

# KIC 010649230

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010649230-01	OBS	7353.01	0.895645	131.830111	53.1	0.507	11.2	18.1	1.61	5927	1.46	9149.49
010649230-02	OBS	No	0.895646	132.277864	50.1	0.591	11.1	18.5	1.61	5927	1.38	9149.48

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010649230-01	OBS	FP	0.00	0	0	1	0	MOD_SEC_DV—MOD_SEC_ALT—PLANET_PERIOD_IS_HALF_ALT—HAS_SEC_TCE—CENT_RESOLVED_OFFSET
010649230-02	OBS	FP	0.00	1	1	1	0	IS_SEC_TCE—CENT_RESOLVED_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.

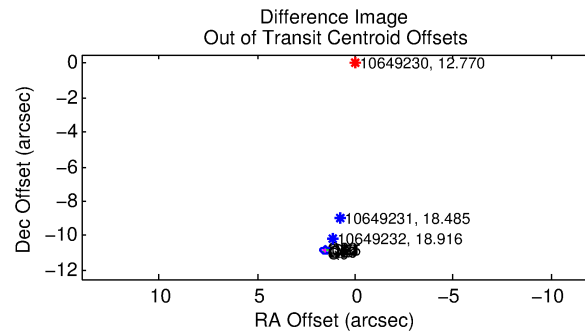
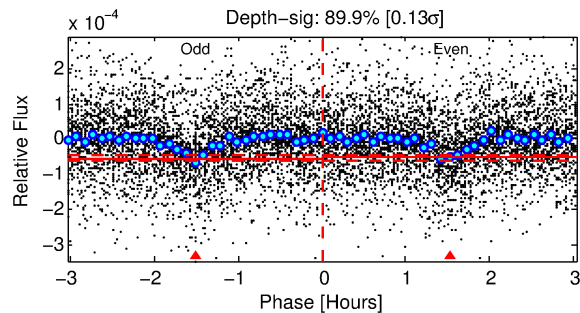
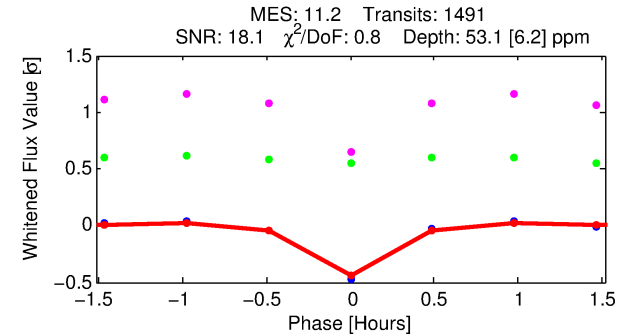
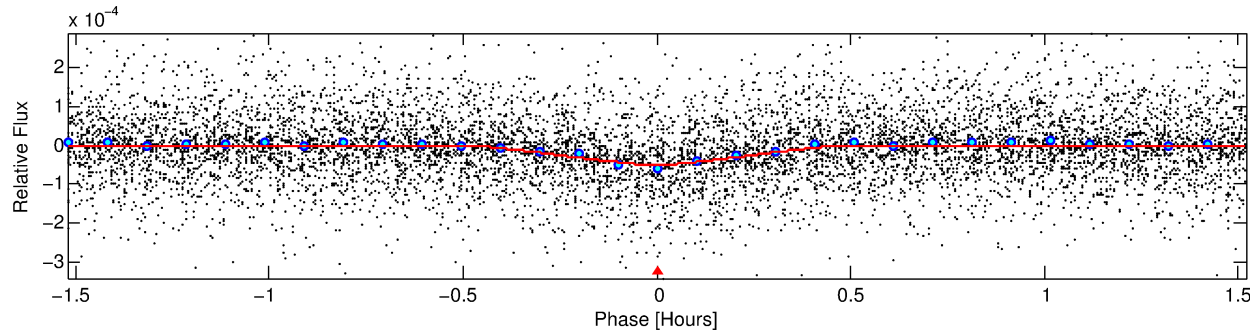
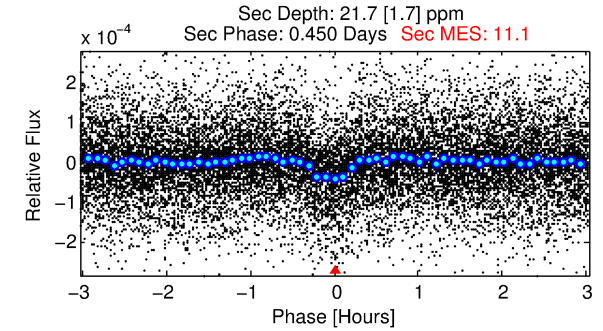
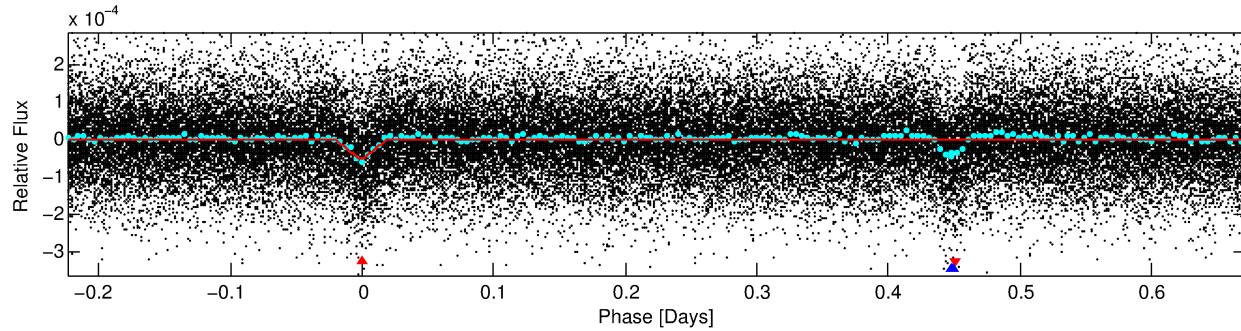
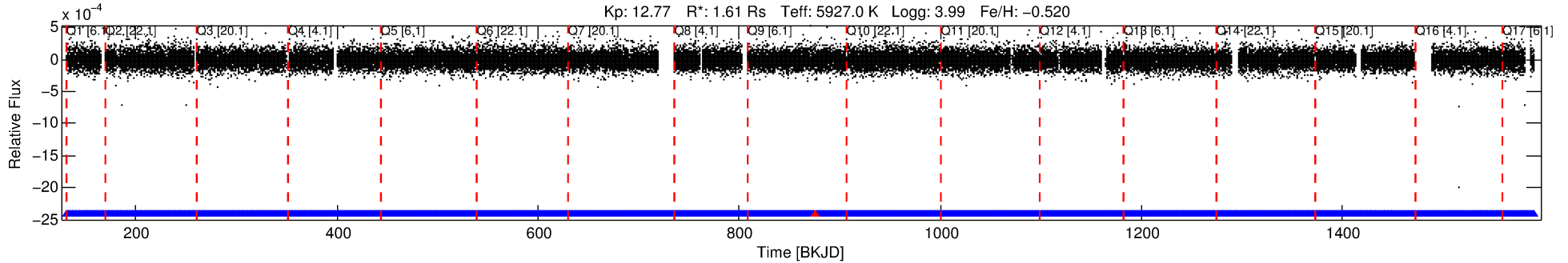
## Ephemeris Match Information For 010649230-01

No Significant Match Found

# DV One-Page Summary

KIC: 10649230 Candidate: 1 of 2 Period: 0.896 d  
KOI: K07353 Corr: No Ephemeris Match

Kp: 12.77 R\*: 1.61 Rs Teff: 5927.0 K Logg: 3.99 Fe/H: -0.520



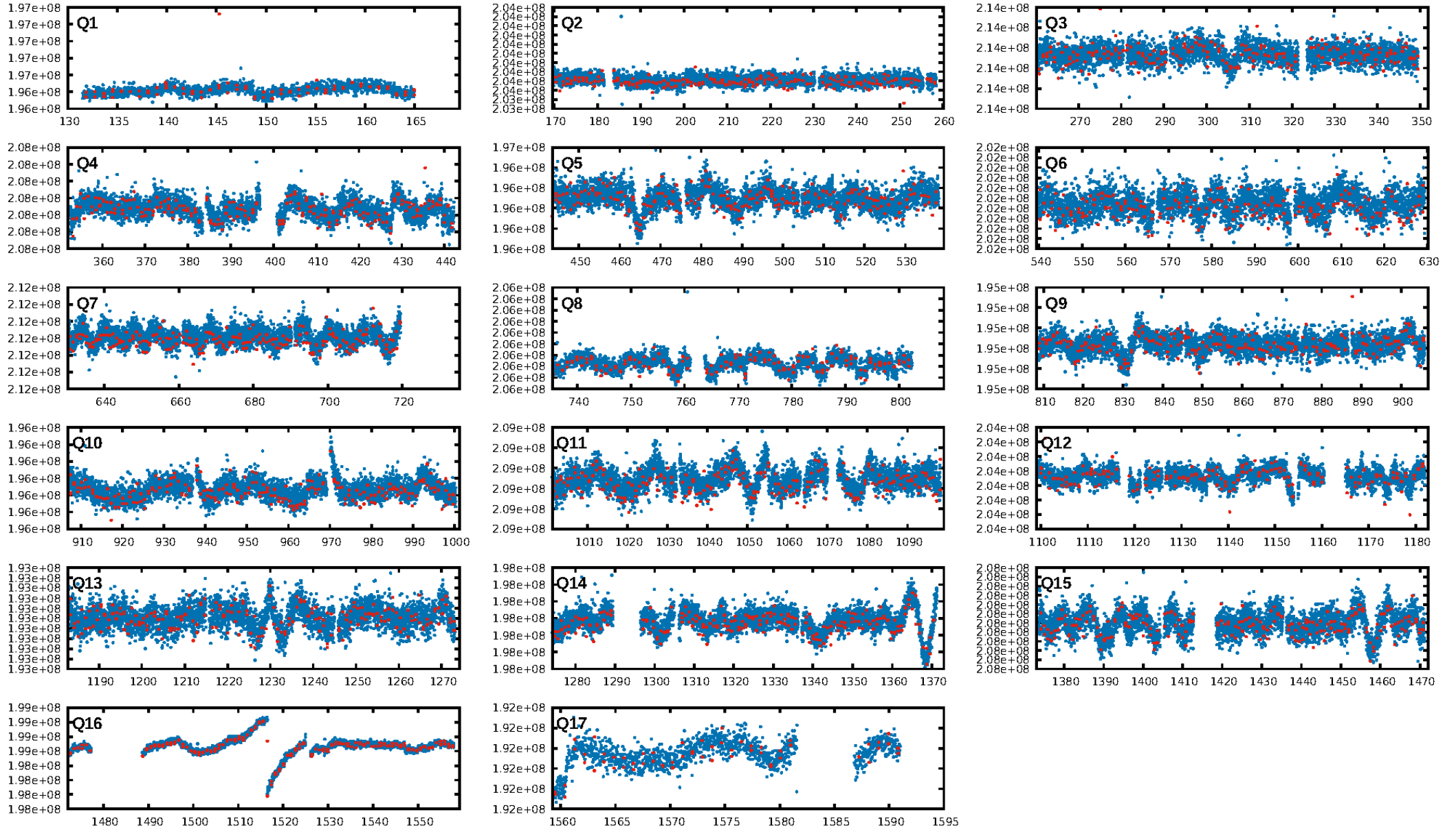
## DV Fit Results:

Period = 0.89564 [0.00001] d  
Epoch = 131.8301 [0.0006] BKJD  
Rp/R\* = 0.0083 [0.0013]  
a/R\* = 5.89 [4.76]  
b = 0.91 [0.16]  
Seff = 9149.49 [7550.21]  
Teq = 2494 [514] K  
Rp = 1.46 [0.68] Re  
a = 0.0177 [0.0085] AU  
Ag = 1.75 [1.54] [0.49σ]  
Teff = 4436 [388] K [3.01σ]

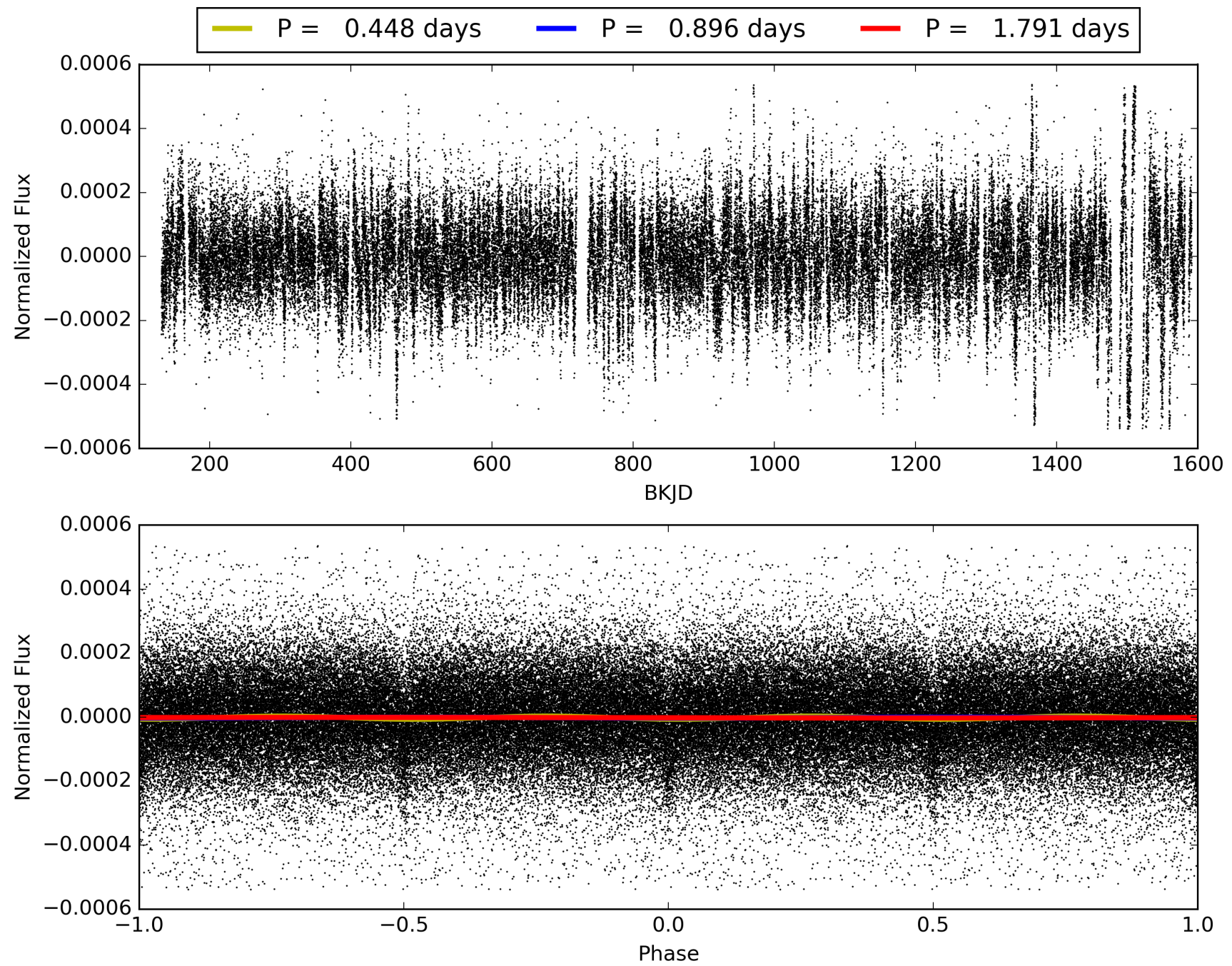
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGoF-sig: N/A  
Bootstrap-pfa: 9.97e-31  
RollingBand-fgt: 1.00 [1422/1423]  
GhostDiagnostic-chr: -0.3834  
Centroid-sig: 0.0%  
Centroid-so: 64.229 arcsec [90.41σ]  
OotOffset-rm: 10.960 arcsec [157.63σ]  
KicOffset-rm: 11.026 arcsec [153.94σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 1.00 [17/17]

# TCE 010649230-01, PDC Light Curves

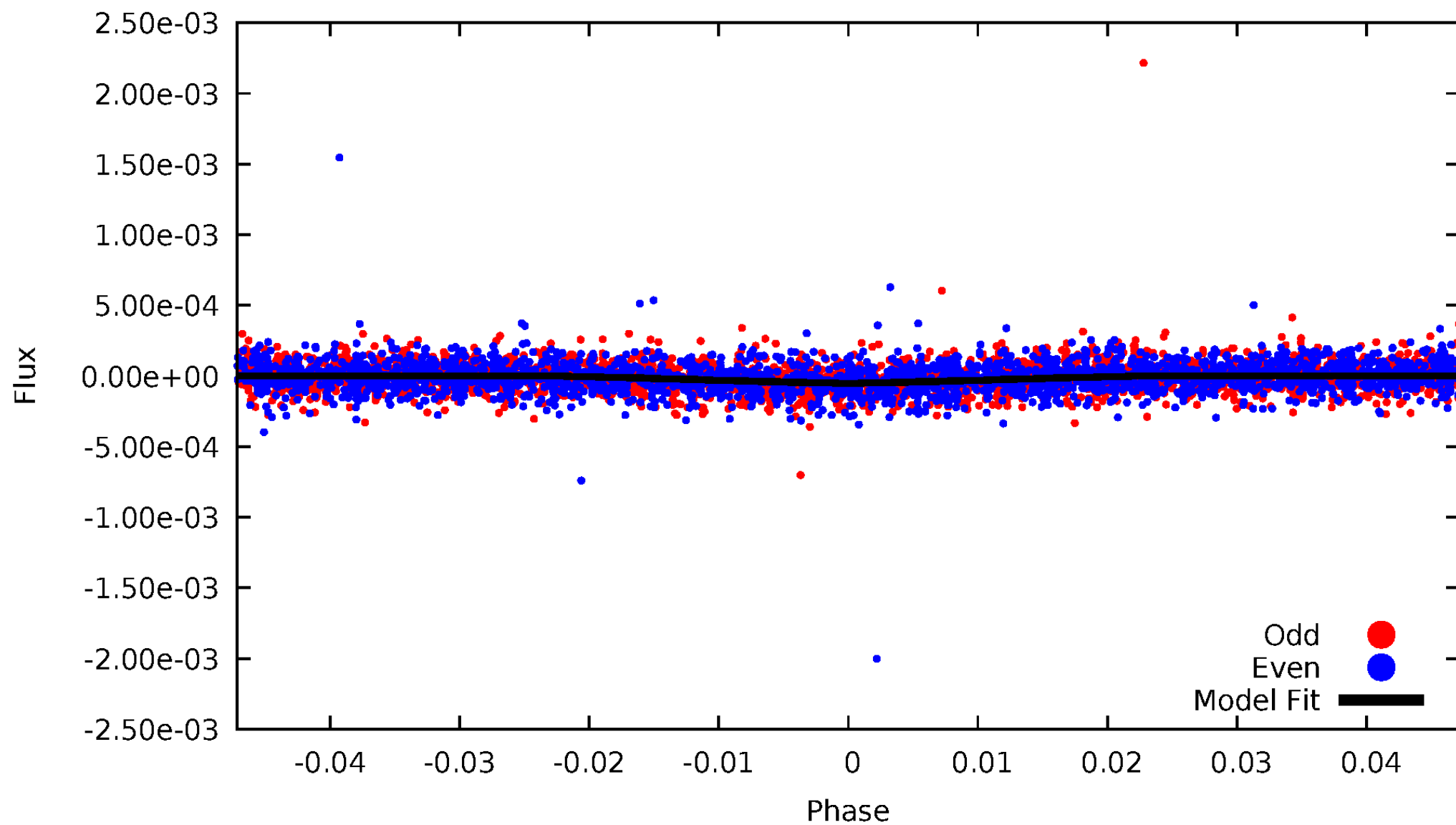


TCE 010649230-01



# DV Odd/Even

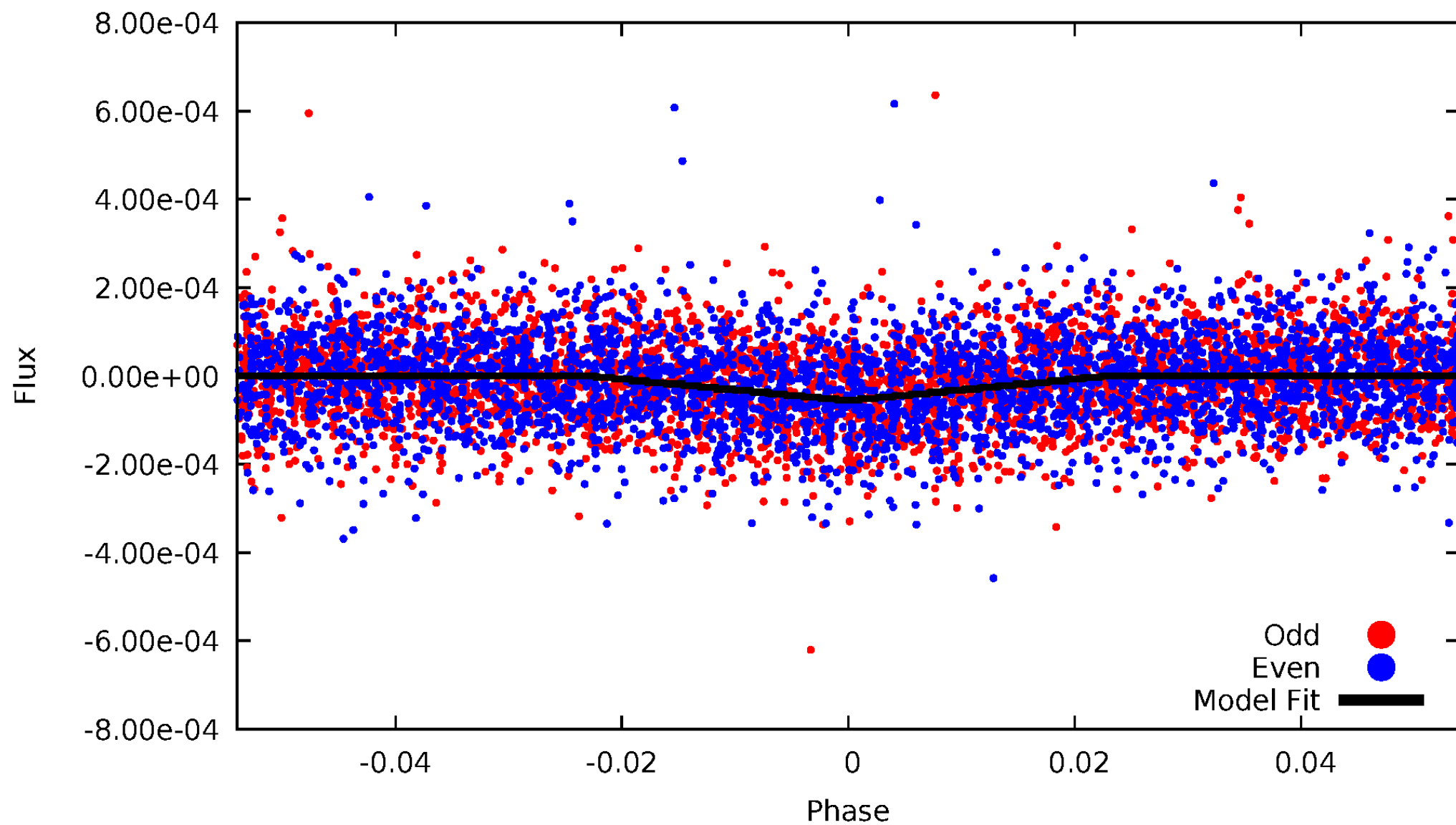
TCE 010649230-01





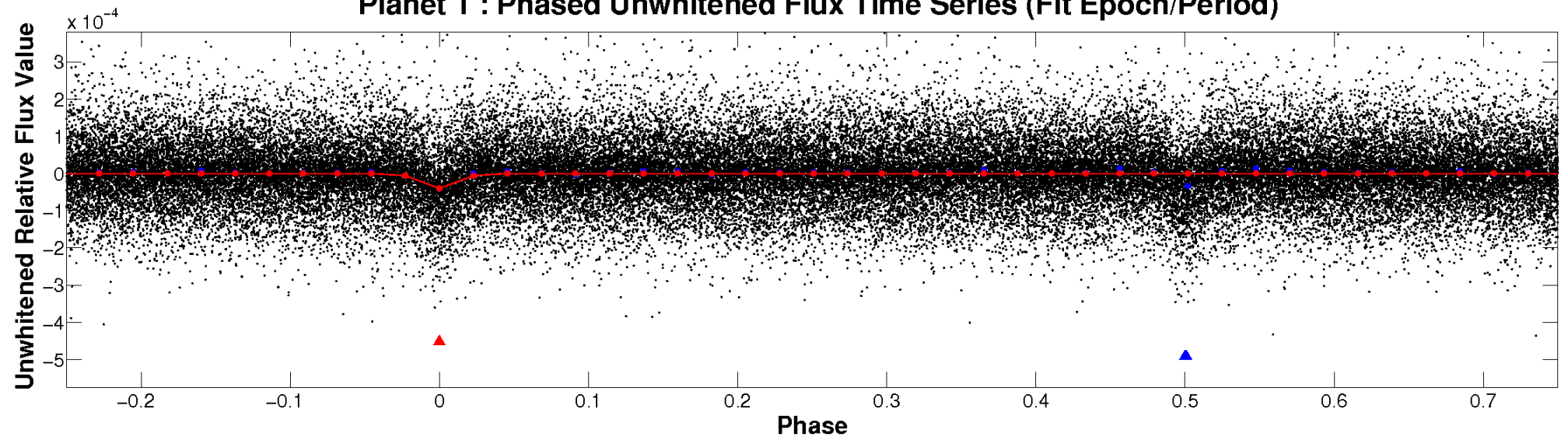
# ALT Odd/Even

TCE 010649230-01

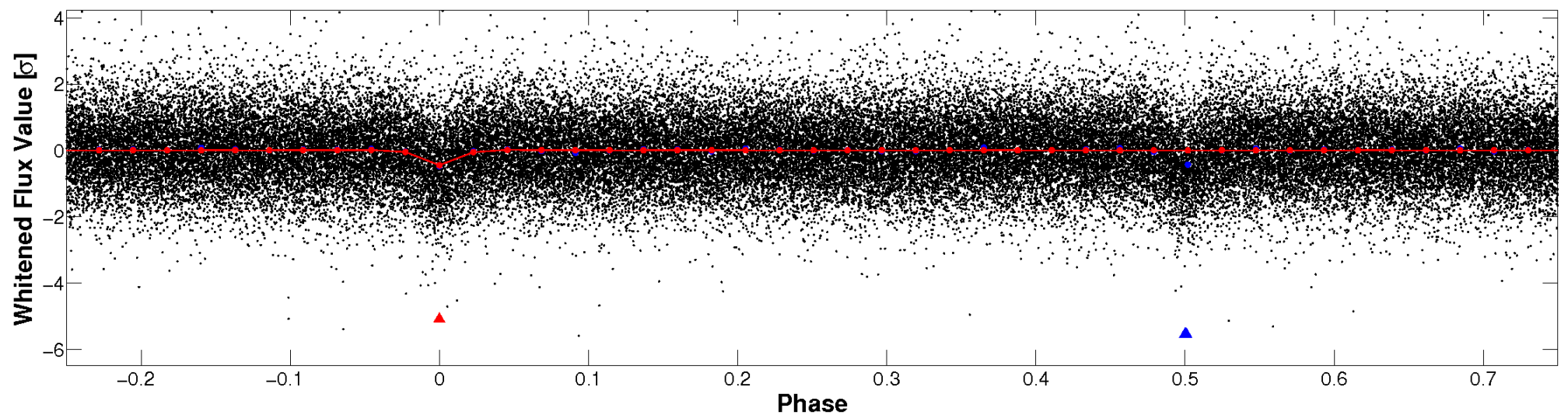


# Non-Whitened Vs. Whitened Light Curve

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

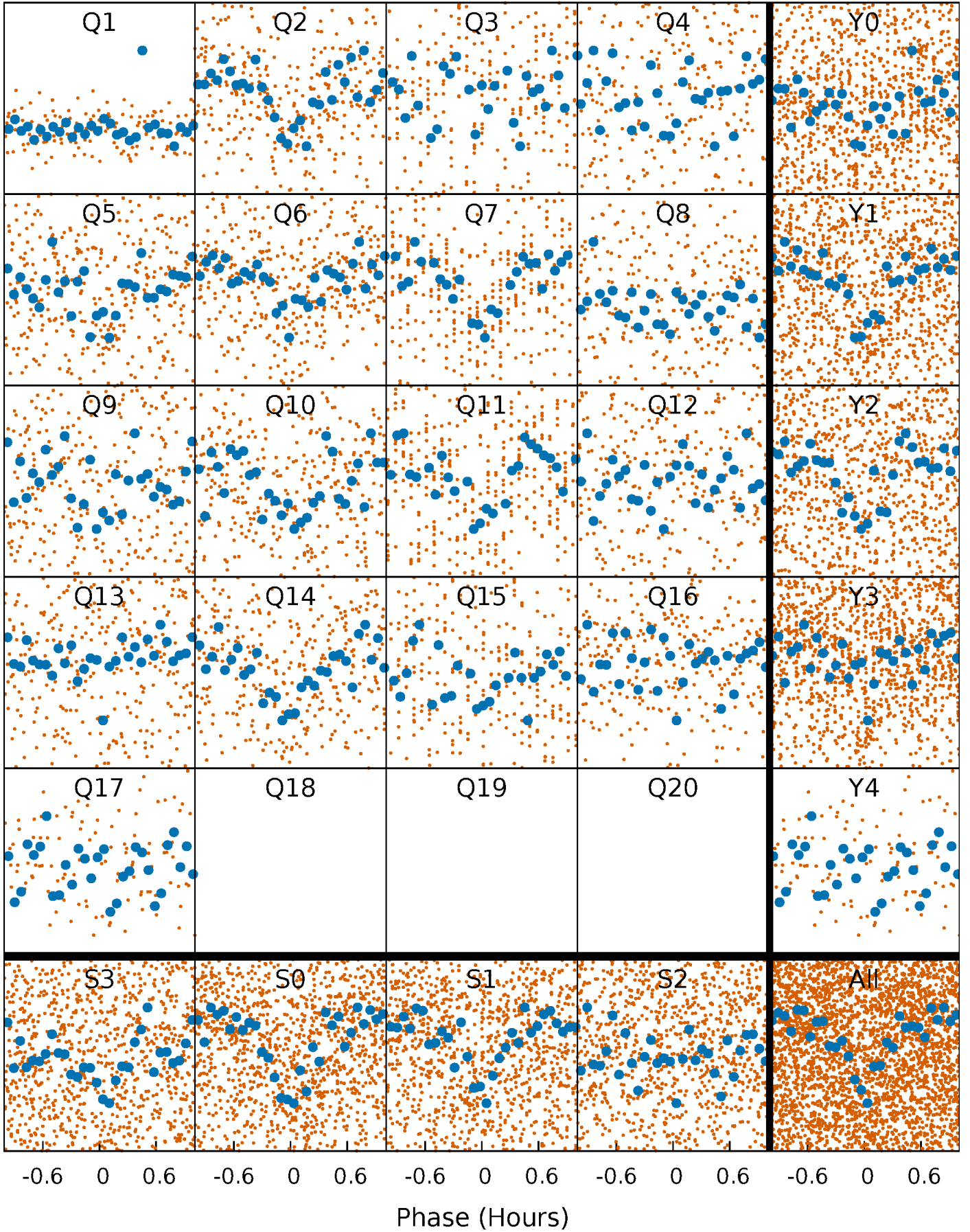


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

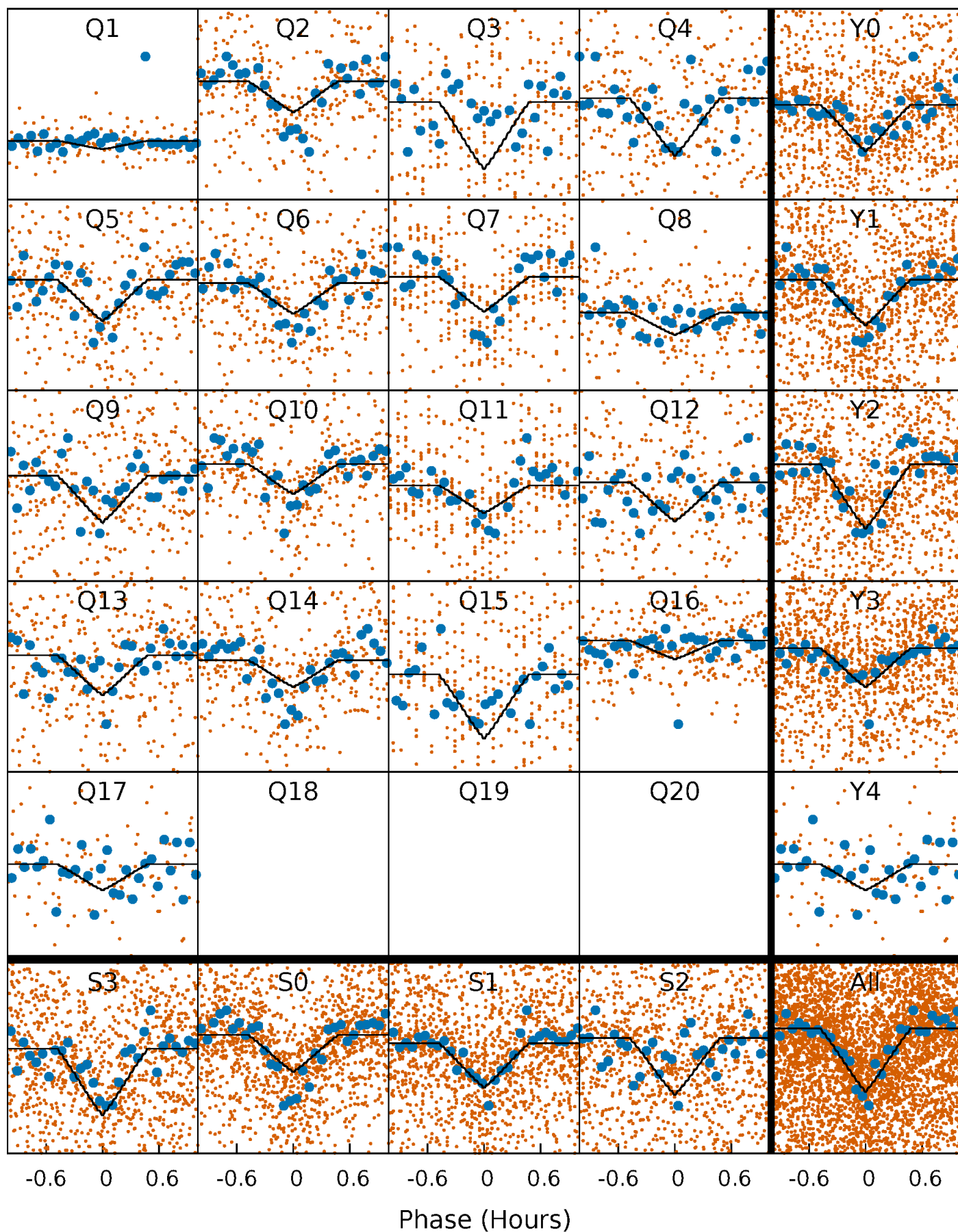
TCE 010649230-01   P= 0.895645 Days    $T_0=131.830111$  (BKJD)





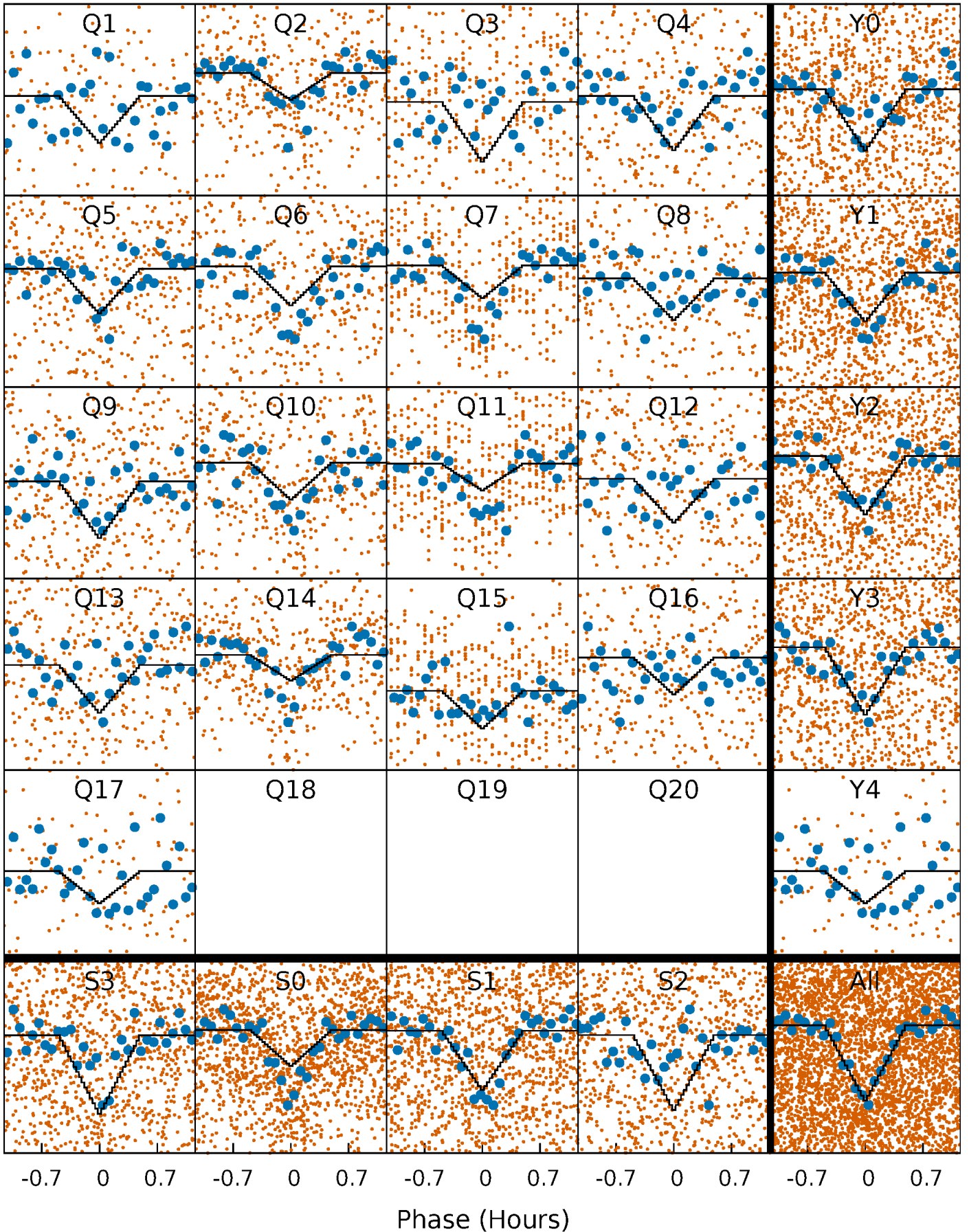
# DV Quarter-Phased Transit Curves

TCE 010649230-01 P= 0.895645 Days  $T_0=131.830111$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

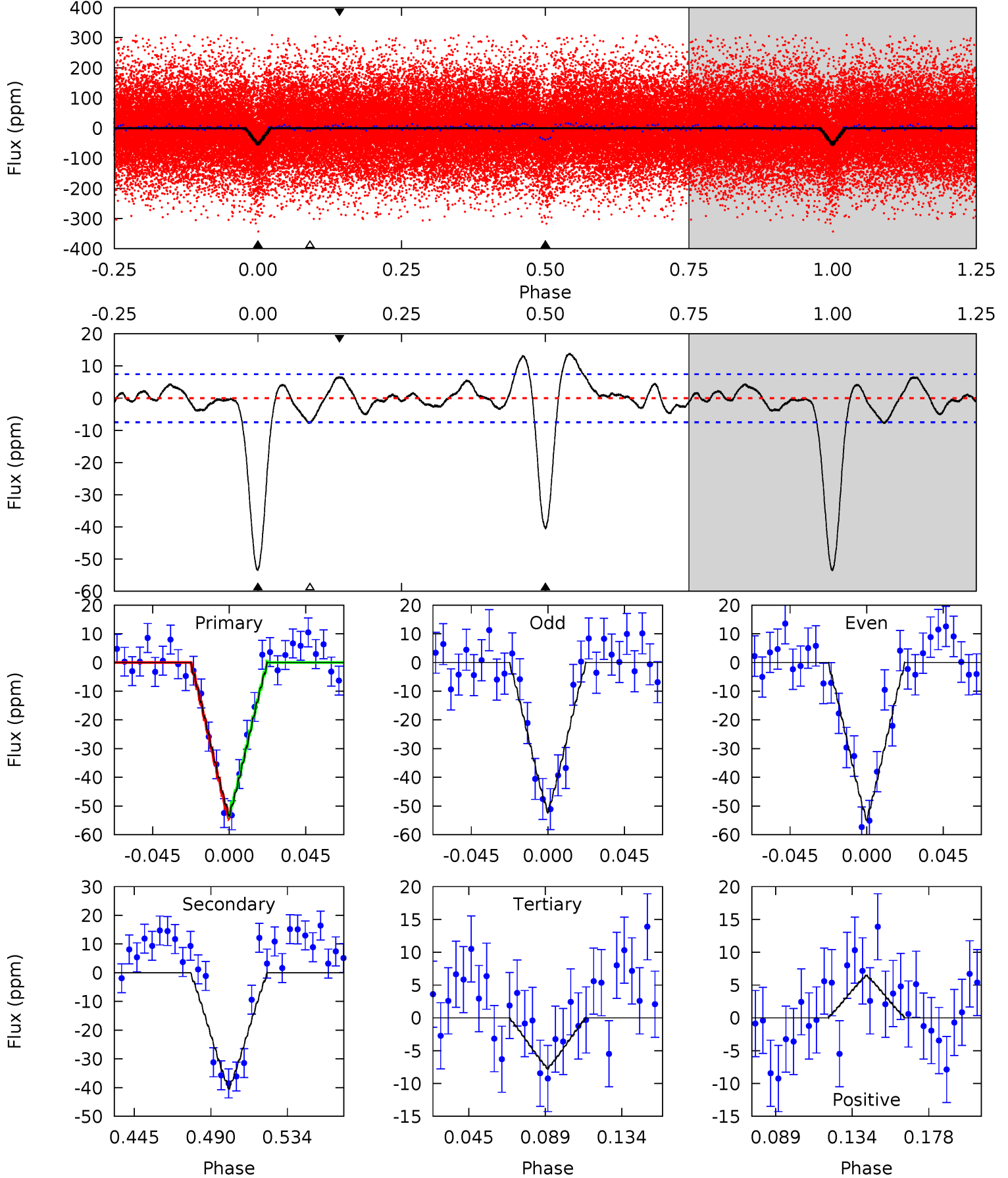
TCE 010649230-01   P= 0.895644 Days    $T_0=131.829856$  (BKJD)



# DV Model-Shift Uniqueness Test

010649230-01, P = 0.895645 Days, E = 130.934466 Days

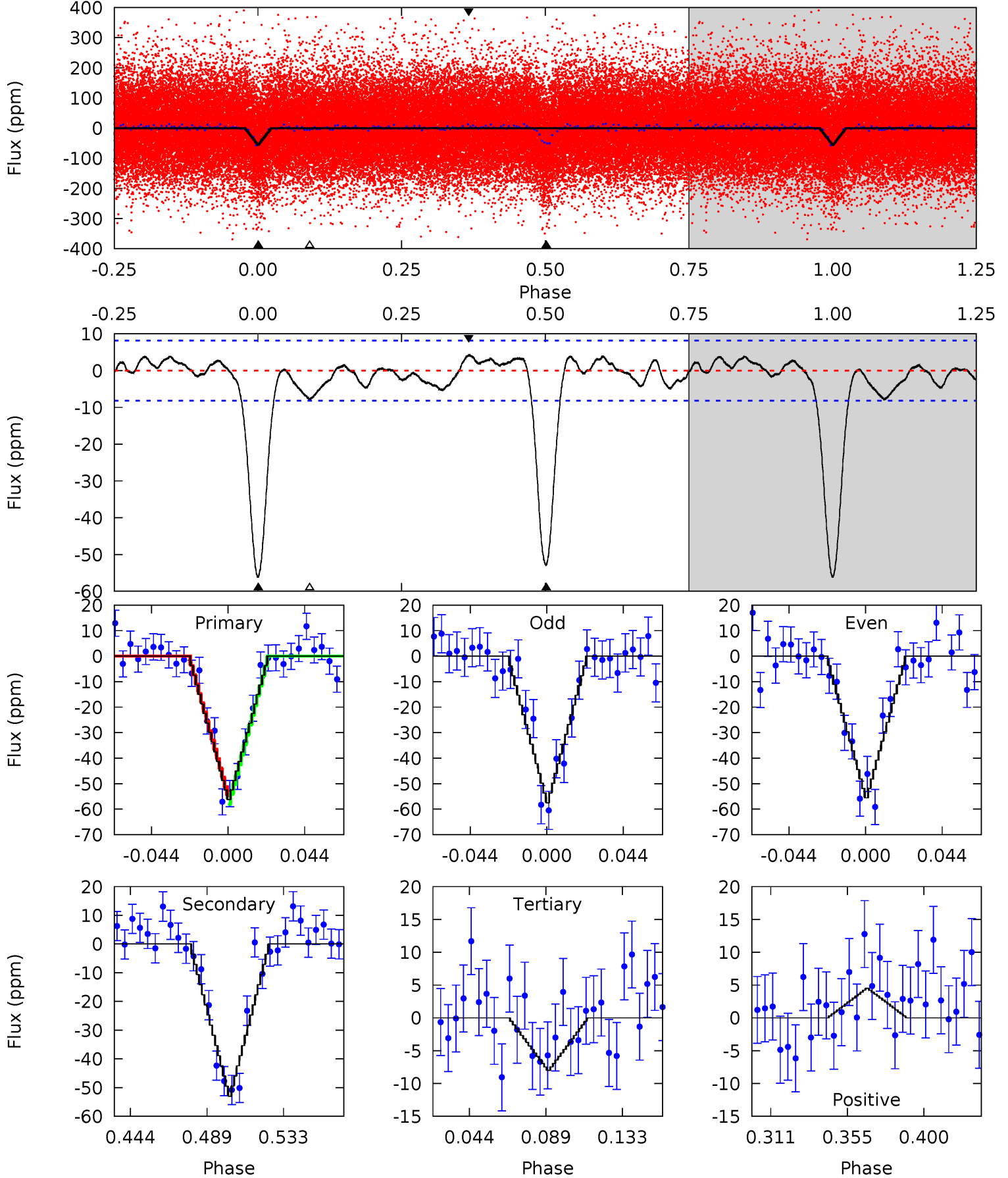
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
33.9	25.7	4.90	4.11	4.73	2.01	2.16	29.0	29.8	20.8	21.5	0.84	1.03	0.21	0.42



# Alt Model-Shift Uniqueness Test

010649230-01, P = 0.895644 Days, E = 130.934212 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
32.6	30.8	4.65	2.62	4.73	2.01	1.58	28.0	30.0	26.1	28.1	0.55	0.94	0.07	0.95



### Stellar Parameters For KIC 010649230

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5927^{+195}_{-177}$	$3.988^{+0.495}_{-0.165}$	$-0.520^{+0.300}_{-0.250}$	$1.607^{+0.472}_{-0.708}$	$0.914^{+0.123}_{-0.110}$	$0.310^{+1.446}_{-0.131}$
	+3%/-3%	+12%/-4%	+58%/-48%	+29%/-44%	+13%/-12%	+466%/-42%
Source	PHO54	PHO54	PHO54	DSEP		

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

### Secondary Eclipse Parameters for KIC 010649230-01 / KOI 7353.01

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-40 \pm 2$	$1.38^{+0.37}_{-0.35}$	$3432^{+321}_{-436}$	$5155^{+442}_{-386}$	$3.688^{+3.127}_{-1.368}$
Alt.	$-53 \pm 2$	$1.20^{+0.36}_{-0.35}$	$3410^{+322}_{-466}$	$5838^{+688}_{-518}$	$6.269^{+6.458}_{-2.509}$

$T_{\text{max}}$  = 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

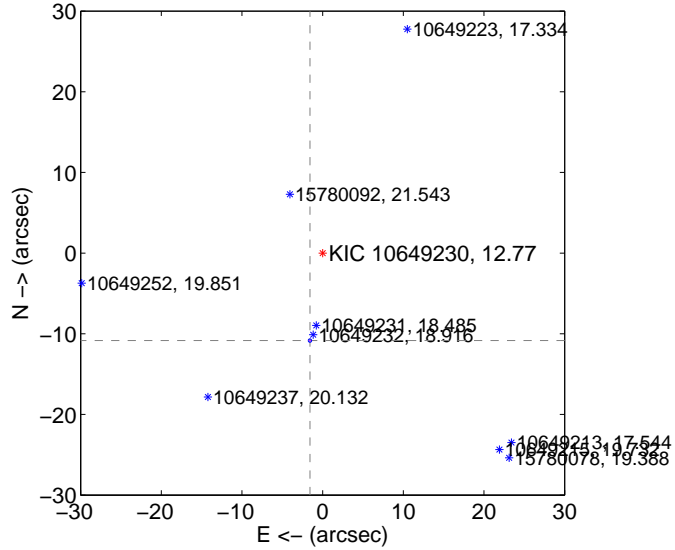
Supplemental centroid analysis for 010649230-01. Kepler magnitude: 12.77. Transit SNR 18.09

There are 17 quarters with good PRF difference image offsets

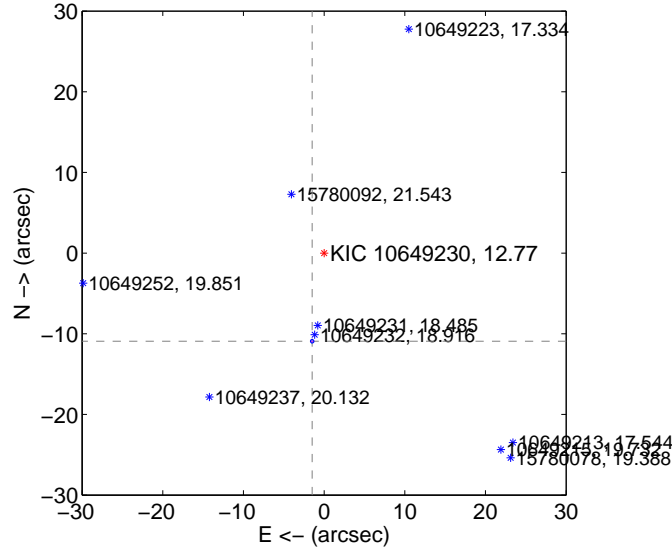
The direct PRF centroid is offset from the target star catalog position by about 0.13 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	10.960 $\pm$ 0.070	157.63	1.572 $\pm$ 0.069	-10.847 $\pm$ 0.069
PRF-fit source offset from KIC position	11.026 $\pm$ 0.072	153.94	1.482 $\pm$ 0.070	-10.926 $\pm$ 0.072
photometric centroid source offset	64.23 $\pm$ 0.71	90.41	9.07 $\pm$ 0.73	-63.59 $\pm$ 0.71

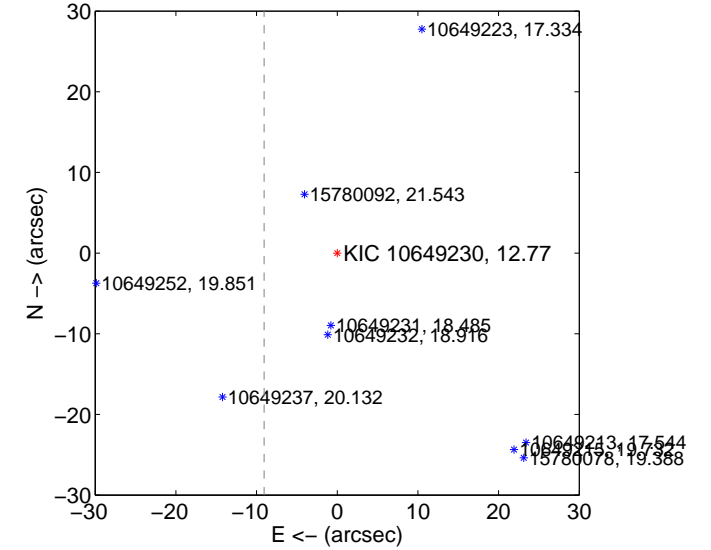
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

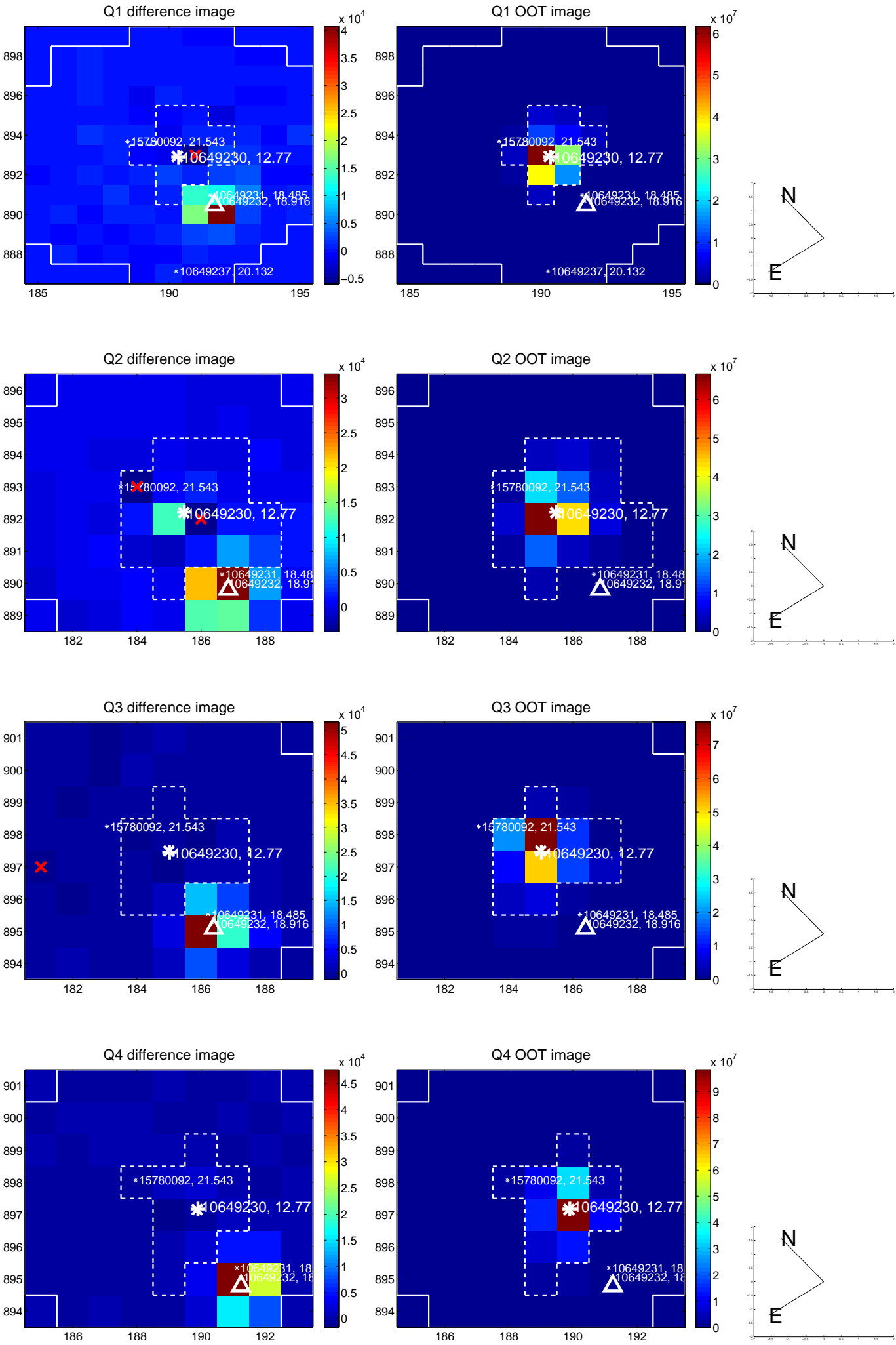


offset from photometric centroids

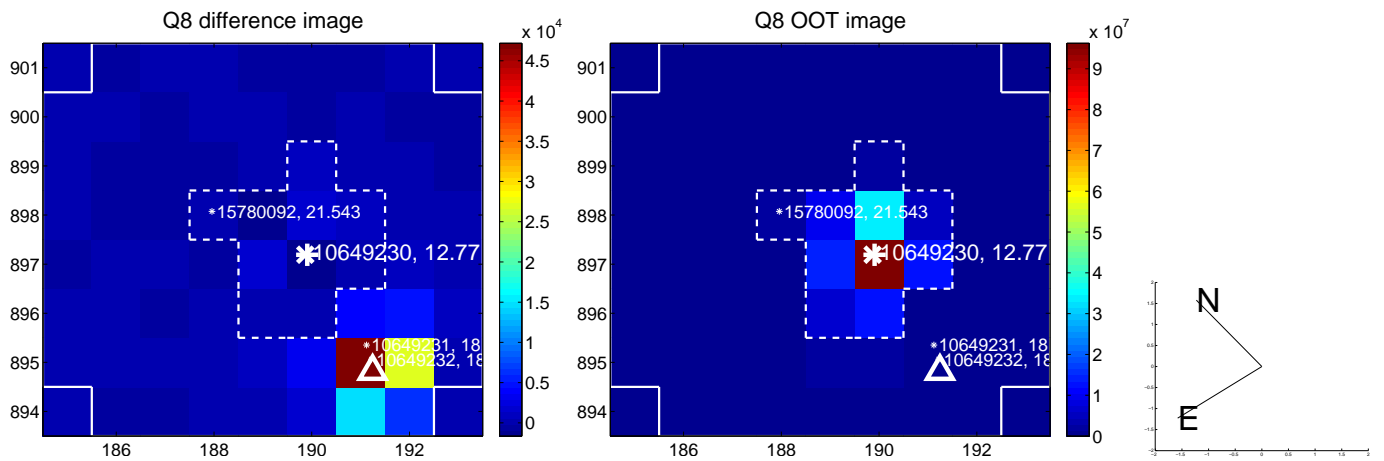
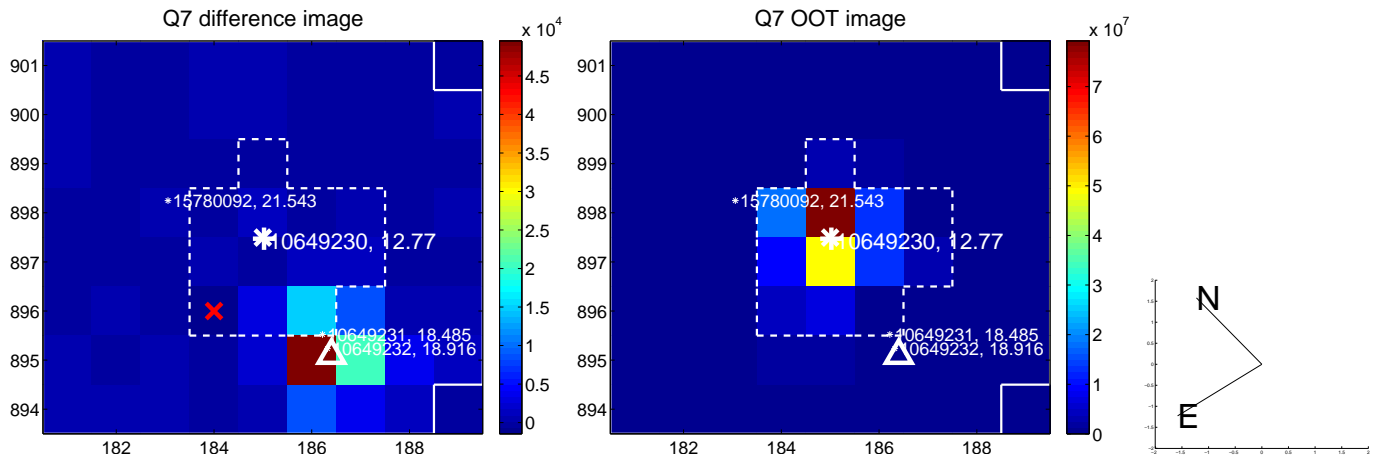
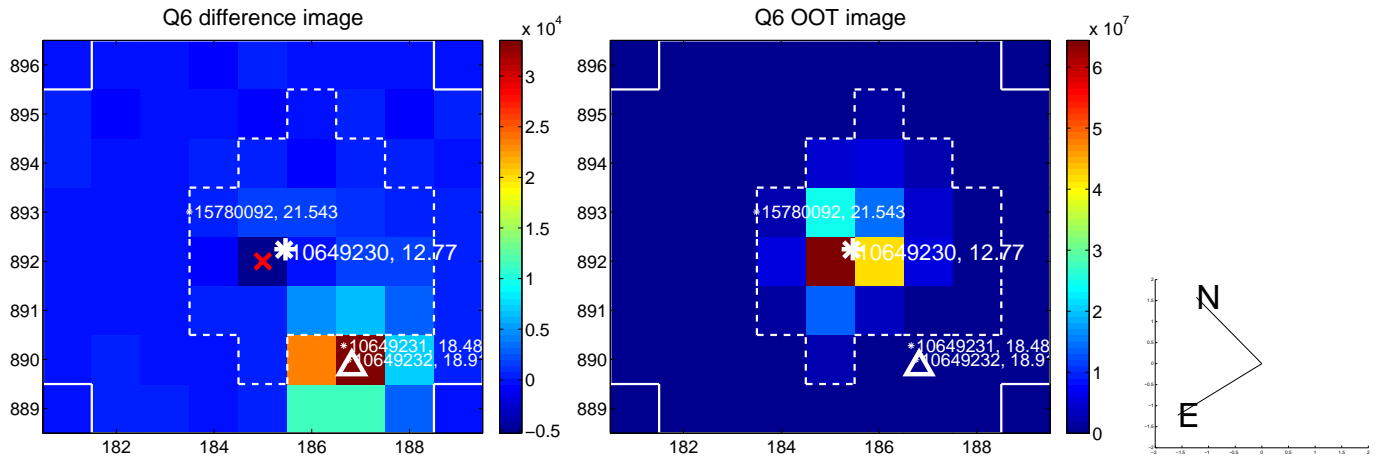
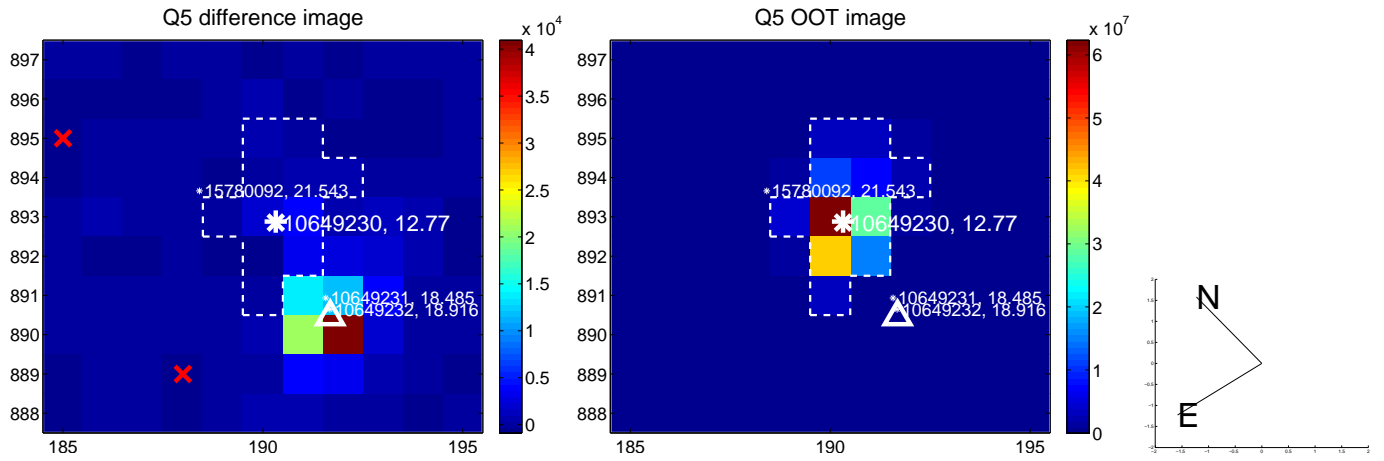


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

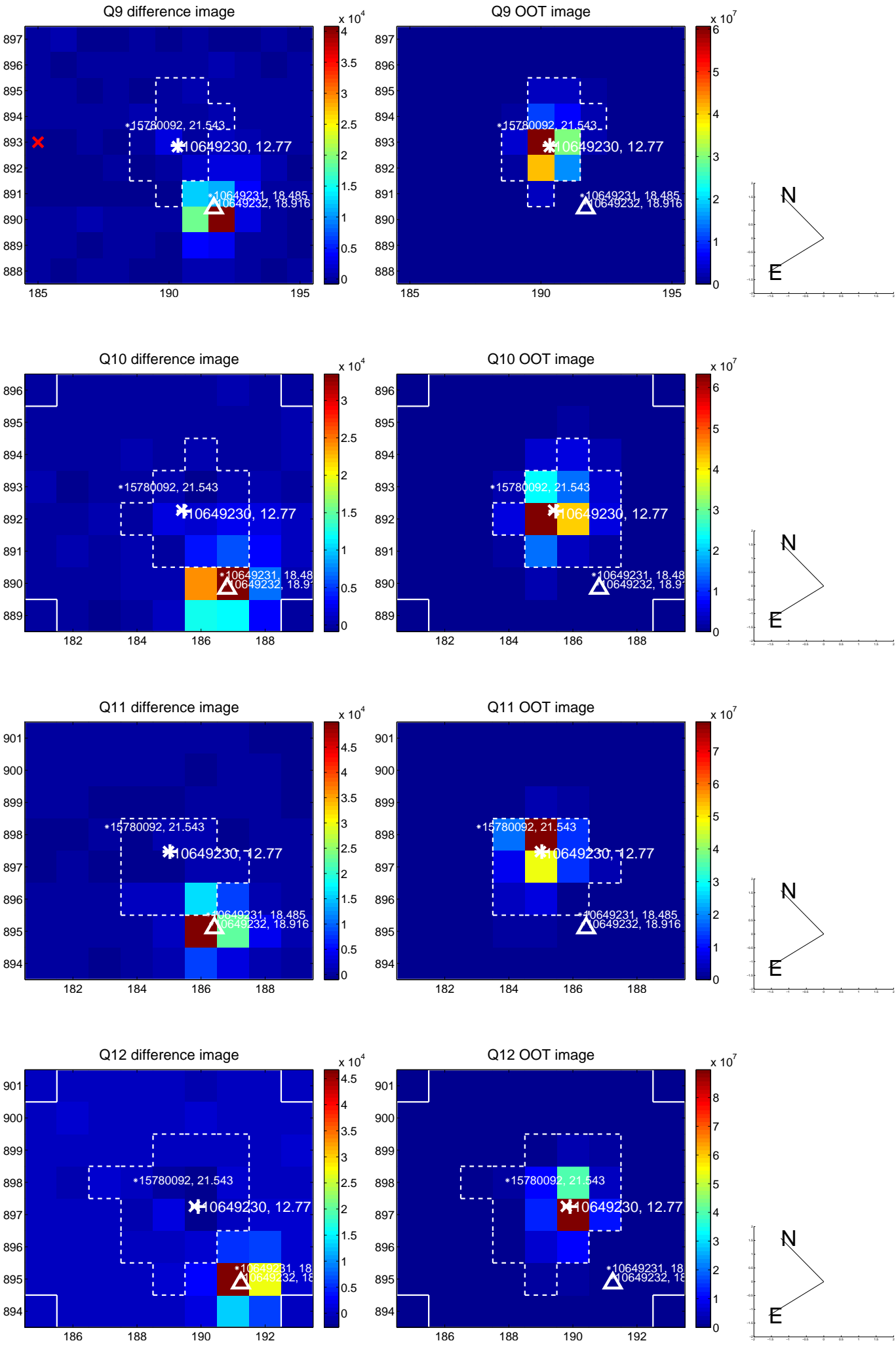
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



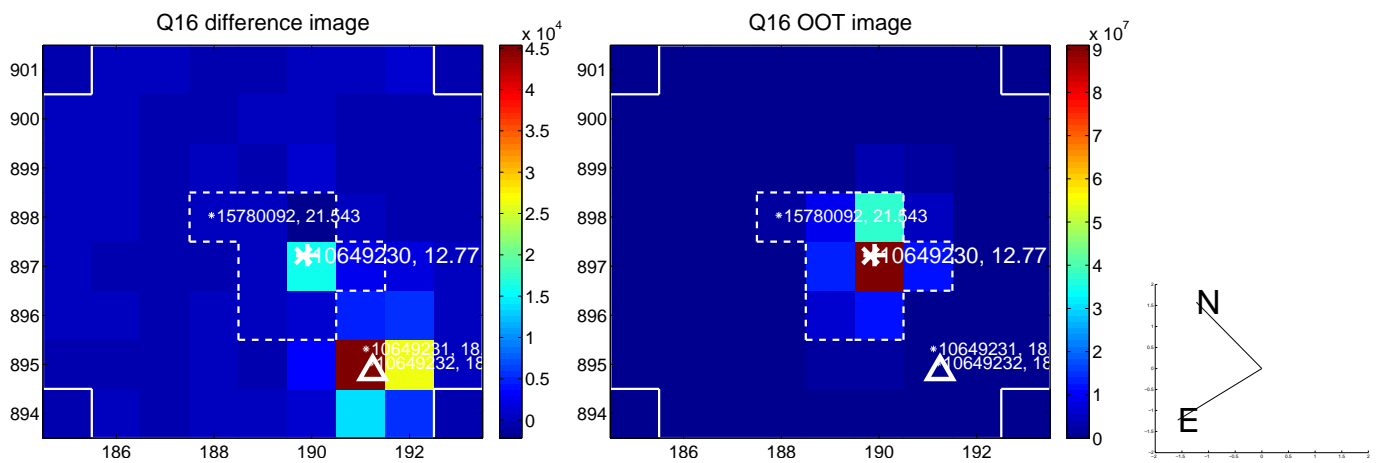
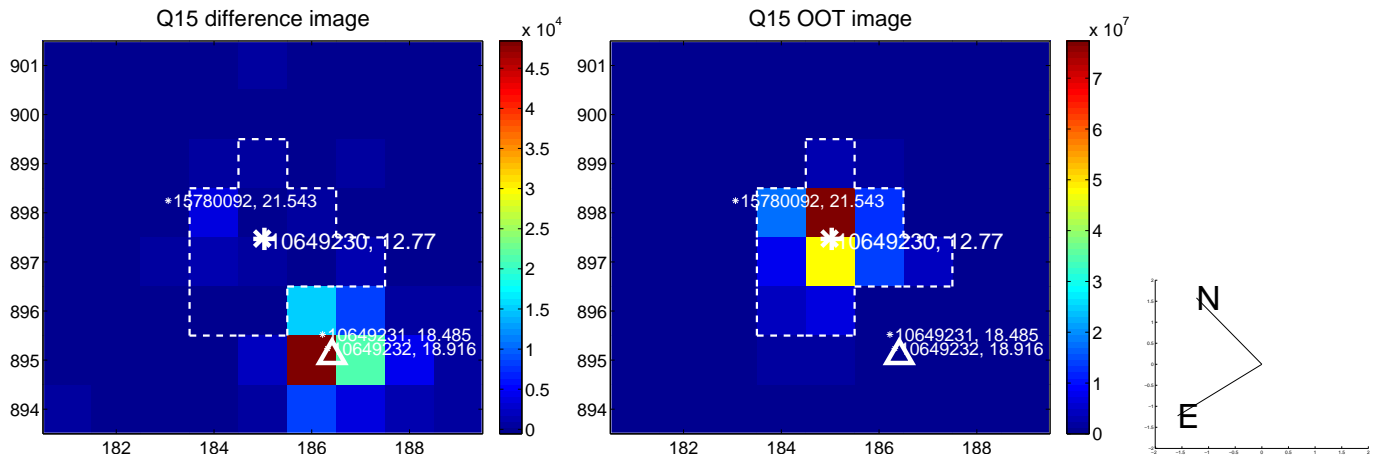
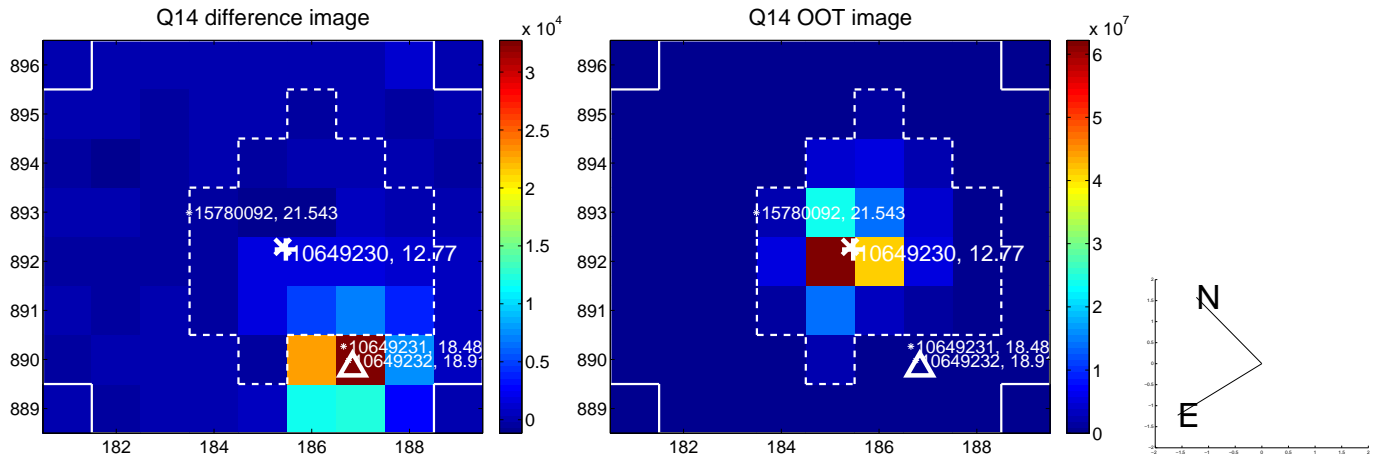
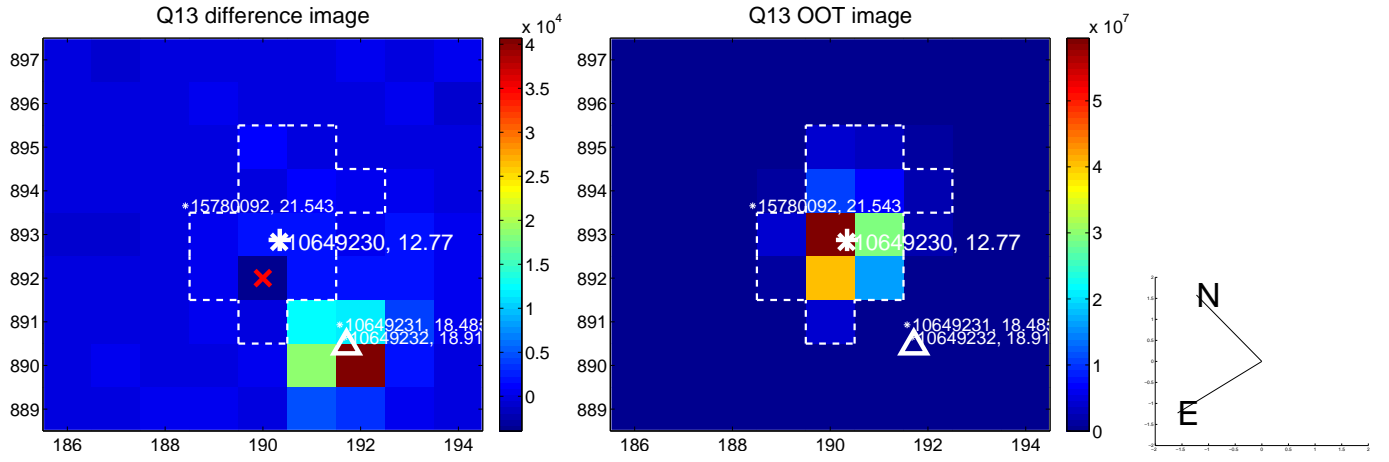
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

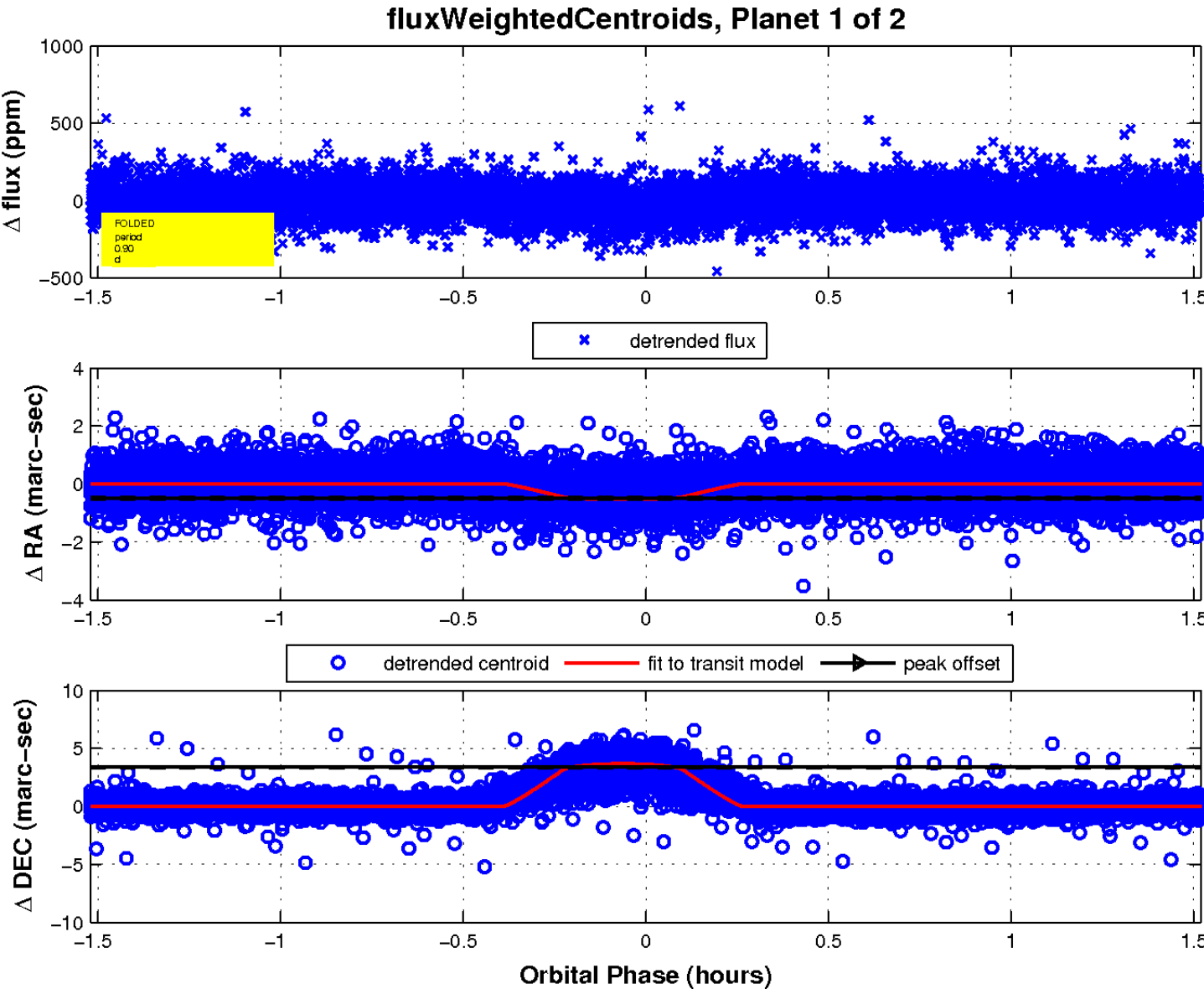
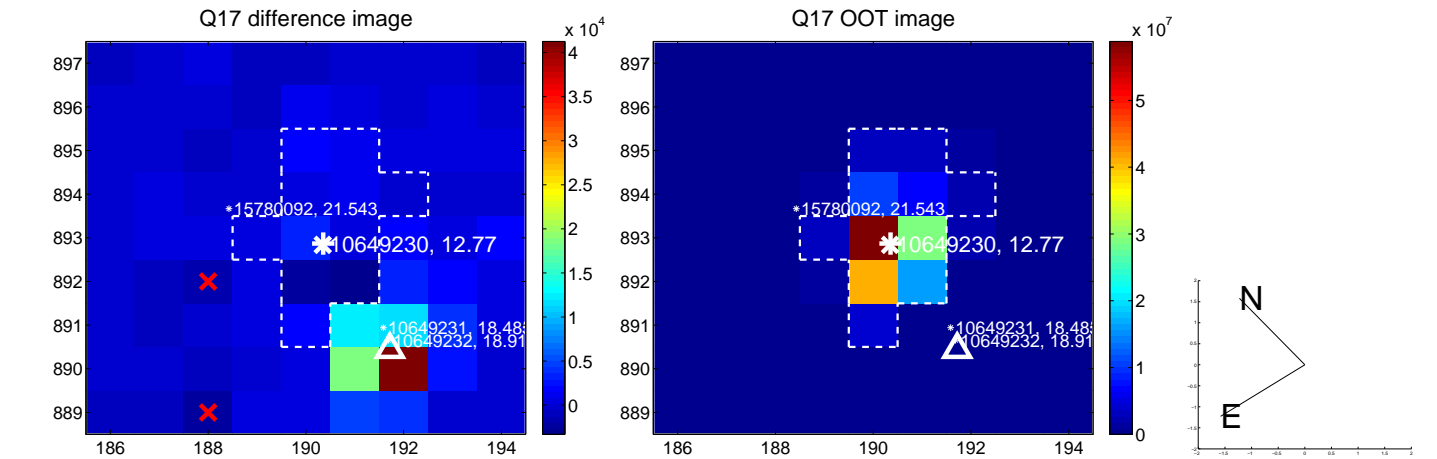


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

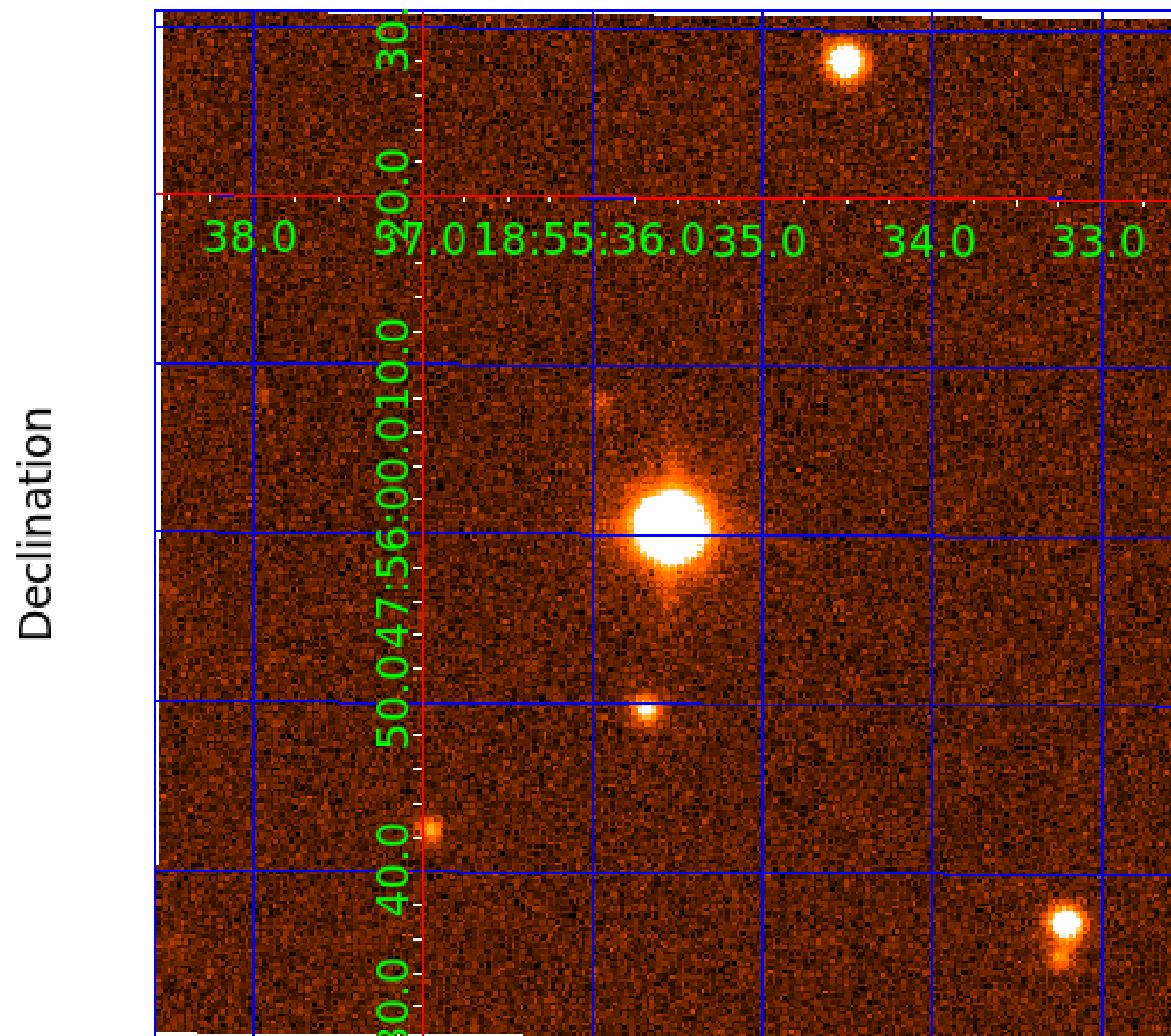




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image



# KIC 010649230

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010649230-01	OBS	7353.01	0.895645	131.830111	53.1	0.507	11.2	18.1	1.61	5927	1.46	9149.49
010649230-02	OBS	No	0.895646	132.277864	50.1	0.591	11.1	18.5	1.61	5927	1.38	9149.48

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010649230-01	OBS	FP	0.00	0	0	1	0	MOD_SEC_DV—MOD_SEC_ALT—PLANET_PERIOD_IS_HALF_ALT—HAS_SEC_TCE—CENT_RESOLVED_OFFSET
010649230-02	OBS	FP	0.00	1	1	1	0	IS_SEC_TCE—CENT_RESOLVED_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 010649230-02

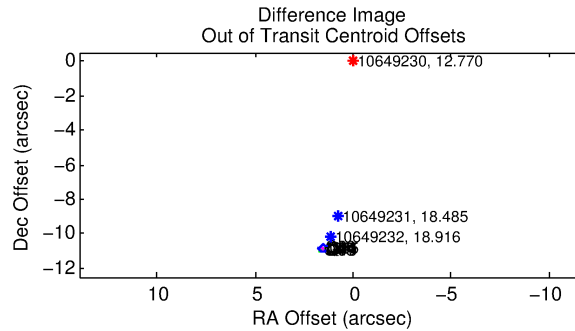
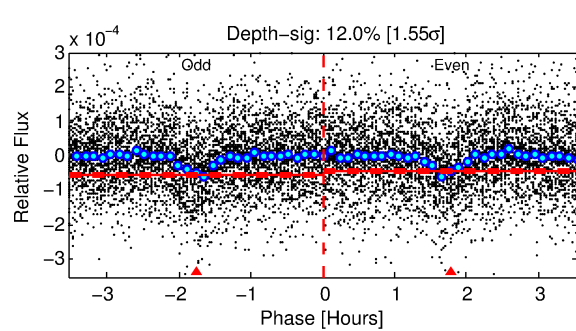
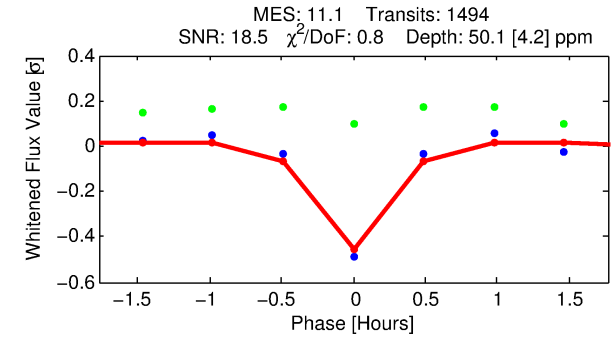
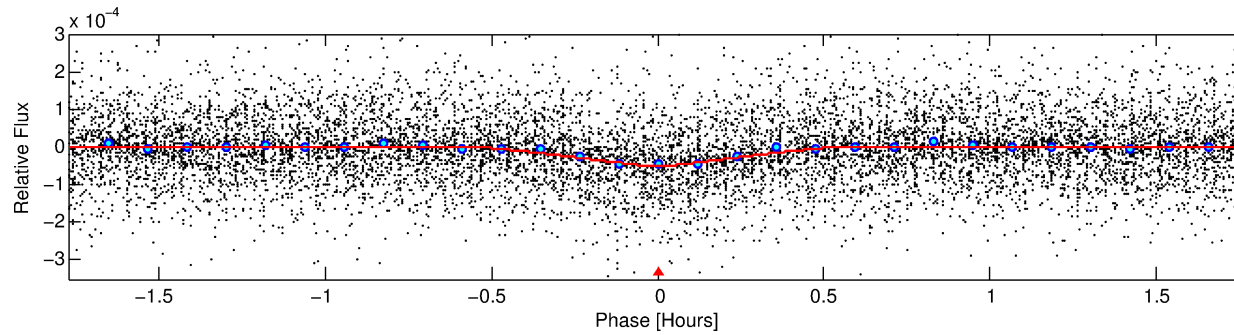
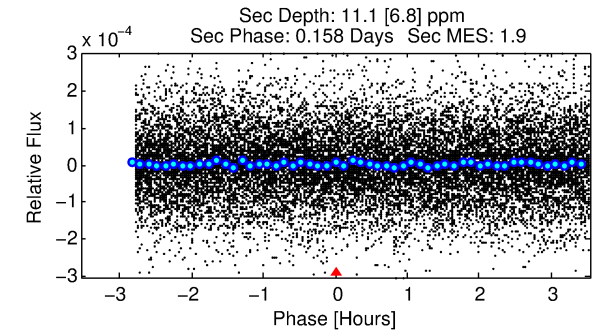
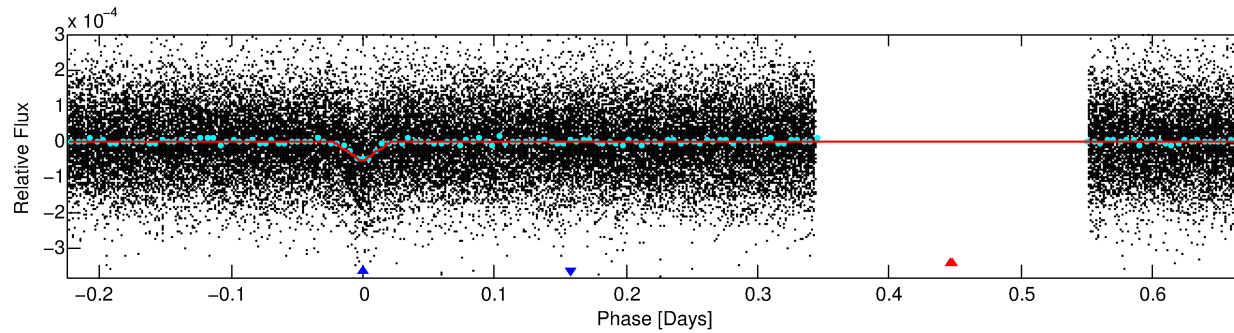
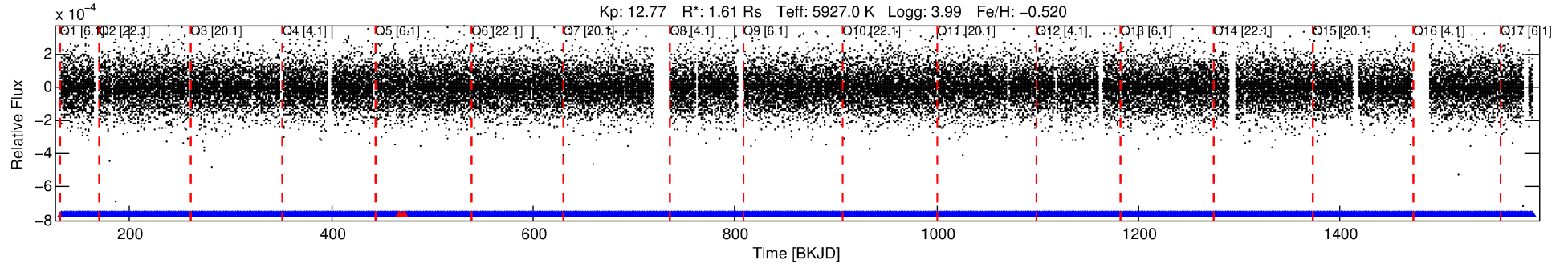
No Significant Match Found

# DV One-Page Summary

KIC: 10649230 Candidate: 2 of 2 Period: 0.896 d

KOI: K07353 Corr: No Ephemeris Match

Kp: 12.77 R\*: 1.61 Rs Teff: 5927.0 K Logg: 3.99 Fe/H: -0.520



## DV Fit Results:

Period = 0.89565 [0.00001] d  
Epoch = 132.2779 [0.0007] BKJD  
Rp/R\* = 0.0078 [0.0012]  
a/R\* = 5.33 [4.34]  
b = 0.90 [0.18]  
Seff = 9149.48 [7550.20]  
Teq = 2494 [514] K  
Rp = 1.38 [0.64] Re  
a = 0.0177 [0.0085] AU  
Ag = 1.01 [1.08] [0.01σ]  
Teffp = 3866 [681] K [1.61σ]

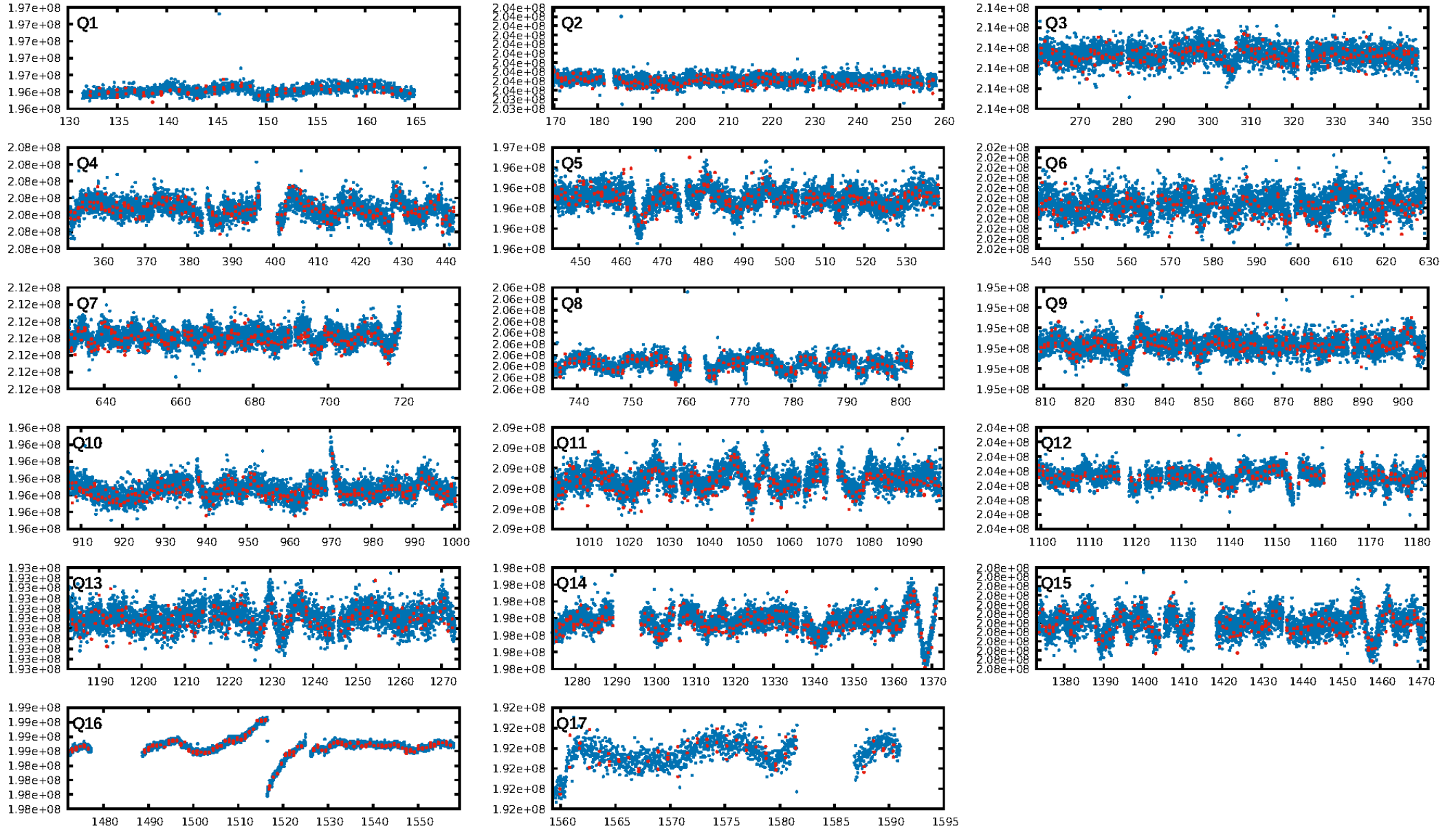
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 1.95e-30  
RollingBand-fgt: 1.00 [1425/1427]  
GhostDiagnostic-chr: -0.5266  
Centroid-sig: 0.0%  
Centroid-so: 56.015 arcsec [80.49σ]  
OotOffset-rm: 10.961 arcsec [158.73σ]  
KicOffset-rm: 11.029 arcsec [151.41σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 10:34:06 Z

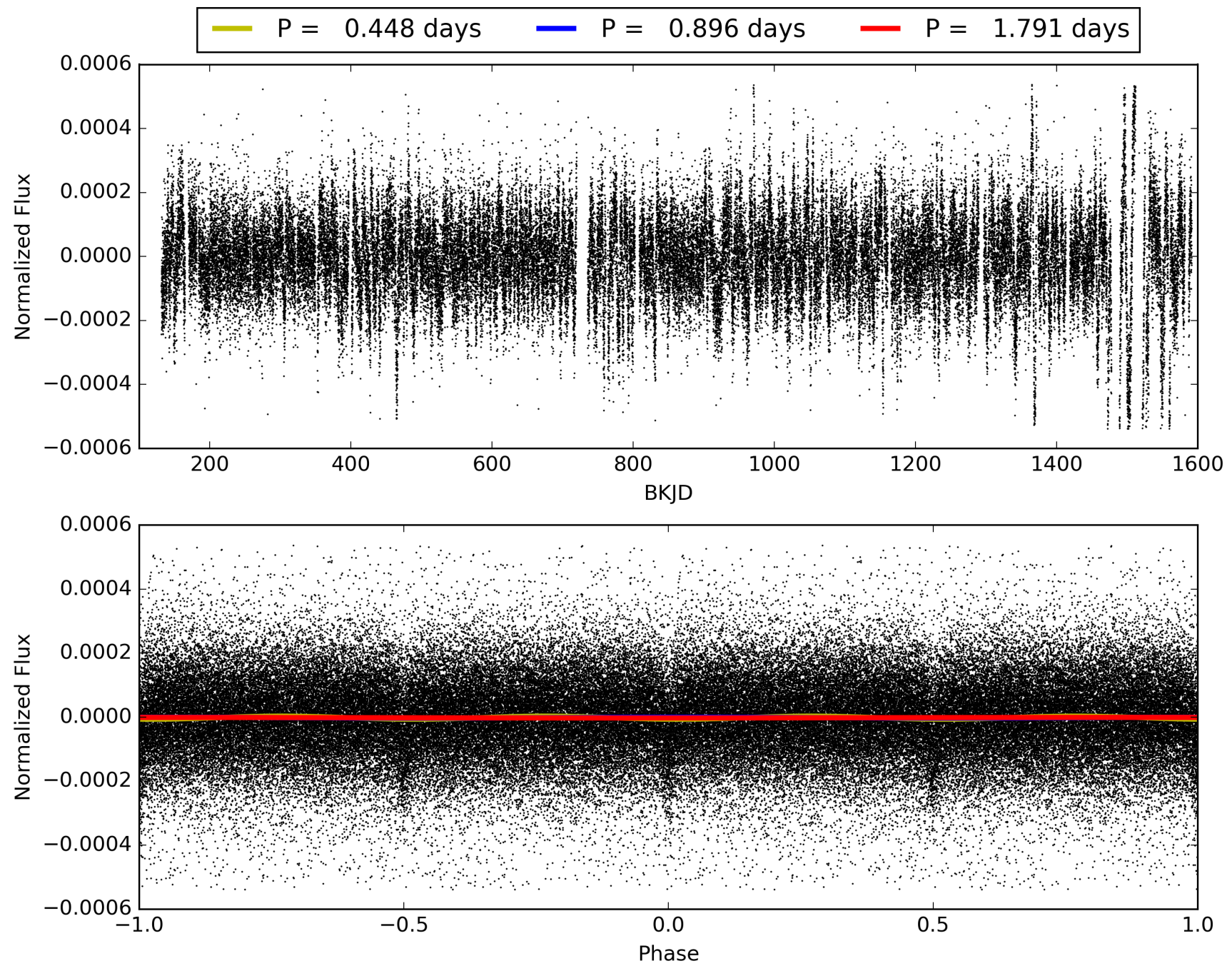
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 010649230-02, PDC Light Curves



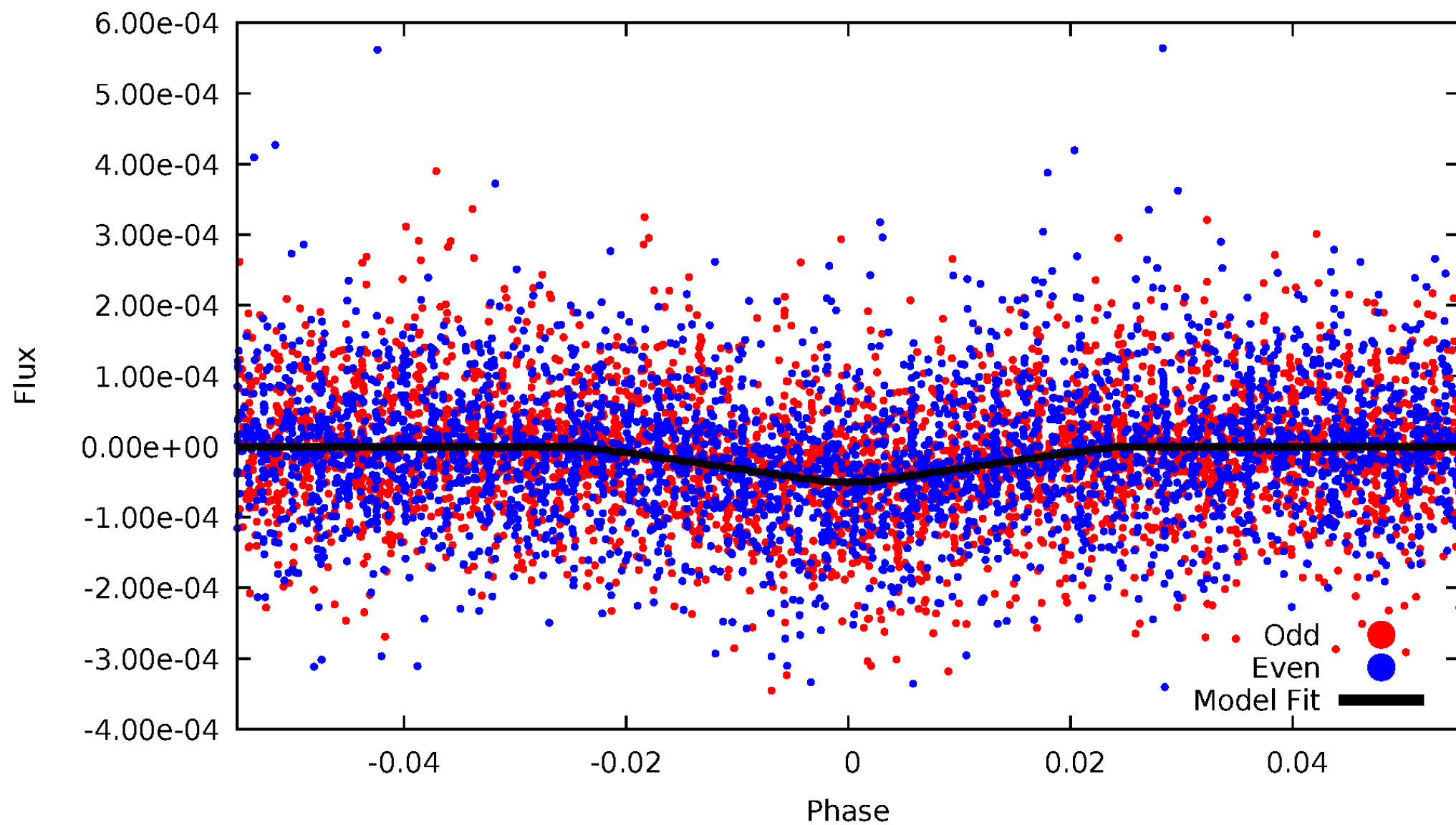


# TCE 010649230-02



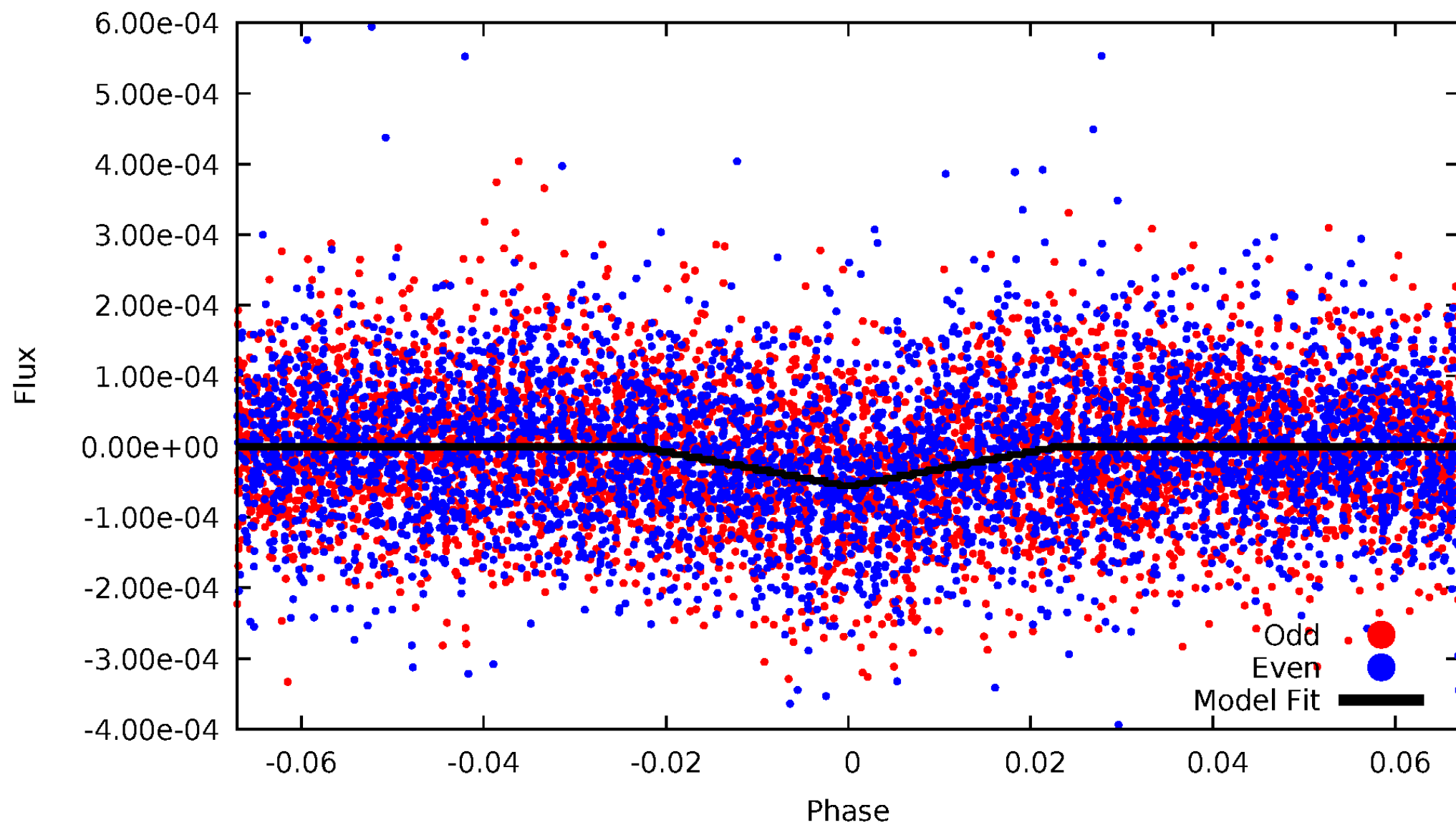
# DV Odd/Even

TCE 010649230-02



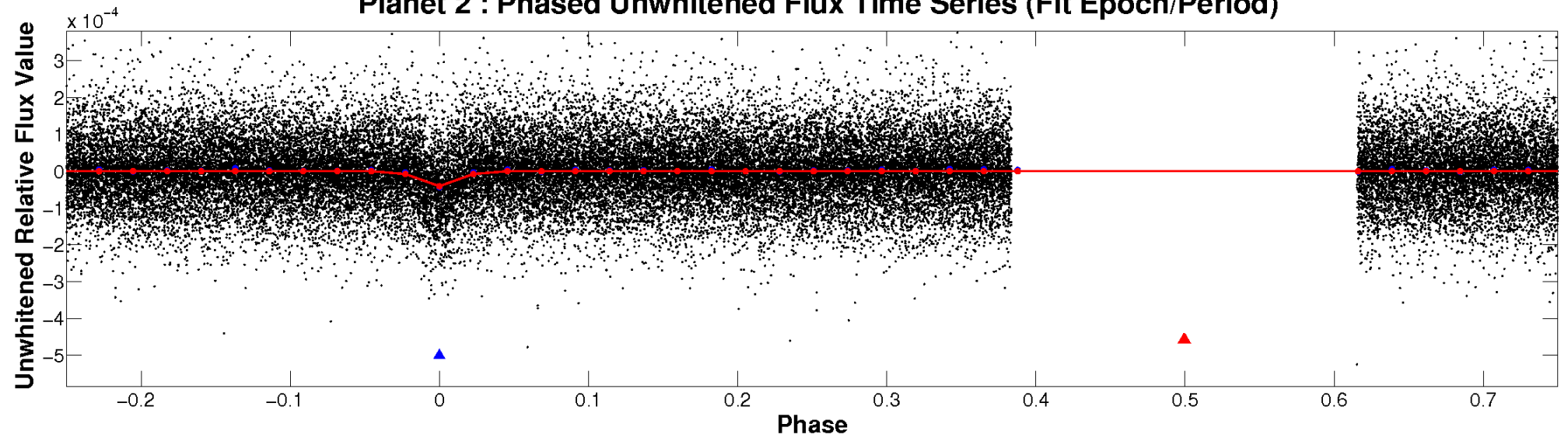
# ALT Odd/Even

TCE 010649230-02

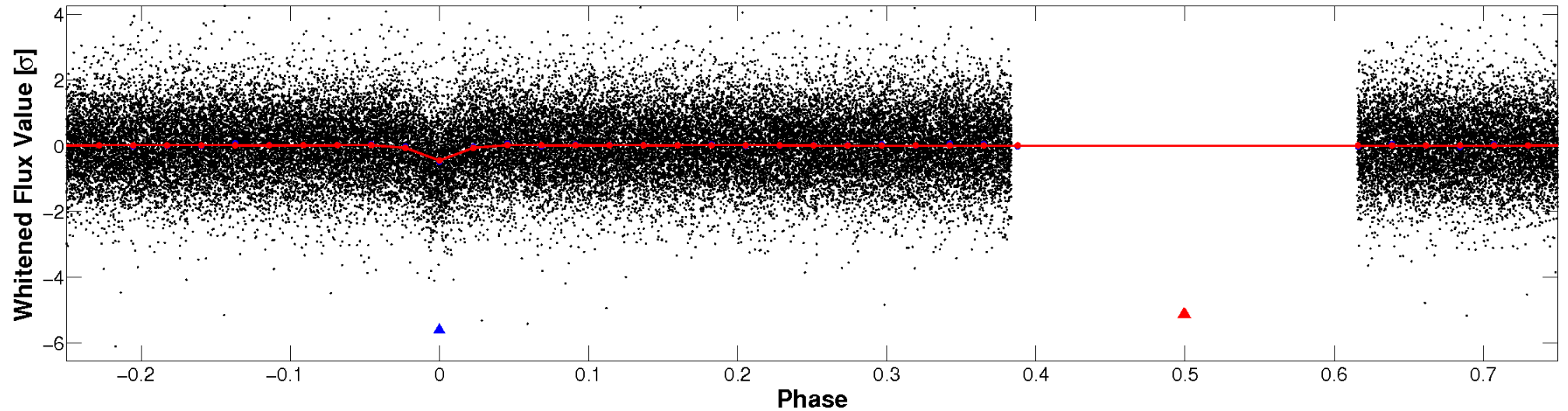


# Non-Whitened Vs. Whitened Light Curve

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



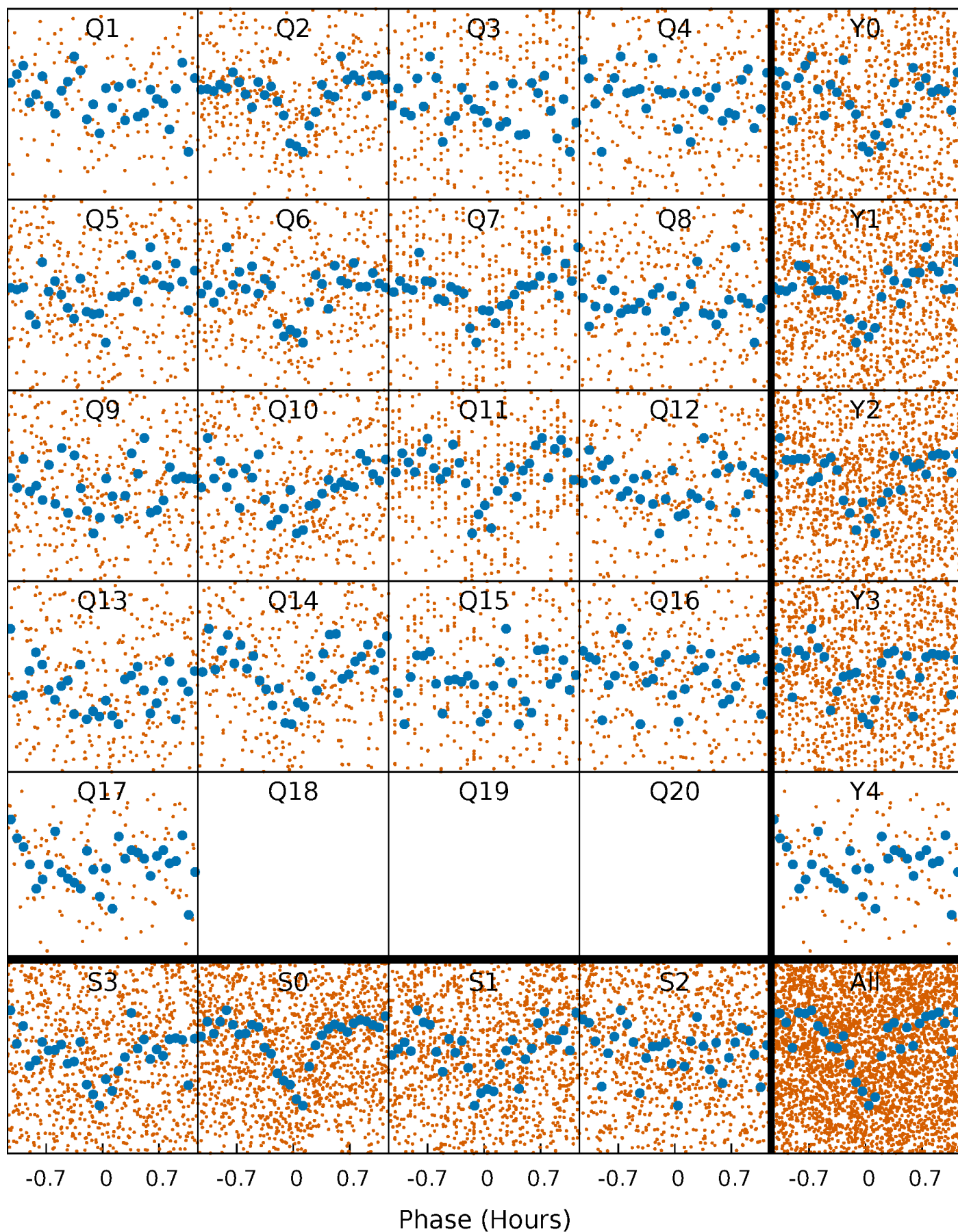
## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)





# PDC Quarter-Phased Transit Curves

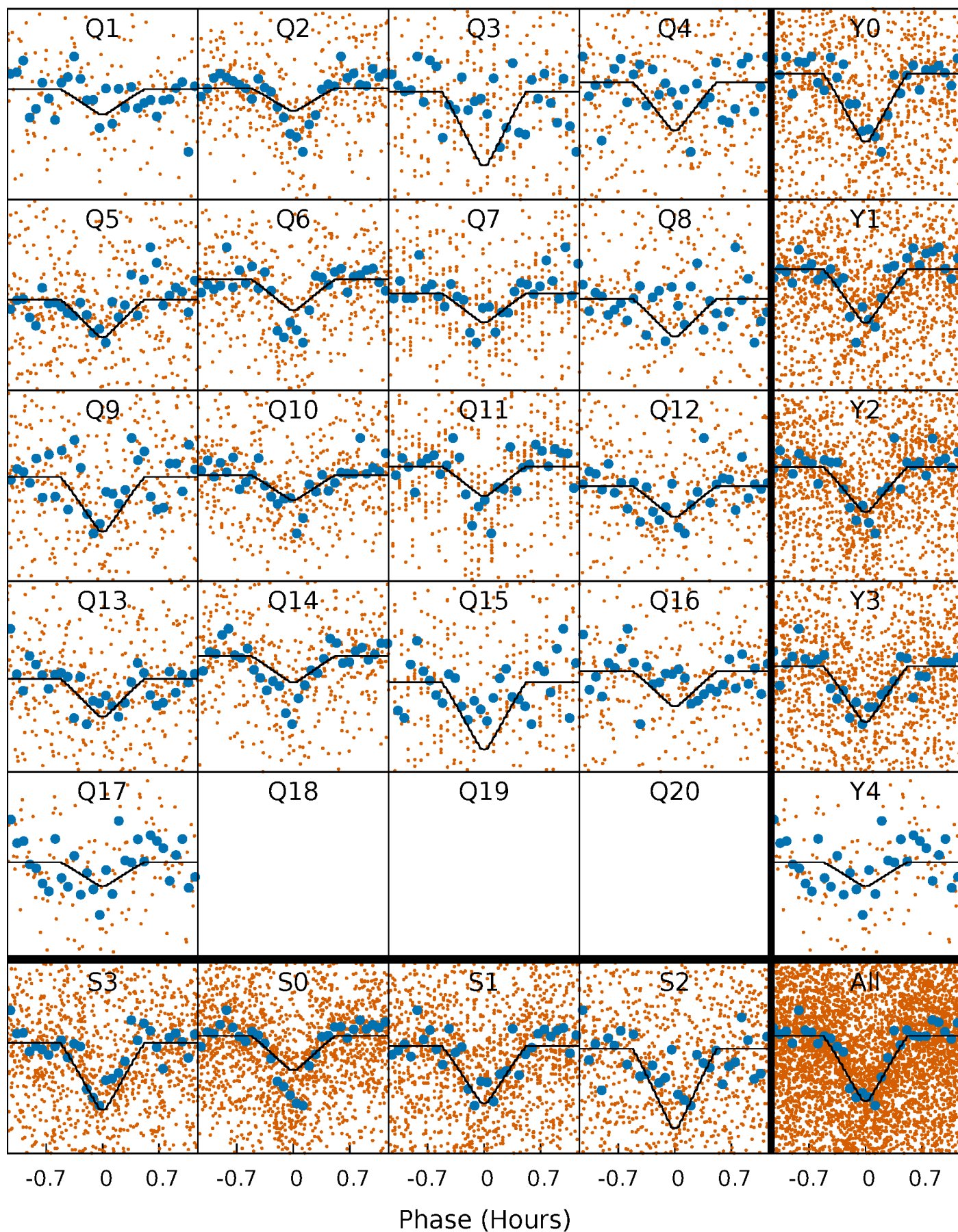
TCE 010649230-02   P= 0.895646 Days    $T_0=132.277864$  (BKJD)





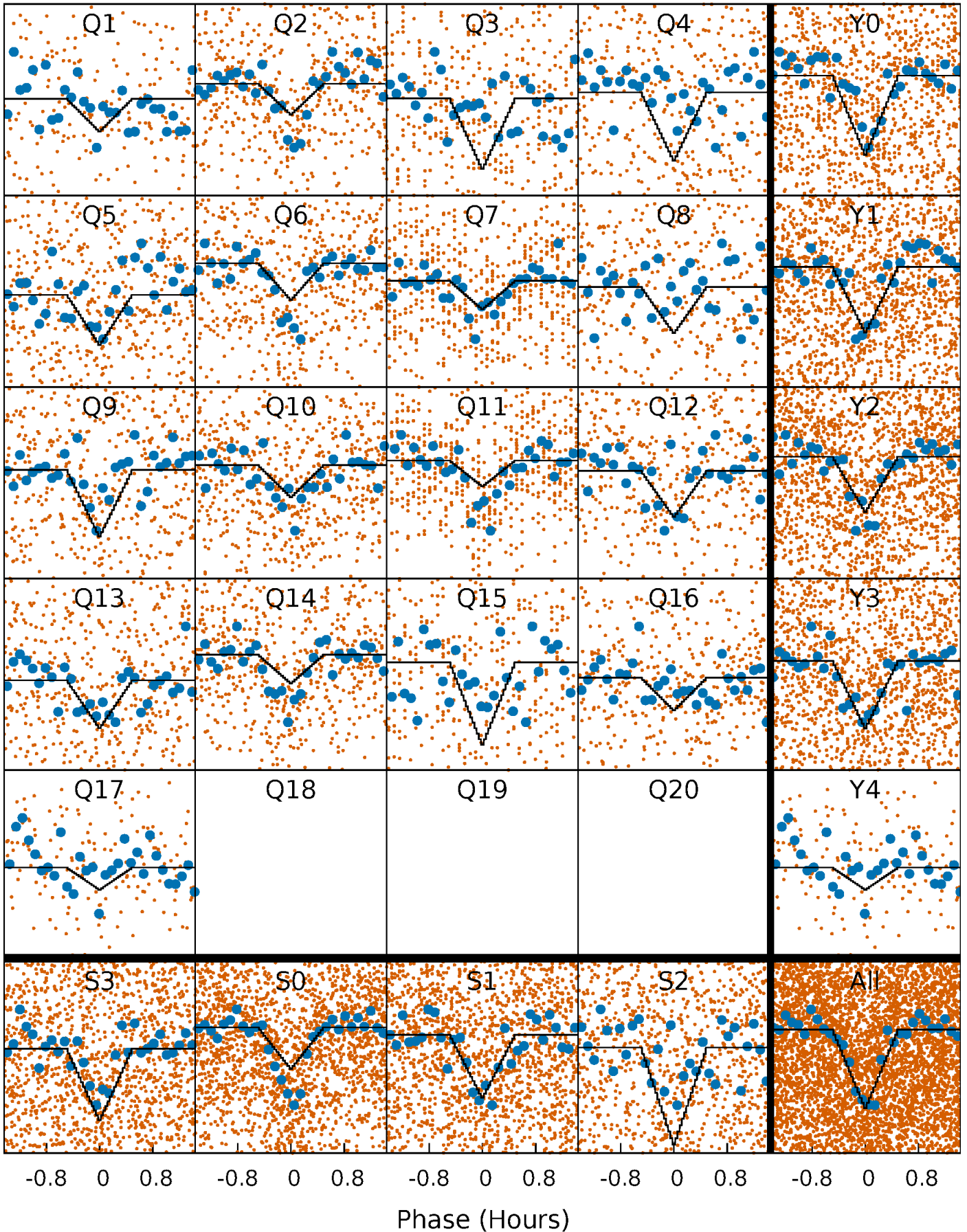
# DV Quarter-Phased Transit Curves

TCE 010649230-02 P= 0.895646 Days  $T_0=132.277864$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

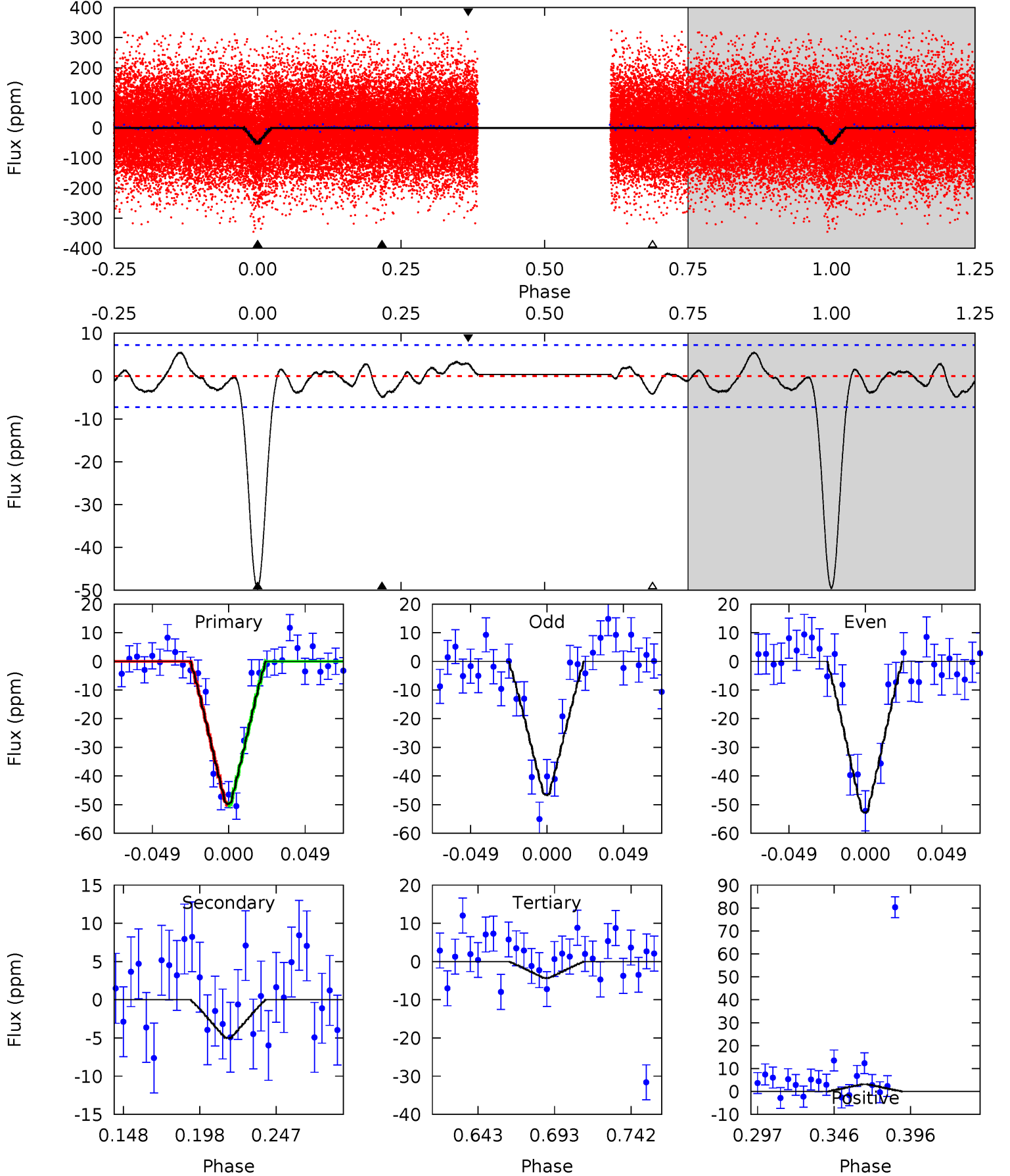
TCE 010649230-02     $P = 0.895644$  Days     $T_0 = 132.278429$  (BKJD)



# DV Model-Shift Uniqueness Test

010649230-02, P = 0.895646 Days, E = 131.382218 Days

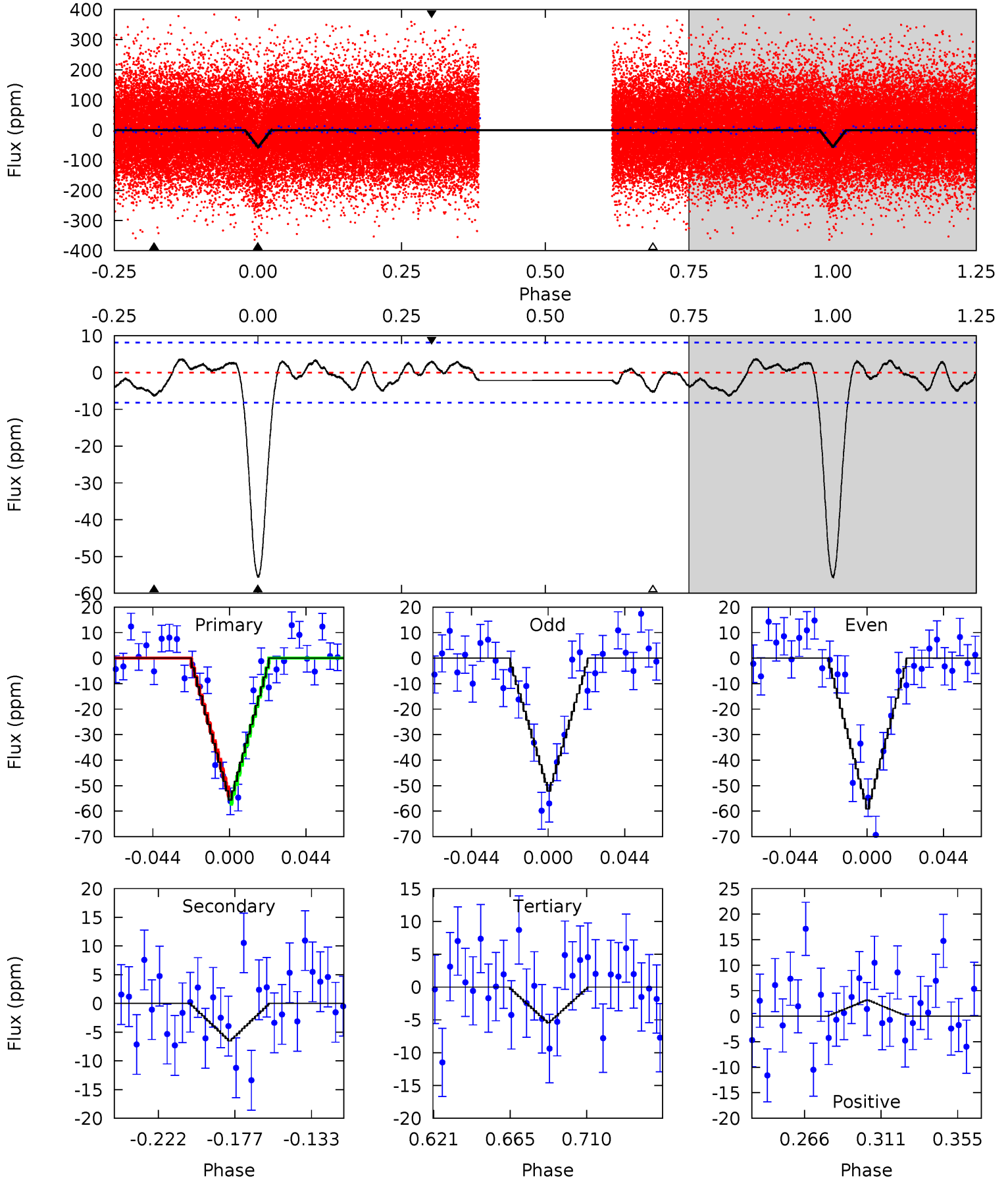
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
32.3	3.27	2.80	2.02	4.71	1.96	1.38	29.5	30.3	0.46	1.25	2.02	1.04	0.10	0.15



# Alt Model-Shift Uniqueness Test

010649230-02, P = 0.895644 Days, E = 131.382785 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
32.2	3.78	3.15	1.84	4.73	2.01	1.26	29.1	30.4	0.63	1.94	2.01	0.98	0.06	0.95



### Stellar Parameters For KIC 010649230

	$T_{\text{eff}} (K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5927^{+195}_{-177}$	$3.988^{+0.495}_{-0.165}$	$-0.520^{+0.300}_{-0.250}$	$1.607^{+0.472}_{-0.708}$	$0.914^{+0.123}_{-0.110}$	$0.310^{+1.446}_{-0.131}$
	+3%/-3%	+12%/-4%	+58%/-48%	+29%/-44%	+13%/-12%	+466%/-42%
Source	PHO54	PHO54	PHO54	DSEP		

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

### Secondary Eclipse Parameters for KIC 010649230-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-5 \pm 2$	$1.28^{+0.35}_{-0.35}$	$3416^{+311}_{-444}$	$3183^{+440}_{-5500}$	$0.536^{+0.497}_{-0.252}$
Alt.	$-7 \pm 2$	$1.24^{+0.36}_{-0.33}$	$3436^{+286}_{-421}$	$3482^{+465}_{-530}$	$0.694^{+0.705}_{-0.290}$

$T_{max}$  = 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

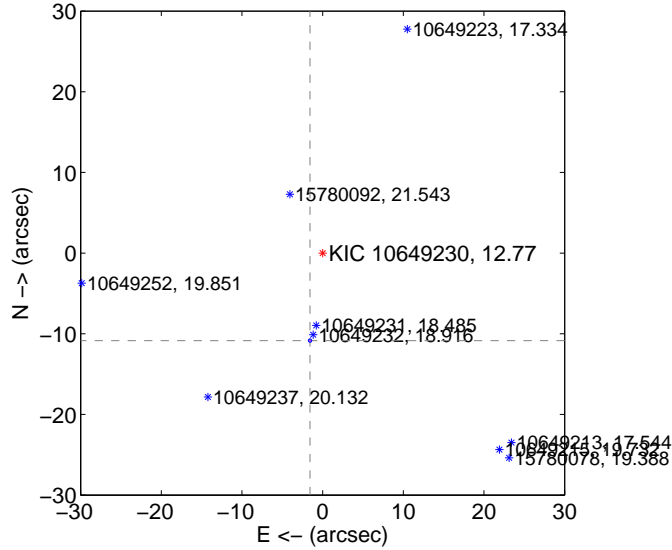
Supplemental centroid analysis for 010649230-02. Kepler magnitude: 12.77. Transit SNR 18.48

There are 17 quarters with good PRF difference image offsets

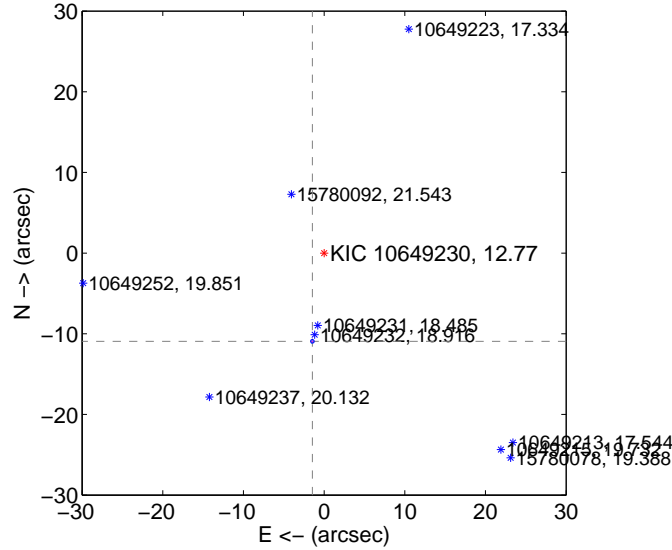
The direct PRF centroid is offset from the target star catalog position by about 0.13 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b>10.961 <math>\pm</math> 0.069</b>	<b>158.73</b>	1.562 $\pm$ 0.070	-10.849 $\pm$ 0.069
PRF-fit source offset from KIC position	<b>11.029 <math>\pm</math> 0.073</b>	<b>151.41</b>	1.455 $\pm$ 0.071	-10.933 $\pm$ 0.073
photometric centroid source offset	<b>56.02 <math>\pm</math> 0.70</b>	<b>80.49</b>	8.76 $\pm$ 0.71	-55.33 $\pm$ 0.70

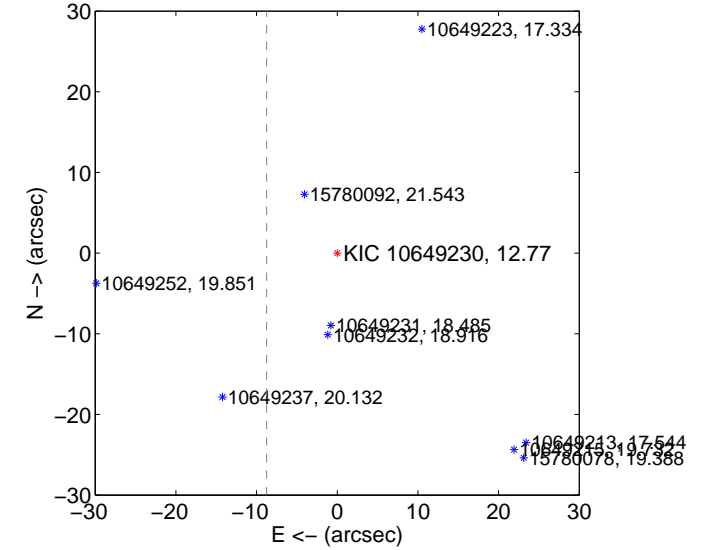
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



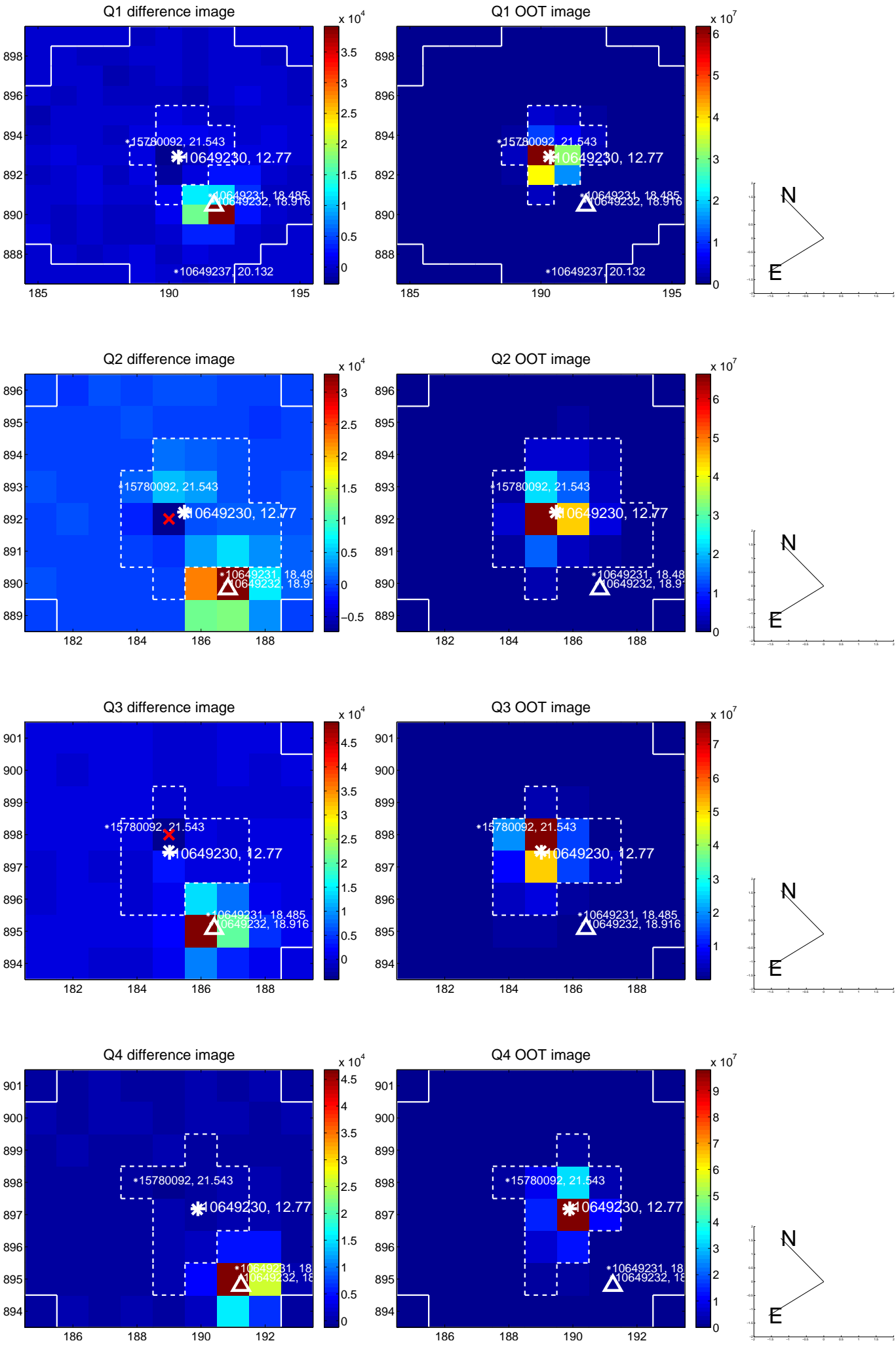
offset from photometric centroids



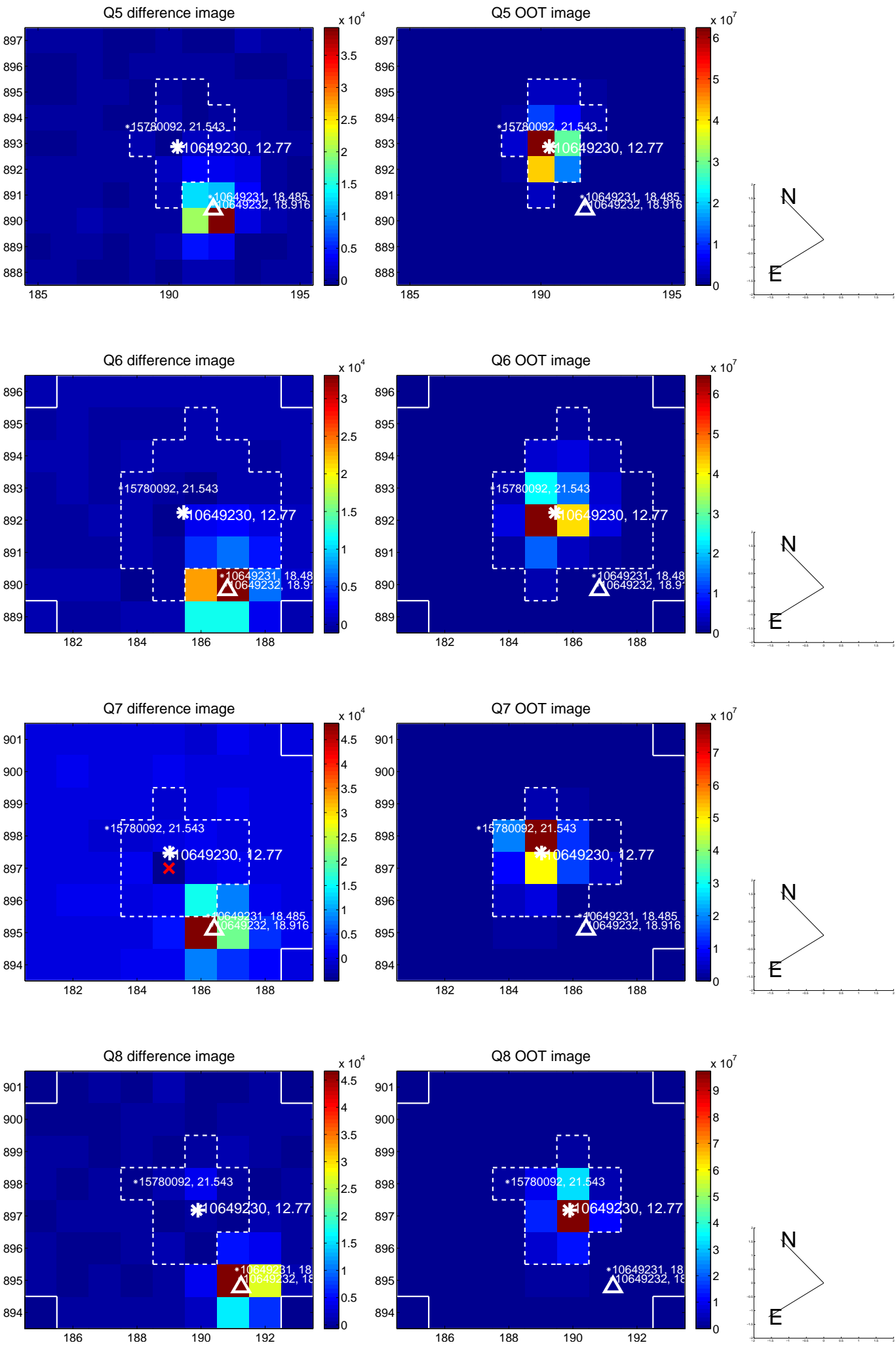
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



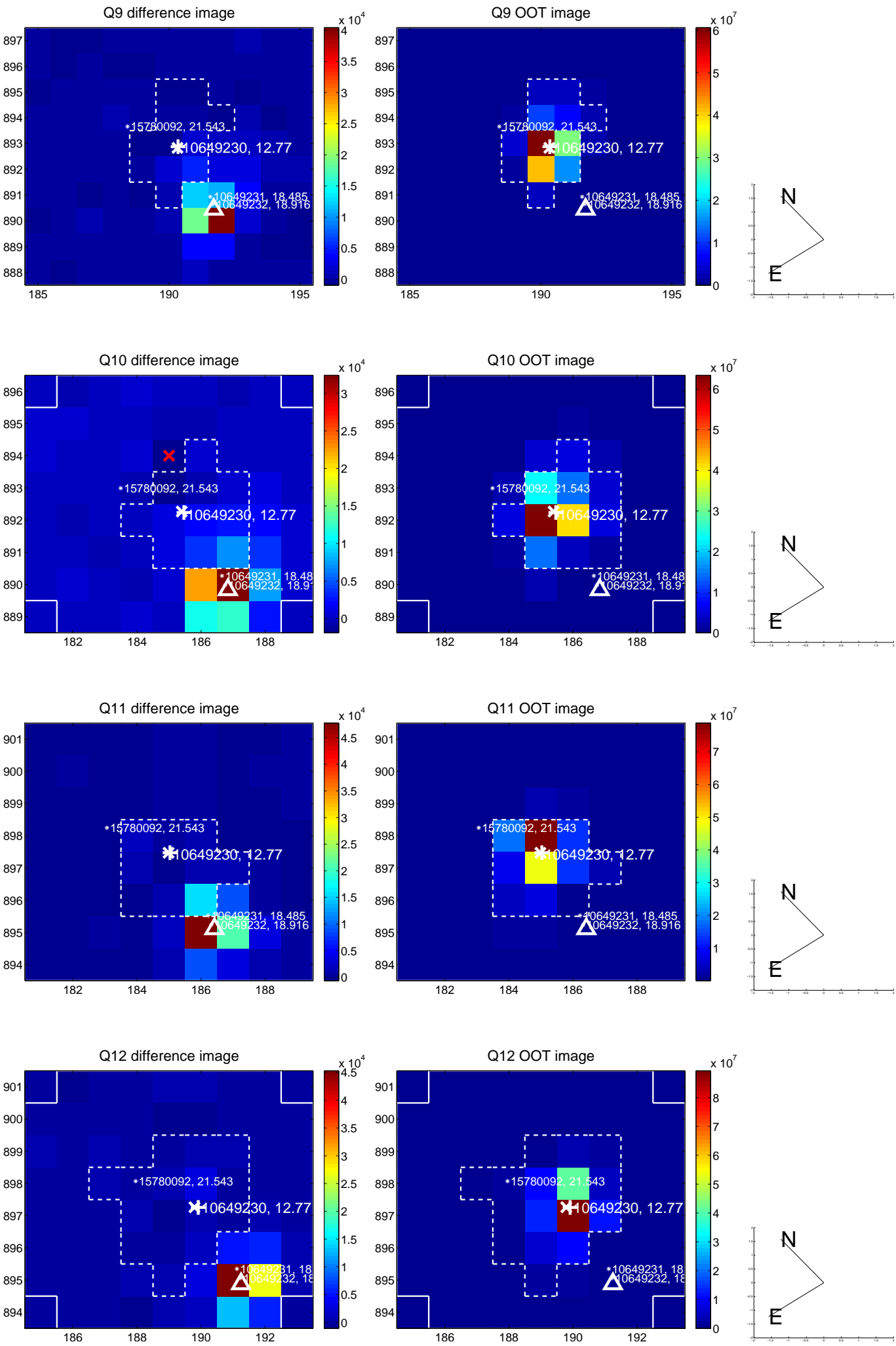
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



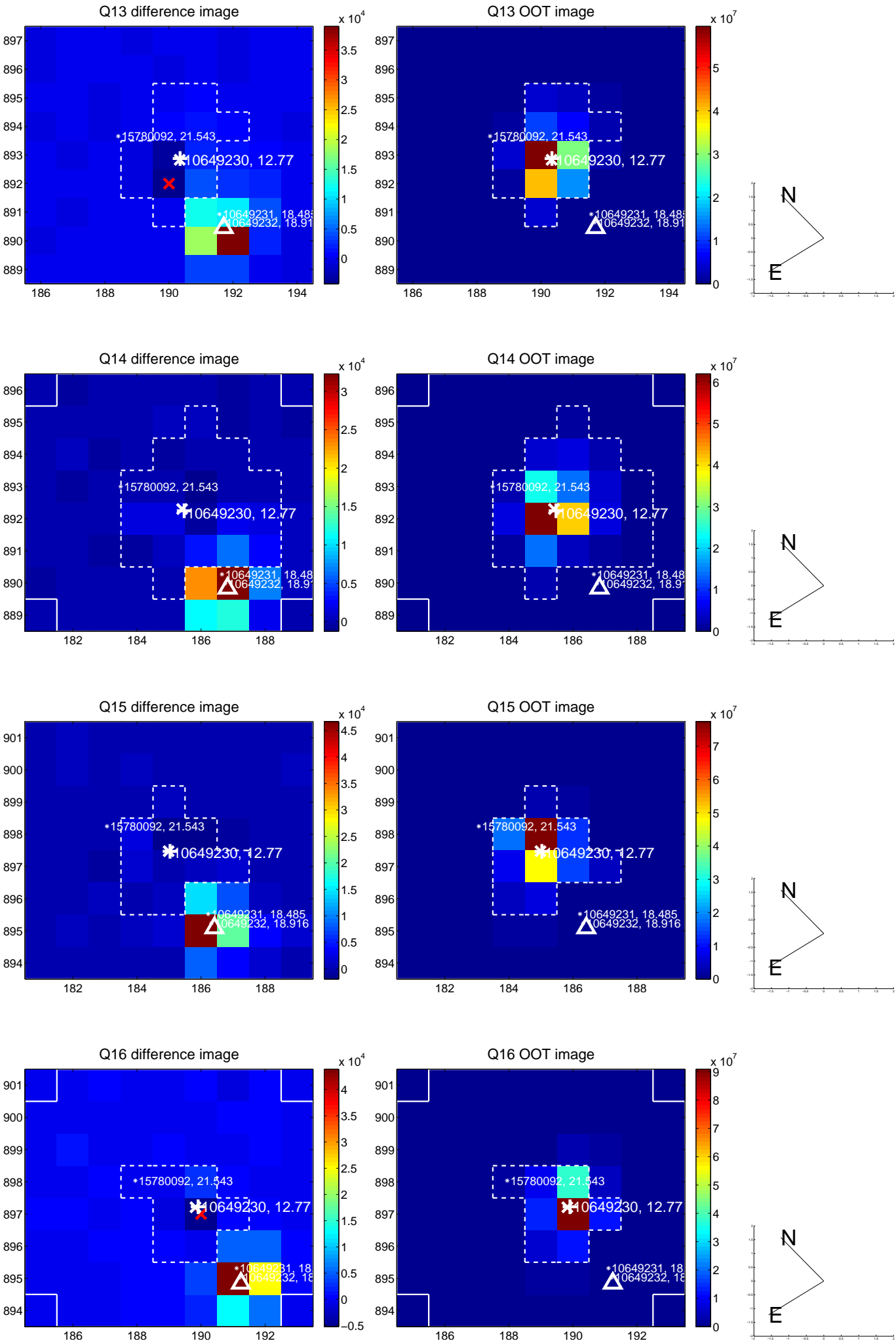
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



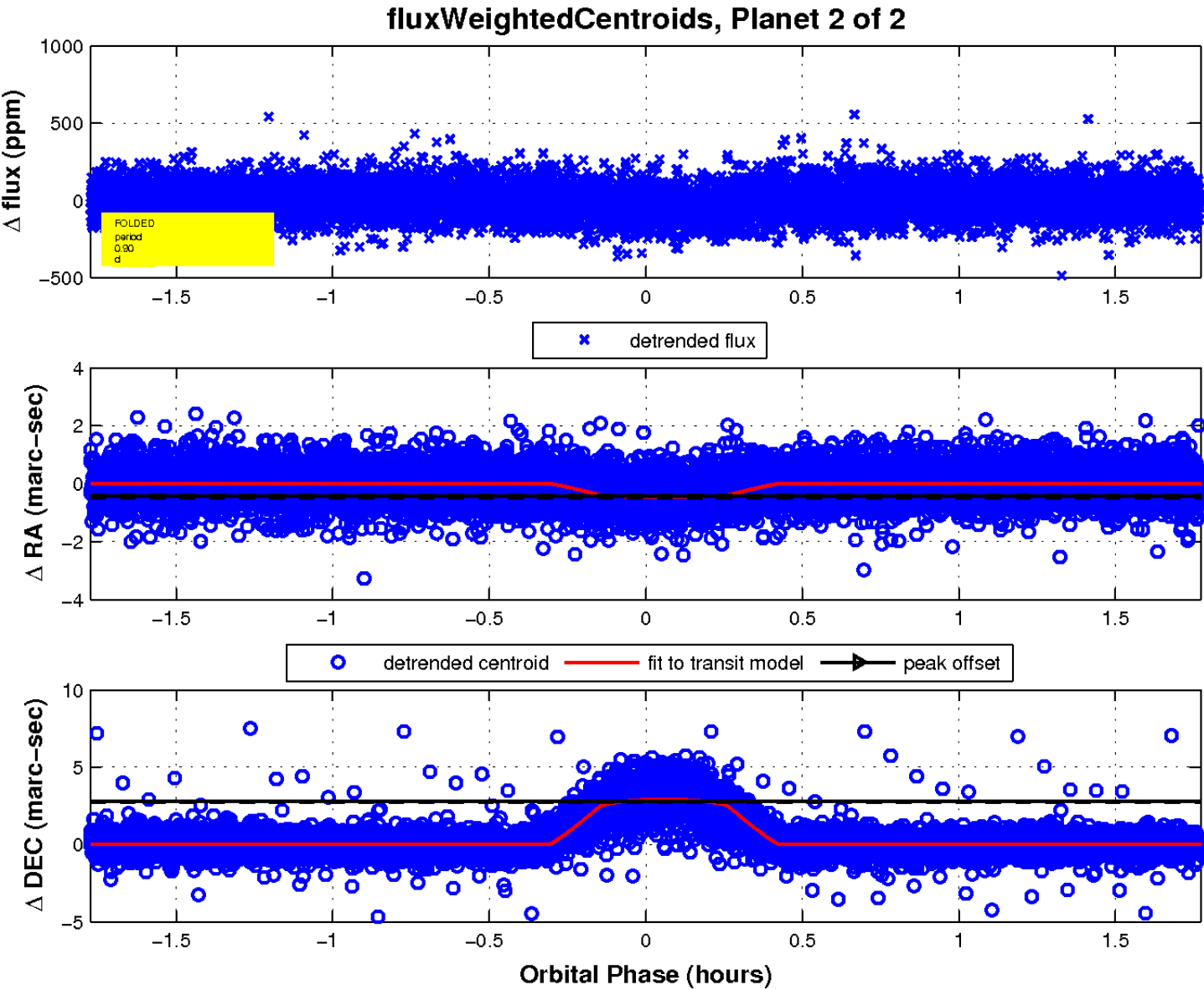
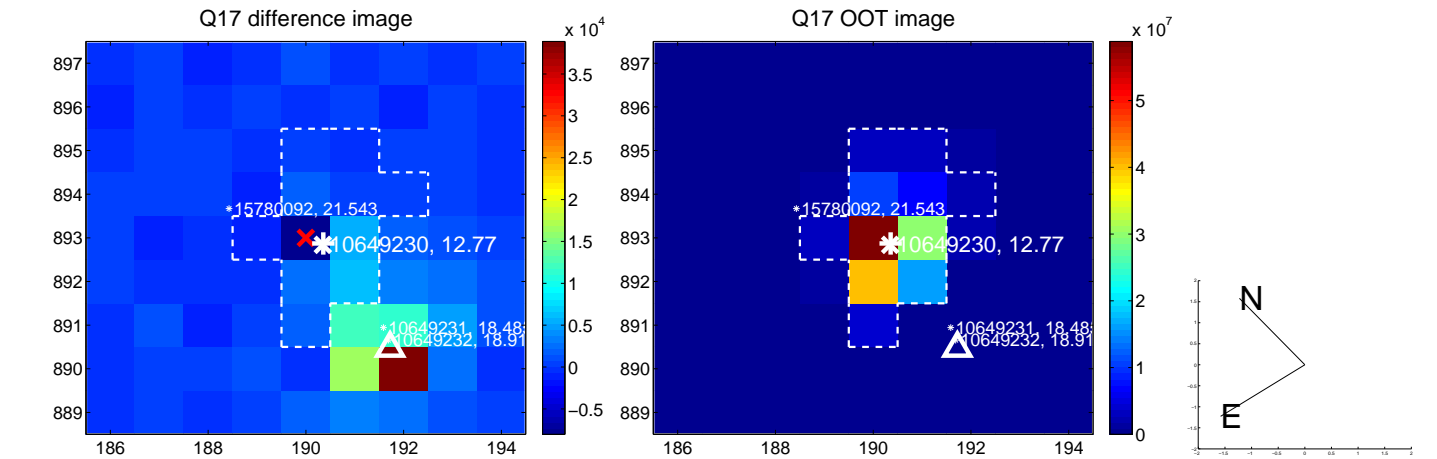
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

