

## KIC 006715221

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006715221-01	OBS	No	1.984918	132.459230	13.3	8.776	9.2	7.4	2.02	6839	0.74	6389.14
006715221-02	OBS	No	107.919359	152.278773	91.7	14.832	10.4	6.2	2.02	6839	2.12	31.02
006715221-03	OBS	No	333.120273	314.487390	168.1	20.190	10.4	7.6	2.02	6839	2.83	6.90
006715221-04	OBS	No	134.224992	188.680406	137.8	3.578	8.3	7.4	2.02	6839	2.67	23.19
006715221-05	OBS	No	107.107514	214.951810	149.8	13.238	8.0	8.9	2.02	6839	3.25	31.33
006715221-06	OBS	No	400.898244	254.418073	152.5	9.827	8.0	7.8	2.02	6839	2.91	5.39
006715221-07	OBS	No	34.101777	151.432052	96.7	3.723	7.7	8.0	2.02	6839	2.32	144.12
006715221-08	OBS	No	65.108276	163.640682	100.0	4.485	7.8	7.8	2.02	6839	2.31	60.85
006715221-09	OBS	No	118.508397	233.886395	144.3	11.967	8.1	7.9	2.02	6839	2.70	27.38
006715221-10	OBS	No	36.316557	165.427888	72.2	12.670	8.2	7.1	2.02	6839	2.27	132.52

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006715221-01	OBS	FP	0.00	1	0	0	0	LPP_DV
006715221-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
006715221-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
006715221-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
006715221-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_ALT—CENT_FEW_MEAS
006715221-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—MOD_NONUNIQ_ALT
006715221-07	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—MOD_NONUNIQ_ALT
006715221-08	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—MOD_NONUNIQ_ALT
006715221-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_MEAS
006715221-10	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_UNRESOLVED_OFFSET

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

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

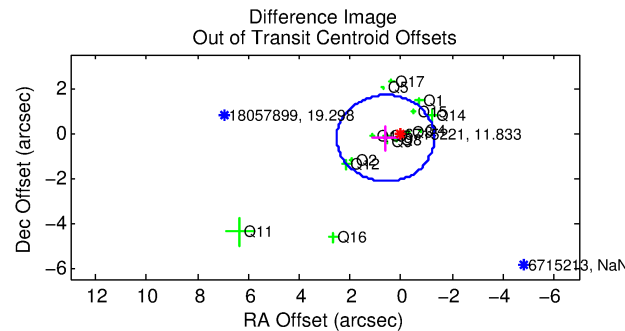
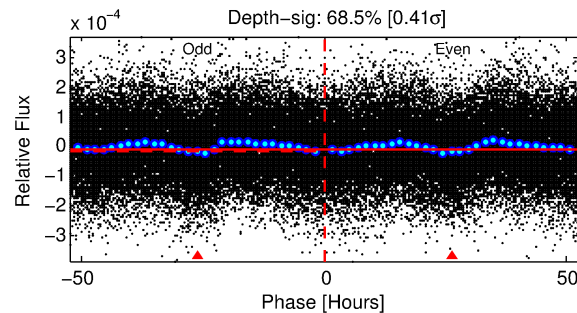
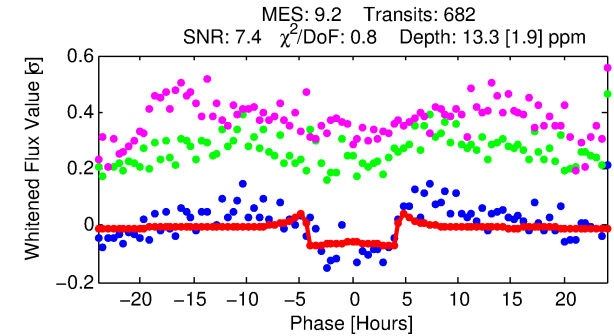
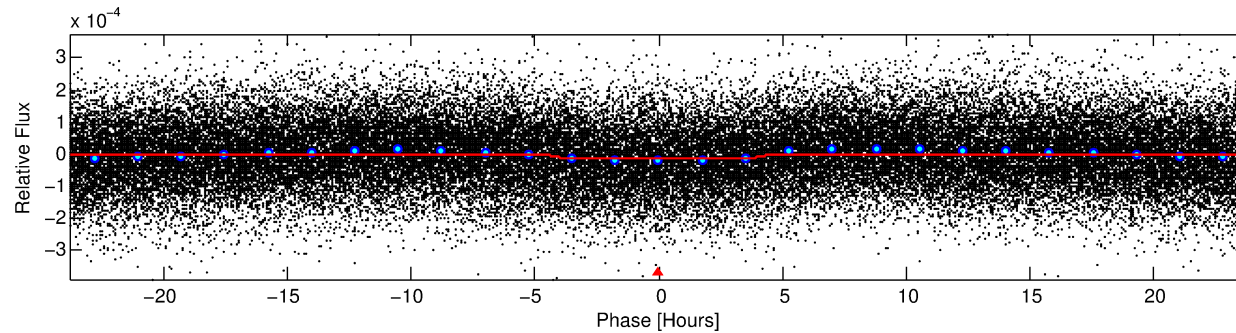
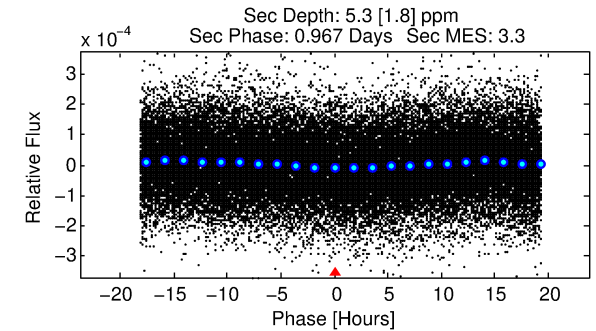
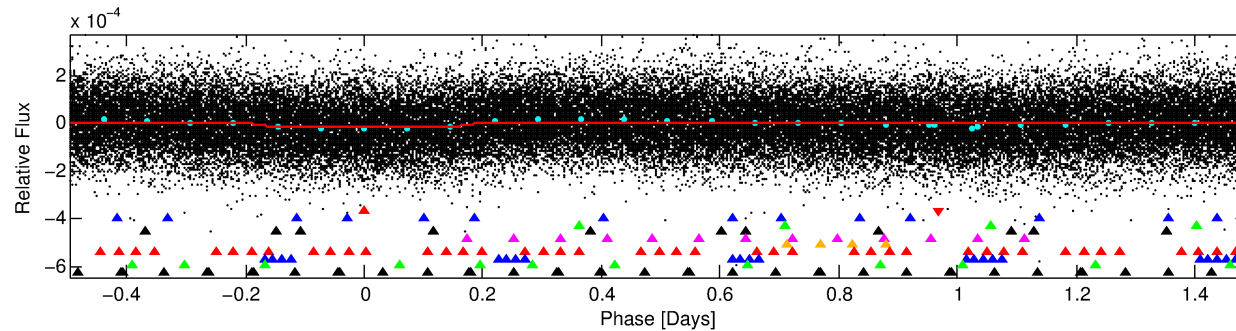
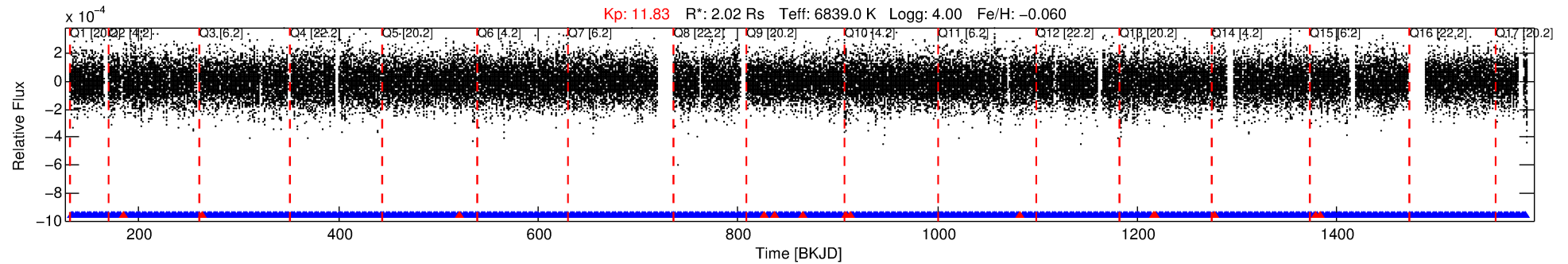
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 006715221-01

No Significant Match Found

# DV One-Page Summary

KIC: 6715221 Candidate: 1 of 10 Period: 1.985 d



## DV Fit Results:

Period = 1.98492 [0.00002] d  
Epoch = 132.4592 [0.0055] BKJD  
Rp/R\* = 0.0034 [0.0020]  
a/R\* = 1.81 [4.15]  
b = 0.20 [16.17]  
Seff = 6389.14 [2640.80]  
Teq = 2280 [236] K  
Rp = 0.74 [0.49] Re  
a = 0.0354 [0.0092] AU  
Ag = 6.54 [8.42] [0.66σ]  
Teffp = 5636 [1740] K [1.91σ]

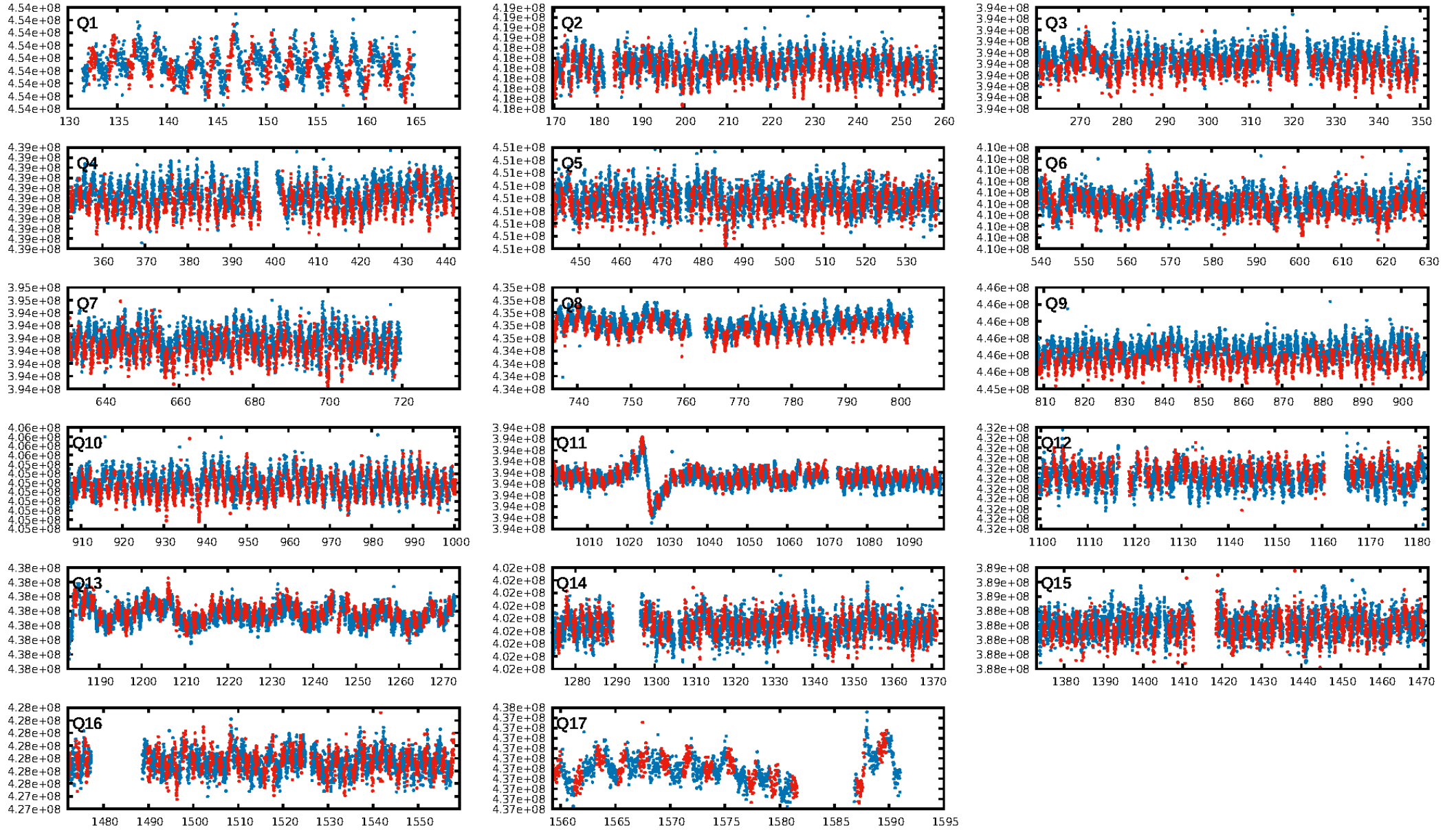
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [80.86σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
**Bootstrap-pfa: 7.00e-12**  
RollingBand-fgt: 0.98 [637/651]  
GhostDiagnostic-chr: 1.021  
Centroid-sig: 18.9%  
Centroid-so: 0.740 arcsec [1.02σ]  
OotOffset-rm: 0.649 arcsec [1.01σ]  
KicOffset-rm: 0.590 arcsec [0.92σ]  
OotOffset-st: 3/4/4/4 [15]  
KicOffset-st: 3/4/4/4 [15]  
DiffImageQuality-fgm: 0.80 [12/15]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 05:29:55 Z

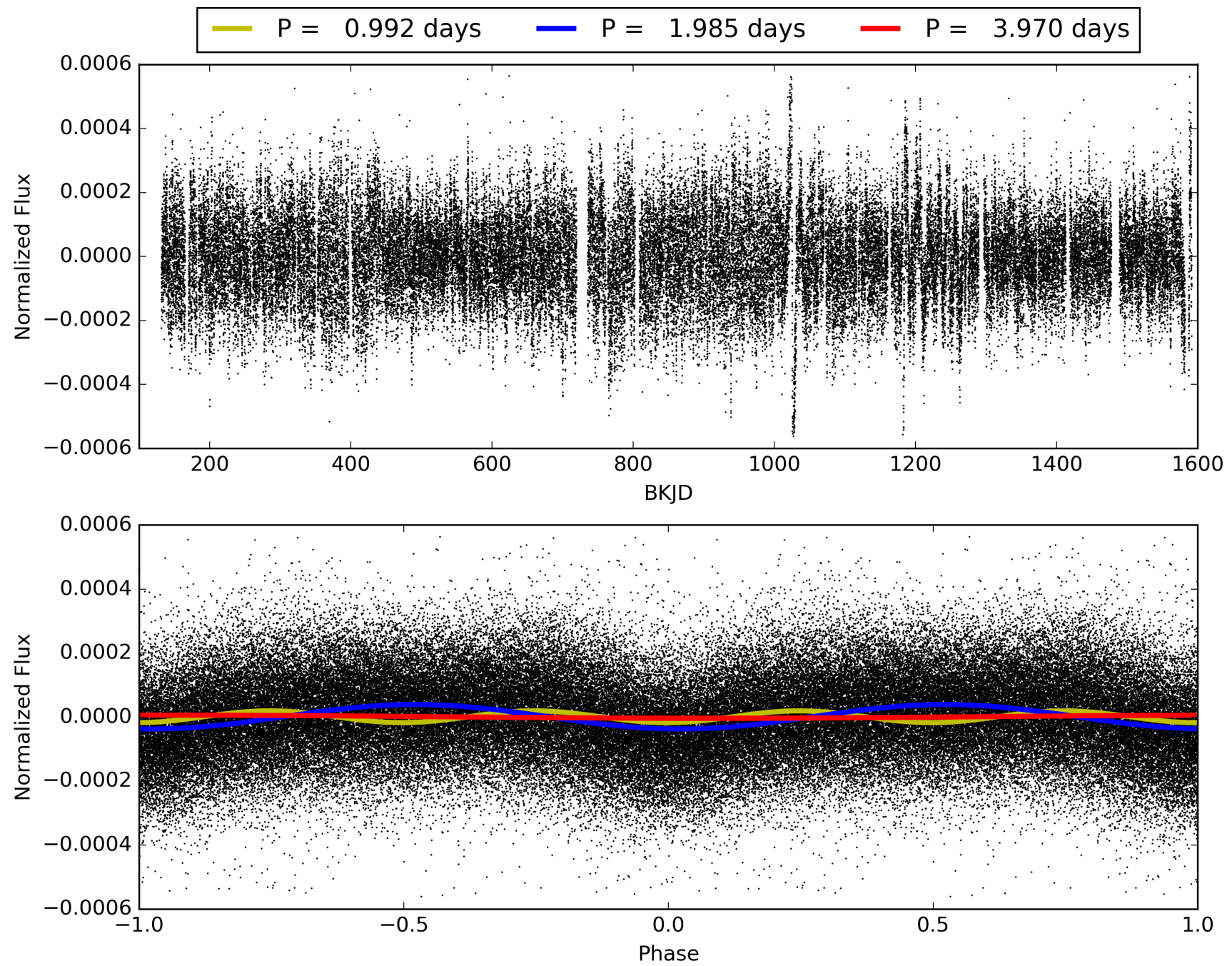
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 006715221-01, PDC Light Curves





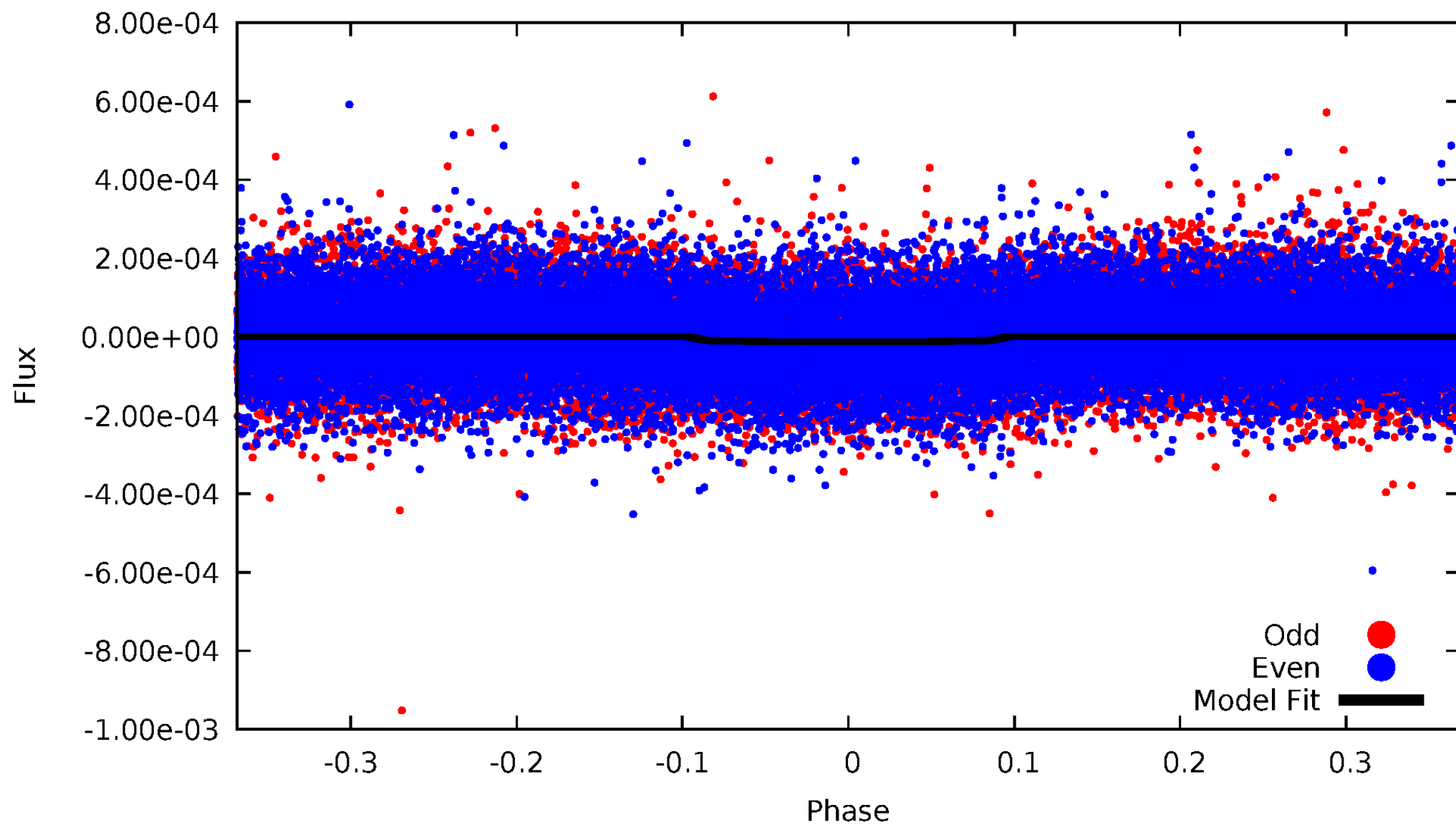
TCE 006715221-01





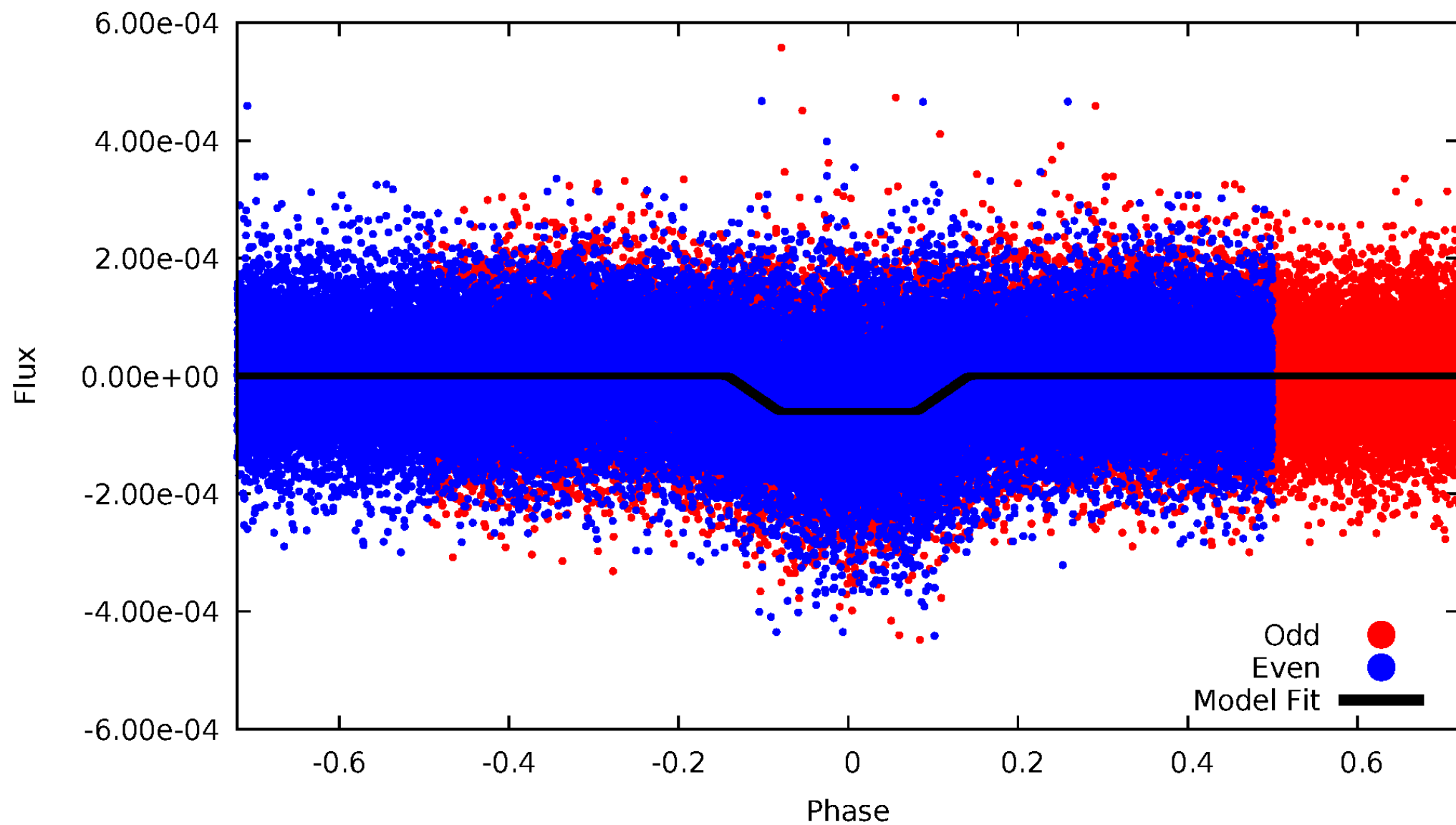
DV Odd/Even

TCE 006715221-01

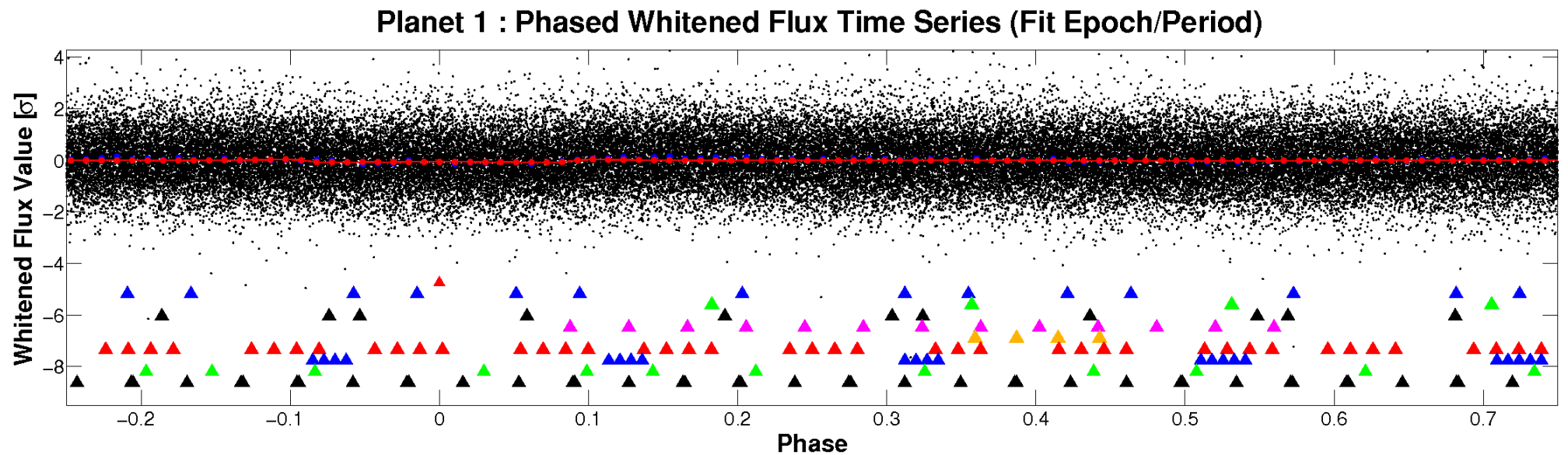
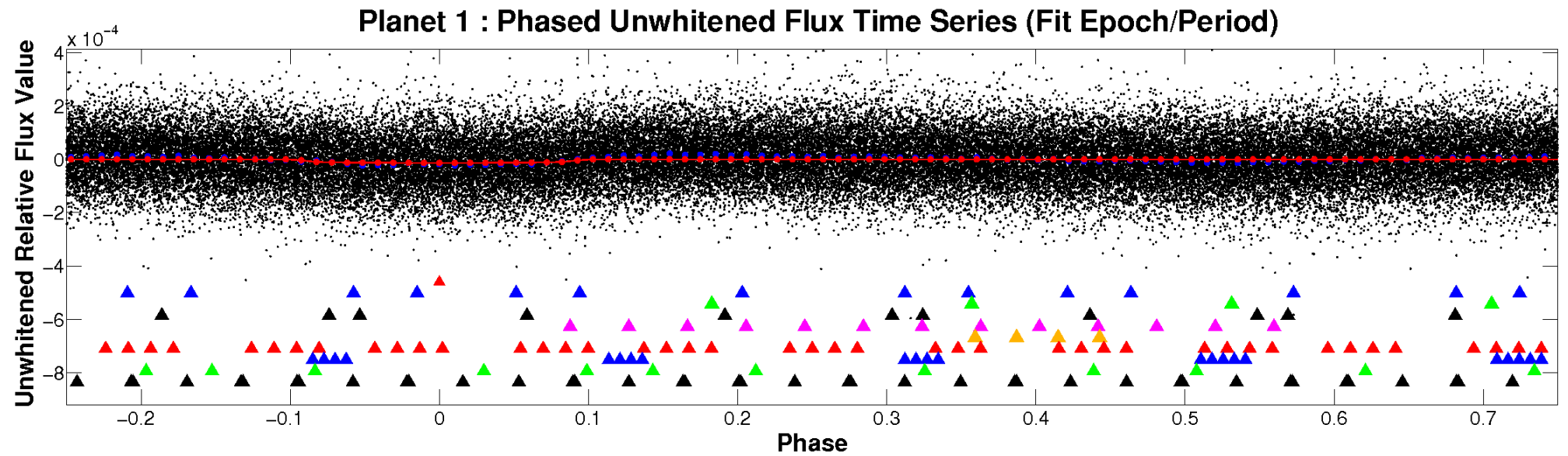


# ALT Odd/Even

TCE 006715221-01



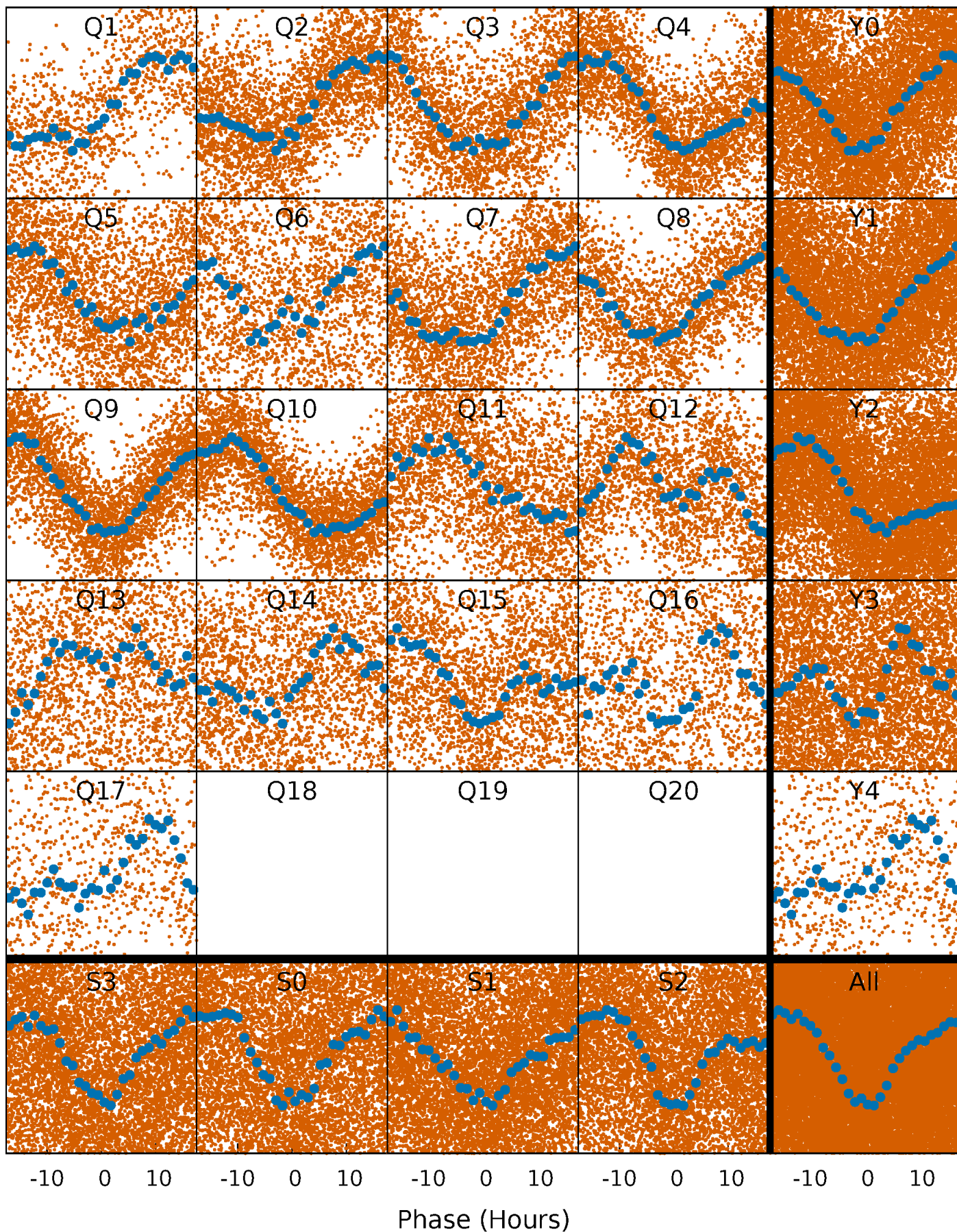
# Non-Whitened Vs. Whitened Light Curve





# PDC Quarter-Phased Transit Curves

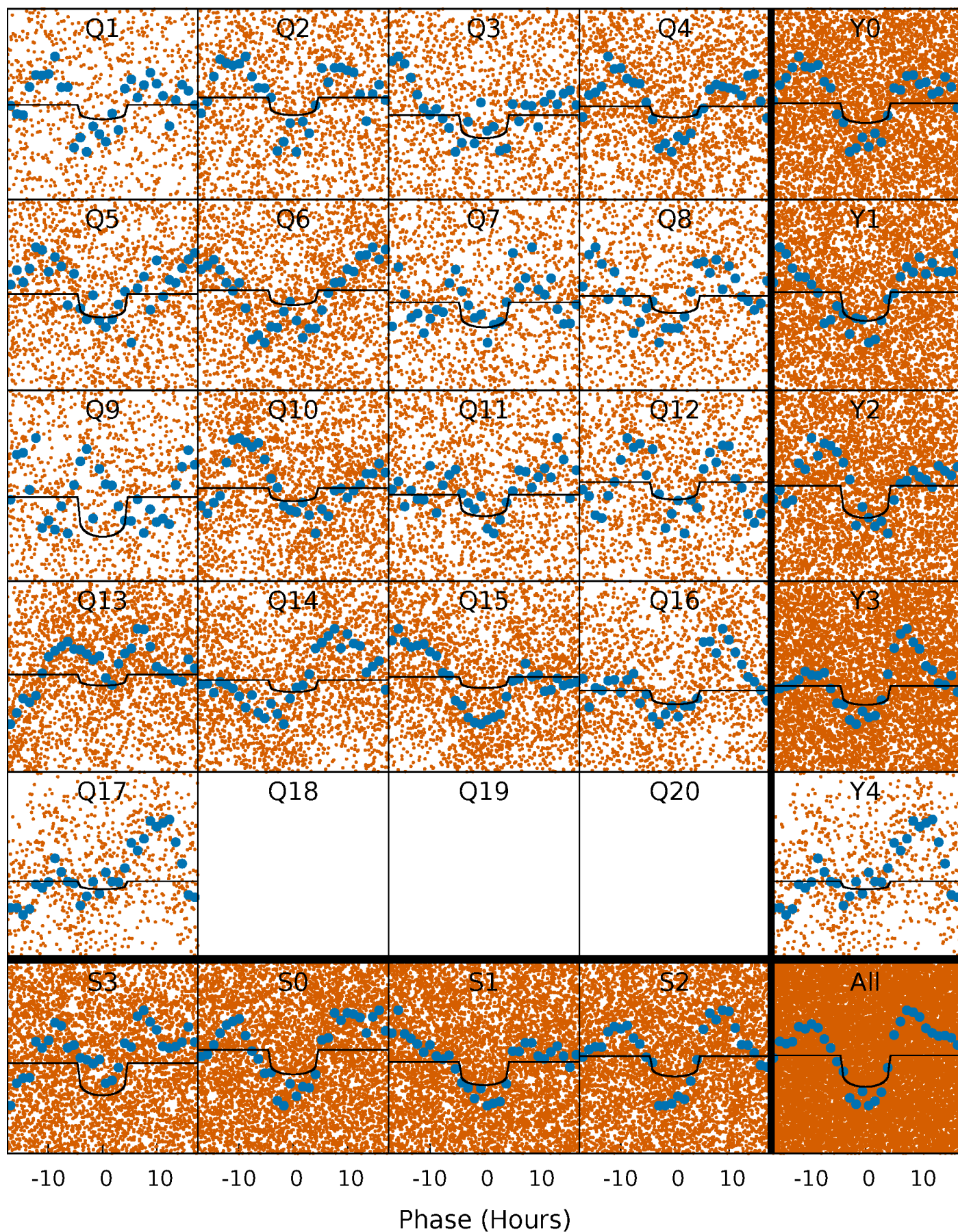
TCE 006715221-01 P= 1.984918 Days  $T_0=132.459230$  (BKJD)





# DV Quarter-Phased Transit Curves

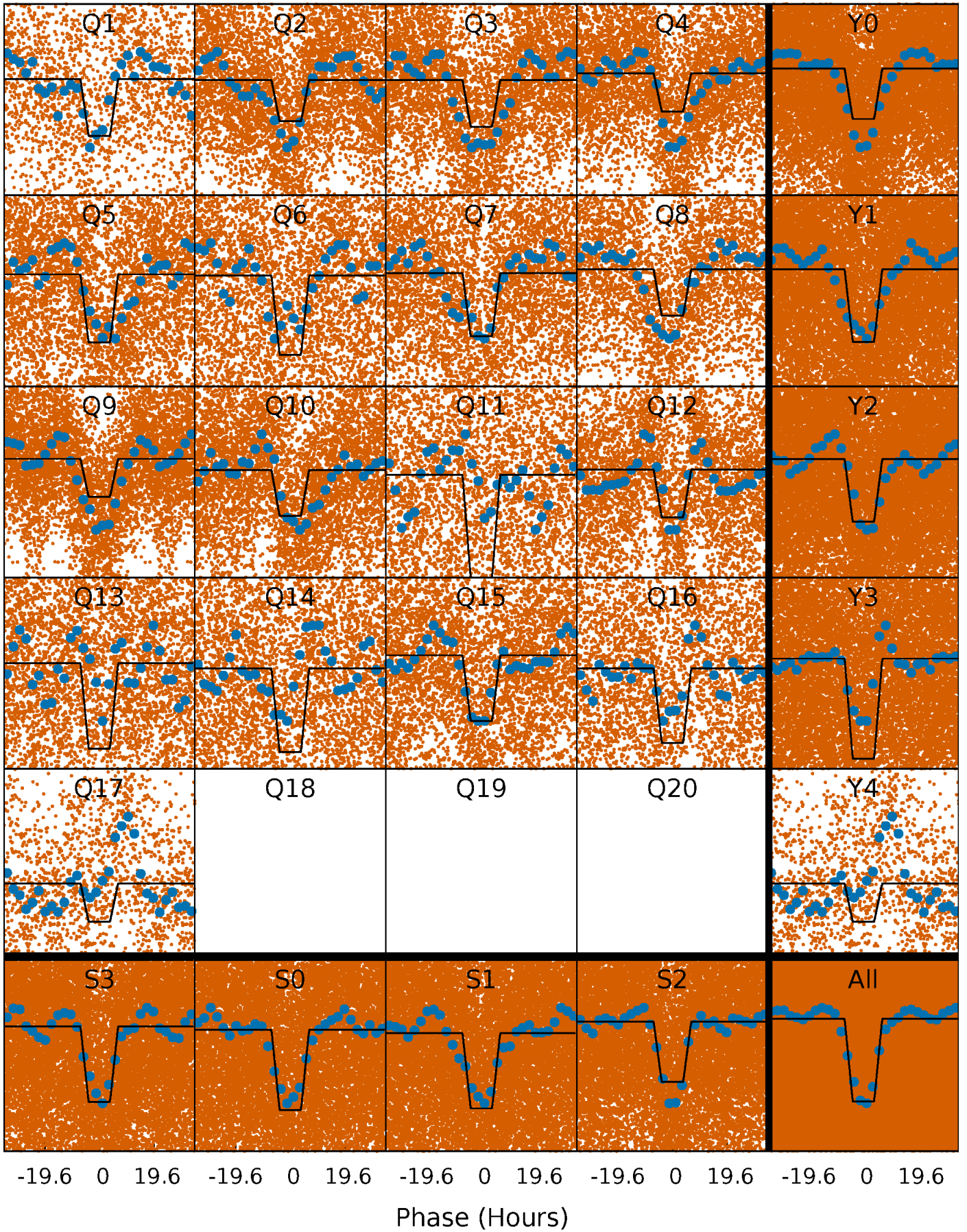
TCE 006715221-01 P= 1.984918 Days  $T_0=132.459230$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

TCE 006715221-01 P= 1.984975 Days  $T_0=132.431520$  (BKJD)

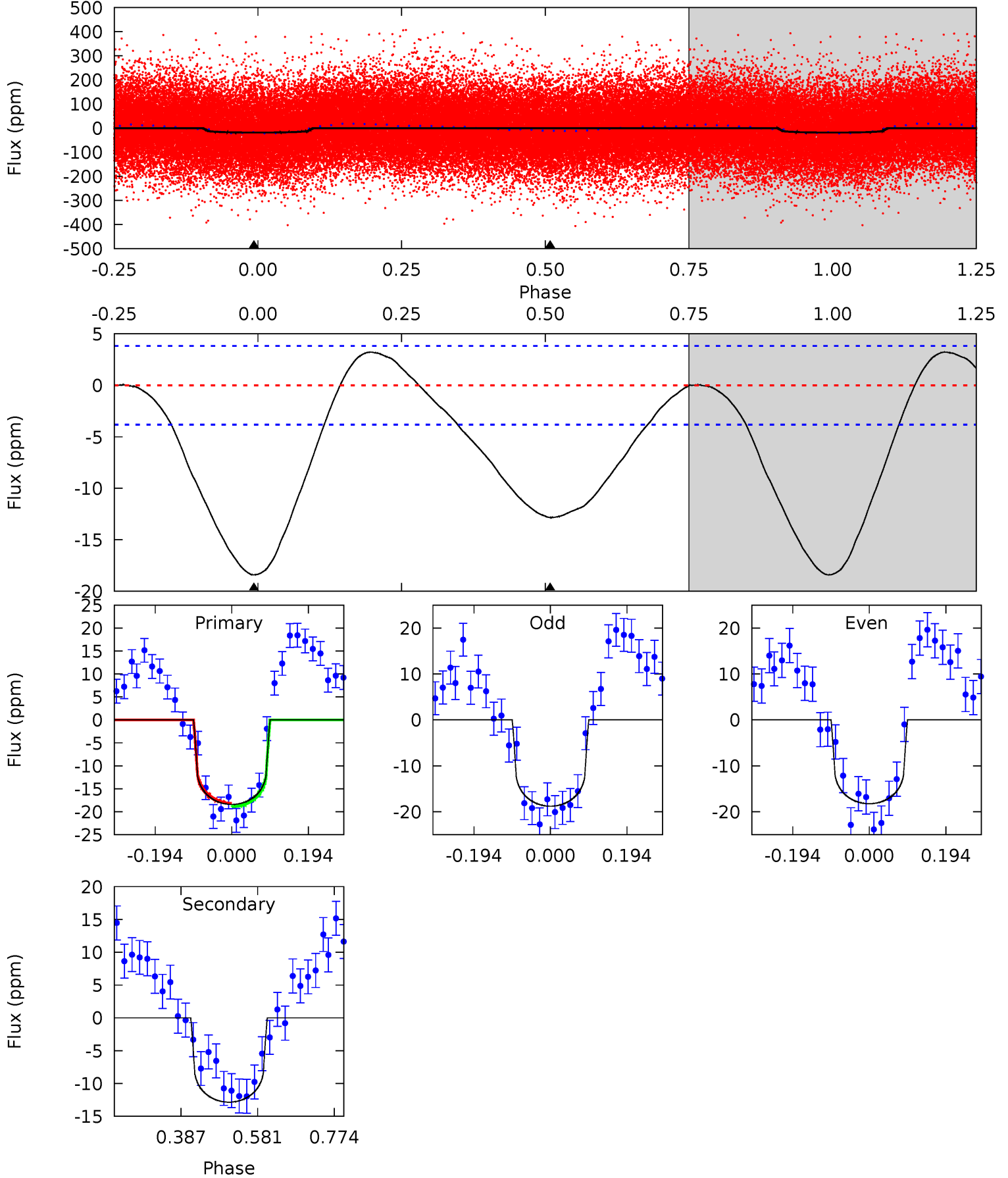




# DV Model-Shift Uniqueness Test

006715221-01, P = 1.984918 Days, E = 130.474312 Days

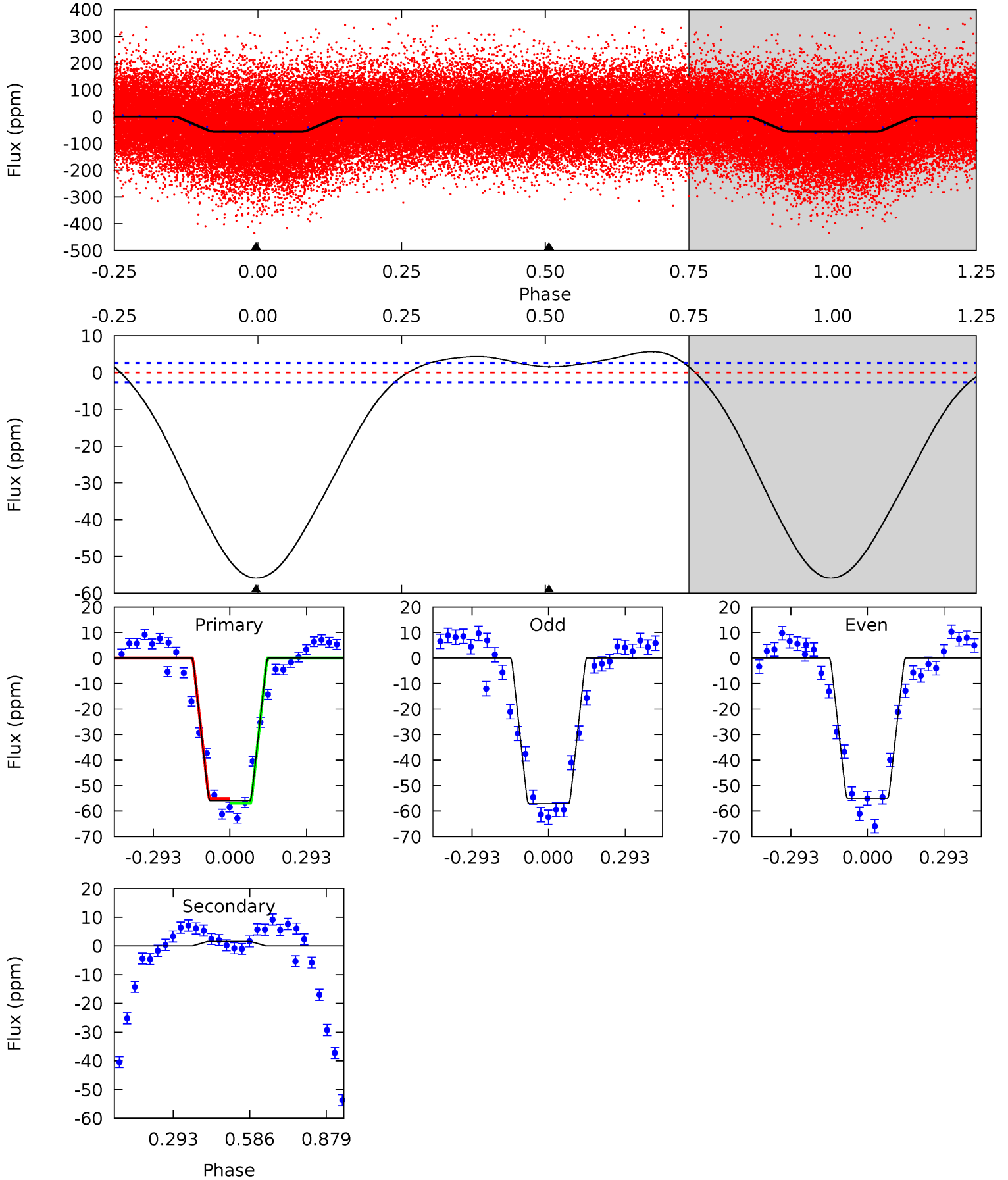
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
21.3	14.9	0	0	4.42	1.30	1.86	21.3	21.3	14.9	14.9	0.32	1.13	0.15	0.39



# Alt Model-Shift Uniqueness Test

006715221-01, P = 1.984975 Days, E = 130.446545 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
92.0	-2.67	0	0	4.33	1.05	3.63	92.0	92.0	-2.67	-2.67	1.65	0.97	0.09	1.37



### Stellar Parameters For KIC 006715221

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6839^{+163}_{-225}$	$4.003^{+0.221}_{-0.119}$	$-0.060^{+0.250}_{-0.300}$	$2.020^{+0.396}_{-0.594}$	$1.497^{+0.172}_{-0.257}$	$0.256^{+0.303}_{-0.104}$
	+2%/-3%	+6%/-3%	+417%/-500%	+20%/-29%	+11%/-17%	+118%/-41%
Source	PHO1	FLK73	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 006715221-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-13 \pm 1$	$0.75^{+0.45}_{-0.41}$	$3165^{+192}_{-251}$	$6834^{+4478}_{-1353}$	$15^{+57}_{-9}$
Alt.	$2 \pm 1$	$1.65^{+0.47}_{-0.49}$	$3163^{+178}_{-234}$	$-3625^{+219}_{-302}$	$-0.412^{+0.198}_{-0.457}$

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



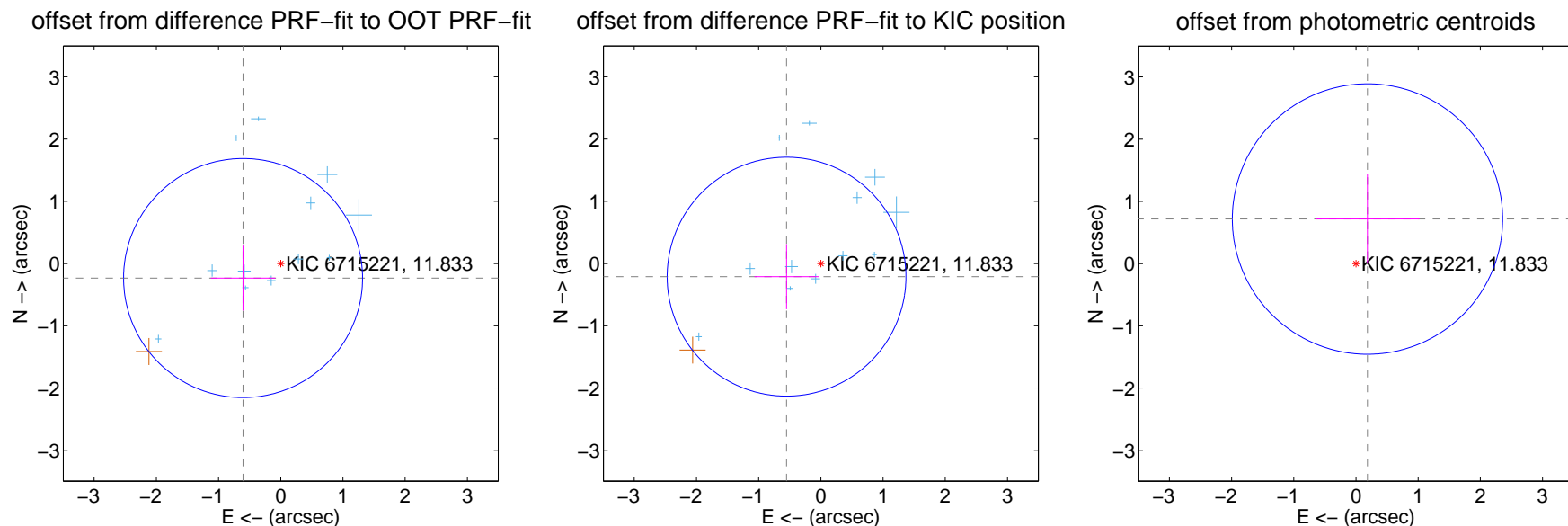
## DV Centroid Data

Supplemental centroid analysis for 006715221-01. **Kepler magnitude: 11.83.** Transit SNR 7.36

There are 12 quarters with good PRF difference image offsets

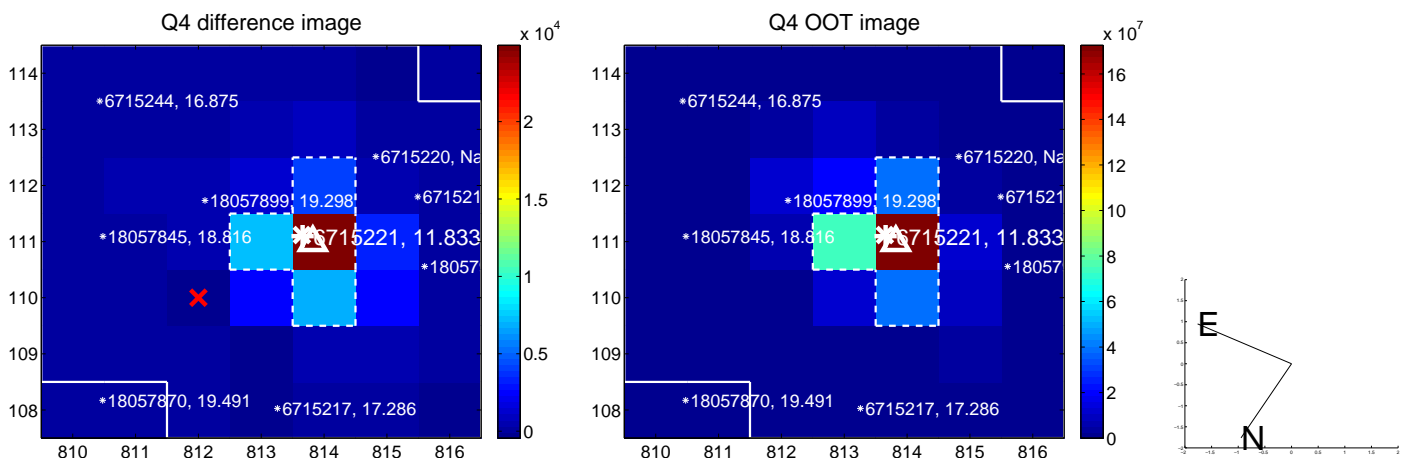
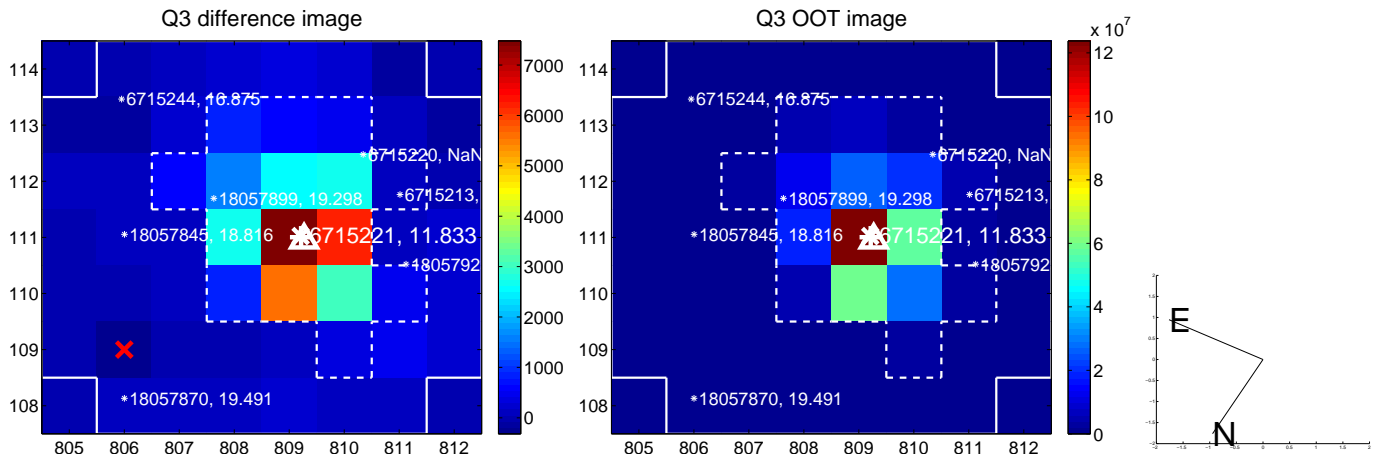
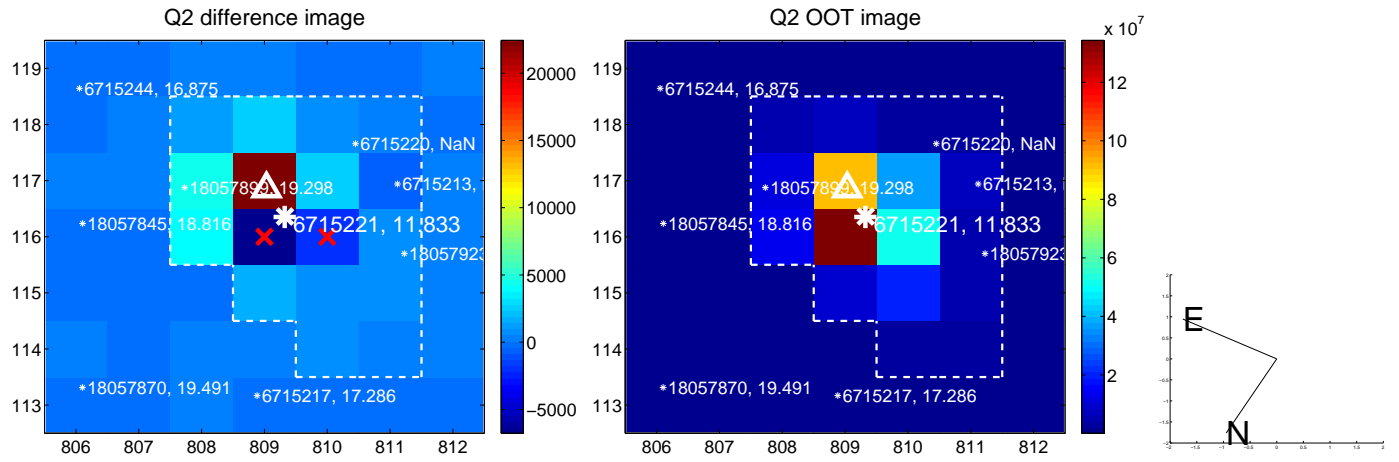
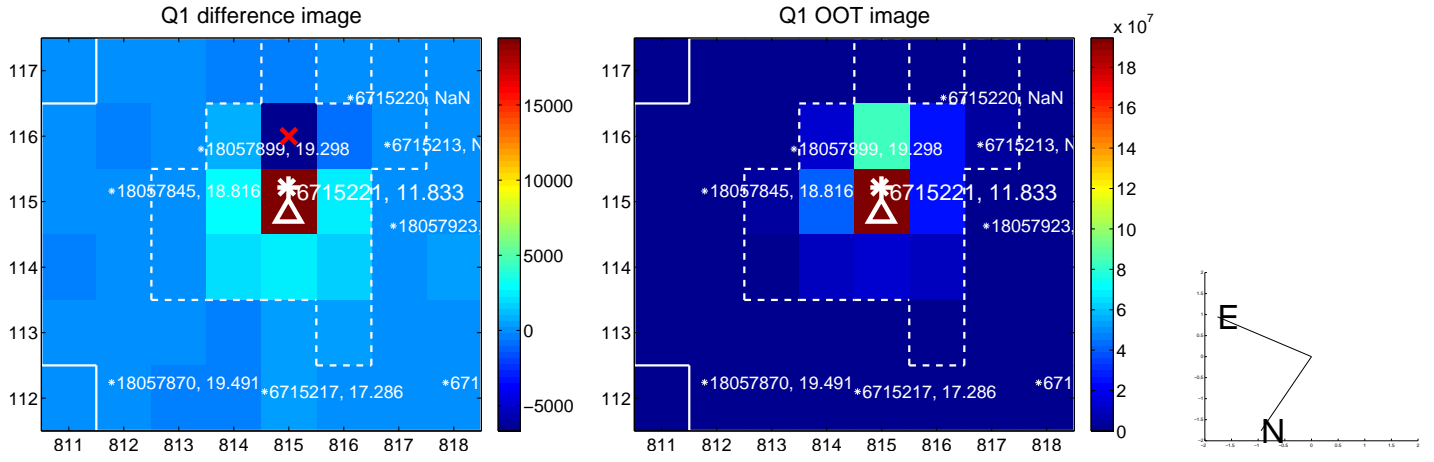
The direct PRF centroid is offset from the target star catalog position by about 0.19 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.649 \pm 0.640$	1.01	$0.606 \pm 0.518$	$-0.233 \pm 0.522$
PRF-fit source offset from KIC position	$0.590 \pm 0.640$	0.92	$0.551 \pm 0.516$	$-0.211 \pm 0.523$
photometric centroid source offset	$0.74 \pm 0.72$	1.02	$-0.19 \pm 0.84$	$0.72 \pm 0.72$

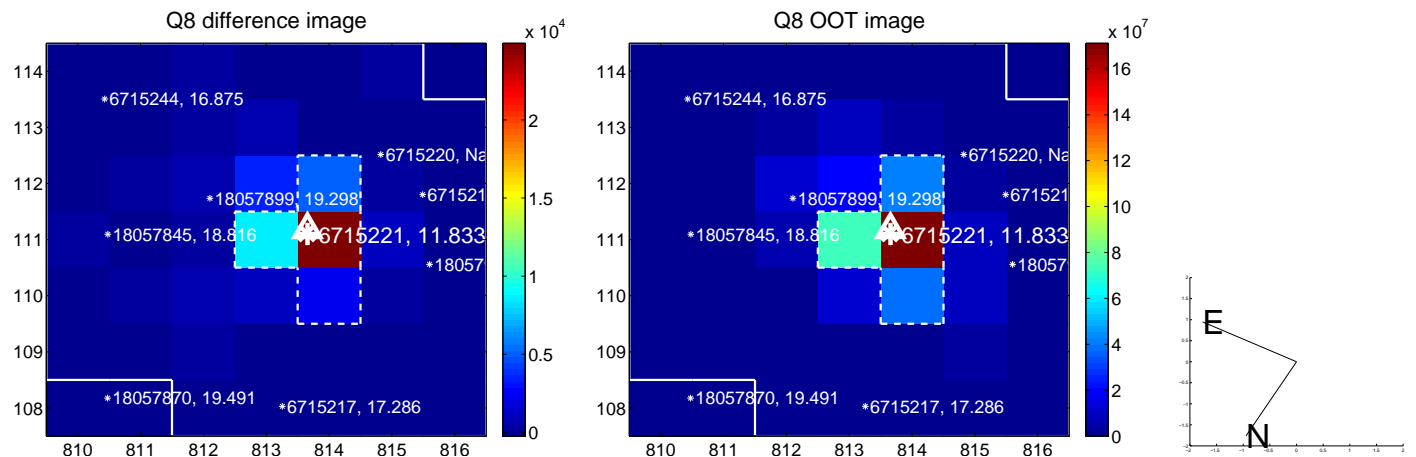
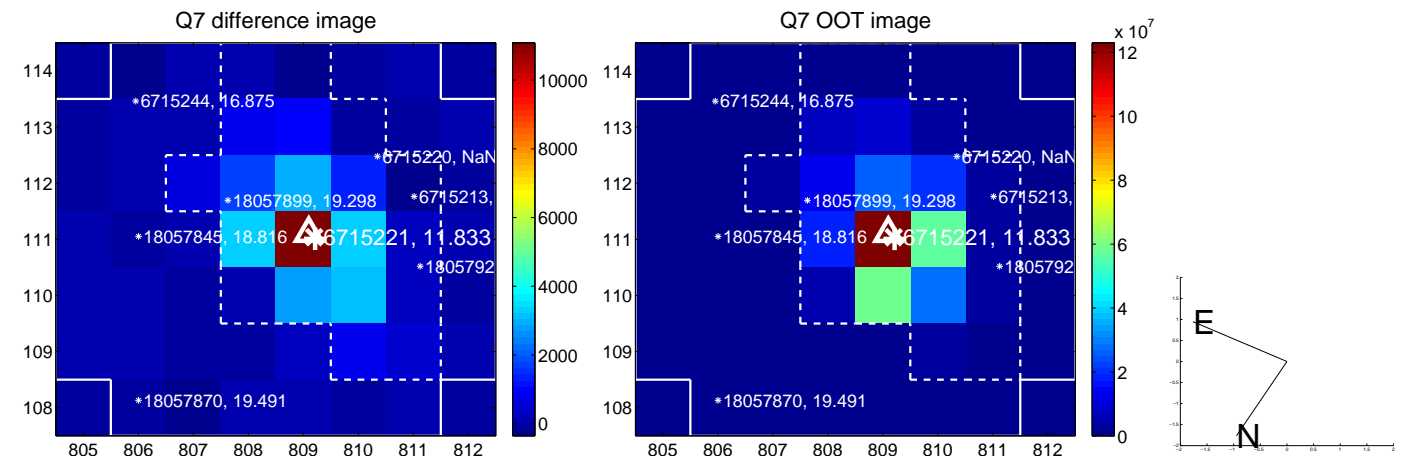
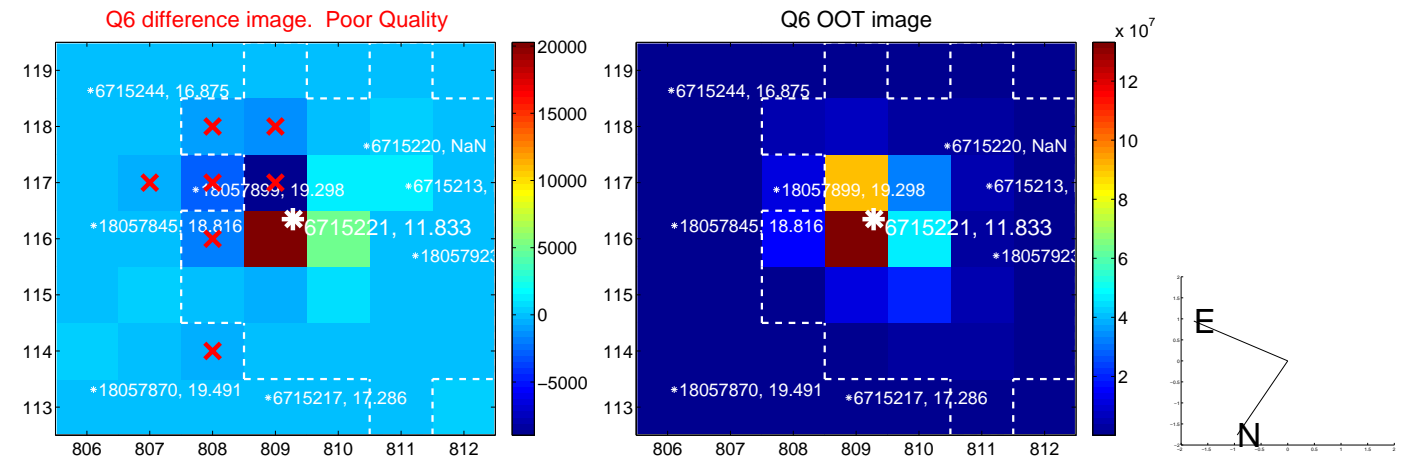
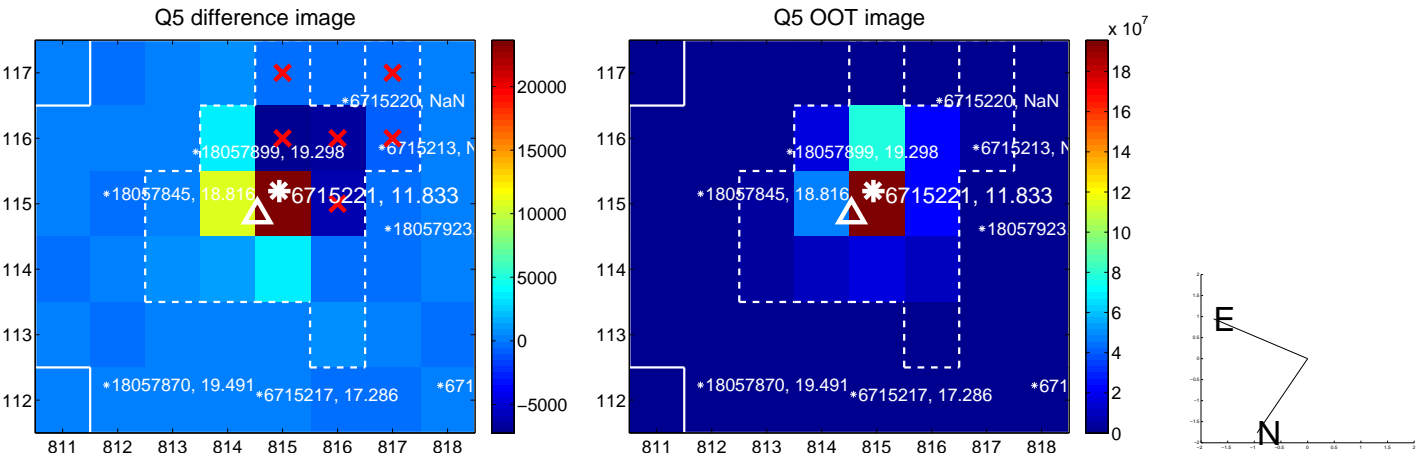


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

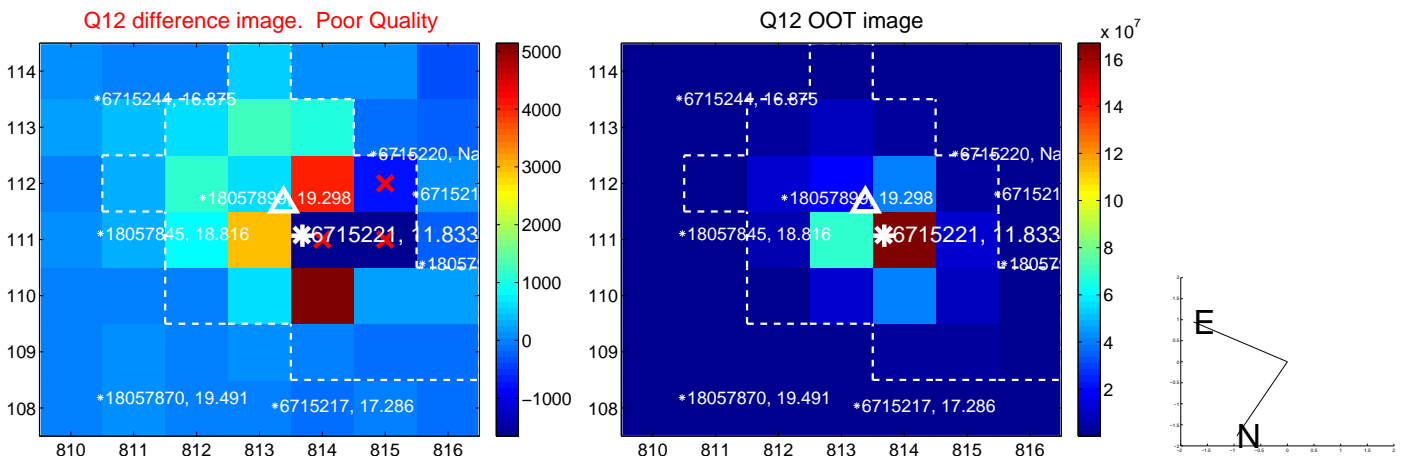
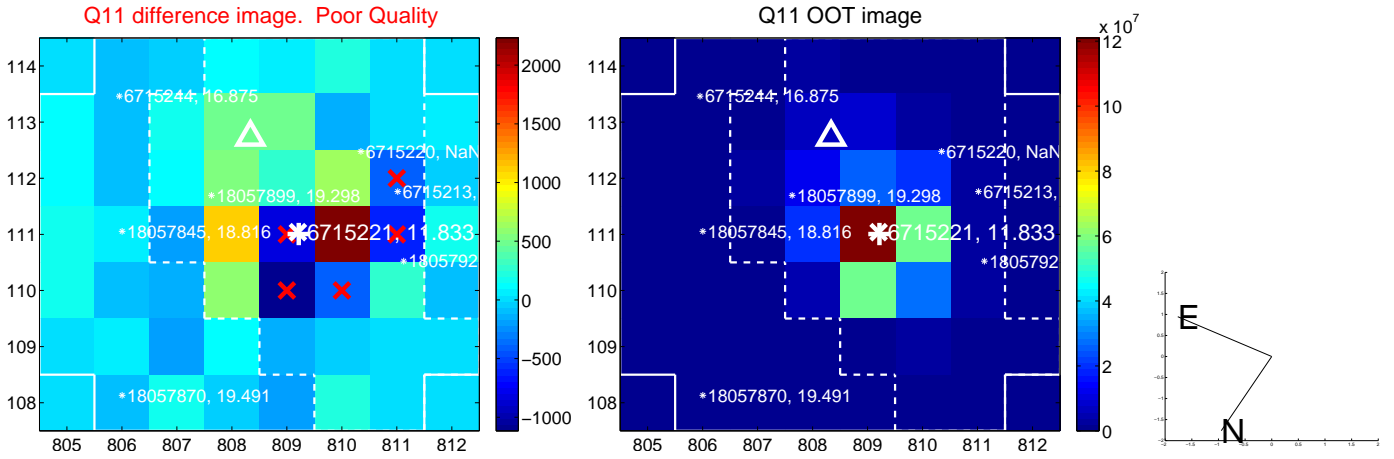
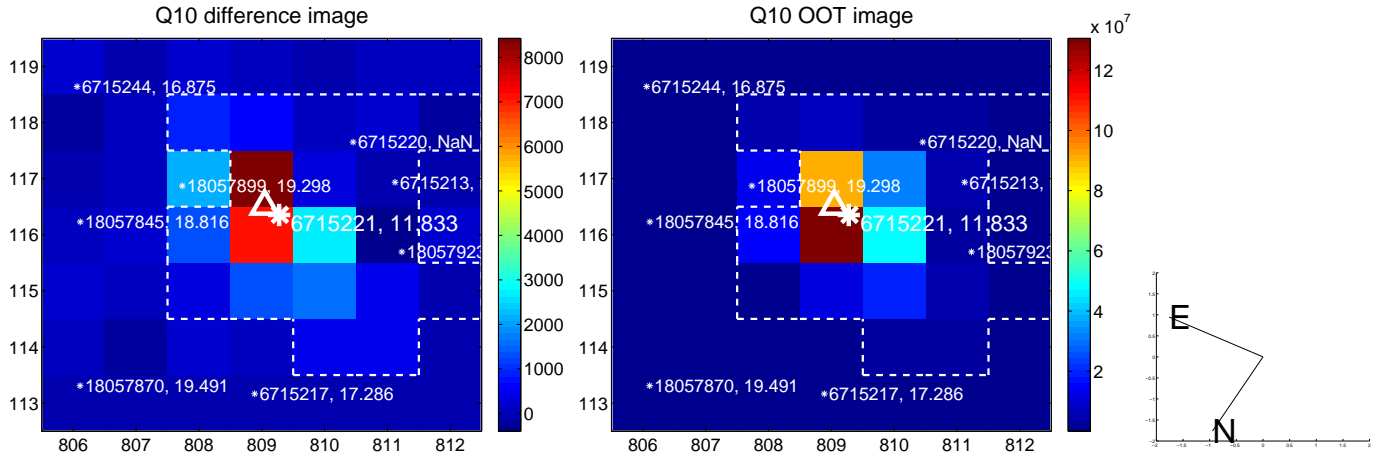
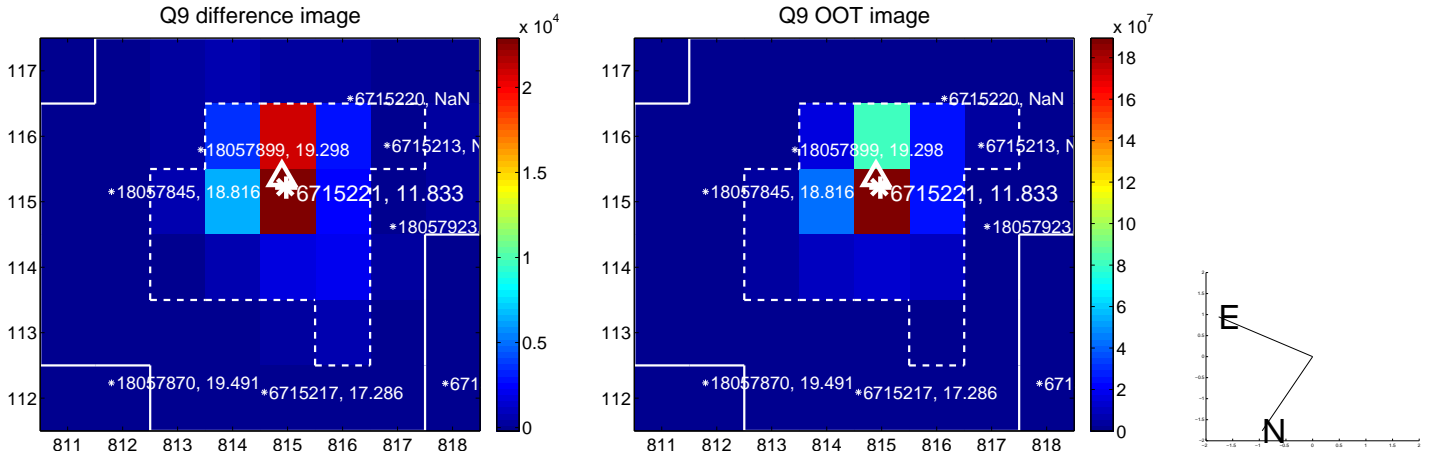


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

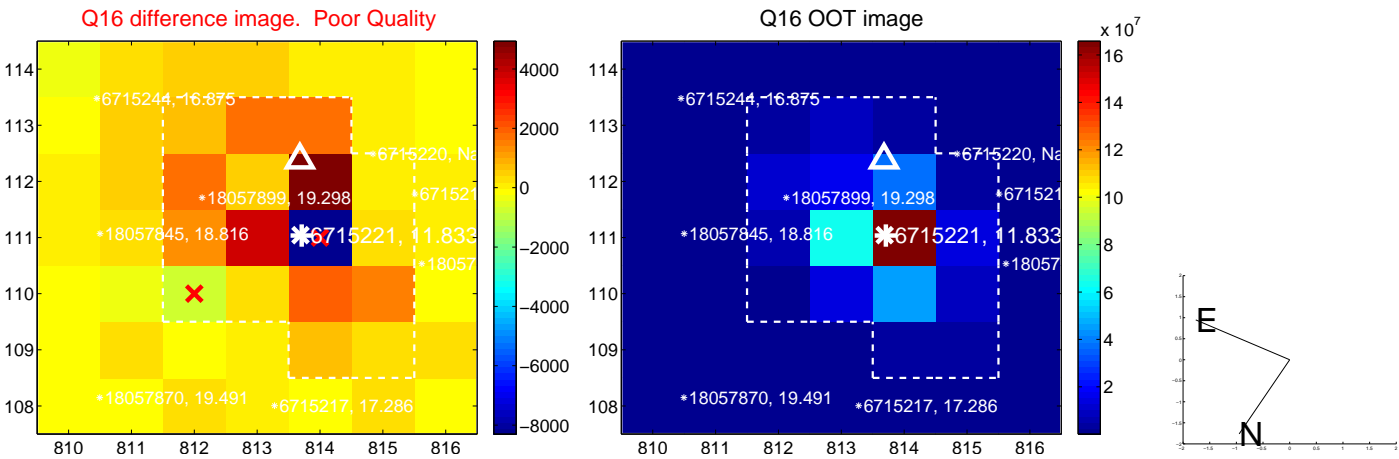
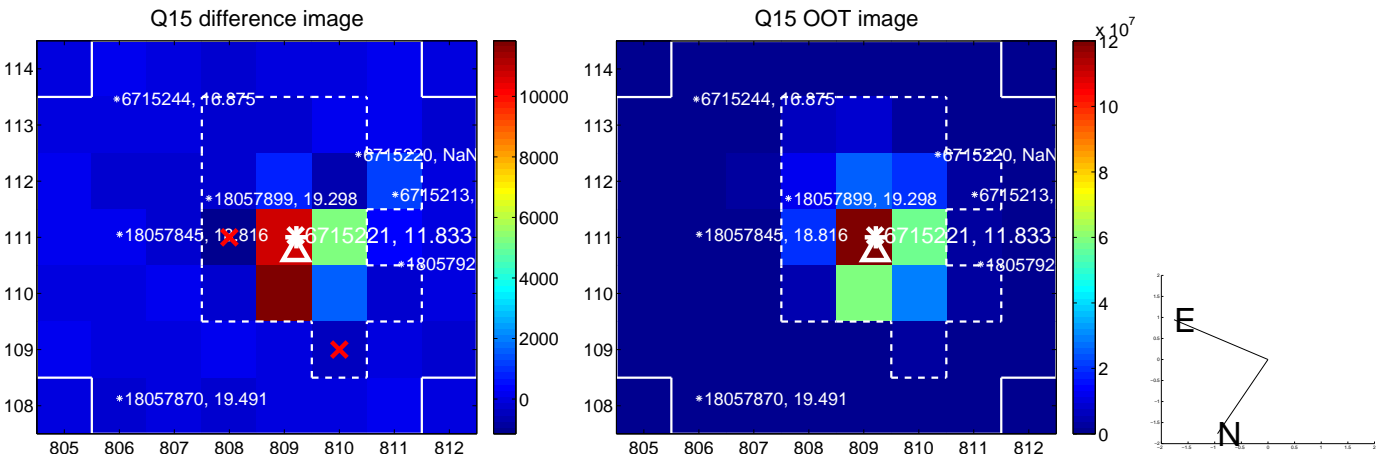
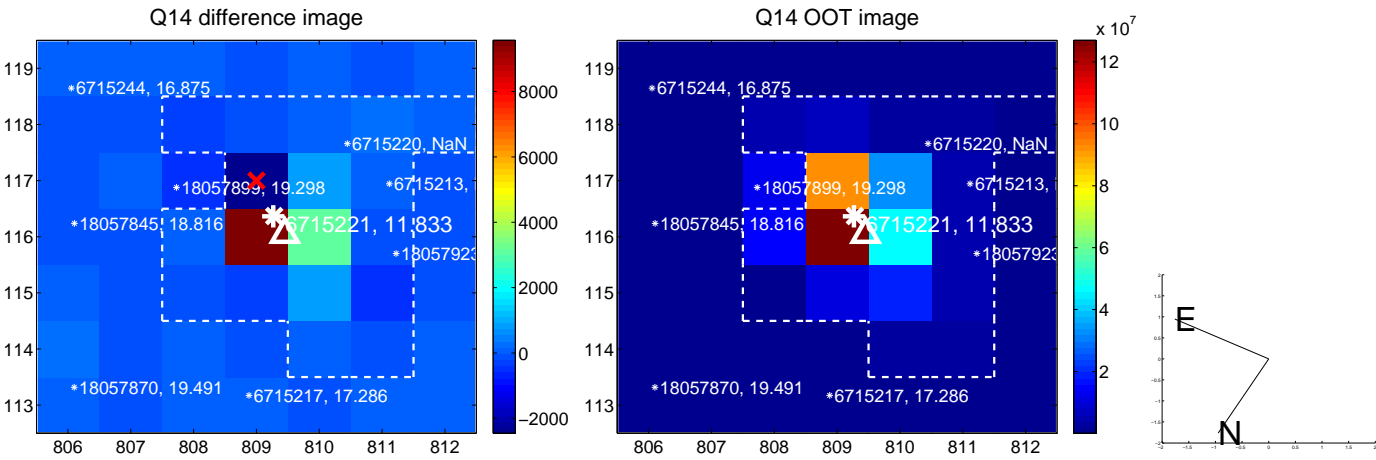
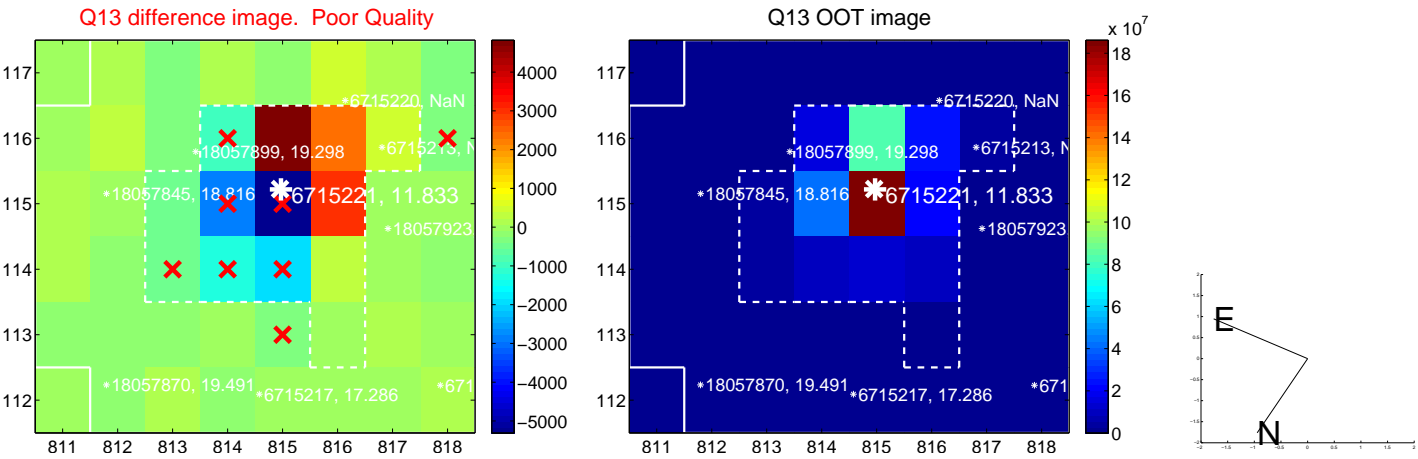




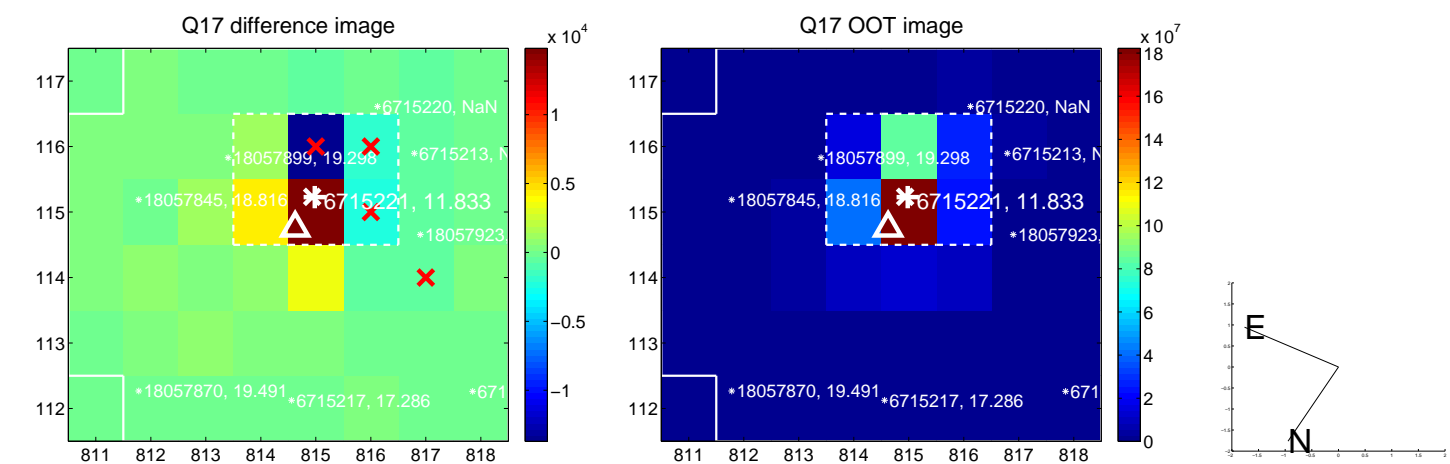
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



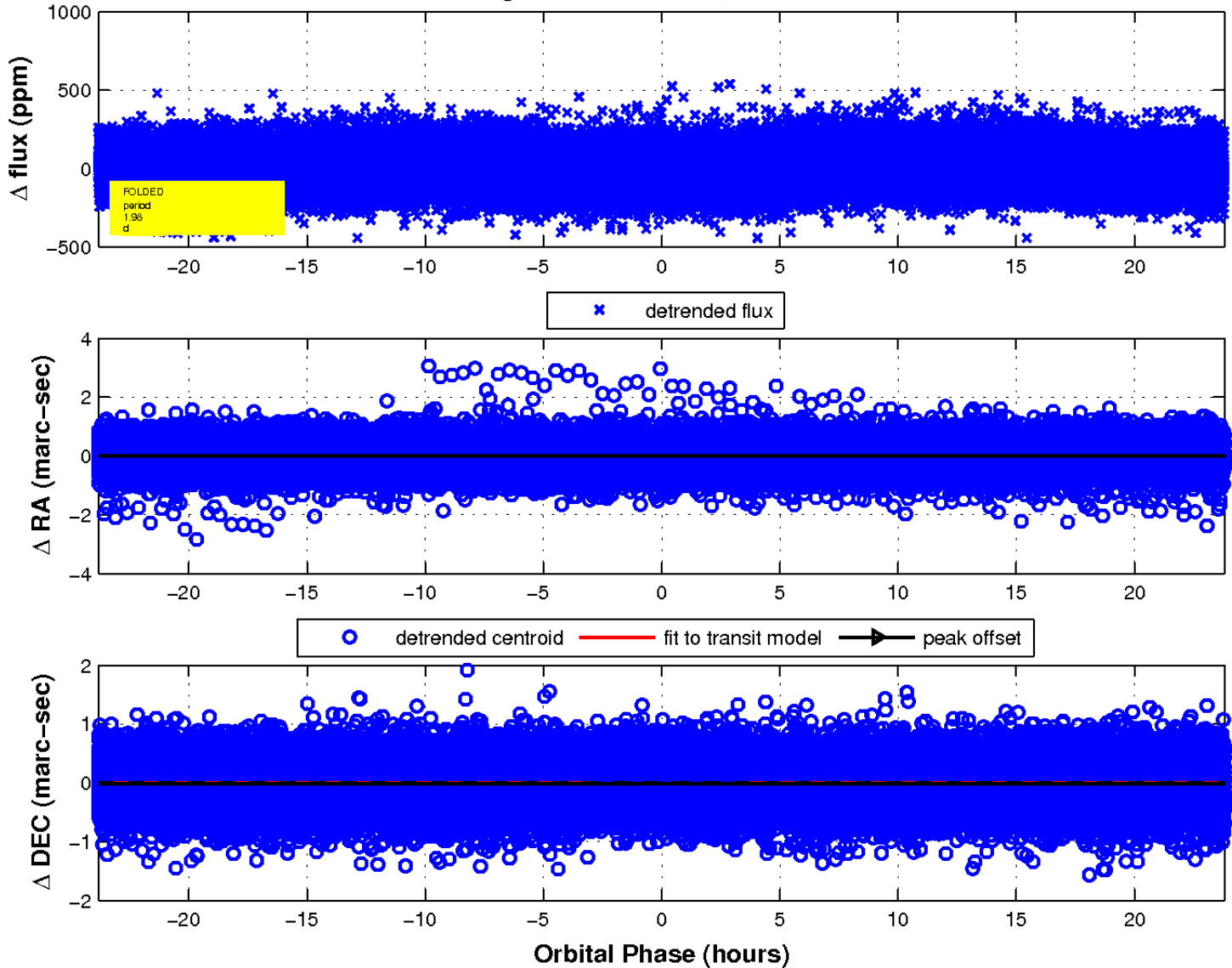
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

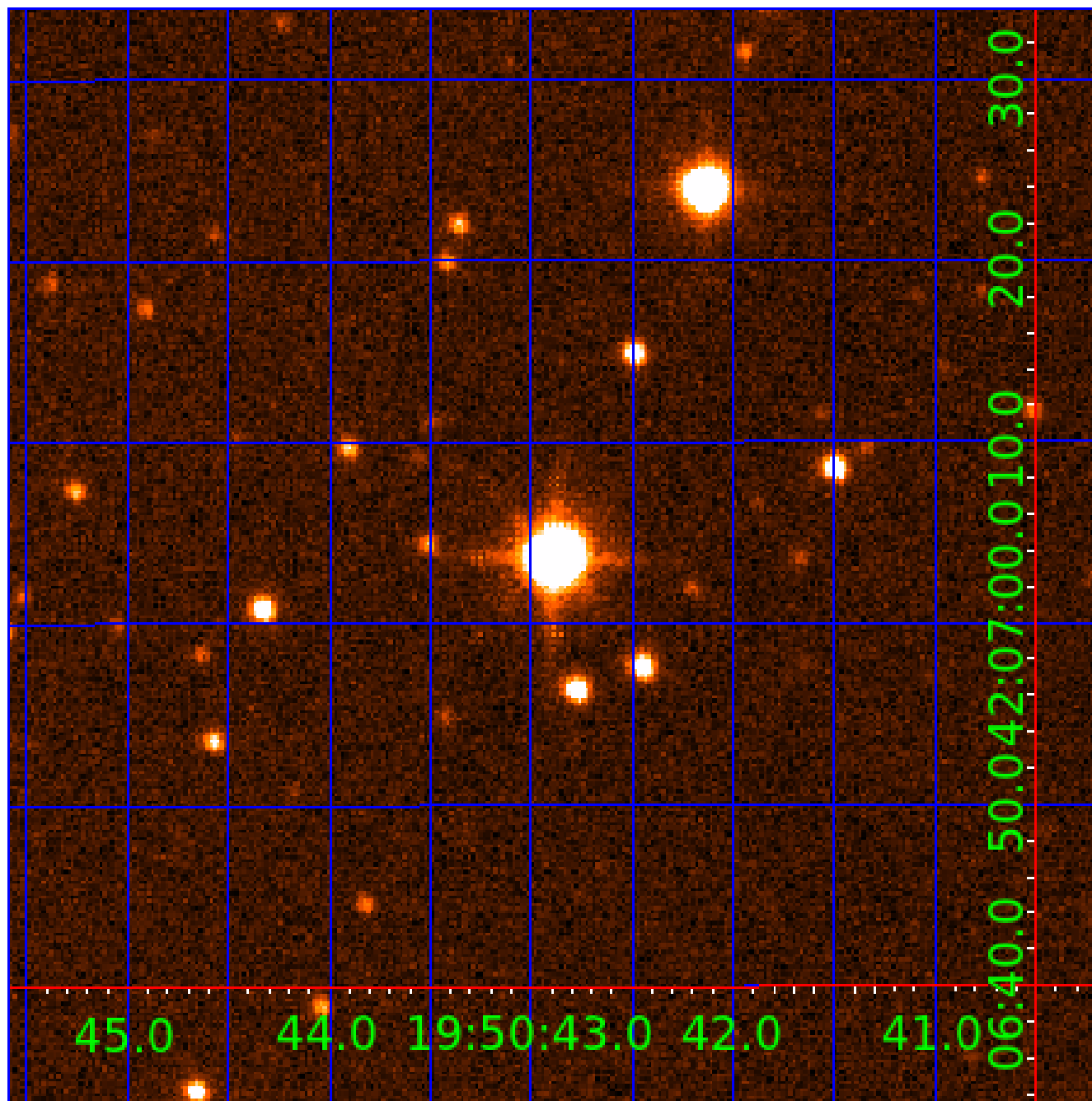


fluxWeightedCentroids, Planet 1 of 10



UKIRT Image

Declination



## KIC 006715221

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006715221-01	OBS	No	1.984918	132.459230	13.3	8.776	9.2	7.4	2.02	6839	0.74	6389.14
006715221-02	OBS	No	107.919359	152.278773	91.7	14.832	10.4	6.2	2.02	6839	2.12	31.02
006715221-03	OBS	No	333.120273	314.487390	168.1	20.190	10.4	7.6	2.02	6839	2.83	6.90
006715221-04	OBS	No	134.224992	188.680406	137.8	3.578	8.3	7.4	2.02	6839	2.67	23.19
006715221-05	OBS	No	107.107514	214.951810	149.8	13.238	8.0	8.9	2.02	6839	3.25	31.33
006715221-06	OBS	No	400.898244	254.418073	152.5	9.827	8.0	7.8	2.02	6839	2.91	5.39
006715221-07	OBS	No	34.101777	151.432052	96.7	3.723	7.7	8.0	2.02	6839	2.32	144.12
006715221-08	OBS	No	65.108276	163.640682	100.0	4.485	7.8	7.8	2.02	6839	2.31	60.85
006715221-09	OBS	No	118.508397	233.886395	144.3	11.967	8.1	7.9	2.02	6839	2.70	27.38
006715221-10	OBS	No	36.316557	165.427888	72.2	12.670	8.2	7.1	2.02	6839	2.27	132.52

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006715221-01	OBS	FP	0.00	1	0	0	0	LPP_DV
006715221-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
006715221-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
006715221-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
006715221-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_ALT—CENT_FEW_MEAS
006715221-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—MOD_NONUNIQ_ALT
006715221-07	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—MOD_NONUNIQ_ALT
006715221-08	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—MOD_NONUNIQ_ALT
006715221-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_MEAS
006715221-10	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_UNRESOLVED_OFFSET

**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.

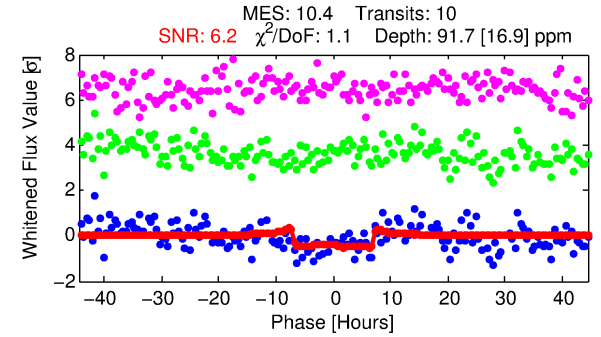
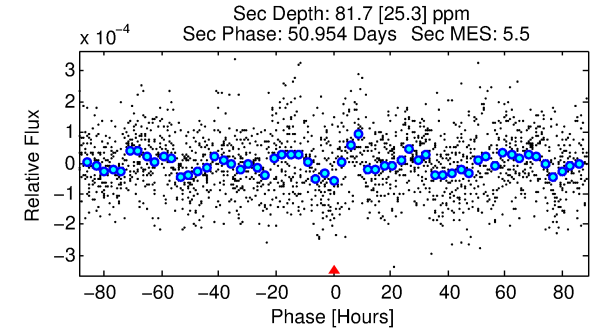
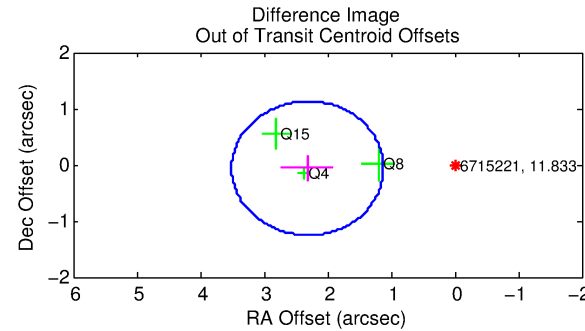
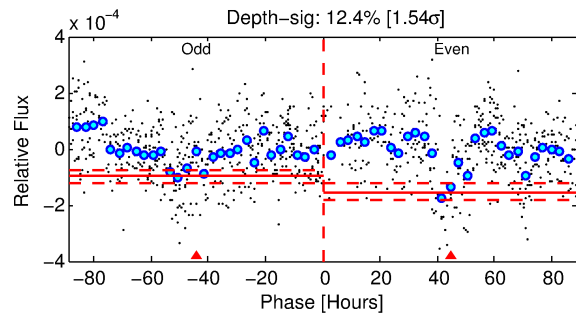
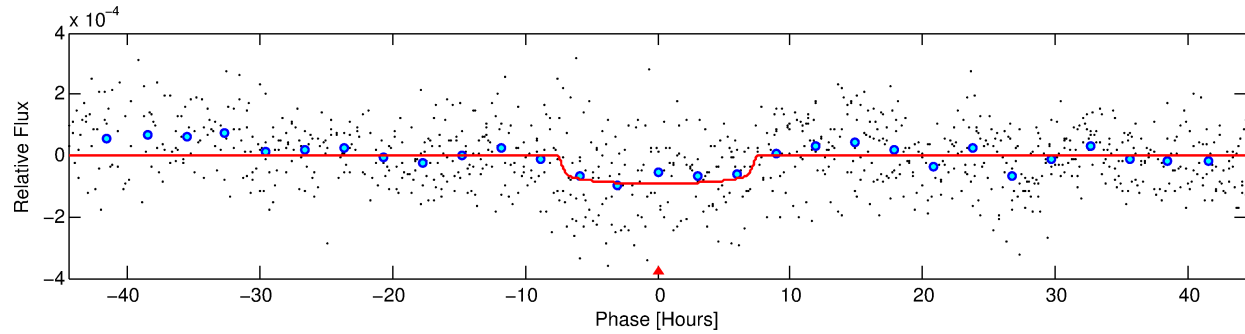
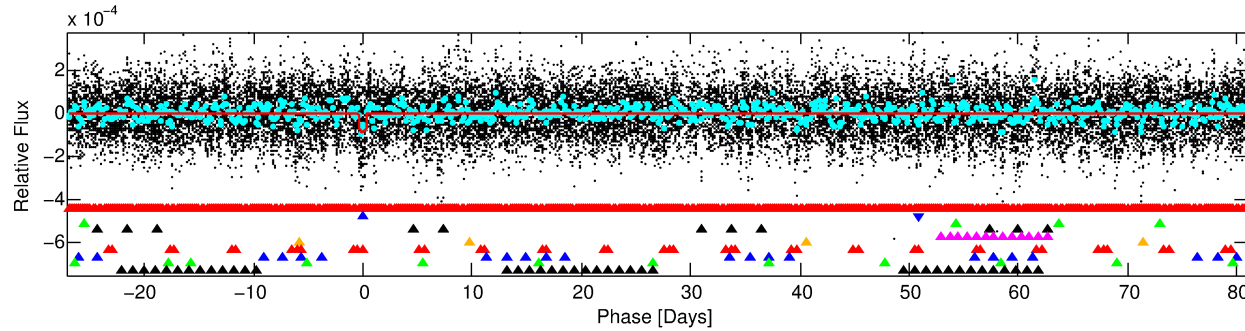
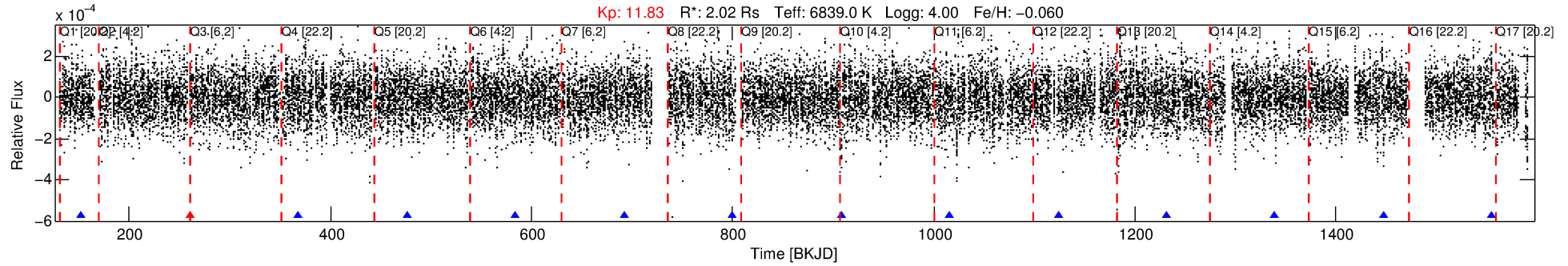
Ephemeris Match Information For 006715221-02

No Significant Match Found



# DV One-Page Summary

KIC: 6715221 Candidate: 2 of 10 Period: 107.919 d



## DV Fit Results:

Period = 107.91936 [0.00262] d  
Epoch = 152.2788 [0.0199] BKJD  
Rp/R\* = 0.0096 [0.0024]  
a/R\* = 35.58 [46.38]  
b = 0.78 [0.65]  
Seff = 31.02 [12.82]  
Teq = 602 [62] K  
Rp = 2.12 [0.82] Re  
a = 0.5078 [0.1316] AU  
Ag = 2581.00 [1819.56] [1.42 $\sigma$ ]  
Teffp = 6632 [996] K [6.04 $\sigma$ ]

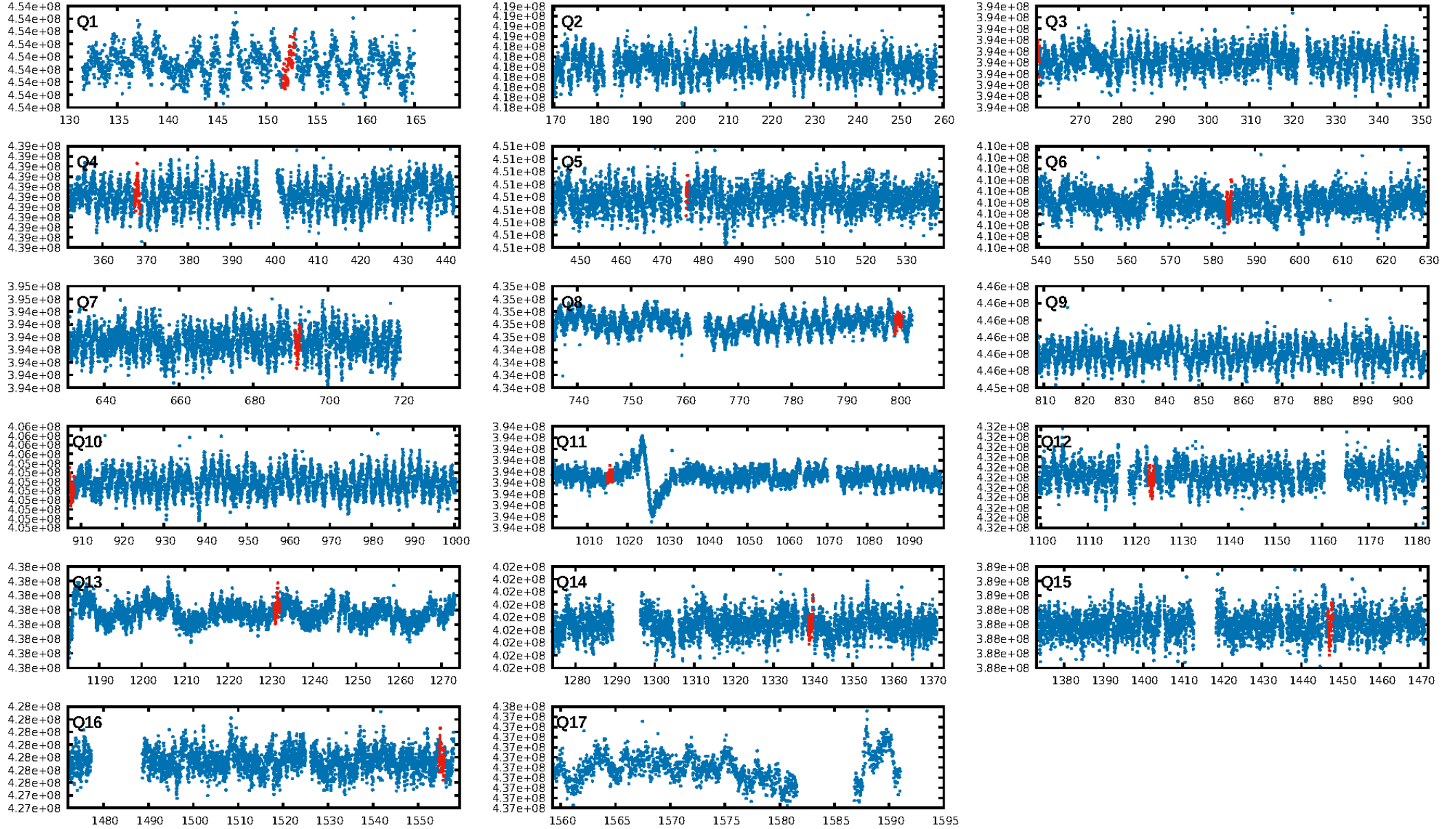
## DV Diagnostic Results:

ShortPeriod-sig: 67.3% [0.98 $\sigma$ ]  
LongPeriod-sig: 100.0% [13.34 $\sigma$ ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 2.43e-13  
RollingBand-fgt: 0.90 [9/10]  
GhostDiagnostic-chr: 1.306  
Centroid-sig: 11.6%  
Centroid-so: 1.054 arcsec [1.35 $\sigma$ ]  
OotOffset-rm: 2.315 arcsec [5.83 $\sigma$ ]  
KicOffset-rm: 2.232 arcsec [6.10 $\sigma$ ]  
OotOffset-st: 0/1/2/0 [3]  
KicOffset-st: 0/1/2/0 [3]  
DiffImageQuality-fgm: 0.00 [0/3]  
DiffImageOverlap-fno: 0.00 [0/8]

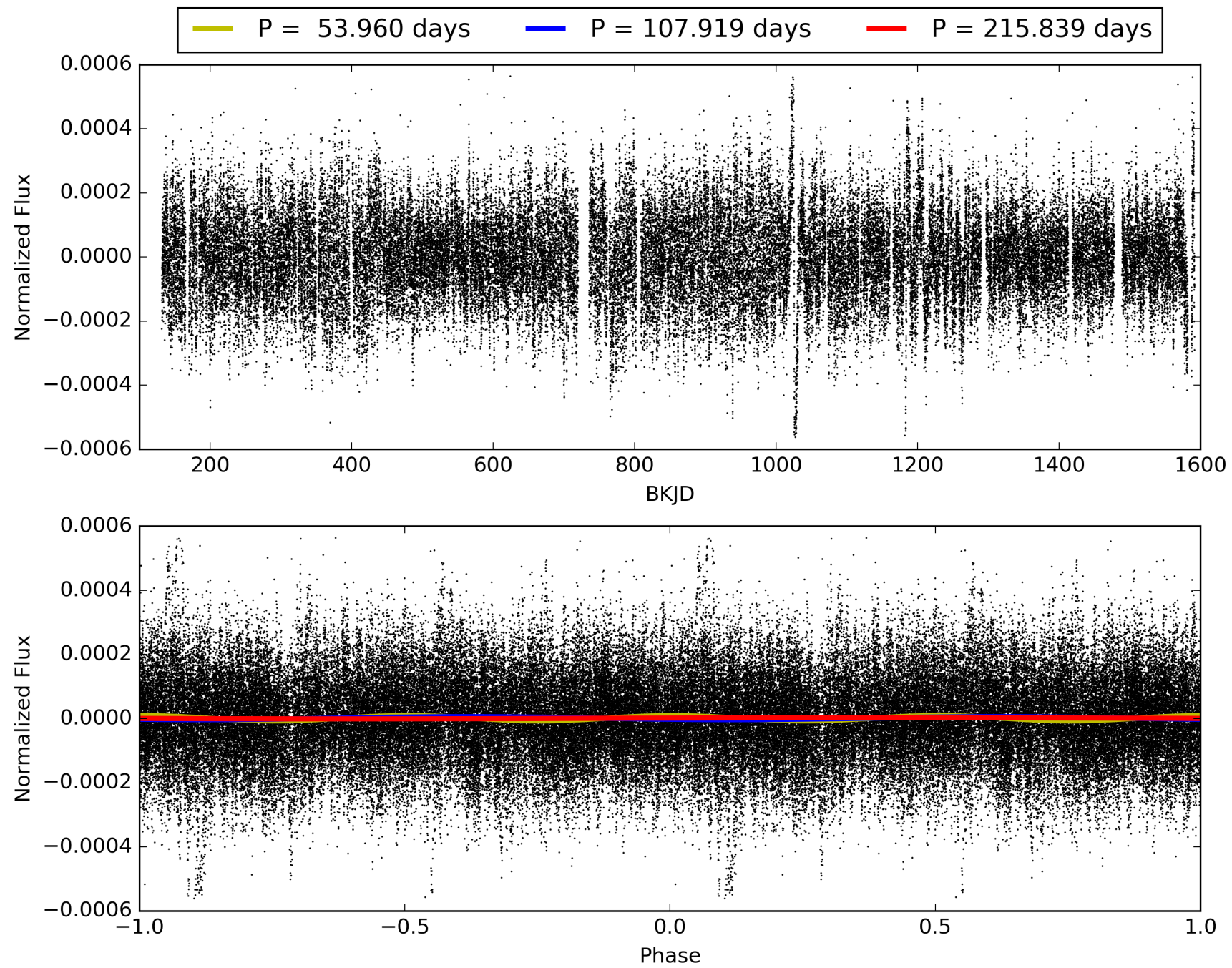
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 05:30:06 Z

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

# TCE 006715221-02, PDC Light Curves

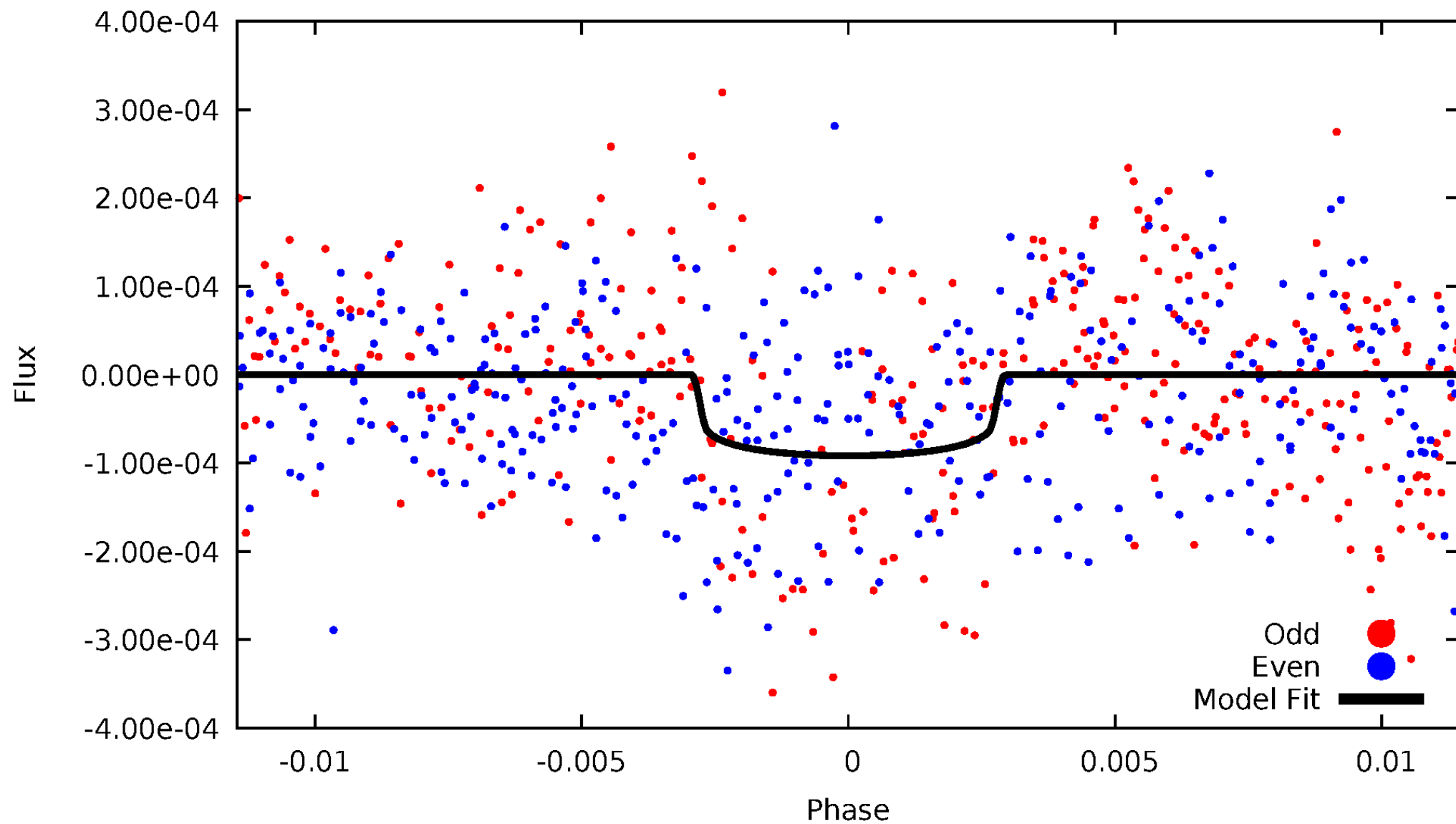


# TCE 006715221-02



# DV Odd/Even

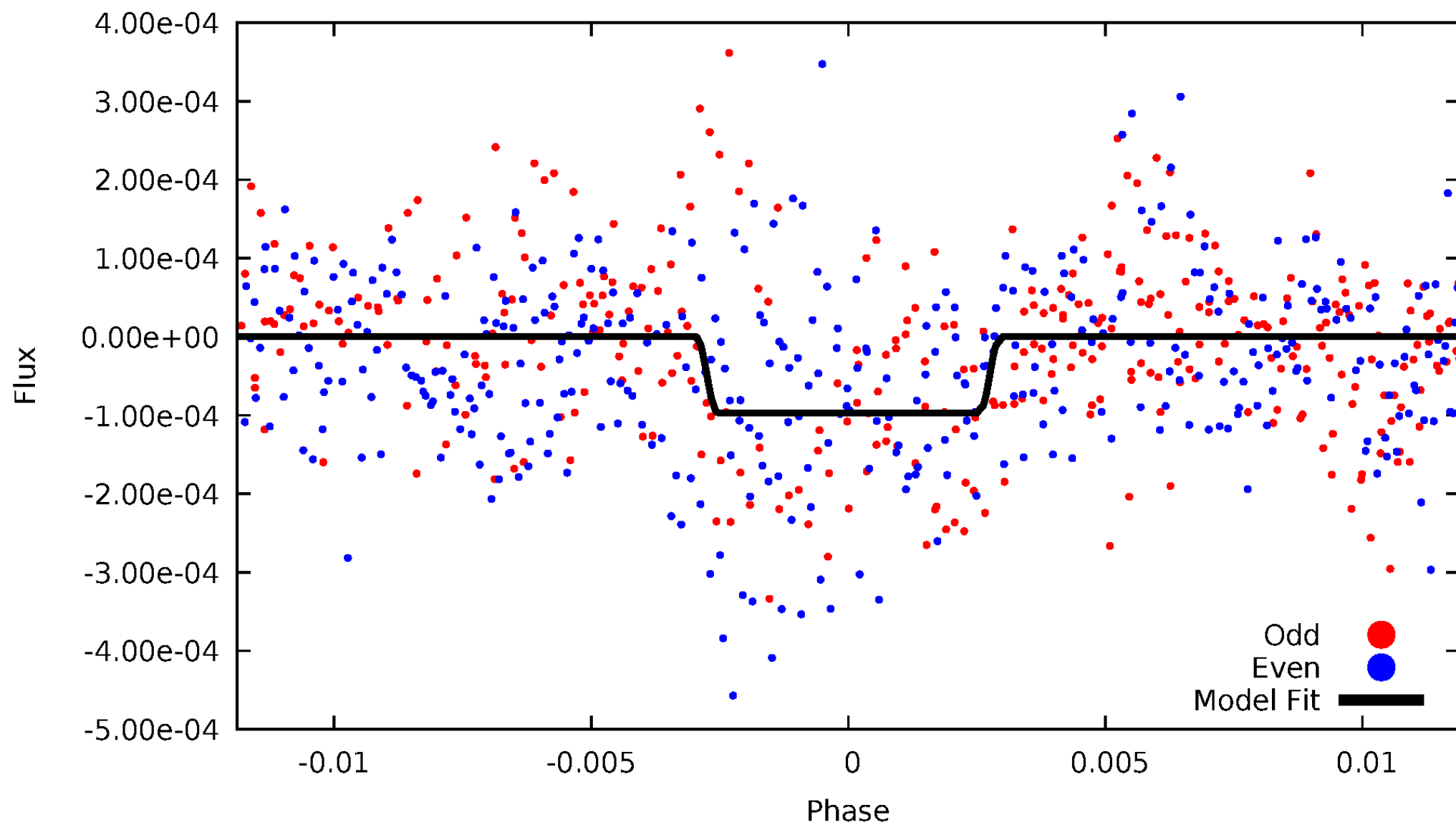
TCE 006715221-02





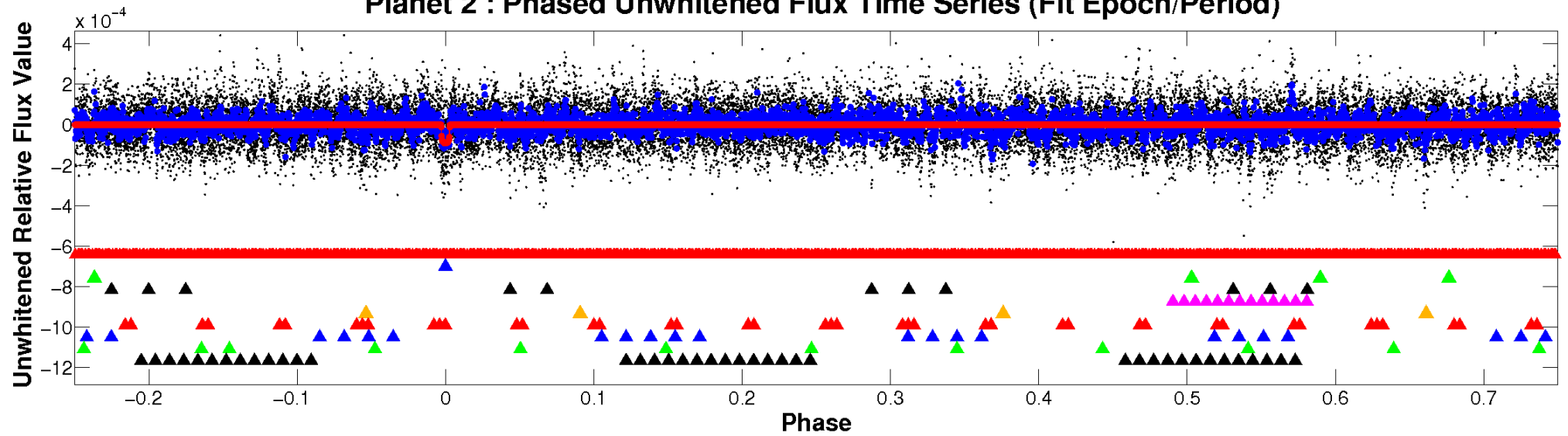
# ALT Odd/Even

TCE 006715221-02

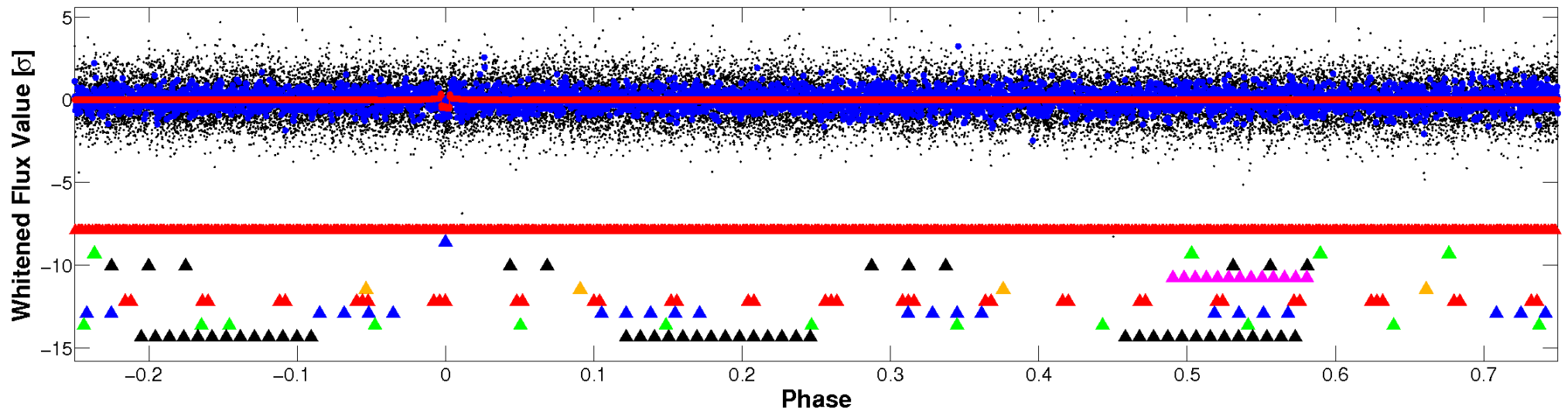


# Non-Whitened Vs. Whitened Light Curve

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

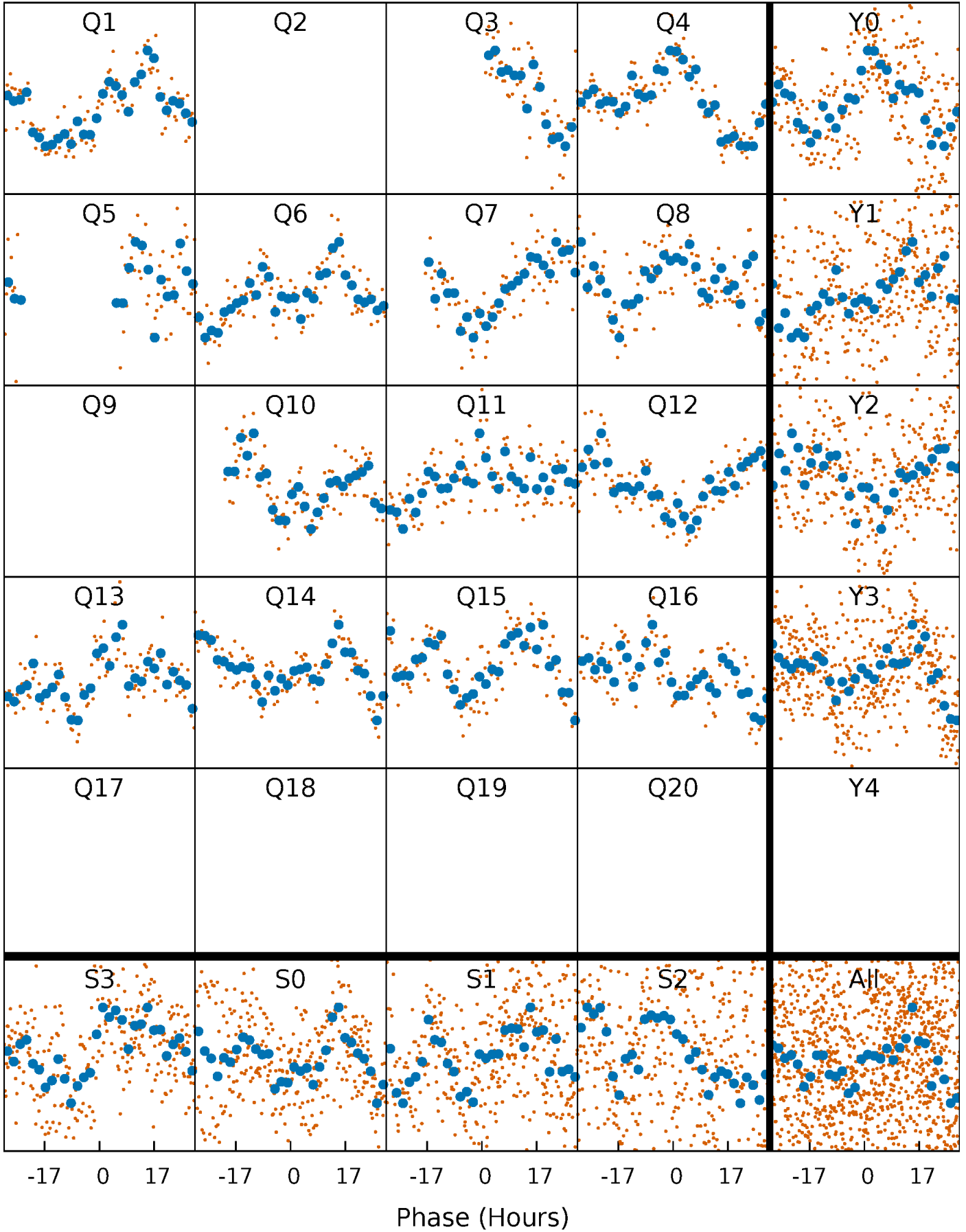


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



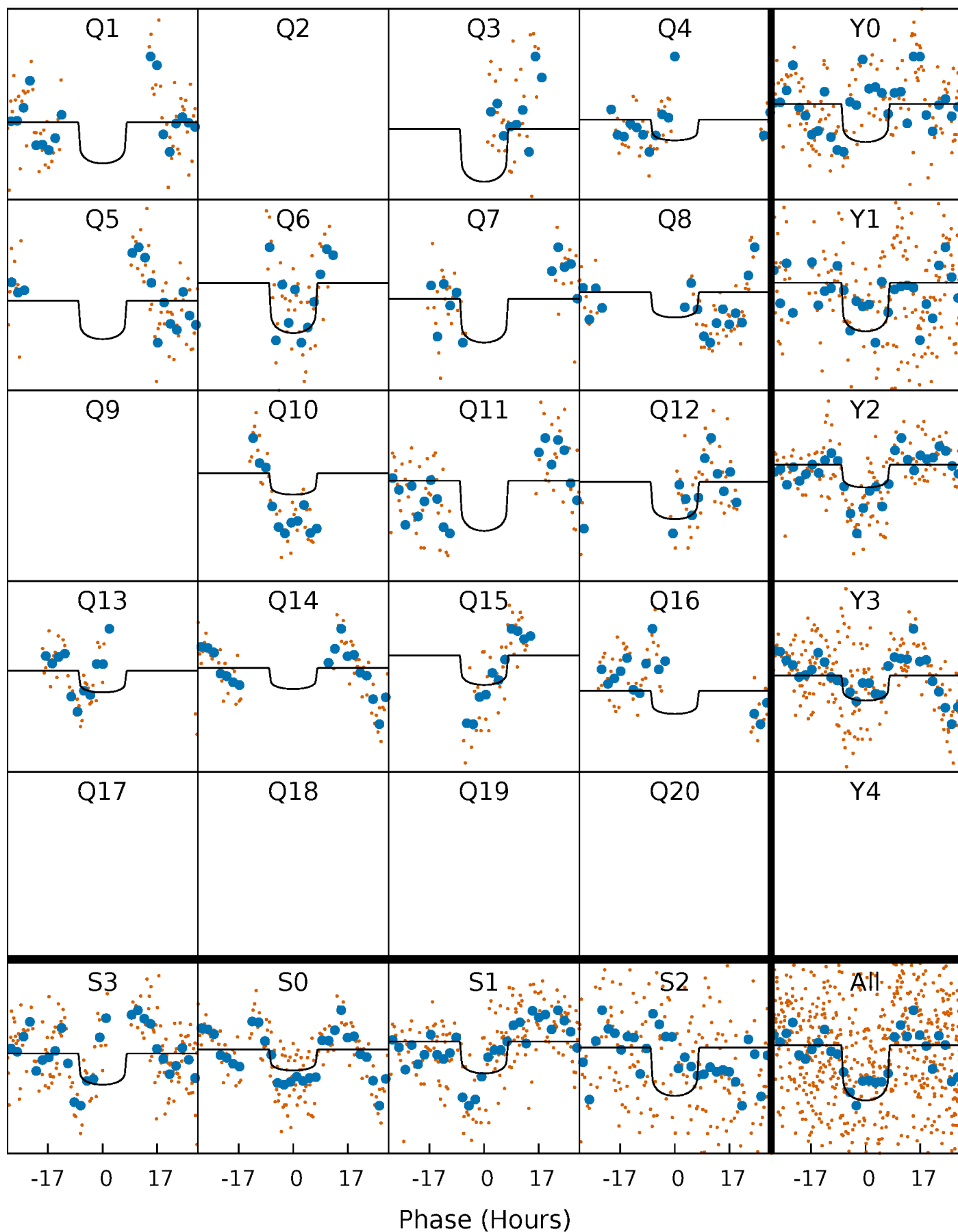
# PDC Quarter-Phased Transit Curves

TCE 006715221-02 P=107.919359 Days  $T_0=152.278773$  (BKJD)



# DV Quarter-Phased Transit Curves

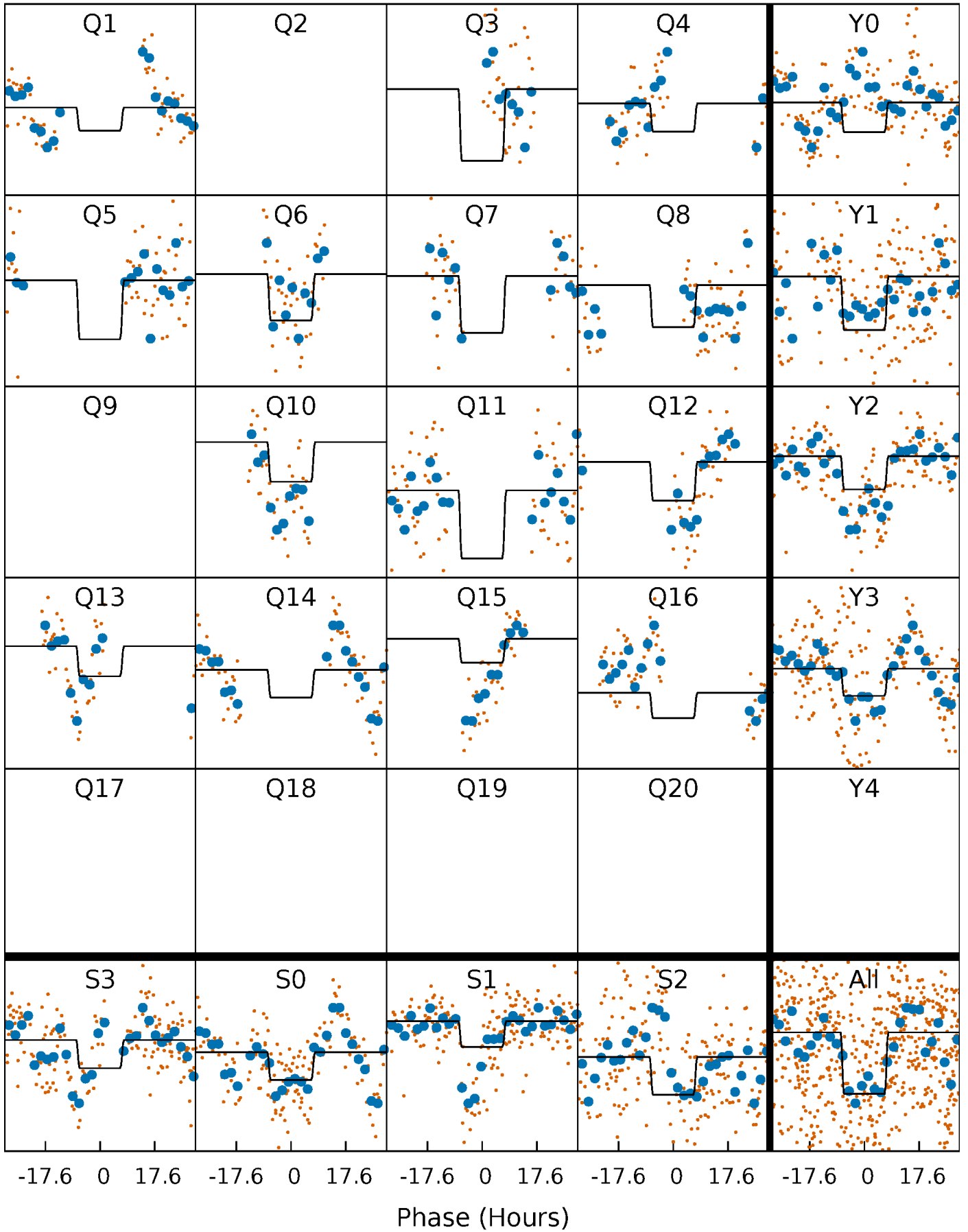
TCE 006715221-02   P=107.919359 Days    $T_0=152.278773$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

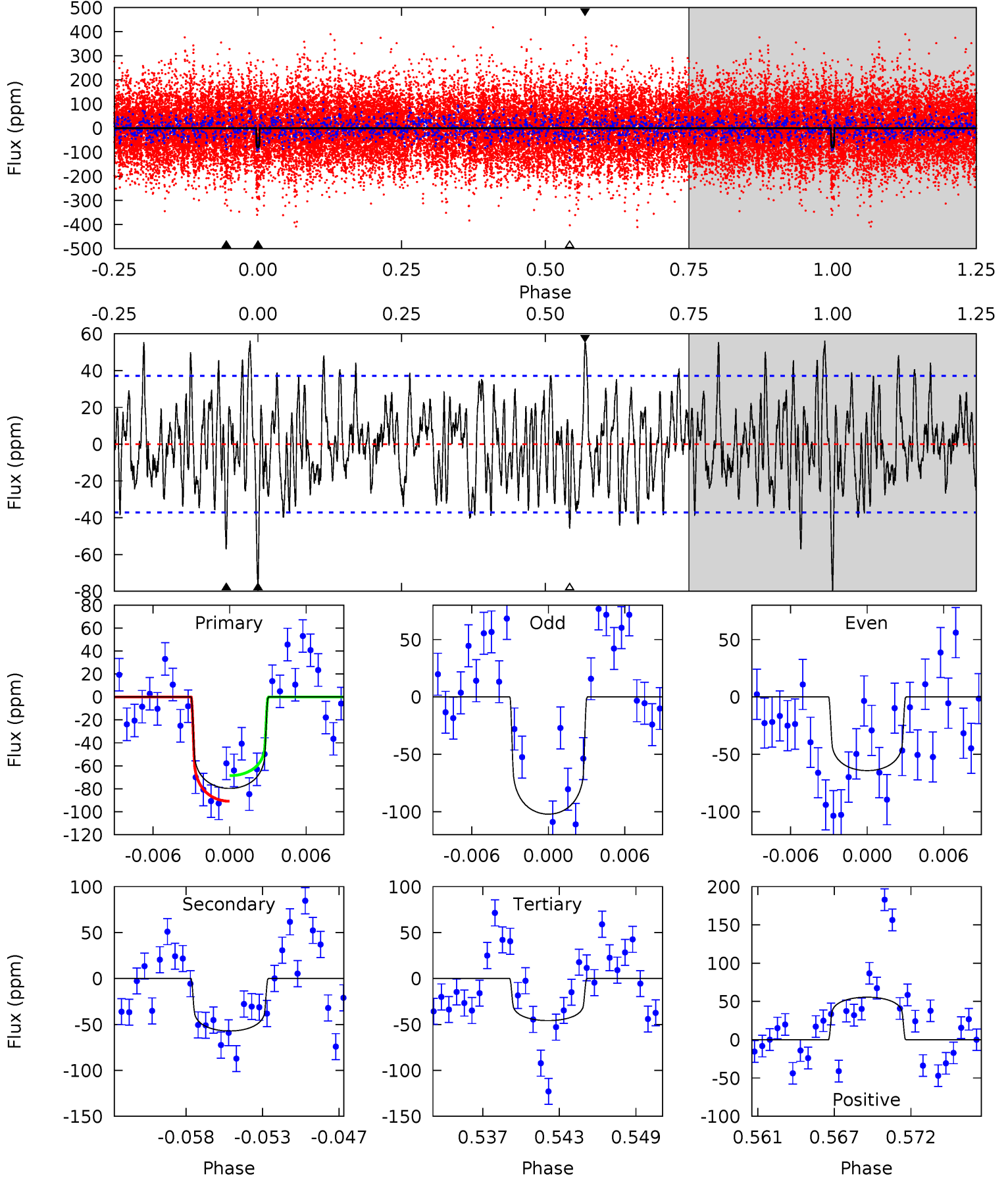
TCE 006715221-02 P=107.916442 Days  $T_0=152.311577$  (BKJD)



# DV Model-Shift Uniqueness Test

006715221-02, P = 107.919359 Days, E = 44.359414 Days

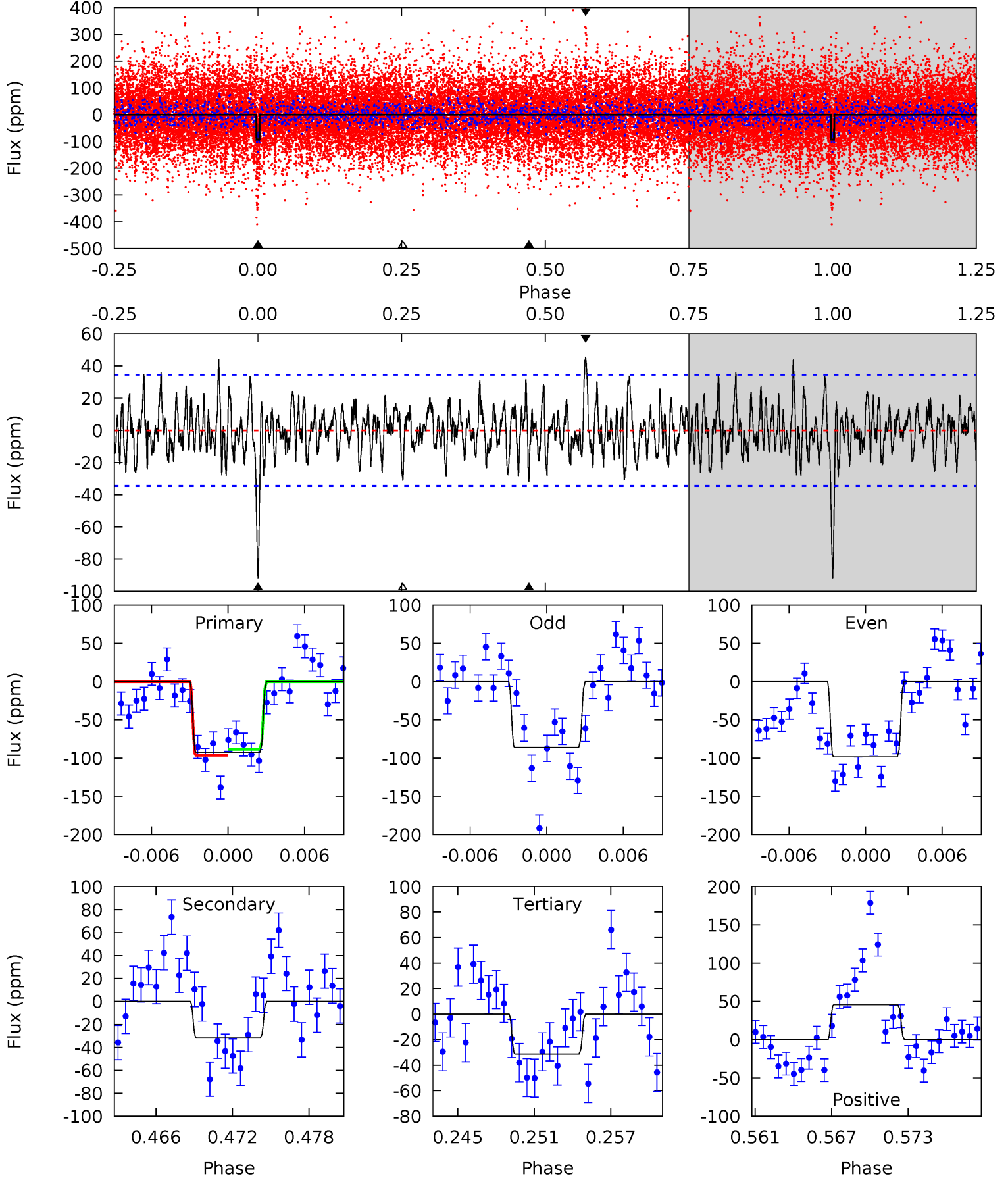
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.0	7.90	6.33	7.68	5.13	2.76	2.64	4.68	3.33	1.56	0.21	2.59	1.06	0.41	1.54



# Alt Model-Shift Uniqueness Test

006715221-02, P = 107.916442 Days, E = 44.395135 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
13.7	4.70	4.62	6.78	5.12	2.75	1.83	9.04	6.89	0.08	-2.07	0.91	0.74	0.33	0.59



### Stellar Parameters For KIC 006715221

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6839^{+163}_{-225}$	$4.003^{+0.221}_{-0.119}$	$-0.060^{+0.250}_{-0.300}$	$2.020^{+0.396}_{-0.594}$	$1.497^{+0.172}_{-0.257}$	$0.256^{+0.303}_{-0.104}$
	+2%/-3%	+6%/-3%	+417%/-500%	+20%/-29%	+11%/-17%	+118%/-41%
Source	PHO1	FLK73	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 006715221-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-57 \pm 7$	$2.03^{+0.59}_{-0.54}$	$833^{+49}_{-57}$	$6034^{+943}_{-596}$	$1987^{+1591}_{-831}$
Alt.	$-32 \pm 7$	$2.11^{+0.64}_{-0.59}$	$835^{+52}_{-64}$	$5209^{+709}_{-554}$	$1033^{+856}_{-461}$

$T_{\text{max}}$  = 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

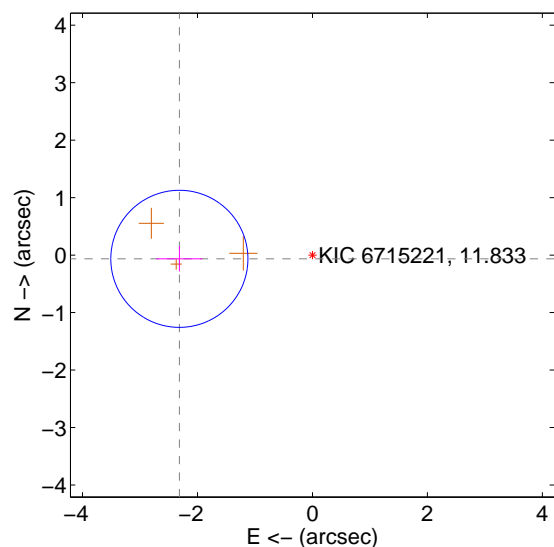
Supplemental centroid analysis for 006715221-02. **Kepler magnitude: 11.83.** Transit SNR 6.16

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

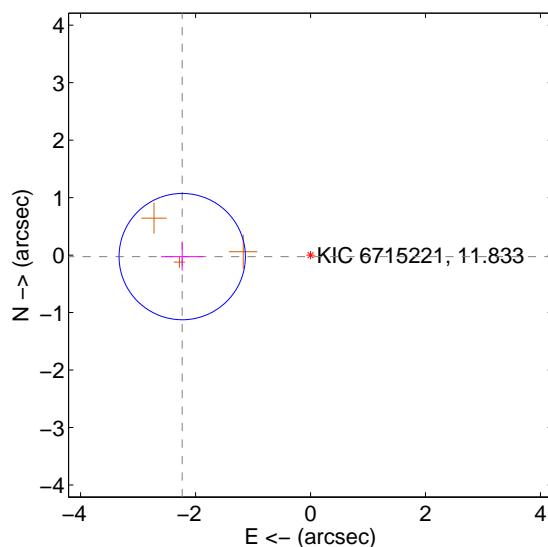
The direct PRF centroid is offset from the target star catalog position by about 0.12 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b>2.315 <math>\pm</math> 0.397</b>	<b>5.83</b>	2.315 $\pm$ 0.402	-0.065 $\pm$ 0.219
PRF-fit source offset from KIC position	<b>2.232 <math>\pm</math> 0.366</b>	<b>6.10</b>	2.232 $\pm$ 0.368	-0.026 $\pm$ 0.245
photometric centroid source offset	1.05 $\pm$ 0.78	1.35	-0.91 $\pm$ 0.82	0.54 $\pm$ 0.67

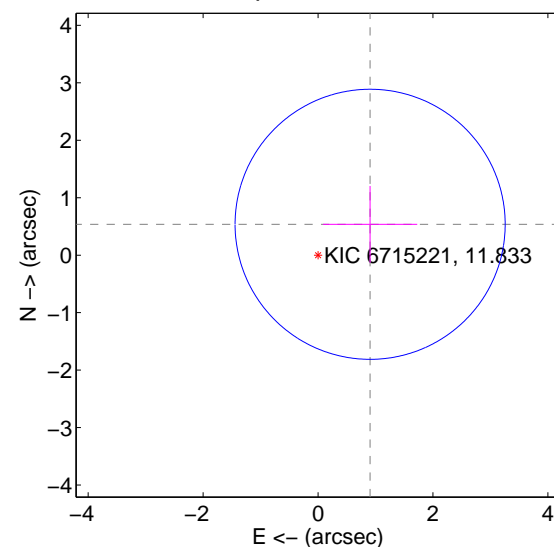
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

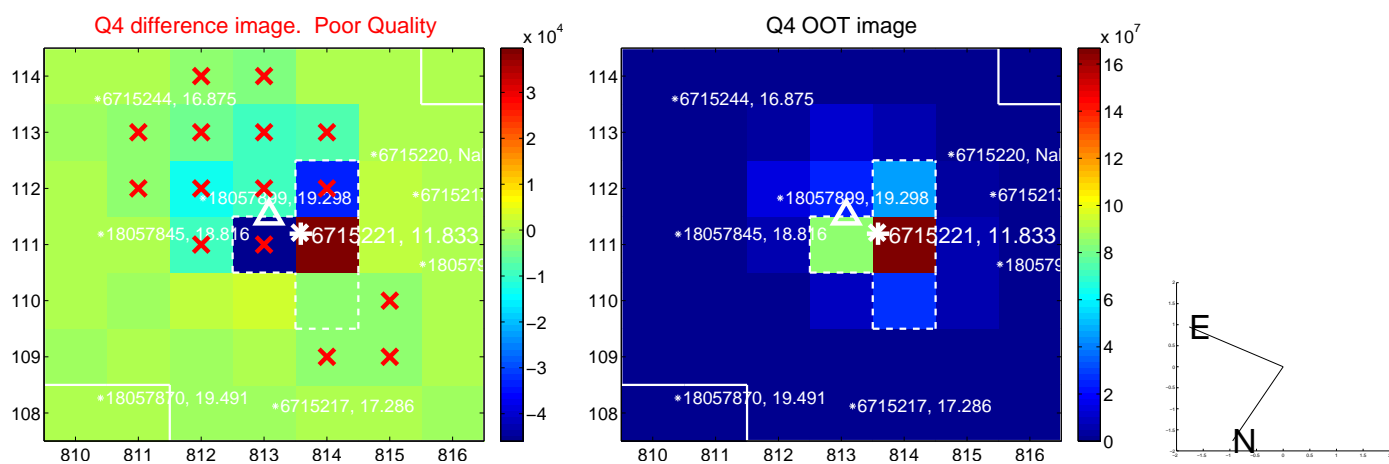
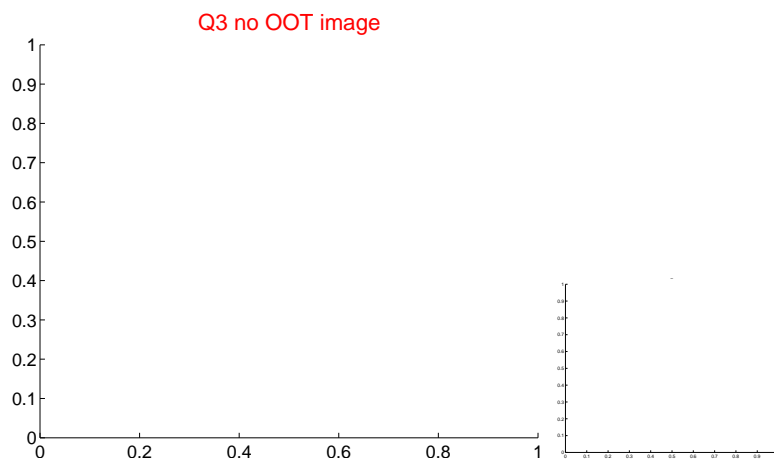
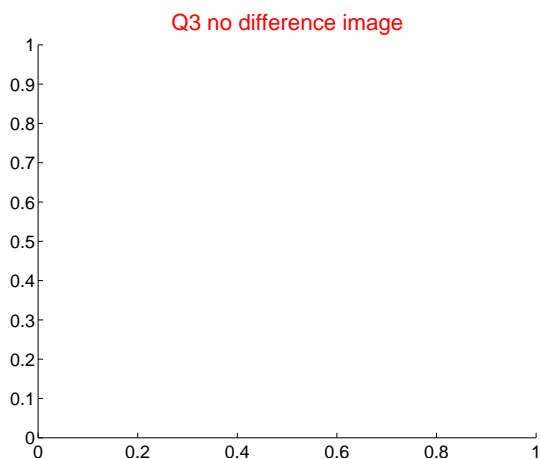
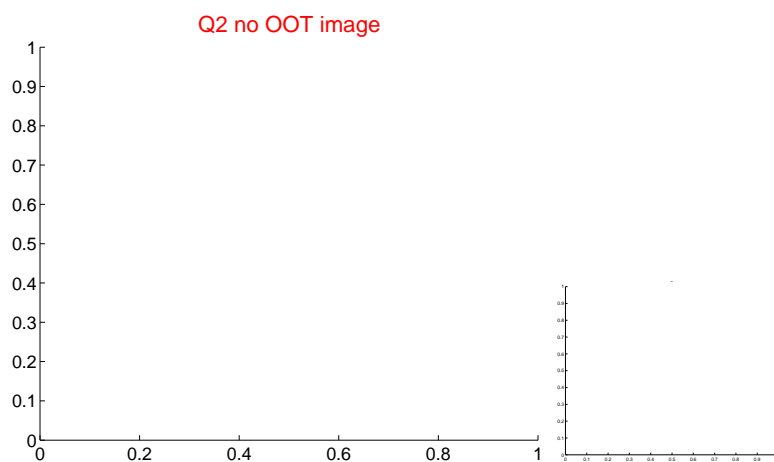
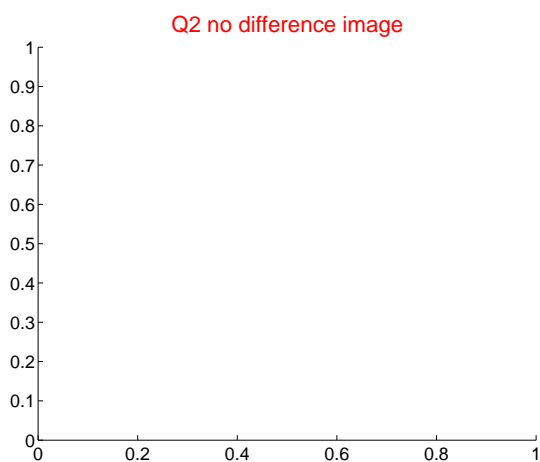
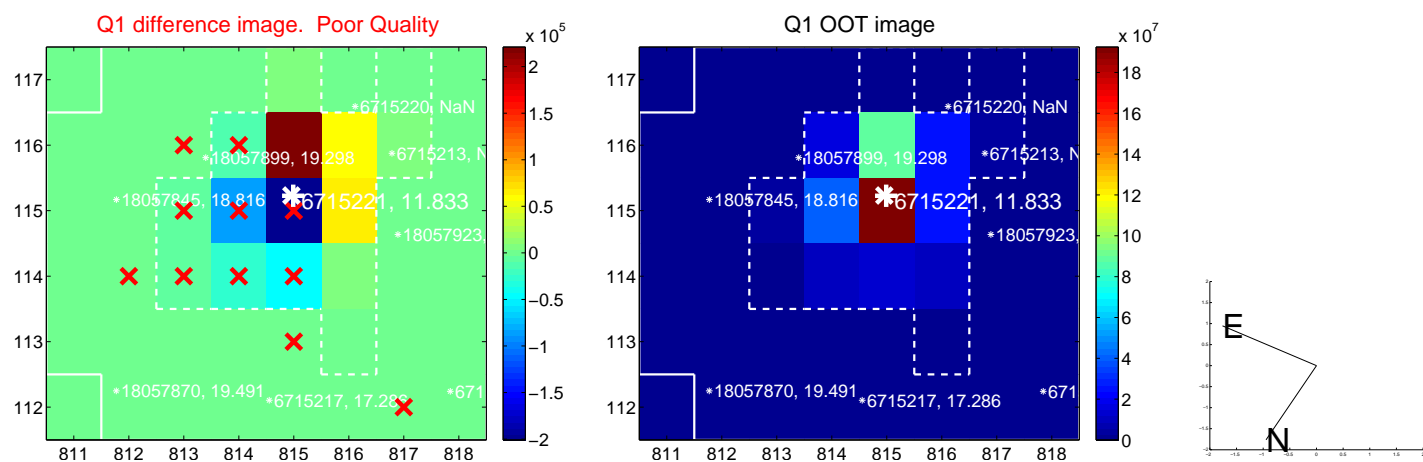


offset from photometric centroids



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.

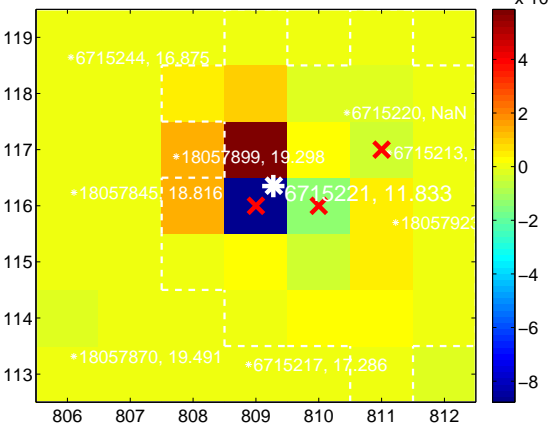
Q5 no difference image



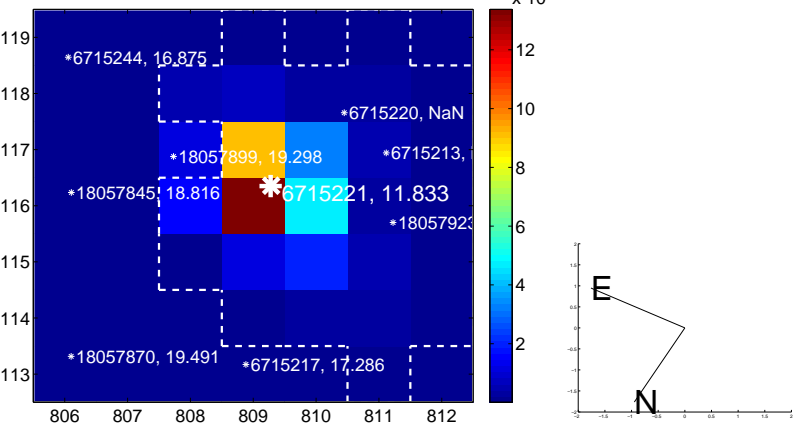
Q5 no OOT image



Q6 difference image. Poor Quality



Q6 OOT image



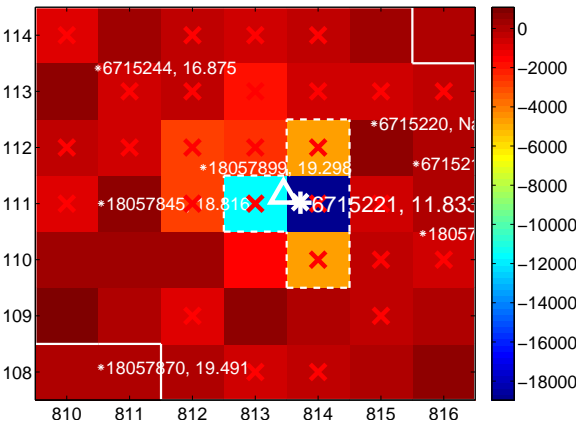
Q7 no difference image



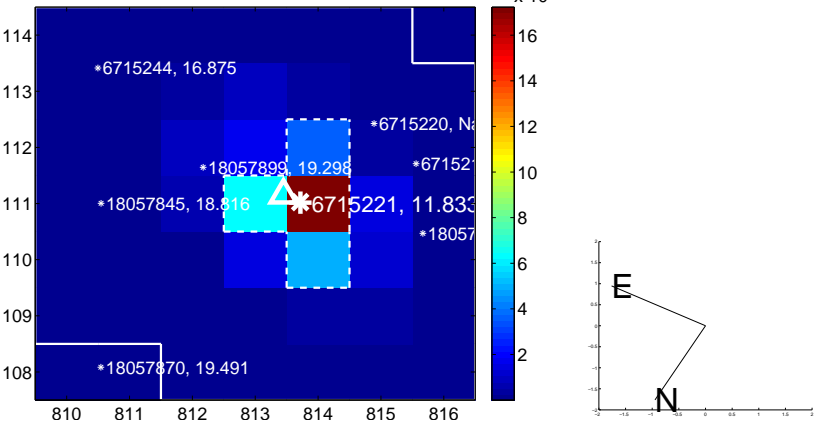
Q7 no OOT image



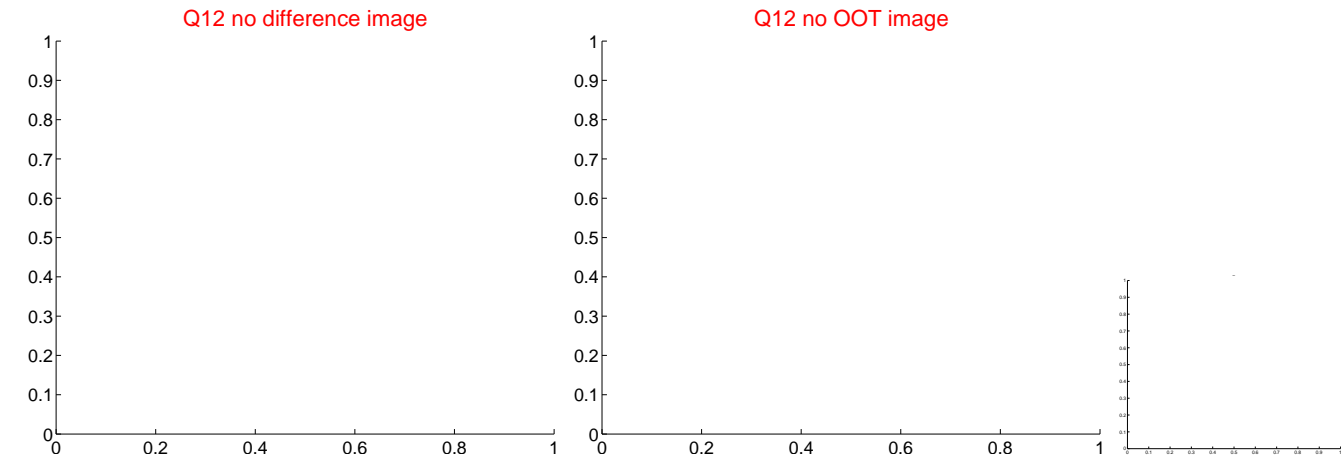
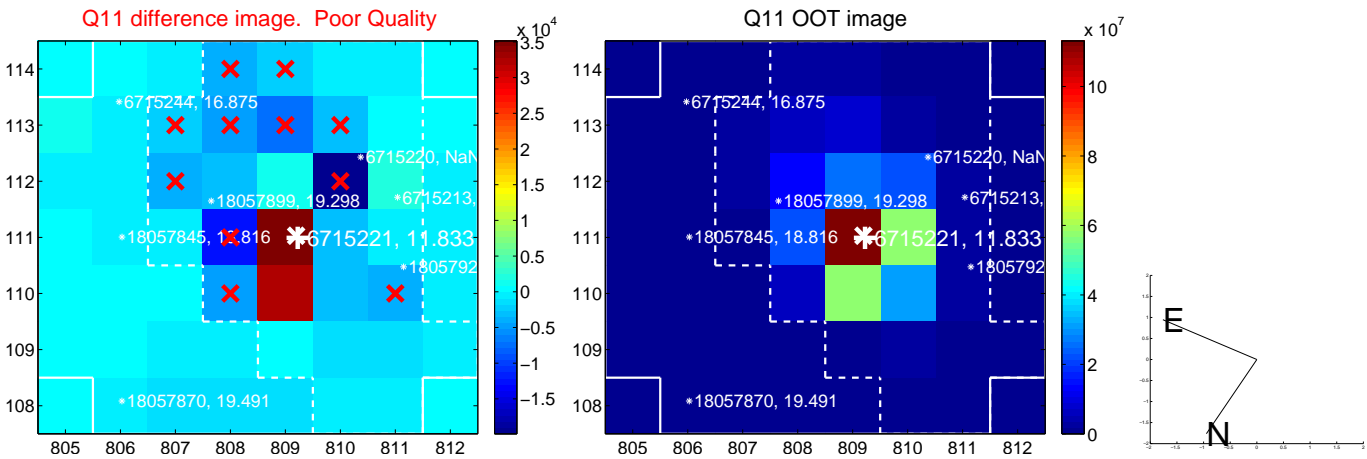
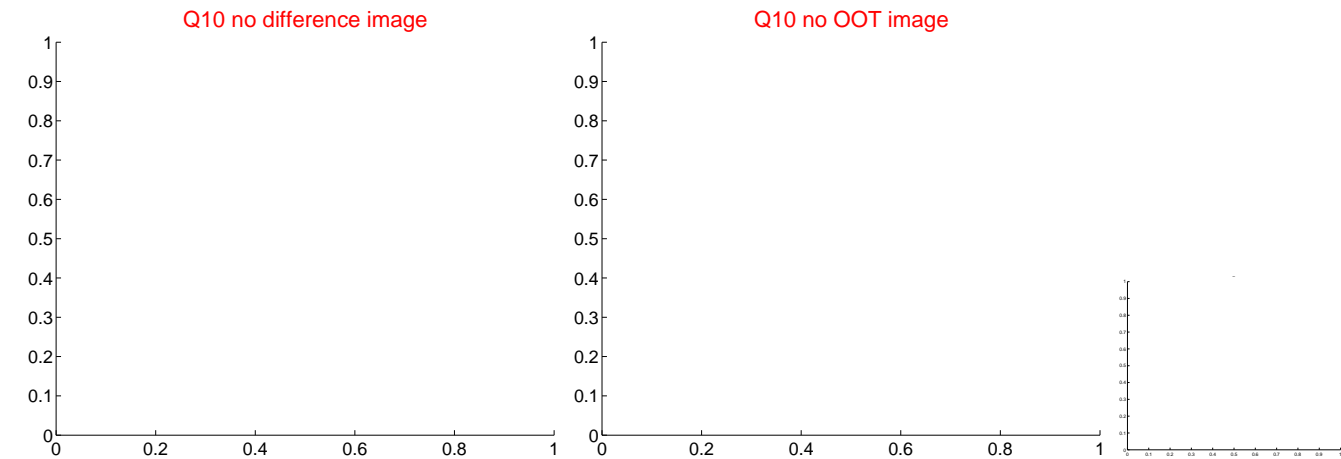
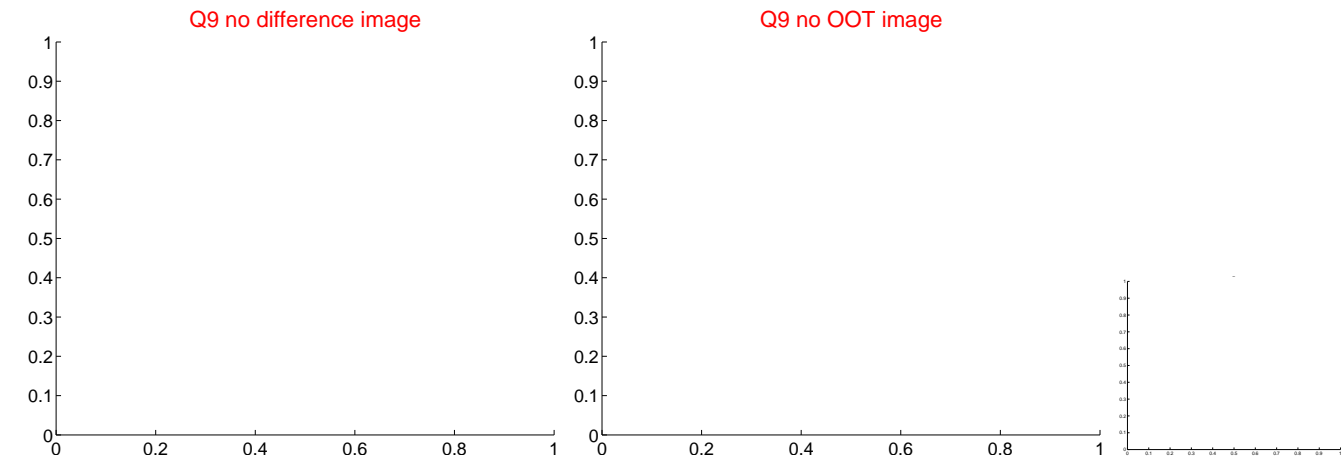
Q8 difference image. Poor Quality



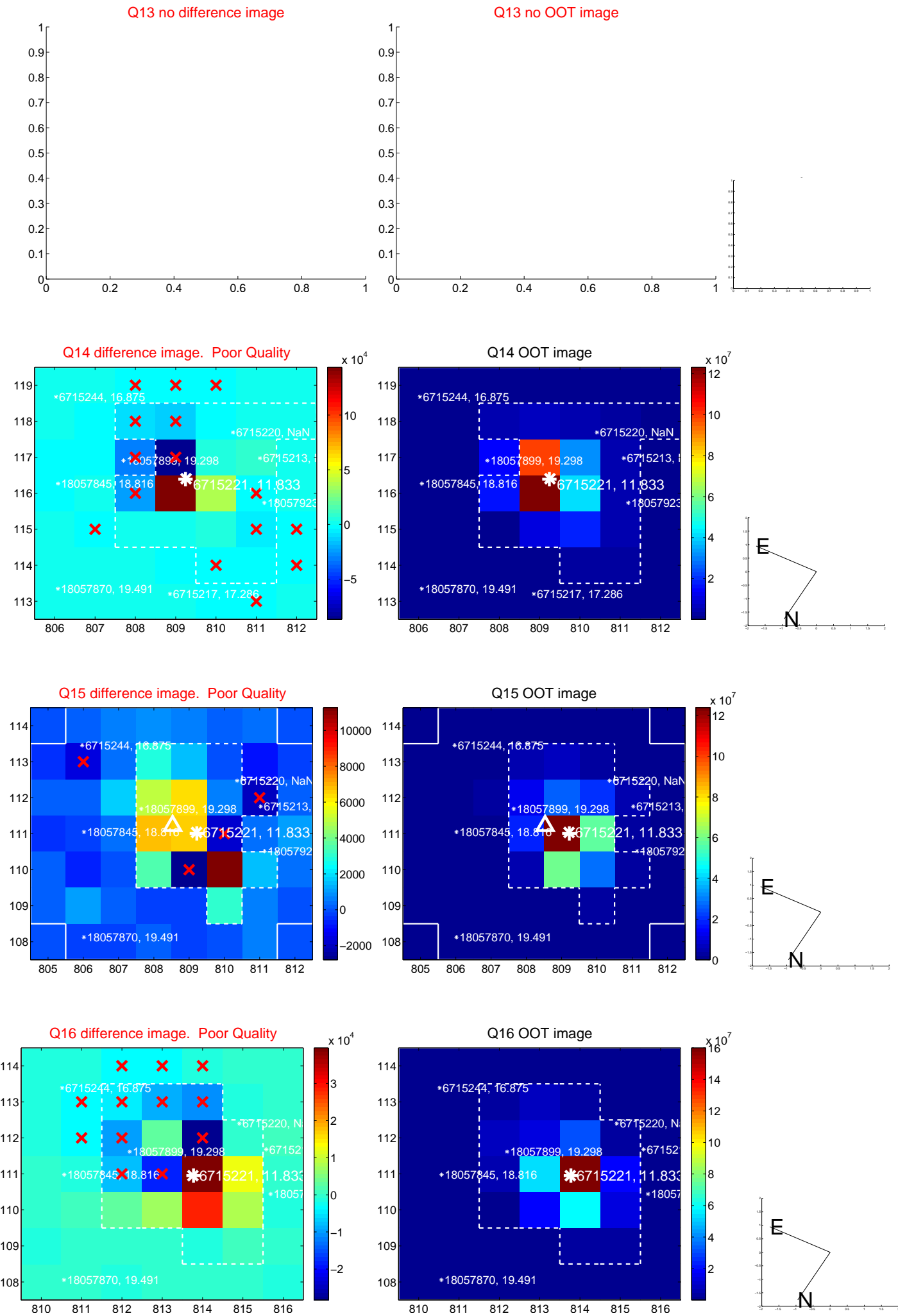
Q8 OOT image



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

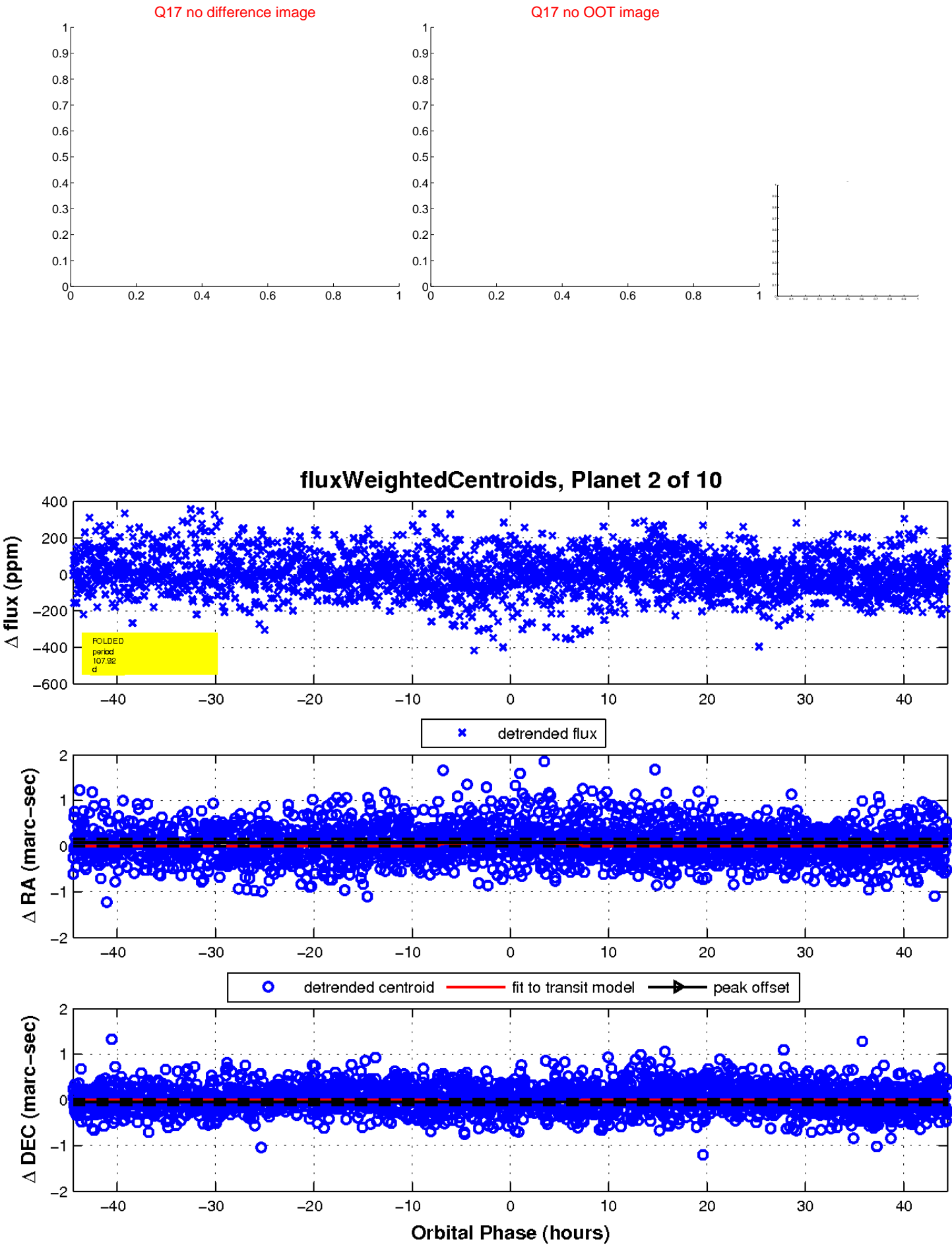


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



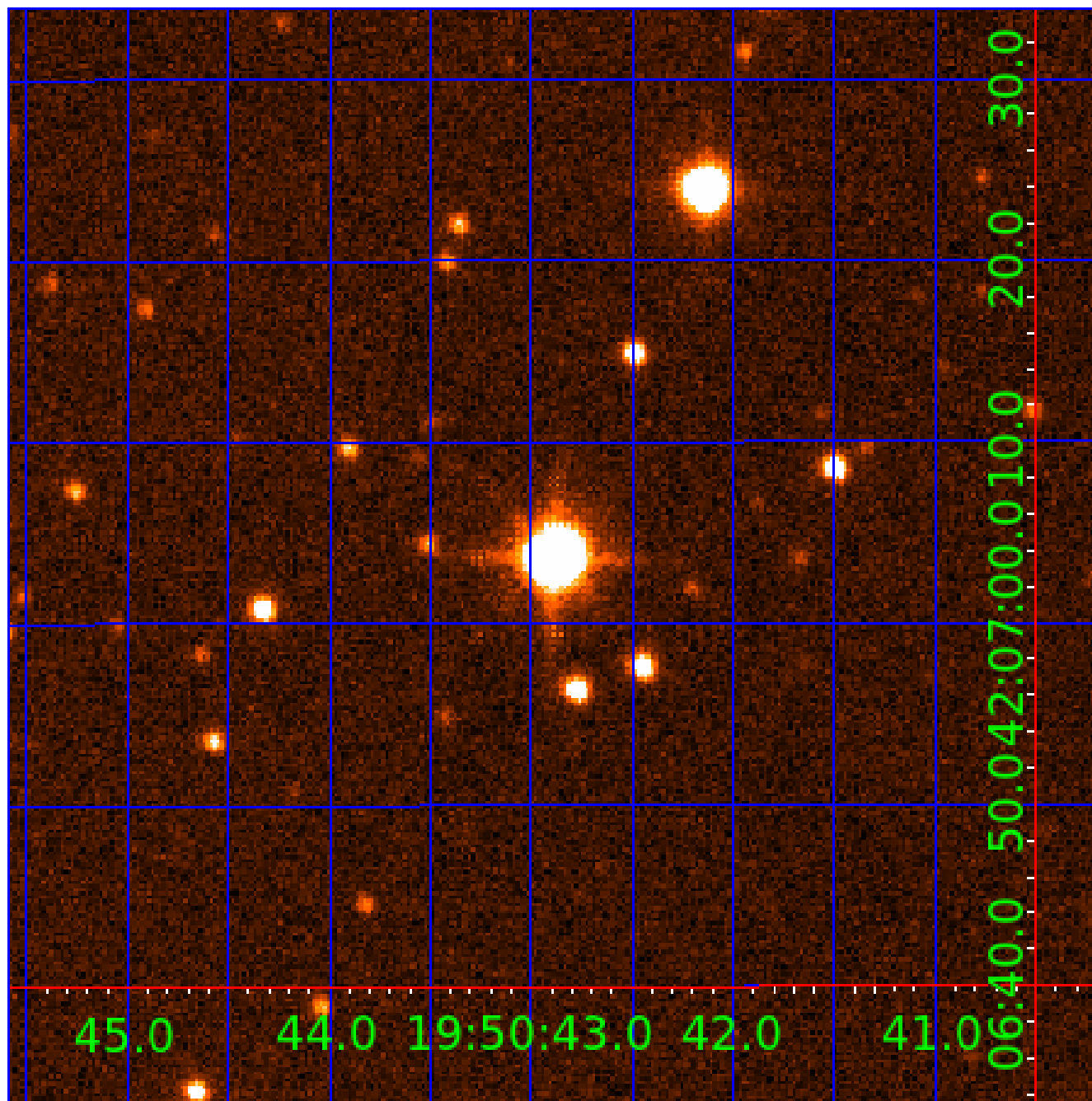


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



## KIC 006715221

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006715221-01	OBS	No	1.984918	132.459230	13.3	8.776	9.2	7.4	2.02	6839	0.74	6389.14
006715221-02	OBS	No	107.919359	152.278773	91.7	14.832	10.4	6.2	2.02	6839	2.12	31.02
006715221-03	OBS	No	333.120273	314.487390	168.1	20.190	10.4	7.6	2.02	6839	2.83	6.90
006715221-04	OBS	No	134.224992	188.680406	137.8	3.578	8.3	7.4	2.02	6839	2.67	23.19
006715221-05	OBS	No	107.107514	214.951810	149.8	13.238	8.0	8.9	2.02	6839	3.25	31.33
006715221-06	OBS	No	400.898244	254.418073	152.5	9.827	8.0	7.8	2.02	6839	2.91	5.39
006715221-07	OBS	No	34.101777	151.432052	96.7	3.723	7.7	8.0	2.02	6839	2.32	144.12
006715221-08	OBS	No	65.108276	163.640682	100.0	4.485	7.8	7.8	2.02	6839	2.31	60.85
006715221-09	OBS	No	118.508397	233.886395	144.3	11.967	8.1	7.9	2.02	6839	2.70	27.38
006715221-10	OBS	No	36.316557	165.427888	72.2	12.670	8.2	7.1	2.02	6839	2.27	132.52

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006715221-01	OBS	FP	0.00	1	0	0	0	LPP_DV
006715221-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
006715221-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
006715221-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
006715221-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_ALT—CENT_FEW_MEAS
006715221-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—MOD_NONUNIQ_ALT
006715221-07	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—MOD_NONUNIQ_ALT
006715221-08	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—MOD_NONUNIQ_ALT
006715221-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_MEAS
006715221-10	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_UNRESOLVED_OFFSET

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

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

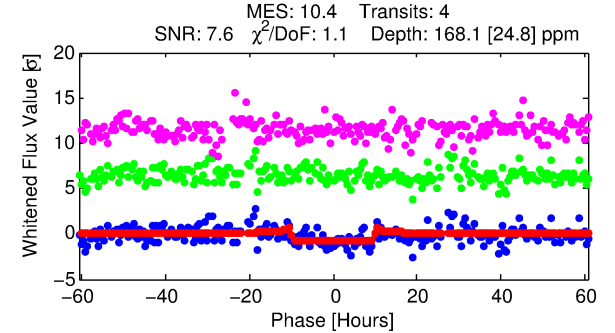
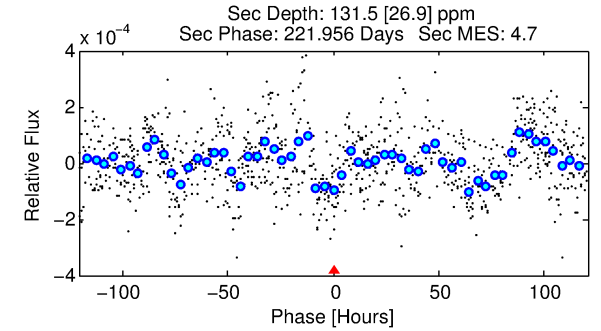
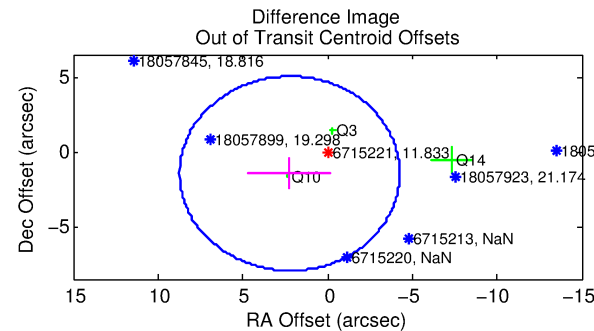
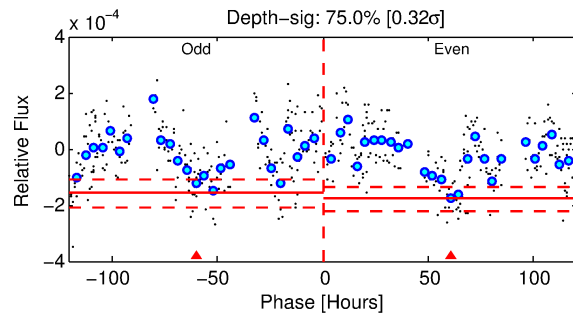
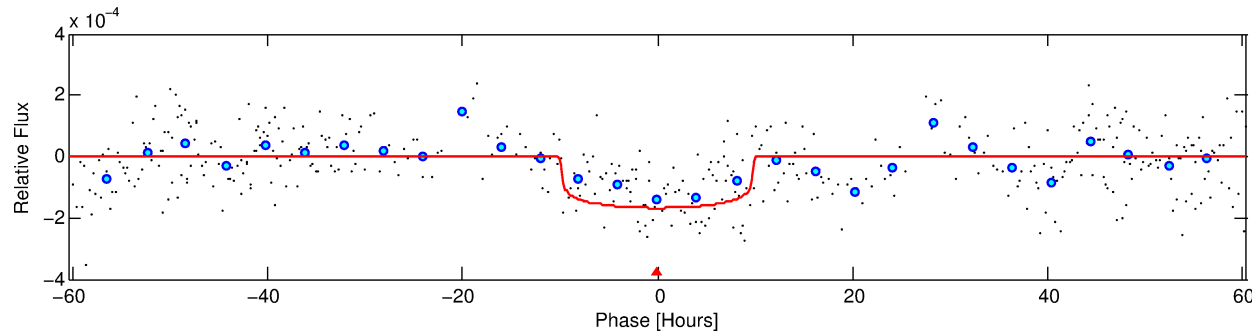
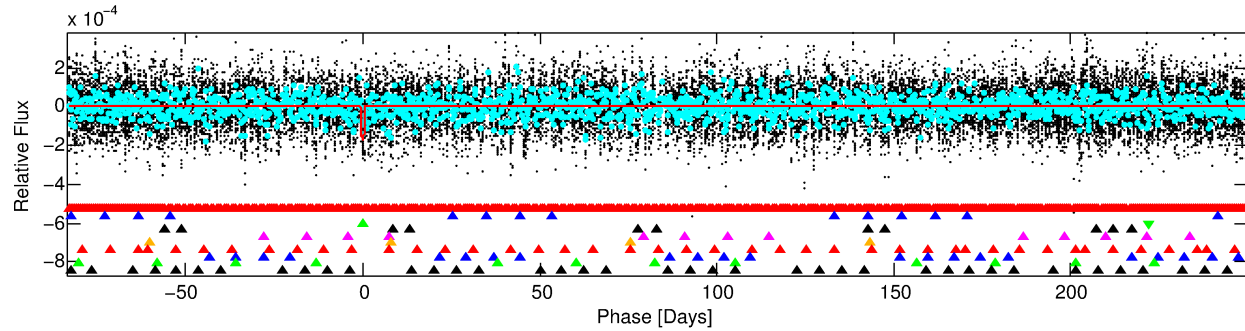
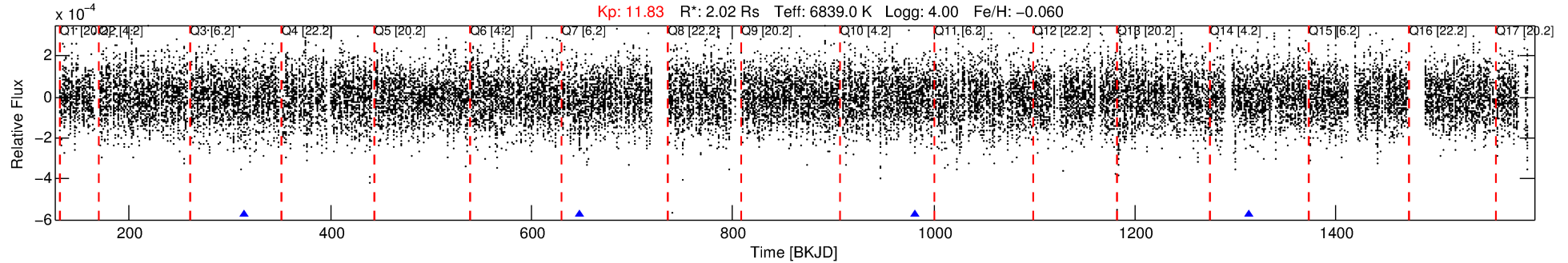
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 006715221-03

No Significant Match Found

# DV One-Page Summary

KIC: 6715221 Candidate: 3 of 10 Period: 333.120 d



## DV Fit Results:

Period = 333.12027 [0.02059] d  
Epoch = 314.4874 [0.0333] BKJD  
Rp/R\* = 0.0128 [0.0026]  
a/R\* = 88.39 [94.79]  
b = 0.73 [0.71]  
Seff = 6.90 [2.85]  
Teq = 413 [43] K  
Rp = 2.83 [1.01] Re  
a = 1.0765 [0.2791] AU  
Ag = 10492.18 [6305.29] [1.66 $\sigma$ ]  
Teffp = 6467 [767] K [7.88 $\sigma$ ]

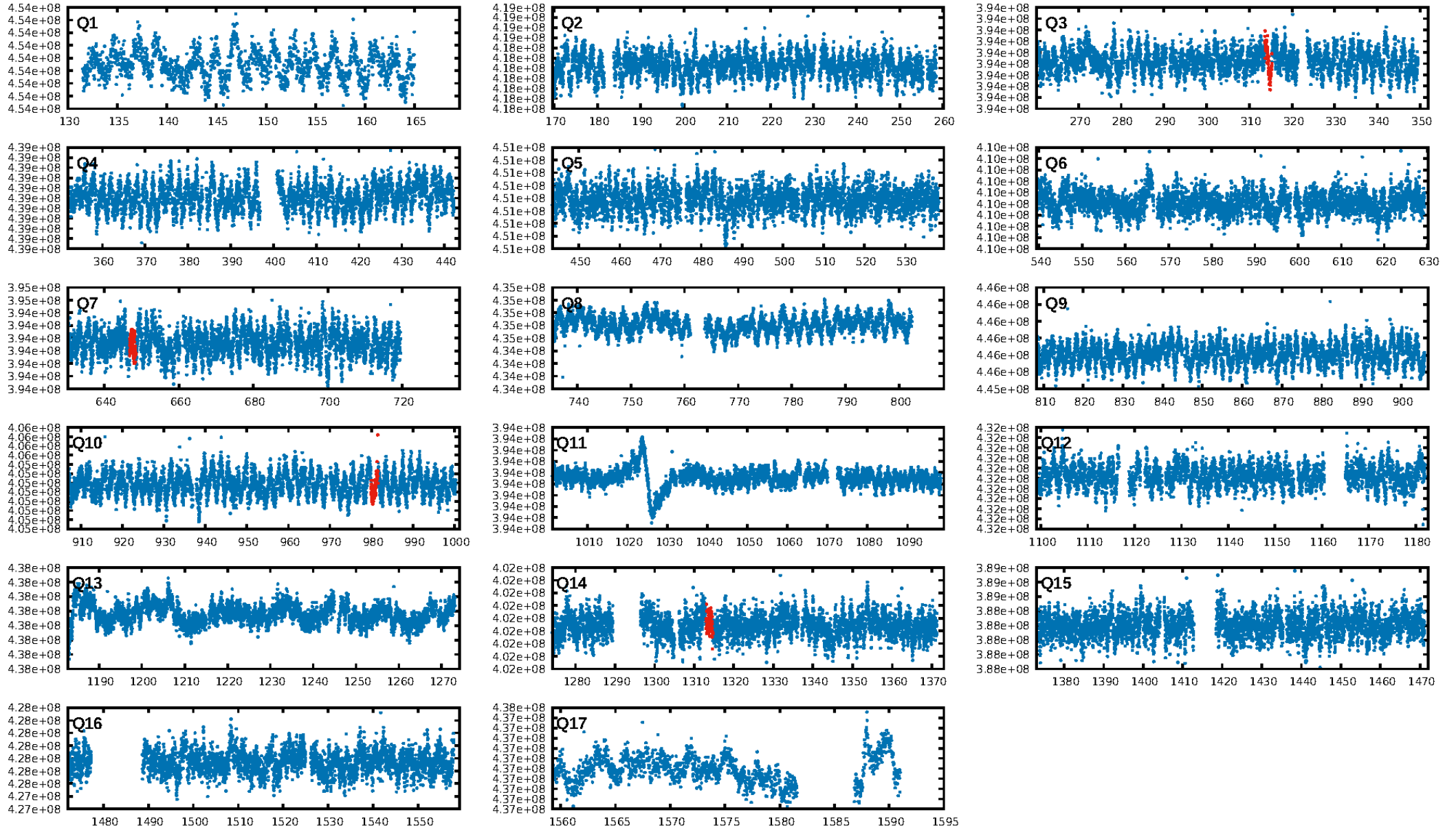
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [232.80 $\sigma$ ]  
LongPeriod-sig: 100.0% [72.44 $\sigma$ ]  
ModelChiSquare2-sig: 5.6%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 1.08e-12**  
RollingBand-fgt: 1.00 [4/4]  
**GhostDiagnostic-chr: 0.6759**  
**Centroid-sig: 0.0%**  
Centroid-so: 1.991 arcsec [2.33 $\sigma$ ]  
OotOffset-rm: 2.668 arcsec [1.23 $\sigma$ ]  
OotOffset-st: 2/1/0/0 [3]  
KicOffset-rm: 2.638 arcsec [1.79 $\sigma$ ]  
KicOffset-st: 2/1/0/0 [3]  
DiffImageQuality-fgm: 0.33 [1/3]  
DiffImageOverlap-fno: 0.00 [0/4]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 05:30:12 Z

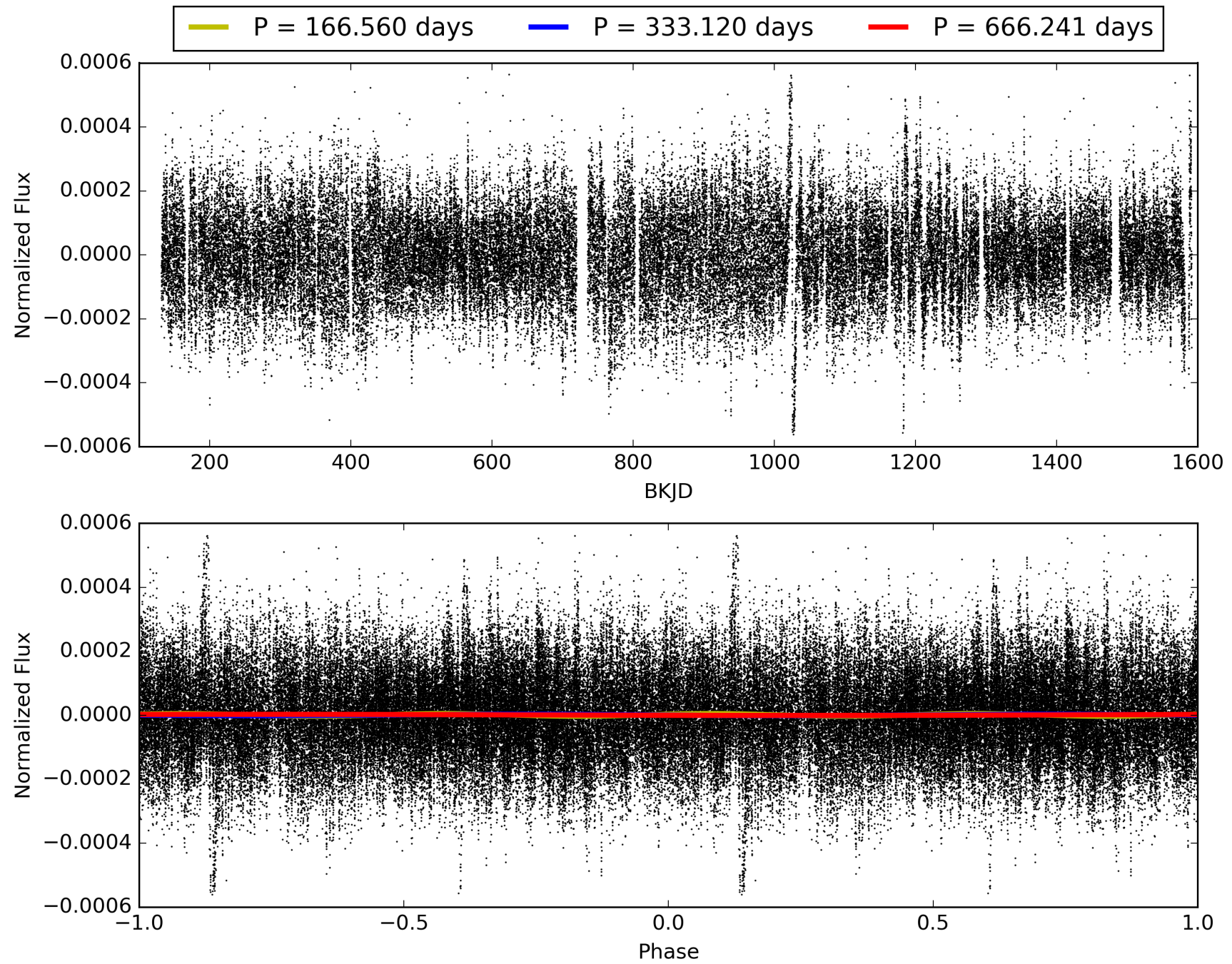
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 006715221-03, PDC Light Curves



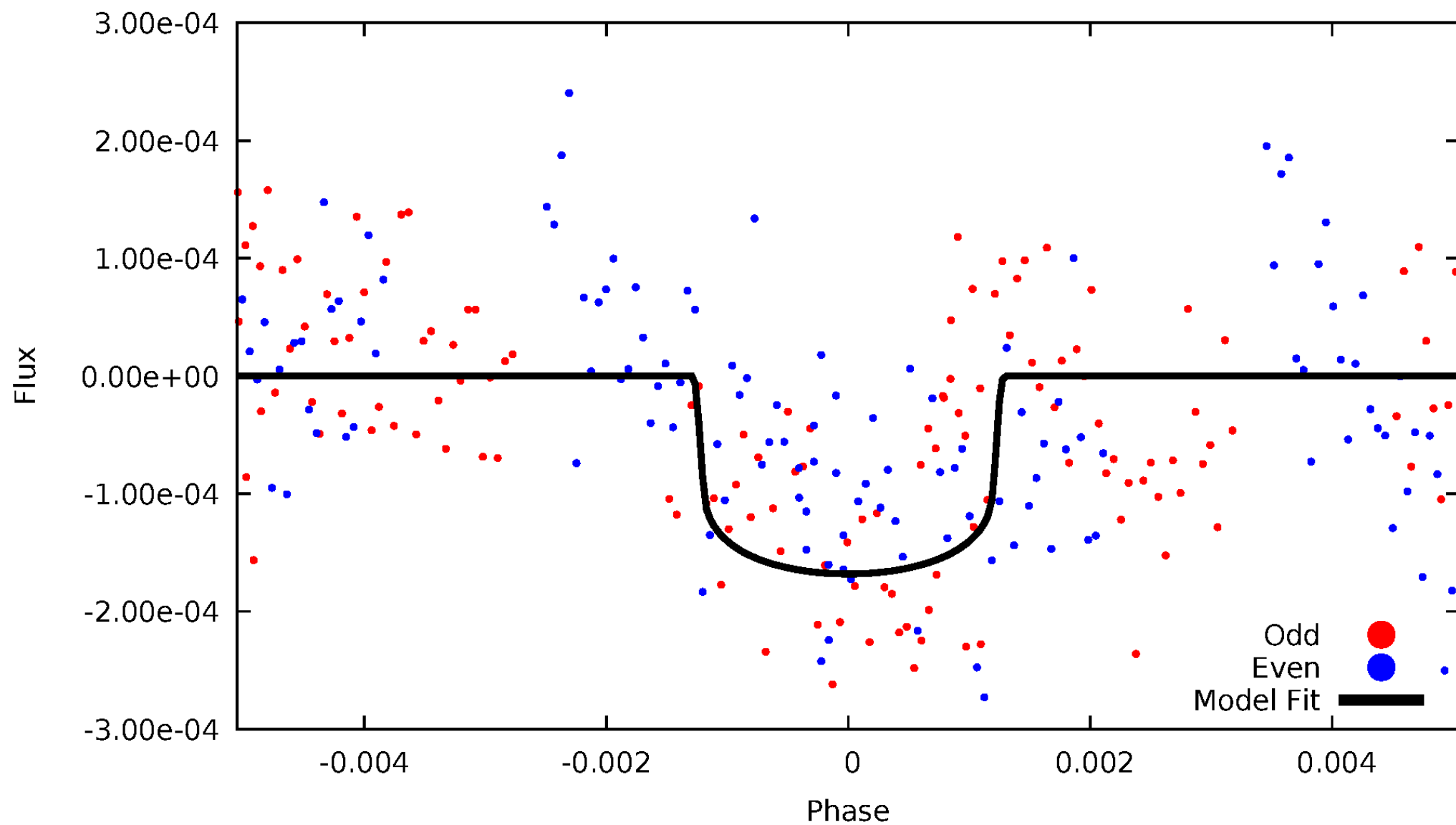


TCE 006715221-03



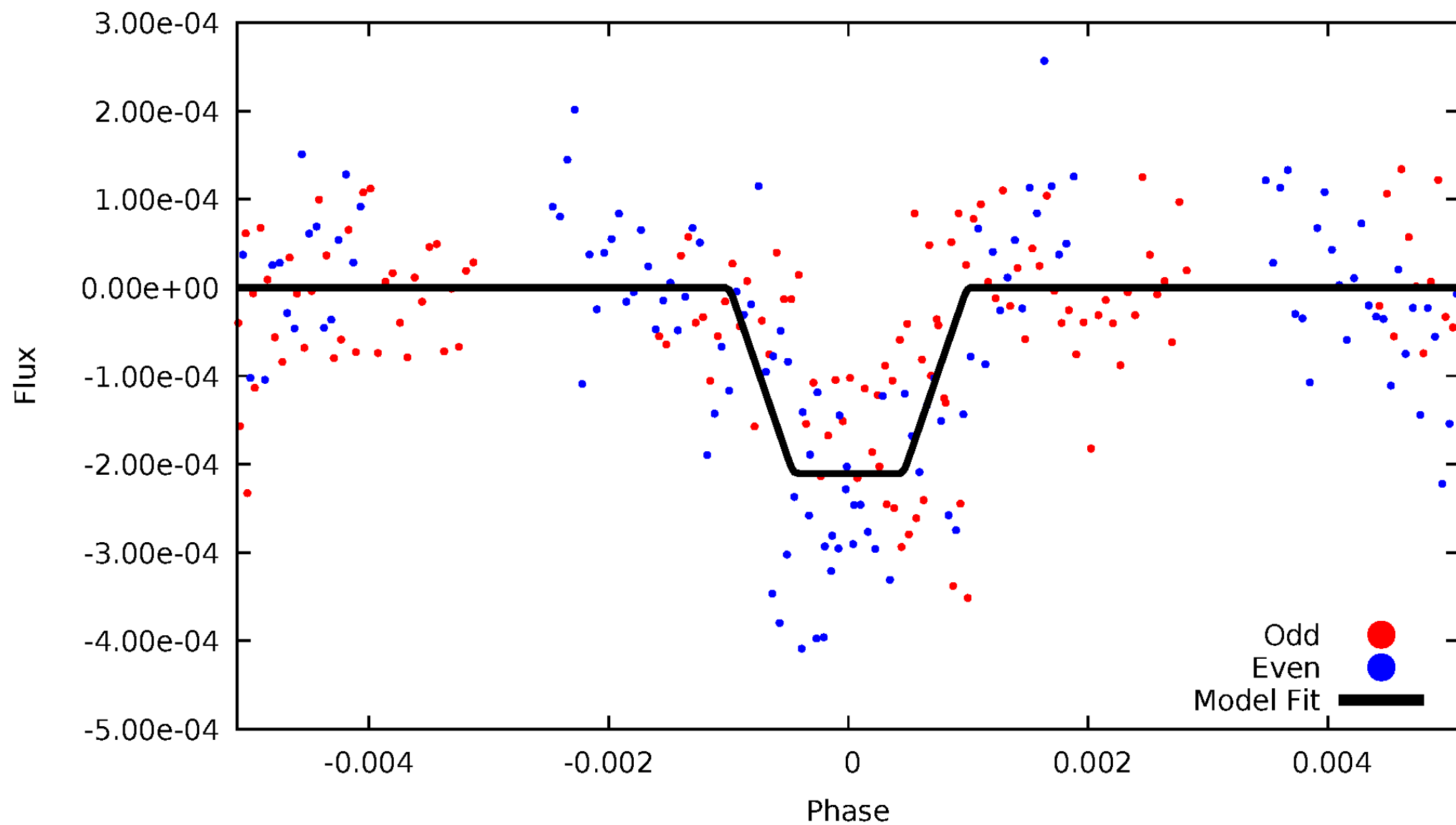
# DV Odd/Even

TCE 006715221-03



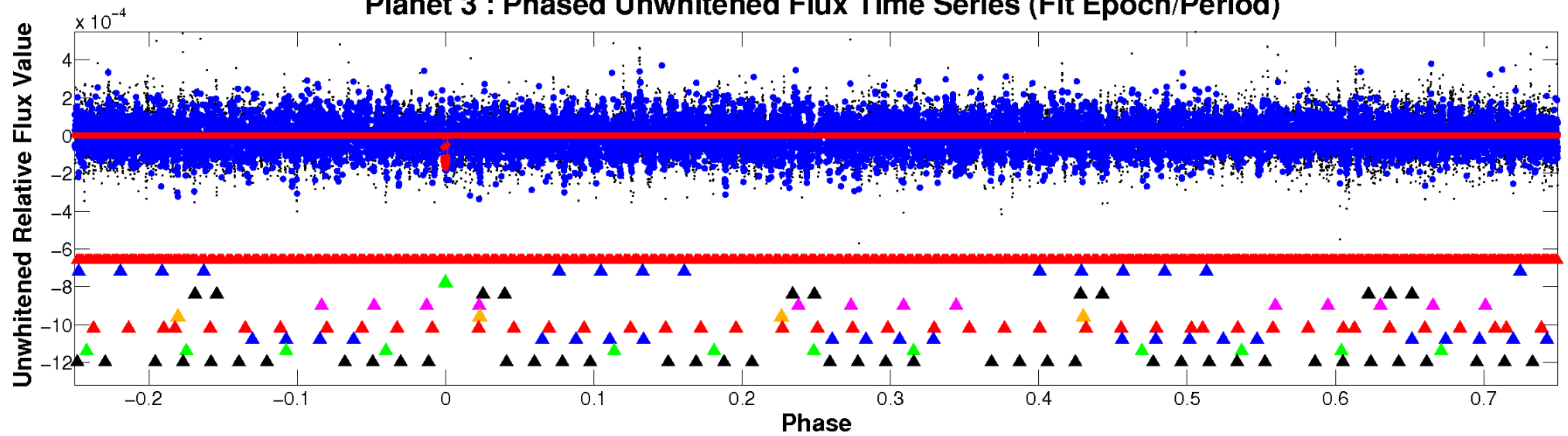
# ALT Odd/Even

TCE 006715221-03

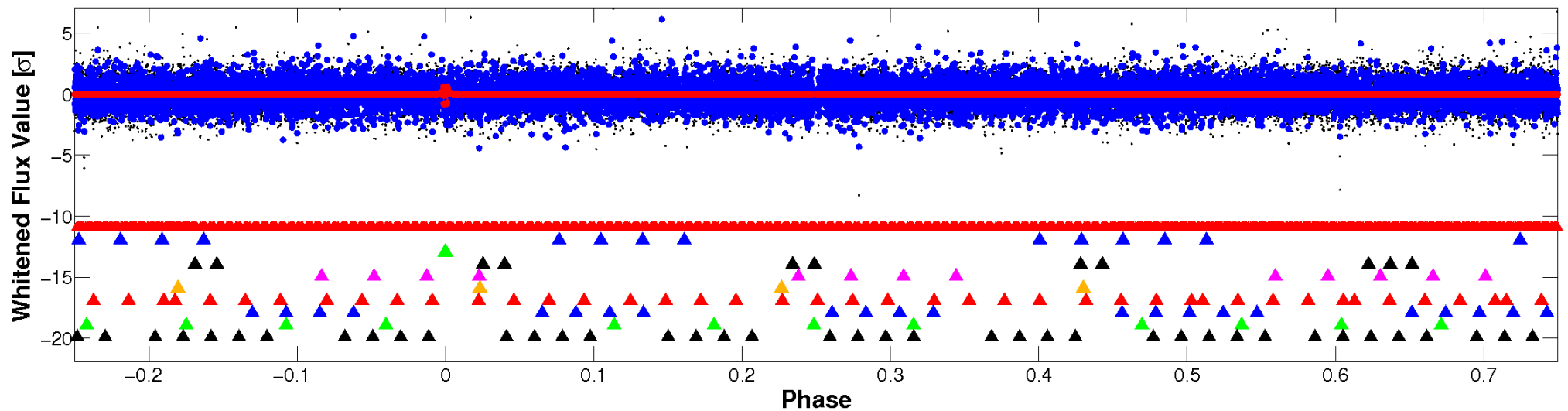


# Non-Whitened Vs. Whitened Light Curve

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

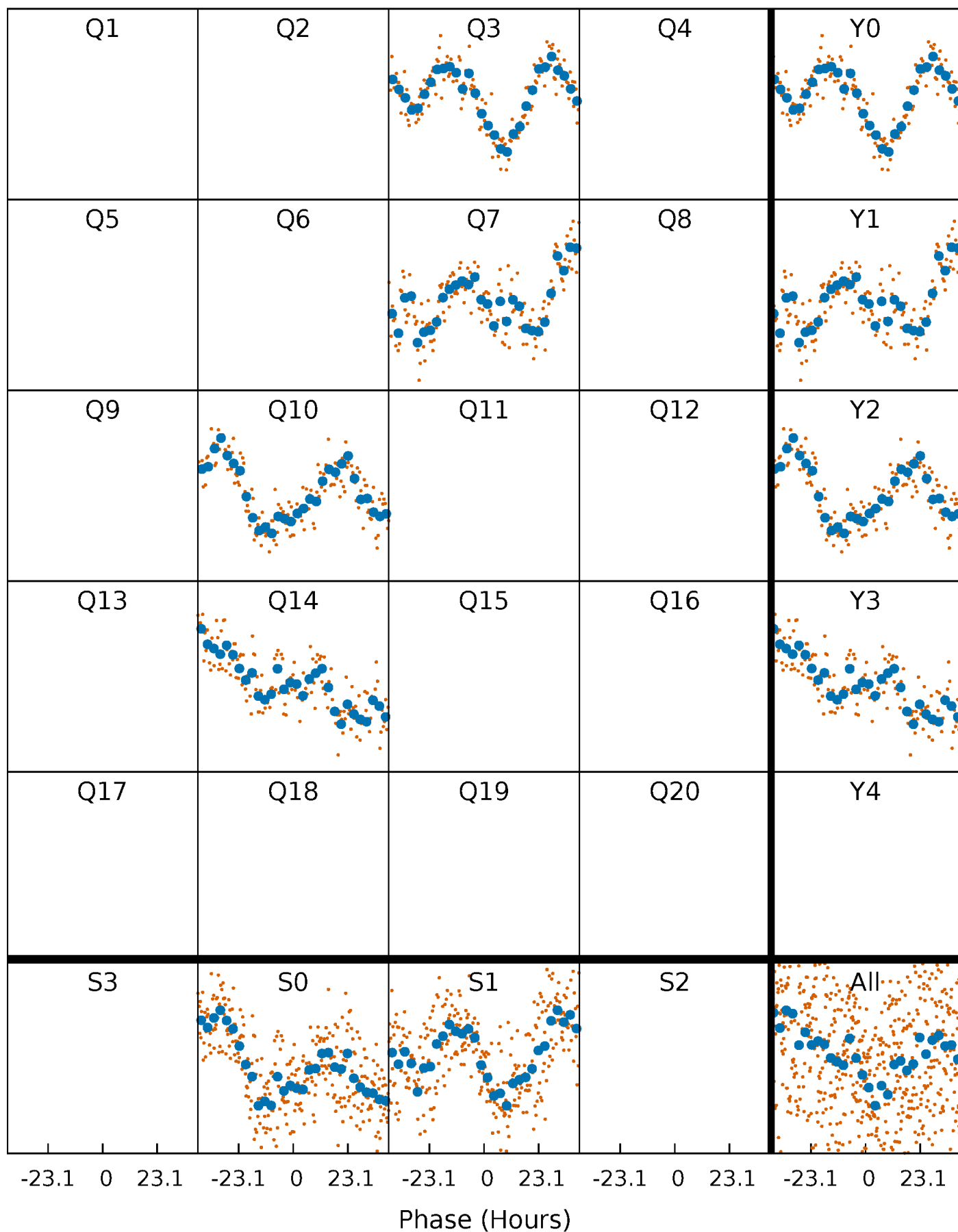


## Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

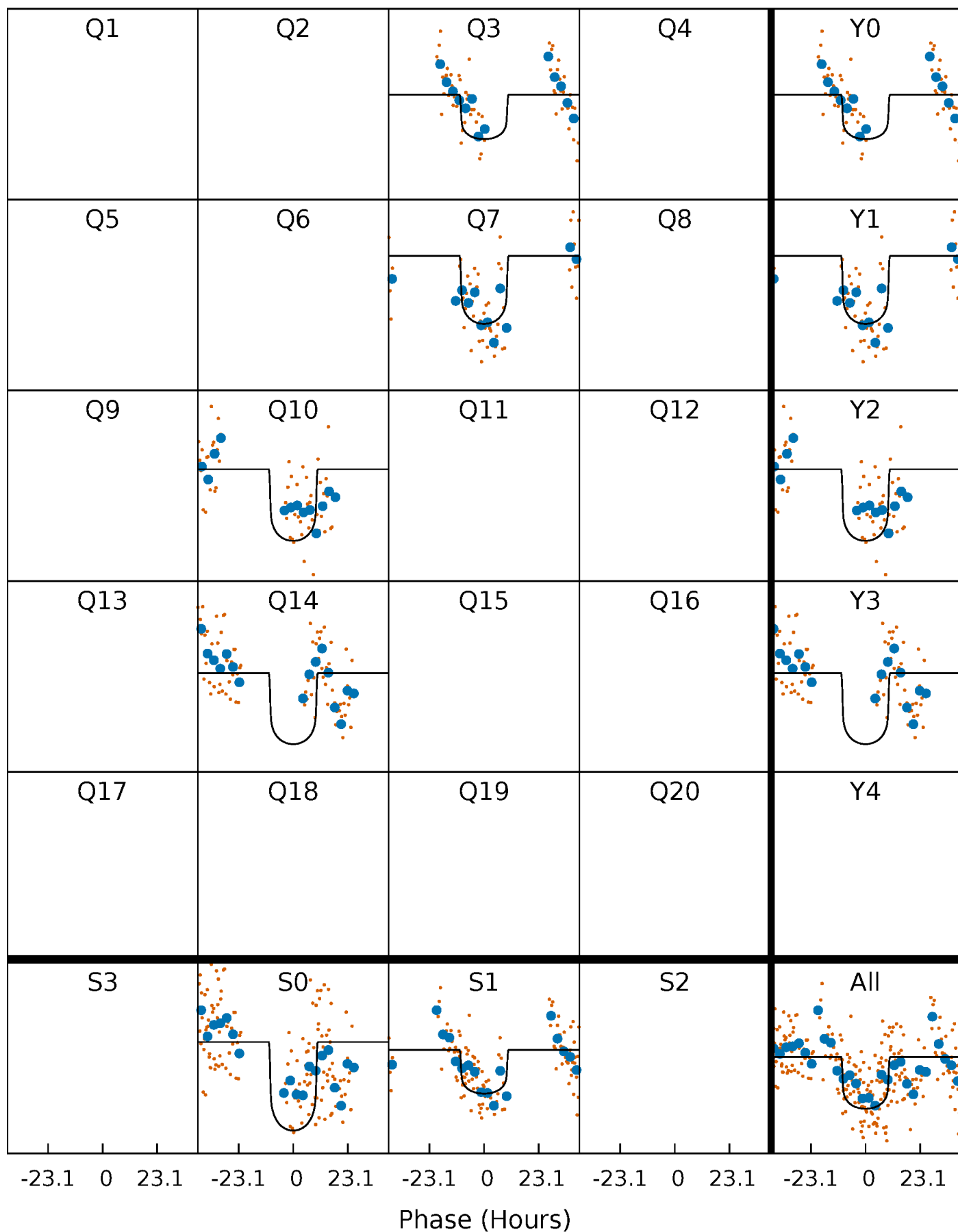
TCE 006715221-03 P=333.120273 Days  $T_0=314.487390$  (BKJD)





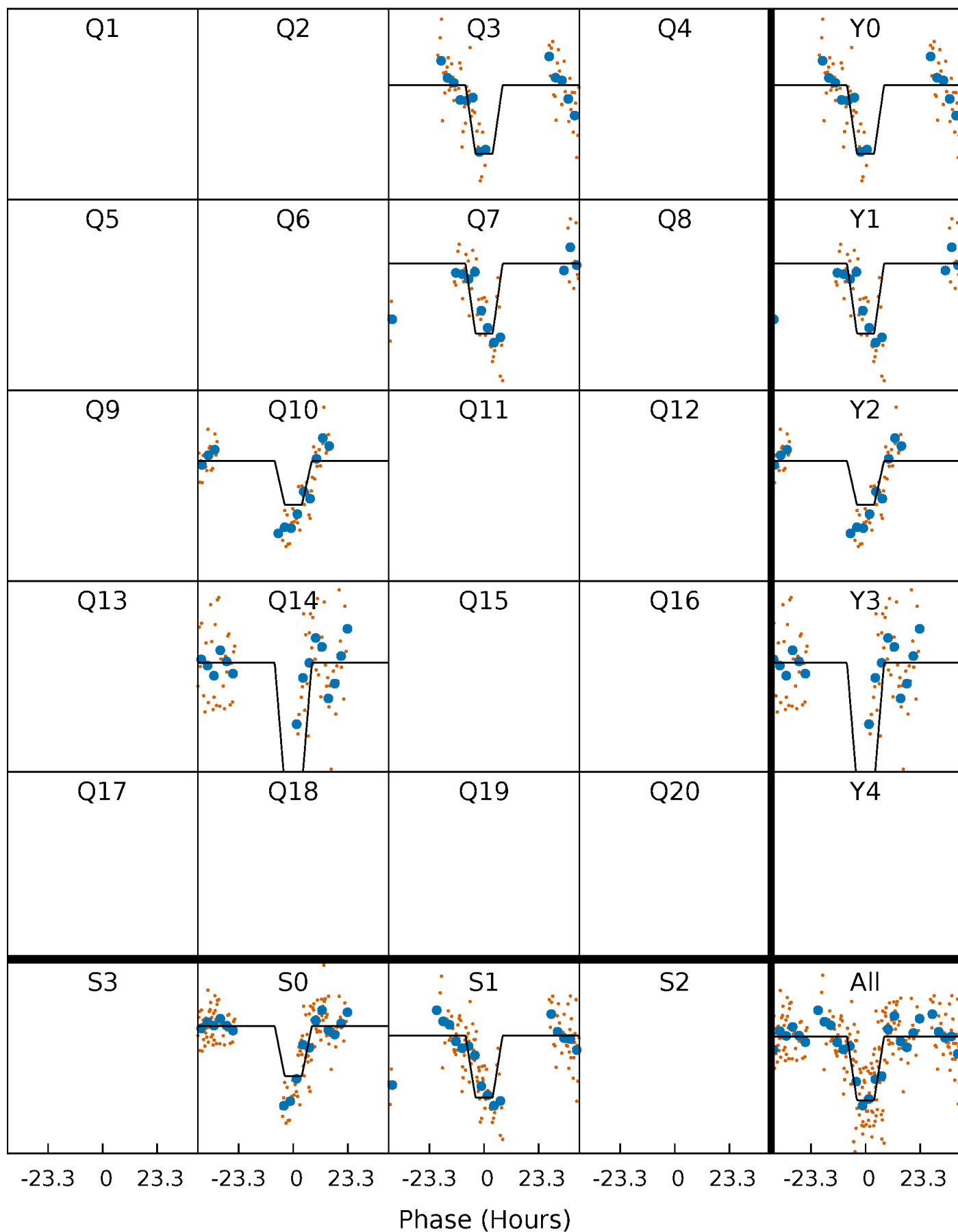
# DV Quarter-Phased Transit Curves

TCE 006715221-03 P=333.120273 Days  $T_0=314.487390$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

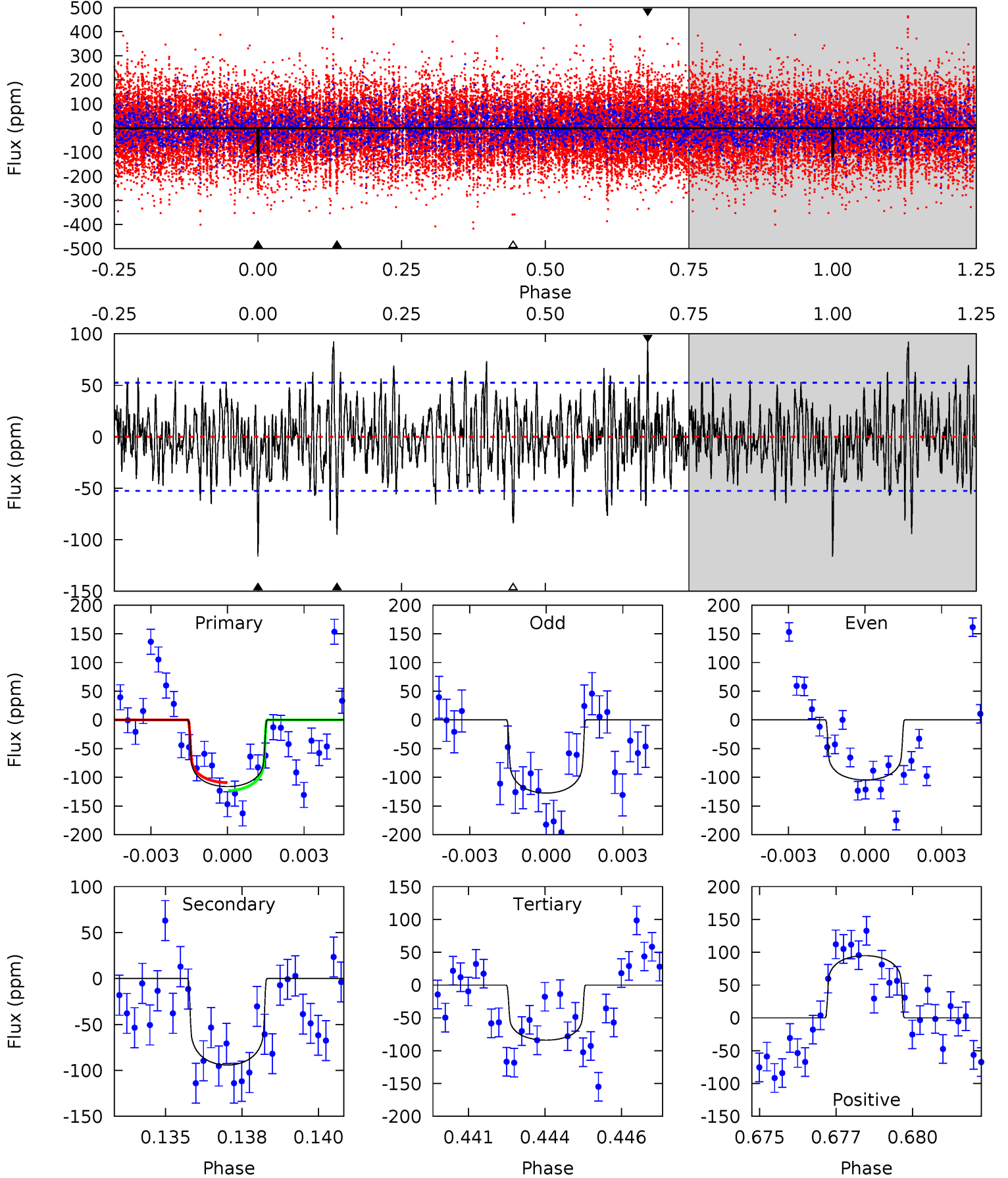
TCE 006715221-03     $P=333.162385$  Days     $T_0=314.478454$  (BKJD)



# DV Model-Shift Uniqueness Test

006715221-03, P = 333.120273 Days, E = 314.487390 Days

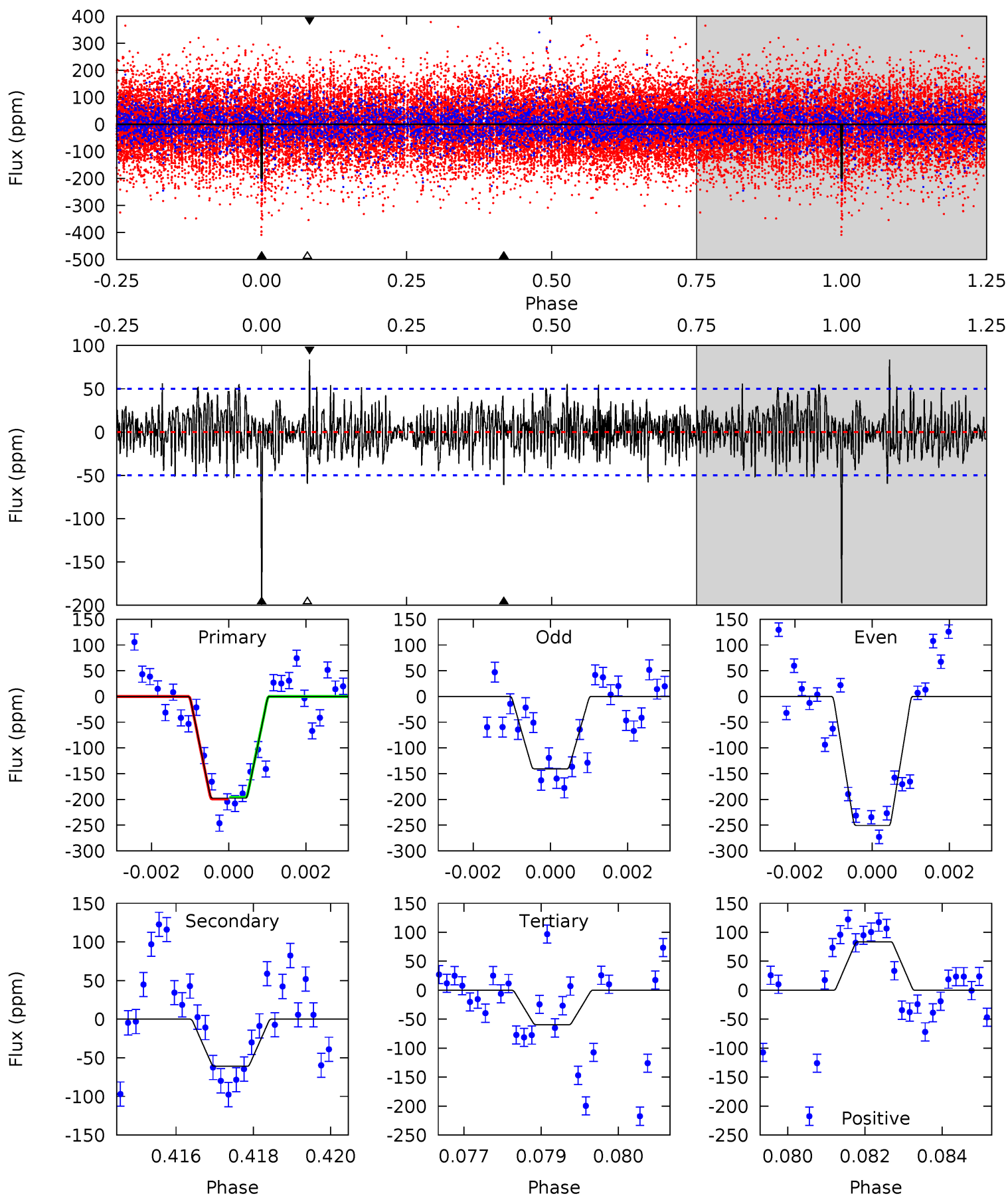
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.7	9.48	8.45	9.54	5.29	3.02	2.54	3.25	2.15	1.04	-0.06	1.15	0.91	0.45	0.70



# Alt Model-Shift Uniqueness Test

006715221-03, P = 333.162385 Days, E = 314.478454 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
21.1	6.50	6.35	8.92	5.33	3.10	1.93	14.7	12.2	0.15	-2.42	5.87	1.03	0.30	0.18



### Stellar Parameters For KIC 006715221

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6839^{+163}_{-225}$	$4.003^{+0.221}_{-0.119}$	$-0.060^{+0.250}_{-0.300}$	$2.020^{+0.396}_{-0.594}$	$1.497^{+0.172}_{-0.257}$	$0.256^{+0.303}_{-0.104}$
	+2%/-3%	+6%/-3%	+417%/-500%	+20%/-29%	+11%/-17%	+118%/-41%
Source	PHO1	FLK73	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 006715221-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-94 \pm 10$	$2.74^{+0.66}_{-0.65}$	$570^{+34}_{-43}$	$5917^{+701}_{-529}$	$7881^{+5971}_{-2710}$
Alt.	$-61 \pm 9$	$3.10^{+0.72}_{-0.64}$	$569^{+36}_{-39}$	$5033^{+494}_{-398}$	$3938^{+2387}_{-1432}$

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



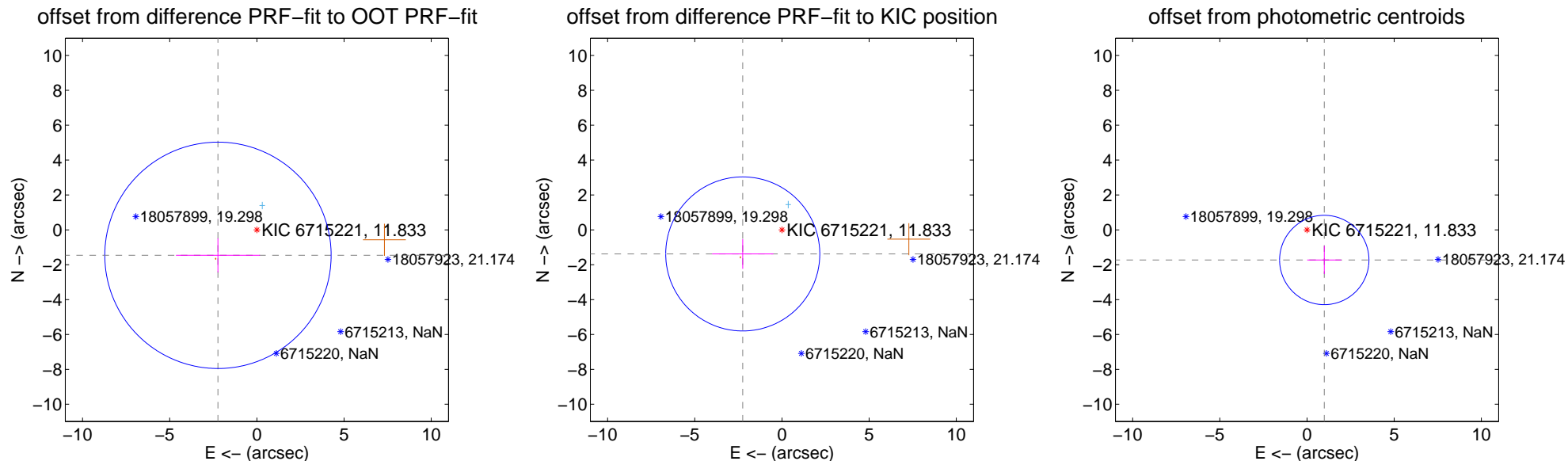
## DV Centroid Data

Supplemental centroid analysis for 006715221-03. **Kepler magnitude: 11.83.** Transit SNR 7.58

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

The direct PRF centroid is offset from the target star catalog position by about 0.05 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.668 \pm 2.164$	1.23	$2.232 \pm 2.408$	$-1.461 \pm 0.974$
PRF-fit source offset from KIC position	$2.638 \pm 1.473$	1.79	$2.248 \pm 1.755$	$-1.381 \pm 0.855$
photometric centroid source offset	$1.99 \pm 0.85$	2.33	$-0.99 \pm 0.98$	$-1.73 \pm 0.81$



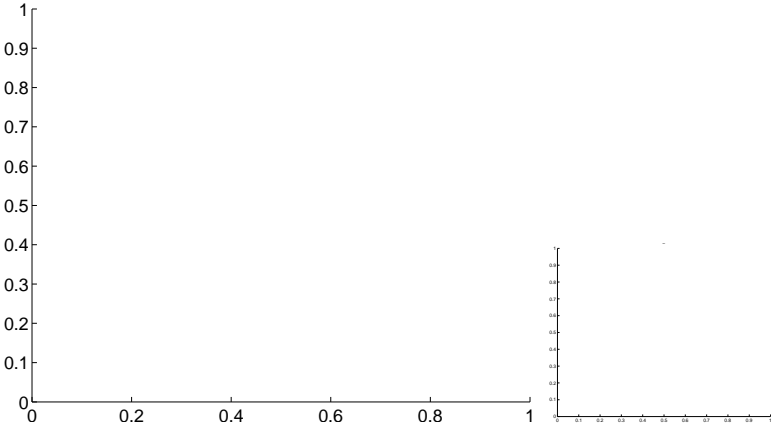
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

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

Q1 no difference image



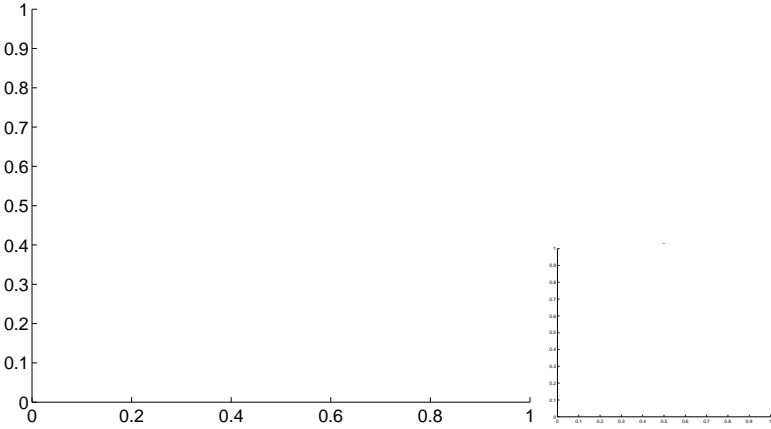
Q1 no OOT image



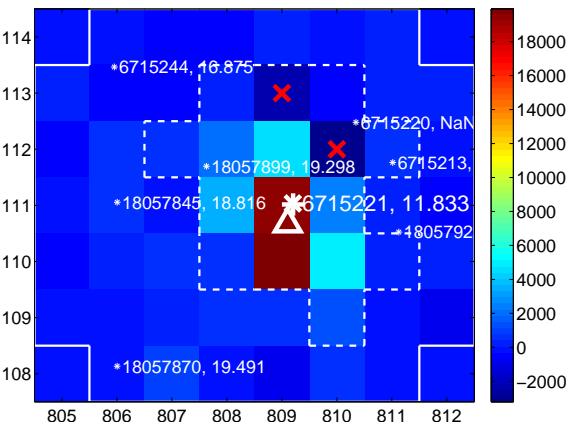
Q2 no difference image



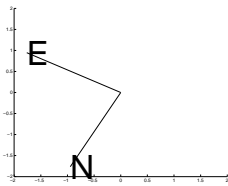
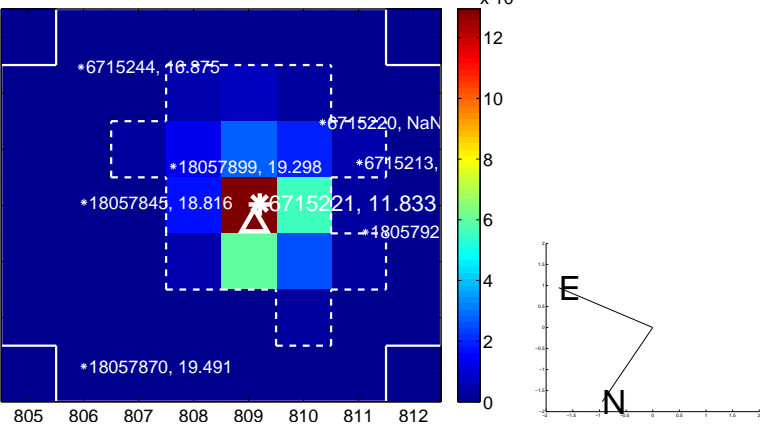
Q2 no OOT image



Q3 difference image



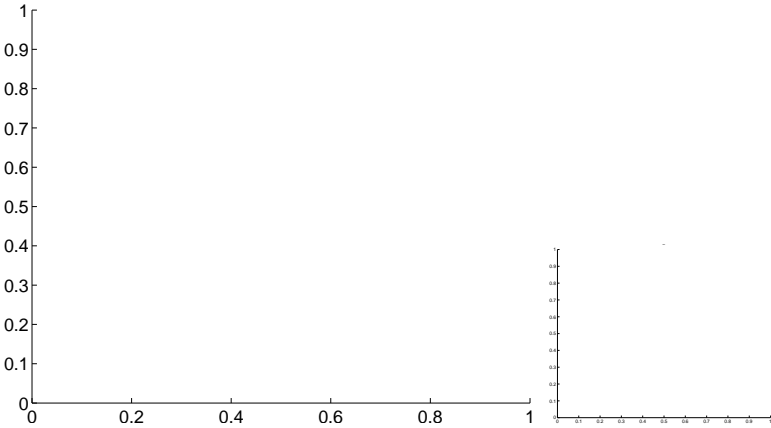
Q3 OOT image



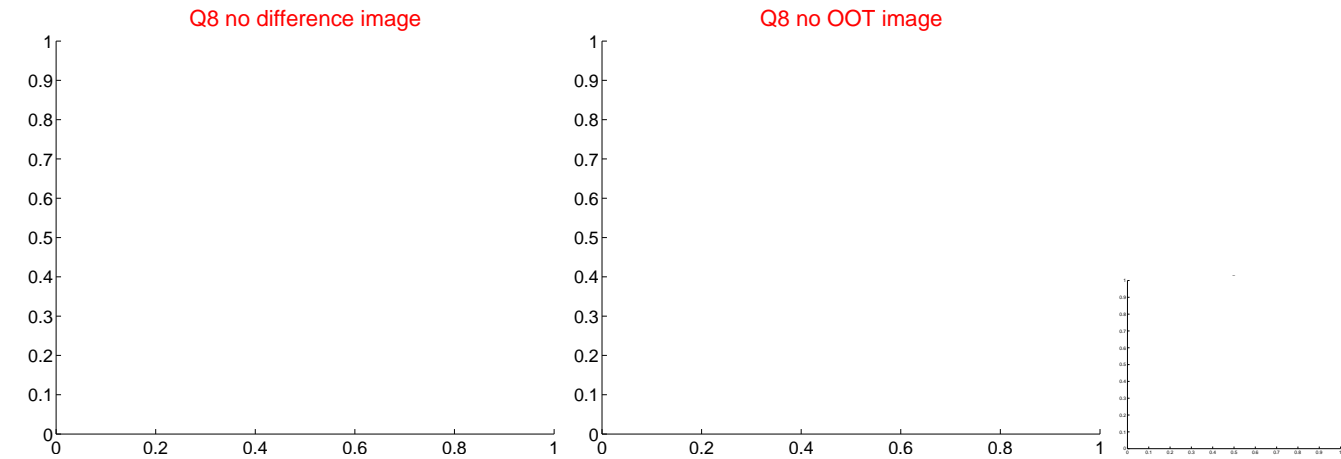
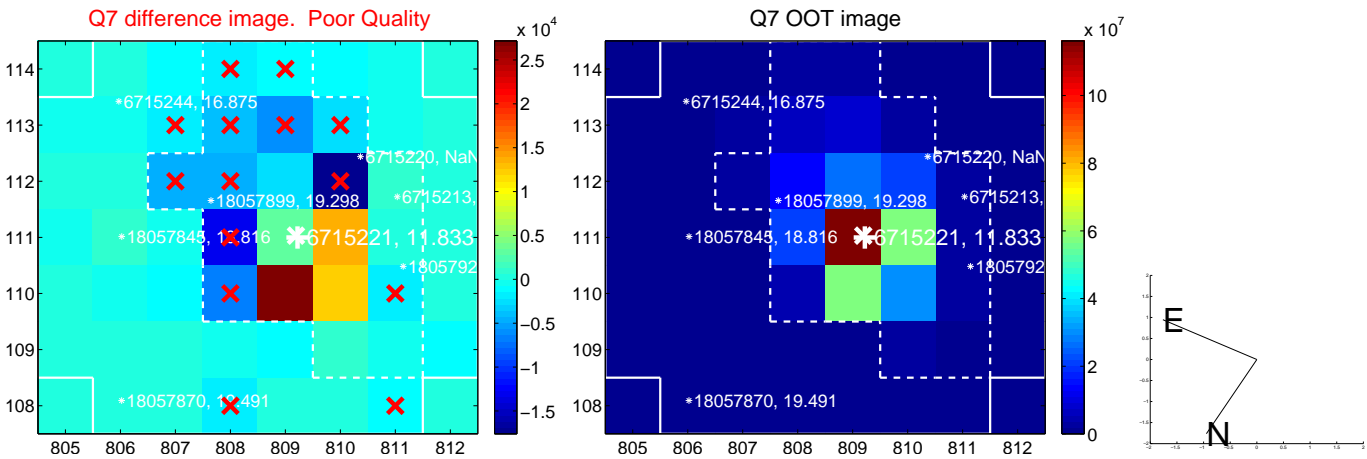
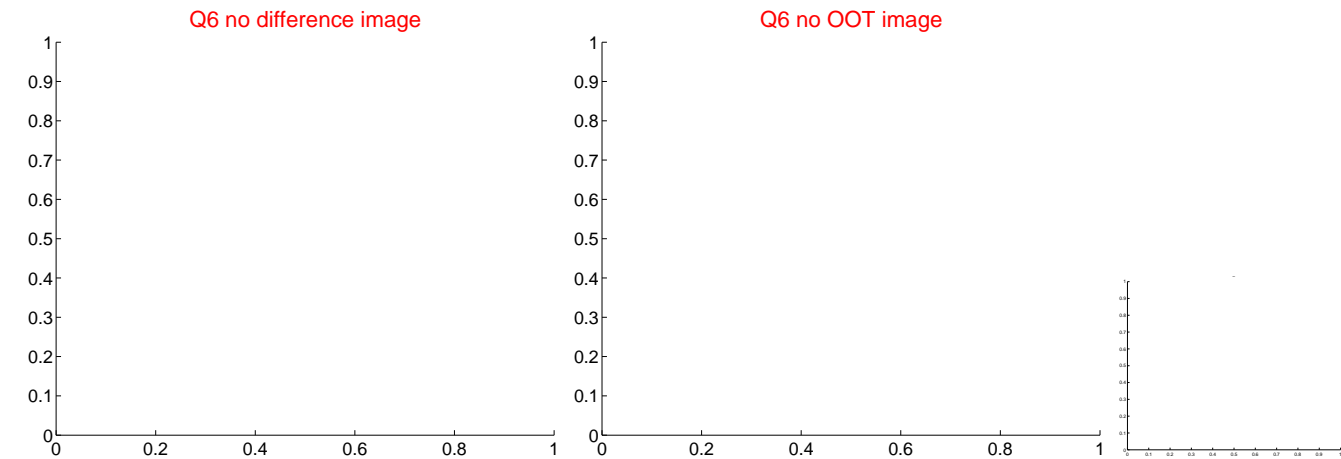
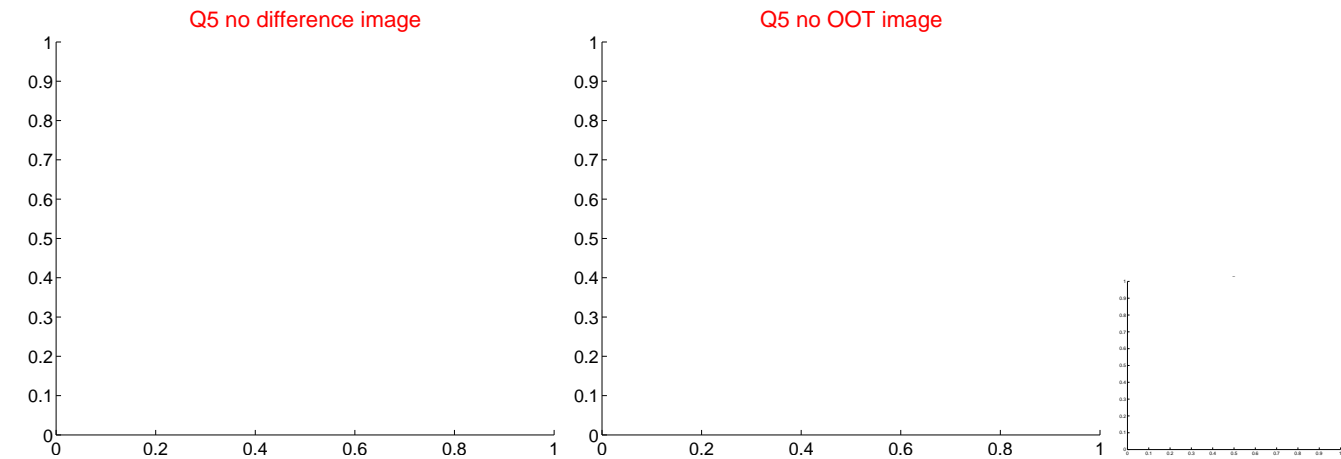
Q4 no difference image



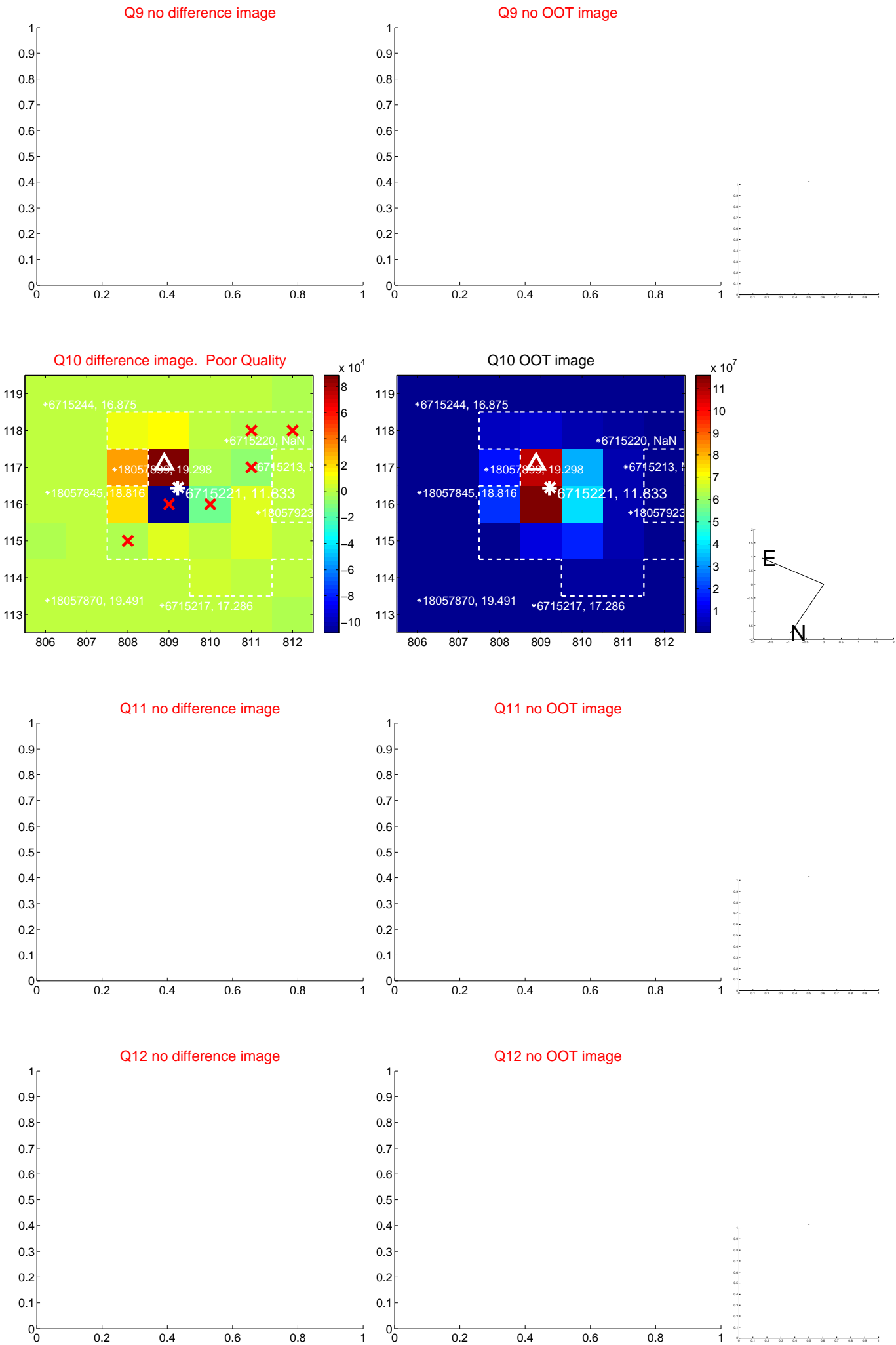
Q4 no OOT image



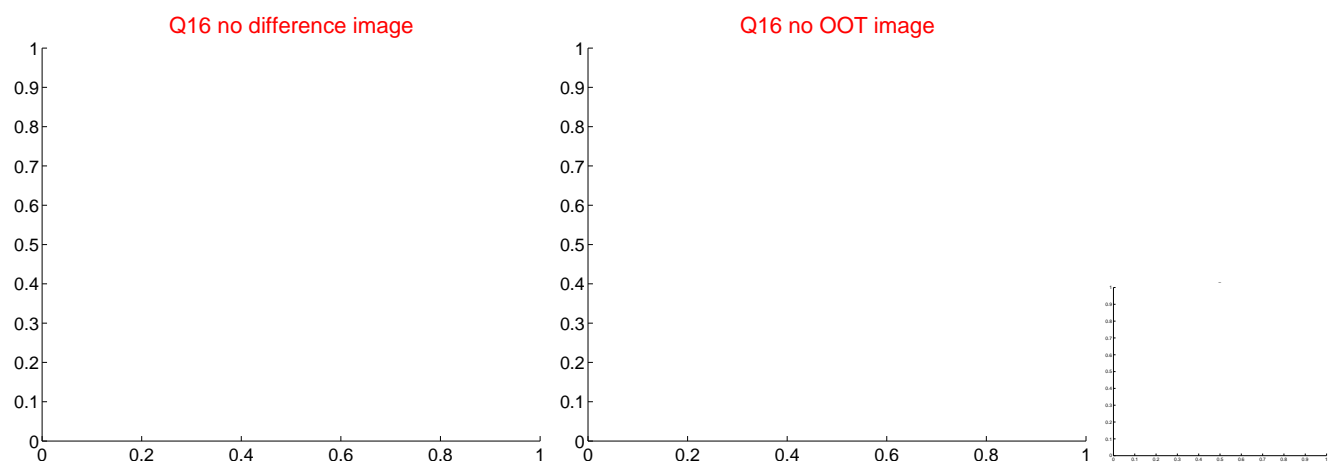
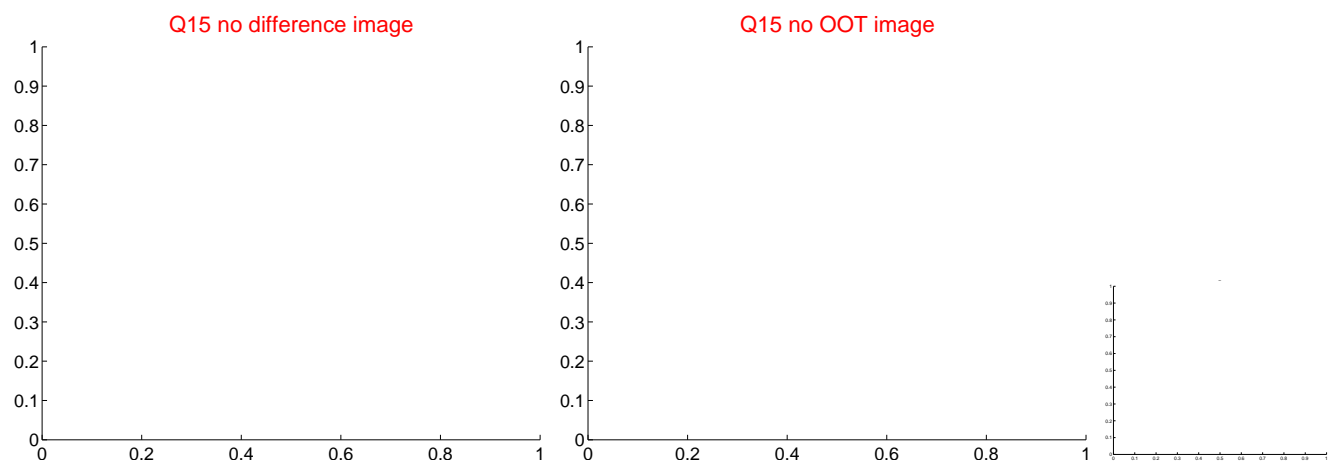
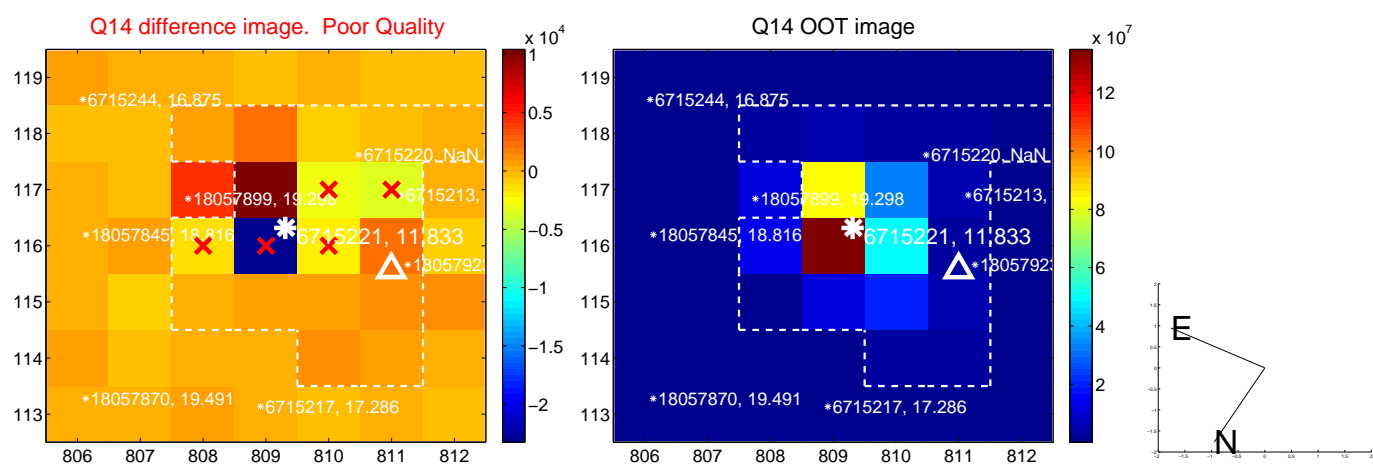
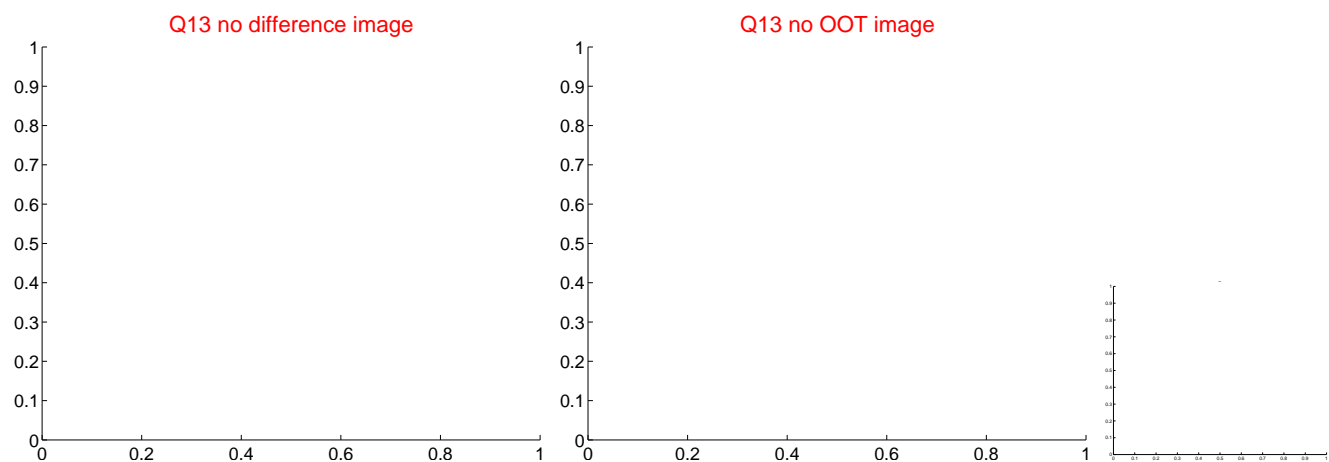
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



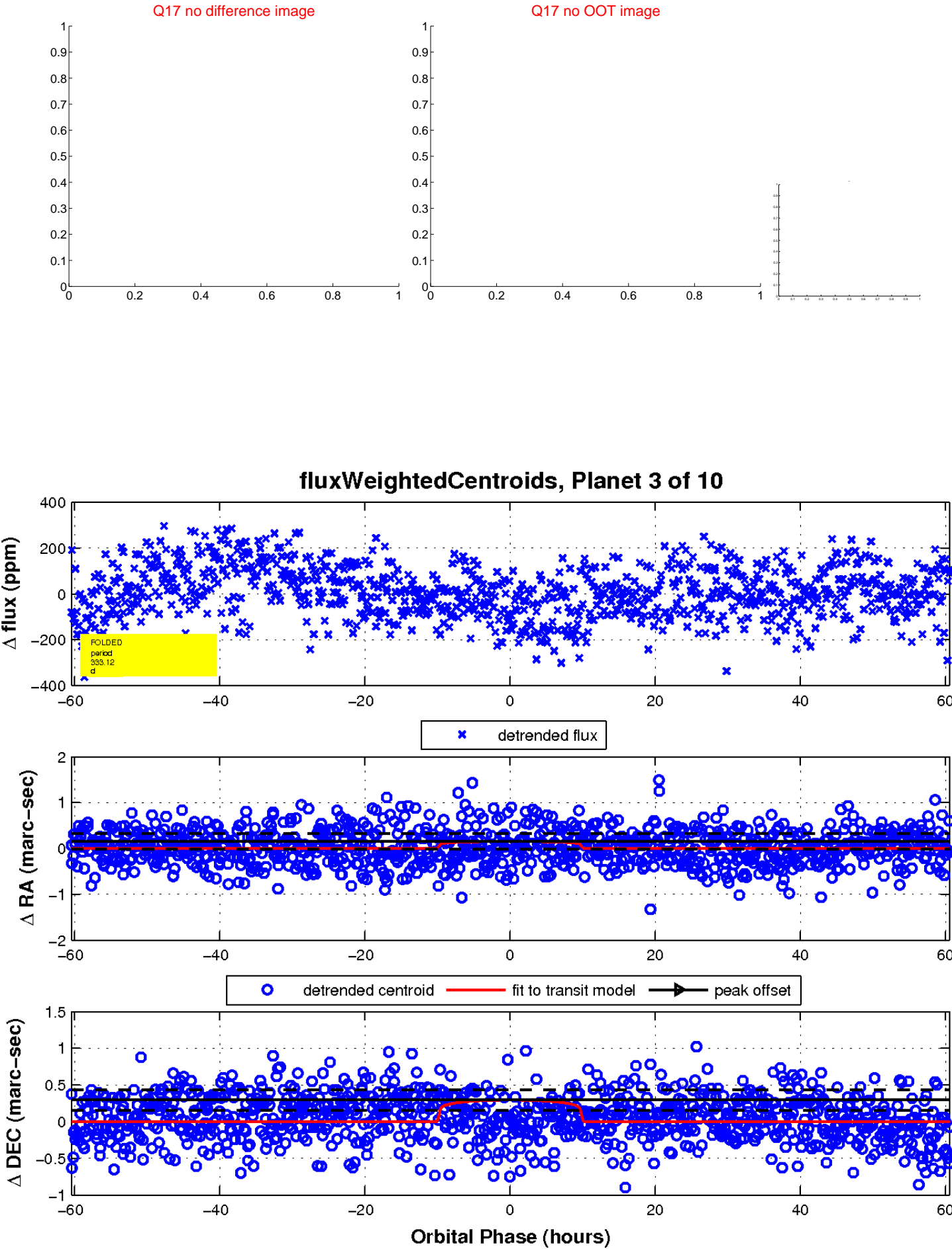
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



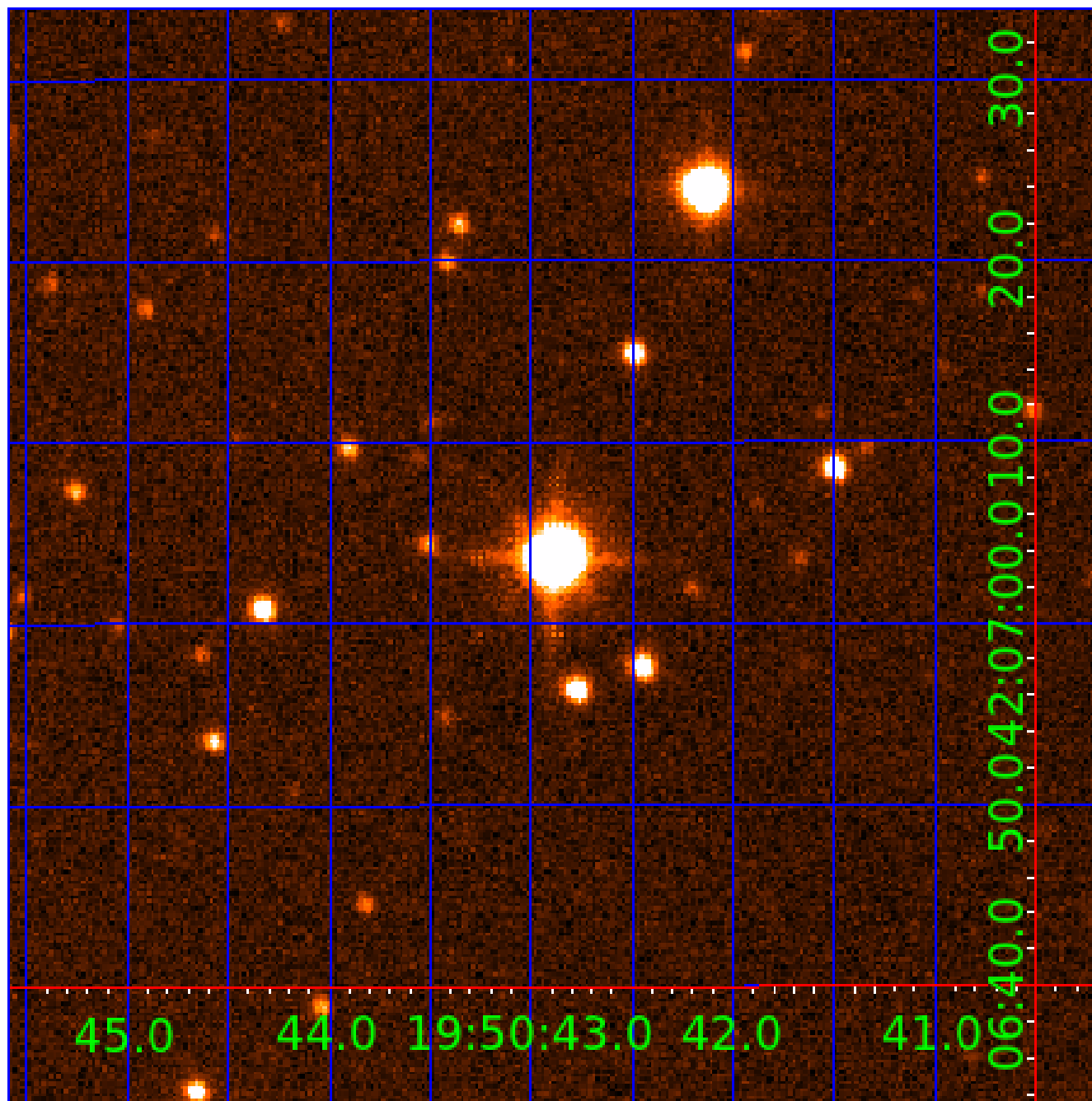
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image

Declination



## KIC 006715221

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006715221-01	OBS	No	1.984918	132.459230	13.3	8.776	9.2	7.4	2.02	6839	0.74	6389.14
006715221-02	OBS	No	107.919359	152.278773	91.7	14.832	10.4	6.2	2.02	6839	2.12	31.02
006715221-03	OBS	No	333.120273	314.487390	168.1	20.190	10.4	7.6	2.02	6839	2.83	6.90
006715221-04	OBS	No	134.224992	188.680406	137.8	3.578	8.3	7.4	2.02	6839	2.67	23.19
006715221-05	OBS	No	107.107514	214.951810	149.8	13.238	8.0	8.9	2.02	6839	3.25	31.33
006715221-06	OBS	No	400.898244	254.418073	152.5	9.827	8.0	7.8	2.02	6839	2.91	5.39
006715221-07	OBS	No	34.101777	151.432052	96.7	3.723	7.7	8.0	2.02	6839	2.32	144.12
006715221-08	OBS	No	65.108276	163.640682	100.0	4.485	7.8	7.8	2.02	6839	2.31	60.85
006715221-09	OBS	No	118.508397	233.886395	144.3	11.967	8.1	7.9	2.02	6839	2.70	27.38
006715221-10	OBS	No	36.316557	165.427888	72.2	12.670	8.2	7.1	2.02	6839	2.27	132.52

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006715221-01	OBS	FP	0.00	1	0	0	0	LPP_DV
006715221-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
006715221-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
006715221-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
006715221-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_ALT—CENT_FEW_MEAS
006715221-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—MOD_NONUNIQ_ALT
006715221-07	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—MOD_NONUNIQ_ALT
006715221-08	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—MOD_NONUNIQ_ALT
006715221-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_MEAS
006715221-10	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_UNRESOLVED_OFFSET

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

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

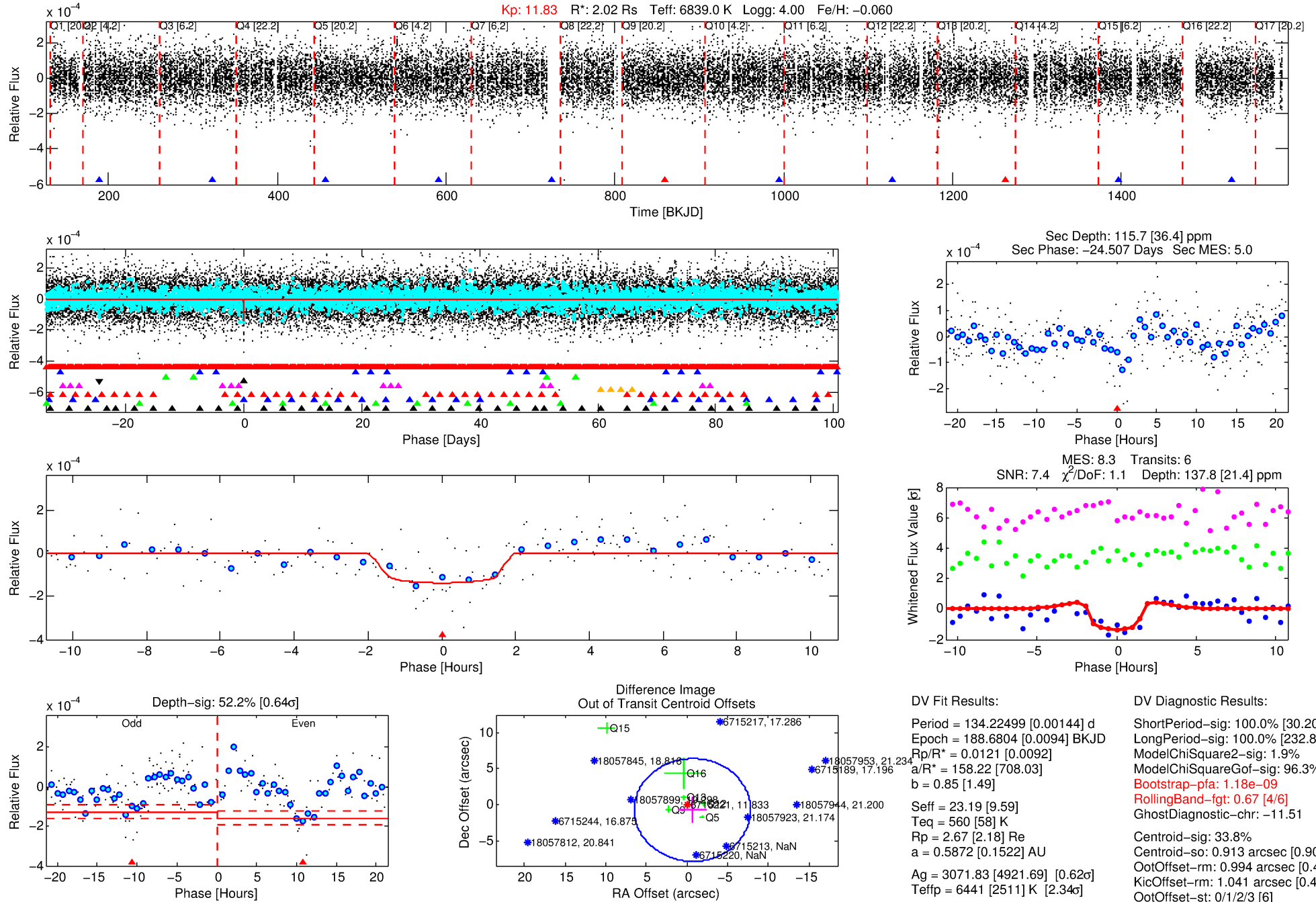
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 006715221-04

No Significant Match Found

# DV One-Page Summary

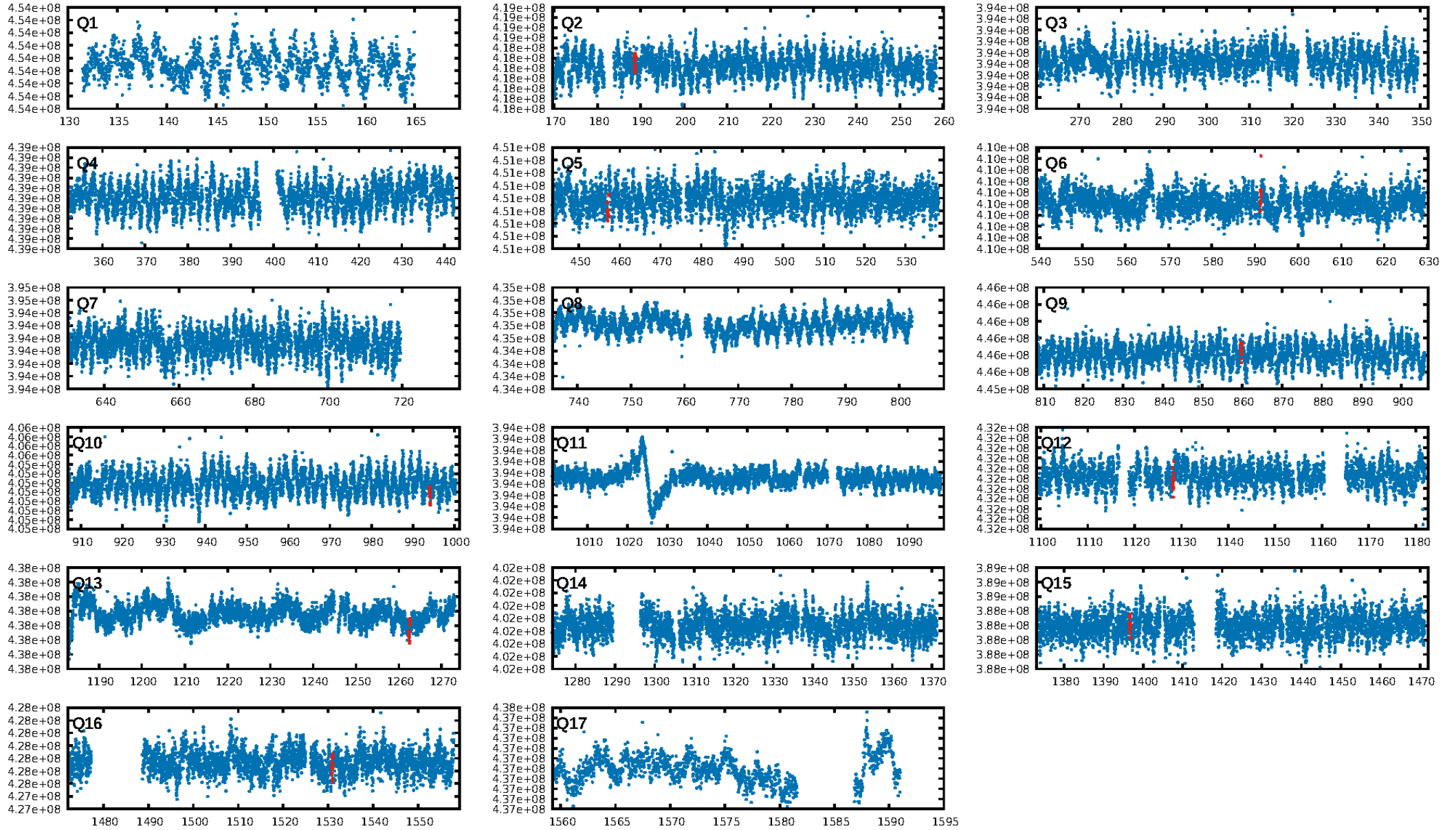
KIC: 6715221 Candidate: 4 of 10 Period: 134.225 d



Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 05:30:17 Z

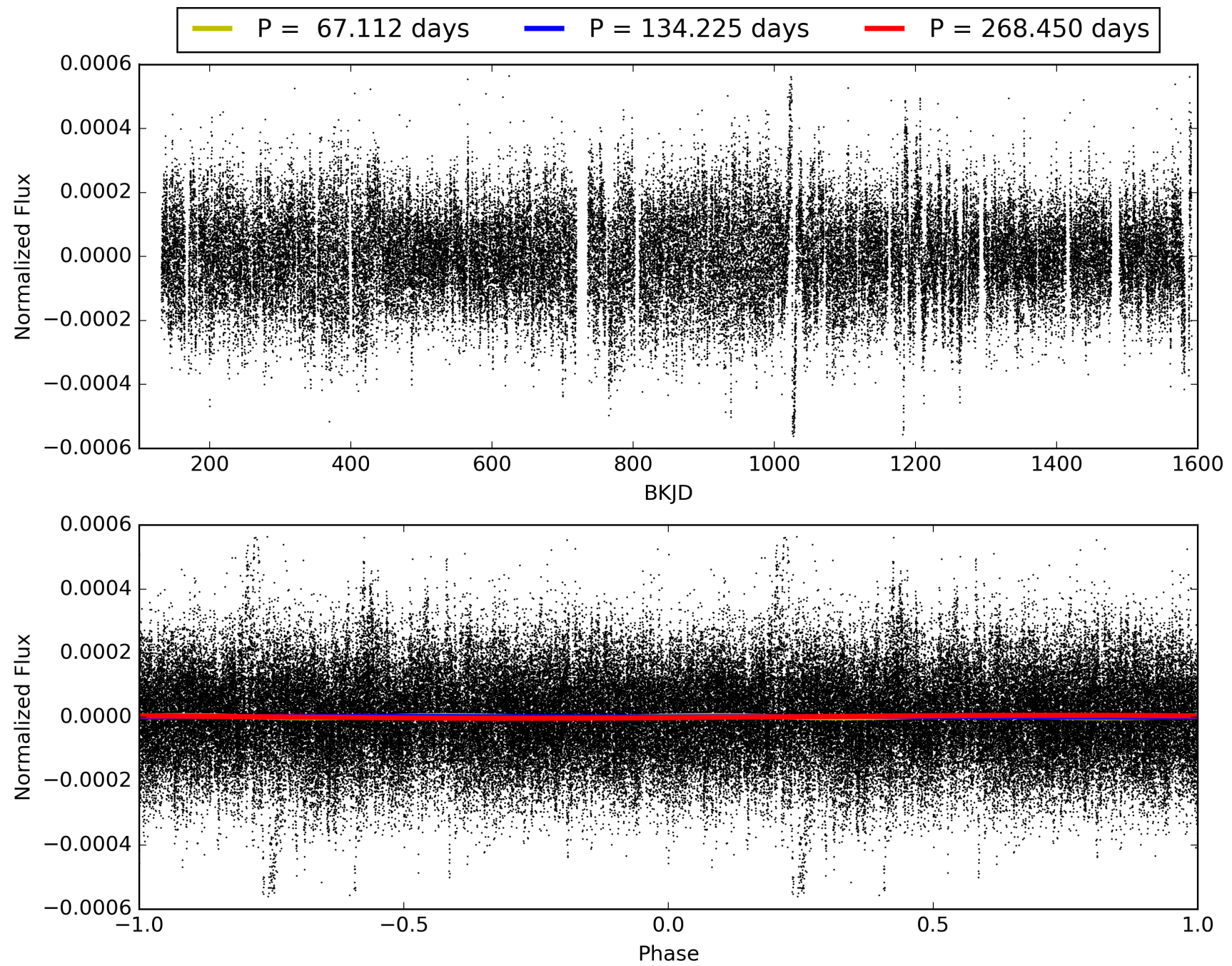
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 006715221-04, PDC Light Curves



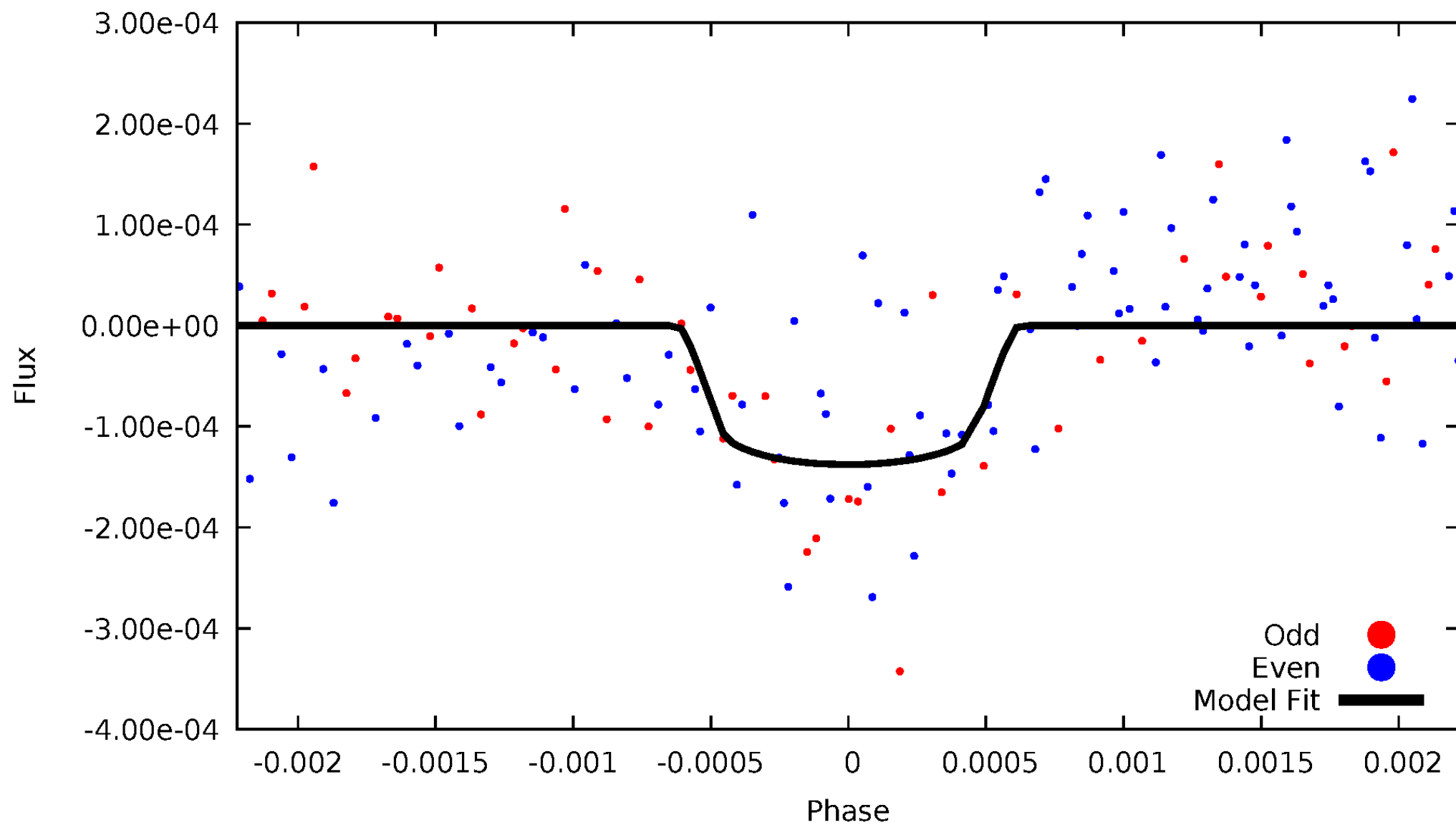


TCE 006715221-04



# DV Odd/Even

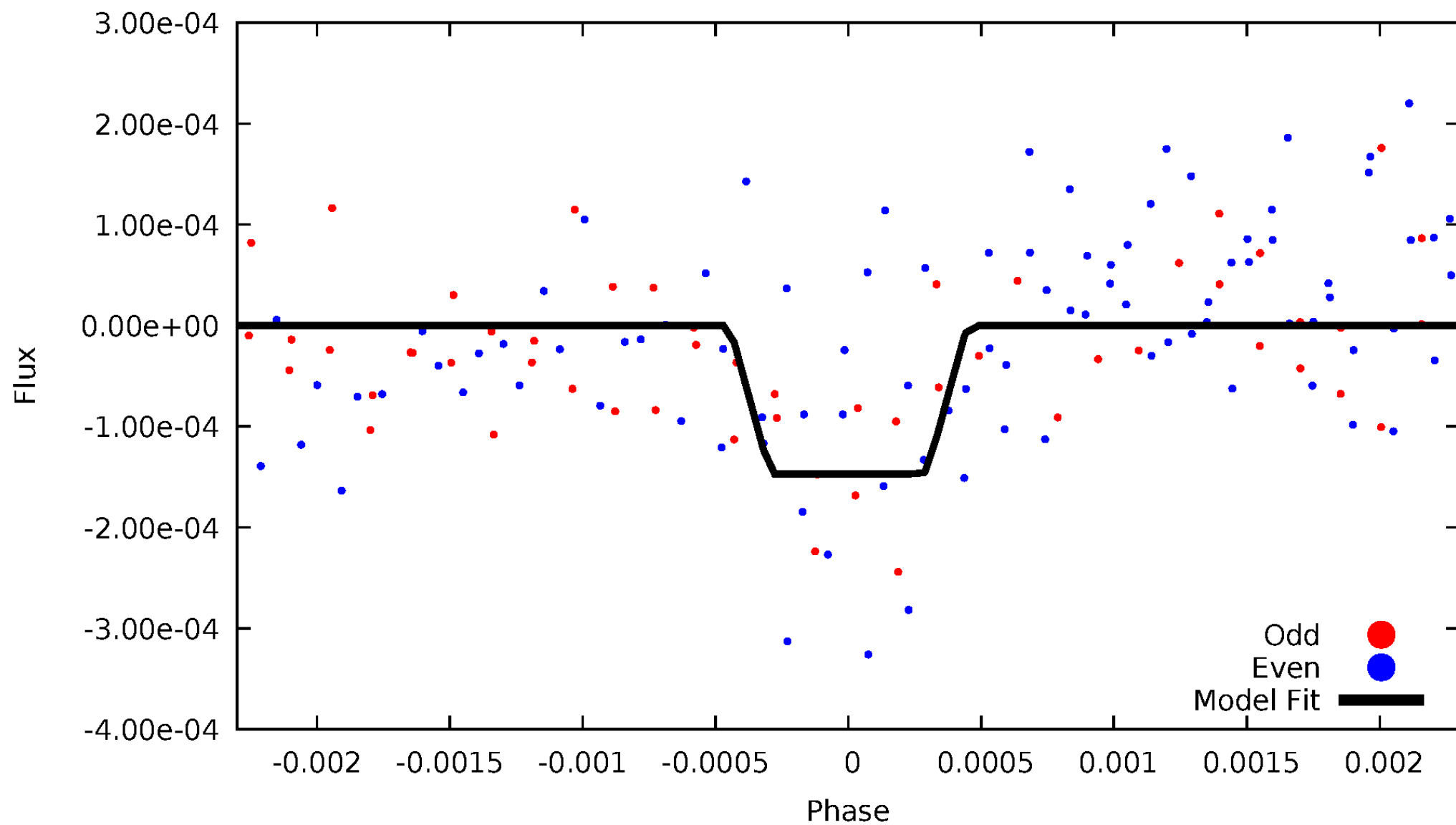
TCE 006715221-04





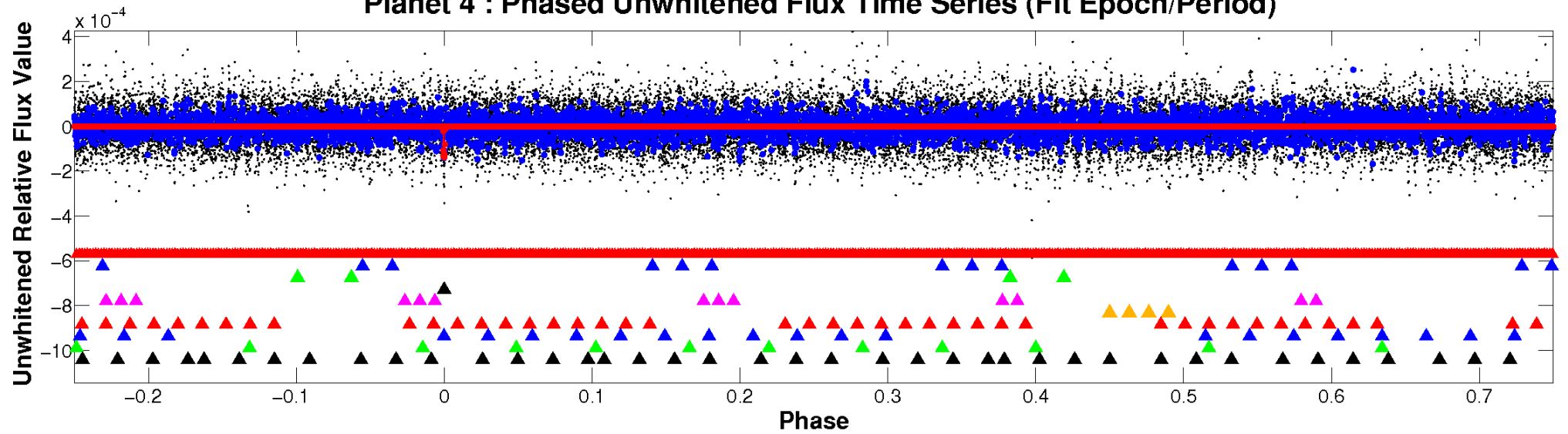
# ALT Odd/Even

TCE 006715221-04

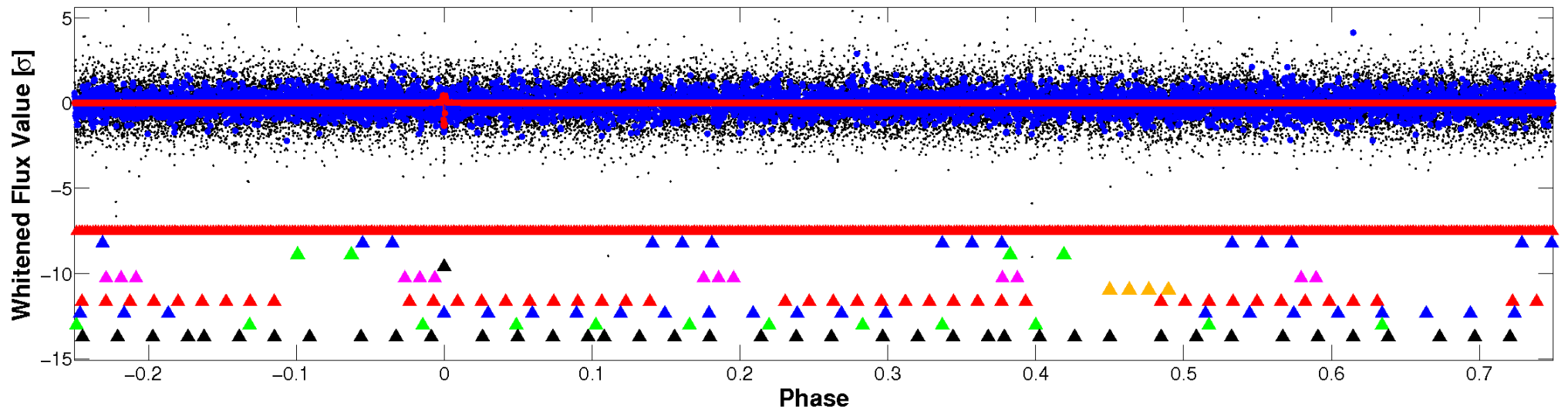


# Non-Whitened Vs. Whitened Light Curve

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

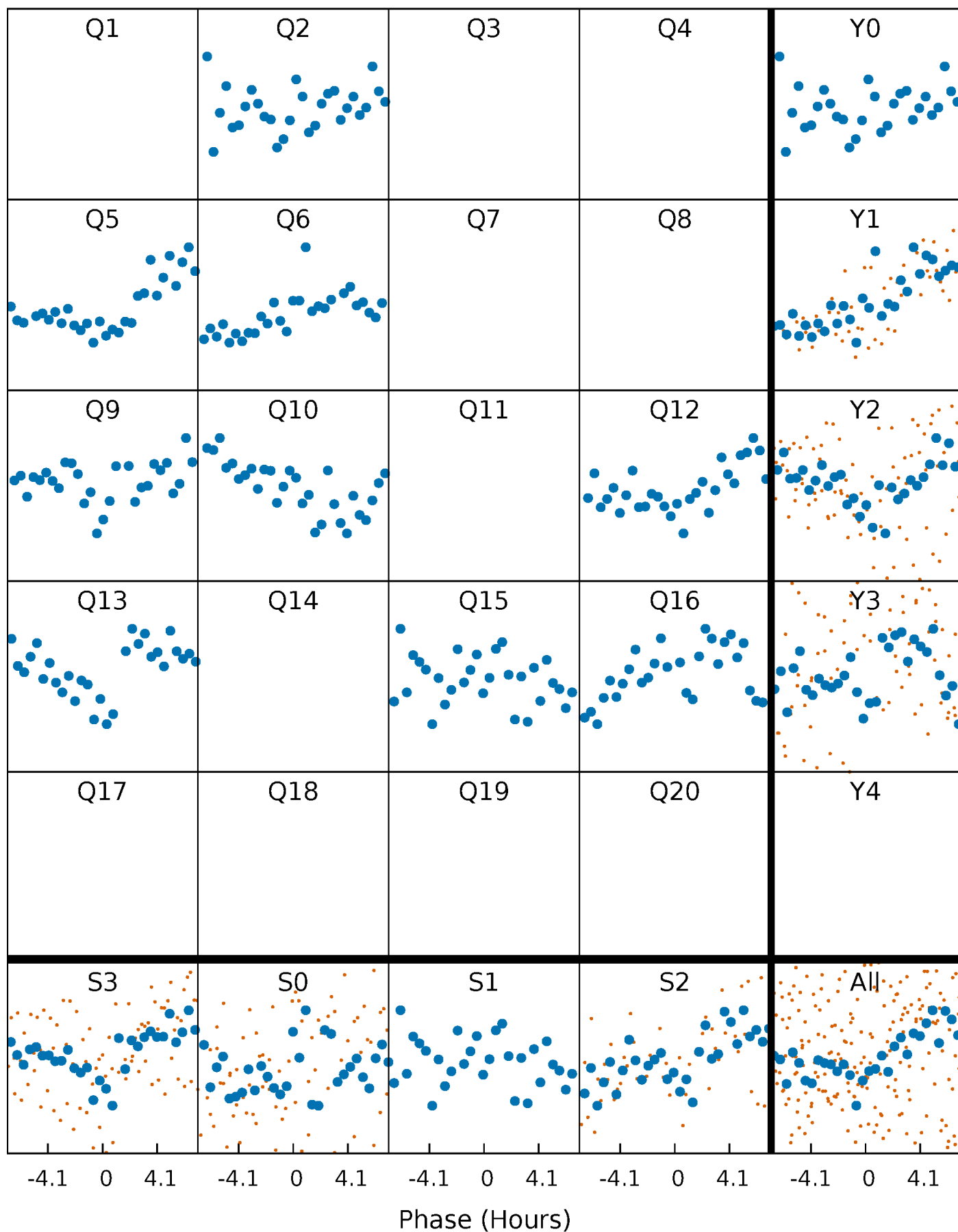


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



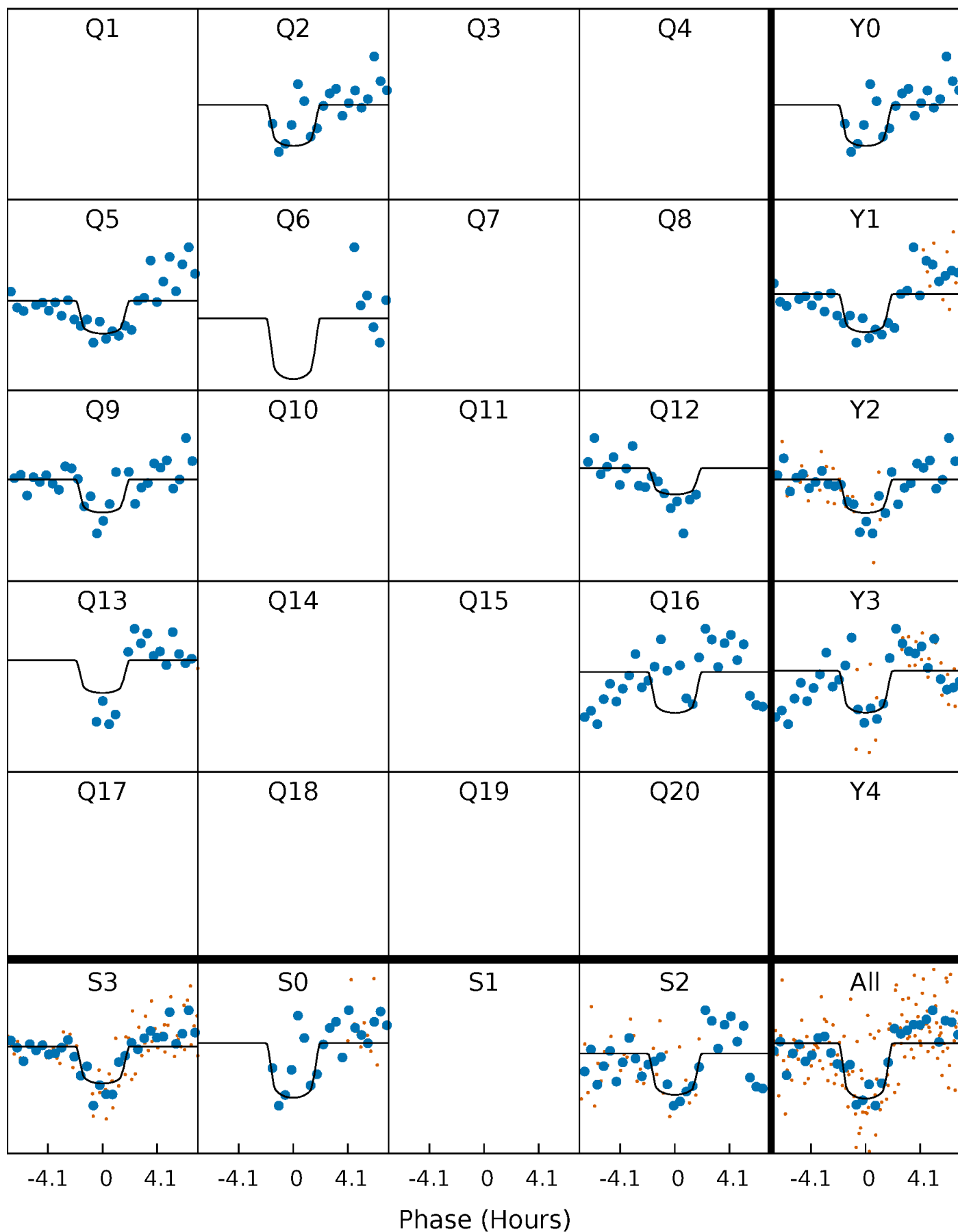
# PDC Quarter-Phased Transit Curves

TCE 006715221-04 P=134.224992 Days  $T_0=188.680406$  (BKJD)



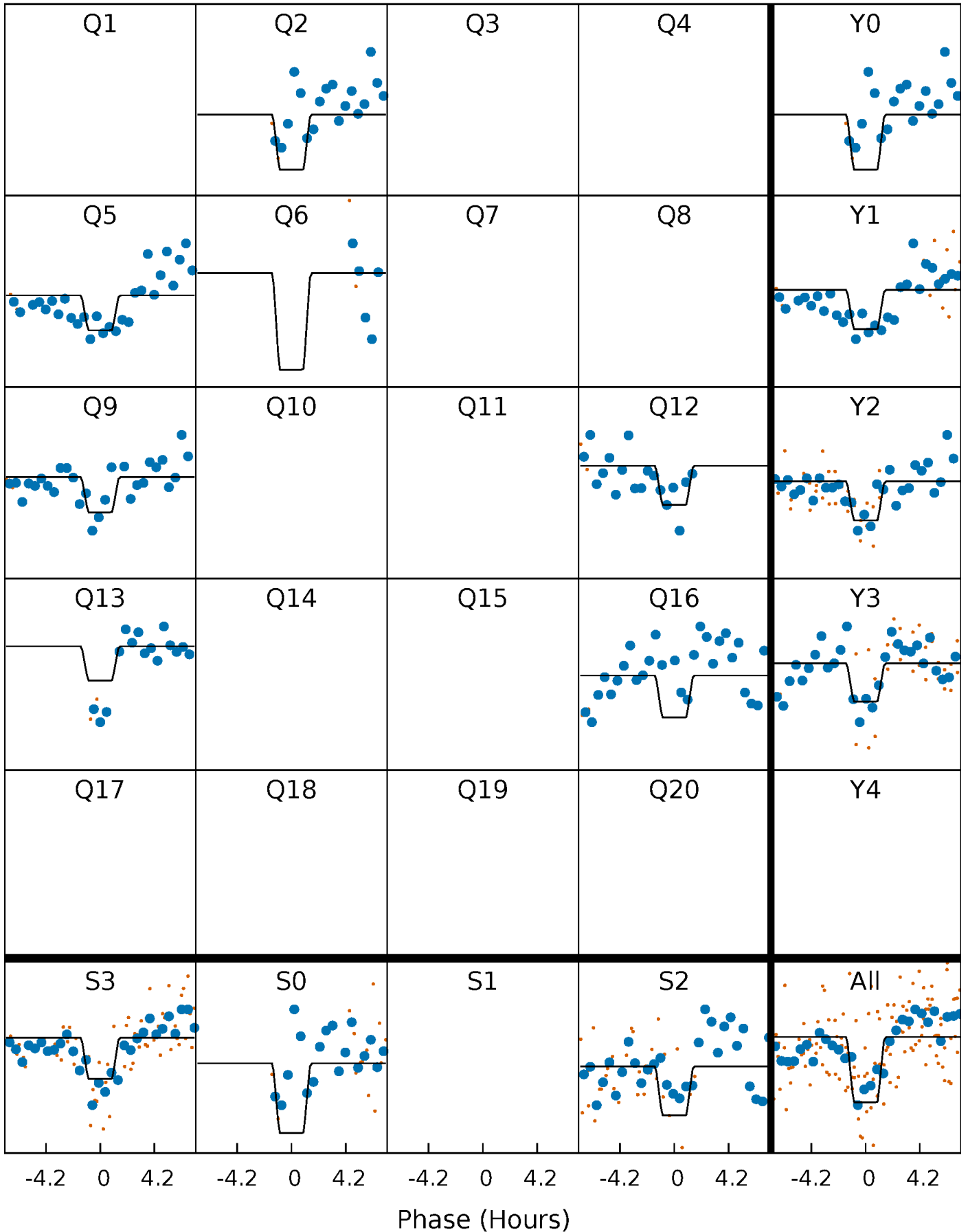
# DV Quarter-Phased Transit Curves

TCE 006715221-04 P=134.224992 Days  $T_0=188.680406$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

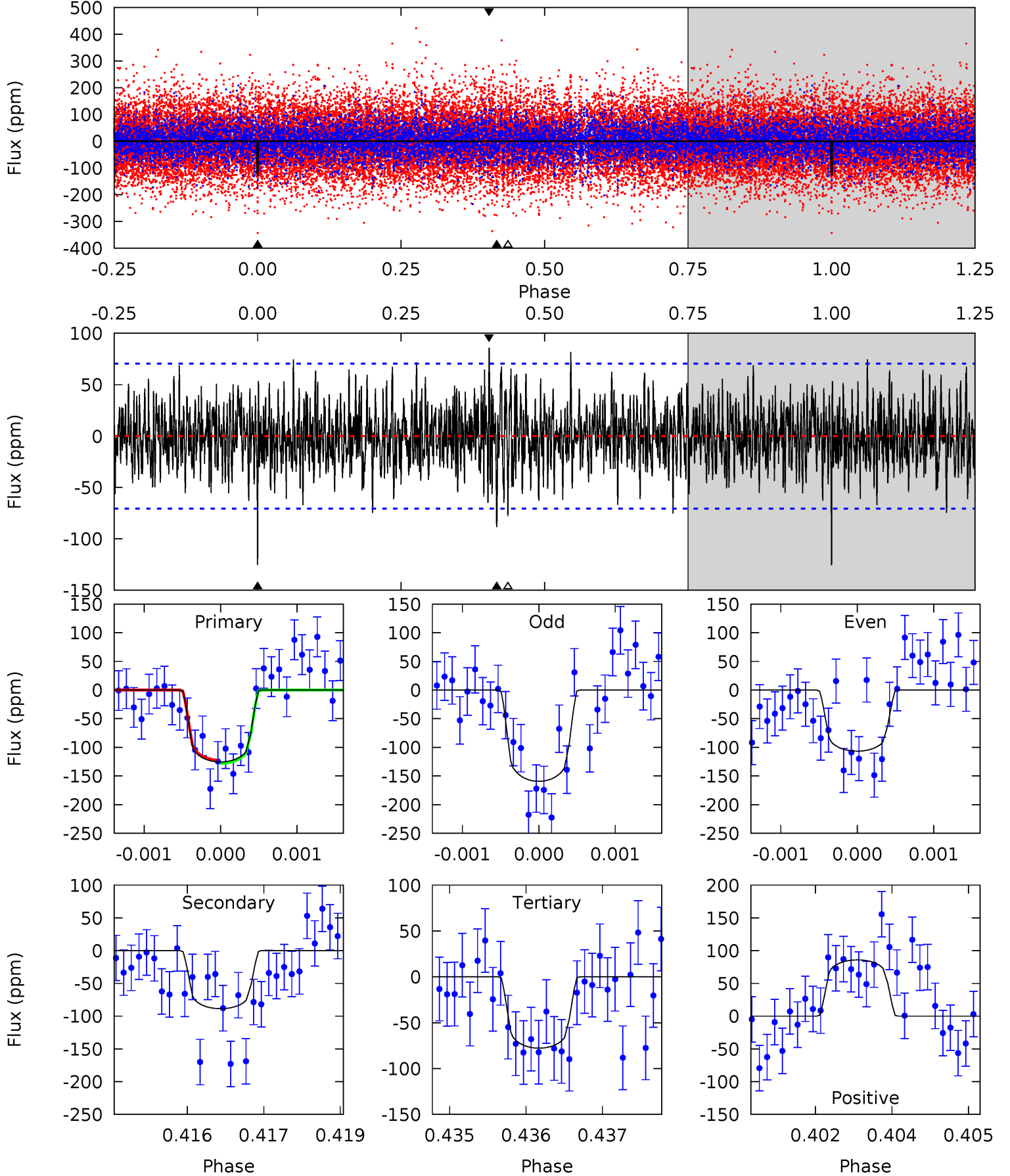
TCE 006715221-04 P=134.226629 Days  $T_0=188.668884$  (BKJD)



# DV Model-Shift Uniqueness Test

006715221-04, P = 134.224992 Days, E = 54.455414 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
9.64	6.80	5.97	6.59	5.41	3.23	1.87	3.67	3.05	0.83	0.21	1.91	0.98	0.41	0.23

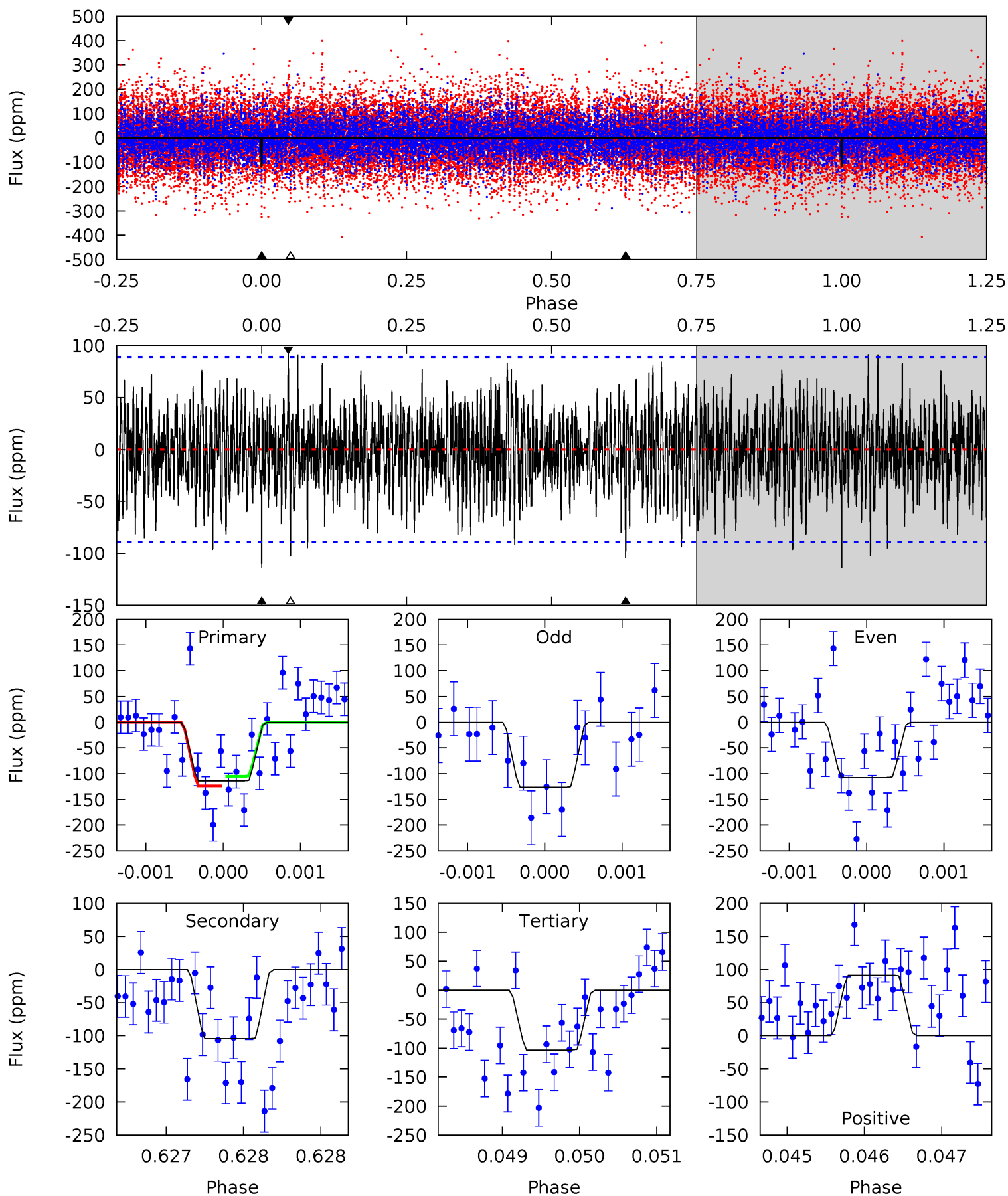




# Alt Model-Shift Uniqueness Test

006715221-04, P = 134.226629 Days, E = 54.442255 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.02	6.42	6.33	5.63	5.48	3.33	1.90	0.68	1.39	0.08	0.79	0.56	0.89	0.45	0.57



### Stellar Parameters For KIC 006715221

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$\rho_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6839^{+163}_{-225}$	$4.003^{+0.221}_{-0.119}$	$-0.060^{+0.250}_{-0.300}$	$2.020^{+0.396}_{-0.594}$	$1.497^{+0.172}_{-0.257}$	$0.256^{+0.303}_{-0.104}$
	+2%/-3%	+6%/-3%	+417%/-500%	+20%/-29%	+11%/-17%	+118%/-41%
Source	PHO1	FLK73	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 006715221-04 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-89 \pm 13$	$2.75^{+1.90}_{-1.59}$	$777^{+45}_{-62}$	$5830^{+3726}_{-1177}$	$2225^{+10241}_{-1453}$
Alt.	$-104 \pm 16$	$2.64^{+2.01}_{-1.52}$	$772^{+48}_{-57}$	$6073^{+3847}_{-1283}$	$2713^{+12290}_{-1820}$

$T_{\text{max}}$  = 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

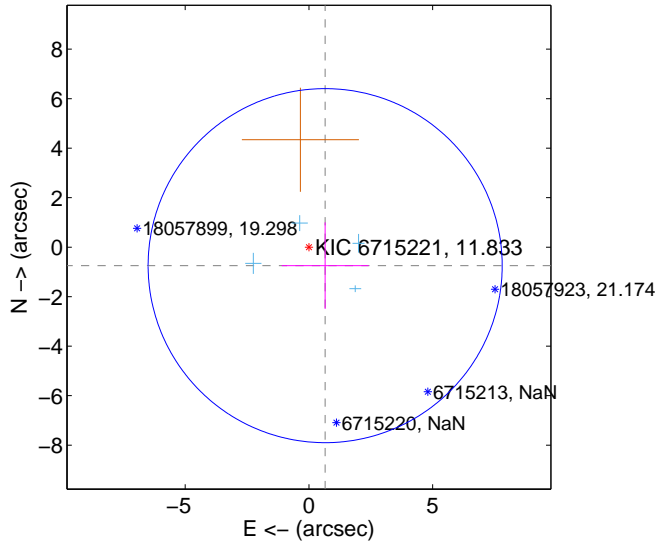
Supplemental centroid analysis for 006715221-04. **Kepler magnitude: 11.83.** Transit SNR 7.38

There are 4 quarters with good PRF difference image offsets

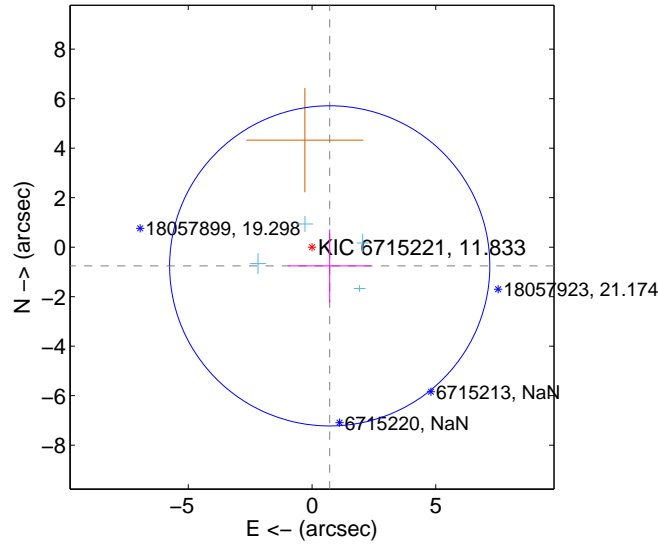
The direct PRF centroid is offset from the target star catalog position by about 0.06 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.994 \pm 2.384$	0.42	$-0.656 \pm 1.755$	$-0.747 \pm 1.749$
PRF-fit source offset from KIC position	$1.041 \pm 2.156$	0.48	$-0.716 \pm 1.665$	$-0.756 \pm 1.477$
photometric centroid source offset	$0.91 \pm 1.02$	0.90	$-0.52 \pm 1.09$	$0.75 \pm 0.98$

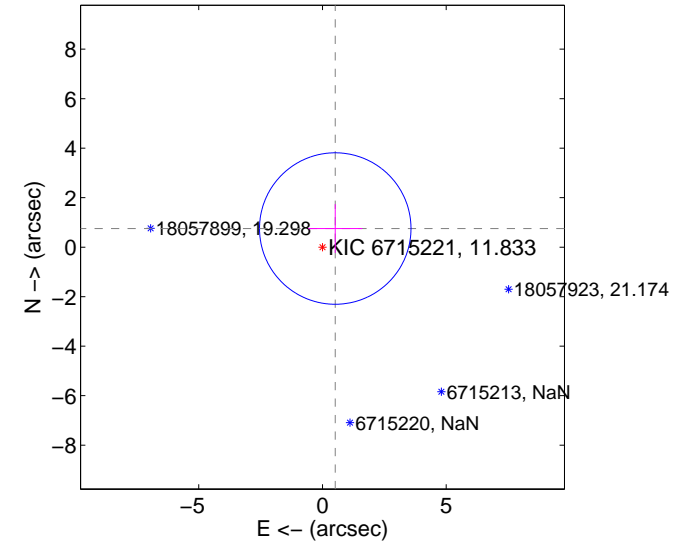
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

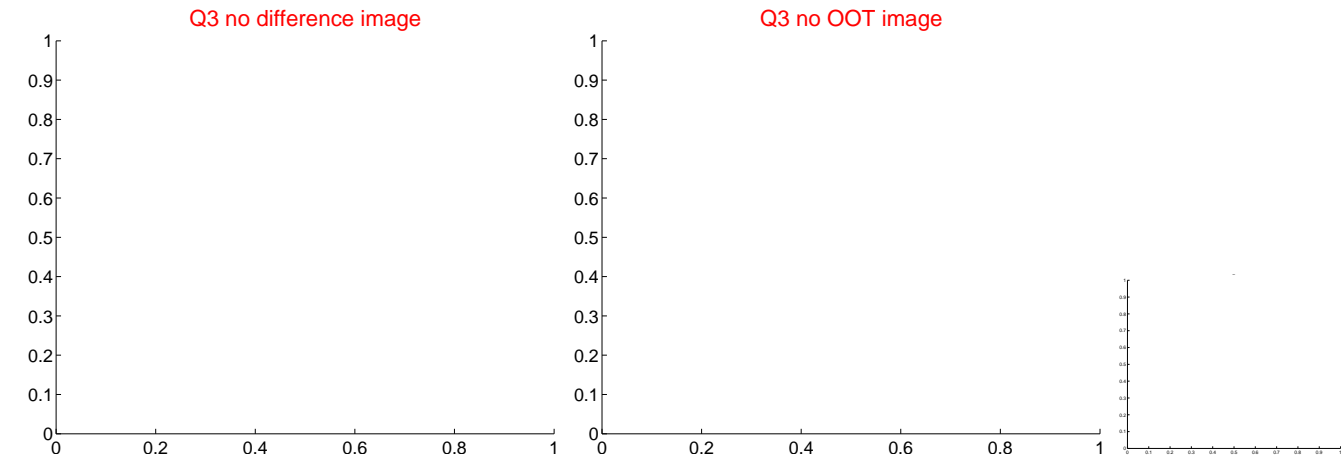
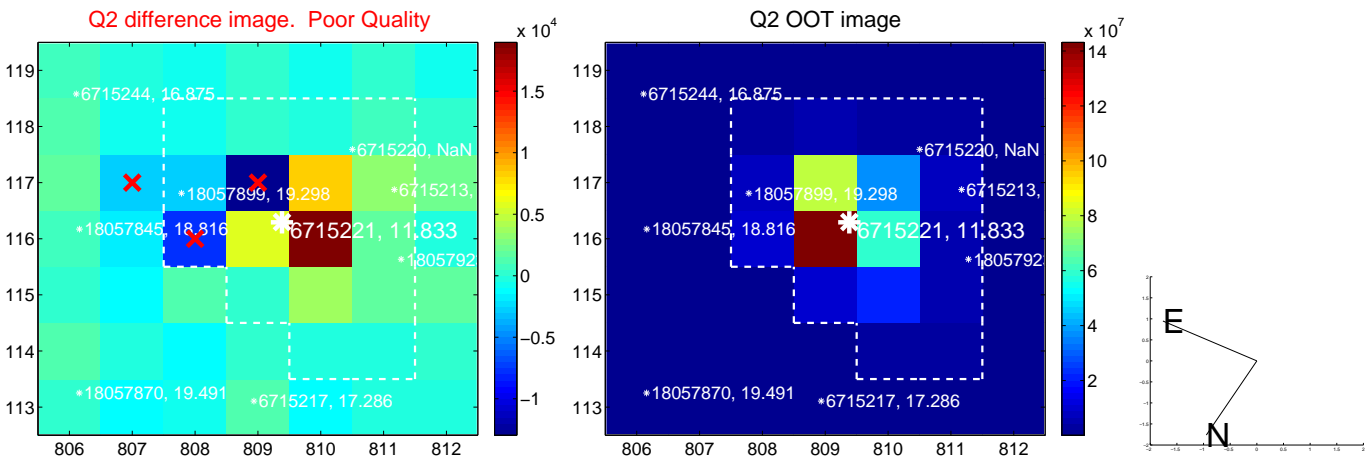


offset from photometric centroids

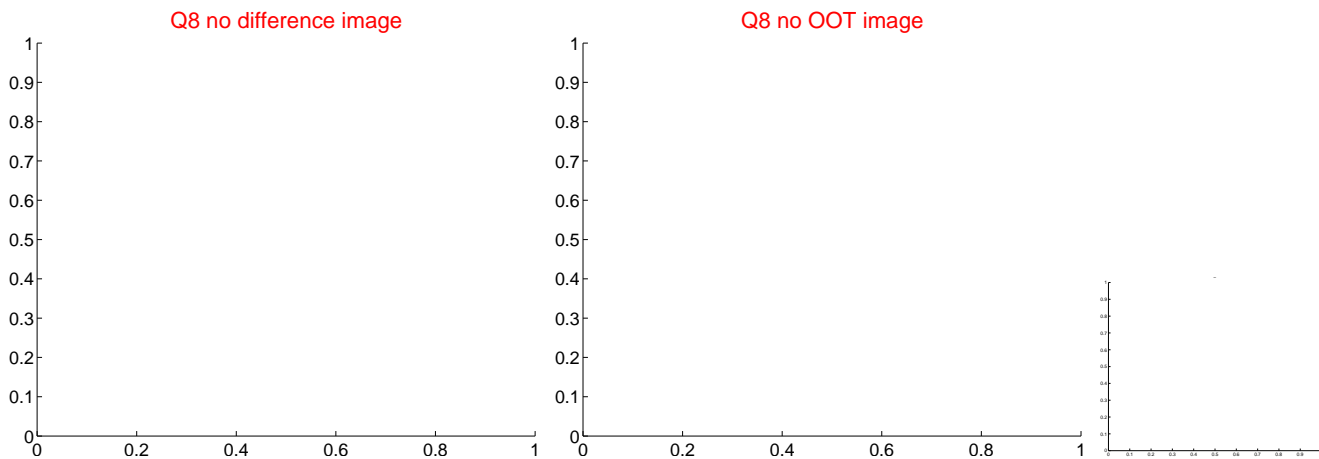
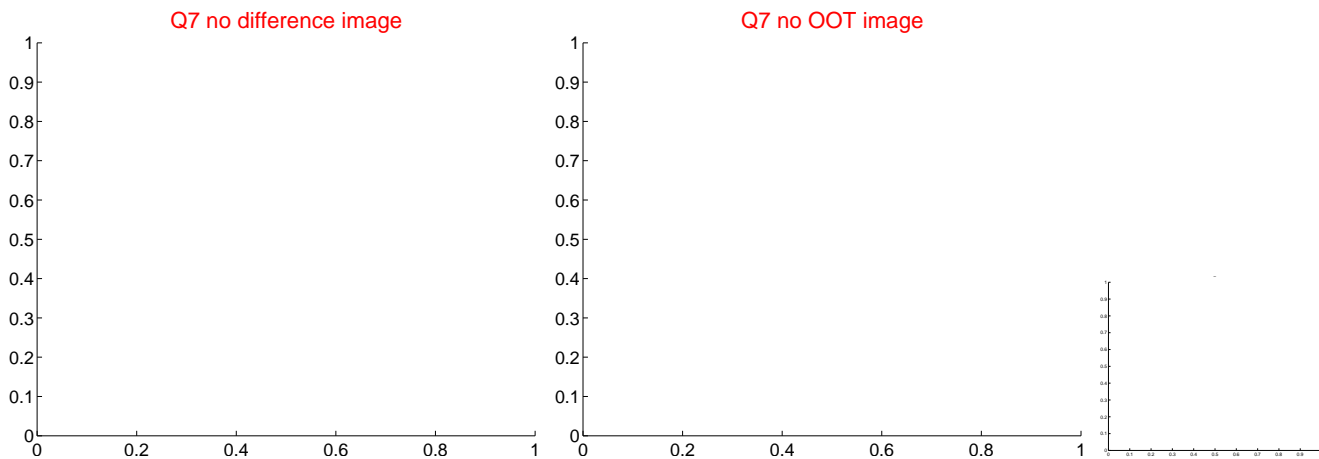
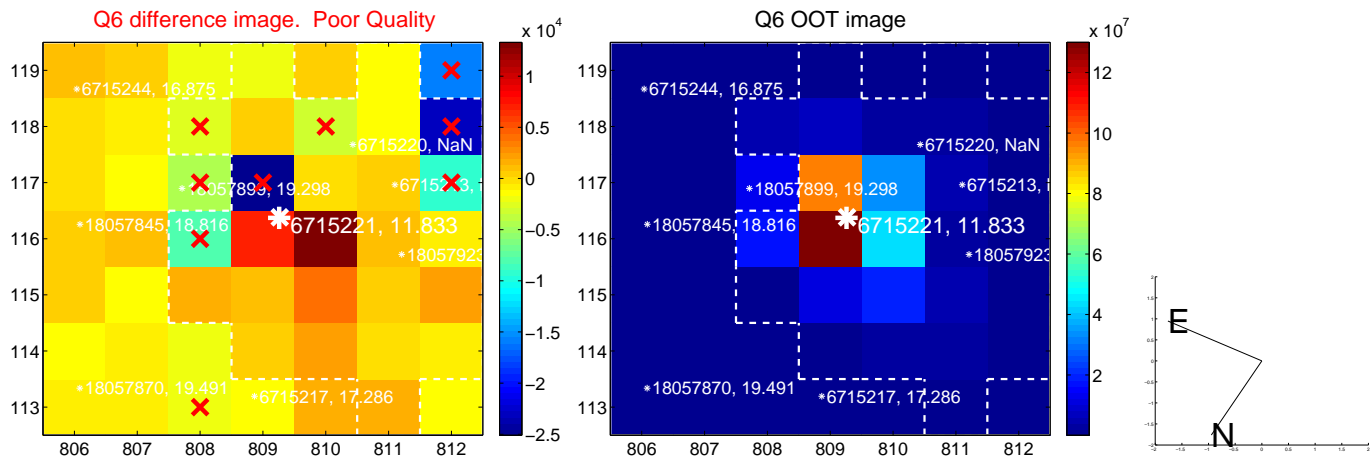
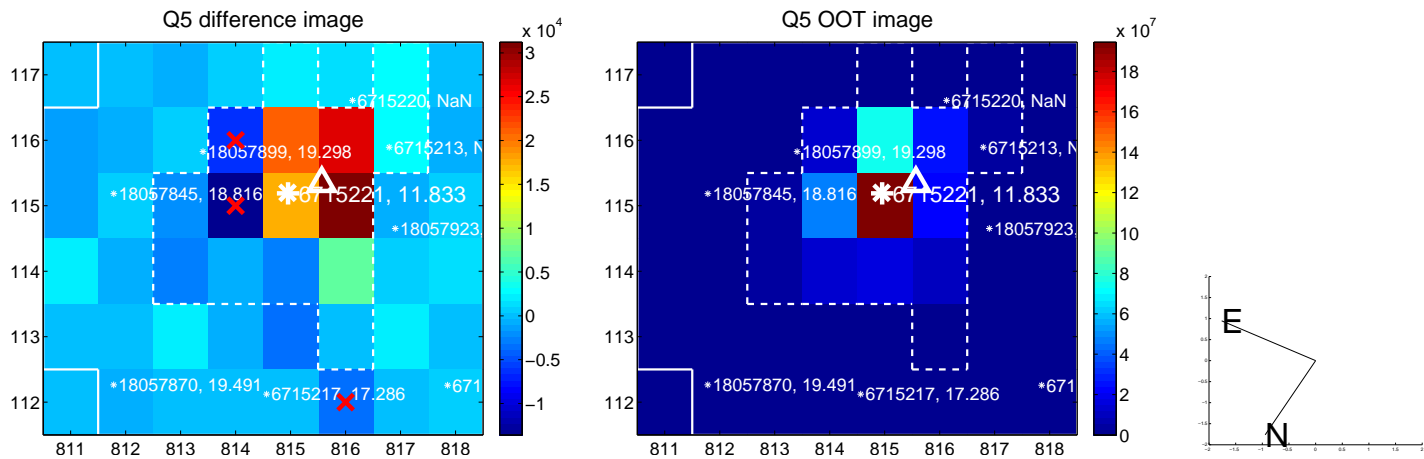


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

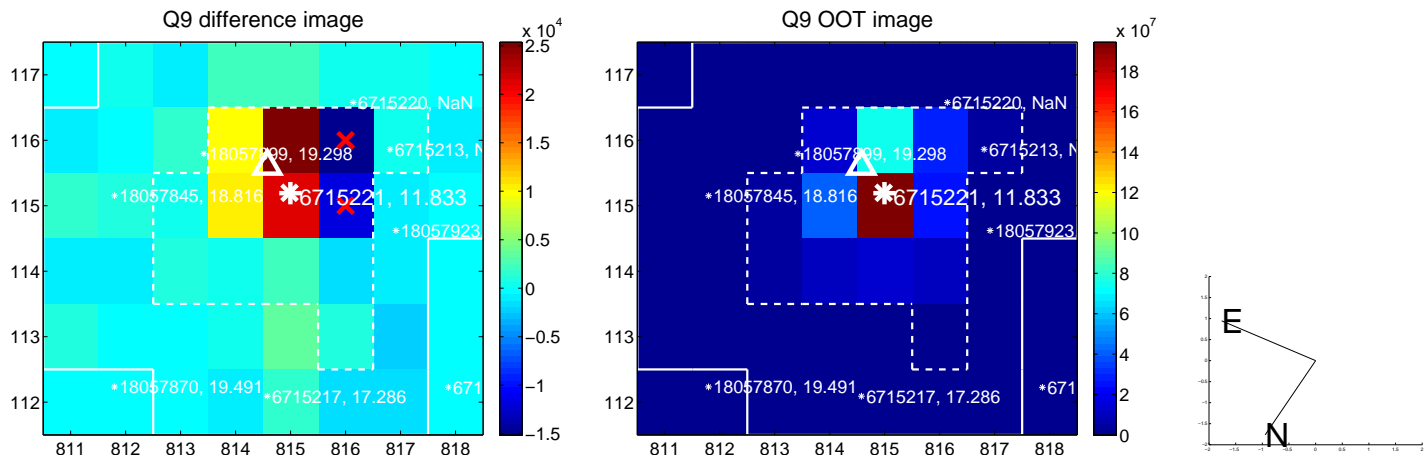
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

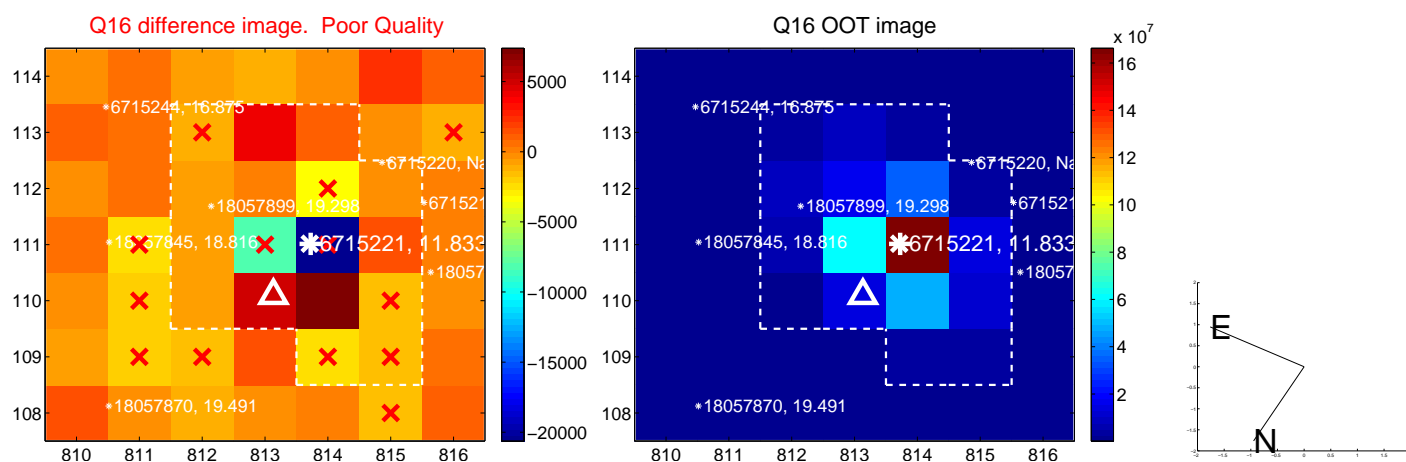
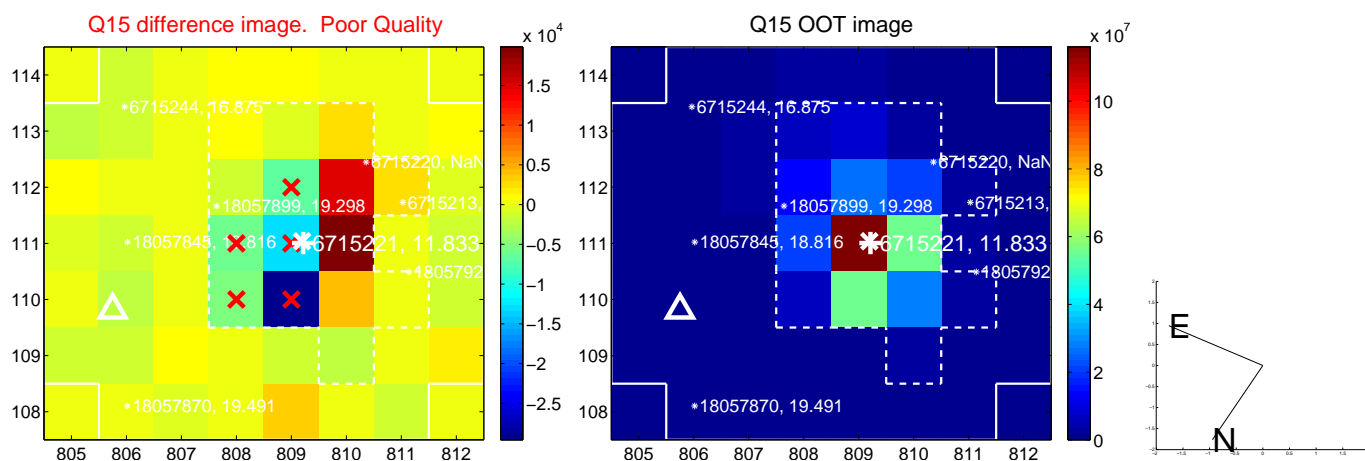
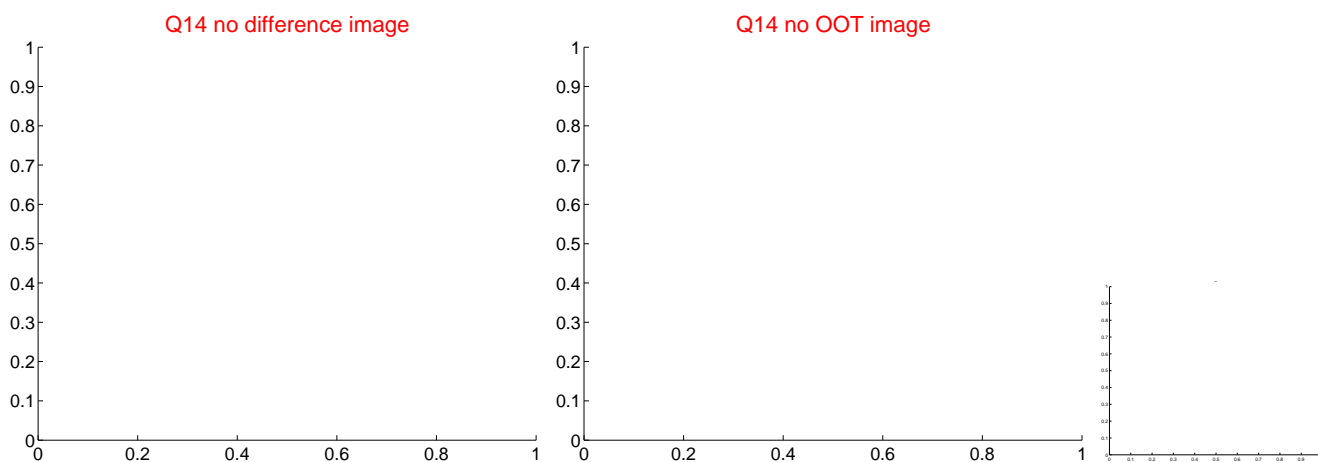
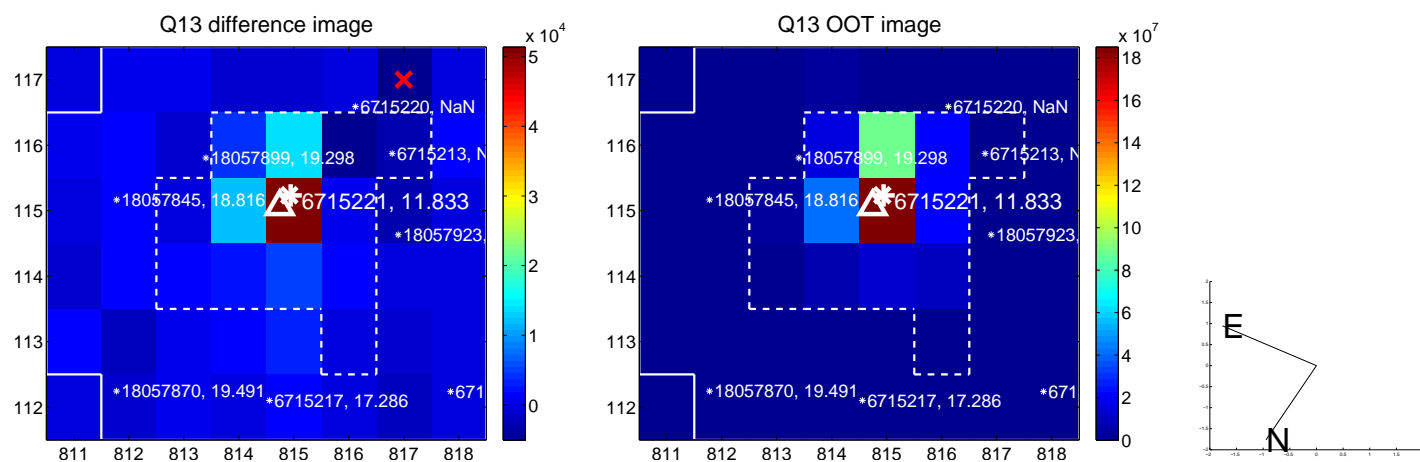


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

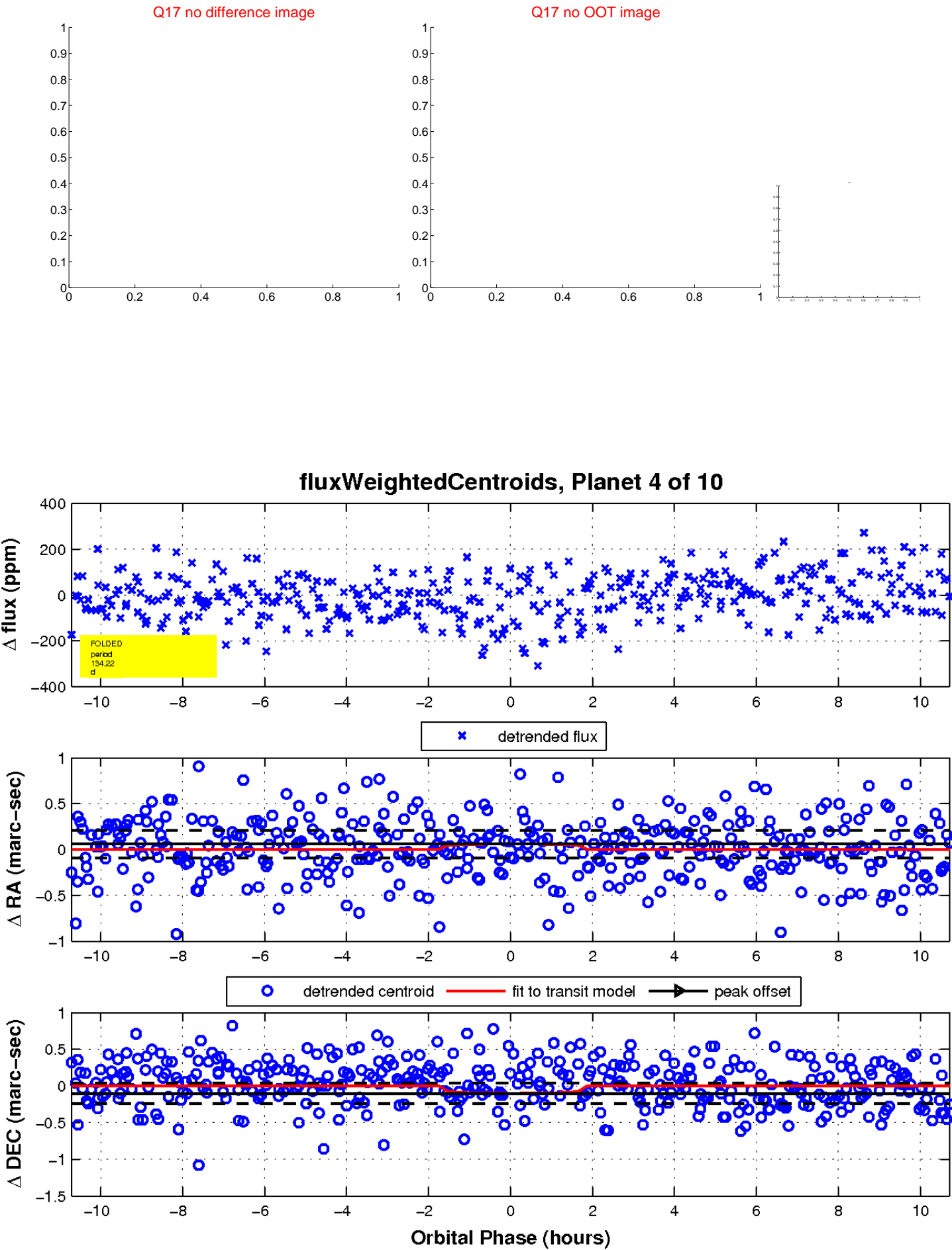




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

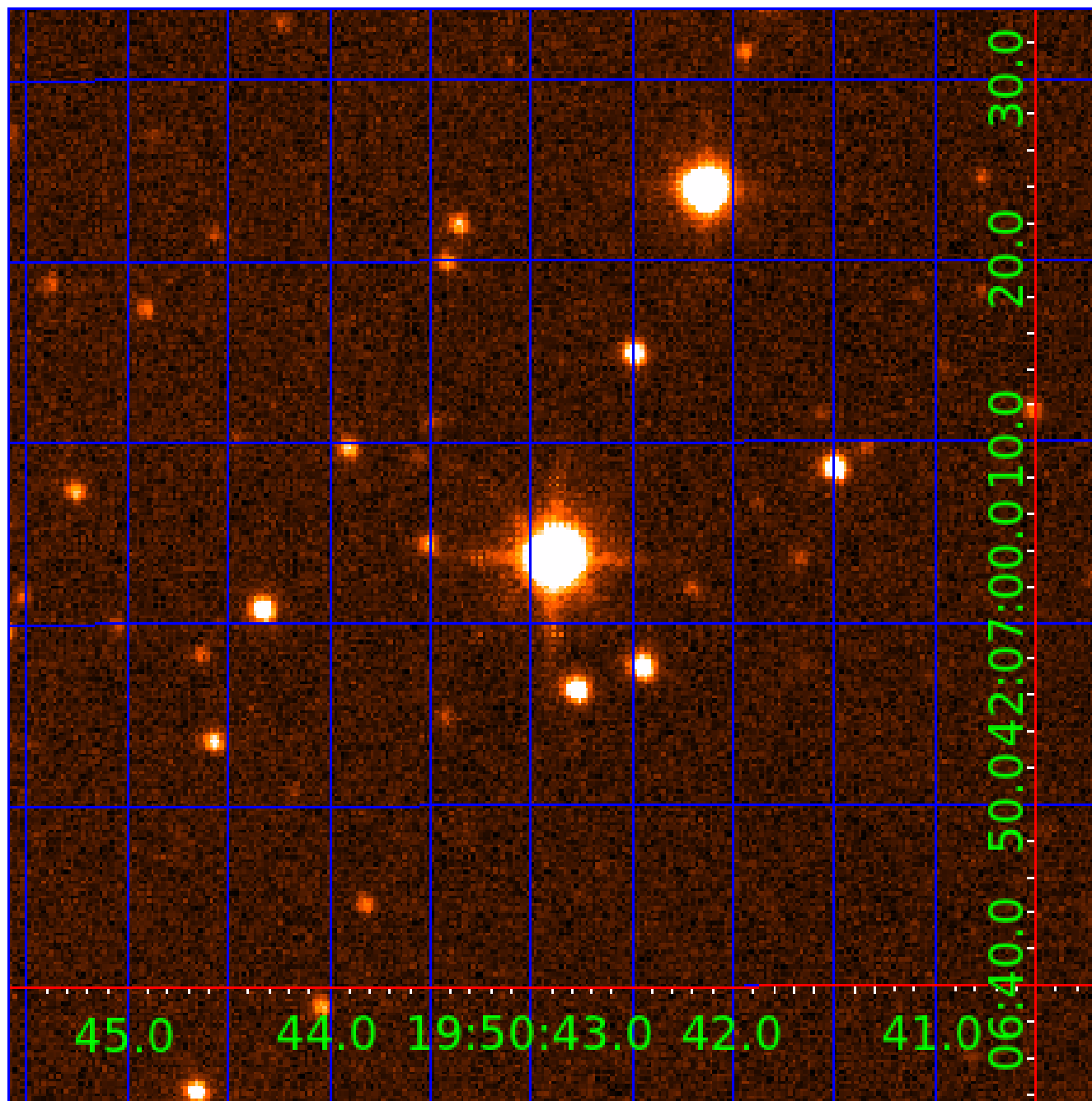


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



## KIC 006715221

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006715221-01	OBS	No	1.984918	132.459230	13.3	8.776	9.2	7.4	2.02	6839	0.74	6389.14
006715221-02	OBS	No	107.919359	152.278773	91.7	14.832	10.4	6.2	2.02	6839	2.12	31.02
006715221-03	OBS	No	333.120273	314.487390	168.1	20.190	10.4	7.6	2.02	6839	2.83	6.90
006715221-04	OBS	No	134.224992	188.680406	137.8	3.578	8.3	7.4	2.02	6839	2.67	23.19
006715221-05	OBS	No	107.107514	214.951810	149.8	13.238	8.0	8.9	2.02	6839	3.25	31.33
006715221-06	OBS	No	400.898244	254.418073	152.5	9.827	8.0	7.8	2.02	6839	2.91	5.39
006715221-07	OBS	No	34.101777	151.432052	96.7	3.723	7.7	8.0	2.02	6839	2.32	144.12
006715221-08	OBS	No	65.108276	163.640682	100.0	4.485	7.8	7.8	2.02	6839	2.31	60.85
006715221-09	OBS	No	118.508397	233.886395	144.3	11.967	8.1	7.9	2.02	6839	2.70	27.38
006715221-10	OBS	No	36.316557	165.427888	72.2	12.670	8.2	7.1	2.02	6839	2.27	132.52

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006715221-01	OBS	FP	0.00	1	0	0	0	LPP_DV
006715221-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
006715221-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
006715221-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
006715221-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_ALT—CENT_FEW_MEAS
006715221-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—MOD_NONUNIQ_ALT
006715221-07	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—MOD_NONUNIQ_ALT
006715221-08	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—MOD_NONUNIQ_ALT
006715221-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_MEAS
006715221-10	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_UNRESOLVED_OFFSET

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

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

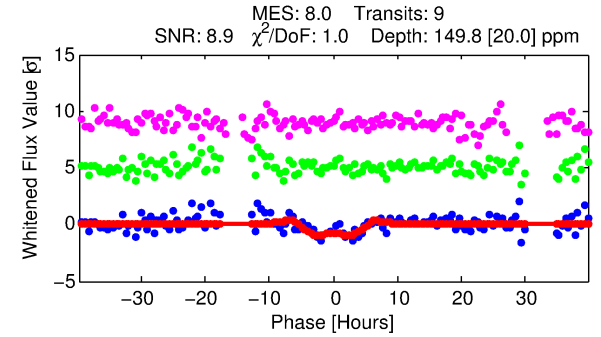
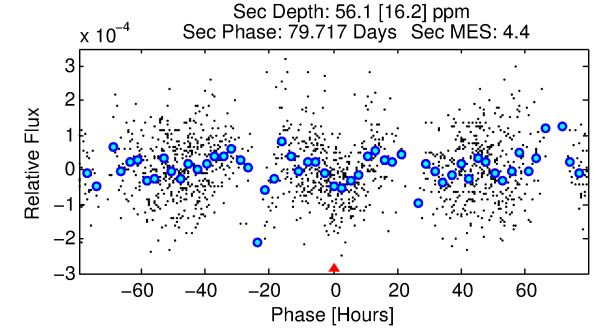
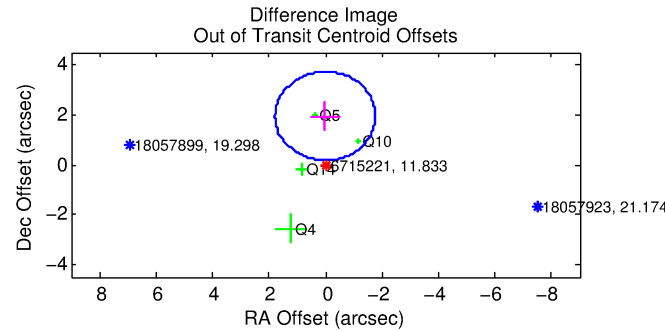
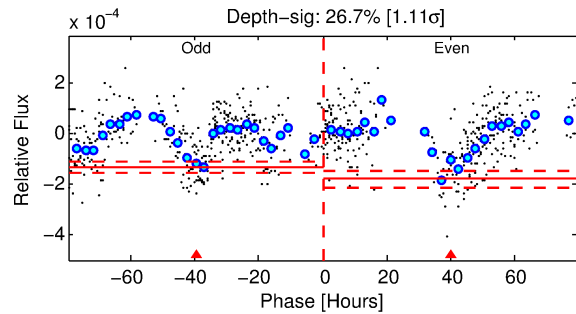
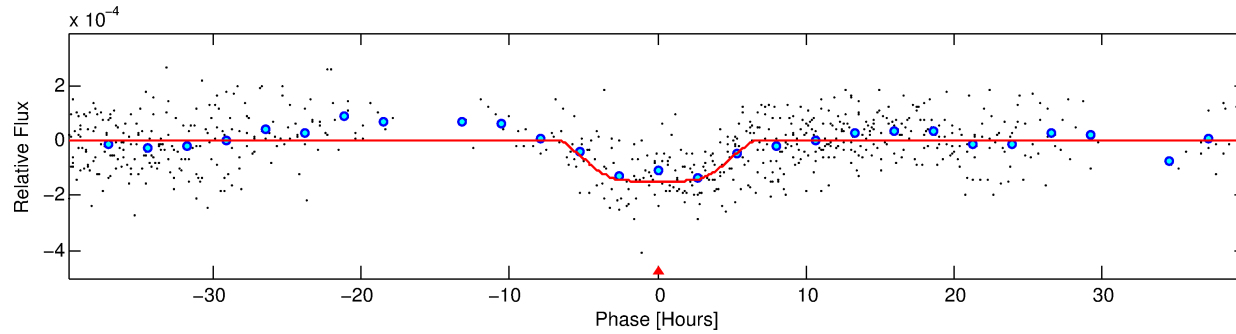
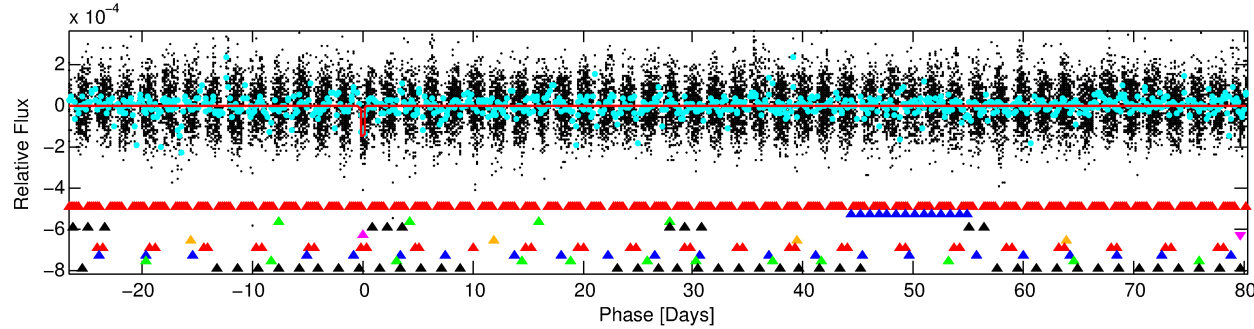
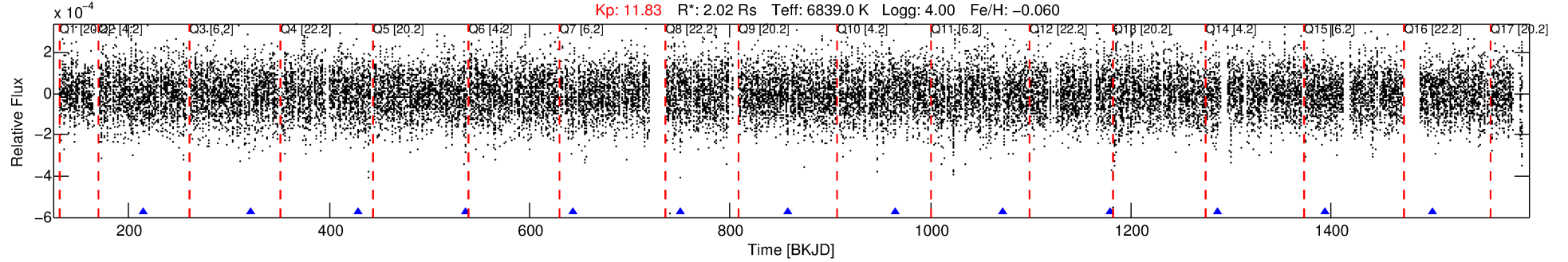
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 006715221-05

No Significant Match Found

# DV One-Page Summary

KIC: 6715221 Candidate: 5 of 10 Period: 107.108 d



## DV Fit Results:

Period = 107.10751 [0.00499] d  
Epoch = 214.9518 [0.0216] BKJD  
Rp/R\* = 0.0147 [0.0011]  
a/R\* = 16.40 [2.40]  
b = 0.98 [0.01]  
Seff = 31.33 [12.95]  
Teff = 603 [62] K  
Rp = 3.25 [0.99] Re  
a = 0.5052 [0.1310] AU  
Ag = 748.26 [381.44] [1.96 $\sigma$ ]  
Teffp = 4878 [429] K [9.86 $\sigma$ ]

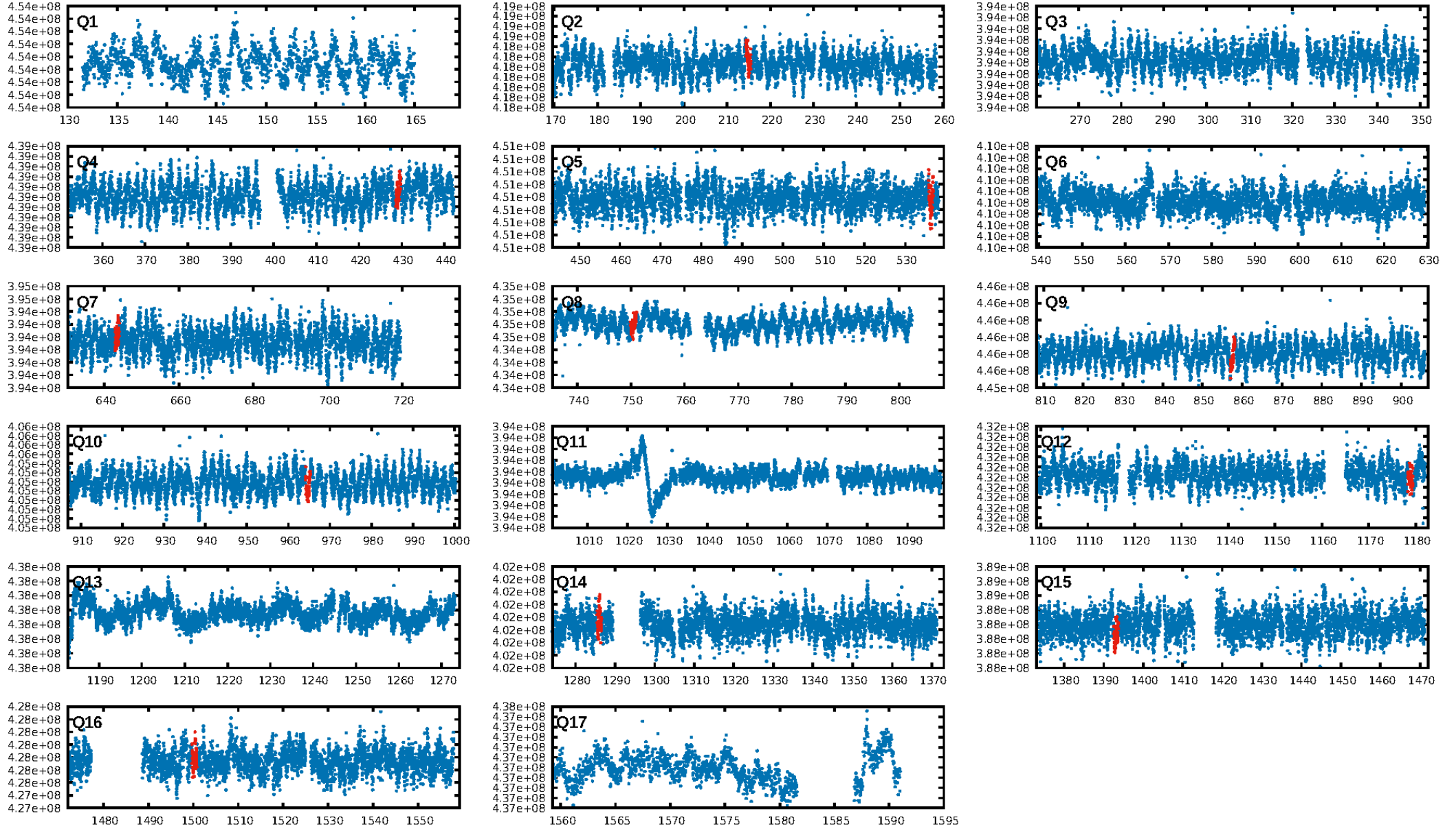
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [72.12 $\sigma$ ]  
LongPeriod-sig: 67.3% [0.98 $\sigma$ ]  
ModelChiSquare2-sig: 71.7%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 8.31e-09**  
RollingBand-fgt: 1.00 [9/9]  
GhostDiagnostic-chr: 2.525  
Centroid-sig: 1.3%  
Centroid-so: 0.849 arcsec [1.55 $\sigma$ ]  
**OotOffset-rm: 1.948 arcsec [3.29 $\sigma$ ]**  
KicOffset-rm: 1.942 arcsec [2.24 $\sigma$ ]  
OotOffset-st: 2/0/1/1 [4]  
KicOffset-st: 2/0/1/1 [4]  
DiffImageQuality-fgm: 0.50 [2/4]  
DiffImageOverlap-fno: 0.00 [0/8]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 05:30:22 Z

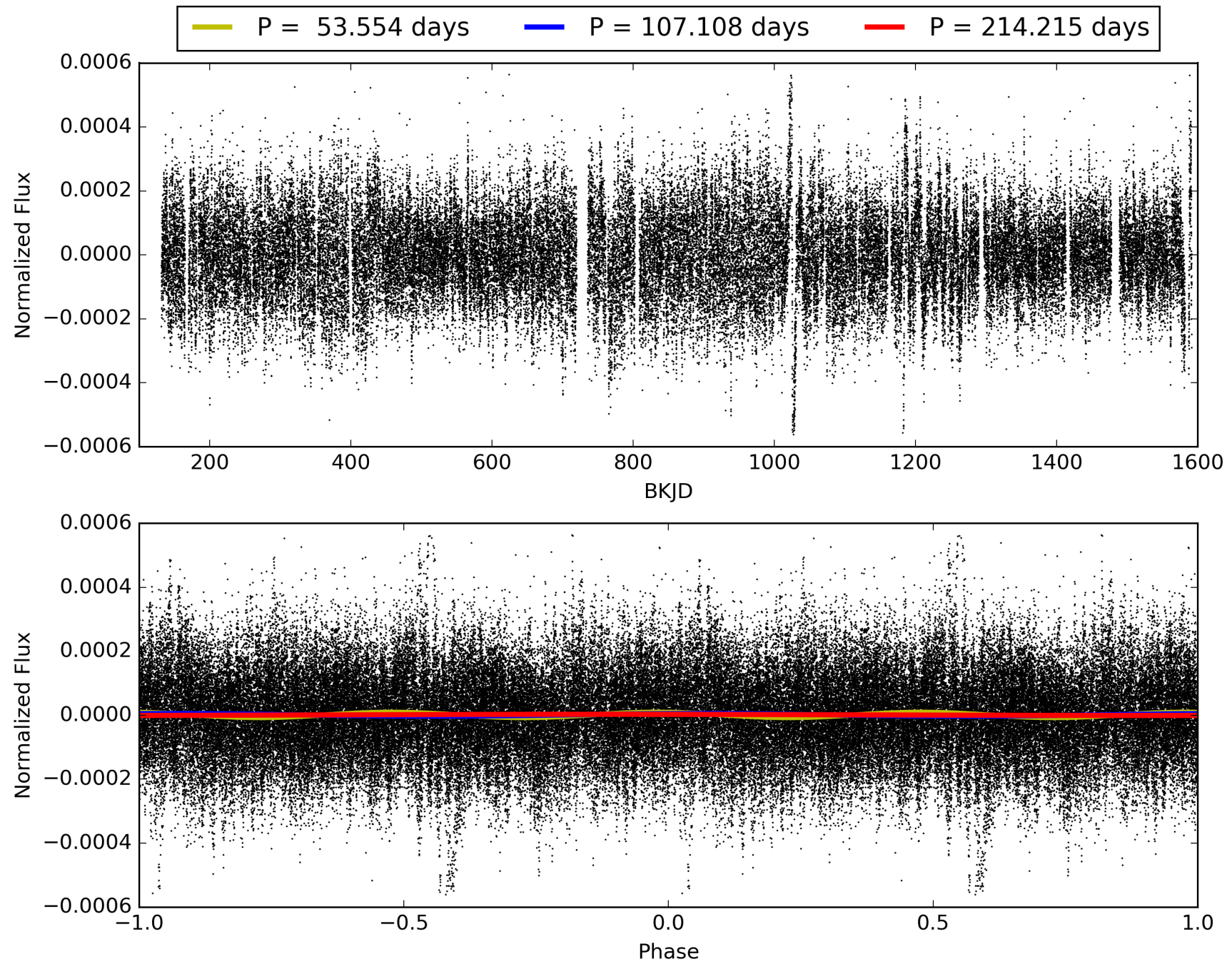
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 006715221-05, PDC Light Curves





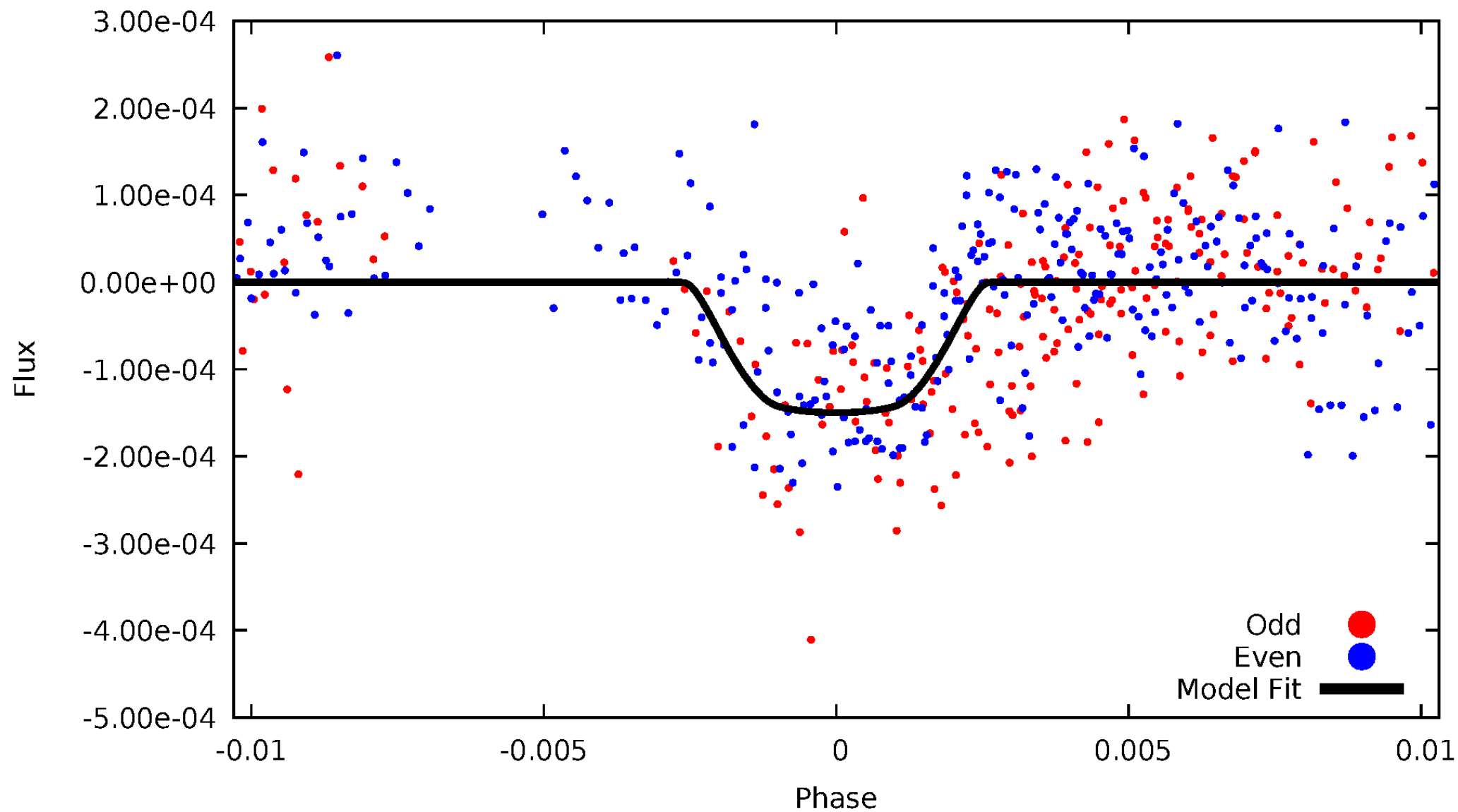
TCE 006715221-05





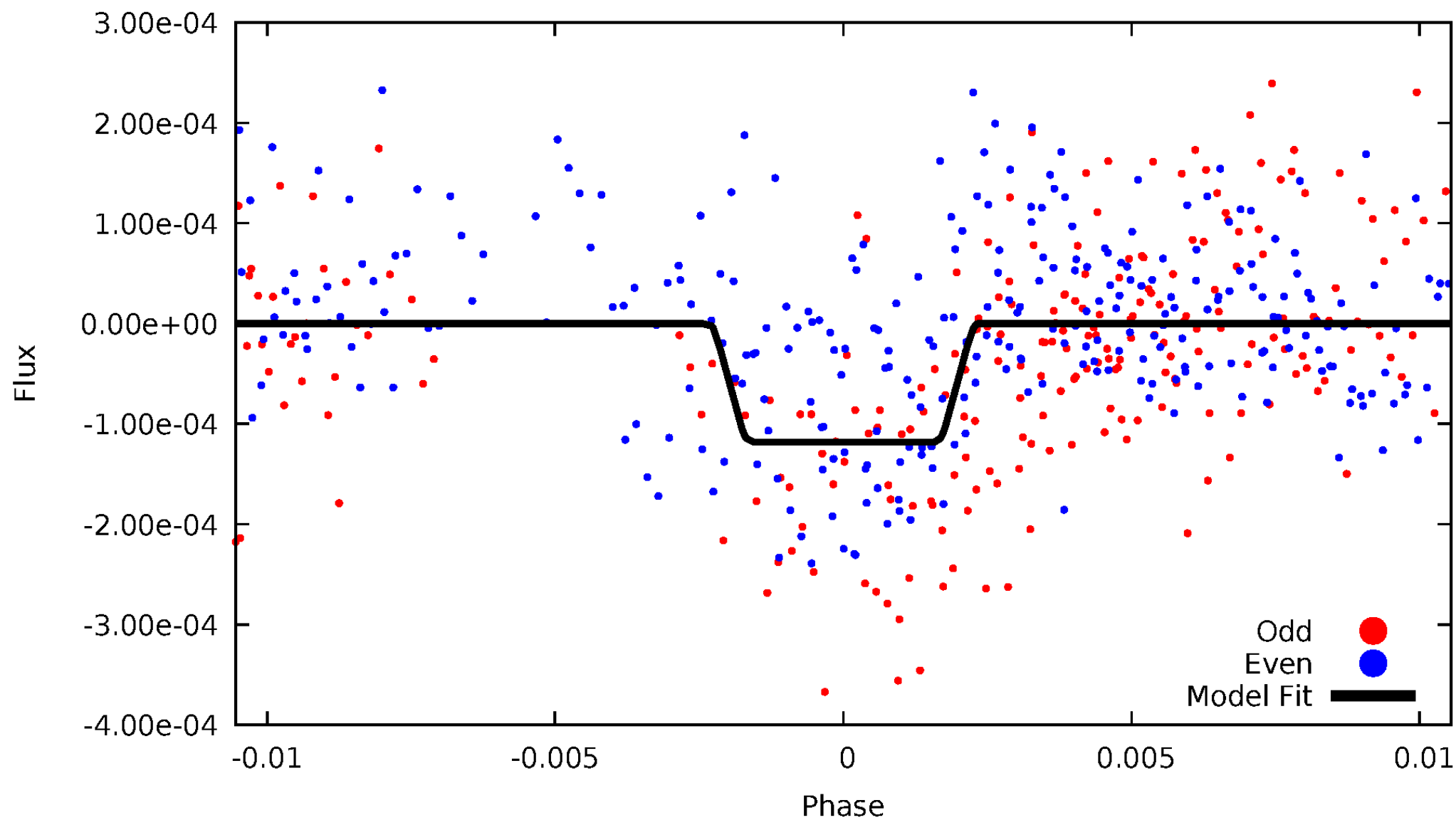
# DV Odd/Even

TCE 006715221-05



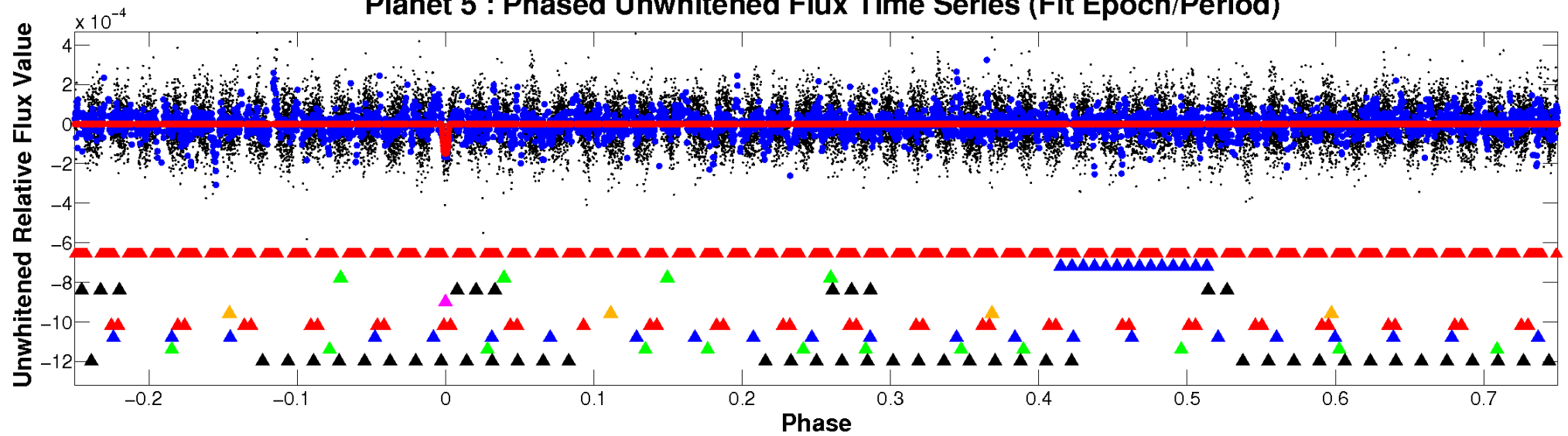
# ALT Odd/Even

TCE 006715221-05

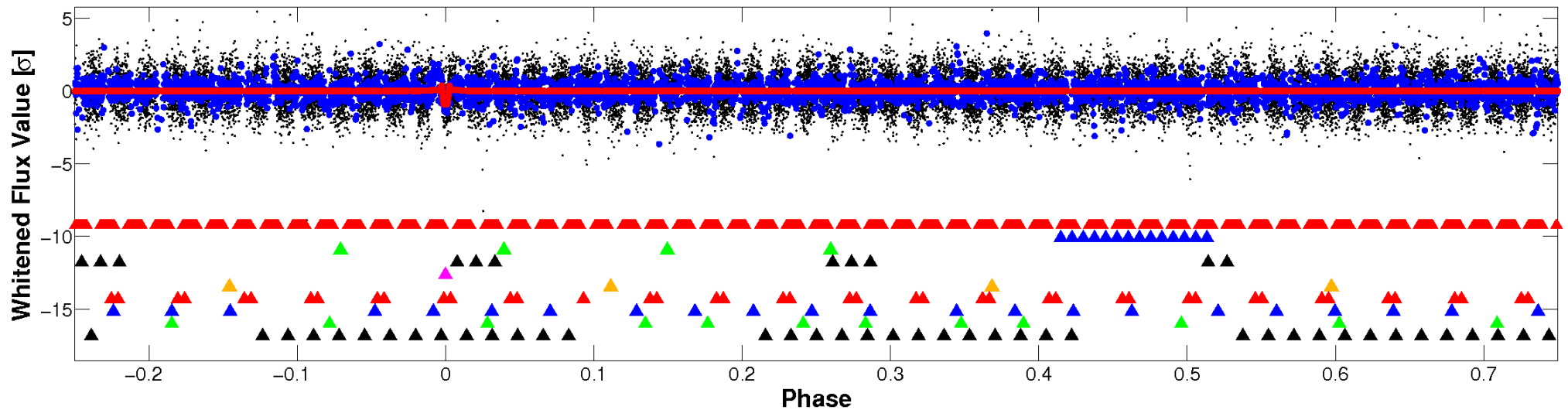


# Non-Whitened Vs. Whitened Light Curve

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

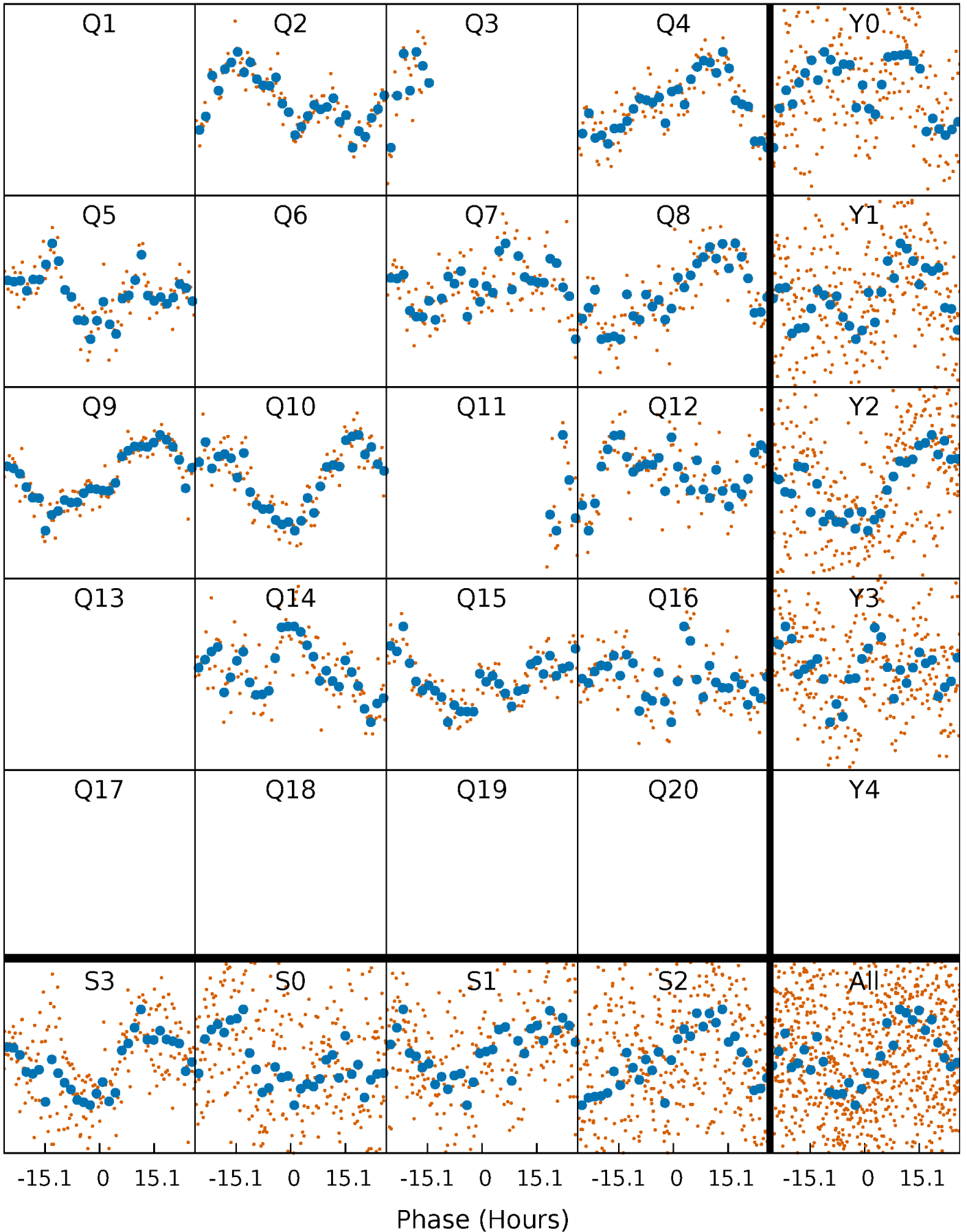


## Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)



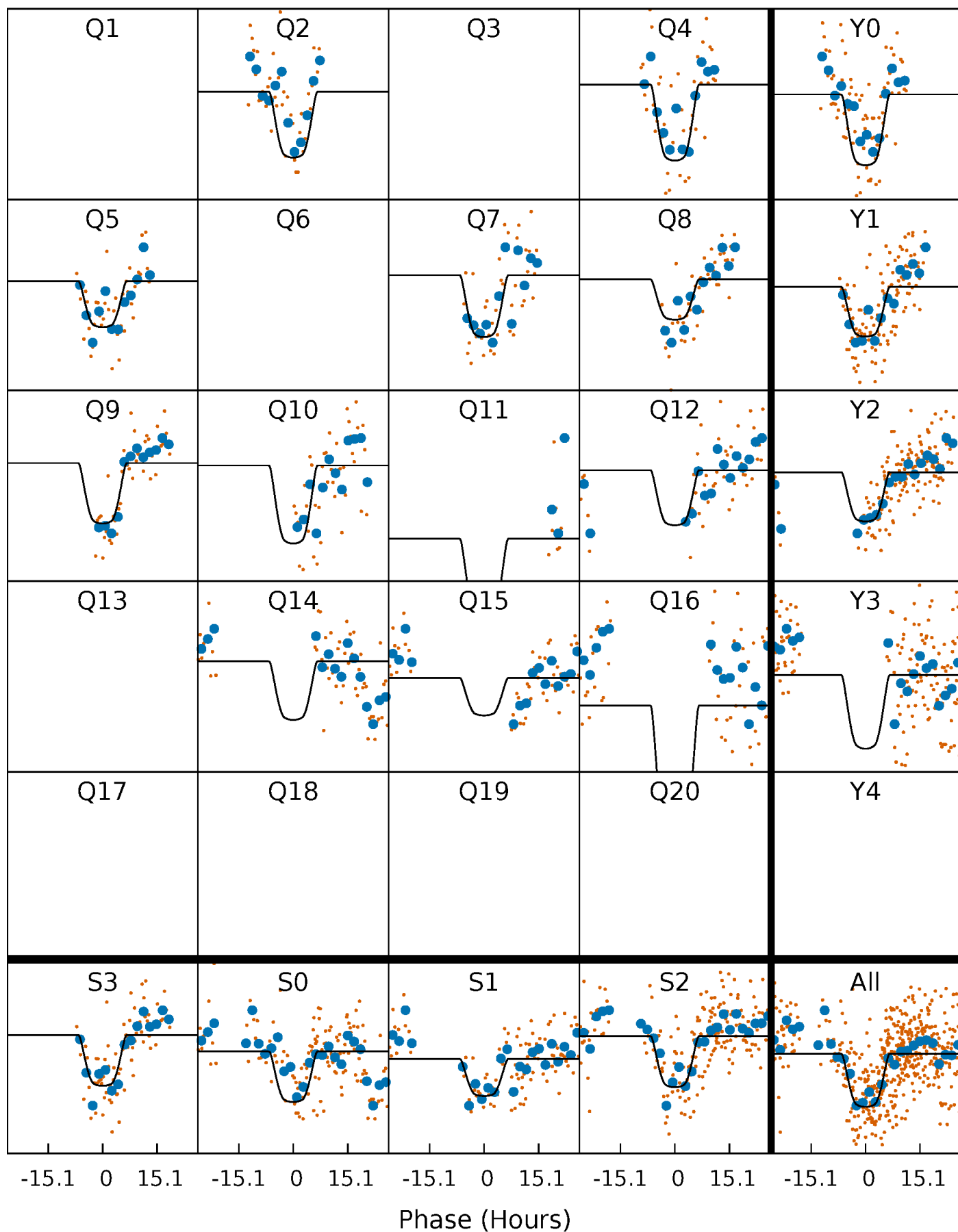
# PDC Quarter-Phased Transit Curves

TCE 006715221-05   P=107.107514 Days    $T_0=214.951810$  (BKJD)



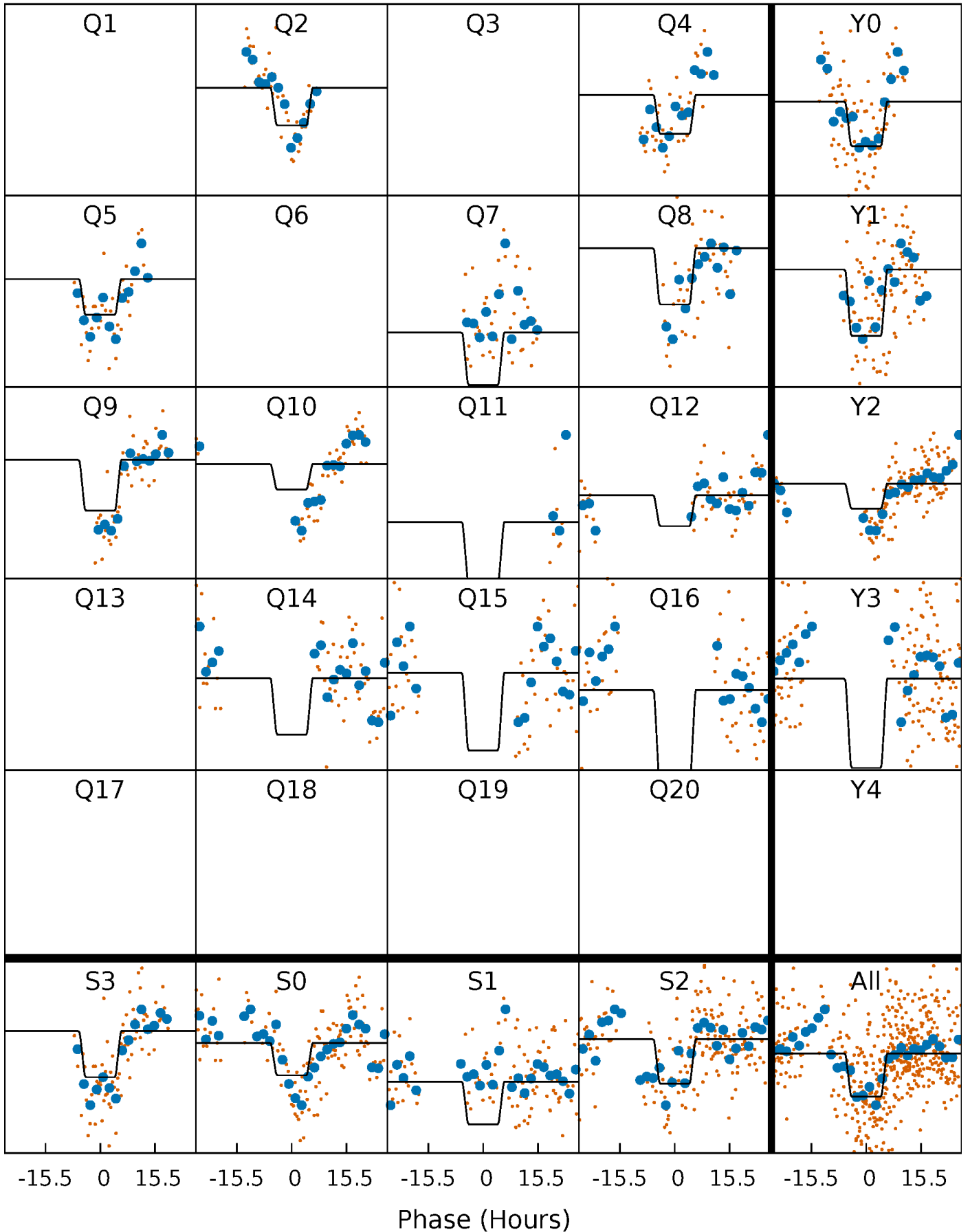
# DV Quarter-Phased Transit Curves

TCE 006715221-05 P=107.107514 Days  $T_0=214.951810$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

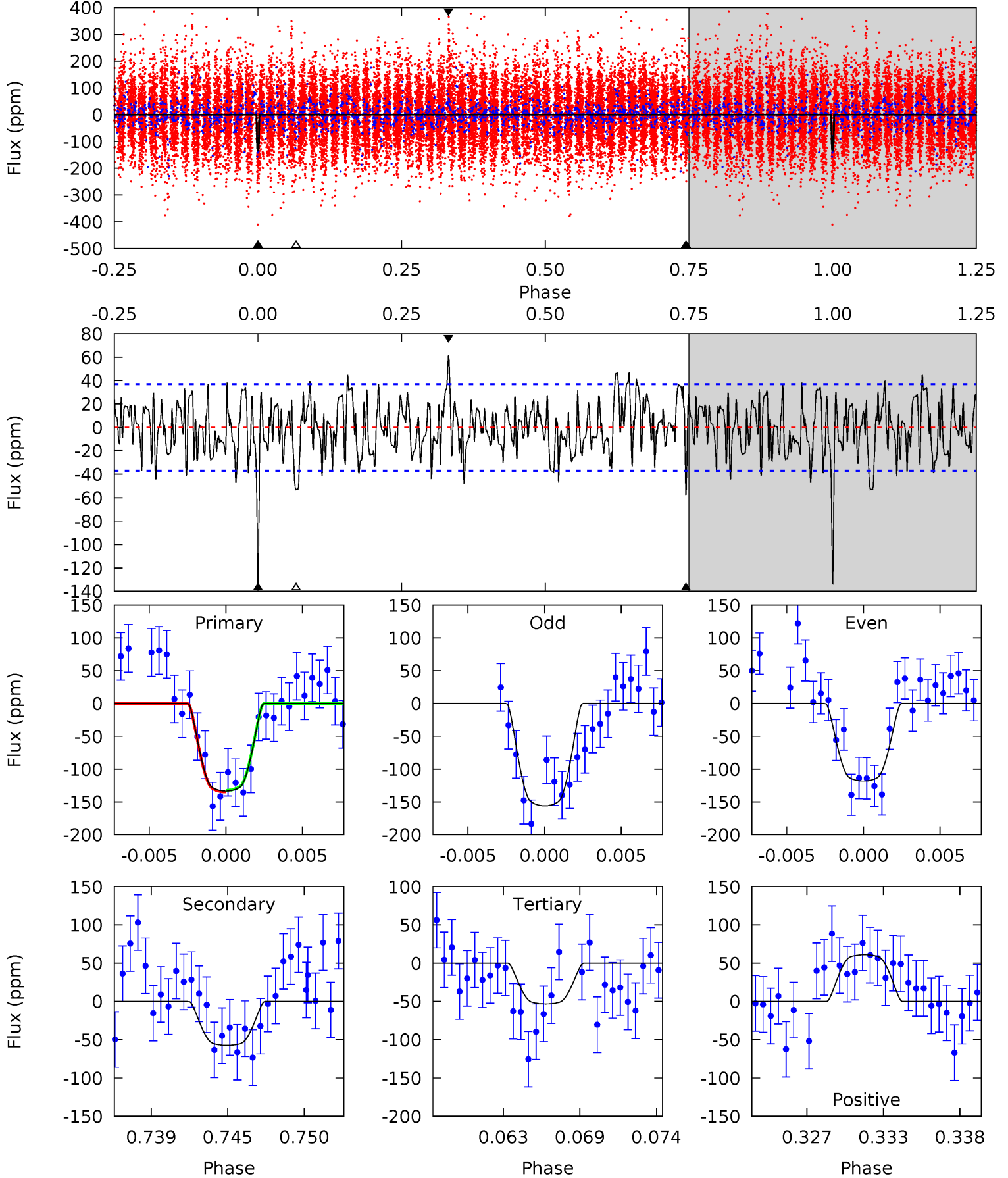
TCE 006715221-05     $P=107.098421$  Days     $T_0=214.985538$  (BKJD)



# DV Model-Shift Uniqueness Test

006715221-05, P = 107.107514 Days, E = 107.844296 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
18.6	7.99	7.40	8.50	5.15	2.79	2.53	11.2	10.1	0.59	-0.51	2.59	0.74	0.31	0.16

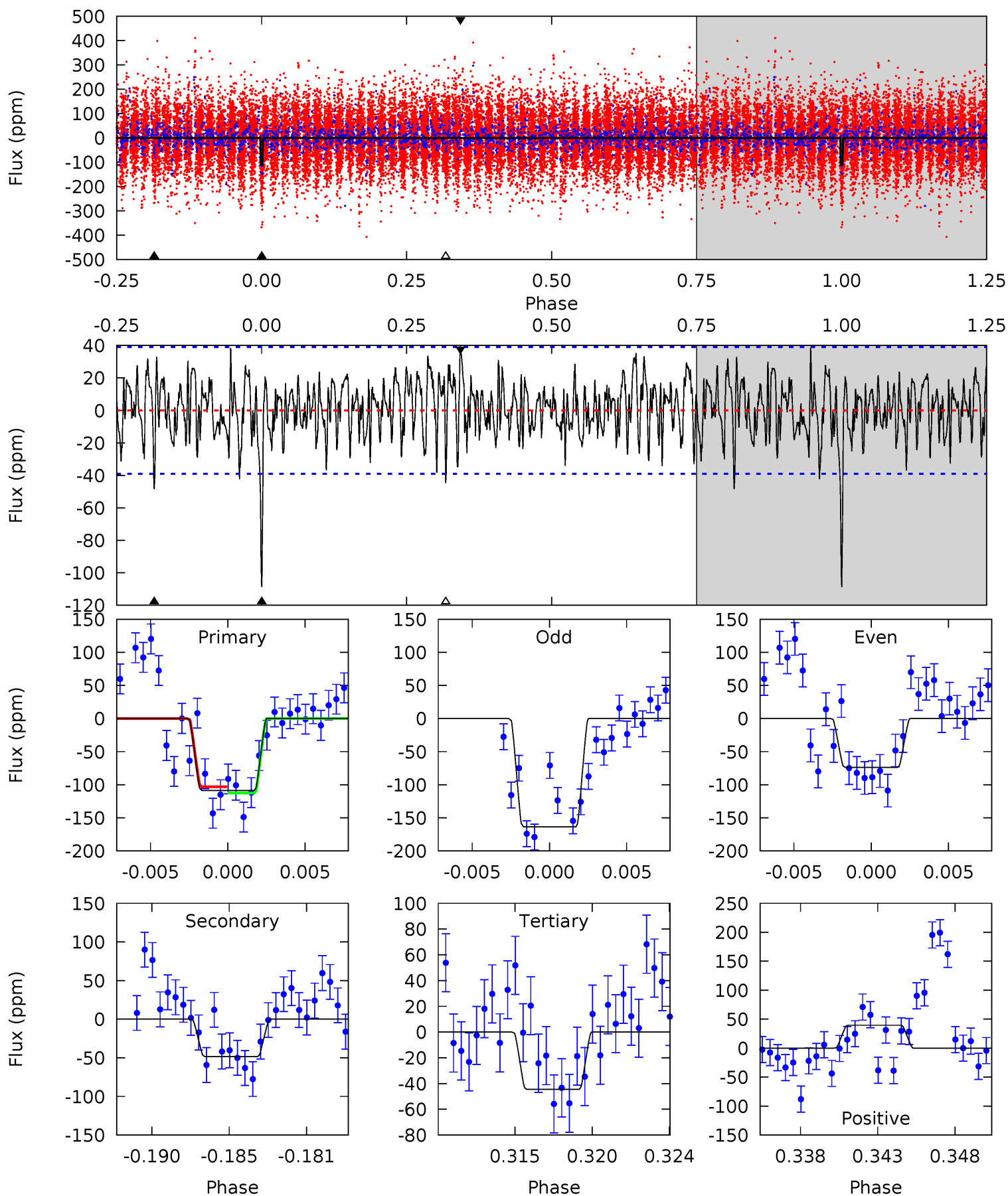




# Alt Model-Shift Uniqueness Test

006715221-05, P = 107.098421 Days, E = 107.887117 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
14.4	6.42	5.90	5.26	5.17	2.83	1.88	8.52	9.16	0.52	1.16	5.84	0.99	0.27	0.60



### Stellar Parameters For KIC 006715221

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6839^{+163}_{-225}$	$4.003^{+0.221}_{-0.119}$	$-0.060^{+0.250}_{-0.300}$	$2.020^{+0.396}_{-0.594}$	$1.497^{+0.172}_{-0.257}$	$0.256^{+0.303}_{-0.104}$
	+2%/-3%	+6%/-3%	+417%/-500%	+20%/-29%	+11%/-17%	+118%/-41%
Source	PHO1	FLK73	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 006715221-05 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-57 \pm 7$	$3.18^{+0.52}_{-0.52}$	$832^{+51}_{-59}$	$4966^{+245}_{-226}$	$805^{+336}_{-212}$
Alt.	$-48 \pm 8$	$2.33^{+0.44}_{-0.37}$	$836^{+53}_{-57}$	$5463^{+367}_{-339}$	$1235^{+542}_{-385}$

$T_{\text{max}}$  = 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

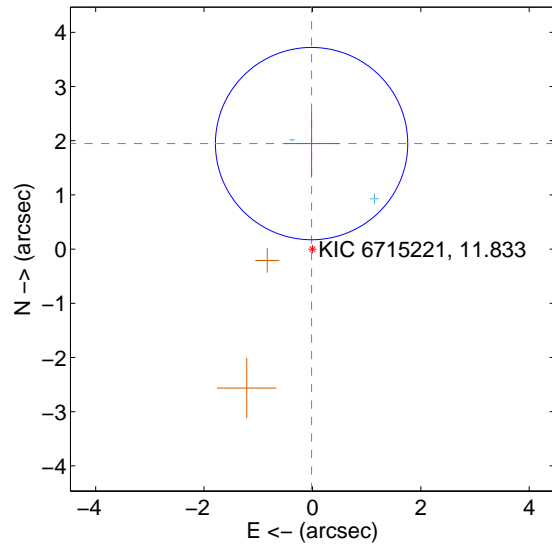
Supplemental centroid analysis for 006715221-05. **Kepler magnitude: 11.83.** Transit SNR 8.95

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

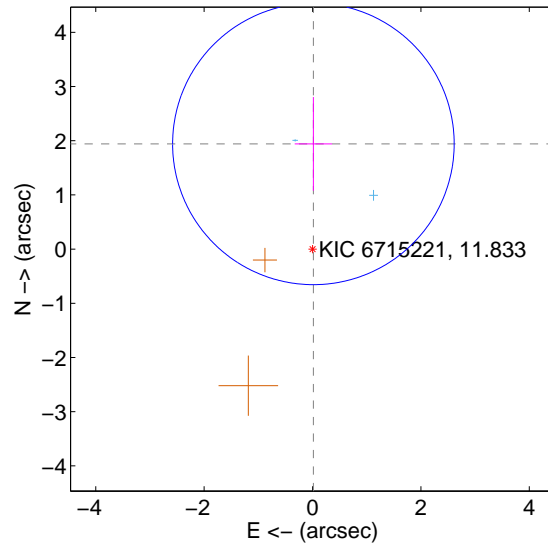
The direct PRF centroid is offset from the target star catalog position by about 0.05 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b><math>1.948 \pm 0.592</math></b>	<b>3.29</b>	$0.016 \pm 0.507$	$1.948 \pm 0.594$
PRF-fit source offset from KIC position	$1.942 \pm 0.866$	2.24	$-0.016 \pm 0.345$	$1.942 \pm 0.865$
photometric centroid source offset	$0.85 \pm 0.55$	1.55	$-0.34 \pm 0.62$	$-0.78 \pm 0.53$

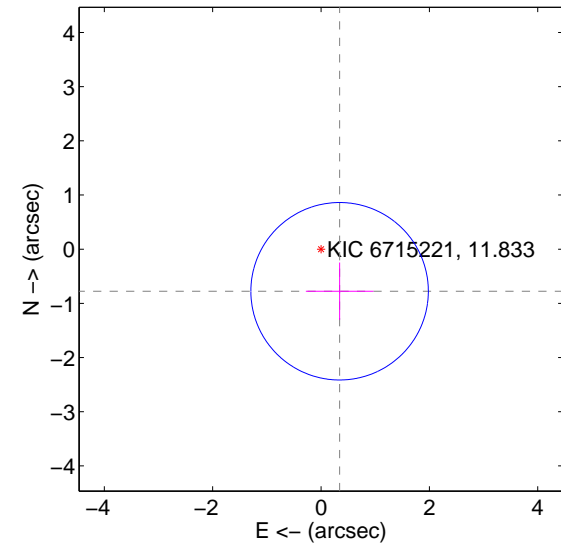
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

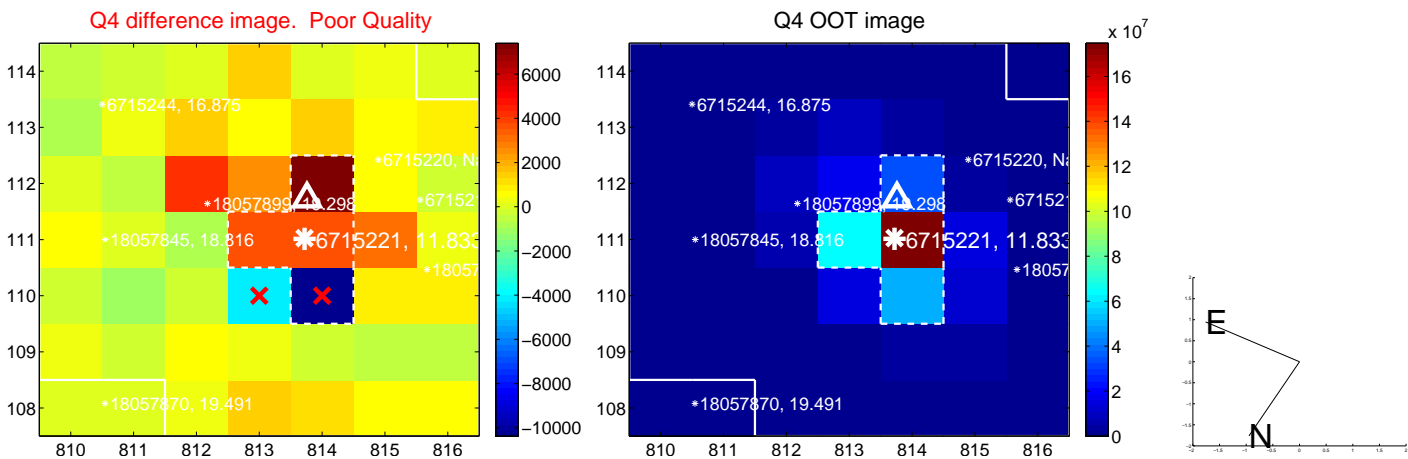
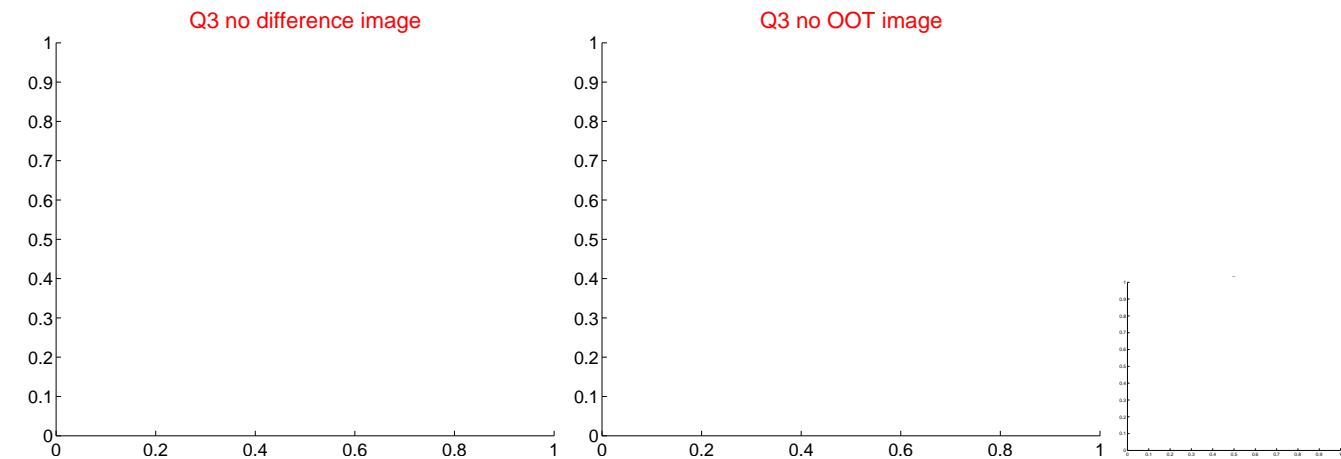
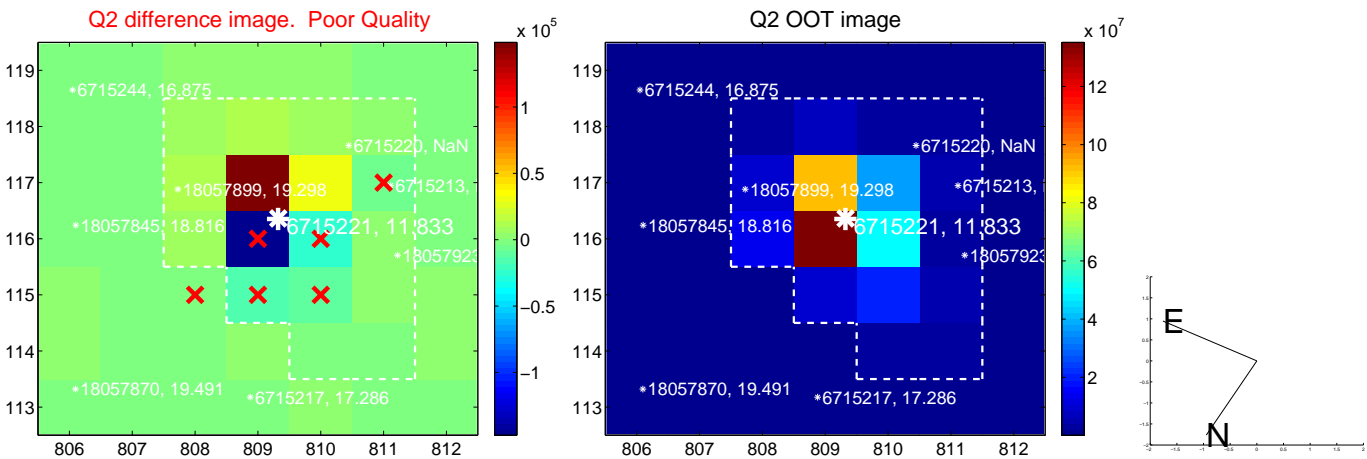


offset from photometric centroids

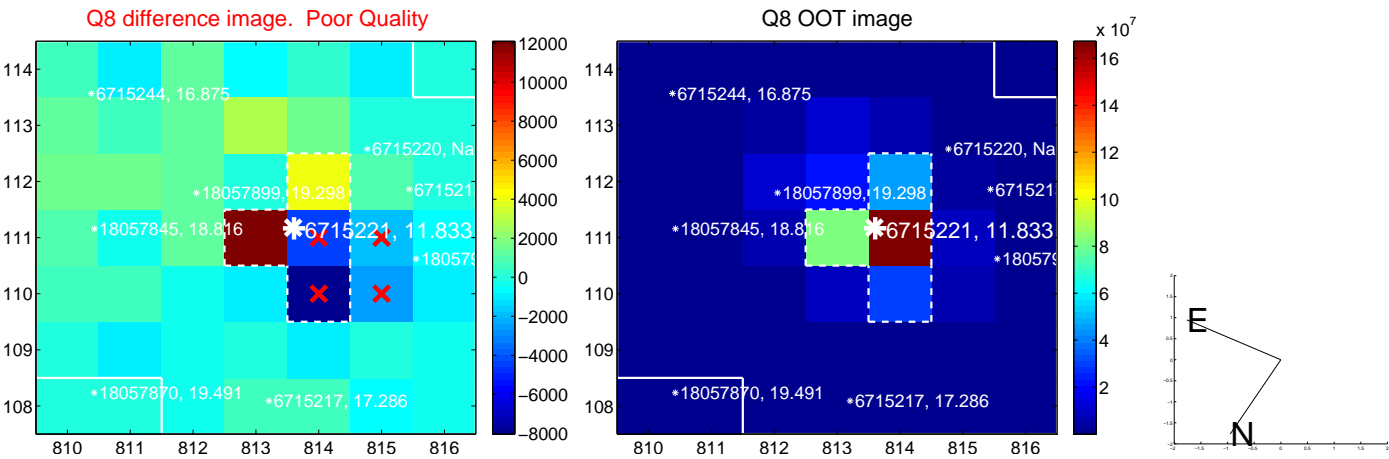
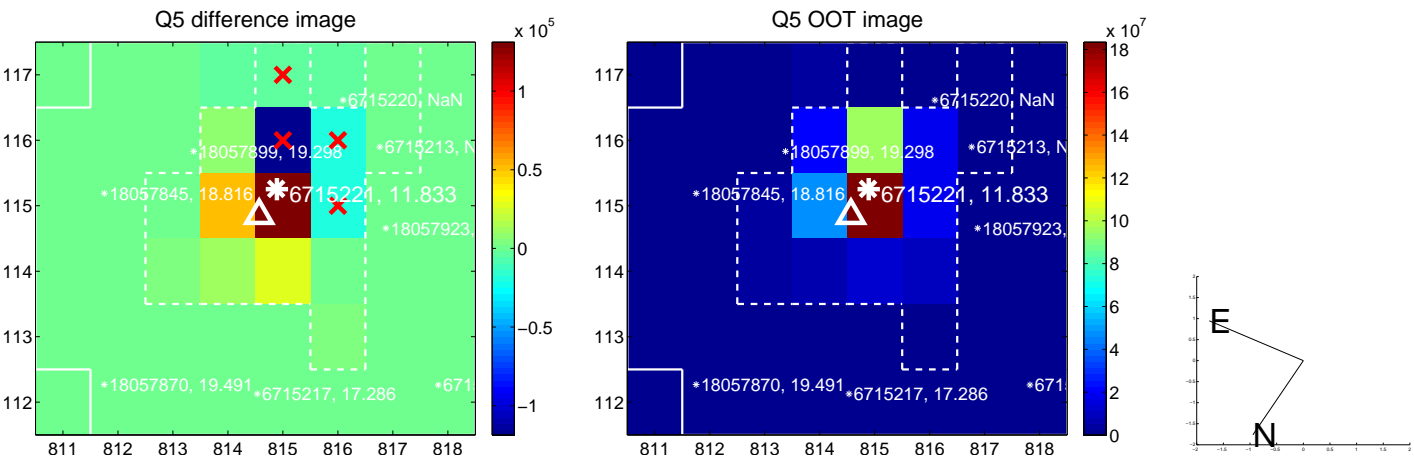


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

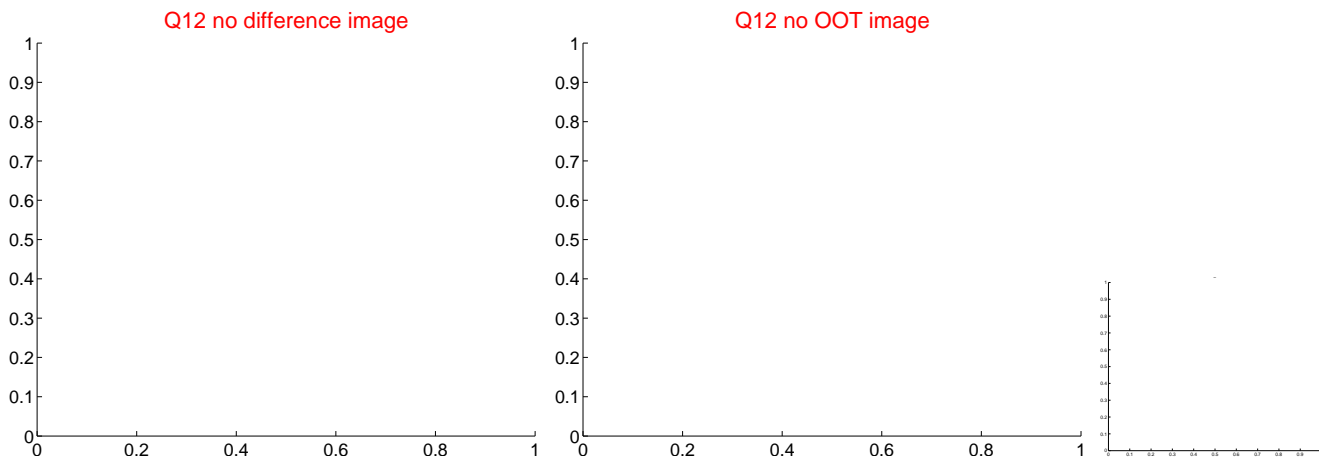
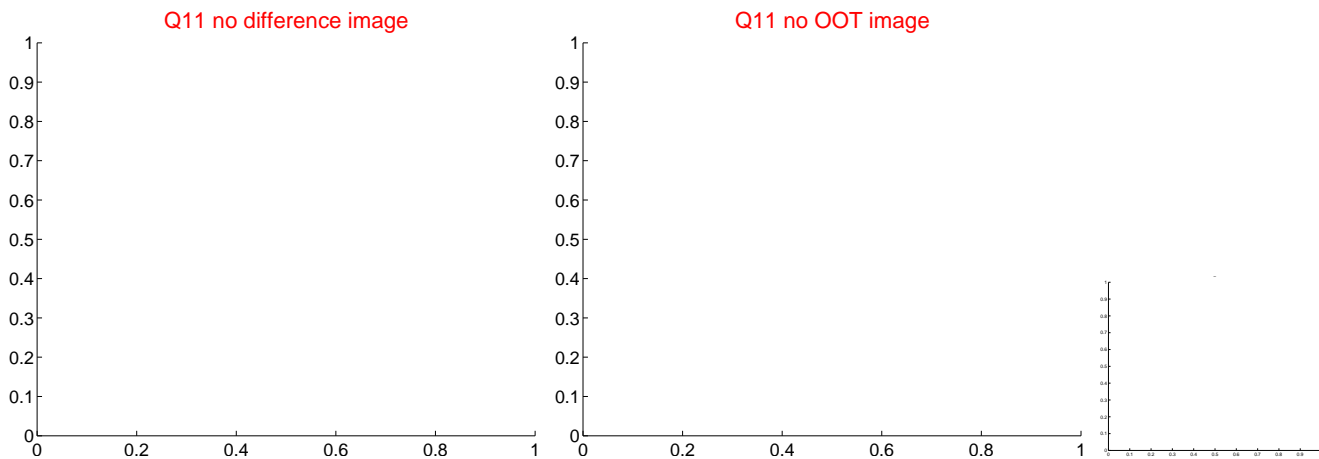
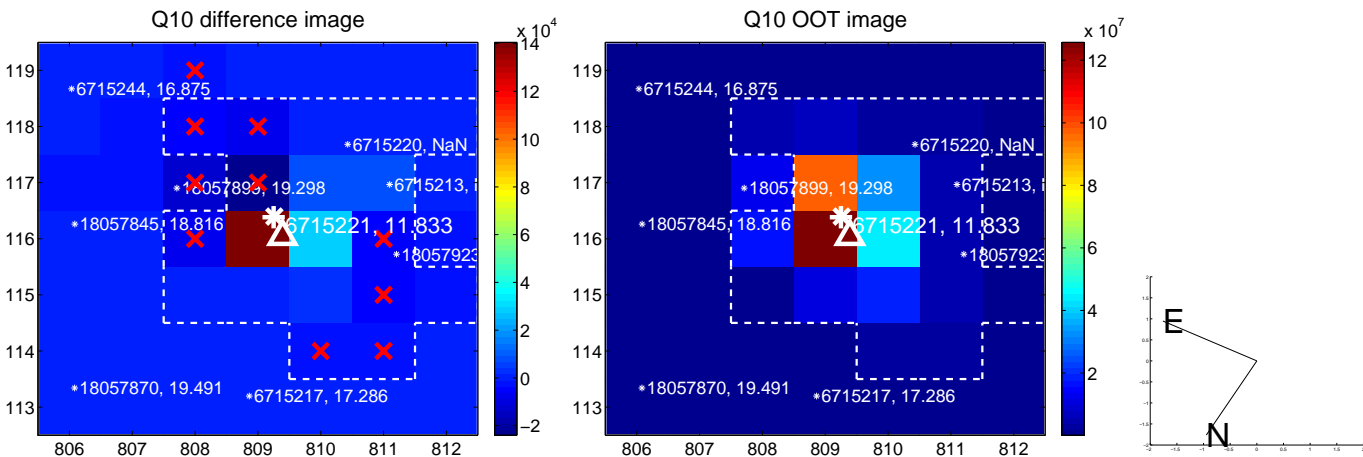
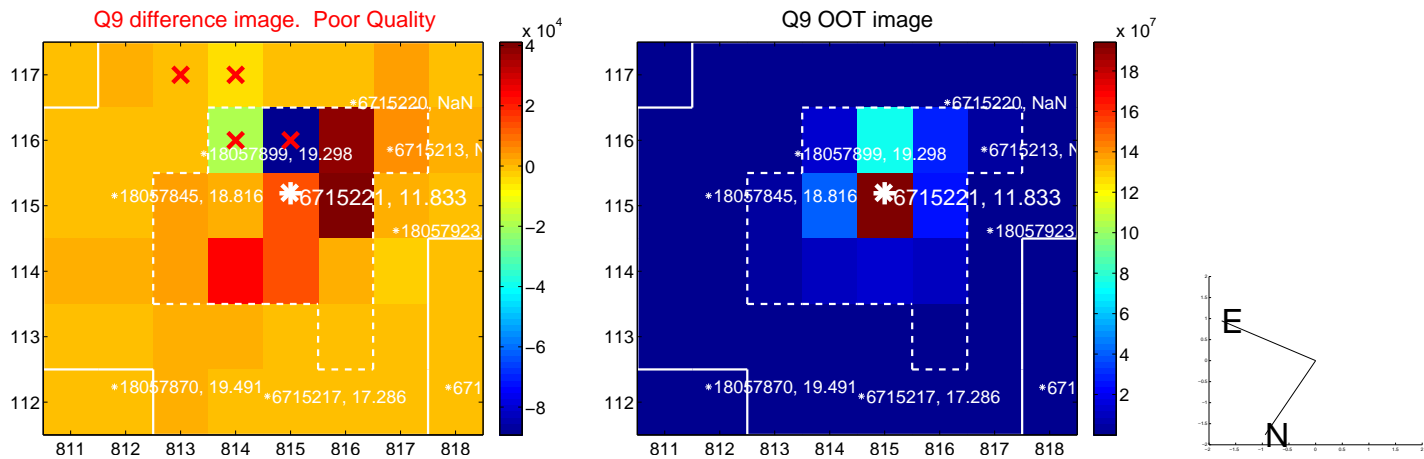
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



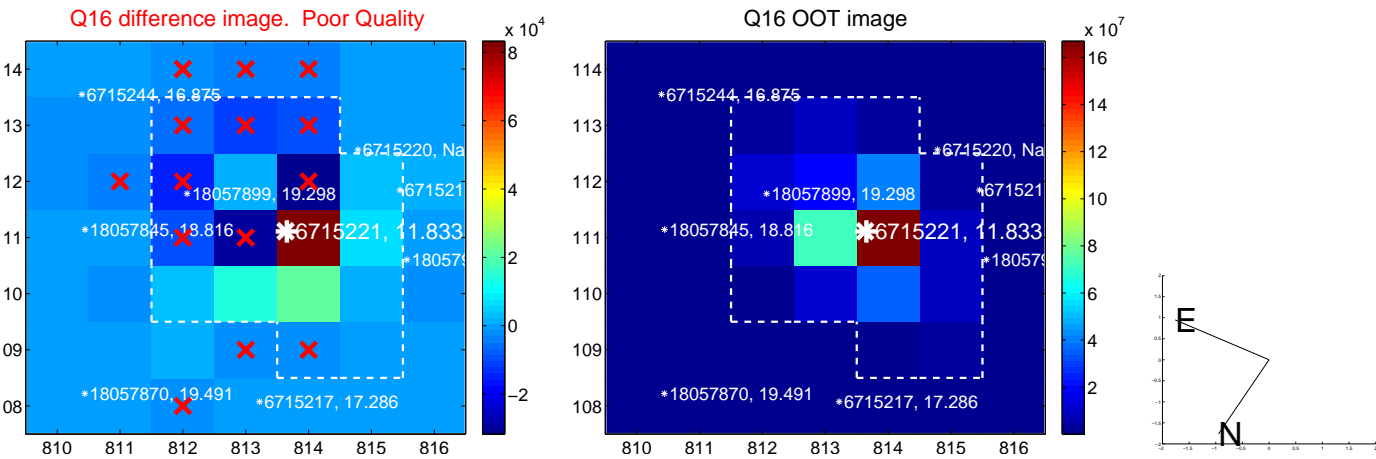
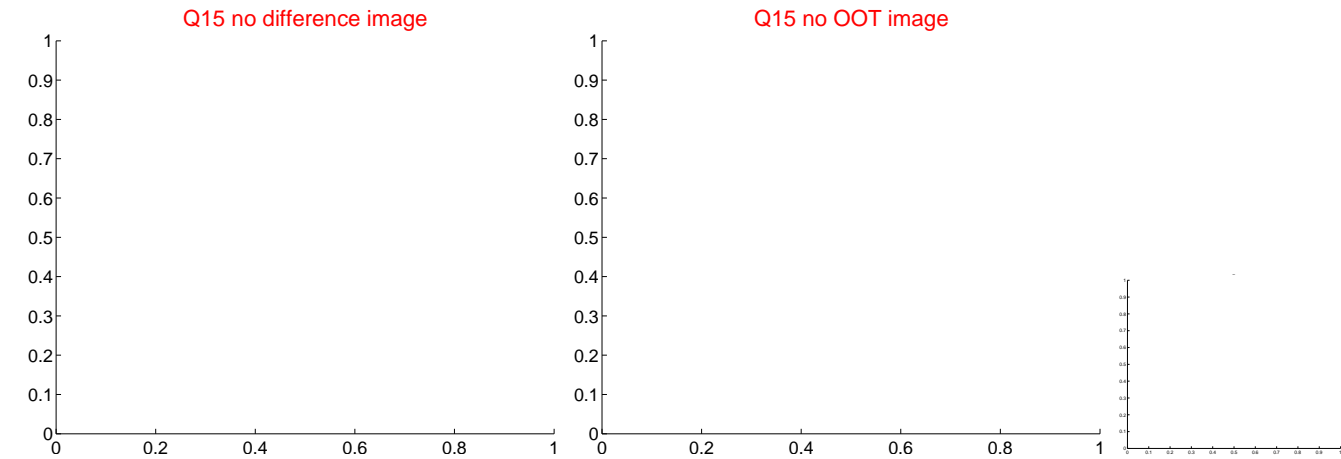
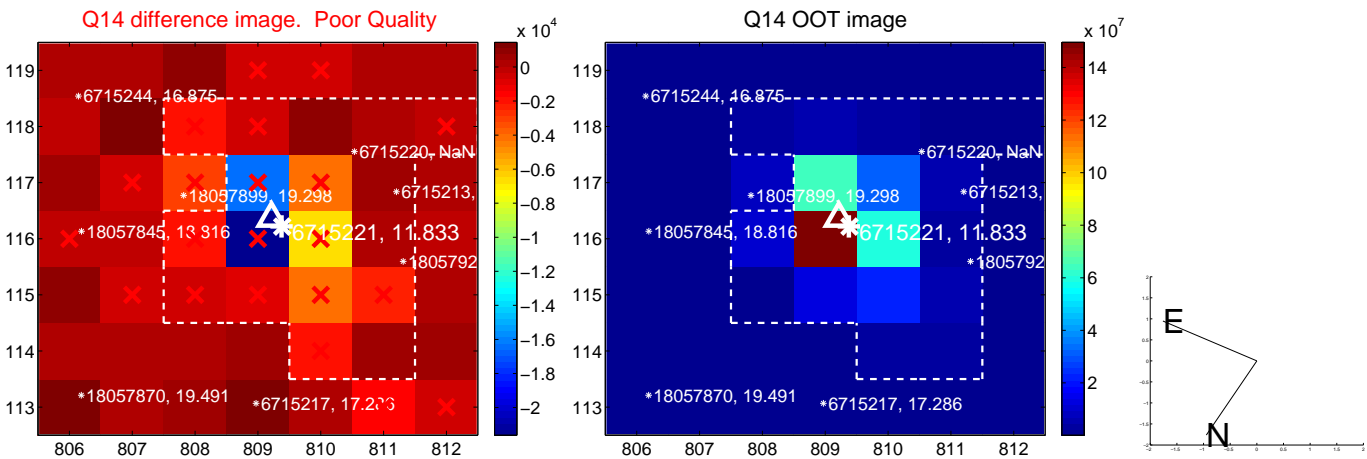
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

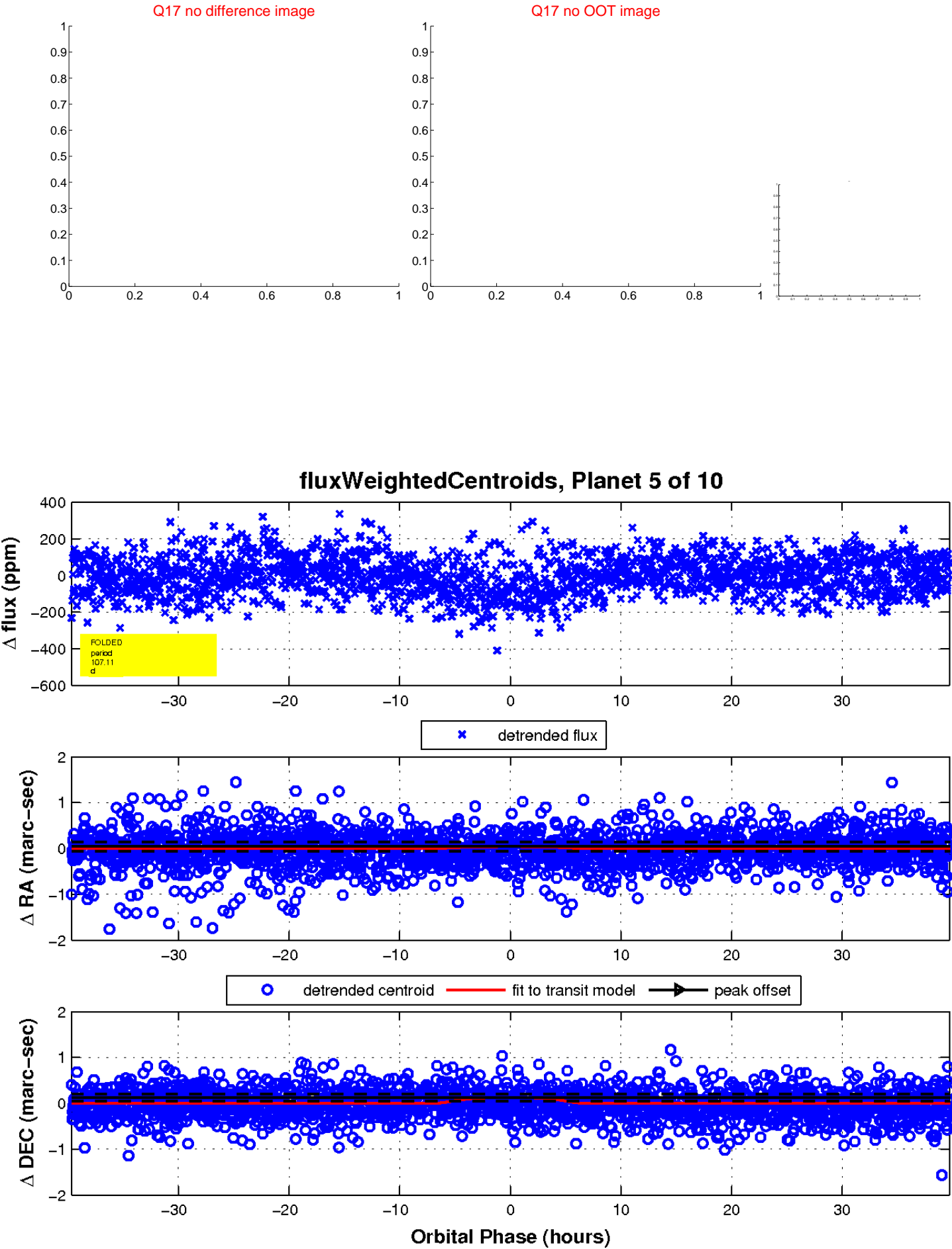


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



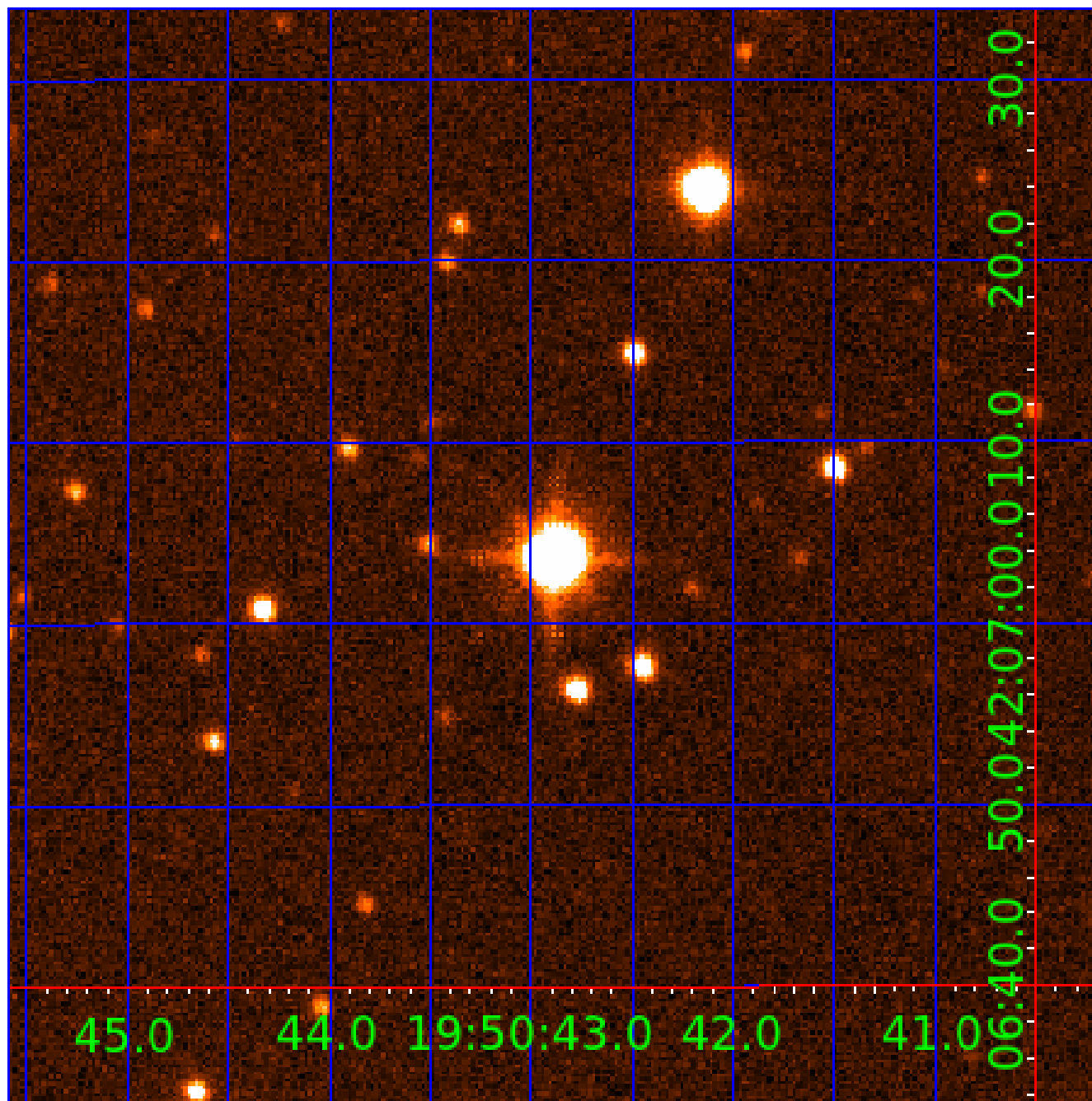


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



## KIC 006715221

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006715221-01	OBS	No	1.984918	132.459230	13.3	8.776	9.2	7.4	2.02	6839	0.74	6389.14
006715221-02	OBS	No	107.919359	152.278773	91.7	14.832	10.4	6.2	2.02	6839	2.12	31.02
006715221-03	OBS	No	333.120273	314.487390	168.1	20.190	10.4	7.6	2.02	6839	2.83	6.90
006715221-04	OBS	No	134.224992	188.680406	137.8	3.578	8.3	7.4	2.02	6839	2.67	23.19
006715221-05	OBS	No	107.107514	214.951810	149.8	13.238	8.0	8.9	2.02	6839	3.25	31.33
006715221-06	OBS	No	400.898244	254.418073	152.5	9.827	8.0	7.8	2.02	6839	2.91	5.39
006715221-07	OBS	No	34.101777	151.432052	96.7	3.723	7.7	8.0	2.02	6839	2.32	144.12
006715221-08	OBS	No	65.108276	163.640682	100.0	4.485	7.8	7.8	2.02	6839	2.31	60.85
006715221-09	OBS	No	118.508397	233.886395	144.3	11.967	8.1	7.9	2.02	6839	2.70	27.38
006715221-10	OBS	No	36.316557	165.427888	72.2	12.670	8.2	7.1	2.02	6839	2.27	132.52

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006715221-01	OBS	FP	0.00	1	0	0	0	LPP_DV
006715221-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
006715221-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
006715221-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
006715221-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_ALT—CENT_FEW_MEAS
006715221-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—MOD_NONUNIQ_ALT
006715221-07	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—MOD_NONUNIQ_ALT
006715221-08	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—MOD_NONUNIQ_ALT
006715221-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_MEAS
006715221-10	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_UNRESOLVED_OFFSET

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

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

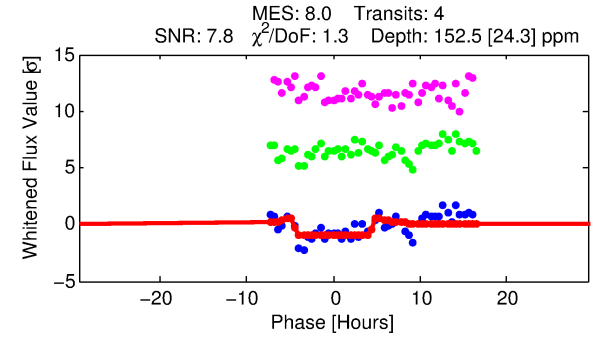
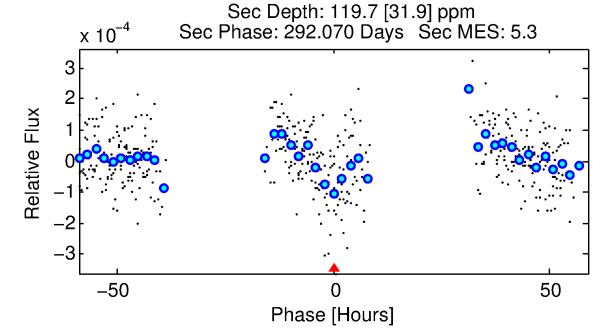
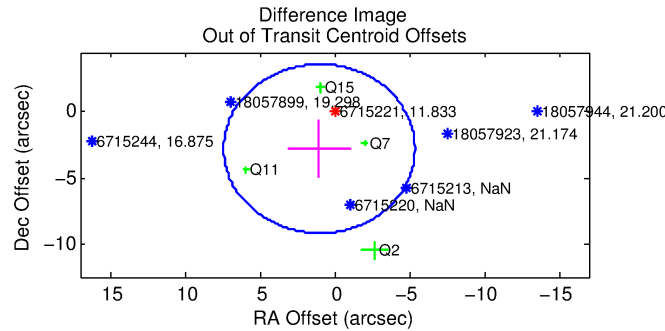
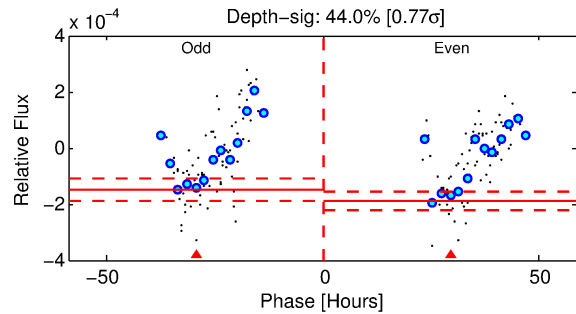
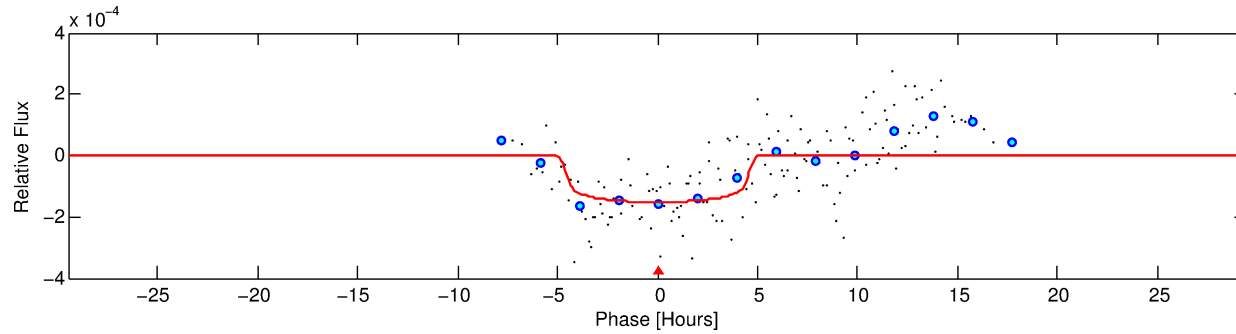
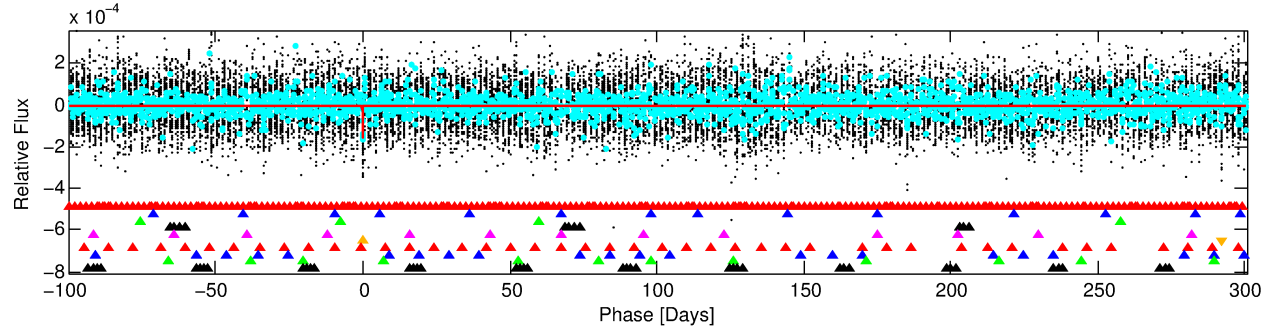
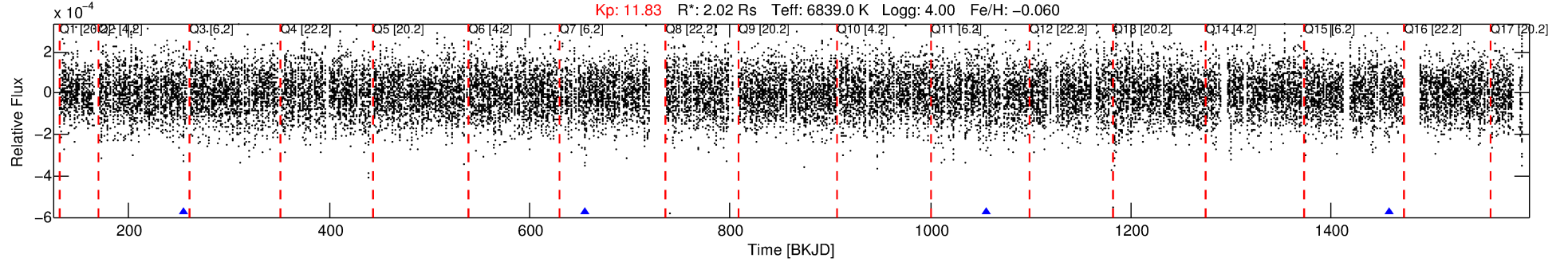
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 006715221-06

No Significant Match Found

# DV One-Page Summary

KIC: 6715221 Candidate: 6 of 10 Period: 400.898 d



## DV Fit Results:

Period = 400.89824 [0.00781] d  
Epoch = 254.4181 [0.0134] BKJD  
Rp/R\* = 0.0132 [0.0022]  
a/R\* = 142.61 [115.91]  
b = 0.90 [0.17]  
Seff = 5.39 [2.23]  
Teq = 389 [40] K  
Rp = 2.91 [0.98] Re  
a = 1.2179 [0.3157] AU  
Ag = 11527.45 [6666.76] [1.73 $\sigma$ ]  
Teffp = 6225 [693] K [8.4 $\sigma$ ]

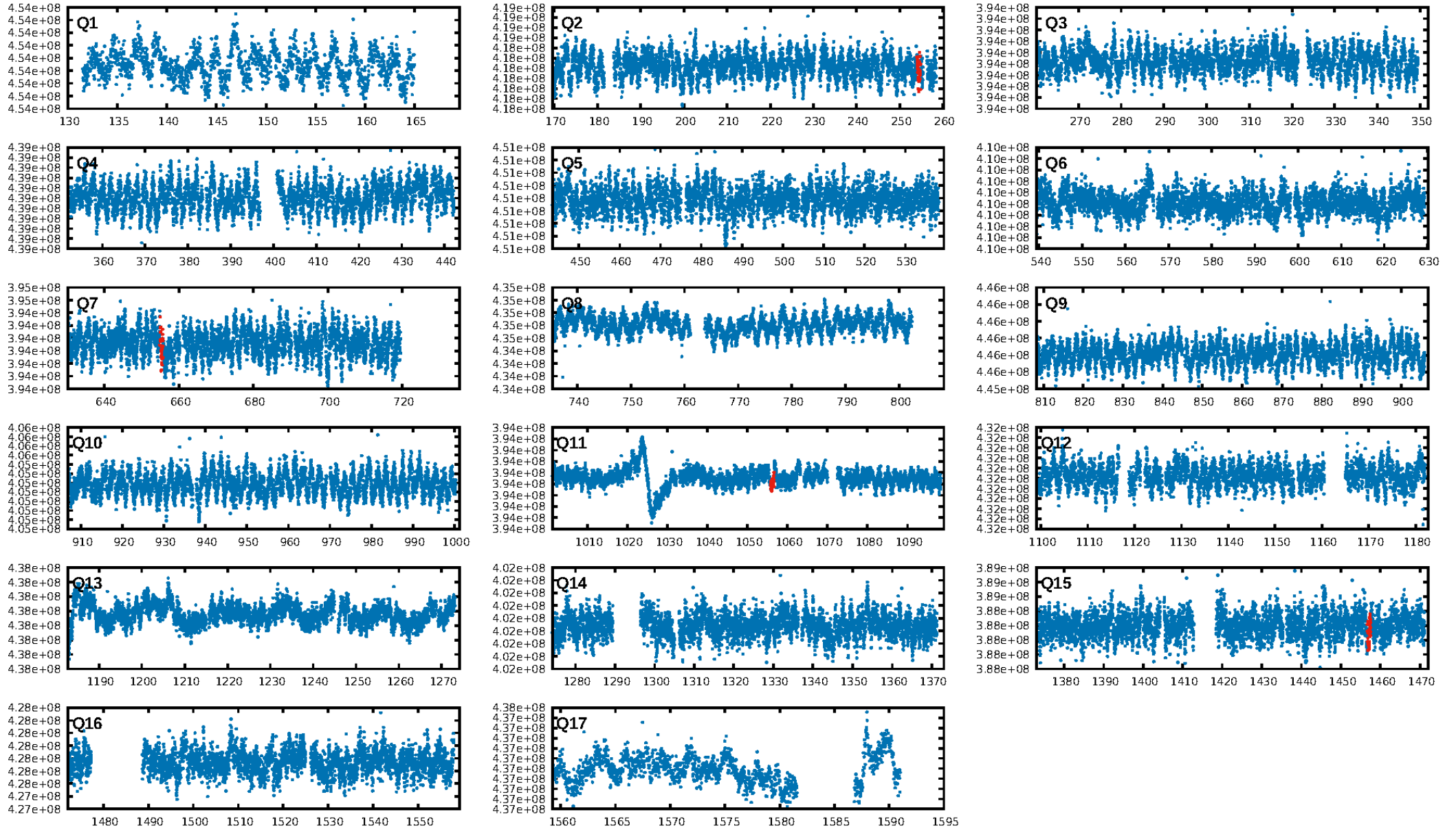
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [72.44 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 28.3%  
ModelChiSquareGof-sig: 98.5%  
**Bootstrap-pfa: 1.87e-08**  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: 11  
Centroid-sig: 36.0%  
Centroid-so: 0.907 arcsec [0.83 $\sigma$ ]  
OotOffset-rm: 2.971 arcsec [1.39 $\sigma$ ]  
OotOffset-st: 1/3/0/0 [4]  
KicOffset-rm: 2.867 arcsec [1.66 $\sigma$ ]  
KicOffset-st: 1/3/0/0 [4]  
DiffImageQuality-fgm: 0.50 [2/4]  
DiffImageOverlap-fno: 0.00 [0/4]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 05:30:28 Z

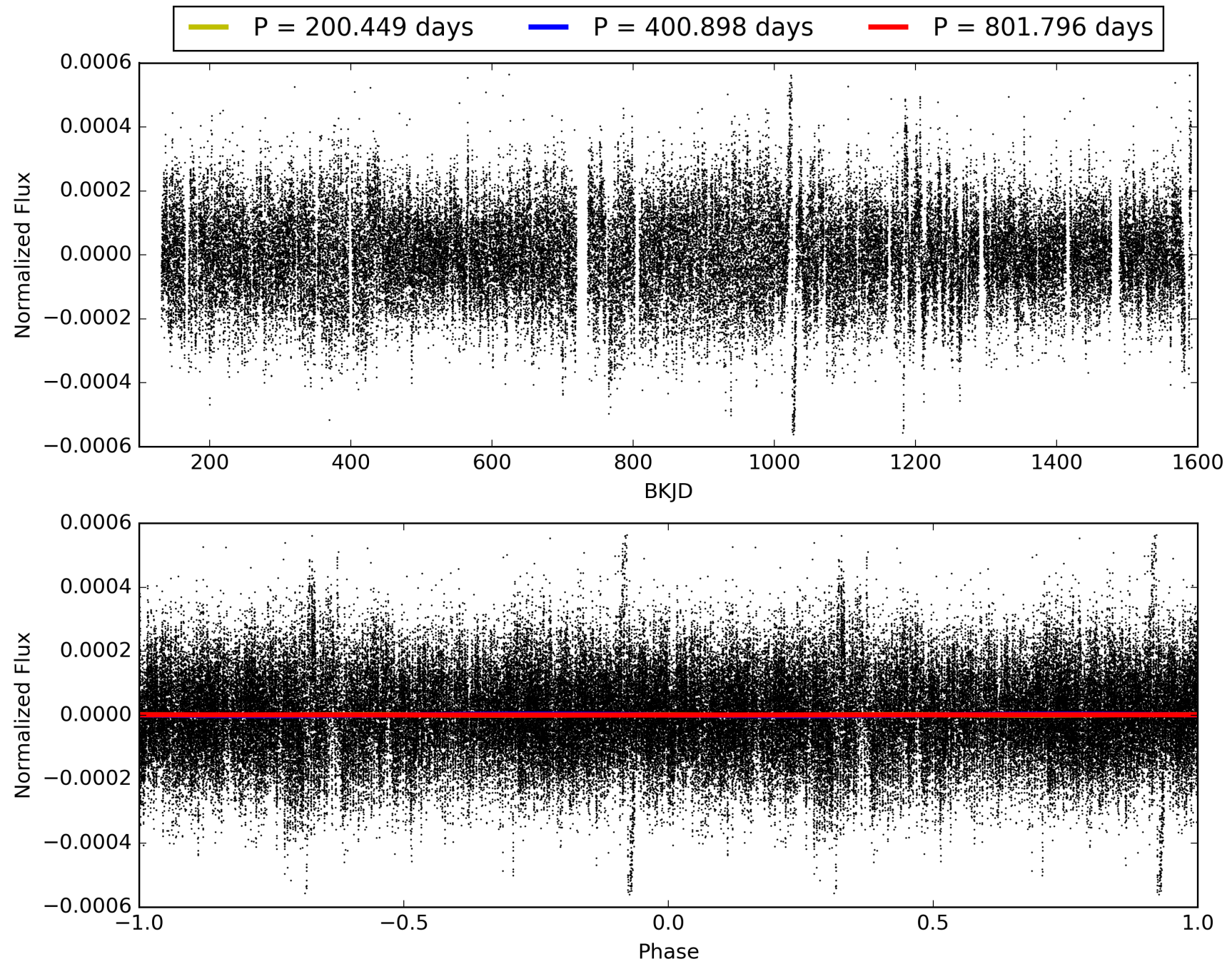
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 006715221-06, PDC Light Curves



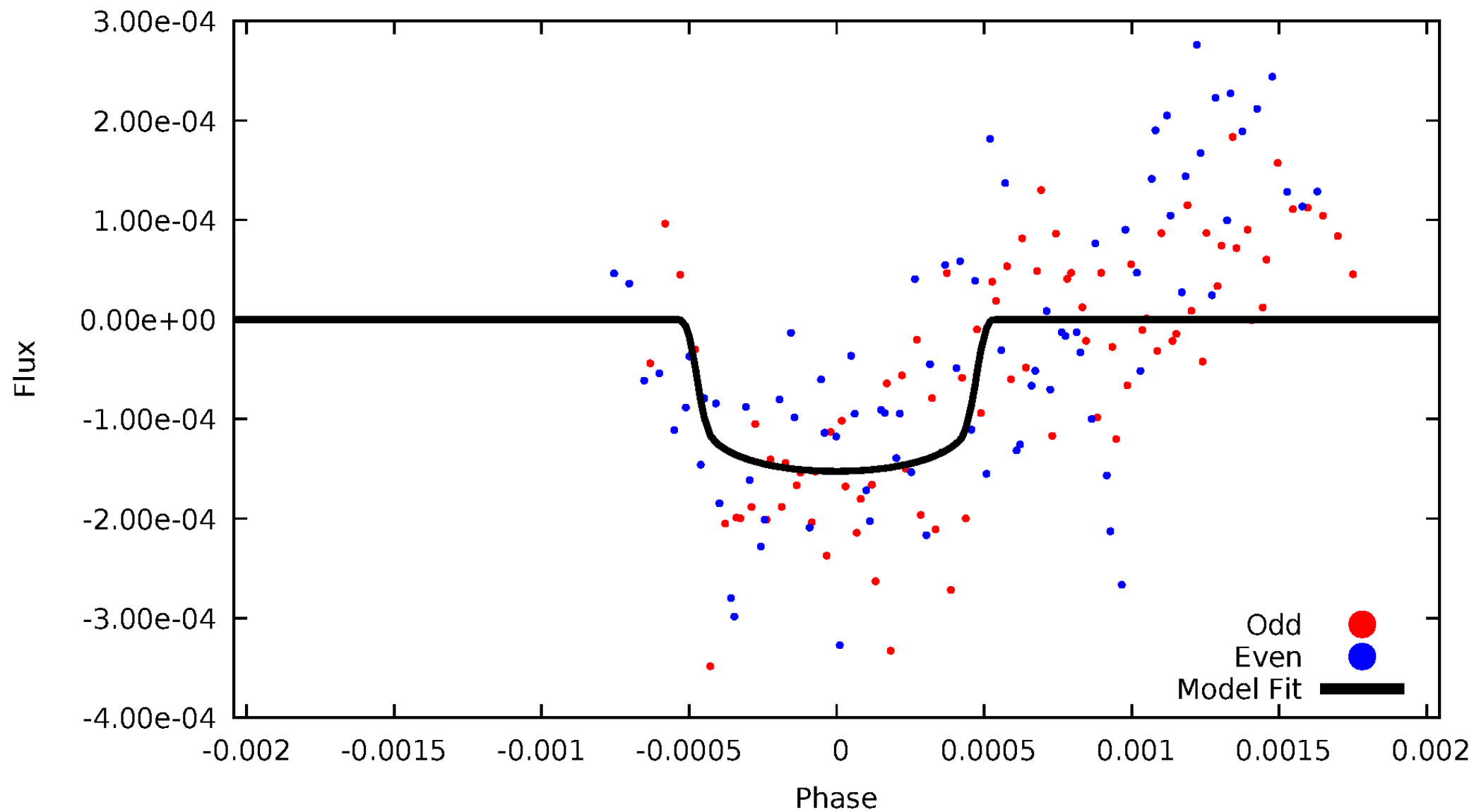


TCE 006715221-06



# DV Odd/Even

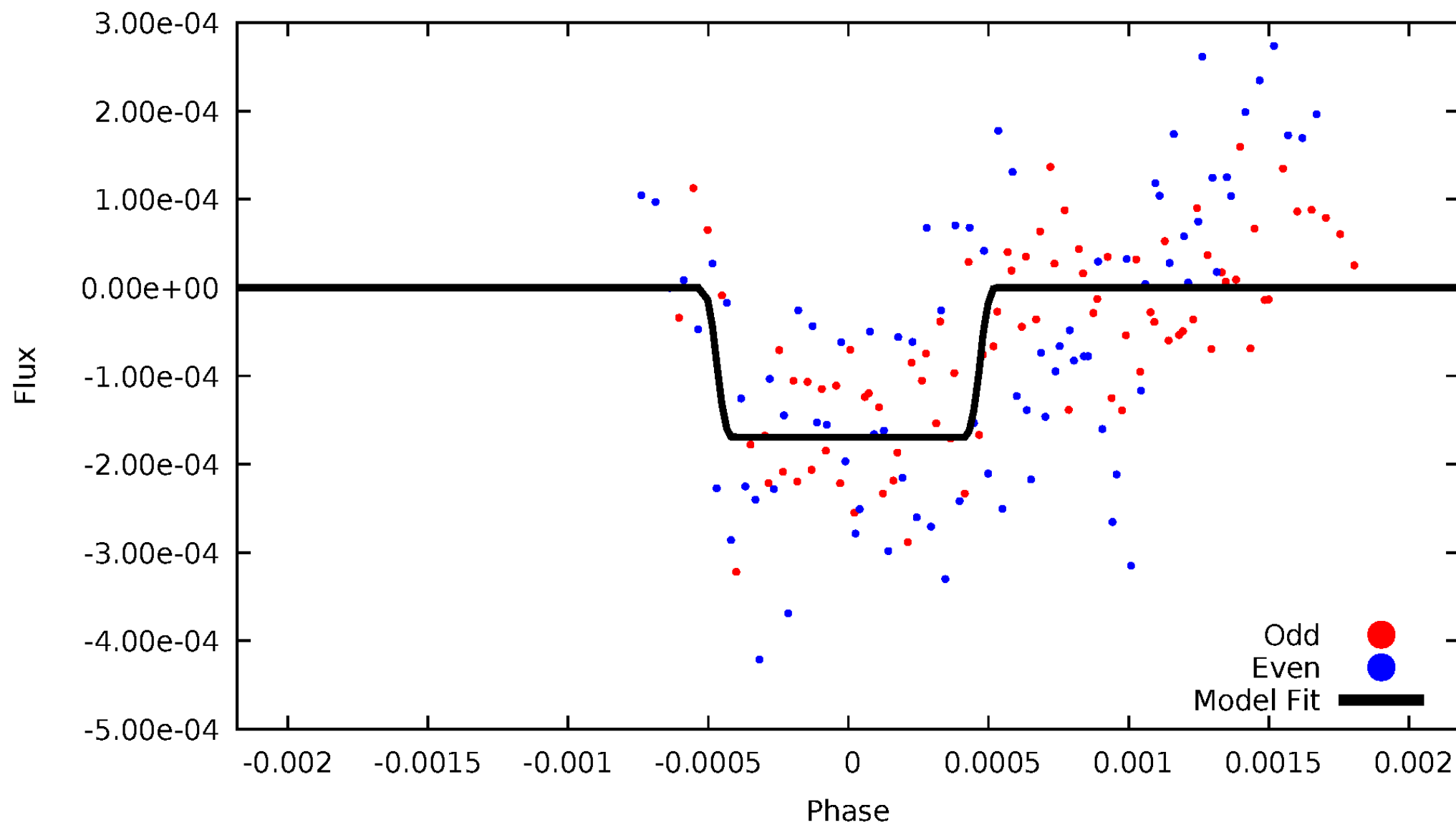
TCE 006715221-06





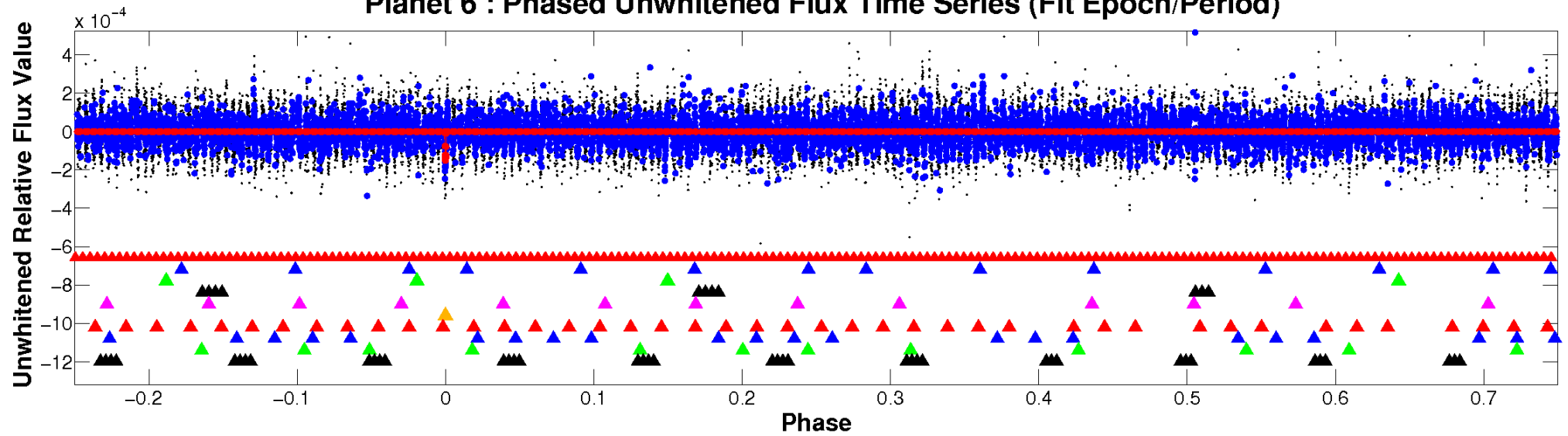
# ALT Odd/Even

TCE 006715221-06

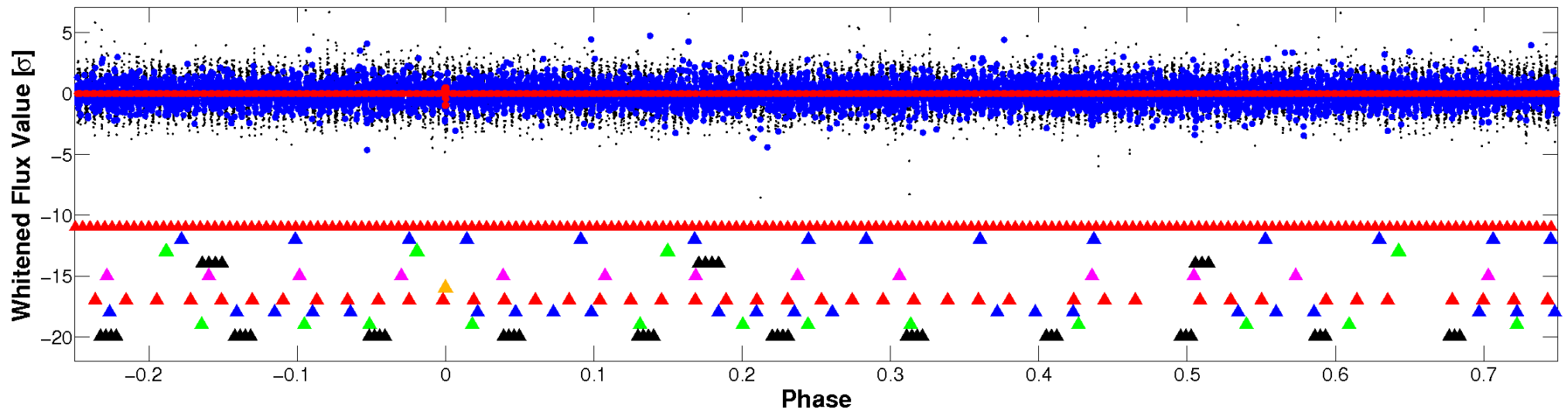


# Non-Whitened Vs. Whitened Light Curve

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



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



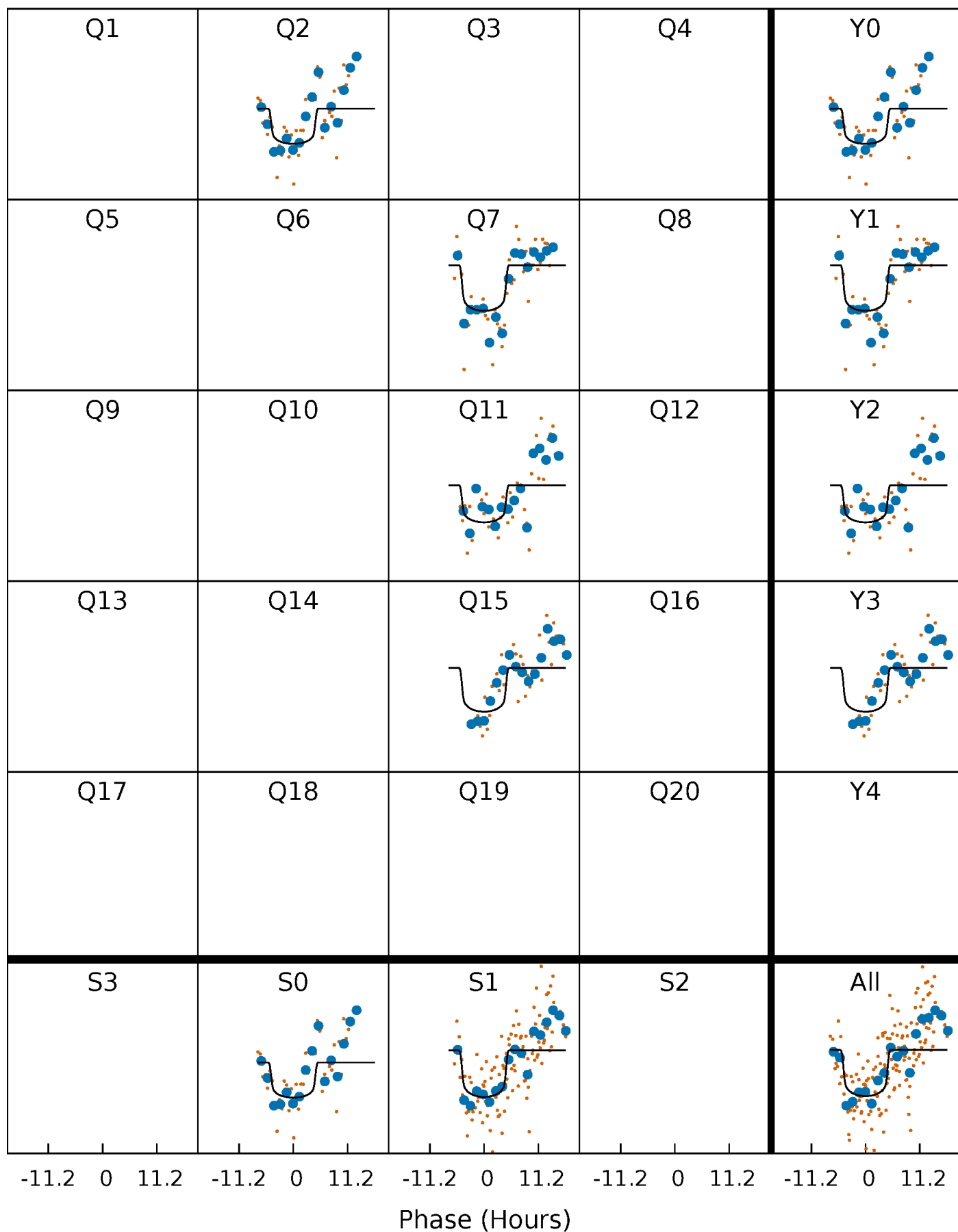
# PDC Quarter-Phased Transit Curves

TCE 006715221-06     $P=400.898244$  Days     $T_0=254.418073$  (BKJD)



# DV Quarter-Phased Transit Curves

TCE 006715221-06 P=400.898244 Days  $T_0=254.418073$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

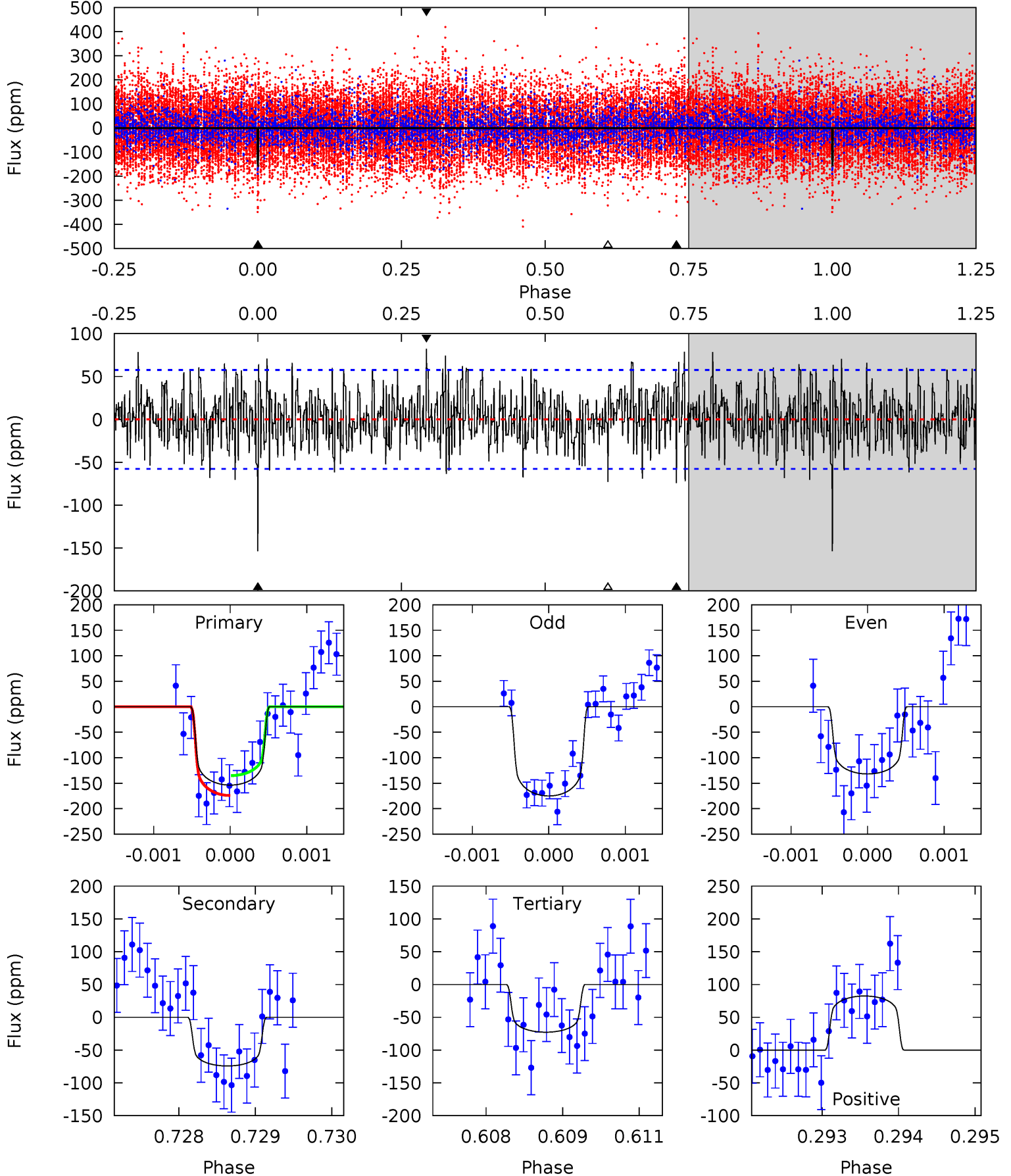
TCE 006715221-06 P=400.892825 Days  $T_0=254.412181$  (BKJD)



# DV Model-Shift Uniqueness Test

006715221-06, P = 400.898244 Days, E = 254.418073 Days

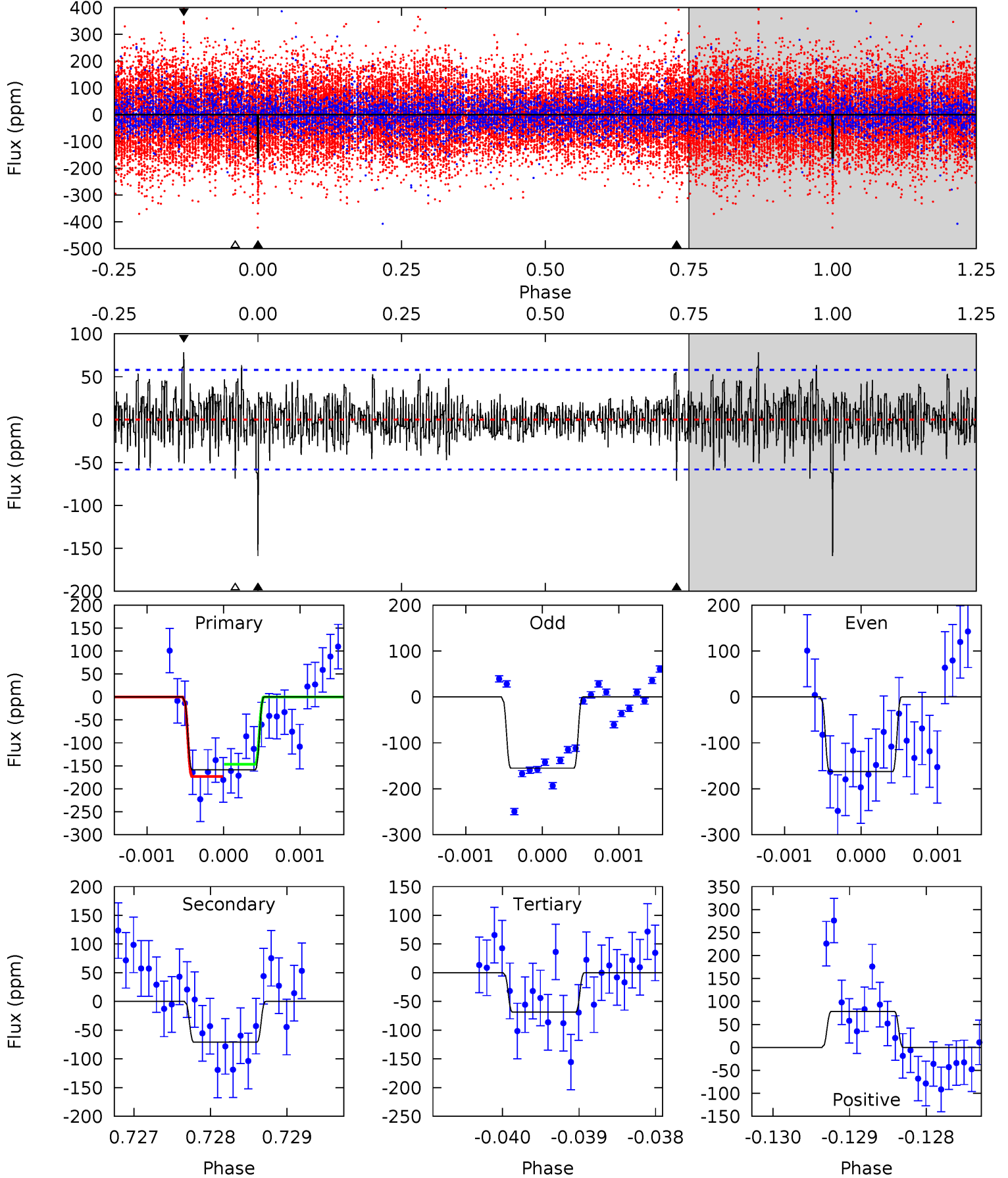
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
14.5	7.01	6.87	7.78	5.44	3.28	2.26	7.64	6.73	0.14	-0.77	2.04	1.11	0.35	1.84



# Alt Model-Shift Uniqueness Test

006715221-06, P = 400.892825 Days, E = 254.412181 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
14.9	6.66	6.44	7.35	5.45	3.29	1.60	8.48	7.56	0.22	-0.70	0.34	1.04	0.33	1.24





### Stellar Parameters For KIC 006715221

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6839^{+163}_{-225}$	$4.003^{+0.221}_{-0.119}$	$-0.060^{+0.250}_{-0.300}$	$2.020^{+0.396}_{-0.594}$	$1.497^{+0.172}_{-0.257}$	$0.256^{+0.303}_{-0.104}$
	+2%/-3%	+6%/-3%	+417%/-500%	+20%/-29%	+11%/-17%	+118%/-41%
Source	PHO1	FLK73	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 006715221-06 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-74 \pm 11$	$2.82^{+0.62}_{-0.58}$	$537^{+34}_{-39}$	$5511^{+542}_{-437}$	$7520^{+4401}_{-2723}$
Alt.	$-71 \pm 11$	$2.77^{+0.63}_{-0.57}$	$537^{+35}_{-42}$	$5500^{+502}_{-449}$	$7458^{+4484}_{-2616}$

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

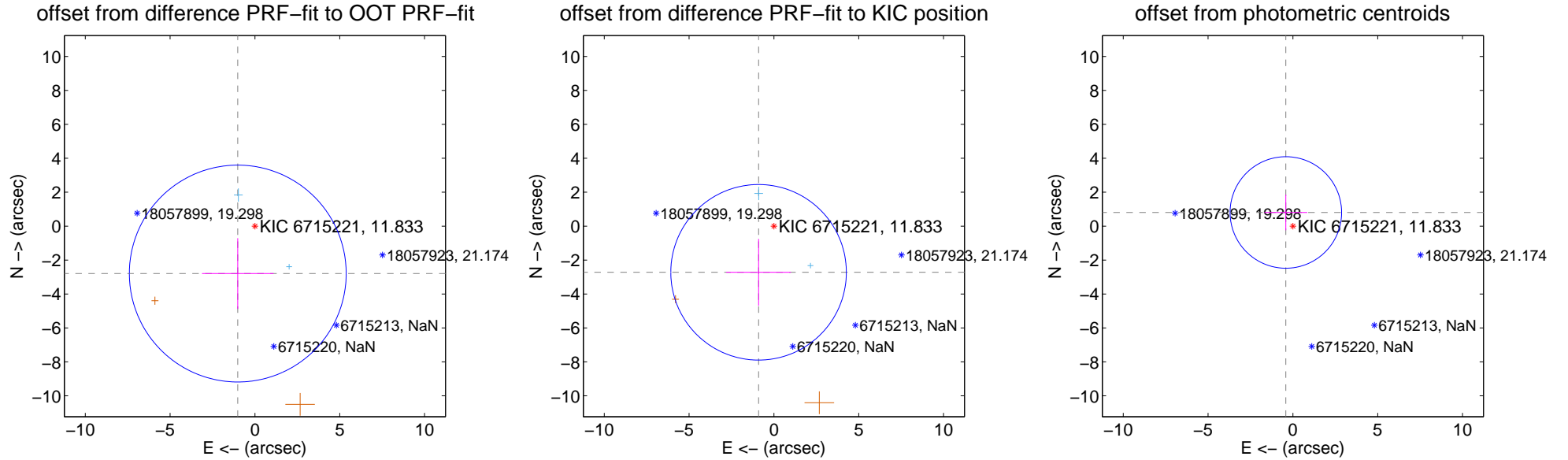
## DV Centroid Data

Supplemental centroid analysis for 006715221-06. **Kepler magnitude: 11.83.** Transit SNR 7.84

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

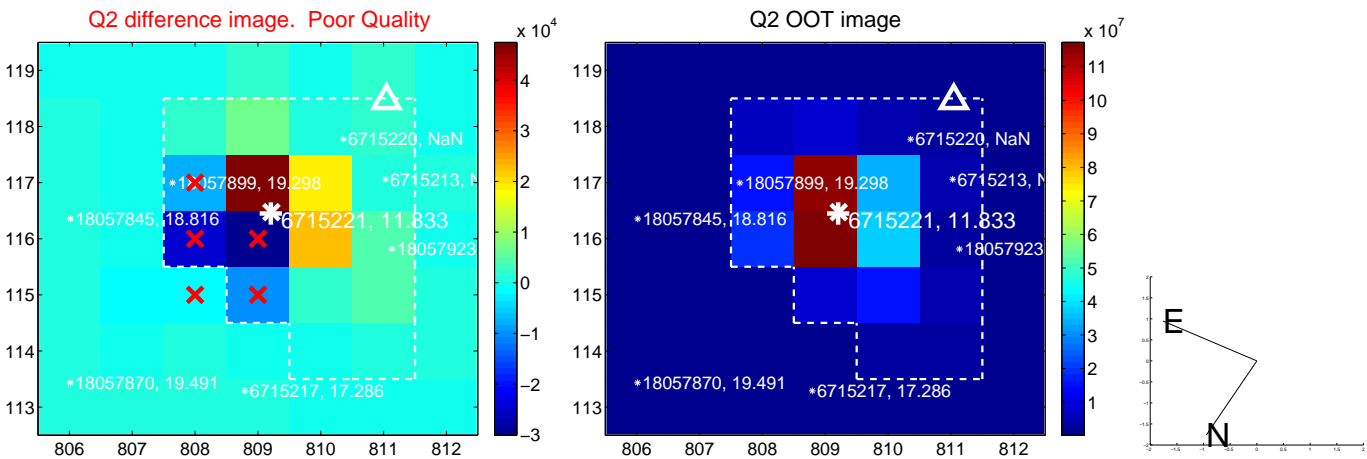
The direct PRF centroid is offset from the target star catalog position by about 0.12 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.971 \pm 2.130$	1.39	$1.011 \pm 2.109$	$-2.794 \pm 2.084$
PRF-fit source offset from KIC position	$2.867 \pm 1.724$	1.66	$0.904 \pm 1.906$	$-2.721 \pm 1.969$
photometric centroid source offset	$0.91 \pm 1.10$	0.83	$0.42 \pm 1.26$	$0.81 \pm 1.05$

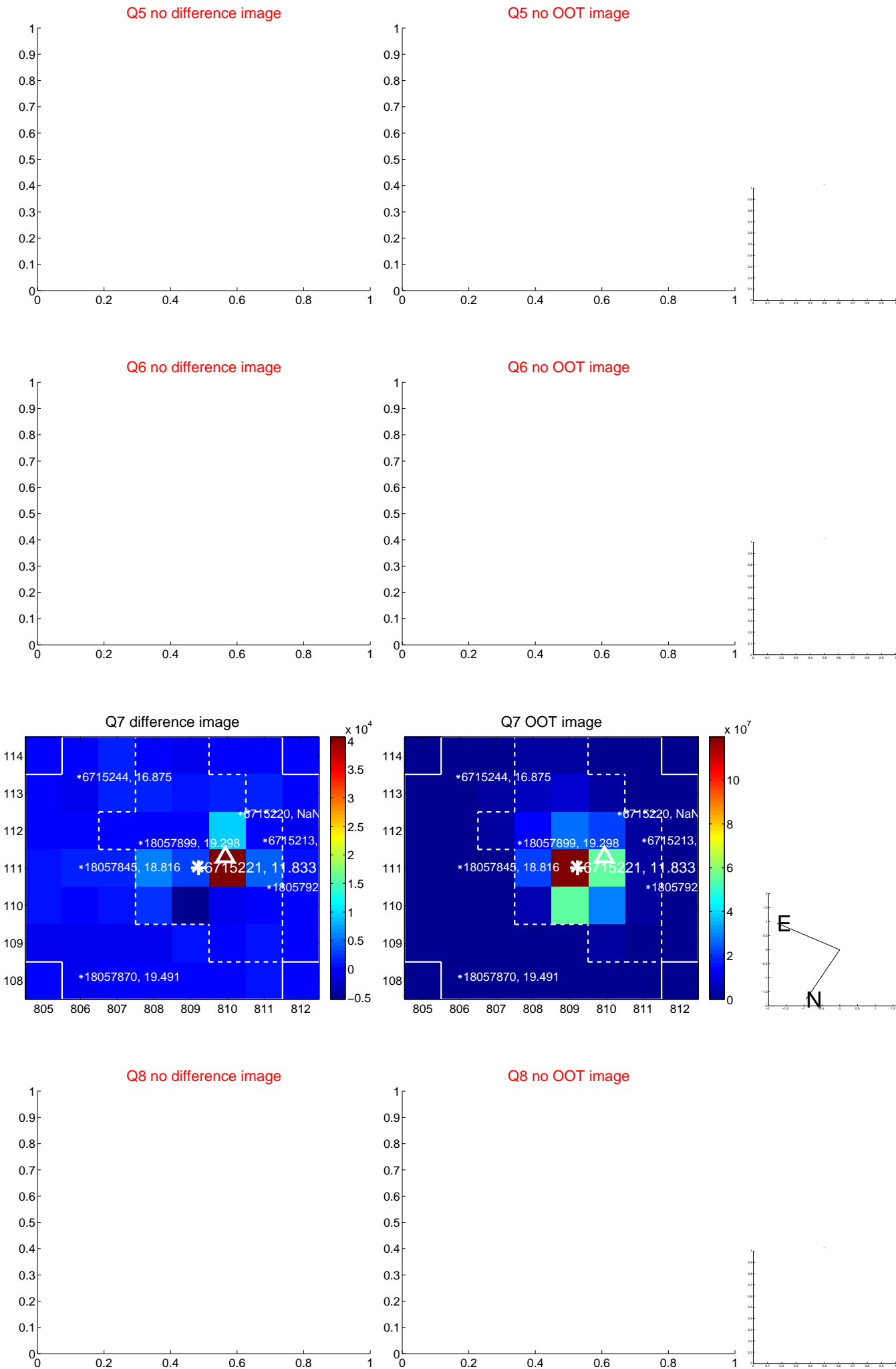


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

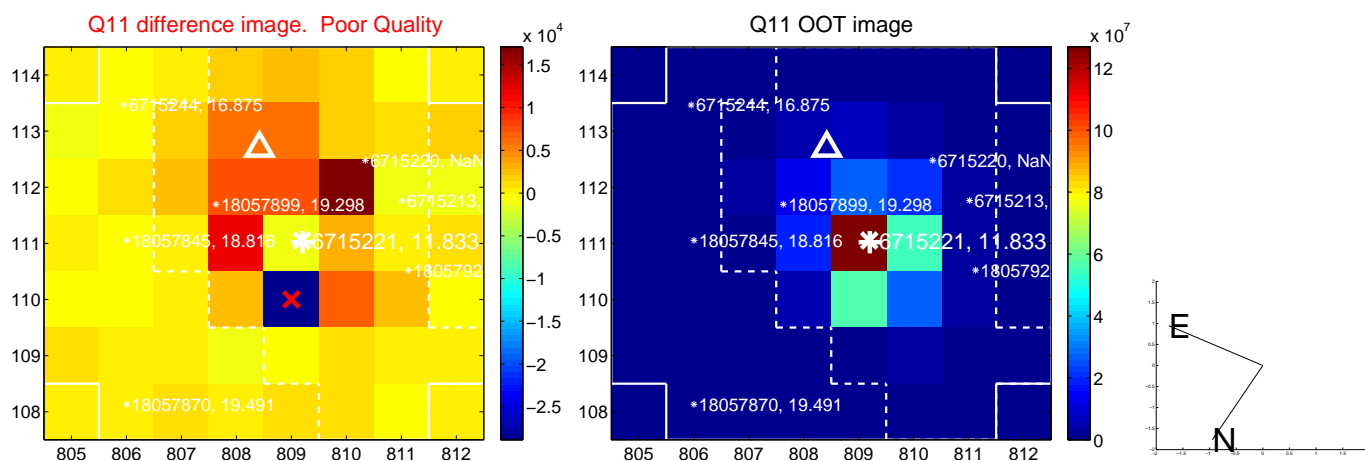
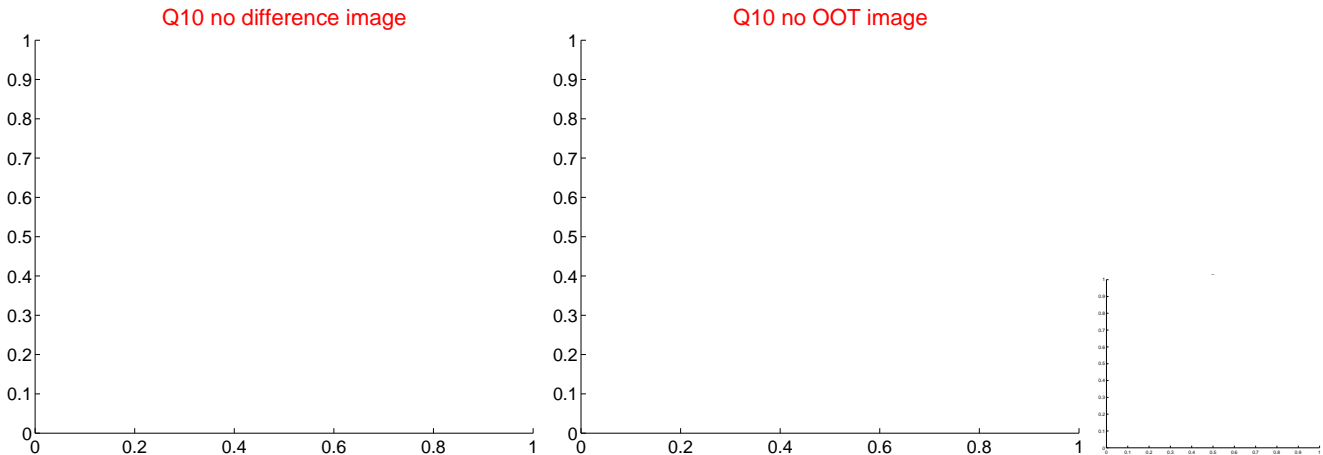
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



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



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

Q13 no difference image



Q13 no OOT image



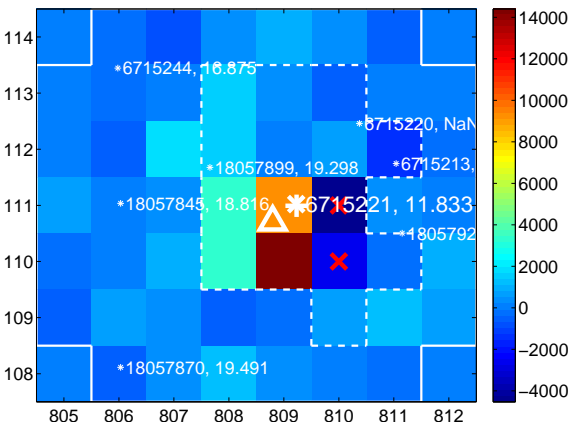
Q14 no difference image



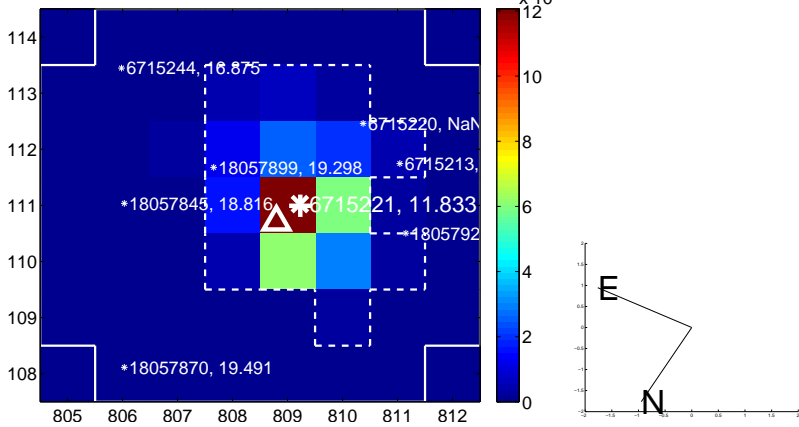
Q14 no OOT image



Q15 difference image



Q15 OOT image



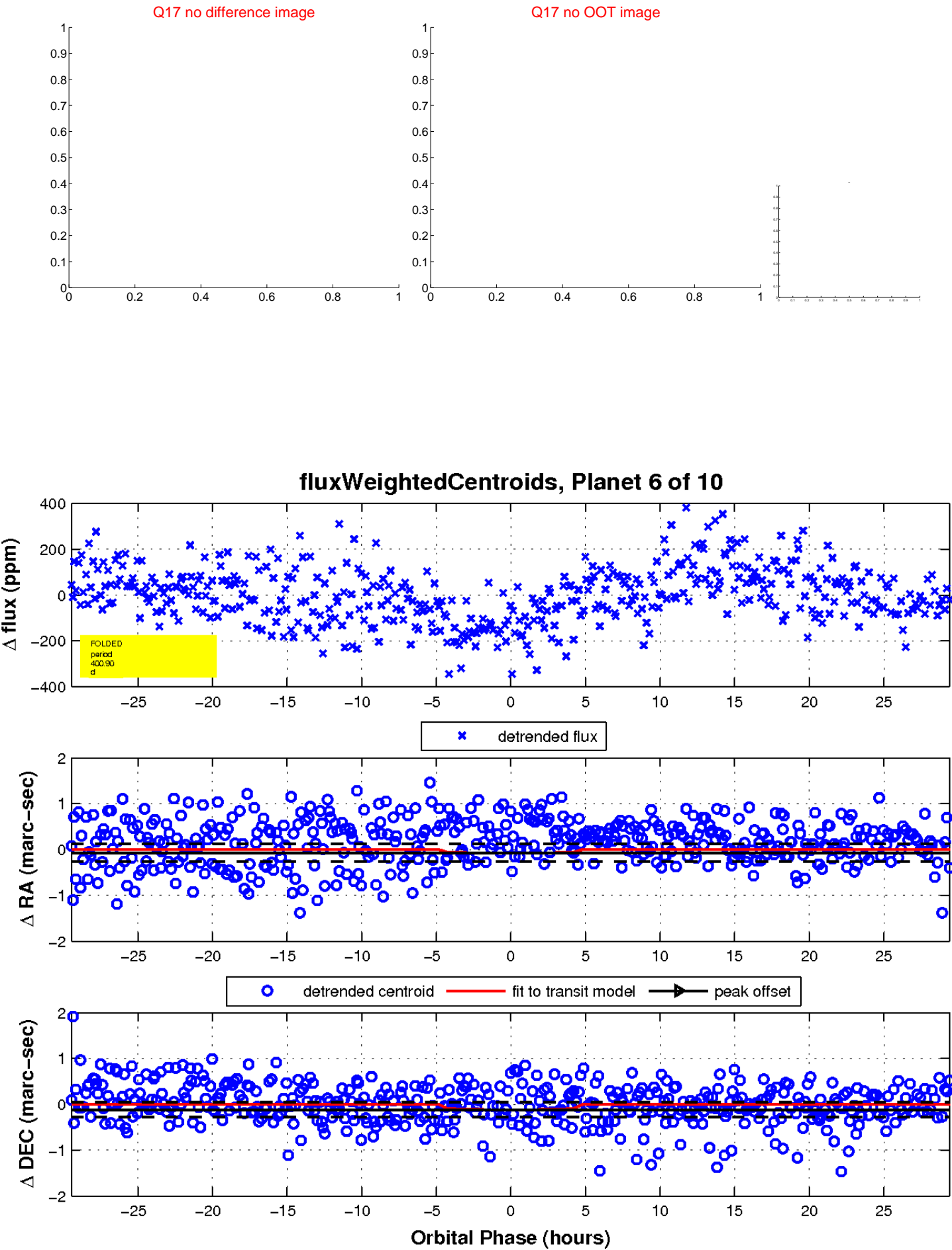
Q16 no difference image



Q16 no OOT image



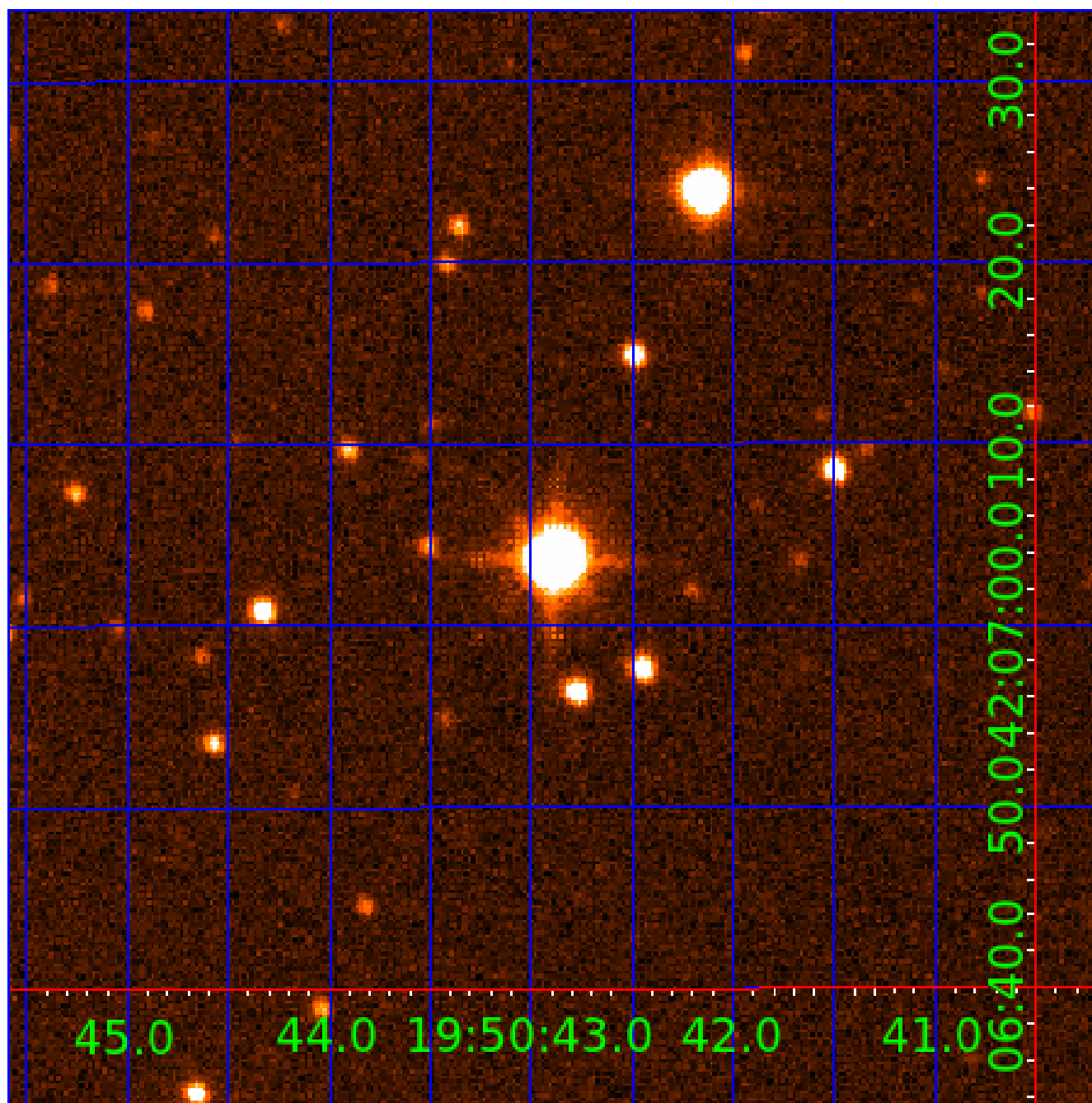
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image

Declination



## KIC 006715221

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006715221-01	OBS	No	1.984918	132.459230	13.3	8.776	9.2	7.4	2.02	6839	0.74	6389.14
006715221-02	OBS	No	107.919359	152.278773	91.7	14.832	10.4	6.2	2.02	6839	2.12	31.02
006715221-03	OBS	No	333.120273	314.487390	168.1	20.190	10.4	7.6	2.02	6839	2.83	6.90
006715221-04	OBS	No	134.224992	188.680406	137.8	3.578	8.3	7.4	2.02	6839	2.67	23.19
006715221-05	OBS	No	107.107514	214.951810	149.8	13.238	8.0	8.9	2.02	6839	3.25	31.33
006715221-06	OBS	No	400.898244	254.418073	152.5	9.827	8.0	7.8	2.02	6839	2.91	5.39
006715221-07	OBS	No	34.101777	151.432052	96.7	3.723	7.7	8.0	2.02	6839	2.32	144.12
006715221-08	OBS	No	65.108276	163.640682	100.0	4.485	7.8	7.8	2.02	6839	2.31	60.85
006715221-09	OBS	No	118.508397	233.886395	144.3	11.967	8.1	7.9	2.02	6839	2.70	27.38
006715221-10	OBS	No	36.316557	165.427888	72.2	12.670	8.2	7.1	2.02	6839	2.27	132.52

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006715221-01	OBS	FP	0.00	1	0	0	0	LPP_DV
006715221-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
006715221-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
006715221-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
006715221-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_ALT—CENT_FEW_MEAS
006715221-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—MOD_NONUNIQ_ALT
006715221-07	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—MOD_NONUNIQ_ALT
006715221-08	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—MOD_NONUNIQ_ALT
006715221-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_MEAS
006715221-10	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_UNRESOLVED_OFFSET

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

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

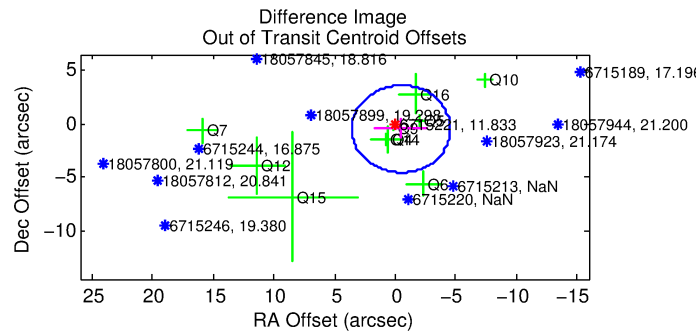
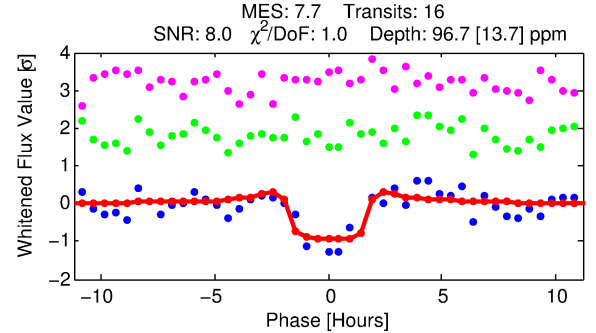
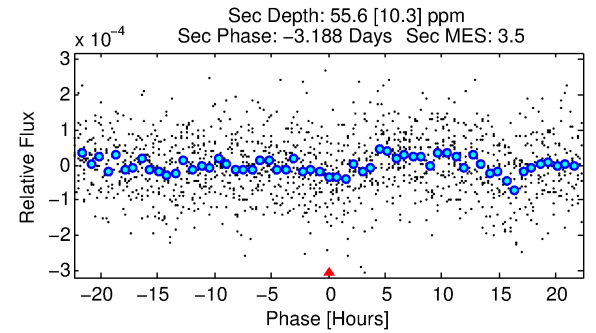
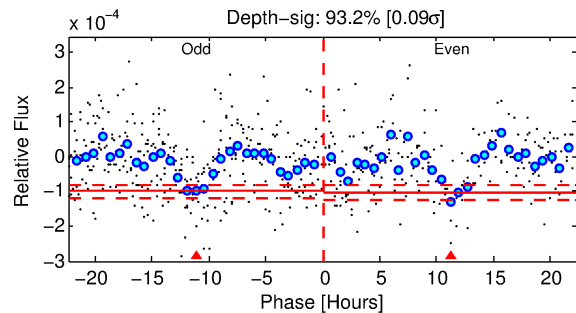
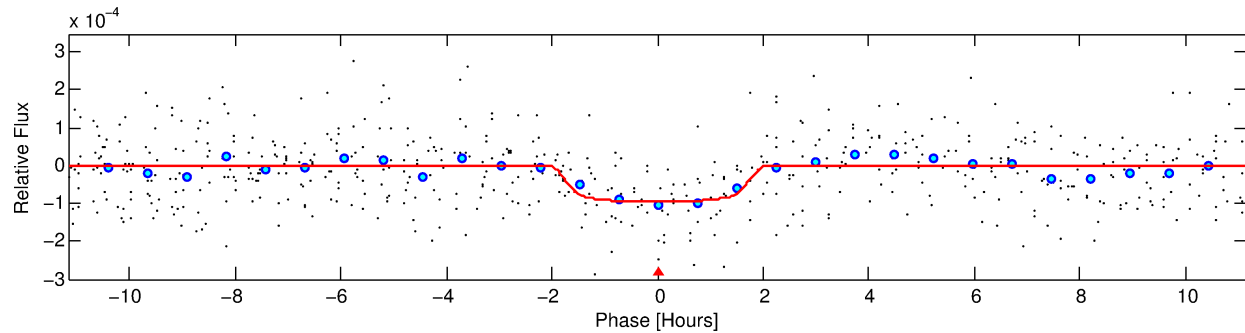
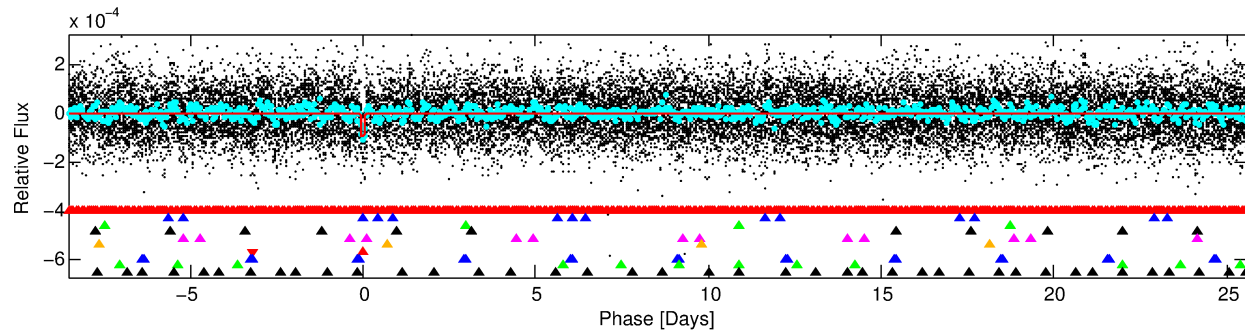
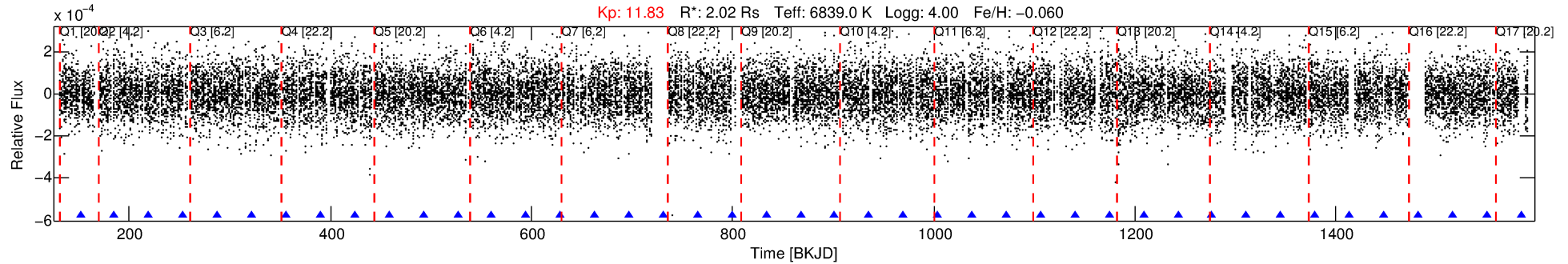
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 006715221-07

No Significant Match Found

# DV One-Page Summary

KIC: 6715221 Candidate: 7 of 10 Period: 34.102 d



## DV Fit Results:

Period = 34.10178 [0.00044] d  
Epoch = 151.4321 [0.0100] BKJD  
Rp/R\* = 0.0105 [0.0051]  
a/R\* = 31.51 [90.16]  
b = 0.90 [0.58]  
Seff = 144.12 [59.57]  
Teq = 884 [91] K  
Rp = 2.32 [1.31] Re  
a = 0.2356 [0.0611] AU  
Ag = 315.25 [332.78] [0.94 $\sigma$ ]  
Teffp = 5756 [1423] K [3.42 $\sigma$ ]

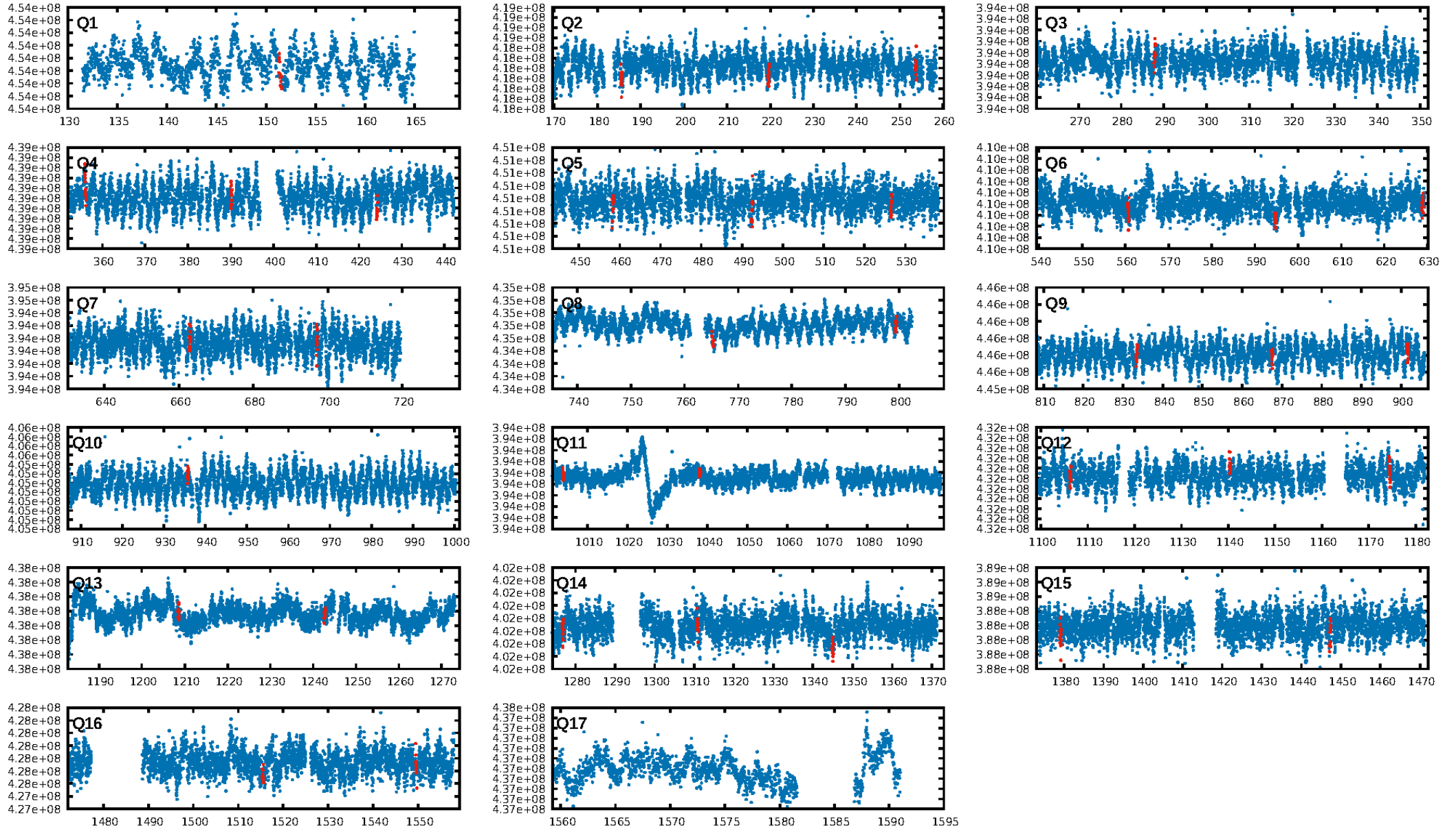
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [80.86 $\sigma$ ]  
LongPeriod-sig: 100.0% [4.03 $\sigma$ ]  
ModelChiSquare2-sig: 87.4%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 3.79e-09**  
RollingBand-fgt: 1.00 [16/16]  
GhostDiagnostic-chr: 1.906  
Centroid-sig: 34.9%  
Centroid-so: 0.697 arcsec [1.03 $\sigma$ ]  
OotOffset-rm: 0.681 arcsec [0.50 $\sigma$ ]  
KicOffset-rm: 0.732 arcsec [0.51 $\sigma$ ]  
OotOffset-st: 3/2/3/2 [10]  
KicOffset-st: 3/2/3/2 [10]  
DiffImageQuality-fgm: 0.30 [3/10]  
DiffImageOverlap-fno: 0.73 [11/15]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 05:30:33 Z

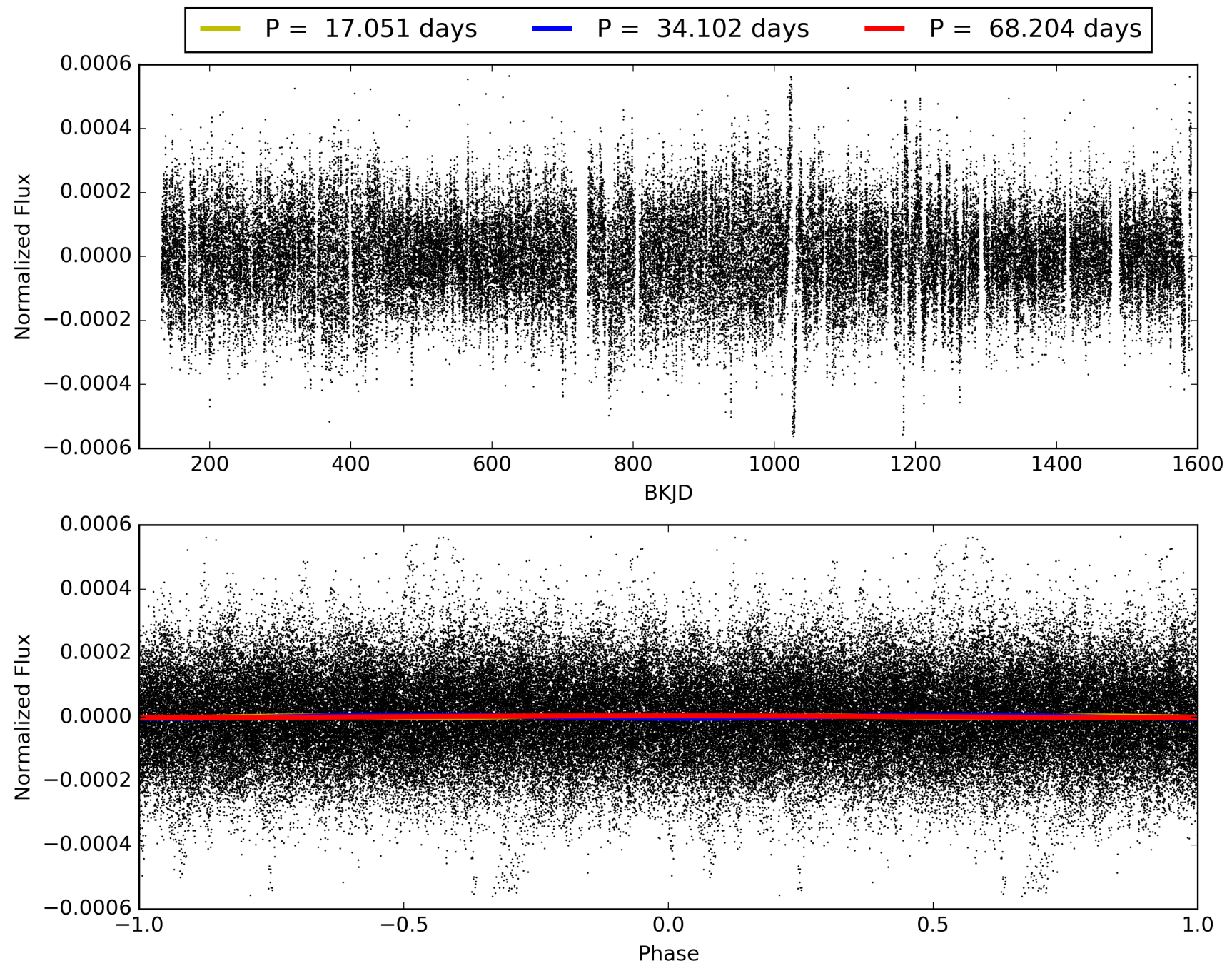
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 006715221-07, PDC Light Curves



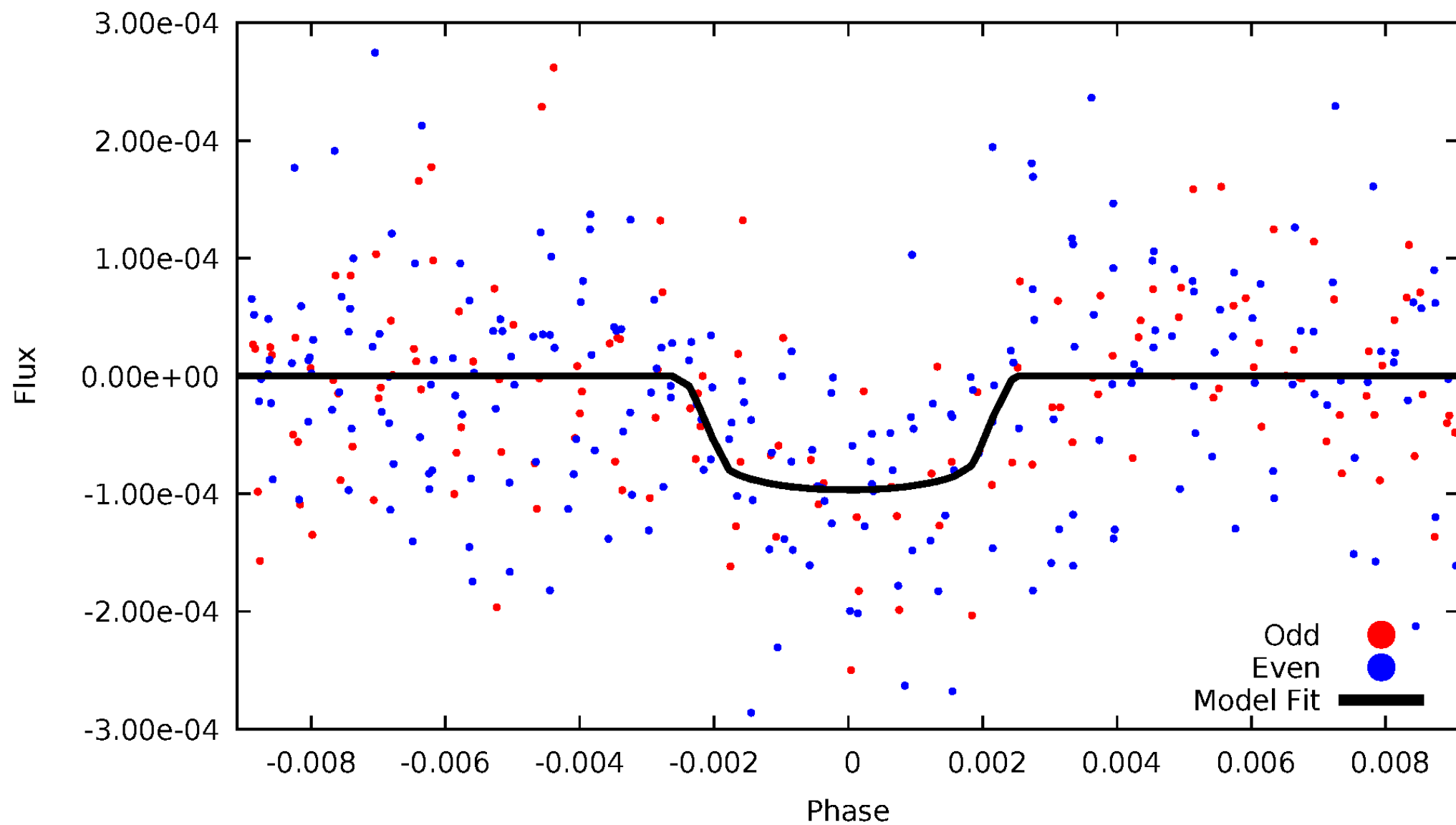


TCE 006715221-07



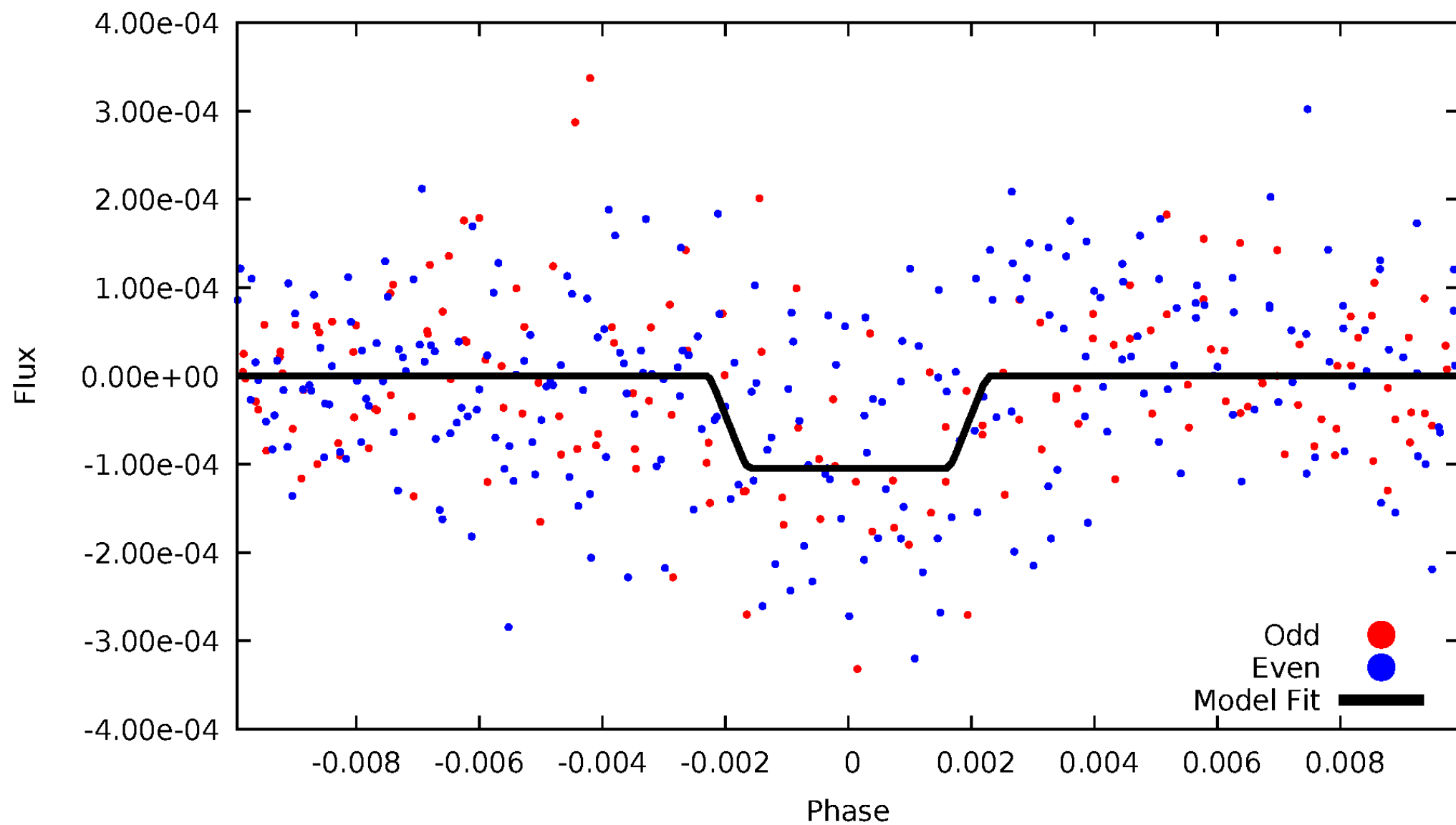
# DV Odd/Even

TCE 006715221-07



# ALT Odd/Even

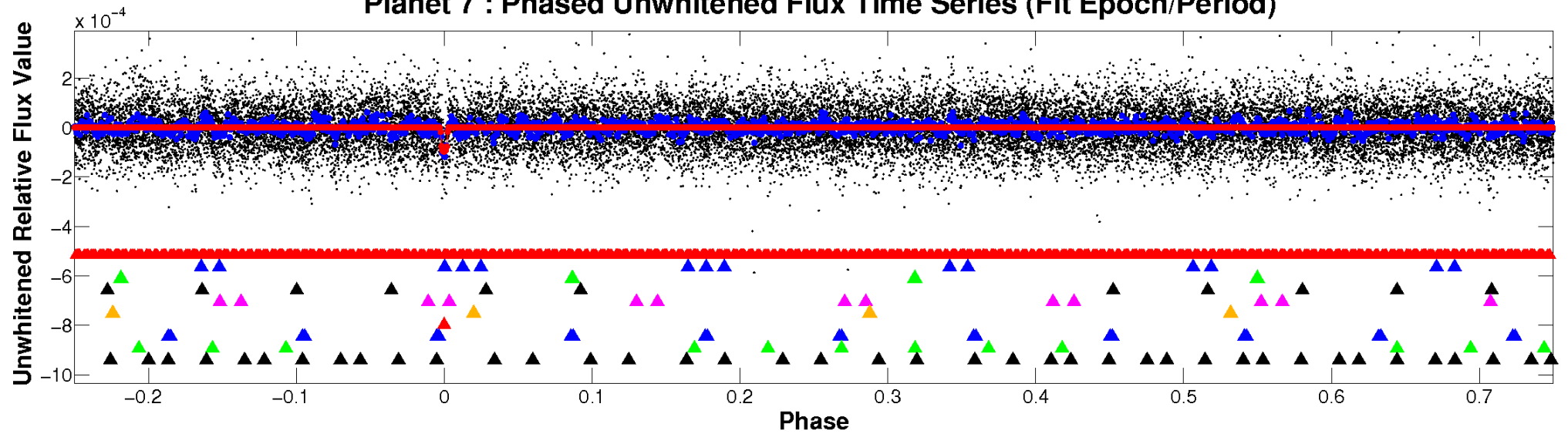
TCE 006715221-07



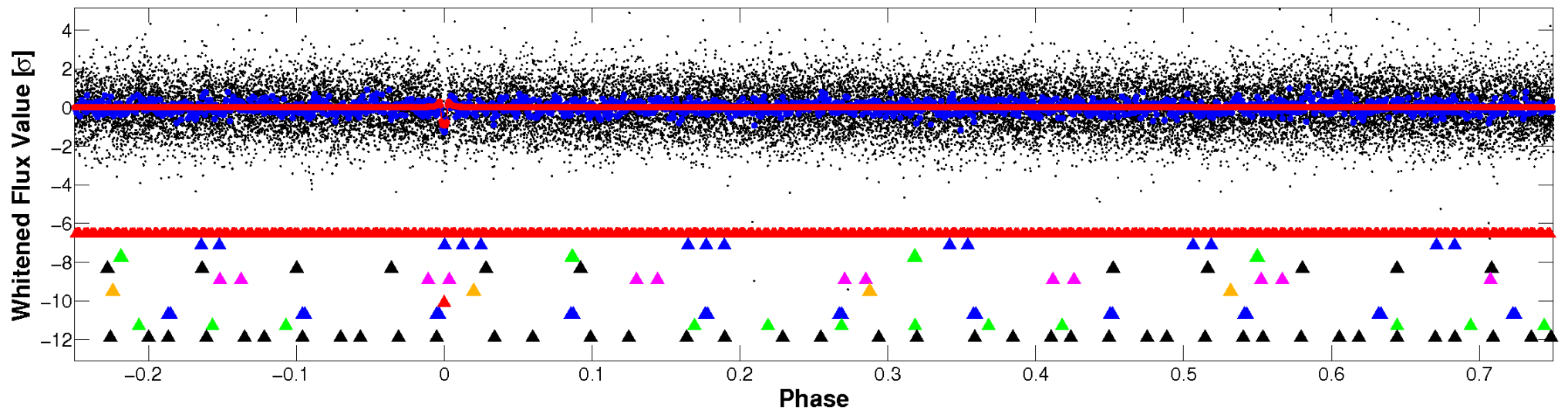


# Non-Whitened Vs. Whitened Light Curve

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

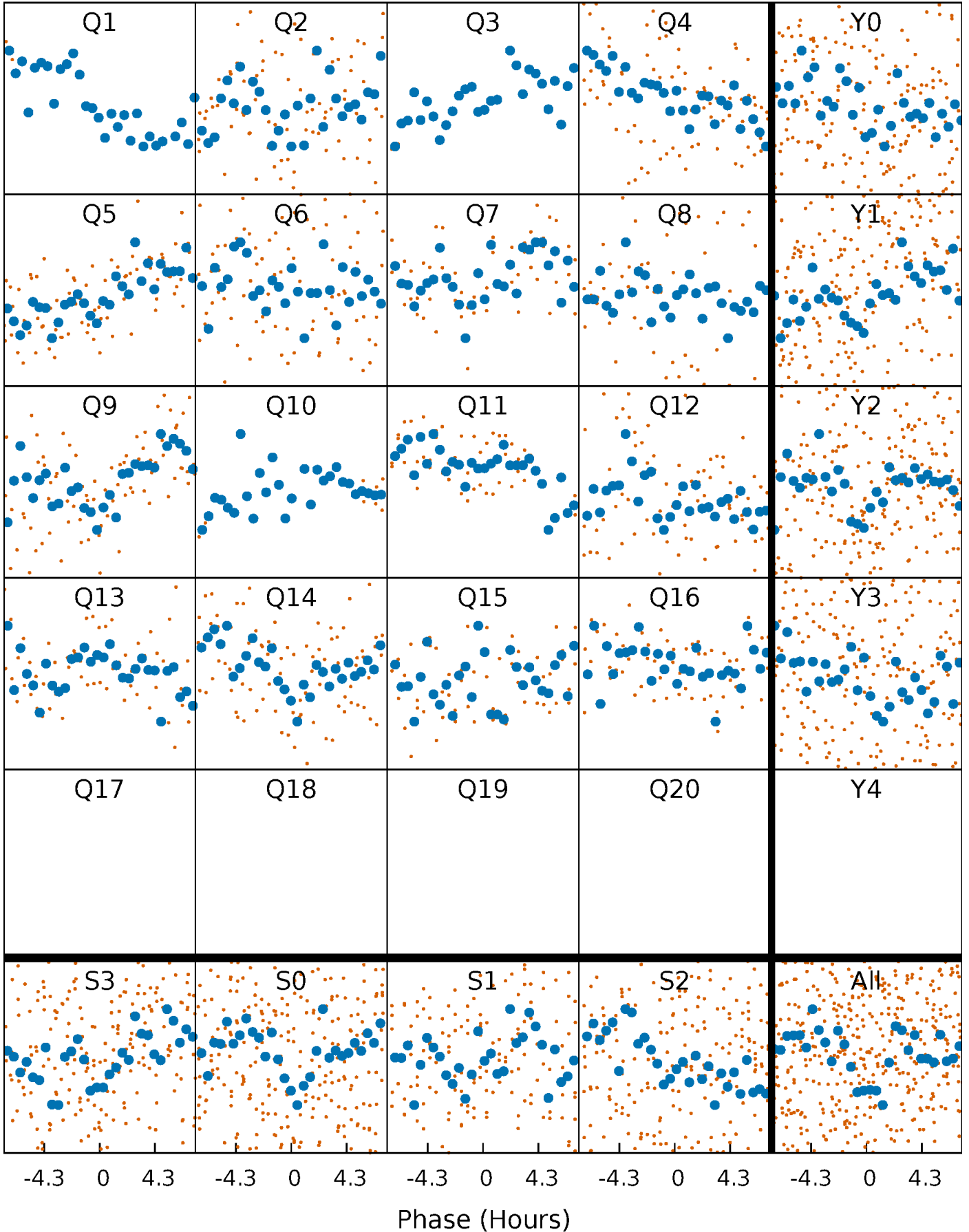


## Planet 7 : Phased Whitened Flux Time Series (Fit Epoch/Period)



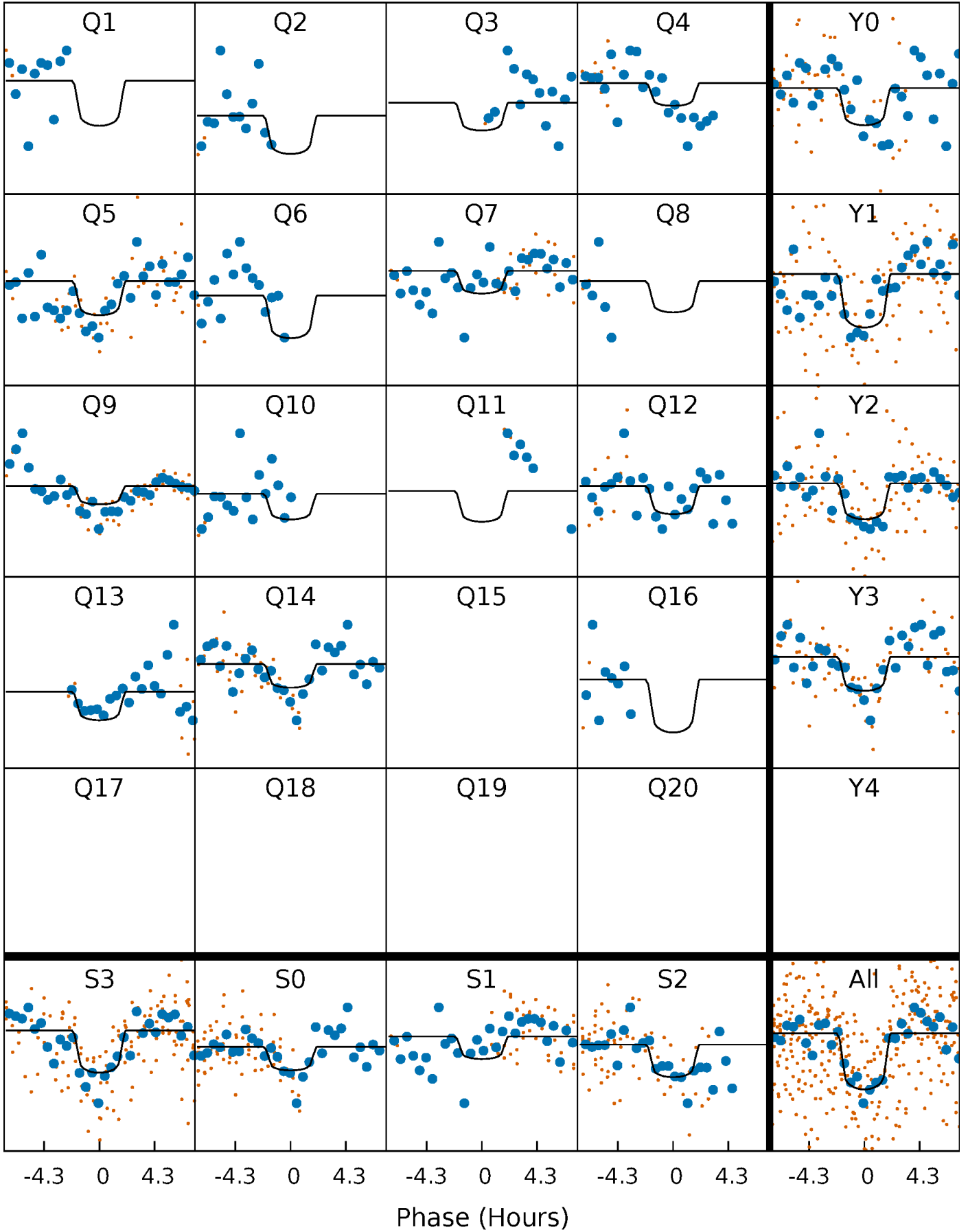
# PDC Quarter-Phased Transit Curves

TCE 006715221-07 P= 34.101777 Days  $T_0=151.432052$  (BKJD)



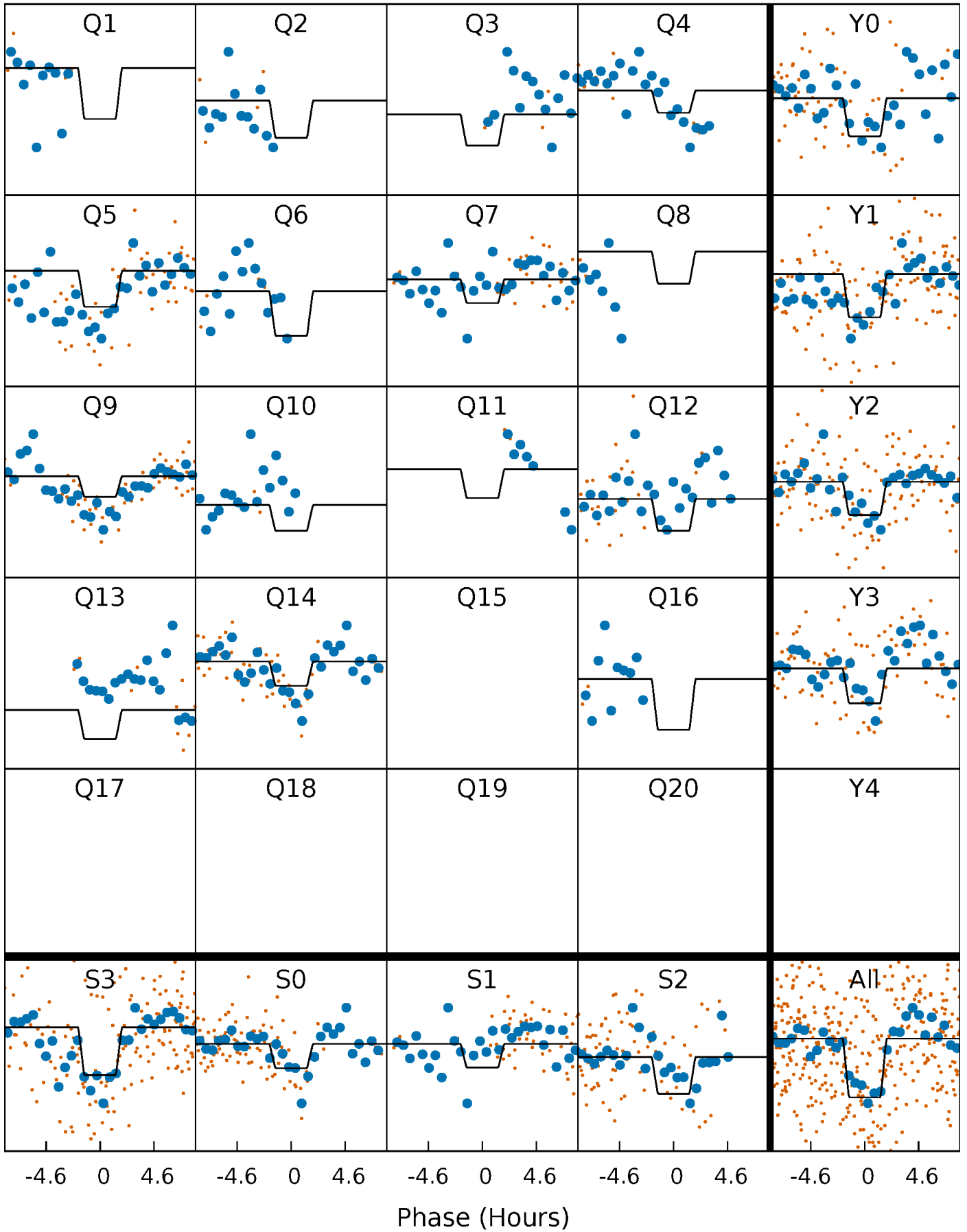
# DV Quarter-Phased Transit Curves

TCE 006715221-07   P= 34.101777 Days    $T_0=151.432052$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

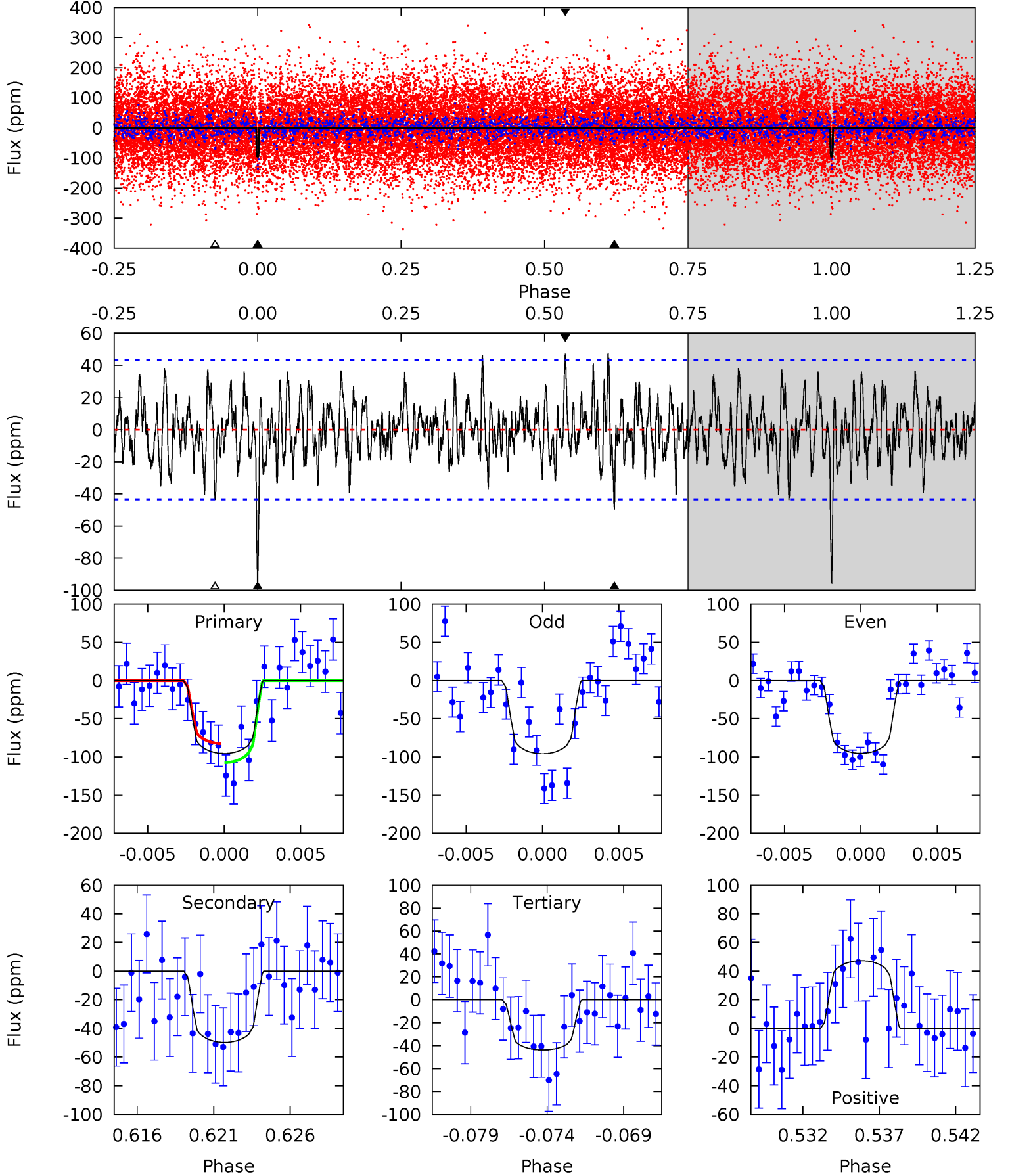
TCE 006715221-07     $P = 34.101426$  Days     $T_0 = 151.435912$  (BKJD)



# DV Model-Shift Uniqueness Test

006715221-07,  $P = 34.101777$  Days,  $E = 117.330275$  Days

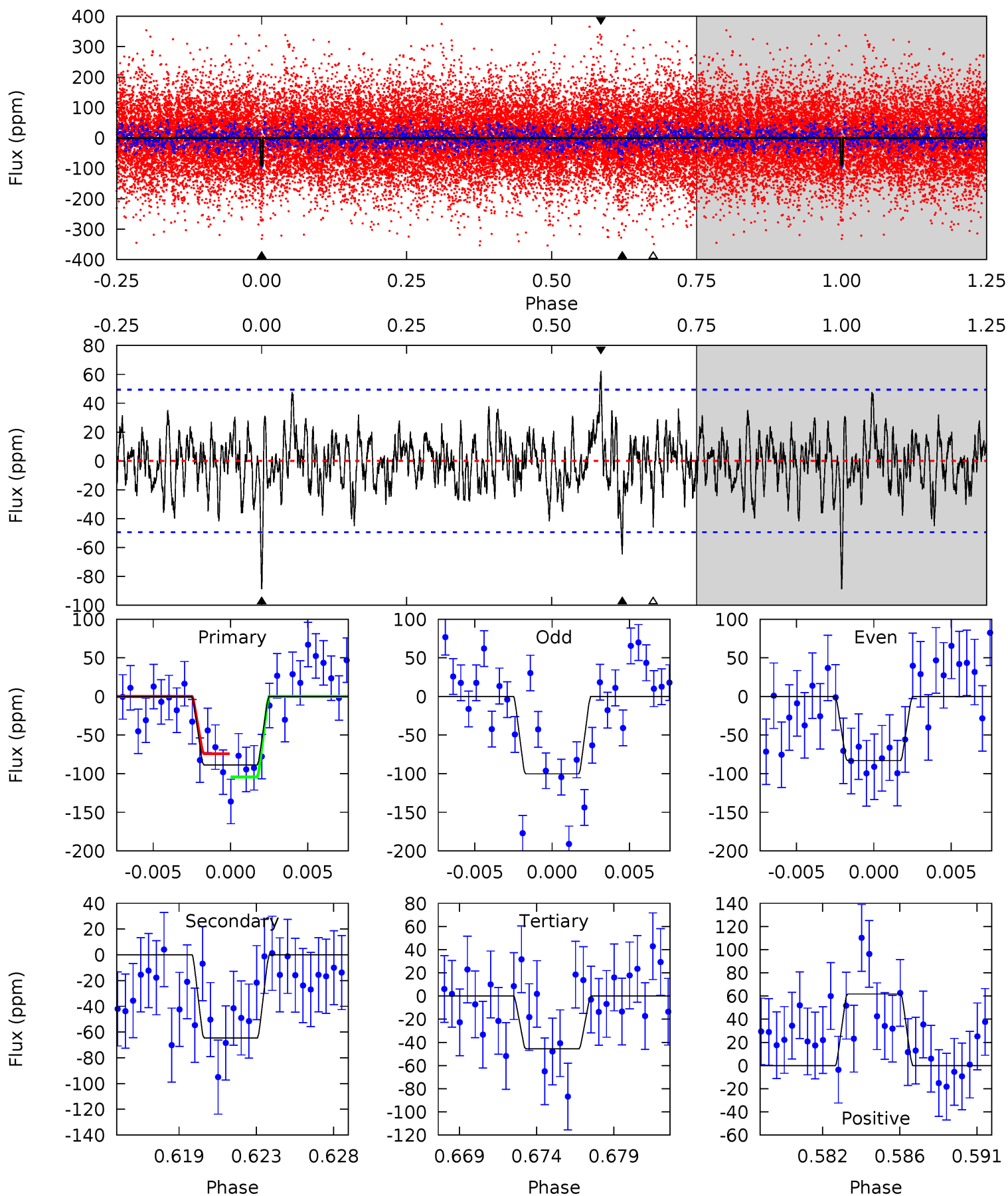
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.3	5.90	5.20	5.61	5.16	2.81	1.77	6.15	5.73	0.71	0.29	0.03	0.92	0.33	1.47



# Alt Model-Shift Uniqueness Test

006715221-07, P = 34.101426 Days, E = 117.334486 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
9.30	6.77	4.78	6.47	5.17	2.83	1.60	4.52	2.83	1.99	0.30	0.85	0.86	0.41	1.59



### Stellar Parameters For KIC 006715221

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6839^{+163}_{-225}$	$4.003^{+0.221}_{-0.119}$	$-0.060^{+0.250}_{-0.300}$	$2.020^{+0.396}_{-0.594}$	$1.497^{+0.172}_{-0.257}$	$0.256^{+0.303}_{-0.104}$
	+2%/-3%	+6%/-3%	+417%/-500%	+20%/-29%	+11%/-17%	+118%/-41%
Source	PHO1	FLK73	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 006715221-07 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-50 \pm 8$	$2.27^{+0.98}_{-1.10}$	$1222^{+77}_{-96}$	$5562^{+2177}_{-872}$	$299^{+762}_{-164}$
Alt.	$-65 \pm 10$	$2.14^{+1.18}_{-1.10}$	$1221^{+76}_{-96}$	$6092^{+2848}_{-1053}$	$440^{+1292}_{-263}$

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



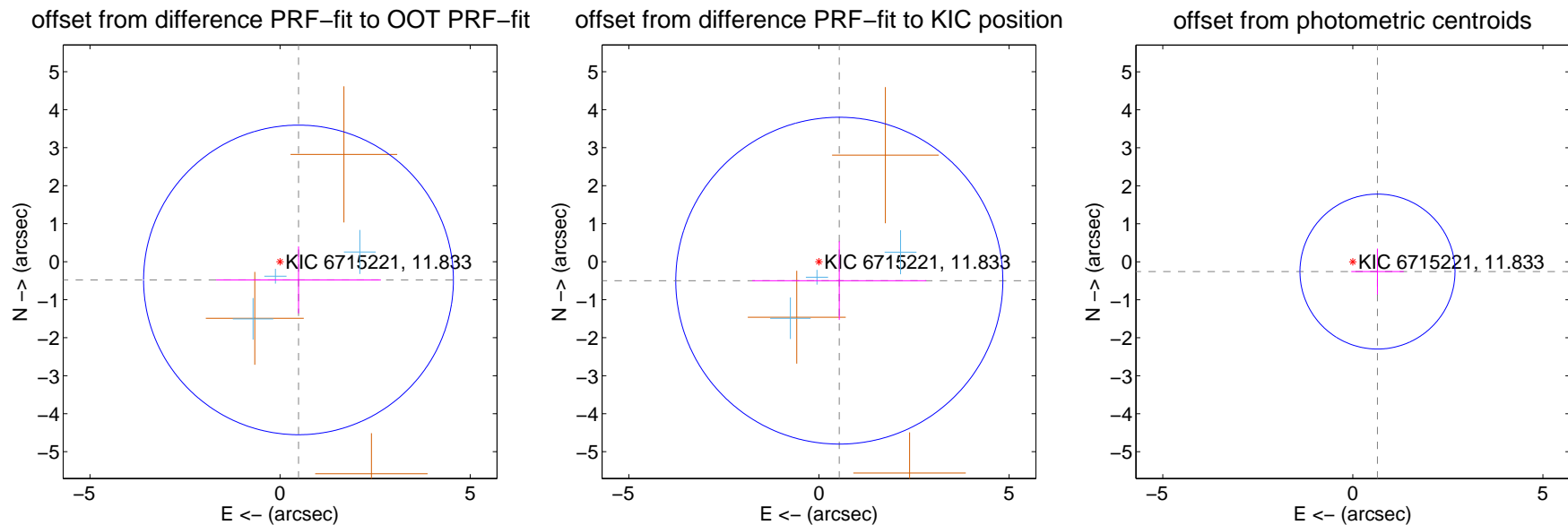
## DV Centroid Data

Supplemental centroid analysis for 006715221-07. **Kepler magnitude: 11.83.** Transit SNR 8.03

**There are 3 quarters with good PRF difference image offsets**

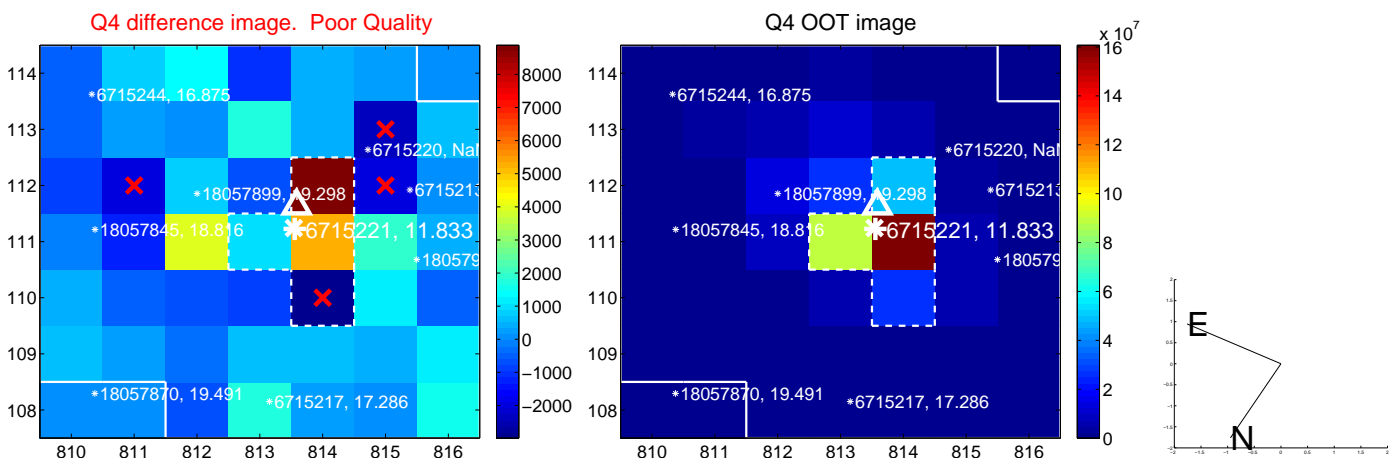
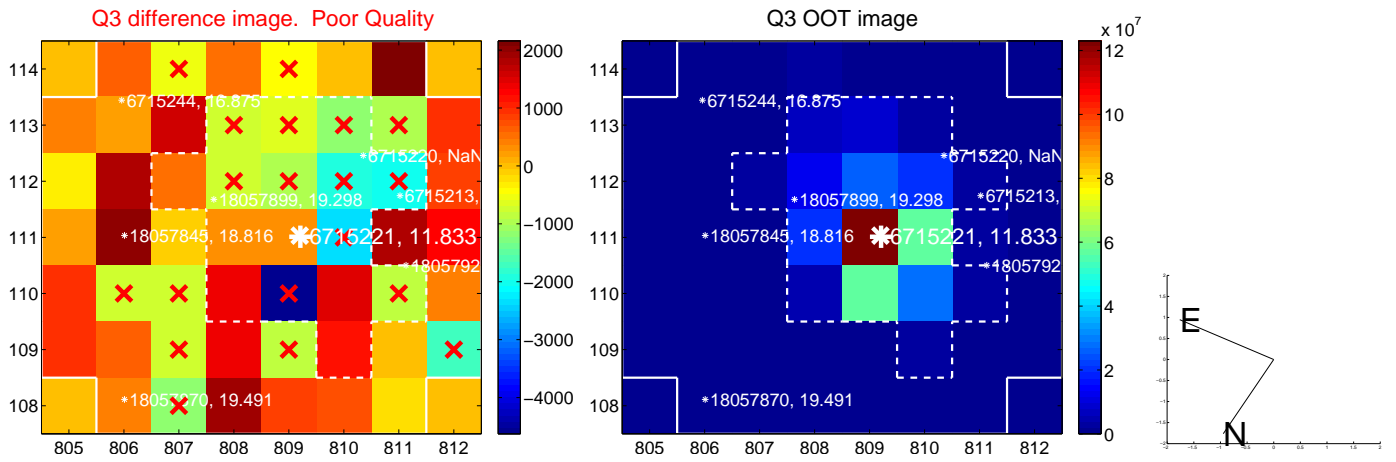
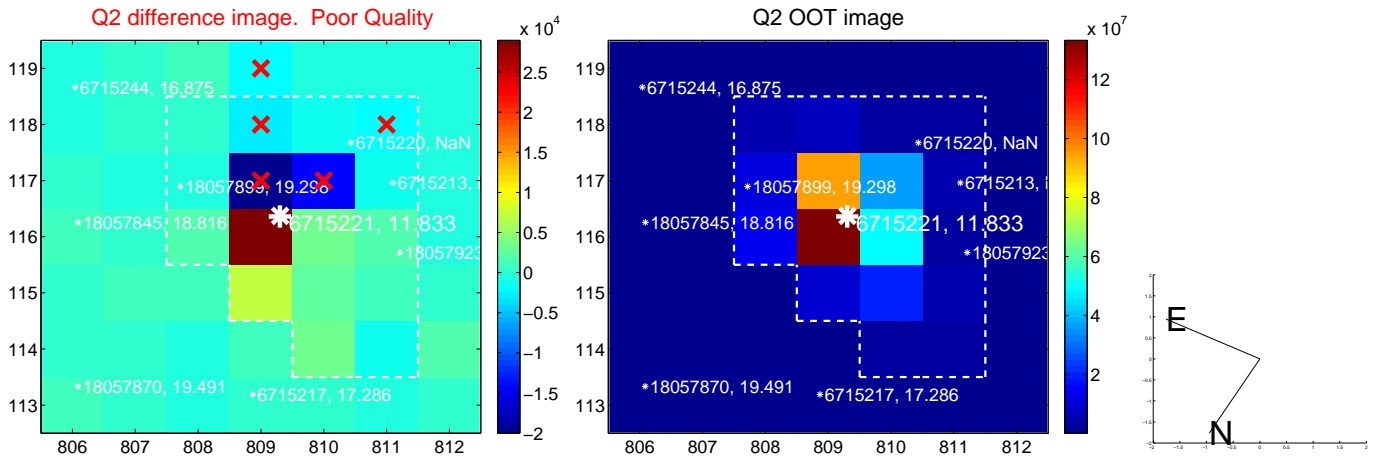
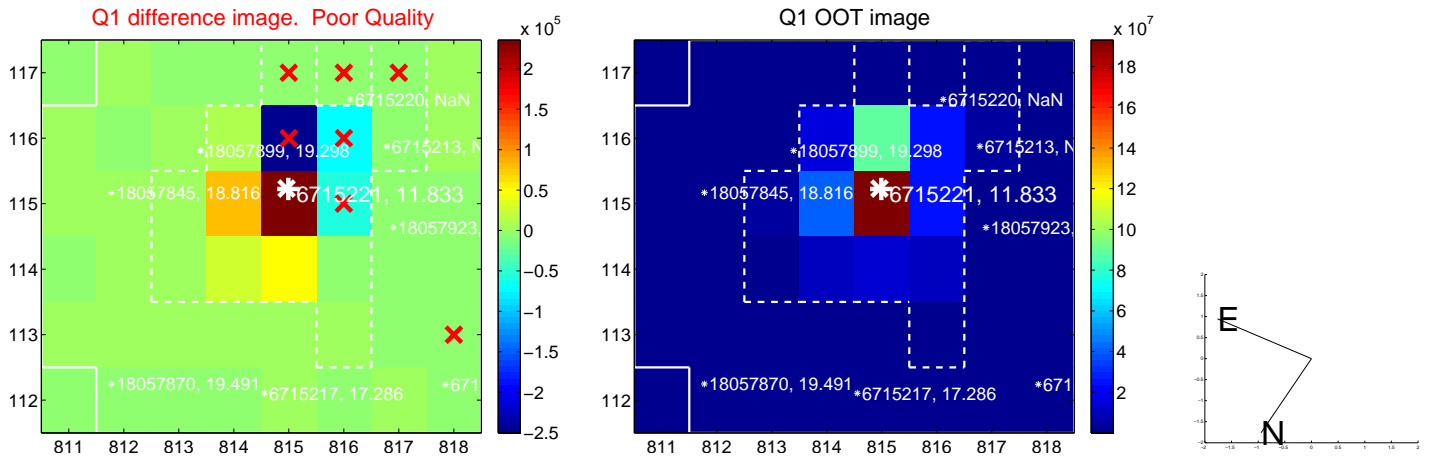
The direct PRF centroid is offset from the target star catalog position by about 0.07 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.681 \pm 1.358$	0.50	$-0.484 \pm 2.167$	$-0.480 \pm 0.881$
PRF-fit source offset from KIC position	$0.732 \pm 1.433$	0.51	$-0.534 \pm 2.290$	$-0.500 \pm 1.033$
photometric centroid source offset	$0.70 \pm 0.68$	1.03	$-0.65 \pm 0.69$	$-0.26 \pm 0.61$

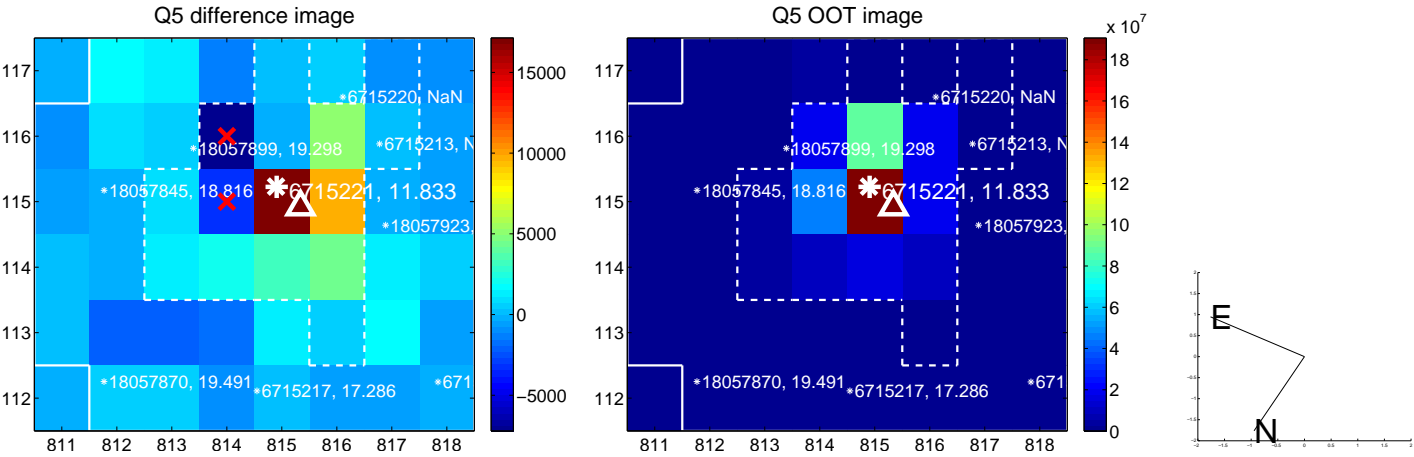


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

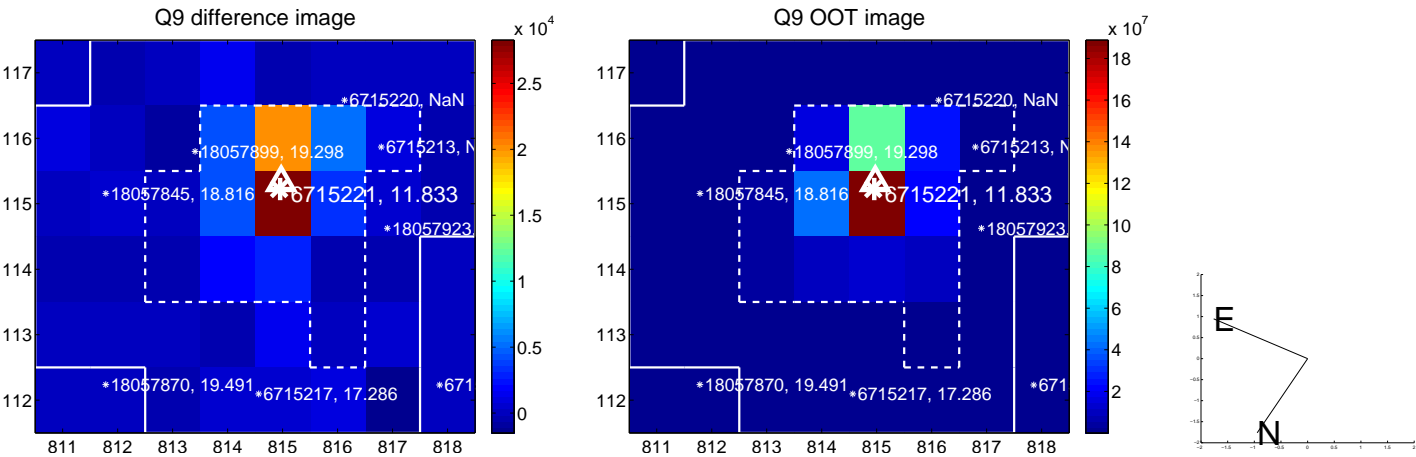
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



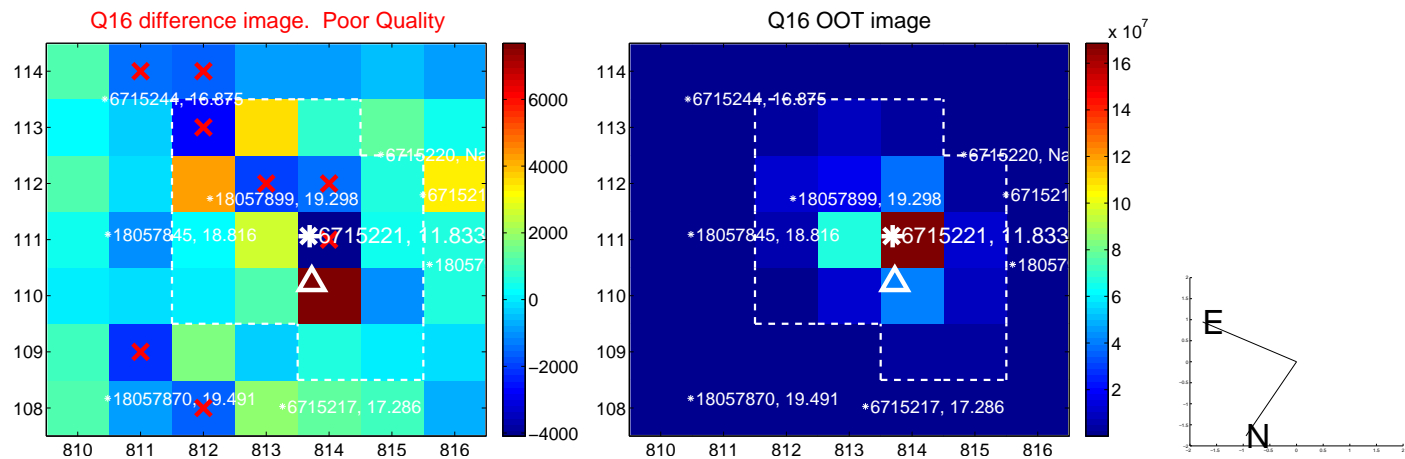
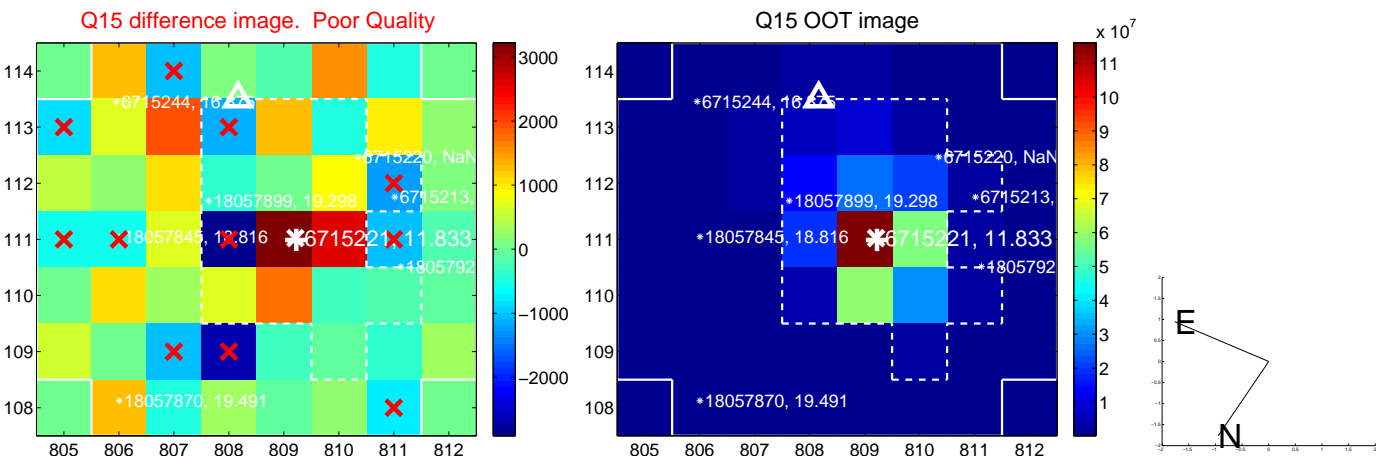
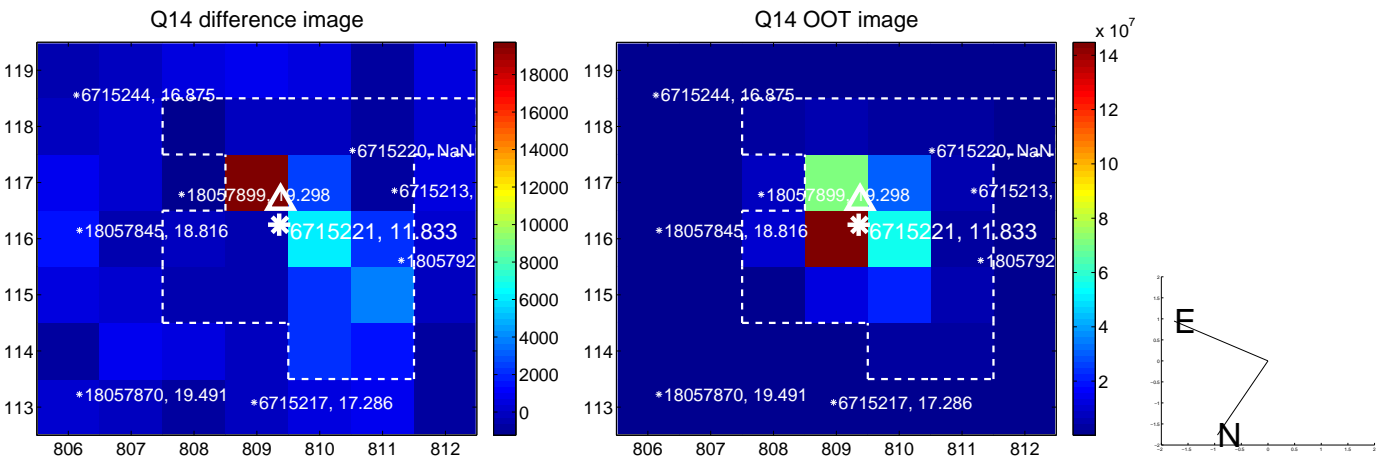
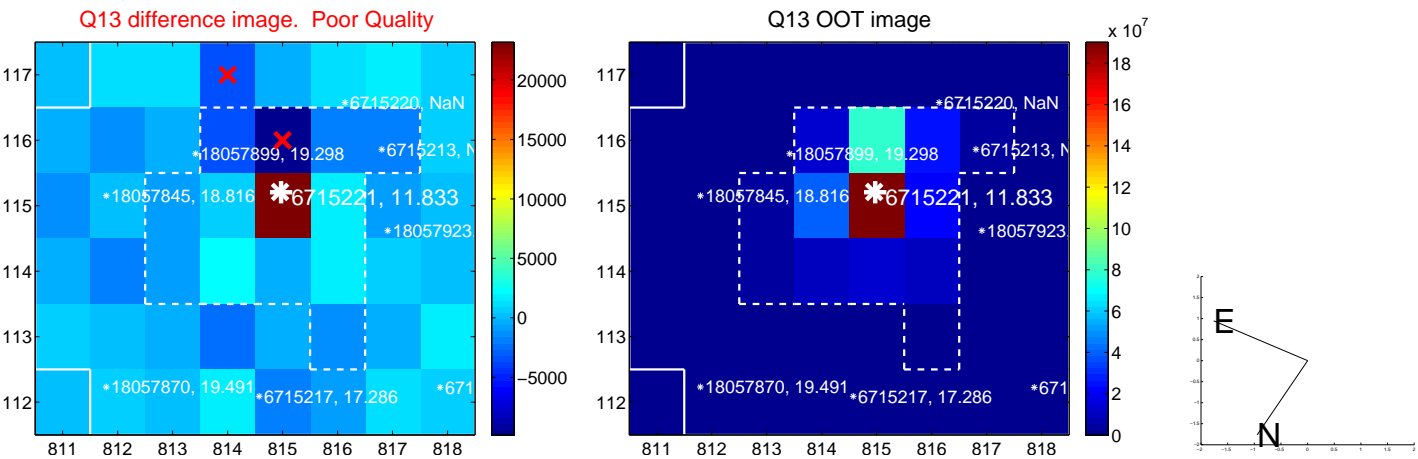
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



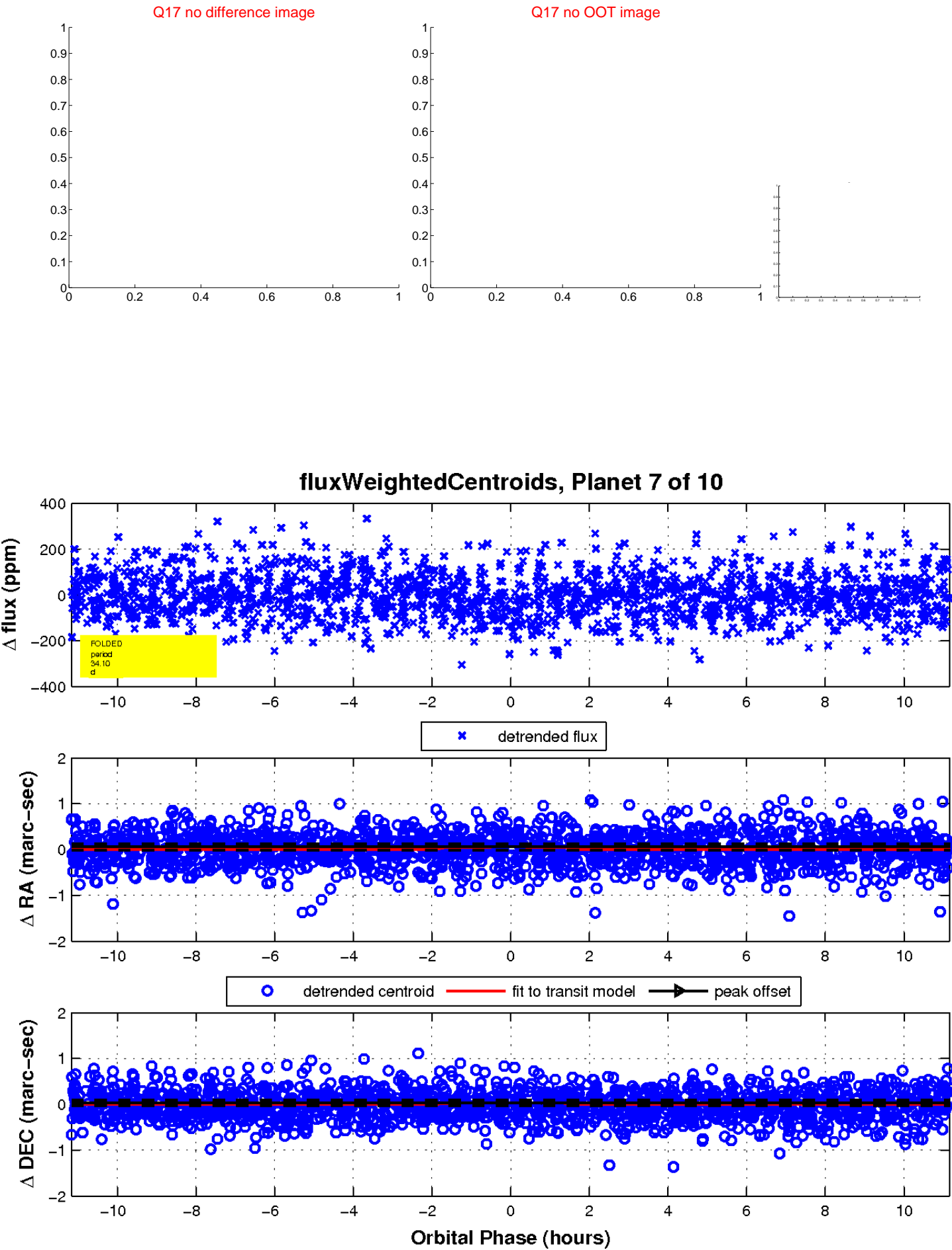
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

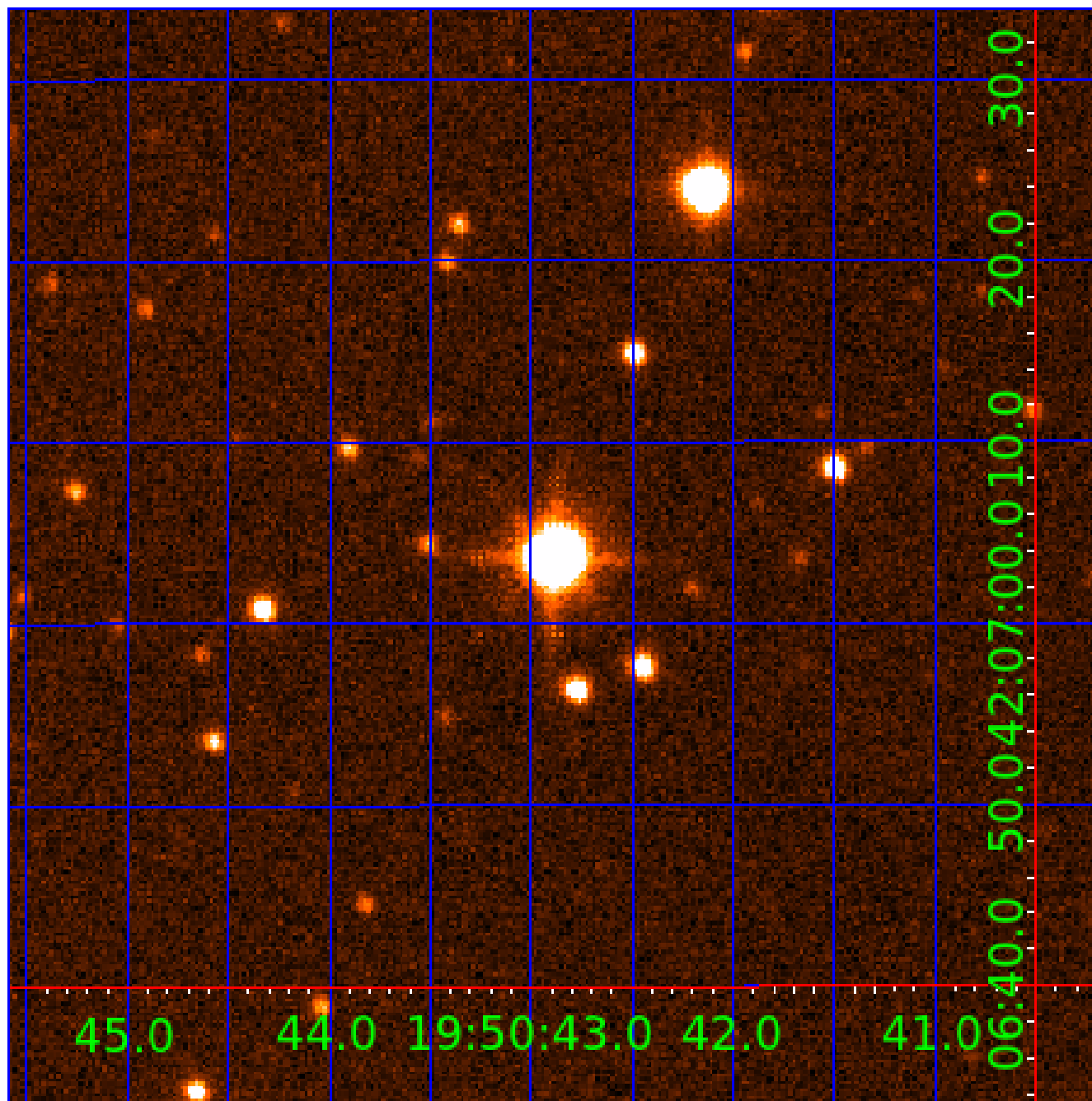


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





## KIC 006715221

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006715221-01	OBS	No	1.984918	132.459230	13.3	8.776	9.2	7.4	2.02	6839	0.74	6389.14
006715221-02	OBS	No	107.919359	152.278773	91.7	14.832	10.4	6.2	2.02	6839	2.12	31.02
006715221-03	OBS	No	333.120273	314.487390	168.1	20.190	10.4	7.6	2.02	6839	2.83	6.90
006715221-04	OBS	No	134.224992	188.680406	137.8	3.578	8.3	7.4	2.02	6839	2.67	23.19
006715221-05	OBS	No	107.107514	214.951810	149.8	13.238	8.0	8.9	2.02	6839	3.25	31.33
006715221-06	OBS	No	400.898244	254.418073	152.5	9.827	8.0	7.8	2.02	6839	2.91	5.39
006715221-07	OBS	No	34.101777	151.432052	96.7	3.723	7.7	8.0	2.02	6839	2.32	144.12
006715221-08	OBS	No	65.108276	163.640682	100.0	4.485	7.8	7.8	2.02	6839	2.31	60.85
006715221-09	OBS	No	118.508397	233.886395	144.3	11.967	8.1	7.9	2.02	6839	2.70	27.38
006715221-10	OBS	No	36.316557	165.427888	72.2	12.670	8.2	7.1	2.02	6839	2.27	132.52

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006715221-01	OBS	FP	0.00	1	0	0	0	LPP_DV
006715221-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
006715221-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
006715221-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
006715221-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_ALT—CENT_FEW_MEAS
006715221-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—MOD_NONUNIQ_ALT
006715221-07	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—MOD_NONUNIQ_ALT
006715221-08	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—MOD_NONUNIQ_ALT
006715221-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_MEAS
006715221-10	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_UNRESOLVED_OFFSET

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

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

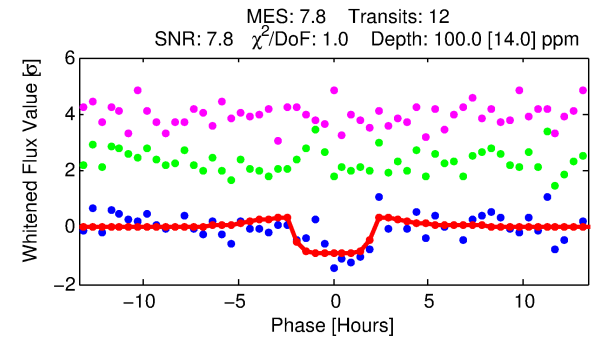
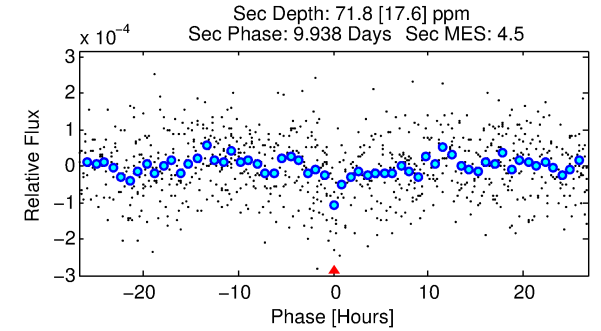
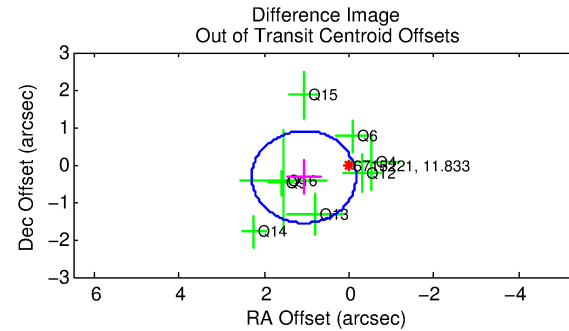
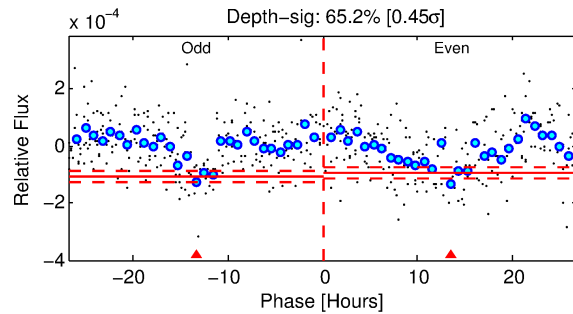
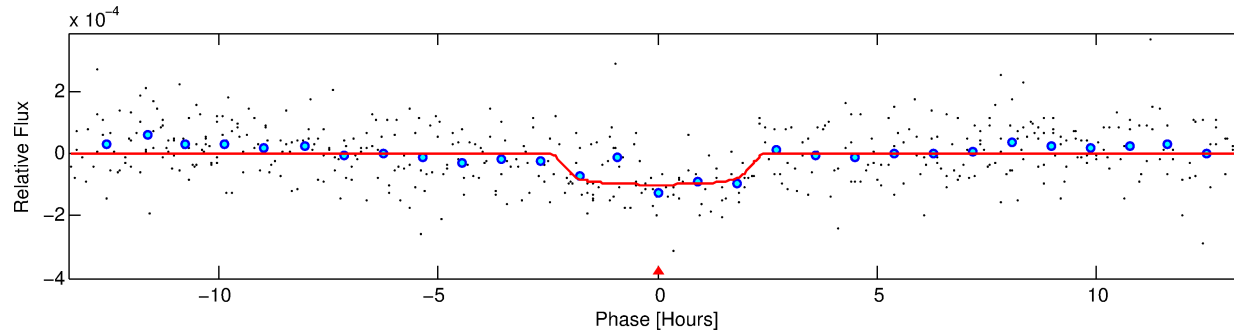
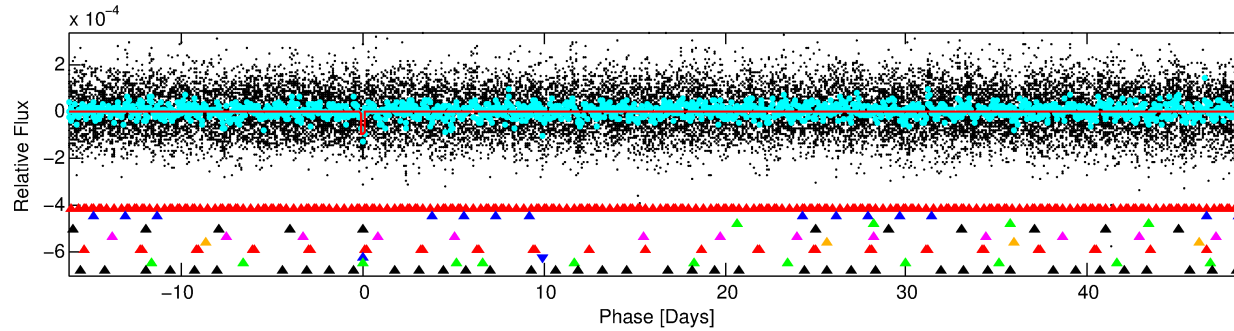
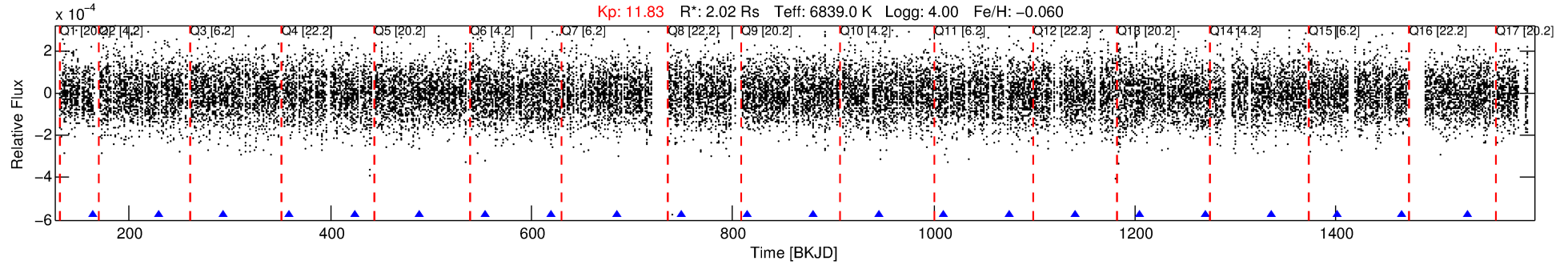
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 006715221-08

No Significant Match Found

# DV One-Page Summary

KIC: 6715221 Candidate: 8 of 10 Period: 65.108 d



## DV Fit Results:

Period = 65.10828 [0.00079] d  
Epoch = 163.6407 [0.0101] BKJD  
Rp/R\* = 0.0105 [0.0052]  
a/R\* = 56.66 [165.28]  
b = 0.87 [0.81]  
Seff = 60.85 [25.15]  
Teff = 712 [74] K  
Rp = 2.31 [1.33] Re  
a = 0.3625 [0.0940] AU  
Ag = 975.24 [1068.90] [0.91 $\sigma$ ]  
Teffp = 6153 [1588] K [3.42 $\sigma$ ]

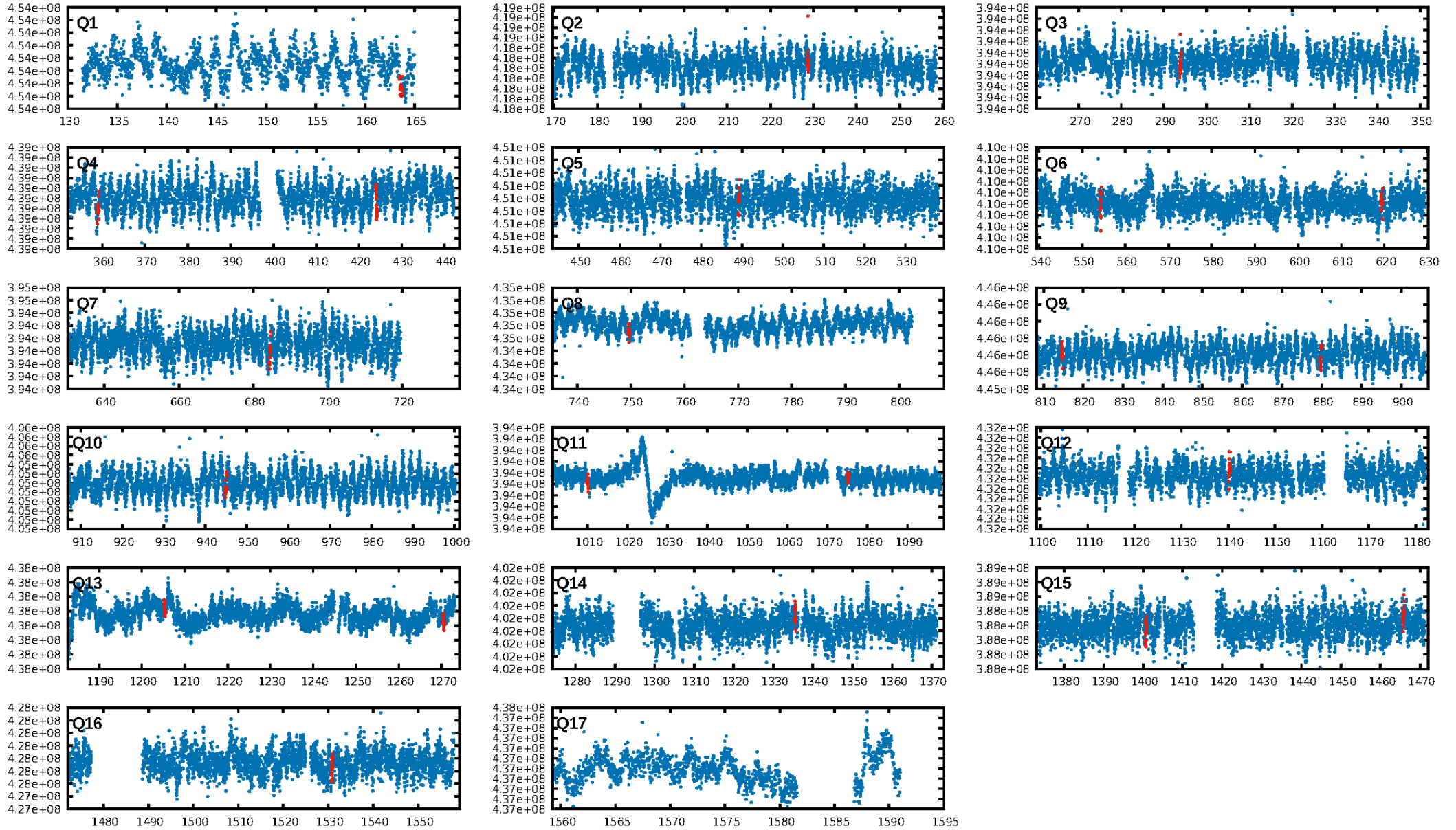
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [51.41 $\sigma$ ]  
LongPeriod-sig: 100.0% [72.12 $\sigma$ ]  
ModelChiSquare2-sig: 25.1%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 1.33e-09**  
RollingBand-fgt: 1.00 [11/11]  
GhostDiagnostic-chr: 3.279  
Centroid-sig: 56.6%  
Centroid-so: 0.513 arcsec [0.65 $\sigma$ ]  
OotOffset-rm: 1.107 arcsec [2.70 $\sigma$ ]  
KicOffset-rm: 1.057 arcsec [2.56 $\sigma$ ]  
OotOffset-st: 2/1/3/2 [8]  
KicOffset-st: 2/1/3/2 [8]  
DiffImageQuality-fgm: 0.62 [5/8]  
DiffImageOverlap-fno: 0.31 [5/16]

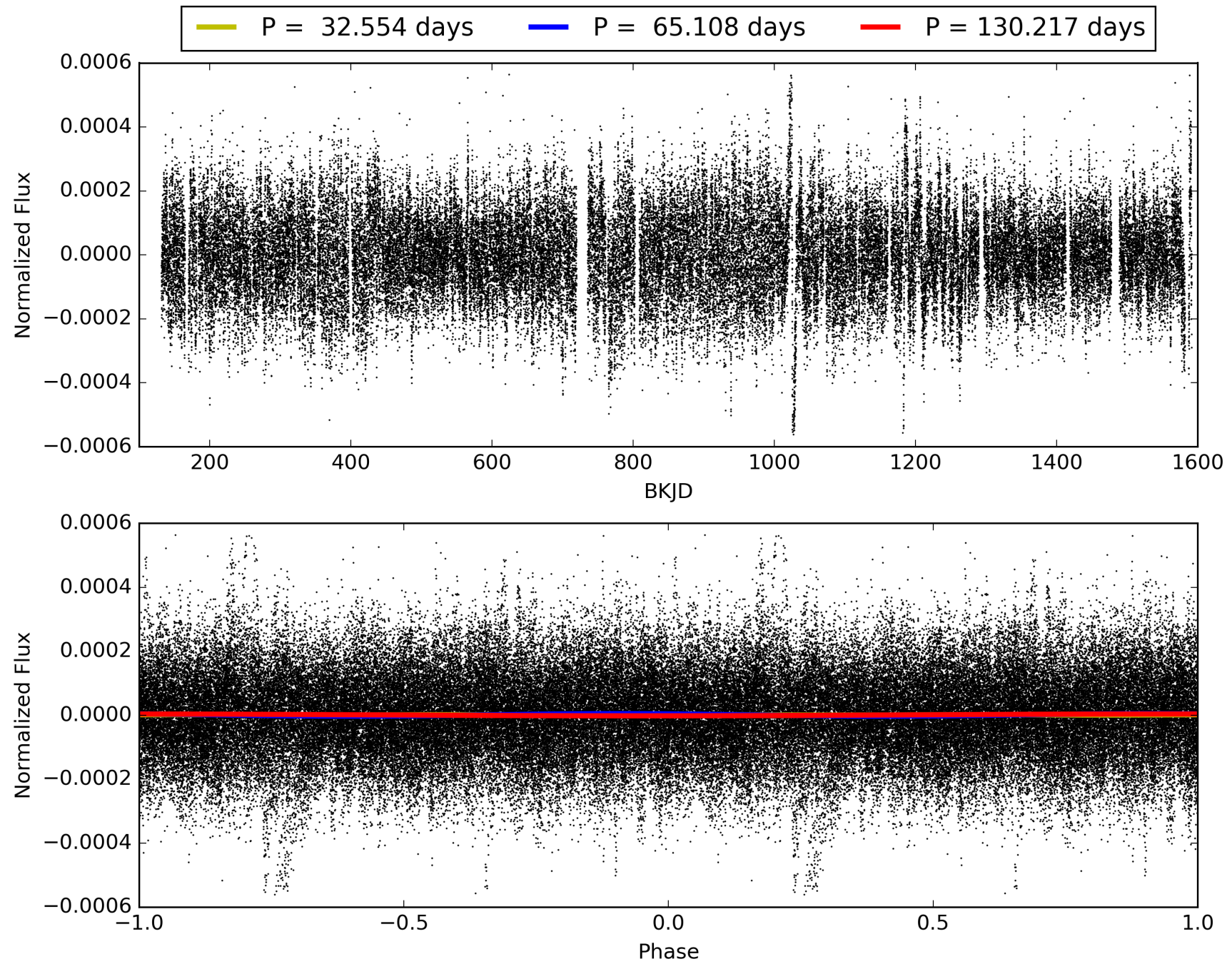
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 05:30:38 Z

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

# TCE 006715221-08, PDC Light Curves

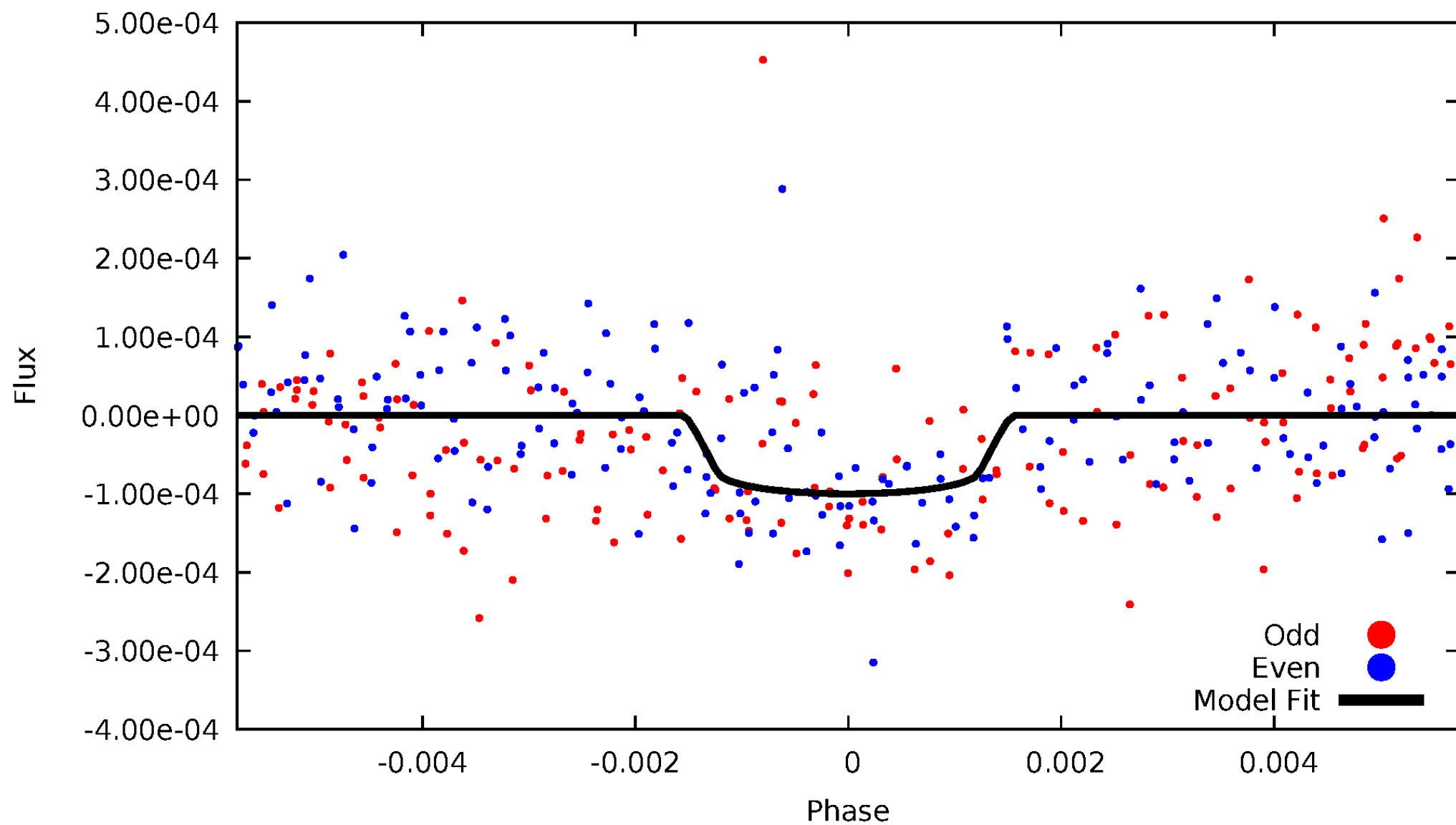


TCE 006715221-08



# DV Odd/Even

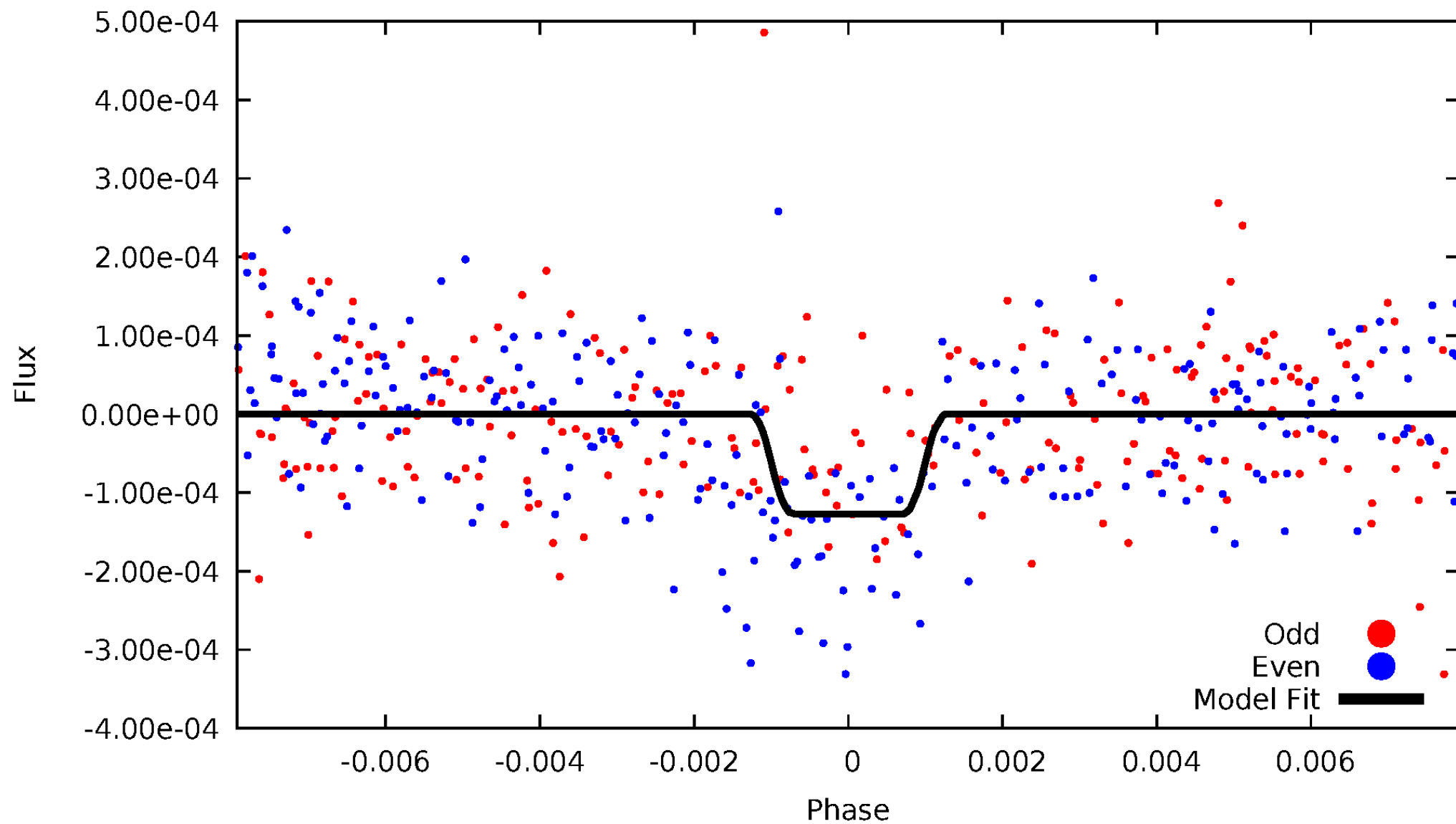
TCE 006715221-08





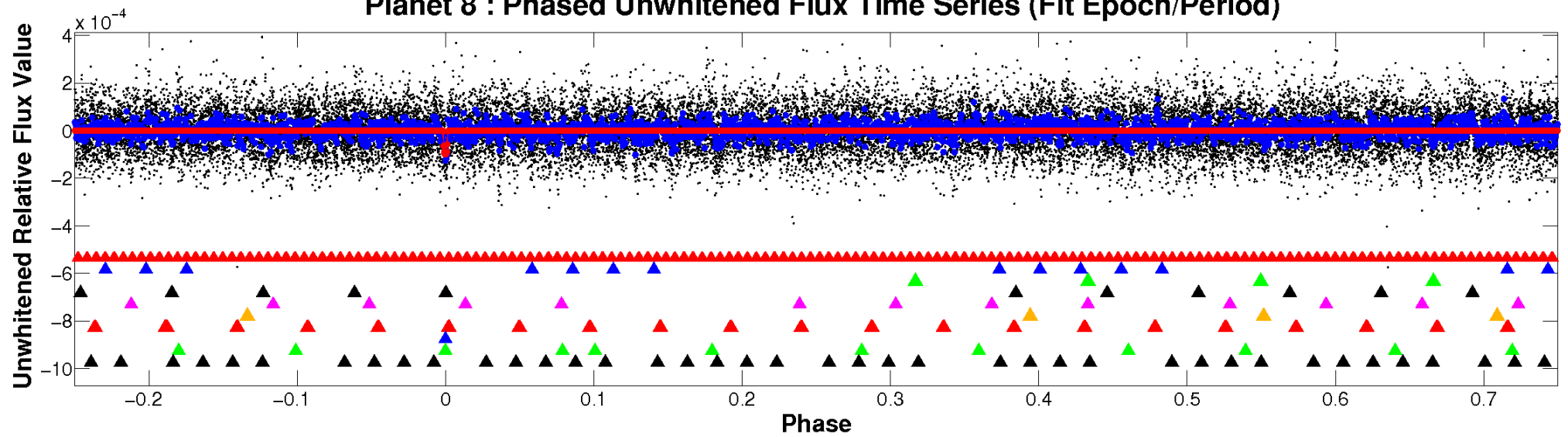
# ALT Odd/Even

TCE 006715221-08

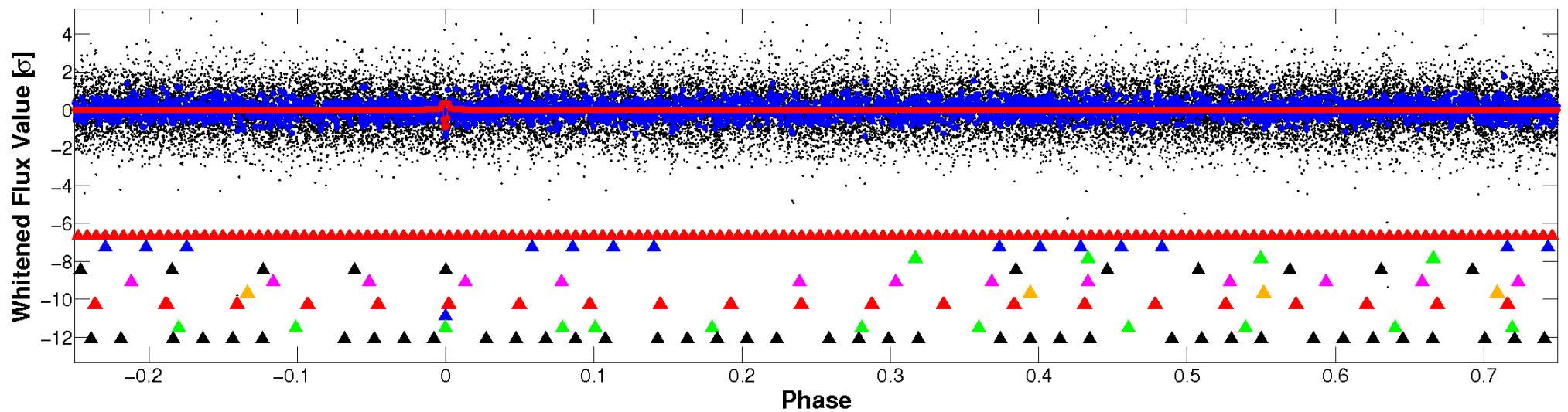


# Non-Whitened Vs. Whitened Light Curve

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



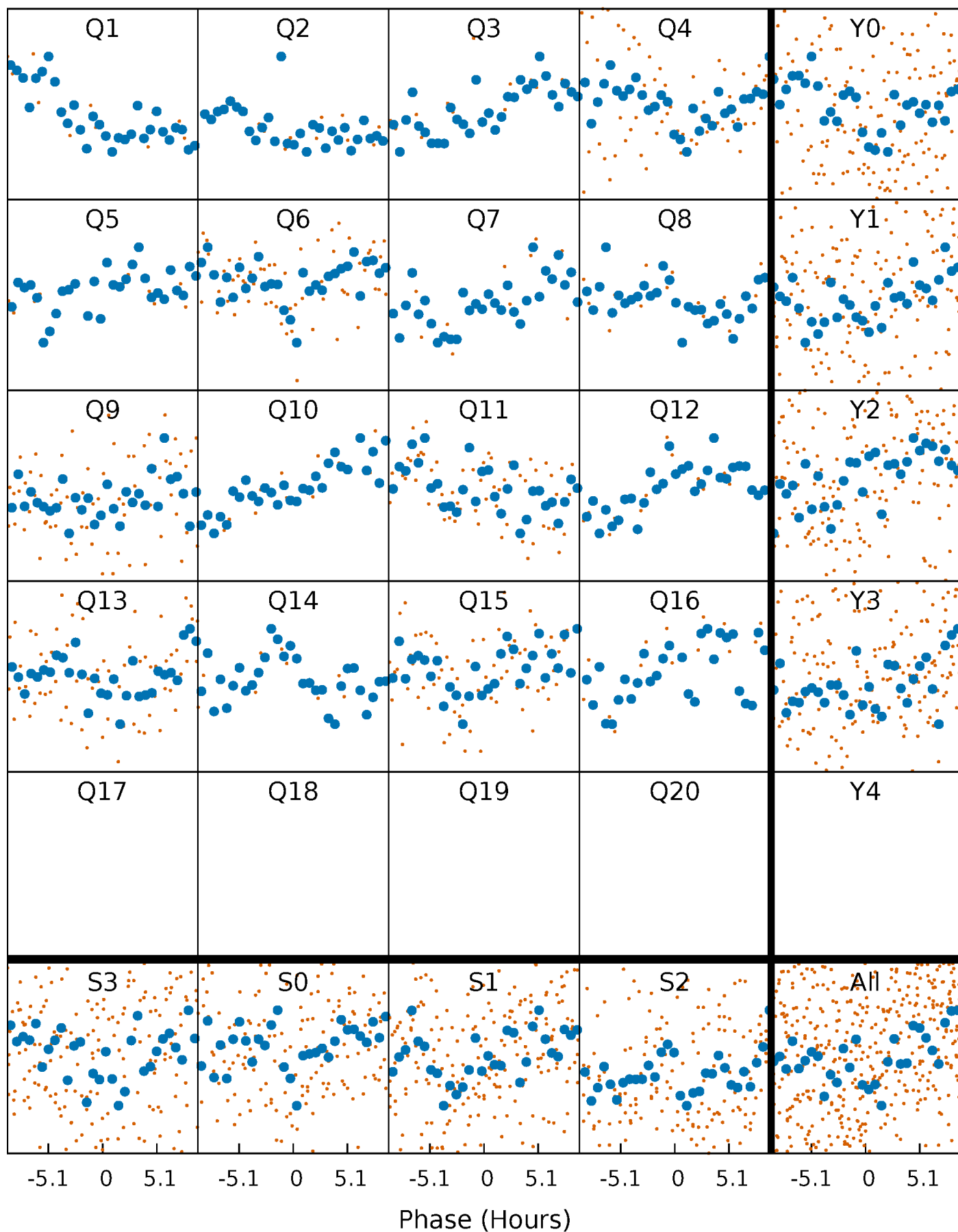
## Planet 8 : Phased Whitened Flux Time Series (Fit Epoch/Period)





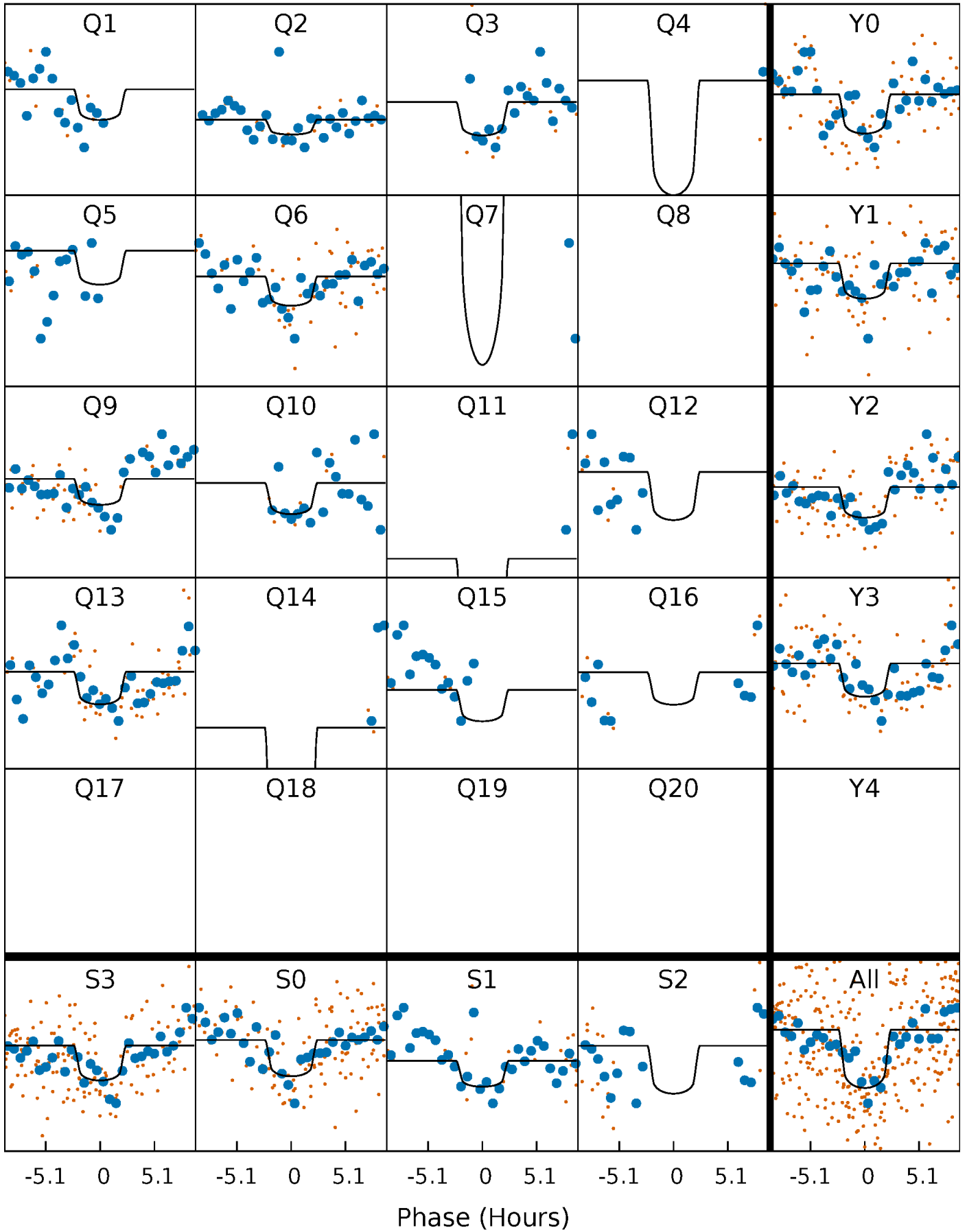
# PDC Quarter-Phased Transit Curves

TCE 006715221-08 P= 65.108276 Days  $T_0=163.640682$  (BKJD)



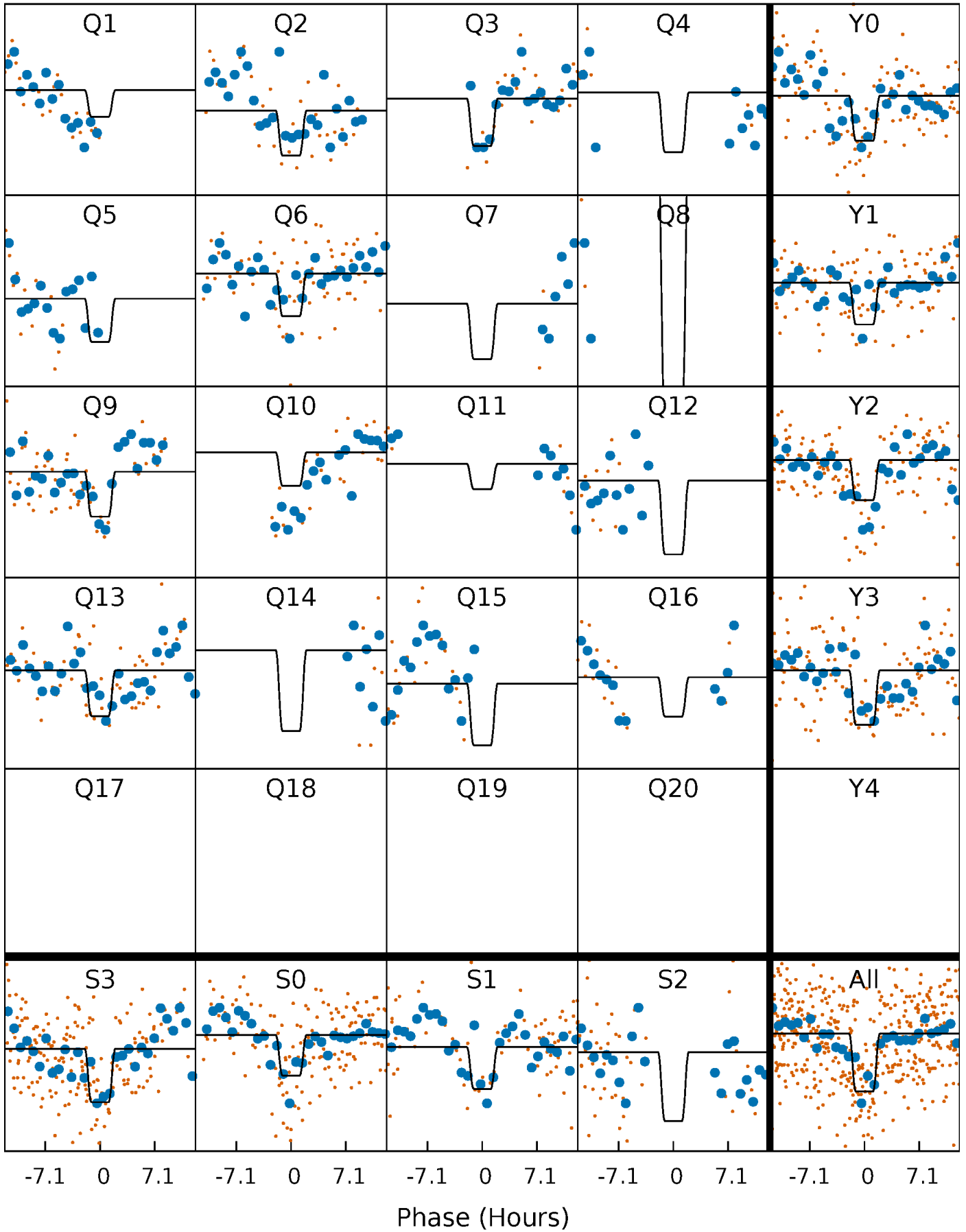
# DV Quarter-Phased Transit Curves

TCE 006715221-08   P= 65.108276 Days    $T_0=163.640682$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

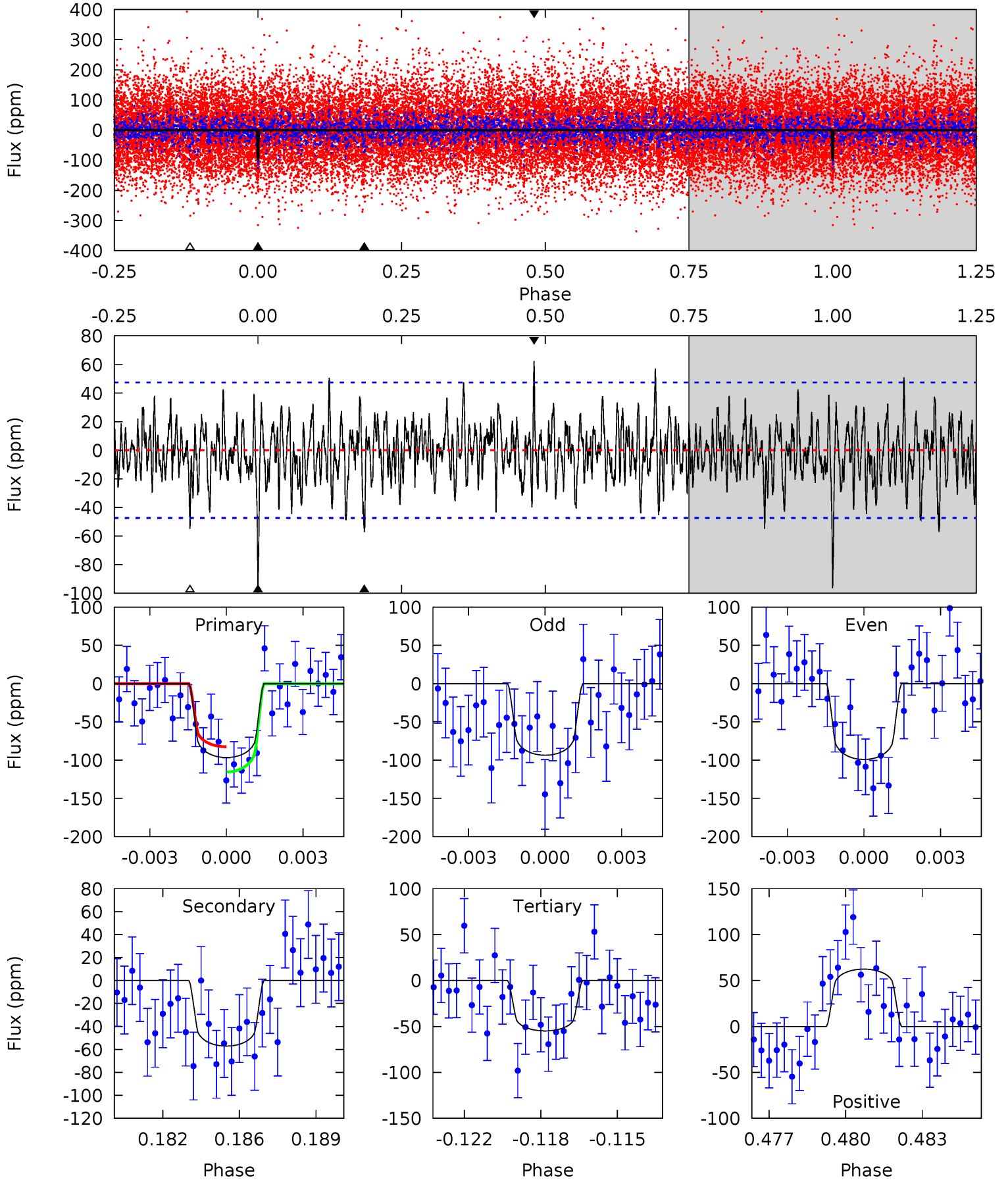
TCE 006715221-08 P= 65.108036 Days  $T_0=163.659774$  (BKJD)



# DV Model-Shift Uniqueness Test

006715221-08, P = 65.108276 Days, E = 98.532406 Days

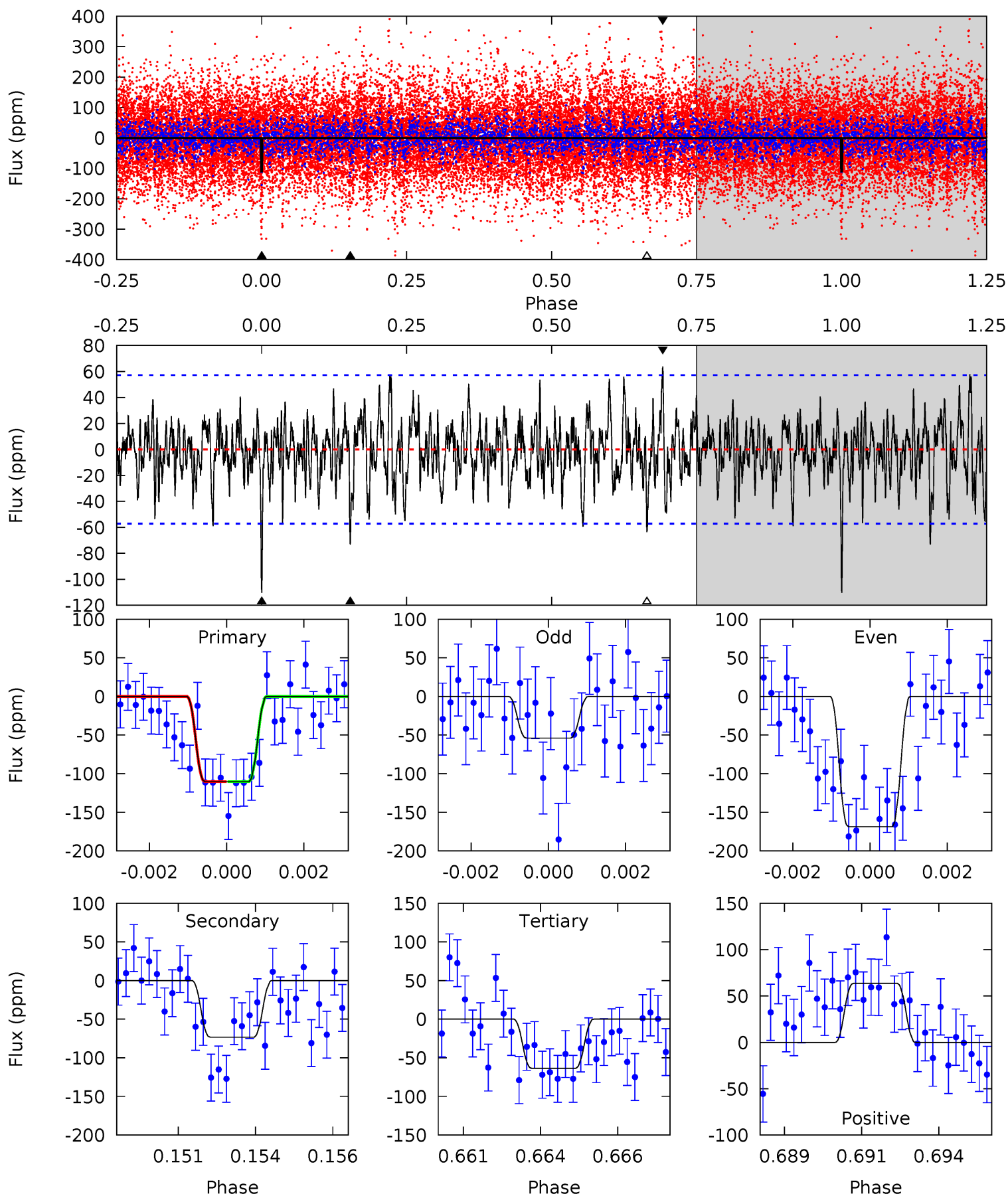
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.7	6.32	6.07	6.90	5.24	2.95	1.83	4.62	3.79	0.25	-0.58	0.31	0.94	0.39	1.81



# Alt Model-Shift Uniqueness Test

006715221-08, P = 65.108036 Days, E = 98.551738 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	6.79	5.89	5.89	5.29	3.03	1.82	4.32	4.31	0.90	0.89	5.27	1.07	0.37	0.01



### Stellar Parameters For KIC 006715221

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6839^{+163}_{-225}$	$4.003^{+0.221}_{-0.119}$	$-0.060^{+0.250}_{-0.300}$	$2.020^{+0.396}_{-0.594}$	$1.497^{+0.172}_{-0.257}$	$0.256^{+0.303}_{-0.104}$
	+2%/-3%	+6%/-3%	+417%/-500%	+20%/-29%	+11%/-17%	+118%/-41%
Source	PHO1	FLK73	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 006715221-08 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-57 \pm 9$	$2.19^{+1.02}_{-1.04}$	$984^{+58}_{-71}$	$5805^{+2434}_{-921}$	$844^{+2273}_{-454}$
Alt.	$-73 \pm 11$	$2.39^{+1.26}_{-1.14}$	$984^{+61}_{-73}$	$5899^{+2541}_{-955}$	$935^{+2394}_{-533}$

$T_{\text{max}}$  = 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

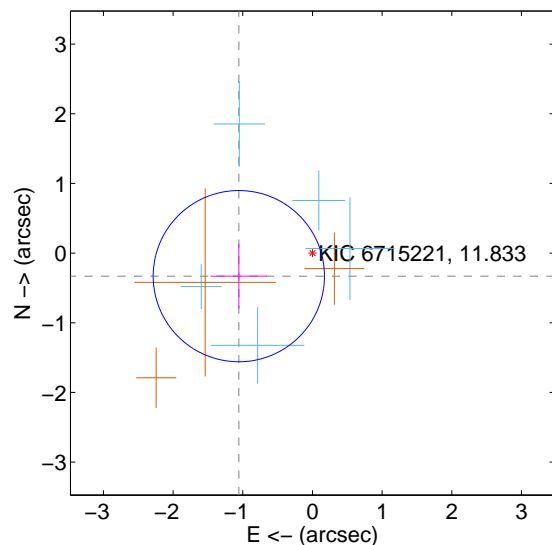
Supplemental centroid analysis for 006715221-08. **Kepler magnitude: 11.83.** Transit SNR 7.81

There are 5 quarters with good PRF difference image offsets

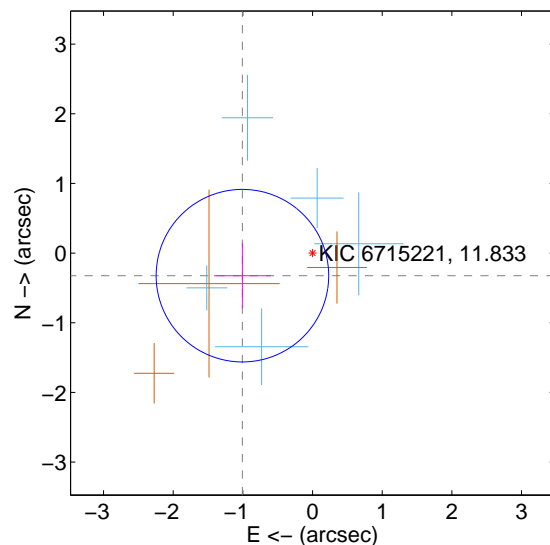
The direct PRF centroid is offset from the target star catalog position by about 0.06 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.107 \pm 0.410$	2.70	$1.057 \pm 0.404$	$-0.331 \pm 0.464$
PRF-fit source offset from KIC position	$1.057 \pm 0.413$	2.56	$1.006 \pm 0.407$	$-0.324 \pm 0.465$
photometric centroid source offset	$0.51 \pm 0.79$	0.65	$0.51 \pm 0.80$	$0.06 \pm 0.70$

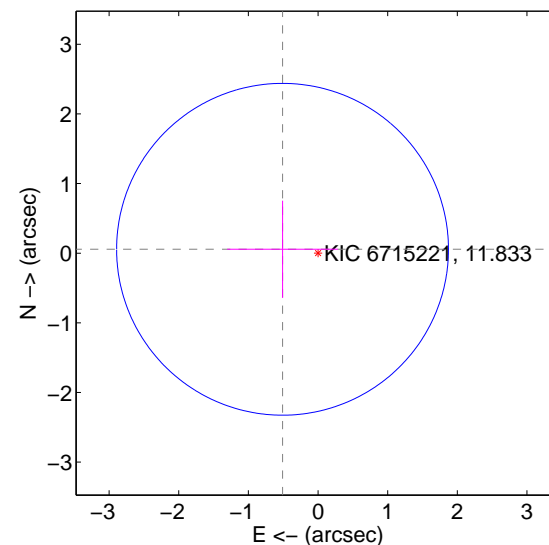
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



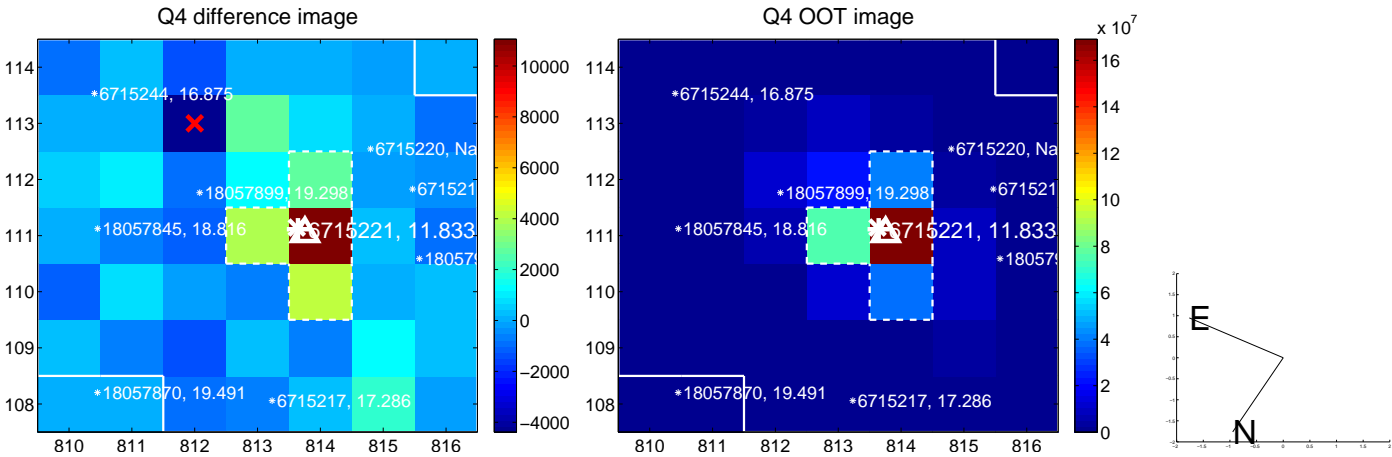
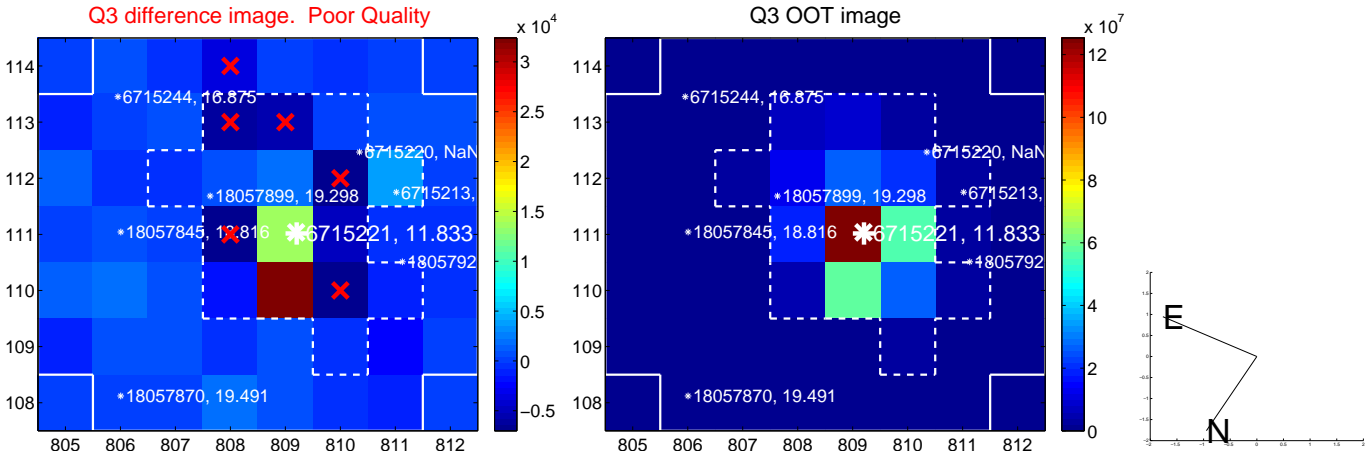
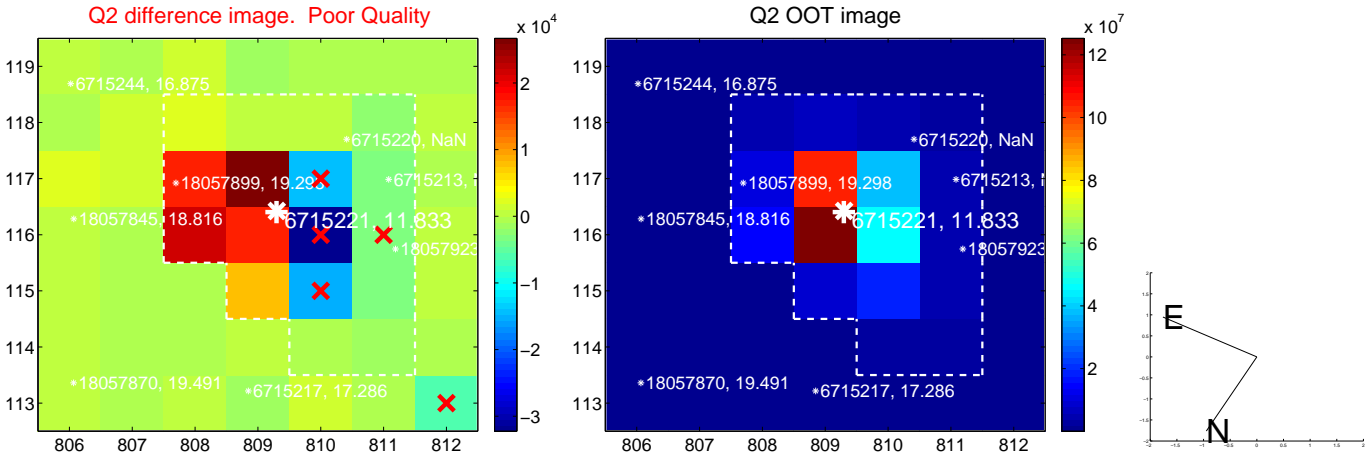
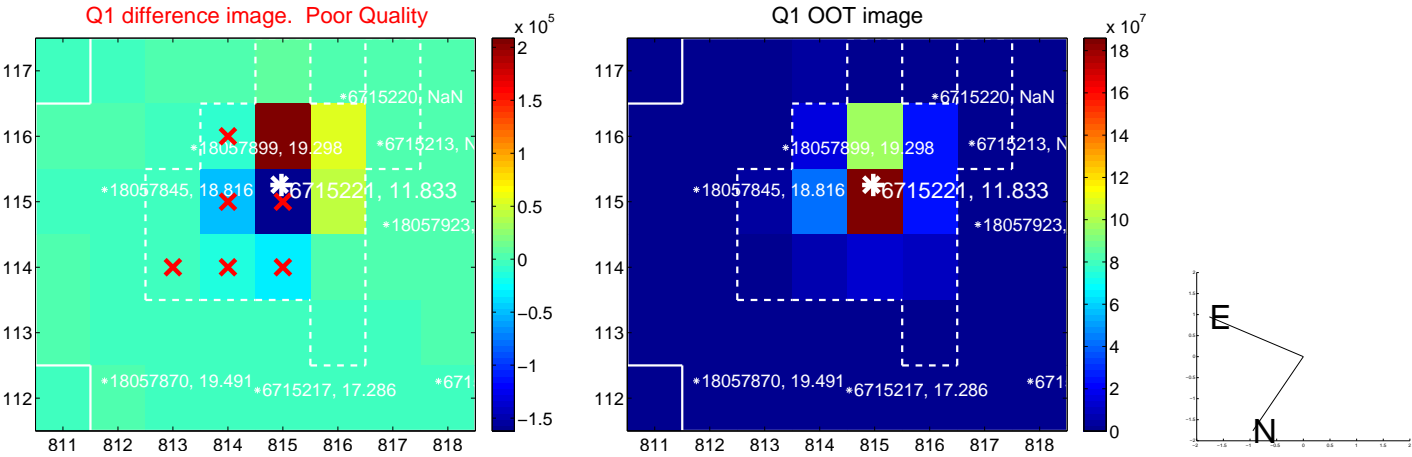
offset from photometric centroids



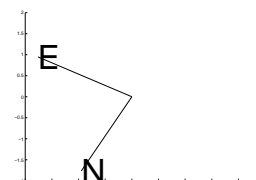
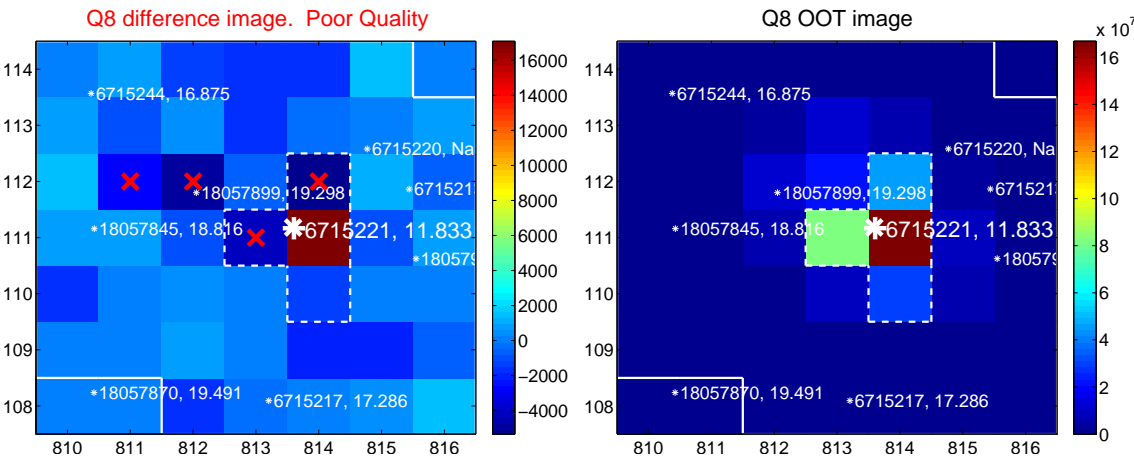
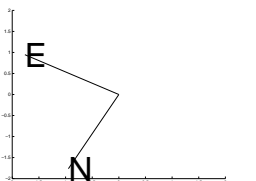
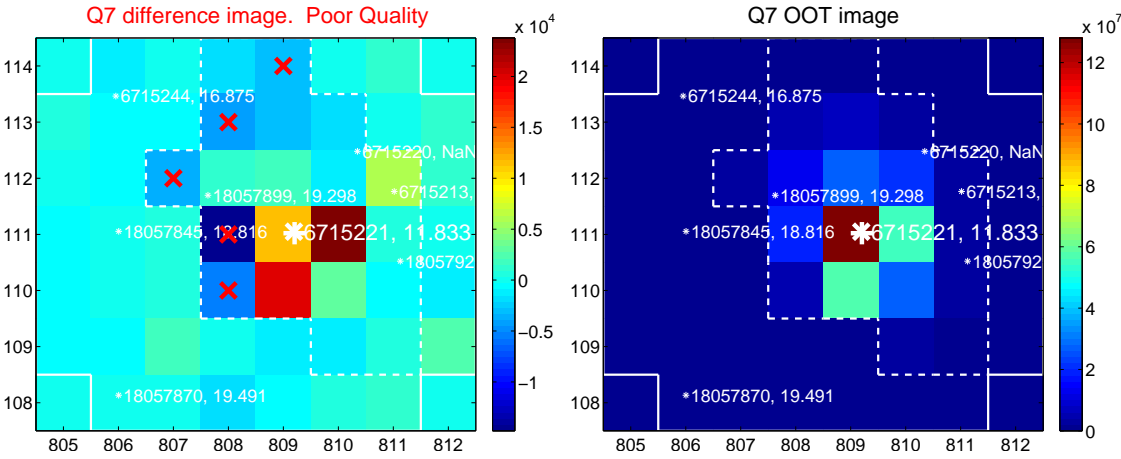
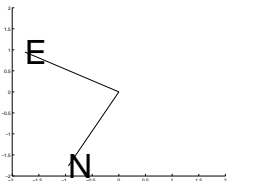
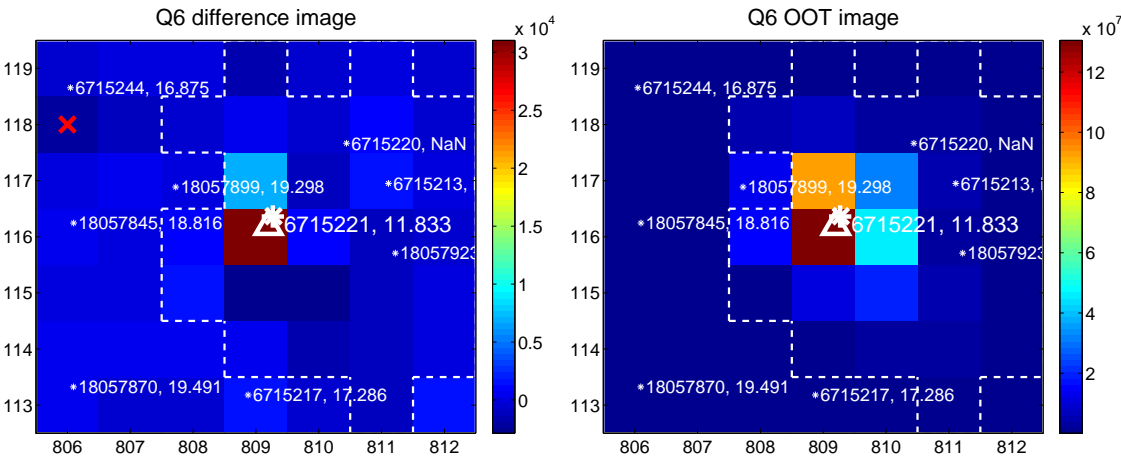
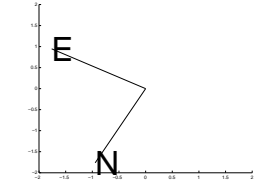
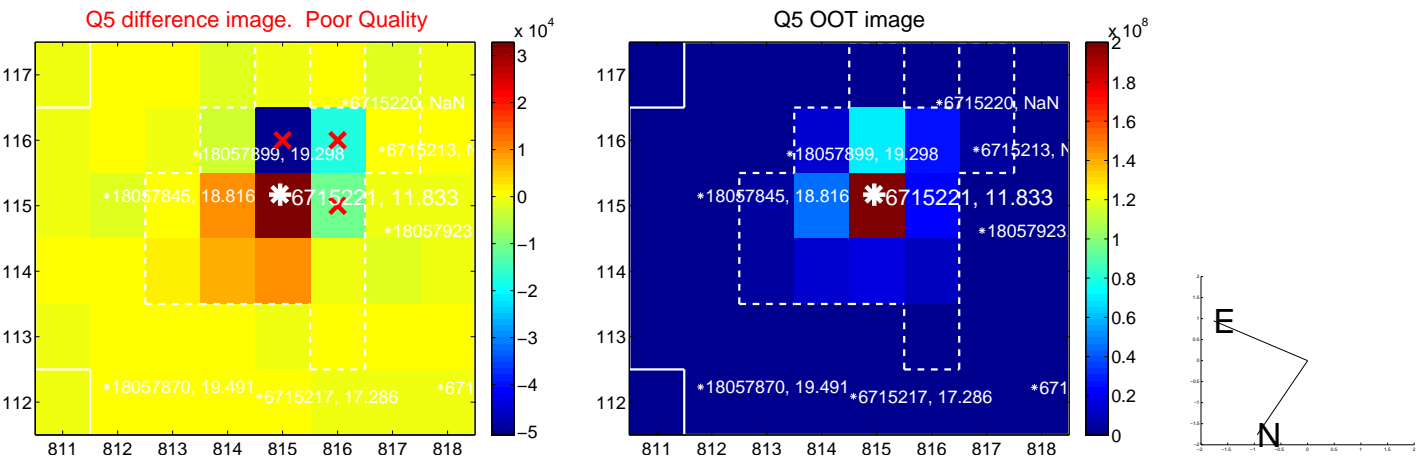
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



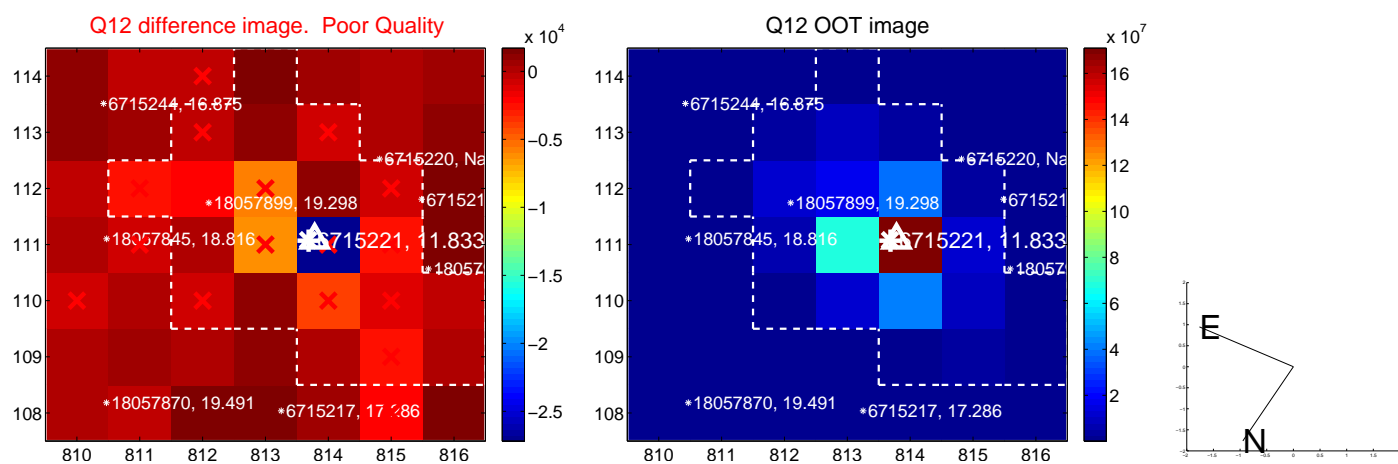
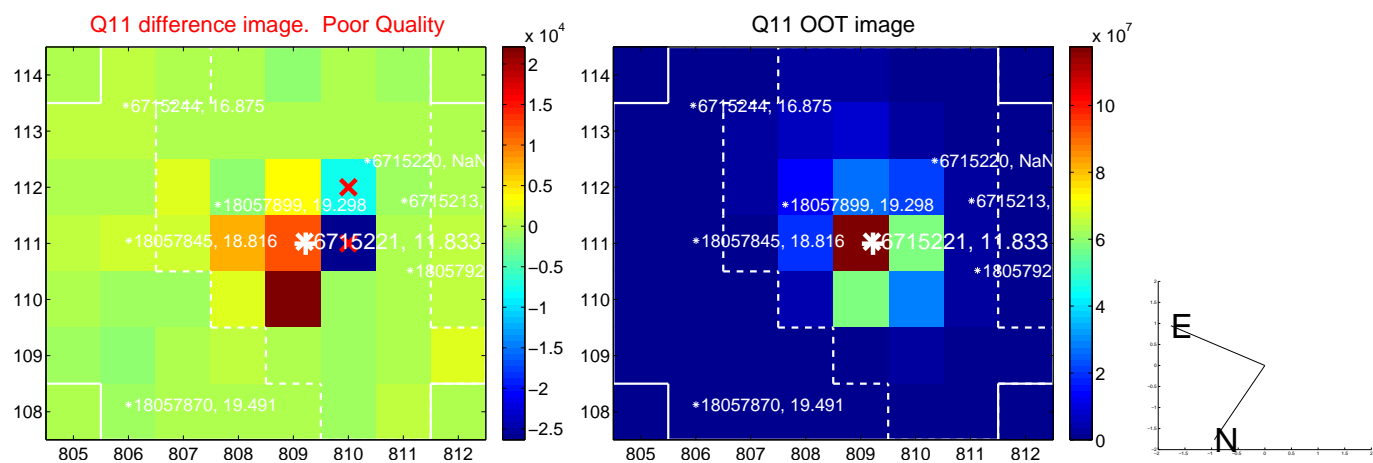
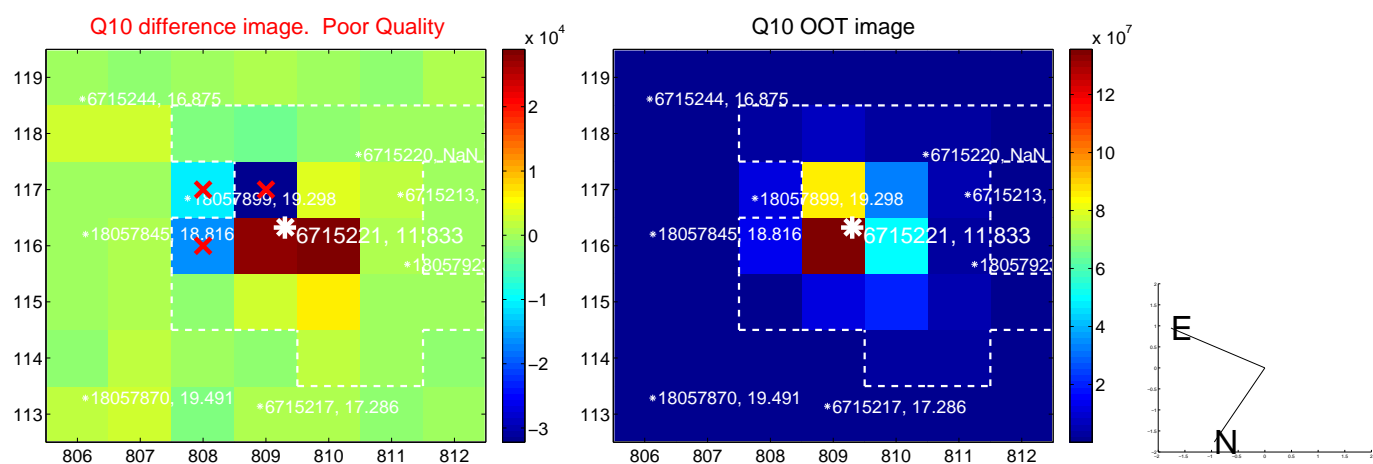
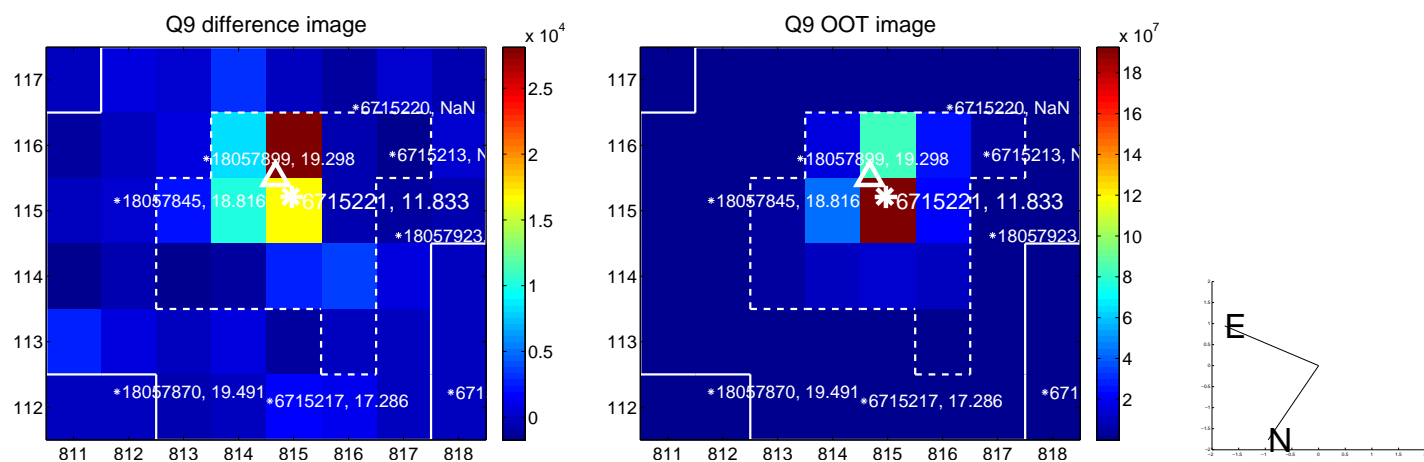
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



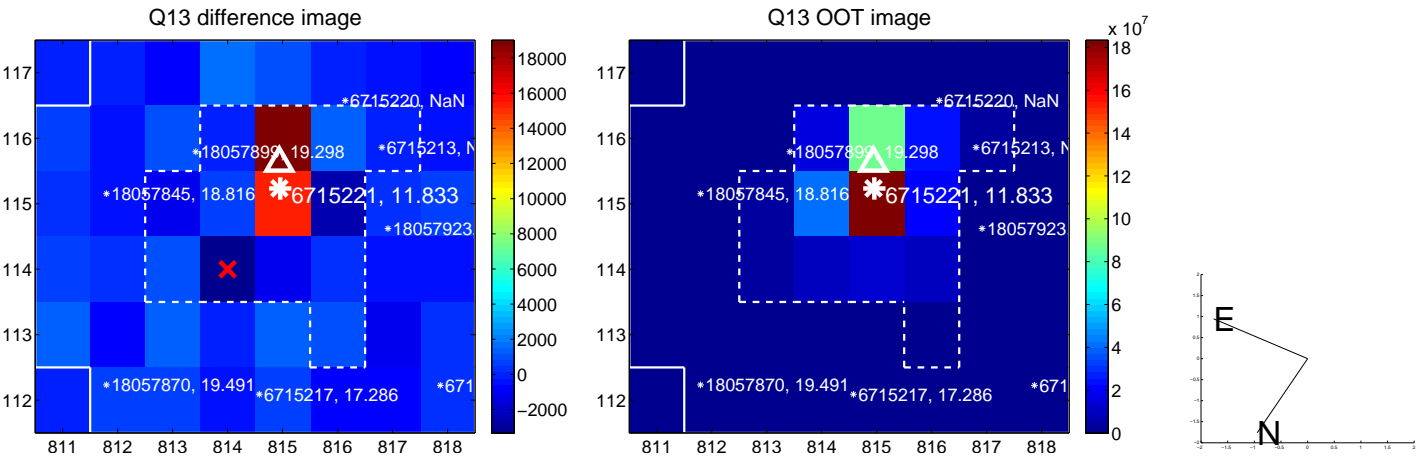
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



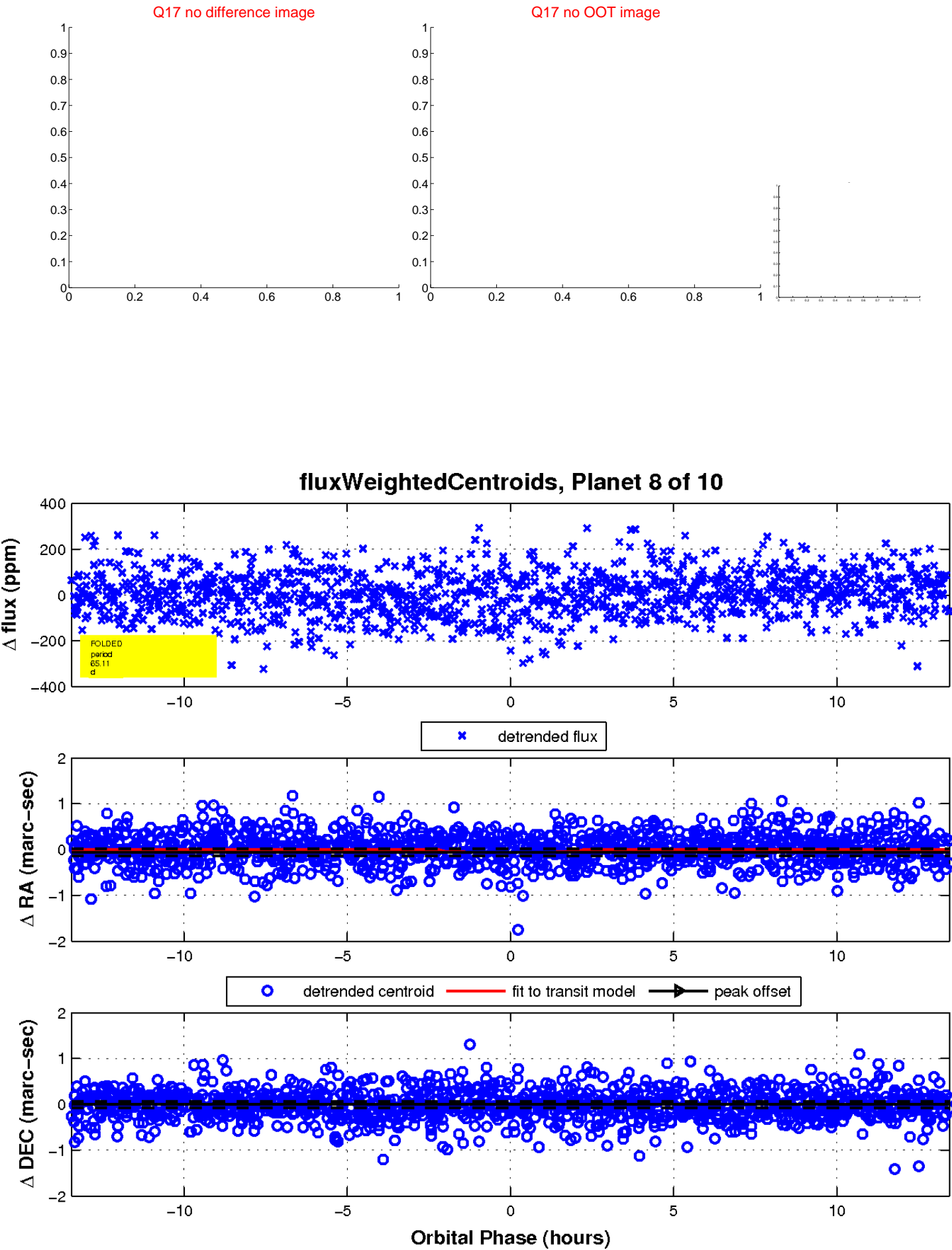
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

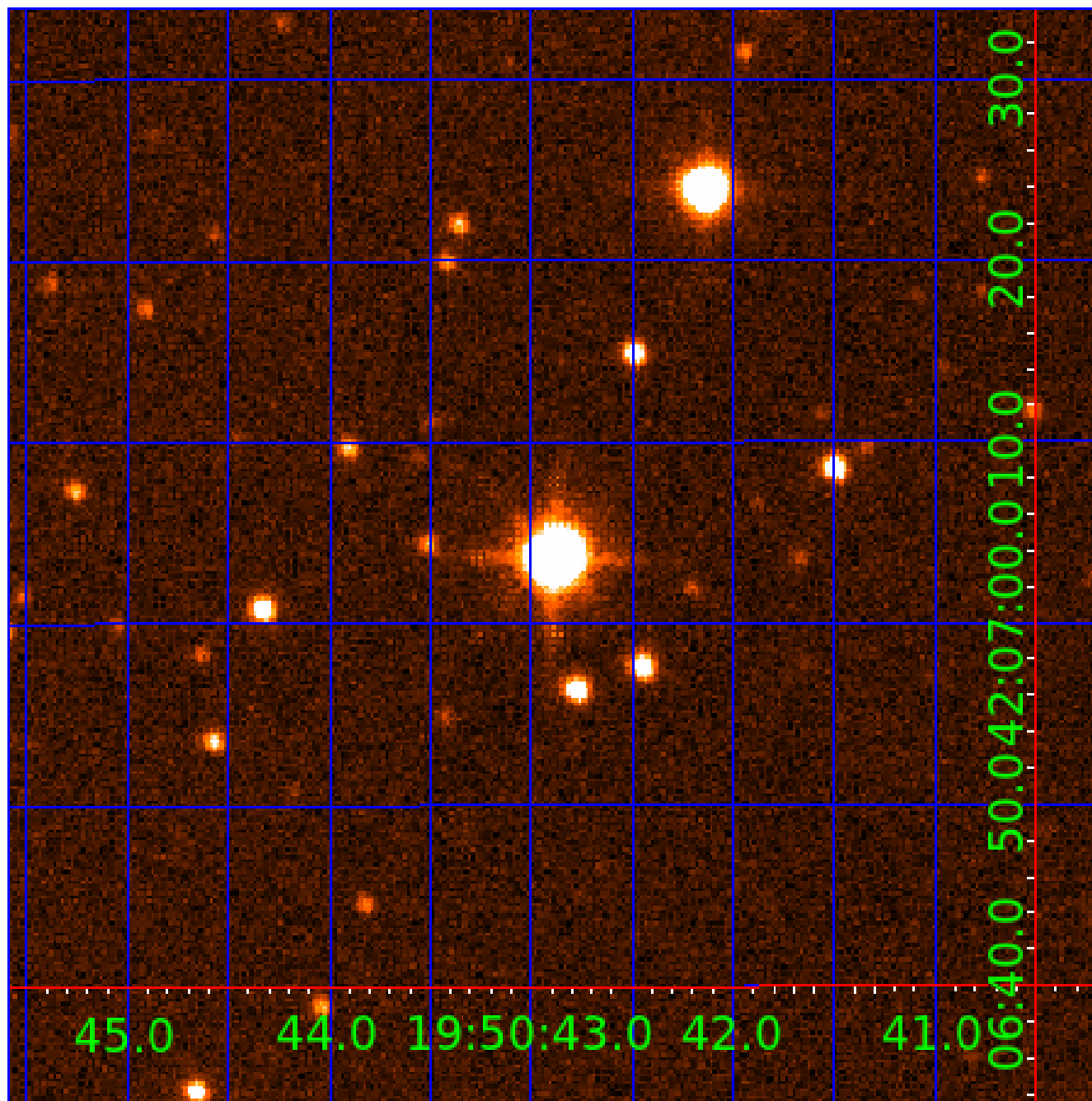


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



## KIC 006715221

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006715221-01	OBS	No	1.984918	132.459230	13.3	8.776	9.2	7.4	2.02	6839	0.74	6389.14
006715221-02	OBS	No	107.919359	152.278773	91.7	14.832	10.4	6.2	2.02	6839	2.12	31.02
006715221-03	OBS	No	333.120273	314.487390	168.1	20.190	10.4	7.6	2.02	6839	2.83	6.90
006715221-04	OBS	No	134.224992	188.680406	137.8	3.578	8.3	7.4	2.02	6839	2.67	23.19
006715221-05	OBS	No	107.107514	214.951810	149.8	13.238	8.0	8.9	2.02	6839	3.25	31.33
006715221-06	OBS	No	400.898244	254.418073	152.5	9.827	8.0	7.8	2.02	6839	2.91	5.39
006715221-07	OBS	No	34.101777	151.432052	96.7	3.723	7.7	8.0	2.02	6839	2.32	144.12
006715221-08	OBS	No	65.108276	163.640682	100.0	4.485	7.8	7.8	2.02	6839	2.31	60.85
006715221-09	OBS	No	118.508397	233.886395	144.3	11.967	8.1	7.9	2.02	6839	2.70	27.38
006715221-10	OBS	No	36.316557	165.427888	72.2	12.670	8.2	7.1	2.02	6839	2.27	132.52

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006715221-01	OBS	FP	0.00	1	0	0	0	LPP_DV
006715221-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
006715221-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
006715221-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
006715221-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_ALT—CENT_FEW_MEAS
006715221-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—MOD_NONUNIQ_ALT
006715221-07	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—MOD_NONUNIQ_ALT
006715221-08	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—MOD_NONUNIQ_ALT
006715221-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_MEAS
006715221-10	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_UNRESOLVED_OFFSET

**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.

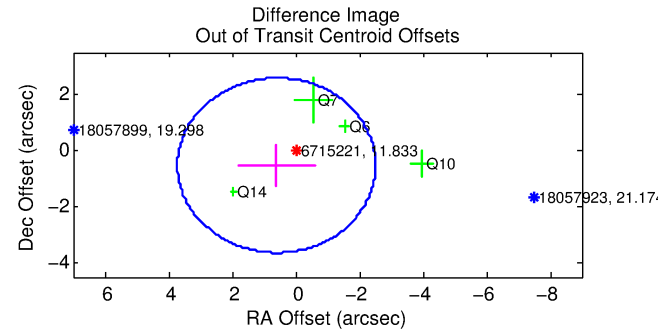
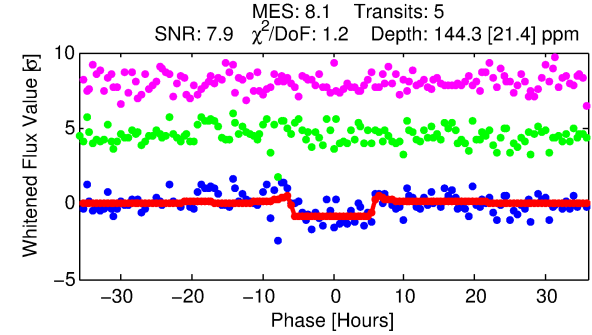
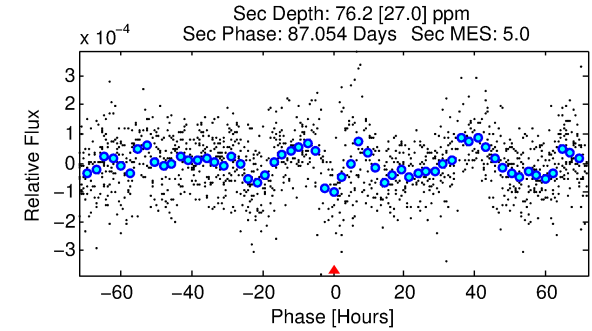
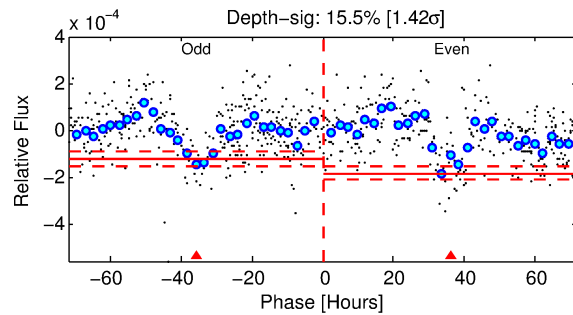
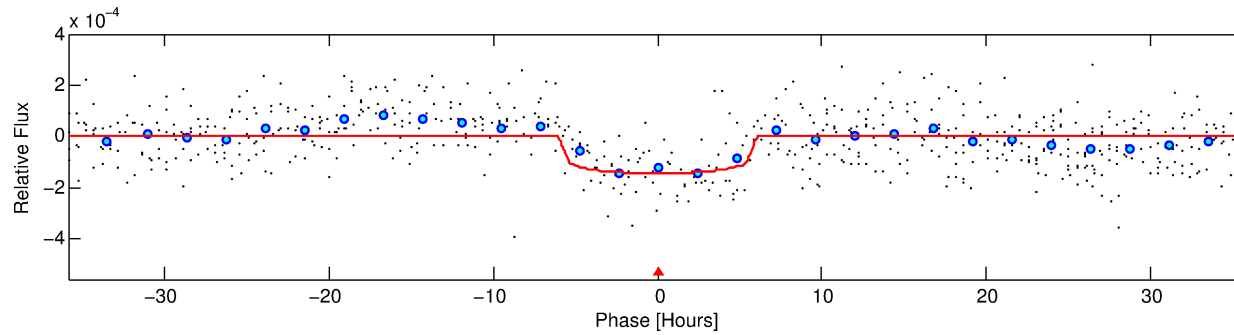
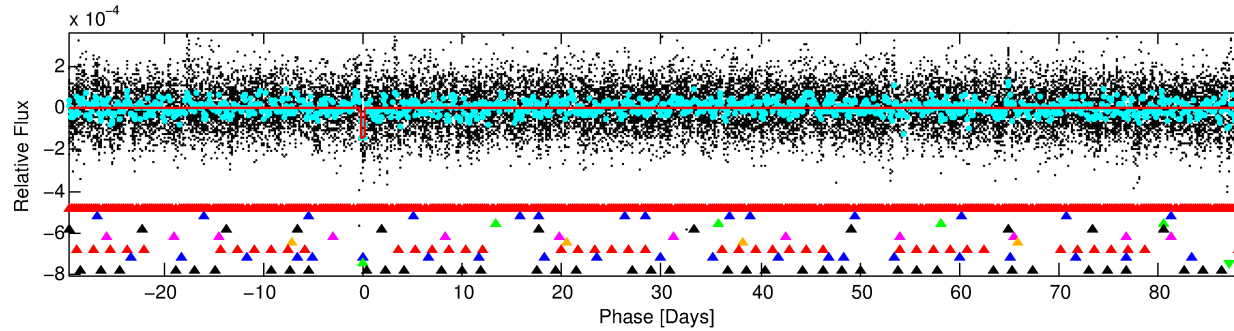
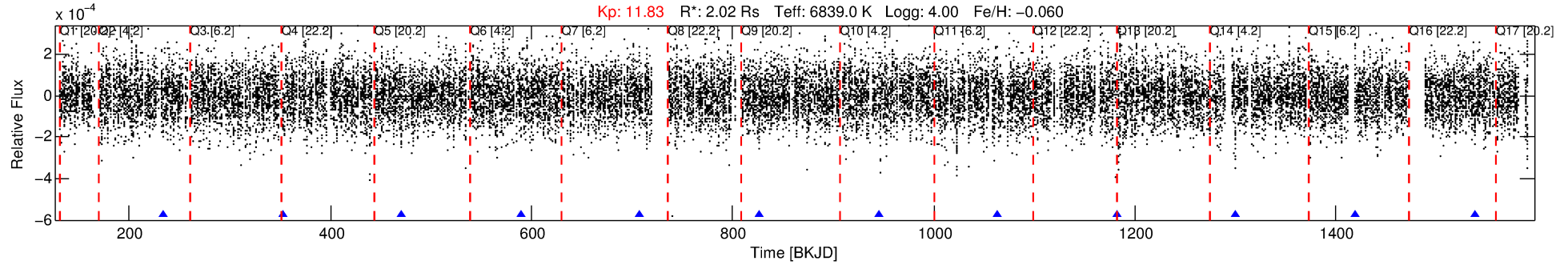
Ephemeris Match Information For 006715221-09

No Significant Match Found



# DV One-Page Summary

KIC: 6715221 Candidate: 9 of 10 Period: 118.508 d



## DV Fit Results:

Period = 118.50840 [0.00263] d  
Epoch = 233.8864 [0.0163] BKJD  
Rp/R\* = 0.0123 [0.0032]  
a/R\* = 44.68 [64.16]  
b = 0.82 [0.57]  
Seff = 27.38 [11.32]  
Teq = 583 [60] K  
Rp = 2.70 [1.06] Re  
a = 0.5405 [0.1401] AU  
Ag = 1679.50 [1246.38] [1.35 $\sigma$ ]  
Teffp = 5773 [929] K [5.57 $\sigma$ ]

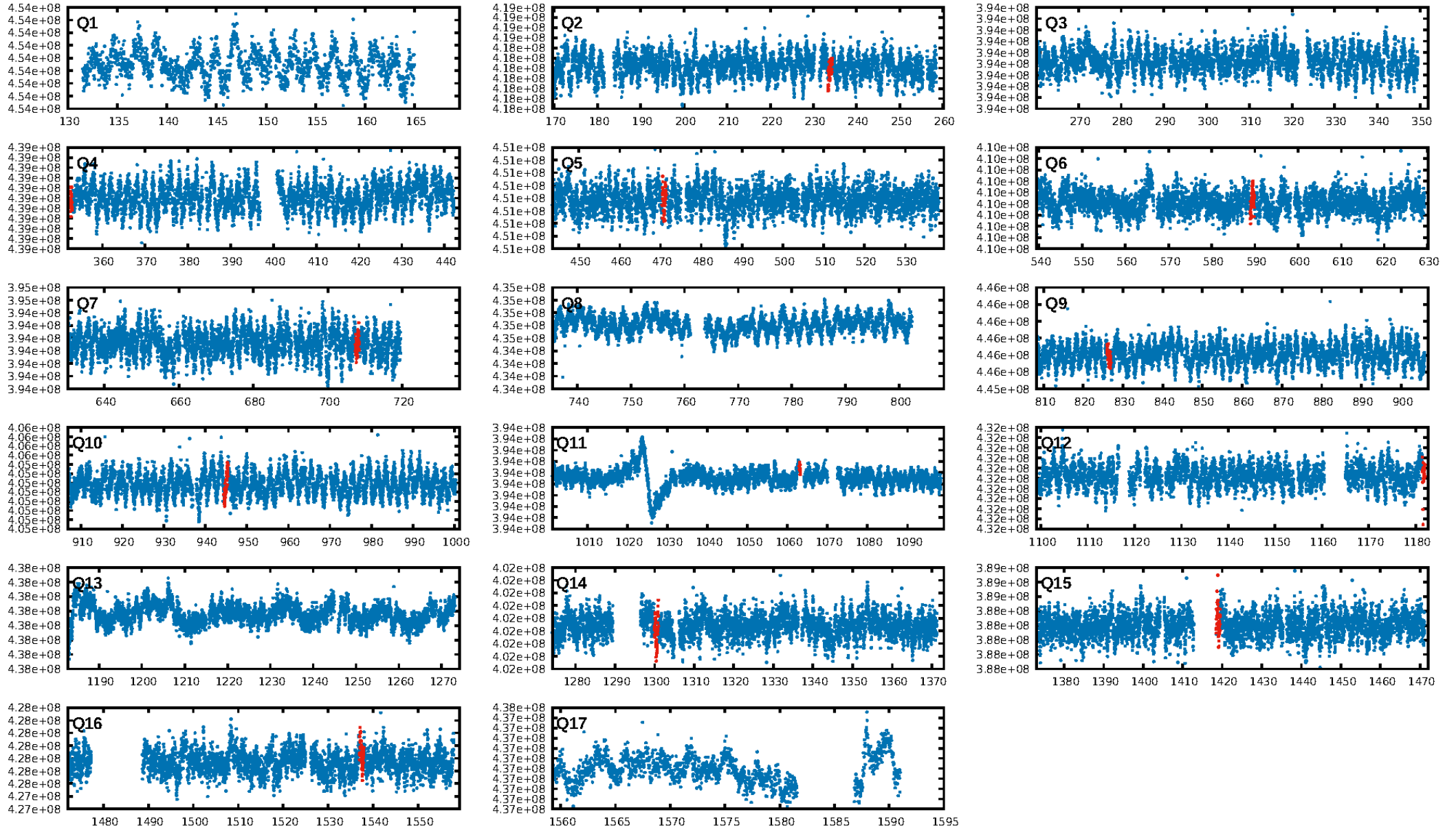
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [13.34 $\sigma$ ]  
LongPeriod-sig: 100.0% [30.20 $\sigma$ ]  
ModelChiSquare2-sig: 0.5%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 2.17e-08**  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: 0.2522  
Centroid-sig: 13.2%  
Centroid-so: 0.706 arcsec [1.13 $\sigma$ ]  
OotOffset-rm: 0.800 arcsec [0.77 $\sigma$ ]  
KicOffset-rm: 0.800 arcsec [0.75 $\sigma$ ]  
OotOffset-st: 3/1/0/0 [4]  
KicOffset-st: 3/1/0/0 [4]  
DiffImageQuality-fgm: 0.50 [2/4]  
DiffImageOverlap-fno: 0.00 [0/8]

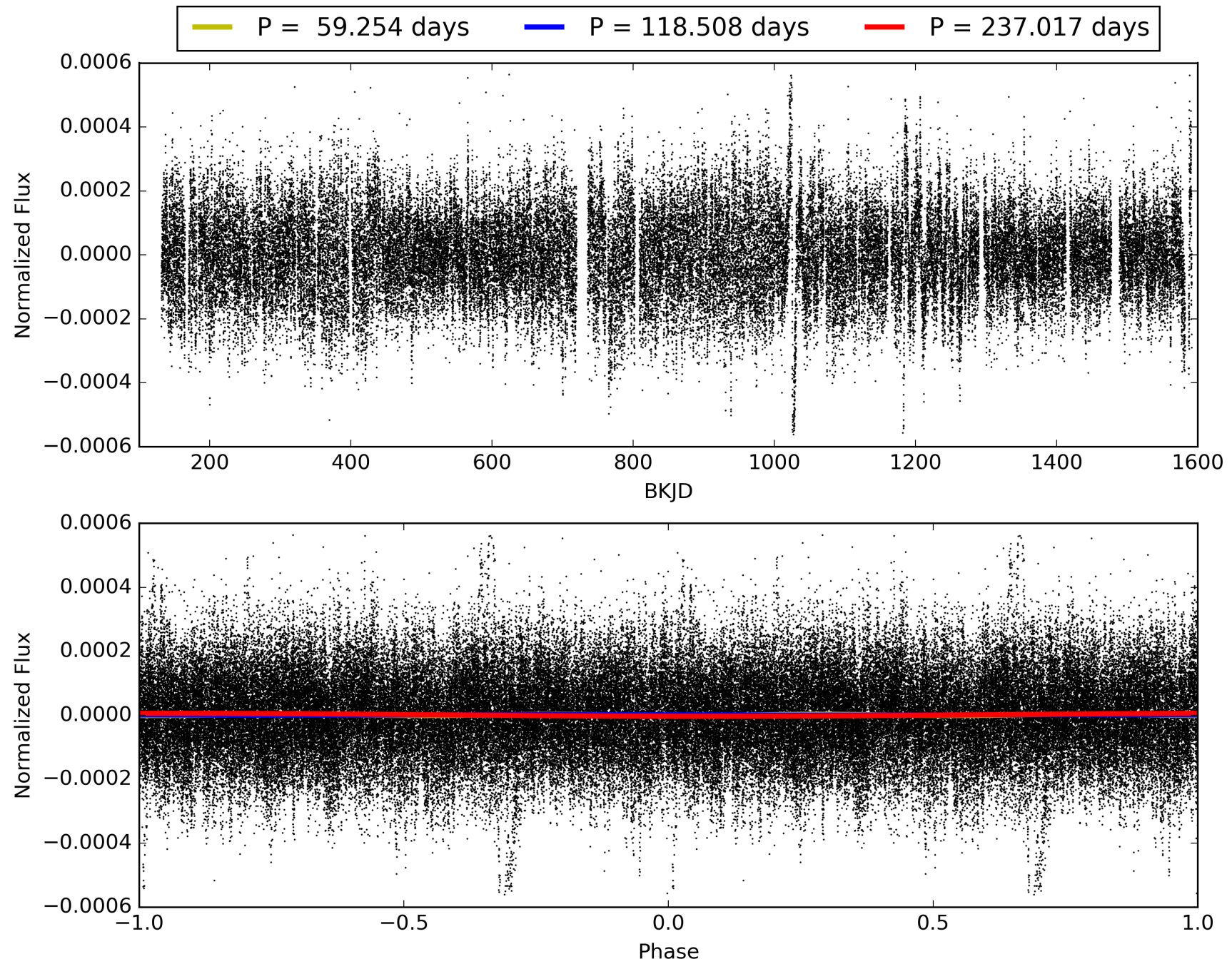
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 05:30:42 Z

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

# TCE 006715221-09, PDC Light Curves

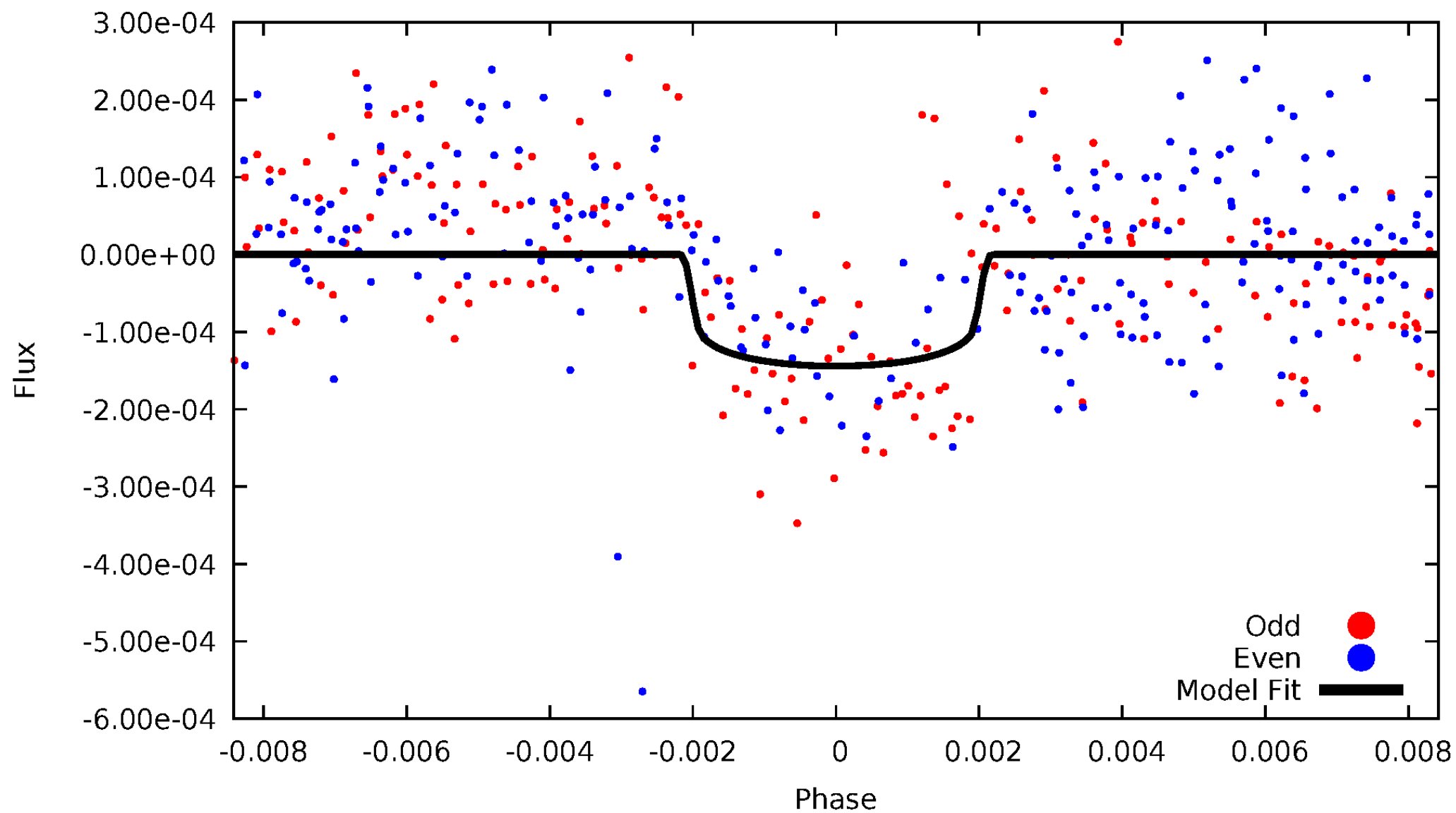


TCE 006715221-09



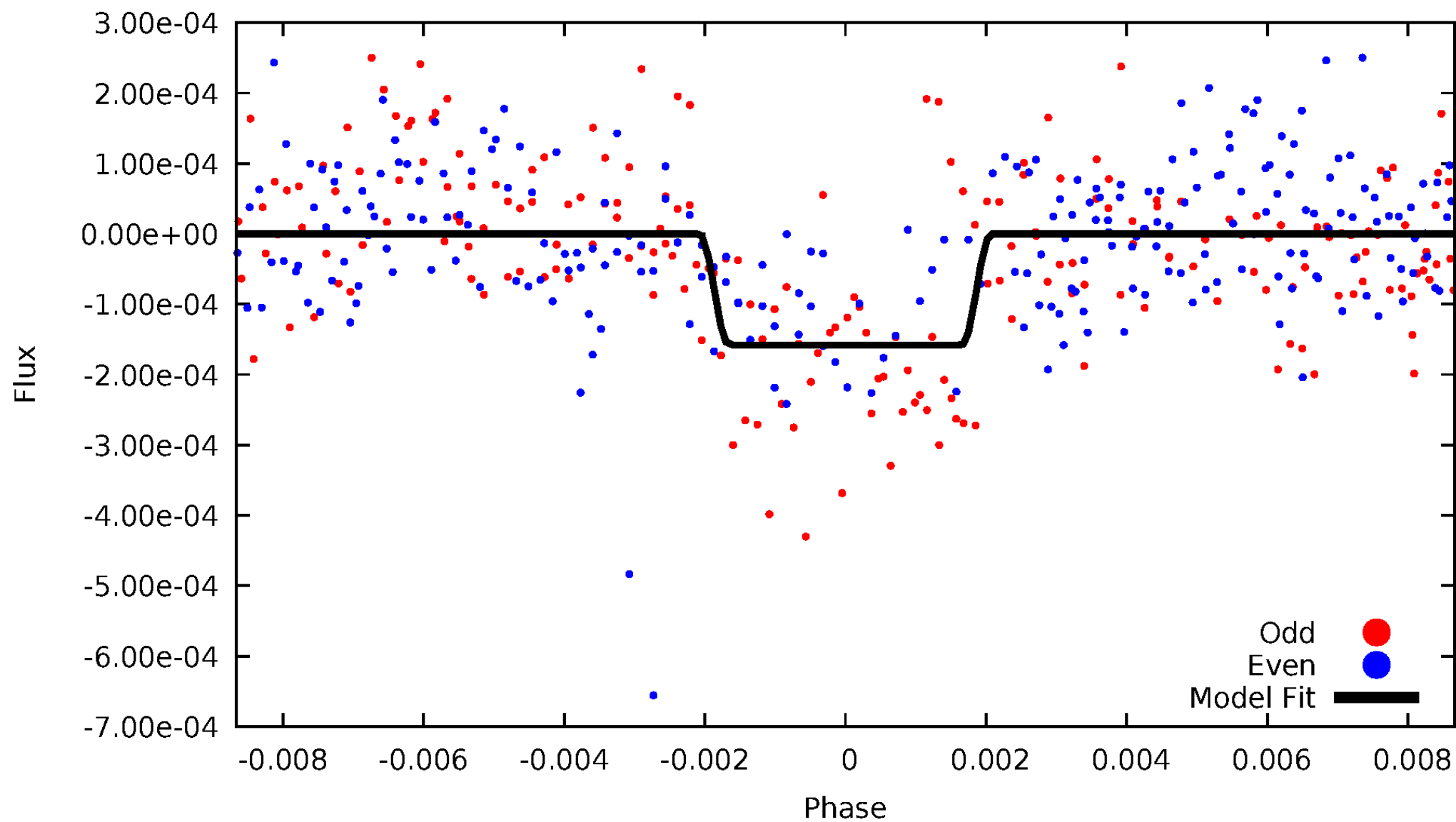
# DV Odd/Even

TCE 006715221-09



# ALT Odd/Even

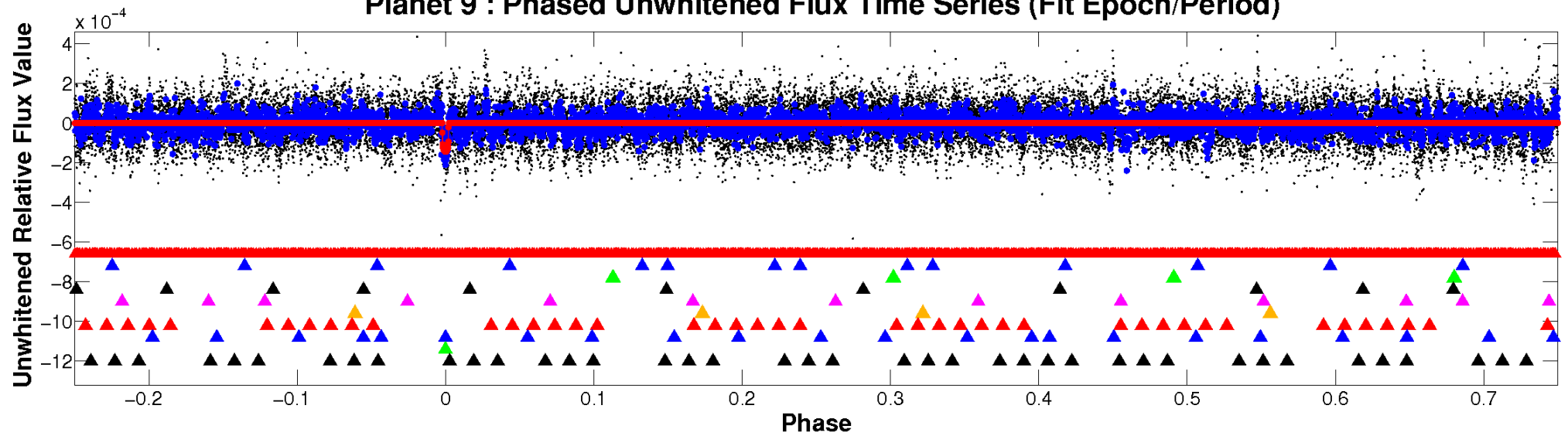
TCE 006715221-09



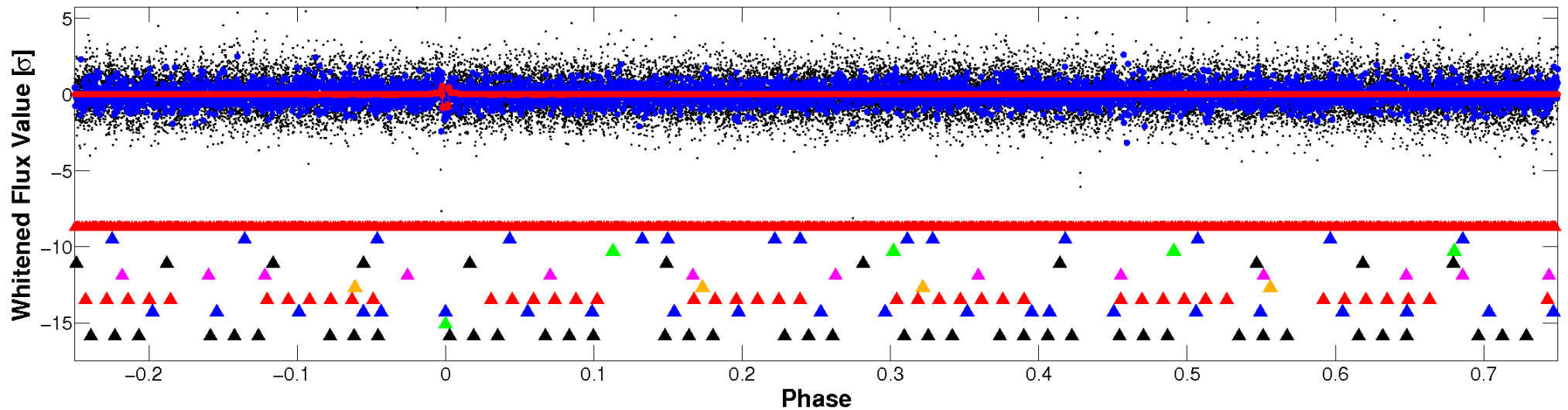


# Non-Whitened Vs. Whitened Light Curve

## Planet 9 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

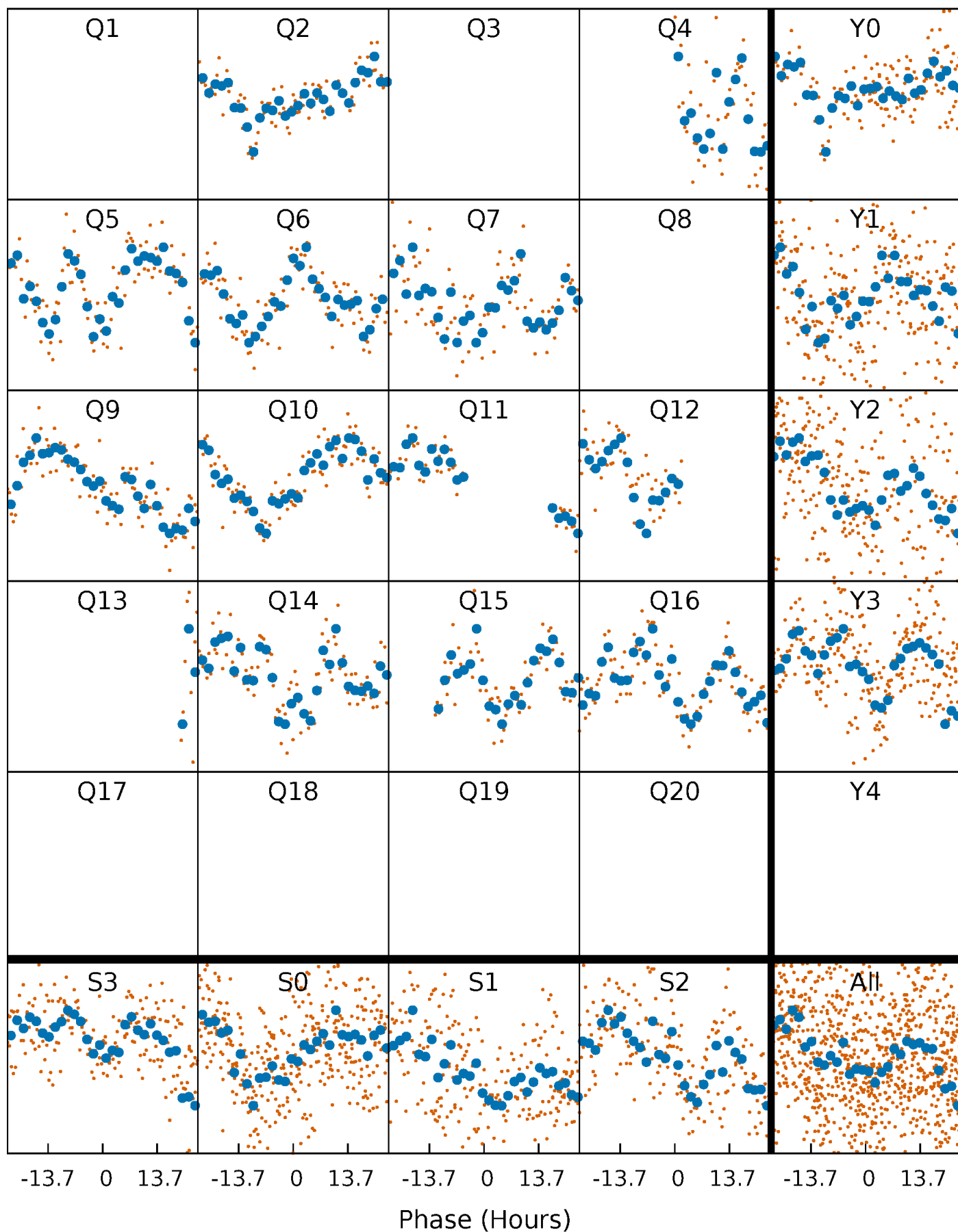


## Planet 9 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

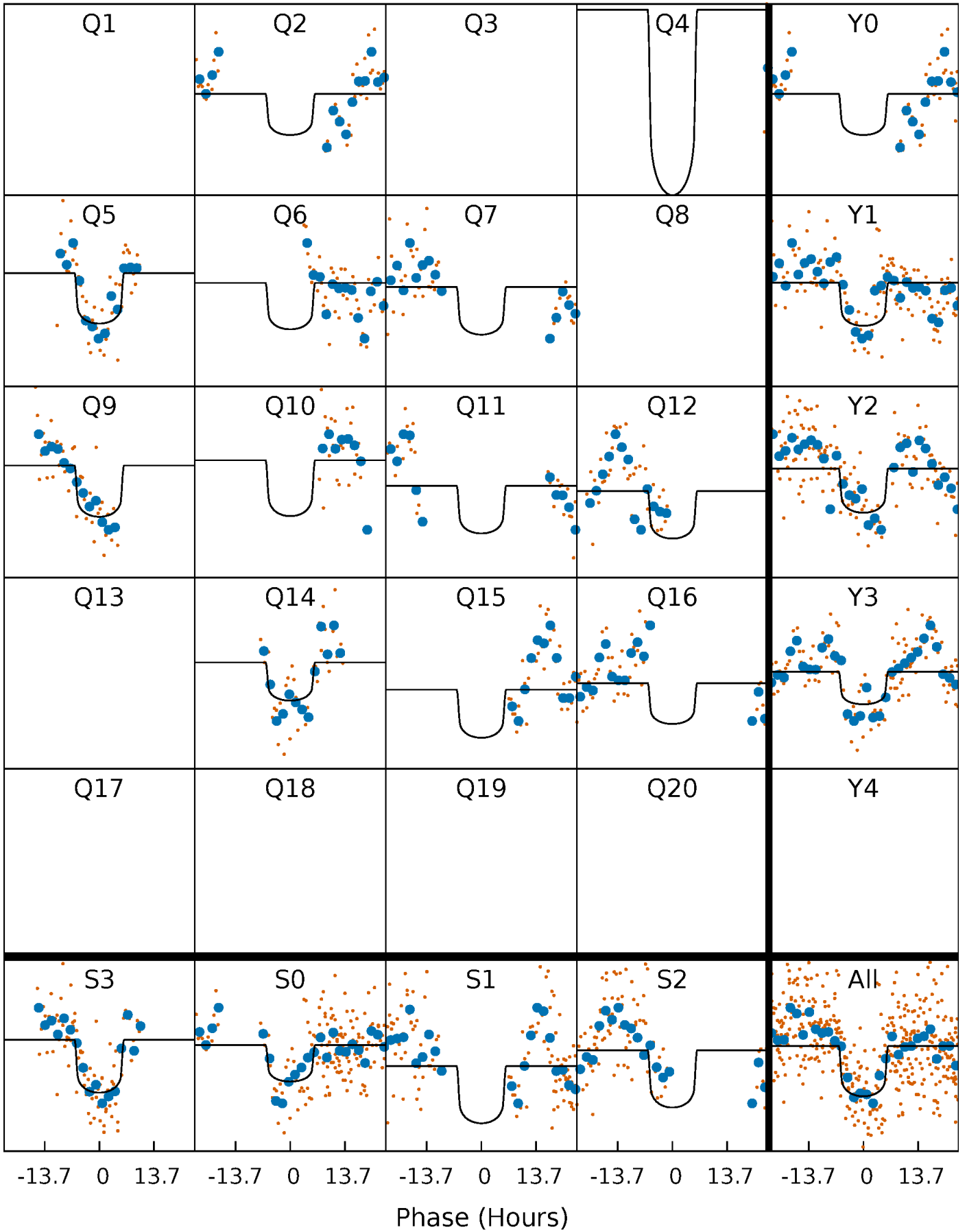
TCE 006715221-09   P=118.508397 Days    $T_0=233.886395$  (BKJD)





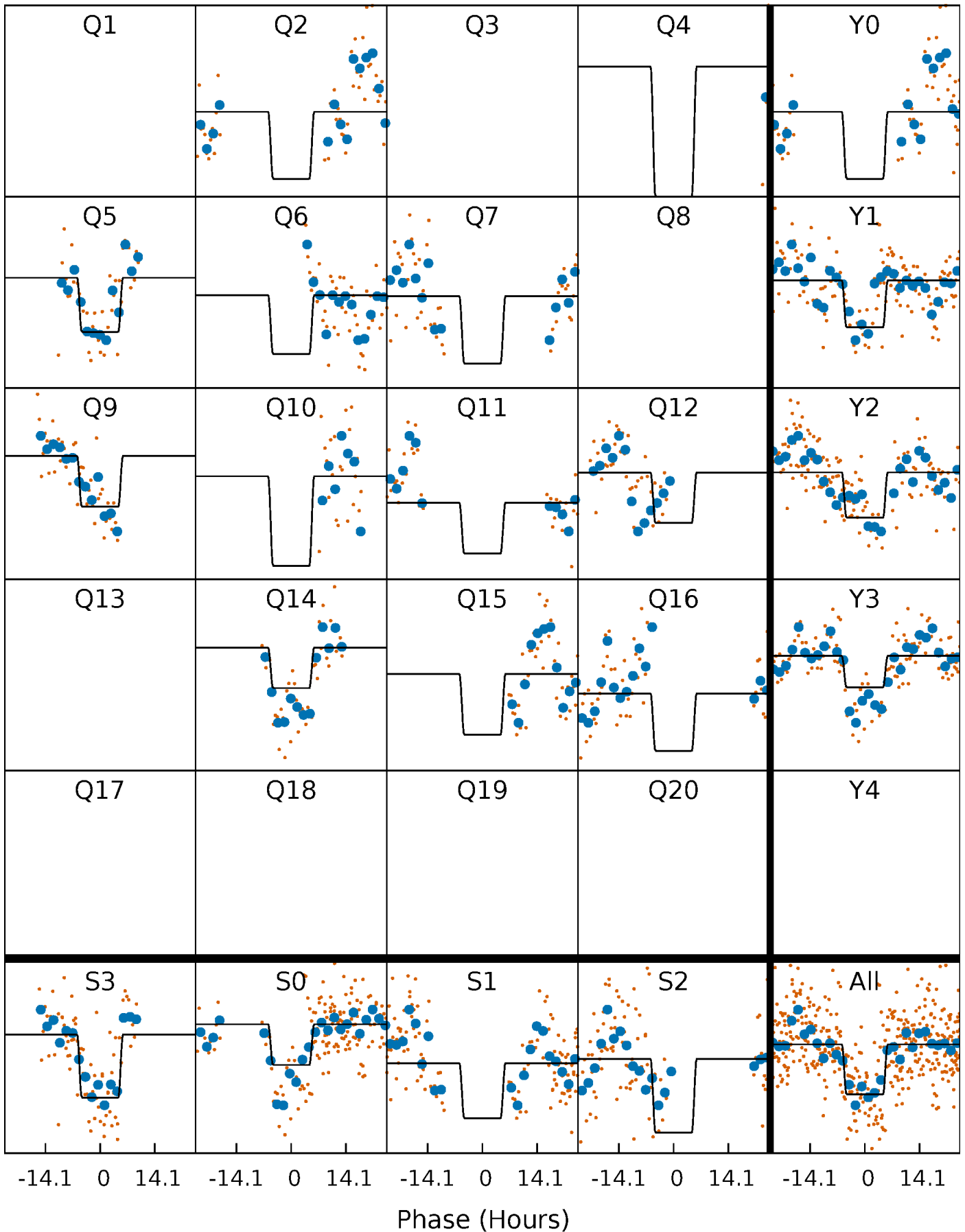
# DV Quarter-Phased Transit Curves

TCE 006715221-09   P=118.508397 Days    $T_0=233.886395$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

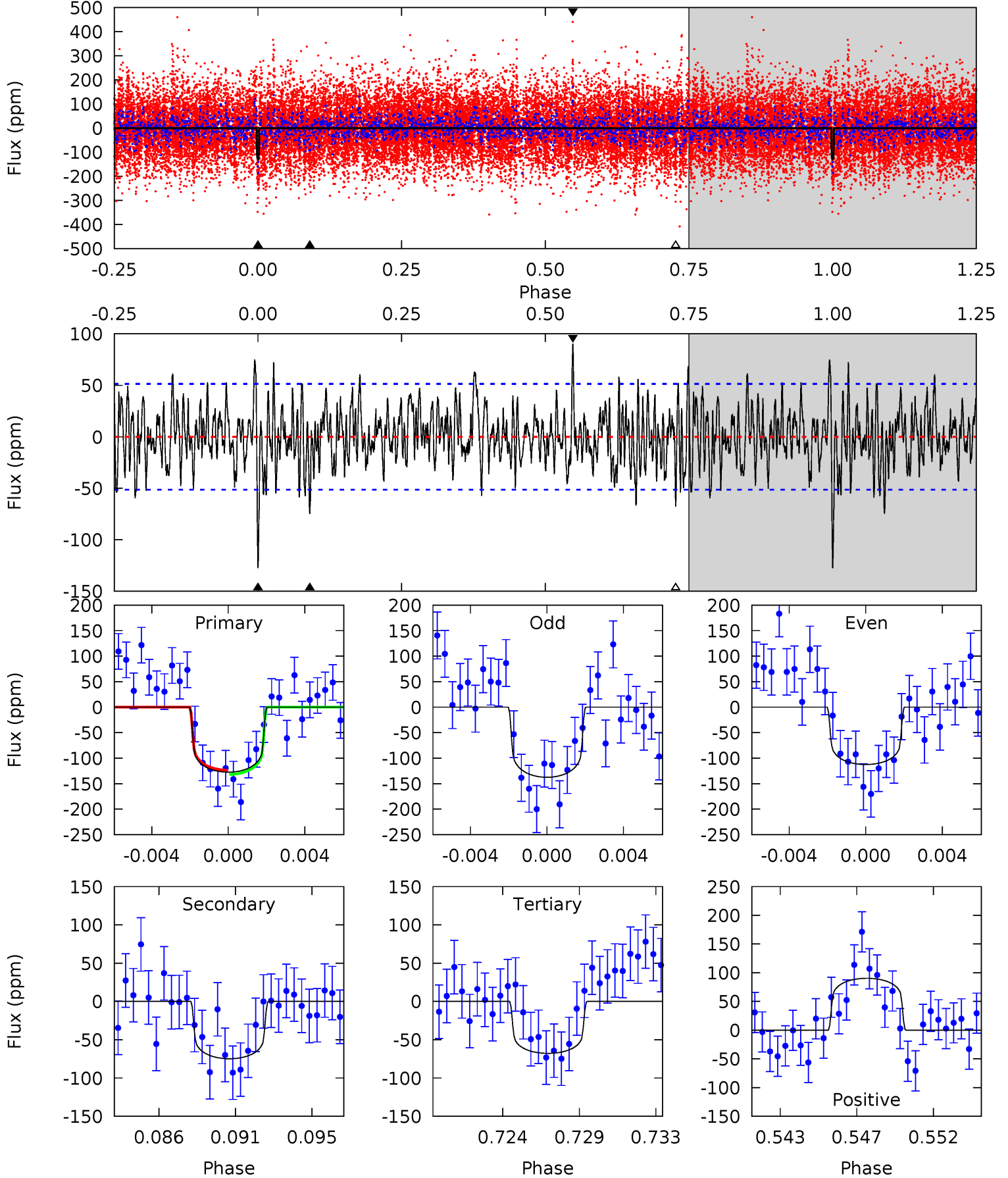
TCE 006715221-09 P=118.507837 Days  $T_0=233.893936$  (BKJD)



# DV Model-Shift Uniqueness Test

006715221-09, P = 118.508397 Days, E = 115.377998 Days

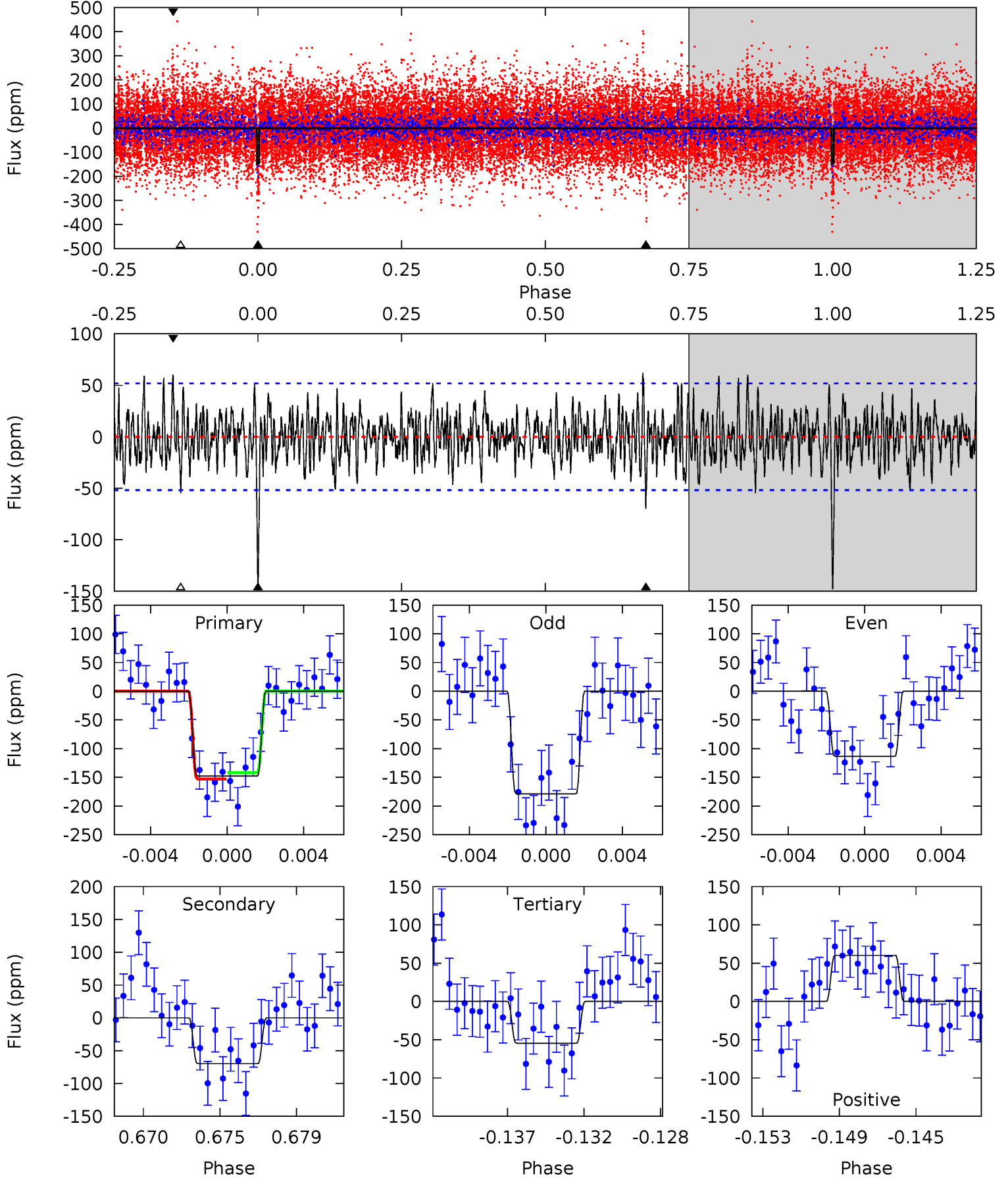
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.9	7.56	6.85	9.13	5.19	2.85	2.42	6.02	3.74	0.71	-1.57	1.24	0.59	0.41	0.42



# Alt Model-Shift Uniqueness Test

006715221-09, P = 118.507837 Days, E = 115.386099 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
14.8	7.00	5.47	6.04	5.19	2.87	1.88	9.35	8.78	1.53	0.95	3.22	0.73	0.30	0.54



### Stellar Parameters For KIC 006715221

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6839^{+163}_{-225}$	$4.003^{+0.221}_{-0.119}$	$-0.060^{+0.250}_{-0.300}$	$2.020^{+0.396}_{-0.594}$	$1.497^{+0.172}_{-0.257}$	$0.256^{+0.303}_{-0.104}$
	+2%/-3%	+6%/-3%	+417%/-500%	+20%/-29%	+11%/-17%	+118%/-41%
Source	PHO1	FLK73	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 006715221-09 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-75 \pm 10$	$2.61^{+0.85}_{-0.77}$	$808^{+46}_{-57}$	$5699^{+990}_{-575}$	$1774^{+1565}_{-776}$
Alt.	$-70 \pm 10$	$2.68^{+0.79}_{-0.78}$	$805^{+51}_{-60}$	$5550^{+933}_{-577}$	$1537^{+1477}_{-639}$

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

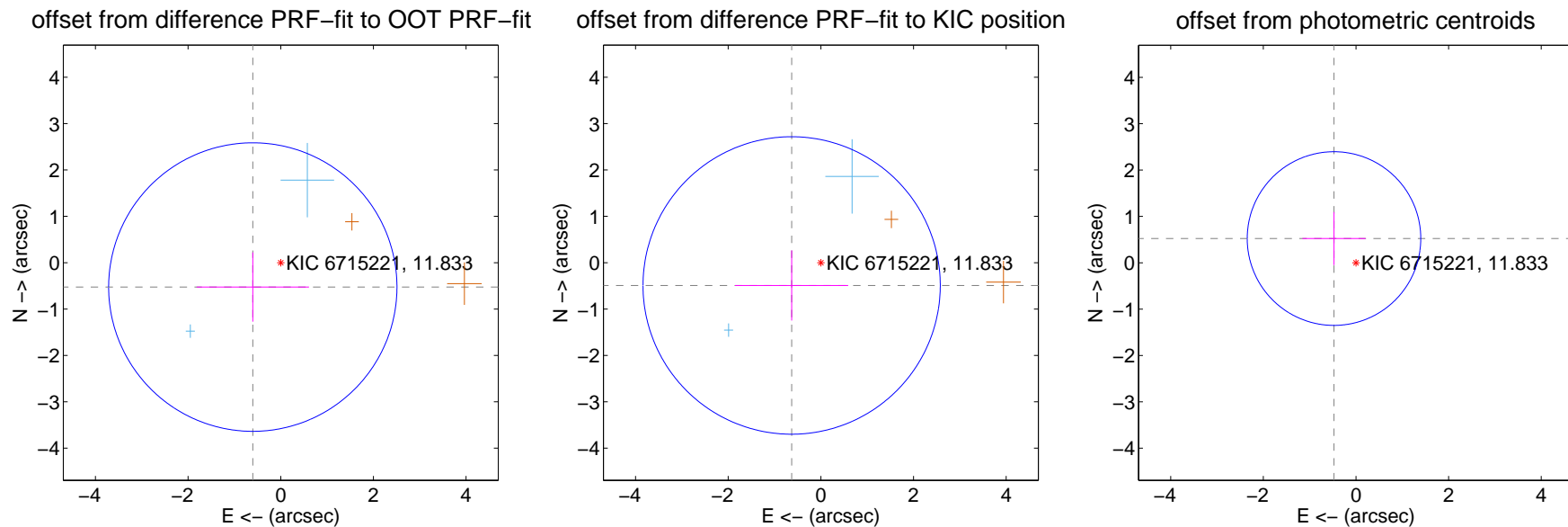
## DV Centroid Data

Supplemental centroid analysis for 006715221-09. **Kepler magnitude: 11.83.** Transit SNR 7.88

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

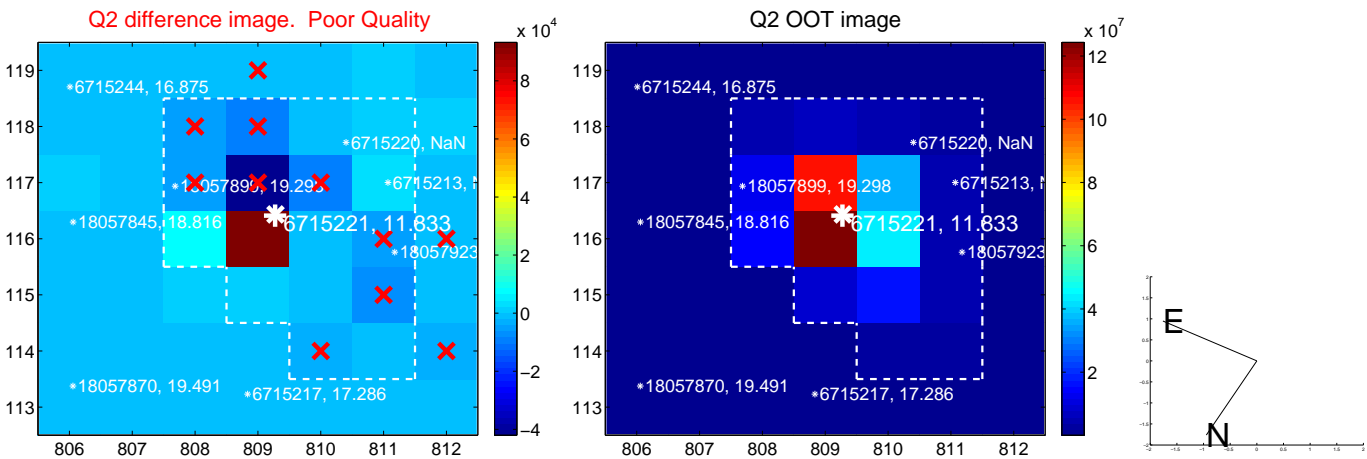
The direct PRF centroid is offset from the target star catalog position by about 0.05 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.800 \pm 1.037$	0.77	$0.603 \pm 1.212$	$-0.526 \pm 0.747$
PRF-fit source offset from KIC position	$0.800 \pm 1.070$	0.75	$0.631 \pm 1.221$	$-0.492 \pm 0.756$
photometric centroid source offset	$0.71 \pm 0.62$	1.13	$0.47 \pm 0.68$	$0.52 \pm 0.57$



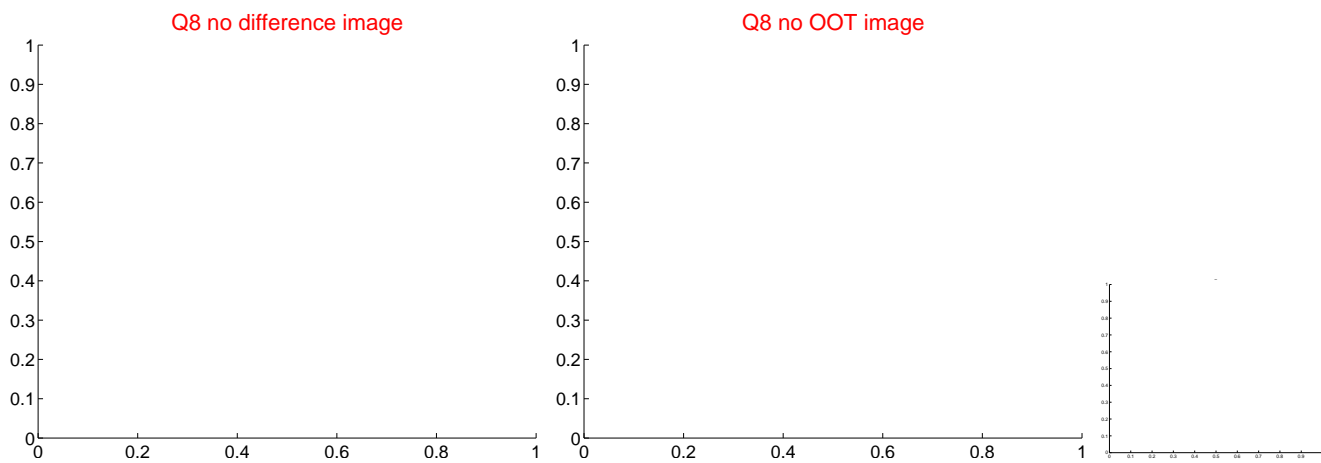
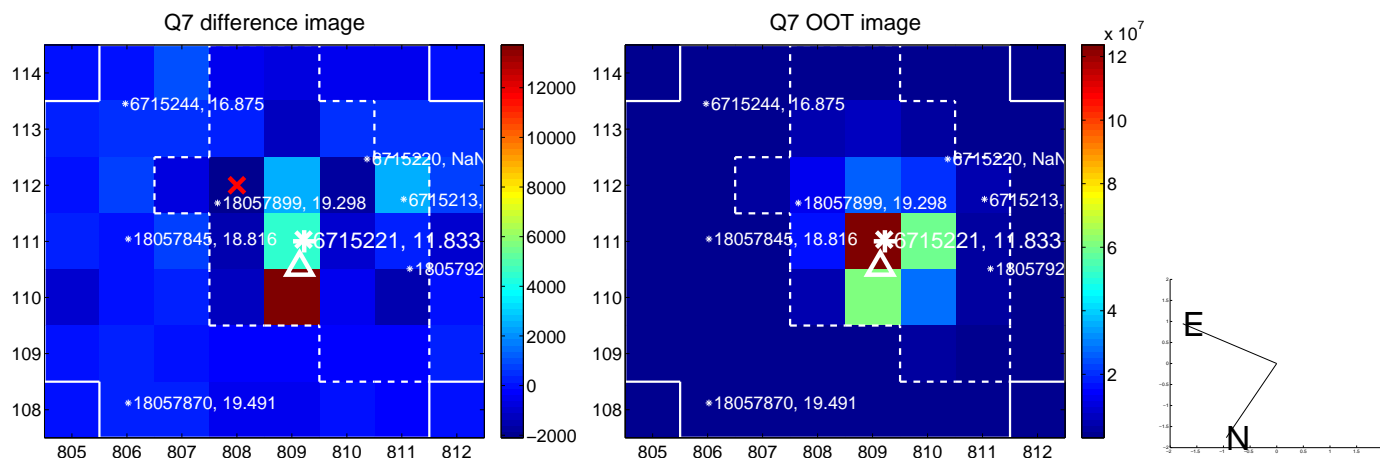
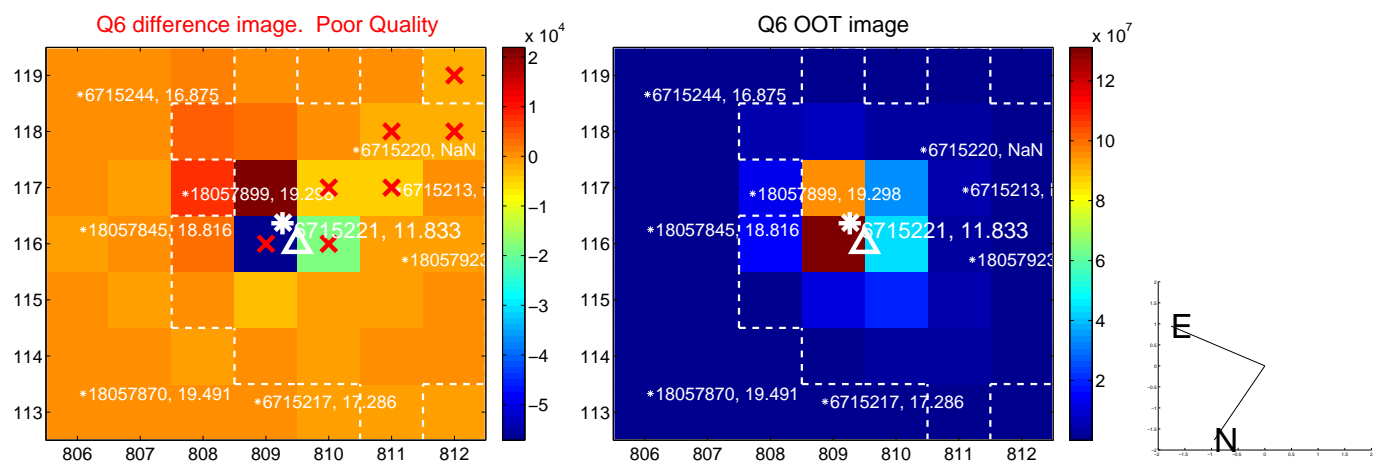
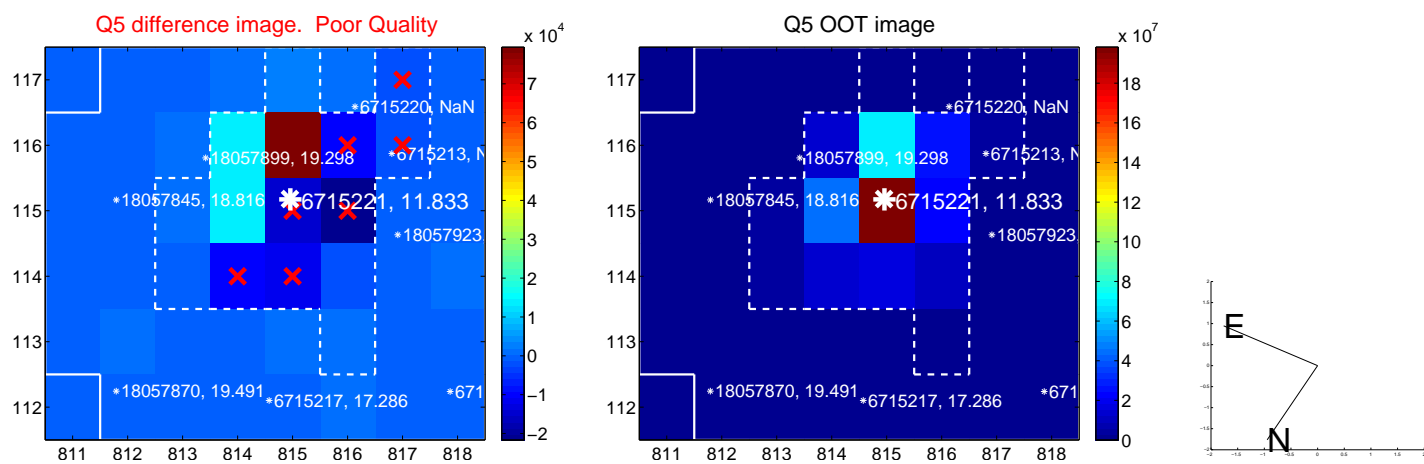
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

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

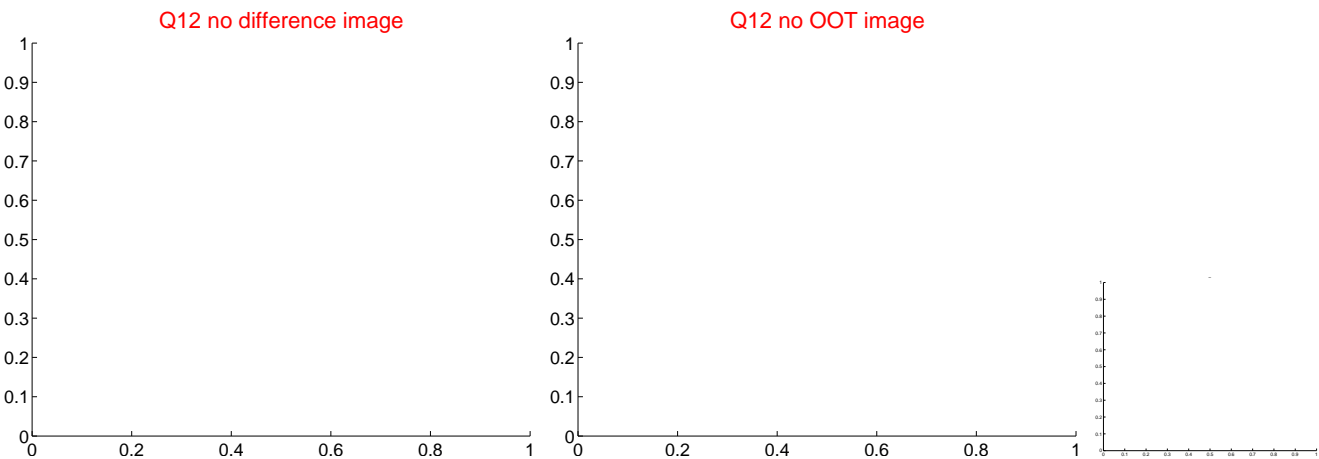
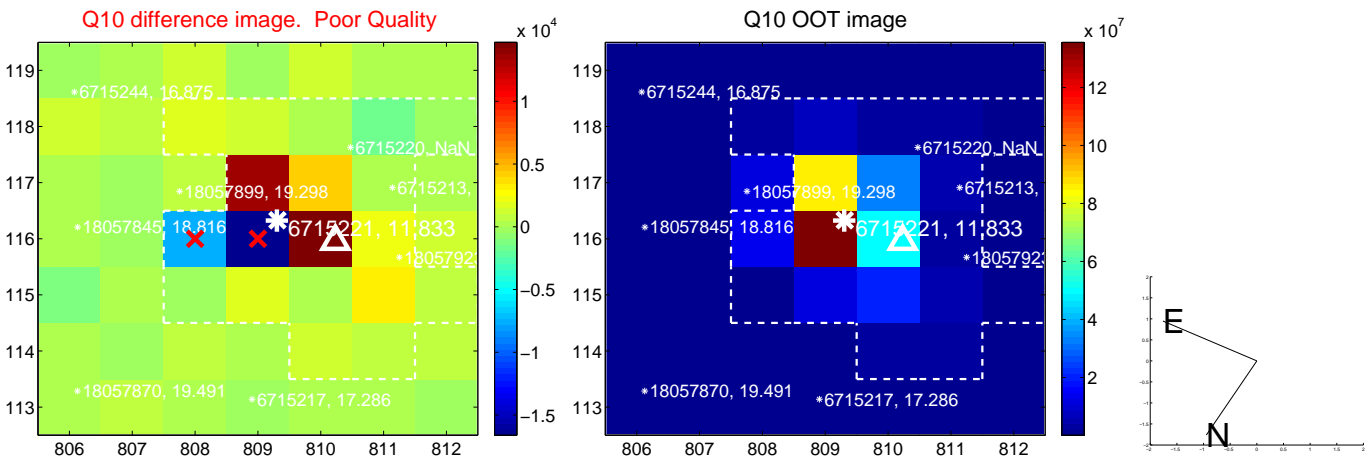
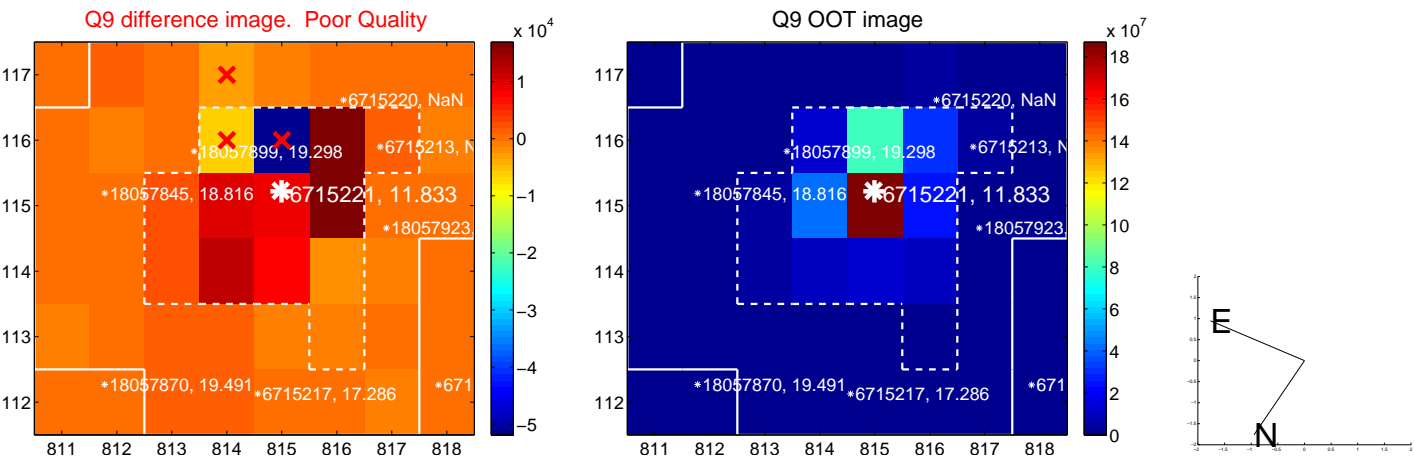




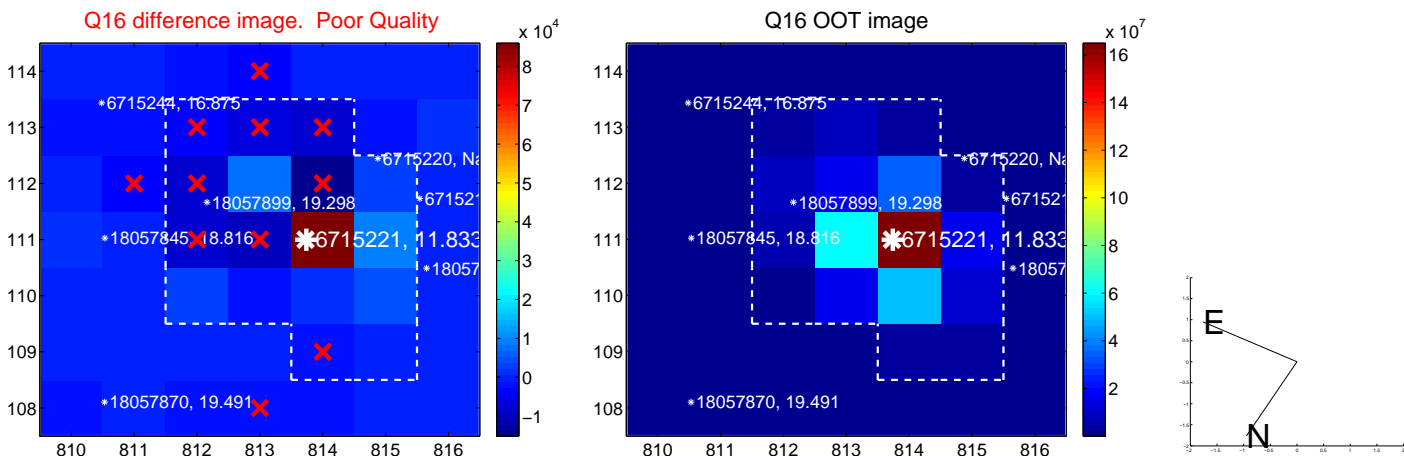
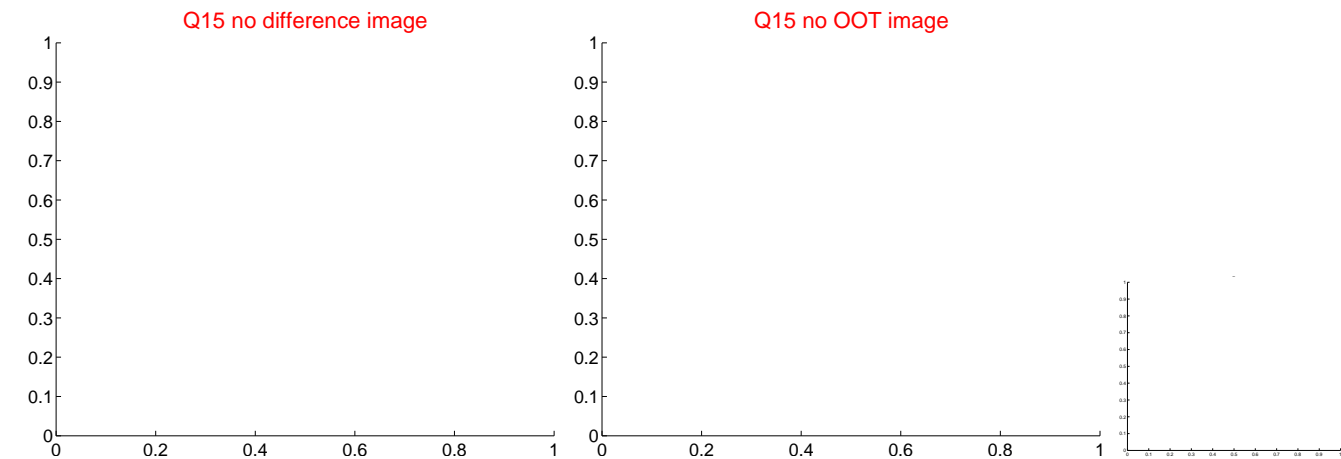
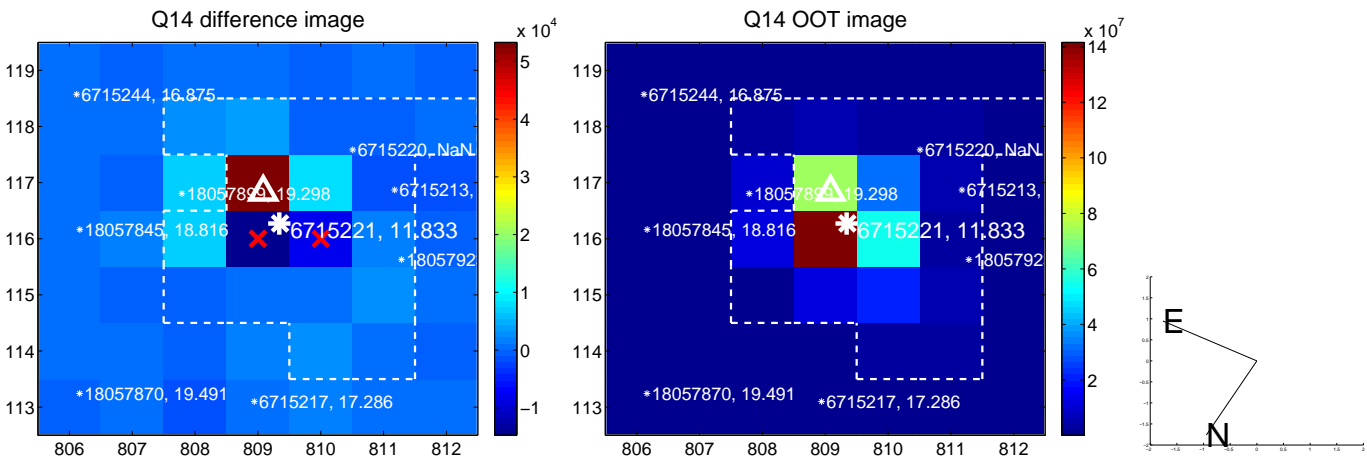
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



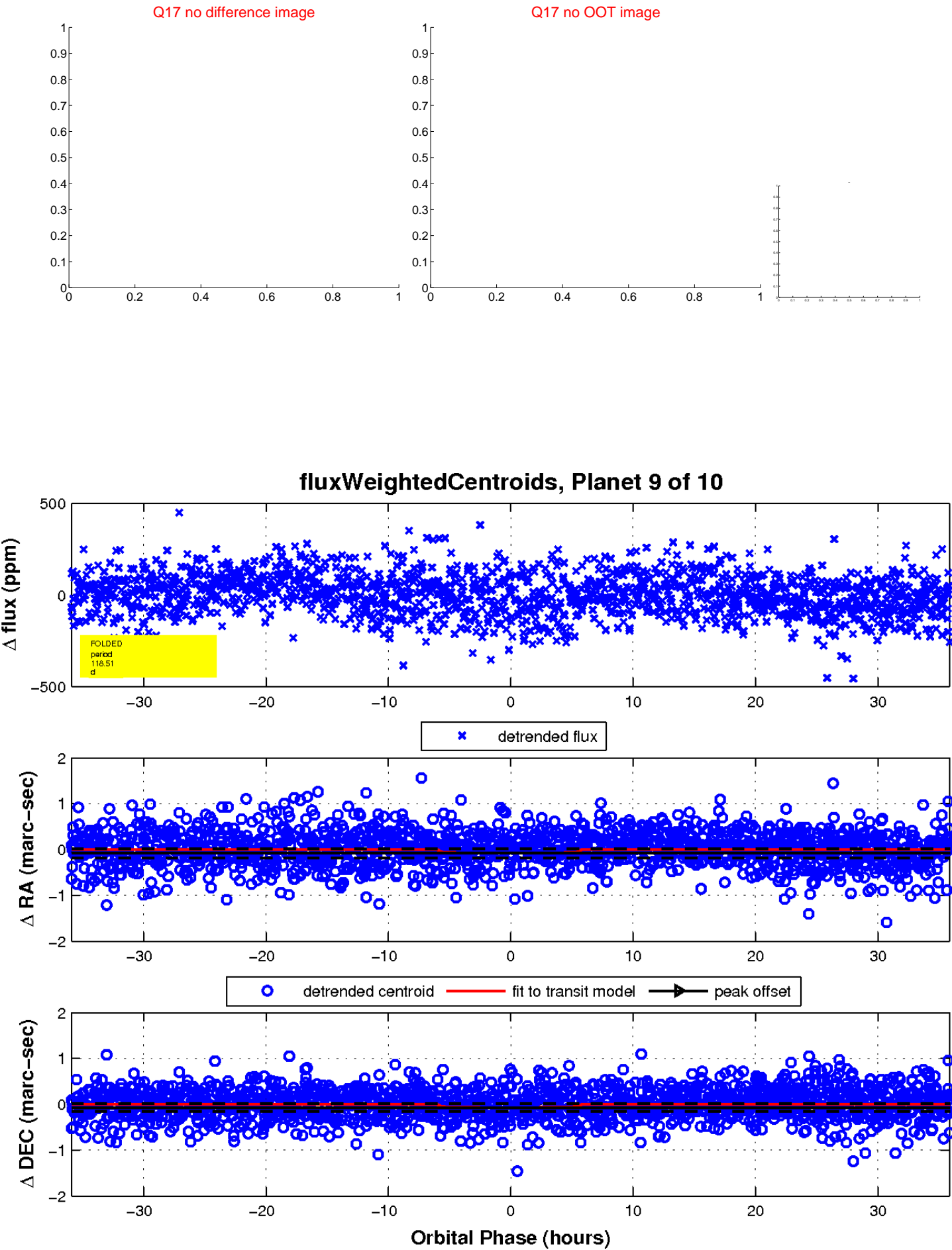
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

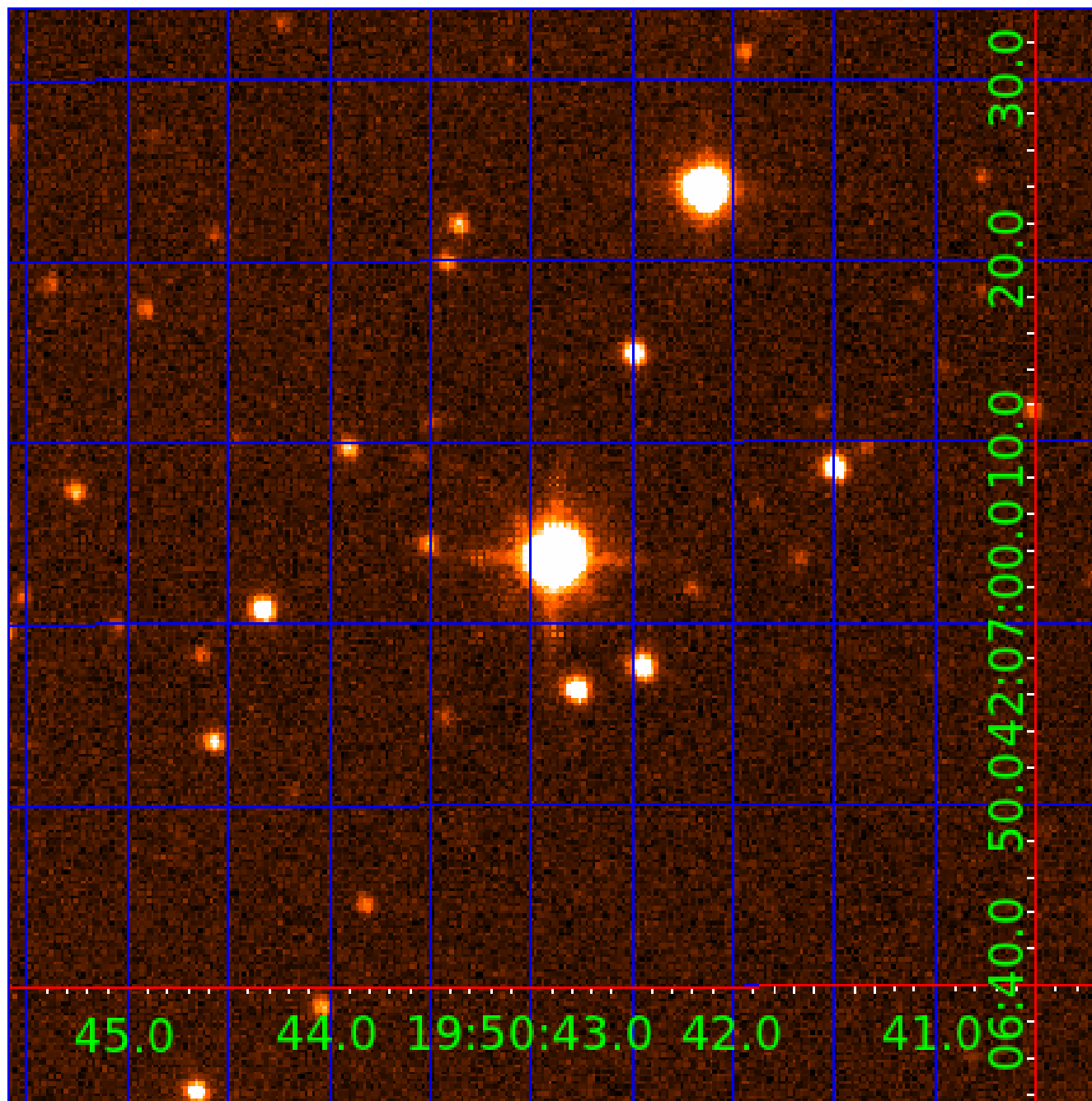


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



## KIC 006715221

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006715221-01	OBS	No	1.984918	132.459230	13.3	8.776	9.2	7.4	2.02	6839	0.74	6389.14
006715221-02	OBS	No	107.919359	152.278773	91.7	14.832	10.4	6.2	2.02	6839	2.12	31.02
006715221-03	OBS	No	333.120273	314.487390	168.1	20.190	10.4	7.6	2.02	6839	2.83	6.90
006715221-04	OBS	No	134.224992	188.680406	137.8	3.578	8.3	7.4	2.02	6839	2.67	23.19
006715221-05	OBS	No	107.107514	214.951810	149.8	13.238	8.0	8.9	2.02	6839	3.25	31.33
006715221-06	OBS	No	400.898244	254.418073	152.5	9.827	8.0	7.8	2.02	6839	2.91	5.39
006715221-07	OBS	No	34.101777	151.432052	96.7	3.723	7.7	8.0	2.02	6839	2.32	144.12
006715221-08	OBS	No	65.108276	163.640682	100.0	4.485	7.8	7.8	2.02	6839	2.31	60.85
006715221-09	OBS	No	118.508397	233.886395	144.3	11.967	8.1	7.9	2.02	6839	2.70	27.38
006715221-10	OBS	No	36.316557	165.427888	72.2	12.670	8.2	7.1	2.02	6839	2.27	132.52

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006715221-01	OBS	FP	0.00	1	0	0	0	LPP_DV
006715221-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
006715221-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
006715221-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
006715221-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_ALT—CENT_FEW_MEAS
006715221-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—MOD_NONUNIQ_ALT
006715221-07	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—MOD_NONUNIQ_ALT
006715221-08	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—MOD_NONUNIQ_ALT
006715221-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_MEAS
006715221-10	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_UNRESOLVED_OFFSET

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

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

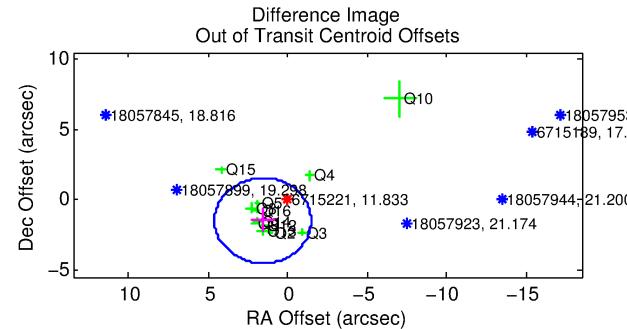
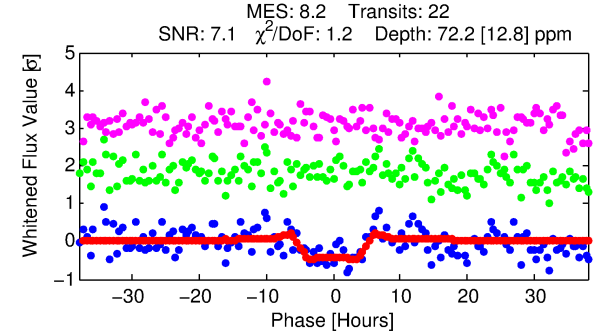
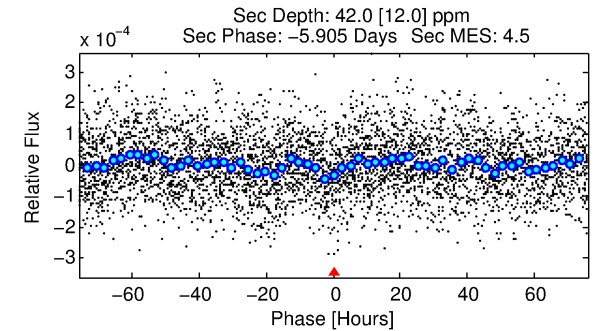
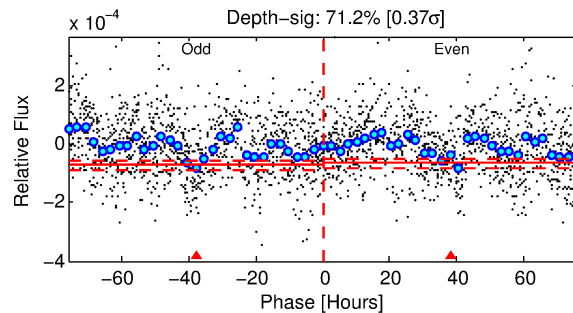
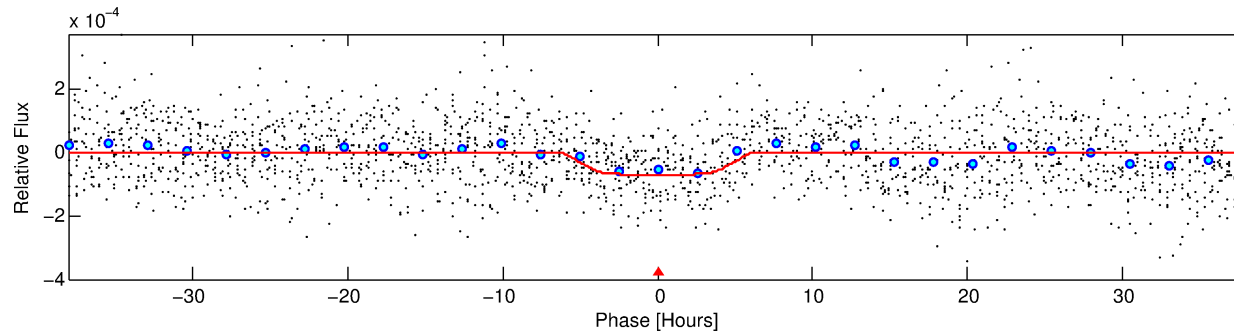
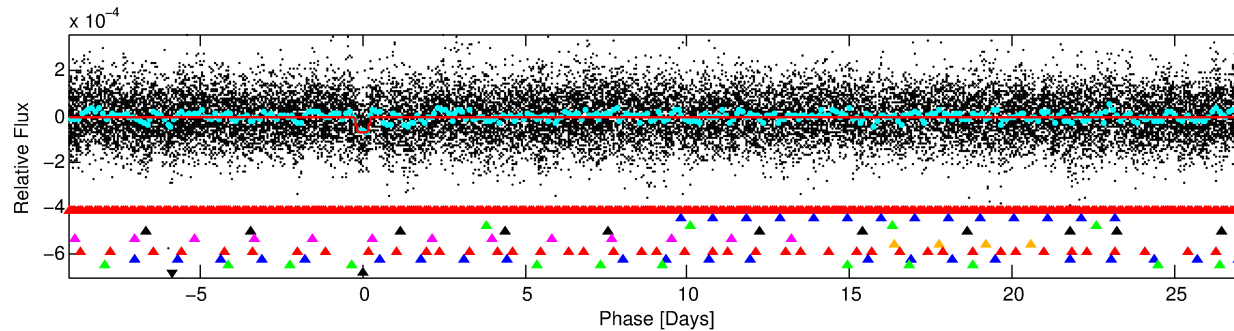
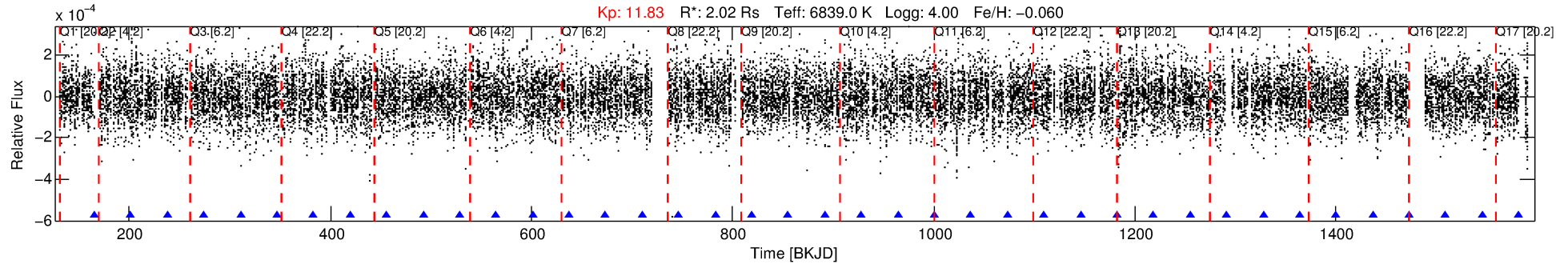
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 006715221-10

No Significant Match Found

# DV One-Page Summary

KIC: 6715221 Candidate: 10 of 10 Period: 36.317 d



## DV Fit Results:

Period = 36.31656 [0.00141] d  
Epoch = 165.4279 [0.0319] BKJD  
Rp/R\* = 0.0103 [0.0010]  
a/R\* = 5.30 [1.16]  
b = 0.98 [0.01]  
Seff = 132.52 [54.78]  
Teq = 865 [89] K  
Rp = 2.27 [0.71] Re  
a = 0.2457 [0.0637] AU  
Ag = 270.58 [142.19] [1.90 $\sigma$ ]  
Teffp = 5425 [507] K [8.85 $\sigma$ ]

## DV Diagnostic Results:

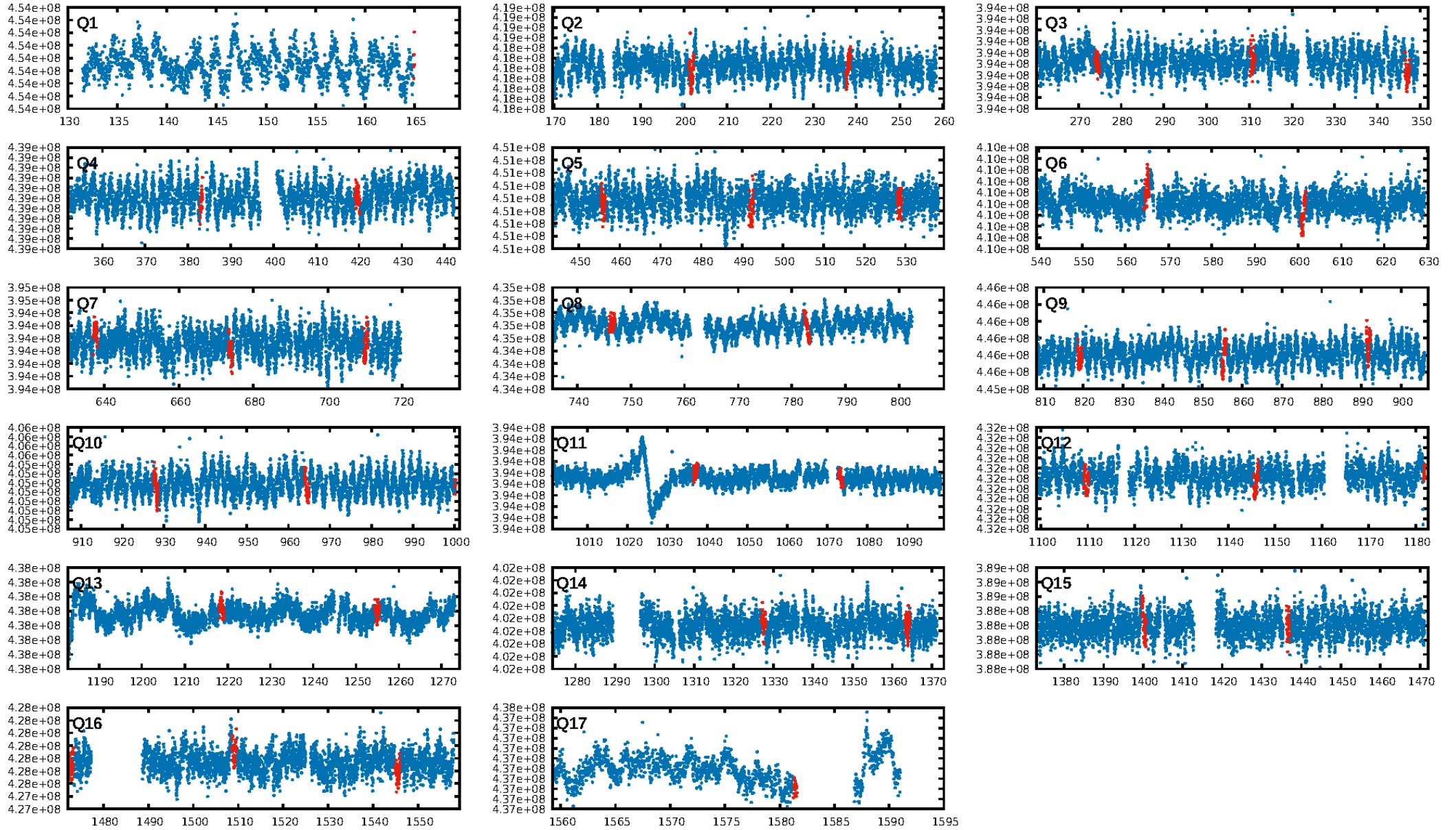
ShortPeriod-sig: 100.0% [4.03 $\sigma$ ]  
LongPeriod-sig: 100.0% [51.41 $\sigma$ ]  
ModelChiSquare2-sig: 71.5%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 9.59e-10**  
RollingBand-fgt: 1.00 [22/22]  
GhostDiagnostic-chr: 1.004  
**Centroid-sig: 0.1%**  
Centroid-so: 1.307 arcsec [1.95 $\sigma$ ]  
OotOffset-rm: 2.169 arcsec [2.15 $\sigma$ ]  
KicOffset-rm: 2.169 arcsec [2.28 $\sigma$ ]  
OotOffset-st: 3/2/4/3 [12]  
KicOffset-st: 3/2/4/3 [12]  
DiffImageQuality-fgm: 0.50 [6/12]  
DiffImageOverlap-fno: 0.00 [0/15]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 05:30:47 Z

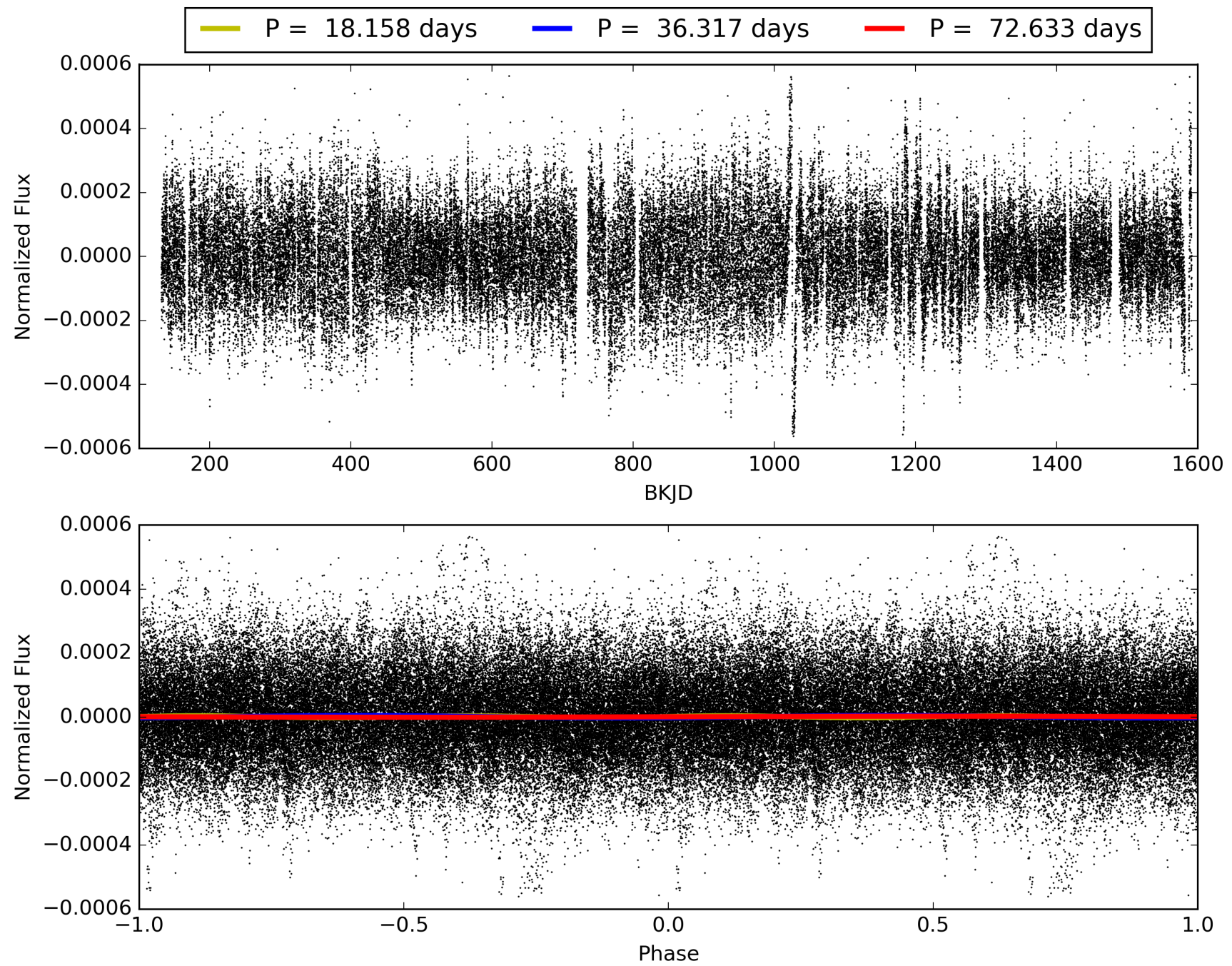
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 006715221-10, PDC Light Curves

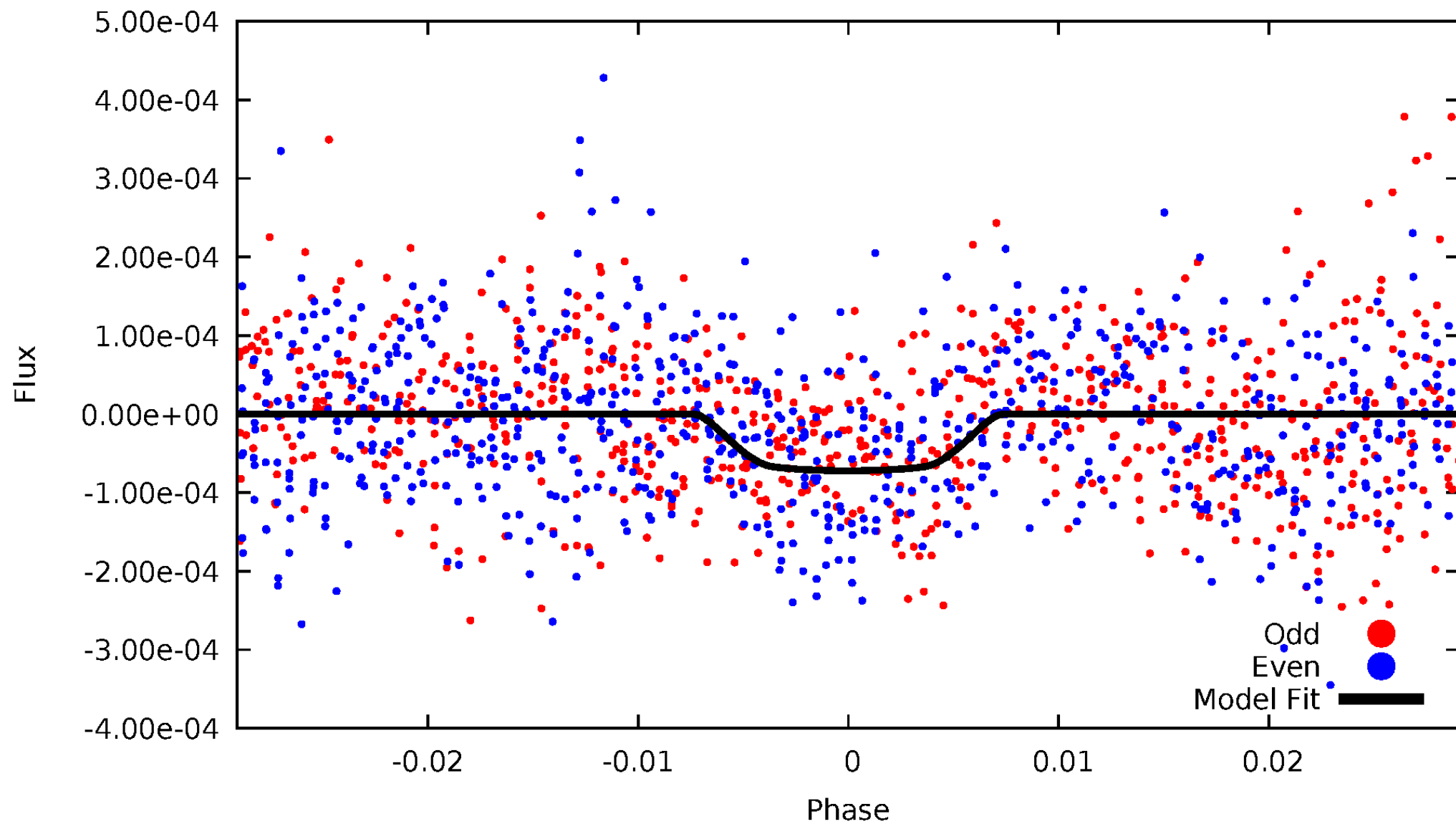


TCE 006715221-10



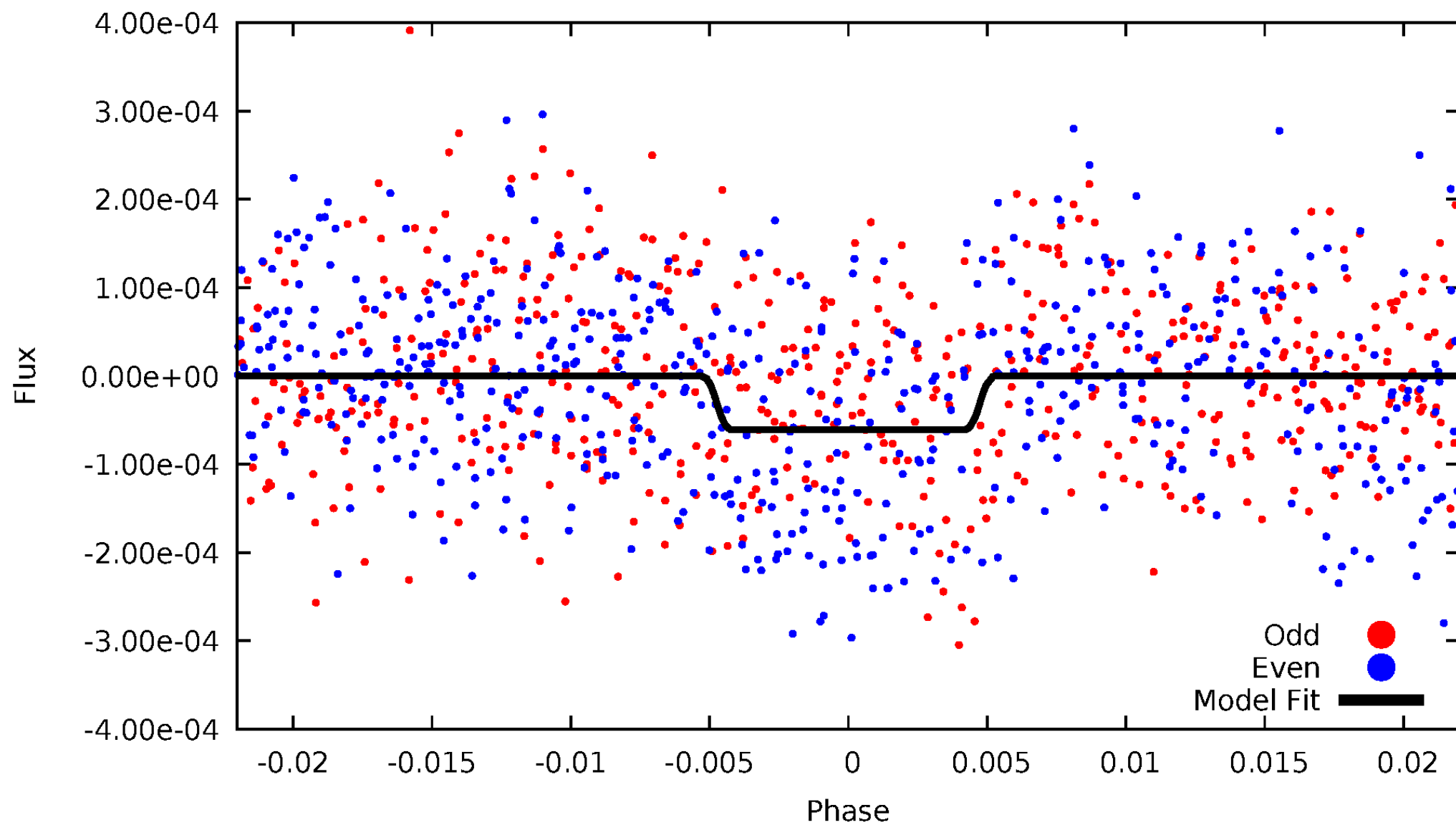
# DV Odd/Even

TCE 006715221-10



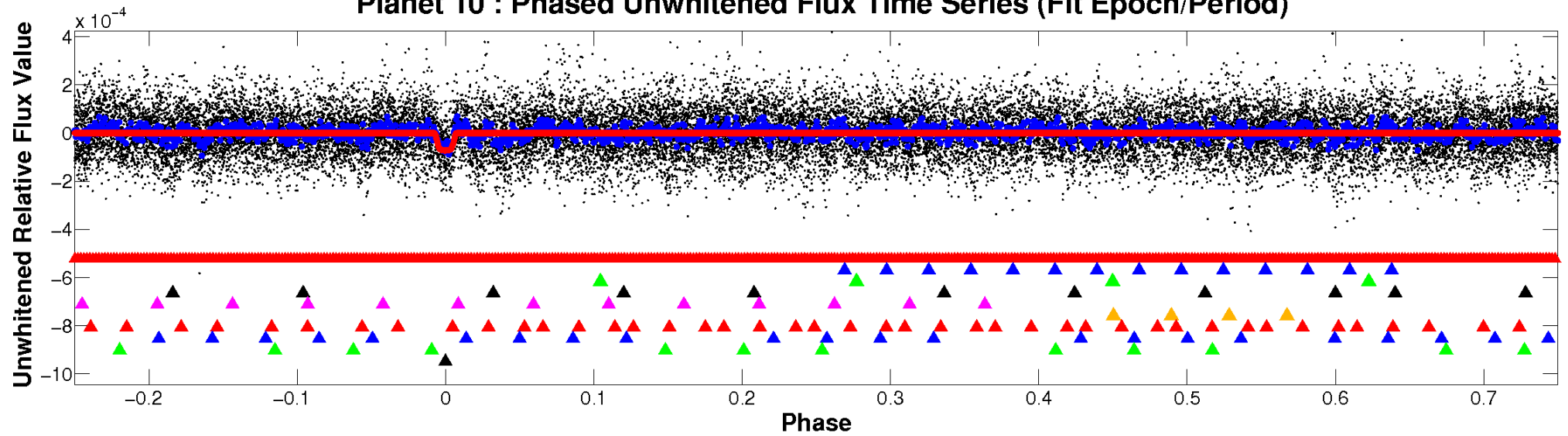
# ALT Odd/Even

TCE 006715221-10

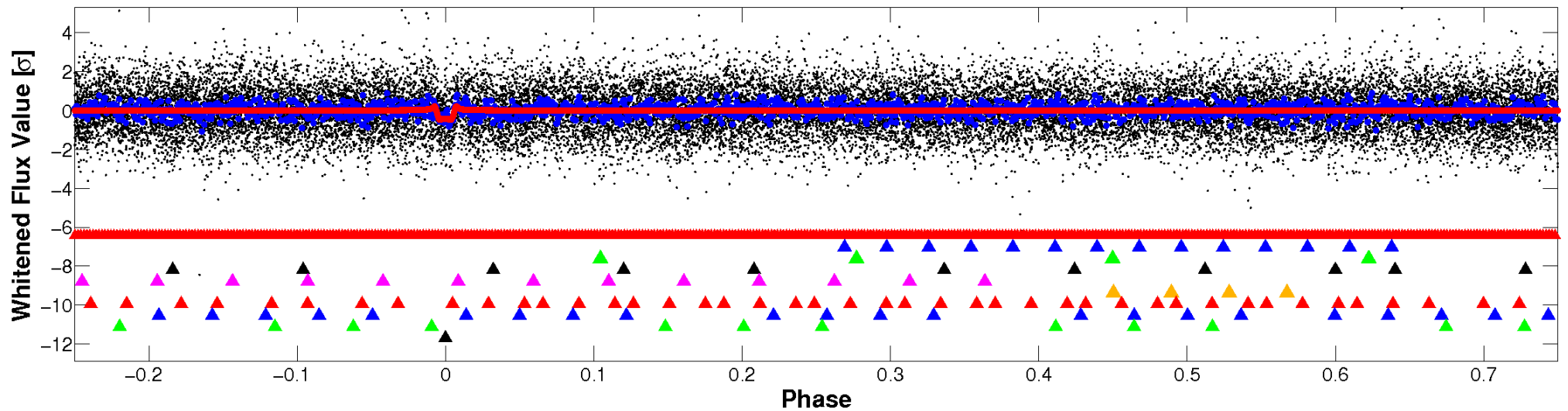


# Non-Whitened Vs. Whitened Light Curve

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



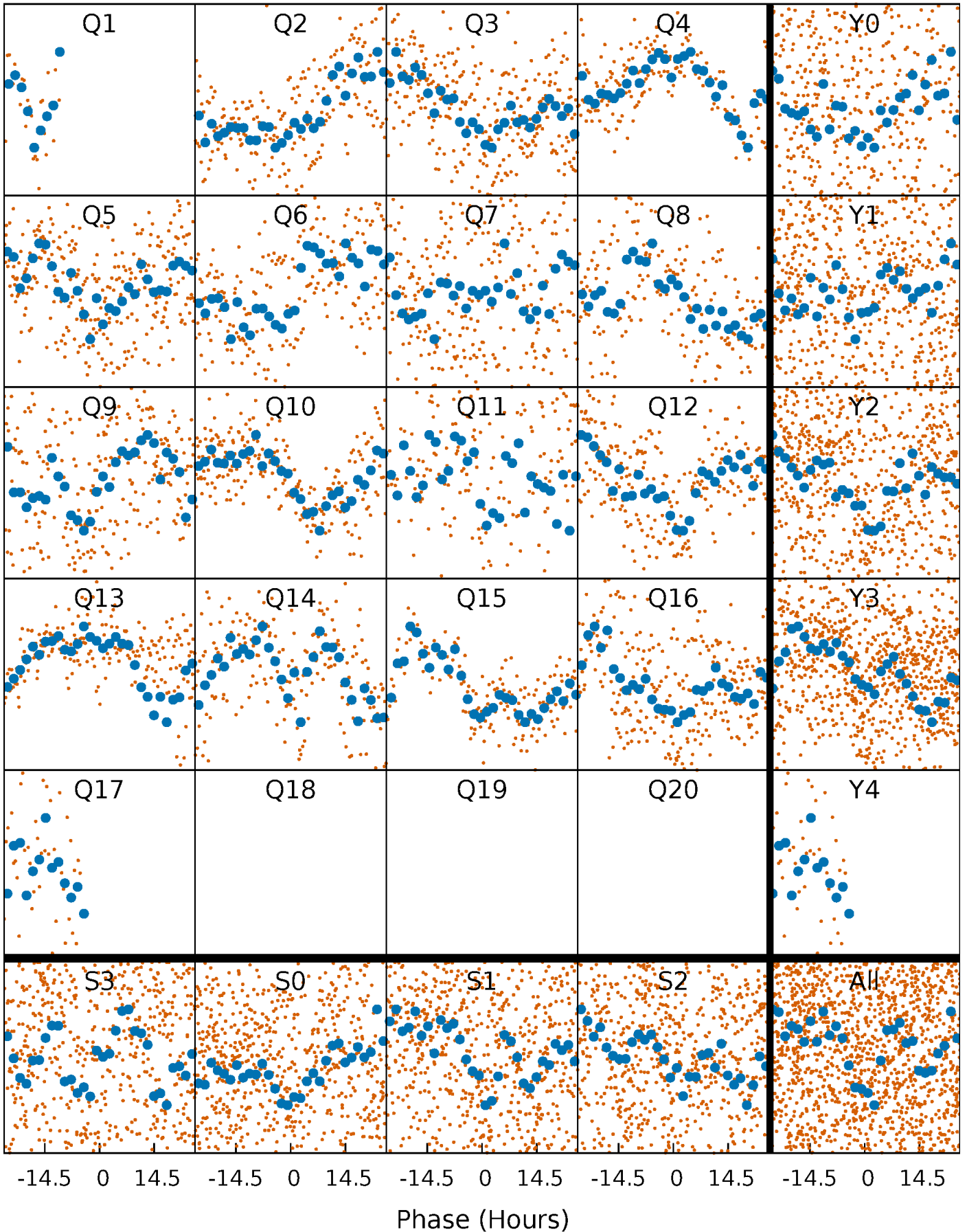
Planet 10 : Phased Whitened Flux Time Series (Fit Epoch/Period)





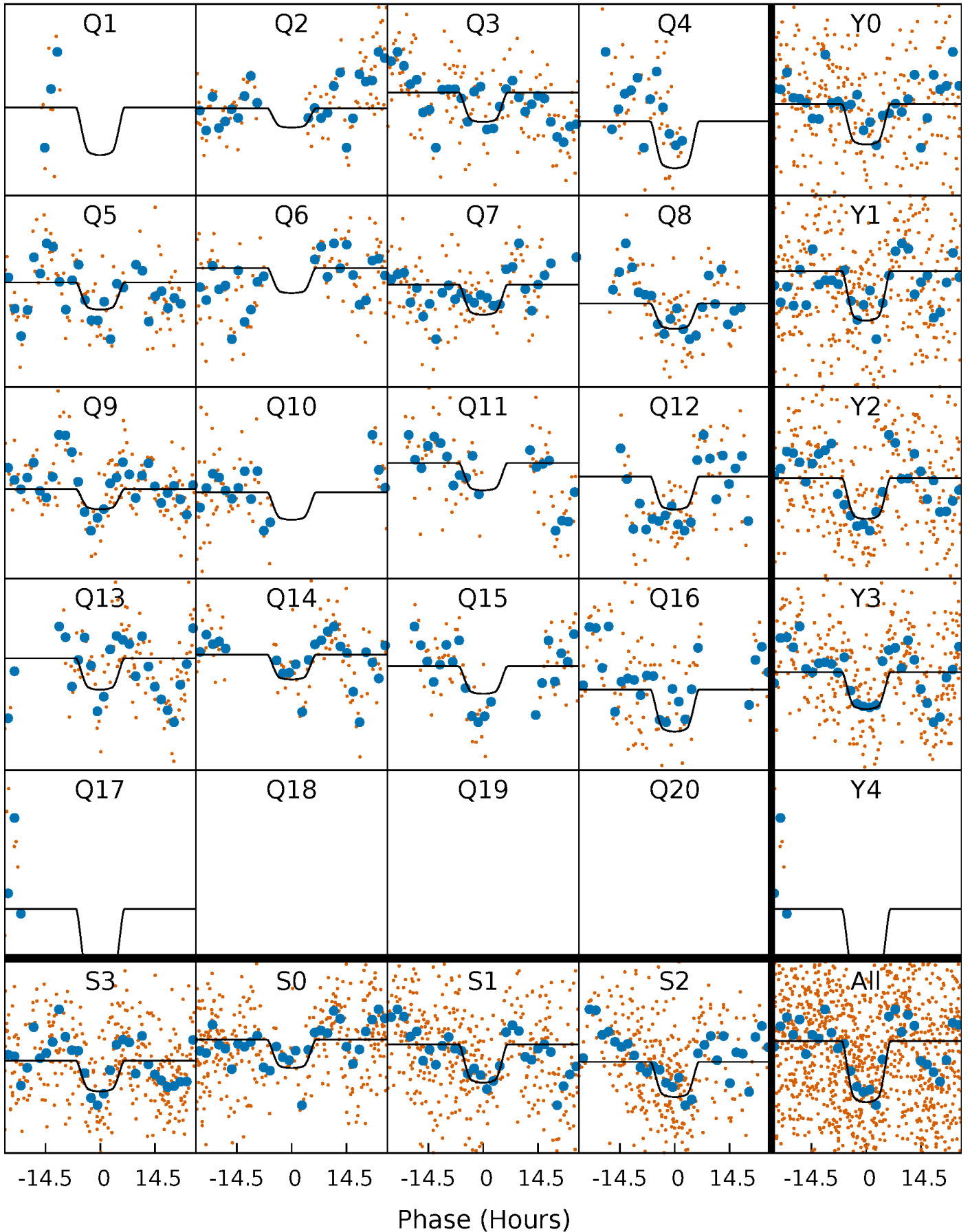
# PDC Quarter-Phased Transit Curves

TCE 006715221-10 P= 36.316557 Days  $T_0=165.427888$  (BKJD)



# DV Quarter-Phased Transit Curves

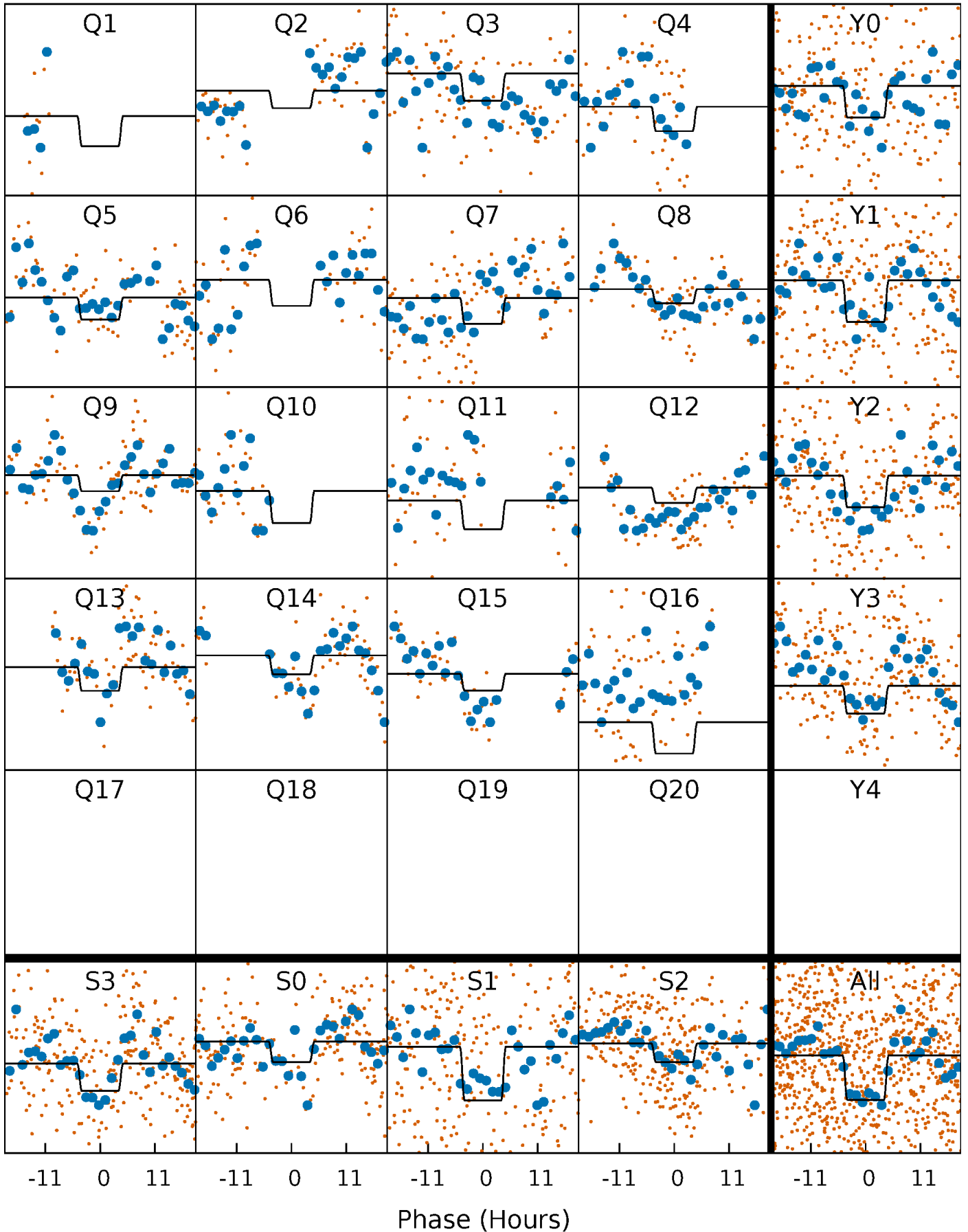
TCE 006715221-10 P= 36.316557 Days  $T_0=165.427888$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

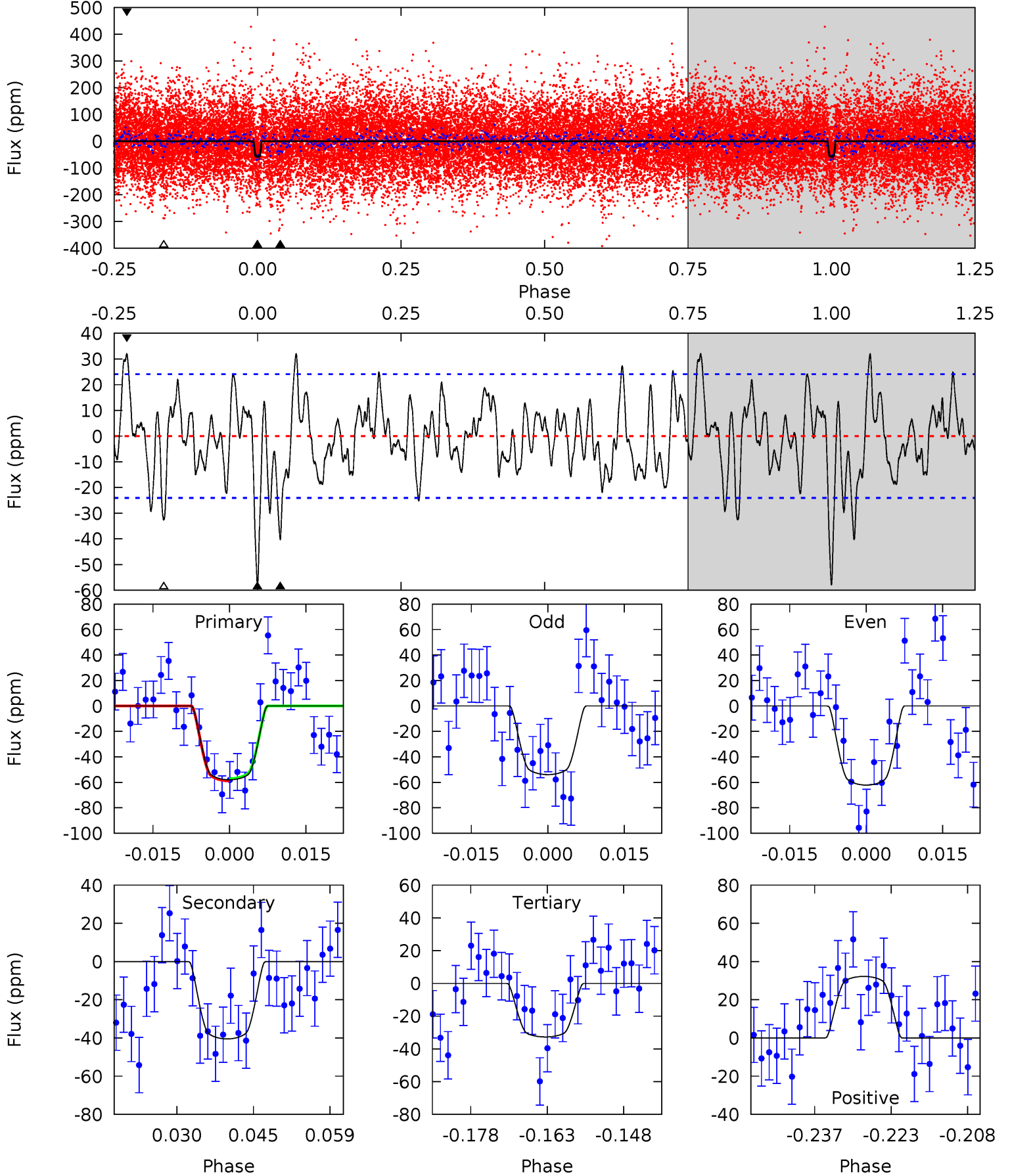
TCE 006715221-10 P= 36.316282 Days  $T_0=165.410495$  (BKJD)



# DV Model-Shift Uniqueness Test

006715221-10, P = 36.316557 Days, E = 129.111331 Days

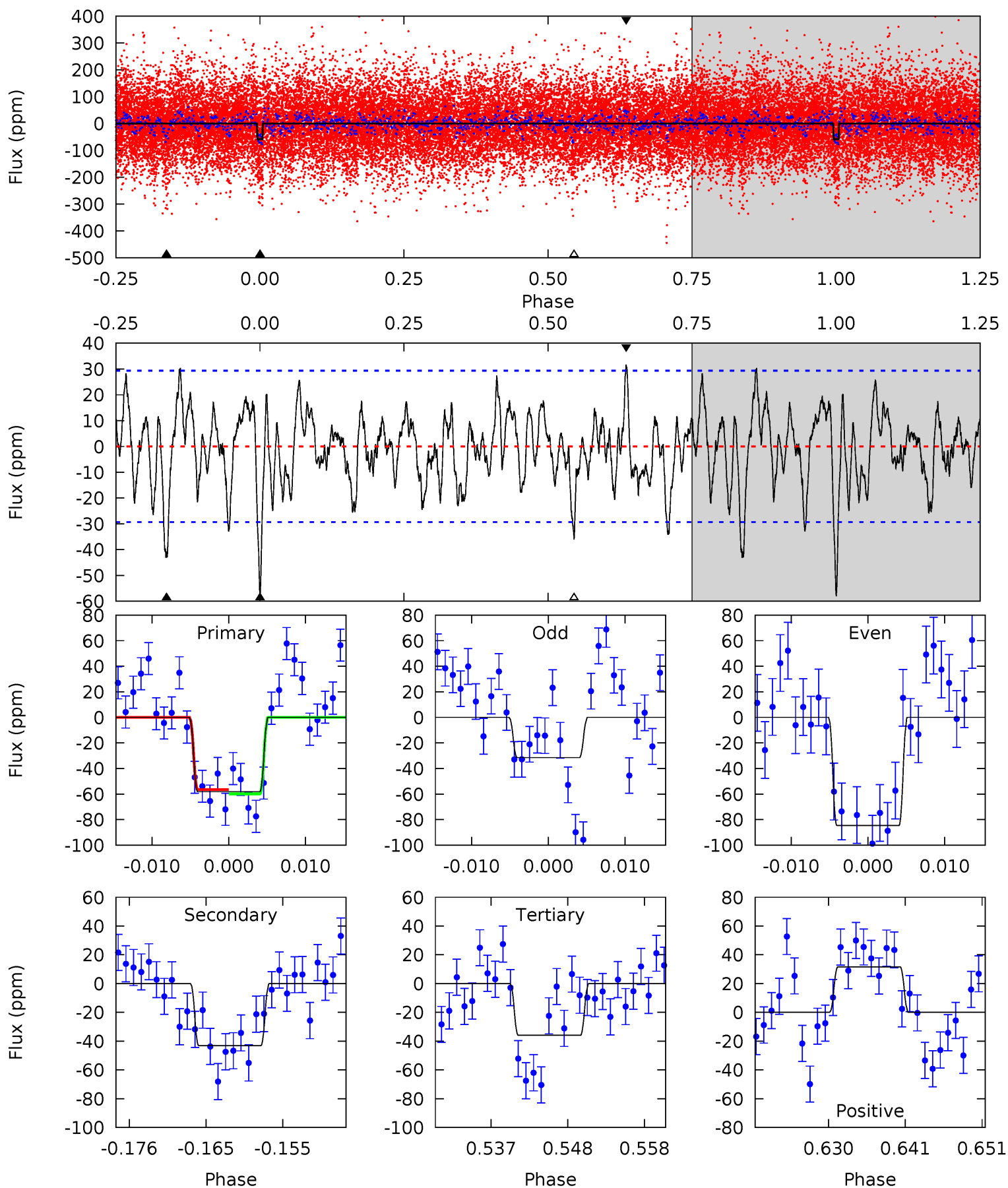
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.9	8.33	6.73	6.63	4.95	2.44	2.43	5.20	5.31	1.60	1.70	0.85	0.68	0.36	0.17



# Alt Model-Shift Uniqueness Test

006715221-10, P = 36.316282 Days, E = 129.094213 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
9.94	7.37	6.14	5.41	5.02	2.56	2.02	3.80	4.53	1.23	1.96	4.54	0.81	0.35	0.30



### Stellar Parameters For KIC 006715221

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6839^{+163}_{-225}$	$4.003^{+0.221}_{-0.119}$	$-0.060^{+0.250}_{-0.300}$	$2.020^{+0.396}_{-0.594}$	$1.497^{+0.172}_{-0.257}$	$0.256^{+0.303}_{-0.104}$
	+2%/-3%	+6%/-3%	+417%/-500%	+20%/-29%	+11%/-17%	+118%/-41%
Source	PHO1	FLK73	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 006715221-10 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-41 \pm 5$	$2.22^{+0.37}_{-0.39}$	$1191^{+76}_{-86}$	$5365^{+324}_{-275}$	$273^{+118}_{-74}$
Alt.	$-43 \pm 6$	$1.69^{+0.35}_{-0.31}$	$1194^{+80}_{-88}$	$6213^{+556}_{-477}$	$507^{+258}_{-167}$

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

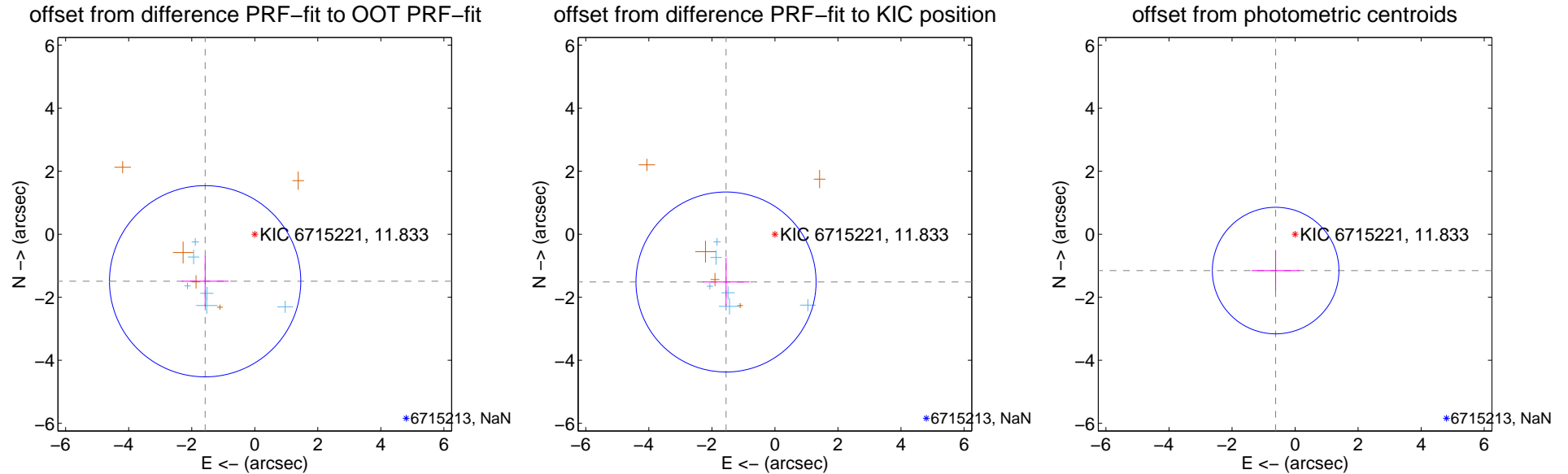
## DV Centroid Data

Supplemental centroid analysis for 006715221-10. **Kepler magnitude: 11.83.** Transit SNR 7.13

There are 6 quarters with good PRF difference image offsets

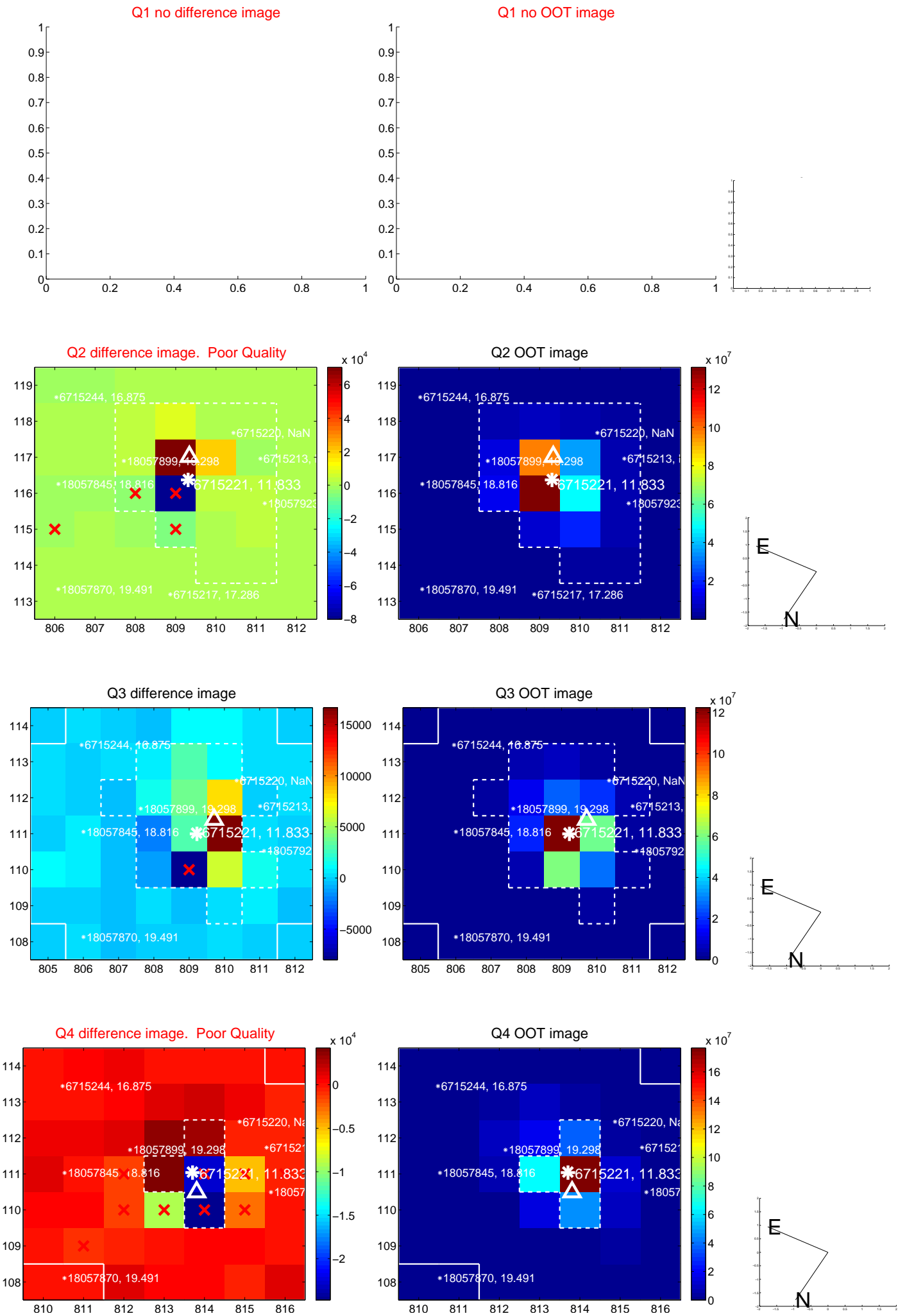
The direct PRF centroid is offset from the target star catalog position by about 0.07 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.169 \pm 1.011$	2.15	$1.575 \pm 0.743$	$-1.492 \pm 0.806$
PRF-fit source offset from KIC position	$2.169 \pm 0.952$	2.28	$1.551 \pm 0.746$	$-1.516 \pm 0.762$
photometric centroid source offset	$1.31 \pm 0.67$	1.95	$0.62 \pm 0.77$	$-1.15 \pm 0.64$

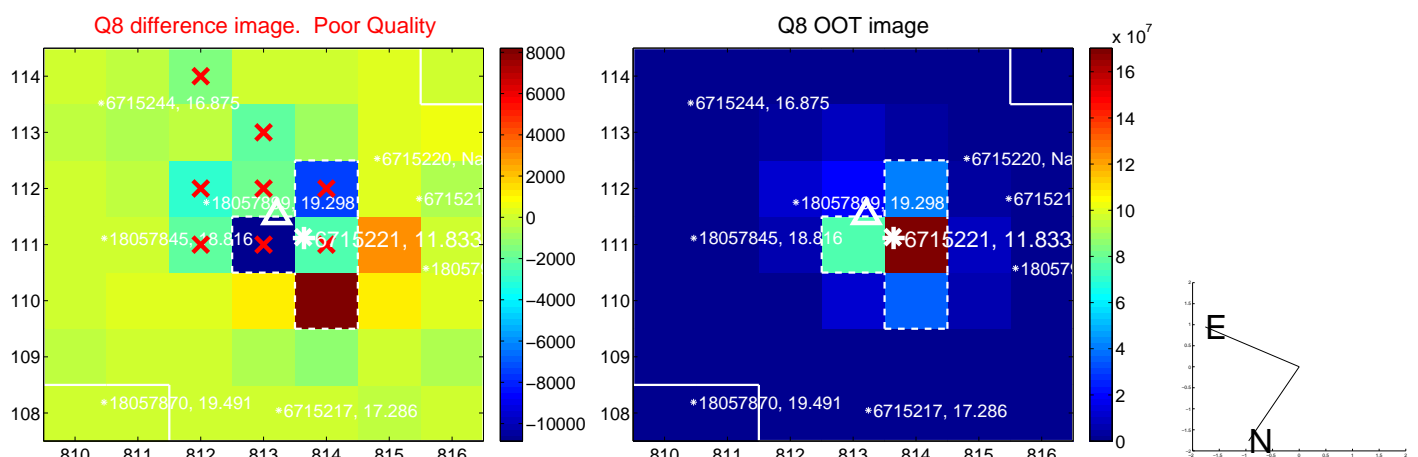
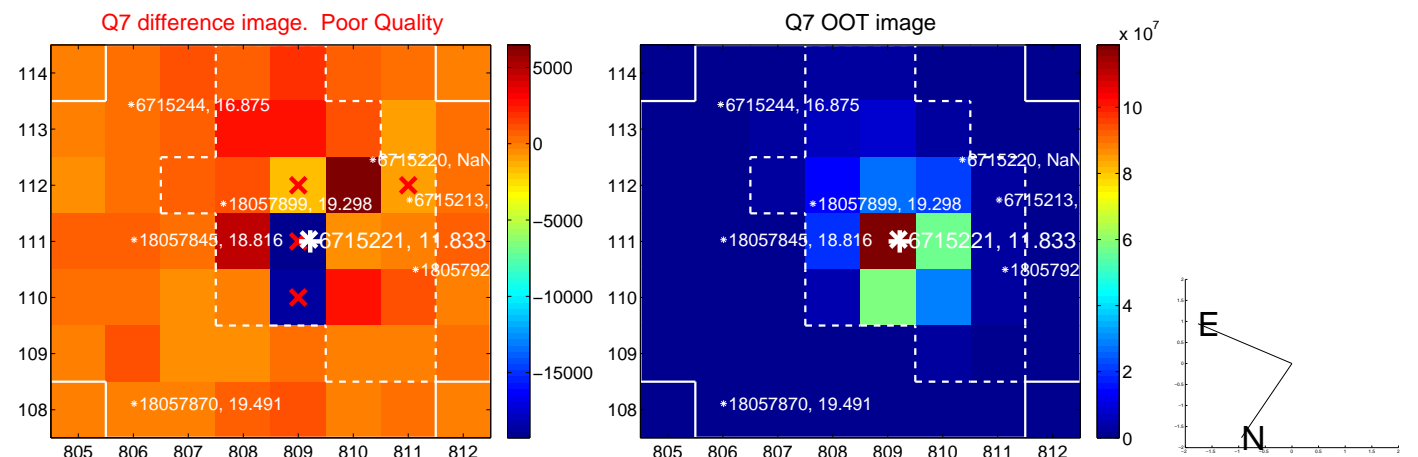
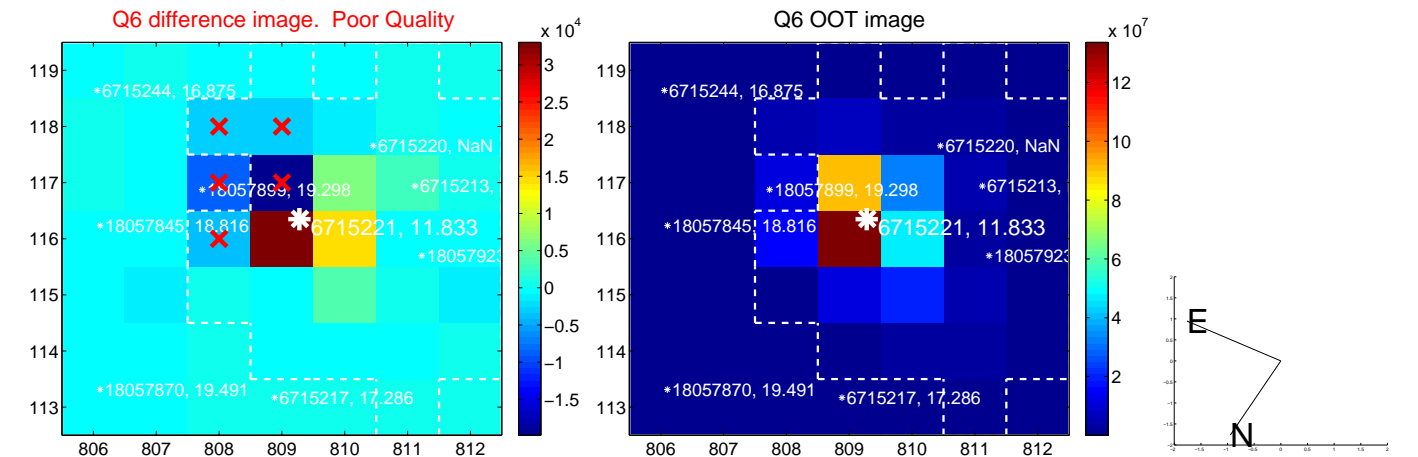
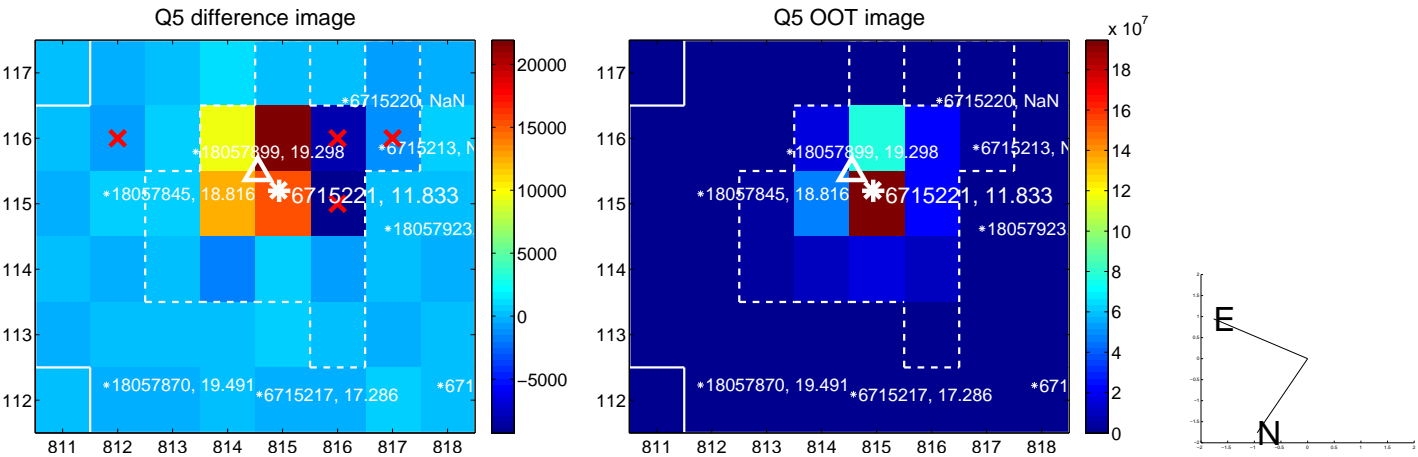


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

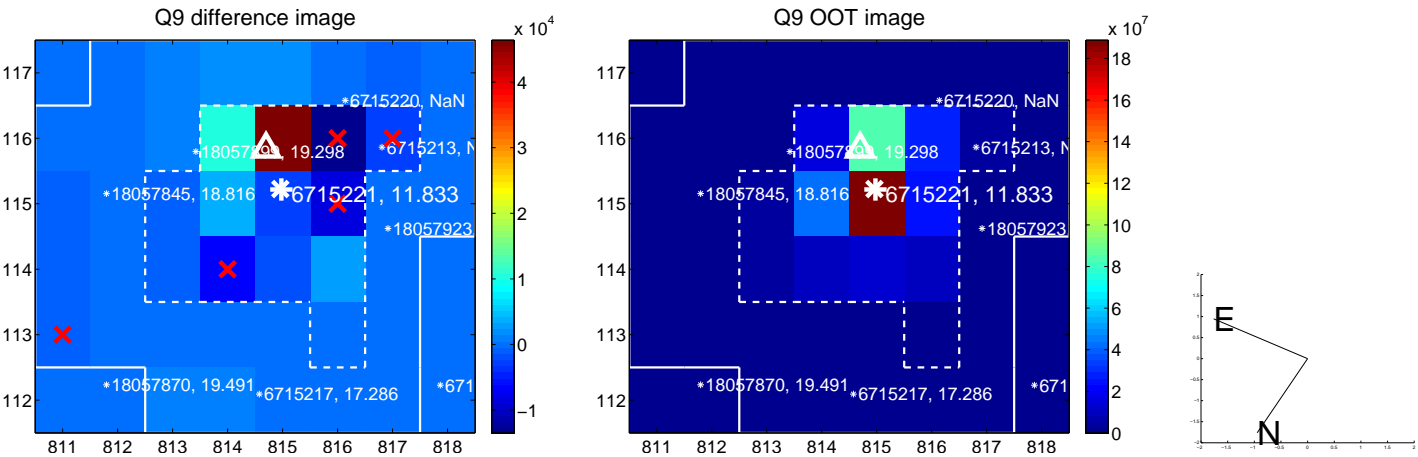


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

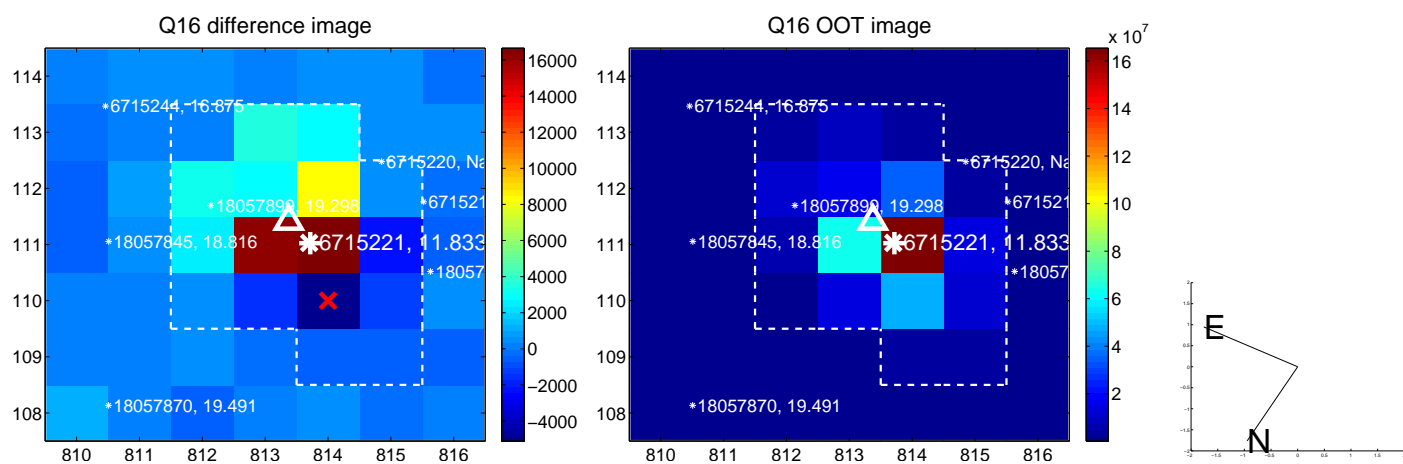
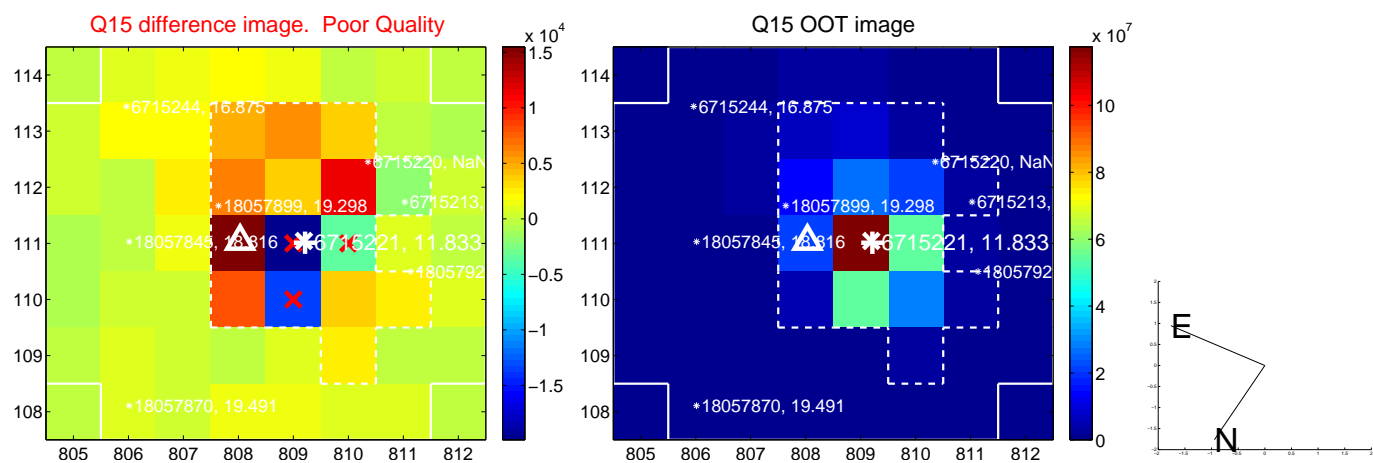
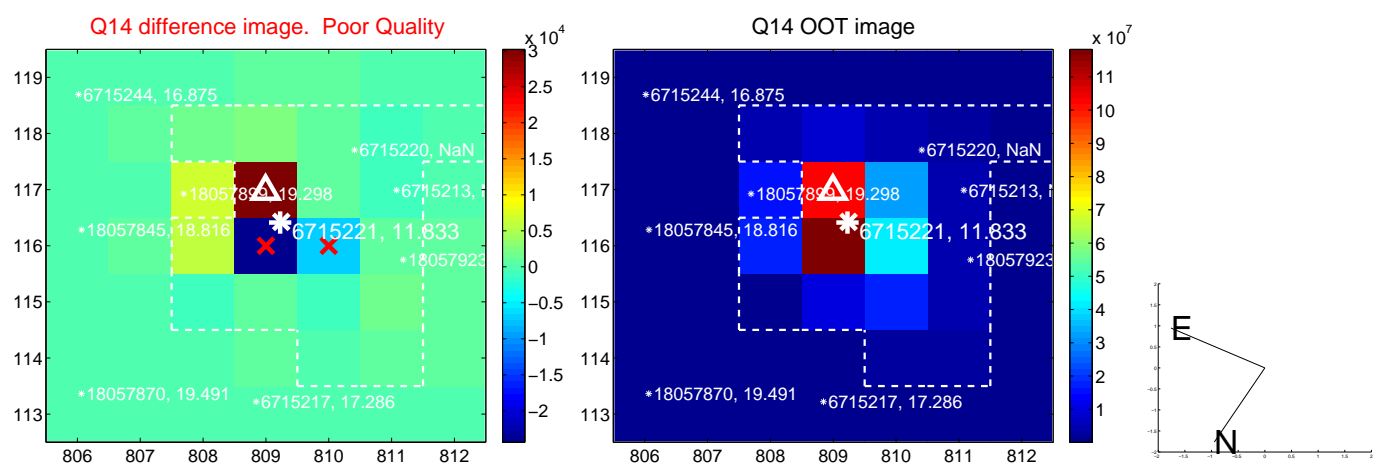
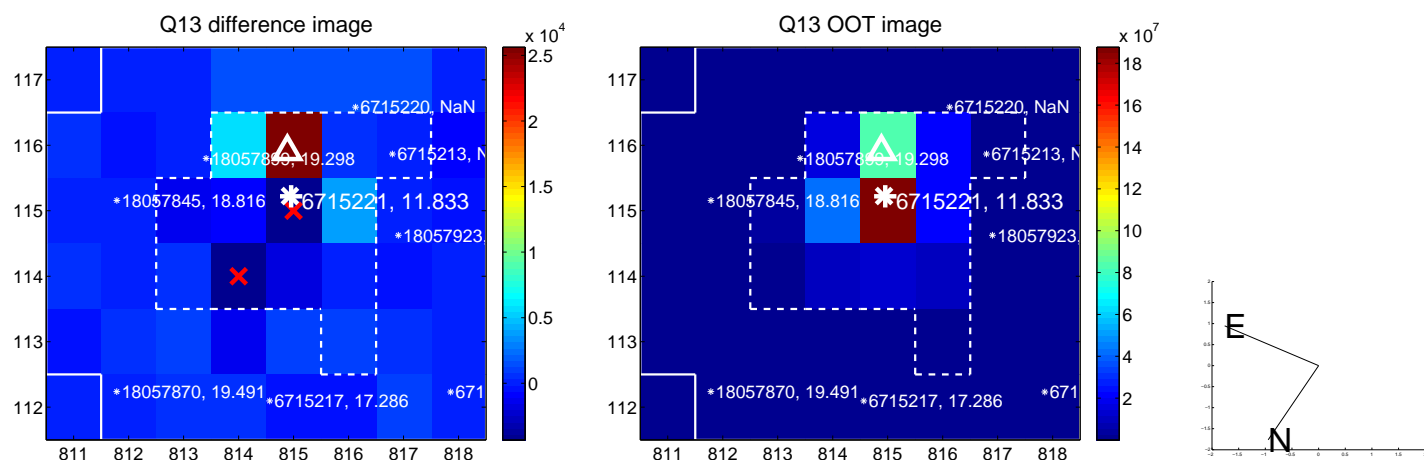




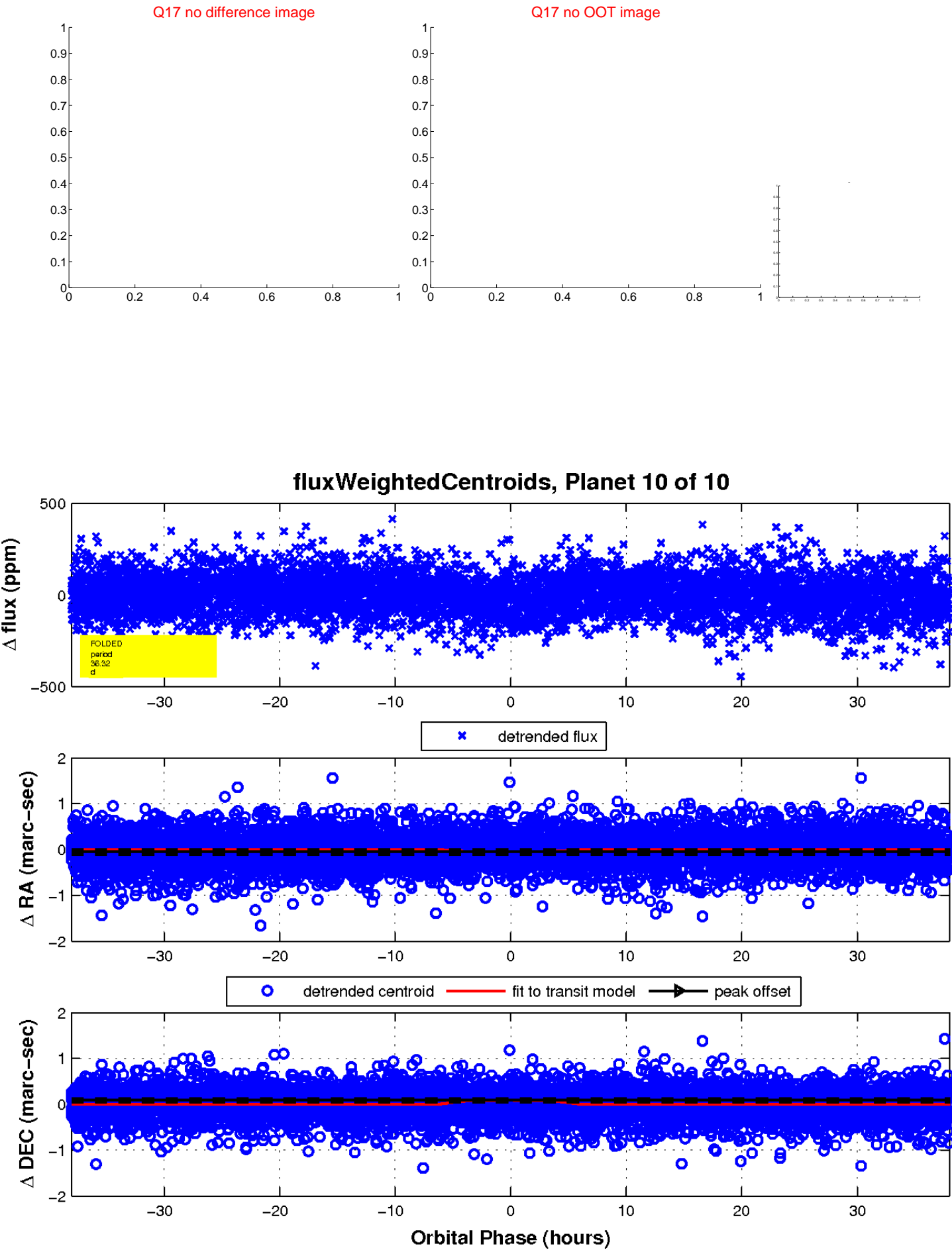
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

