

# KIC 006768616

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006768616-01	OBS	6765.01	13.056564	140.672758	132.3	4.752	7.9	8.8	0.99	6078	1.25	104.01
006768616-02	OBS	6765.02	8.824902	131.708216	116.7	3.106	8.1	7.7	0.99	6078	1.26	175.35

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006768616-01	OBS	PC	0.95	0	0	0	0	NO_COMMENT
006768616-02	OBS	FP	0.29	1	0	0	0	MOD_NONUNIQ_ALT

**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.

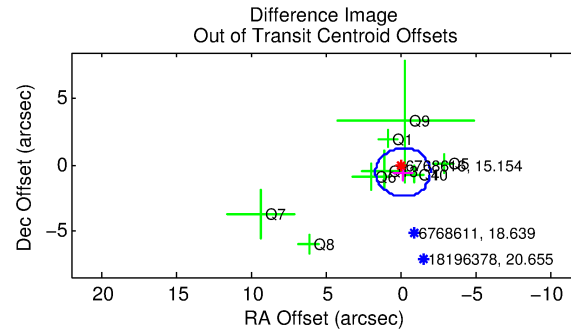
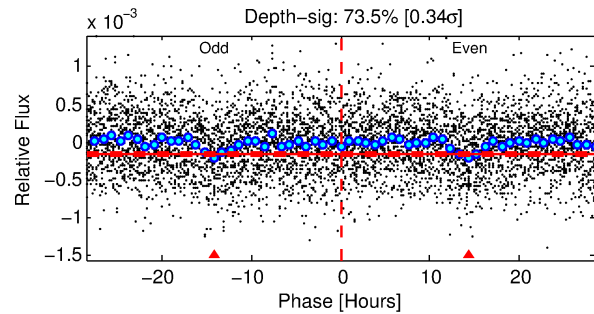
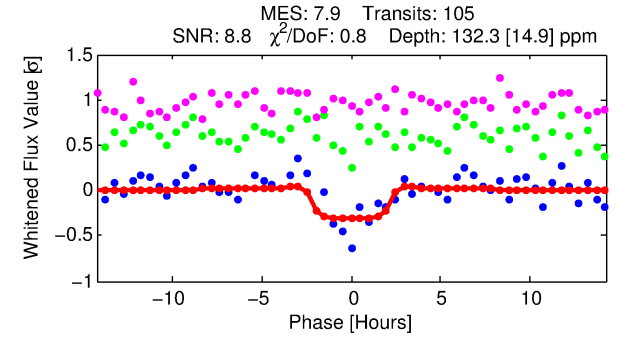
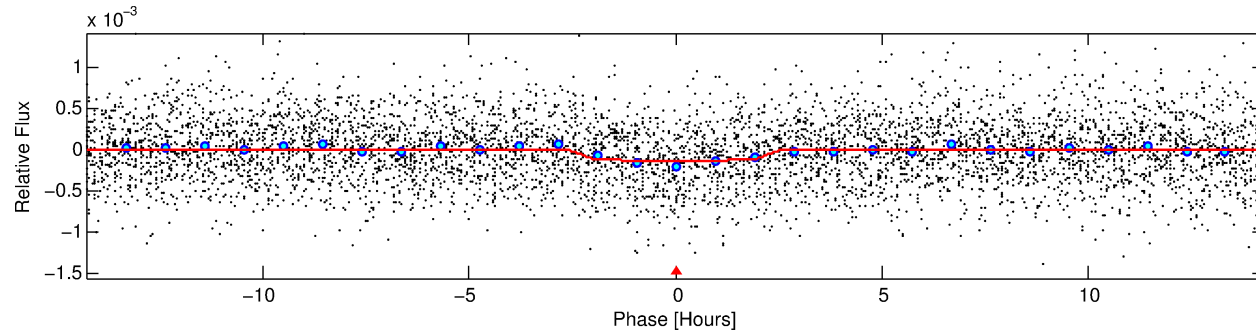
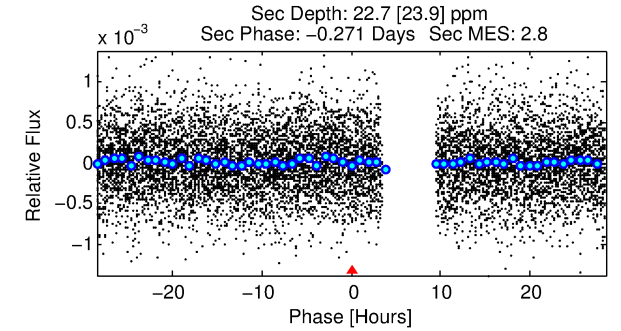
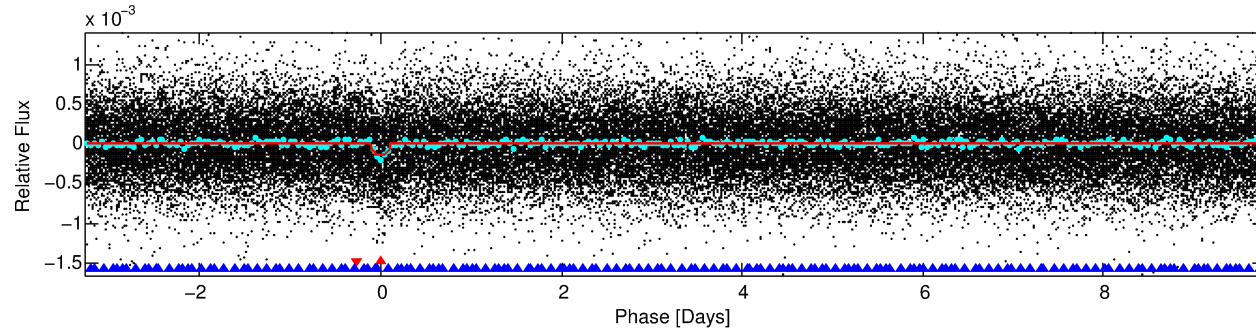
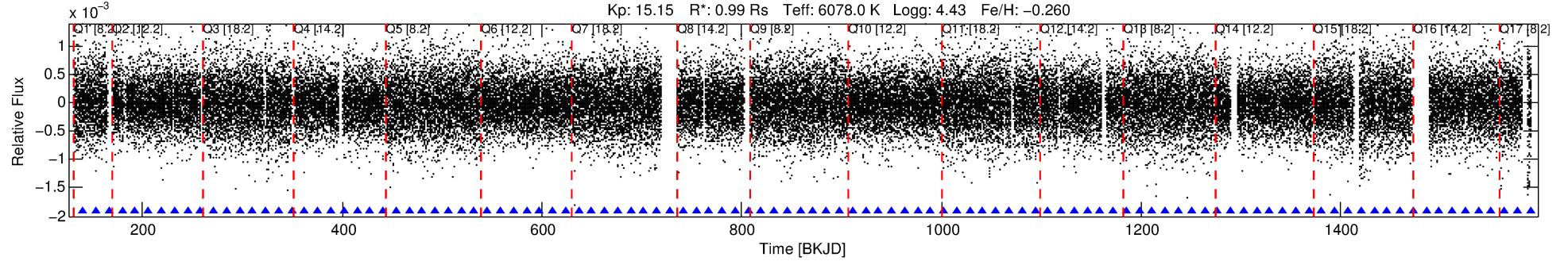
## Ephemeris Match Information For 006768616-01

No Significant Match Found

# DV One-Page Summary

KIC: 6768616 Candidate: 1 of 2 Period: 13.057 d

KOI: K06765.01 Corr: 0.841



## DV Fit Results:

Period = 13.05656 [0.00017] d  
Epoch = 140.6728 [0.0101] BKJD  
Rp/R\* = 0.0116 [0.0090]  
a/R\* = 13.62 [54.06]  
b = 0.78 [2.06]  
Seff = 104.01 [41.69]  
Teq = 814 [82] K  
Rp = 1.25 [1.05] Re  
a = 0.1078 [0.0276] AU  
Ag = 92.19 [177.27] [0.51σ]  
Teffp = 3901 [1843] K [1.67σ]

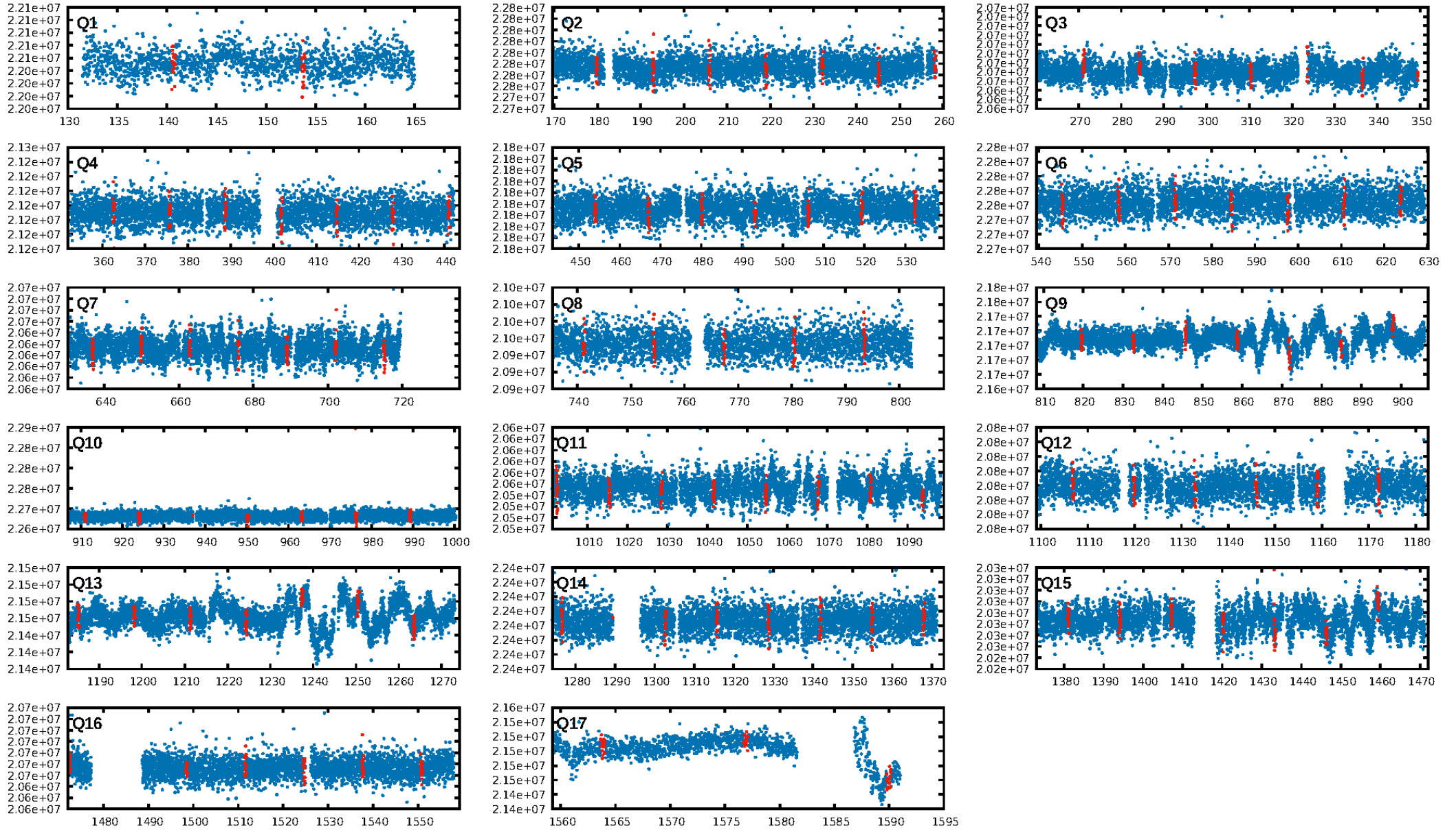
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [17.89σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 99.6%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 4.53e-15  
RollingBand-fgt: 1.00 [100/100]  
GhostDiagnostic-chr: 2.401  
Centroid-sig: 7.0%  
Centroid-so: 2.194 arcsec [1.46σ]  
OotOffset-rm: 0.601 arcsec [0.98σ]  
KicOffset-rm: 0.750 arcsec [1.23σ]  
OotOffset-st: 2/1/2/4 [9]  
KicOffset-st: 2/1/2/4 [9]  
DiffImageQuality-fgm: 0.44 [4/9]  
DiffImageOverlap-fno: 1.00 [17/17]

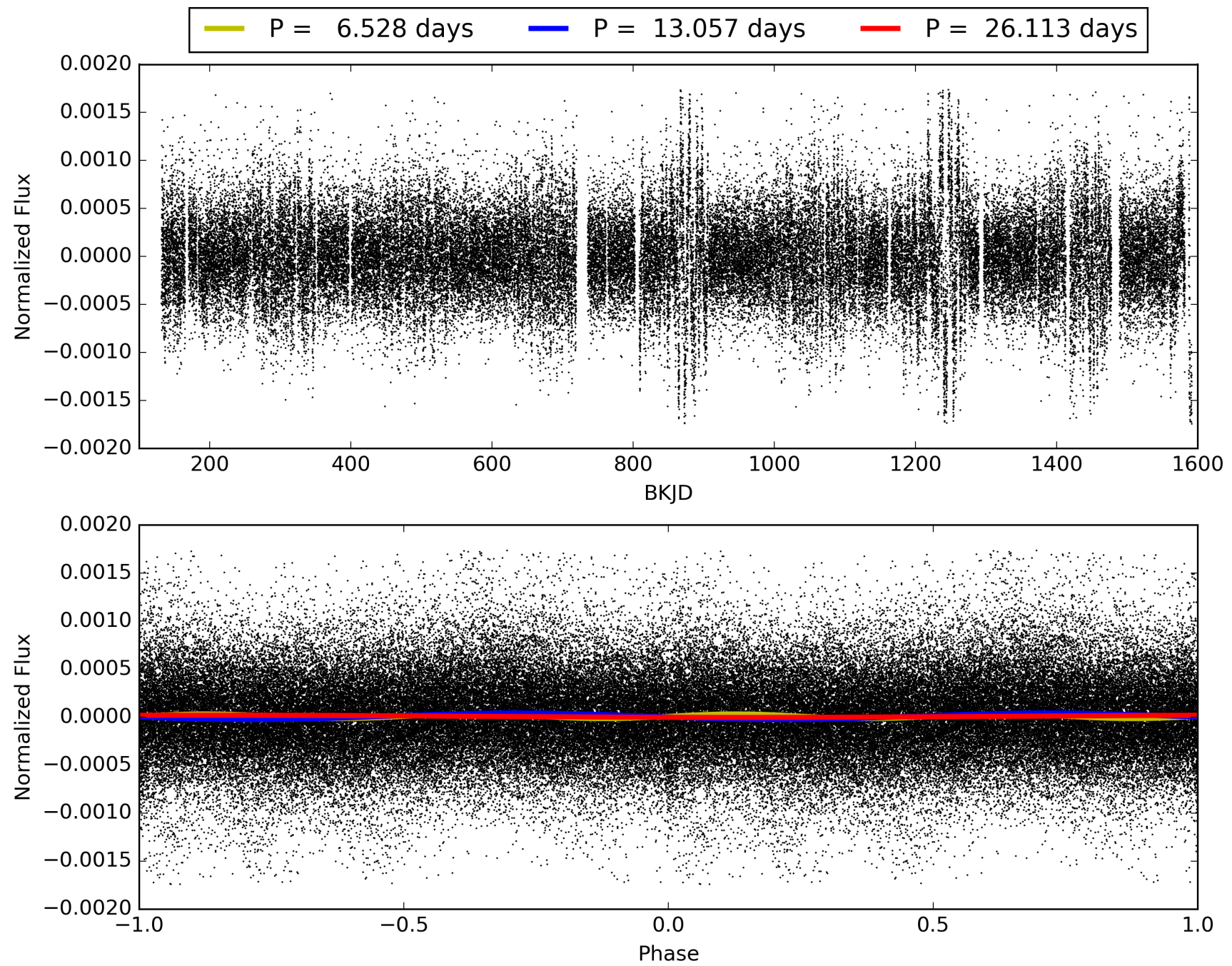
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 20:11:49 Z

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

# TCE 006768616-01, PDC Light Curves



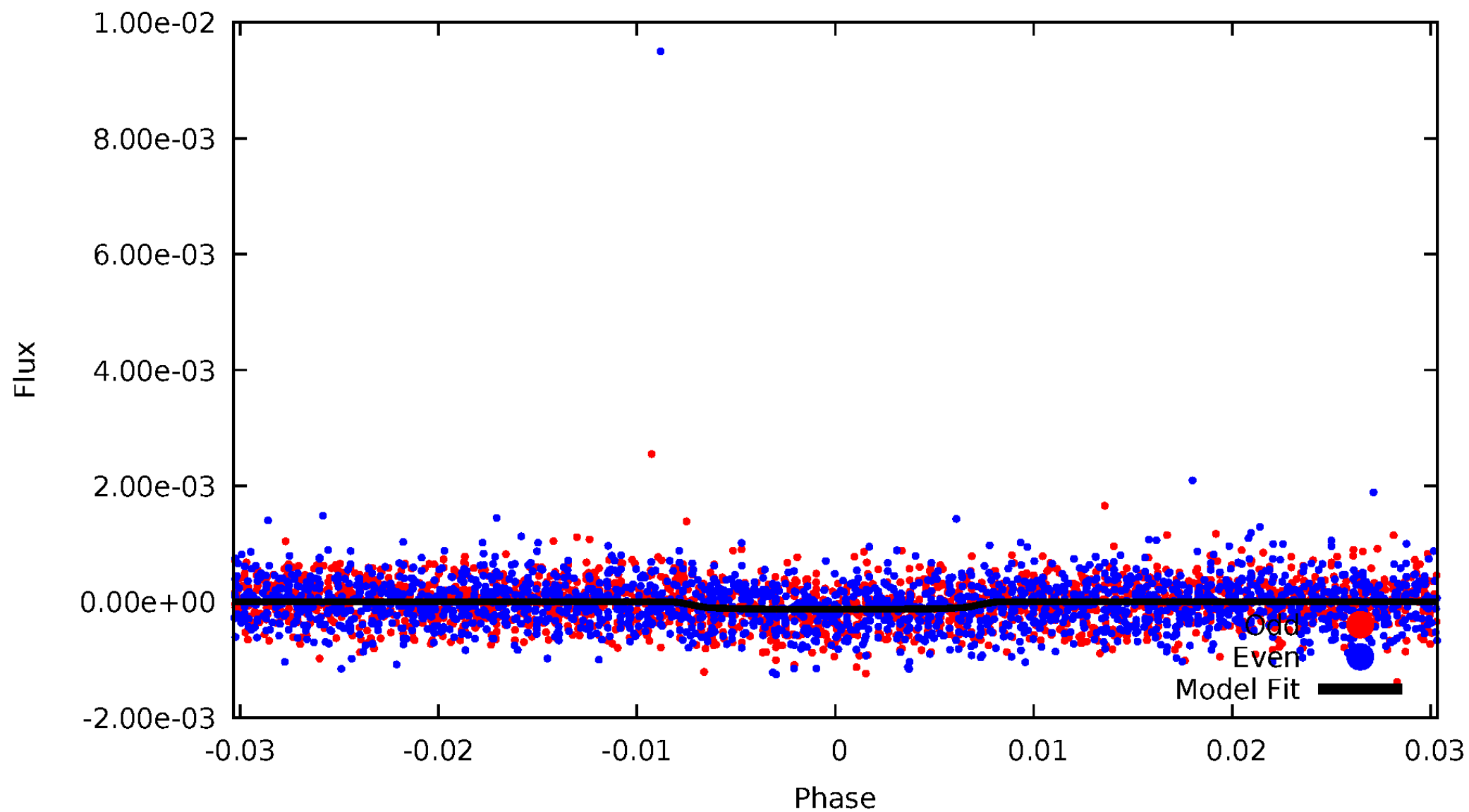
TCE 006768616-01





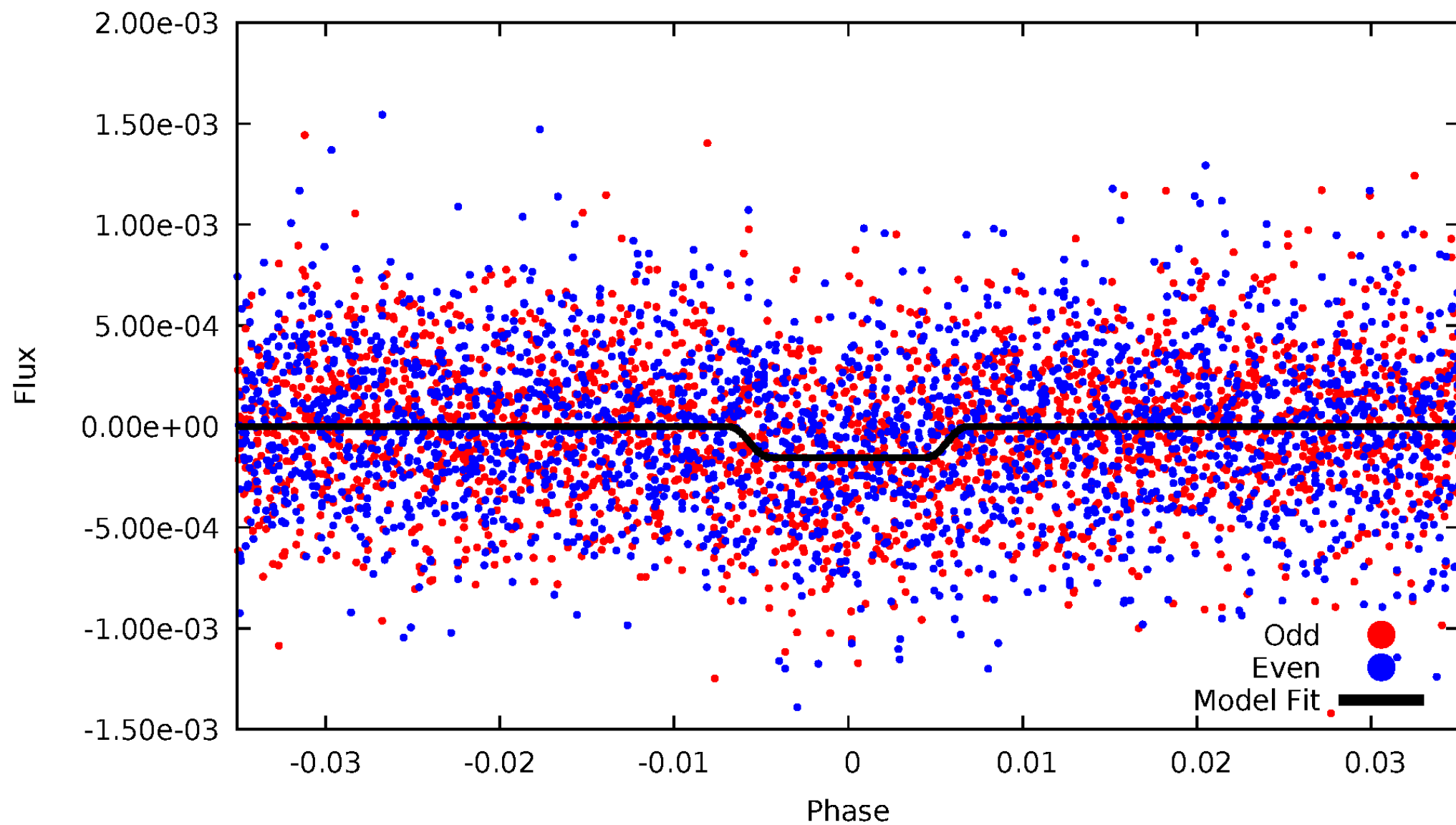
# DV Odd/Even

TCE 006768616-01



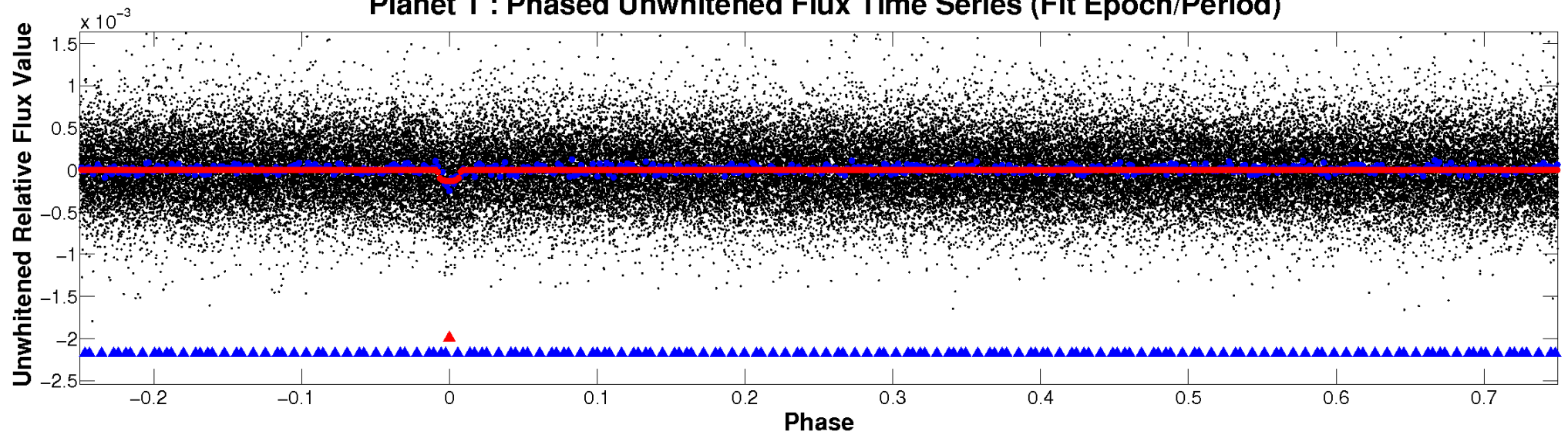
# ALT Odd/Even

TCE 006768616-01

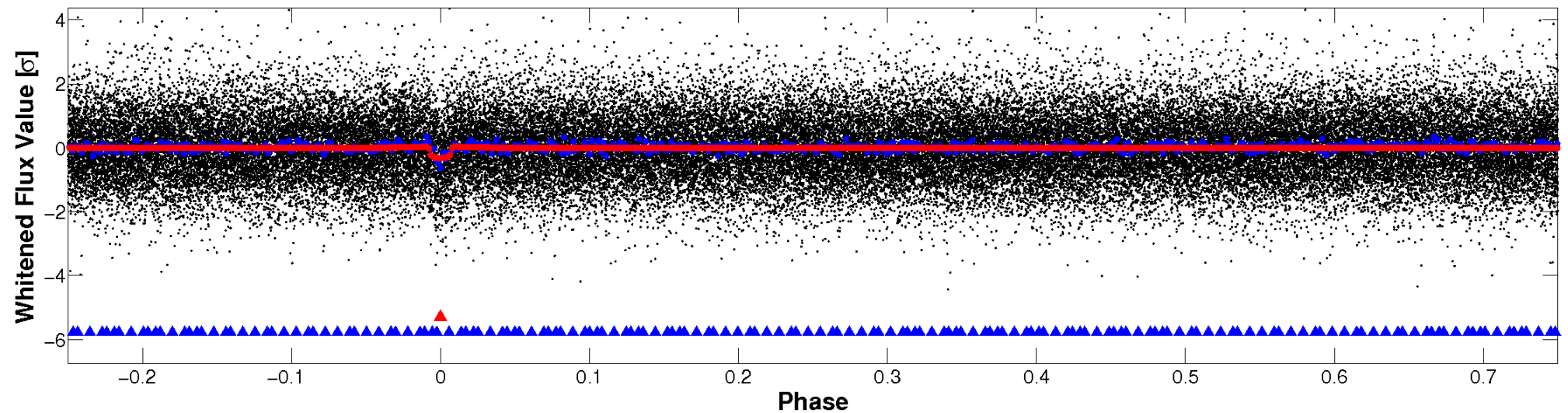


# Non-Whitened Vs. Whitened Light Curve

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

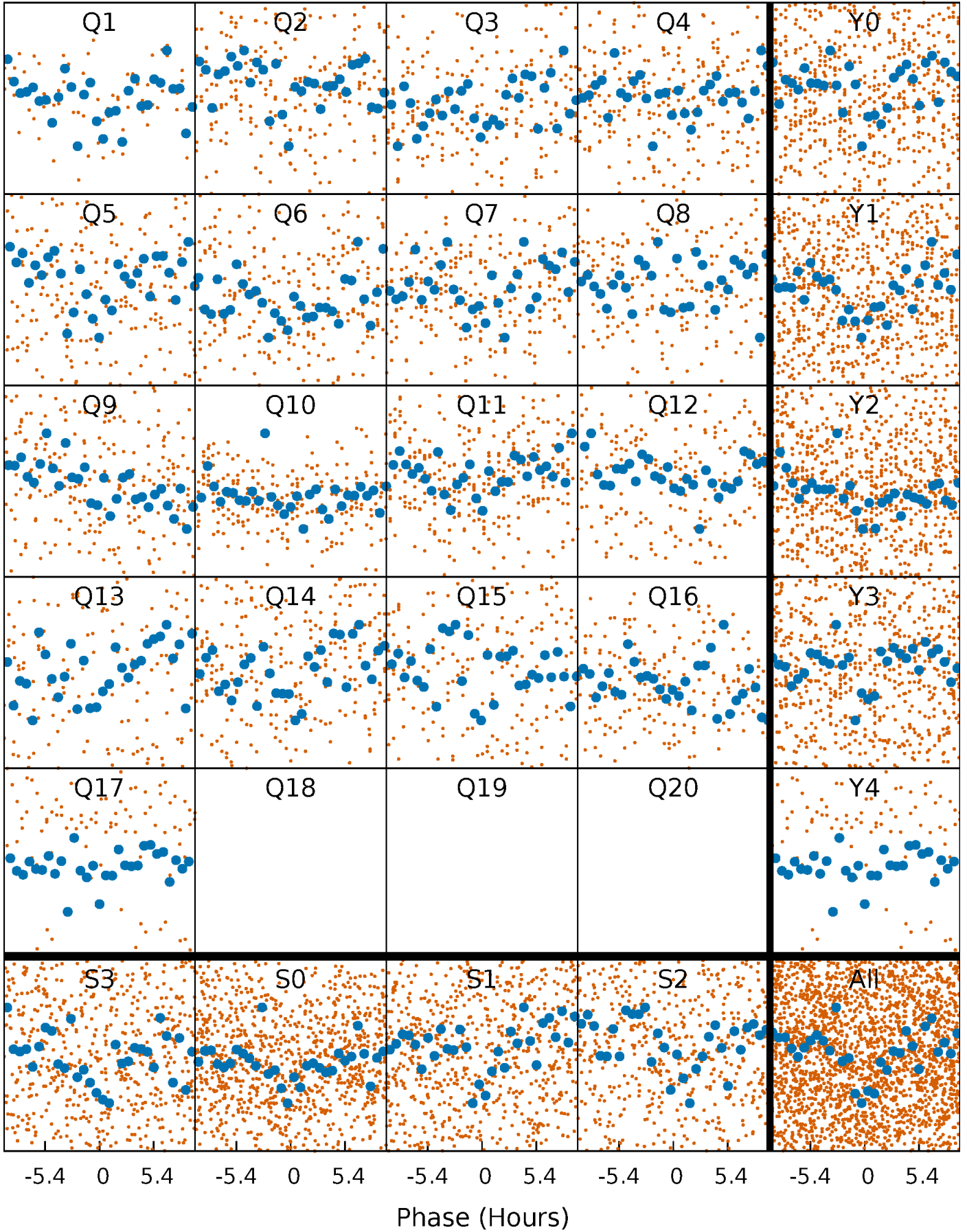


## Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

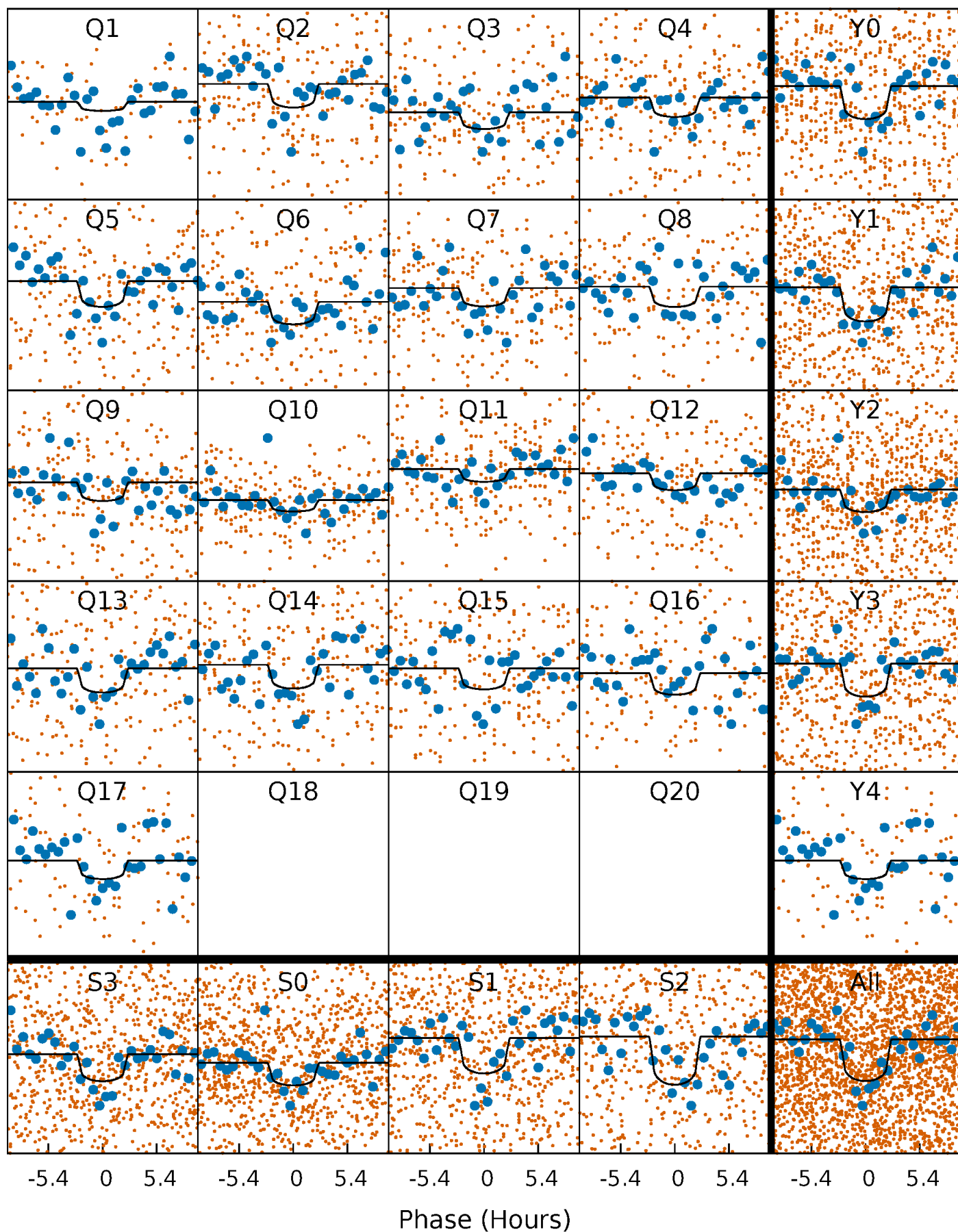
TCE 006768616-01 P= 13.056564 Days  $T_0=140.672758$  (BKJD)





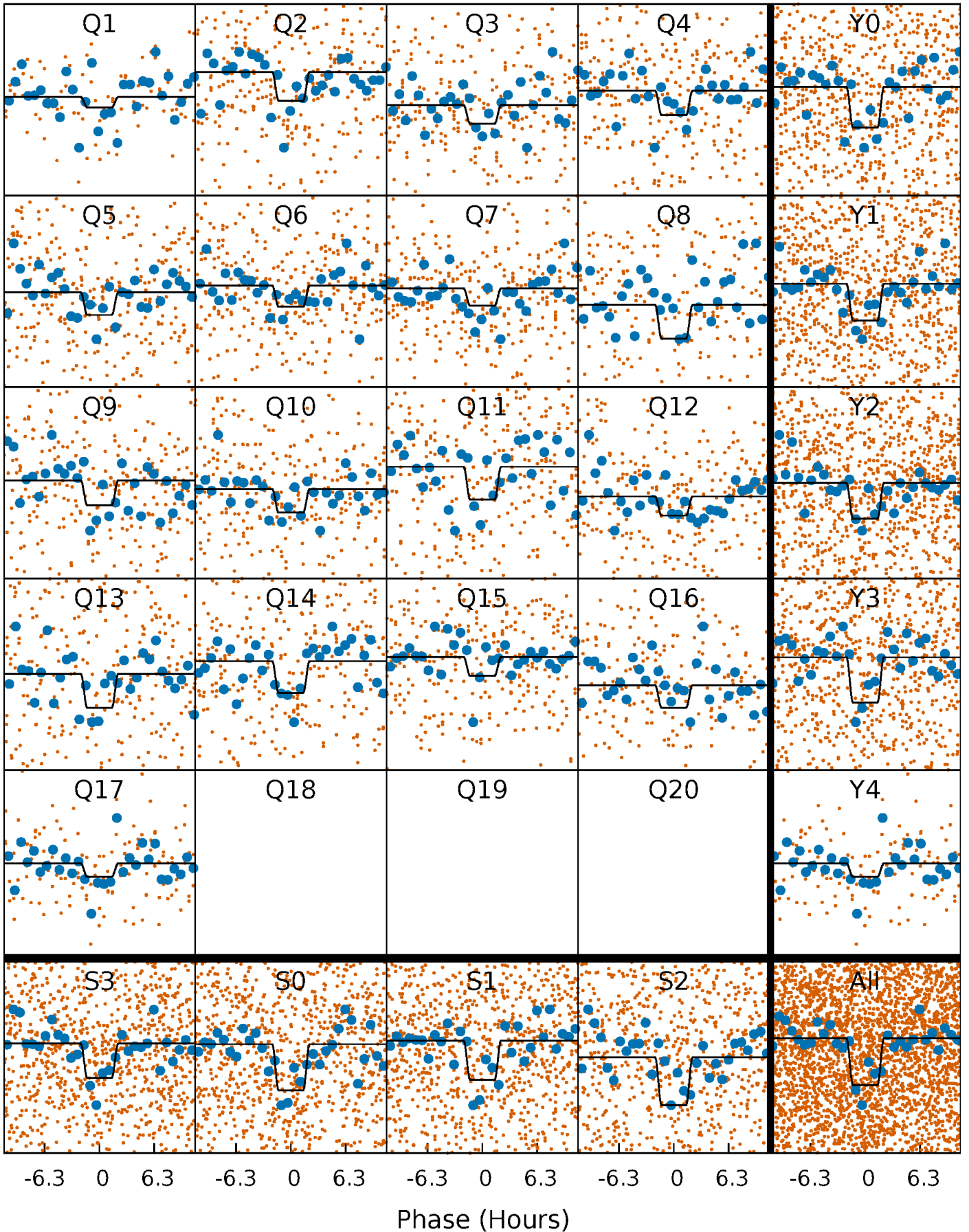
# DV Quarter-Phased Transit Curves

TCE 006768616-01 P= 13.056564 Days  $T_0=140.672758$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

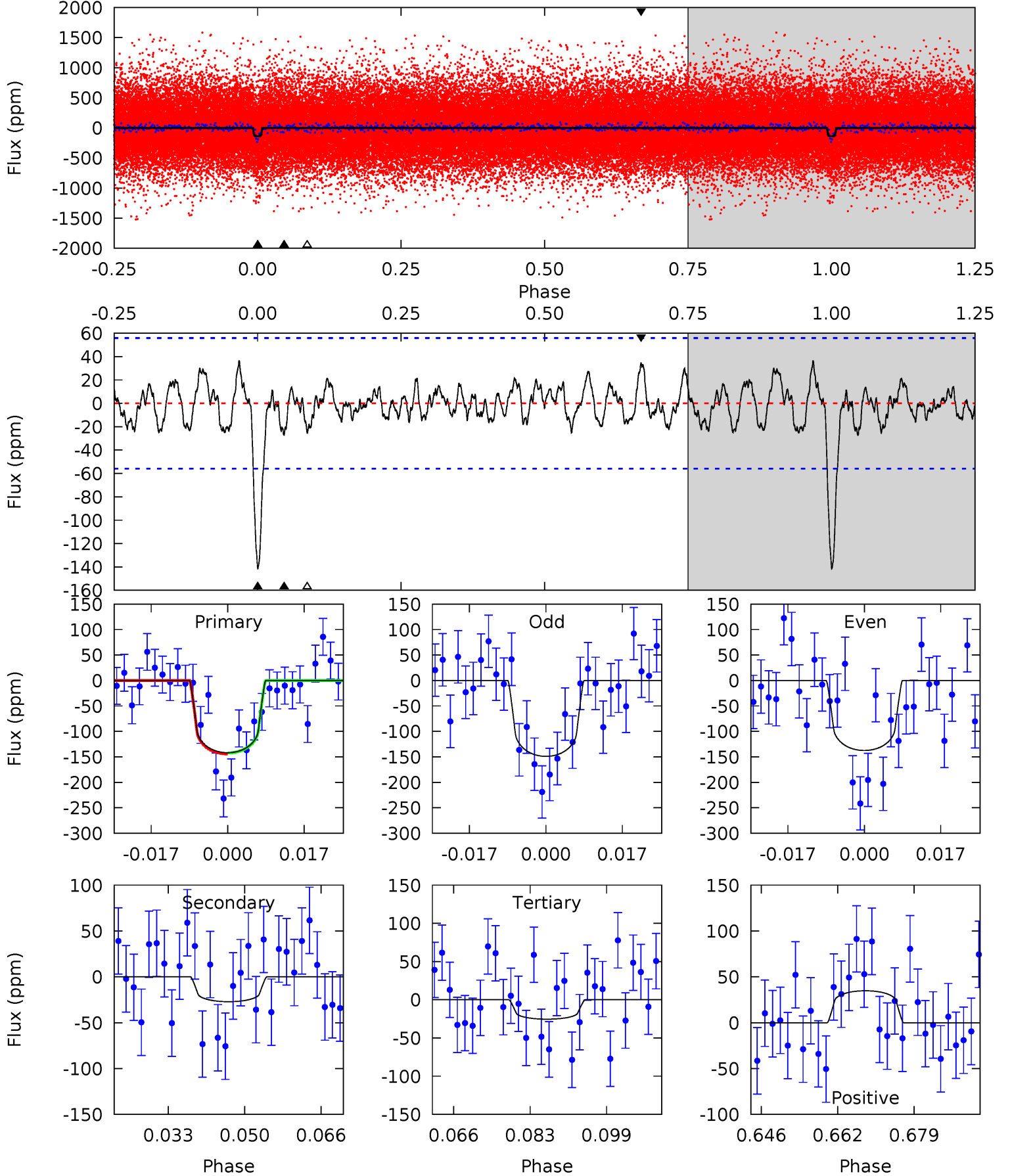
TCE 006768616-01 P= 13.056507 Days  $T_0=140.686535$  (BKJD)



# DV Model-Shift Uniqueness Test

006768616-01, P = 13.056564 Days, E = 127.616194 Days

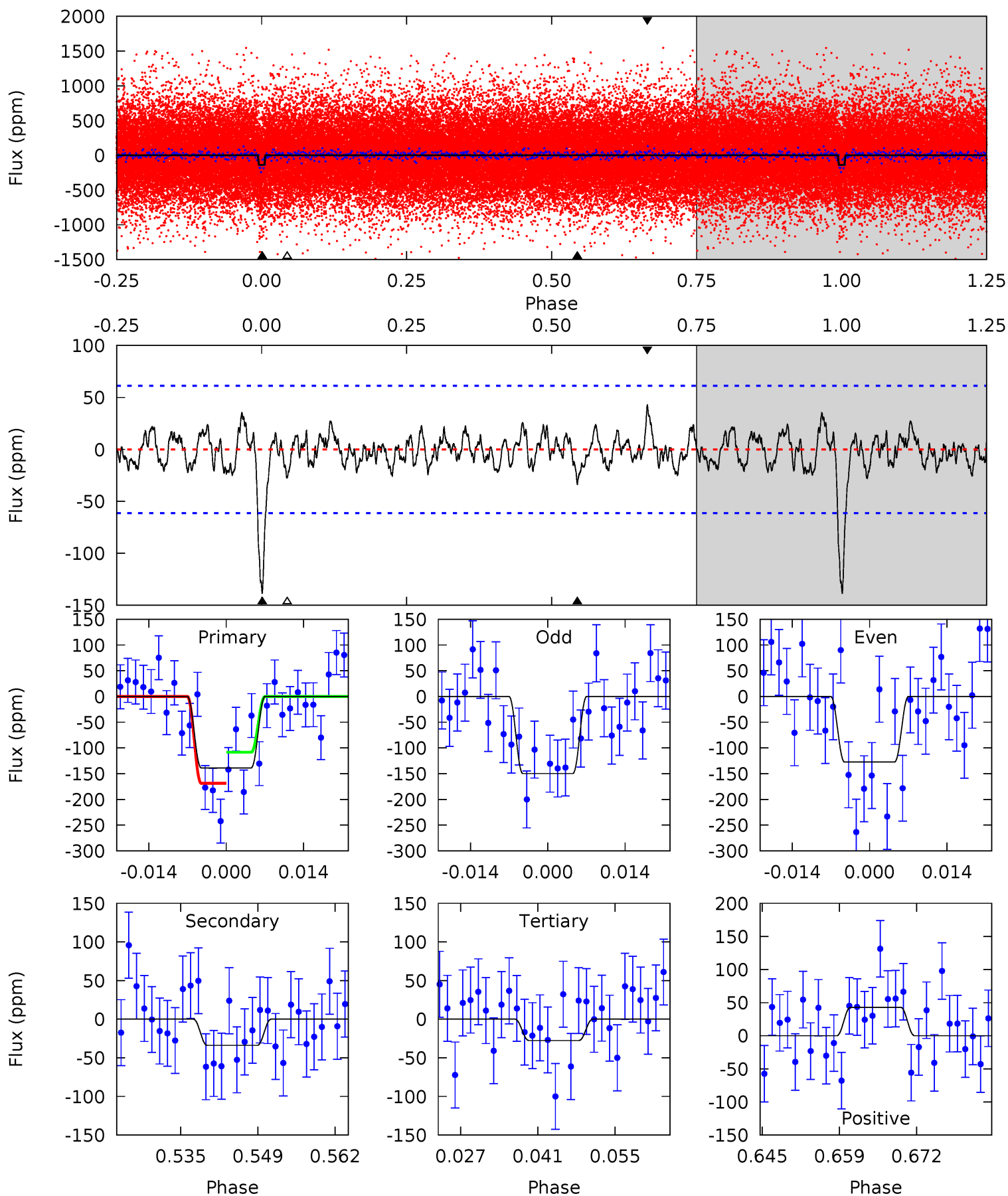
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.5	2.39	2.24	3.07	4.93	2.40	1.12	10.3	9.42	0.15	-0.68	0.51	1.12	0.20	0.08



# Alt Model-Shift Uniqueness Test

006768616-01, P = 13.056507 Days, E = 127.630028 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
11.2	2.75	2.23	3.48	4.97	2.46	1.00	9.00	7.75	0.51	-0.73	0.91	1.08	0.24	2.45





### Stellar Parameters For KIC 006768616

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6078^{+181}_{-200}$	$4.434^{+0.084}_{-0.210}$	$-0.260^{+0.300}_{-0.300}$	$0.994^{+0.296}_{-0.127}$	$0.978^{+0.142}_{-0.116}$	$1.402^{+0.523}_{-0.732}$
	+3%/-3%	+2%/-5%	+115%/-115%	+30%/-13%	+15%/-12%	+37%/-52%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 006768616-01 / KOI 6765.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-27 \pm 11$	$1.47^{+0.93}_{-0.88}$	$1156^{+82}_{-63}$	$4096^{+1851}_{-676}$	$77^{+369}_{-50}$
Alt.	$-34 \pm 12$	$1.49^{+1.00}_{-0.88}$	$1153^{+91}_{-59}$	$4206^{+2114}_{-710}$	$90^{+502}_{-60}$

$T_{\text{max}}$  = 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

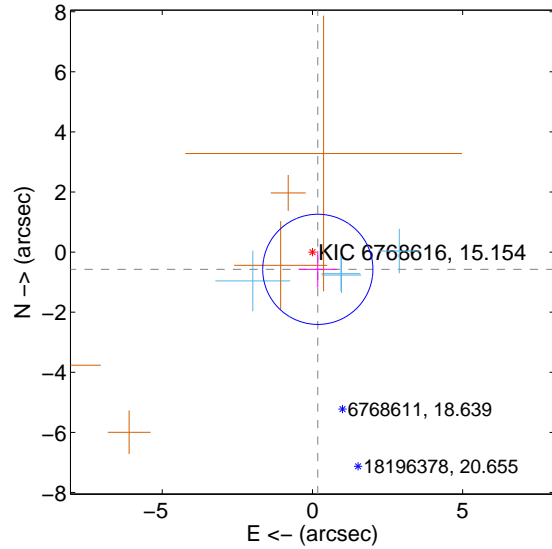
Supplemental centroid analysis for 006768616-01. Kepler magnitude: 15.15. Transit SNR 8.77

There are 4 quarters with good PRF difference image offsets

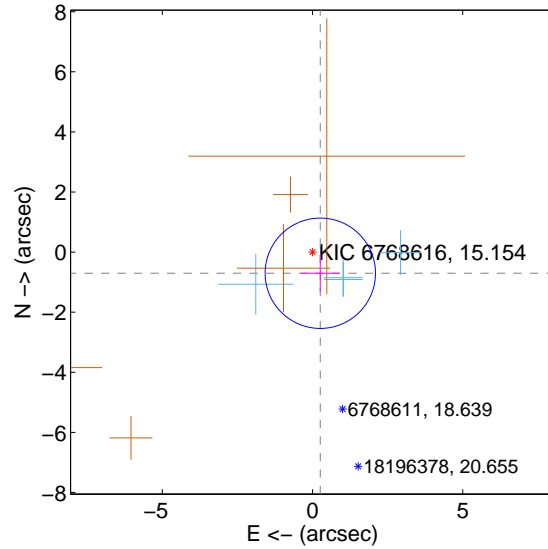
The direct PRF centroid is offset from the target star catalog position by about 0.13 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.601 \pm 0.611$	0.98	$-0.179 \pm 0.636$	$-0.574 \pm 0.609$
PRF-fit source offset from KIC position	$0.750 \pm 0.612$	1.23	$-0.259 \pm 0.636$	$-0.704 \pm 0.609$
photometric centroid source offset	$2.19 \pm 1.51$	1.46	$1.89 \pm 1.45$	$-1.11 \pm 1.65$

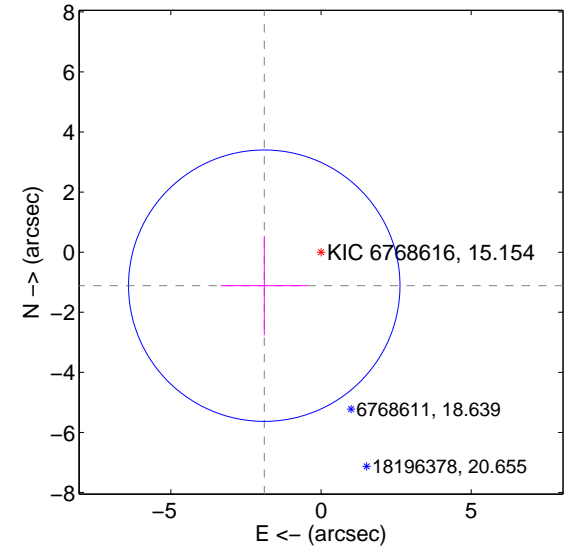
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

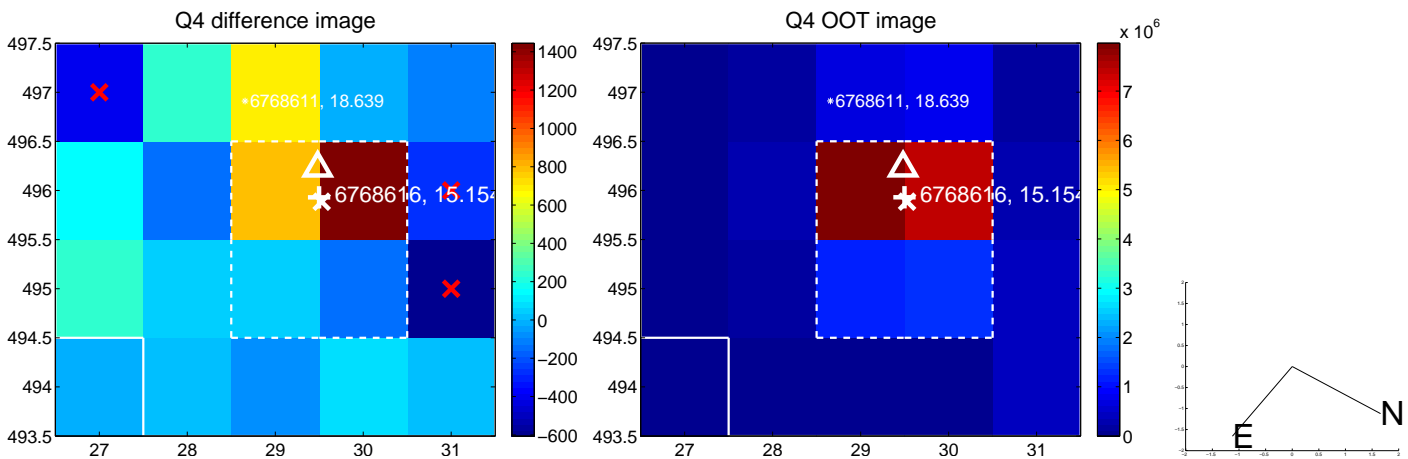
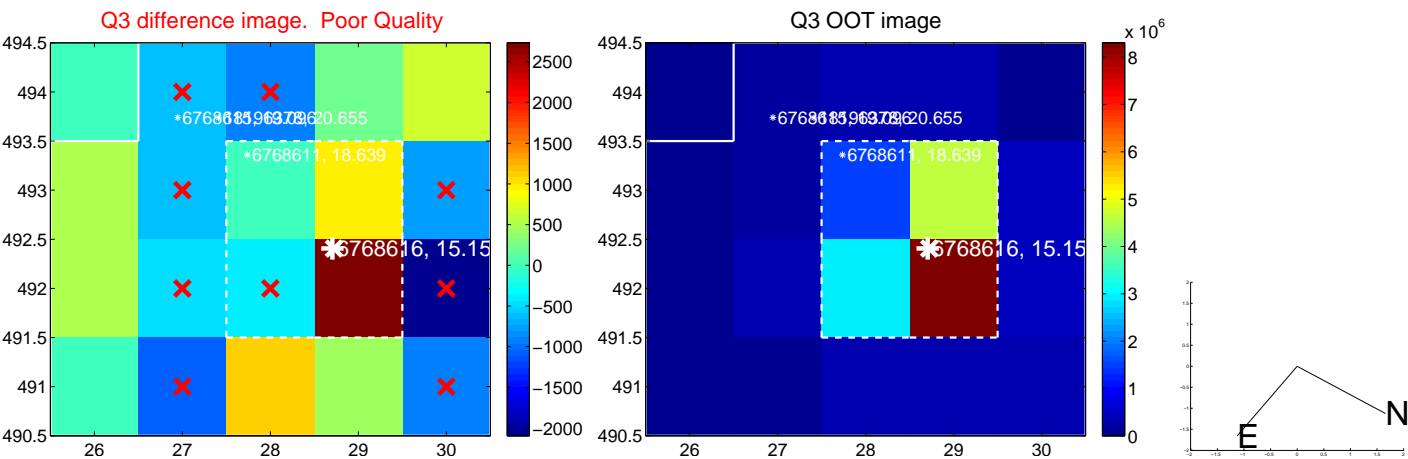
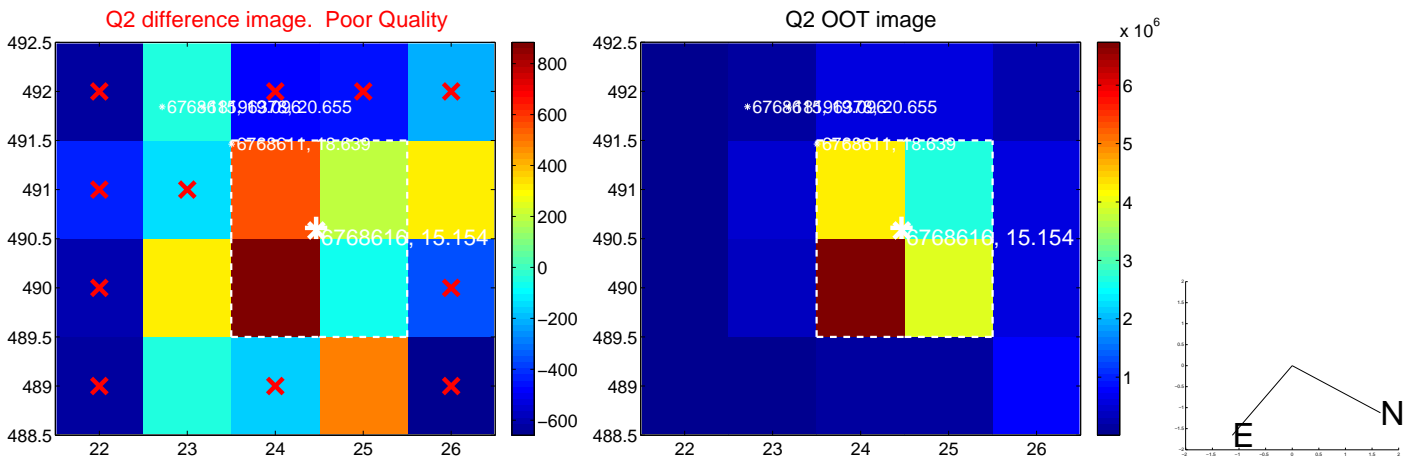
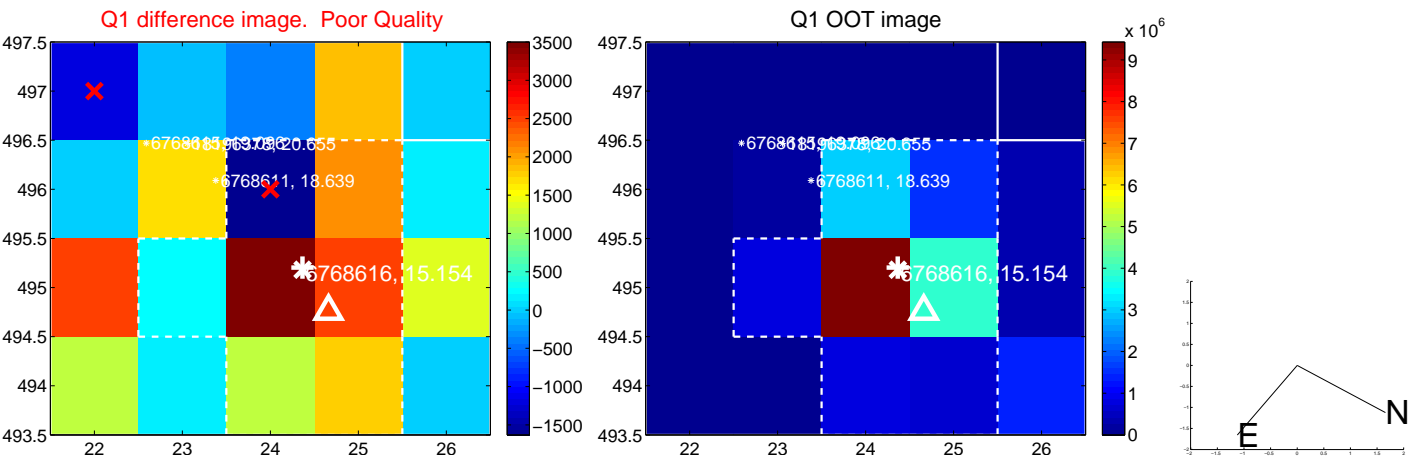


offset from photometric centroids

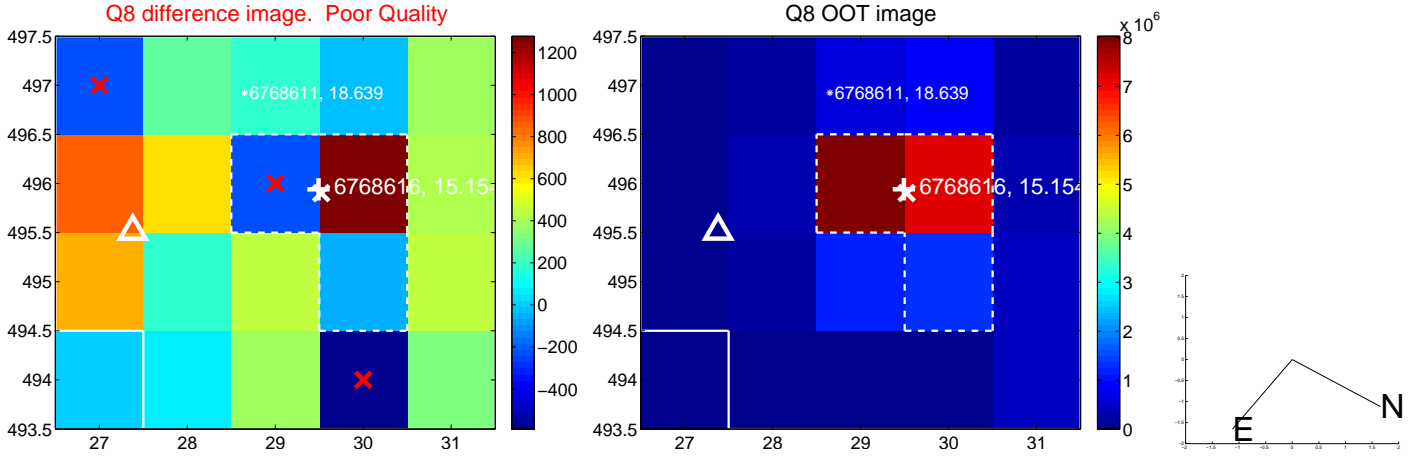
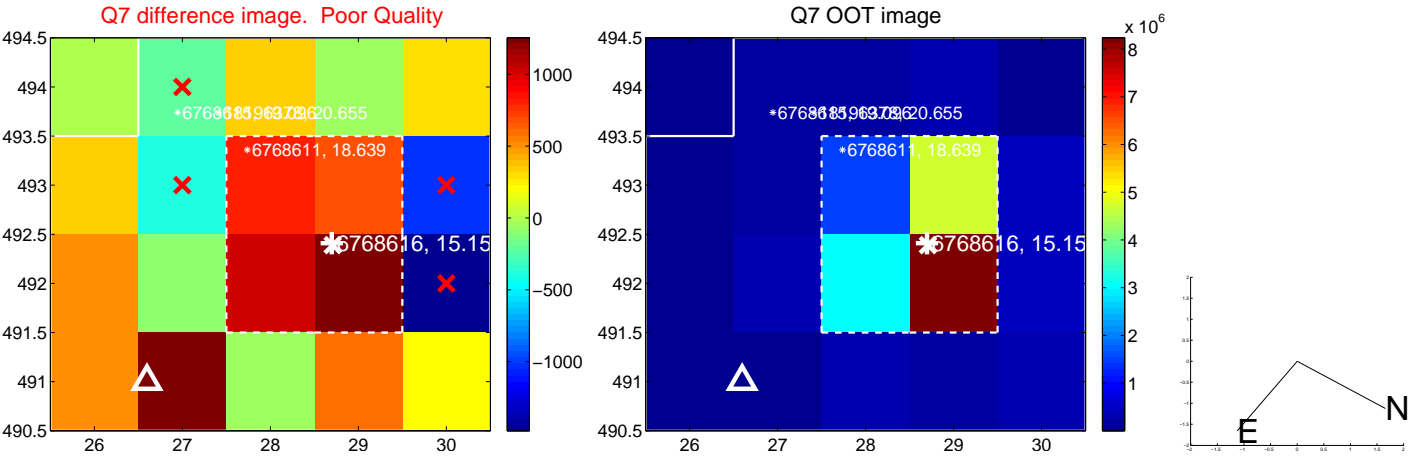
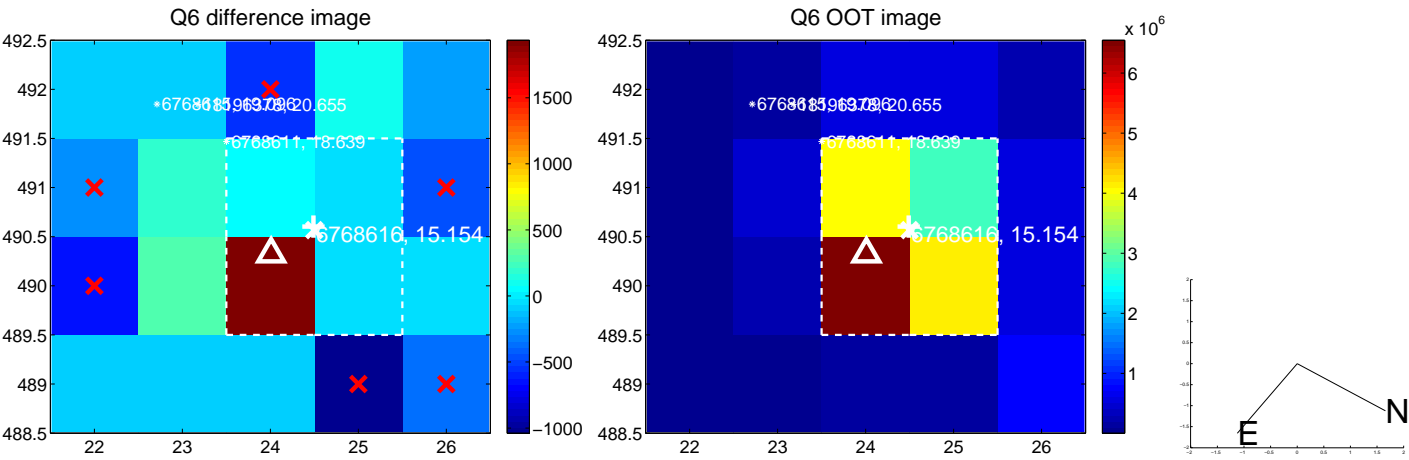
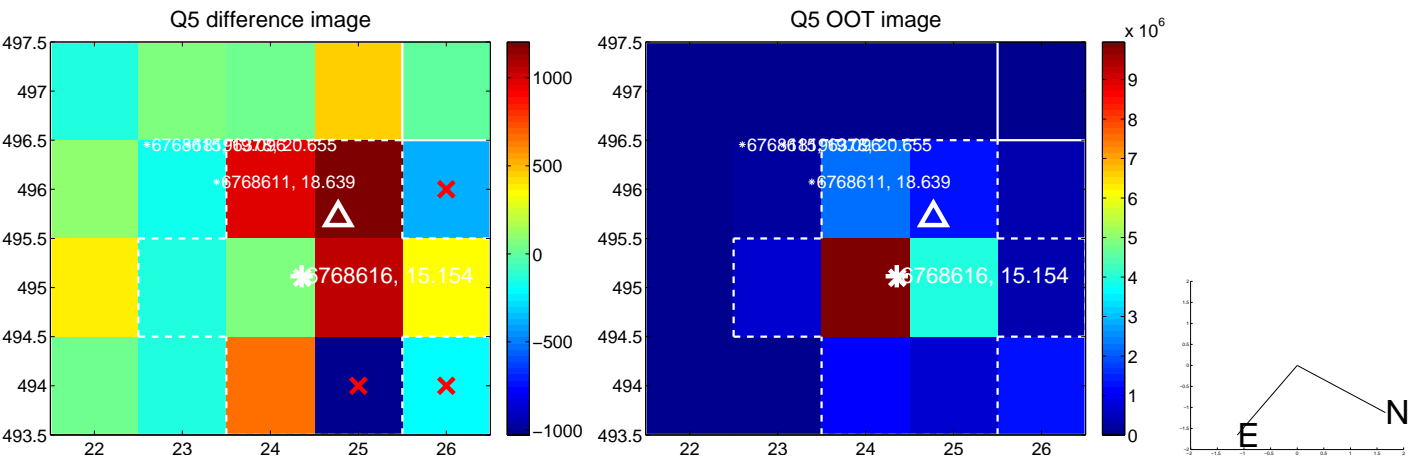


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



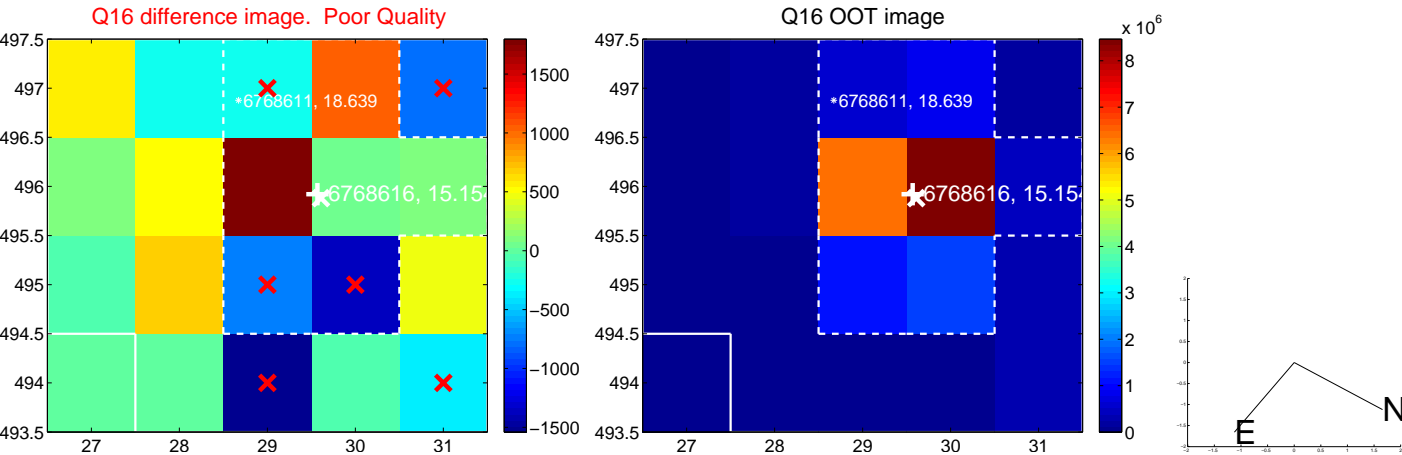
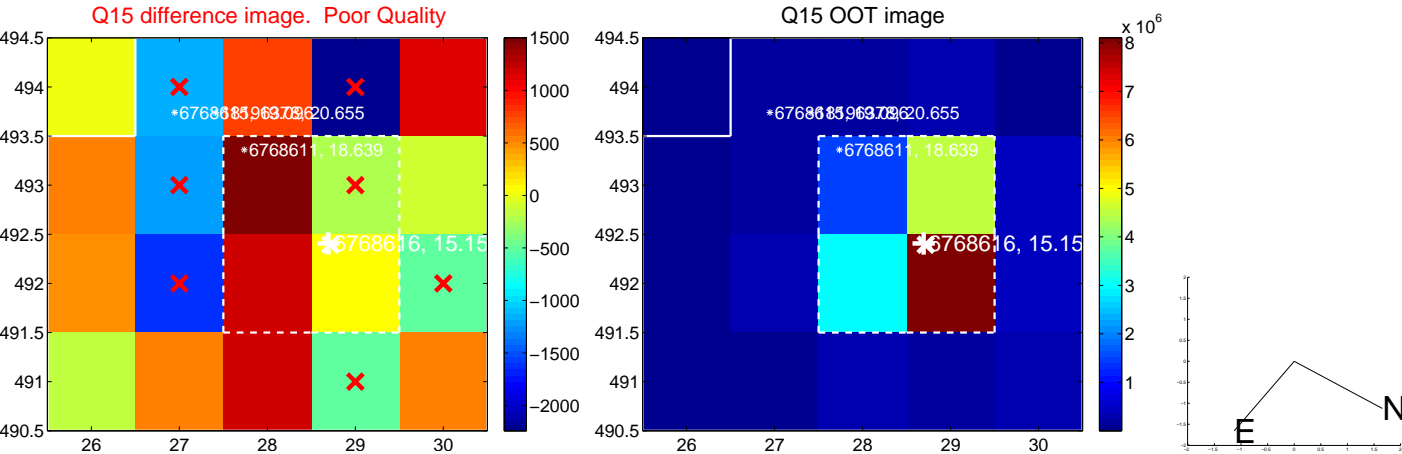
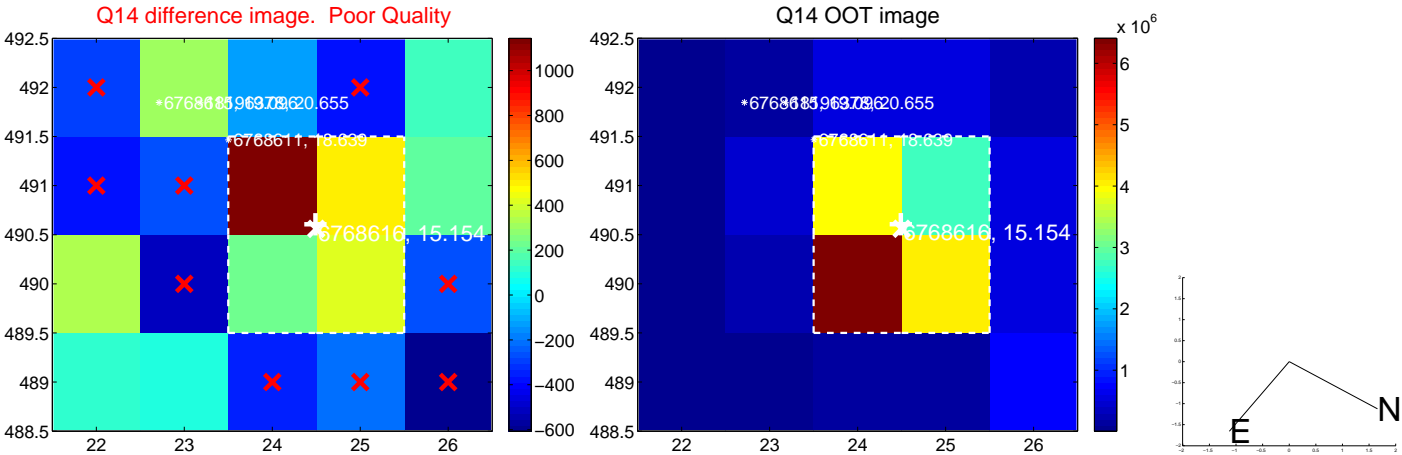
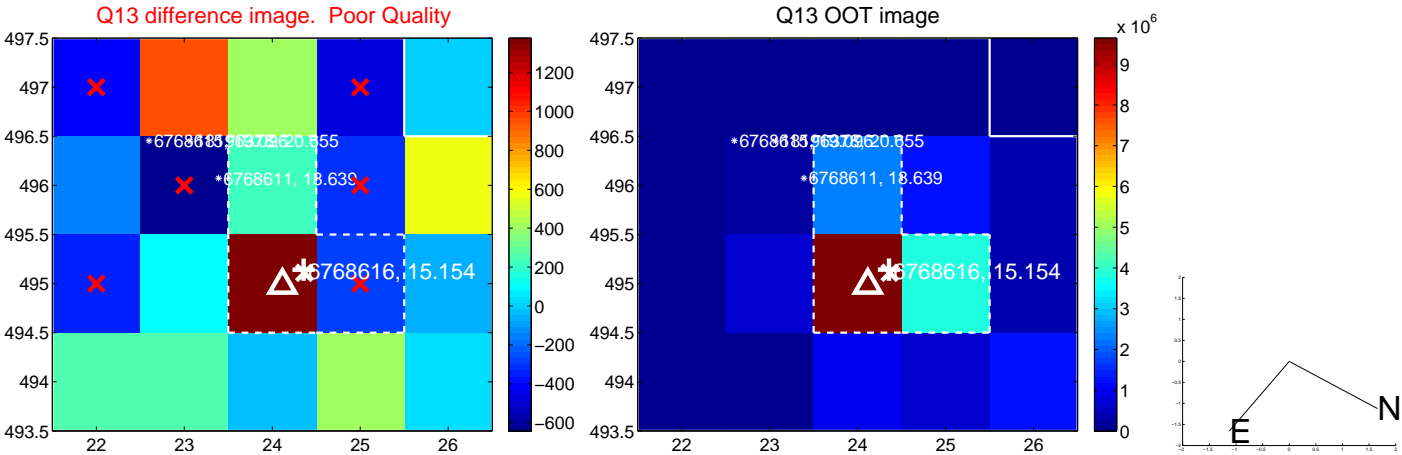
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



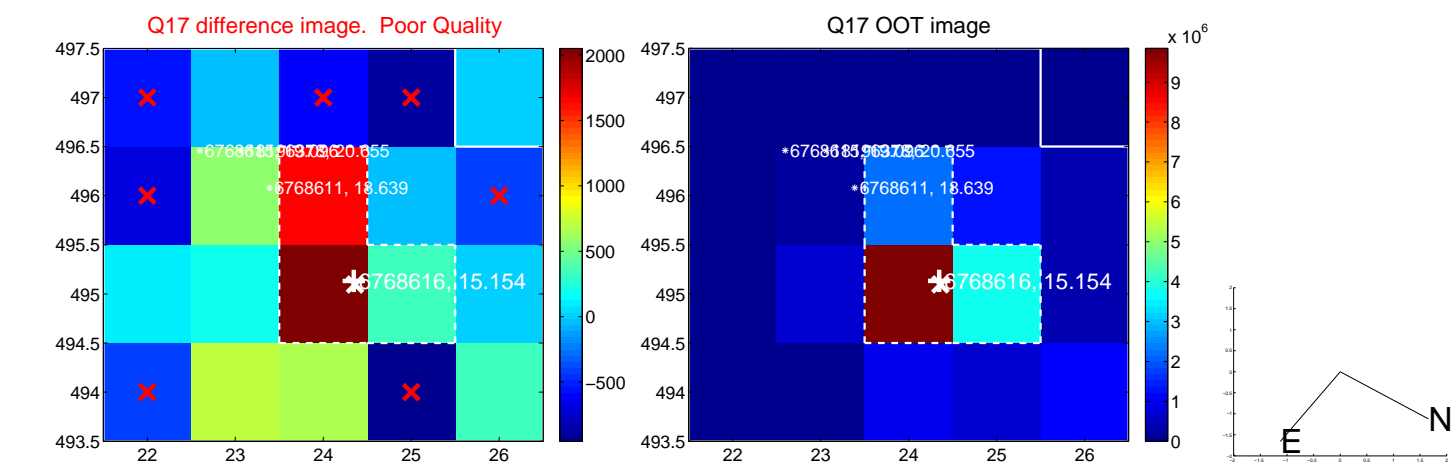




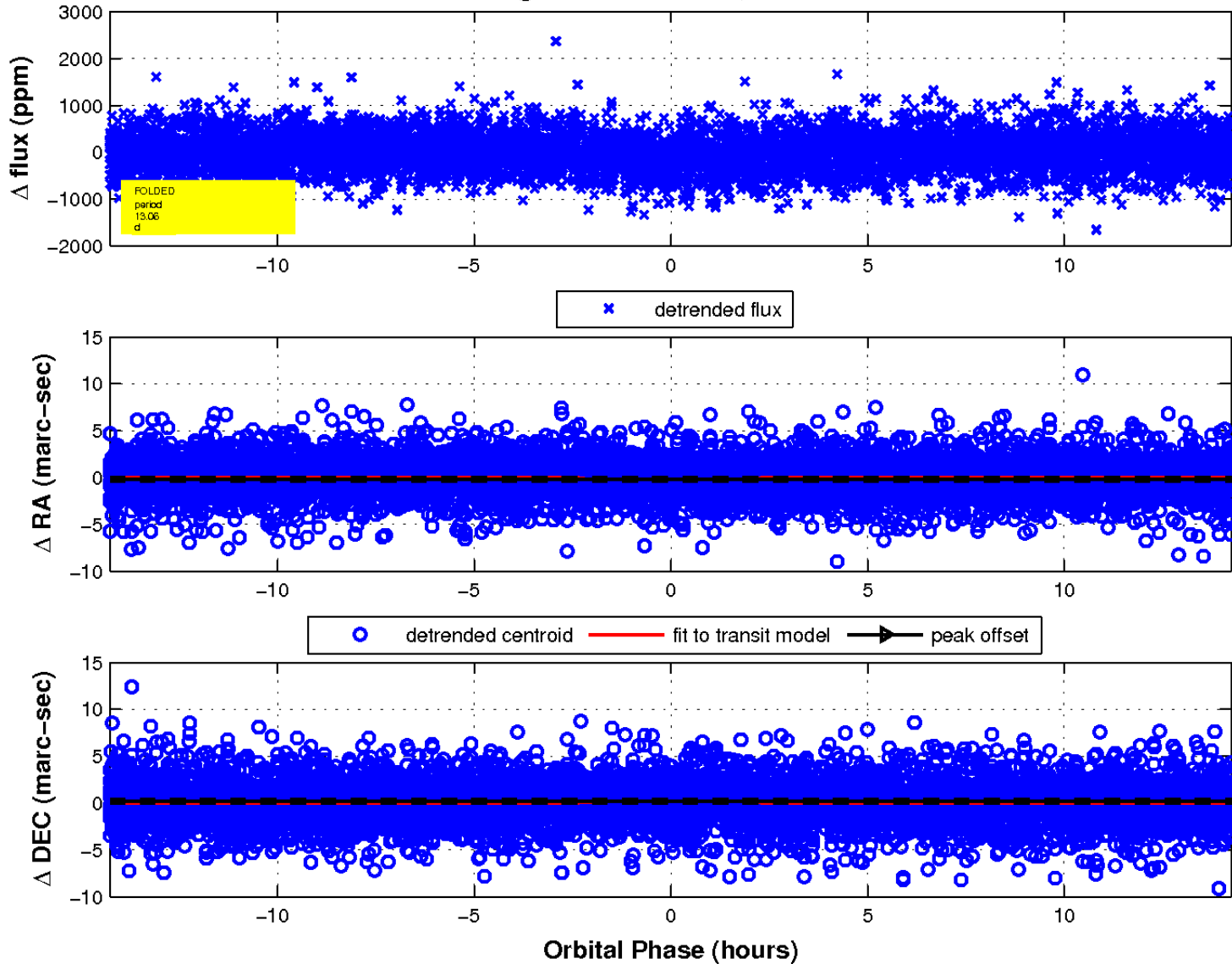
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

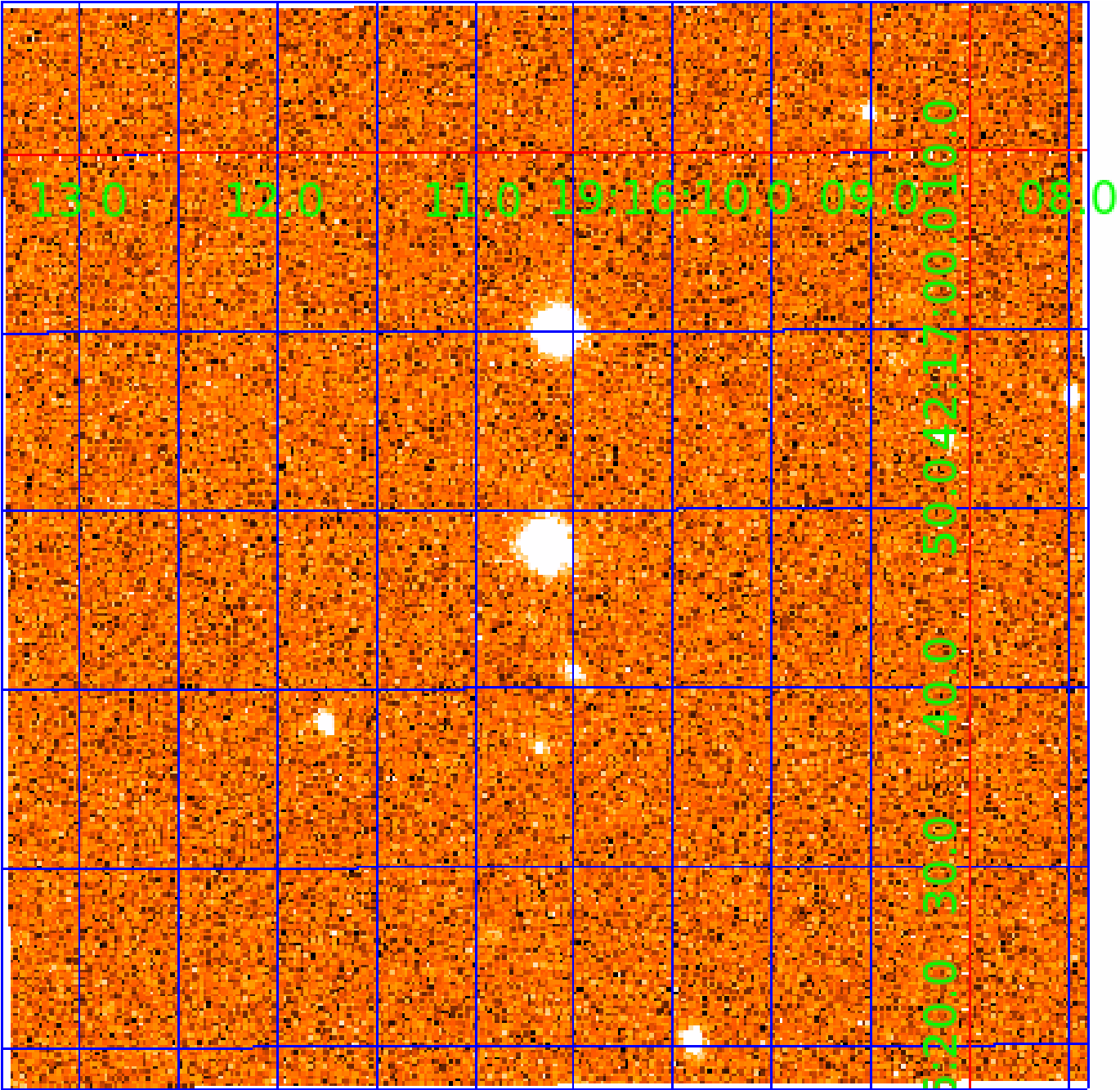


fluxWeightedCentroids, Planet 1 of 2



UKIRT Image

Declination





# KIC 006768616

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006768616-01	OBS	6765.01	13.056564	140.672758	132.3	4.752	7.9	8.8	0.99	6078	1.25	104.01
006768616-02	OBS	6765.02	8.824902	131.708216	116.7	3.106	8.1	7.7	0.99	6078	1.26	175.35

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006768616-01	OBS	PC	0.95	0	0	0	0	NO_COMMENT
006768616-02	OBS	FP	0.29	1	0	0	0	MOD_NONUNIQ_ALT

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

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

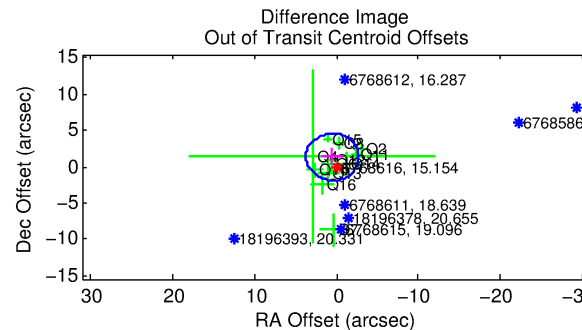
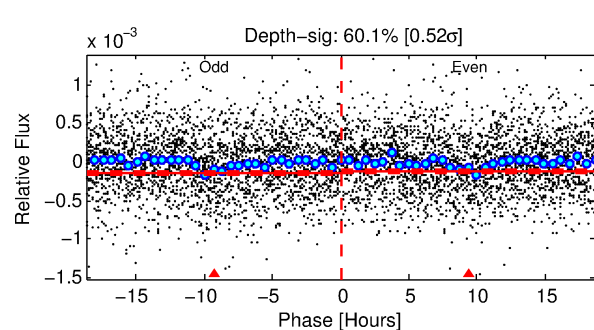
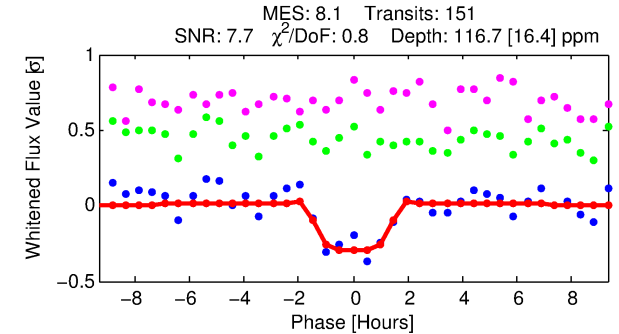
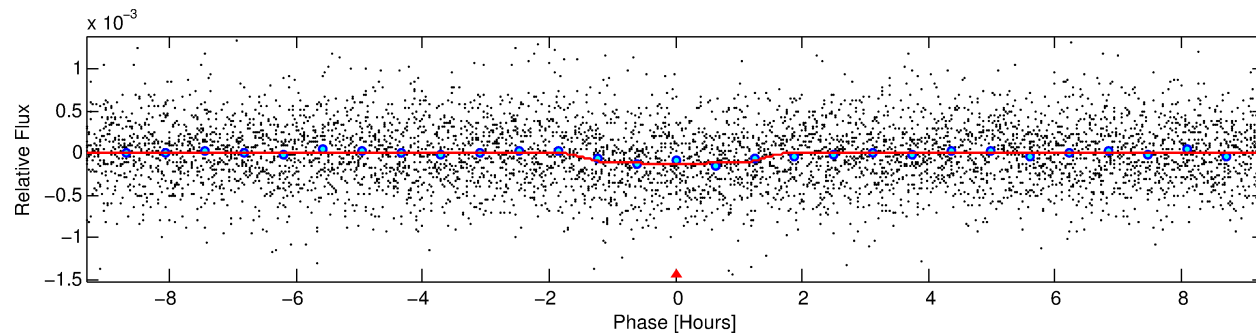
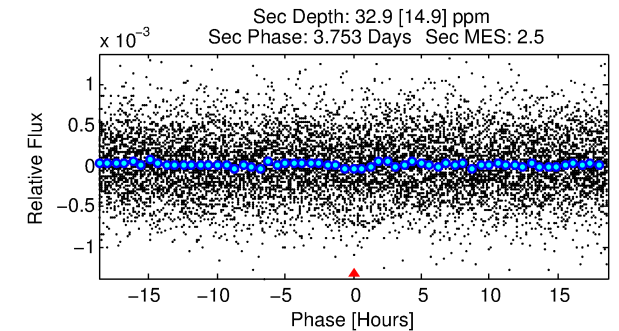
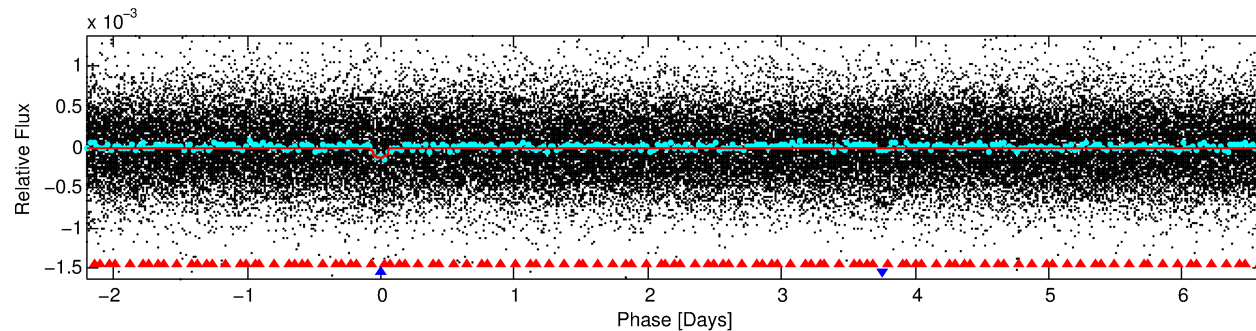
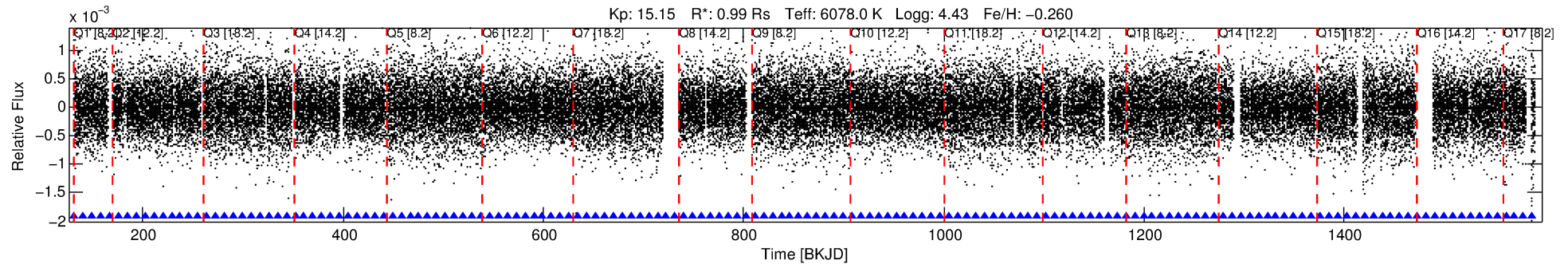
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 006768616-02

No Significant Match Found

# DV One-Page Summary

KIC: 6768616 Candidate: 2 of 2 Period: 8.825 d  
KOI: K06765 Corr: No Ephemeris Match



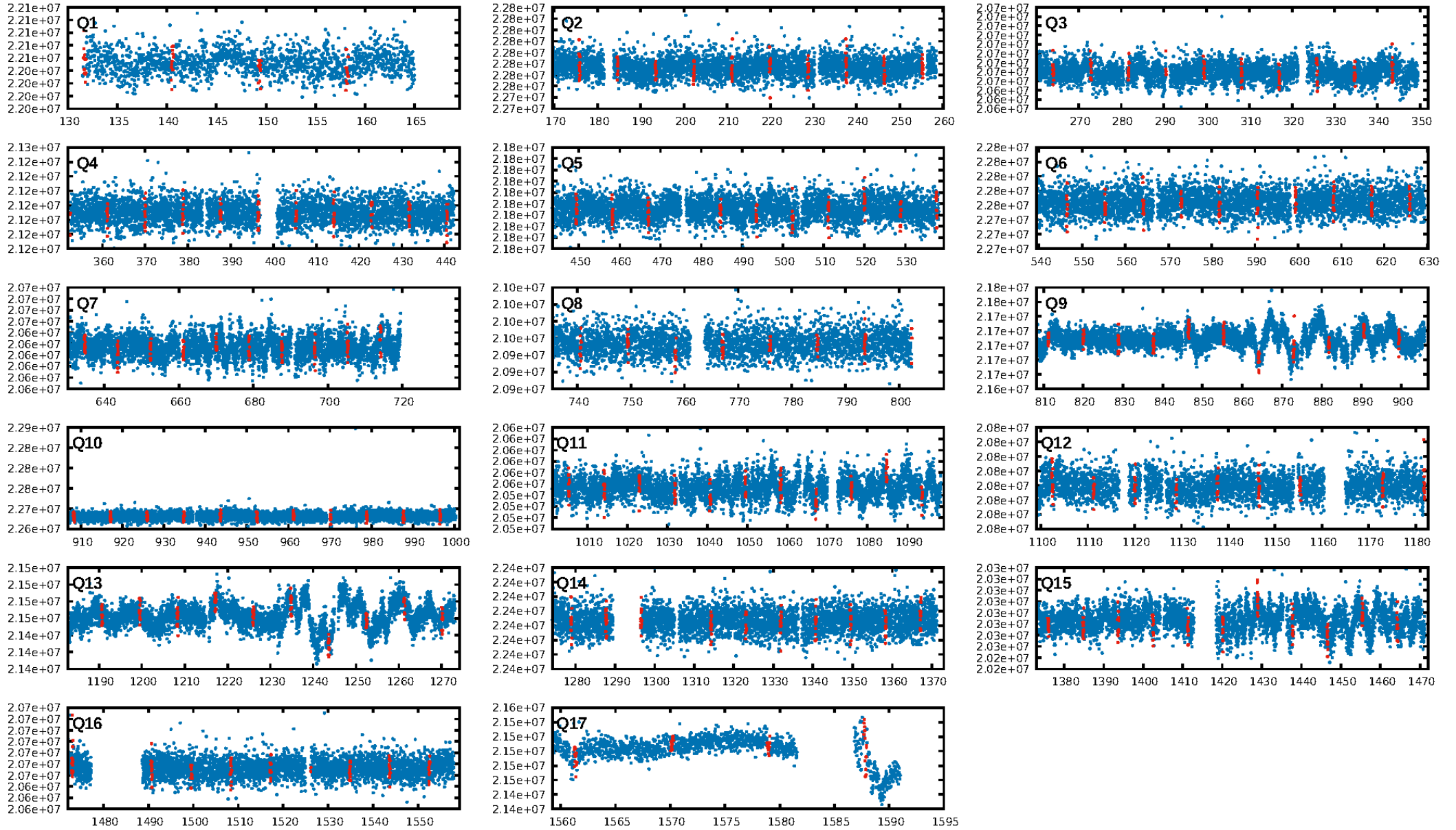
## DV Fit Results:

Period = 8.82490 [0.00010] d  
Epoch = 131.7082 [0.0085] BKJD  
Rp/R\* = 0.0116 [0.0082]  
a/R\* = 10.12 [37.64]  
b = 0.90 [0.82]  
Seff = 175.35 [70.28]  
Teq = 928 [93] K  
Rp = 1.26 [0.97] Re  
a = 0.0830 [0.0212] AU  
Ag = 78.30 [119.96] [0.64σ]  
Teffp = 4268 [1590] K [2.10σ]

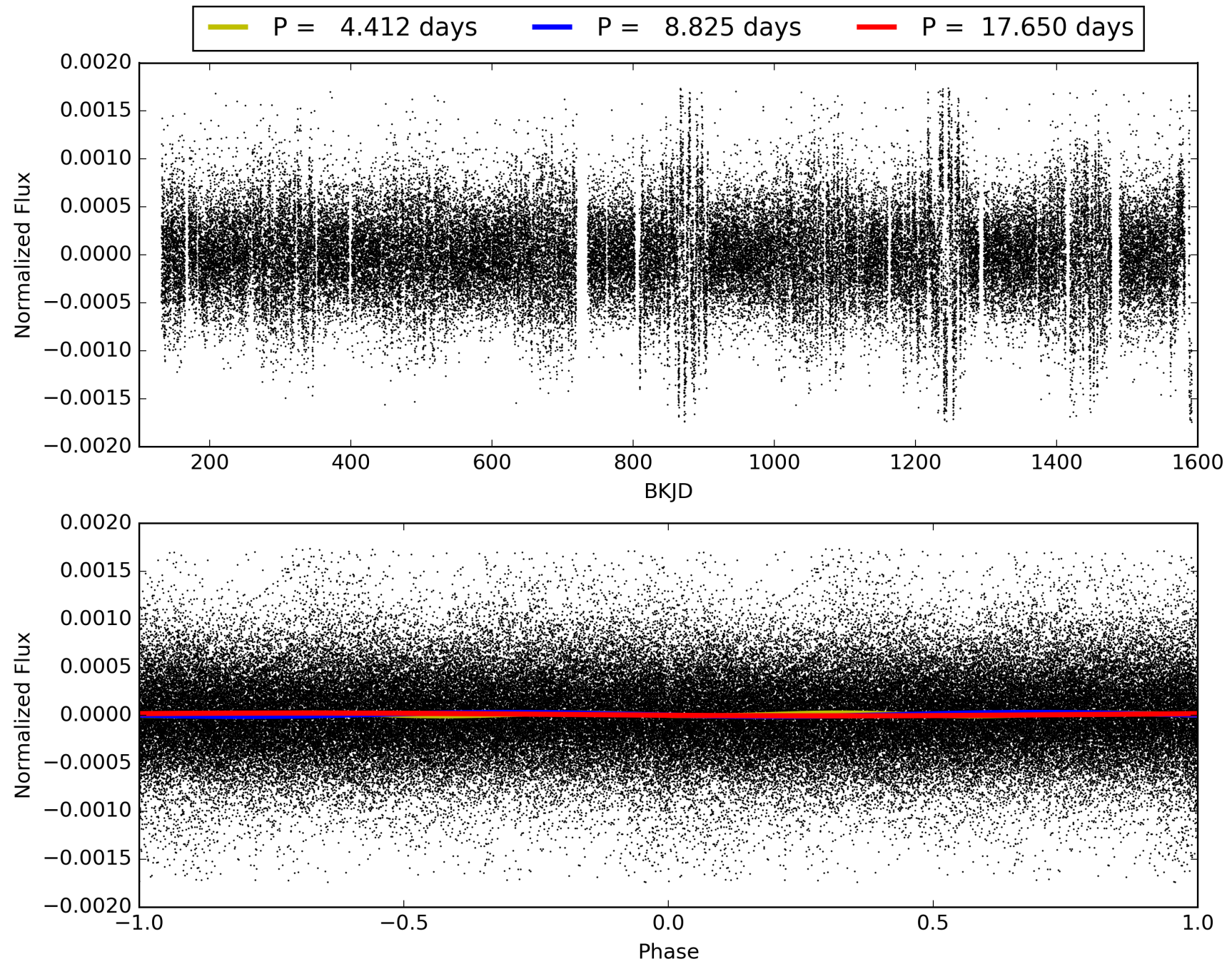
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [17.89σ]  
ModelChiSquare2-sig: 99.7%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 1.55e-15  
RollingBand-fgt: 1.00 [144/144]  
GhostDiagnostic-chr: 1.475  
Centroid-sig: 21.5%  
Centroid-so: 1.935 arcsec [1.09σ]  
OotOffset-rm: 1.414 arcsec [1.31σ]  
KicOffset-rm: 1.609 arcsec [1.52σ]  
OotOffset-st: 4/3/4/1 [12]  
KicOffset-st: 4/3/4/1 [12]  
DiffImageQuality-fgm: 0.25 [3/12]  
DiffImageOverlap-fno: 1.00 [17/17]

# TCE 006768616-02, PDC Light Curves



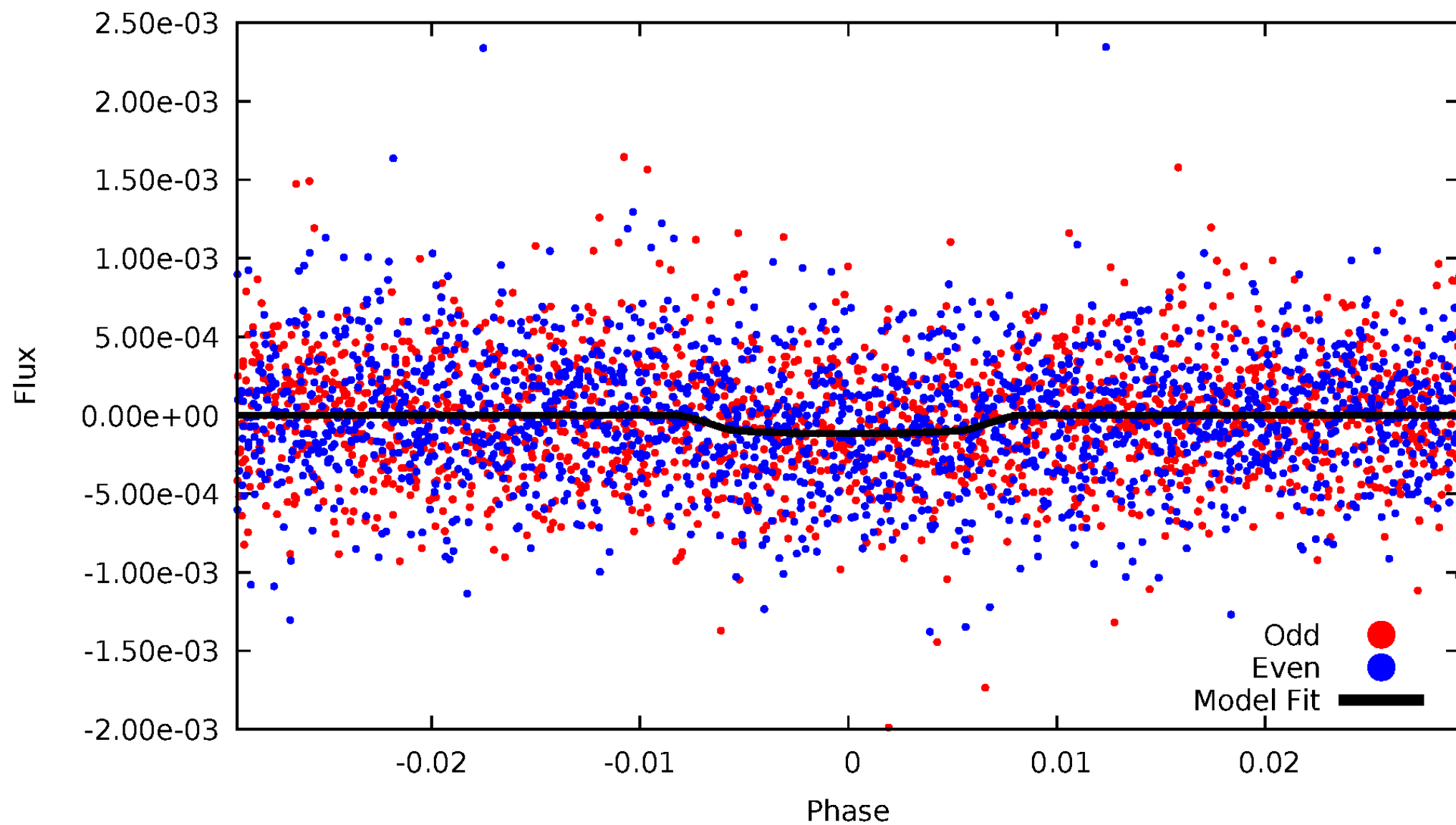
TCE 006768616-02





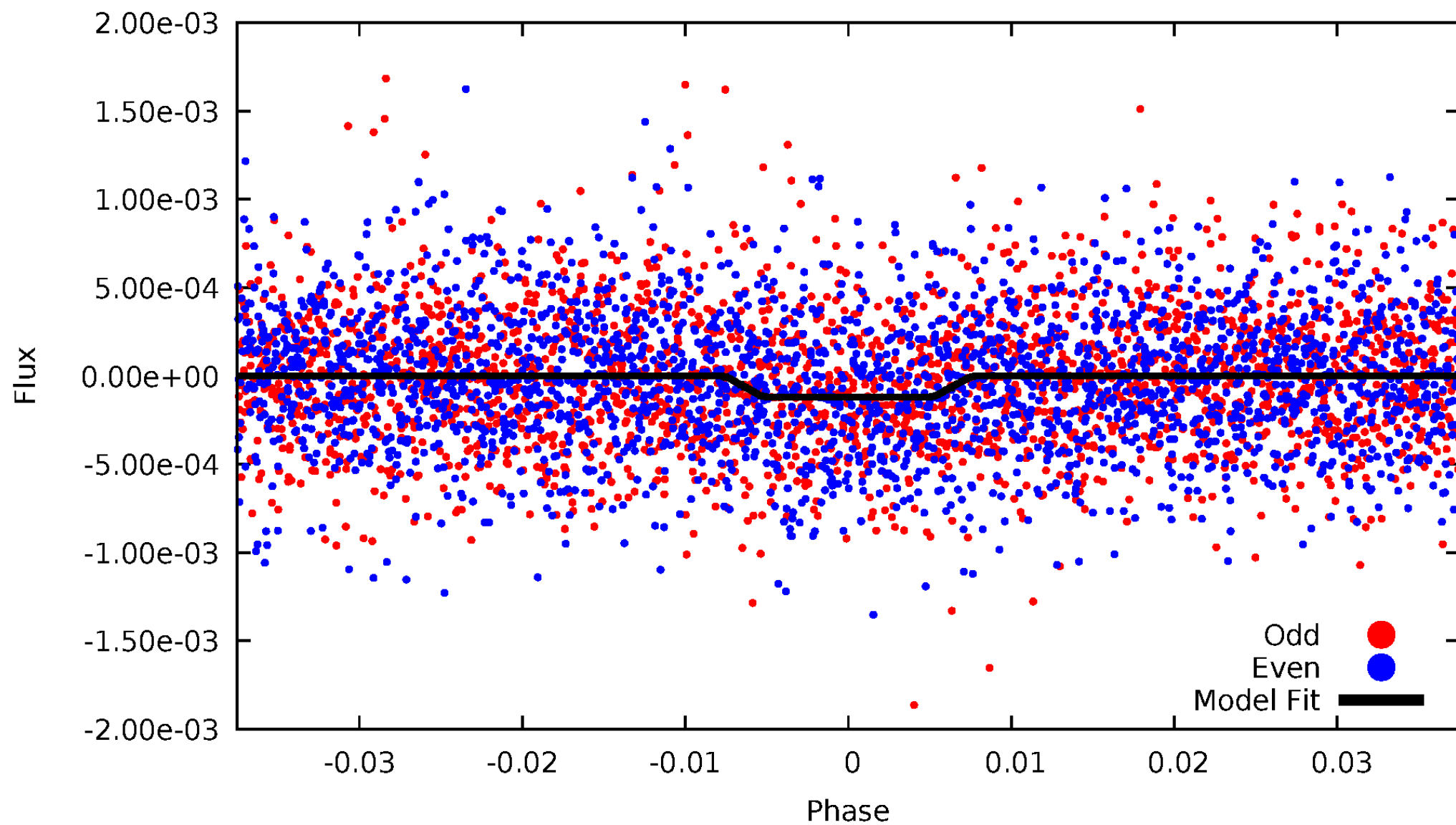
DV Odd/Even

TCE 006768616-02



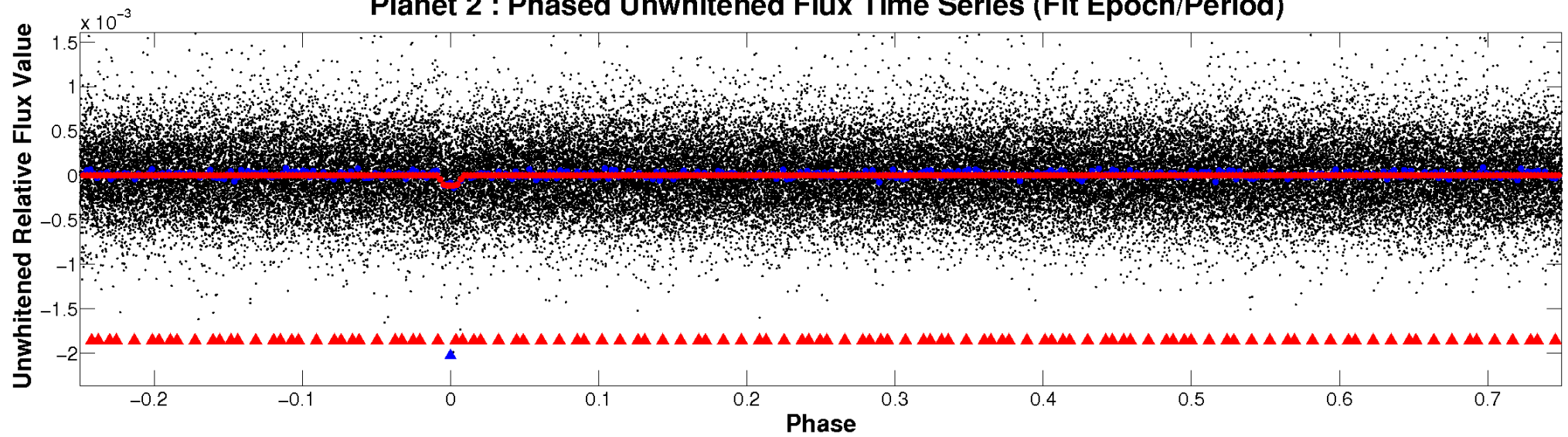
# ALT Odd/Even

TCE 006768616-02

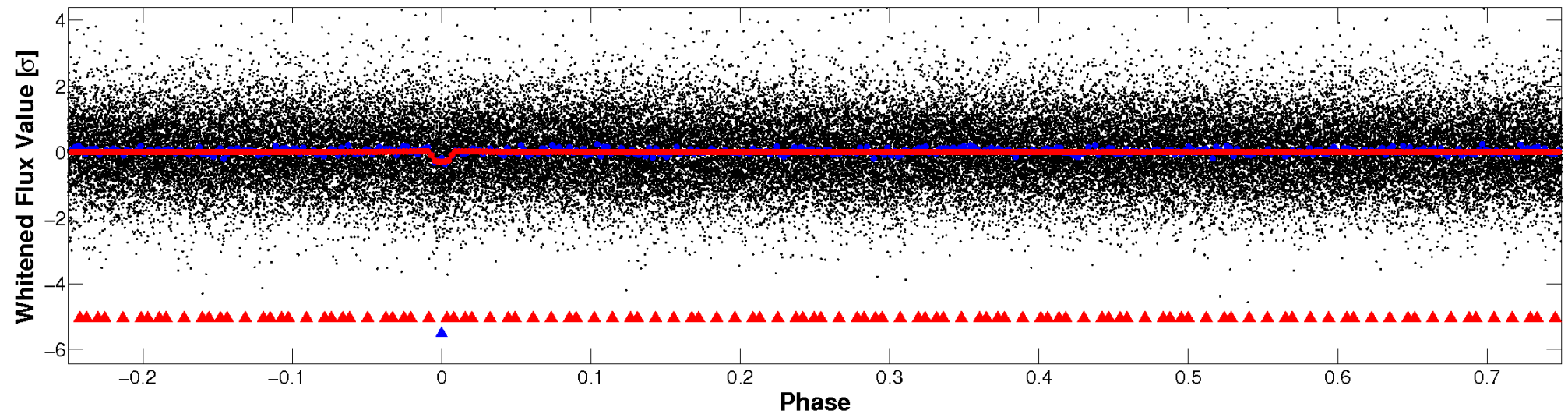


# Non-Whitened Vs. Whitened Light Curve

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

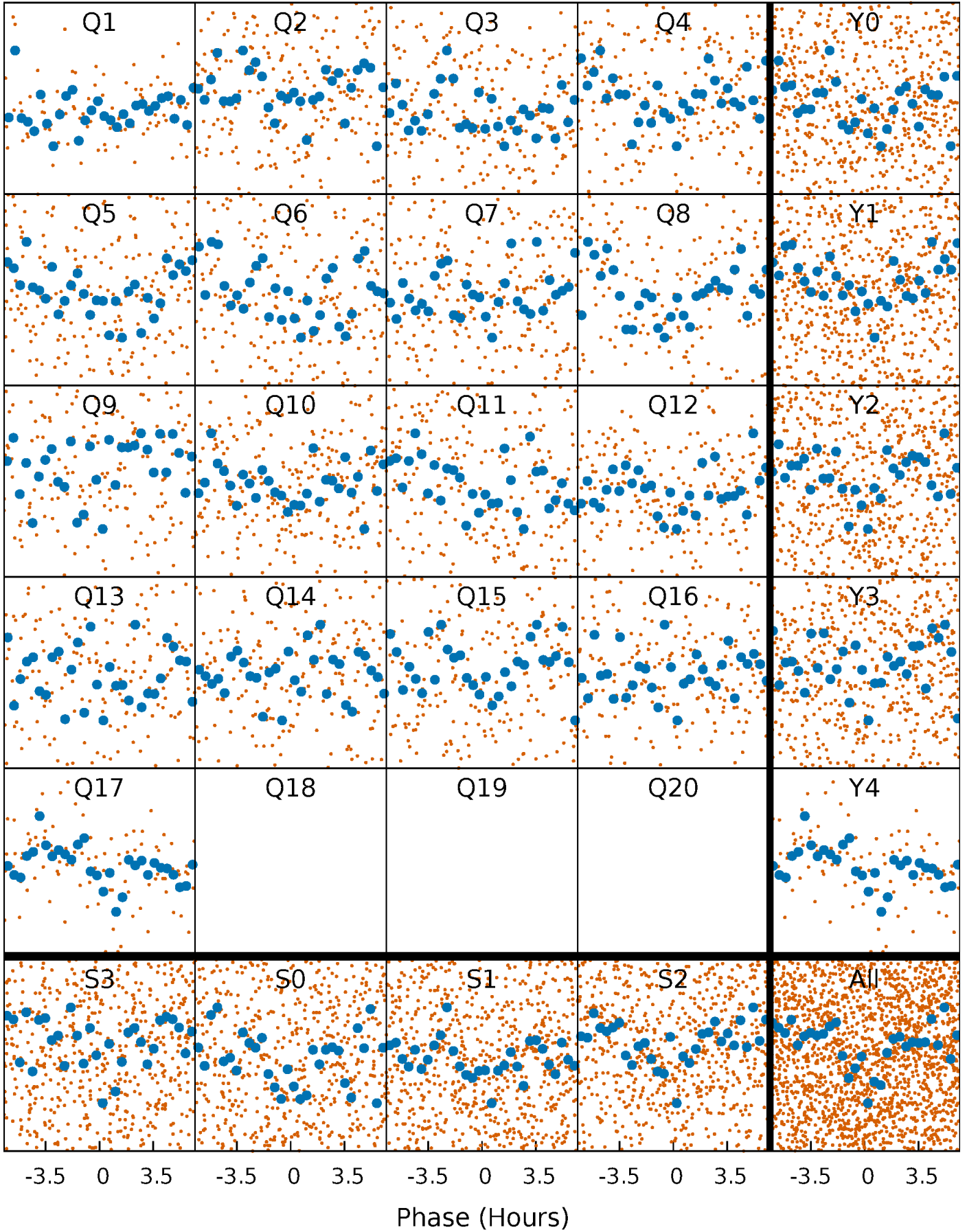


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



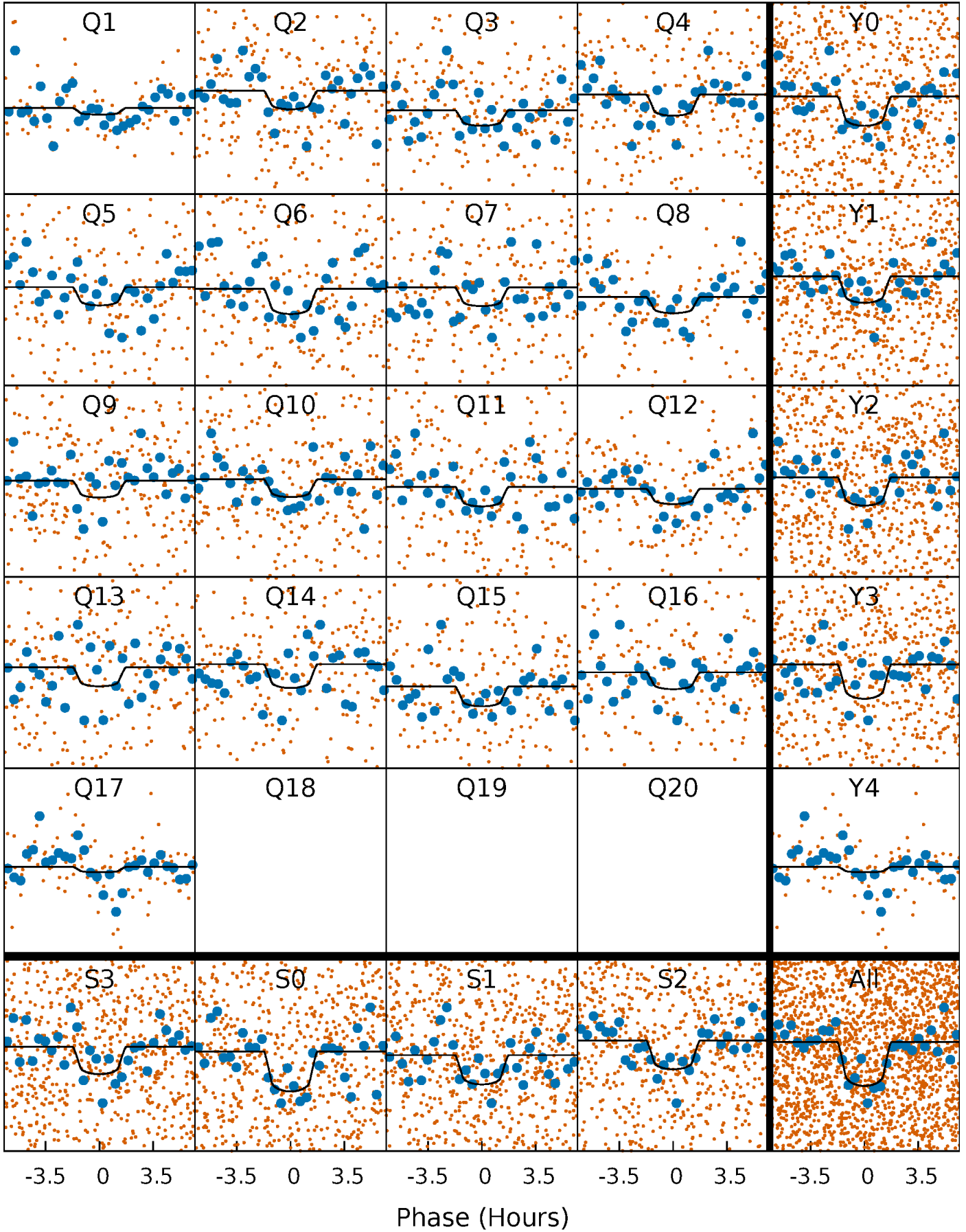
# PDC Quarter-Phased Transit Curves

TCE 006768616-02 P= 8.824902 Days  $T_0=131.708216$  (BKJD)



# DV Quarter-Phased Transit Curves

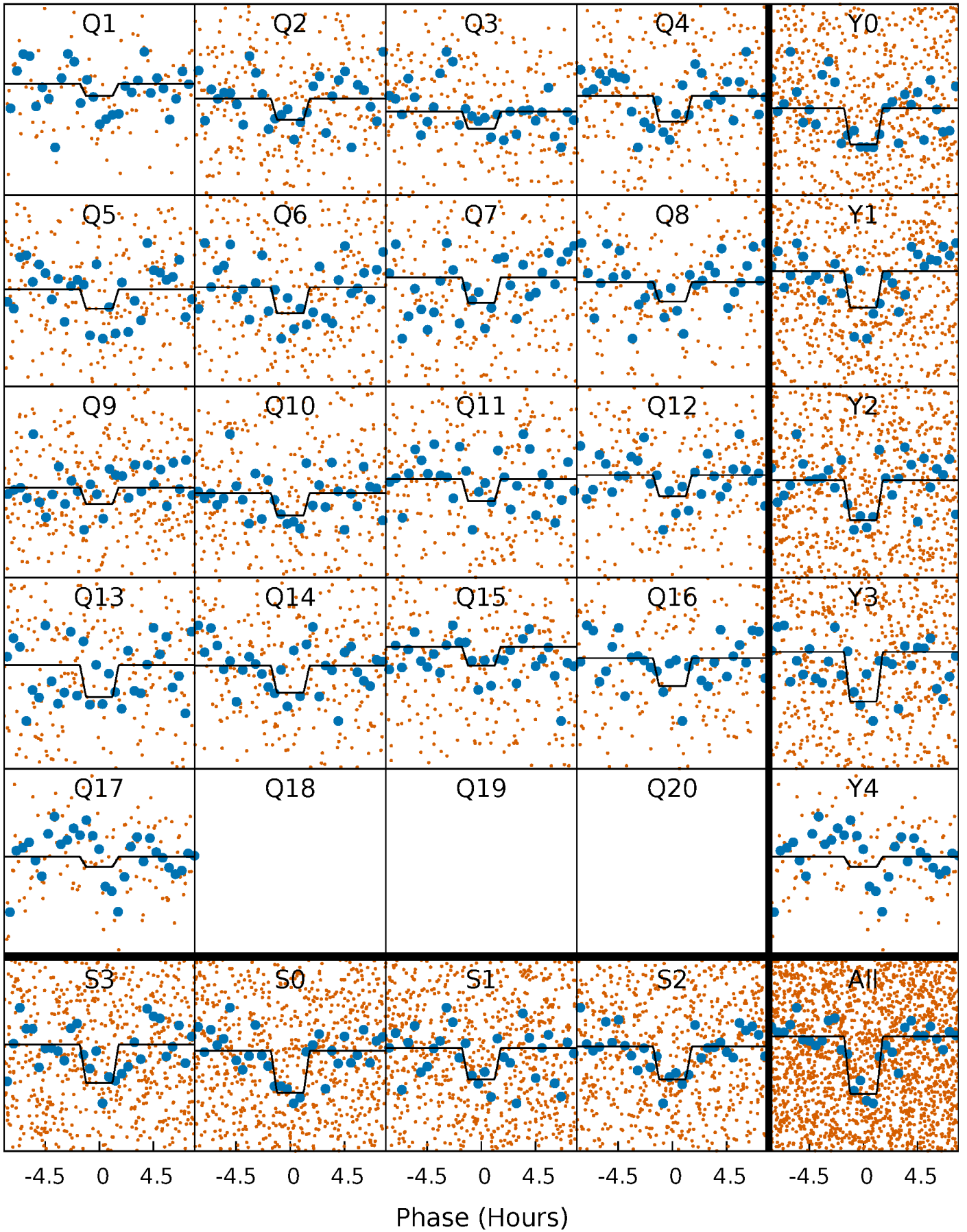
TCE 006768616-02   P= 8.824902 Days    $T_0=131.708216$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

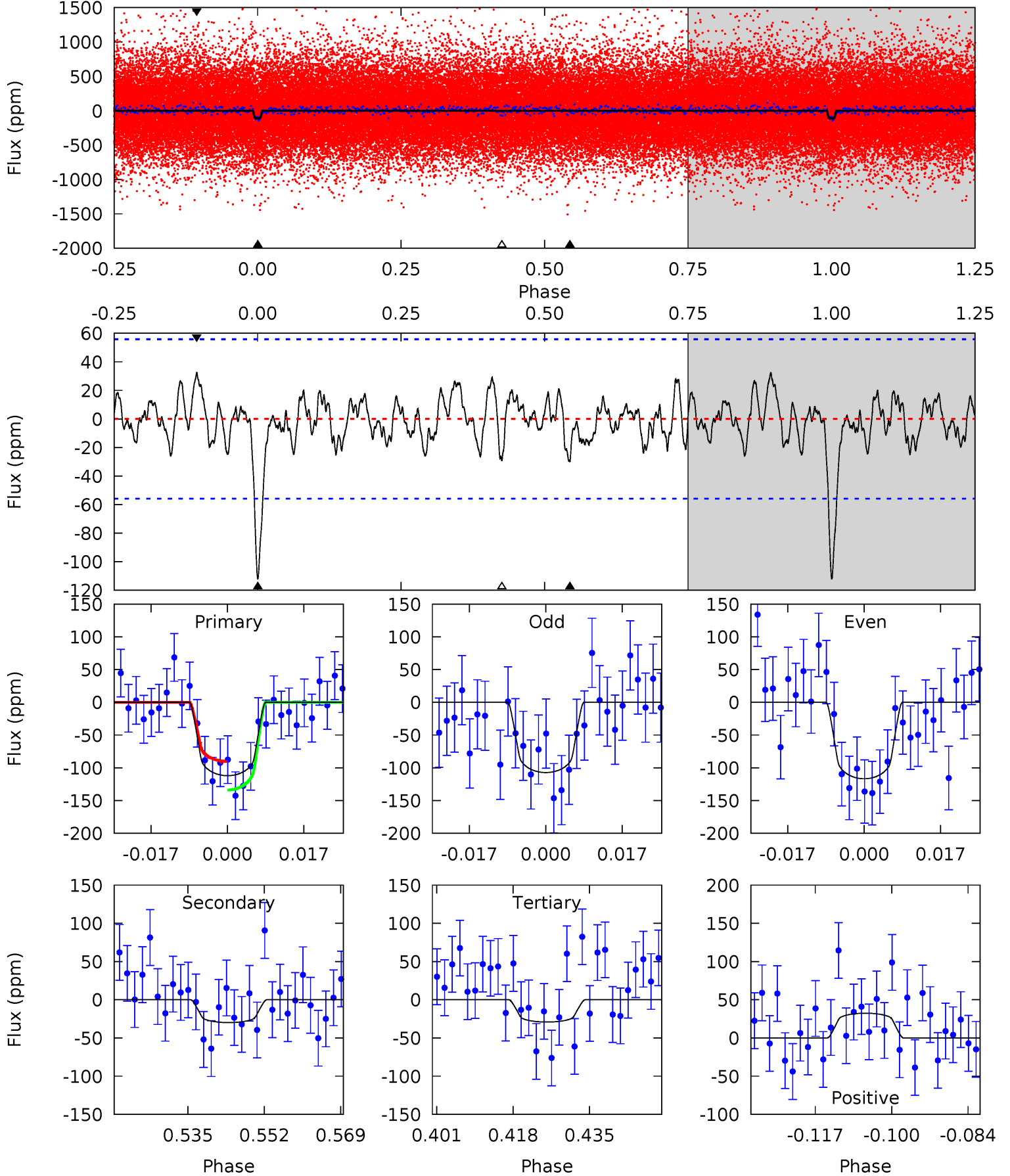
TCE 006768616-02 P= 8.824647 Days  $T_0=131.731797$  (BKJD)



# DV Model-Shift Uniqueness Test

006768616-02, P = 8.824902 Days, E = 122.883314 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
9.88	2.63	2.57	2.86	4.93	2.39	1.11	7.31	7.02	0.06	-0.23	0.42	0.94	0.22	1.93

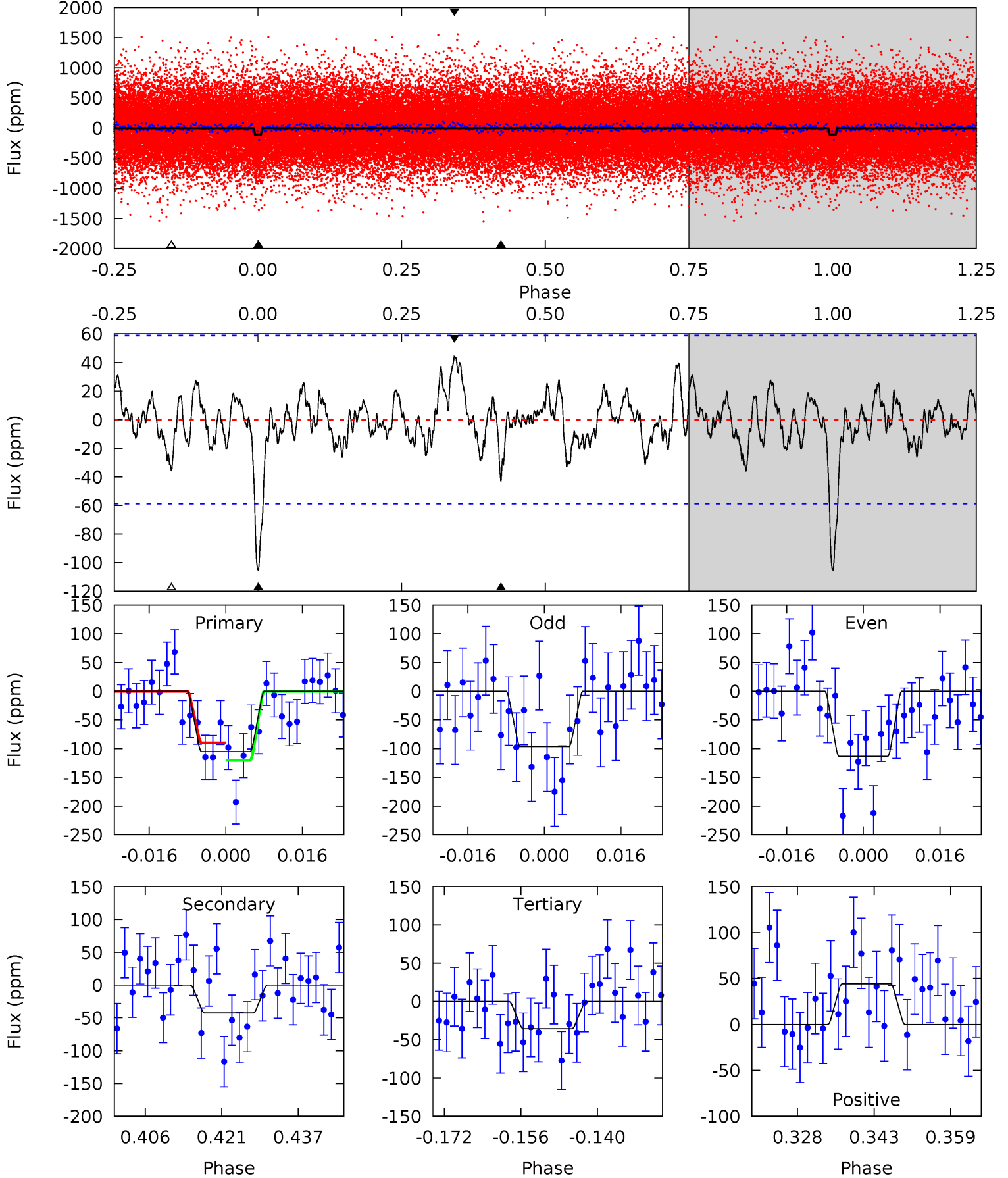




# Alt Model-Shift Uniqueness Test

006768616-02, P = 8.824647 Days, E = 122.907150 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.84	3.58	3.00	3.72	4.94	2.42	1.23	5.84	5.12	0.58	-0.14	0.71	0.75	0.30	1.27



### Stellar Parameters For KIC 006768616

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6078^{+181}_{-200}$	$4.434^{+0.084}_{-0.210}$	$-0.260^{+0.300}_{-0.300}$	$0.994^{+0.296}_{-0.127}$	$0.978^{+0.142}_{-0.116}$	$1.402^{+0.523}_{-0.732}$
	+3%/-3%	+2%/-5%	+115%/-115%	+30%/-13%	+15%/-12%	+37%/-52%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 006768616-02 / KOI 6765.02

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-30 \pm 11$	$1.41^{+0.97}_{-0.82}$	$1315^{+93}_{-73}$	$4199^{+1785}_{-694}$	$54^{+243}_{-36}$
Alt.	$-43 \pm 12$	$1.30^{+0.88}_{-0.70}$	$1309^{+99}_{-64}$	$4649^{+1973}_{-839}$	$90^{+336}_{-60}$

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

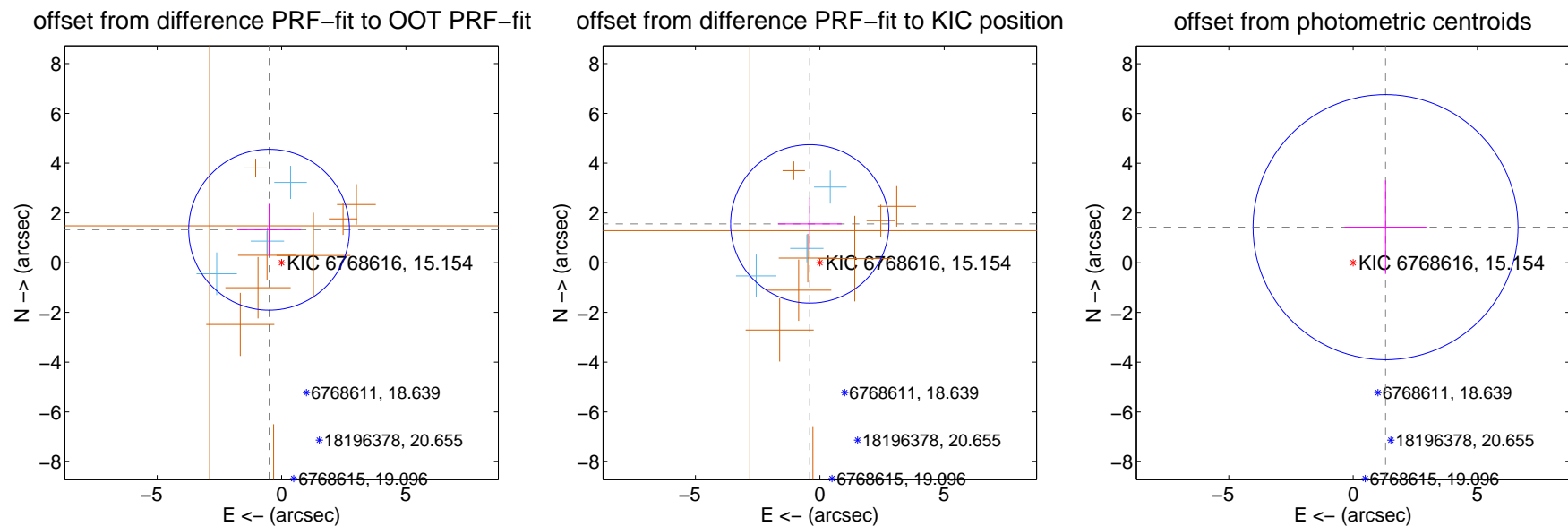
## DV Centroid Data

Supplemental centroid analysis for 006768616-02. Kepler magnitude: 15.15. Transit SNR 7.68

There are 3 quarters with good PRF difference image offsets

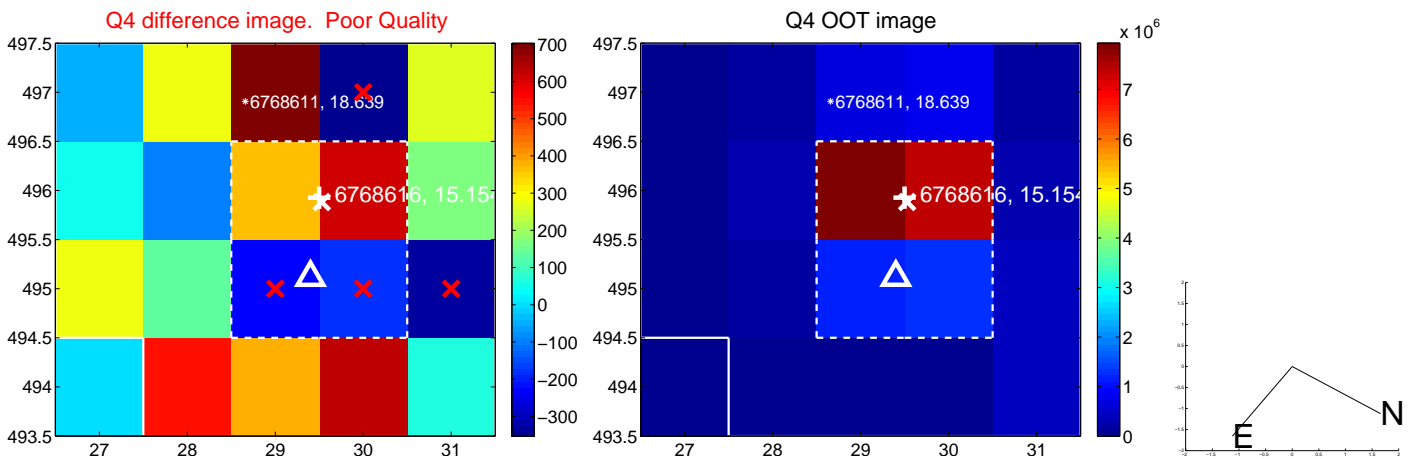
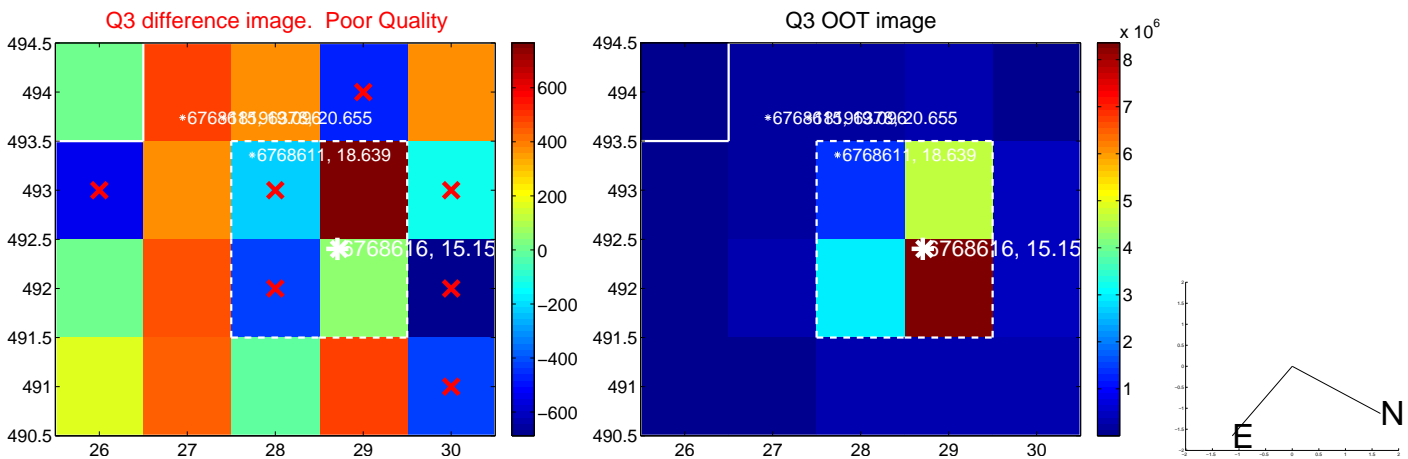
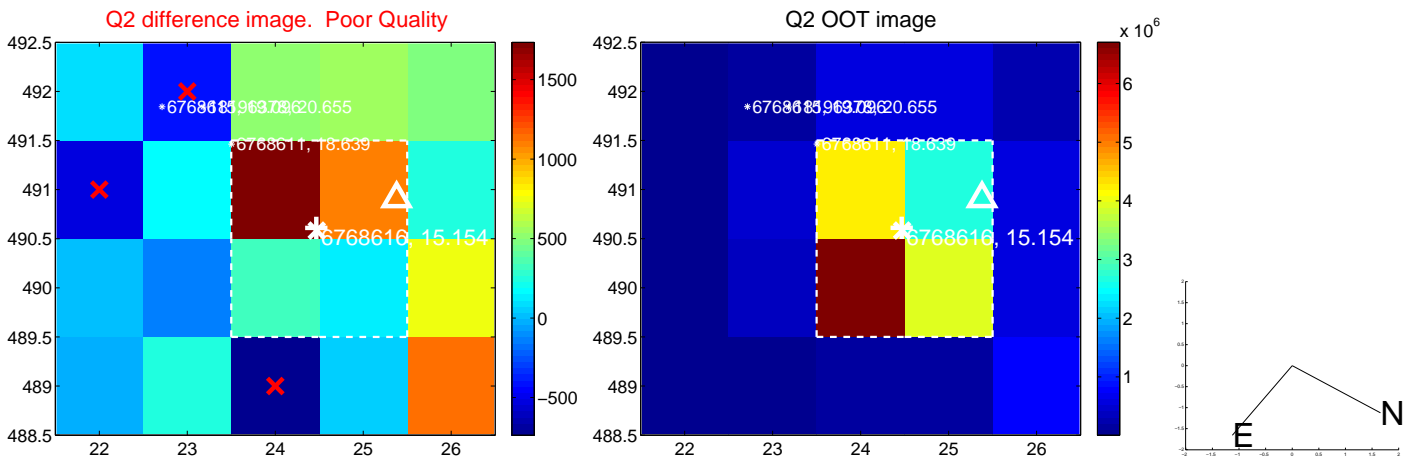
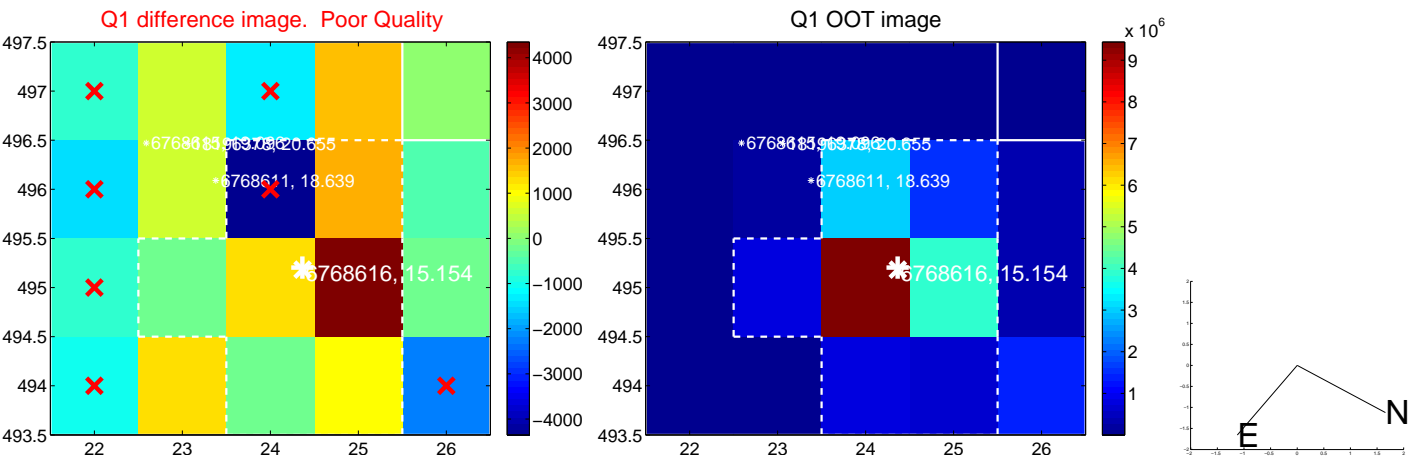
The direct PRF centroid is offset from the target star catalog position by about 0.23 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.414 \pm 1.077$	1.31	$0.502 \pm 1.282$	$1.322 \pm 1.044$
PRF-fit source offset from KIC position	$1.609 \pm 1.061$	1.52	$0.404 \pm 1.282$	$1.558 \pm 1.044$
photometric centroid source offset	$1.93 \pm 1.78$	1.09	$-1.30 \pm 1.64$	$1.43 \pm 1.88$

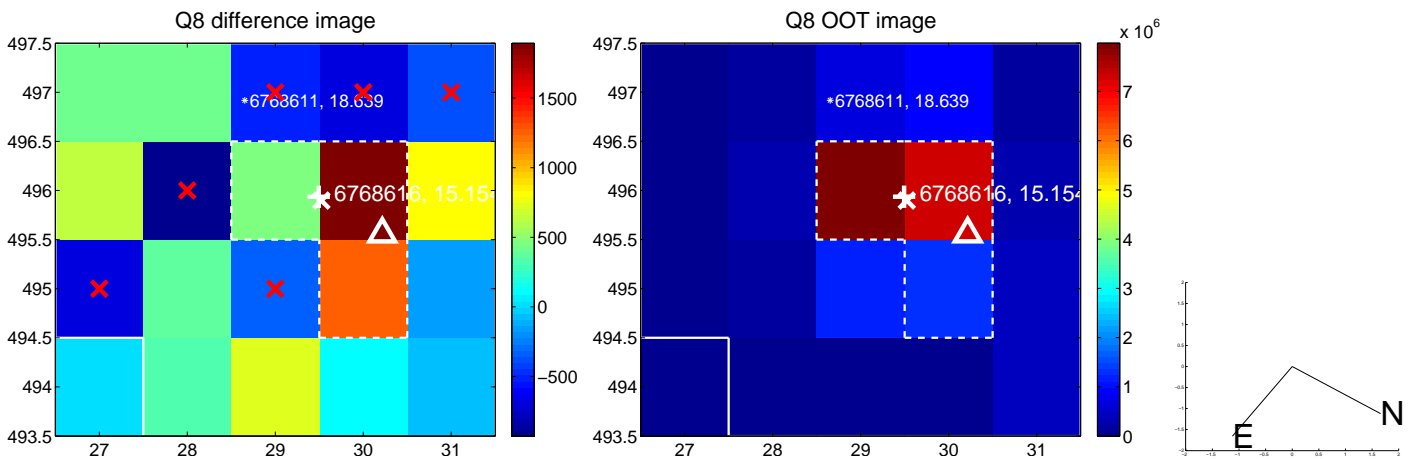
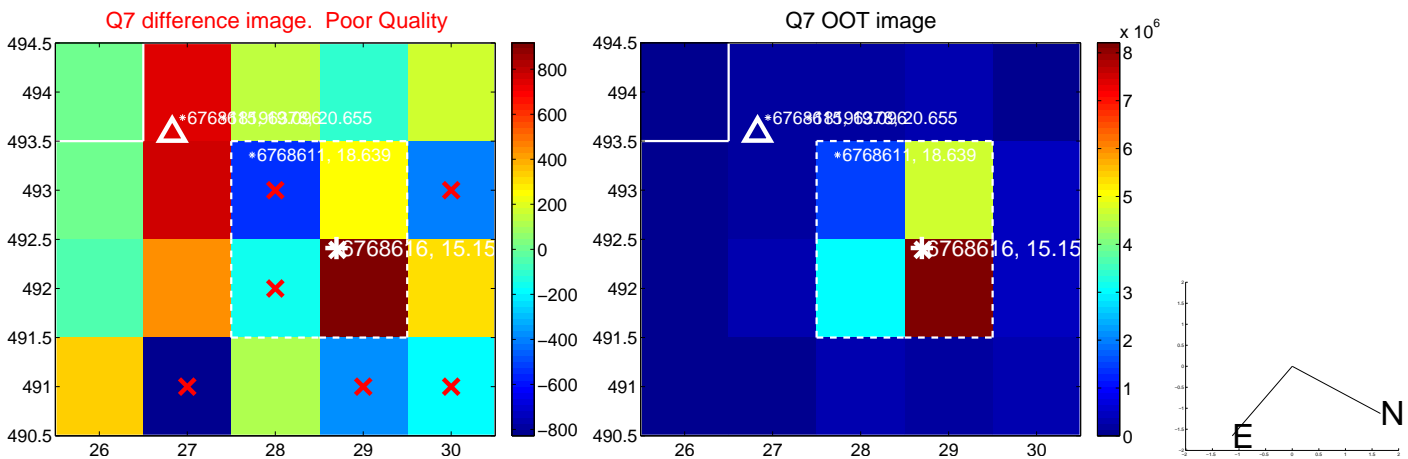
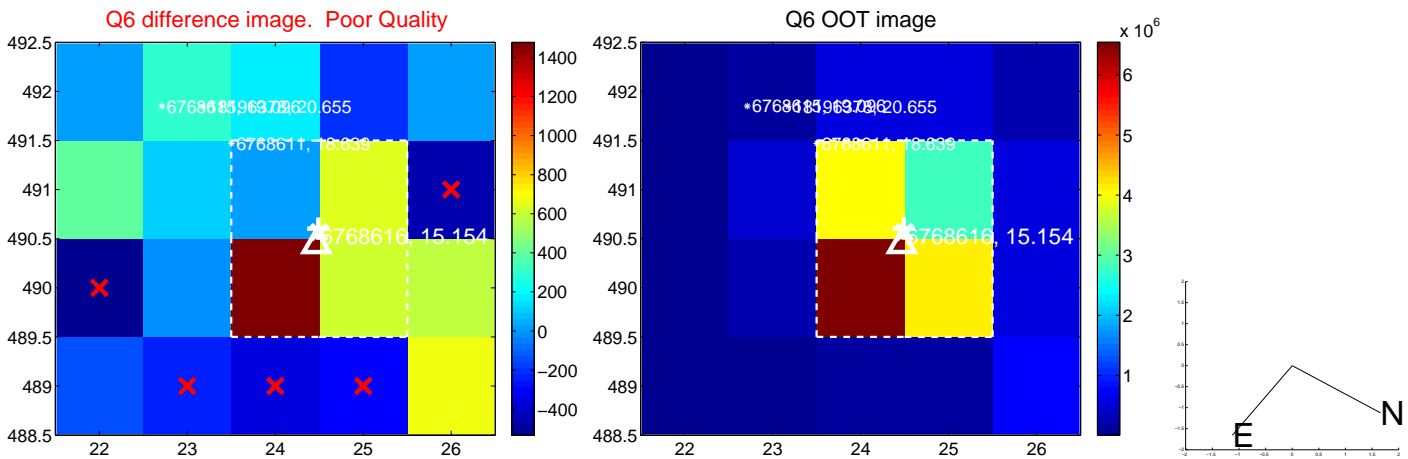
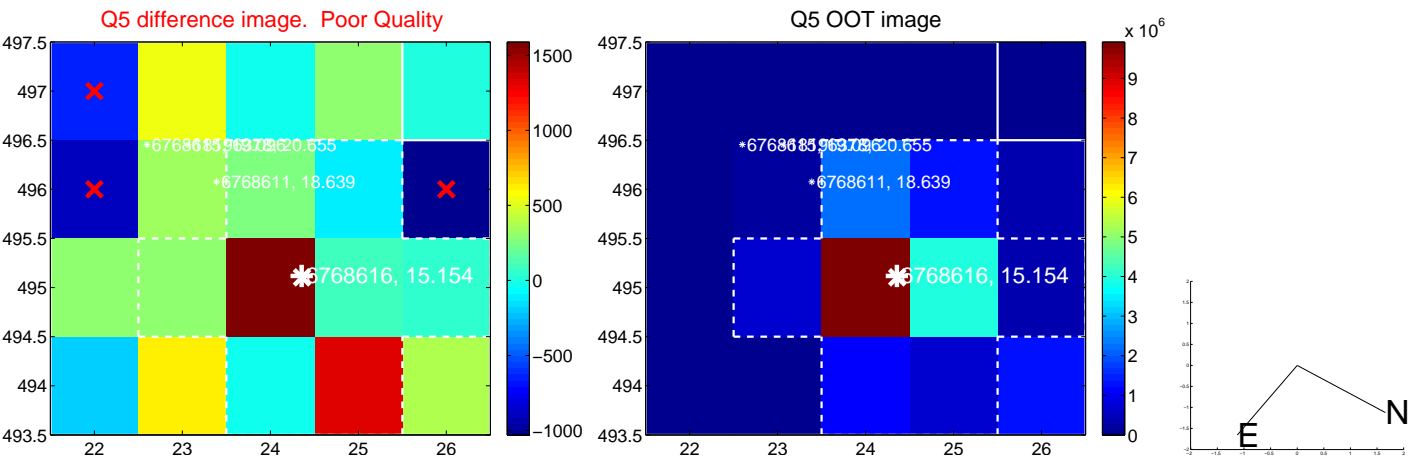


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

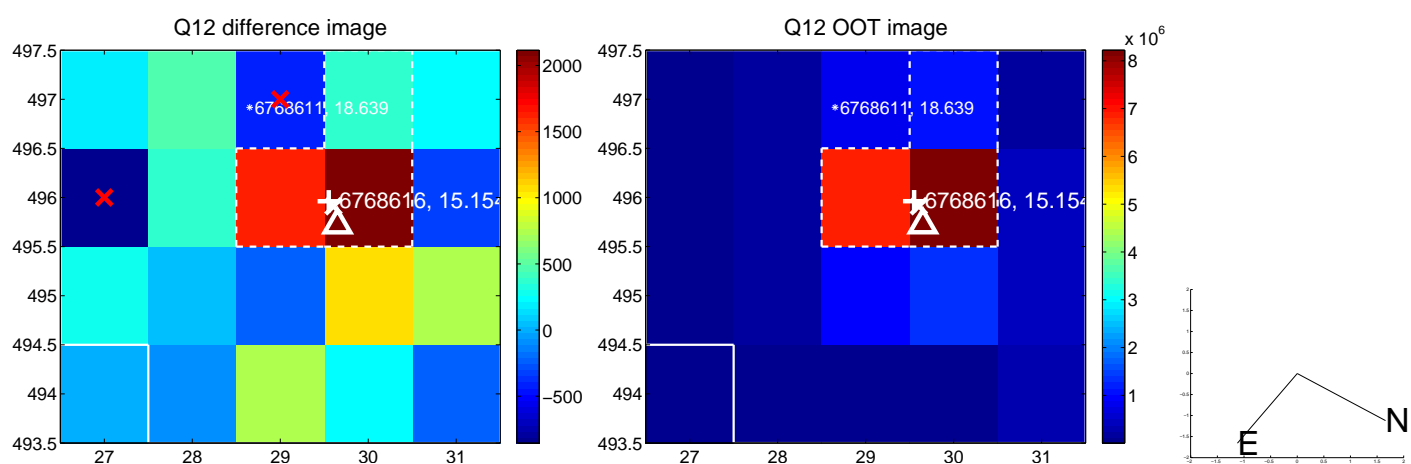
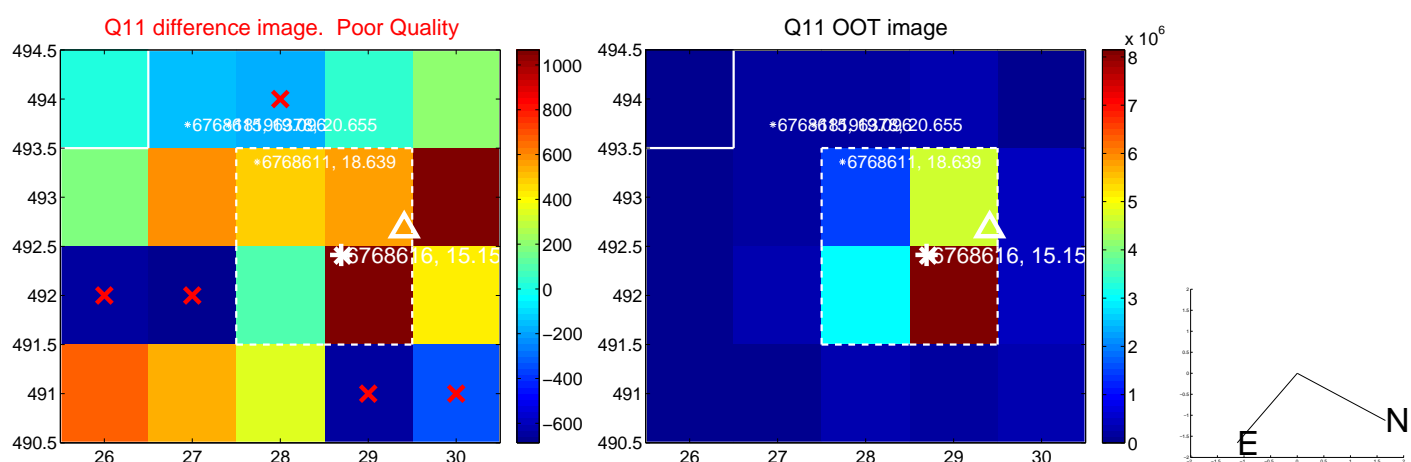
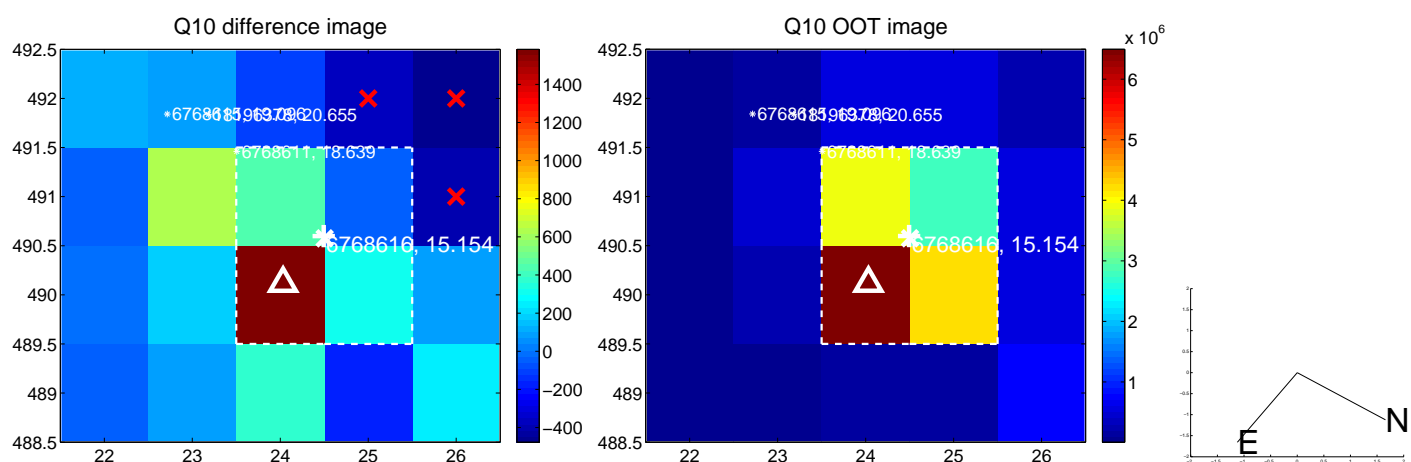
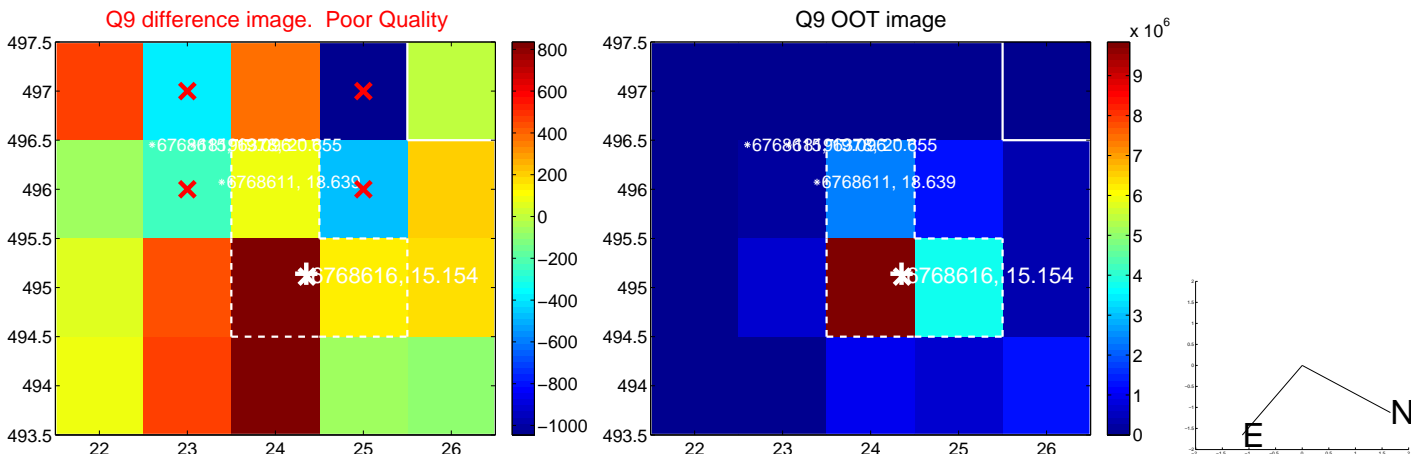
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

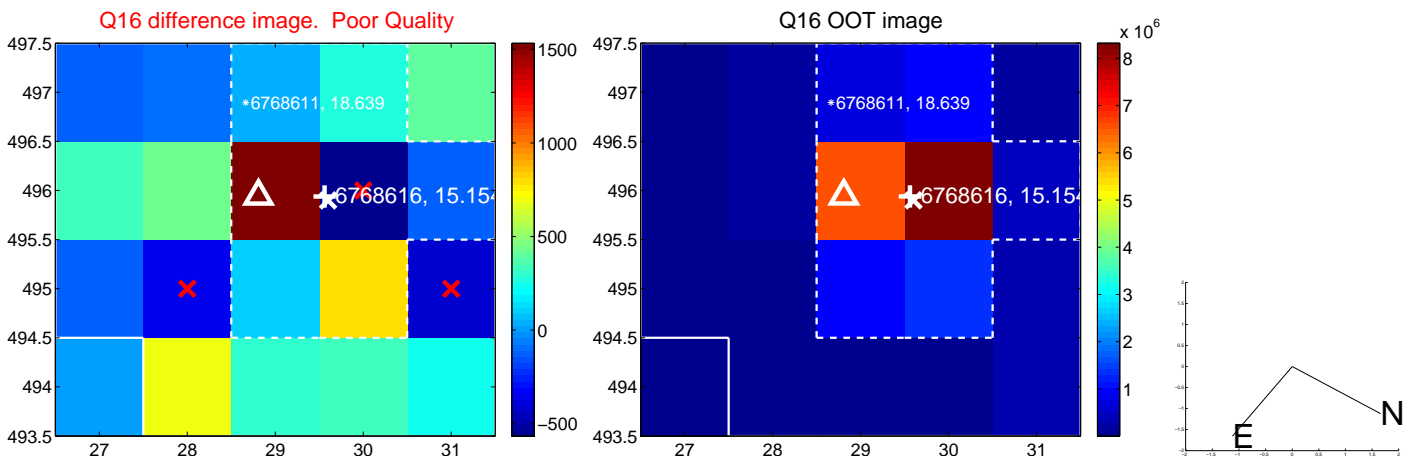
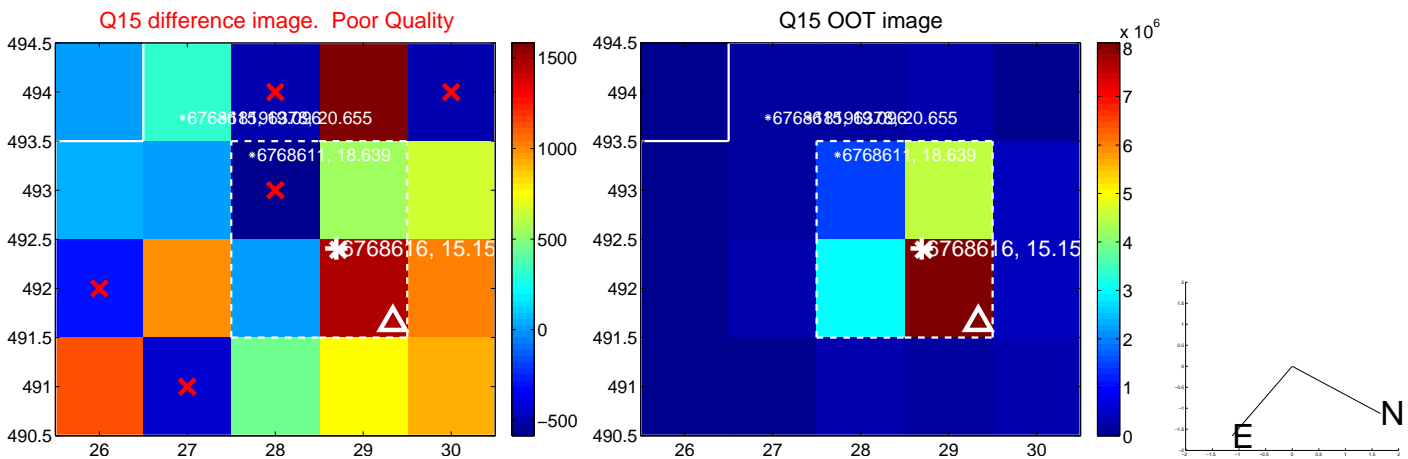
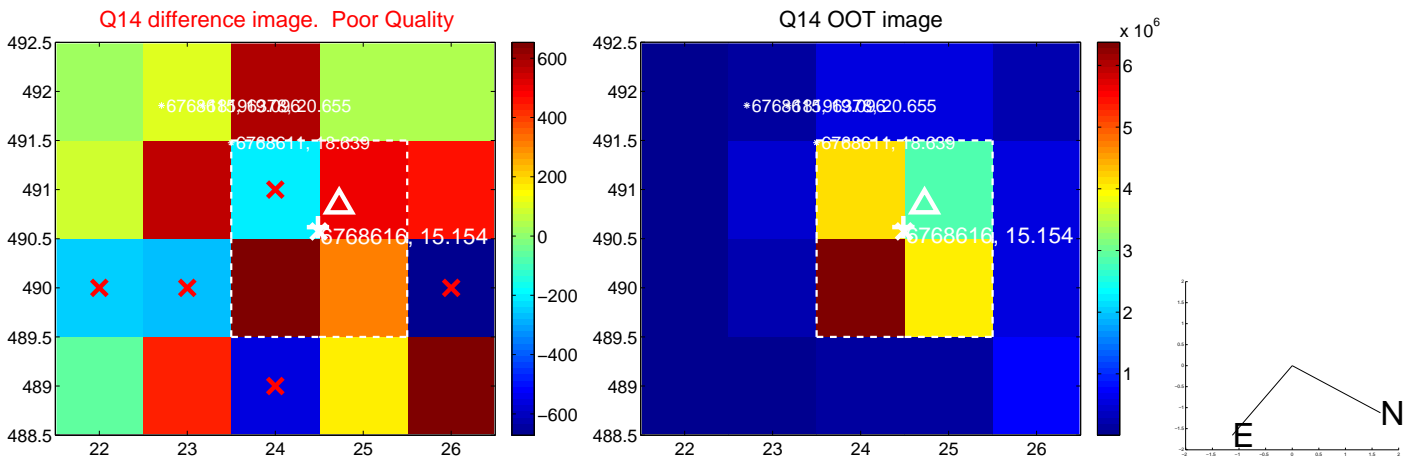
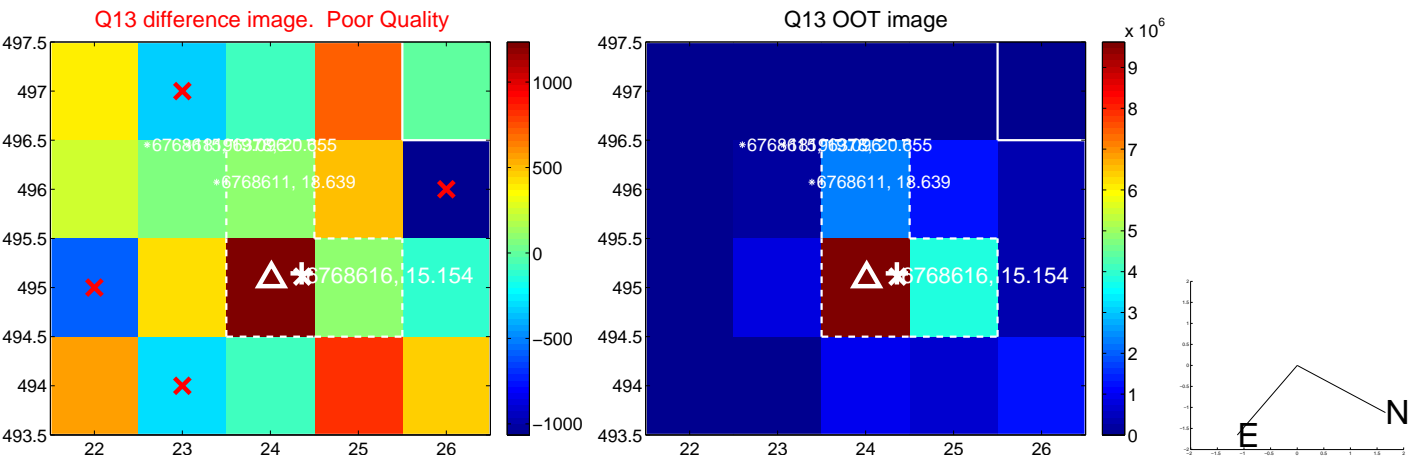


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

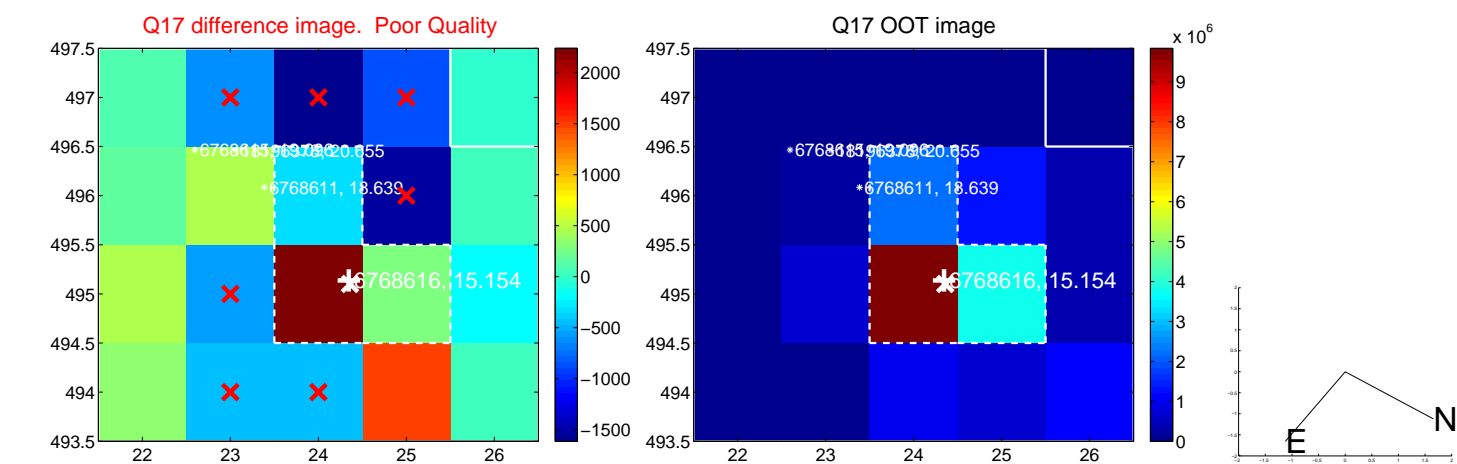




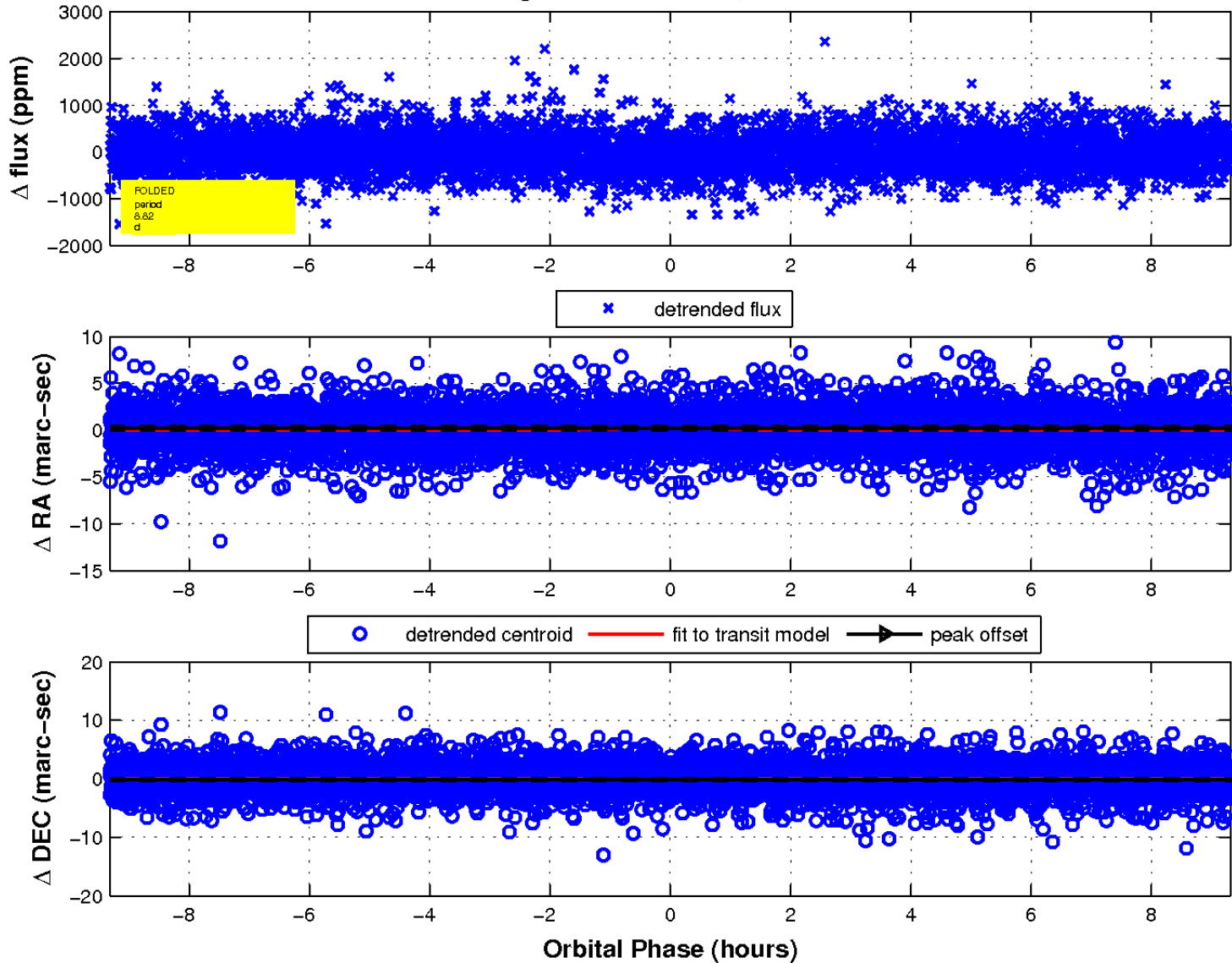
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

Declination

