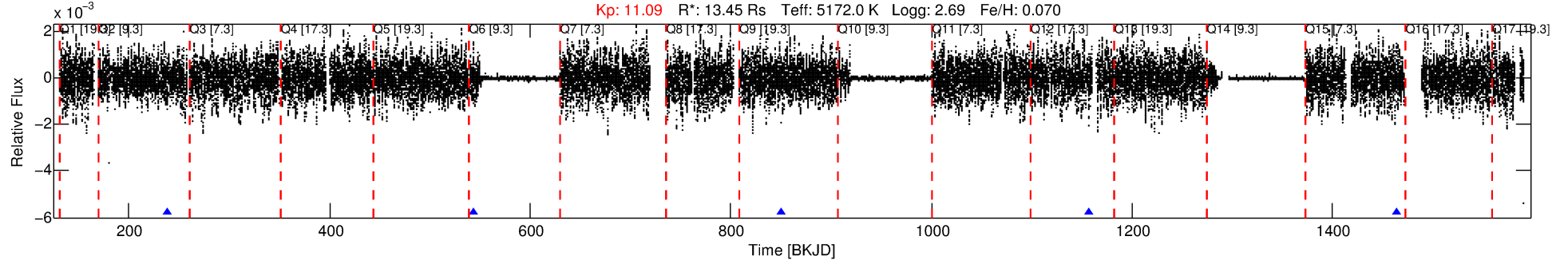
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 008315220-01

No Significant Match Found

# DV One-Page Summary

KIC: 8315220 Candidate: 1 of 10 Period: 306.367 d



## DV Fit Results:

Period = 306.36697 [0.01180] d  
Epoch = 238.0029 [0.0189] BKJD  
Rp/R\* = 0.0491 [0.0608]  
a/R\* = 57.27 [18.40]  
b = 0.99 [0.10]  
Seff = 66.75 [39.40]  
Teq = 729 [108] K  
Rp = 72.09 [97.79] Re  
a = 1.3185 [0.5592] AU  
Ag = 91.73 [233.12] [0.39σ]  
Teffp = 3487 [2168] K [1.27σ]

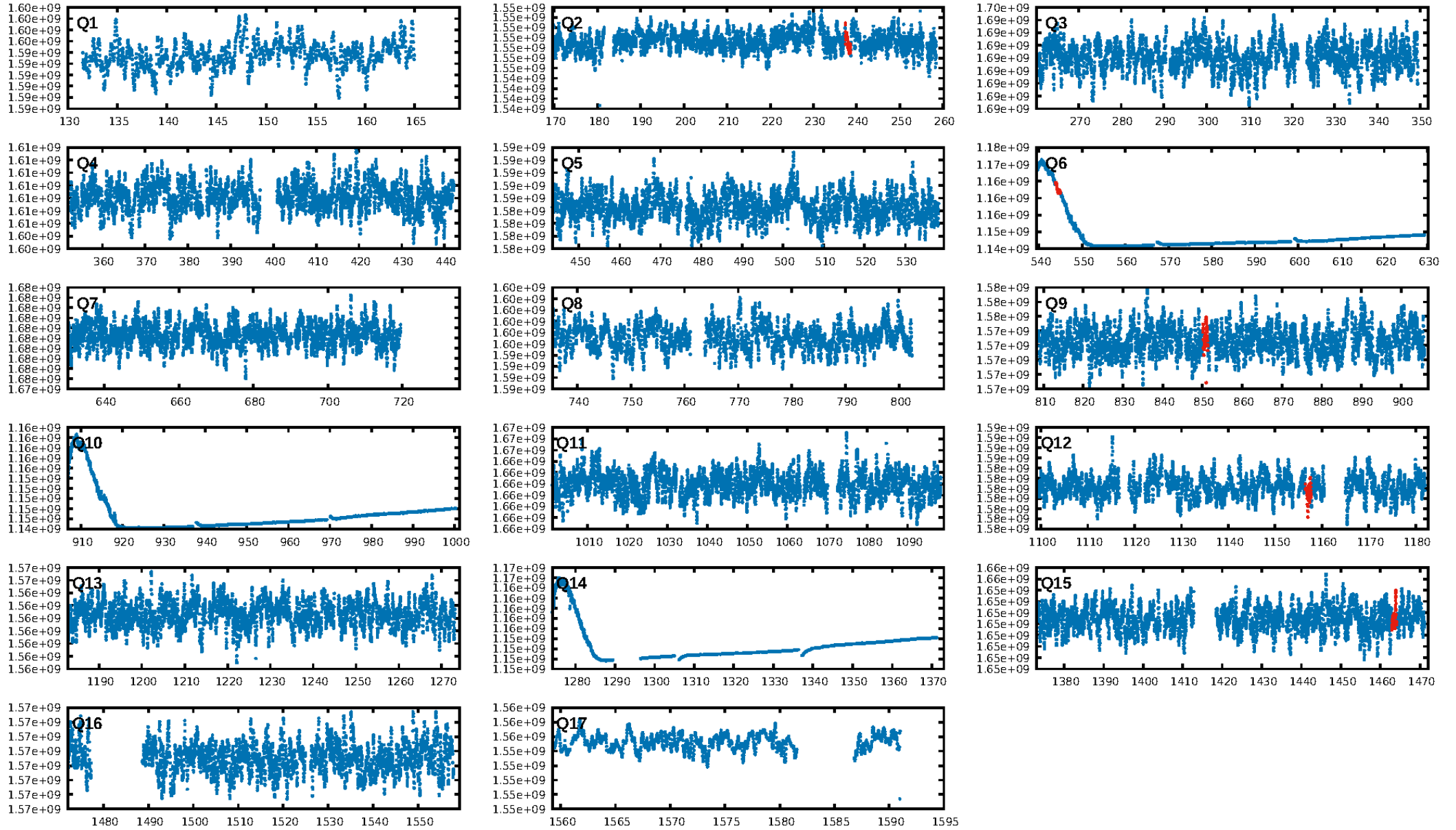
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [131.79σ]  
LongPeriod-sig: 100.0% [64.36σ]  
ModelChiSquare2-sig: 2.6%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 1.49e-19  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: 1.227  
Centroid-sig: 11.2%  
Centroid-so: 0.683 arcsec [1.45σ]  
OotOffset-rm: 3.139 arcsec [1.55σ]  
KicOffset-rm: 2.885 arcsec [2.03σ]  
OotOffset-st: 2/1/1/1 [5]  
KicOffset-st: 2/1/1/1 [5]  
DiffImageQuality-fgm: 0.20 [1/5]  
DiffImageOverlap-fno: 0.60 [3/5]

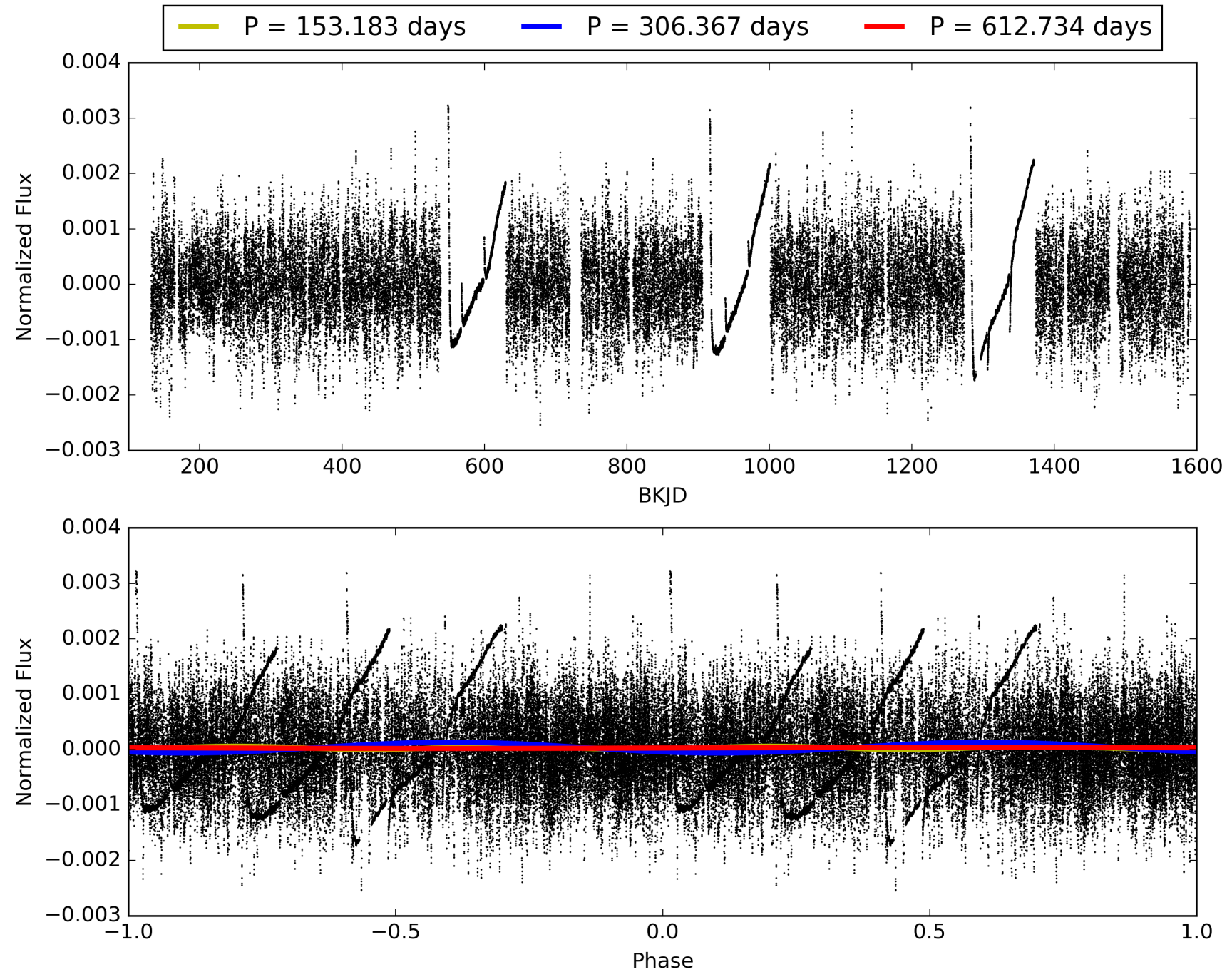
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 16:08:30 Z

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

# TCE 008315220-01, PDC Light Curves



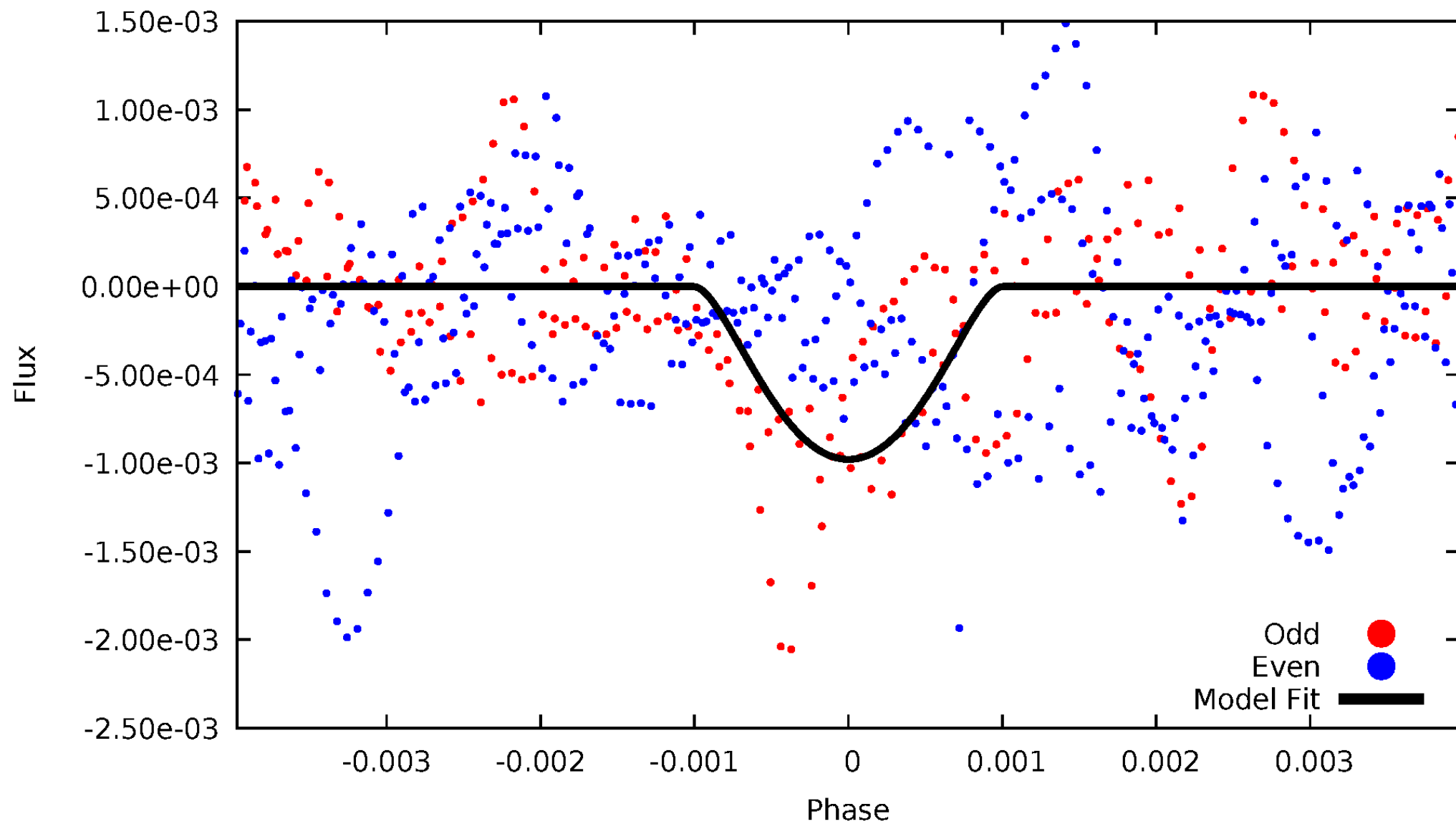
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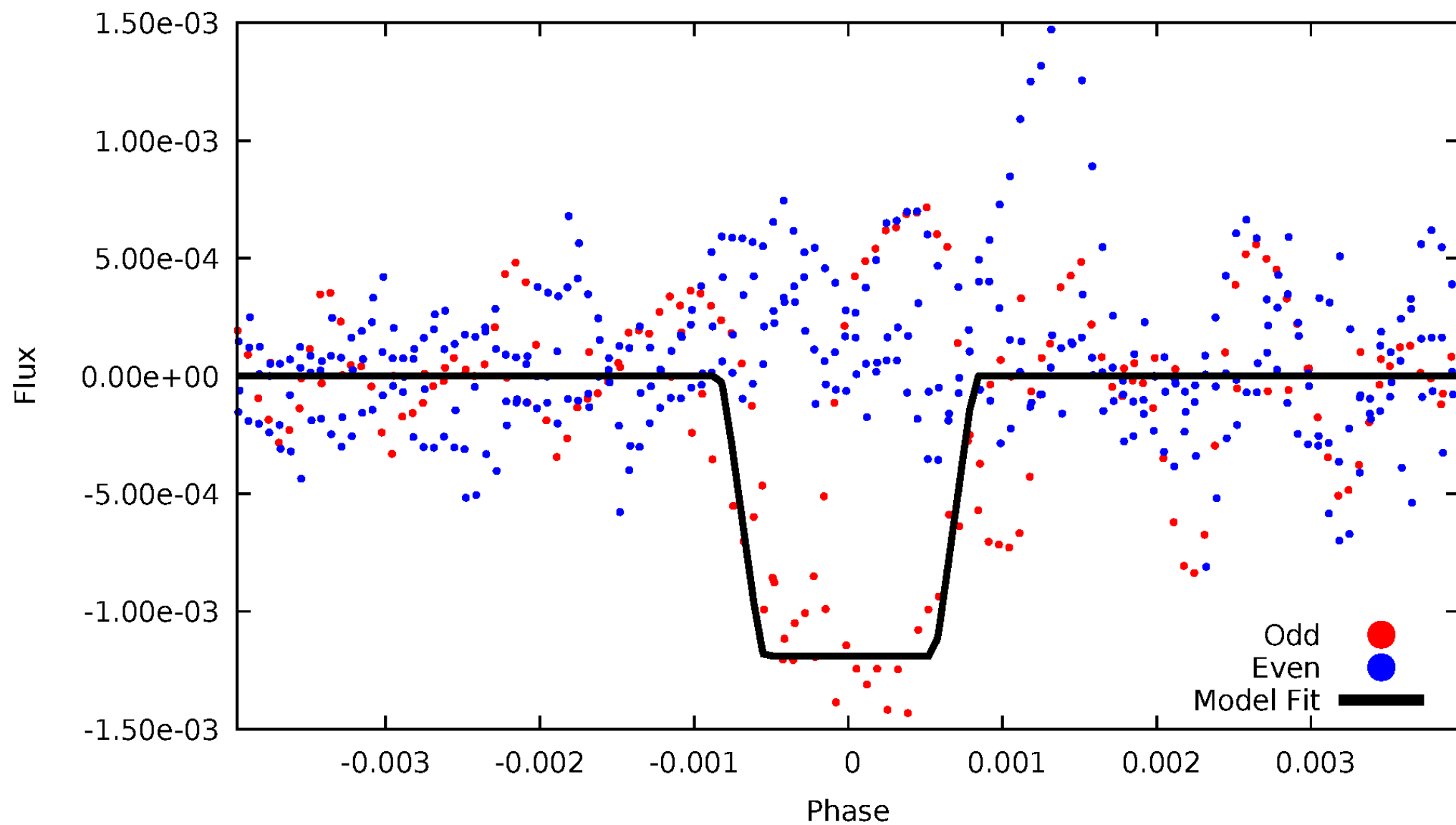
# DV Odd/Even

TCE 008315220-01



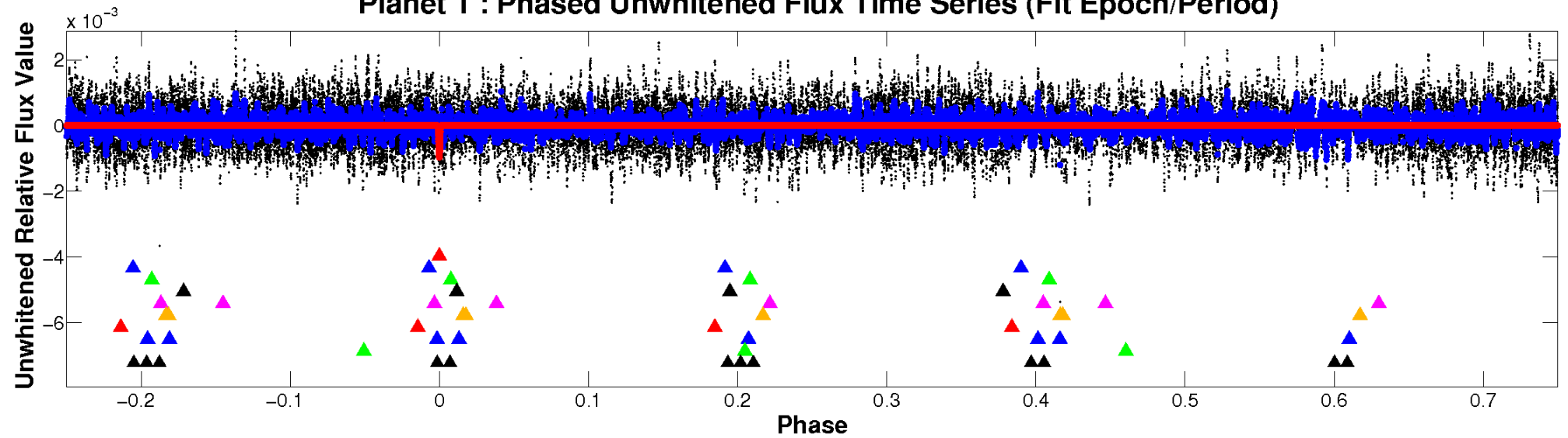
# ALT Odd/Even

TCE 008315220-01

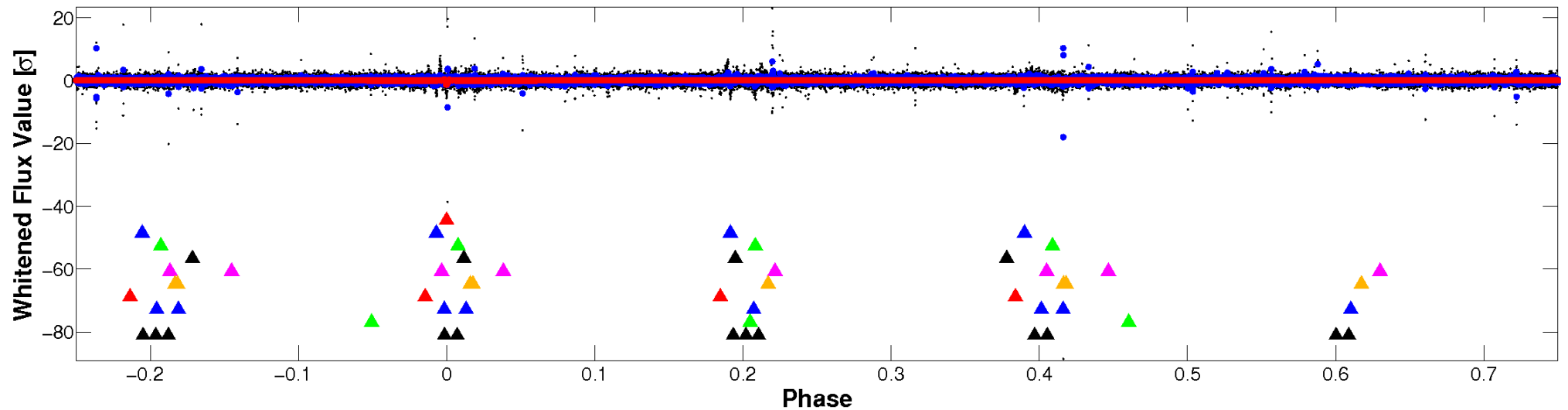


# Non-Whitened Vs. Whitened Light Curve

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

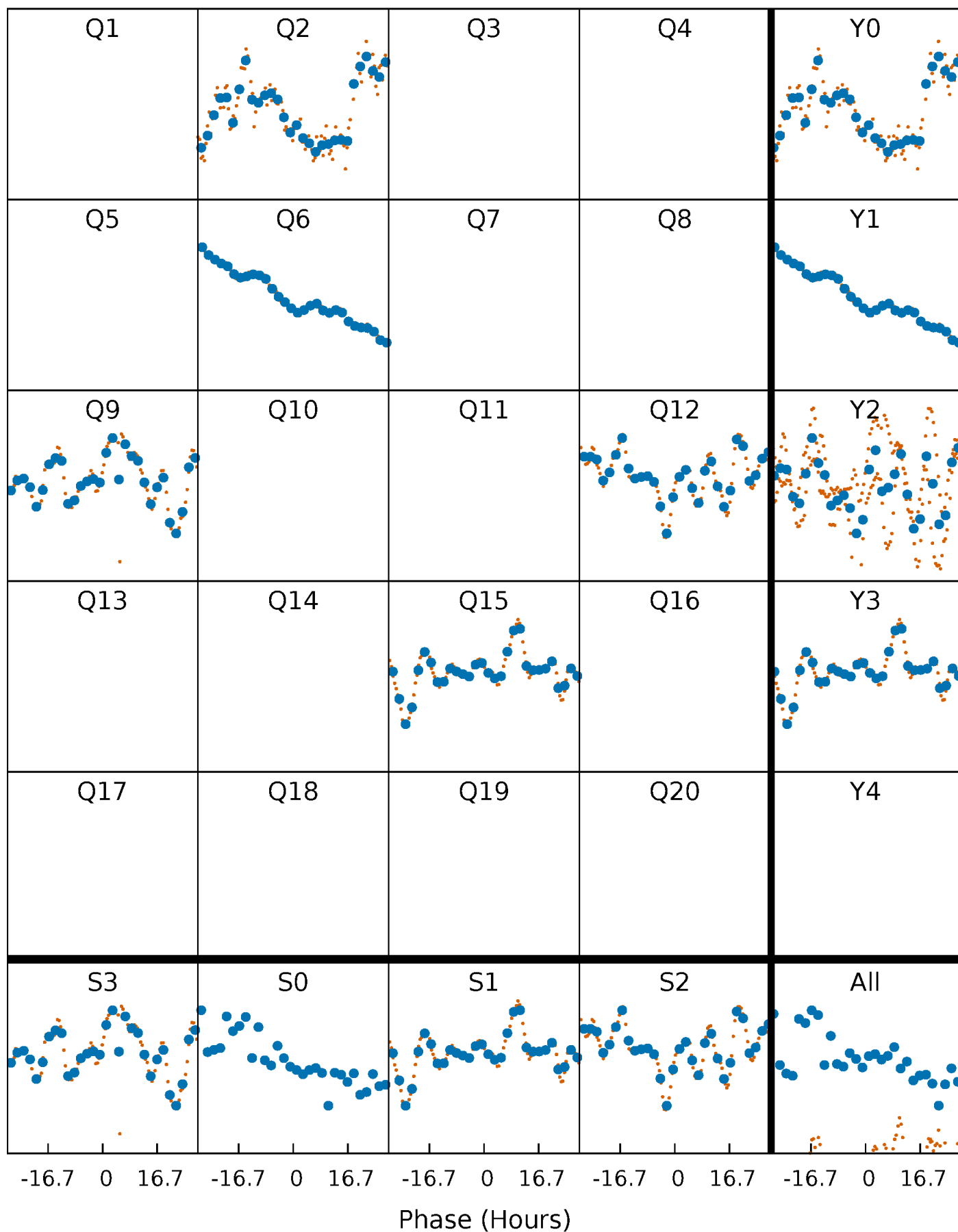


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

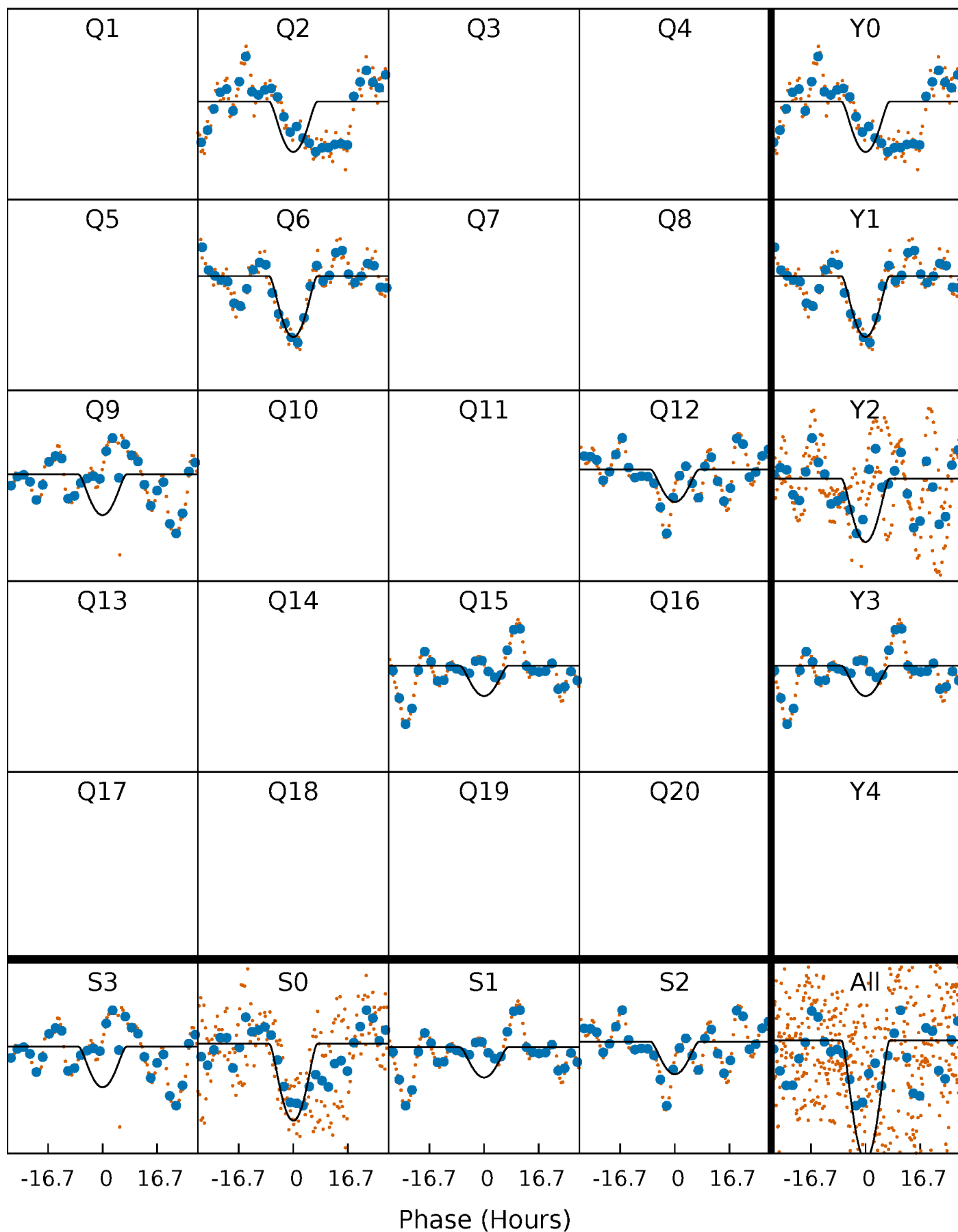
TCE 008315220-01 P=306.366968 Days  $T_0=238.002854$  (BKJD)





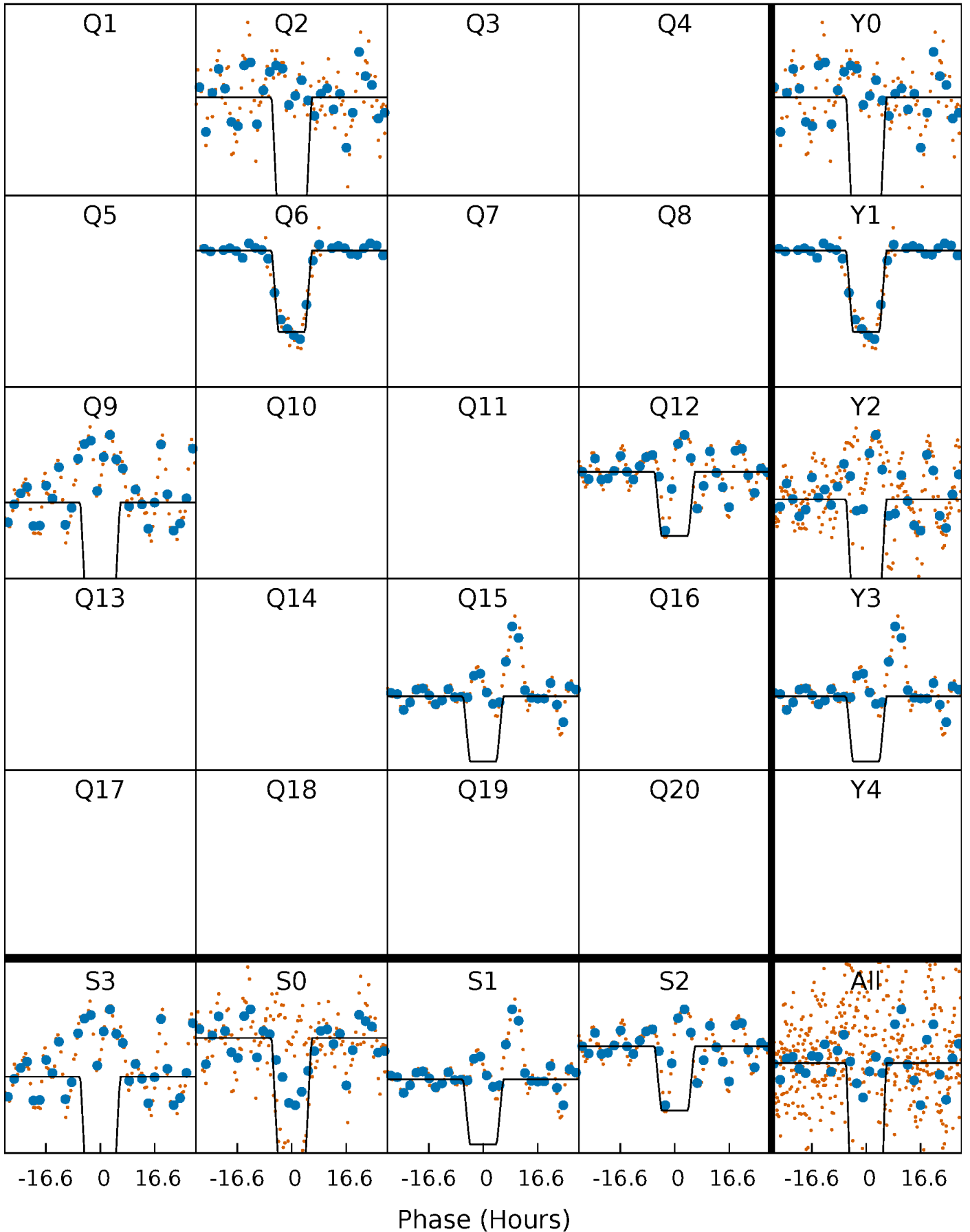
# DV Quarter-Phased Transit Curves

TCE 008315220-01 P=306.366968 Days  $T_0=238.002854$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

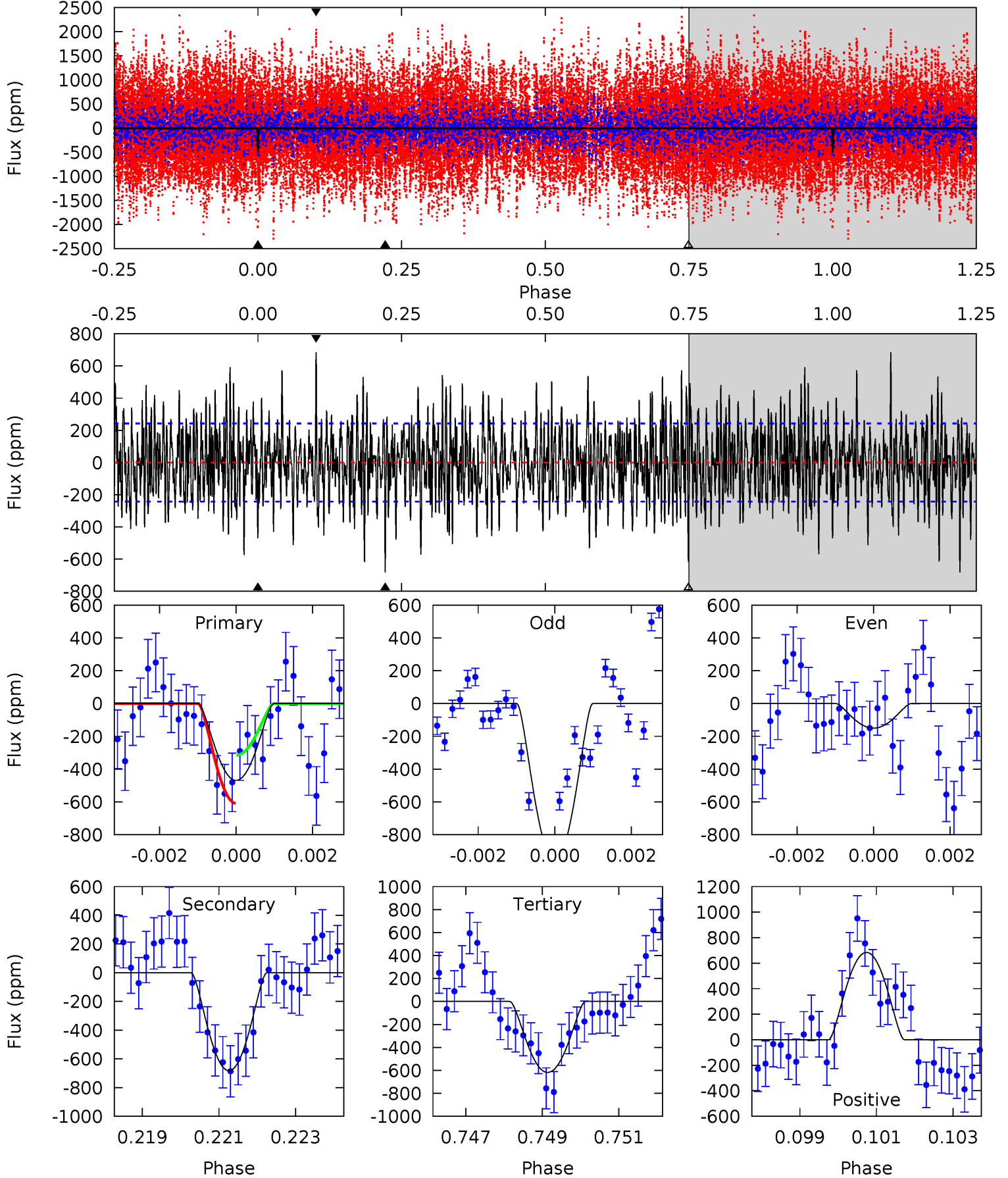
TCE 008315220-01 P=306.380799 Days  $T_0=237.956964$  (BKJD)



# DV Model-Shift Uniqueness Test

008315220-01, P = 306.366968 Days, E = 238.002854 Days

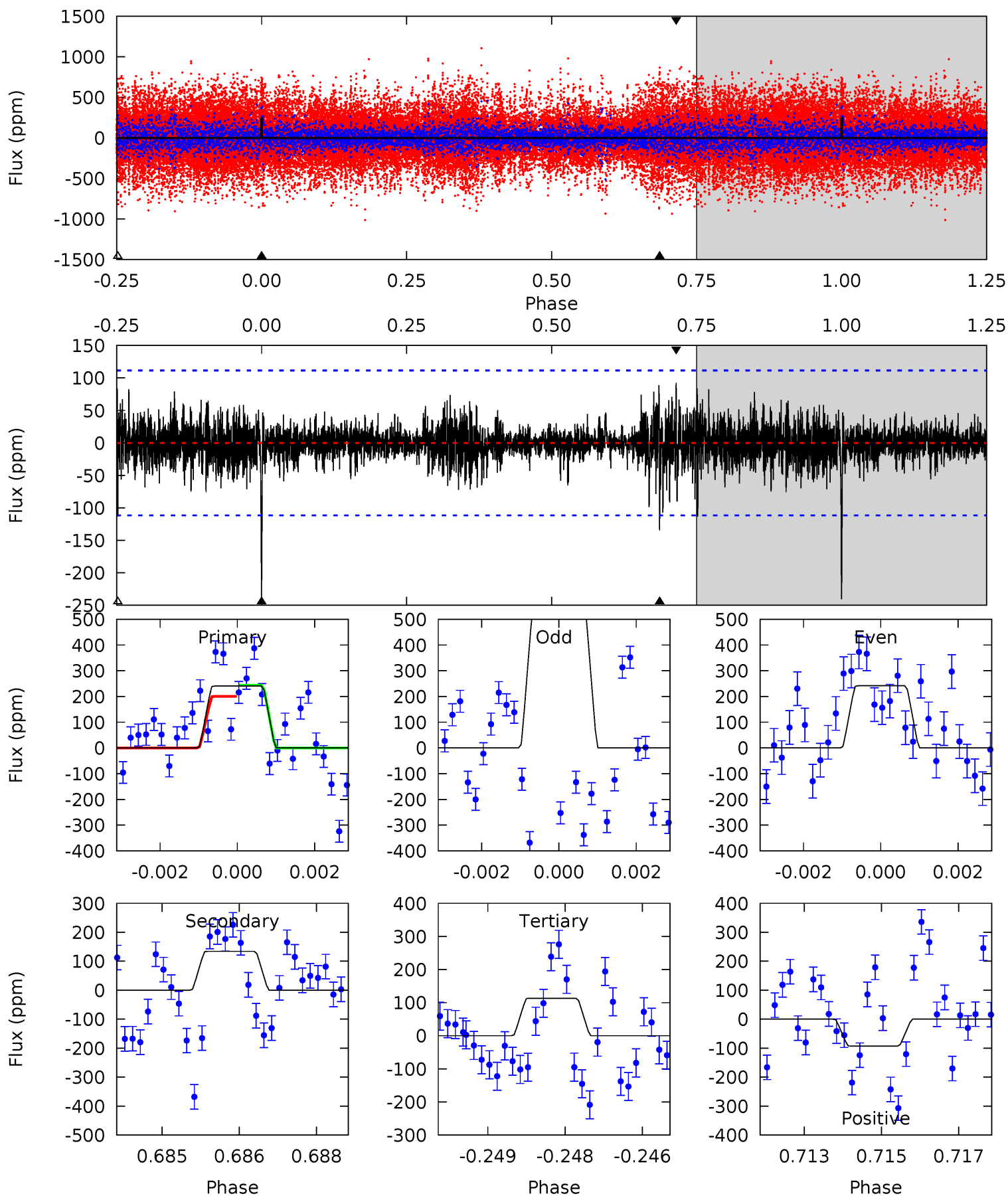
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.3	15.0	13.6	15.0	5.32	3.09	4.28	-3.27	-4.73	1.40	-0.06	8.53	0.75	0.50	3.23



# Alt Model-Shift Uniqueness Test

008315220-01, P = 306.380799 Days, E = 237.956964 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
11.6	6.45	5.45	4.45	5.36	3.14	1.04	6.11	7.10	1.00	1.99	8.21	-0.69	0.28	1.04





### Stellar Parameters For KIC 008315220

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5172^{+70}_{-248}$	$2.693^{+0.273}_{-0.126}$	$0.070^{+0.150}_{-0.600}$	$13.454^{+2.481}_{-7.442}$	$3.257^{+0.222}_{-1.999}$	$0.002^{+0.006}_{-0.001}$
	+1%/-5%	+10%/-5%	+214%/-857%	+18%/-55%	+7%/-61%	+302%/-38%
Source	PHO1	FLK73	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 008315220-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-682 \pm 46$	$85.96^{+79.88}_{-55.60}$	$1007^{+60}_{-94}$	$3656^{+1801}_{-635}$	$85^{+591}_{-61}$
Alt.	$-134 \pm 21$	$78.42^{+76.13}_{-52.36}$	$1005^{+58}_{-94}$	$2951^{+1180}_{-465}$	$20^{+163}_{-15}$

$T_{max}$  = 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  $A_{obs} \gg 1.0$

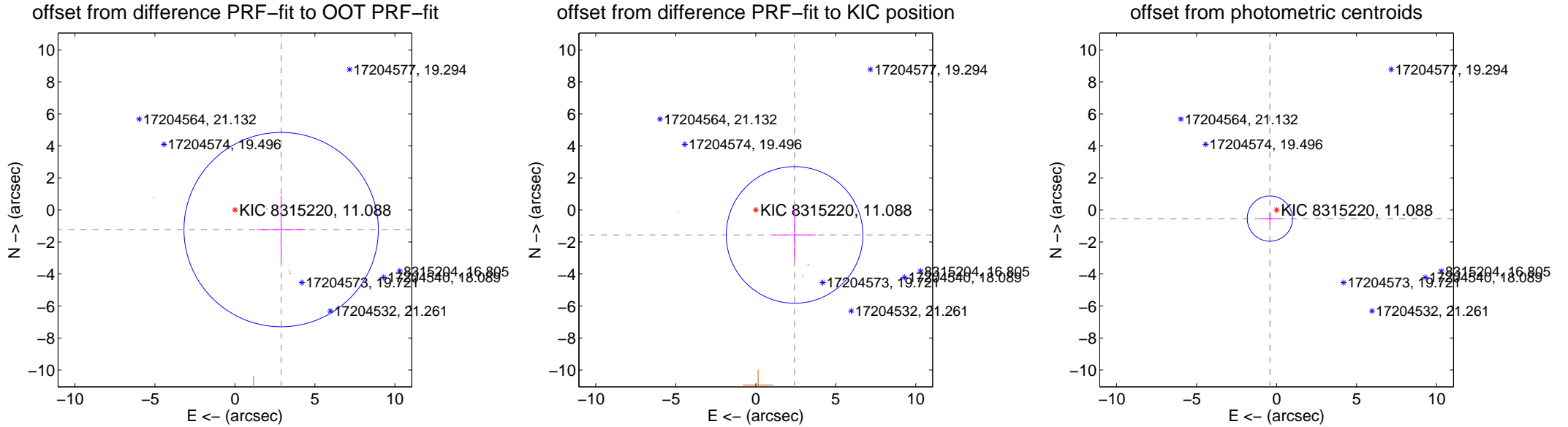
## DV Centroid Data

Supplemental centroid analysis for 008315220-01. **Kepler magnitude: 11.09.** Transit SNR 18.22

**There are 1 quarters with good PRF difference image offsets**

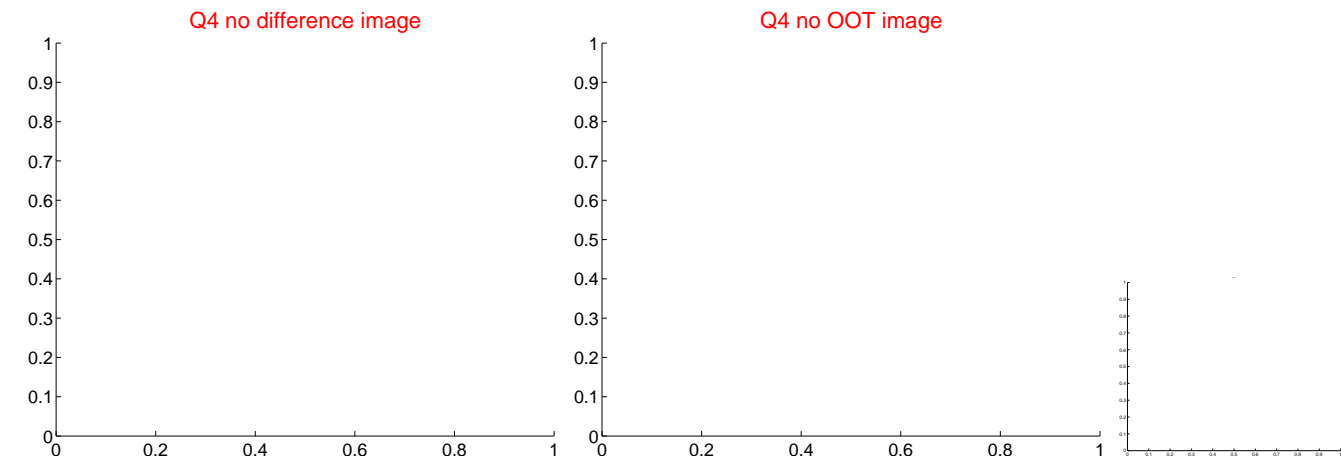
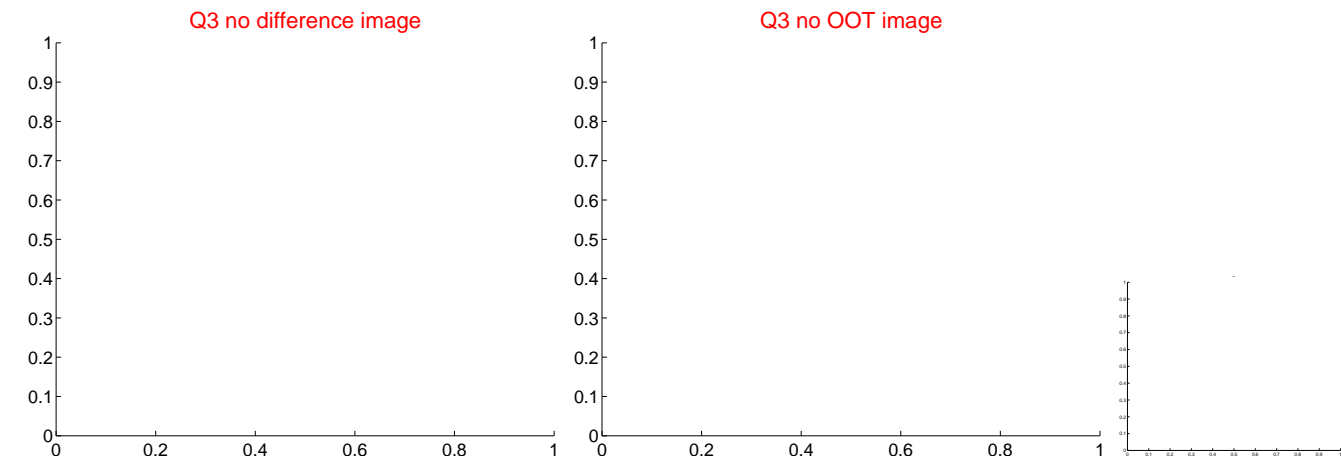
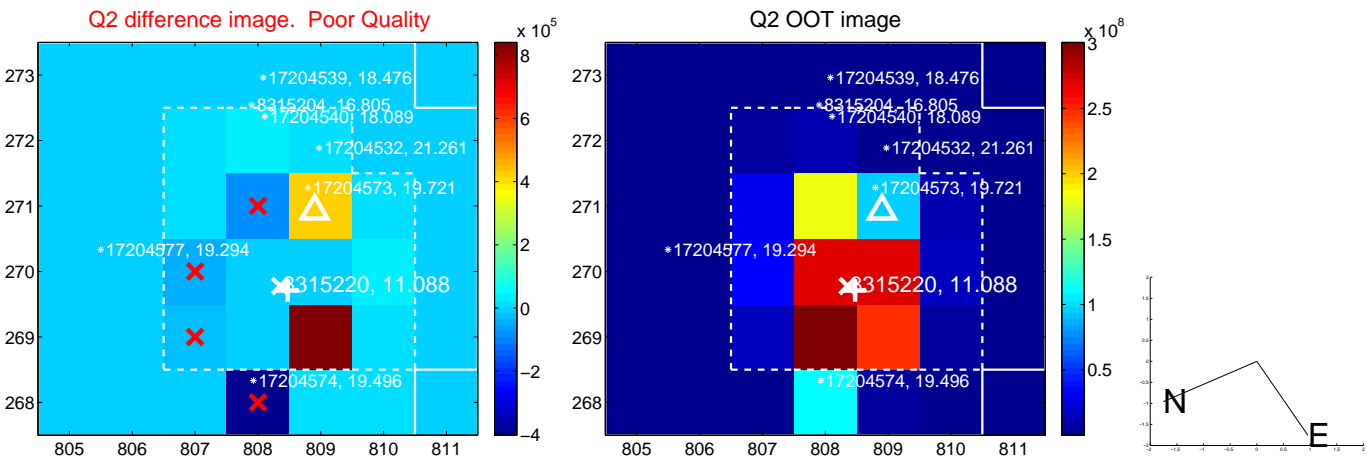
The direct PRF centroid is offset from the target star catalog position by about 1.09 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$3.139 \pm 2.024$	1.55	$-2.890 \pm 1.495$	$-1.226 \pm 2.125$
PRF-fit source offset from KIC position	$2.885 \pm 1.423$	2.03	$-2.426 \pm 1.320$	$-1.561 \pm 1.648$
photometric centroid source offset	$0.68 \pm 0.47$	1.45	$0.42 \pm 0.61$	$-0.54 \pm 0.37$

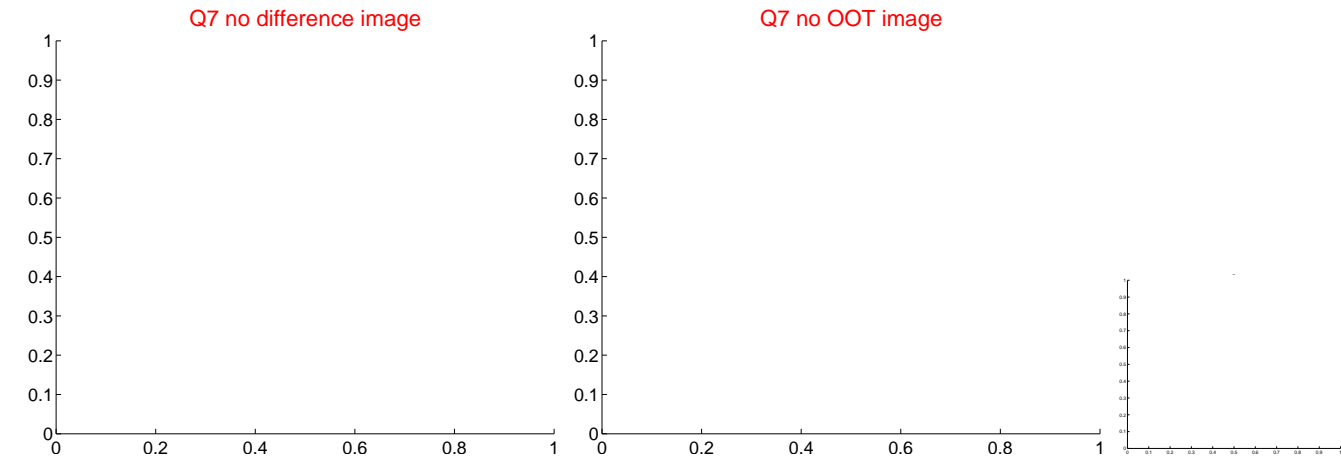
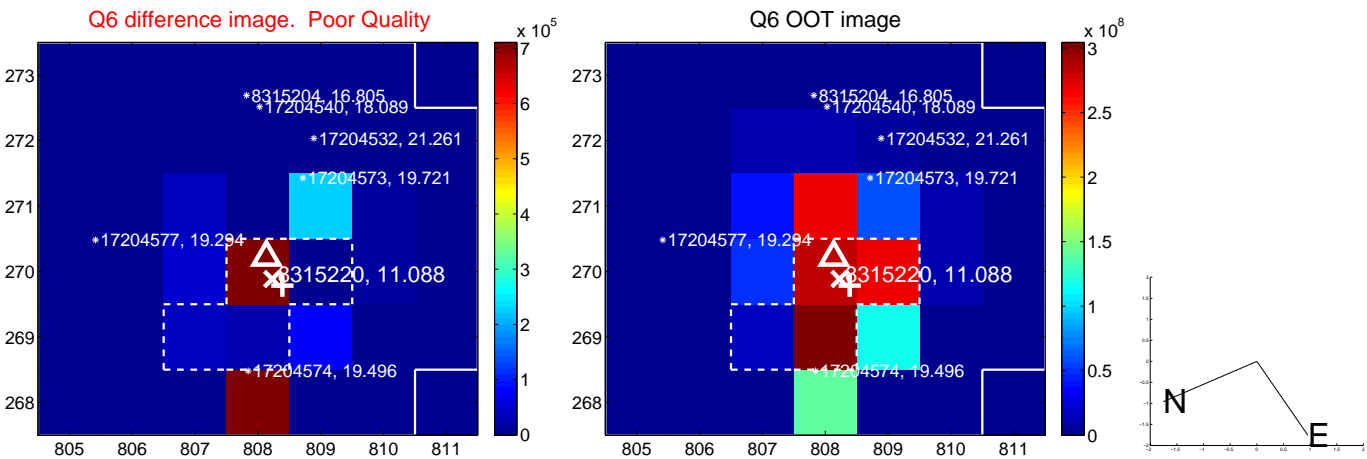


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: 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.

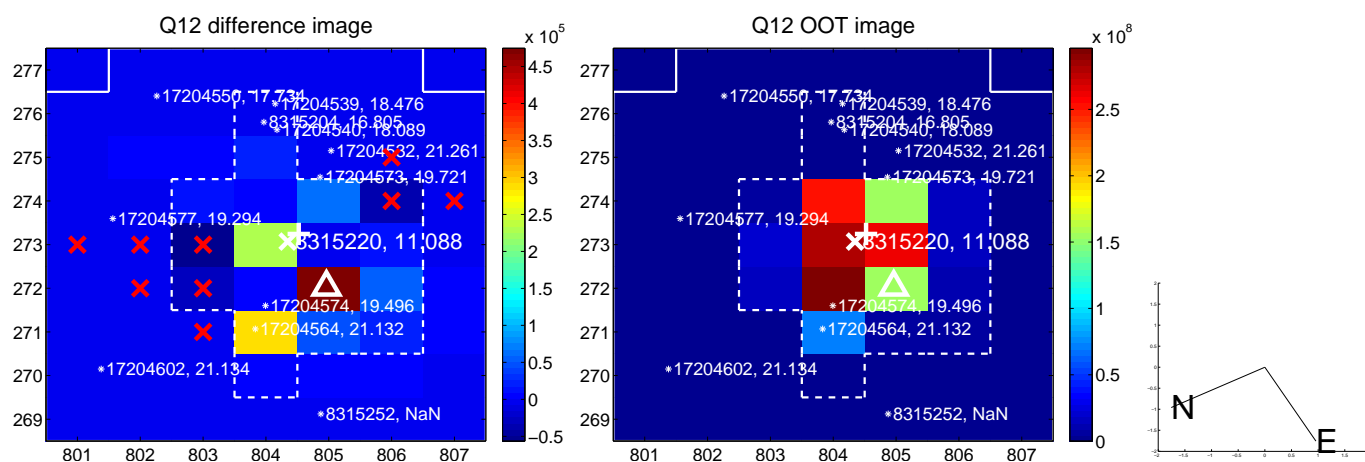
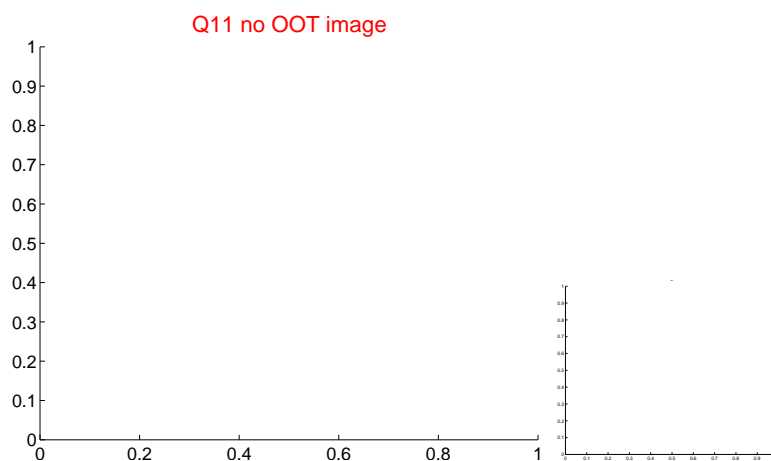
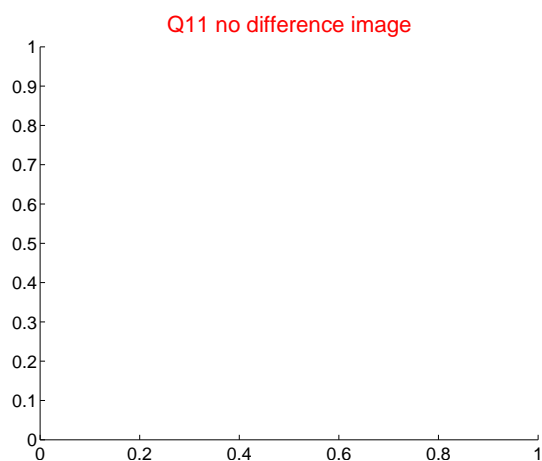
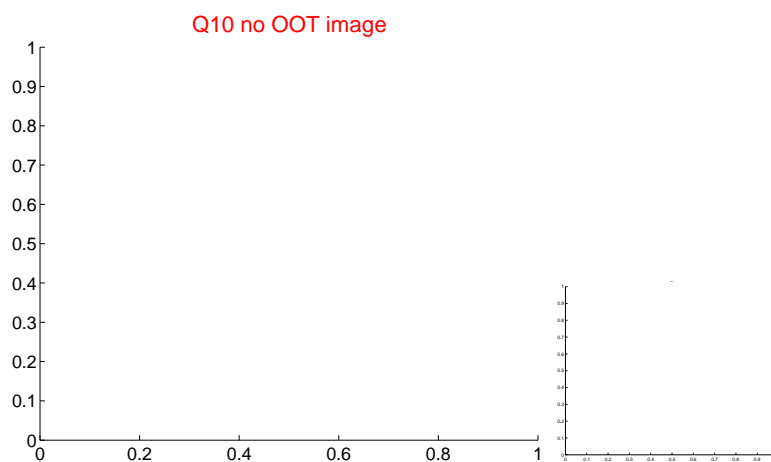
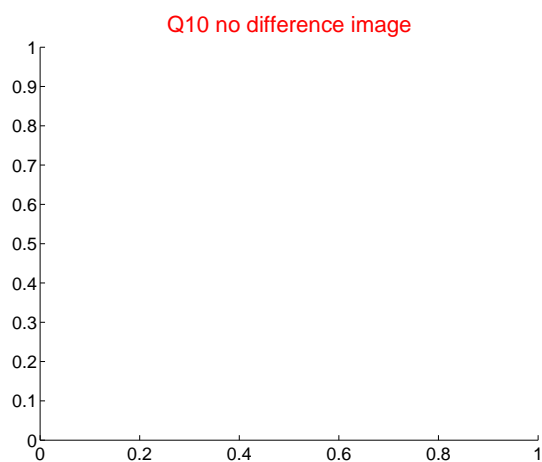
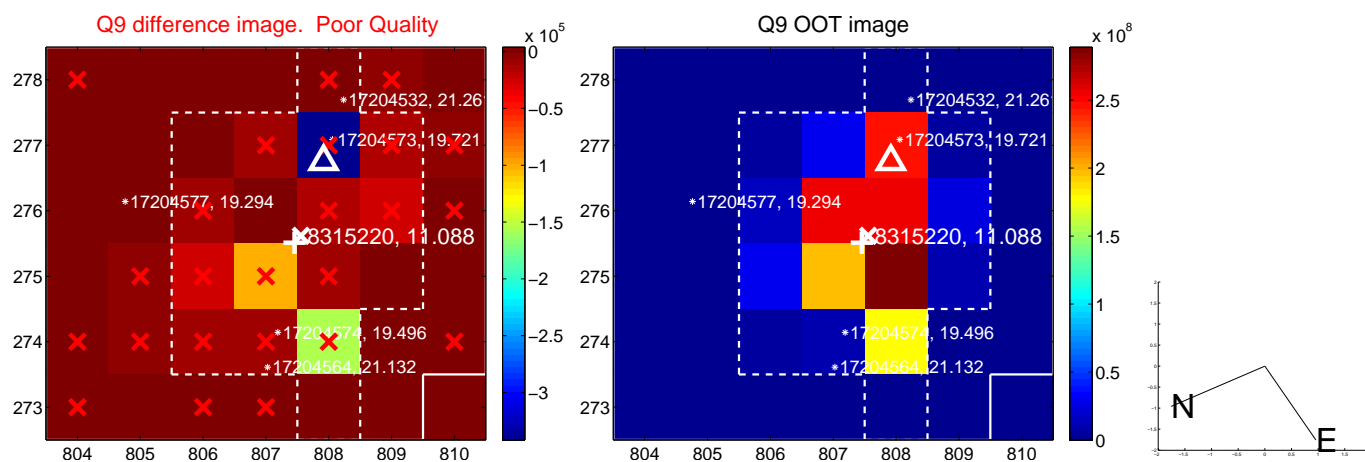


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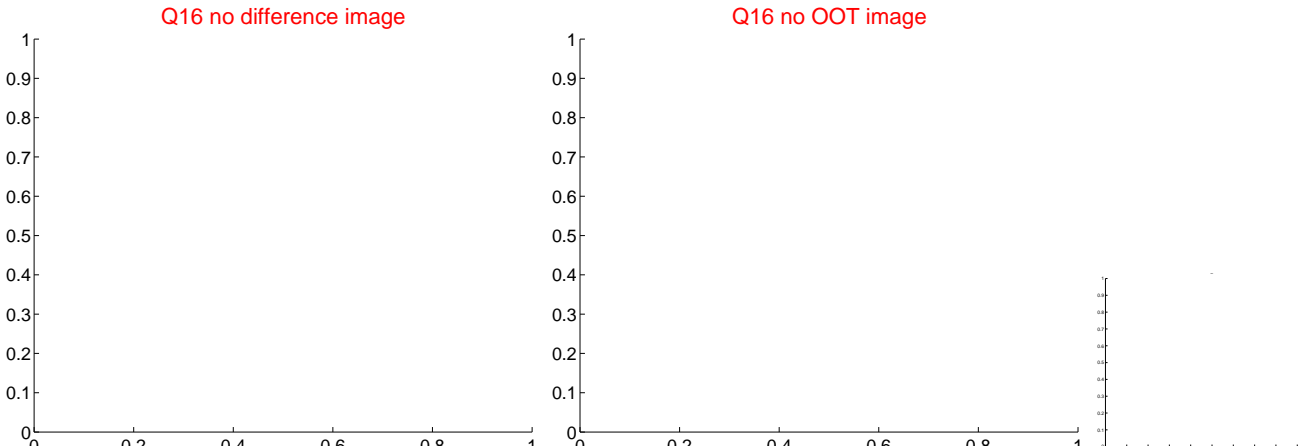
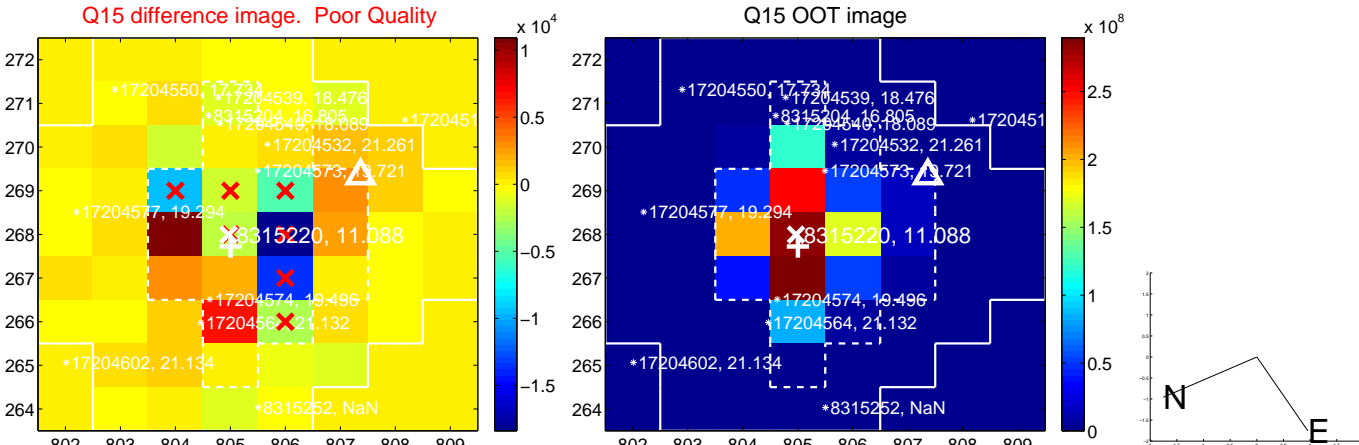
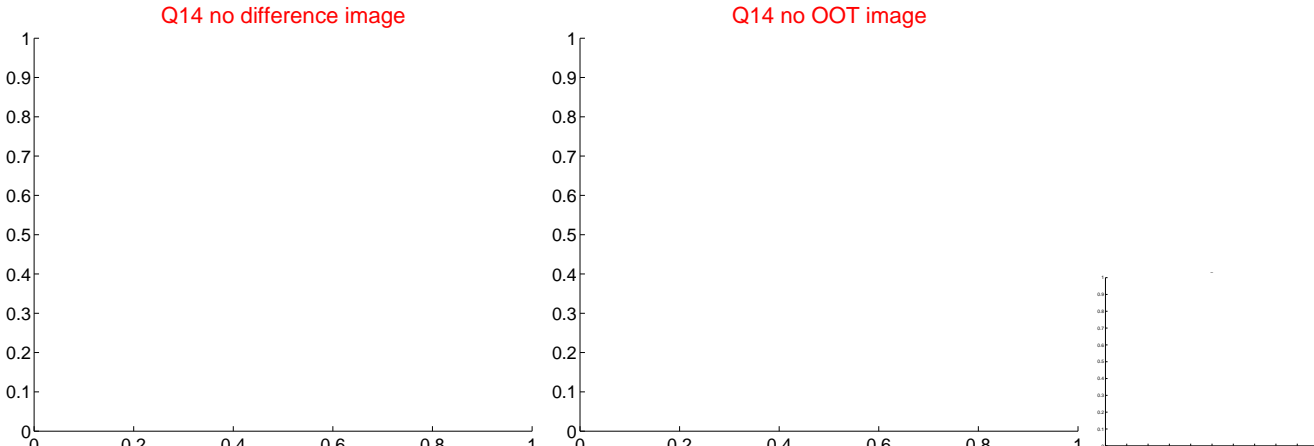
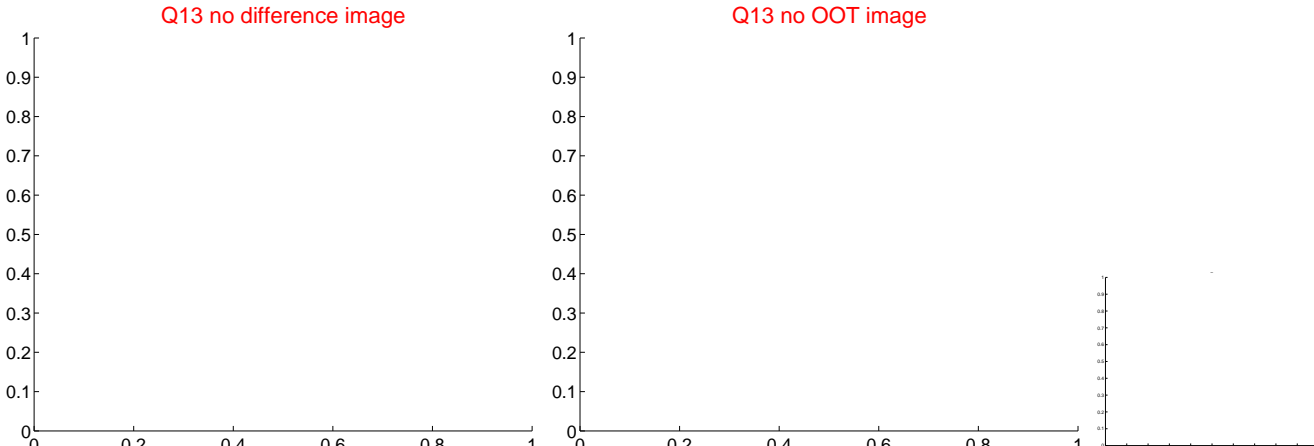




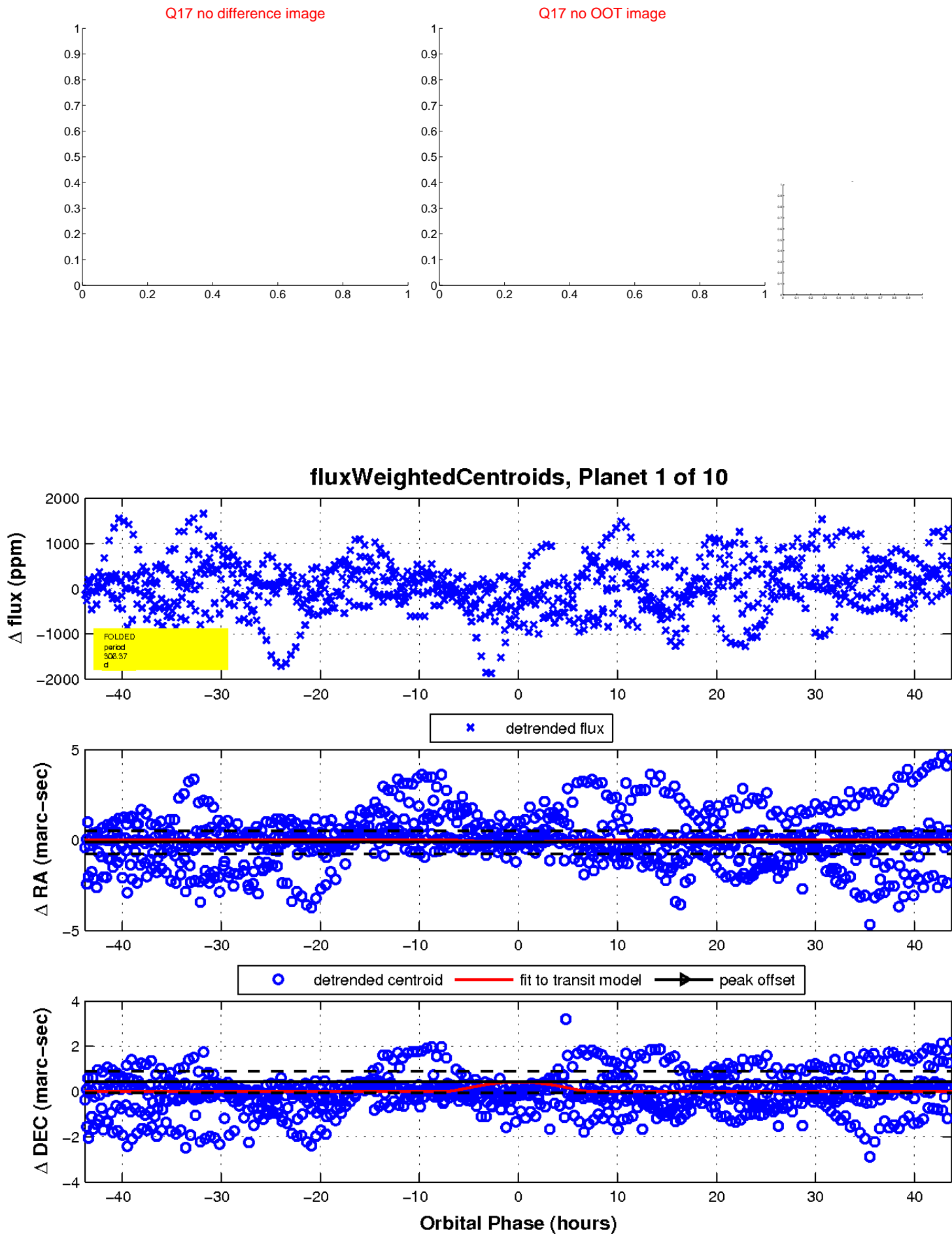
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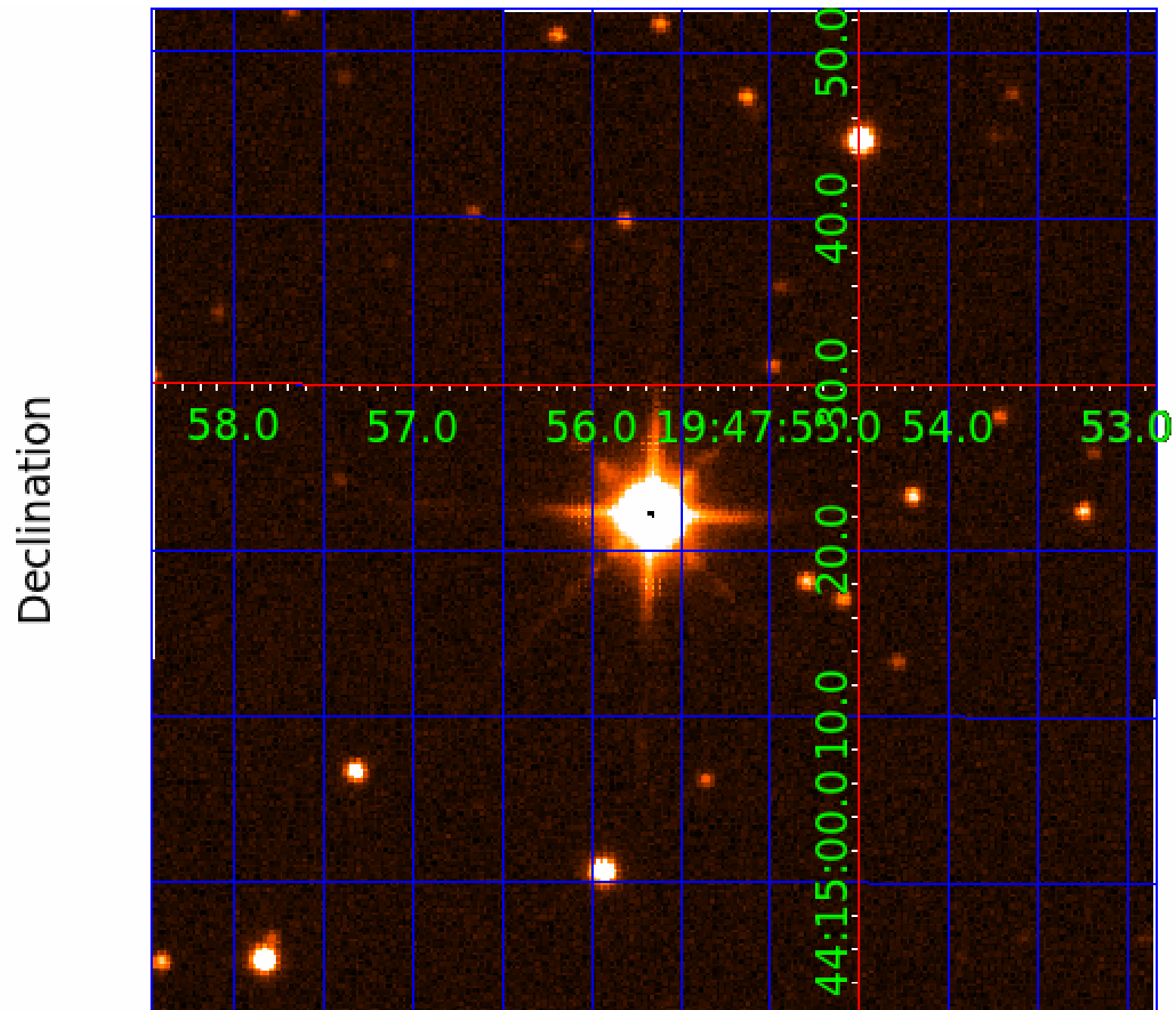
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white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image





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## Robovetter Results

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008315220-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—NO_FITS—INCONSISTENT_TRANS—CENT_SATURATED
008315220-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_TER_DV—MOD_POS_DV—MOD_TER_ALT—MOD_POS_ALT— INCONSISTENT_TRANS—CENT_SATURATED
008315220-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
008315220-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_ZUMA—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT— MOD_POS_ALT—INCONSISTENT_TRANS—SAME_NTL_PERIOD—CENT_SATURATED
008315220-06	OBS	FP	0.00	1	0	1	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_SATURATED—HALO_GHOST
008315220-07	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—SAME_NTL_PERIOD—CENT_SATURATED
008315220-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV— CENT_SATURATED
008315220-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS— CENT_SATURATED
008315220-10	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED

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

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

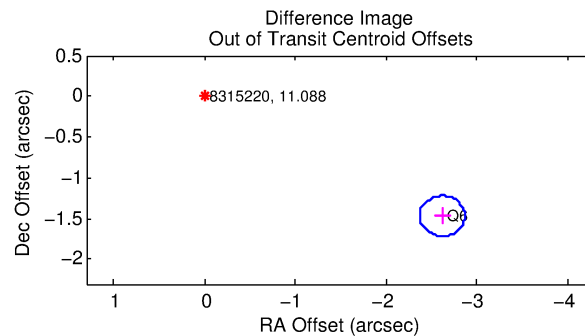
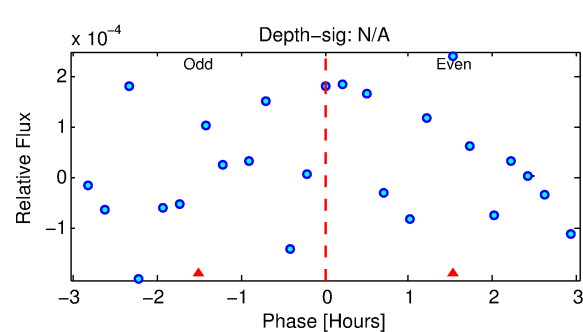
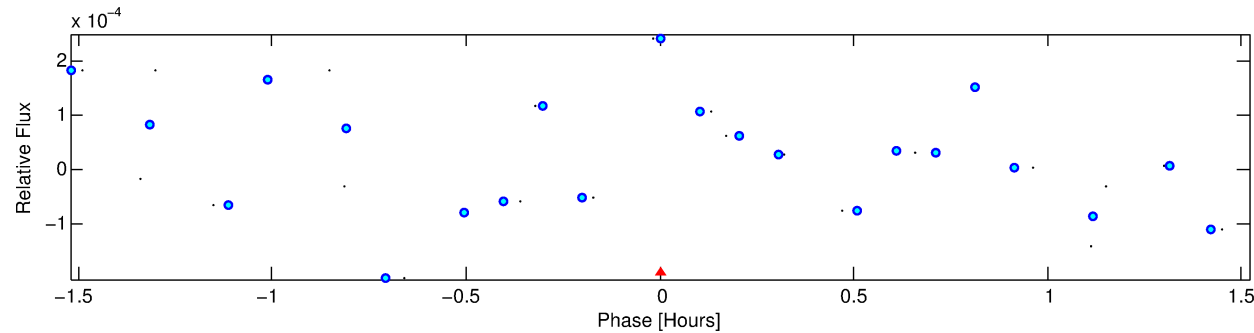
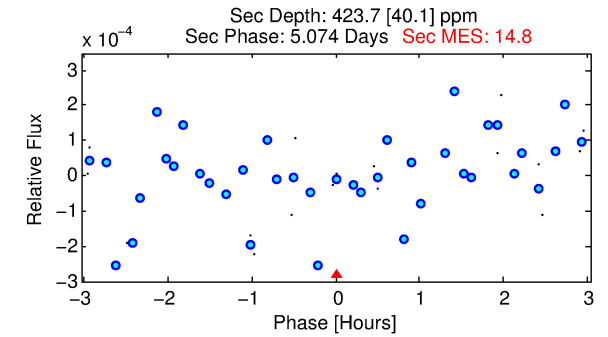
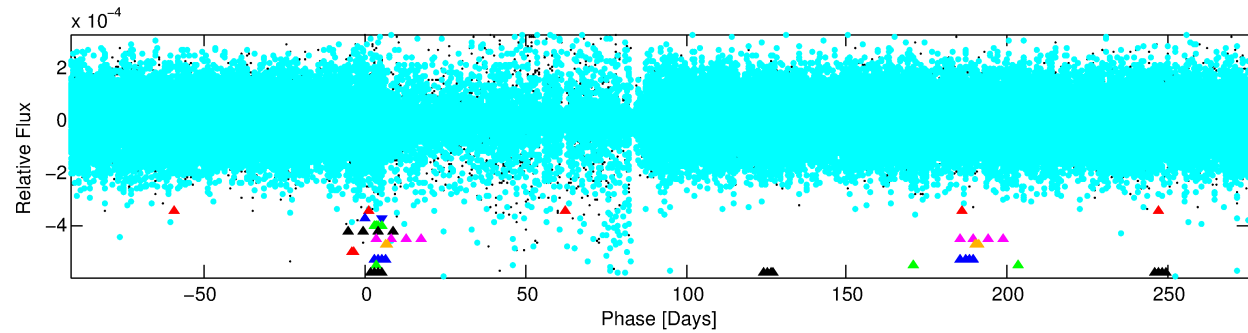
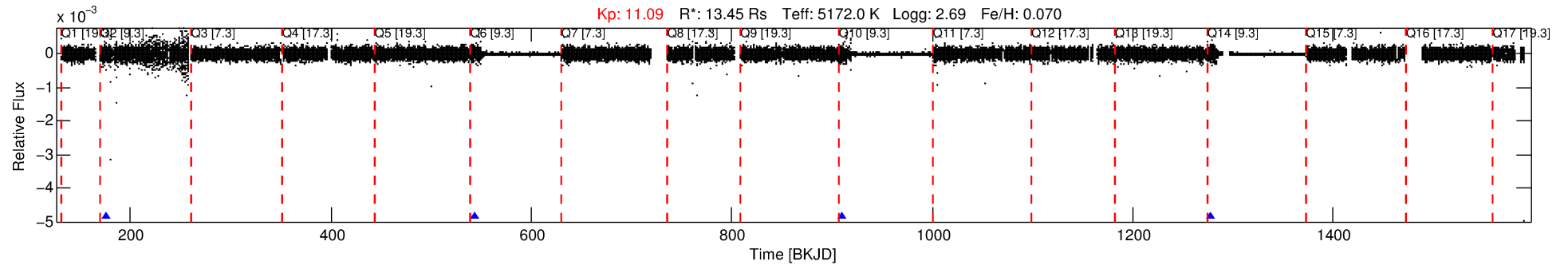
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Ephemeris Match Information For 008315220-02

No Significant Match Found

# DV One-Page Summary

KIC: 8315220 Candidate: 2 of 10 Period: 367.177 d



## TPS TCE Results:

Period = 367.17745 d  
Epoch = 175.0685 BKJD

DV fit results are unavailable

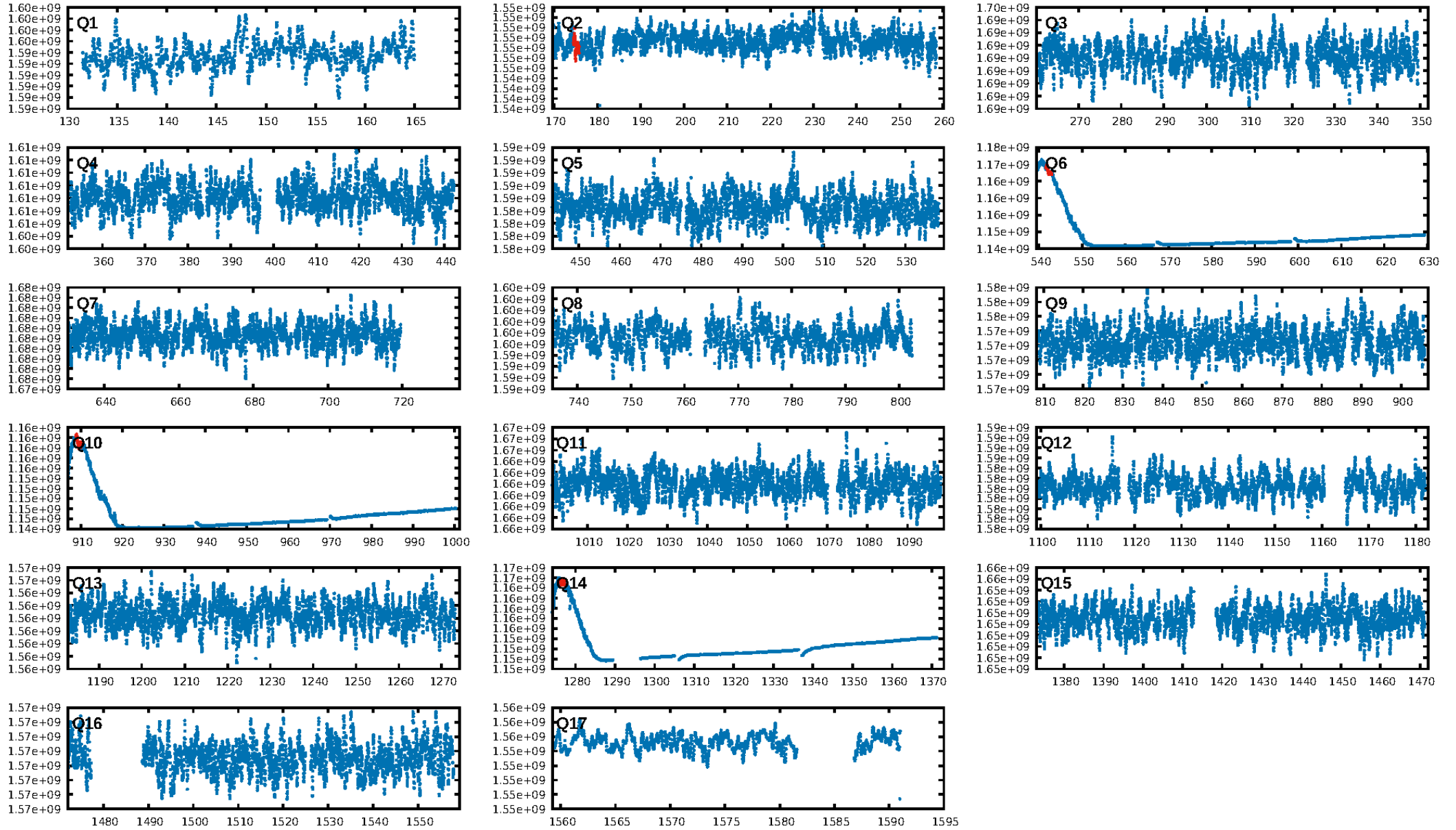
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [5.31 $\sigma$ ]  
LongPeriod-sig: 18.9% [0.24 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 4.54e-34  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: 365.1  
Centroid-sig: 13.4%  
Centroid-so: 38.646 arcsec [1.44 $\sigma$ ]  
OotOffset-rm: 2.999 arcsec [36.45 $\sigma$ ]  
KicOffset-rm: 2.680 arcsec [32.18 $\sigma$ ]  
OotOffset-st: 1/0/0/0 [1]  
KicOffset-st: 1/0/0/0 [1]  
DiffImageQuality-fgm: 0.00 [0/1]  
DiffImageOverlap-fno: 1.00 [1/1]

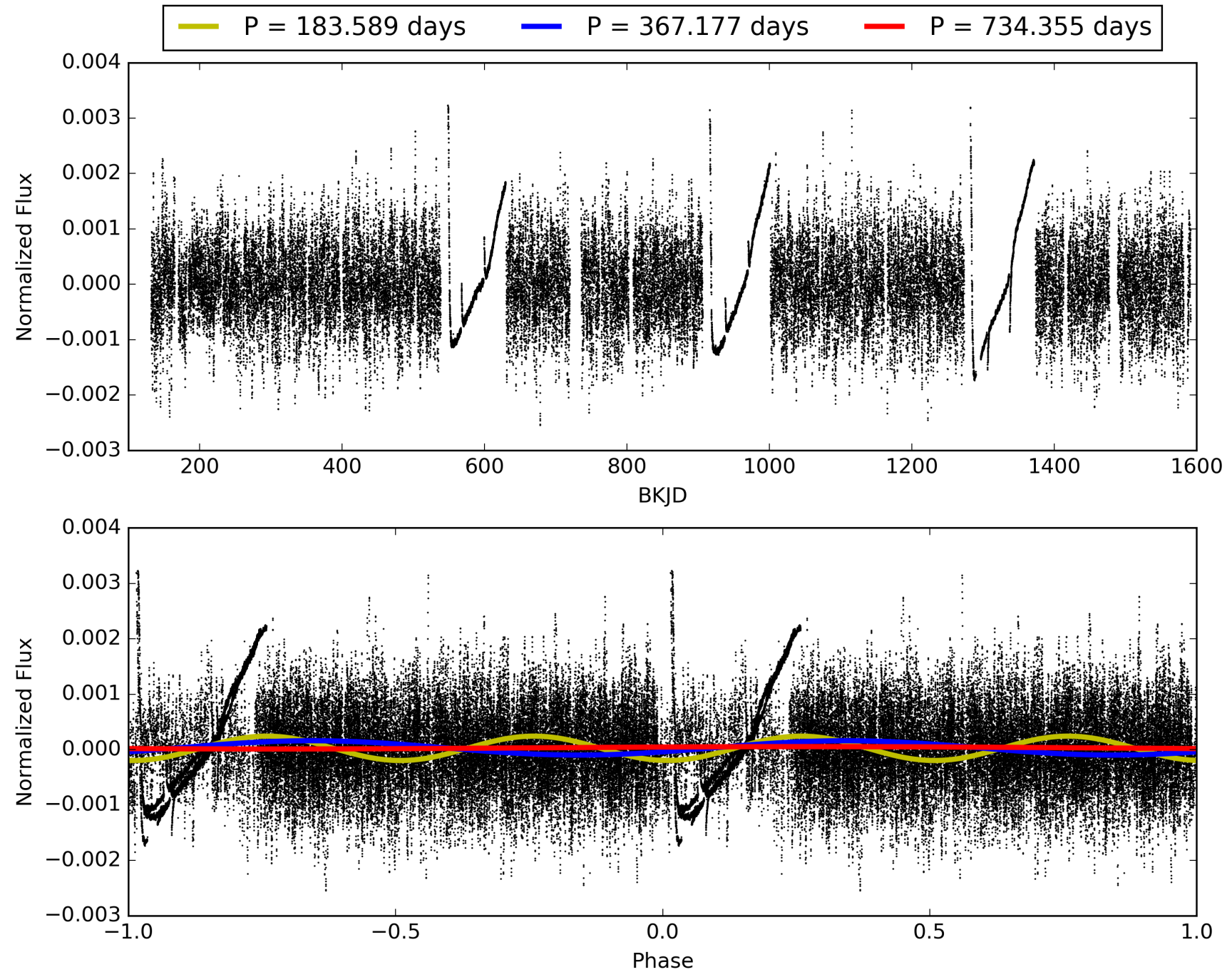
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 16:09:46 Z

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

# TCE 008315220-02, PDC Light Curves

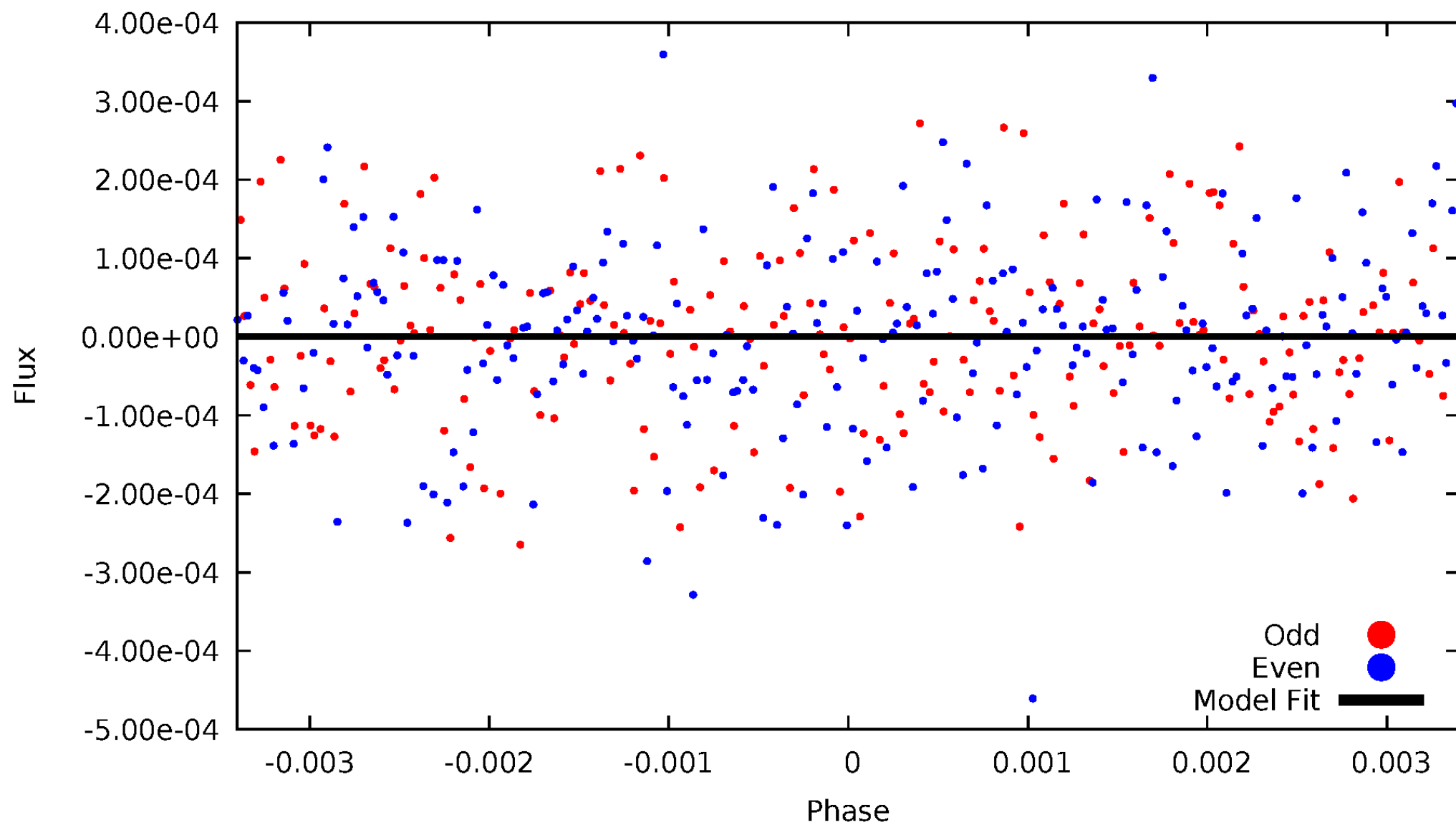


# TCE 008315220-02



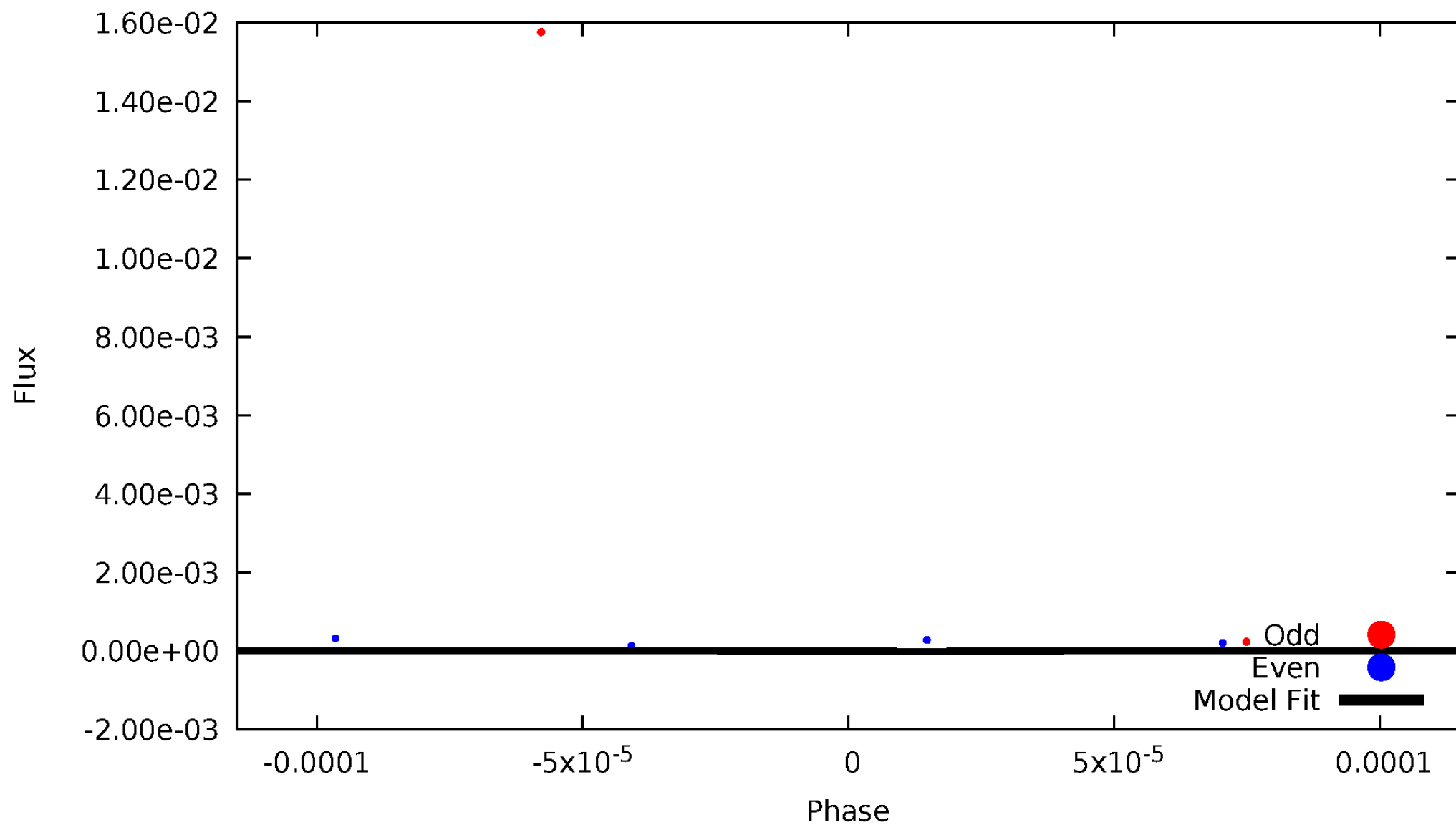
# DV Odd/Even

TCE 008315220-02



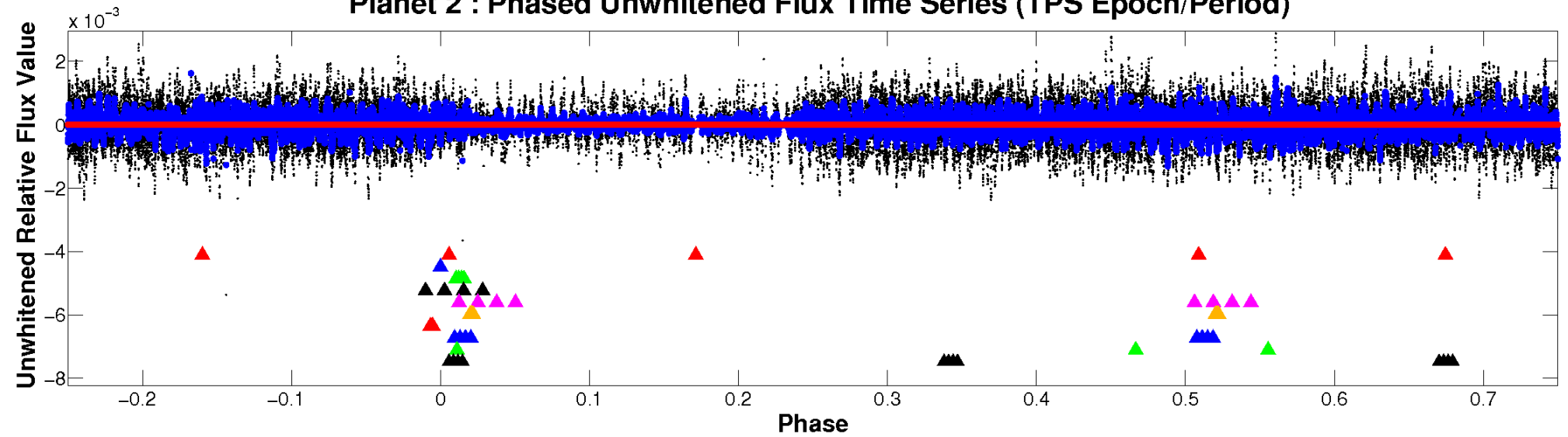
# ALT Odd/Even

TCE 008315220-02



# Non-Whitened Vs. Whitened Light Curve

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



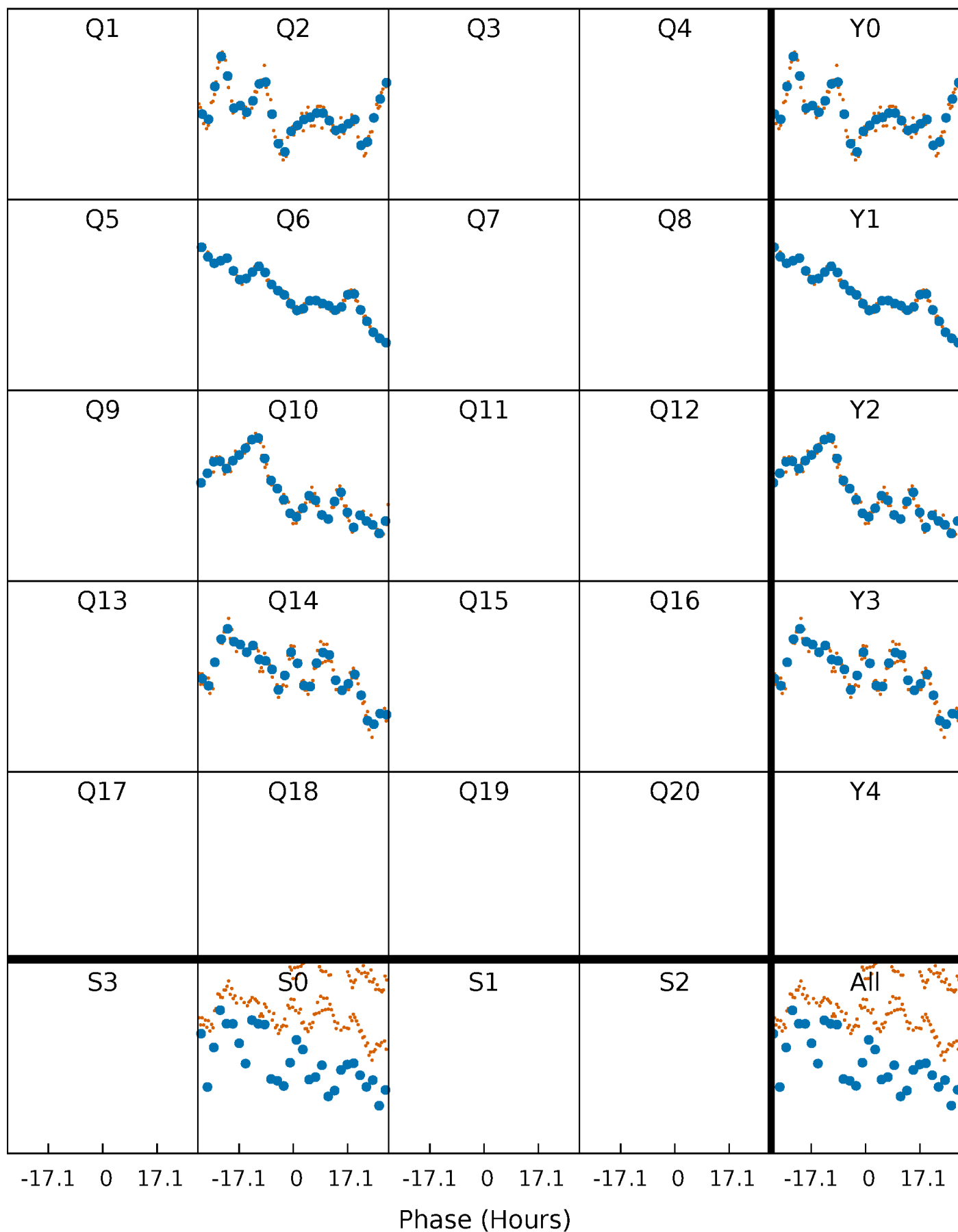
Planet 2 : Phased Whitened Flux Time Series (TPS Epoch/Period)





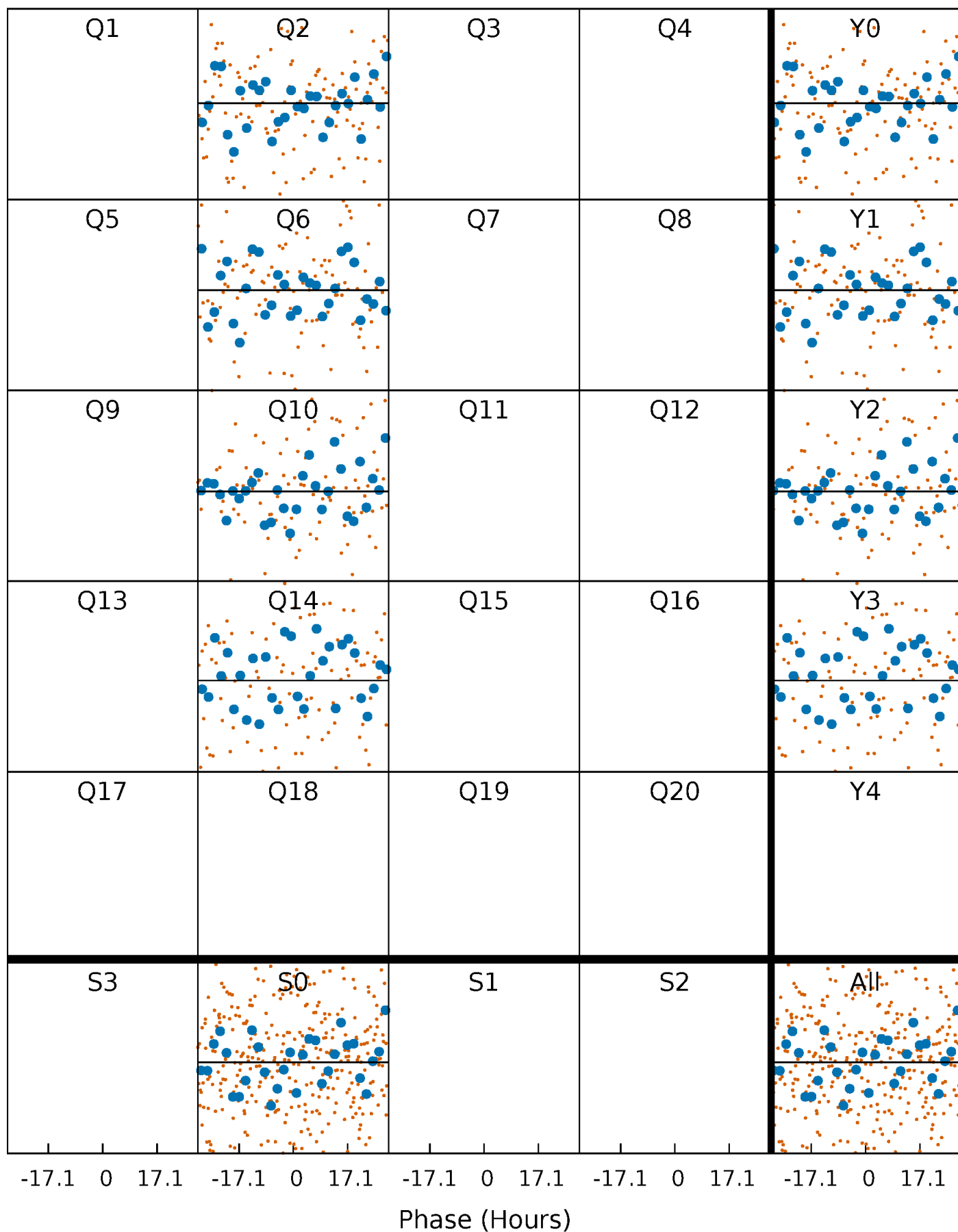
# PDC Quarter-Phased Transit Curves

TCE 008315220-02 P=367.177451 Days  $T_0=175.068533$  (BKJD)



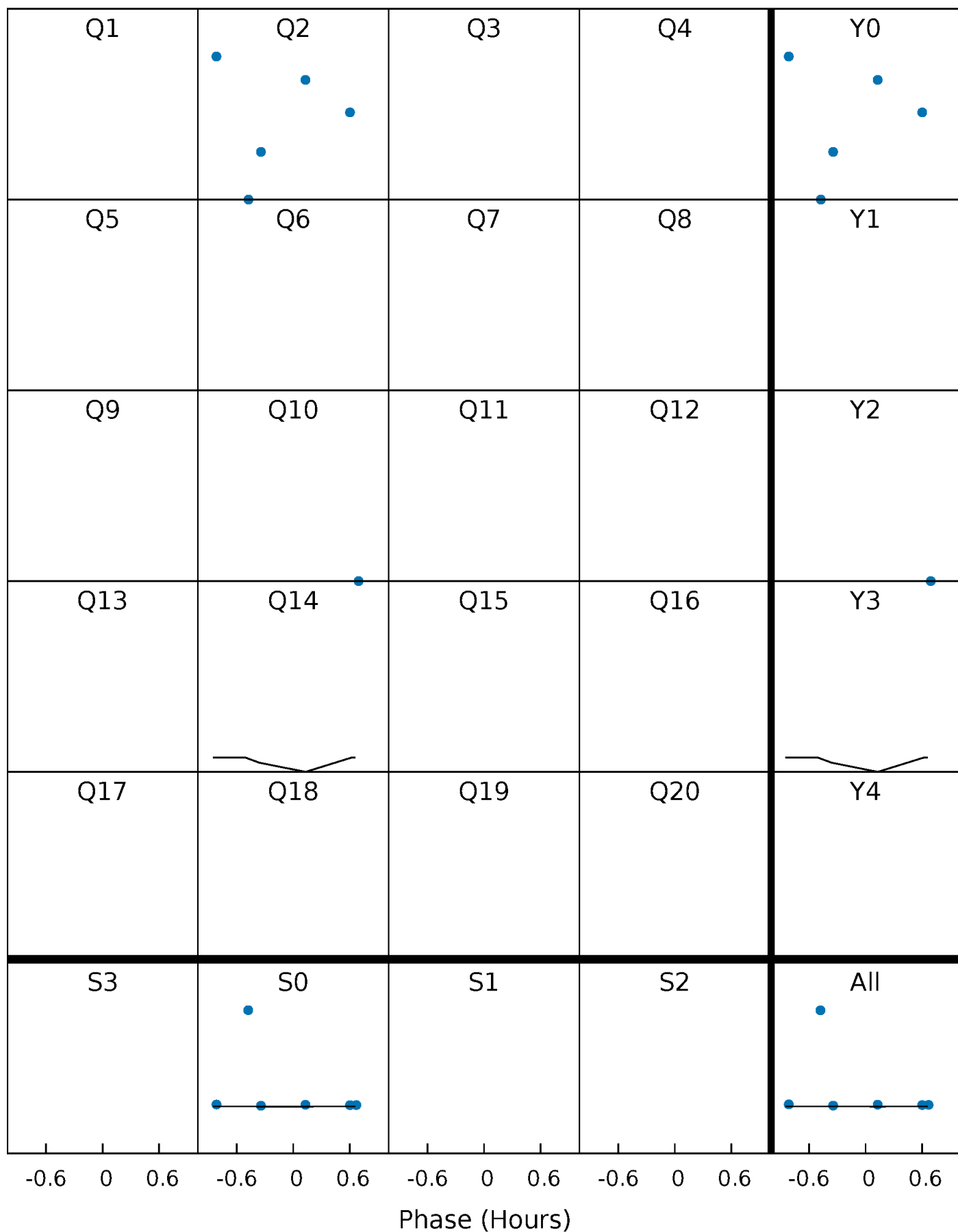
# DV Quarter-Phased Transit Curves

TCE 008315220-02     $P=367.177451$  Days     $T_0=175.068533$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

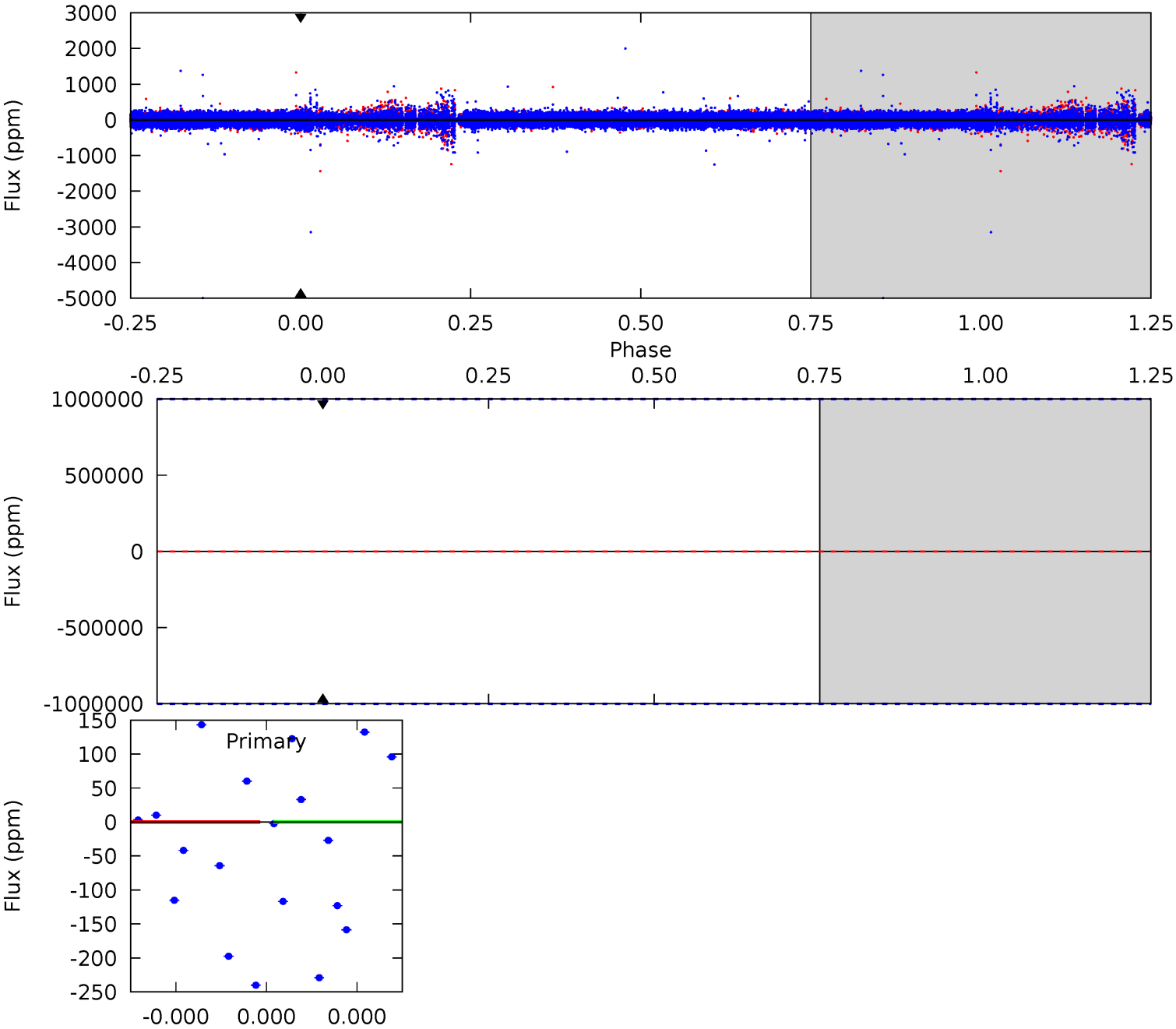
TCE 008315220-02 P=367.177451 Days  $T_0=175.869553$  (BKJD)



# DV Model-Shift Uniqueness Test

008315220-02, P = 367.177451 Days, E = 175.068533 Days

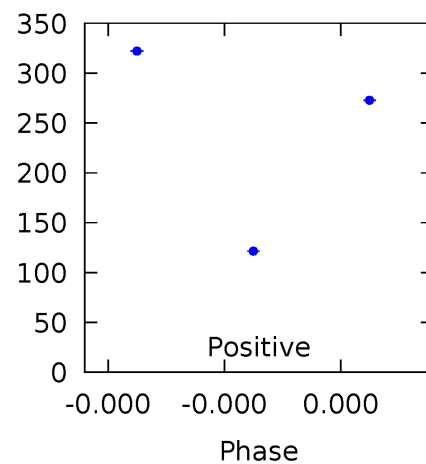
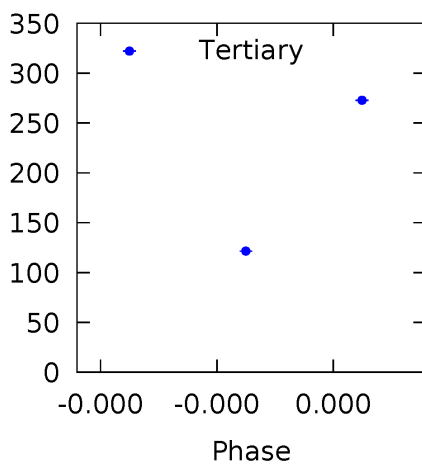
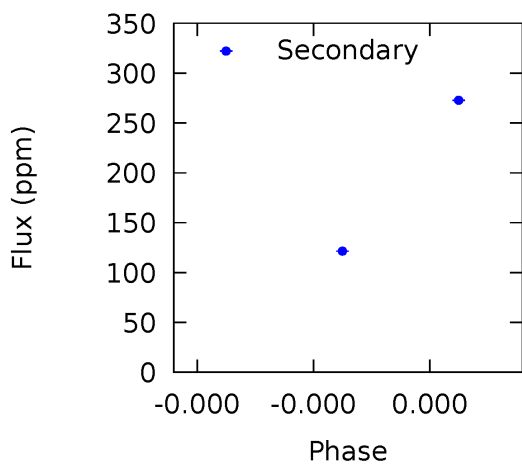
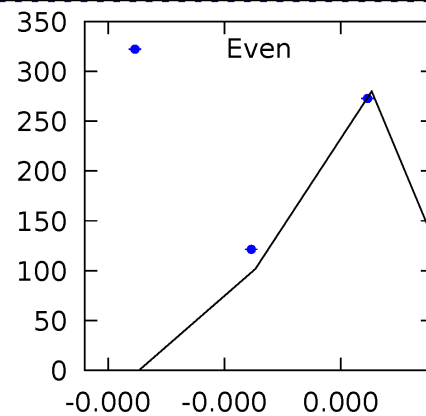
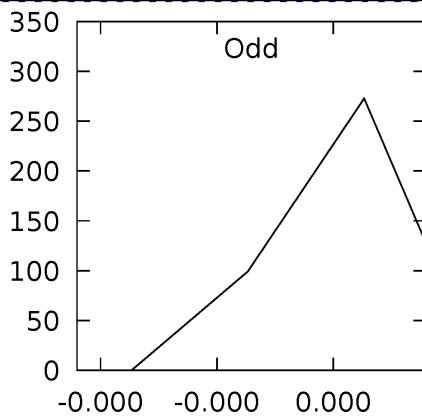
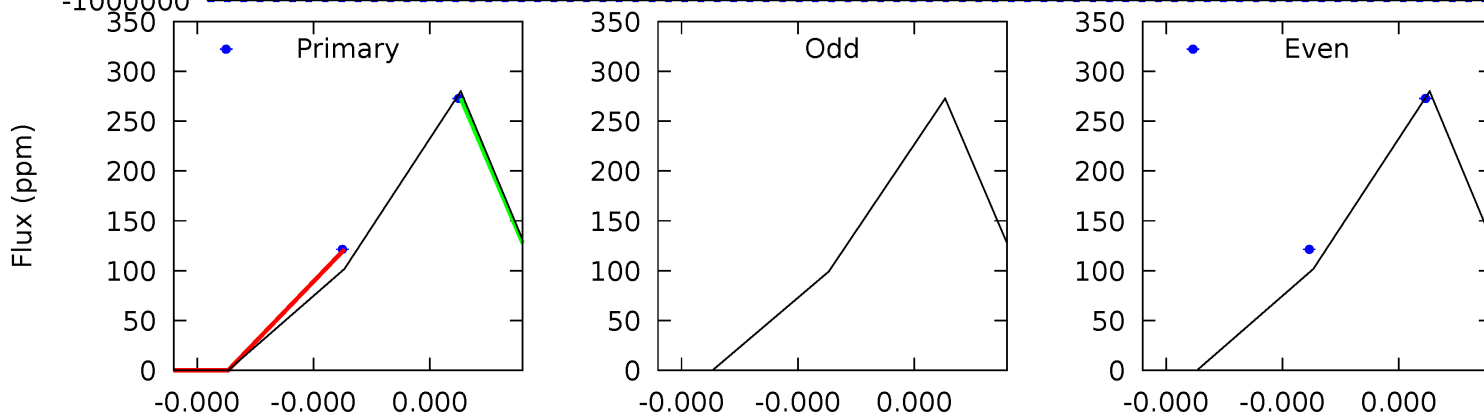
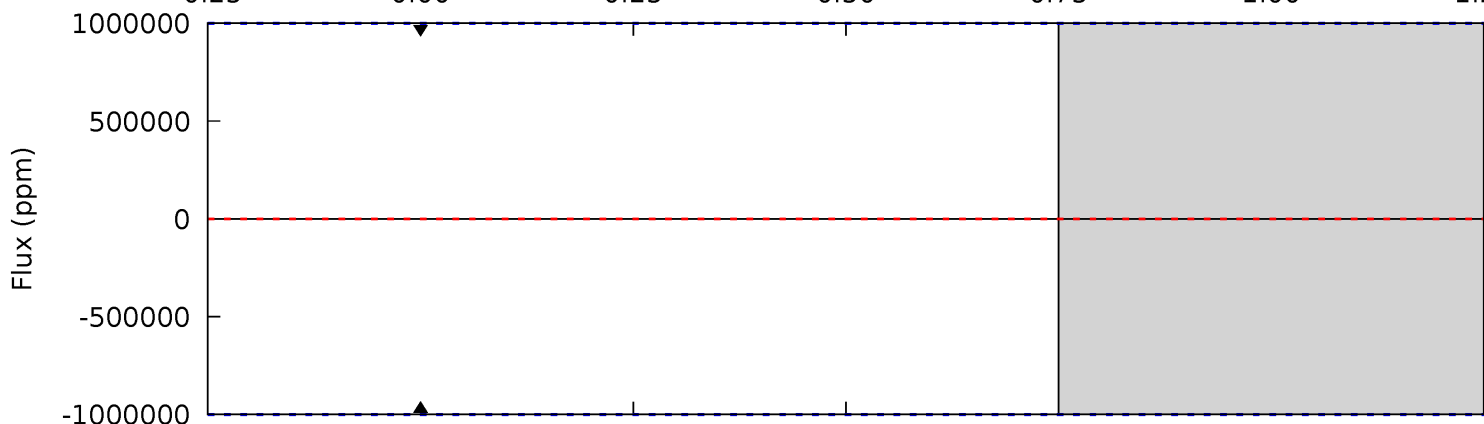
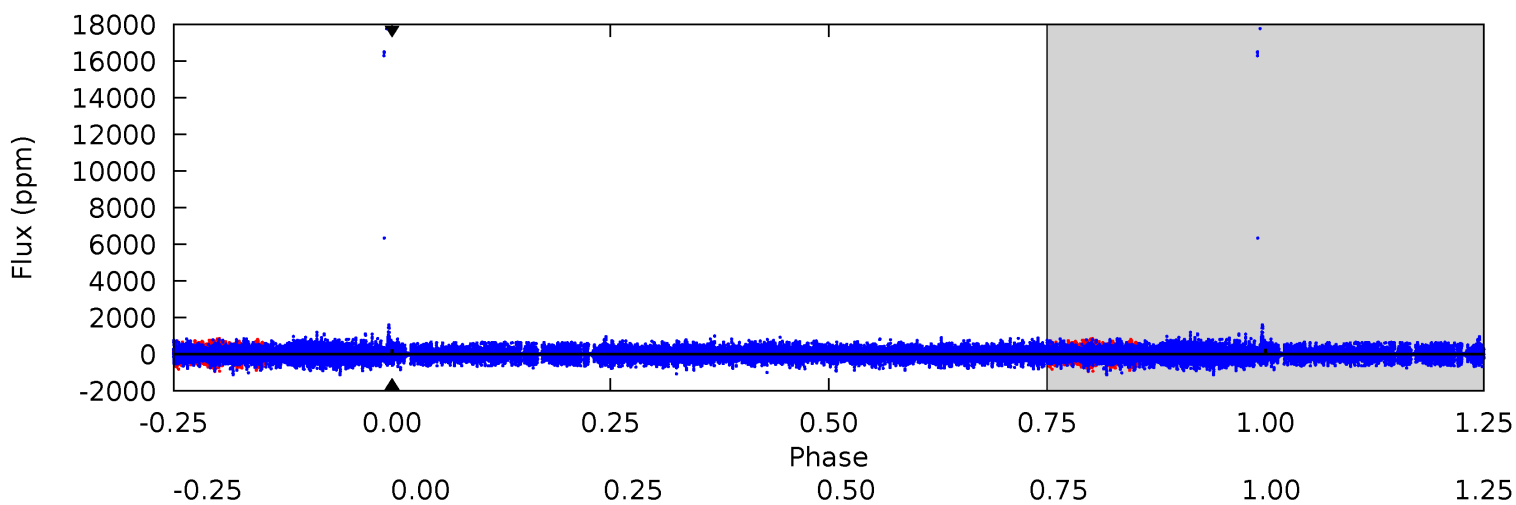
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



# Alt Model-Shift Uniqueness Test

008315220-02, P = 367.177451 Days, E = 175.869553 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	0	0	0	1.00	1.00	1.00	0	0	0	0	0.00	0	0	0.00



### Stellar Parameters For KIC 008315220

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5172^{+70}_{-248}$	$2.693^{+0.273}_{-0.126}$	$0.070^{+0.150}_{-0.600}$	$13.454^{+2.481}_{-7.442}$	$3.257^{+0.222}_{-1.999}$	$0.002^{+0.006}_{-0.001}$
	+1%/-5%	+10%/-5%	+214%/-857%	+18%/-55%	+7%/-61%	+302%/-38%
Source	PHO1	FLK73	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 008315220-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$0 \pm 1000000$	$96.49^{+108.09}_{-67.27}$	$942^{+59}_{-96}$	$2905^{+13818}_{-18155}$	$21^{+21110}_{-18326}$
Alt.	$-0 \pm 1000000$	$95.76^{+119.16}_{-65.22}$	$948^{+57}_{-89}$	$3670^{+13812}_{-19417}$	$107^{+23215}_{-19783}$

$T_{max}$  = 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  $A_{obs} \gg 1.0$

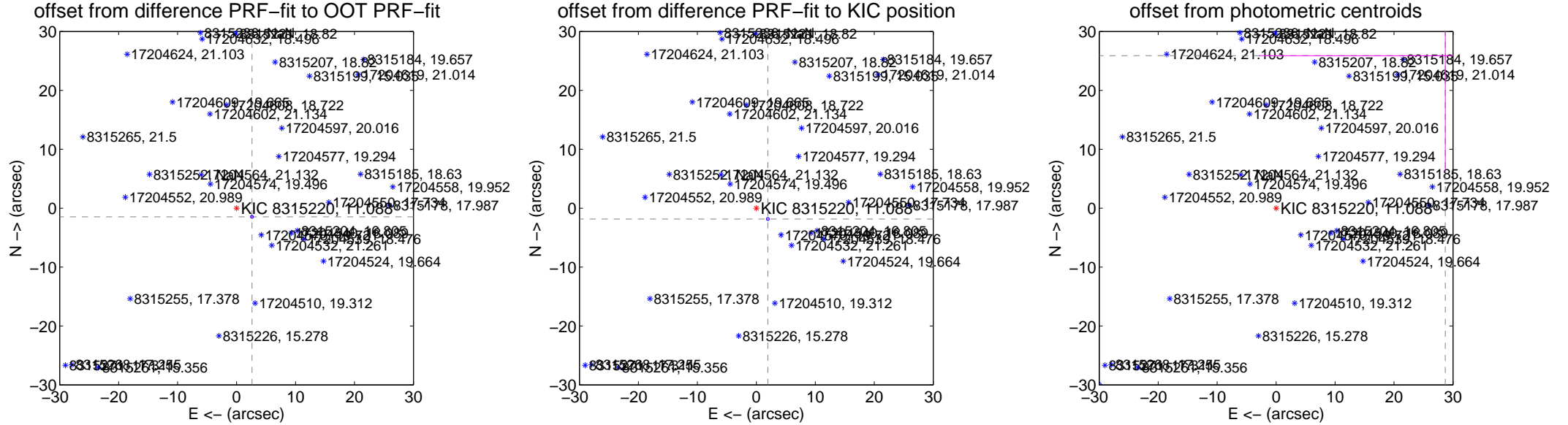
## DV Centroid Data

Supplemental centroid analysis for 008315220-02. **Kepler magnitude: 11.09.** Transit SNR -1.00

**There are 0 quarters with good PRF difference image offsets**

The direct PRF centroid is offset from the target star catalog position by about 0.76 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b><math>2.999 \pm 0.082</math></b>	<b>36.45</b>	$-2.616 \pm 0.081$	$-1.466 \pm 0.086$
PRF-fit source offset from KIC position	<b><math>2.680 \pm 0.083</math></b>	<b>32.18</b>	$-1.953 \pm 0.081$	$-1.835 \pm 0.086$
photometric centroid source offset	$38.64 \pm 26.89$	1.44	$-28.69 \pm 31.58$	$25.89 \pm 19.66$



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.

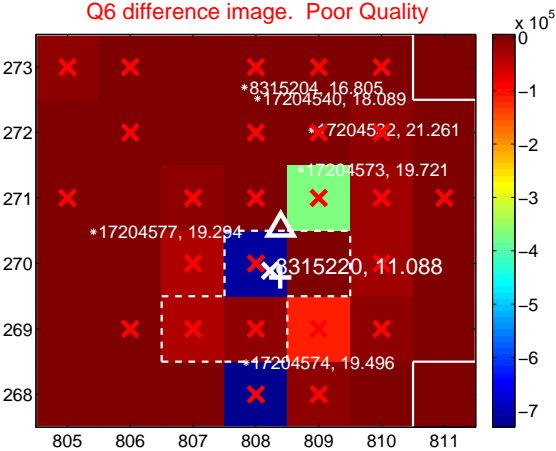
Q5 no difference image



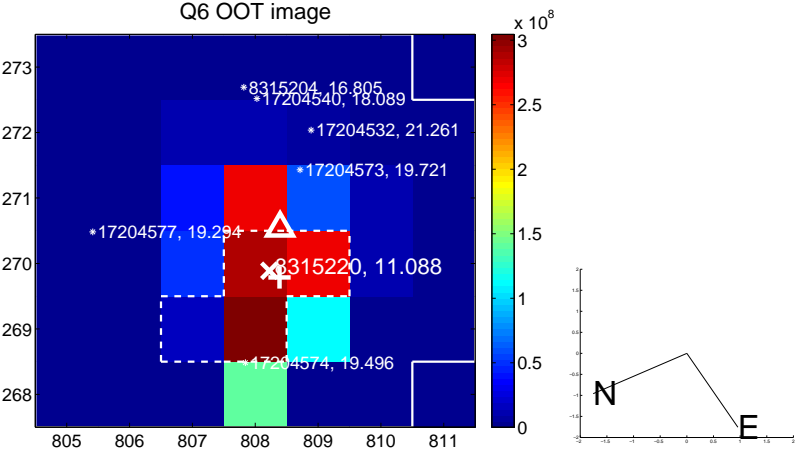
Q5 no OOT image



Q6 difference image. Poor Quality



Q6 OOT image



Q7 no difference image



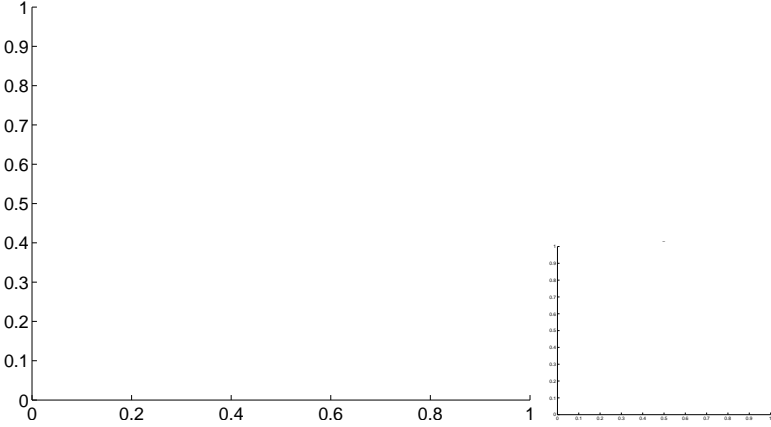
Q7 no OOT image



Q8 no difference image



Q8 no OOT image



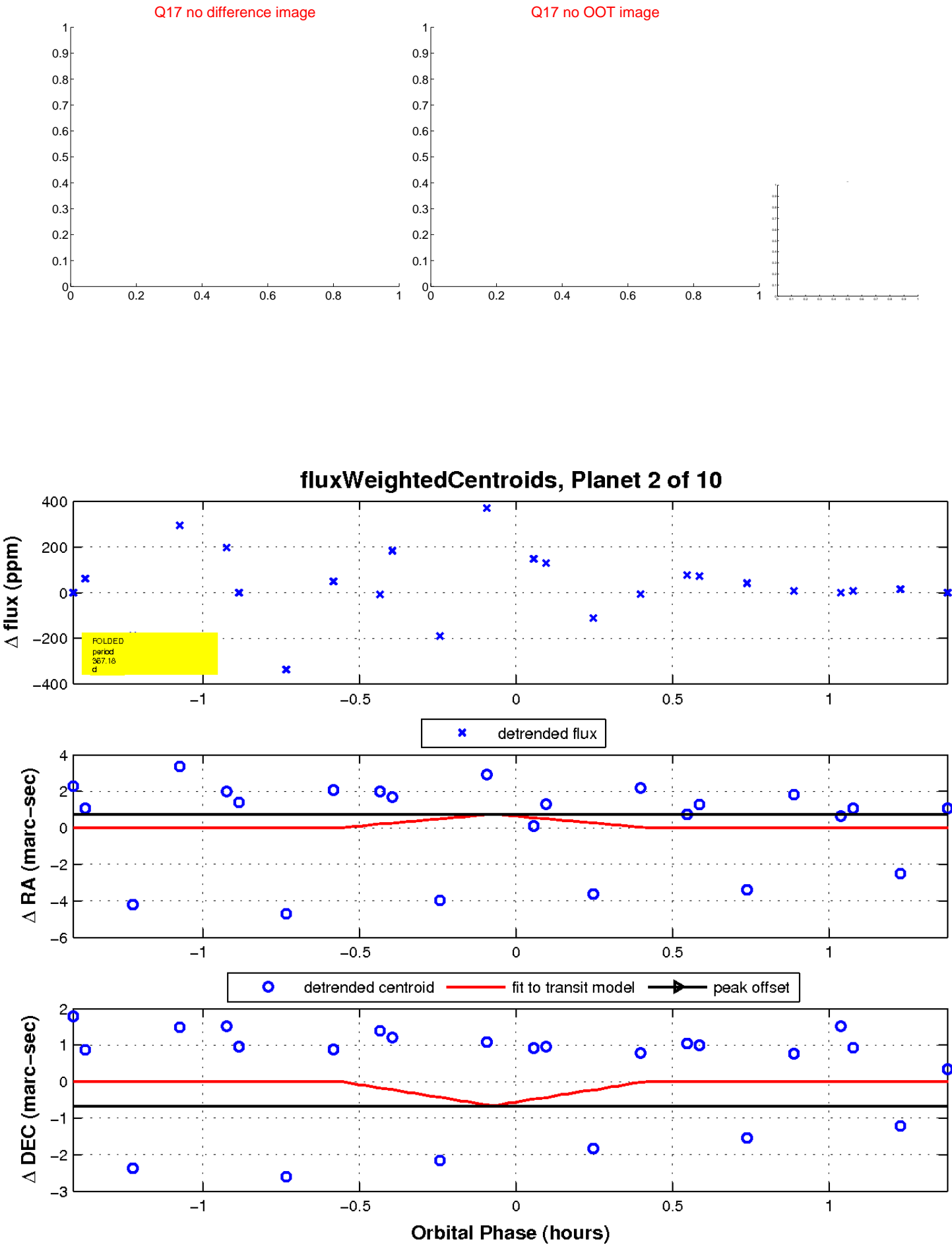
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



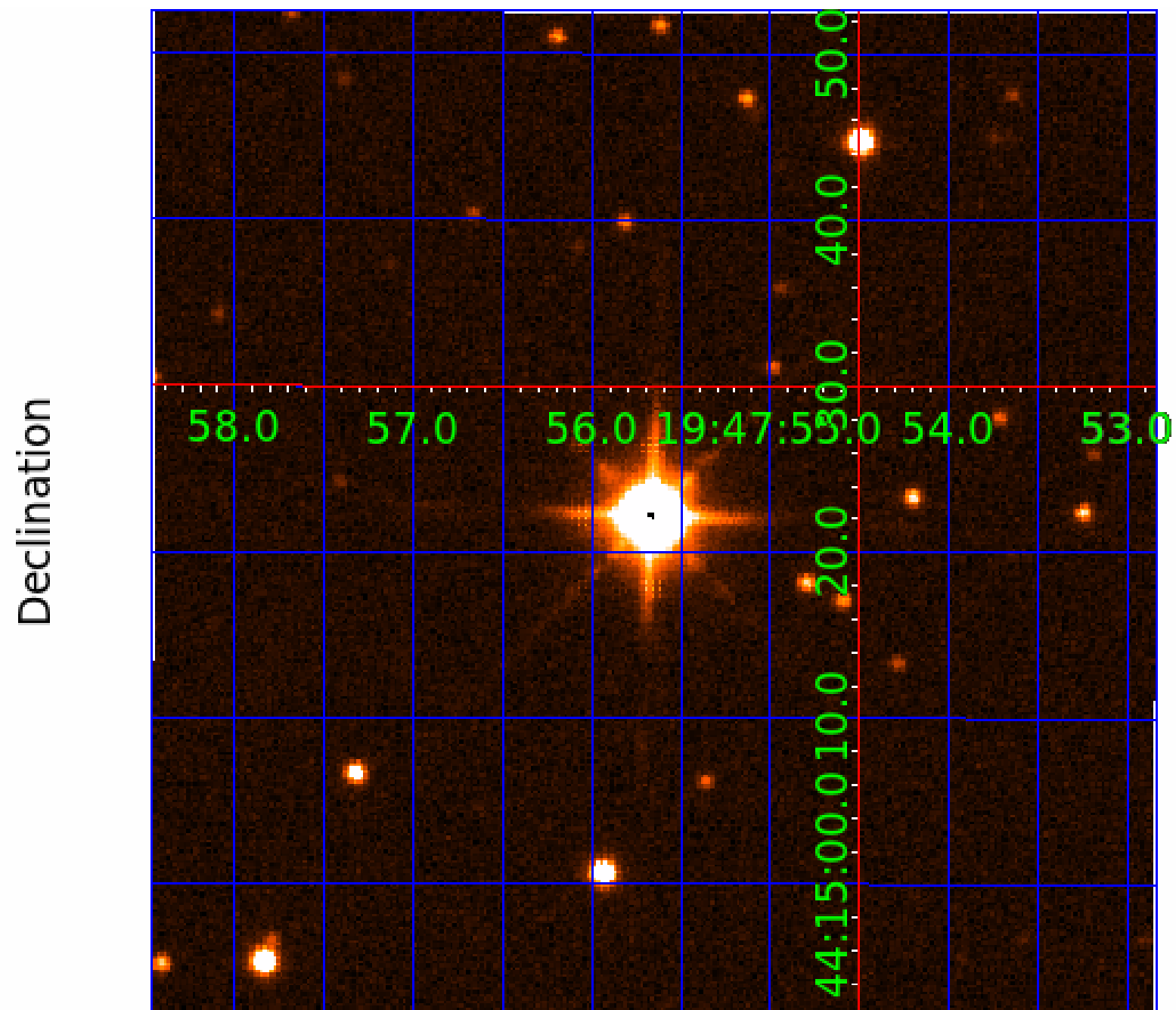
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image



## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008315220-01	OBS	No	306.366968	238.002854	978.6	14.592	25.2	18.2	13.45	5172	72.09	66.75
008315220-02	OBS	No	367.177451	175.068533	144.9	15.000	31.5	-1.0	13.45	5172	15.78	52.43
008315220-03	OBS	No	367.826147	178.916856	582.1	16.110	18.5	18.2	13.45	5172	43.69	52.31
008315220-04	OBS	No	362.484543	185.462403	90.9	15.000	21.3	-1.0	13.45	5172	12.50	53.34
008315220-05	OBS	No	181.269349	193.563129	108.1	6.180	14.6	5.3	13.45	5172	16.33	134.38
008315220-06	OBS	No	183.715252	182.372967	347.0	16.910	17.2	18.0	13.45	5172	28.23	132.00
008315220-07	OBS	No	367.388598	172.555205	46.9	15.000	13.2	-1.0	13.45	5172	8.98	52.39
008315220-08	OBS	No	182.919583	182.566043	325.9	10.920	15.3	8.9	13.45	5172	25.79	132.76
008315220-09	OBS	No	534.460195	379.043140	118.9	7.500	16.0	-1.0	13.45	5172	14.30	31.78
008315220-10	OBS	No	122.022409	180.490237	52.5	15.000	11.2	-1.0	13.45	5172	9.50	227.78

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008315220-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_SATURATED
008315220-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—NO_FITS—INCONSISTENT_TRANS—CENT_SATURATED
008315220-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_TER_DV—MOD_POS_DV—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
008315220-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
008315220-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_ZUMA—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—SAME_NTL_PERIOD—CENT_SATURATED
008315220-06	OBS	FP	0.00	1	0	1	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_SATURATED—HALO_GHOST
008315220-07	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—SAME_NTL_PERIOD—CENT_SATURATED
008315220-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_SATURATED
008315220-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
008315220-10	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED

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

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

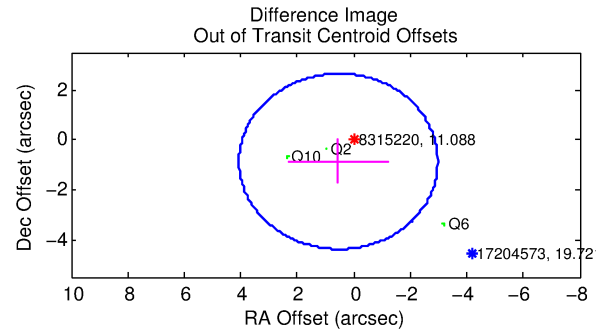
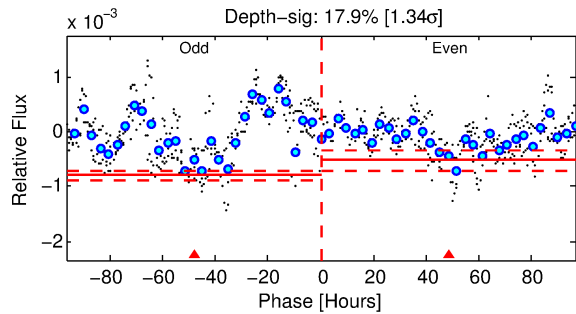
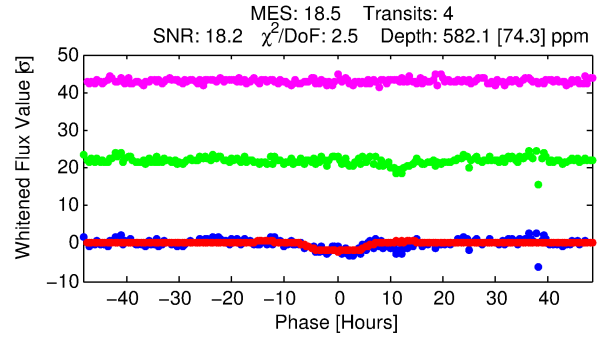
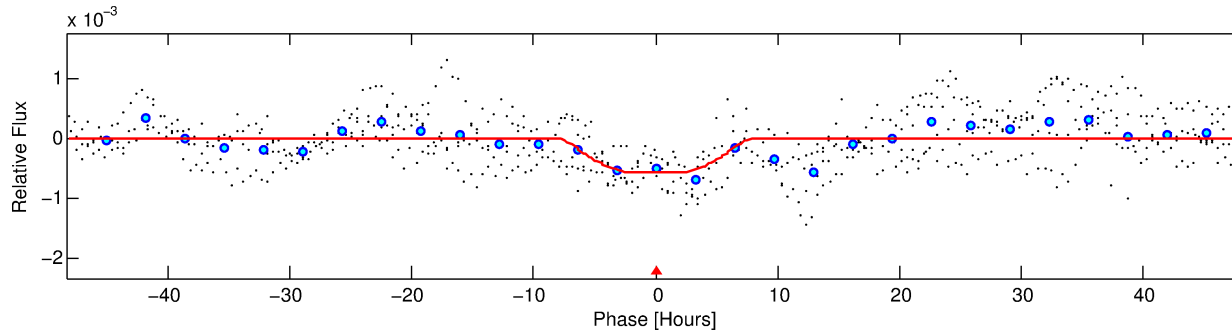
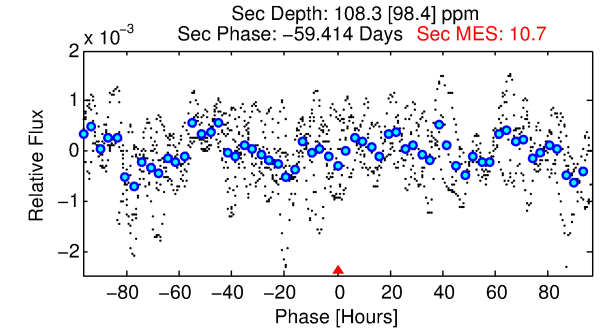
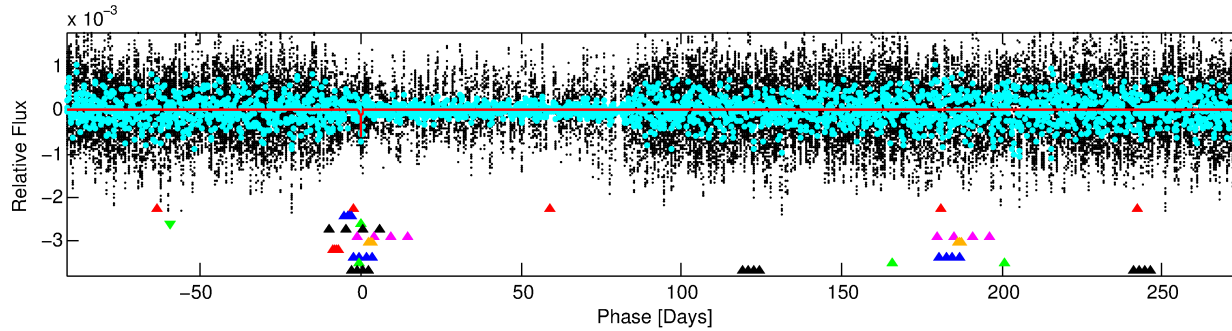
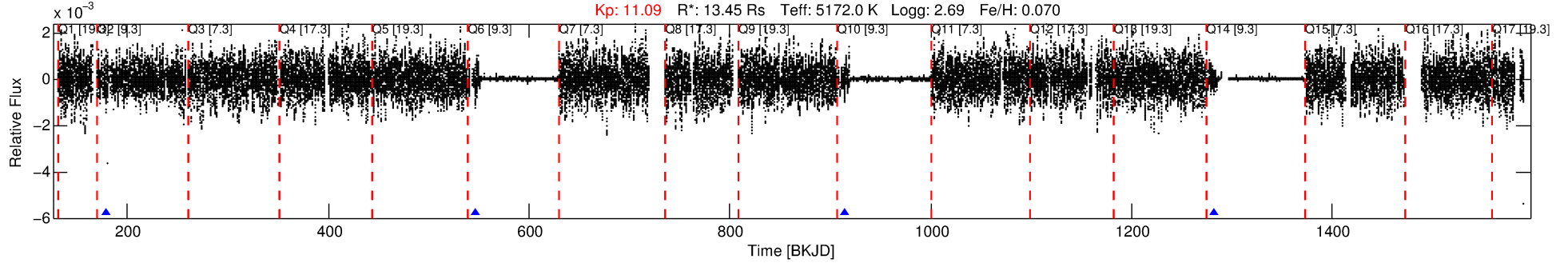
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 008315220-03

No Significant Match Found

# DV One-Page Summary

KIC: 8315220 Candidate: 3 of 10 Period: 367.826 d



## DV Fit Results:

Period = 367.82615 [0.01846] d  
Epoch = 178.9169 [0.0386] BKJD  
Rp/R\* = 0.0298 [0.0029]  
a/R\* = 63.76 [11.03]  
b = 0.96 [0.02]  
Seff = 52.31 [30.88]  
Teq = 686 [101] K  
Rp = 43.68 [24.54] Re  
a = 1.4895 [0.6317] AU  
Ag = 69.25 [75.06] [0.91σ]  
Teffp = 3059 [725] K [3.24σ]

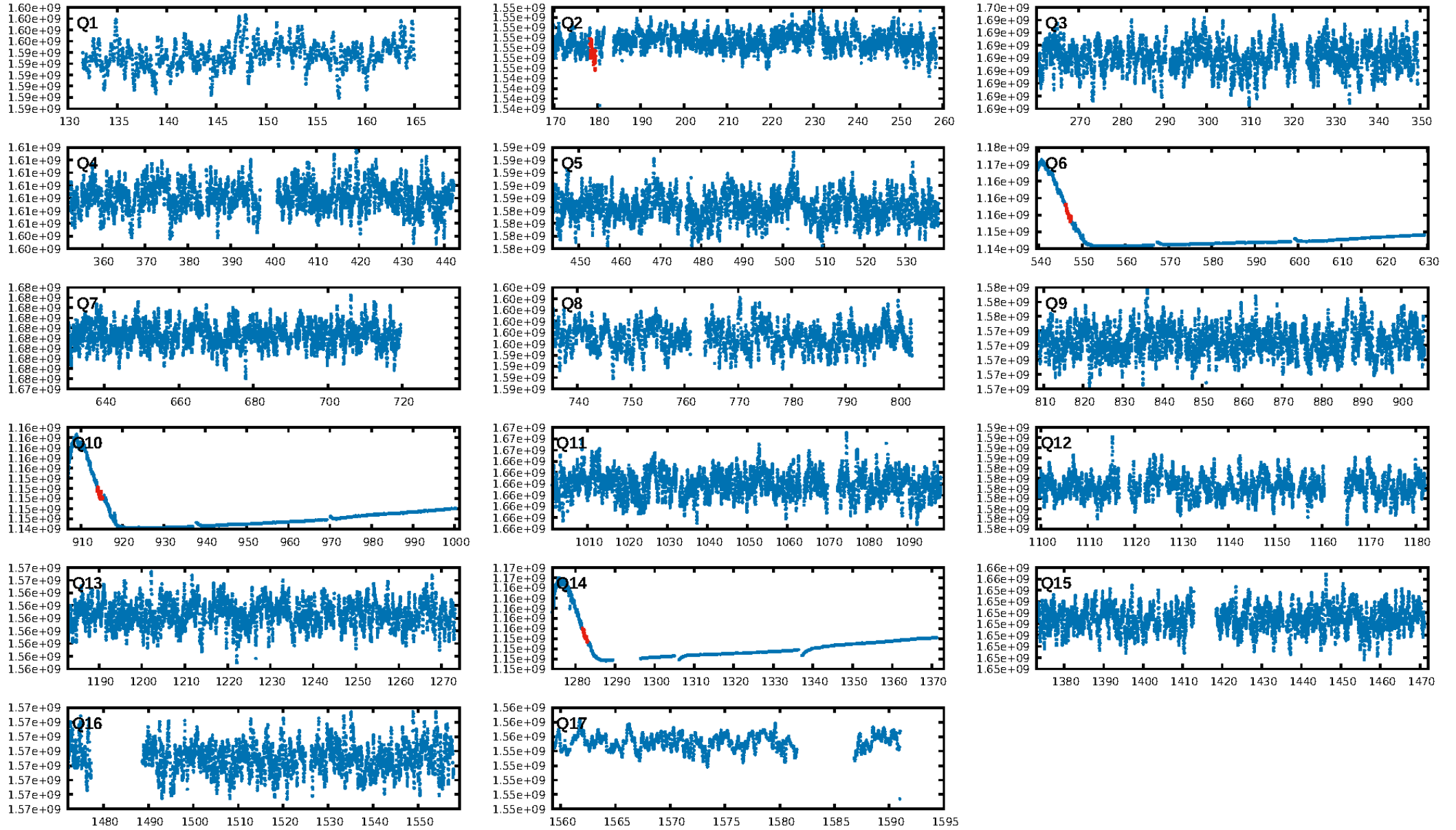
## DV Diagnostic Results:

ShortPeriod-sig: 36.7% [0.48σ]  
LongPeriod-sig: 100.0% [225.06σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 0.4%  
Bootstrap-pfa: 1.64e-14  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: 0.5027  
Centroid-sig: 0.0%  
Centroid-so: 4.306 arcsec [2.79σ]  
OotOffset-rm: 1.024 arcsec [0.87σ]  
OotOffset-st: 3/0/0/0 [3]  
KicOffset-rm: 1.727 arcsec [1.21σ]  
KicOffset-st: 3/0/0/0 [3]  
DiffImageQuality-fgm: 0.33 [1/3]  
DiffImageOverlap-fno: 0.33 [1/3]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 16:09:56 Z

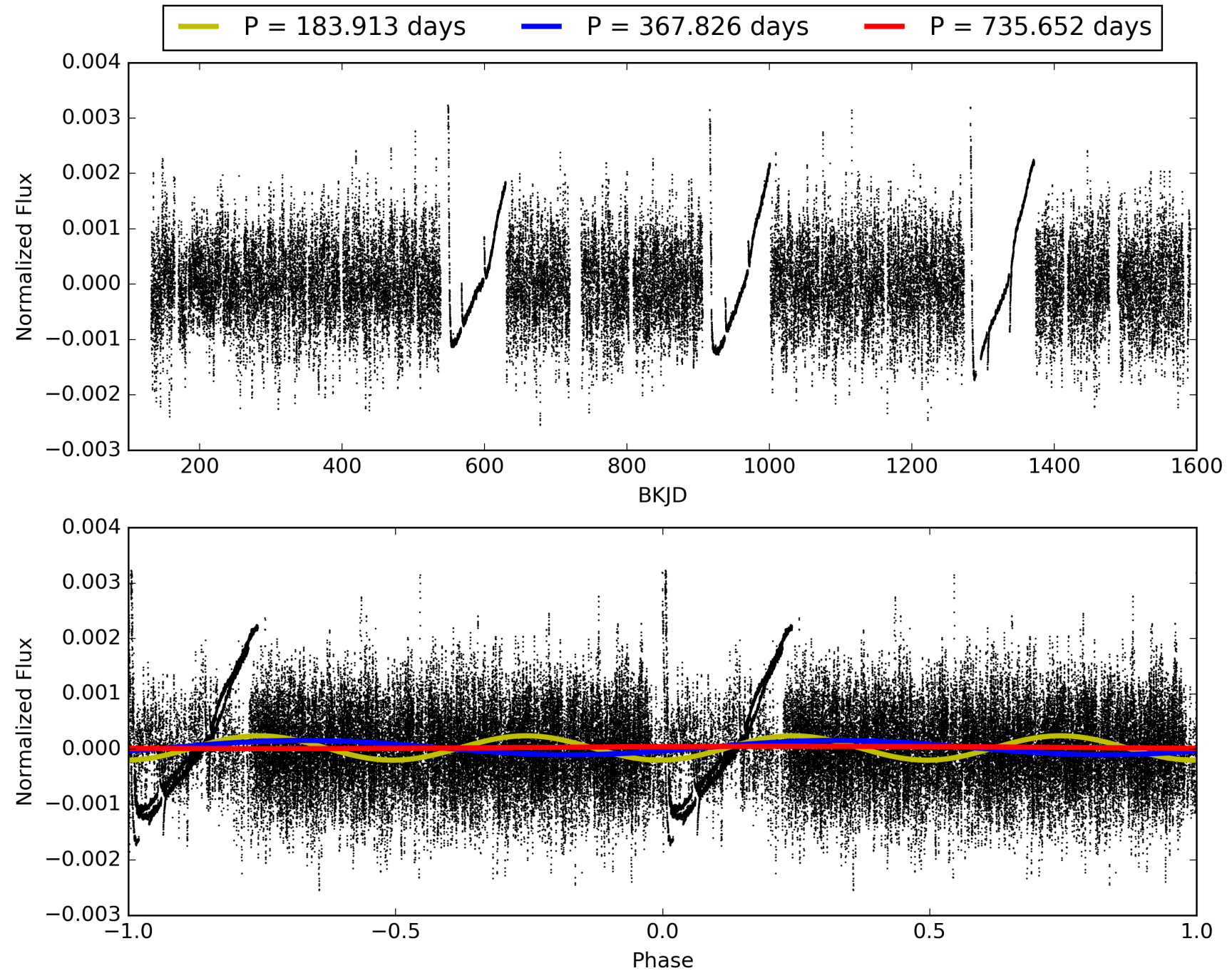
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 008315220-03, PDC Light Curves



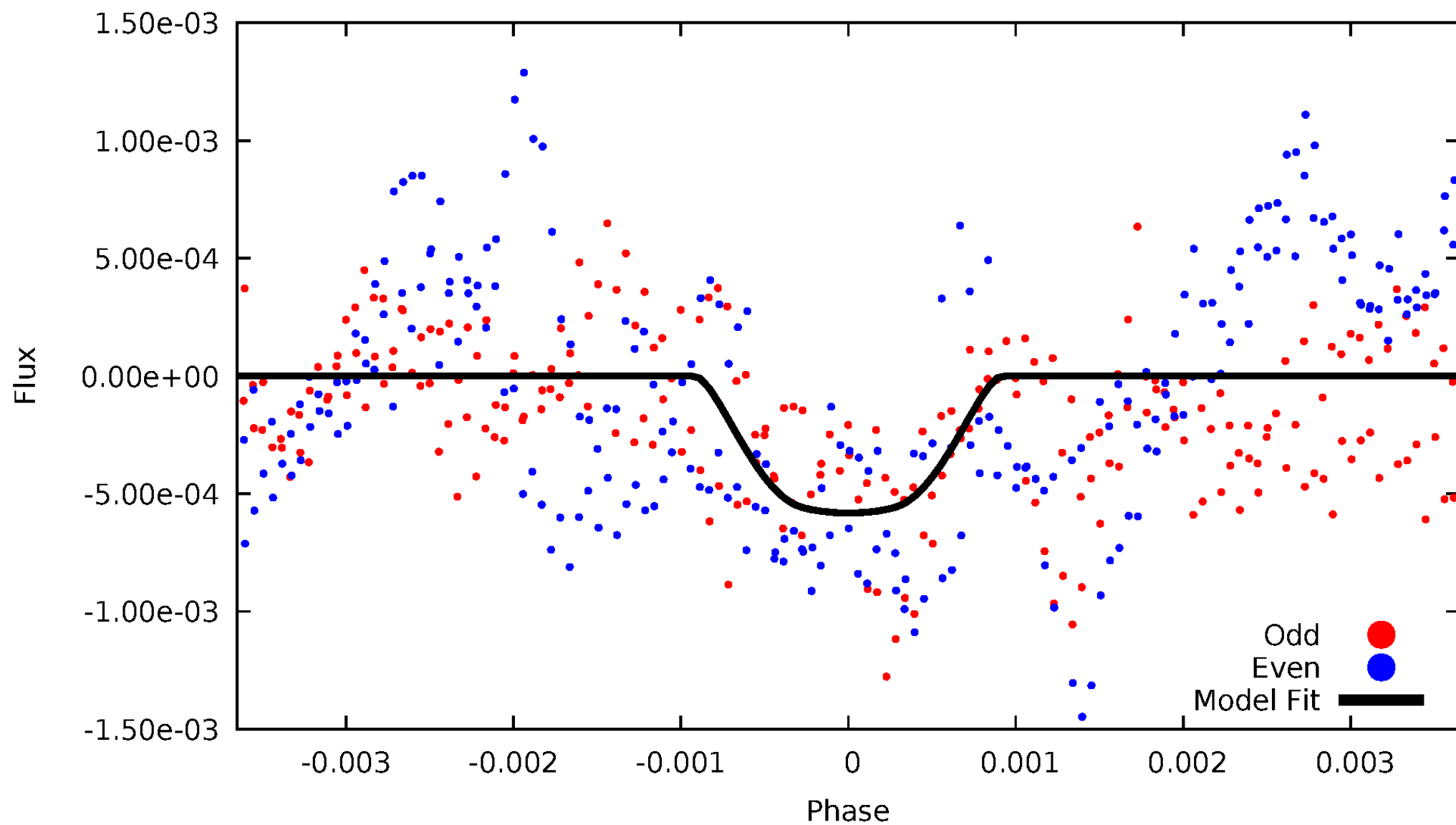


# TCE 008315220-03



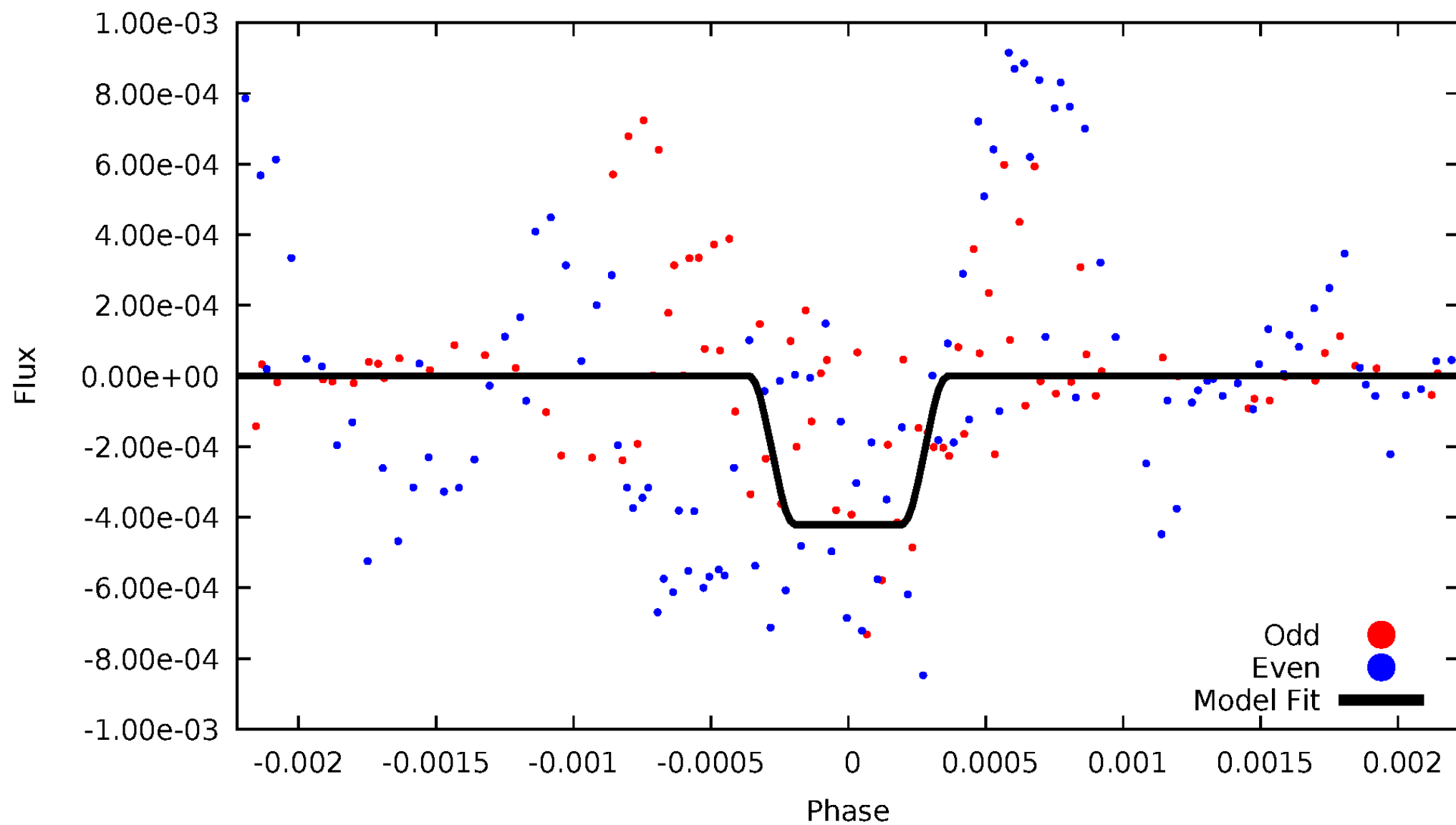
# DV Odd/Even

TCE 008315220-03



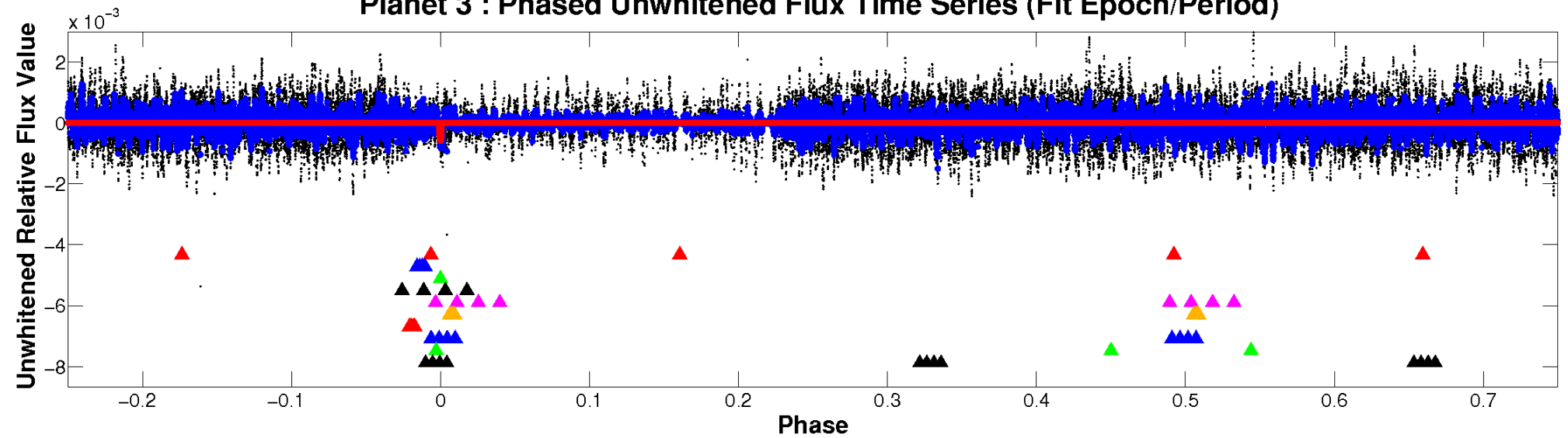
# ALT Odd/Even

TCE 008315220-03

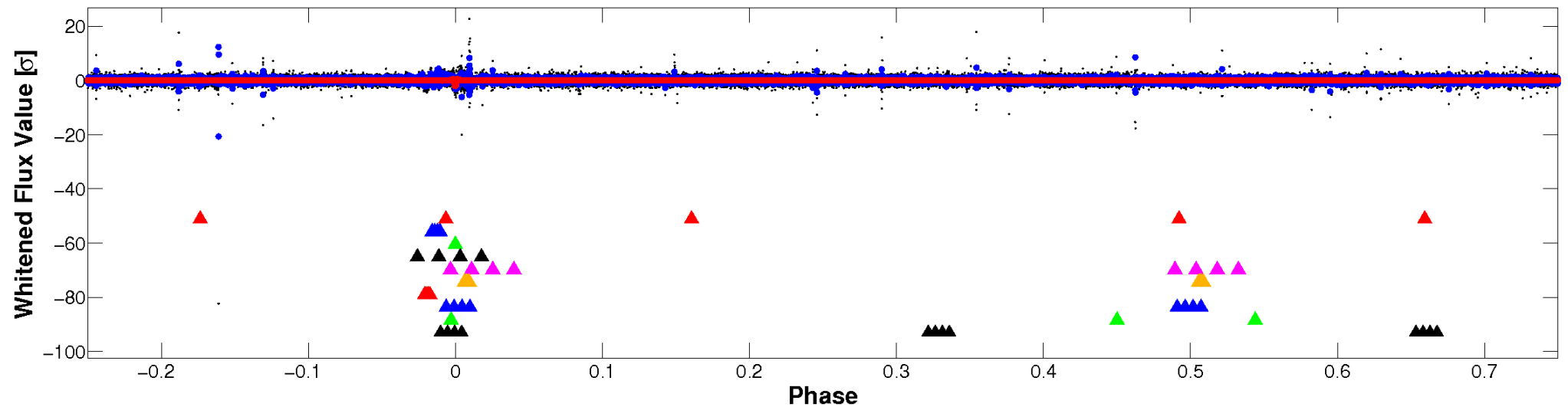


# Non-Whitened Vs. Whitened Light Curve

## Planet 3 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

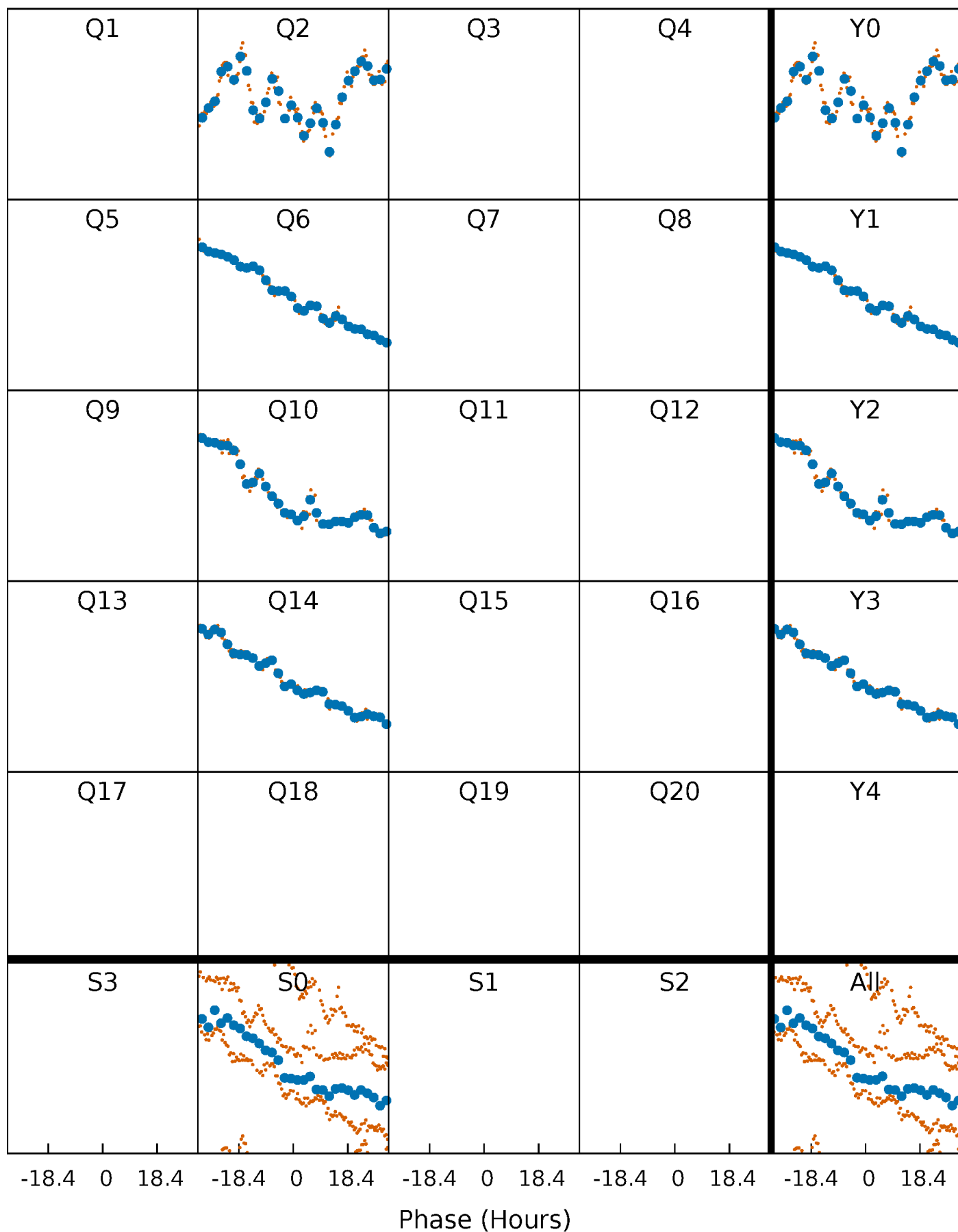


## Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



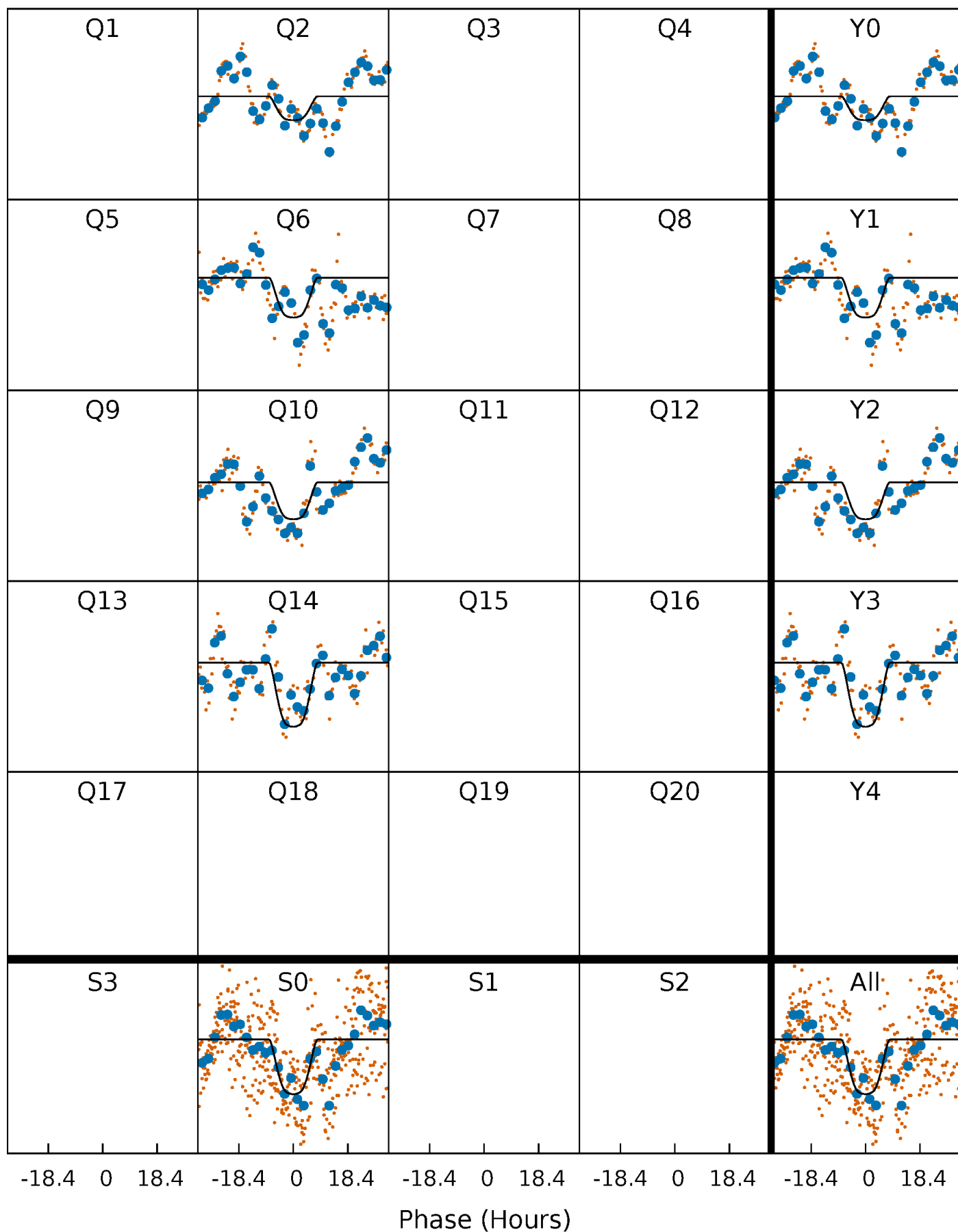
# PDC Quarter-Phased Transit Curves

TCE 008315220-03 P=367.826147 Days  $T_0=178.916856$  (BKJD)



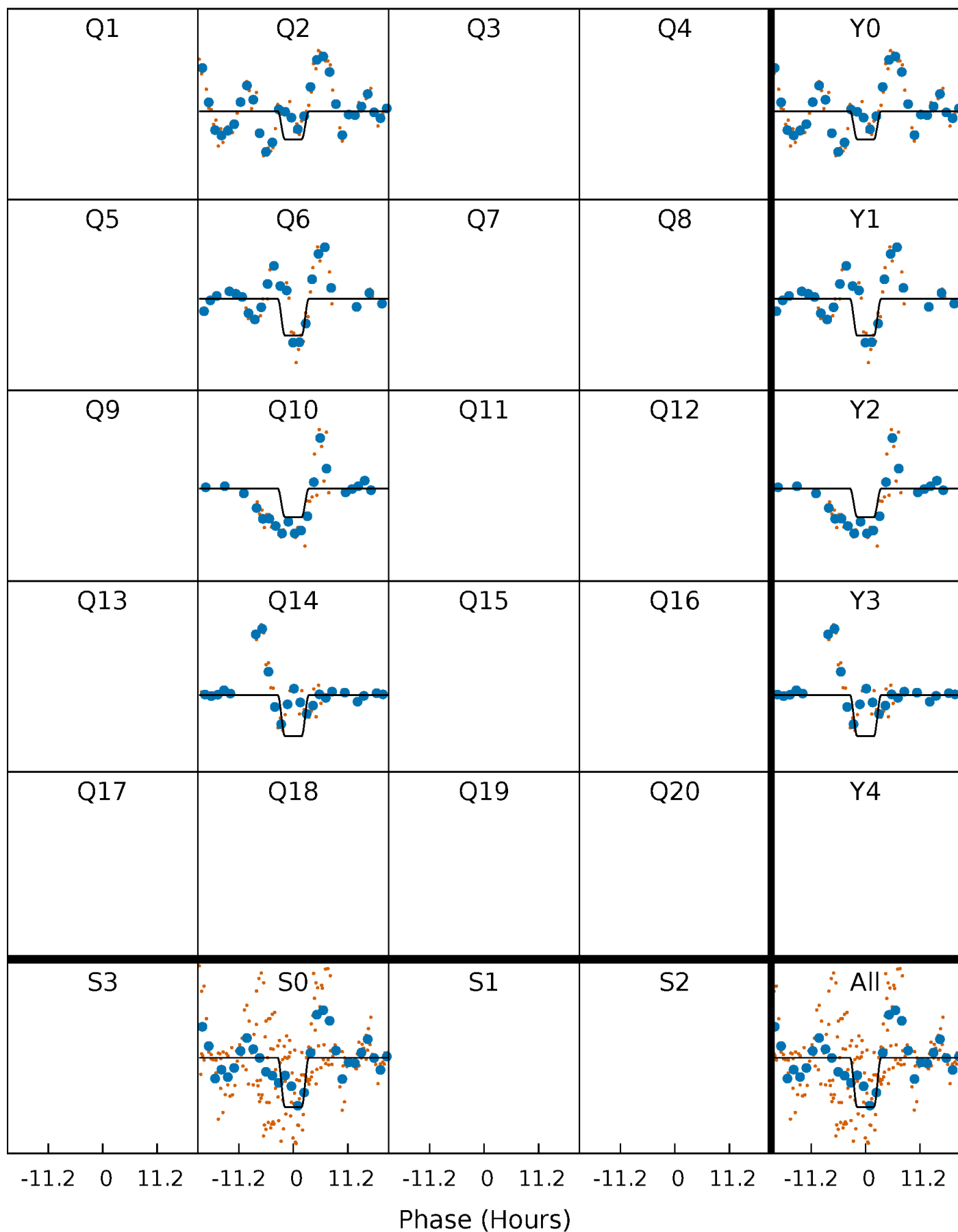
# DV Quarter-Phased Transit Curves

TCE 008315220-03 P=367.826147 Days  $T_0=178.916856$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

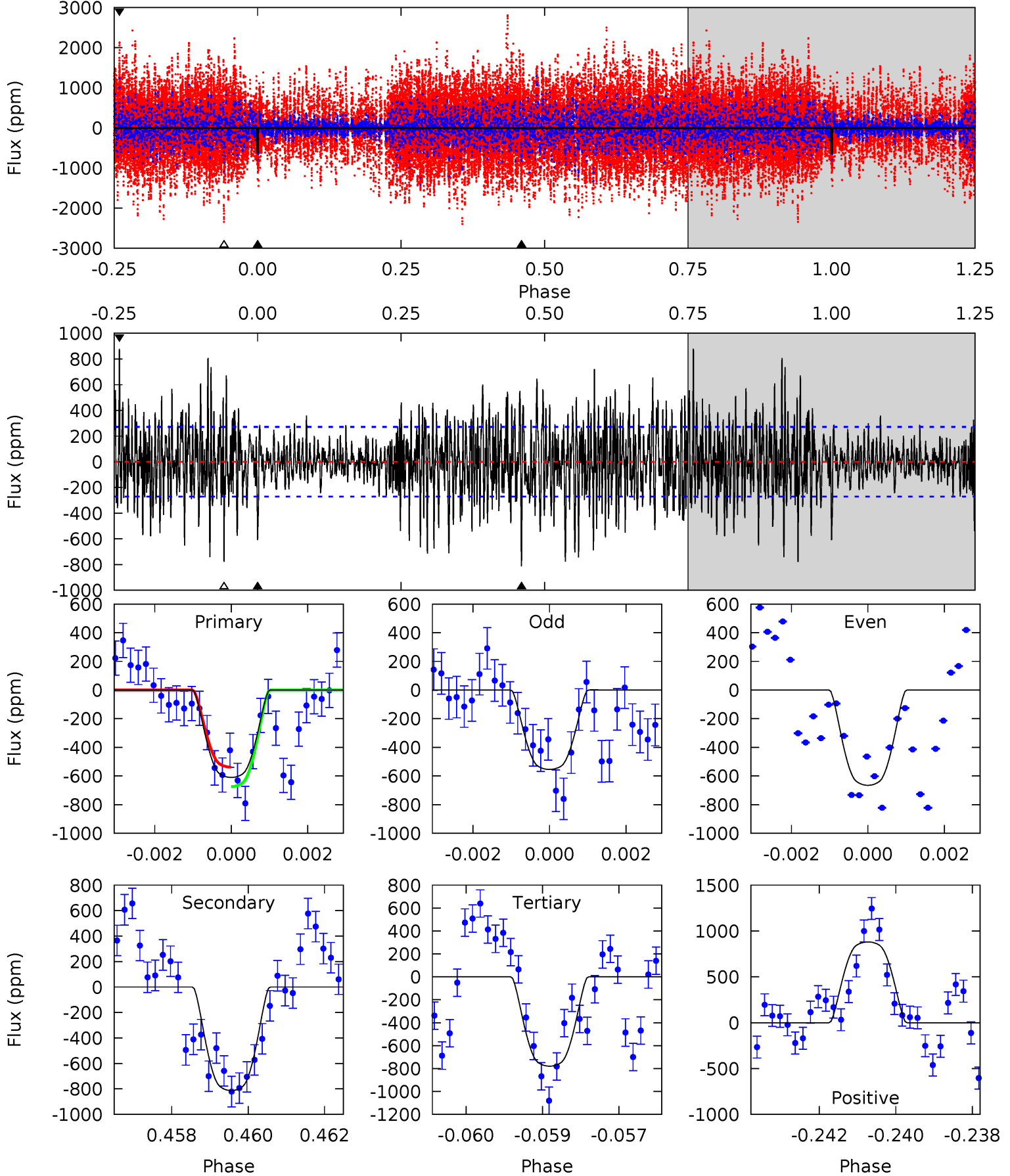
TCE 008315220-03 P=367.790458 Days  $T_0=179.011444$  (BKJD)



# DV Model-Shift Uniqueness Test

008315220-03, P = 367.826147 Days, E = 178.916856 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
12.0	16.0	15.4	17.4	5.34	3.12	4.37	-3.33	-5.33	0.67	-1.32	1.08	0.94	0.52	1.38

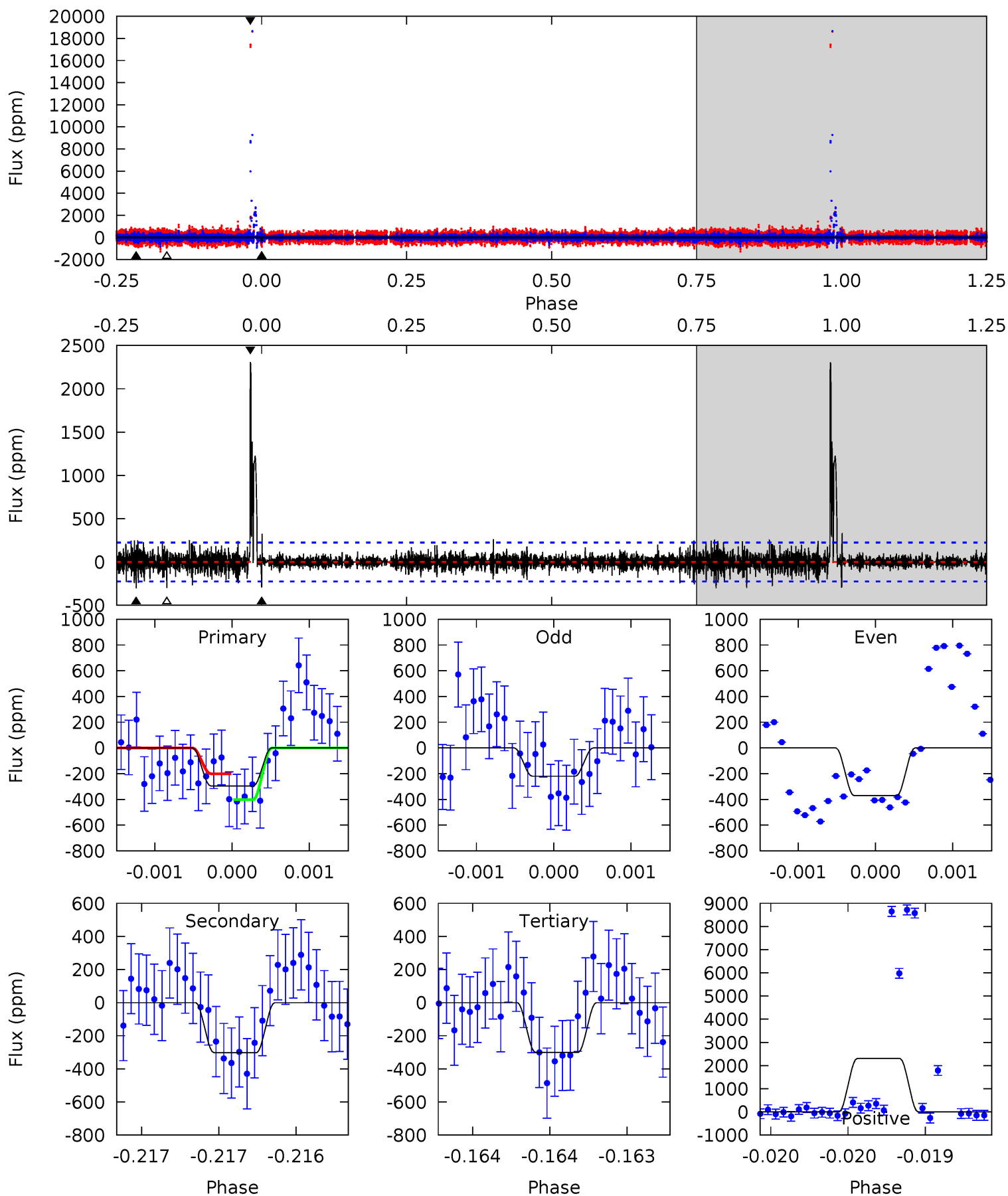




# Alt Model-Shift Uniqueness Test

008315220-03, P = 367.790458 Days, E = 179.011444 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
7.24	7.41	7.37	56.5	5.51	3.39	2.10	-0.13	-49.3	0.04	-49.1	1.21	1.44	0.88	2.49



### Stellar Parameters For KIC 008315220

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5172^{+70}_{-248}$	$2.693^{+0.273}_{-0.126}$	$0.070^{+0.150}_{-0.600}$	$13.454^{+2.481}_{-7.442}$	$3.257^{+0.222}_{-1.999}$	$0.002^{+0.006}_{-0.001}$
	+1%/-5%	+10%/-5%	+214%/-857%	+18%/-55%	+7%/-61%	+302%/-38%
Source	PHO1	FLK73	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 008315220-03 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-813 \pm 51$	$42.84^{+7.23}_{-9.83}$	$945^{+58}_{-87}$	$5018^{+312}_{-262}$	$535^{+290}_{-144}$
Alt.	$-302 \pm 41$	$28.93^{+6.92}_{-7.36}$	$949^{+57}_{-94}$	$4796^{+347}_{-341}$	$430^{+286}_{-146}$

$T_{\text{max}}$  = Theoretical Maximum Planetary Temperature

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

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

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

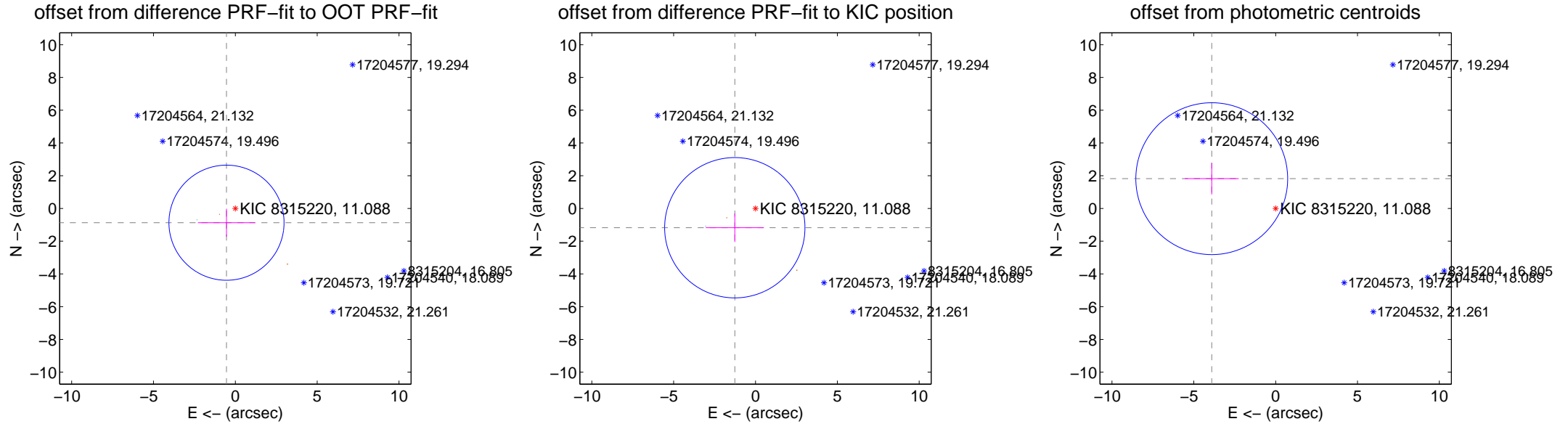
## DV Centroid Data

Supplemental centroid analysis for 008315220-03. **Kepler magnitude: 11.09.** Transit SNR 18.24

**There are 1 quarters with good PRF difference image offsets**

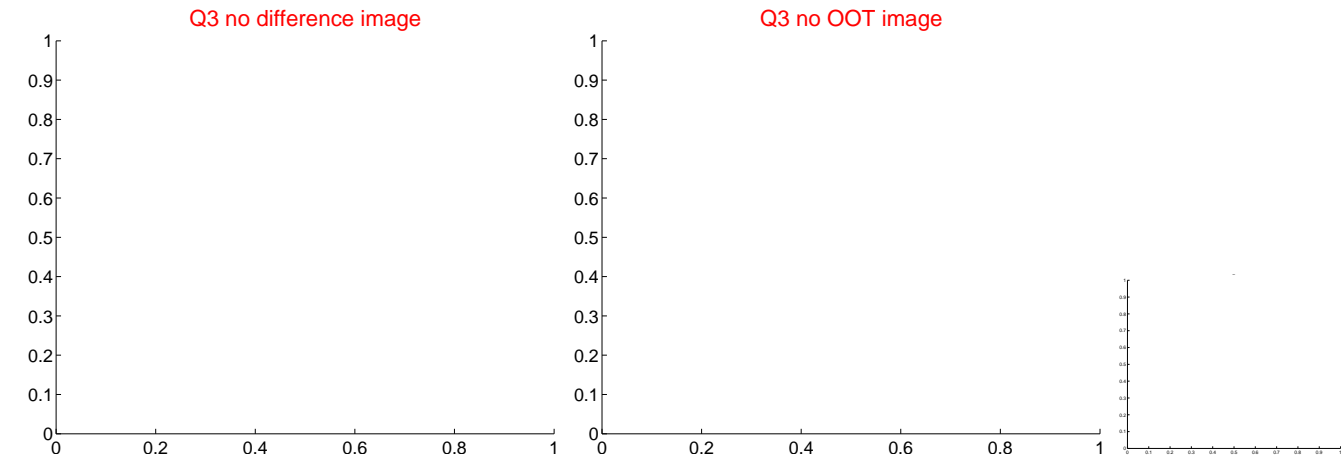
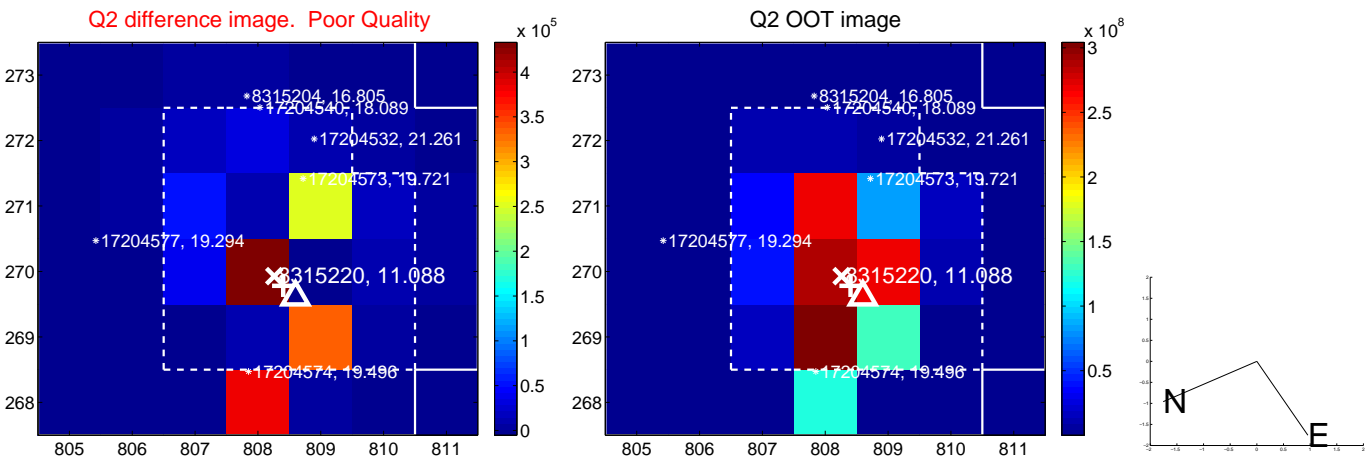
The direct PRF centroid is offset from the target star catalog position by about 0.80 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.024 \pm 1.172$	0.87	$0.540 \pm 1.749$	$-0.871 \pm 0.852$
PRF-fit source offset from KIC position	$1.727 \pm 1.429$	1.21	$1.264 \pm 1.776$	$-1.178 \pm 0.871$
photometric centroid source offset	$4.31 \pm 1.55$	2.79	$3.90 \pm 1.65$	$1.82 \pm 0.96$

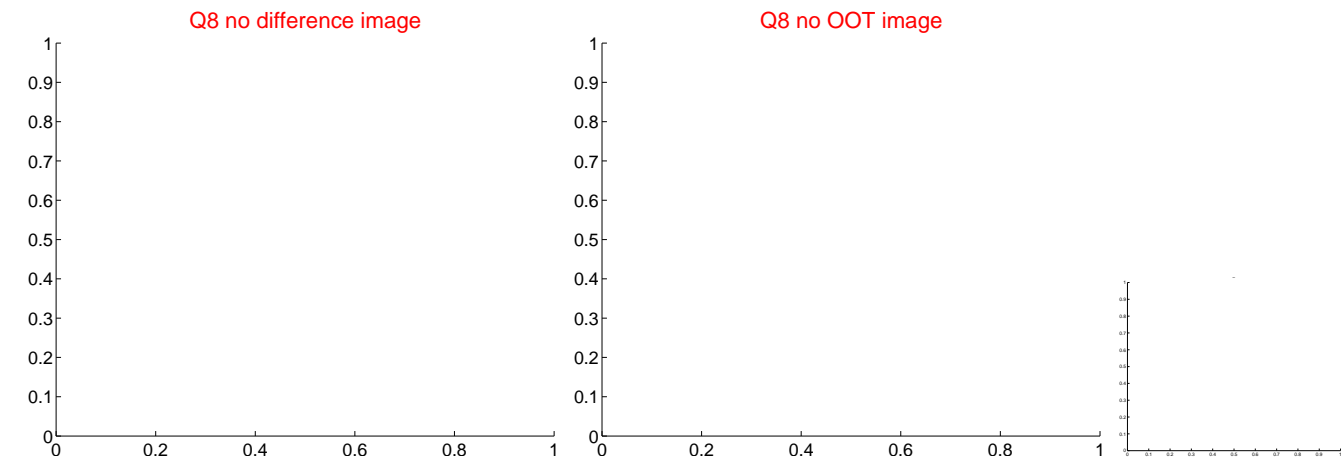
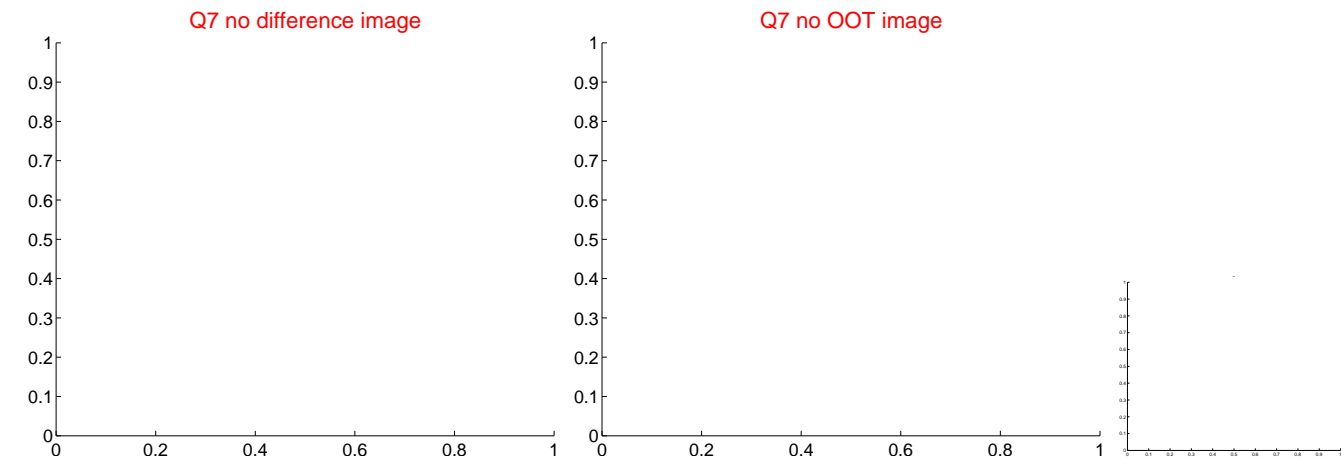
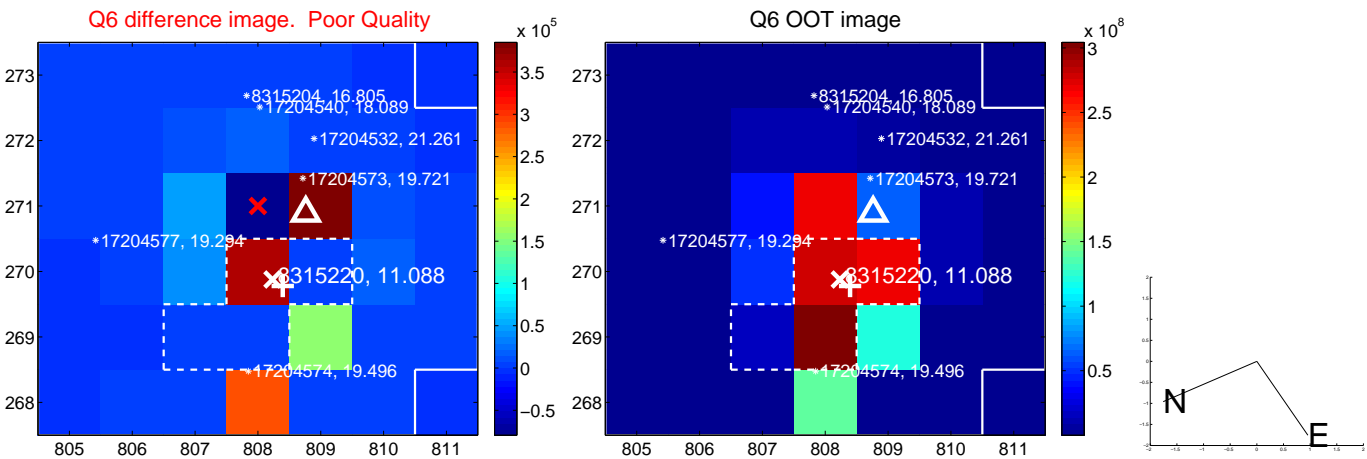


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: 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.

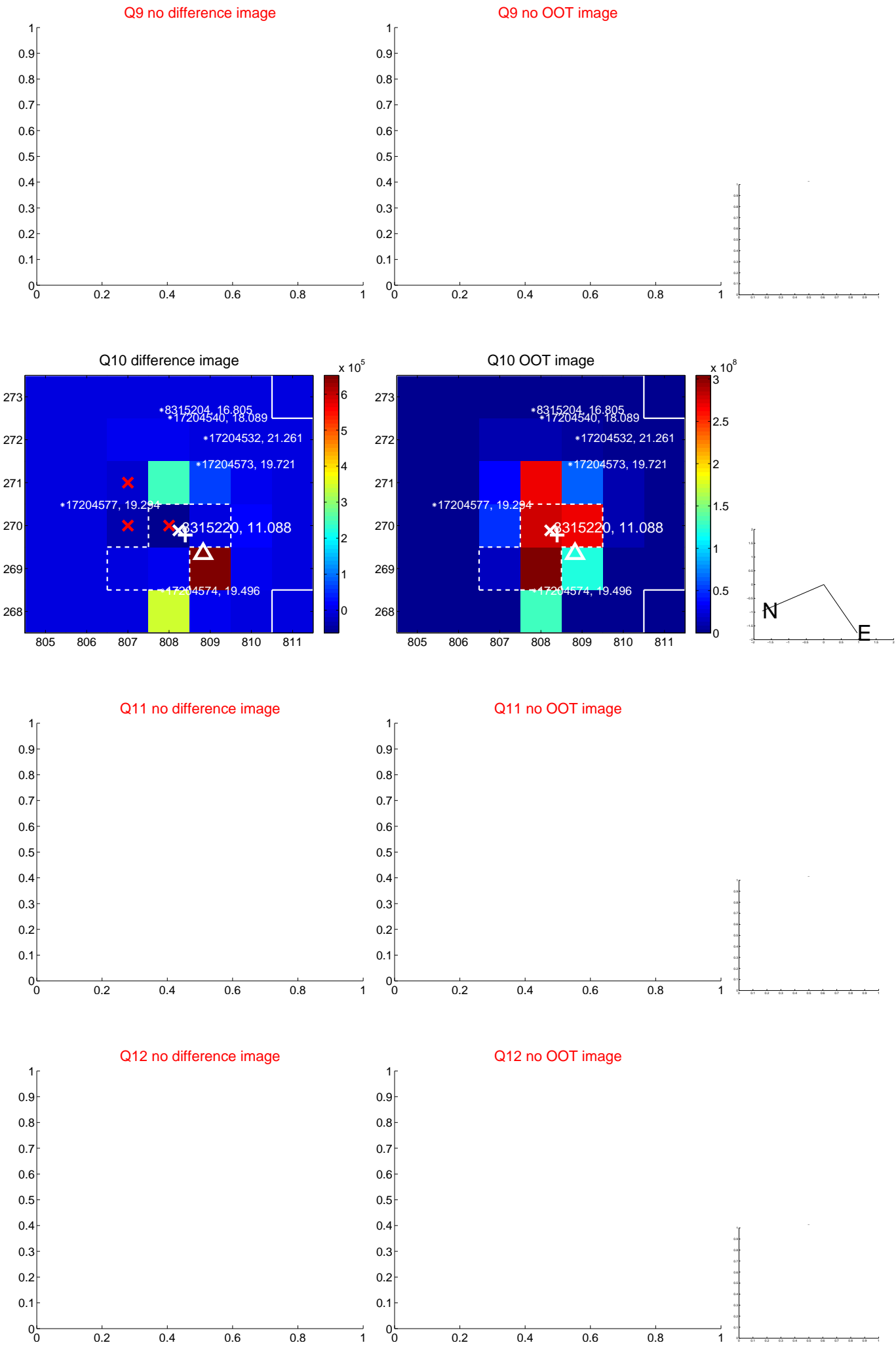
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



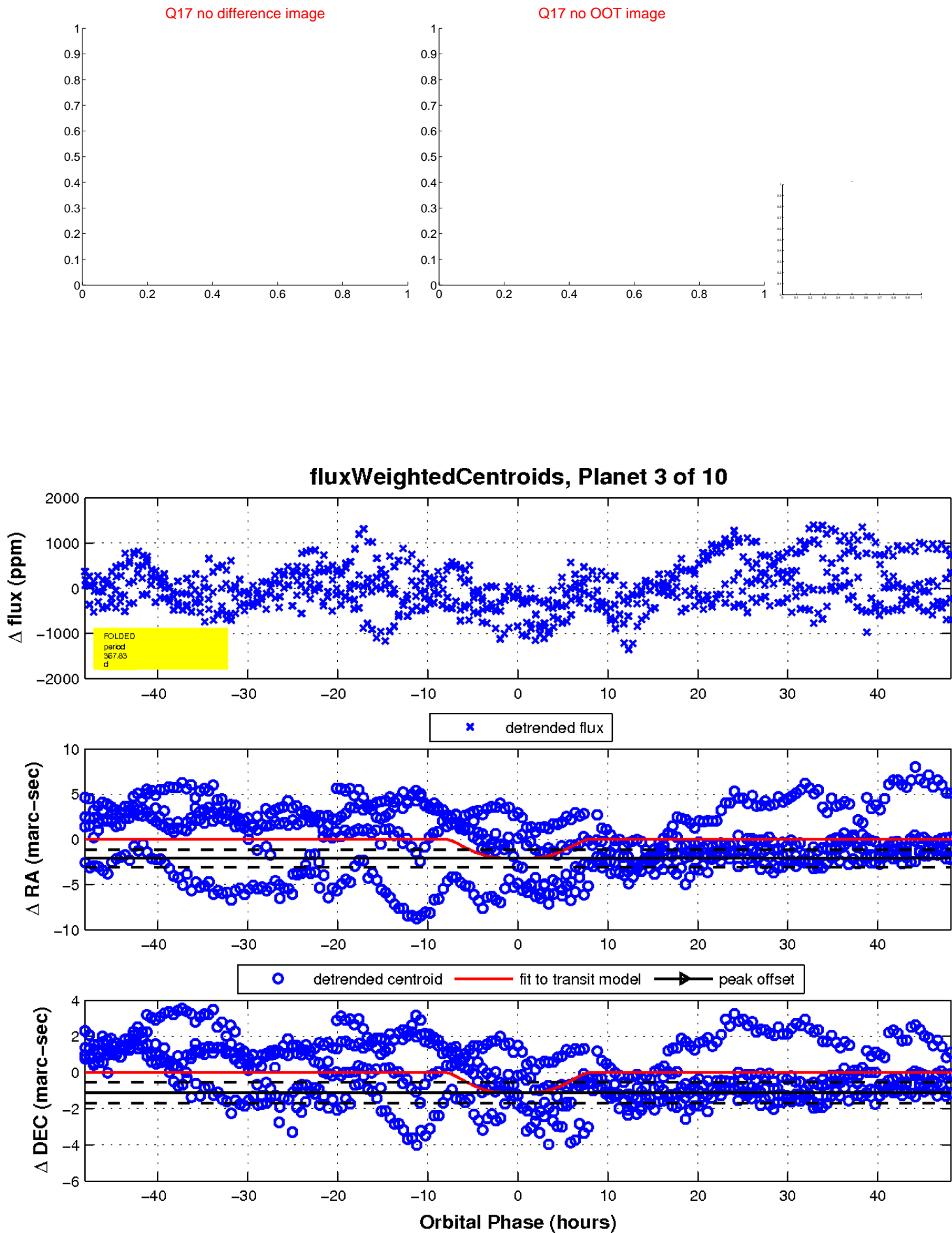
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

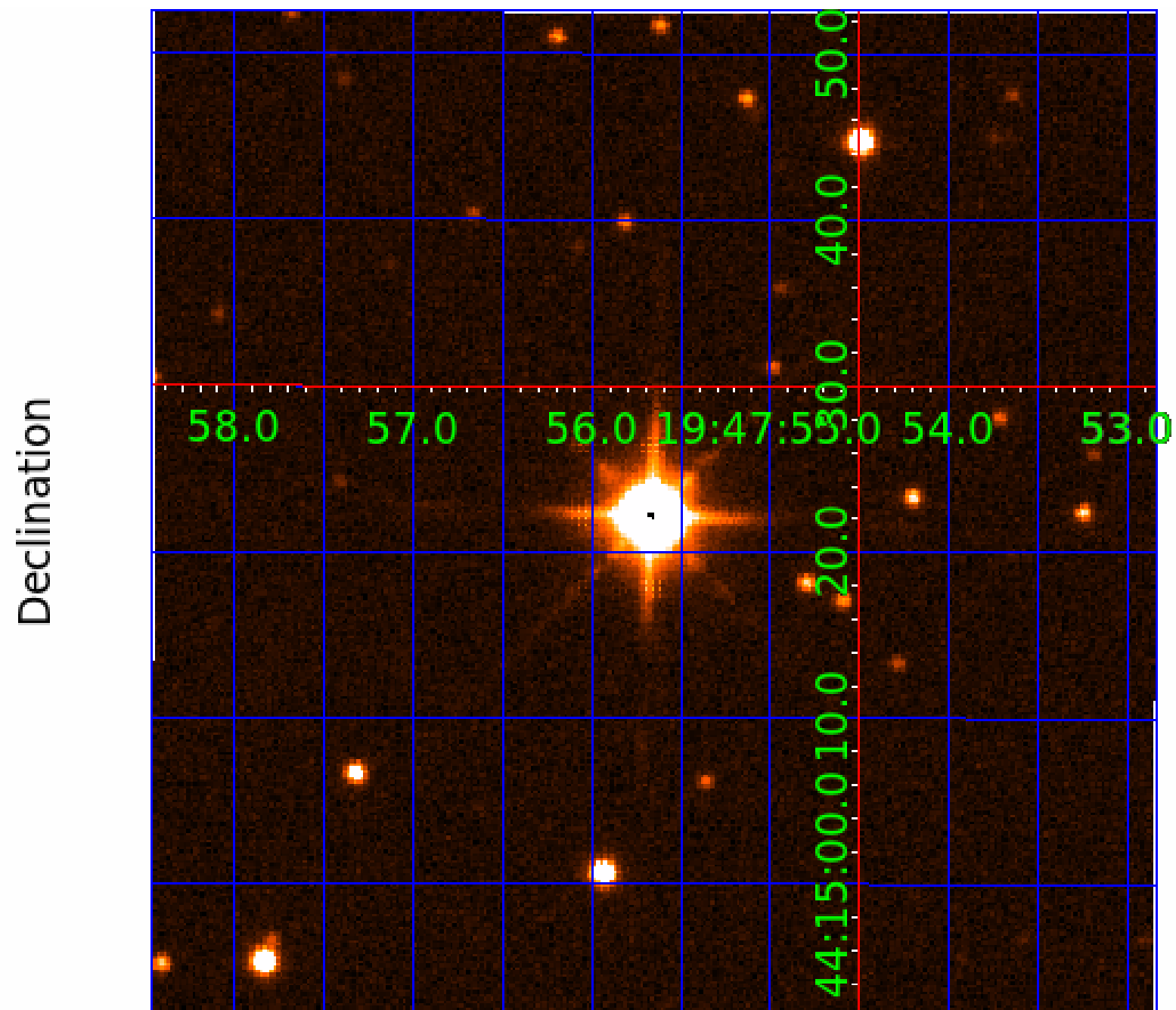


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image



## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008315220-01	OBS	No	306.366968	238.002854	978.6	14.592	25.2	18.2	13.45	5172	72.09	66.75
008315220-02	OBS	No	367.177451	175.068533	144.9	15.000	31.5	-1.0	13.45	5172	15.78	52.43
008315220-03	OBS	No	367.826147	178.916856	582.1	16.110	18.5	18.2	13.45	5172	43.69	52.31
008315220-04	OBS	No	362.484543	185.462403	90.9	15.000	21.3	-1.0	13.45	5172	12.50	53.34
008315220-05	OBS	No	181.269349	193.563129	108.1	6.180	14.6	5.3	13.45	5172	16.33	134.38
008315220-06	OBS	No	183.715252	182.372967	347.0	16.910	17.2	18.0	13.45	5172	28.23	132.00
008315220-07	OBS	No	367.388598	172.555205	46.9	15.000	13.2	-1.0	13.45	5172	8.98	52.39
008315220-08	OBS	No	182.919583	182.566043	325.9	10.920	15.3	8.9	13.45	5172	25.79	132.76
008315220-09	OBS	No	534.460195	379.043140	118.9	7.500	16.0	-1.0	13.45	5172	14.30	31.78
008315220-10	OBS	No	122.022409	180.490237	52.5	15.000	11.2	-1.0	13.45	5172	9.50	227.78

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008315220-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_SATURATED
008315220-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—NO_FITS—INCONSISTENT_TRANS—CENT_SATURATED
008315220-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_TER_DV—MOD_POS_DV—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
008315220-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
008315220-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_ZUMA—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—SAME_NTL_PERIOD—CENT_SATURATED
008315220-06	OBS	FP	0.00	1	0	1	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_SATURATED—HALO_GHOST
008315220-07	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—SAME_NTL_PERIOD—CENT_SATURATED
008315220-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_SATURATED
008315220-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
008315220-10	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED

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

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

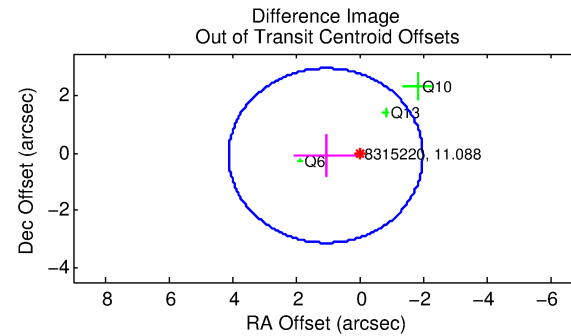
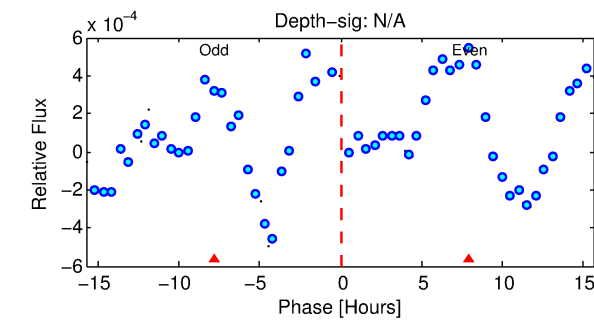
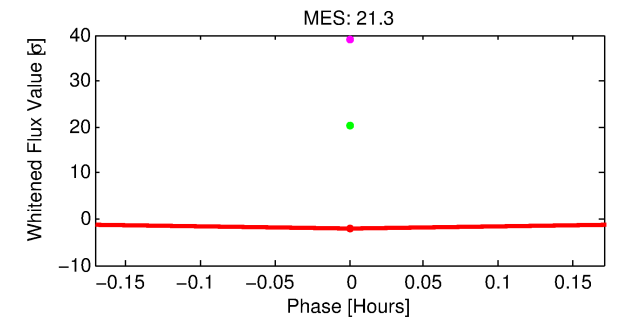
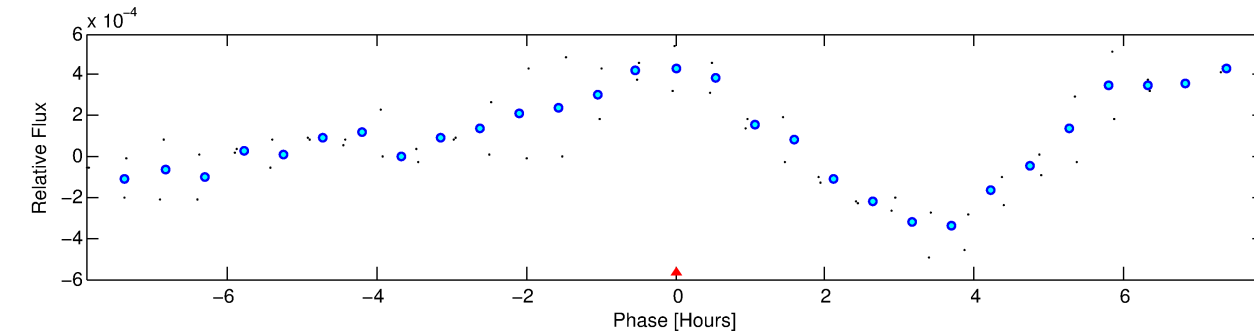
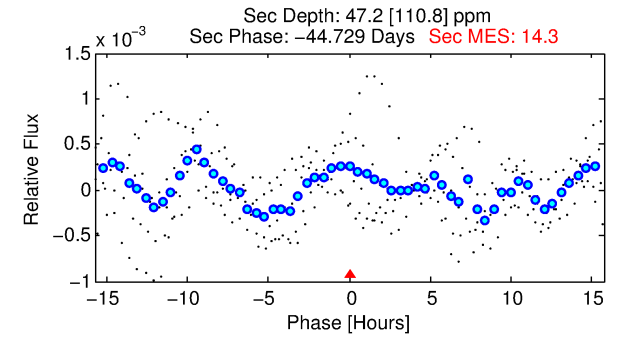
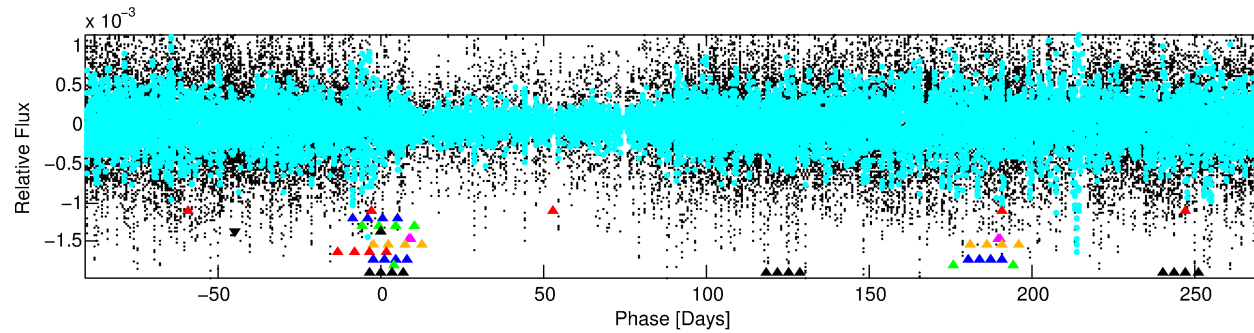
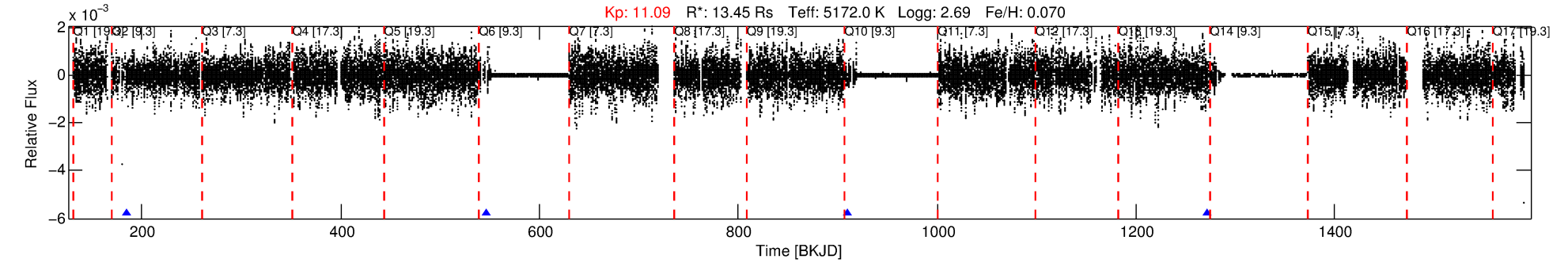
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 008315220-04

No Significant Match Found

# DV One-Page Summary

KIC: 8315220 Candidate: 4 of 10 Period: 362.485 d



## TPS TCE Results:

Period = 362.48454 d  
Epoch = 185.4624 BKJD

DV fit results are unavailable

## DV Diagnostic Results:

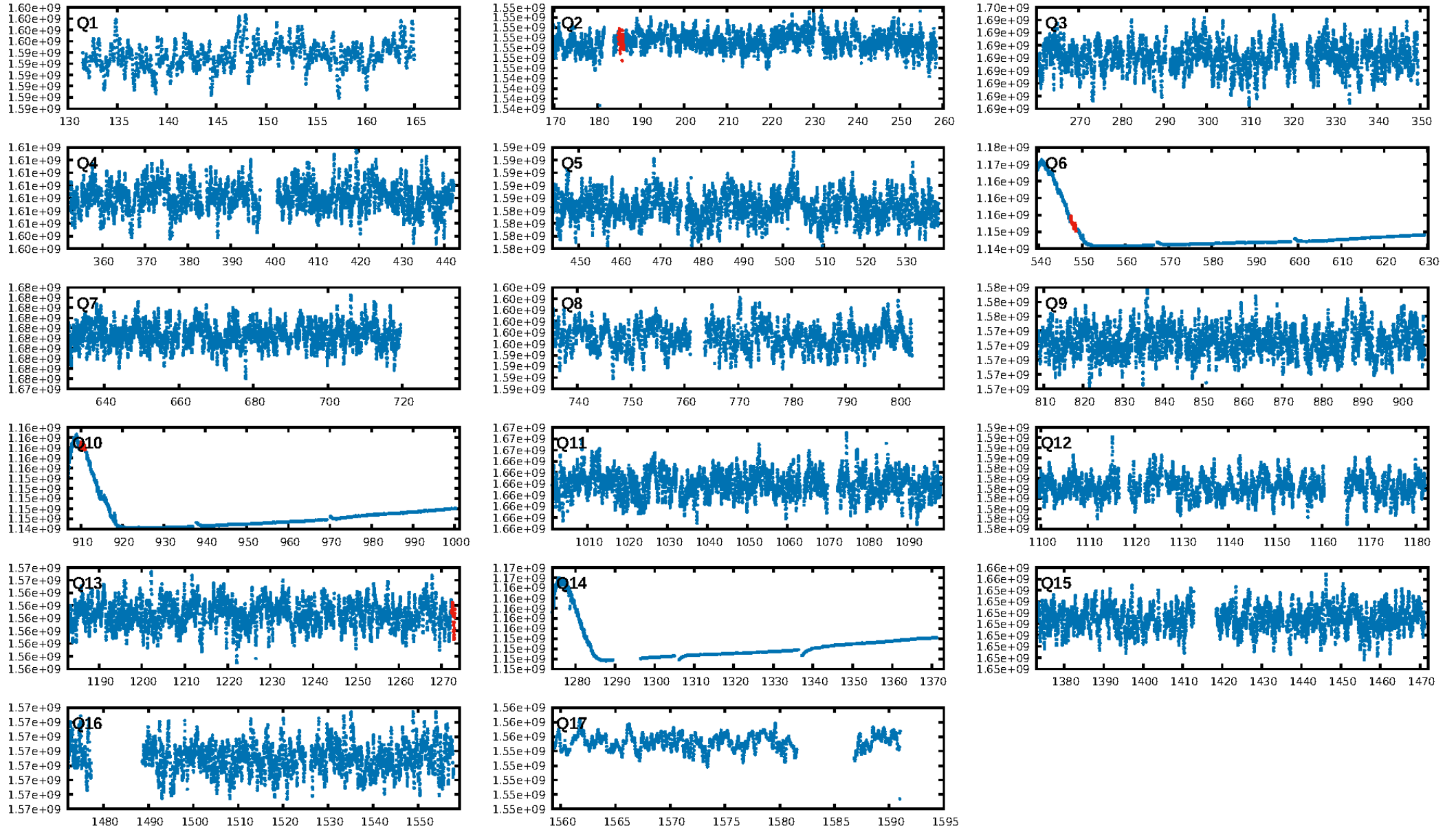
ShortPeriod-sig: 100.0% [64.36σ]  
LongPeriod-sig: 100.0% [5.31σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 2.57e-19  
RollingBand-fgt: 1.00 [2/2]  
GhostDiagnostic-chr: N/A

Centroid-sig: N/A  
Centroid-so: N/A  
OotOffset-rm: 1.056 arcsec [1.04σ]  
KicOffset-rm: 1.539 arcsec [1.20σ]  
OotOffset-st: 2/0/0/1 [3]  
KicOffset-st: 2/0/0/1 [3]  
DiffImageQuality-fgm: 0.00 [0/3]  
DiffImageOverlap-fno: 0.67 [2/3]

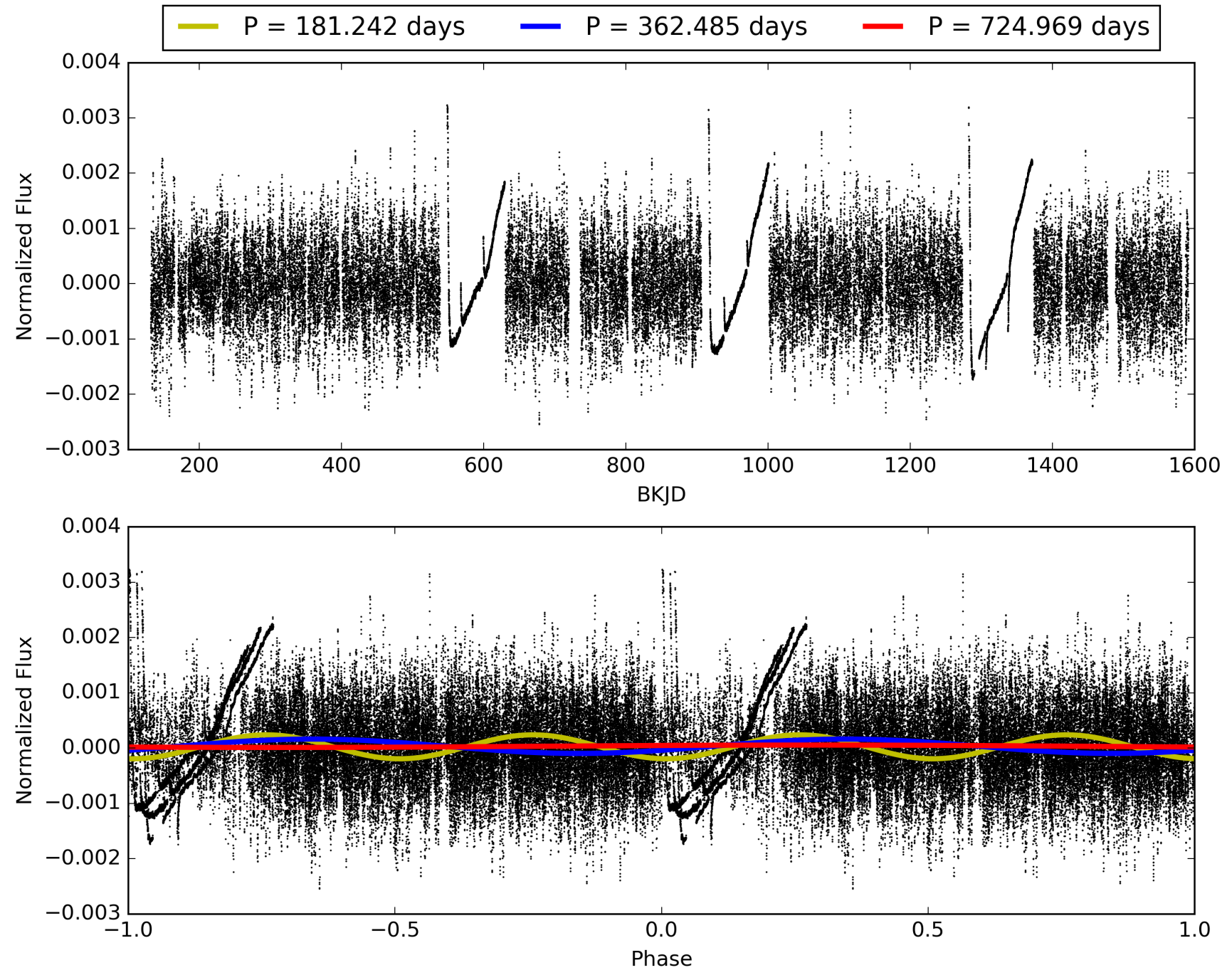
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 16:10:14 Z

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

# TCE 008315220-04, PDC Light Curves

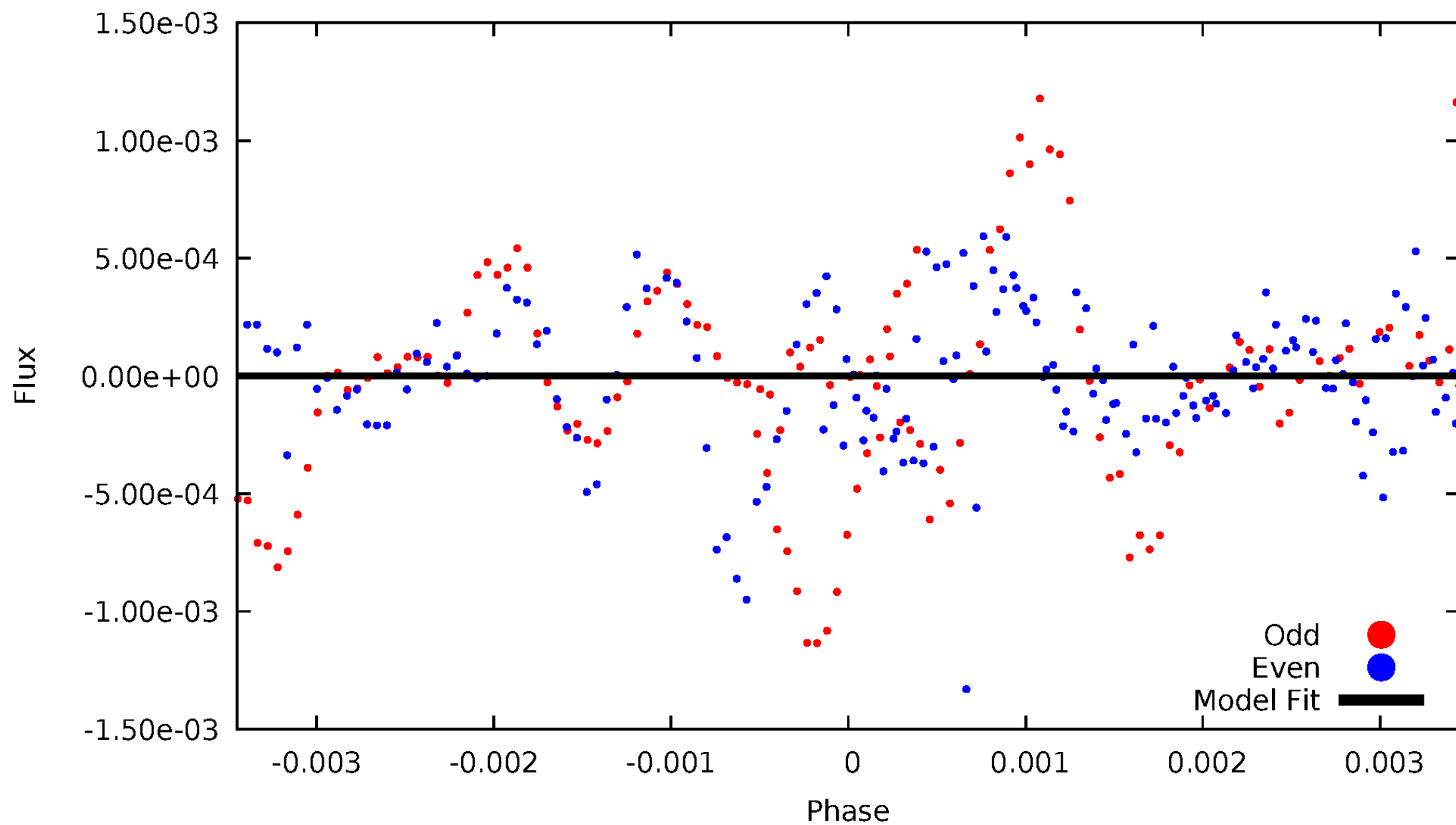


# TCE 008315220-04



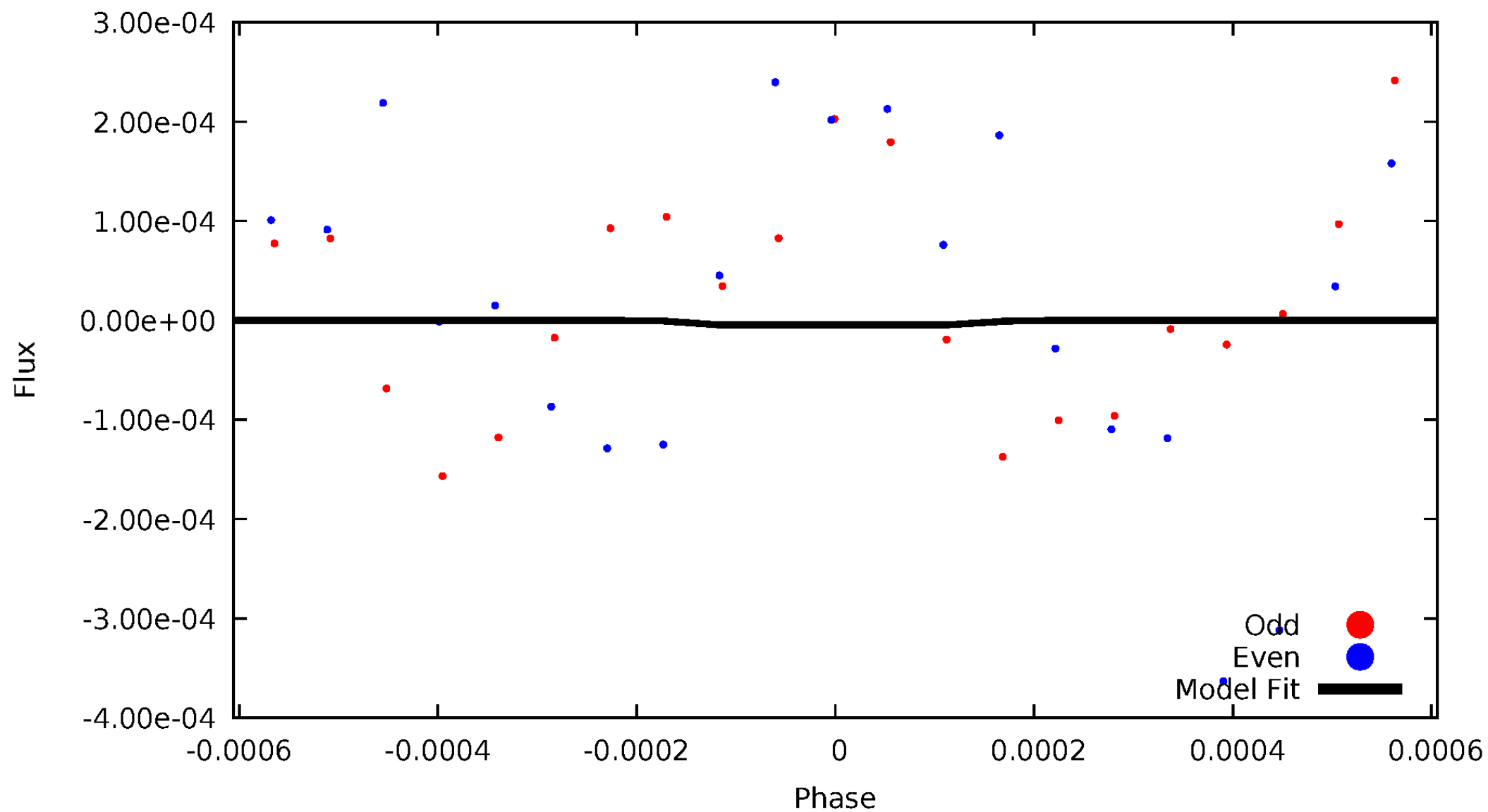
# DV Odd/Even

TCE 008315220-04



# ALT Odd/Even

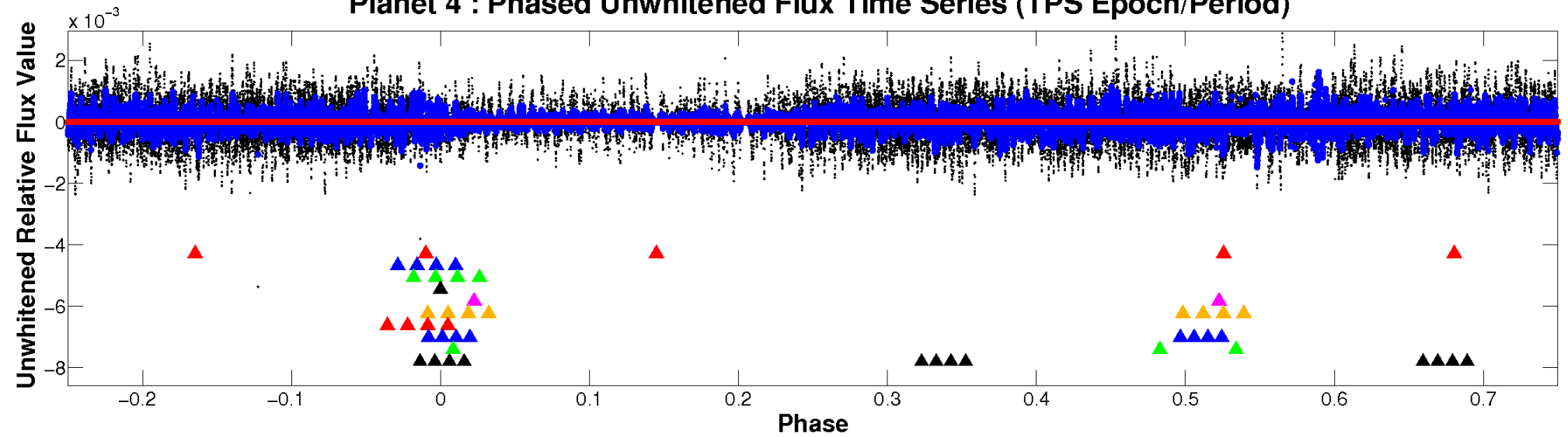
TCE 008315220-04





# Non-Whitened Vs. Whitened Light Curve

**Planet 4 : Phased Unwhitened Flux Time Series (TPS Epoch/Period)**



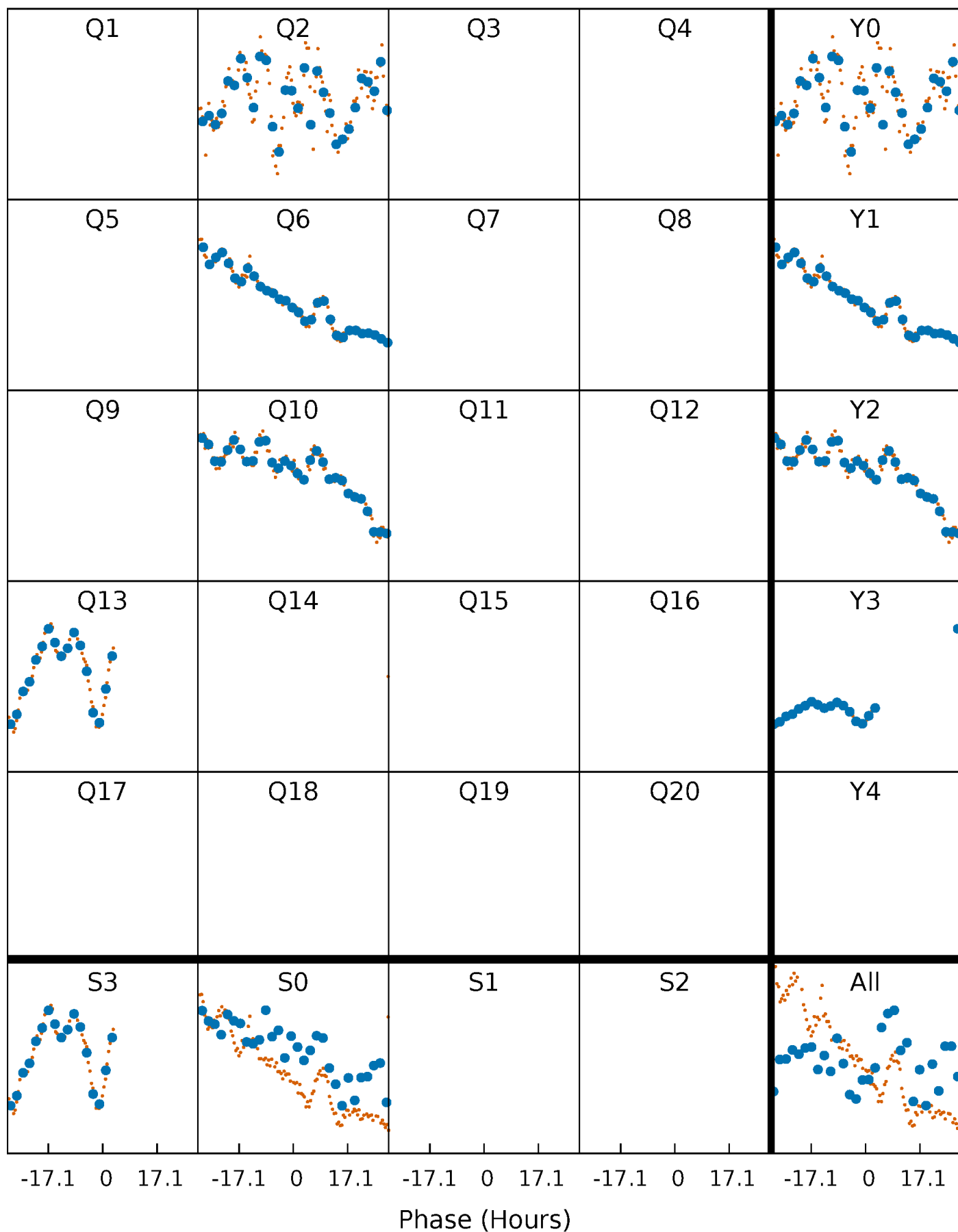
**Planet 4 : Phased Whitened Flux Time Series (TPS Epoch/Period)**





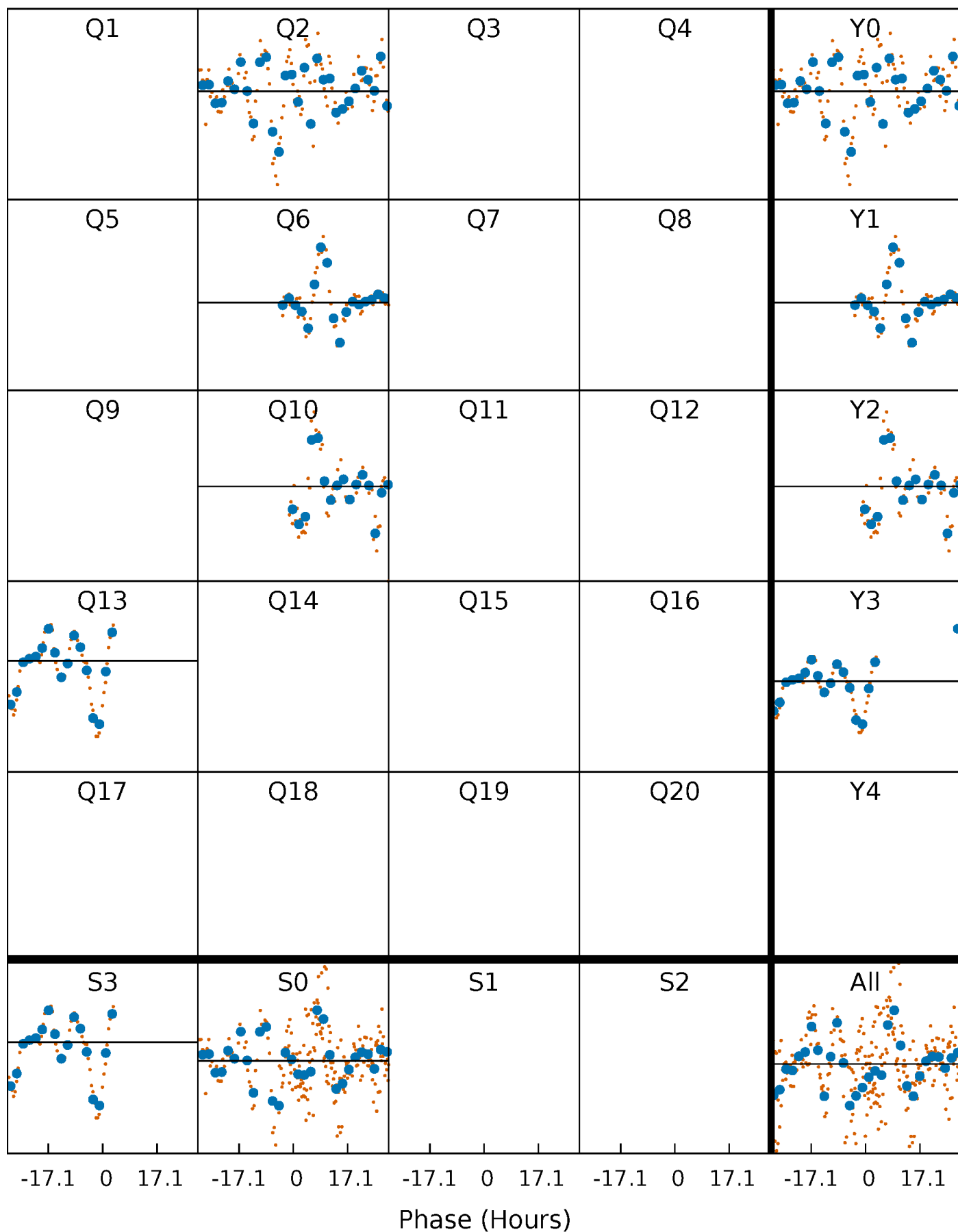
# PDC Quarter-Phased Transit Curves

TCE 008315220-04     $P=362.484543$  Days     $T_0=185.462403$  (BKJD)



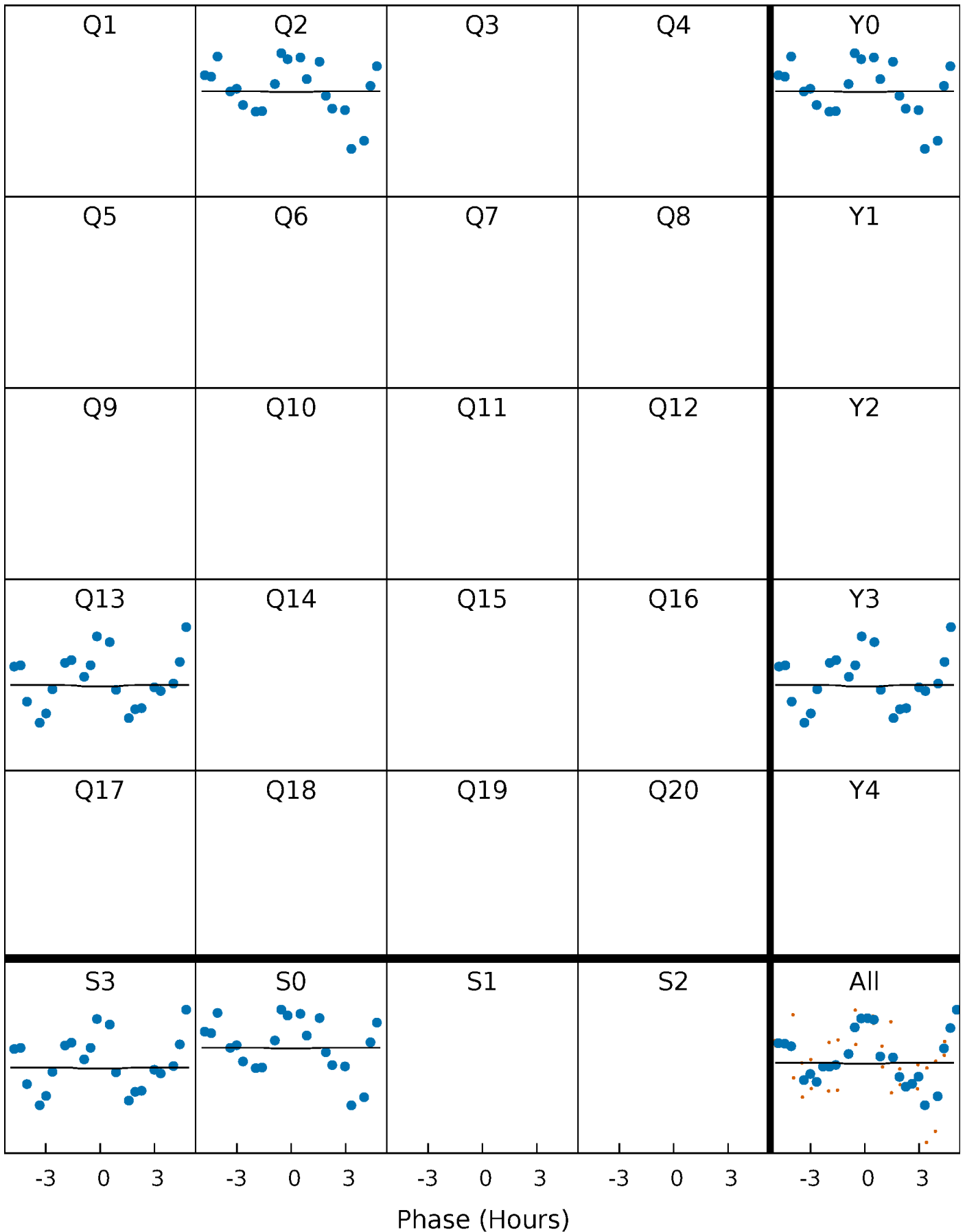
# DV Quarter-Phased Transit Curves

TCE 008315220-04 P=362.484543 Days  $T_0=185.462403$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

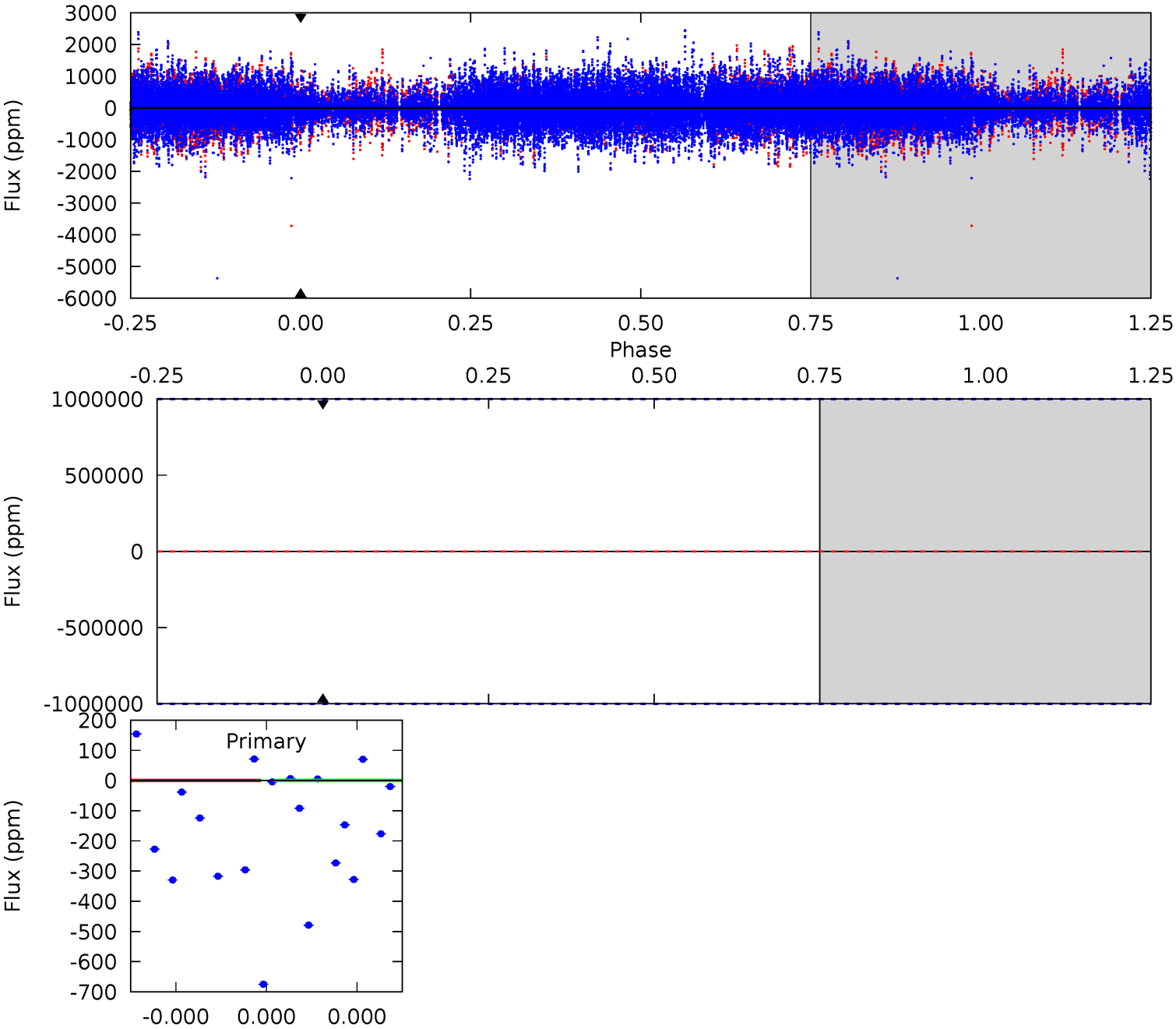
TCE 008315220-04 P=362.484543 Days  $T_0=184.785748$  (BKJD)



# DV Model-Shift Uniqueness Test

008315220-04, P = 362.484543 Days, E = 185.462403 Days

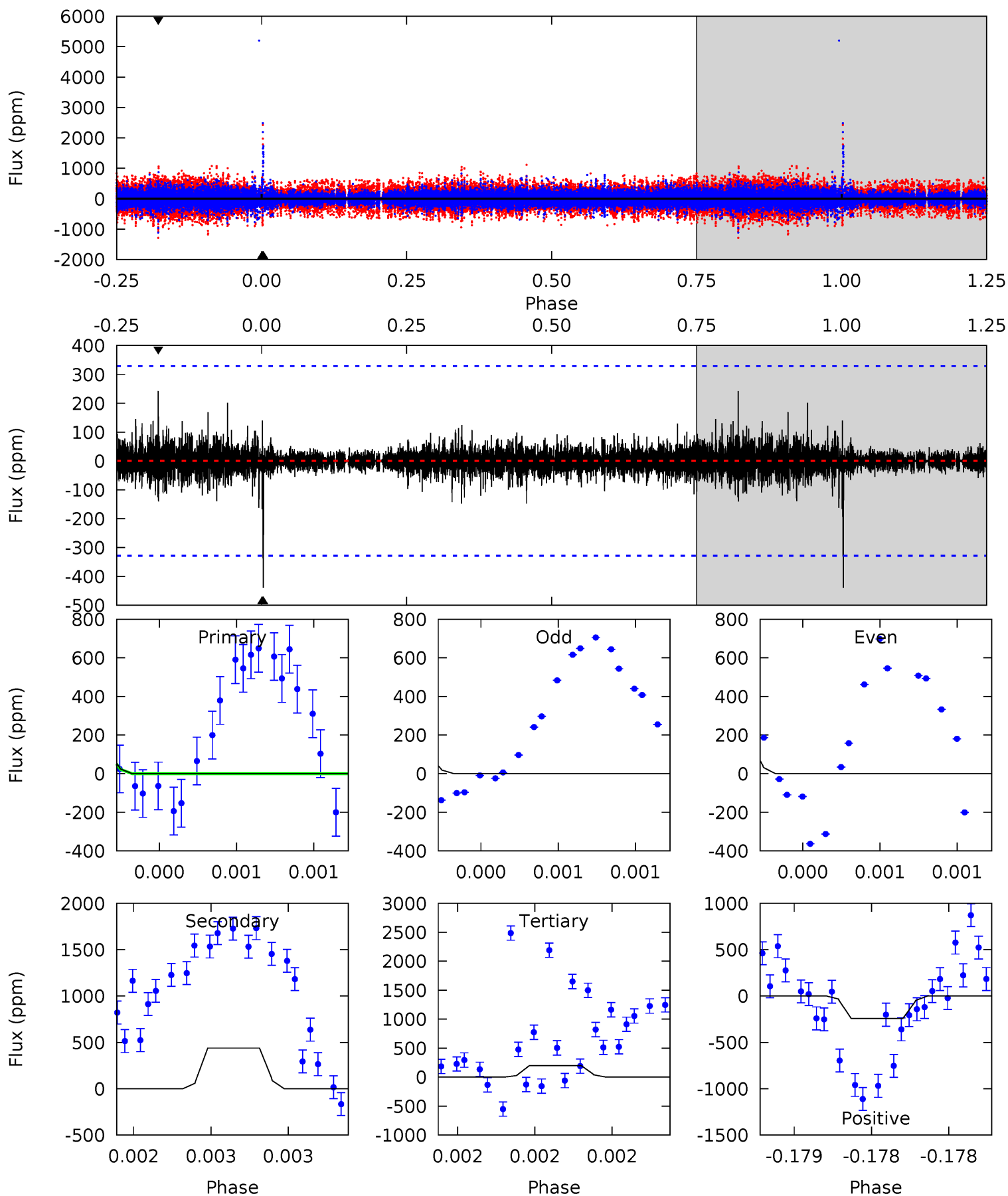
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



# Alt Model-Shift Uniqueness Test

008315220-04, P = 362.484543 Days, E = 184.785748 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
2.17	7.53	3.41	4.15	5.64	3.58	0.52	-1.25	-1.99	4.11	3.37	0.46	1.00	0.36	0.18



### Stellar Parameters For KIC 008315220

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5172^{+70}_{-248}$	$2.693^{+0.273}_{-0.126}$	$0.070^{+0.150}_{-0.600}$	$13.454^{+2.481}_{-7.442}$	$3.257^{+0.222}_{-1.999}$	$0.002^{+0.006}_{-0.001}$
	+1%/-5%	+10%/-5%	+214%/-857%	+18%/-55%	+7%/-61%	+302%/-38%
Source	PHO1	FLK73	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 008315220-04 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$0 \pm 1000000$	$97.57^{+111.18}_{-66.87}$	$946^{+61}_{-95}$	$-4078^{+21958}_{-11821}$	$-199.893^{+26685.717}_{-19872.180}$
Alt.	$-439 \pm 58$	$85.65^{+123.19}_{-57.13}$	$951^{+59}_{-91}$	$3413^{+1755}_{-713}$	$68^{+521}_{-56}$

$T_{\text{max}}$  = Theoretical Maximum Planetary Temperature  
 $T_{\text{obs}}$  = Observed Planetary Temperature (Assuming  $A=0.3$ )  
 $A_{\text{obs}}$  = Observed Albedo (Assuming  $T=0$ )

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

## DV Centroid Data

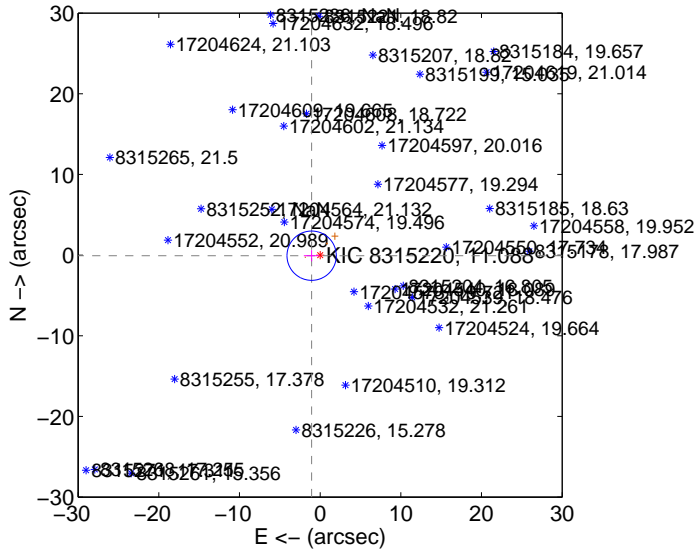
Supplemental centroid analysis for 008315220-04. **Kepler magnitude: 11.09.** Transit SNR -1.00

**There are 0 quarters with good PRF difference image offsets**

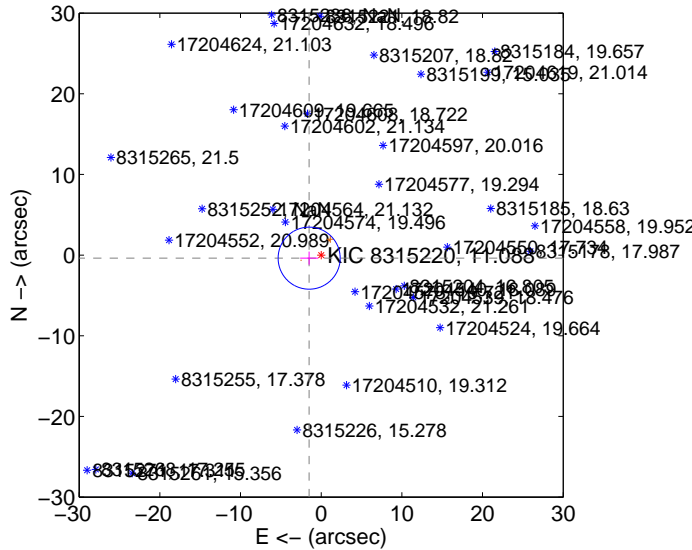
The direct PRF centroid is offset from the target star catalog position by about 0.40 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.056 \pm 1.019$	1.04	$1.054 \pm 0.973$	$-0.074 \pm 0.698$
PRF-fit source offset from KIC position	$1.539 \pm 1.282$	1.20	$1.491 \pm 1.118$	$-0.380 \pm 0.807$
photometric centroid source offset	—	—	—	—

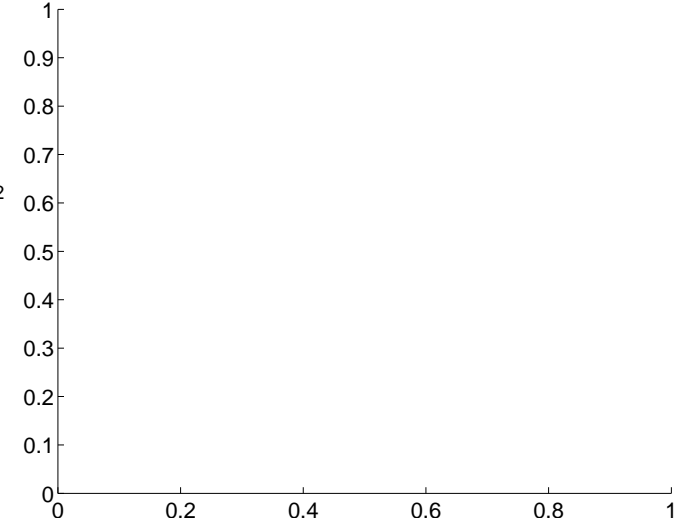
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



**There are no 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  $\times$ : 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.

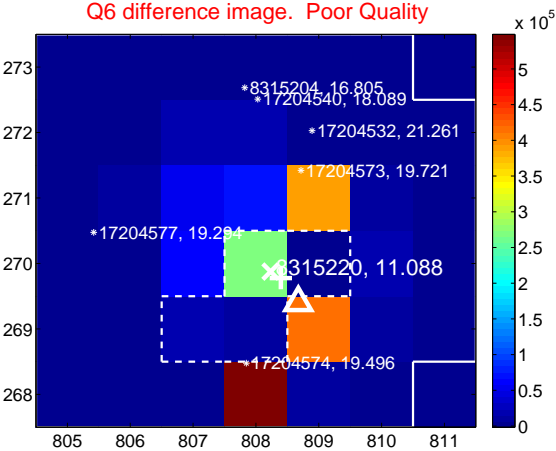
Q5 no difference image



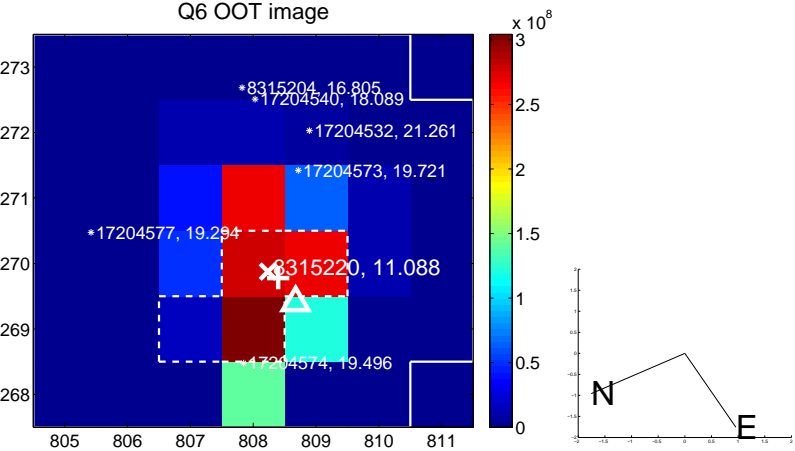
Q5 no OOT image



Q6 difference image. Poor Quality



Q6 OOT image



Q7 no difference image



Q7 no OOT image



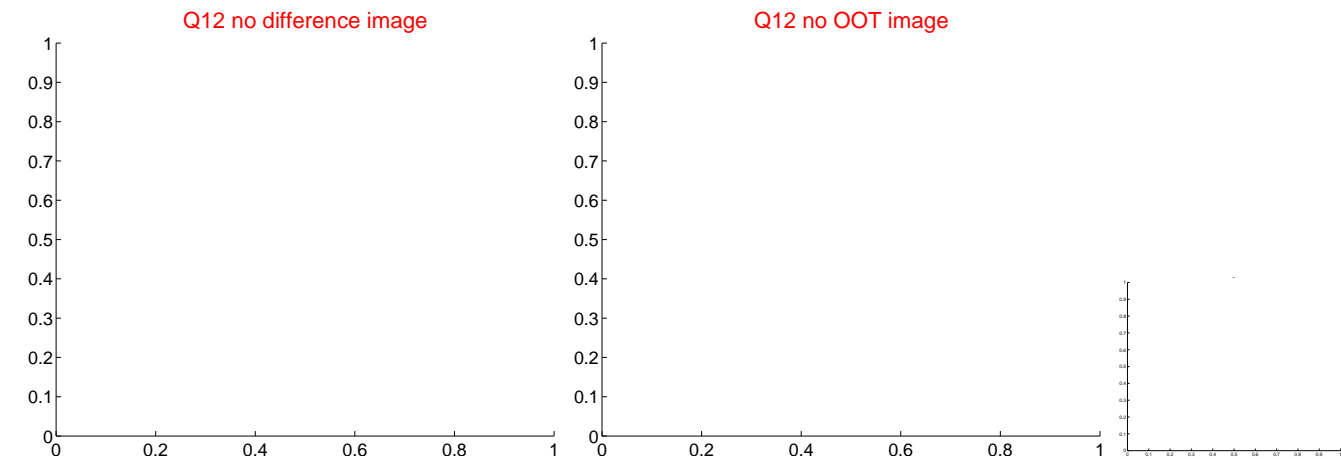
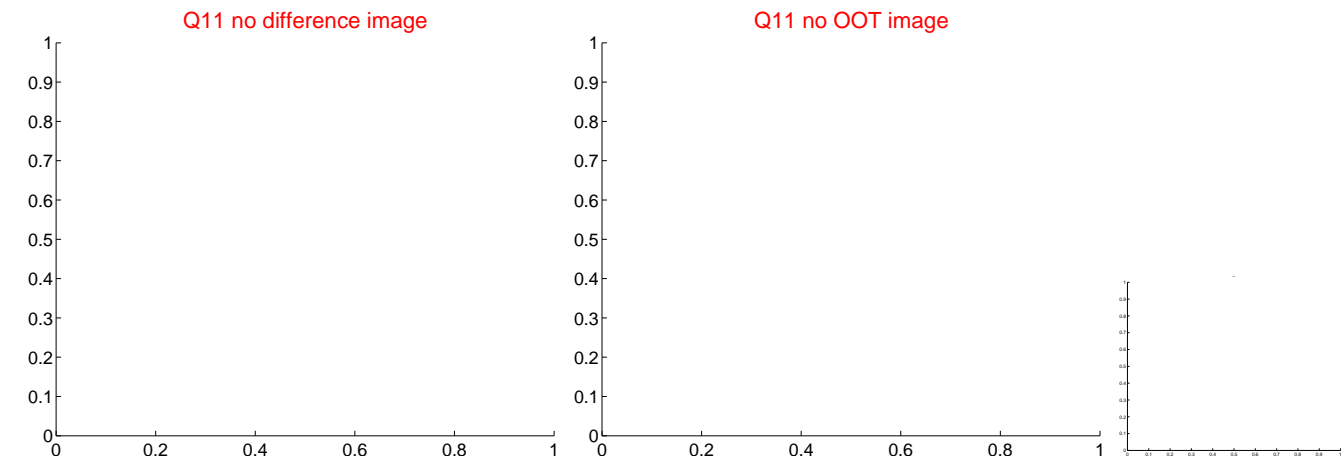
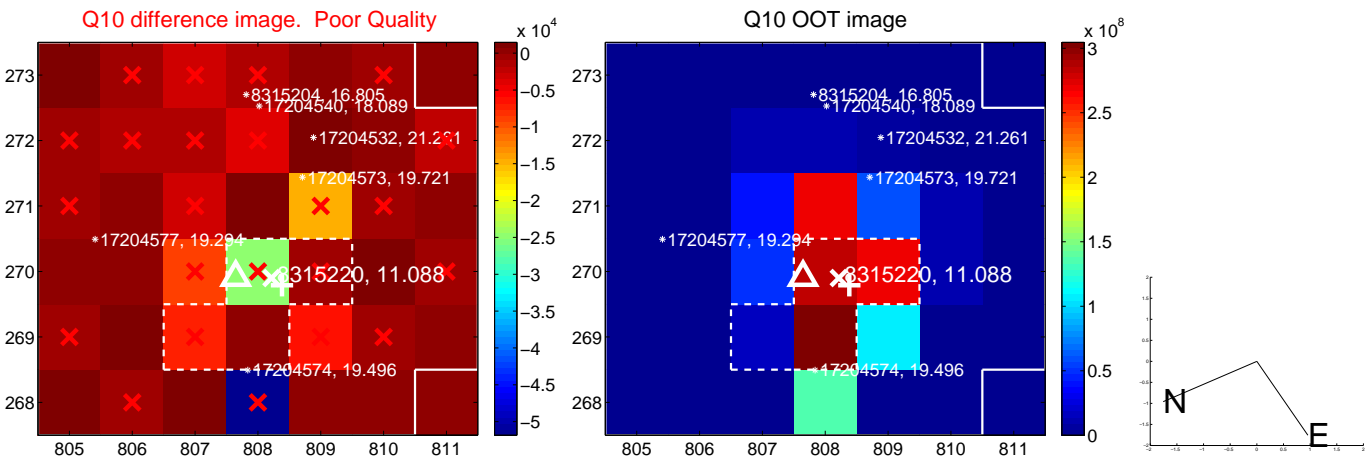
Q8 no difference image



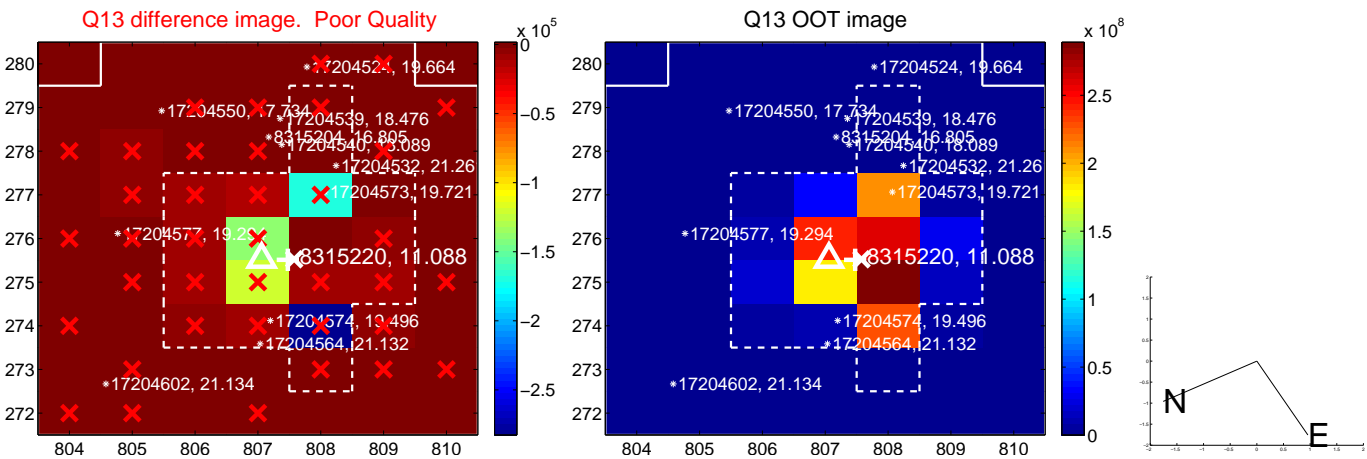
Q8 no OOT image



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.

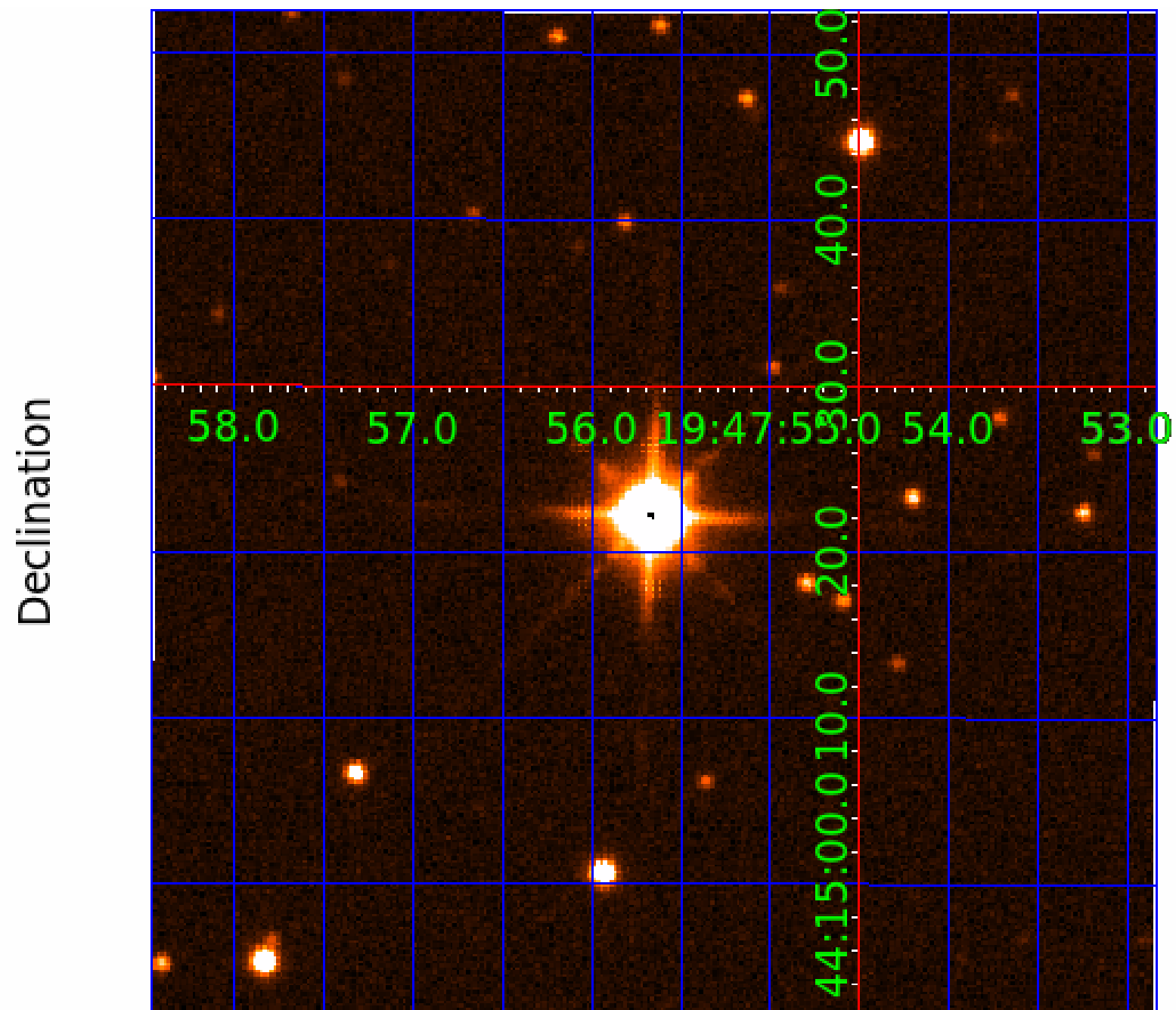


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



folded centroid time series figure for this object.

UKIRT Image



## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008315220-01	OBS	No	306.366968	238.002854	978.6	14.592	25.2	18.2	13.45	5172	72.09	66.75
008315220-02	OBS	No	367.177451	175.068533	144.9	15.000	31.5	-1.0	13.45	5172	15.78	52.43
008315220-03	OBS	No	367.826147	178.916856	582.1	16.110	18.5	18.2	13.45	5172	43.69	52.31
008315220-04	OBS	No	362.484543	185.462403	90.9	15.000	21.3	-1.0	13.45	5172	12.50	53.34
008315220-05	OBS	No	181.269349	193.563129	108.1	6.180	14.6	5.3	13.45	5172	16.33	134.38
008315220-06	OBS	No	183.715252	182.372967	347.0	16.910	17.2	18.0	13.45	5172	28.23	132.00
008315220-07	OBS	No	367.388598	172.555205	46.9	15.000	13.2	-1.0	13.45	5172	8.98	52.39
008315220-08	OBS	No	182.919583	182.566043	325.9	10.920	15.3	8.9	13.45	5172	25.79	132.76
008315220-09	OBS	No	534.460195	379.043140	118.9	7.500	16.0	-1.0	13.45	5172	14.30	31.78
008315220-10	OBS	No	122.022409	180.490237	52.5	15.000	11.2	-1.0	13.45	5172	9.50	227.78

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008315220-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_SATURATED
008315220-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—NO_FITS—INCONSISTENT_TRANS—CENT_SATURATED
008315220-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_TER_DV—MOD_POS_DV—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
008315220-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
008315220-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_ZUMA—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—SAME_NTL_PERIOD—CENT_SATURATED
008315220-06	OBS	FP	0.00	1	0	1	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_SATURATED—HALO_GHOST
008315220-07	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—SAME_NTL_PERIOD—CENT_SATURATED
008315220-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_SATURATED
008315220-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
008315220-10	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED

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

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

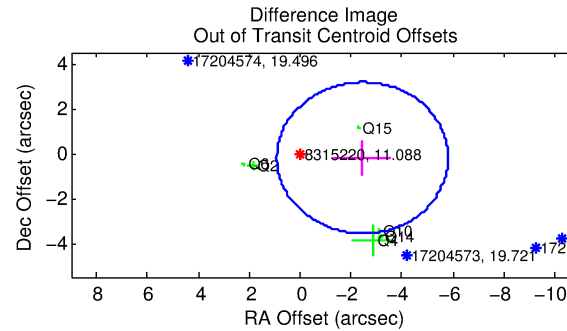
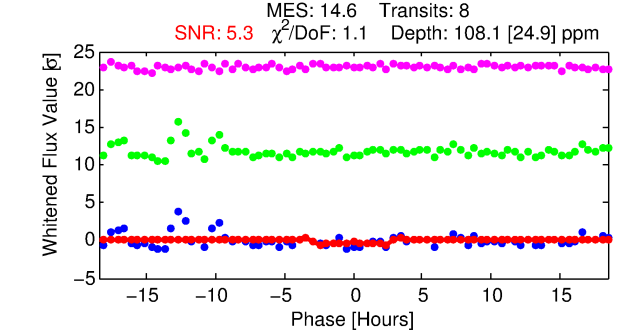
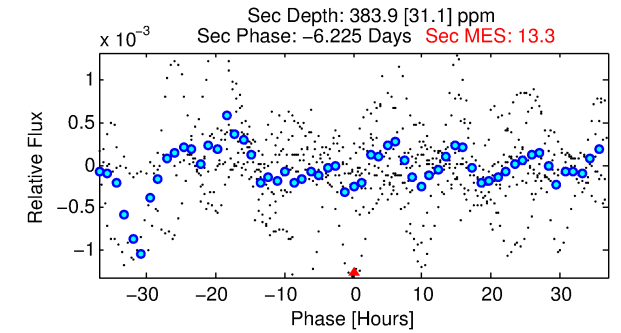
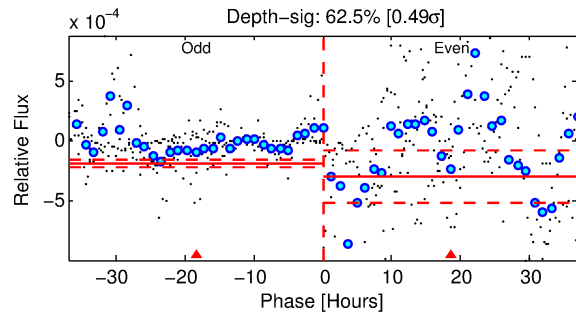
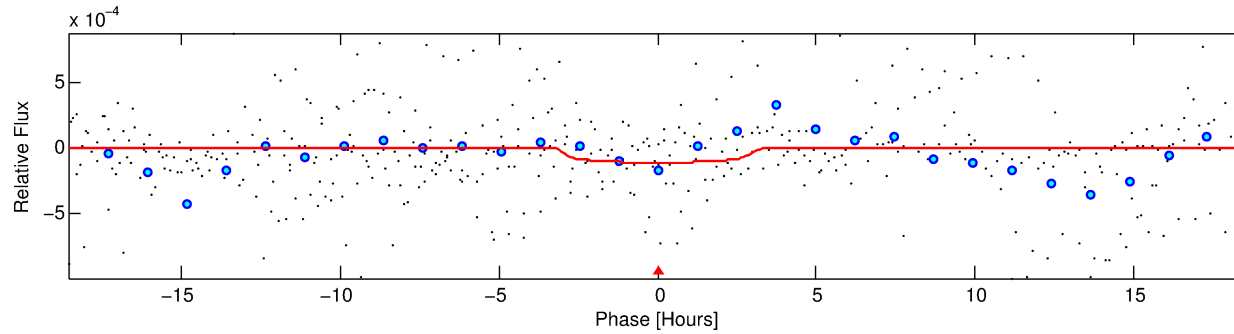
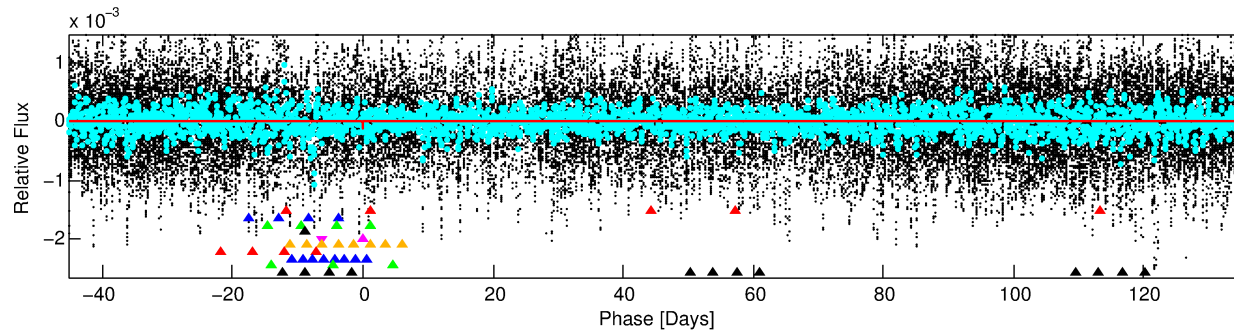
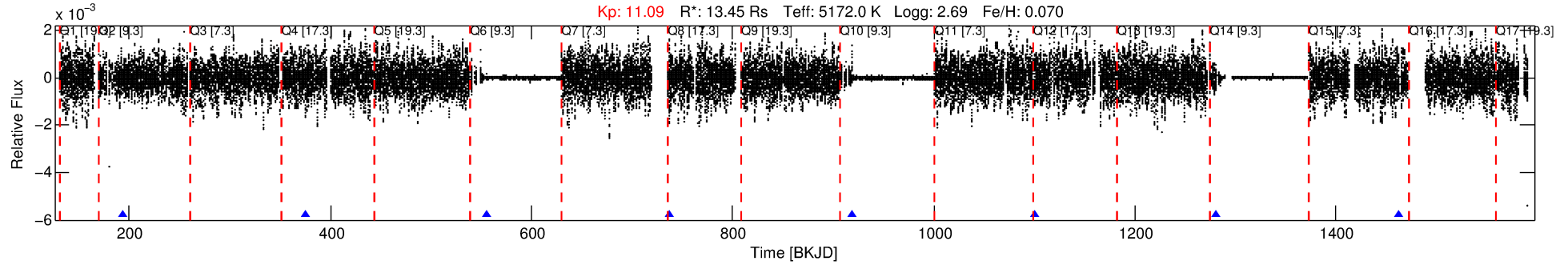
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 008315220-05

No Significant Match Found

# DV One-Page Summary

KIC: 8315220 Candidate: 5 of 10 Period: 181.269 d



## DV Fit Results:

Period = 181.26935 [0.00309] d  
Epoch = 193.5631 [0.0091] BKJD  
Rp/R\* = 0.0111 [0.0056]  
a/R\* = 117.50 [247.15]  
b = 0.86 [0.63]  
Seff = 134.38 [79.32]  
Teq = 868 [128] K  
Rp = 16.33 [12.25] Re  
a = 0.9293 [0.3941] AU  
Ag = 684.17 [794.10] [0.86σ]  
Teffp = 6865 [1777] K [3.37σ]

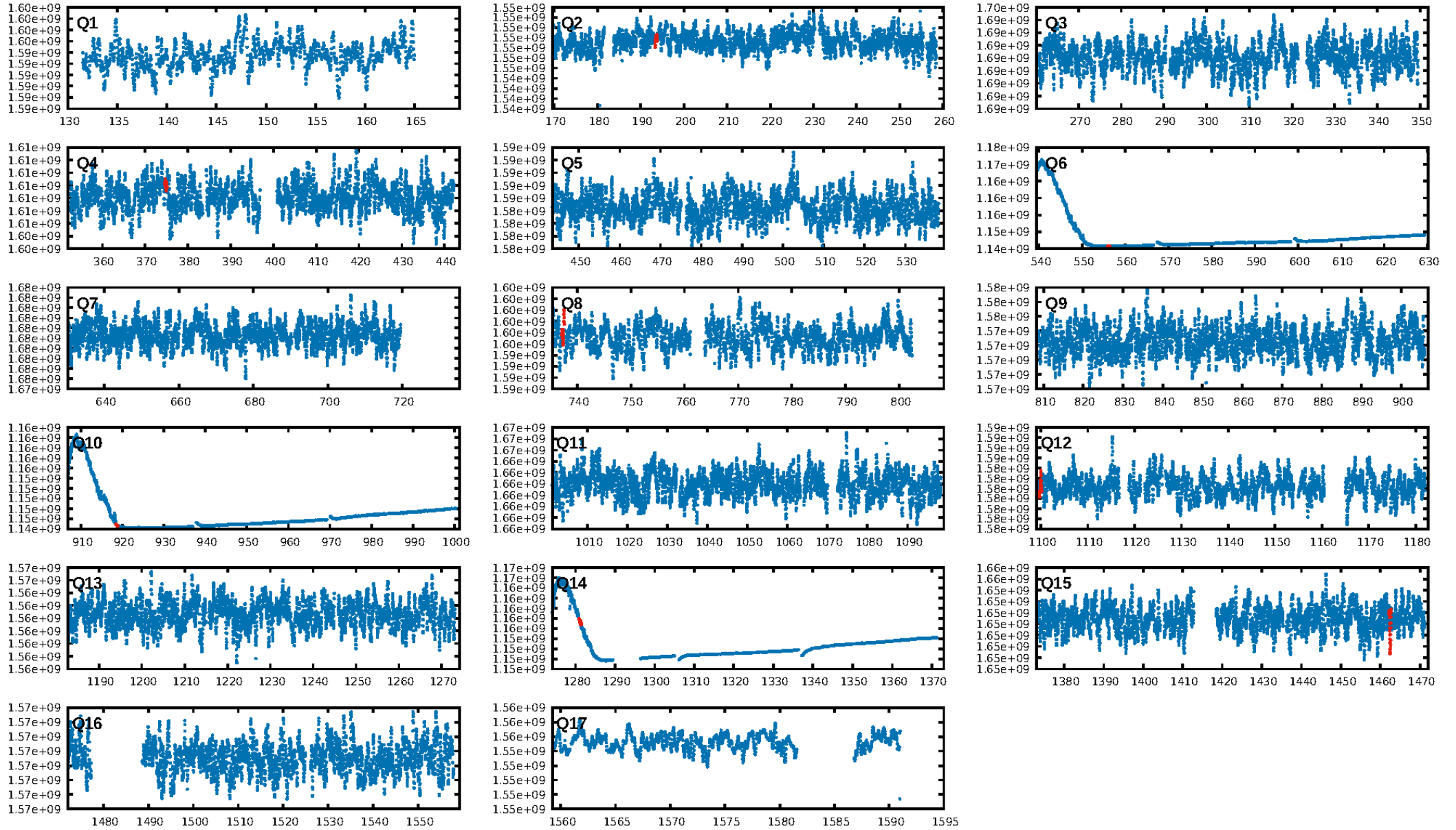
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [87.65σ]  
LongPeriod-sig: 99.8% [3.16σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 95.7%  
Bootstrap-pfa: 3.46e-15  
RollingBand-fgt: 1.00 [8/8]  
GhostDiagnostic-chr: -2.559  
Centroid-sig: 20.0%  
Centroid-so: 3.195 arcsec [1.41σ]  
OotOffset-rm: 2.458 arcsec [2.19σ]  
OotOffset-st: 4/1/1/0 [6]  
KicOffset-rm: 2.367 arcsec [2.67σ]  
KicOffset-st: 4/1/1/0 [6]  
DiffImageQuality-fgm: 0.17 [1/6]  
DiffImageOverlap-fno: 0.86 [6/7]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 16:10:23 Z

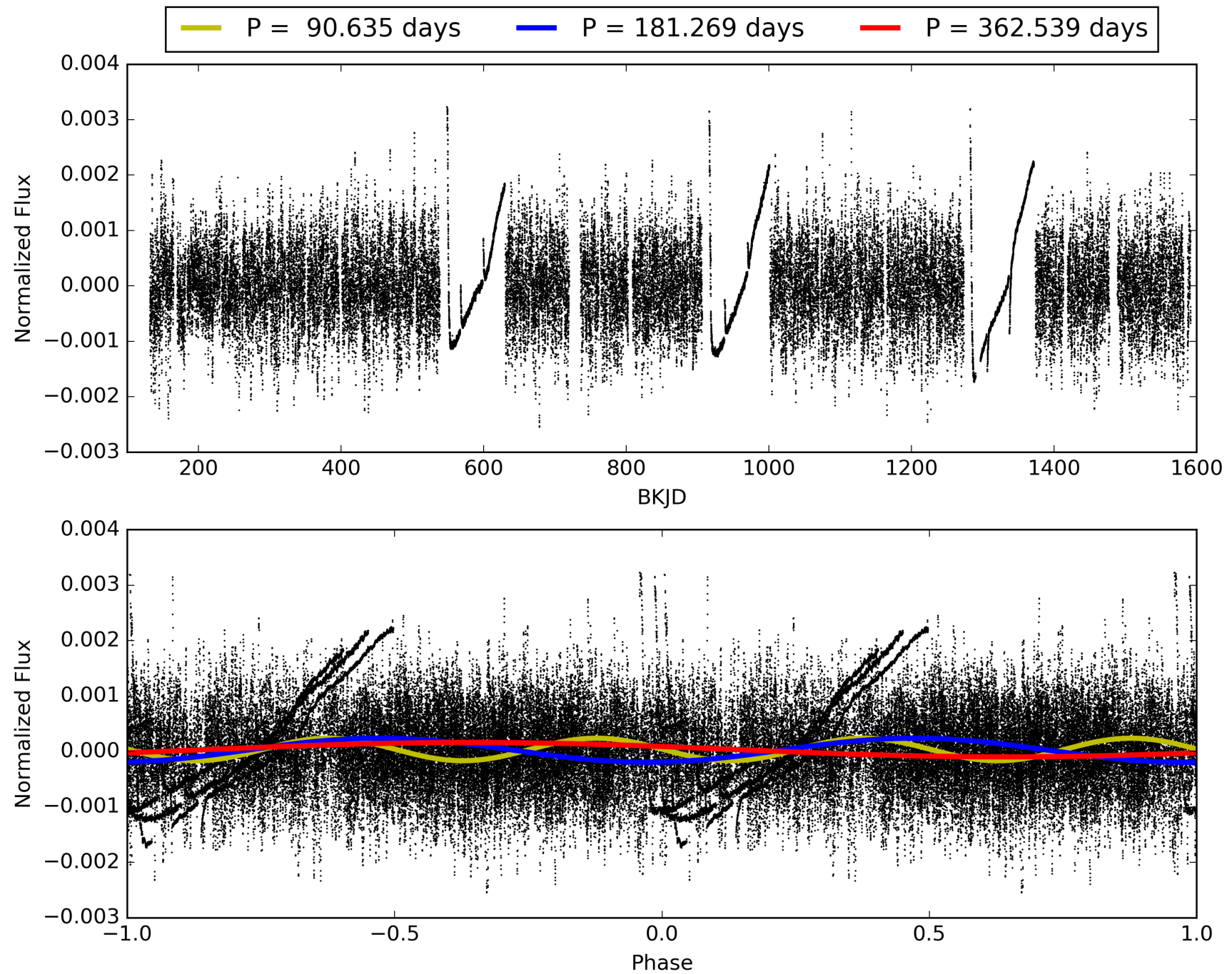
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 008315220-05, PDC Light Curves



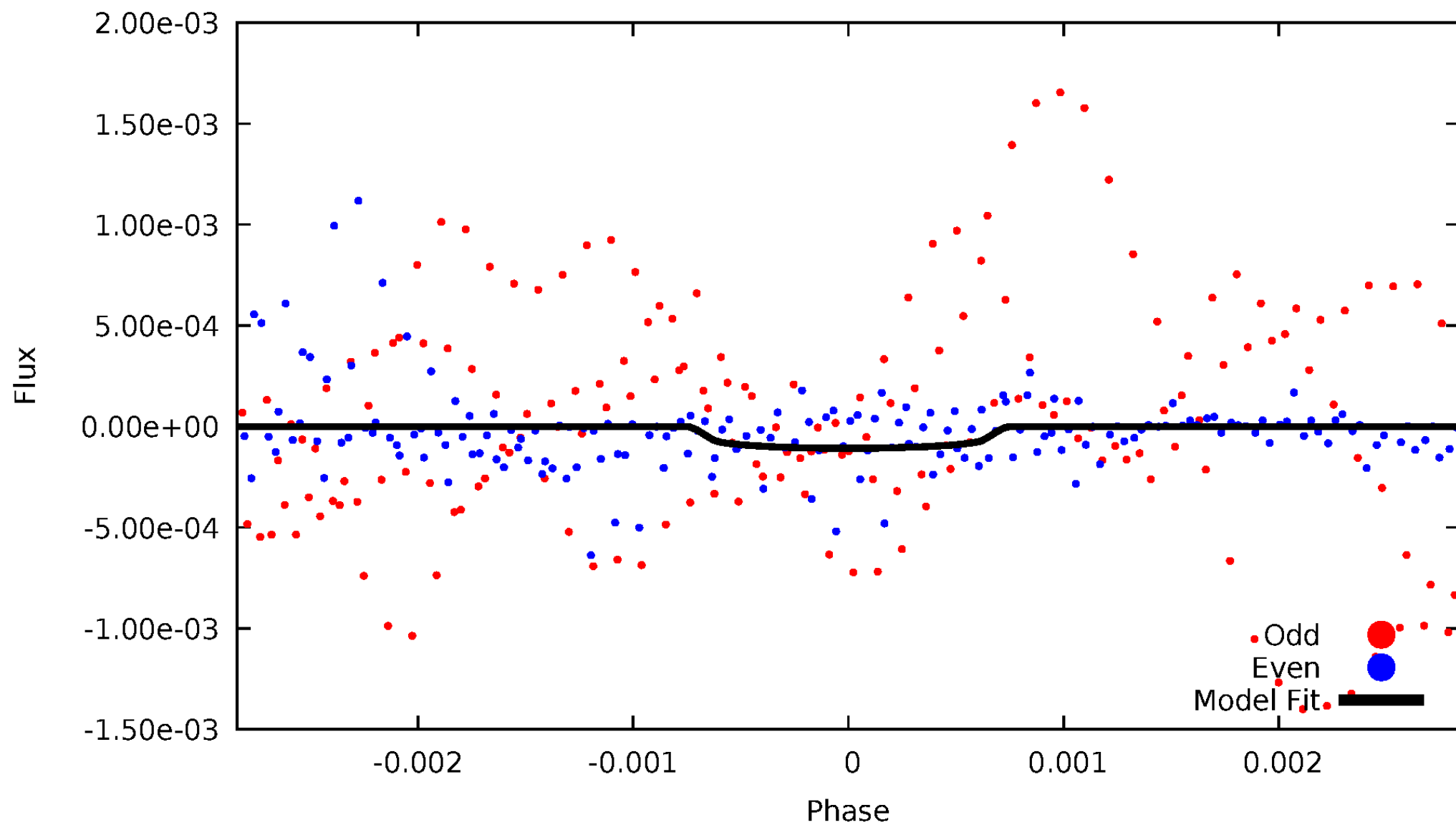


TCE 008315220-05



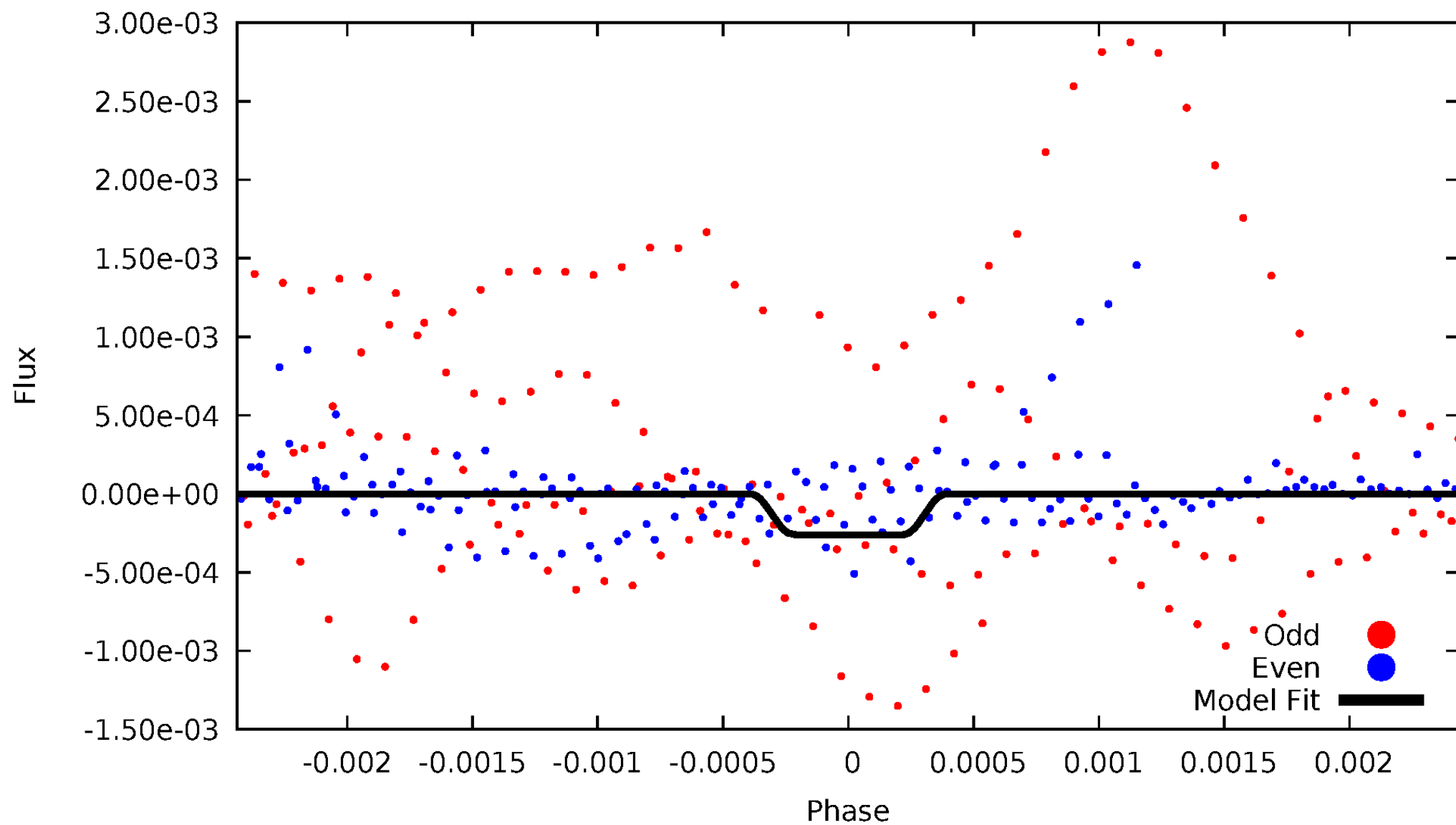
# DV Odd/Even

TCE 008315220-05



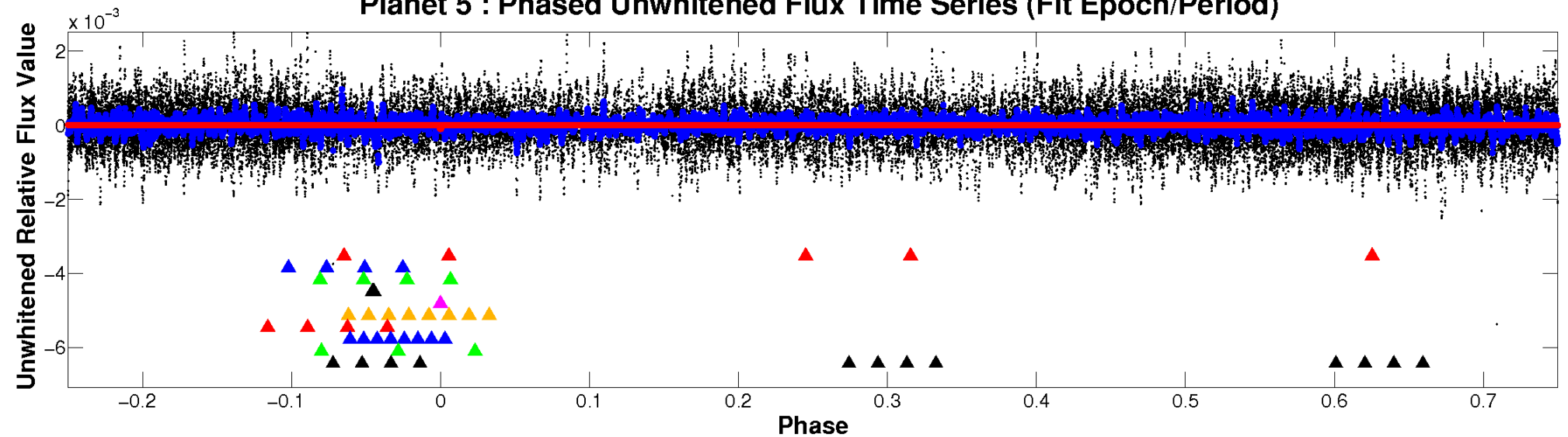
# ALT Odd/Even

TCE 008315220-05

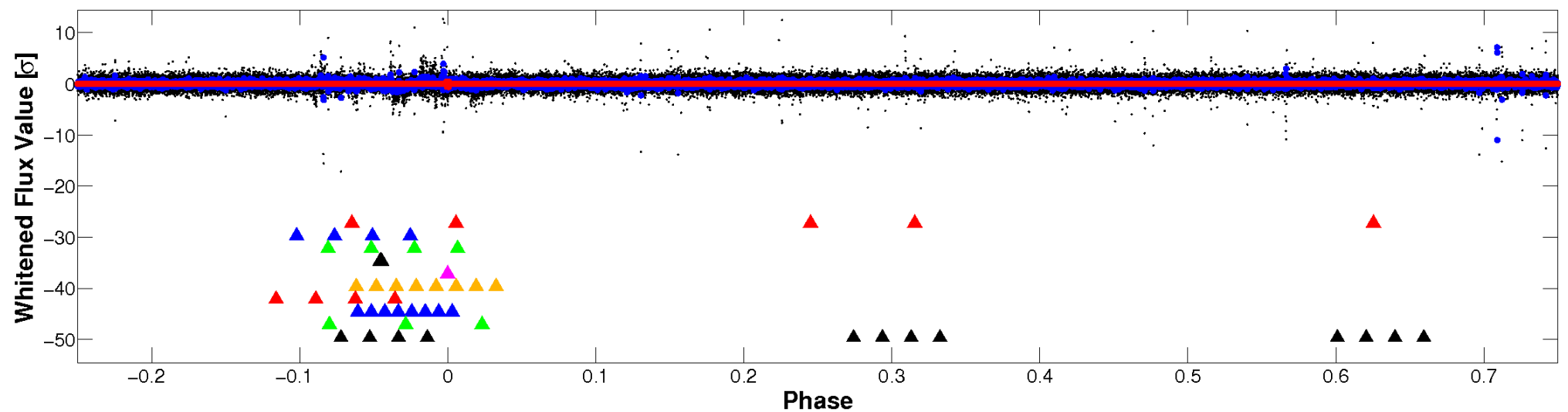


# Non-Whitened Vs. Whitened Light Curve

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

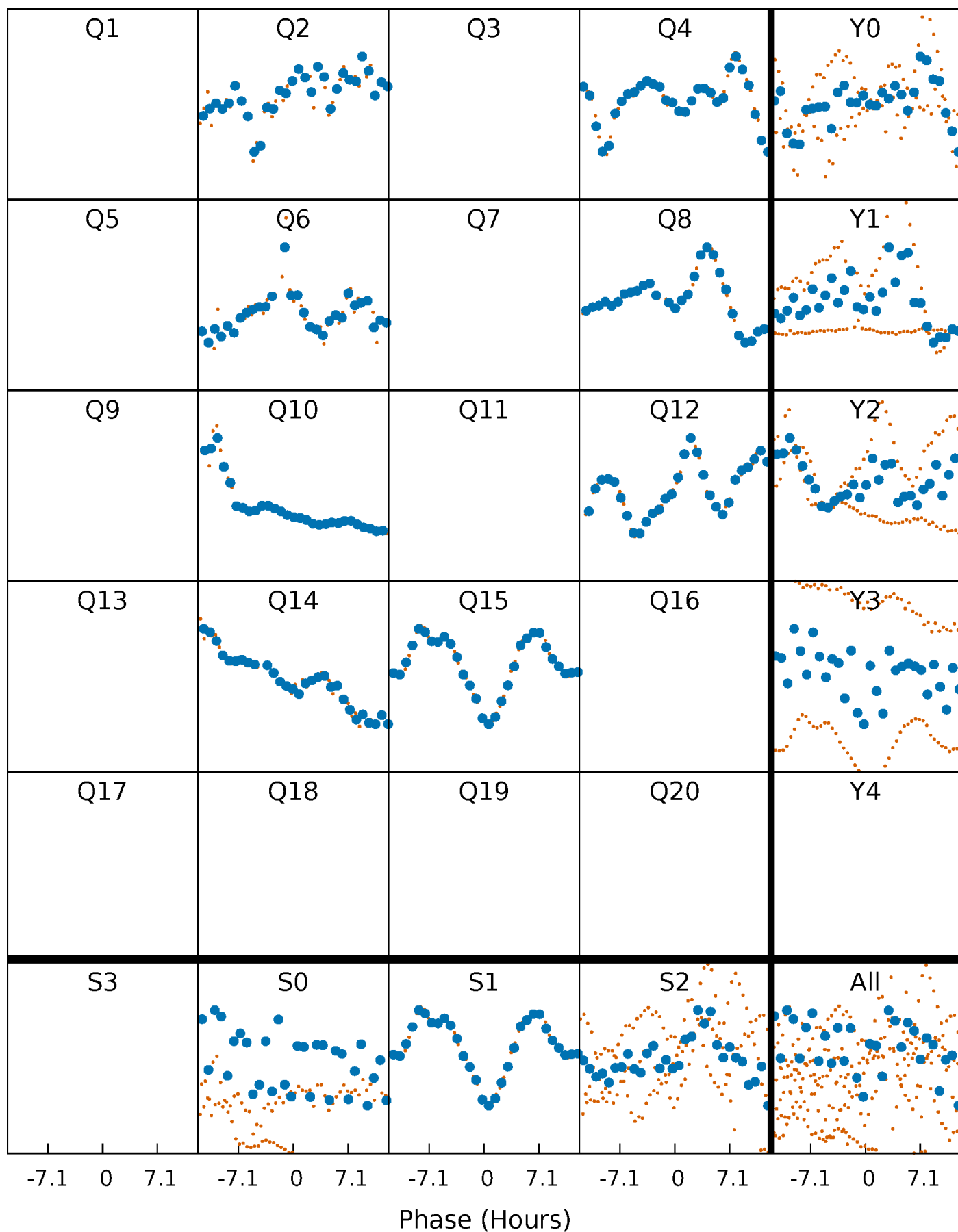


## Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)



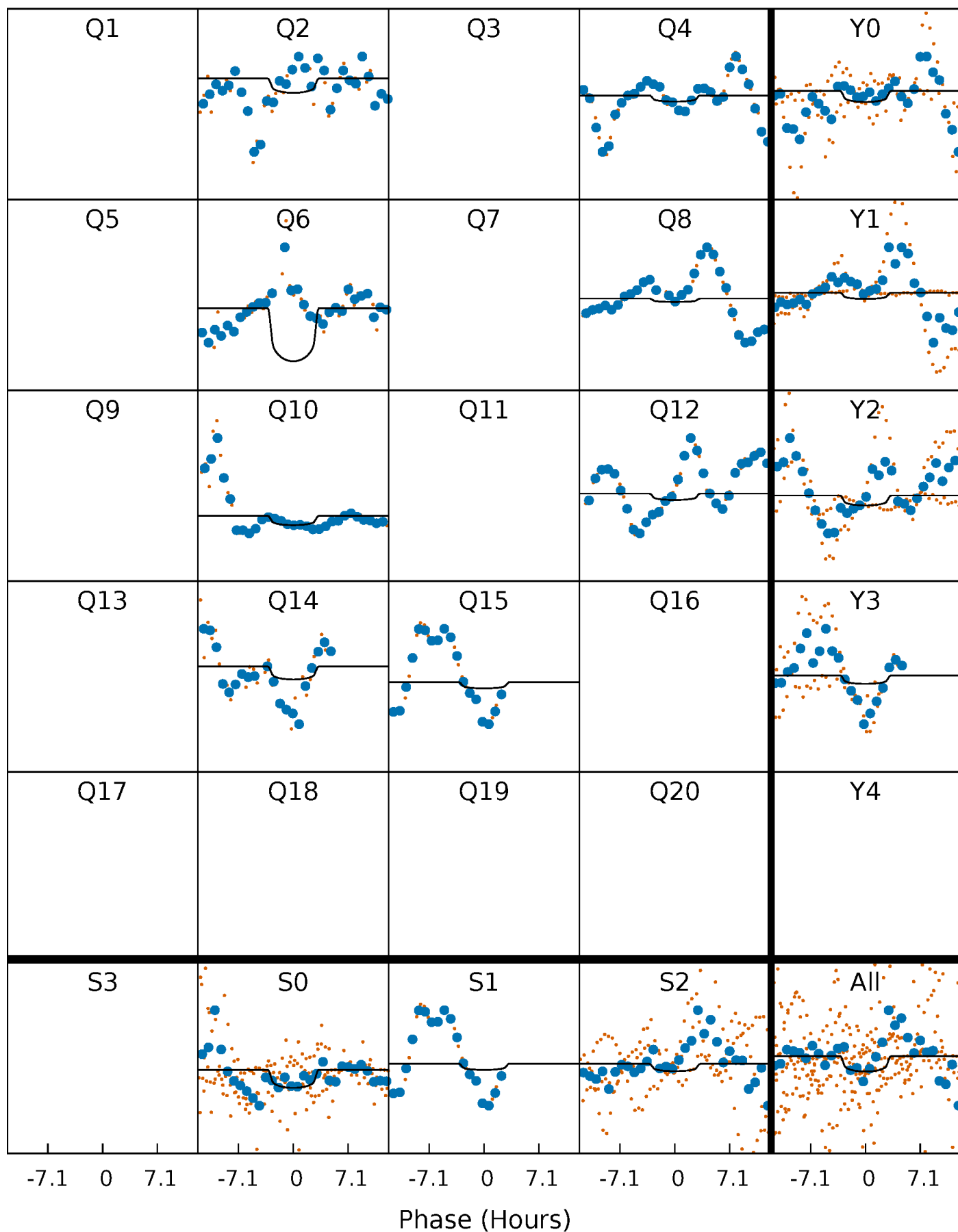
# PDC Quarter-Phased Transit Curves

TCE 008315220-05     $P=181.269349$  Days     $T_0=193.563129$  (BKJD)



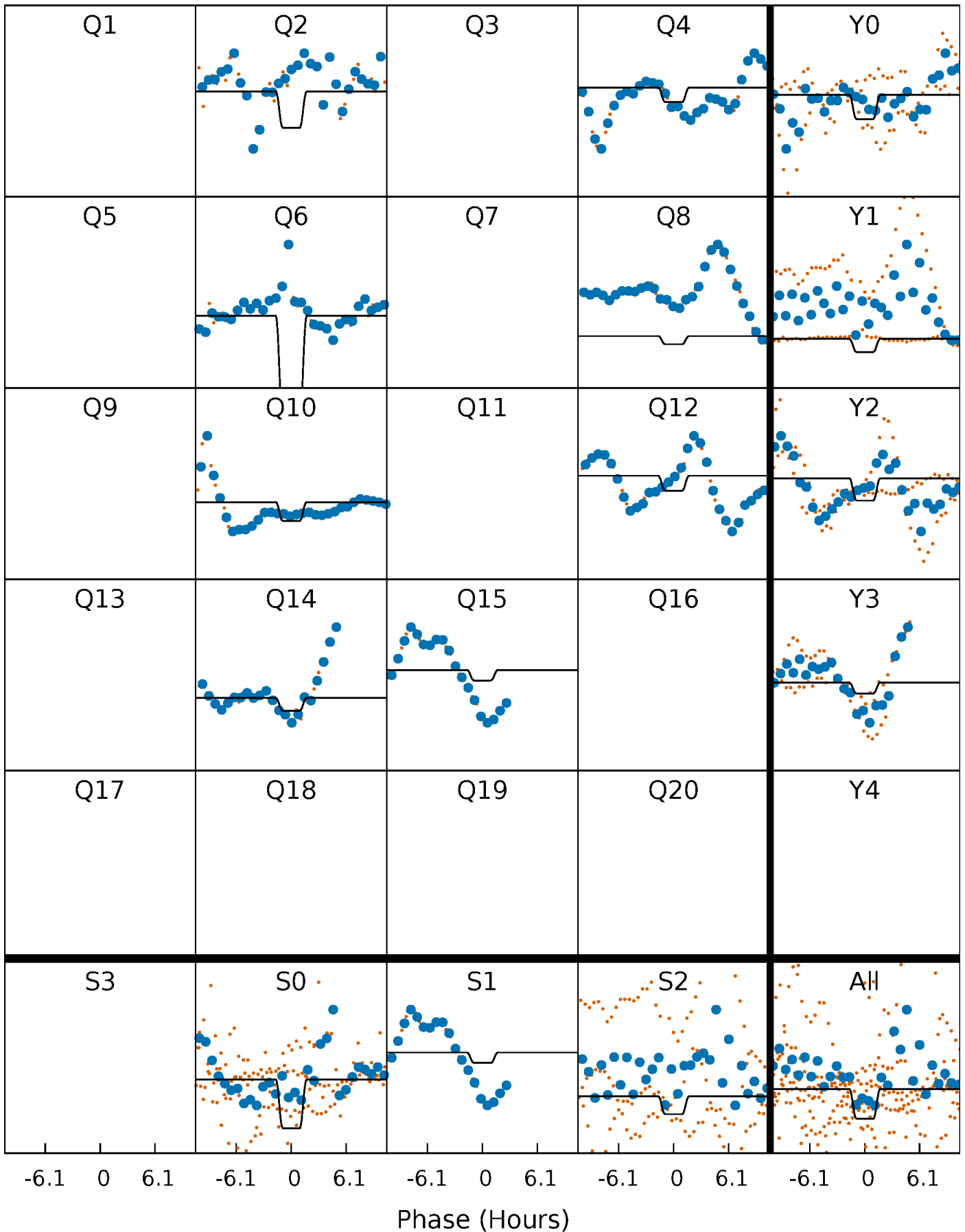
# DV Quarter-Phased Transit Curves

TCE 008315220-05     $P=181.269349$  Days     $T_0=193.563129$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

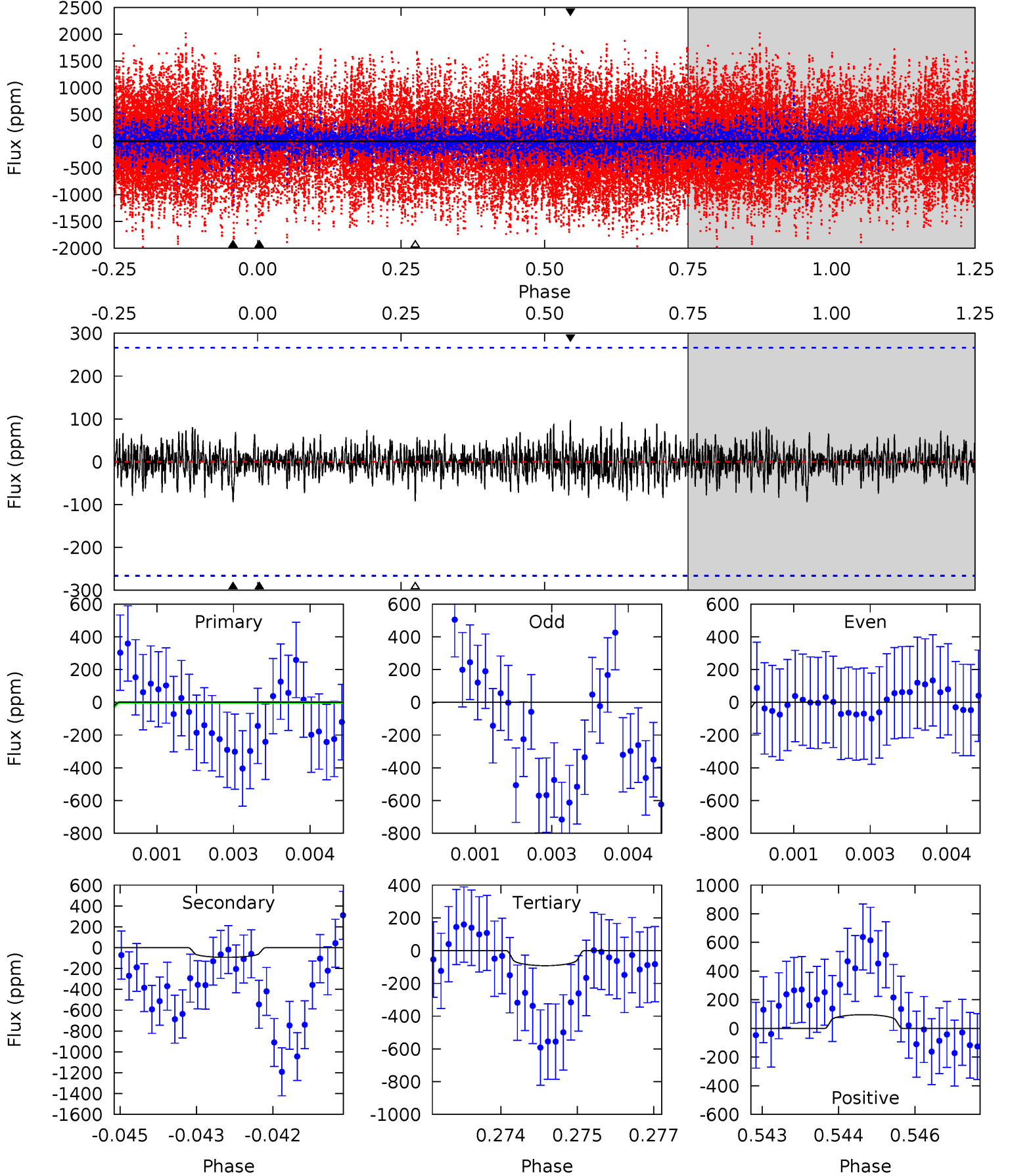
TCE 008315220-05 P=181.272922 Days  $T_0=193.527146$  (BKJD)



# DV Model-Shift Uniqueness Test

008315220-05,  $P = 181.269349$  Days,  $E = 12.293780$  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
0.95	1.88	1.86	1.94	5.38	3.18	0.56	-0.91	-0.99	0.02	-0.06	0.72	1.06	0.51	0.37

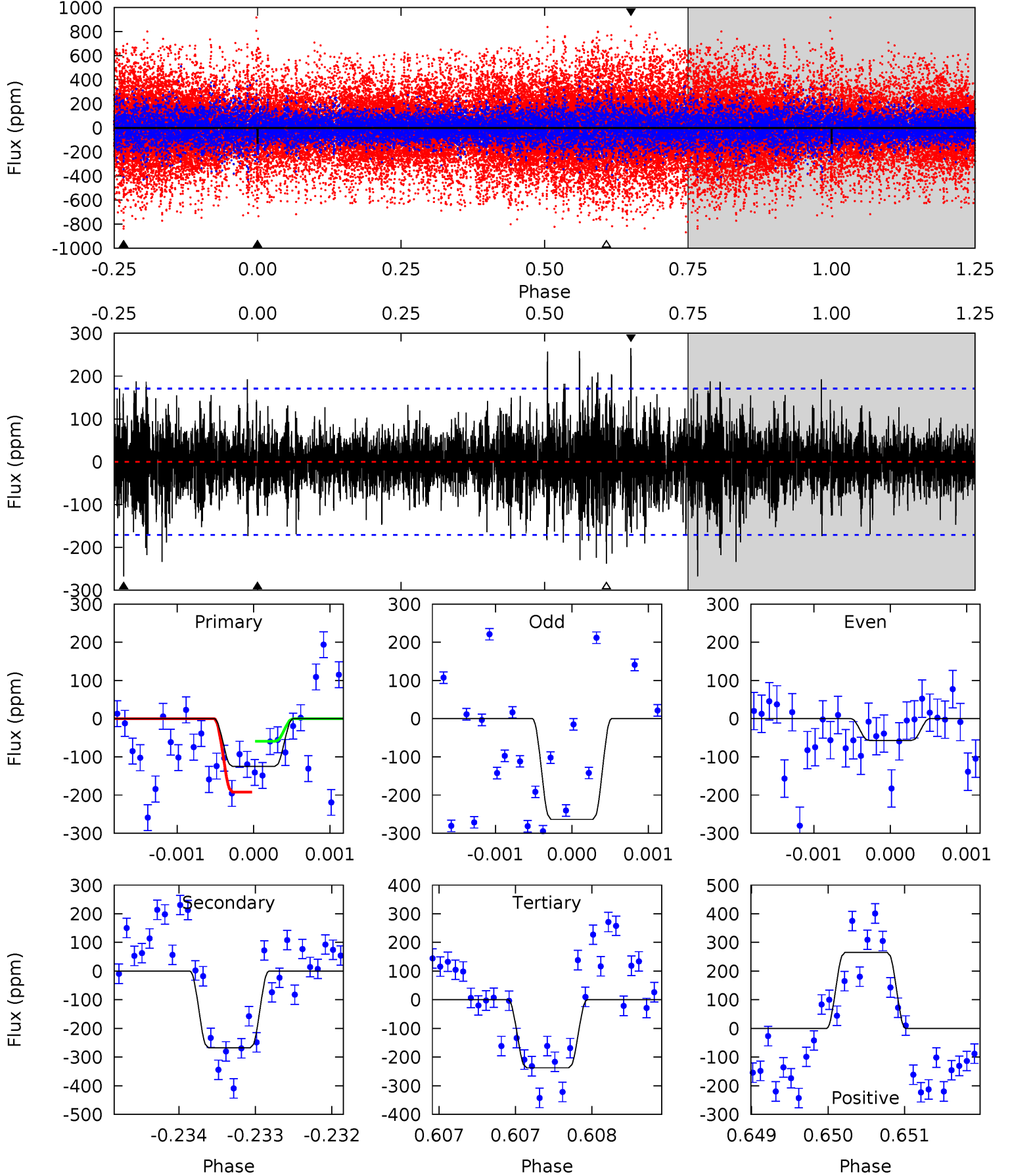




# Alt Model-Shift Uniqueness Test

008315220-05, P = 181.272922 Days, E = 12.254224 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
4.03	8.61	7.65	8.56	5.50	3.37	1.87	-3.62	-4.53	0.96	0.06	3.24	0.97	0.50	0



### Stellar Parameters For KIC 008315220

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5172^{+70}_{-248}$	$2.693^{+0.273}_{-0.126}$	$0.070^{+0.150}_{-0.600}$	$13.454^{+2.481}_{-7.442}$	$3.257^{+0.222}_{-1.999}$	$0.002^{+0.006}_{-0.001}$
	+1%/-5%	+10%/-5%	+214%/-857%	+18%/-55%	+7%/-61%	+302%/-38%
Source	PHO1	FLK73	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 008315220-05 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-93 \pm 49$	$15.67^{+9.37}_{-7.54}$	$1193^{+74}_{-110}$	$4719^{+1460}_{-926}$	$161^{+433}_{-111}$
Alt.	$-267 \pm 31$	$22.44^{+9.73}_{-8.89}$	$1199^{+74}_{-127}$	$5110^{+1210}_{-578}$	$245^{+382}_{-122}$

$T_{max}$  = 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  $A_{obs} \gg 1.0$

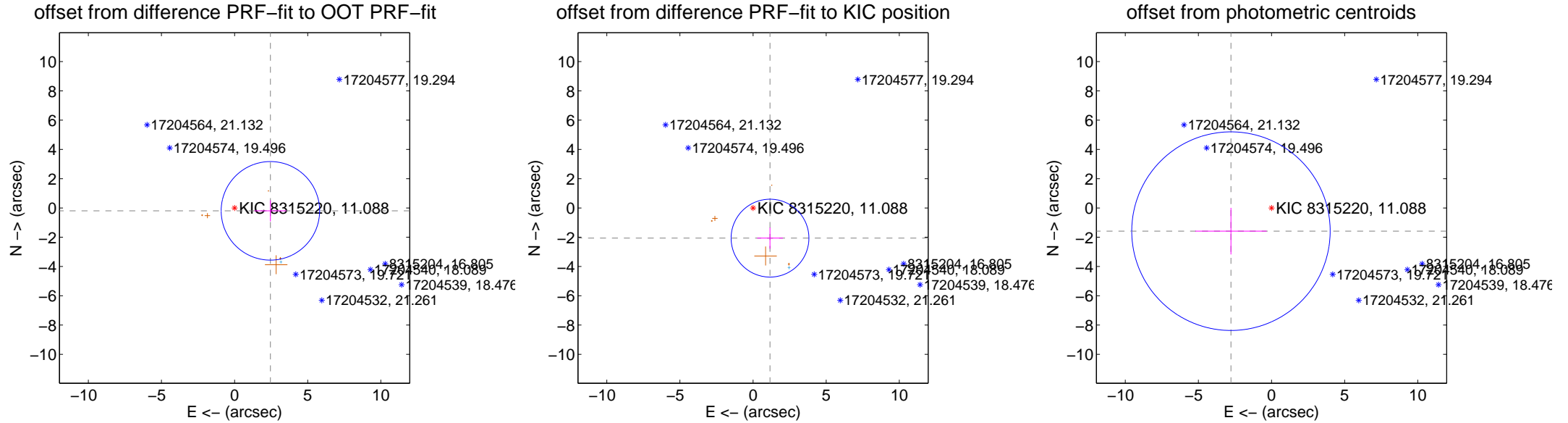
## DV Centroid Data

Supplemental centroid analysis for 008315220-05. **Kepler magnitude: 11.09.** Transit SNR 5.33

**There are 1 quarters with good PRF difference image offsets**

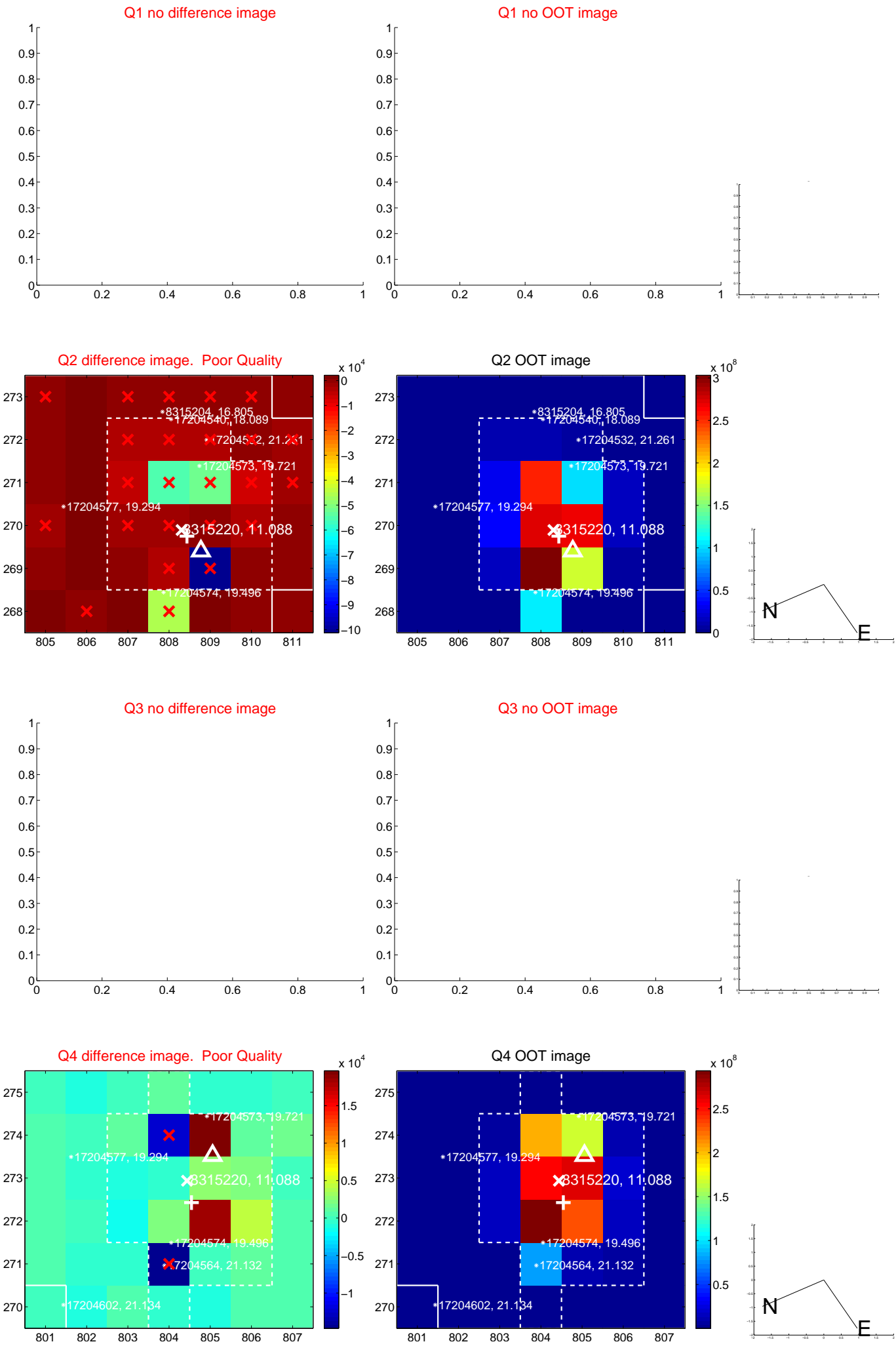
The direct PRF centroid is offset from the target star catalog position by about 1.11 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.458 \pm 1.122$	2.19	$-2.450 \pm 1.092$	$-0.198 \pm 0.719$
PRF-fit source offset from KIC position	$2.367 \pm 0.887$	2.67	$-1.160 \pm 0.882$	$-2.063 \pm 0.721$
photometric centroid source offset	$3.20 \pm 2.26$	1.41	$2.77 \pm 2.44$	$-1.59 \pm 1.59$

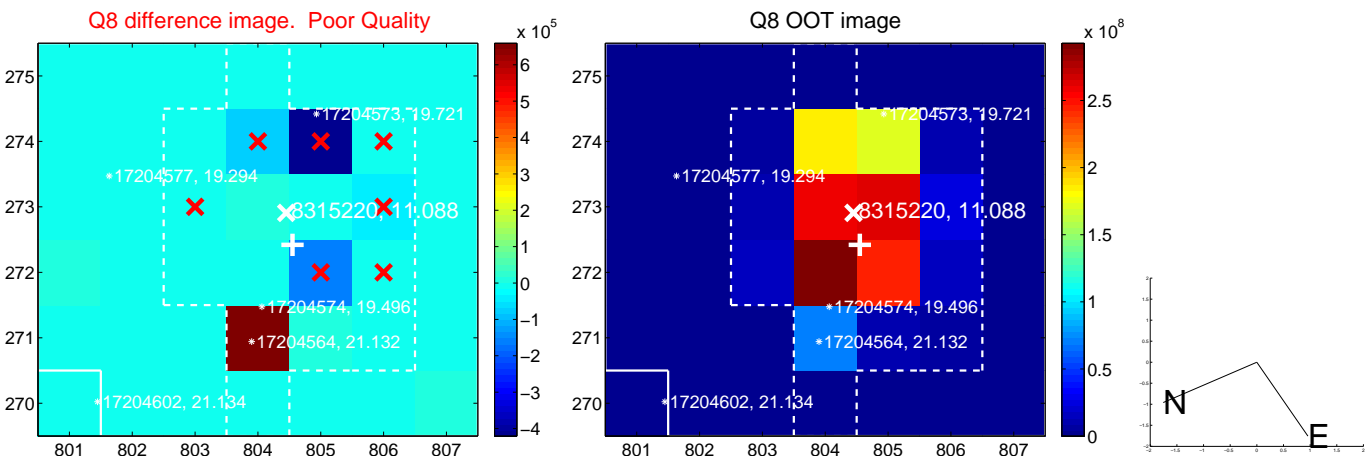
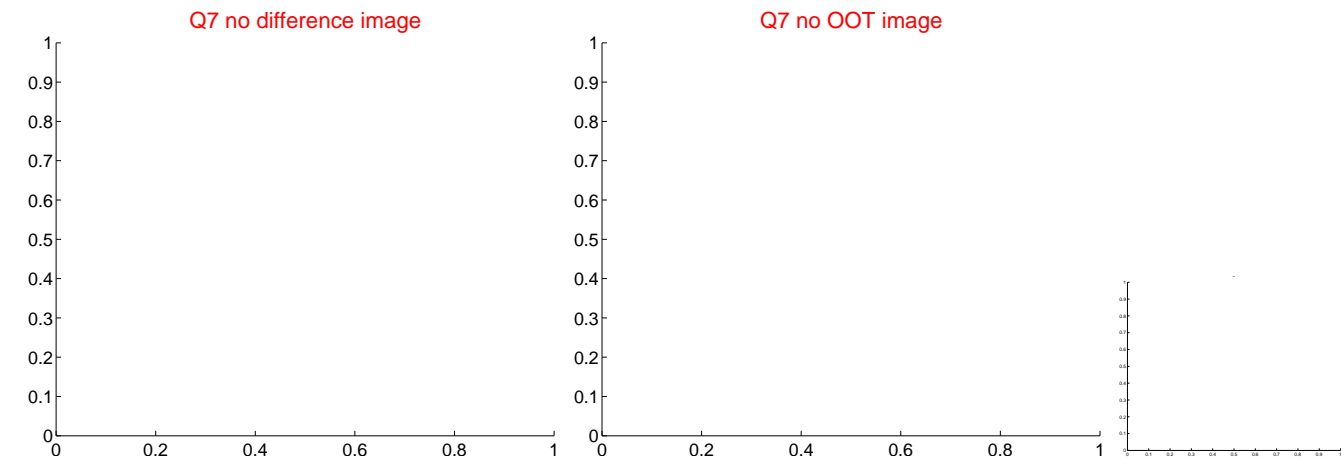
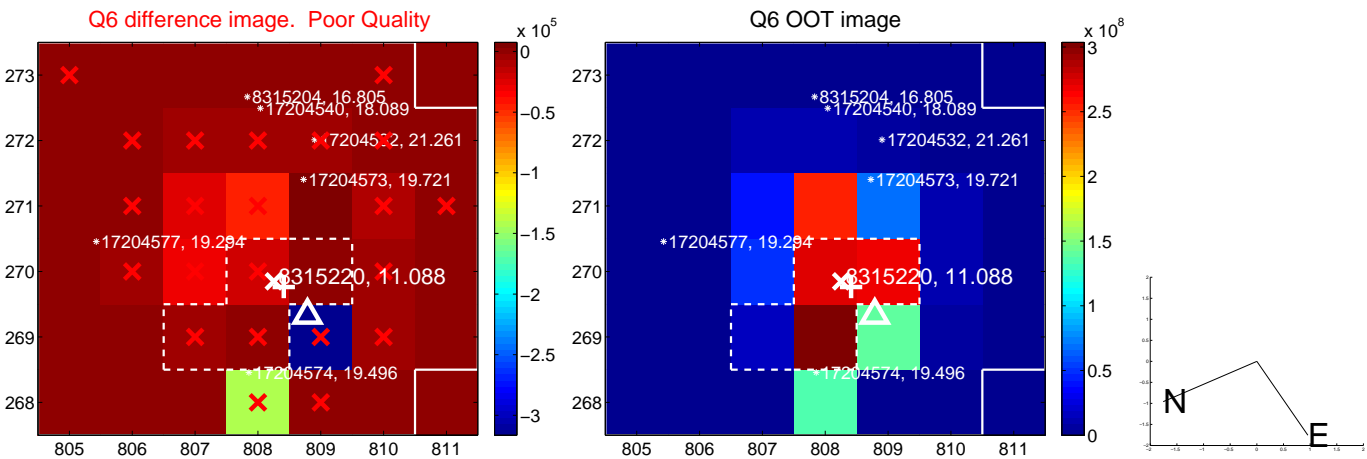


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: 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.

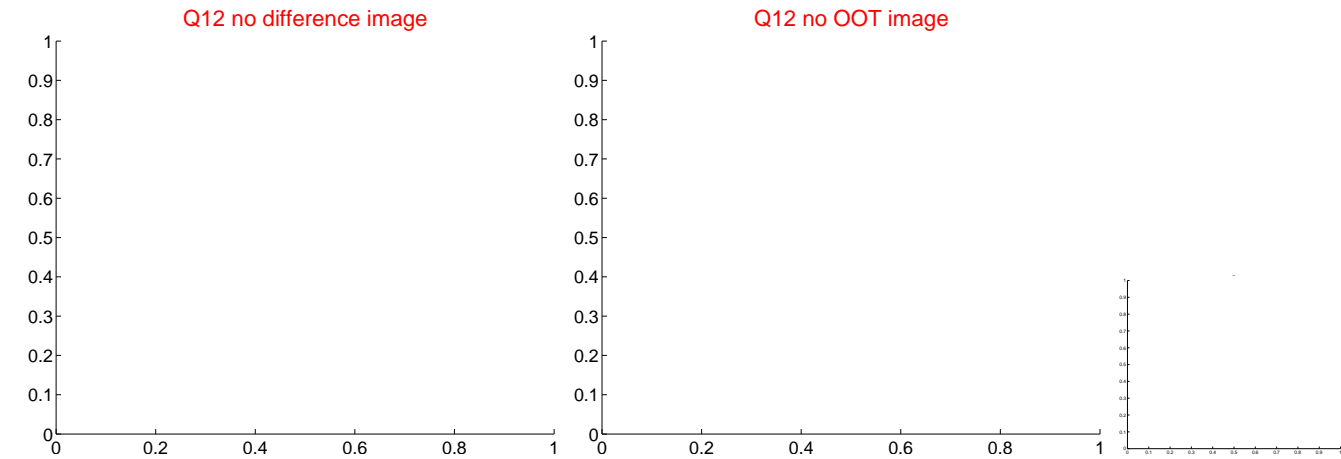
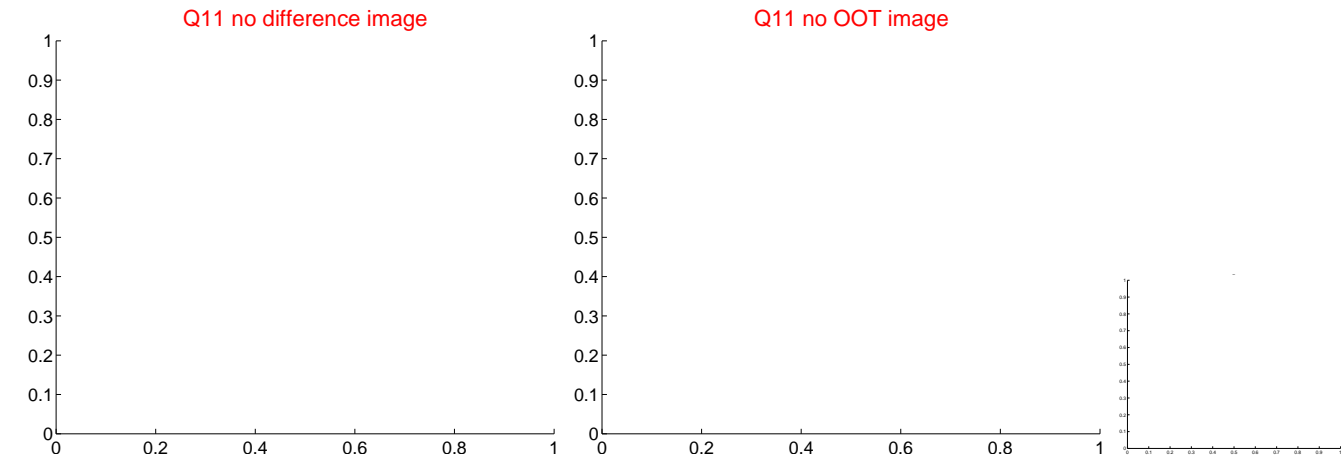
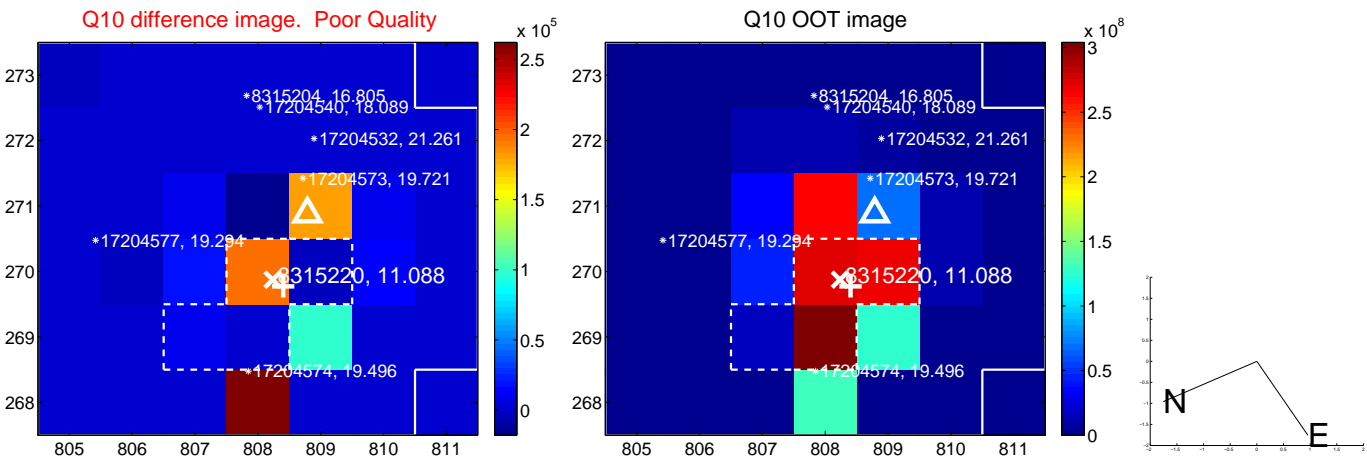
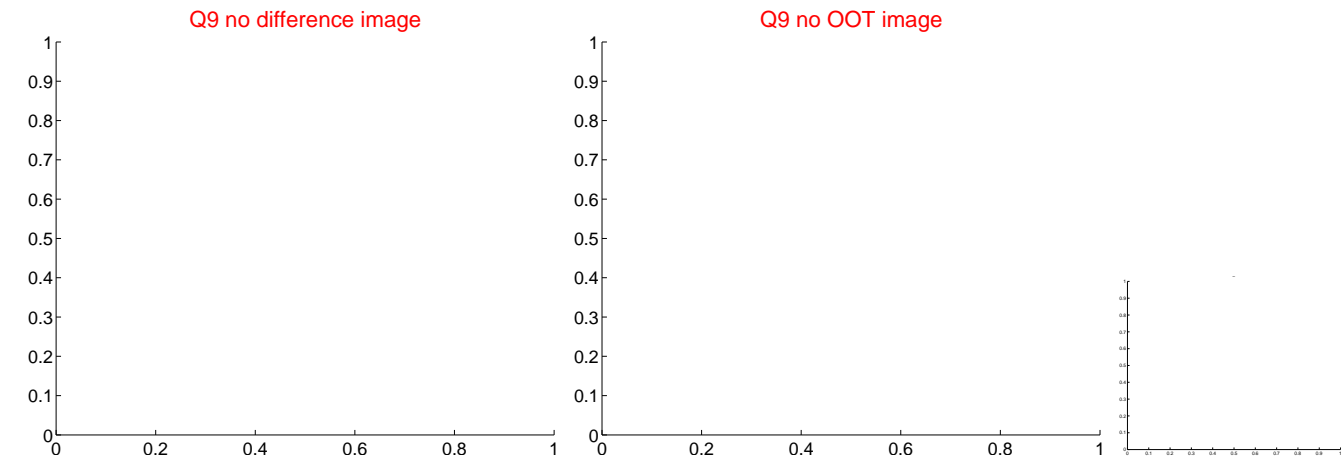
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



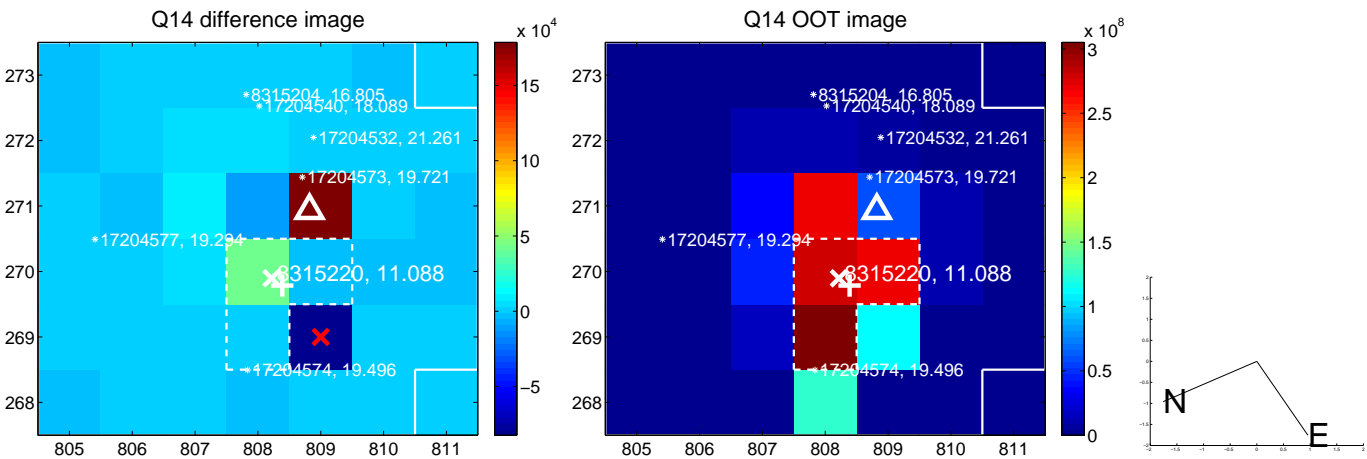
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



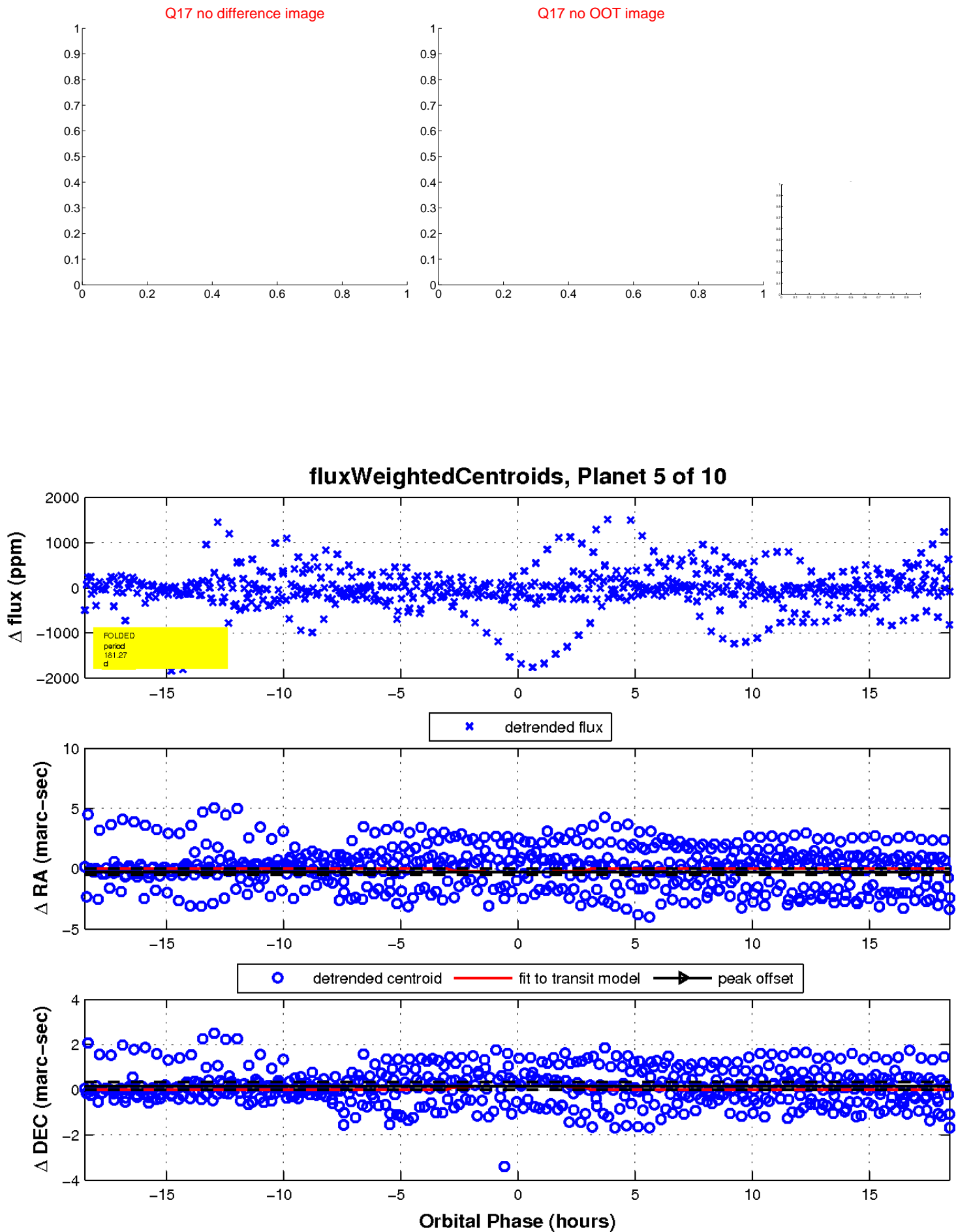
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

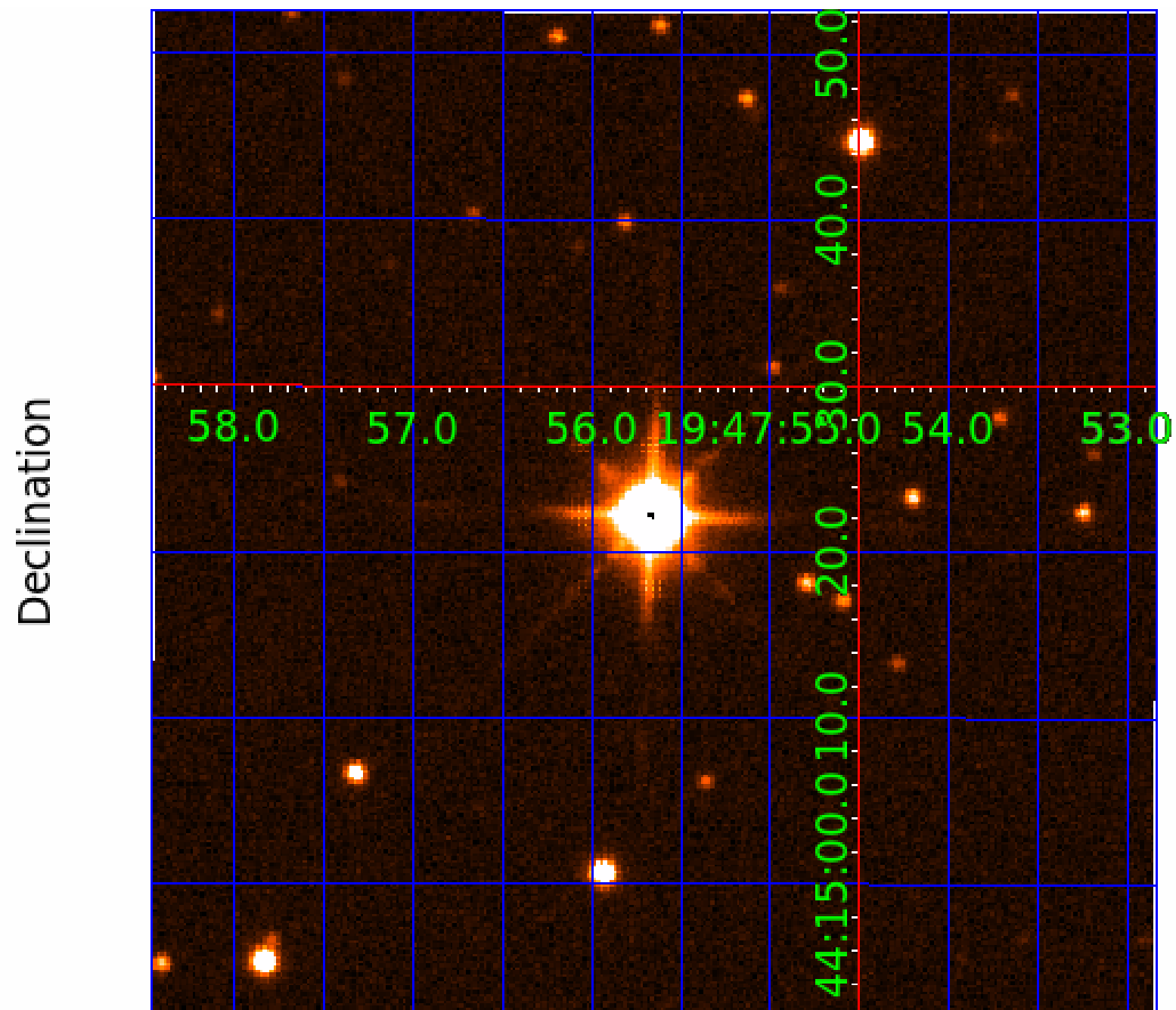


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image



## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008315220-01	OBS	No	306.366968	238.002854	978.6	14.592	25.2	18.2	13.45	5172	72.09	66.75
008315220-02	OBS	No	367.177451	175.068533	144.9	15.000	31.5	-1.0	13.45	5172	15.78	52.43
008315220-03	OBS	No	367.826147	178.916856	582.1	16.110	18.5	18.2	13.45	5172	43.69	52.31
008315220-04	OBS	No	362.484543	185.462403	90.9	15.000	21.3	-1.0	13.45	5172	12.50	53.34
008315220-05	OBS	No	181.269349	193.563129	108.1	6.180	14.6	5.3	13.45	5172	16.33	134.38
008315220-06	OBS	No	183.715252	182.372967	347.0	16.910	17.2	18.0	13.45	5172	28.23	132.00
008315220-07	OBS	No	367.388598	172.555205	46.9	15.000	13.2	-1.0	13.45	5172	8.98	52.39
008315220-08	OBS	No	182.919583	182.566043	325.9	10.920	15.3	8.9	13.45	5172	25.79	132.76
008315220-09	OBS	No	534.460195	379.043140	118.9	7.500	16.0	-1.0	13.45	5172	14.30	31.78
008315220-10	OBS	No	122.022409	180.490237	52.5	15.000	11.2	-1.0	13.45	5172	9.50	227.78

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008315220-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_SATURATED
008315220-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—NO_FITS—INCONSISTENT_TRANS—CENT_SATURATED
008315220-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_TER_DV—MOD_POS_DV—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
008315220-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
008315220-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_ZUMA—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—SAME_NTL_PERIOD—CENT_SATURATED
008315220-06	OBS	FP	0.00	1	0	1	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_SATURATED—HALO_GHOST
008315220-07	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—SAME_NTL_PERIOD—CENT_SATURATED
008315220-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_SATURATED
008315220-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
008315220-10	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED

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

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

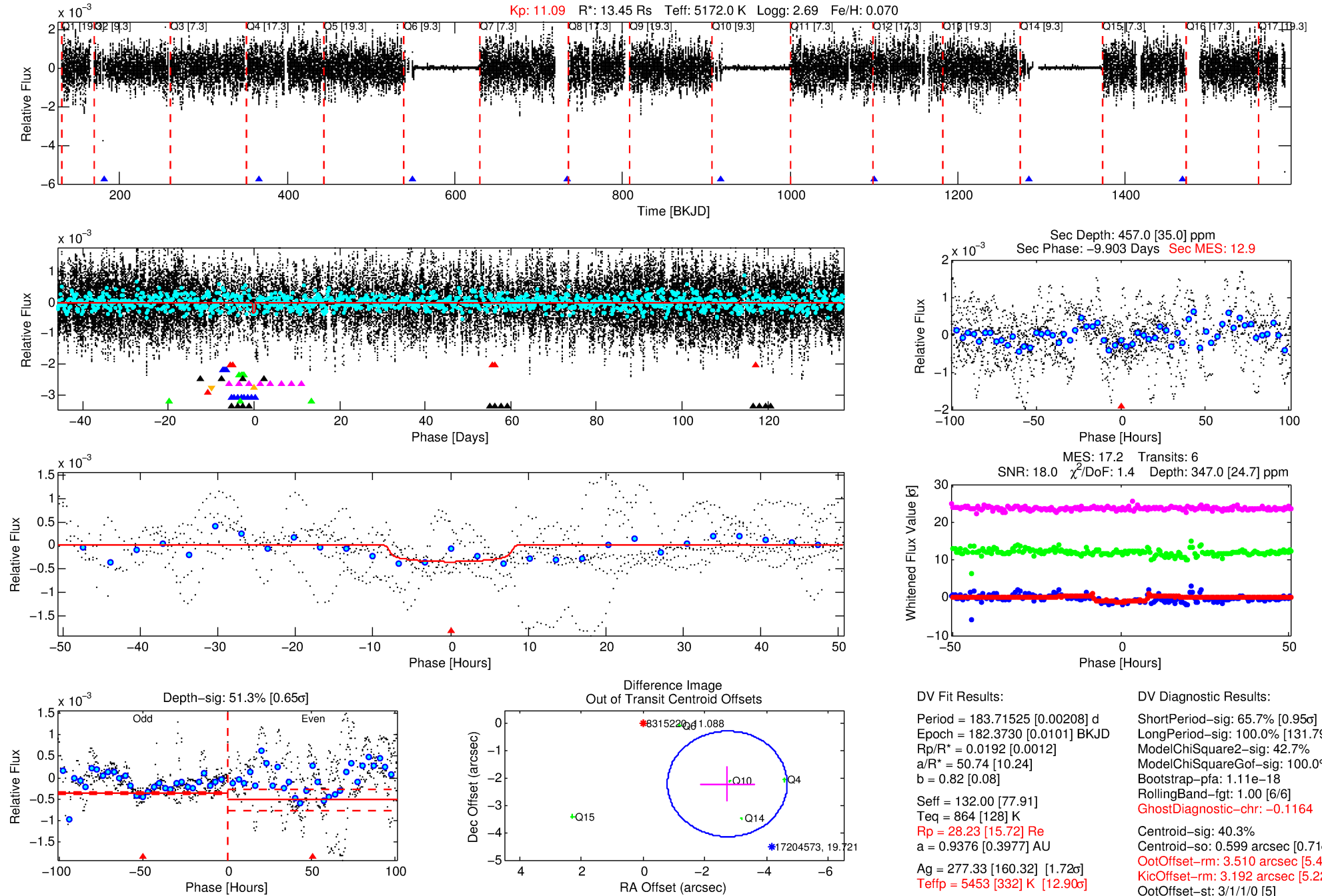
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 008315220-06

No Significant Match Found

# DV One-Page Summary

KIC: 8315220 Candidate: 6 of 10 Period: 183.715 d



## DV Fit Results:

Period = 183.71525 [0.00208] d  
Epoch = 182.3730 [0.0101] BKJD  
Rp/R\* = 0.0192 [0.0012]  
a/R\* = 50.74 [10.24]  
b = 0.82 [0.08]  
Seff = 132.00 [77.91]  
Teff = 864 [128] K  
Rp = 28.23 [15.72] Re  
a = 0.9376 [0.3977] AU  
Ag = 277.33 [160.32] [1.72σ]  
Teffp = 5453 [332] K [12.90σ]

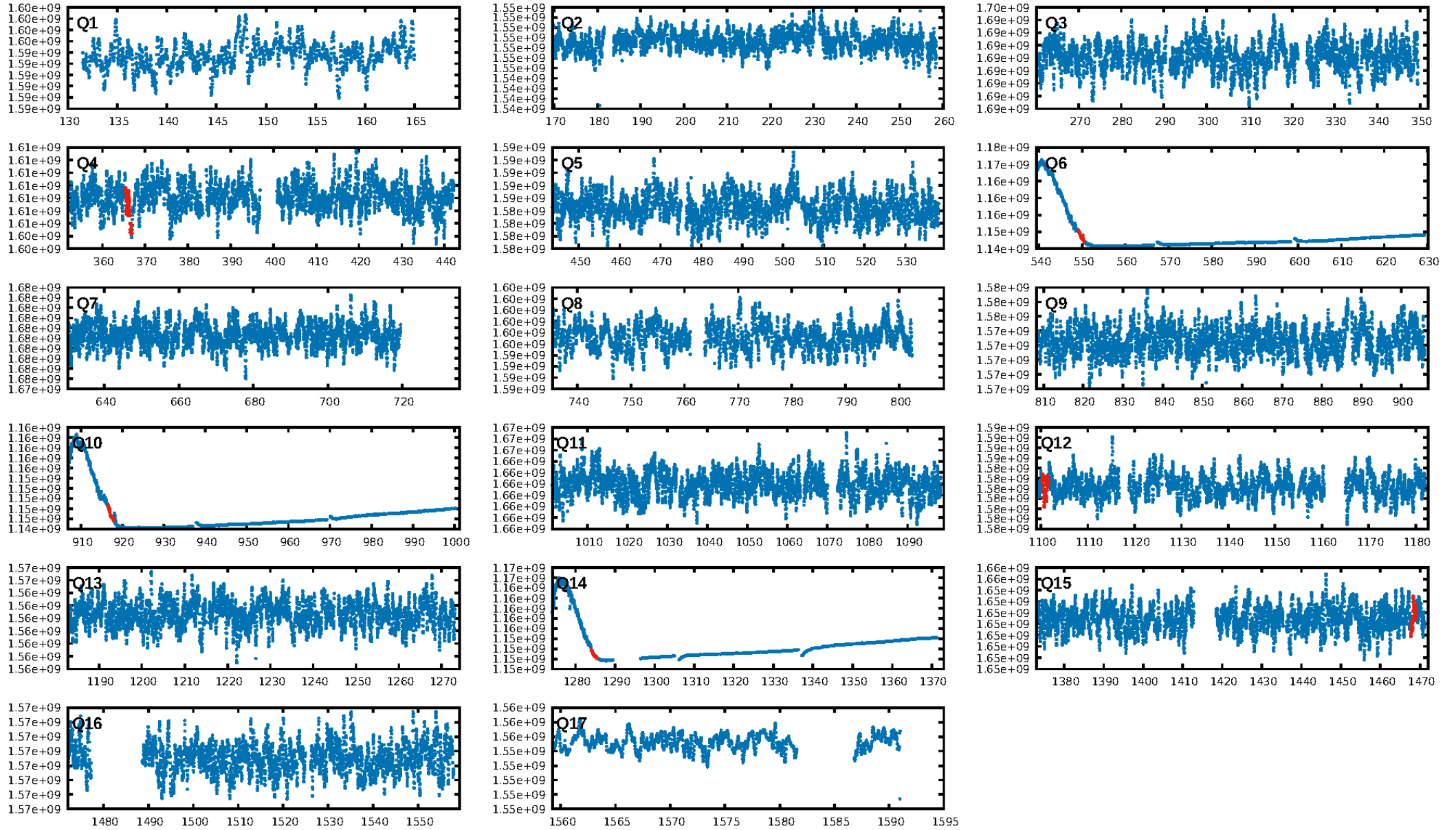
## DV Diagnostic Results:

ShortPeriod-sig: 65.7% [0.95σ]  
LongPeriod-sig: 100.0% [131.79σ]  
ModelChiSquare2-sig: 42.7%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 1.11e-18  
RollingBand-fgt: 1.00 [6/6]  
GhostDiagnostic-chr: -0.1164  
Centroid-sig: 40.3%  
Centroid-so: 0.599 arcsec [0.71σ]  
OotOffset-rm: 3.510 arcsec [5.43σ]  
KicOffset-rm: 3.192 arcsec [5.22σ]  
OotOffset-st: 3/1/1/0 [5]  
KicOffset-st: 3/1/1/0 [5]  
DiffImageQuality-fgm: 0.00 [0/5]  
DiffImageOverlap-fno: 0.60 [3/5]

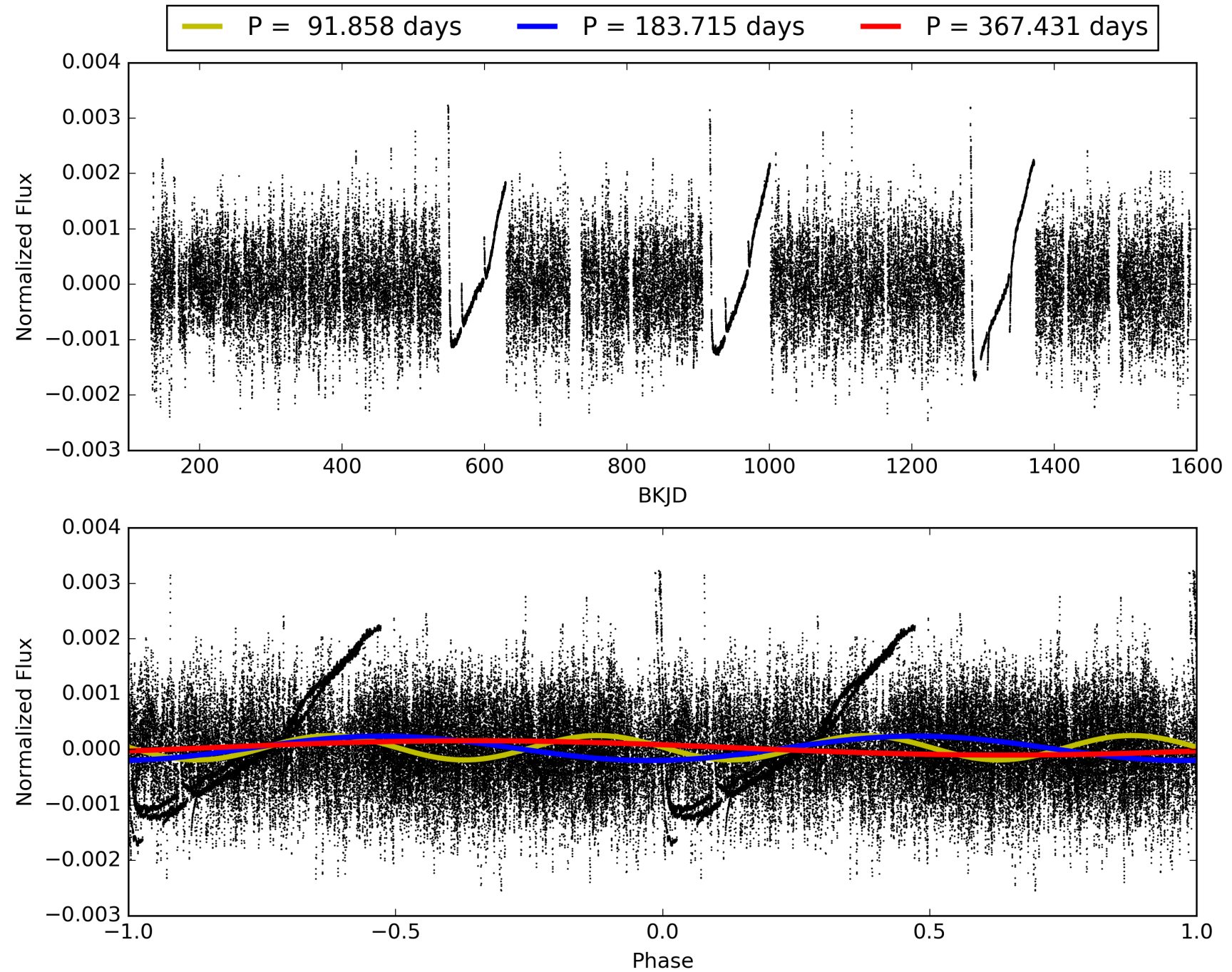
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 16:10:30 Z

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

# TCE 008315220-06, PDC Light Curves

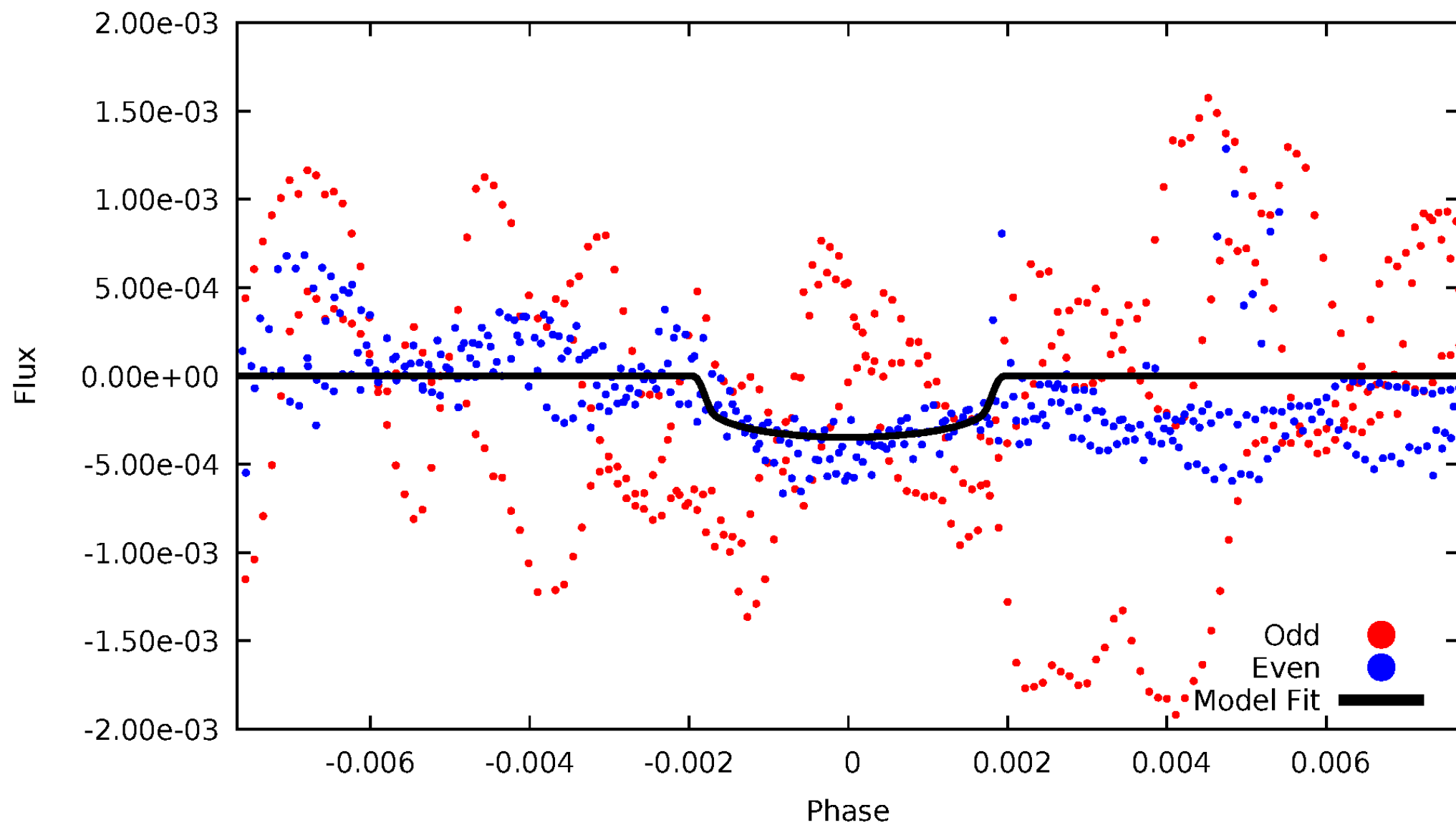


# TCE 008315220-06



# DV Odd/Even

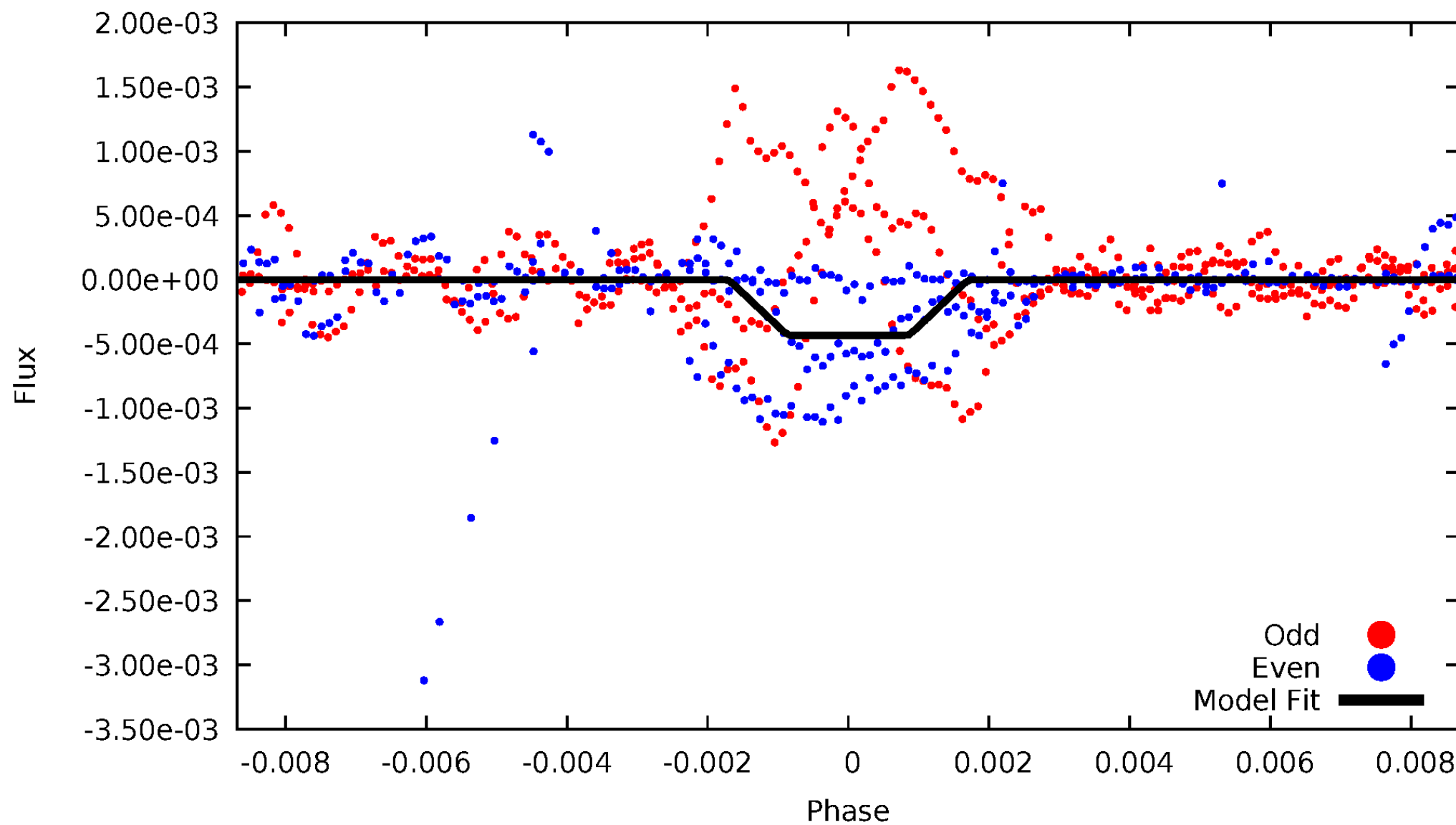
TCE 008315220-06





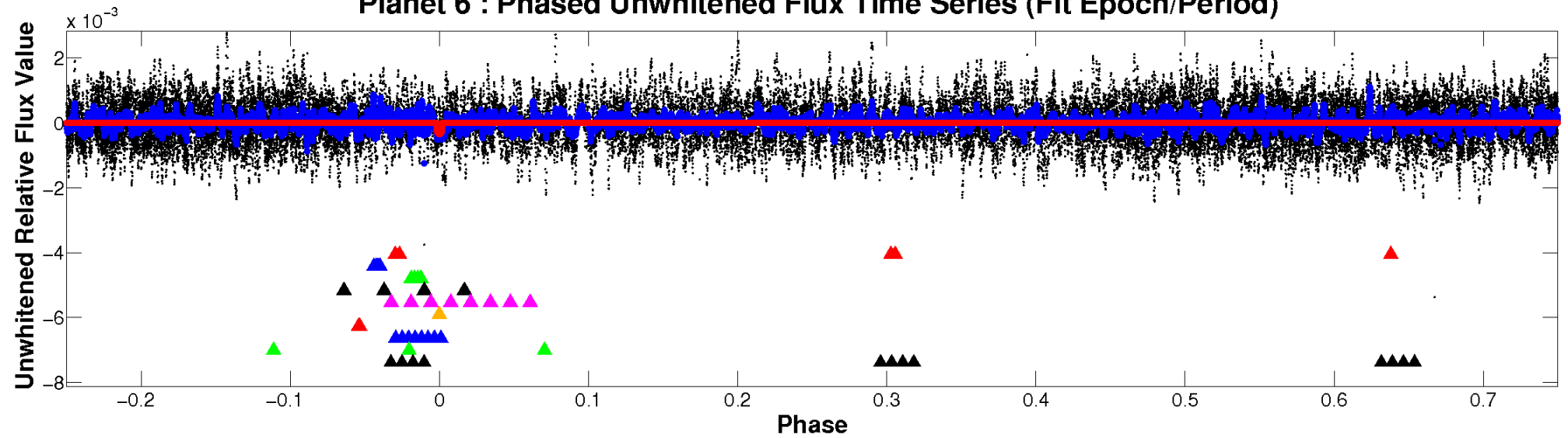
# ALT Odd/Even

TCE 008315220-06

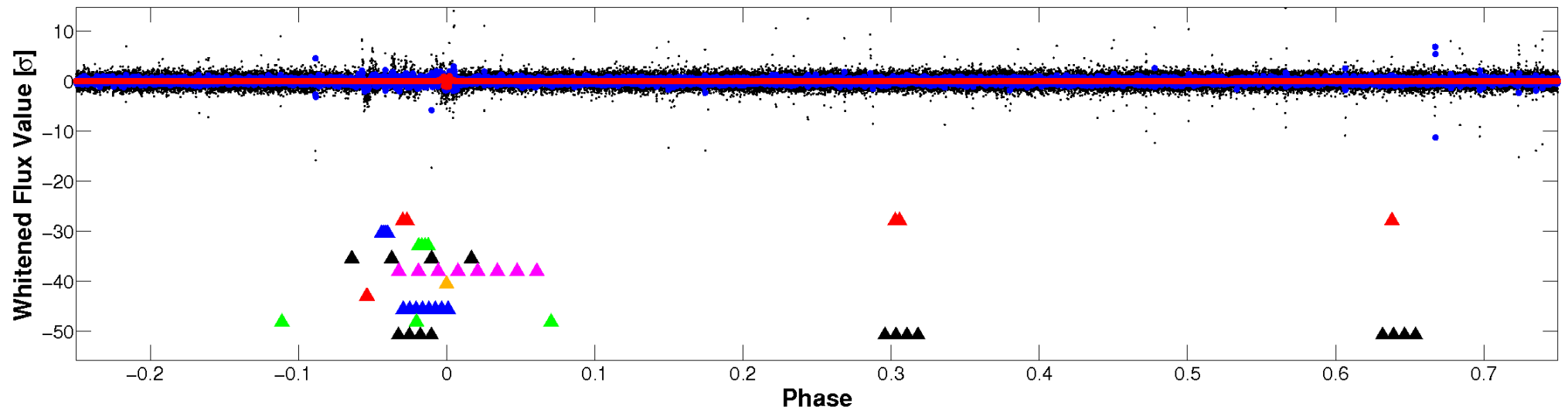


# Non-Whitened Vs. Whitened Light Curve

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



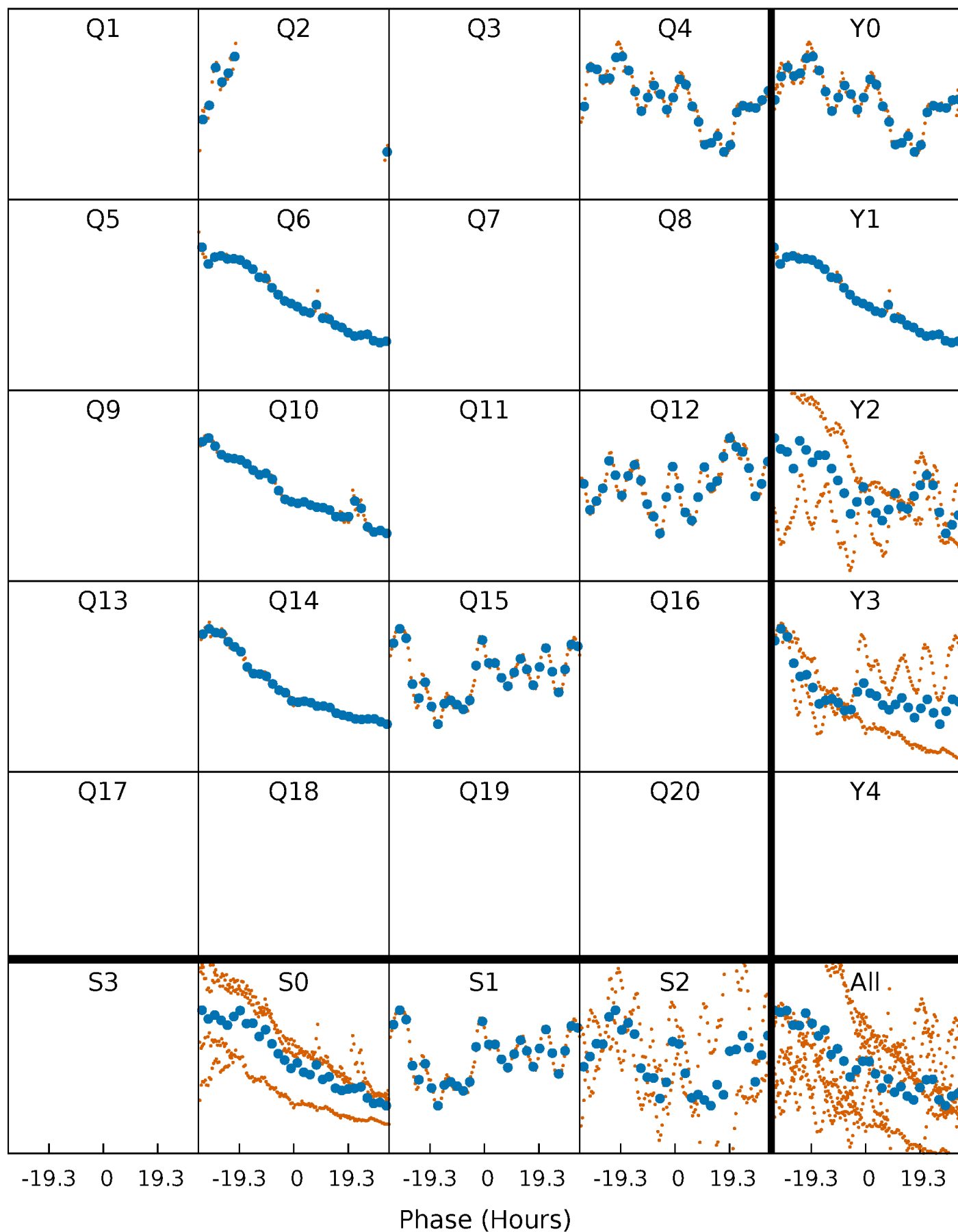
## Planet 6 : Phased Whitened Flux Time Series (Fit Epoch/Period)





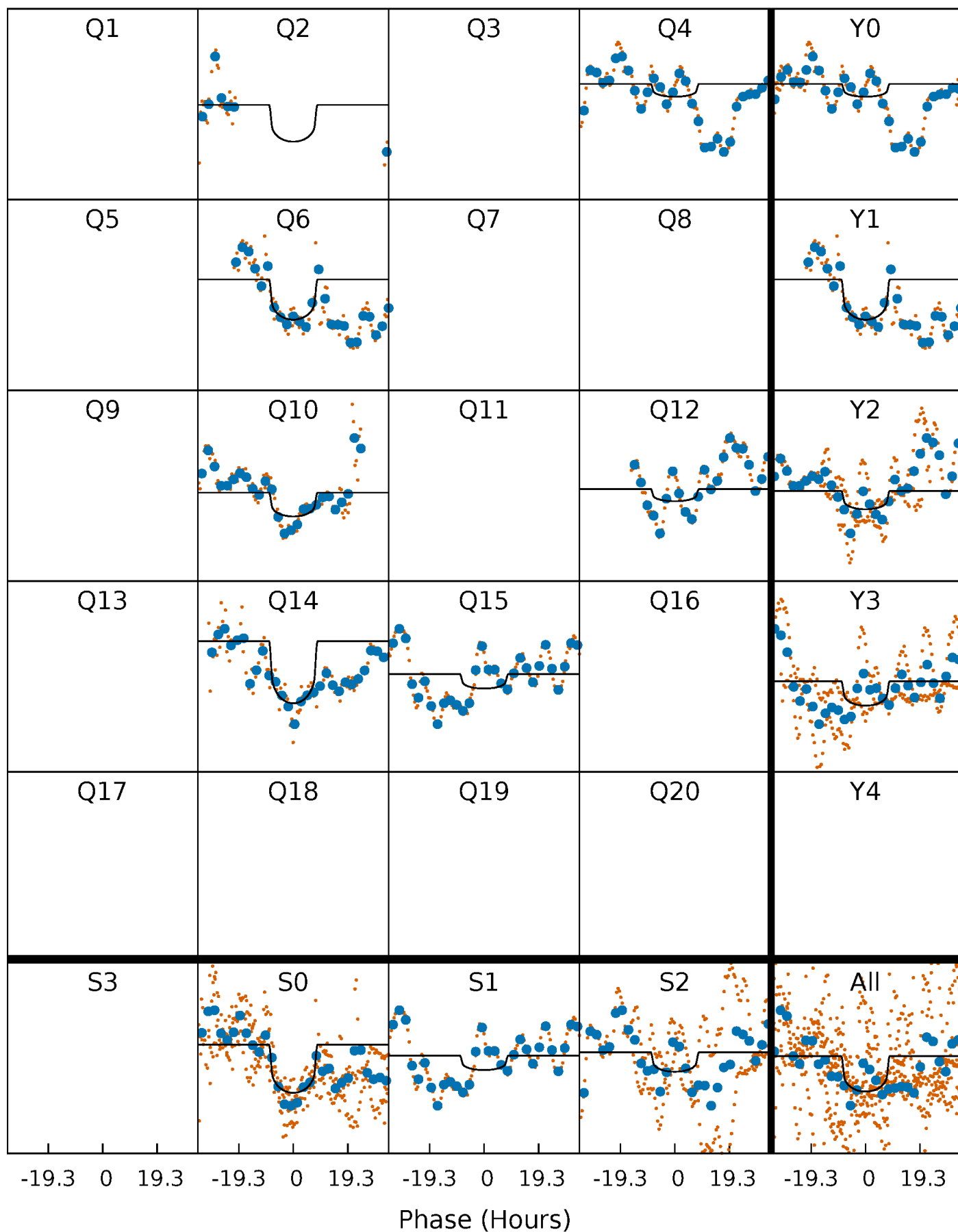
# PDC Quarter-Phased Transit Curves

TCE 008315220-06 P=183.715252 Days  $T_0=182.372967$  (BKJD)



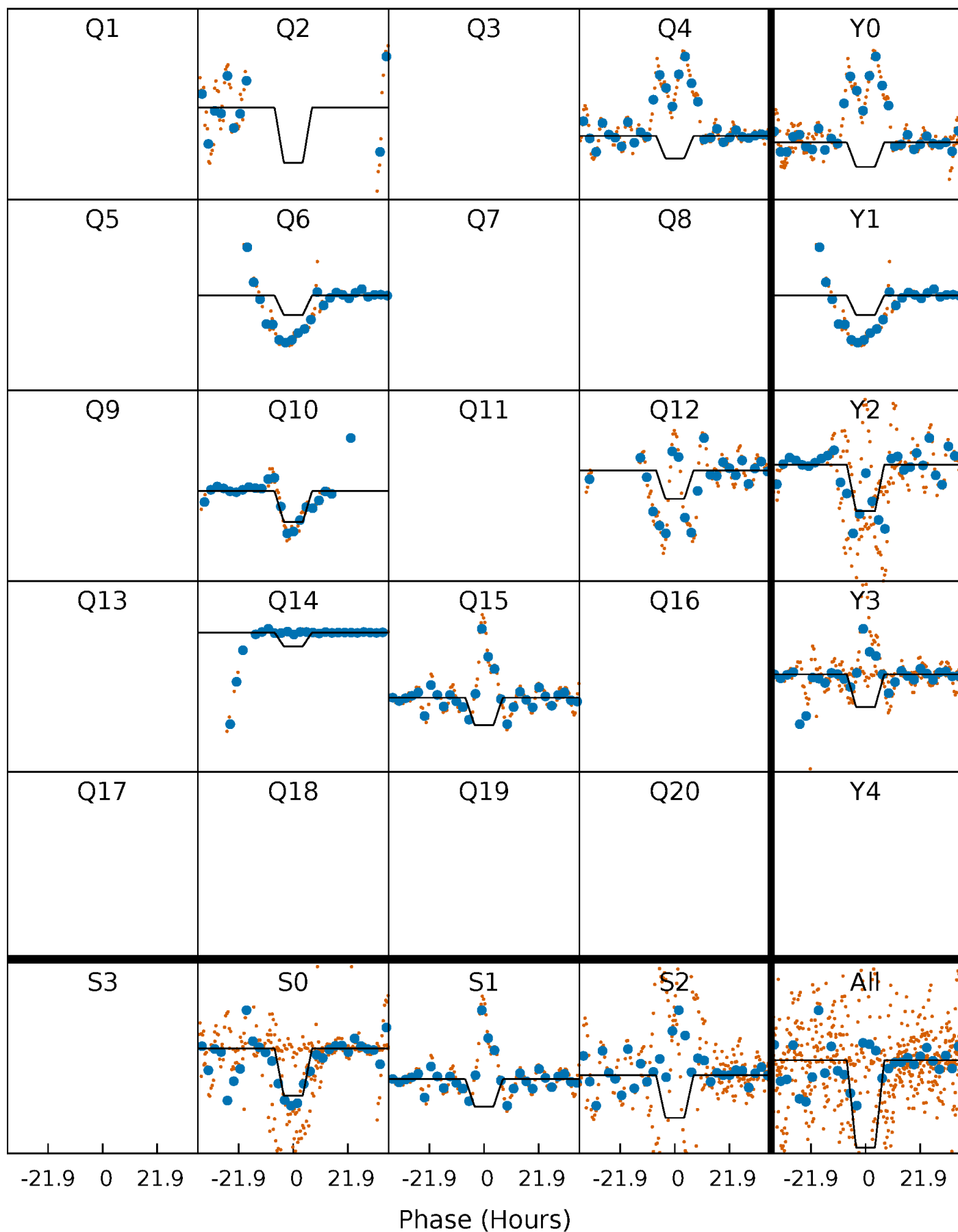
# DV Quarter-Phased Transit Curves

TCE 008315220-06 P=183.715252 Days  $T_0=182.372967$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

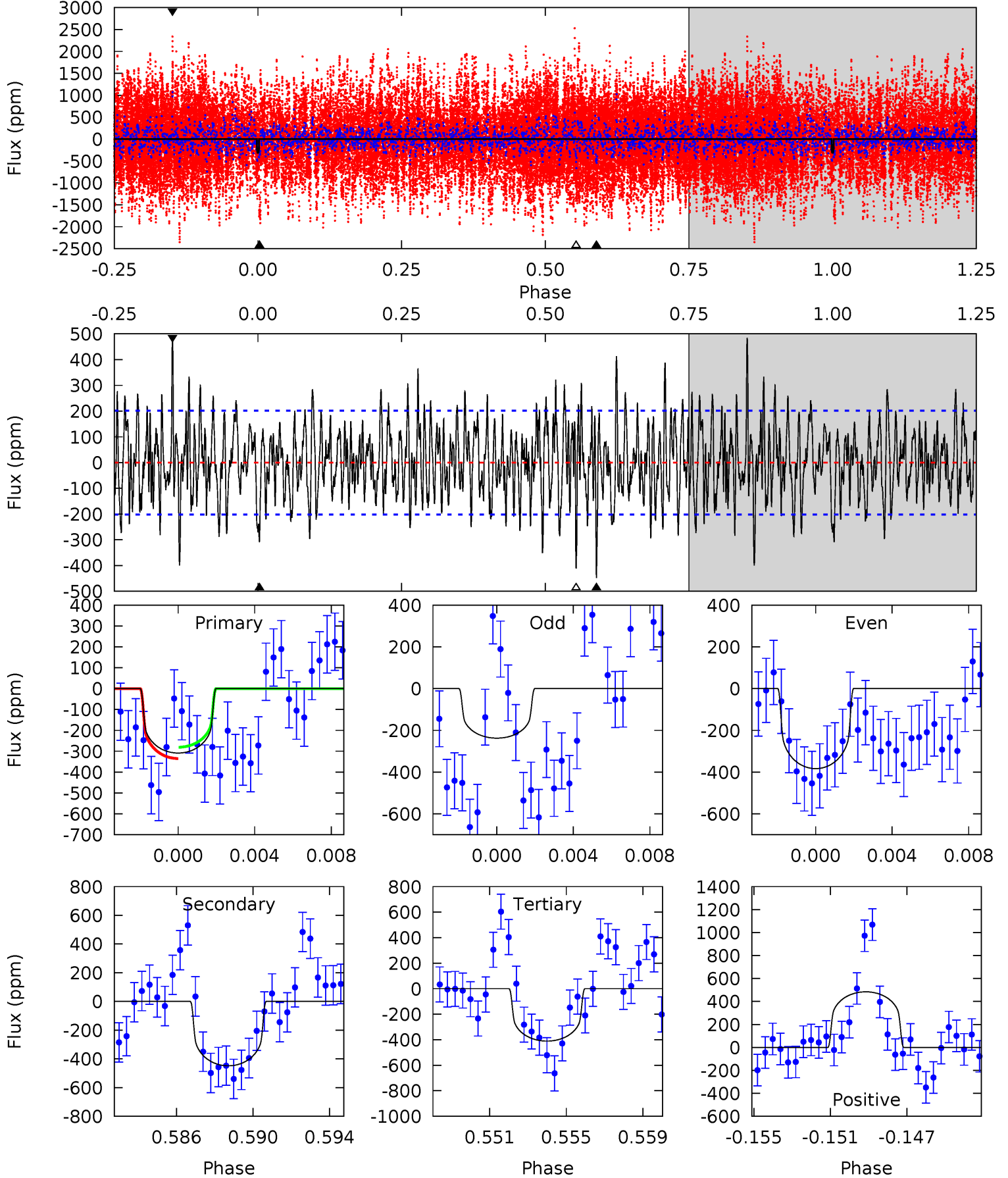
TCE 008315220-06 P=183.718138 Days  $T_0=182.318191$  (BKJD)



# DV Model-Shift Uniqueness Test

008315220-06, P = 183.715252 Days, E = 182.372967 Days

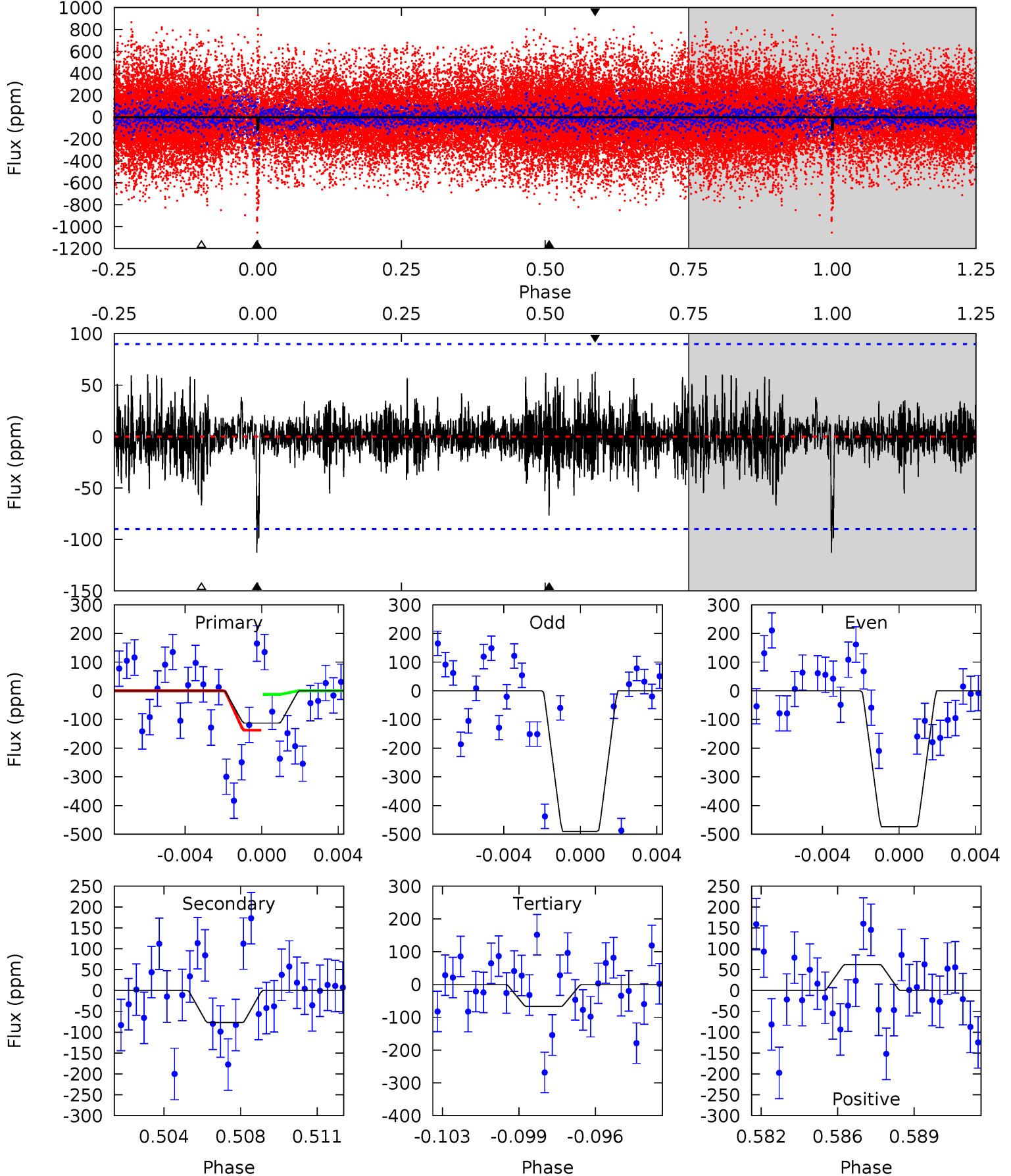
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.96	11.6	10.6	12.5	5.20	2.88	3.28	-2.62	-4.52	0.97	-0.92	1.95	0.85	0.52	0.75



# Alt Model-Shift Uniqueness Test

008315220-06, P = 183.718138 Days, E = 182.318191 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
6.54	4.45	3.88	3.60	5.22	2.92	0.98	2.66	2.94	0.57	0.85	0.35	0.14	0.35	3.68



### Stellar Parameters For KIC 008315220

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5172^{+70}_{-248}$	$2.693^{+0.273}_{-0.126}$	$0.070^{+0.150}_{-0.600}$	$13.454^{+2.481}_{-7.442}$	$3.257^{+0.222}_{-1.999}$	$0.002^{+0.006}_{-0.001}$
	+1%/-5%	+10%/-5%	+214%/-857%	+18%/-55%	+7%/-61%	+302%/-38%
Source	PHO1	FLK73	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 008315220-06 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-448 \pm 39$	$28.28^{+4.14}_{-6.44}$	$1195^{+69}_{-117}$	$5349^{+244}_{-296}$	$274^{+134}_{-65}$
Alt.	$-77 \pm 17$	$30.31^{+3.77}_{-7.42}$	$1191^{+68}_{-124}$	$3668^{+177}_{-187}$	$41^{+21}_{-12}$

$T_{max}$  = 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  $A_{obs} \gg 1.0$

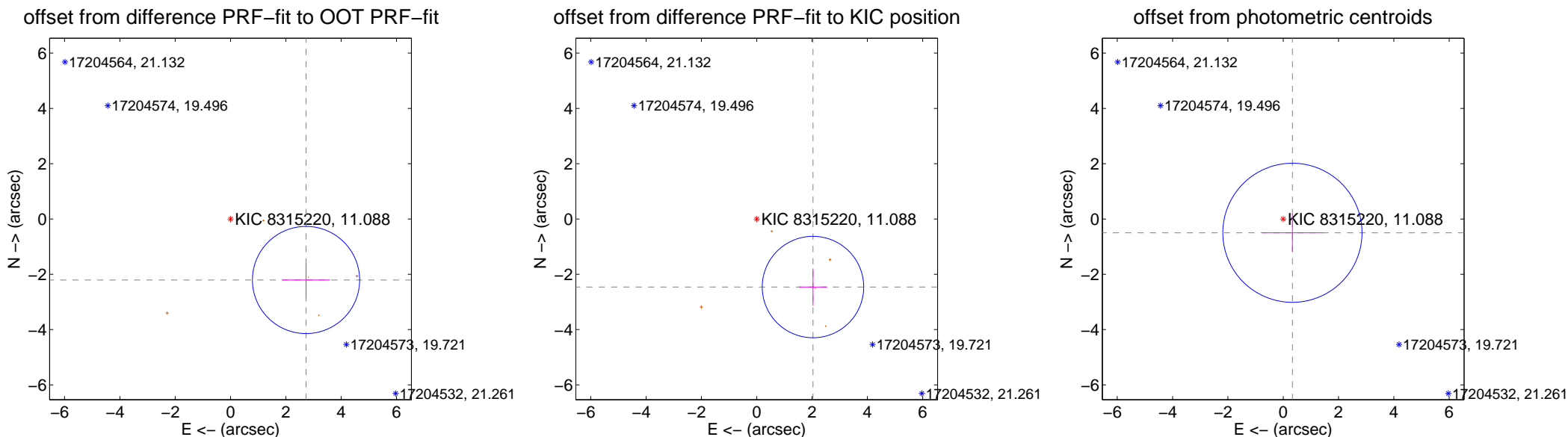
## DV Centroid Data

Supplemental centroid analysis for 008315220-06. **Kepler magnitude: 11.09.** Transit SNR 17.97

**There are 0 quarters with good PRF difference image offsets**

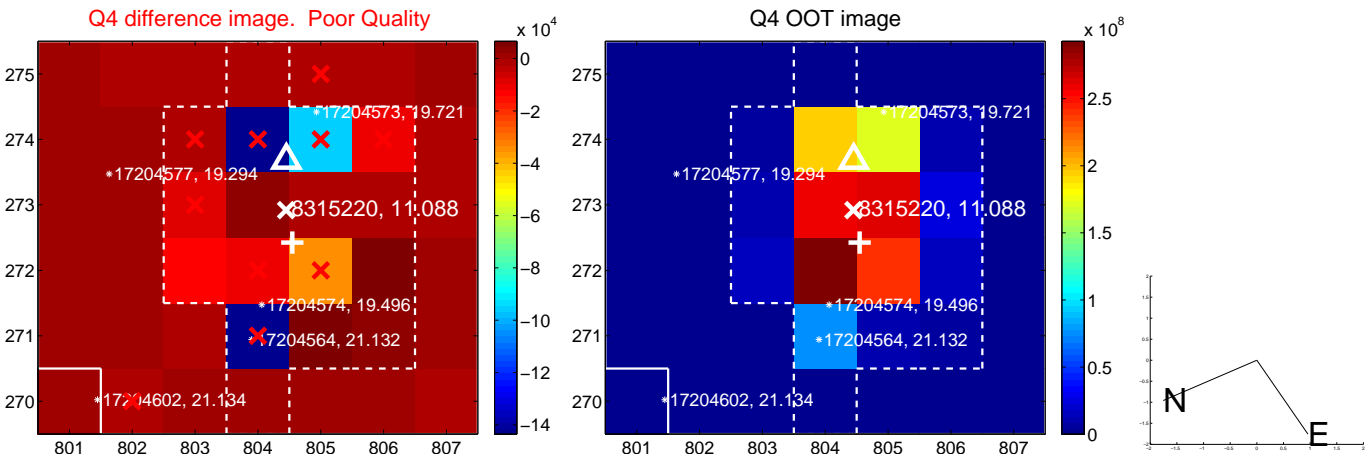
The direct PRF centroid is offset from the target star catalog position by about 0.36 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b><math>3.510 \pm 0.646</math></b>	<b>5.43</b>	$-2.730 \pm 0.862$	$-2.206 \pm 0.615$
PRF-fit source offset from KIC position	<b><math>3.192 \pm 0.611</math></b>	<b>5.22</b>	$-2.033 \pm 0.510$	$-2.460 \pm 0.672$
photometric centroid source offset	$0.60 \pm 0.84$	0.71	$-0.33 \pm 1.10$	$-0.50 \pm 0.69$



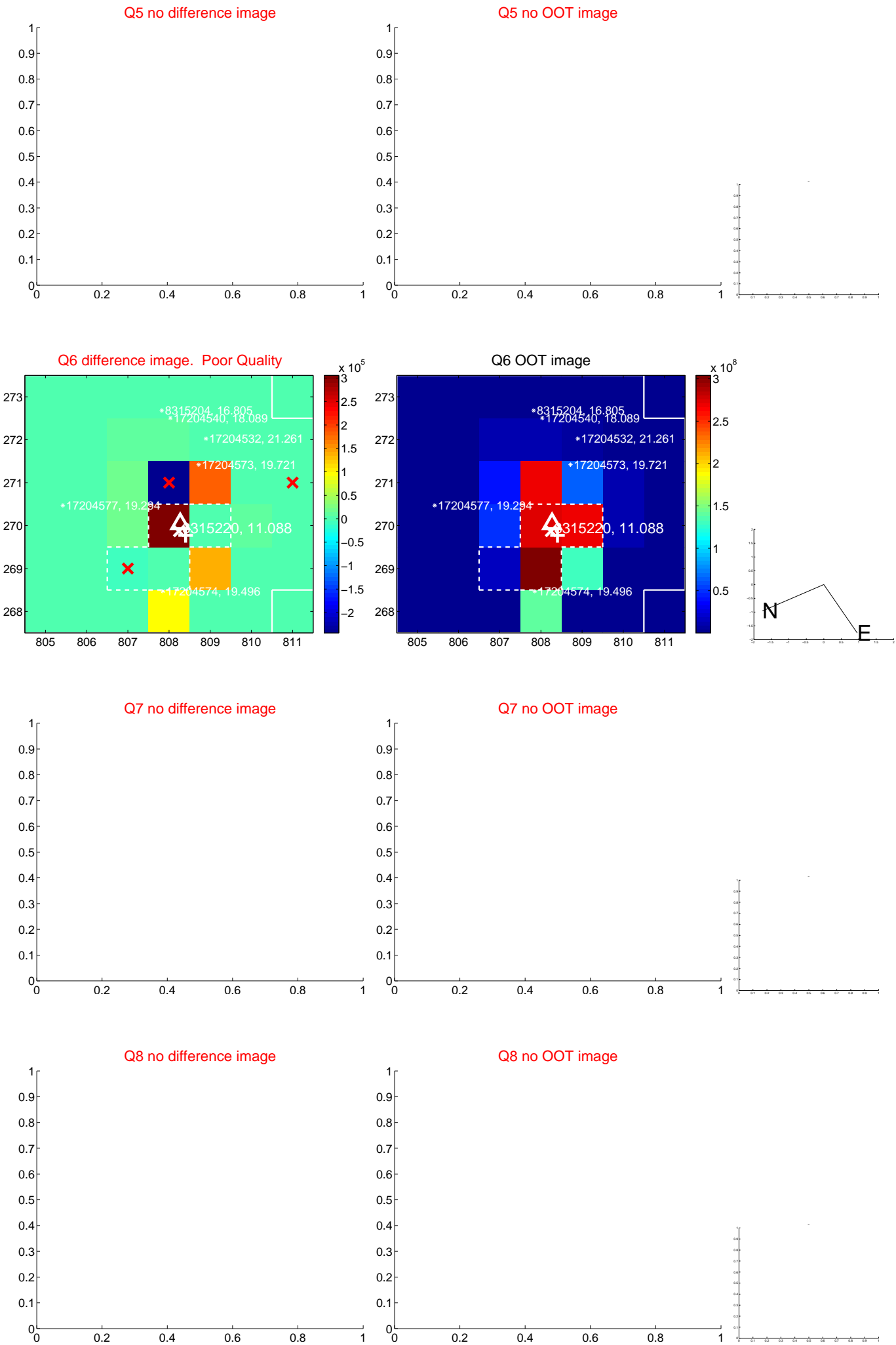
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: 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.

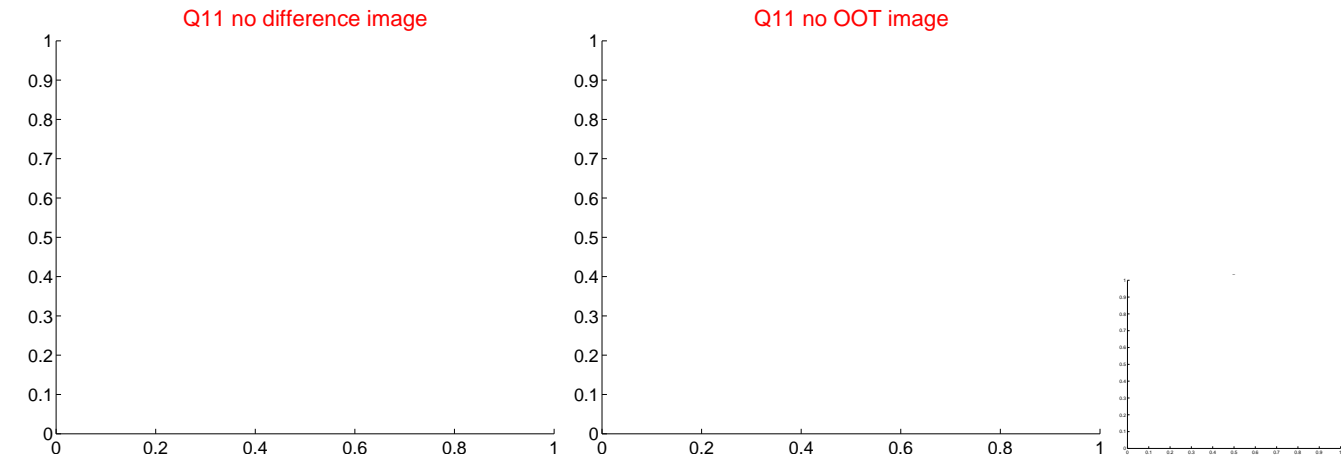
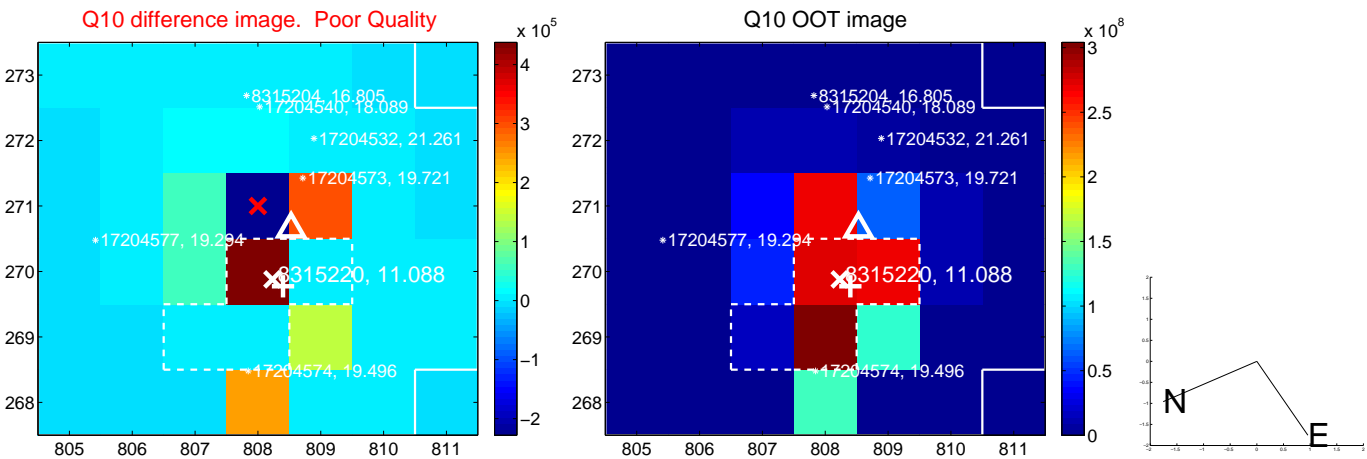




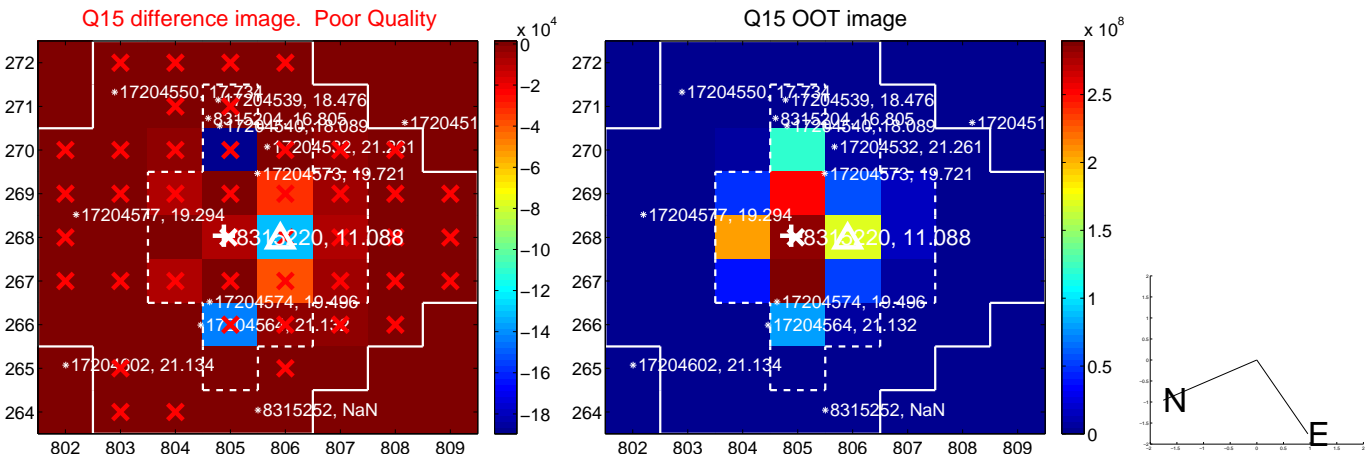
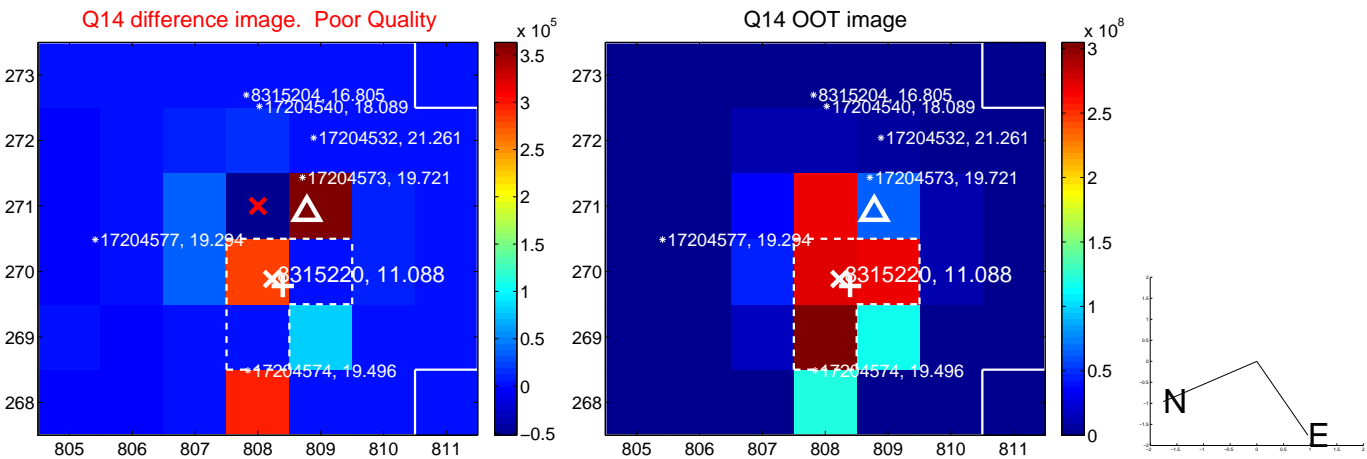
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



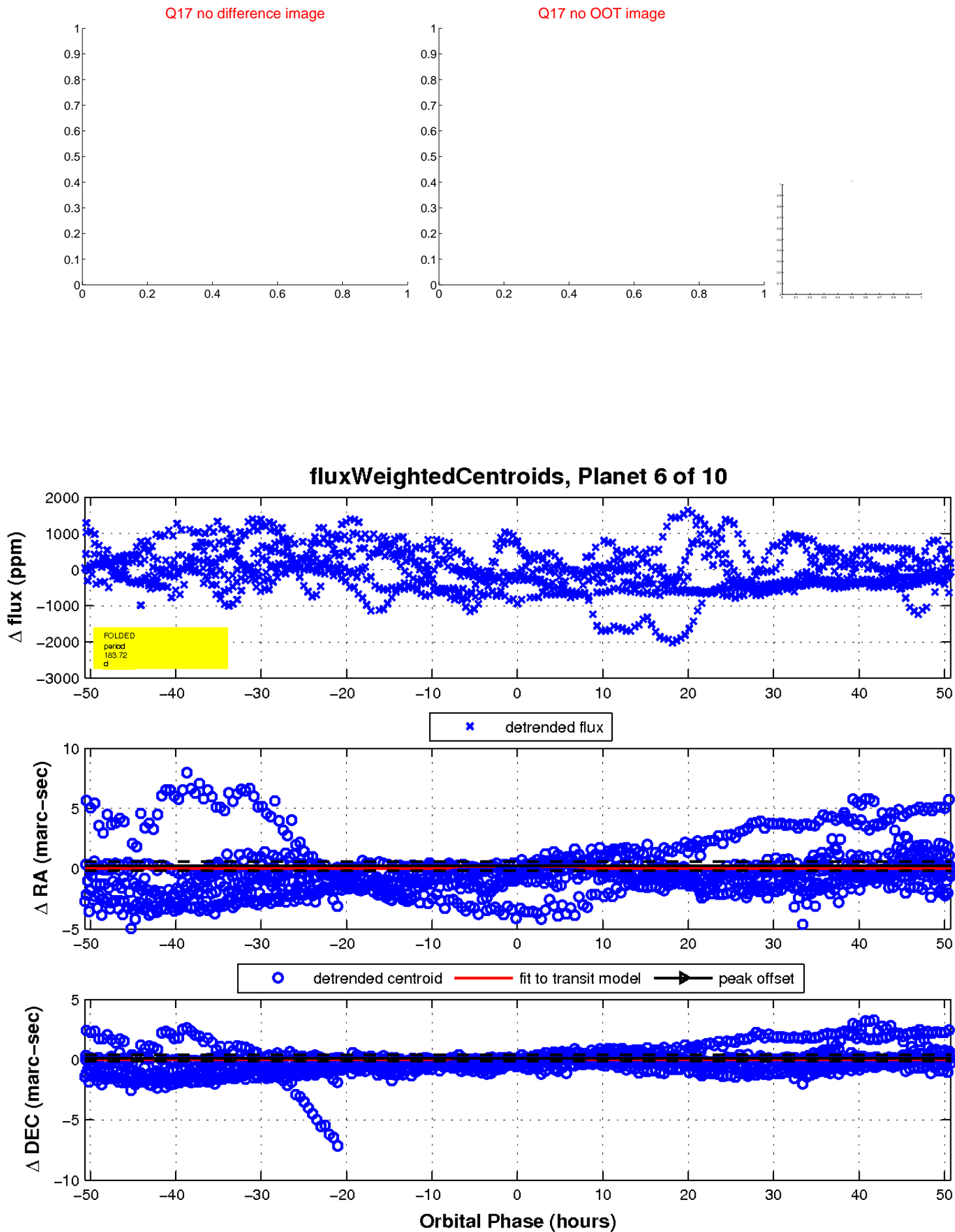
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



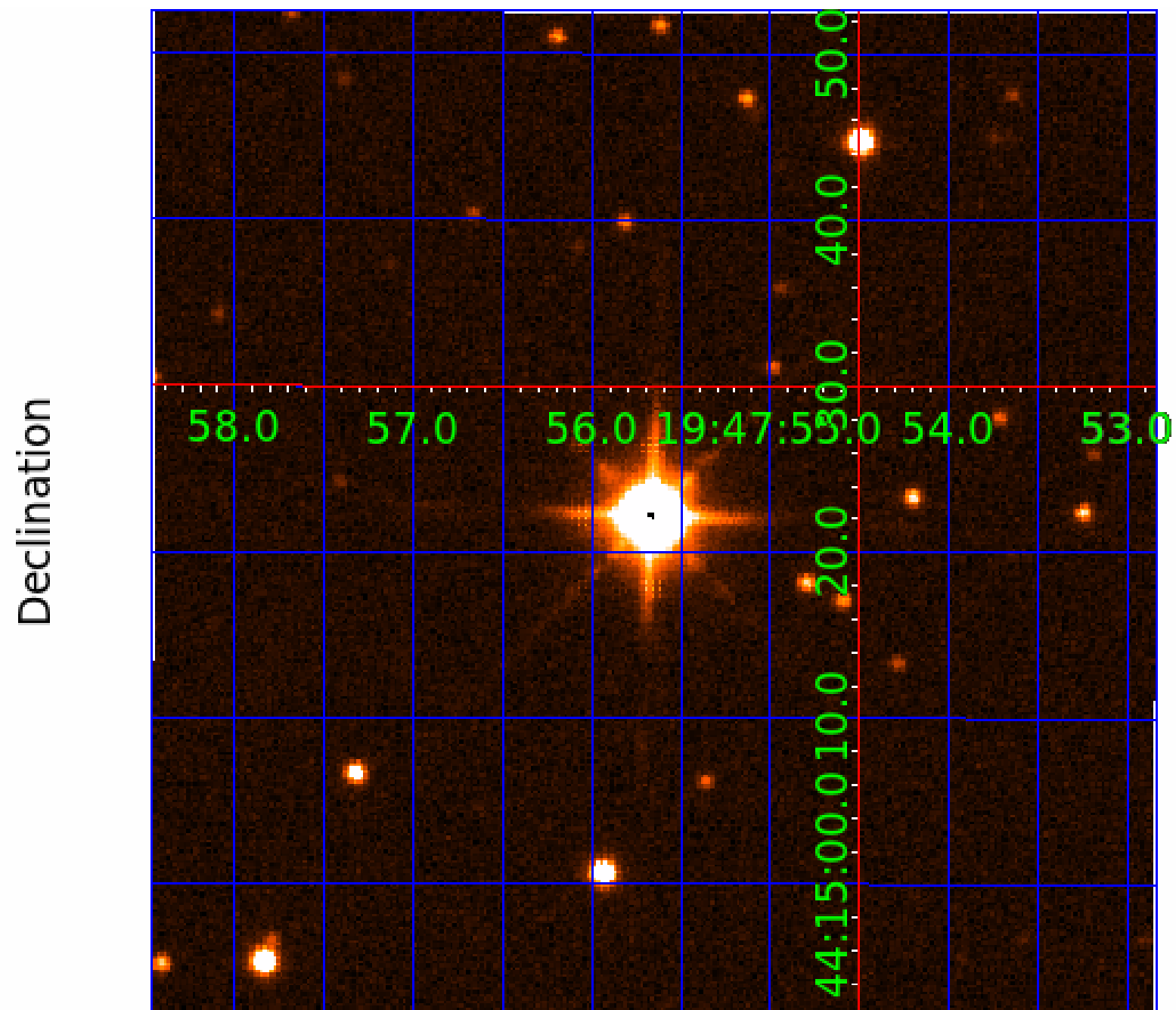
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image



## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008315220-01	OBS	No	306.366968	238.002854	978.6	14.592	25.2	18.2	13.45	5172	72.09	66.75
008315220-02	OBS	No	367.177451	175.068533	144.9	15.000	31.5	-1.0	13.45	5172	15.78	52.43
008315220-03	OBS	No	367.826147	178.916856	582.1	16.110	18.5	18.2	13.45	5172	43.69	52.31
008315220-04	OBS	No	362.484543	185.462403	90.9	15.000	21.3	-1.0	13.45	5172	12.50	53.34
008315220-05	OBS	No	181.269349	193.563129	108.1	6.180	14.6	5.3	13.45	5172	16.33	134.38
008315220-06	OBS	No	183.715252	182.372967	347.0	16.910	17.2	18.0	13.45	5172	28.23	132.00
008315220-07	OBS	No	367.388598	172.555205	46.9	15.000	13.2	-1.0	13.45	5172	8.98	52.39
008315220-08	OBS	No	182.919583	182.566043	325.9	10.920	15.3	8.9	13.45	5172	25.79	132.76
008315220-09	OBS	No	534.460195	379.043140	118.9	7.500	16.0	-1.0	13.45	5172	14.30	31.78
008315220-10	OBS	No	122.022409	180.490237	52.5	15.000	11.2	-1.0	13.45	5172	9.50	227.78

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008315220-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_SATURATED
008315220-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—NO_FITS—INCONSISTENT_TRANS—CENT_SATURATED
008315220-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_TER_DV—MOD_POS_DV—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
008315220-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
008315220-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_ZUMA—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—SAME_NTL_PERIOD—CENT_SATURATED
008315220-06	OBS	FP	0.00	1	0	1	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_SATURATED—HALO_GHOST
008315220-07	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—SAME_NTL_PERIOD—CENT_SATURATED
008315220-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_SATURATED
008315220-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
008315220-10	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED

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

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

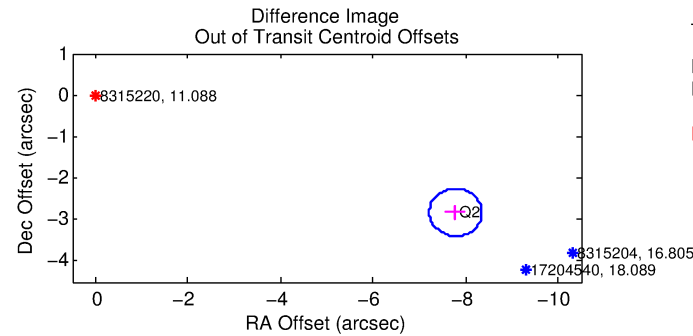
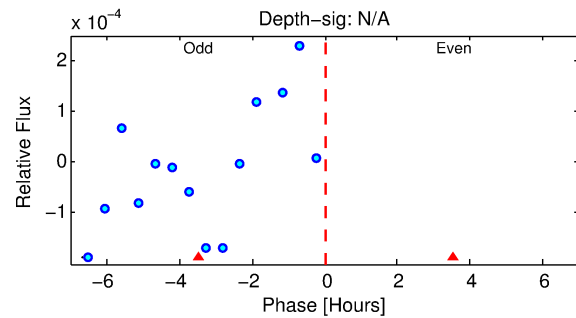
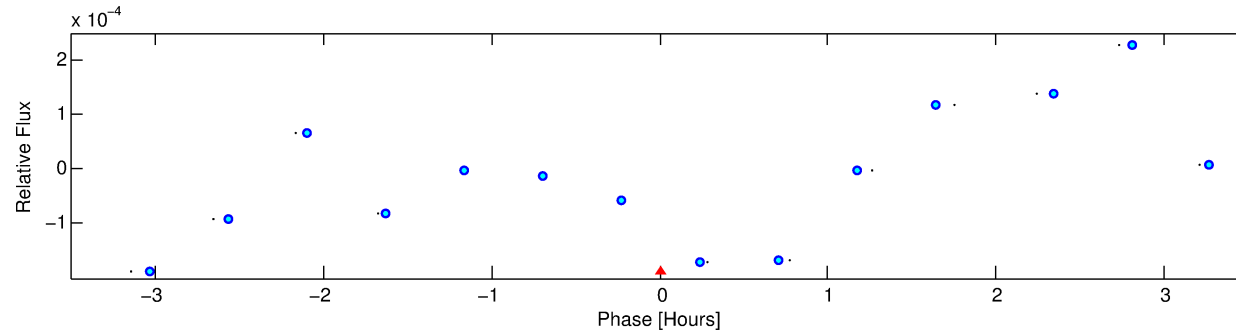
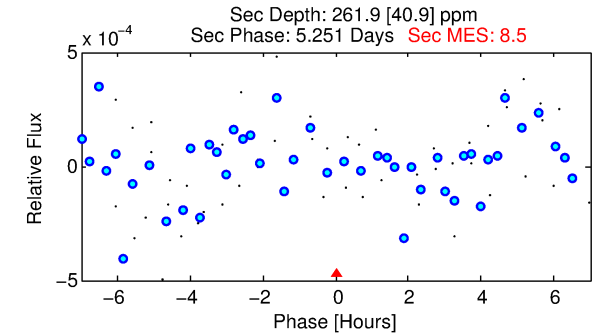
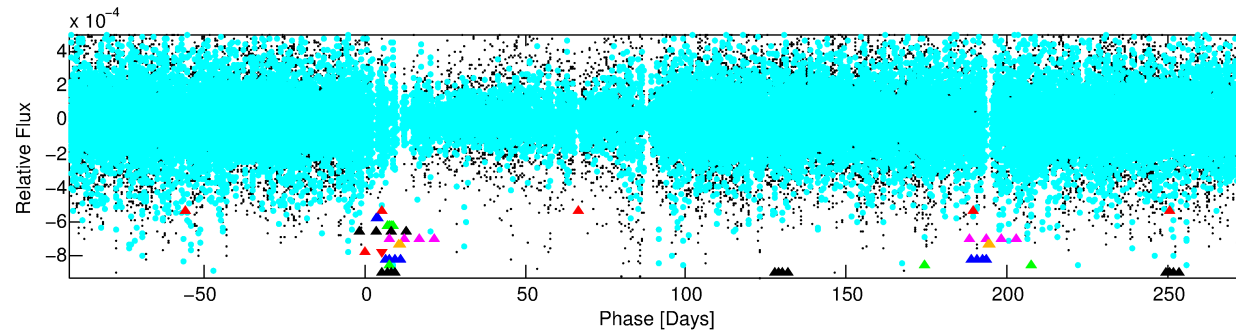
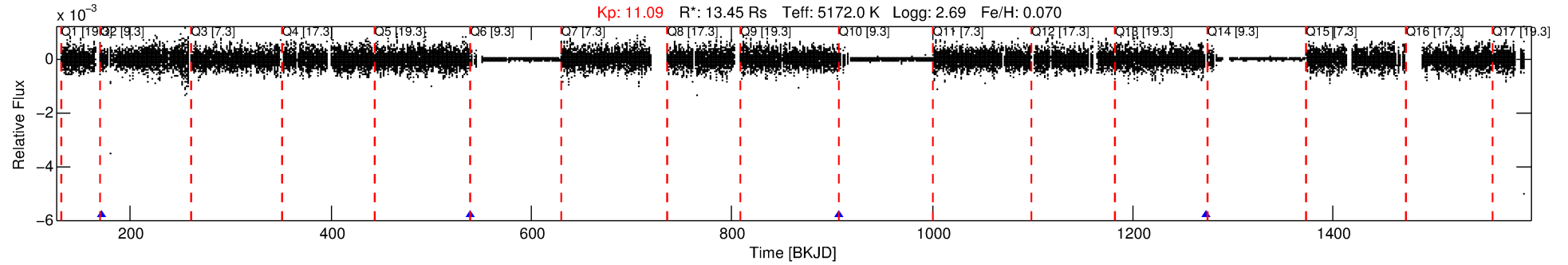
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 008315220-07

No Significant Match Found

# DV One-Page Summary

KIC: 8315220 Candidate: 7 of 10 Period: 367.389 d



## TPS TCE Results:

Period = 367.38860 d  
Epoch = 172.5552 BKJD

DV fit results are unavailable

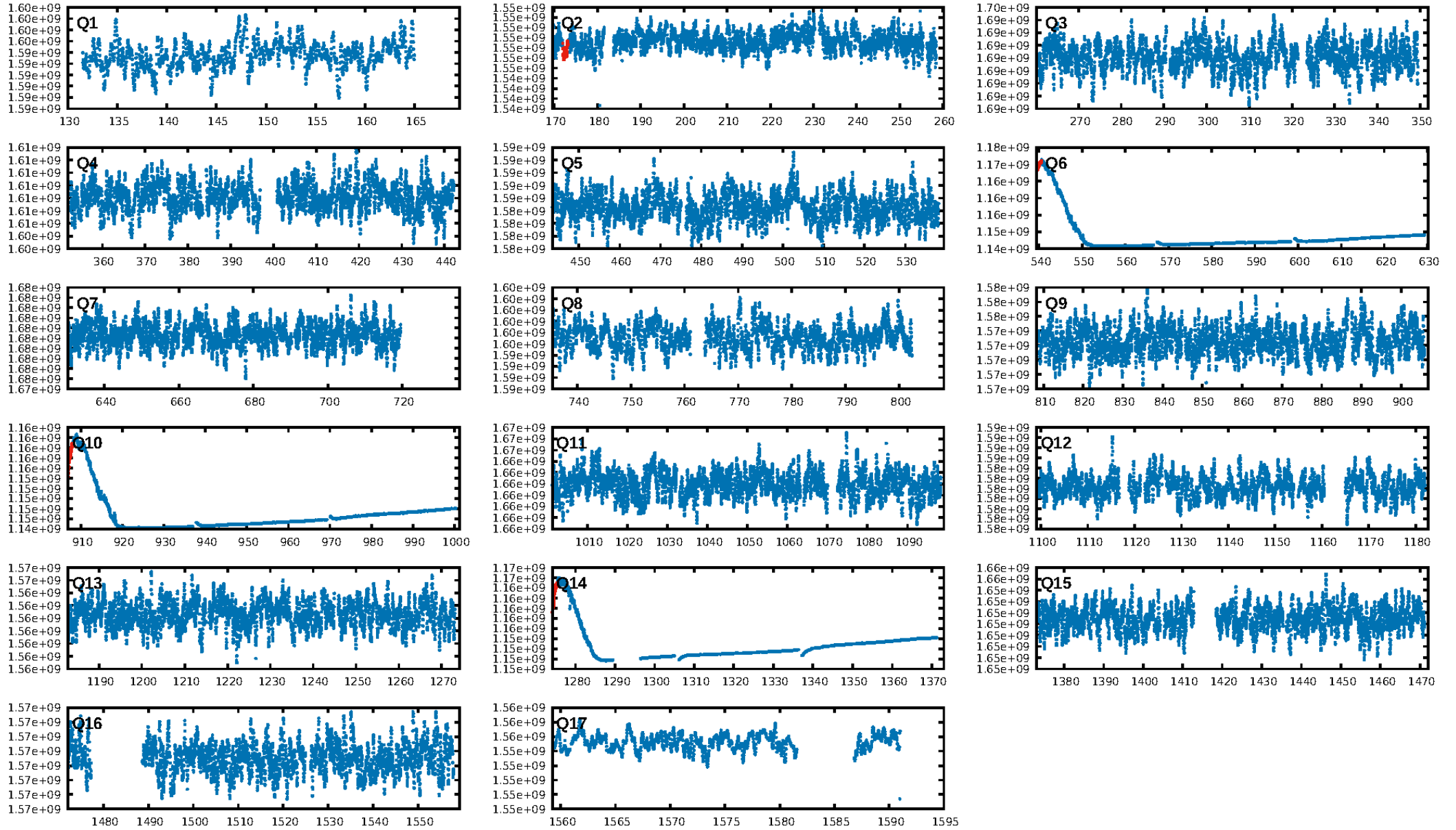
## DV Diagnostic Results:

ShortPeriod-sig: 18.9% [0.24 $\sigma$ ]  
LongPeriod-sig: 36.7% [0.48 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGoF-sig: N/A  
**Bootstrap-pfa: 5.95e-11**  
RollingBand-fgt: 1.00 [1/1]  
**GhostDiagnostic-chr: 1.593**  
Centroid-sig: 40.6%  
Centroid-so: 16.384 arcsec [0.66 $\sigma$ ]  
**OotOffset-rm: 8.277 arcsec [43.60 $\sigma$ ]**  
**KicOffset-rm: 7.629 arcsec [40.51 $\sigma$ ]**  
OotOffset-st: 1/0/0/0 [1]  
KicOffset-st: 1/0/0/0 [1]  
DiffImageQuality-fgm: 0.00 [0/1]  
DiffImageOverlap-fno: 1.00 [1/1]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 16:11:04 Z

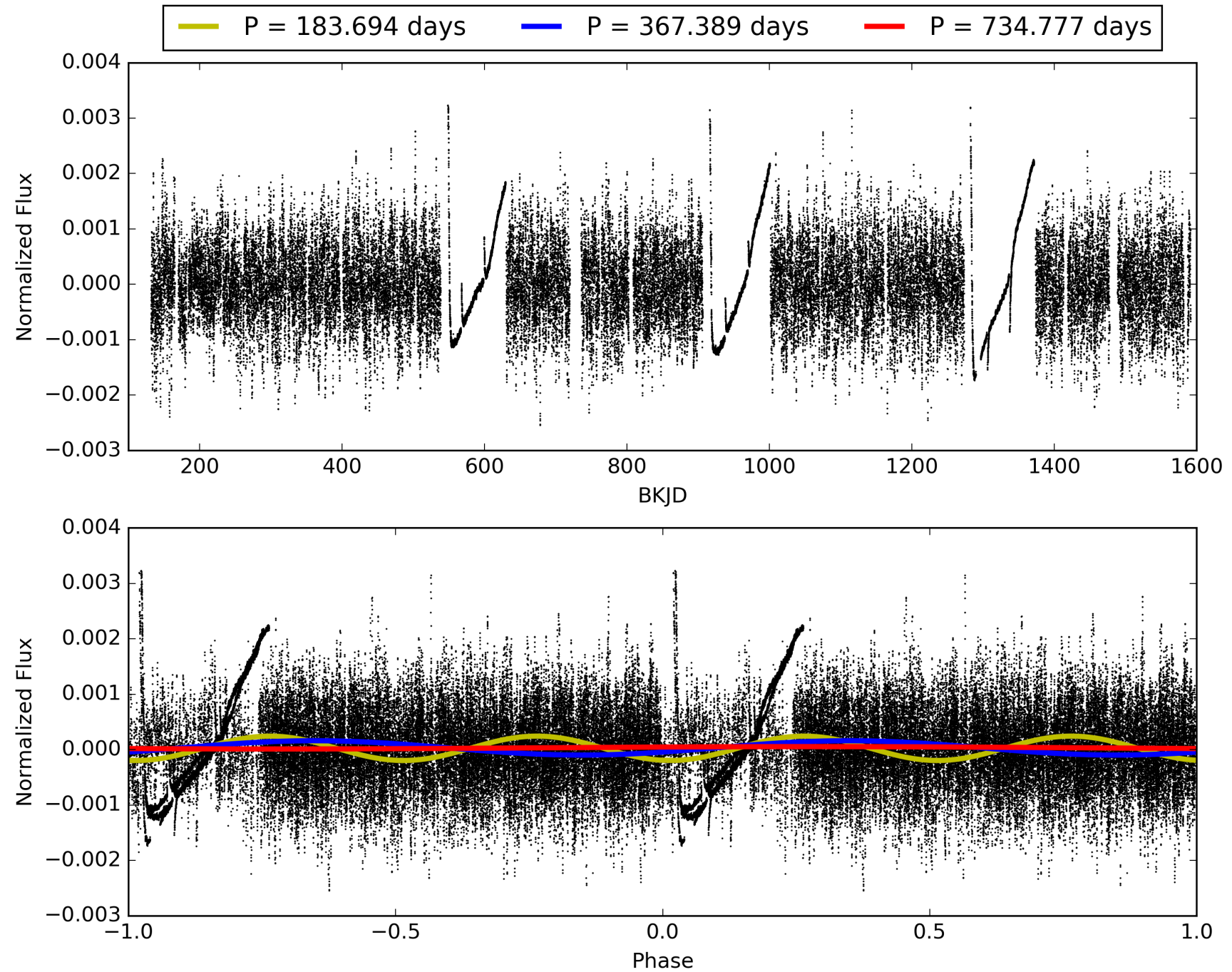
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 008315220-07, PDC Light Curves



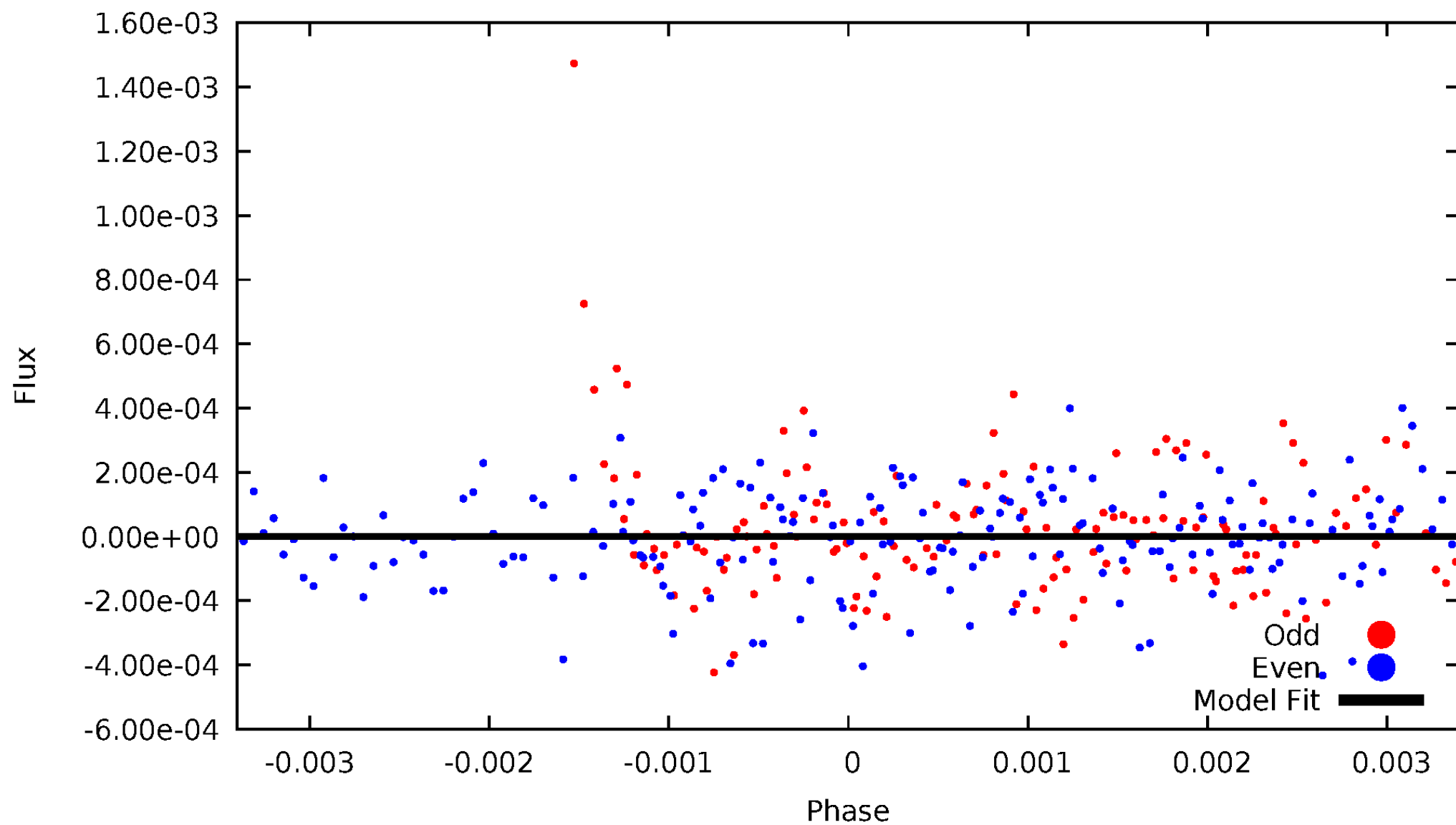


# TCE 008315220-07



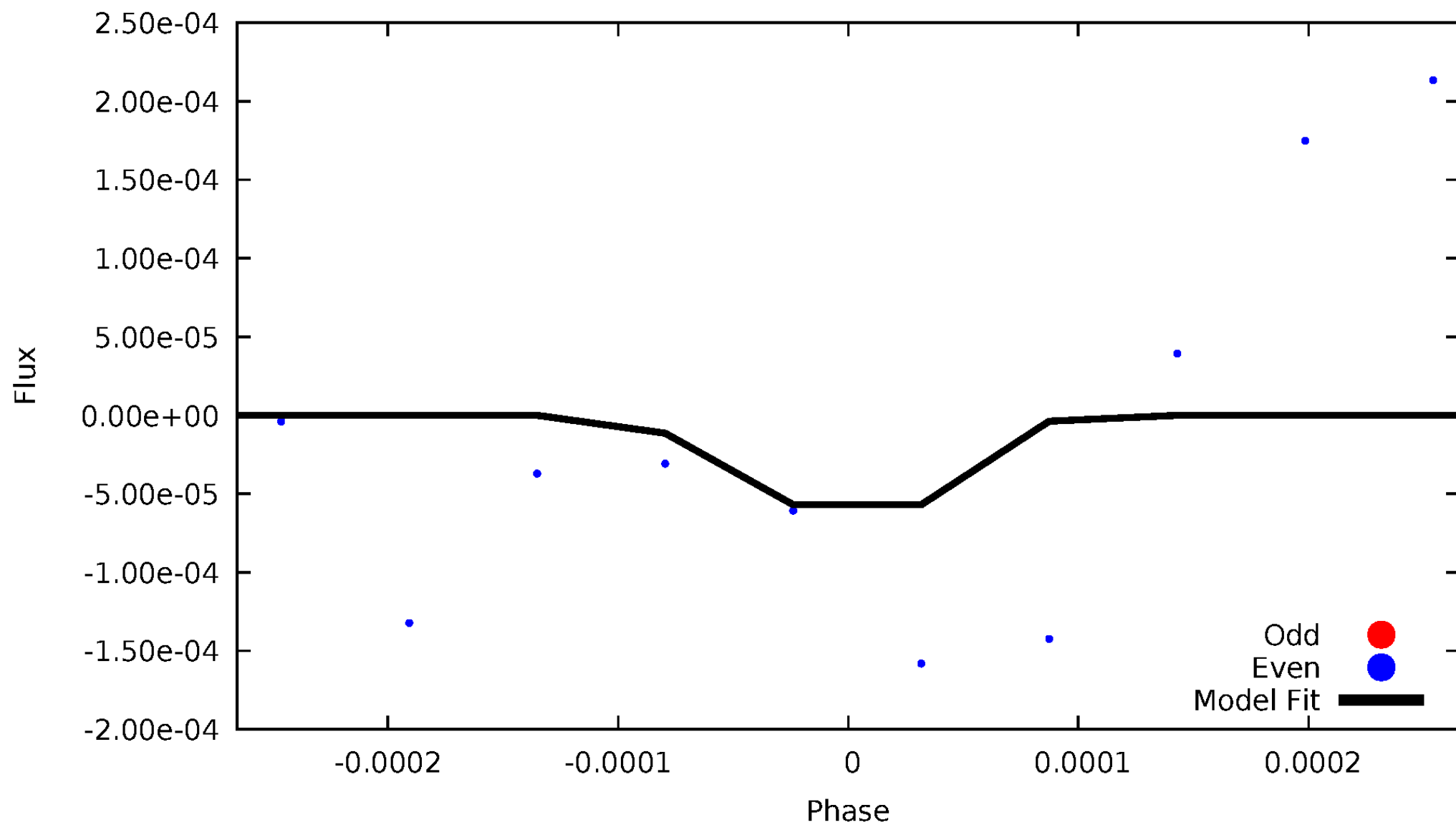
# DV Odd/Even

TCE 008315220-07

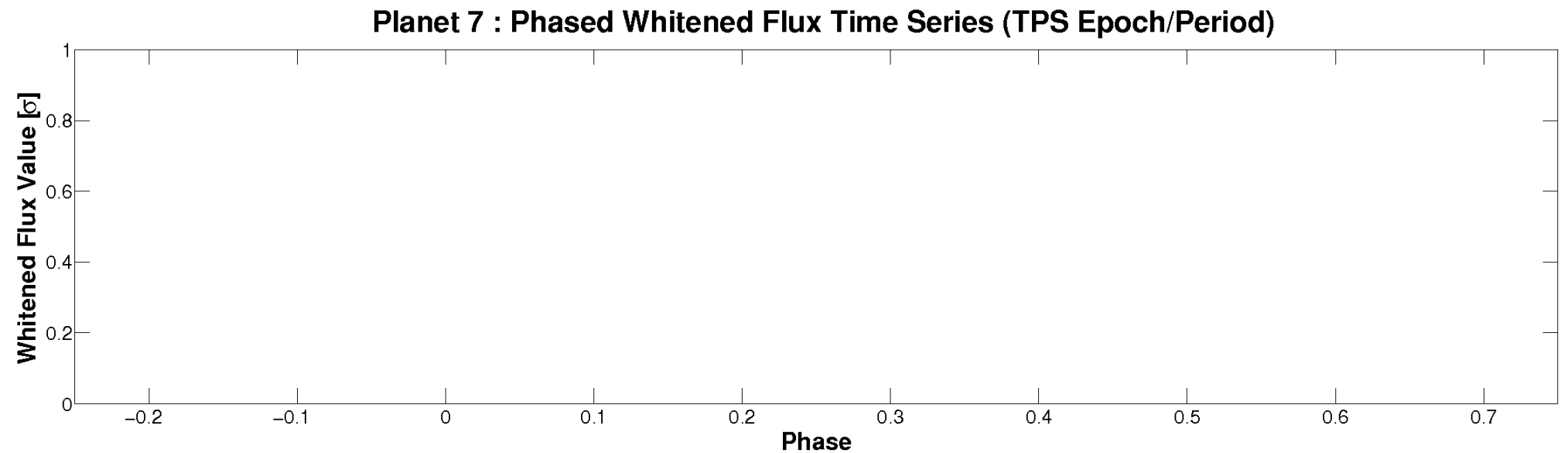
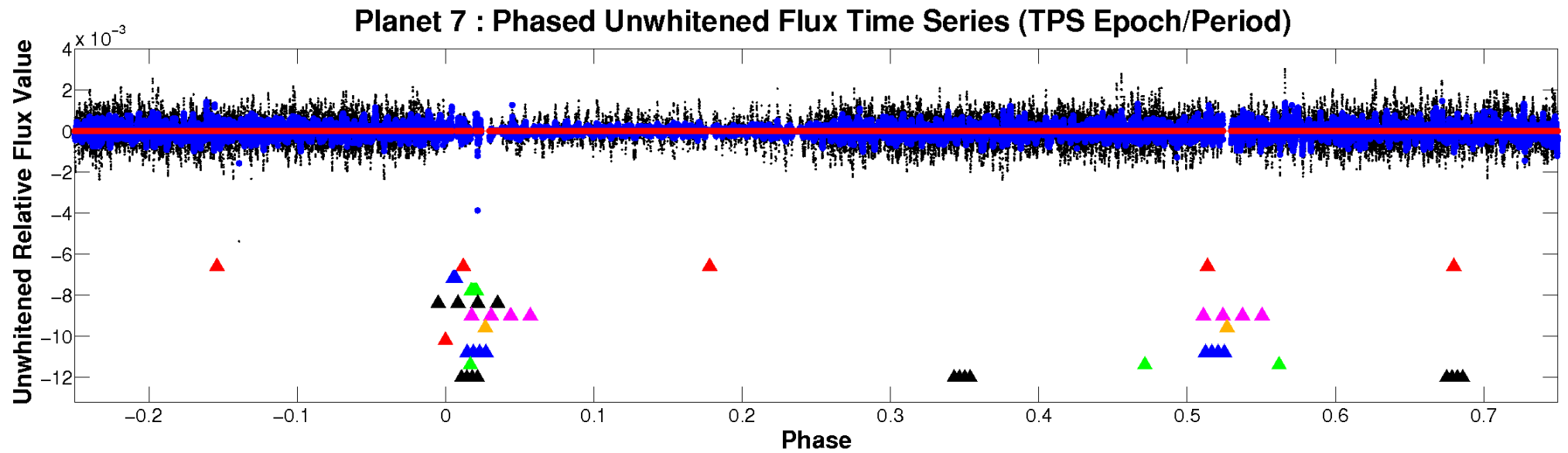


# ALT Odd/Even

TCE 008315220-07

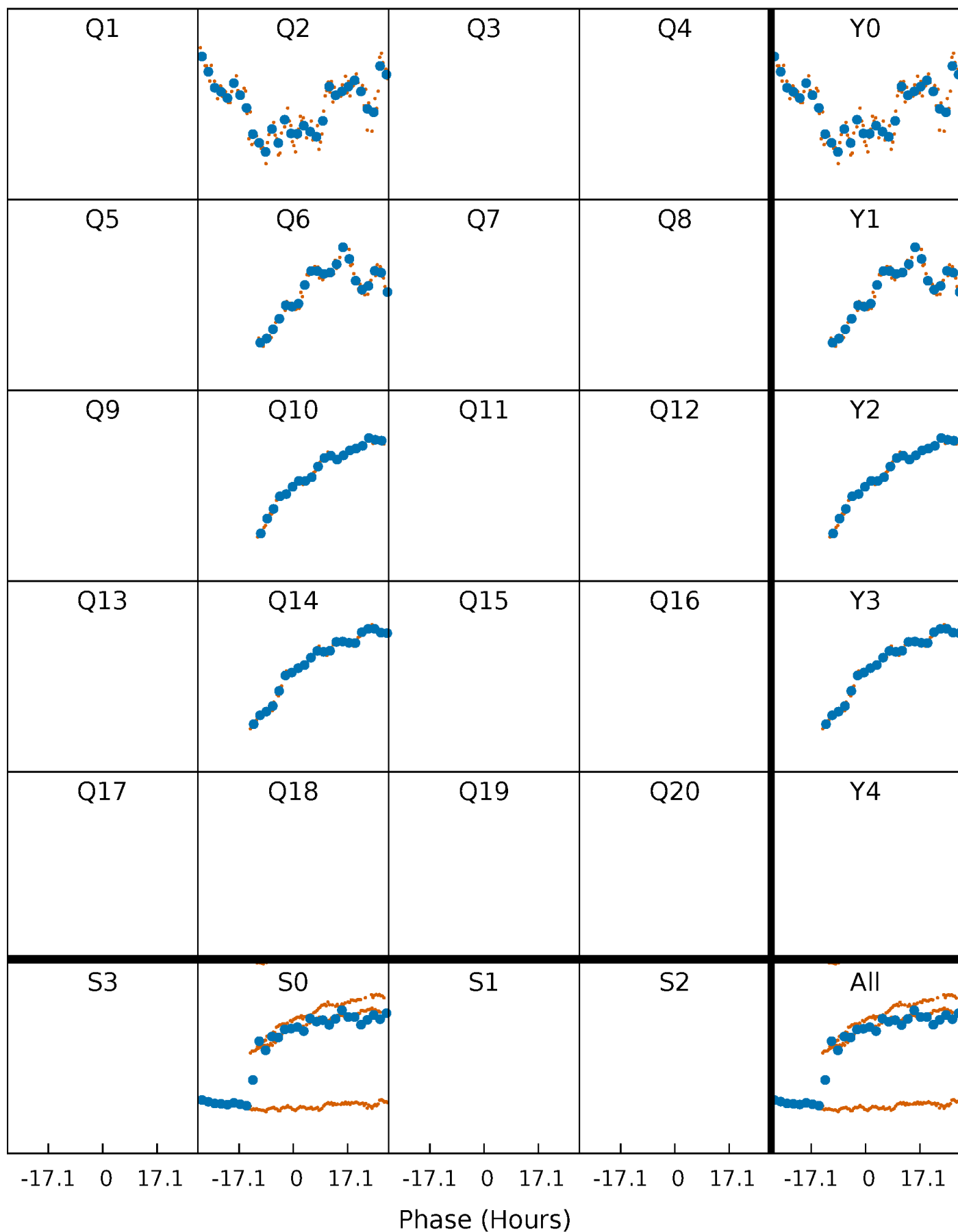


# Non-Whitened Vs. Whitened Light Curve



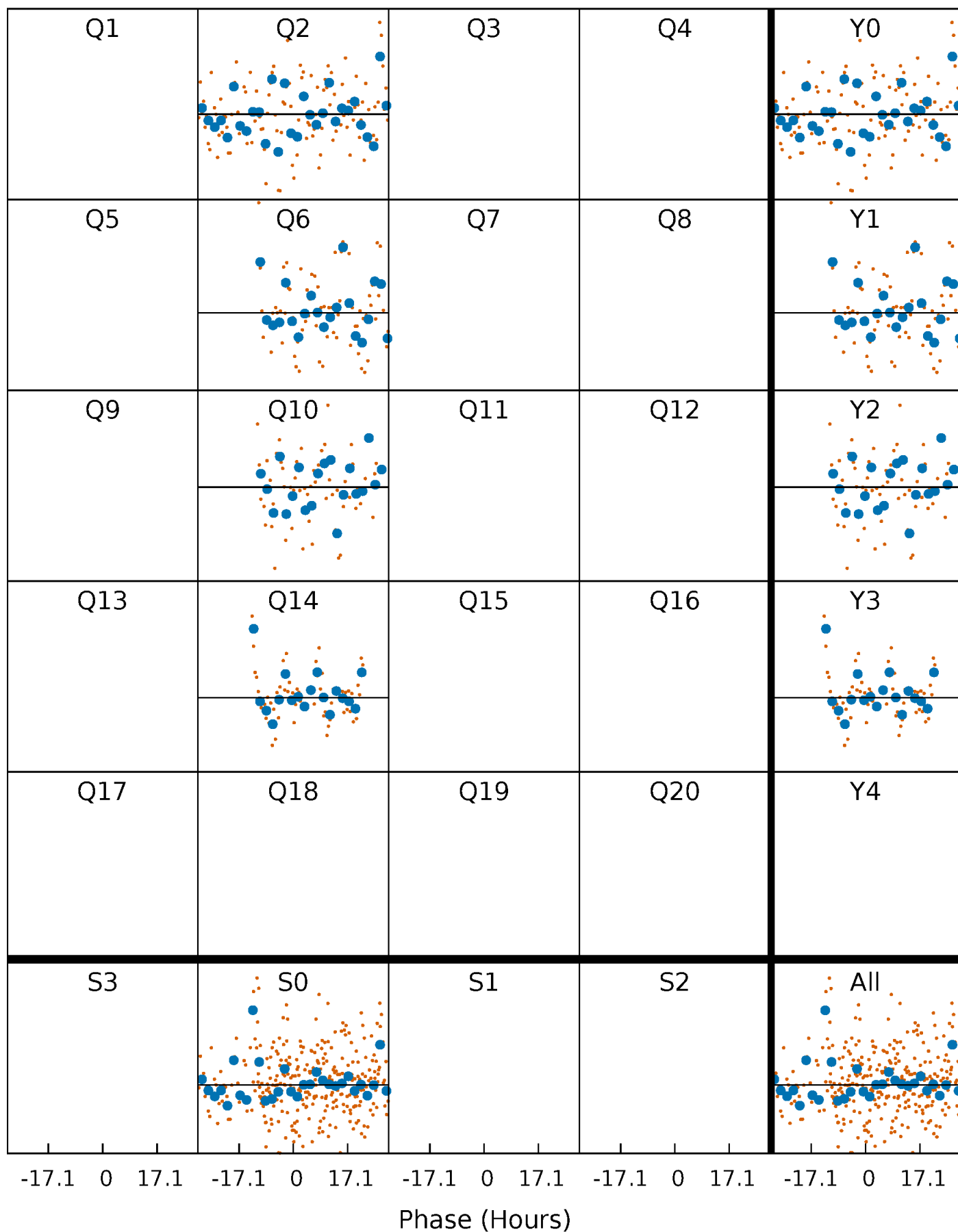
# PDC Quarter-Phased Transit Curves

TCE 008315220-07     $P=367.388598$  Days     $T_0=172.555205$  (BKJD)



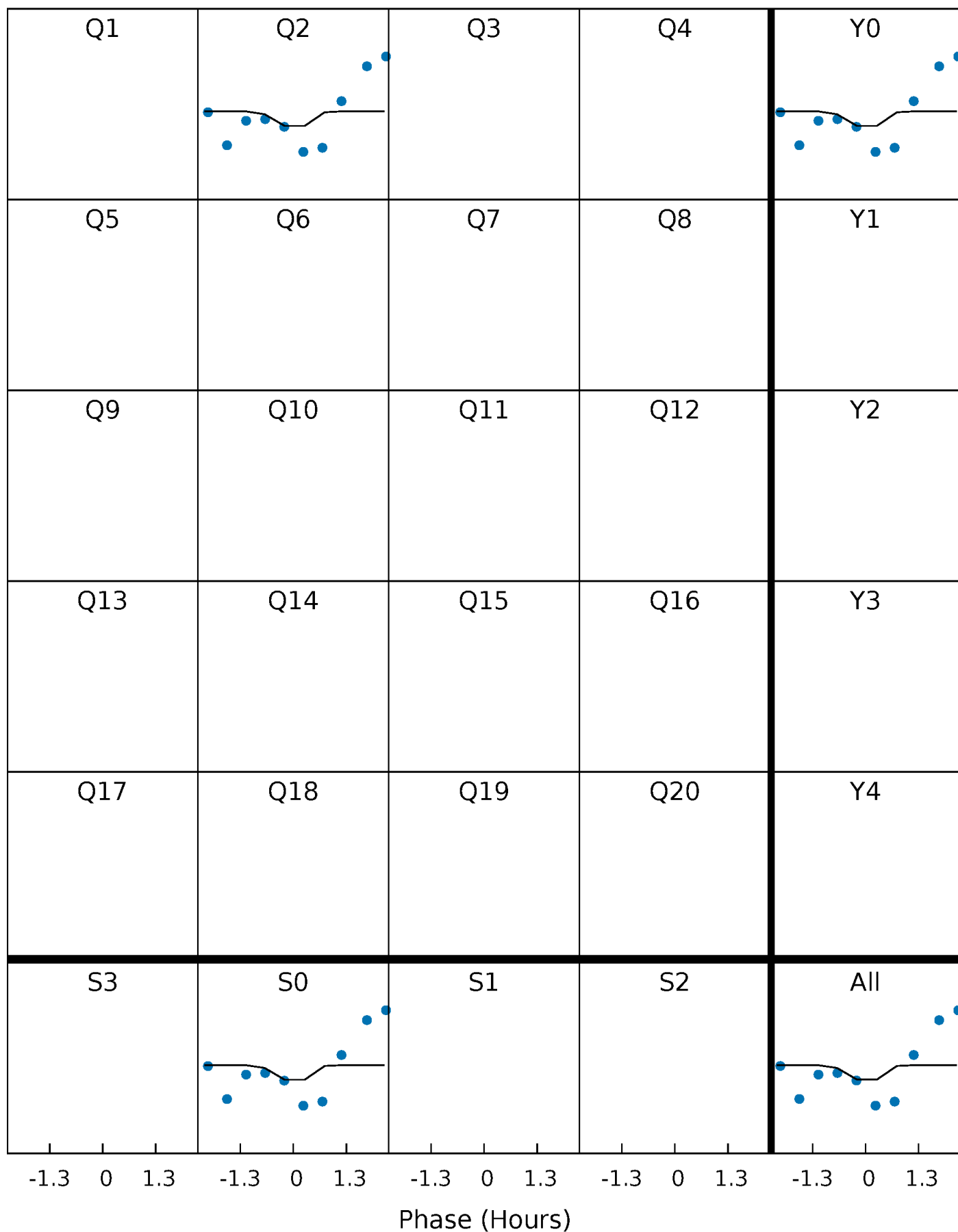
# DV Quarter-Phased Transit Curves

TCE 008315220-07     $P=367.388598$  Days     $T_0=172.555205$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

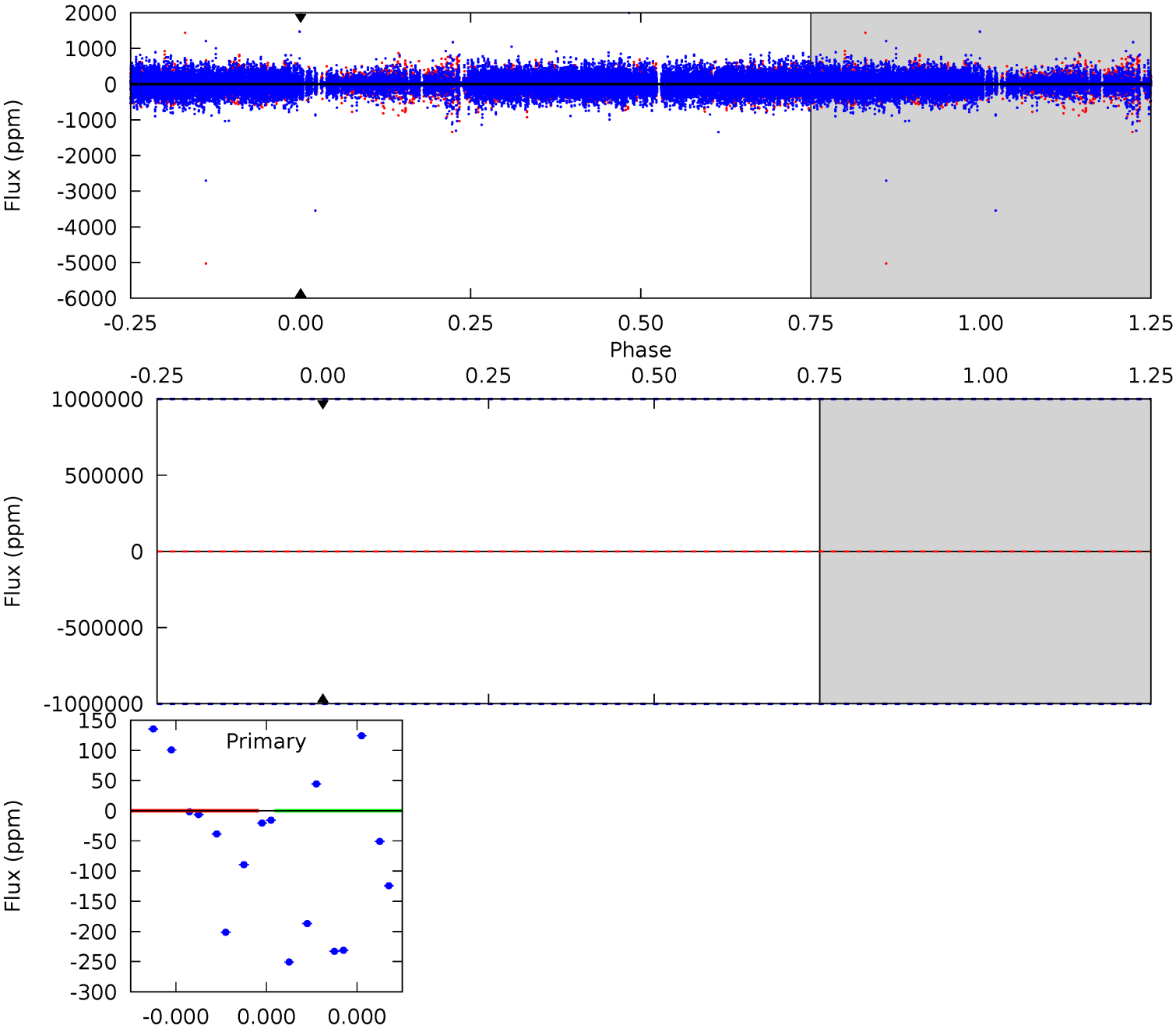
TCE 008315220-07 P=367.388598 Days  $T_0=171.694765$  (BKJD)



# DV Model-Shift Uniqueness Test

008315220-07, P = 367.388598 Days, E = 172.555205 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	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0

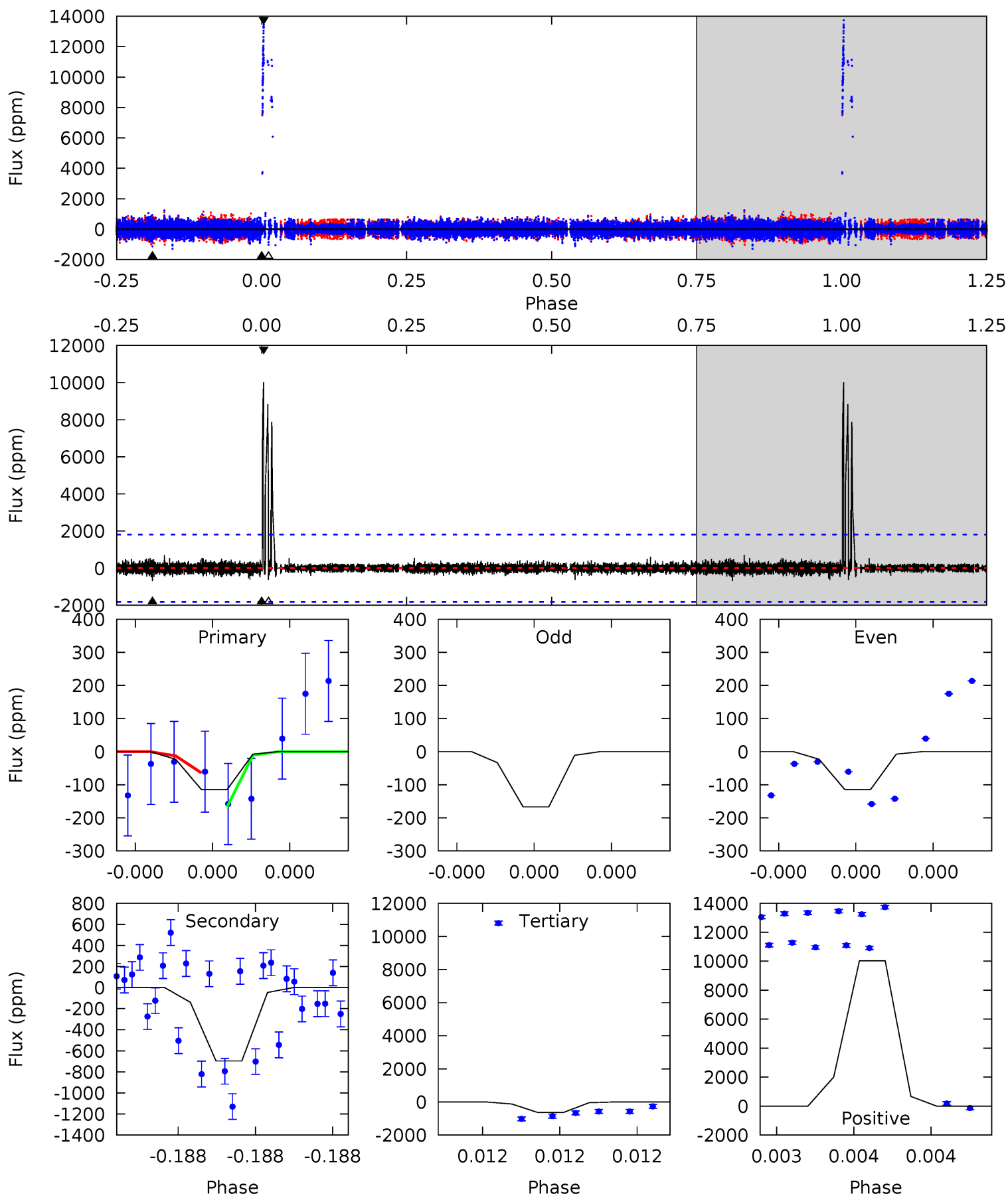




# Alt Model-Shift Uniqueness Test

008315220-07, P = 367.388598 Days, E = 171.694765 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
0.36	2.21	2.02	31.8	5.76	3.76	1.06	-1.65	-31.5	0.20	-29.6	0.08	1.00	0.94	0.17



### Stellar Parameters For KIC 008315220

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5172^{+70}_{-248}$	$2.693^{+0.273}_{-0.126}$	$0.070^{+0.150}_{-0.600}$	$13.454^{+2.481}_{-7.442}$	$3.257^{+0.222}_{-1.999}$	$0.002^{+0.006}_{-0.001}$
	+1%/-5%	+10%/-5%	+214%/-857%	+18%/-55%	+7%/-61%	+302%/-38%
Source	PHO1	FLK73	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 008315220-07 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$0 \pm 1000000$	$97.05^{+123.84}_{-67.94}$	$945^{+56}_{-86}$	$4101^{+14582}_{-18087}$	$207^{+26193}_{-16108}$
Alt.	$-697 \pm 315$	$90.00^{+110.40}_{-62.55}$	$948^{+58}_{-94}$	$3526^{+2087}_{-749}$	$88^{+868}_{-73}$

$T_{max}$  = 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  $A_{obs} \gg 1.0$

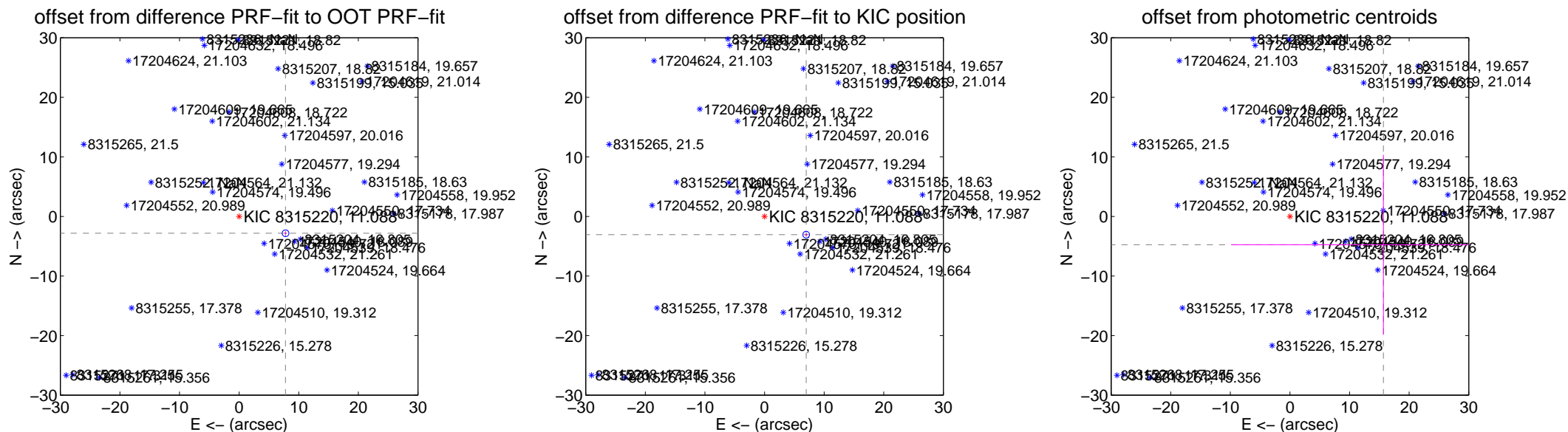
## DV Centroid Data

Supplemental centroid analysis for 008315220-07. **Kepler magnitude: 11.09.** Transit SNR -1.00

There are 0 quarters with good PRF difference image offsets

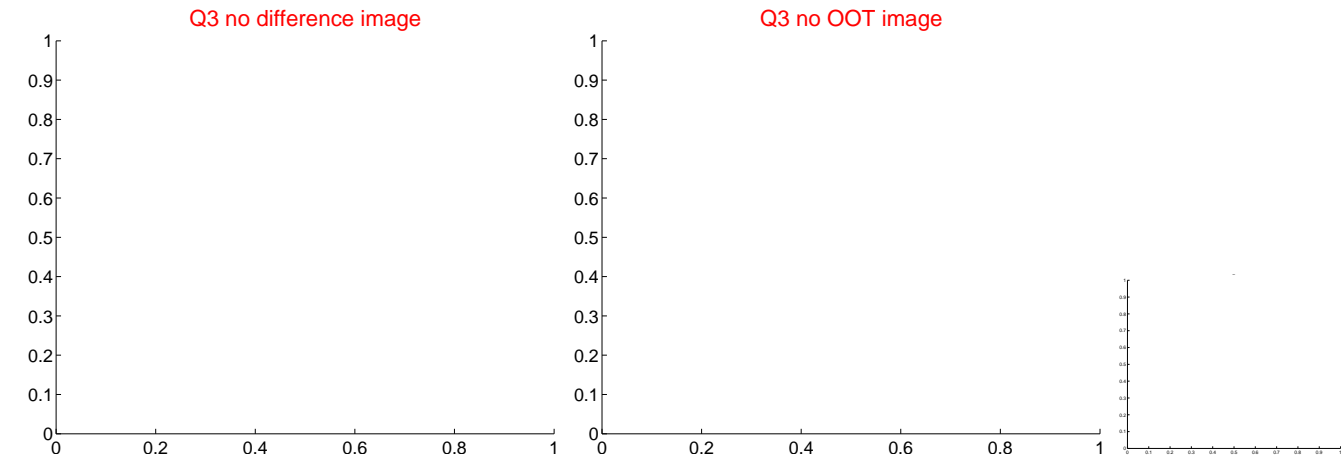
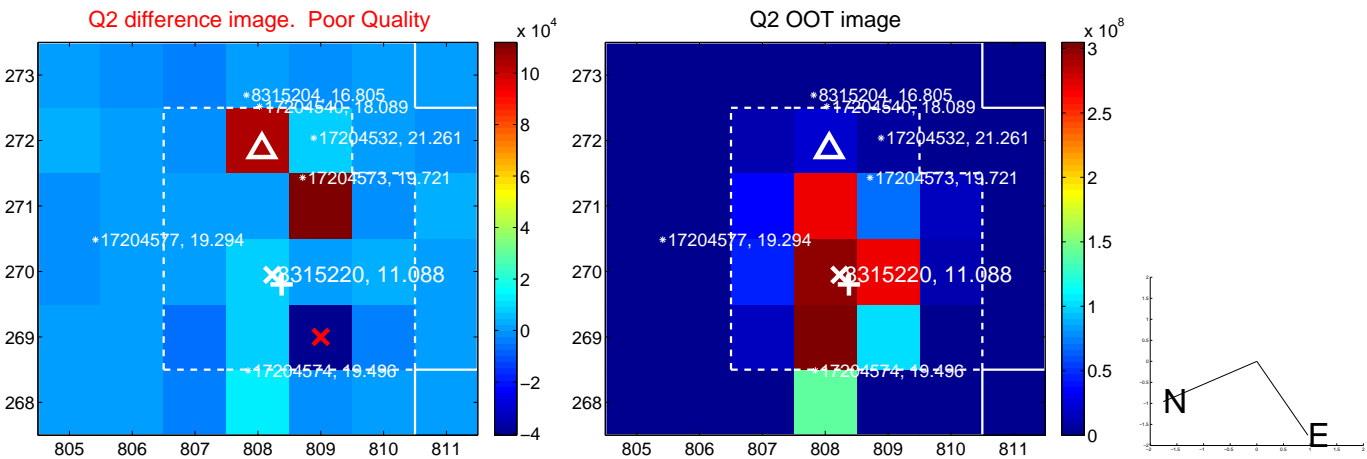
The direct PRF centroid is offset from the target star catalog position by about 0.83 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b>8.277 <math>\pm</math> 0.190</b>	<b>43.60</b>	-7.780 $\pm$ 0.194	-2.824 $\pm$ 0.158
PRF-fit source offset from KIC position	<b>7.629 <math>\pm</math> 0.188</b>	<b>40.51</b>	-6.987 $\pm$ 0.194	-3.063 $\pm$ 0.158
photometric centroid source offset	16.38 $\pm$ 24.82	0.66	-15.68 $\pm$ 25.53	-4.75 $\pm$ 15.11

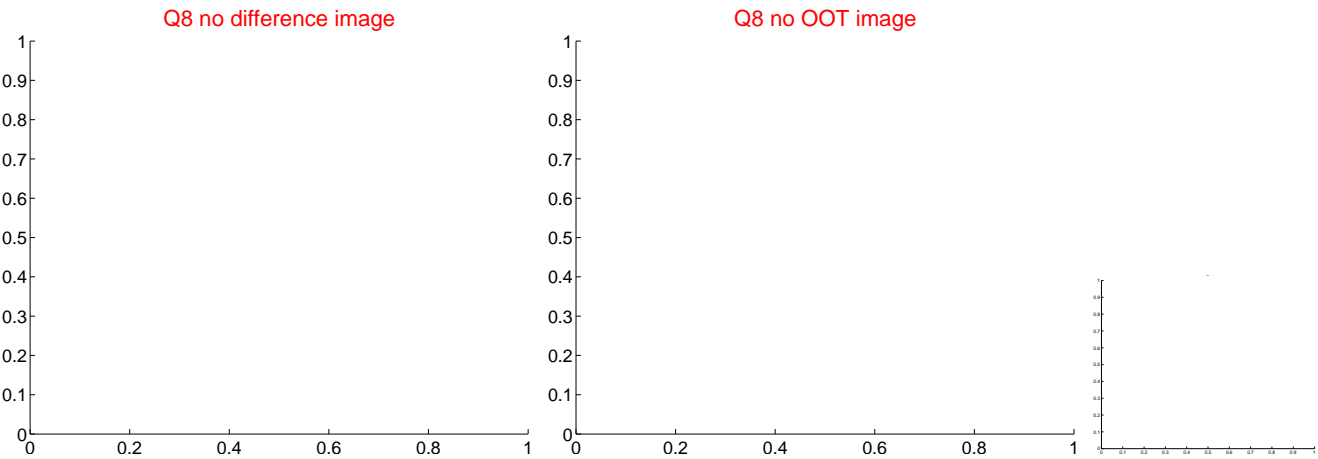
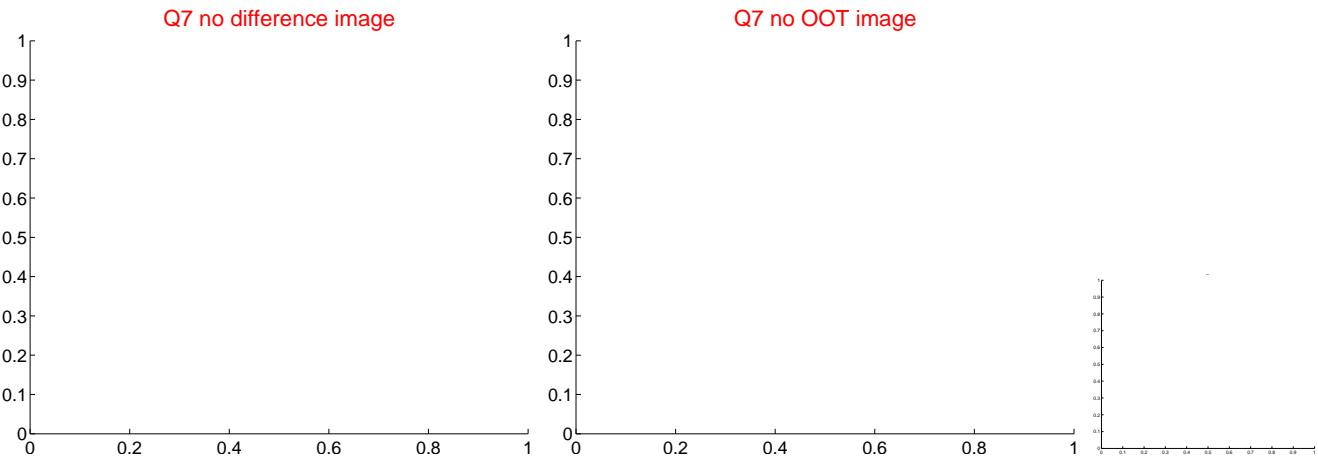
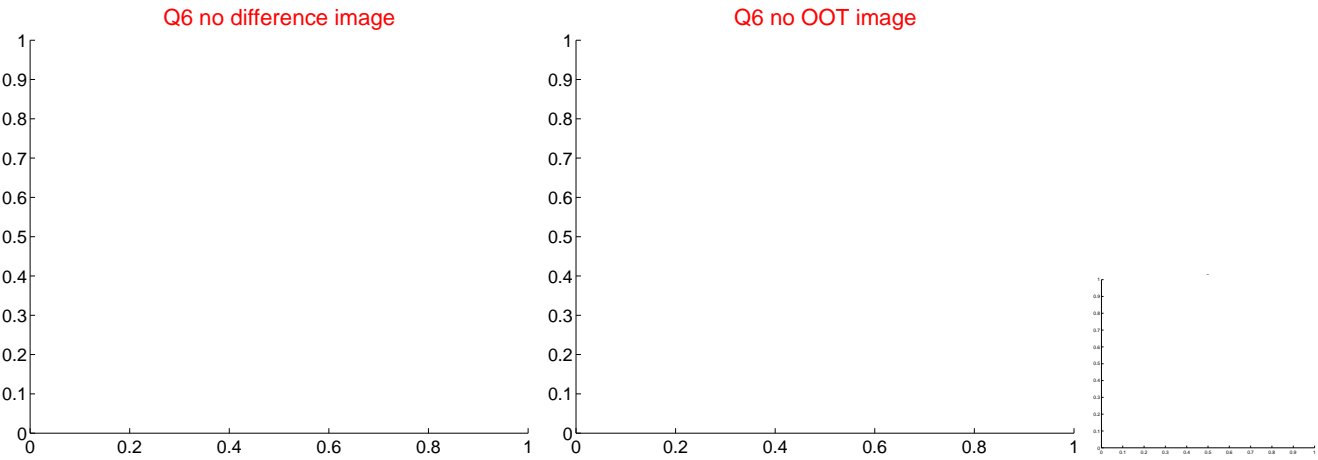
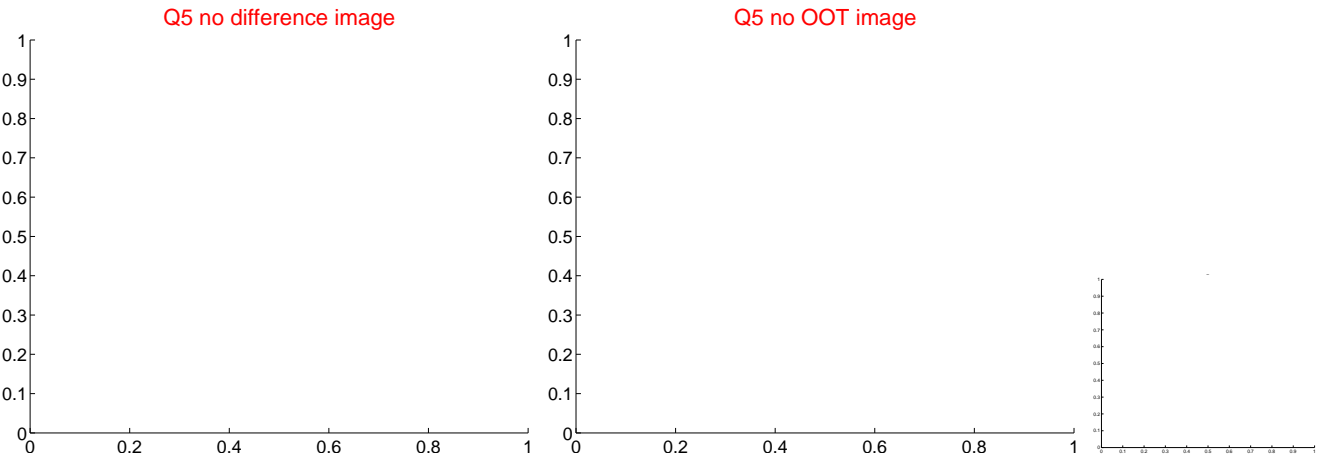


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: 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.



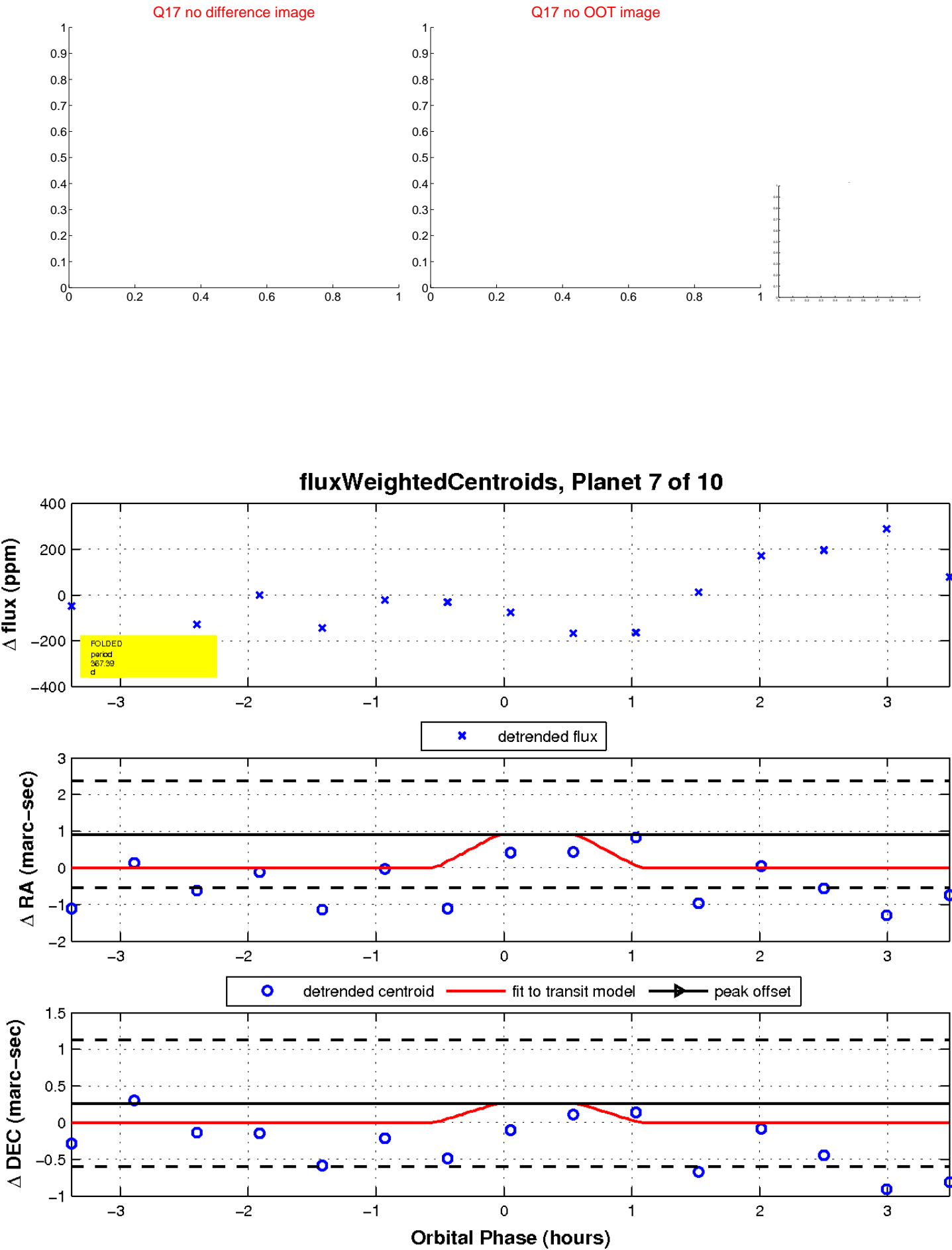
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

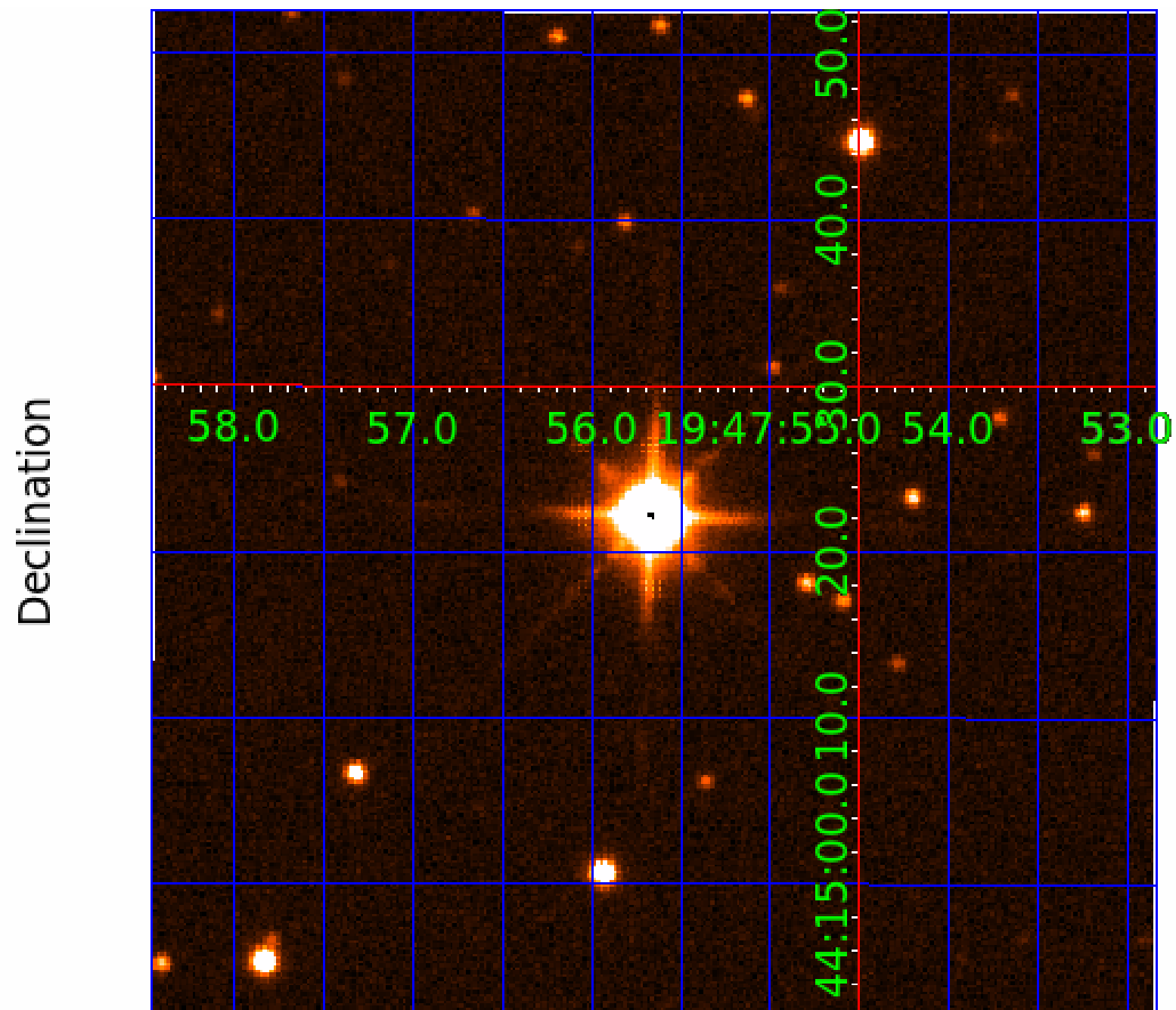


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image



## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008315220-01	OBS	No	306.366968	238.002854	978.6	14.592	25.2	18.2	13.45	5172	72.09	66.75
008315220-02	OBS	No	367.177451	175.068533	144.9	15.000	31.5	-1.0	13.45	5172	15.78	52.43
008315220-03	OBS	No	367.826147	178.916856	582.1	16.110	18.5	18.2	13.45	5172	43.69	52.31
008315220-04	OBS	No	362.484543	185.462403	90.9	15.000	21.3	-1.0	13.45	5172	12.50	53.34
008315220-05	OBS	No	181.269349	193.563129	108.1	6.180	14.6	5.3	13.45	5172	16.33	134.38
008315220-06	OBS	No	183.715252	182.372967	347.0	16.910	17.2	18.0	13.45	5172	28.23	132.00
008315220-07	OBS	No	367.388598	172.555205	46.9	15.000	13.2	-1.0	13.45	5172	8.98	52.39
008315220-08	OBS	No	182.919583	182.566043	325.9	10.920	15.3	8.9	13.45	5172	25.79	132.76
008315220-09	OBS	No	534.460195	379.043140	118.9	7.500	16.0	-1.0	13.45	5172	14.30	31.78
008315220-10	OBS	No	122.022409	180.490237	52.5	15.000	11.2	-1.0	13.45	5172	9.50	227.78

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008315220-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_SATURATED
008315220-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—NO_FITS—INCONSISTENT_TRANS—CENT_SATURATED
008315220-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_TER_DV—MOD_POS_DV—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
008315220-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
008315220-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_ZUMA—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—SAME_NTL_PERIOD—CENT_SATURATED
008315220-06	OBS	FP	0.00	1	0	1	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_SATURATED—HALO_GHOST
008315220-07	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—SAME_NTL_PERIOD—CENT_SATURATED
008315220-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_SATURATED
008315220-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
008315220-10	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED

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

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

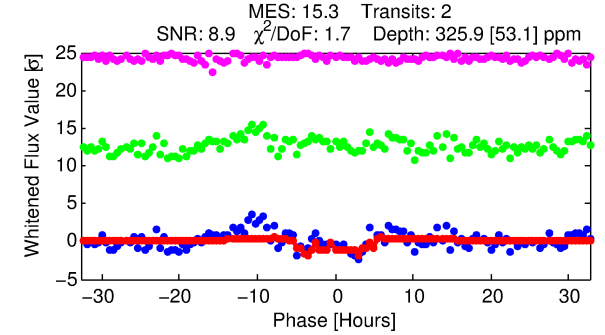
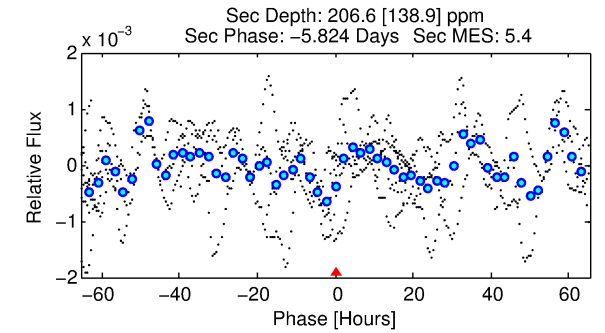
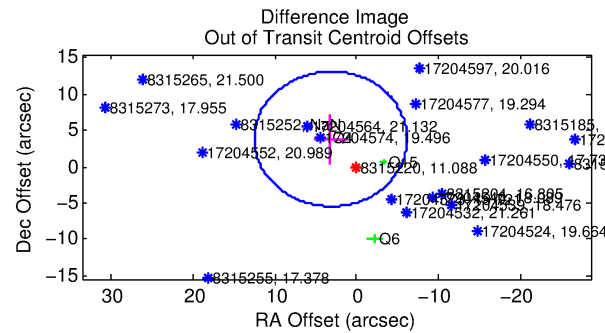
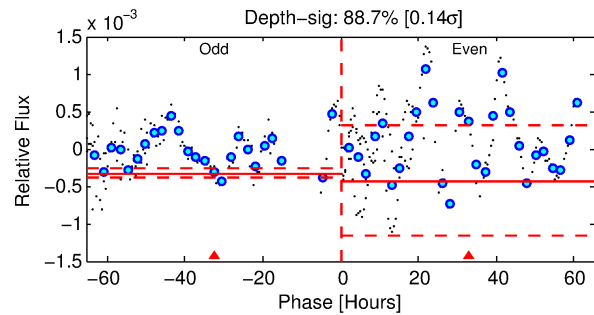
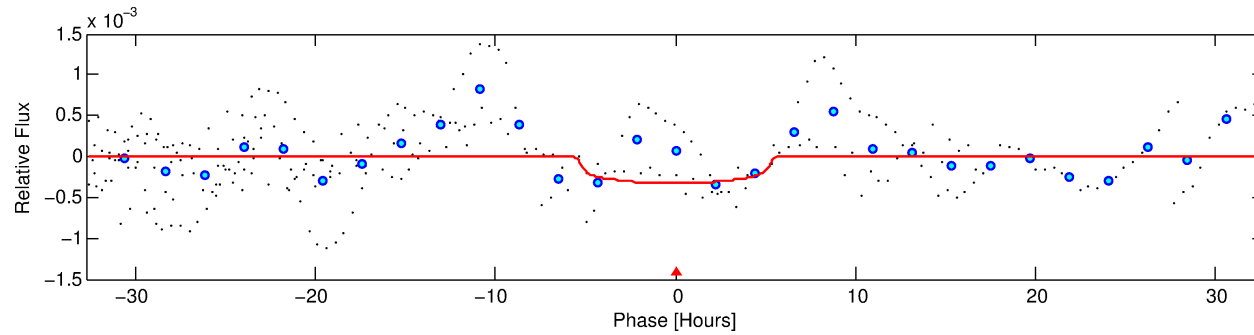
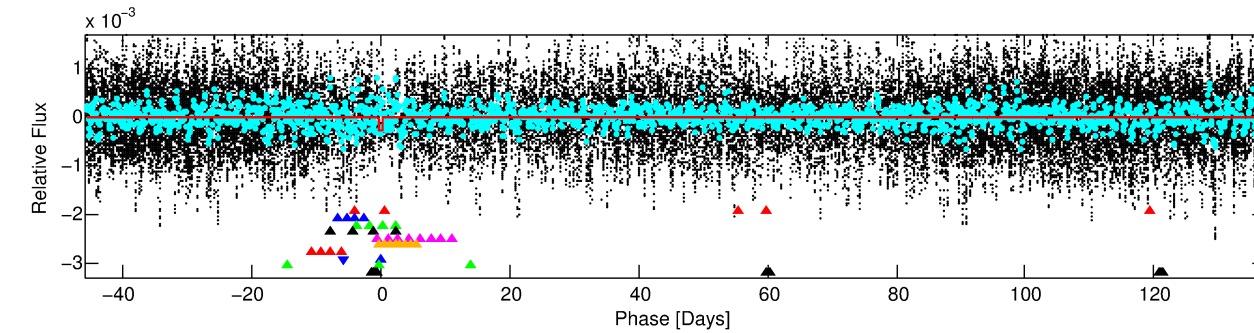
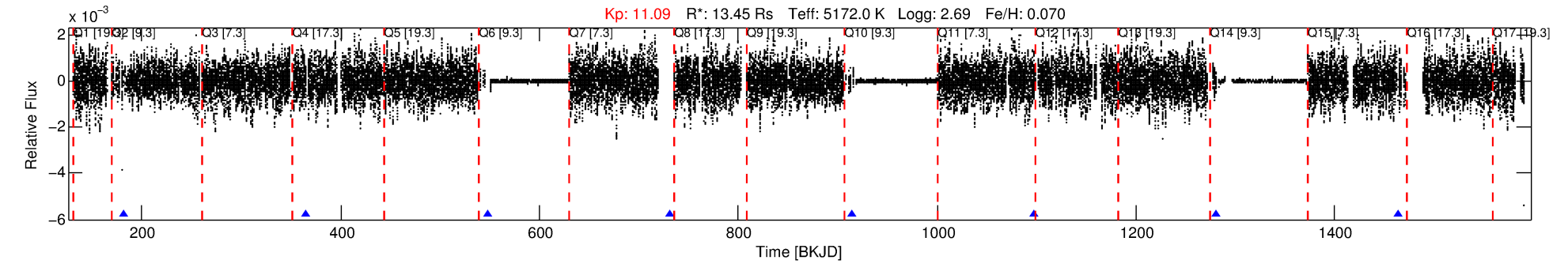
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 008315220-08

No Significant Match Found

# DV One-Page Summary

KIC: 8315220 Candidate: 8 of 10 Period: 182.920 d



## DV Fit Results:

Period = 182.91958 [0.01063] d  
Epoch = 182.5660 [0.0572] BKJD  
Rp/R\* = 0.0176 [0.0125]  
a/R\* = 95.85 [262.49]  
b = 0.69 [2.08]  
Seff = 132.76 [78.36]  
Teq = 866 [128] K  
Rp = 25.79 [23.22] Re  
a = 0.9349 [0.3965] AU  
Ag = 149.36 [249.12] [0.60 $\sigma$ ]  
Teff = 4678 [1852] K [2.05 $\sigma$ ]

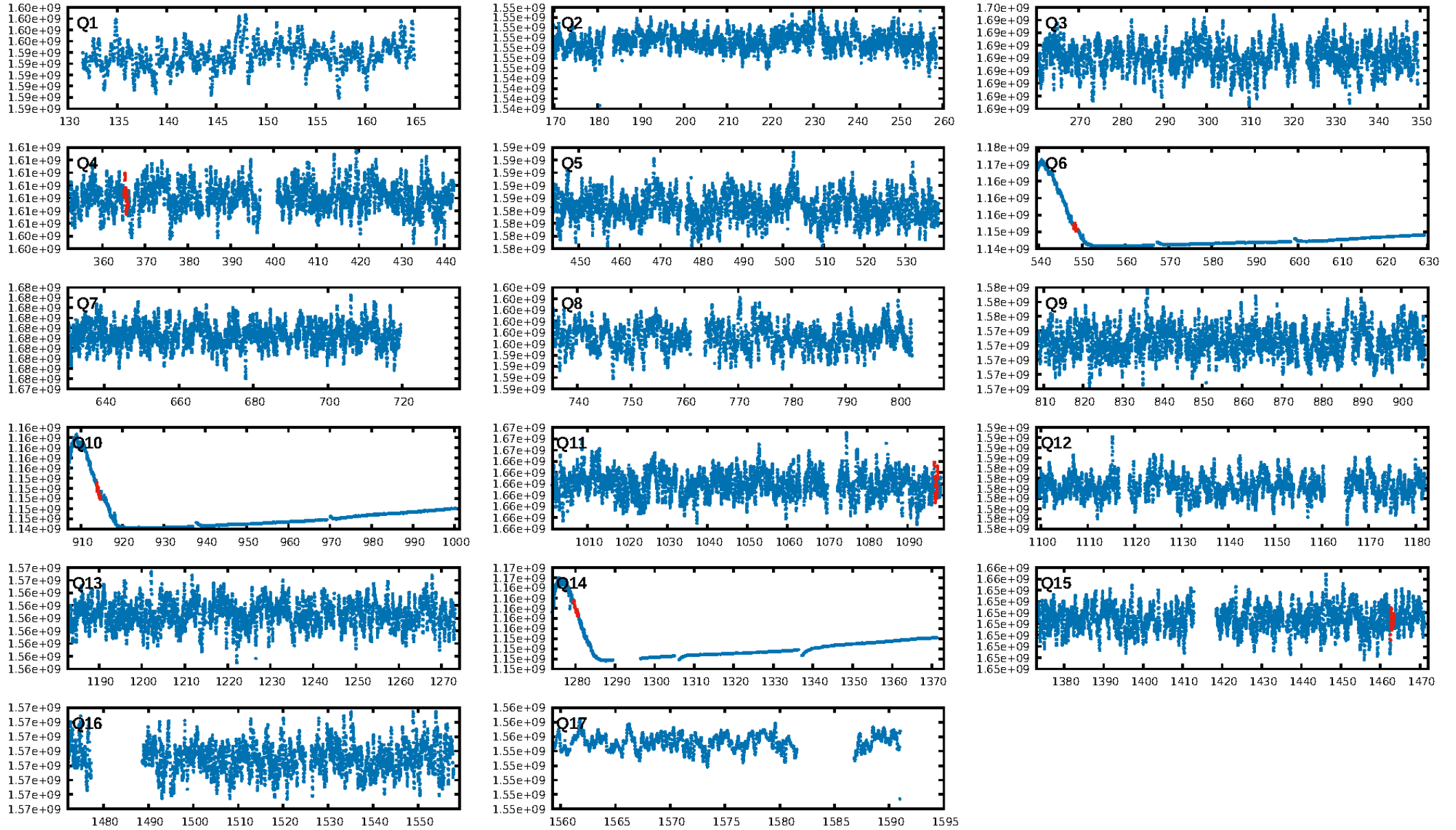
## DV Diagnostic Results:

ShortPeriod-sig: 99.8% [3.16 $\sigma$ ]  
LongPeriod-sig: 65.7% [0.95 $\sigma$ ]  
ModelChiSquare2-sig: 58.1%  
ModelChiSquareGof-sig: 97.5%  
Bootstrap-pfa: 4.94e-16  
RollingBand-fgt: 1.00 [2/2]  
GhostDiagnostic-chr: -5.043  
Centroid-sig: 7.0%  
Centroid-so: 0.784 arcsec [1.09 $\sigma$ ]  
OotOffset-rm: 4.978 arcsec [1.61 $\sigma$ ]  
KicOffset-rm: 6.712 arcsec [1.40 $\sigma$ ]  
OotOffset-st: 1/1/1/0 [3]  
KicOffset-st: 1/1/1/0 [3]  
DiffImageQuality-fgm: 0.00 [0/3]  
DiffImageOverlap-fno: 0.25 [1/4]

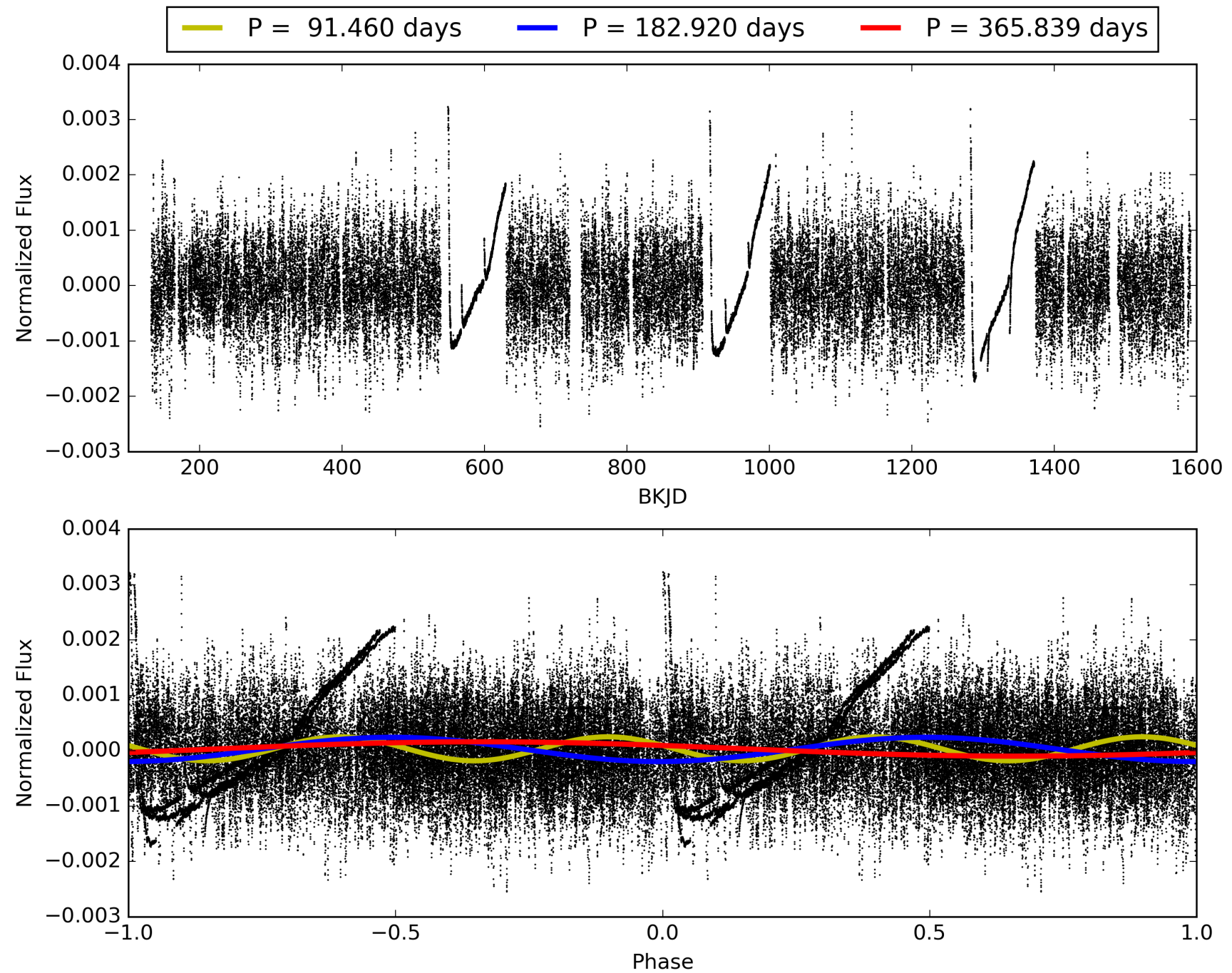
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 16:11:13 Z

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

# TCE 008315220-08, PDC Light Curves

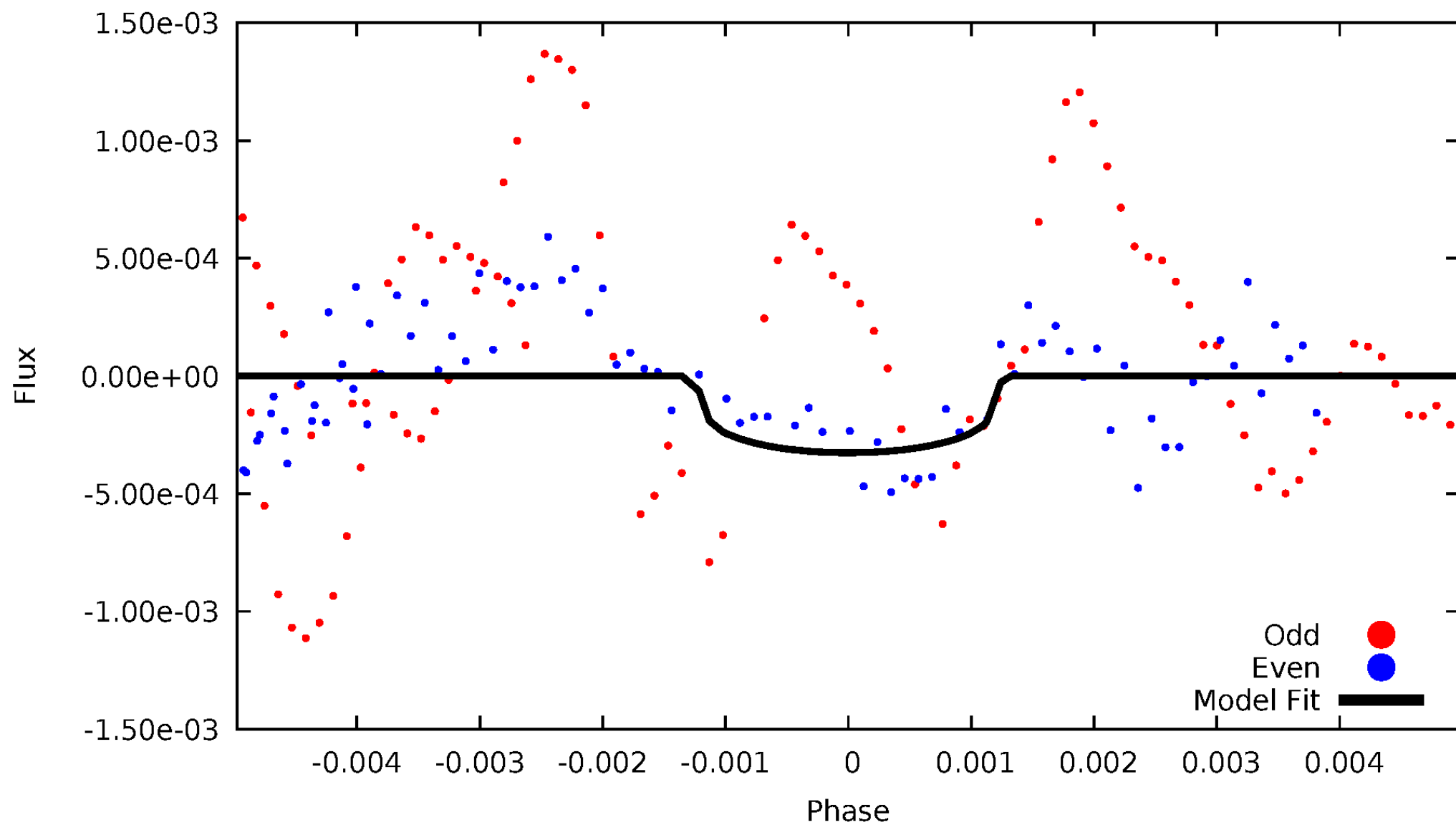


# TCE 008315220-08



# DV Odd/Even

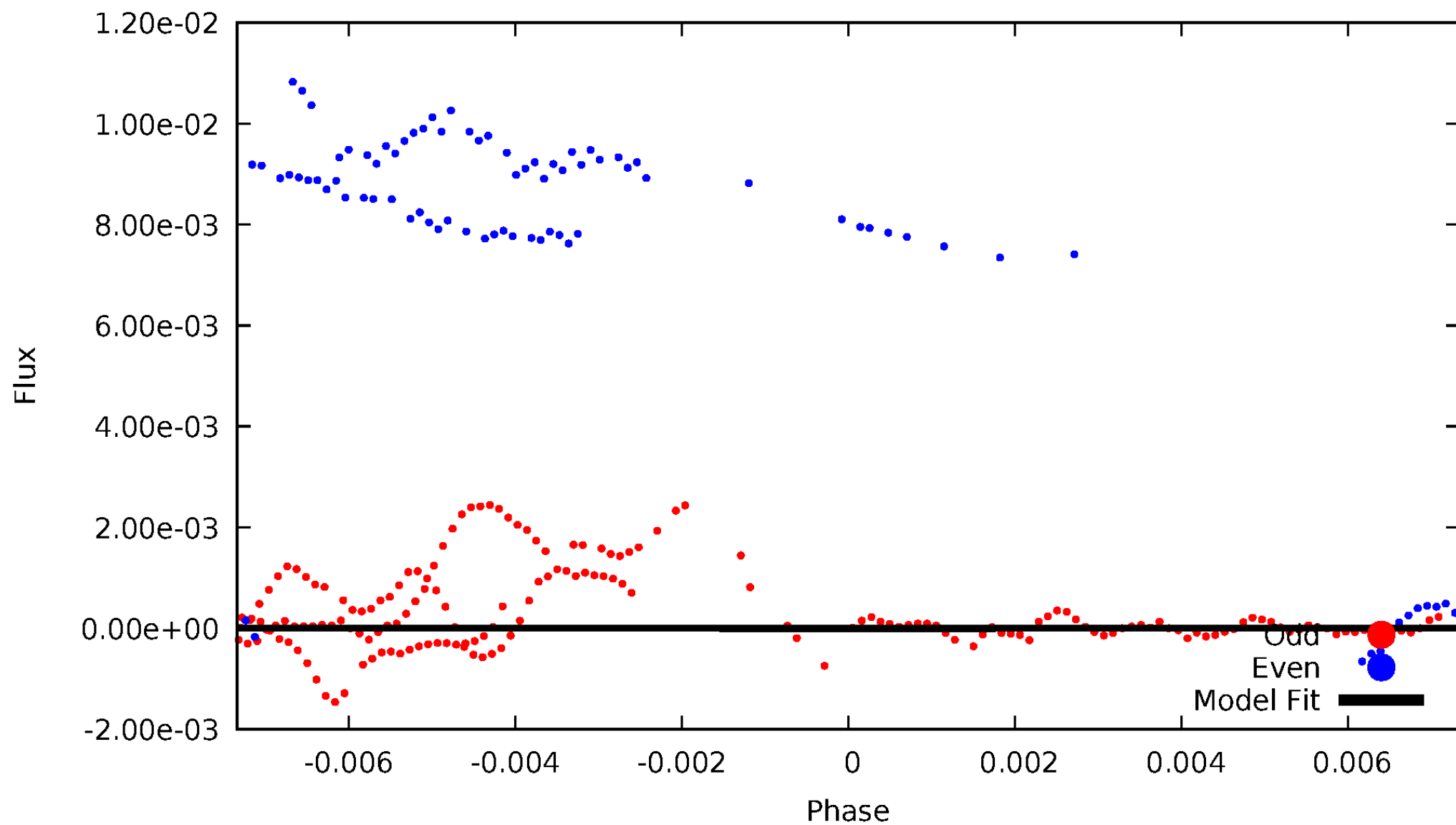
TCE 008315220-08





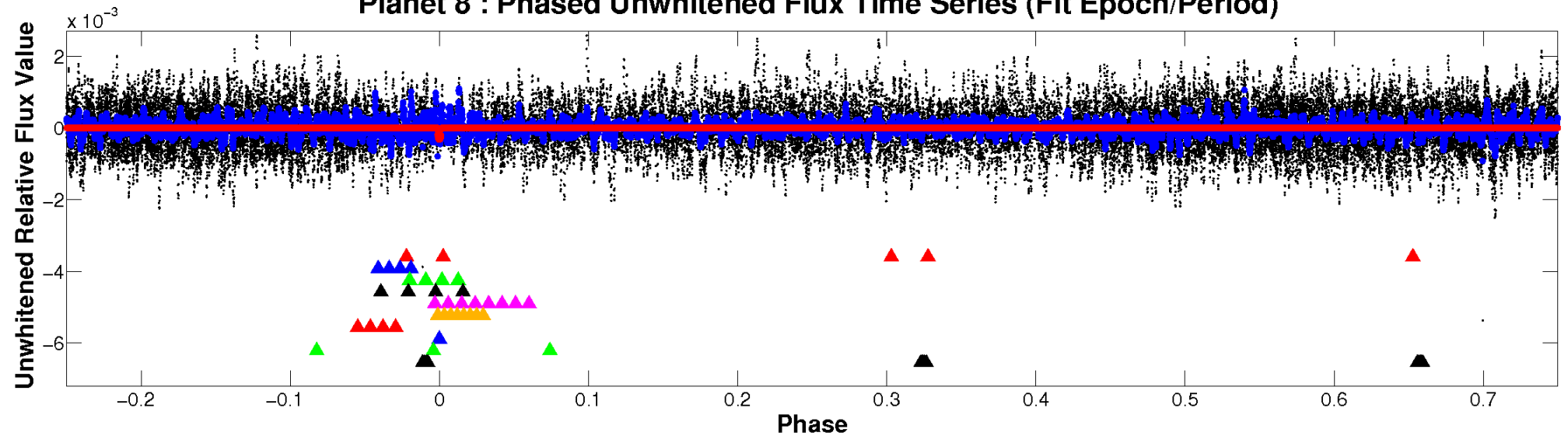
# ALT Odd/Even

TCE 008315220-08

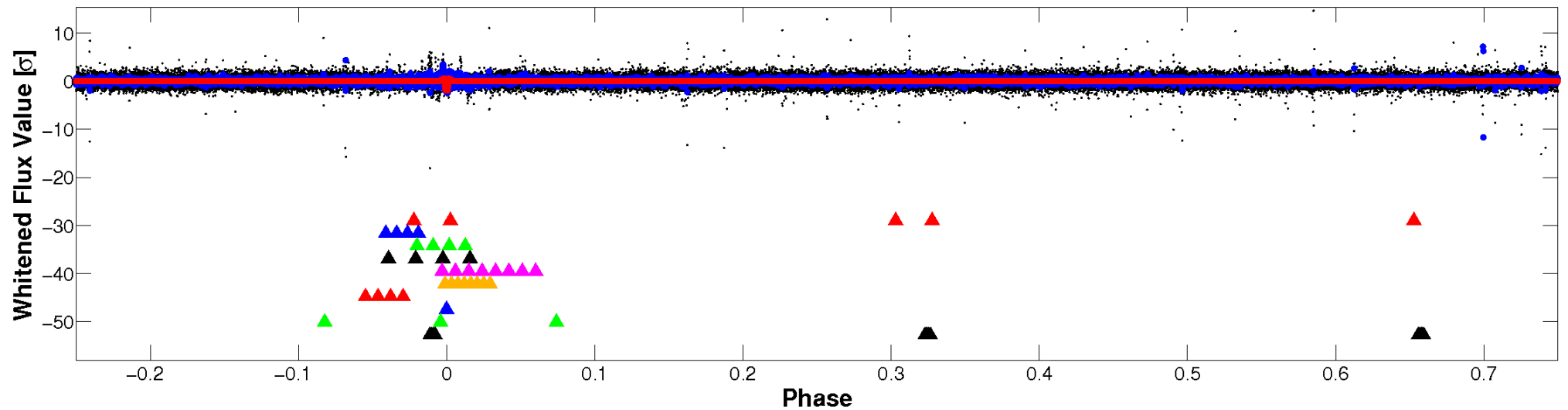


# Non-Whitened Vs. Whitened Light Curve

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



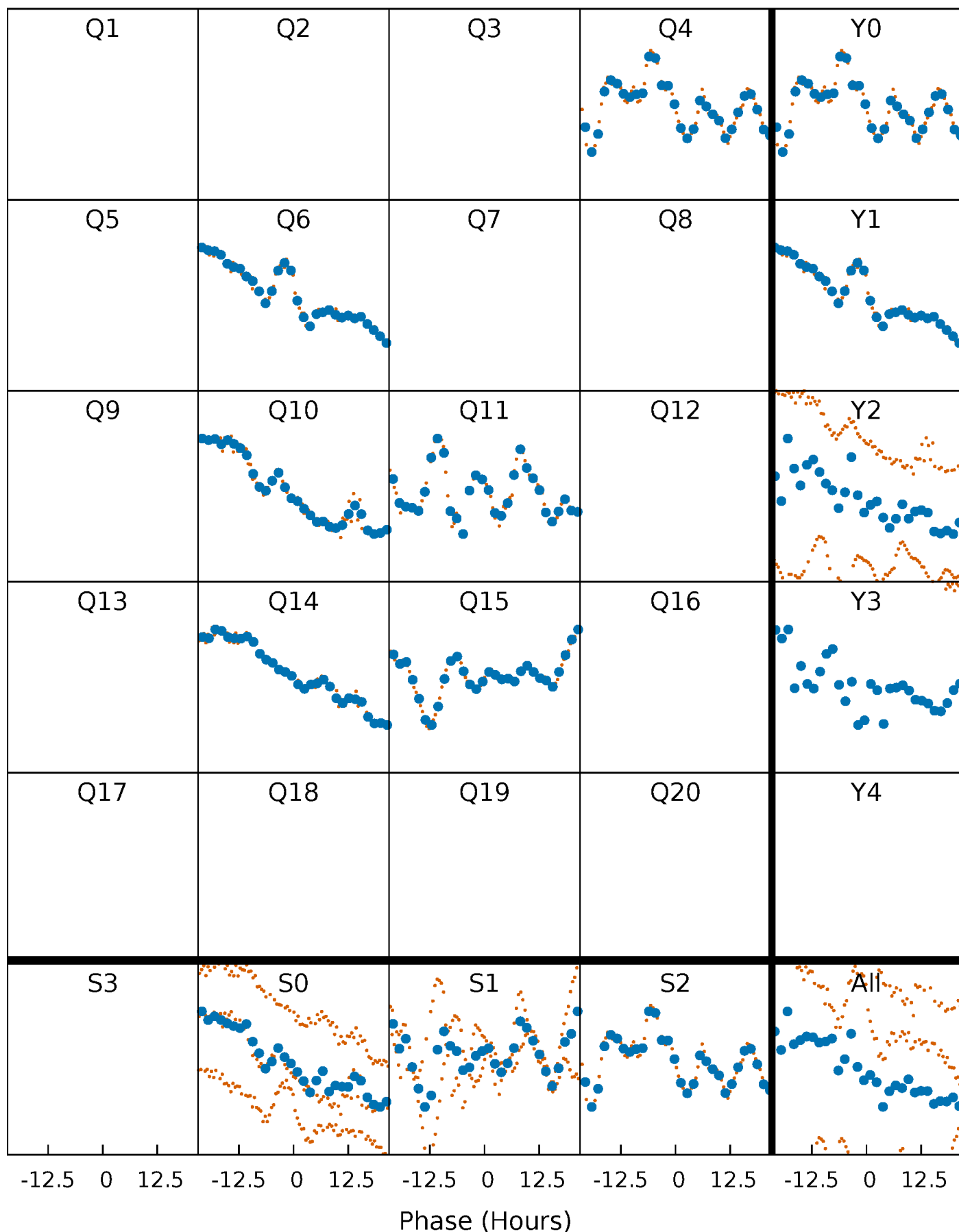
## Planet 8 : Phased Whitened Flux Time Series (Fit Epoch/Period)





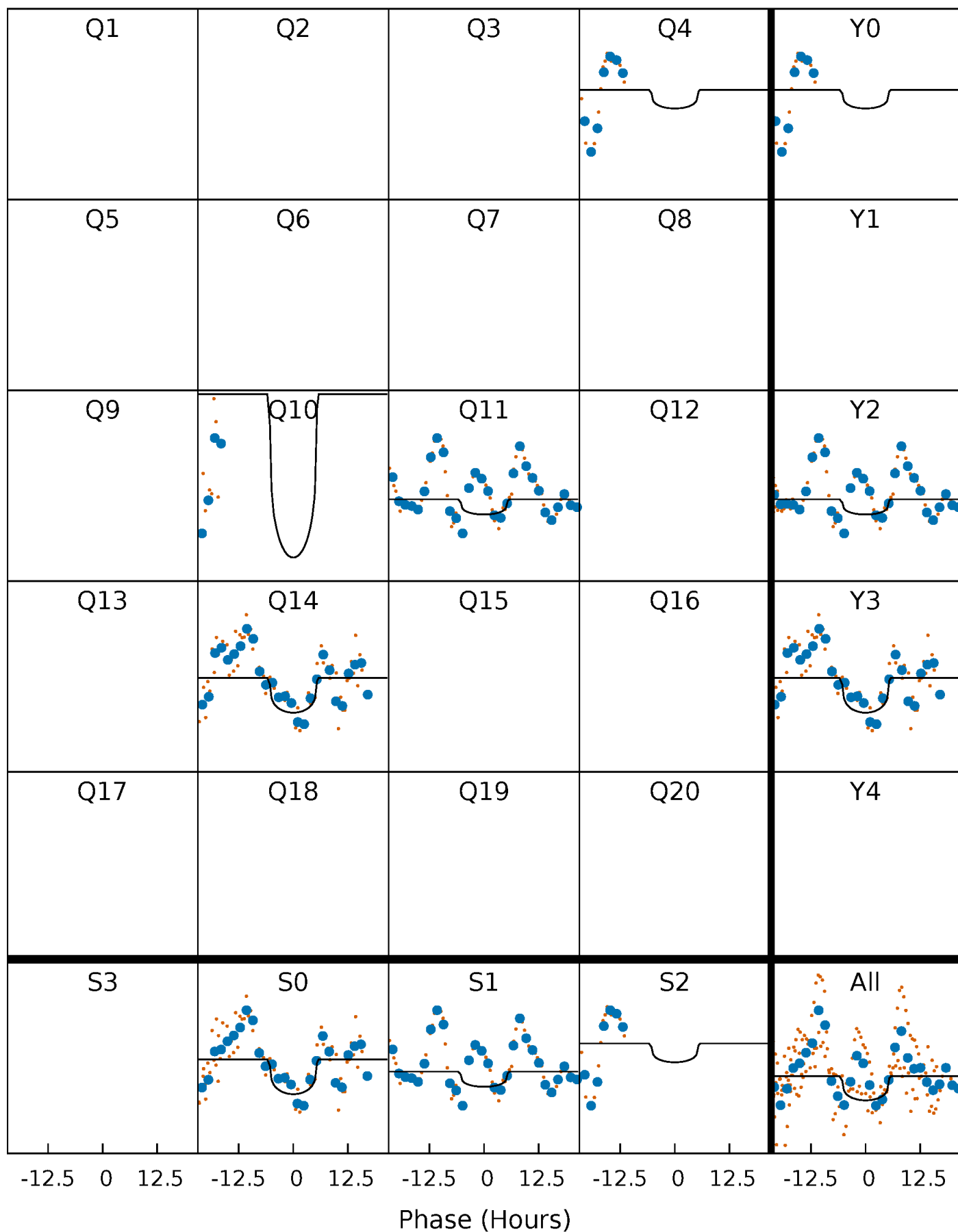
# PDC Quarter-Phased Transit Curves

TCE 008315220-08 P=182.919583 Days  $T_0=182.566043$  (BKJD)



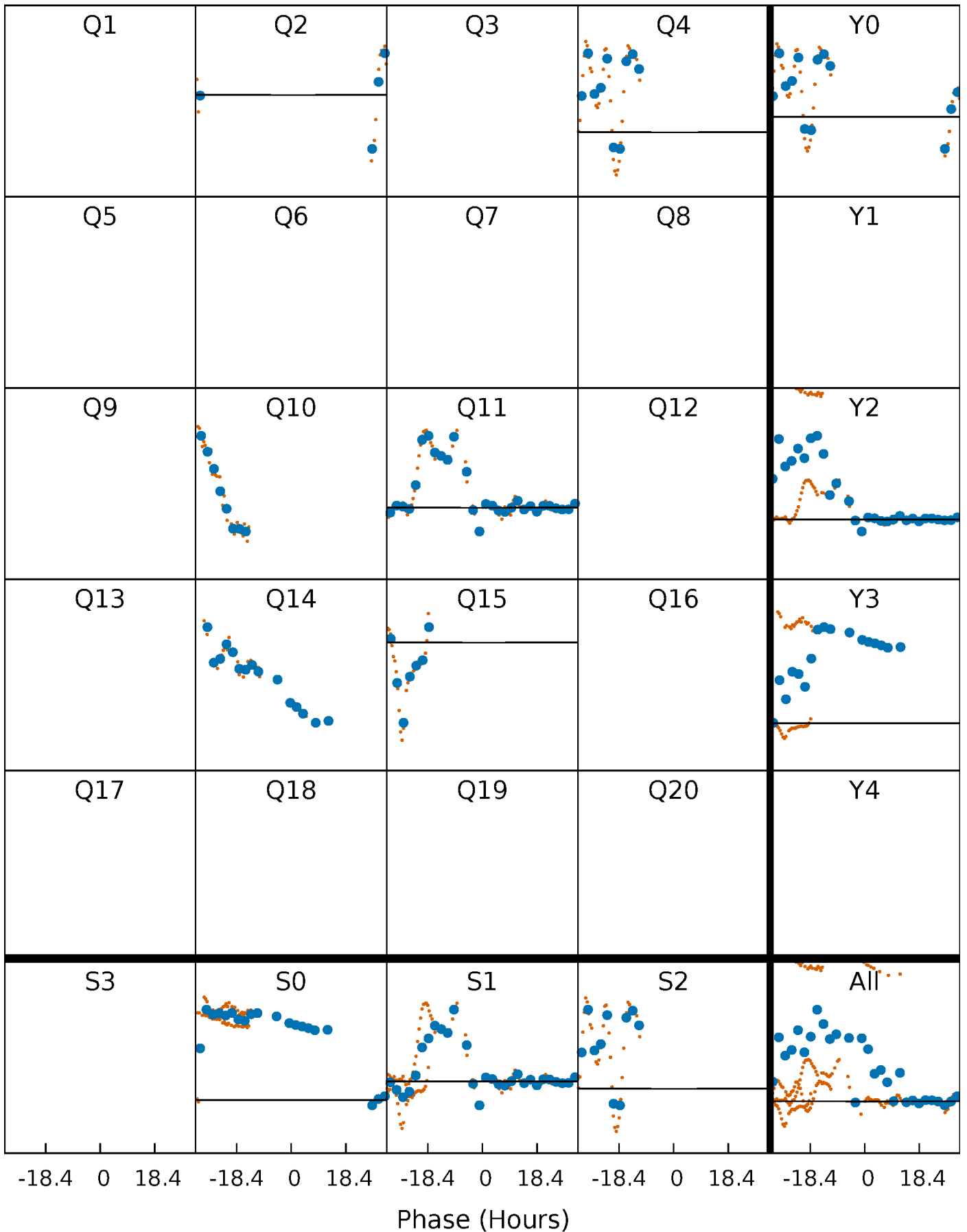
# DV Quarter-Phased Transit Curves

TCE 008315220-08     $P=182.919583$  Days     $T_0=182.566043$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

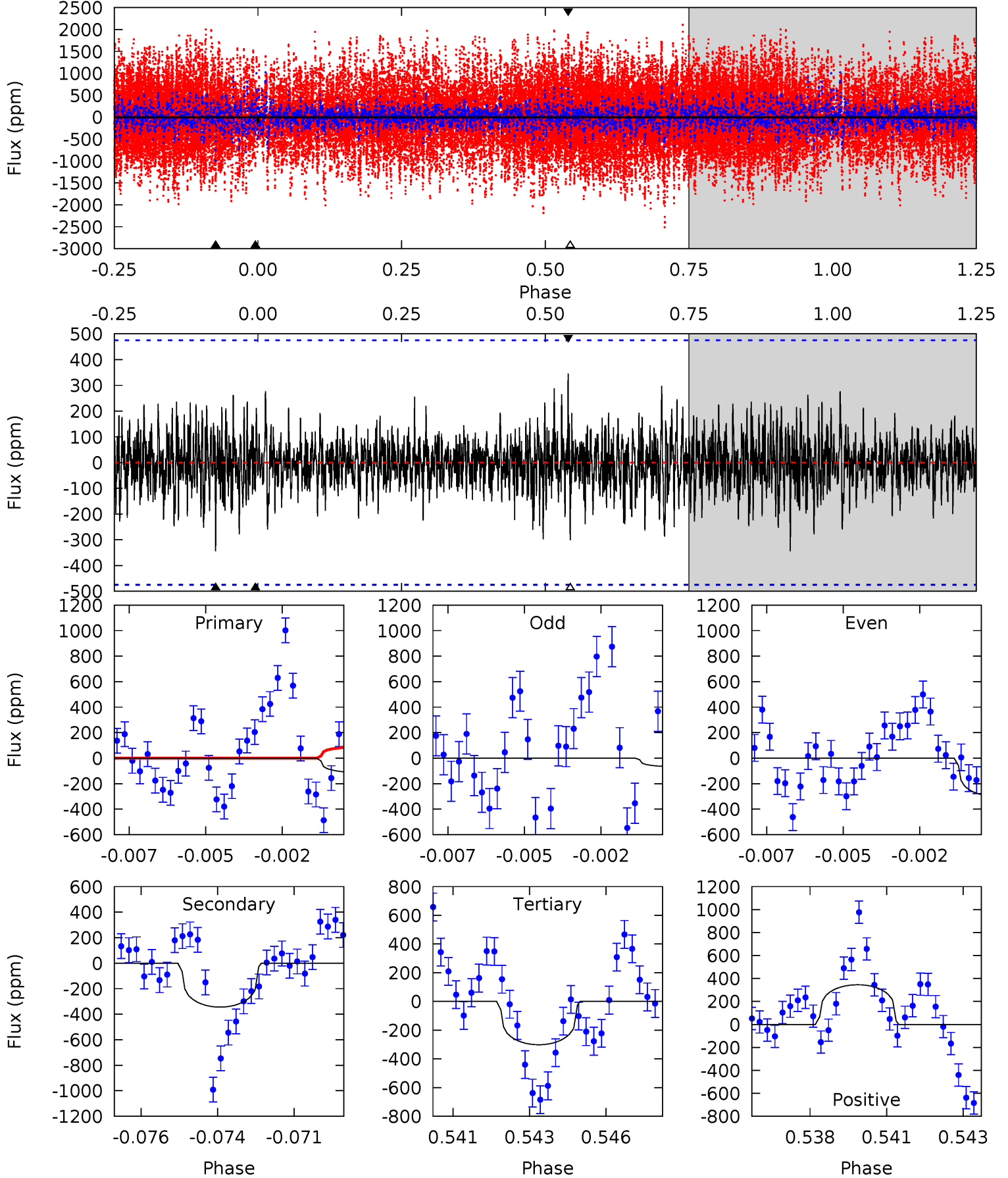
TCE 008315220-08 P=182.887173 Days  $T_0=182.593432$  (BKJD)



# DV Model-Shift Uniqueness Test

008315220-08, P = 182.919583 Days, E = 182.566043 Days

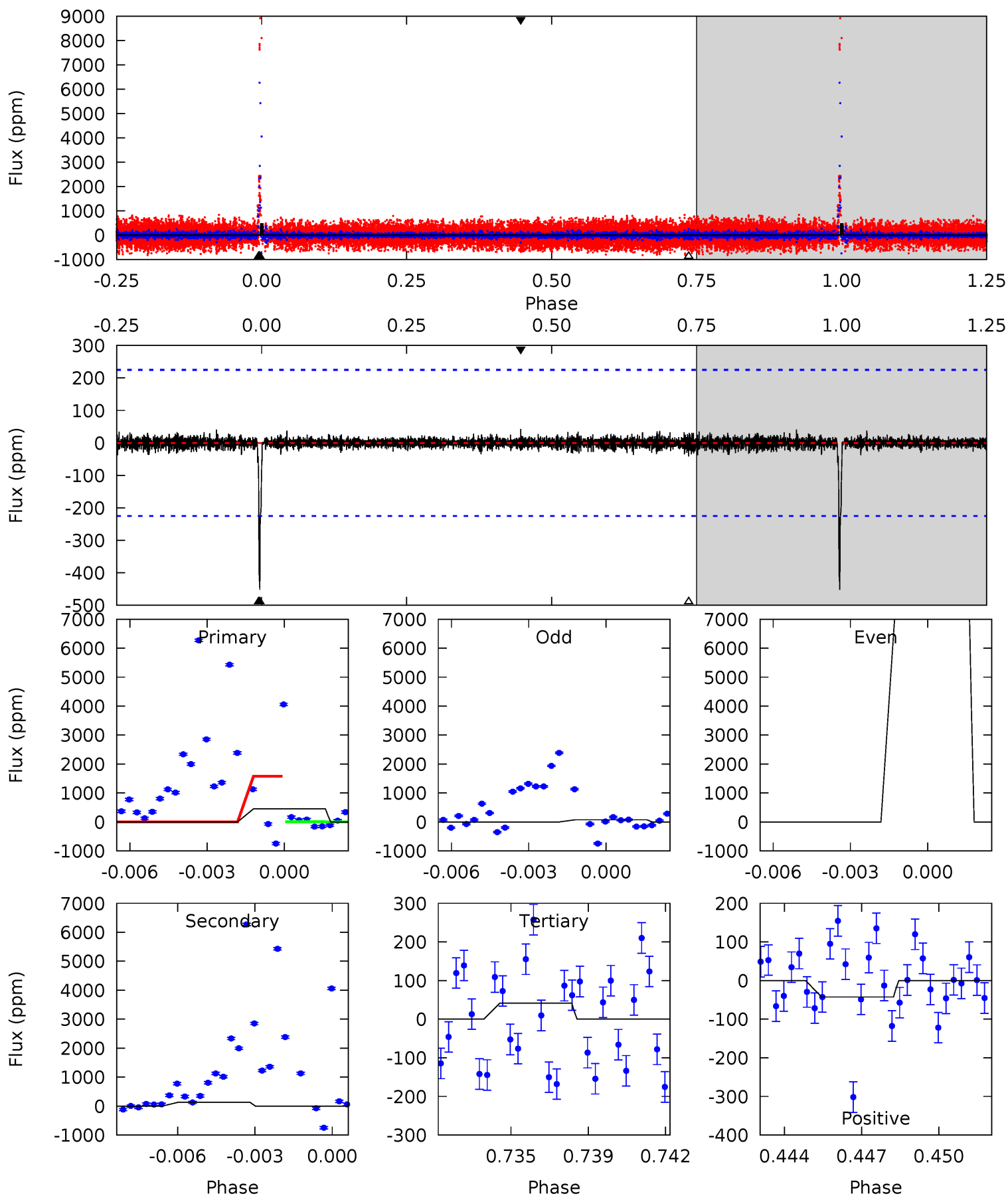
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
1.25	3.83	3.36	3.84	5.29	3.03	0.92	-2.11	-2.60	0.48	-0.01	1.34	1.00	0.50	1.12



# Alt Model-Shift Uniqueness Test

008315220-08, P = 182.887173 Days, E = 182.593432 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
10.5	3.08	0.97	0.99	5.24	2.94	0.23	9.55	9.54	2.10	2.09	101.0	1.00	0.09	14.1



### Stellar Parameters For KIC 008315220

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5172^{+70}_{-248}$	$2.693^{+0.273}_{-0.126}$	$0.070^{+0.150}_{-0.600}$	$13.454^{+2.481}_{-7.442}$	$3.257^{+0.222}_{-1.999}$	$0.002^{+0.006}_{-0.001}$
	+1%/-5%	+10%/-5%	+214%/-857%	+18%/-55%	+7%/-61%	+302%/-38%
Source	PHO1	FLK73	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 008315220-08 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-344 \pm 90$	$25.00^{+18.25}_{-14.37}$	$1192^{+81}_{-116}$	$5135^{+2758}_{-968}$	$237^{+1167}_{-157}$
Alt.	$-132 \pm 43$	$11.71^{+13.58}_{-8.19}$	$1189^{+79}_{-122}$	$5725^{+6141}_{-1553}$	$419^{+4260}_{-332}$

$T_{max}$  = 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  $A_{obs} \gg 1.0$

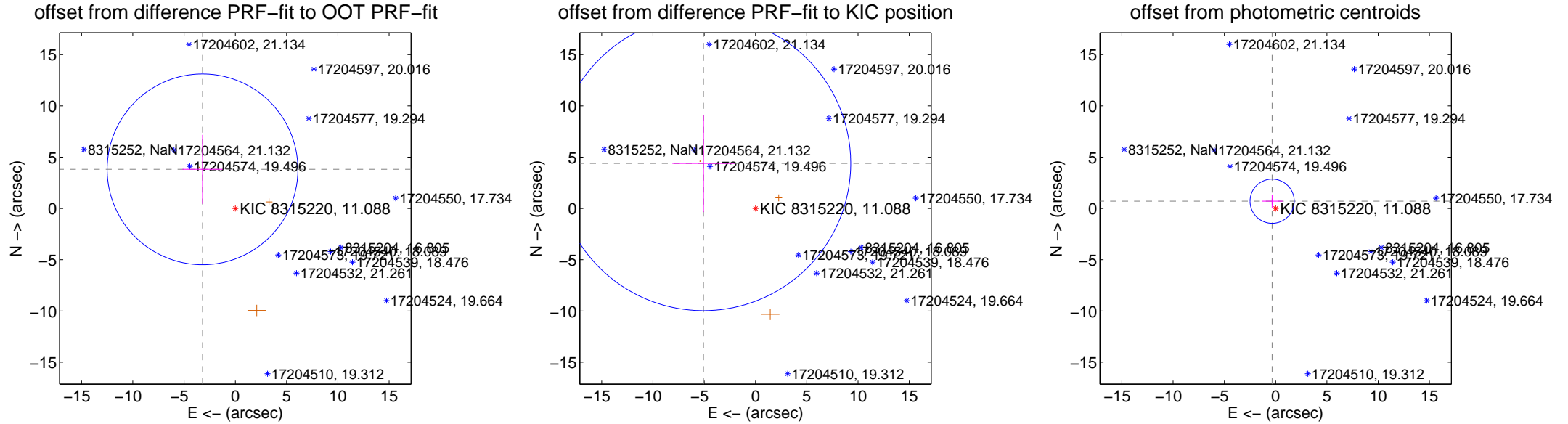
## DV Centroid Data

Supplemental centroid analysis for 008315220-08. **Kepler magnitude: 11.09.** Transit SNR 8.94

**There are 0 quarters with good PRF difference image offsets**

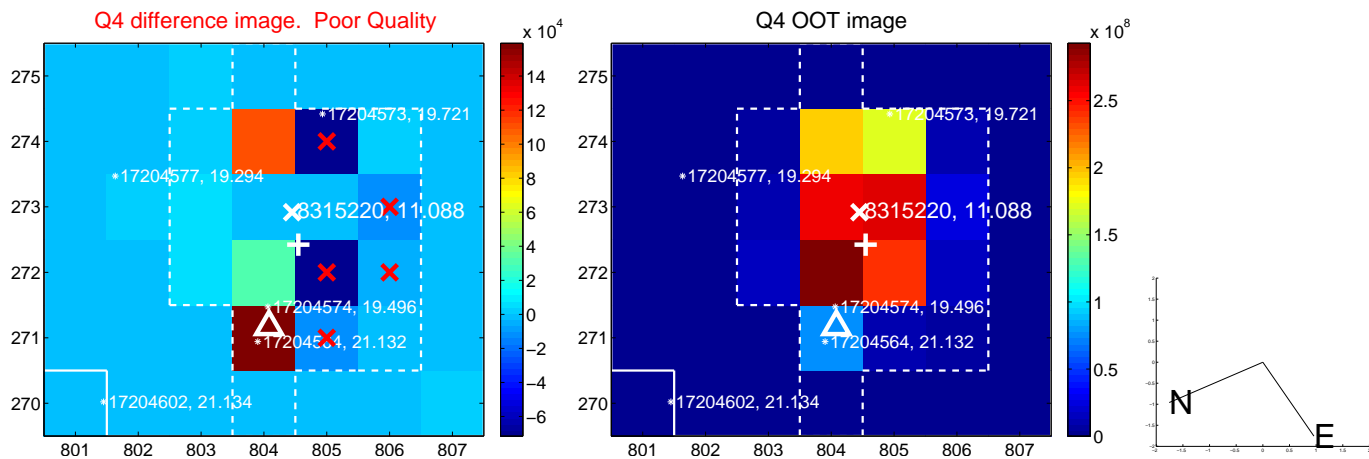
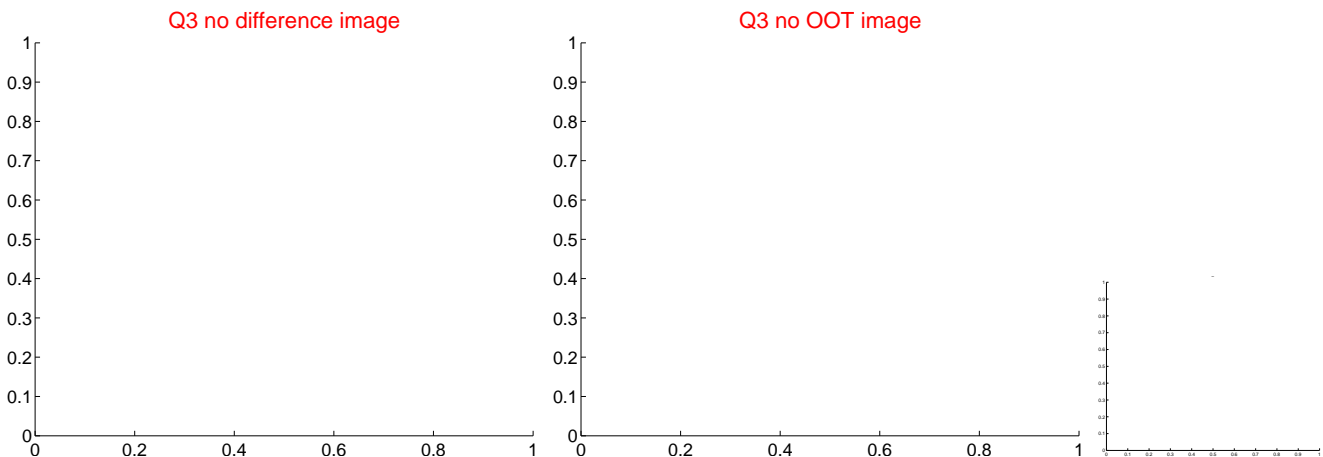
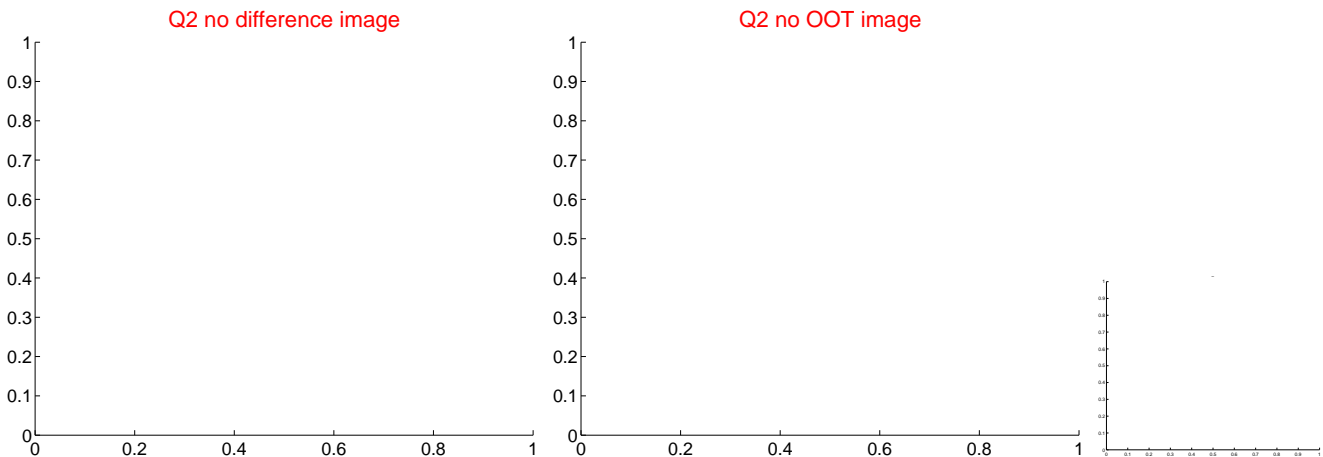
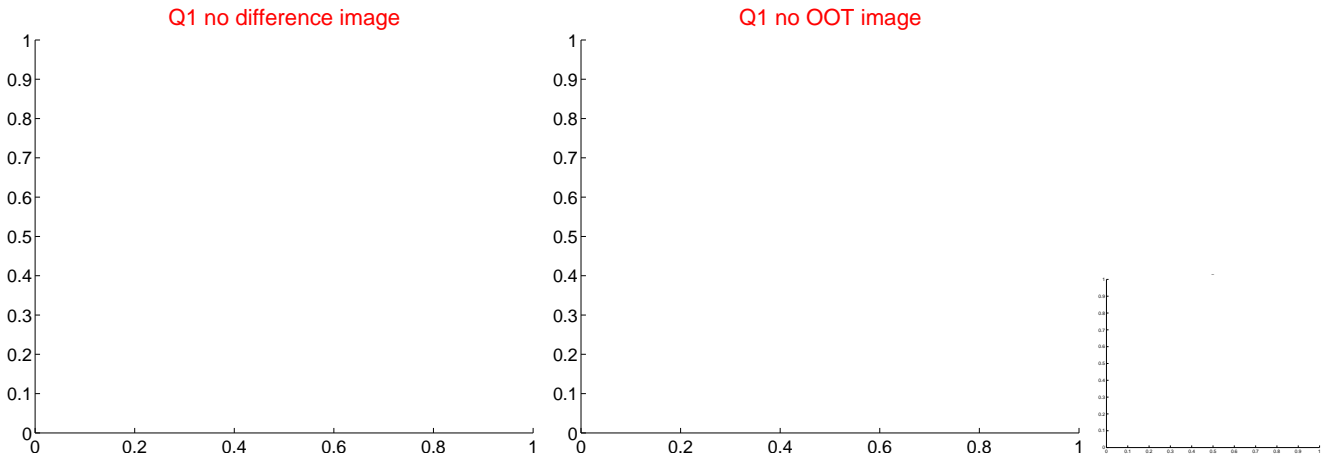
The direct PRF centroid is offset from the target star catalog position by about 1.09 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$4.978 \pm 3.101$	1.61	$3.200 \pm 1.950$	$3.813 \pm 3.362$
PRF-fit source offset from KIC position	$6.712 \pm 4.787$	1.40	$5.074 \pm 3.031$	$4.394 \pm 4.752$
photometric centroid source offset	$0.78 \pm 0.72$	1.09	$0.34 \pm 1.01$	$0.71 \pm 0.63$



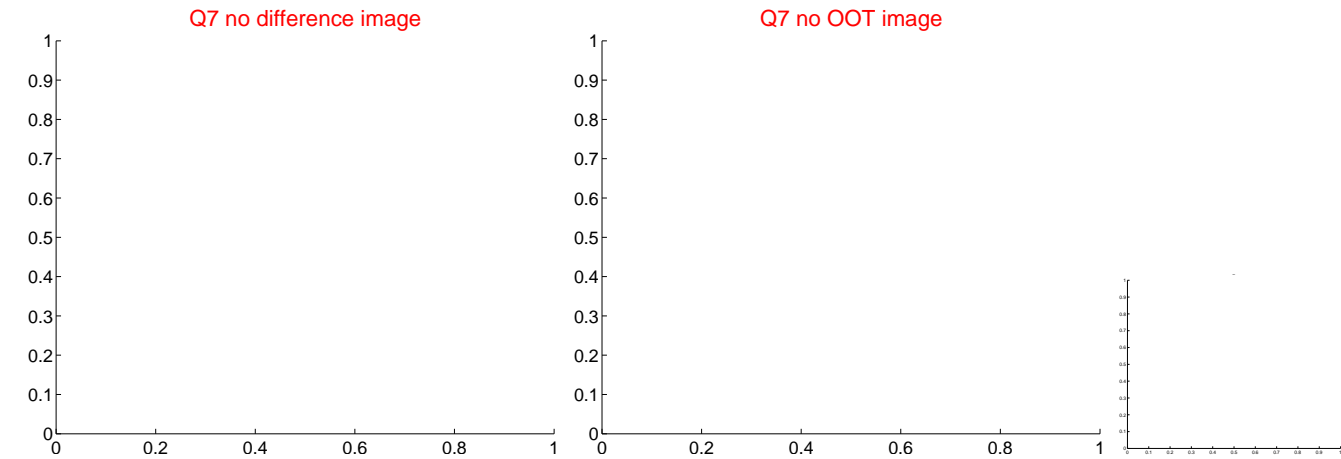
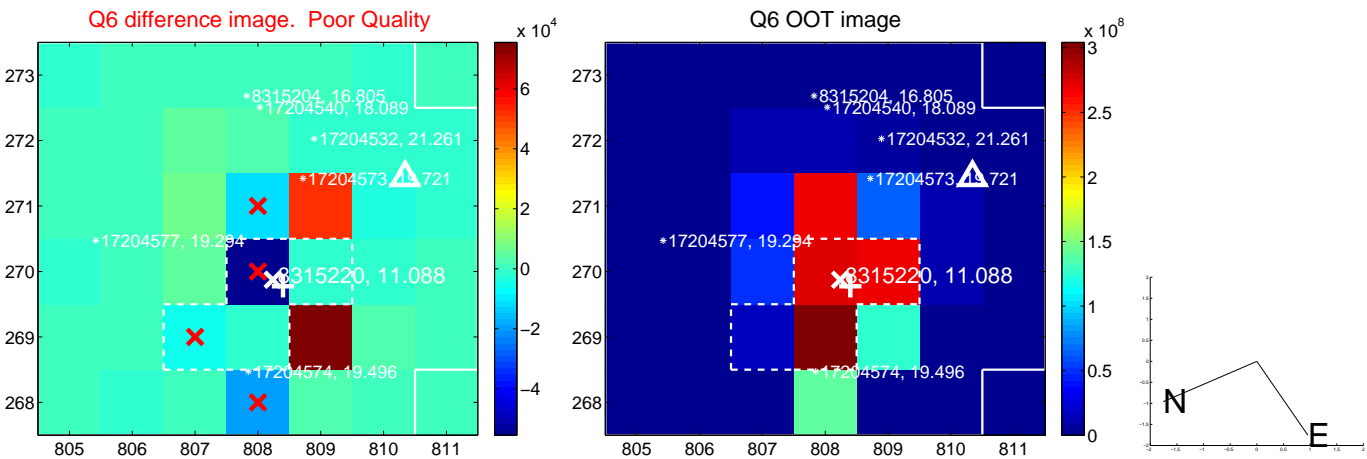
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: 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  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value

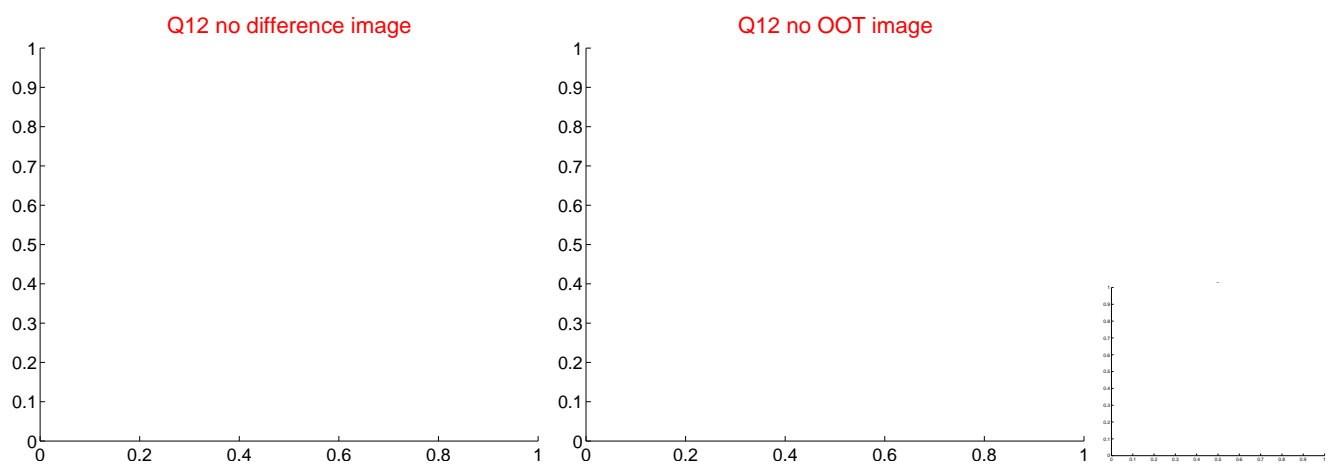
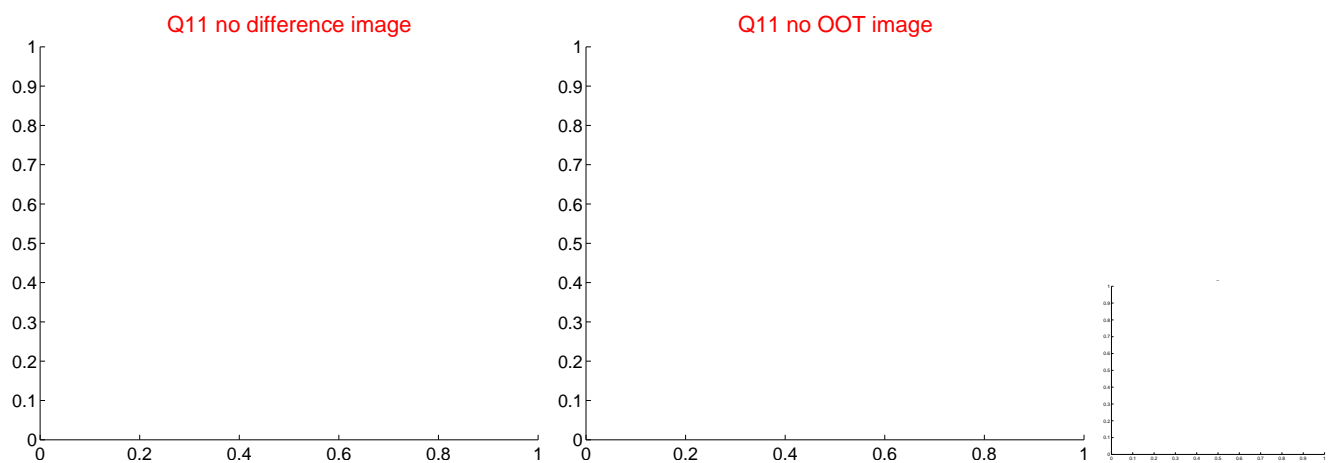
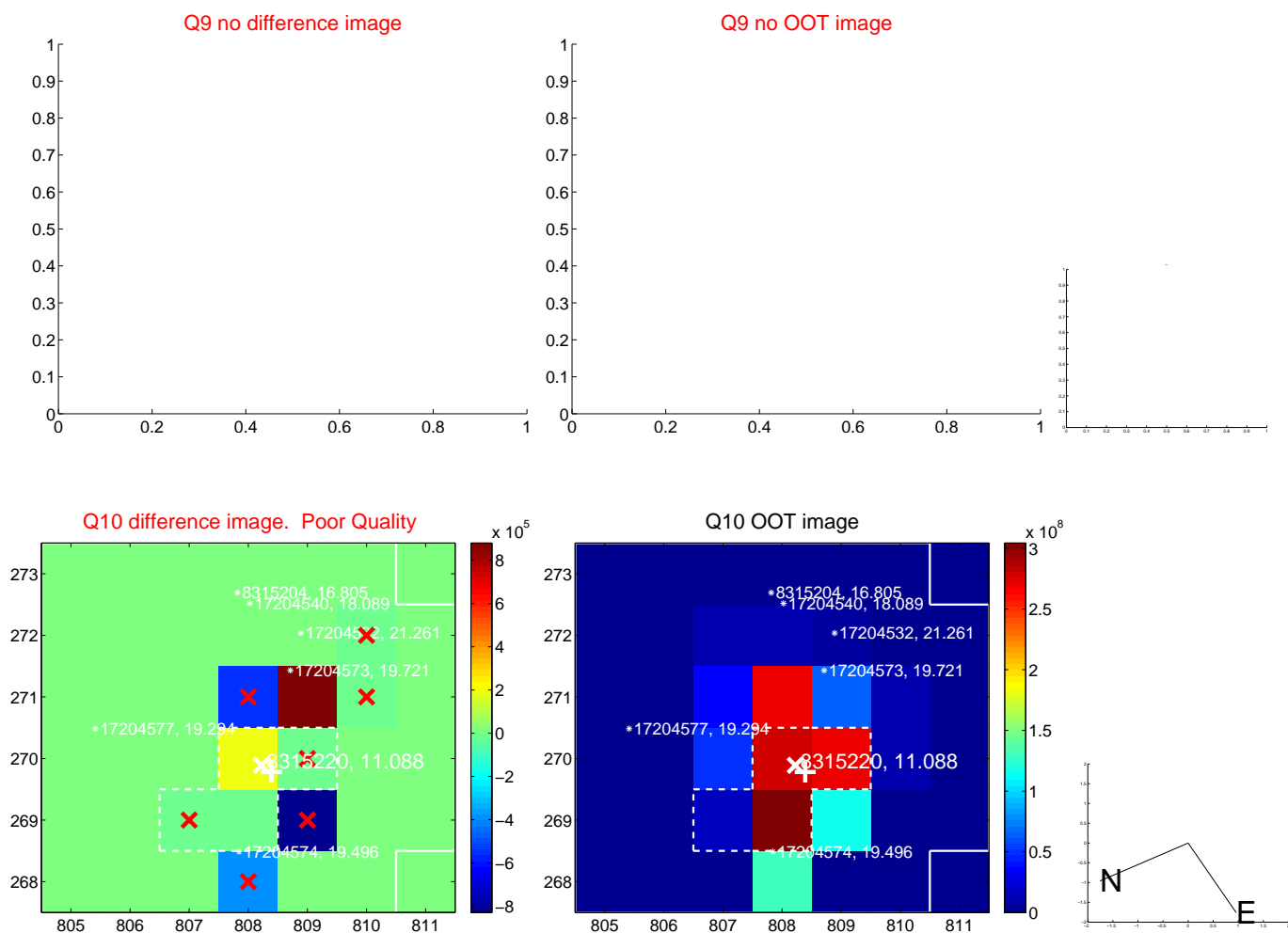




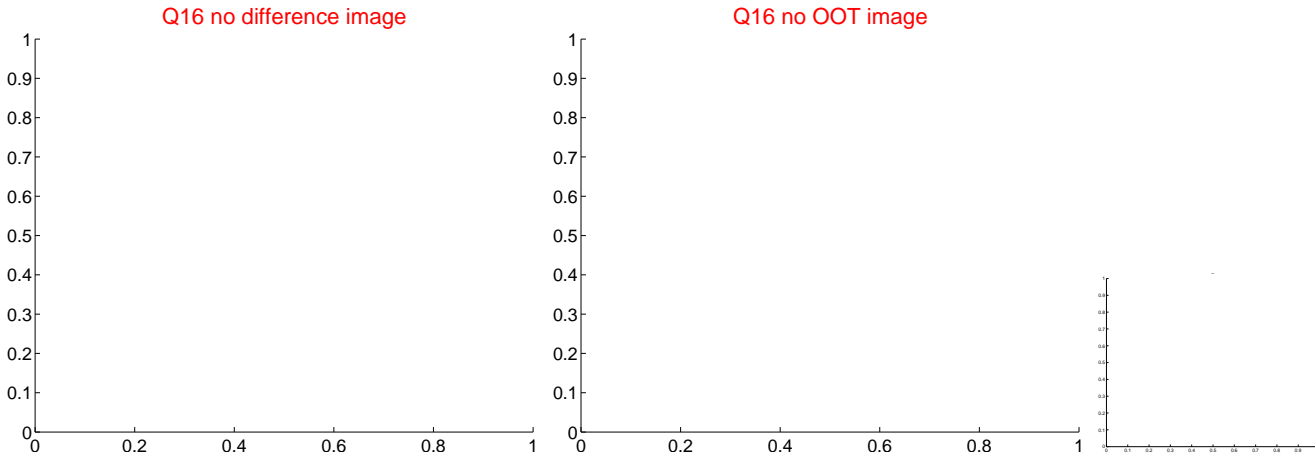
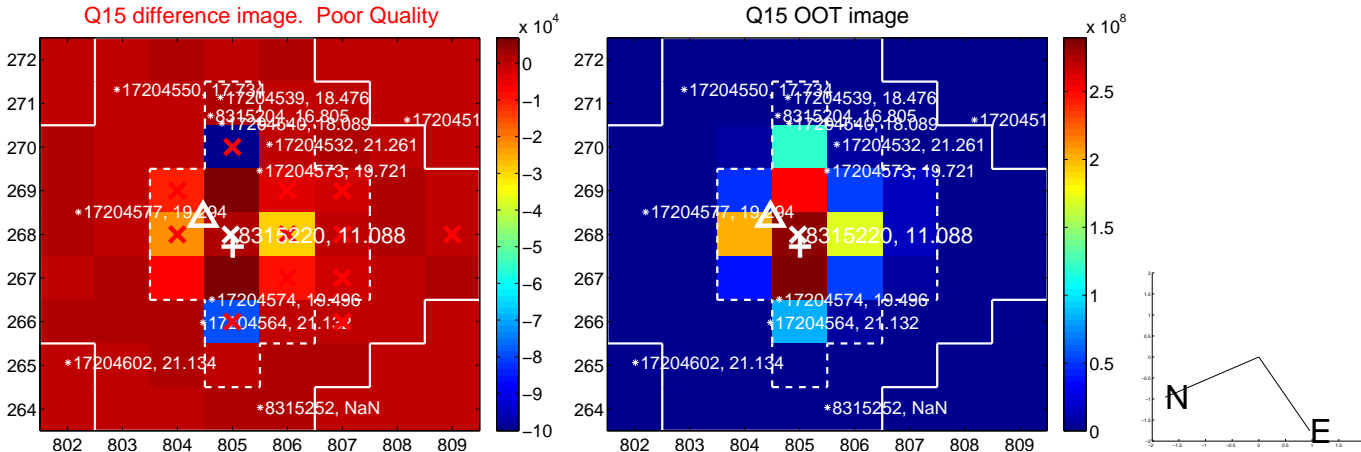
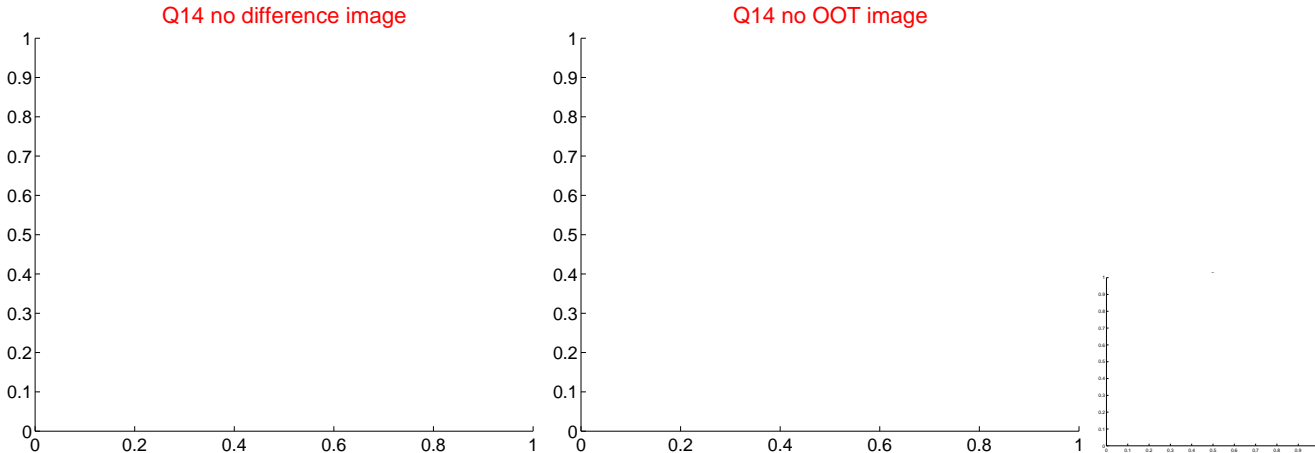
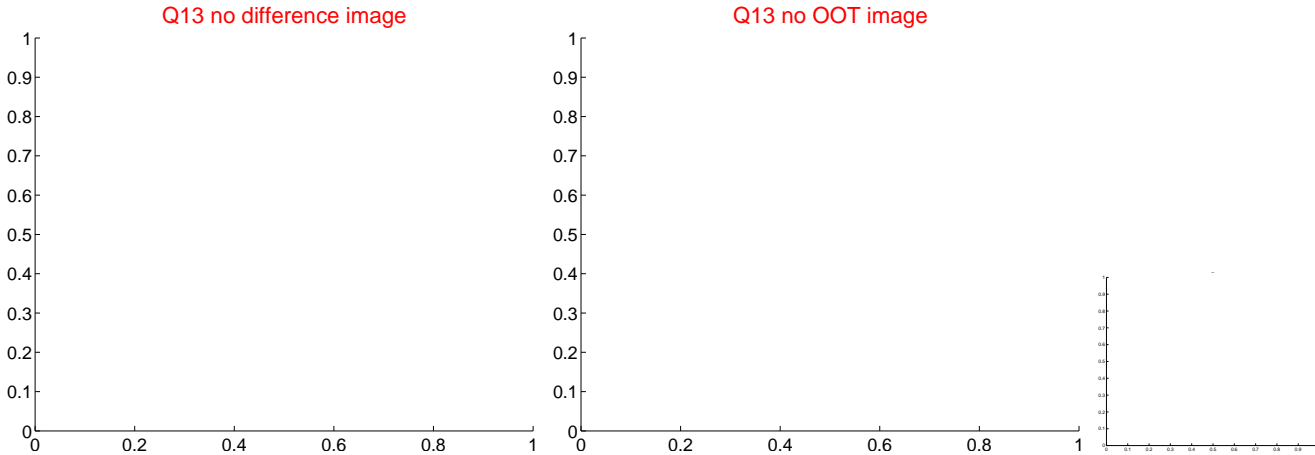
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



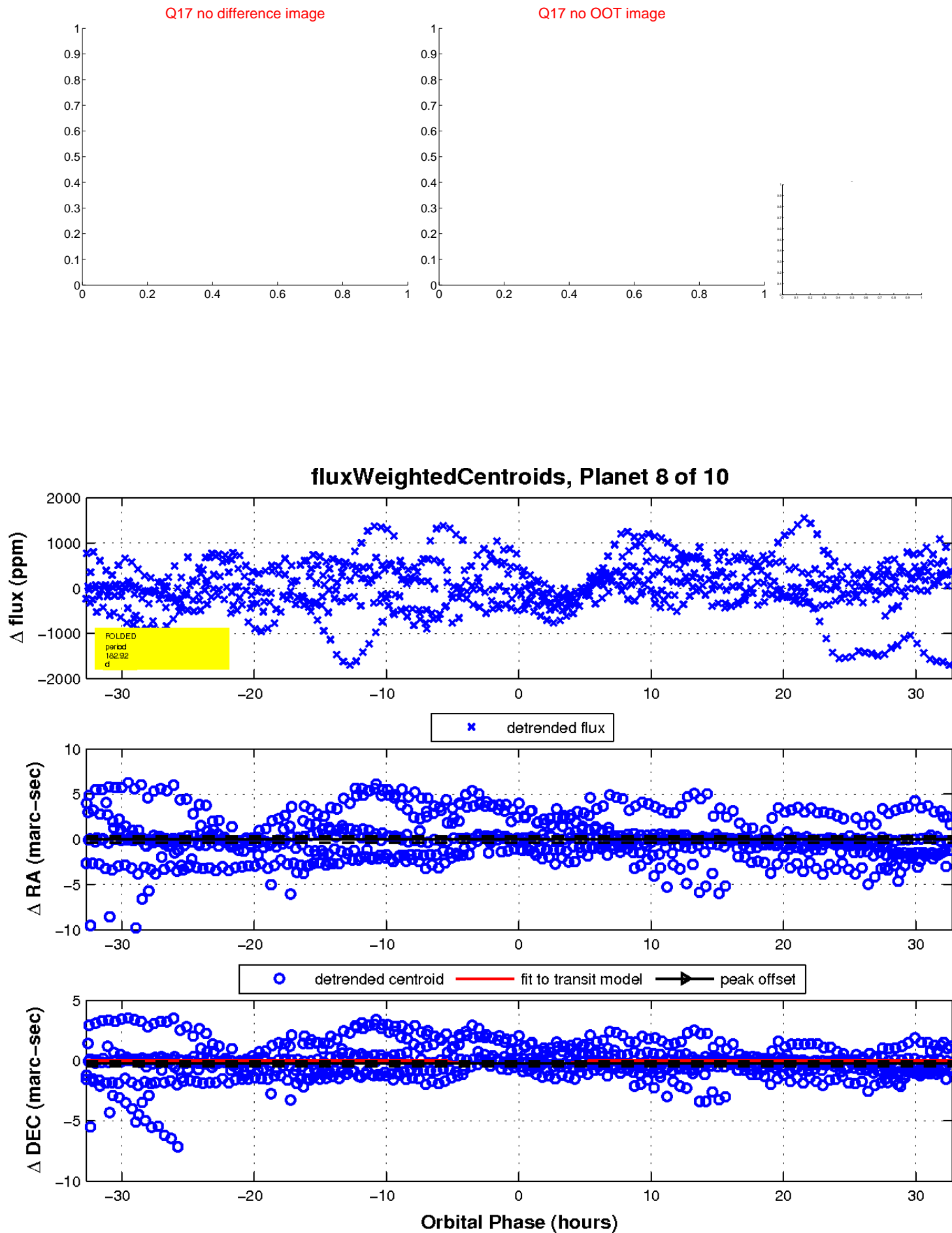
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



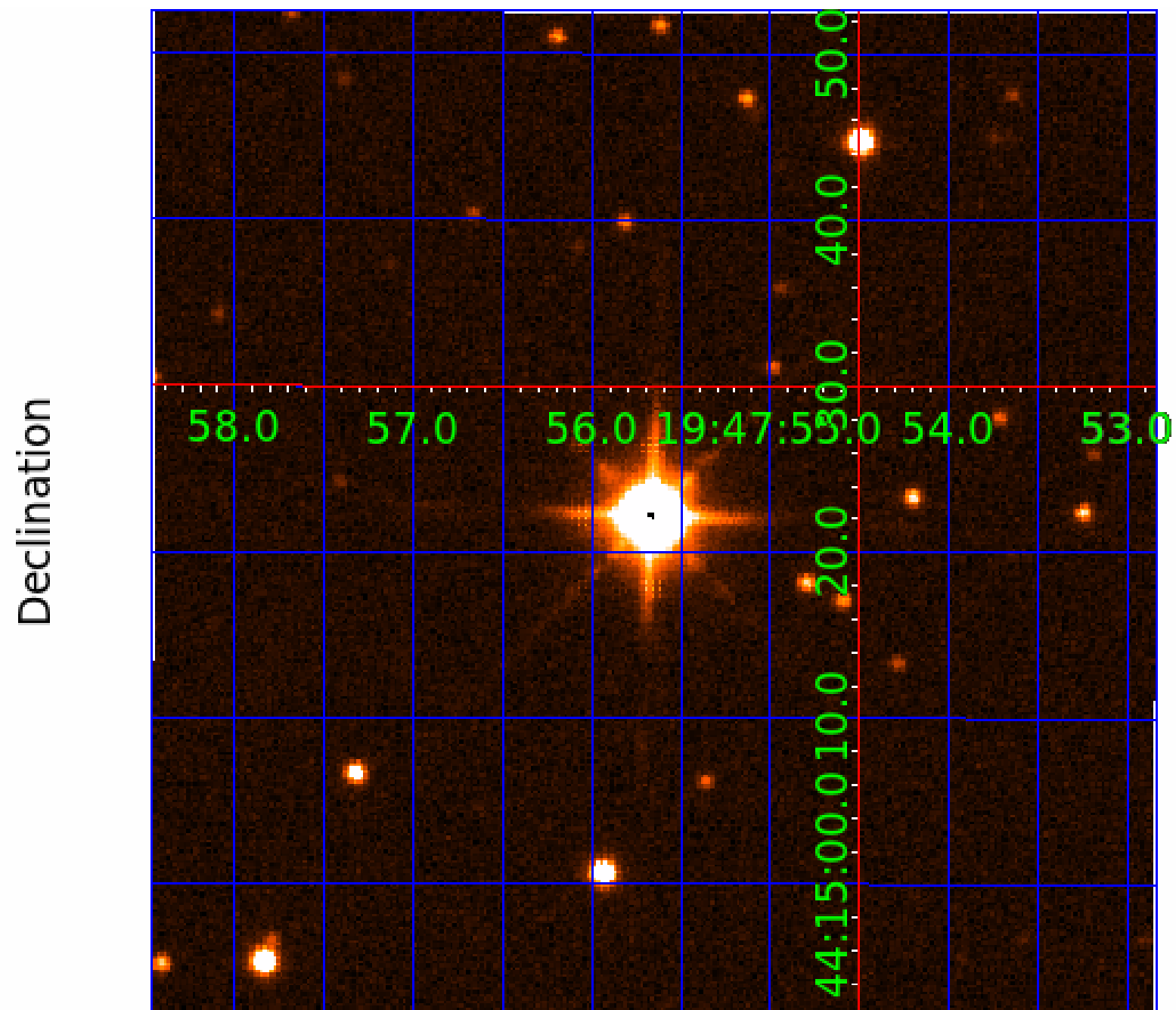
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image



## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008315220-01	OBS	No	306.366968	238.002854	978.6	14.592	25.2	18.2	13.45	5172	72.09	66.75
008315220-02	OBS	No	367.177451	175.068533	144.9	15.000	31.5	-1.0	13.45	5172	15.78	52.43
008315220-03	OBS	No	367.826147	178.916856	582.1	16.110	18.5	18.2	13.45	5172	43.69	52.31
008315220-04	OBS	No	362.484543	185.462403	90.9	15.000	21.3	-1.0	13.45	5172	12.50	53.34
008315220-05	OBS	No	181.269349	193.563129	108.1	6.180	14.6	5.3	13.45	5172	16.33	134.38
008315220-06	OBS	No	183.715252	182.372967	347.0	16.910	17.2	18.0	13.45	5172	28.23	132.00
008315220-07	OBS	No	367.388598	172.555205	46.9	15.000	13.2	-1.0	13.45	5172	8.98	52.39
008315220-08	OBS	No	182.919583	182.566043	325.9	10.920	15.3	8.9	13.45	5172	25.79	132.76
008315220-09	OBS	No	534.460195	379.043140	118.9	7.500	16.0	-1.0	13.45	5172	14.30	31.78
008315220-10	OBS	No	122.022409	180.490237	52.5	15.000	11.2	-1.0	13.45	5172	9.50	227.78

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008315220-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_SATURATED
008315220-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—NO_FITS—INCONSISTENT_TRANS—CENT_SATURATED
008315220-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_TER_DV—MOD_POS_DV—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
008315220-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
008315220-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_ZUMA—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—SAME_NTL_PERIOD—CENT_SATURATED
008315220-06	OBS	FP	0.00	1	0	1	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_SATURATED—HALO_GHOST
008315220-07	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—SAME_NTL_PERIOD—CENT_SATURATED
008315220-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_SATURATED
008315220-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
008315220-10	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED

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

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

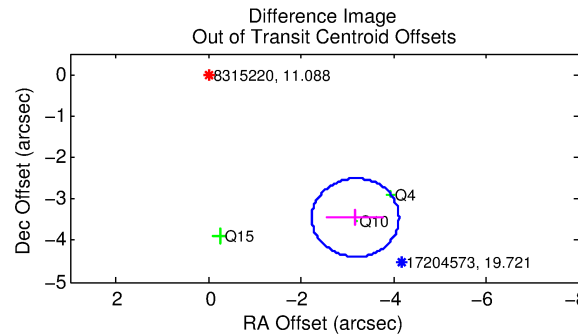
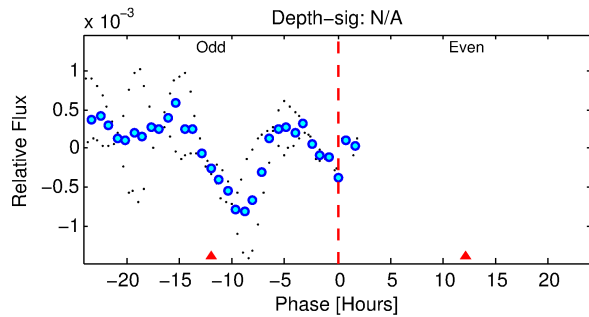
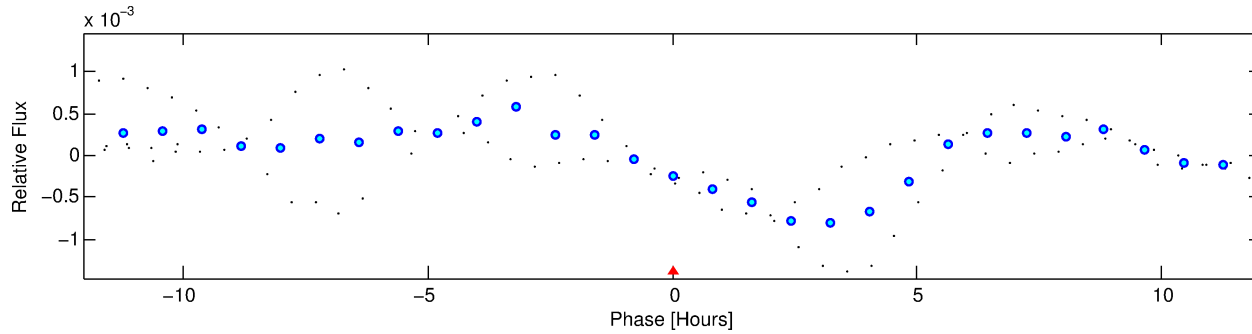
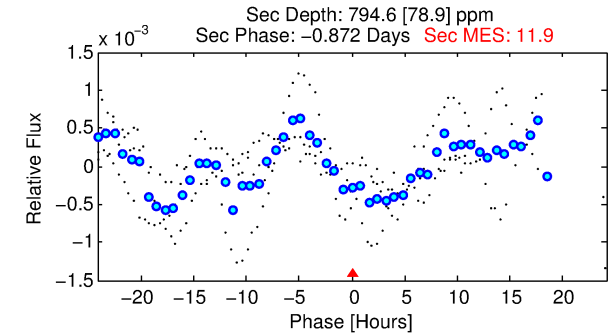
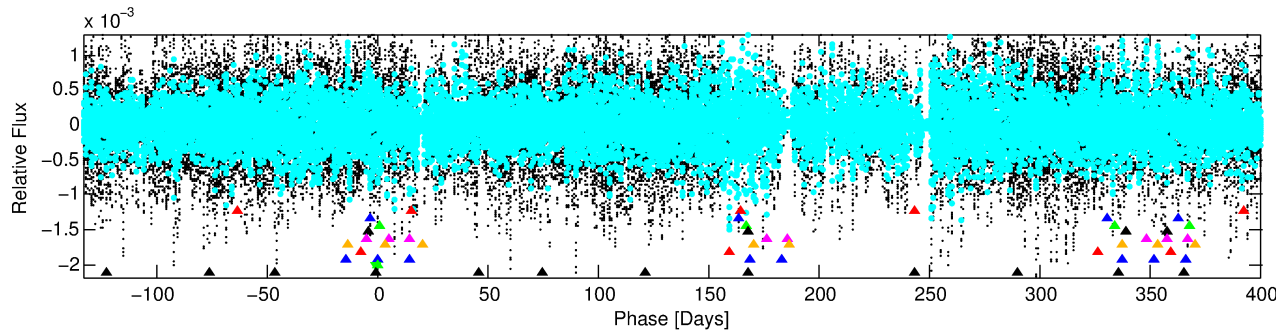
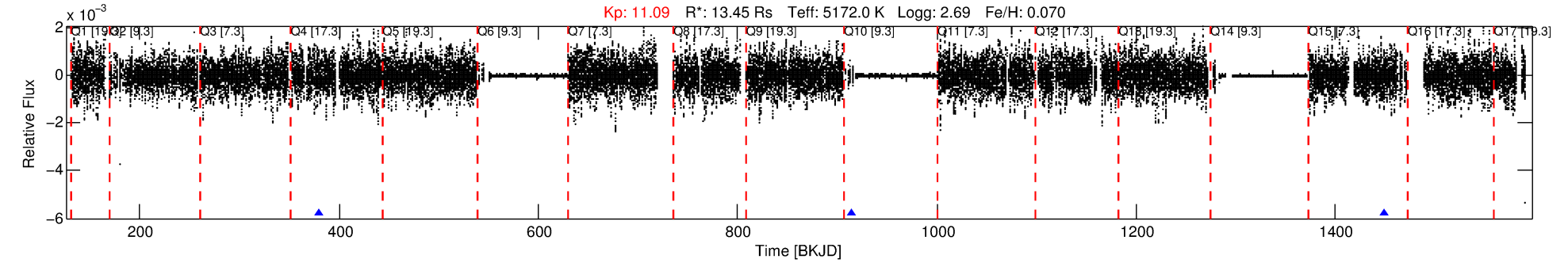
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 008315220-09

No Significant Match Found

# DV One-Page Summary

KIC: 8315220 Candidate: 9 of 10 Period: 534.460 d



## TPS TCE Results:

Period = 534.46020 d  
Epoch = 379.0431 BKJD

DV fit results are unavailable

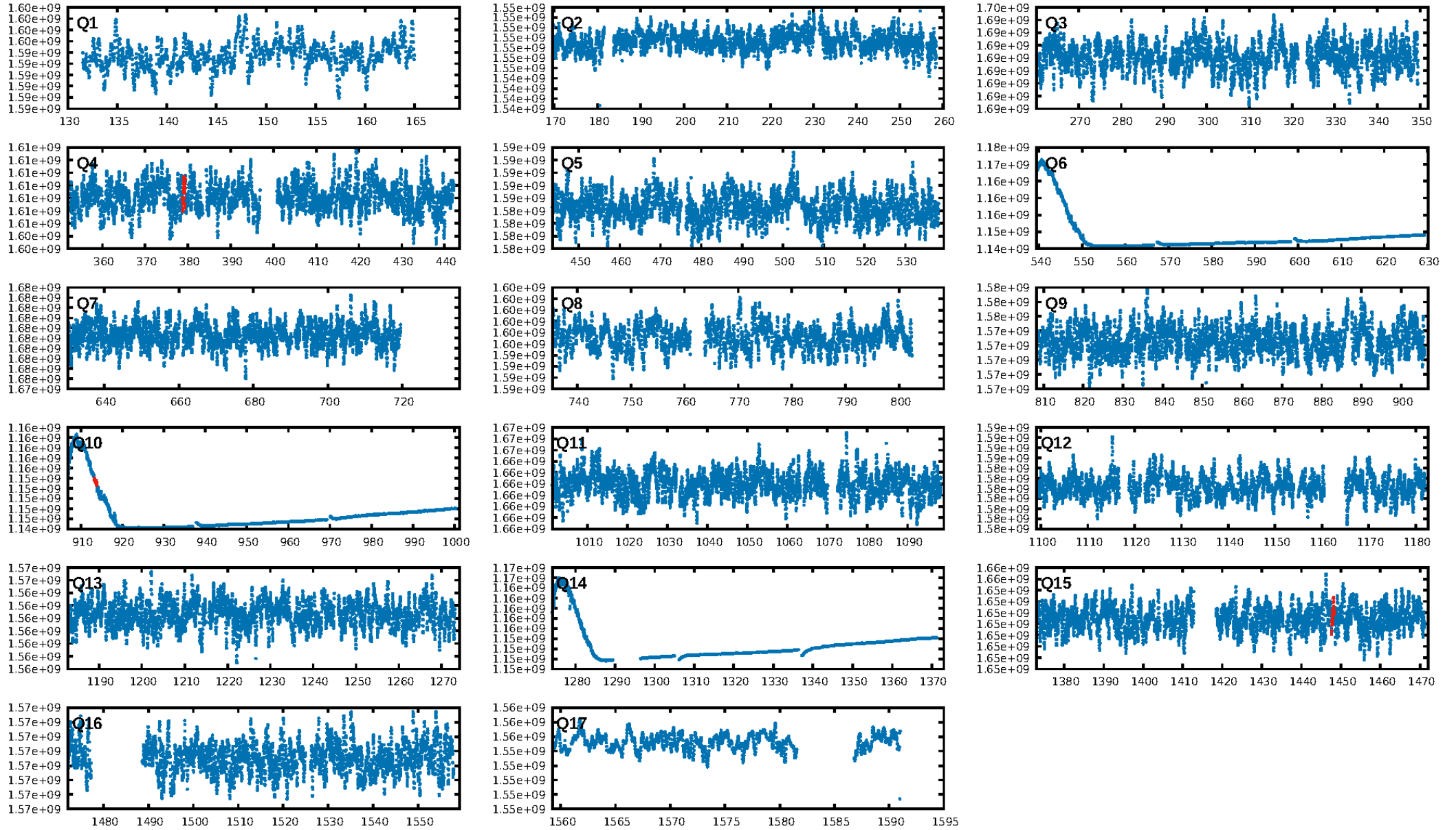
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [225.06 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 8.92e-12  
RollingBand-fgt: 1.00 [2/2]  
GhostDiagnostic-chr: N/A  
Centroid-sig: N/A  
Centroid-so: N/A  
OotOffset-rm: 4.691 arcsec [14.91 $\sigma$ ]  
KicOffset-rm: 4.353 arcsec [9.66 $\sigma$ ]  
OotOffset-st: 1/1/1/0 [3]  
KicOffset-st: 1/1/1/0 [3]  
DiffImageQuality-fgm: 0.33 [1/3]  
DiffImageOverlap-fno: 0.67 [2/3]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 16:11:30 Z

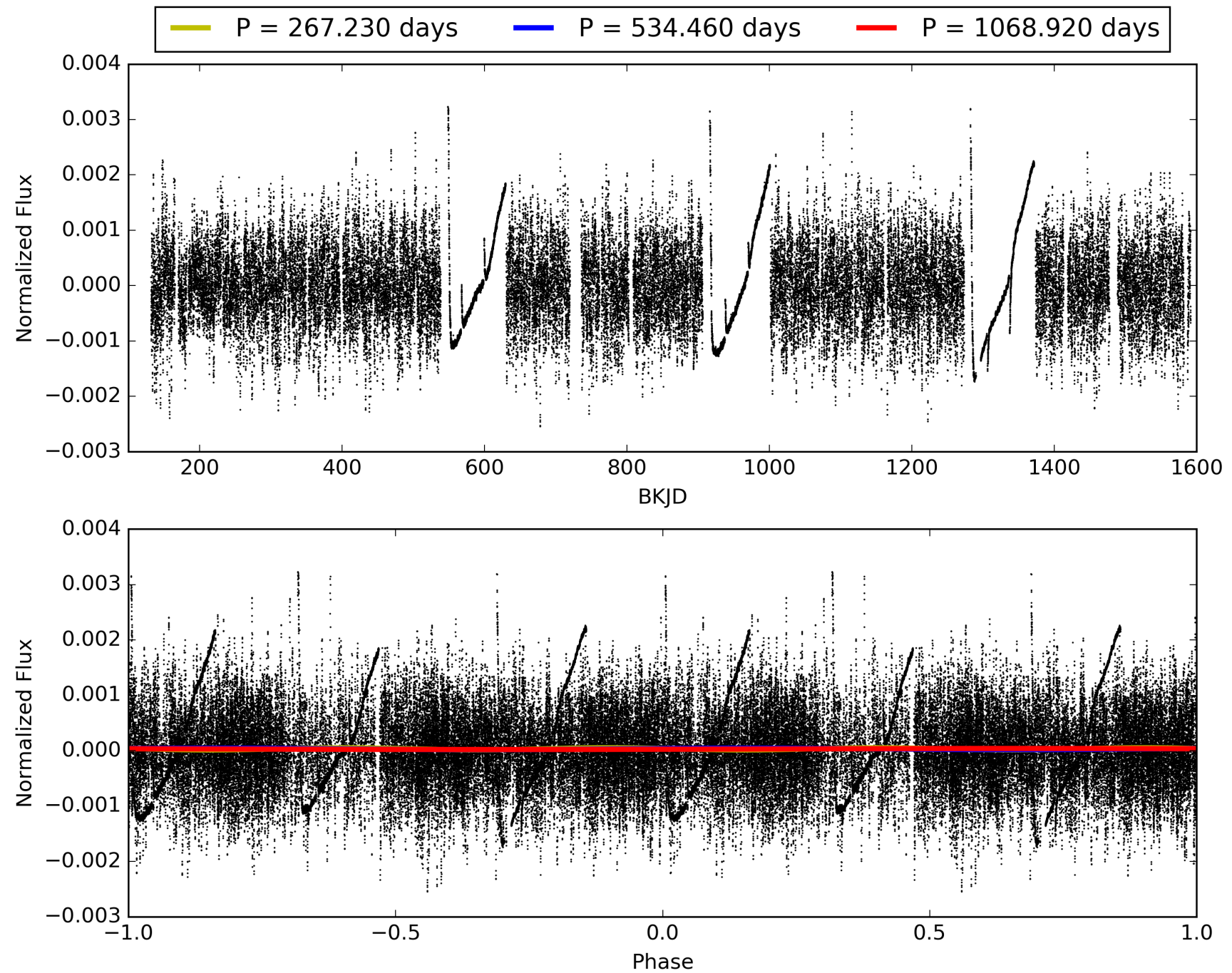
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 008315220-09, PDC Light Curves



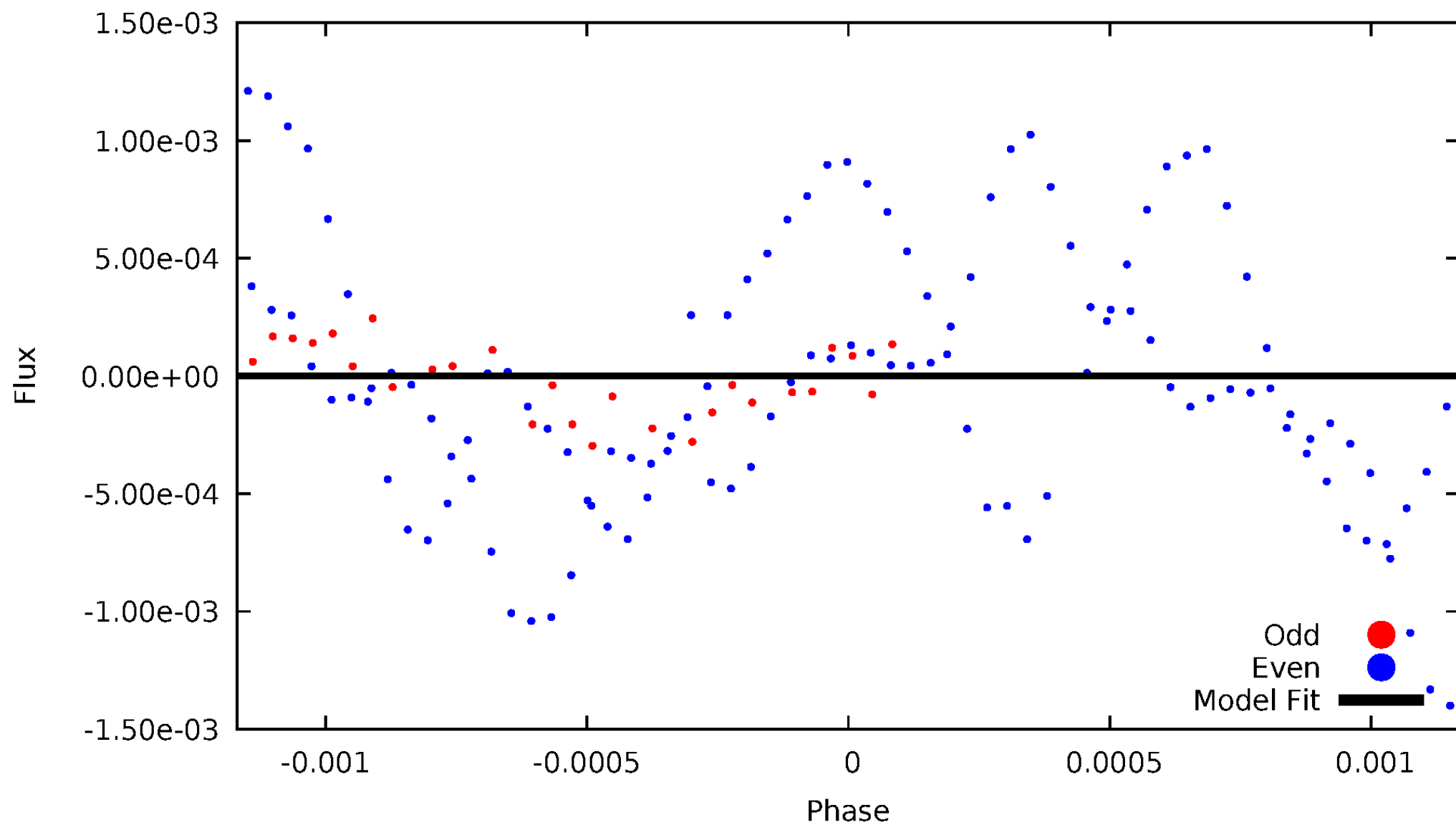


# TCE 008315220-09



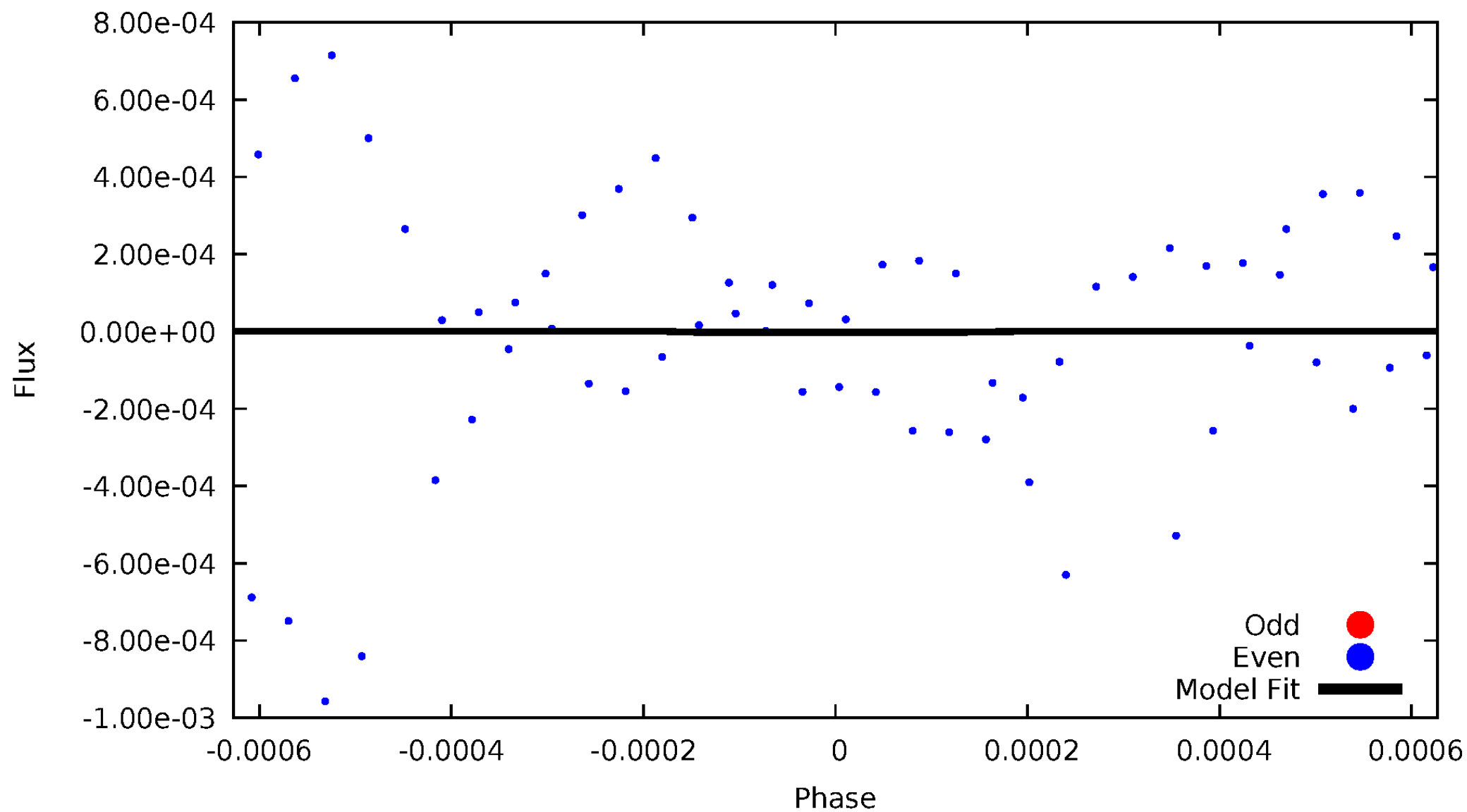
# DV Odd/Even

TCE 008315220-09

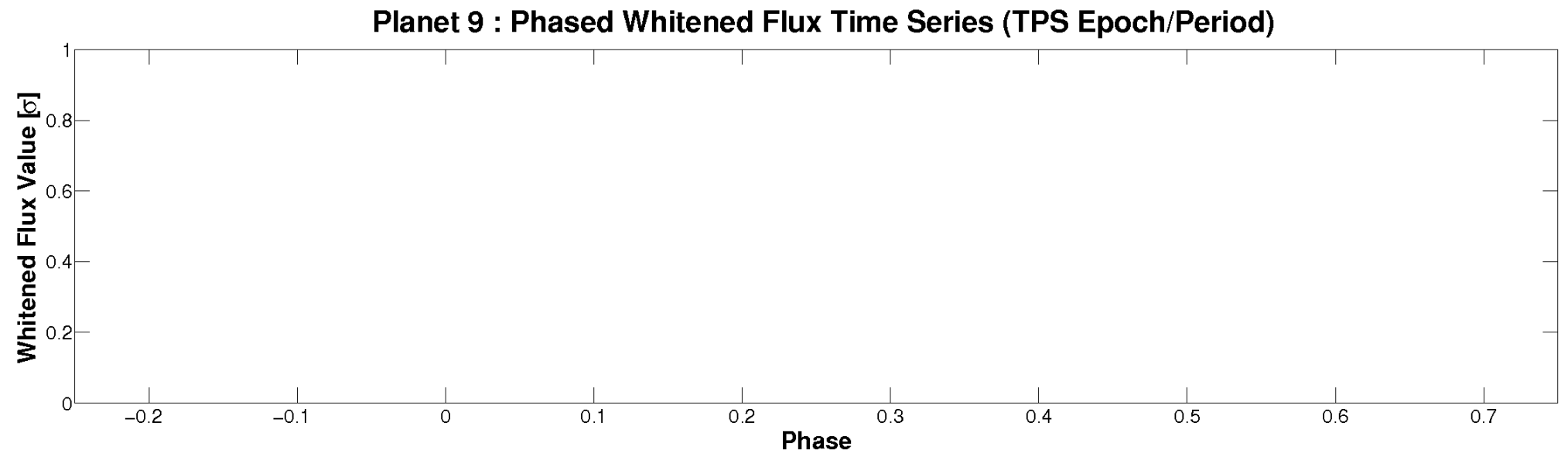
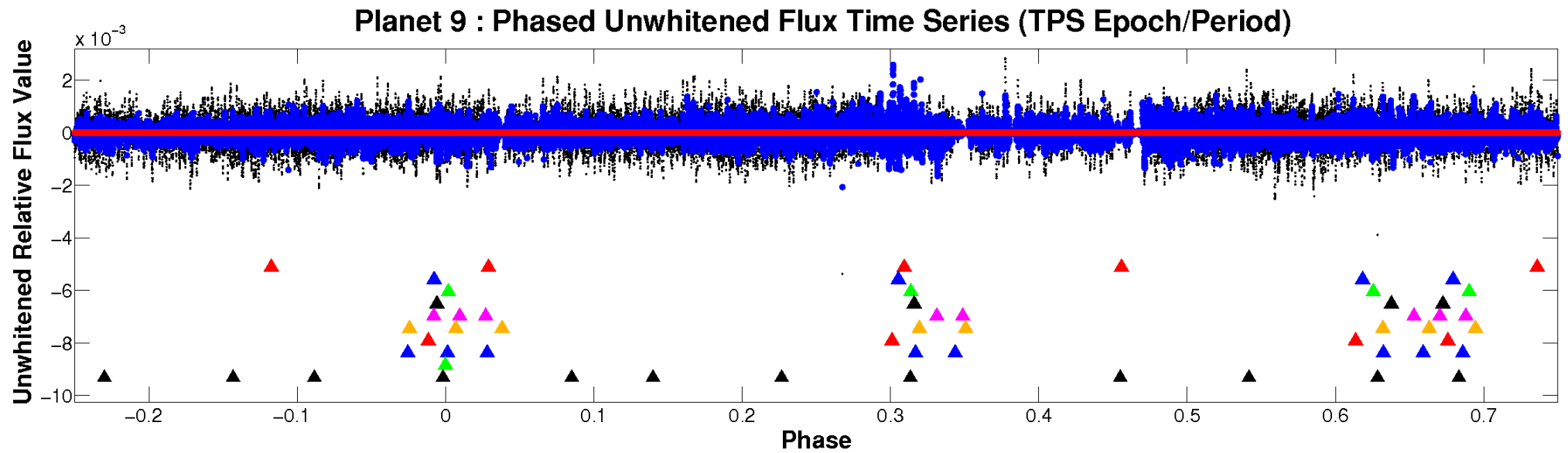


# ALT Odd/Even

TCE 008315220-09

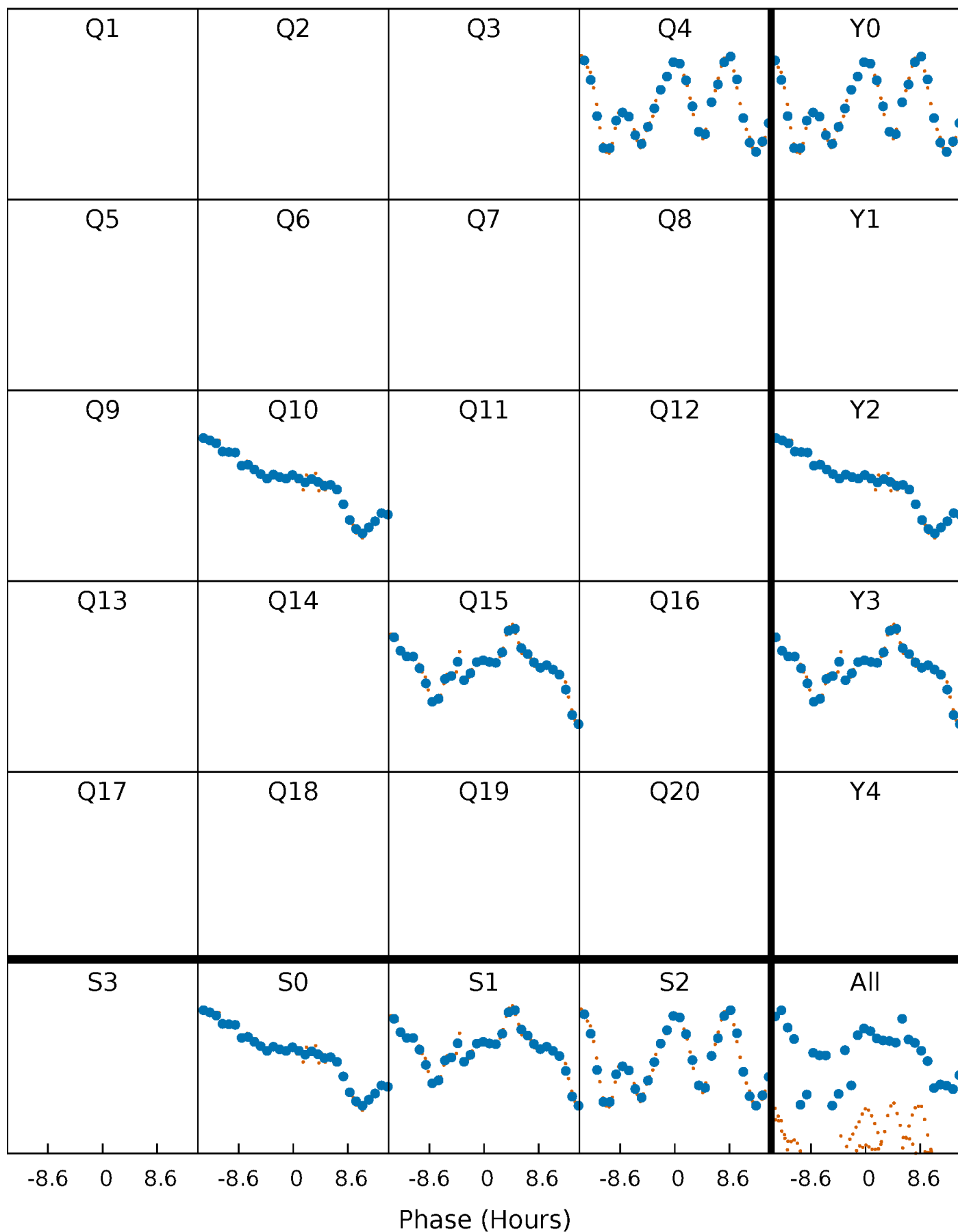


# Non-Whitened Vs. Whitened Light Curve



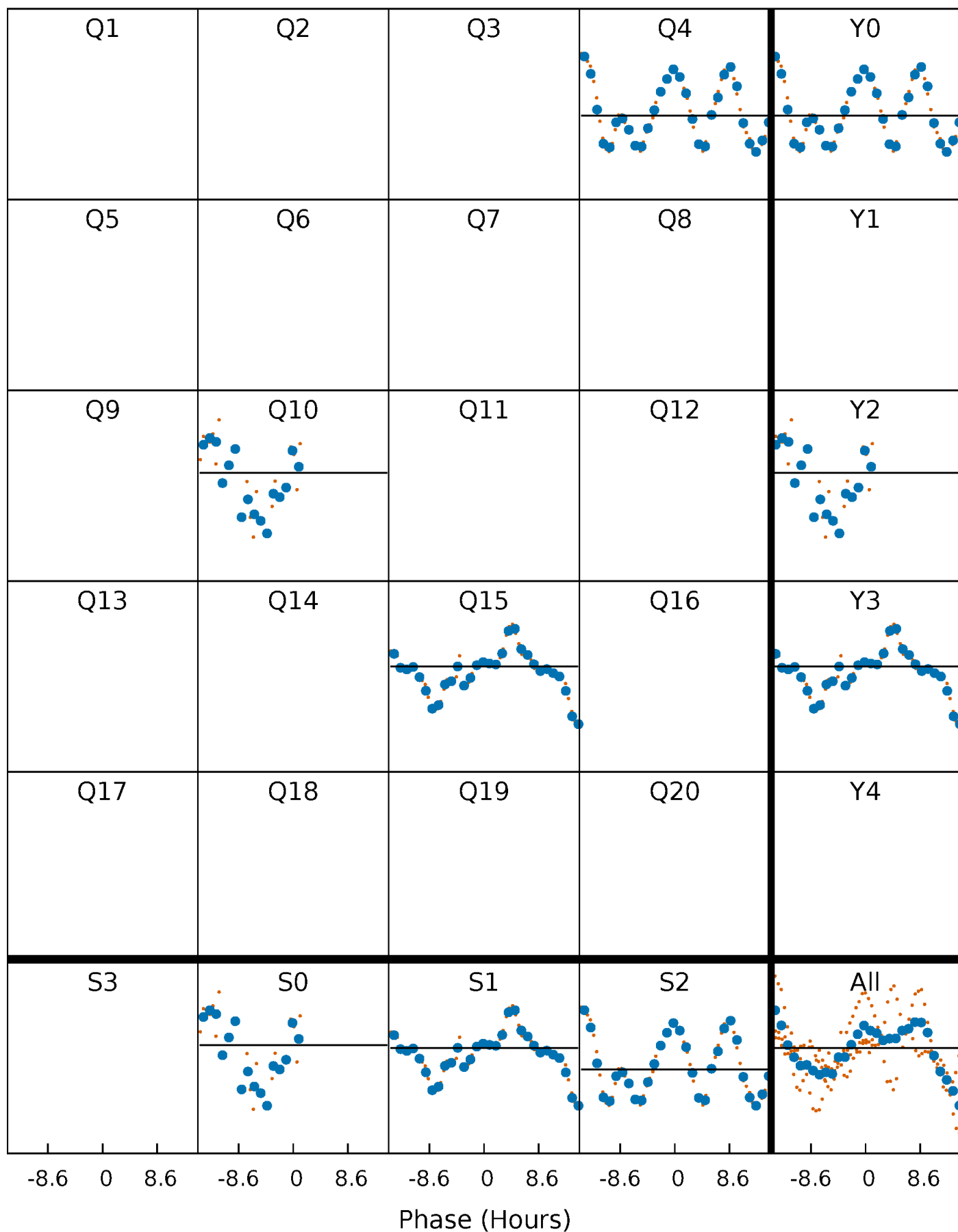
# PDC Quarter-Phased Transit Curves

TCE 008315220-09     $P=534.460195$  Days     $T_0=379.043140$  (BKJD)



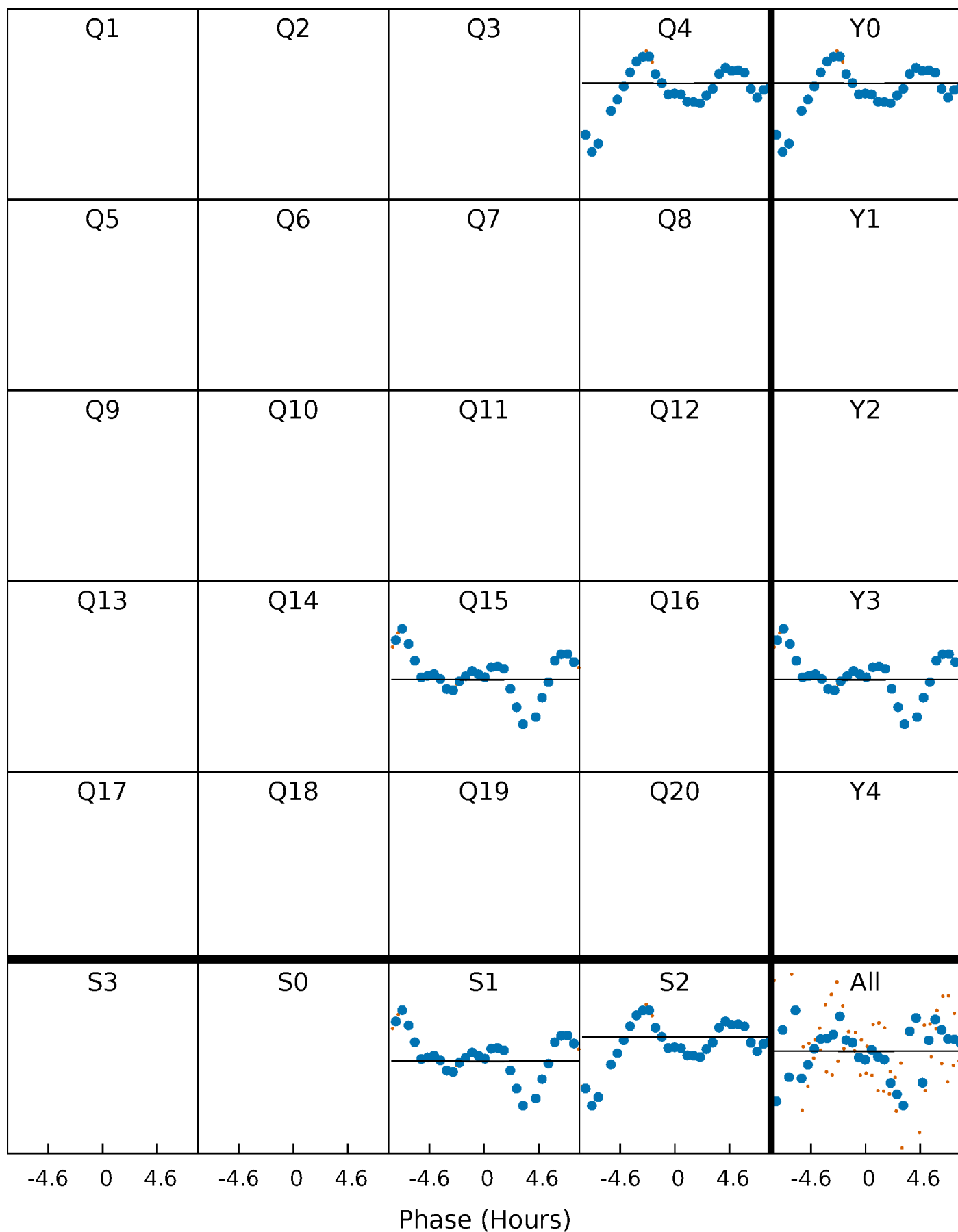
# DV Quarter-Phased Transit Curves

TCE 008315220-09     $P=534.460195$  Days     $T_0=379.043140$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

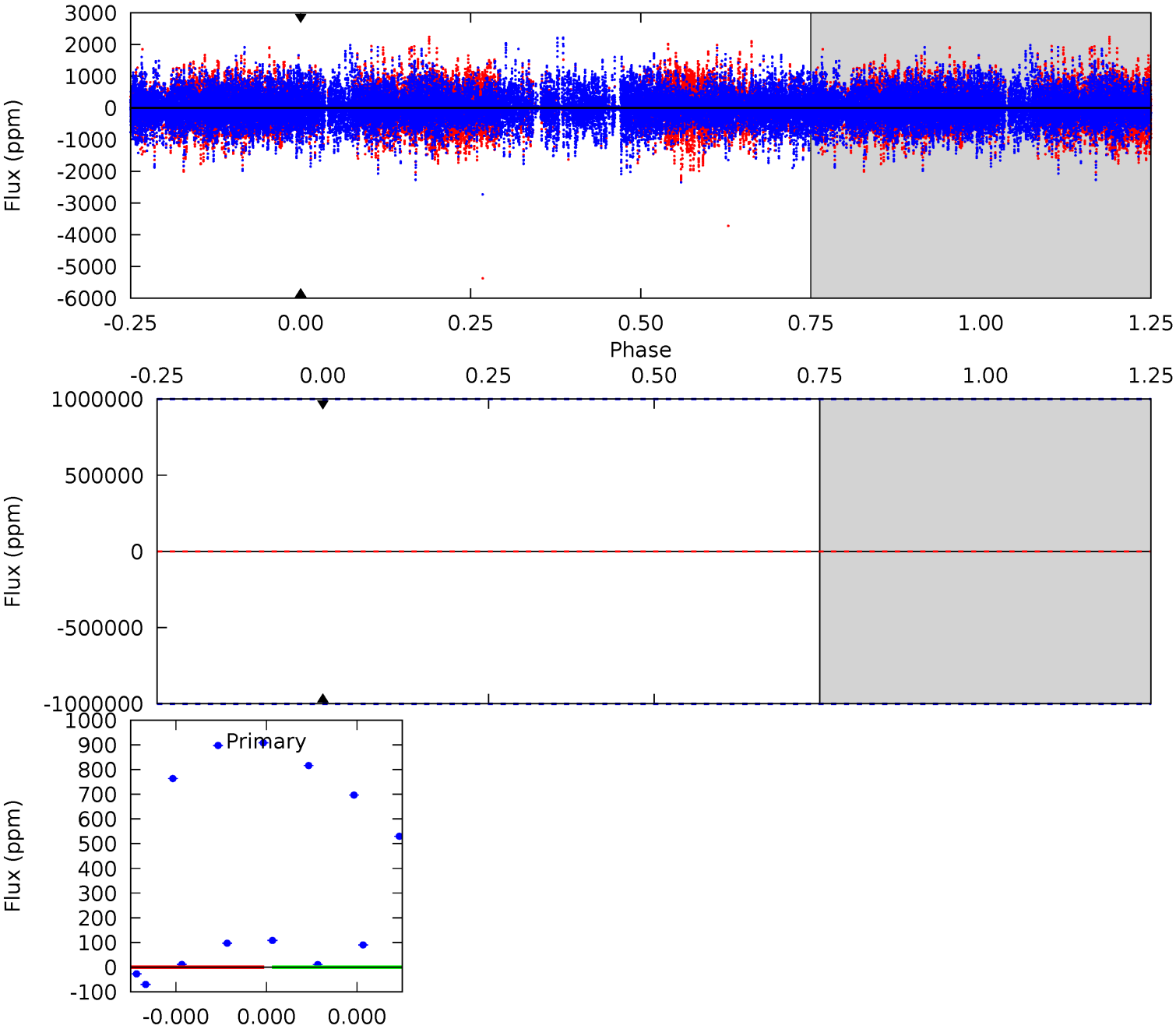
TCE 008315220-09 P=534.460195 Days  $T_0=379.509899$  (BKJD)



DV Model-Shift Uniqueness Test

008315220-09, P = 534.460195 Days, E = 379.043140 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	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0

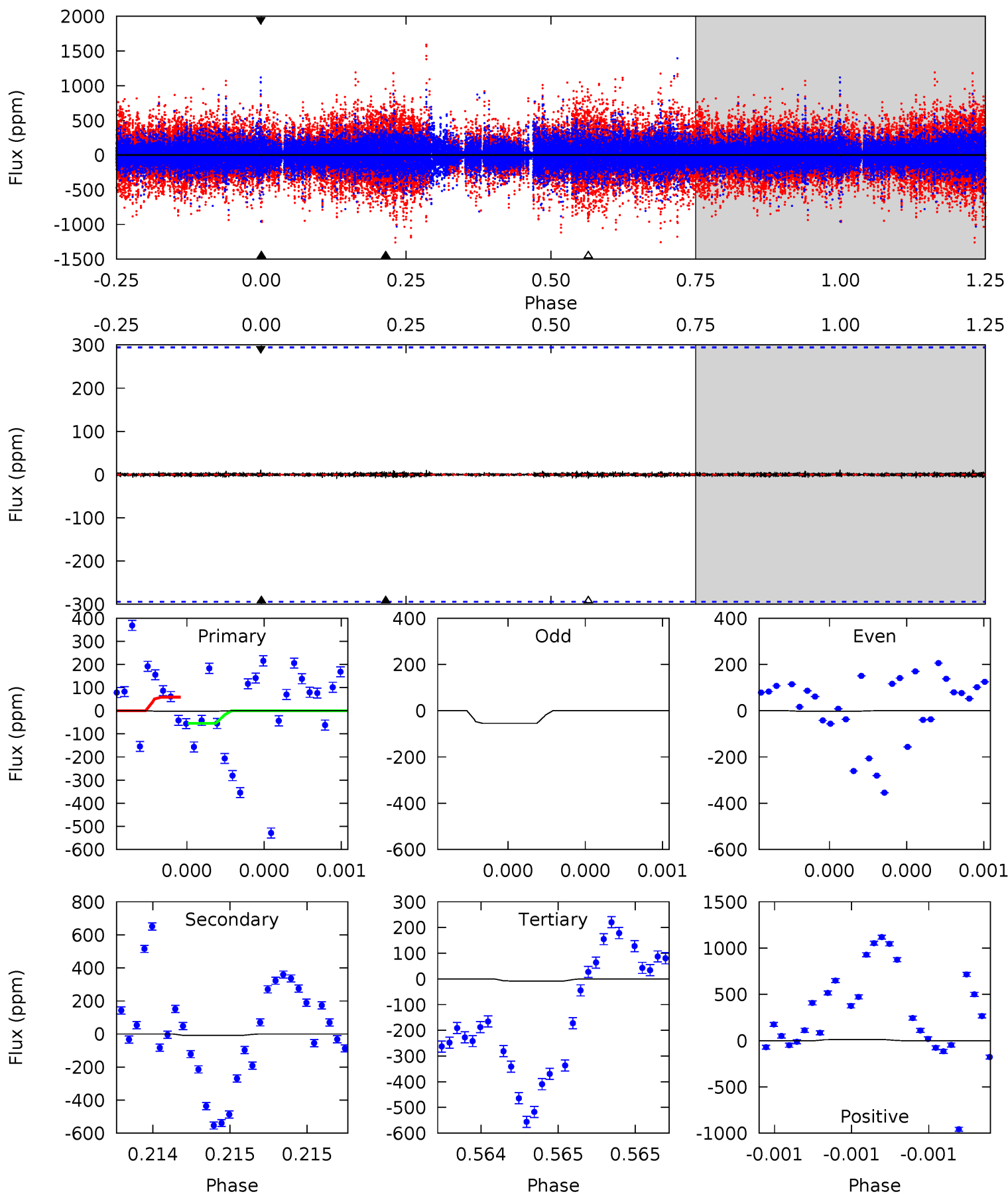




# Alt Model-Shift Uniqueness Test

008315220-09, P = 534.460195 Days, E = 379.509899 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
0.04	0.16	0.15	0.21	5.64	3.58	0.03	-0.11	-0.17	0.01	-0.05	0.60	1.00	0.57	0.04



### Stellar Parameters For KIC 008315220

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5172^{+70}_{-248}$	$2.693^{+0.273}_{-0.126}$	$0.070^{+0.150}_{-0.600}$	$13.454^{+2.481}_{-7.442}$	$3.257^{+0.222}_{-1.999}$	$0.002^{+0.006}_{-0.001}$
	+1%/-5%	+10%/-5%	+214%/-857%	+18%/-55%	+7%/-61%	+302%/-38%
Source	PHO1	FLK73	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 008315220-09 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$0 \pm 1000000$	$95.34^{+106.84}_{-67.69}$	$831^{+54}_{-80}$	$-4201^{+20515}_{-12365}$	$-299.338^{+34255.903}_{-42033.974}$
Alt.	$-8 \pm 52$	$93.15^{+104.77}_{-65.71}$	$833^{+51}_{-80}$	$1796^{+981}_{-4403}$	$0.788^{+26.488}_{-16.437}$

$T_{\text{max}}$  = Theoretical Maximum Planetary Temperature  
 $T_{\text{obs}}$  = Observed Planetary Temperature (Assuming  $A=0.3$ )  
 $A_{\text{obs}}$  = Observed Albedo (Assuming  $T=0$ )

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

## DV Centroid Data

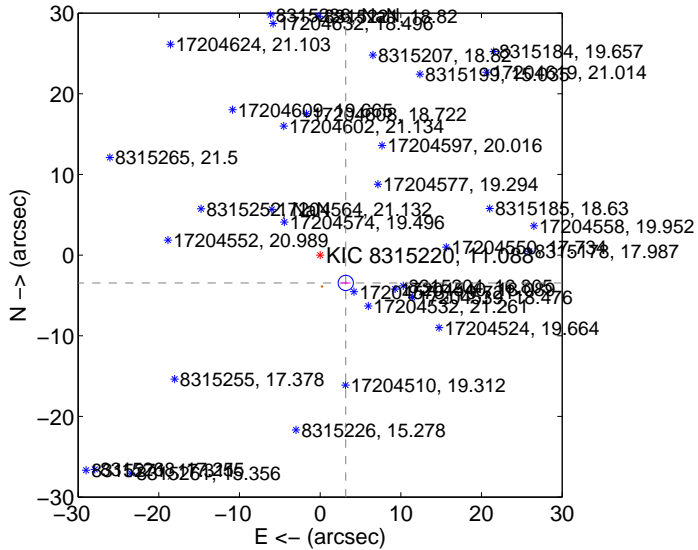
Supplemental centroid analysis for 008315220-09. **Kepler magnitude: 11.09.** Transit SNR -1.00

**There are 1 quarters with good PRF difference image offsets**

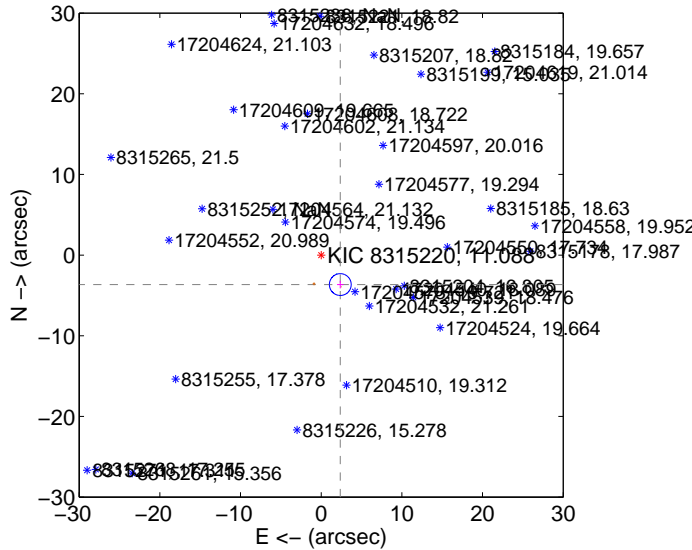
The direct PRF centroid is offset from the target star catalog position by about 1.18 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b>4.691 <math>\pm</math> 0.315</b>	<b>14.91</b>	-3.176 $\pm$ 0.608	-3.452 $\pm$ 0.192
PRF-fit source offset from KIC position	<b>4.353 <math>\pm</math> 0.451</b>	<b>9.66</b>	-2.369 $\pm$ 0.397	-3.652 $\pm$ 0.471
photometric centroid source offset	—	—	—	—

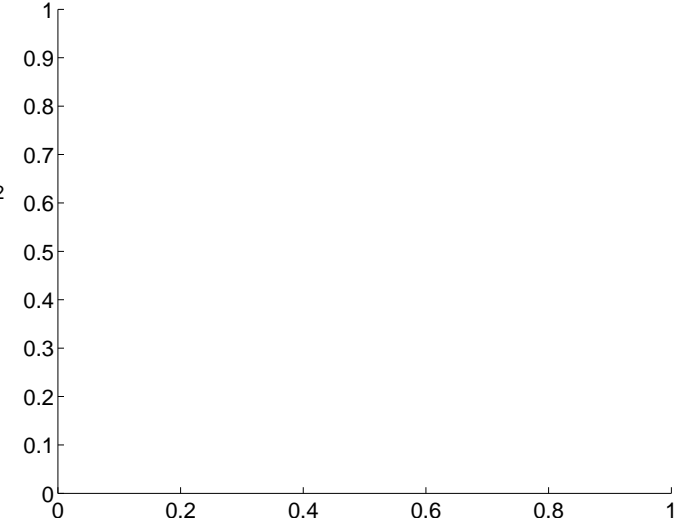
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



**There are no 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  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

Q1 no difference image



Q1 no OOT image



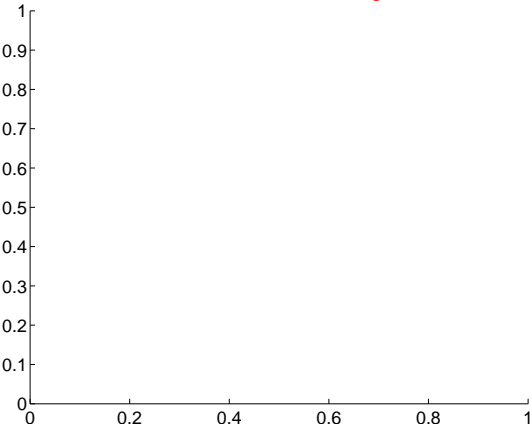
Q2 no difference image



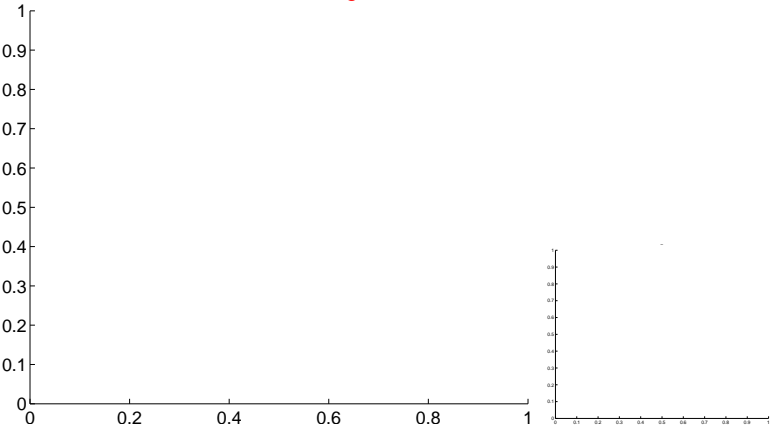
Q2 no OOT image



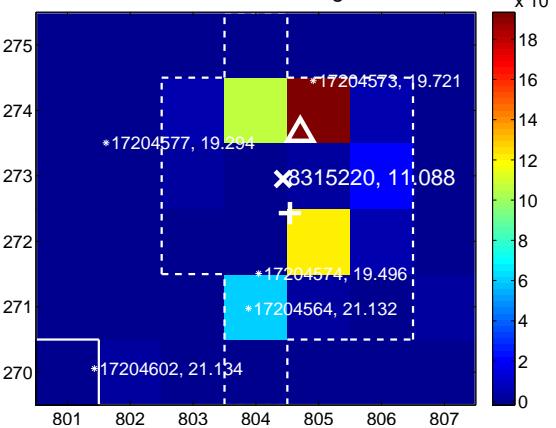
Q3 no difference image



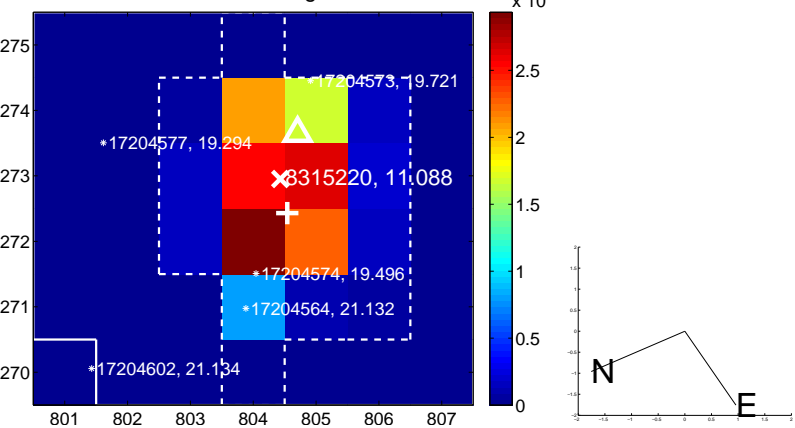
Q3 no OOT image



Q4 difference image



Q4 OOT image

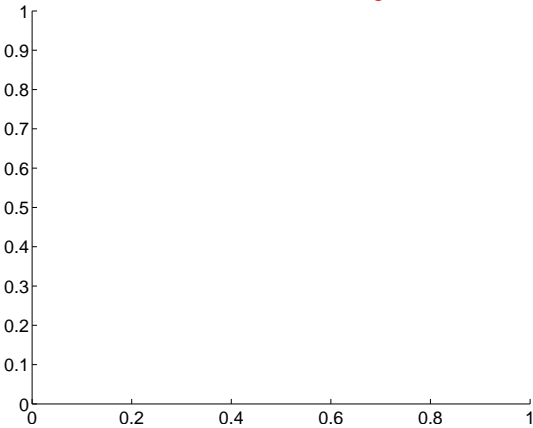


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

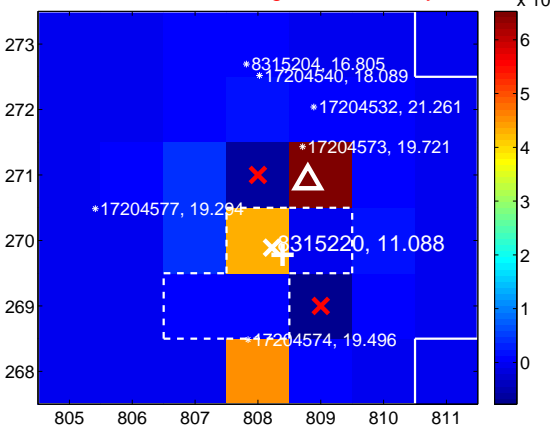
Q9 no difference image



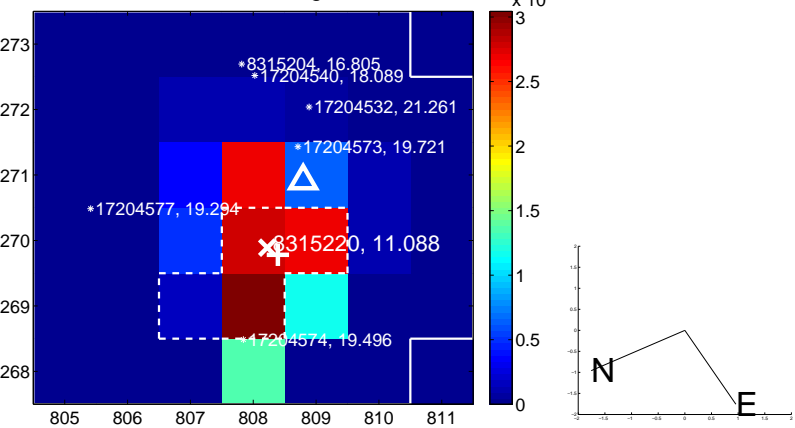
Q9 no OOT image



Q10 difference image. Poor Quality



Q10 OOT image



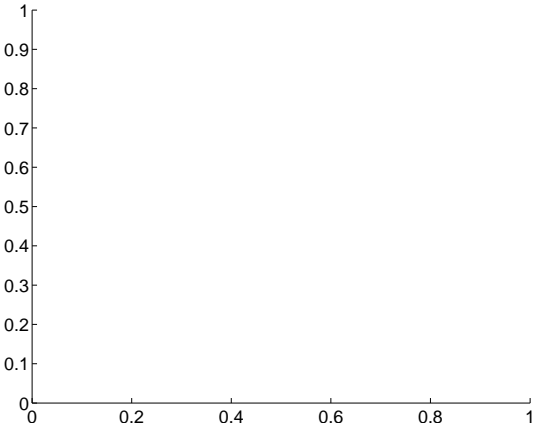
Q11 no difference image



Q11 no OOT image



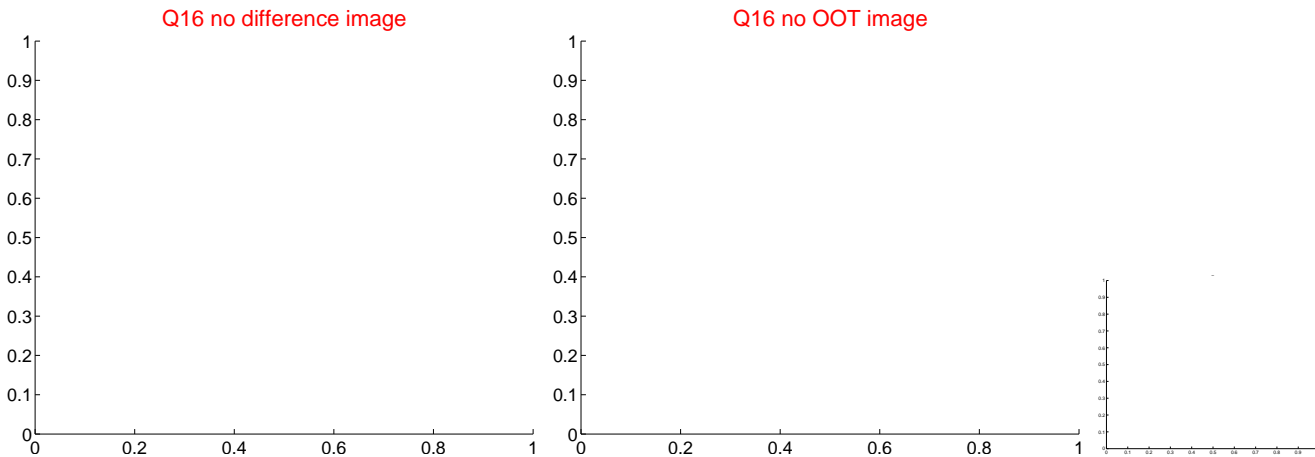
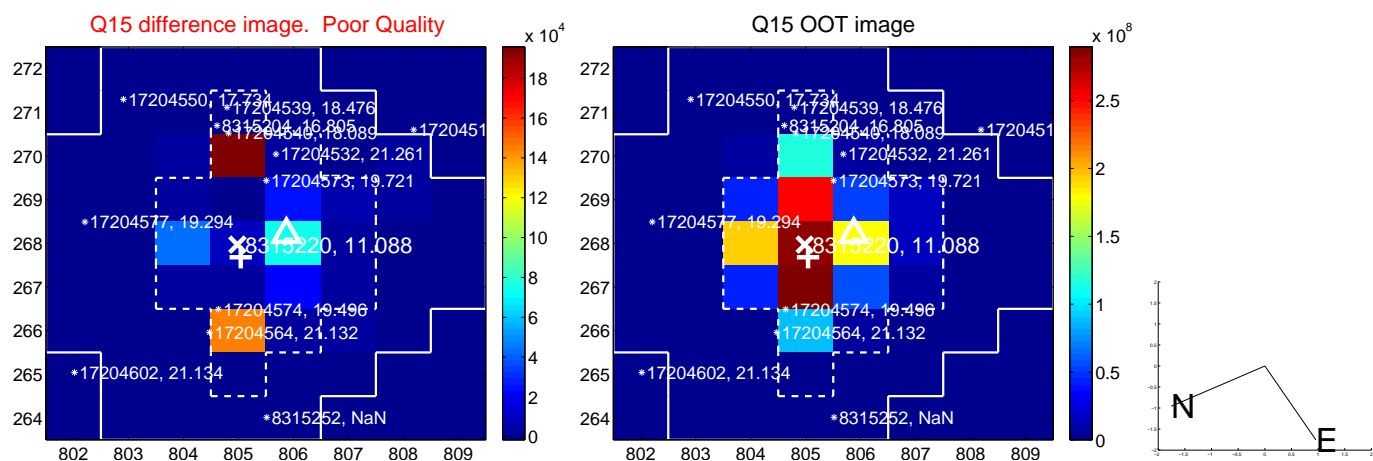
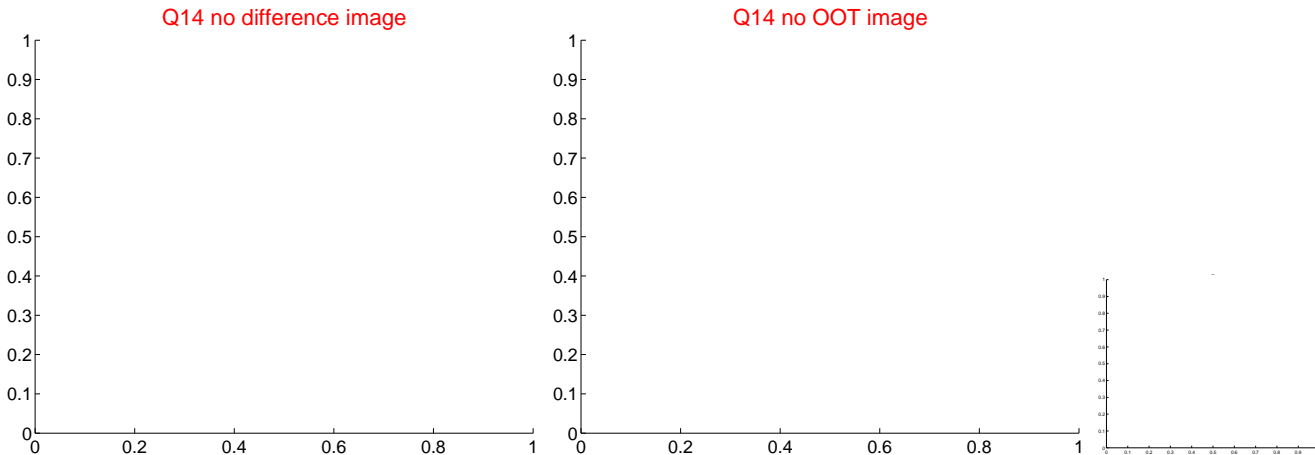
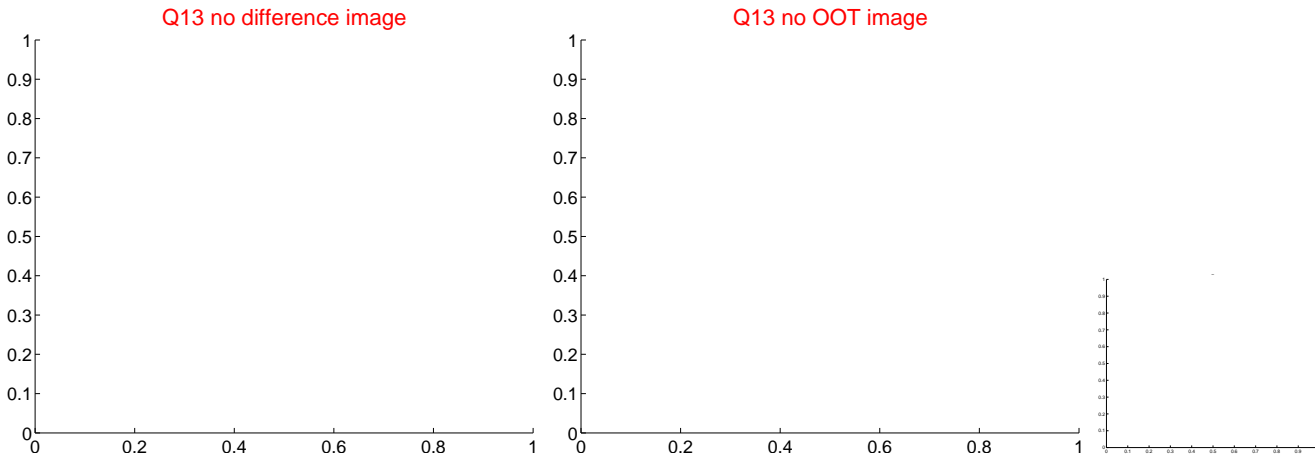
Q12 no difference image



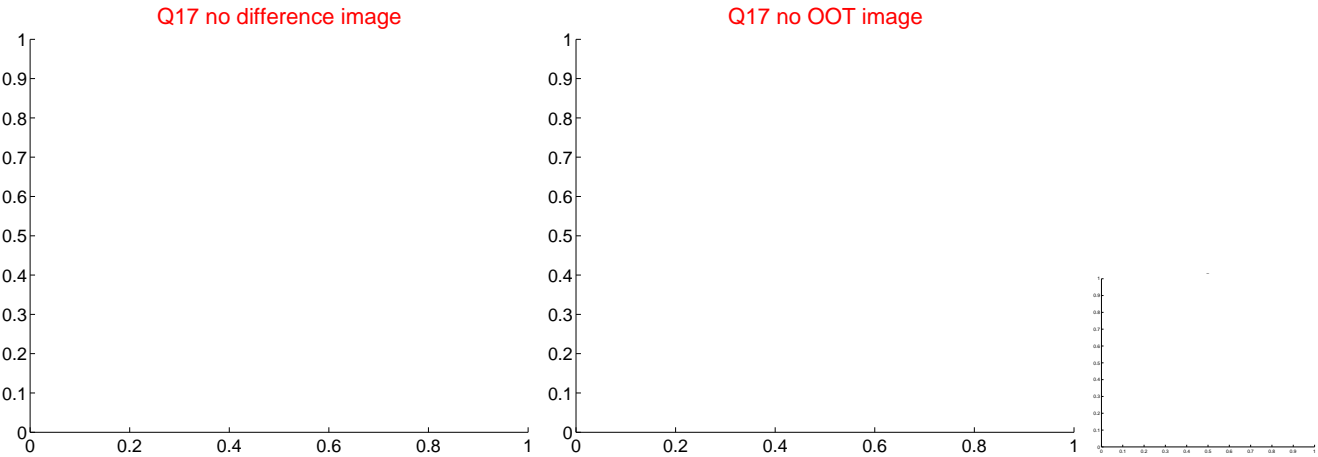
Q12 no OOT image



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



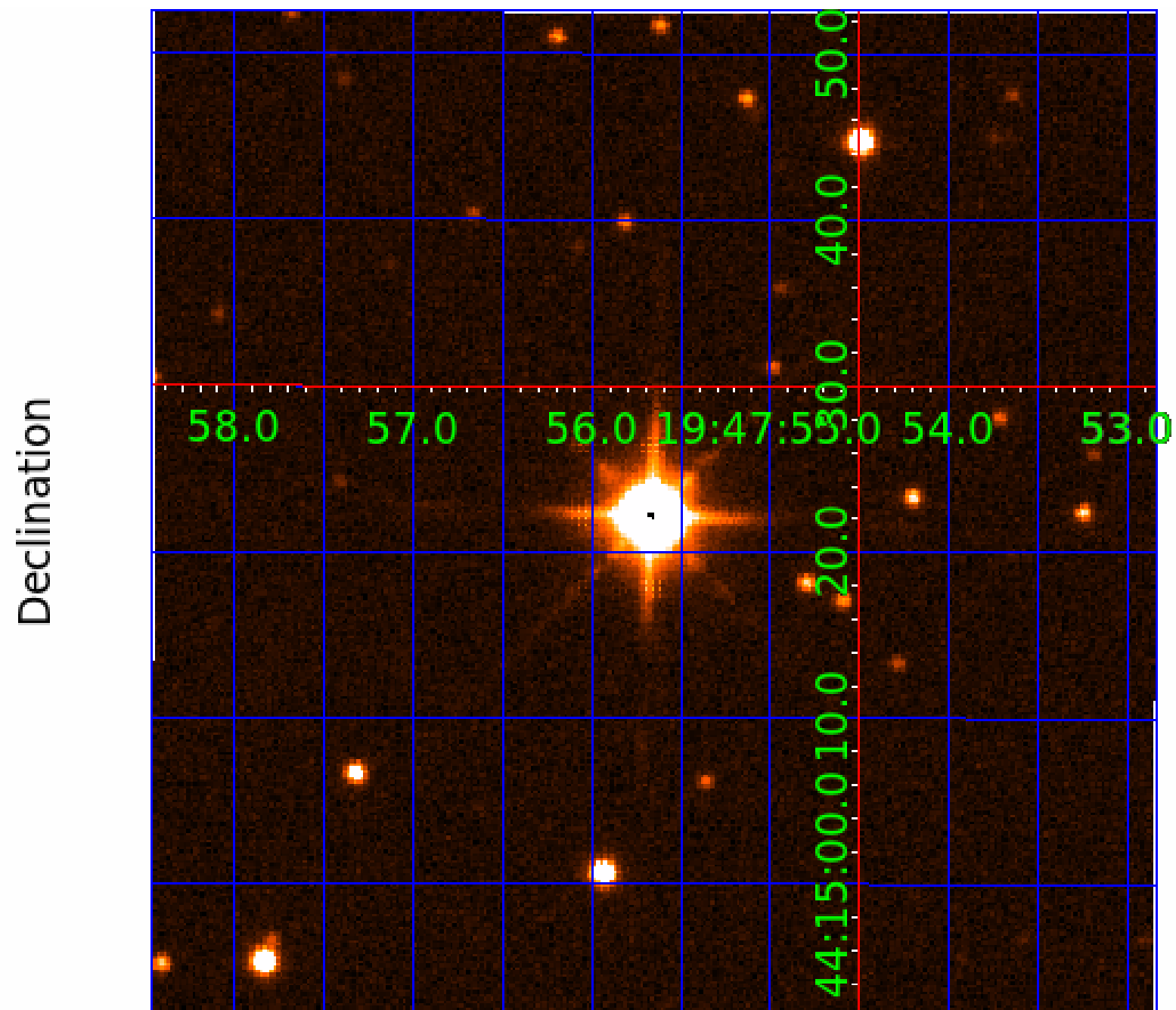
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



folded centroid time series figure for this object.



UKIRT Image



## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008315220-01	OBS	No	306.366968	238.002854	978.6	14.592	25.2	18.2	13.45	5172	72.09	66.75
008315220-02	OBS	No	367.177451	175.068533	144.9	15.000	31.5	-1.0	13.45	5172	15.78	52.43
008315220-03	OBS	No	367.826147	178.916856	582.1	16.110	18.5	18.2	13.45	5172	43.69	52.31
008315220-04	OBS	No	362.484543	185.462403	90.9	15.000	21.3	-1.0	13.45	5172	12.50	53.34
008315220-05	OBS	No	181.269349	193.563129	108.1	6.180	14.6	5.3	13.45	5172	16.33	134.38
008315220-06	OBS	No	183.715252	182.372967	347.0	16.910	17.2	18.0	13.45	5172	28.23	132.00
008315220-07	OBS	No	367.388598	172.555205	46.9	15.000	13.2	-1.0	13.45	5172	8.98	52.39
008315220-08	OBS	No	182.919583	182.566043	325.9	10.920	15.3	8.9	13.45	5172	25.79	132.76
008315220-09	OBS	No	534.460195	379.043140	118.9	7.500	16.0	-1.0	13.45	5172	14.30	31.78
008315220-10	OBS	No	122.022409	180.490237	52.5	15.000	11.2	-1.0	13.45	5172	9.50	227.78

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008315220-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_SATURATED
008315220-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—NO_FITS—INCONSISTENT_TRANS—CENT_SATURATED
008315220-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_TER_DV—MOD_POS_DV—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
008315220-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
008315220-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_ZUMA—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—SAME_NTL_PERIOD—CENT_SATURATED
008315220-06	OBS	FP	0.00	1	0	1	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_SATURATED—HALO_GHOST
008315220-07	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—SAME_NTL_PERIOD—CENT_SATURATED
008315220-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_SATURATED
008315220-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
008315220-10	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED

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

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

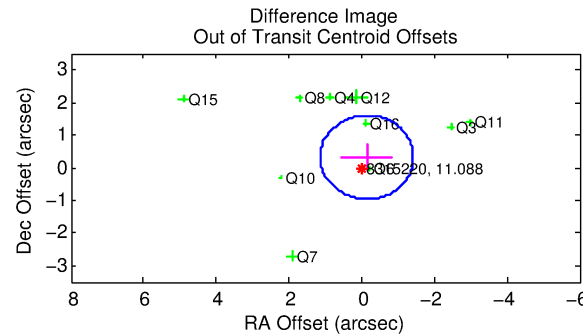
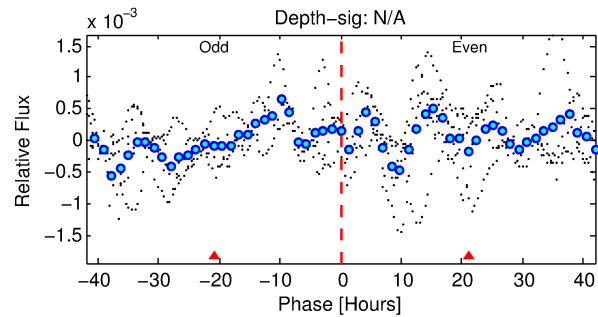
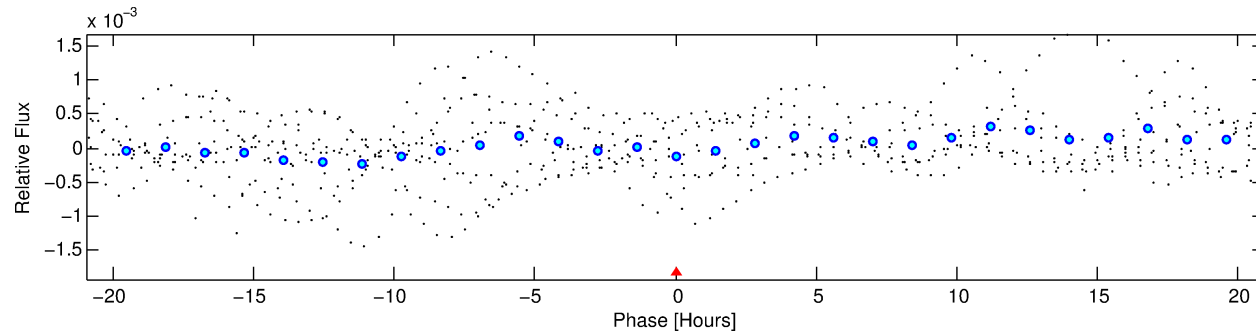
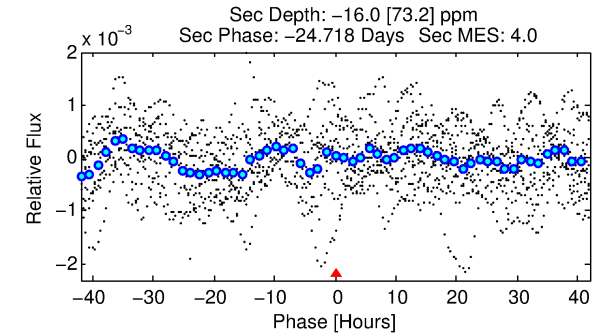
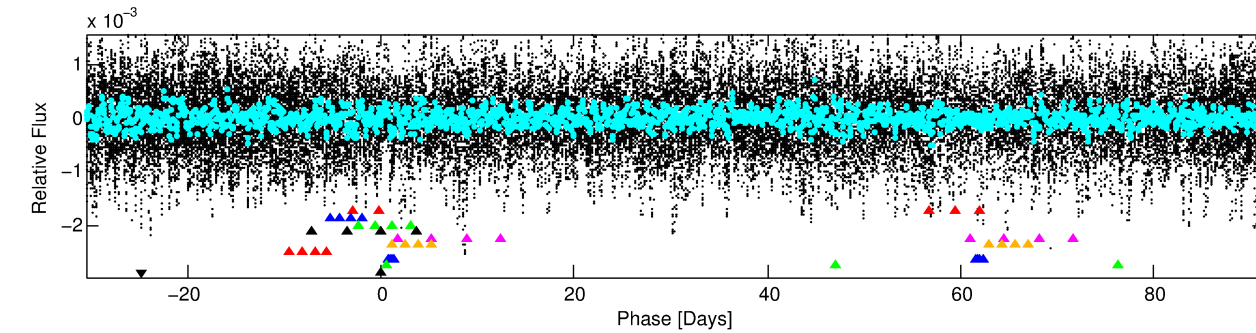
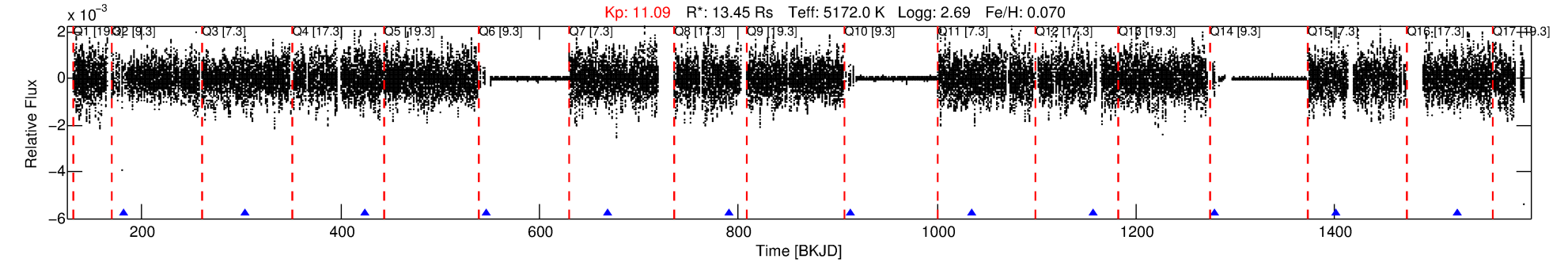
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 008315220-10

No Significant Match Found

# DV One-Page Summary

KIC: 8315220 Candidate: 10 of 10 Period: 122.022 d



## TPS TCE Results:

Period = 122.02241 d  
Epoch = 180.4902 BKJD

DV fit results are unavailable

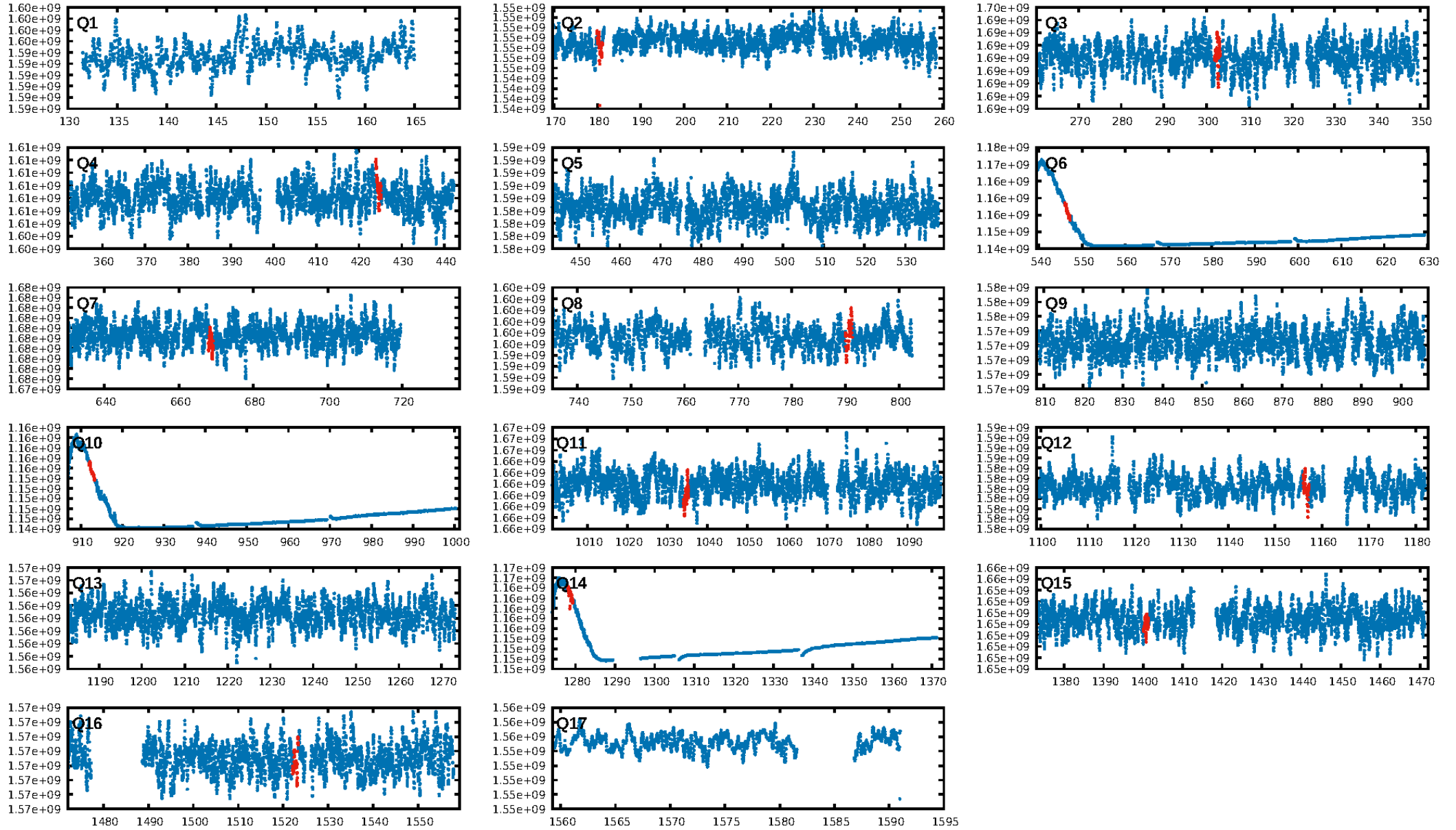
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [87.65]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 9.35e-13  
RollingBand-fgt: 1.00 [9/9]  
GhostDiagnostic-chr: -11.55  
Centroid-sig: 90.4%  
Centroid-so: 0.587 arcsec [0.67]  
OotOffset-rm: 0.348 arcsec [0.81]  
KicOffset-rm: 1.499 arcsec [2.14]  
OotOffset-st: 2/4/4/0 [10]  
KicOffset-st: 2/4/4/0 [10]  
DiffImageQuality-fgm: 0.20 [2/10]  
DiffImageOverlap-fno: 0.80 [8/10]

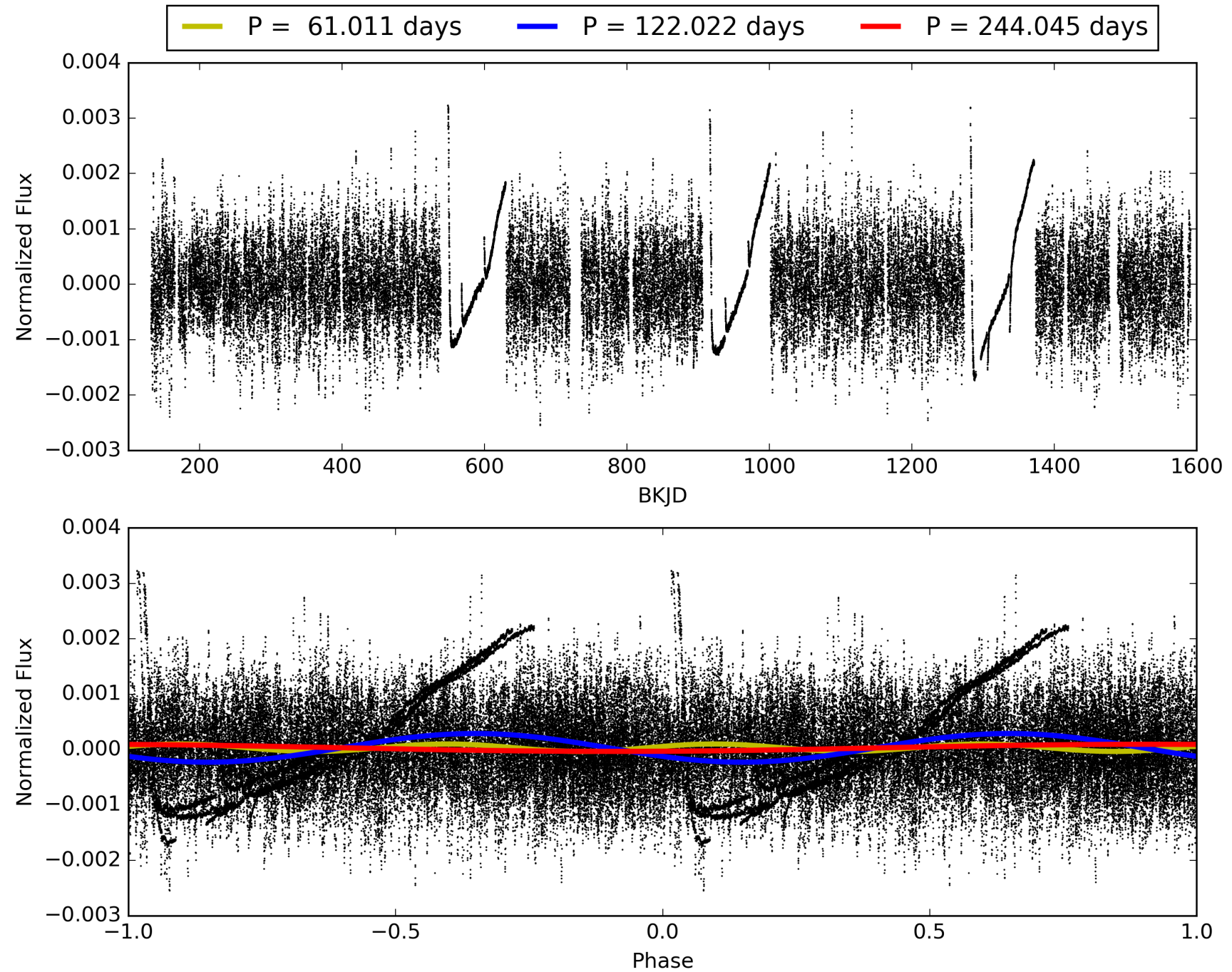
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 16:11:38 Z

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

# TCE 008315220-10, PDC Light Curves

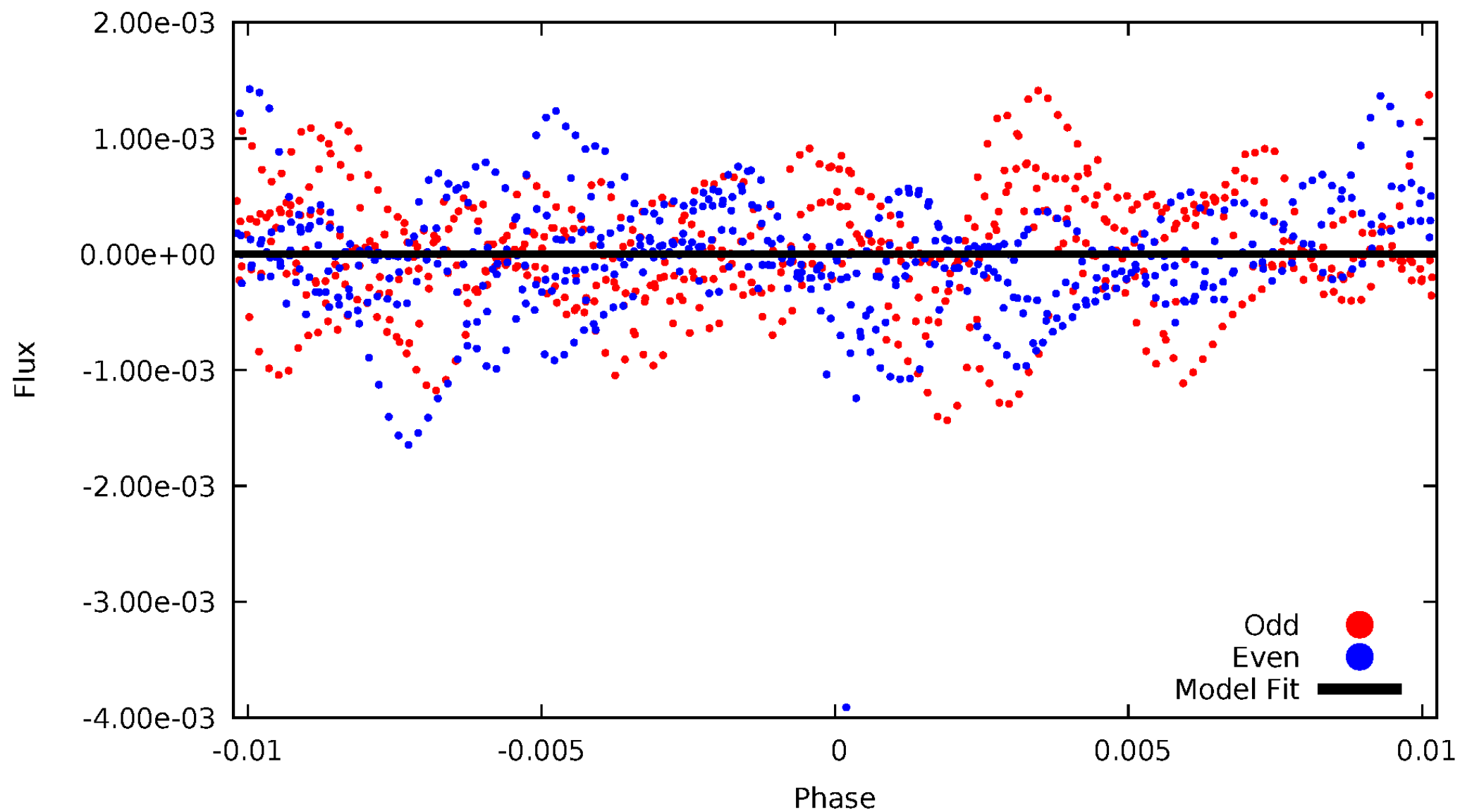


# TCE 008315220-10



# DV Odd/Even

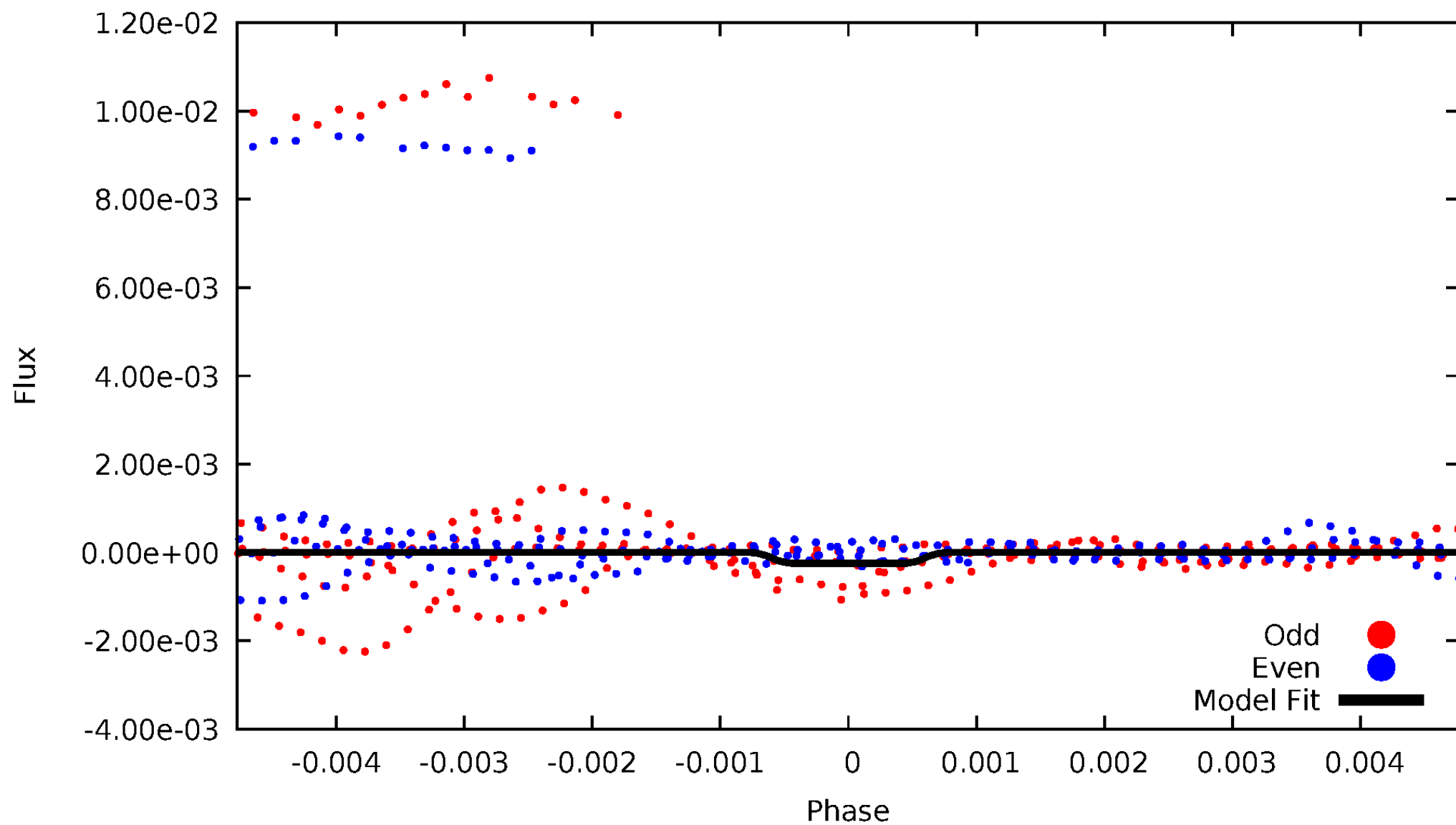
TCE 008315220-10





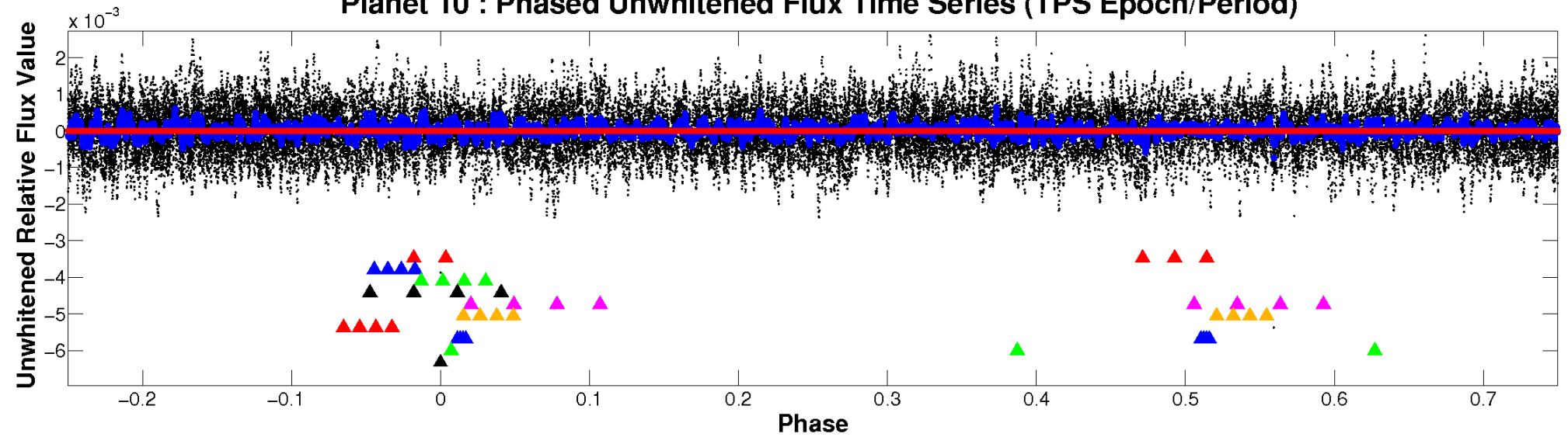
# ALT Odd/Even

TCE 008315220-10

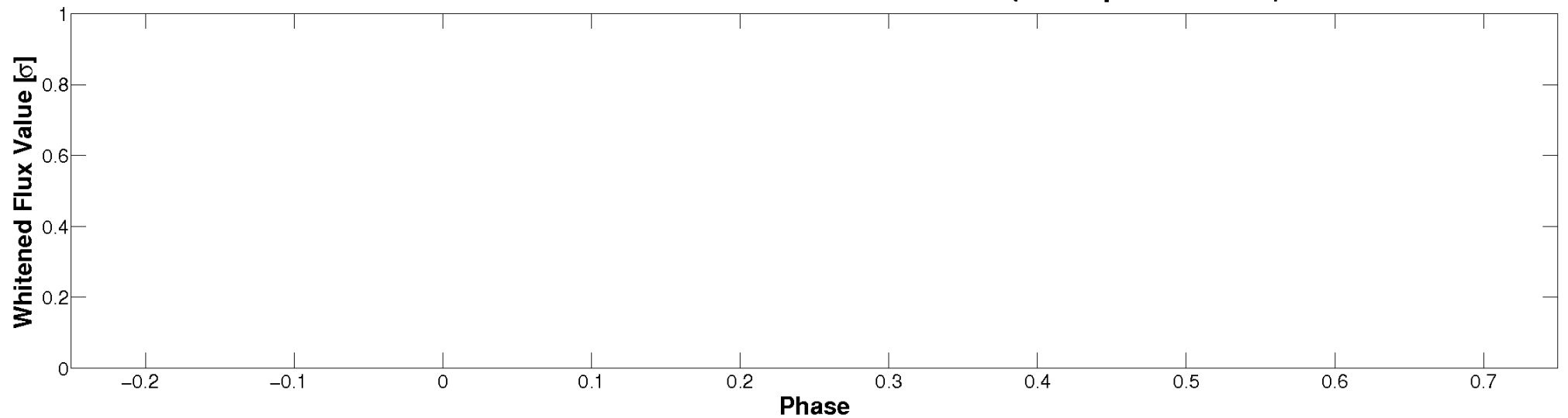


# Non-Whitened Vs. Whitened Light Curve

Planet 10 : Phased Unwhitened Flux Time Series (TPS Epoch/Period)



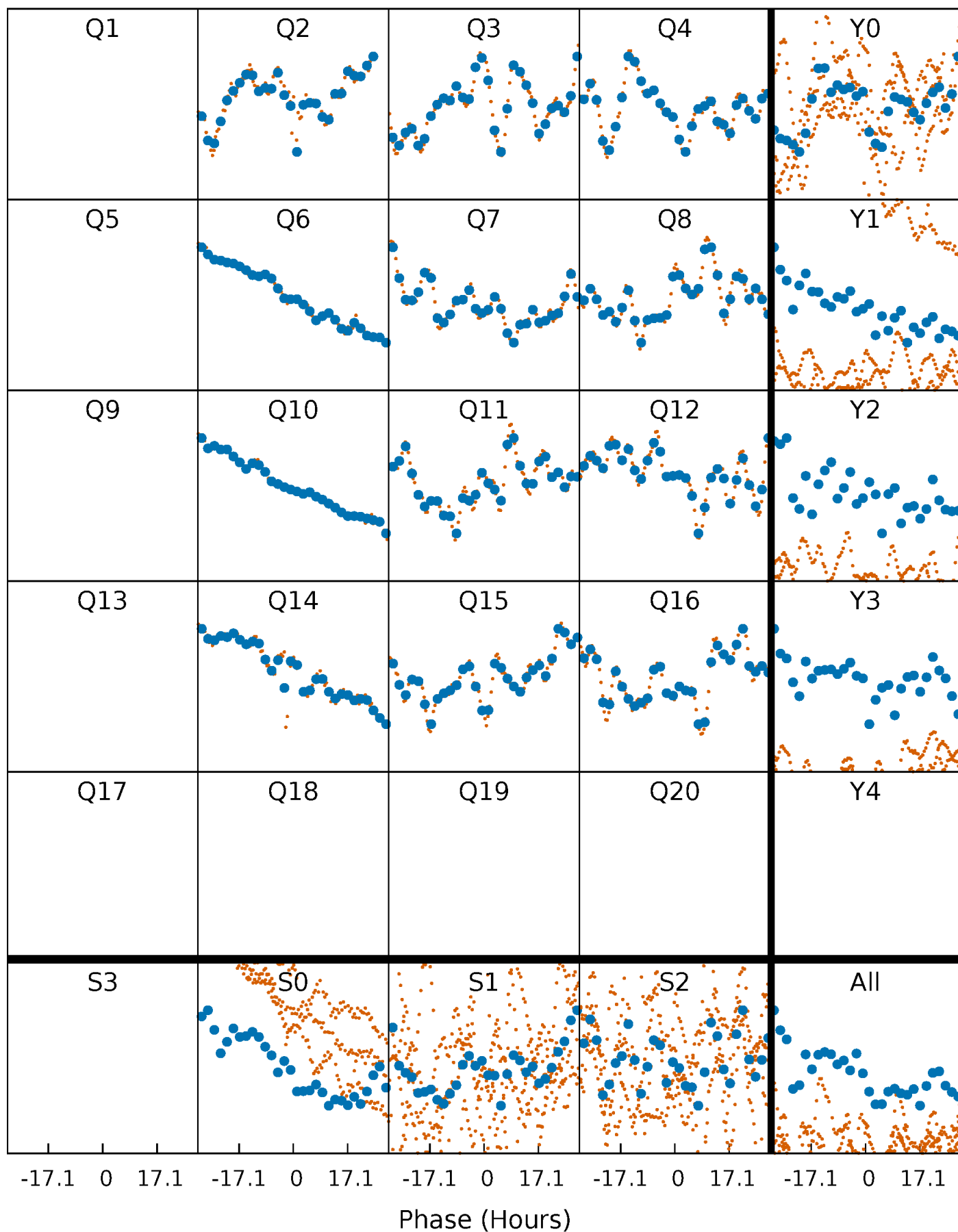
Planet 10 : Phased Whitened Flux Time Series (TPS Epoch/Period)





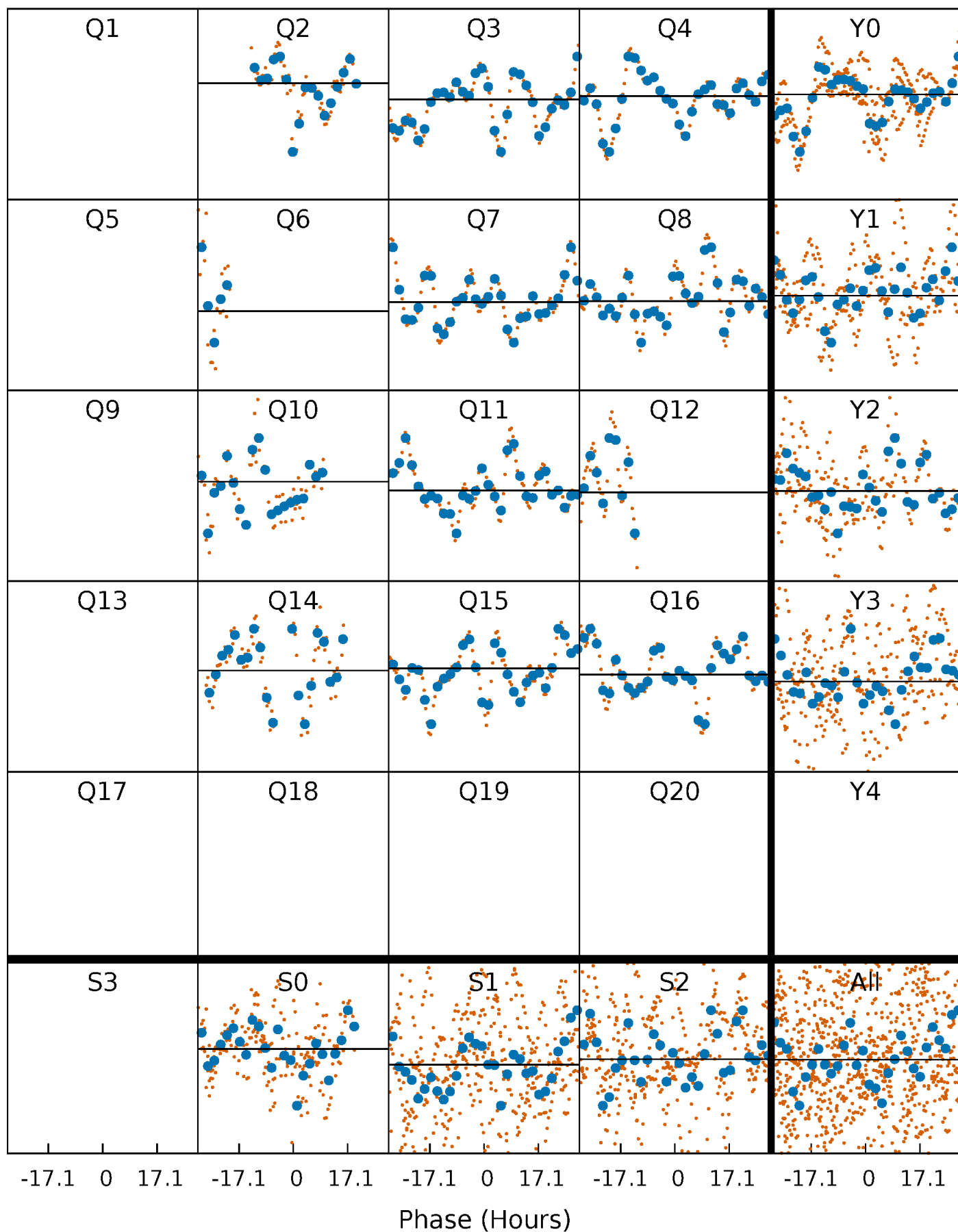
# PDC Quarter-Phased Transit Curves

TCE 008315220-10 P=122.022409 Days  $T_0=180.490237$  (BKJD)



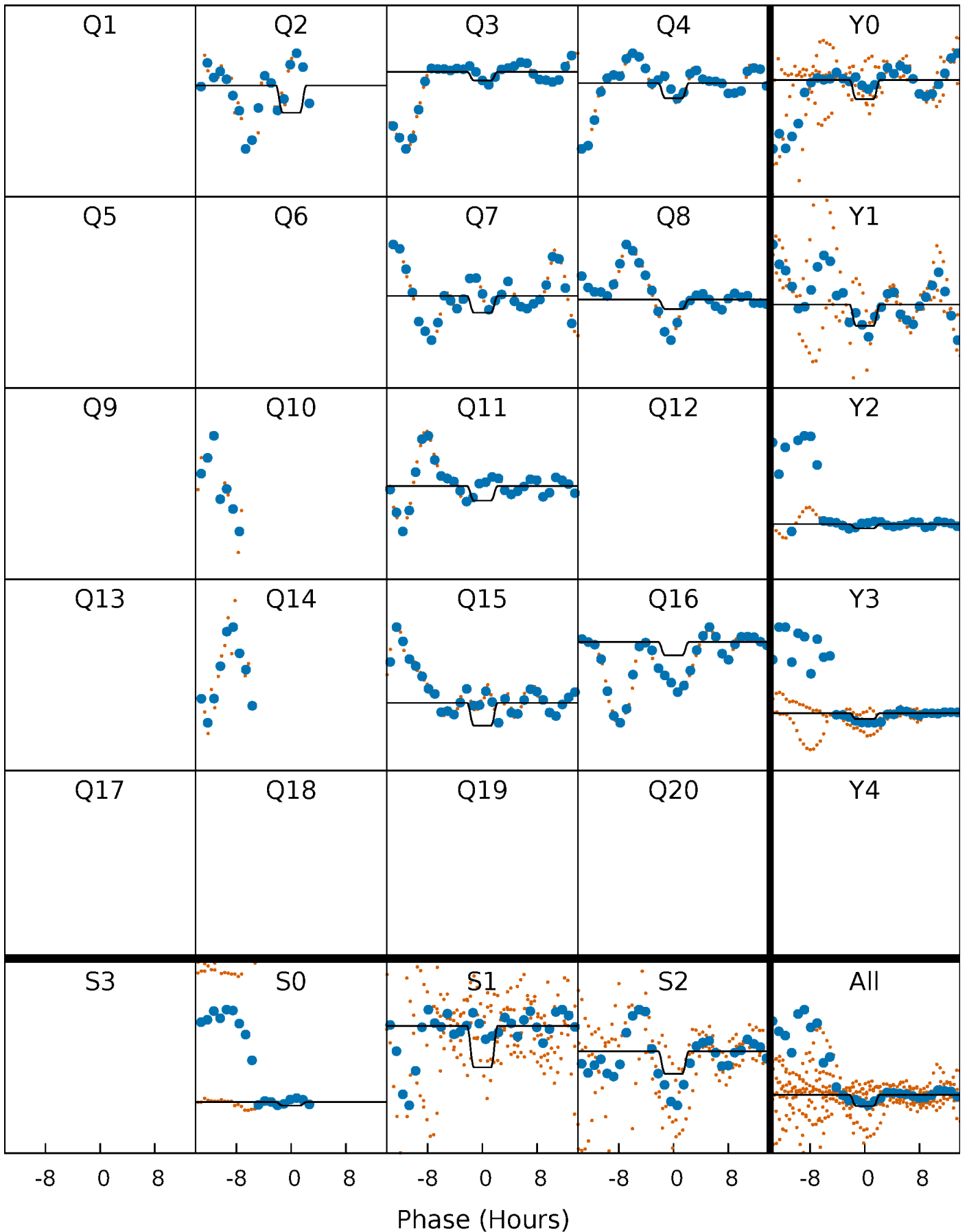
# DV Quarter-Phased Transit Curves

TCE 008315220-10     $P=122.022409$  Days     $T_0=180.490237$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

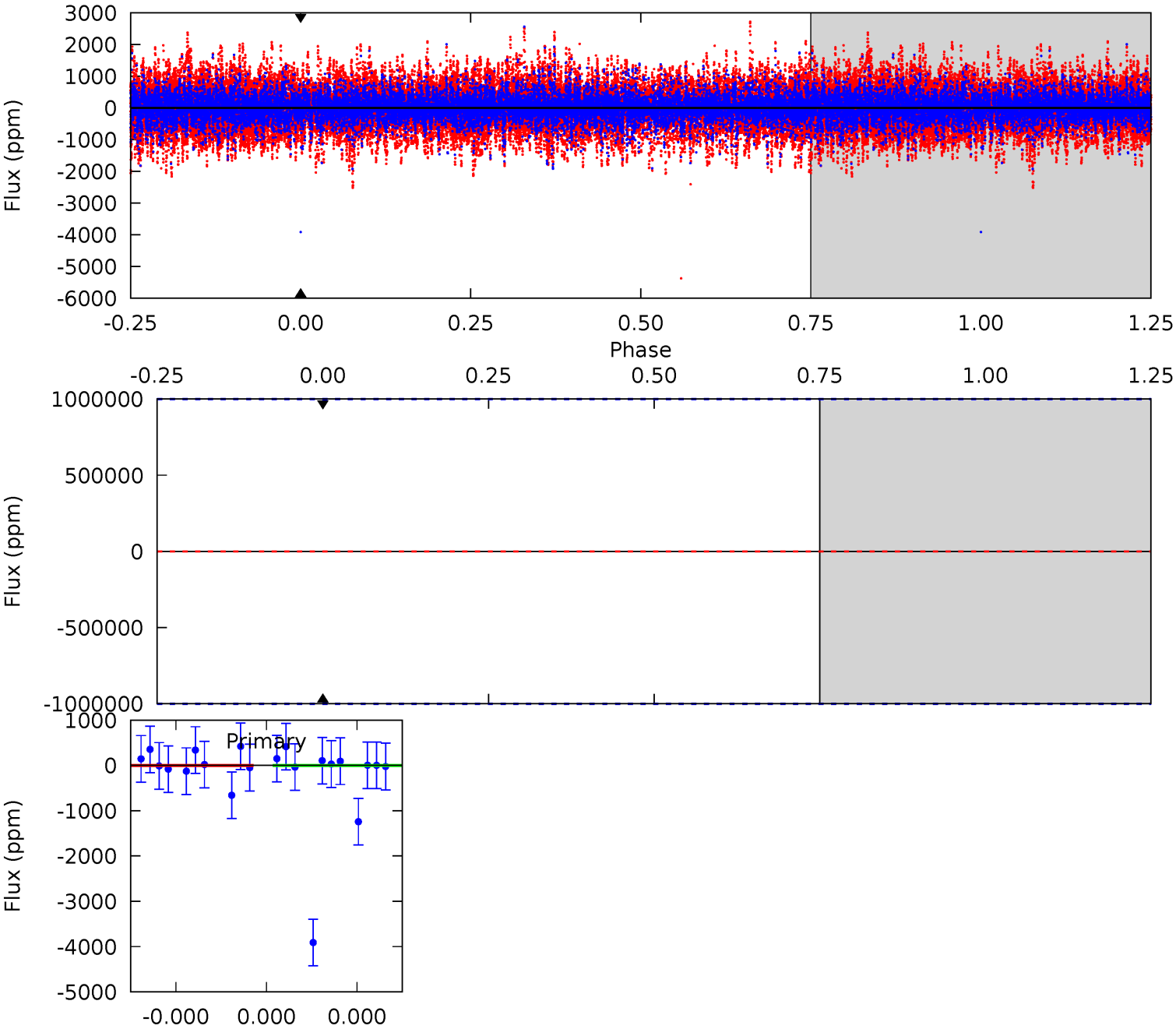
TCE 008315220-10   P=122.022409 Days    $T_0=181.184363$  (BKJD)



# DV Model-Shift Uniqueness Test

008315220-10, P = 122.022409 Days, E = 58.467828 Days

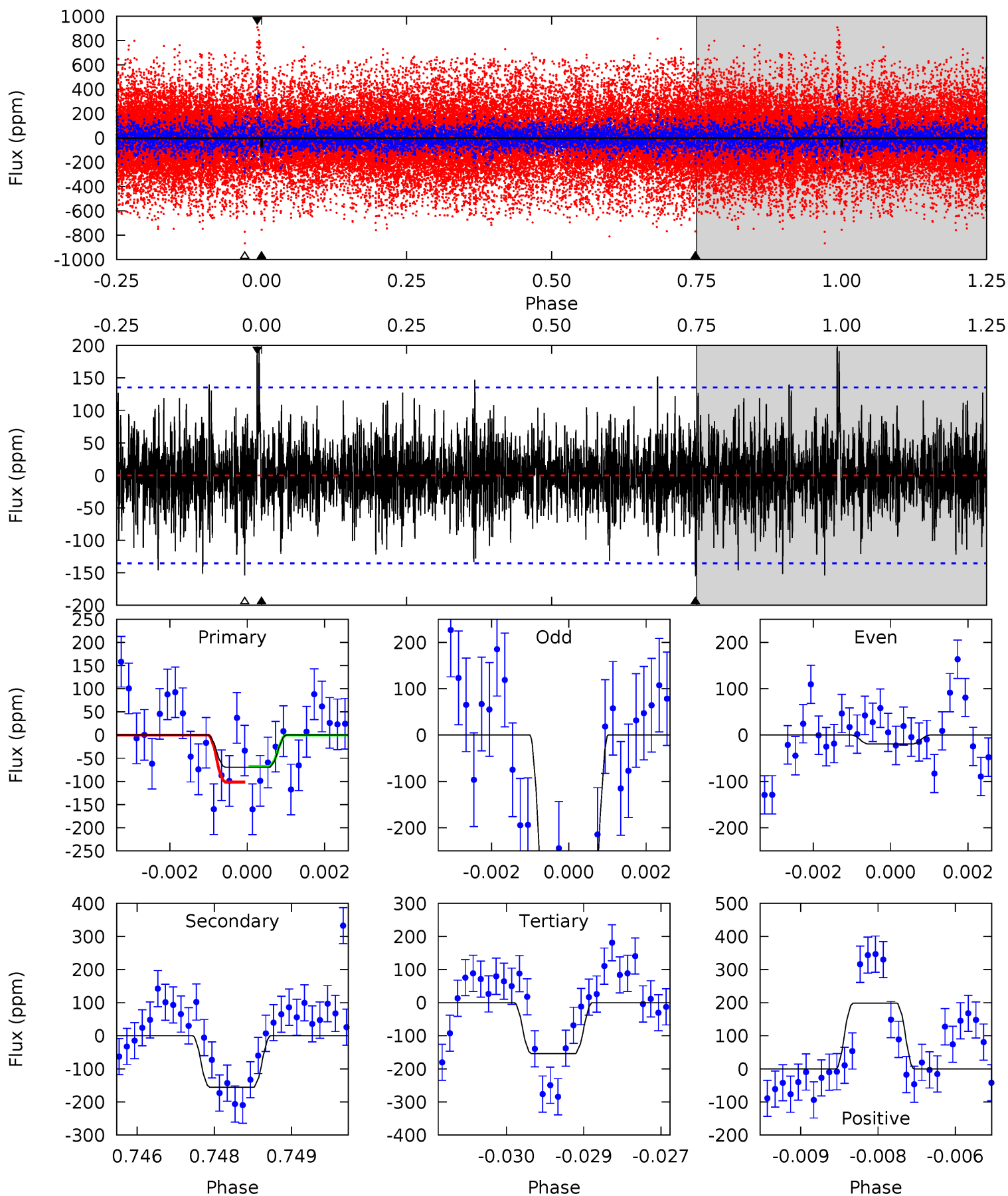
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



# Alt Model-Shift Uniqueness Test

008315220-10,  $P = 122.022409$  Days,  $E = 59.161954$  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
2.76	6.17	6.11	7.88	5.38	3.17	1.68	-3.36	-5.12	0.06	-1.70	8.33	4.54	0.56	0.69



### Stellar Parameters For KIC 008315220

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5172^{+70}_{-248}$	$2.693^{+0.273}_{-0.126}$	$0.070^{+0.150}_{-0.600}$	$13.454^{+2.481}_{-7.442}$	$3.257^{+0.222}_{-1.999}$	$0.002^{+0.006}_{-0.001}$
	+1%/-5%	+10%/-5%	+214%/-857%	+18%/-55%	+7%/-61%	+302%/-38%
Source	PHO1	FLK73	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 008315220-10 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$0 \pm 1000000$	$93.39^{+112.59}_{-64.55}$	$1361^{+86}_{-133}$	$-4284^{+23072}_{-11119}$	$-46.446^{+6715.459}_{-4407.290}$
Alt.	$-155 \pm 25$	$98.51^{+112.08}_{-67.87}$	$1359^{+96}_{-137}$	$2810^{+1160}_{-569}$	$4.141^{+36.422}_{-3.205}$

$T_{max}$  = 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  $A_{obs} \gg 1.0$

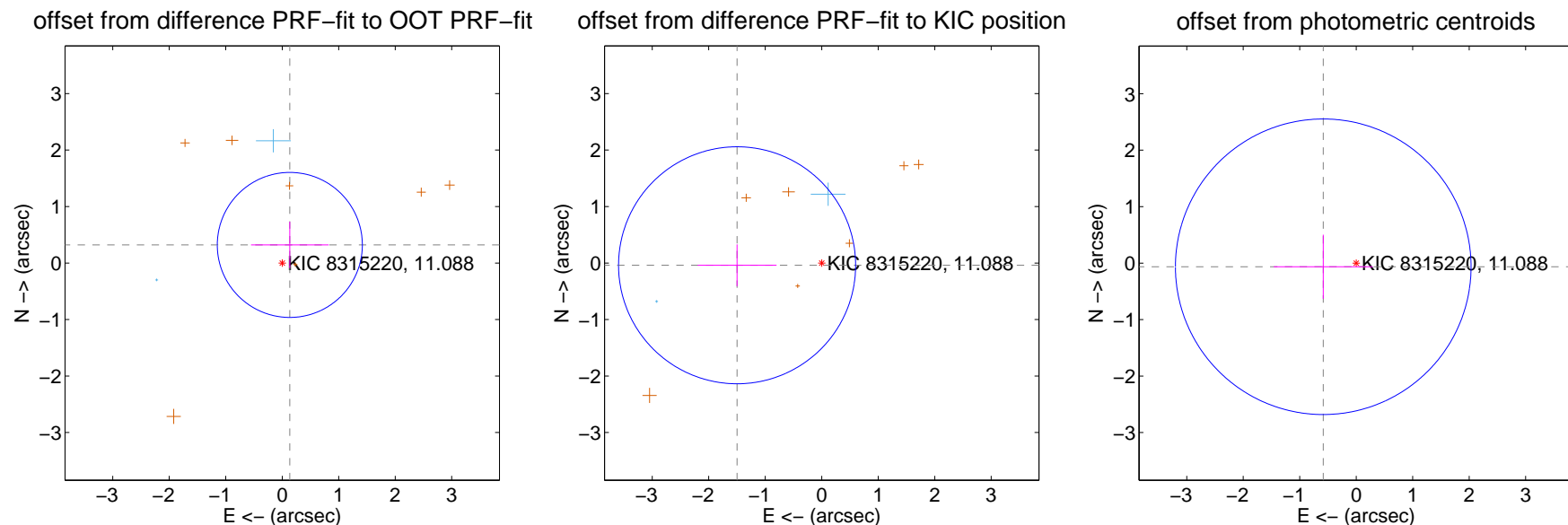
## DV Centroid Data

Supplemental centroid analysis for 008315220-10. **Kepler magnitude: 11.09.** Transit SNR -1.00

**There are 2 quarters with good PRF difference image offsets**

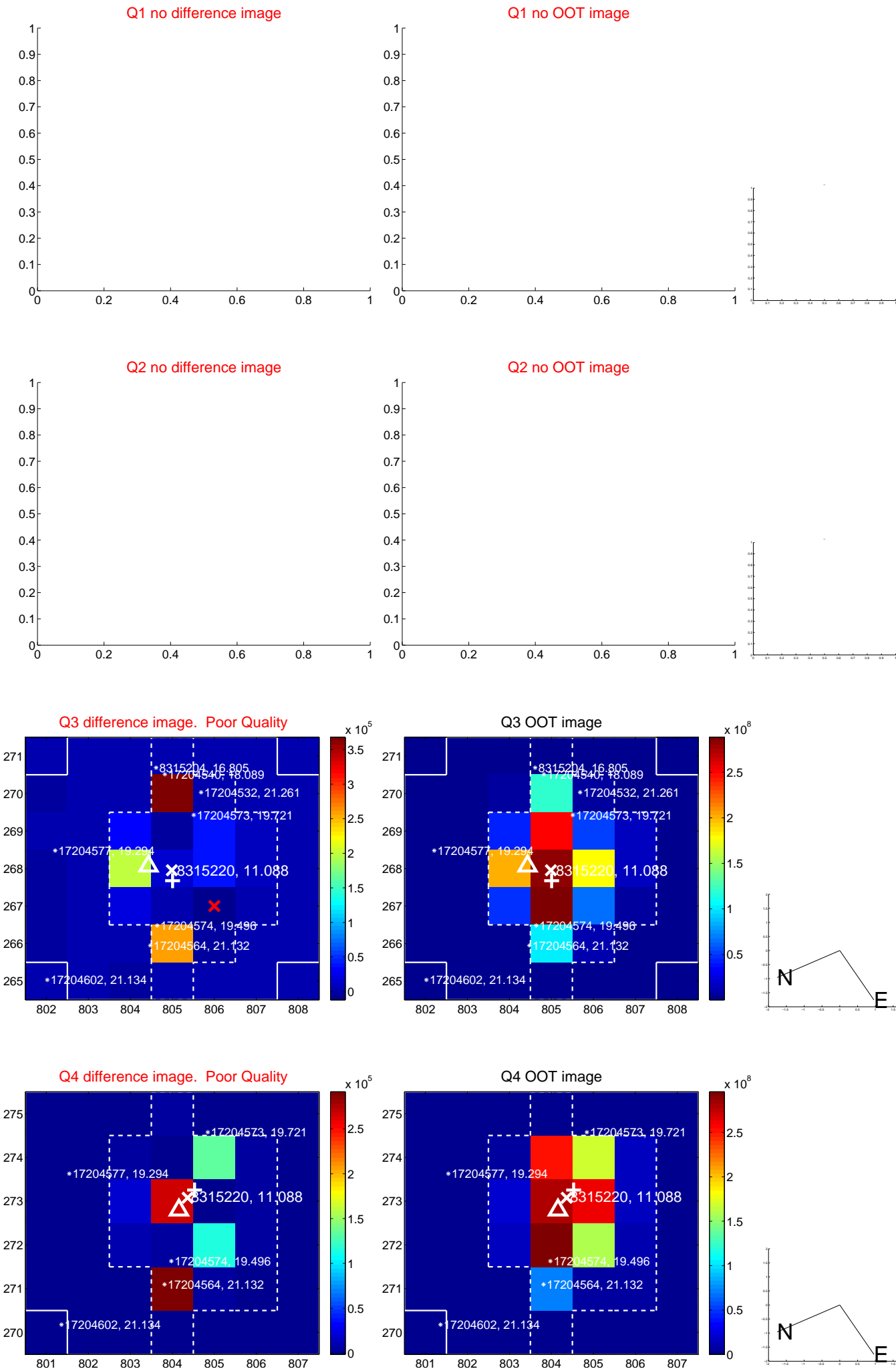
The direct PRF centroid is offset from the target star catalog position by about 1.08 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.348 \pm 0.428$	0.81	$-0.134 \pm 0.687$	$0.321 \pm 0.410$
PRF-fit source offset from KIC position	$1.499 \pm 0.699$	2.14	$1.498 \pm 0.698$	$-0.040 \pm 0.370$
photometric centroid source offset	$0.59 \pm 0.87$	0.67	$0.58 \pm 0.88$	$-0.06 \pm 0.57$



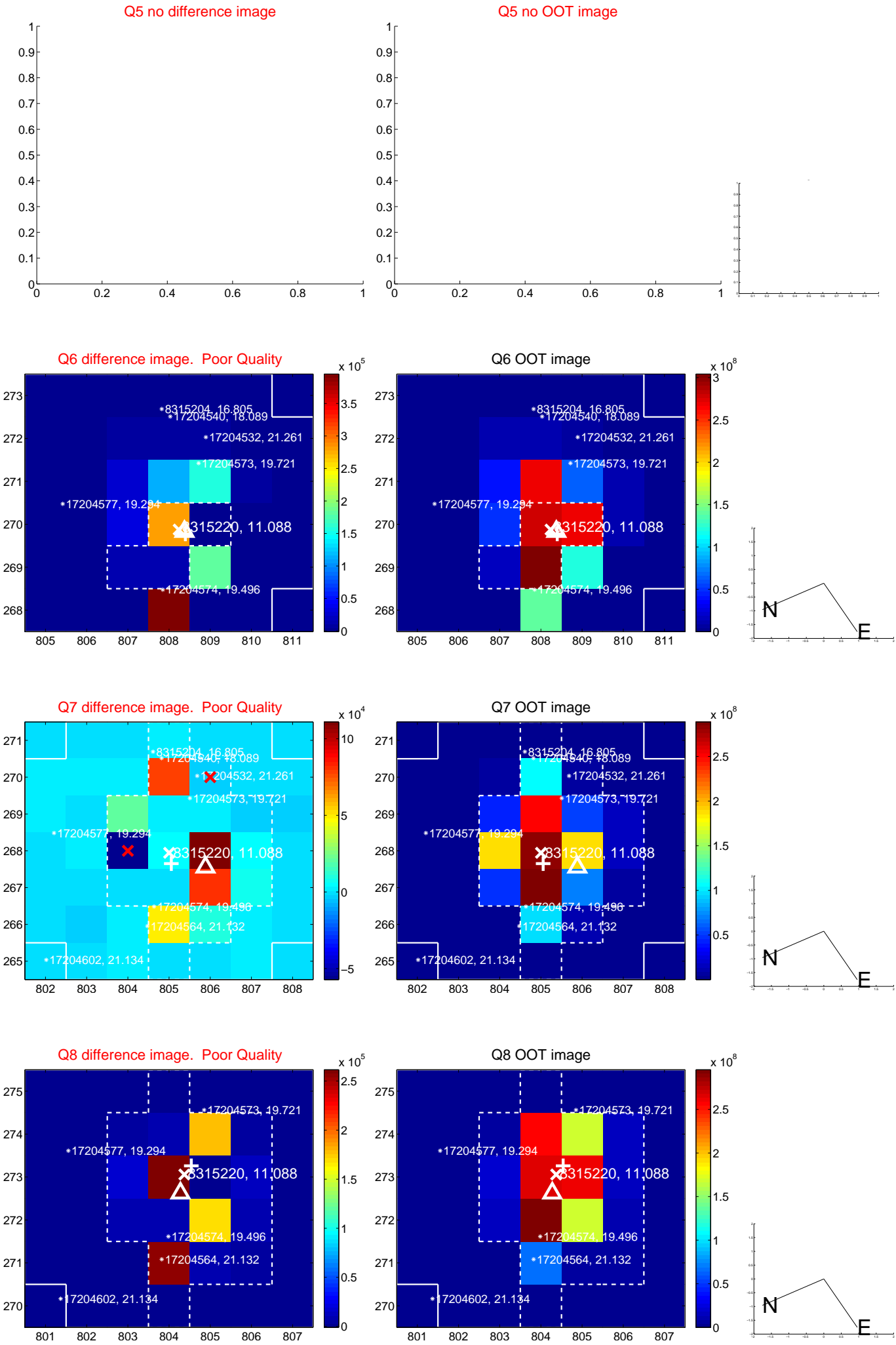
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: 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.

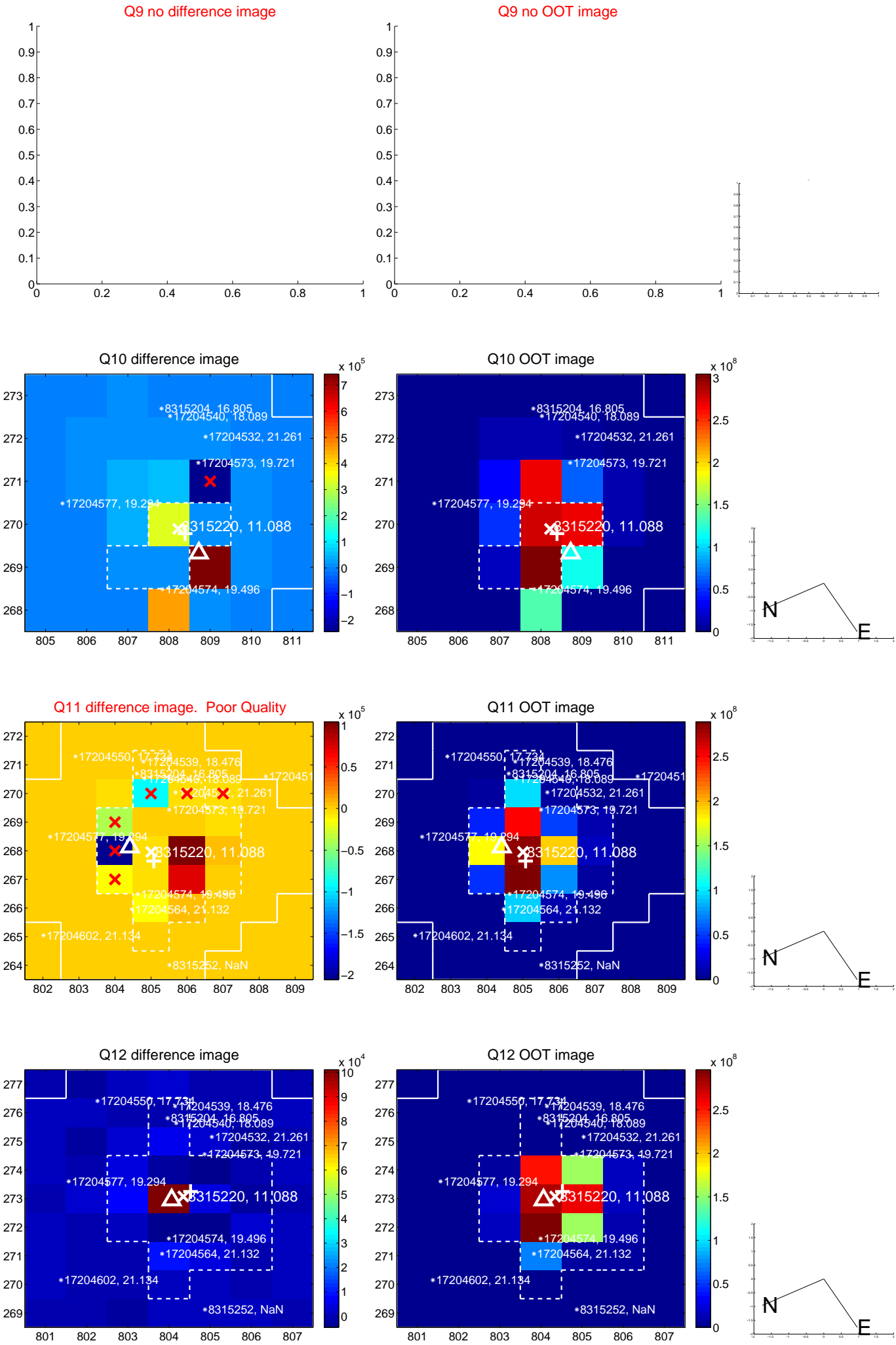




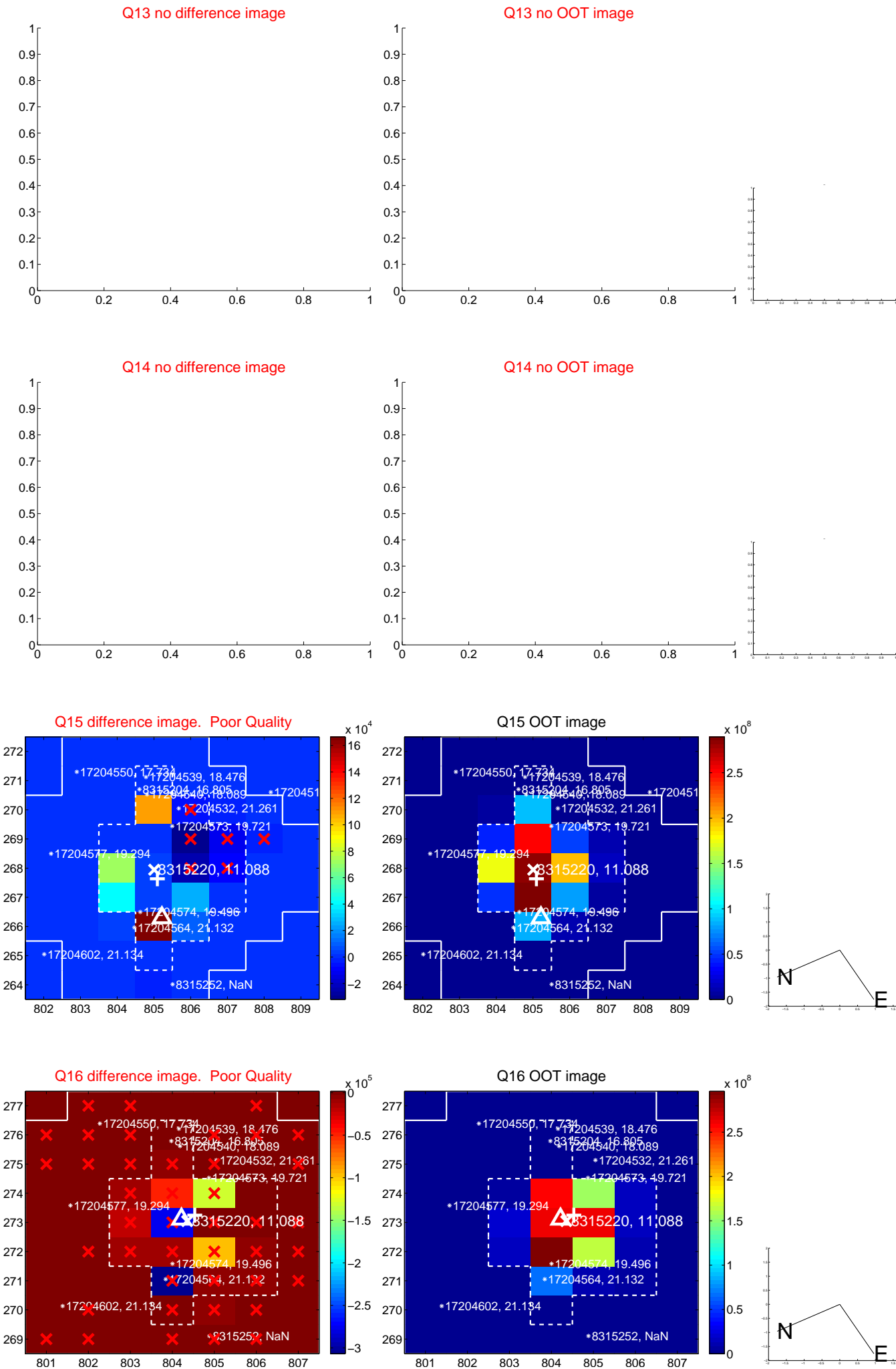
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



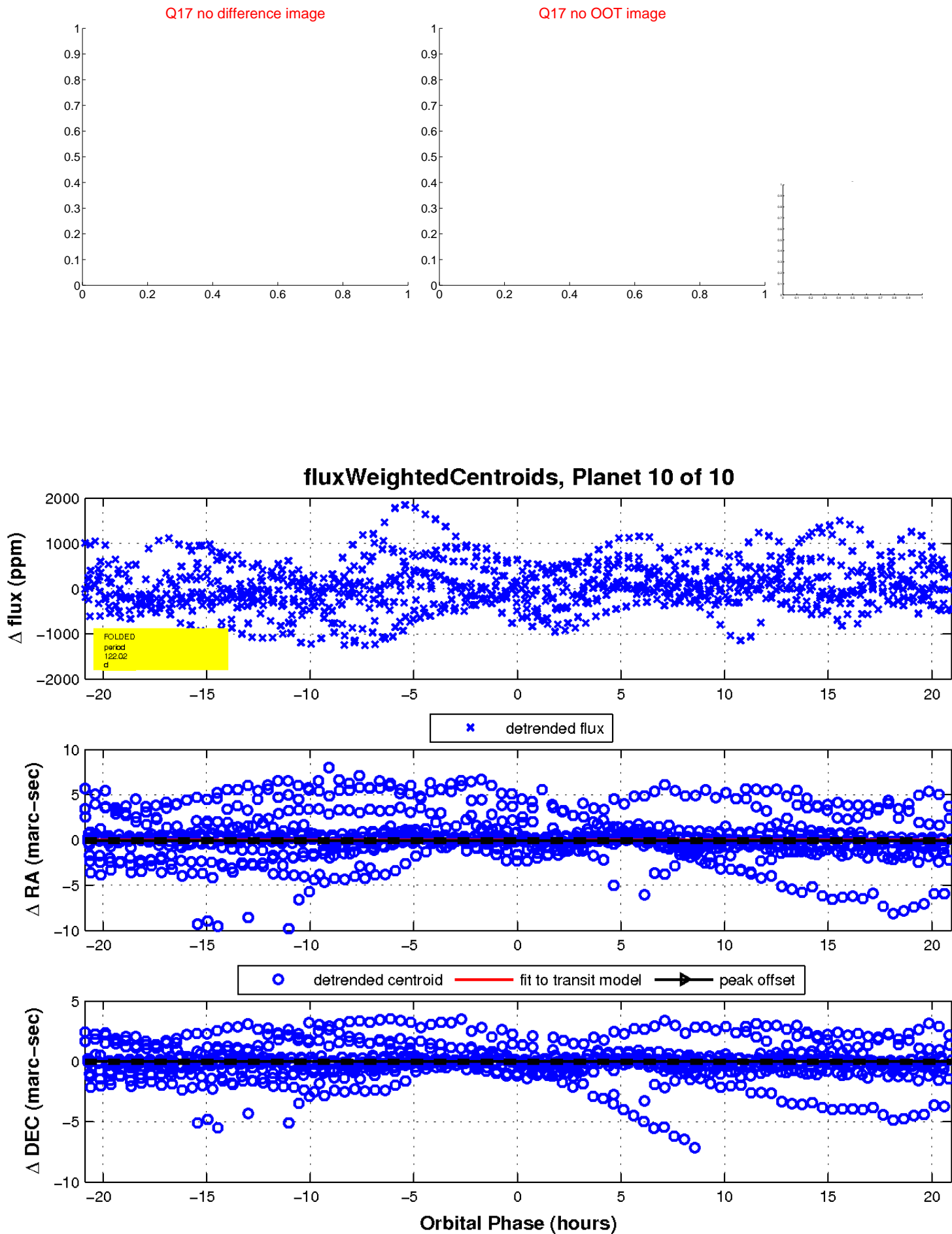
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

