

# KIC 004860932

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004860932-01	OBS	1600.01	12.365605	140.923135	368.1	3.612	18.8	20.3	0.95	6075	3.11	98.75
004860932-02	OBS	No	12.365770	137.877446	278.1	5.475	17.2	19.1	0.95	6075	2.65	98.75

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004860932-01	OBS	FP	0.00	0	1	1	0	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE—CENT_RESOLVED_OFFSET—HALO_GHOST
004860932-02	OBS	FP	0.00	1	1	1	0	IS_SEC_TCE—CENT_RESOLVED_OFFSET—HALO_GHOST

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

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

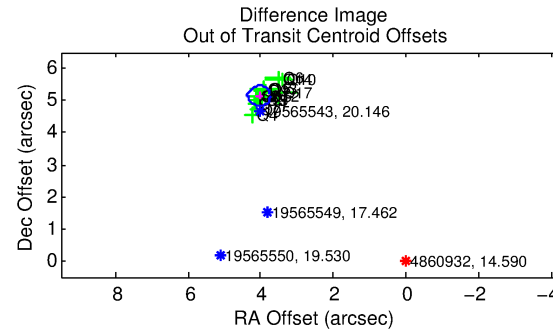
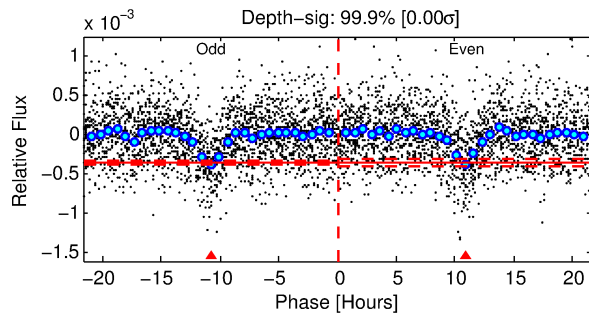
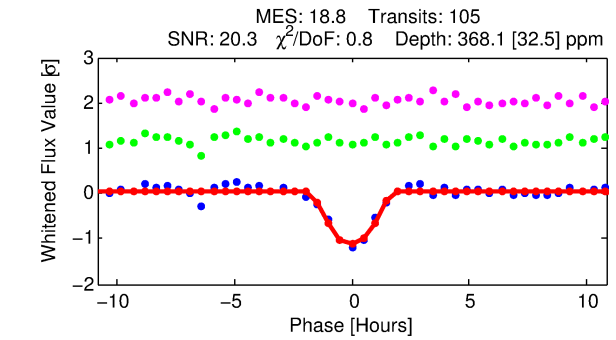
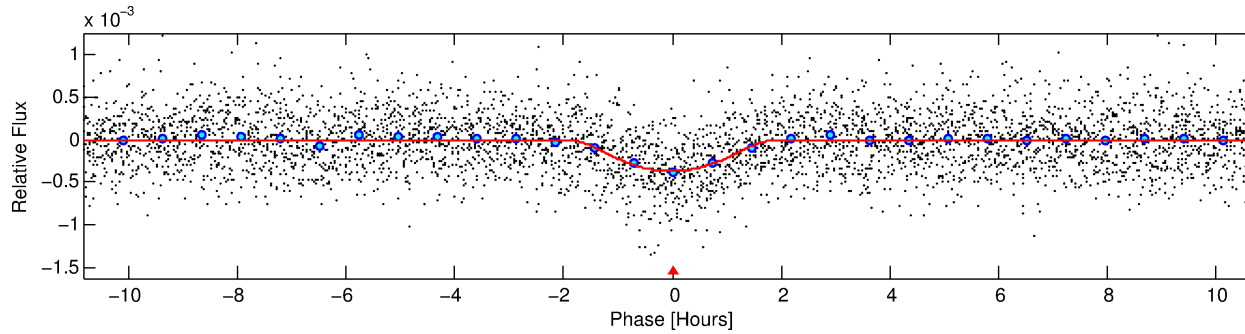
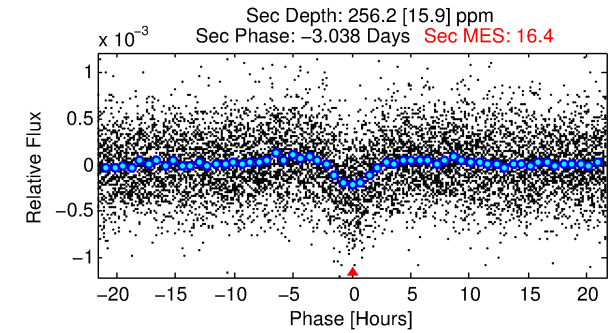
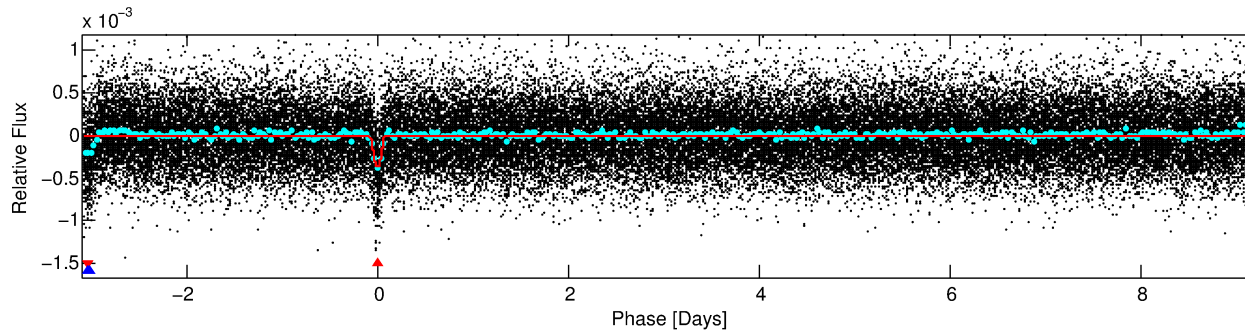
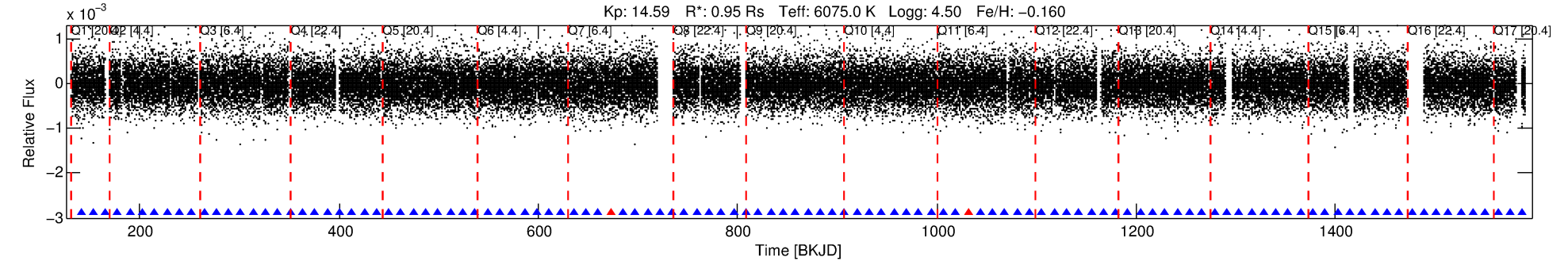
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 004860932-01

No Significant Match Found

# DV One-Page Summary

KIC: 4860932 Candidate: 1 of 2 Period: 12.366 d  
KOI: K01600.01 Corr: 0.974



## DV Fit Results:

Period = 12.36561 [0.00006] d  
Epoch = 140.9231 [0.0043] BKJD  
Rp/R\* = 0.0300 [0.0340]  
a/R\* = 7.30 [2.72]  
b = 0.99 [0.06]  
Seff = 98.75 [39.58]  
Teq = 804 [81] K  
Rp = 3.11 [3.66] Re  
a = 0.1058 [0.0274] AU  
Ag = 162.76 [374.66] [0.43σ]  
Teffp = 4439 [2524] K [1.44σ]

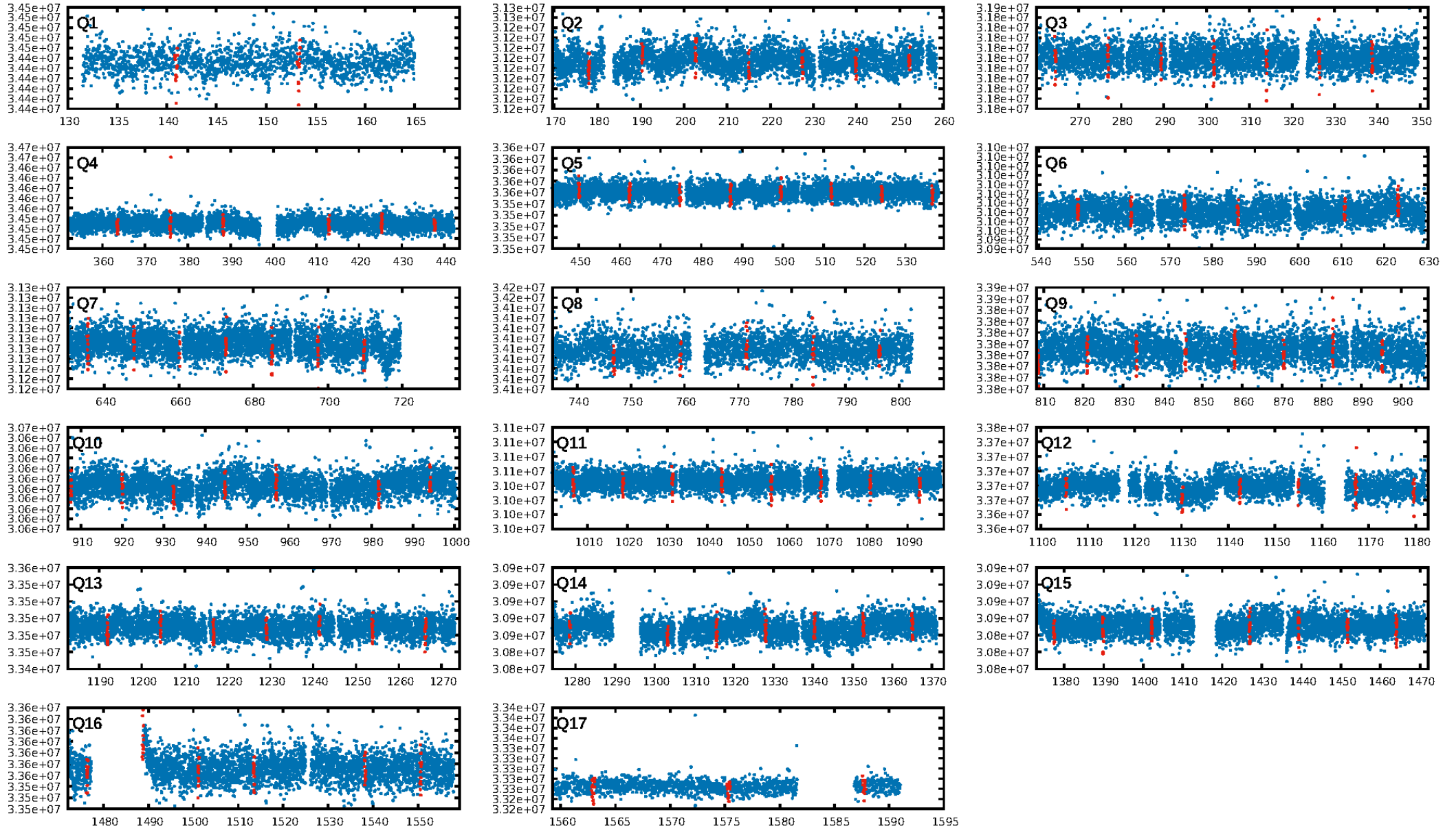
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: 37.2%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 4.50e-76  
RollingBand-fgt: 0.98 [98/100]  
GhostDiagnostic-chr: 0.1251  
Centroid-sig: 0.0%  
Centroid-so: 12.168 arcsec [20.69σ]  
OotOffset-rm: 6.551 arcsec [63.14σ]  
KicOffset-rm: 6.218 arcsec [69.69σ]  
OotOffset-st: 3/4/4/4 [15]  
KicOffset-st: 3/4/4/4 [15]  
DiffImageQuality-fgm: 1.00 [15/15]  
DiffImageOverlap-fno: 1.00 [17/17]

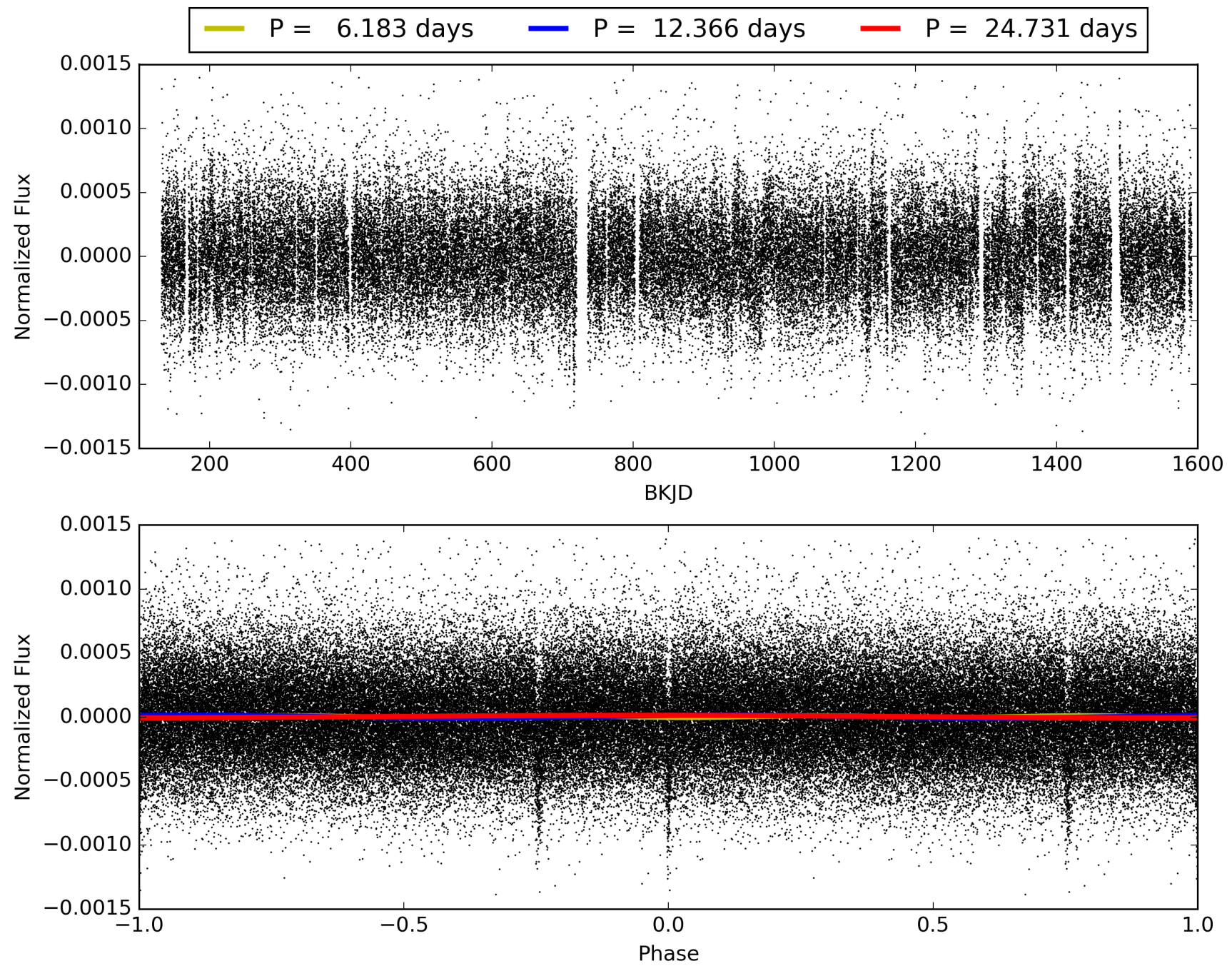
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 13:08:07 Z

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

# TCE 004860932-01, PDC Light Curves



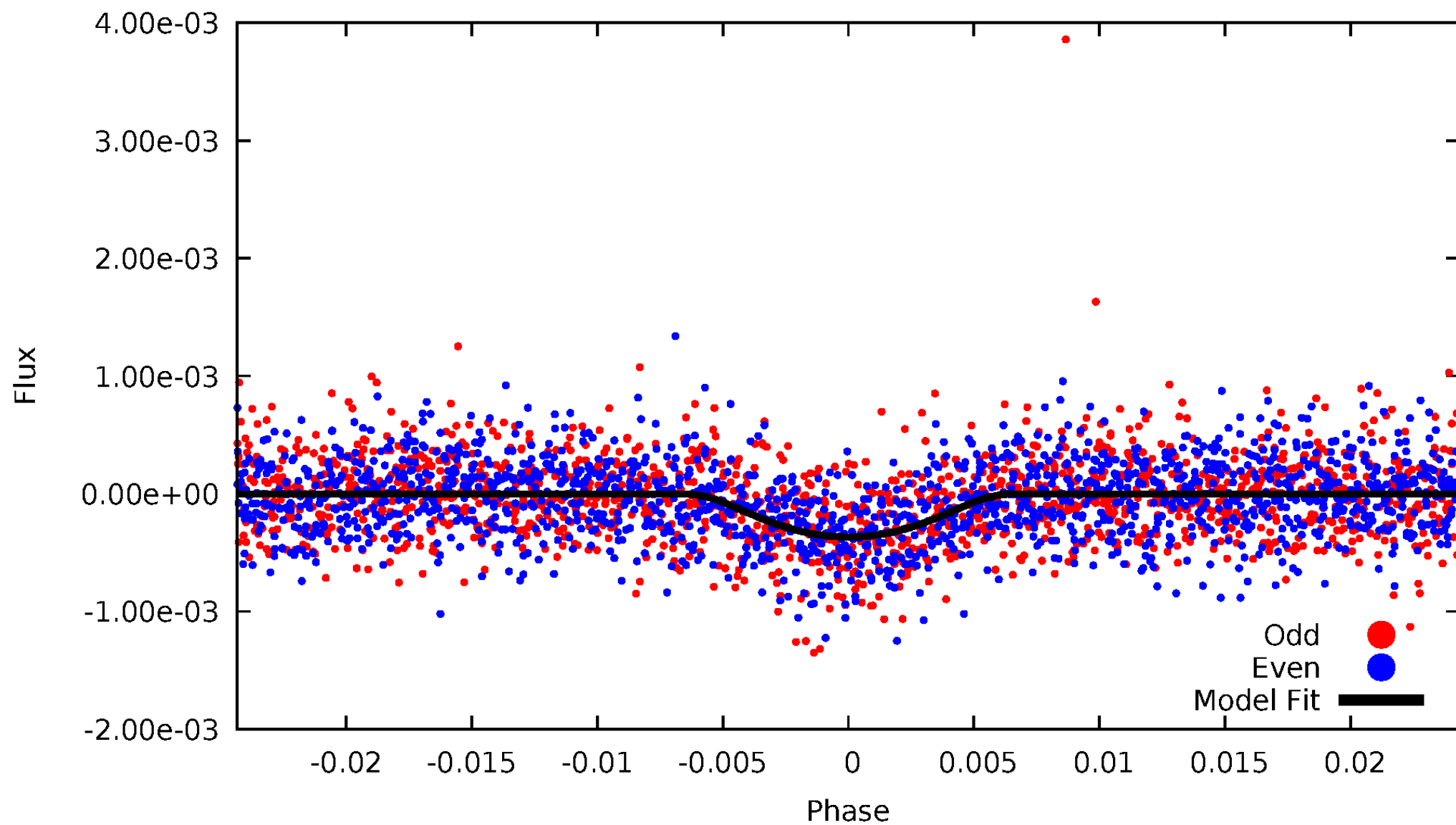
TCE 004860932-01





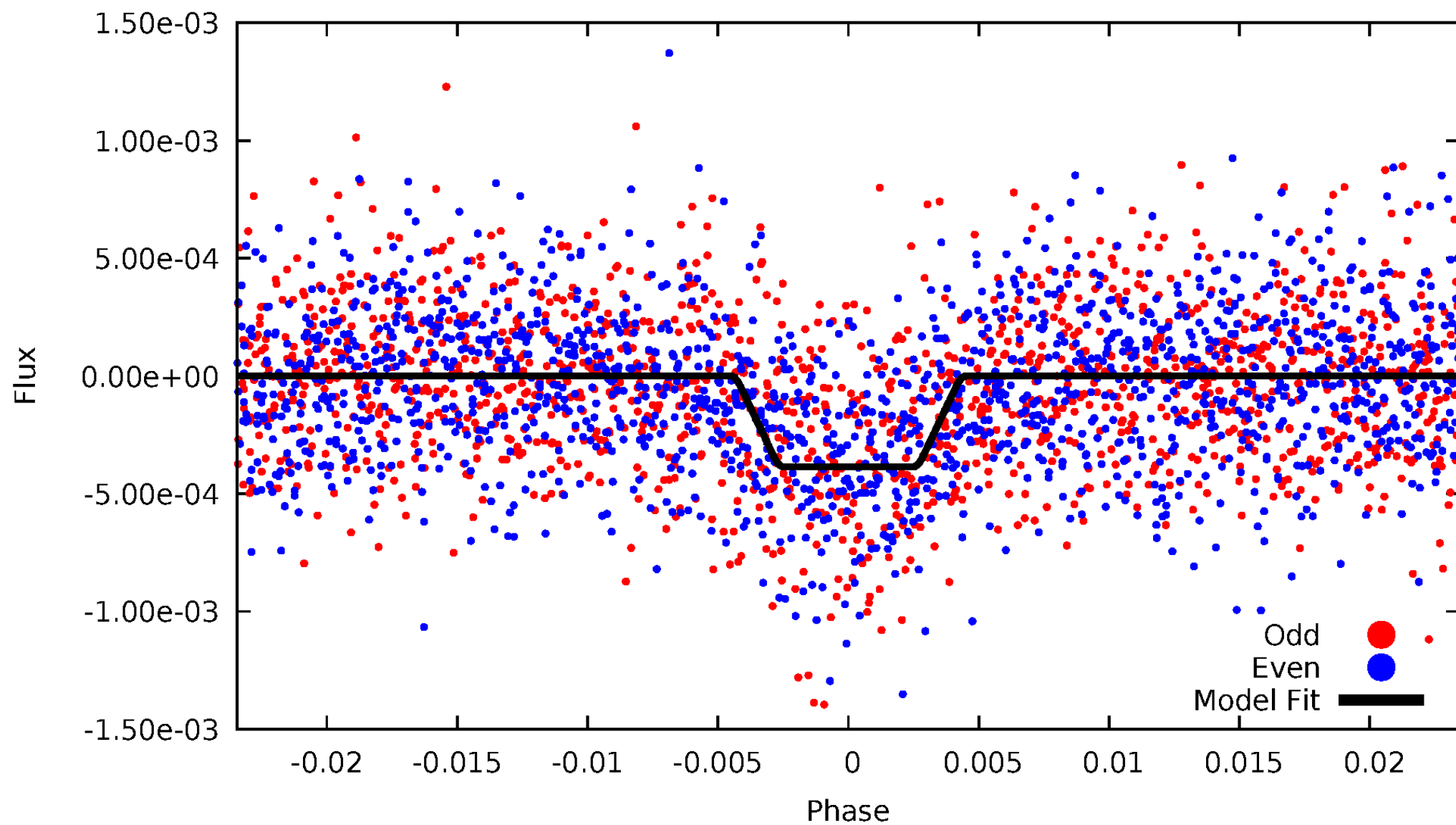
# DV Odd/Even

TCE 004860932-01

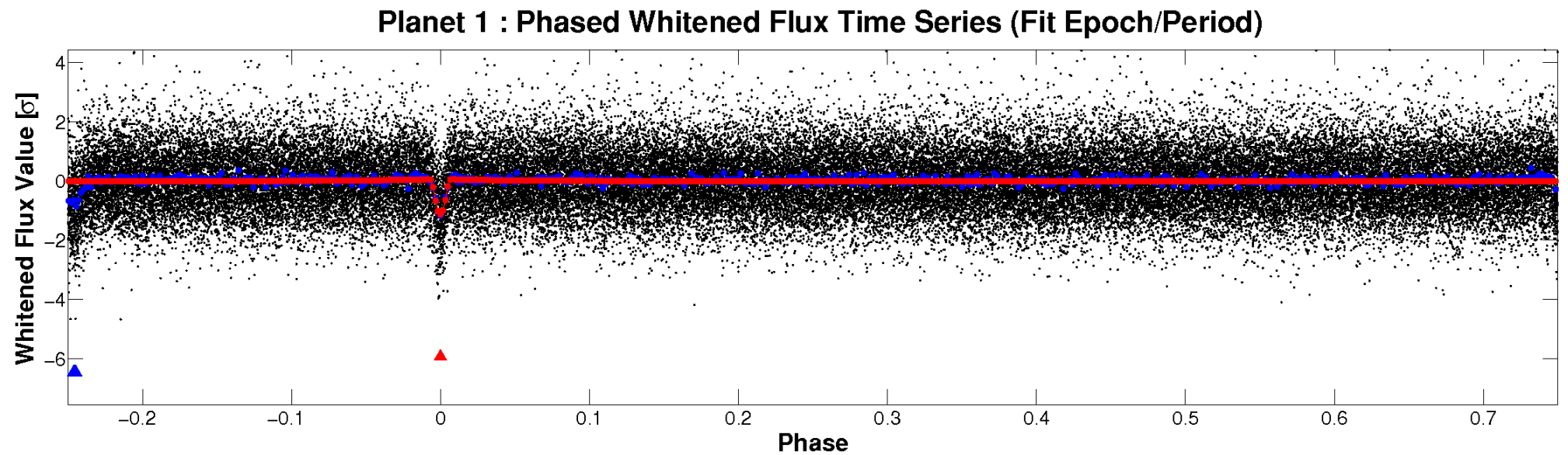
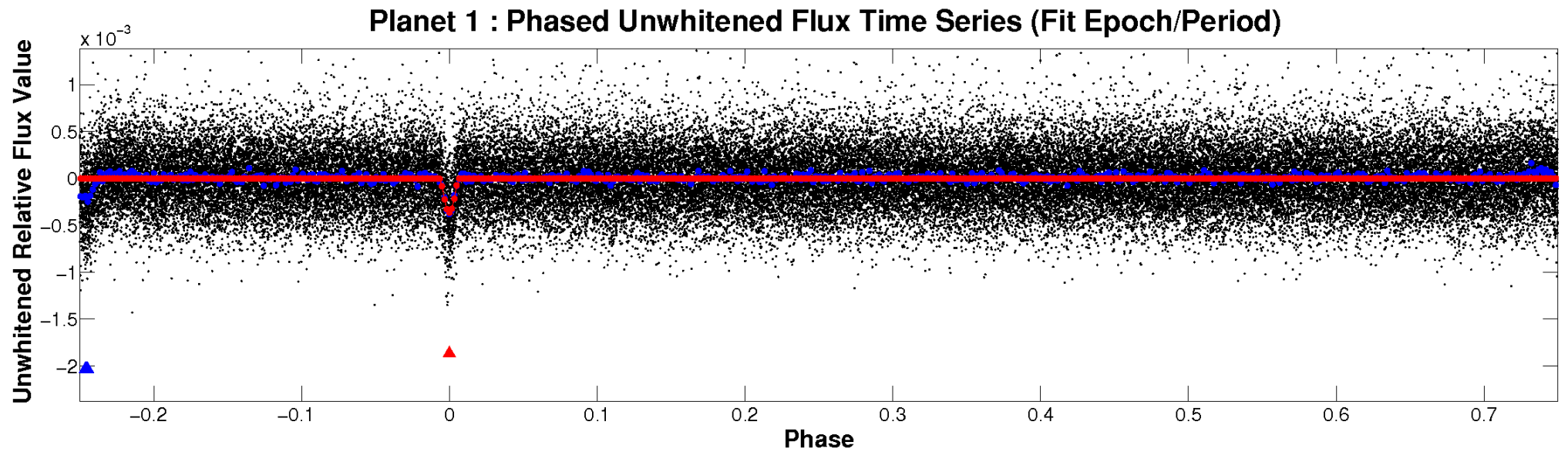


# ALT Odd/Even

TCE 004860932-01

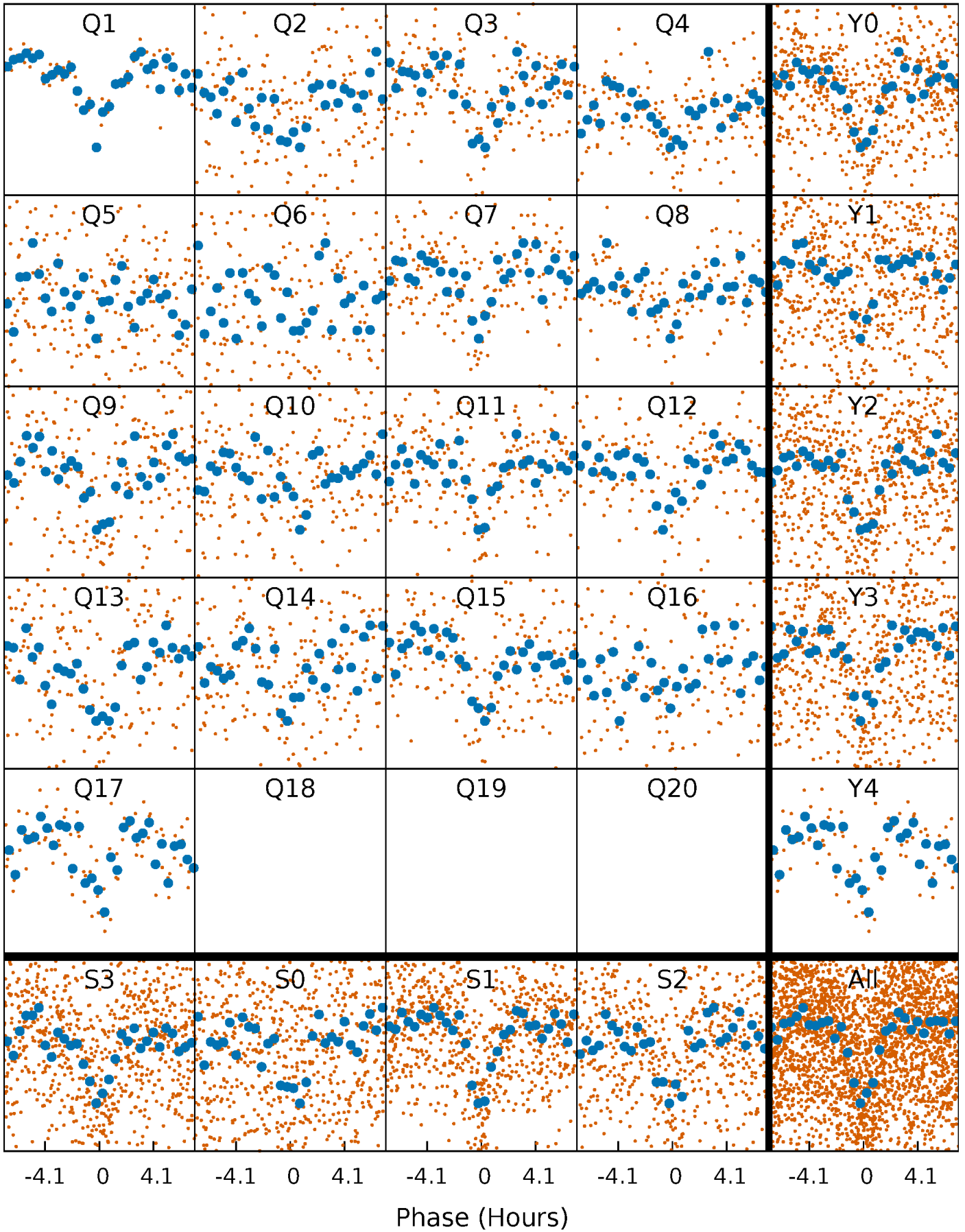


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

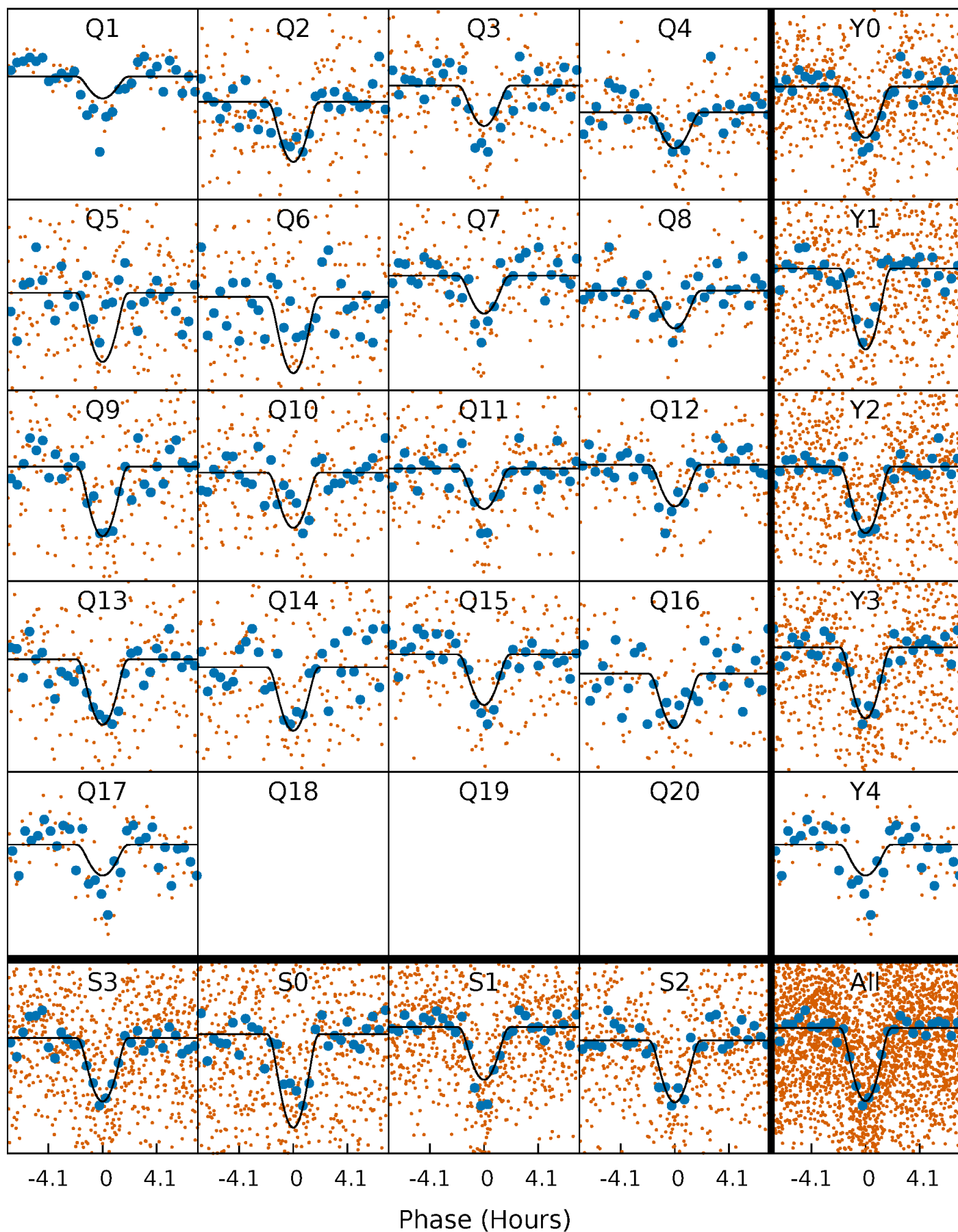
TCE 004860932-01   P= 12.365605 Days    $T_0=140.923135$  (BKJD)





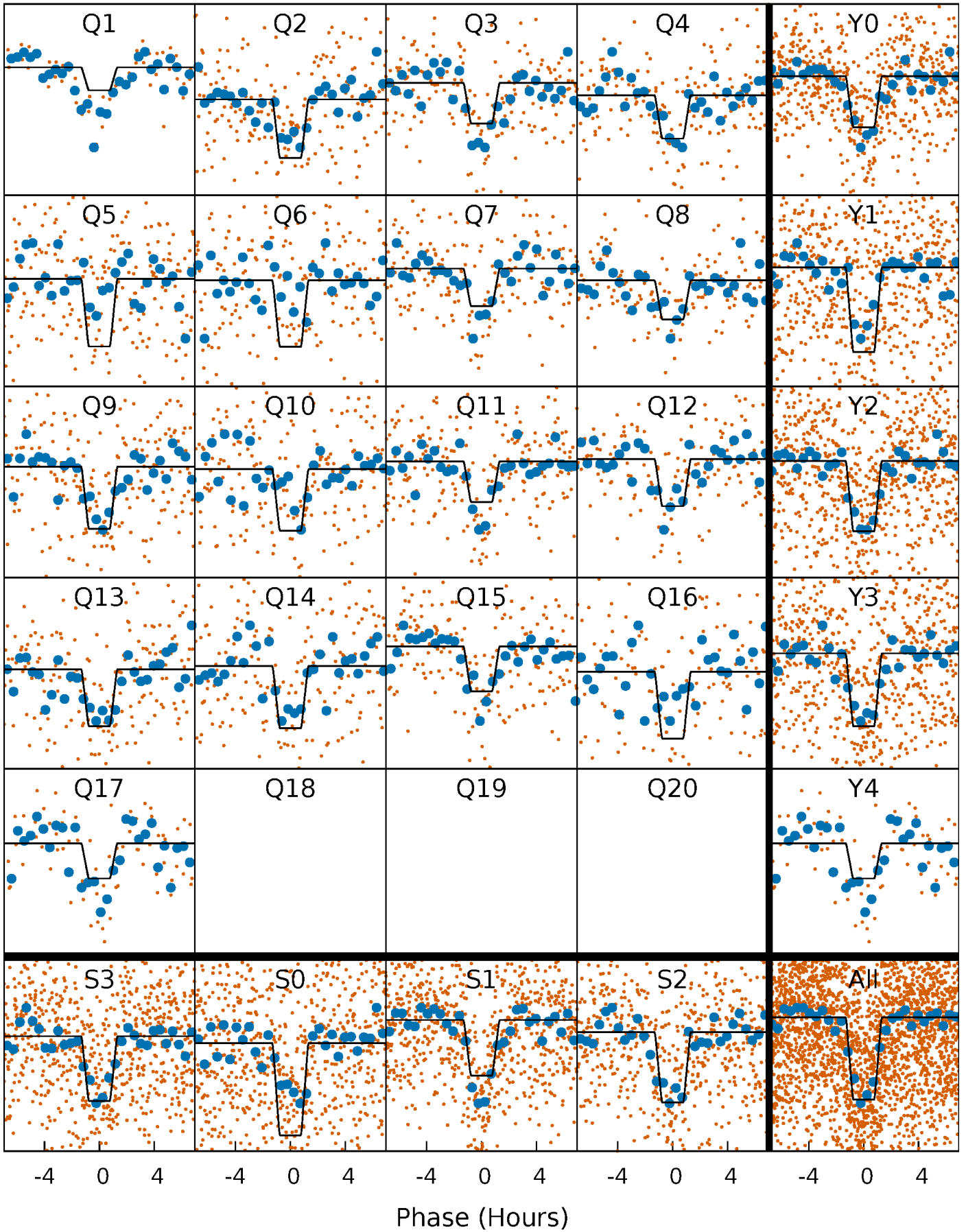
# DV Quarter-Phased Transit Curves

TCE 004860932-01     $P = 12.365605$  Days     $T_0 = 140.923135$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

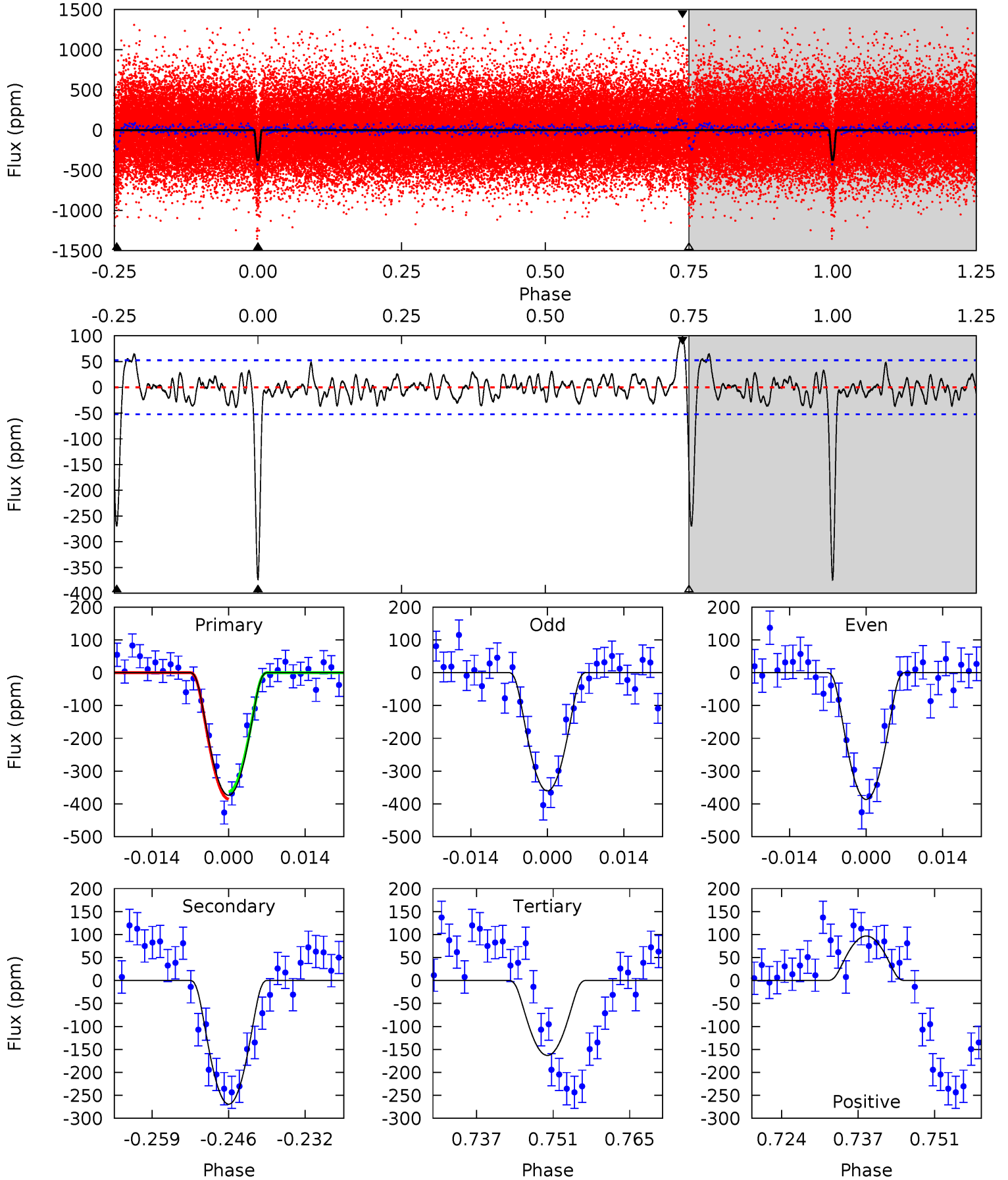
TCE 004860932-01 P= 12.365642 Days  $T_0=140.920678$  (BKJD)



# DV Model-Shift Uniqueness Test

004860932-01, P = 12.365605 Days, E = 128.557530 Days

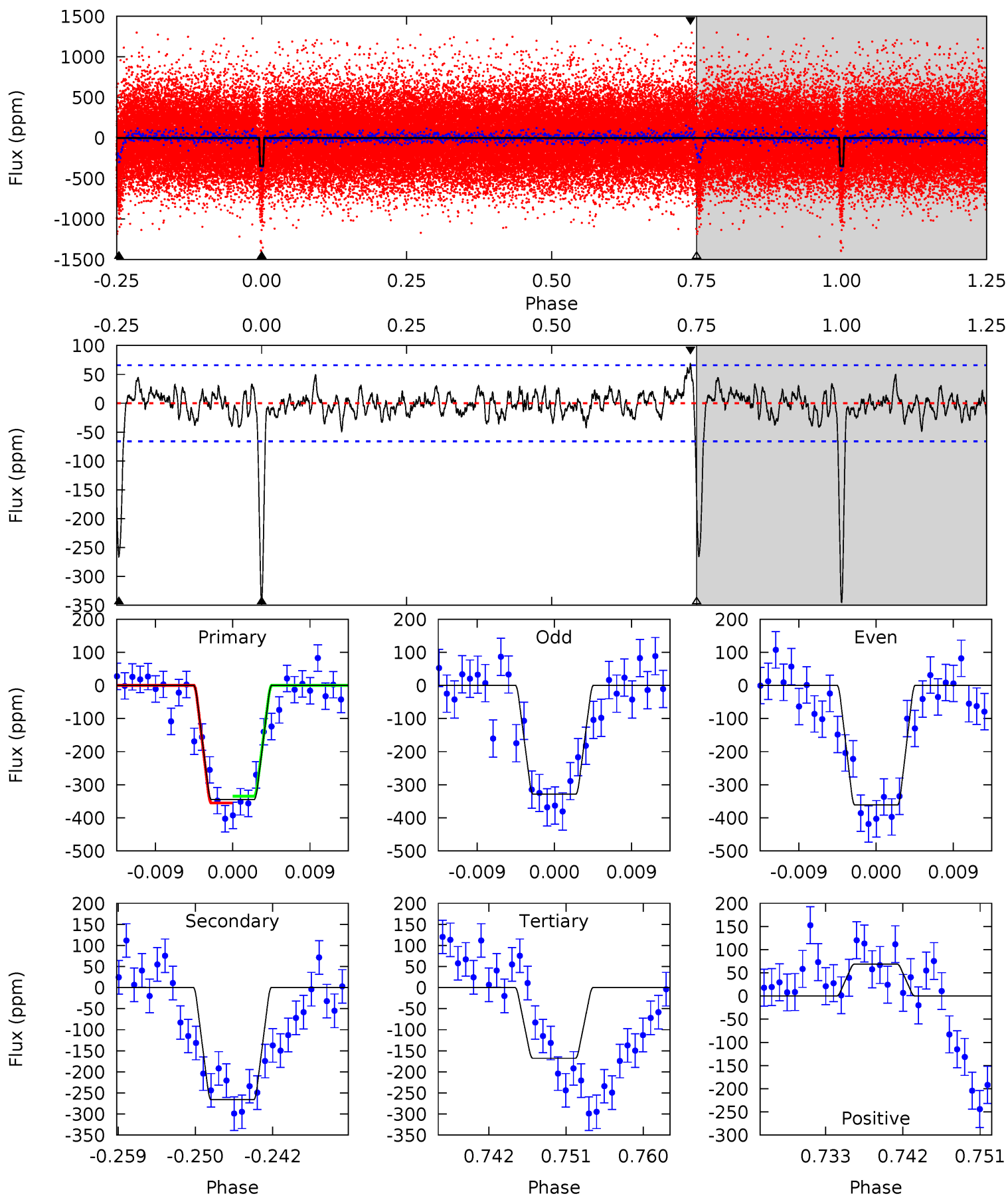
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
35.4	25.5	15.4	9.16	4.97	2.47	2.01	19.9	26.2	10.0	16.3	1.23	0.98	0.21	1.06



# Alt Model-Shift Uniqueness Test

004860932-01, P = 12.365642 Days, E = 128.555036 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
26.4	20.4	12.8	5.27	5.05	2.61	1.39	13.6	21.2	7.53	15.1	1.26	1.02	0.17	0.78



### Stellar Parameters For KIC 004860932

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6075^{+163}_{-199}$	$4.495^{+0.052}_{-0.208}$	$-0.160^{+0.250}_{-0.350}$	$0.952^{+0.291}_{-0.097}$	$1.033^{+0.126}_{-0.140}$	$1.689^{+0.456}_{-0.860}$
	+3%/-3%	+1%/-5%	+156%/-219%	+31%/-10%	+12%/-14%	+27%/-51%
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 004860932-01 / KOI 1600.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-269 \pm 11$	$3.90^{+3.39}_{-2.45}$	$1145^{+80}_{-53}$	$4333^{+2299}_{-857}$	$105^{+650}_{-75}$
Alt.	$-266 \pm 13$	$3.47^{+3.10}_{-2.41}$	$1146^{+79}_{-54}$	$4515^{+3516}_{-912}$	$137^{+1208}_{-100}$

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



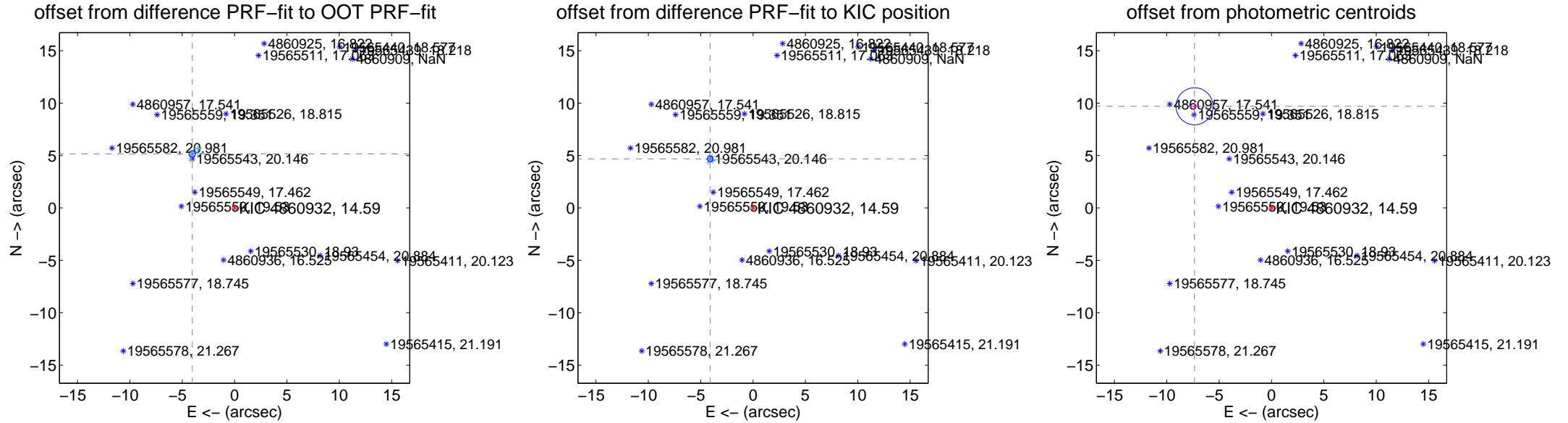
## DV Centroid Data

Supplemental centroid analysis for 004860932-01. Kepler magnitude: 14.59. Transit SNR 20.34

There are 15 quarters with good PRF difference image offsets

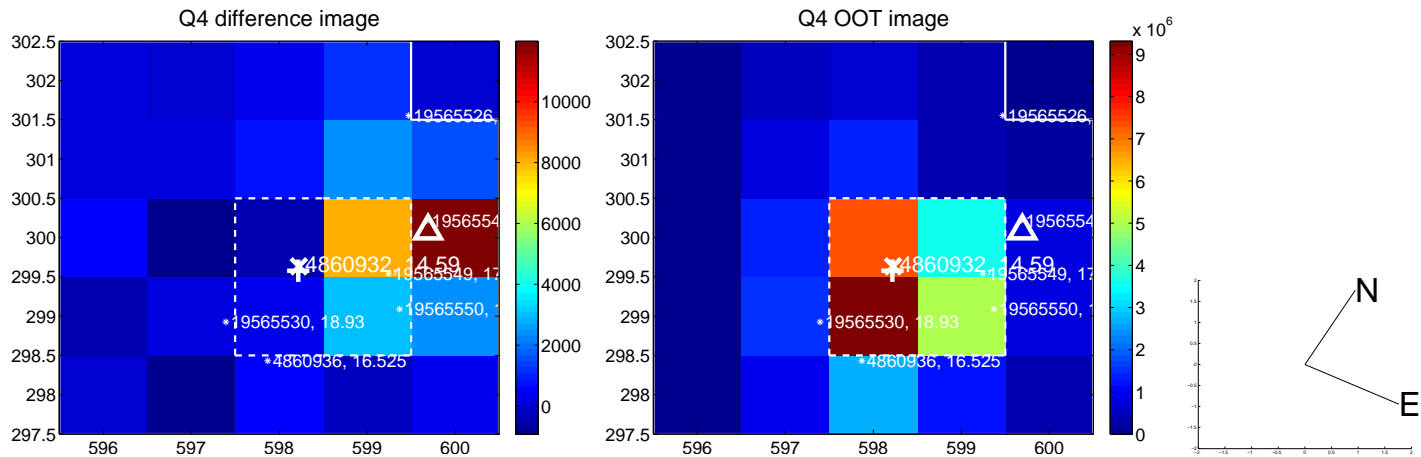
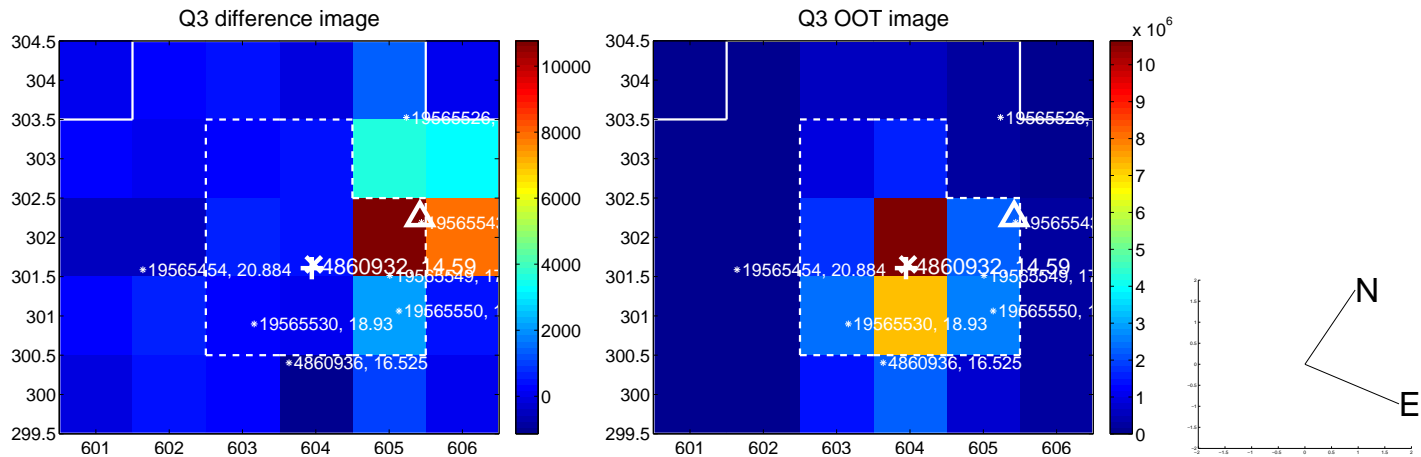
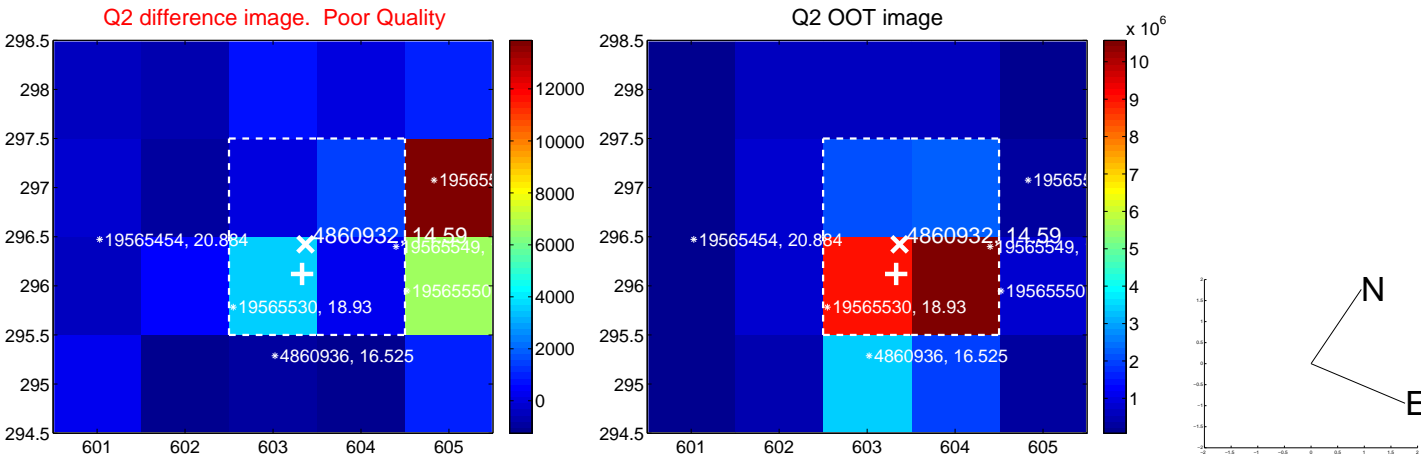
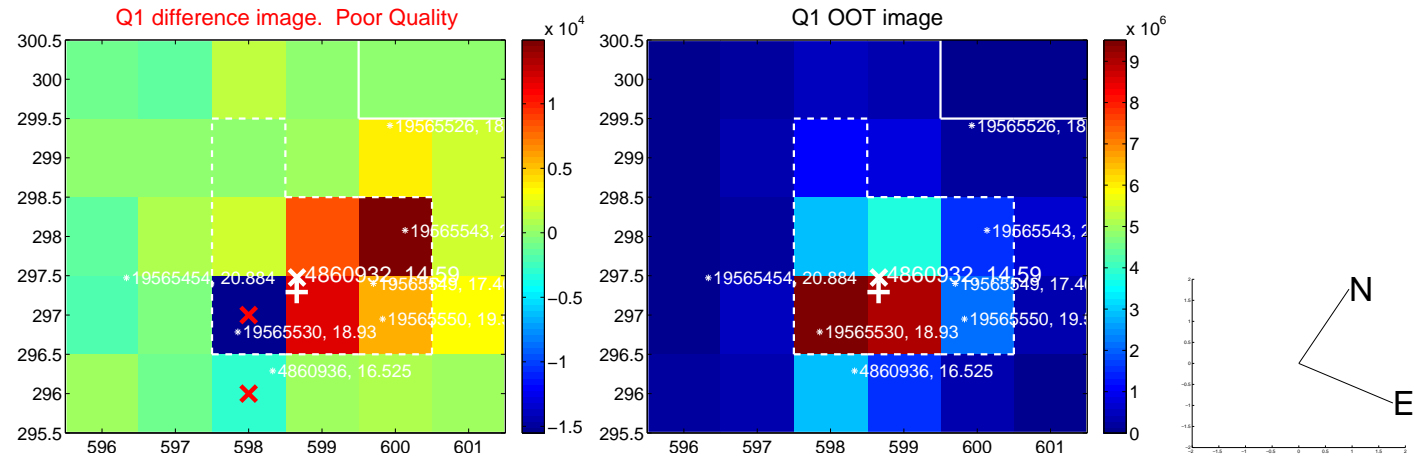
The direct PRF centroid is offset from the target star catalog position by about 0.70 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b><math>6.551 \pm 0.104</math></b>	<b>63.14</b>	$4.043 \pm 0.087$	$5.154 \pm 0.113$
PRF-fit source offset from KIC position	<b><math>6.218 \pm 0.089</math></b>	<b>69.69</b>	$4.099 \pm 0.097$	$4.676 \pm 0.083$
photometric centroid source offset	<b><math>12.17 \pm 0.59</math></b>	<b>20.69</b>	$7.35 \pm 0.58$	$9.70 \pm 0.59$

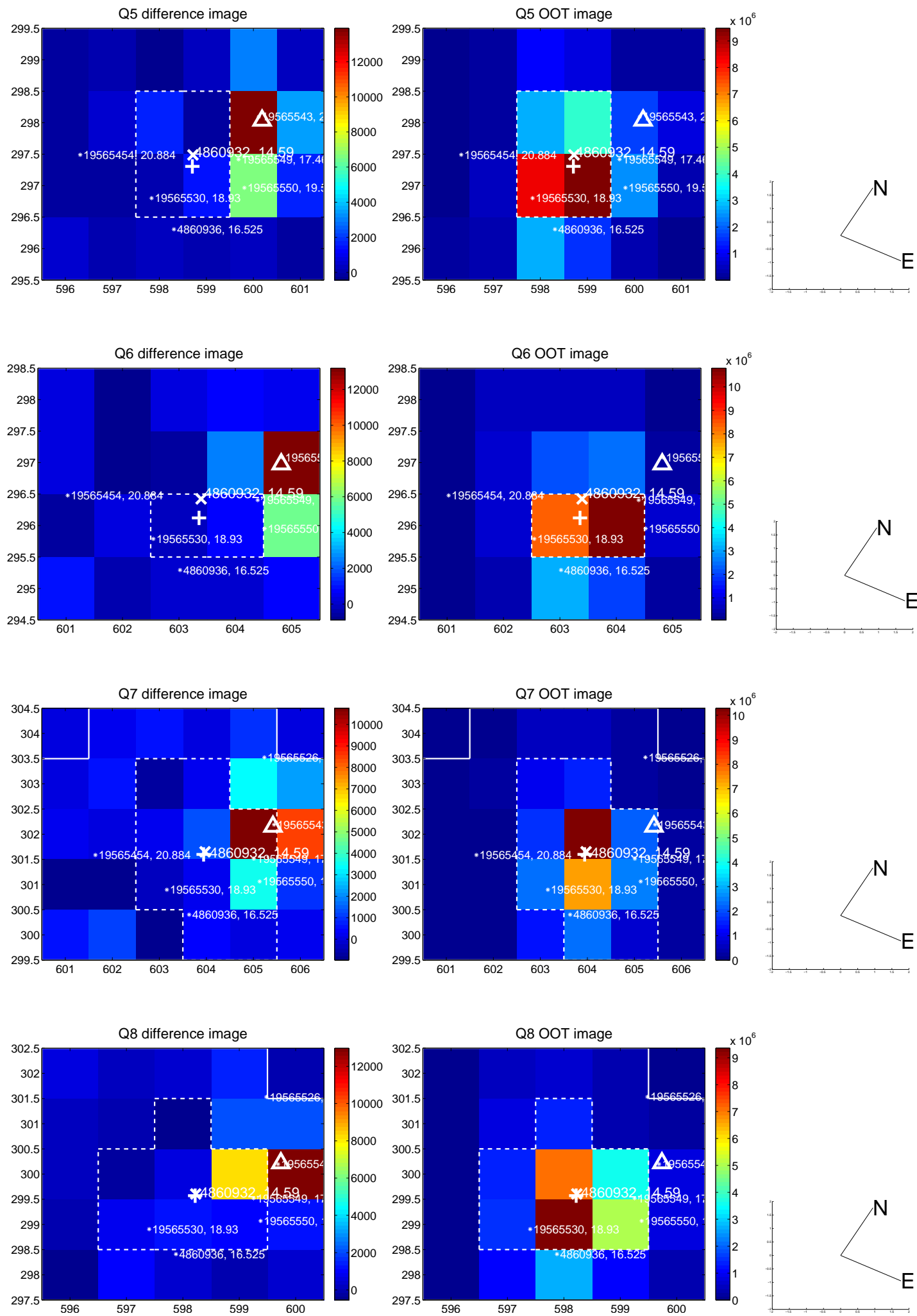


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

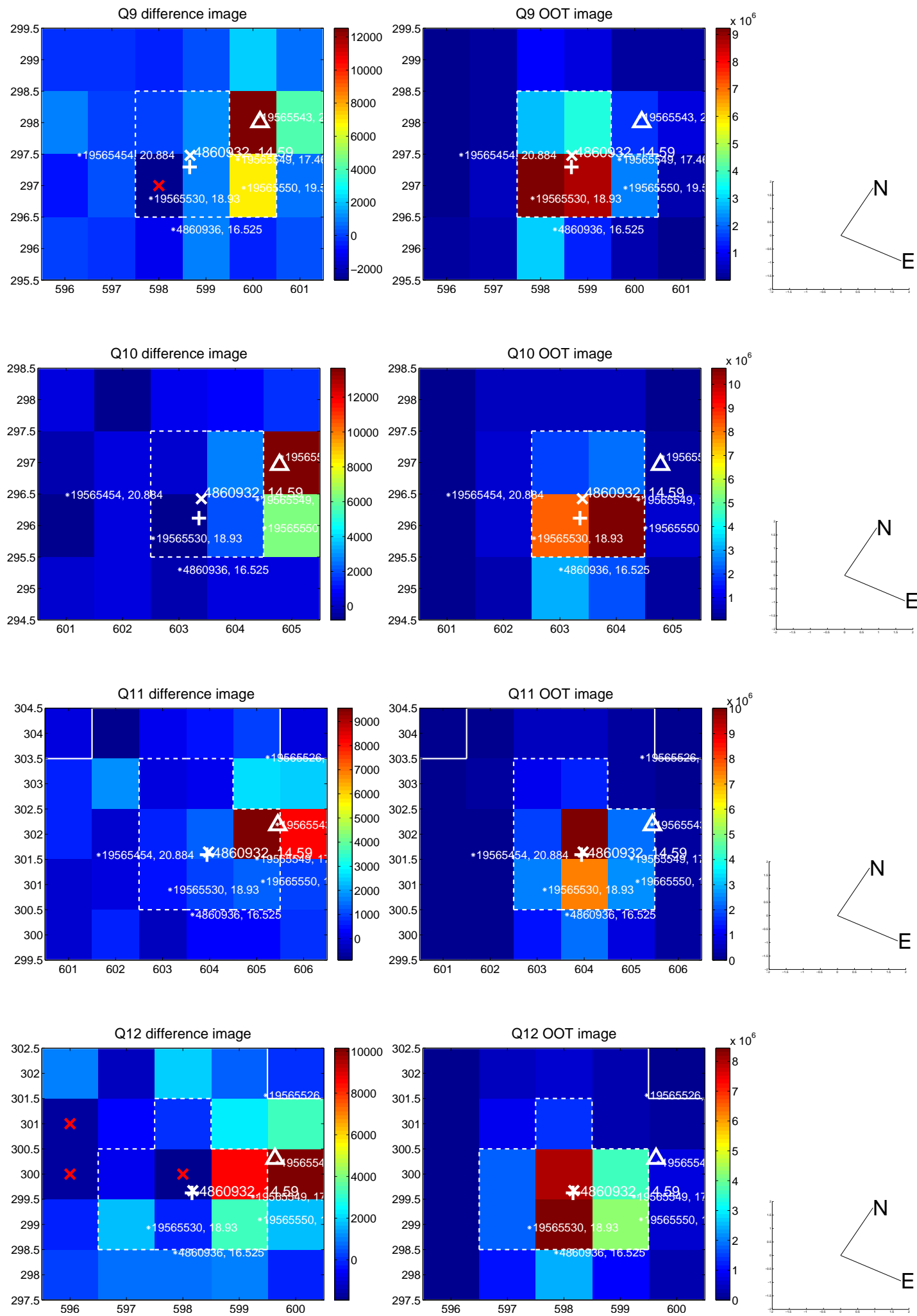
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



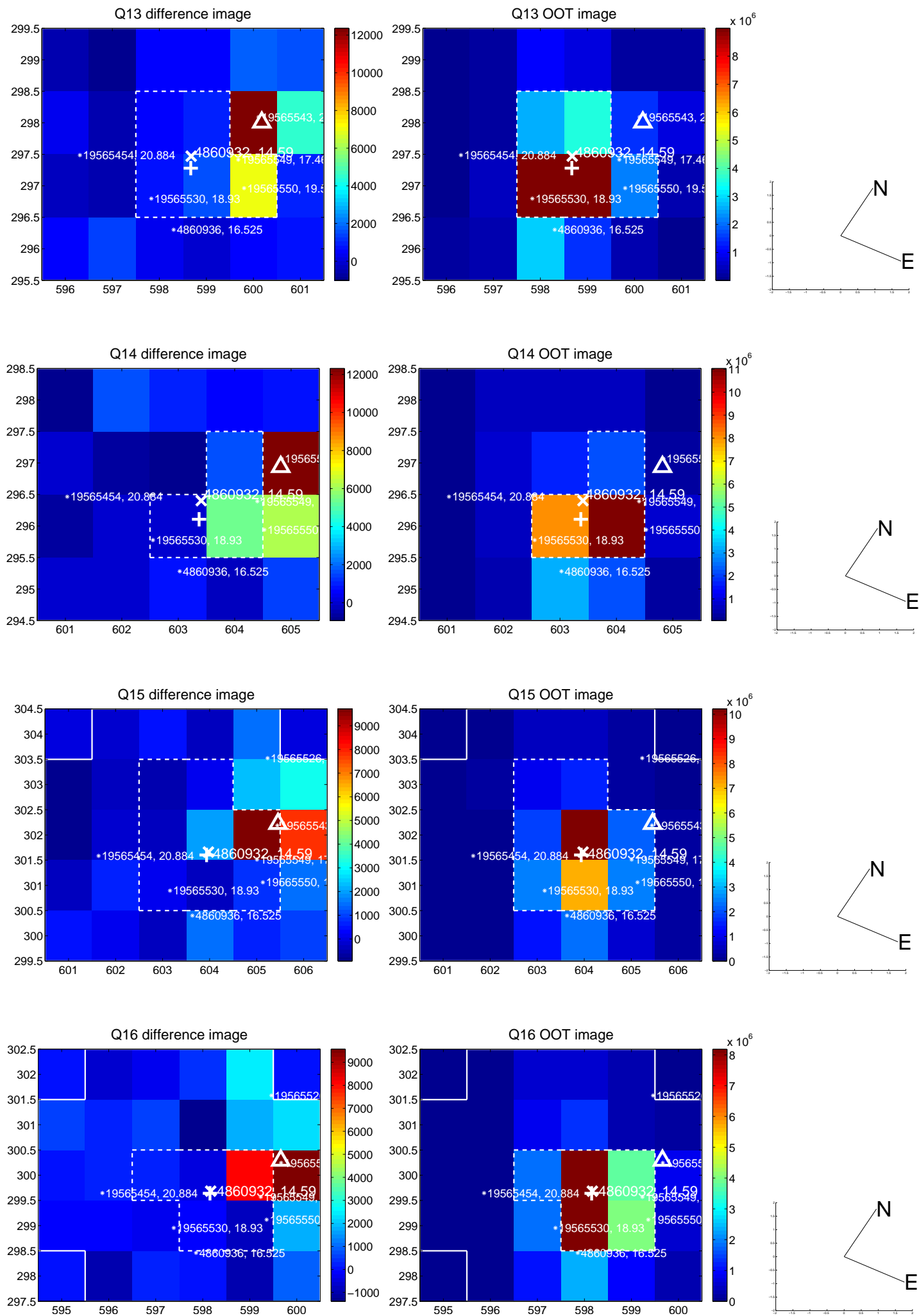
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

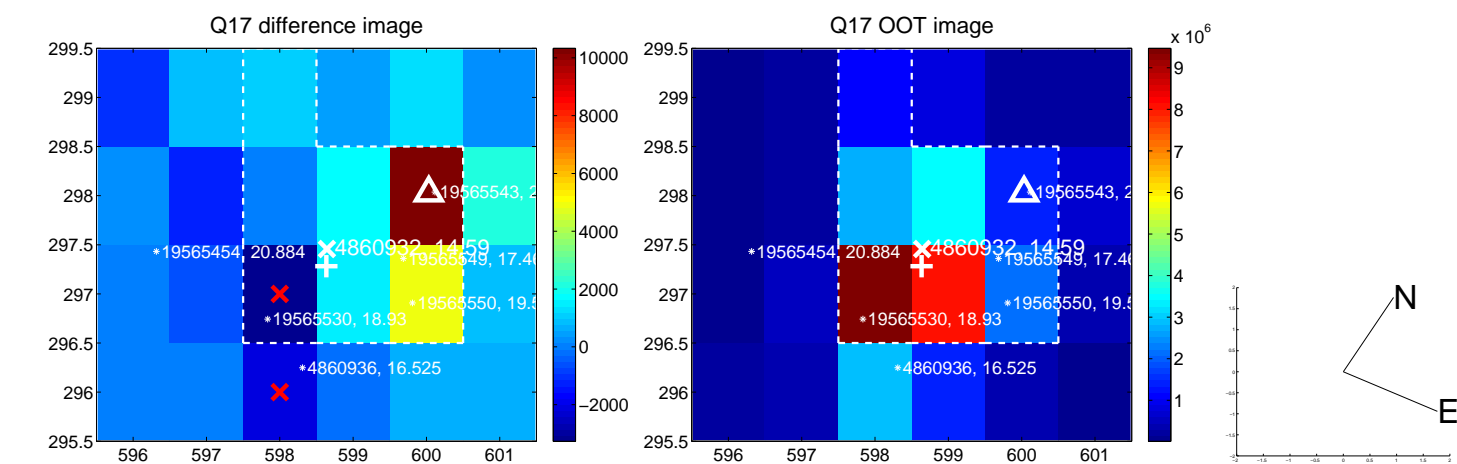


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

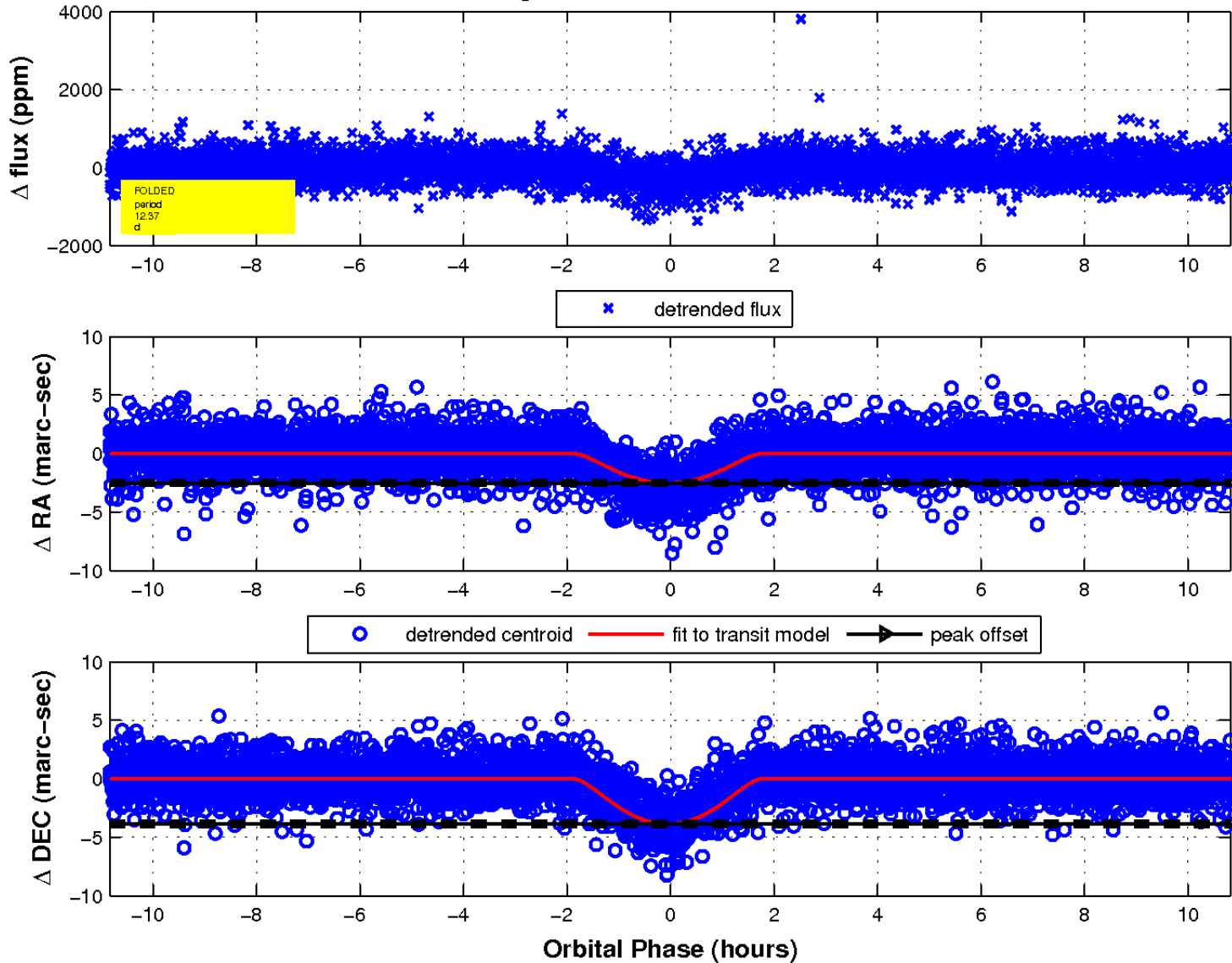




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

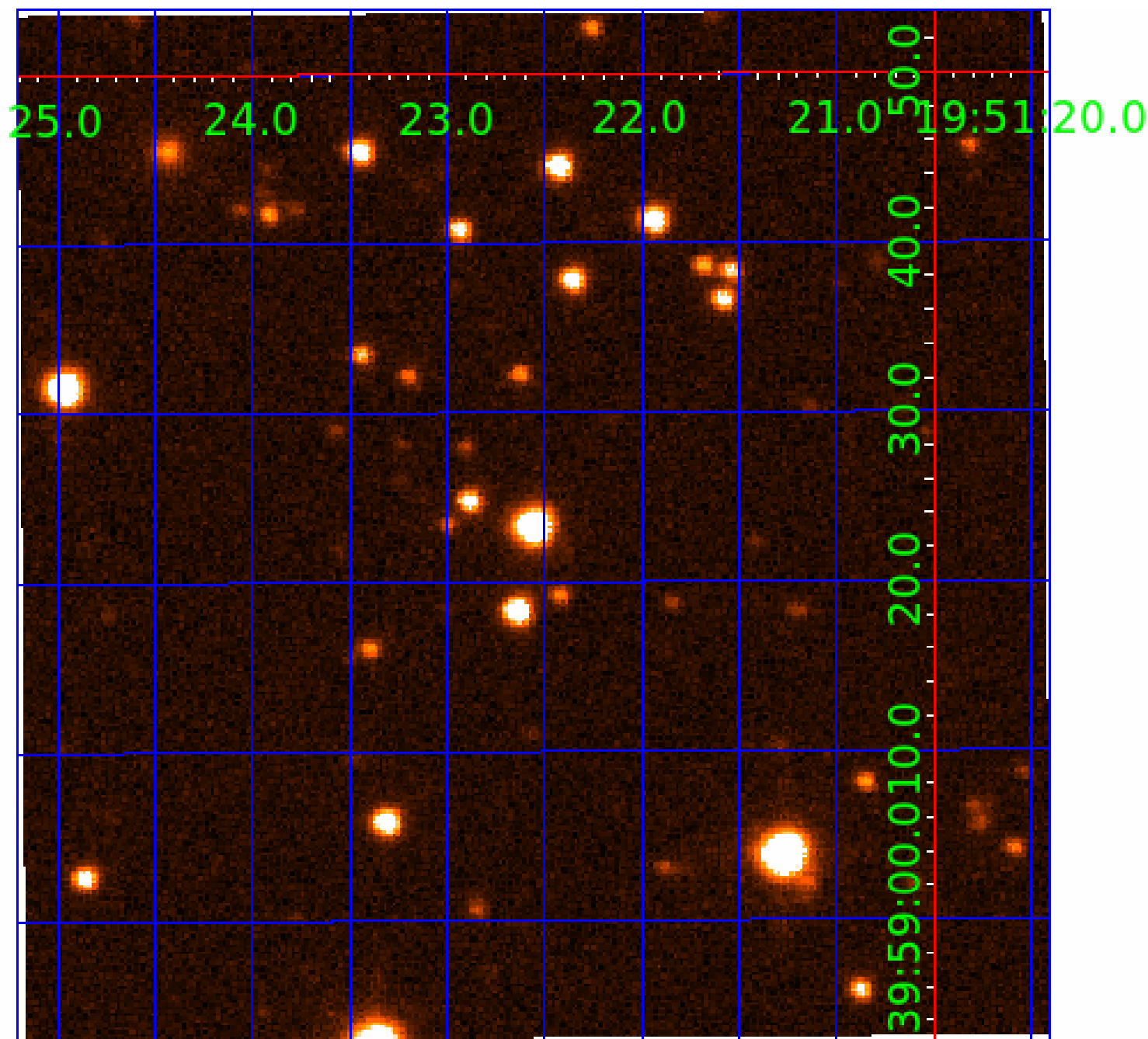


fluxWeightedCentroids, Planet 1 of 2



UKIRT Image

Declination



# KIC 004860932

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004860932-01	OBS	1600.01	12.365605	140.923135	368.1	3.612	18.8	20.3	0.95	6075	3.11	98.75
004860932-02	OBS	No	12.365770	137.877446	278.1	5.475	17.2	19.1	0.95	6075	2.65	98.75

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004860932-01	OBS	FP	0.00	0	1	1	0	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE—CENT_RESOLVED_OFFSET—HALO_GHOST
004860932-02	OBS	FP	0.00	1	1	1	0	IS_SEC_TCE—CENT_RESOLVED_OFFSET—HALO_GHOST

**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.

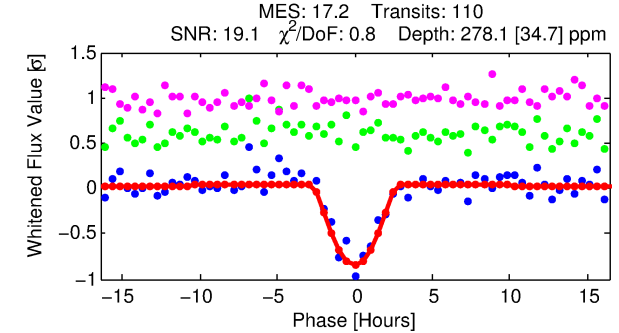
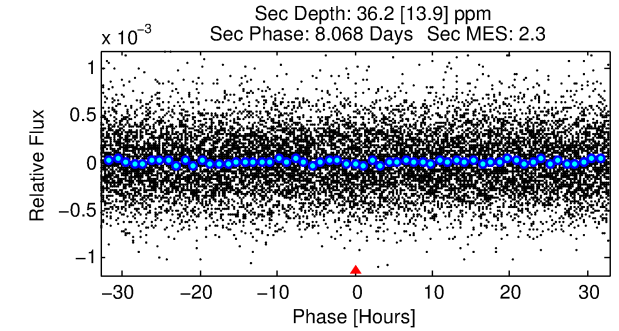
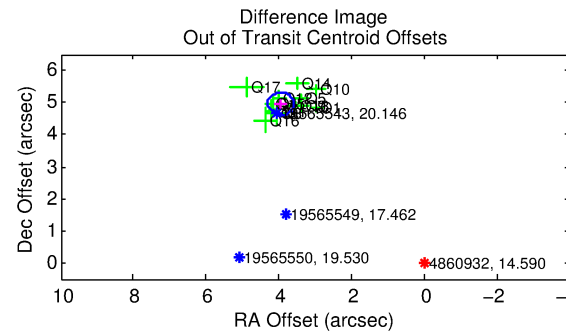
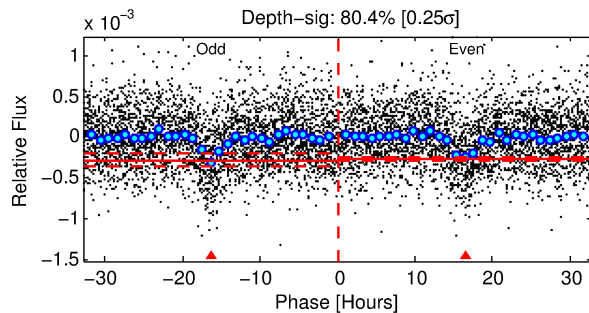
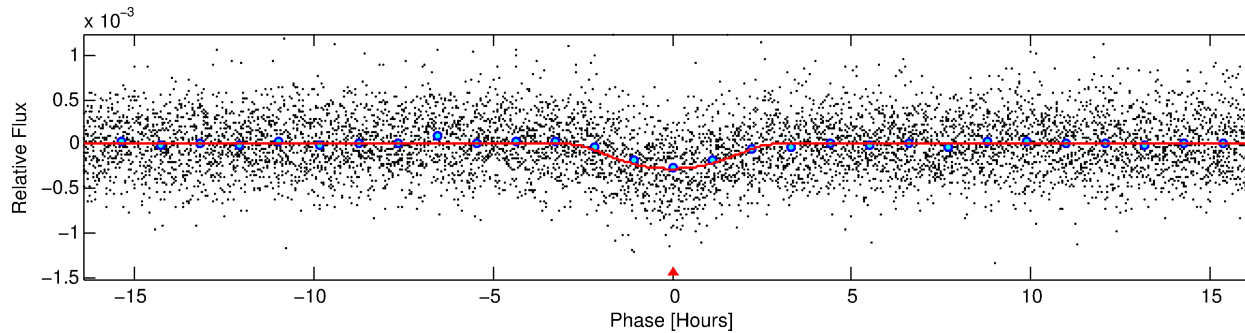
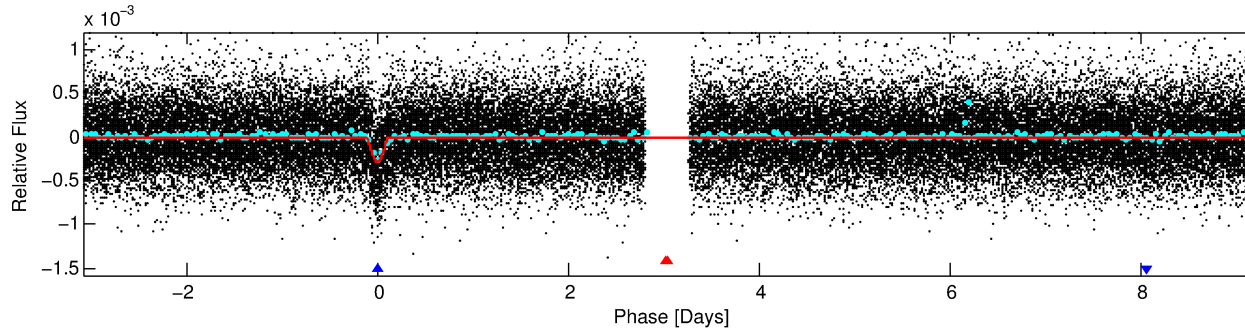
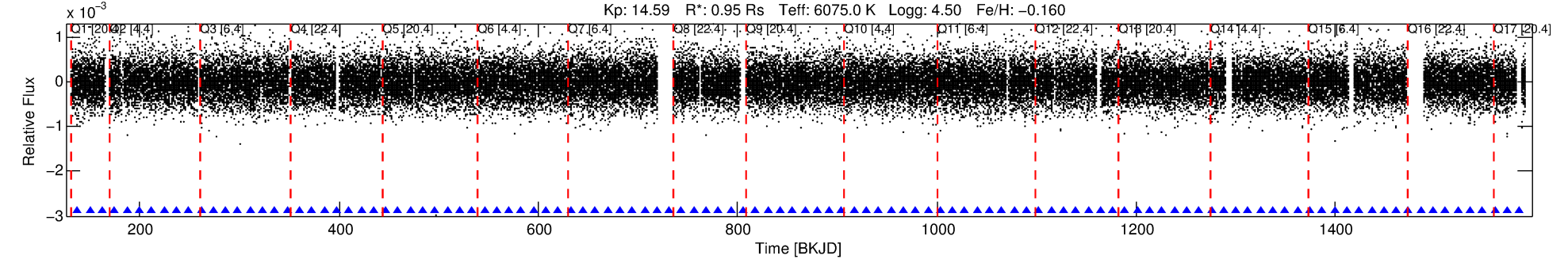
## Ephemeris Match Information For 004860932-02

No Significant Match Found

# DV One-Page Summary

KIC: 4860932 Candidate: 2 of 2 Period: 12.366 d  
KOI: K01600 Corr: No Ephemeris Match

Kp: 14.59 R\*: 0.95 Rs Teff: 6075.0 K Logg: 4.50 Fe/H: -0.160



## DV Fit Results:

Period = 12.36577 [0.00010] d  
Epoch = 137.8774 [0.0068] BKJD  
Rp/R\* = 0.0256 [0.0243]  
a/R\* = 4.60 [1.49]  
b = 0.99 [0.04]  
Seff = 98.75 [39.58]  
Teq = 804 [81] K  
Rp = 2.65 [2.65] Re  
a = 0.1058 [0.0274] AU  
Ag = 31.67 [62.61] [0.49σ]  
Teffp = 2948 [1433] K [1.49σ]

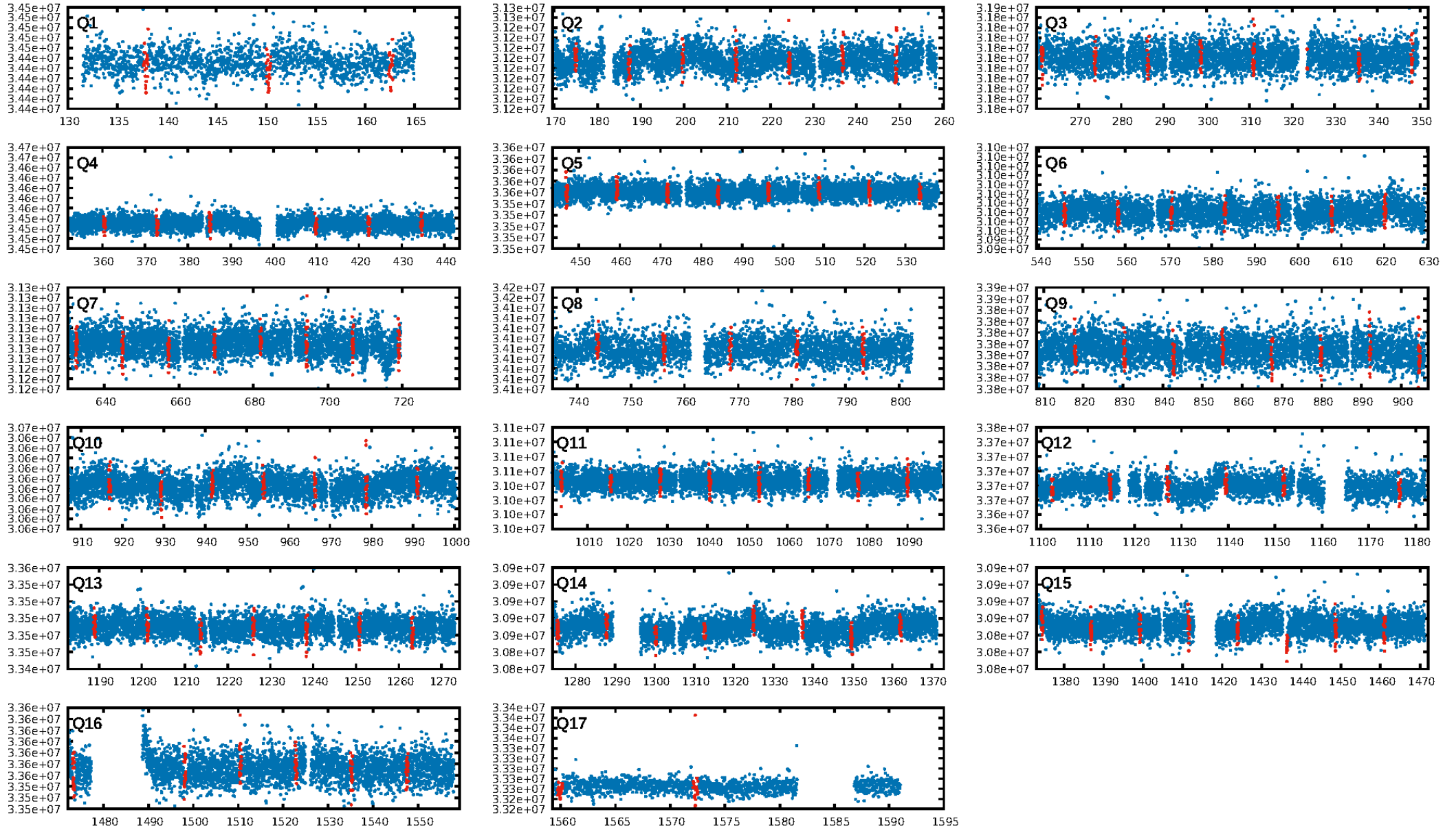
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 8.7%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 2.46e-64  
RollingBand-fgt: 1.00 [105/105]  
GhostDiagnostic-chr: 0.07117  
Centroid-sig: 0.0%  
Centroid-so: 11.412 arcsec [18.13σ]  
OotOffset-rm: 6.340 arcsec [53.96σ]  
KicOffset-rm: 6.006 arcsec [44.31σ]  
OotOffset-st: 2/4/4/5 [15]  
KicOffset-st: 2/4/4/5 [15]  
DiffImageQuality-fgm: 0.93 [14/15]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 13:08:20 Z

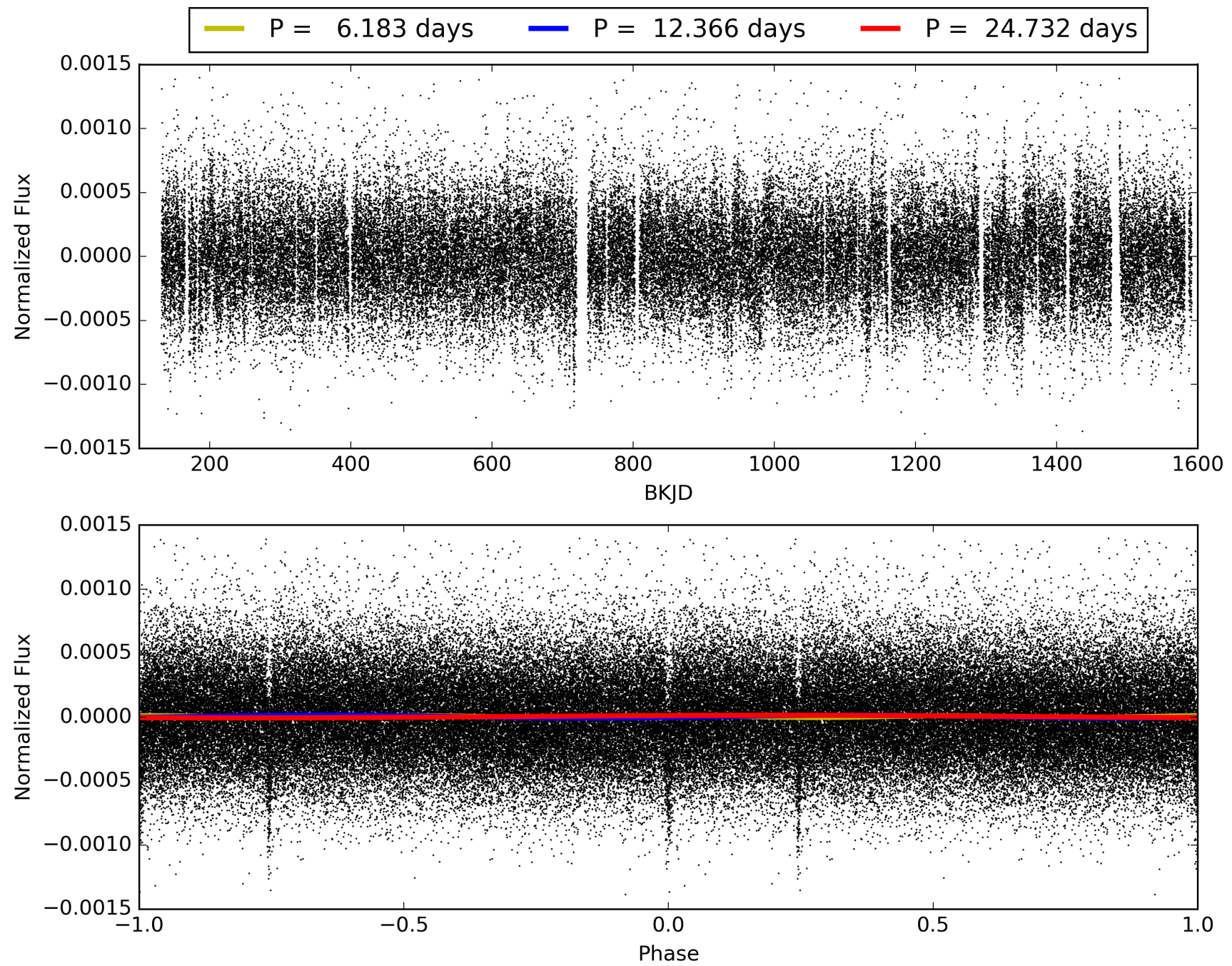
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 004860932-02, PDC Light Curves



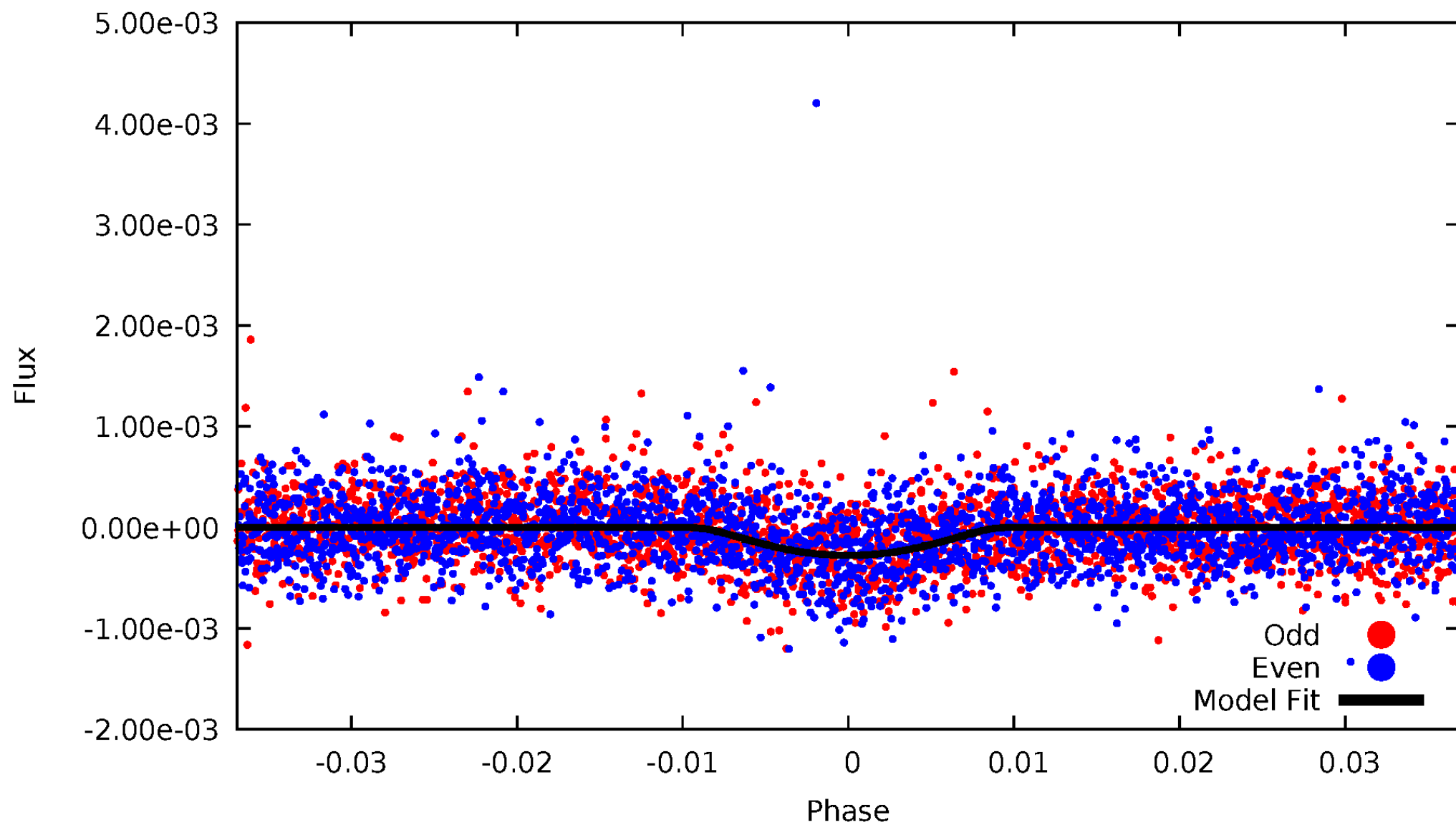


TCE 004860932-02



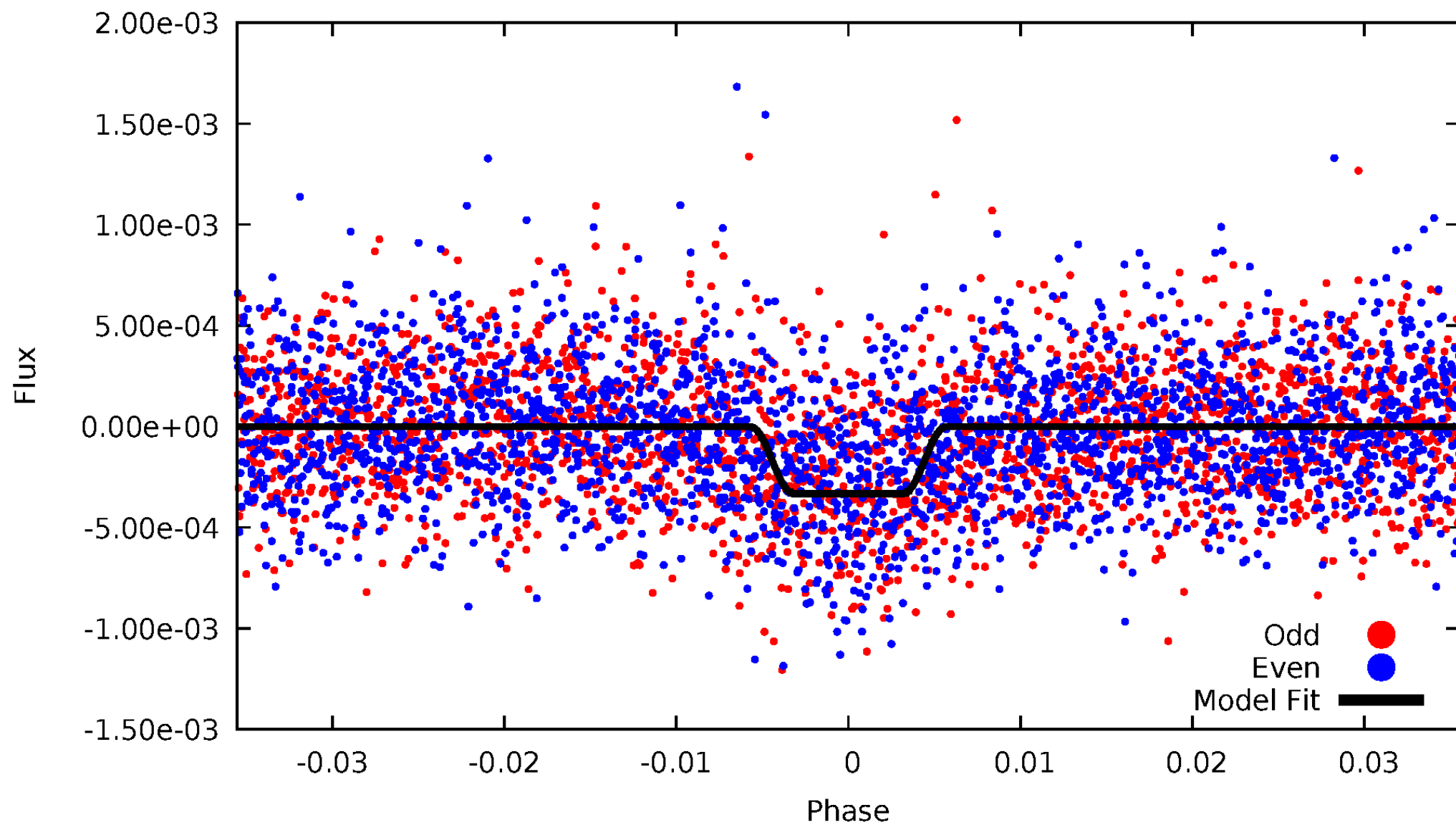
# DV Odd/Even

TCE 004860932-02



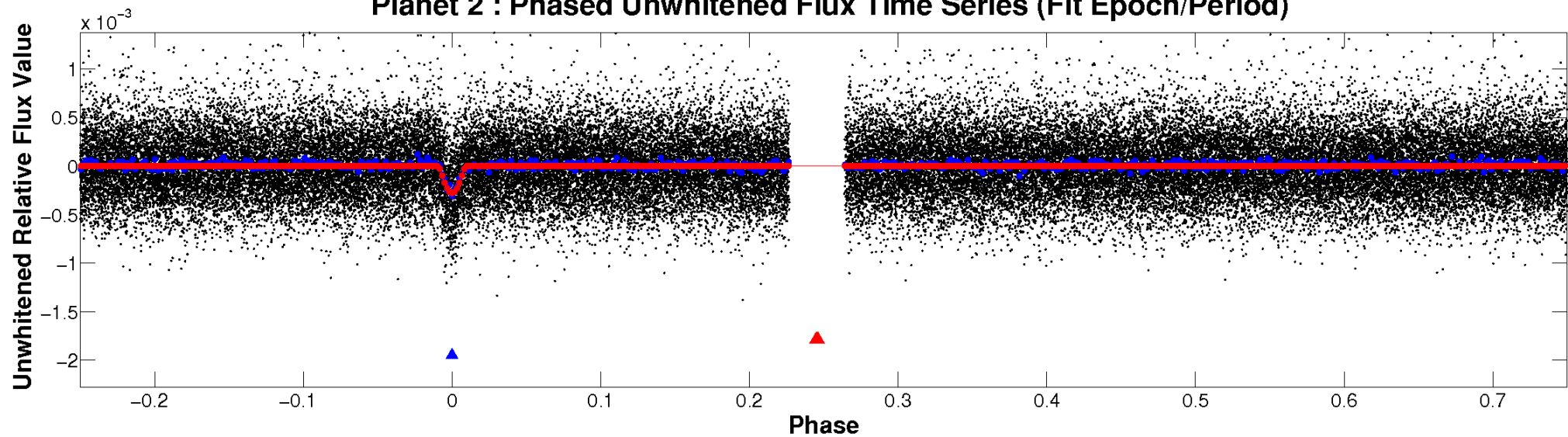
# ALT Odd/Even

TCE 004860932-02

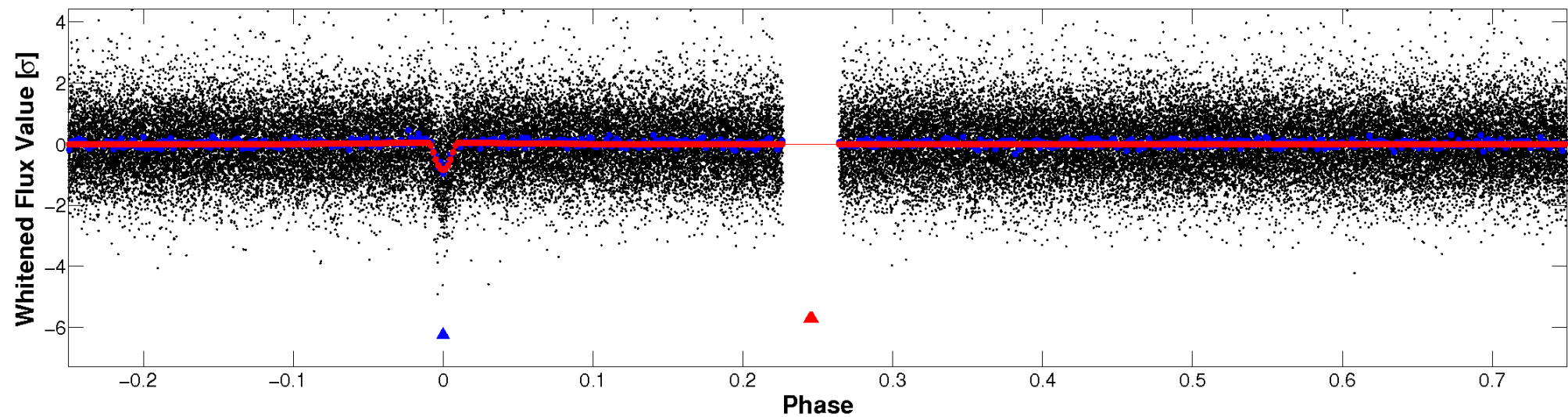


# Non-Whitened Vs. Whitened Light Curve

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



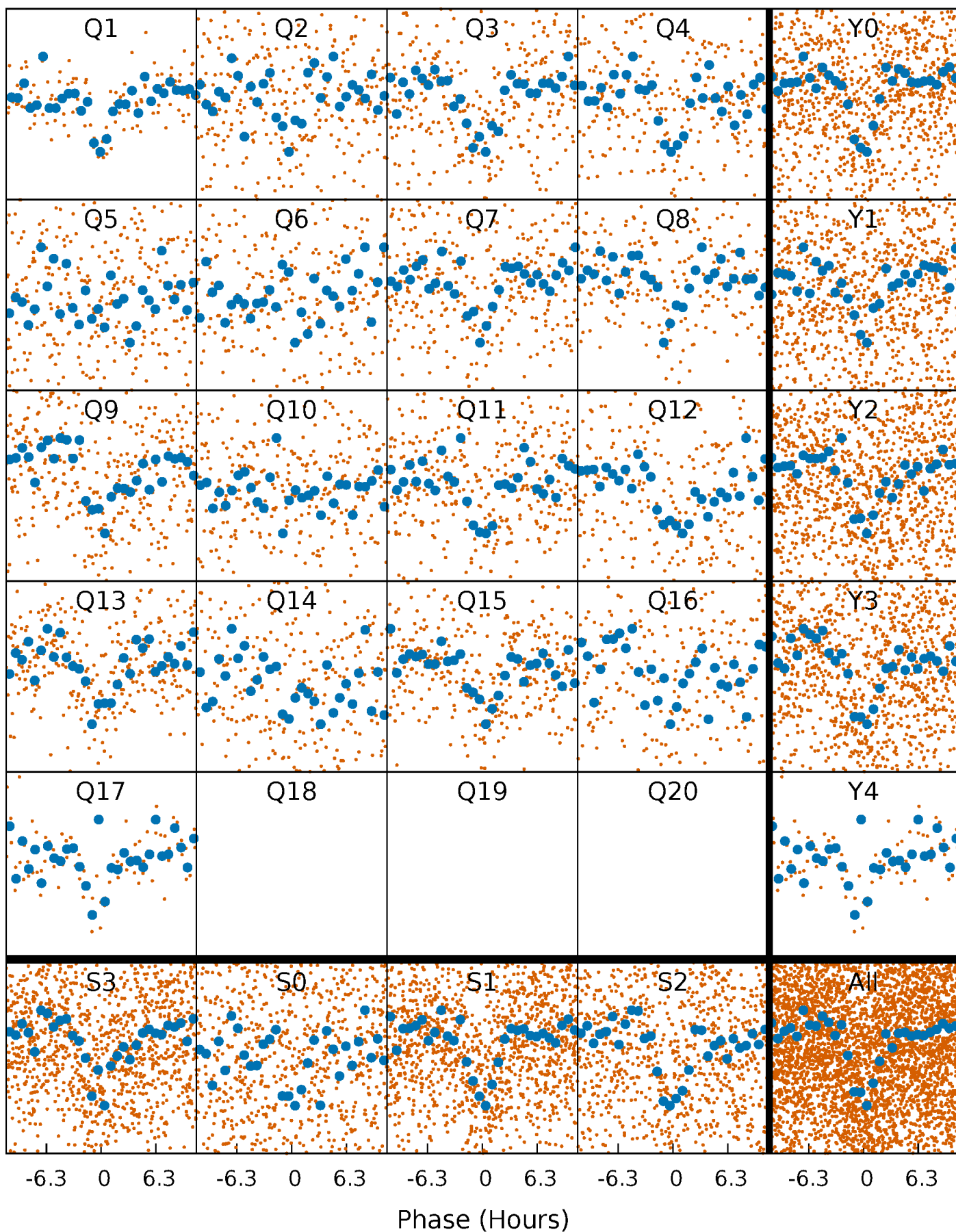
## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)





# PDC Quarter-Phased Transit Curves

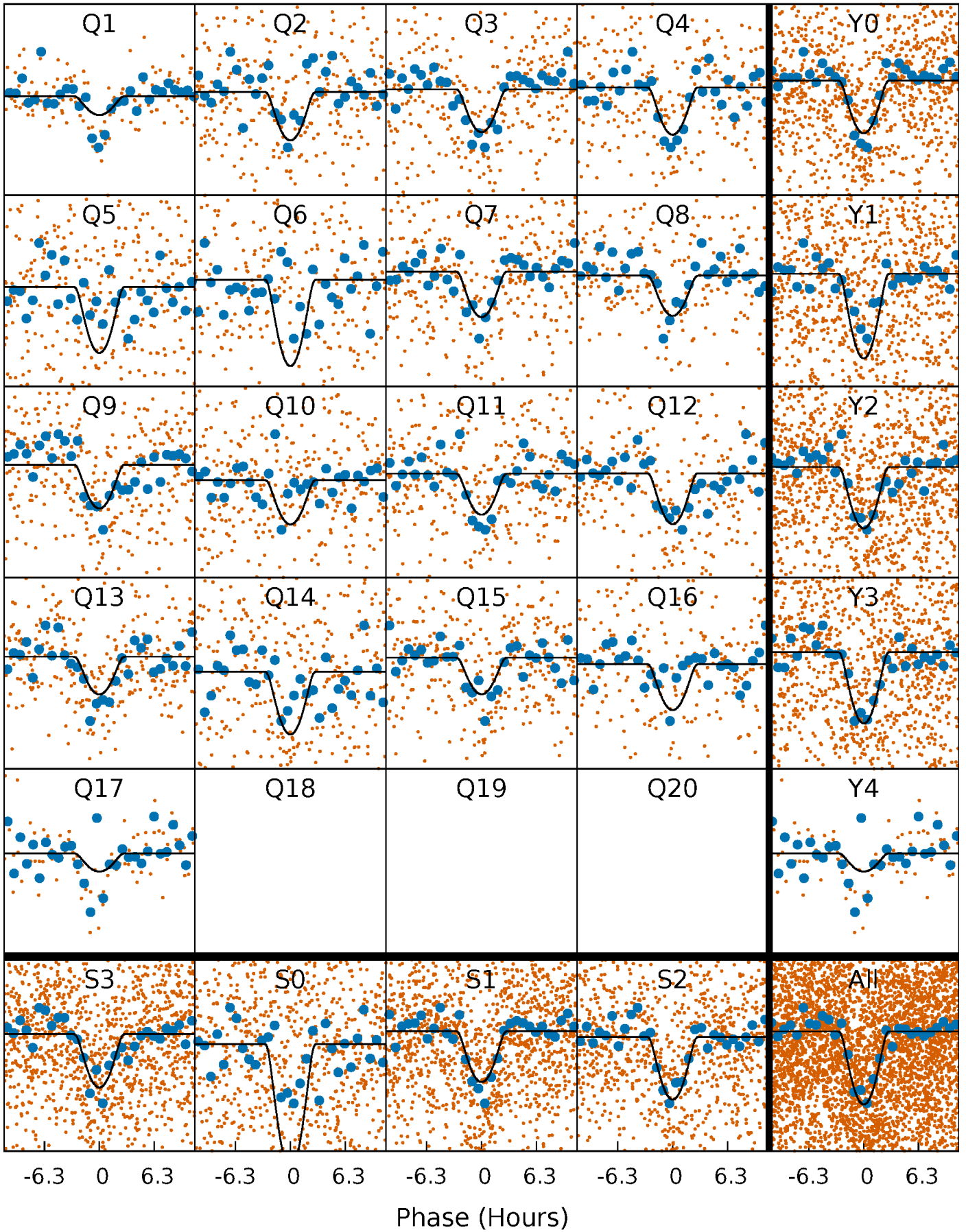
TCE 004860932-02 P= 12.365770 Days  $T_0=137.877446$  (BKJD)





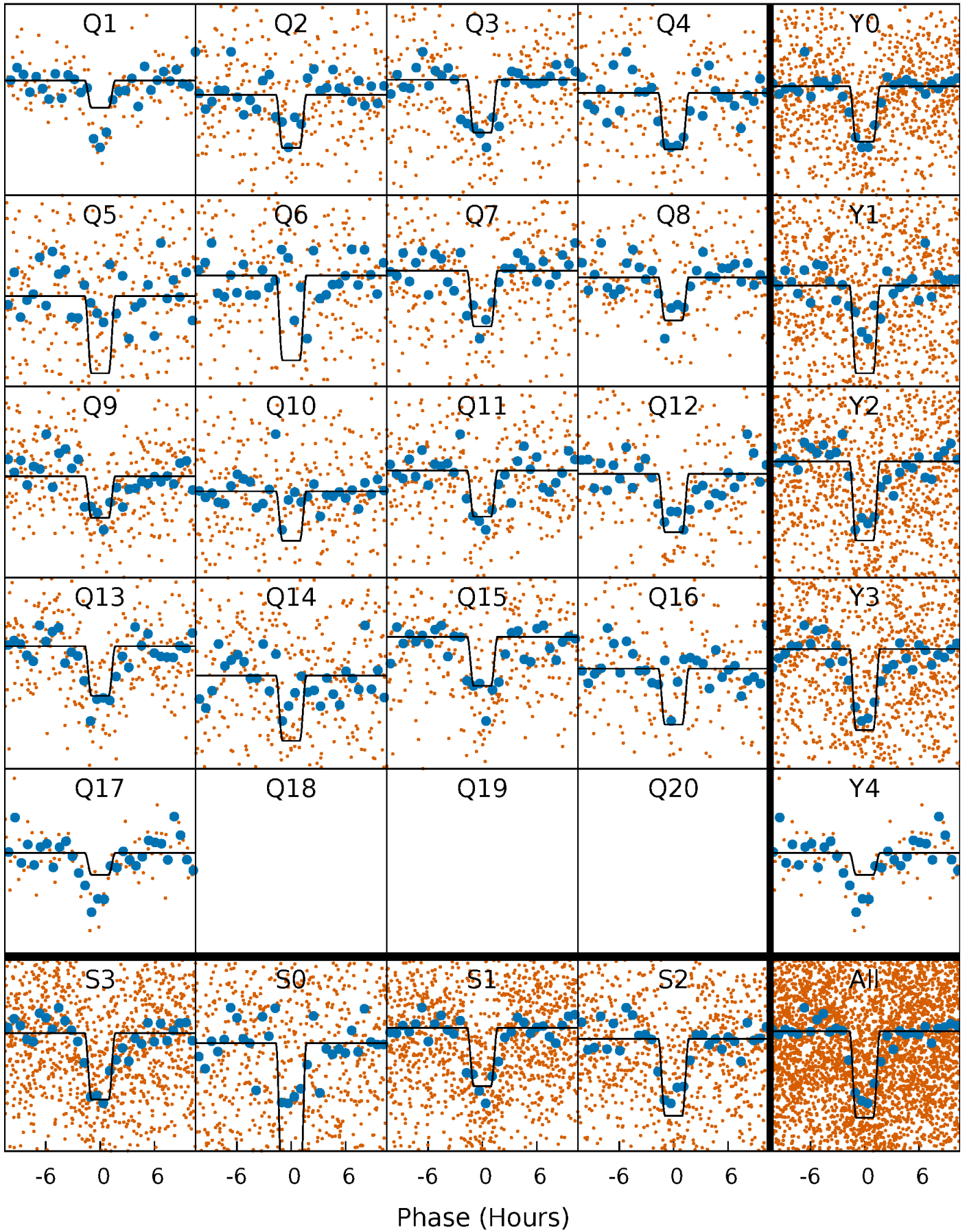
# DV Quarter-Phased Transit Curves

TCE 004860932-02   P= 12.365770 Days    $T_0=137.877446$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

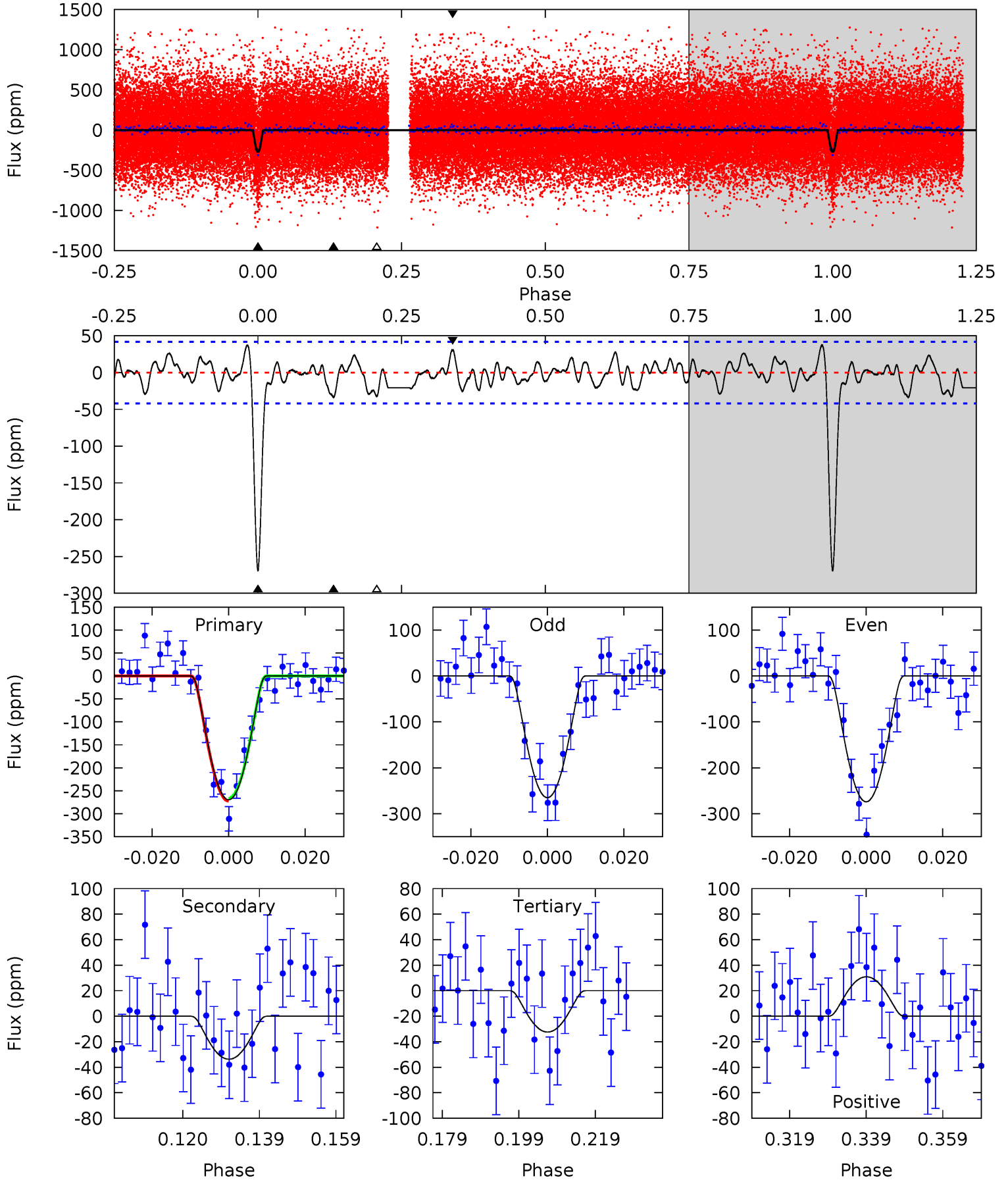
TCE 004860932-02 P= 12.365789 Days  $T_0=137.877776$  (BKJD)



# DV Model-Shift Uniqueness Test

004860932-02, P = 12.365770 Days, E = 125.511676 Days

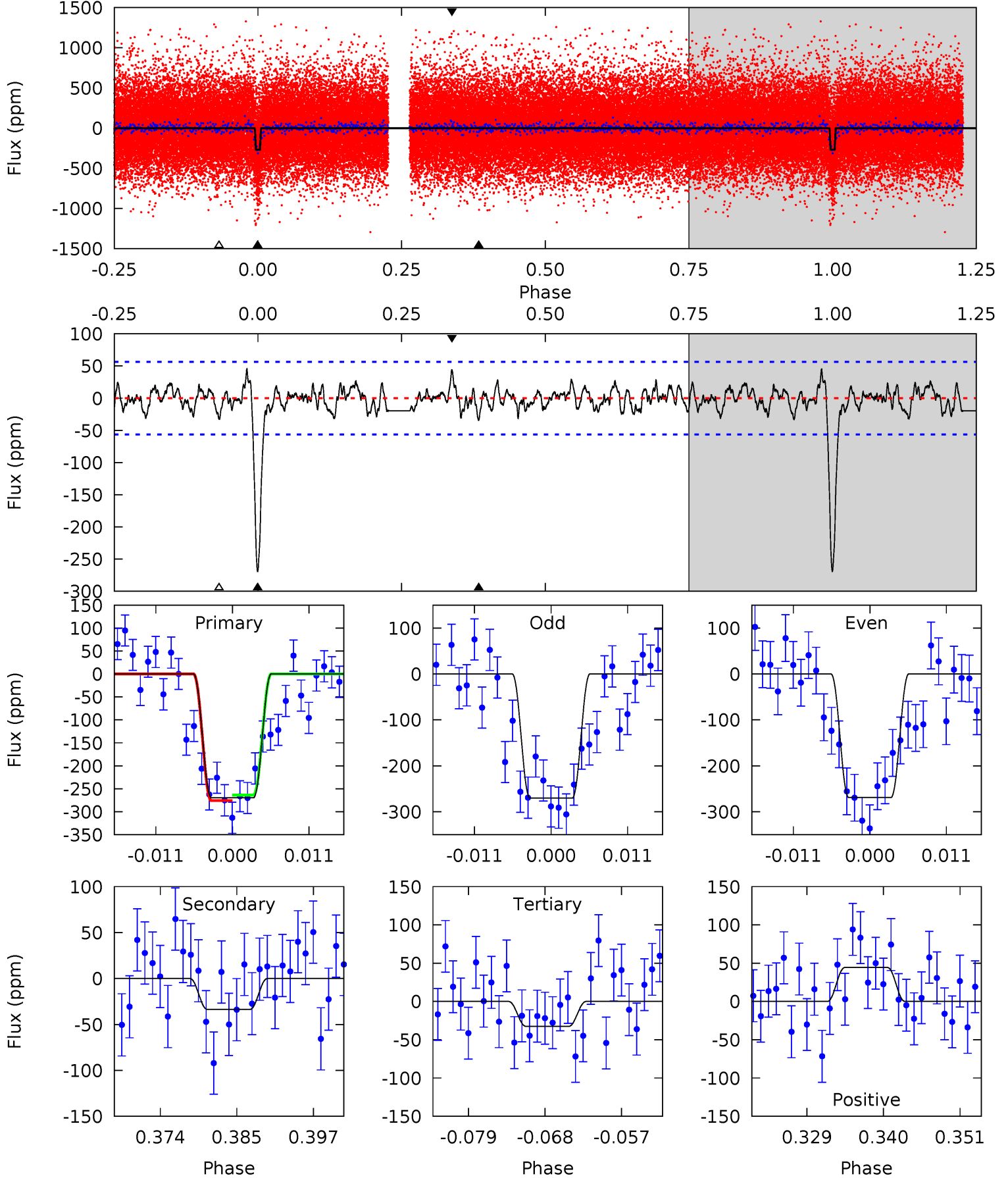
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
31.5	3.93	3.78	3.61	4.89	2.33	1.44	27.7	27.9	0.15	0.33	0.53	1.02	0.12	0.32



# Alt Model-Shift Uniqueness Test

004860932-02,  $P = 12.365789$  Days,  $E = 125.511987$  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
23.9	2.99	2.90	3.94	5.00	2.53	1.18	21.0	19.9	0.10	-0.95	0.07	0.98	0.14	0.53



### Stellar Parameters For KIC 004860932

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6075^{+163}_{-199}$	$4.495^{+0.052}_{-0.208}$	$-0.160^{+0.250}_{-0.350}$	$0.952^{+0.291}_{-0.097}$	$1.033^{+0.126}_{-0.140}$	$1.689^{+0.456}_{-0.860}$
	+3%/-3%	+1%/-5%	+156%/-219%	+31%/-10%	+12%/-14%	+27%/-51%
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 004860932-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-34 \pm 9$	$3.26^{+2.52}_{-2.04}$	$1147^{+77}_{-57}$	$3239^{+1258}_{-506}$	$18^{+115}_{-12}$
Alt.	$-34 \pm 11$	$2.79^{+2.32}_{-1.85}$	$1148^{+82}_{-52}$	$3372^{+1512}_{-579}$	$25^{+179}_{-18}$

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

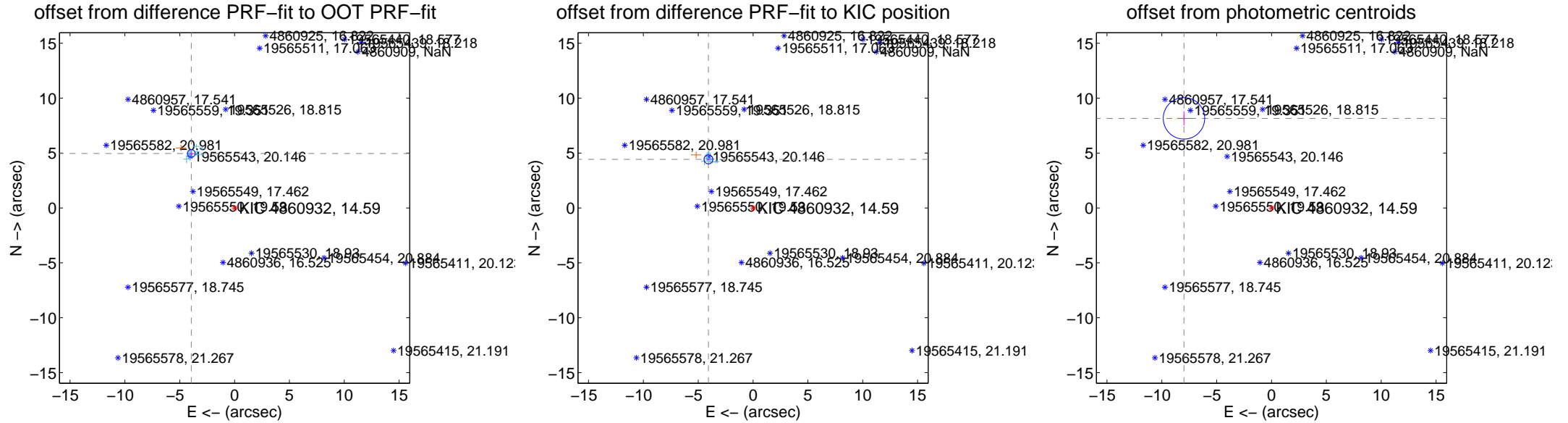
# DV Centroid Data

Supplemental centroid analysis for 004860932-02. Kepler magnitude: 14.59. Transit SNR 19.10

There are 14 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.71 arcsec

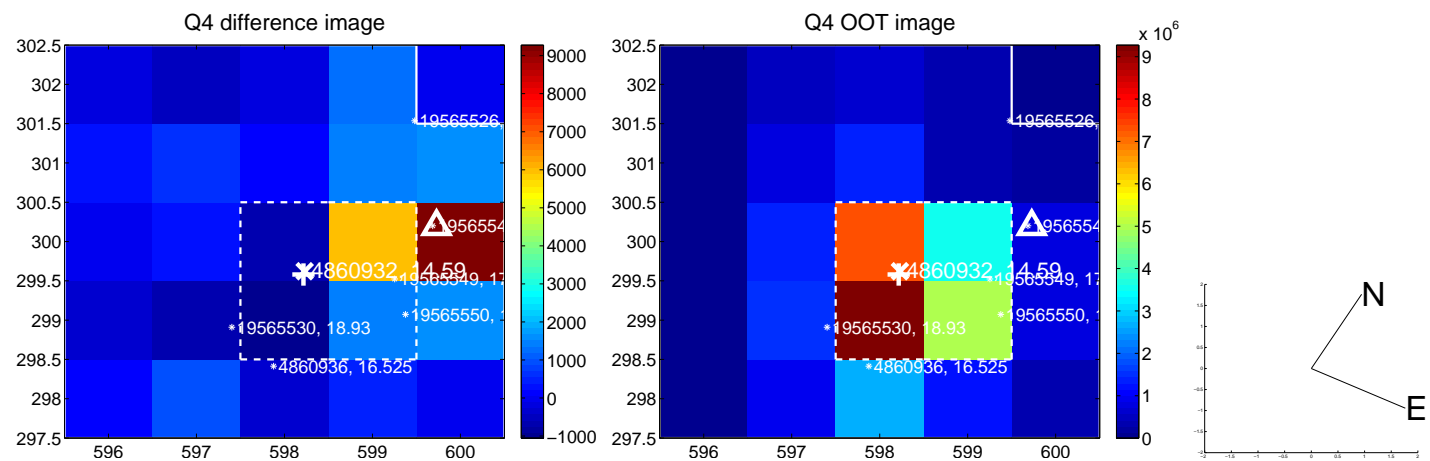
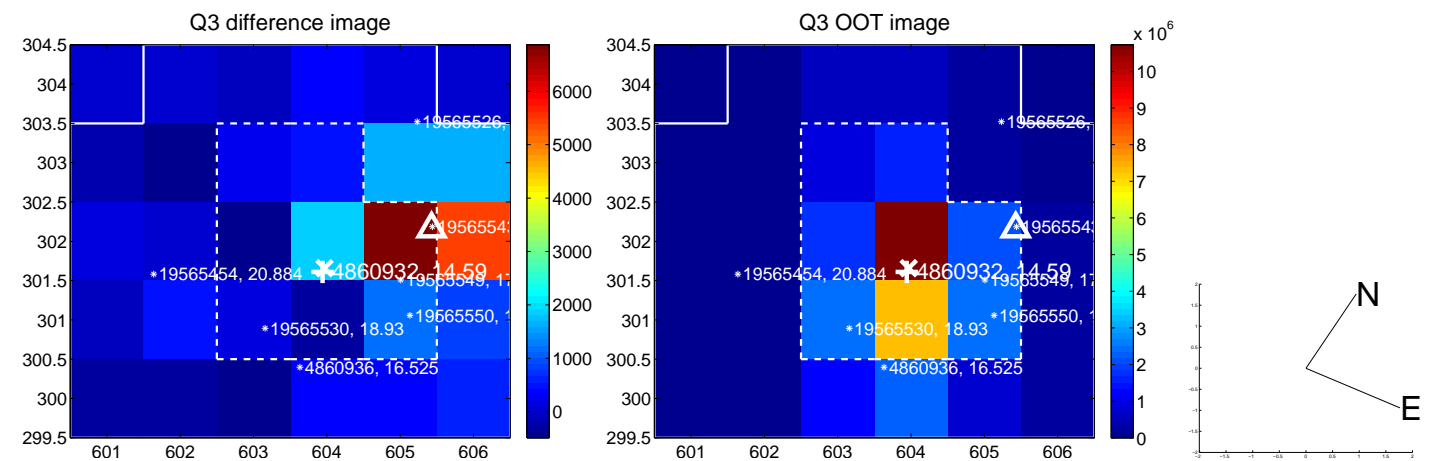
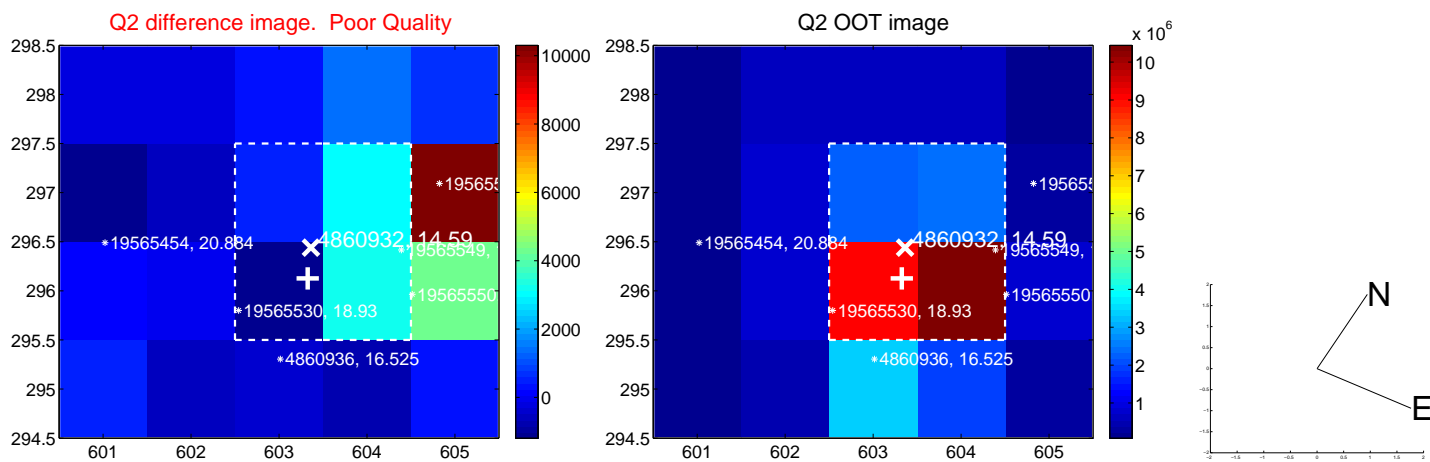
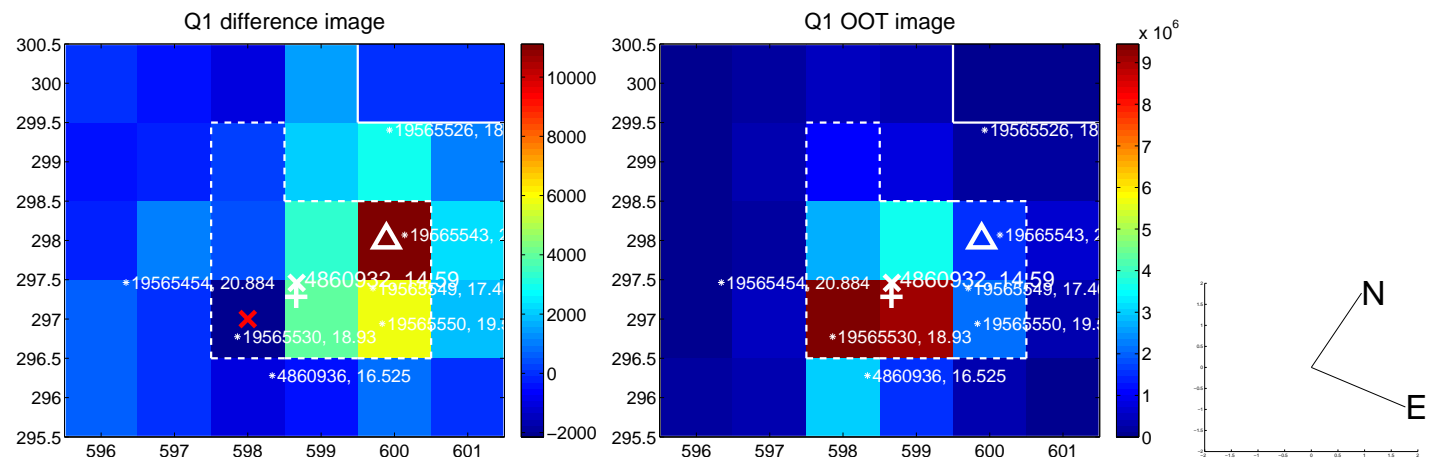
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b><math>6.340 \pm 0.118</math></b>	<b>53.96</b>	$3.946 \pm 0.142$	$4.963 \pm 0.099$
PRF-fit source offset from KIC position	<b><math>6.006 \pm 0.136</math></b>	<b>44.31</b>	$4.065 \pm 0.134$	$4.421 \pm 0.095$
photometric centroid source offset	<b><math>11.41 \pm 0.63</math></b>	<b>18.13</b>	$7.98 \pm 0.61$	$8.16 \pm 0.64$



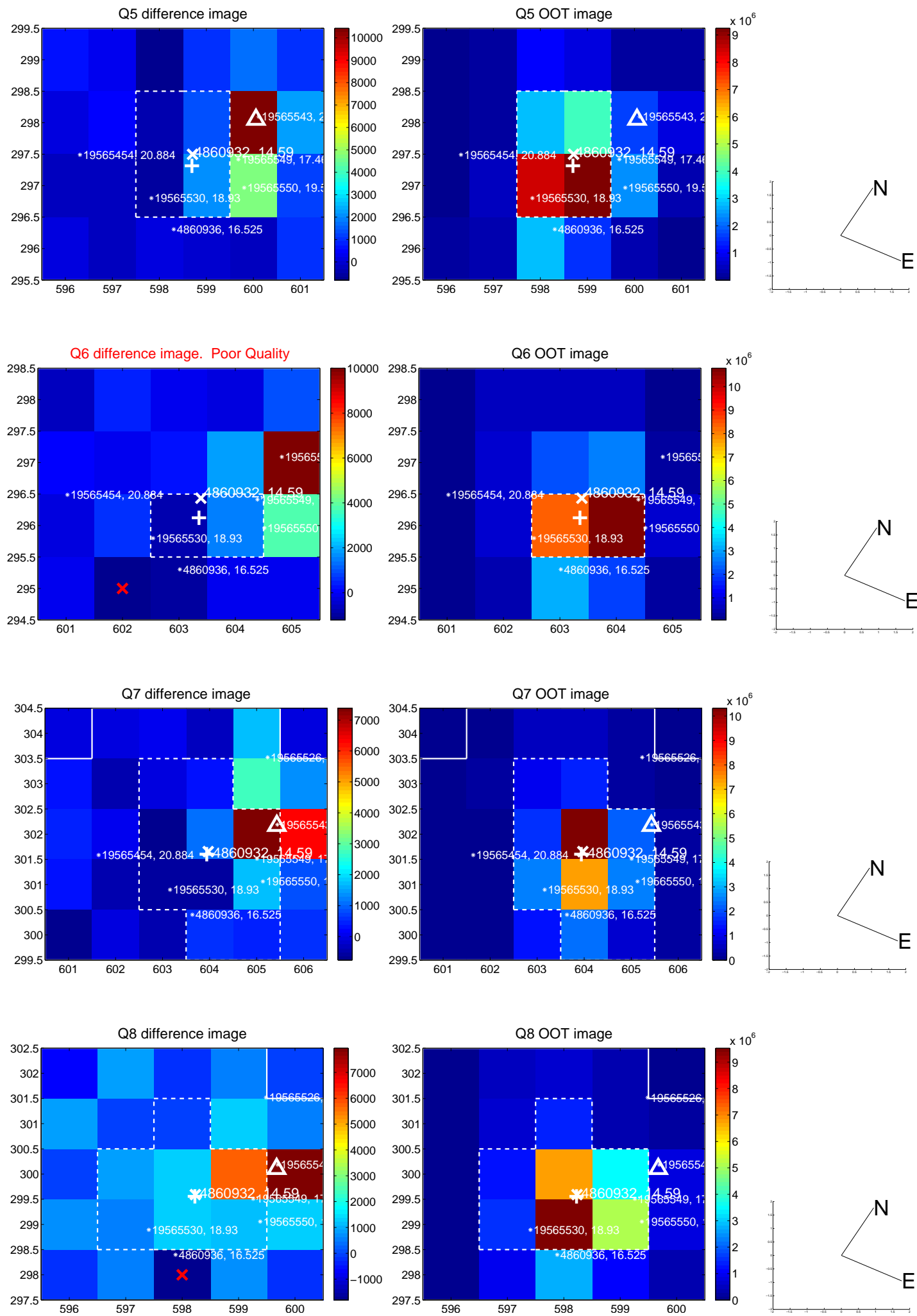
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



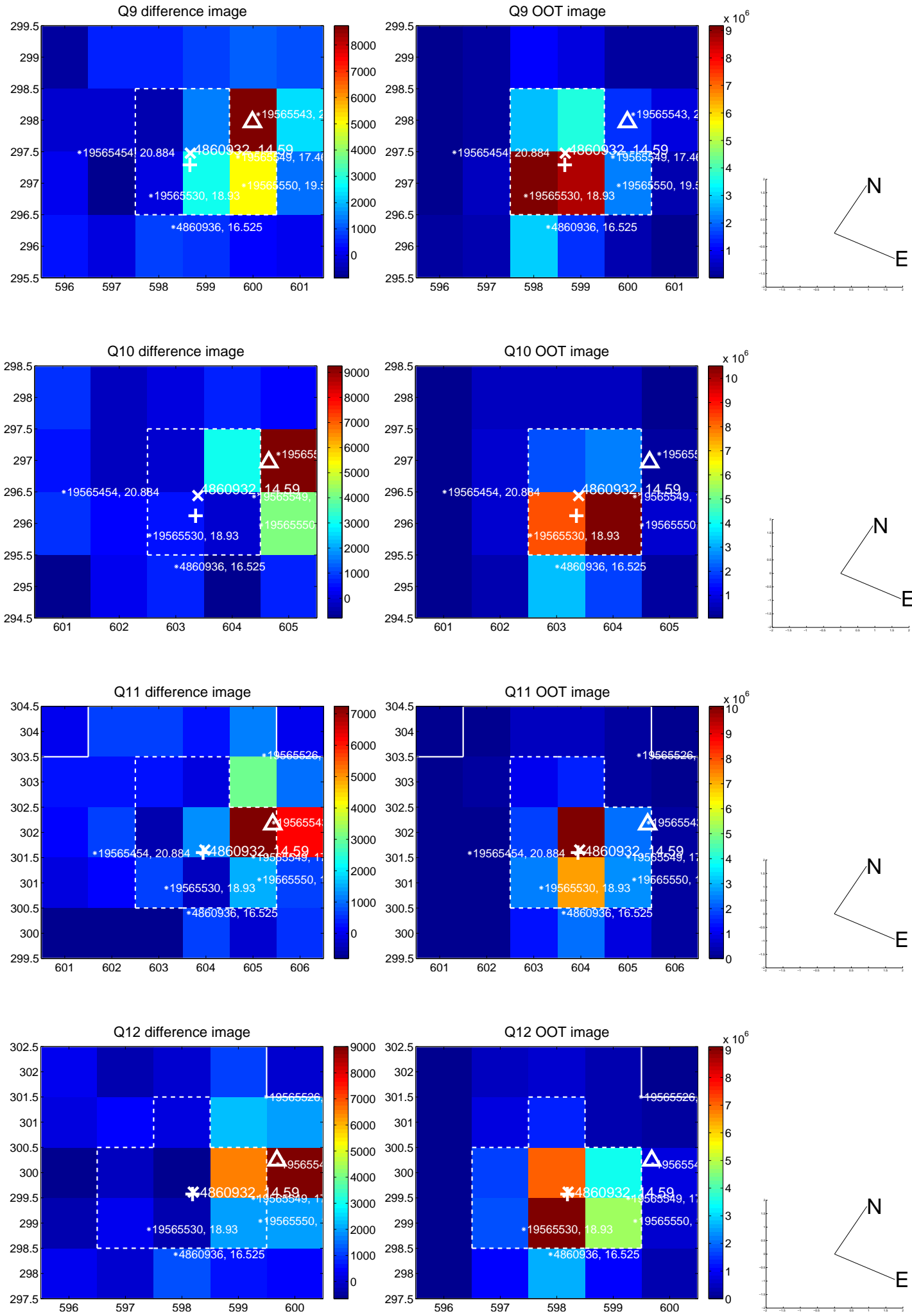
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



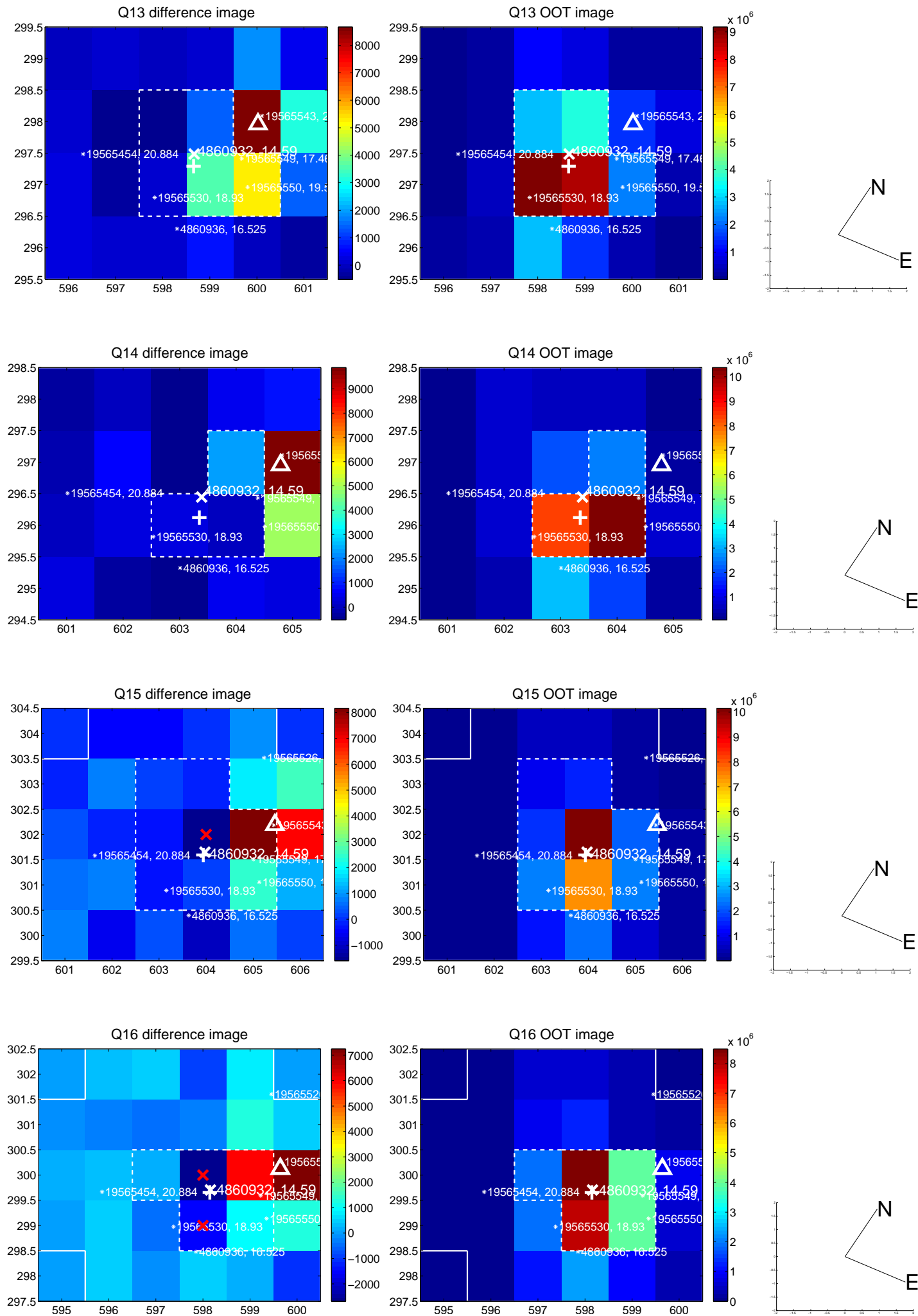
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



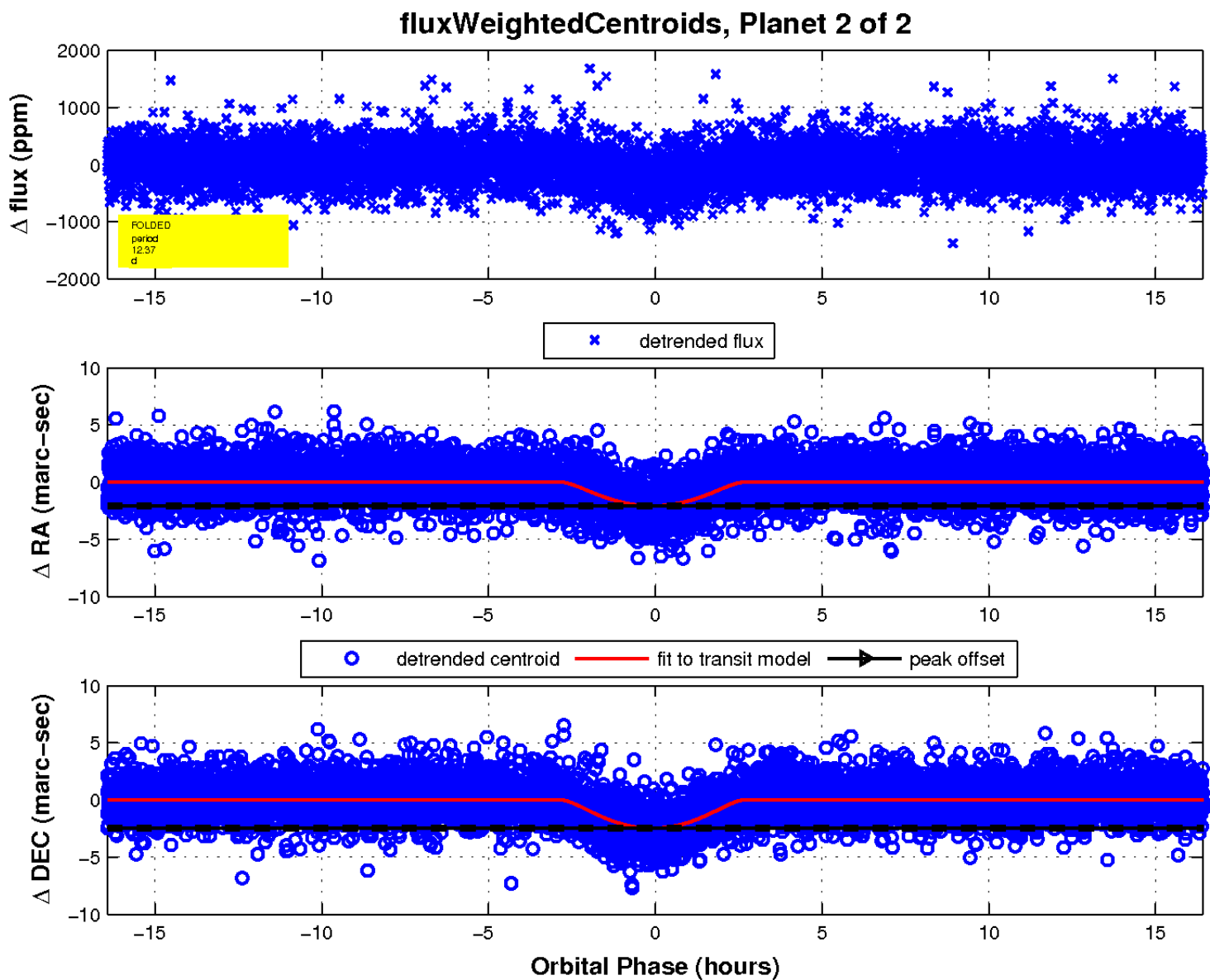
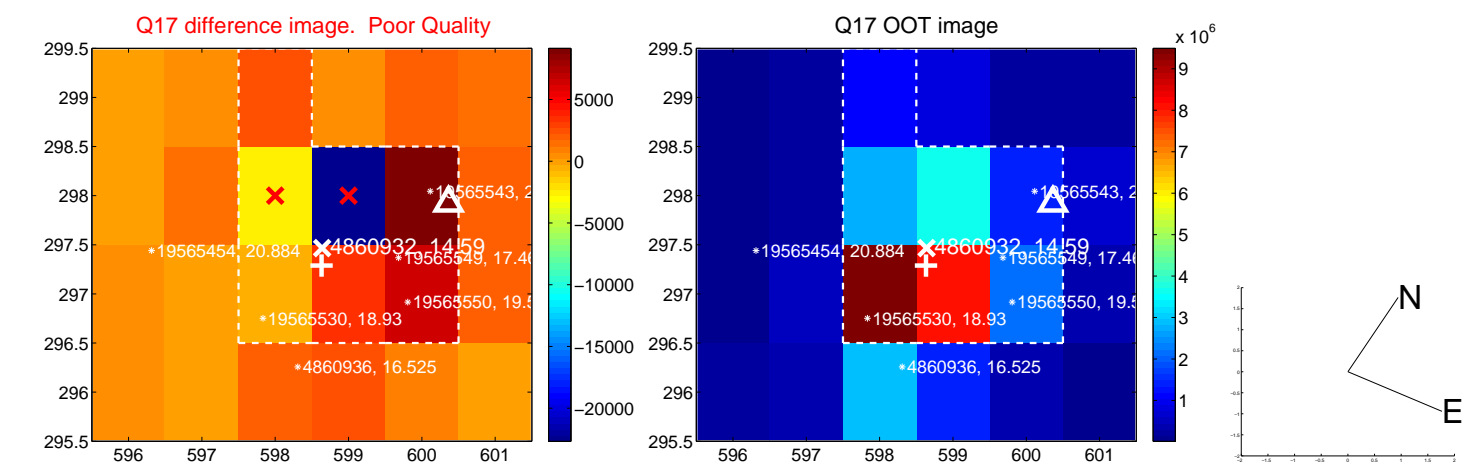
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UKIRT Image

Declination

