

# KIC 006468721

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006468721-01	OBS	No	1.541674	132.790389	81.4	7.127	9.3	9.4	0.81	5392	0.72	780.06
006468721-02	OBS	No	286.984886	165.204748	4719.6	34.386	15.7	10.1	0.81	5392	9.39	0.73
006468721-03	OBS	No	122.936432	151.267385	1315.9	36.096	10.7	4.3	0.81	5392	4.78	2.27
006468721-04	OBS	No	376.234302	172.267288	1073.1	7.478	9.4	6.7	0.81	5392	3.47	0.51

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006468721-01	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV
006468721-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
006468721-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
006468721-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL_SKYE—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS

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

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

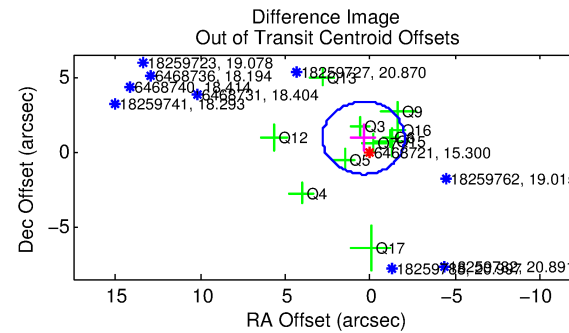
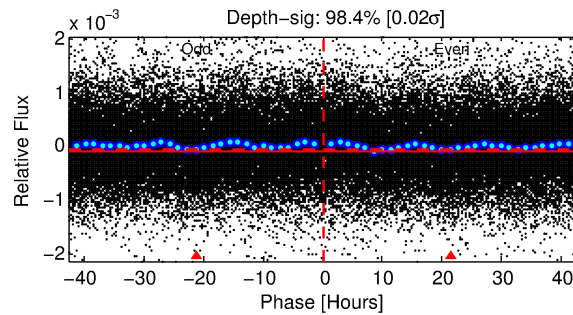
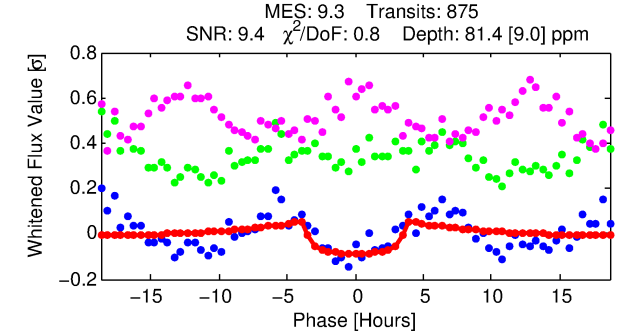
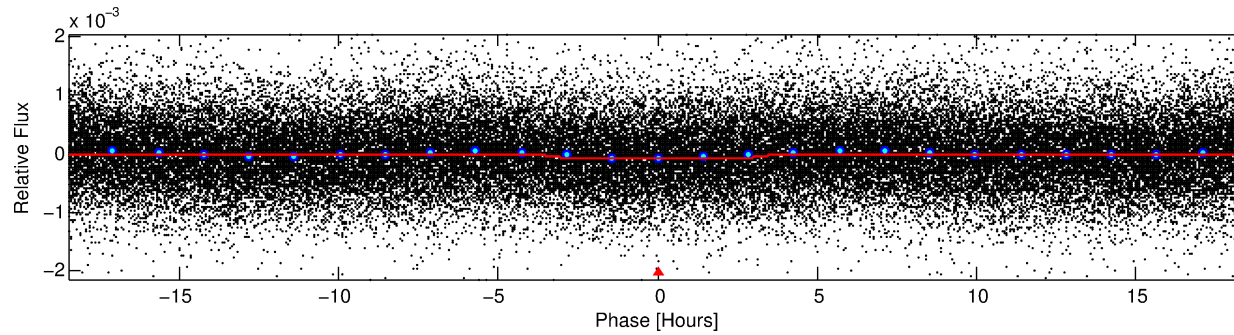
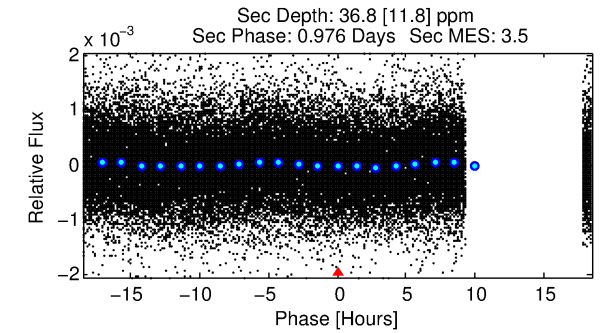
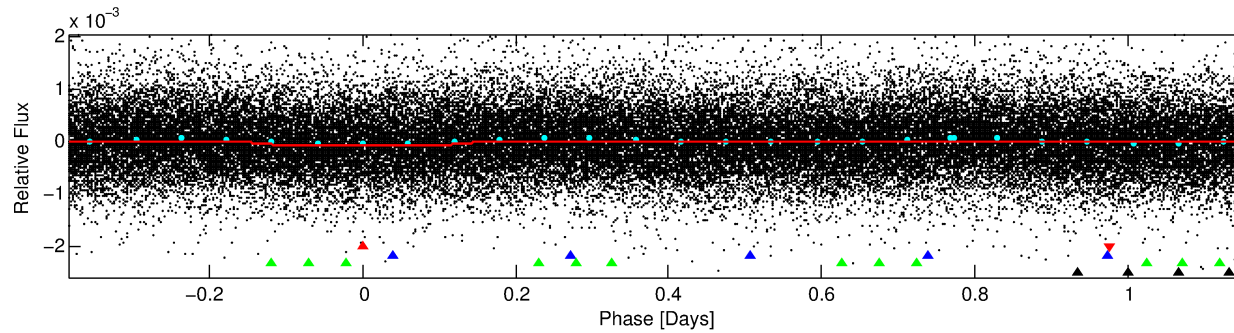
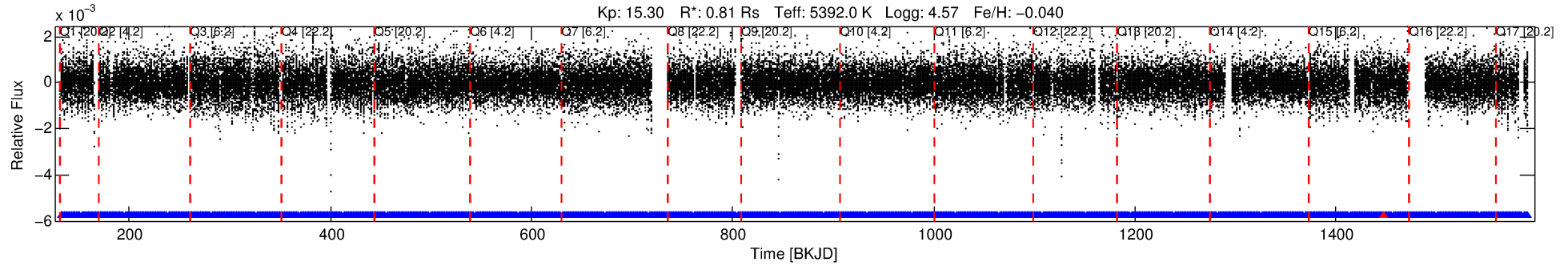
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 006468721-01

No Significant Match Found

# DV One-Page Summary

KIC: 6468721 Candidate: 1 of 4 Period: 1.542 d



## DV Fit Results:

Period = 1.54167 [0.00002] d  
Epoch = 132.7904 [0.0056] BKJD  
Rp/R\* = 0.0082 [0.0088]  
a/R\* = 1.72 [4.75]  
b = 0.30 [13.02]  
Seff = 780.06 [213.27]  
Teq = 1348 [92] K  
Rp = 0.72 [0.79] Re  
a = 0.0251 [0.0042] AU  
Ag = 24.66 [53.95] [0.44σ]  
Teffp = 4643 [2527] K [1.30σ]

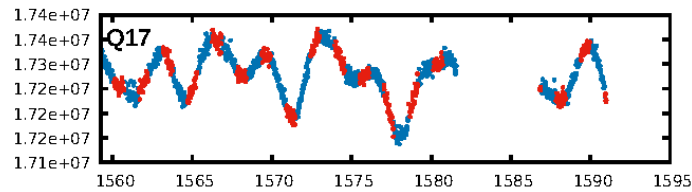
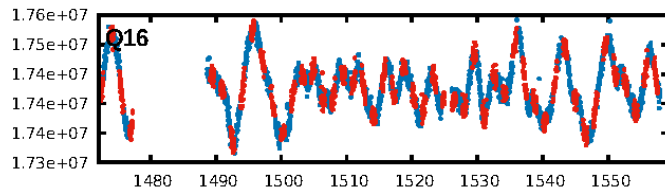
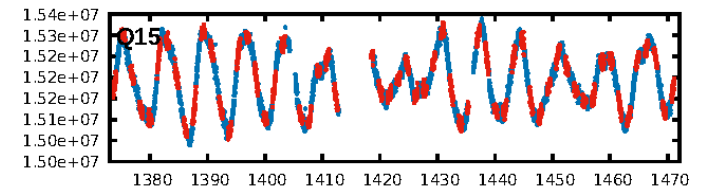
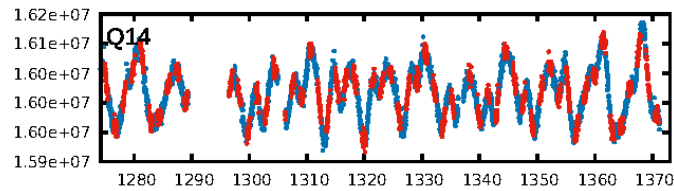
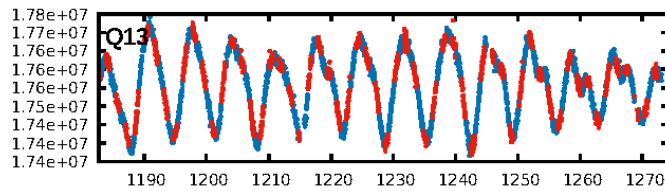
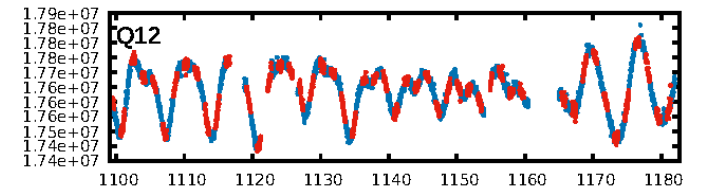
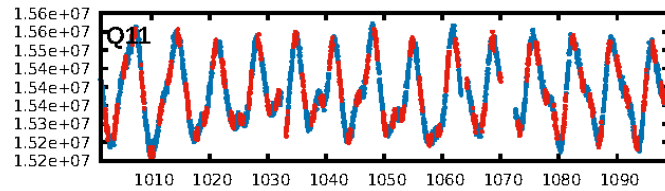
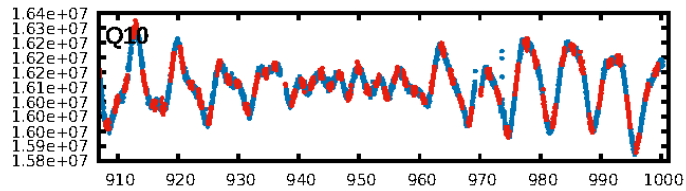
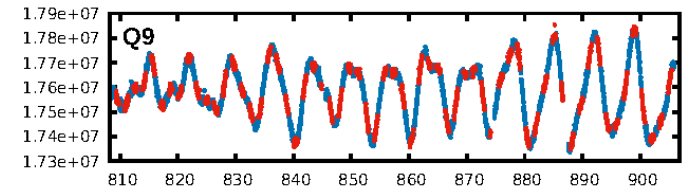
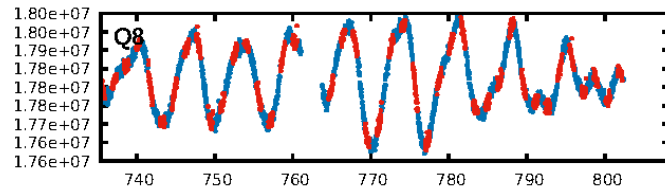
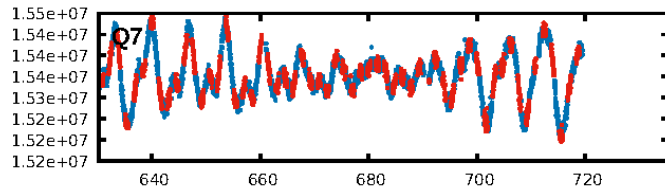
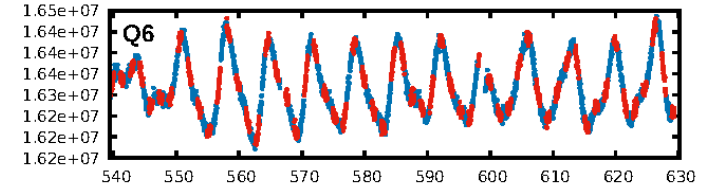
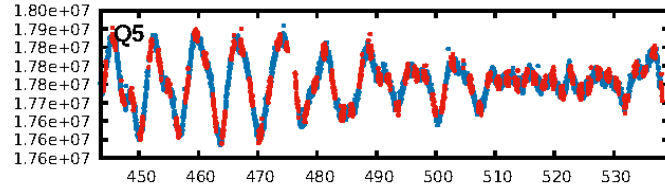
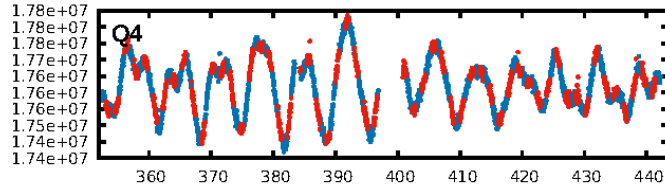
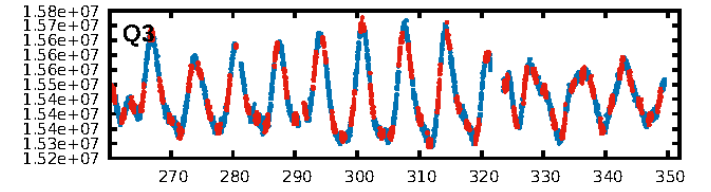
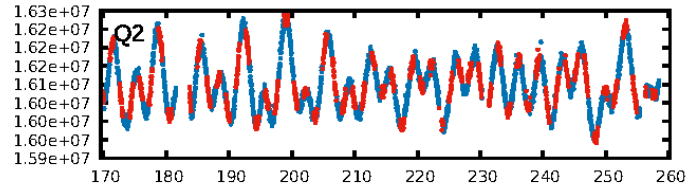
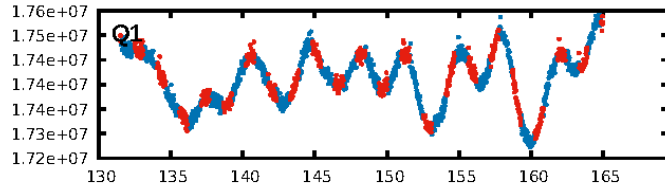
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [79.18σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 1.77e-16  
RollingBand-fgt: 1.00 [837/838]  
GhostDiagnostic-chr: 8.985  
Centroid-sig: 35.2%  
Centroid-so: 0.763 arcsec [0.80σ]  
OotOffset-rm: 0.993 arcsec [1.23σ]  
KicOffset-rm: 1.027 arcsec [1.26σ]  
OotOffset-st: 1/3/3/4 [11]  
KicOffset-st: 1/3/3/4 [11]  
DiffImageQuality-fgm: 0.36 [4/11]  
DiffImageOverlap-fno: 1.00 [17/17]

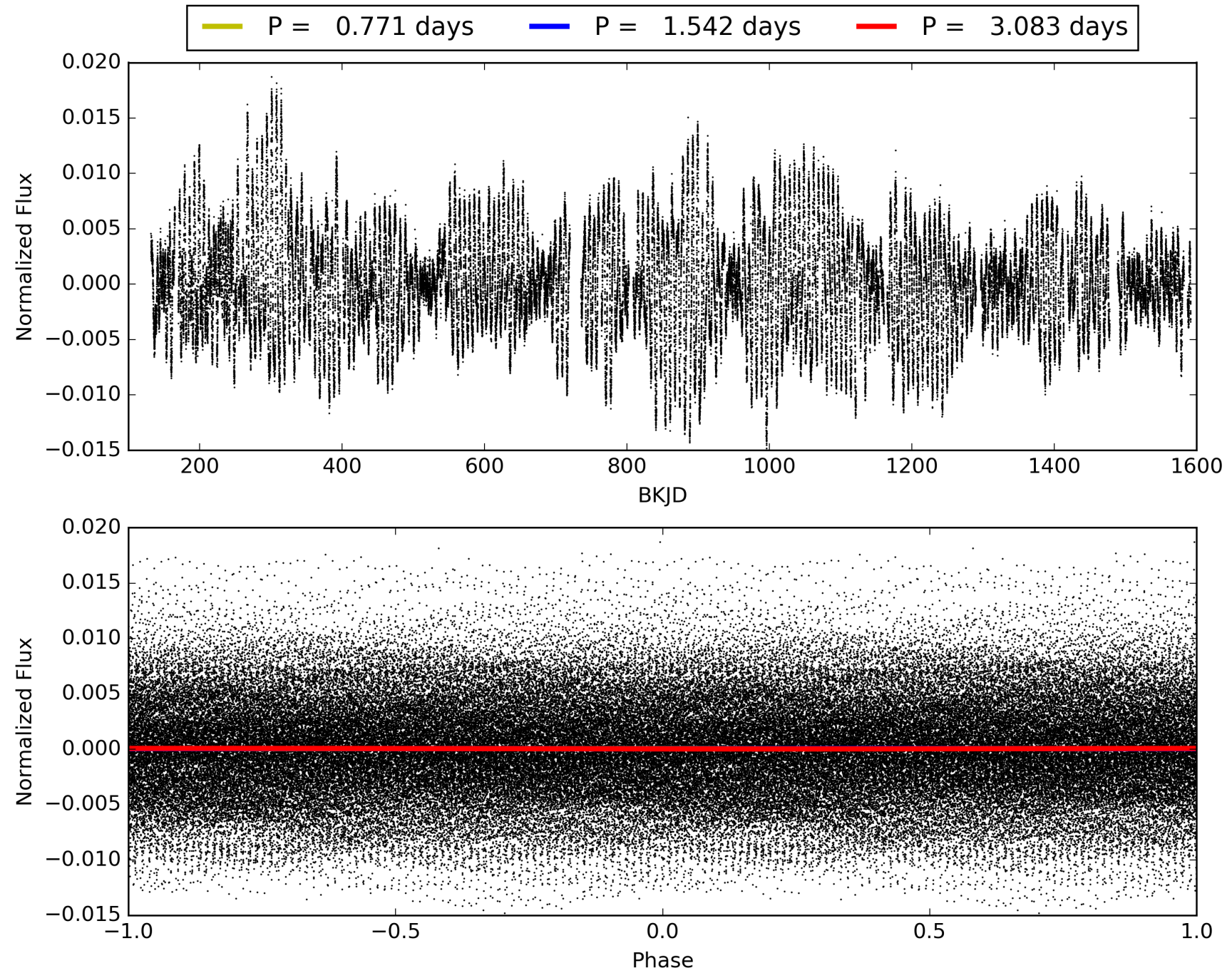
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This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 006468721-01, PDC Light Curves



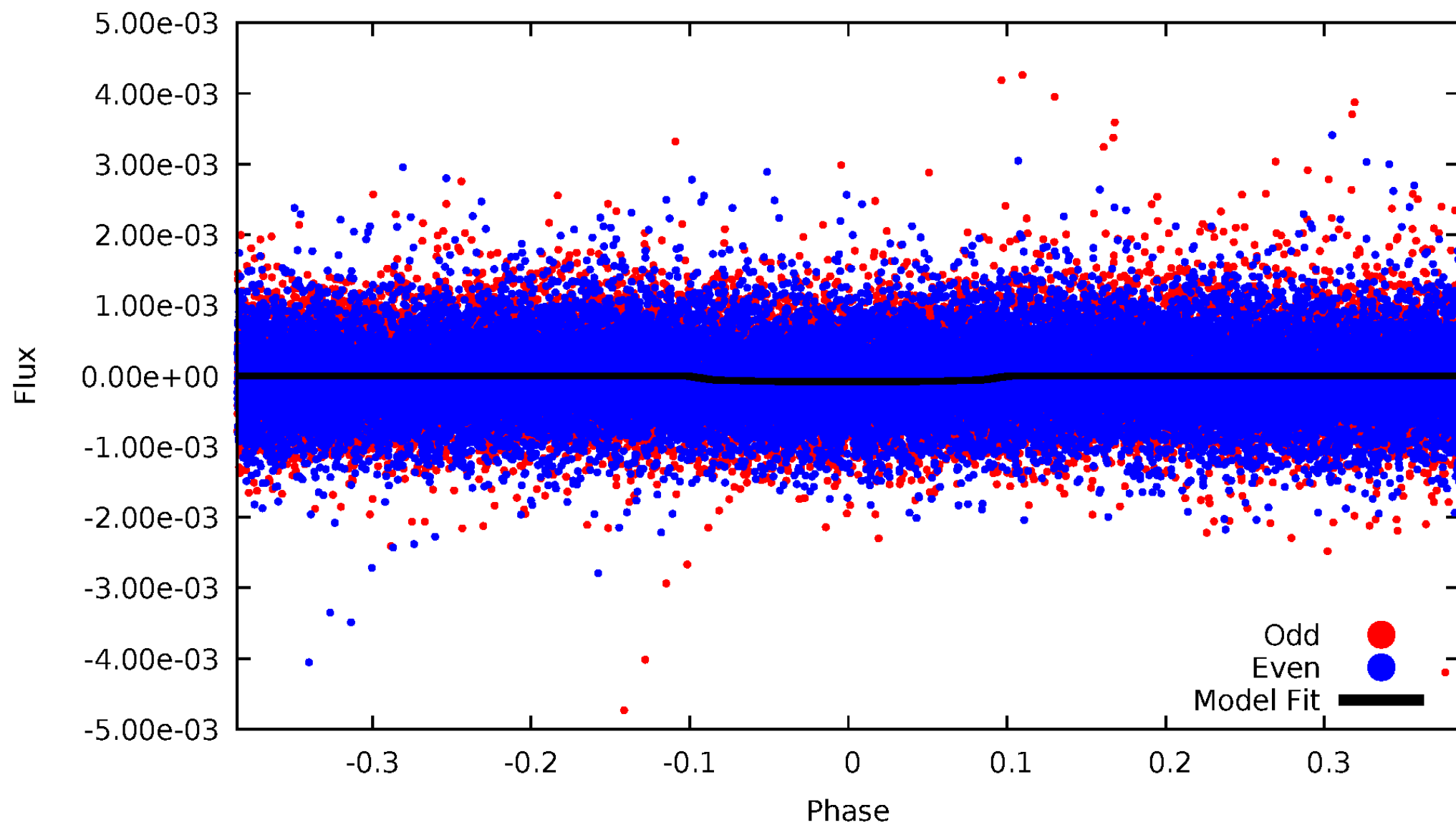
TCE 006468721-01





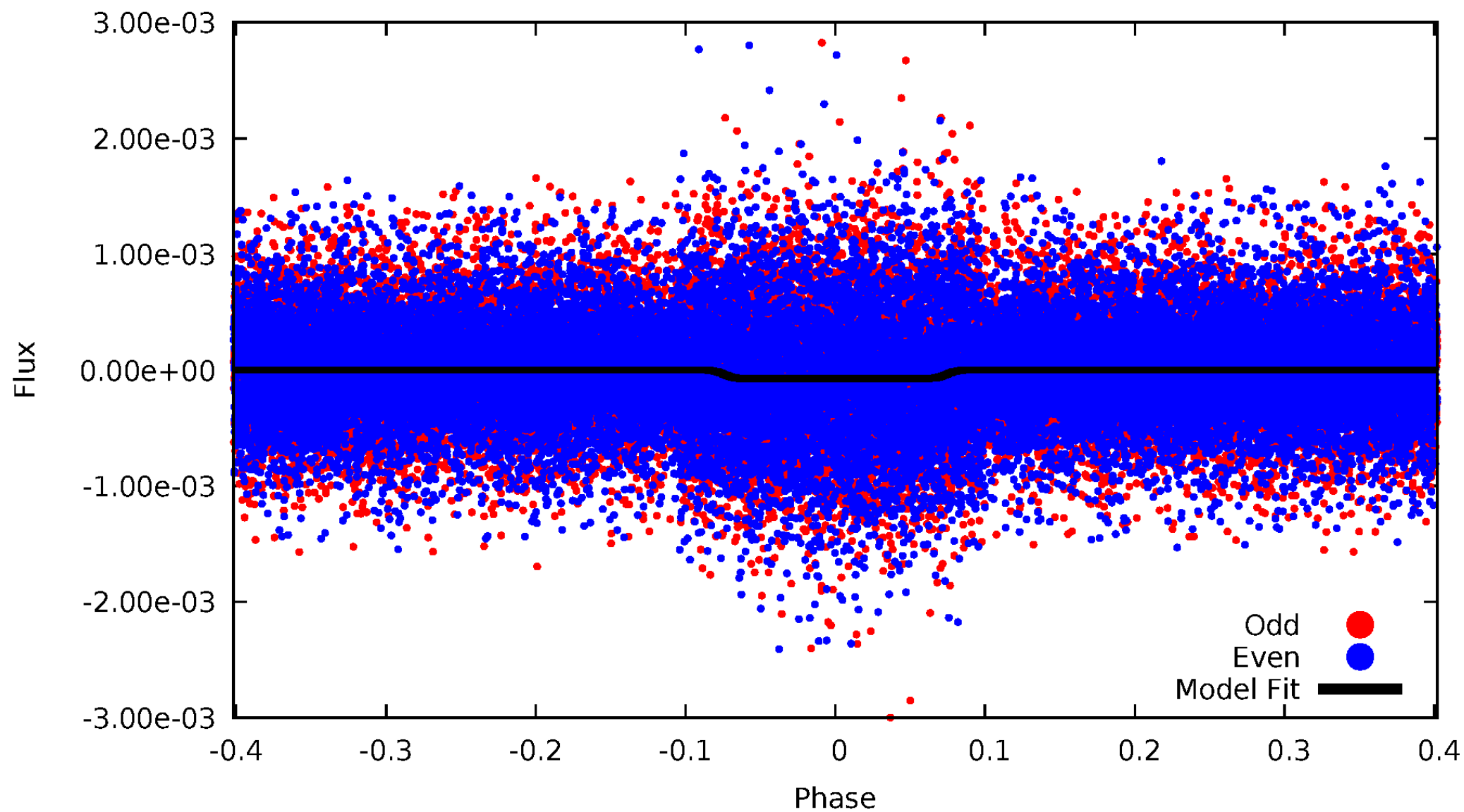
# DV Odd/Even

TCE 006468721-01

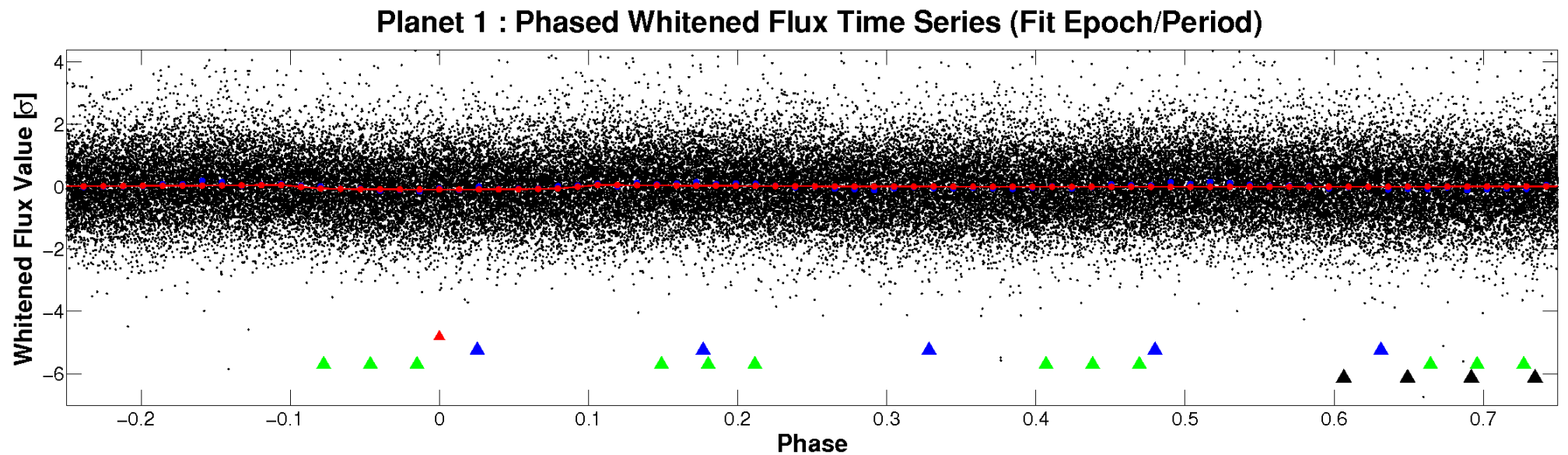
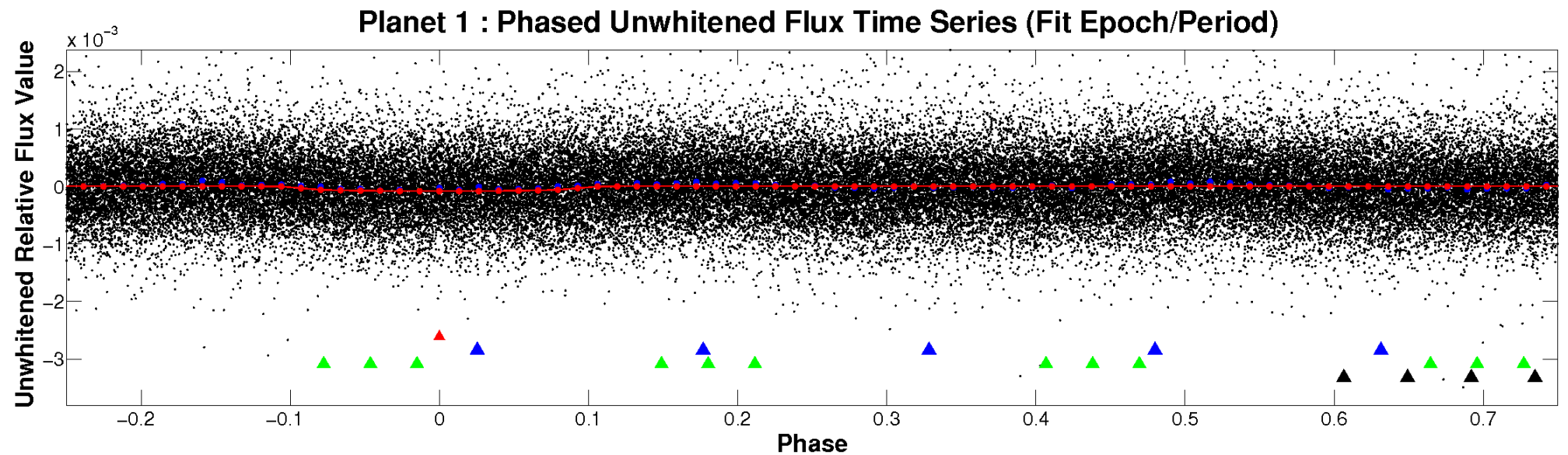


# ALT Odd/Even

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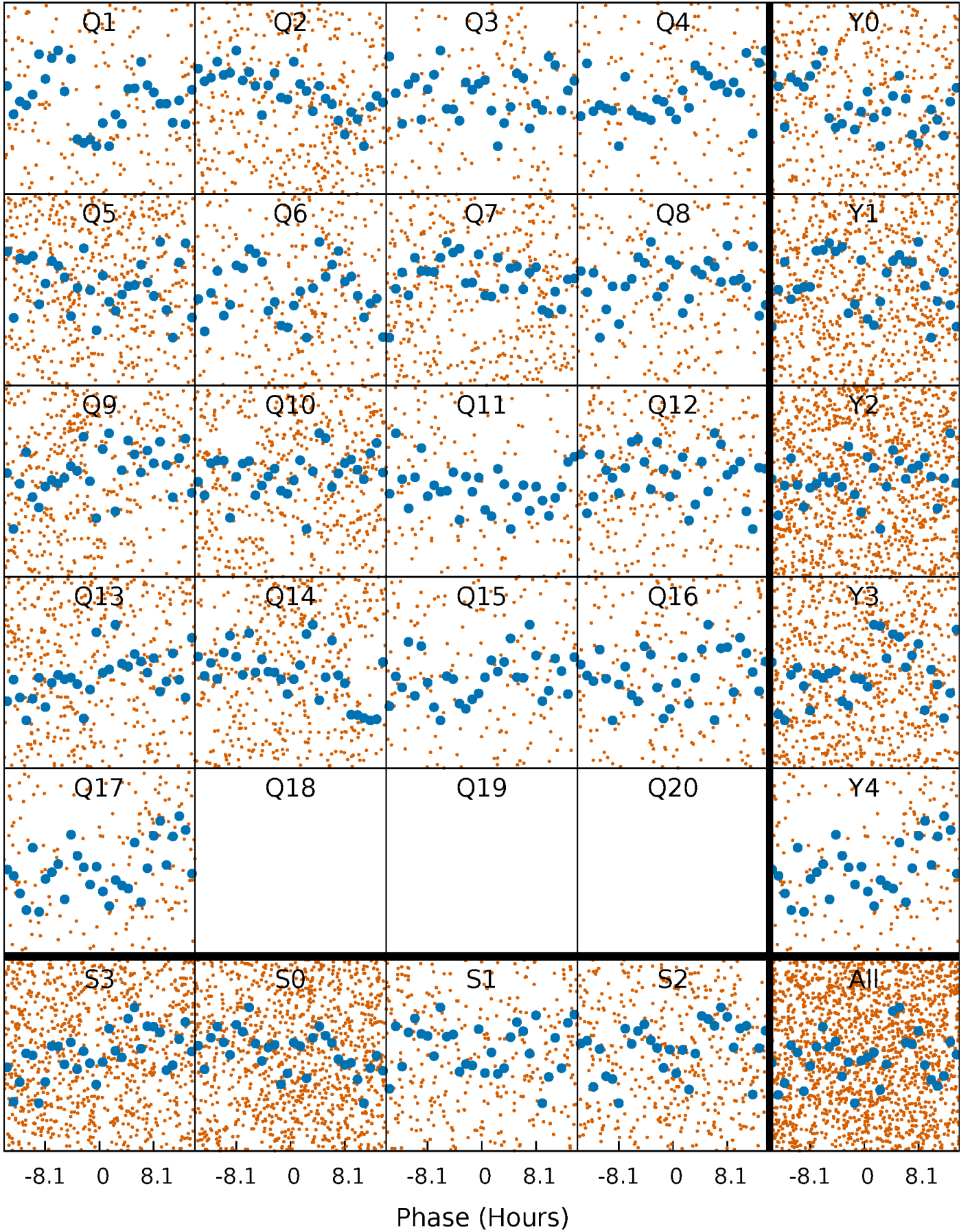


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

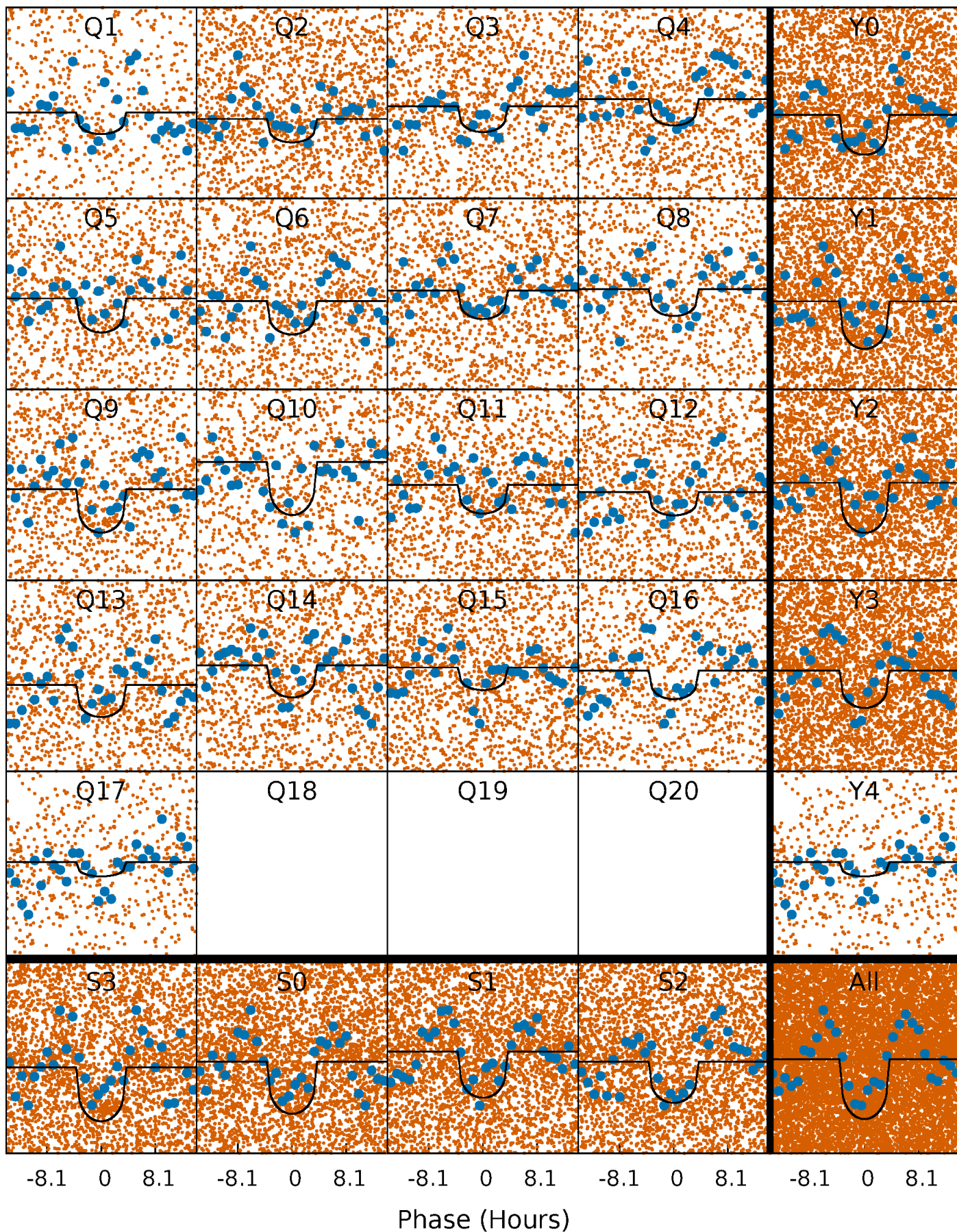
TCE 006468721-01 P= 1.541674 Days  $T_0=132.790389$  (BKJD)





# DV Quarter-Phased Transit Curves

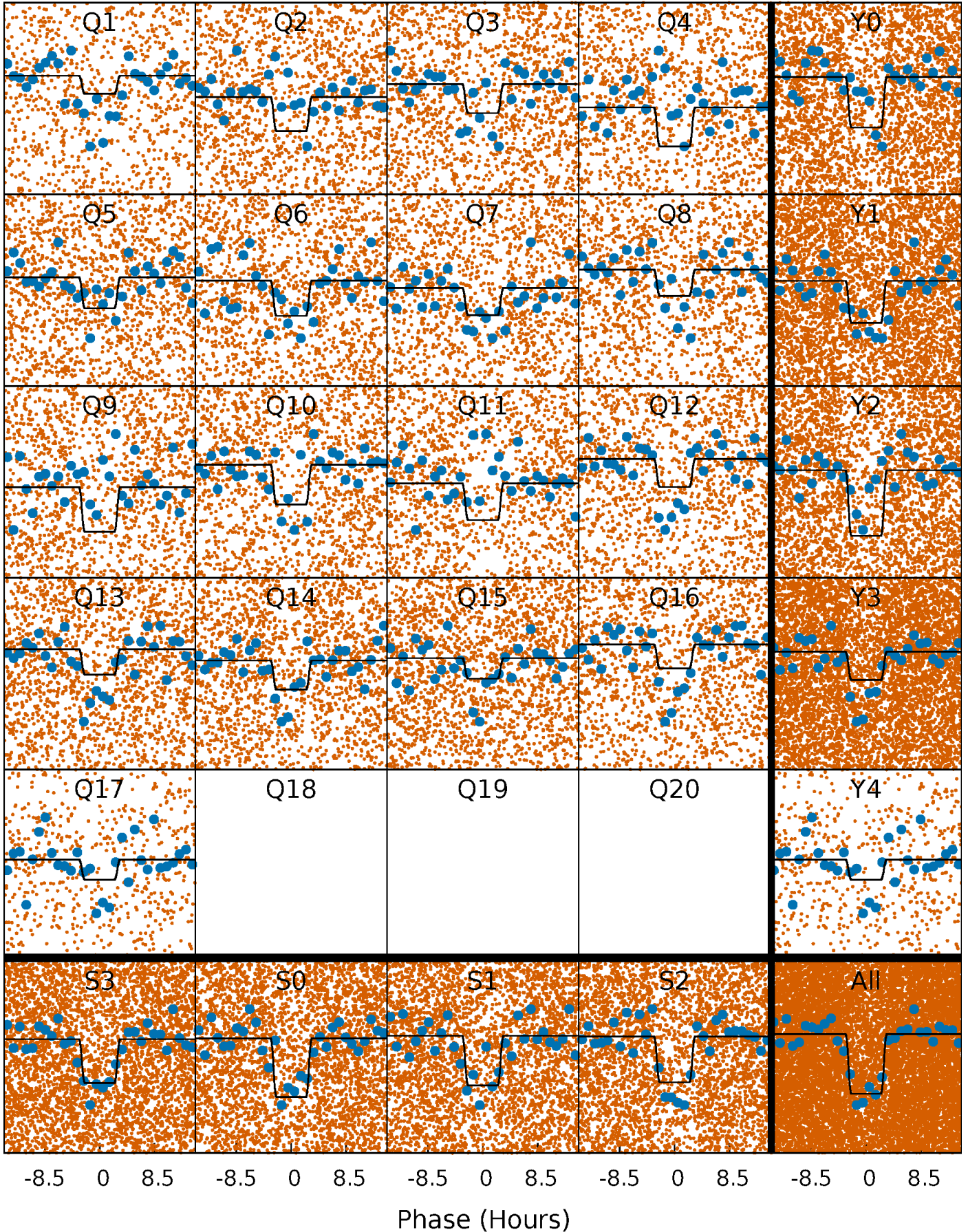
TCE 006468721-01 P= 1.541674 Days  $T_0=132.790389$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

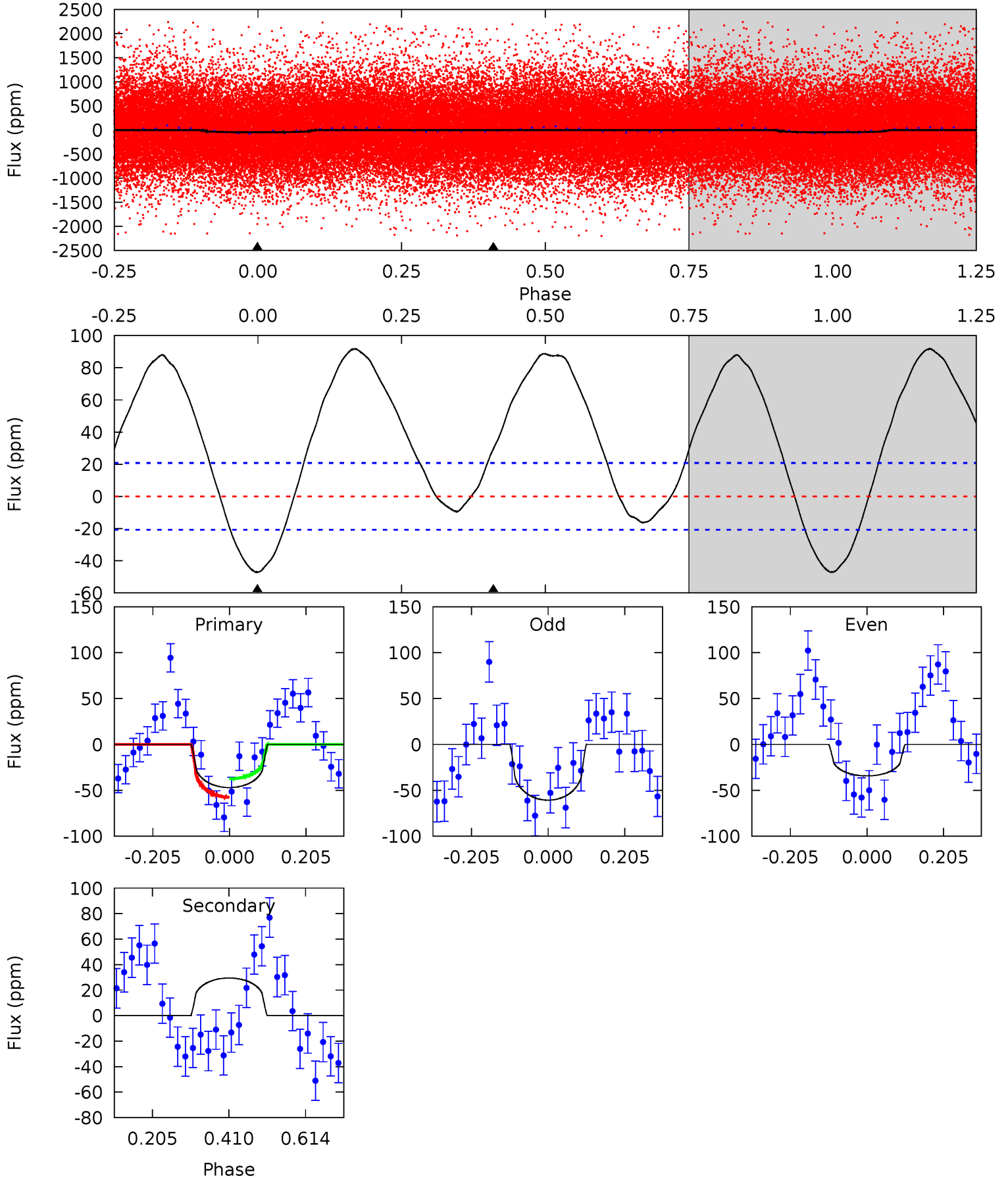
TCE 006468721-01 P= 1.541659 Days  $T_0=132.803491$  (BKJD)



# DV Model-Shift Uniqueness Test

006468721-01, P = 1.541674 Days, E = 131.248715 Days

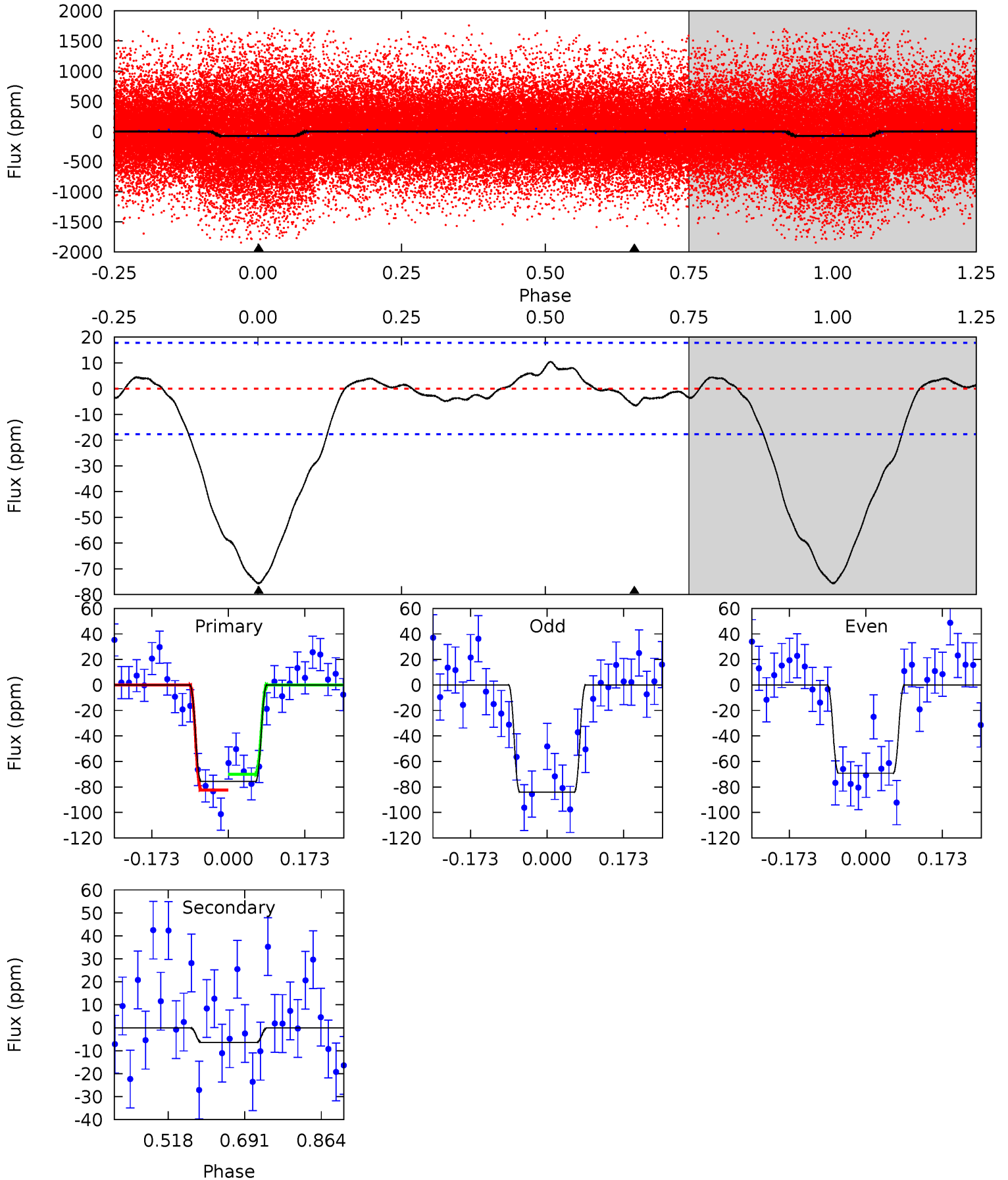
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.0	-6.27	0	0	4.41	1.27	5.57	10.0	10.0	-6.27	-6.27	2.82	0.77	0.66	2.11



# Alt Model-Shift Uniqueness Test

006468721-01, P = 1.541659 Days, E = 131.261832 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
19.0	1.62	0	0	4.45	1.36	0.78	19.0	19.0	1.62	1.62	1.82	1.02	0.12	1.55





### Stellar Parameters For KIC 006468721

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5392^{+160}_{-160}$	$4.574^{+0.034}_{-0.136}$	$-0.040^{+0.300}_{-0.300}$	$0.806^{+0.158}_{-0.068}$	$0.890^{+0.073}_{-0.097}$	$2.396^{+0.418}_{-0.916}$
	+3%/-3%	+1%/-3%	+750%/-750%	+20%/-8%	+8%/-11%	+17%/-38%
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 006468721-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$29 \pm 5$	$0.98^{+0.71}_{-0.62}$	$1916^{+93}_{-77}$	$-4137^{+708}_{-2096}$	$-10.519^{+7.070}_{-63.033}$
Alt.	$-6 \pm 4$	$0.99^{+0.69}_{-0.61}$	$1921^{+99}_{-81}$	$3087^{+1299}_{-805}$	$2.095^{+13.650}_{-1.613}$

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

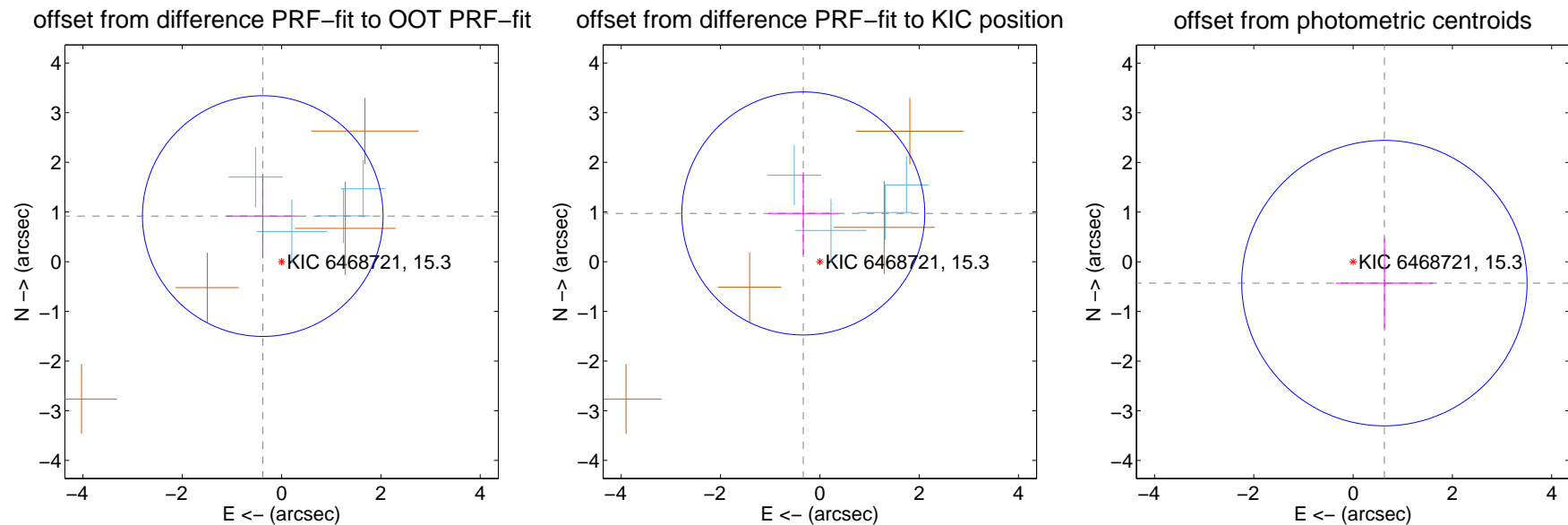
## DV Centroid Data

Supplemental centroid analysis for 006468721-01. Kepler magnitude: 15.30. Transit SNR 9.44

There are 4 quarters with good PRF difference image offsets

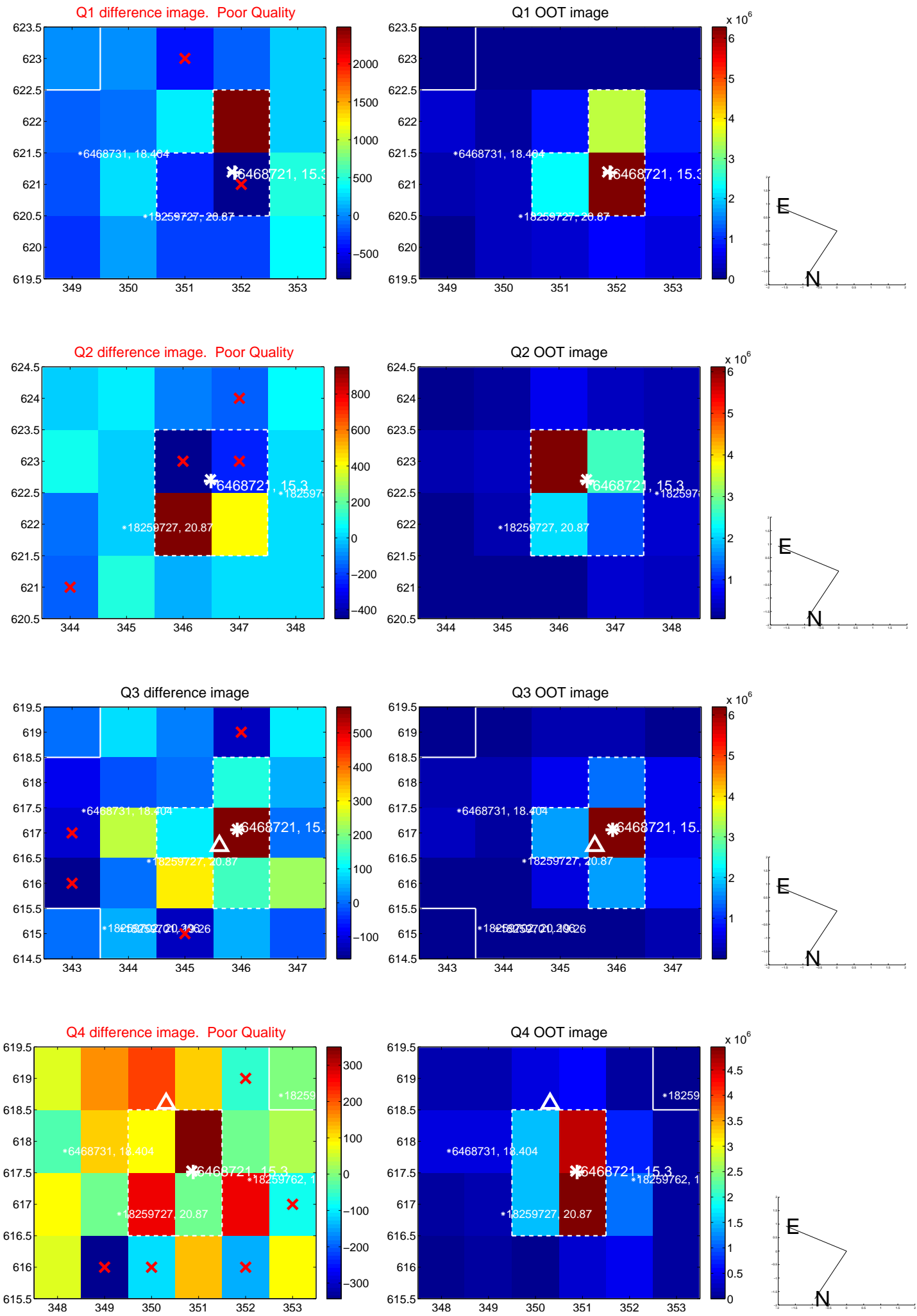
The direct PRF centroid is offset from the target star catalog position by about 0.11 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.993 \pm 0.808$	1.23	$0.379 \pm 0.724$	$0.918 \pm 0.847$
PRF-fit source offset from KIC position	$1.027 \pm 0.815$	1.26	$0.333 \pm 0.699$	$0.971 \pm 0.834$
photometric centroid source offset	$0.76 \pm 0.96$	0.80	$-0.63 \pm 0.98$	$-0.43 \pm 0.91$

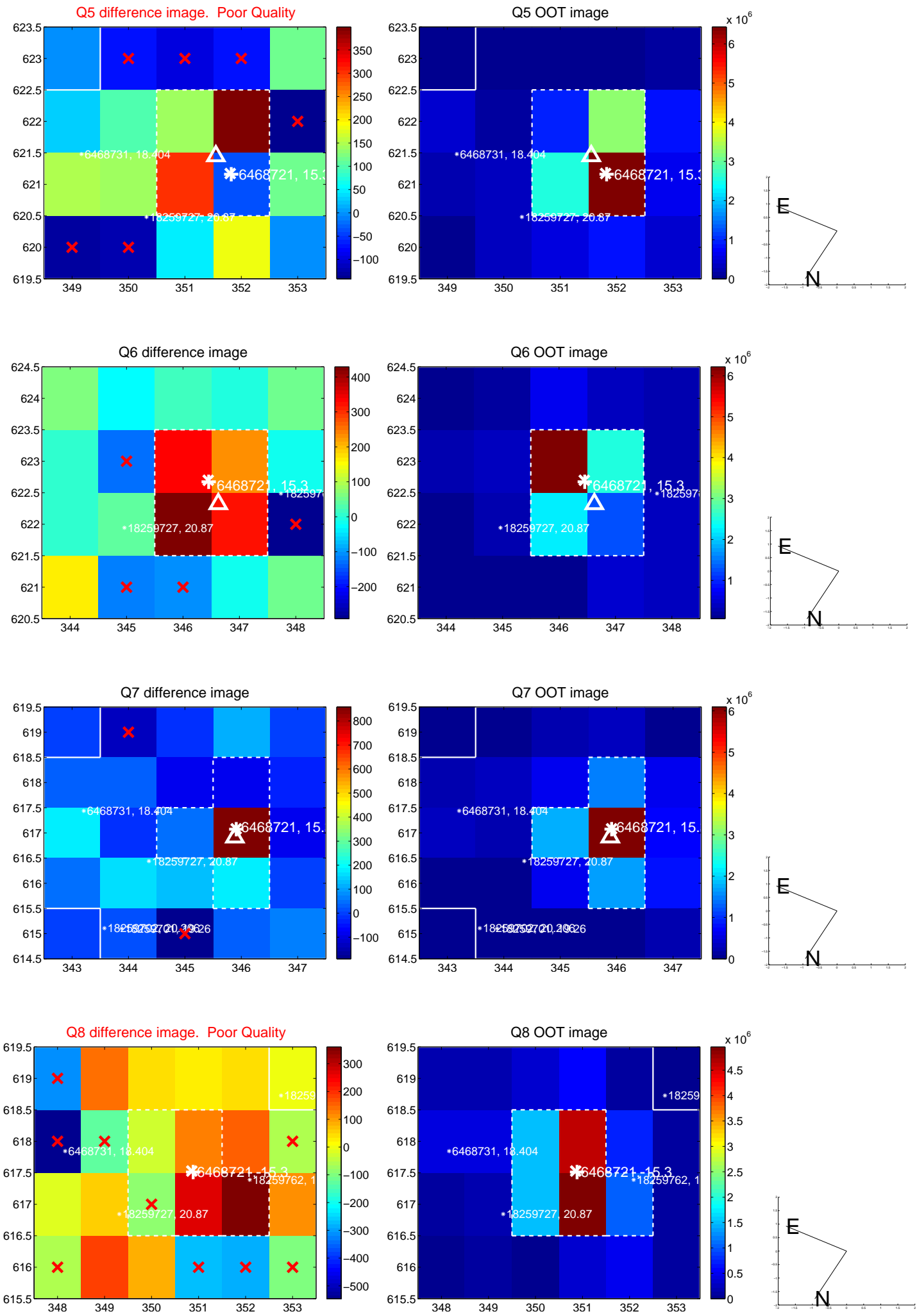


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

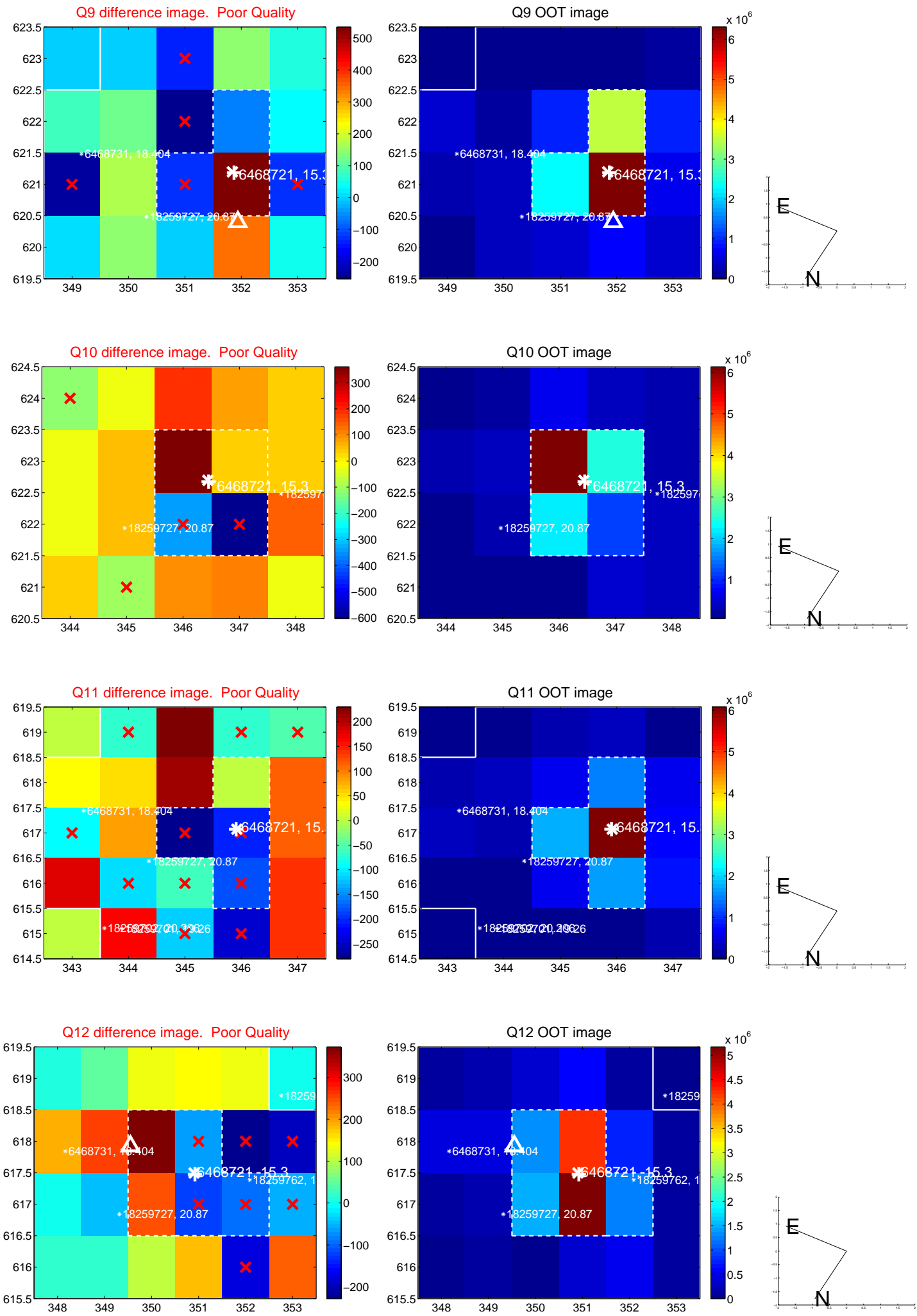


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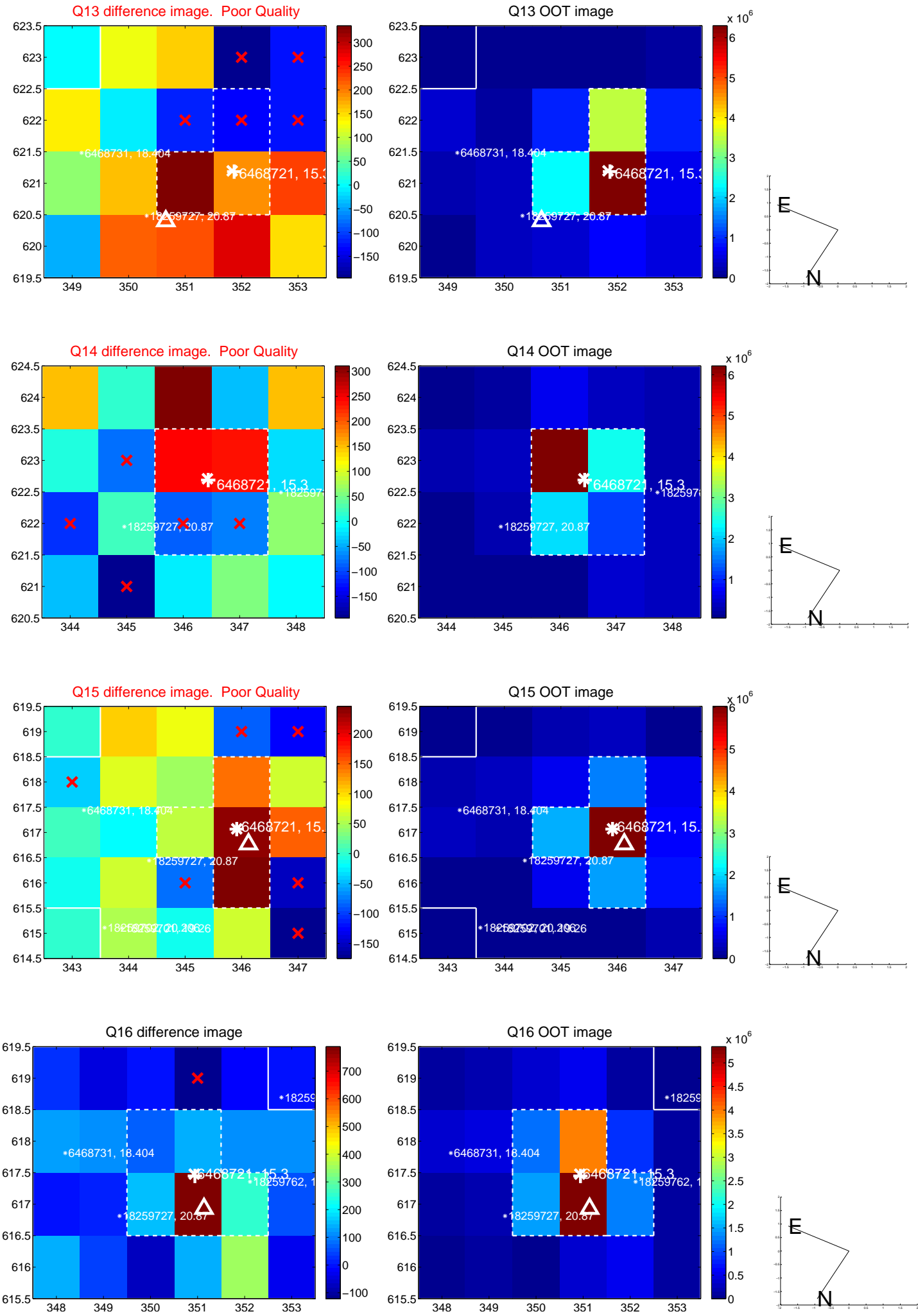




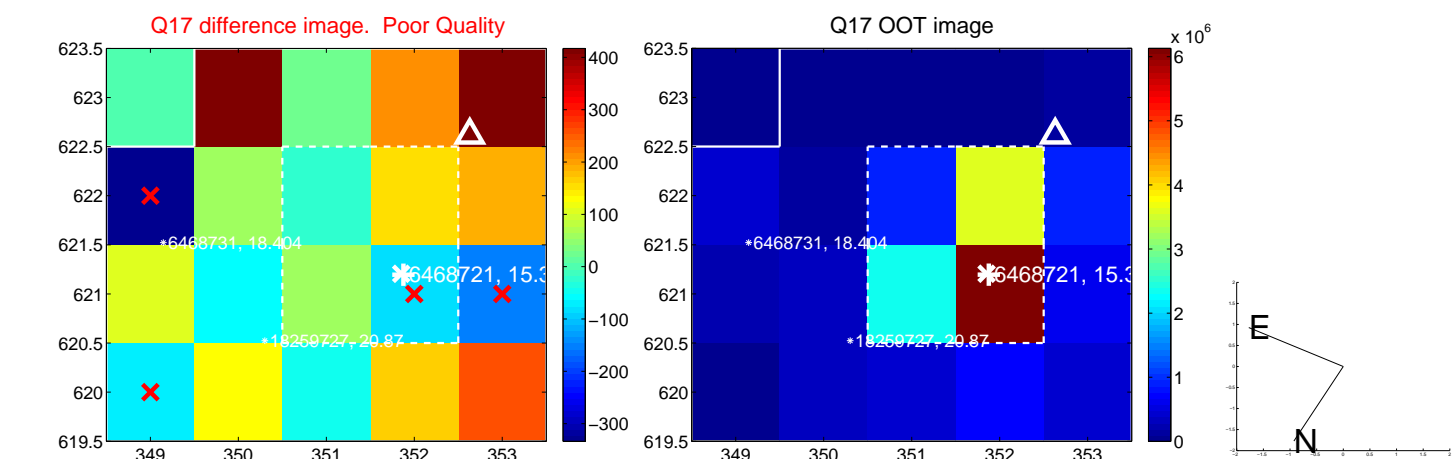
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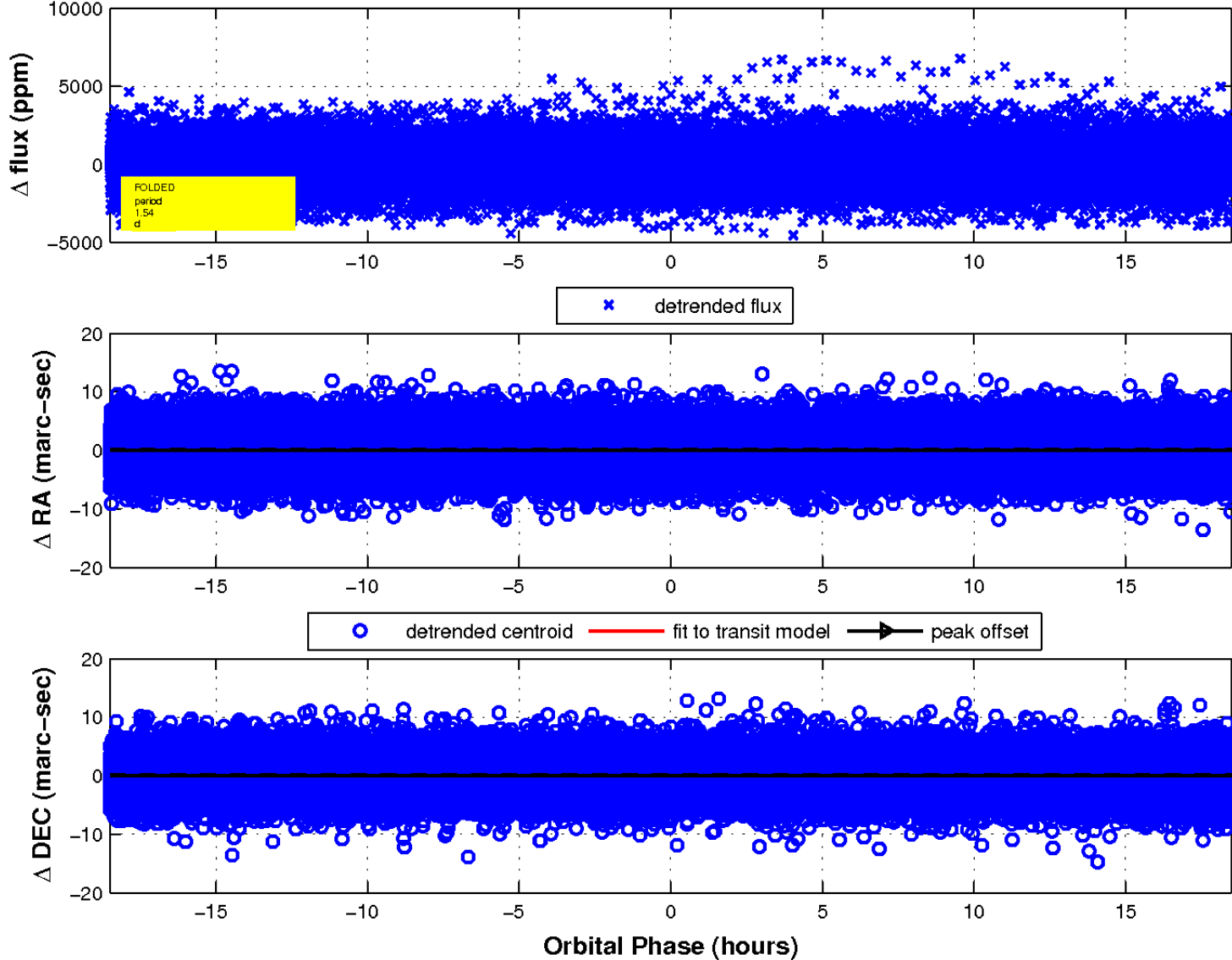
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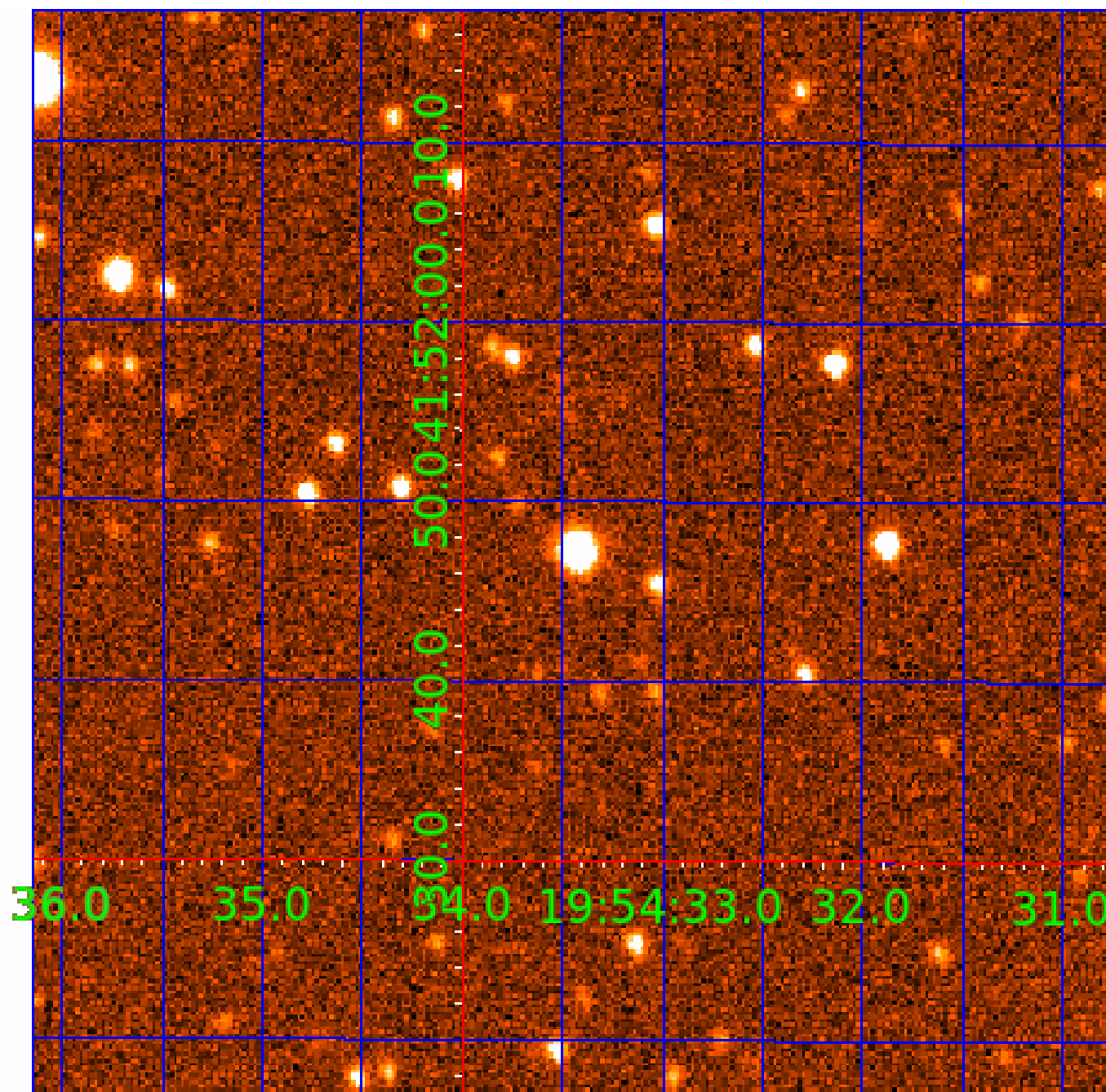


fluxWeightedCentroids, Planet 1 of 4



UKIRT Image

Declination





# KIC 006468721

## 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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006468721-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
006468721-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
006468721-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL_SKYE—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS

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

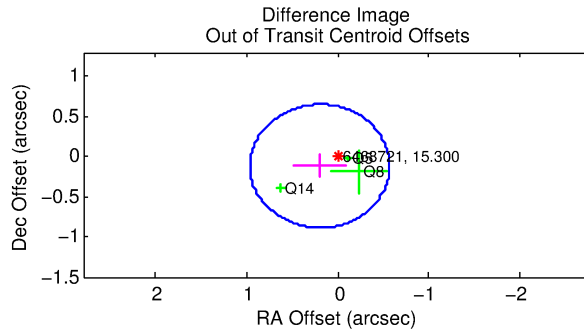
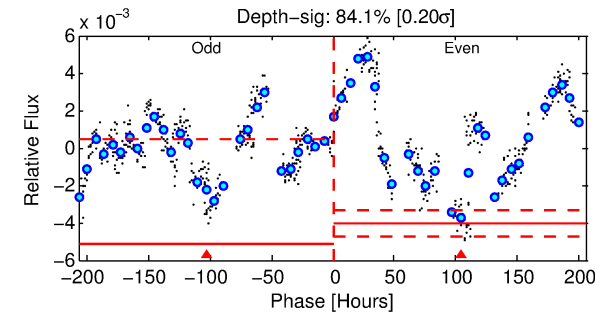
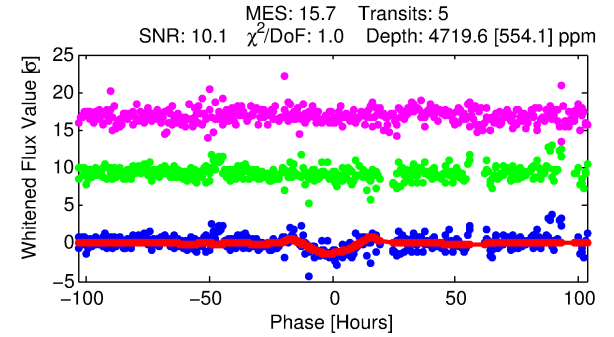
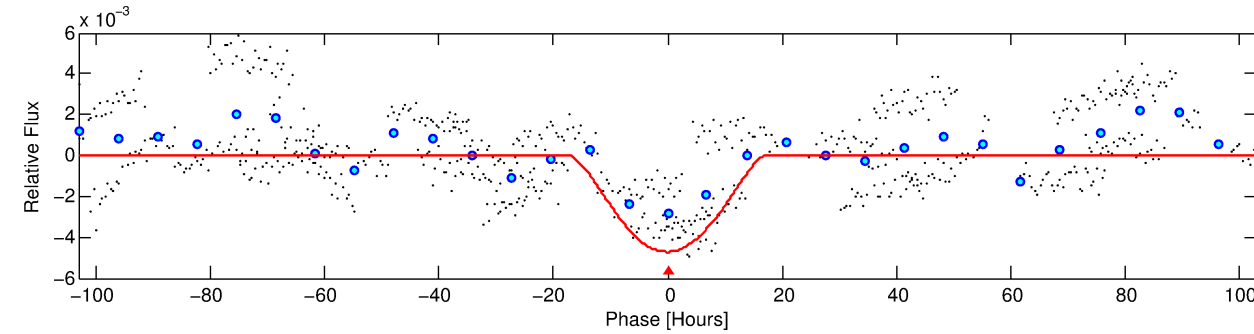
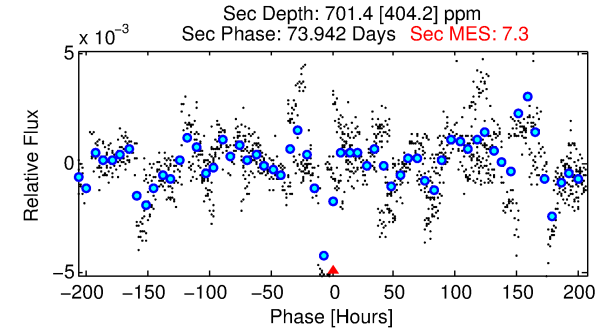
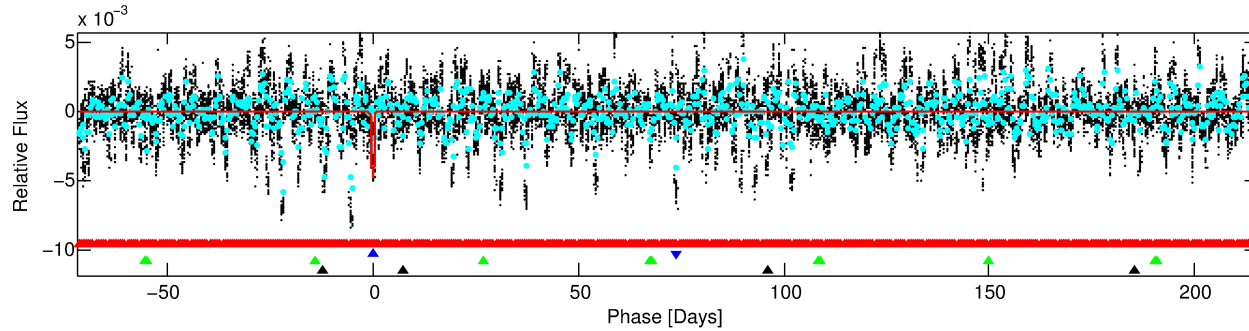
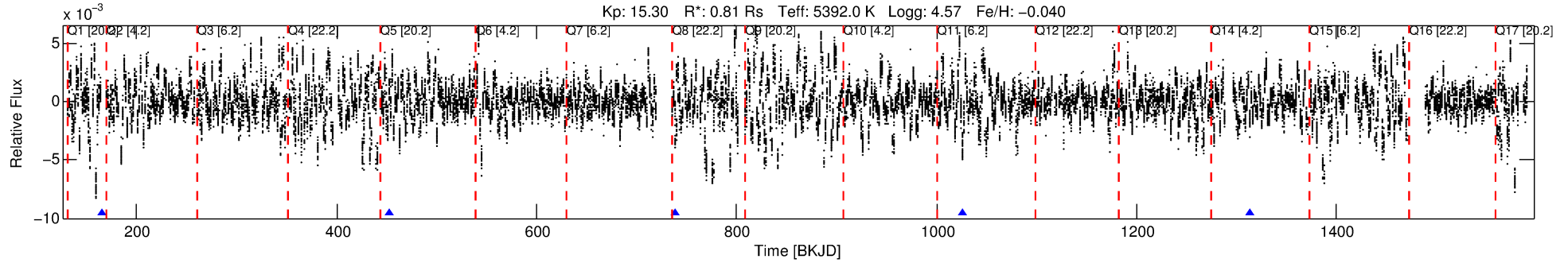
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 006468721-02

No Significant Match Found

# DV One-Page Summary

KIC: 6468721 Candidate: 2 of 4 Period: 286.985 d



## DV Fit Results:

Period = 286.98489 [0.02112] d  
Epoch = 165.2047 [0.0499] BKJD  
Rp/R\* = 0.1067 [0.0901]  
a/R\* = 32.48 [6.24]  
b = 0.98 [0.14]  
Seff = 0.73 [0.20]  
Teq = 236 [16] K  
Rp = 9.39 [8.14] Re  
a = 0.8188 [0.1369] AU  
Ag = 2934.82 [5287.53] [0.55σ]  
Teffp = 2686 [1201] K [2.04σ]

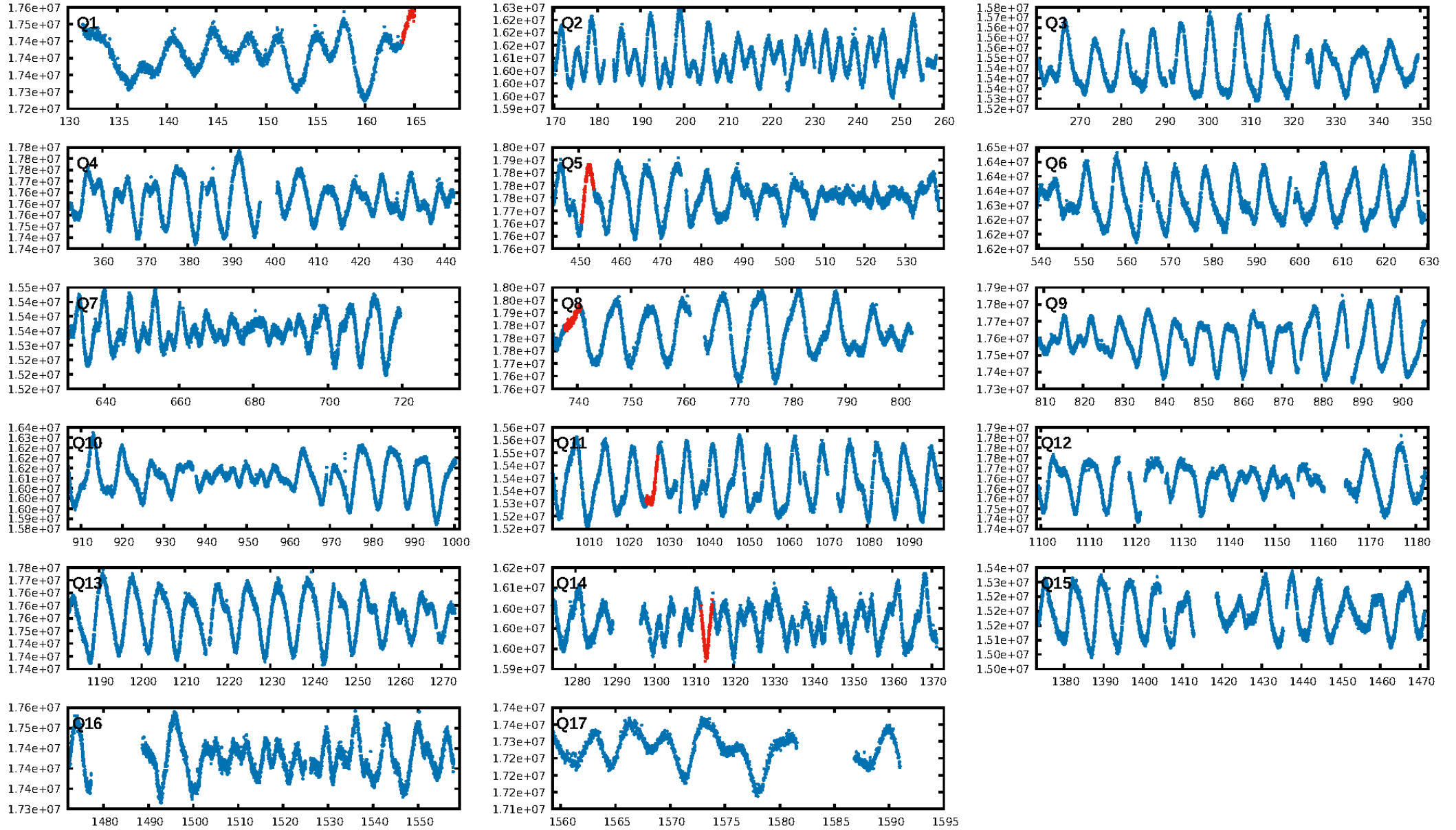
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [78.97σ]  
LongPeriod-sig: 100.0% [60.87σ]  
ModelChiSquare2-sig: 31.8%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 1.03e-20  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: -1.885  
Centroid-sig: 38.4%  
Centroid-so: 0.281 arcsec [1.77σ]  
OotOffset-rm: 0.230 arcsec [0.90σ]  
KicOffset-rm: 0.171 arcsec [0.78σ]  
OotOffset-st: 1/0/1/1 [3]  
KicOffset-st: 1/0/1/1 [3]  
DiffImageQuality-fgm: 0.33 [1/3]  
DiffImageOverlap-fno: 0.00 [0/3]

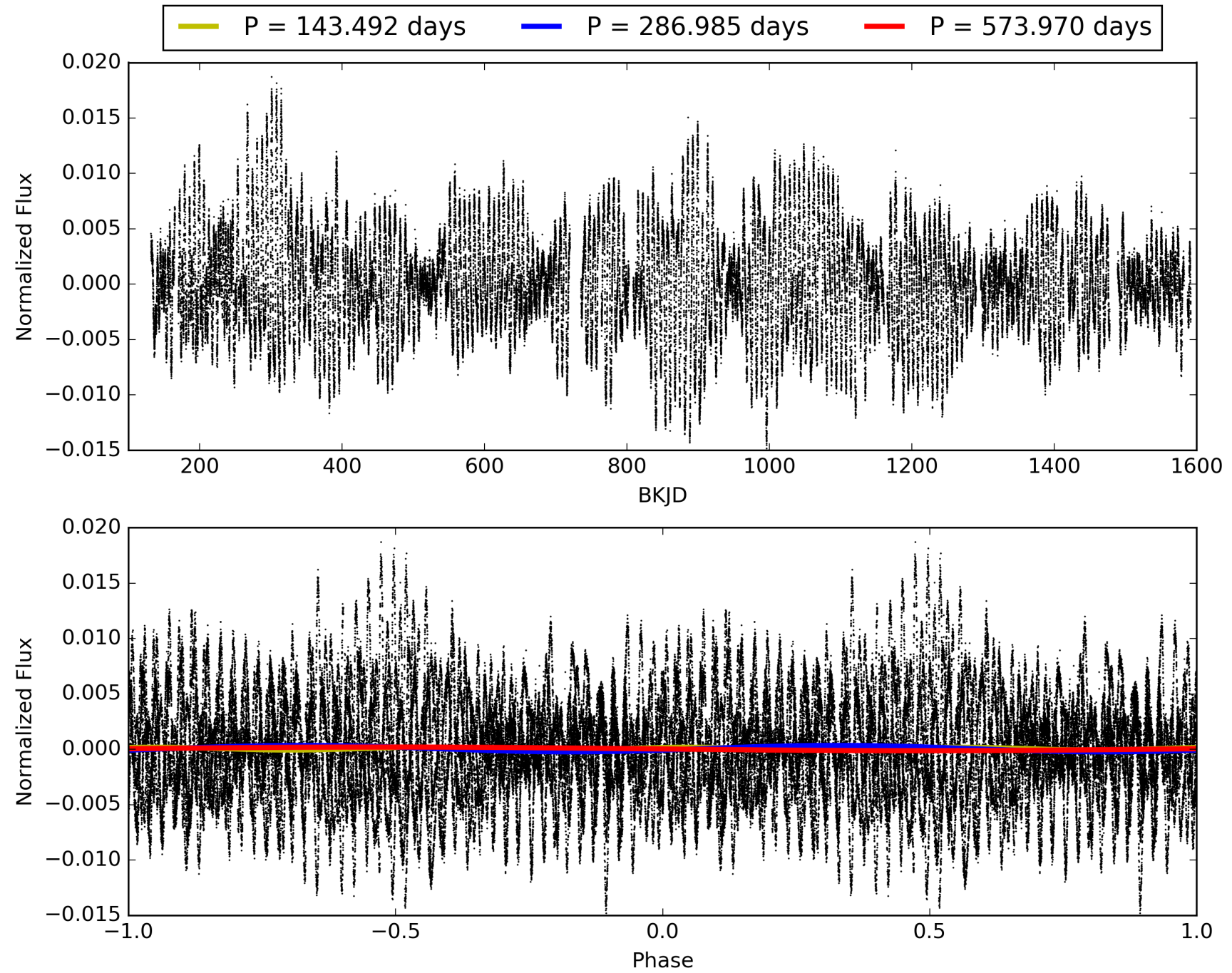
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 12:03:03 Z

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

# TCE 006468721-02, PDC Light Curves

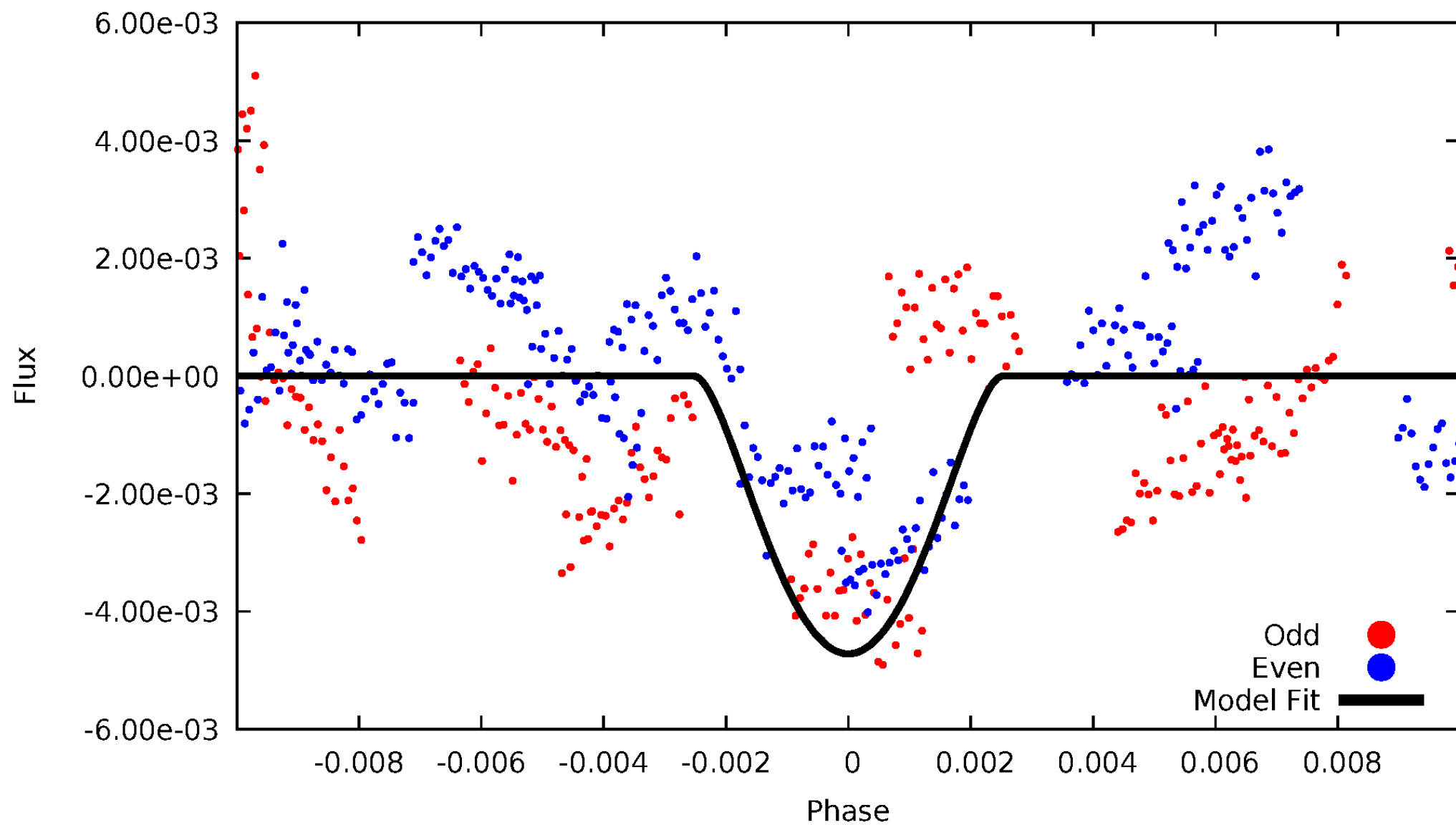


TCE 006468721-02



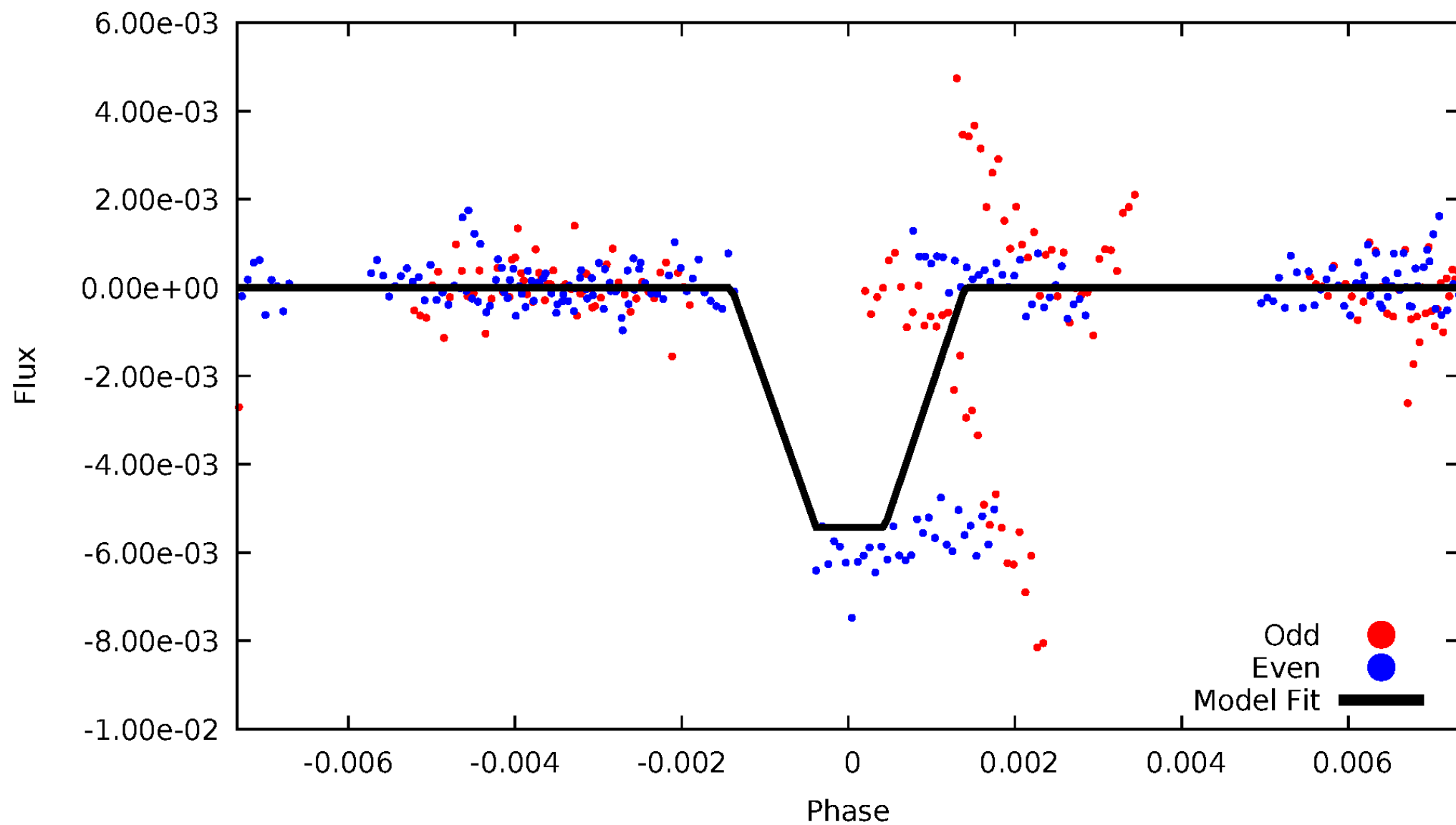
# DV Odd/Even

TCE 006468721-02



# ALT Odd/Even

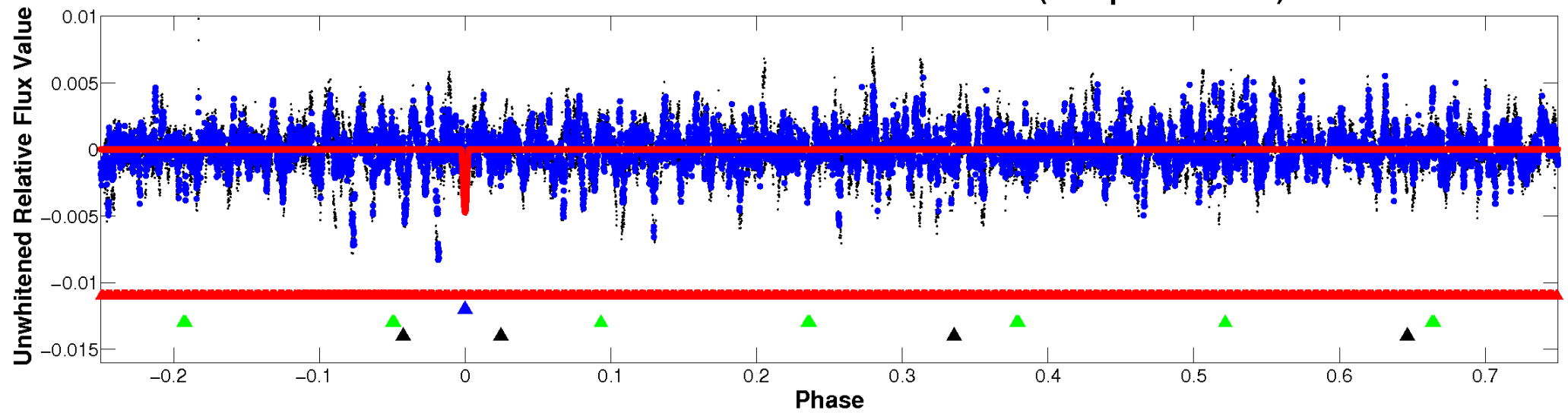
TCE 006468721-02



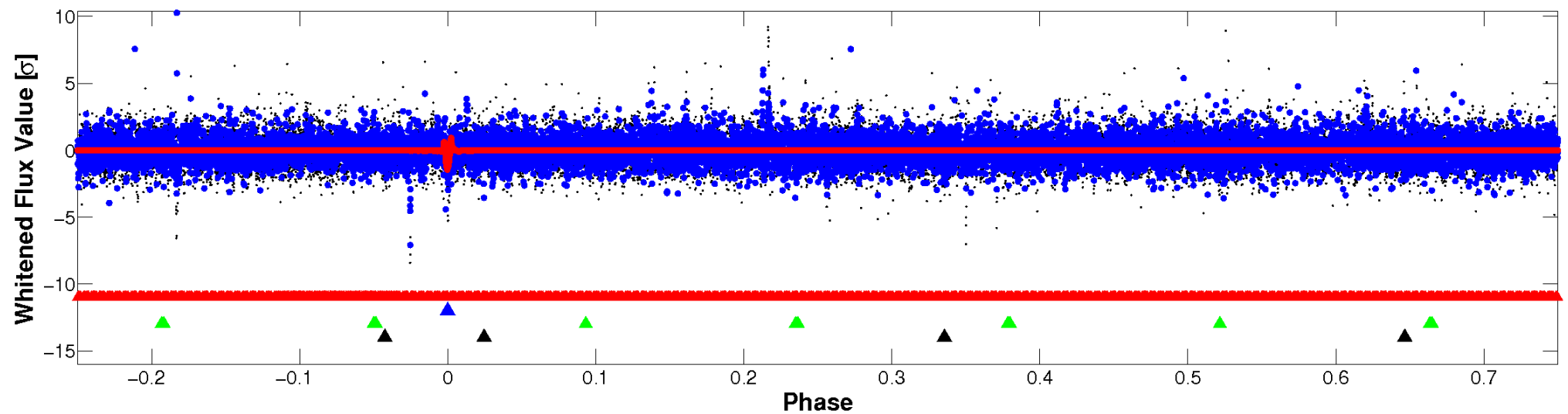


# Non-Whitened Vs. Whitened Light Curve

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

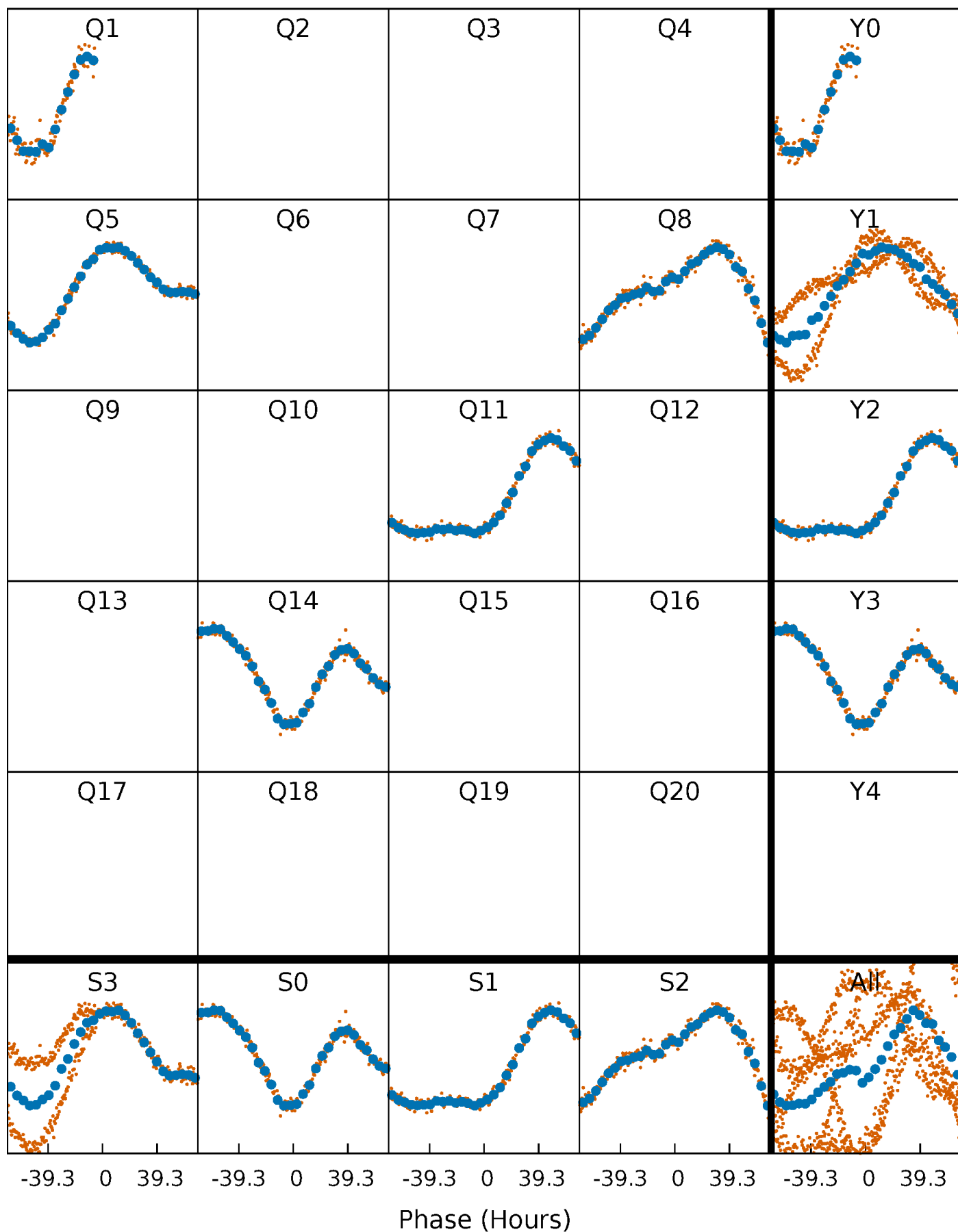


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



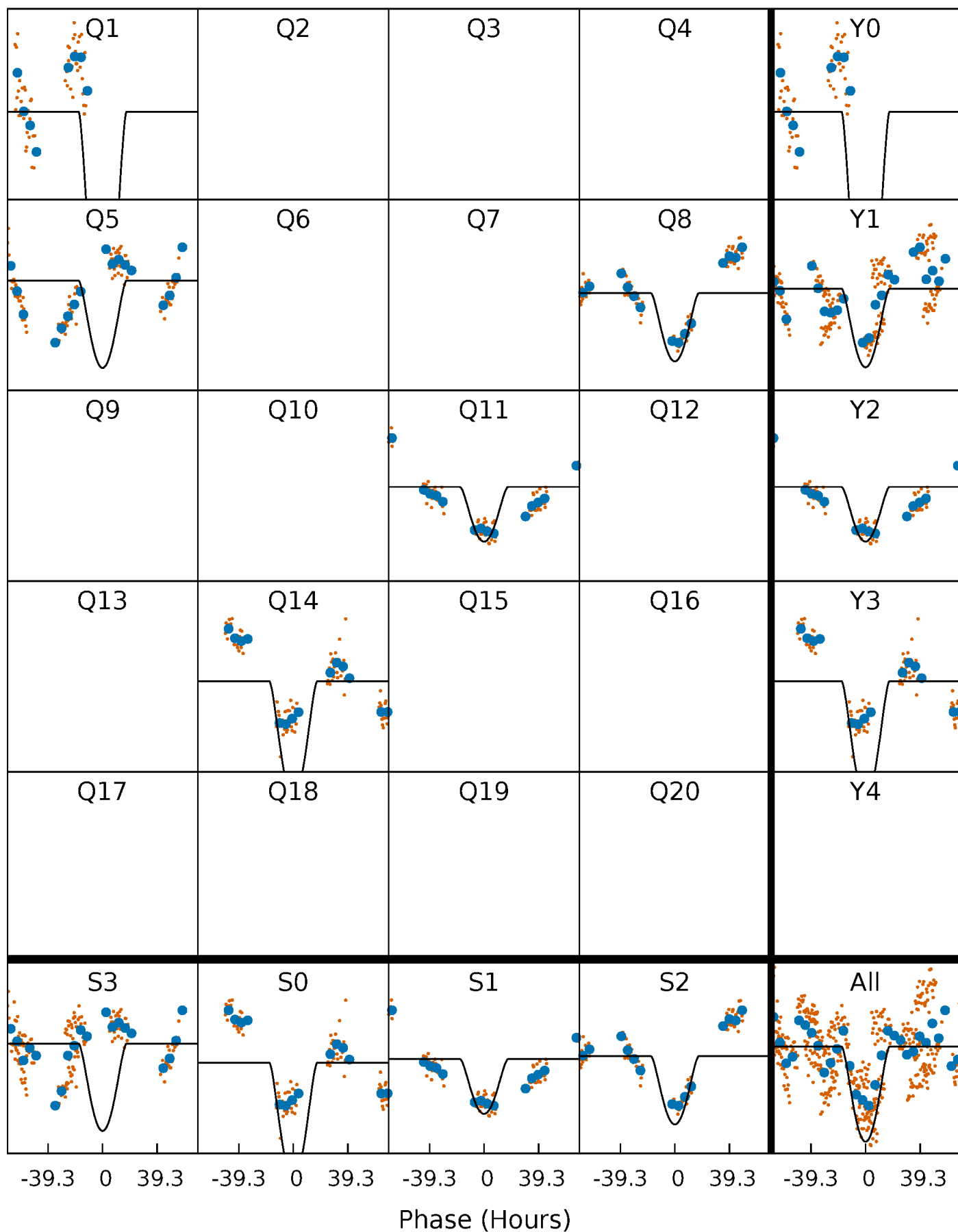
# PDC Quarter-Phased Transit Curves

TCE 006468721-02 P=286.984887 Days  $T_0=165.204748$  (BKJD)



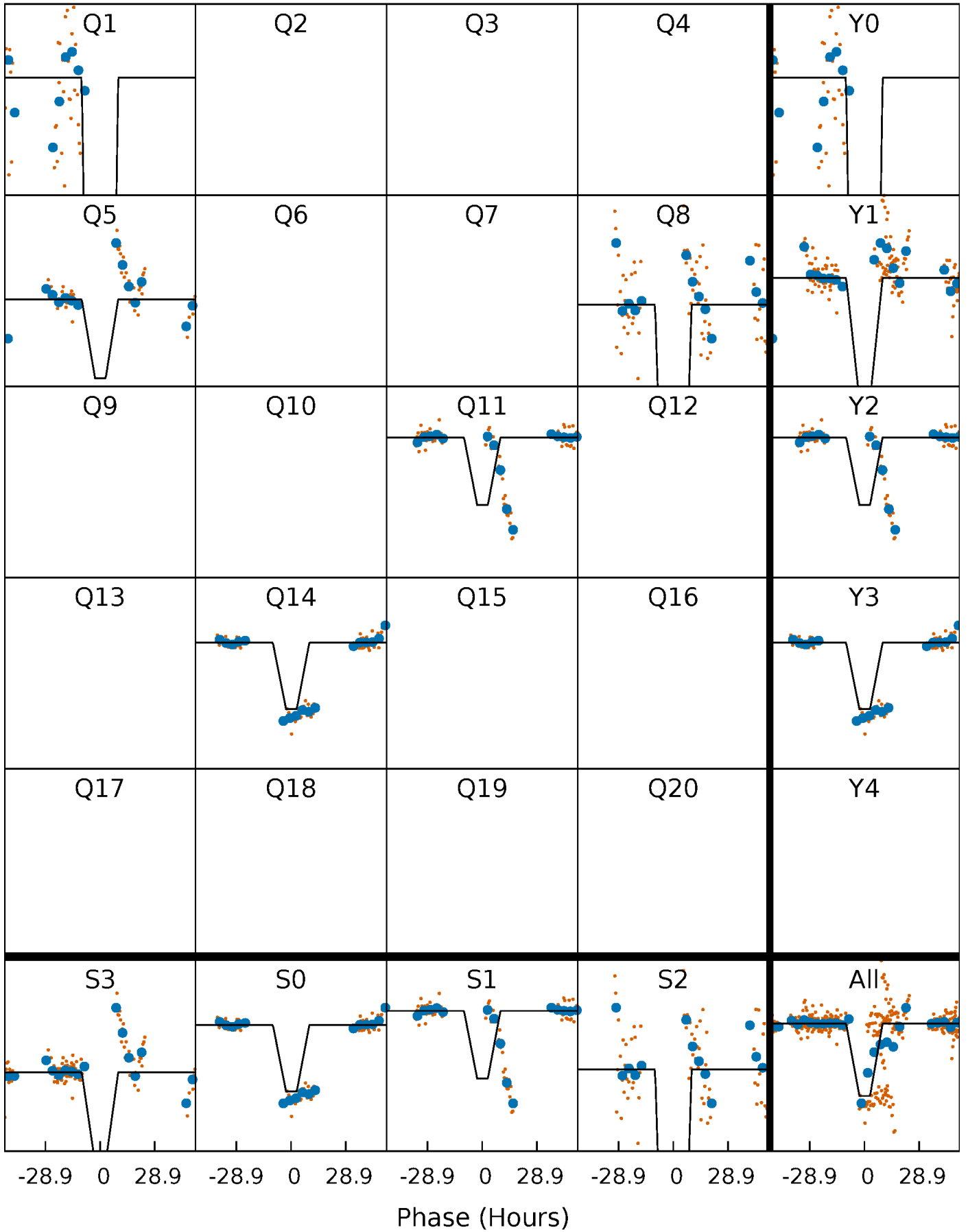
# DV Quarter-Phased Transit Curves

TCE 006468721-02   P=286.984887 Days    $T_0=165.204748$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

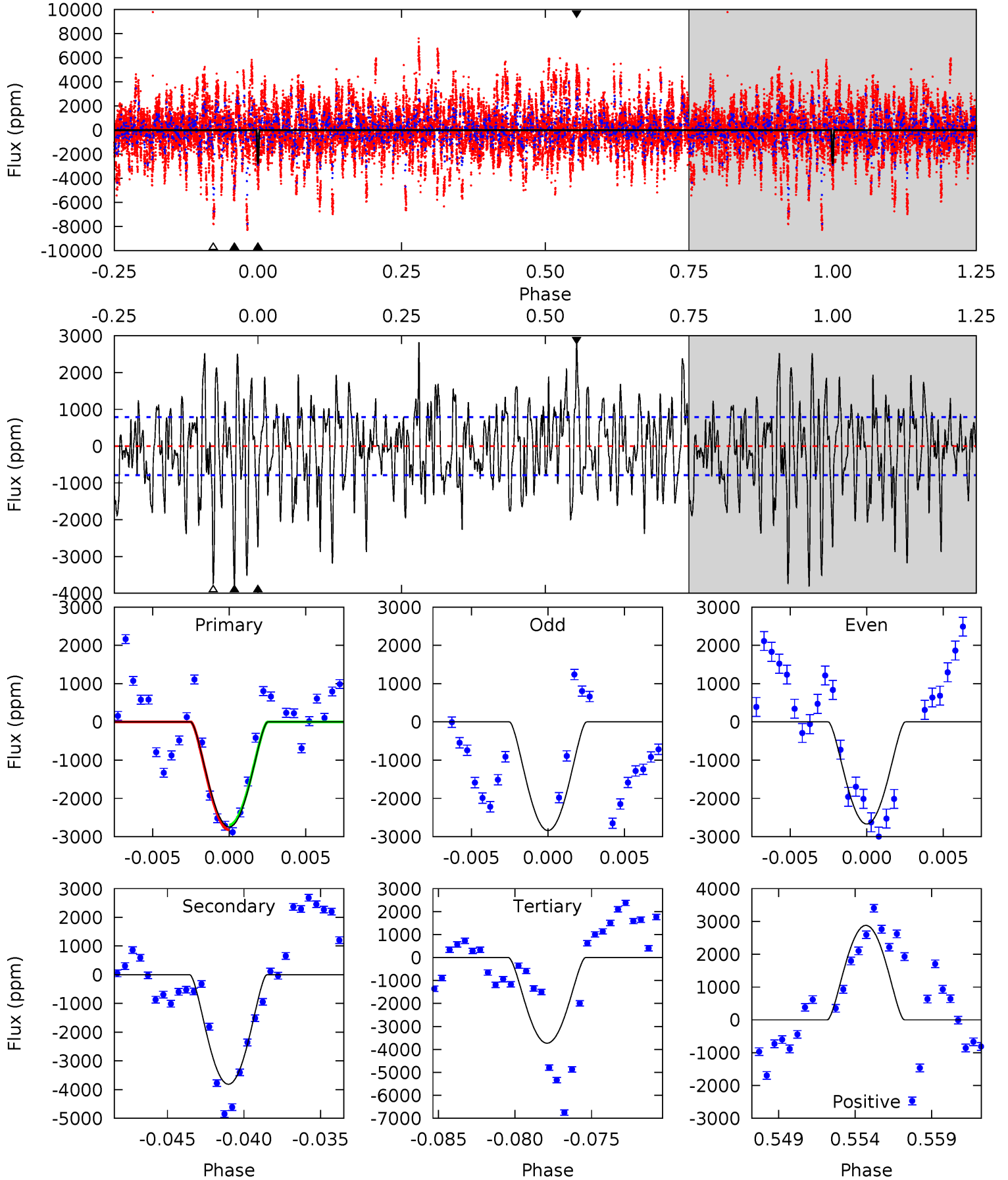
TCE 006468721-02 P=286.914427 Days  $T_0=165.090558$  (BKJD)



# DV Model-Shift Uniqueness Test

006468721-02, P = 286.984887 Days, E = 165.204748 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
18.0	25.0	24.4	18.9	5.16	2.81	6.42	-6.44	-0.87	0.55	6.12	0.56	0.63	0.43	0.40

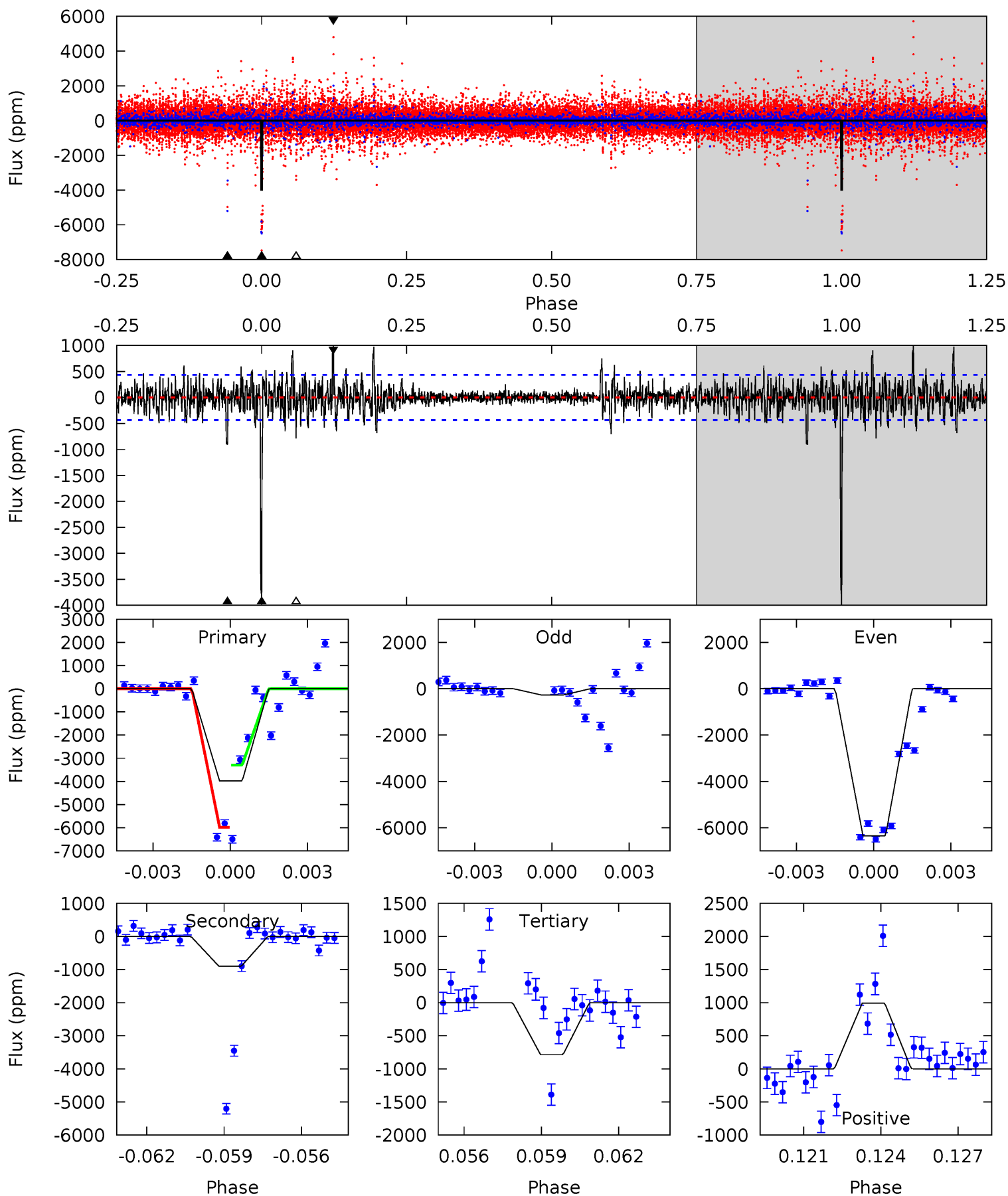




# Alt Model-Shift Uniqueness Test

006468721-02, P = 286.914427 Days, E = 165.090558 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
48.2	10.9	9.50	12.0	5.26	2.99	1.88	38.7	36.2	1.38	-1.13	36.3	17.3	0.20	11.4



### Stellar Parameters For KIC 006468721

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5392^{+160}_{-160}$	$4.574^{+0.034}_{-0.136}$	$-0.040^{+0.300}_{-0.300}$	$0.806^{+0.158}_{-0.068}$	$0.890^{+0.073}_{-0.097}$	$2.396^{+0.418}_{-0.916}$
	+3%/-3%	+1%/-3%	+750%/-750%	+20%/-8%	+8%/-11%	+17%/-38%
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 006468721-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-3813 \pm 153$	$10.42^{+7.93}_{-6.02}$	$335^{+16}_{-13}$	$4201^{+1872}_{-743}$	$12773^{+58999}_{-8666}$
Alt.	$-899 \pm 83$	$8.76^{+7.80}_{-5.64}$	$335^{+17}_{-12}$	$3487^{+1506}_{-597}$	$4294^{+29068}_{-3101}$

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

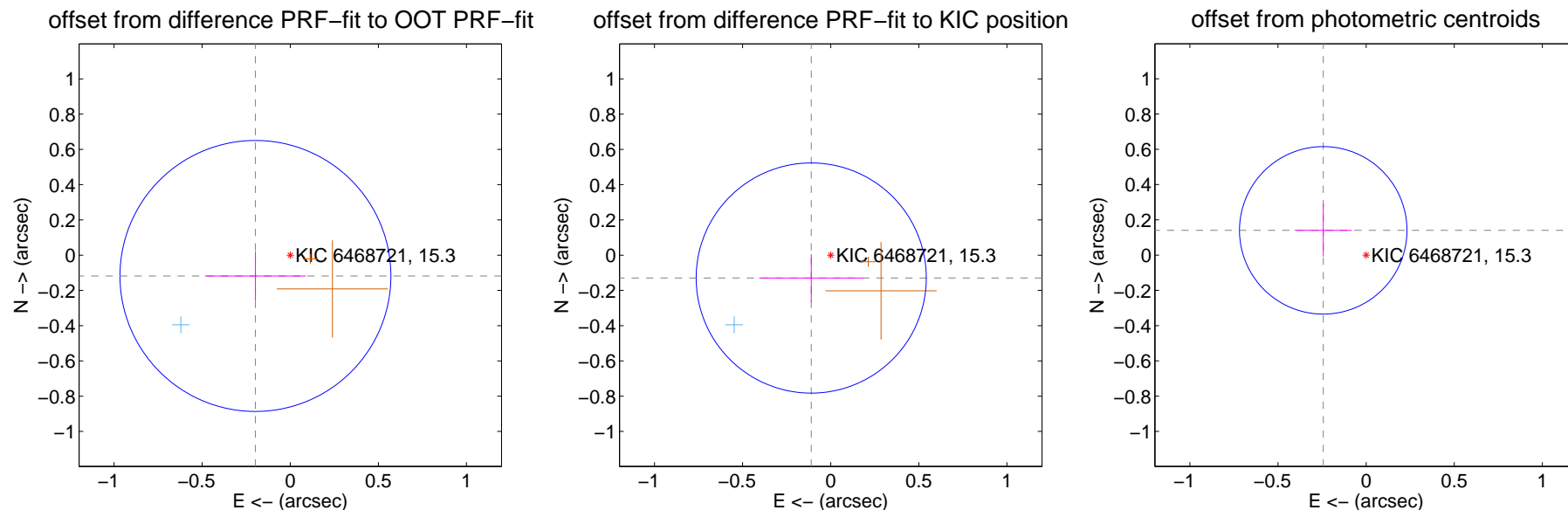
## DV Centroid Data

Supplemental centroid analysis for 006468721-02. Kepler magnitude: 15.30. Transit SNR 10.13

There are 1 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.07 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.230 \pm 0.256$	0.90	$0.198 \pm 0.286$	$-0.118 \pm 0.141$
PRF-fit source offset from KIC position	$0.171 \pm 0.218$	0.78	$0.111 \pm 0.295$	$-0.130 \pm 0.136$
photometric centroid source offset	$0.28 \pm 0.16$	1.77	$0.24 \pm 0.16$	$0.14 \pm 0.15$

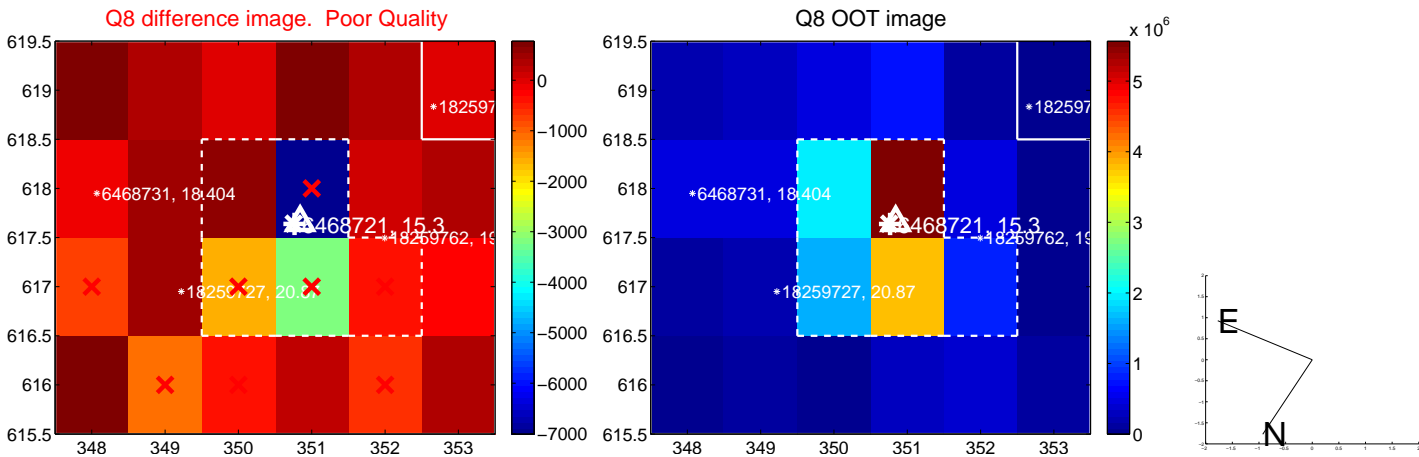
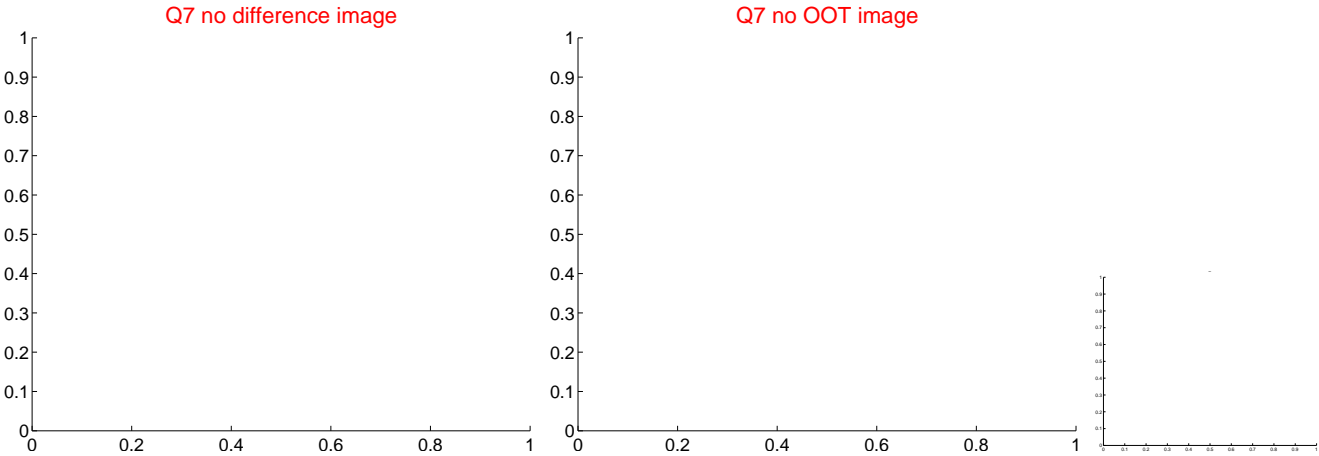
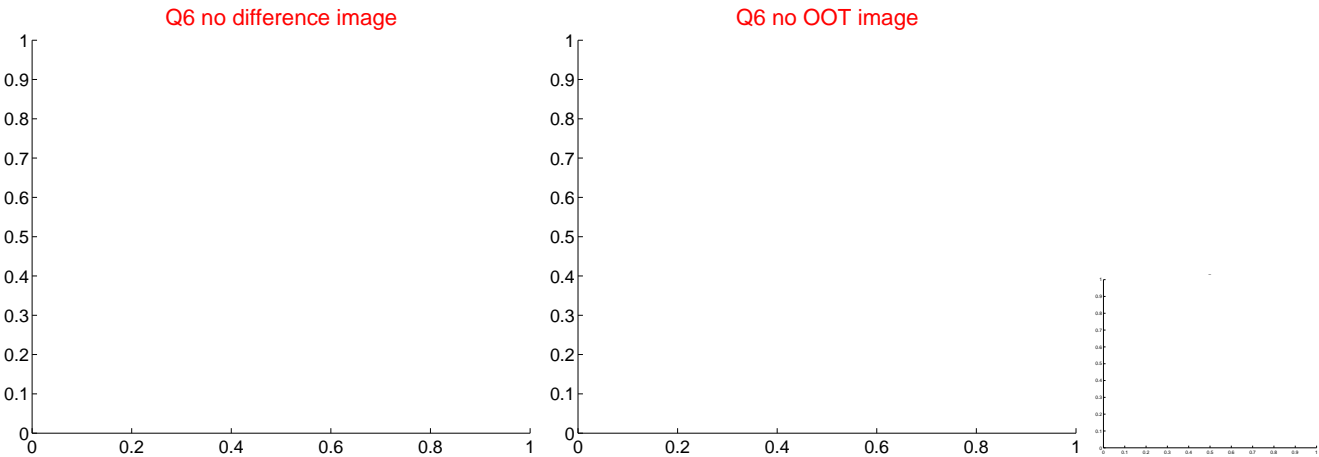
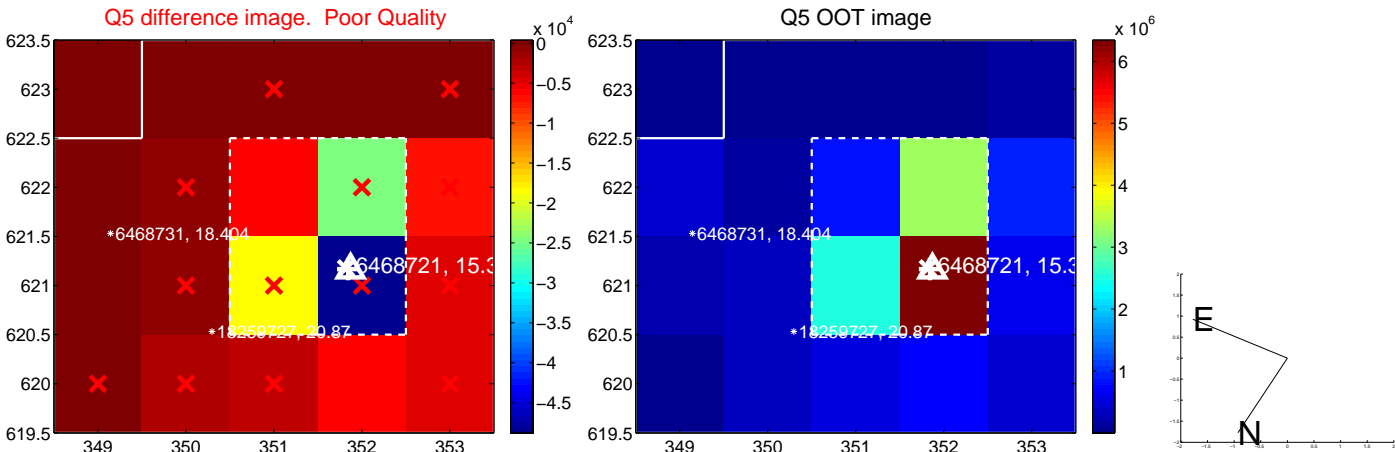


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

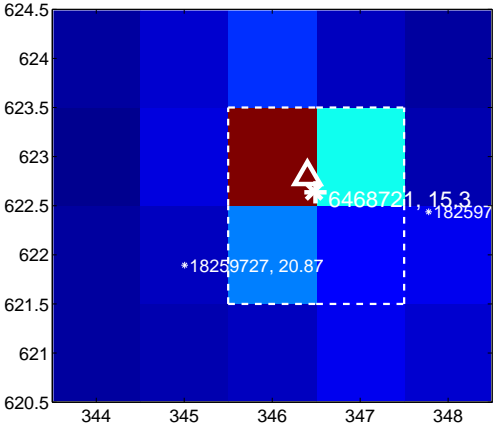
Q13 no difference image



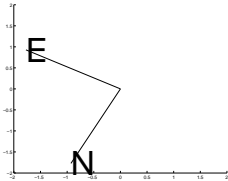
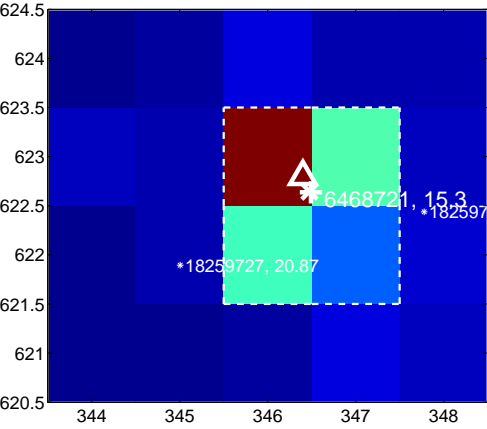
Q13 no OOT image



Q14 difference image



Q14 OOT image



Q15 no difference image



Q15 no OOT image



Q16 no difference image



Q16 no OOT image



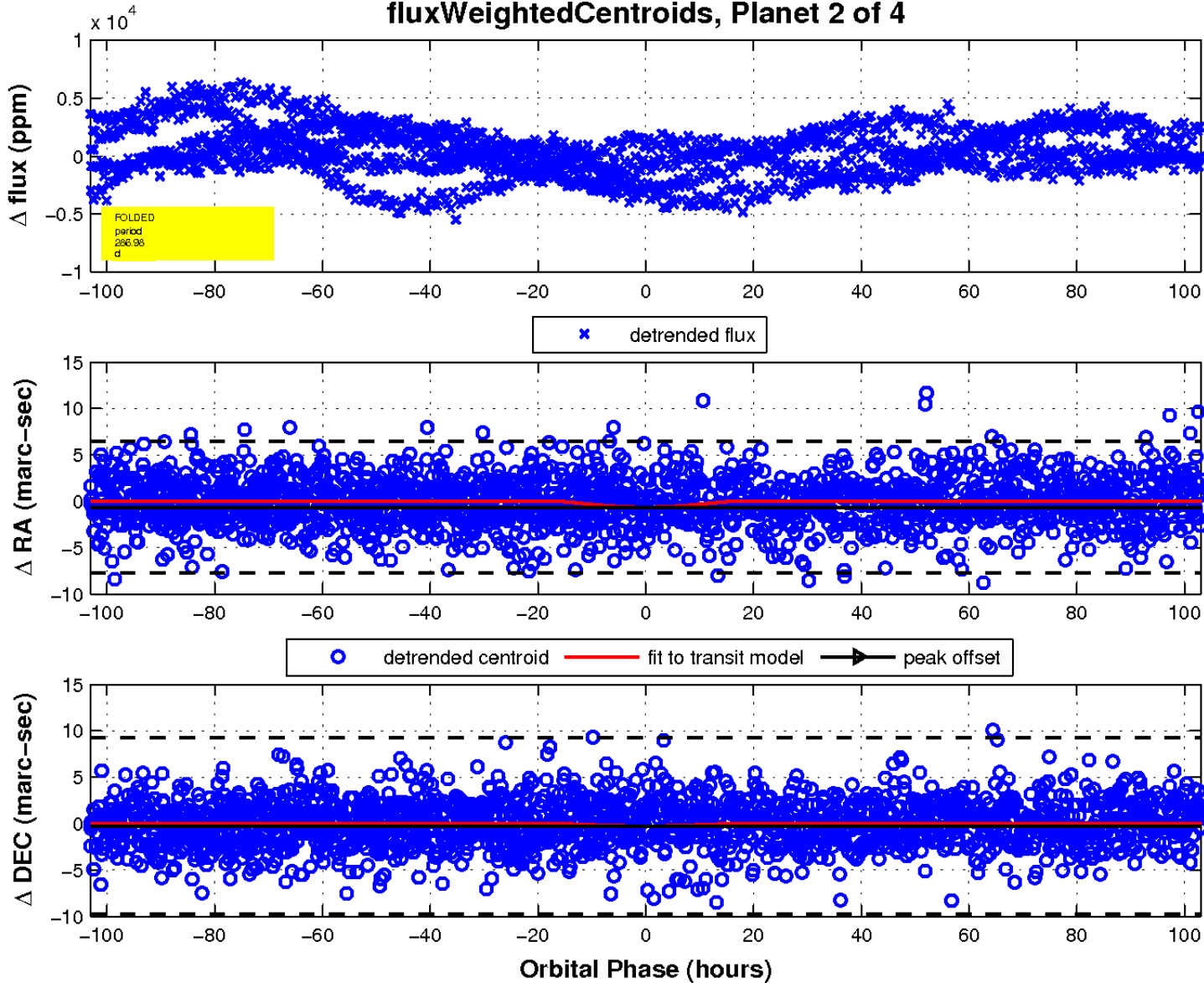
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

Q17 no difference image

Q17 no OOT image

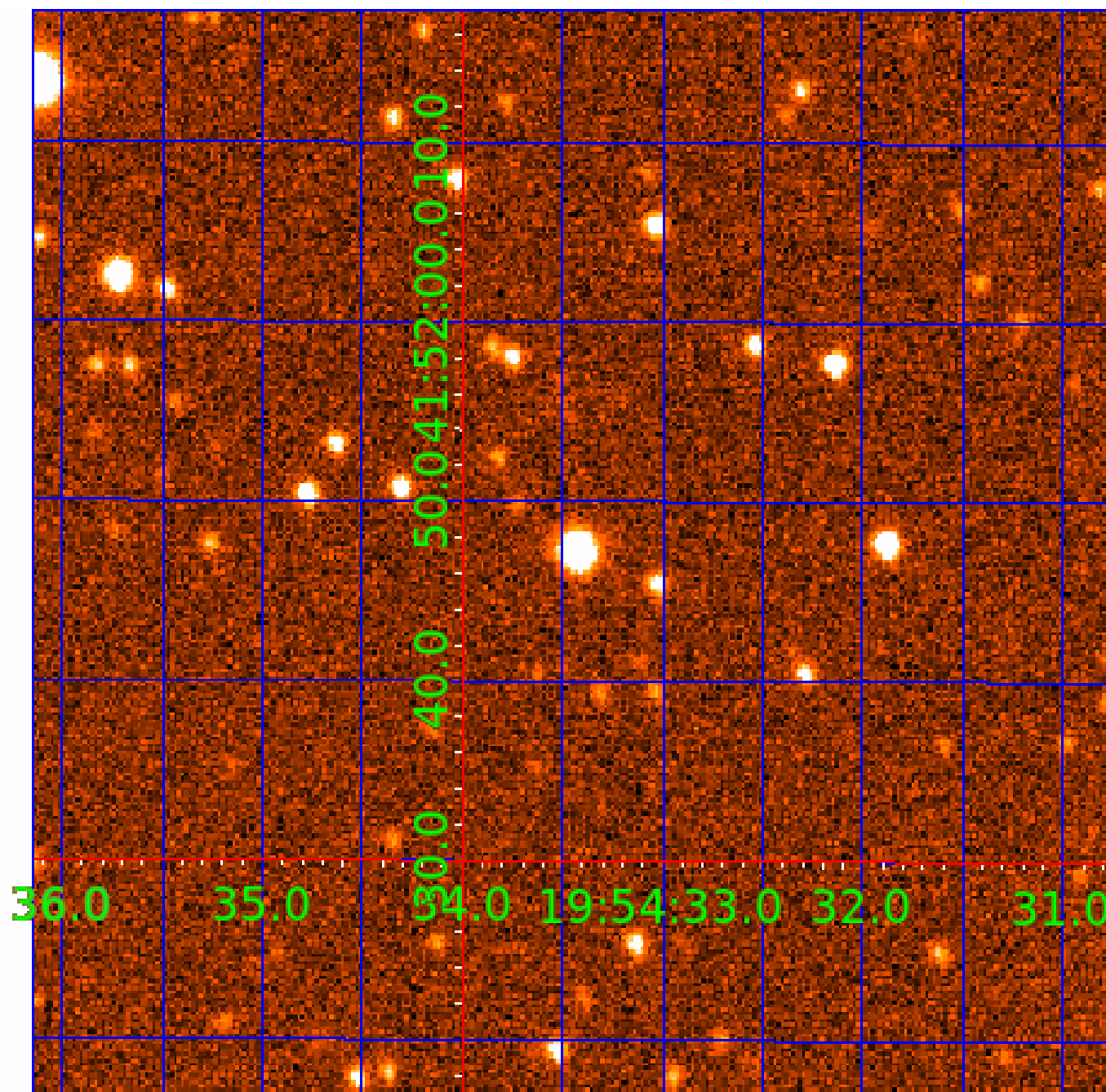


fluxWeightedCentroids, Planet 2 of 4



UKIRT Image

Declination



# KIC 006468721

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006468721-01	OBS	No	1.541674	132.790389	81.4	7.127	9.3	9.4	0.81	5392	0.72	780.06
006468721-02	OBS	No	286.984886	165.204748	4719.6	34.386	15.7	10.1	0.81	5392	9.39	0.73
006468721-03	OBS	No	122.936432	151.267385	1315.9	36.096	10.7	4.3	0.81	5392	4.78	2.27
006468721-04	OBS	No	376.234302	172.267288	1073.1	7.478	9.4	6.7	0.81	5392	3.47	0.51

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006468721-01	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV
006468721-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
006468721-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
006468721-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL_SKYE—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS

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

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

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

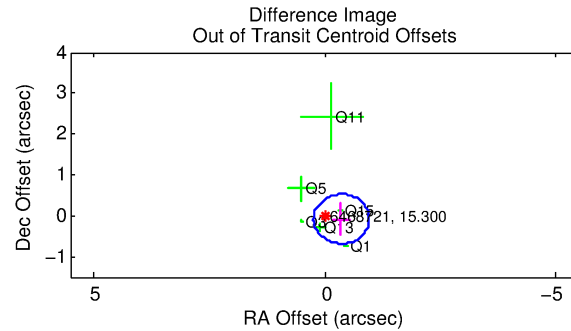
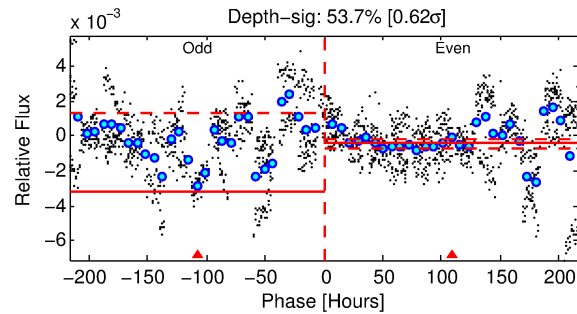
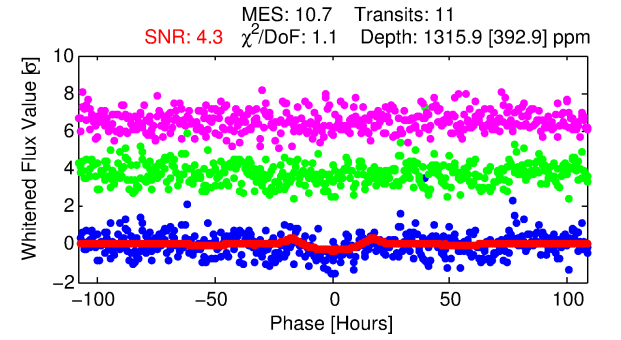
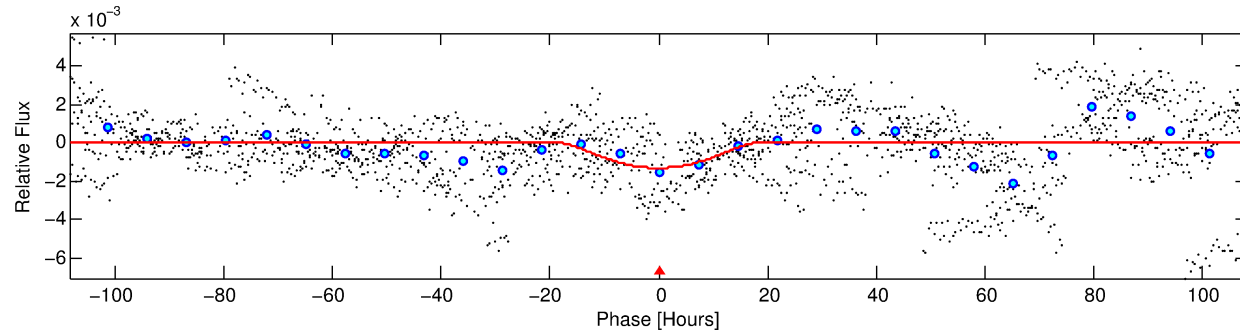
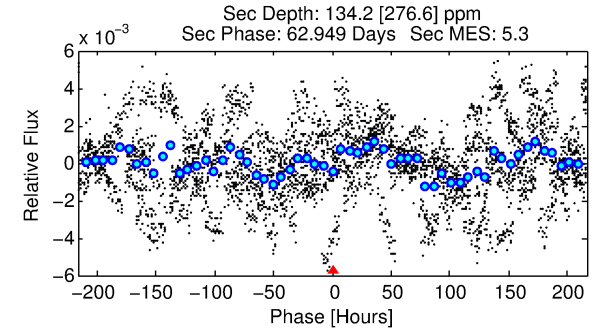
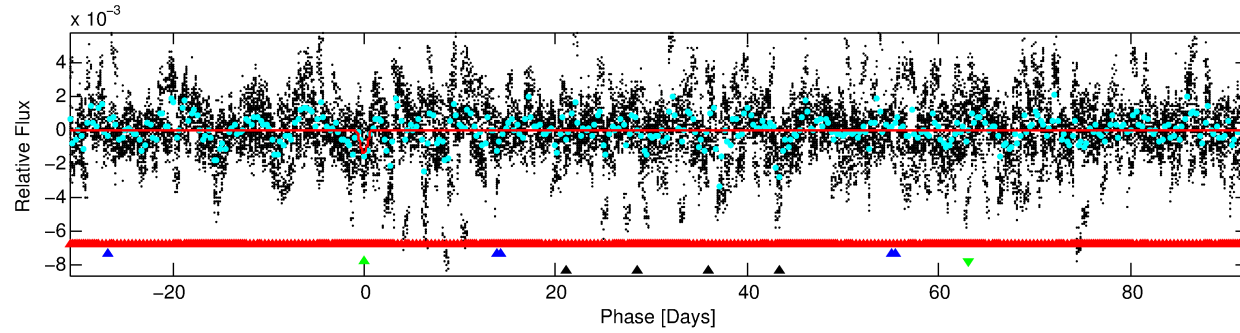
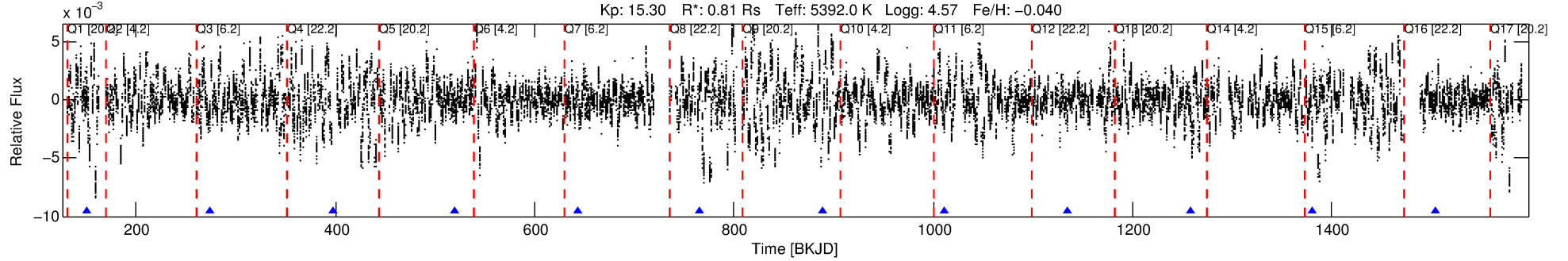
## Ephemeris Match Information For 006468721-03

No Significant Match Found



# DV One-Page Summary

KIC: 6468721 Candidate: 3 of 4 Period: 122.936 d



## DV Fit Results:

Period = 122.93643 [0.01504] d  
Epoch = 151.2674 [0.1033] BKJD  
Rp/R\* = 0.0544 [0.0637]  
a/R\* = 10.02 [3.28]  
b = 0.98 [0.11]  
Seff = 2.27 [0.62]  
Teq = 313 [21] K  
Rp = 4.78 [5.68] Re  
a = 0.4653 [0.0778] AU  
Ag = 698.17 [2185.06] [0.32σ]  
Teffp = 2488 [1942] K [1.12σ]

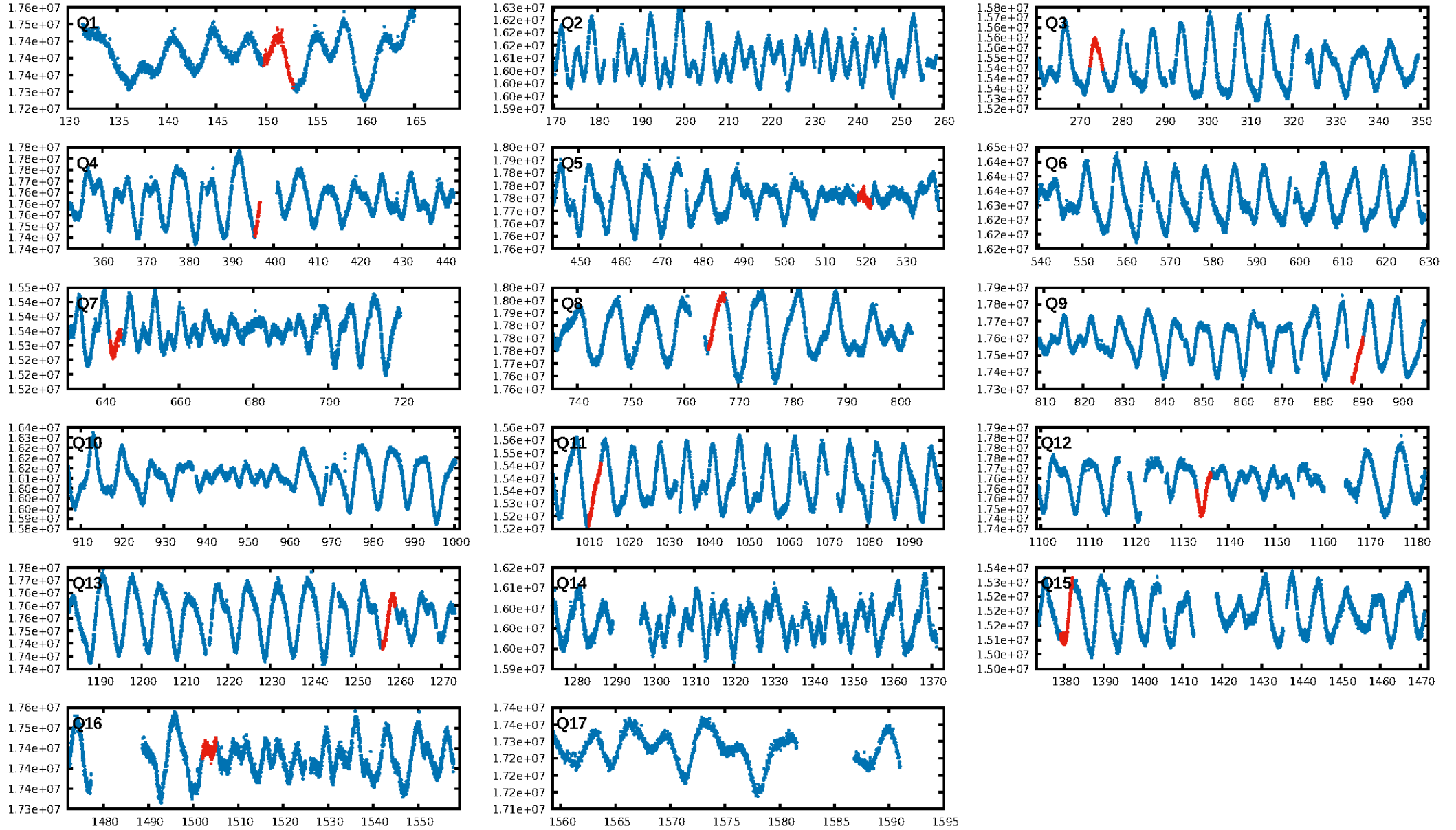
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [79.18σ]  
LongPeriod-sig: 100.0% [78.97σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 1.66e-13  
RollingBand-fgt: 1.00 [10/10]  
GhostDiagnostic-chr: -0.7589  
Centroid-sig: 11.4%  
Centroid-so: 0.491 arcsec [1.31σ]  
OotOffset-rm: 0.370 arcsec [1.84σ]  
KicOffset-rm: 0.183 arcsec [0.99σ]  
OotOffset-st: 0/3/0/3 [6]  
KicOffset-st: 0/3/0/3 [6]  
DiffImageQuality-fgm: 0.17 [1/6]  
DiffImageOverlap-fno: 0.00 [0/6]

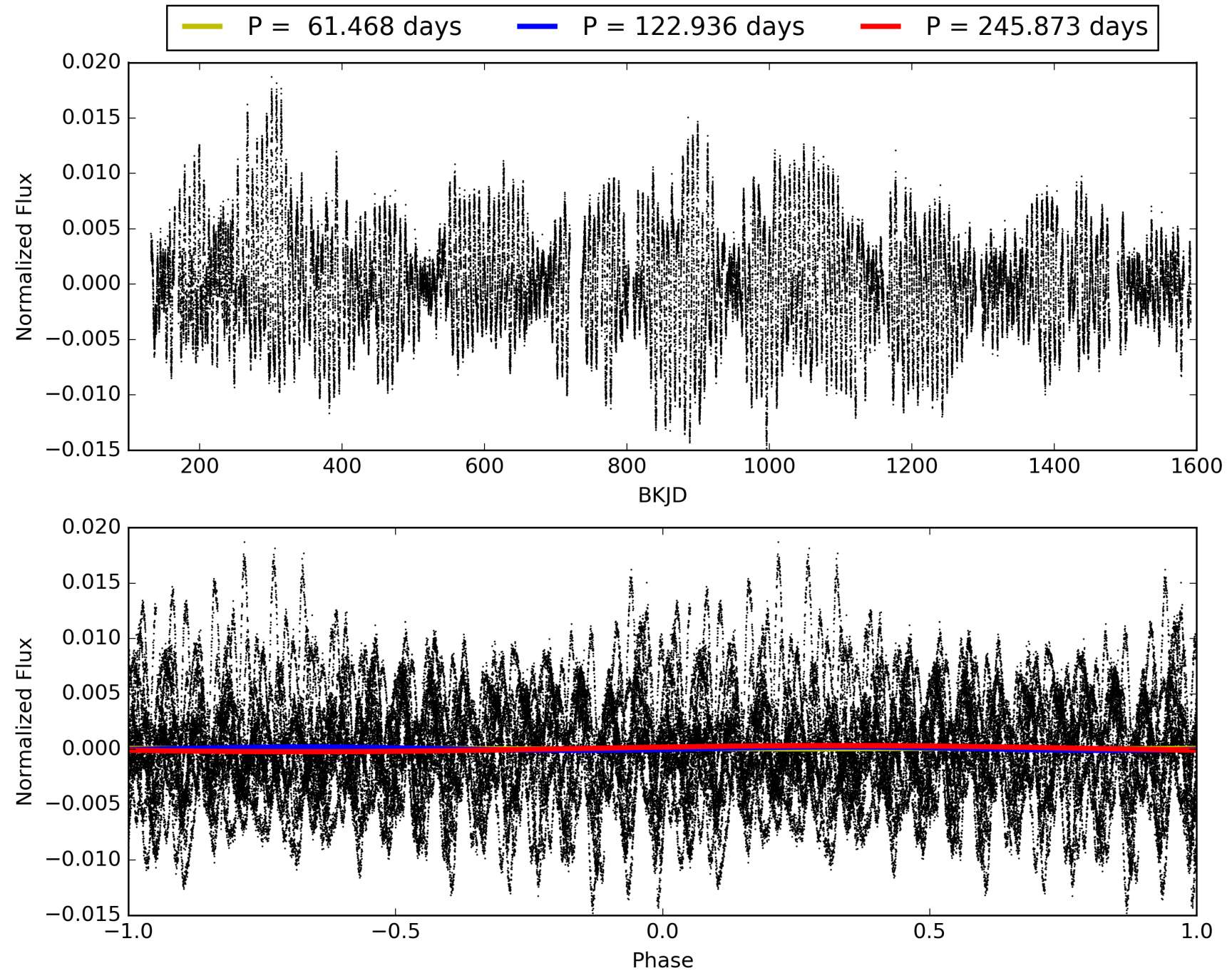
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 12:03:08 Z

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

# TCE 006468721-03, PDC Light Curves

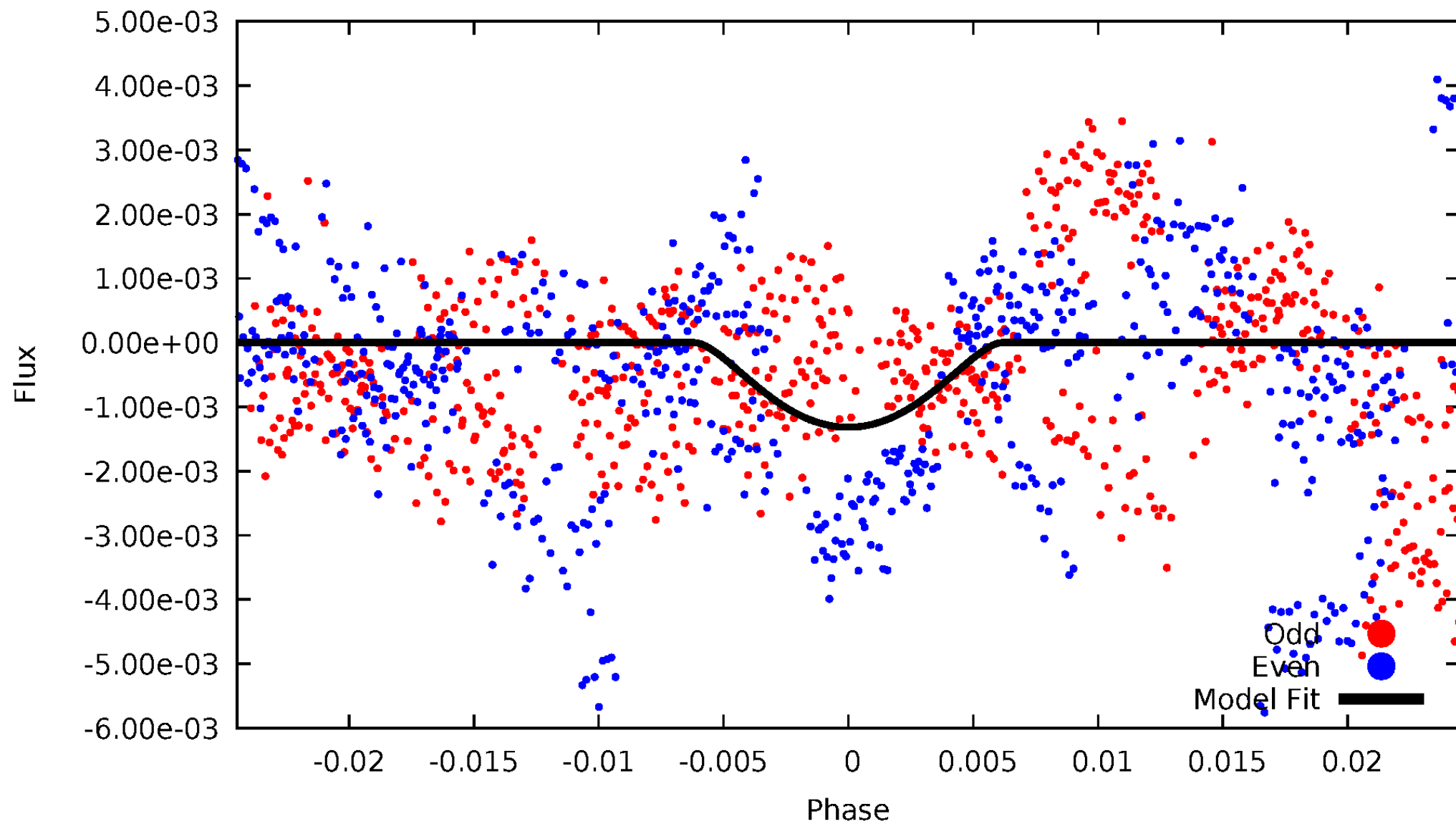


# TCE 006468721-03



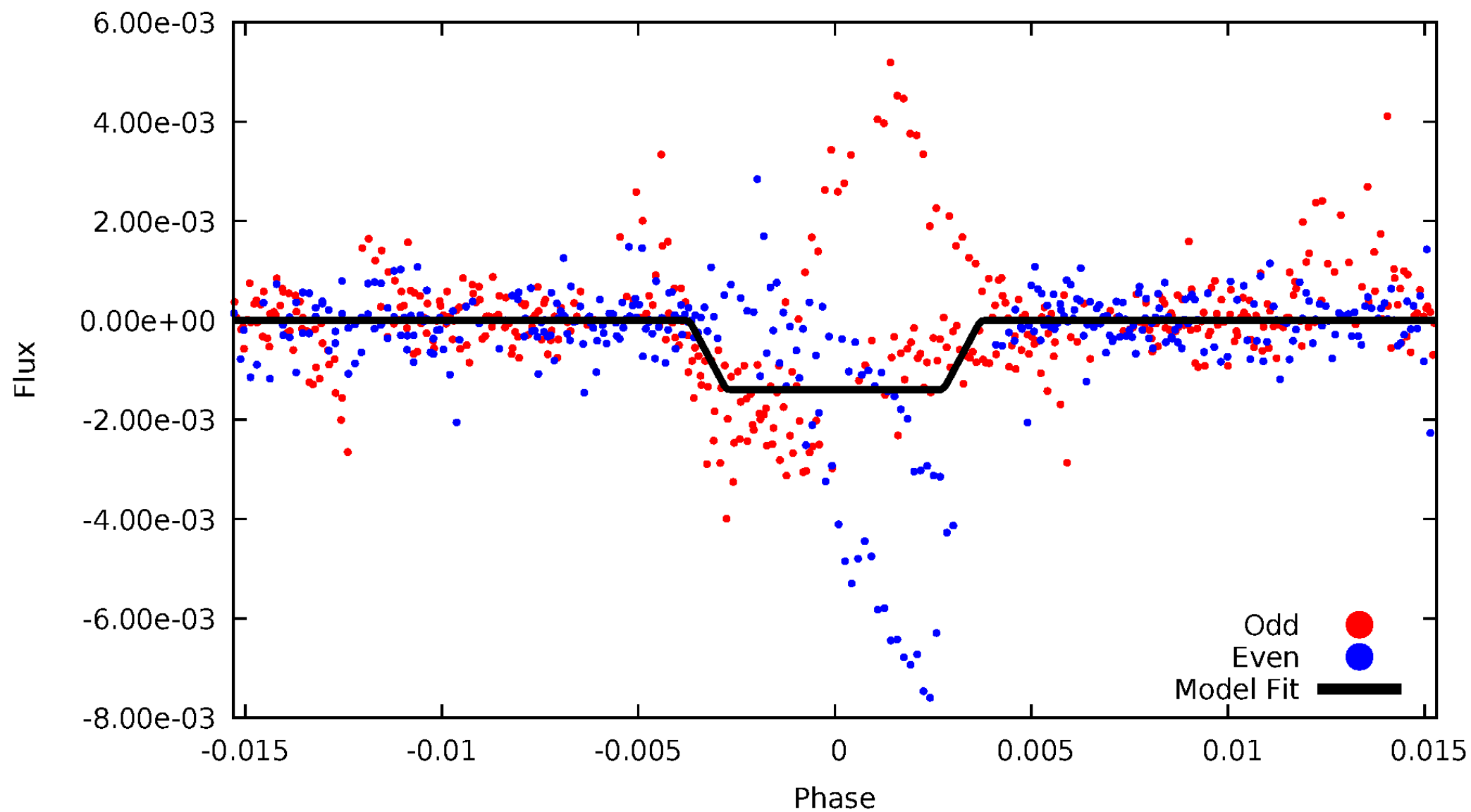
# DV Odd/Even

TCE 006468721-03



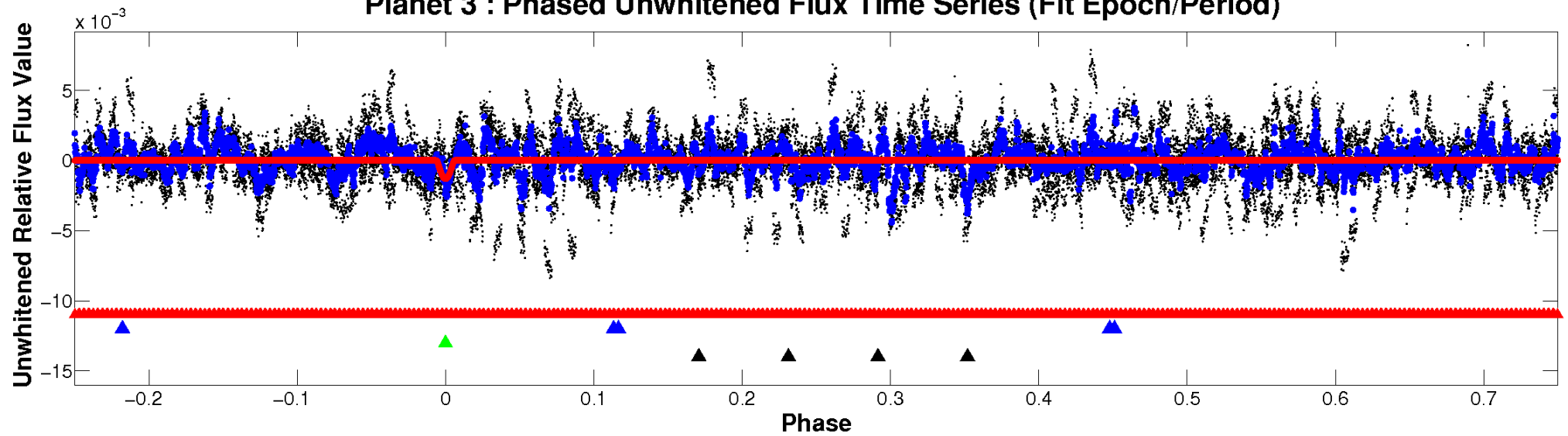
# ALT Odd/Even

TCE 006468721-03

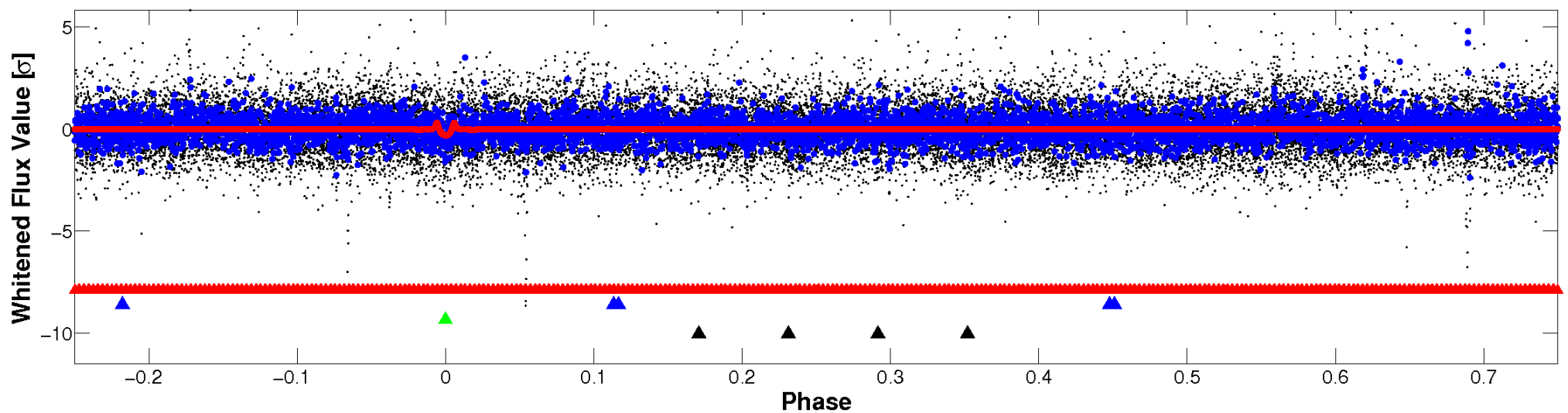


# Non-Whitened Vs. Whitened Light Curve

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



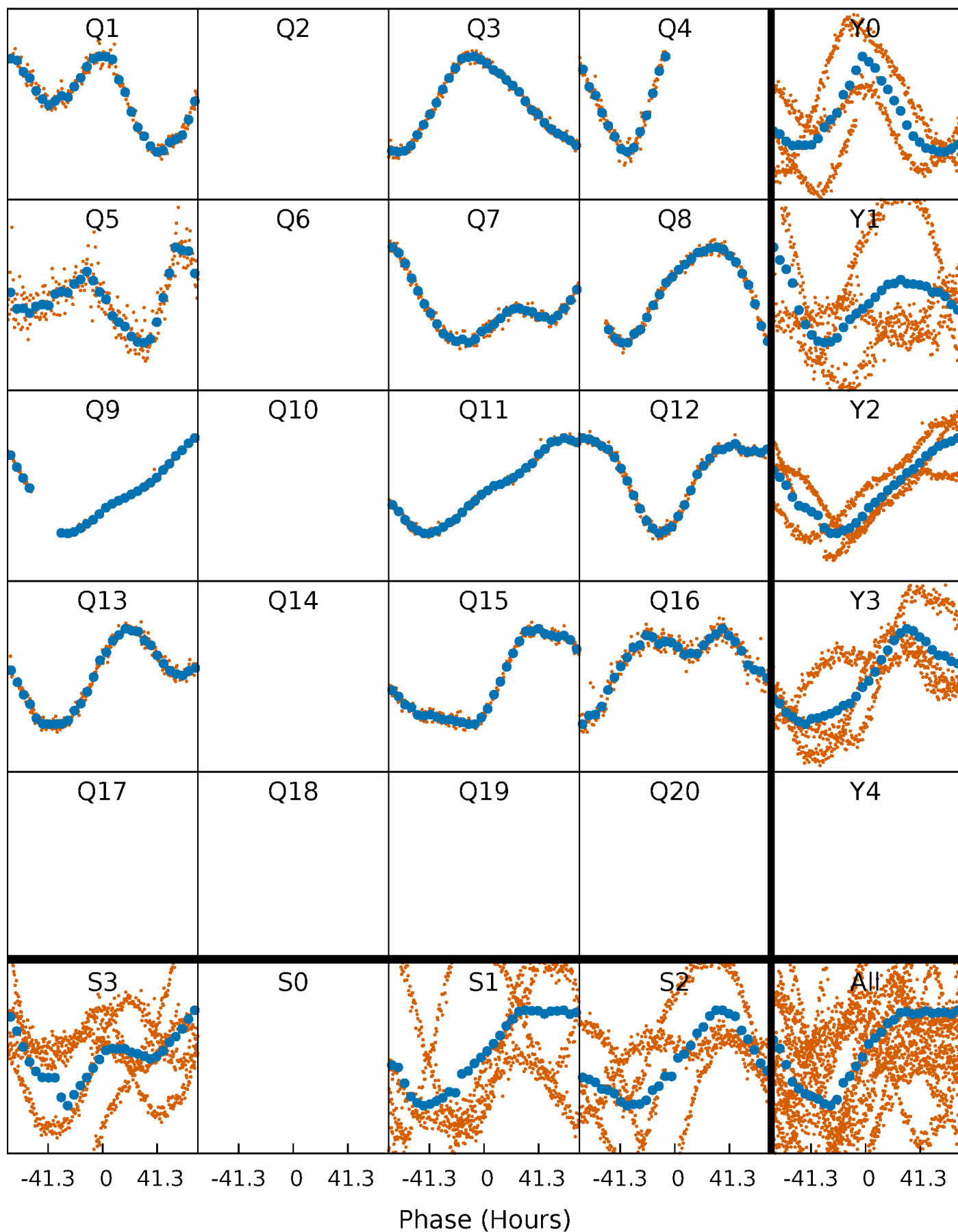
Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)





# PDC Quarter-Phased Transit Curves

TCE 006468721-03 P=122.936432 Days  $T_0=151.267385$  (BKJD)



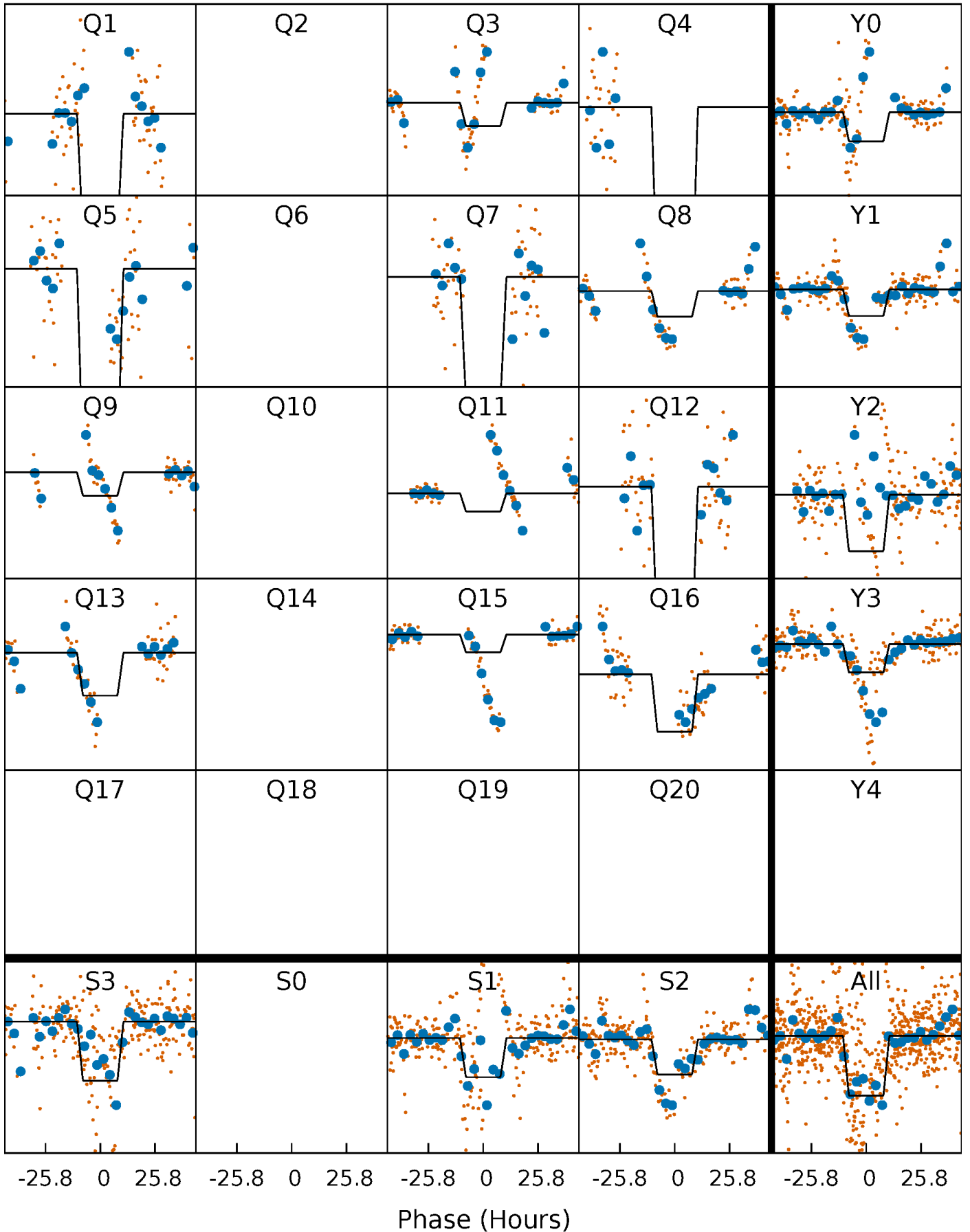
# DV Quarter-Phased Transit Curves

TCE 006468721-03 P=122.936432 Days  $T_0=151.267385$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

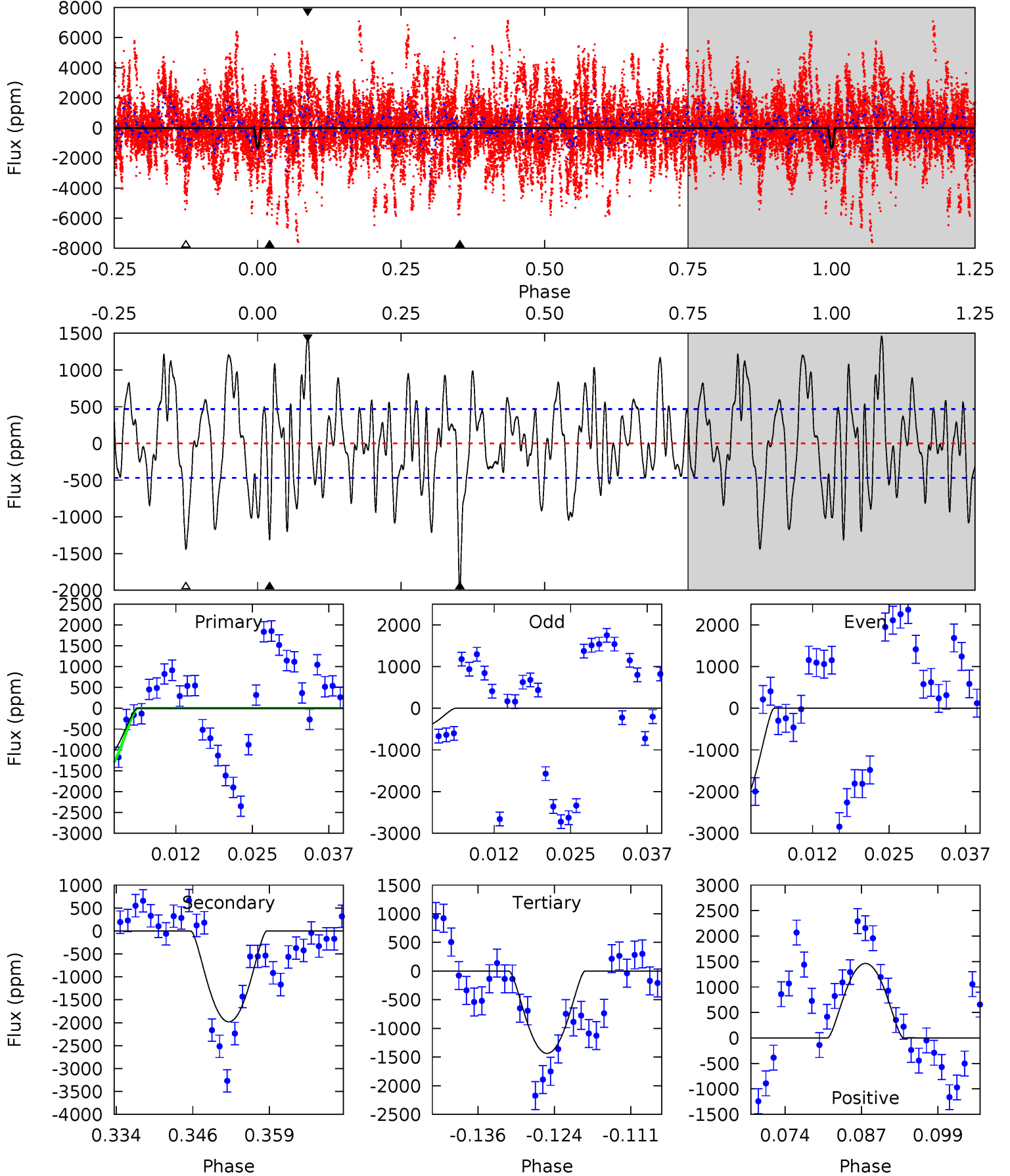
TCE 006468721-03   P=122.962353 Days    $T_0=151.148372$  (BKJD)



# DV Model-Shift Uniqueness Test

006468721-03, P = 122.936432 Days, E = 28.330953 Days

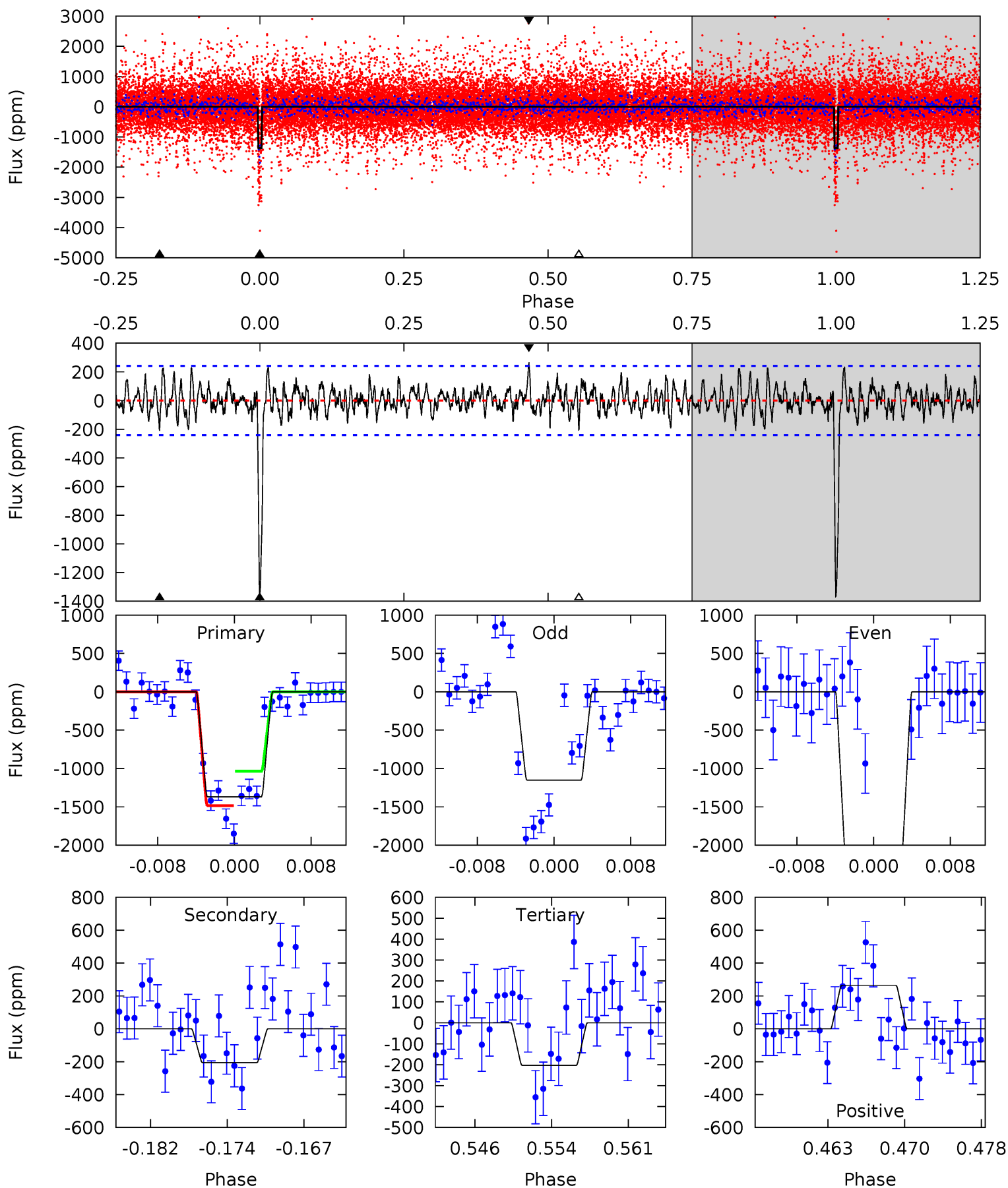
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
14.0	21.1	15.3	15.6	4.99	2.50	5.69	-1.29	-1.58	5.81	5.52	10.4	1.25	0.42	3.19



# Alt Model-Shift Uniqueness Test

006468721-03, P = 122.962353 Days, E = 28.186019 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
28.8	4.35	4.29	5.58	5.08	2.67	1.51	24.5	23.2	0.07	-1.23	11.9	0.98	0.16	4.59



### Stellar Parameters For KIC 006468721

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5392^{+160}_{-160}$	$4.574^{+0.034}_{-0.136}$	$-0.040^{+0.300}_{-0.300}$	$0.806^{+0.158}_{-0.068}$	$0.890^{+0.073}_{-0.097}$	$2.396^{+0.418}_{-0.916}$
	+3%/-3%	+1%/-3%	+750%/-750%	+20%/-8%	+8%/-11%	+17%/-38%
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 006468721-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-1982 \pm 94$	$6.28^{+5.05}_{-3.97}$	$445^{+22}_{-19}$	$4509^{+2715}_{-866}$	$5962^{+37034}_{-4149}$
Alt.	$-207 \pm 47$	$5.15^{+5.11}_{-3.38}$	$446^{+20}_{-17}$	$3272^{+1433}_{-589}$	$919^{+6767}_{-698}$

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



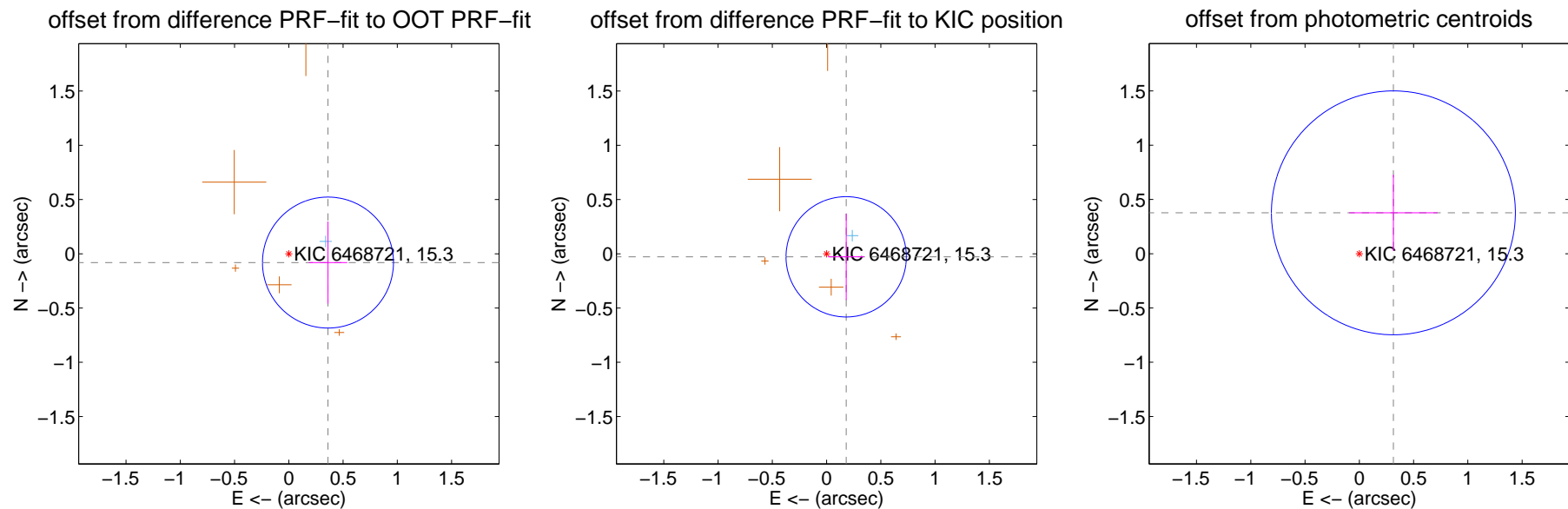
## DV Centroid Data

Supplemental centroid analysis for 006468721-03. Kepler magnitude: 15.30. Transit SNR 4.30

There are 1 quarters with good PRF difference image offsets

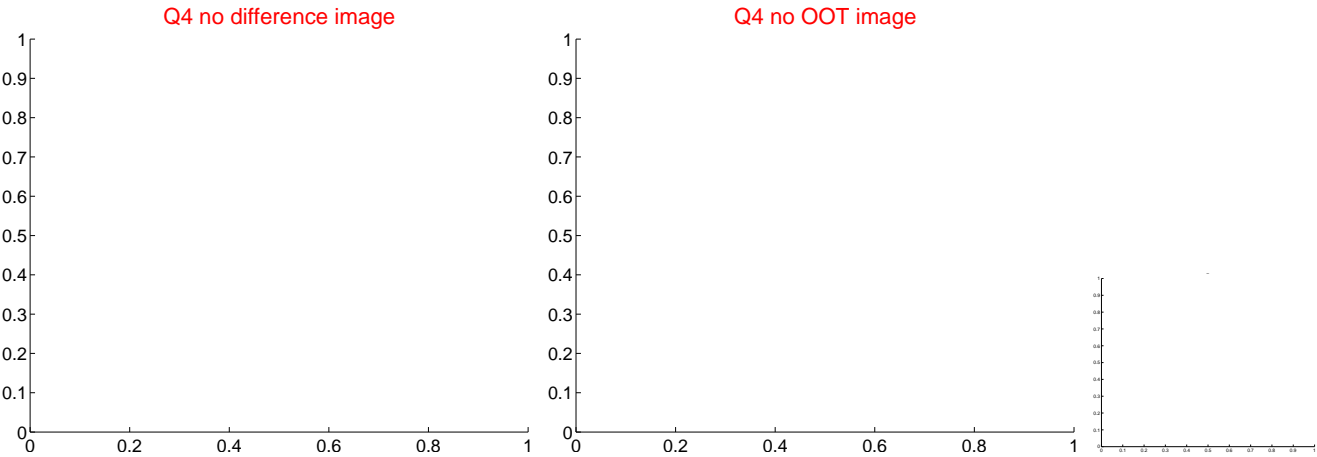
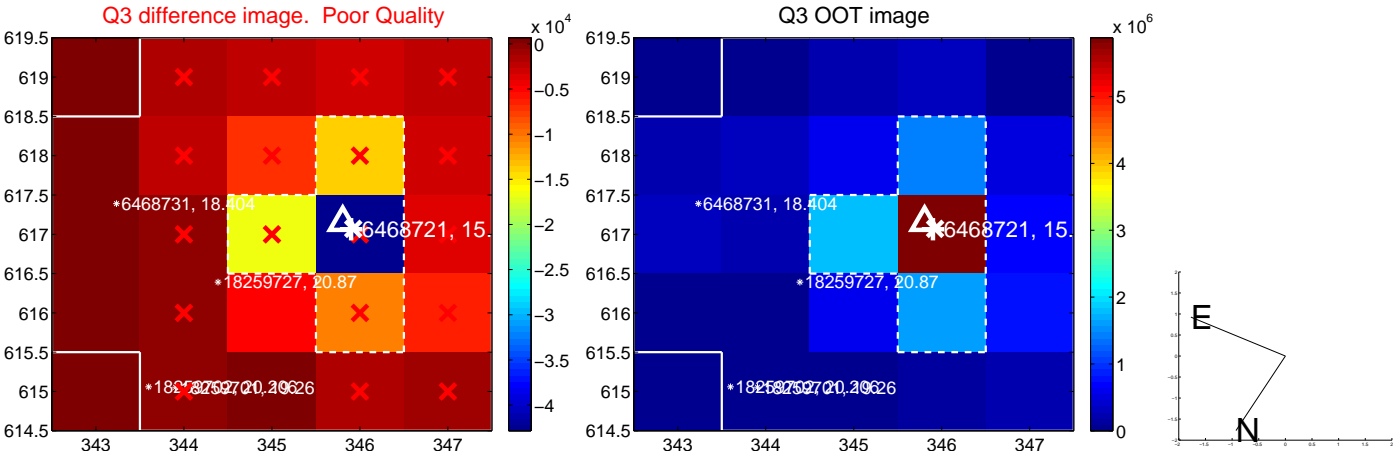
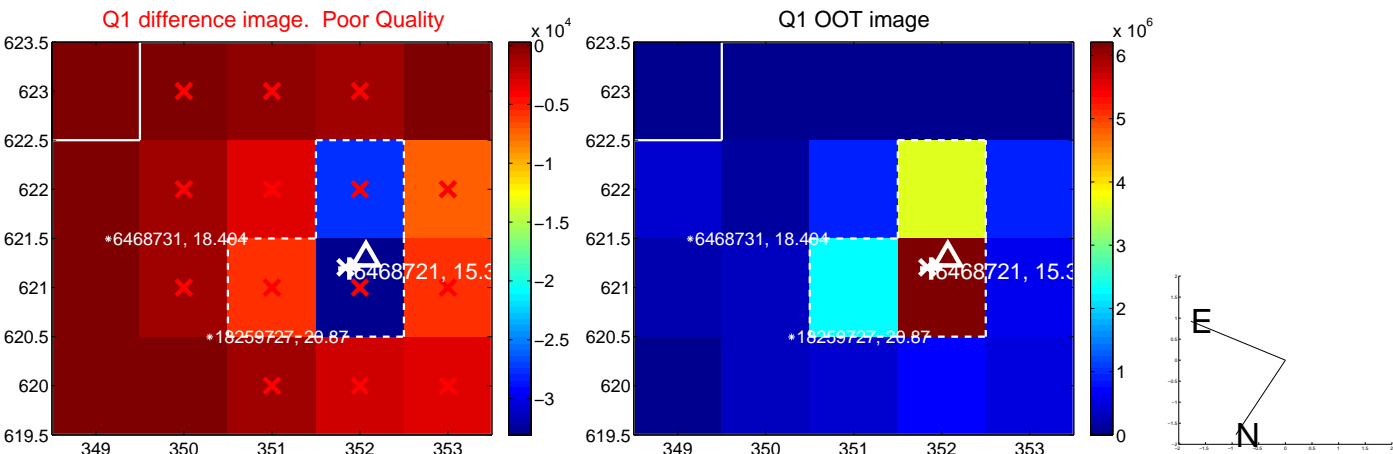
The direct PRF centroid is offset from the target star catalog position by about 0.12 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.370 \pm 0.201$	1.84	$-0.361 \pm 0.178$	$-0.081 \pm 0.378$
PRF-fit source offset from KIC position	$0.183 \pm 0.185$	0.99	$-0.181 \pm 0.167$	$-0.028 \pm 0.397$
photometric centroid source offset	$0.49 \pm 0.37$	1.31	$-0.31 \pm 0.41$	$0.38 \pm 0.35$

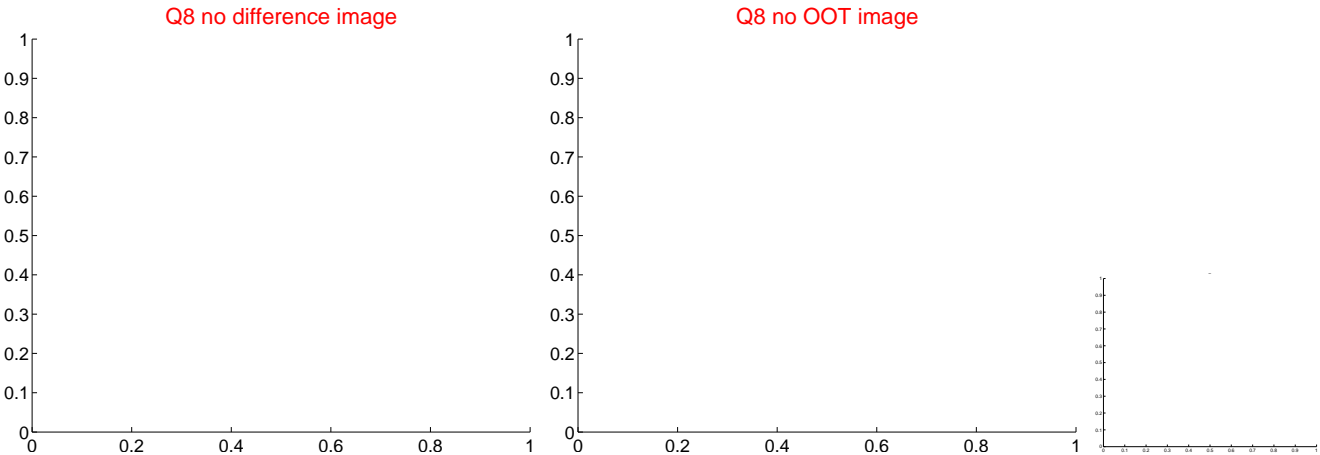
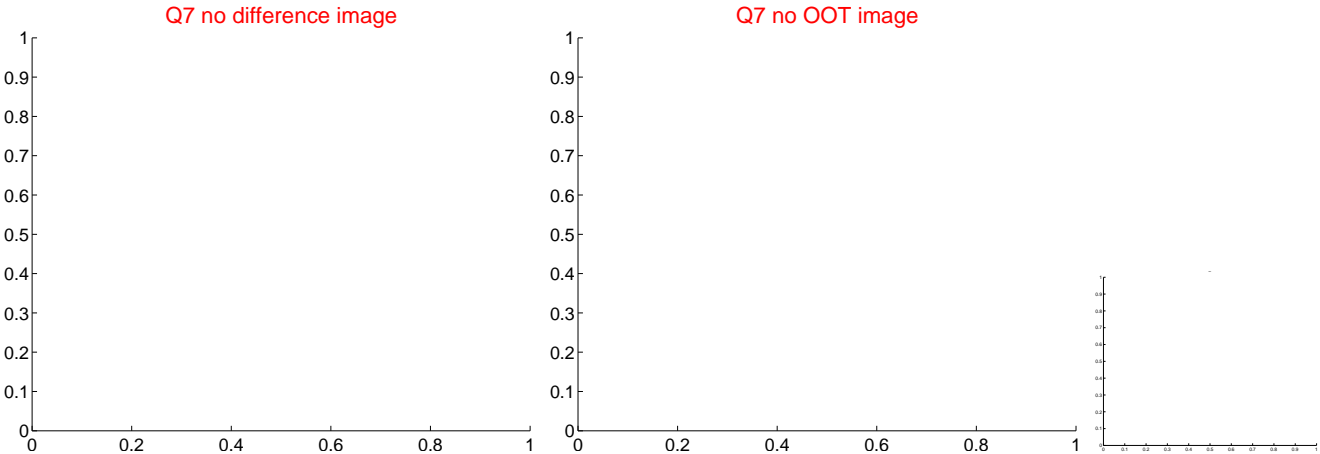
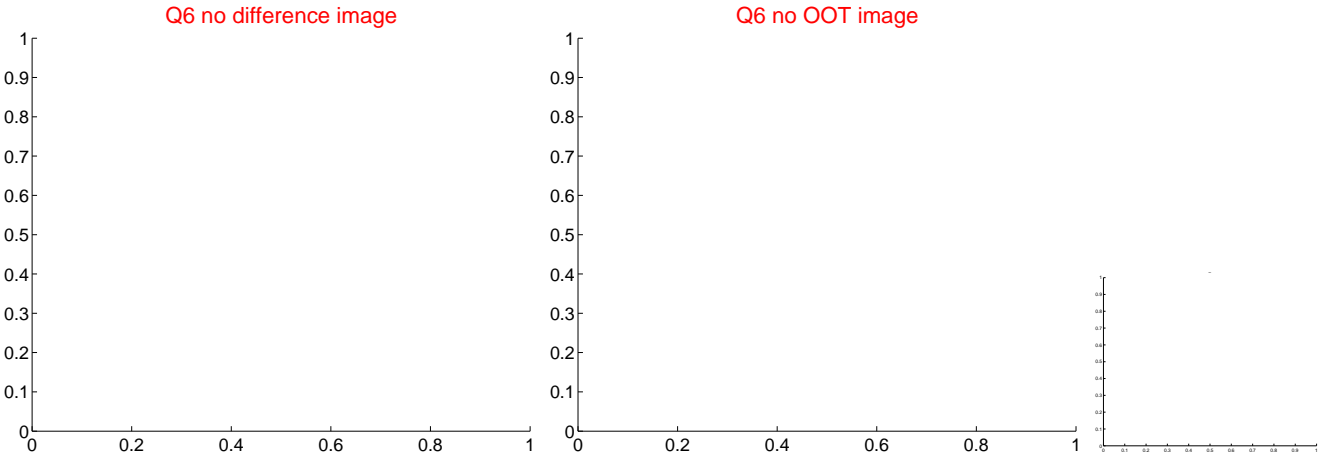
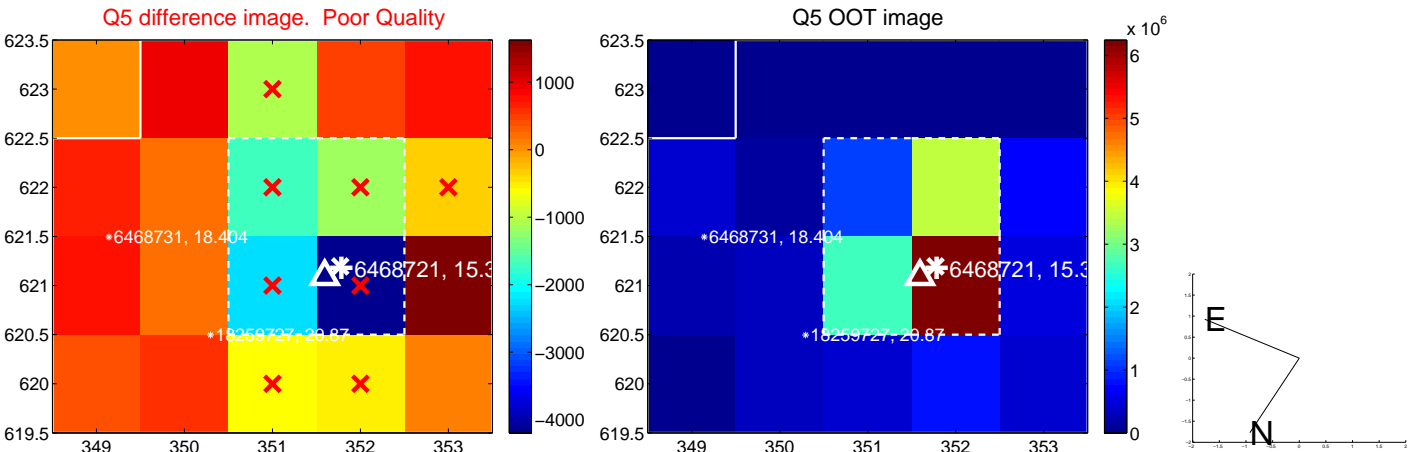


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

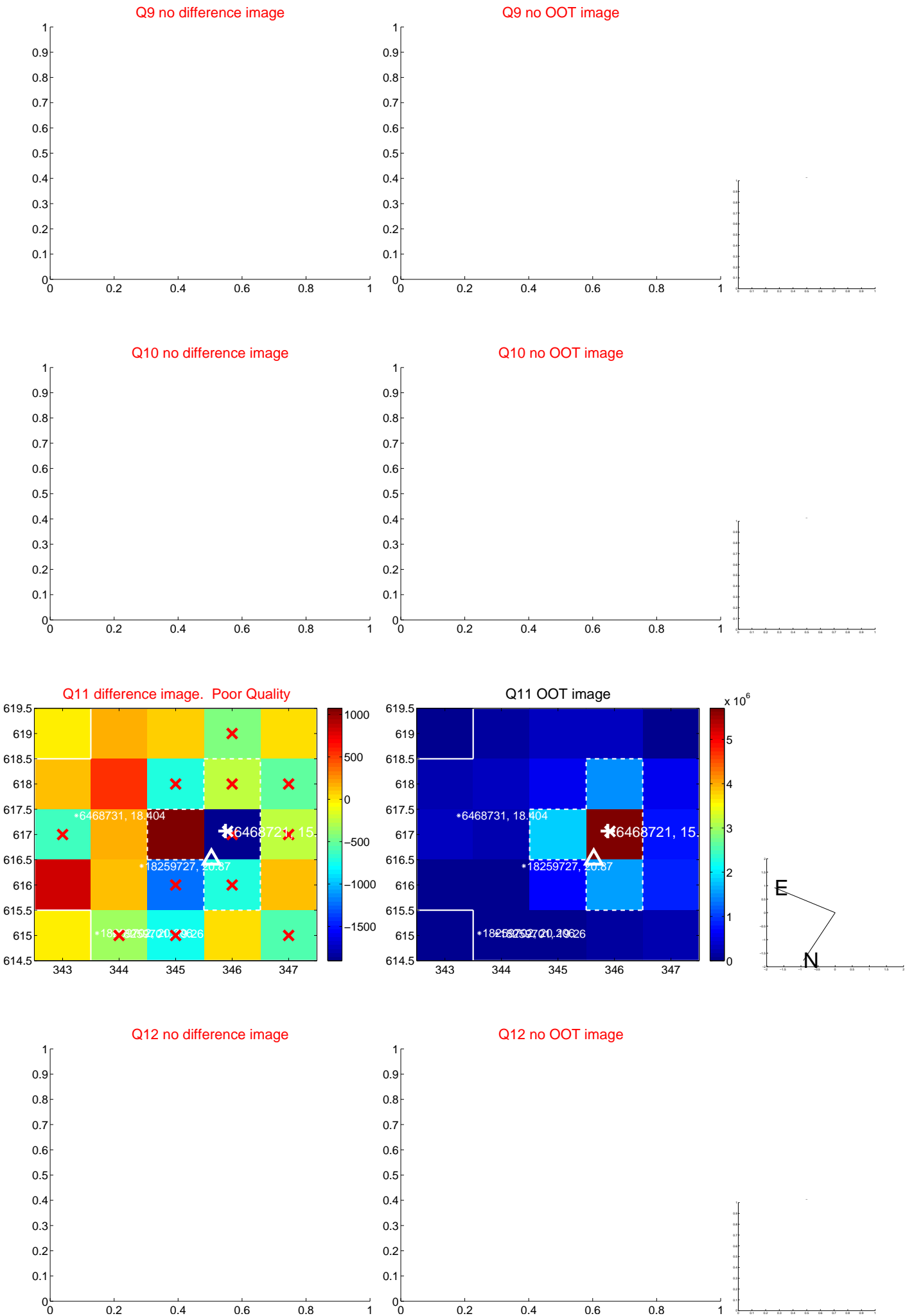
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



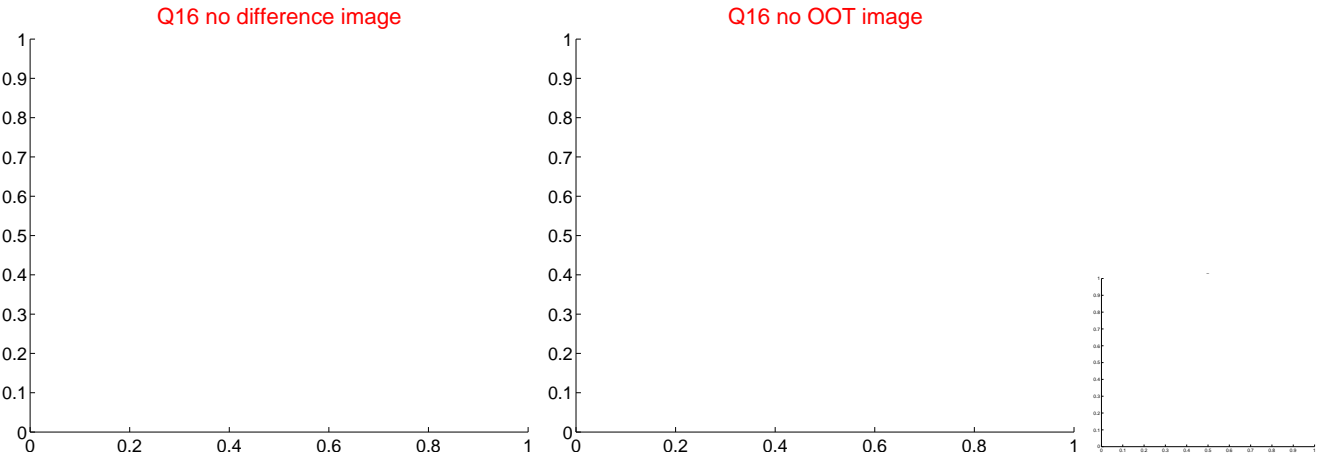
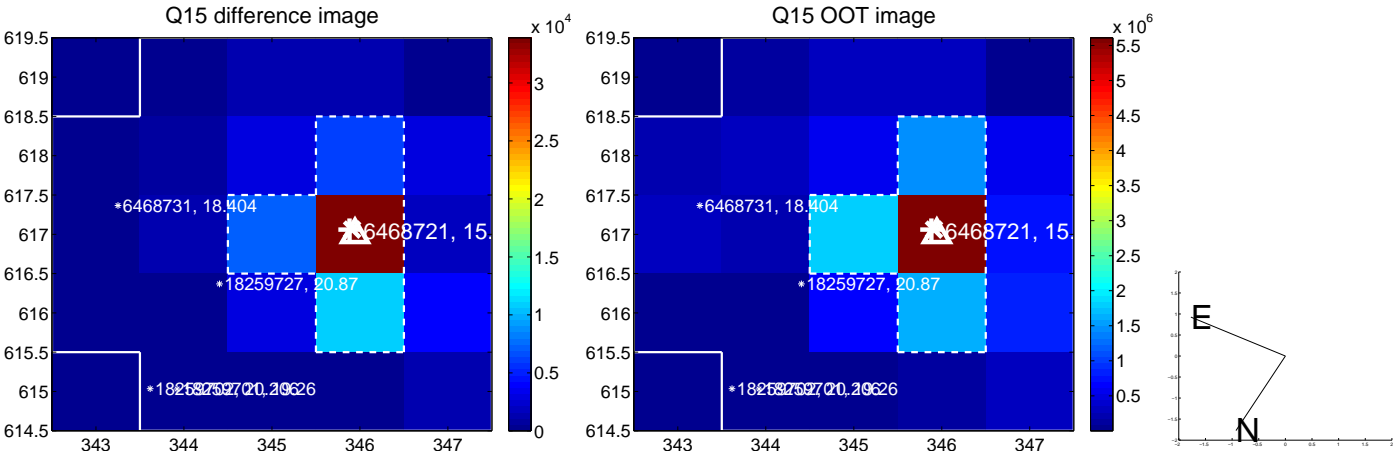
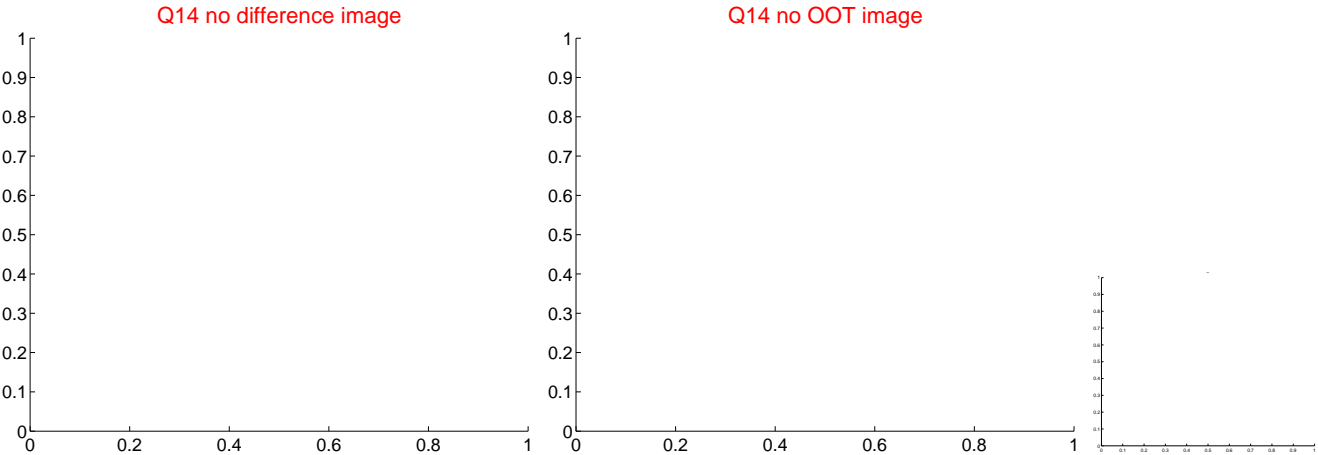
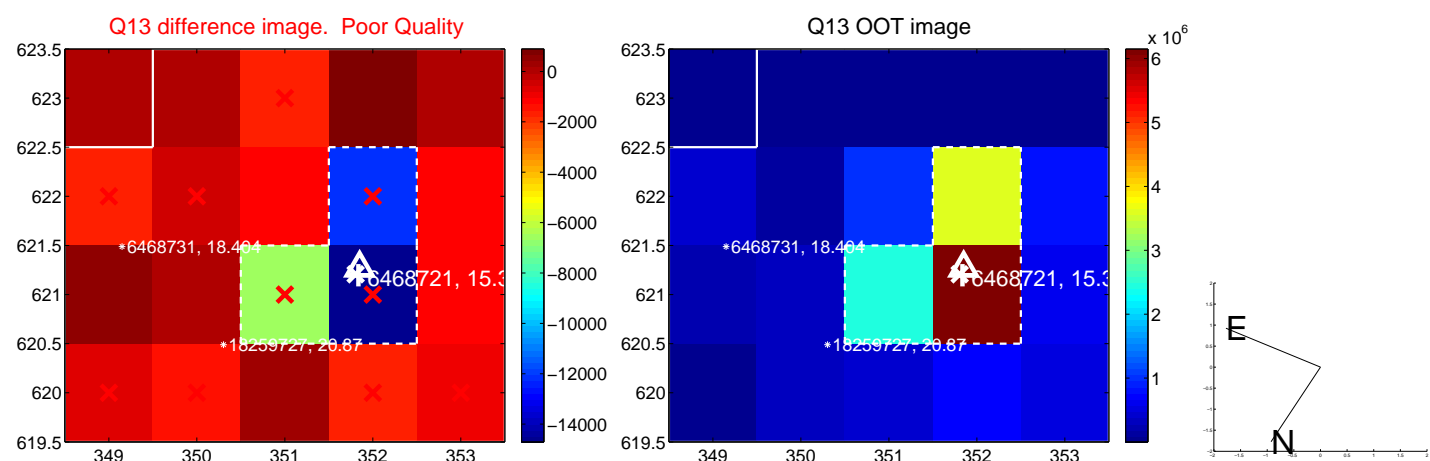
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



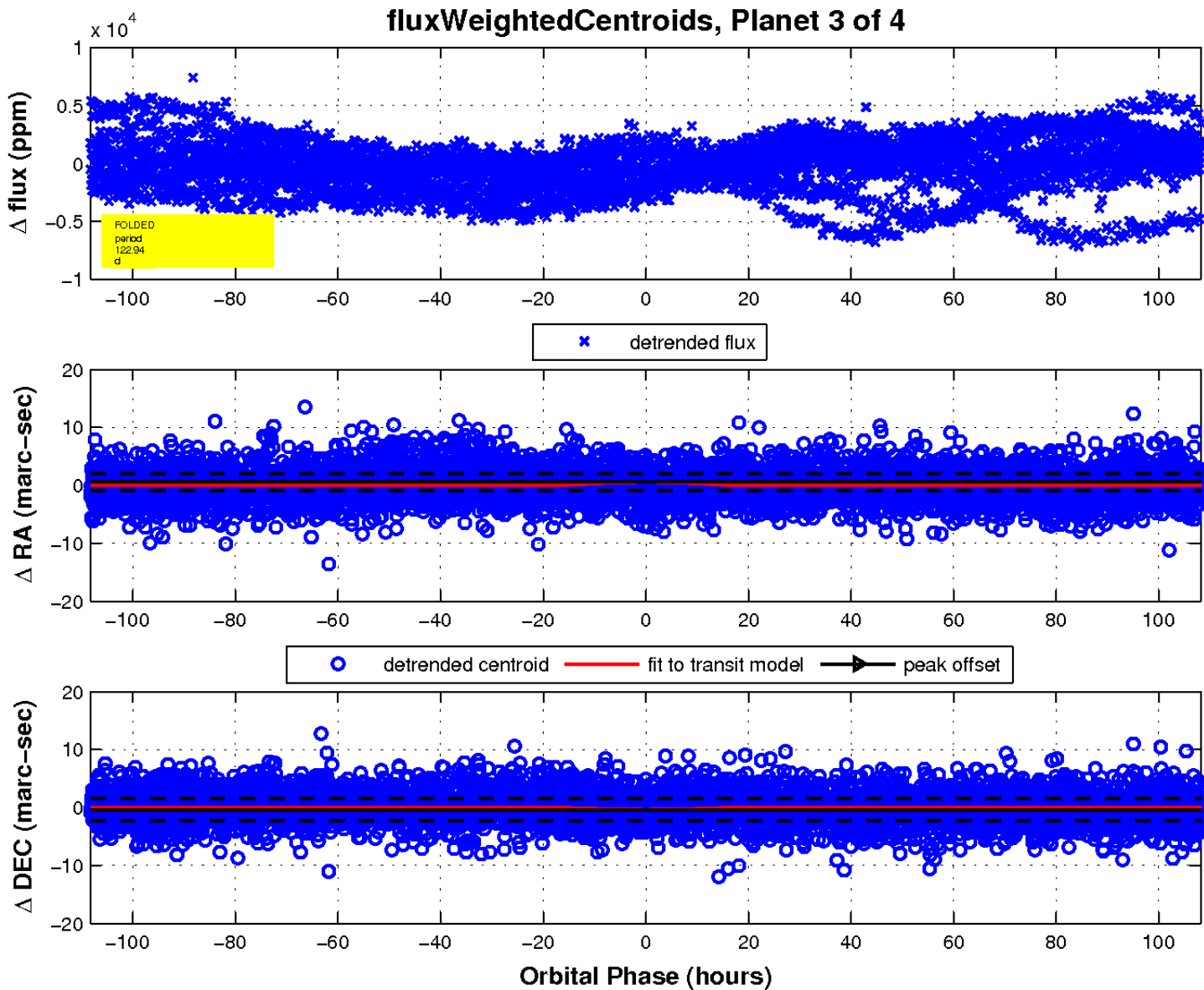
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

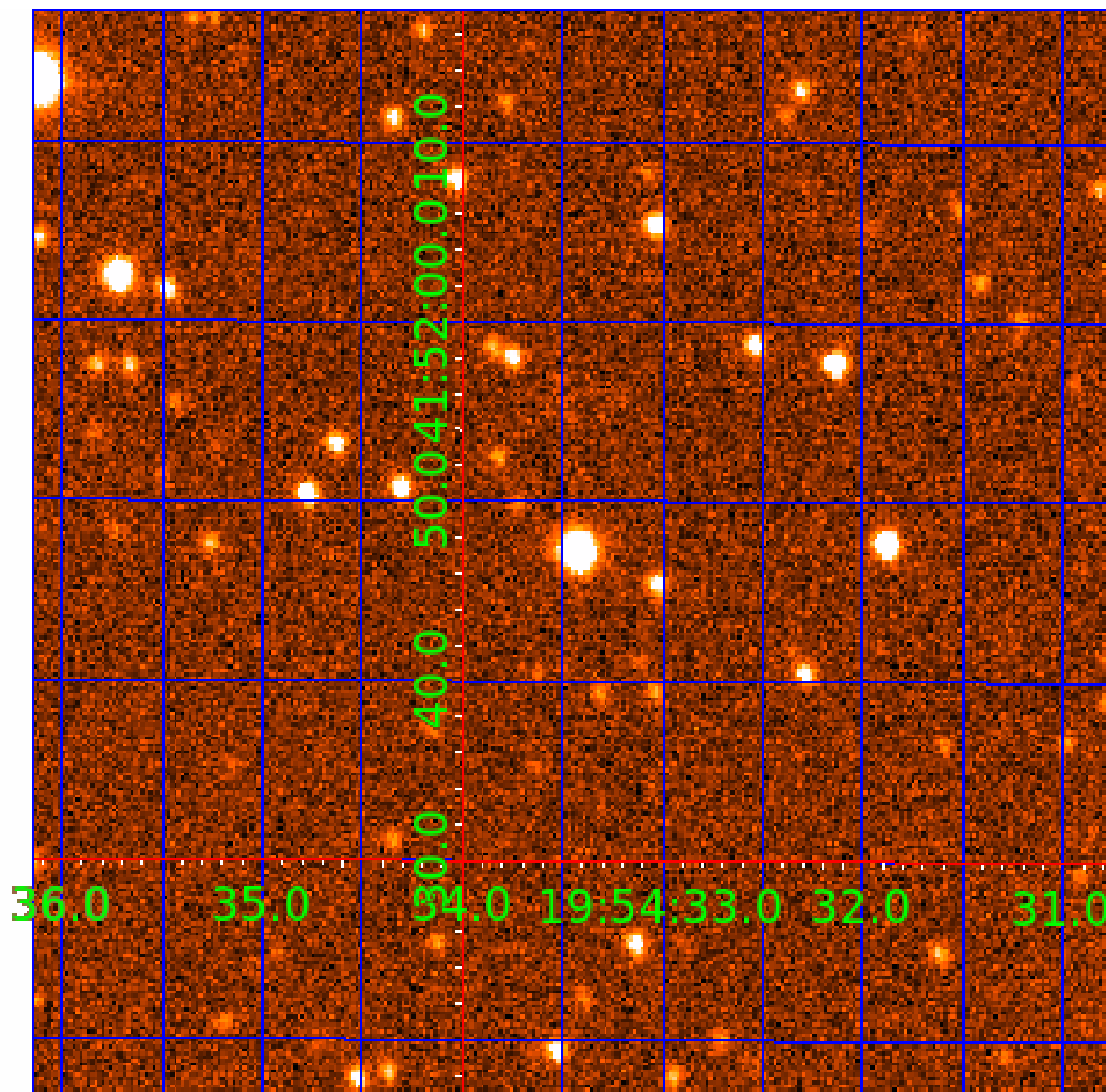
Q17 no difference image

Q17 no OOT image



UKIRT Image

Declination





# KIC 006468721

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006468721-01	OBS	No	1.541674	132.790389	81.4	7.127	9.3	9.4	0.81	5392	0.72	780.06
006468721-02	OBS	No	286.984886	165.204748	4719.6	34.386	15.7	10.1	0.81	5392	9.39	0.73
006468721-03	OBS	No	122.936432	151.267385	1315.9	36.096	10.7	4.3	0.81	5392	4.78	2.27
006468721-04	OBS	No	376.234302	172.267288	1073.1	7.478	9.4	6.7	0.81	5392	3.47	0.51

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006468721-01	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV
006468721-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
006468721-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
006468721-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL_SKYE—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS

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

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

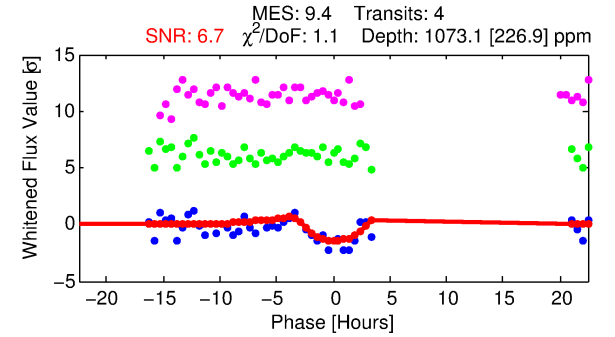
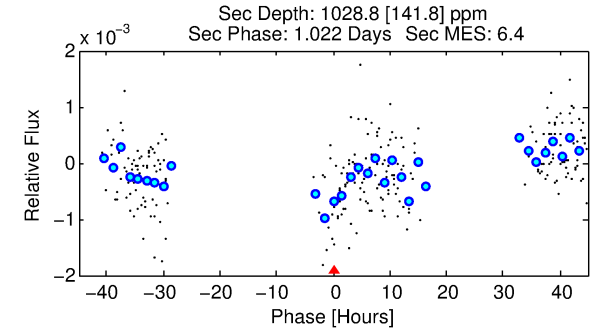
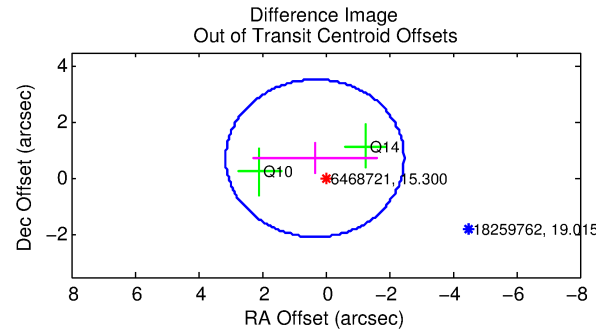
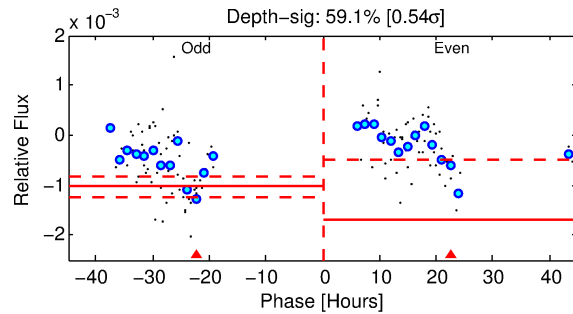
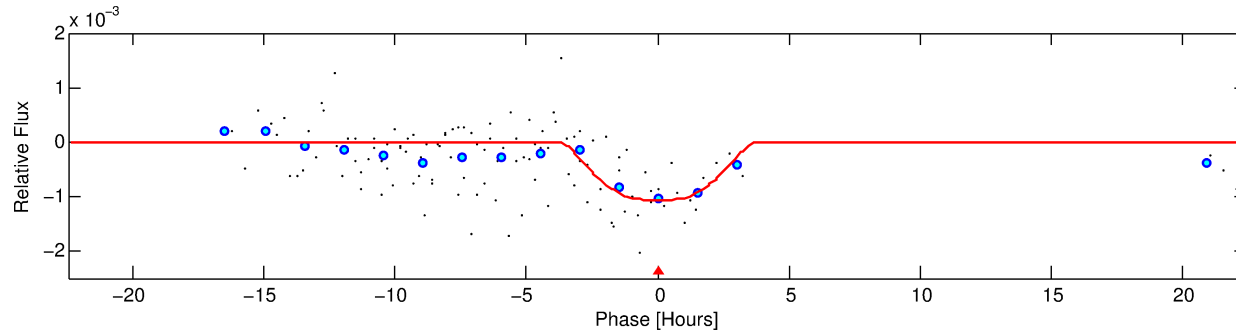
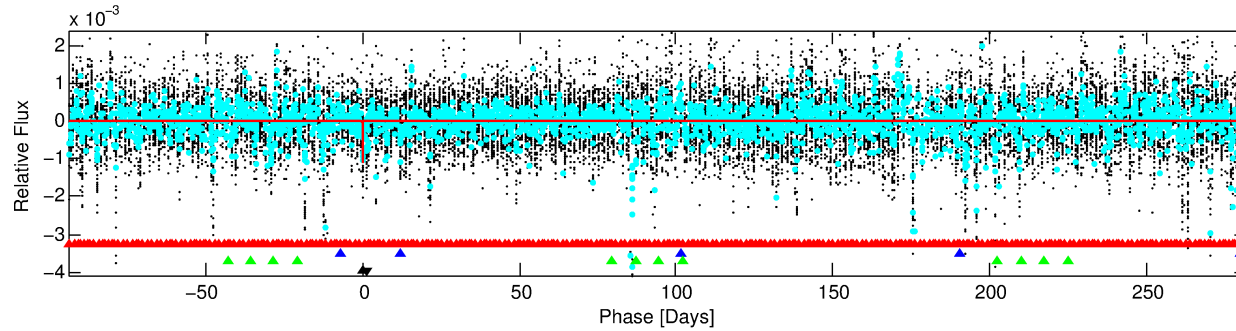
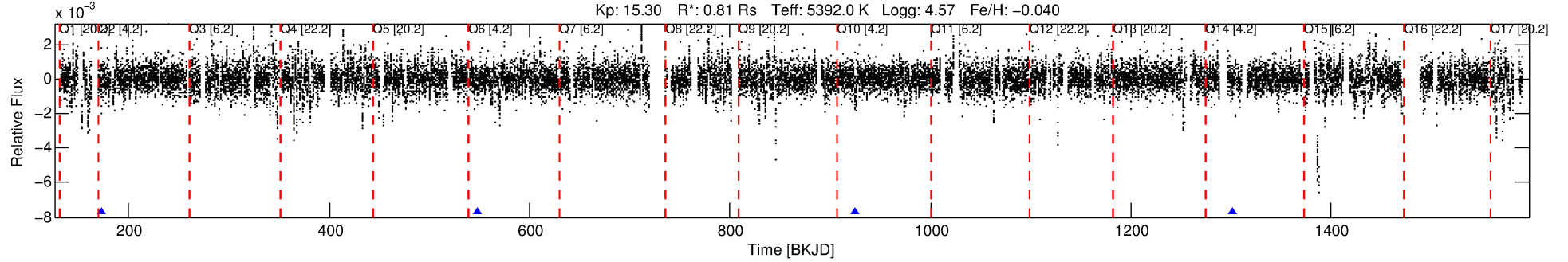
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 006468721-04

No Significant Match Found

# DV One-Page Summary

KIC: 6468721 Candidate: 4 of 4 Period: 376.234 d



## DV Fit Results:

Period = 376.23430 [0.01155] d  
Epoch = 172.2673 [0.0159] BKJD  
Rp/R\* = 0.0394 [0.0059]  
a/R\* = 157.48 [41.46]  
b = 0.96 [0.03]  
Seff = 0.51 [0.14]  
Teq = 216 [15] K  
Rp = 3.47 [0.86] Re  
a = 0.9808 [0.1640] AU  
Ag = 45260.29 [18619.81] [2.43 $\sigma$ ]  
Teffp = 4863 [426] K [10.91 $\sigma$ ]

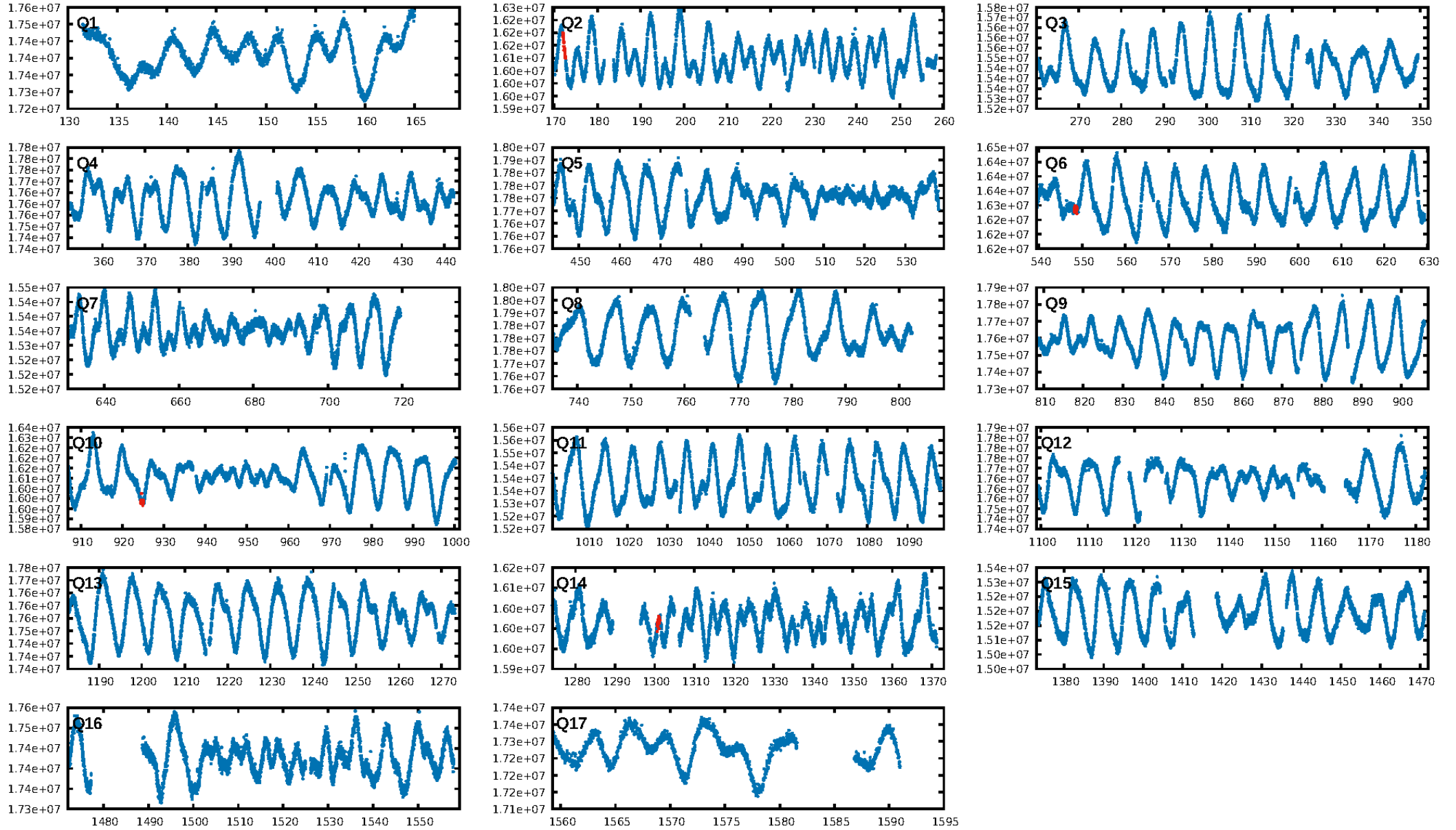
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [60.87 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 33.7%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 3.57e-08  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: -0.9538  
Centroid-sig: 26.8%  
Centroid-so: 1.123 arcsec [1.06 $\sigma$ ]  
OotOffset-rm: 0.798 arcsec [0.85 $\sigma$ ]  
OotOffset-st: 2/0/0/0 [2]  
KicOffset-rm: 0.761 arcsec [0.98 $\sigma$ ]  
KicOffset-st: 2/0/0/0 [2]  
DiffImageQuality-fgm: 0.00 [0/2]  
DiffImageOverlap-fno: 0.00 [0/4]

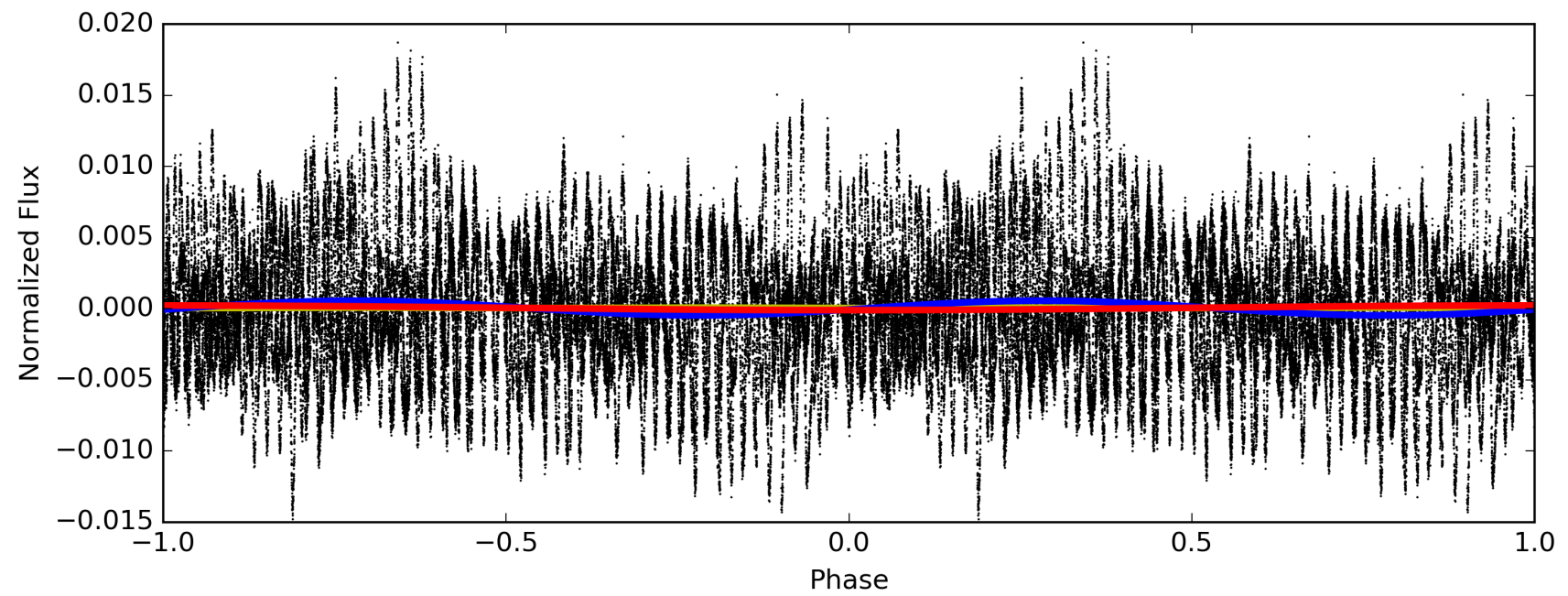
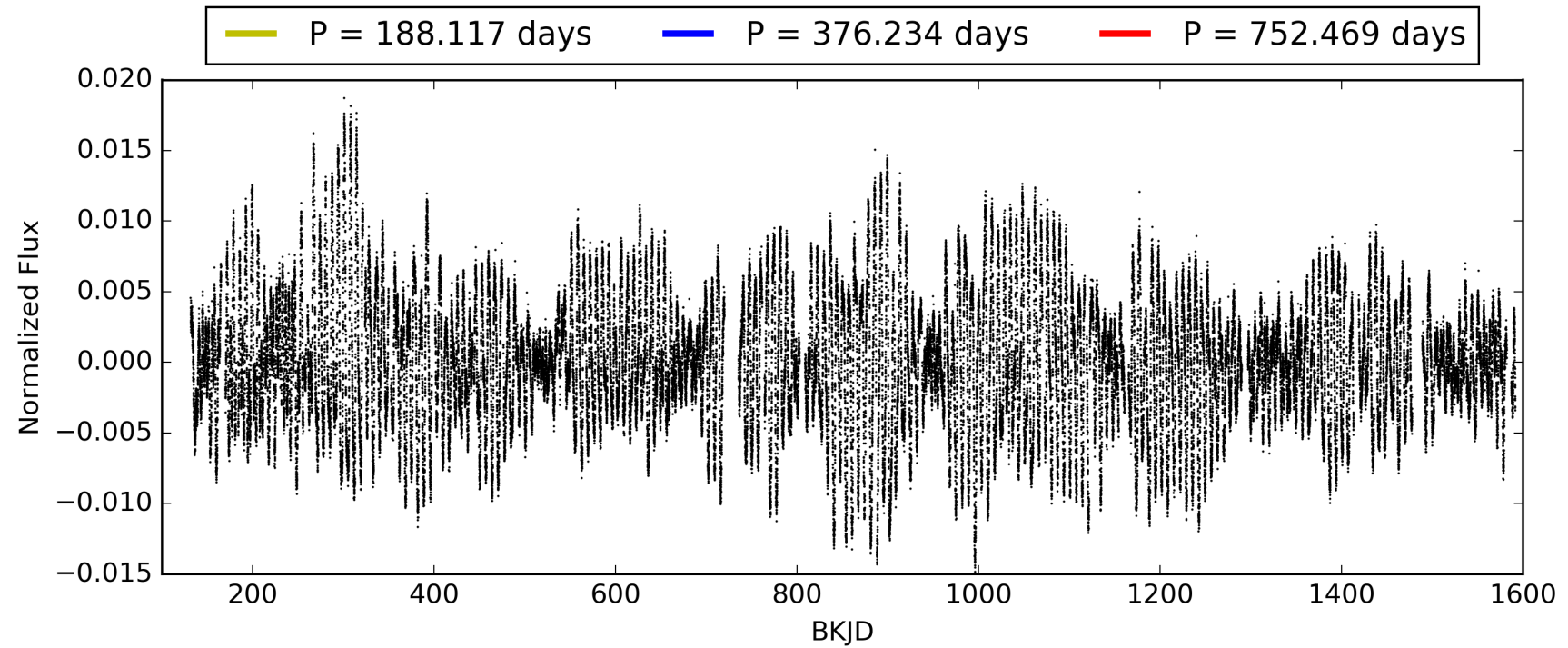
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 12:03:15 Z

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

# TCE 006468721-04, PDC Light Curves

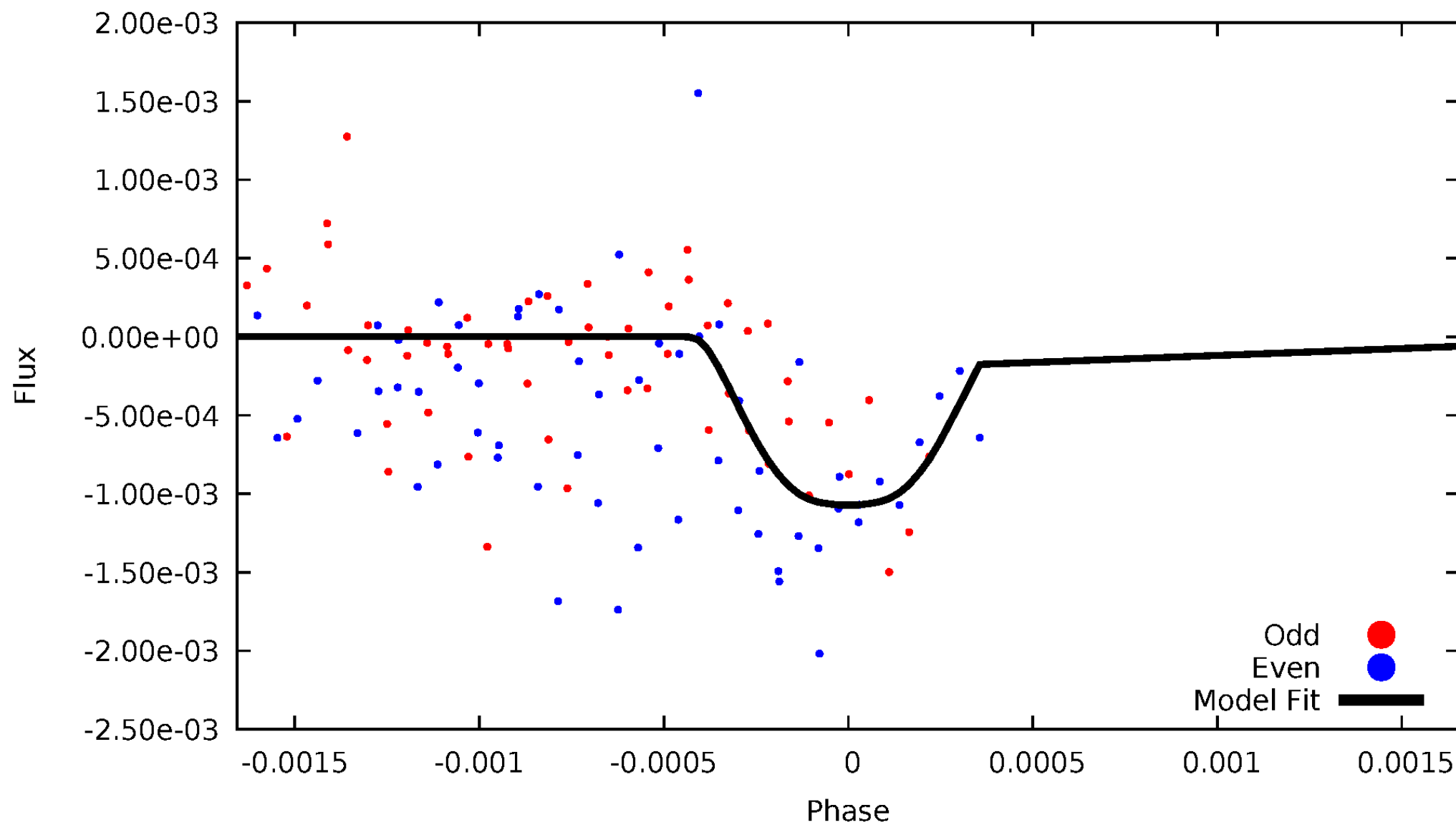


TCE 006468721-04



# DV Odd/Even

TCE 006468721-04





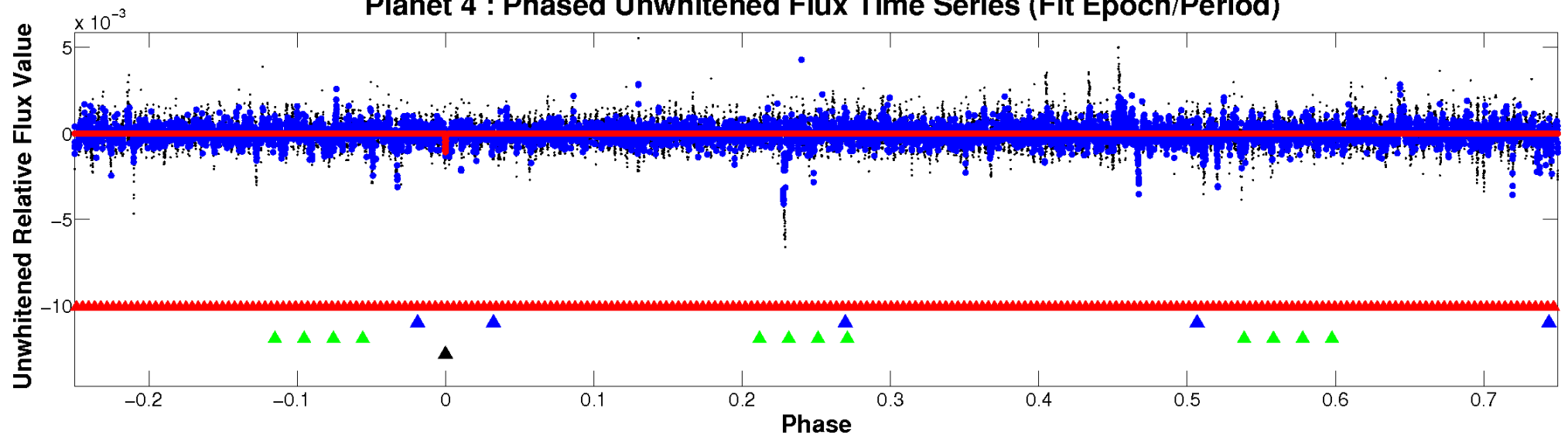
ALT Odd/Even

This plot does not exist for this TCE.

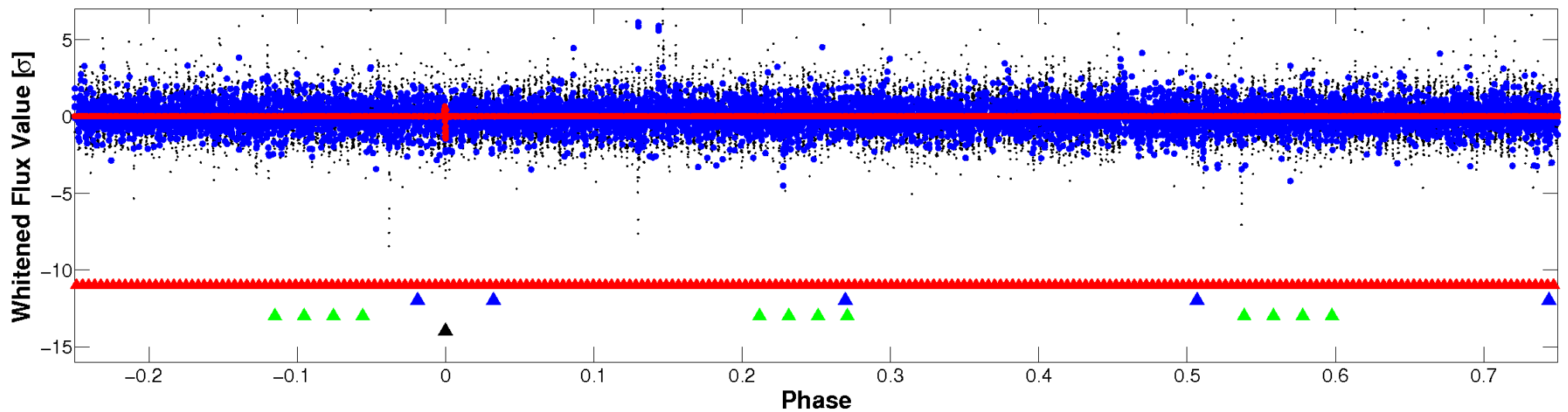


# Non-Whitened Vs. Whitened Light Curve

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

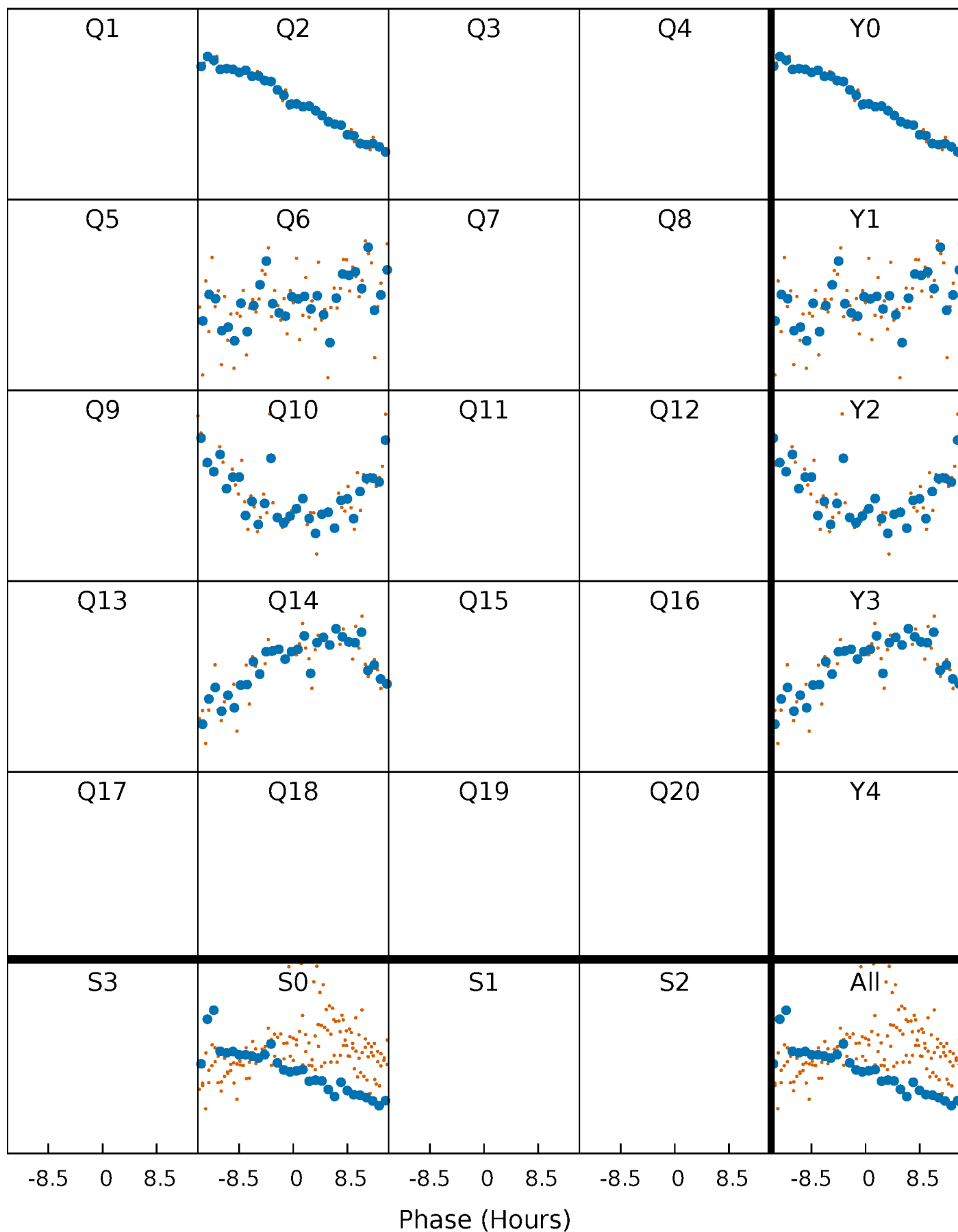


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



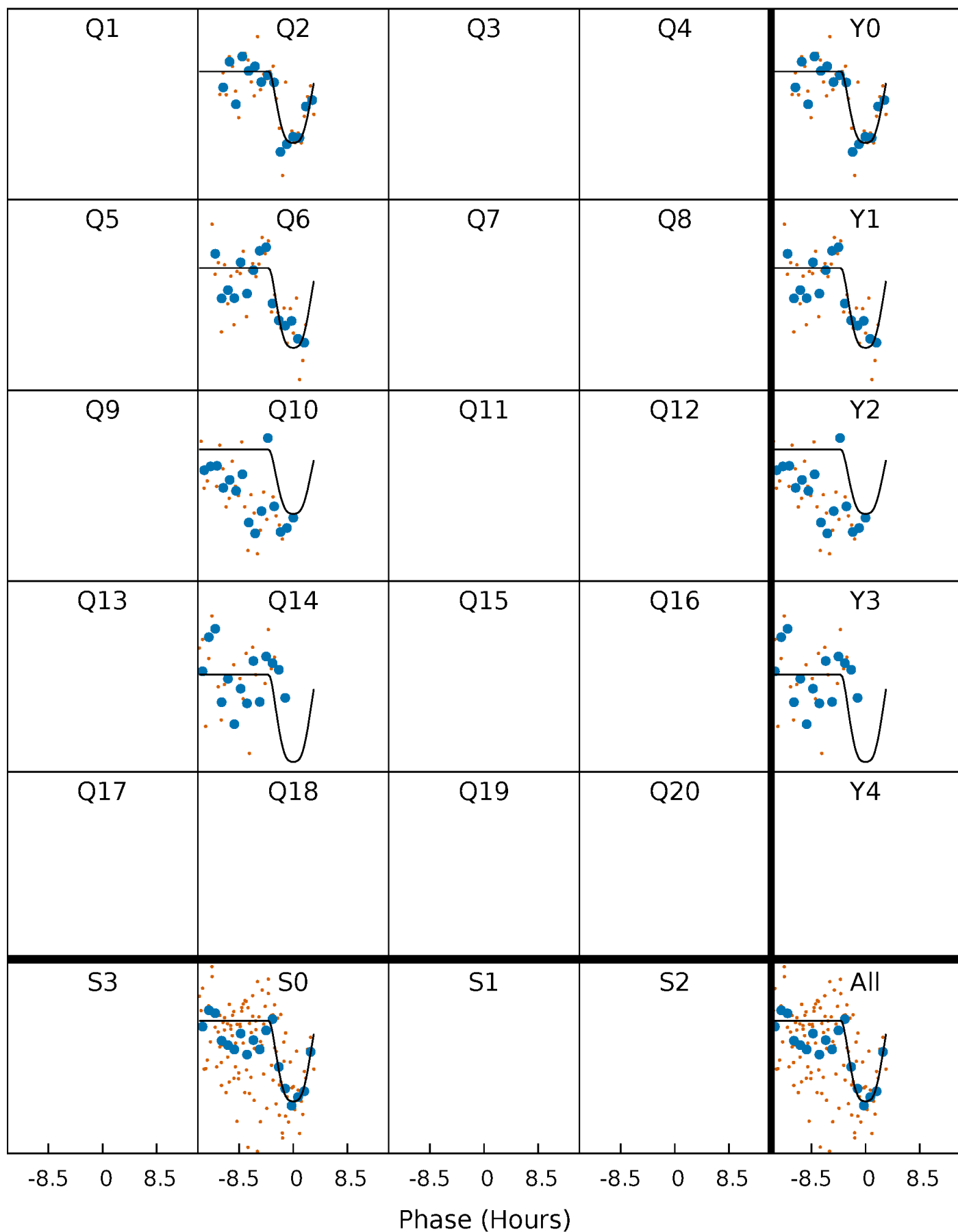
# PDC Quarter-Phased Transit Curves

TCE 006468721-04     $P=376.234302$  Days     $T_0=172.267288$  (BKJD)



# DV Quarter-Phased Transit Curves

TCE 006468721-04     $P=376.234302$  Days     $T_0=172.267288$  (BKJD)

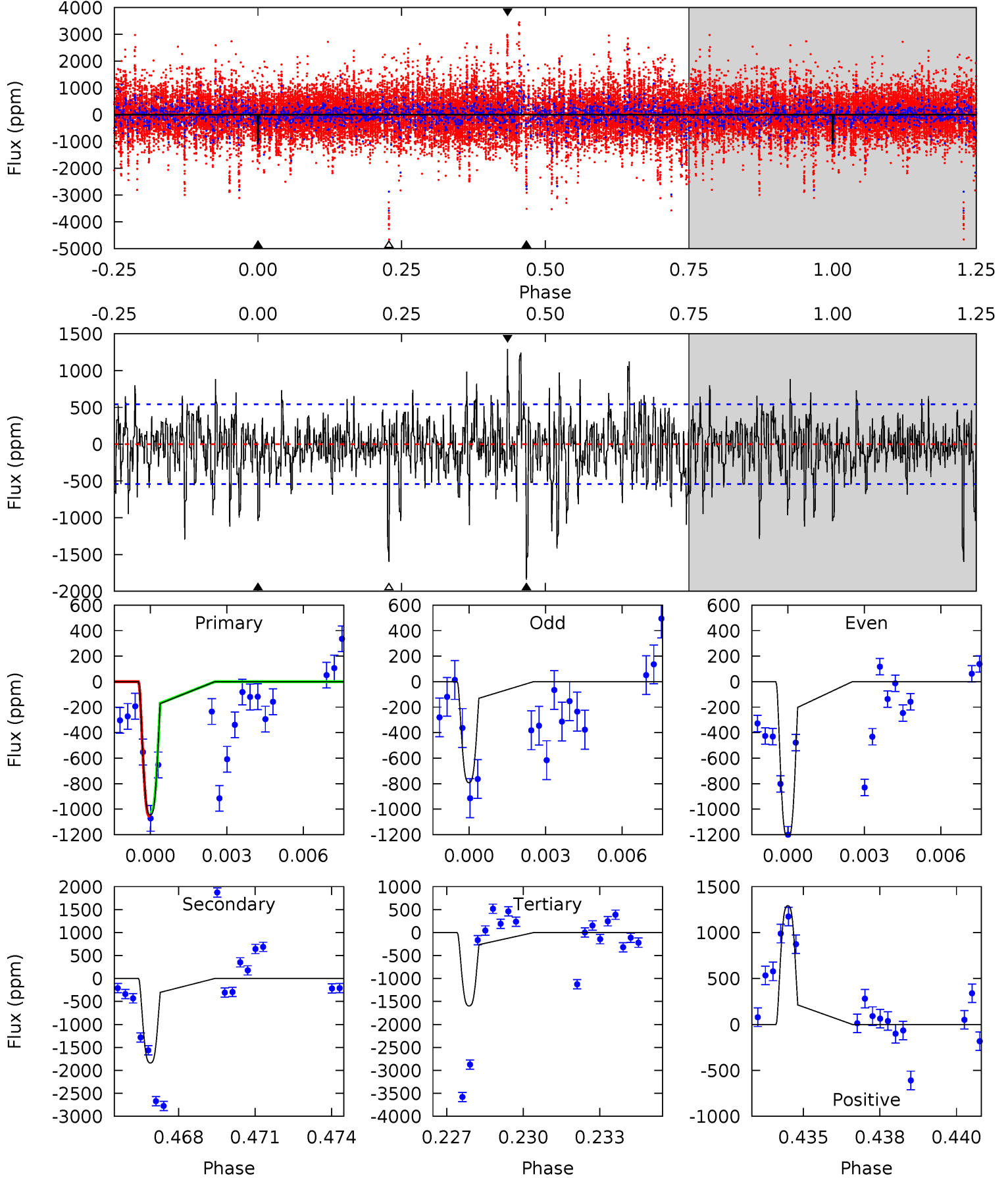


This plot does not exist for this TCE.

# DV Model-Shift Uniqueness Test

006468721-04, P = 376.234302 Days, E = 172.267288 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
10.2	17.9	15.5	12.5	5.27	2.99	3.03	-5.36	-2.39	2.35	5.33	2.05	0.87	0.41	0.16



## Alt Model-Shift Uniqueness Test

This plot does not exist for this TCE.

### Stellar Parameters For KIC 006468721

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5392^{+160}_{-160}$	$4.574^{+0.034}_{-0.136}$	$-0.040^{+0.300}_{-0.300}$	$0.806^{+0.158}_{-0.068}$	$0.890^{+0.073}_{-0.097}$	$2.396^{+0.418}_{-0.916}$
	+3%/-3%	+1%/-3%	+750%/-750%	+20%/-8%	+8%/-11%	+17%/-38%
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 006468721-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-1841 \pm 103$	$3.57^{+0.64}_{-0.53}$	$307^{+15}_{-13}$	$5610^{+468}_{-380}$	$74725^{+28836}_{-20761}$
Alt.	N/A	N/A	N/A	N/A	N/A

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



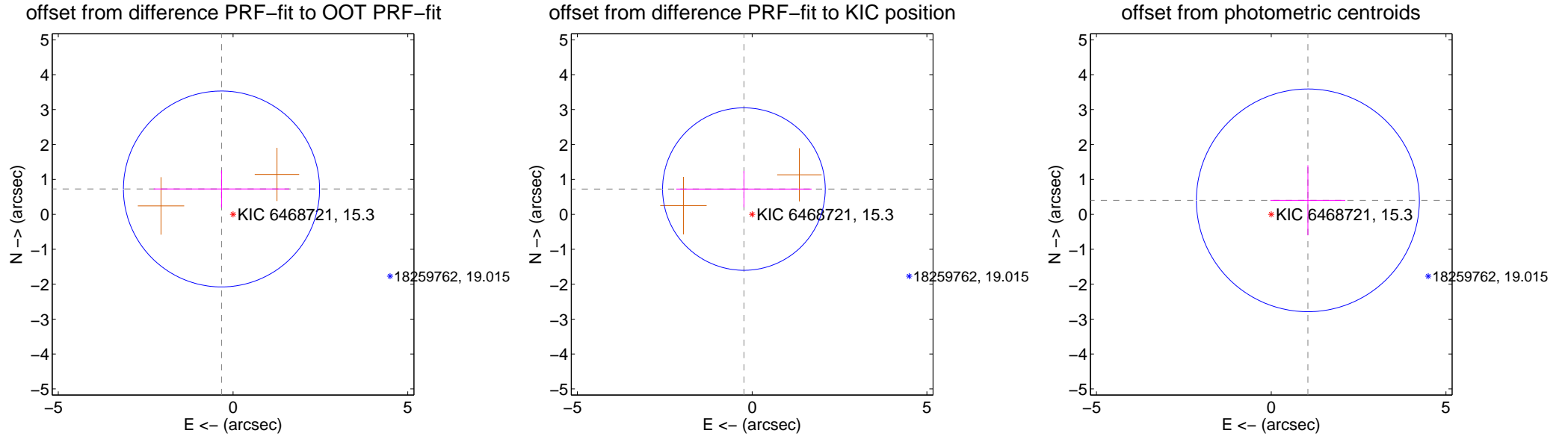
## DV Centroid Data

Supplemental centroid analysis for 006468721-04. Kepler magnitude: 15.30. Transit SNR 6.67

There are 0 quarters with good PRF difference image offsets

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

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.798 \pm 0.935$	0.85	$0.330 \pm 1.938$	$0.726 \pm 0.529$
PRF-fit source offset from KIC position	$0.761 \pm 0.775$	0.98	$0.235 \pm 1.937$	$0.724 \pm 0.520$
photometric centroid source offset	$1.12 \pm 1.06$	1.06	$-1.05 \pm 1.07$	$0.40 \pm 1.00$



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.

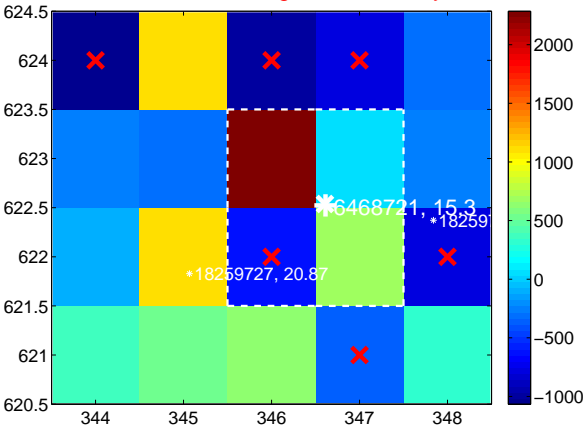
Q1 no difference image



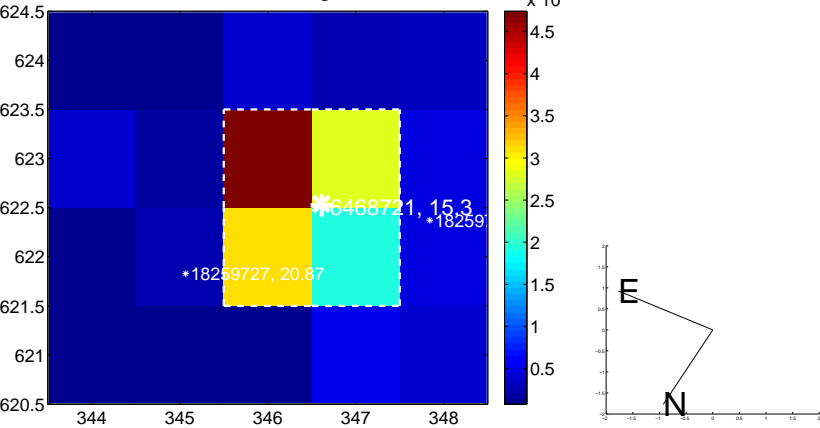
Q1 no OOT image



Q2 difference image. Poor Quality



Q2 OOT image



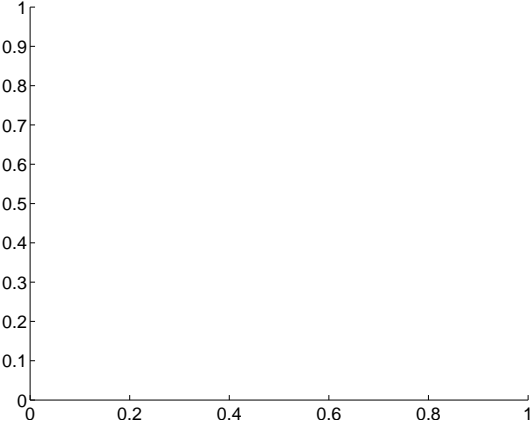
Q3 no difference image



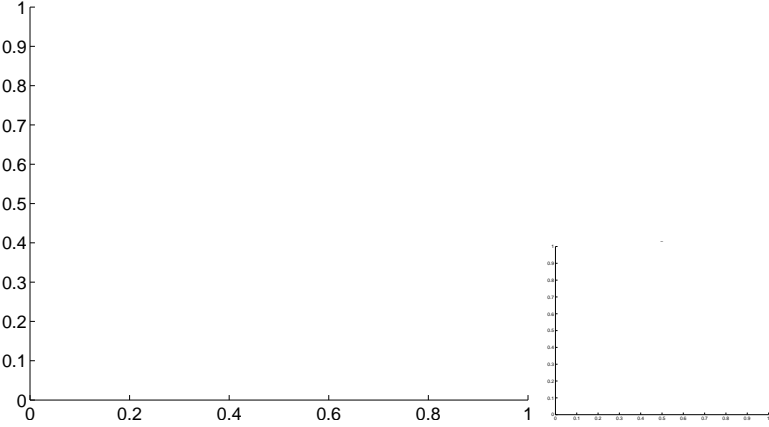
Q3 no OOT image



Q4 no difference image



Q4 no OOT image



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

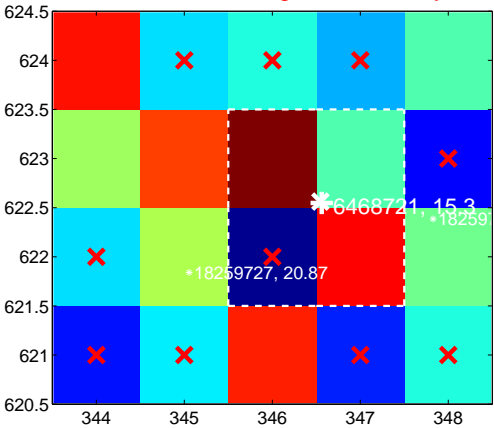
Q5 no difference image



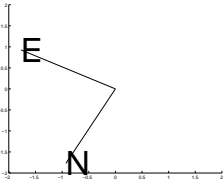
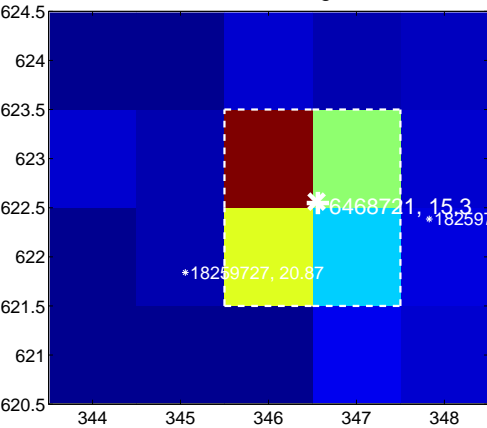
Q5 no OOT image



Q6 difference image. Poor Quality



Q6 OOT image



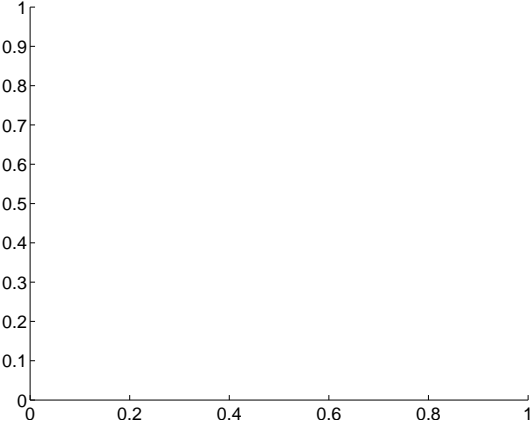
Q7 no difference image



Q7 no OOT image



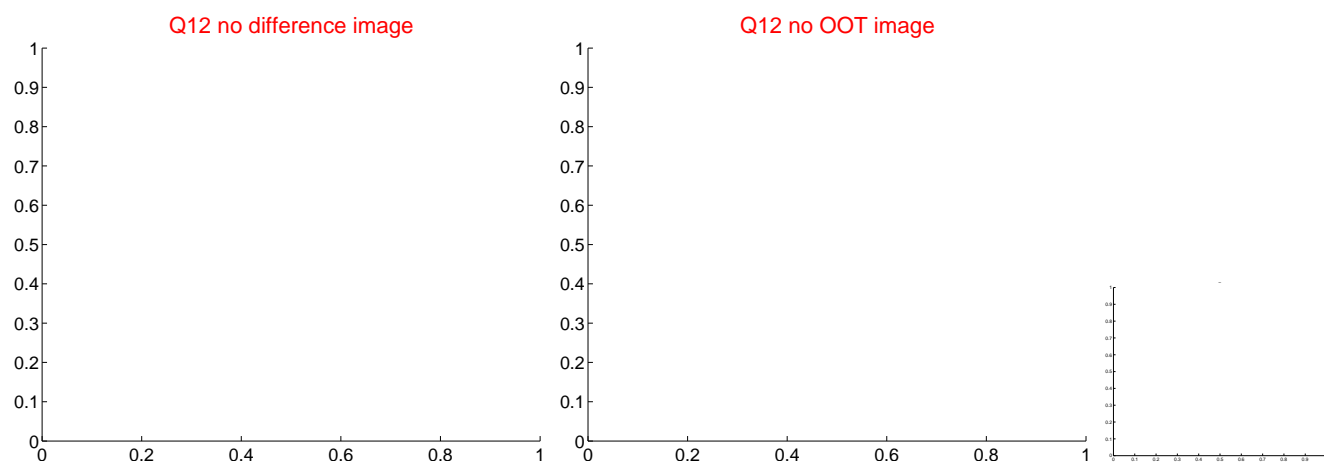
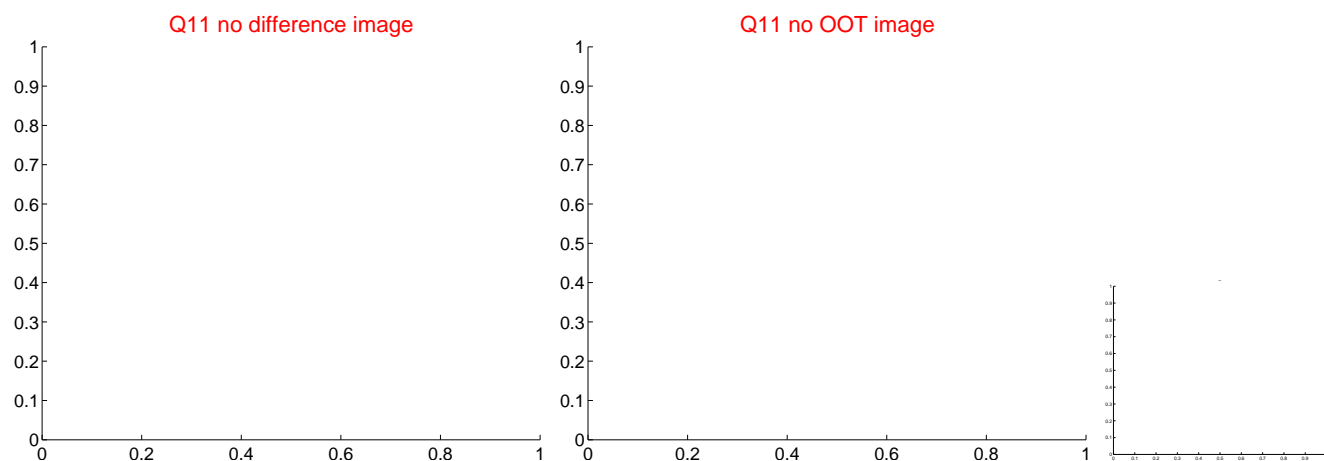
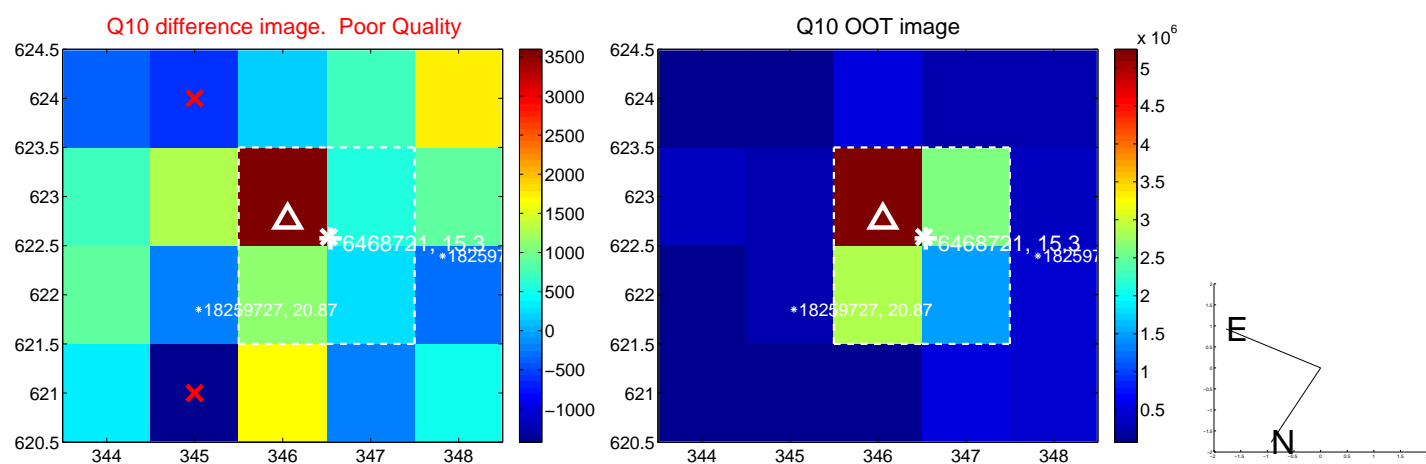
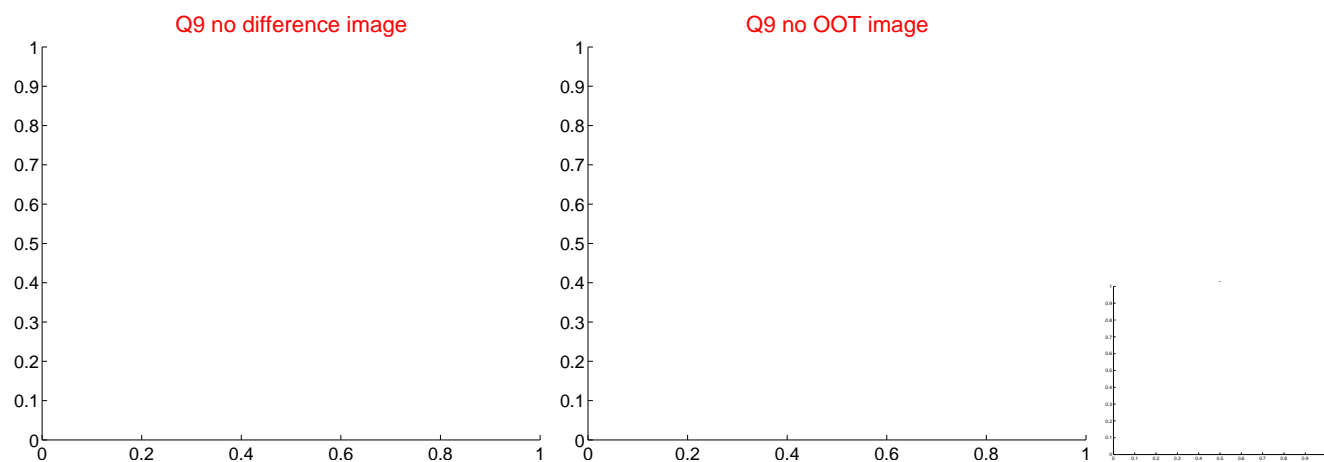
Q8 no difference image



Q8 no OOT image



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



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

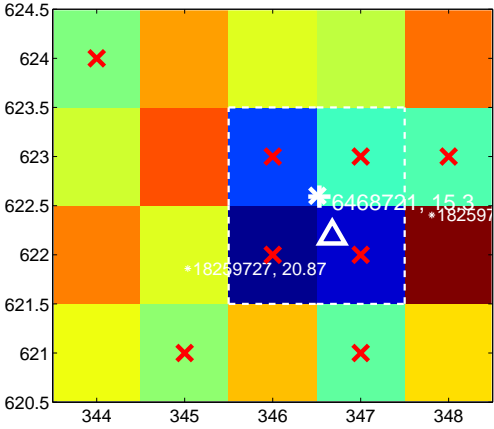
Q13 no difference image



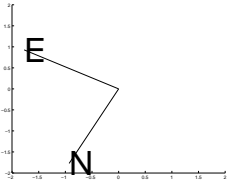
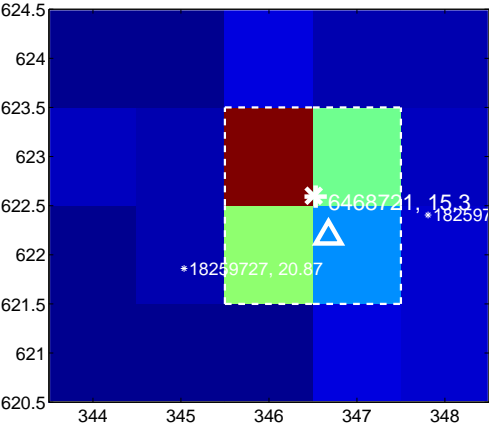
Q13 no OOT image



Q14 difference image. Poor Quality



Q14 OOT image



Q15 no difference image



Q15 no OOT image



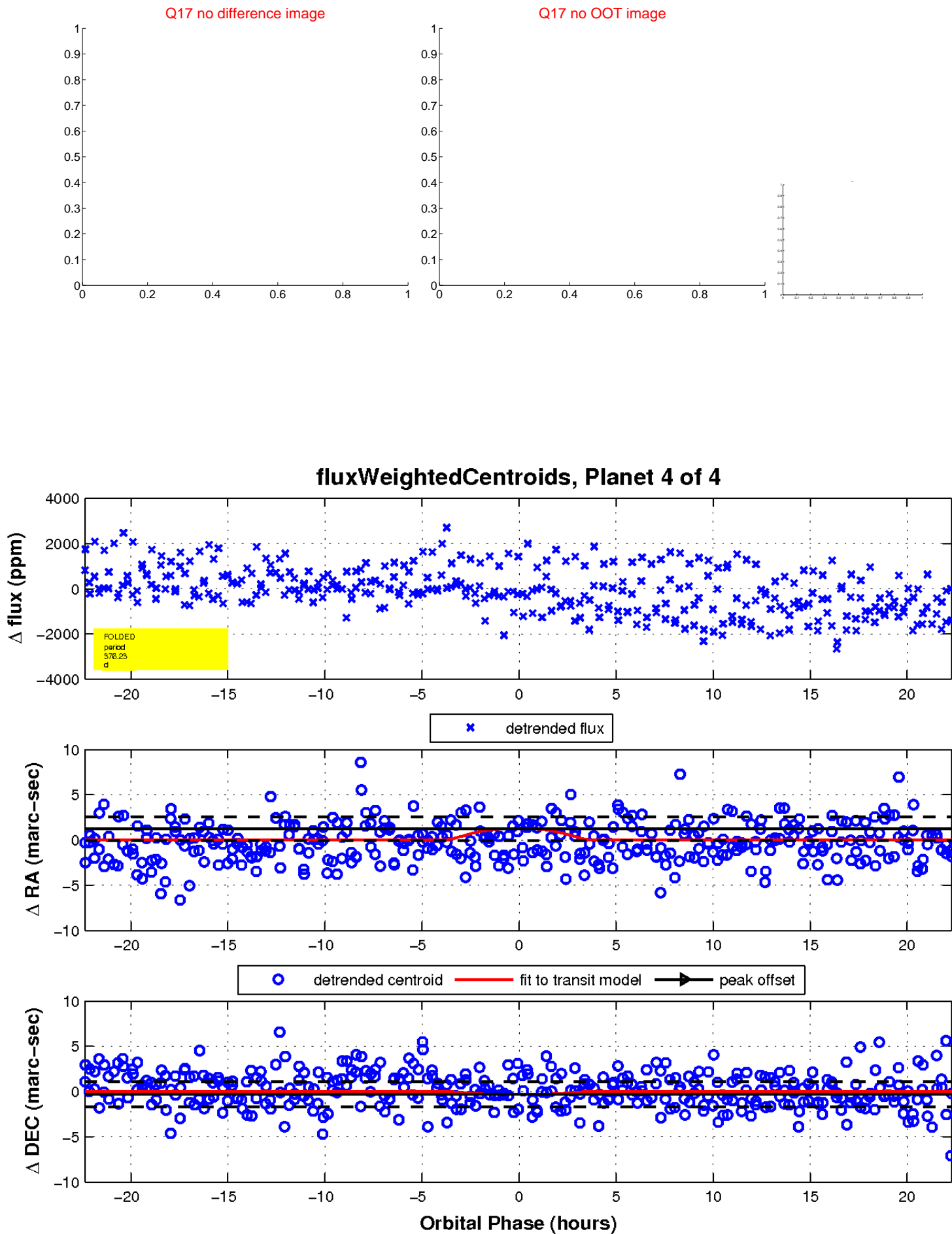
Q16 no difference image



Q16 no OOT image



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



UKIRT Image

Declination

