

# KIC 005031857

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005031857-01	OBS	1573.01	24.812113	131.666871	2016.4	3.738	91.7	95.9	0.92	6086	4.77	37.51
005031857-02	OBS	1573.02	7.136892	131.757319	147.6	3.010	13.6	14.9	0.92	6086	1.31	197.57

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005031857-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
005031857-02	OBS	PC	1.00	0	0	0	0	NO_COMMENT

**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.

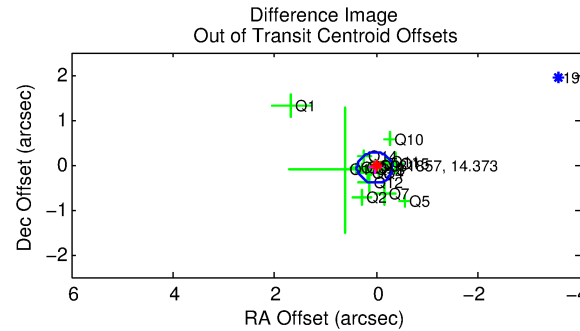
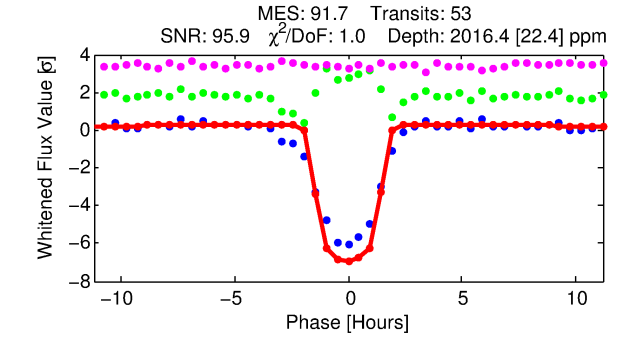
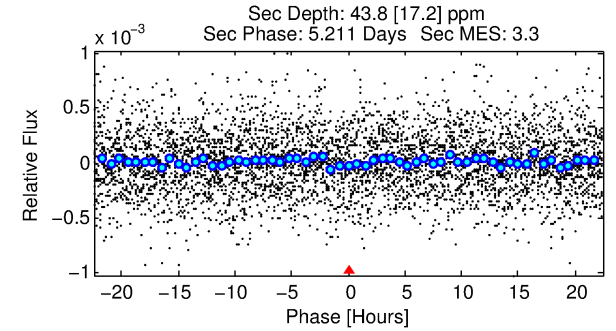
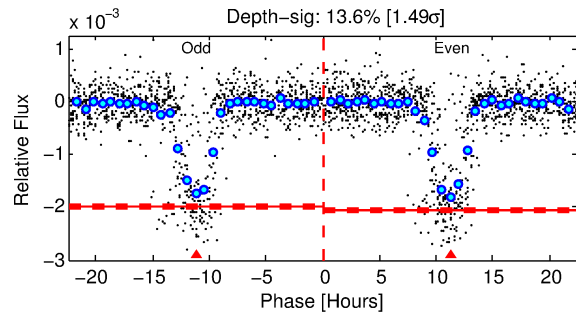
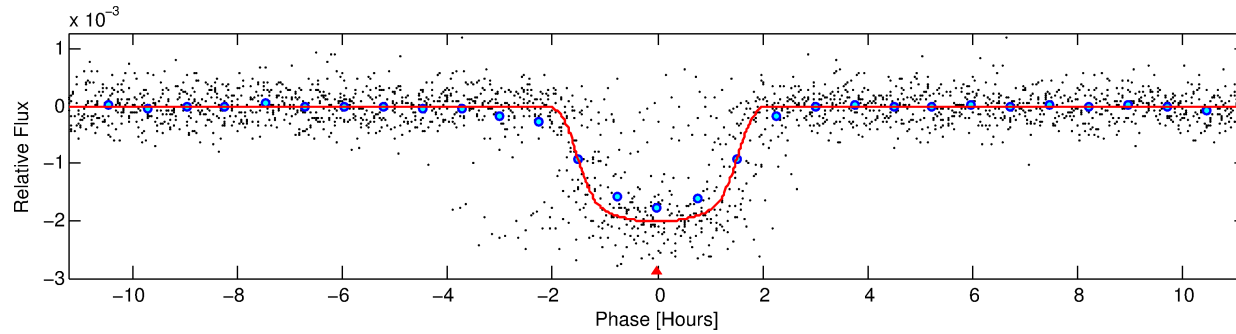
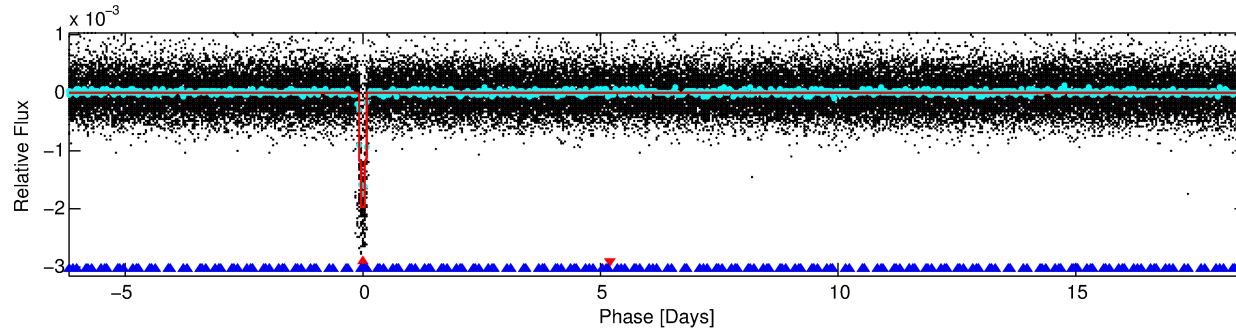
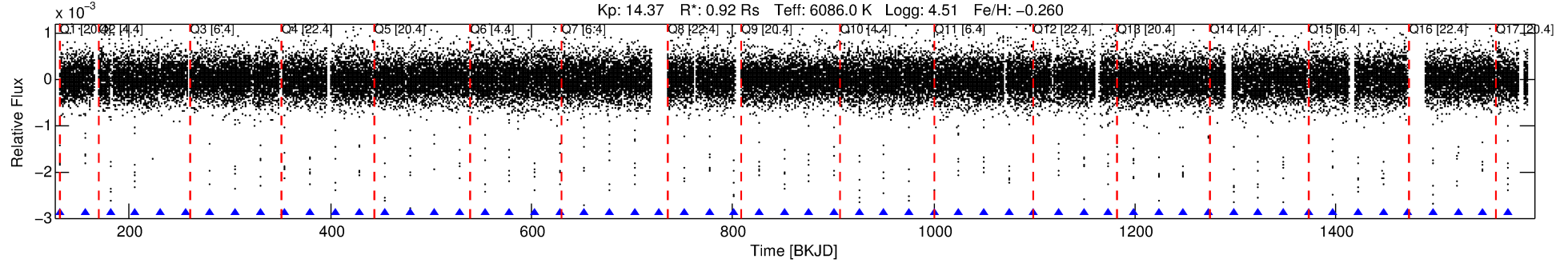
## Ephemeris Match Information For 005031857-01

No Significant Match Found

# DV One-Page Summary

KIC: 5031857 Candidate: 1 of 2 Period: 24.812 d  
KOI: K01573.01 Corr: 0.871

Kp: 14.37 R\*: 0.92 Rs Teff: 6086.0 K Logg: 4.51 Fe/H: -0.260



## DV Fit Results:

Period = 24.81211 [0.00003] d  
Epoch = 131.6669 [0.0009] BKJD  
Rp/R\* = 0.0475 [0.0007]  
a/R\* = 29.36 [1.95]  
b = 0.87 [0.02]  
Seff = 37.51 [15.73]  
Teq = 631 [66] K  
Rp = 4.77 [1.49] Re  
a = 0.1667 [0.0448] AU  
Ag = 29.44 [16.48] [1.73σ]  
Teffp = 2273 [236] K [6.70σ]

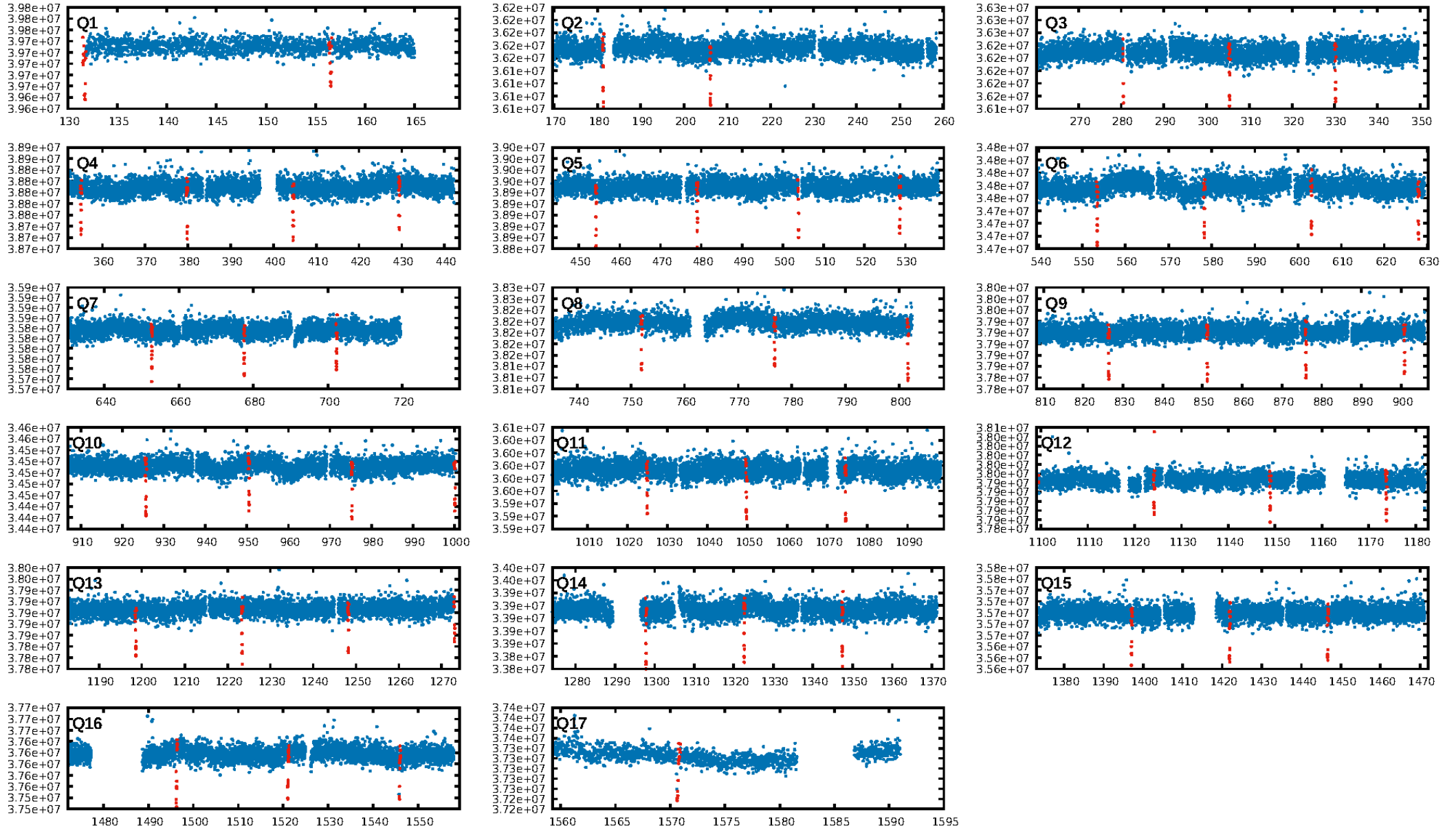
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [88.39σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 66.7%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [50/50]  
GhostDiagnostic-chr: 4.042  
Centroid-sig: 6.6%  
Centroid-so: 0.256 arcsec [1.94σ]  
OotOffset-rm: 0.080 arcsec [0.70σ]  
KicOffset-rm: 0.265 arcsec [1.46σ]  
OotOffset-st: 4/4/3/5 [16]  
KicOffset-st: 4/4/3/5 [16]  
DiffImageQuality-fgm: 0.94 [15/16]  
DiffImageOverlap-fno: 1.00 [17/17]

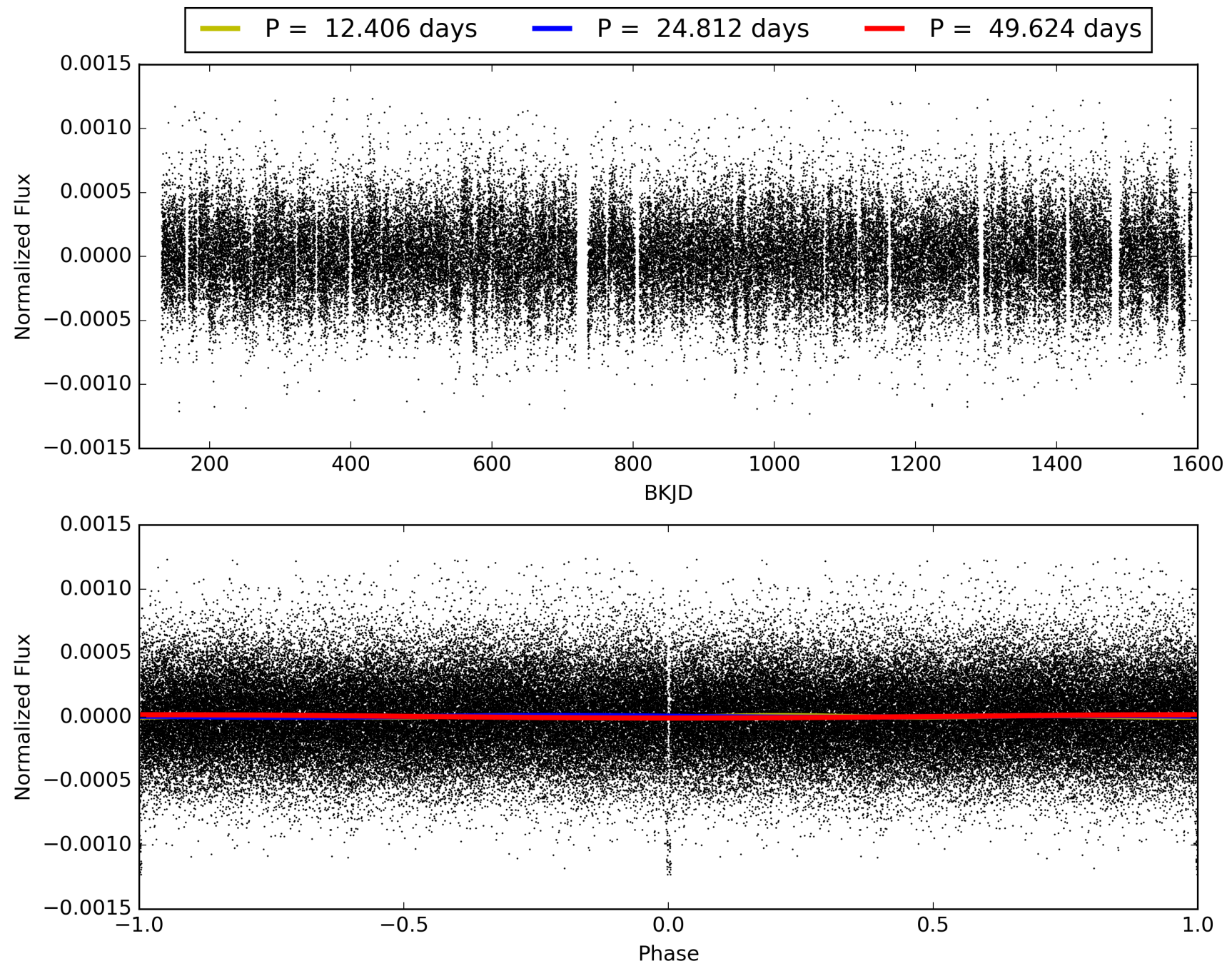
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 23:59:53 Z

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

# TCE 005031857-01, PDC Light Curves

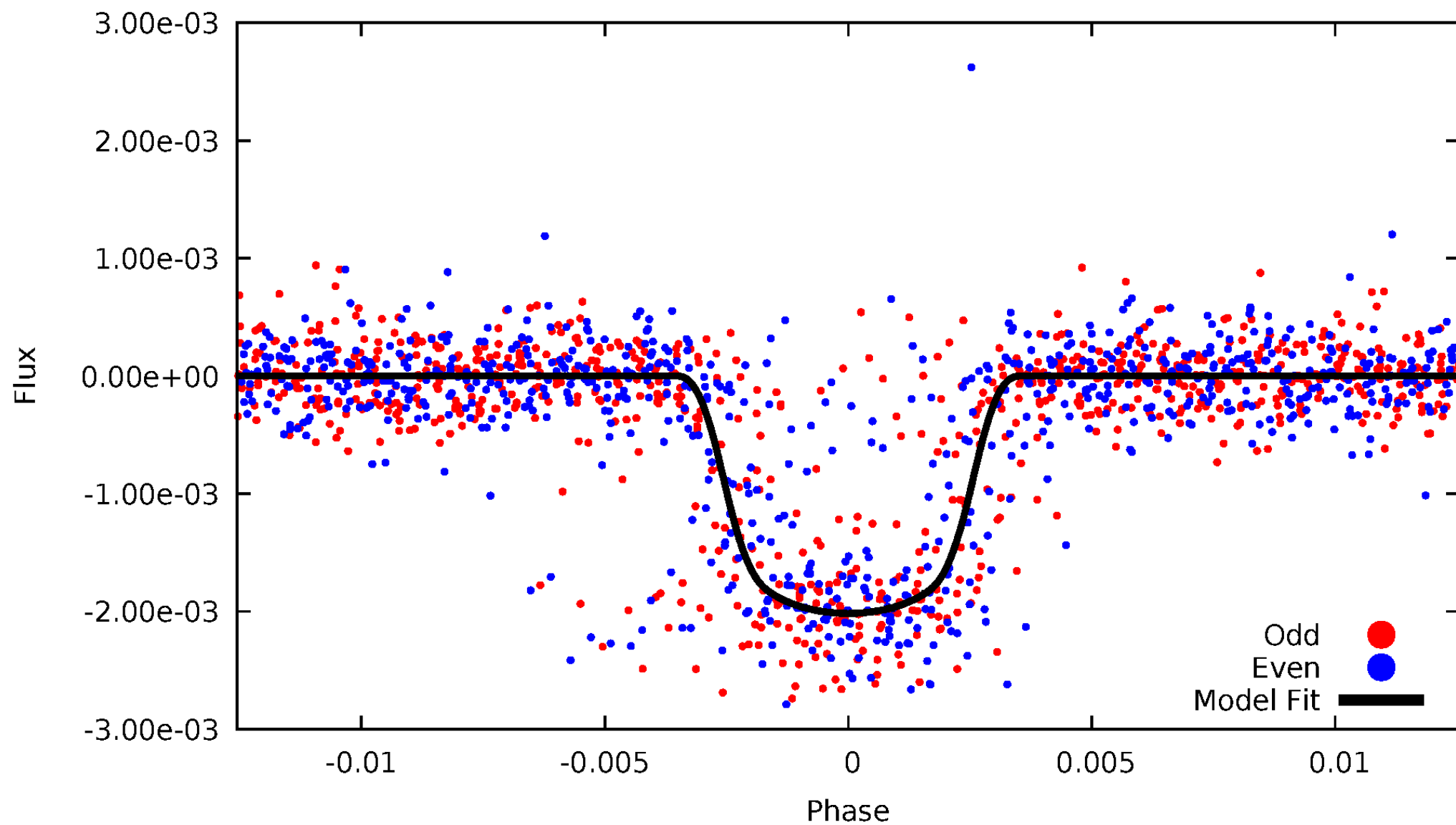


TCE 005031857-01



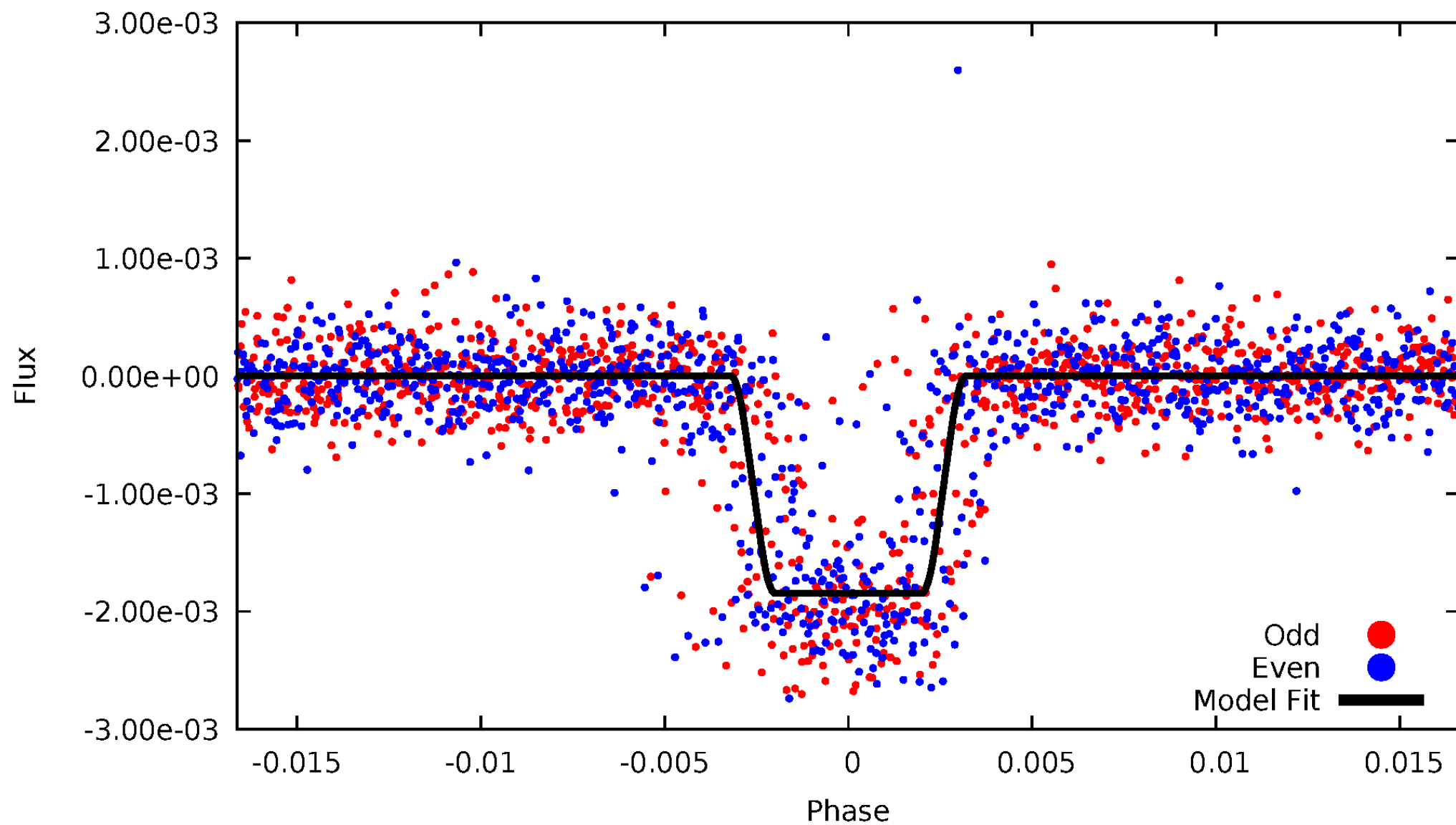
# DV Odd/Even

TCE 005031857-01



# ALT Odd/Even

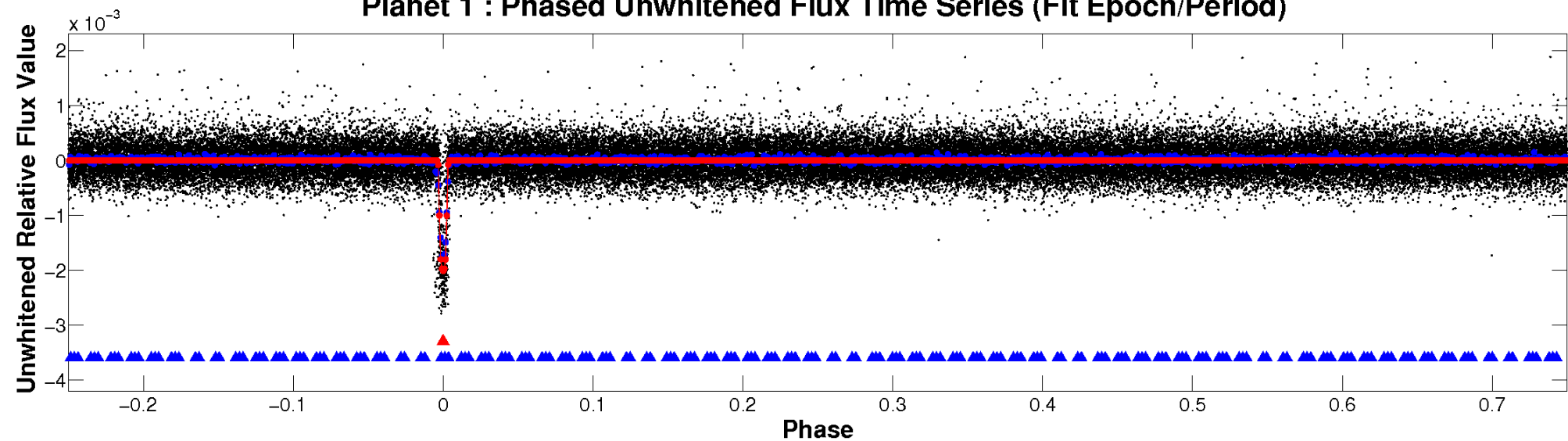
TCE 005031857-01



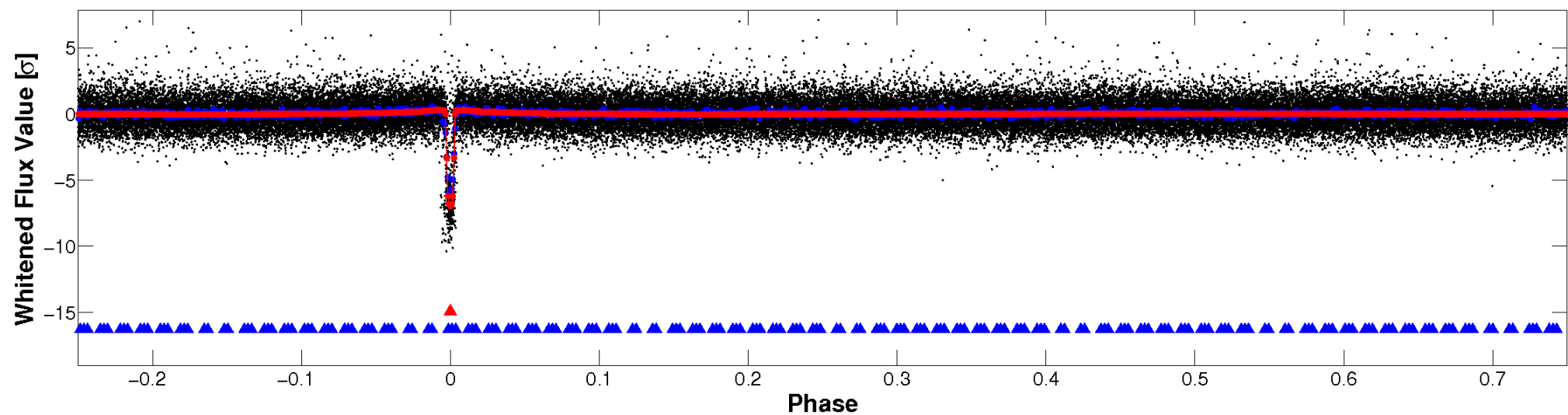


# Non-Whitened Vs. Whitened Light Curve

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

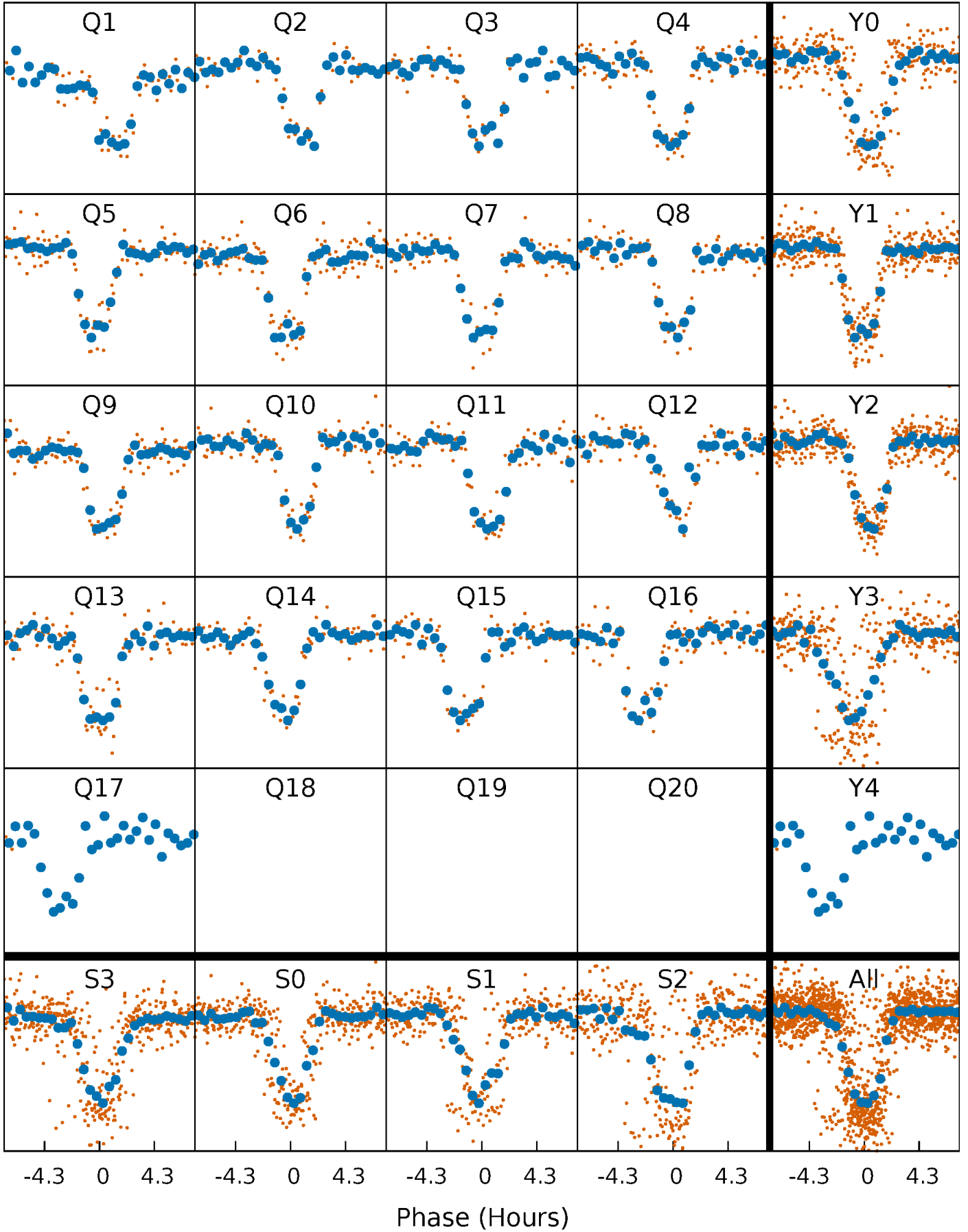


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

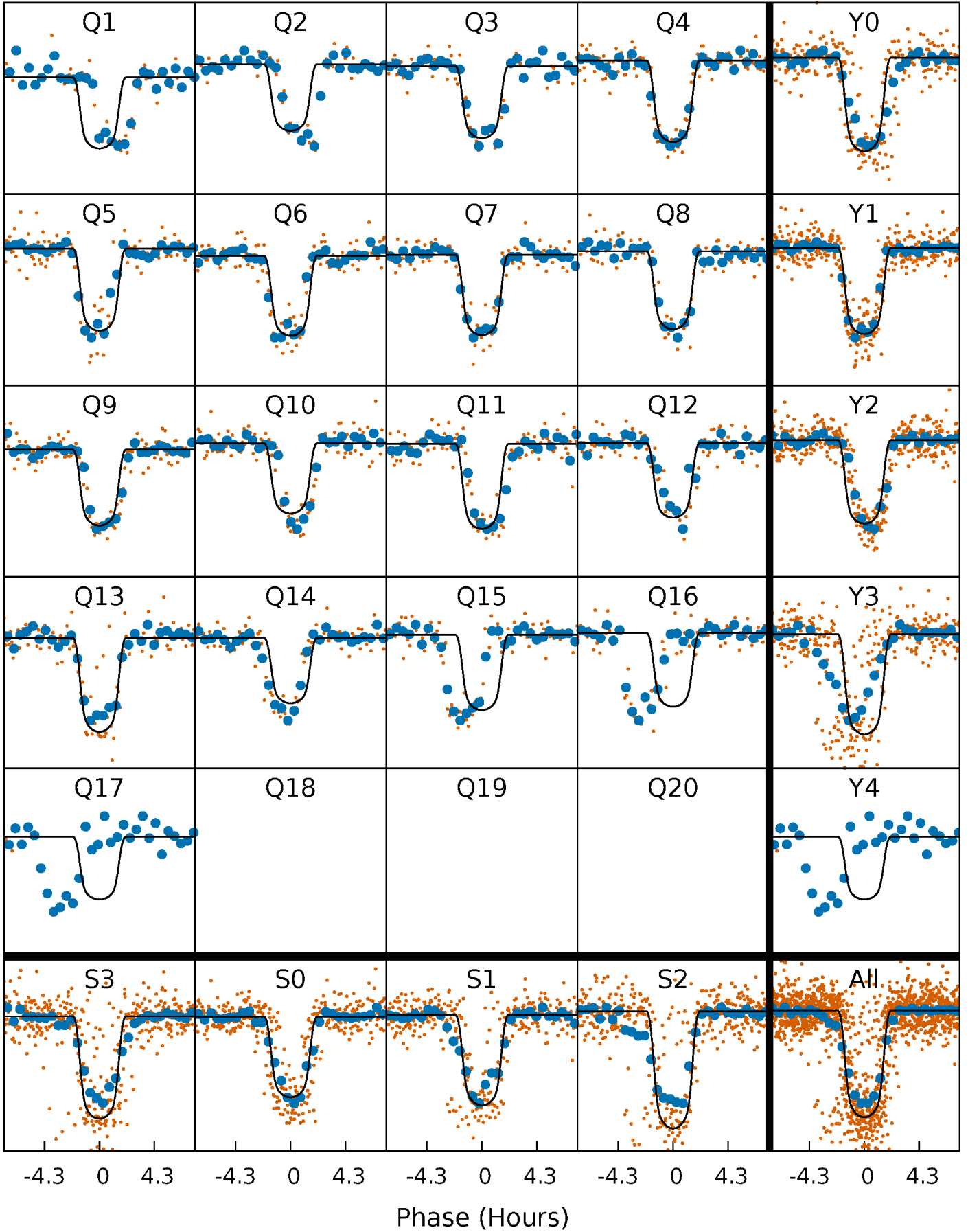
TCE 005031857-01 P= 24.812113 Days  $T_0=131.666870$  (BKJD)





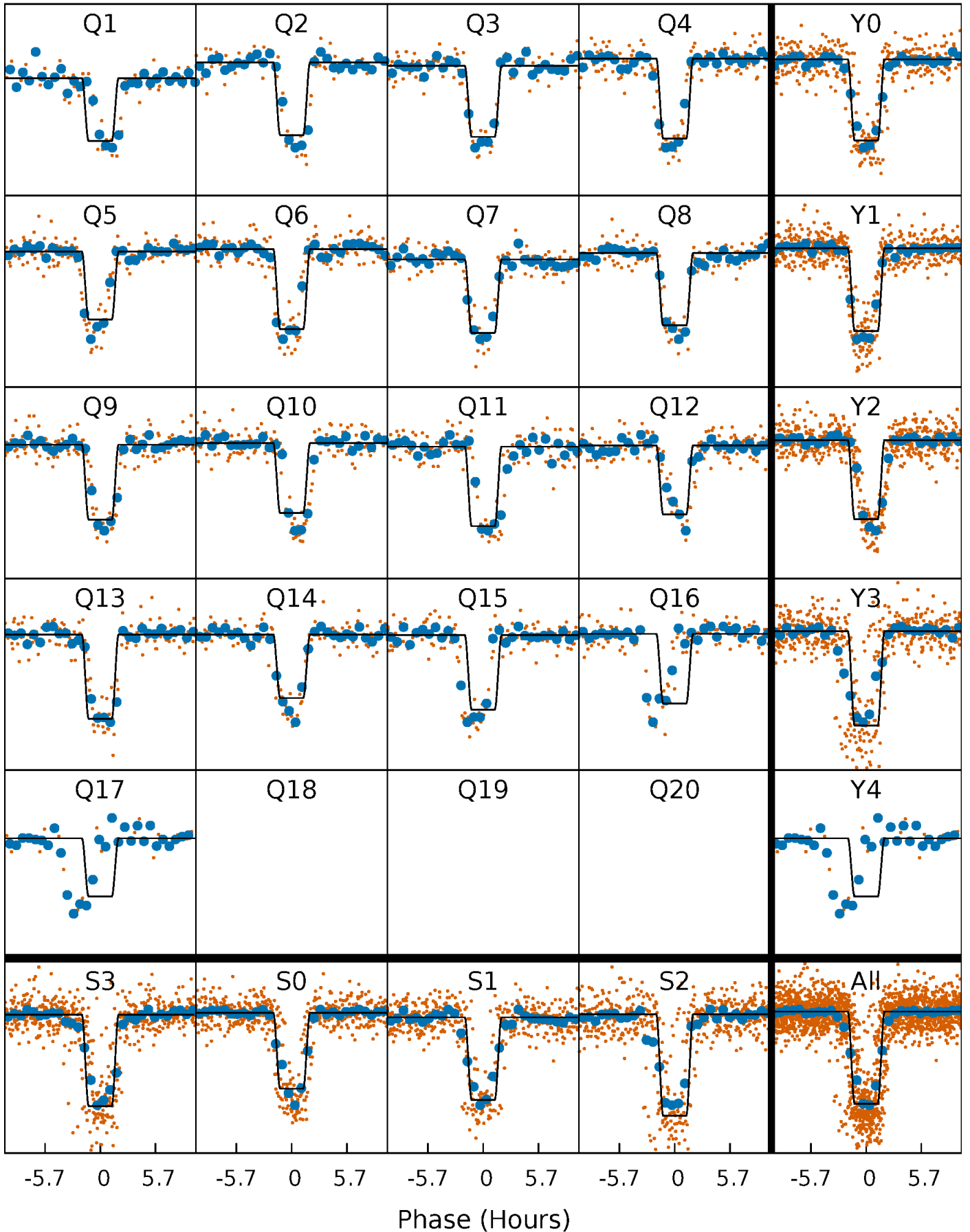
# DV Quarter-Phased Transit Curves

TCE 005031857-01 P= 24.812113 Days  $T_0=131.666870$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

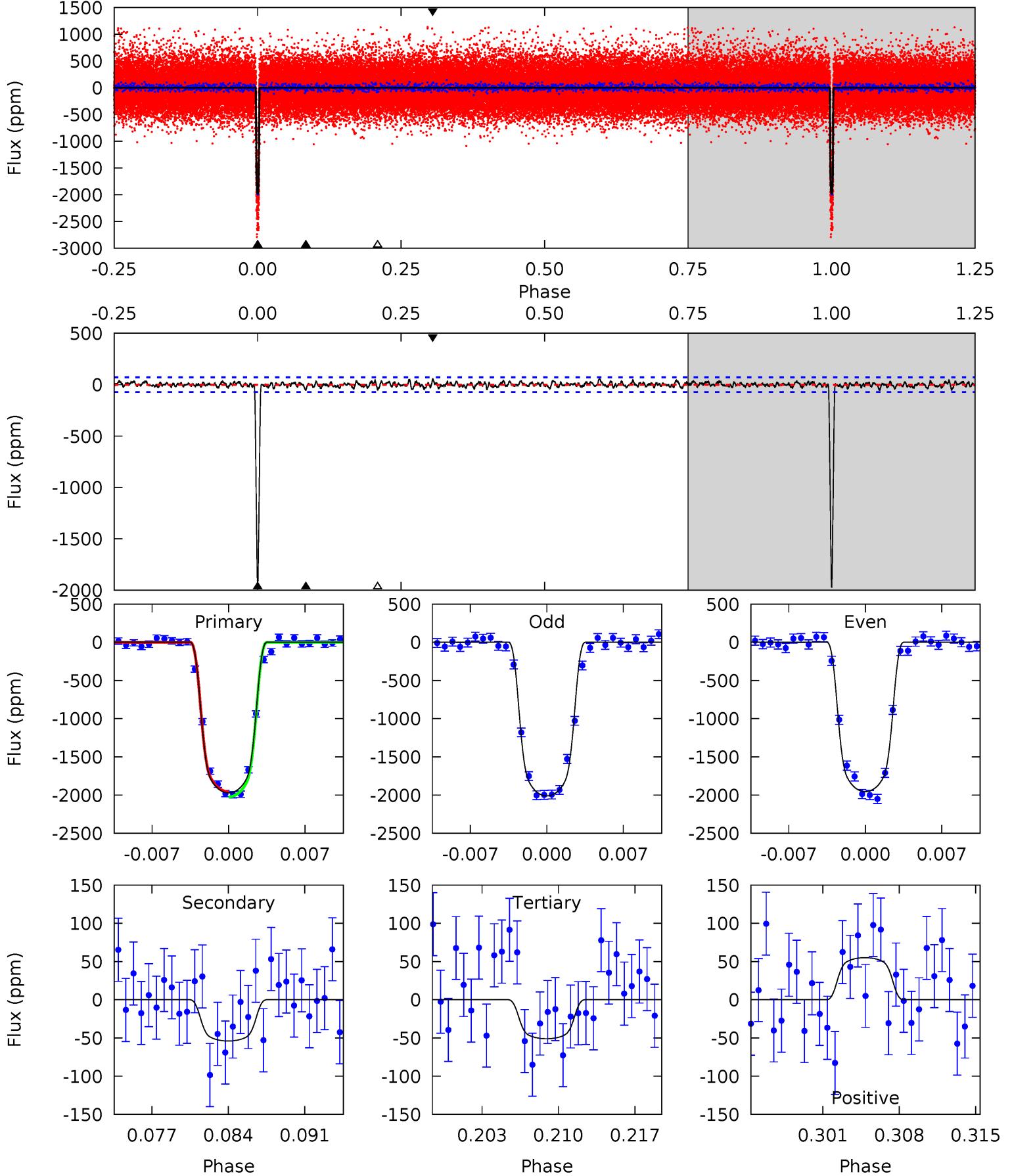
TCE 005031857-01 P= 24.811368 Days  $T_0=131.685503$  (BKJD)



# DV Model-Shift Uniqueness Test

005031857-01, P = 24.812113 Days, E = 106.854757 Days

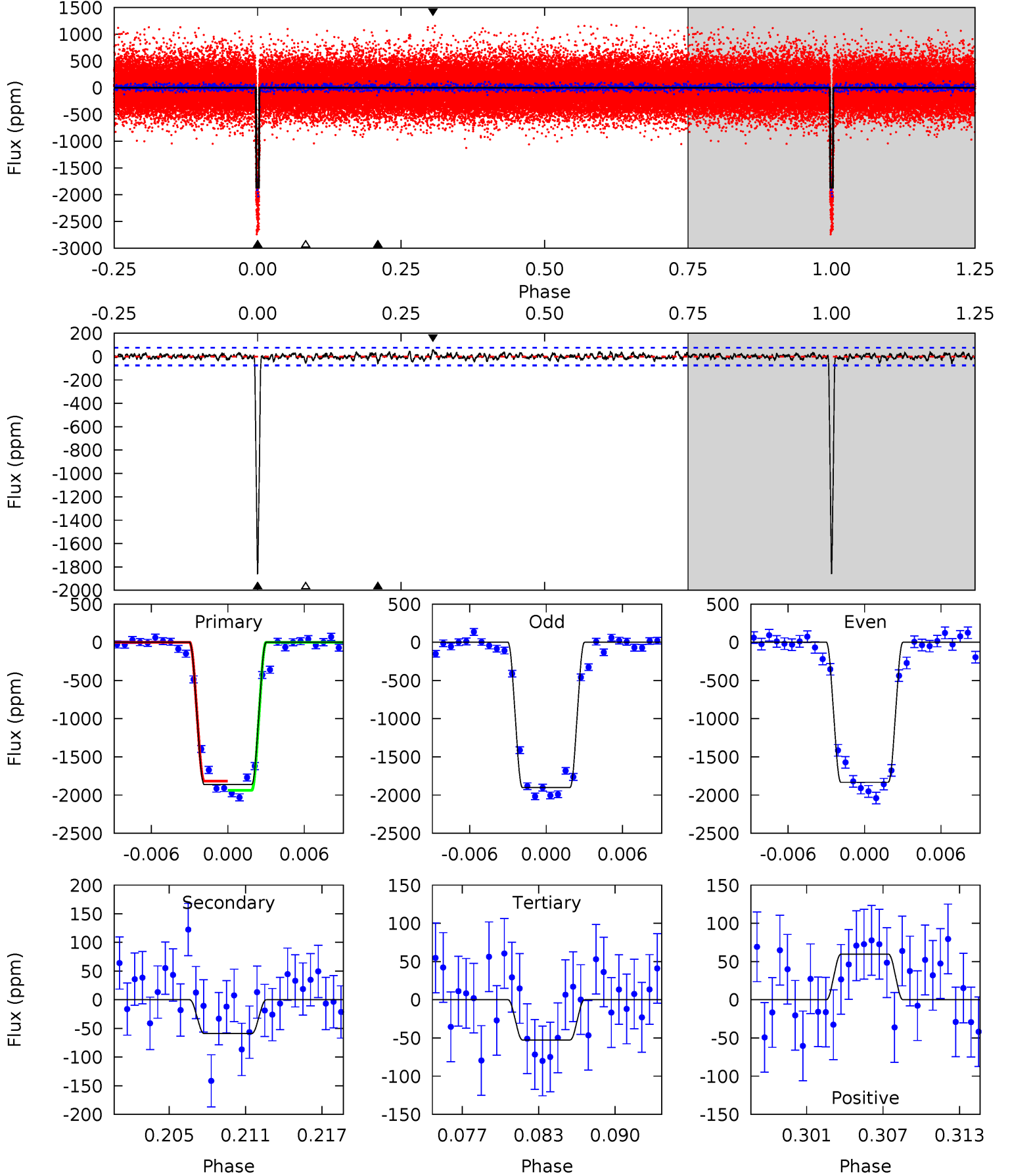
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
141.3	3.87	3.65	3.95	5.09	2.70	1.21	137.6	137.3	0.21	-0.08	2.03	0.90	0.03	2.43



# Alt Model-Shift Uniqueness Test

005031857-01,  $P = 24.811368$  Days,  $E = 106.874135$  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
126.2	4.00	3.57	4.05	5.11	2.73	1.06	122.7	122.2	0.43	-0.05	2.36	0.97	0.03	4.06



### Stellar Parameters For KIC 005031857

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6086^{+182}_{-200}$	$4.511^{+0.052}_{-0.221}$	$-0.260^{+0.300}_{-0.300}$	$0.921^{+0.288}_{-0.096}$	$1.003^{+0.129}_{-0.129}$	$1.808^{+0.385}_{-0.972}$
	+3%/-3%	+1%/-5%	+115%/-115%	+31%/-10%	+13%/-13%	+21%/-54%
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 005031857-01 / KOI 1573.01

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-54 \pm 14$	$4.96^{+0.72}_{-0.45}$	$907^{+60}_{-49}$	$3044^{+120}_{-129}$	$32^{+12}_{-10}$
Alt.	$-59 \pm 15$	$4.44^{+0.78}_{-0.35}$	$901^{+79}_{-45}$	$3163^{+135}_{-135}$	$42^{+16}_{-13}$

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

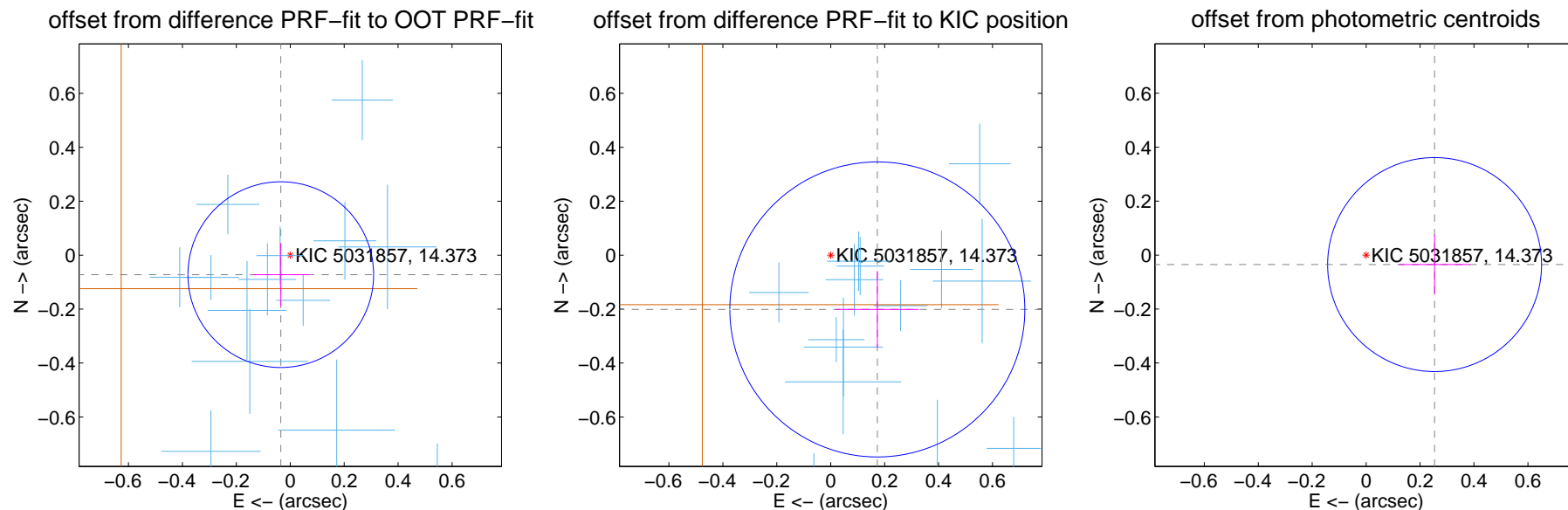
## DV Centroid Data

Supplemental centroid analysis for 005031857-01. Kepler magnitude: 14.37. Transit SNR 95.94

There are 15 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.16 arcsec

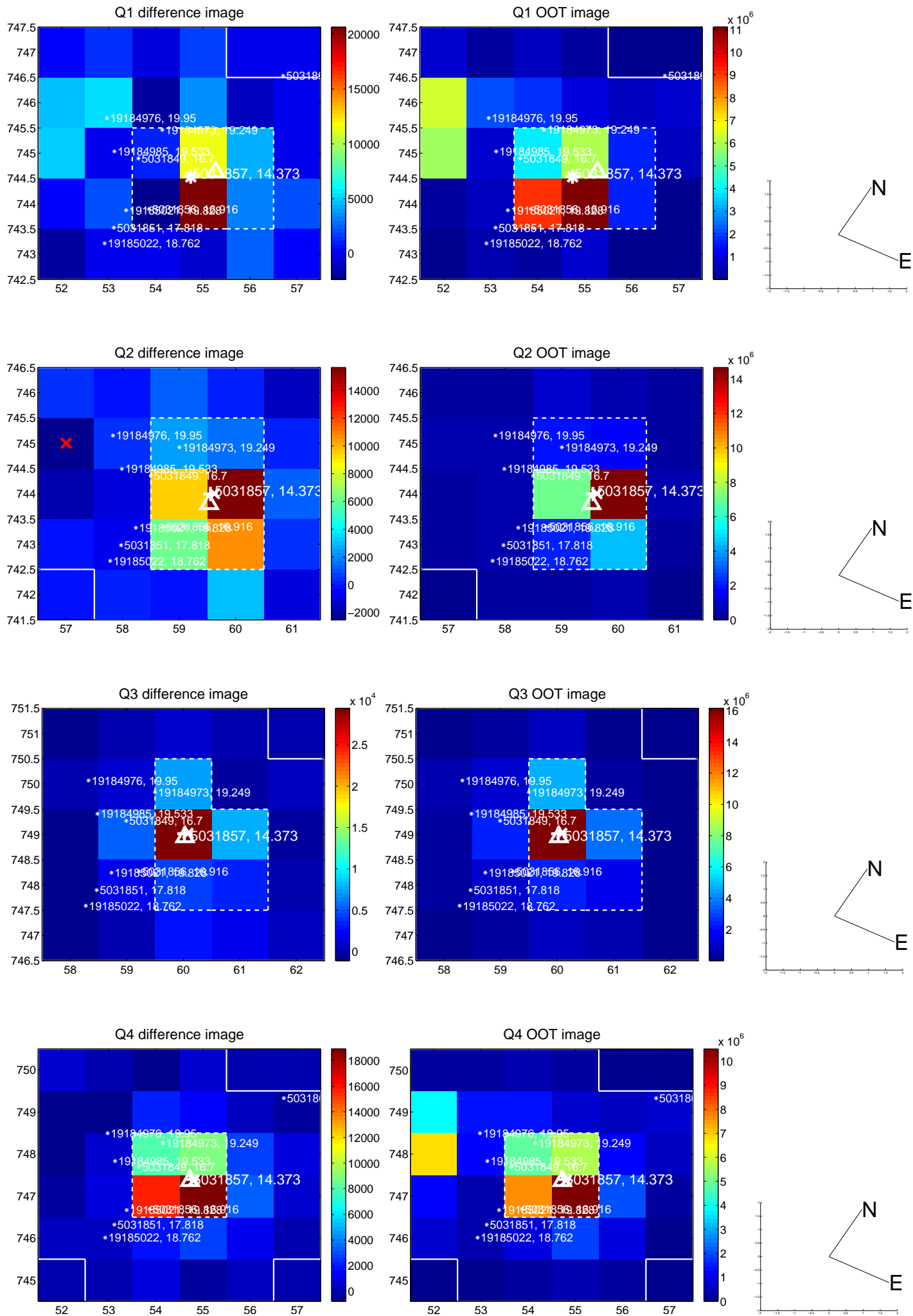
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.080 \pm 0.115$	0.70	$0.035 \pm 0.104$	$-0.072 \pm 0.117$
PRF-fit source offset from KIC position	$0.265 \pm 0.182$	1.46	$-0.173 \pm 0.154$	$-0.201 \pm 0.142$
photometric centroid source offset	$0.26 \pm 0.13$	1.94	$-0.25 \pm 0.13$	$-0.04 \pm 0.11$



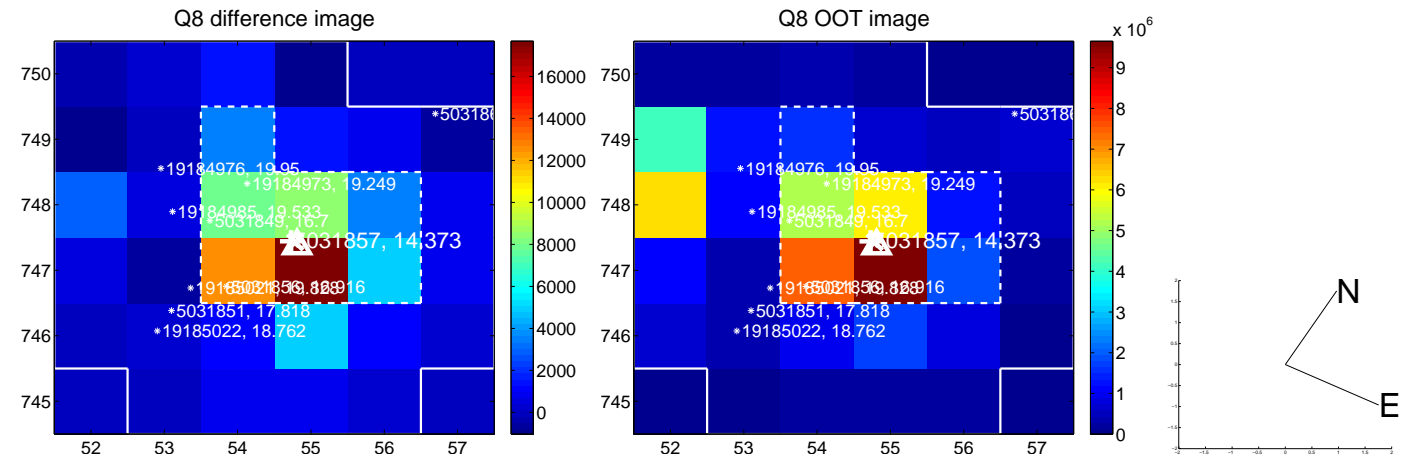
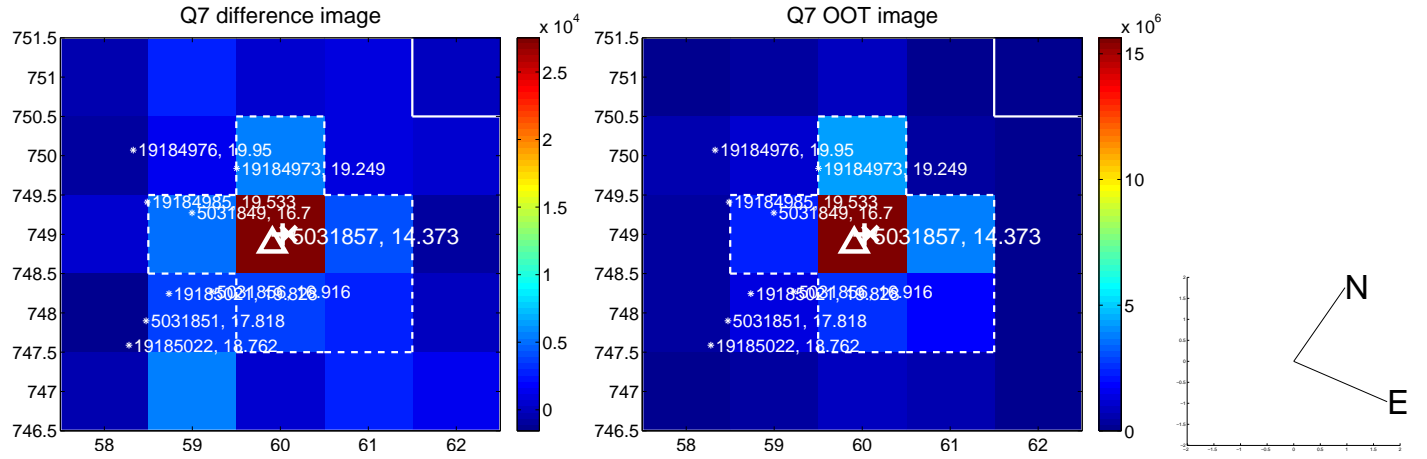
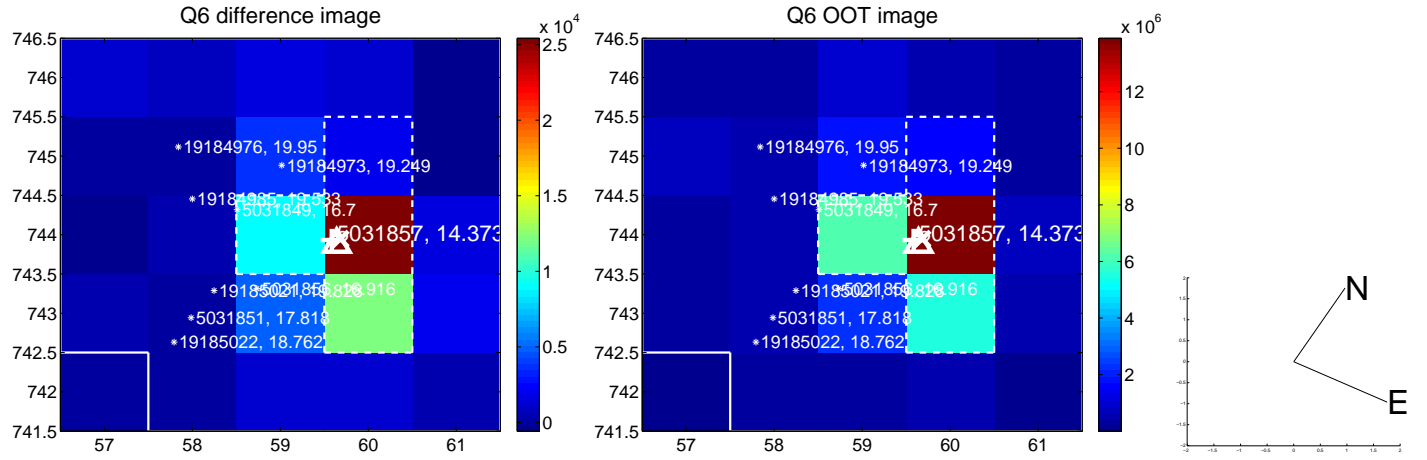
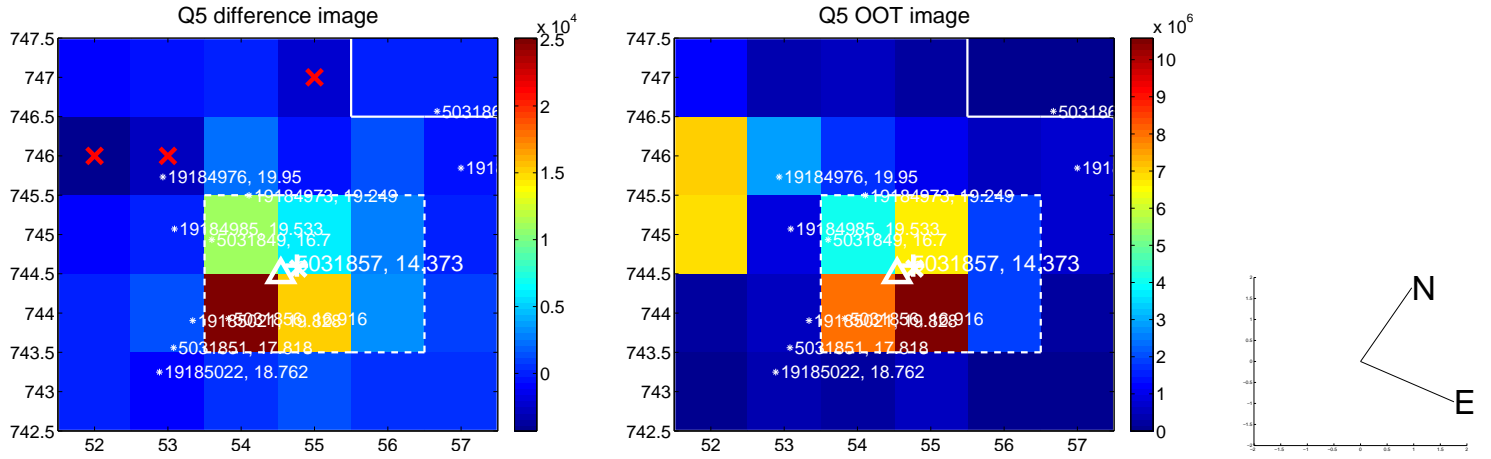
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



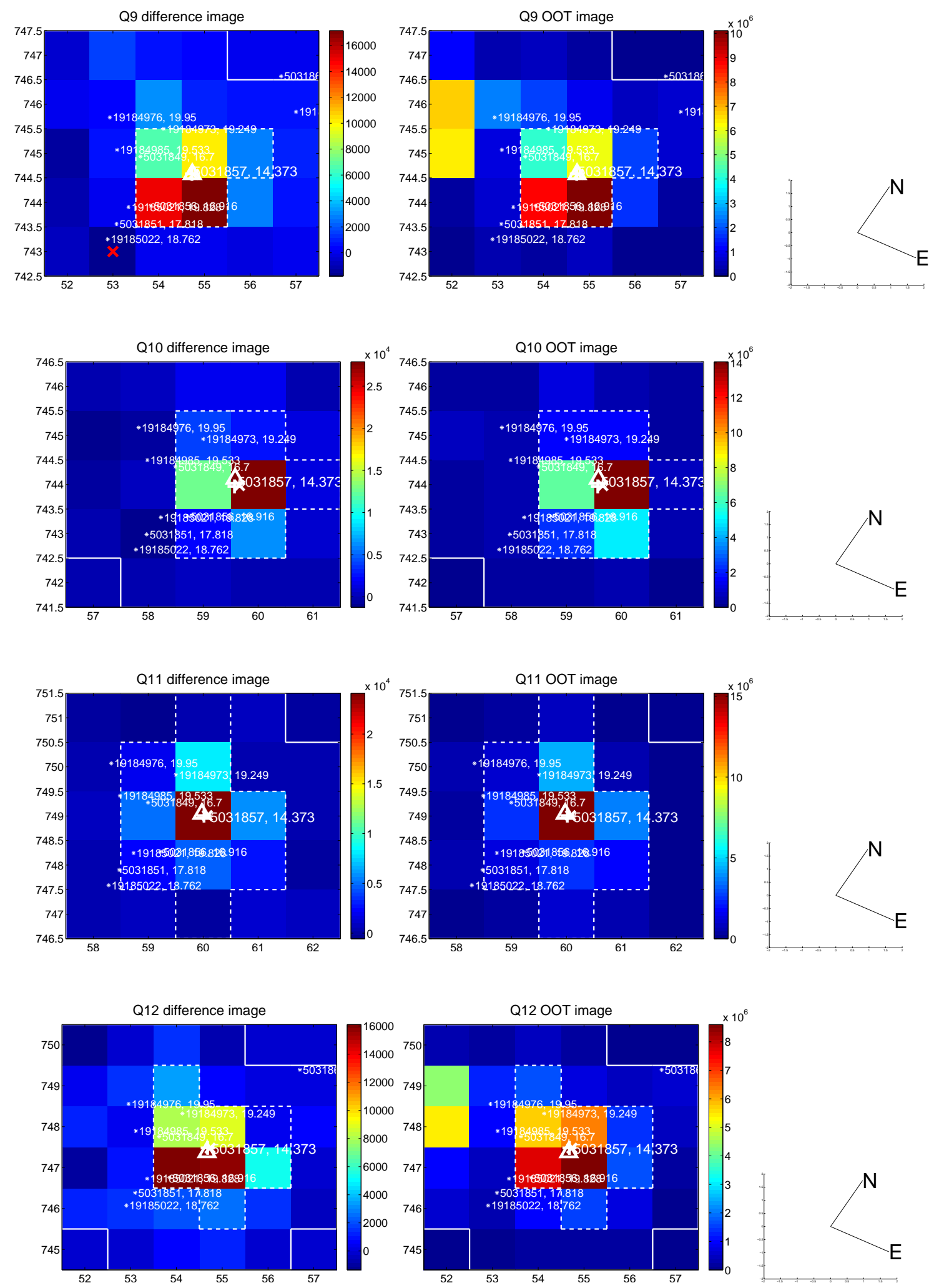
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



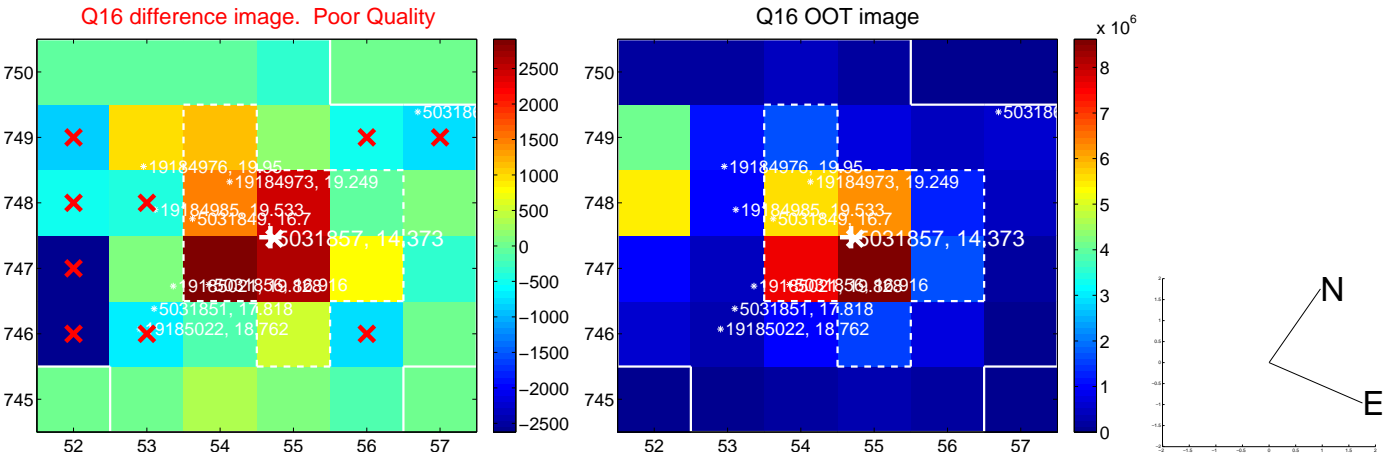
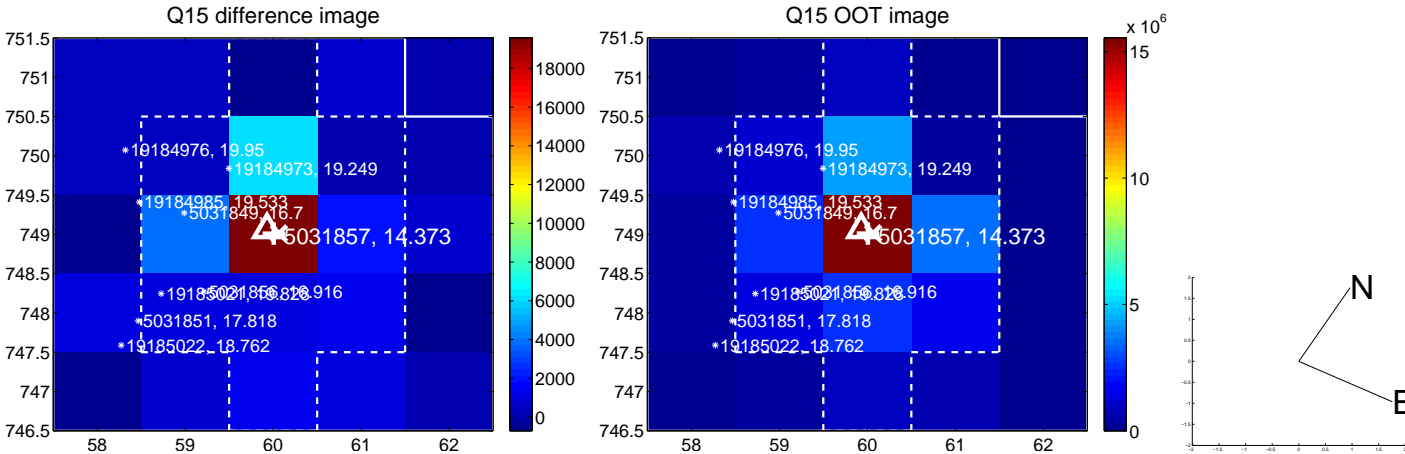
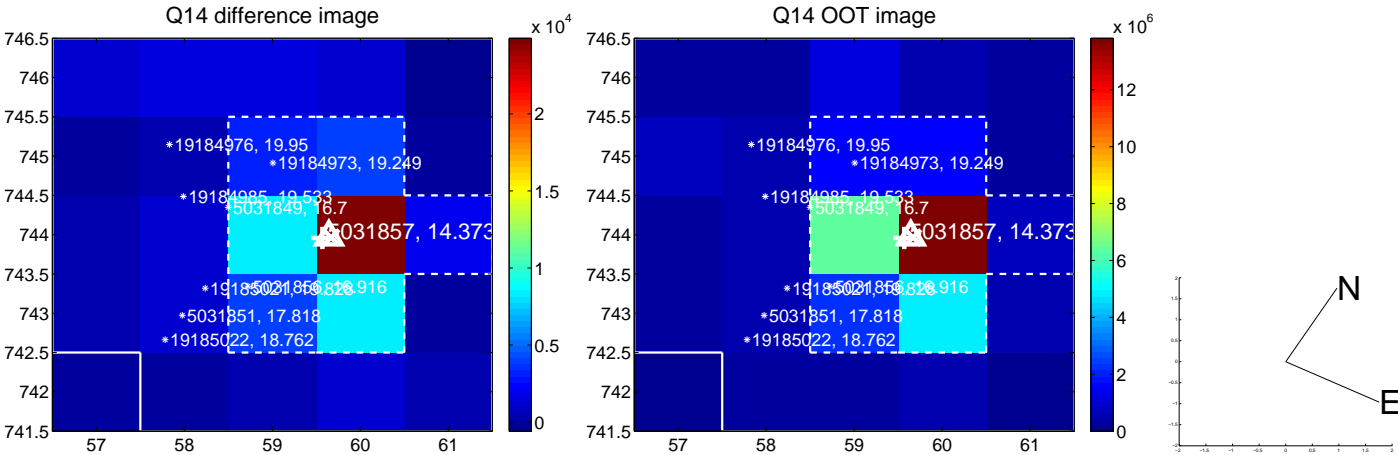
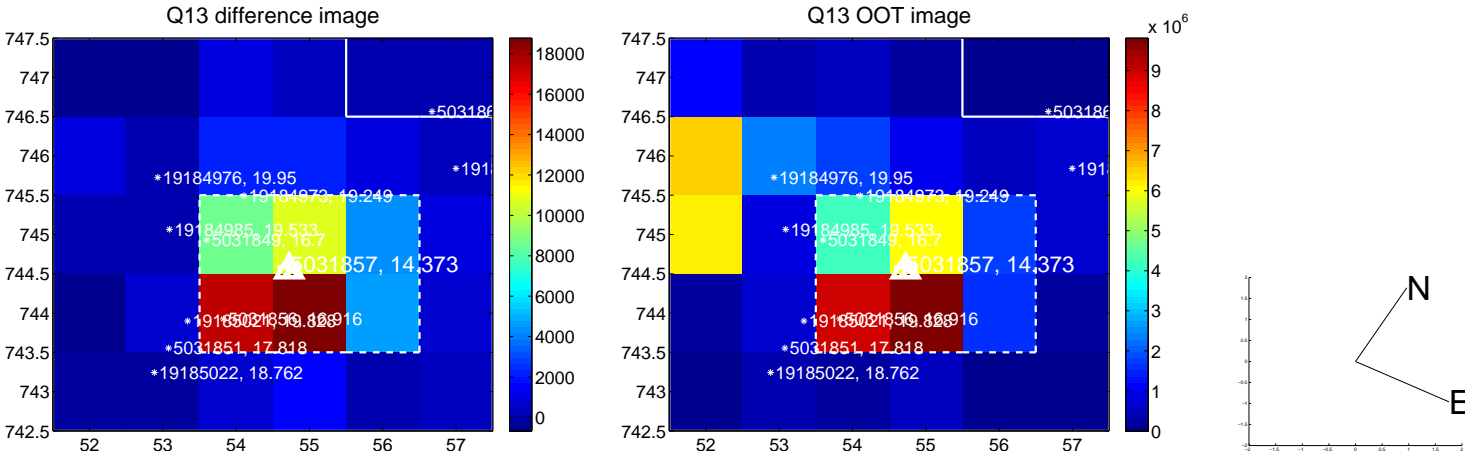
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



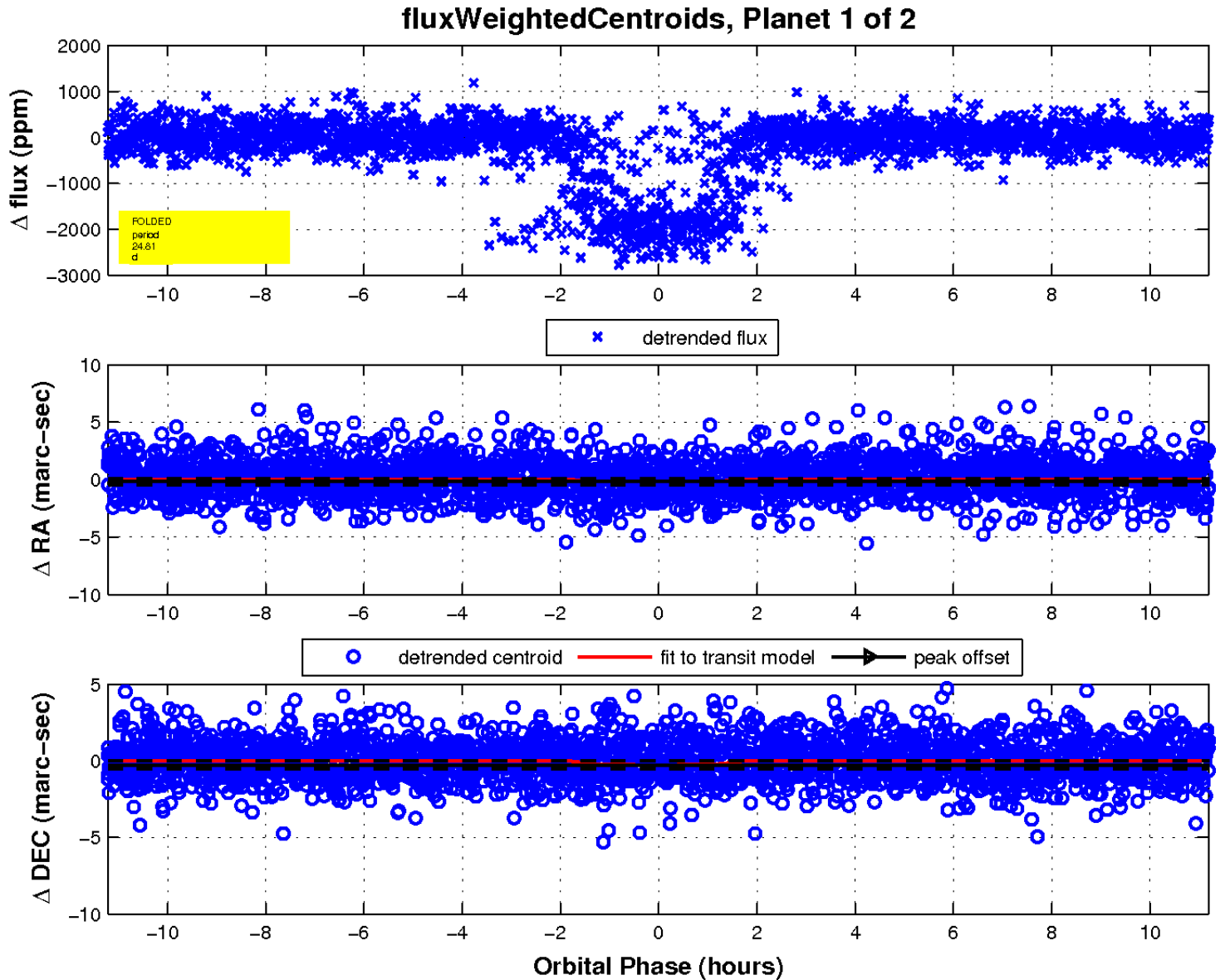
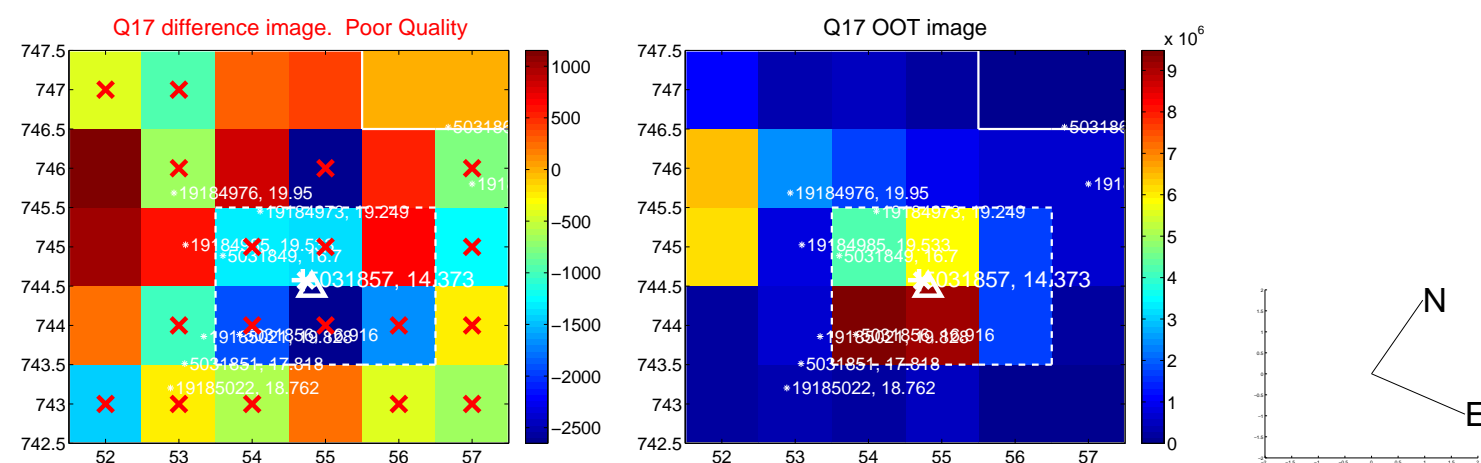
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

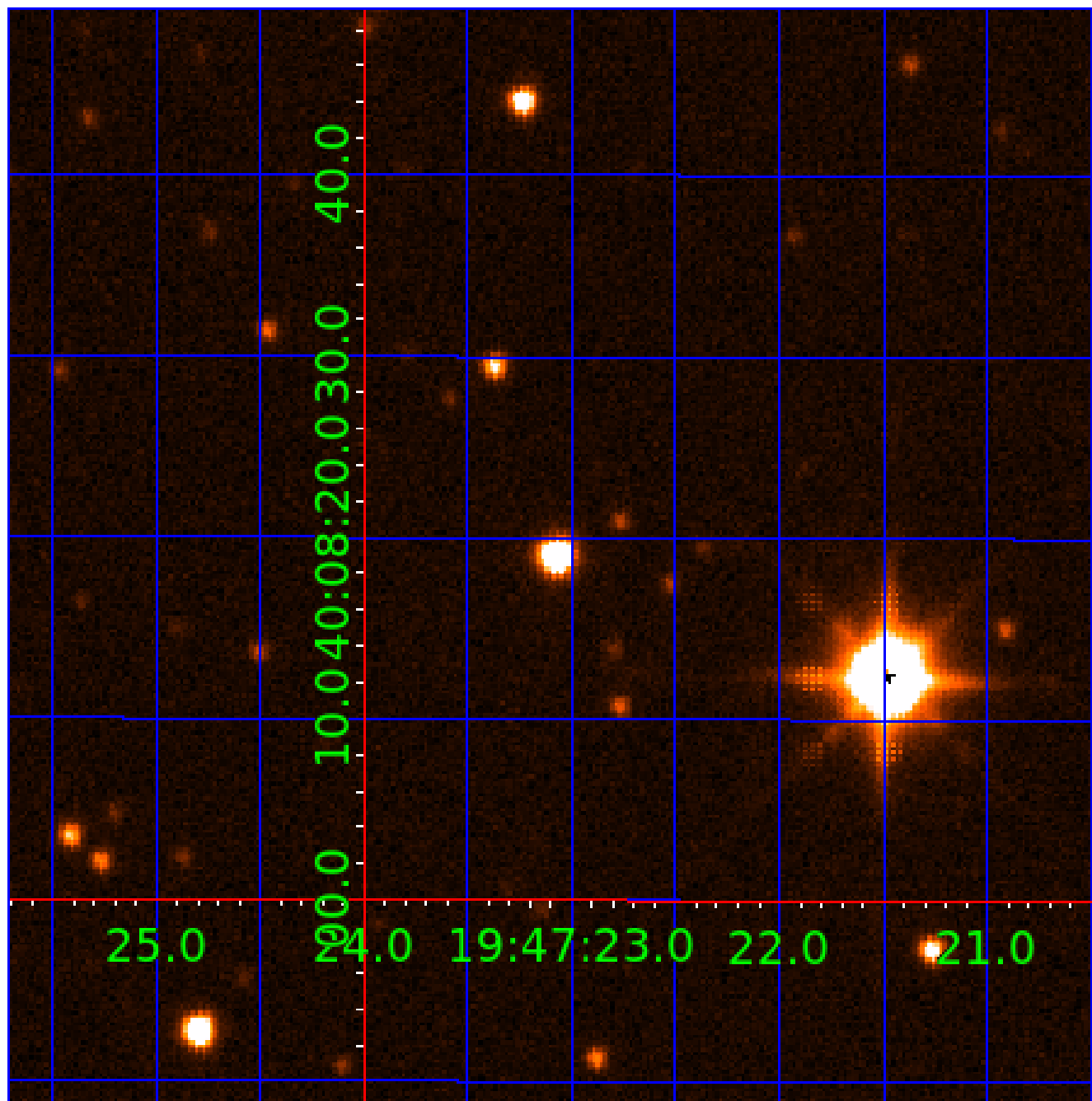


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 005031857

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005031857-01	OBS	1573.01	24.812113	131.666871	2016.4	3.738	91.7	95.9	0.92	6086	4.77	37.51
005031857-02	OBS	1573.02	7.136892	131.757319	147.6	3.010	13.6	14.9	0.92	6086	1.31	197.57

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005031857-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
005031857-02	OBS	PC	1.00	0	0	0	0	NO_COMMENT

**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 005031857-02

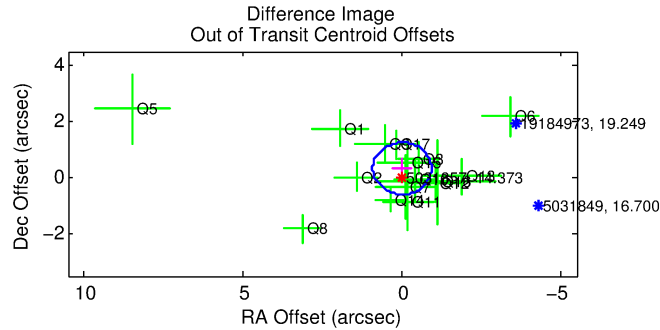
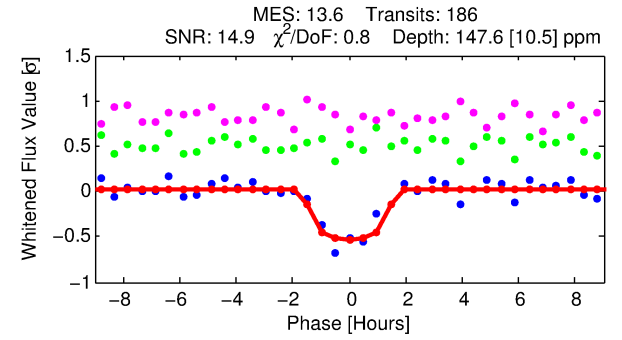
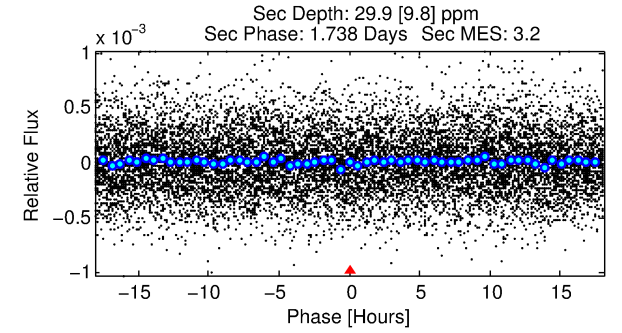
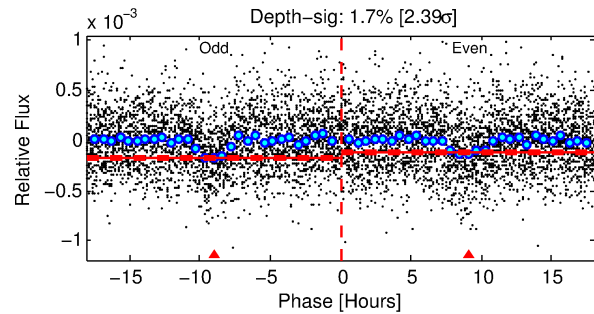
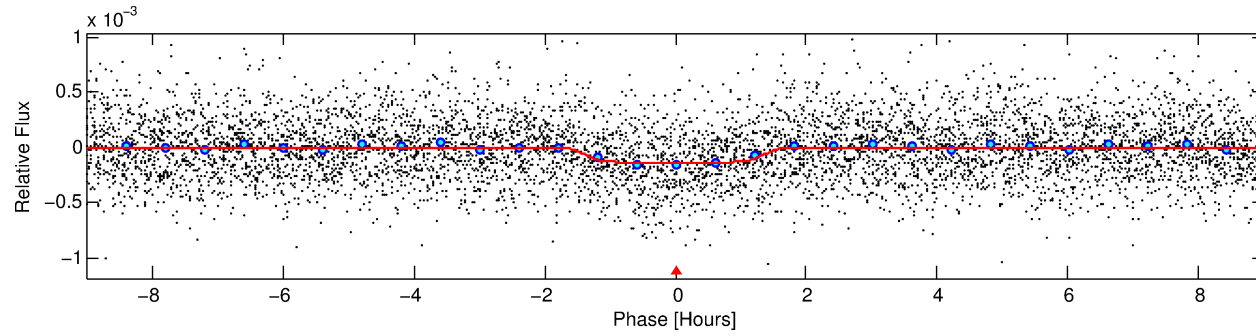
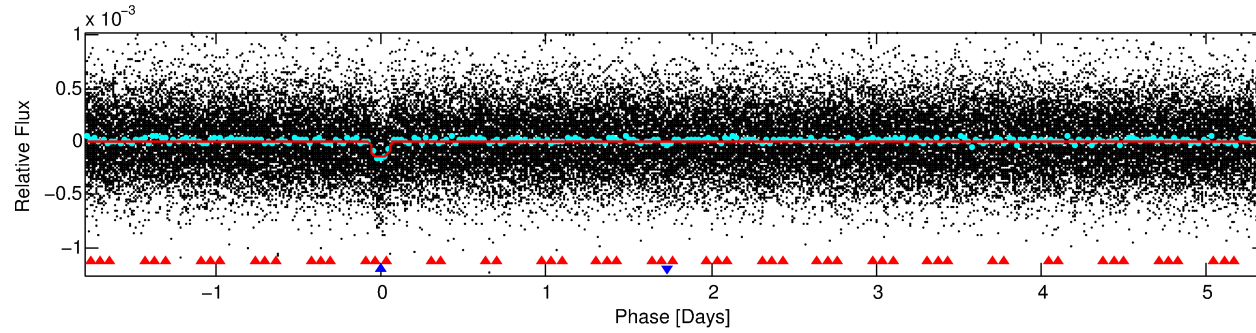
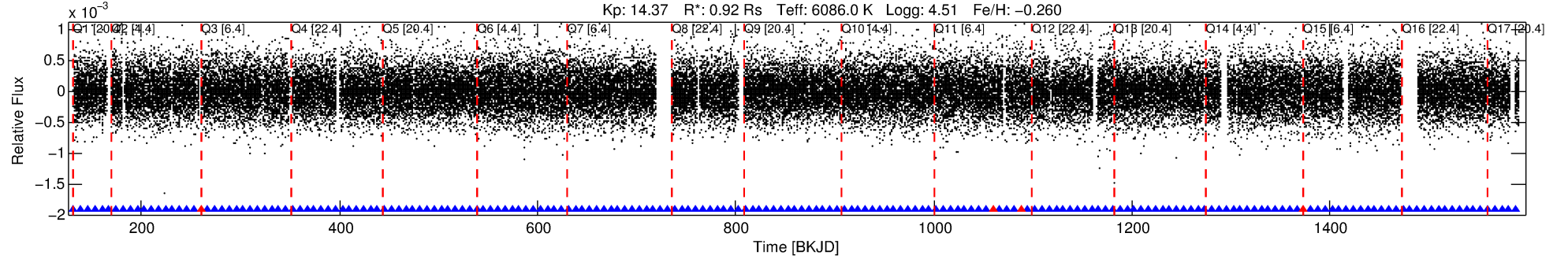
No Significant Match Found

# DV One-Page Summary

KIC: 5031857 Candidate: 2 of 2 Period: 7.137 d

KOI: K01573.02 Corr: 0.920

Kp: 14.37 R\*: 0.92 Rs Teff: 6086.0 K Logg: 4.51 Fe/H: -0.260



## DV Fit Results:

Period = 7.13689 [0.00004] d  
Epoch = 131.7573 [0.0040] BKJD  
Rp/R\* = 0.0130 [0.0052]  
a/R\* = 8.71 [18.22]  
b = 0.89 [0.49]  
Seff = 197.57 [82.84]  
Teq = 956 [100] K  
Rp = 1.31 [0.66] Re  
a = 0.0726 [0.0195] AU  
Ag = 50.73 [48.25] [1.03σ]  
Teffp = 3945 [862] K [3.45σ]

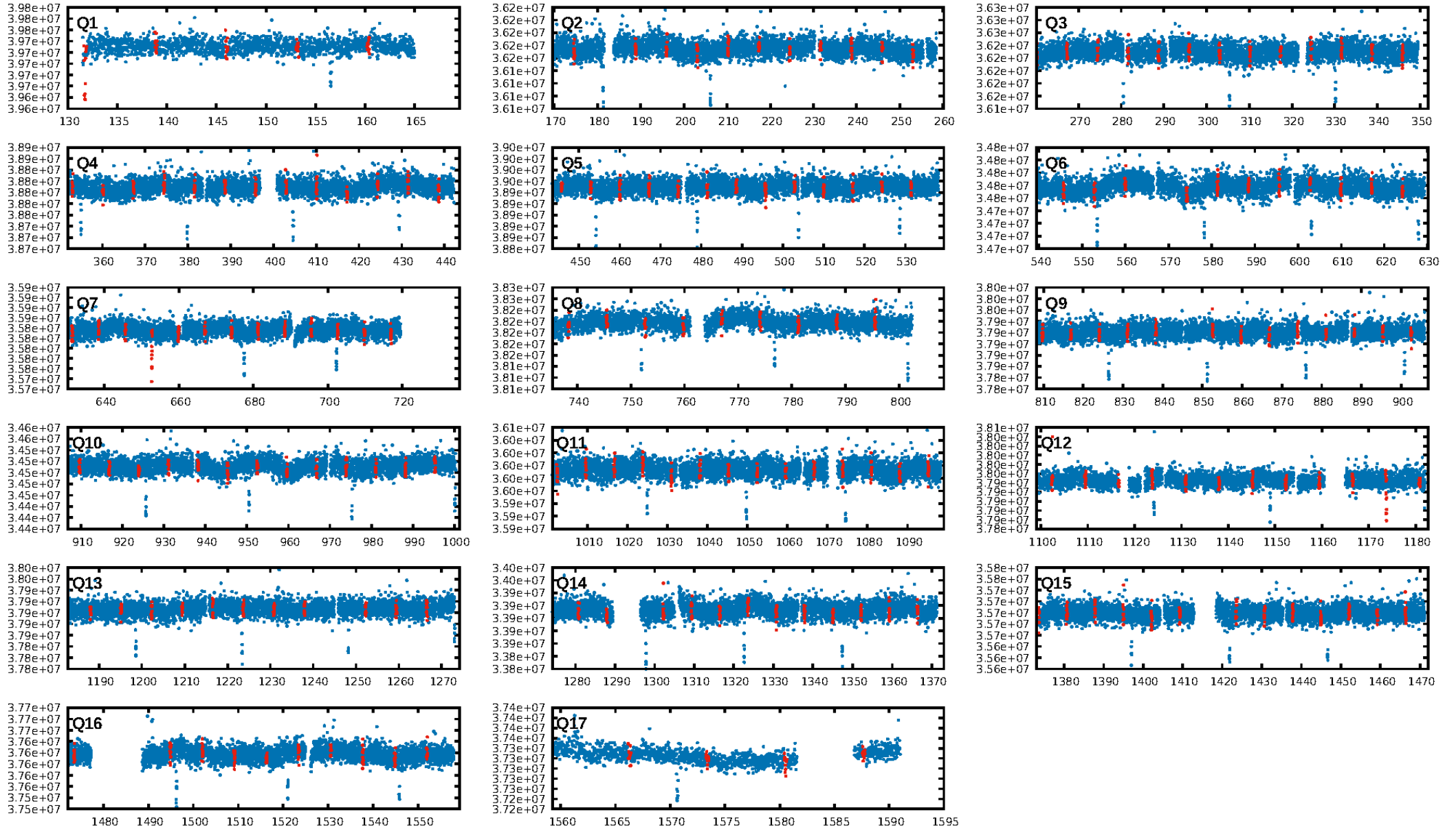
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [88.39σ]  
ModelChiSquare2-sig: 100.0%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 4.27e-41  
RollingBand-fgt: 0.98 [174/178]  
GhostDiagnostic-chr: 1.82  
Centroid-sig: 3.5%  
Centroid-so: 1.872 arcsec [1.93σ]  
OotOffset-rm: 0.328 arcsec [1.07σ]  
KicOffset-rm: 0.320 arcsec [0.70σ]  
OotOffset-st: 4/4/3/5 [16]  
KicOffset-st: 4/4/3/5 [16]  
DiffImageQuality-fgm: 0.50 [8/16]  
DiffImageOverlap-fno: 1.00 [17/17]

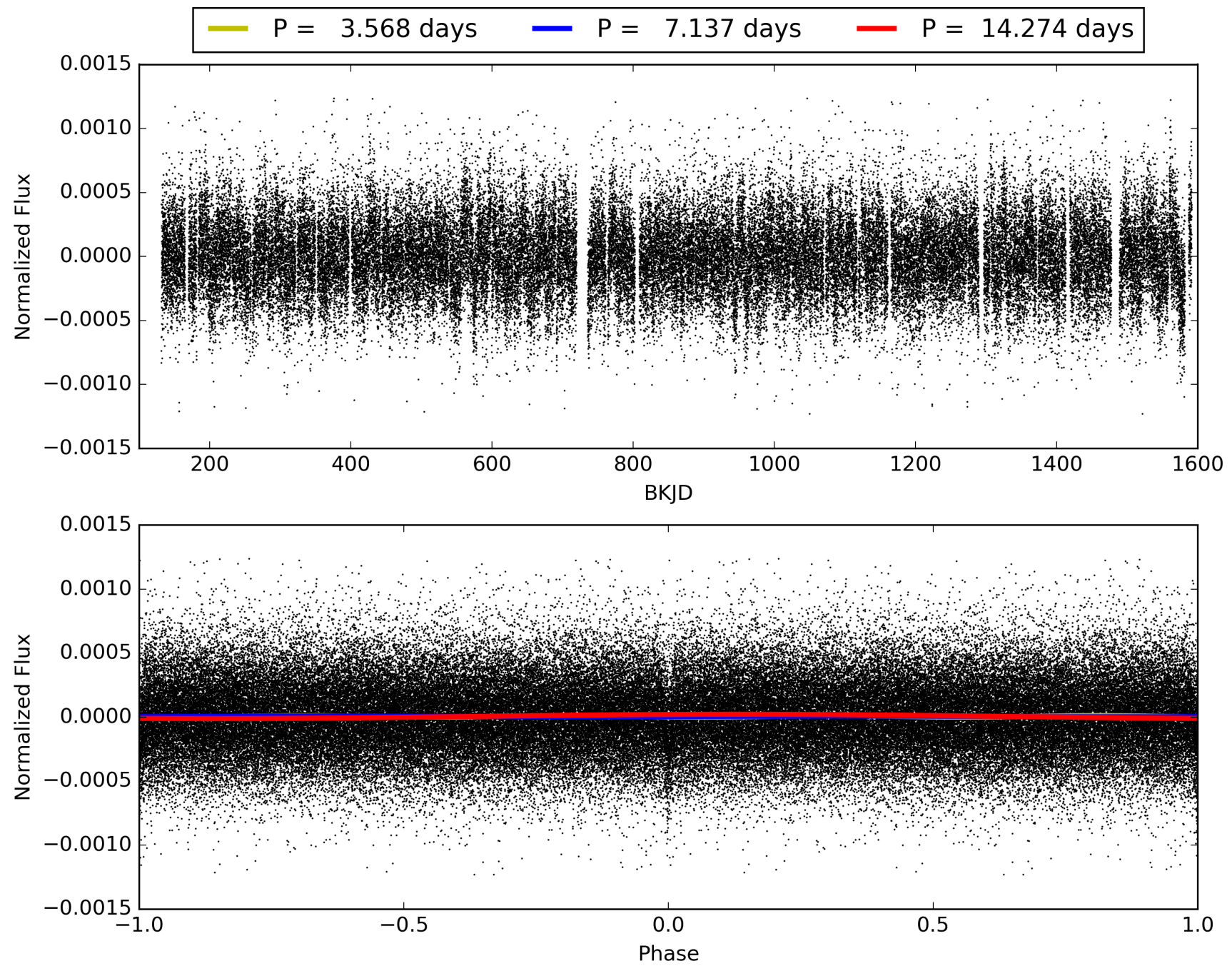
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 23:59:59 Z

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

# TCE 005031857-02, PDC Light Curves

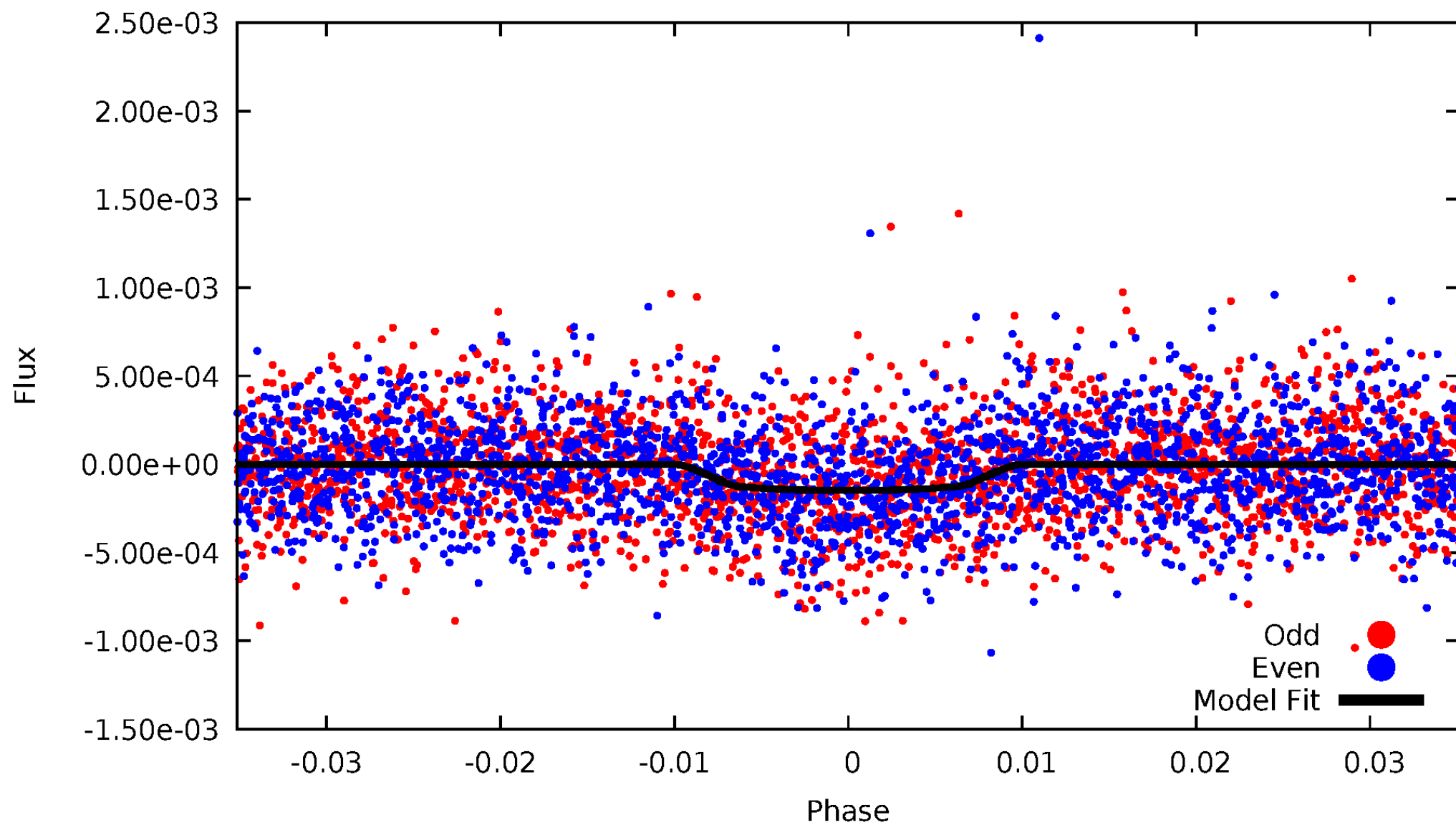


TCE 005031857-02



# DV Odd/Even

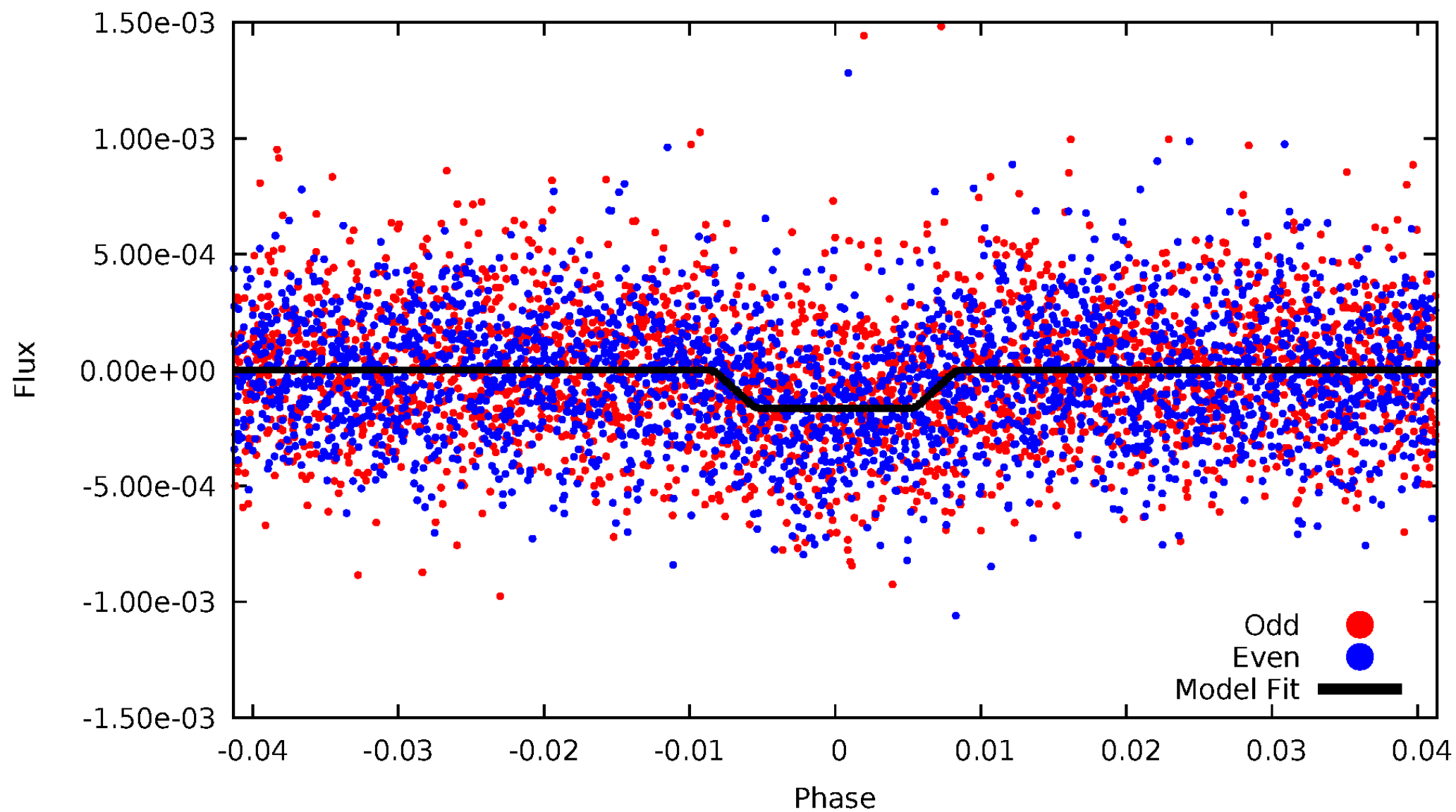
TCE 005031857-02





# ALT Odd/Even

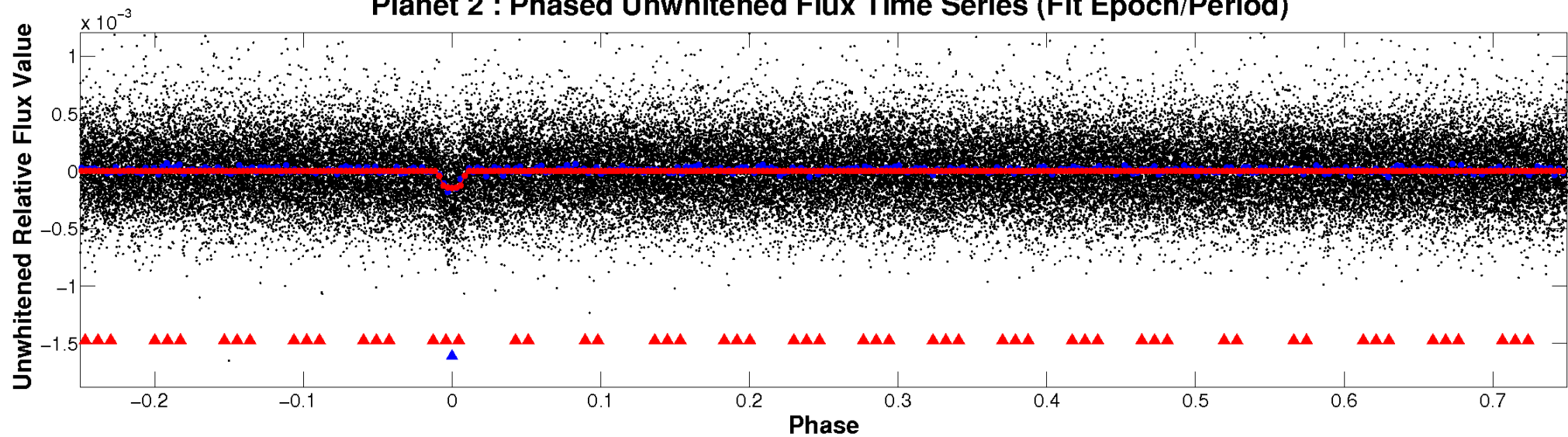
TCE 005031857-02



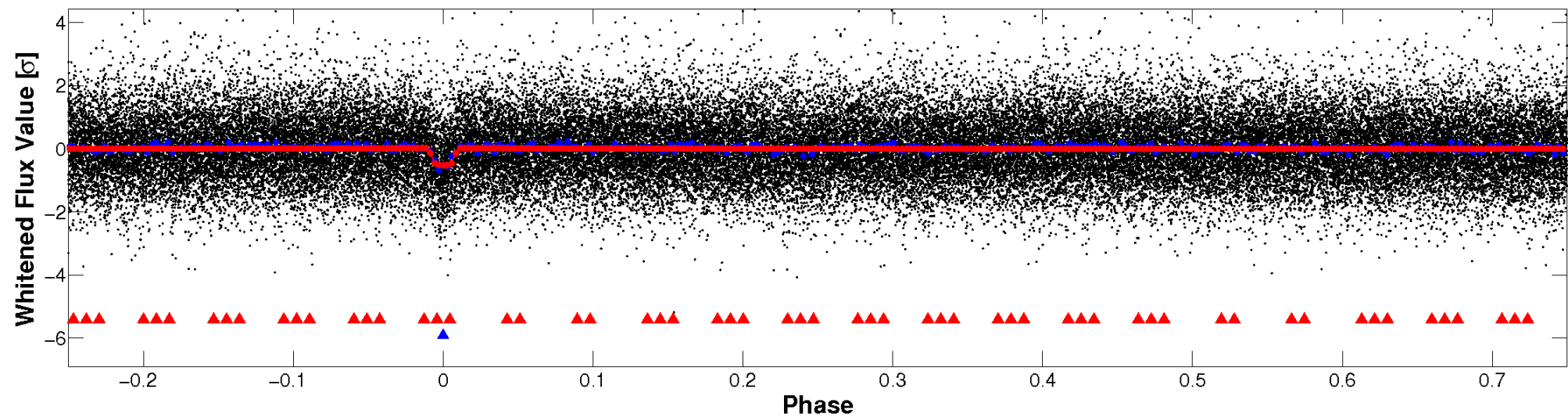


# Non-Whitened Vs. Whitened Light Curve

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

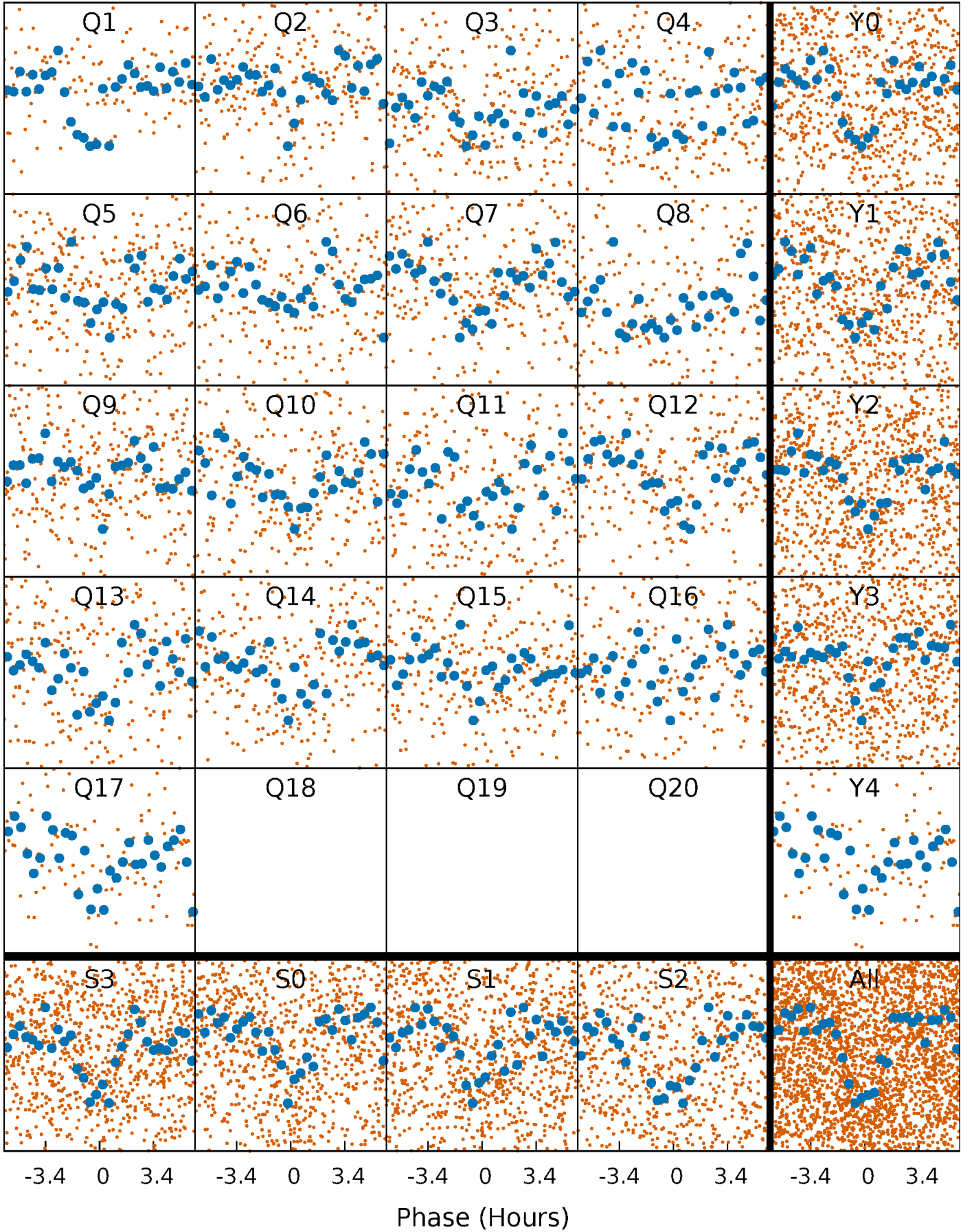


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



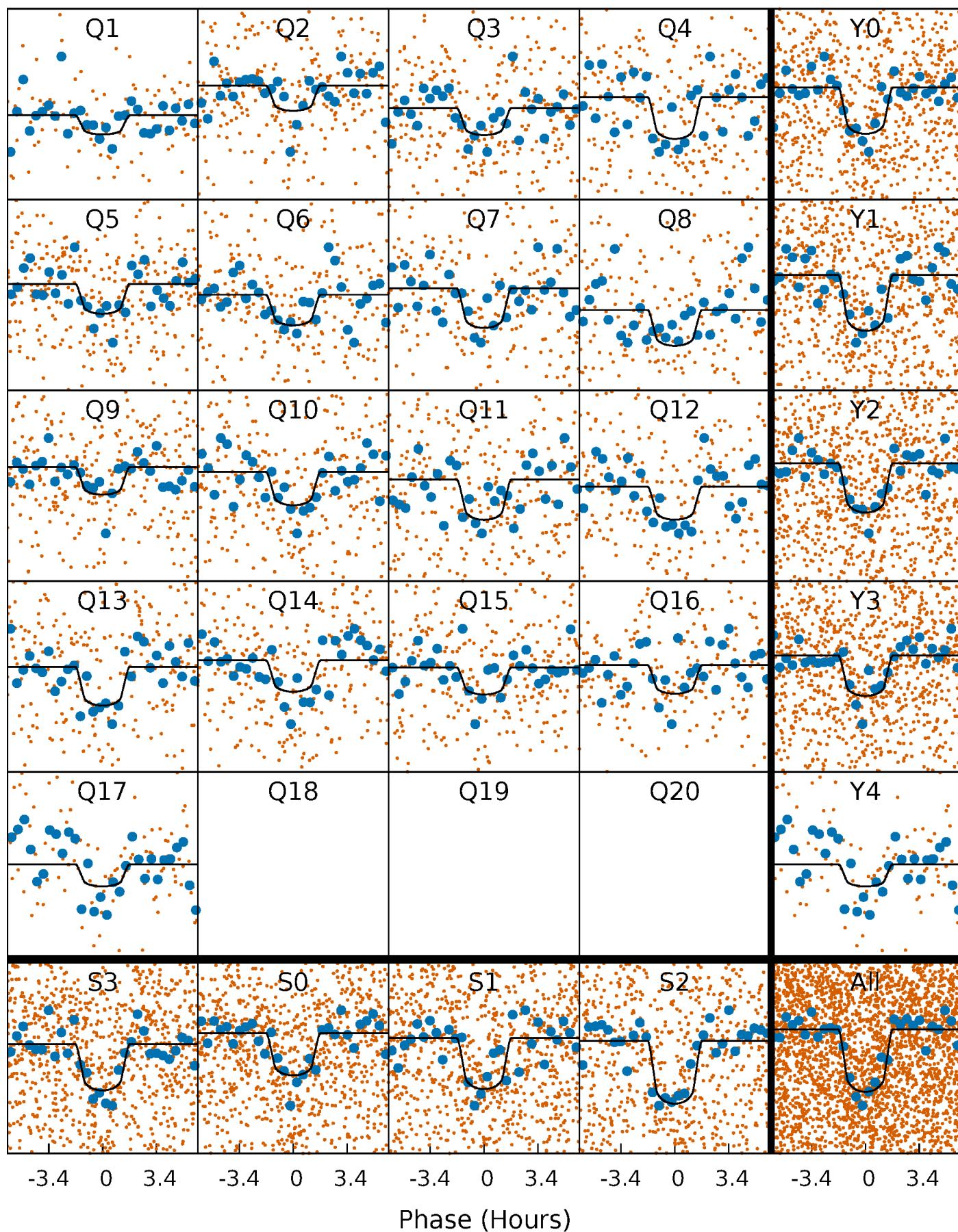
# PDC Quarter-Phased Transit Curves

TCE 005031857-02   P= 7.136892 Days    $T_0=131.757319$  (BKJD)



# DV Quarter-Phased Transit Curves

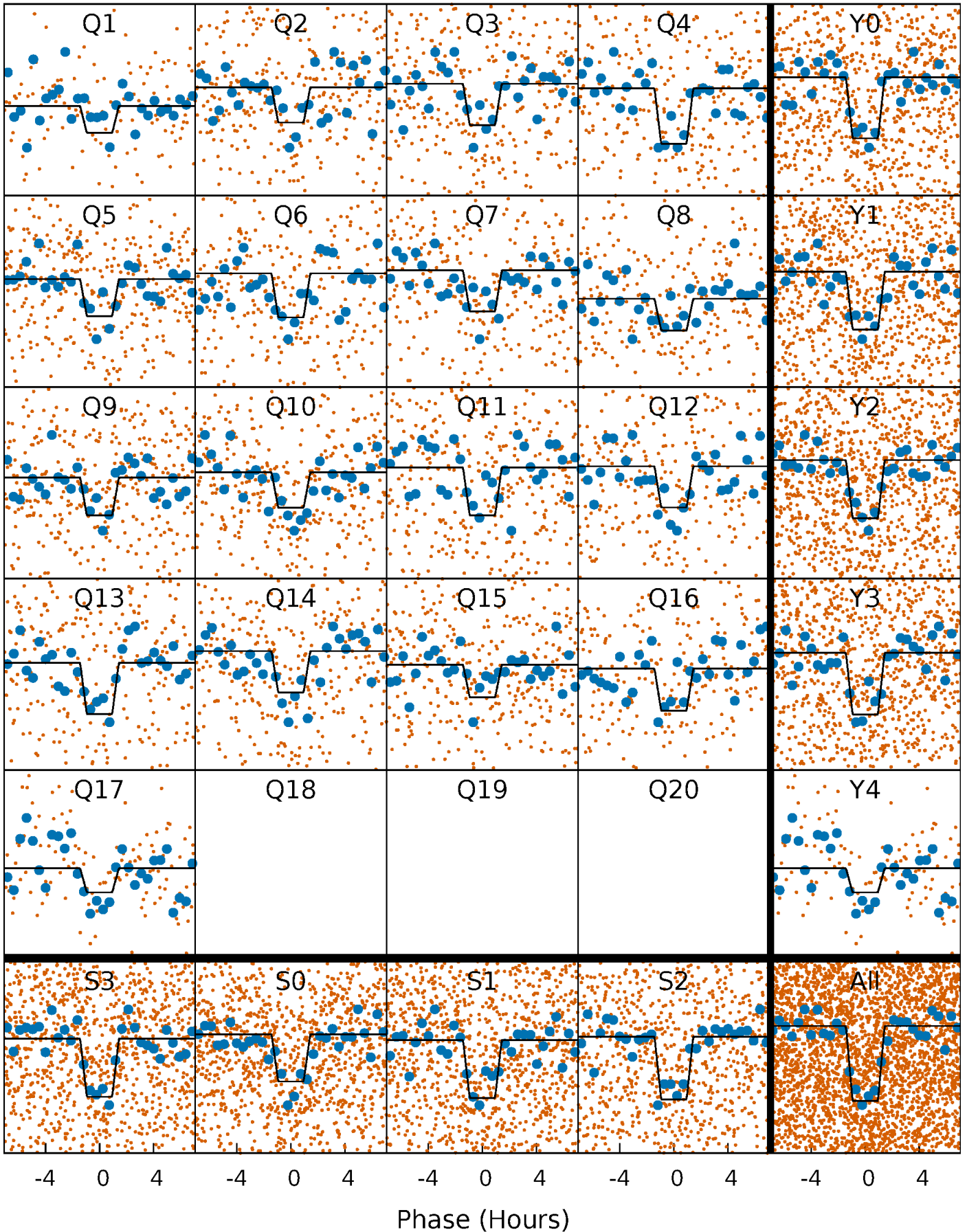
TCE 005031857-02 P= 7.136892 Days  $T_0=131.757319$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

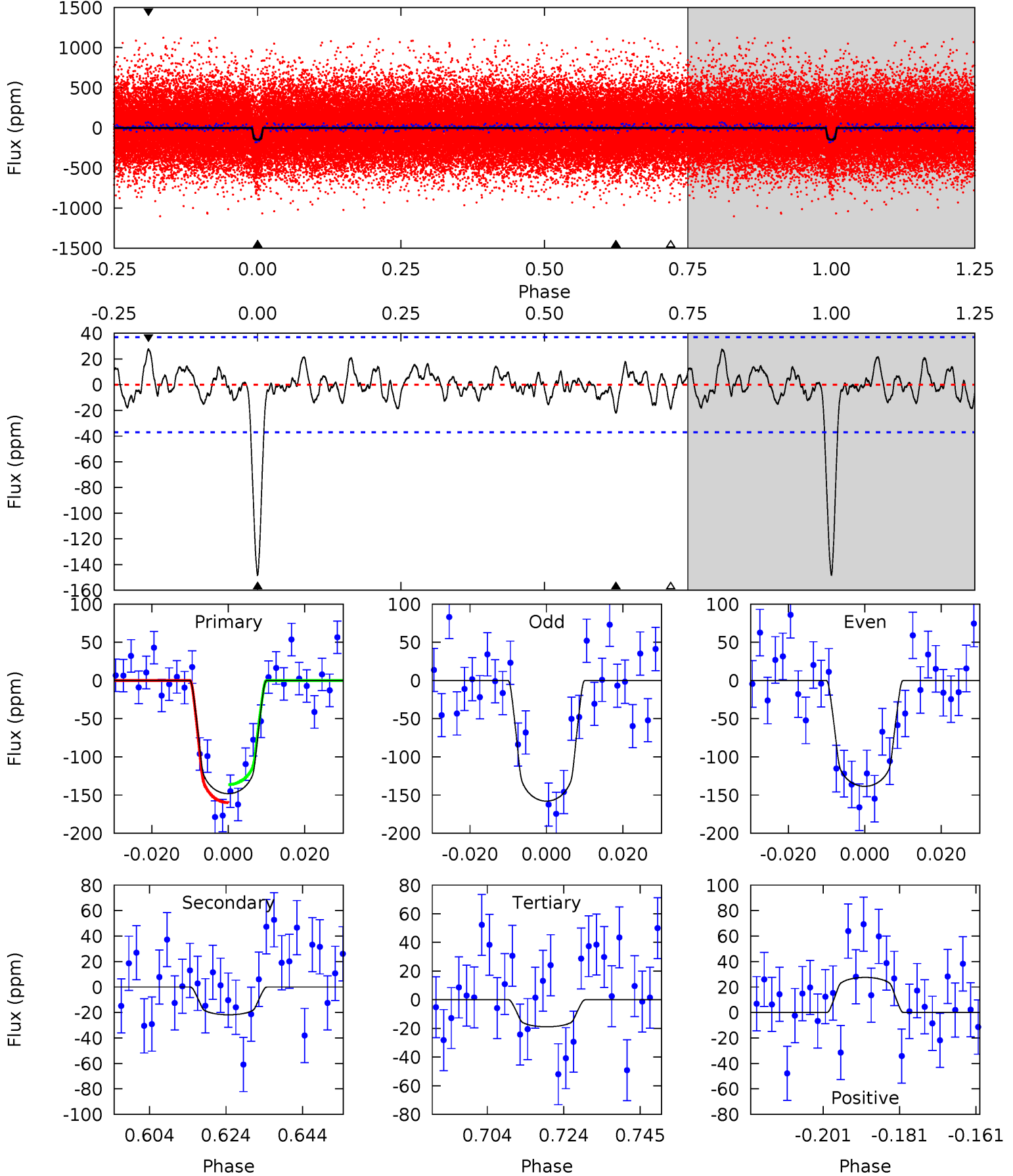
TCE 005031857-02   P= 7.136964 Days    $T_0=131.747855$  (BKJD)



# DV Model-Shift Uniqueness Test

005031857-02, P = 7.136892 Days, E = 131.757319 Days

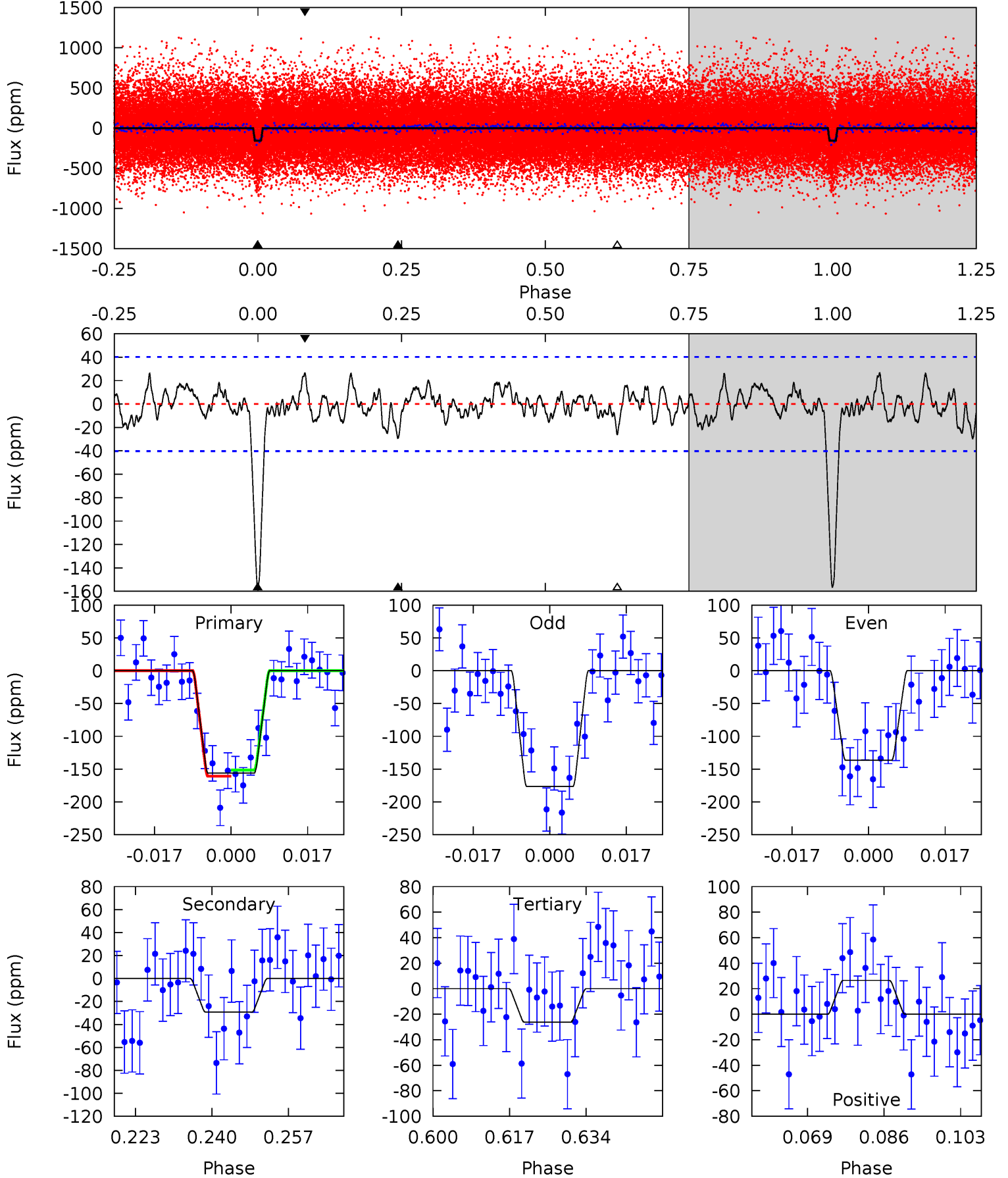
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
19.6	2.88	2.49	3.64	4.89	2.32	1.10	17.1	16.0	0.39	-0.76	1.28	1.04	0.16	1.56



# Alt Model-Shift Uniqueness Test

005031857-02, P = 7.136964 Days, E = 131.747855 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
19.1	3.59	3.22	3.25	4.92	2.38	1.18	15.9	15.9	0.37	0.34	2.45	1.00	0.15	0.58





### Stellar Parameters For KIC 005031857

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6086^{+182}_{-200}$	$4.511^{+0.052}_{-0.221}$	$-0.260^{+0.300}_{-0.300}$	$0.921^{+0.288}_{-0.096}$	$1.003^{+0.129}_{-0.129}$	$1.808^{+0.385}_{-0.972}$
	+3%/-3%	+1%/-5%	+115%/-115%	+31%/-10%	+13%/-13%	+21%/-54%
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 005031857-02 / KOI 1573.02

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-22 \pm 8$	$1.40^{+0.59}_{-0.59}$	$1370^{+108}_{-70}$	$3966^{+909}_{-500}$	$32^{+66}_{-18}$
Alt.	$-29 \pm 8$	$1.34^{+0.58}_{-0.52}$	$1369^{+108}_{-66}$	$4226^{+1012}_{-561}$	$47^{+83}_{-27}$

$T_{\text{max}}$  = 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

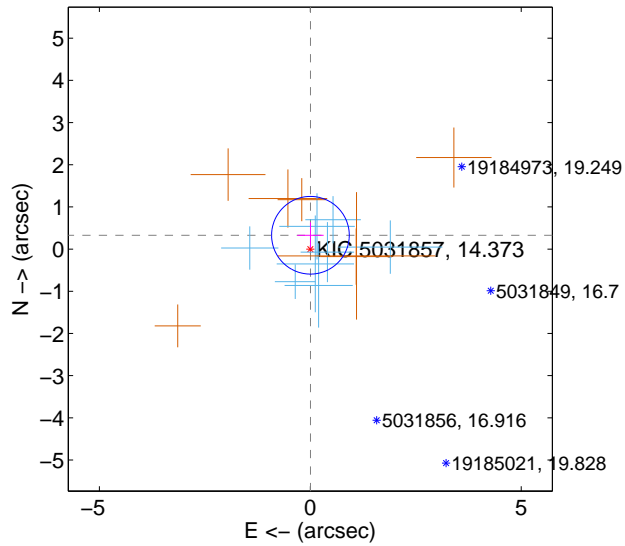
Supplemental centroid analysis for 005031857-02. Kepler magnitude: 14.37. Transit SNR 14.88

There are 8 quarters with good PRF difference image offsets

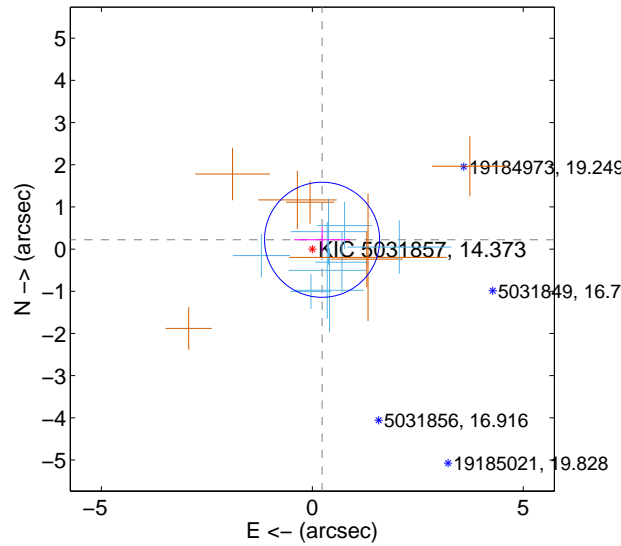
The direct PRF centroid is offset from the target star catalog position by about 0.16 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.328 \pm 0.307$	1.07	$-0.003 \pm 0.313$	$0.328 \pm 0.307$
PRF-fit source offset from KIC position	$0.320 \pm 0.455$	0.70	$-0.232 \pm 0.661$	$0.221 \pm 0.295$
photometric centroid source offset	$1.87 \pm 0.97$	1.93	$-1.81 \pm 0.98$	$0.49 \pm 0.84$

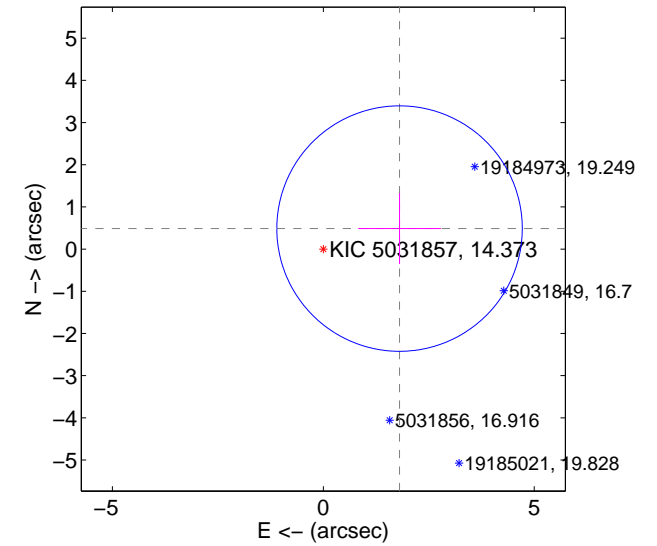
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

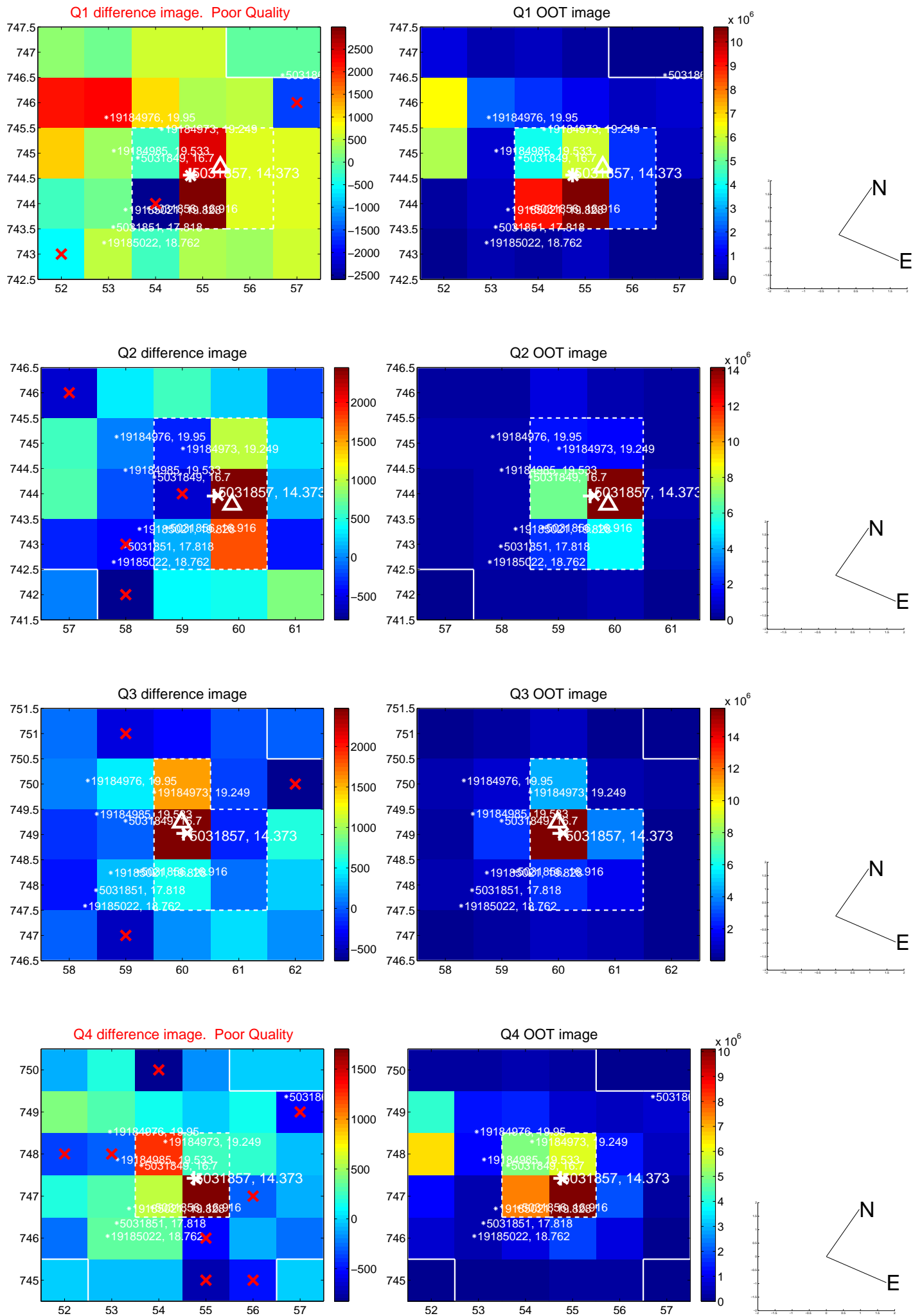


offset from photometric centroids

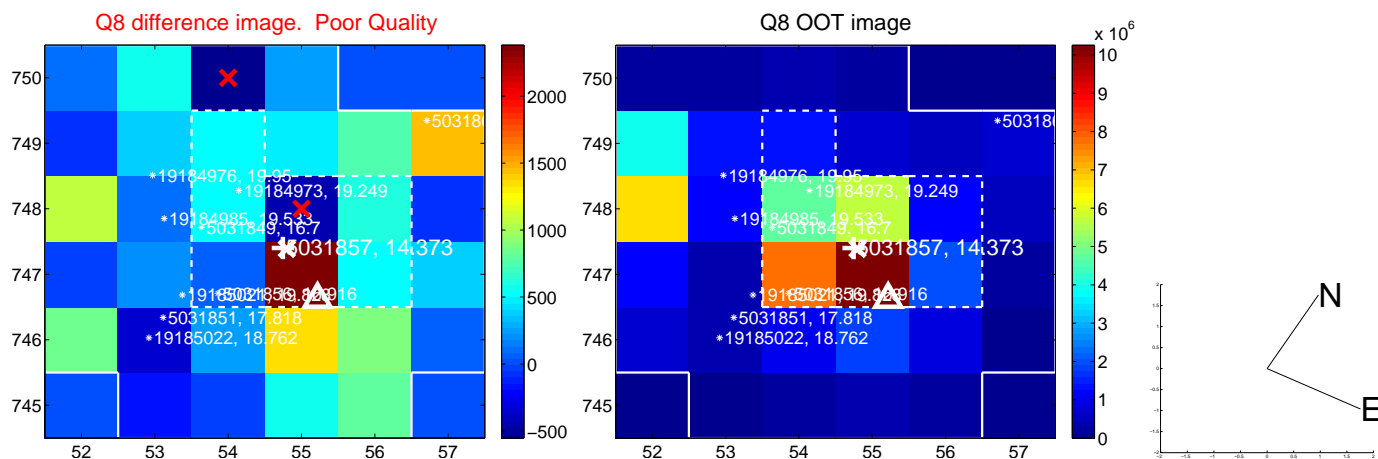
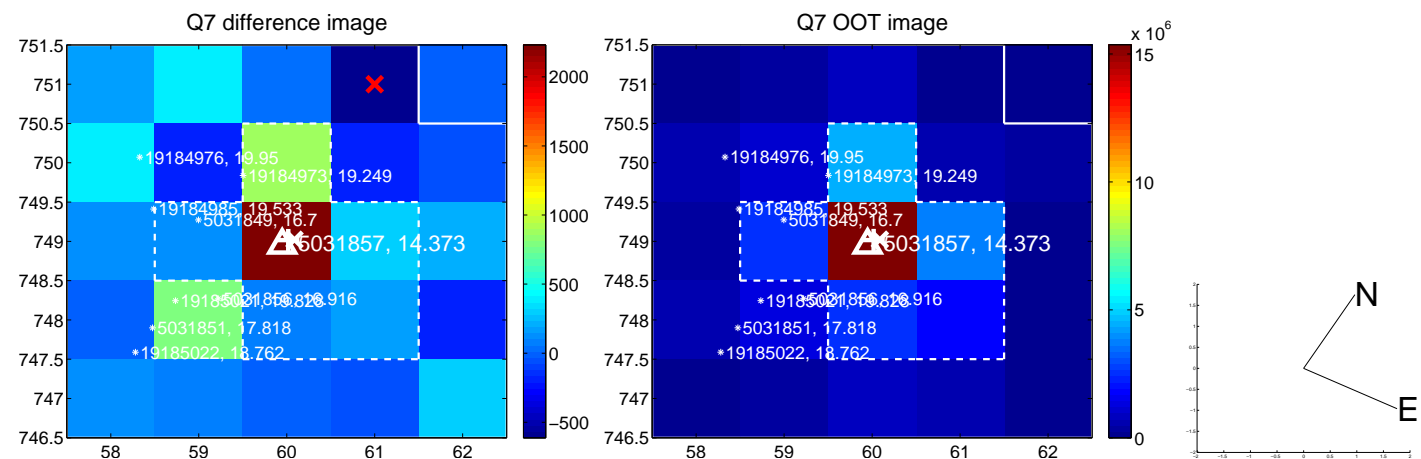
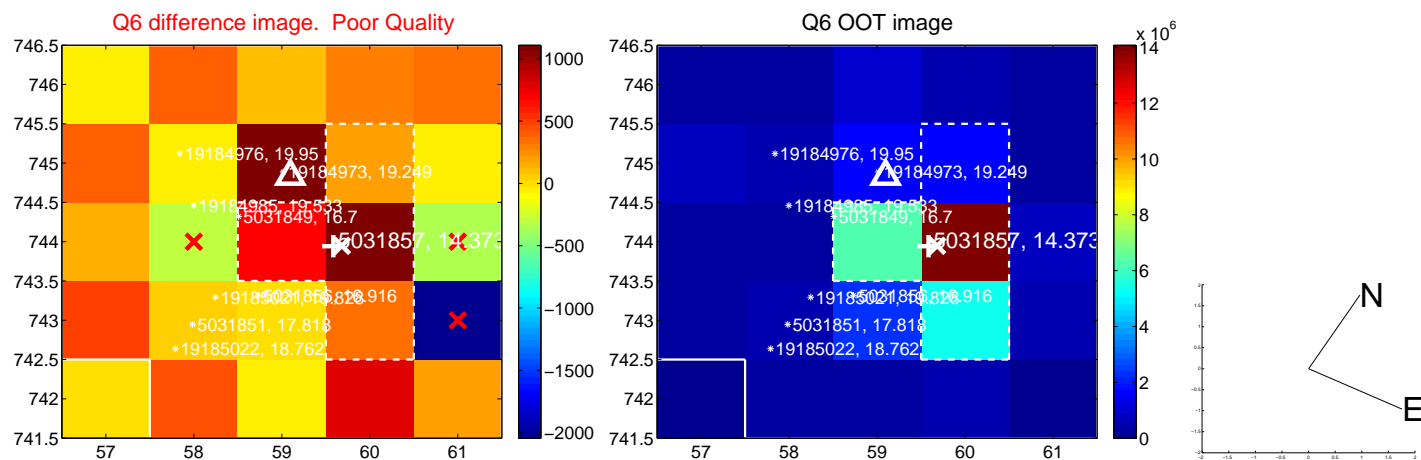
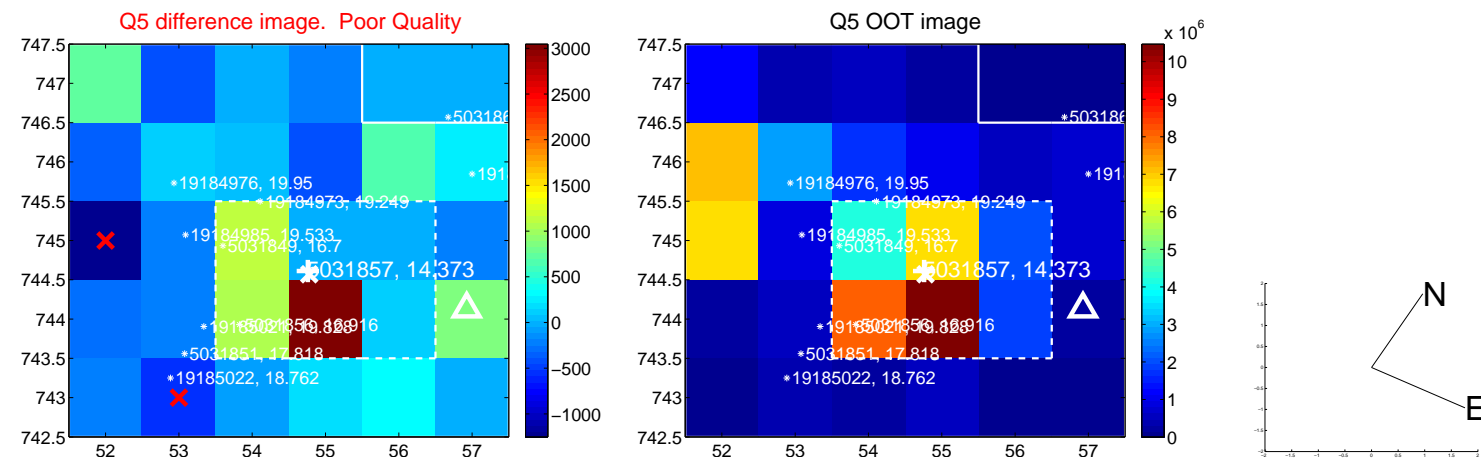


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

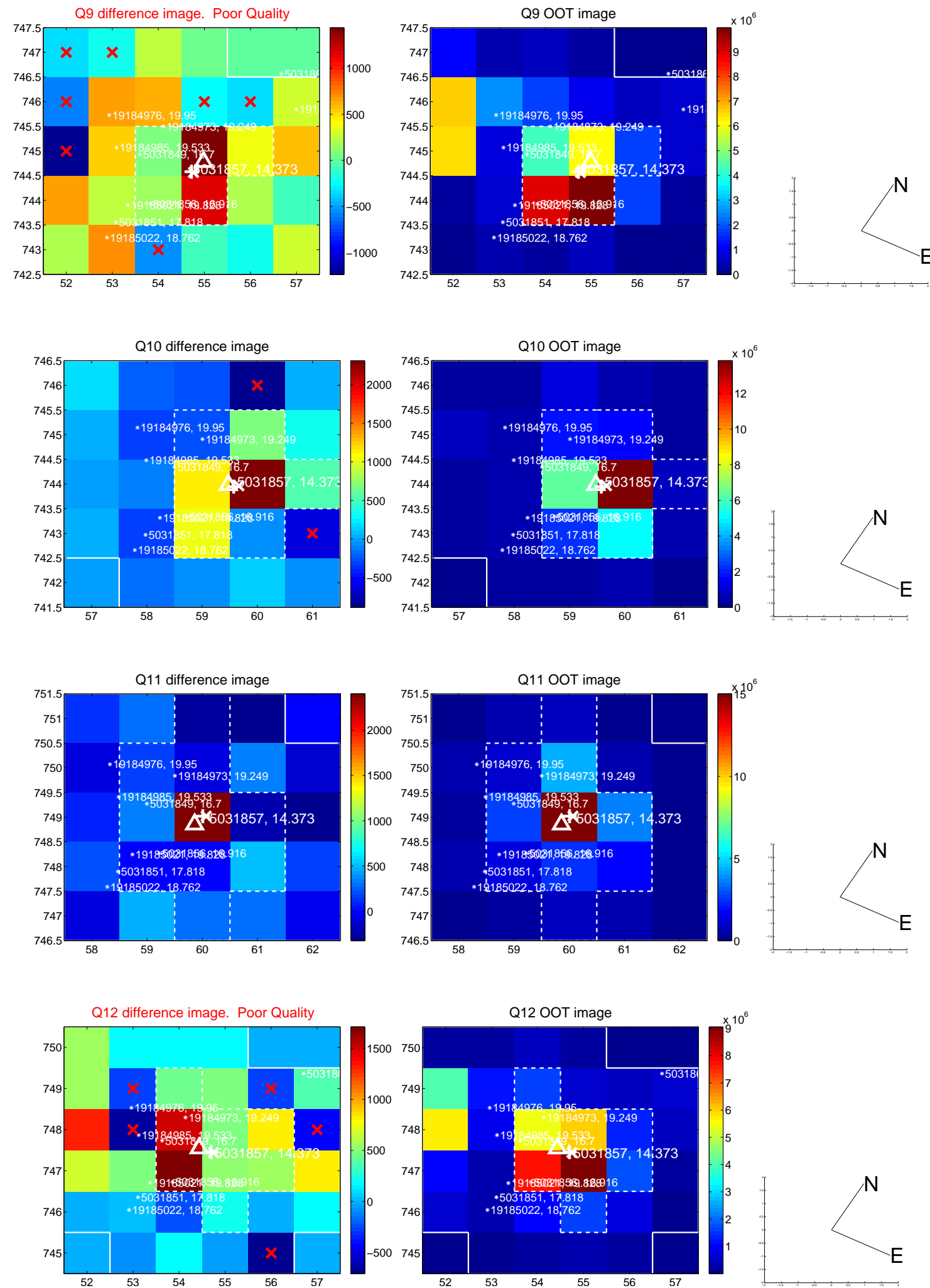
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



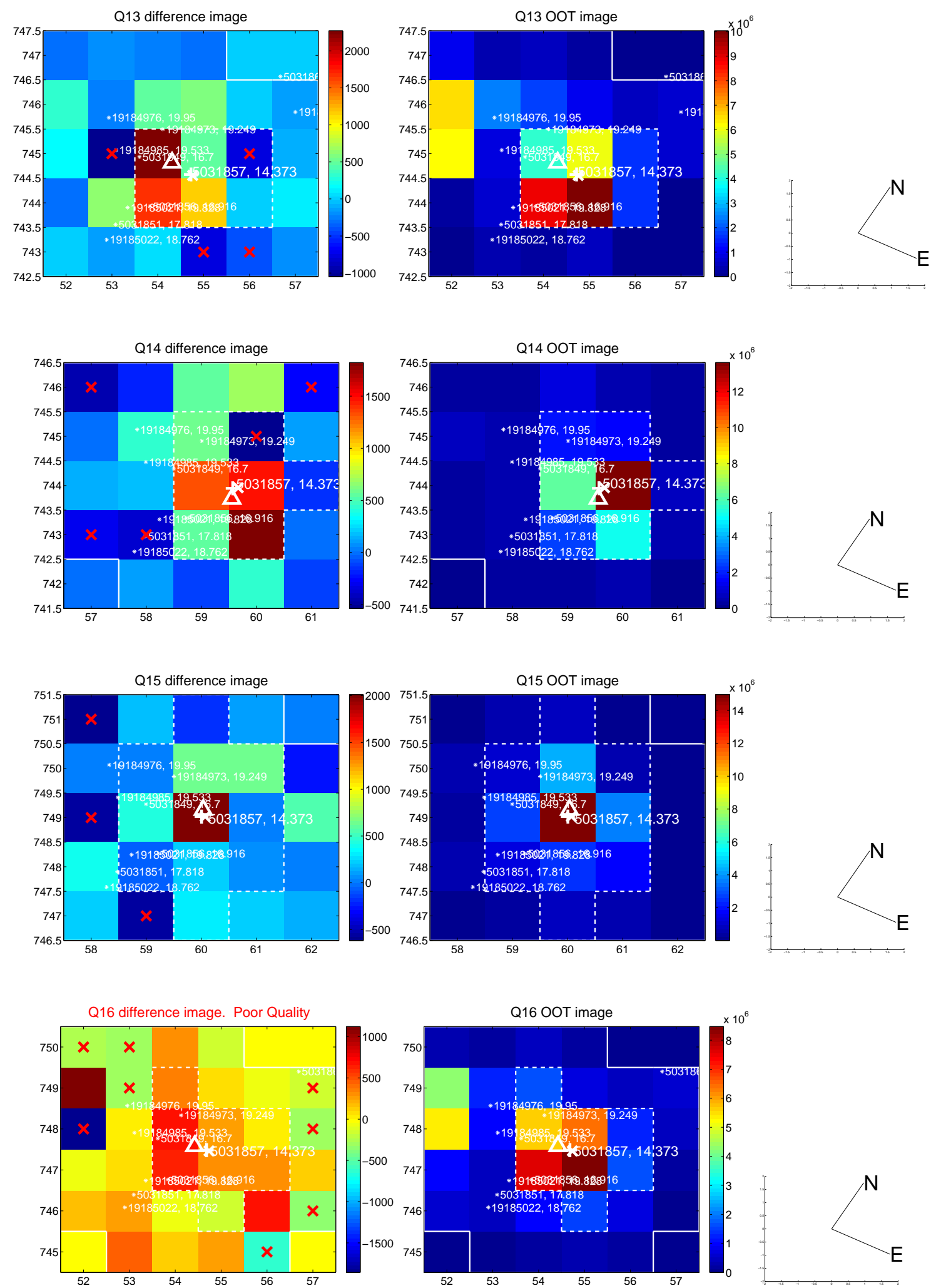
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



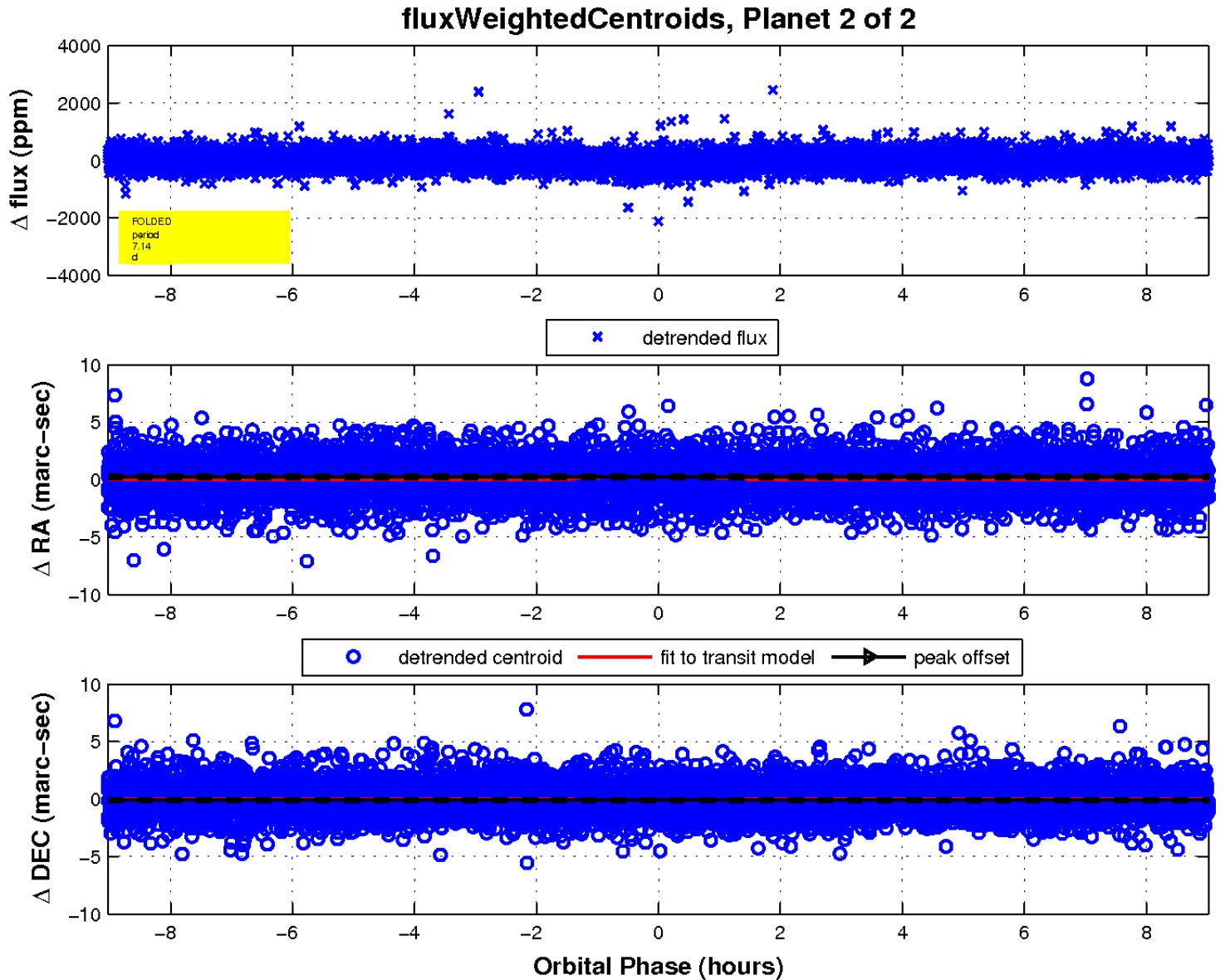
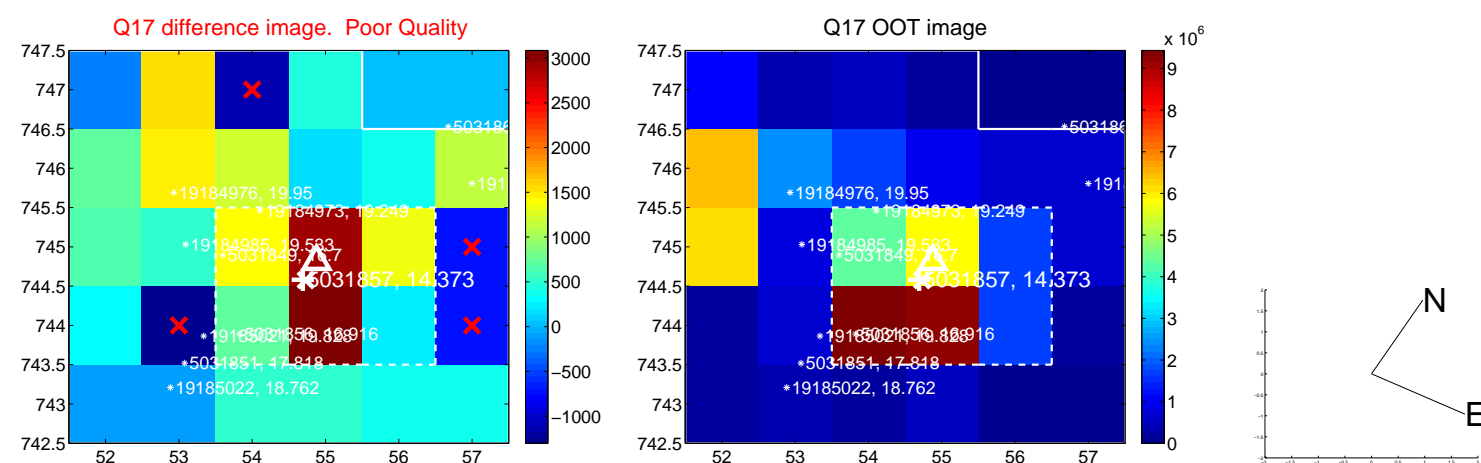
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

