

# KIC 008230809

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008230809-01	OBS	6055.01	4.078353	132.160296	35085.0	6.271	1248.4	1285.2	0.87	5872	16.37	363.14
008230809-02	OBS	No	2.039157	132.163350	657.2	6.362	28.9	27.1	0.87	5872	2.62	915.06
008230809-03	OBS	No	459.775191	133.805203	2651.9	9.930	11.4	8.6	0.87	5872	8.30	0.67
008230809-04	OBS	No	173.937364	263.354229	1377.2	2.938	9.0	5.6	0.87	5872	3.28	2.44
008230809-05	OBS	No	580.104195	301.984575	1357.8	10.284	8.2	5.7	0.87	5872	3.71	0.49

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008230809-01	OBS	FP	0.43	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE
008230809-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE
008230809-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
008230809-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
008230809-05	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS—HALO_GHOST

**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.

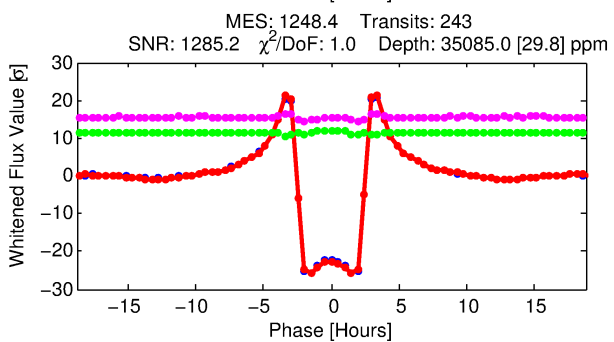
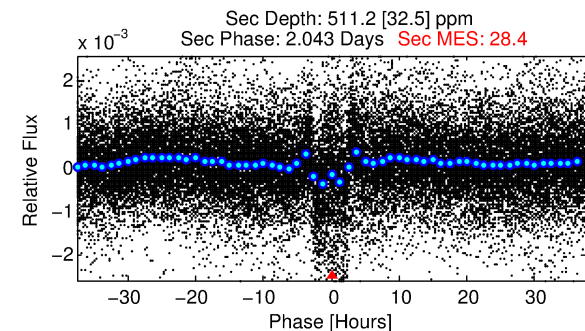
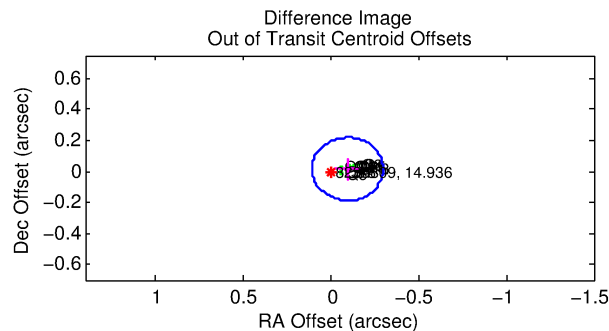
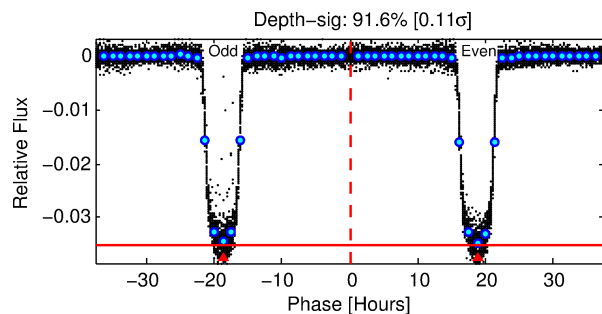
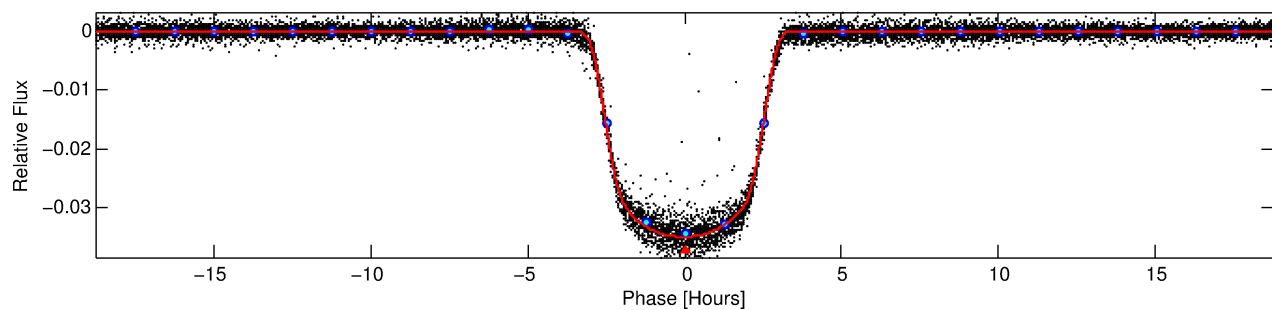
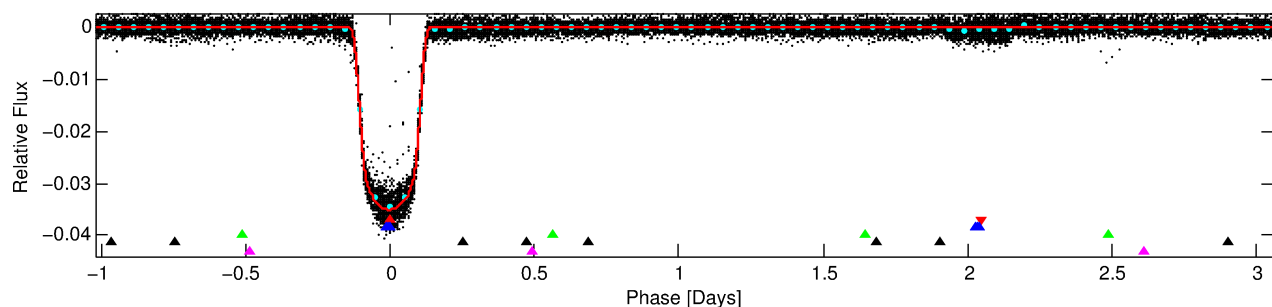
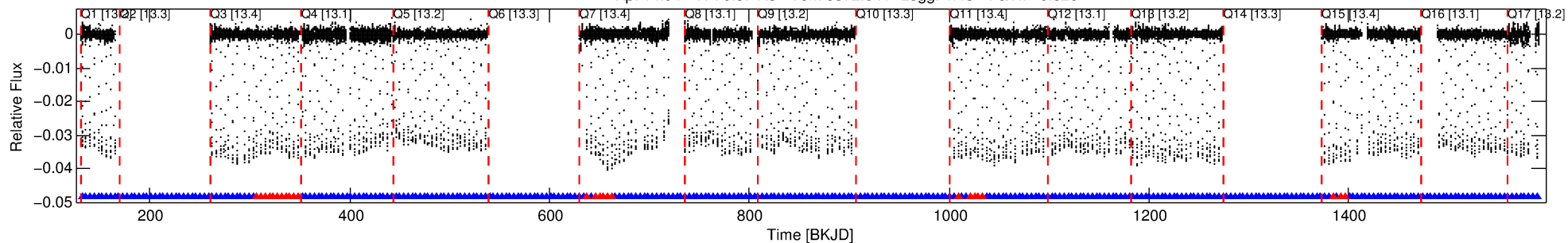
## Ephemeris Match Information For 008230809-01

No Significant Match Found

# DV One-Page Summary

KIC: 8230809 Candidate: 1 of 5 Period: 4.078 d  
KOI: K06055.01 Corr: 1.000

Kp: 14.94 R\*: 0.87 Rs Teff: 5872.0 K Logg: 4.48 Fe/H: -0.520



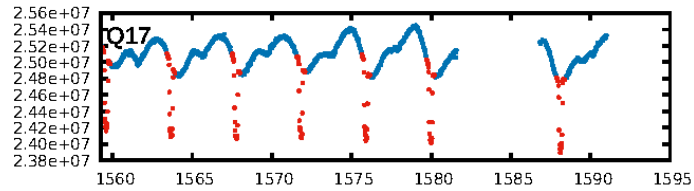
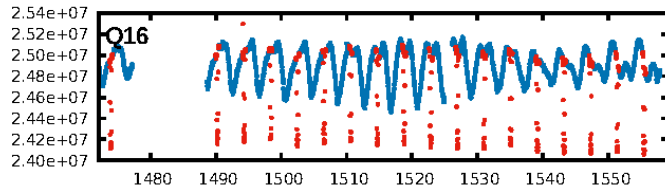
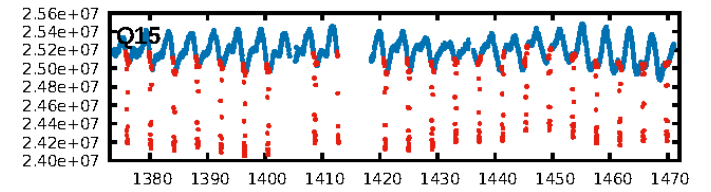
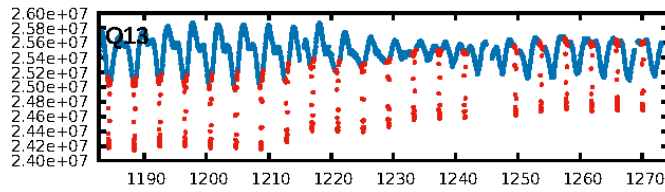
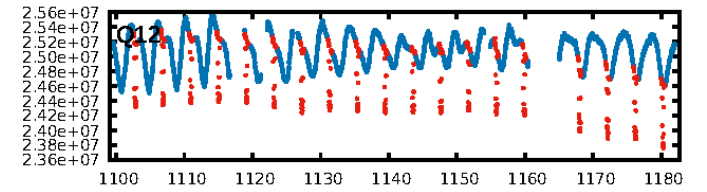
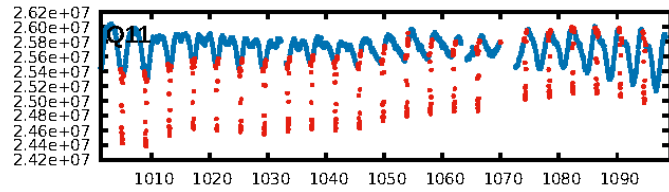
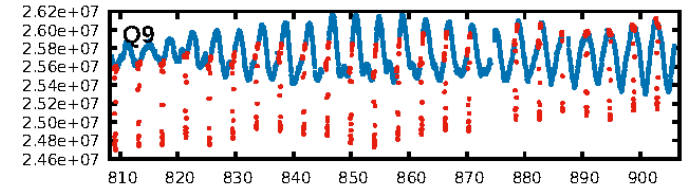
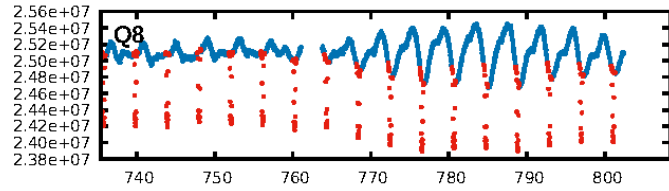
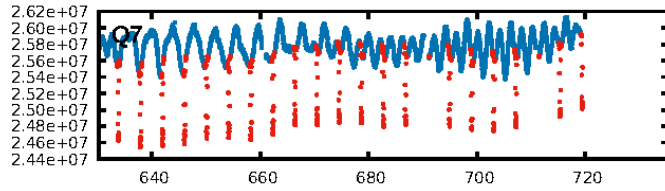
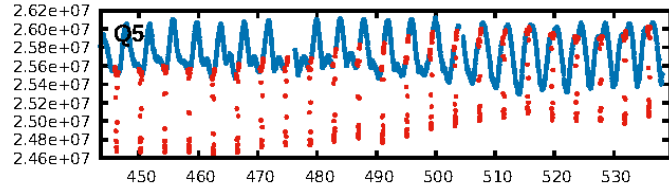
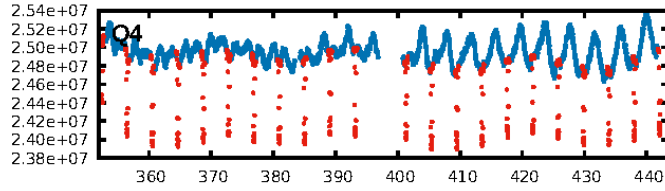
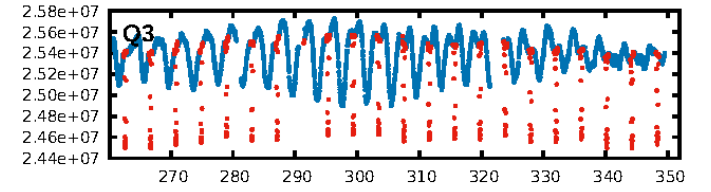
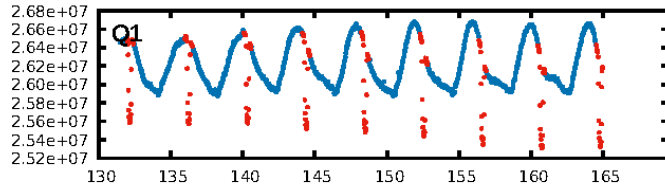
## DV Fit Results:

Period = 4.07835 [0.00000] d  
Epoch = 132.1603 [0.0000] BKJD  
Rp/R\* = 0.1731 [0.0001]  
a/R\* = 5.70 [0.01]  
b = 0.28 [0.01]  
Seff = 363.14 [122.51]  
Teq = 1113 [94] K  
Rp = 16.37 [4.17] Re  
a = 0.0470 [0.0100] AU  
Ag = 2.31 [0.73] [1.79σ]  
Teffp = 2122 [78] K [8.26σ]

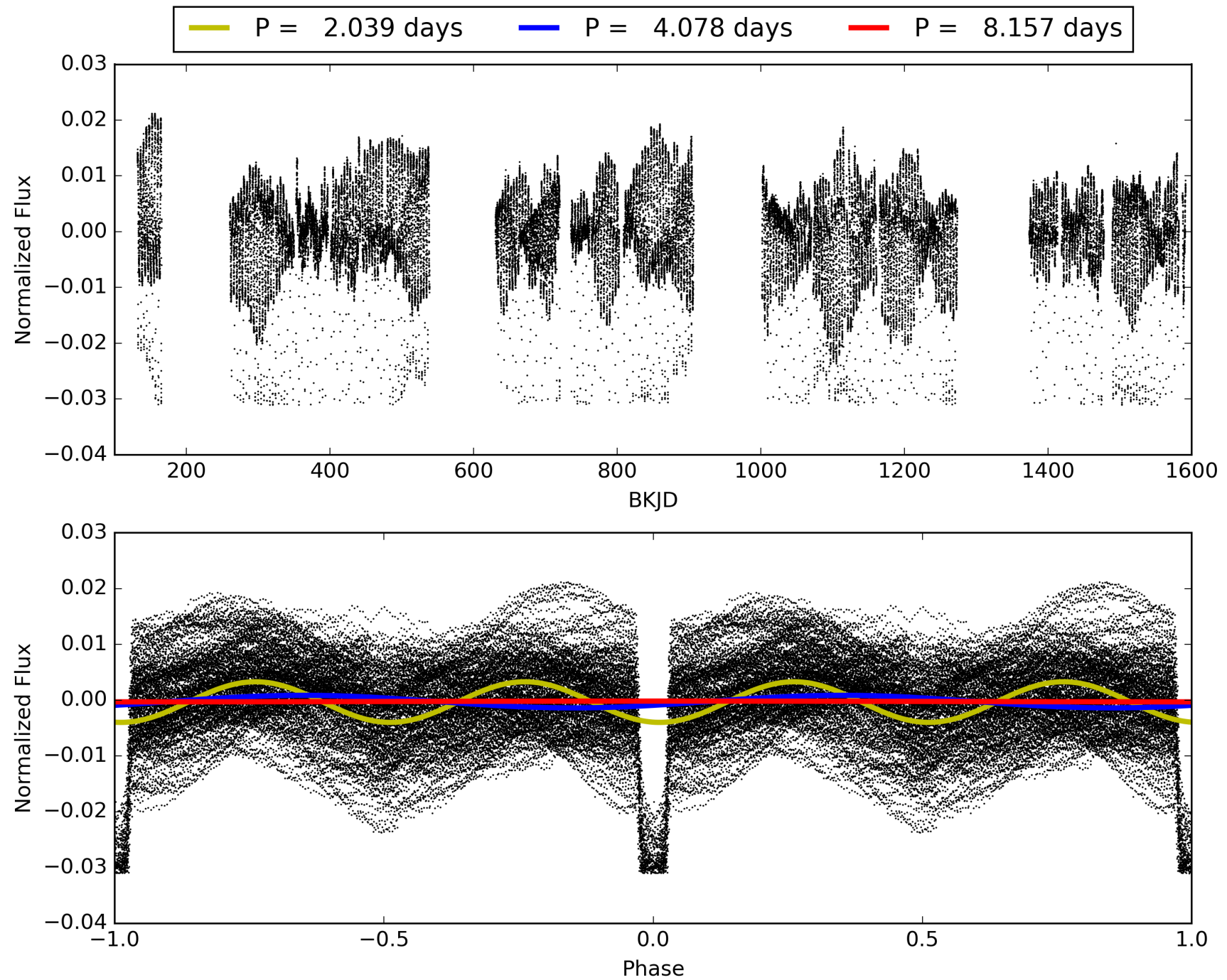
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [5.48σ]  
LongPeriod-sig: 100.0% [588.65σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 0.89 [202/227]  
GhostDiagnostic-chr: 2.085  
Centroid-sig: 0.0%  
Centroid-so: 0.251 arcsec [45.62σ]  
OotOffset-rm: 0.096 arcsec [1.41σ]  
OotOffset-st: 0/4/4/5 [13]  
KicOffset-rm: 0.115 arcsec [1.64σ]  
KicOffset-st: 0/4/4/5 [13]  
DiffImageQuality-fgm: 1.00 [13/13]  
DiffImageOverlap-fno: 0.00 [0/13]

# TCE 008230809-01, PDC Light Curves



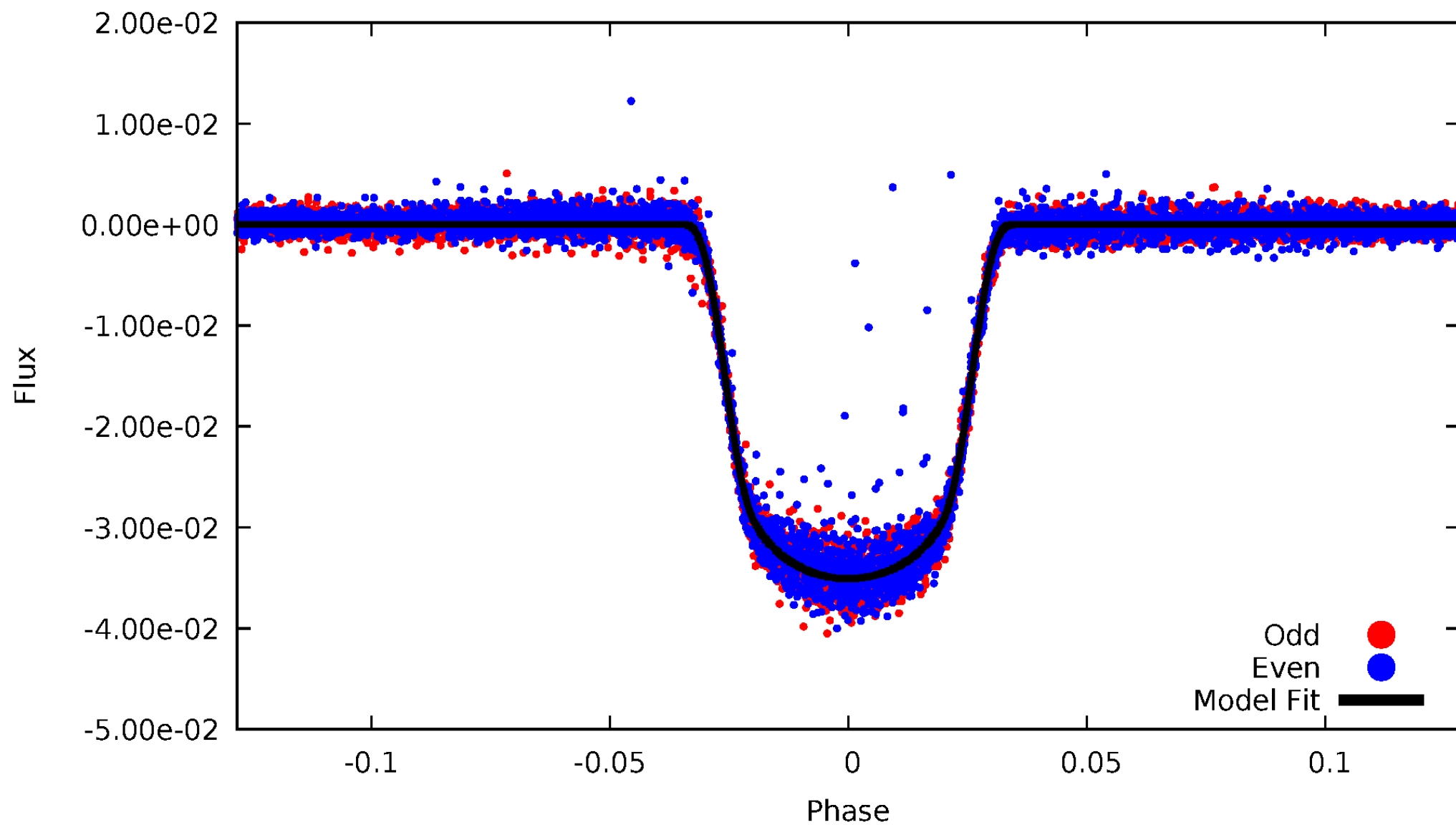
TCE 008230809-01





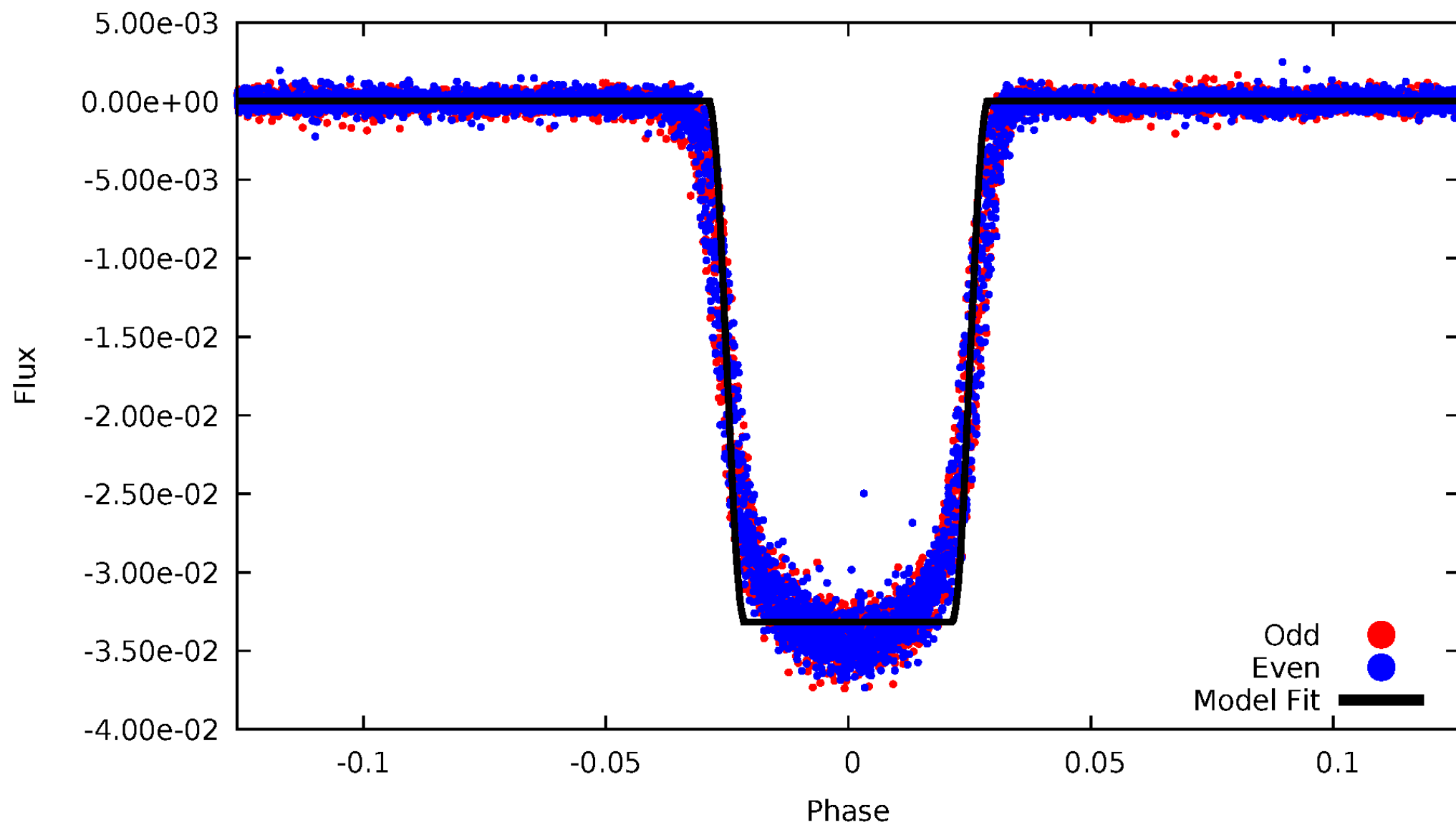
# DV Odd/Even

TCE 008230809-01



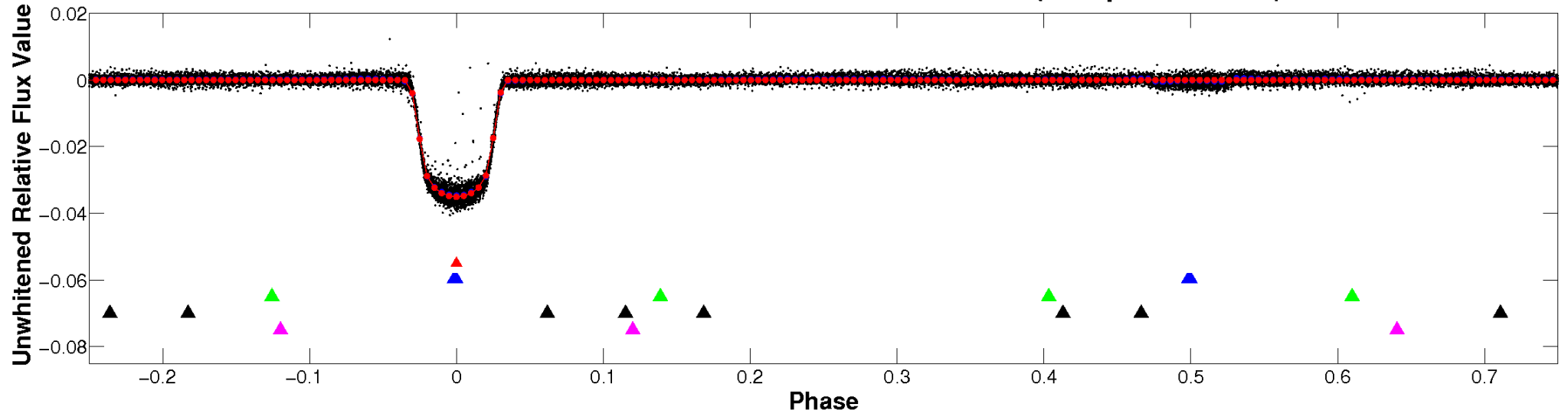
# ALT Odd/Even

TCE 008230809-01

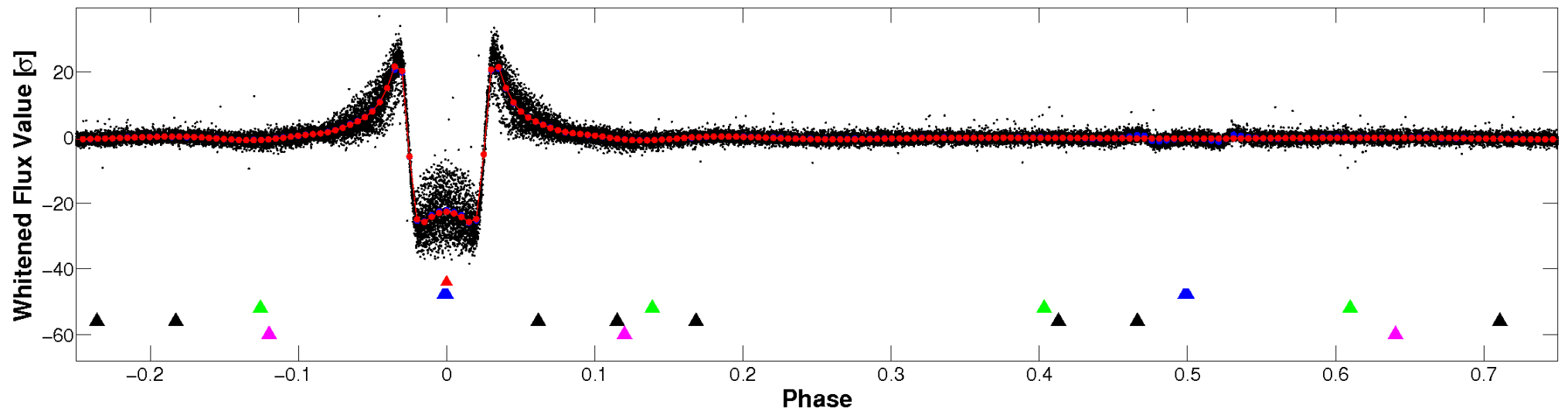


# Non-Whitened Vs. Whitened Light Curve

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

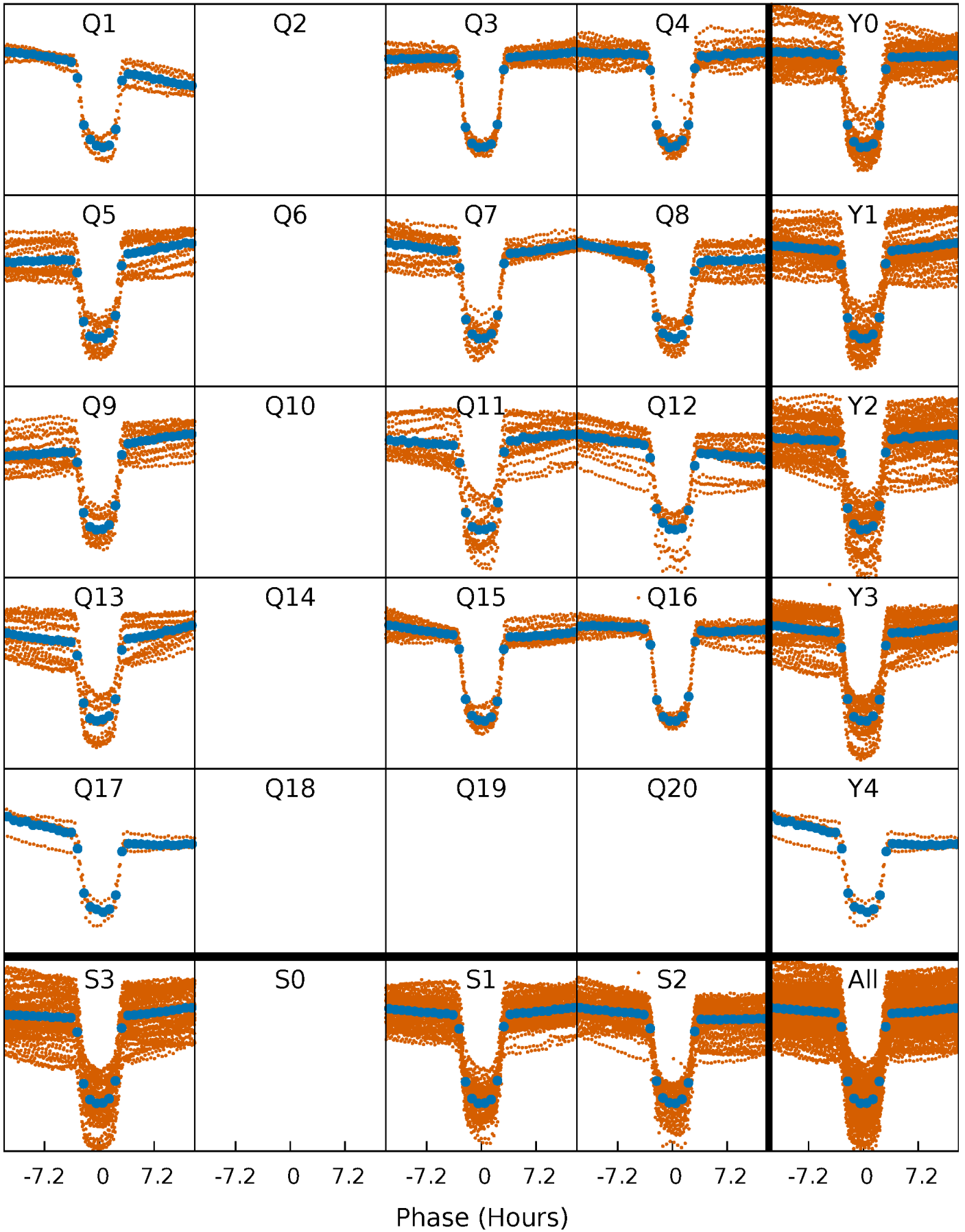


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



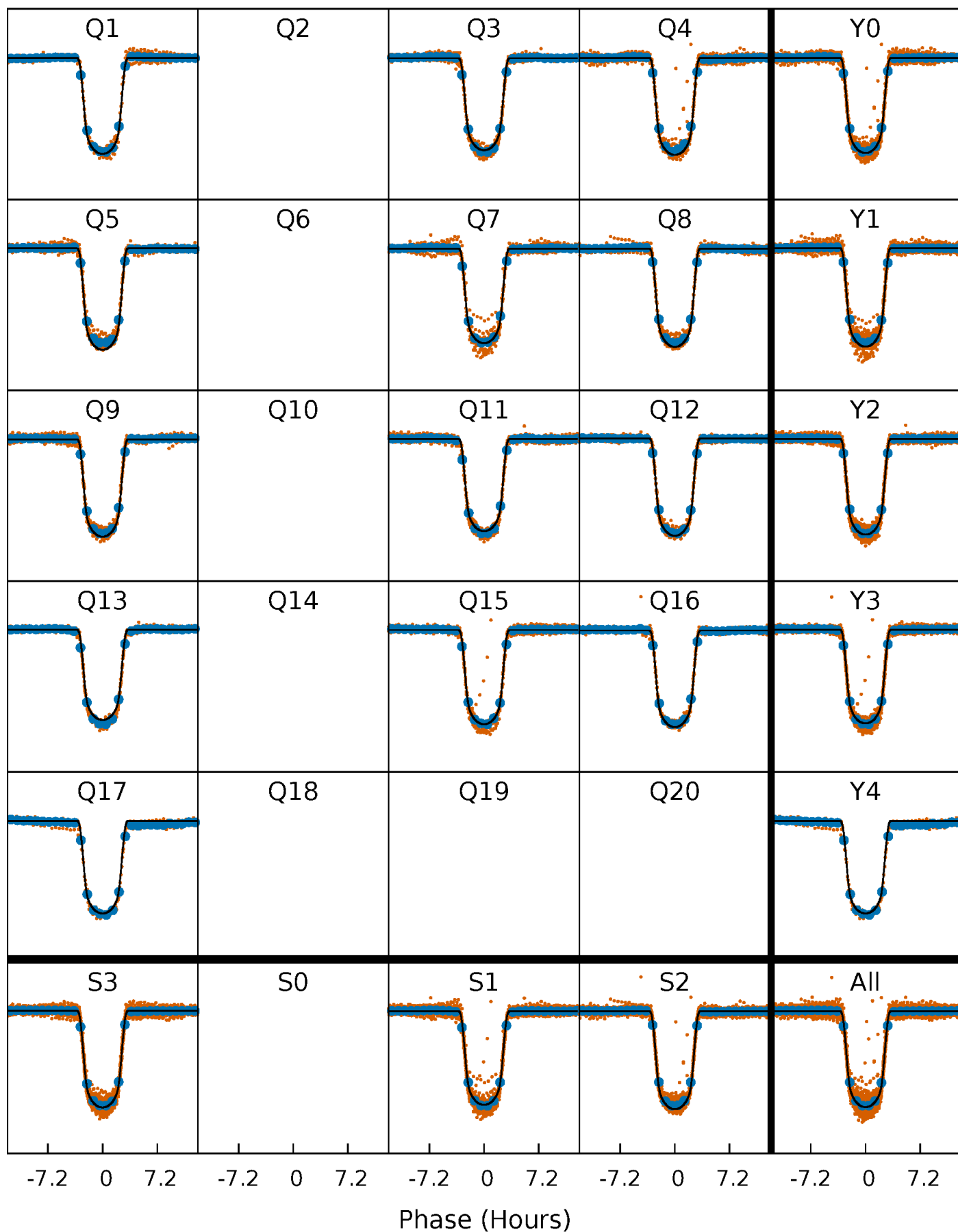
# PDC Quarter-Phased Transit Curves

TCE 008230809-01 P= 4.078353 Days  $T_0=132.160296$  (BKJD)



# DV Quarter-Phased Transit Curves

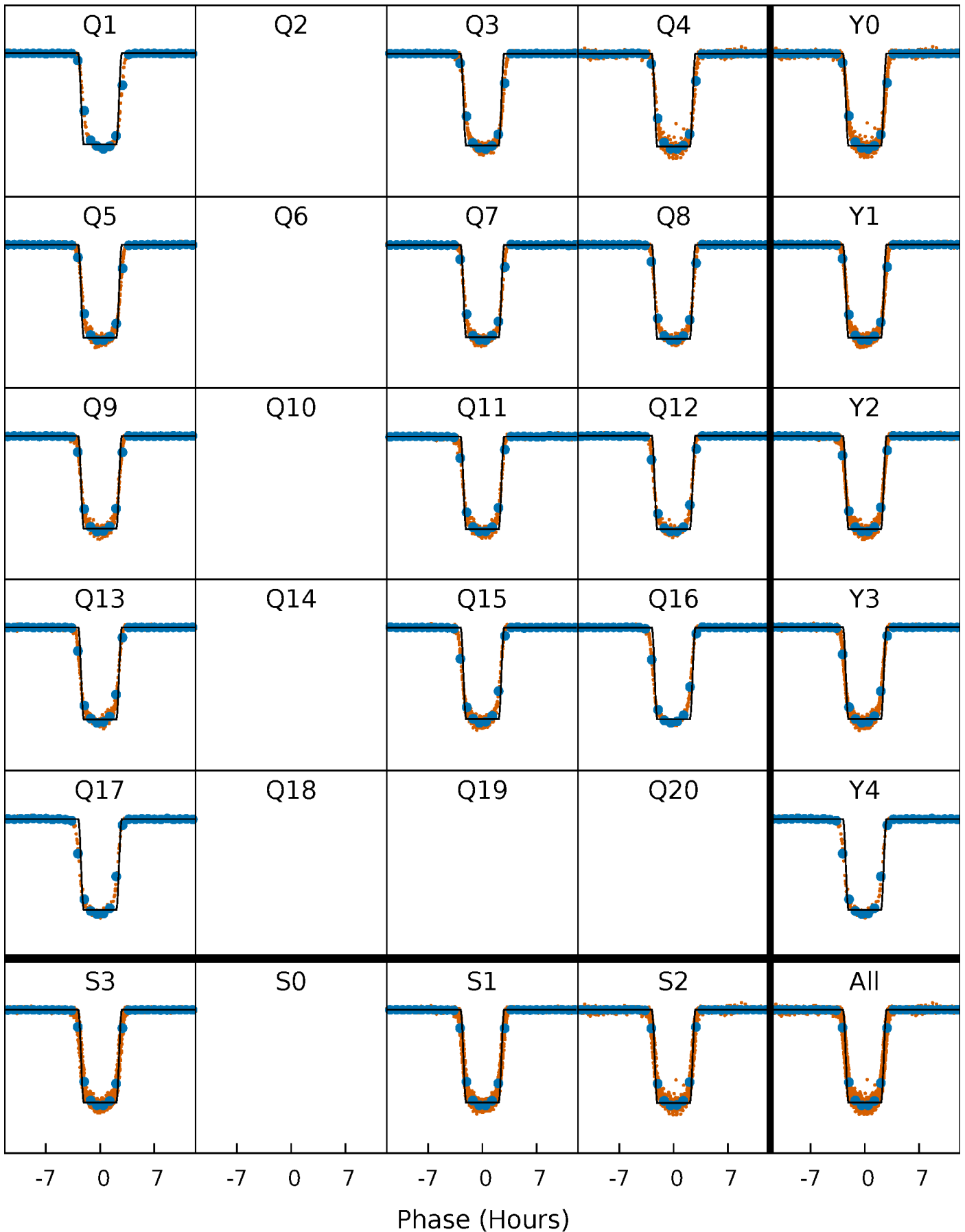
TCE 008230809-01 P= 4.078353 Days  $T_0=132.160296$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

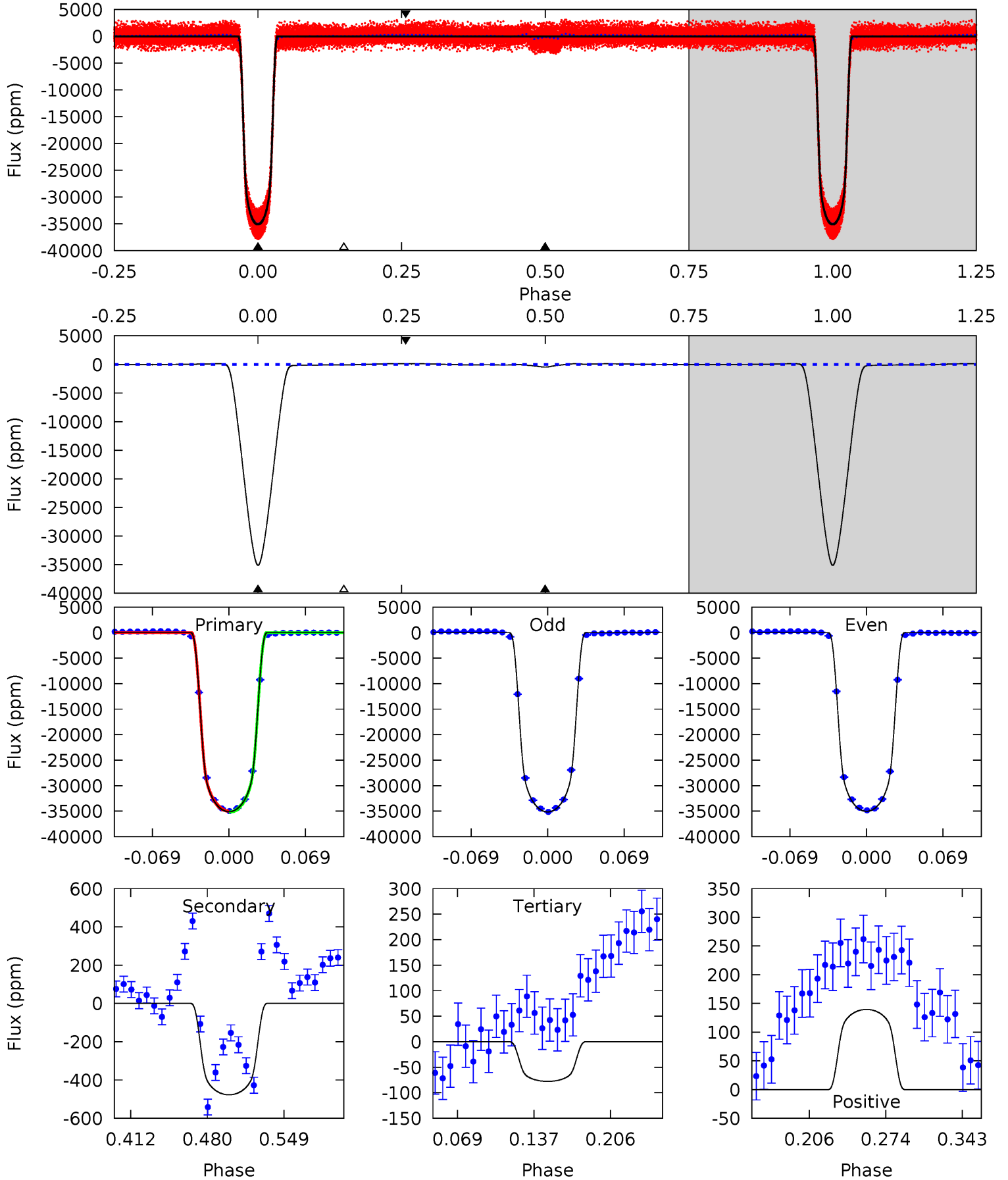
TCE 008230809-01   P= 4.078406 Days    $T_0=132.150119$  (BKJD)



# DV Model-Shift Uniqueness Test

008230809-01, P = 4.078353 Days, E = 128.081943 Days

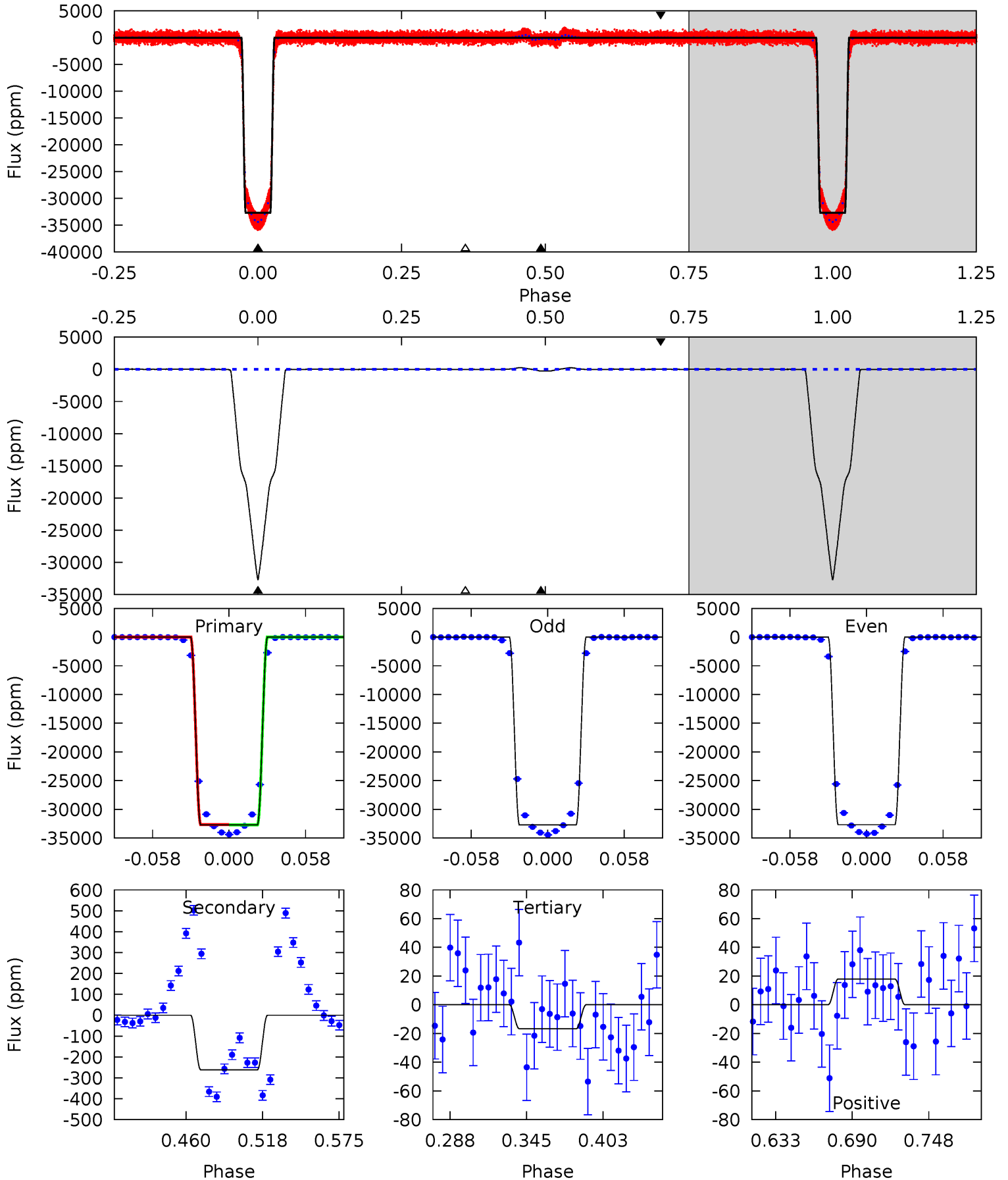
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
2615	35.5	5.79	10.4	4.64	1.82	5.60	2609	2604	29.8	25.1	4.29	1.00	0.00	0



# Alt Model-Shift Uniqueness Test

008230809-01, P = 4.078406 Days, E = 128.071713 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
3716	29.7	1.90	2.04	4.68	1.90	2.18	3714	3714	27.8	27.7	0.78	1.00	0.01	2.69



### Stellar Parameters For KIC 008230809

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5872^{+177}_{-195}$	$4.481^{+0.091}_{-0.169}$	$-0.520^{+0.300}_{-0.300}$	$0.867^{+0.221}_{-0.102}$	$0.830^{+0.105}_{-0.070}$	$1.791^{+0.710}_{-0.823}$
	+3%/-3%	+2%/-4%	+58%/-58%	+25%/-12%	+13%/-8%	+40%/-46%
Source	KIC0	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 008230809-01 / KOI 6055.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-477 \pm 13$	$16.64^{+2.19}_{-1.22}$	$1570^{+101}_{-78}$	$2761^{+51}_{-52}$	$2.078^{+0.349}_{-0.411}$
Alt.	$-261 \pm 9$	$17.36^{+2.55}_{-1.25}$	$1570^{+102}_{-80}$	$2465^{+48}_{-51}$	$1.039^{+0.175}_{-0.220}$

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

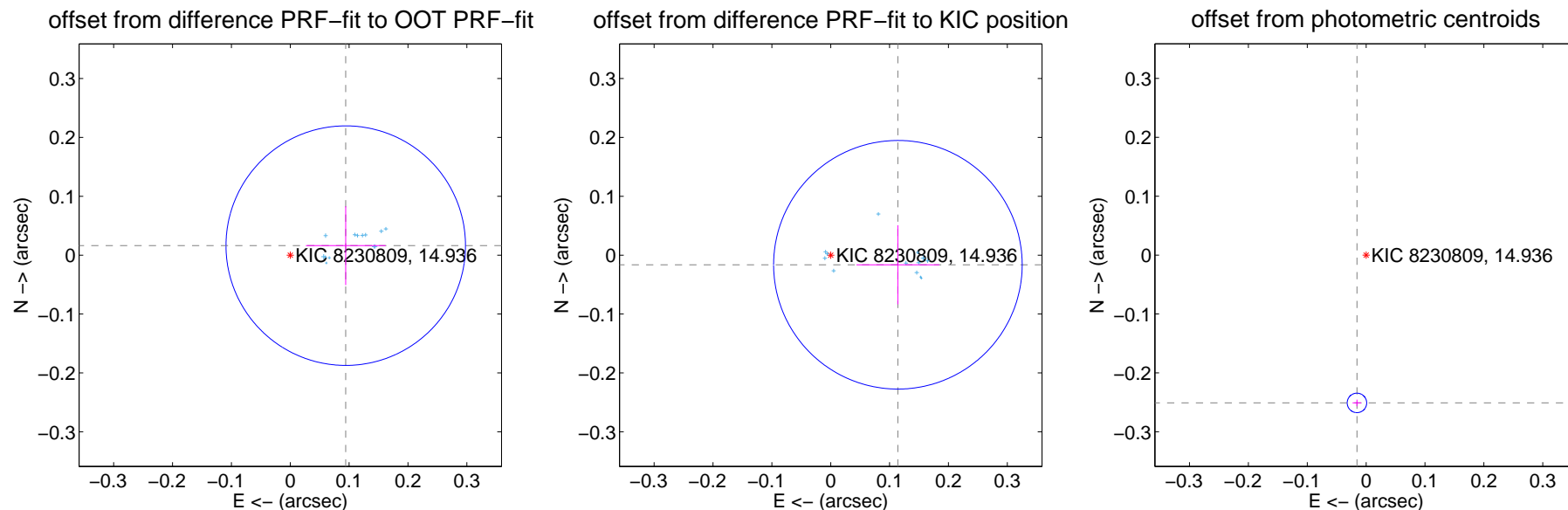
## DV Centroid Data

Supplemental centroid analysis for 008230809-01. Kepler magnitude: 14.94. Transit SNR 1285.16

There are 13 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.10 arcsec

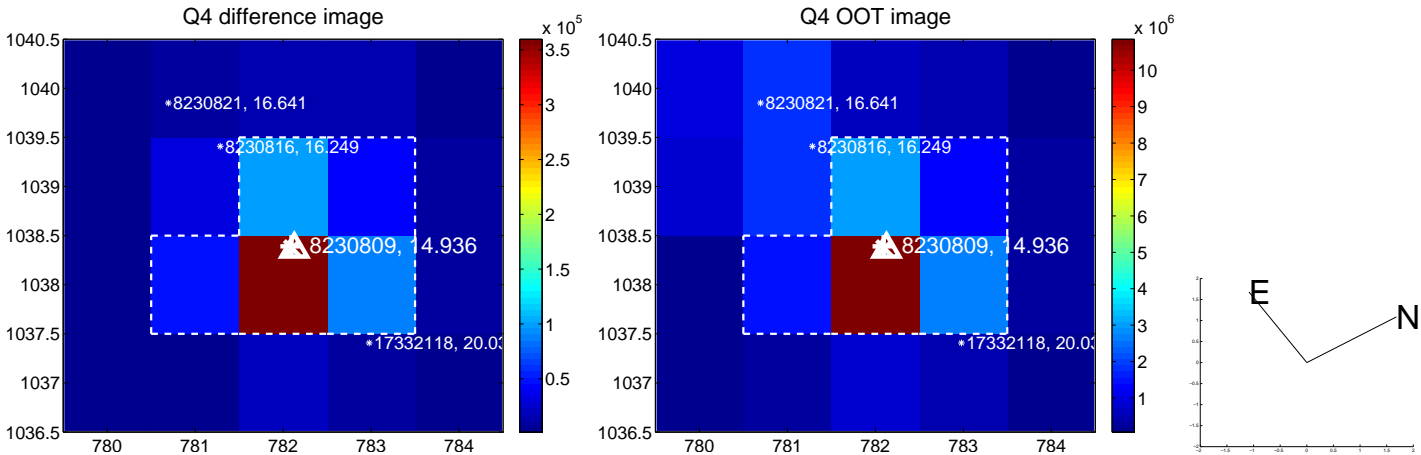
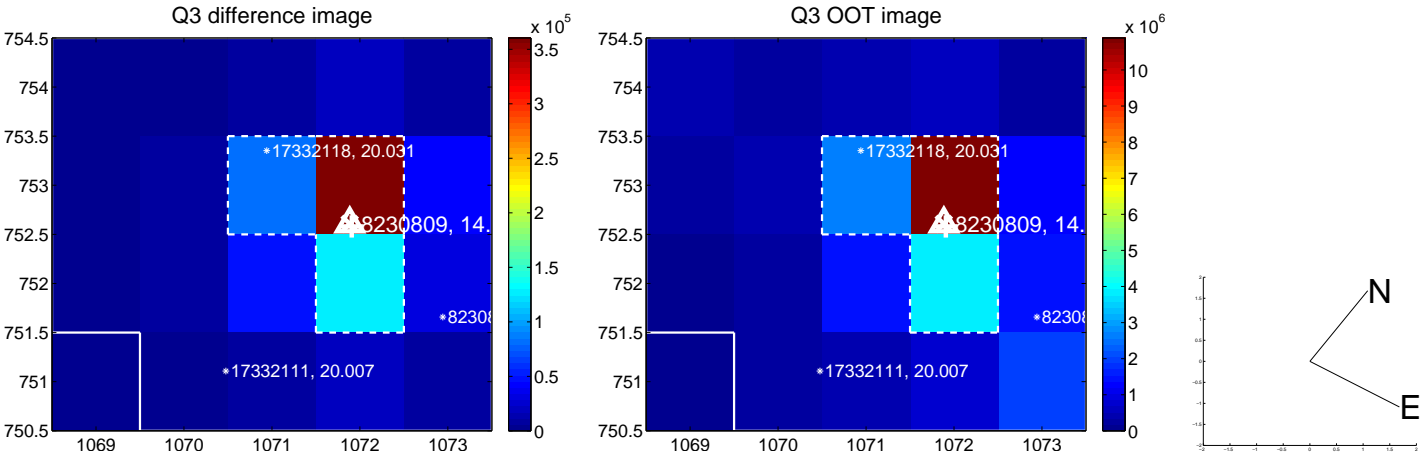
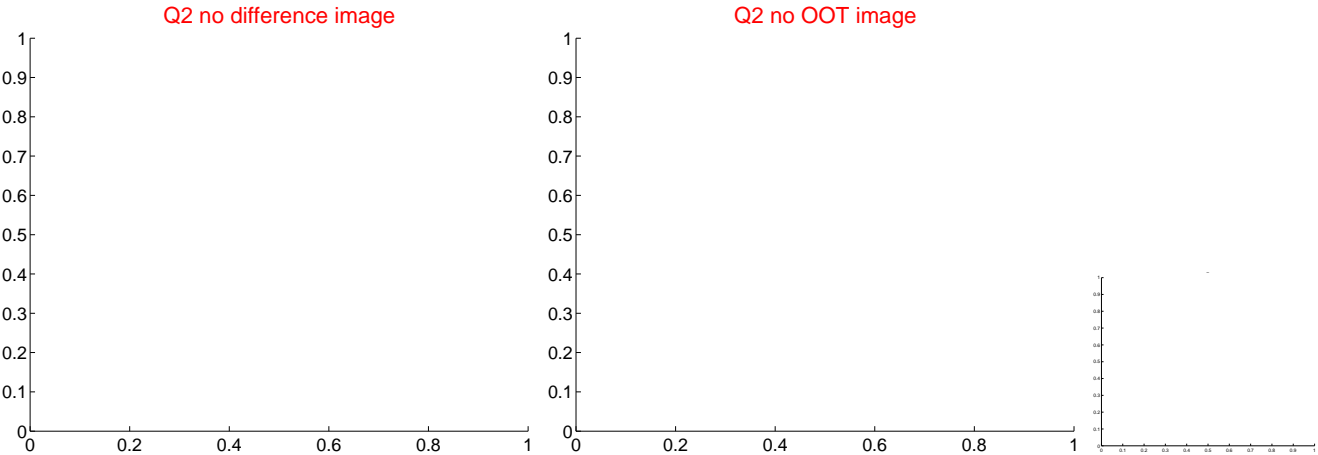
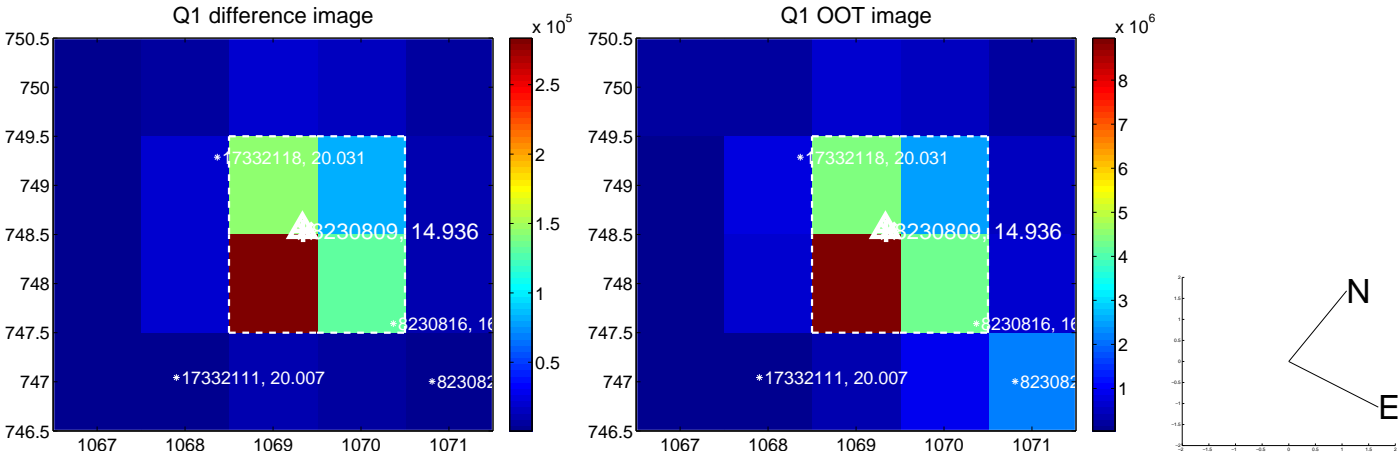
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.096 \pm 0.068$	1.41	$-0.094 \pm 0.068$	$0.016 \pm 0.067$
PRF-fit source offset from KIC position	$0.115 \pm 0.070$	1.64	$-0.114 \pm 0.070$	$-0.016 \pm 0.067$
photometric centroid source offset	$0.25 \pm 0.01$	45.62	$0.02 \pm 0.01$	$-0.25 \pm 0.01$



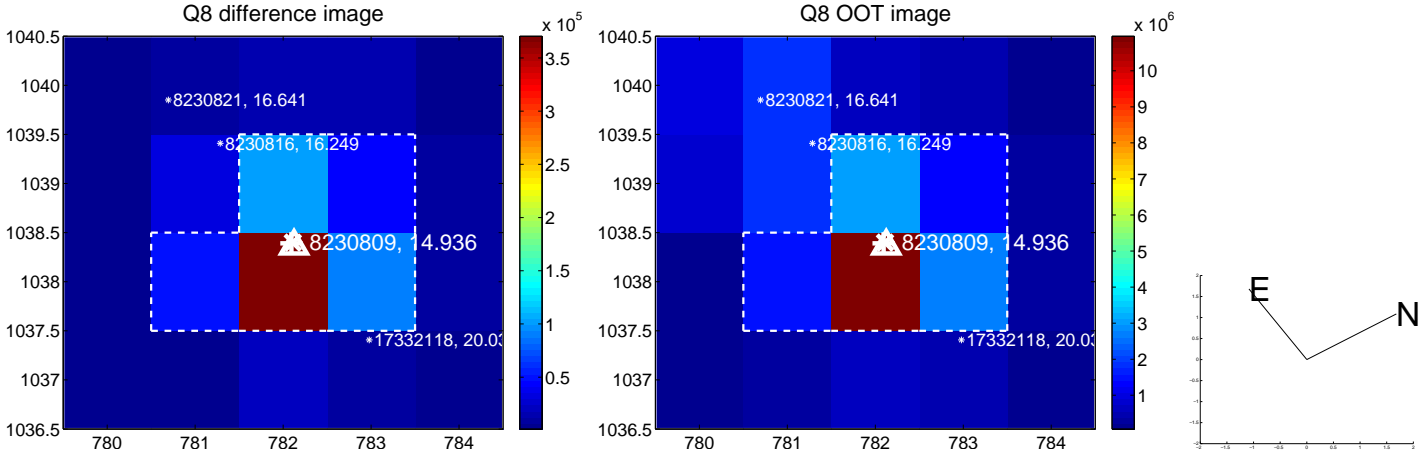
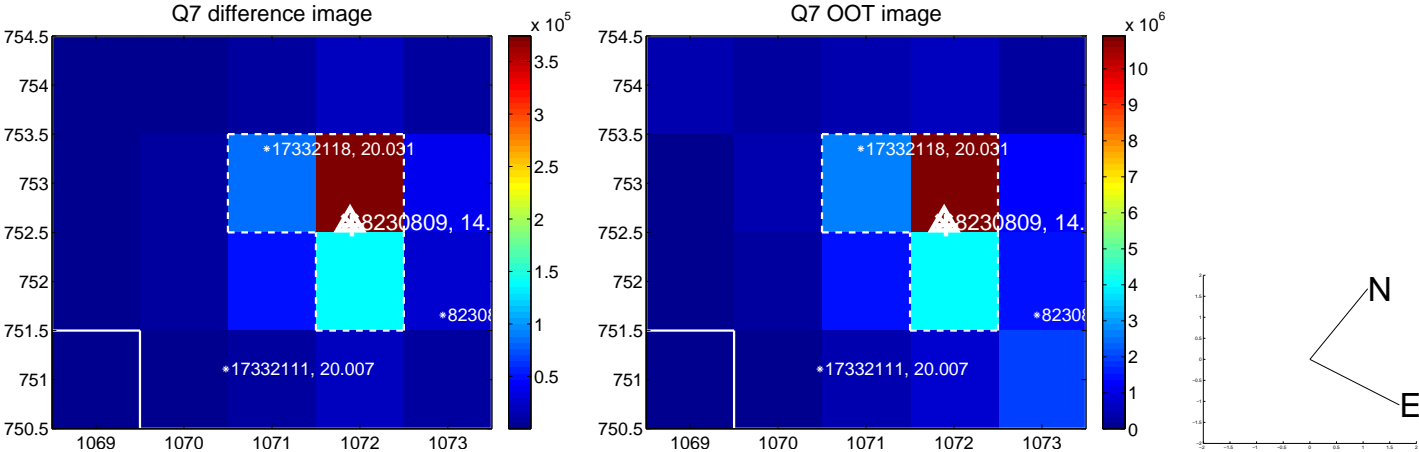
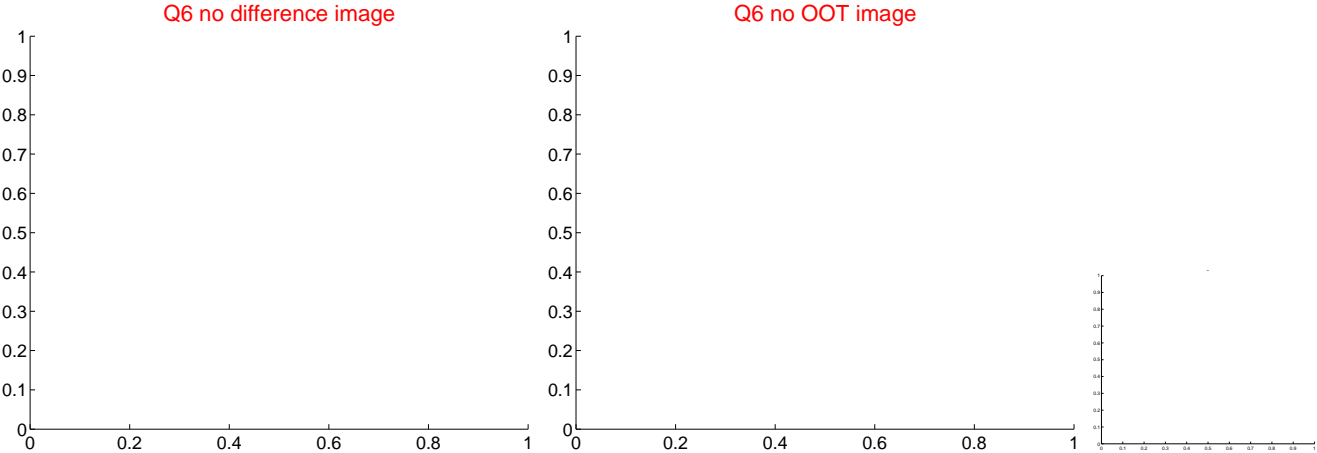
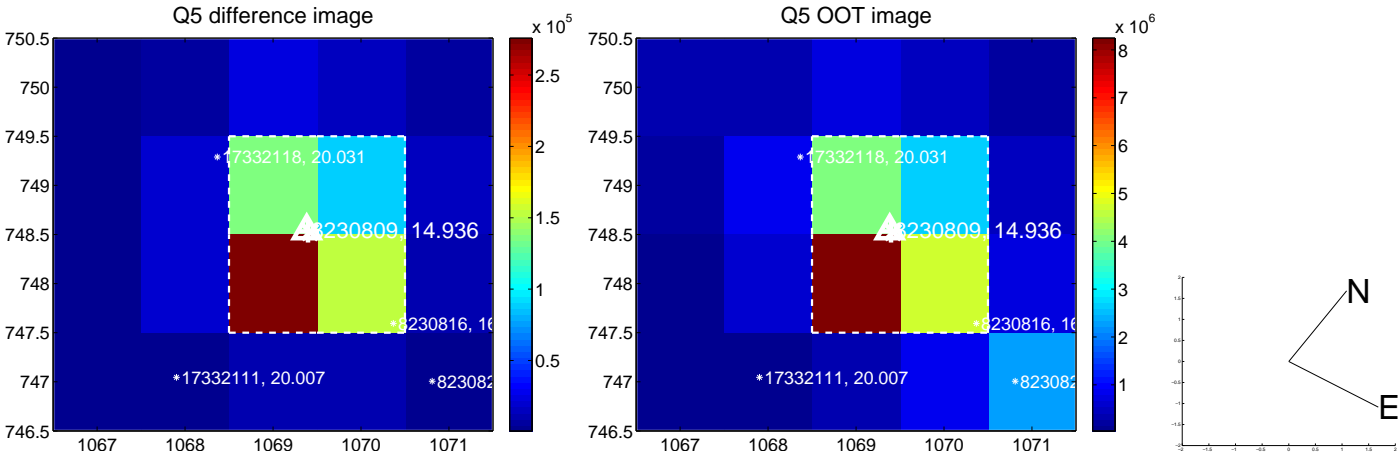
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



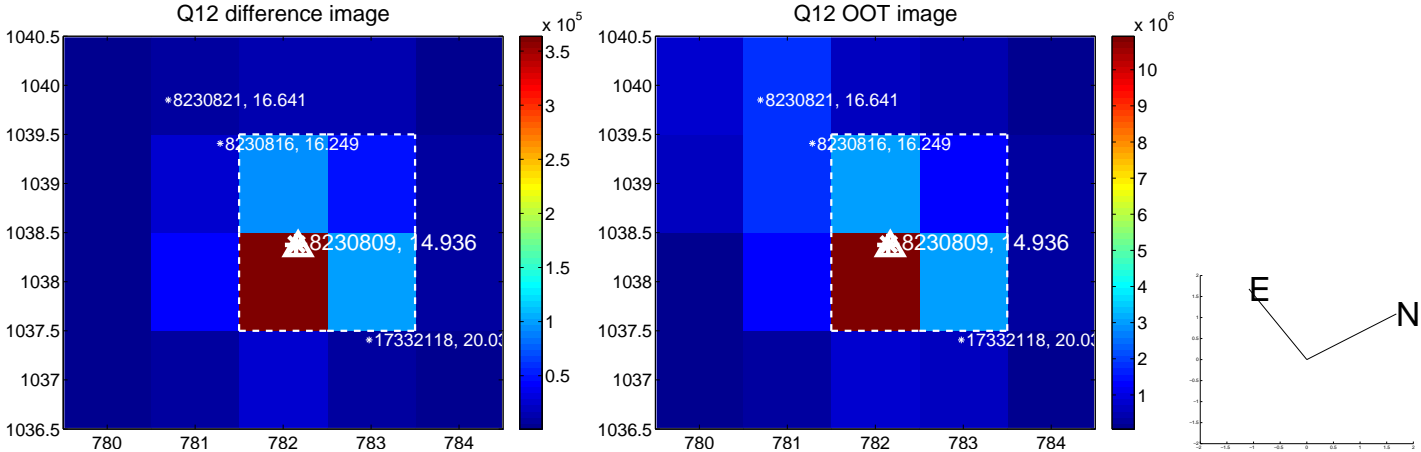
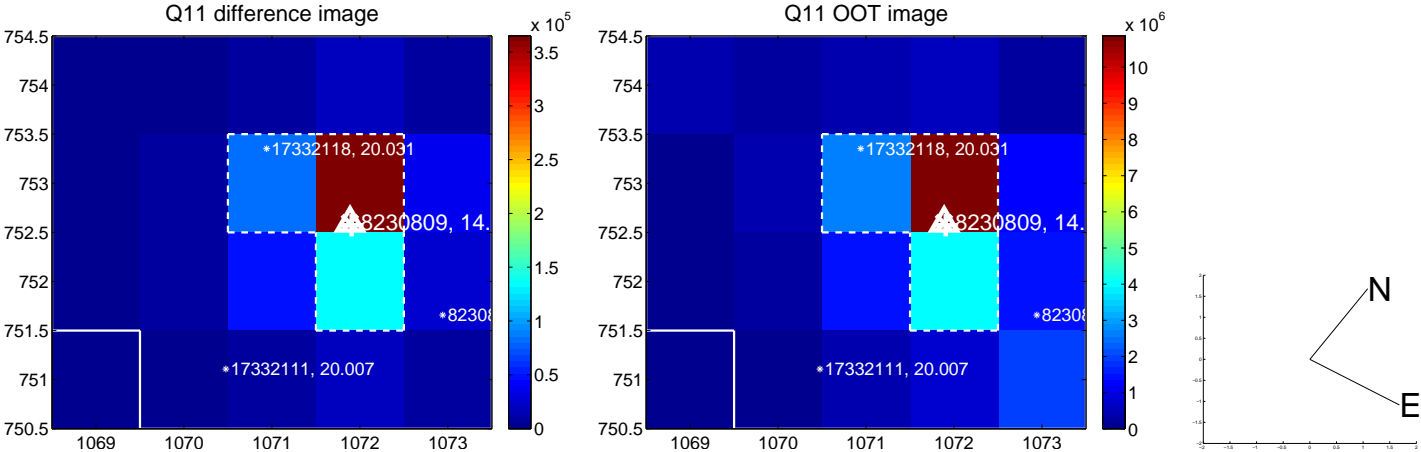
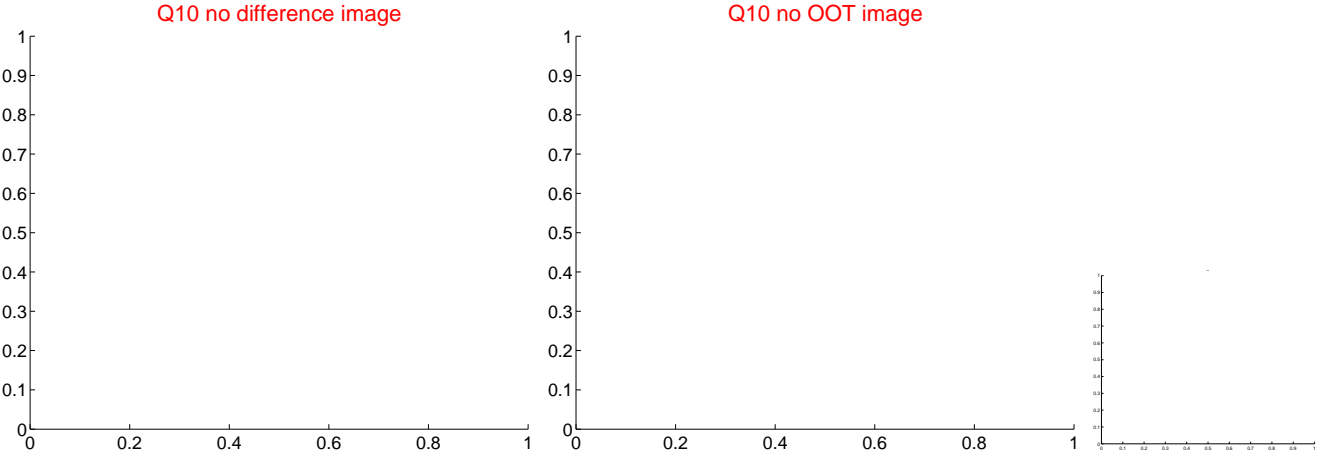
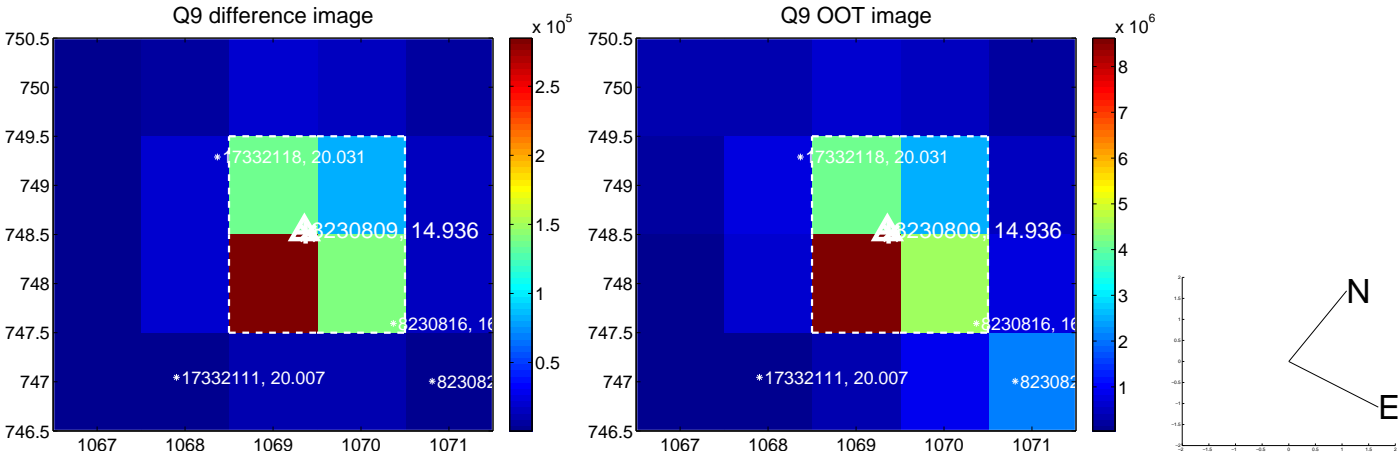
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



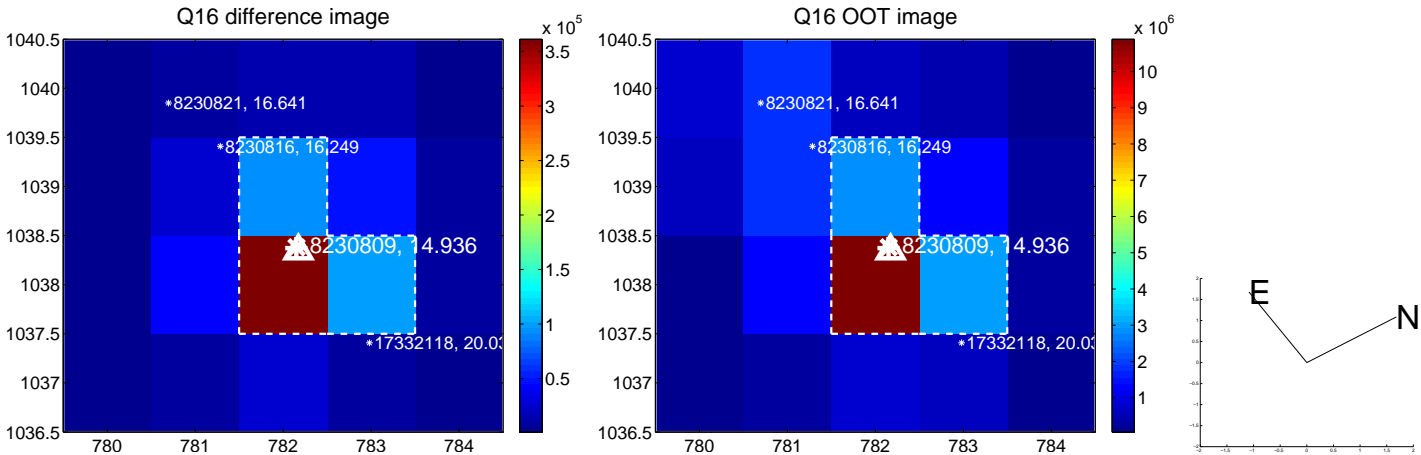
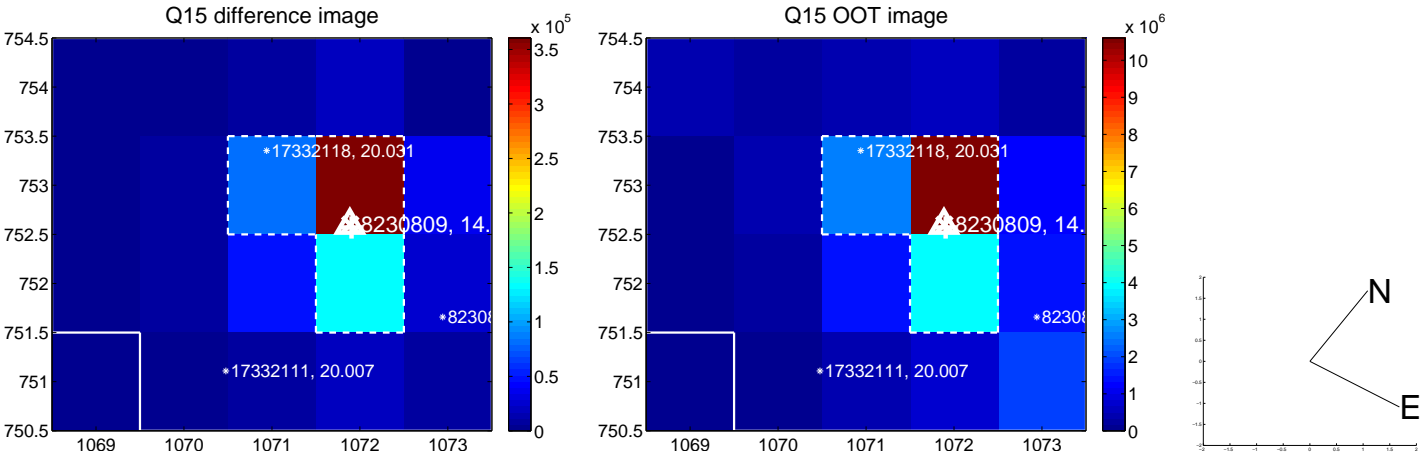
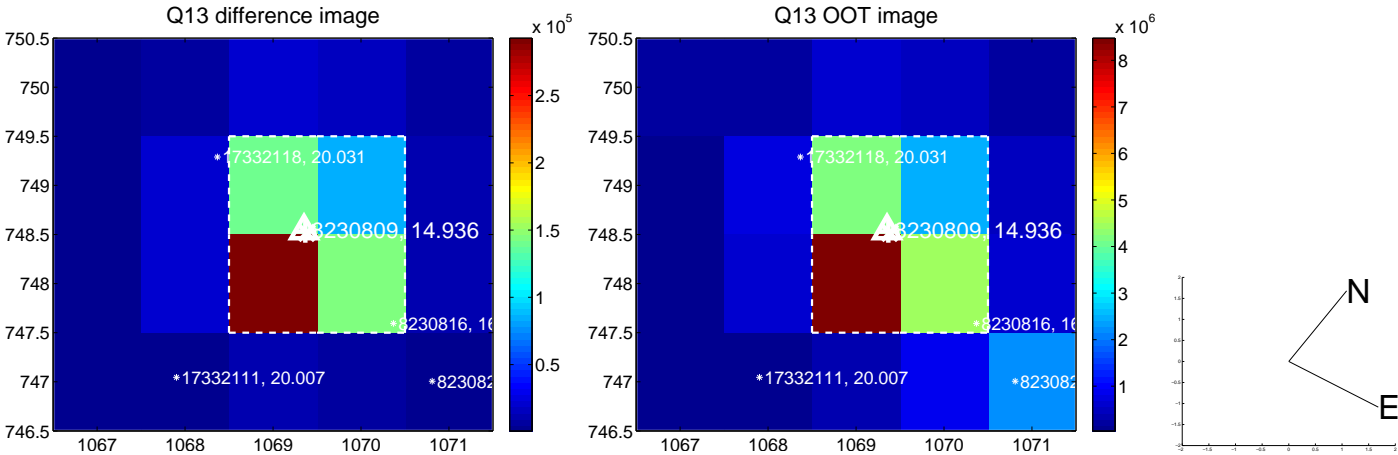
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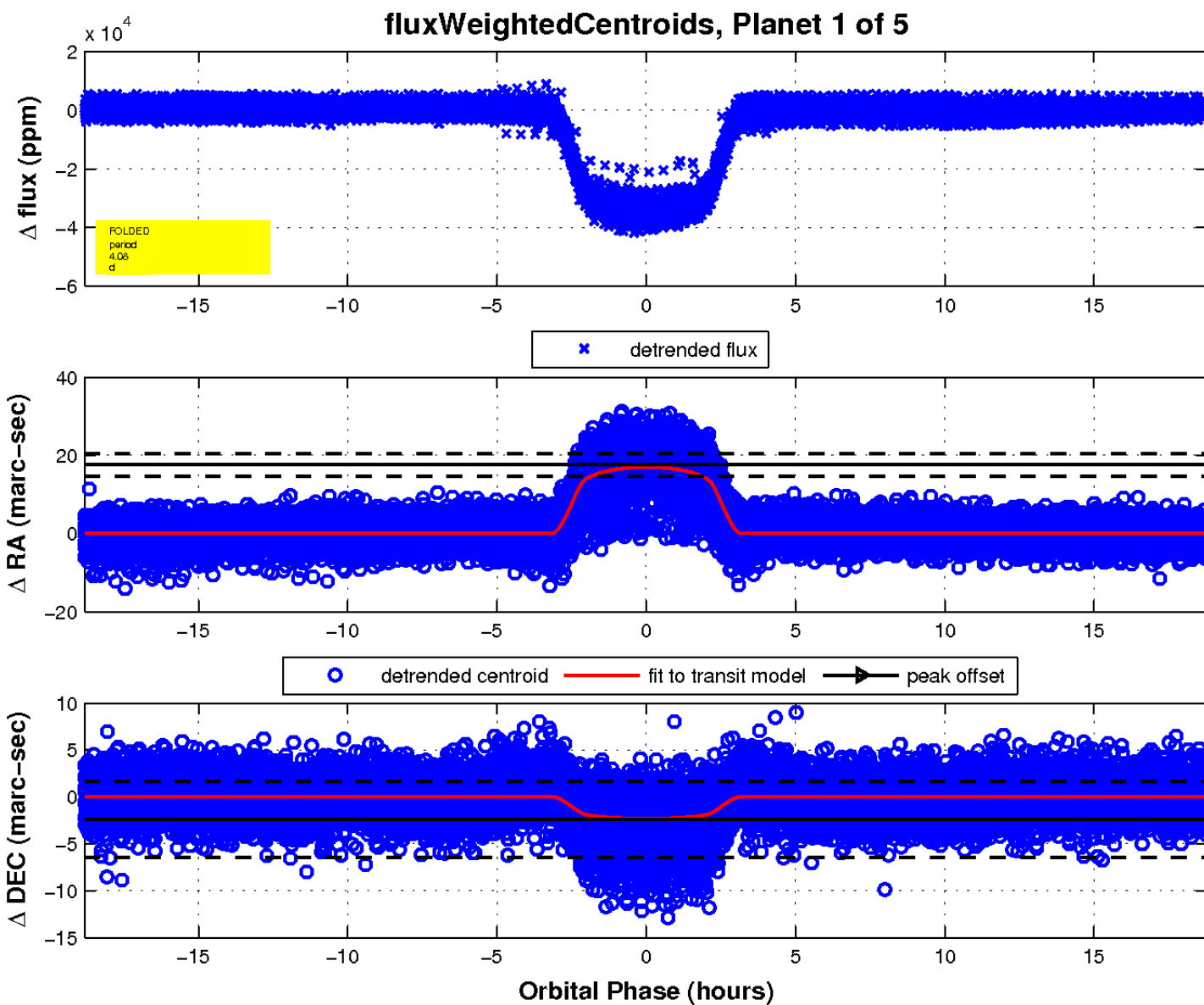
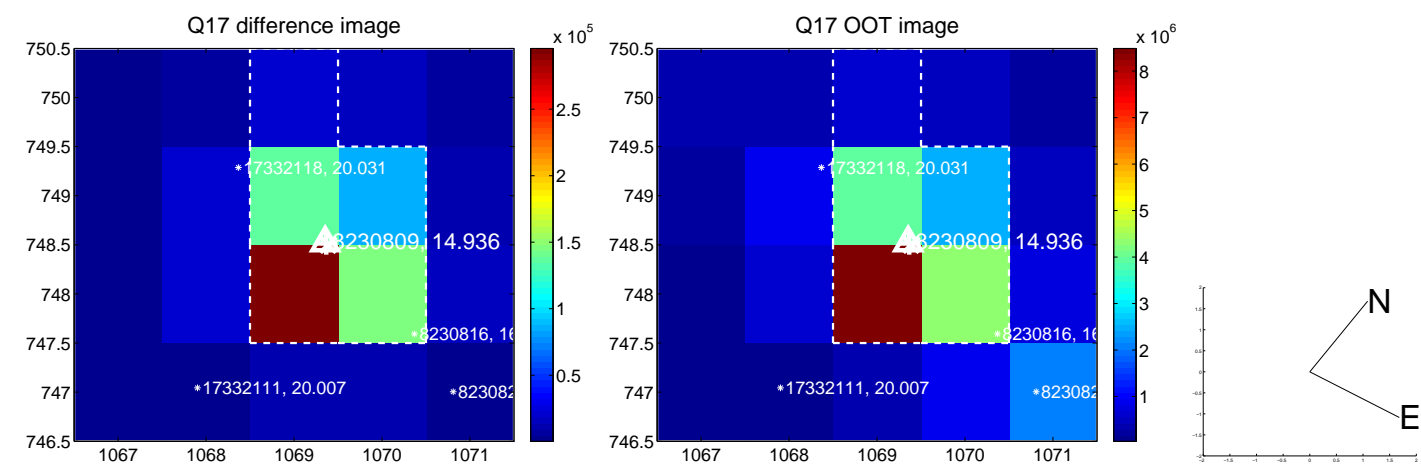
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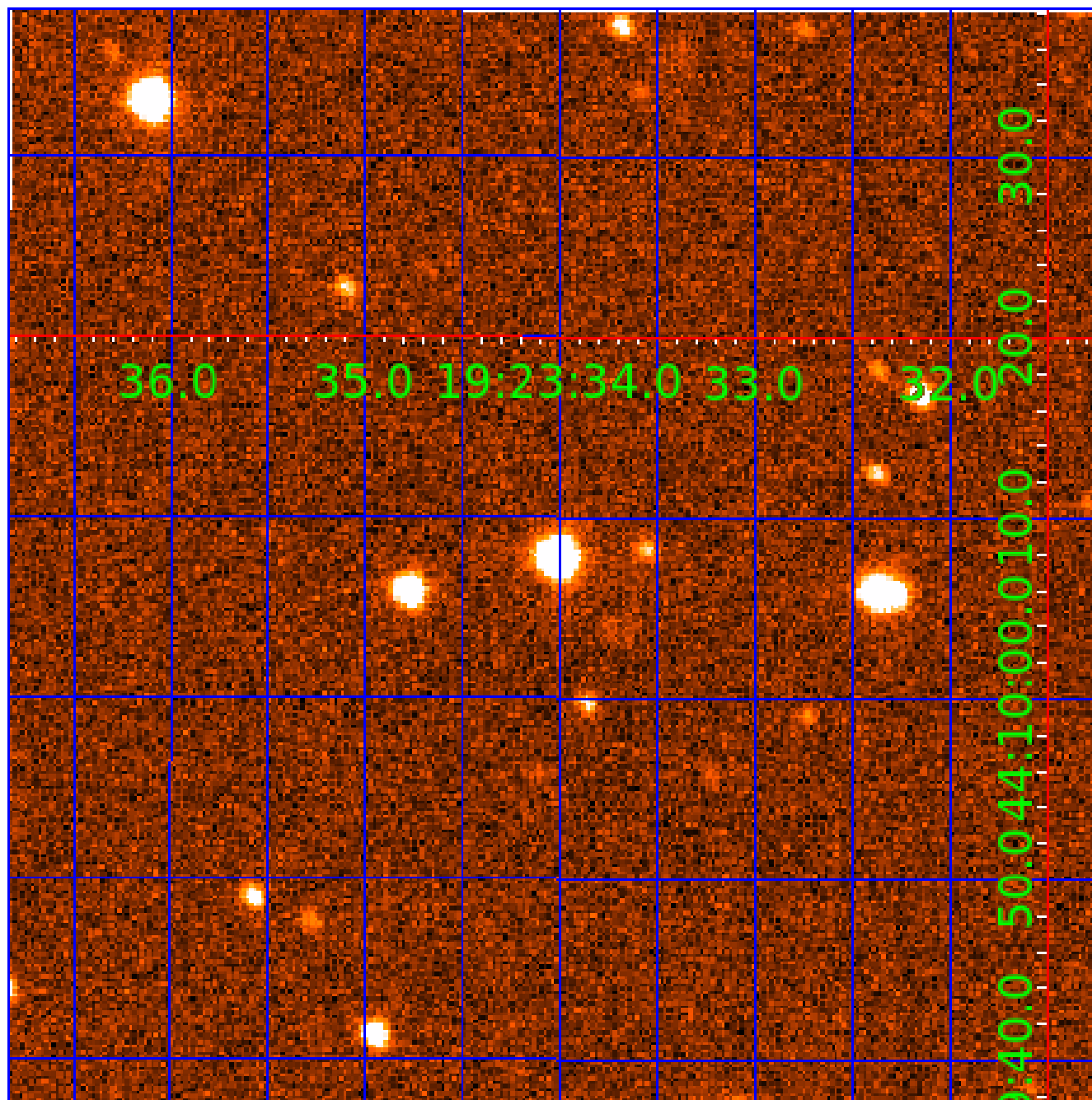
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UKIRT Image

Declination



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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.

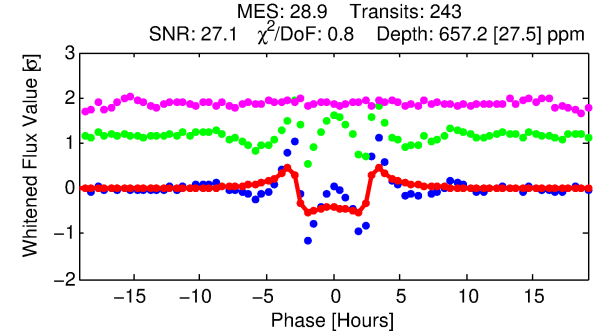
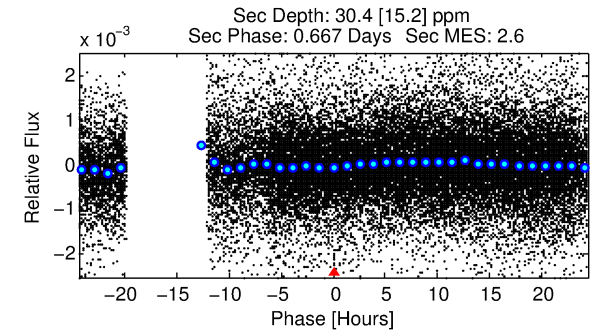
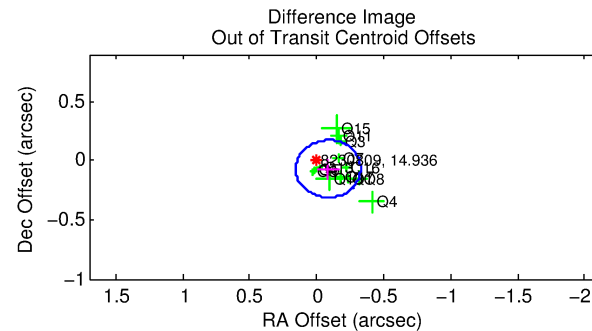
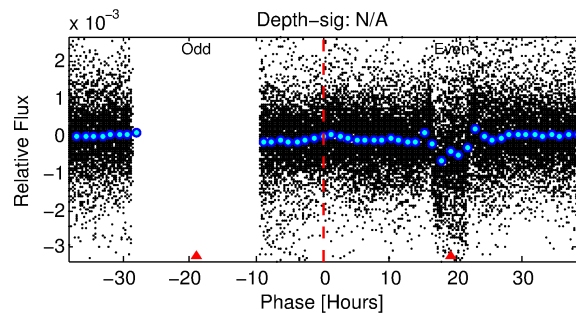
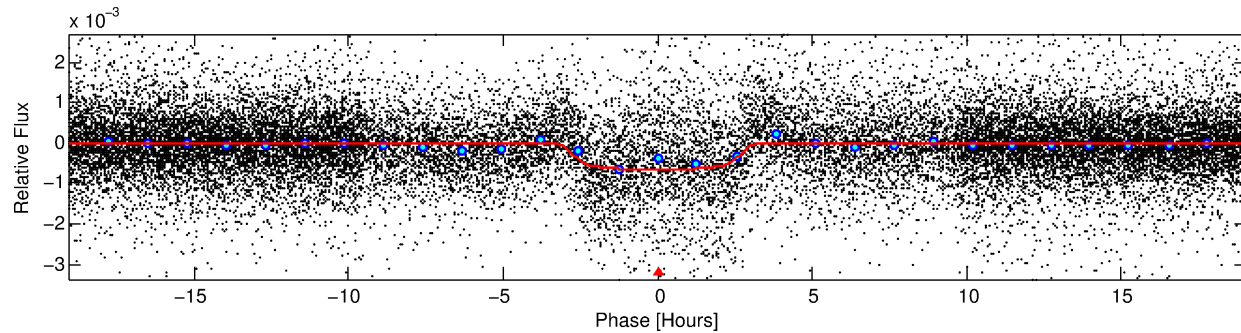
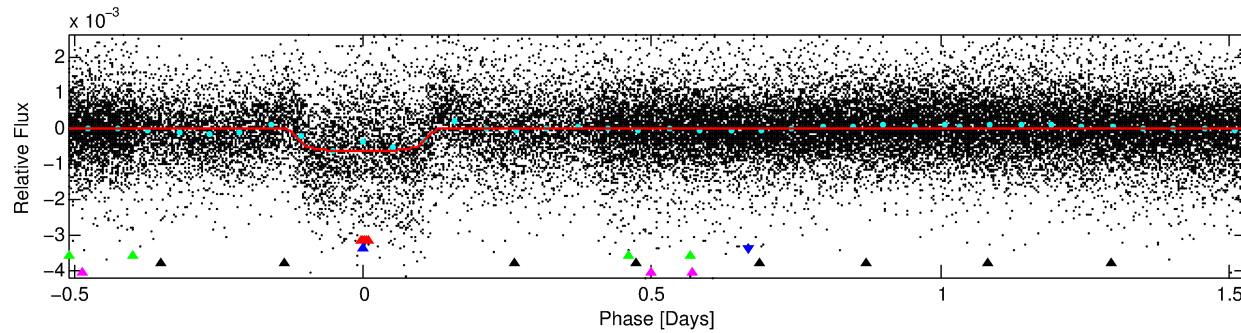
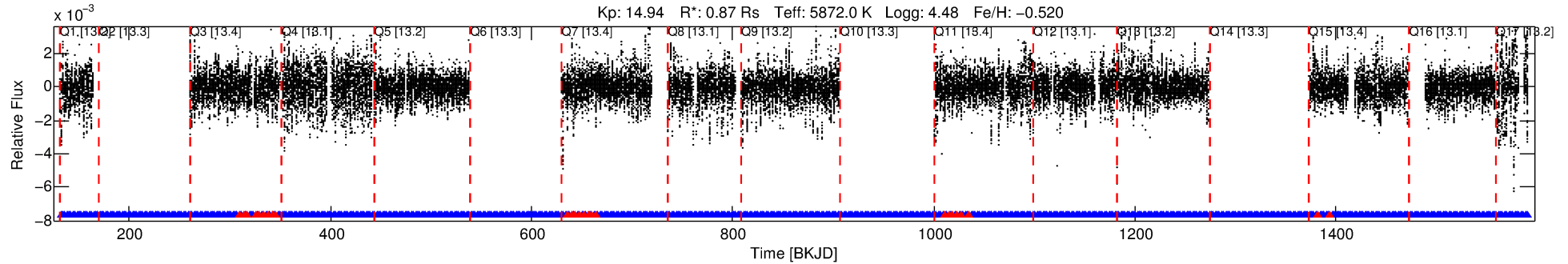
## Ephemeris Match Information For 008230809-02

No Significant Match Found

# DV One-Page Summary

KIC: 8230809 Candidate: 2 of 5 Period: 2.039 d  
KOI: K06055 Corr: No Ephemeris Match

Kp: 14.94 R\*: 0.87 Rs Teff: 5872.0 K Logg: 4.48 Fe/H: -0.520



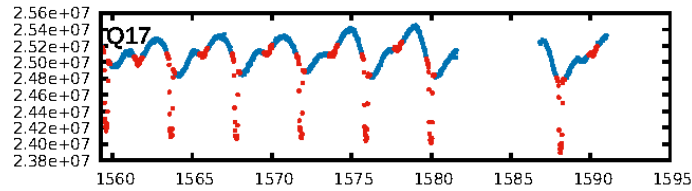
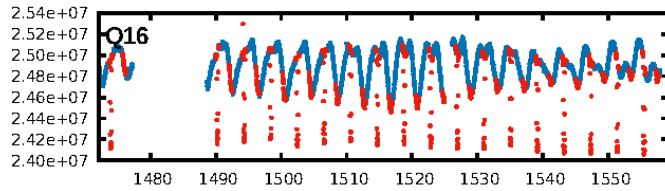
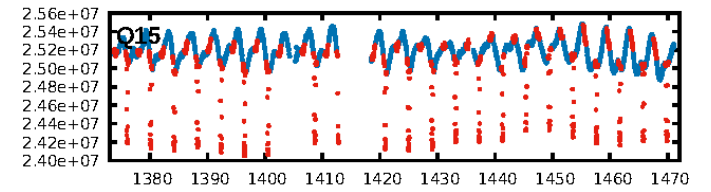
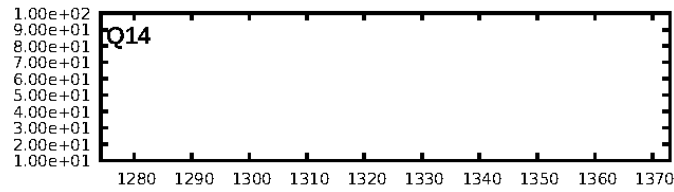
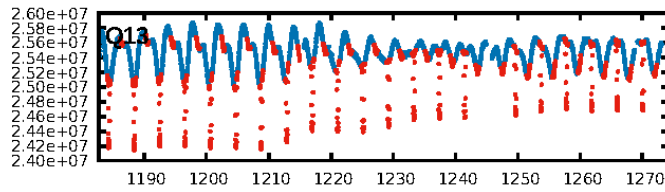
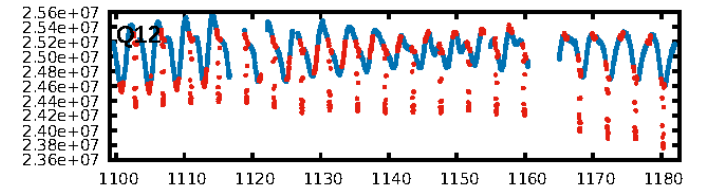
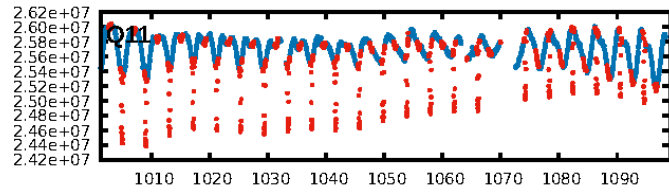
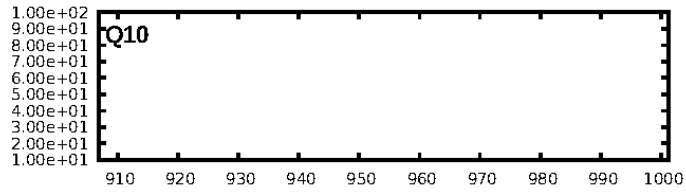
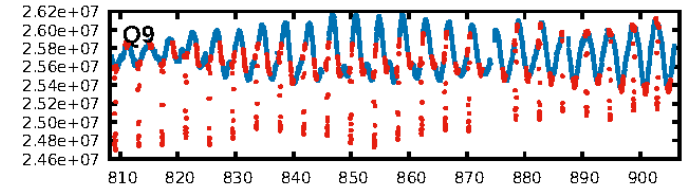
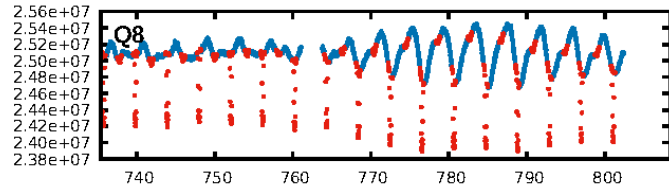
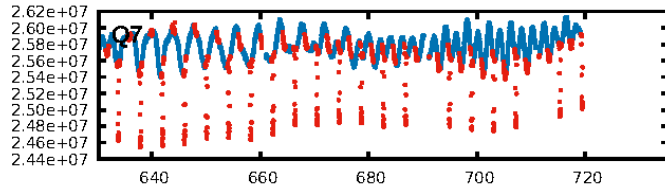
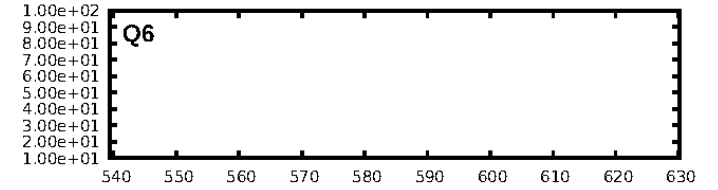
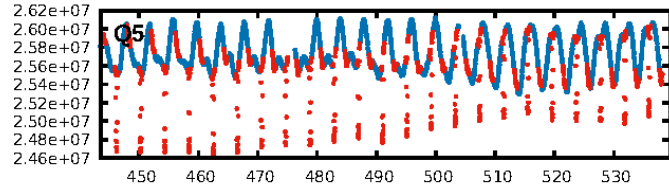
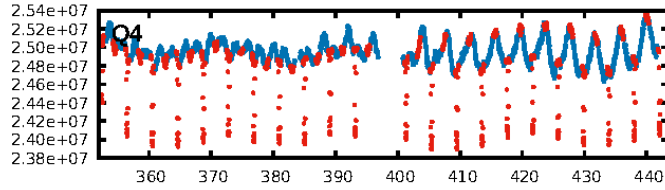
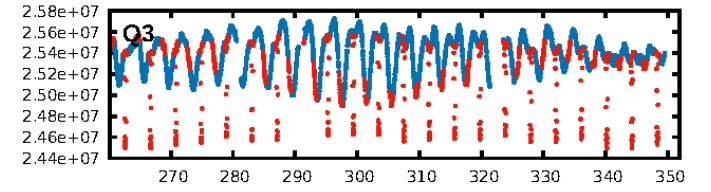
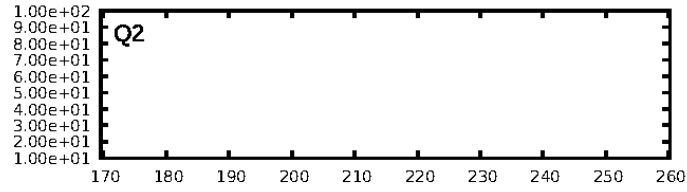
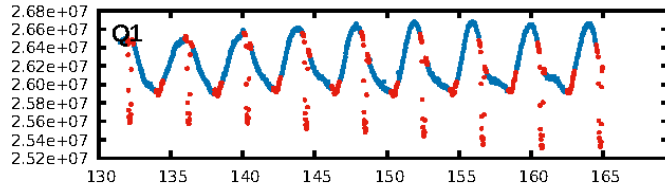
## DV Fit Results:

Period = 2.03916 [0.00001] d  
Epoch = 132.1634 [0.0014] BKJD  
Rp/R\* = 0.0277 [0.0008]  
a/R\* = 1.54 [0.08]  
b = 0.90 [0.02]  
Seff = 915.06 [308.72]  
Teq = 1402 [118] K  
Rp = 2.62 [0.67] Re  
a = 0.0296 [0.0063] AU  
Ag = 2.13 [1.26] [0.90σ]  
Teffp = 2620 [341] K [3.38σ]

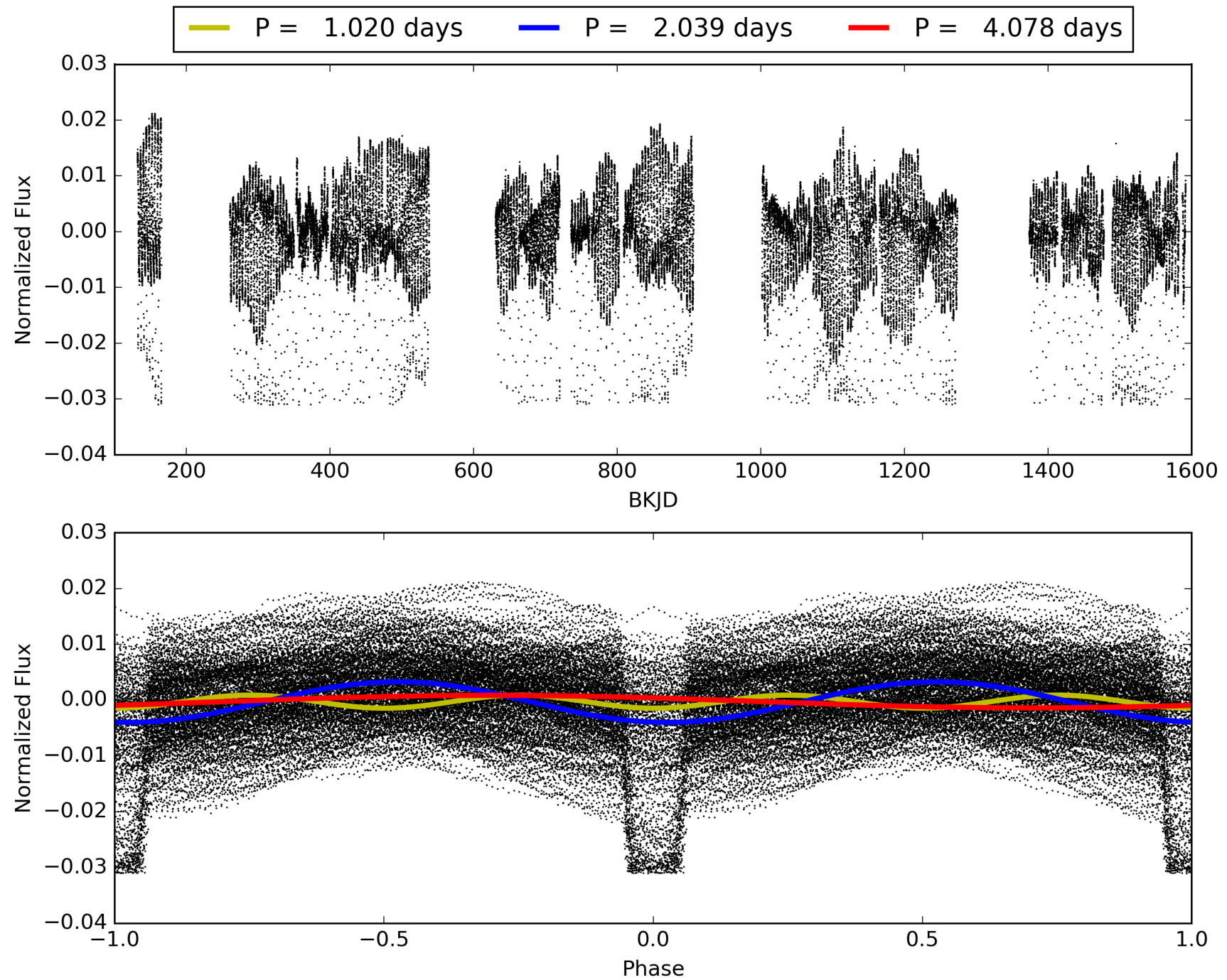
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [5.48σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 1.19e-142  
RollingBand-fgt: 0.89 [204/229]  
GhostDiagnostic-chr: 1.209  
Centroid-sig: 0.0%  
Centroid-so: 0.663 arcsec [2.62σ]  
OotOffset-rm: 0.109 arcsec [1.35σ]  
KicOffset-rm: 0.148 arcsec [1.74σ]  
OotOffset-st: 0/4/4/5 [13]  
KicOffset-st: 0/4/4/5 [13]  
DiffImageQuality-fgm: 1.00 [13/13]  
DiffImageOverlap-fno: 1.00 [13/13]

# TCE 008230809-02, PDC Light Curves



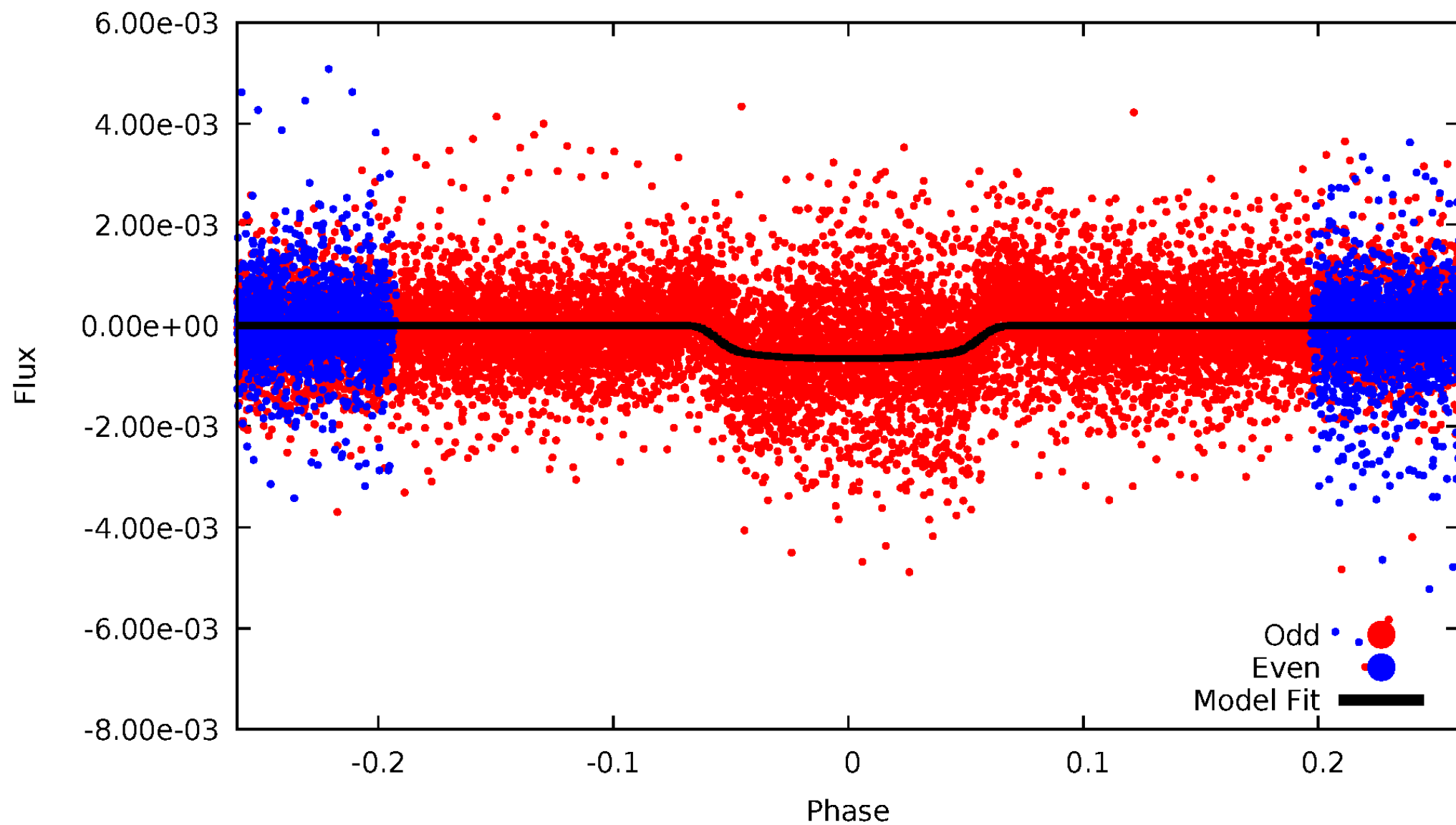
TCE 008230809-02





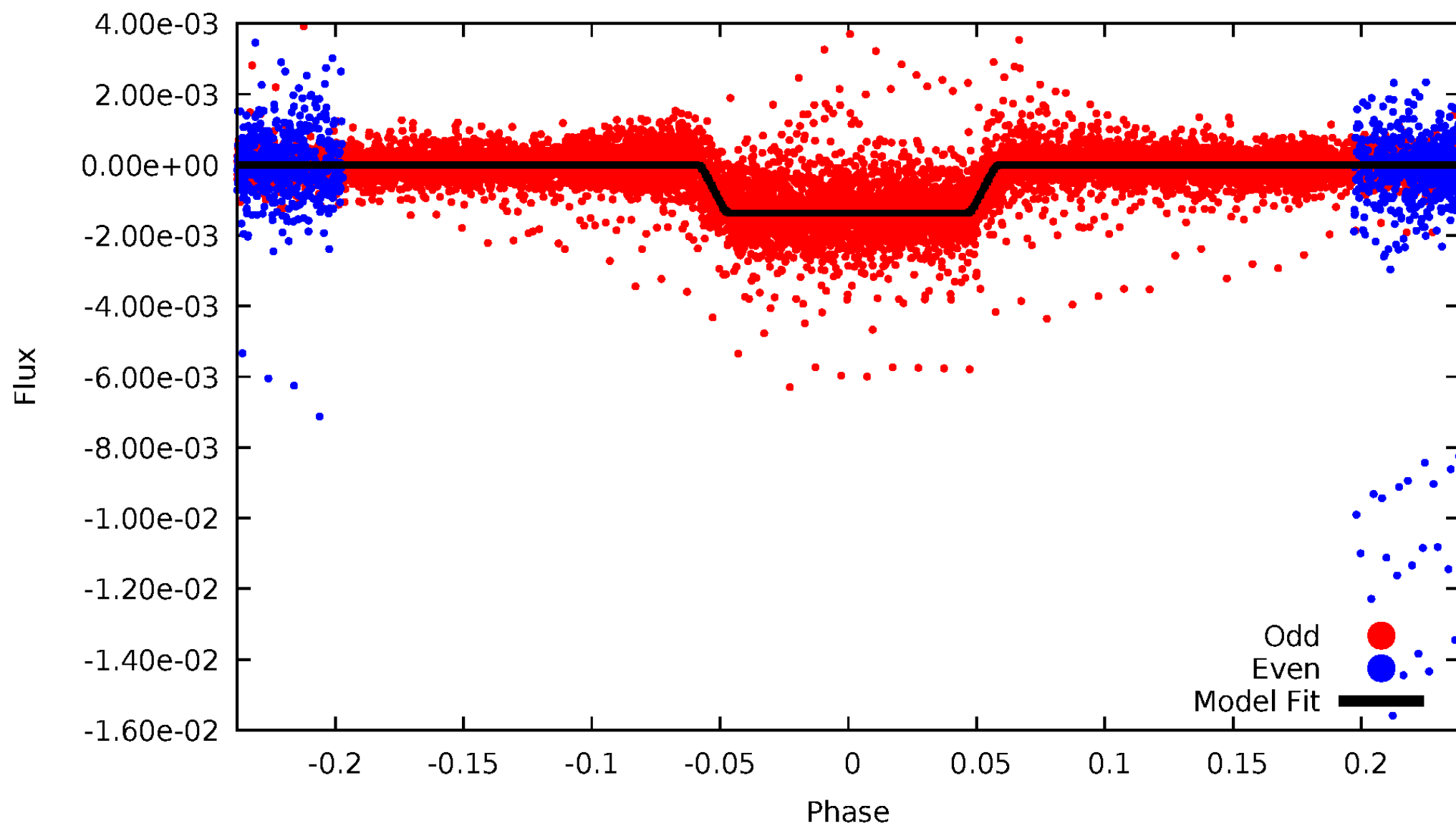
# DV Odd/Even

TCE 008230809-02



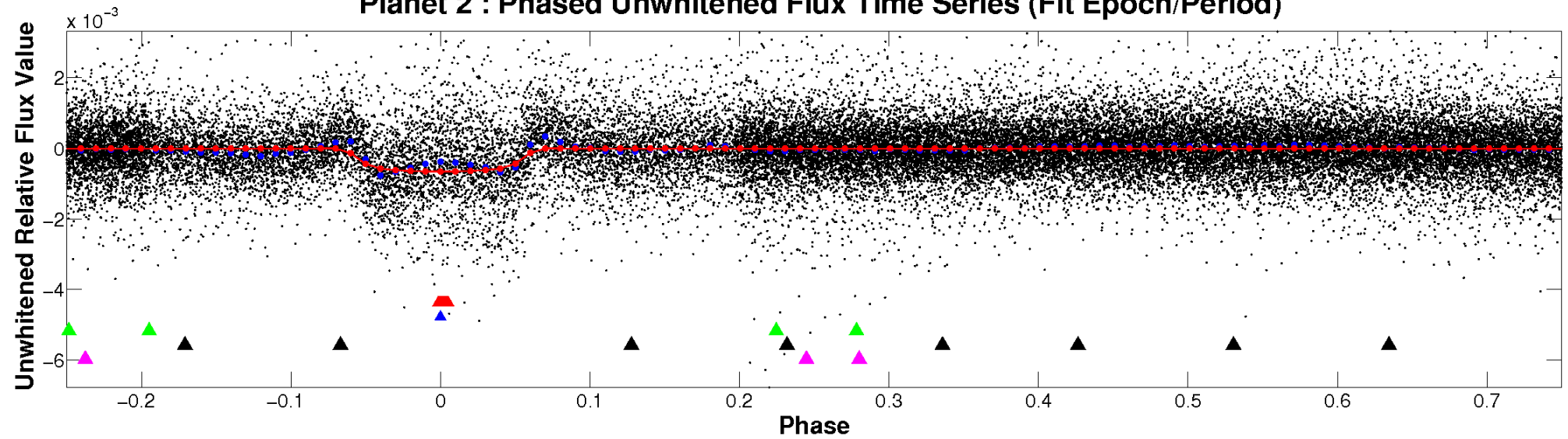
# ALT Odd/Even

TCE 008230809-02

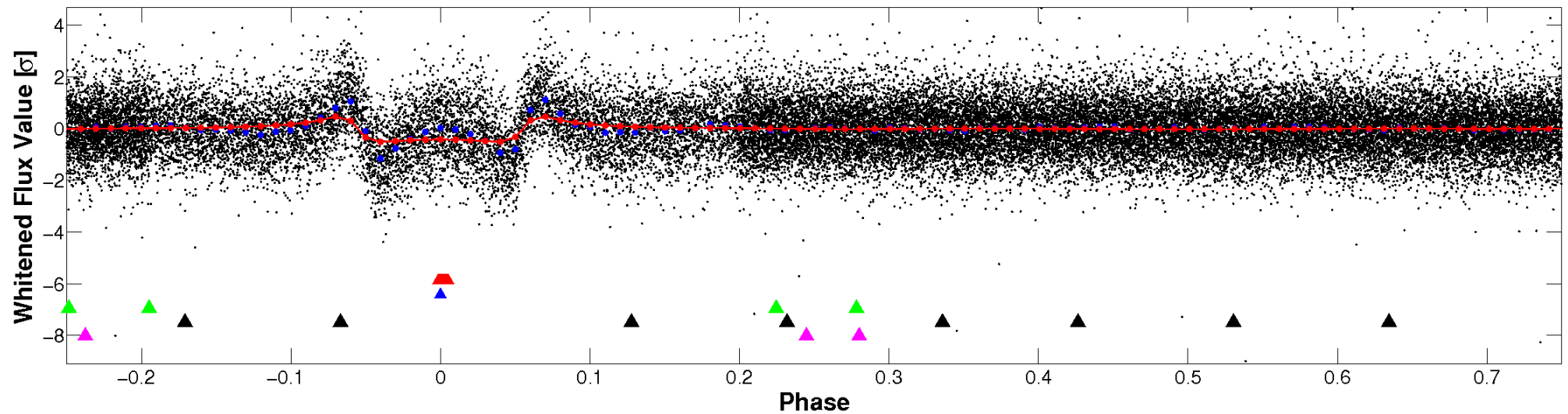


# Non-Whitened Vs. Whitened Light Curve

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



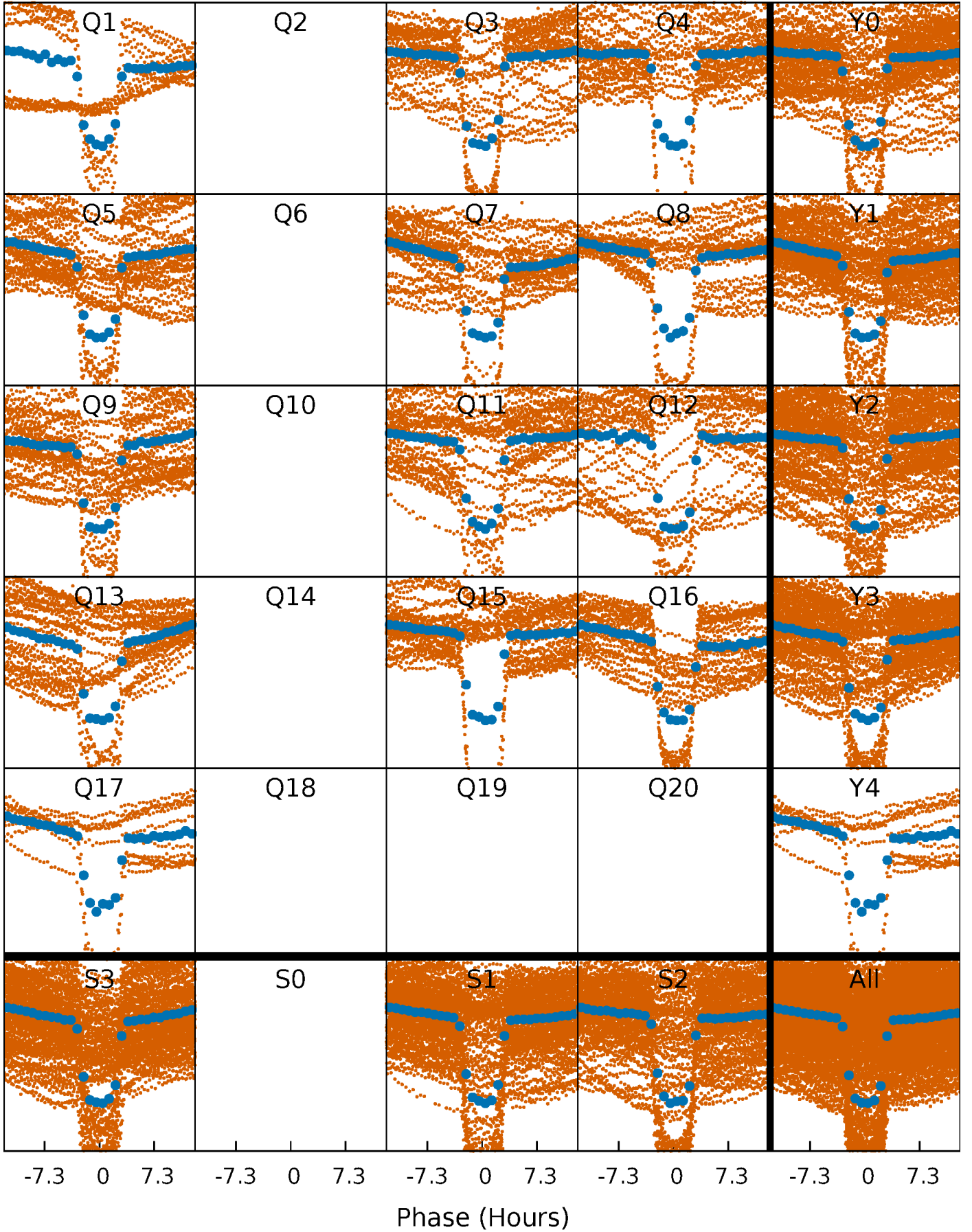
## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)





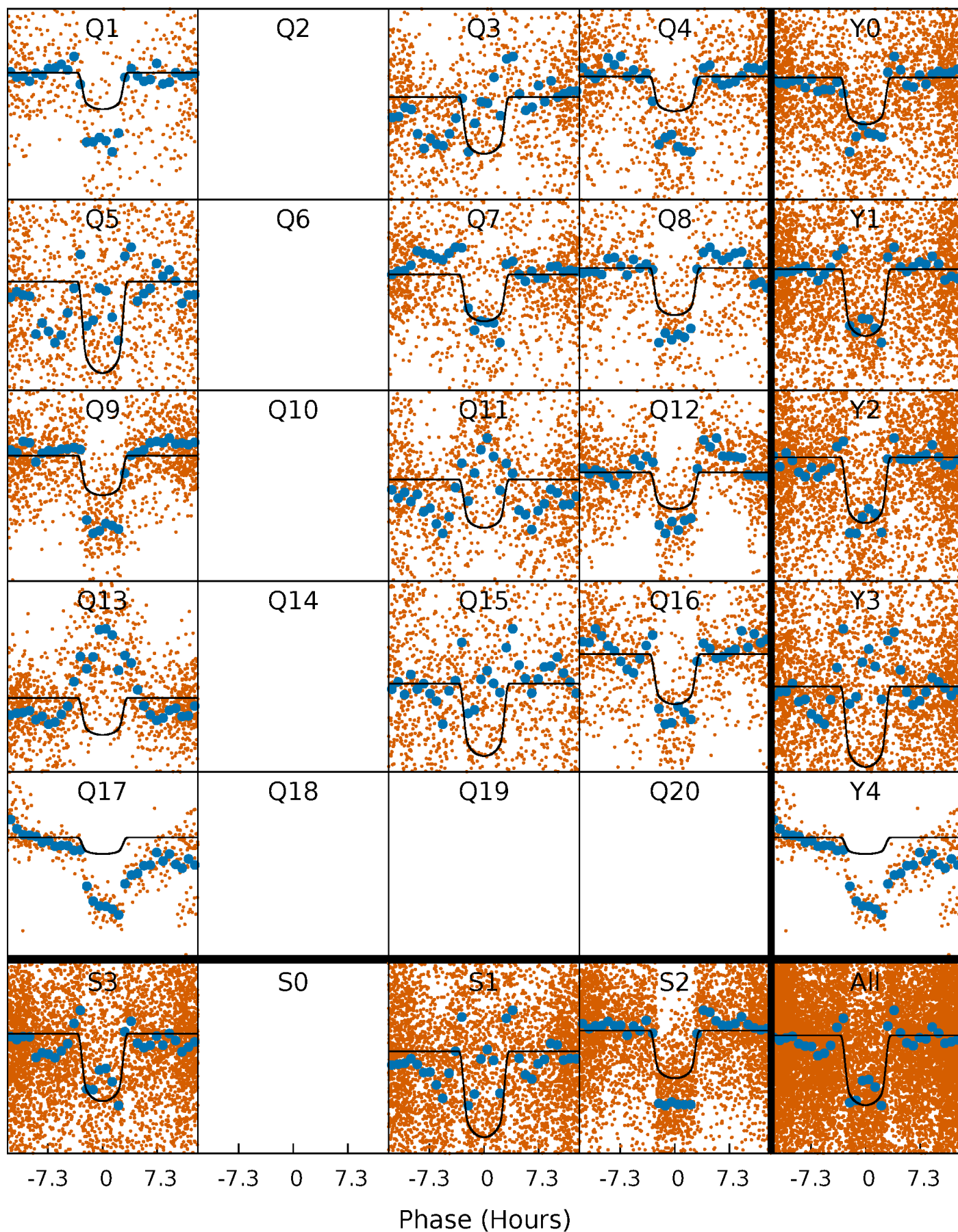
# PDC Quarter-Phased Transit Curves

TCE 008230809-02   P= 2.039157 Days    $T_0=132.163350$  (BKJD)



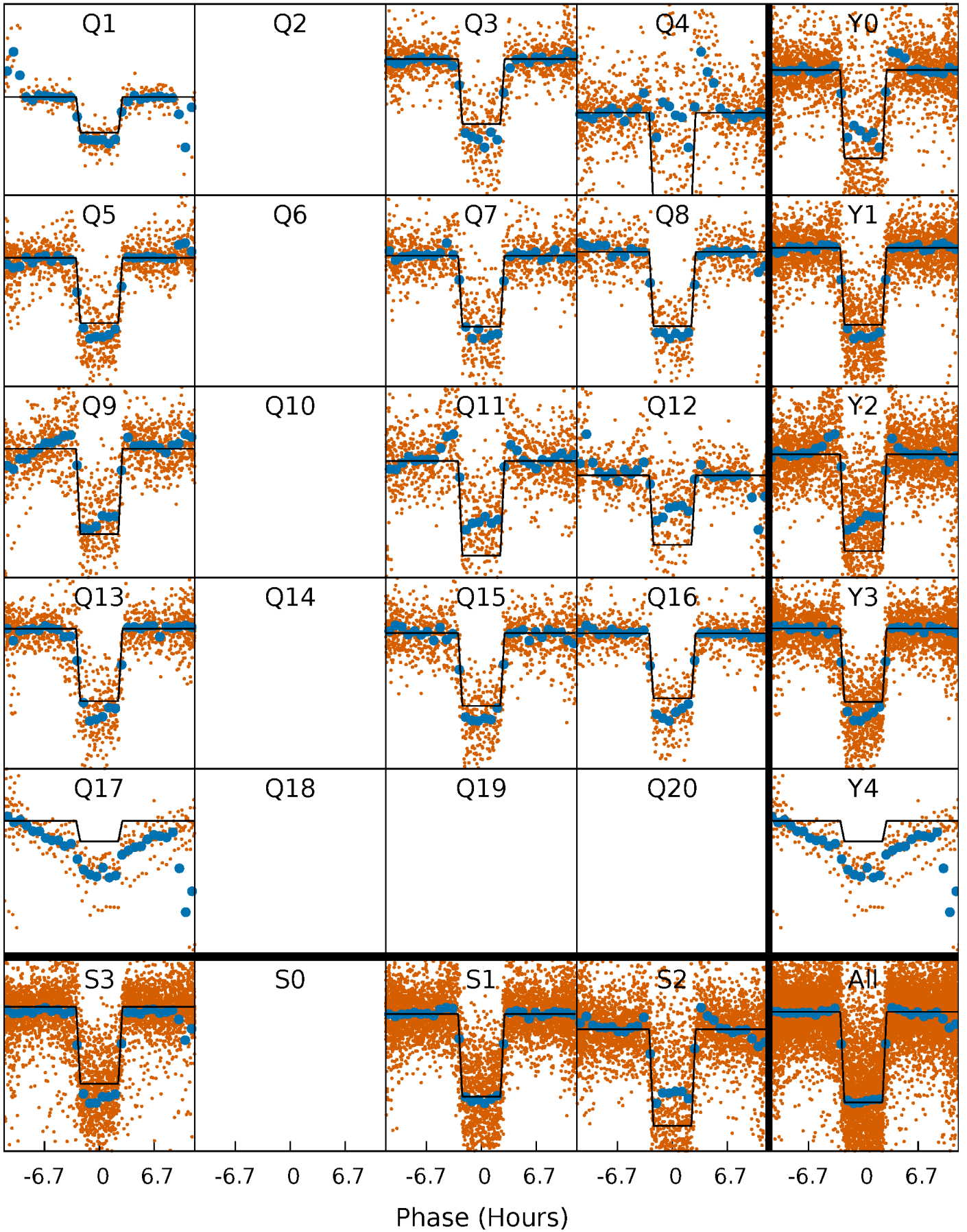
# DV Quarter-Phased Transit Curves

TCE 008230809-02 P= 2.039157 Days  $T_0=132.163350$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 008230809-02 P= 2.039175 Days  $T_0=132.160964$  (BKJD)

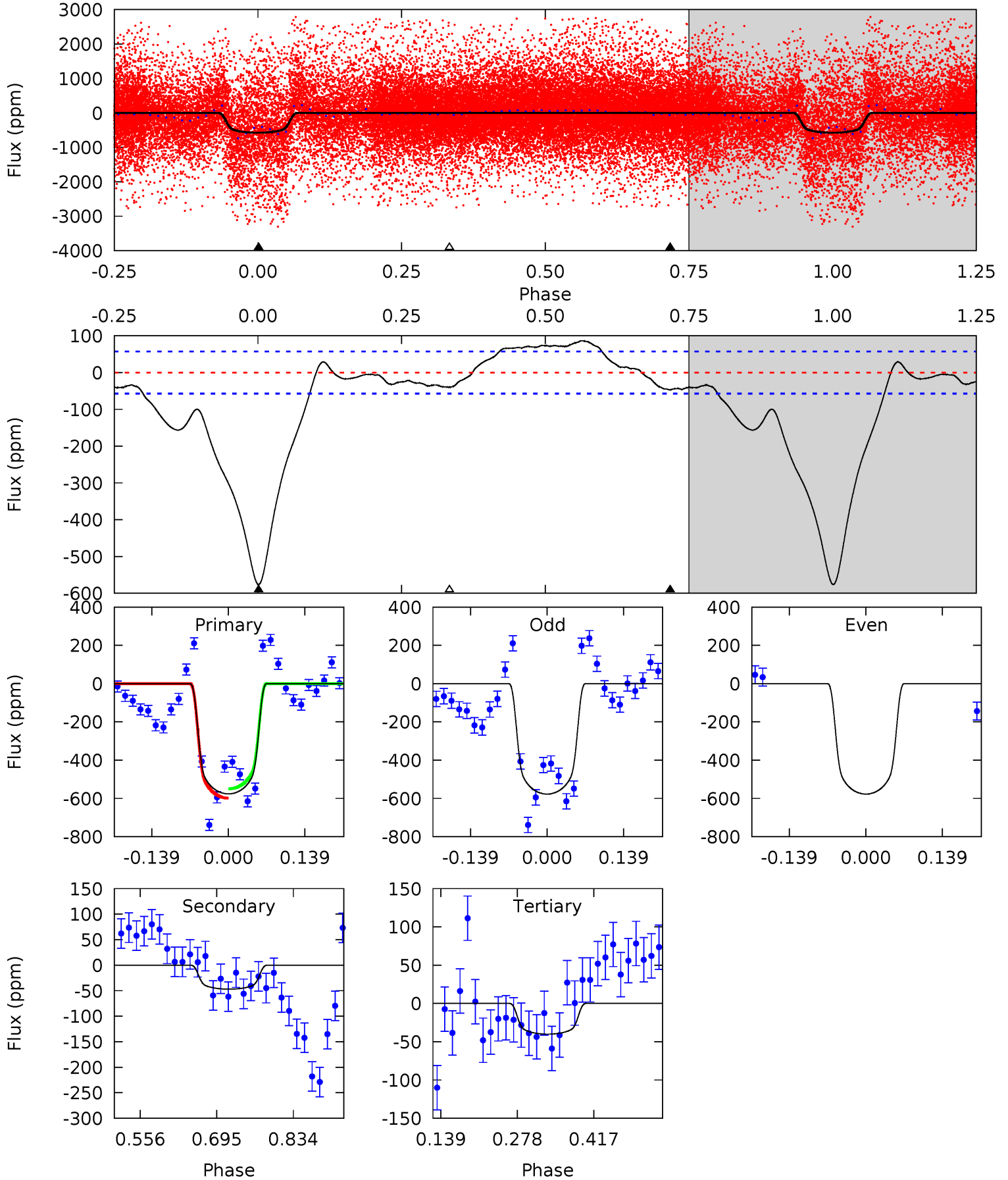




# DV Model-Shift Uniqueness Test

008230809-02, P = 2.039157 Days, E = 130.124193 Days

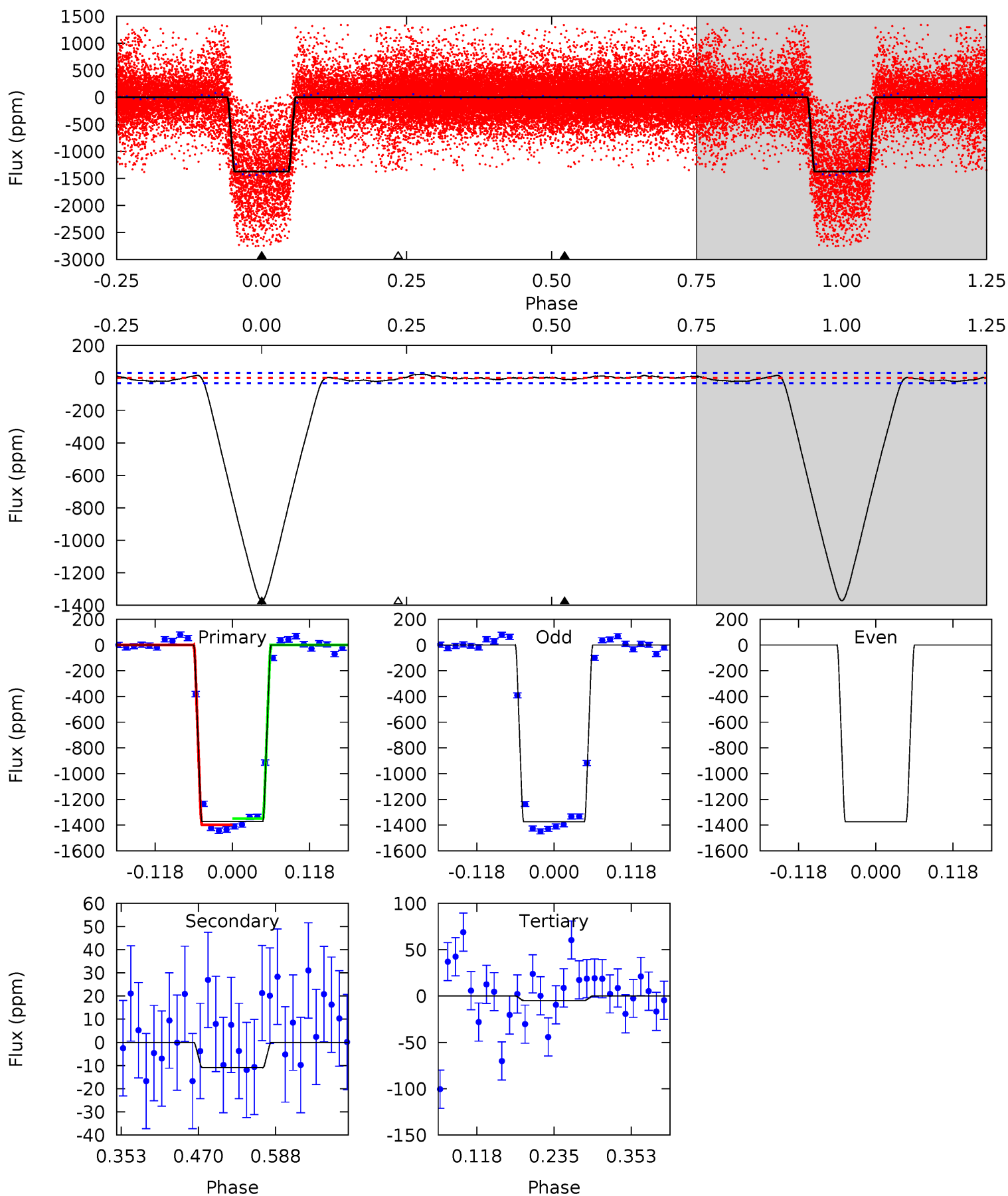
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
45.1	3.68	3.14	0	4.50	1.48	3.80	42.0	45.1	0.54	3.68	0	0.91	0.13	1.88



# Alt Model-Shift Uniqueness Test

008230809-02, P = 2.039175 Days, E = 130.121789 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
197.4	1.57	0.71	0	4.53	1.56	1.60	196.7	197.4	0.85	1.57	0	0.97	0.02	3.61



### Stellar Parameters For KIC 008230809

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$\rho_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5872^{+177}_{-195}$	$4.481^{+0.091}_{-0.169}$	$-0.520^{+0.300}_{-0.300}$	$0.867^{+0.221}_{-0.102}$	$0.830^{+0.105}_{-0.070}$	$1.791^{+0.710}_{-0.823}$
	+3%/-3%	+2%/-4%	+58%/-58%	+25%/-12%	+13%/-8%	+40%/-46%
Source	KIC0	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 008230809-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-47 \pm 13$	$2.64^{+0.37}_{-0.21}$	$1971^{+122}_{-98}$	$3374^{+158}_{-198}$	$3.175^{+1.046}_{-1.047}$
Alt.	$-11 \pm 7$	$3.53^{+0.46}_{-0.28}$	$1971^{+119}_{-98}$	$2219^{+343}_{-4534}$	$0.413^{+0.289}_{-0.271}$

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

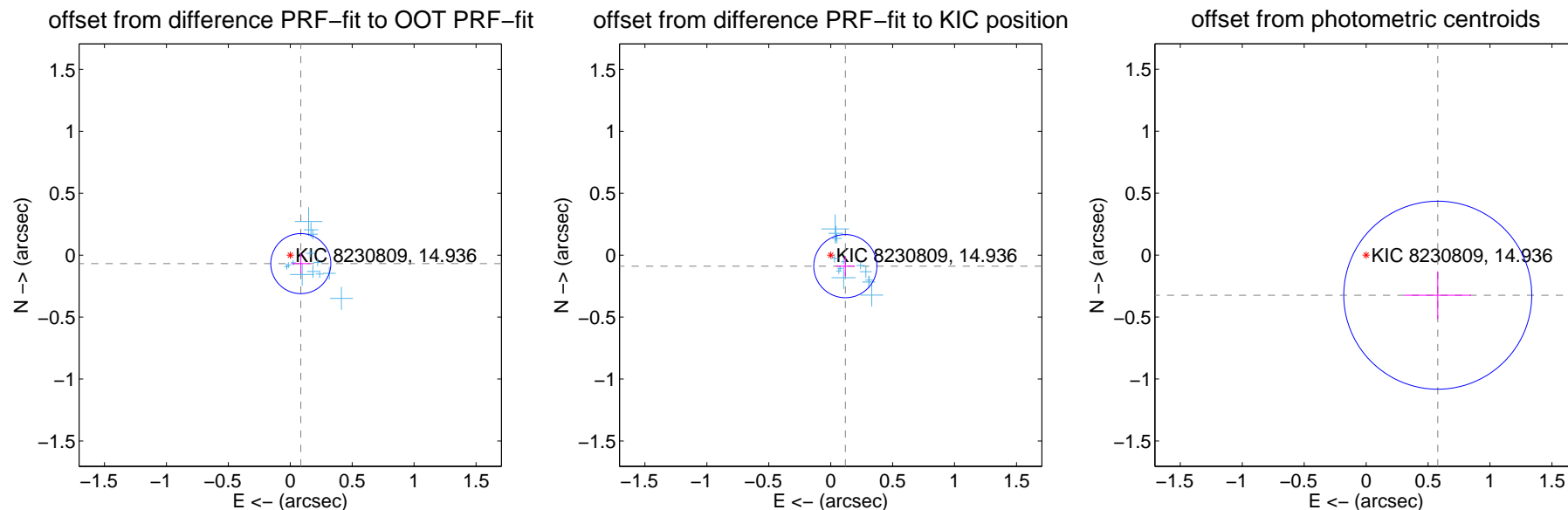
## DV Centroid Data

Supplemental centroid analysis for 008230809-02. Kepler magnitude: 14.94. Transit SNR 27.09

There are 13 quarters with good PRF difference image offsets

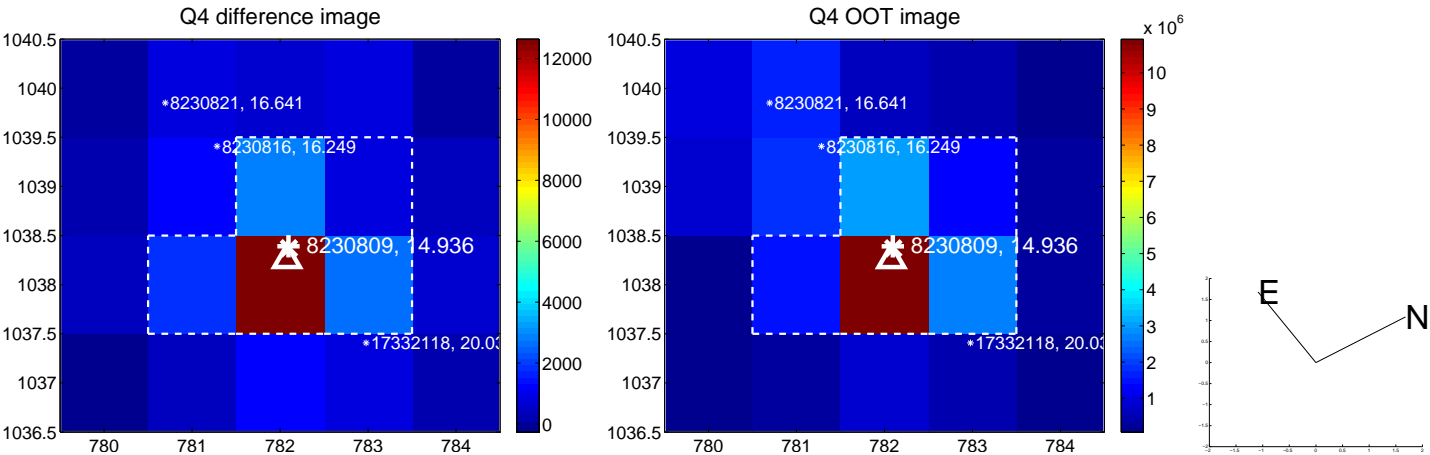
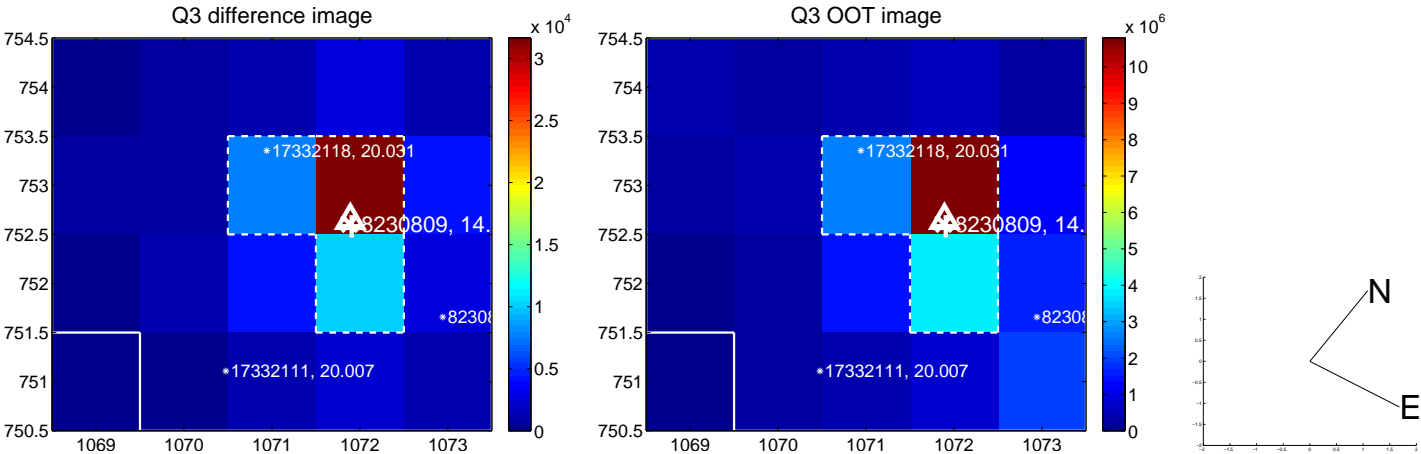
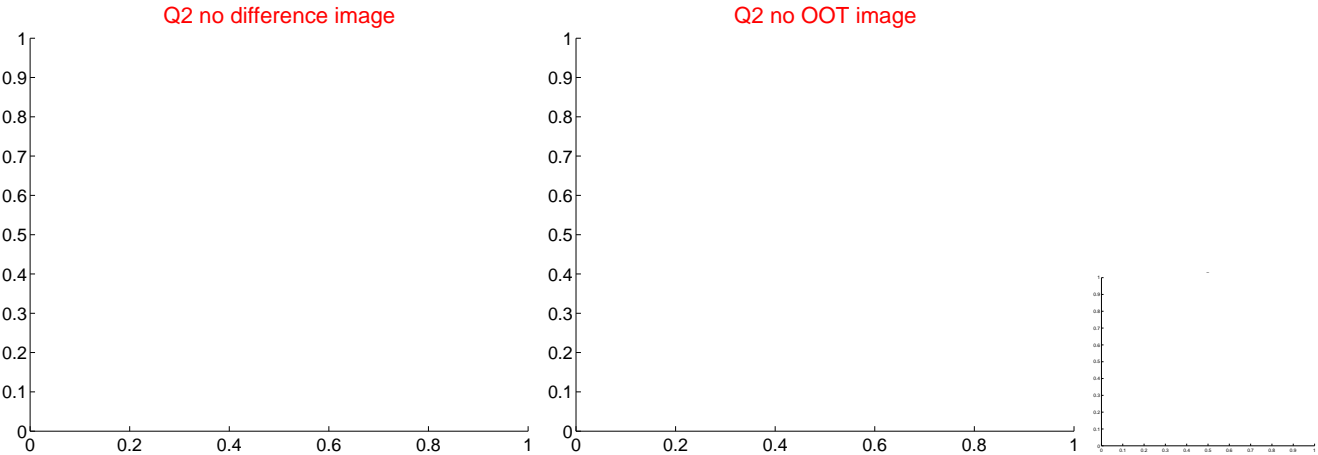
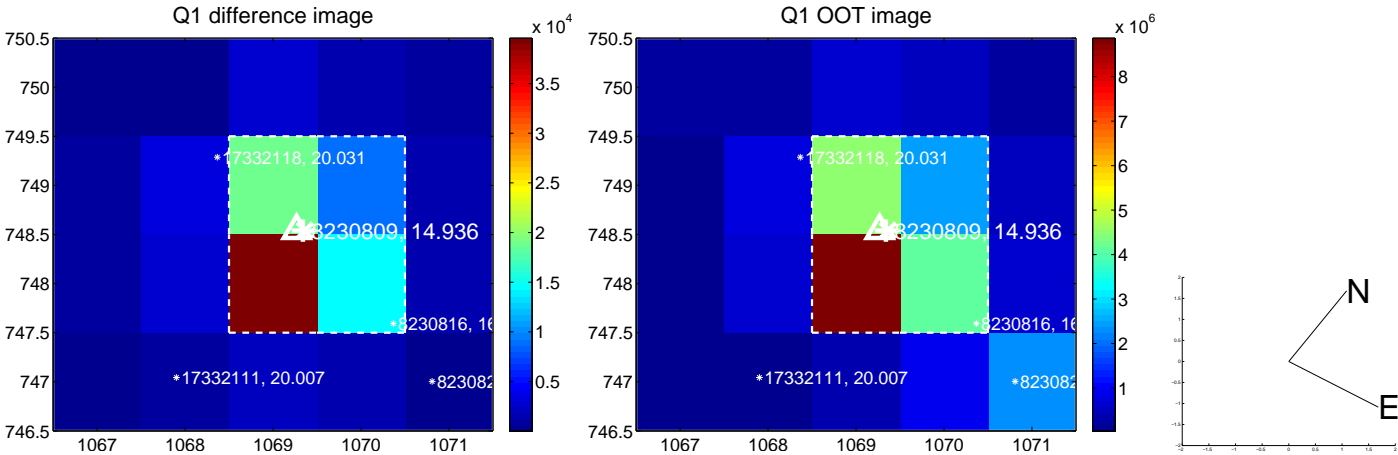
The direct PRF centroid is offset from the target star catalog position by about 0.10 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.109 \pm 0.081$	1.35	$-0.085 \pm 0.076$	$-0.068 \pm 0.080$
PRF-fit source offset from KIC position	$0.148 \pm 0.085$	1.74	$-0.118 \pm 0.076$	$-0.089 \pm 0.080$
photometric centroid source offset	$0.66 \pm 0.25$	2.62	$-0.58 \pm 0.27$	$-0.32 \pm 0.19$



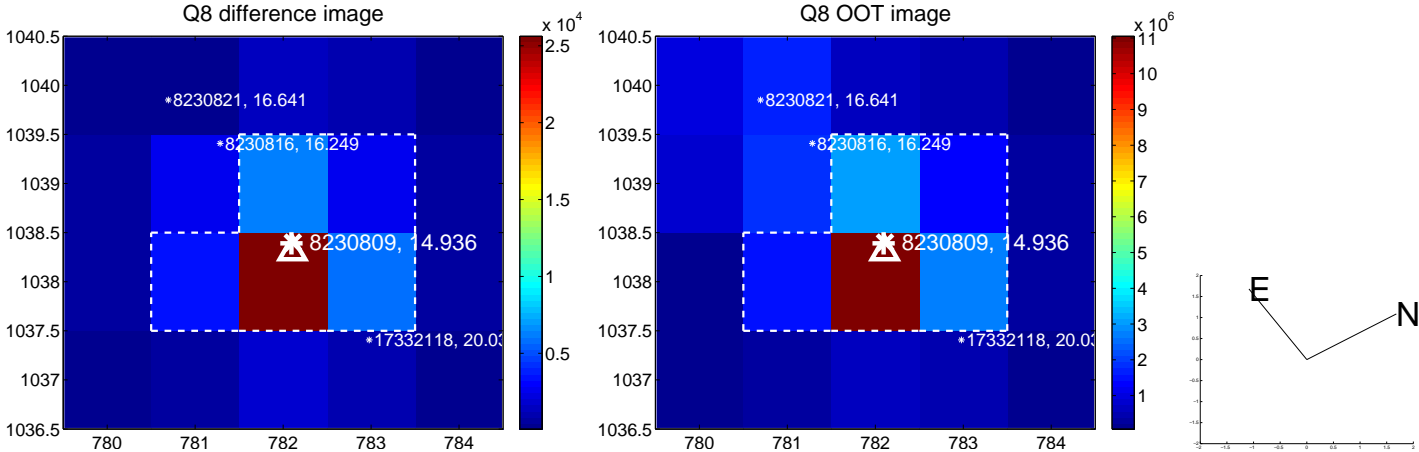
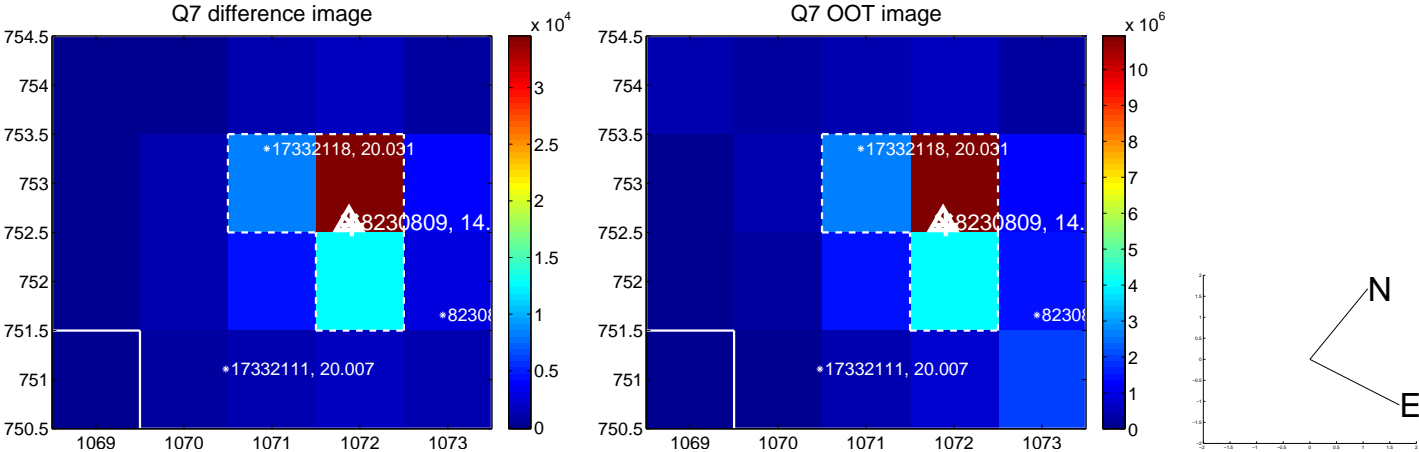
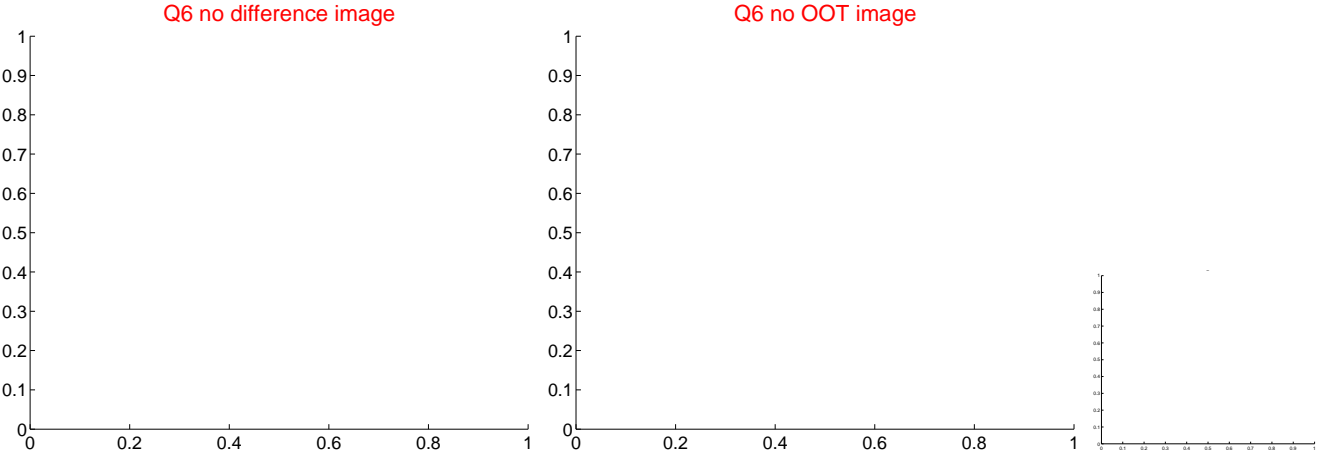
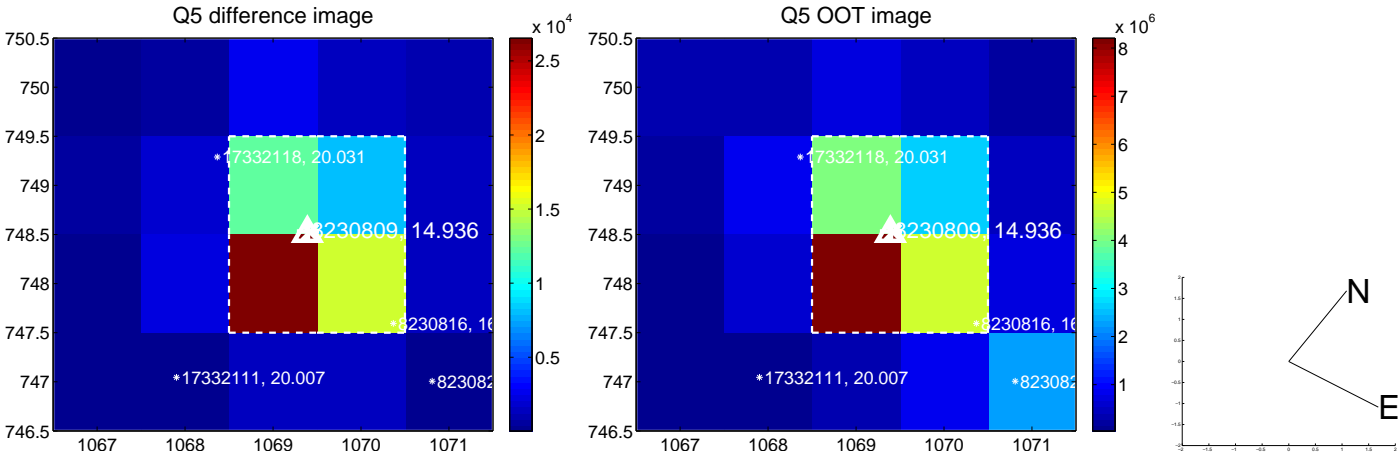
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



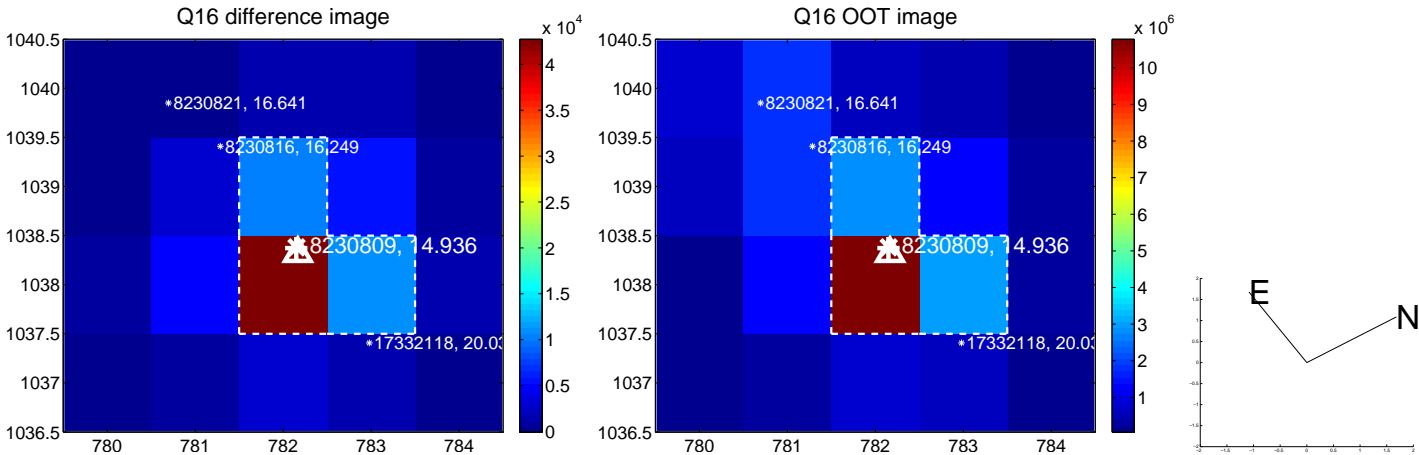
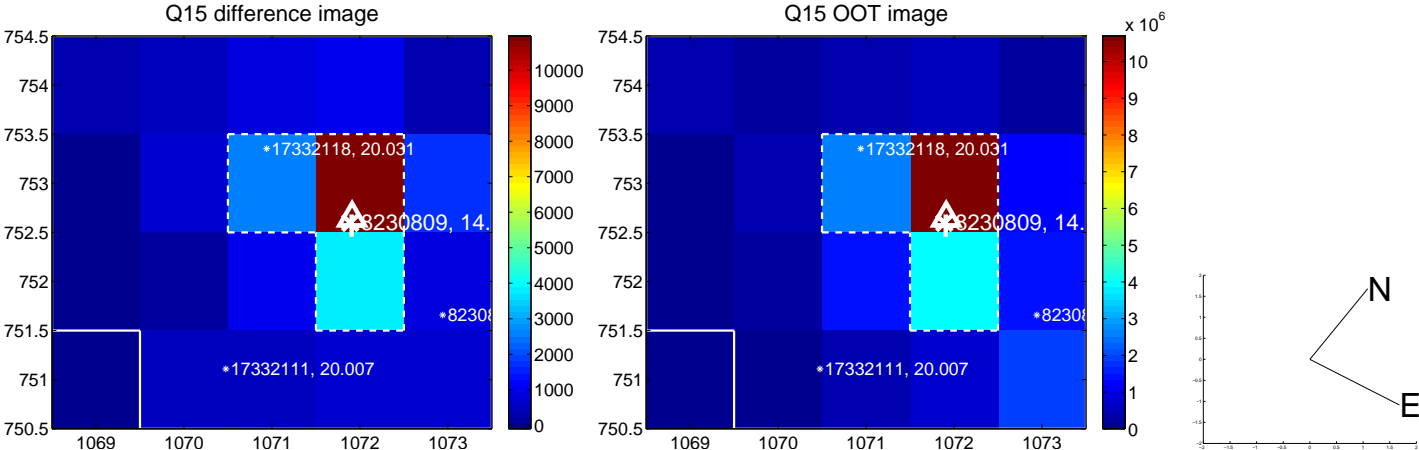
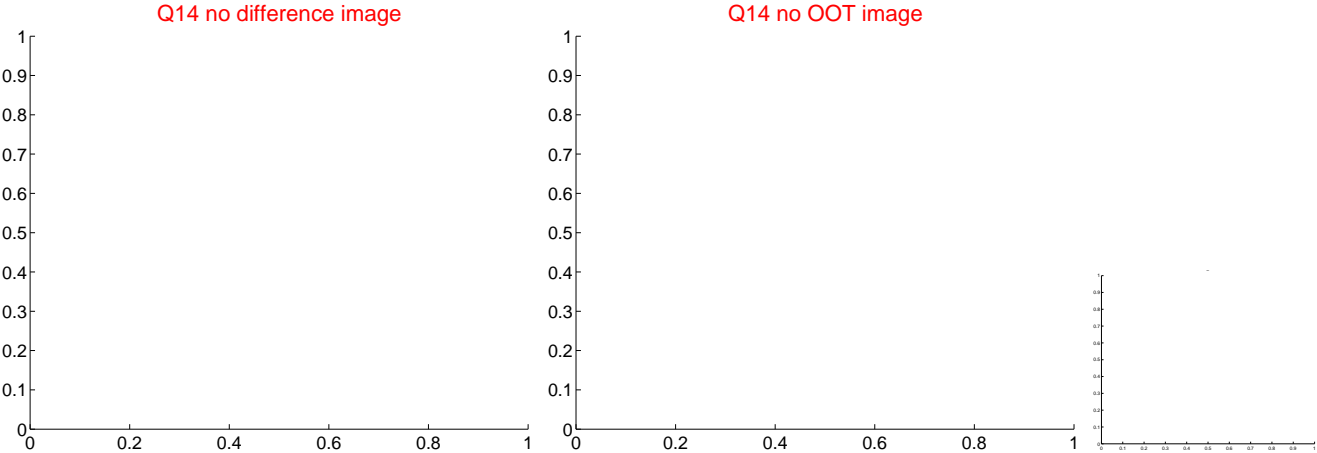
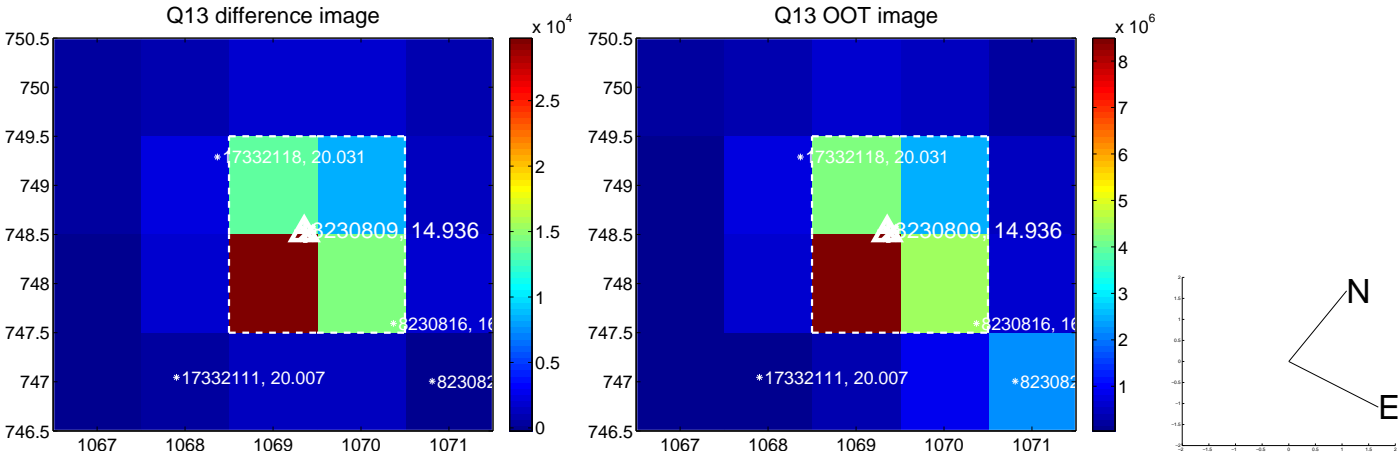


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

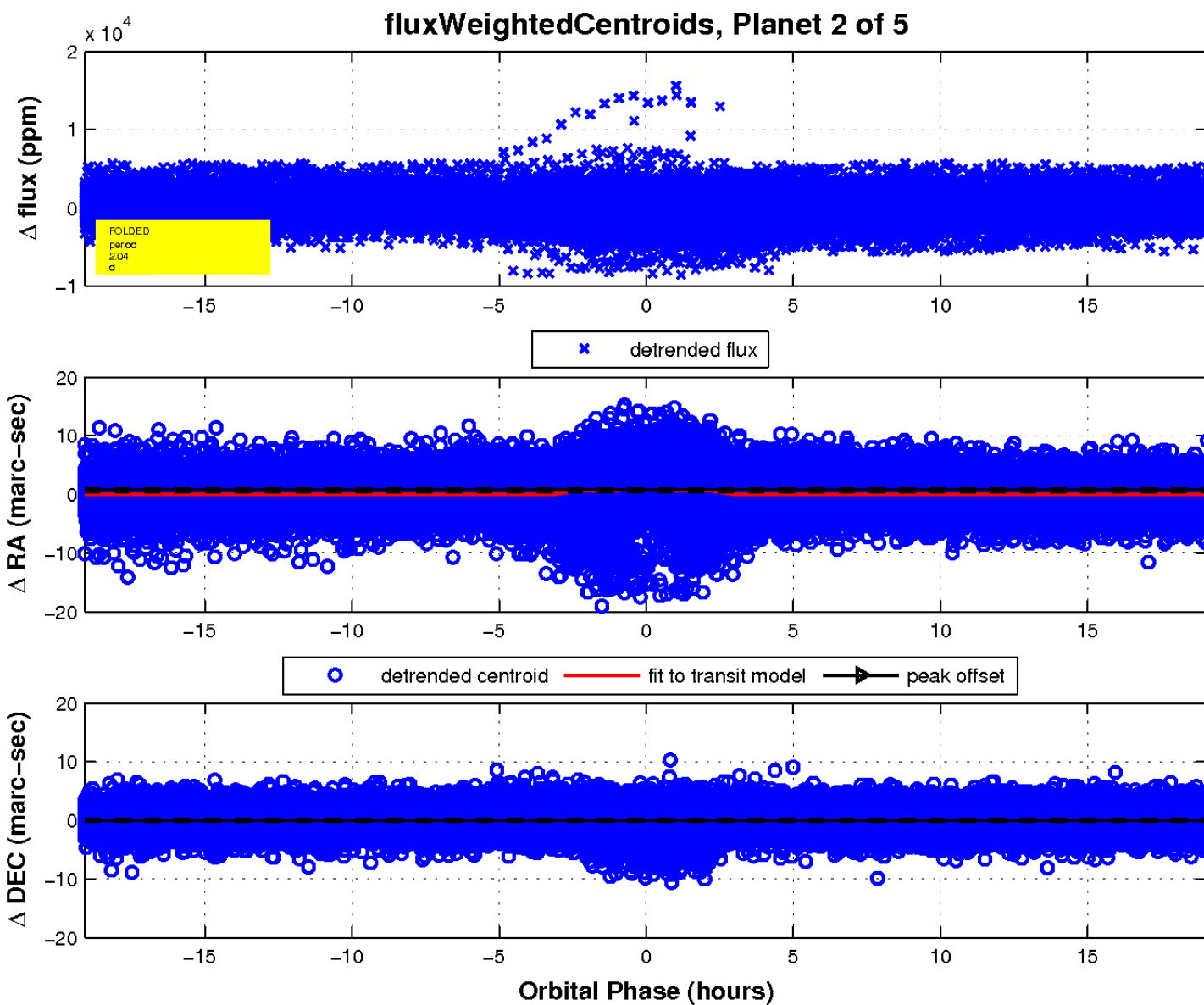
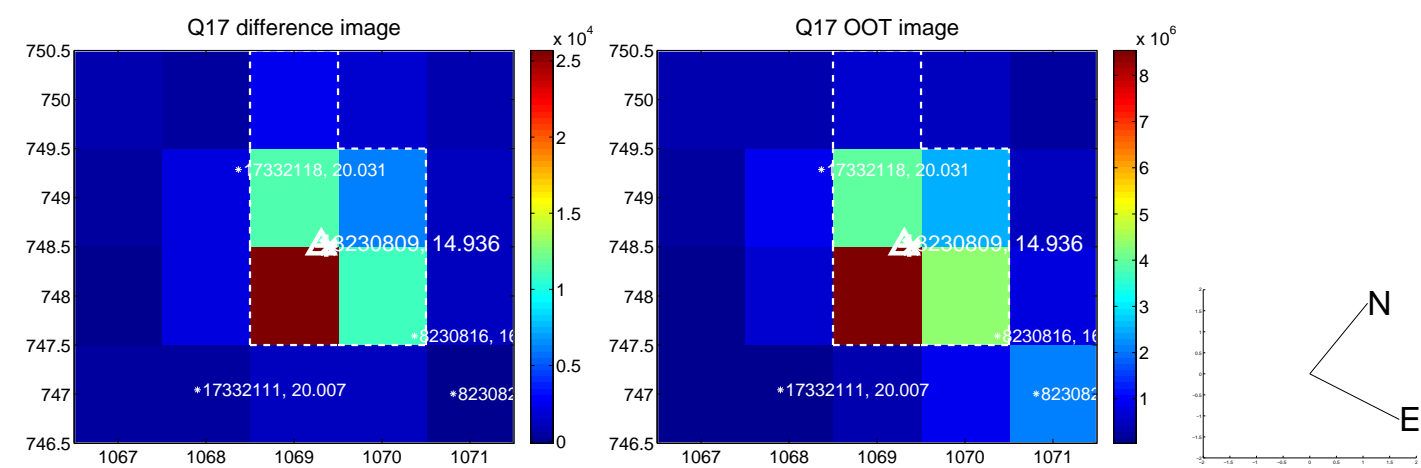




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

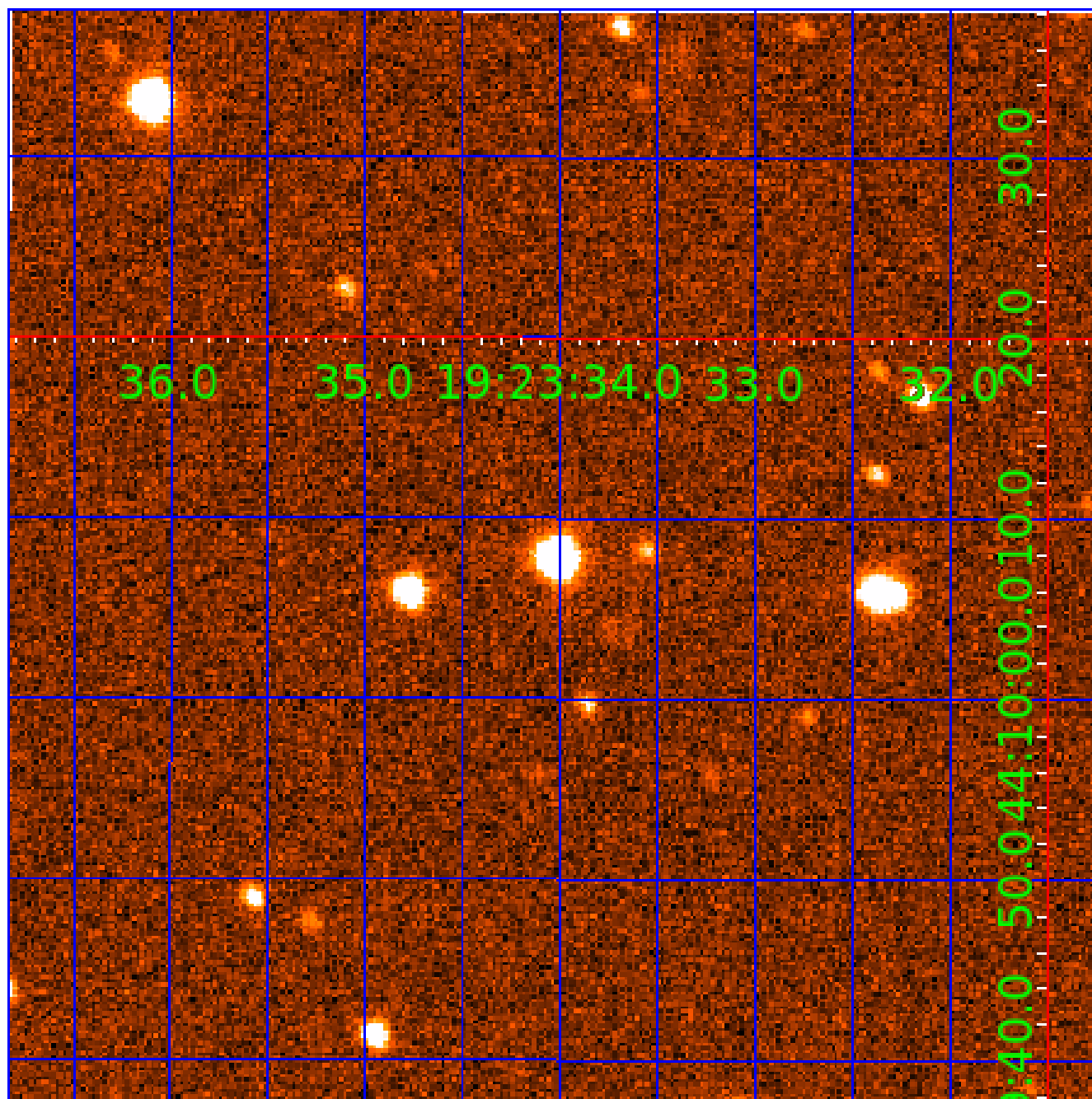


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 008230809

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008230809-01	OBS	6055.01	4.078353	132.160296	35085.0	6.271	1248.4	1285.2	0.87	5872	16.37	363.14
008230809-02	OBS	No	2.039157	132.163350	657.2	6.362	28.9	27.1	0.87	5872	2.62	915.06
008230809-03	OBS	No	459.775191	133.805203	2651.9	9.930	11.4	8.6	0.87	5872	8.30	0.67
008230809-04	OBS	No	173.937364	263.354229	1377.2	2.938	9.0	5.6	0.87	5872	3.28	2.44
008230809-05	OBS	No	580.104195	301.984575	1357.8	10.284	8.2	5.7	0.87	5872	3.71	0.49

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008230809-01	OBS	FP	0.43	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE
008230809-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE
008230809-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
008230809-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
008230809-05	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS—HALO_GHOST

**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 008230809-03

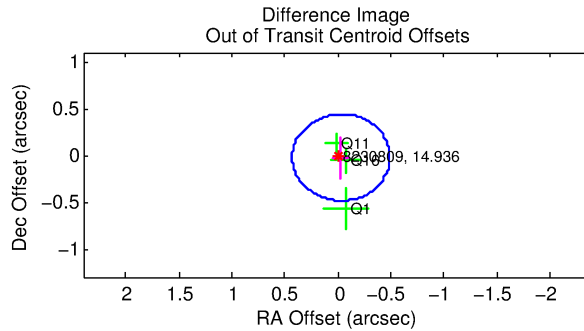
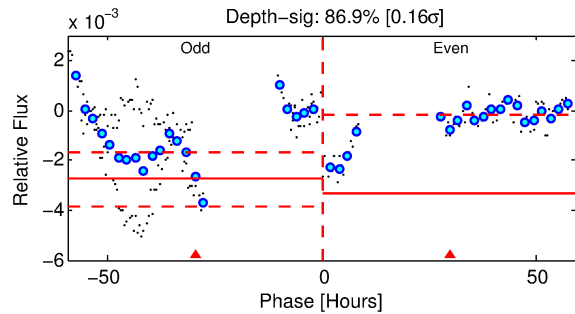
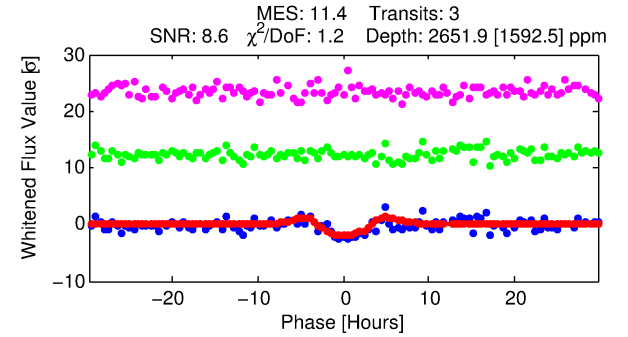
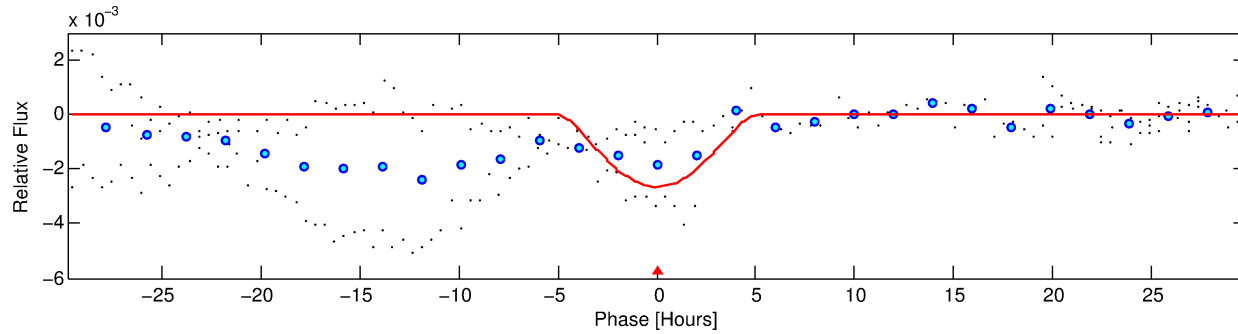
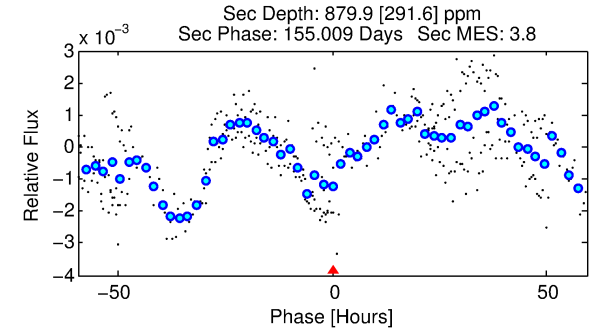
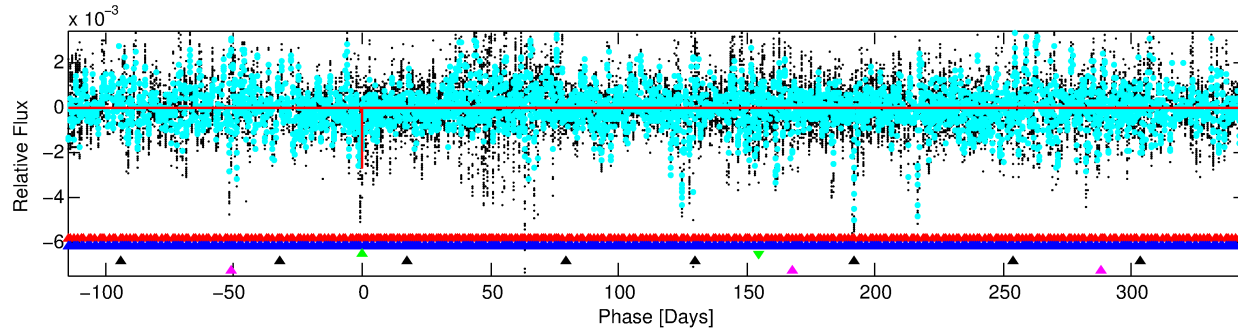
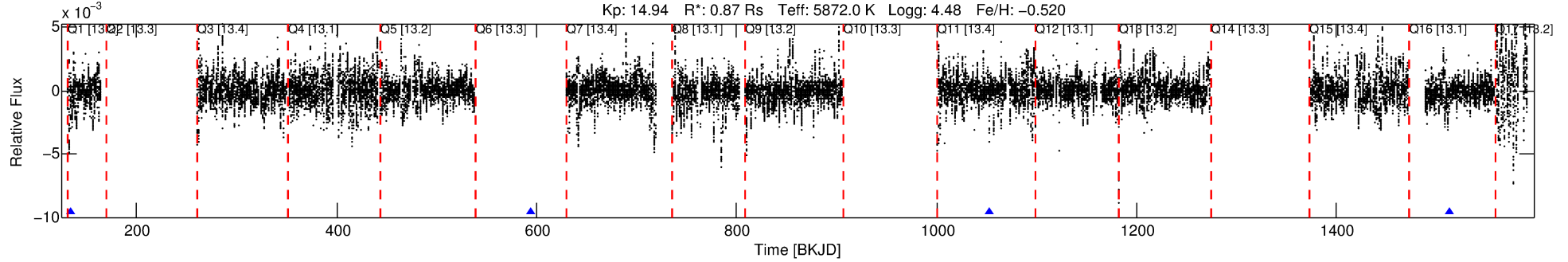
No Significant Match Found

# DV One-Page Summary

KIC: 8230809 Candidate: 3 of 5 Period: 459.775 d

KOI: K06055 Corr: No Ephemeris Match

Kp: 14.94 R\*: 0.87 Rs Teff: 5872.0 K Logg: 4.48 Fe/H: -0.520



## DV Fit Results:

Period = 459.77519 [0.01351] d  
Epoch = 133.8052 [0.0274] BKJD  
Rp/R\* = 0.0878 [0.2092]  
a/R\* = 151.43 [76.03]  
b = 1.00 [0.26]  
Seff = 0.67 [0.22]  
Teq = 230 [19] K  
Rp = 8.30 [19.90] Re  
a = 1.0958 [0.2343] AU  
Ag = 8430.74 [40372.01] [0.21] $\sigma$   
Teffp = 3414 [4080] K [0.78] $\sigma$

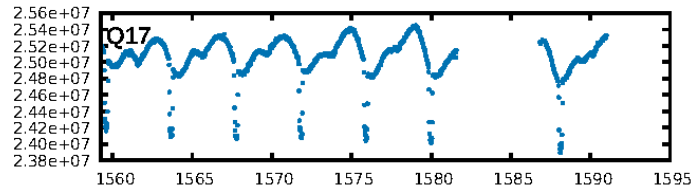
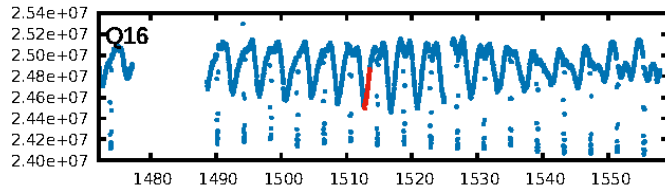
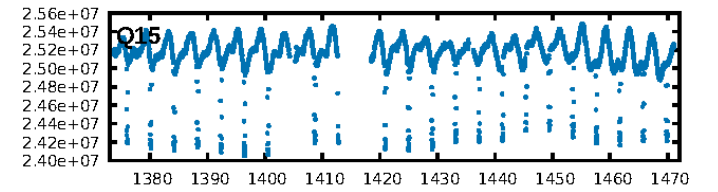
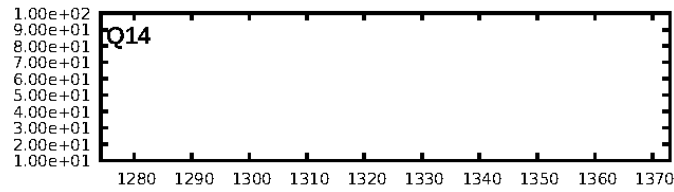
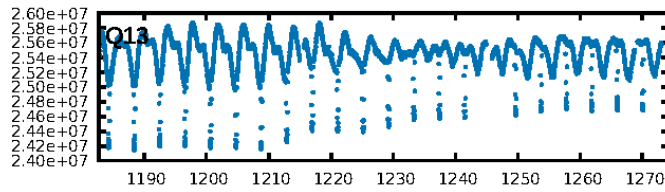
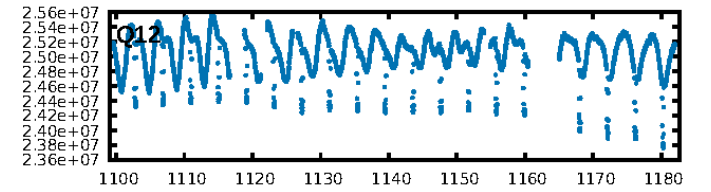
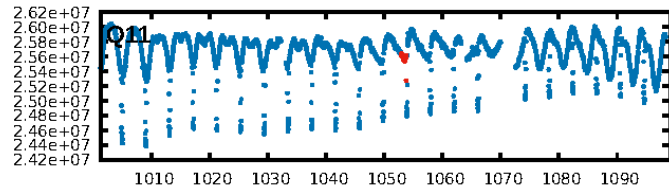
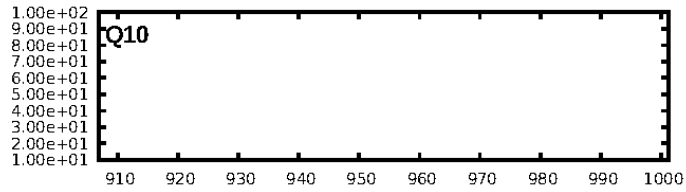
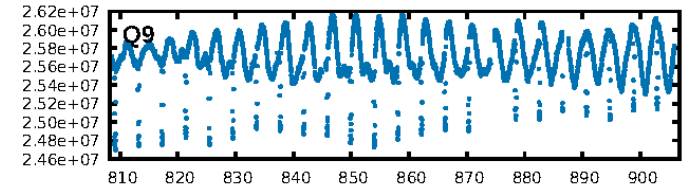
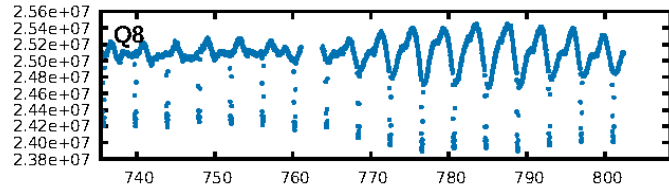
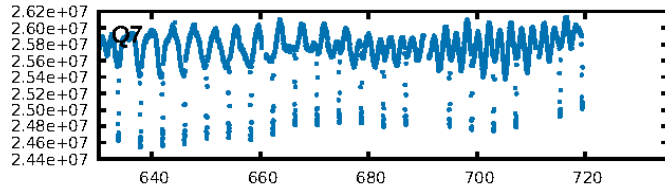
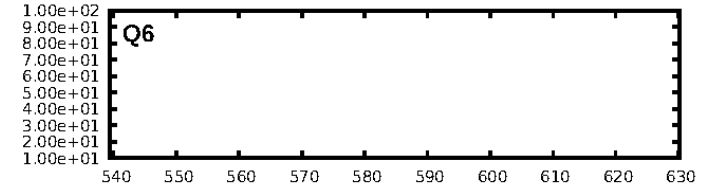
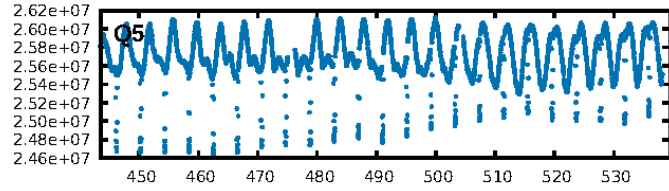
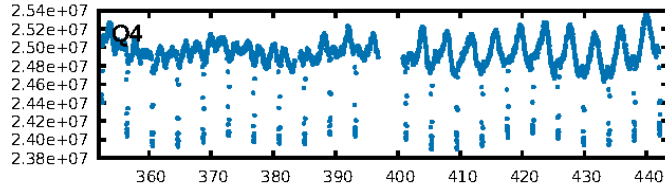
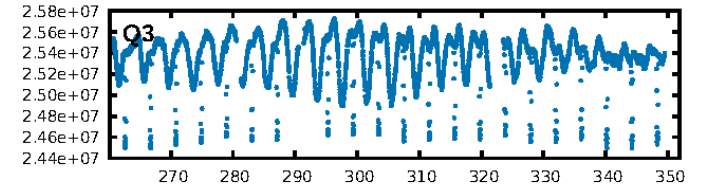
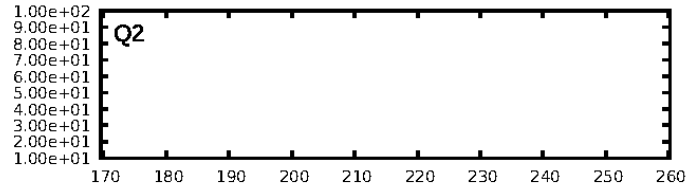
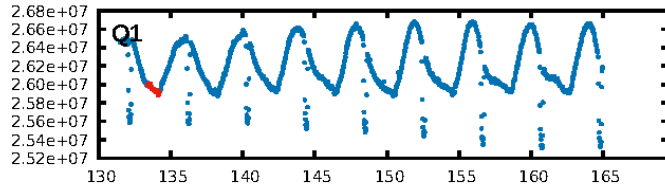
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [662.45] $\sigma$   
LongPeriod-sig: 100.0% [202.01] $\sigma$   
ModelChiSquare2-sig: 15.8%  
ModelChiSquareGof-sig: 99.9%  
Bootstrap-pfa: 5.38e-13  
RollingBand-fgt: 1.00 [2/2]  
**GhostDiagnostic-chr: 0.5257**  
Centroid-sig: 67.7%  
Centroid-so: 1.006 arcsec [1.36] $\sigma$   
OotOffset-rm: 0.040 arcsec [0.26] $\sigma$   
KicOffset-rm: 0.054 arcsec [0.26] $\sigma$   
OotOffset-st: 0/1/1/1 [3]  
KicOffset-st: 0/1/1/1 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 0.00 [0/3]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 19:08:12 Z

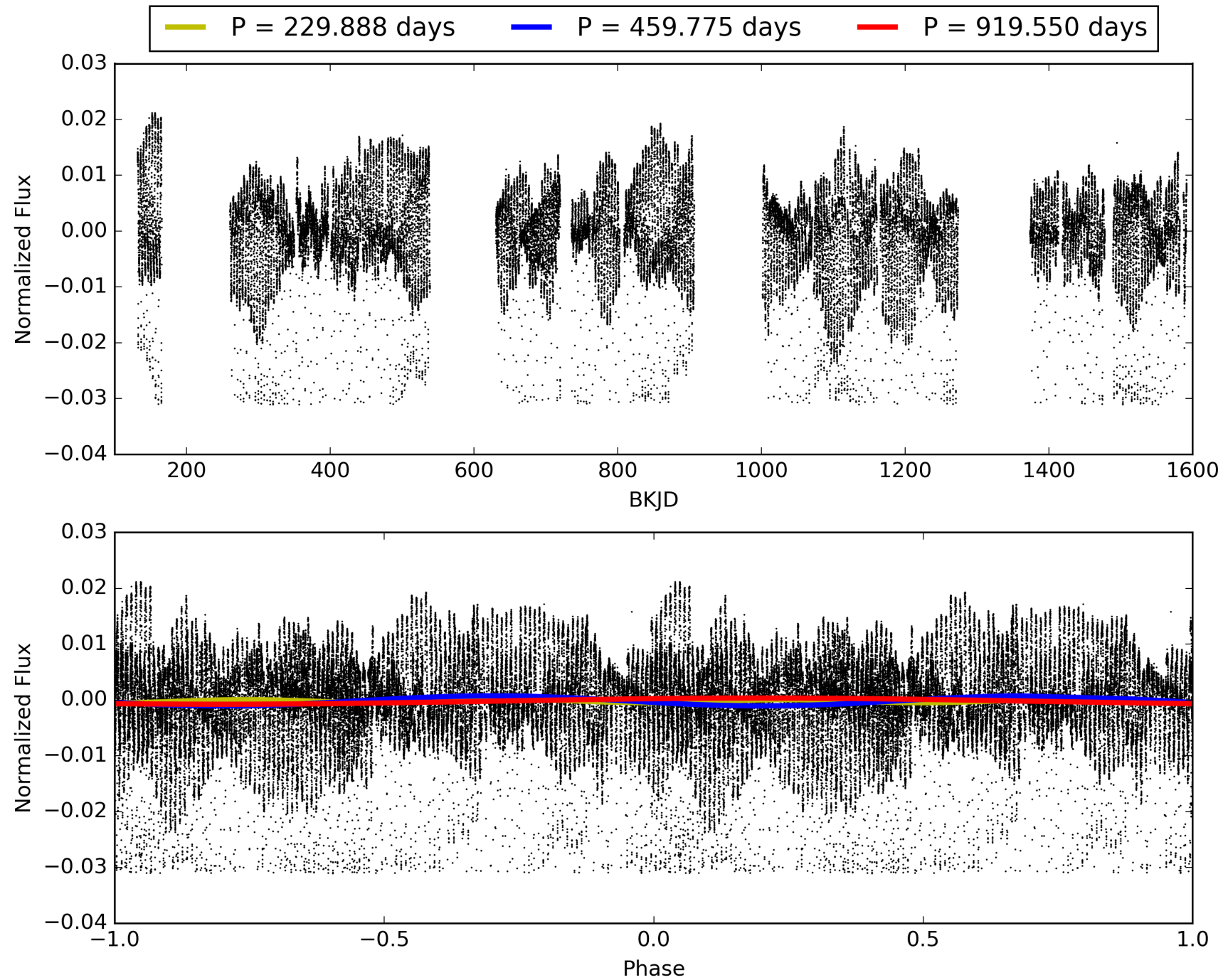
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 008230809-03, PDC Light Curves



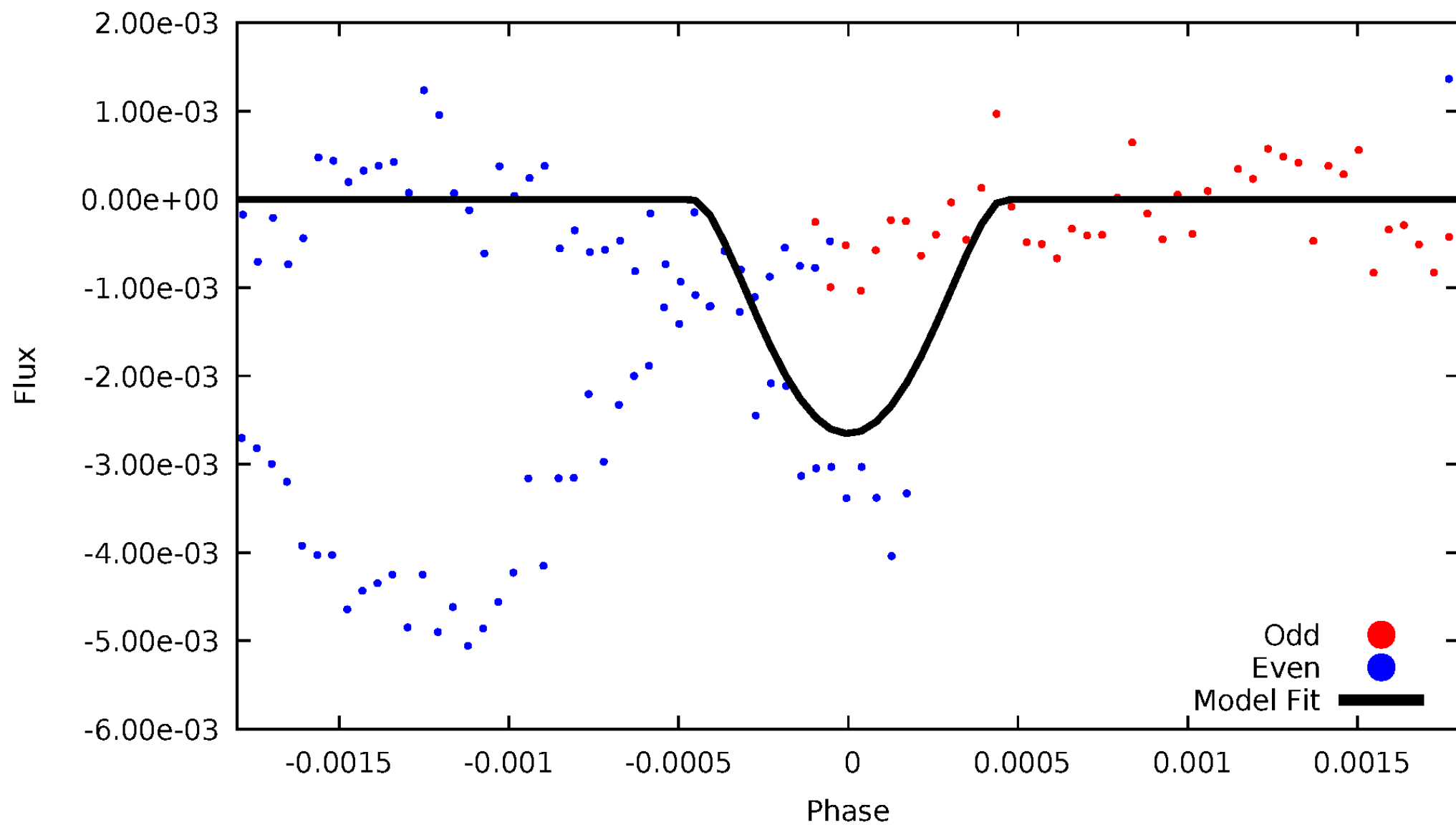


TCE 008230809-03



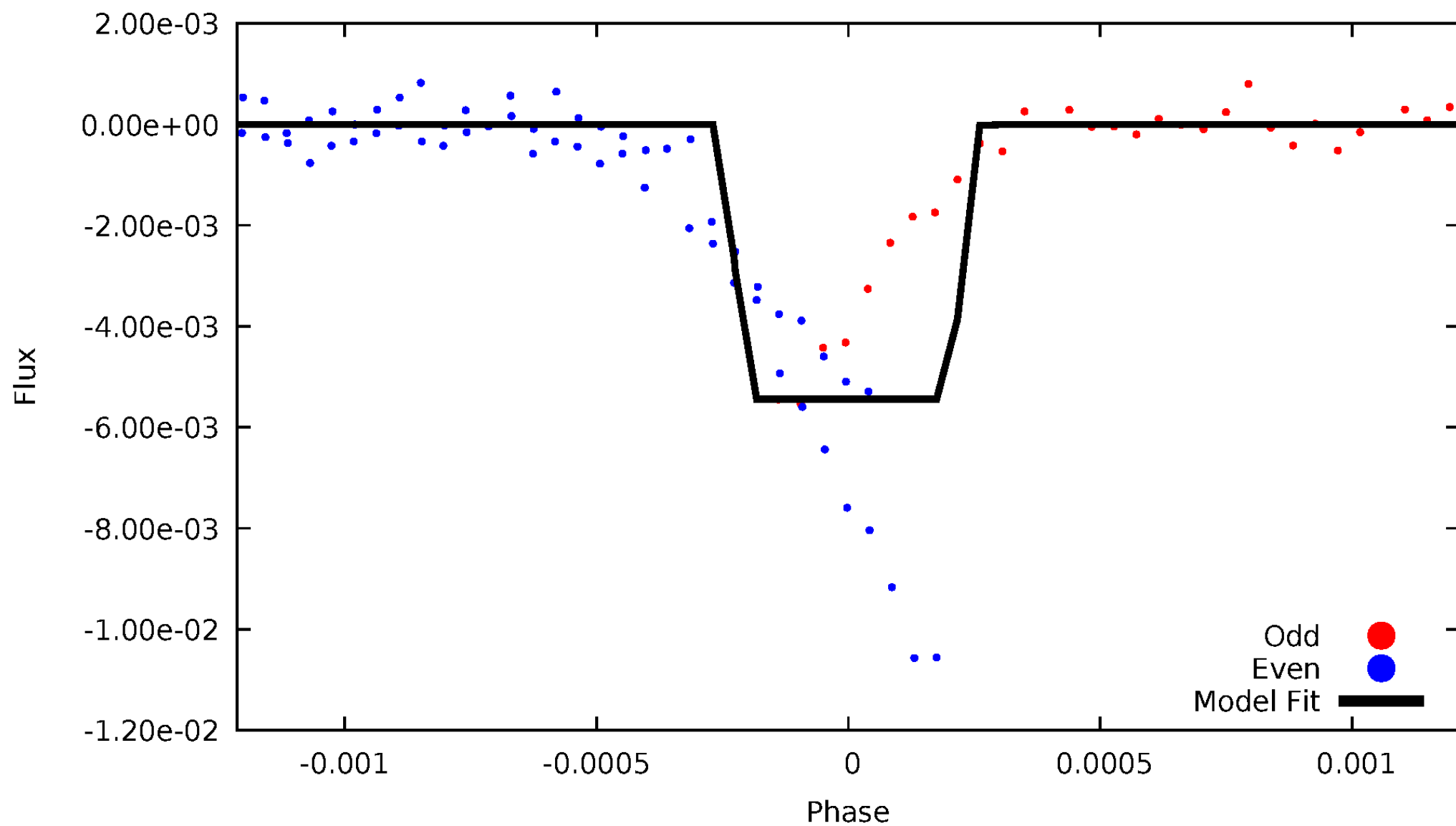
# DV Odd/Even

TCE 008230809-03



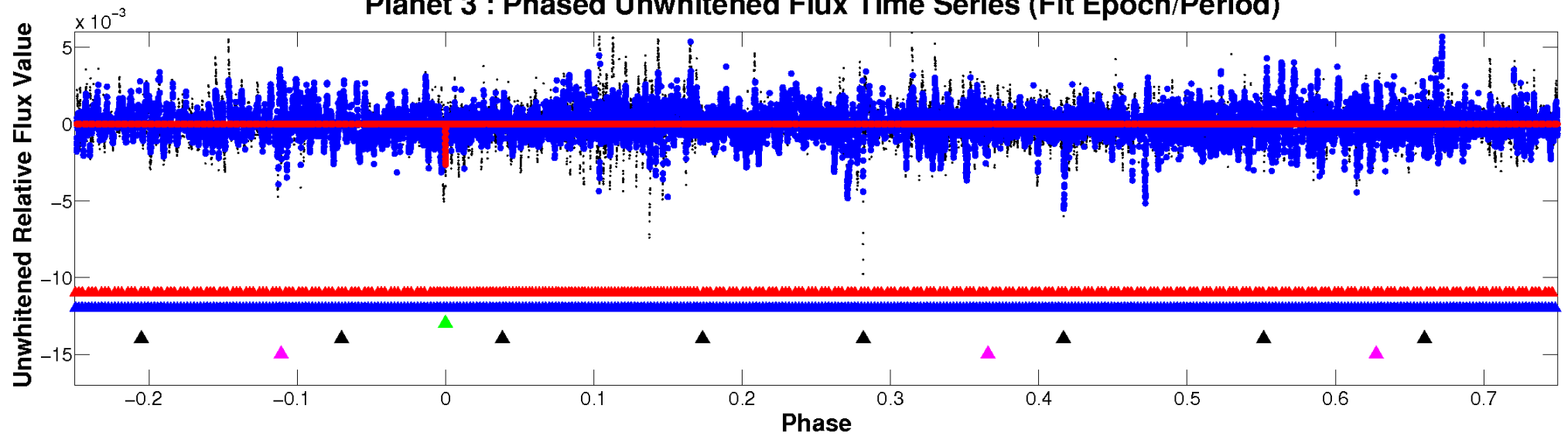
# ALT Odd/Even

TCE 008230809-03

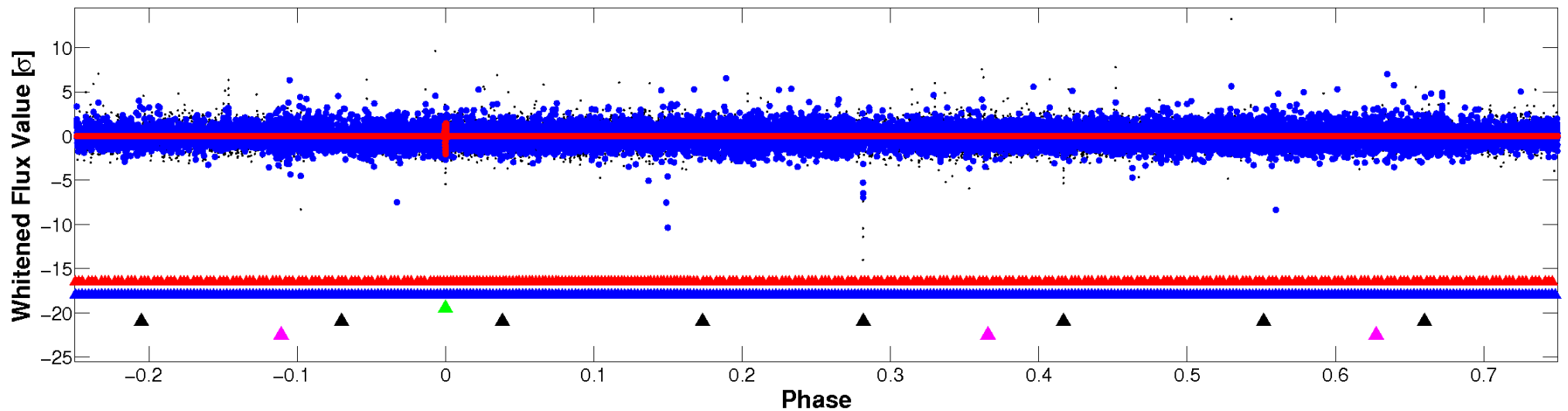


# Non-Whitened Vs. Whitened Light Curve

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

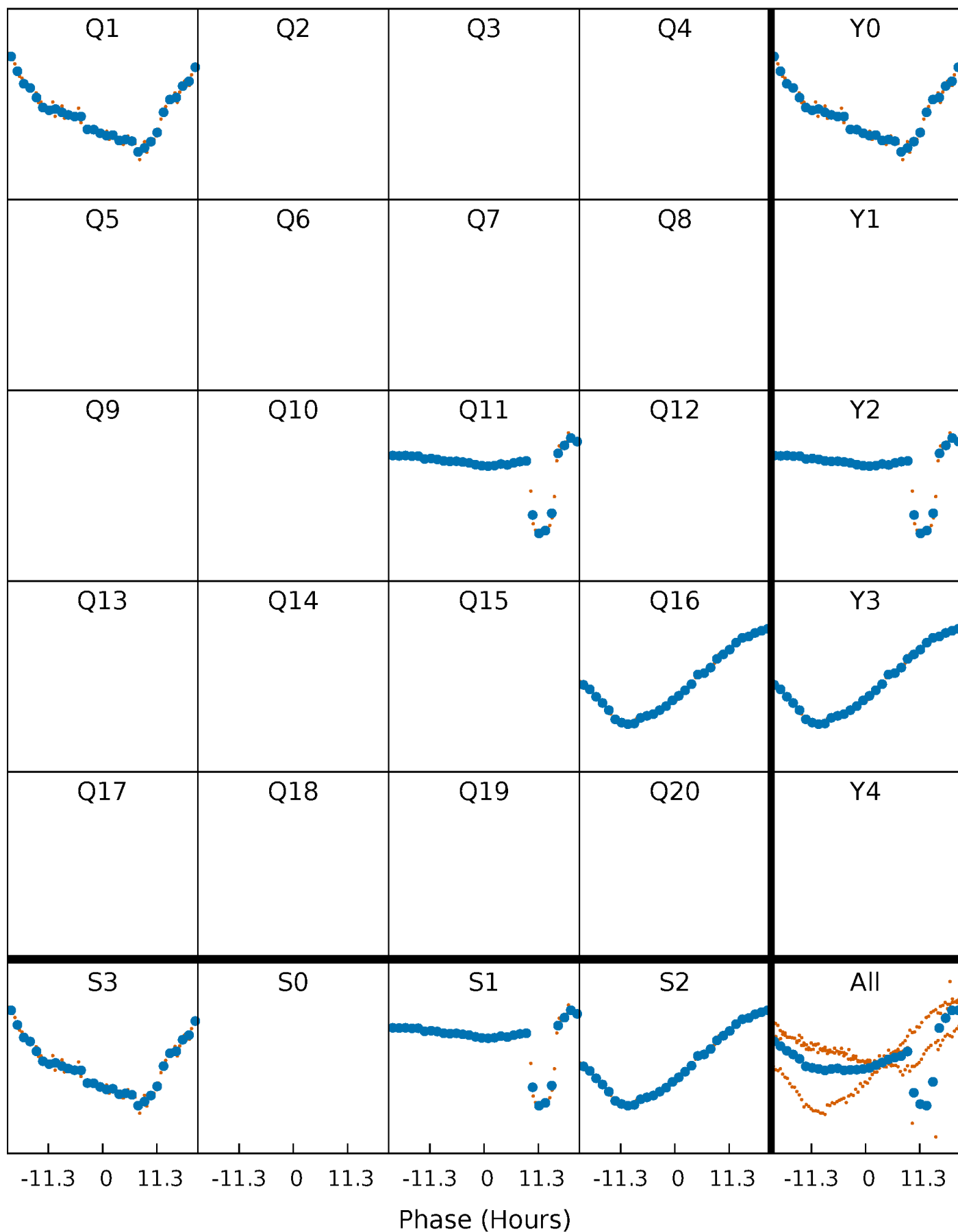


Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



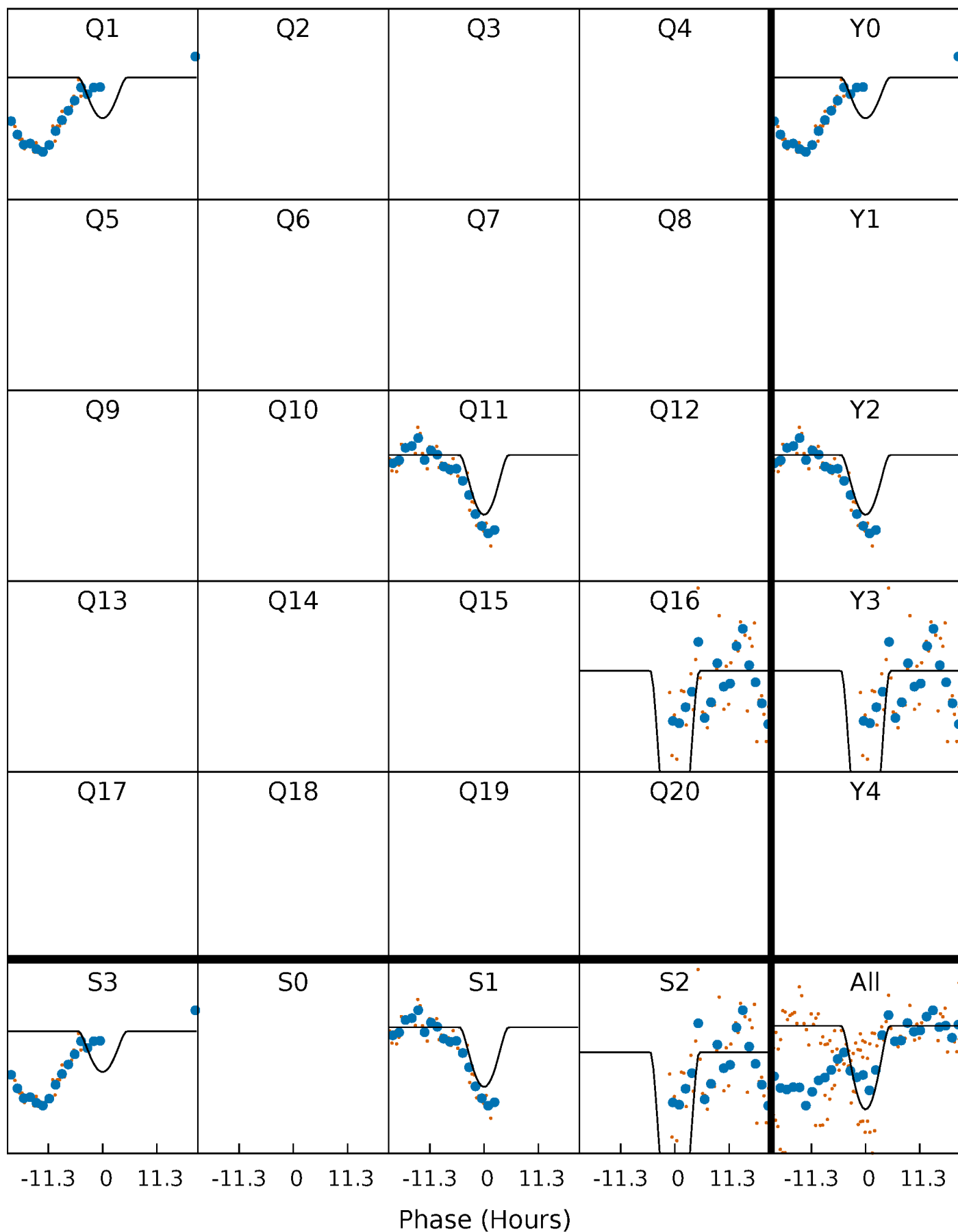
# PDC Quarter-Phased Transit Curves

TCE 008230809-03 P=459.775191 Days  $T_0=133.805203$  (BKJD)



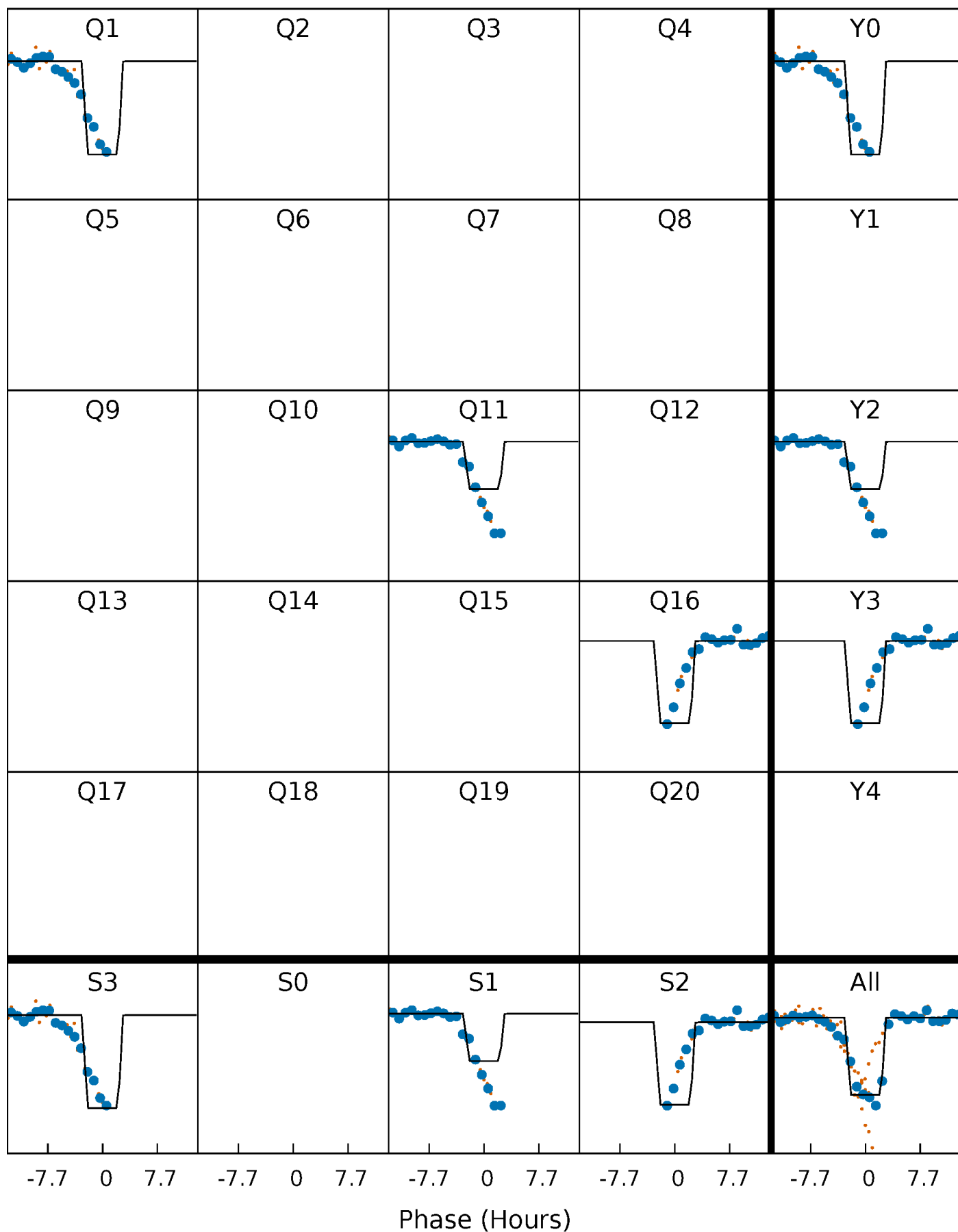
# DV Quarter-Phased Transit Curves

TCE 008230809-03 P=459.775191 Days  $T_0=133.805203$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

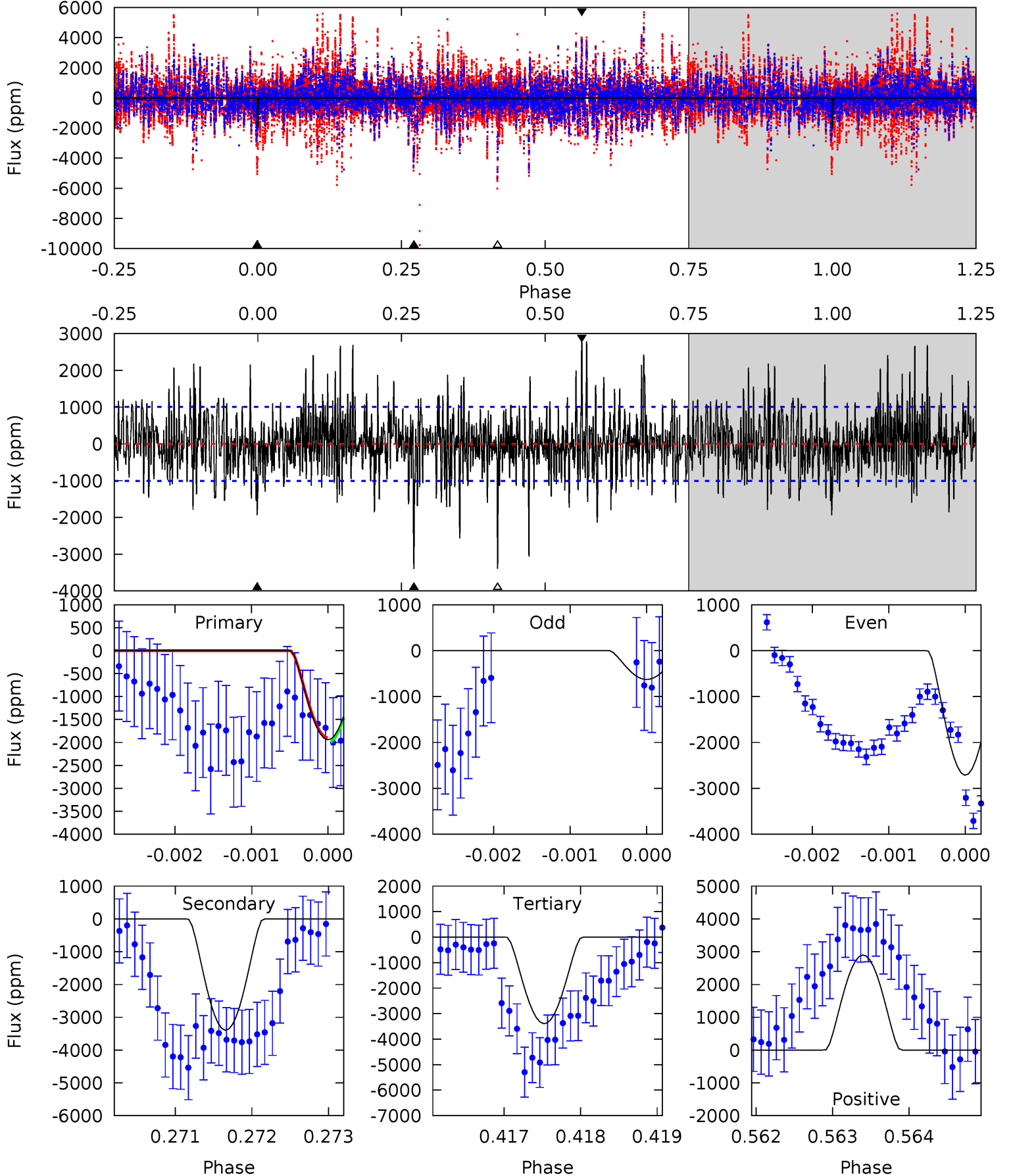
TCE 008230809-03 P=459.795967 Days  $T_0=133.762164$  (BKJD)



# DV Model-Shift Uniqueness Test

008230809-03, P = 459.775191 Days, E = 133.805203 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
10.6	18.4	18.4	15.8	5.46	3.31	3.54	-7.89	-5.20	0.00	2.70	5.35	1.70	0.46	0.23

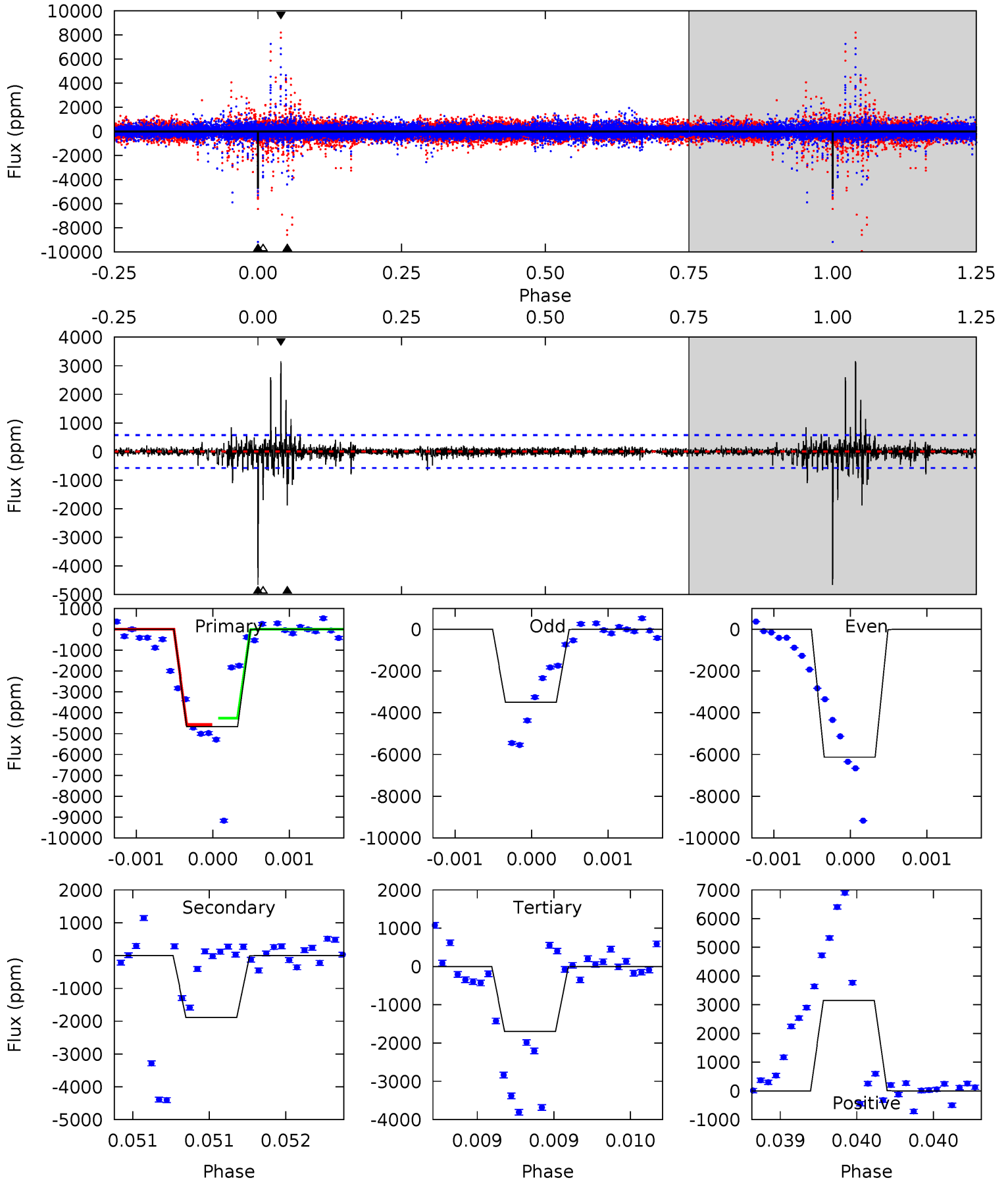




# Alt Model-Shift Uniqueness Test

008230809-03, P = 459.795967 Days, E = 133.762164 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
45.0	18.2	16.4	30.4	5.56	3.46	1.53	28.6	14.6	1.81	-12.2	12.8	1.14	0.40	0



### Stellar Parameters For KIC 008230809

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5872^{+177}_{-195}$	$4.481^{+0.091}_{-0.169}$	$-0.520^{+0.300}_{-0.300}$	$0.867^{+0.221}_{-0.102}$	$0.830^{+0.105}_{-0.070}$	$1.791^{+0.710}_{-0.823}$
	+3%/-3%	+2%/-4%	+58%/-58%	+25%/-12%	+13%/-8%	+40%/-46%
Source	KIC0	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 008230809-03 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-3394 \pm 184$	$17.27^{+15.79}_{-11.53}$	$325^{+20}_{-17}$	$3754^{+2111}_{-671}$	$7755^{+58338}_{-5701}$
Alt.	$-1882 \pm 103$	$17.45^{+16.70}_{-11.31}$	$326^{+20}_{-19}$	$3395^{+1638}_{-597}$	$4078^{+30233}_{-2997}$

$T_{max}$  = 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

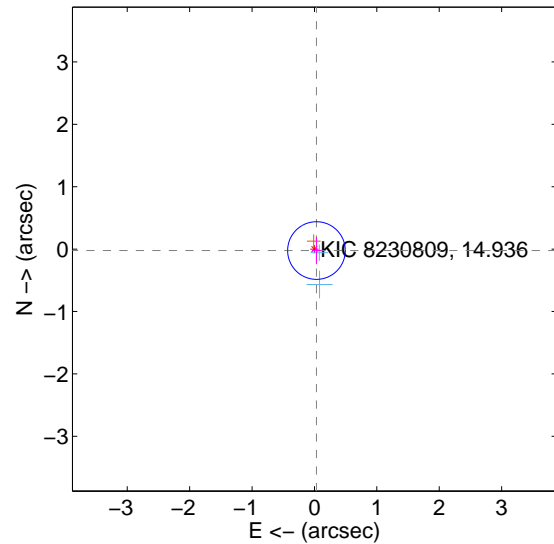
Supplemental centroid analysis for 008230809-03. Kepler magnitude: 14.94. Transit SNR 8.65

There are 2 quarters with good PRF difference image offsets

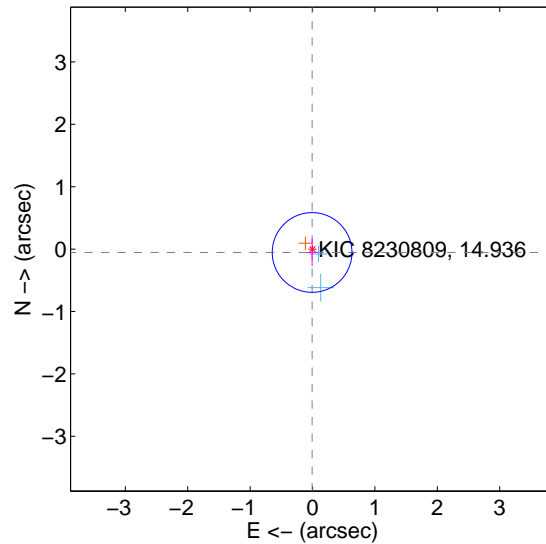
The direct PRF centroid is offset from the target star catalog position by about 0.03 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.040 \pm 0.154$	0.26	$-0.032 \pm 0.071$	$-0.023 \pm 0.219$
PRF-fit source offset from KIC position	$0.054 \pm 0.213$	0.26	$0.007 \pm 0.095$	$-0.054 \pm 0.221$
photometric centroid source offset	$1.01 \pm 0.74$	1.36	$0.95 \pm 0.77$	$-0.32 \pm 0.47$

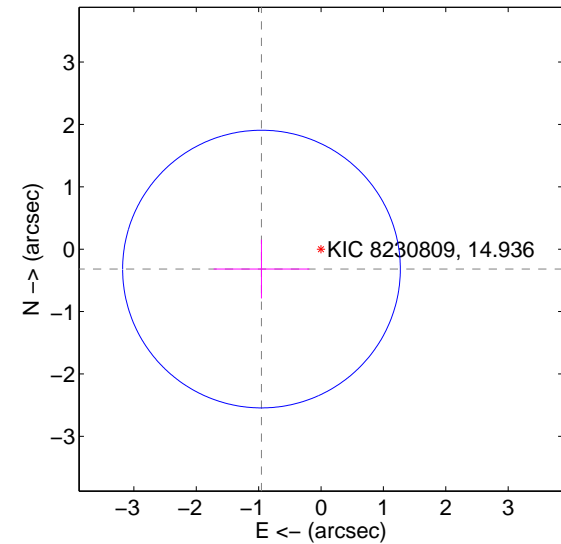
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

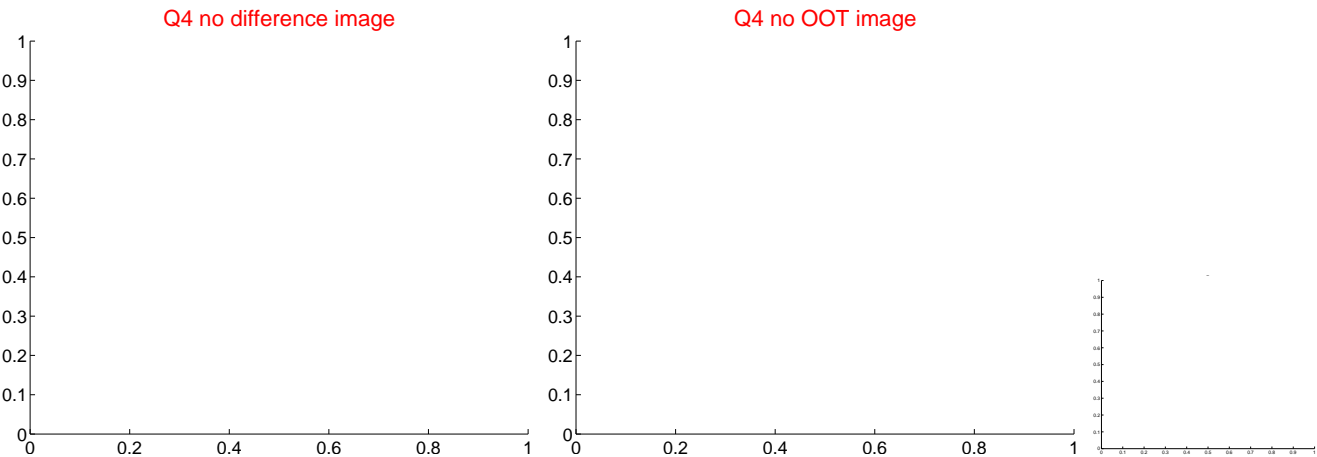
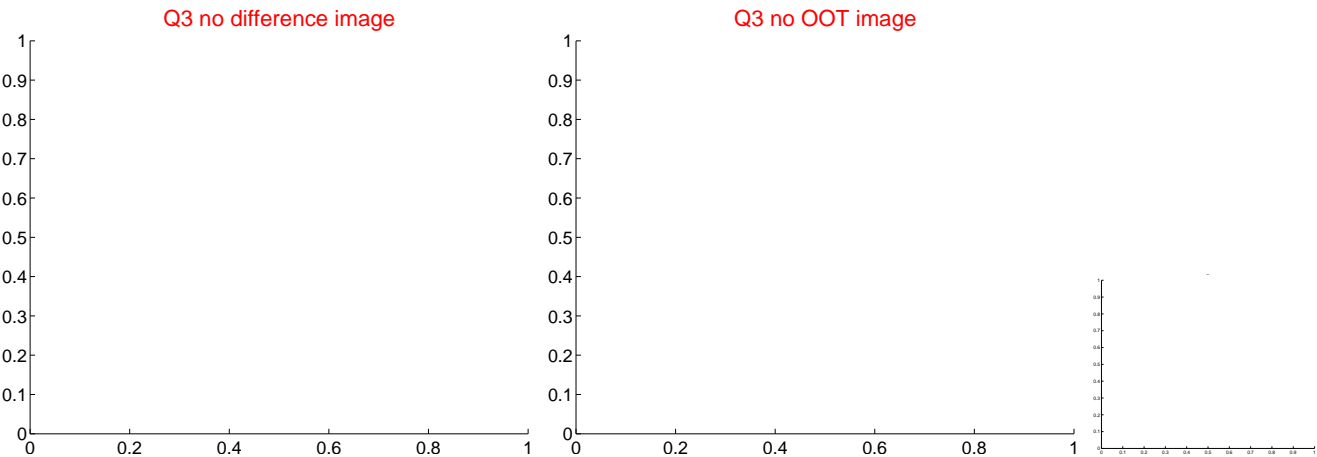
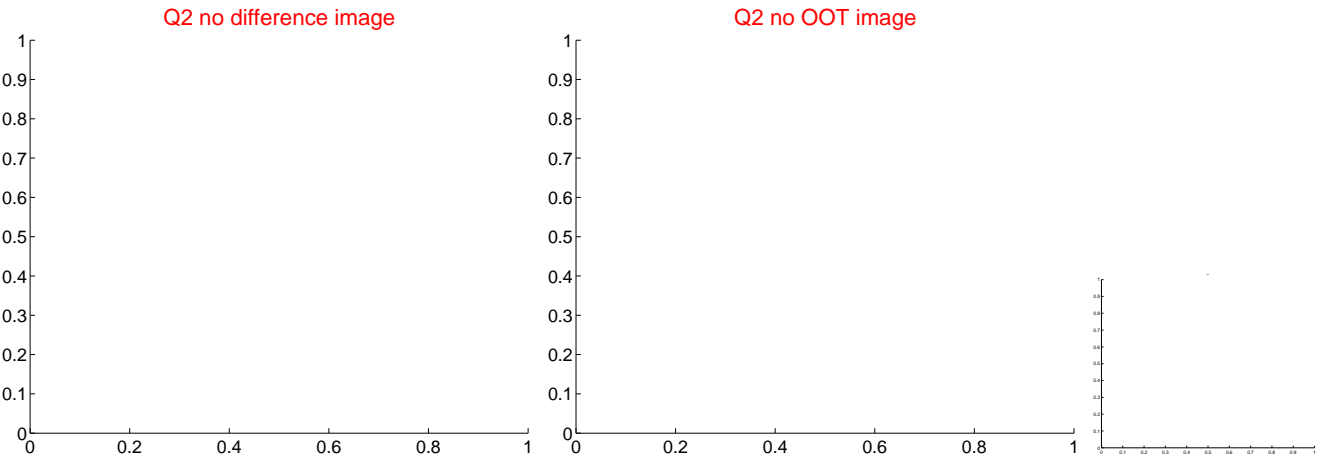
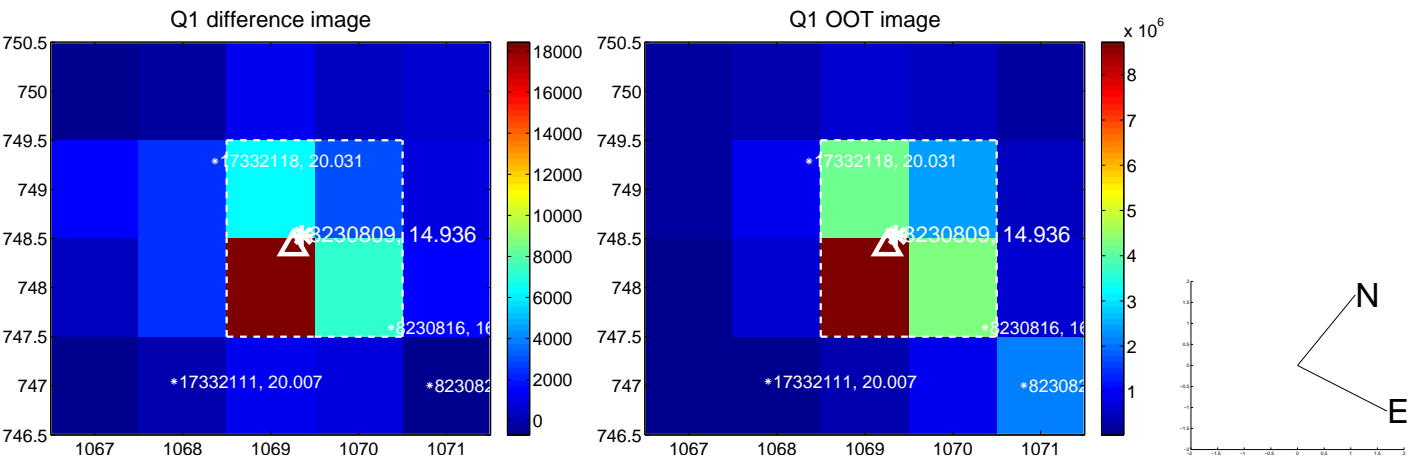


offset from photometric centroids



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

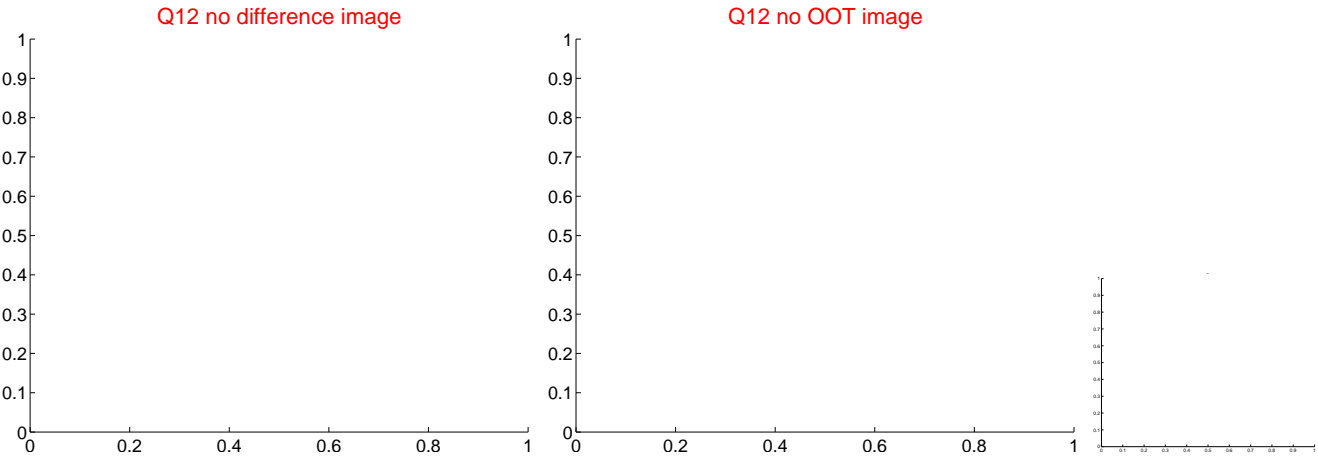
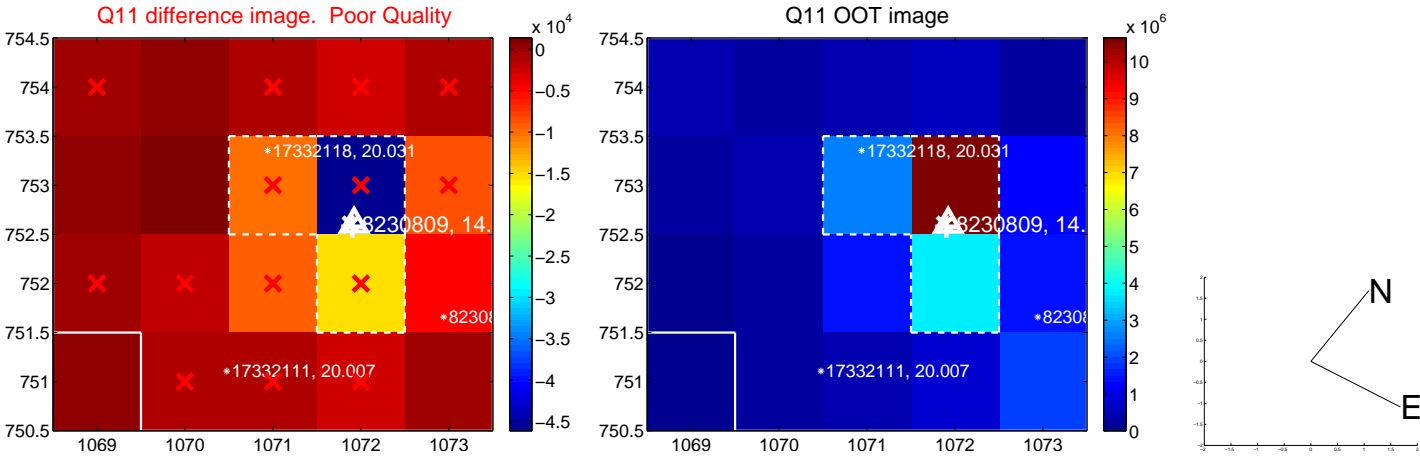
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

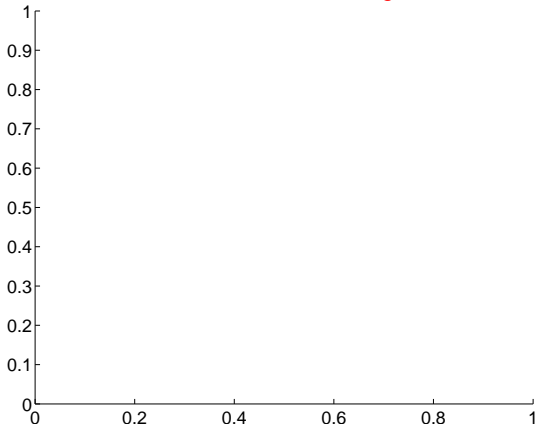


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

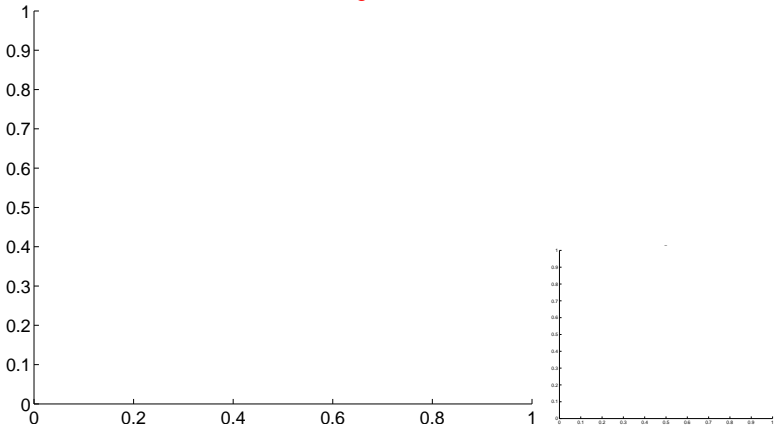


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

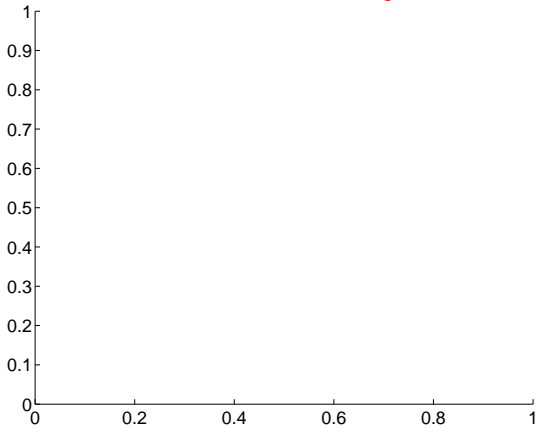
Q13 no difference image



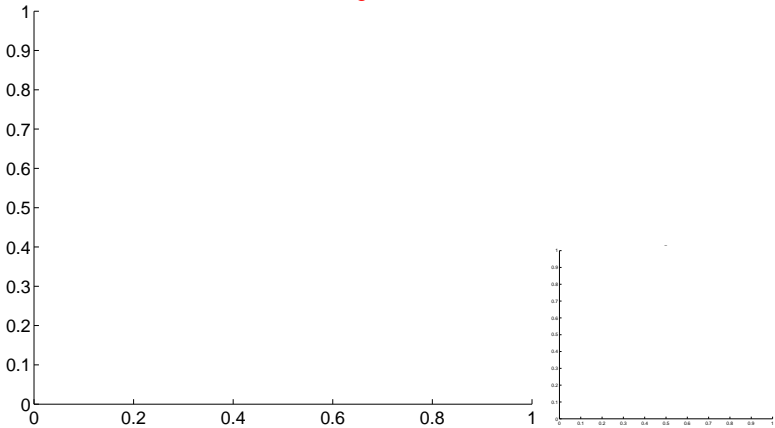
Q13 no OOT image



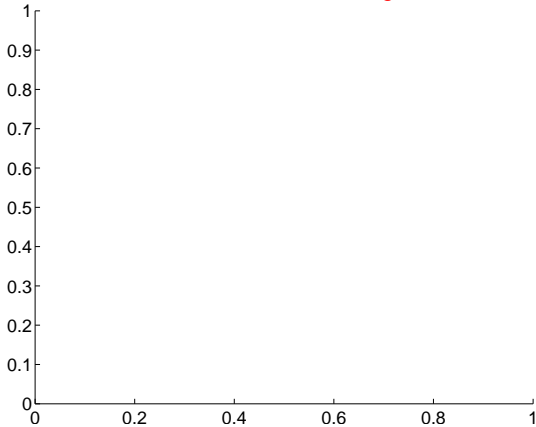
Q14 no difference image



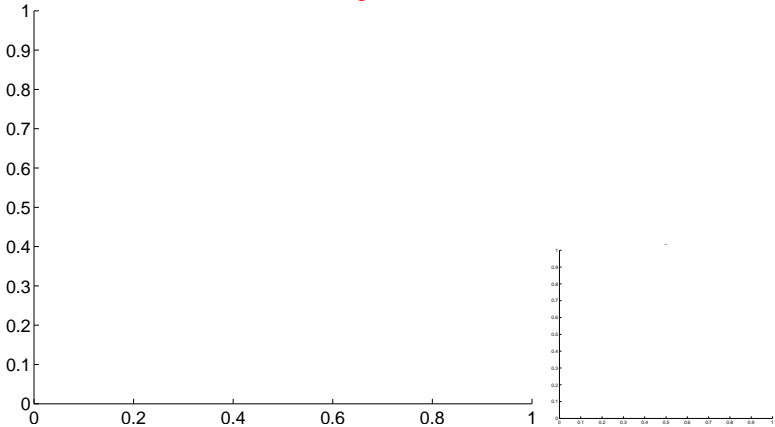
Q14 no OOT image



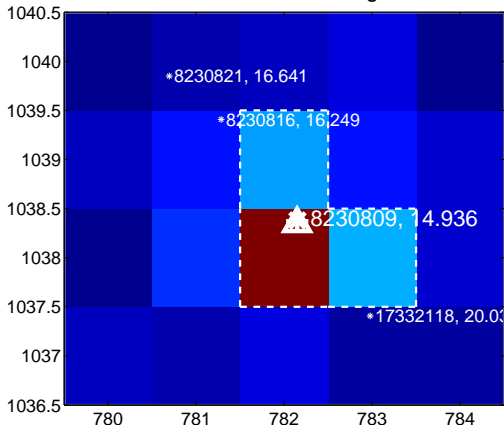
Q15 no difference image



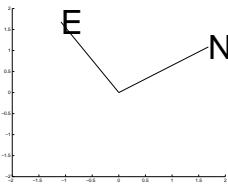
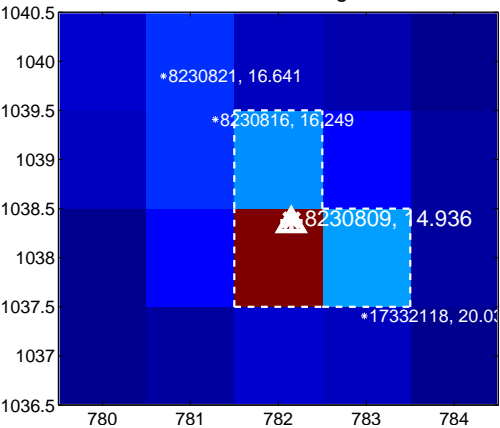
Q15 no OOT image



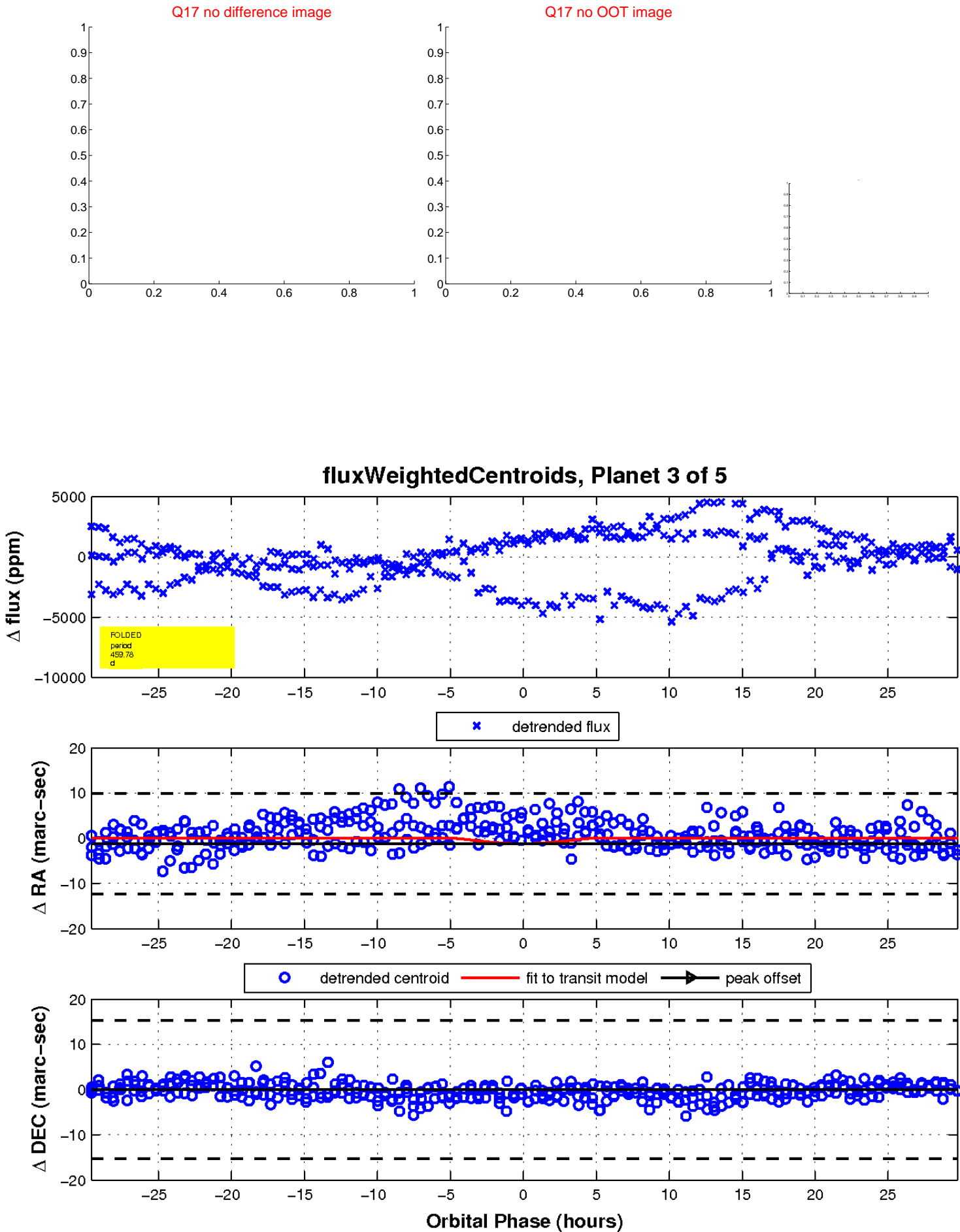
Q16 difference image



Q16 OOT image



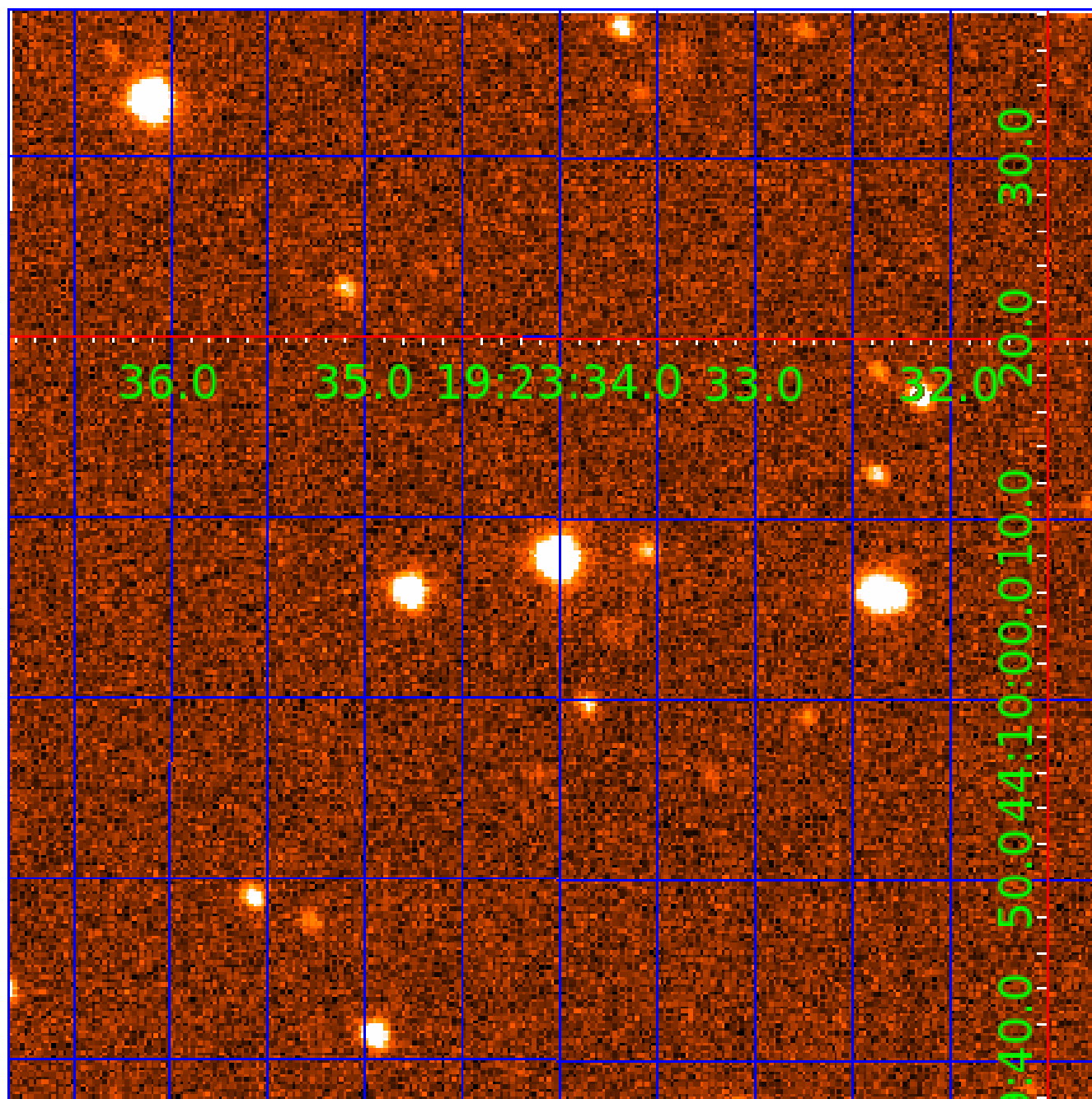
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image

Declination



# KIC 008230809

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008230809-01	OBS	6055.01	4.078353	132.160296	35085.0	6.271	1248.4	1285.2	0.87	5872	16.37	363.14
008230809-02	OBS	No	2.039157	132.163350	657.2	6.362	28.9	27.1	0.87	5872	2.62	915.06
008230809-03	OBS	No	459.775191	133.805203	2651.9	9.930	11.4	8.6	0.87	5872	8.30	0.67
008230809-04	OBS	No	173.937364	263.354229	1377.2	2.938	9.0	5.6	0.87	5872	3.28	2.44
008230809-05	OBS	No	580.104195	301.984575	1357.8	10.284	8.2	5.7	0.87	5872	3.71	0.49

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008230809-01	OBS	FP	0.43	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE
008230809-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE
008230809-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
008230809-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
008230809-05	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS—HALO_GHOST

**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.

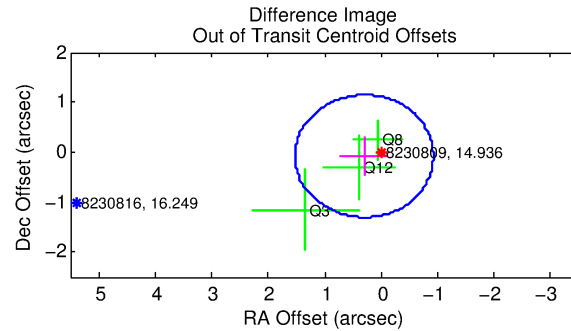
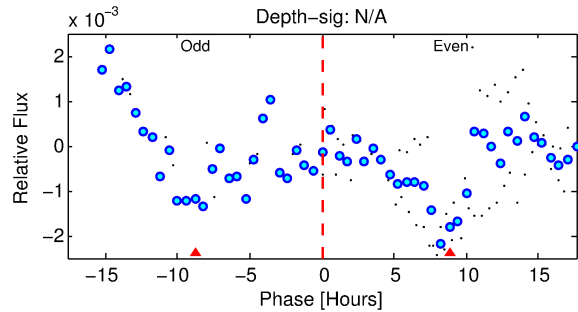
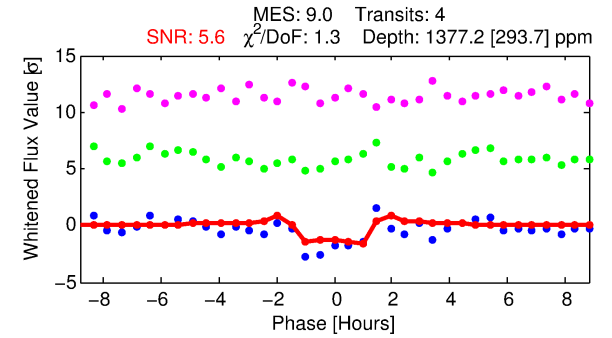
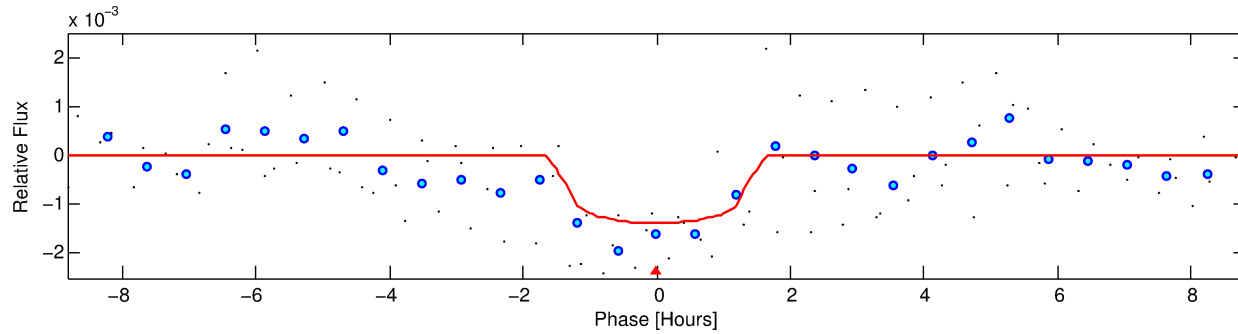
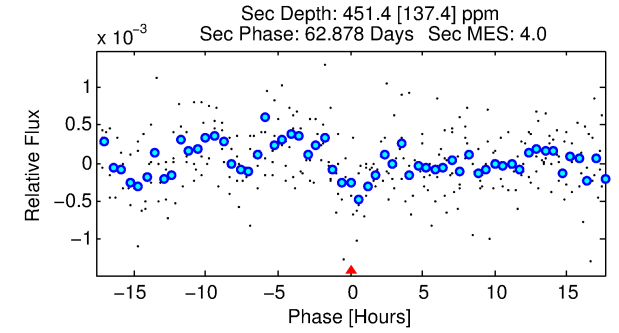
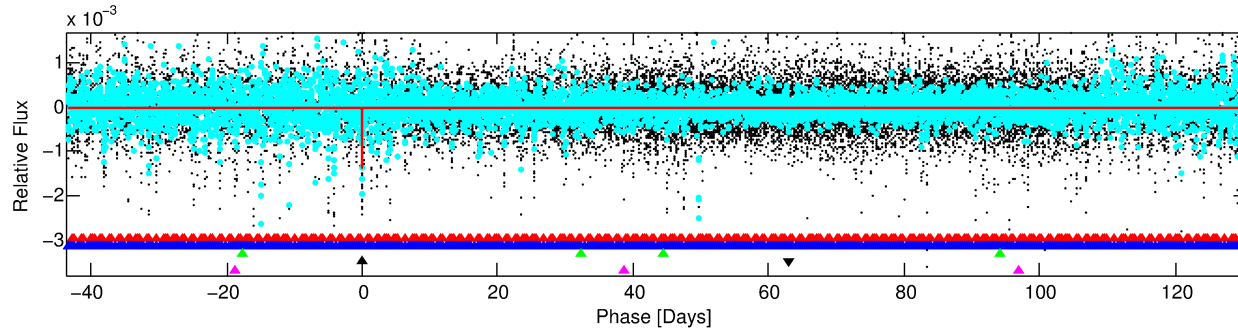
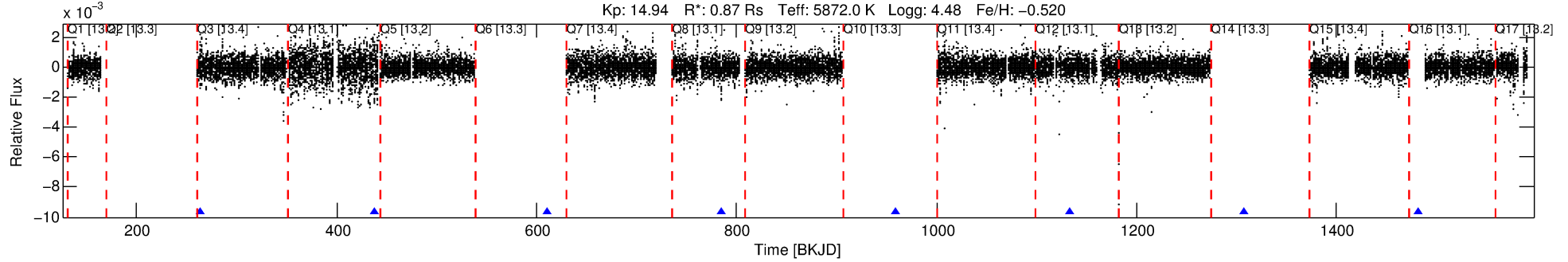
## Ephemeris Match Information For 008230809-04

No Significant Match Found

# DV One-Page Summary

KIC: 8230809 Candidate: 4 of 5 Period: 173.937 d  
KOI: K06055 Corr: No Ephemeris Match

Kp: 14.94 R\*: 0.87 Rs Teff: 5872.0 K Logg: 4.48 Fe/H: -0.520



## DV Fit Results:

Period = 173.93736 [0.00240] d  
Epoch = 263.3542 [0.0056] BKJD  
Rp/R\* = 0.0346 [0.0317]  
a/R\* = 427.74 [1818.48]  
b = 0.42 [8.43]  
Seff = 2.44 [0.82]  
Teq = 319 [27] K  
Rp = 3.28 [3.11] Re  
a = 0.5732 [0.1225] AU  
Ag = 7597.10 [14298.37] [0.53σ]  
Teffp = 4599 [2140] K [2.00σ]

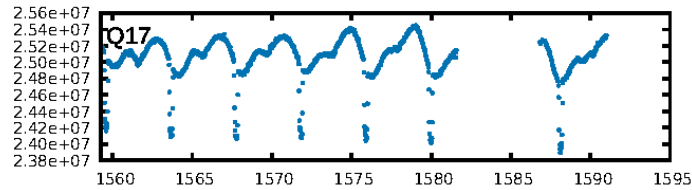
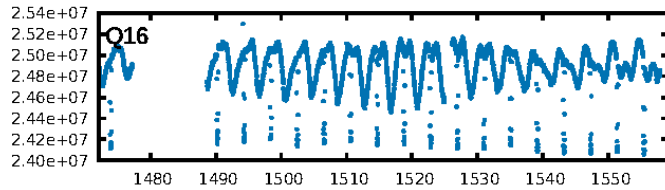
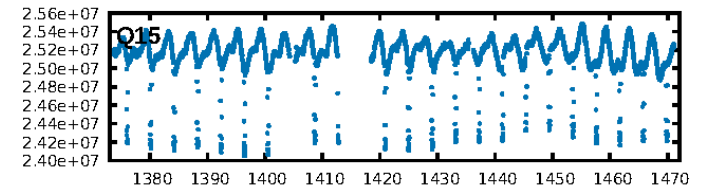
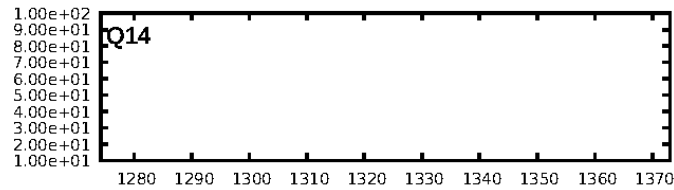
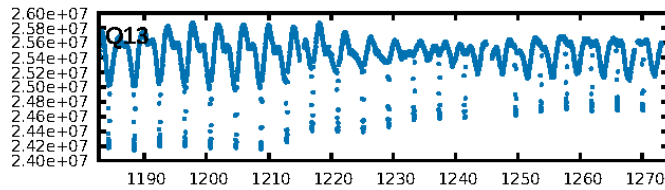
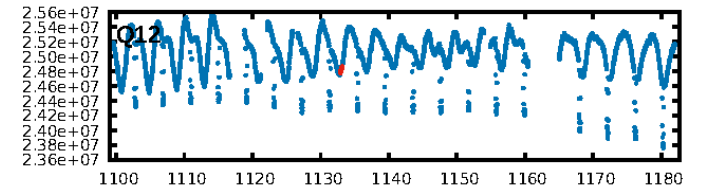
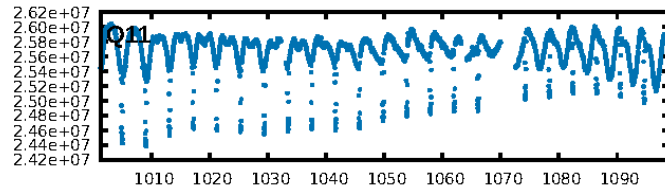
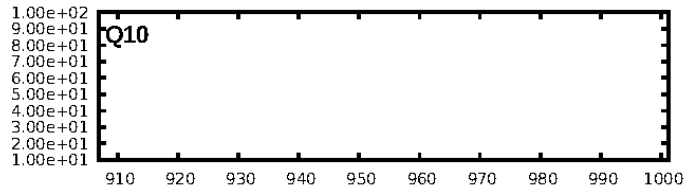
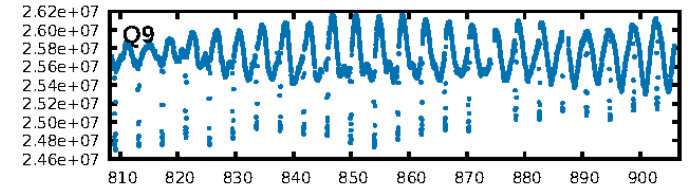
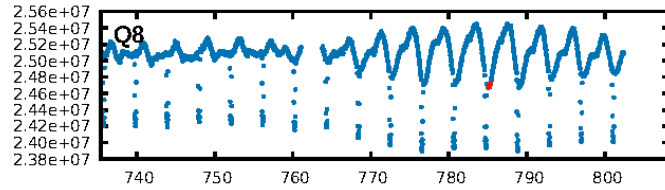
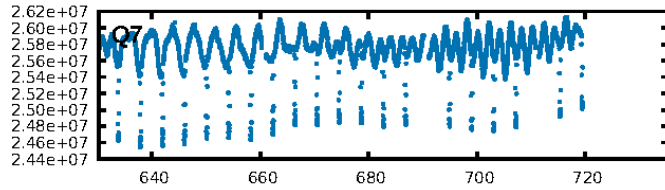
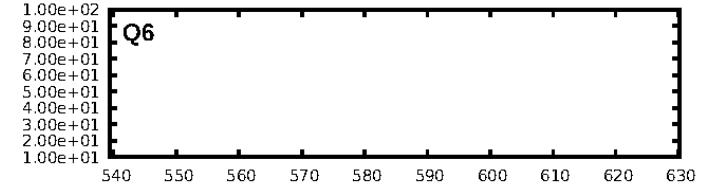
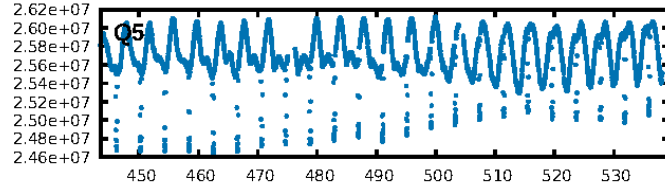
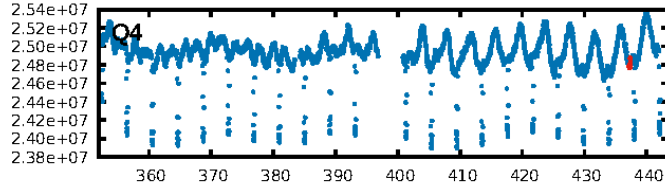
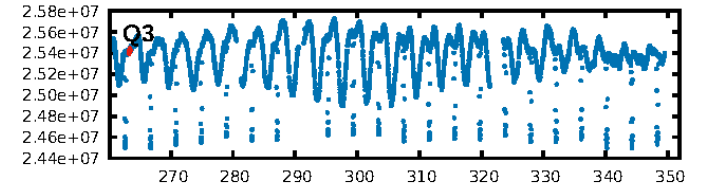
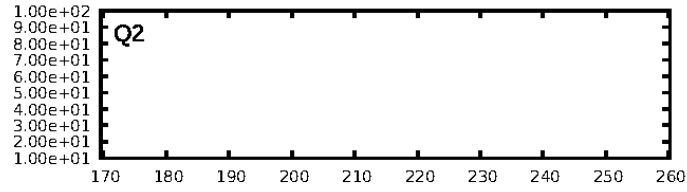
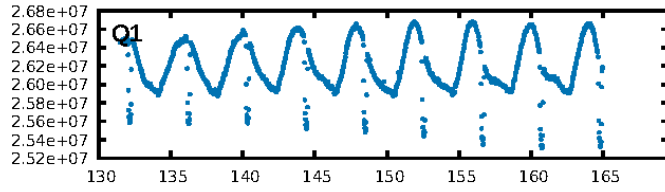
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [588.65σ]  
LongPeriod-sig: 100.0% [662.45σ]  
ModelChiSquare2-sig: 14.5%  
ModelChiSquareGof-sig: 99.9%  
Bootstrap-pfa: 2.03e-13  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: -0.7667  
Centroid-sig: 74.5%  
Centroid-so: 0.907 arcsec [0.84σ]  
OotOffset-rm: 0.310 arcsec [0.76σ]  
OotOffset-st: 0/1/2/0 [3]  
KicOffset-rm: 0.345 arcsec [0.85σ]  
KicOffset-st: 0/1/2/0 [3]  
DiffImageQuality-fgm: 1.00 [3/3]  
DiffImageOverlap-fno: 0.75 [3/4]

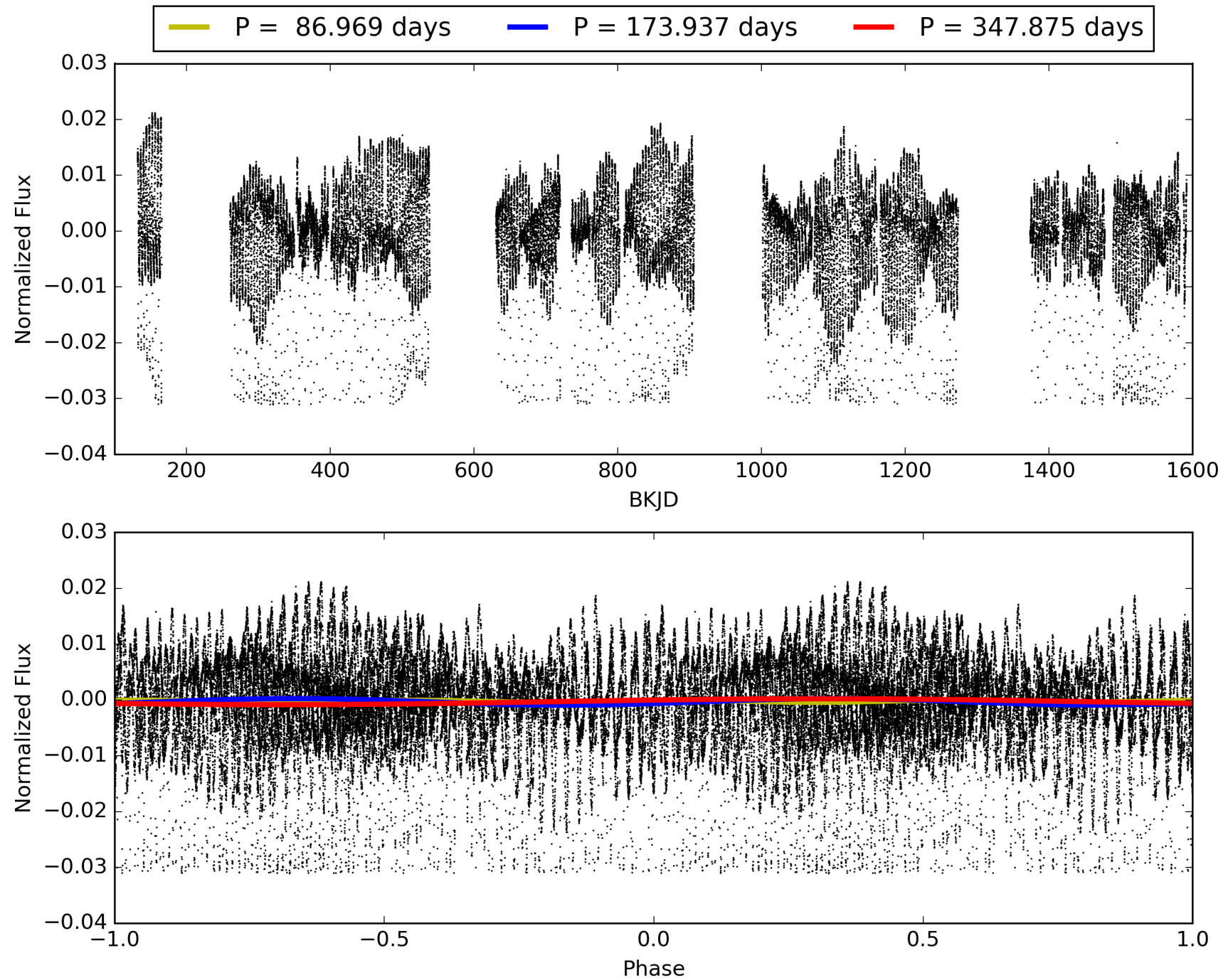
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 19:08:19 Z

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

# TCE 008230809-04, PDC Light Curves

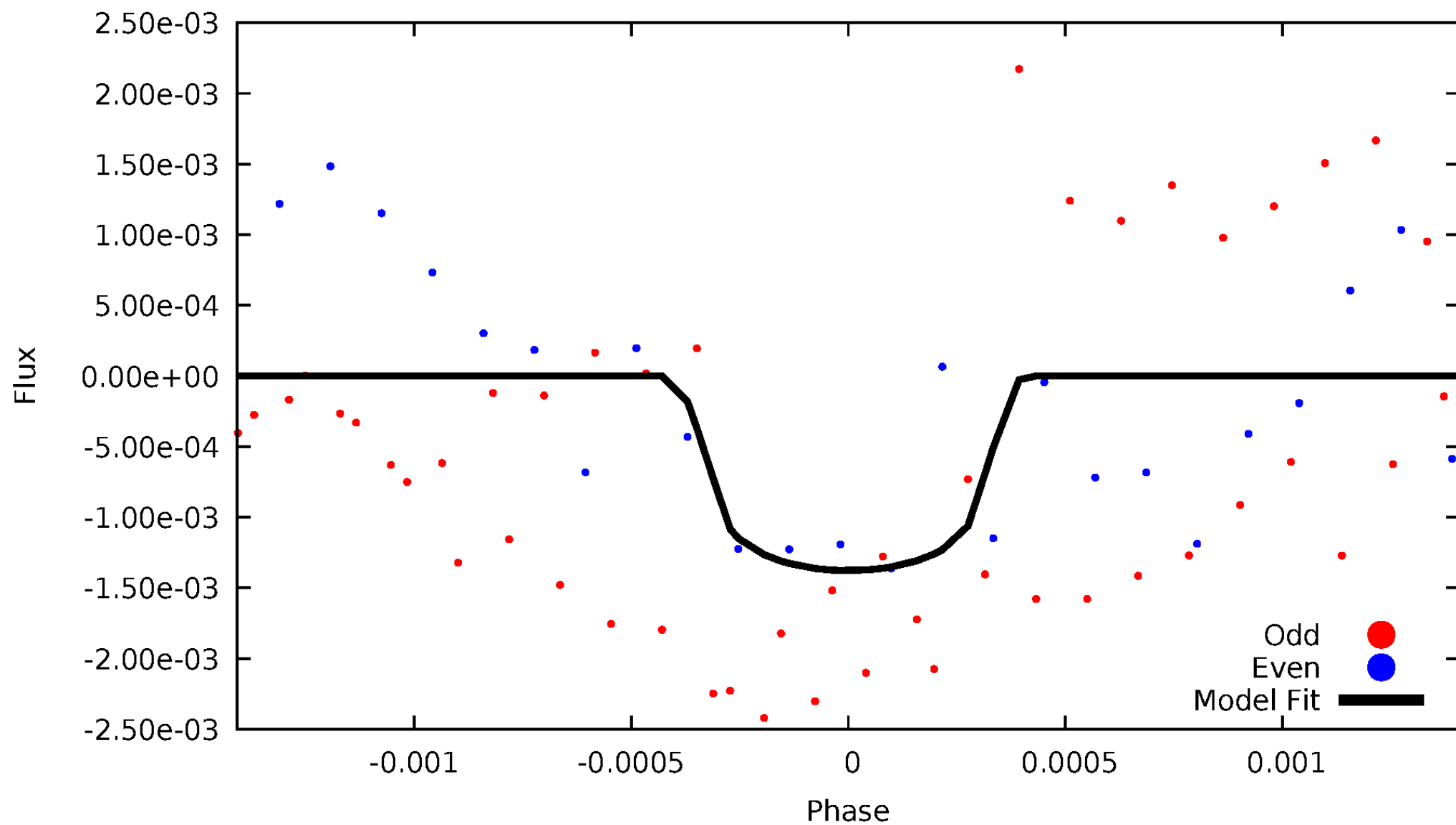


TCE 008230809-04



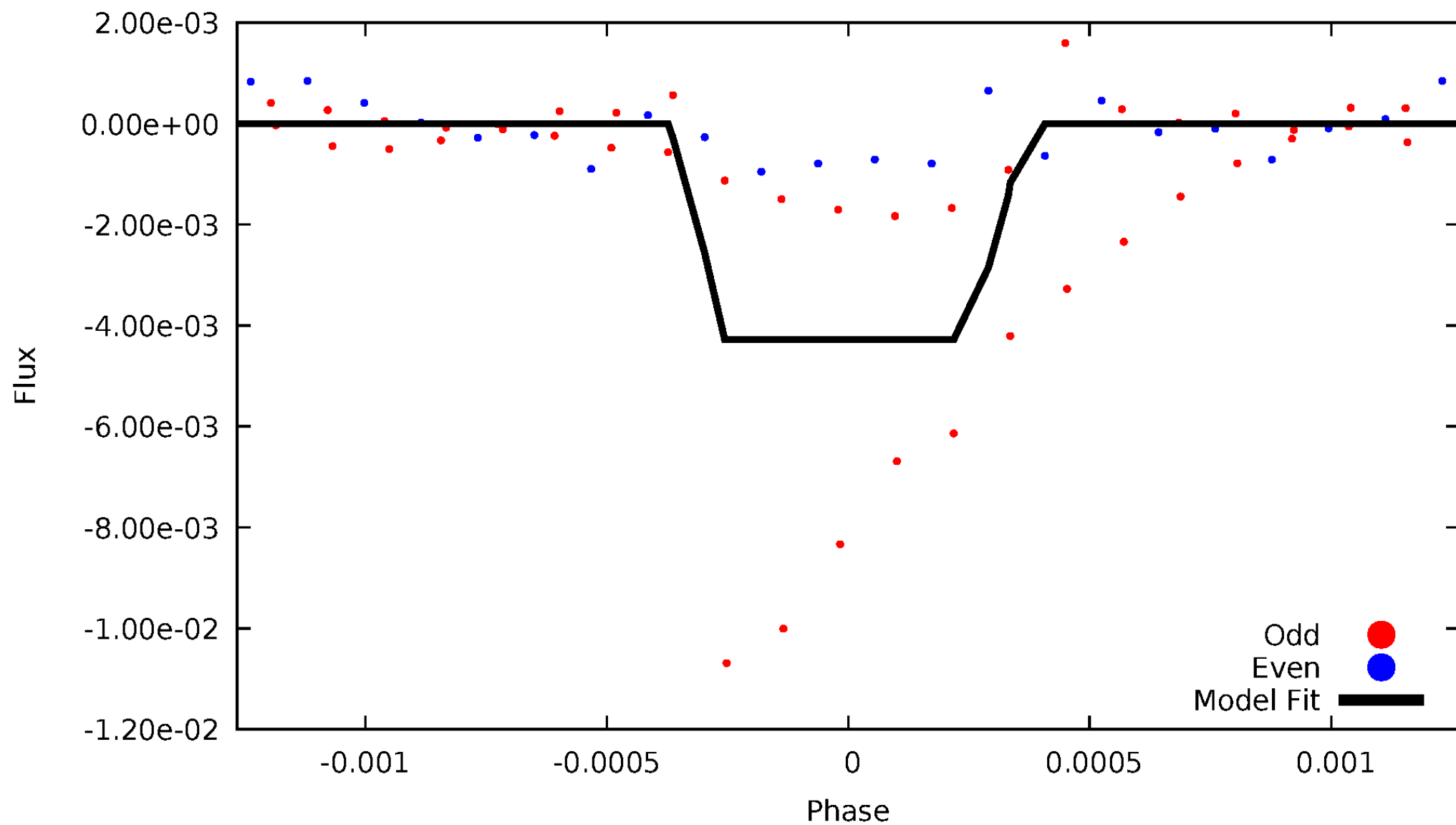
# DV Odd/Even

TCE 008230809-04



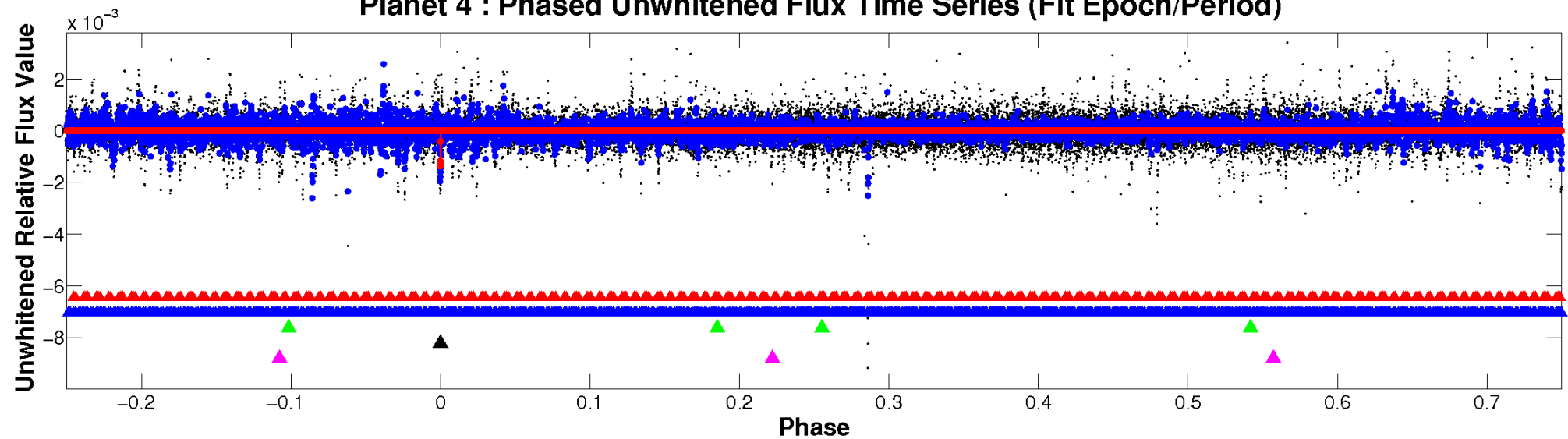
# ALT Odd/Even

TCE 008230809-04

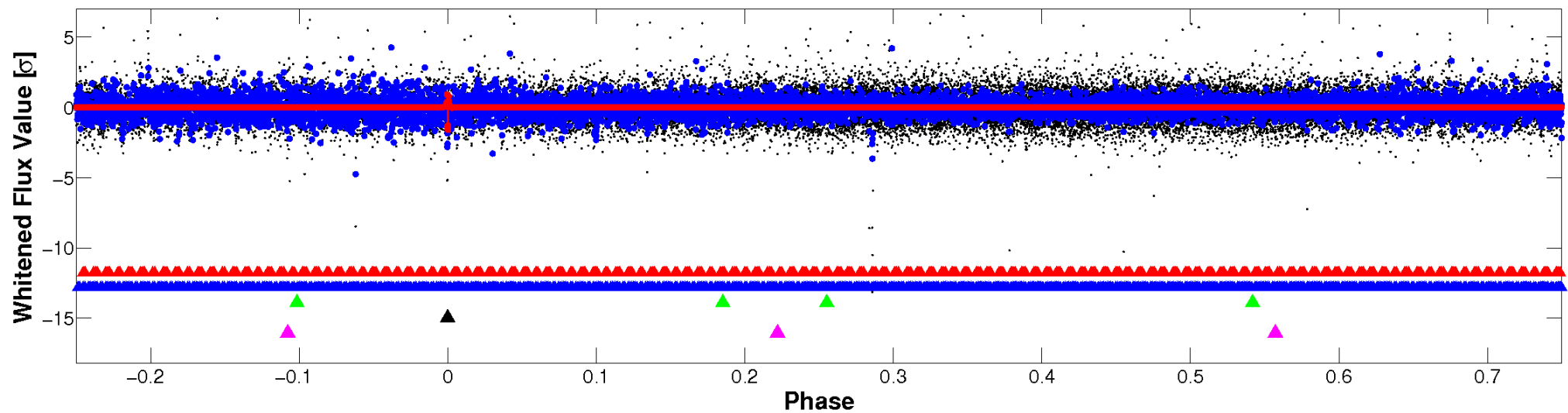


# Non-Whitened Vs. Whitened Light Curve

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



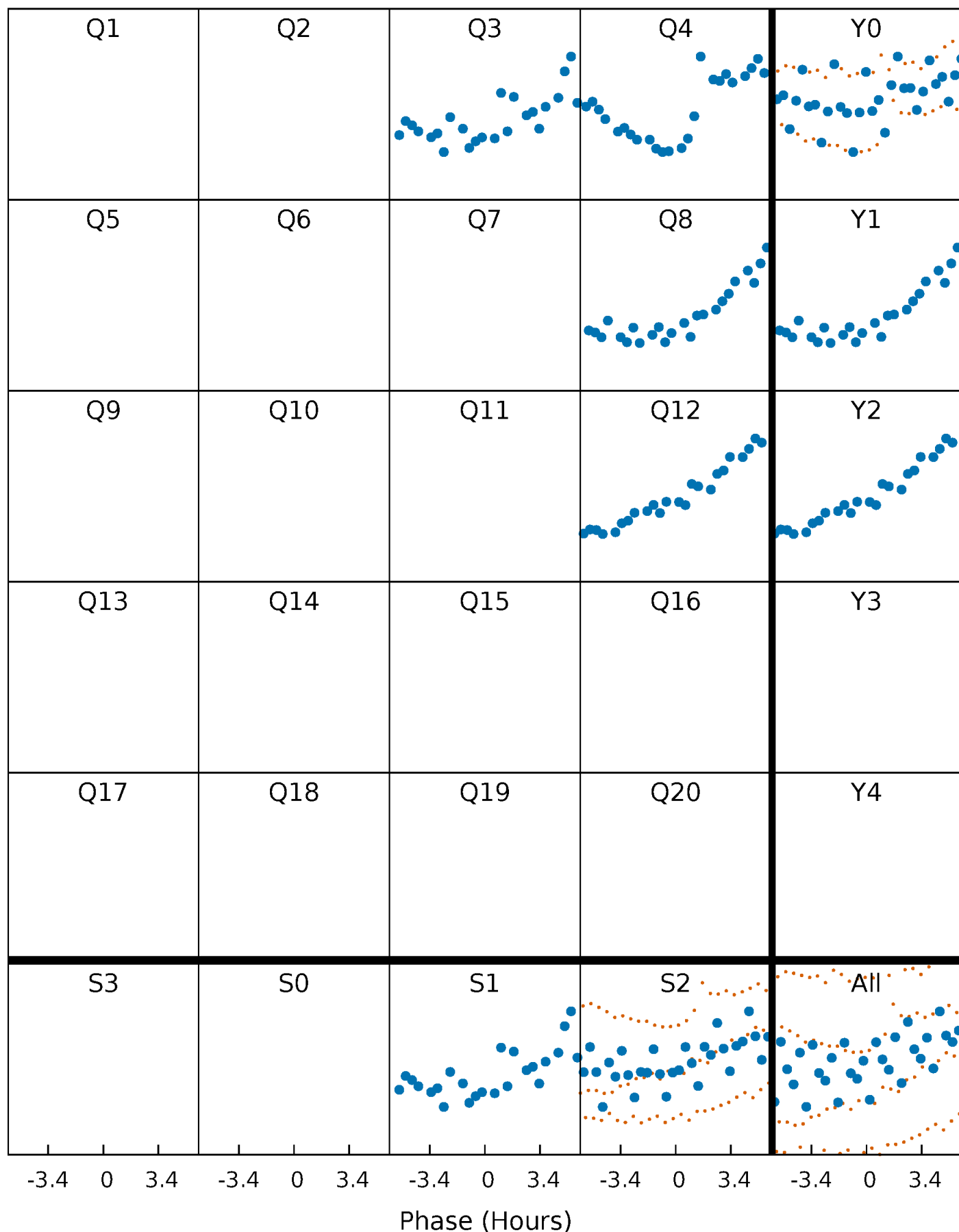
## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)





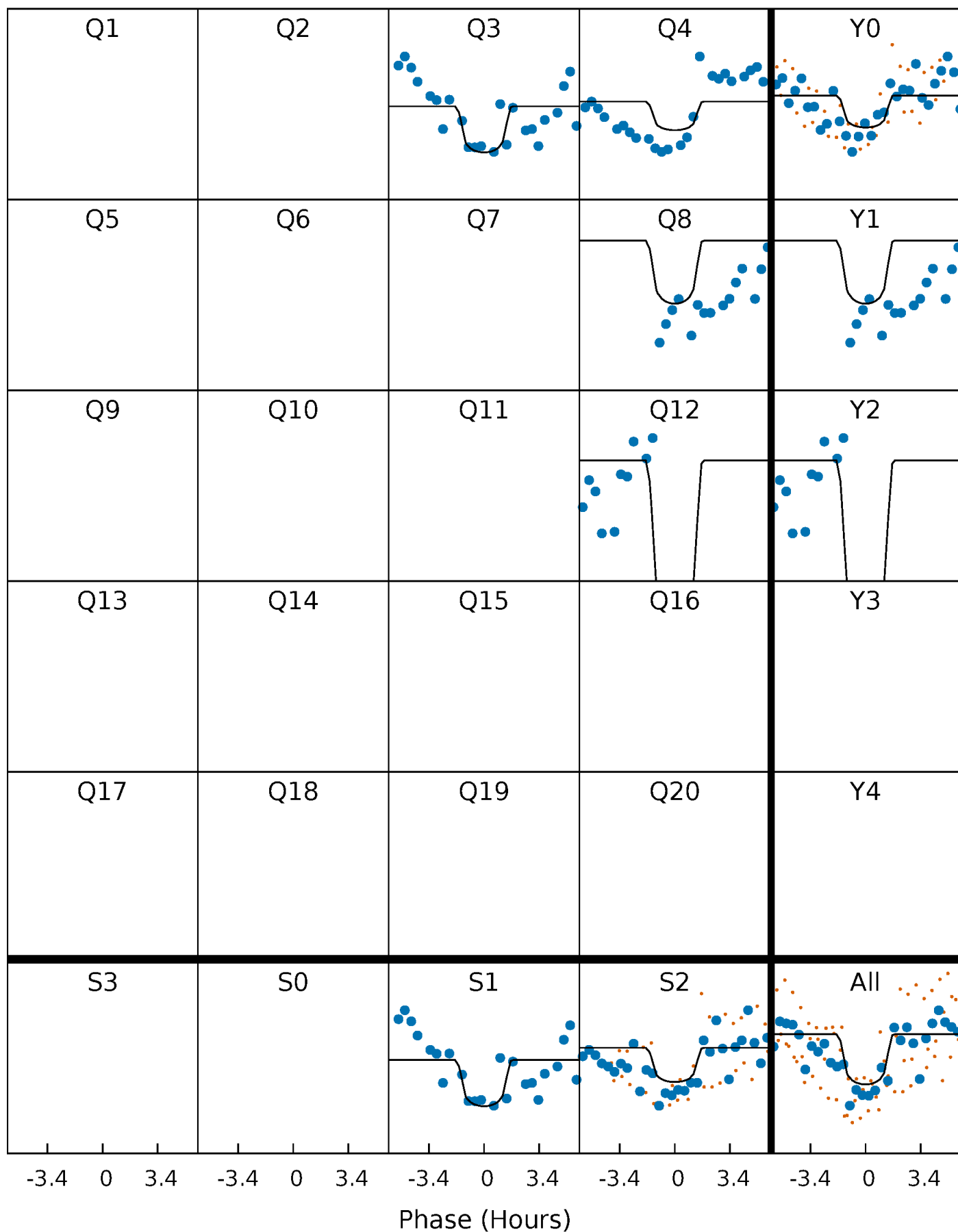
# PDC Quarter-Phased Transit Curves

TCE 008230809-04 P=173.937364 Days  $T_0=263.354229$  (BKJD)



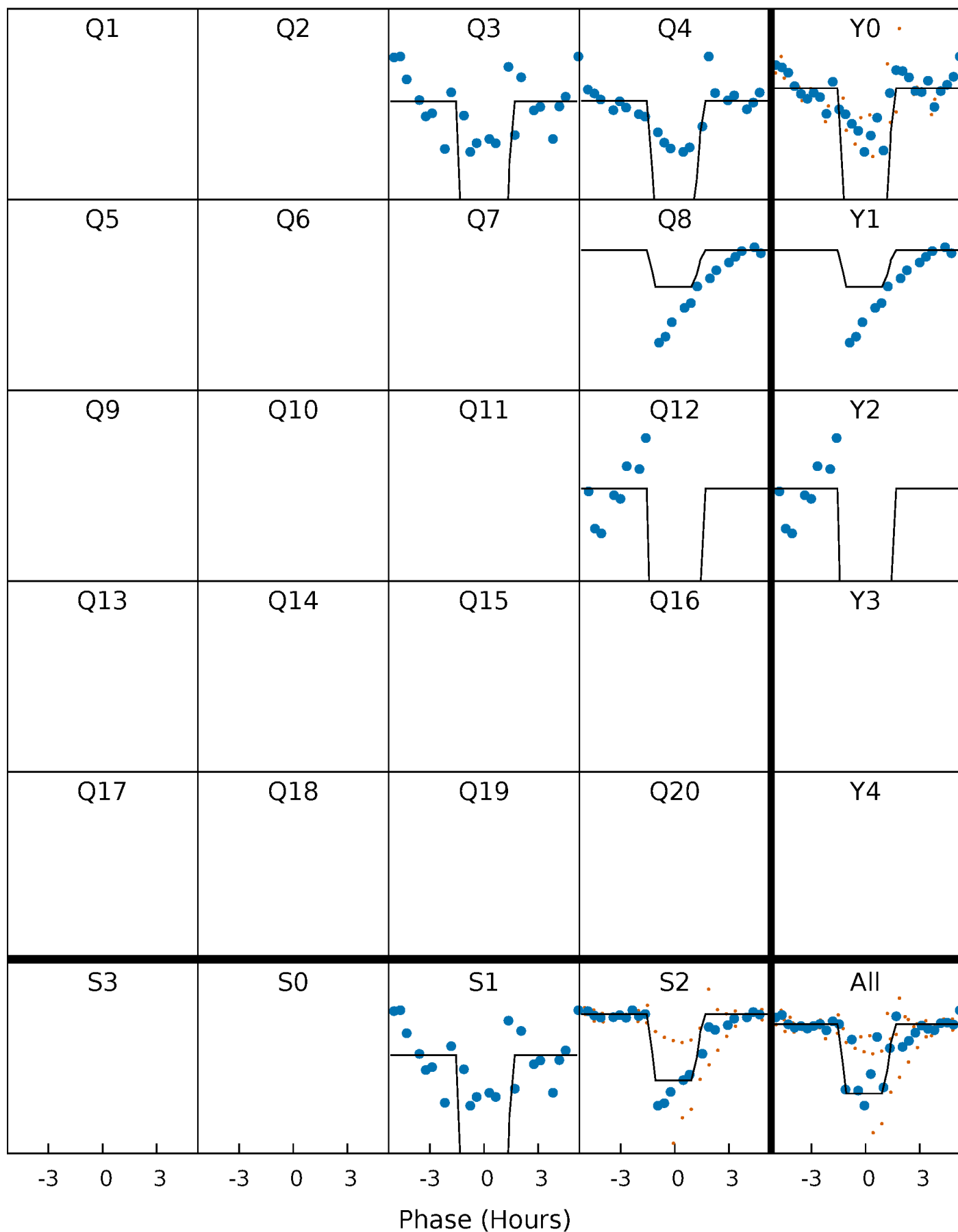
# DV Quarter-Phased Transit Curves

TCE 008230809-04     $P=173.937364$  Days     $T_0=263.354229$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

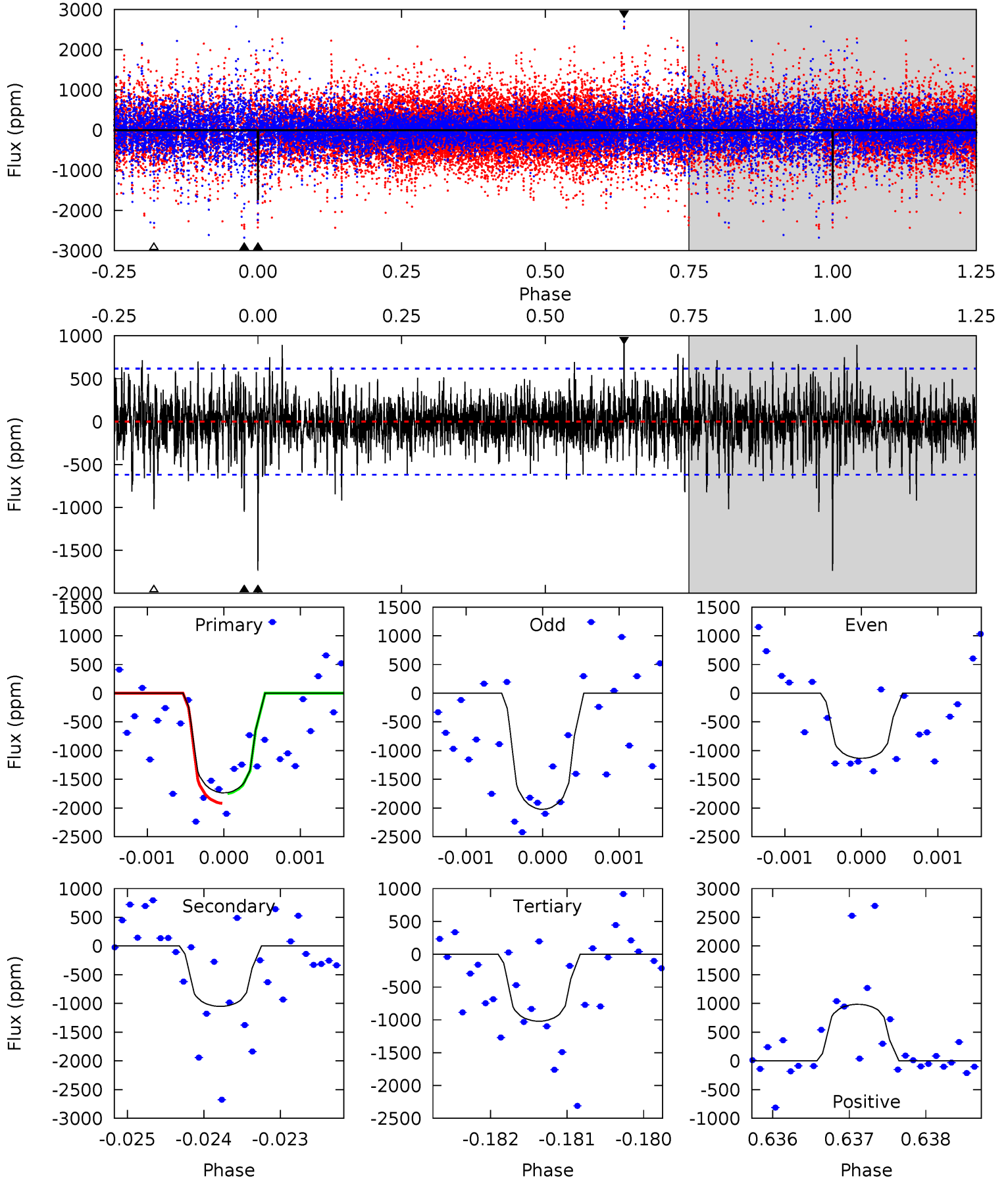
TCE 008230809-04 P=173.940423 Days  $T_0=263.341479$  (BKJD)



# DV Model-Shift Uniqueness Test

008230809-04,  $P = 173.937364$  Days,  $E = 89.416865$  Days

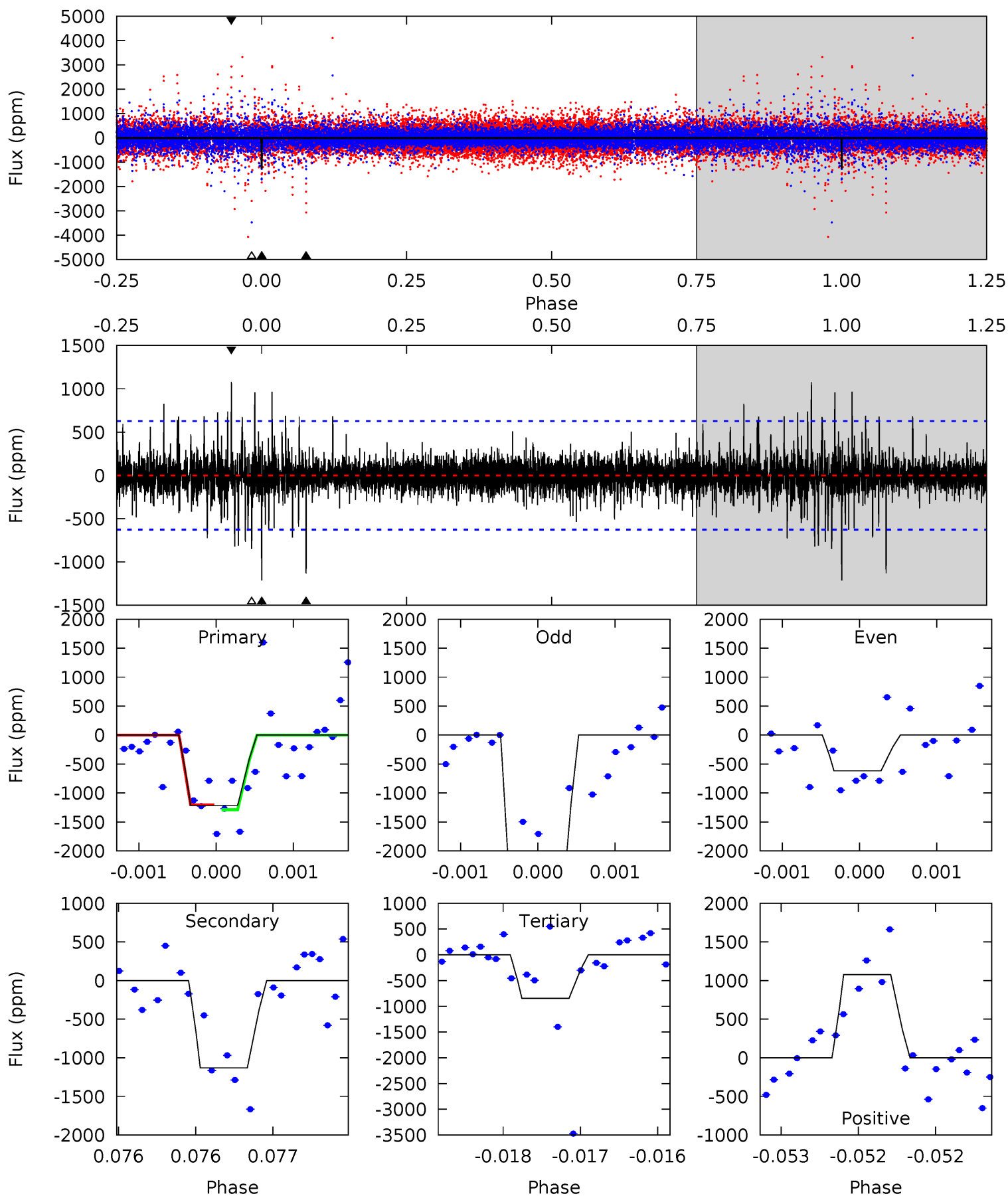
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
15.4	9.33	9.06	8.75	5.49	3.35	1.79	6.35	6.66	0.27	0.58	3.69	0.90	0.36	0.73



# Alt Model-Shift Uniqueness Test

008230809-04, P = 173.940423 Days, E = 89.401056 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
10.6	9.92	7.43	9.45	5.50	3.36	1.15	3.21	1.19	2.49	0.47	12.4	2.24	0.47	0



### Stellar Parameters For KIC 008230809

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$\rho_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5872^{+177}_{-195}$	$4.481^{+0.091}_{-0.169}$	$-0.520^{+0.300}_{-0.300}$	$0.867^{+0.221}_{-0.102}$	$0.830^{+0.105}_{-0.070}$	$1.791^{+0.710}_{-0.823}$
	+3%/-3%	+2%/-4%	+58%/-58%	+25%/-12%	+13%/-8%	+40%/-46%
Source	KIC0	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 008230809-04 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-1051 \pm 113$	$4.00^{+3.19}_{-2.40}$	$448^{+32}_{-23}$	$5298^{+3189}_{-1116}$	$11830^{+61833}_{-8140}$
Alt.	$-1131 \pm 114$	$6.65^{+2.87}_{-3.04}$	$451^{+27}_{-23}$	$4337^{+1281}_{-539}$	$4695^{+10678}_{-2466}$

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

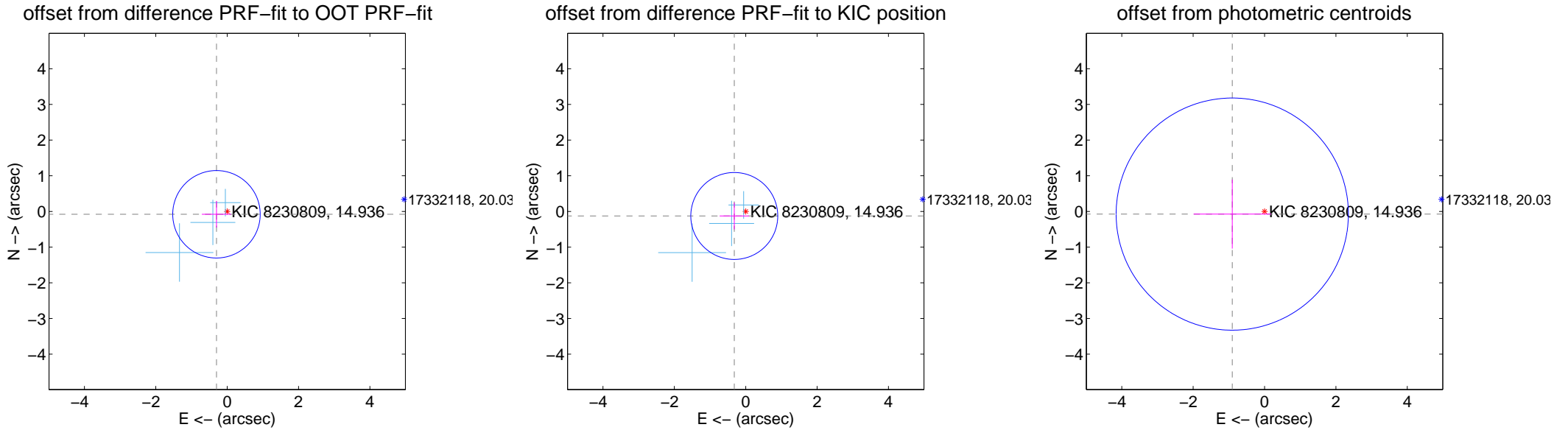
## DV Centroid Data

Supplemental centroid analysis for 008230809-04. Kepler magnitude: 14.94. Transit SNR 5.62

There are 3 quarters with good PRF difference image offsets

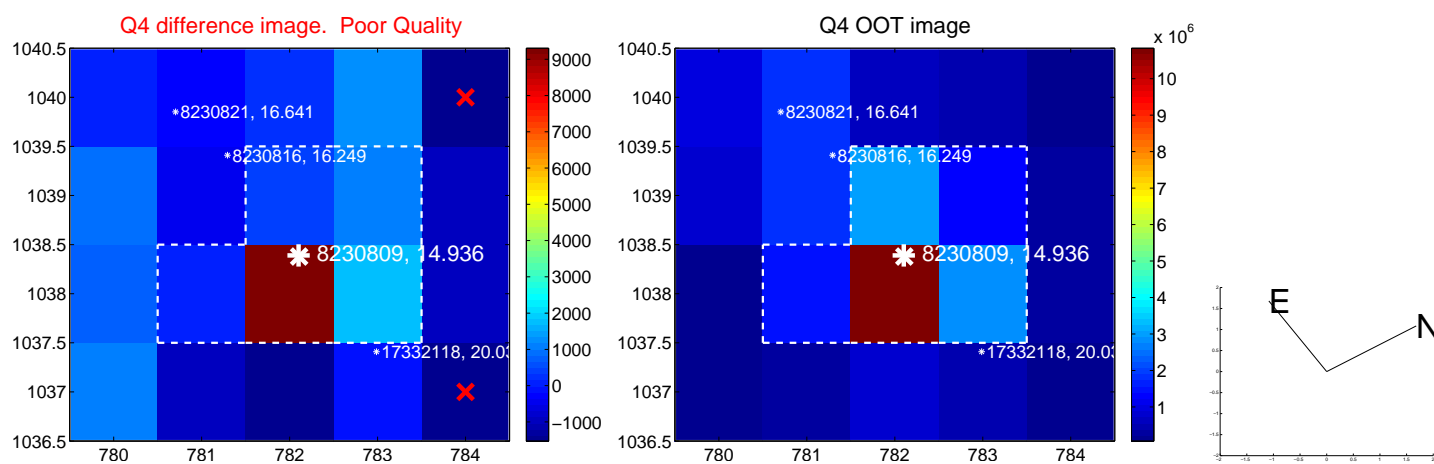
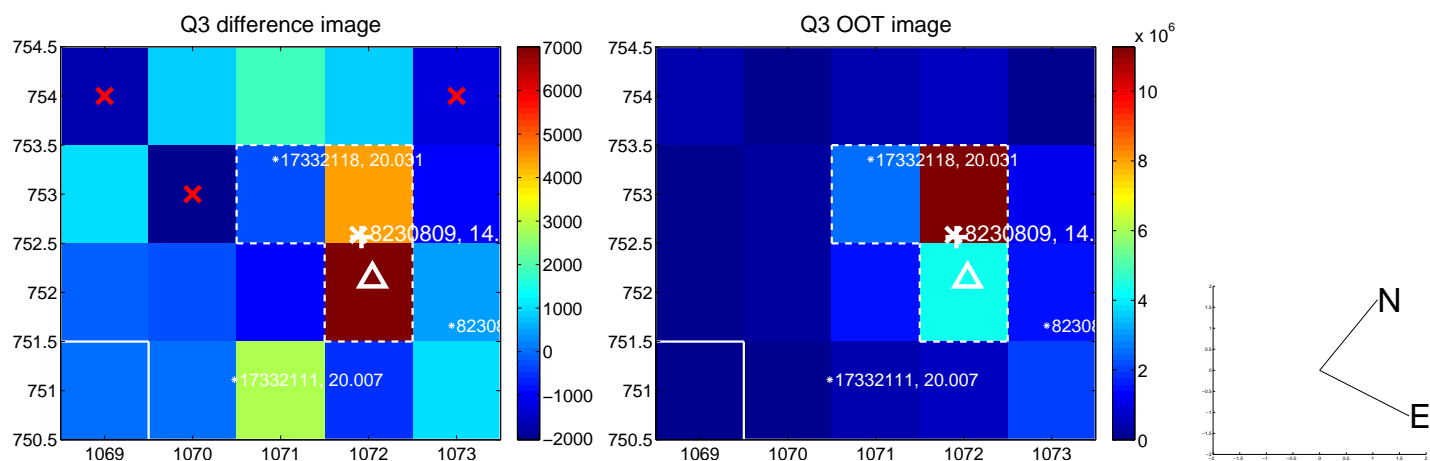
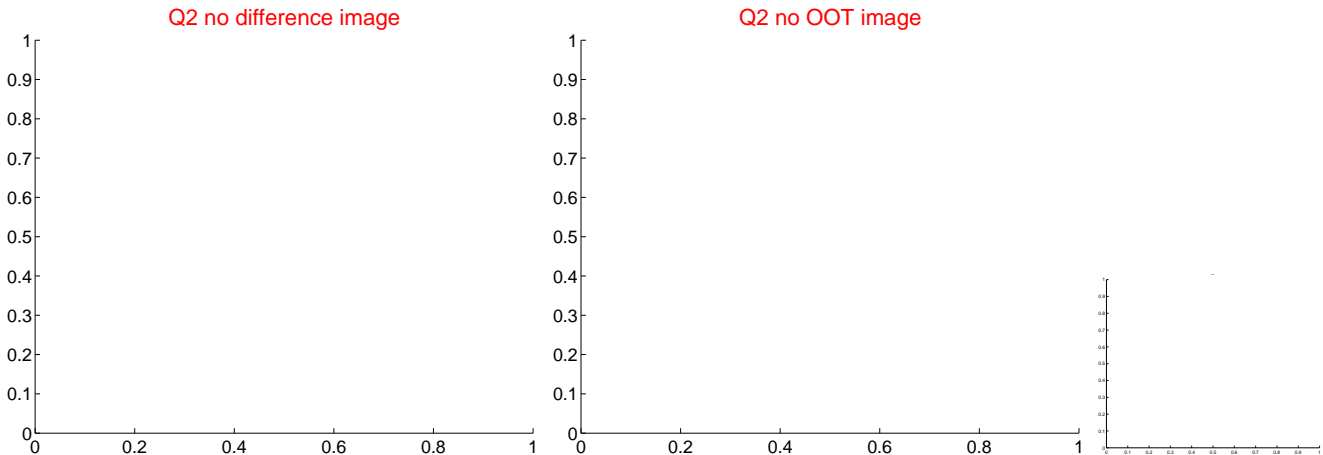
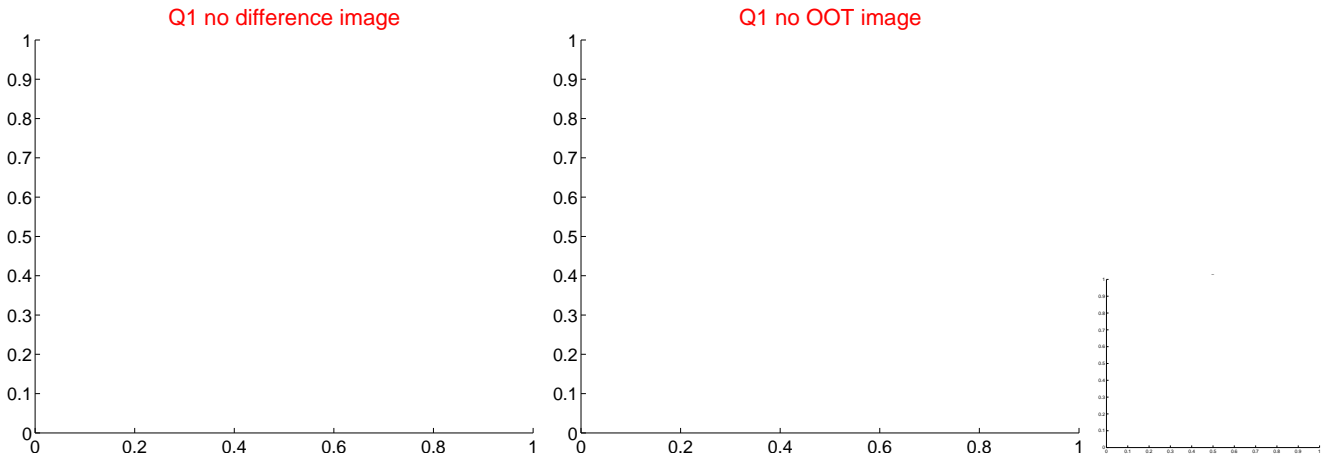
The direct PRF centroid is offset from the target star catalog position by about 0.03 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.310 \pm 0.409$	0.76	$0.300 \pm 0.411$	$-0.079 \pm 0.374$
PRF-fit source offset from KIC position	$0.345 \pm 0.406$	0.85	$0.321 \pm 0.411$	$-0.127 \pm 0.374$
photometric centroid source offset	$0.91 \pm 1.08$	0.84	$0.90 \pm 1.09$	$-0.07 \pm 0.97$



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 no difference image



Q6 no OOT image



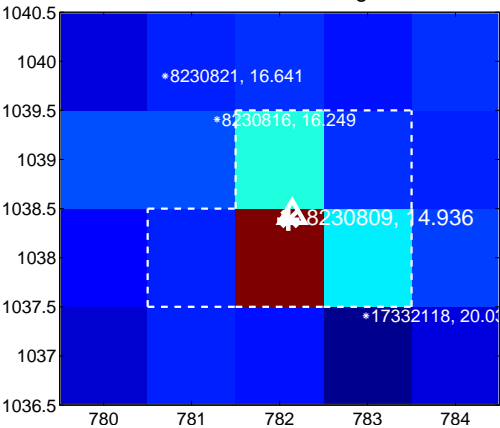
Q7 no difference image



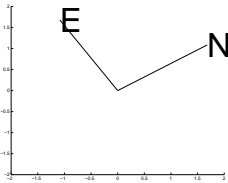
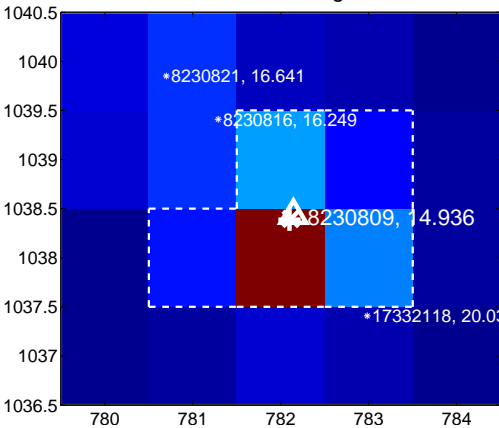
Q7 no OOT image



Q8 difference image



Q8 OOT image



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

Q9 no difference image



Q9 no OOT image



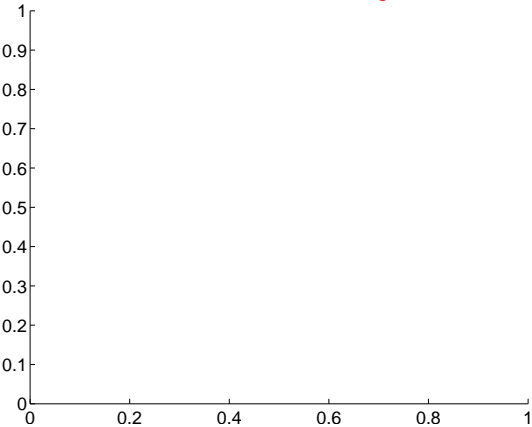
Q10 no difference image



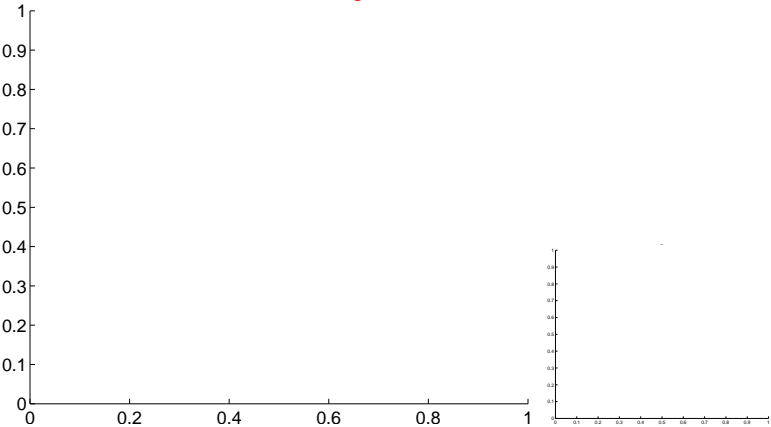
Q10 no OOT image



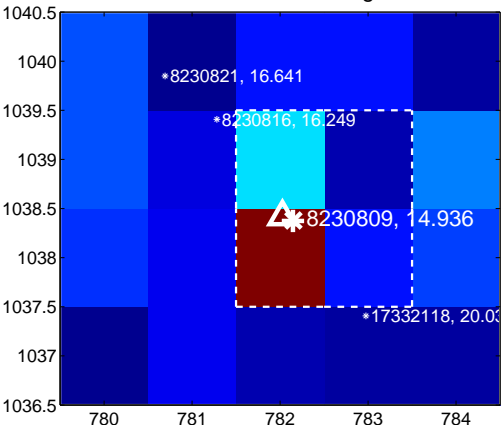
Q11 no difference image



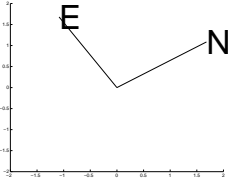
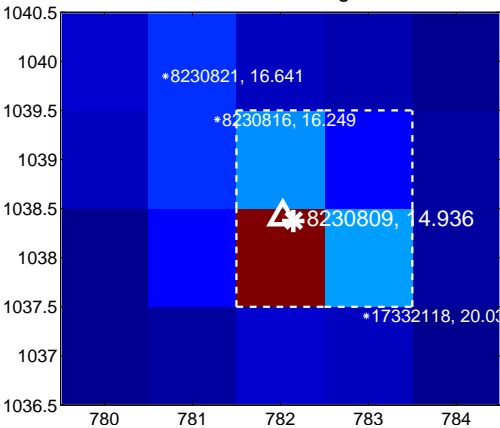
Q11 no OOT image



Q12 difference image



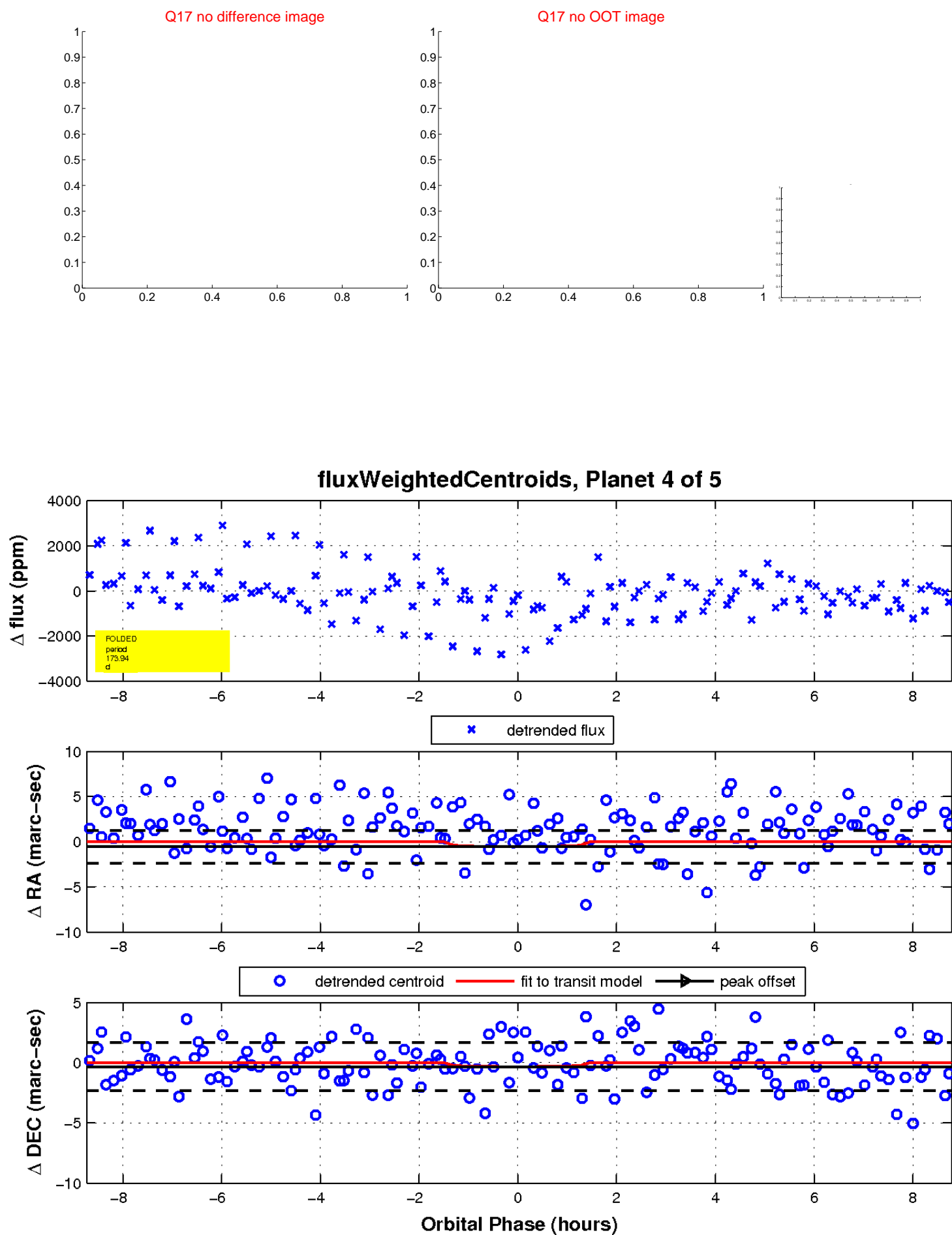
Q12 OOT image



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

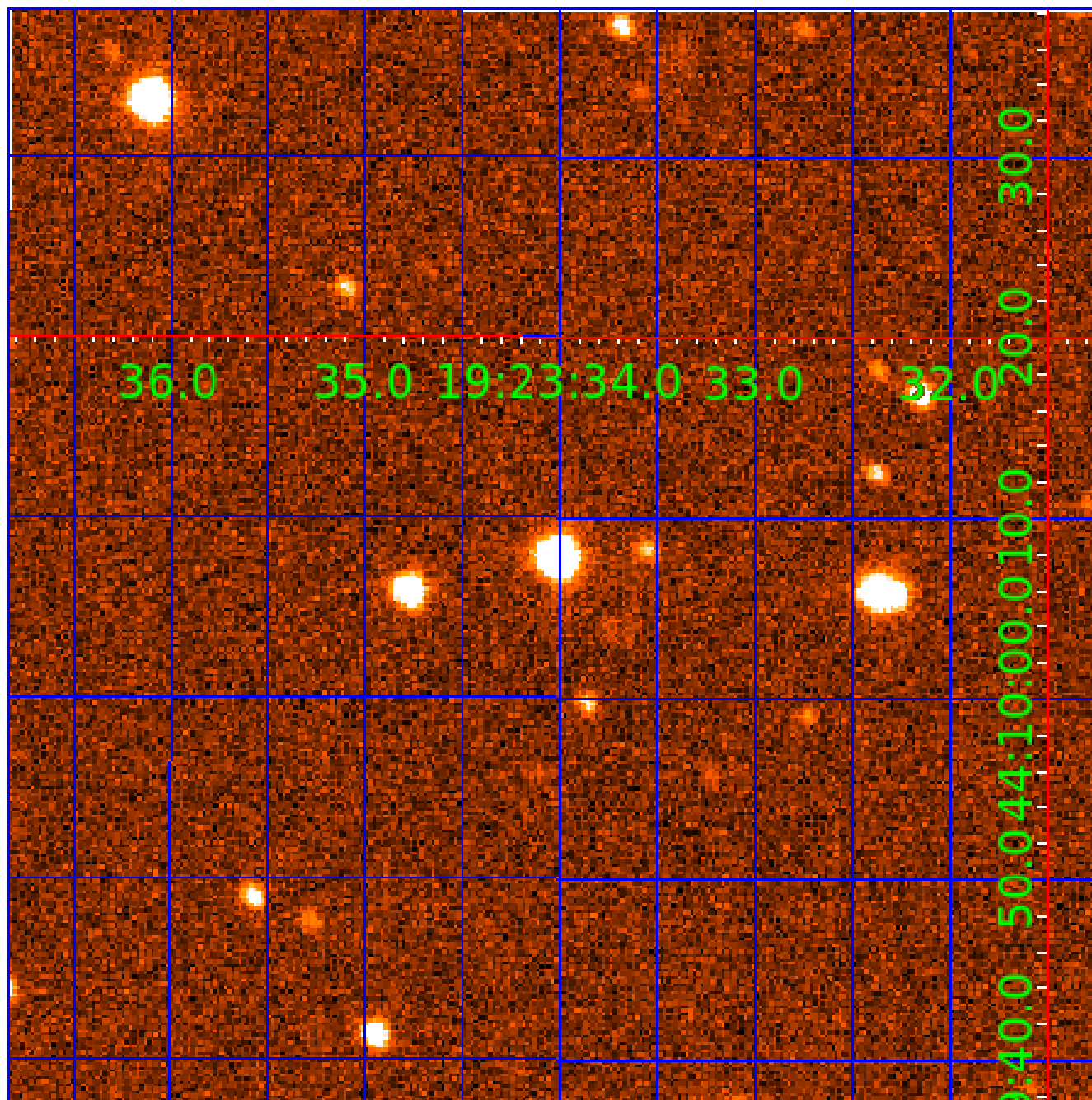


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 008230809

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008230809-01	OBS	6055.01	4.078353	132.160296	35085.0	6.271	1248.4	1285.2	0.87	5872	16.37	363.14
008230809-02	OBS	No	2.039157	132.163350	657.2	6.362	28.9	27.1	0.87	5872	2.62	915.06
008230809-03	OBS	No	459.775191	133.805203	2651.9	9.930	11.4	8.6	0.87	5872	8.30	0.67
008230809-04	OBS	No	173.937364	263.354229	1377.2	2.938	9.0	5.6	0.87	5872	3.28	2.44
008230809-05	OBS	No	580.104195	301.984575	1357.8	10.284	8.2	5.7	0.87	5872	3.71	0.49

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008230809-01	OBS	FP	0.43	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE
008230809-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE
008230809-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
008230809-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
008230809-05	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS—HALO_GHOST

**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.

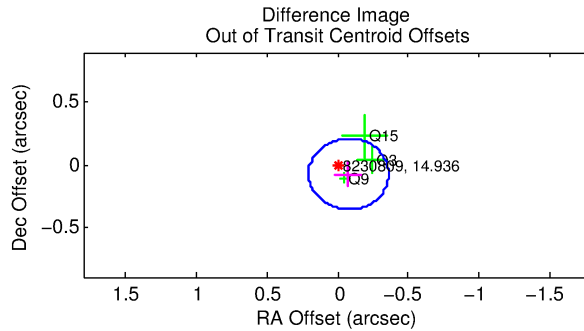
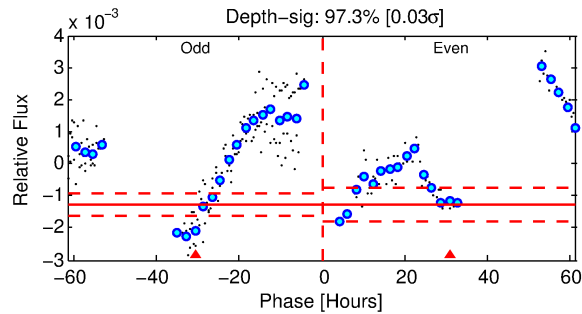
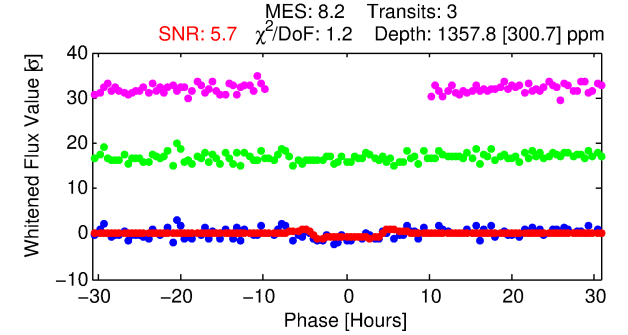
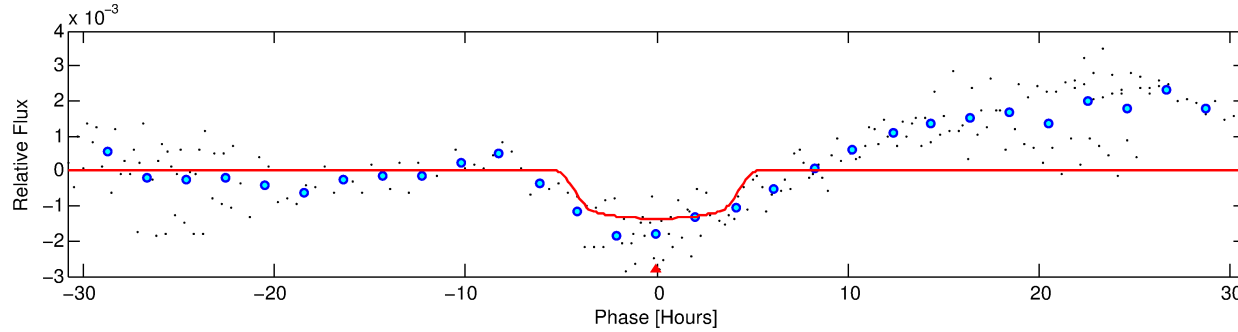
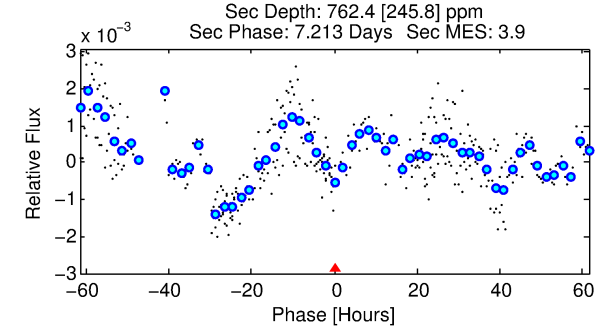
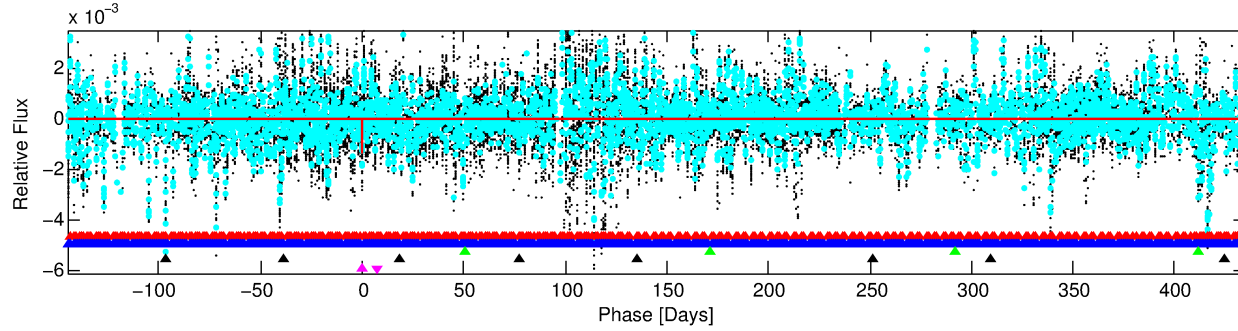
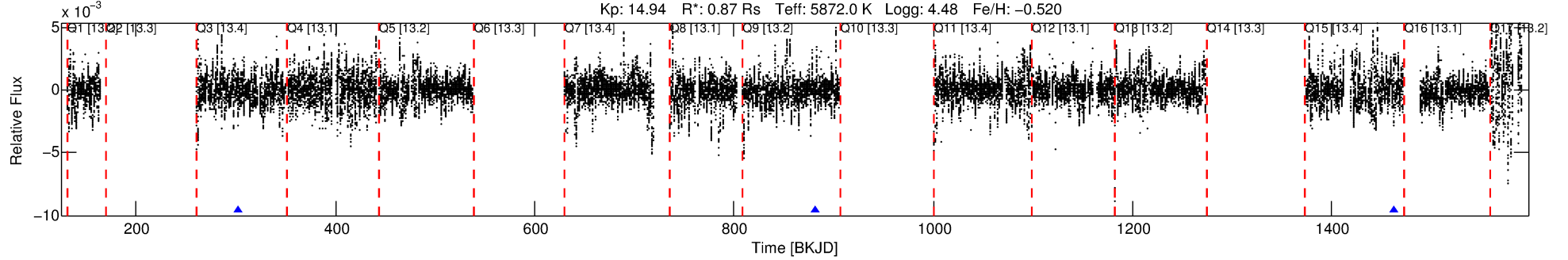
## Ephemeris Match Information For 008230809-05

No Significant Match Found

# DV One-Page Summary

KIC: 8230809 Candidate: 5 of 5 Period: 580.104 d  
KOI: K06055 Corr: No Ephemeris Match

Kp: 14.94 R\*: 0.87 Rs Teff: 5872.0 K Logg: 4.48 Fe/H: -0.520



## DV Fit Results:

Period = 580.10420 [0.01402] d  
Epoch = 301.9846 [0.0180] BKJD  
Rp/R\* = 0.0393 [0.0055]  
a/R\* = 235.52 [81.18]  
b = 0.88 [0.08]  
Seff = 0.49 [0.17]  
Teq = 213 [18] K  
Rp = 3.71 [1.08] Re  
a = 1.2795 [0.2735] AU  
Ag = 49764.80 [26280.44] [1.89σ]  
Teffp = 4924 [551] K [8.54σ]

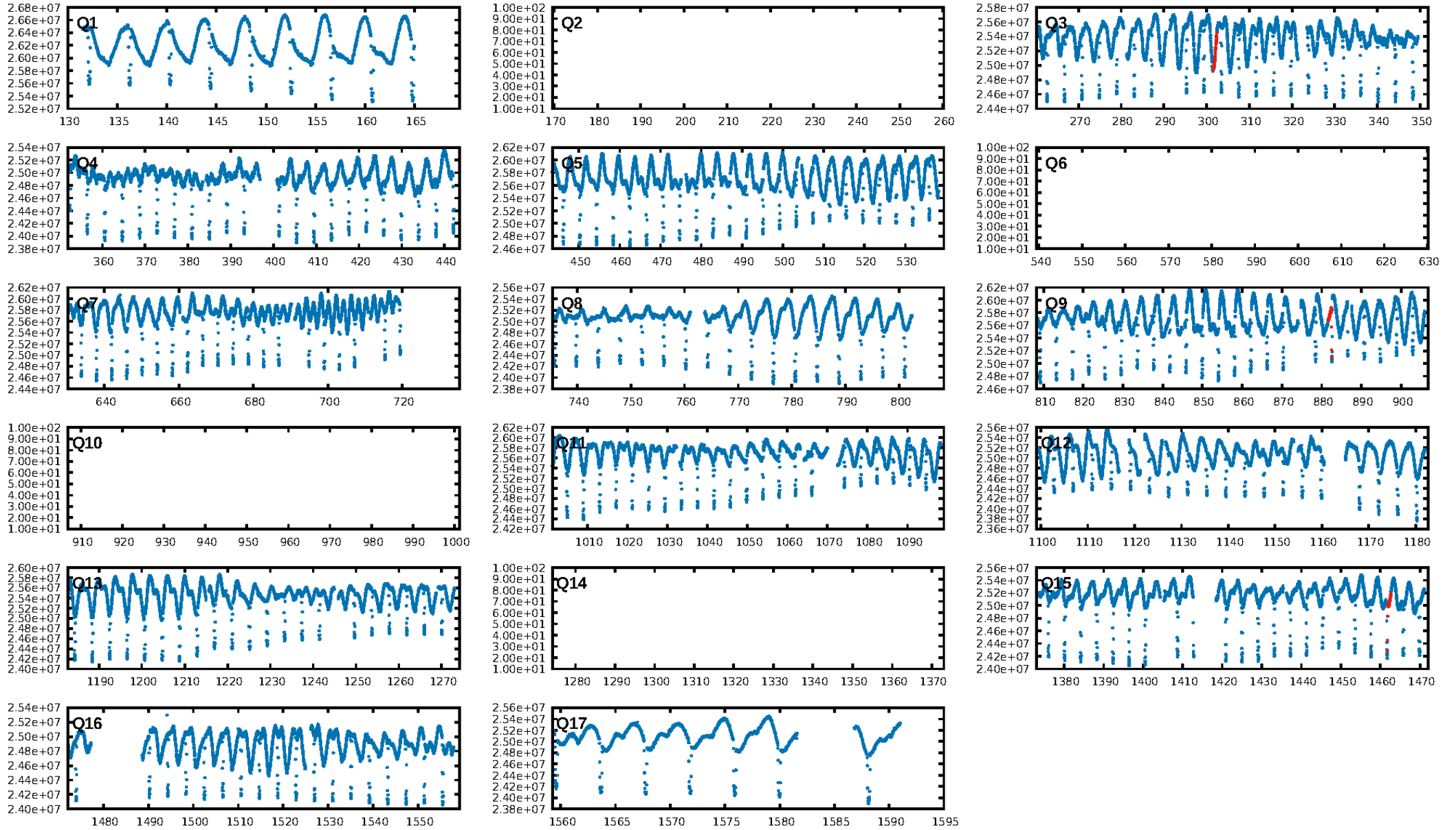
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [202.01σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 64.7%  
ModelChiSquareGof-sig: 96.5%  
**Bootstrap-pfa: 3.74e-08**  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -0.1162  
Centroid-sig: 30.5%  
Centroid-so: 0.843 arcsec [0.67σ]  
OotOffset-rm: 0.109 arcsec [1.15σ]  
OotOffset-st: 0/2/0/1 [3]  
KicOffset-rm: 0.196 arcsec [2.08σ]  
KicOffset-st: 0/2/0/1 [3]  
DiffImageQuality-fgm: 0.33 [1/3]  
DiffImageOverlap-fno: 0.00 [0/3]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 19:08:26 Z

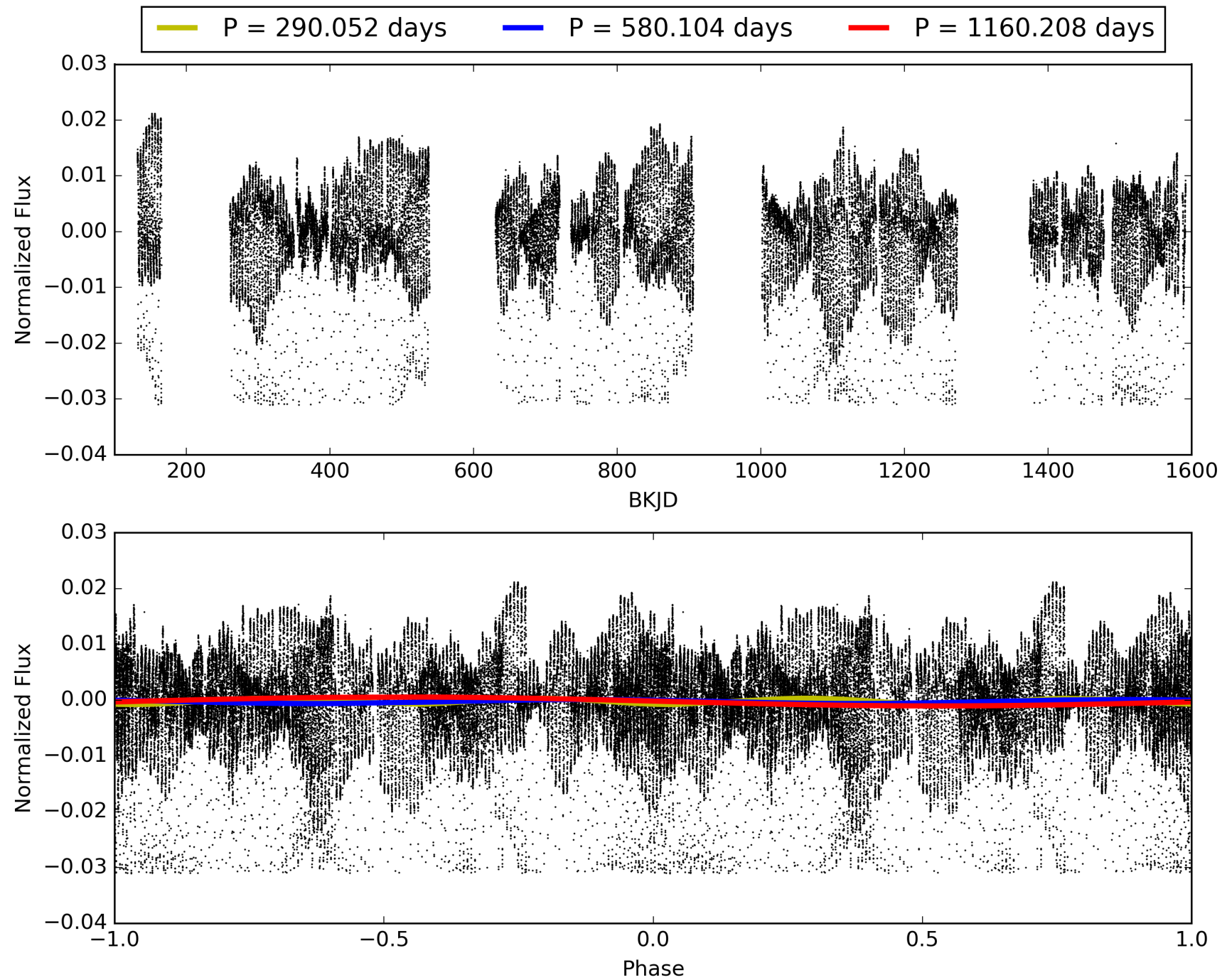
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 008230809-05, PDC Light Curves



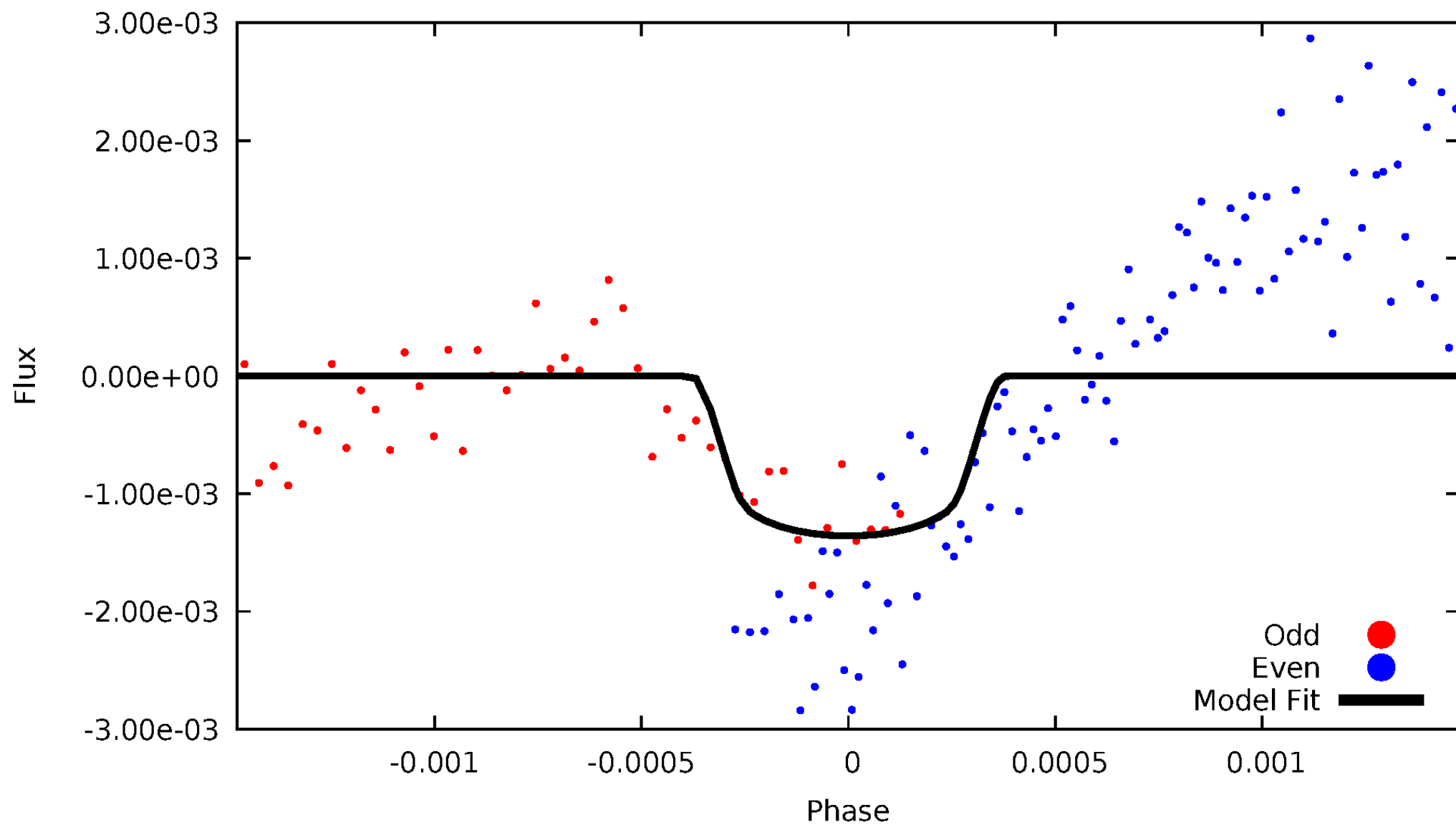


TCE 008230809-05



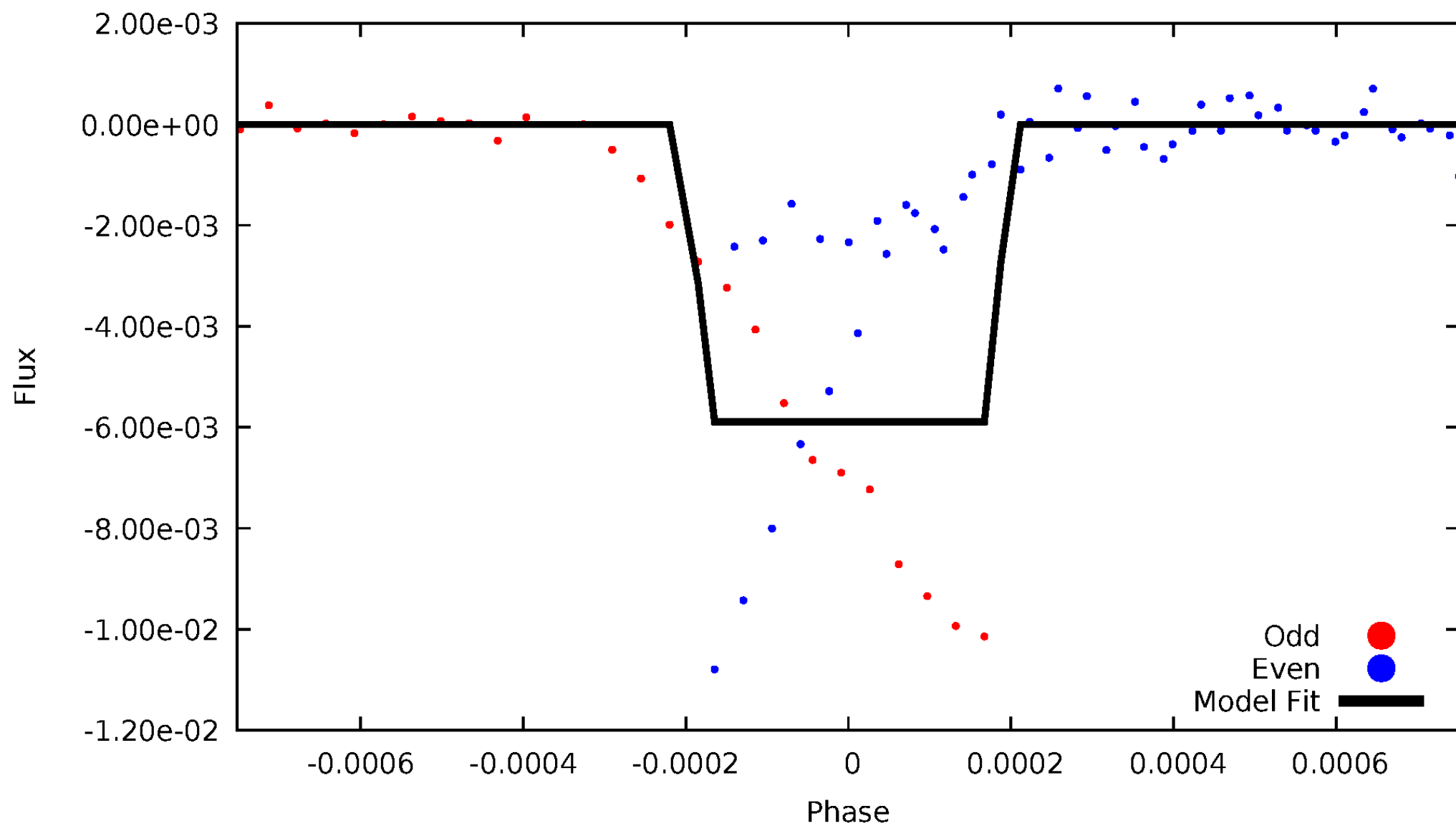
# DV Odd/Even

TCE 008230809-05



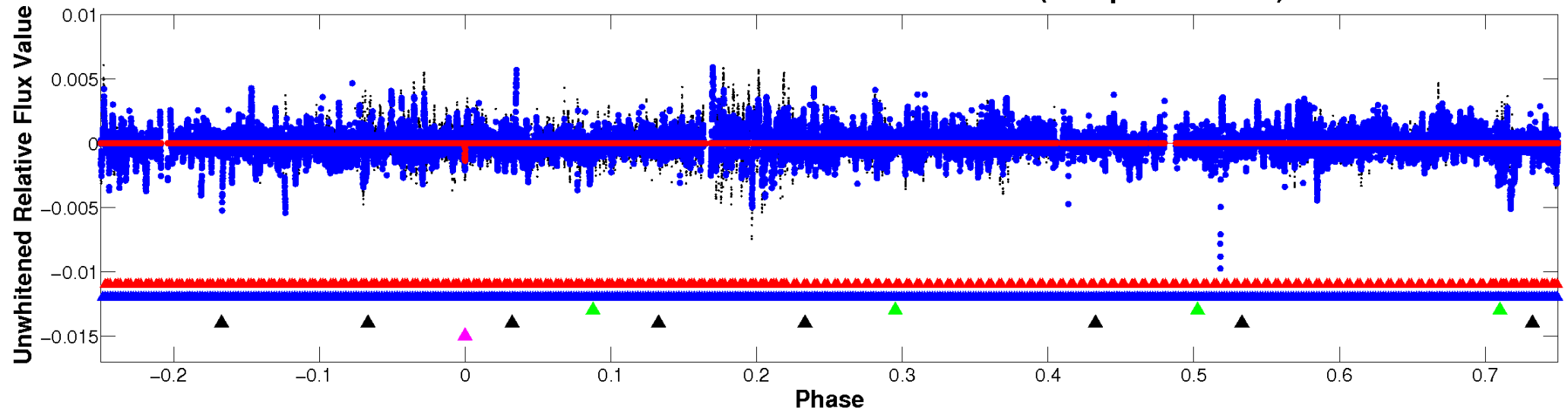
# ALT Odd/Even

TCE 008230809-05

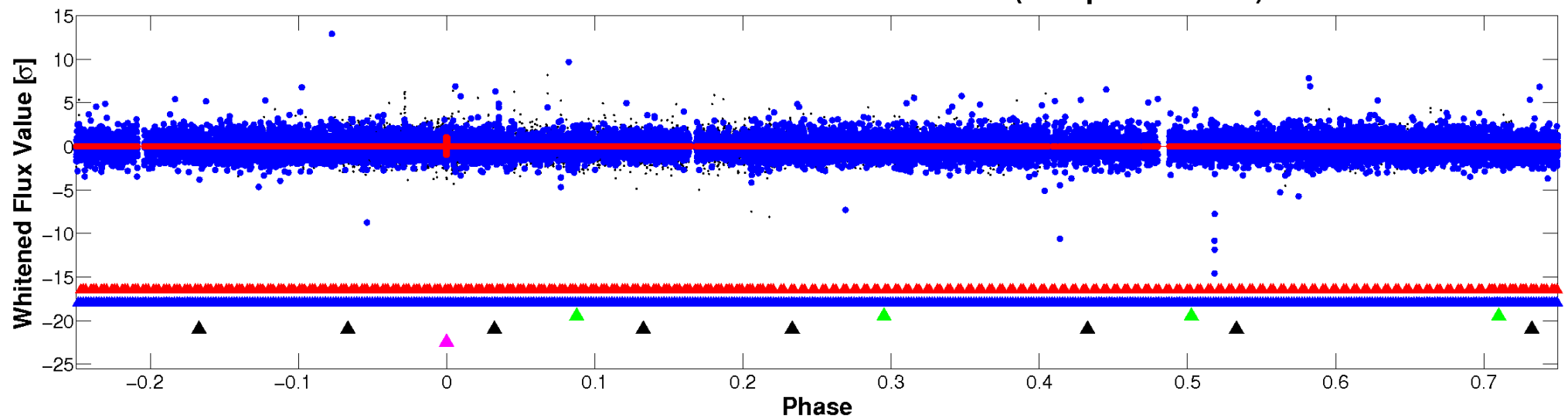


# Non-Whitened Vs. Whitened Light Curve

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

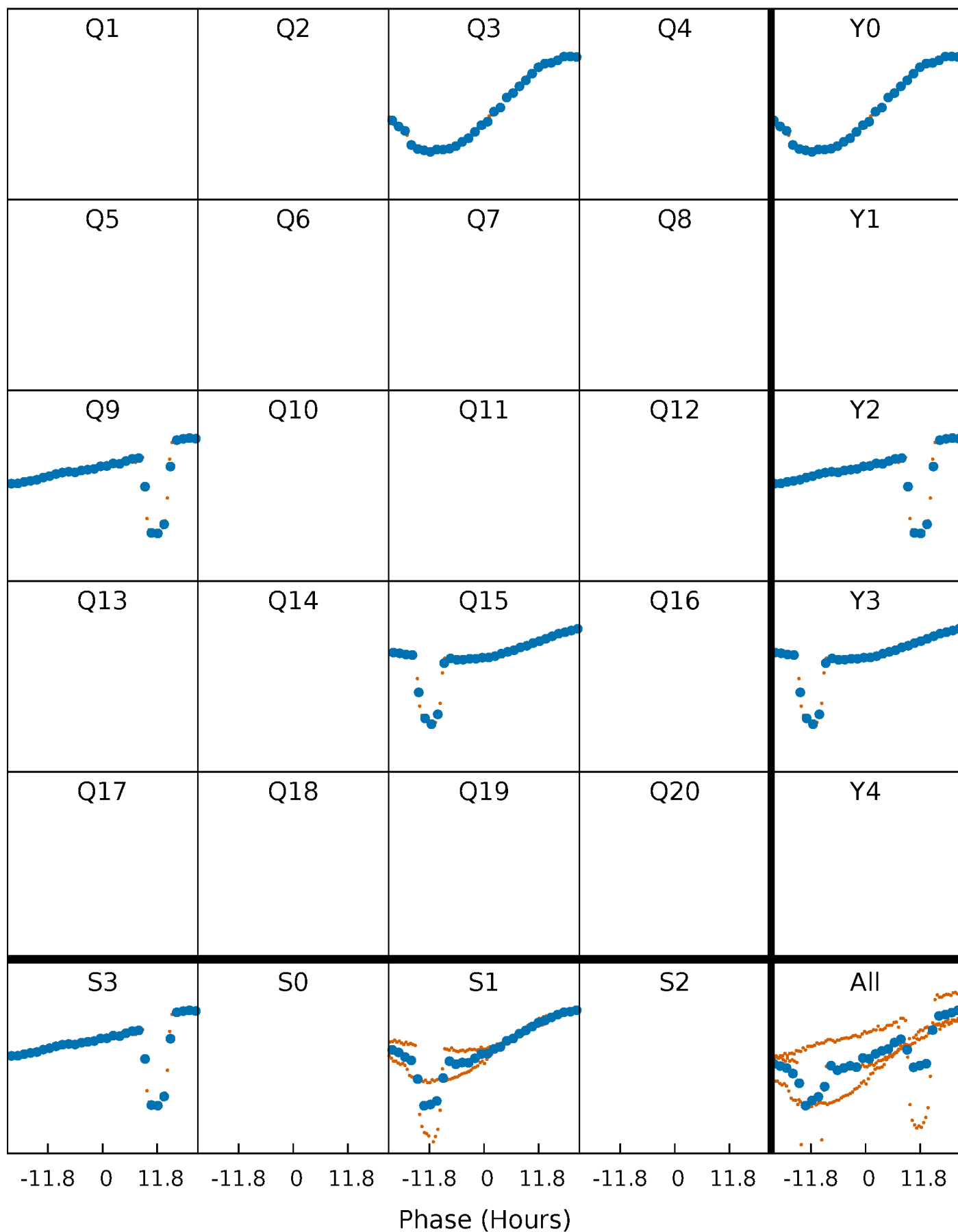


Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)



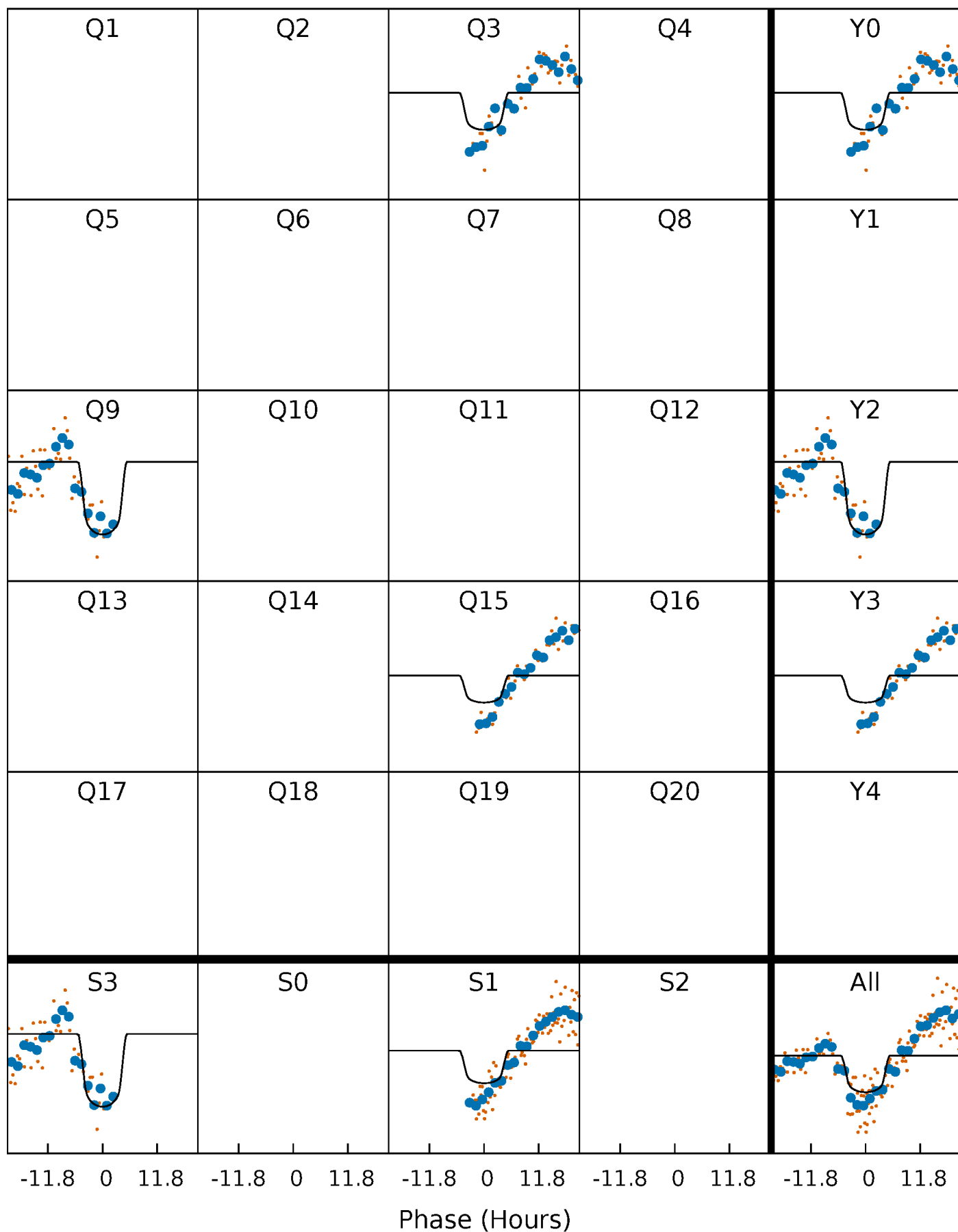
# PDC Quarter-Phased Transit Curves

TCE 008230809-05     $P=580.104195$  Days     $T_0=301.984575$  (BKJD)



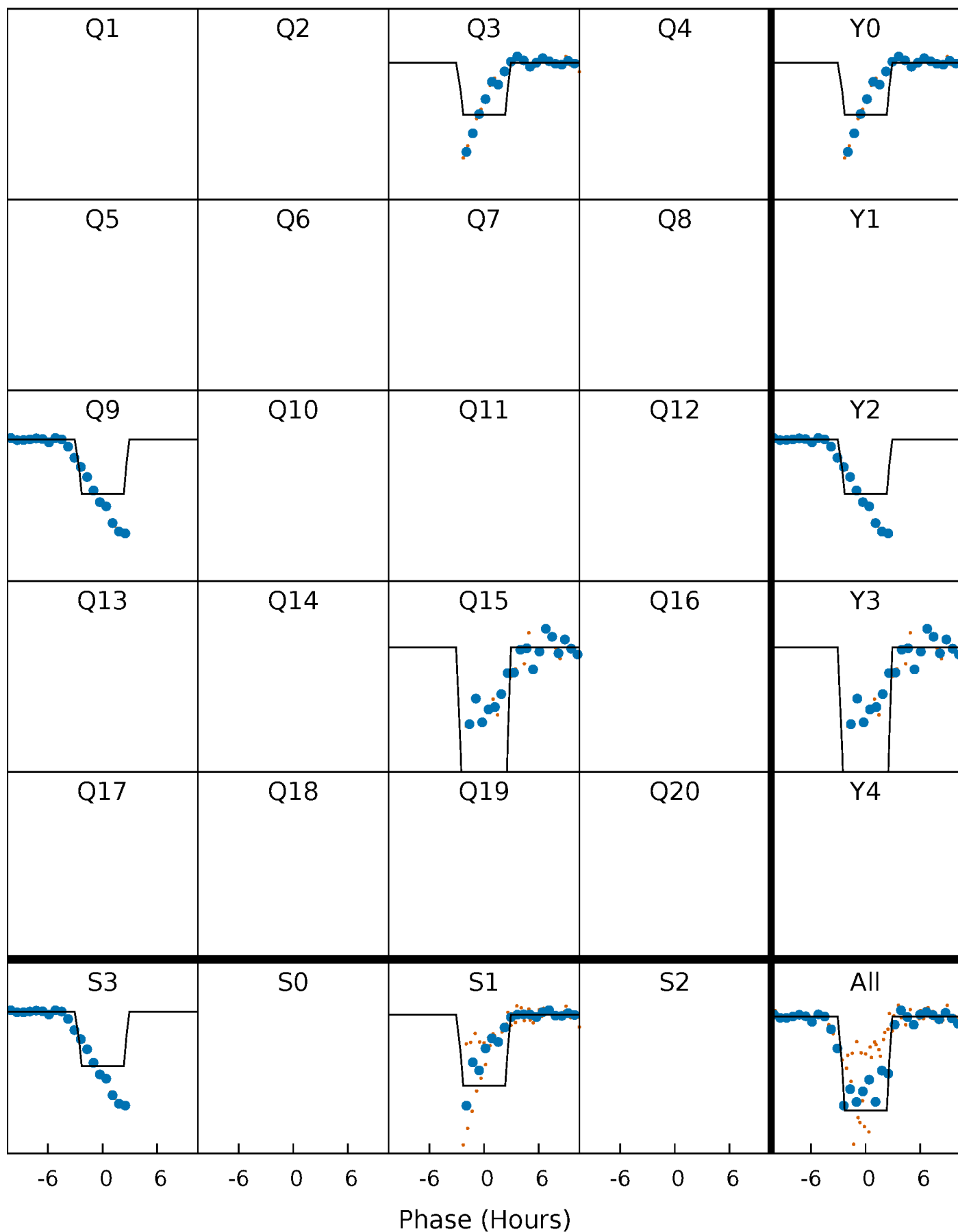
# DV Quarter-Phased Transit Curves

TCE 008230809-05     $P=580.104195$  Days     $T_0=301.984575$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

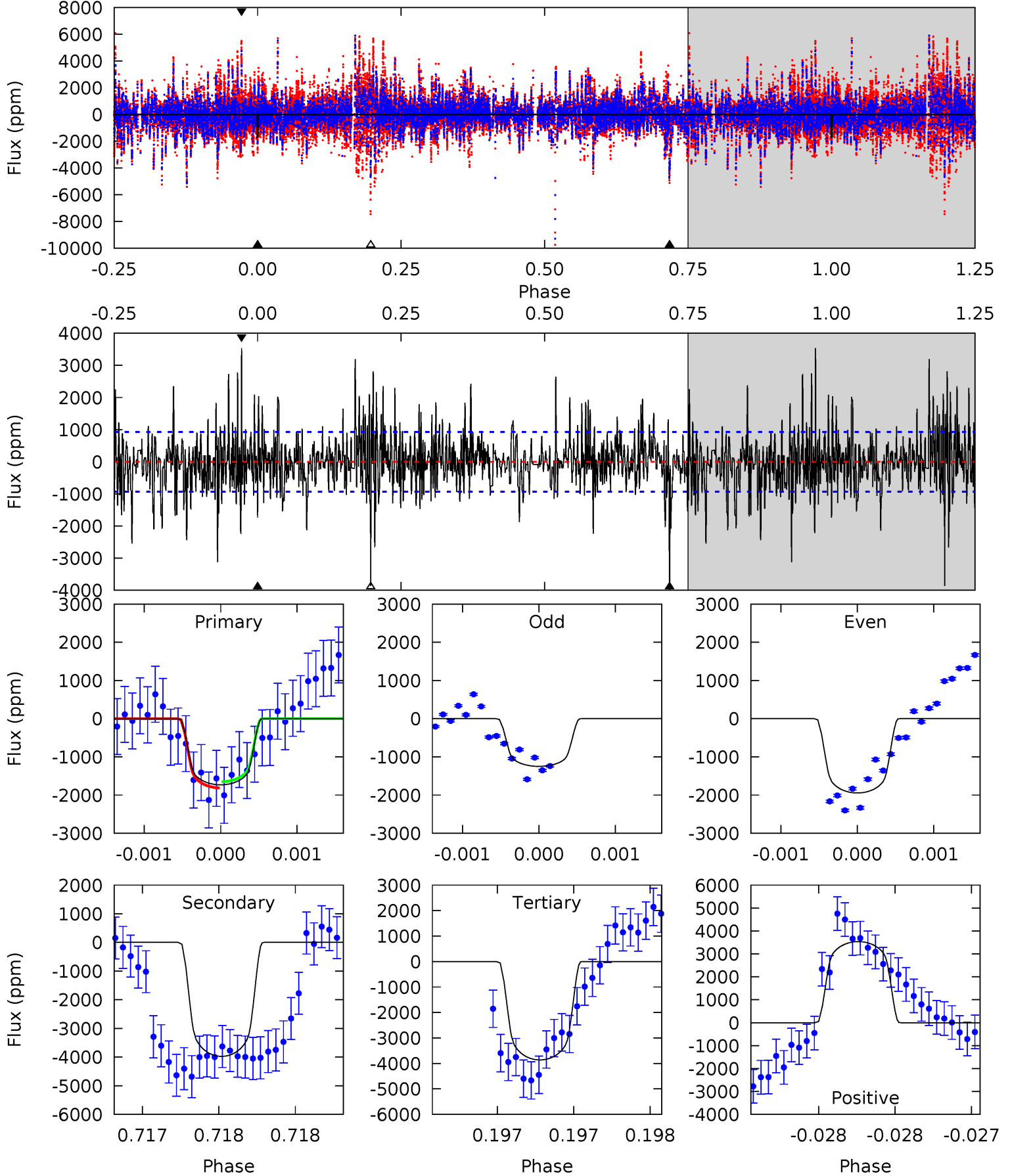
TCE 008230809-05     $P=580.142824$  Days     $T_0=301.921424$  (BKJD)



# DV Model-Shift Uniqueness Test

008230809-05, P = 580.104195 Days, E = 301.984575 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	23.6	22.9	21.0	5.51	3.39	4.28	-12.6	-10.7	0.68	2.60	1.92	1.00	0.47	0.48

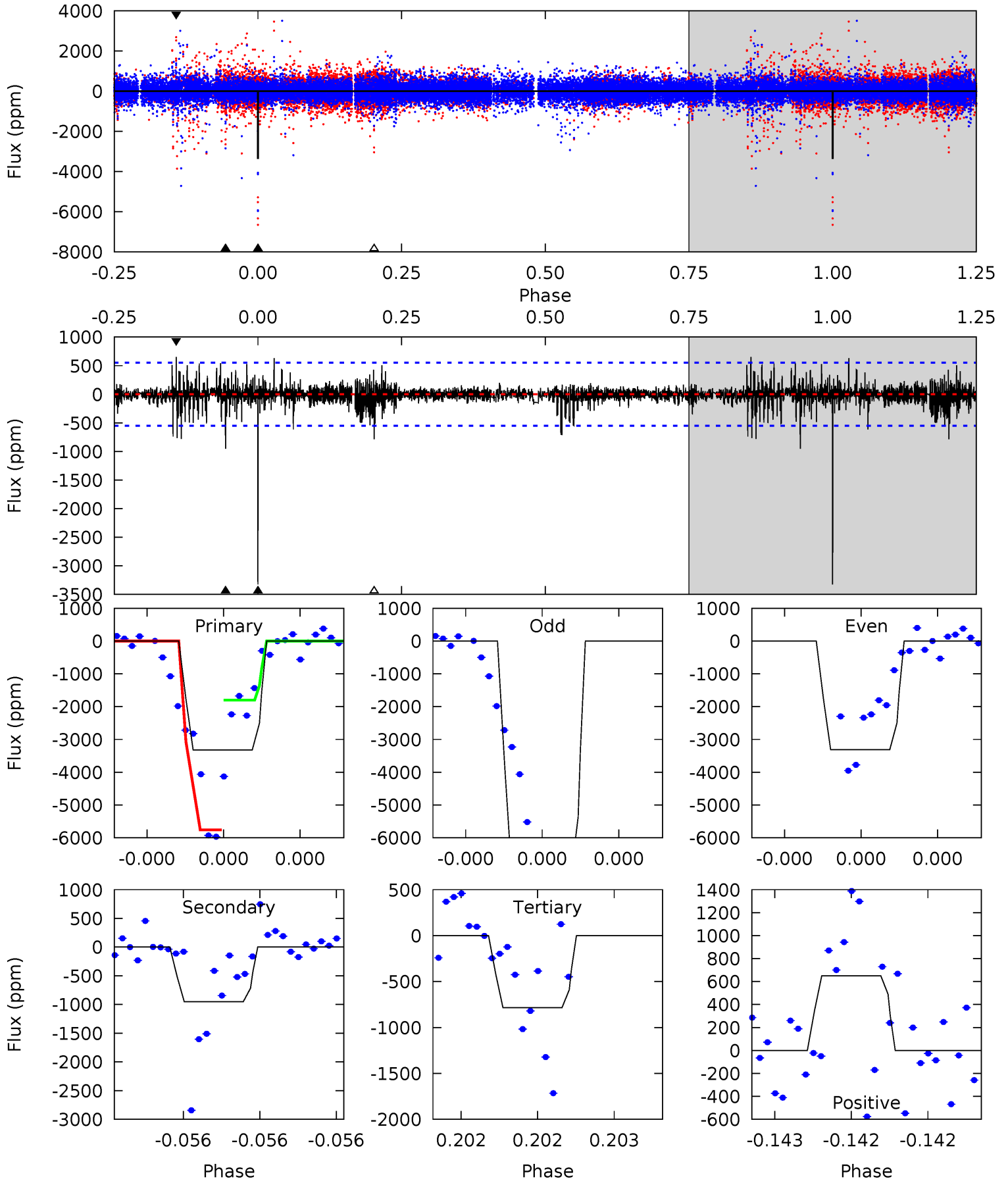




# Alt Model-Shift Uniqueness Test

008230809-05, P = 580.142824 Days, E = 301.921424 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
33.9	9.71	8.00	6.63	5.62	3.56	1.01	25.9	27.3	1.70	3.07	23.8	0.93	0.16	19.4



### Stellar Parameters For KIC 008230809

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5872^{+177}_{-195}$	$4.481^{+0.091}_{-0.169}$	$-0.520^{+0.300}_{-0.300}$	$0.867^{+0.221}_{-0.102}$	$0.830^{+0.105}_{-0.070}$	$1.791^{+0.710}_{-0.823}$
	+3%/-3%	+2%/-4%	+58%/-58%	+25%/-12%	+13%/-8%	+40%/-46%
Source	KIC0	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 008230809-05 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-3975 \pm 169$	$3.84^{+0.73}_{-0.67}$	$301^{+20}_{-16}$	$7539^{+855}_{-638}$	$246103^{+111731}_{-72561}$
Alt.	$-950 \pm 98$	$7.43^{+1.01}_{-0.89}$	$301^{+19}_{-17}$	$4032^{+149}_{-165}$	$15586^{+4046}_{-3750}$

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

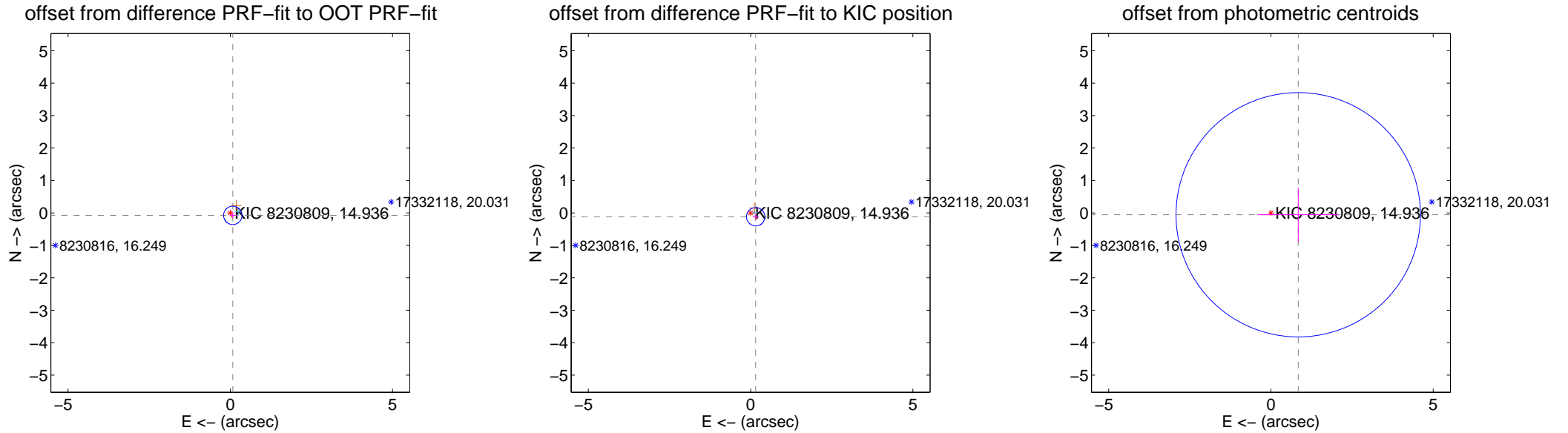
## DV Centroid Data

Supplemental centroid analysis for 008230809-05. Kepler magnitude: 14.94. Transit SNR 5.73

There are 1 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.11 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.109 \pm 0.094$	1.15	$-0.078 \pm 0.093$	$-0.076 \pm 0.096$
PRF-fit source offset from KIC position	$0.196 \pm 0.094$	2.08	$-0.156 \pm 0.093$	$-0.119 \pm 0.096$
photometric centroid source offset	$0.84 \pm 1.26$	0.67	$-0.84 \pm 1.26$	$-0.06 \pm 0.84$



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.

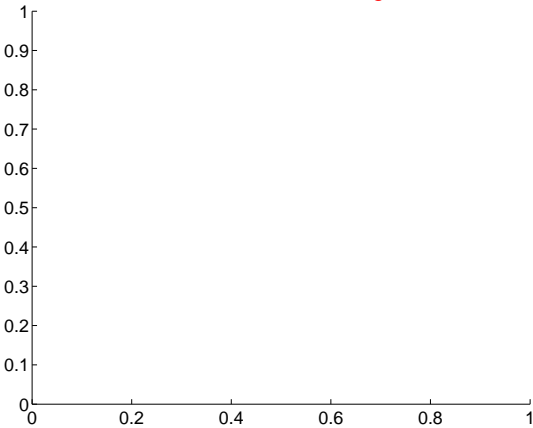
Q1 no difference image



Q1 no OOT image



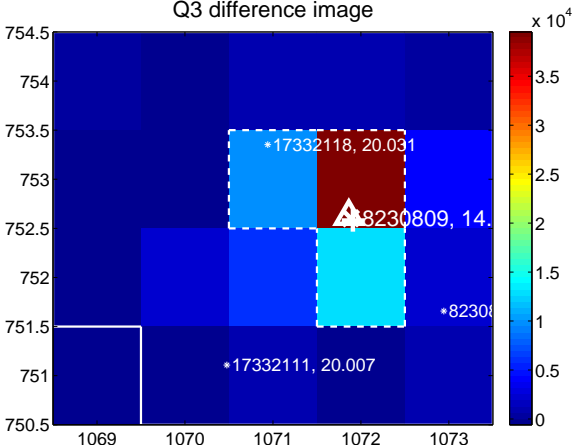
Q2 no difference image



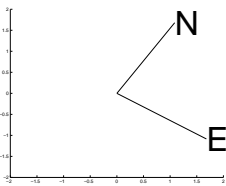
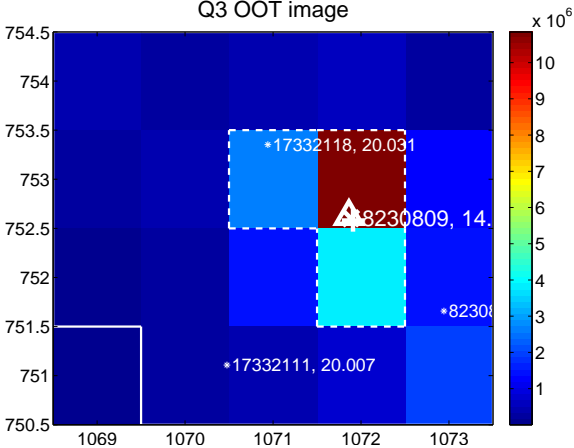
Q2 no OOT image



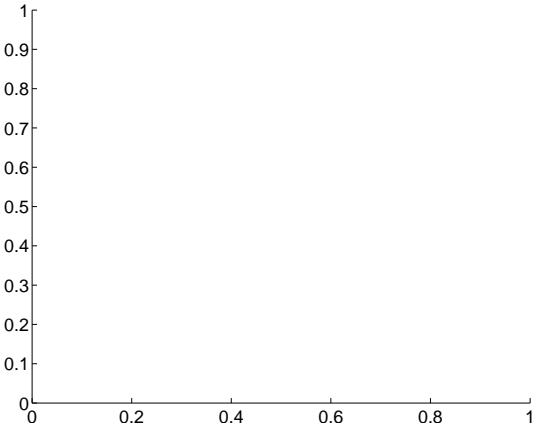
Q3 difference image



Q3 OOT image



Q4 no difference image



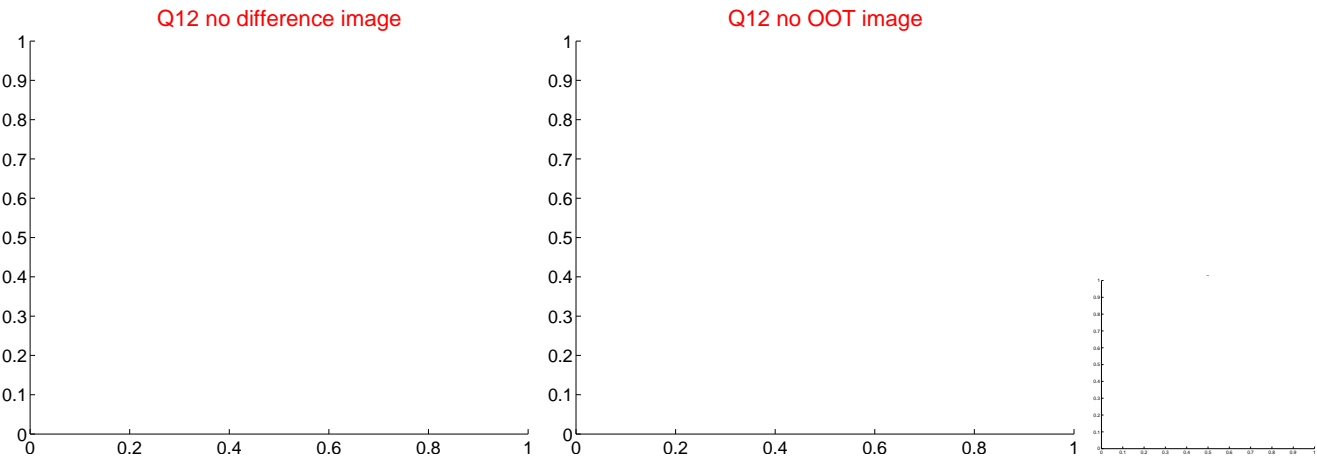
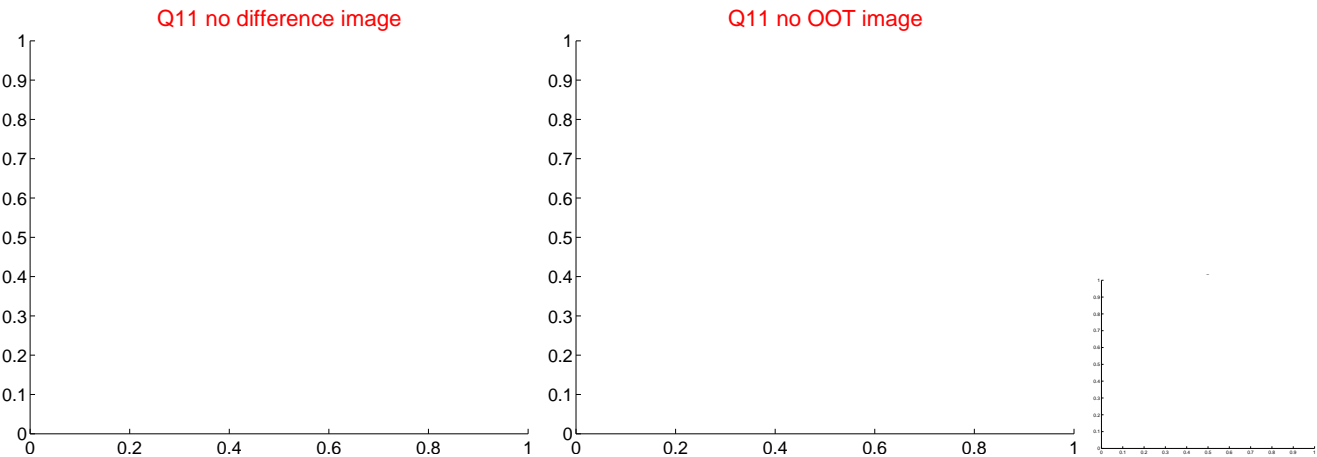
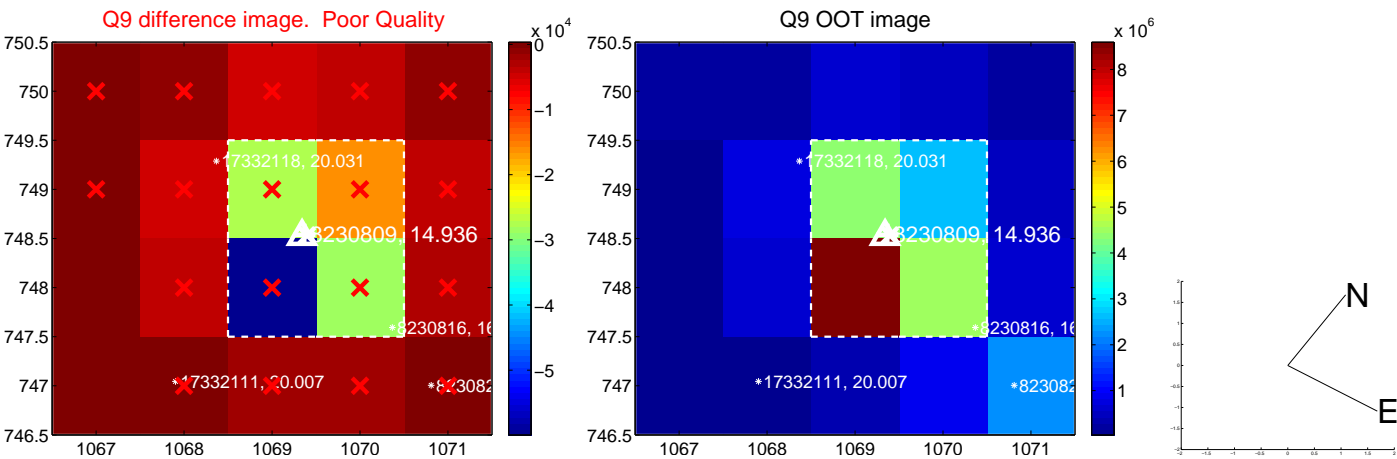
Q4 no OOT image



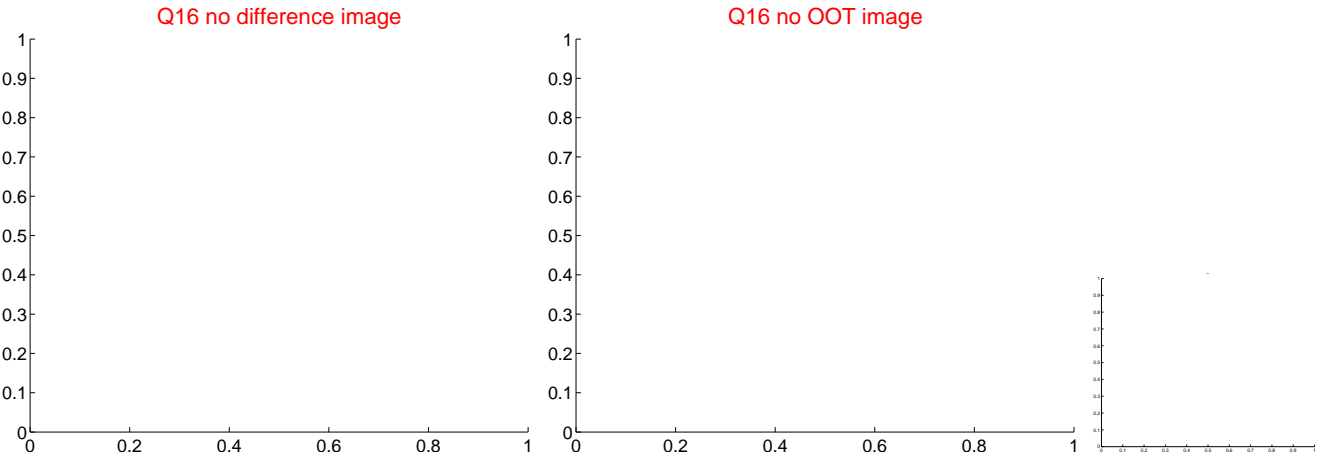
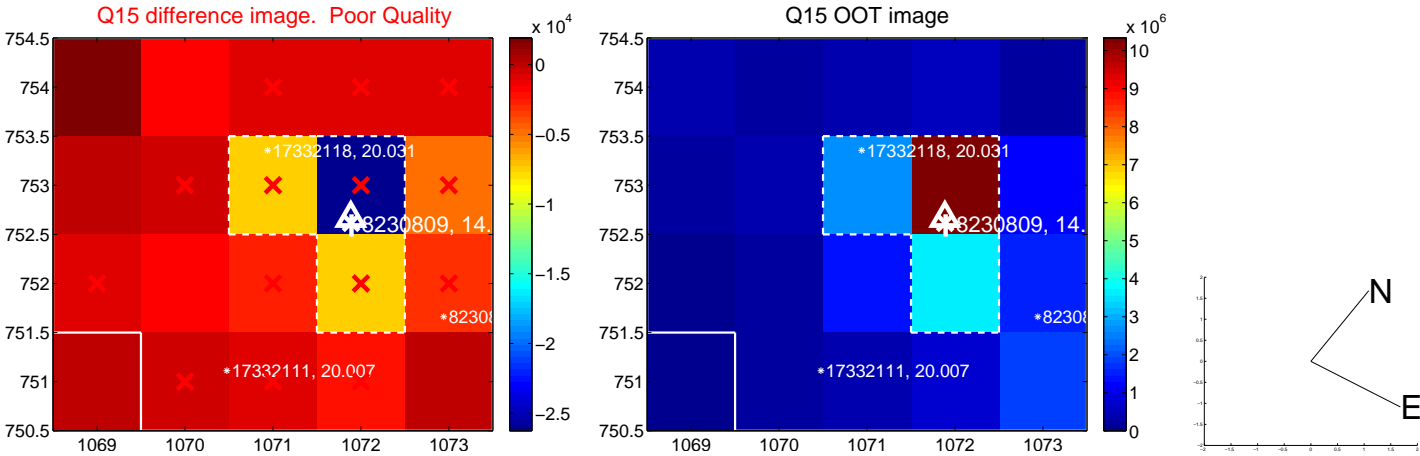
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



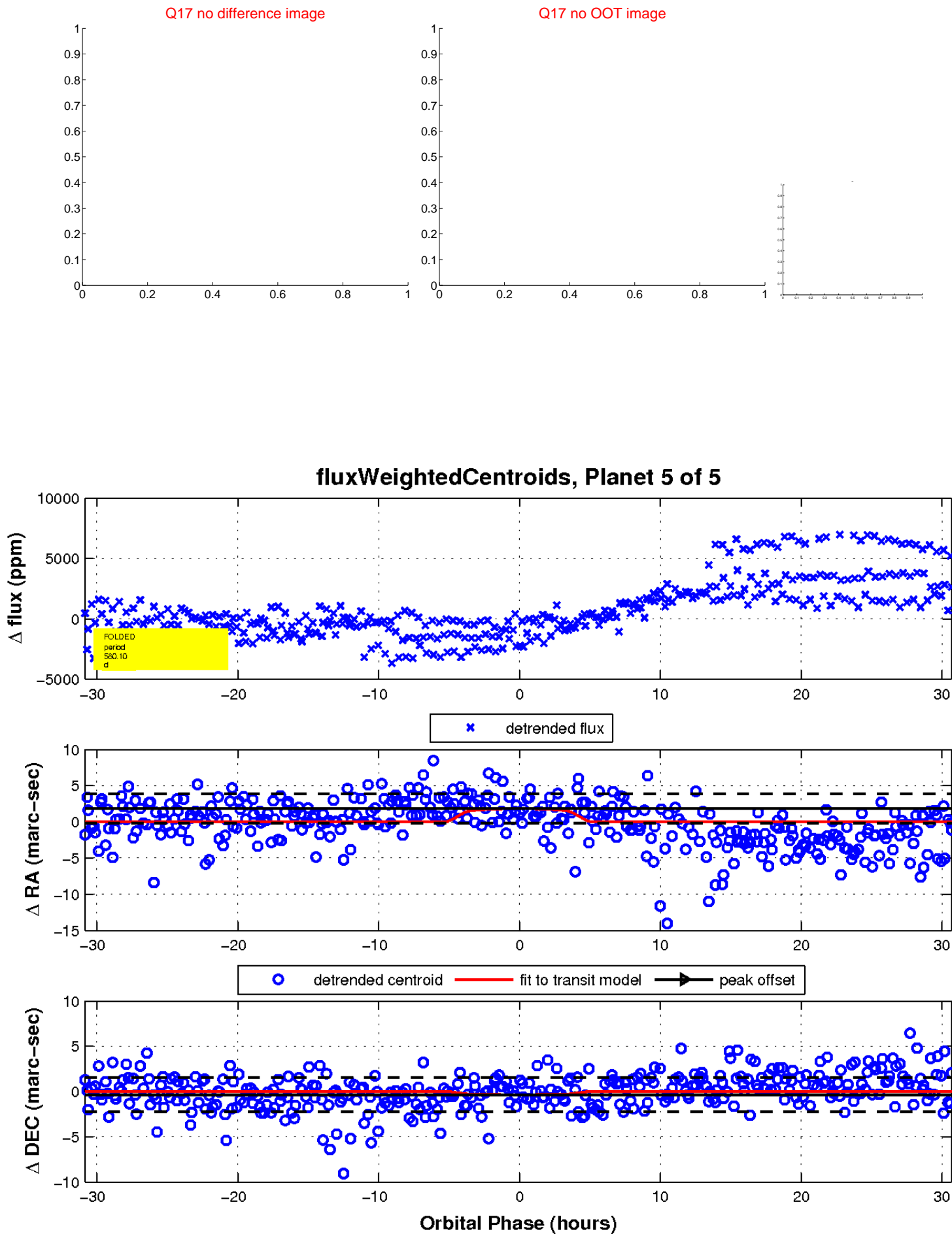
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



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





UKIRT Image

Declination

