

# KIC 006369222

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006369222-01	OBS	No	1.225743	132.337263	9.0	9.173	8.3	5.2	3.72	6742	1.20	37615.57
006369222-02	OBS	No	22.050061	149.034044	281.3	3.751	18.9	19.3	3.72	6742	6.86	798.03

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006369222-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT
006369222-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—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.

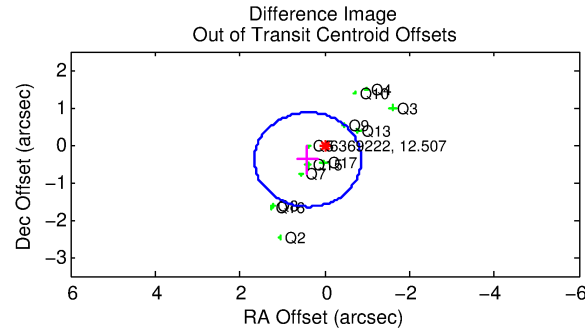
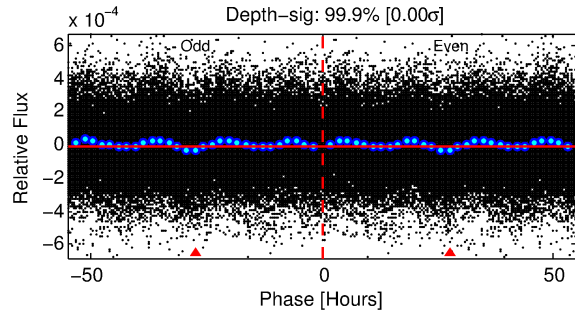
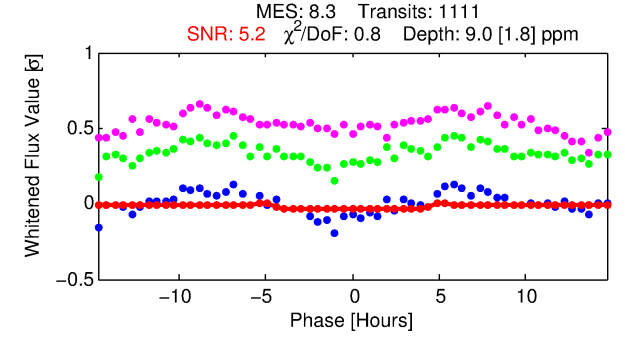
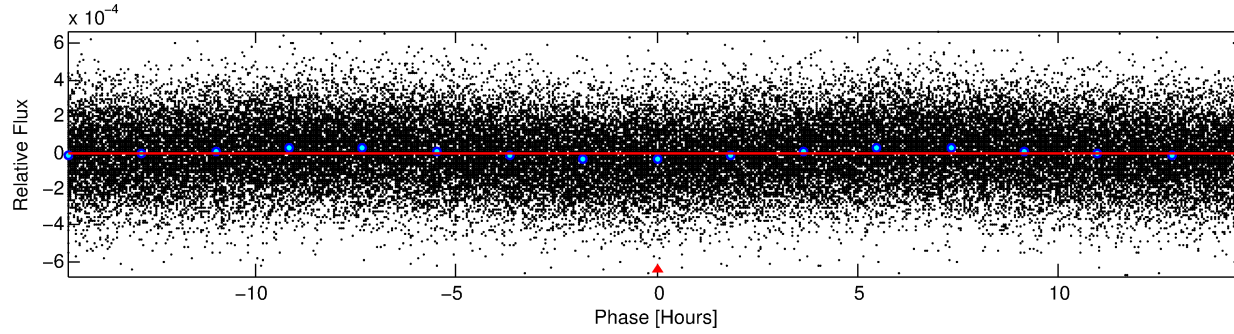
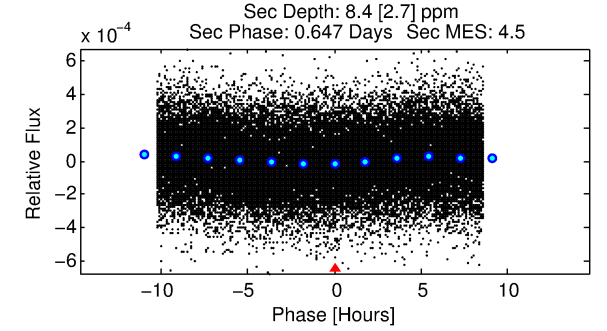
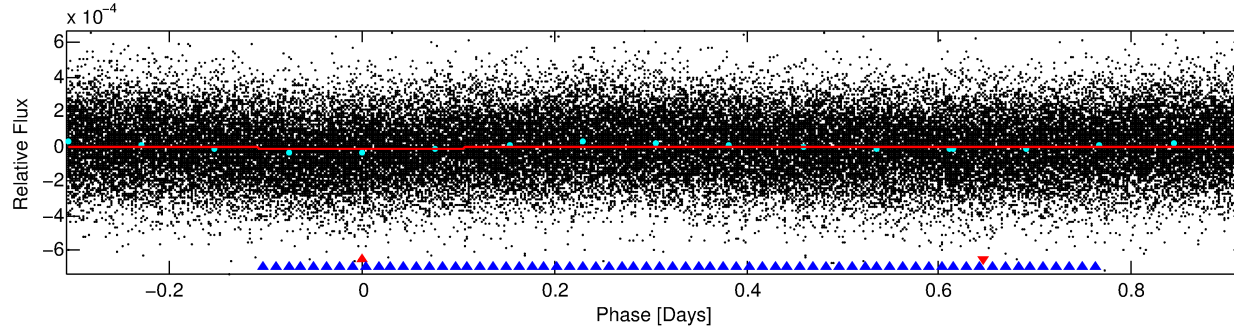
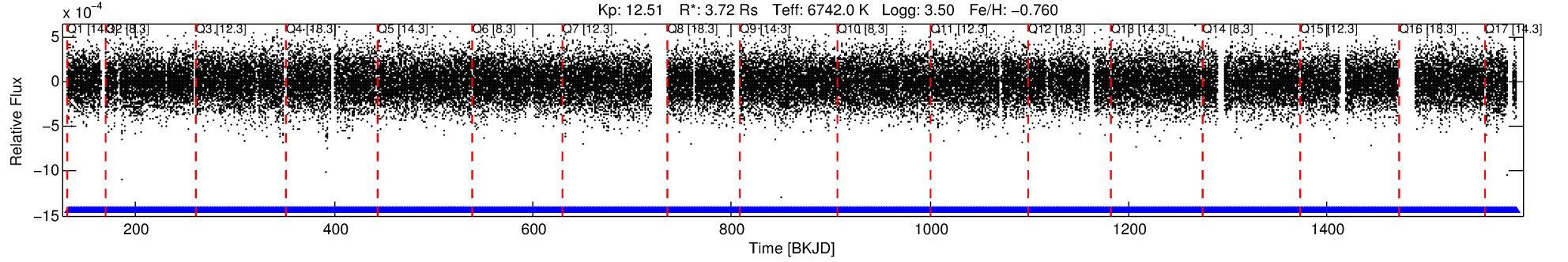
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 006369222-01

No Significant Match Found

# DV One-Page Summary

KIC: 6369222 Candidate: 1 of 2 Period: 1.226 d



## DV Fit Results:

Period = 1.22574 [0.00004] d  
Epoch = 132.3373 [0.0117] BKJD  
Rp/R\* = 0.0030 [0.0028]  
a/R\* = 1.11 [1.18]  
b = 0.70 [4.05]  
Seff = 37615.57 [24396.39]  
Teq = 3551 [576] K  
Rp = 1.20 [1.25] Re  
a = 0.0261 [0.0107] AU  
Ag = 2.19 [4.41] [0.27σ]  
Teffp = 6682 [3196] K [0.96σ]

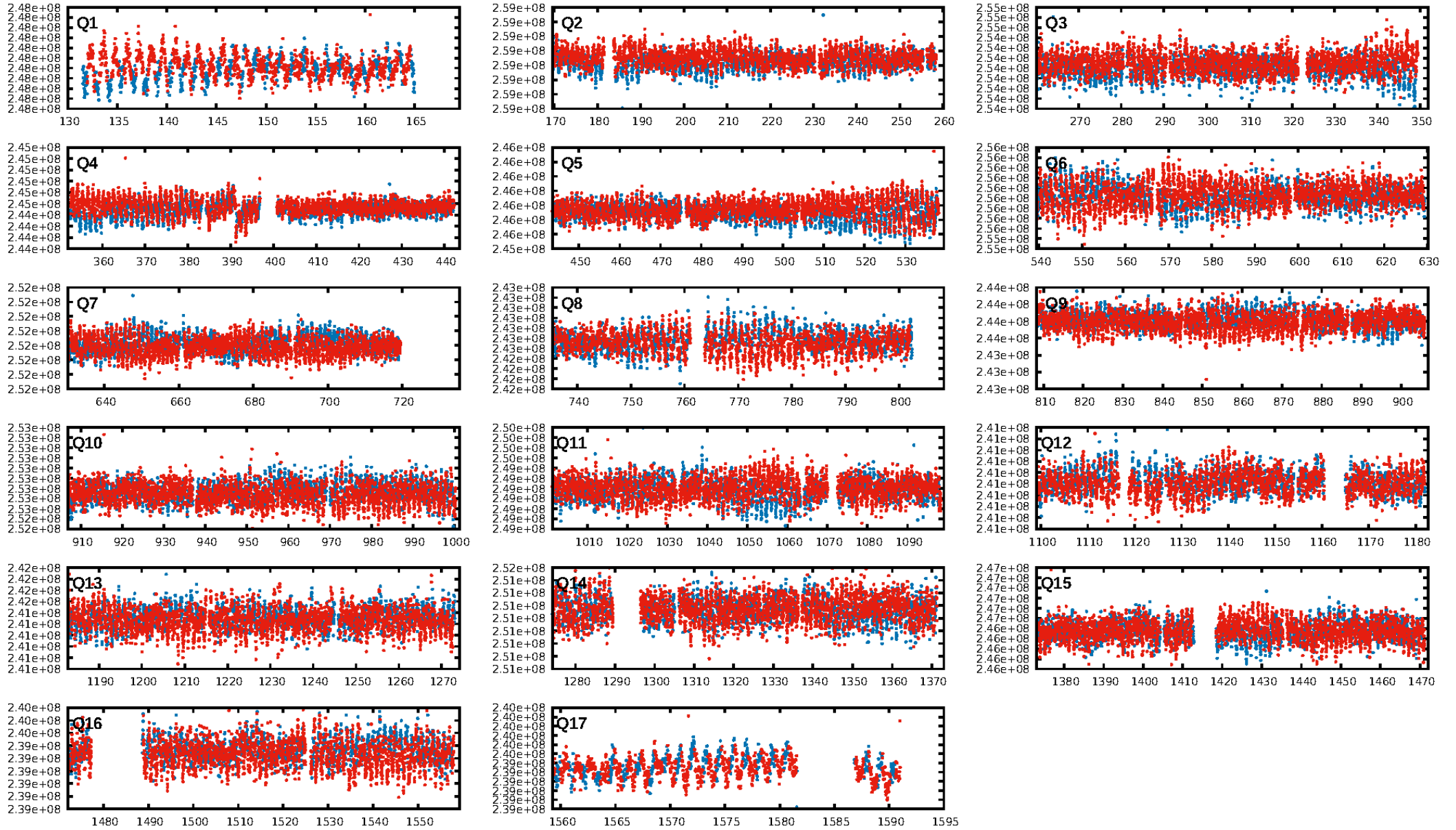
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [50.43σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 3.87e-44  
RollingBand-fgt: 1.00 [1061/1061]  
GhostDiagnostic-chr: 3.285  
Centroid-sig: 42.4%  
Centroid-so: 0.636 arcsec [0.74σ]  
OotOffset-rm: 0.559 arcsec [1.33σ]  
OotOffset-st: 2/3/3/5 [13]  
KicOffset-rm: 0.592 arcsec [1.46σ]  
KicOffset-st: 2/3/3/5 [13]  
DiffImageQuality-fgm: 0.62 [8/13]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 06:42:48 Z

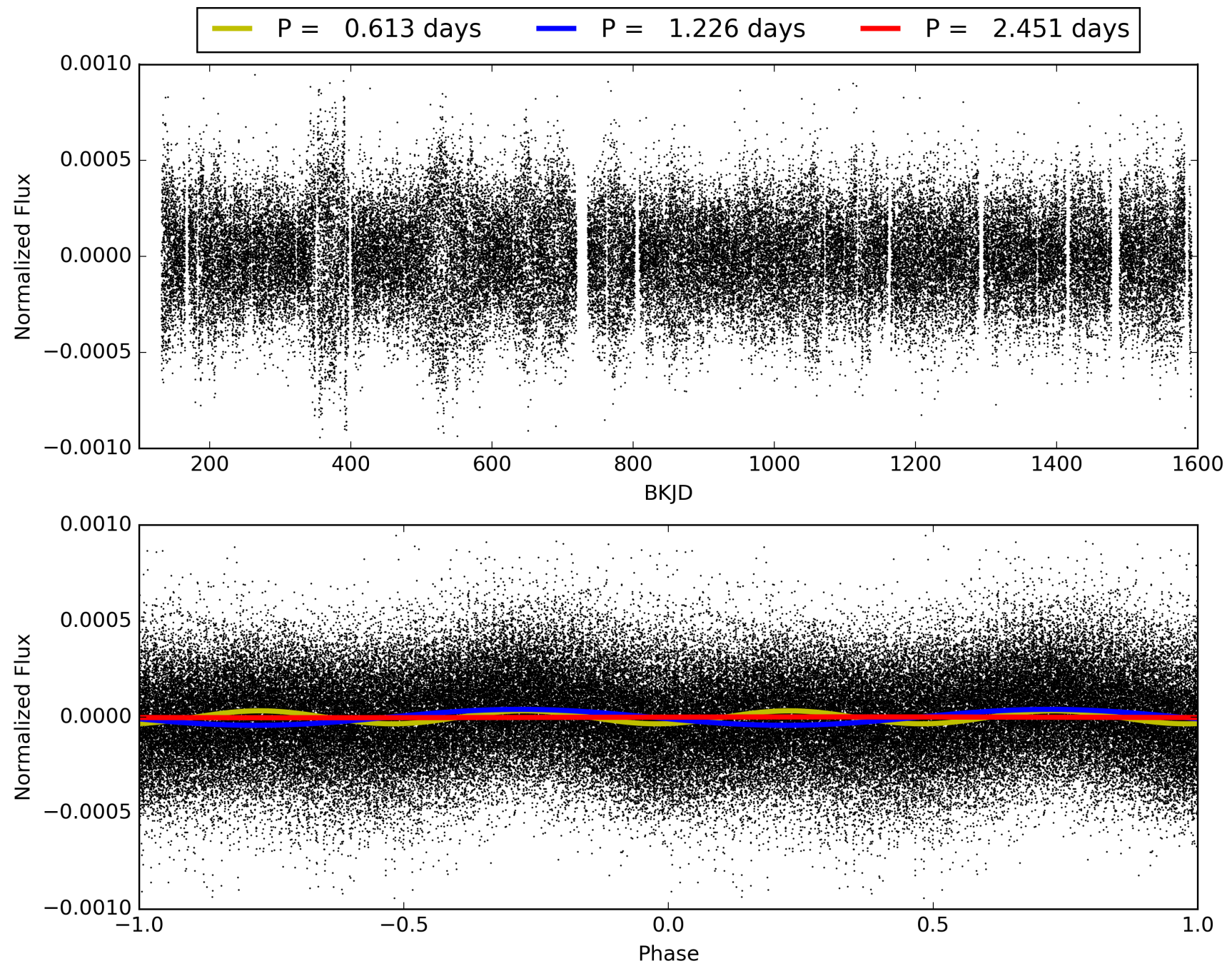
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 006369222-01, PDC Light Curves



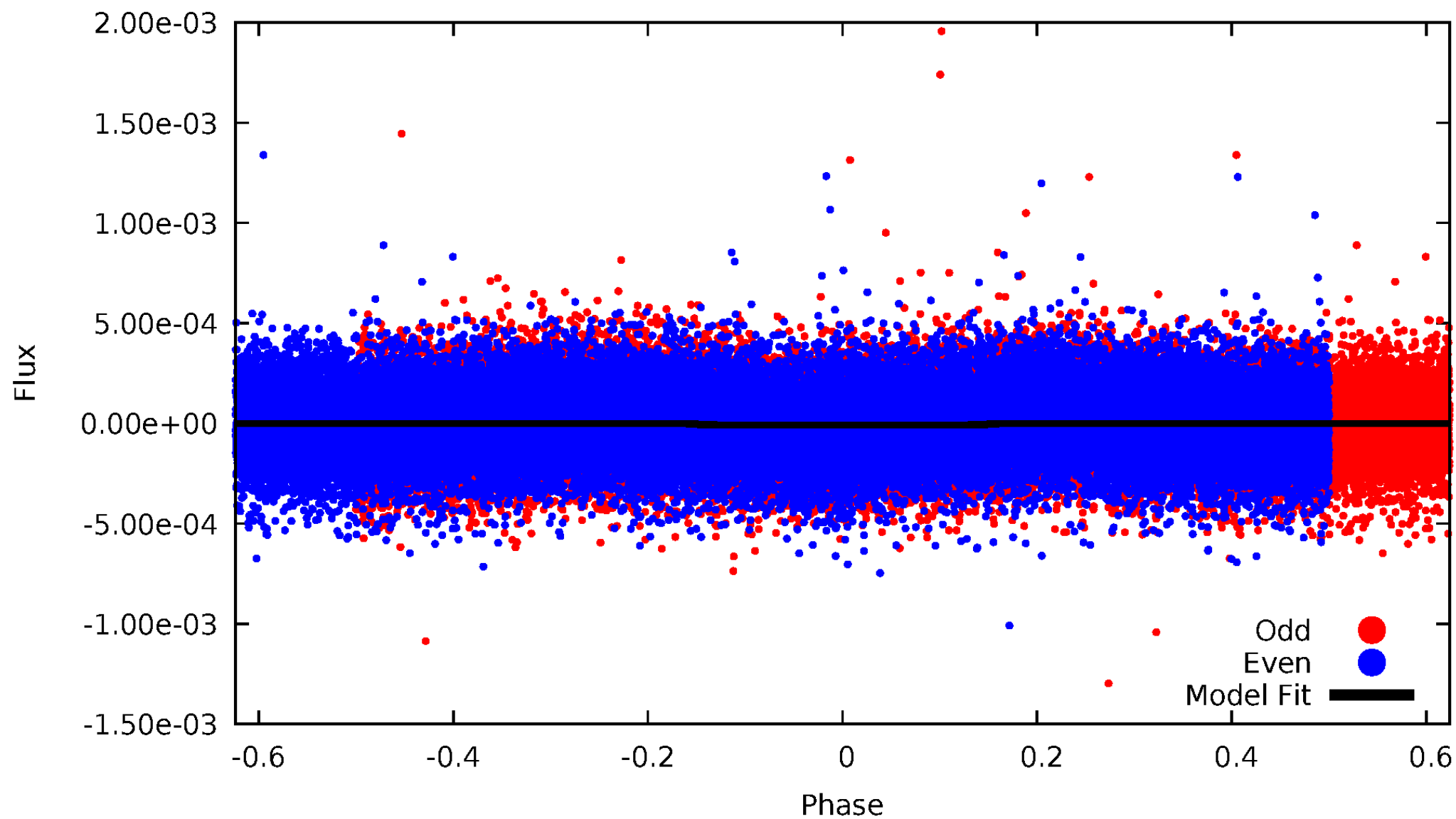


TCE 006369222-01



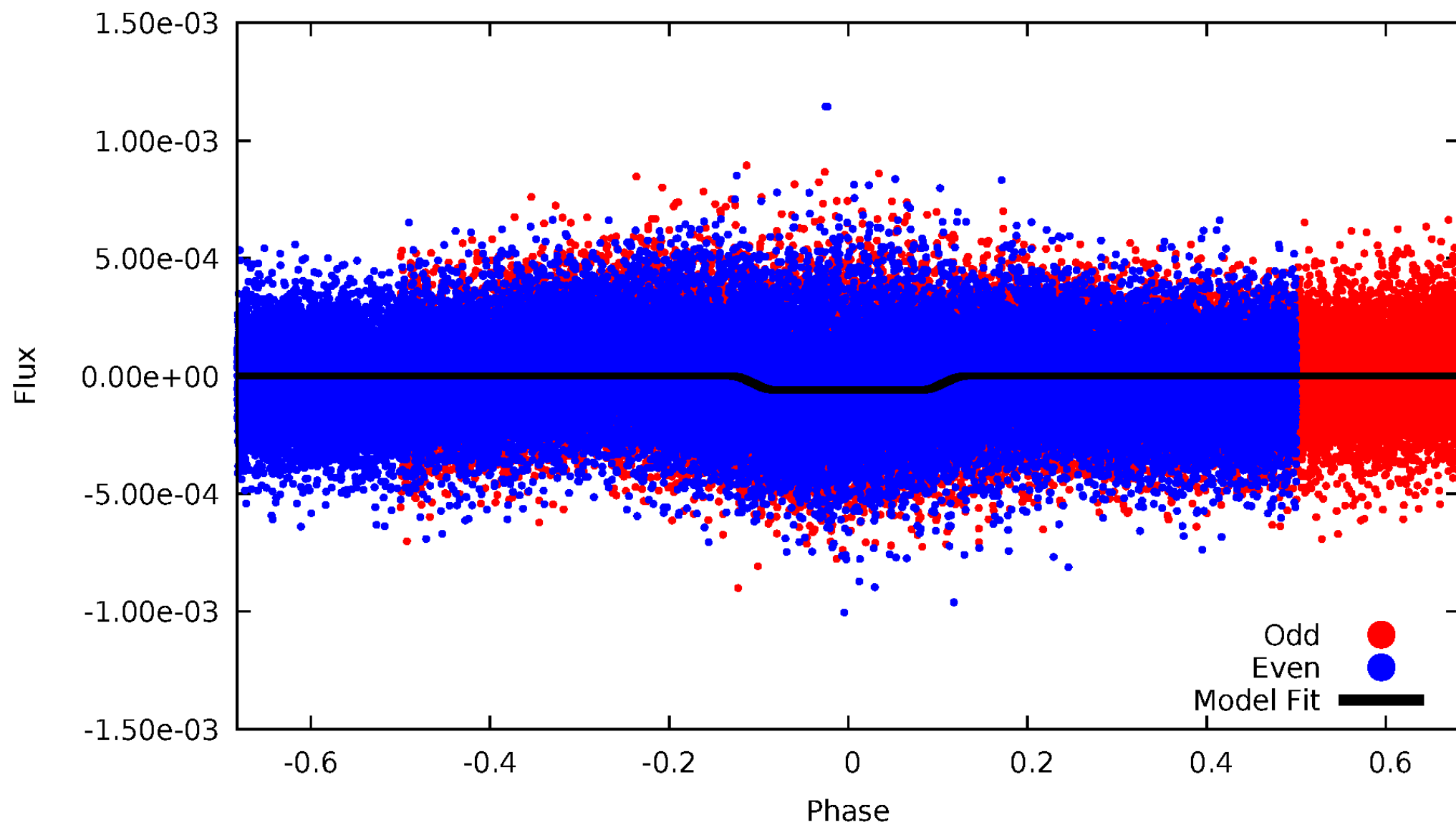
# DV Odd/Even

TCE 006369222-01

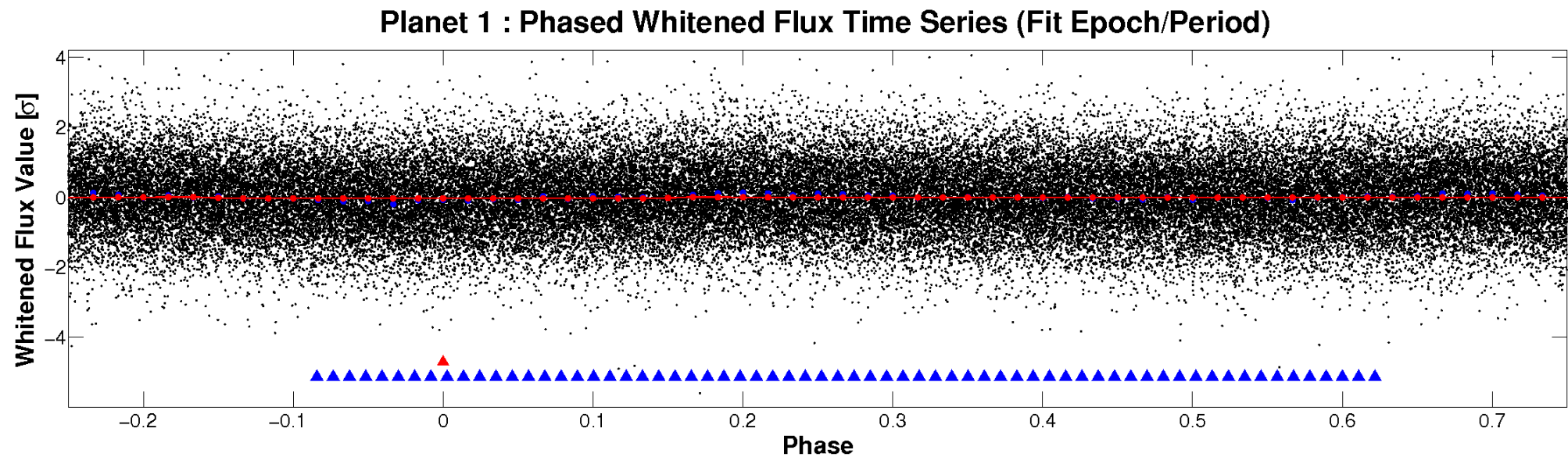
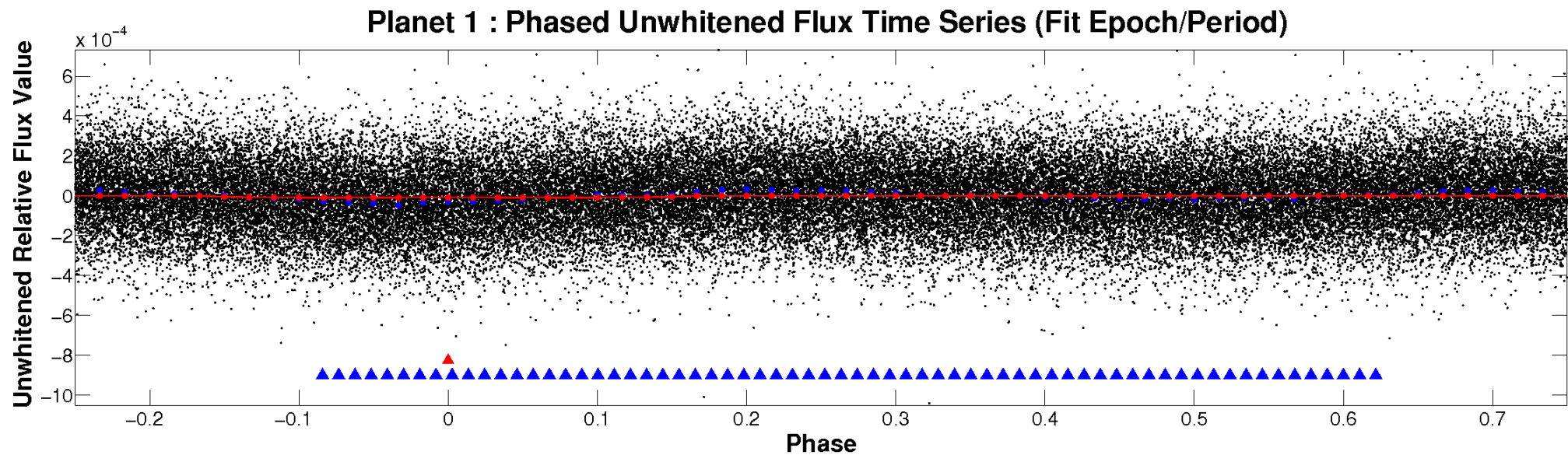


# ALT Odd/Even

TCE 006369222-01



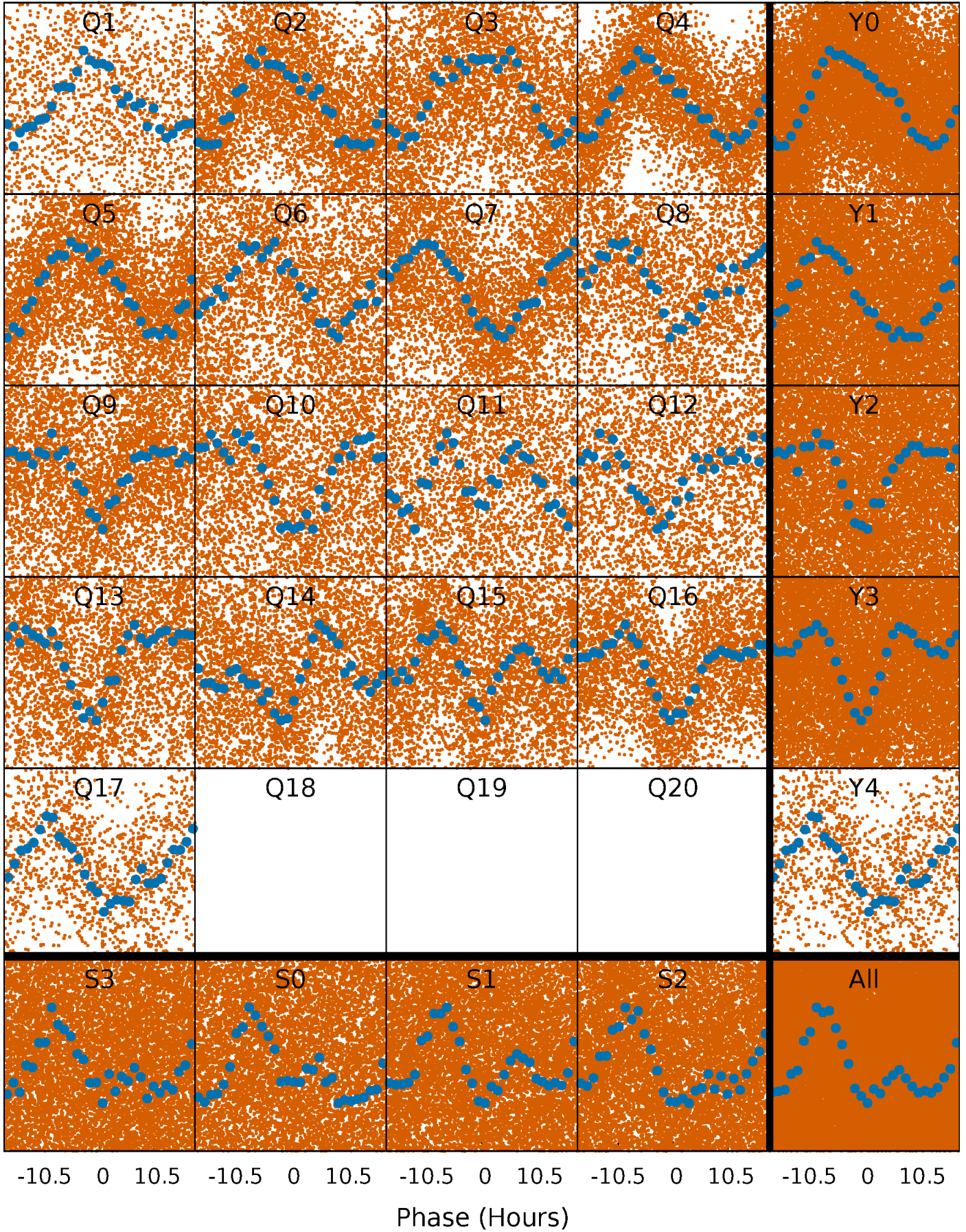
# Non-Whitened Vs. Whitened Light Curve





# PDC Quarter-Phased Transit Curves

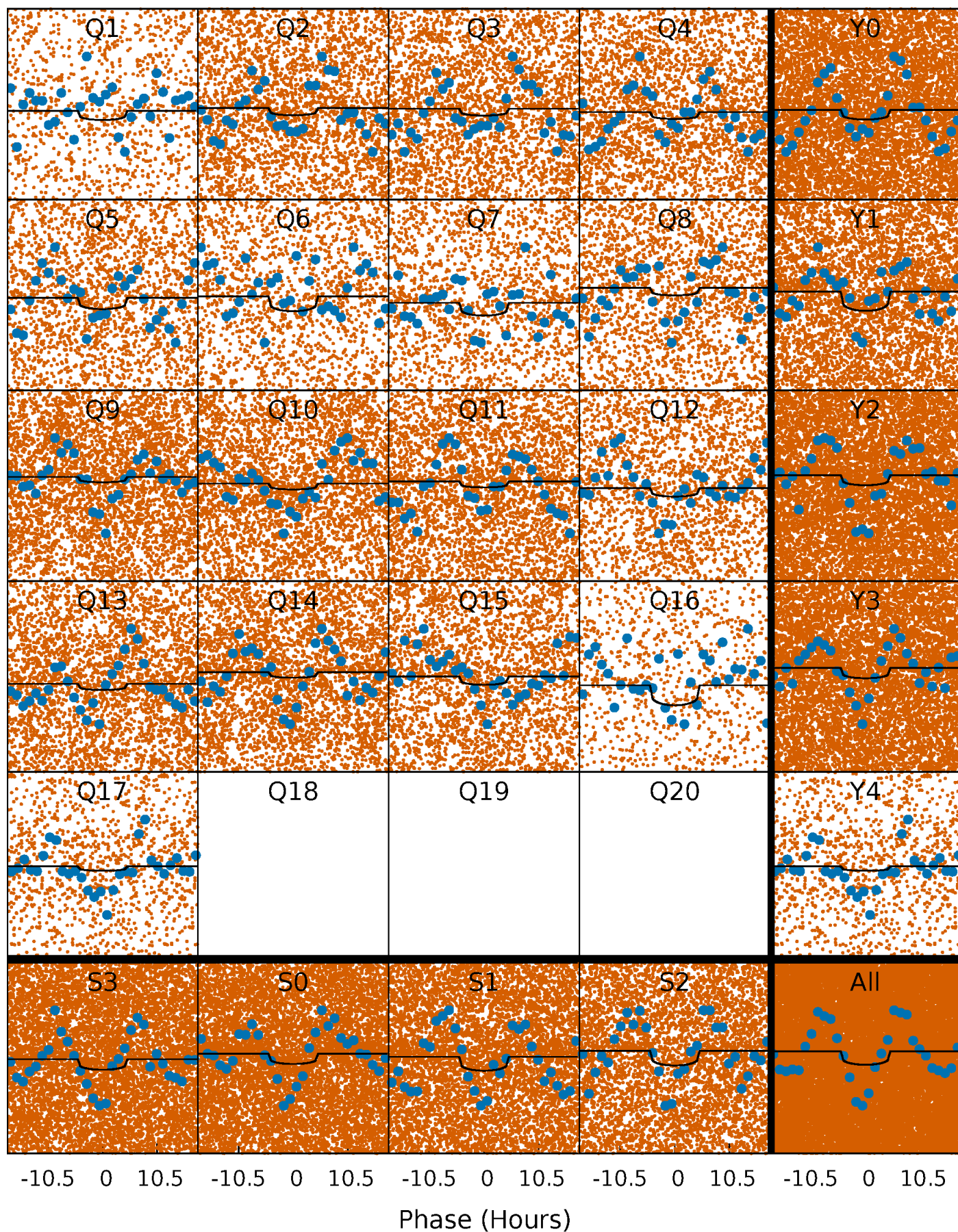
TCE 006369222-01   P= 1.225743 Days    $T_0=132.337263$  (BKJD)





# DV Quarter-Phased Transit Curves

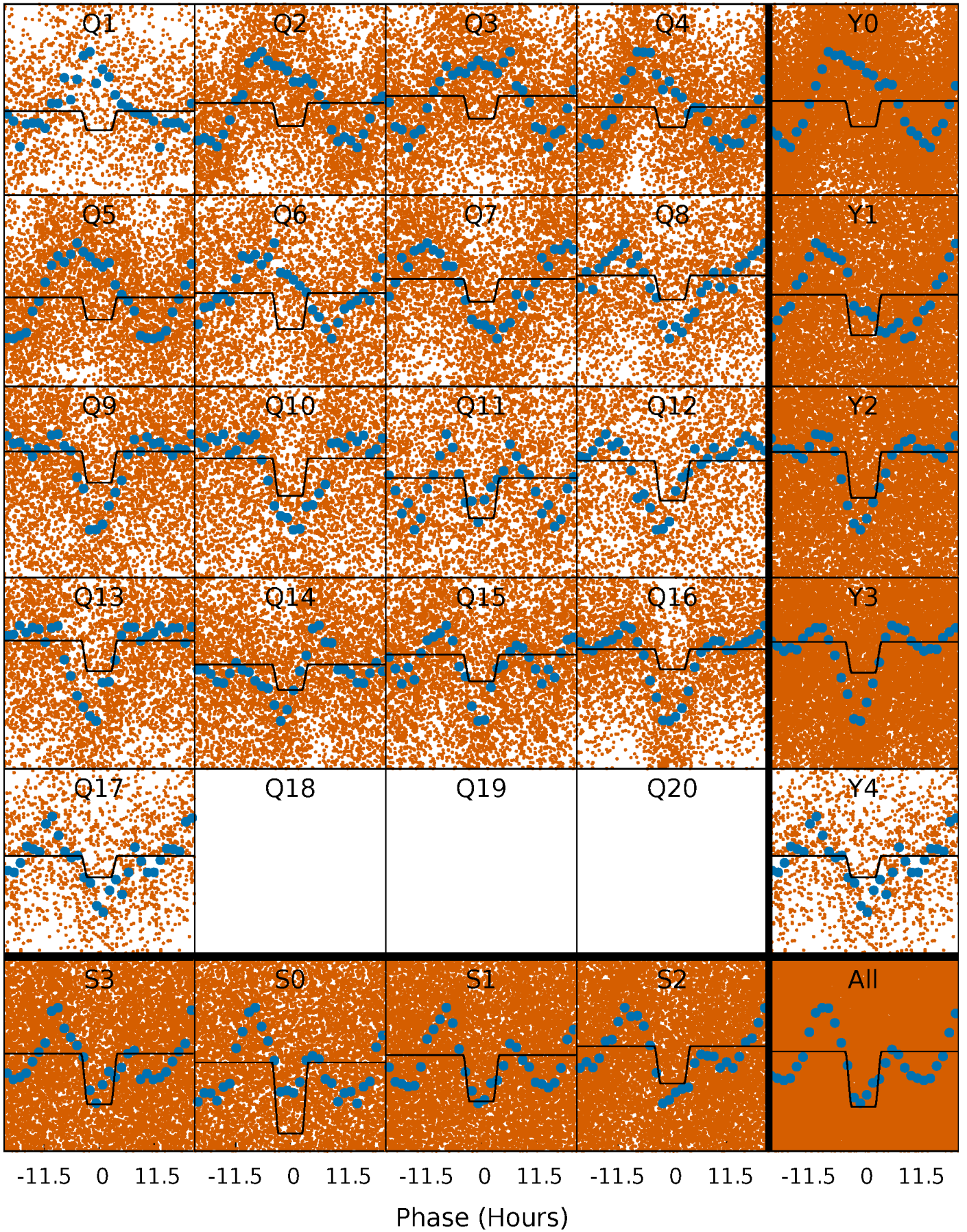
TCE 006369222-01   P= 1.225743 Days    $T_0=132.337263$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

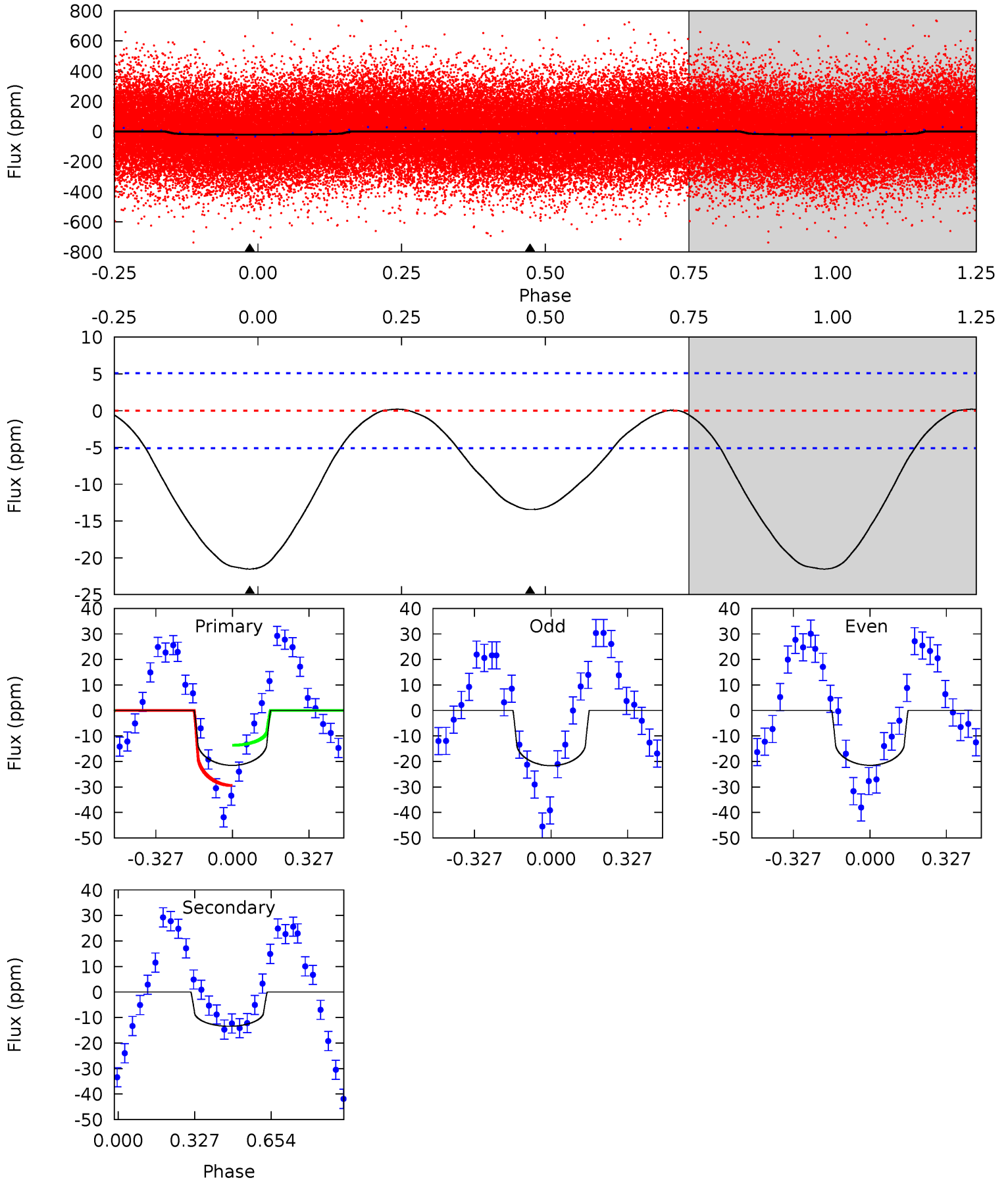
TCE 006369222-01   P= 1.225746 Days    $T_0=132.347687$  (BKJD)



# DV Model-Shift Uniqueness Test

006369222-01, P = 1.225743 Days, E = 131.111520 Days

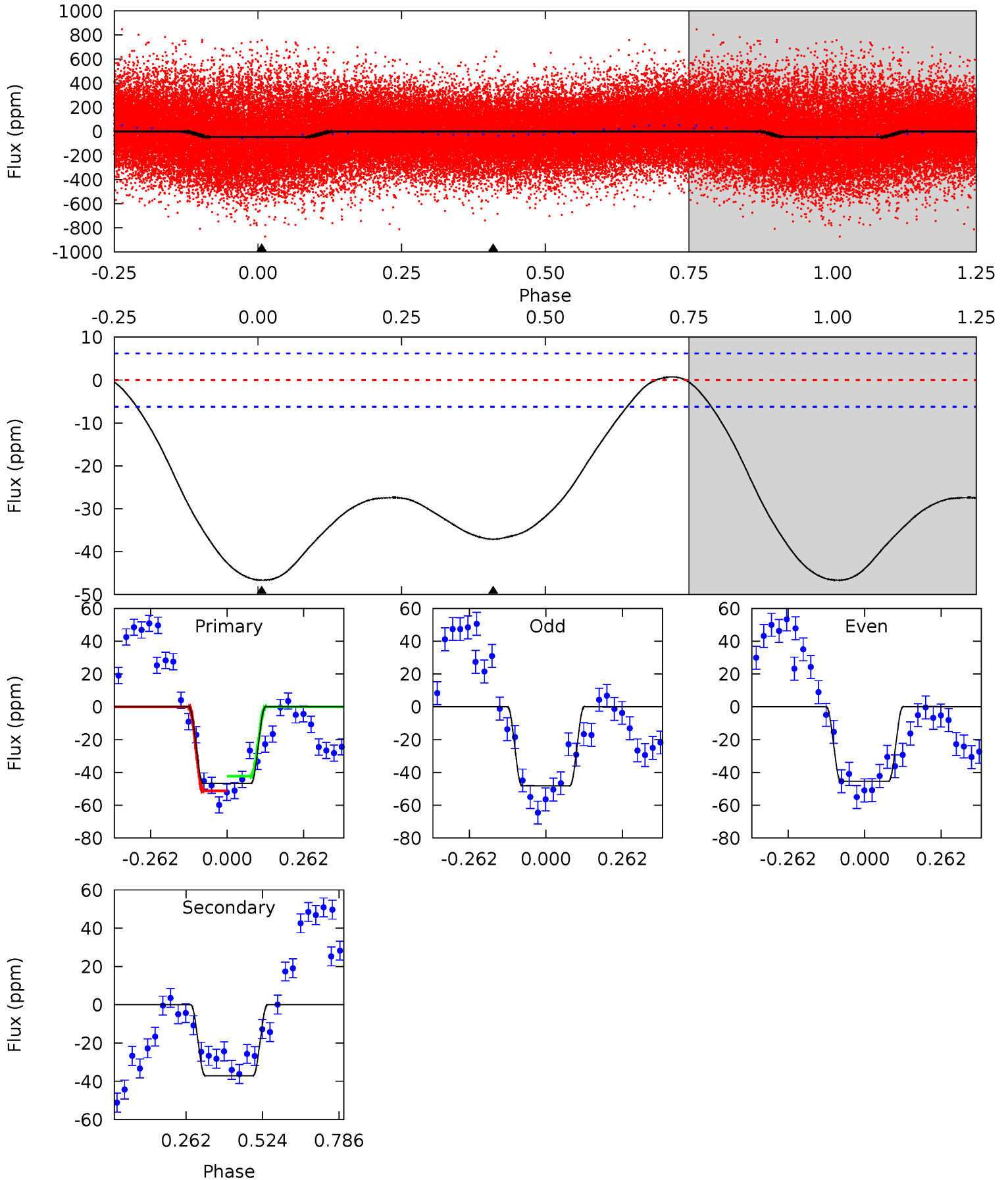
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
18.2	11.4	0	0	4.31	0.98	0.28	18.2	18.2	11.4	11.4	0.07	0.97	0.01	6.76



# Alt Model-Shift Uniqueness Test

006369222-01, P = 1.225746 Days, E = 131.121941 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
32.7	26.0	0	0	4.36	1.12	0.82	32.7	32.7	26.0	26.0	0.97	0.95	0.02	2.92





### Stellar Parameters For KIC 006369222

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6742^{+182}_{-203}$	$3.495^{+0.368}_{-0.092}$	$-0.760^{+0.350}_{-0.300}$	$3.722^{+0.549}_{-1.647}$	$1.580^{+0.182}_{-0.424}$	$0.043^{+0.134}_{-0.013}$
	+3%/-3%	+11%/-3%	+46%/-39%	+15%/-44%	+12%/-27%	+309%/-30%
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 006369222-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-13 \pm 1$	$1.27^{+1.06}_{-0.79}$	$4861^{+290}_{-482}$	$6750^{+6573}_{-1932}$	$3.002^{+17.481}_{-2.049}$
Alt.	$-37 \pm 1$	$2.94^{+1.28}_{-1.19}$	$4872^{+301}_{-489}$	$5649^{+1761}_{-977}$	$1.603^{+2.794}_{-0.829}$

$T_{max}$  = 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

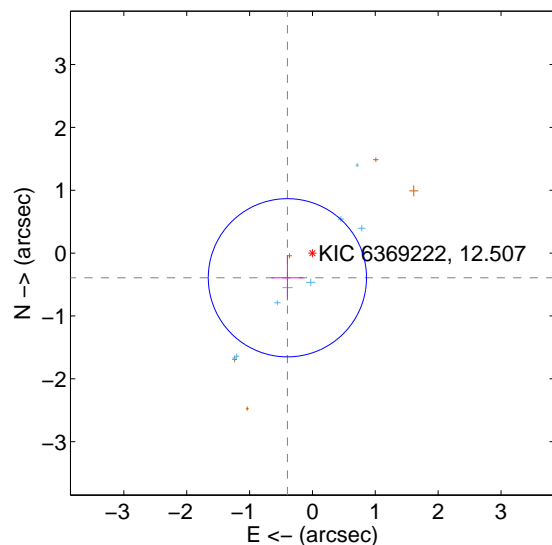
Supplemental centroid analysis for 006369222-01. Kepler magnitude: 12.51. Transit SNR 5.16

There are 8 quarters with good PRF difference image offsets

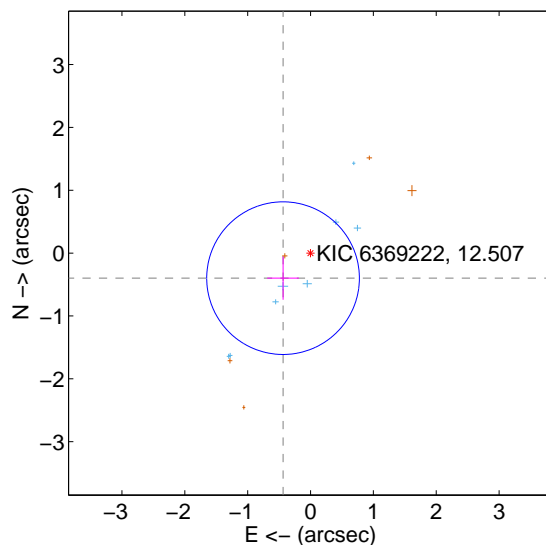
The direct PRF centroid is offset from the target star catalog position by about 0.03 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.559 \pm 0.419$	1.33	$0.398 \pm 0.256$	$-0.392 \pm 0.359$
PRF-fit source offset from KIC position	$0.592 \pm 0.405$	1.46	$0.437 \pm 0.253$	$-0.399 \pm 0.344$
photometric centroid source offset	$0.64 \pm 0.86$	0.74	$-0.20 \pm 0.94$	$0.60 \pm 0.85$

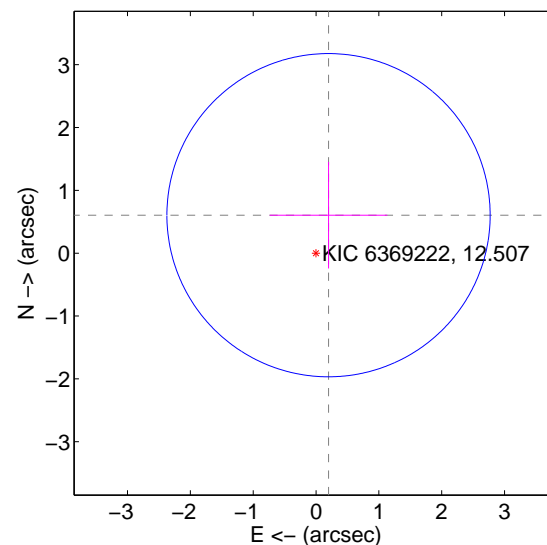
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

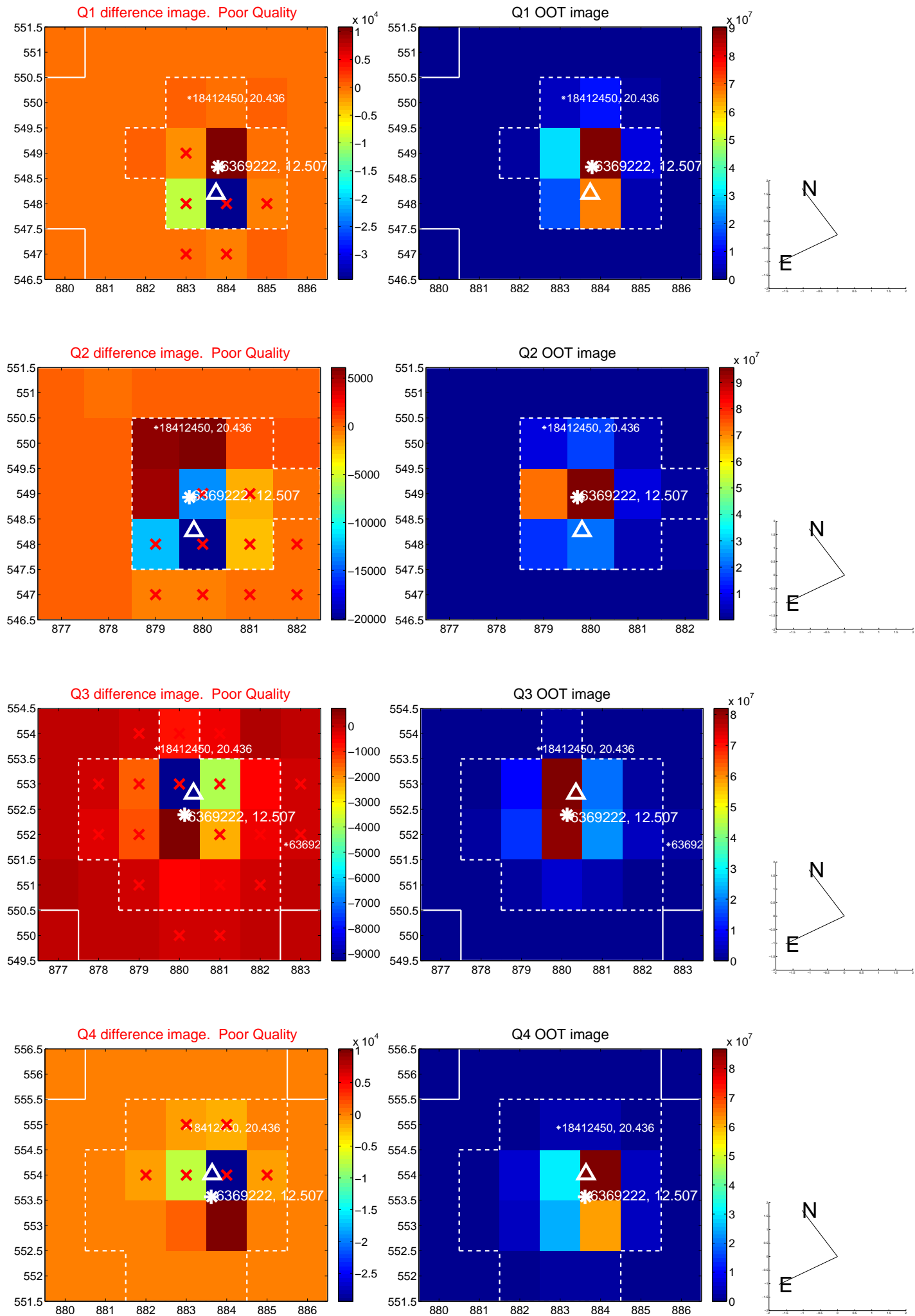


offset from photometric centroids

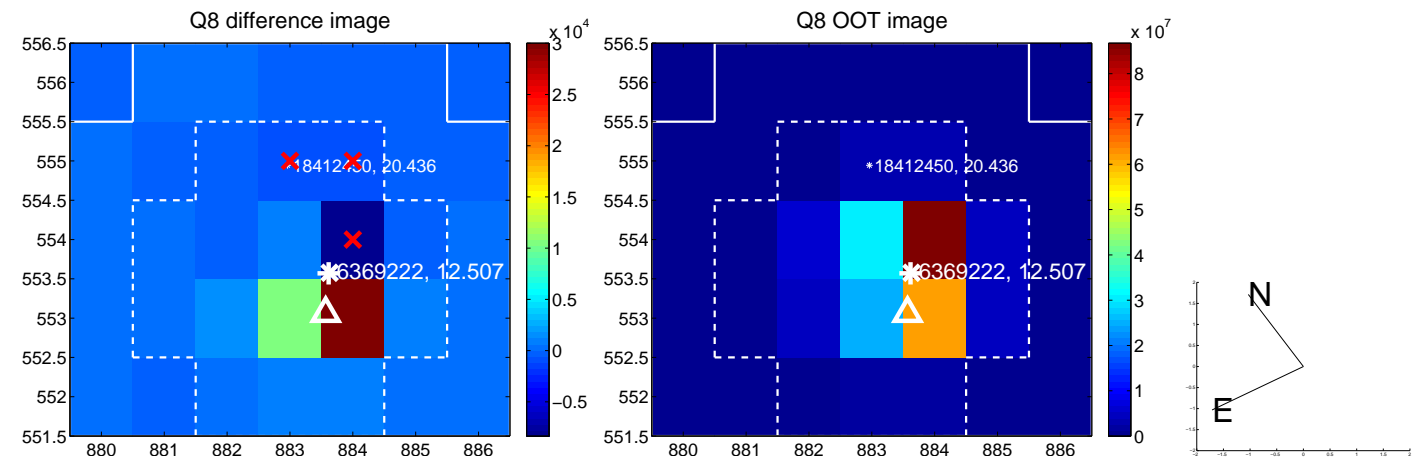
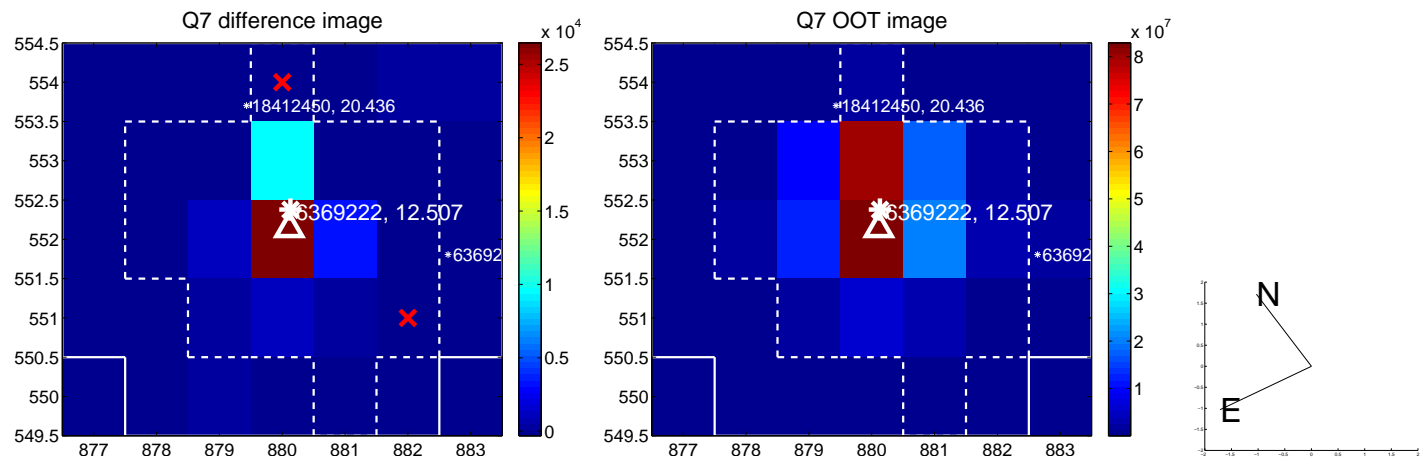
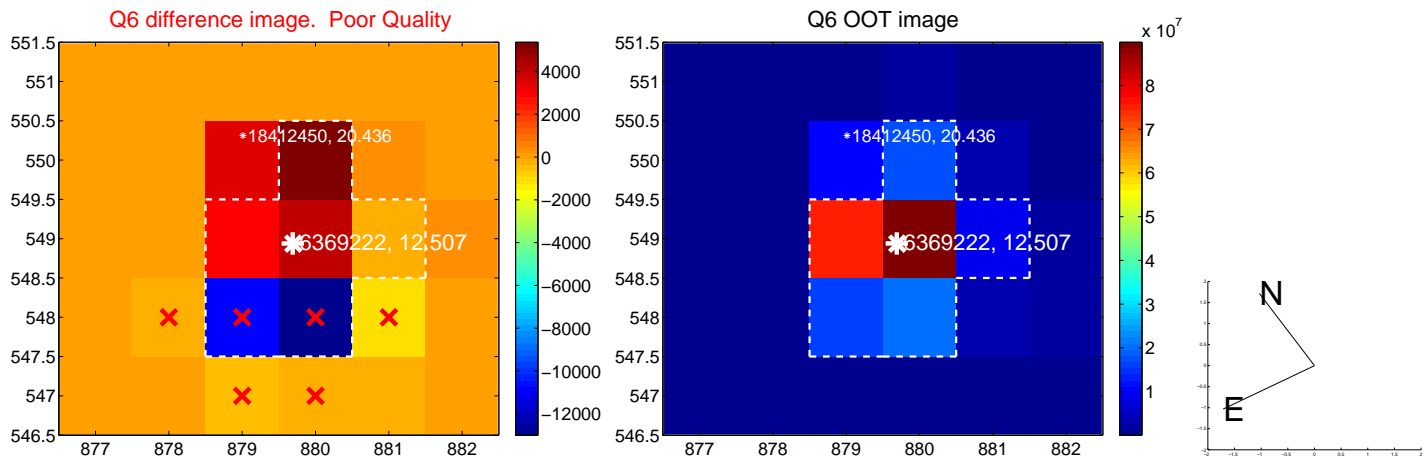
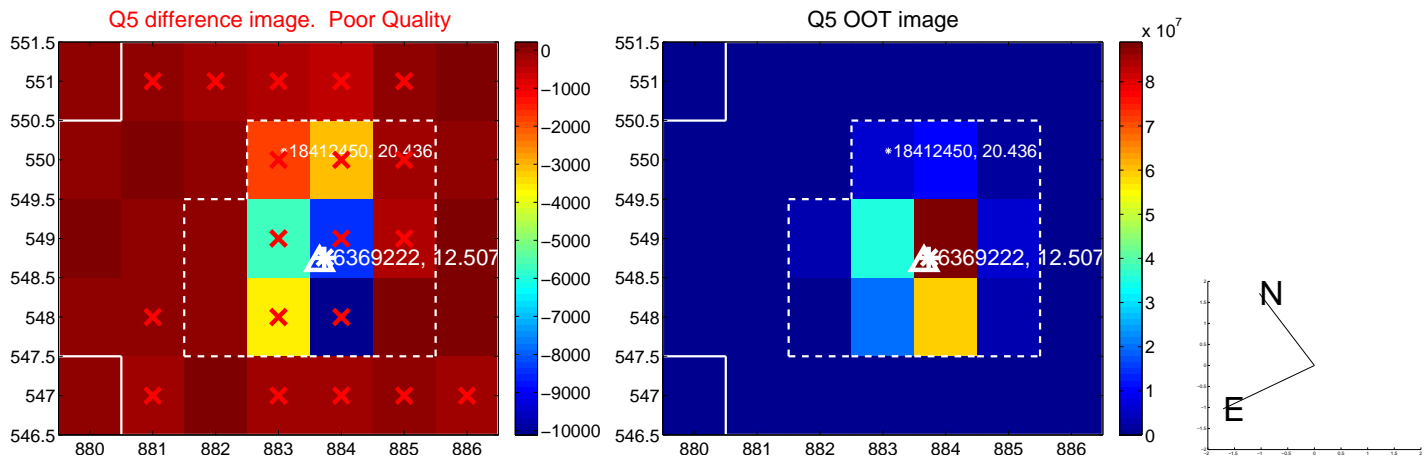


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

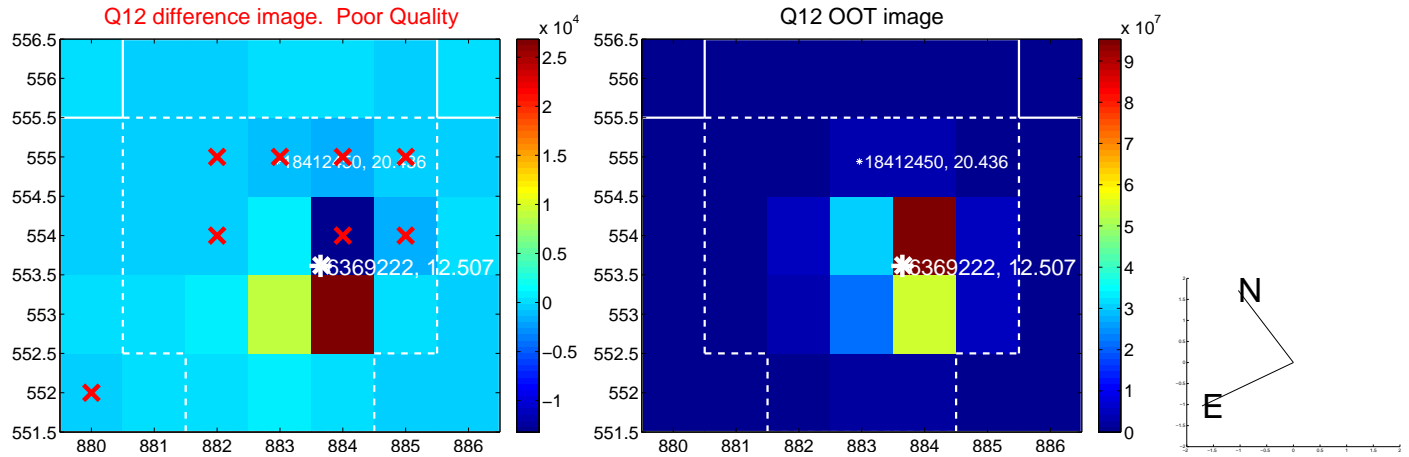
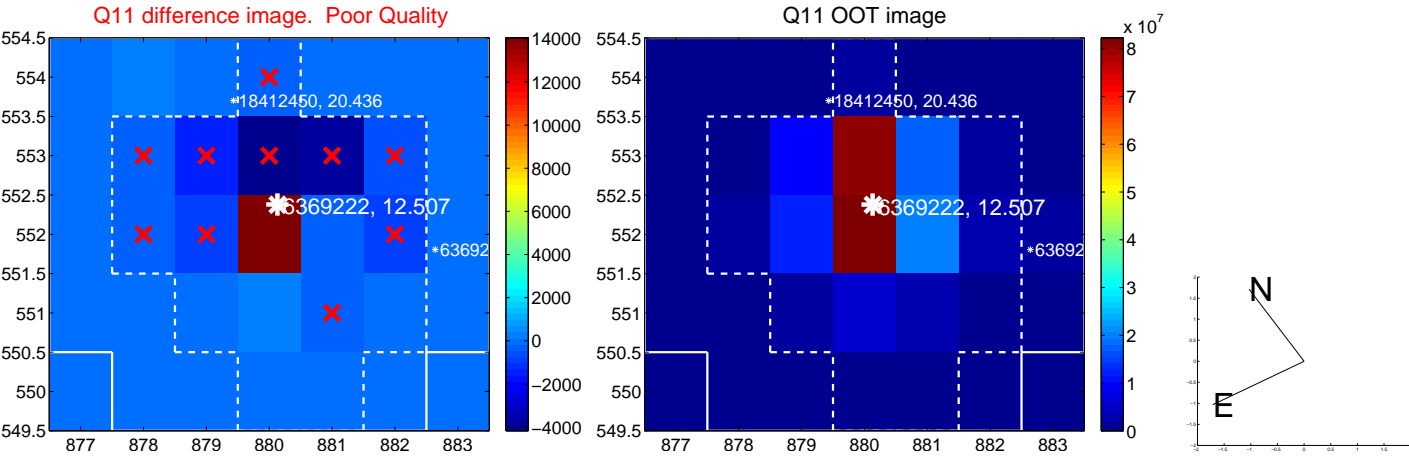
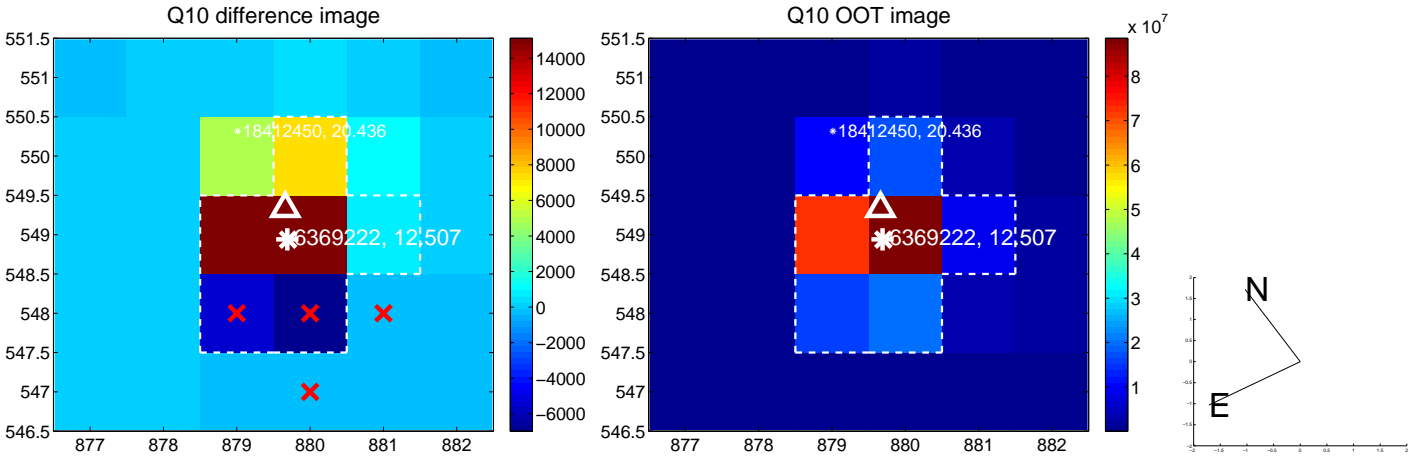
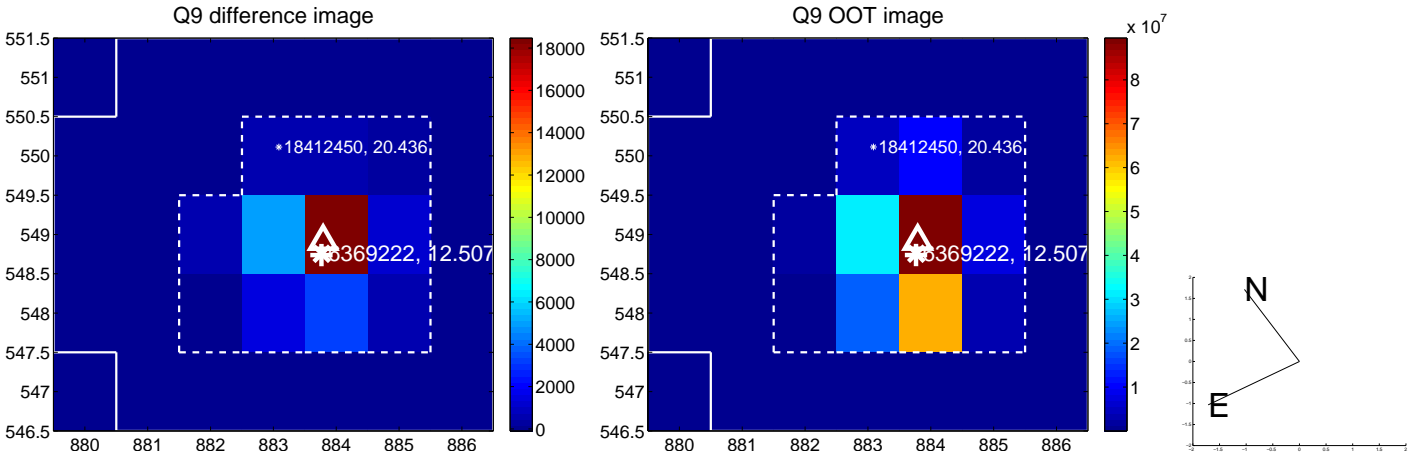


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

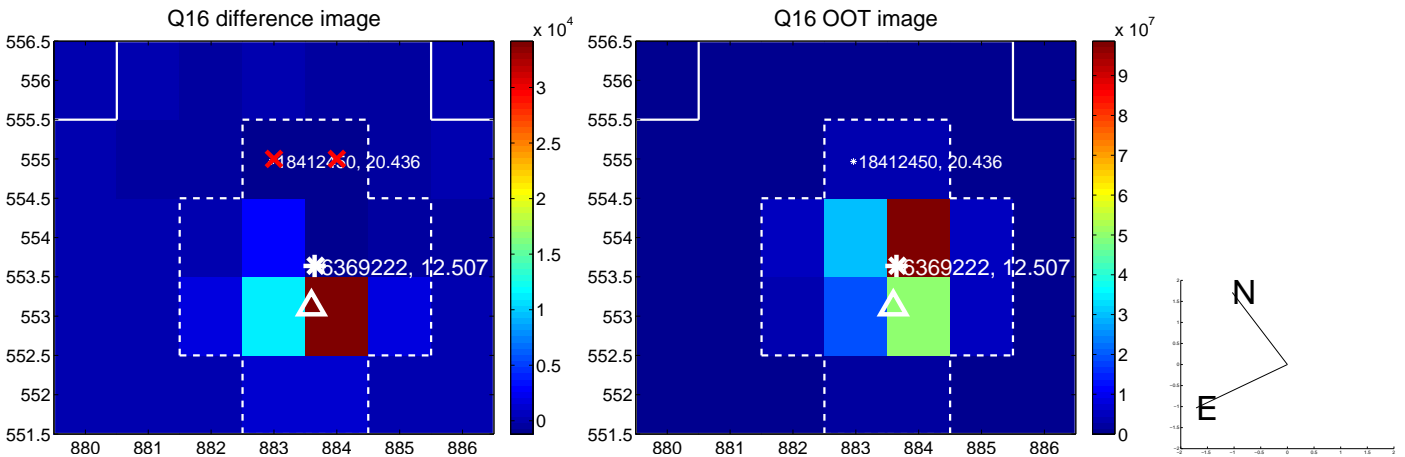
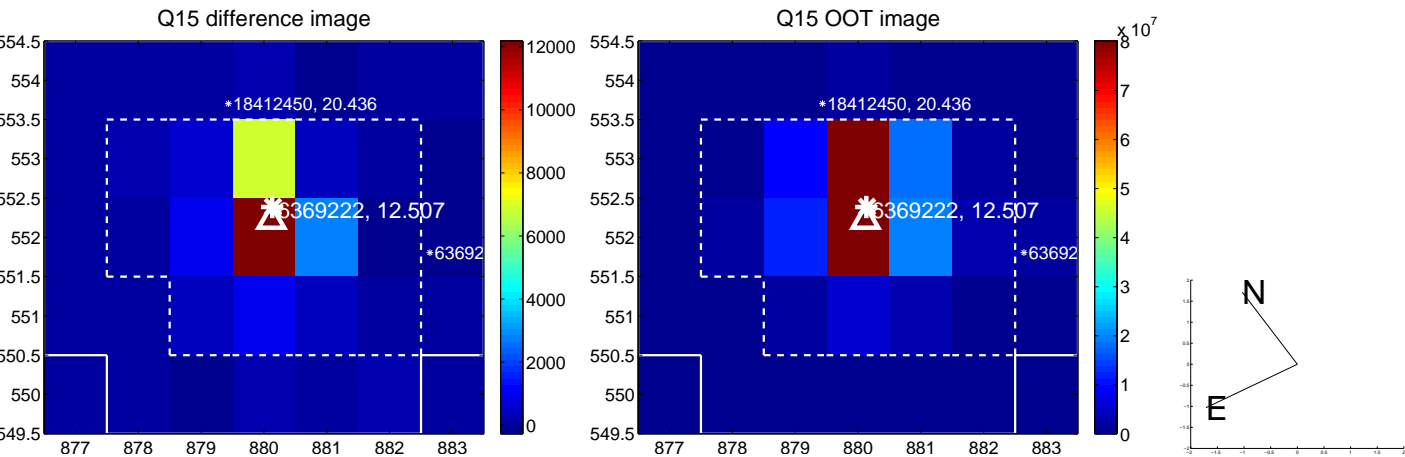
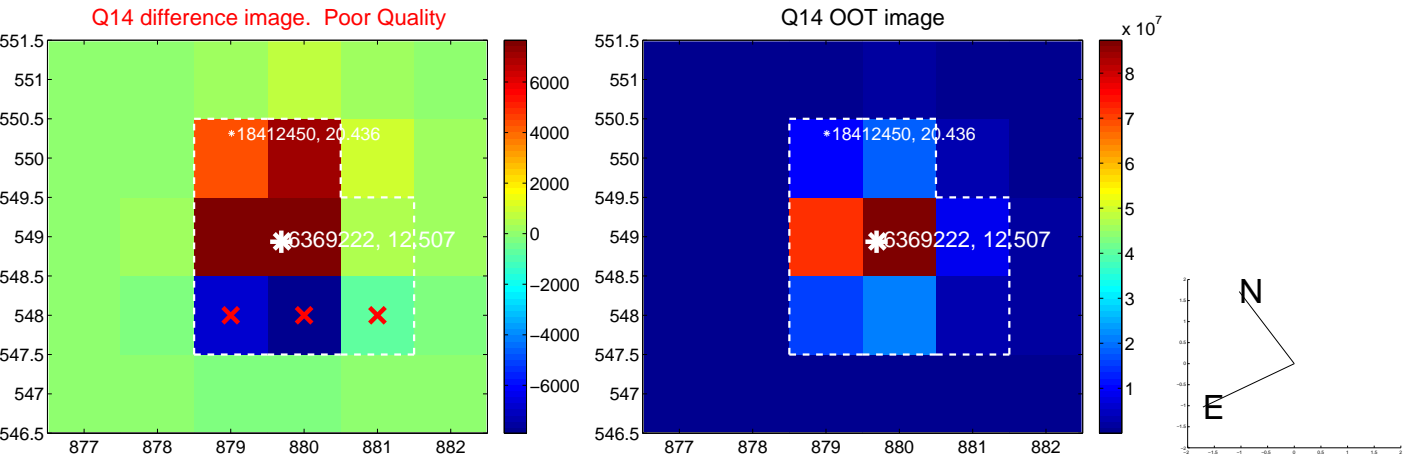
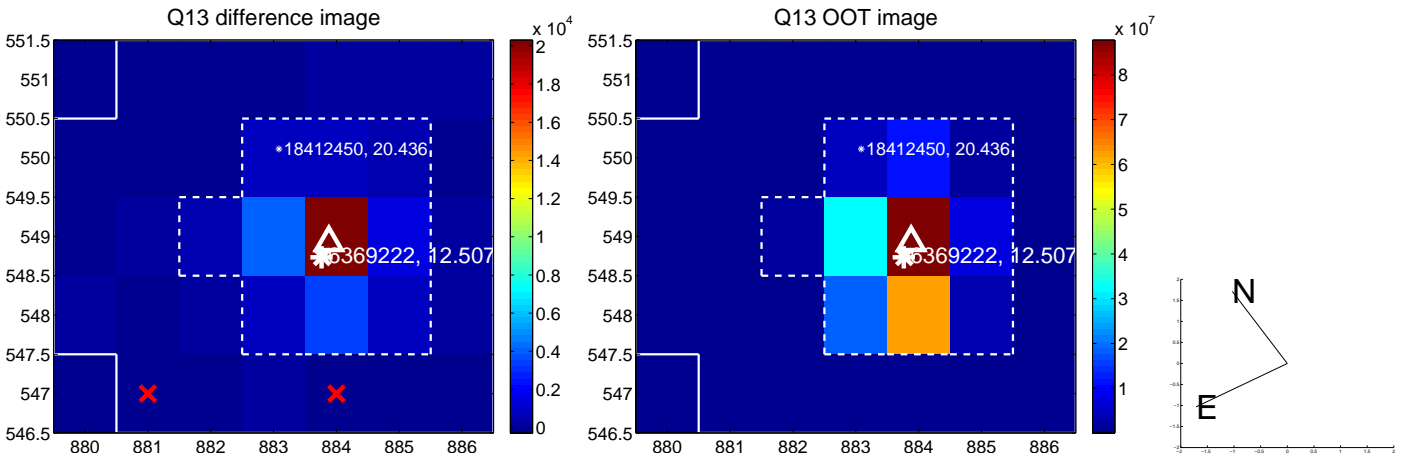




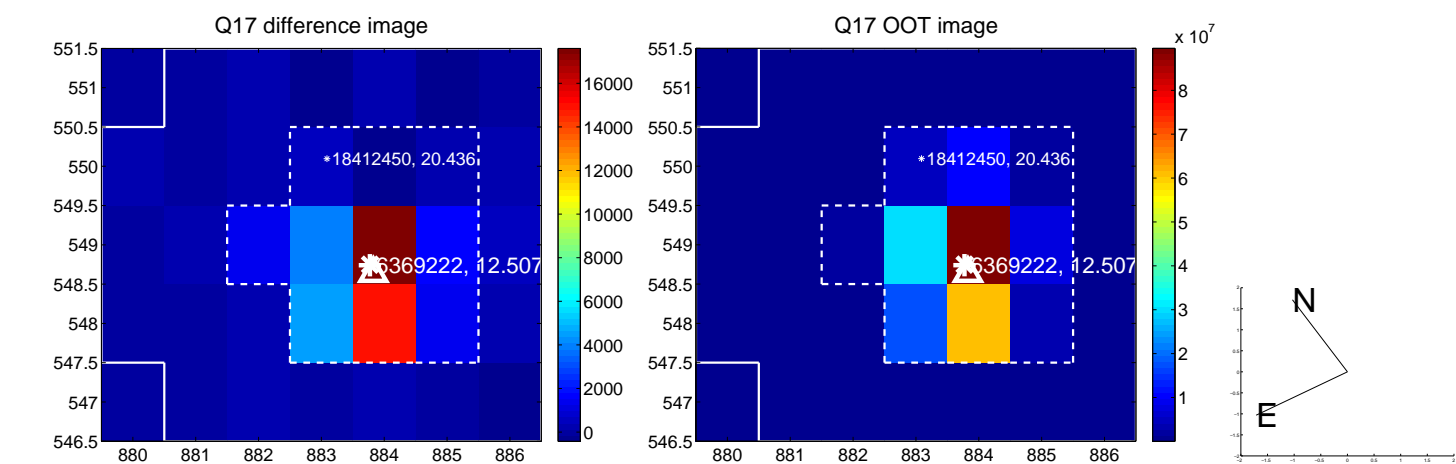
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



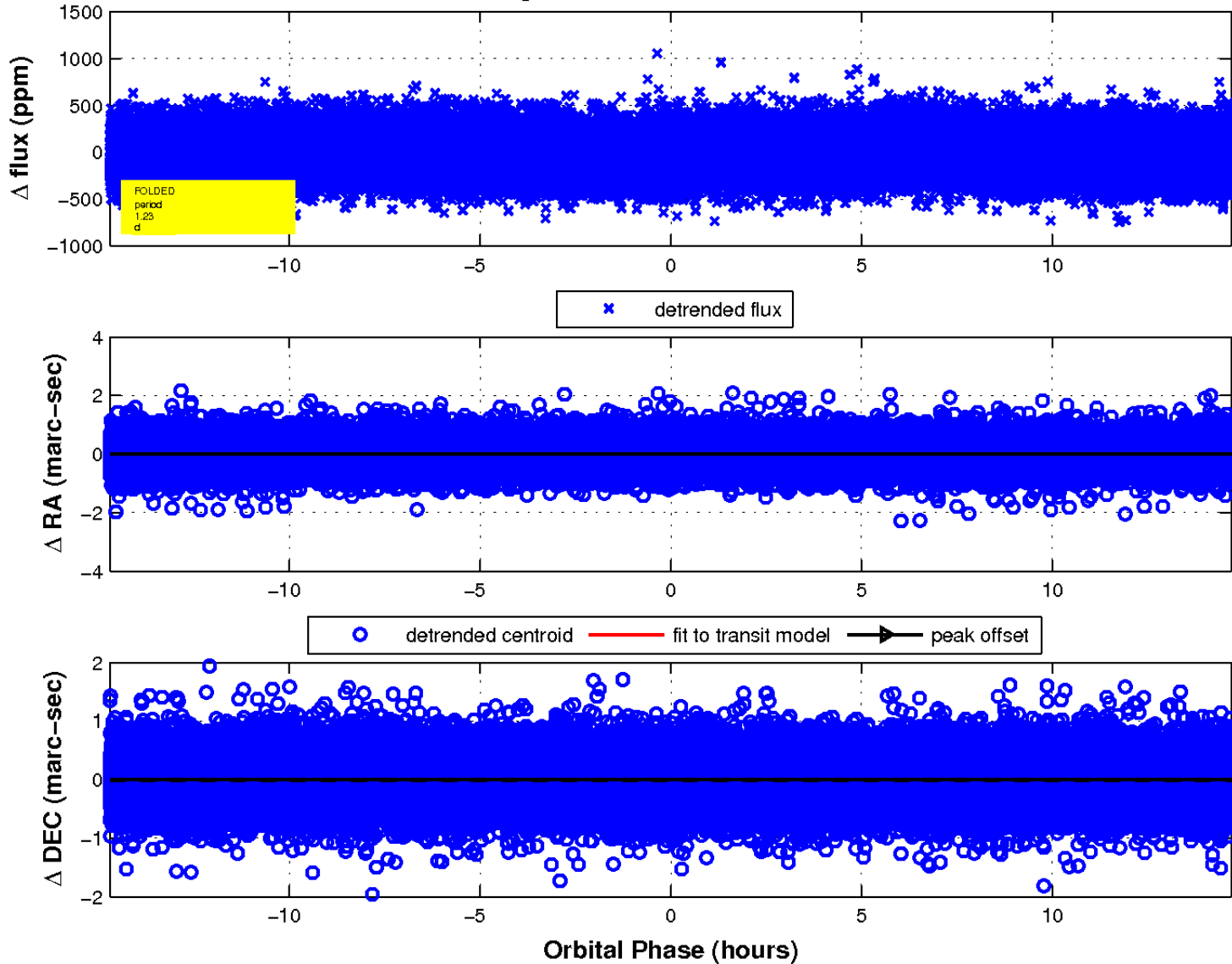
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

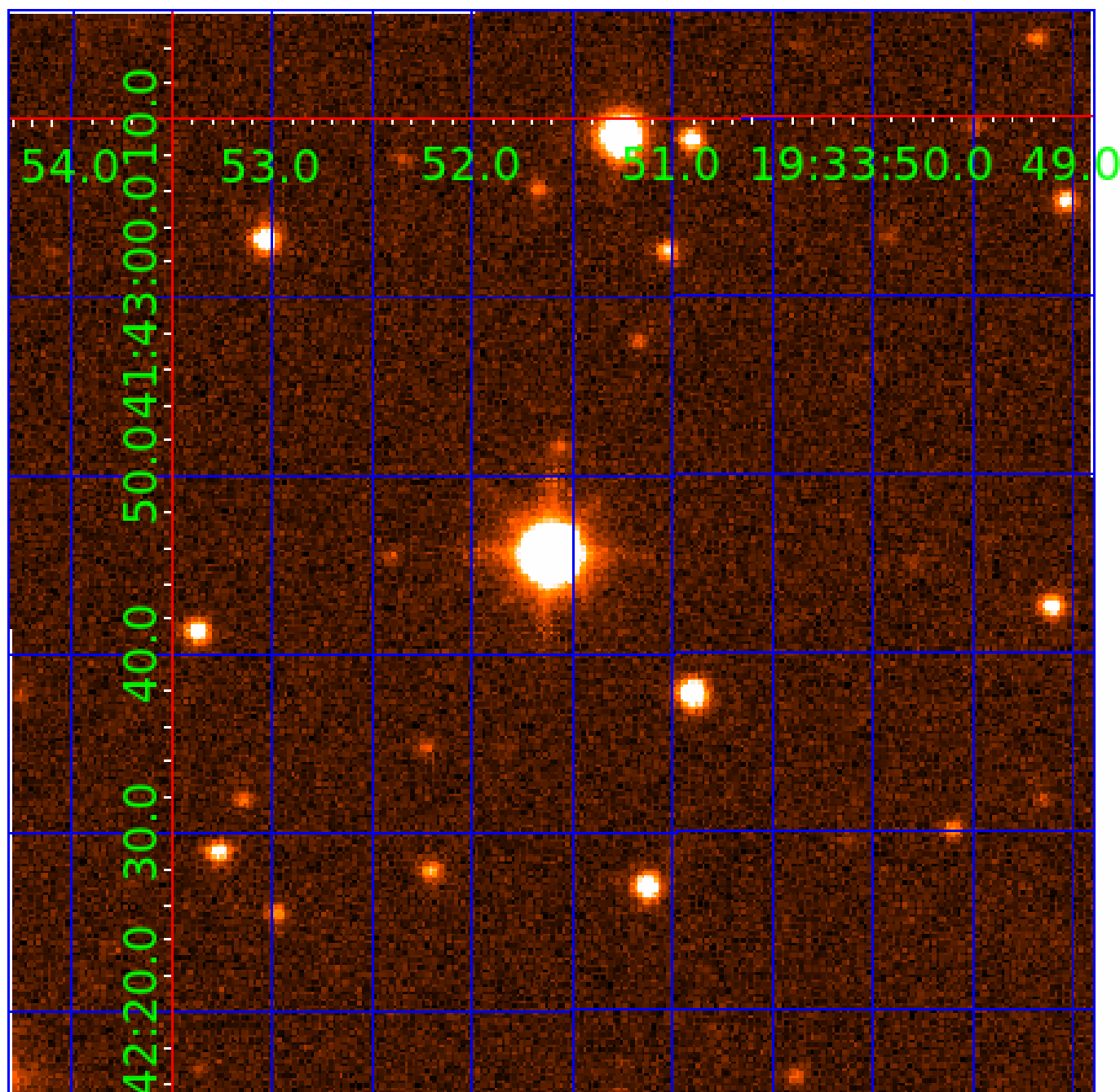


fluxWeightedCentroids, Planet 1 of 2



UKIRT Image

Declination





# KIC 006369222

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006369222-01	OBS	No	1.225743	132.337263	9.0	9.173	8.3	5.2	3.72	6742	1.20	37615.57
006369222-02	OBS	No	22.050061	149.034044	281.3	3.751	18.9	19.3	3.72	6742	6.86	798.03

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006369222-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT
006369222-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—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.

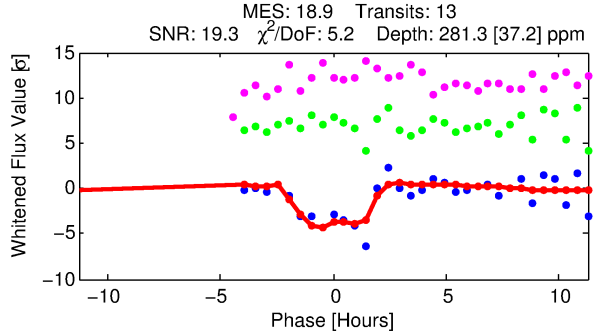
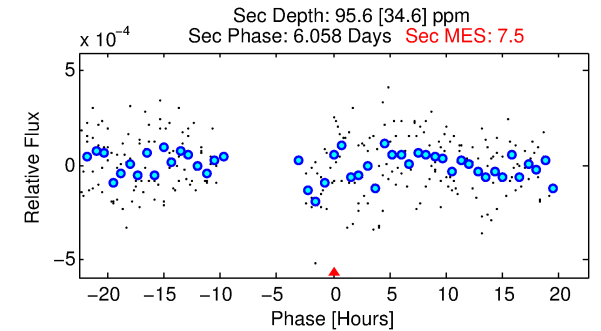
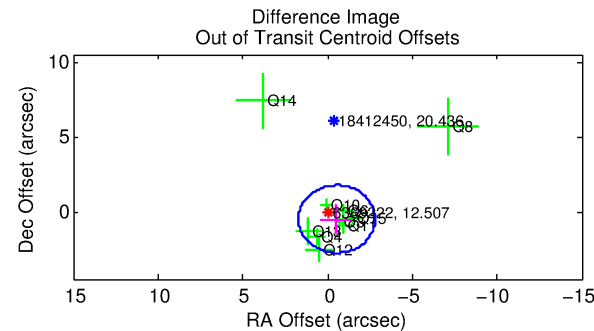
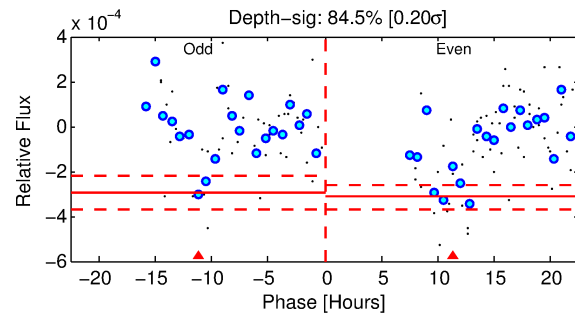
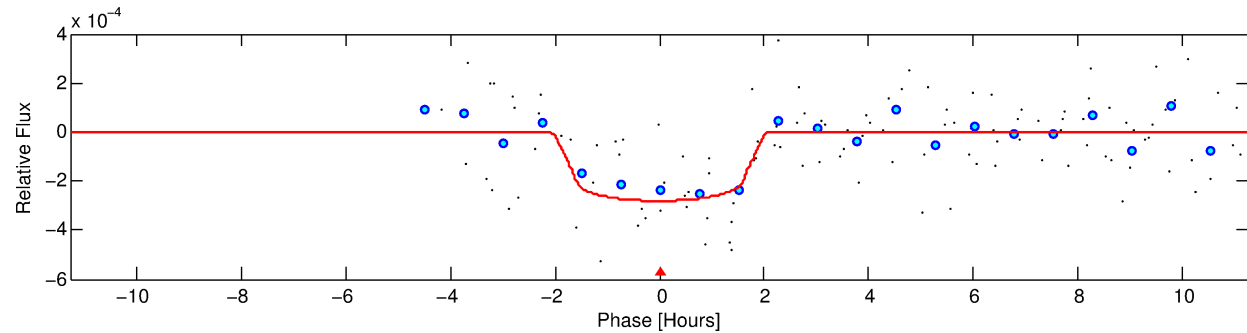
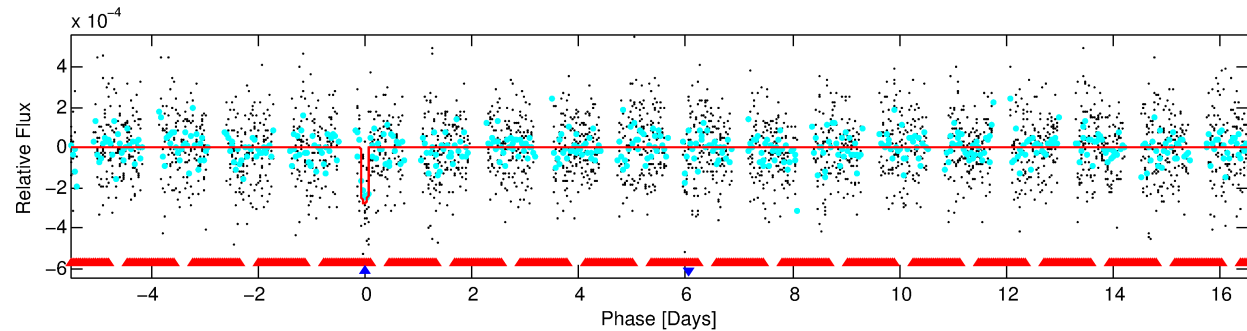
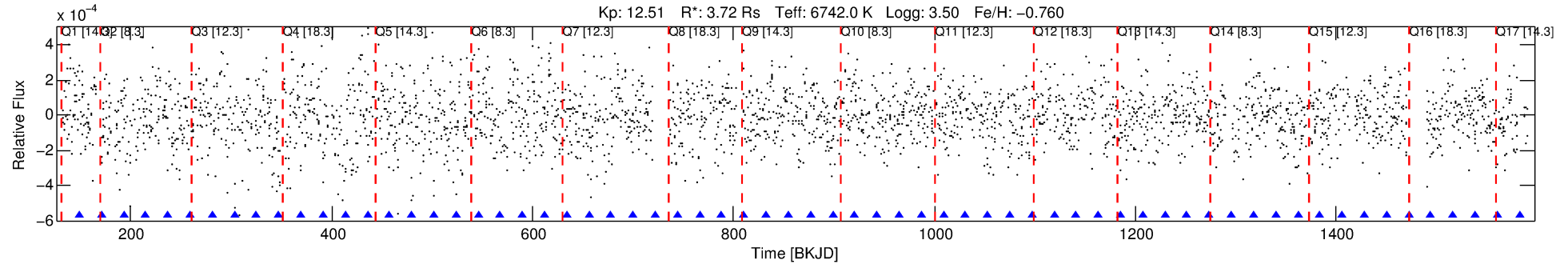
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 006369222-02

No Significant Match Found

# DV One-Page Summary

KIC: 6369222 Candidate: 2 of 2 Period: 22.050 d



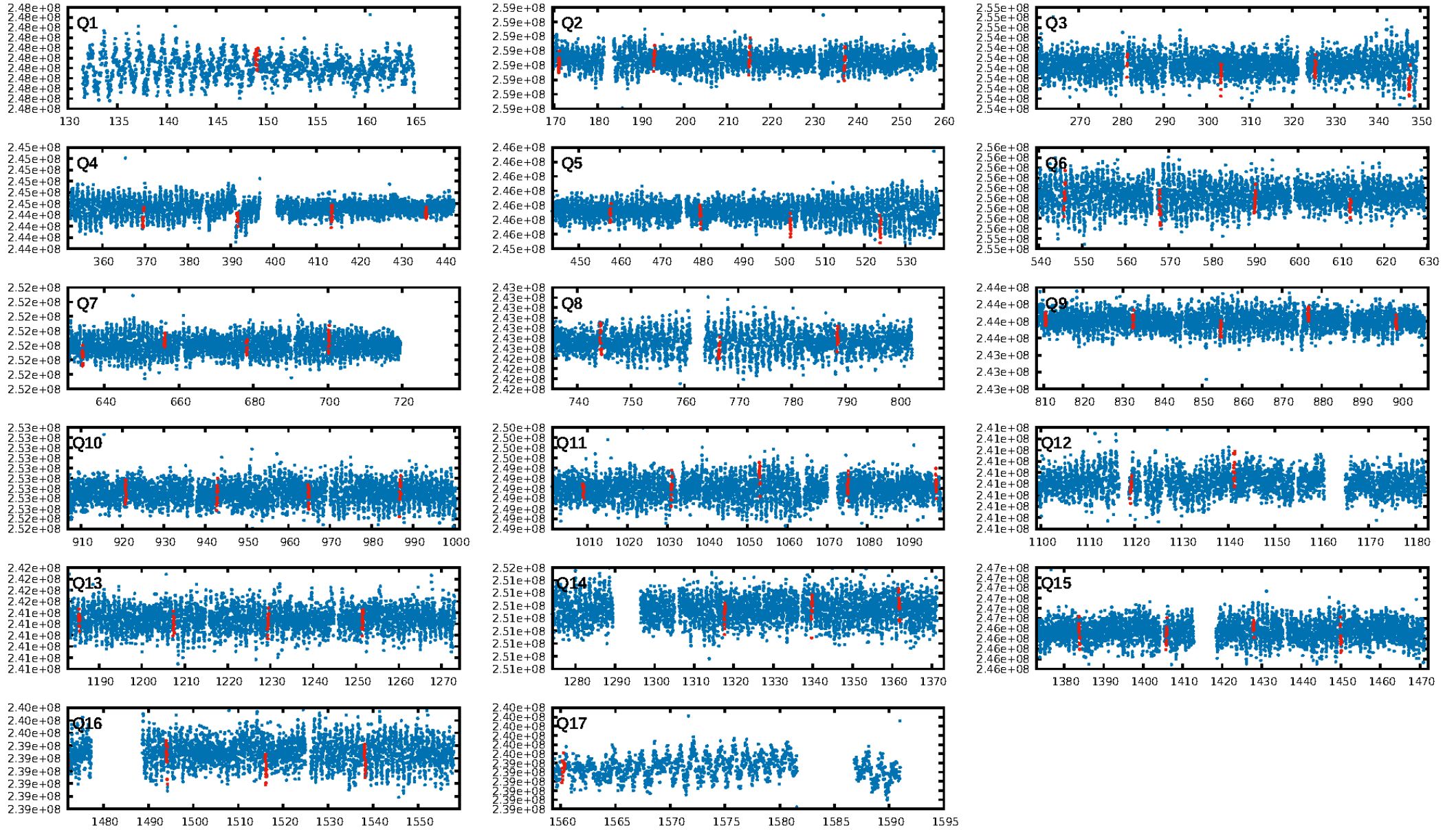
## DV Fit Results:

Period = 22.05006 [0.00263] d  
Epoch = 149.0340 [0.0306] BKJD  
Rp/R\* = 0.0169 [0.0251]  
a/R\* = 28.99 [254.78]  
b = 0.79 [4.29]  
Seff = 798.03 [517.58]  
Teq = 1355 [220] K  
Rp = 6.86 [10.62] Re  
a = 0.1793 [0.0732] AU  
Ag = 35.97 [110.03] [0.32 $\sigma$ ]  
Teffp = 5132 [3842] K [0.98 $\sigma$ ]

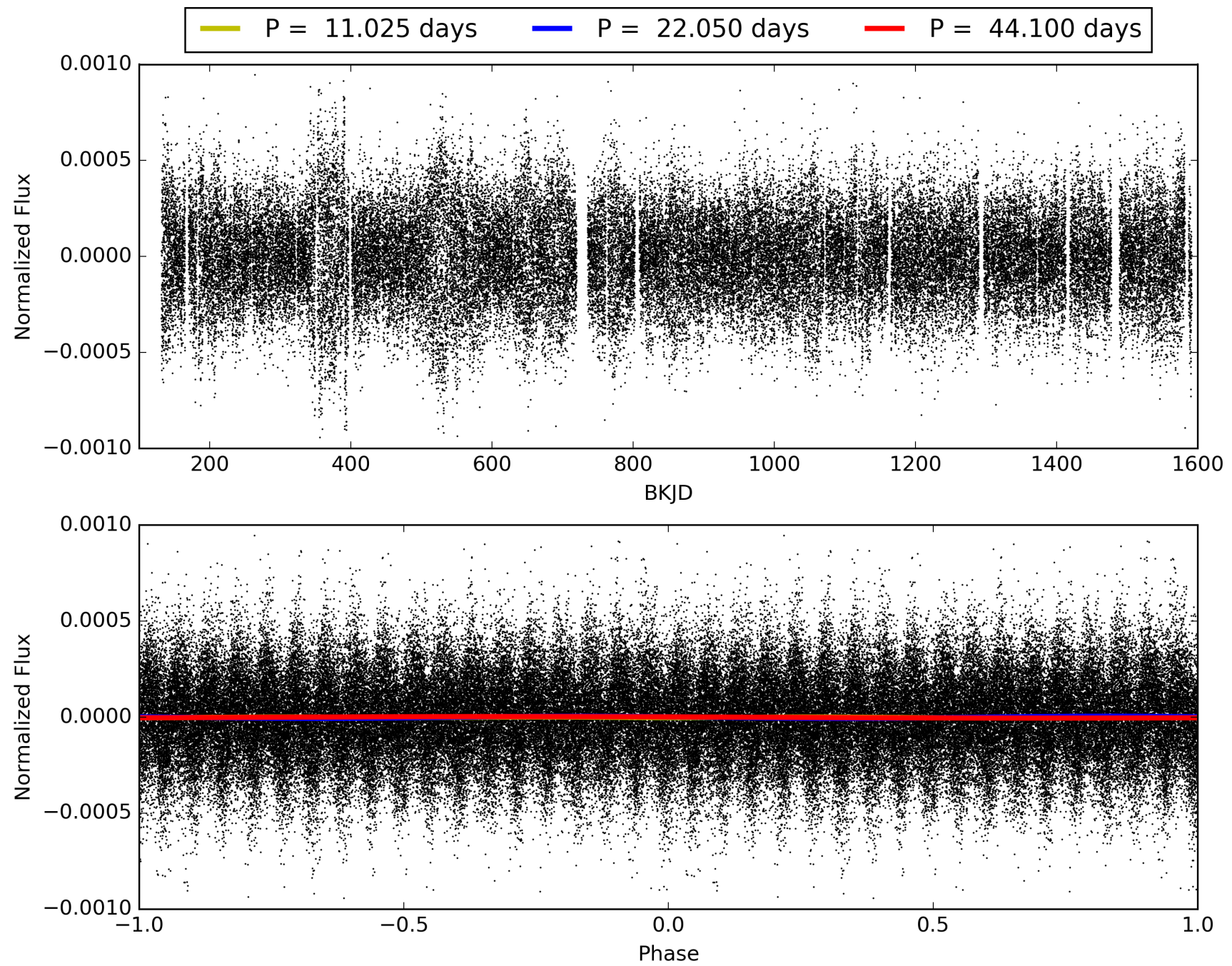
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [50.43 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 32.1%  
Bootstrap-pfa: 3.94e-31  
RollingBand-fgt: 1.00 [13/13]  
GhostDiagnostic-chr: 0.3785  
Centroid-sig: 37.4%  
Centroid-so: 0.180 arcsec [0.94 $\sigma$ ]  
OotOffset-rm: 0.731 arcsec [0.97 $\sigma$ ]  
KicOffset-rm: 0.714 arcsec [0.82 $\sigma$ ]  
OotOffset-st: 3/3/3/1 [10]  
KicOffset-st: 3/3/3/1 [10]  
DiffImageQuality-fgm: 0.50 [5/10]  
DiffImageOverlap-fno: 0.19 [3/16]

# TCE 006369222-02, PDC Light Curves



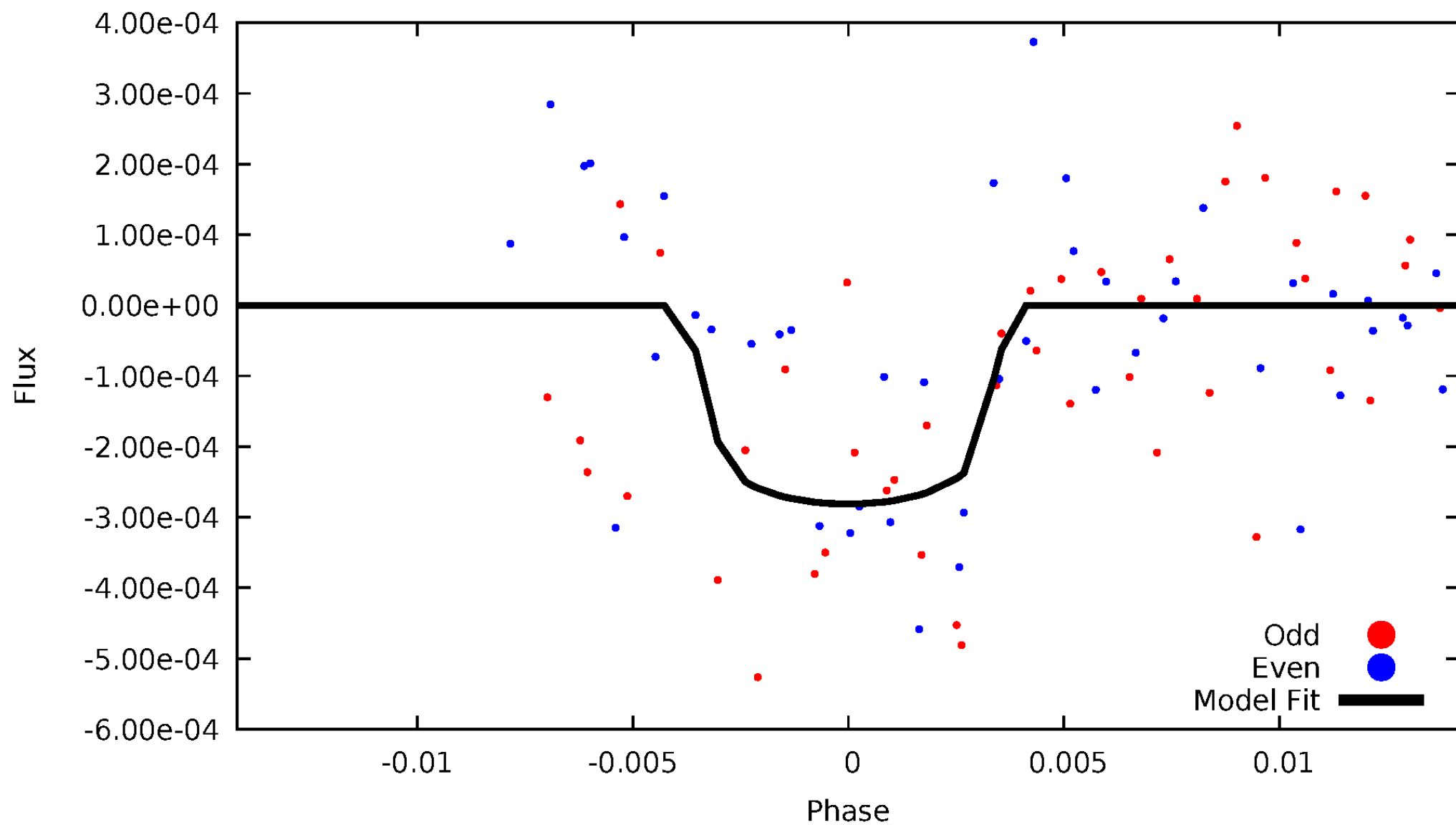
TCE 006369222-02





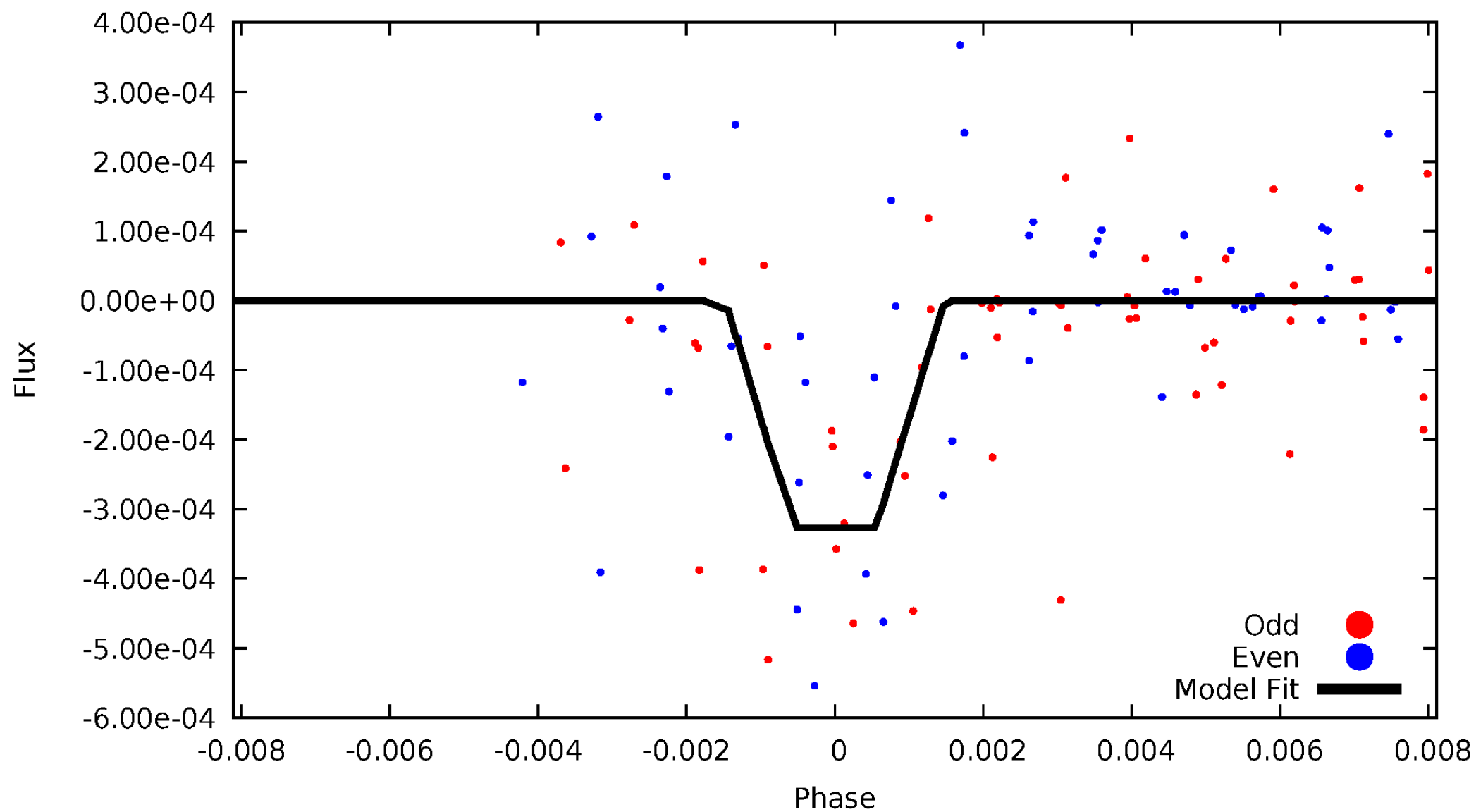
# DV Odd/Even

TCE 006369222-02



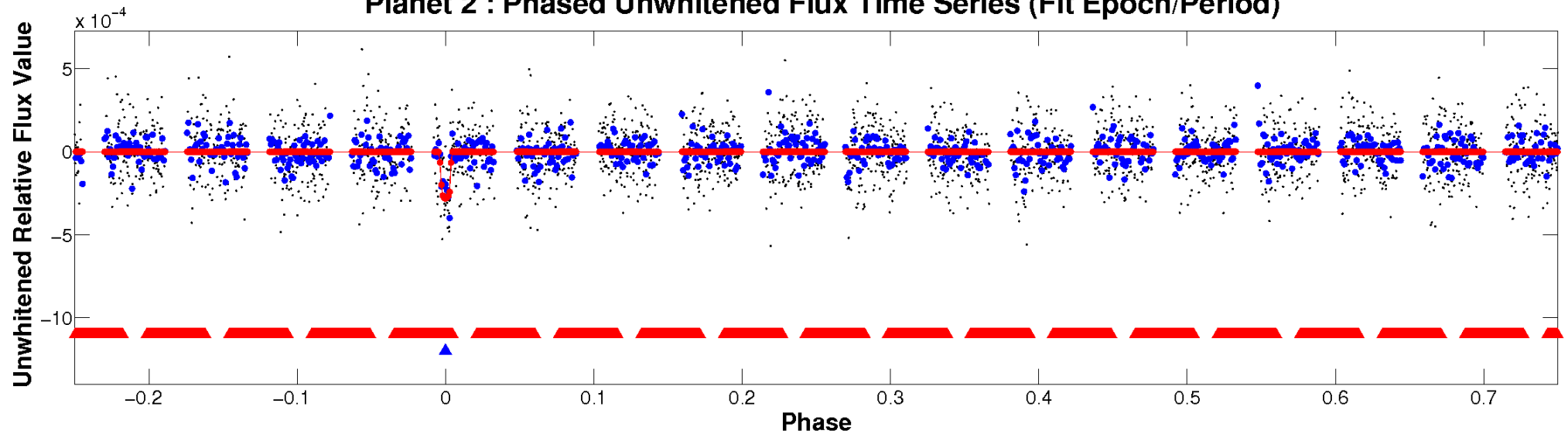
# ALT Odd/Even

TCE 006369222-02

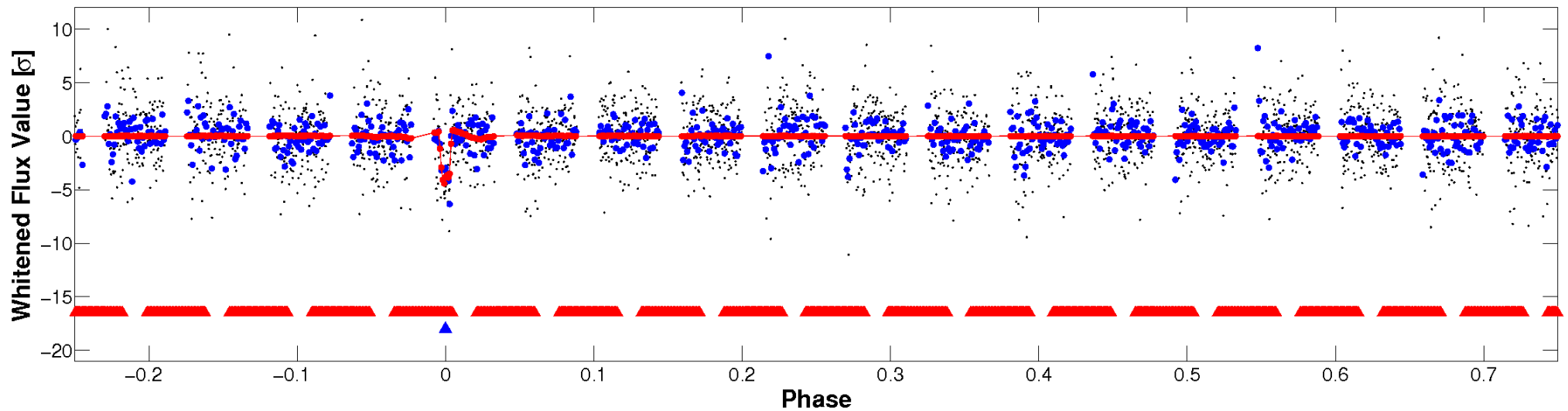


# Non-Whitened Vs. Whitened Light Curve

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

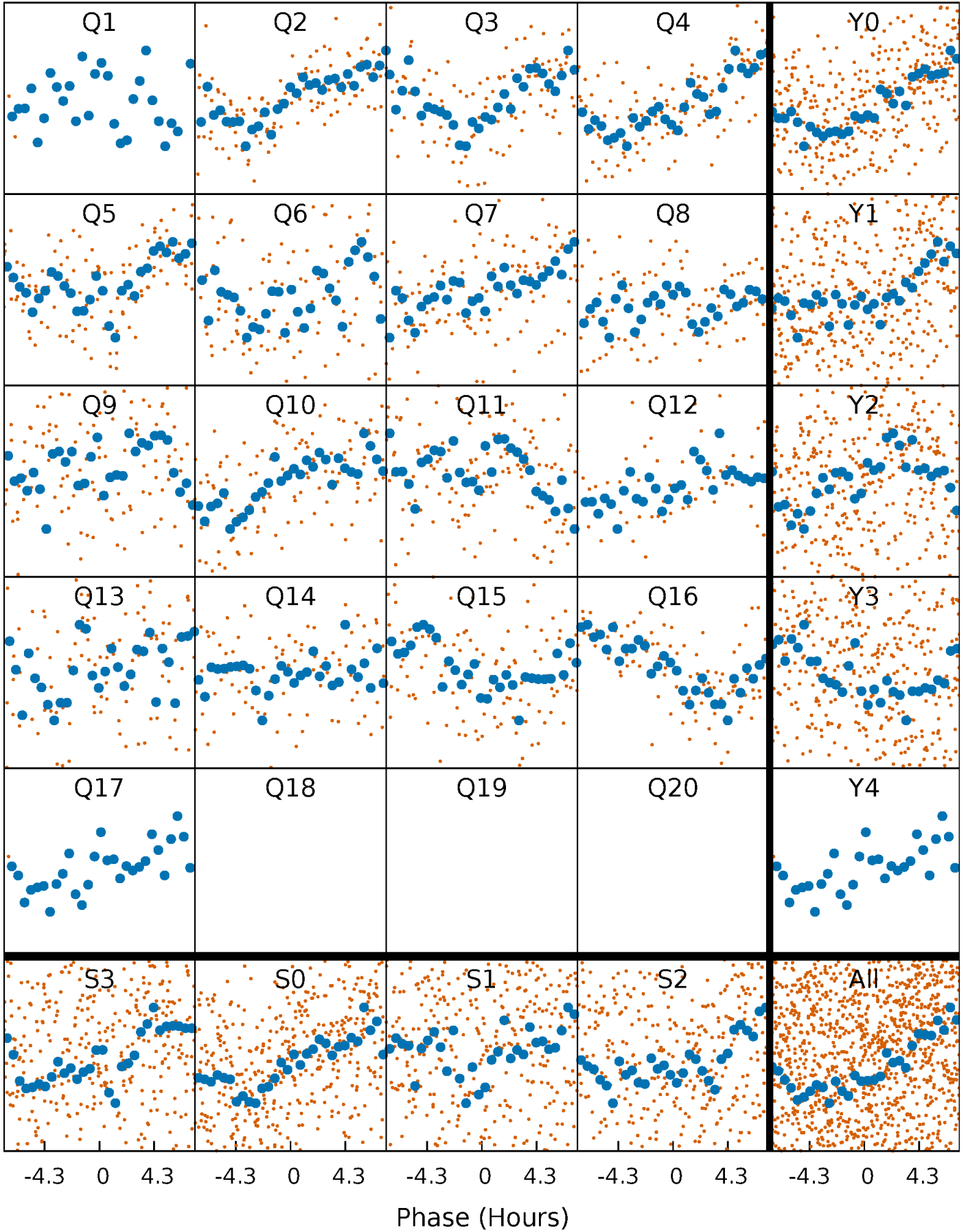


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



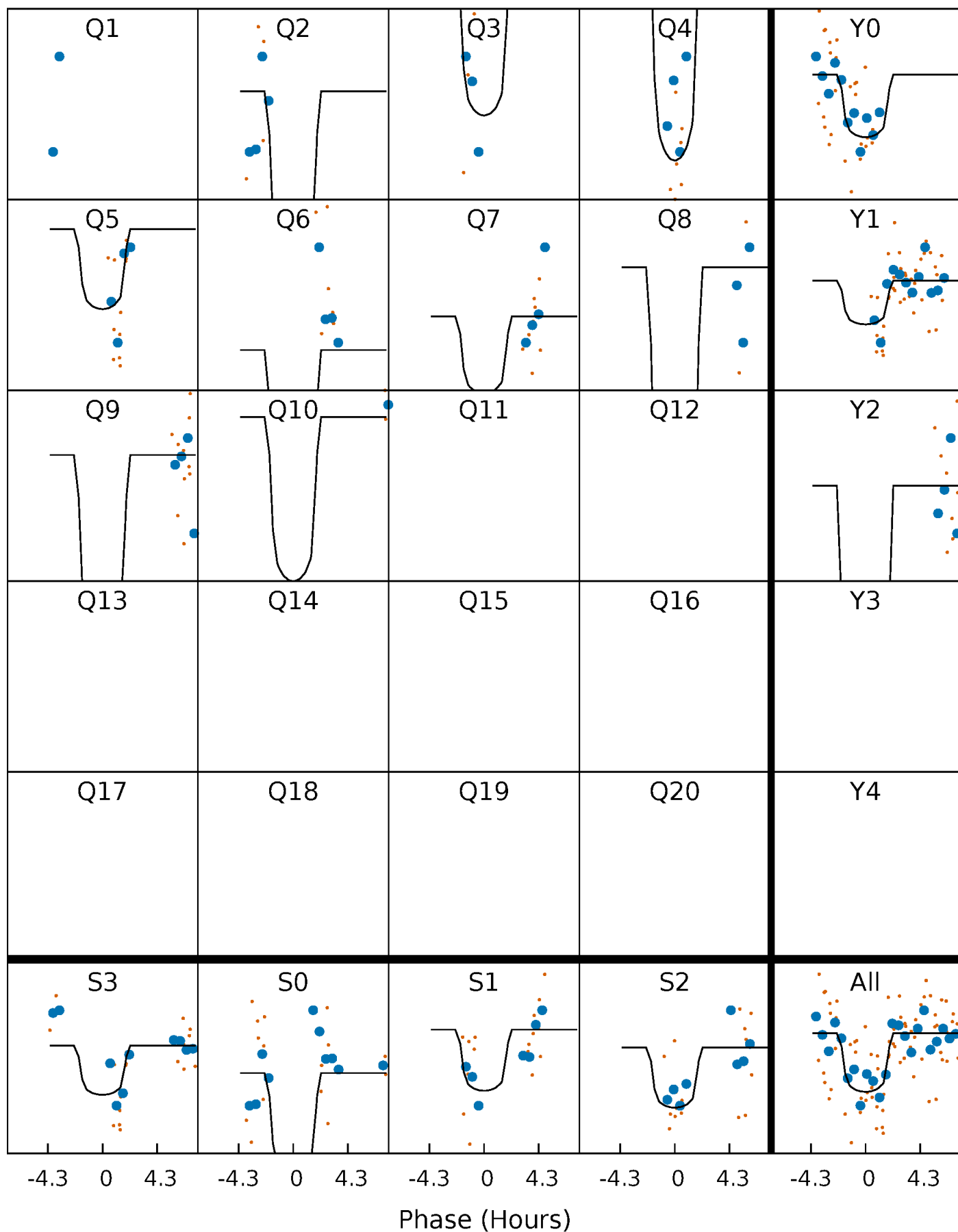
# PDC Quarter-Phased Transit Curves

TCE 006369222-02   P= 22.050061 Days    $T_0=149.034044$  (BKJD)



# DV Quarter-Phased Transit Curves

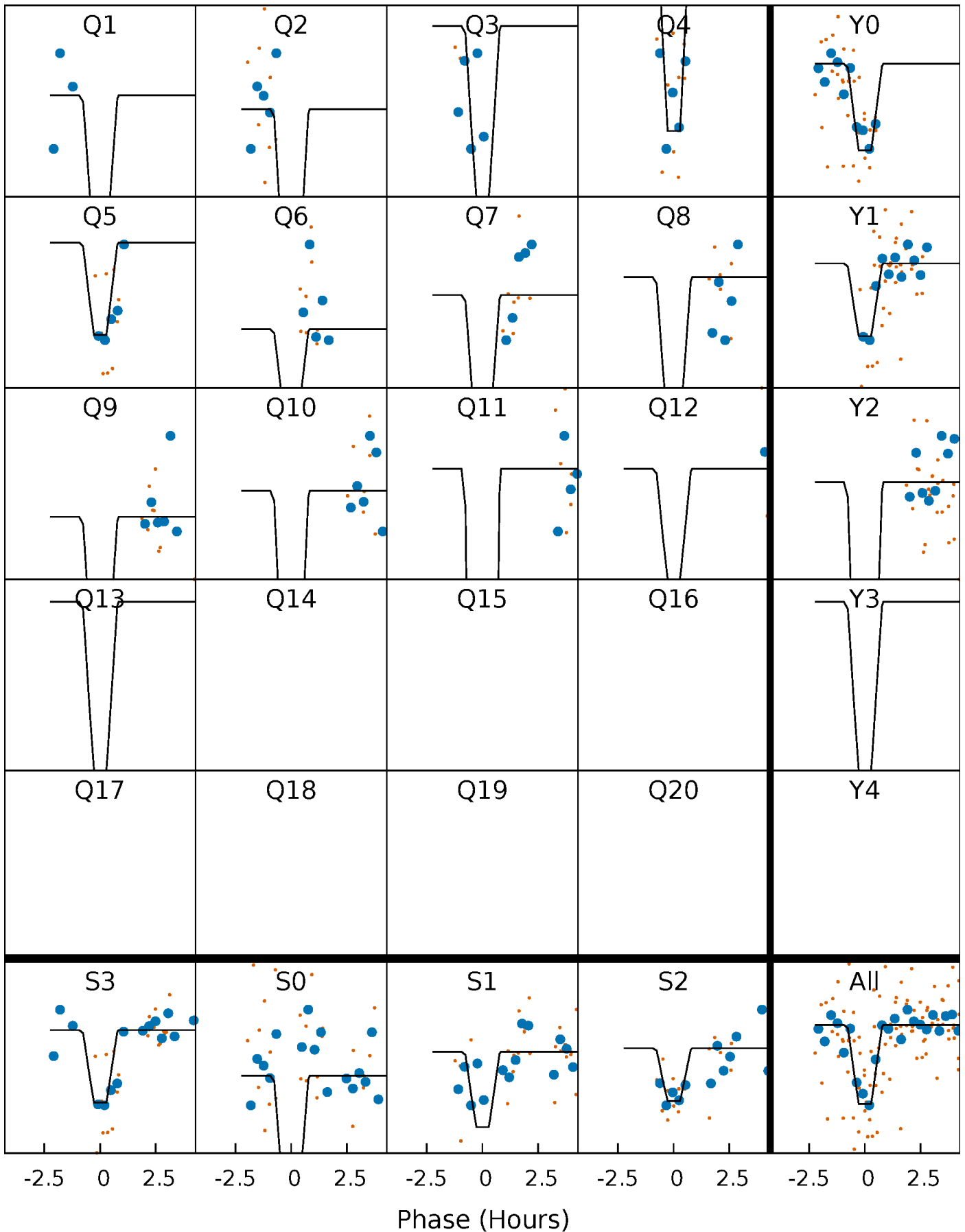
TCE 006369222-02   P= 22.050061 Days    $T_0=149.034044$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

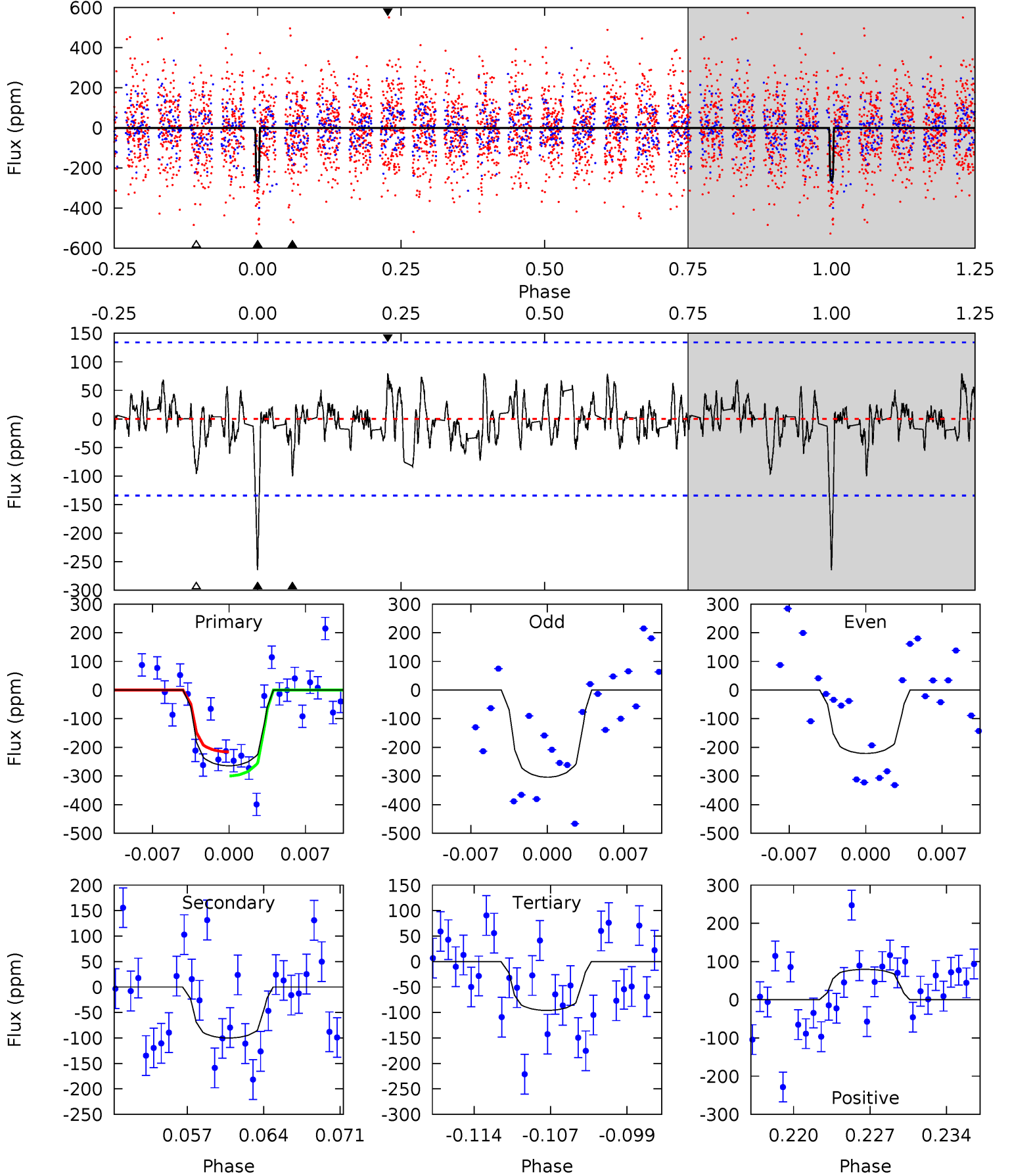
TCE 006369222-02 P= 22.057704 Days  $T_0=148.954061$  (BKJD)



# DV Model-Shift Uniqueness Test

006369222-02,  $P = 22.050061$  Days,  $E = 126.983983$  Days

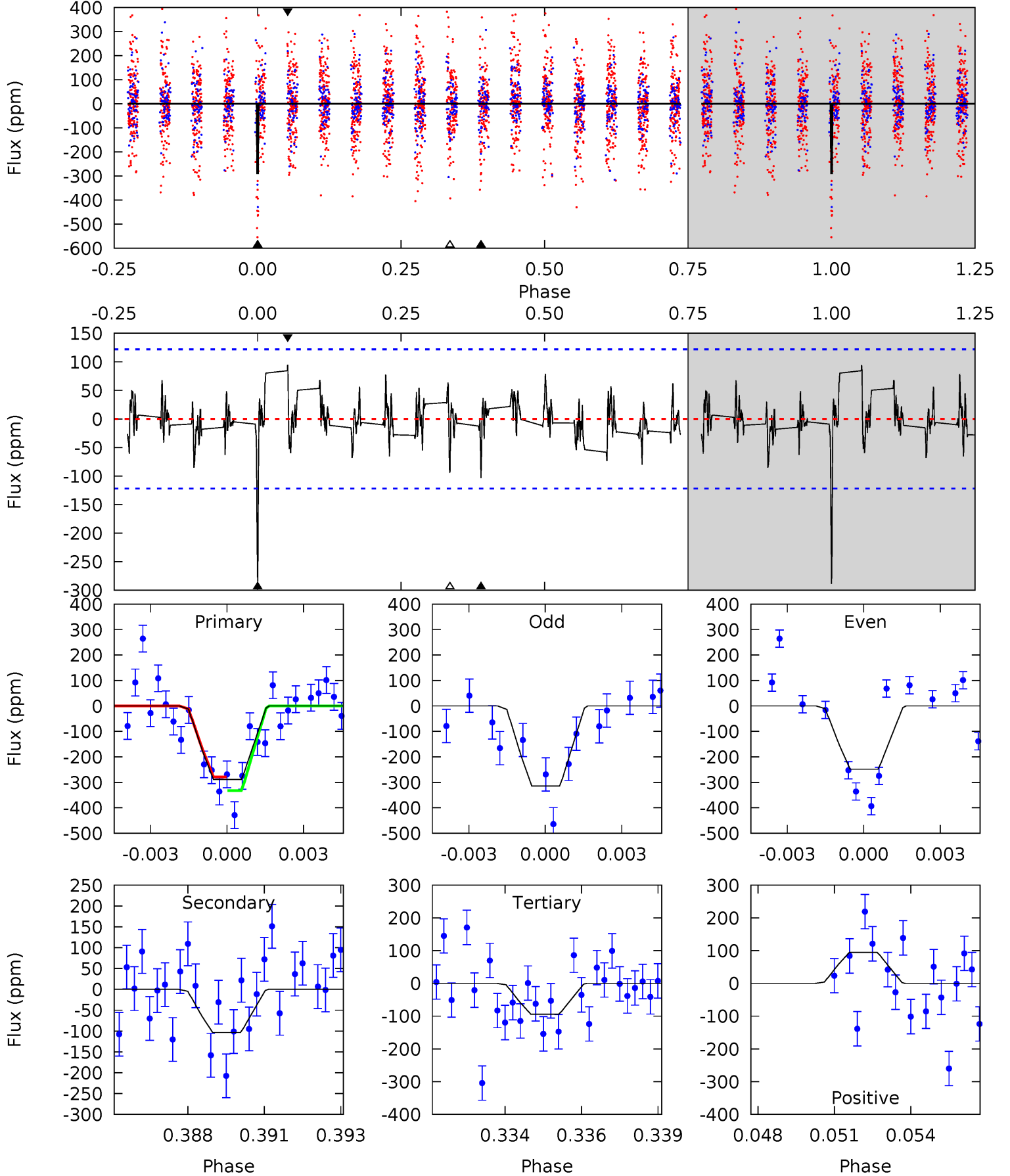
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.0	3.80	3.64	3.02	5.09	2.69	1.16	6.40	7.03	0.16	0.78	1.59	1.09	0.23	1.55



# Alt Model-Shift Uniqueness Test

006369222-02,  $P = 22.057704$  Days,  $E = 126.896357$  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	4.47	4.07	4.07	5.26	2.98	1.26	8.40	8.40	0.39	0.39	1.38	0.97	0.25	1.14



### Stellar Parameters For KIC 006369222

	$T_{\text{eff}} (K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6742^{+182}_{-203}$	$3.495^{+0.368}_{-0.092}$	$-0.760^{+0.350}_{-0.300}$	$3.722^{+0.549}_{-1.647}$	$1.580^{+0.182}_{-0.424}$	$0.043^{+0.134}_{-0.013}$
	+3%/-3%	+11%/-3%	+46%/-39%	+15%/-44%	+12%/-27%	+309%/-30%
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 006369222-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-100 \pm 26$	$9.13^{+8.50}_{-5.96}$	$1857^{+115}_{-193}$	$4411^{+2732}_{-906}$	$20^{+139}_{-15}$
Alt.	$-103 \pm 23$	$8.96^{+9.15}_{-5.69}$	$1862^{+108}_{-209}$	$4471^{+2738}_{-916}$	$22^{+128}_{-16}$

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

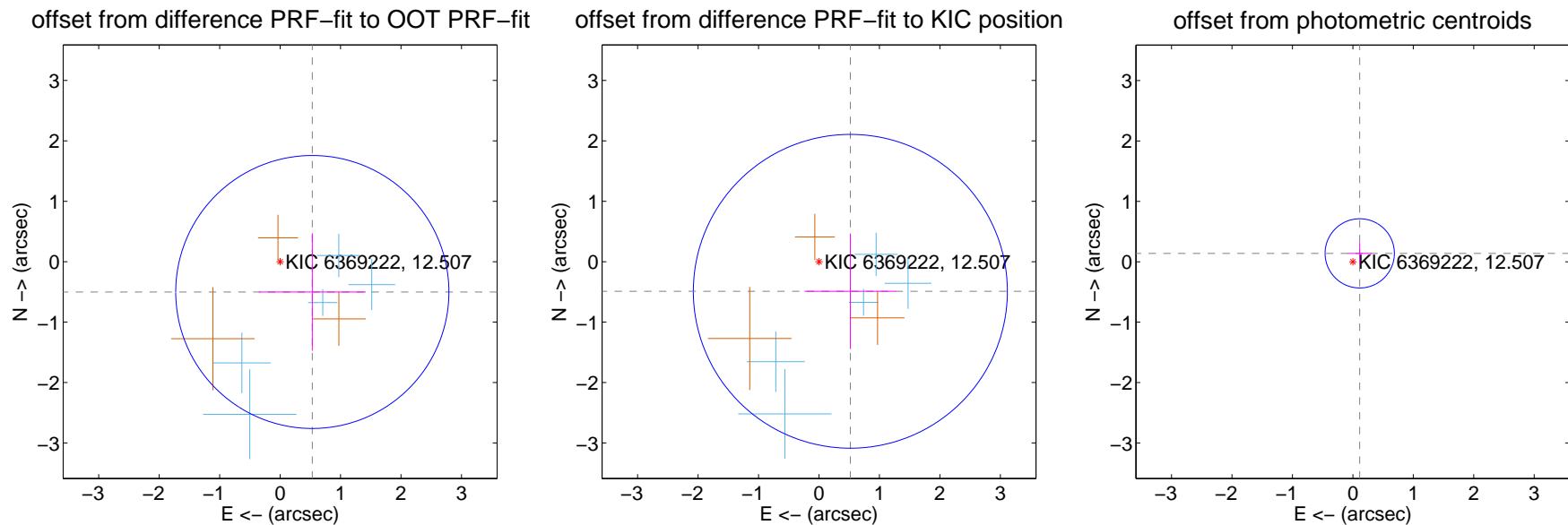
## DV Centroid Data

Supplemental centroid analysis for 006369222-02. Kepler magnitude: 12.51. Transit SNR 19.31

There are 5 quarters with good PRF difference image offsets

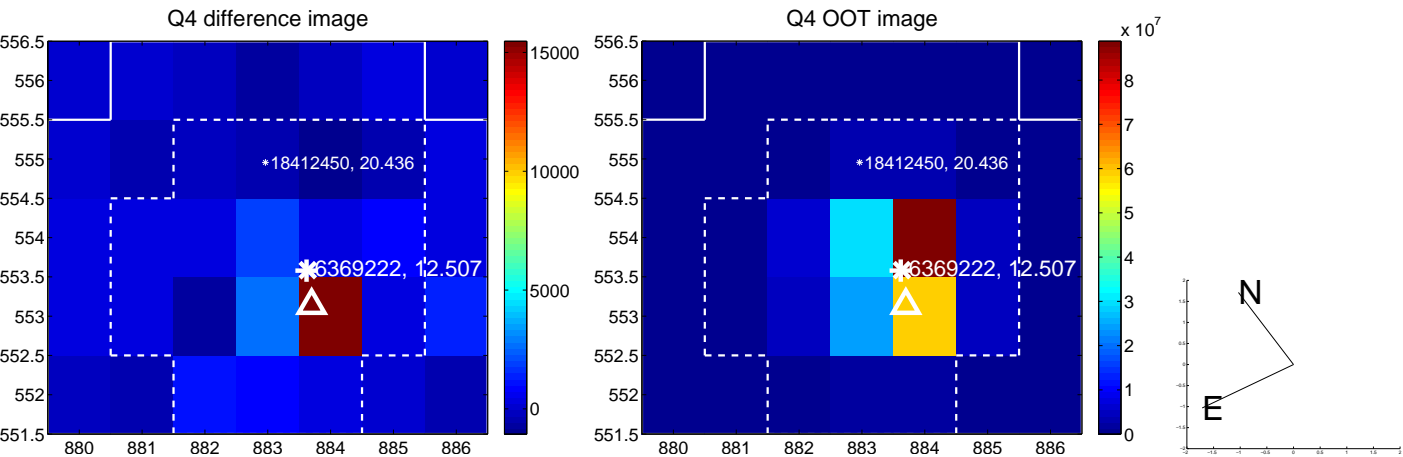
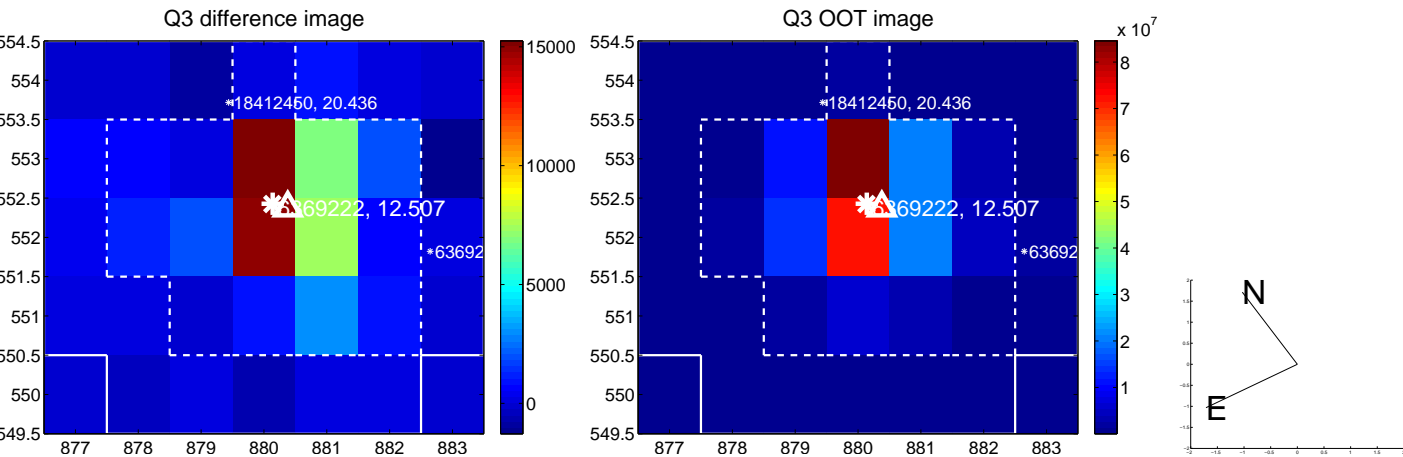
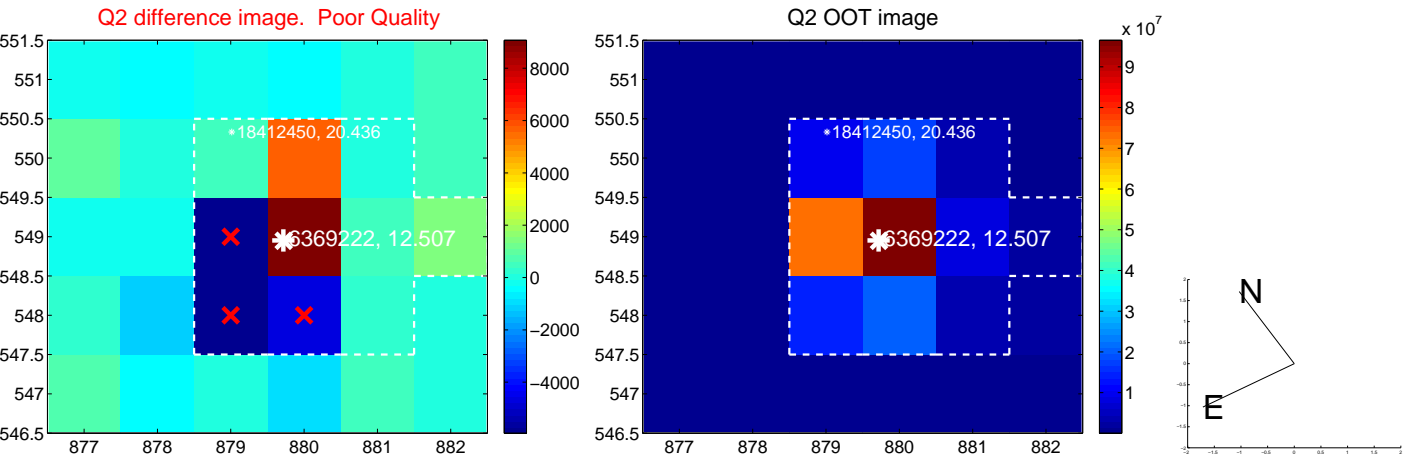
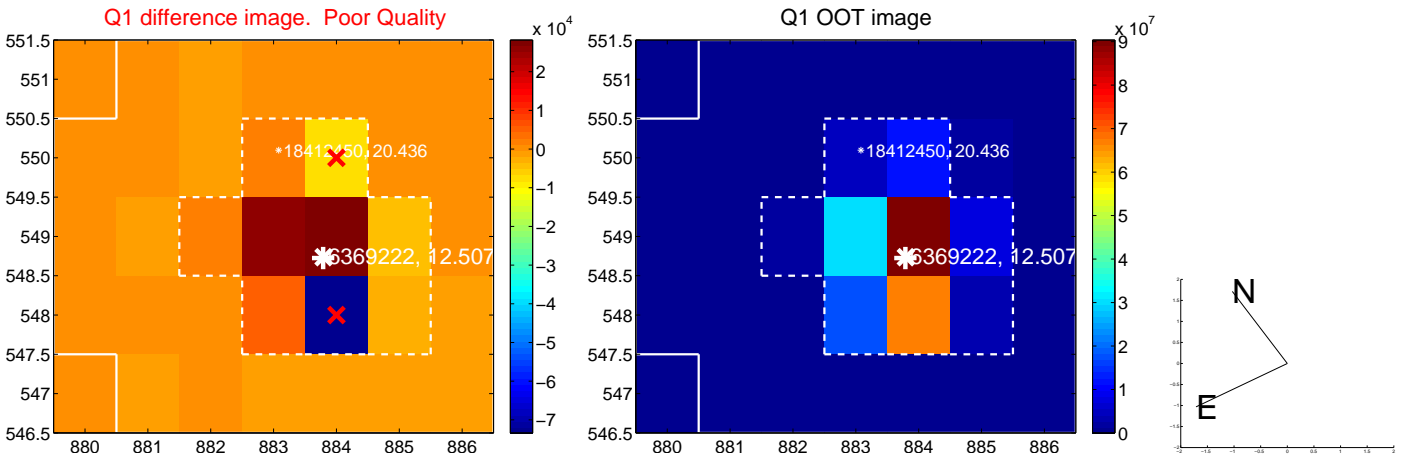
The direct PRF centroid is offset from the target star catalog position by about 0.05 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.731 \pm 0.753$	0.97	$-0.533 \pm 0.883$	$-0.501 \pm 0.972$
PRF-fit source offset from KIC position	$0.714 \pm 0.866$	0.82	$-0.519 \pm 0.757$	$-0.490 \pm 0.955$
photometric centroid source offset	$0.18 \pm 0.19$	0.94	$-0.11 \pm 0.20$	$0.14 \pm 0.18$



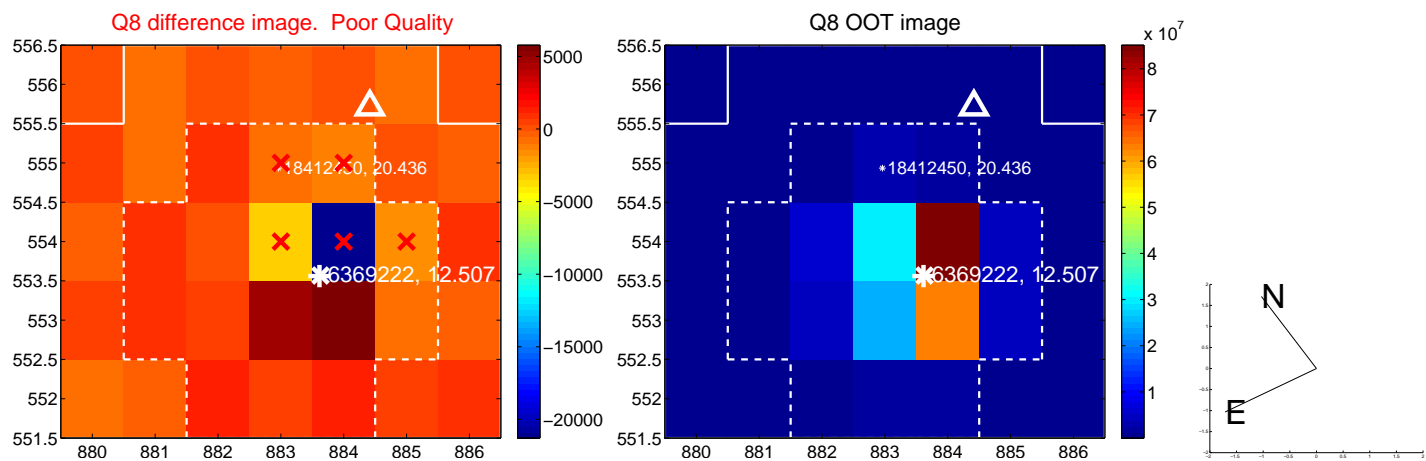
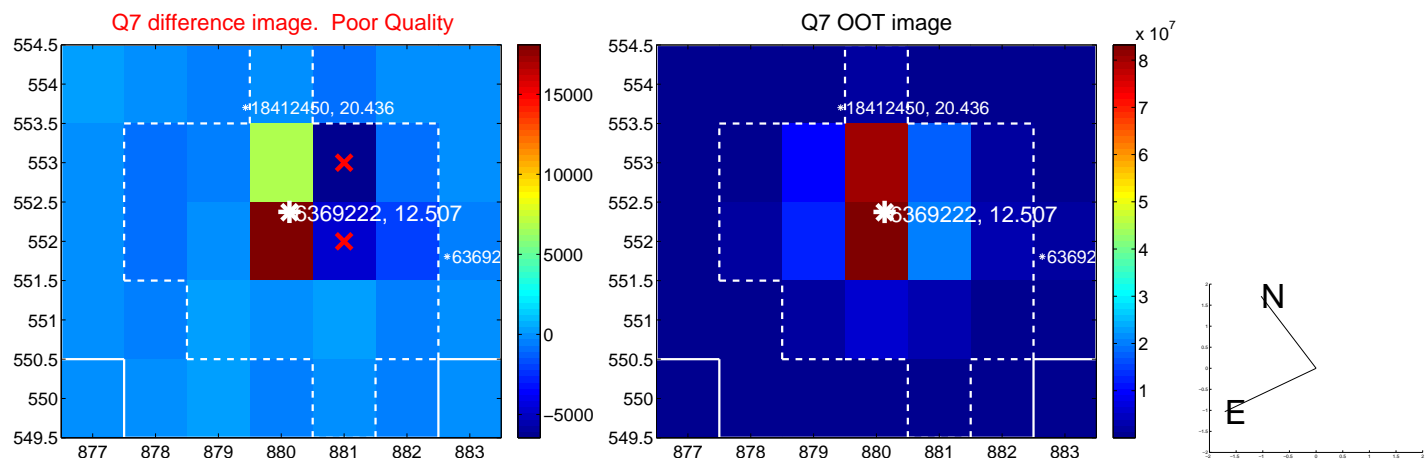
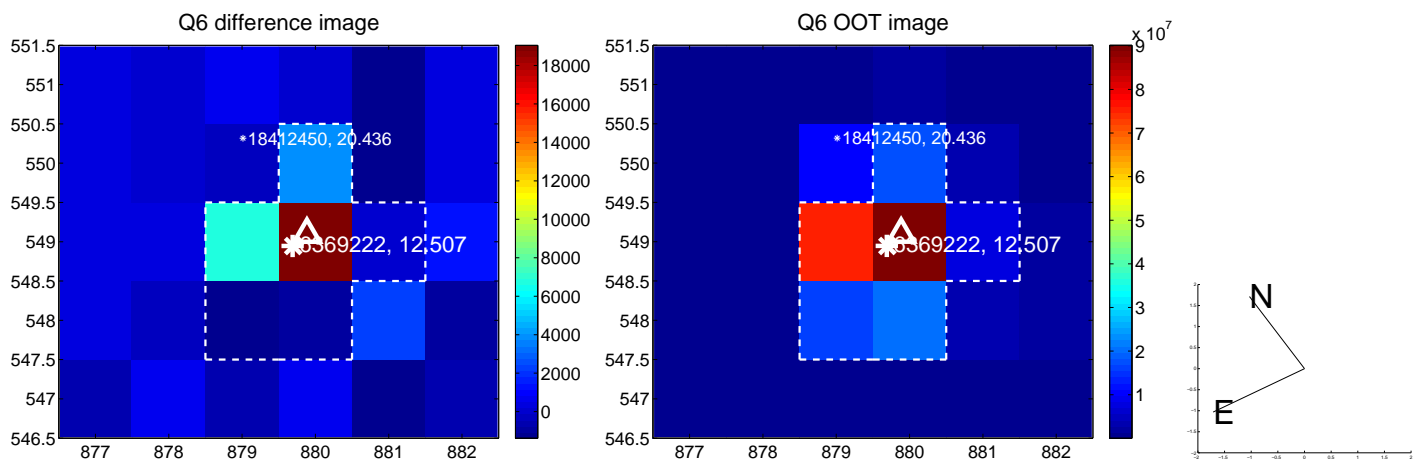
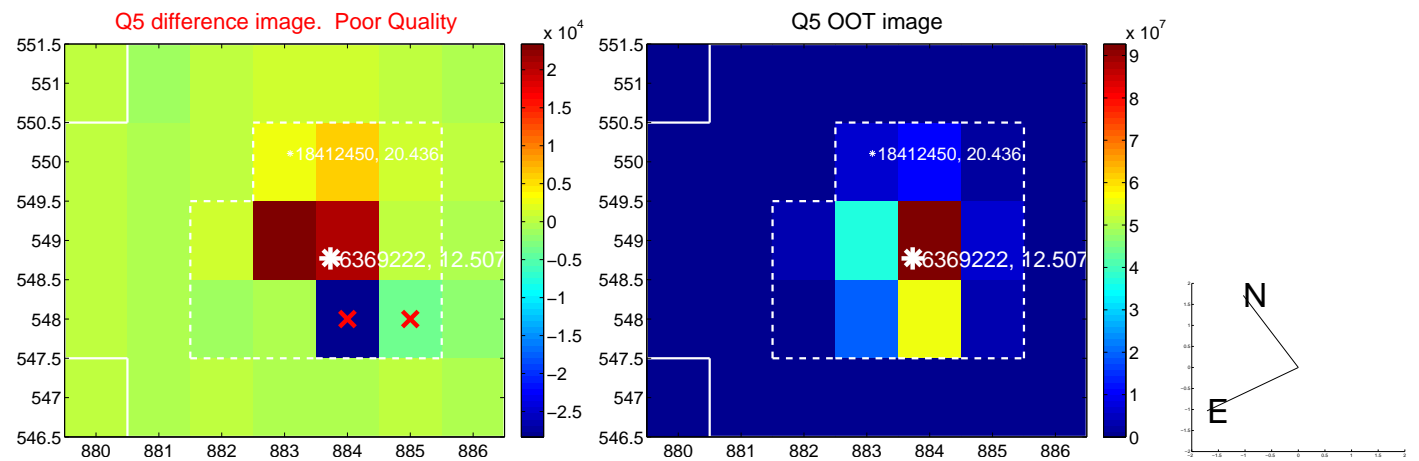
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

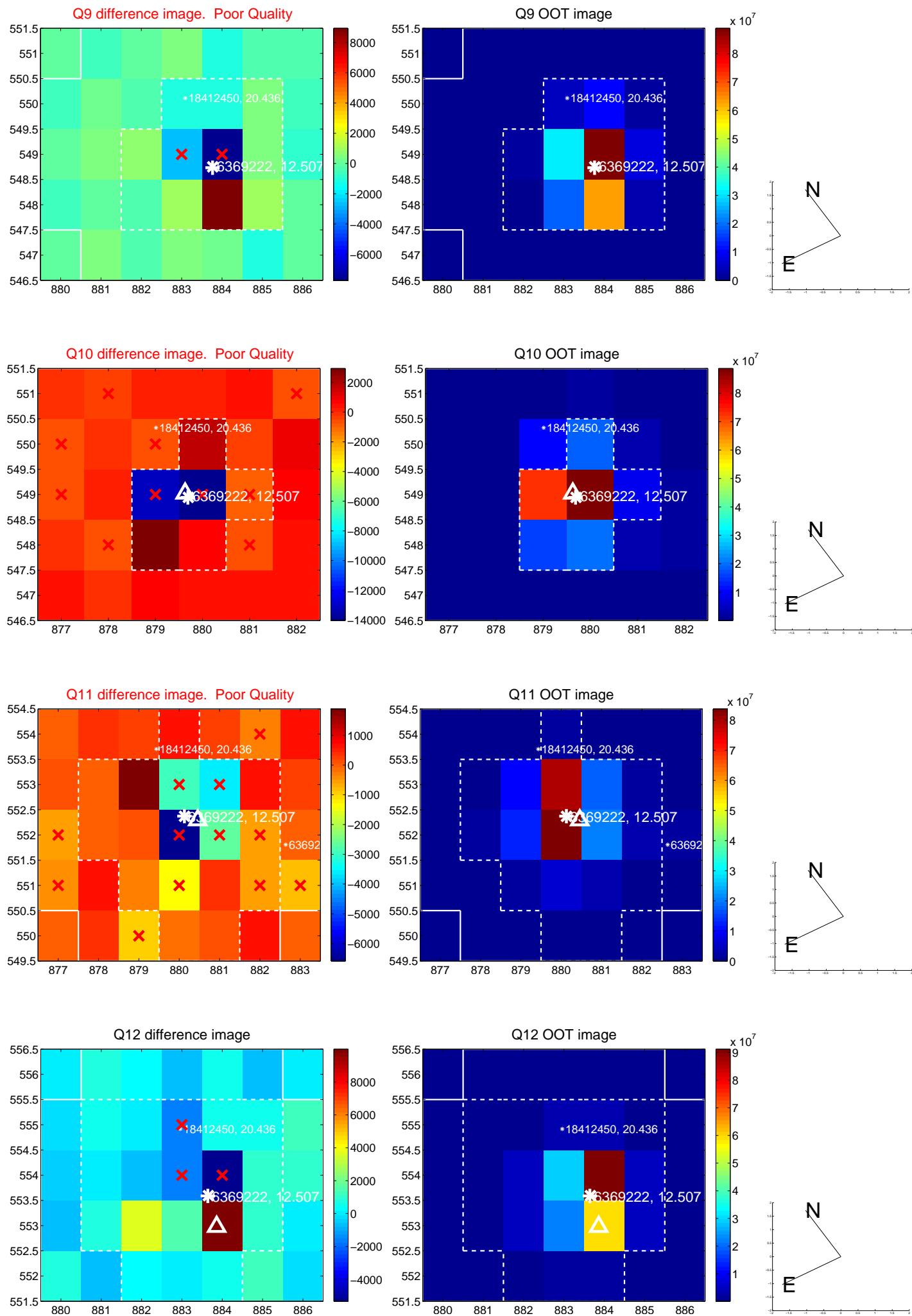




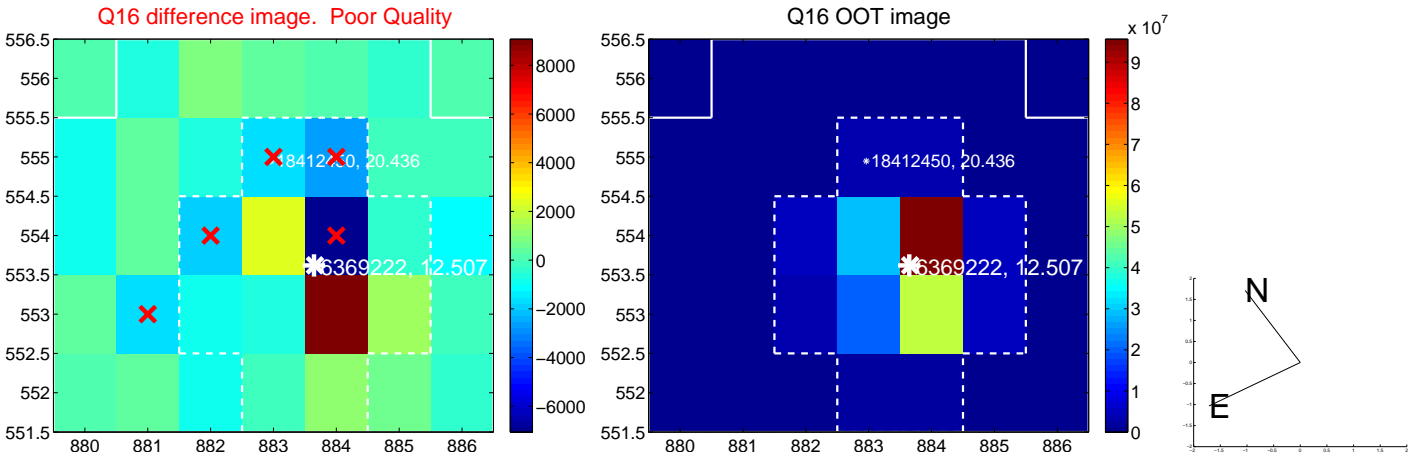
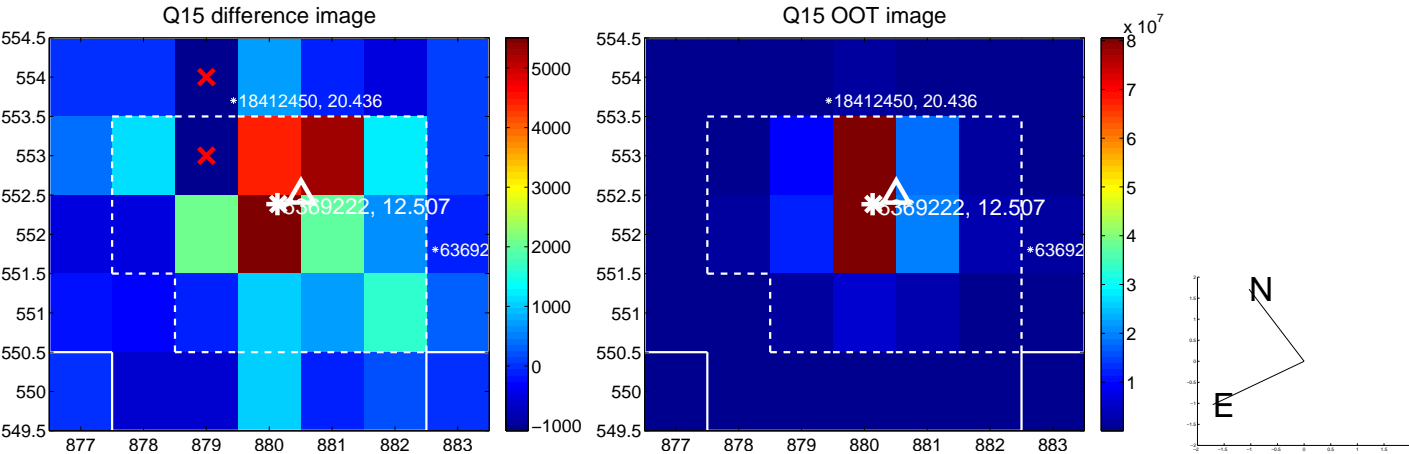
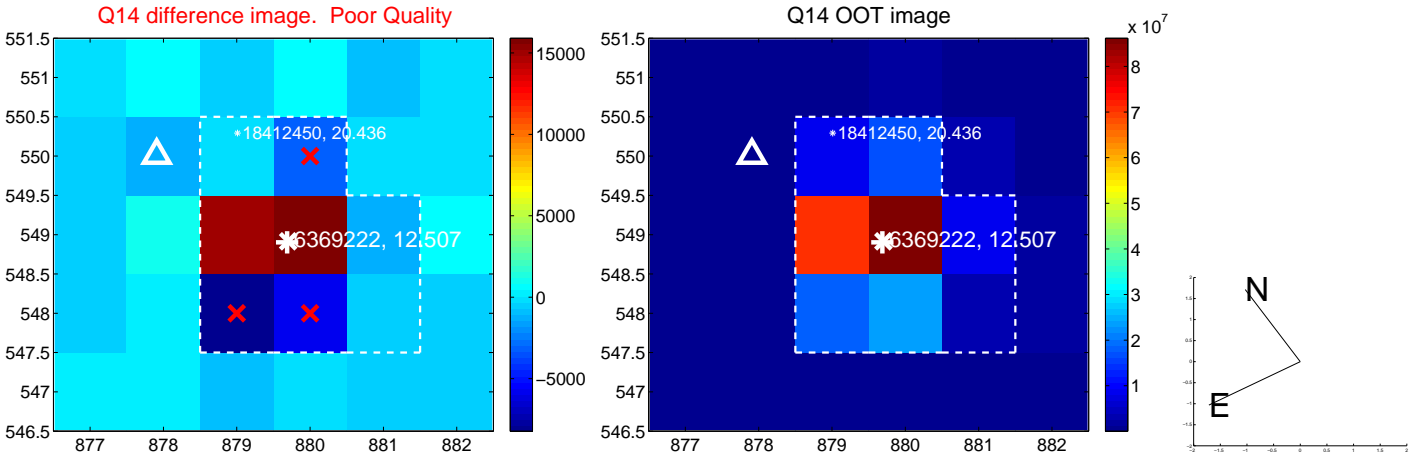
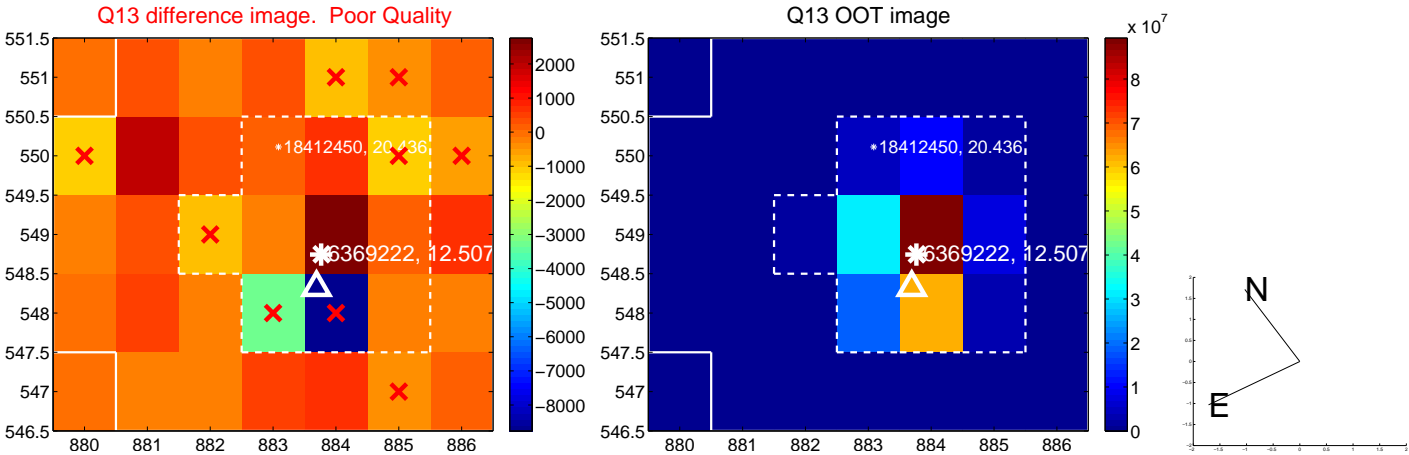
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



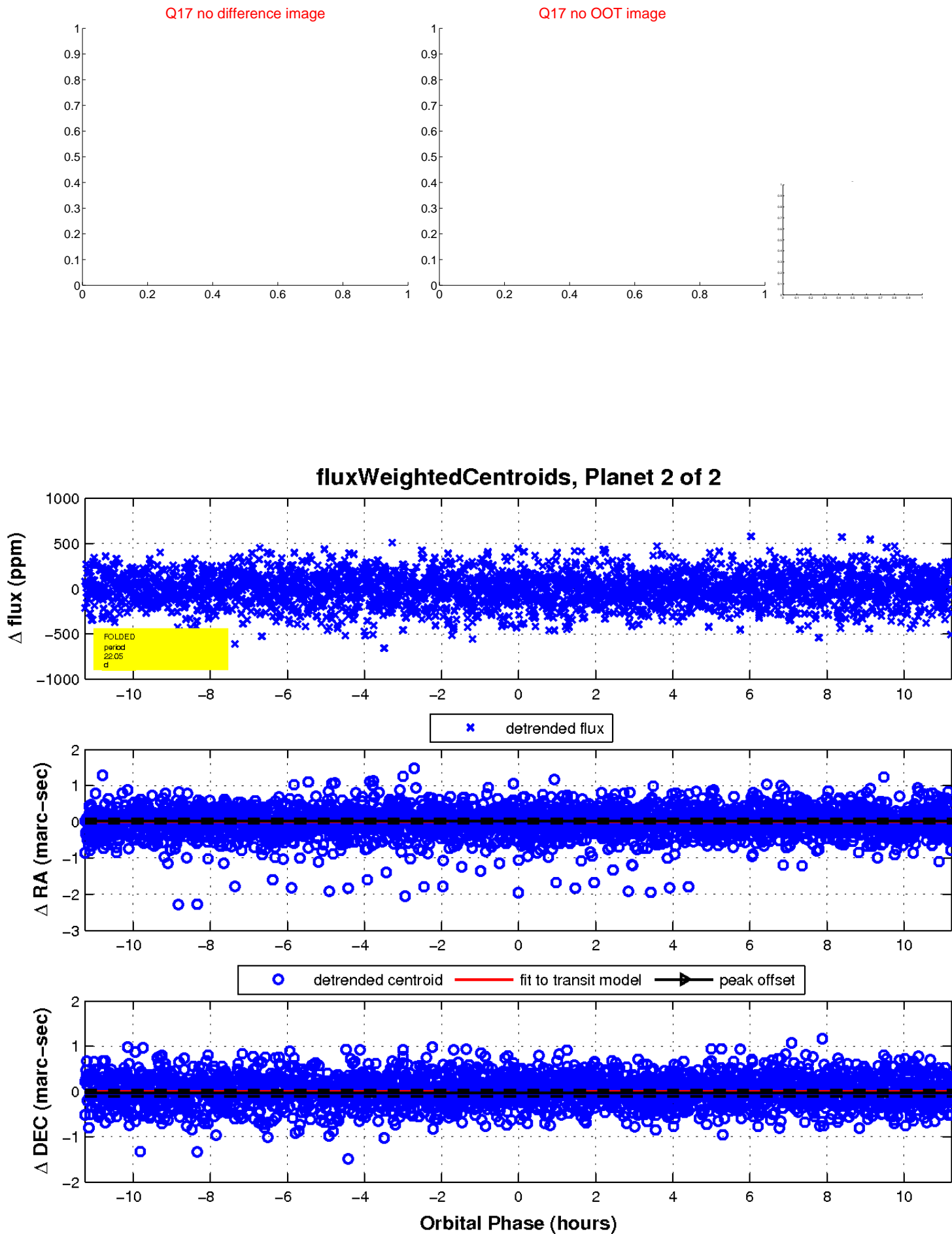
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

