

# KIC 005480528

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005480528-02	OBS	No	463.440704	201.789800	1525.2	4.568	18.7	10.2	3.27	5098	12.53	5.38
005480528-03	OBS	No	450.088539	215.311220	601.8	3.789	19.3	4.2	3.27	5098	8.14	5.59
005480528-05	OBS	No	398.751600	312.275239	898.5	4.814	17.2	6.3	3.27	5098	10.27	6.57
005480528-06	OBS	No	396.976392	403.379510	892.9	3.500	18.6	-1.0	3.27	5098	9.60	6.61

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005480528-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
005480528-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
005480528-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—CENT_FEW_DIFFS
005480528-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_ZUMA—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_NOFITS

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

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

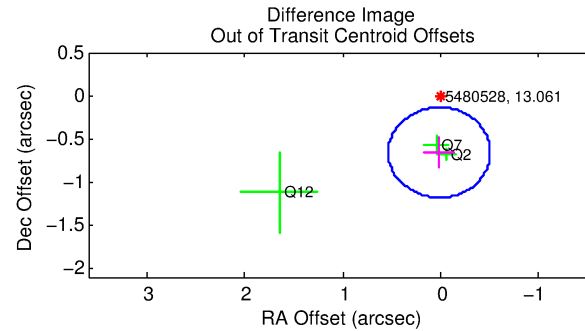
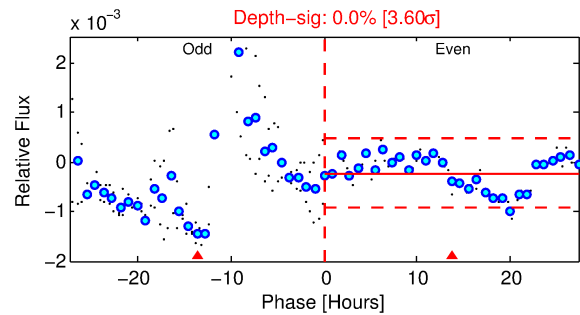
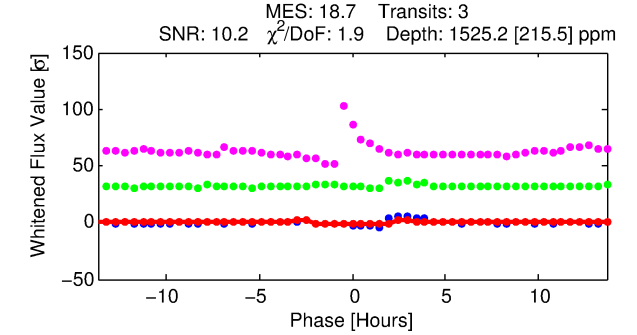
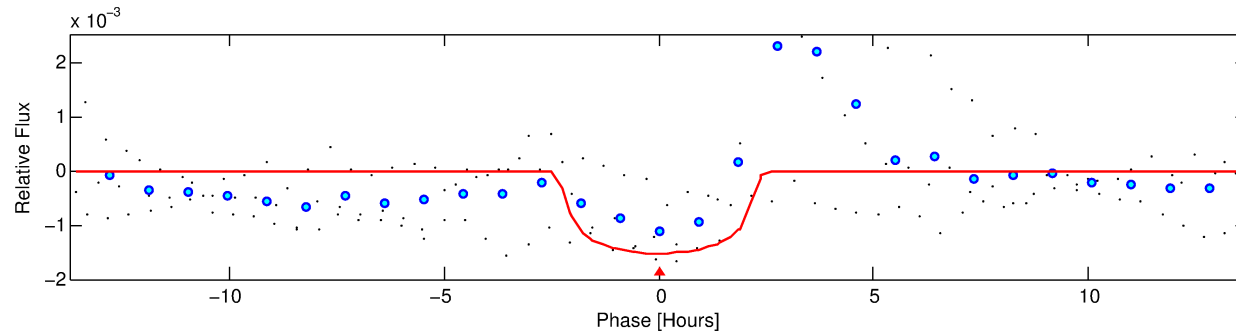
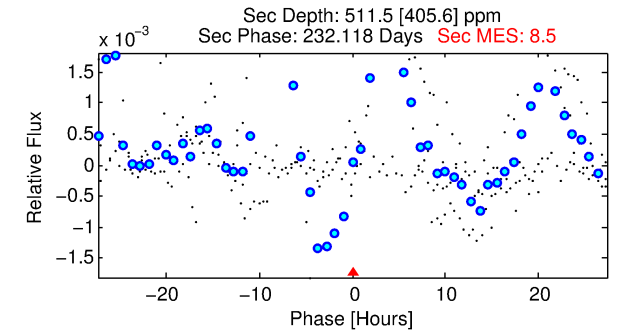
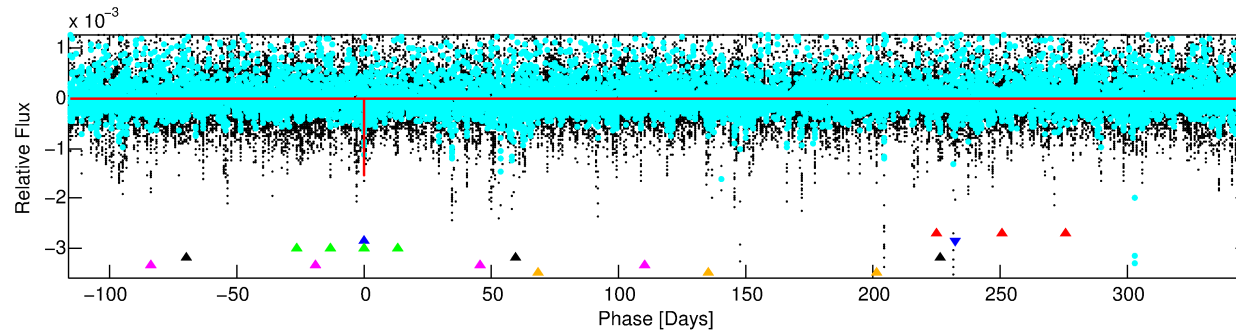
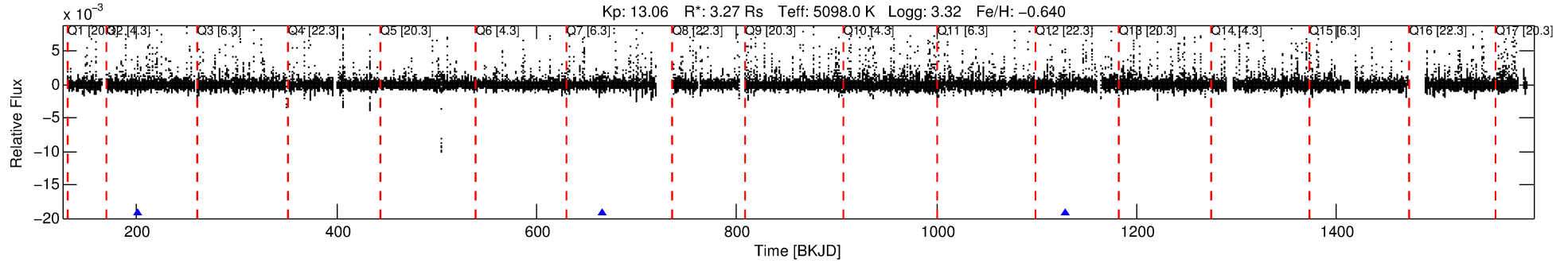
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 005480528-02

No Significant Match Found

# DV One-Page Summary

KIC: 5480528 Candidate: 2 of 6 Period: 463.441 d



## DV Fit Results:

Period = 463.44070 [0.00349] d  
Epoch = 201.7898 [0.0042] BKJD  
Rp/R\* = 0.0351 [0.1013]  
a/R\* = 802.16 [9068.51]  
b = 0.00 [54573.49]  
Seff = 5.38 [4.18]  
Teq = 388 [75] K  
Rp = 12.53 [37.33] Re  
a = 1.0981 [0.6303] AU  
Ag = 2162.53 [12713.94] [0.17 $\sigma$ ]  
Teffp = 4094 [5966] K [0.62 $\sigma$ ]

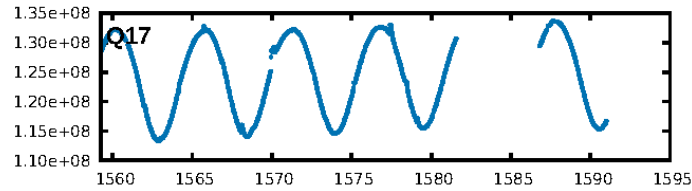
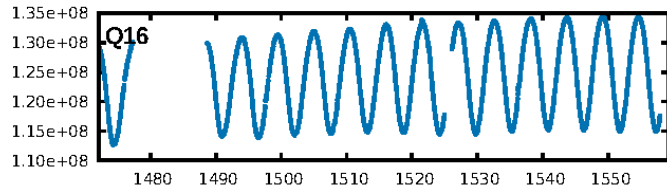
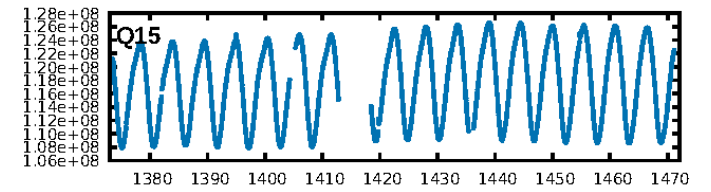
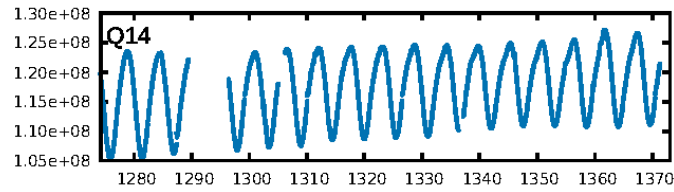
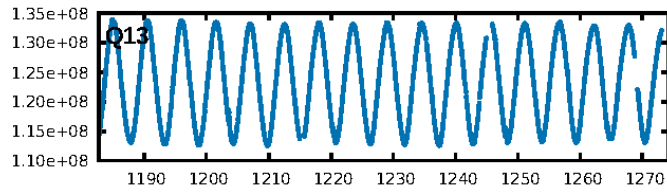
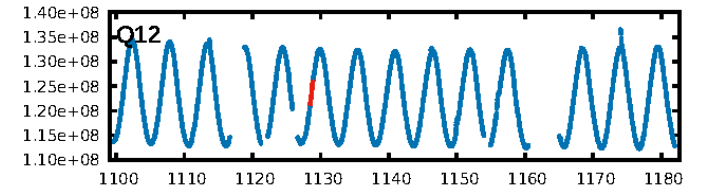
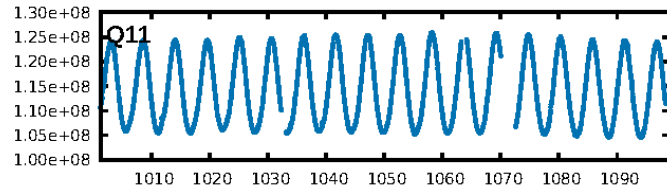
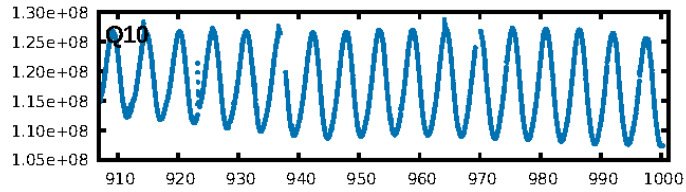
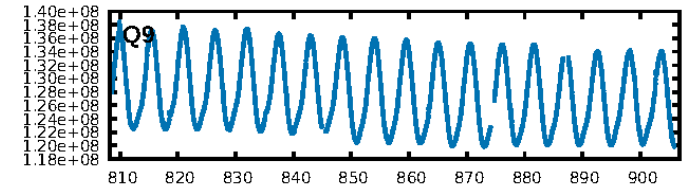
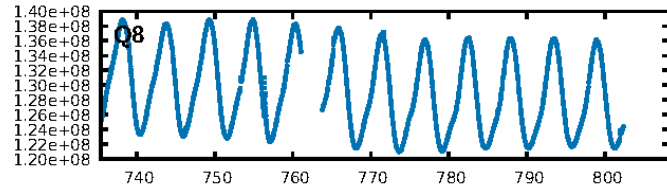
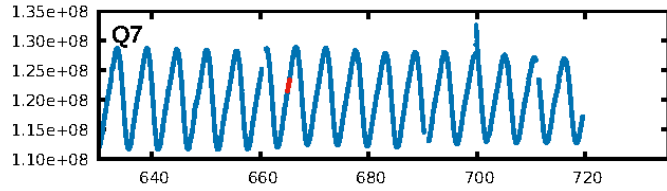
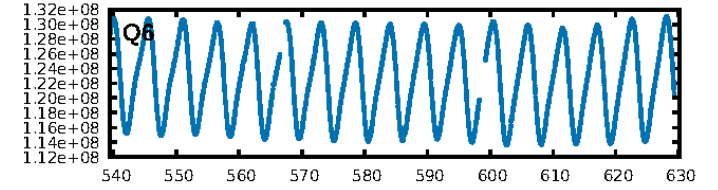
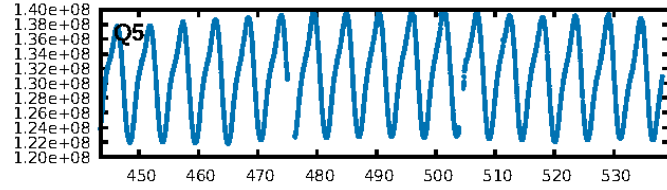
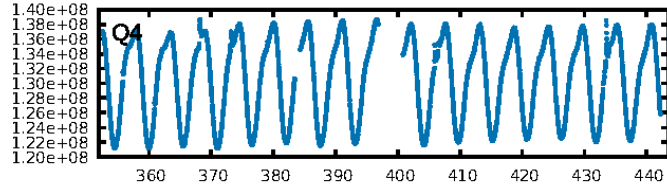
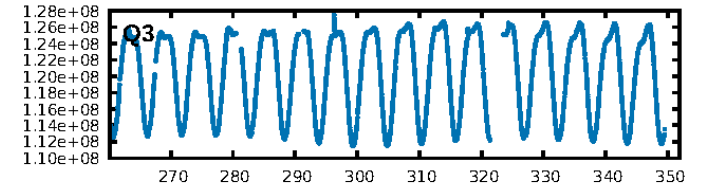
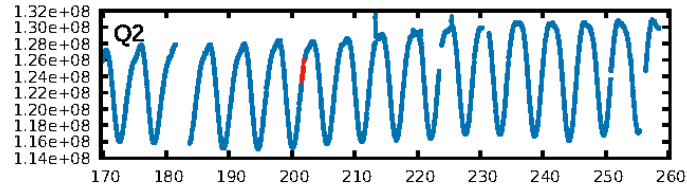
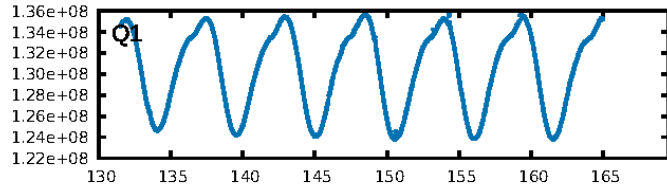
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [53.99 $\sigma$ ]  
LongPeriod-sig: 100.0% [768.94 $\sigma$ ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 2.8%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 1.697  
Centroid-sig: 53.3%  
Centroid-so: 1.944 arcsec [0.95 $\sigma$ ]  
OotOffset-rm: 0.660 arcsec [3.80 $\sigma$ ]  
OotOffset-st: 1/1/1/0 [3]  
KicOffset-rm: 0.588 arcsec [2.19 $\sigma$ ]  
KicOffset-st: 1/1/1/0 [3]  
DiffImageQuality-fgm: 0.33 [1/3]  
DiffImageOverlap-fno: 0.67 [2/3]

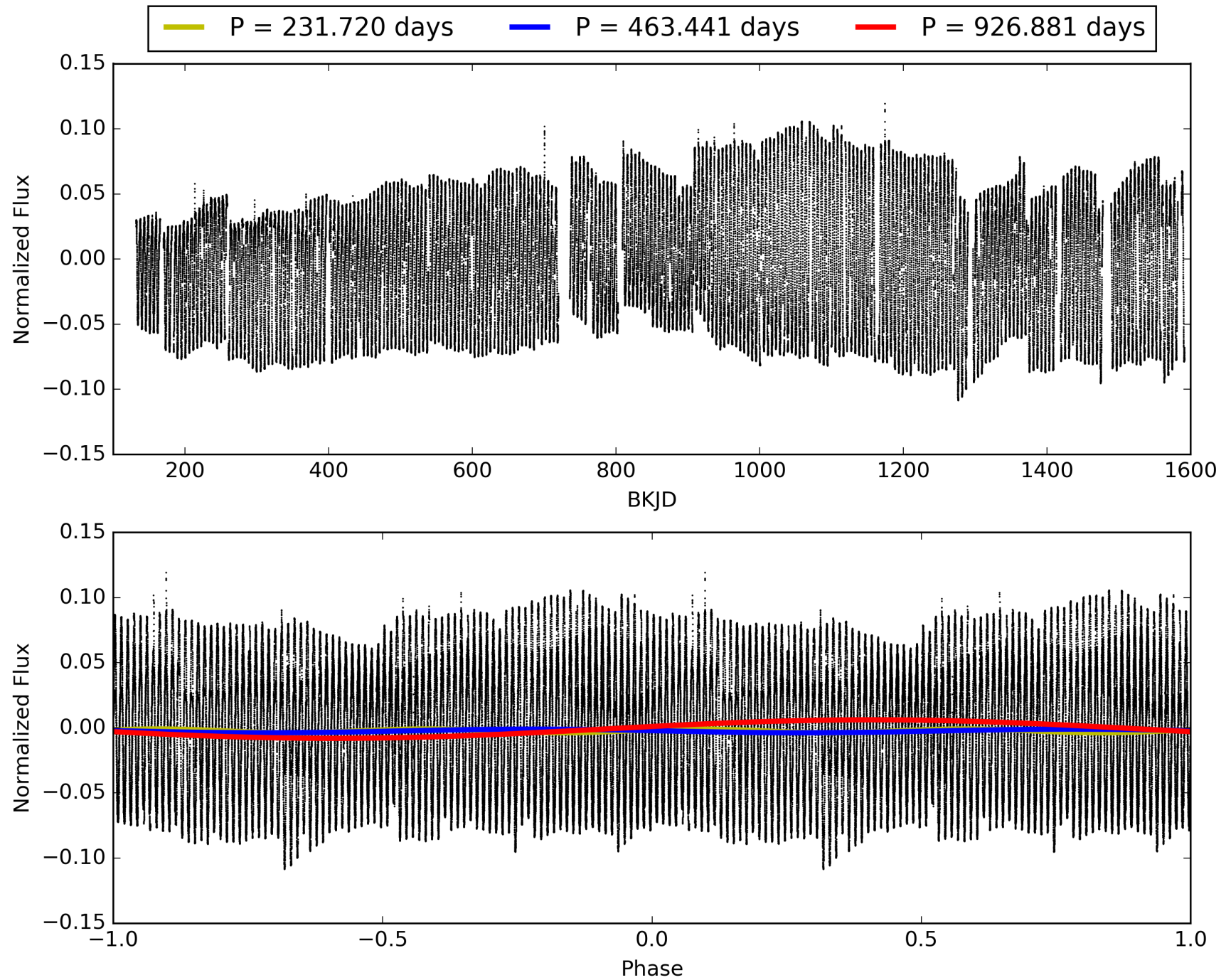
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 16:16:25 Z

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

# TCE 005480528-02, PDC Light Curves

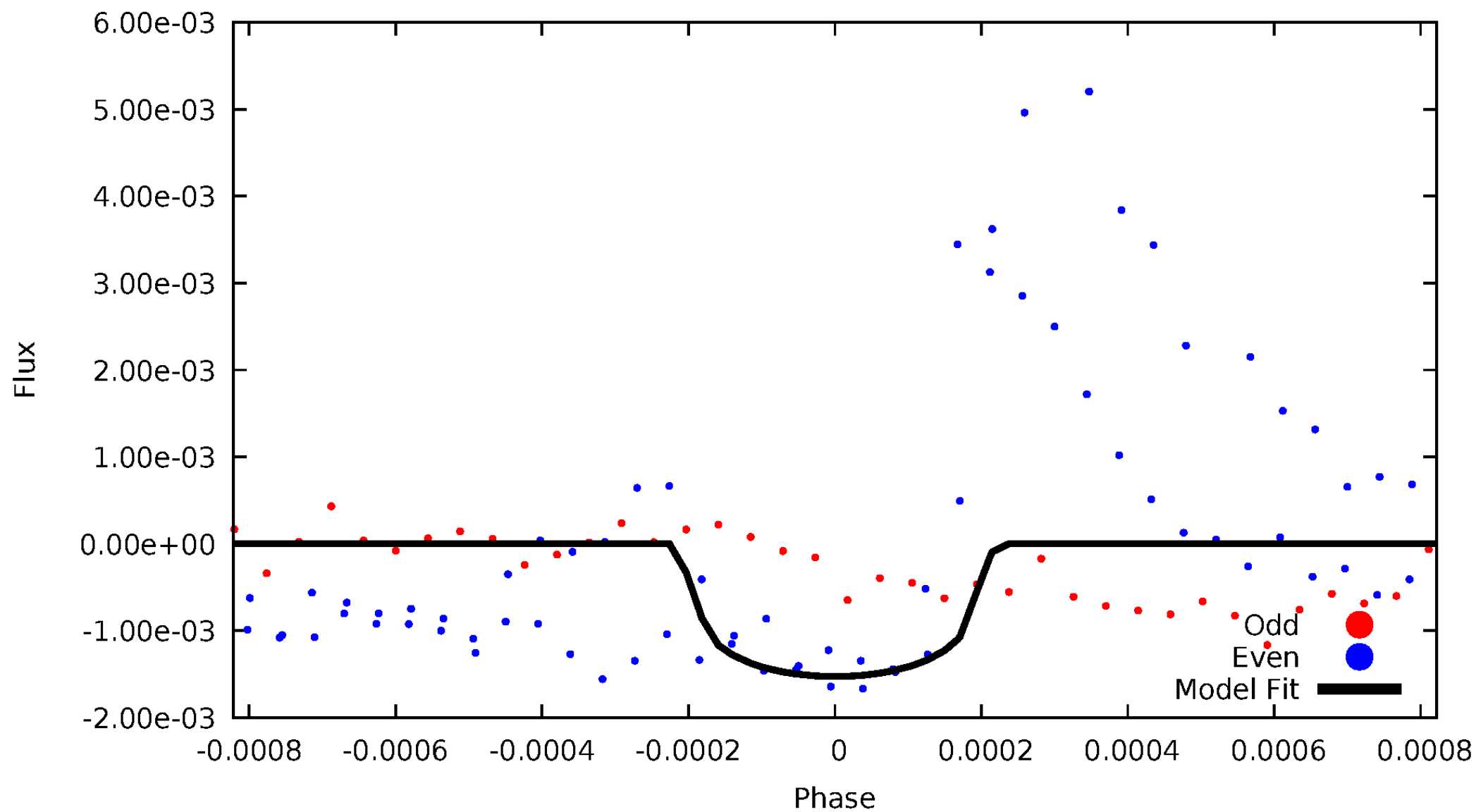


TCE 005480528-02



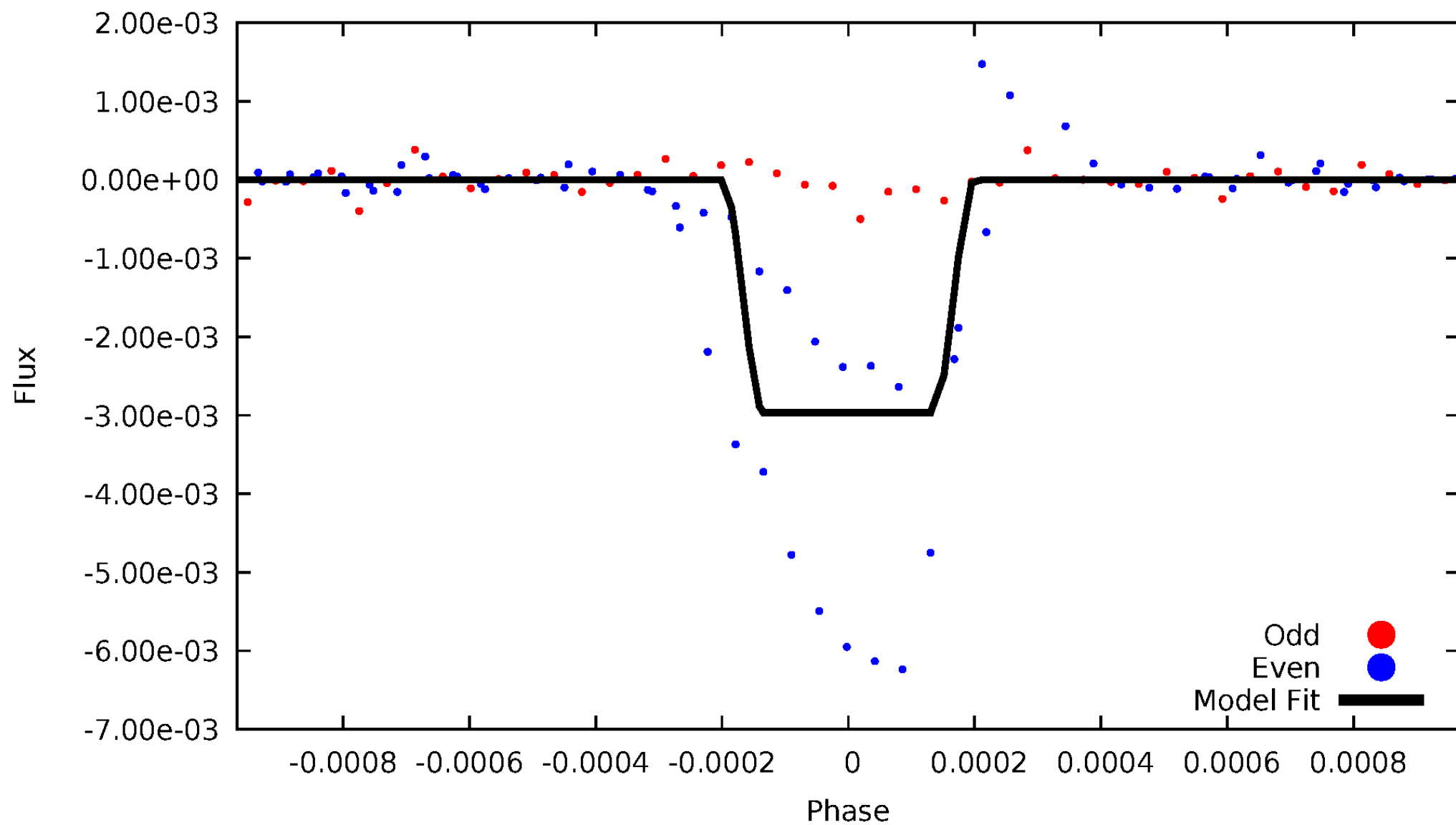
# DV Odd/Even

TCE 005480528-02



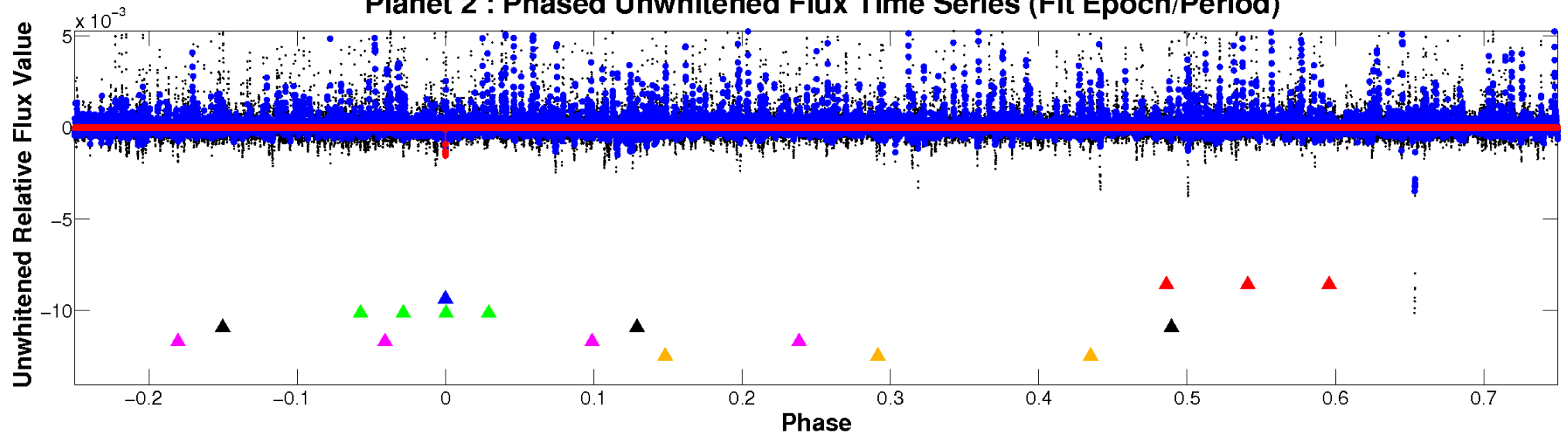
# ALT Odd/Even

TCE 005480528-02

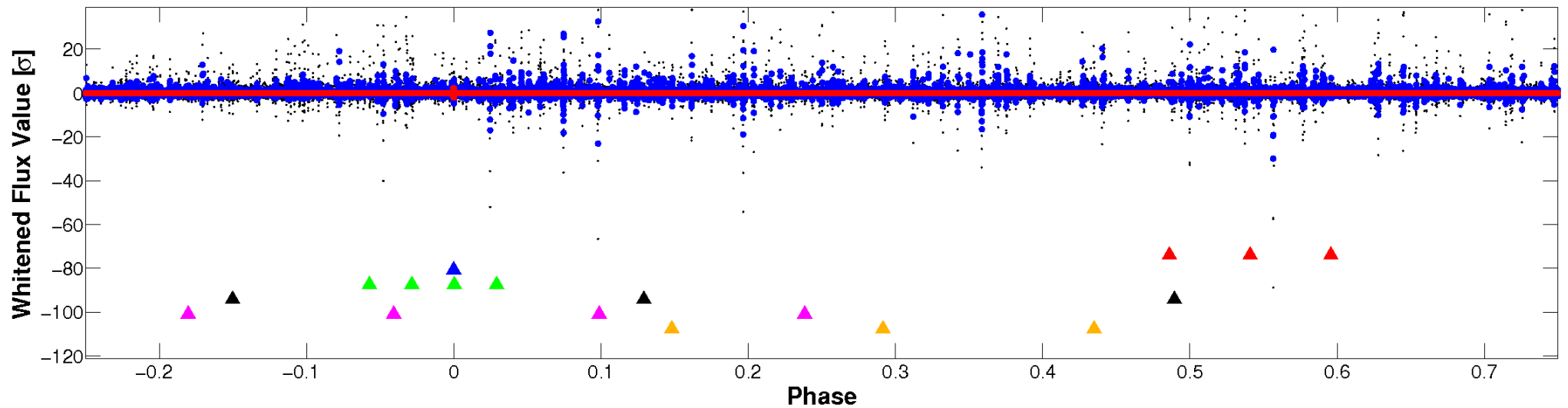


# Non-Whitened Vs. Whitened Light Curve

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

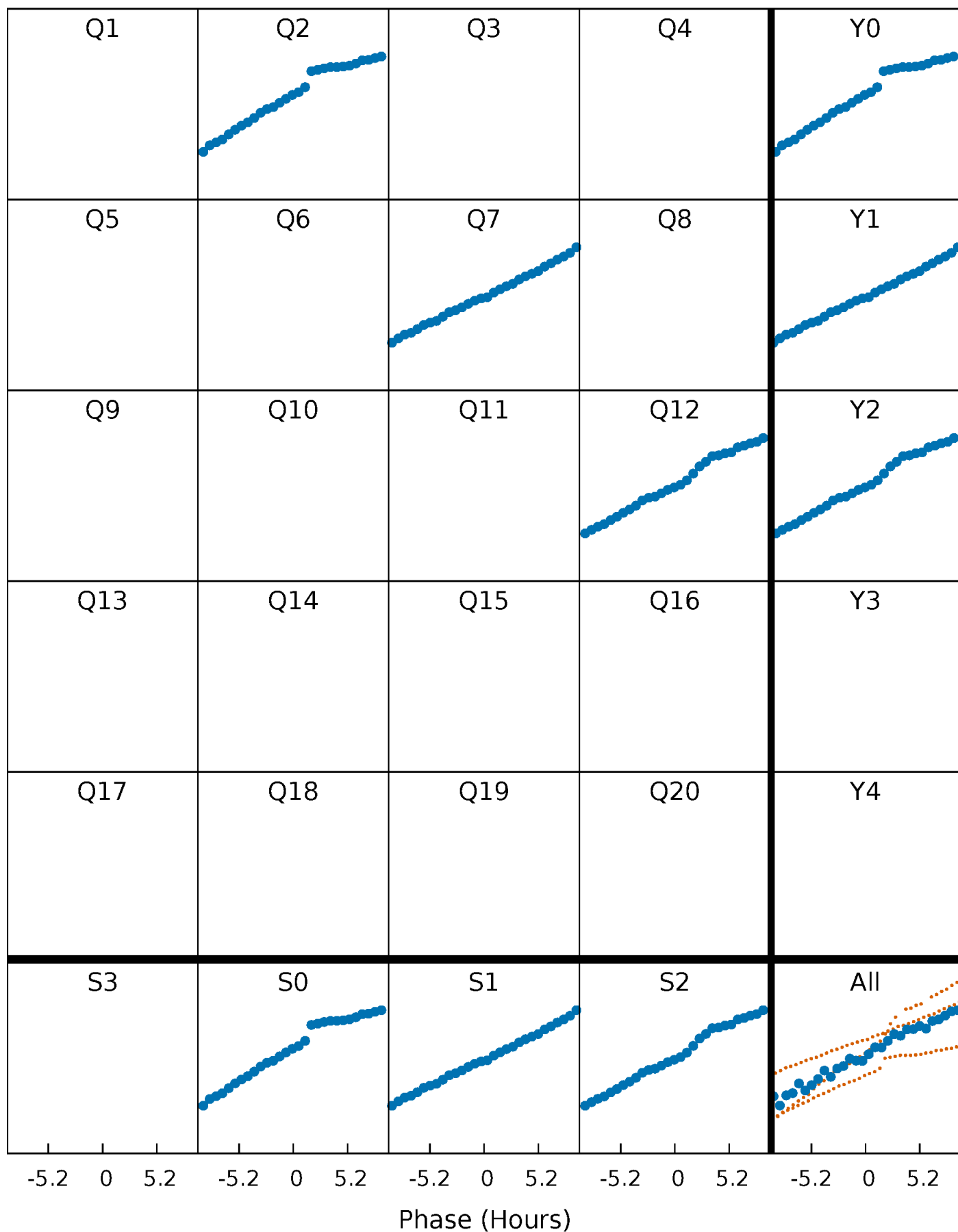


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

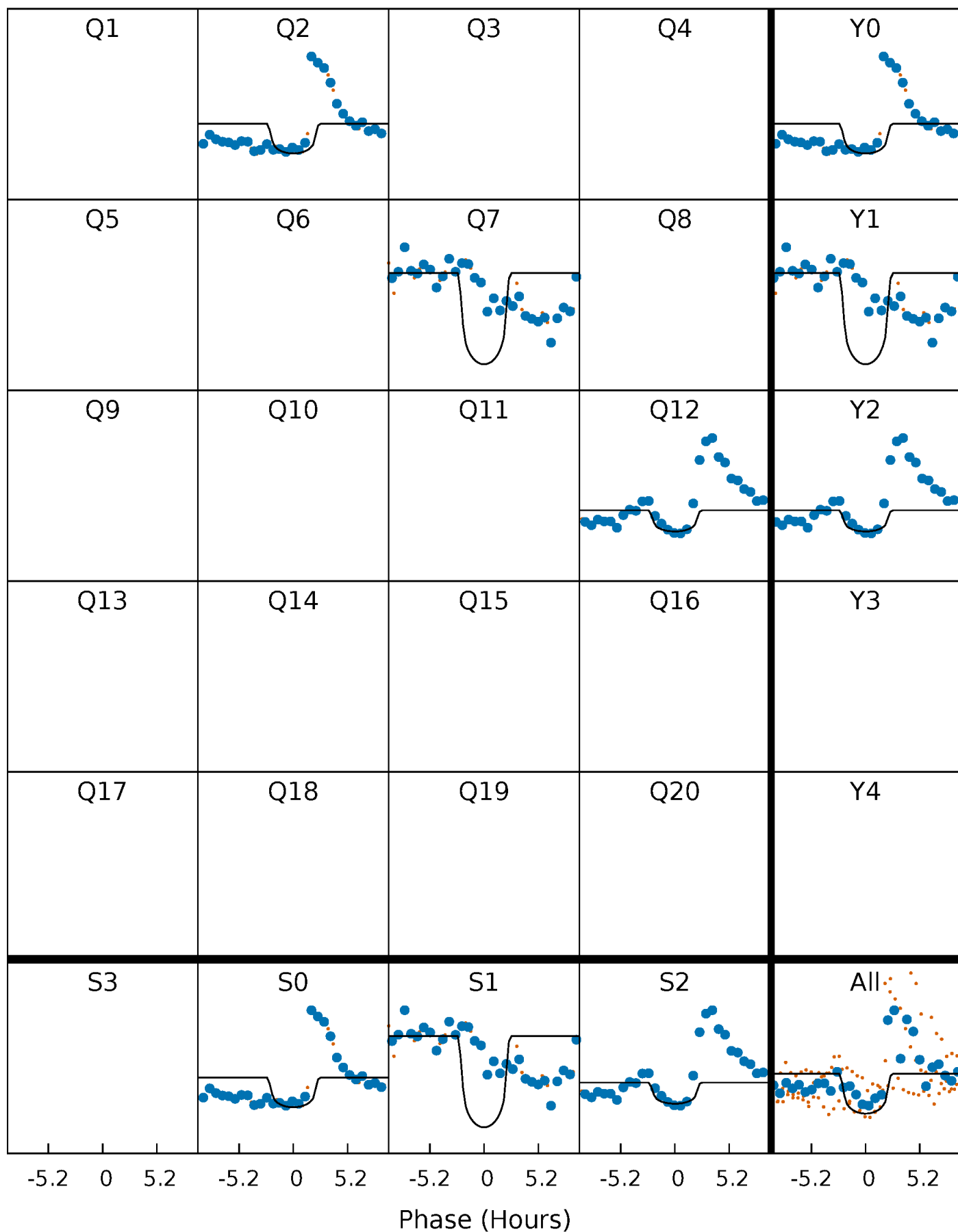
TCE 005480528-02 P=463.440704 Days  $T_0=201.789800$  (BKJD)





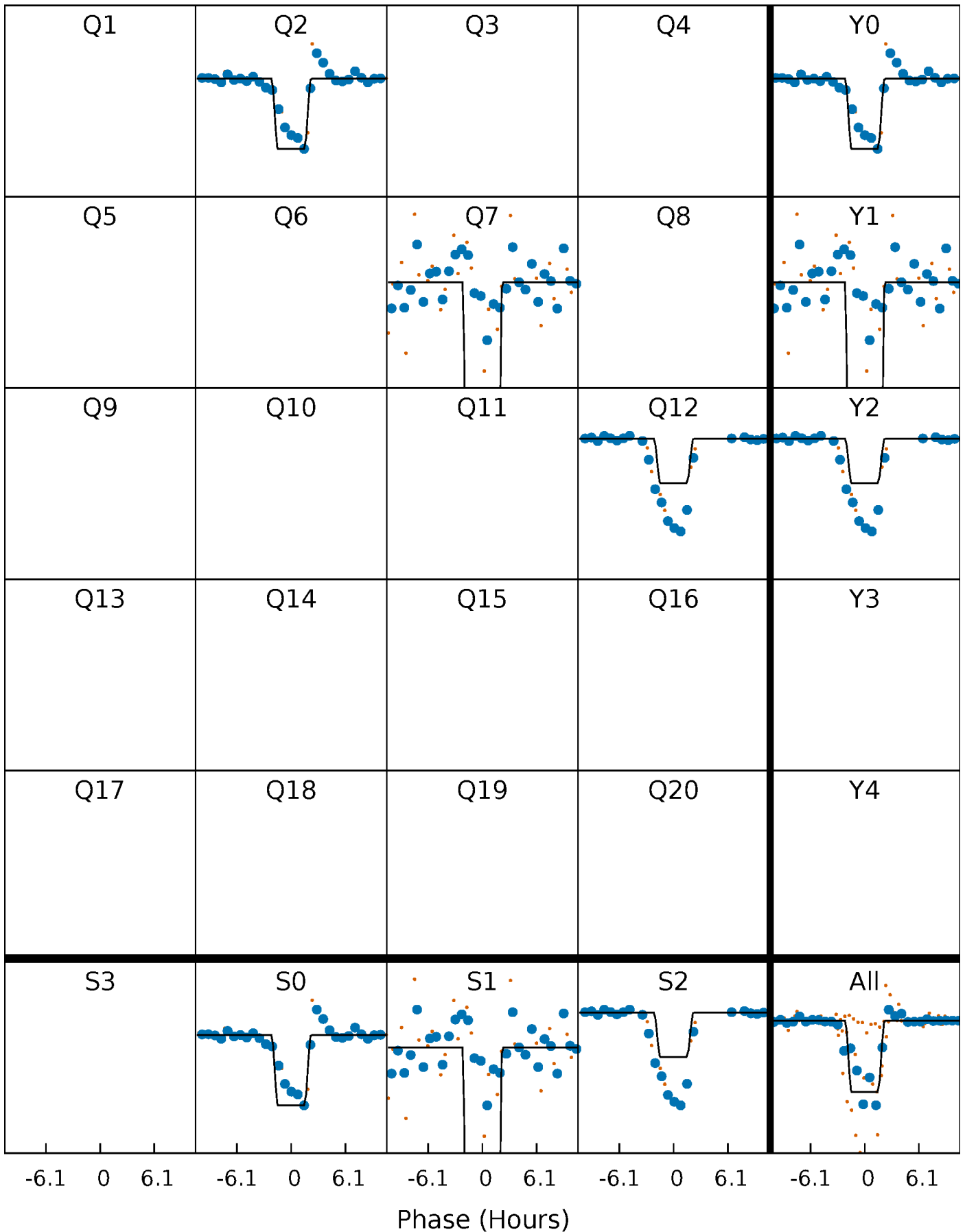
# DV Quarter-Phased Transit Curves

TCE 005480528-02 P=463.440704 Days  $T_0=201.789800$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

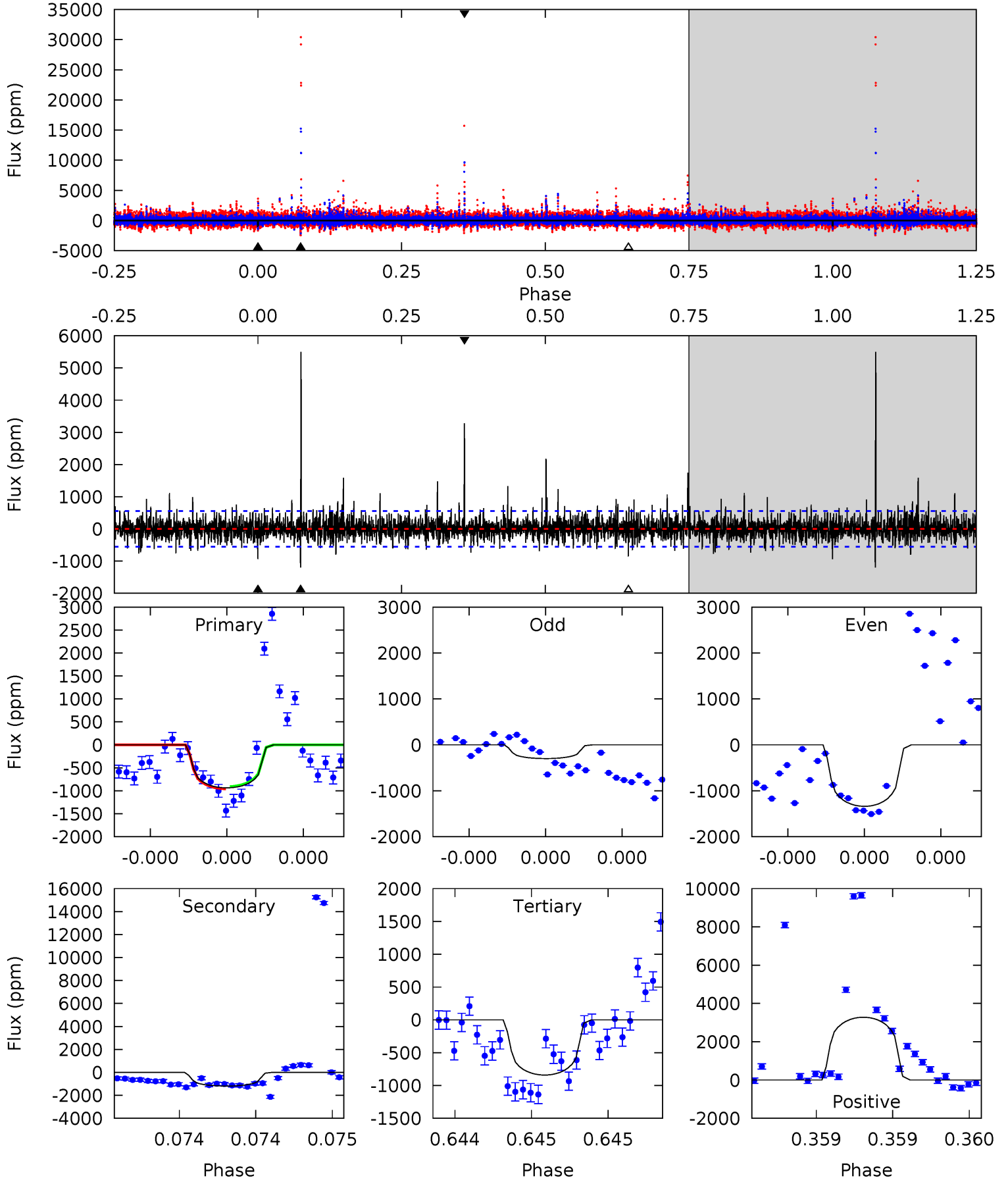
TCE 005480528-02 P=463.460385 Days  $T_0=201.769271$  (BKJD)



# DV Model-Shift Uniqueness Test

005480528-02, P = 463.440704 Days, E = 201.789800 Days

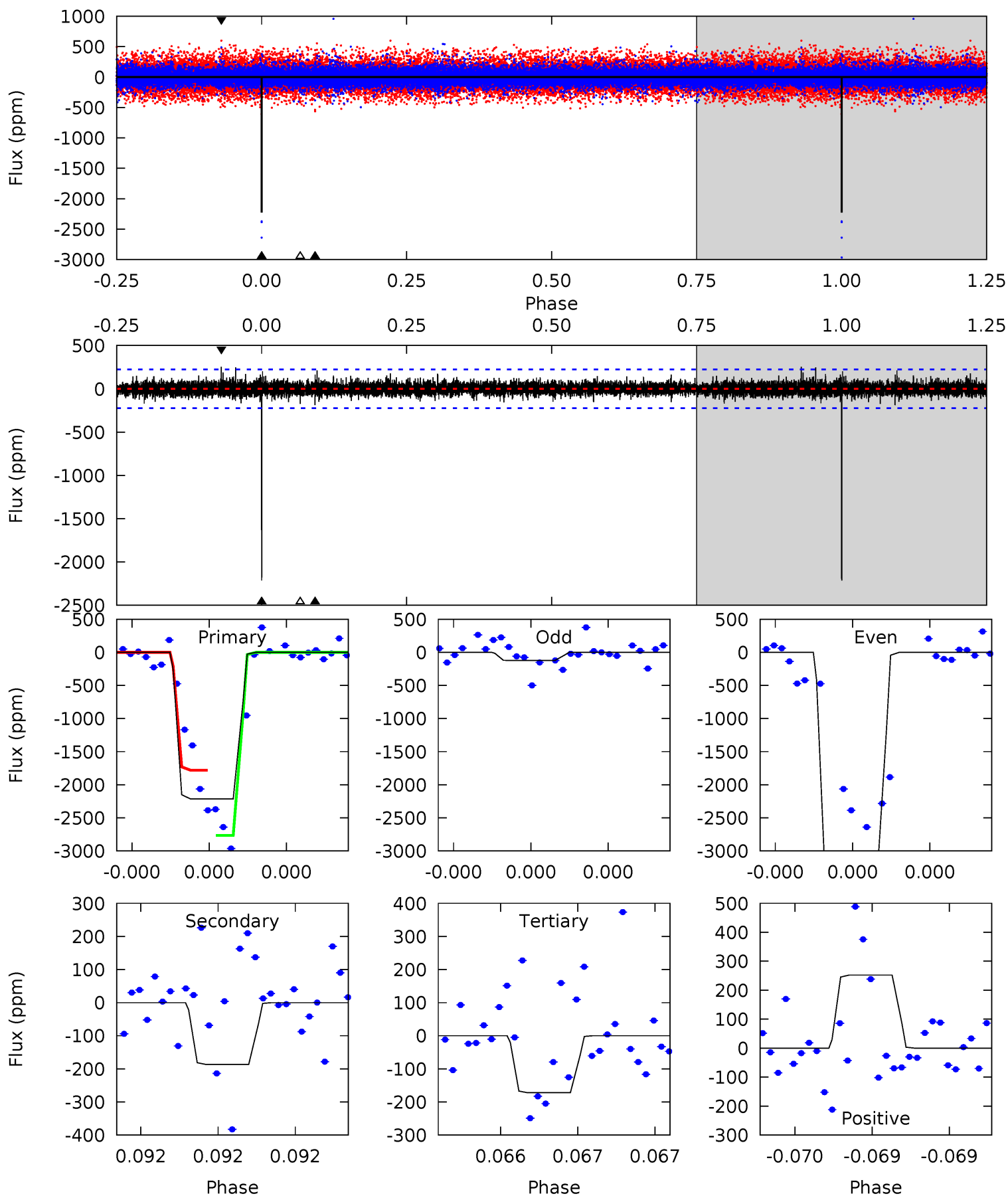
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.48	12.1	8.52	33.2	5.60	3.53	2.55	0.96	-23.7	3.56	-21.1	2.66	0.92	0.82	0.23



# Alt Model-Shift Uniqueness Test

005480528-02, P = 463.460385 Days, E = 201.769271 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
55.6	4.69	4.32	6.34	5.61	3.54	0.90	51.3	49.2	0.36	-1.65	57.9	1.15	0.10	0



### Stellar Parameters For KIC 005480528

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5098^{+140}_{-127}$	$3.323^{+0.385}_{-0.315}$	$-0.640^{+0.300}_{-0.250}$	$3.273^{+1.977}_{-2.416}$	$0.821^{+0.281}_{-0.187}$	$0.033^{+0.083}_{-0.022}$
	+3%/-2%	+12%/-9%	+47%/-39%	+60%/-74%	+34%/-23%	+252%/-66%
Source	PHO1	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 005480528-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-1193 \pm 99$	$31.75^{+35.09}_{-21.76}$	$556^{+73}_{-70}$	$3632^{+1939}_{-691}$	$785^{+7068}_{-602}$
Alt.	$-187 \pm 40$	$32.22^{+33.72}_{-21.42}$	$548^{+73}_{-64}$	$2709^{+1051}_{-406}$	$119^{+983}_{-89}$

$T_{max}$  = 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

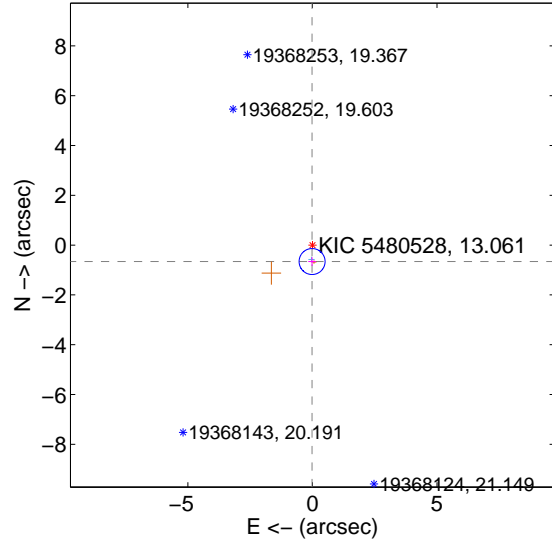
Supplemental centroid analysis for 005480528-02. Kepler magnitude: 13.06. Transit SNR 10.15

There are 1 quarters with good PRF difference image offsets

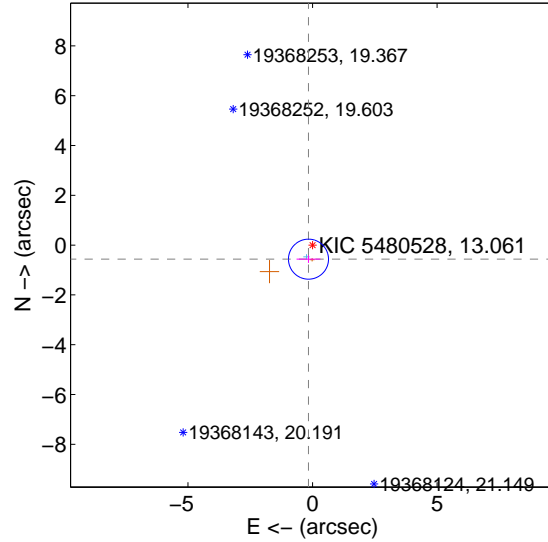
The direct PRF centroid is offset from the target star catalog position by about 0.10 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.660 \pm 0.174$	3.80	$0.014 \pm 0.156$	$-0.660 \pm 0.174$
PRF-fit source offset from KIC position	$0.588 \pm 0.268$	2.19	$0.162 \pm 0.480$	$-0.565 \pm 0.152$
photometric centroid source offset	$1.94 \pm 2.05$	0.95	$-1.93 \pm 2.07$	$0.25 \pm 0.87$

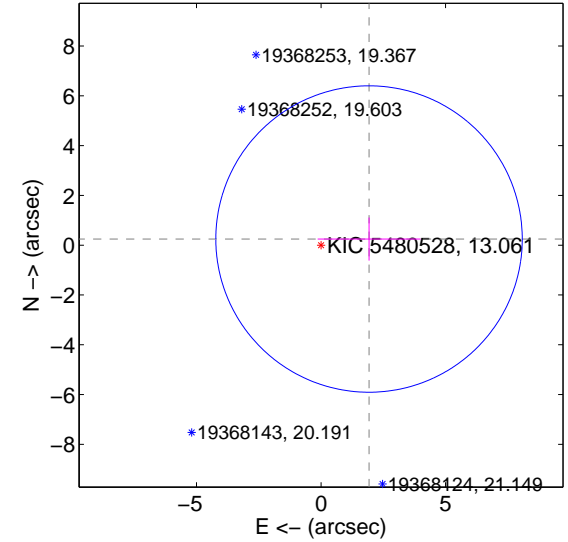
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

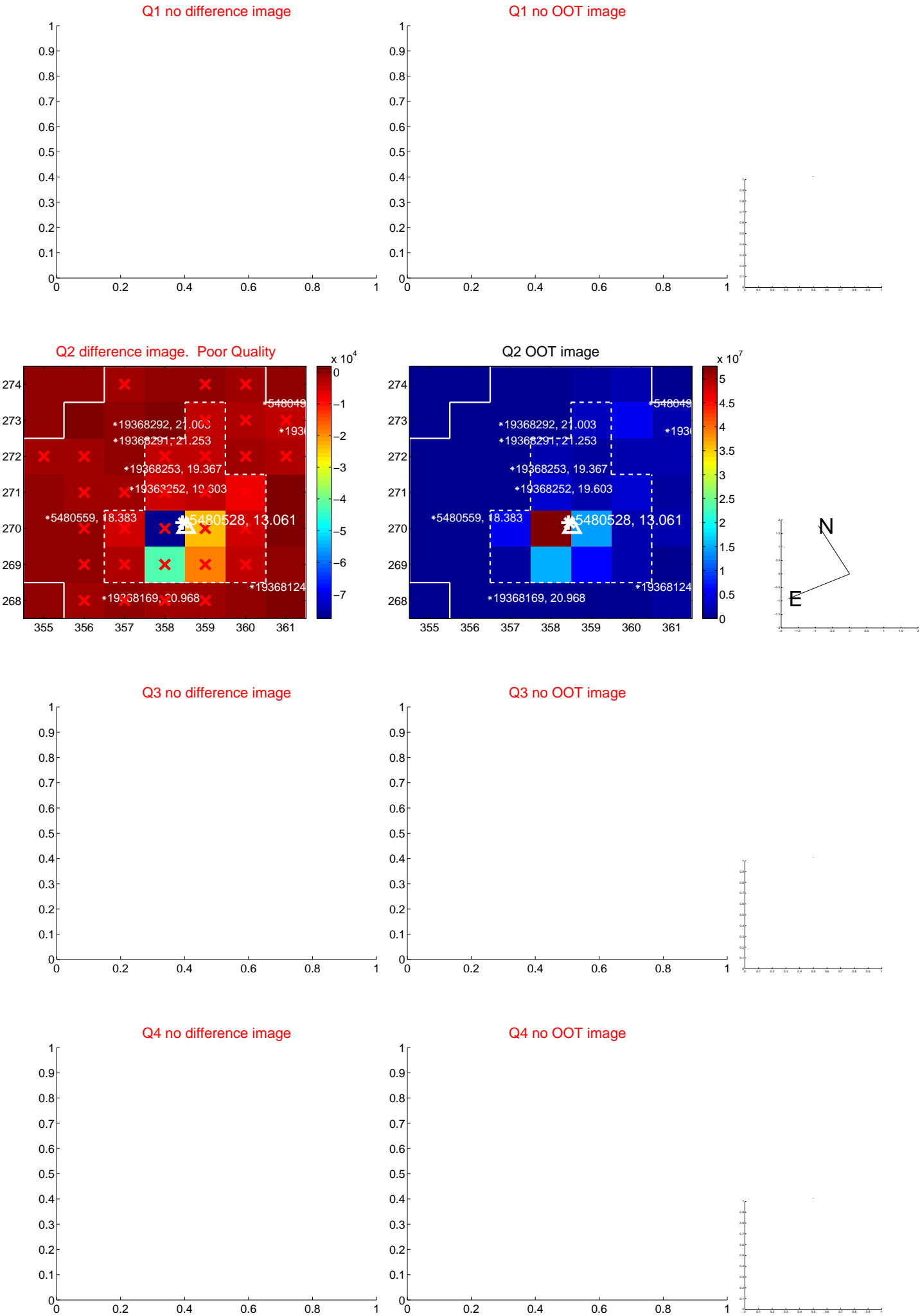


offset from photometric centroids



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.

Q5 no difference image



Q5 no OOT image



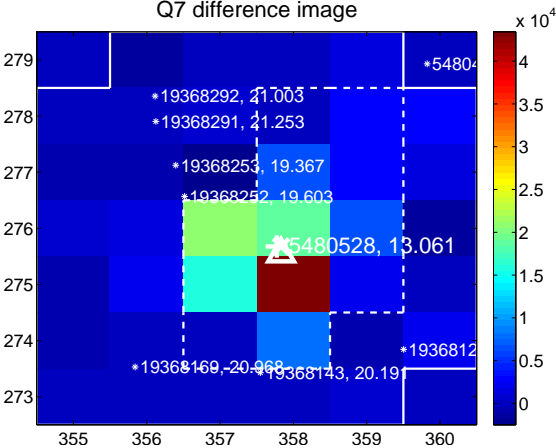
Q6 no difference image



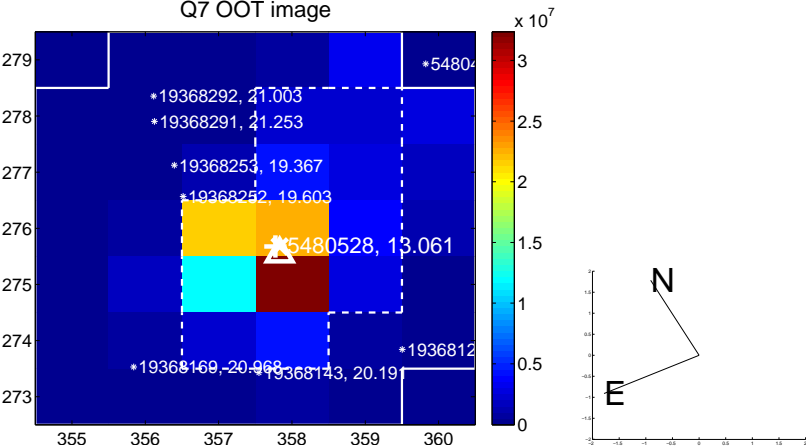
Q6 no OOT image



Q7 difference image



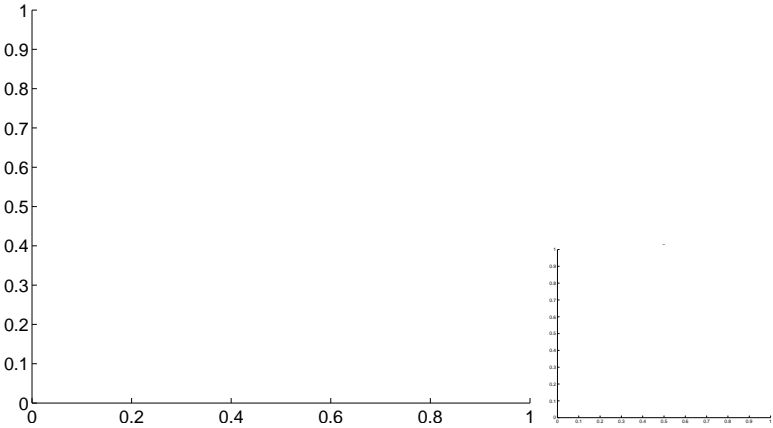
Q7 OOT image



Q8 no difference image

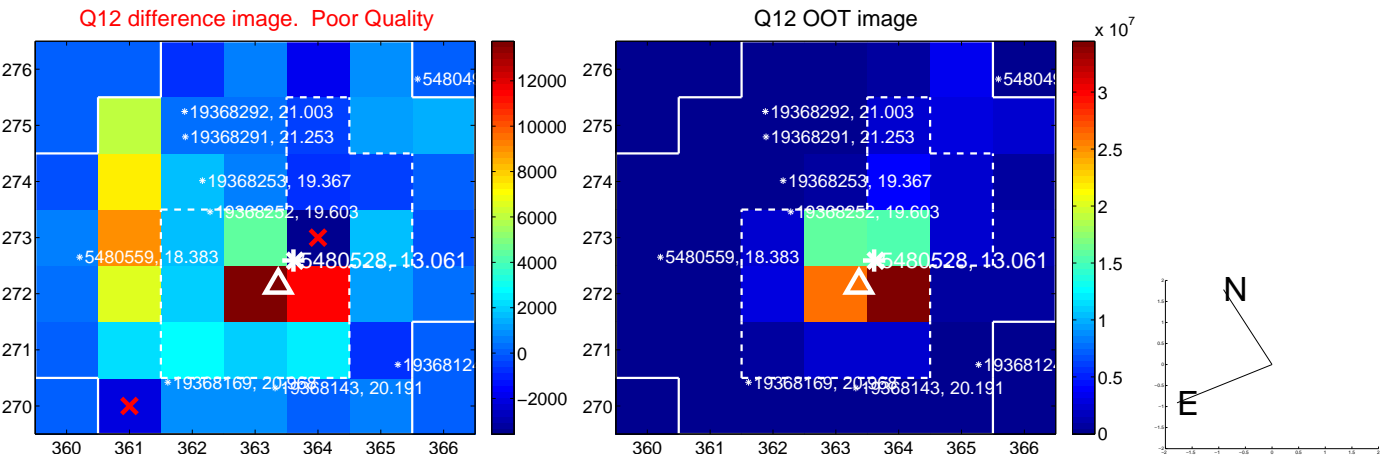


Q8 no OOT image





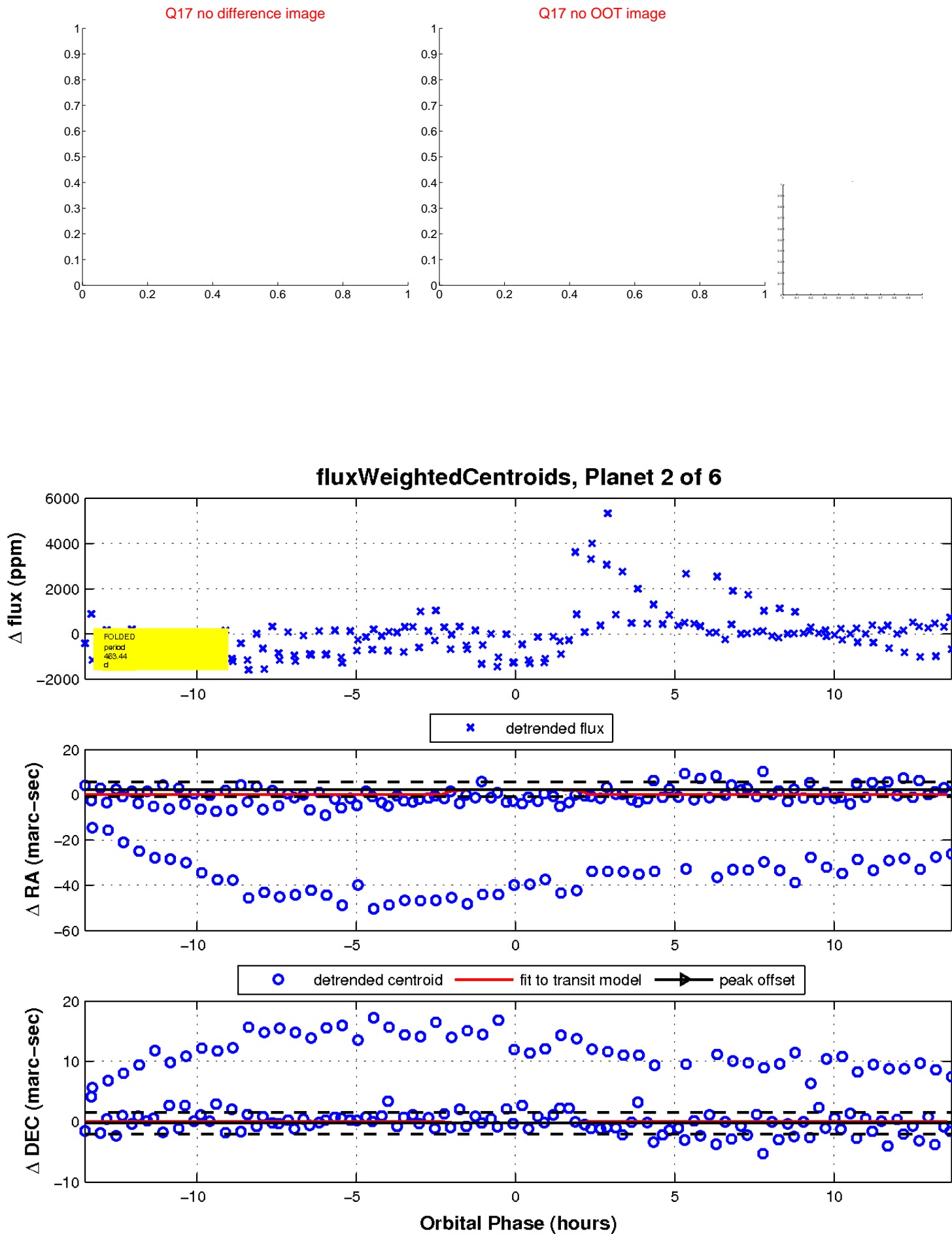
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

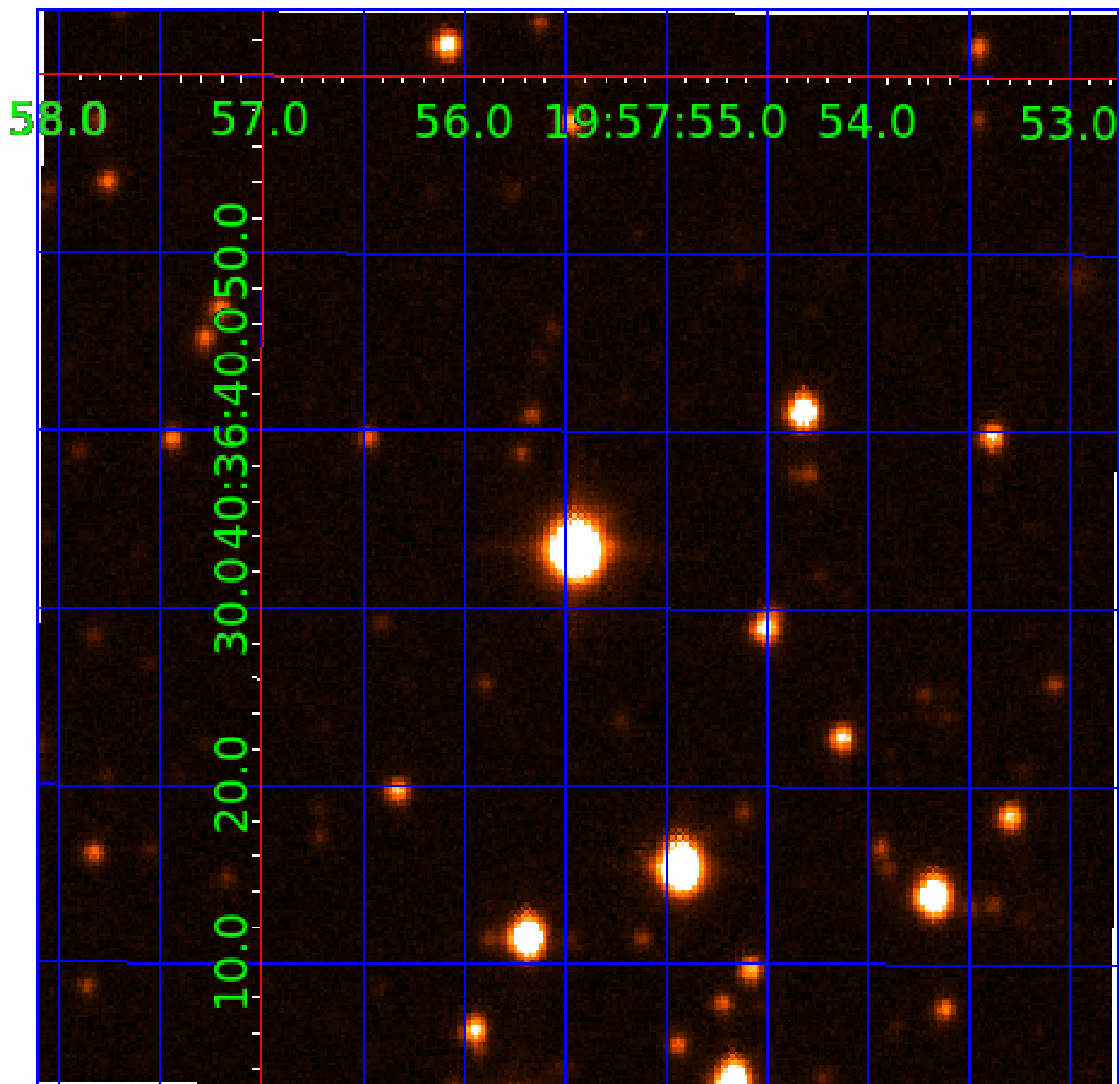


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 005480528

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
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## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
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005480528-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
005480528-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—CENT_FEW_DIFFS
005480528-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_ZUMA—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_NOFITS

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

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

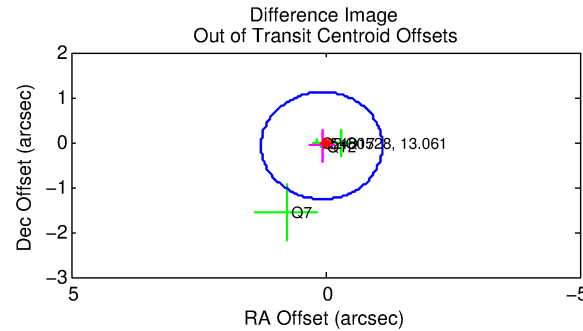
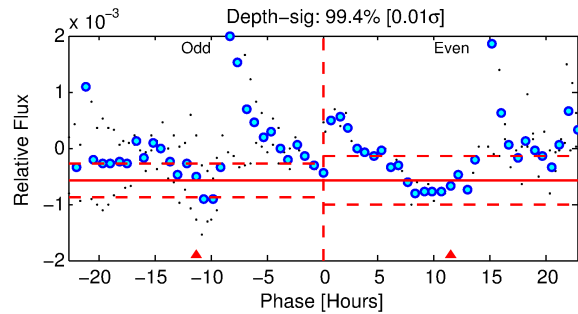
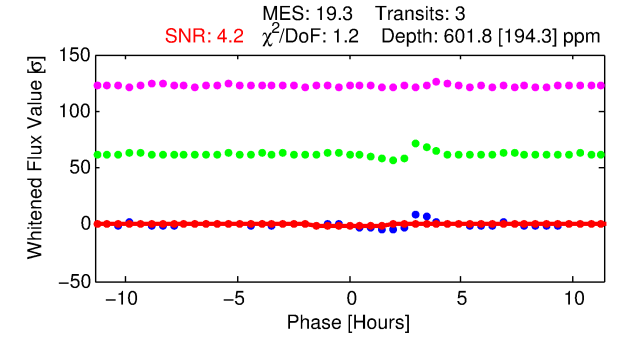
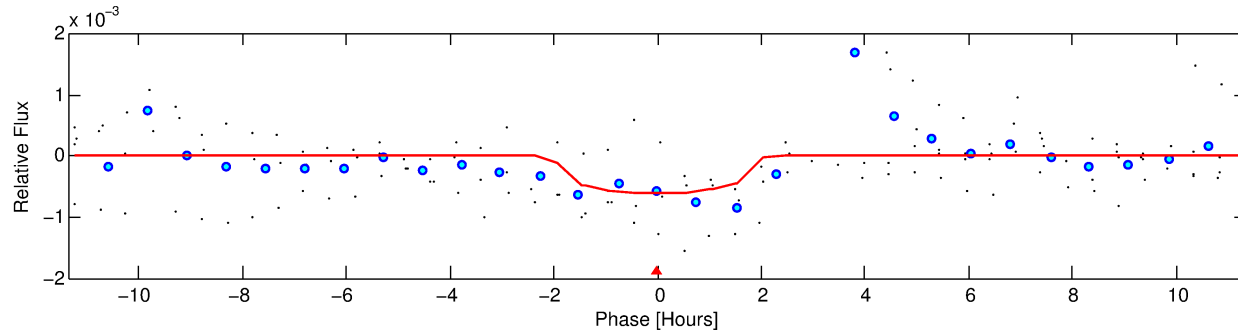
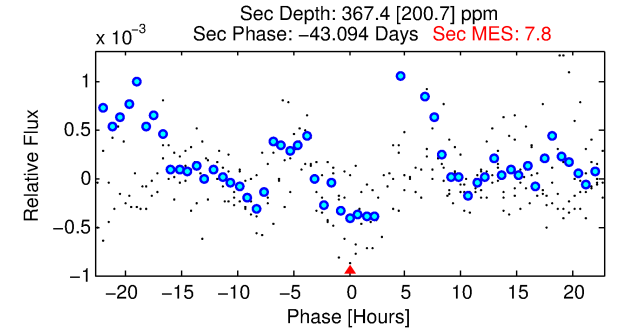
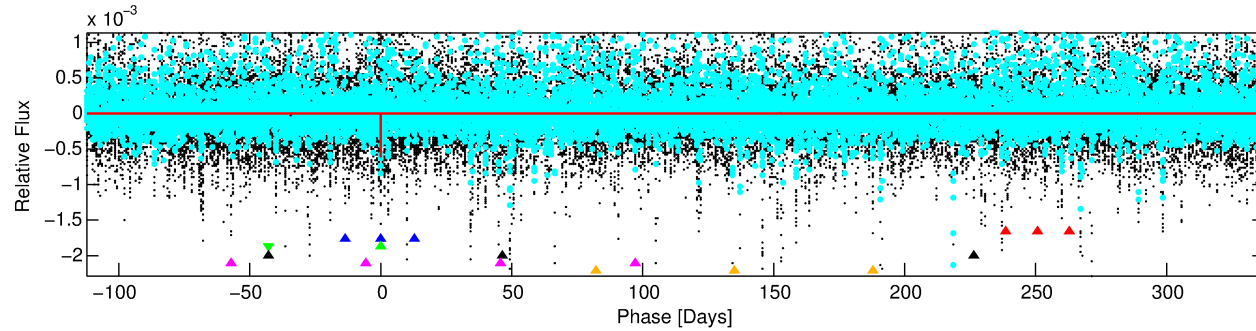
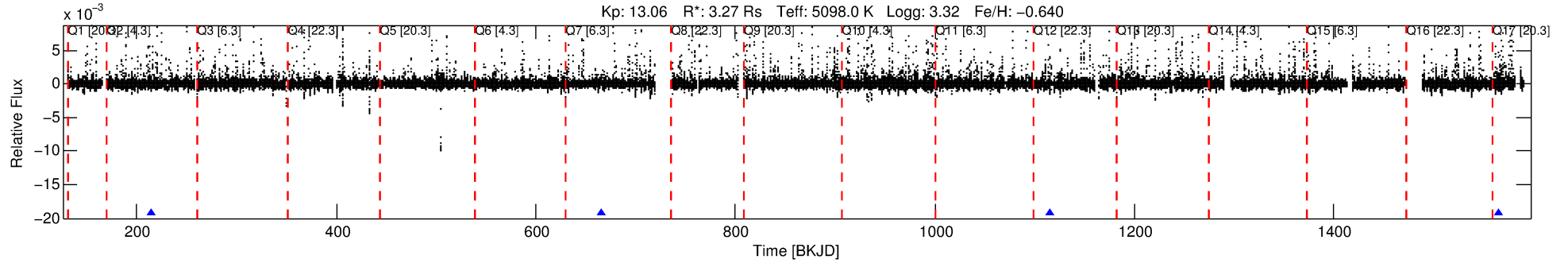
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 005480528-03

No Significant Match Found

# DV One-Page Summary

KIC: 5480528 Candidate: 3 of 6 Period: 450.089 d



## DV Fit Results:

Period = 450.08854 [0.00627] d  
Epoch = 215.3112 [0.0135] BKJD  
Rp/R\* = 0.0228 [0.0678]  
a/R\* = 818.77 [9619.85]  
b = 0.48 [18.99]  
Seff = 5.59 [4.34]  
Teff = 392 [76] K  
Rp = 8.14 [24.96] Re  
a = 1.0769 [0.6182] AU  
Ag = 3541.07 [21354.48] [0.17σ]  
Teffp = 4676 [6994] K [0.61σ]

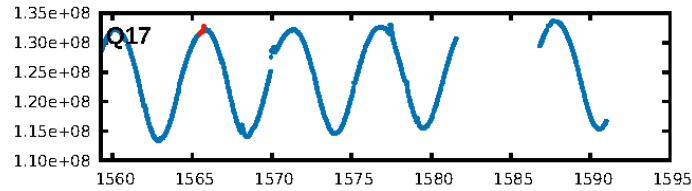
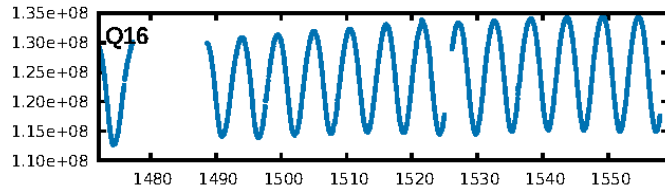
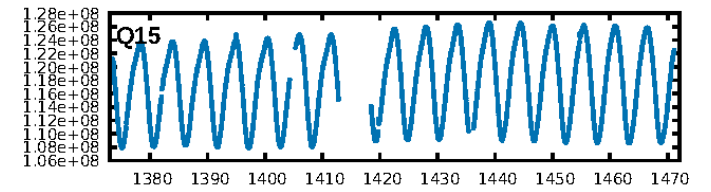
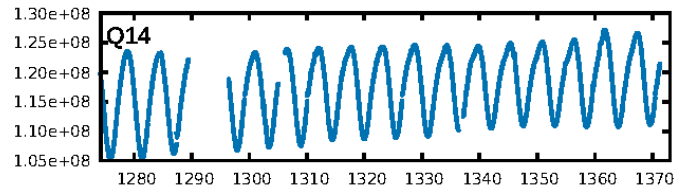
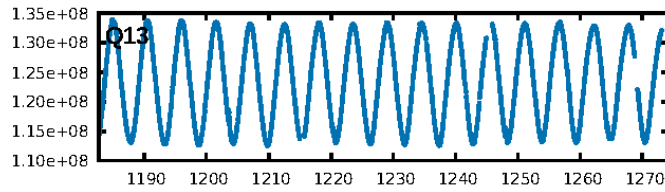
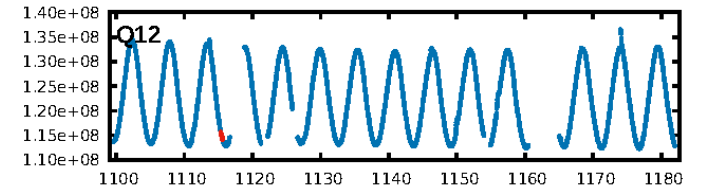
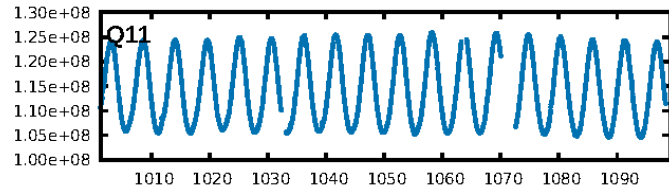
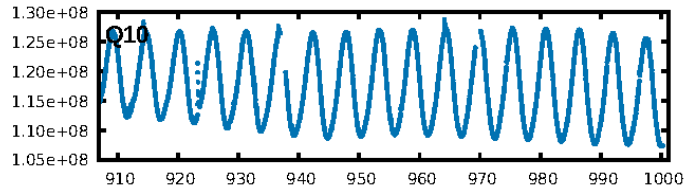
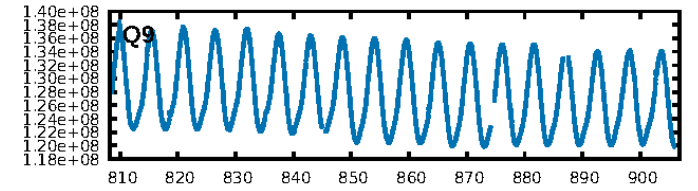
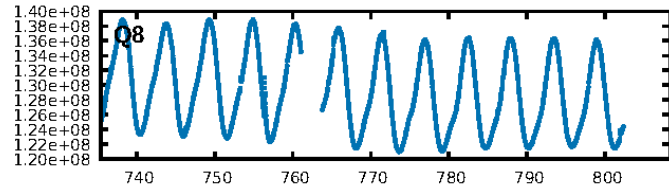
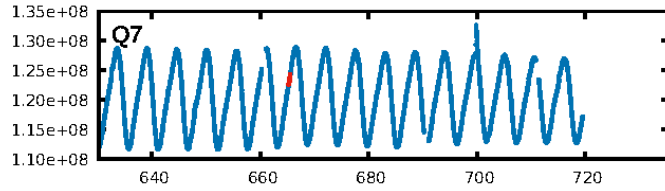
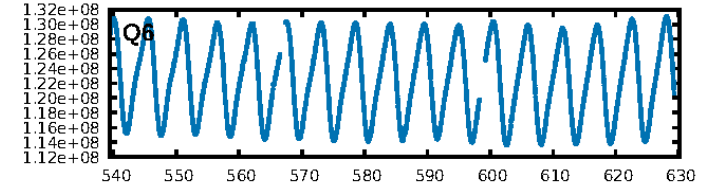
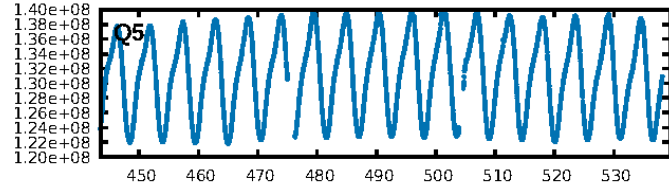
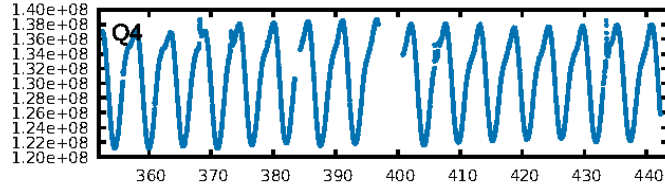
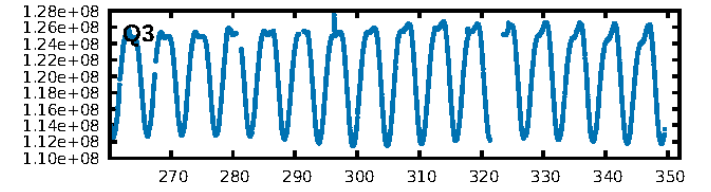
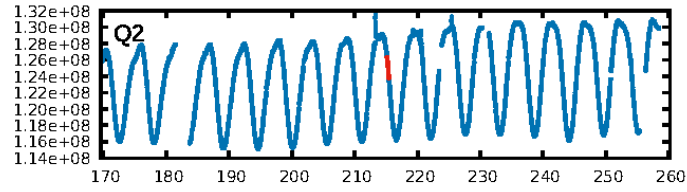
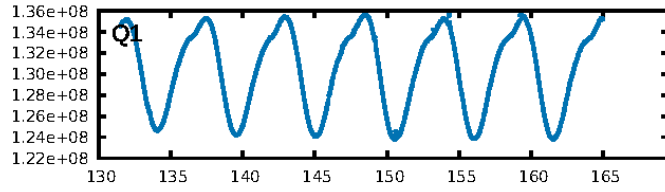
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [51.32σ]  
LongPeriod-sig: 100.0% [53.99σ]  
ModelChiSquare2-sig: 5.3%  
ModelChiSquareGof-sig: 89.8%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [2/2]  
GhostDiagnostic-chr: 0.9377  
Centroid-sig: 19.0%  
Centroid-so: 5.402 arcsec [1.17σ]  
OotOffset-rm: 0.105 arcsec [0.26σ]  
KicOffset-rm: 0.153 arcsec [0.60σ]  
OotOffset-st: 1/1/1/1 [4]  
KicOffset-st: 1/1/1/1 [4]  
DiffImageQuality-fgm: 0.50 [2/4]  
DiffImageOverlap-fno: 0.75 [3/4]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 16:16:43 Z

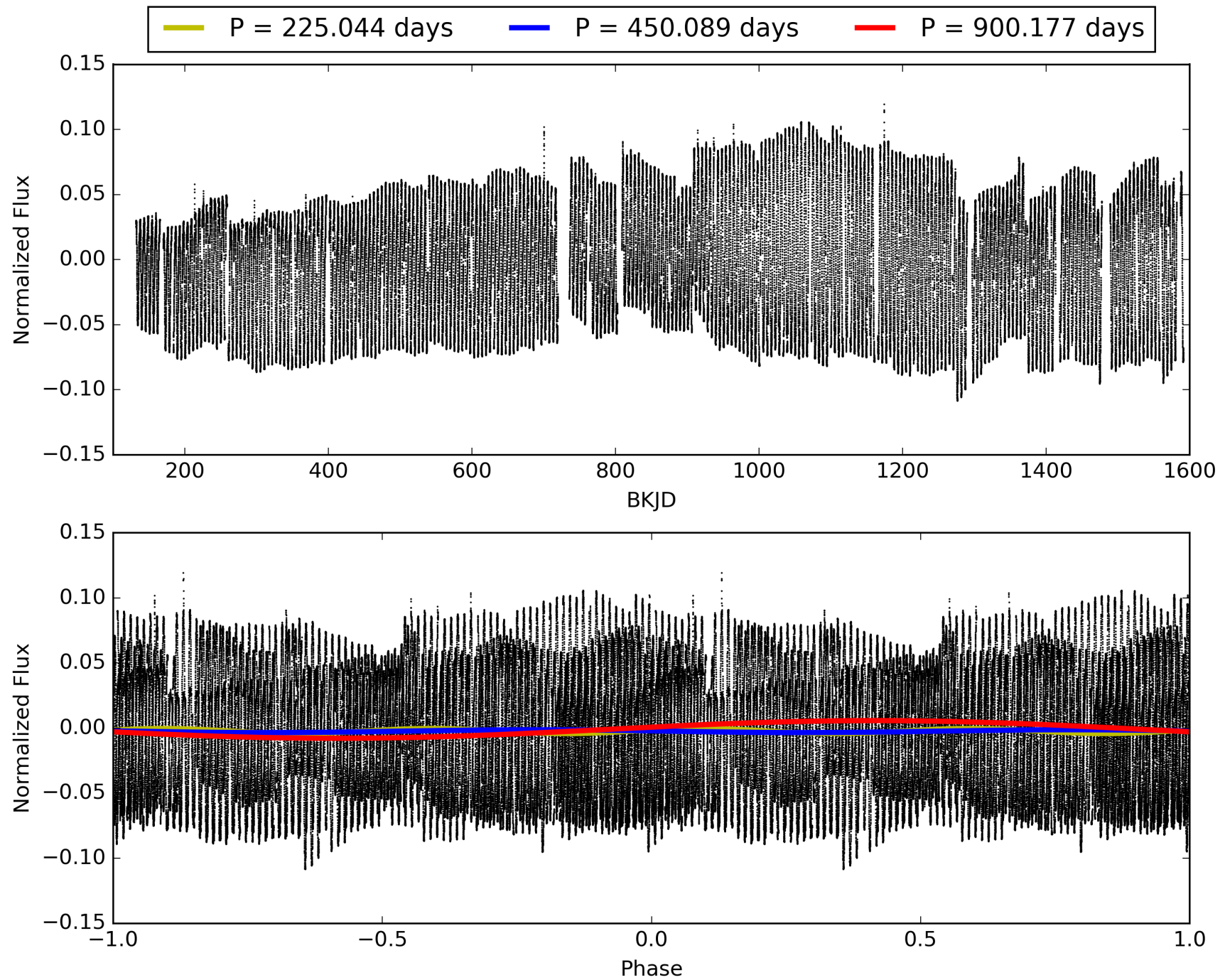
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 005480528-03, PDC Light Curves





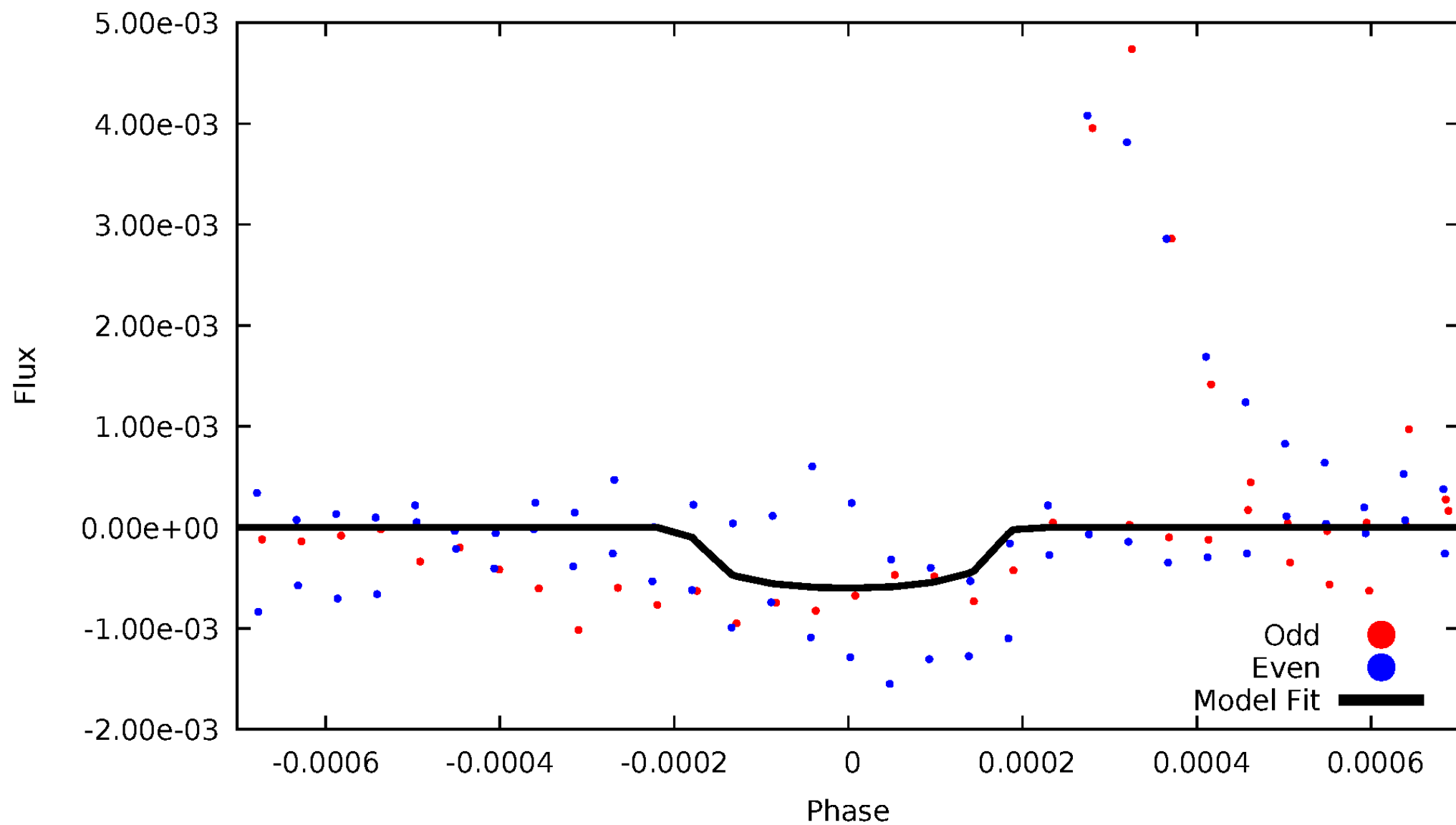
# TCE 005480528-03





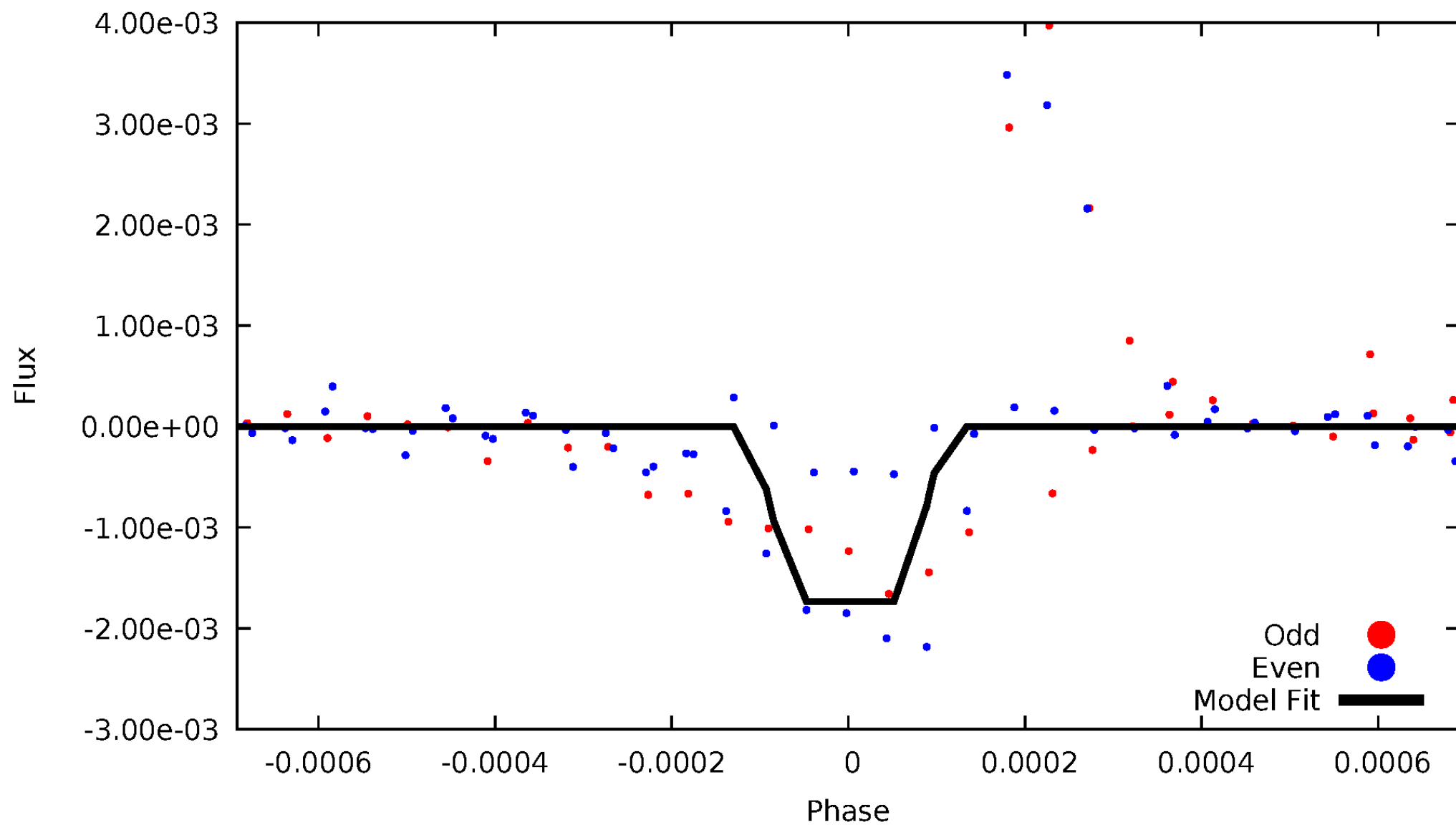
# DV Odd/Even

TCE 005480528-03



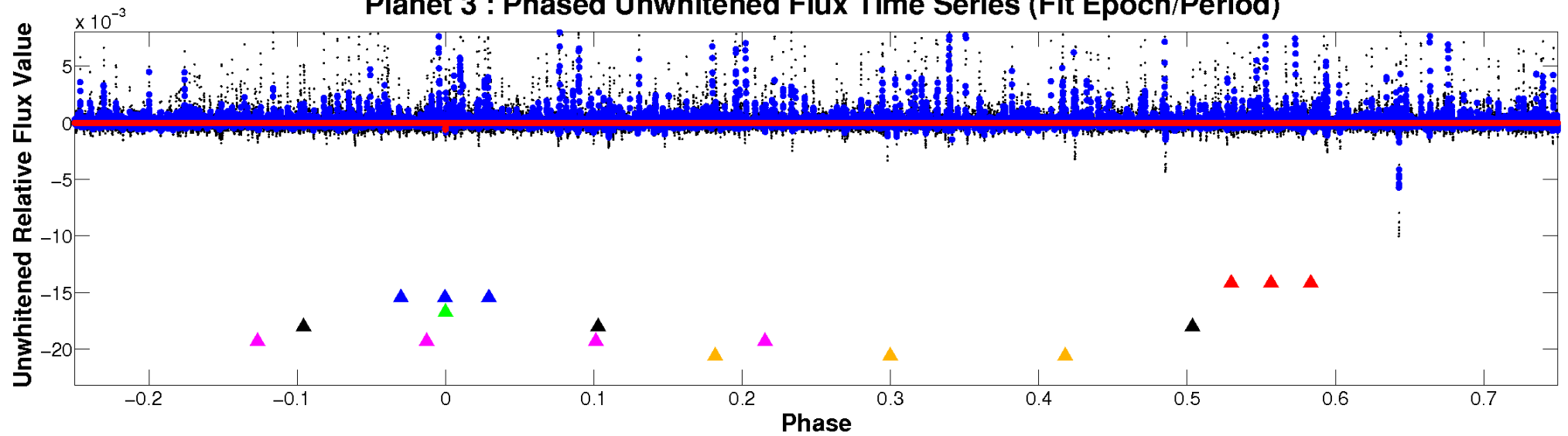
# ALT Odd/Even

TCE 005480528-03

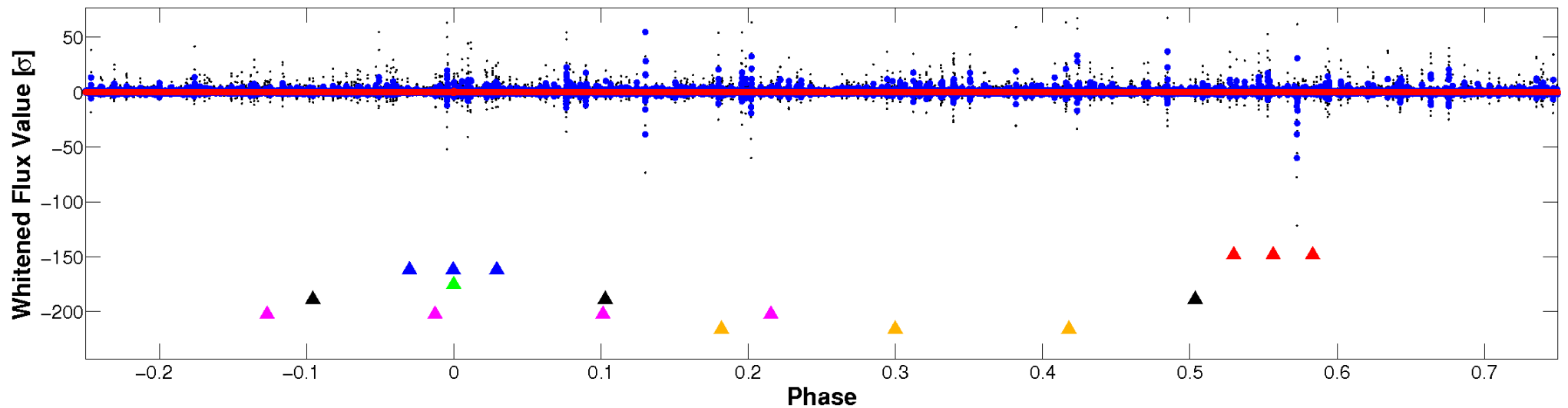


# Non-Whitened Vs. Whitened Light Curve

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

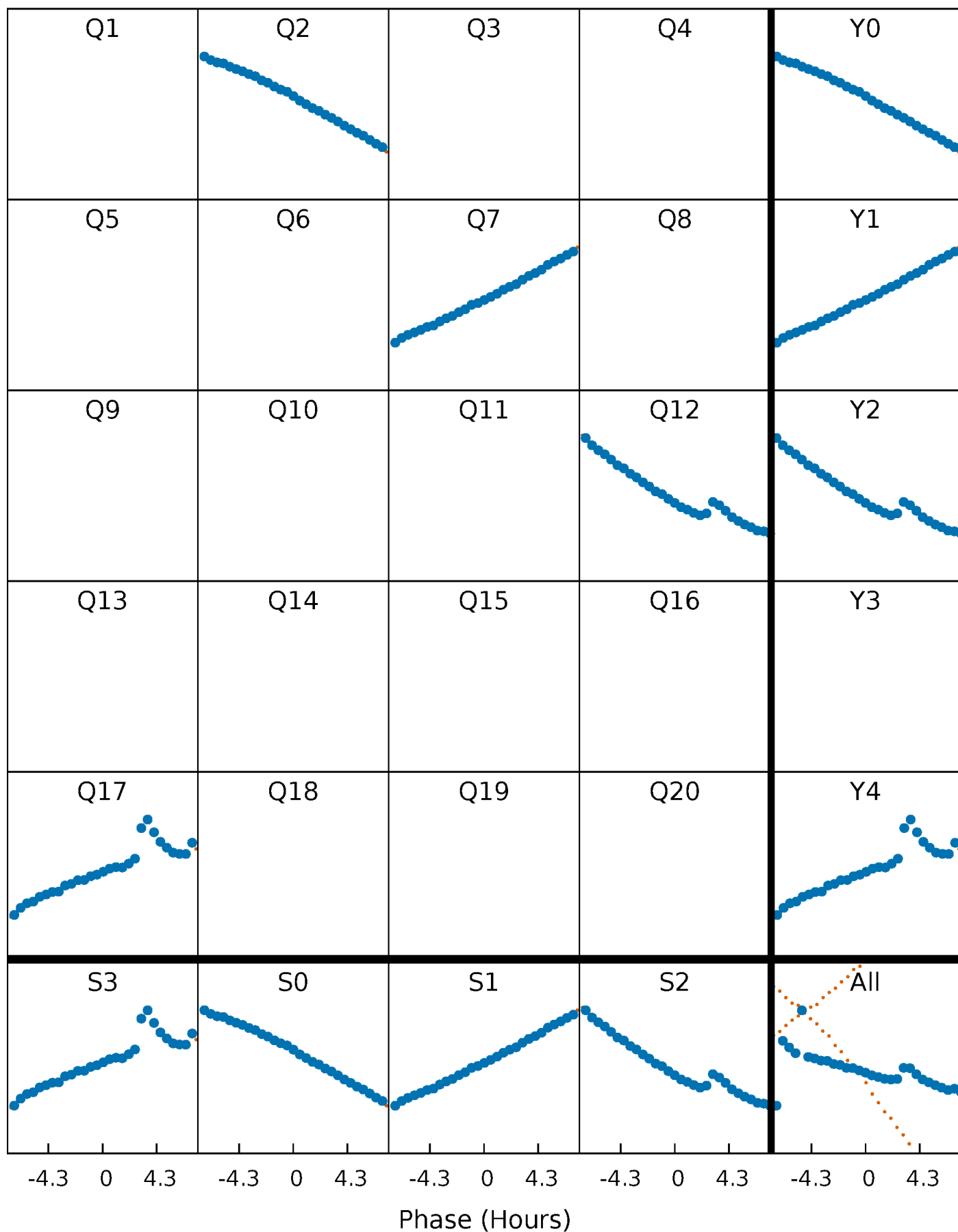


## Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



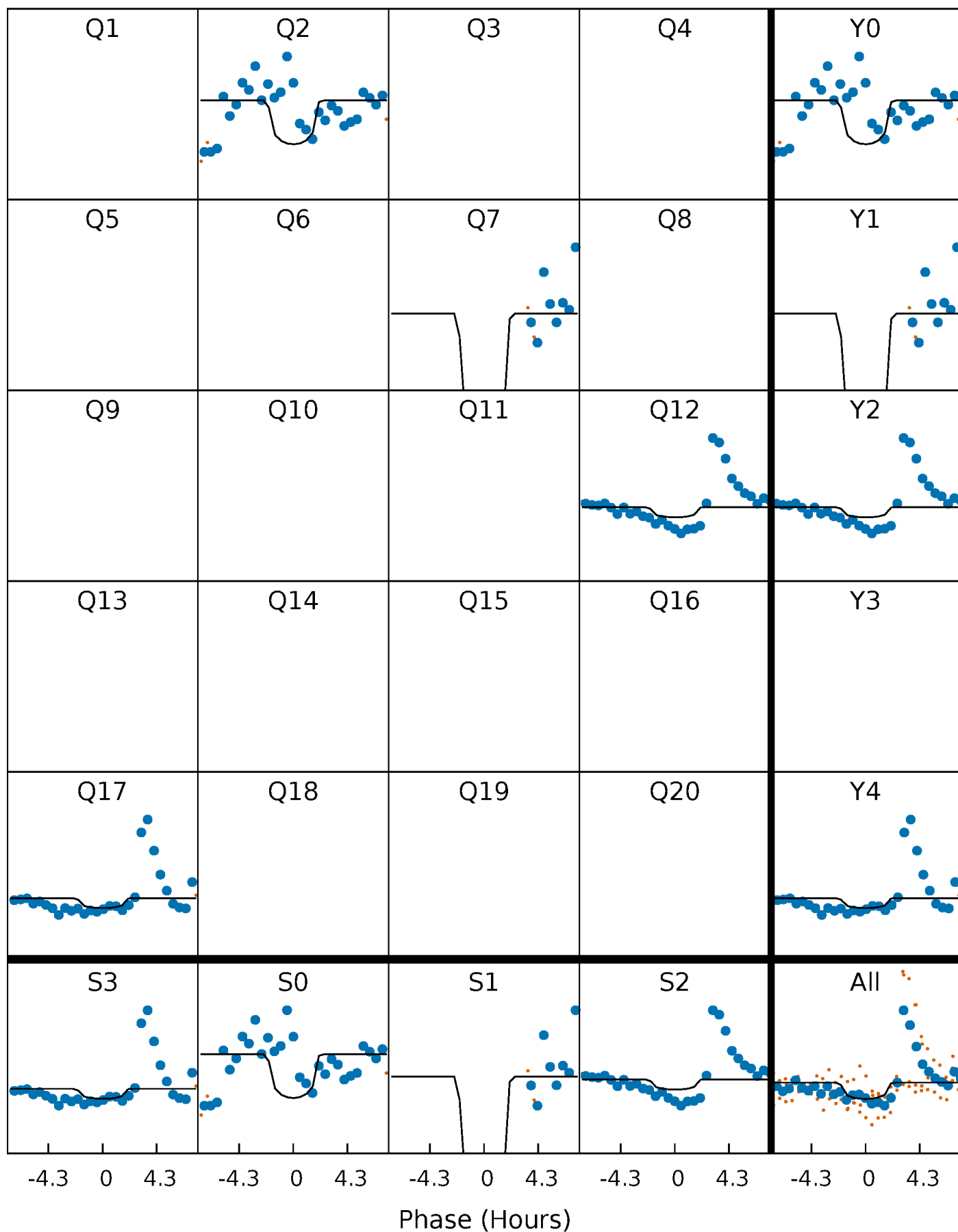
# PDC Quarter-Phased Transit Curves

TCE 005480528-03 P=450.088539 Days  $T_0=215.311220$  (BKJD)



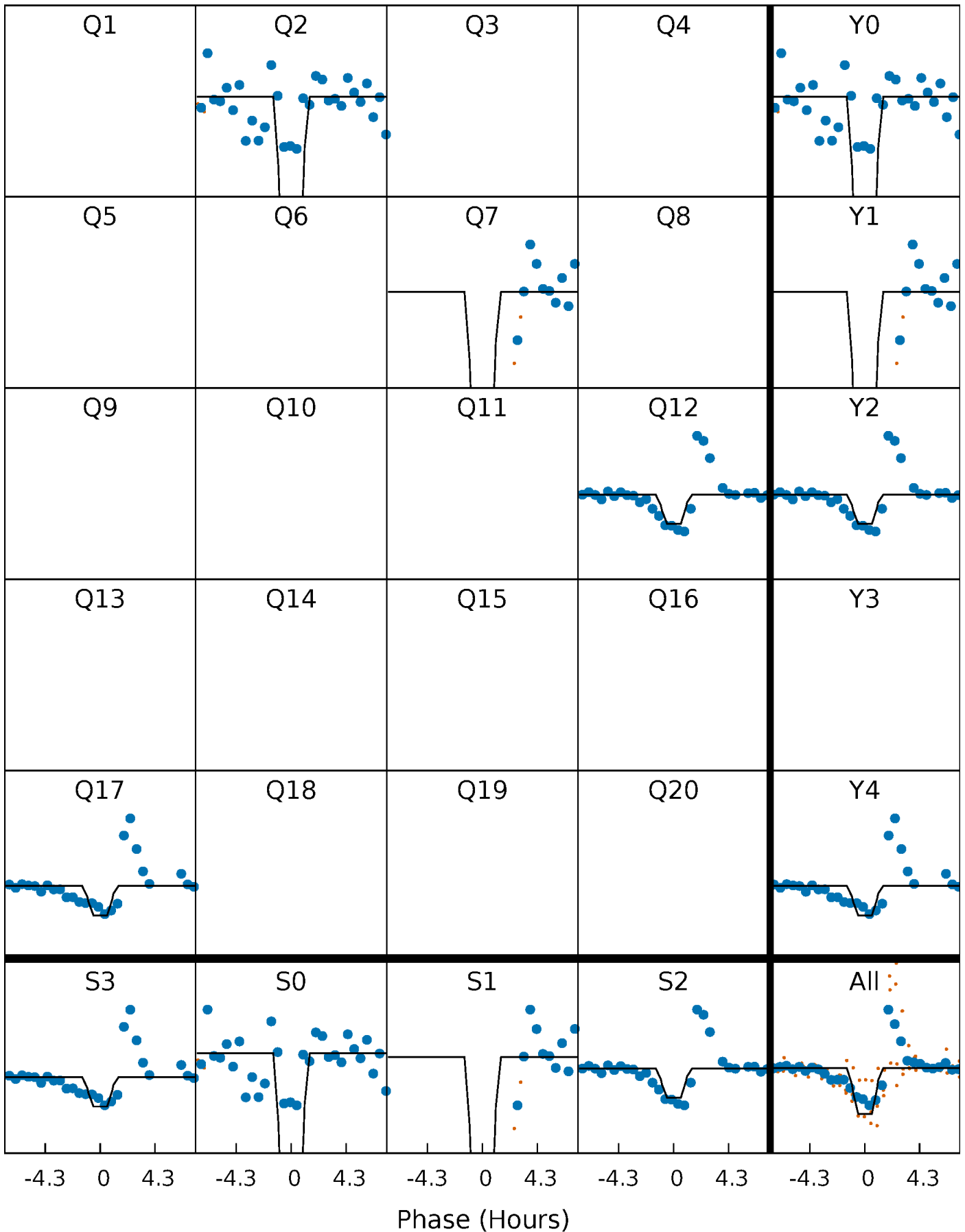
# DV Quarter-Phased Transit Curves

TCE 005480528-03     $P=450.088539$  Days     $T_0=215.311220$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

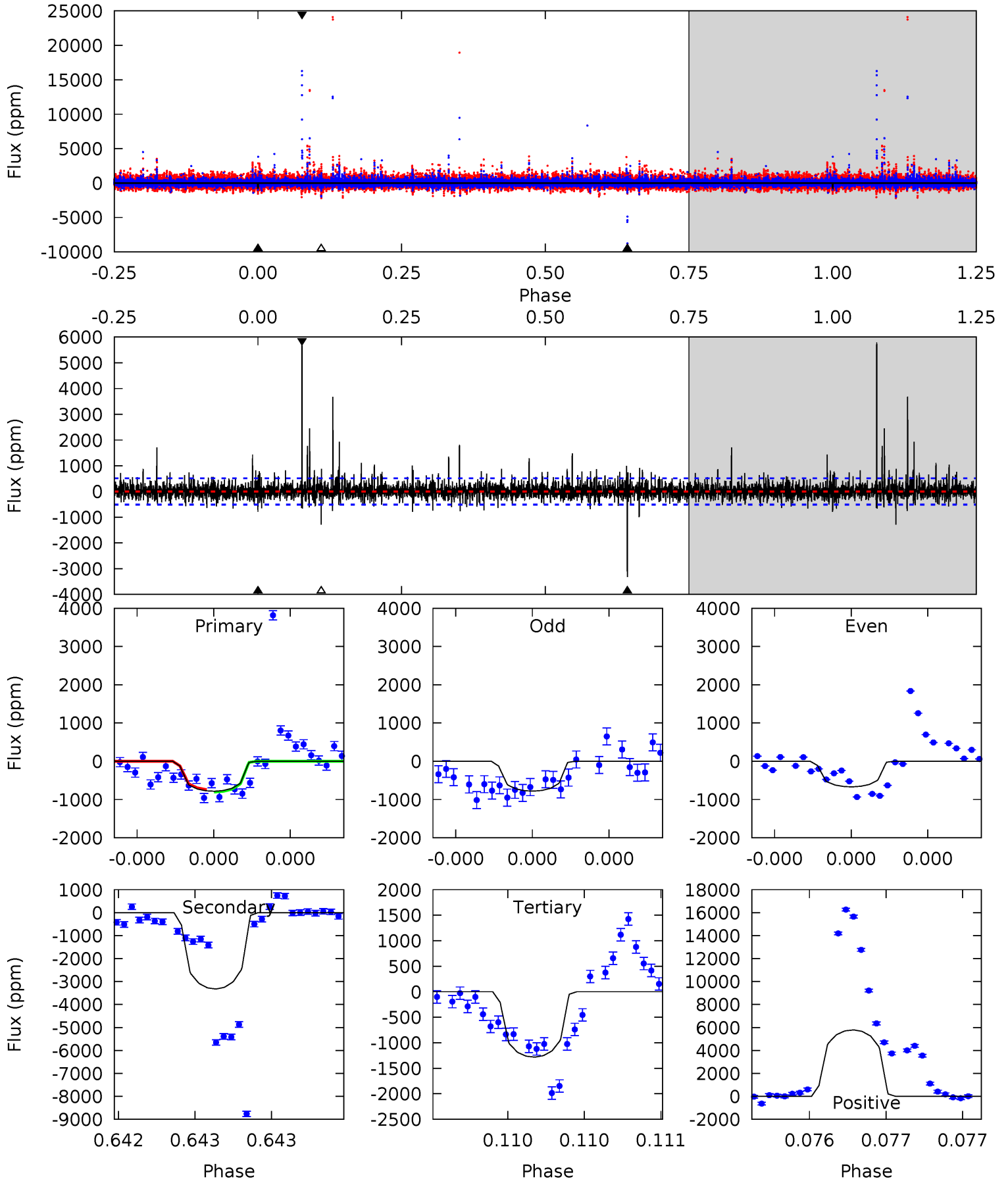
TCE 005480528-03 P=450.090026 Days  $T_0=215.350977$  (BKJD)



# DV Model-Shift Uniqueness Test

005480528-03, P = 450.088539 Days, E = 215.311220 Days

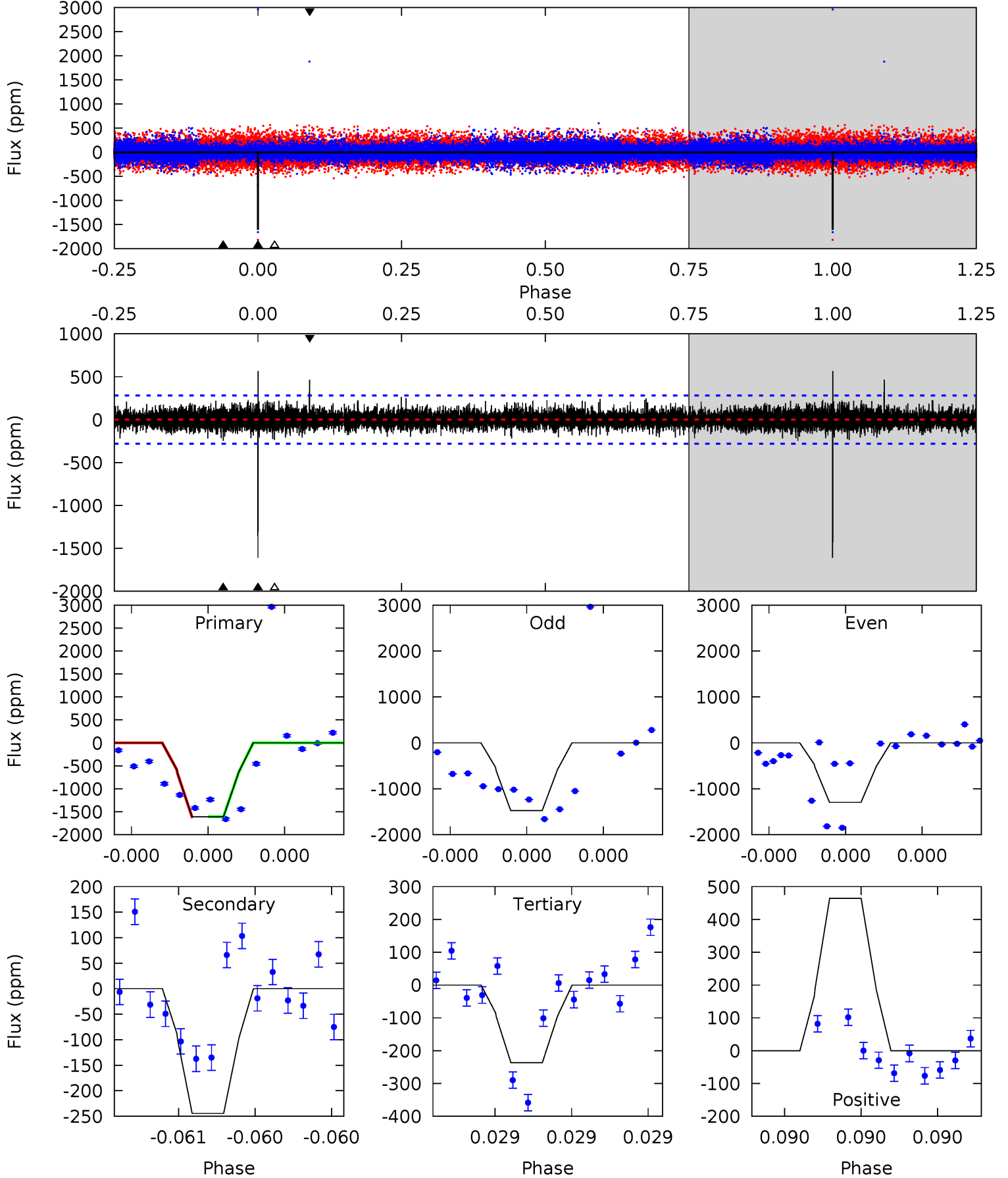
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.55	36.3	14.0	63.2	5.61	3.53	2.61	-5.43	-54.6	22.3	-26.9	0.31	0.90	0.64	0.35



# Alt Model-Shift Uniqueness Test

005480528-03, P = 450.090026 Days, E = 215.350977 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
32.7	4.96	4.80	9.44	5.71	3.69	1.04	27.9	23.3	0.16	-4.47	2.34	0.91	0.26	0





### Stellar Parameters For KIC 005480528

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5098^{+140}_{-127}$	$3.323^{+0.385}_{-0.315}$	$-0.640^{+0.300}_{-0.250}$	$3.273^{+1.977}_{-2.416}$	$0.821^{+0.281}_{-0.187}$	$0.033^{+0.083}_{-0.022}$
	+3%/-2%	+12%/-9%	+47%/-39%	+60%/-74%	+34%/-23%	+252%/-66%
Source	PHO1	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 005480528-03 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-3322 \pm 92$	$20.52^{+23.77}_{-14.14}$	$565^{+68}_{-77}$	$5268^{+4515}_{-1322}$	$5240^{+51045}_{-4105}$
Alt.	$-244 \pm 49$	$22.30^{+25.11}_{-15.37}$	$558^{+71}_{-81}$	$3146^{+1429}_{-561}$	$302^{+2709}_{-234}$

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

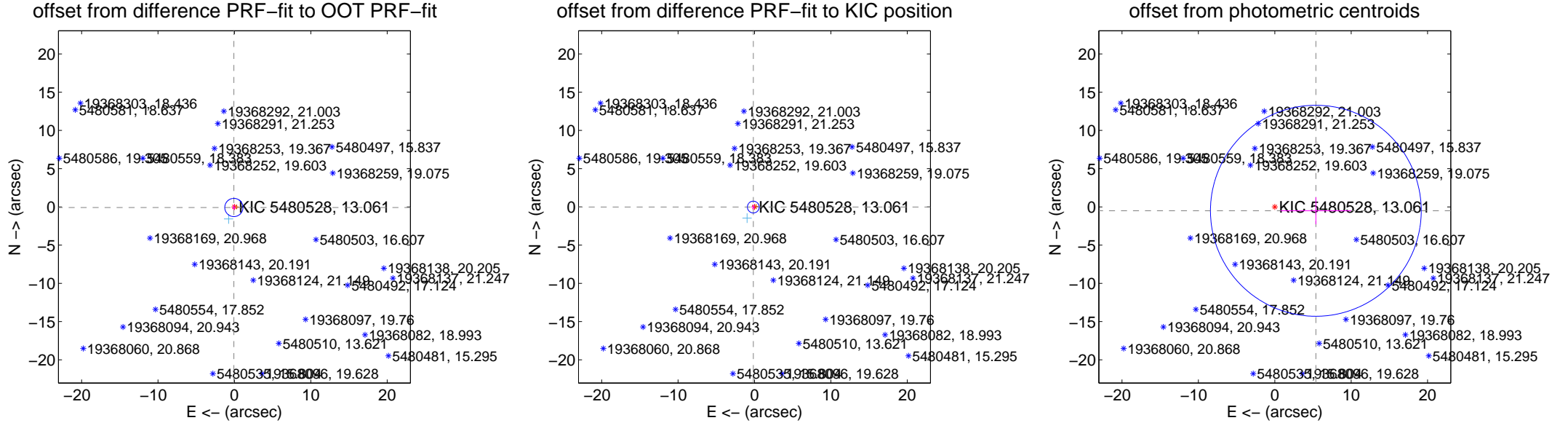
## DV Centroid Data

Supplemental centroid analysis for 005480528-03. Kepler magnitude: 13.06. Transit SNR 4.15

There are 2 quarters with good PRF difference image offsets

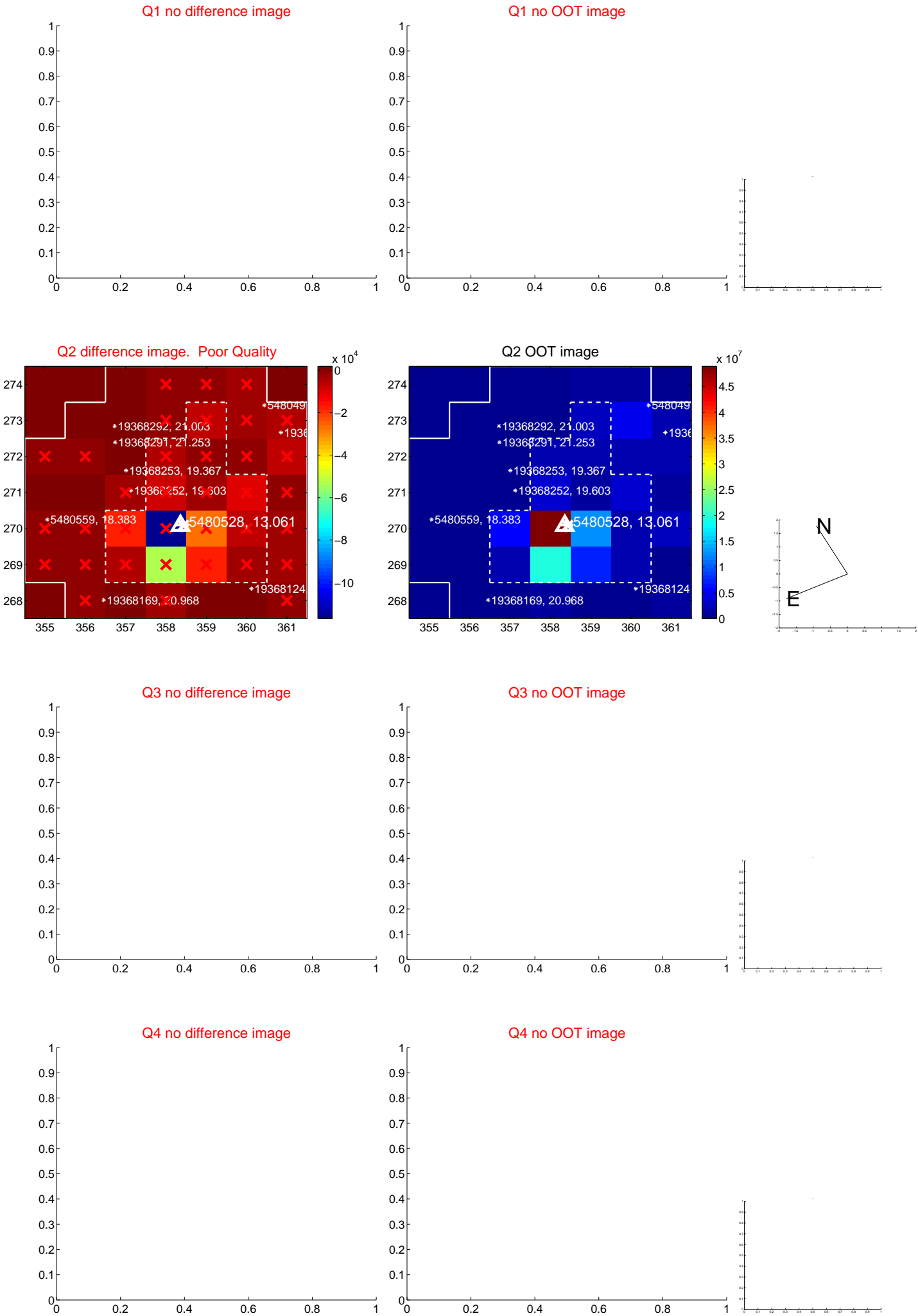
The direct PRF centroid is offset from the target star catalog position by about 0.13 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.105 \pm 0.397$	0.26	$0.070 \pm 0.232$	$-0.078 \pm 0.347$
PRF-fit source offset from KIC position	$0.153 \pm 0.257$	0.60	$0.152 \pm 0.218$	$-0.022 \pm 0.333$
photometric centroid source offset	$5.40 \pm 4.60$	1.17	$-5.38 \pm 4.62$	$-0.51 \pm 1.76$



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



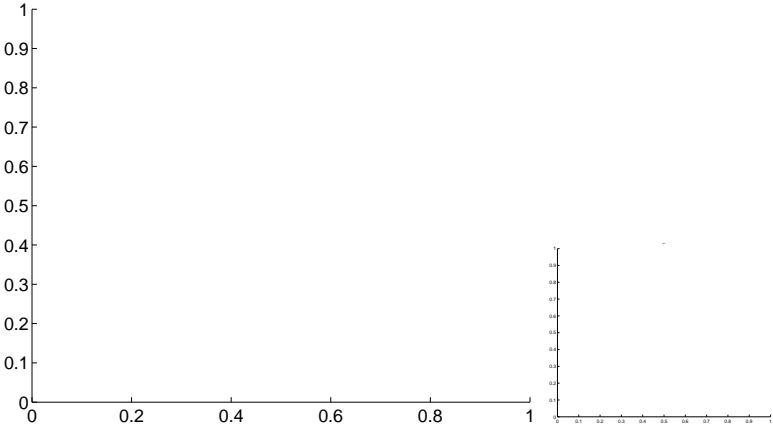
Q5 no OOT image



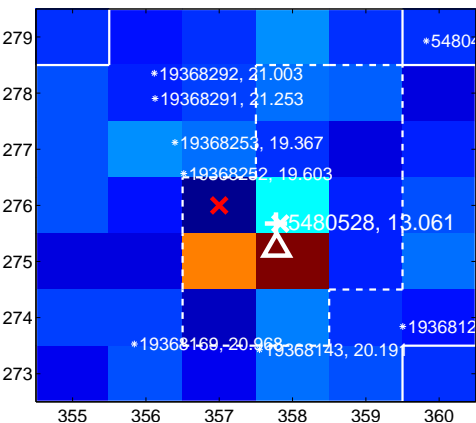
Q6 no difference image



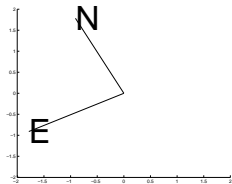
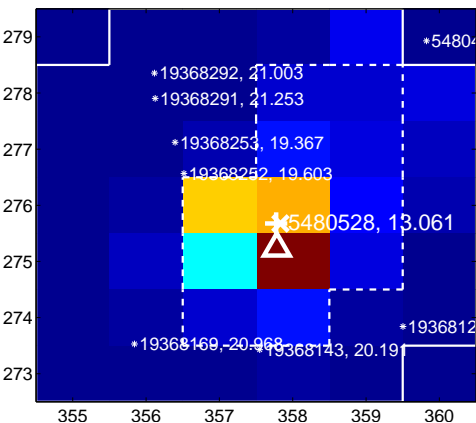
Q6 no OOT image



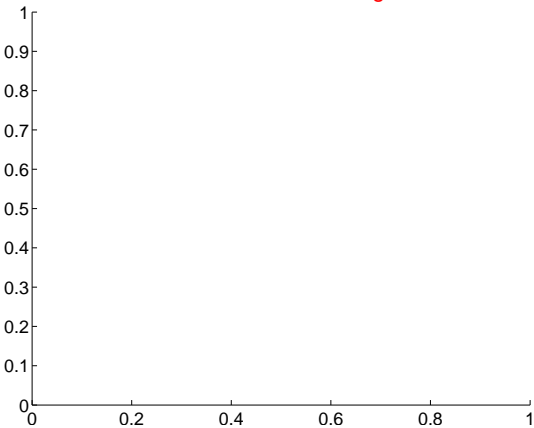
Q7 difference image



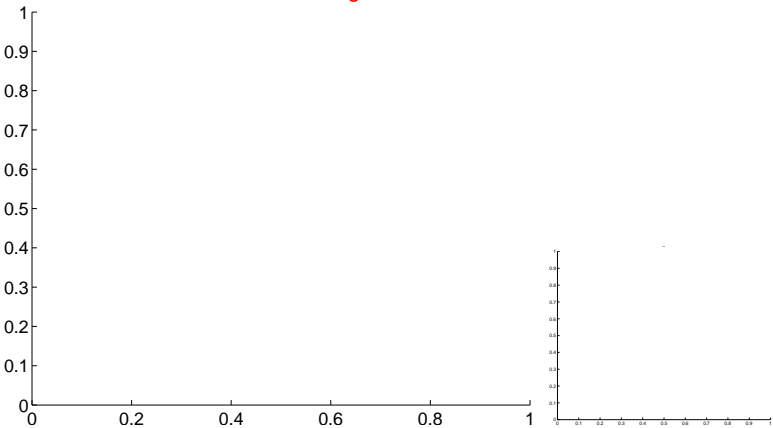
Q7 OOT image



Q8 no difference image



Q8 no OOT image



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

Q9 no difference image



Q9 no OOT image



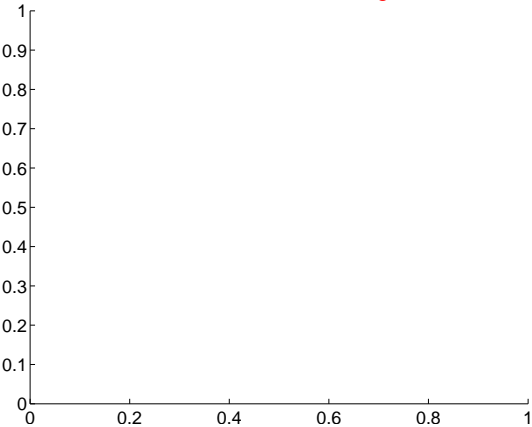
Q10 no difference image



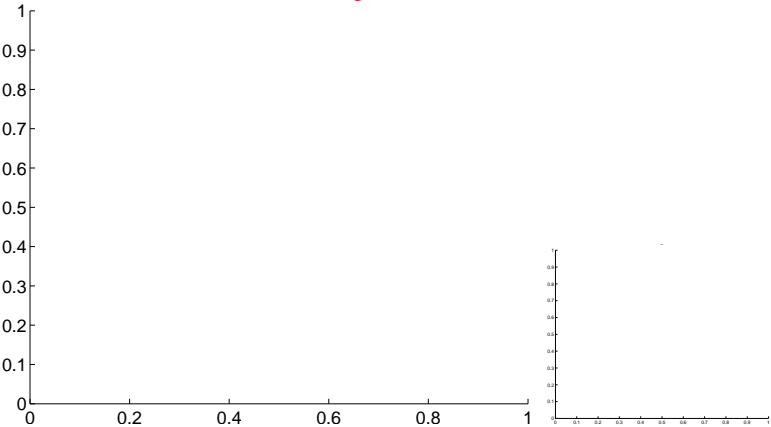
Q10 no OOT image



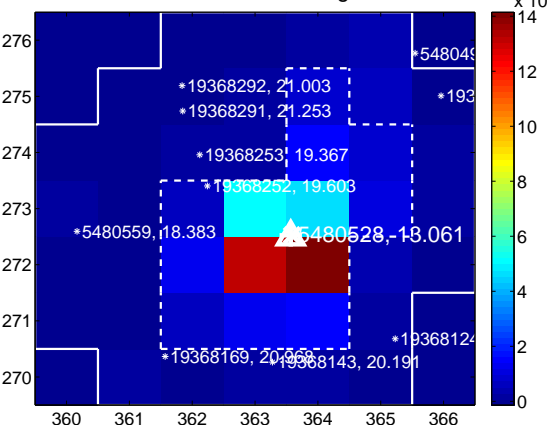
Q11 no difference image



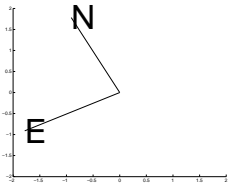
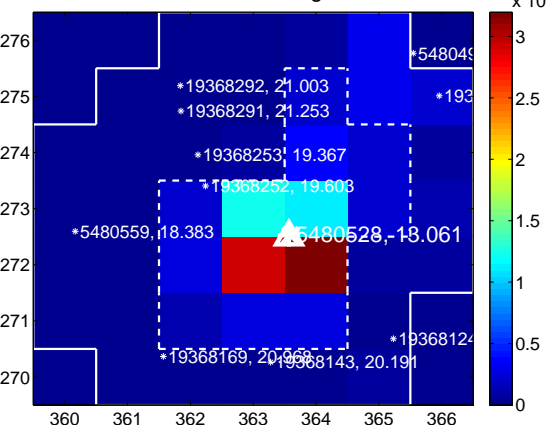
Q11 no OOT image



Q12 difference image



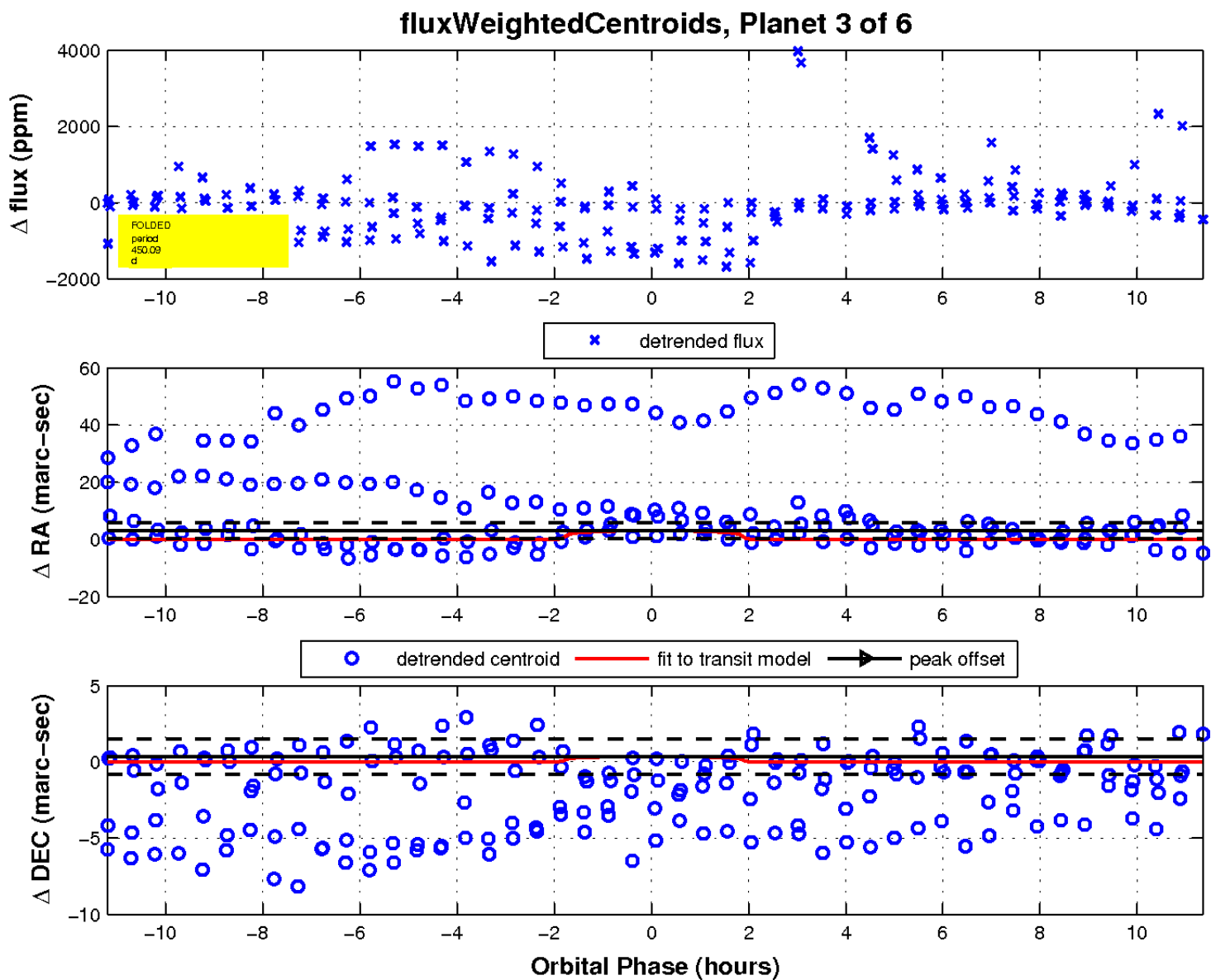
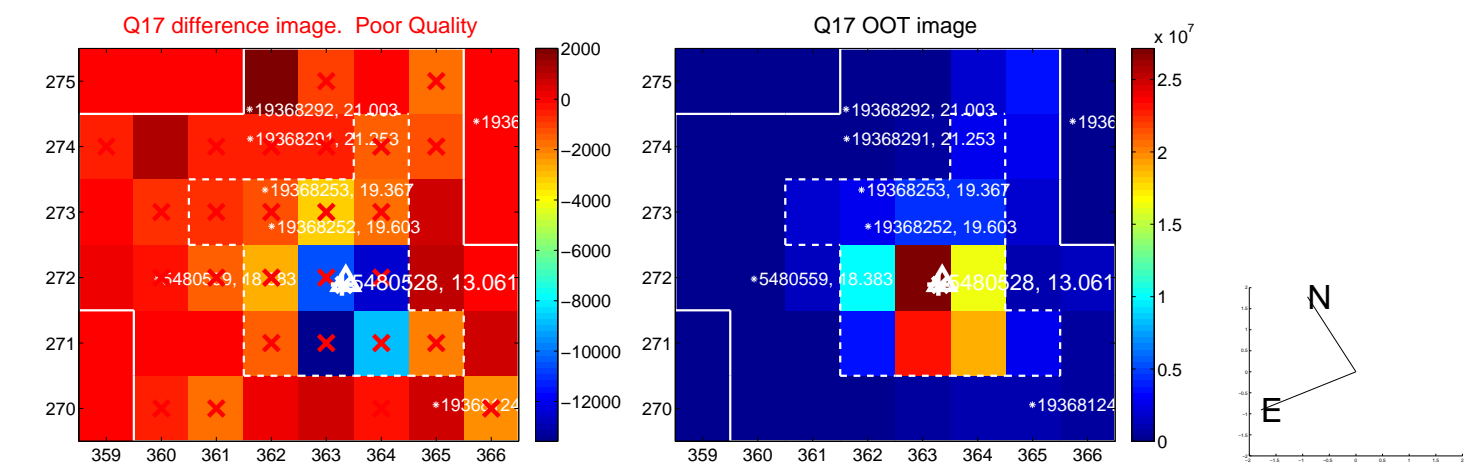
Q12 OOT image



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

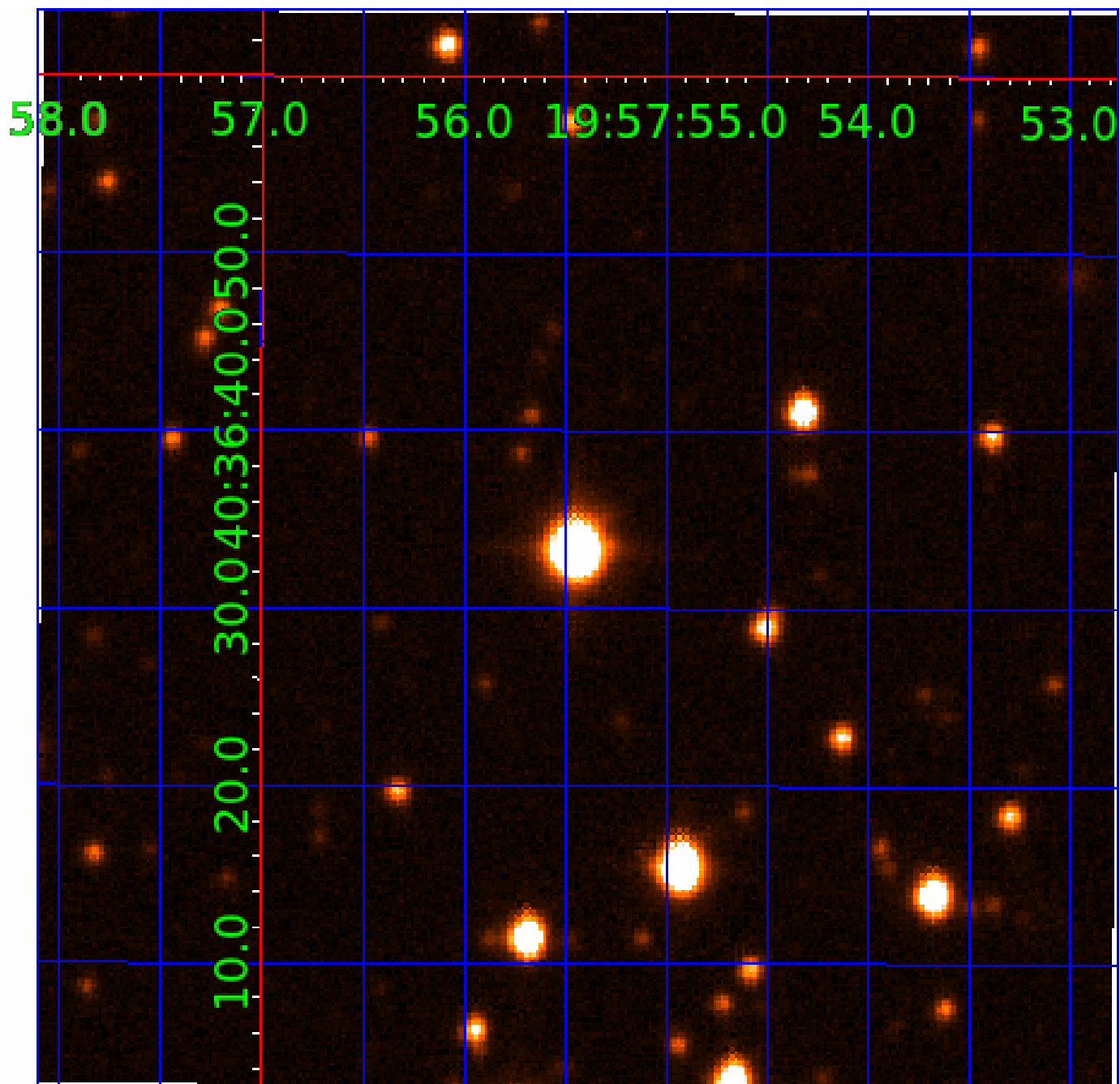


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 005480528

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005480528-02	OBS	No	463.440704	201.789800	1525.2	4.568	18.7	10.2	3.27	5098	12.53	5.38
005480528-03	OBS	No	450.088539	215.311220	601.8	3.789	19.3	4.2	3.27	5098	8.14	5.59
005480528-05	OBS	No	398.751600	312.275239	898.5	4.814	17.2	6.3	3.27	5098	10.27	6.57
005480528-06	OBS	No	396.976392	403.379510	892.9	3.500	18.6	-1.0	3.27	5098	9.60	6.61

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005480528-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
005480528-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
005480528-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—CENT_FEW_DIFFS
005480528-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_ZUMA—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_NOFITS

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

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

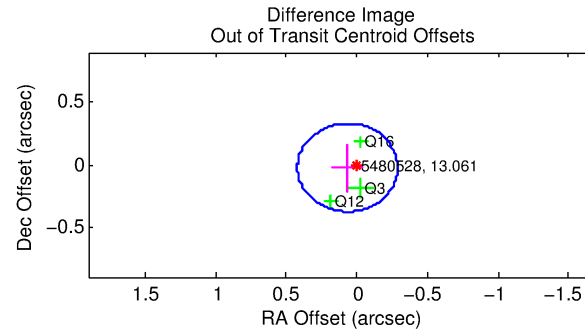
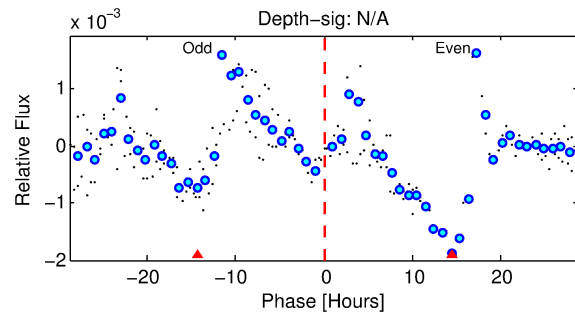
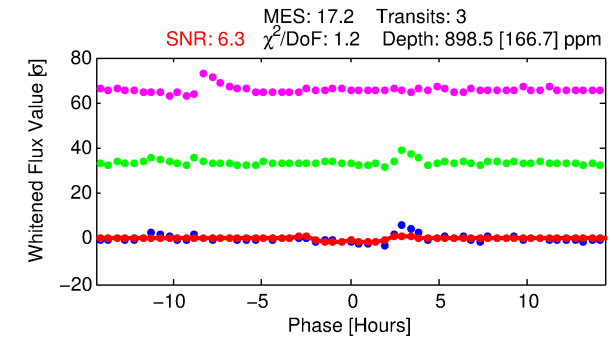
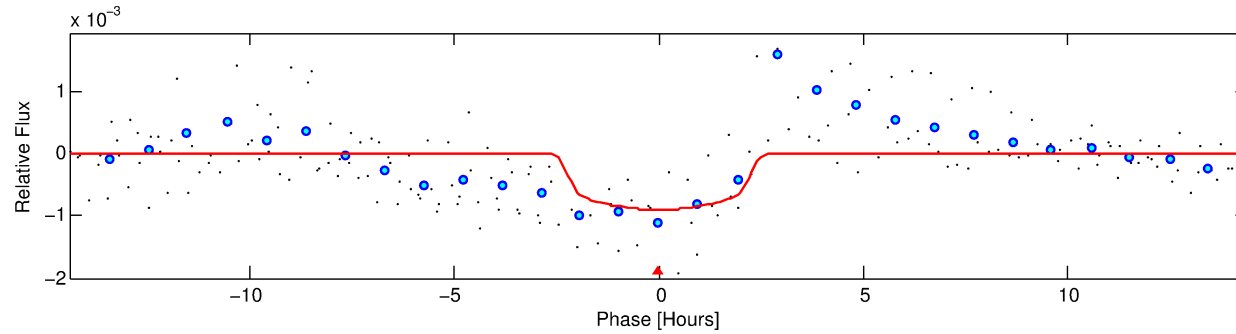
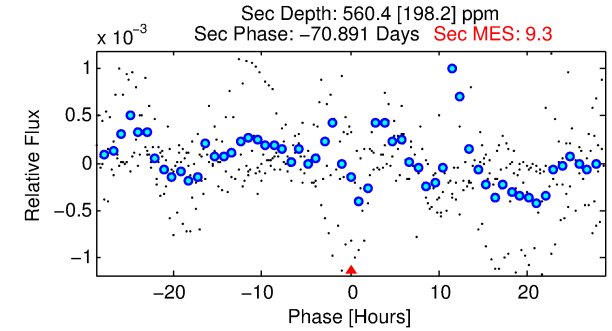
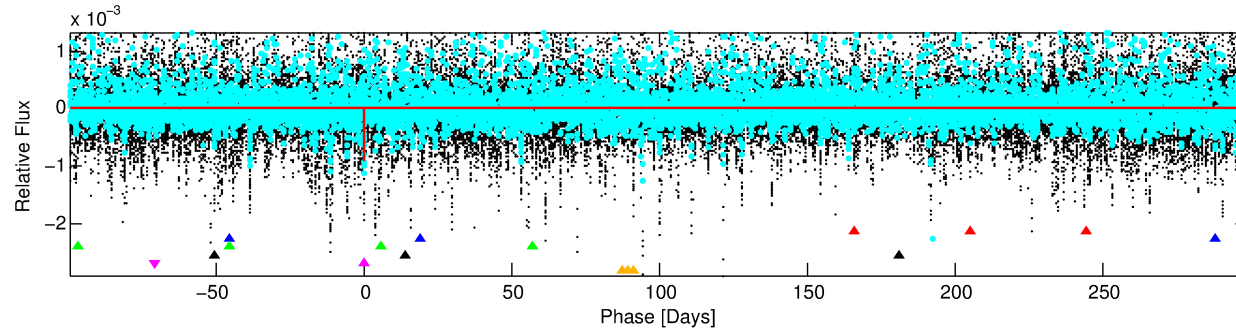
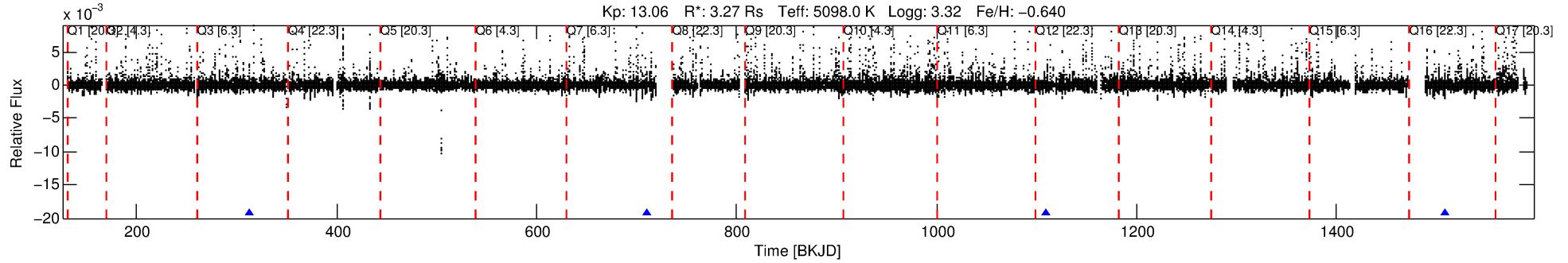
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 005480528-05

No Significant Match Found

# DV One-Page Summary

KIC: 5480528 Candidate: 5 of 6 Period: 398.752 d



## DV Fit Results:

Period = 398.75160 [0.00365] d  
Epoch = 312.2752 [0.0070] BKJD  
Rp/R\* = 0.0288 [0.0426]  
a/R\* = 509.89 [2963.42]  
b = 0.64 [5.46]  
Seff = 6.57 [5.10]  
Teq = 408 [79] K  
Rp = 10.27 [17.00] Re  
a = 0.9934 [0.5702] AU  
Ag = 2882.81 [8878.21] [0.32] $\sigma$   
Teffp = 4625 [3450] K [1.22] $\sigma$

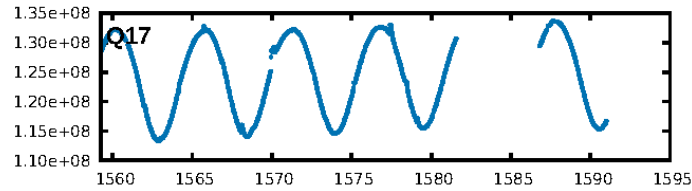
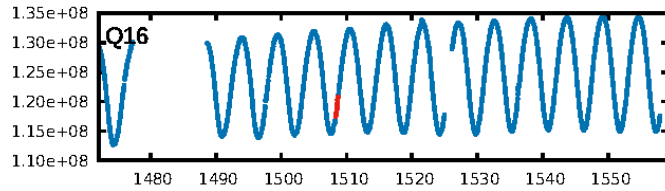
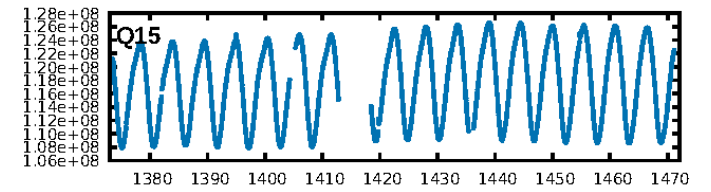
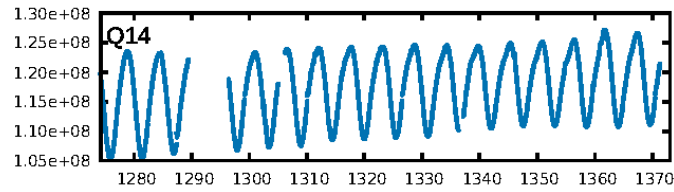
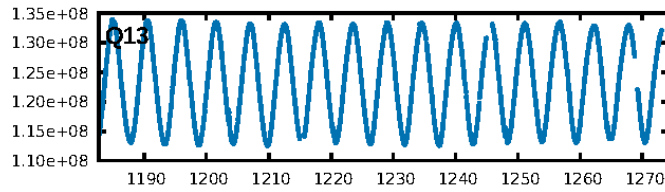
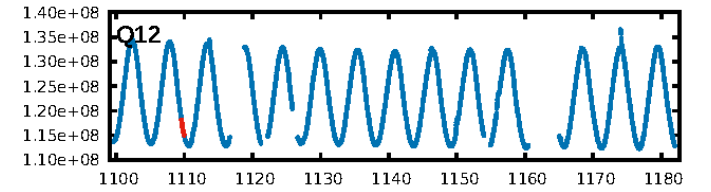
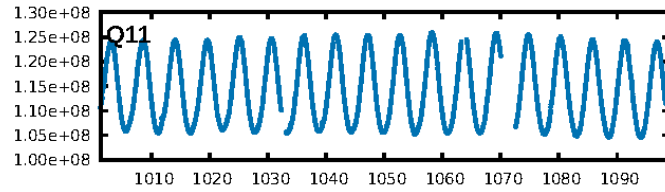
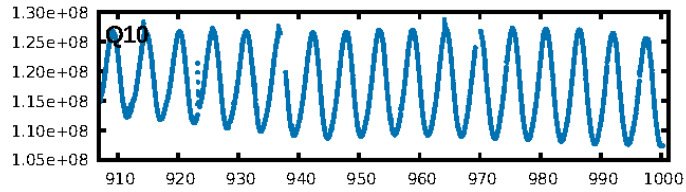
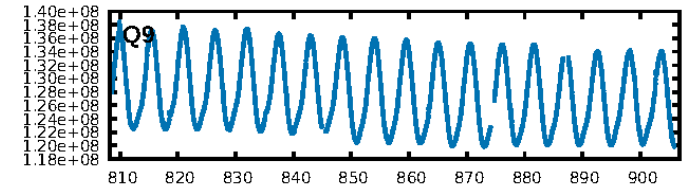
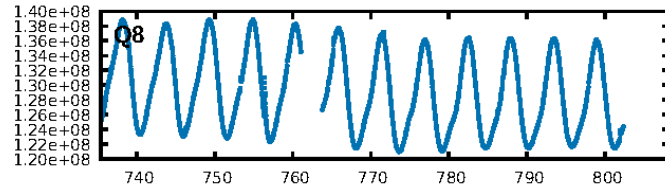
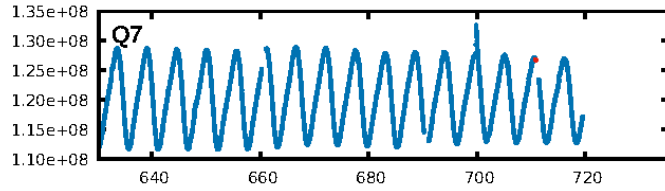
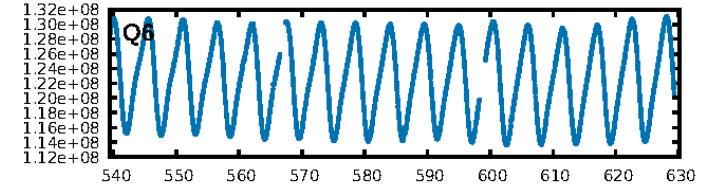
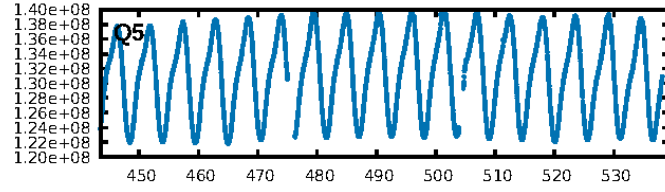
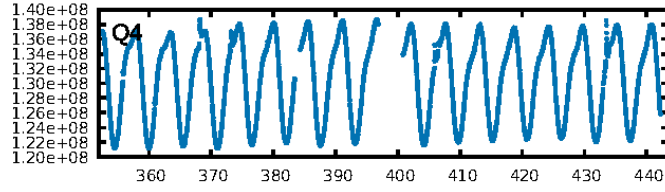
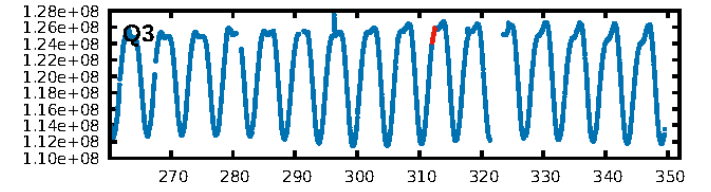
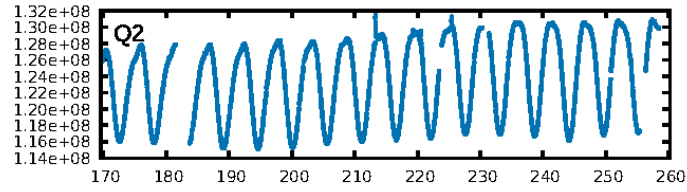
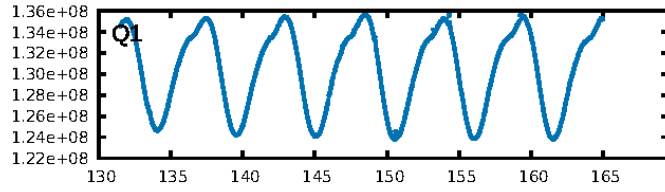
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [7.16] $\sigma$   
LongPeriod-sig: 100.0% [147.83] $\sigma$   
ModelChiSquare2-sig: 27.8%  
ModelChiSquareGof-sig: 72.5%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -0.7163  
Centroid-sig: 1.0%  
Centroid-so: 1.023 arcsec [1.22] $\sigma$   
OotOffset-rm: 0.070 arcsec [0.59] $\sigma$   
KicOffset-rm: 0.157 arcsec [1.61] $\sigma$   
OotOffset-st: 0/1/2/0 [3]  
KicOffset-st: 0/1/2/0 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 1.00 [3/3]

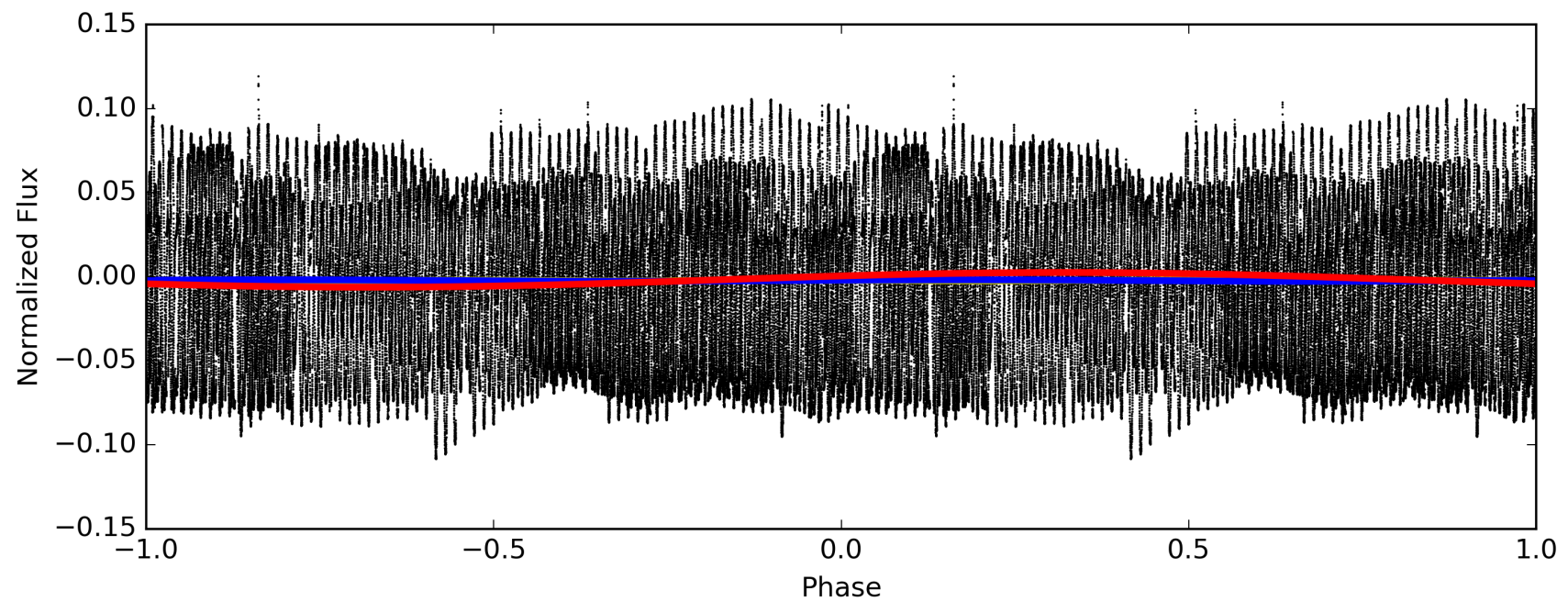
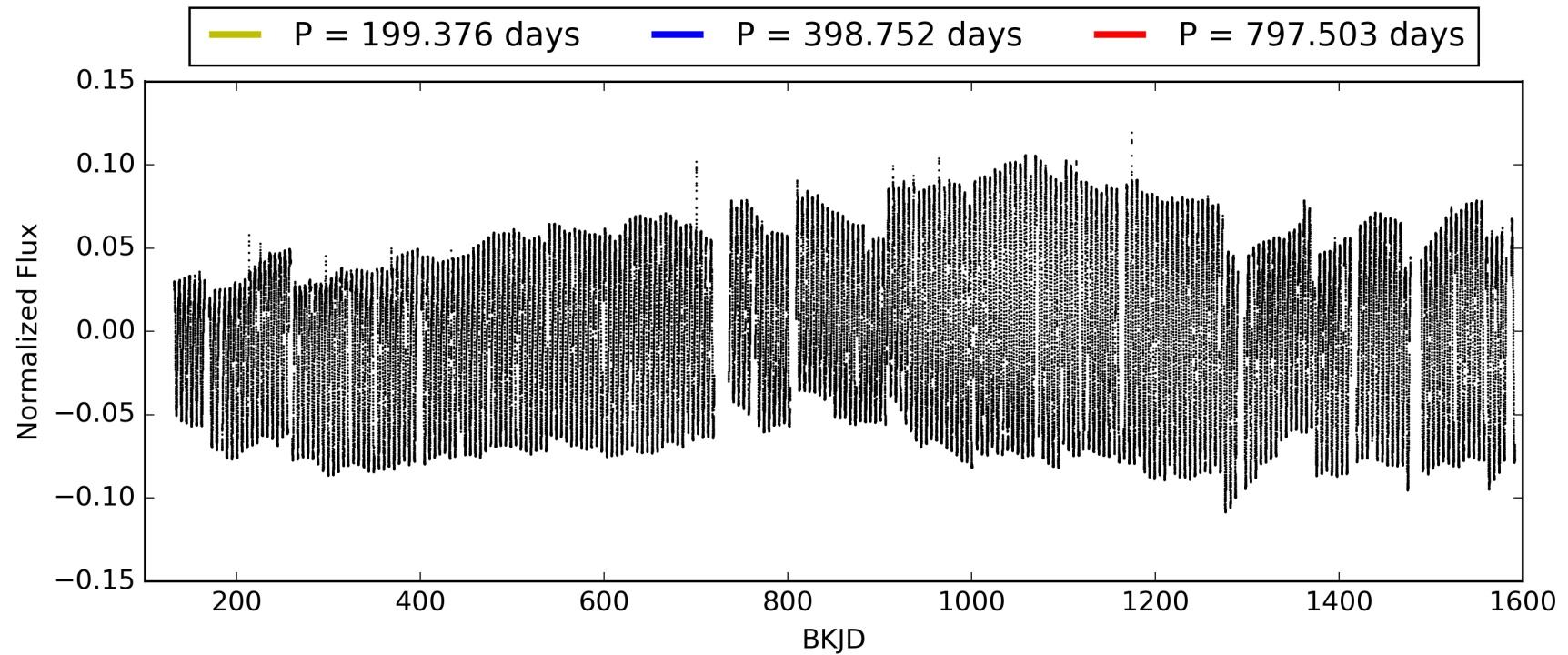
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 16:17:28 Z

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

# TCE 005480528-05, PDC Light Curves

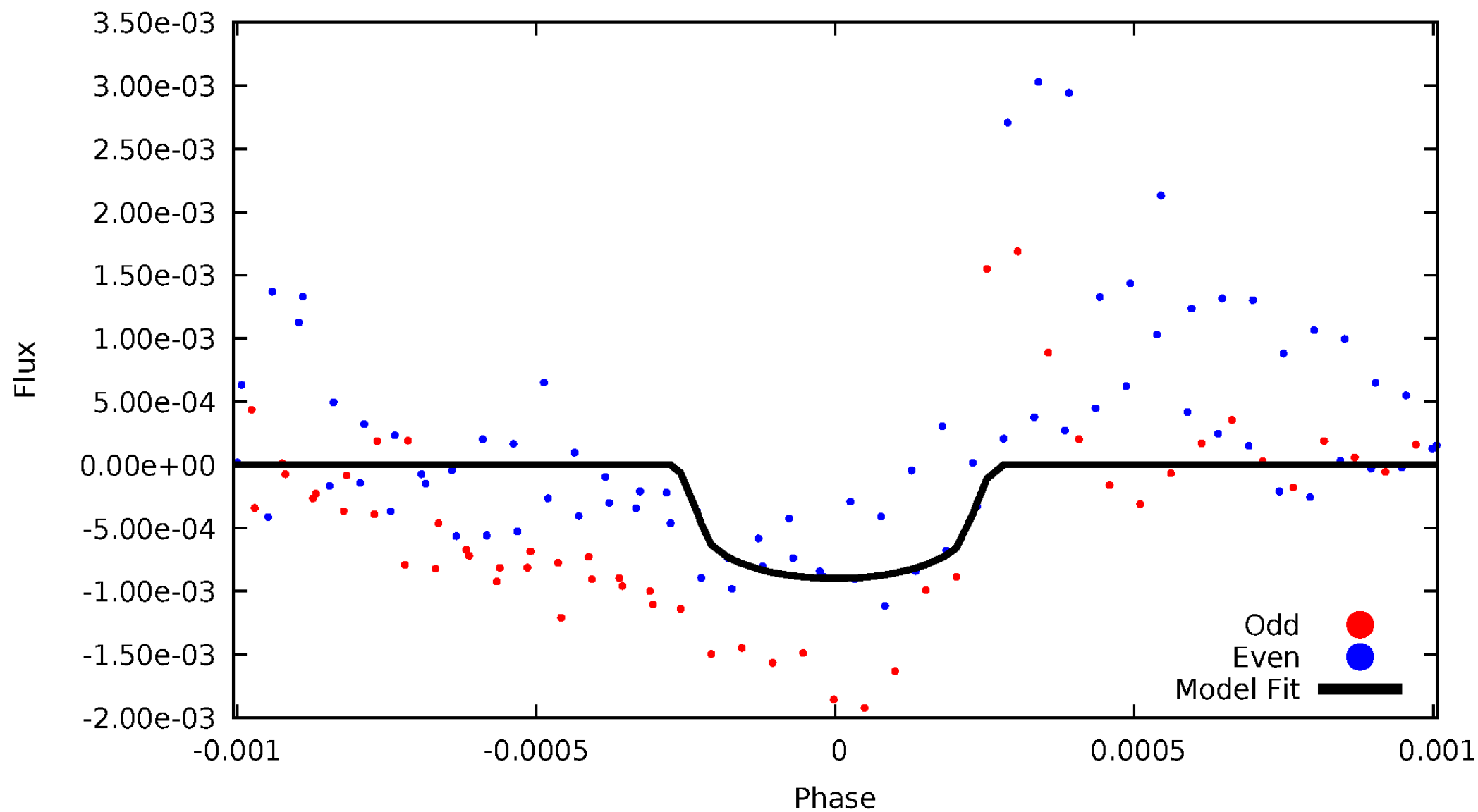


TCE 005480528-05



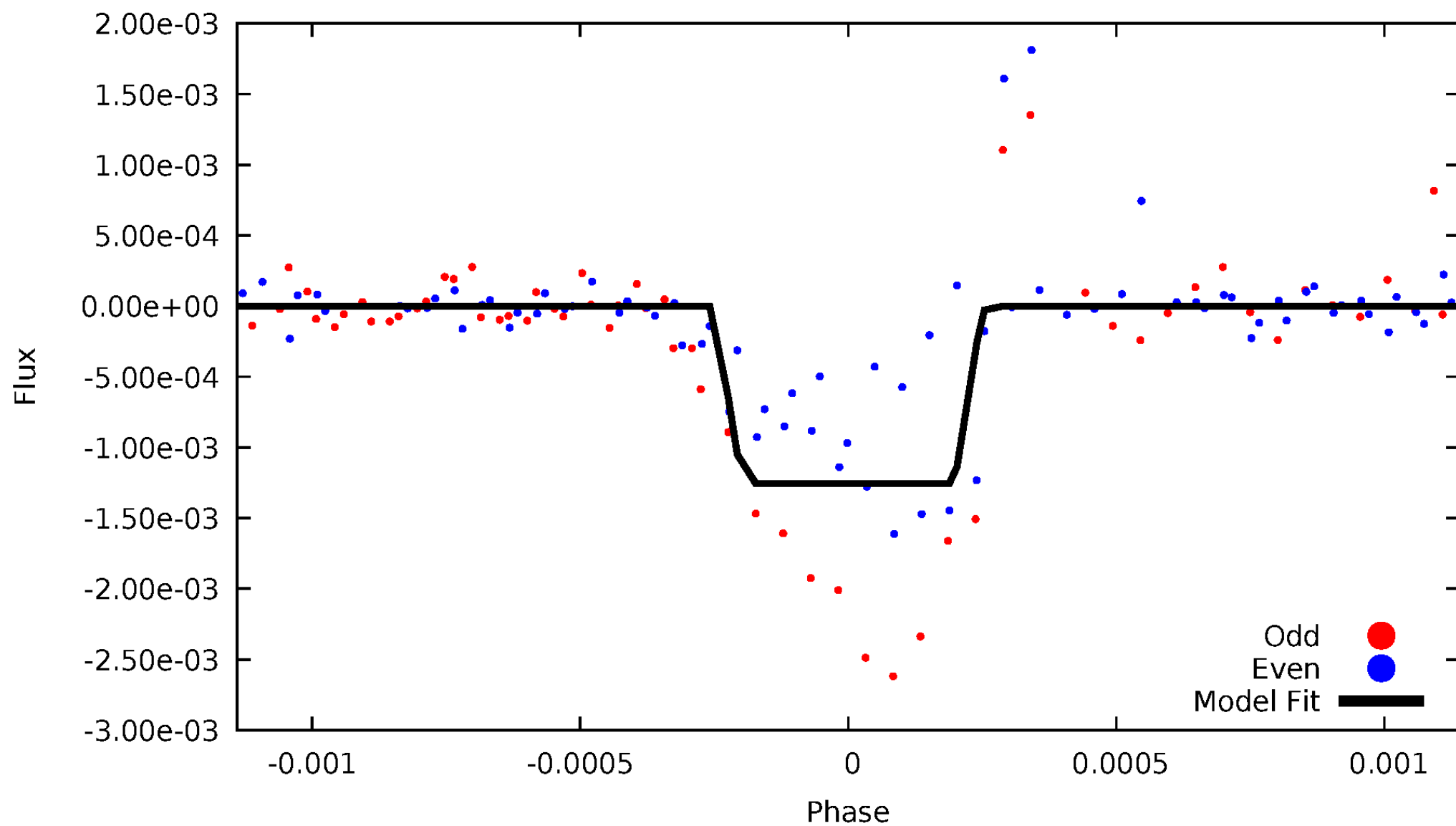
# DV Odd/Even

TCE 005480528-05



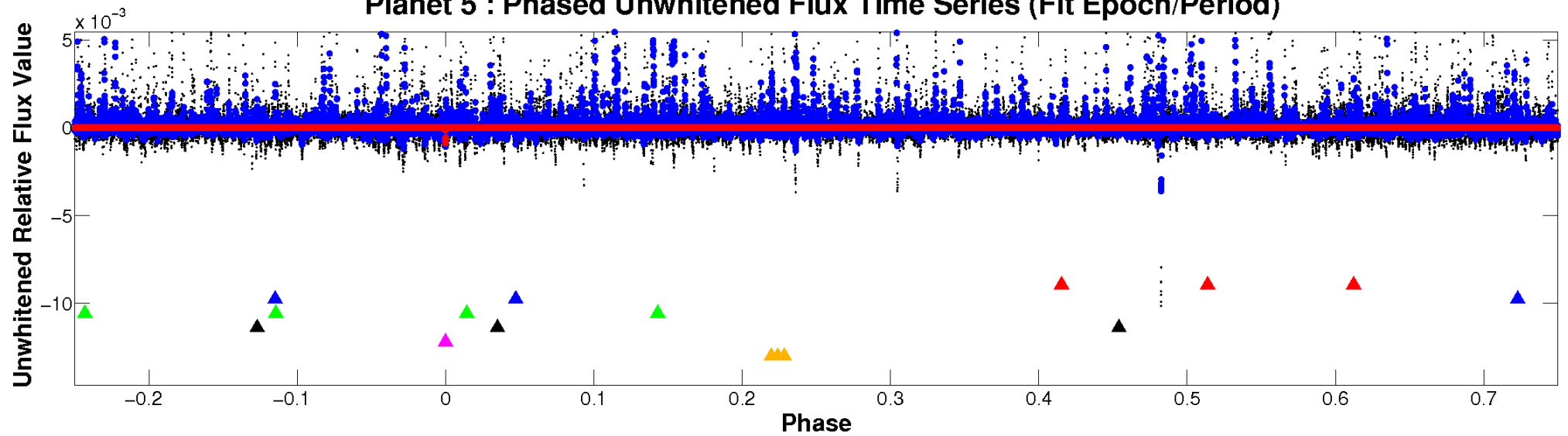
# ALT Odd/Even

TCE 005480528-05

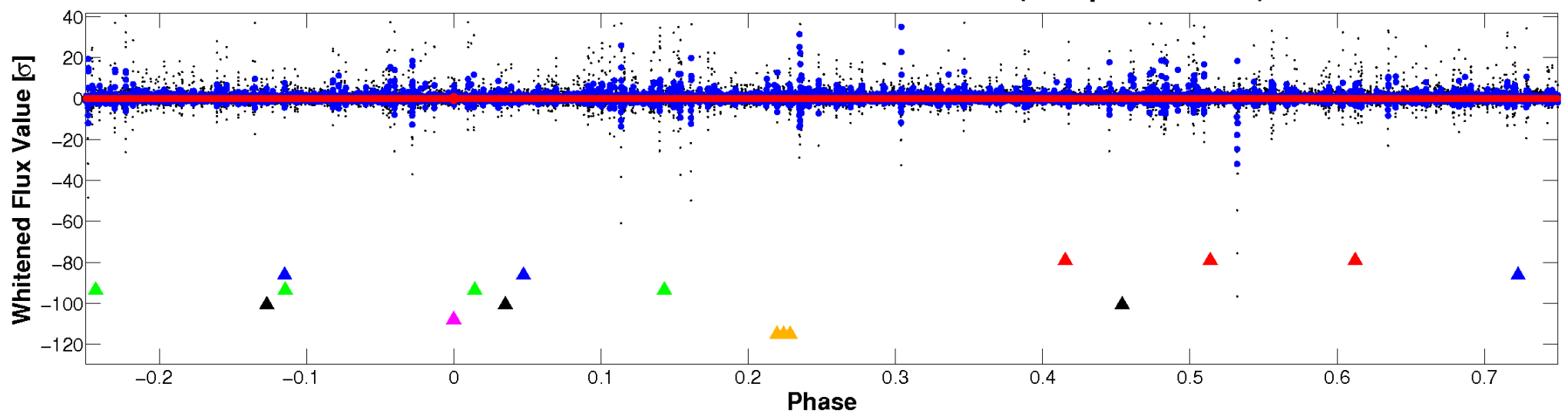


# Non-Whitened Vs. Whitened Light Curve

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



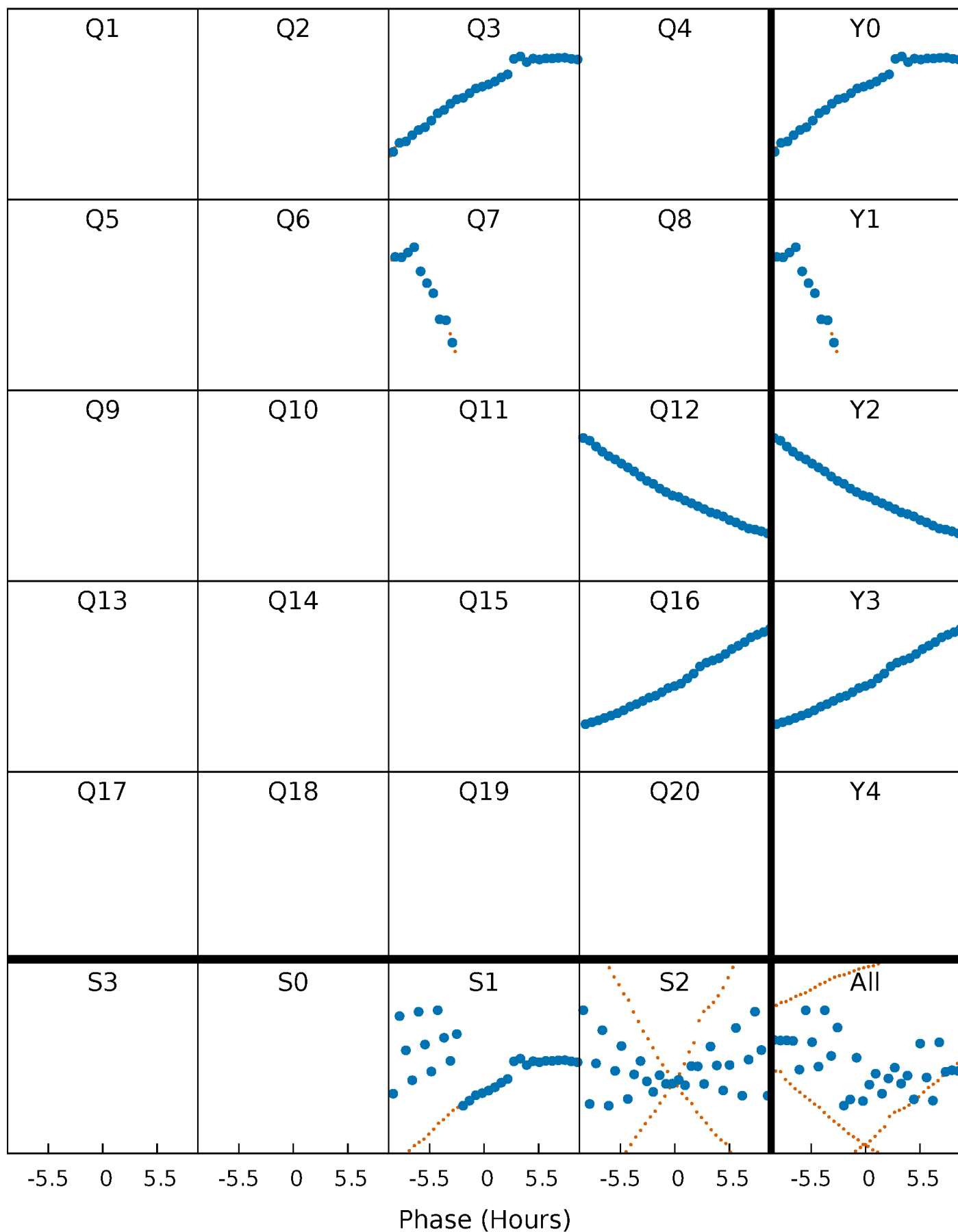
## Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)





# PDC Quarter-Phased Transit Curves

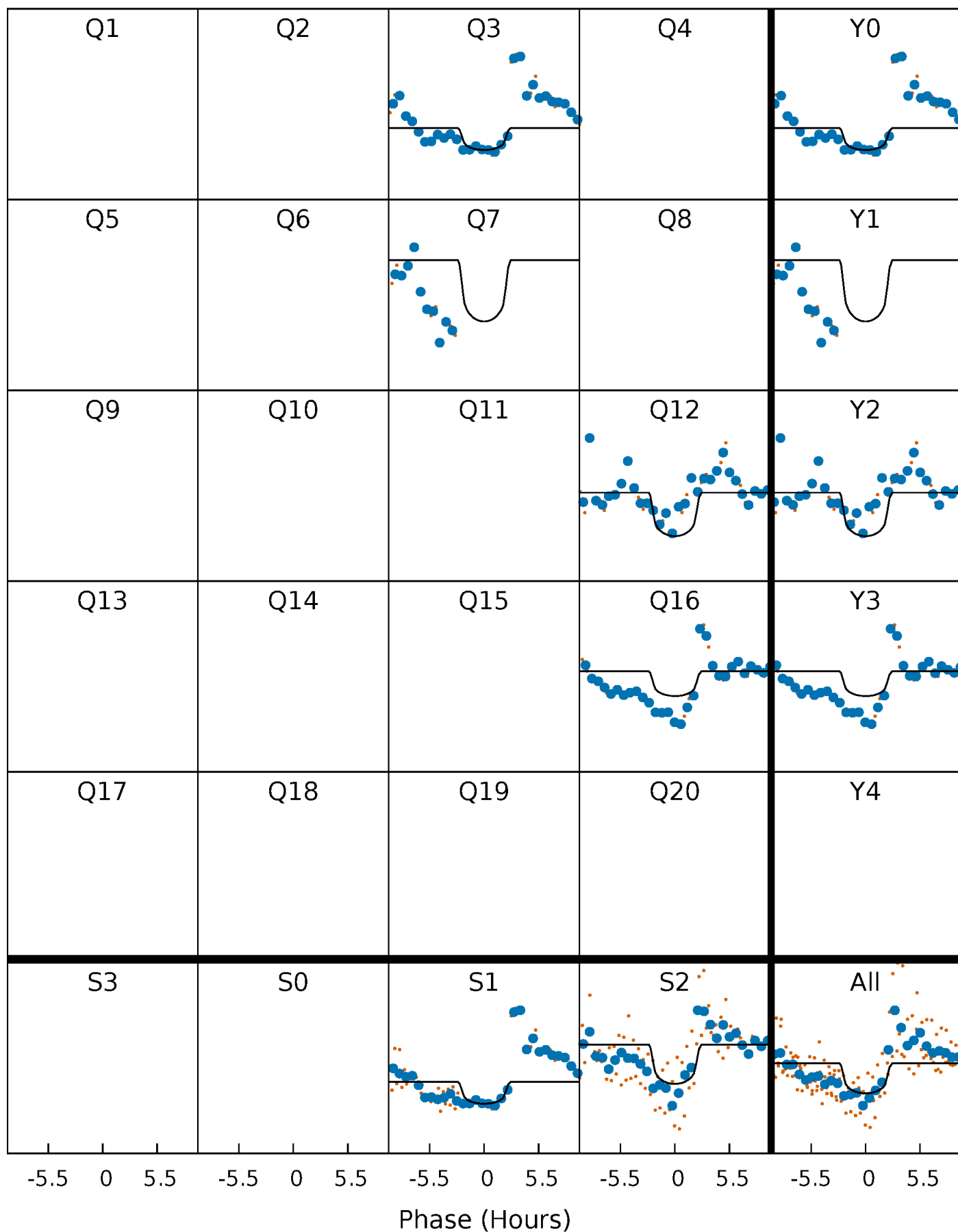
TCE 005480528-05     $P=398.751600$  Days     $T_0=312.275239$  (BKJD)





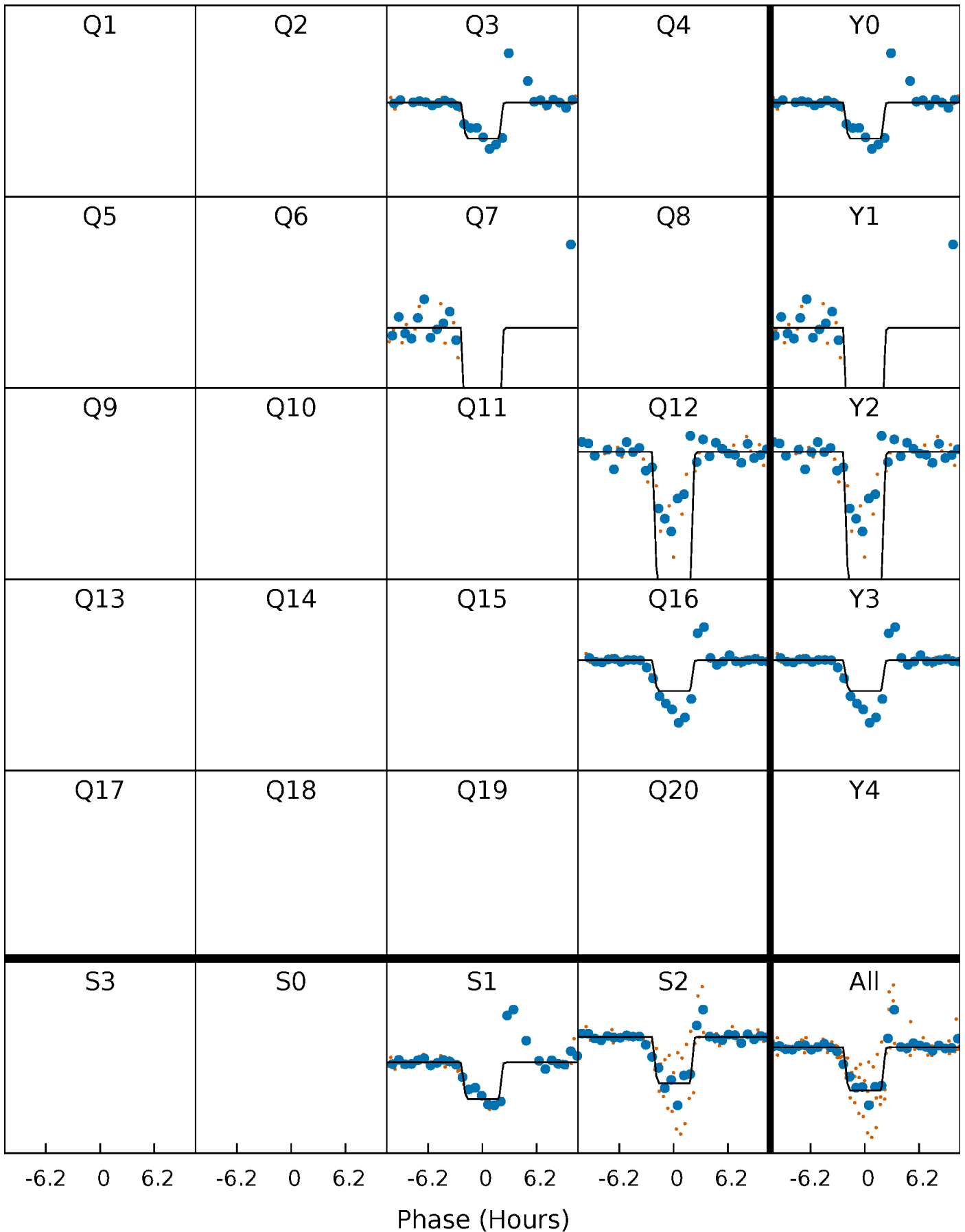
# DV Quarter-Phased Transit Curves

TCE 005480528-05     $P=398.751600$  Days     $T_0=312.275239$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

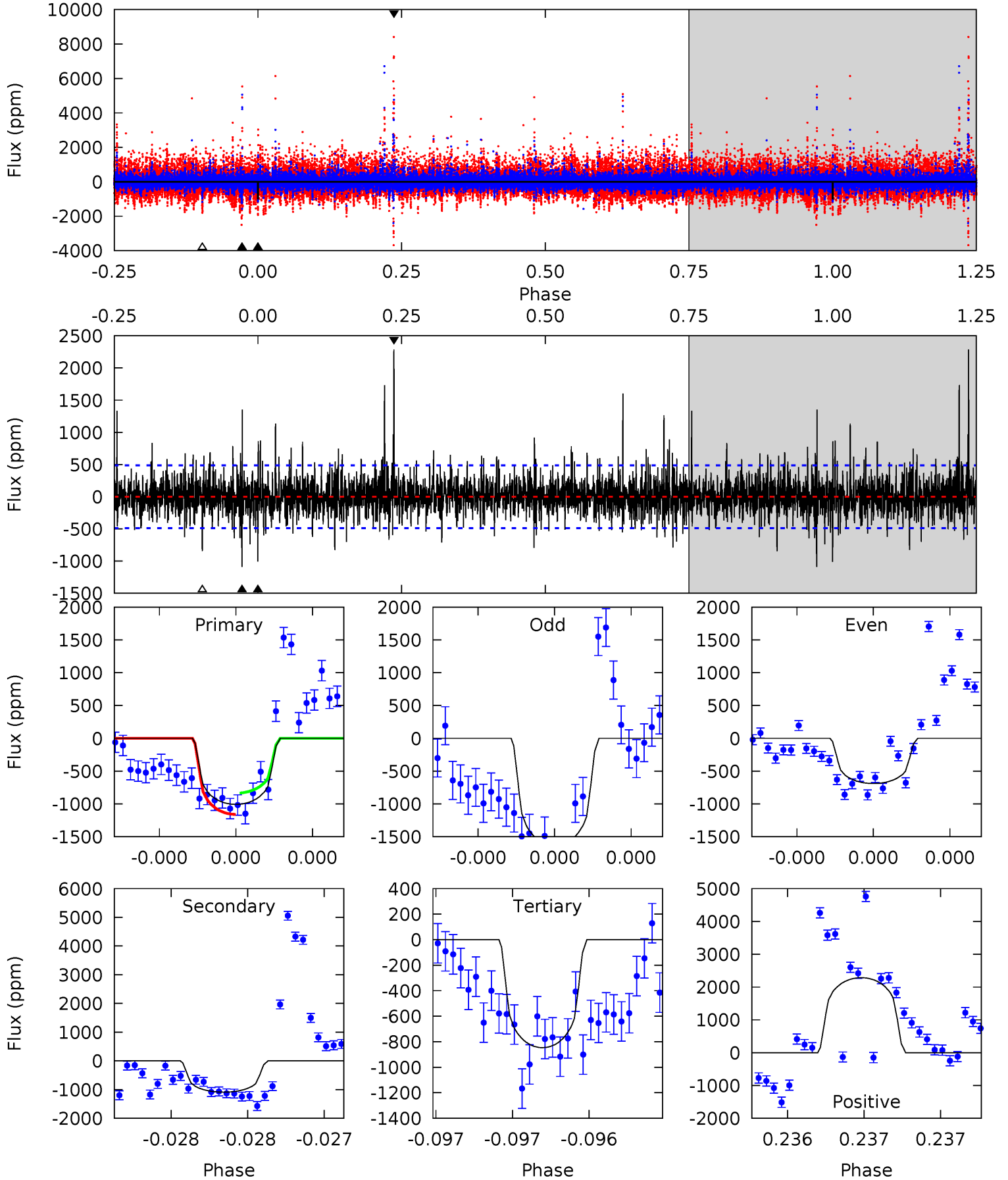
TCE 005480528-05     $P=398.747301$  Days     $T_0=312.274317$  (BKJD)



# DV Model-Shift Uniqueness Test

005480528-05, P = 398.751600 Days, E = 312.275239 Days

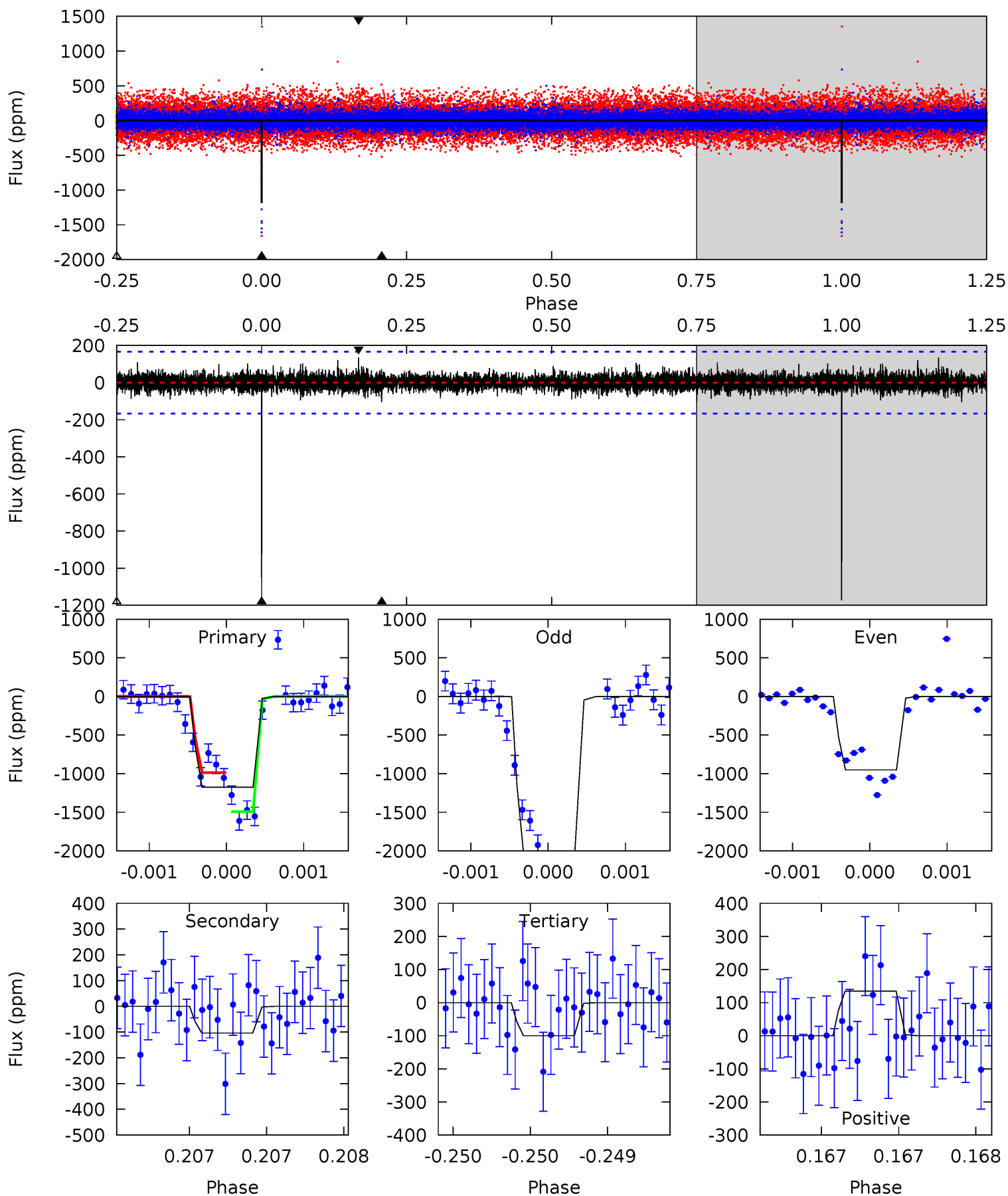
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.5	12.5	9.68	26.1	5.58	3.49	2.51	1.84	-14.6	2.78	-13.7	3.02	1.04	0.68	1.88



# Alt Model-Shift Uniqueness Test

005480528-05, P = 398.747301 Days, E = 312.274317 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
39.1	3.46	3.33	4.50	5.56	3.46	0.74	35.8	34.6	0.13	-1.03	20.5	1.02	0.10	8.23



### Stellar Parameters For KIC 005480528

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5098^{+140}_{-127}$	$3.323^{+0.385}_{-0.315}$	$-0.640^{+0.300}_{-0.250}$	$3.273^{+1.977}_{-2.416}$	$0.821^{+0.281}_{-0.187}$	$0.033^{+0.083}_{-0.022}$
	+3%/-2%	+12%/-9%	+47%/-39%	+60%/-74%	+34%/-23%	+252%/-66%
Source	PHO1	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 005480528-05 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-1089 \pm 87$	$14.52^{+14.67}_{-9.70}$	$584^{+80}_{-75}$	$4789^{+3029}_{-1052}$	$2842^{+21970}_{-2135}$
Alt.	$-104 \pm 30$	$16.40^{+16.44}_{-10.66}$	$584^{+76}_{-79}$	$3028^{+1312}_{-480}$	$209^{+1559}_{-159}$

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

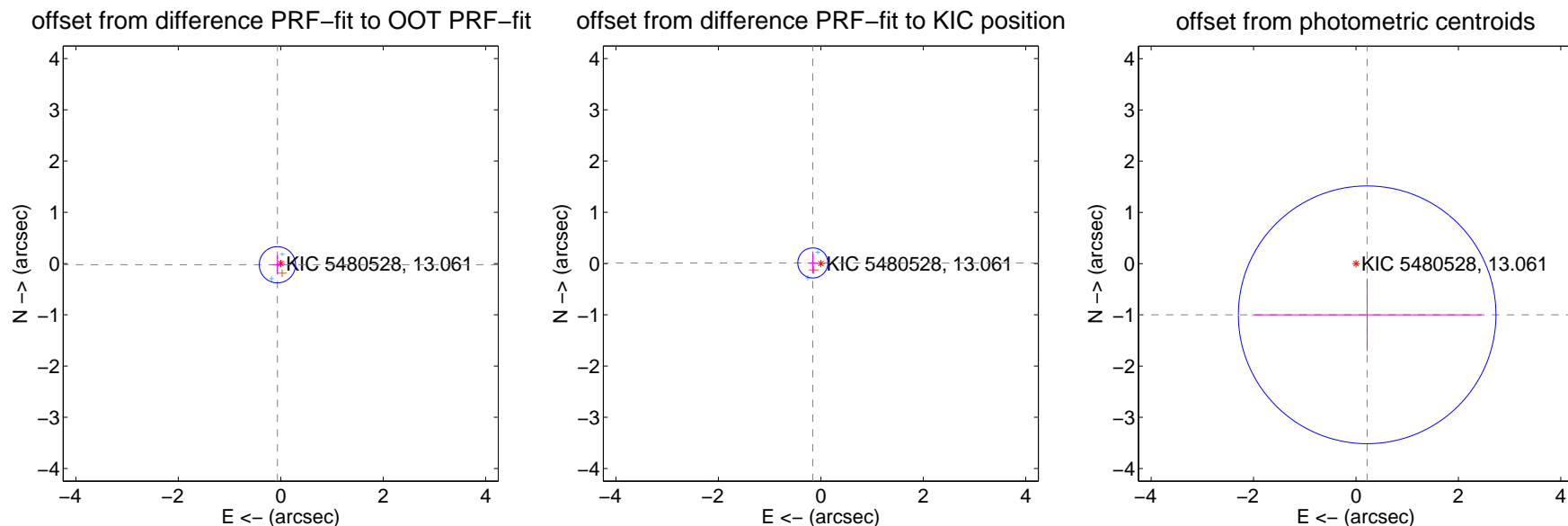
## DV Centroid Data

Supplemental centroid analysis for 005480528-05. Kepler magnitude: 13.06. Transit SNR 6.29

There are 2 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.09 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.070 \pm 0.118$	0.59	$0.066 \pm 0.105$	$-0.024 \pm 0.188$
PRF-fit source offset from KIC position	$0.157 \pm 0.098$	1.61	$0.157 \pm 0.097$	$0.012 \pm 0.191$
photometric centroid source offset	$1.02 \pm 0.84$	1.22	$-0.22 \pm 2.24$	$-1.00 \pm 0.71$



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



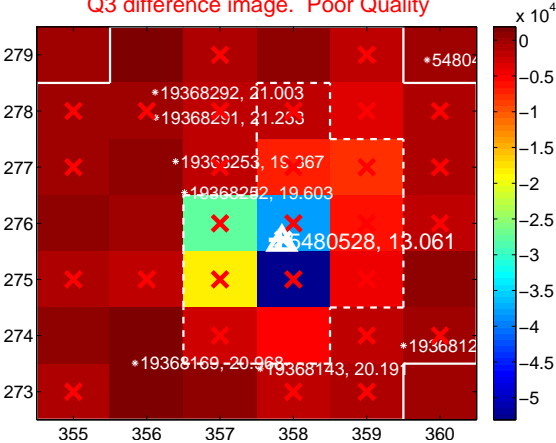
Q2 no difference image



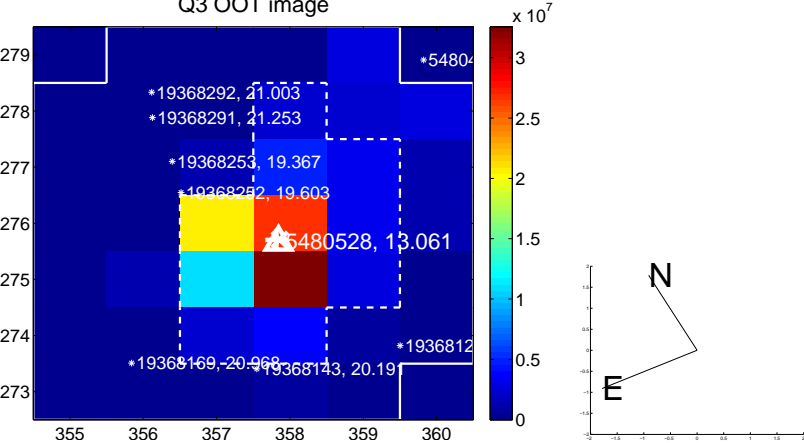
Q2 no OOT image



Q3 difference image. Poor Quality



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.

Q9 no difference image



Q9 no OOT image



Q10 no difference image



Q10 no OOT image



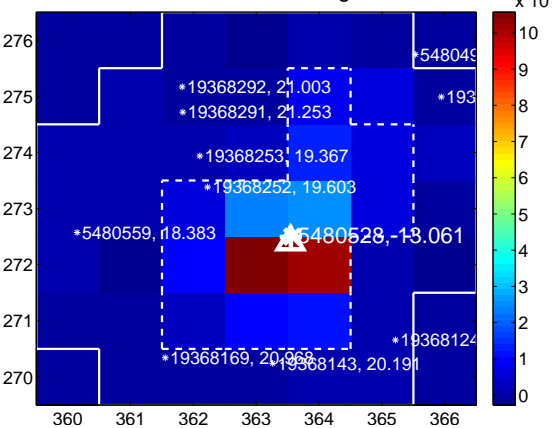
Q11 no difference image



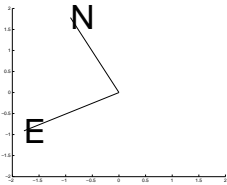
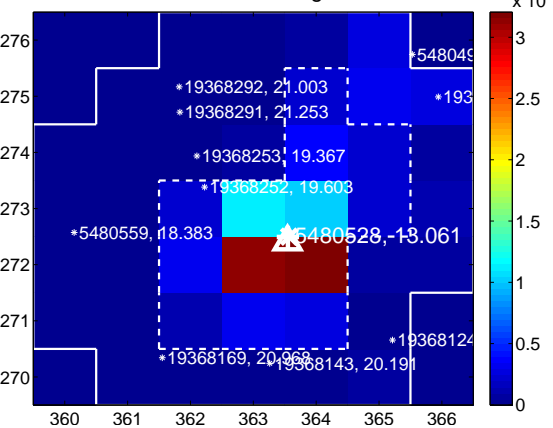
Q11 no OOT image



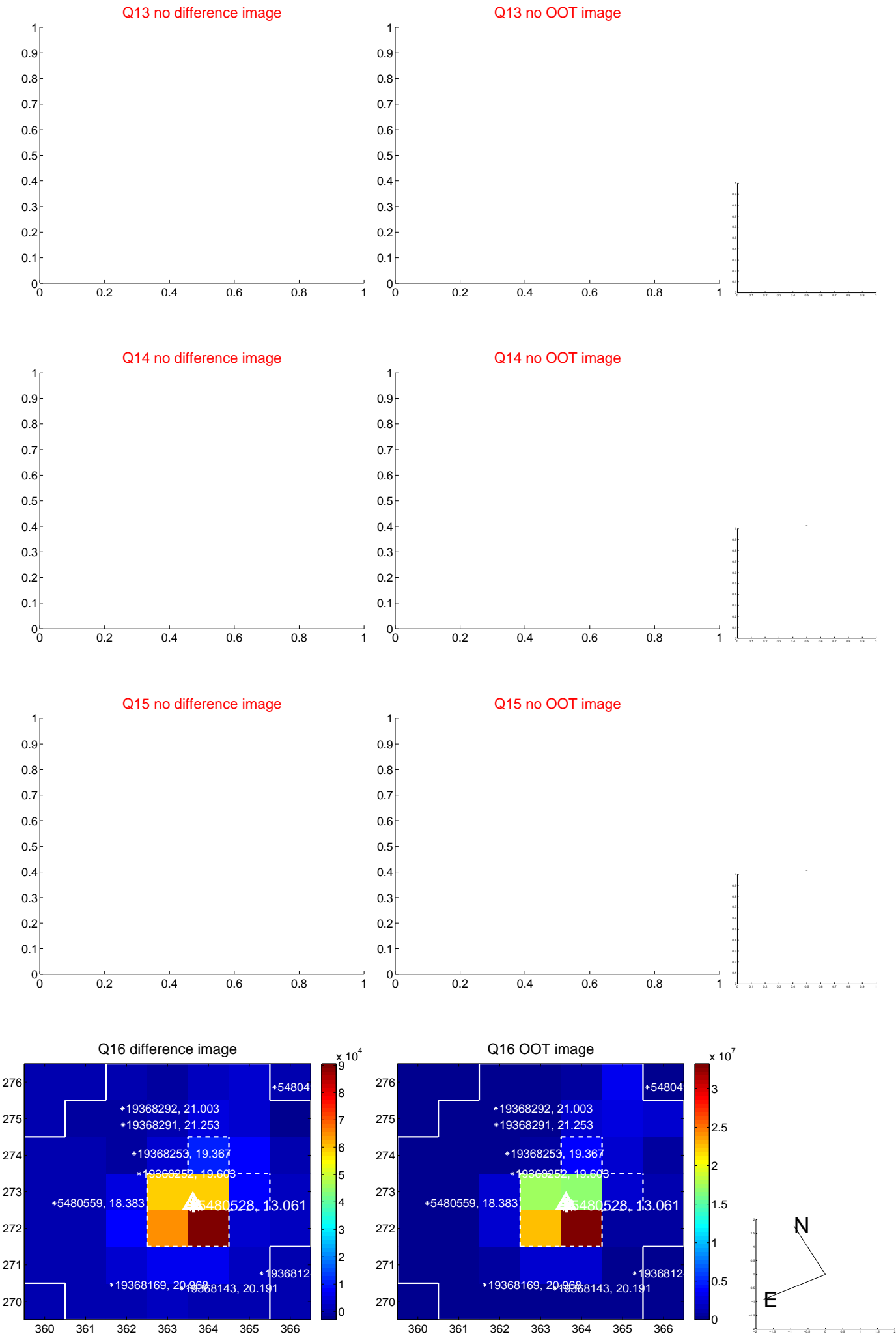
Q12 difference image



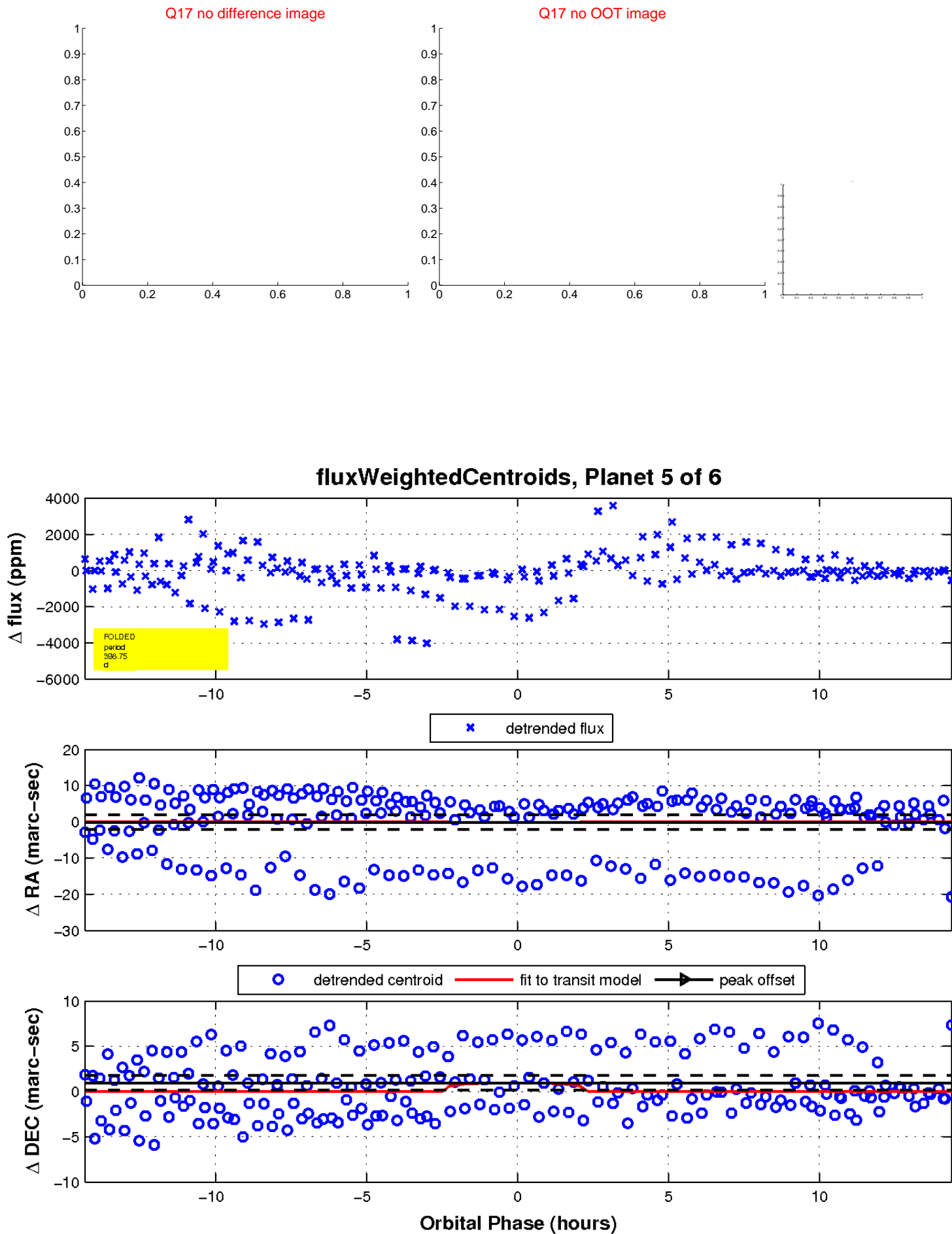
Q12 OOT image



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

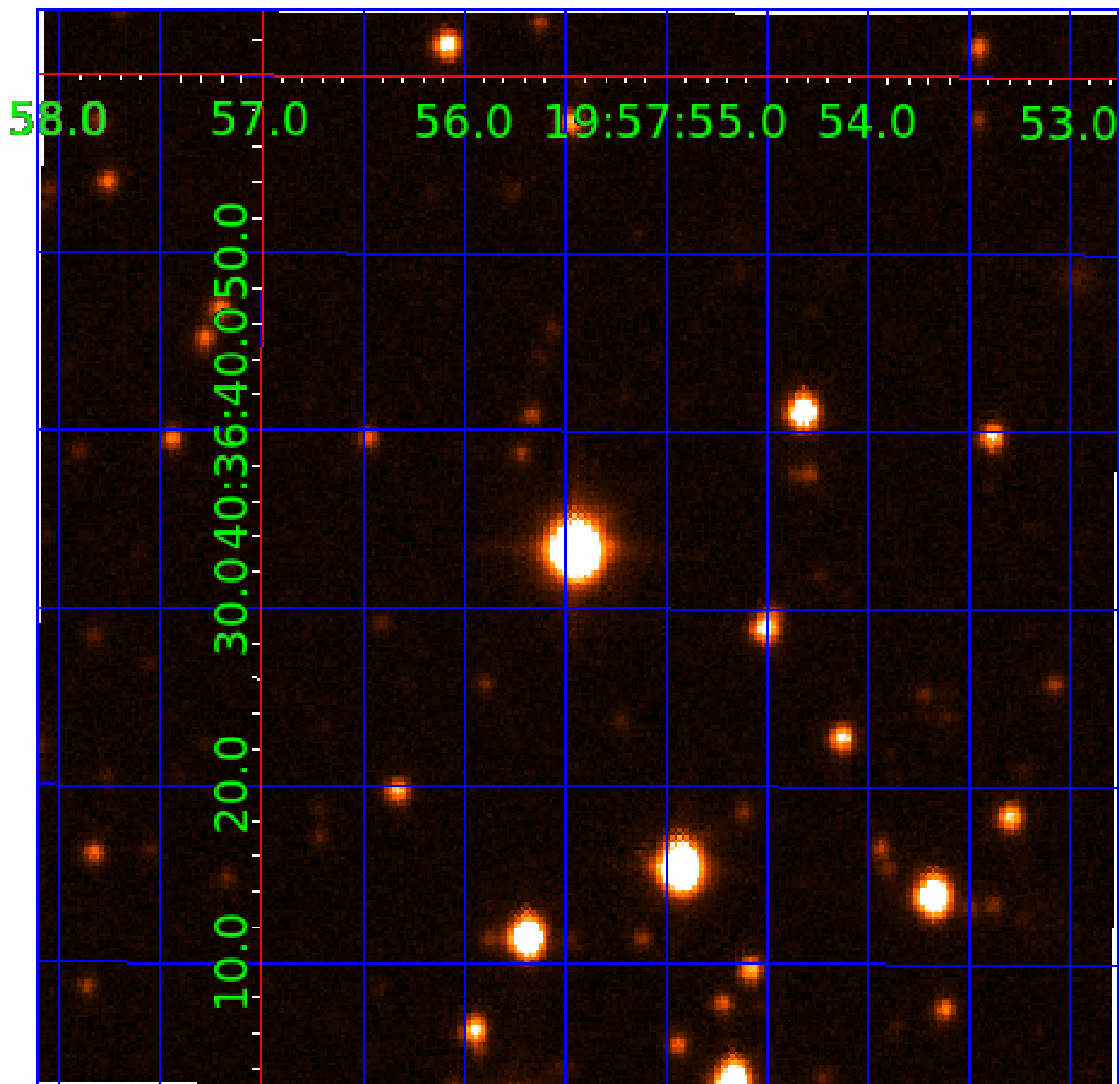


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 005480528

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005480528-02	OBS	No	463.440704	201.789800	1525.2	4.568	18.7	10.2	3.27	5098	12.53	5.38
005480528-03	OBS	No	450.088539	215.311220	601.8	3.789	19.3	4.2	3.27	5098	8.14	5.59
005480528-05	OBS	No	398.751600	312.275239	898.5	4.814	17.2	6.3	3.27	5098	10.27	6.57
005480528-06	OBS	No	396.976392	403.379510	892.9	3.500	18.6	-1.0	3.27	5098	9.60	6.61

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005480528-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
005480528-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
005480528-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—CENT_FEW_DIFFS
005480528-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_ZUMA—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_NOFITS

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

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

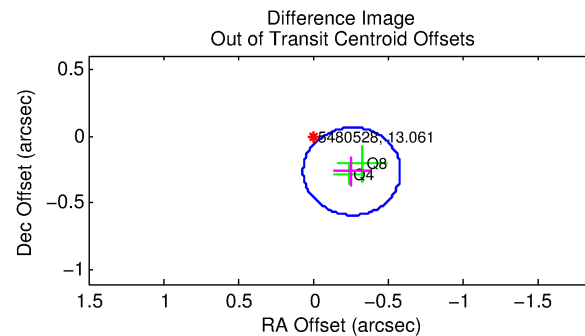
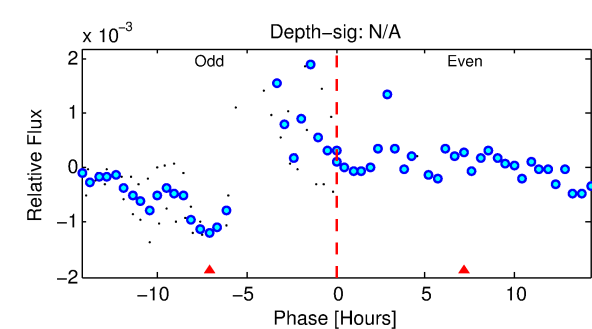
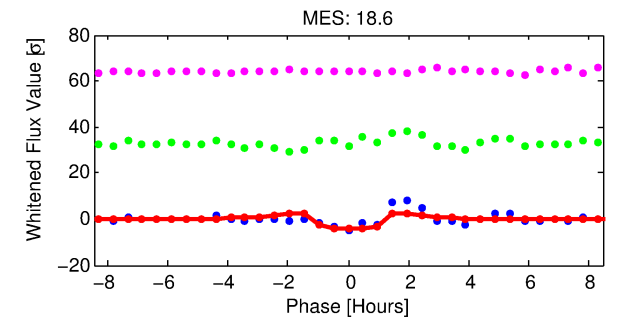
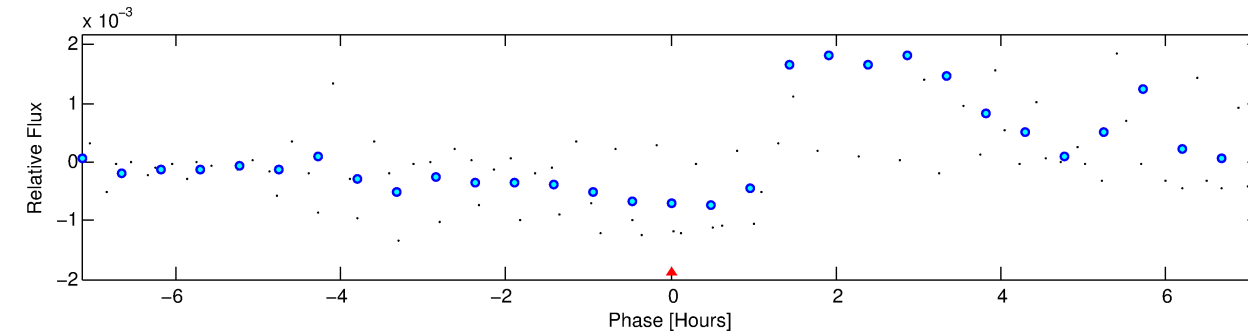
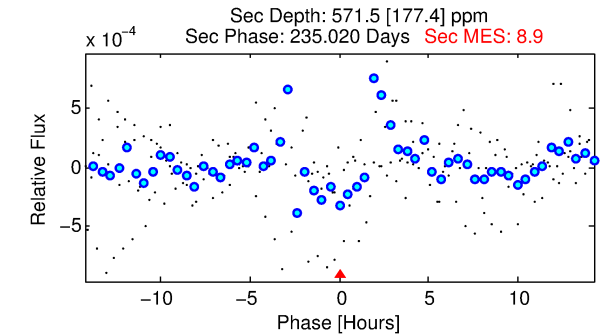
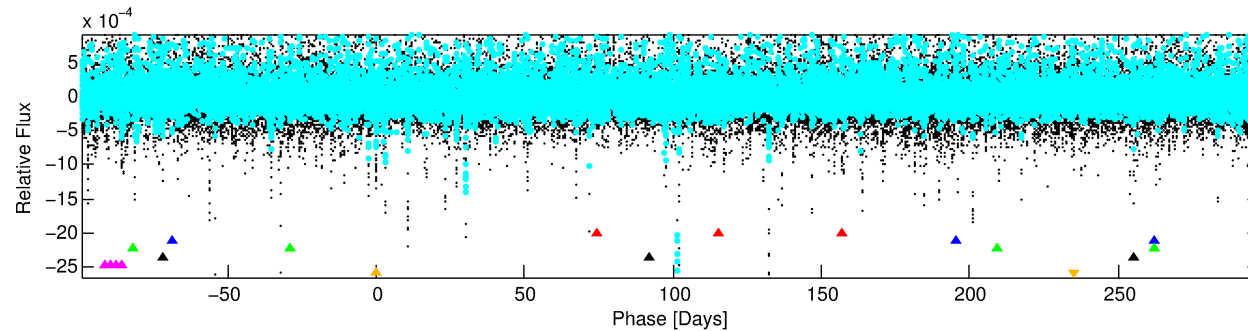
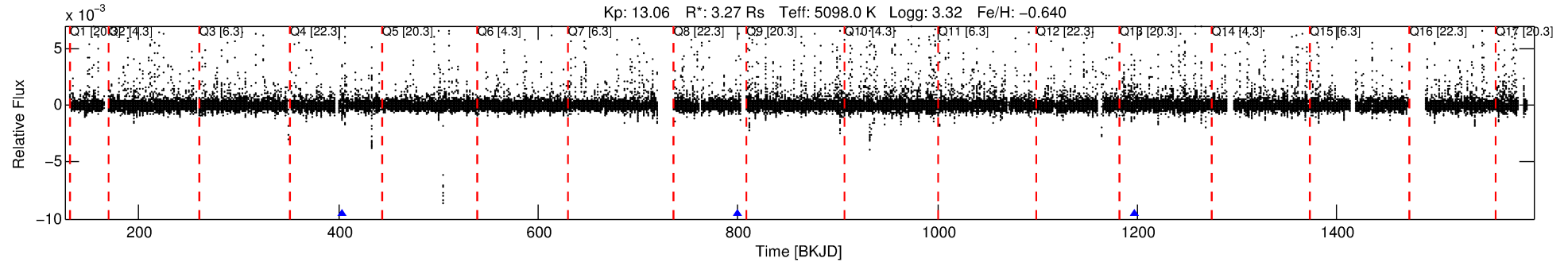
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 005480528-06

No Significant Match Found

# DV One-Page Summary

KIC: 5480528 Candidate: 6 of 6 Period: 396.976 d



## TPS TCE Results:

Period = 396.97639 d  
Epoch = 403.3795 BKJD

DV fit results are unavailable

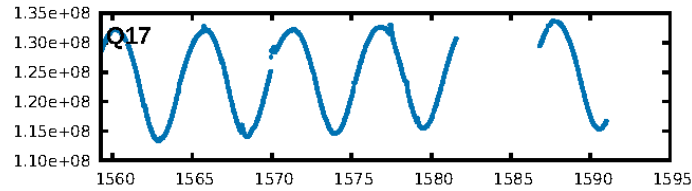
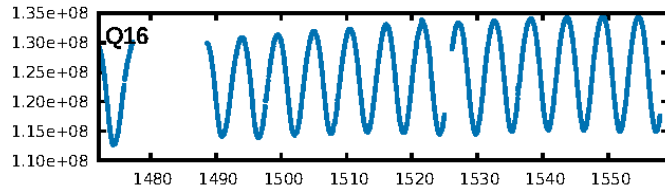
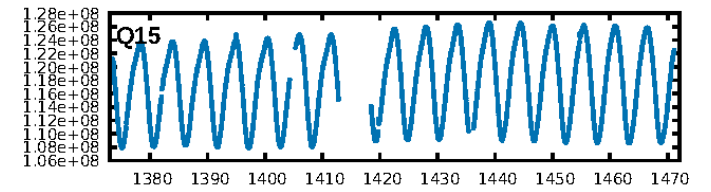
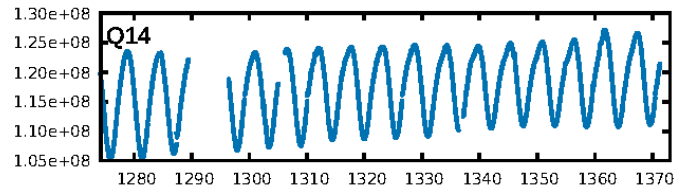
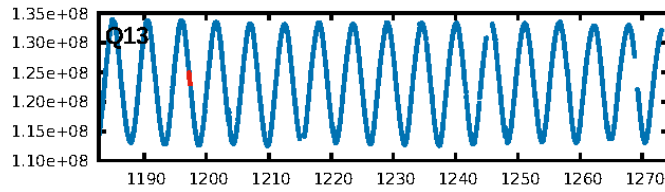
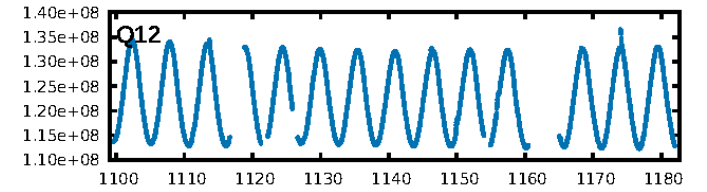
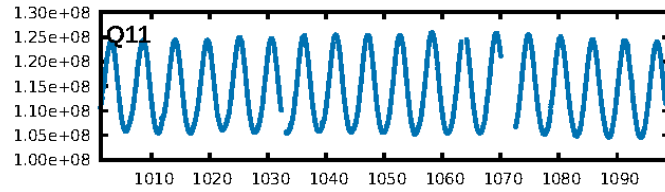
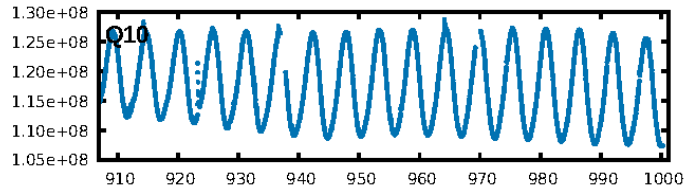
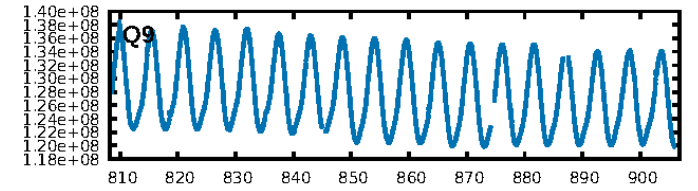
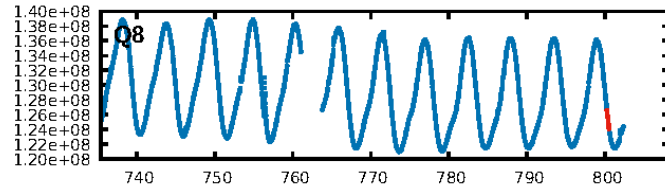
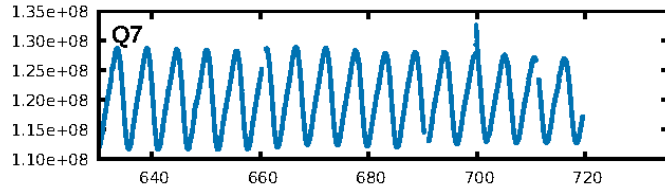
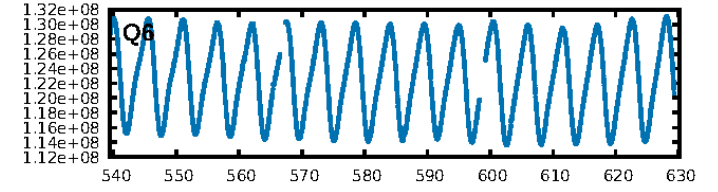
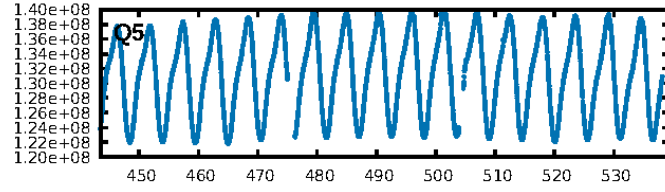
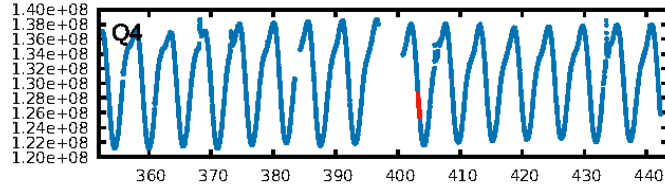
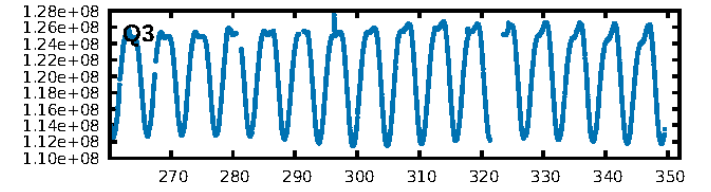
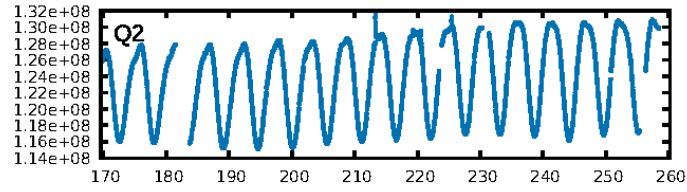
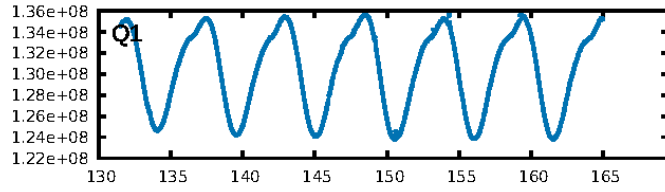
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [7.16σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -6.034  
Centroid-sig: 81.9%  
Centroid-so: 0.422 arcsec [0.25σ]  
OotOffset-rm: 0.370 arcsec [3.41σ]  
KicOffset-rm: 0.330 arcsec [3.05σ]  
OotOffset-st: 0/0/2/0 [2]  
KicOffset-st: 0/0/2/0 [2]  
DiffImageQuality-fgm: 1.00 [2/2]  
DiffImageOverlap-fno: 1.00 [2/2]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 16:17:50 Z

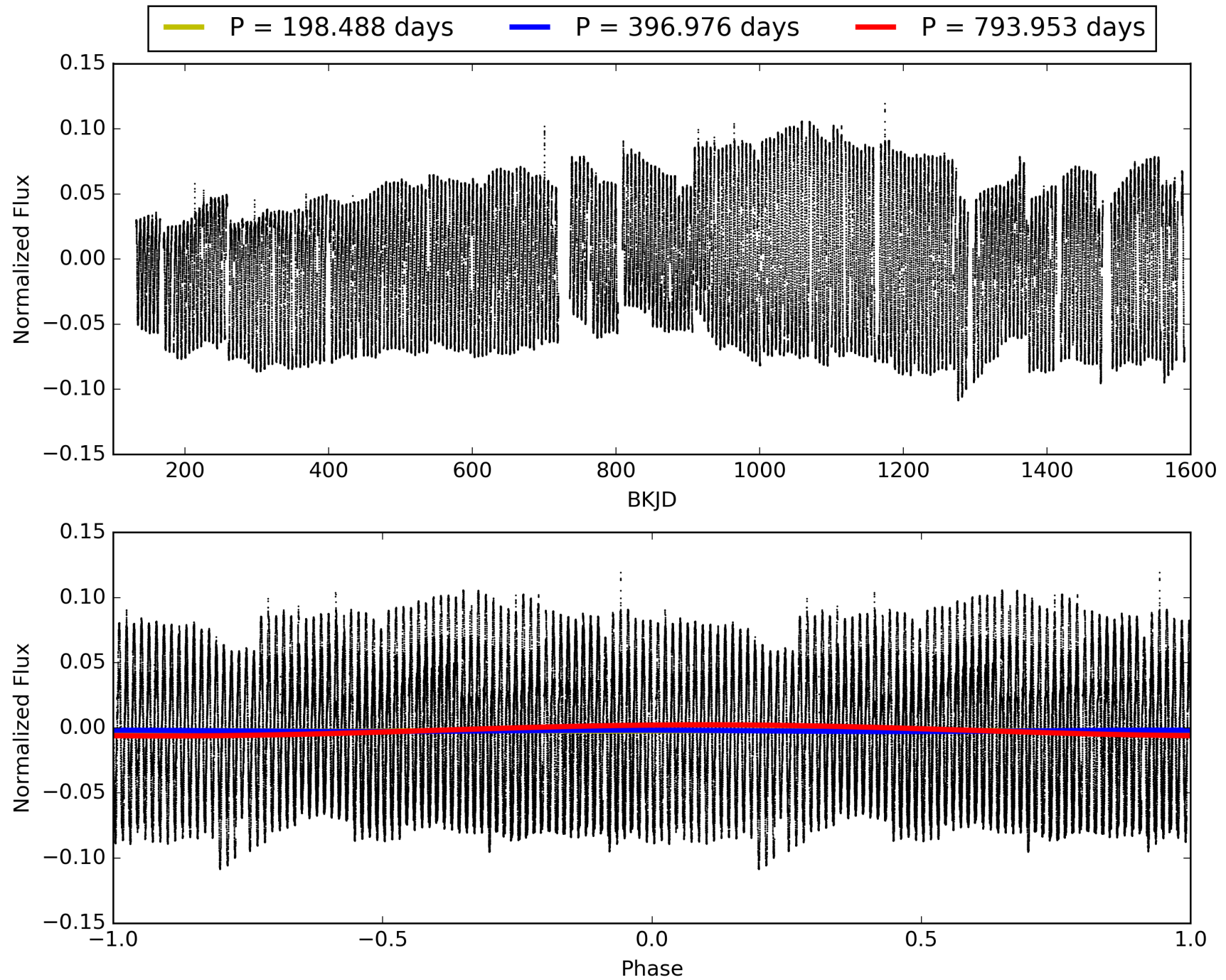
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 005480528-06, PDC Light Curves





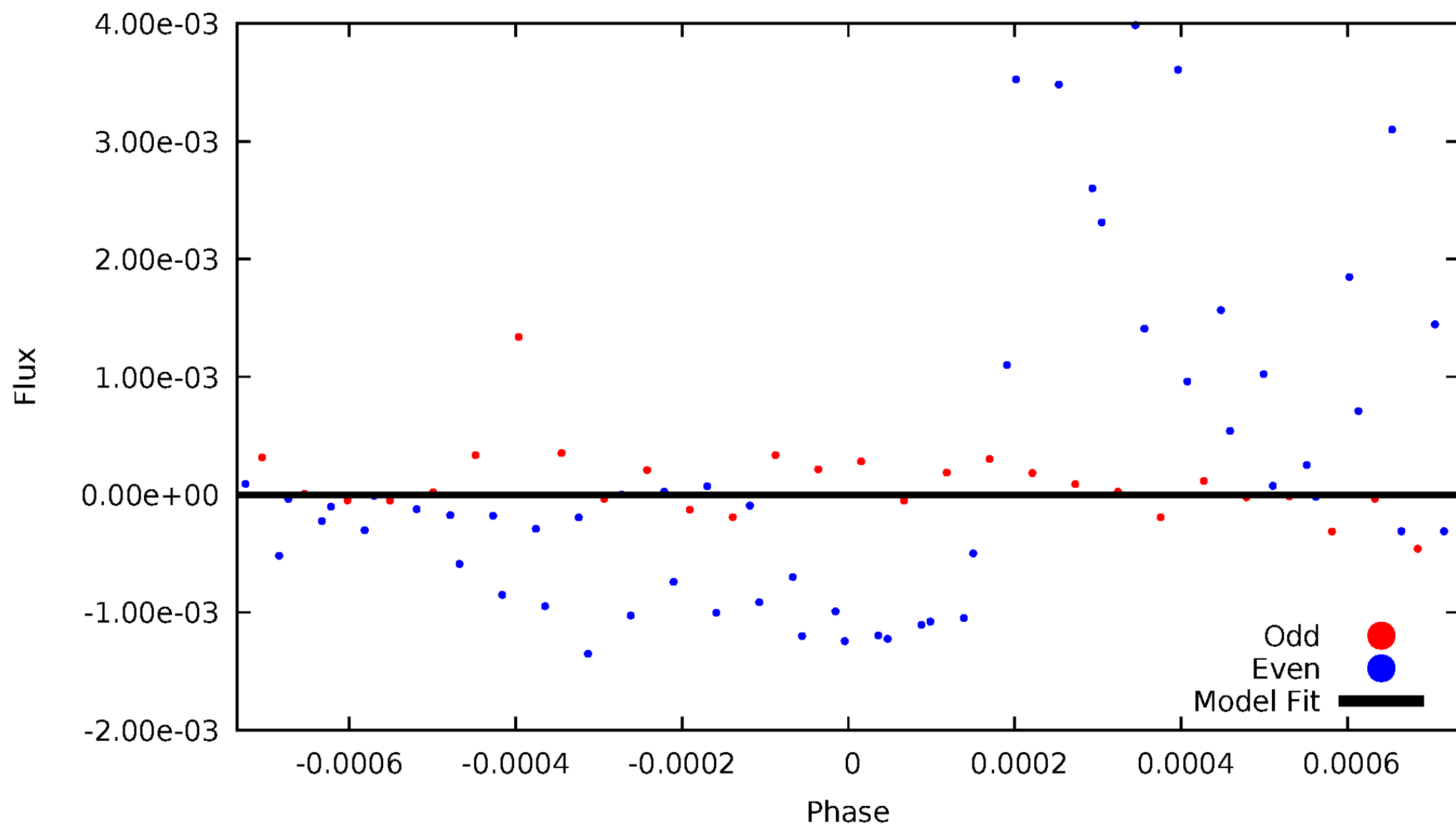
TCE 005480528-06





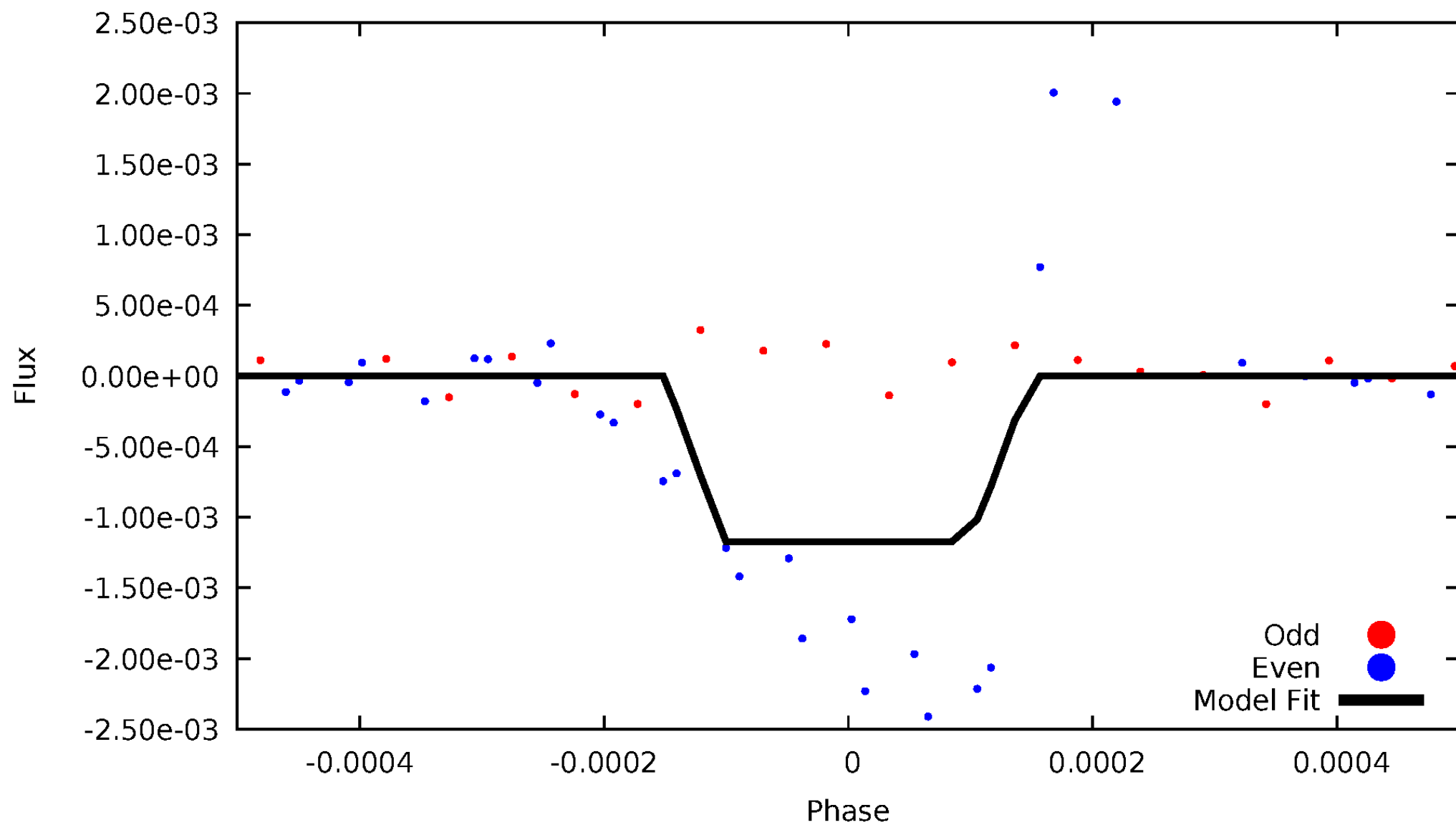
# DV Odd/Even

TCE 005480528-06



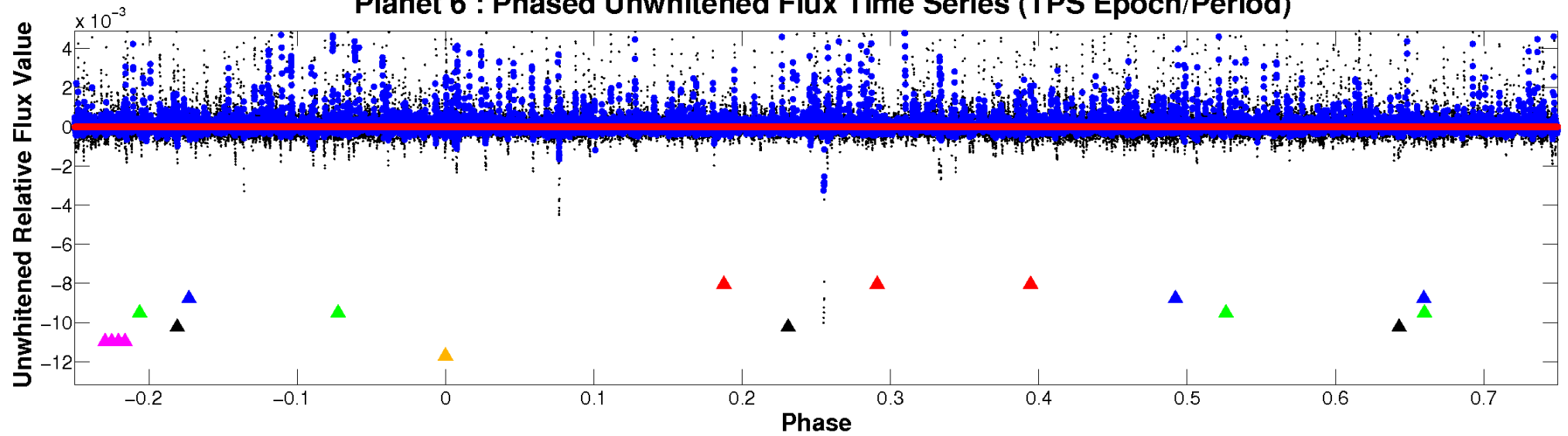
# ALT Odd/Even

TCE 005480528-06



# Non-Whitened Vs. Whitened Light Curve

**Planet 6 : Phased Unwhitened Flux Time Series (TPS Epoch/Period)**

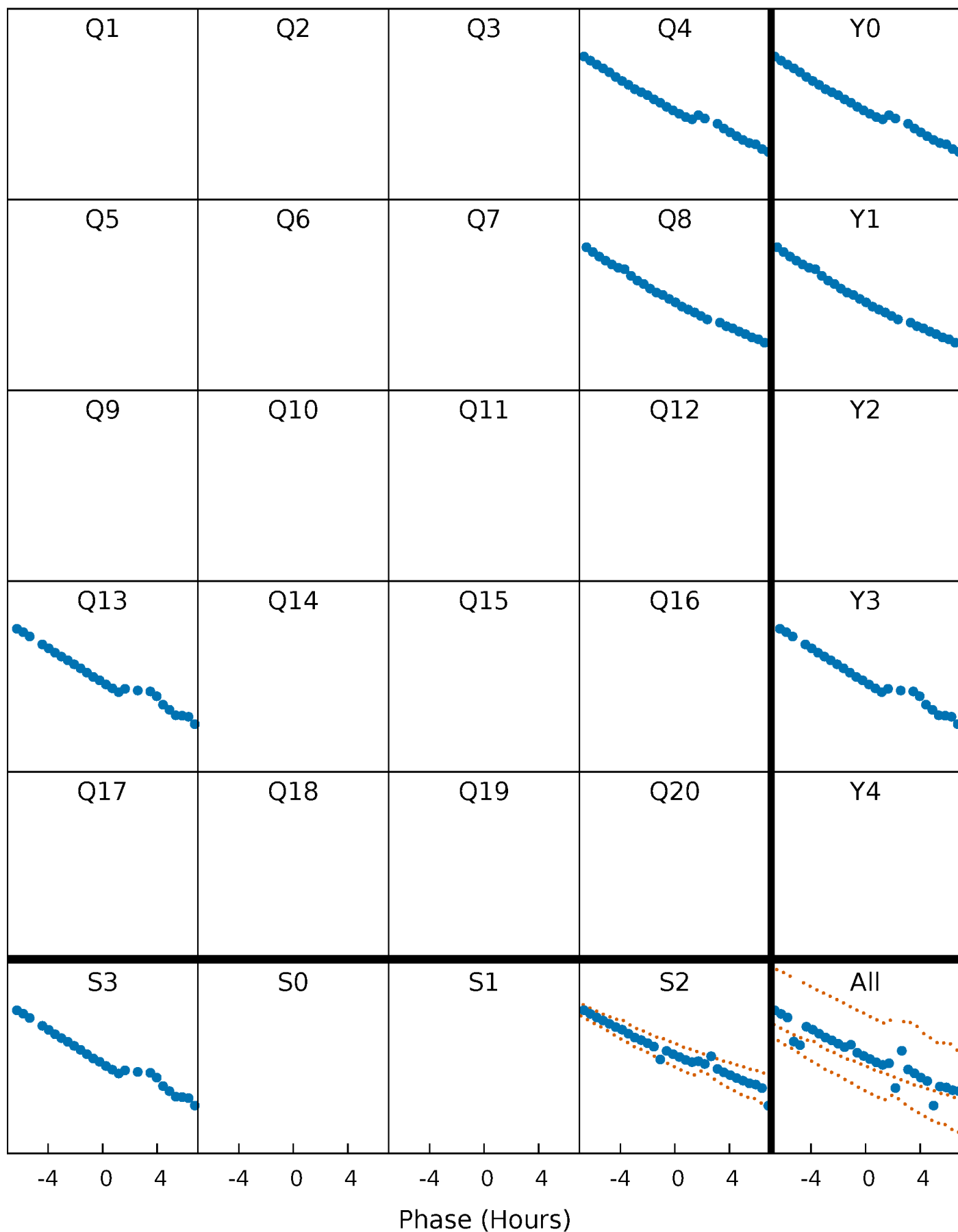


**Planet 6 : Phased Whitened Flux Time Series (TPS Epoch/Period)**



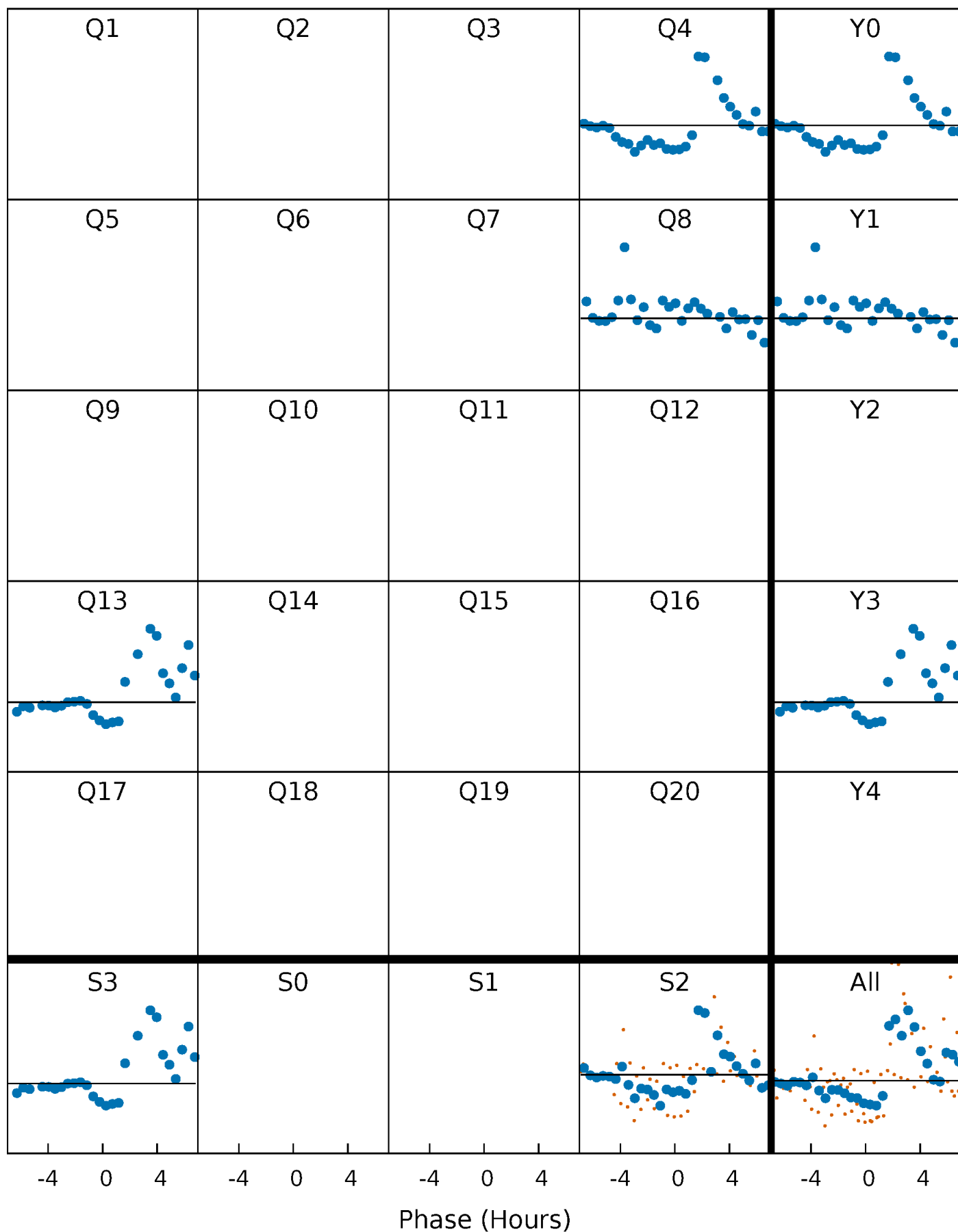
# PDC Quarter-Phased Transit Curves

TCE 005480528-06 P=396.976392 Days  $T_0=403.379510$  (BKJD)



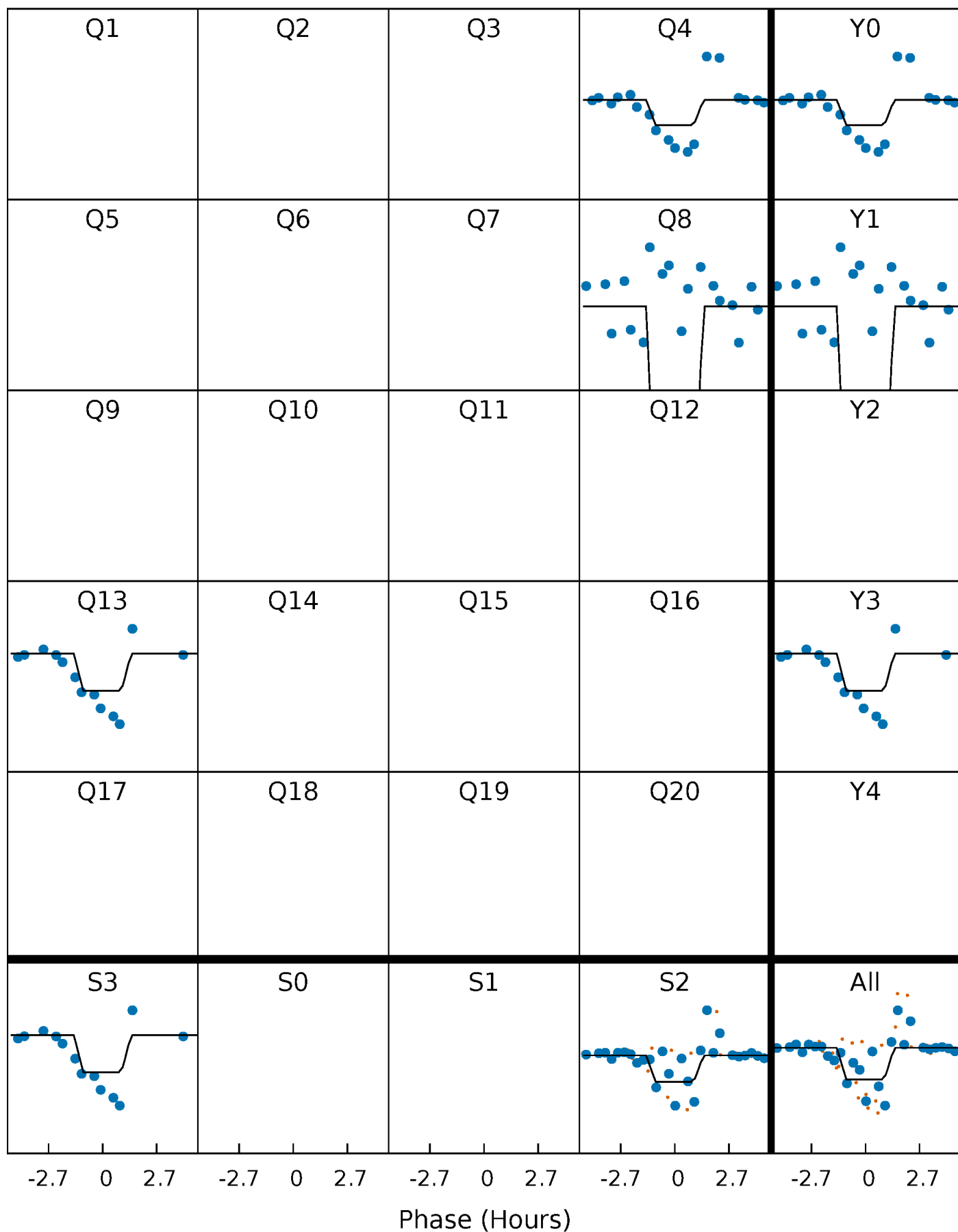
# DV Quarter-Phased Transit Curves

TCE 005480528-06     $P=396.976392$  Days     $T_0=403.379510$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

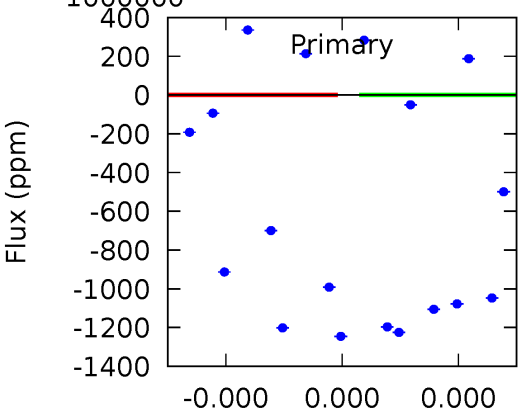
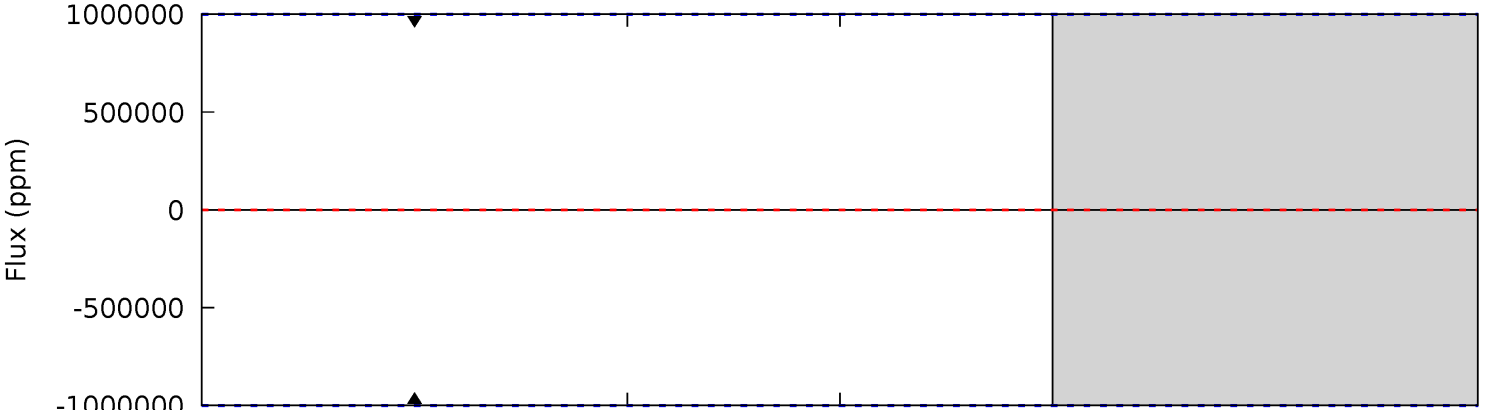
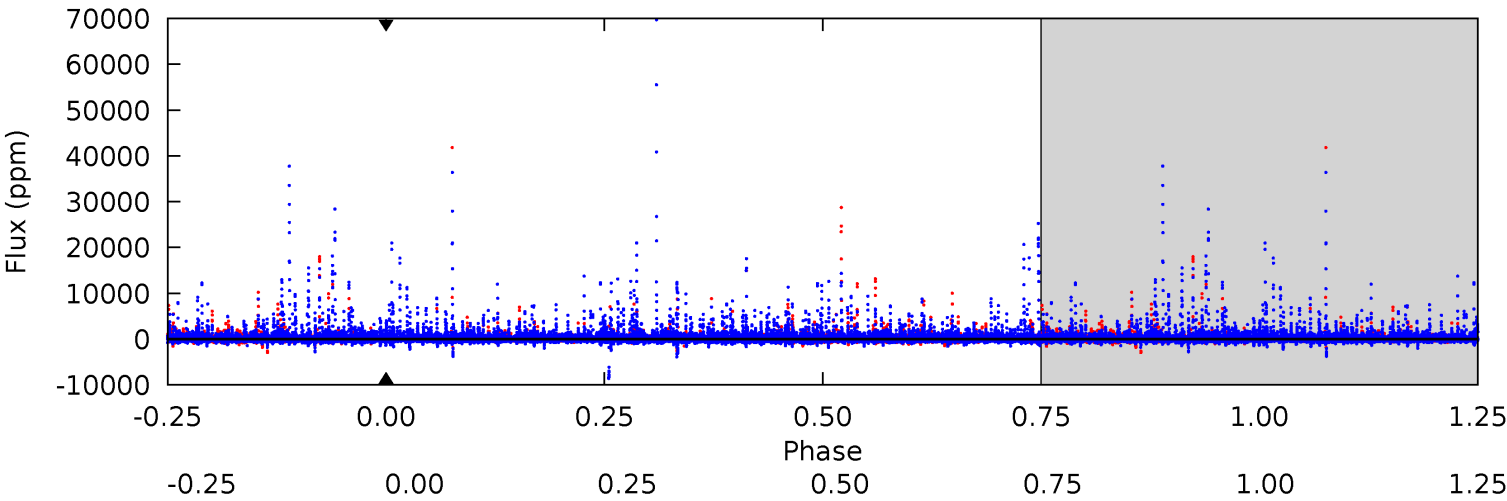
TCE 005480528-06 P=396.976392 Days  $T_0=403.392811$  (BKJD)



# DV Model-Shift Uniqueness Test

005480528-06, P = 396.976392 Days, E = 6.403118 Days

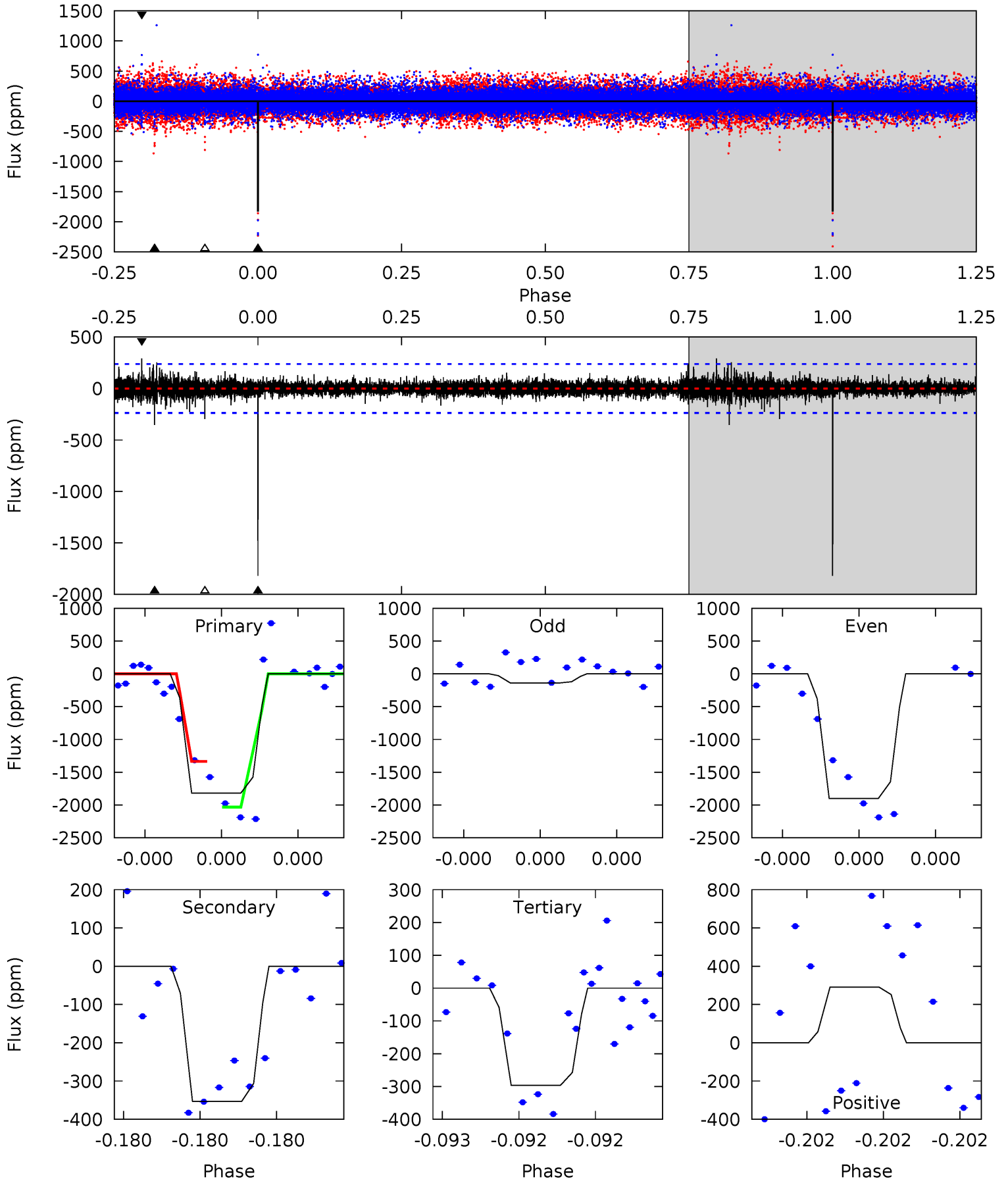
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



# Alt Model-Shift Uniqueness Test

005480528-06, P = 396.976392 Days, E = 6.416419 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
43.6	8.47	7.11	6.96	5.69	3.65	0.87	36.5	36.6	1.36	1.51	21.4	0.72	0.14	0





### Stellar Parameters For KIC 005480528

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5098^{+140}_{-127}$	$3.323^{+0.385}_{-0.315}$	$-0.640^{+0.300}_{-0.250}$	$3.273^{+1.977}_{-2.416}$	$0.821^{+0.281}_{-0.187}$	$0.033^{+0.083}_{-0.022}$
	+3%/-2%	+12%/-9%	+47%/-39%	+60%/-74%	+34%/-23%	+252%/-66%
Source	PHO1	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 005480528-06 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$0 \pm 1000000$	$29.01^{+31.33}_{-18.91}$	$585^{+73}_{-79}$	$4396^{+9625}_{-16761}$	$2157^{+115652}_{-87592}$
Alt.	$-353 \pm 42$	$31.94^{+33.53}_{-22.07}$	$588^{+74}_{-74}$	$3045^{+1378}_{-537}$	$201^{+1982}_{-158}$

$T_{max}$  = 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

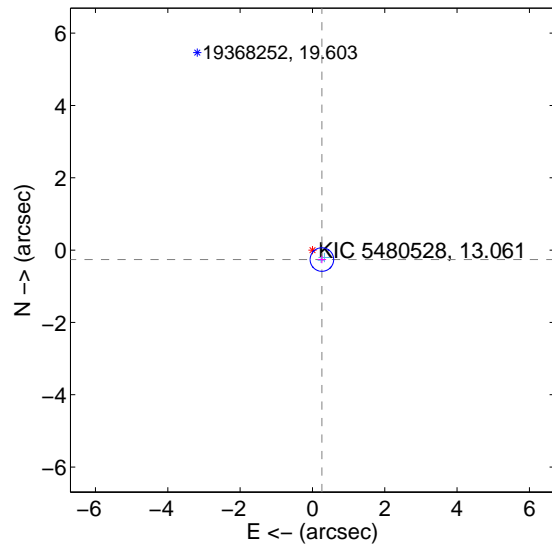
Supplemental centroid analysis for 005480528-06. Kepler magnitude: 13.06. Transit SNR -1.00

There are 2 quarters with good PRF difference image offsets

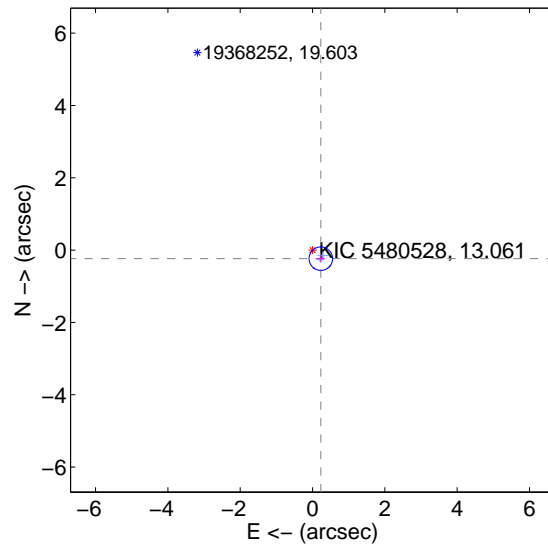
The direct PRF centroid is offset from the target star catalog position by about 0.06 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.370 \pm 0.109$	3.41	$-0.262 \pm 0.116$	$-0.261 \pm 0.101$
PRF-fit source offset from KIC position	$0.330 \pm 0.108$	3.05	$-0.229 \pm 0.116$	$-0.237 \pm 0.101$
photometric centroid source offset	$0.42 \pm 1.72$	0.25	$0.34 \pm 2.04$	$0.25 \pm 0.82$

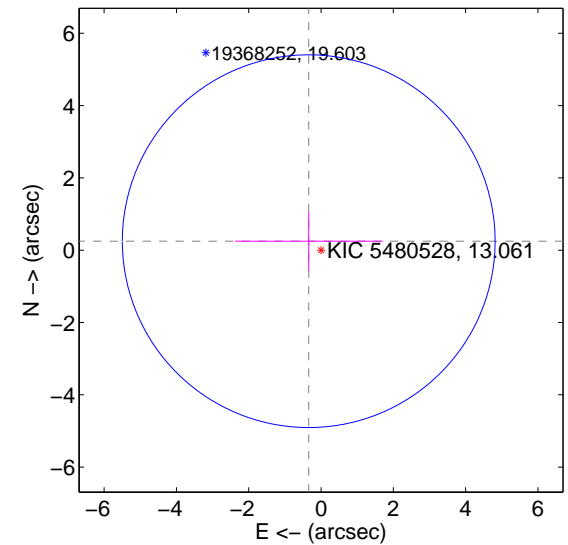
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

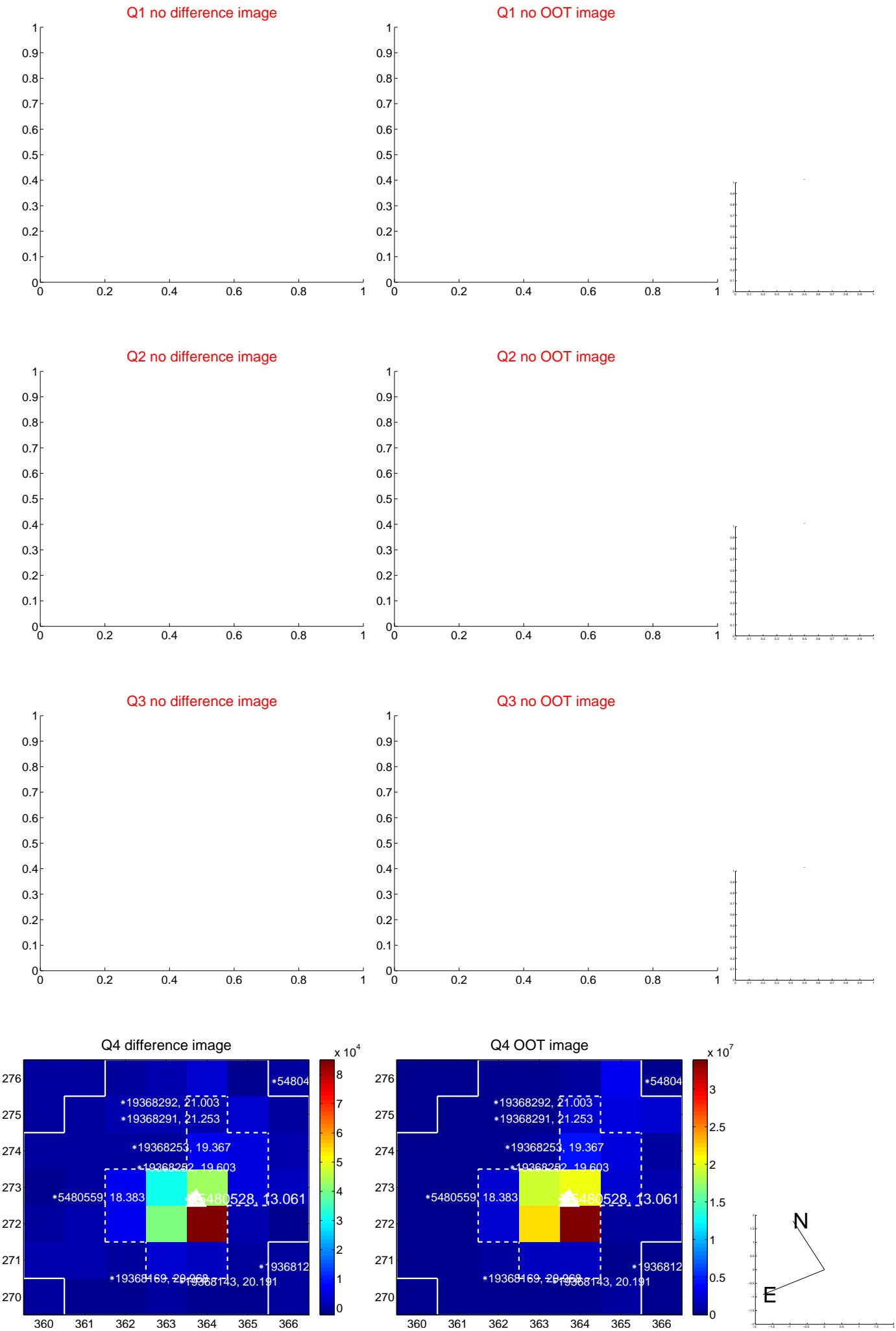


offset from photometric centroids

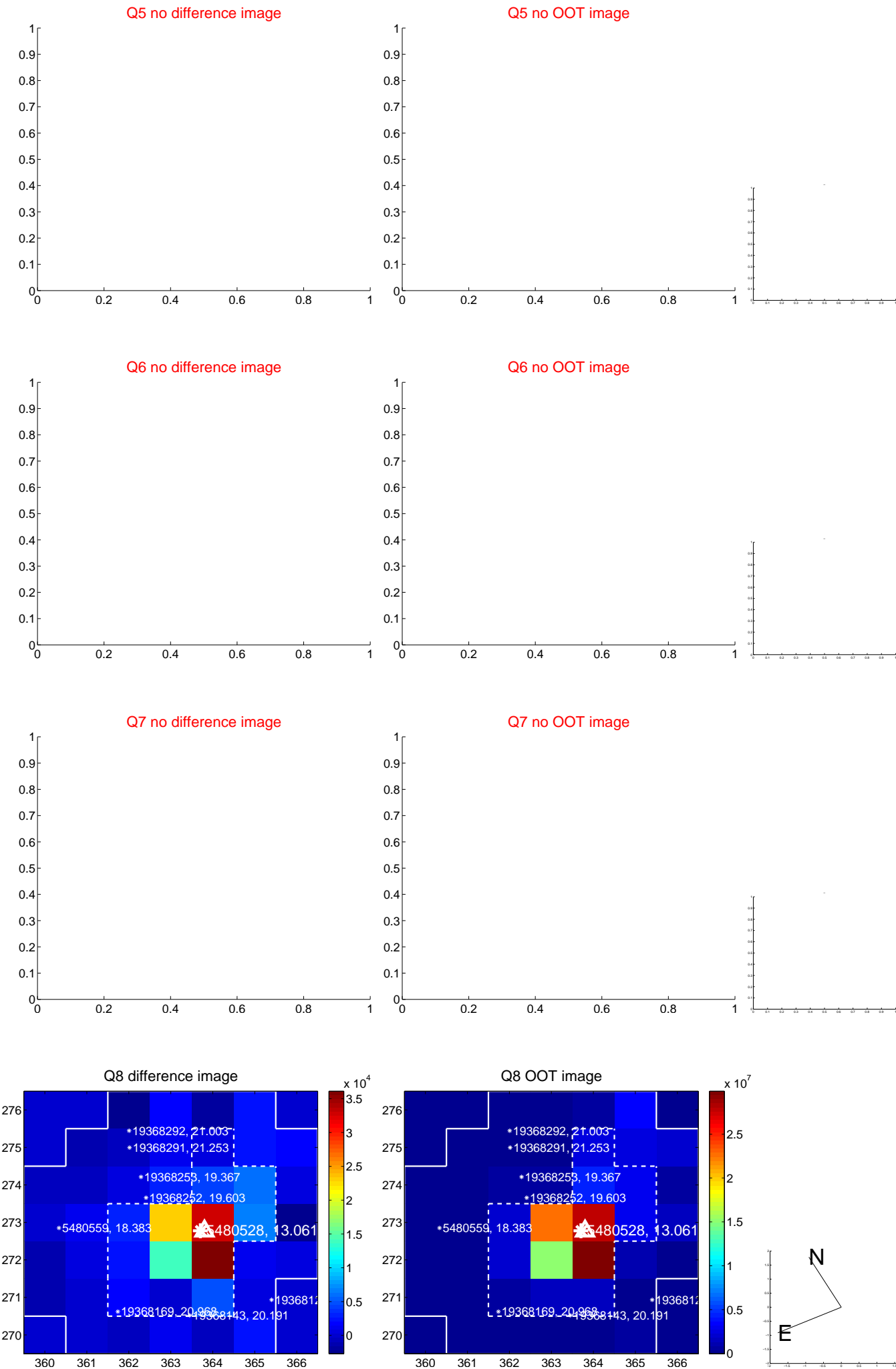


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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



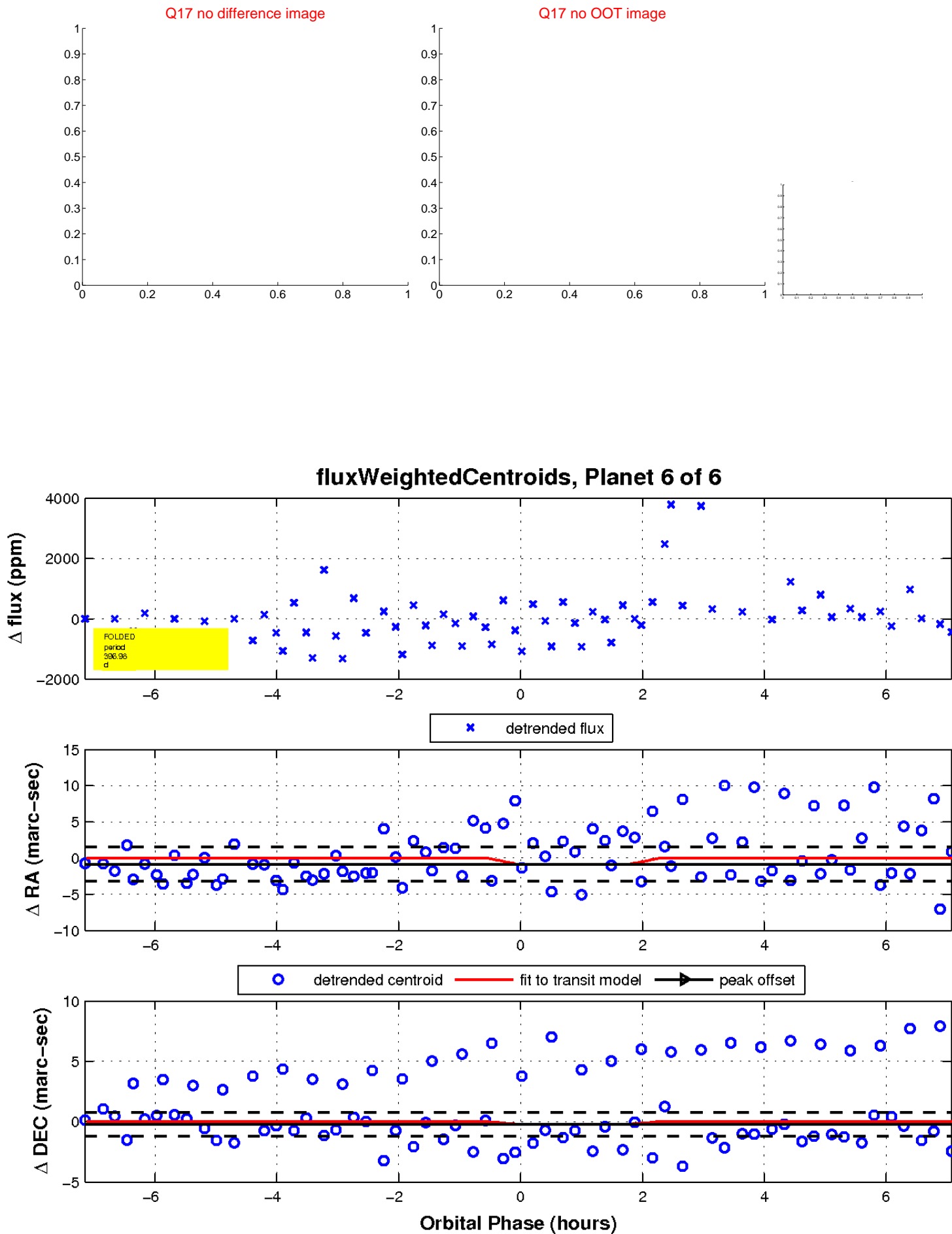
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



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



UKIRT Image

Declination

