

# KIC 011308499

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
011308499-01	OBS	2168.01	3.281888	132.431457	171.5	3.095	20.5	21.3	1.16	5859	1.80	731.41
011308499-02	OBS	2168.02	12.516056	135.036388	251.1	5.138	18.7	19.6	1.16	5859	2.17	122.75

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
011308499-01	OBS	PC	0.99	0	0	0	0	NO_COMMENT
011308499-02	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.

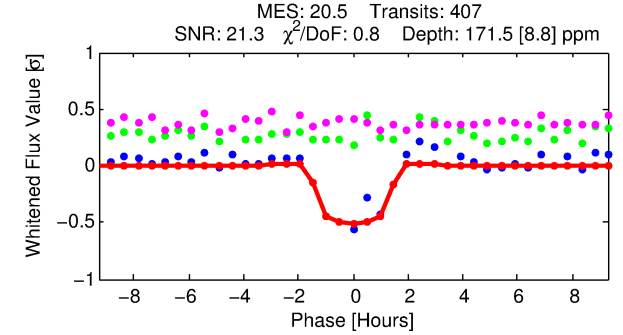
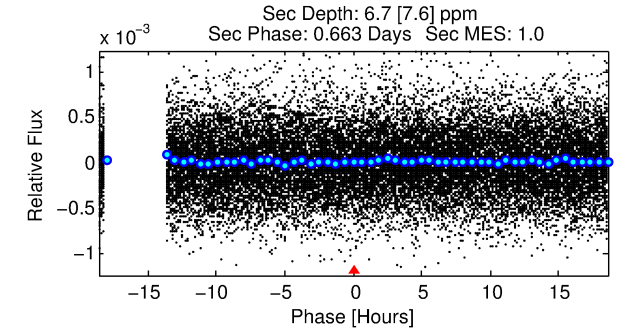
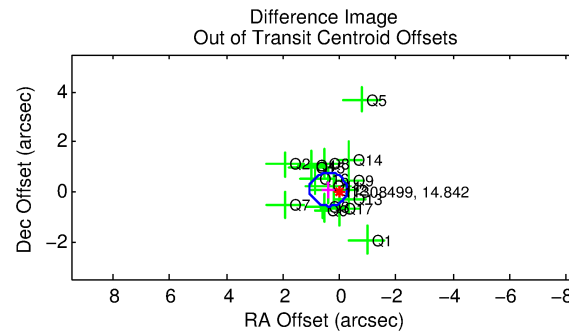
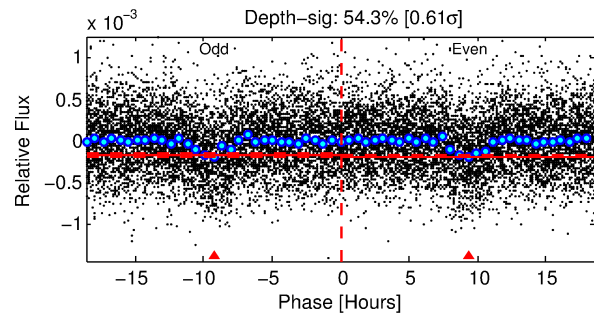
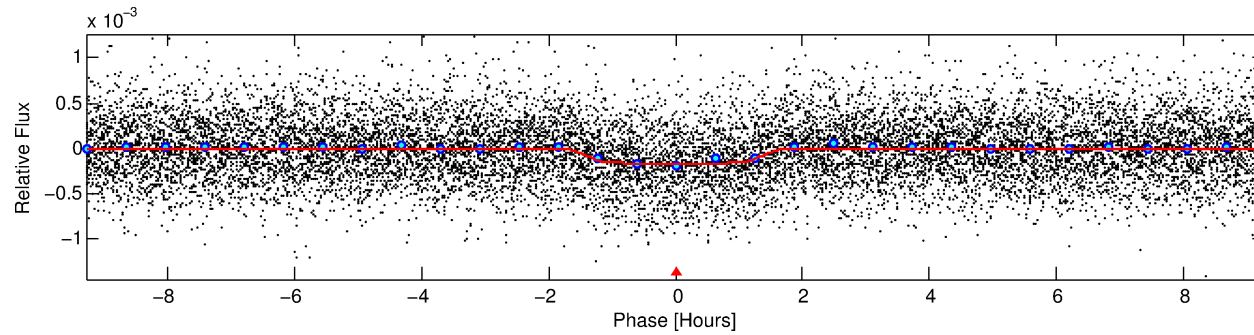
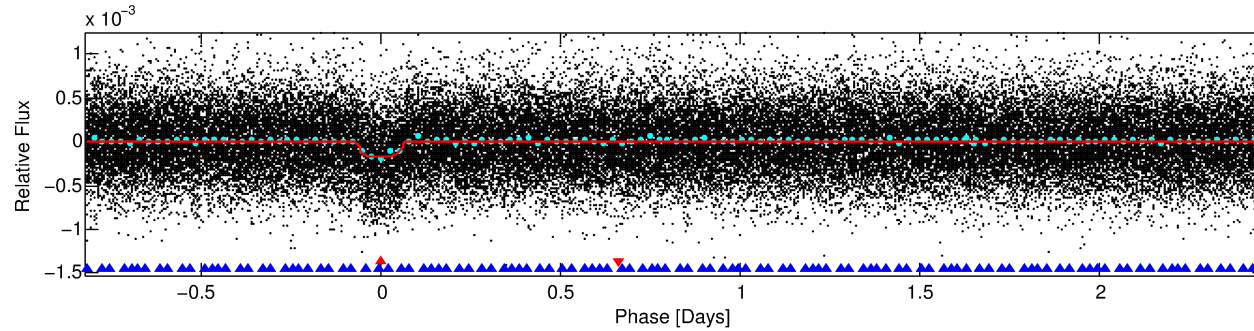
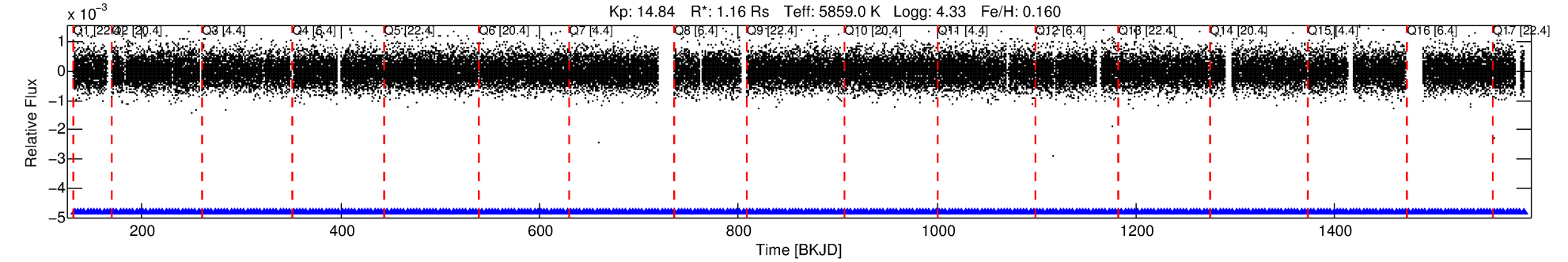
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 011308499-01

No Significant Match Found

# DV One-Page Summary

KIC: 11308499 Candidate: 1 of 2 Period: 3.282 d  
KOI: K02168.01 Name: Kepler-366b Corr: 0.954



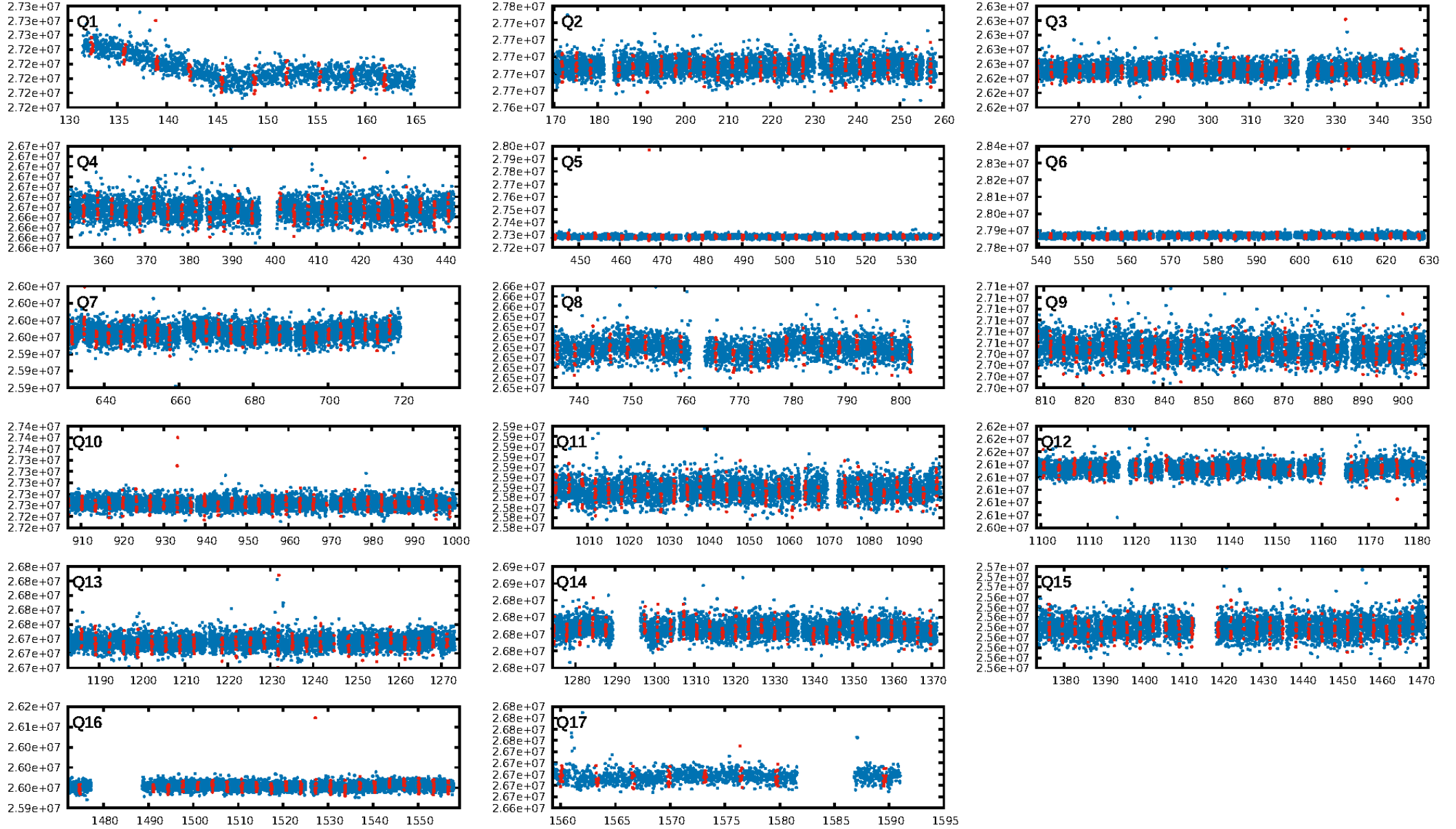
## DV Fit Results:

Period = 3.28189 [0.00001] d  
Epoch = 132.4315 [0.0023] BKJD  
Rp/R\* = 0.0142 [0.0041]  
a/R\* = 3.95 [5.09]  
b = 0.90 [0.31]  
Seff = 731.41 [152.20]  
Teff = 1326 [69] K  
Rp = 1.80 [0.60] Re  
a = 0.0441 [0.0061] AU  
Ag = 2.21 [2.85] [0.42 $\sigma$ ]  
Teffp = 2500 [797] K [1.47 $\sigma$ ]

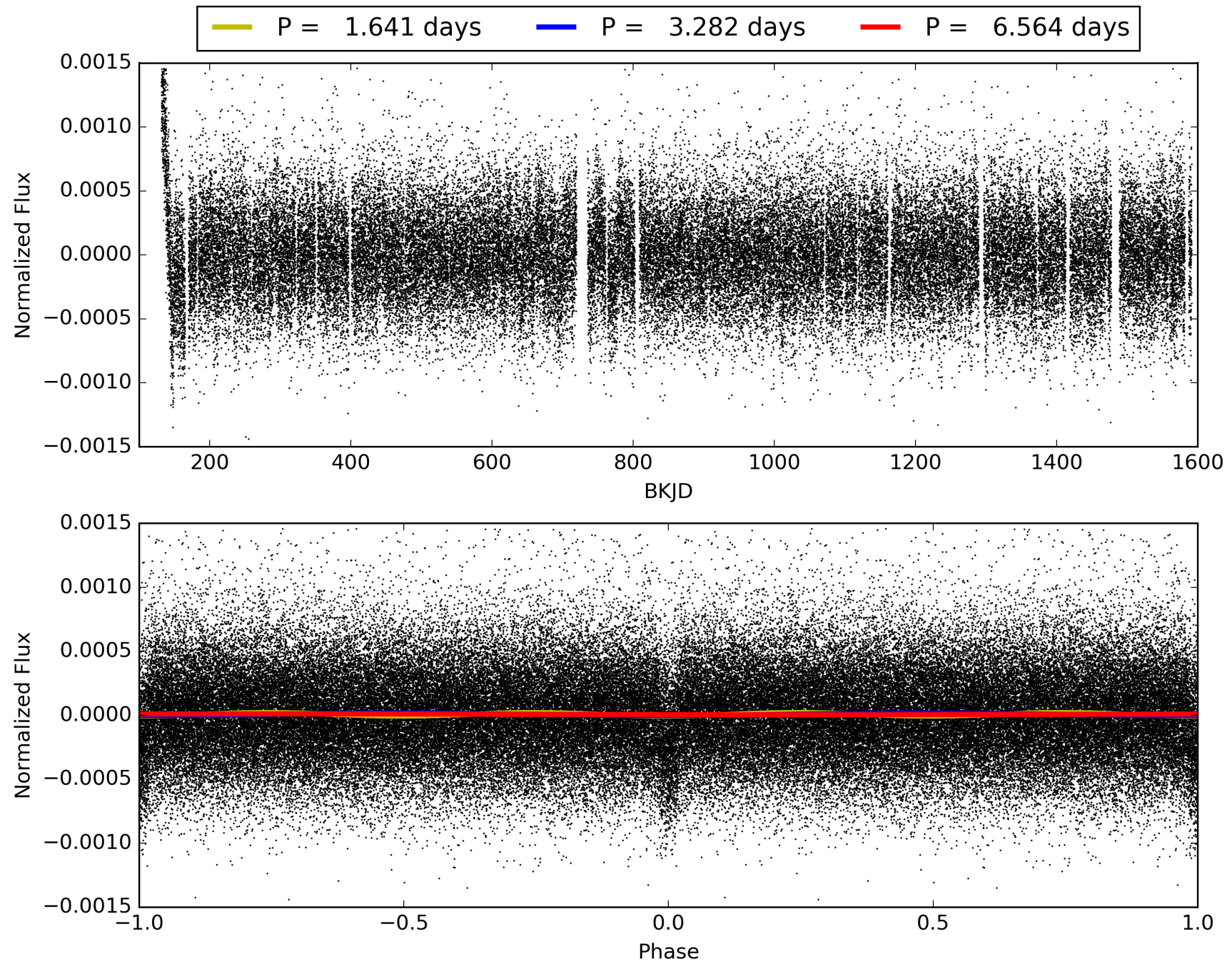
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [36.95 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 7.06e-89  
RollingBand-fgt: 1.00 [389/389]  
GhostDiagnostic-chr: 2.559  
Centroid-sig: 0.0%  
Centroid-so: 2.084 arcsec [3.05 $\sigma$ ]  
OotOffset-rm: 0.403 arcsec [1.82 $\sigma$ ]  
KicOffset-rm: 0.396 arcsec [1.68 $\sigma$ ]  
OotOffset-st: 3/4/4/5 [16]  
KicOffset-st: 3/4/4/5 [16]  
DiffImageQuality-fgm: 0.94 [15/16]  
DiffImageOverlap-fno: 1.00 [17/17]

# TCE 011308499-01, PDC Light Curves

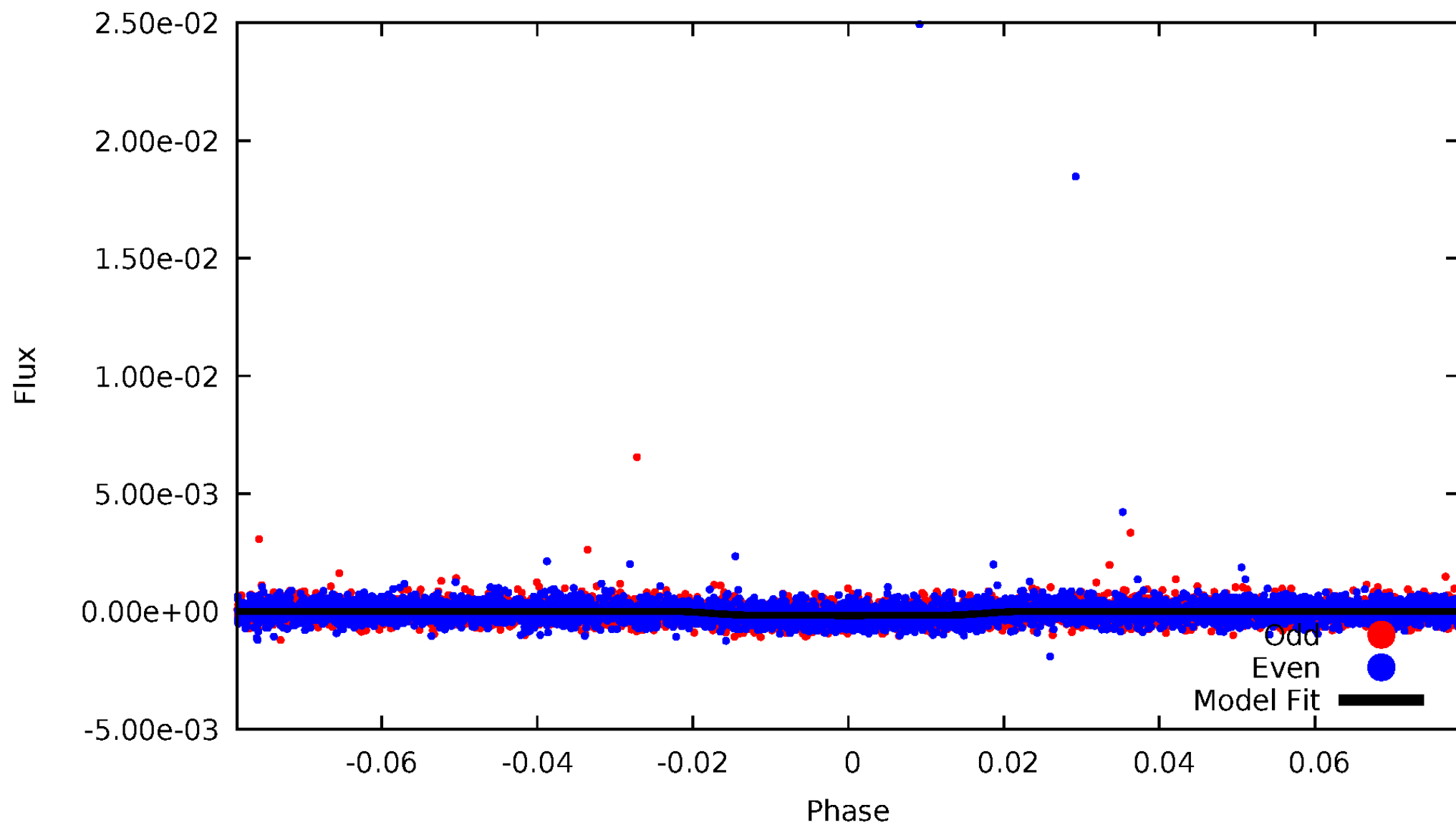


TCE 011308499-01



# DV Odd/Even

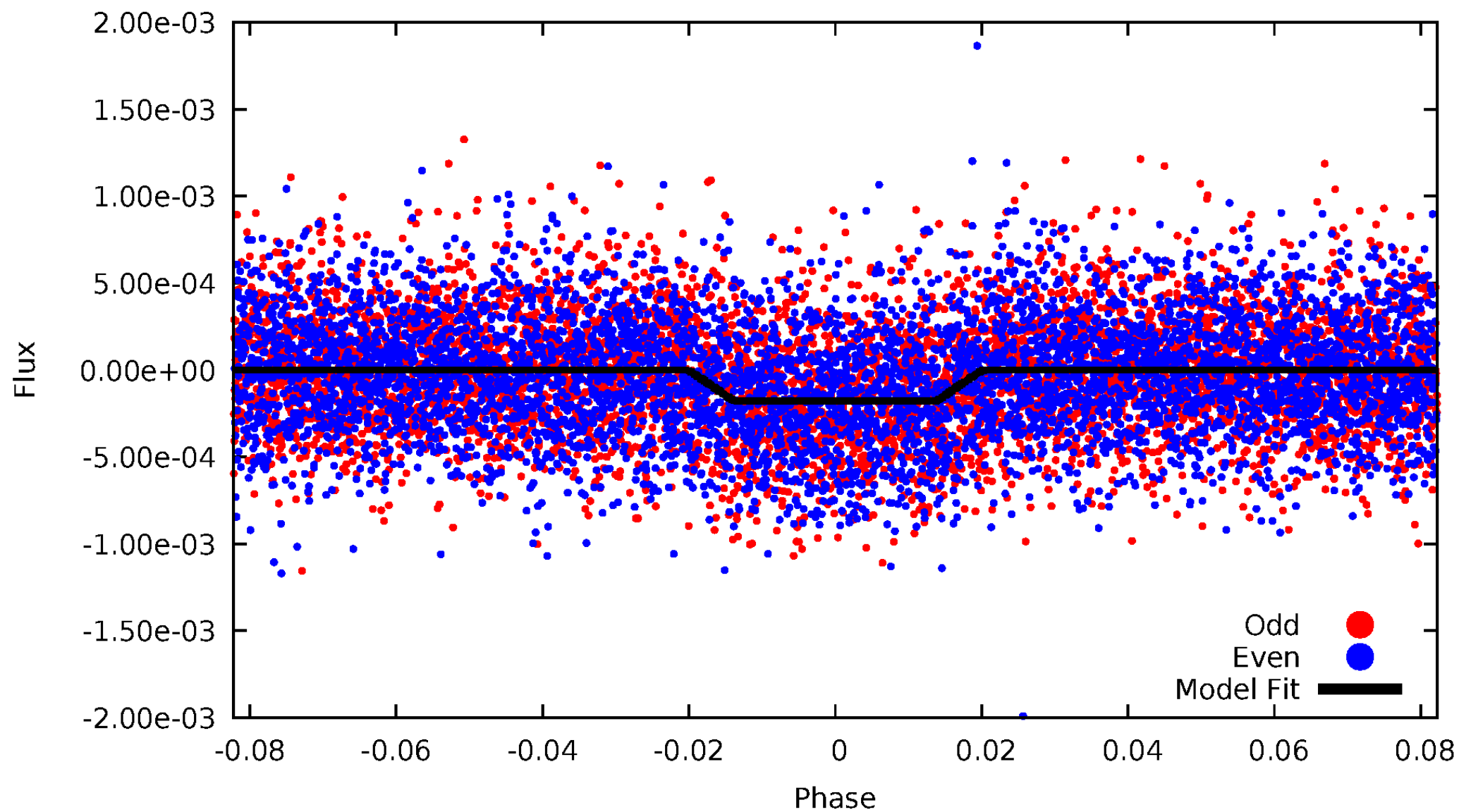
TCE 011308499-01



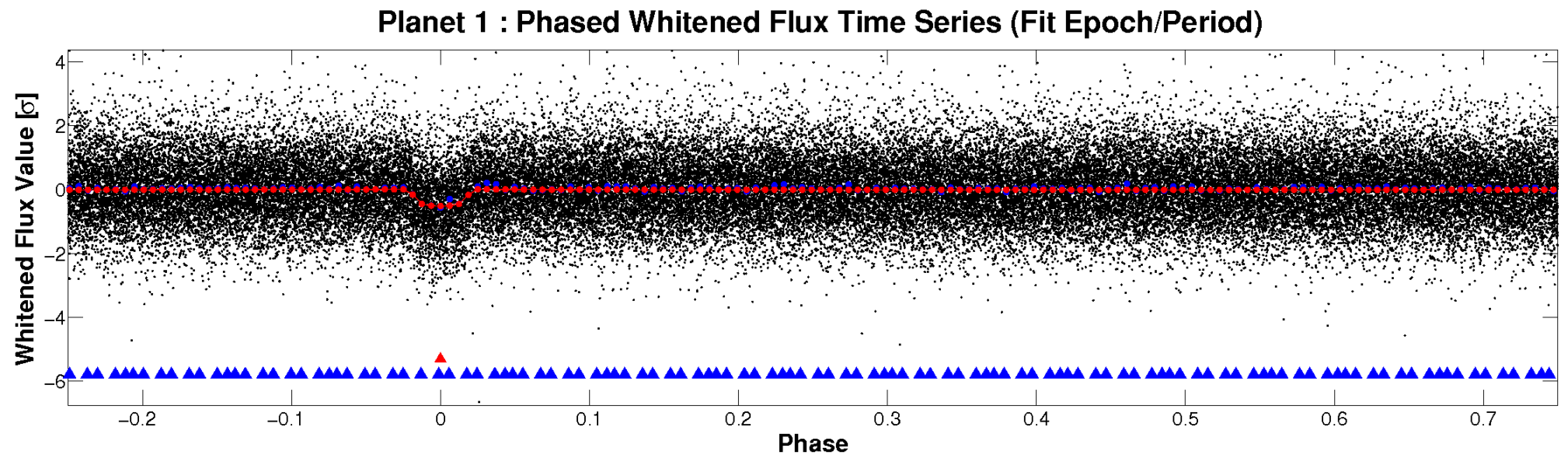
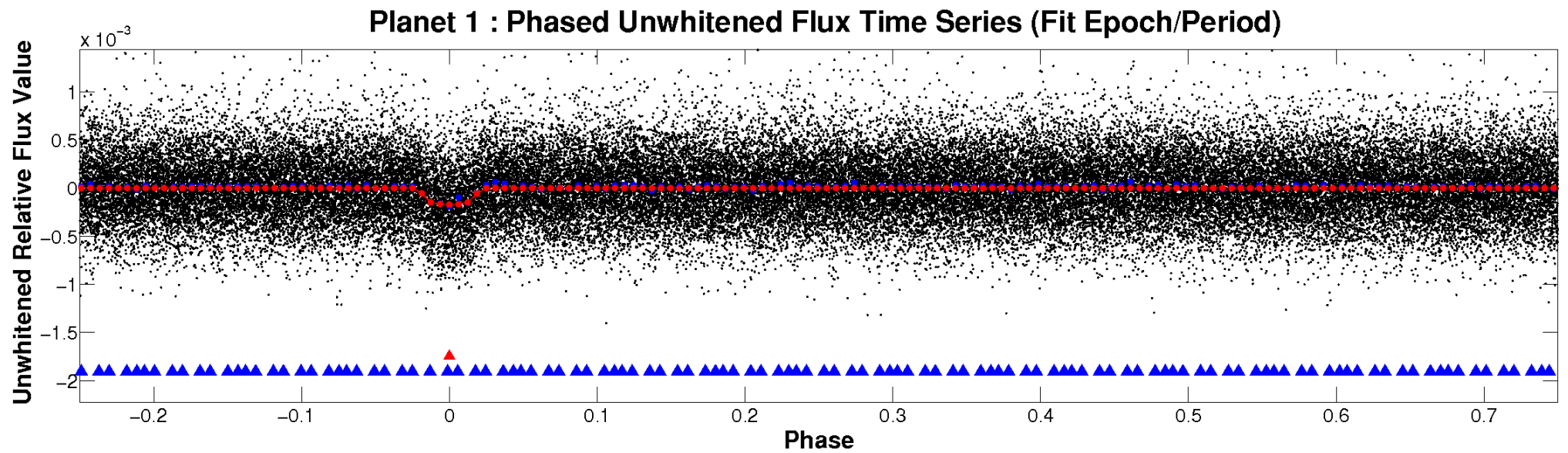


# ALT Odd/Even

TCE 011308499-01

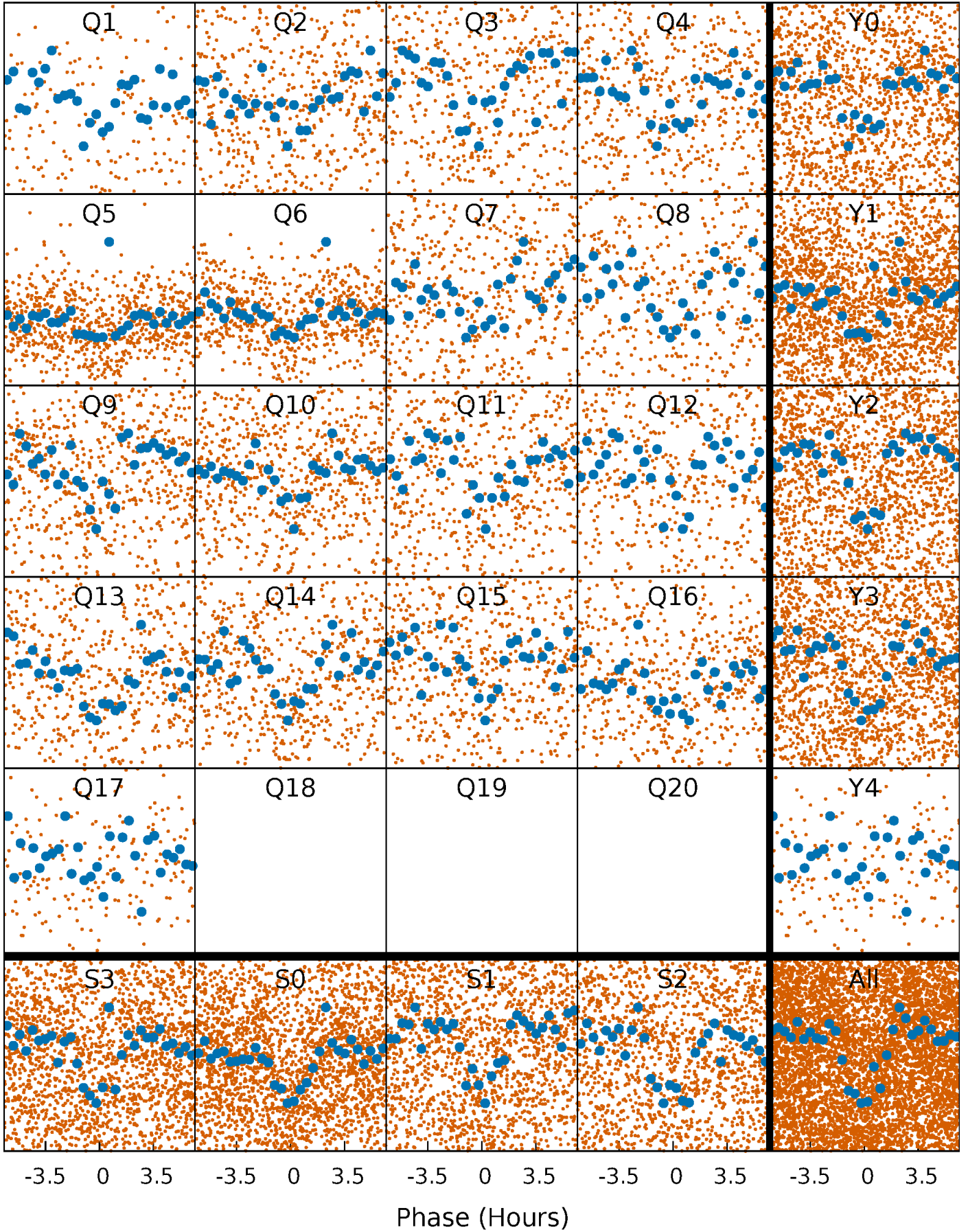


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

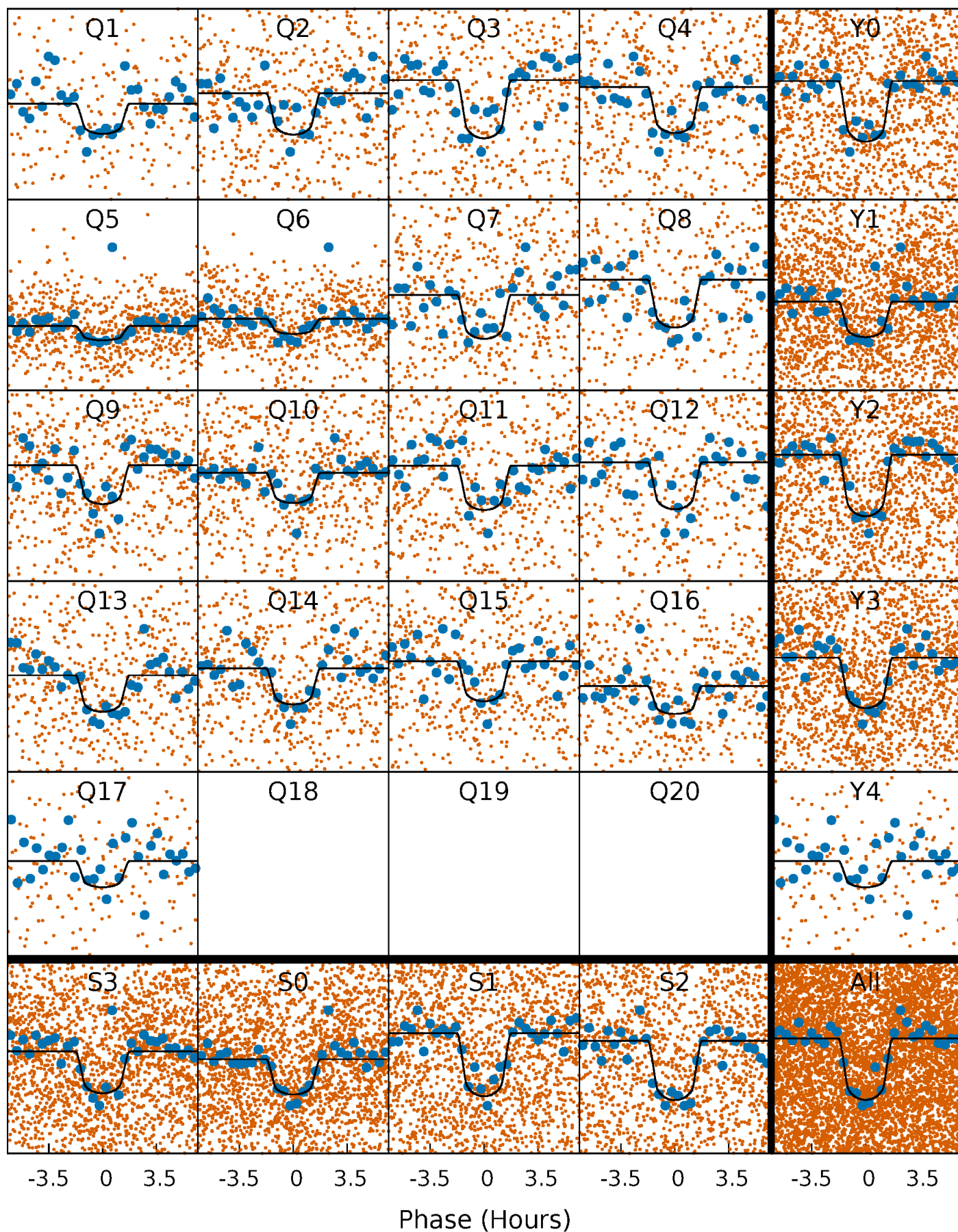
TCE 011308499-01   P= 3.281888 Days    $T_0=132.431456$  (BKJD)





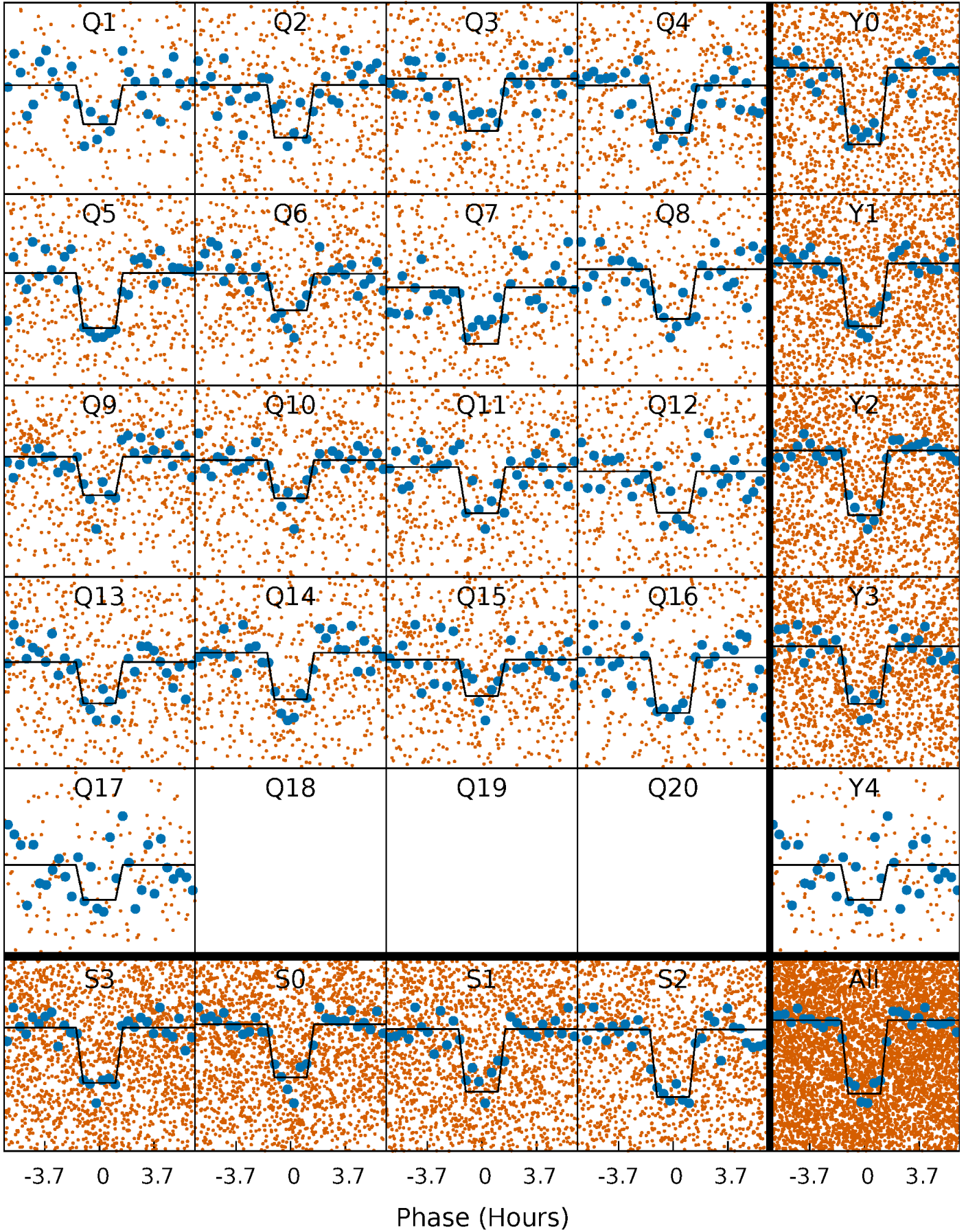
# DV Quarter-Phased Transit Curves

TCE 011308499-01 P= 3.281888 Days  $T_0=132.431456$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

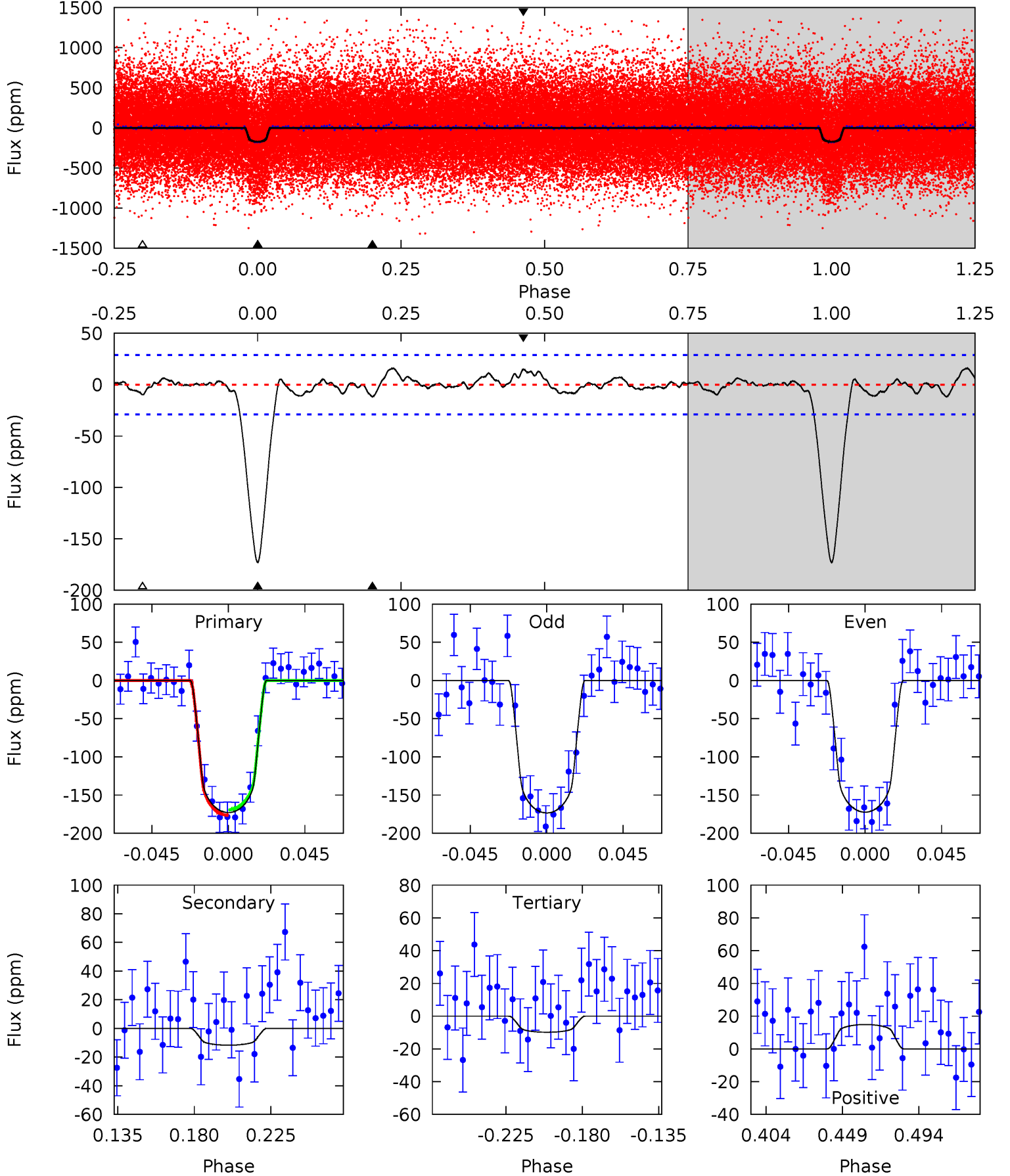
TCE 011308499-01   P= 3.281902 Days    $T_0=132.427899$  (BKJD)



# DV Model-Shift Uniqueness Test

011308499-01, P = 3.281888 Days, E = 129.149568 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
28.3	1.92	1.61	2.44	4.73	2.01	0.84	26.7	25.9	0.30	-0.52	0.09	0.98	0.08	0.59

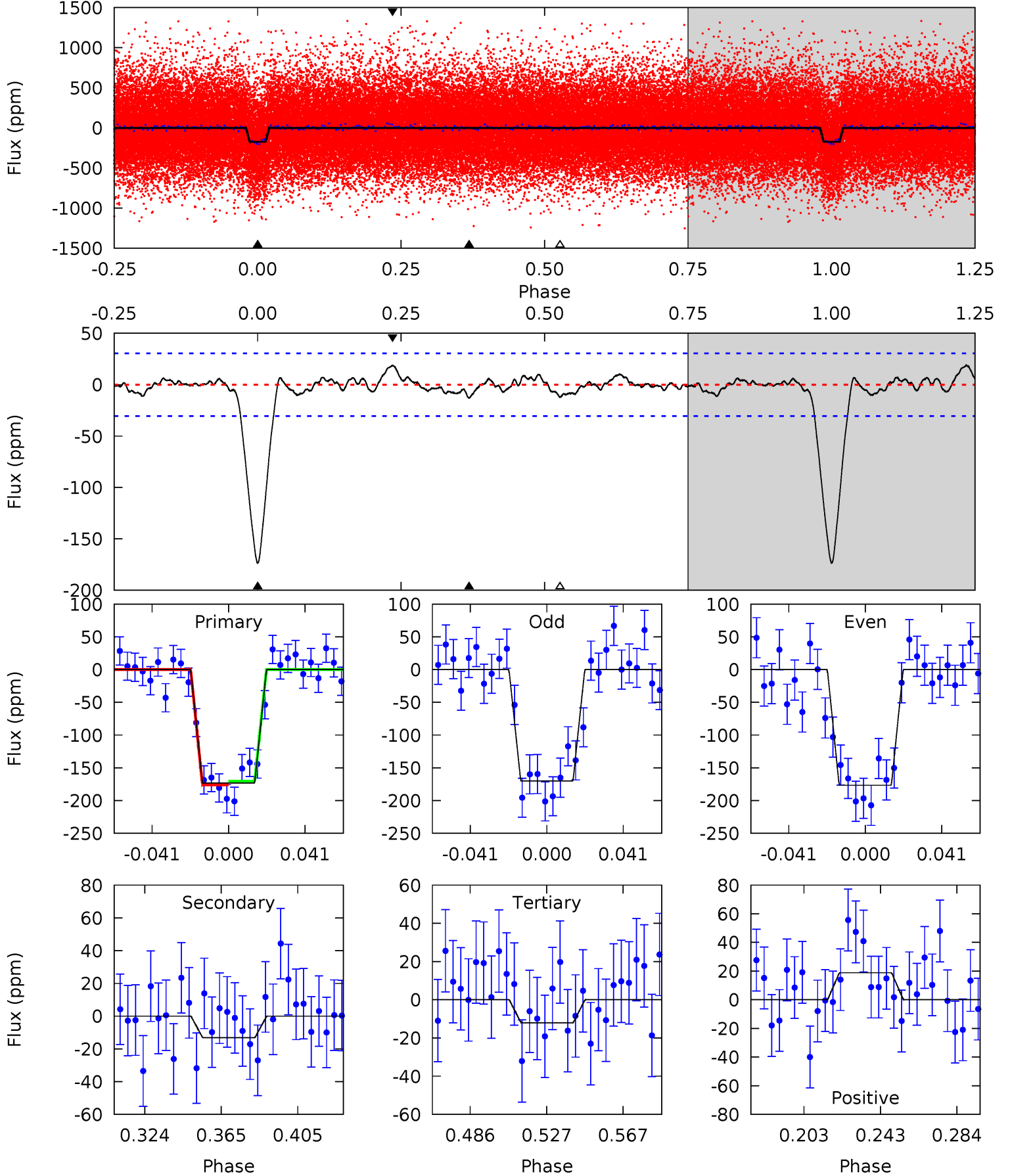




# Alt Model-Shift Uniqueness Test

011308499-01, P = 3.281902 Days, E = 129.145997 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
27.0	2.05	1.87	2.93	4.75	2.05	0.85	25.1	24.1	0.18	-0.89	0.50	1.06	0.10	0.43





### Stellar Parameters For KIC 011308499

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5859^{+79}_{-79}$	$4.335^{+0.099}_{-0.110}$	$0.160^{+0.150}_{-0.150}$	$1.162^{+0.190}_{-0.143}$	$1.064^{+0.070}_{-0.070}$	$0.955^{+0.405}_{-0.336}$
	+1%/-1%	+2%/-3%	+94%/-94%	+16%/-12%	+7%/-7%	+42%/-35%
Source	SPE90	SPE90	SPE90	DSEP		

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

### Secondary Eclipse Parameters for KIC 011308499-01 / KOI 2168.01

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-12 \pm 6$	$1.79^{+0.53}_{-0.52}$	$1857^{+81}_{-74}$	$3351^{+525}_{-479}$	$3.769^{+4.932}_{-2.285}$
Alt.	$-13 \pm 6$	$1.71^{+0.51}_{-0.53}$	$1852^{+78}_{-64}$	$3481^{+534}_{-442}$	$4.783^{+6.316}_{-2.700}$

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

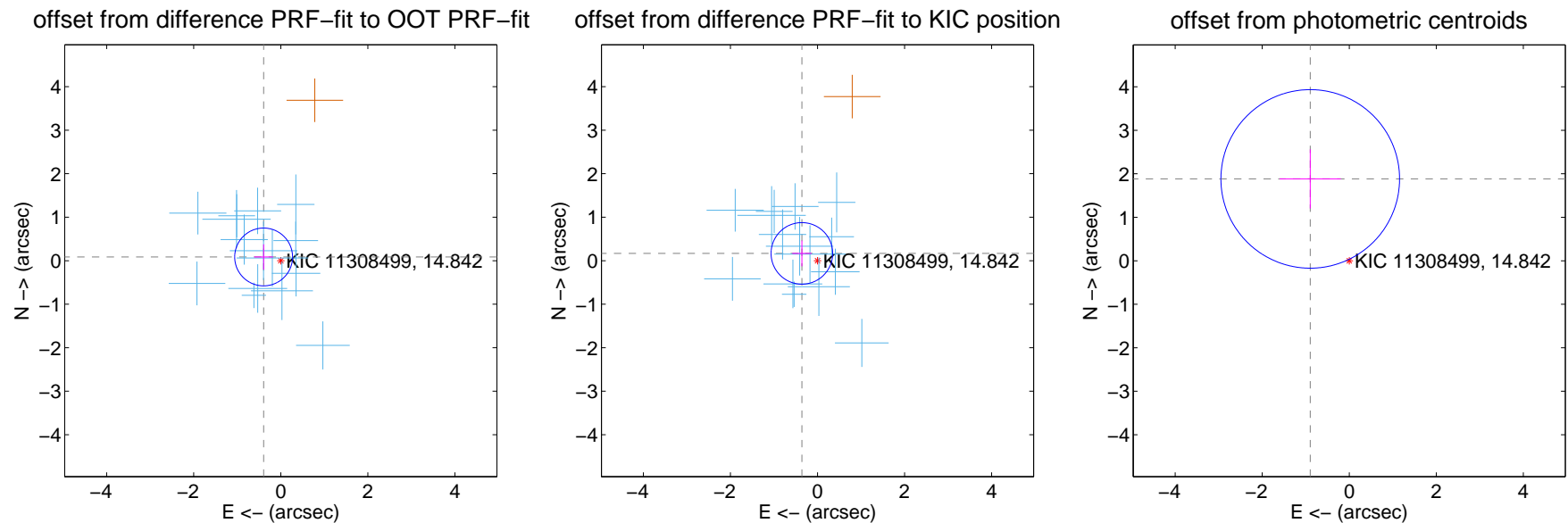
## DV Centroid Data

Supplemental centroid analysis for 011308499-01. Kepler magnitude: 14.84. Transit SNR 21.26

There are 15 quarters with good PRF difference image offsets

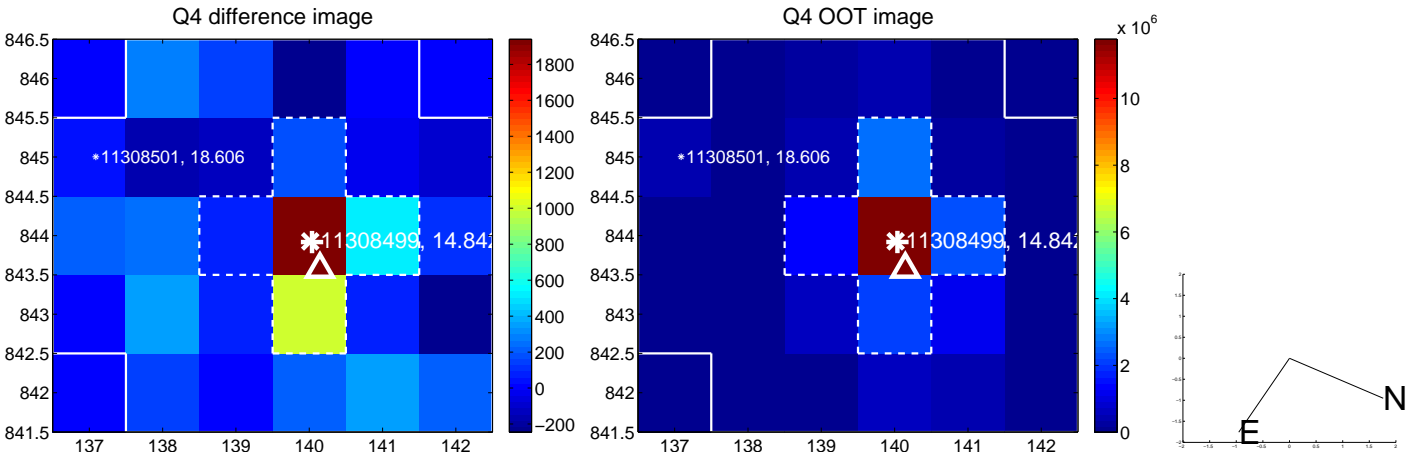
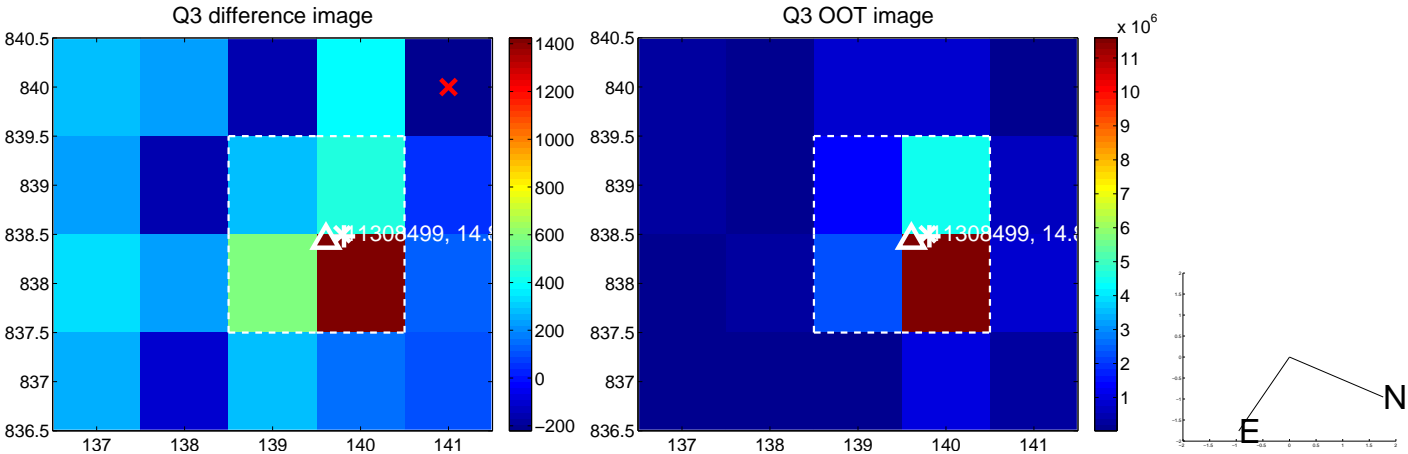
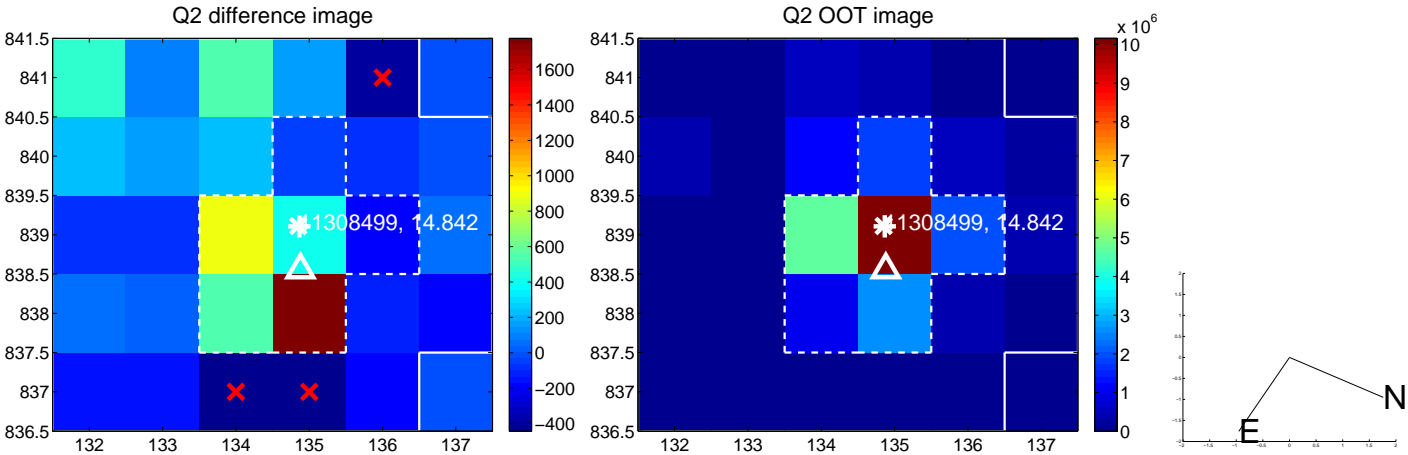
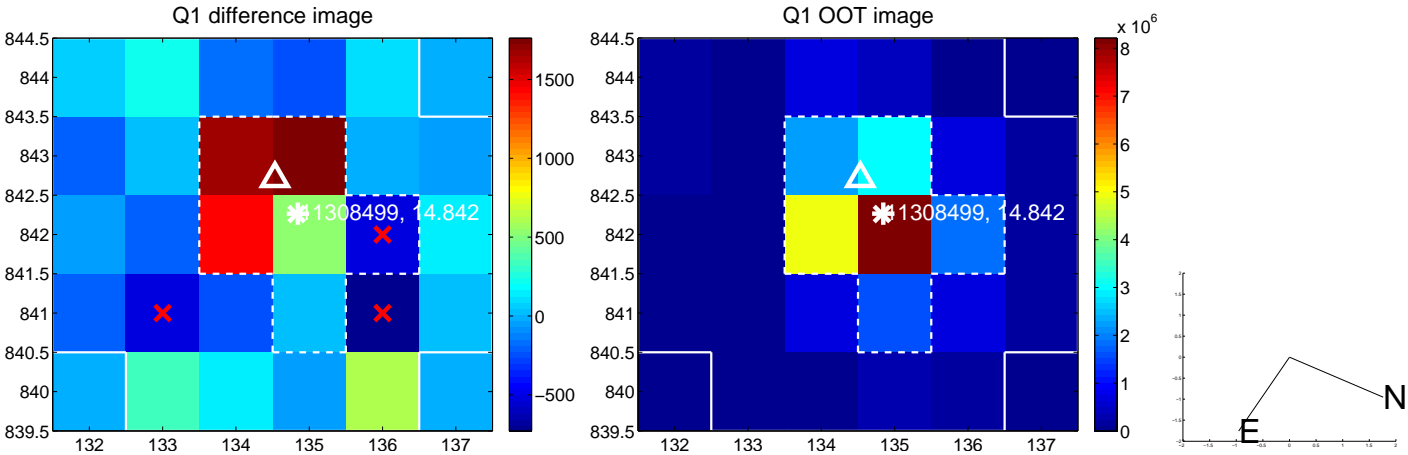
The direct PRF centroid is offset from the target star catalog position by about 0.09 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.403 \pm 0.221$	1.82	$0.394 \pm 0.218$	$0.086 \pm 0.291$
PRF-fit source offset from KIC position	$0.396 \pm 0.236$	1.68	$0.359 \pm 0.221$	$0.168 \pm 0.295$
photometric centroid source offset	$2.08 \pm 0.68$	<b>3.05</b>	$0.90 \pm 0.70$	$1.88 \pm 0.68$

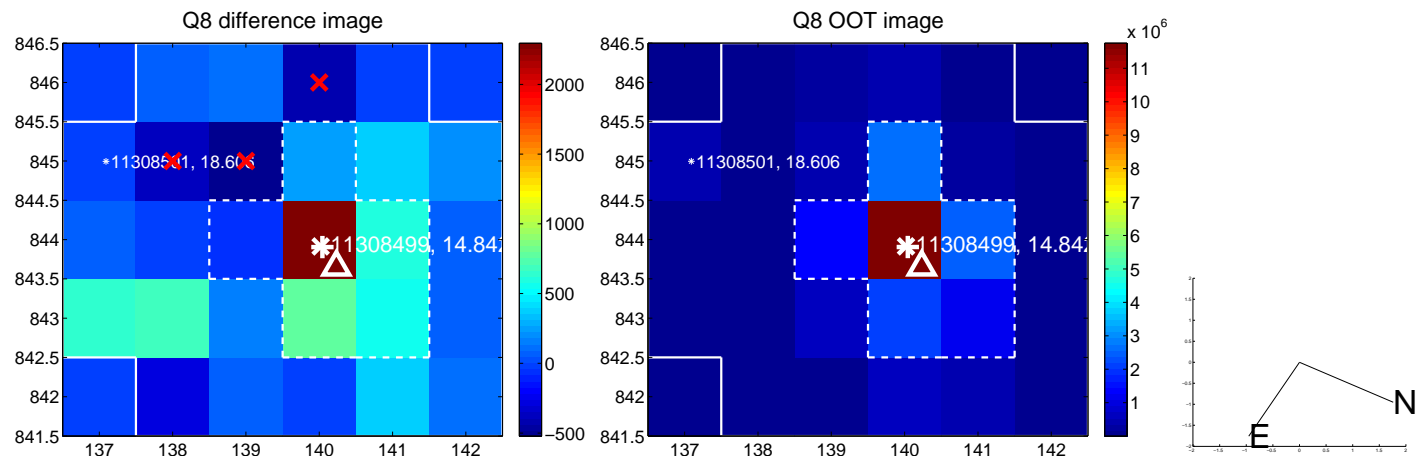
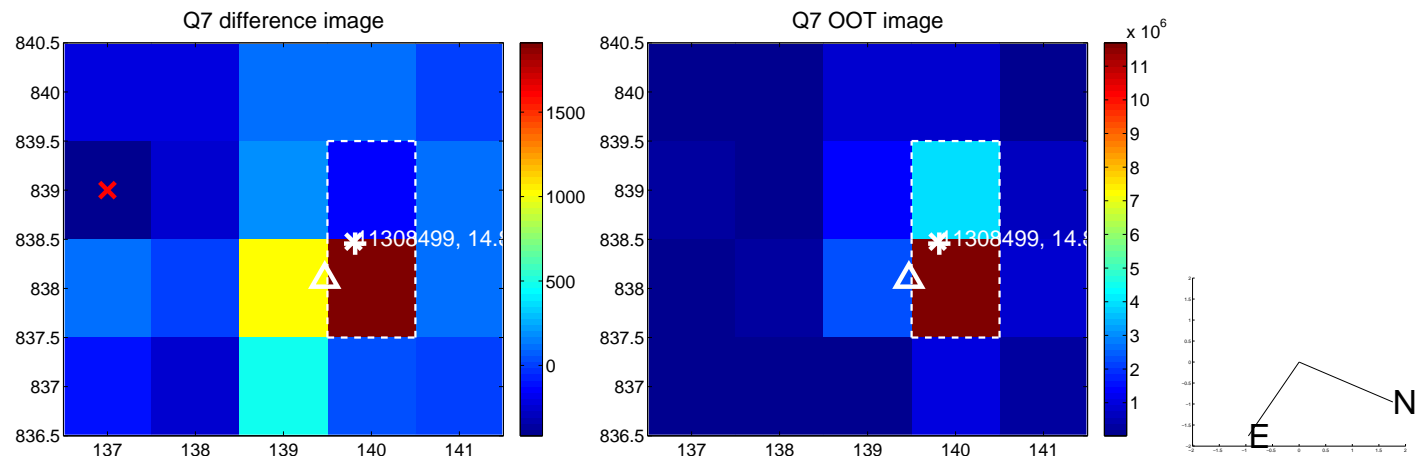
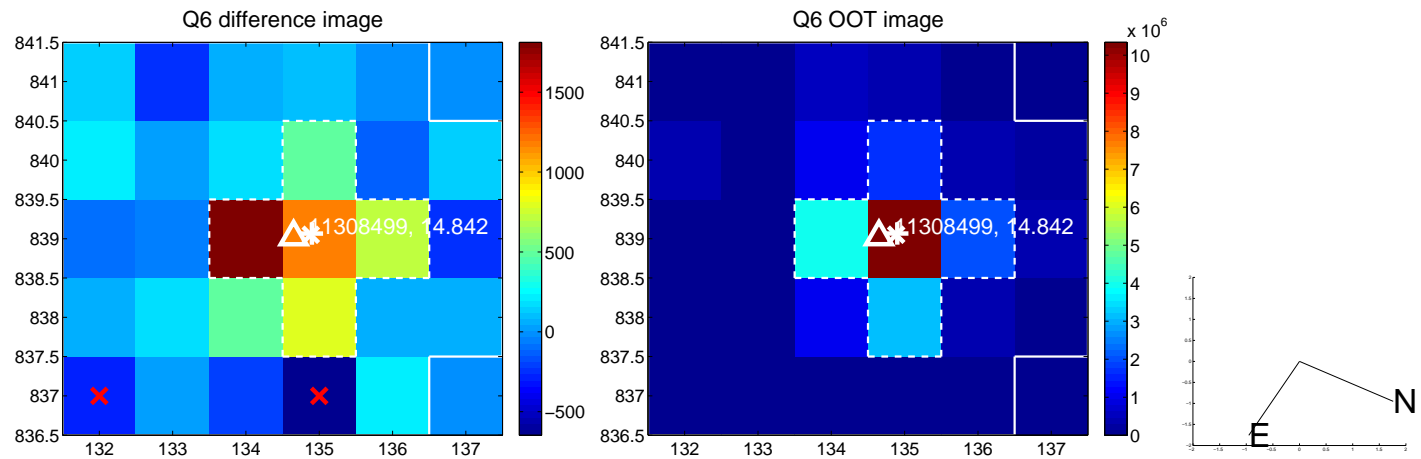
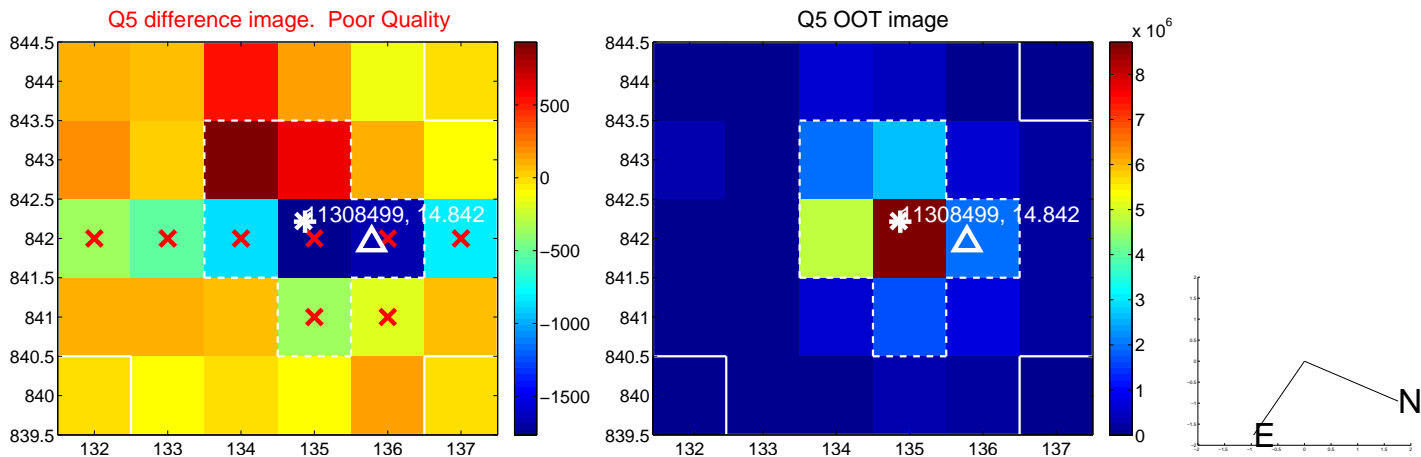


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

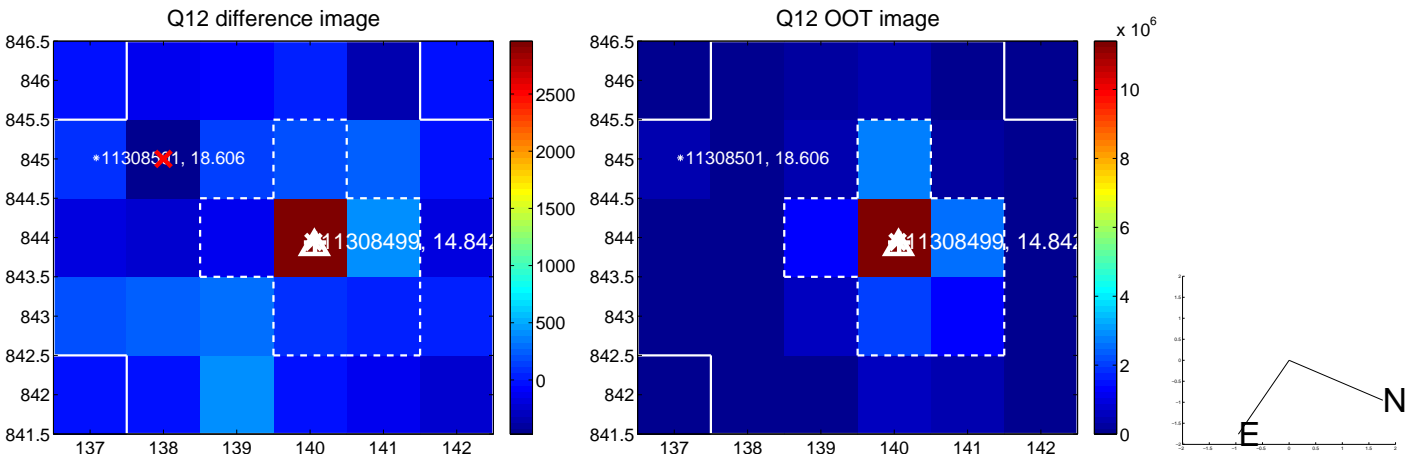
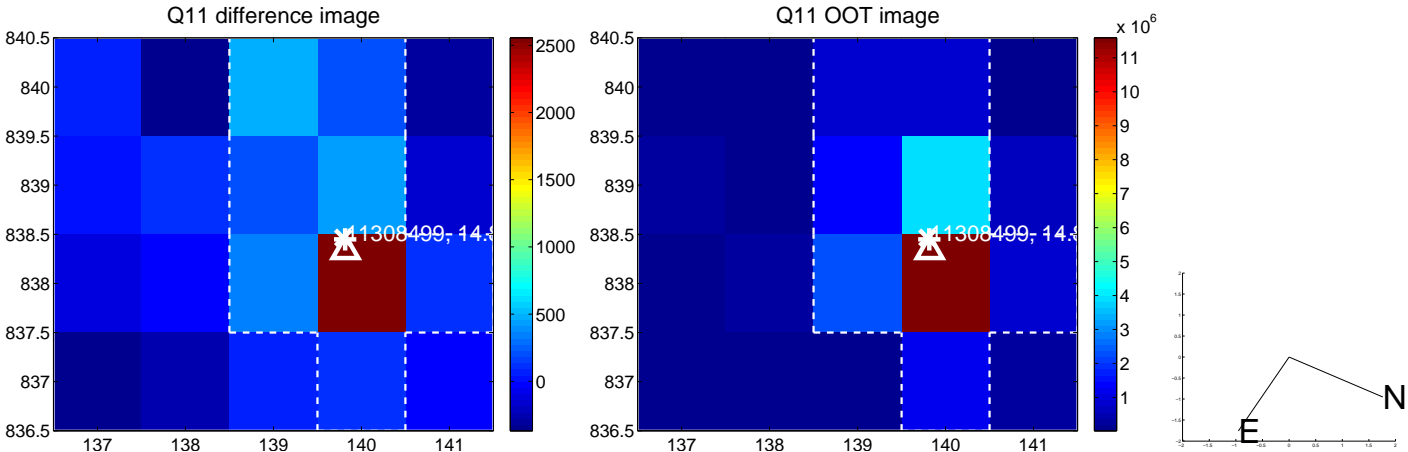
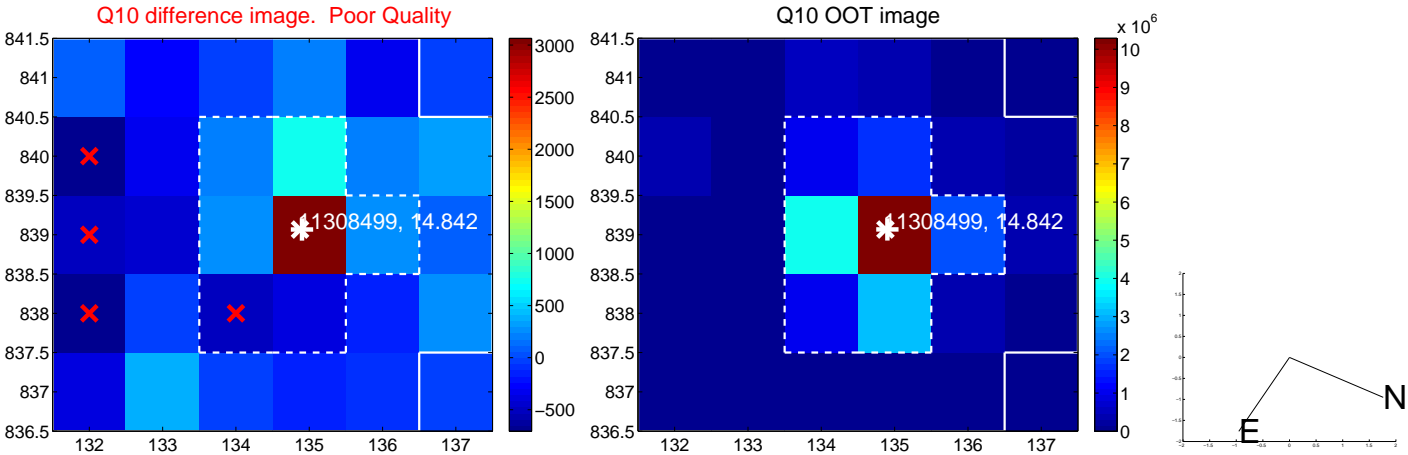
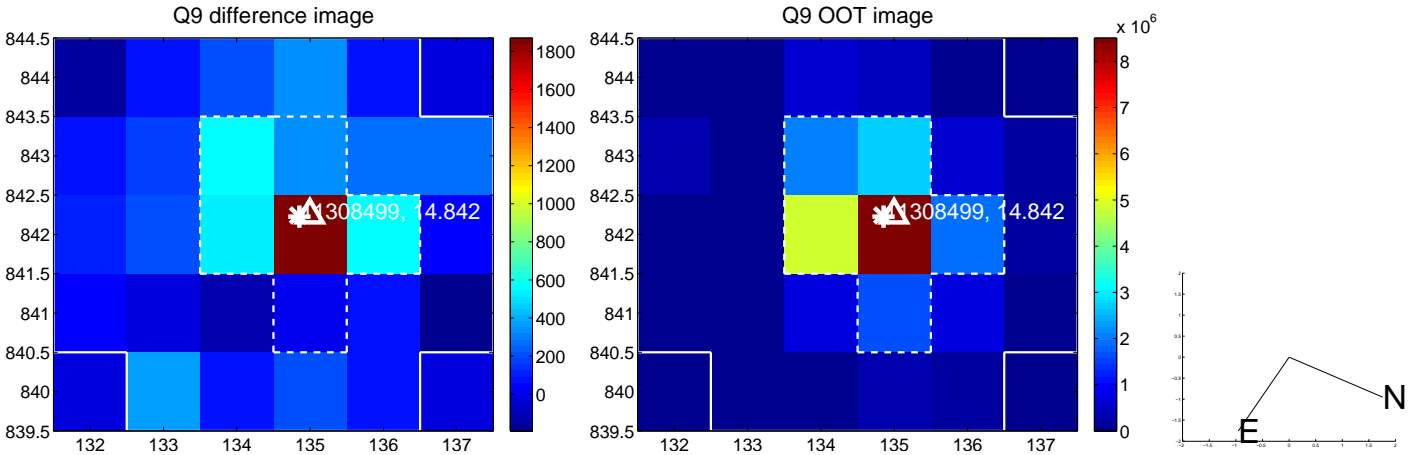


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

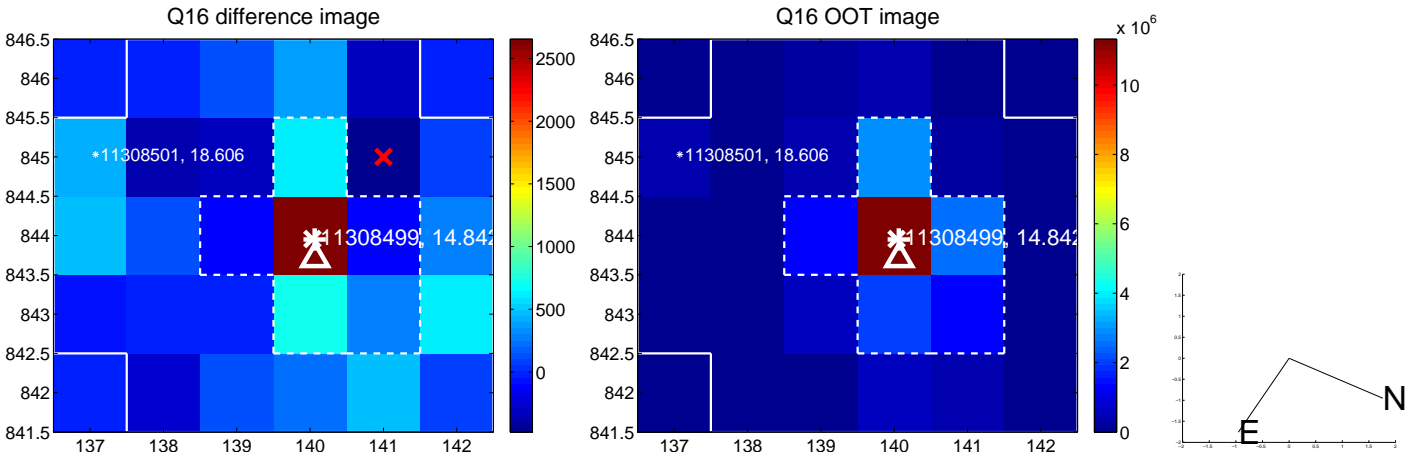
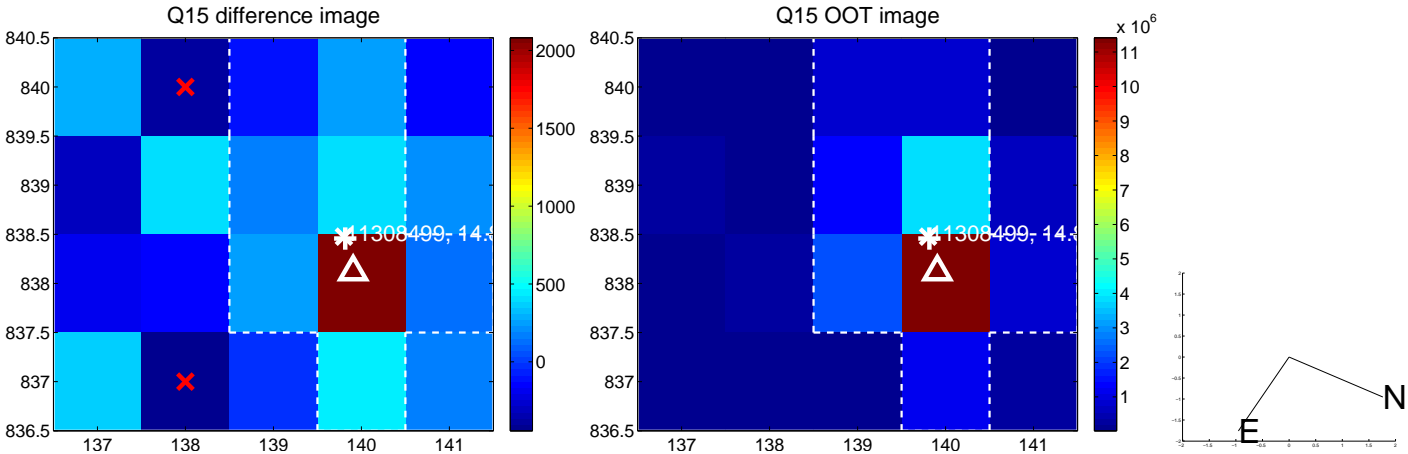
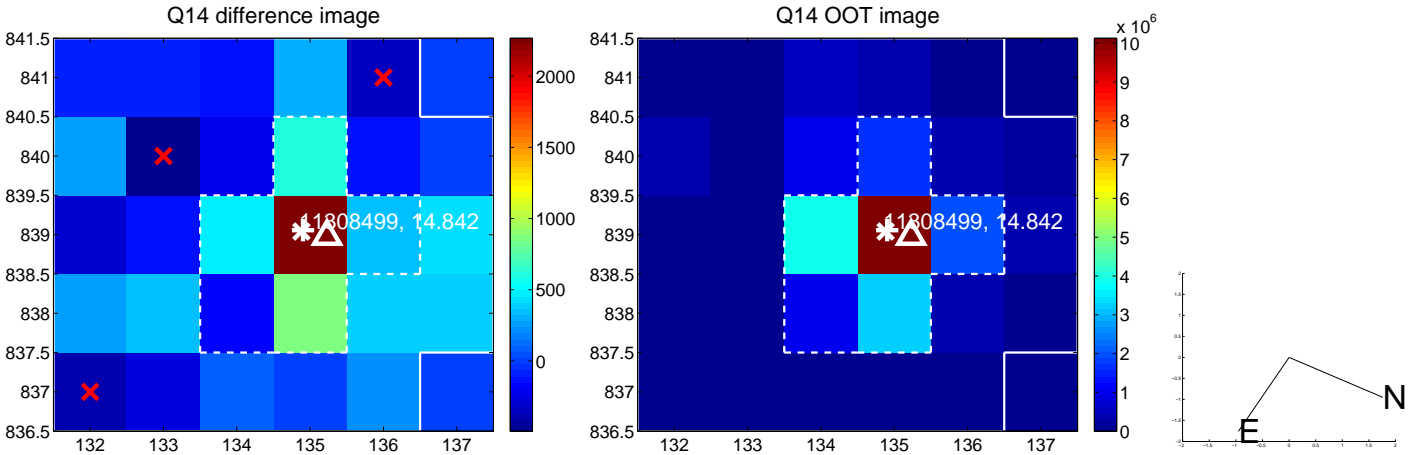
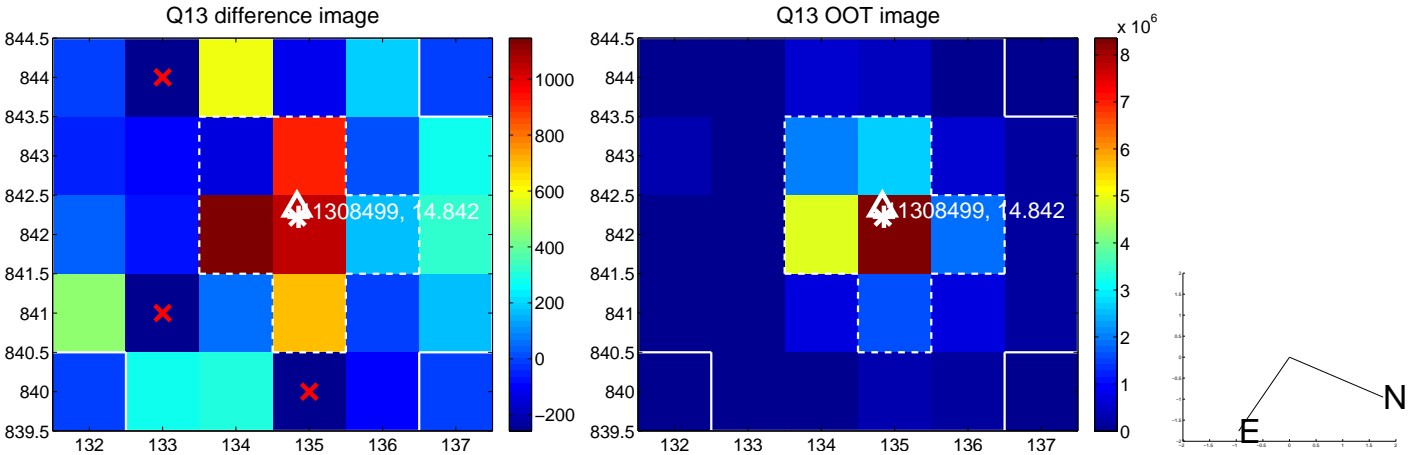




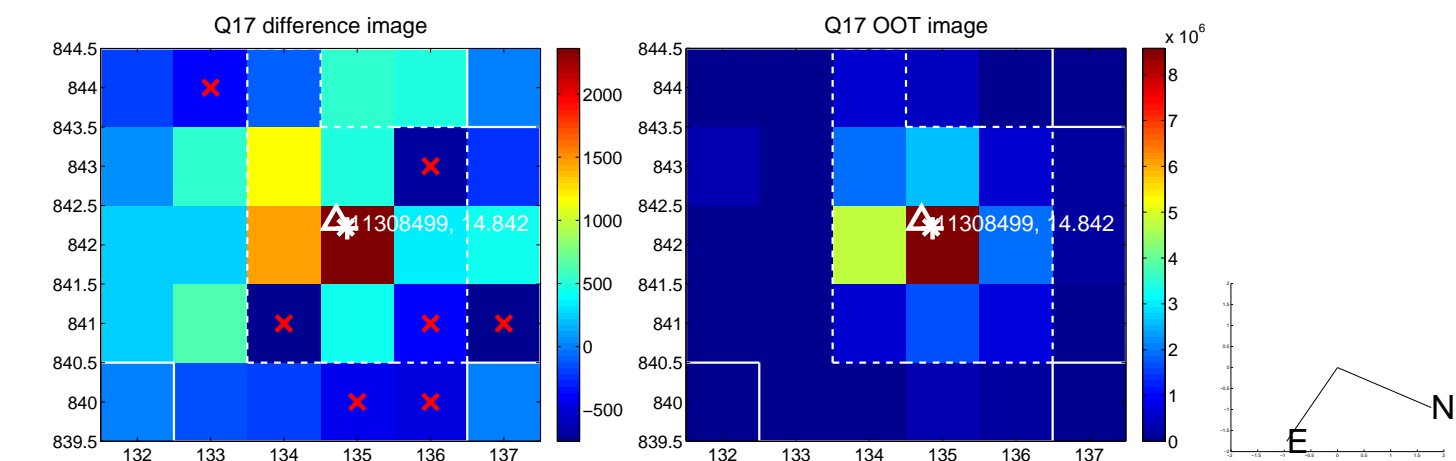
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



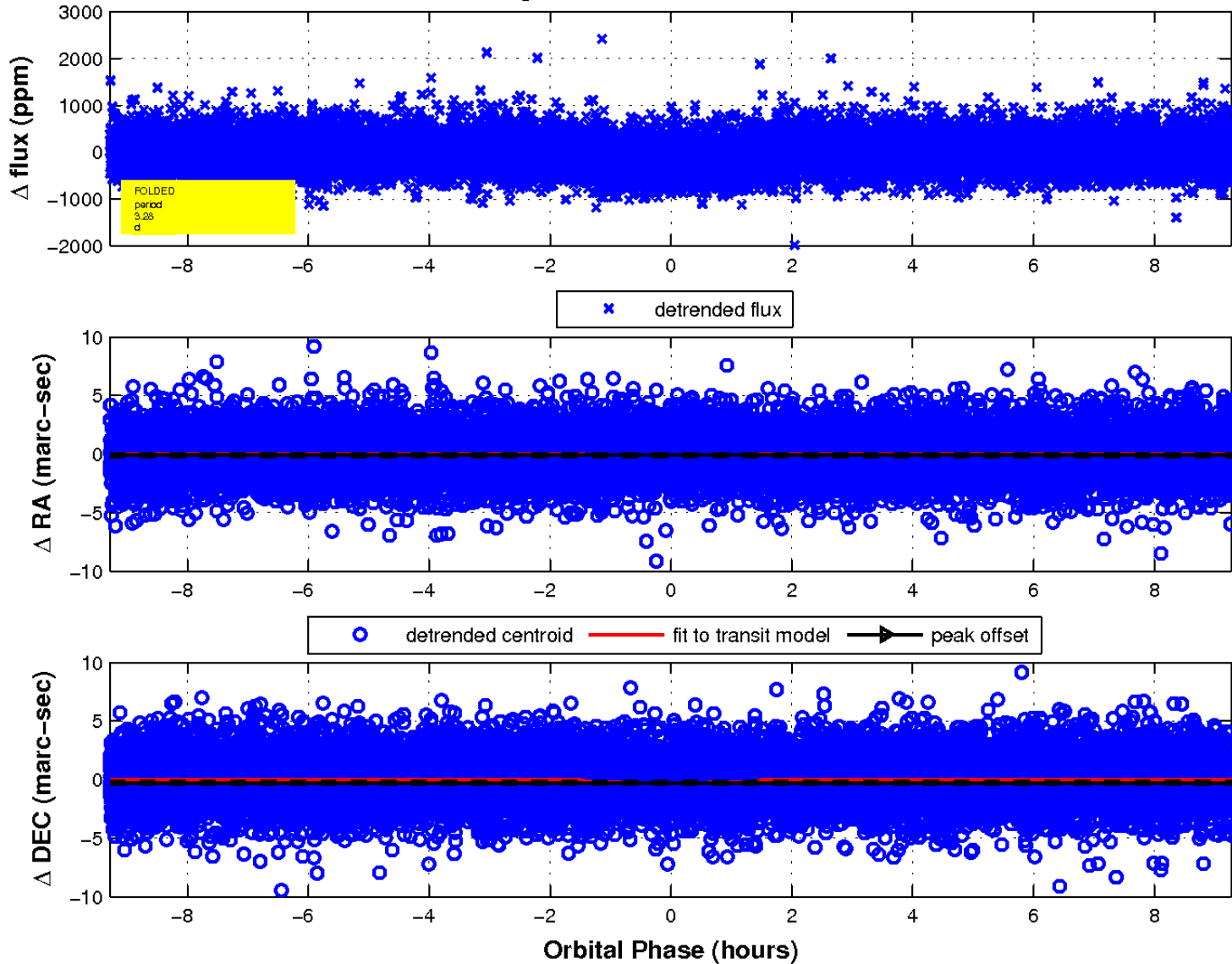
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

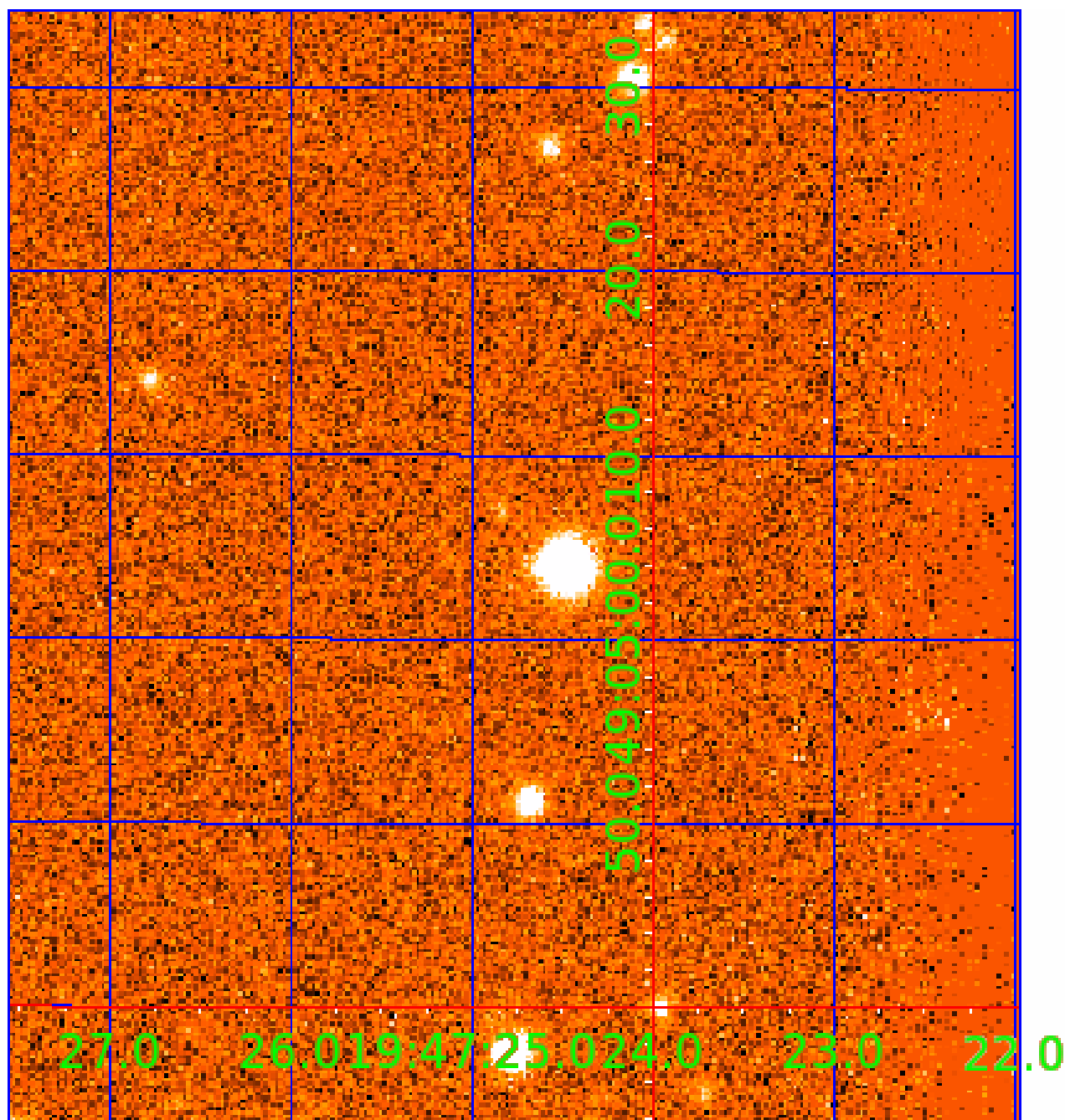


fluxWeightedCentroids, Planet 1 of 2



# UKIRT Image

Declination





# KIC 011308499

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
011308499-01	OBS	2168.01	3.281888	132.431457	171.5	3.095	20.5	21.3	1.16	5859	1.80	731.41
011308499-02	OBS	2168.02	12.516056	135.036388	251.1	5.138	18.7	19.6	1.16	5859	2.17	122.75

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
011308499-01	OBS	PC	0.99	0	0	0	0	NO_COMMENT
011308499-02	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.

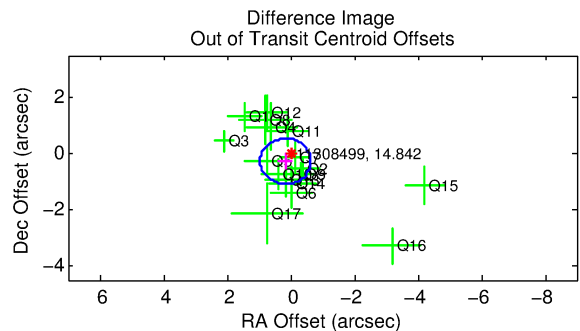
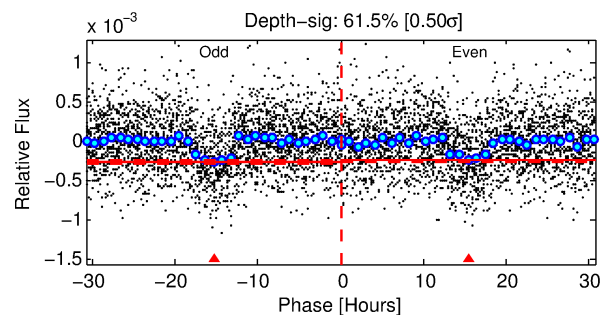
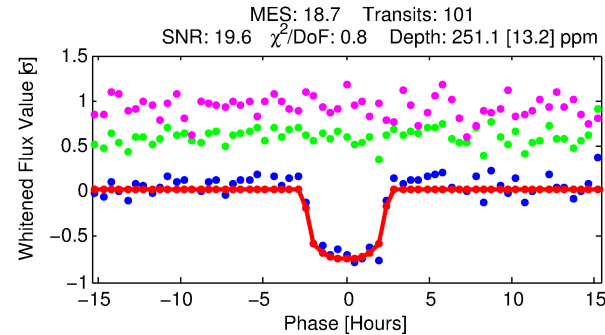
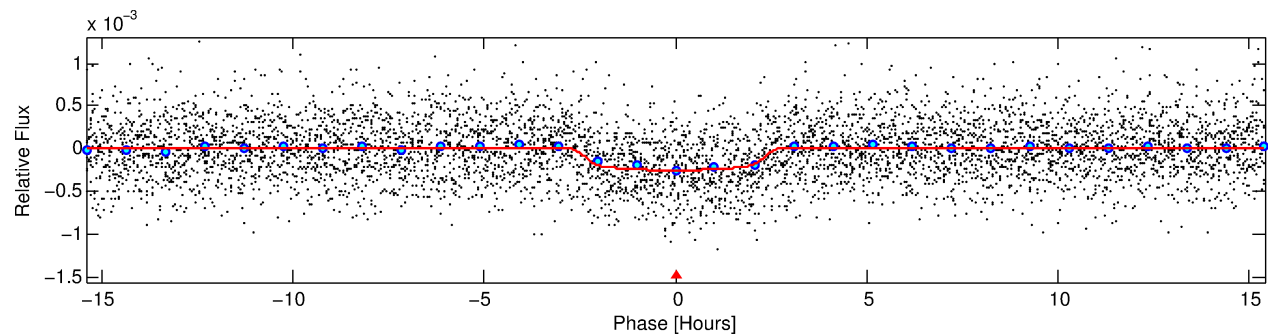
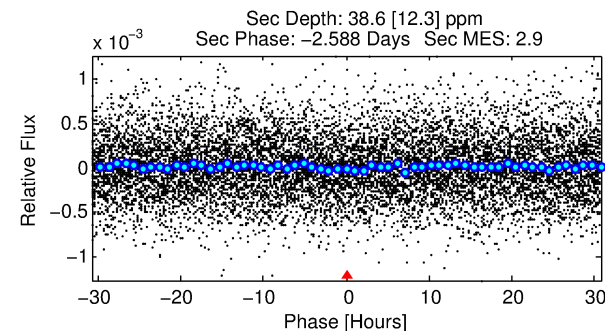
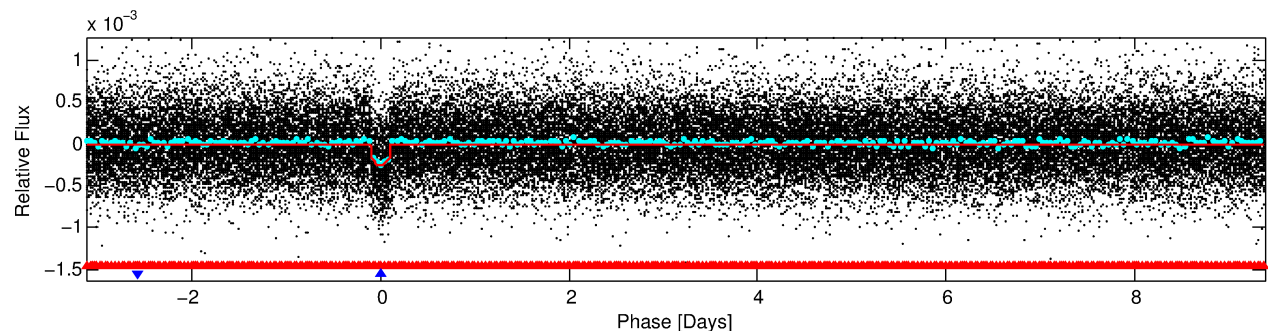
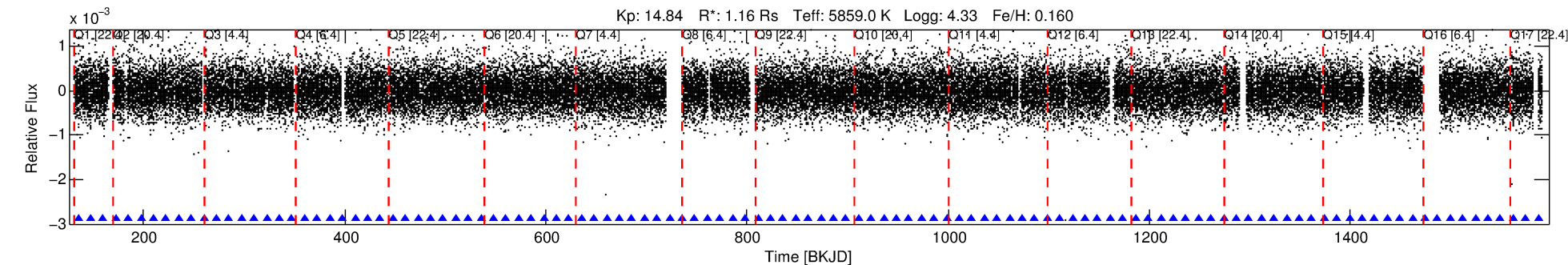
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 011308499-02

No Significant Match Found

# DV One-Page Summary

KIC: 11308499 Candidate: 2 of 2 Period: 12.516 d  
KOI: K02168.02 Name: Kepler-366c Corr: 0.972



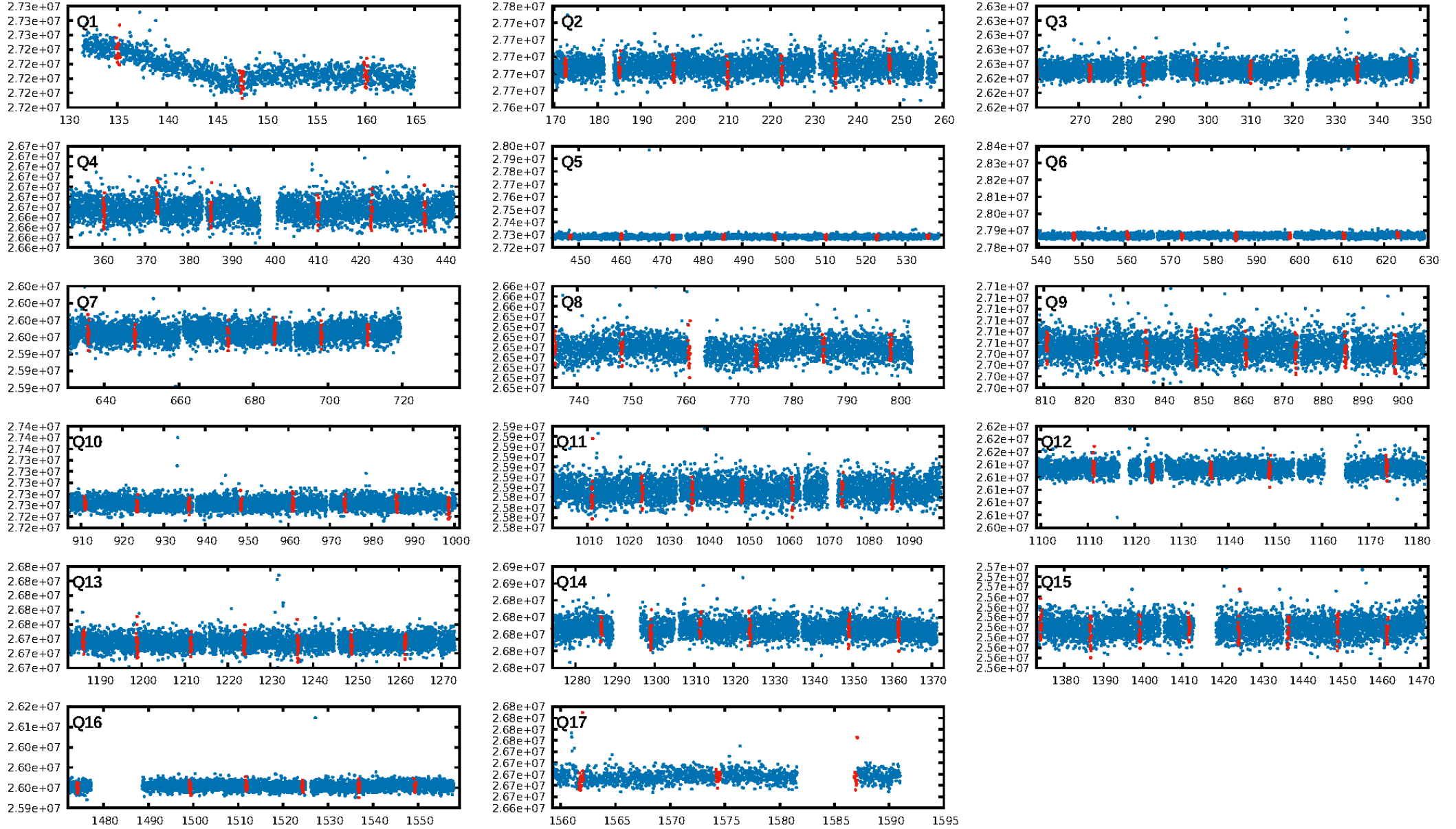
## DV Fit Results:

Period = 12.51606 [0.00009] d  
Epoch = 135.0364 [0.0055] BKJD  
Rp/R\* = 0.0171 [0.0031]  
a/R\* = 9.16 [7.68]  
b = 0.89 [0.20]  
Seff = 122.75 [25.54]  
Teff = 849 [44] K  
Rp = 2.17 [0.53] Re  
a = 0.1078 [0.0149] AU  
Ag = 52.40 [27.33] [1.88σ]  
Teffp = 3531 [428] K [6.24σ]

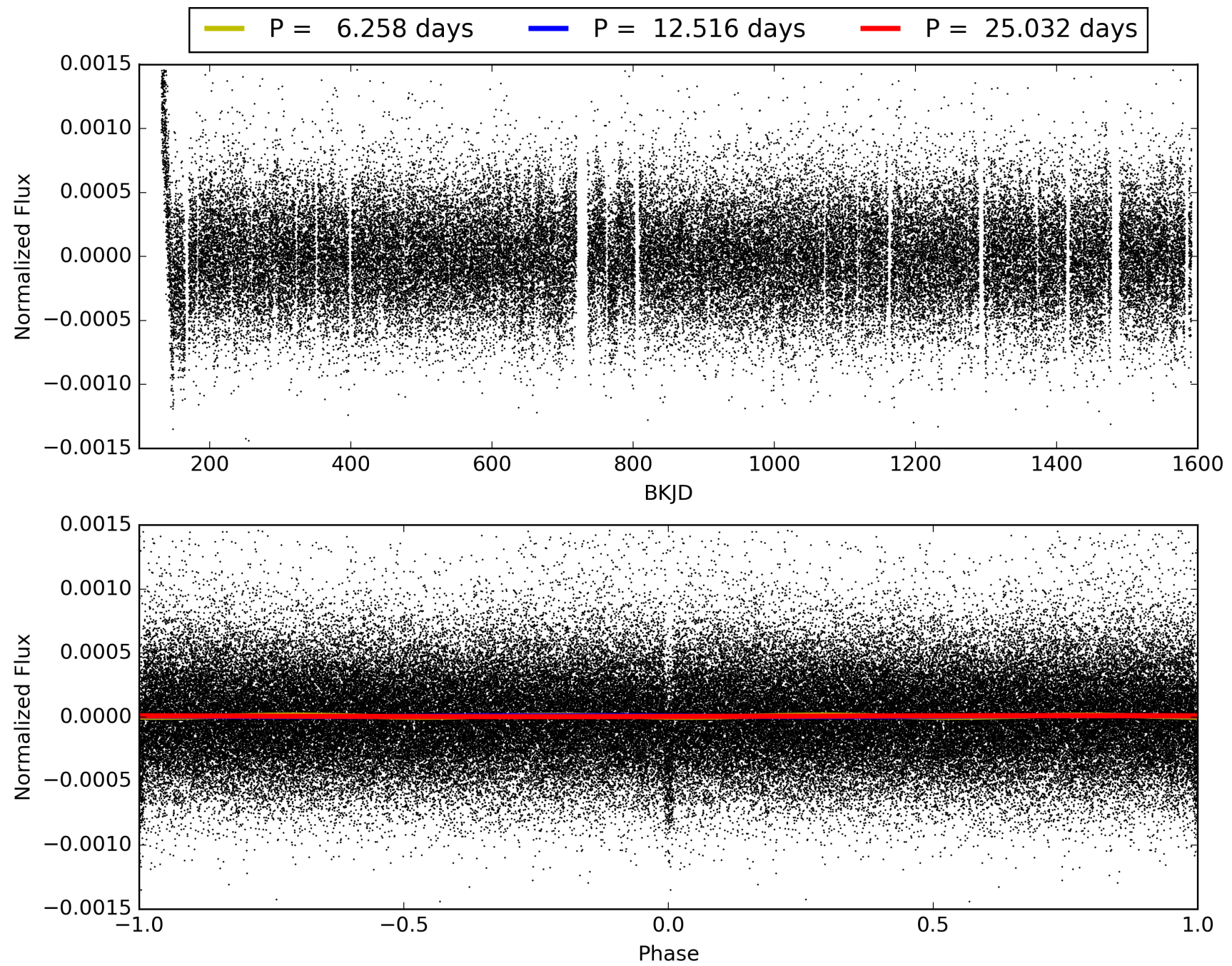
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [36.95σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 100.0%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 9.39e-75  
RollingBand-fgt: 1.00 [95/95]  
GhostDiagnostic-chr: 7.859  
Centroid-sig: 87.6%  
Centroid-so: 0.440 arcsec [0.62σ]  
OotOffset-rm: 0.315 arcsec [1.17σ]  
KicOffset-rm: 0.235 arcsec [0.91σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.76 [13/17]  
DiffImageOverlap-fno: 1.00 [17/17]

# TCE 011308499-02, PDC Light Curves



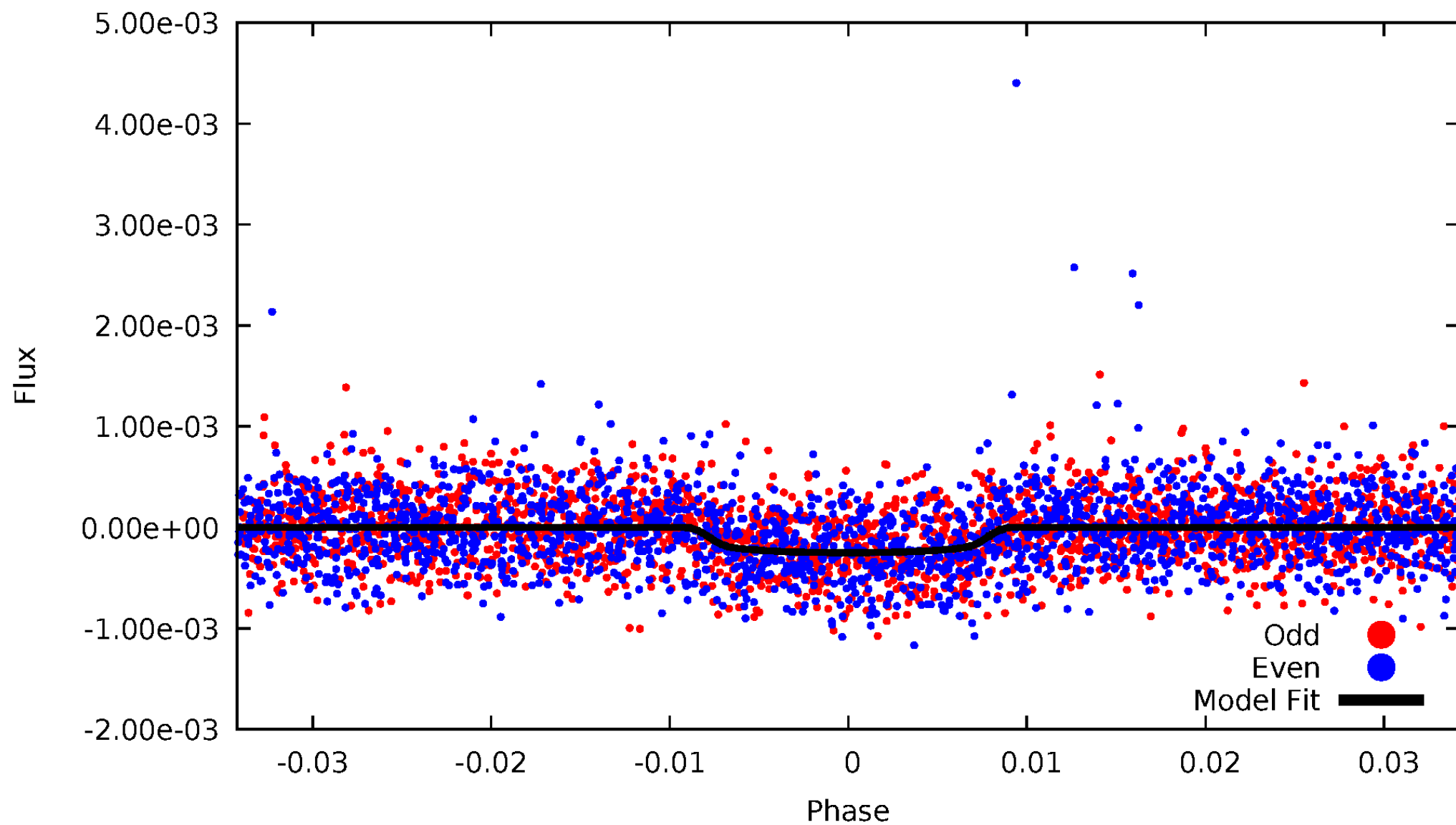
# TCE 011308499-02





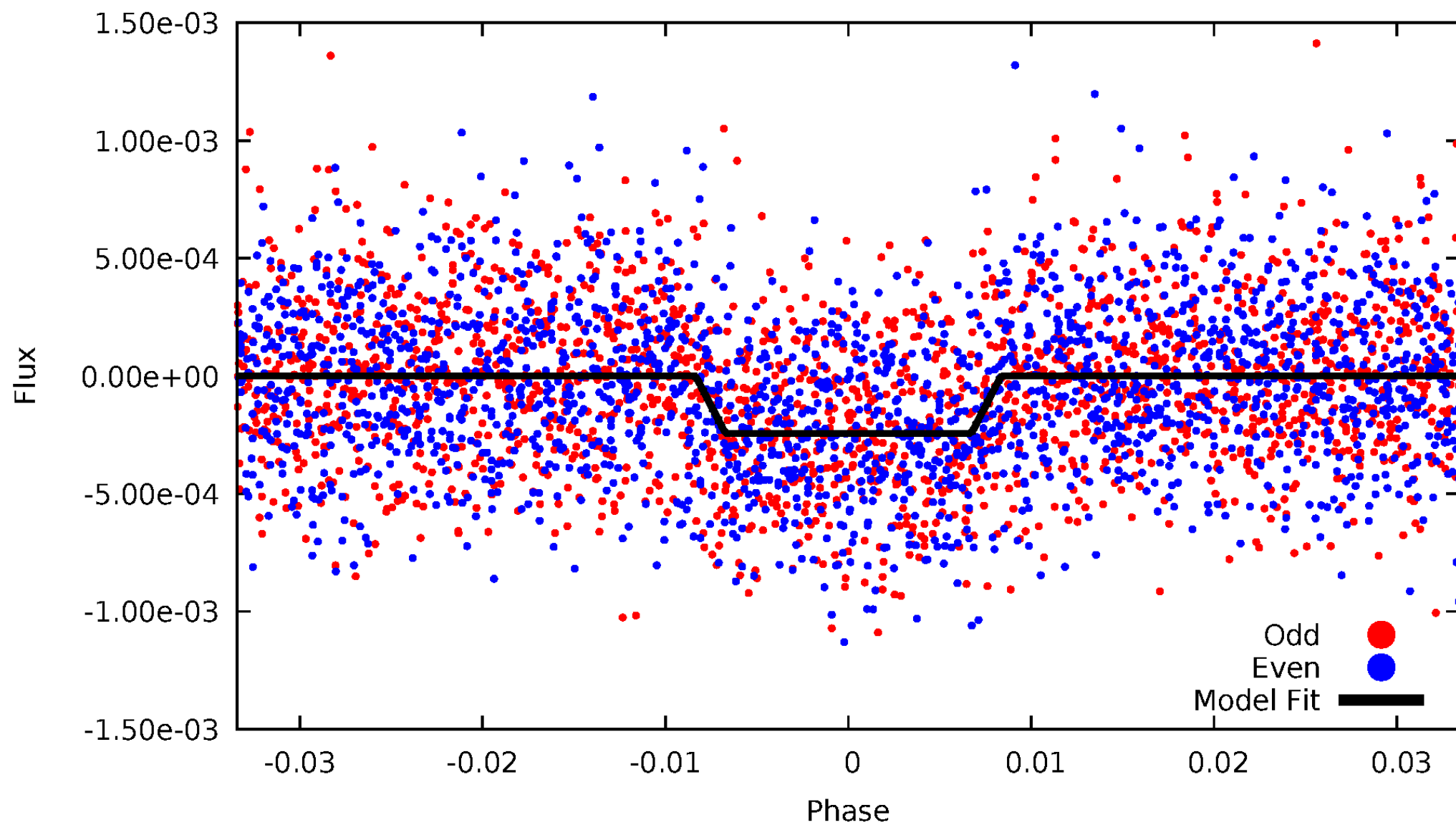
# DV Odd/Even

TCE 011308499-02



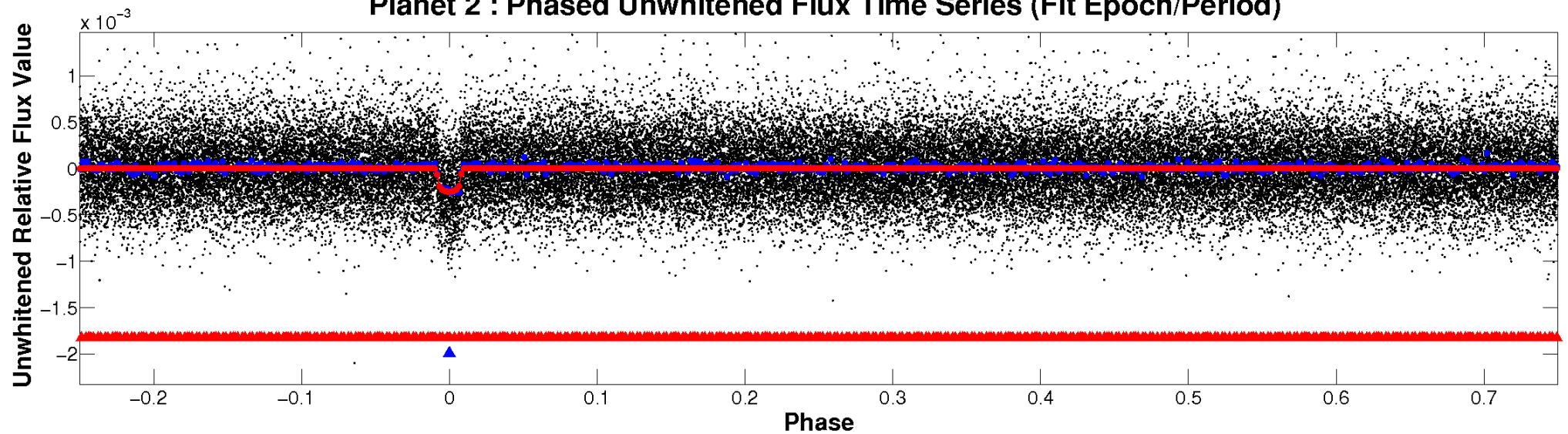
# ALT Odd/Even

TCE 011308499-02

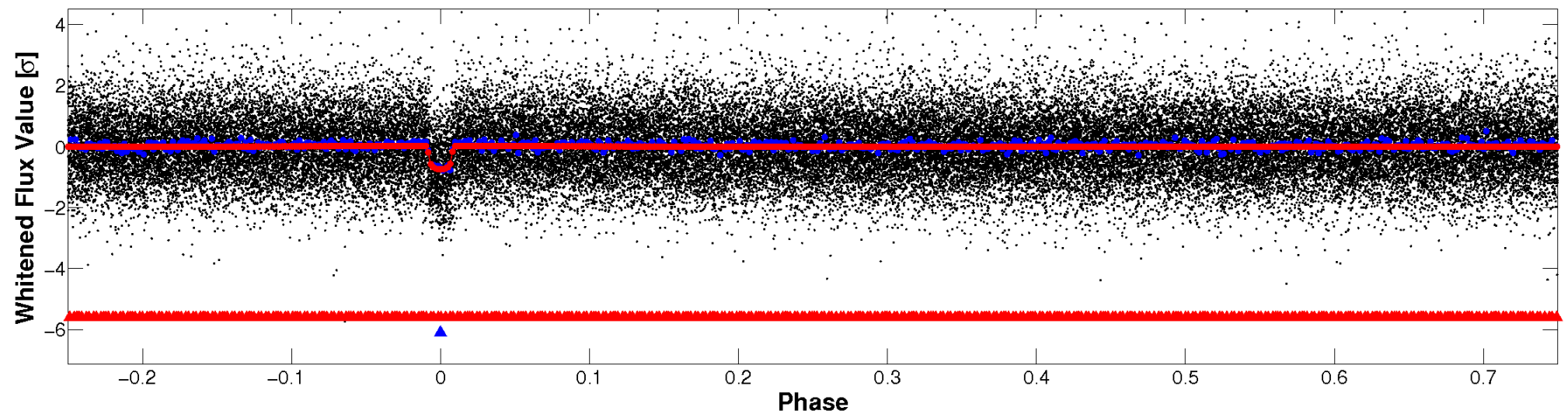


# Non-Whitened Vs. Whitened Light Curve

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

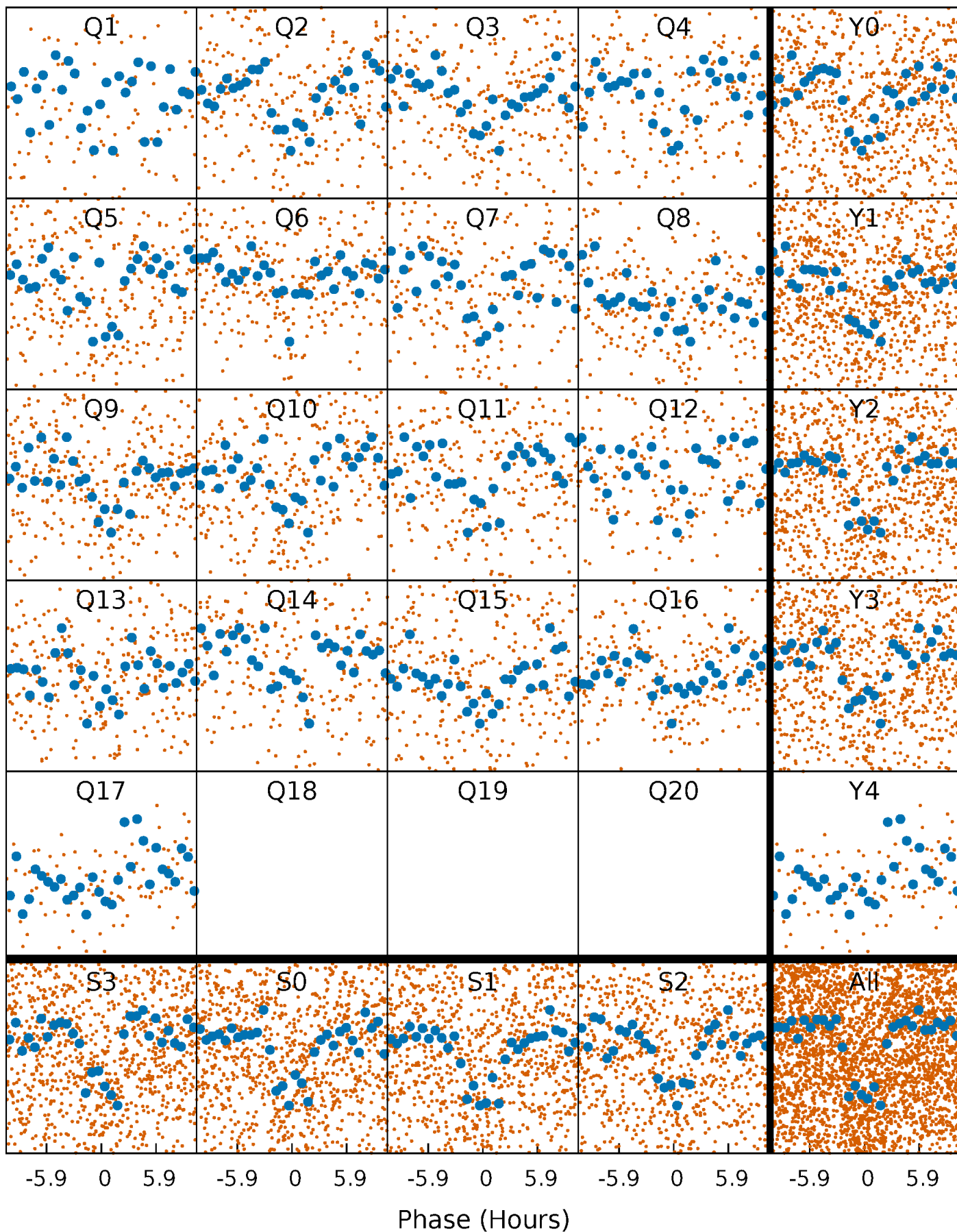


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



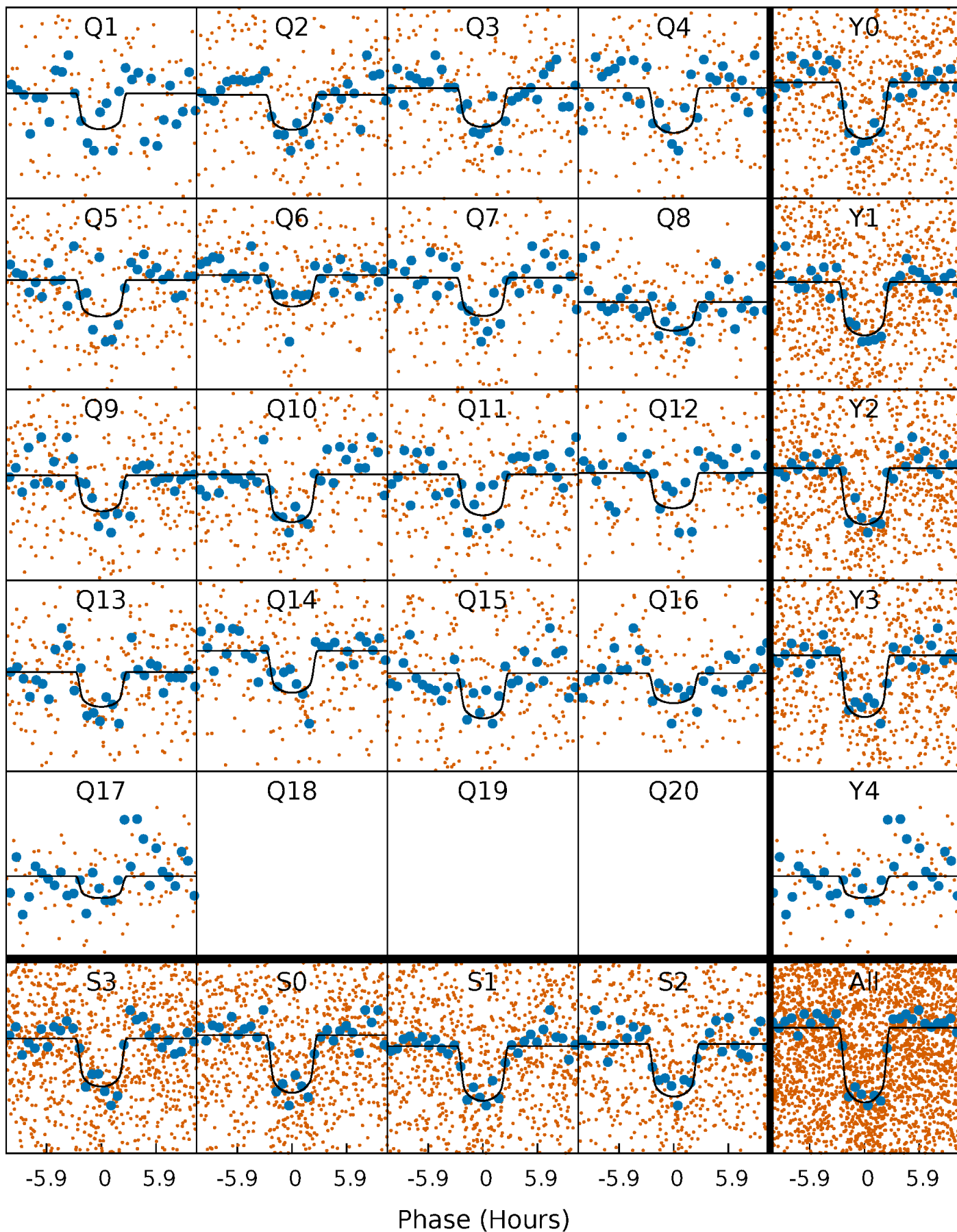
# PDC Quarter-Phased Transit Curves

TCE 011308499-02 P= 12.516056 Days  $T_0=135.036388$  (BKJD)



# DV Quarter-Phased Transit Curves

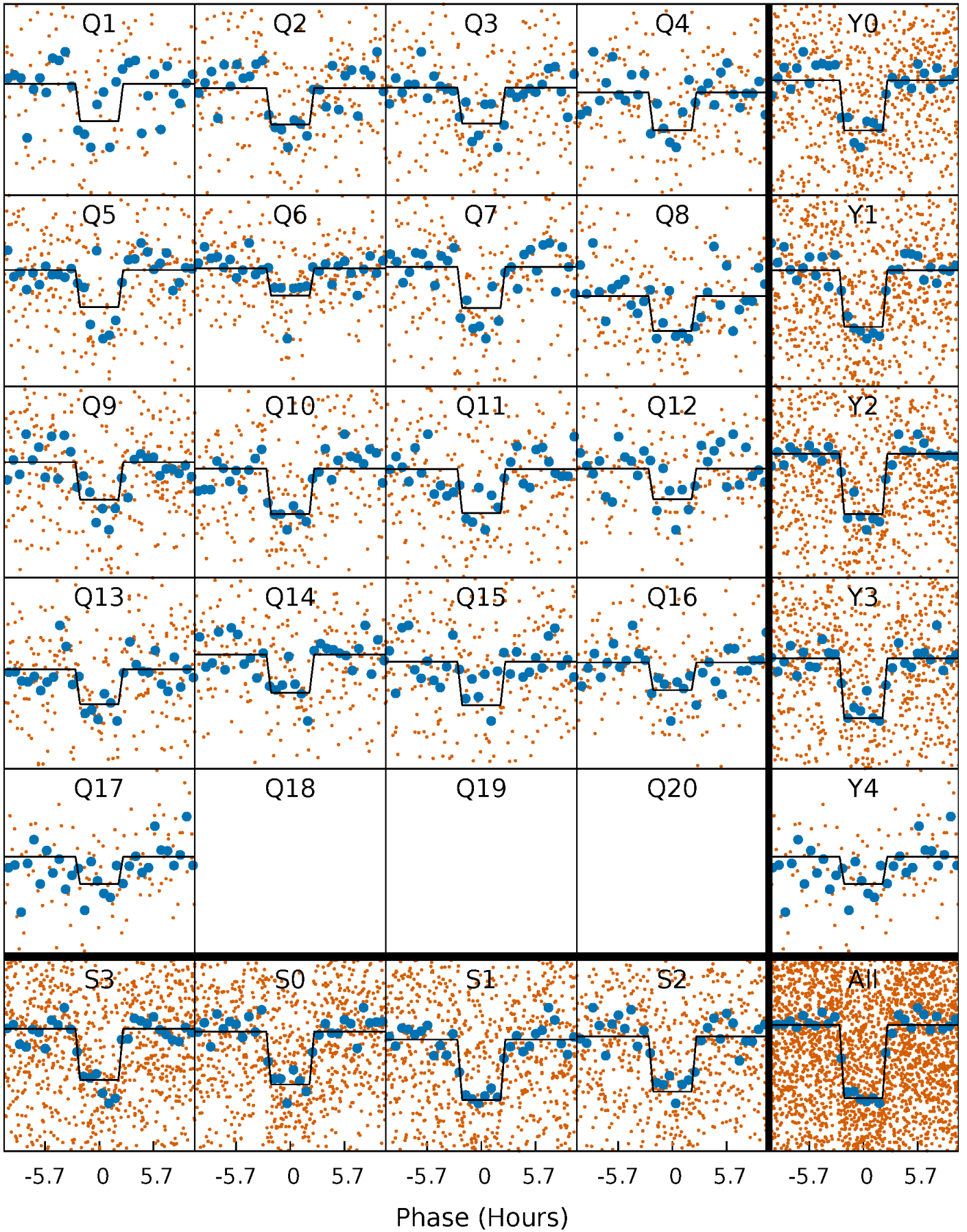
TCE 011308499-02 P= 12.516056 Days  $T_0=135.036388$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

TCE 011308499-02 P= 12.515995 Days  $T_0=135.041643$  (BKJD)

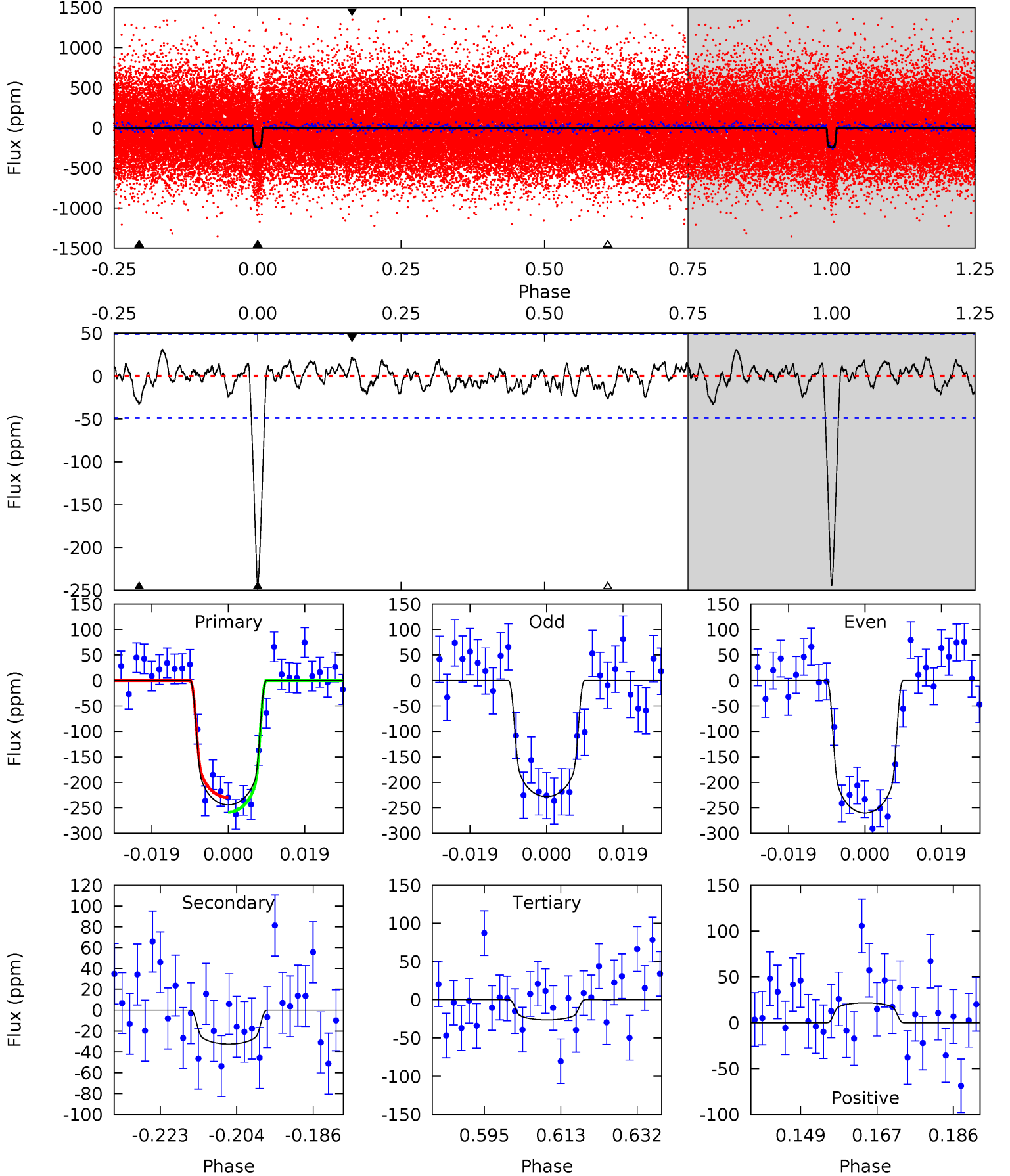




# DV Model-Shift Uniqueness Test

011308499-02,  $P = 12.516056$  Days,  $E = 122.520332$  Days

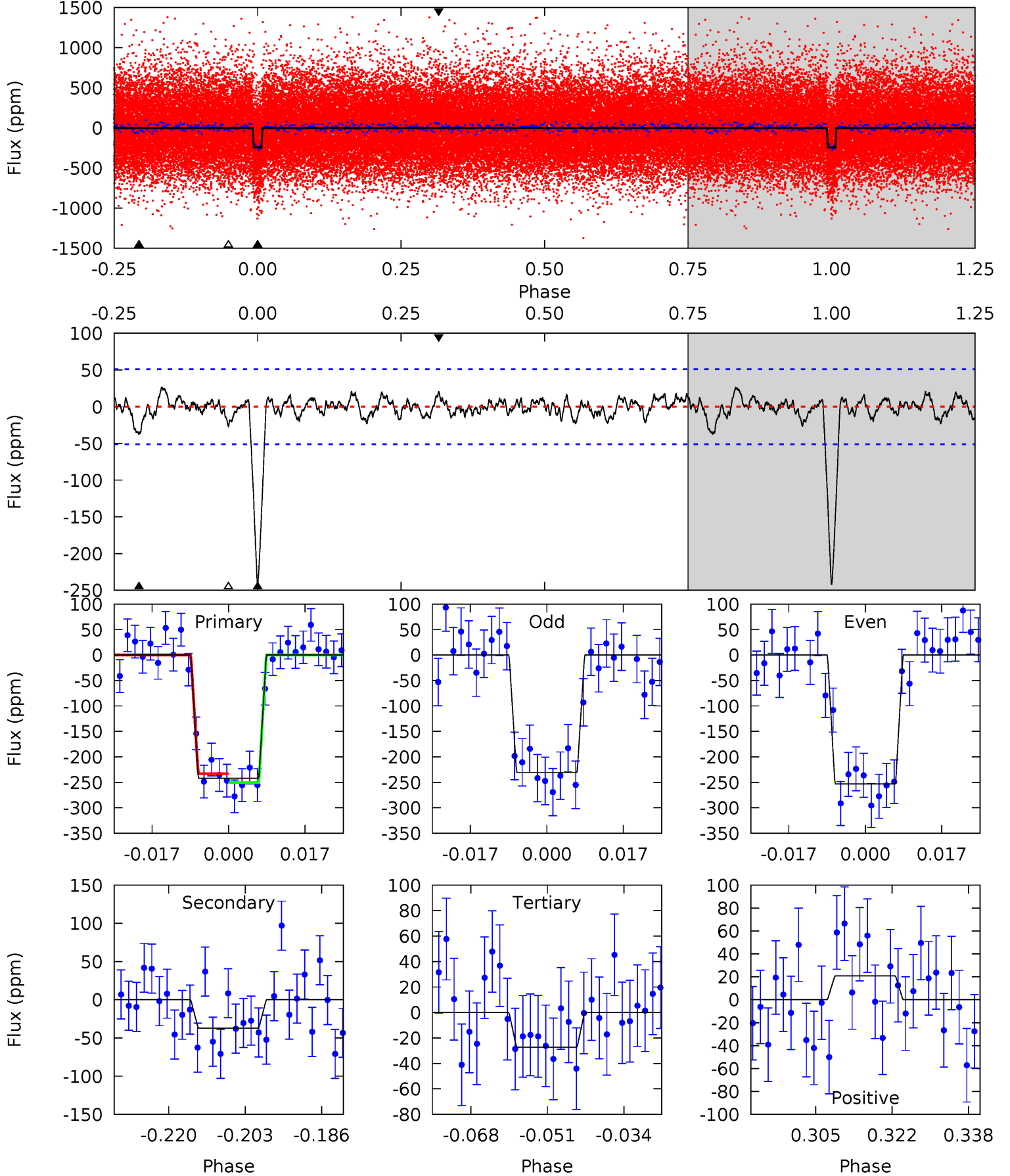
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
24.4	3.25	2.63	2.16	4.91	2.35	1.05	21.8	22.3	0.63	1.09	1.61	1.02	0.11	1.45



# Alt Model-Shift Uniqueness Test

011308499-02, P = 12.515995 Days, E = 122.525648 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
23.3	3.56	2.62	2.00	4.92	2.39	0.89	20.7	21.3	0.95	1.56	1.09	0.99	0.10	0.85



### Stellar Parameters For KIC 011308499

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5859^{+79}_{-79}$	$4.335^{+0.099}_{-0.110}$	$0.160^{+0.150}_{-0.150}$	$1.162^{+0.190}_{-0.143}$	$1.064^{+0.070}_{-0.070}$	$0.955^{+0.405}_{-0.336}$
	+1%/-1%	+2%/-3%	+94%/-94%	+16%/-12%	+7%/-7%	+42%/-35%
Source	SPE90	SPE90	SPE90	DSEP		

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

### Secondary Eclipse Parameters for KIC 011308499-02 / KOI 2168.02

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-33 \pm 10$	$2.19^{+0.45}_{-0.44}$	$1189^{+51}_{-43}$	$3750^{+335}_{-277}$	$43^{+28}_{-17}$
Alt.	$-37 \pm 10$	$1.97^{+0.48}_{-0.41}$	$1186^{+54}_{-42}$	$3987^{+424}_{-326}$	$61^{+46}_{-25}$

$T_{max}$  = 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

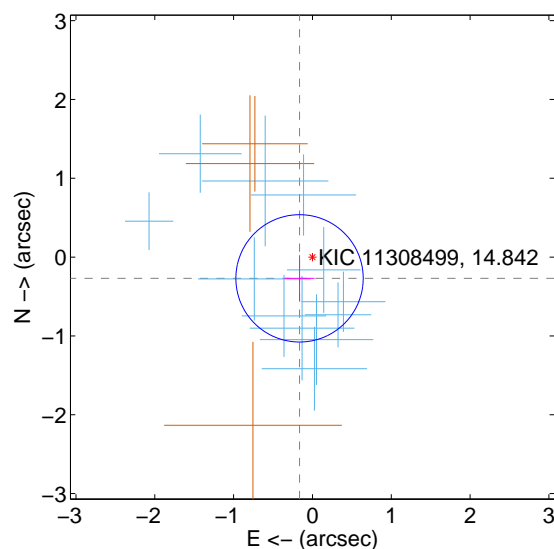
Supplemental centroid analysis for 011308499-02. Kepler magnitude: 14.84. Transit SNR 19.57

There are 13 quarters with good PRF difference image offsets

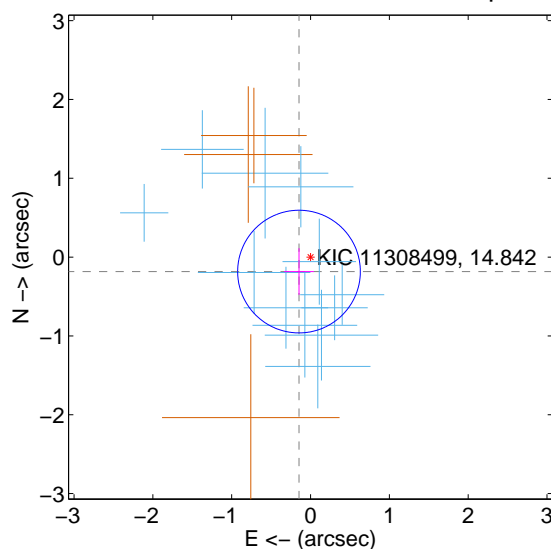
The direct PRF centroid is offset from the target star catalog position by about 0.10 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.315 \pm 0.269$	1.17	$0.164 \pm 0.190$	$-0.270 \pm 0.293$
PRF-fit source offset from KIC position	$0.235 \pm 0.259$	0.91	$0.146 \pm 0.189$	$-0.184 \pm 0.296$
photometric centroid source offset	$0.44 \pm 0.71$	0.62	$0.12 \pm 0.74$	$0.42 \pm 0.70$

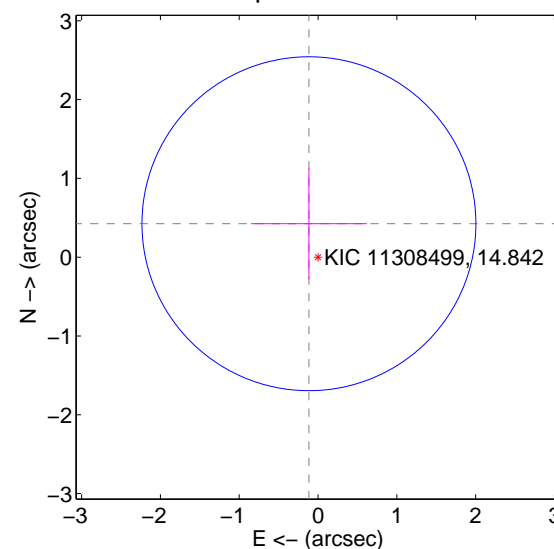
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

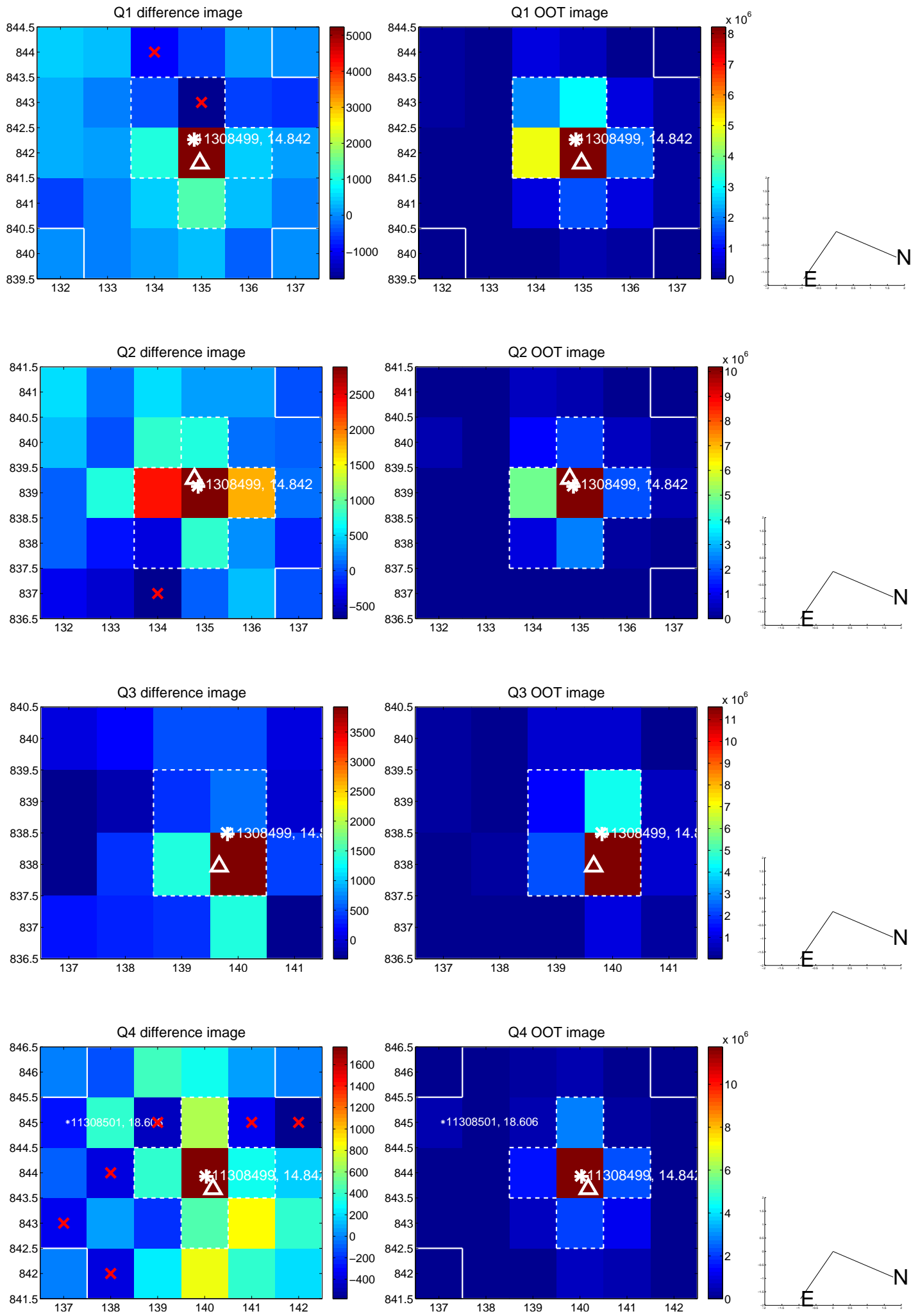


offset from photometric centroids

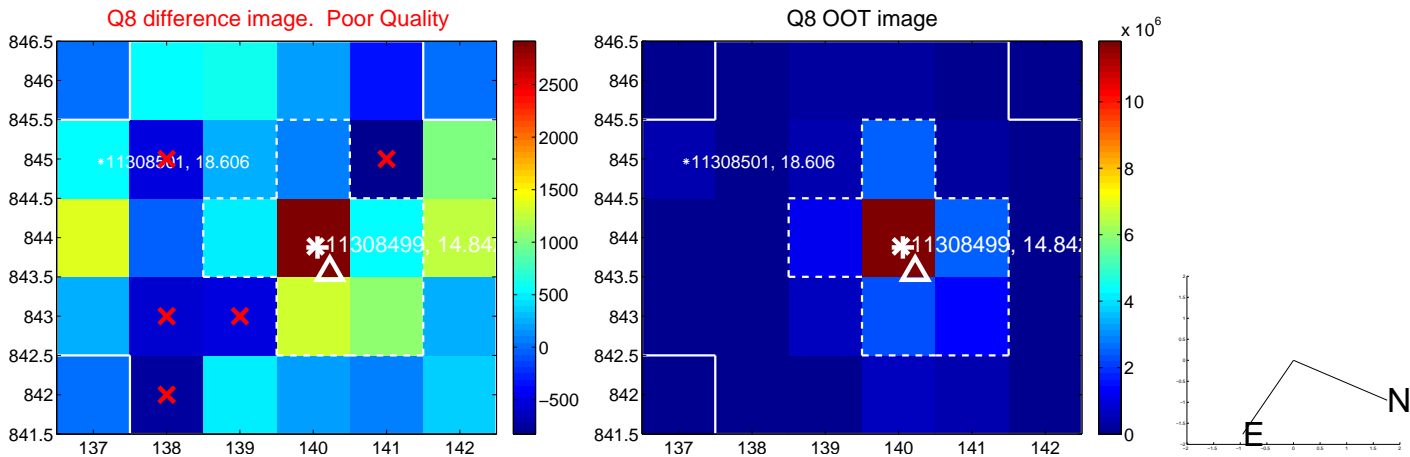
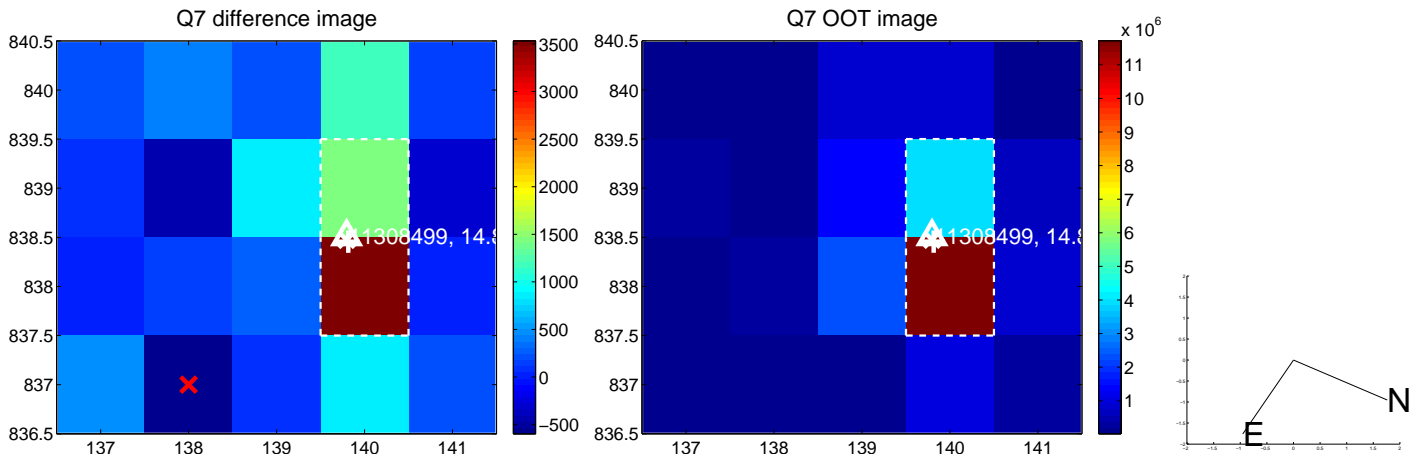
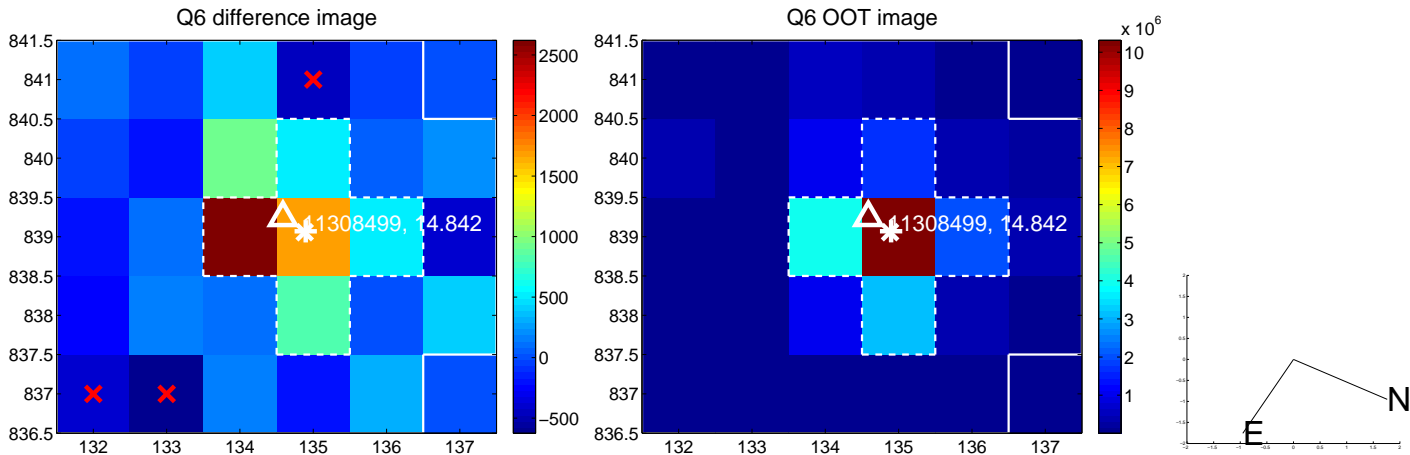
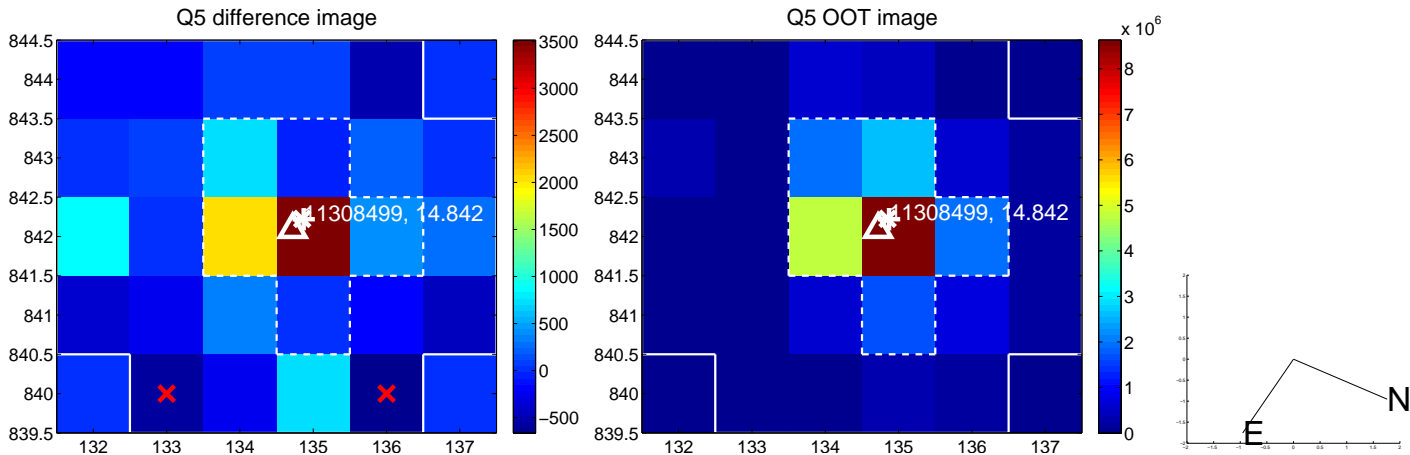


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

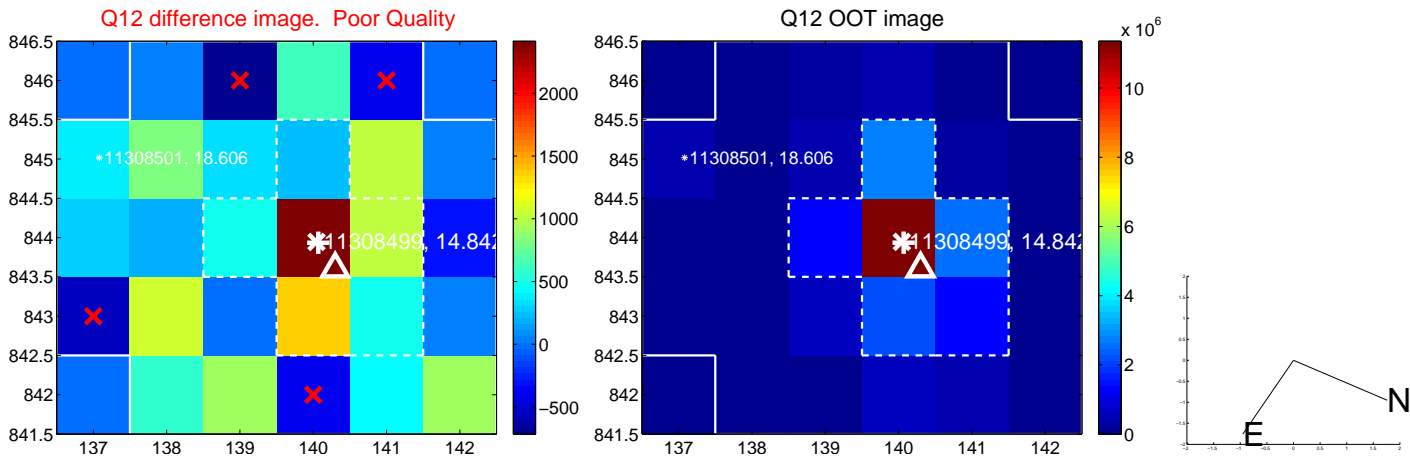
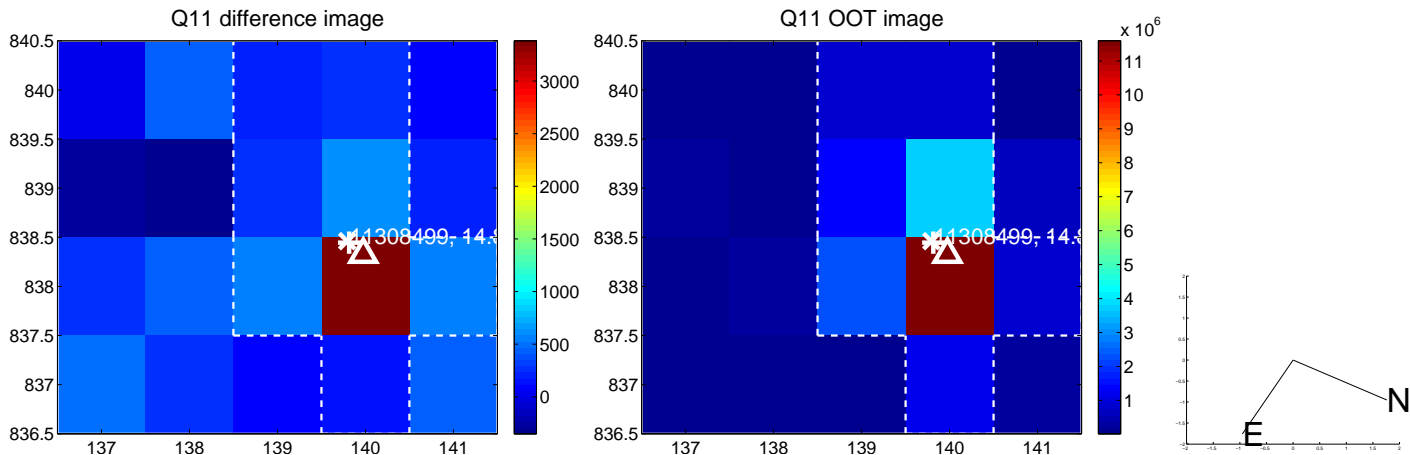
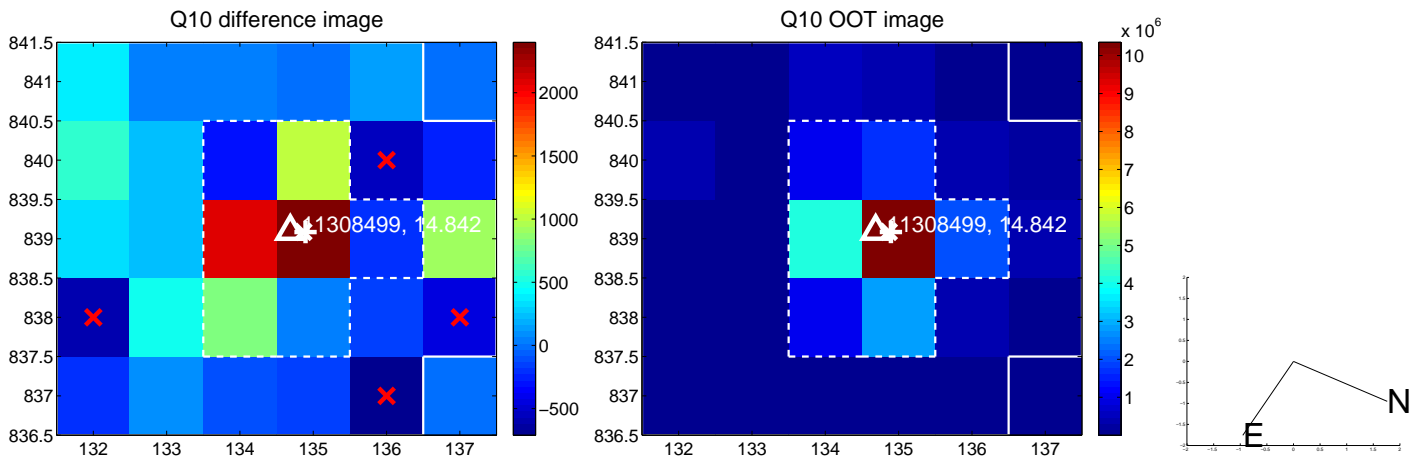
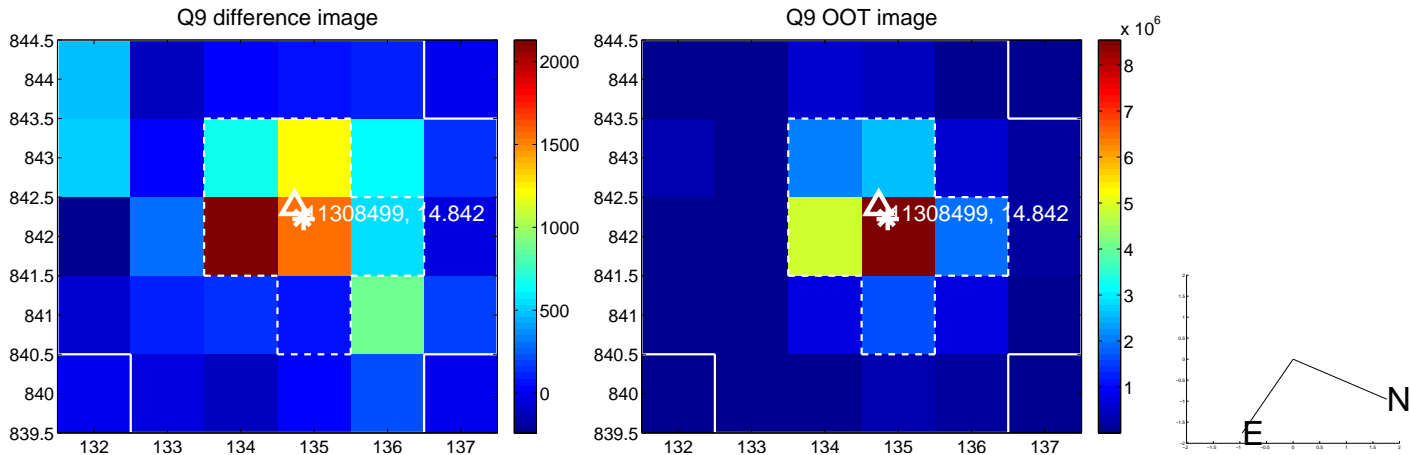


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

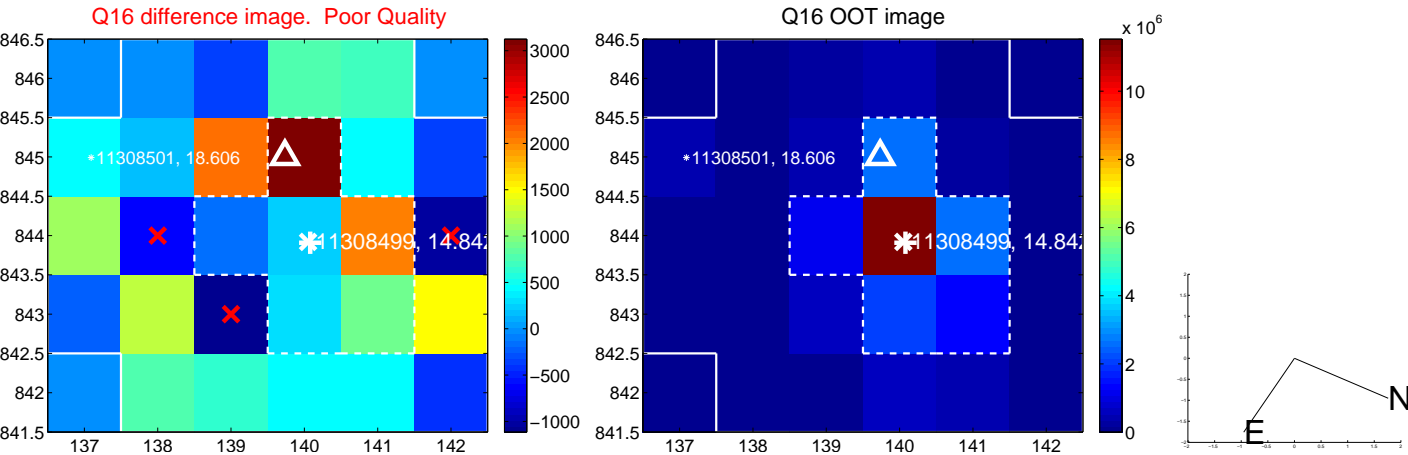
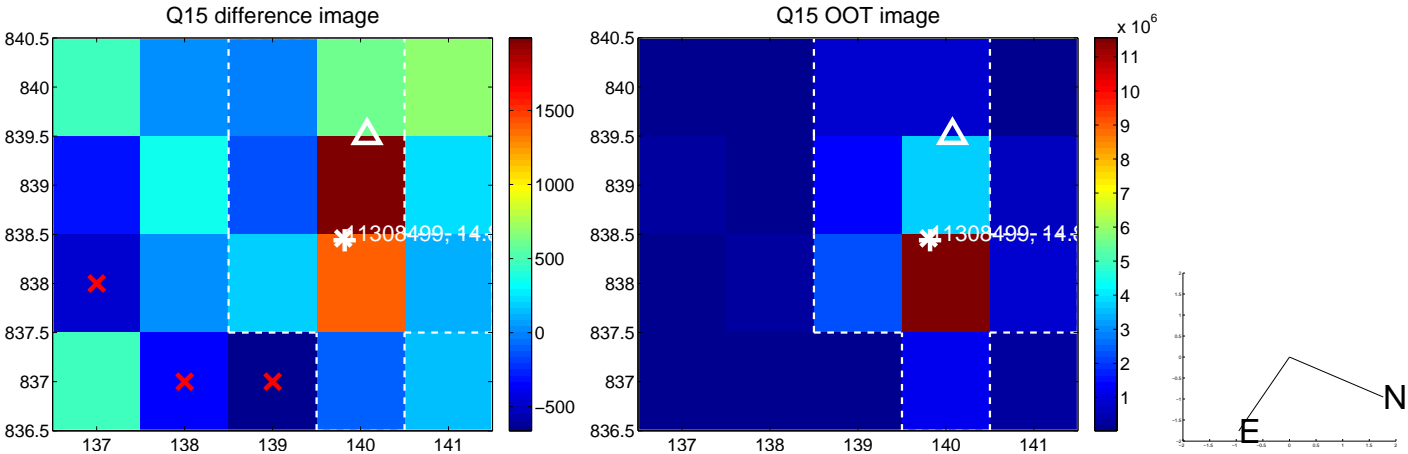
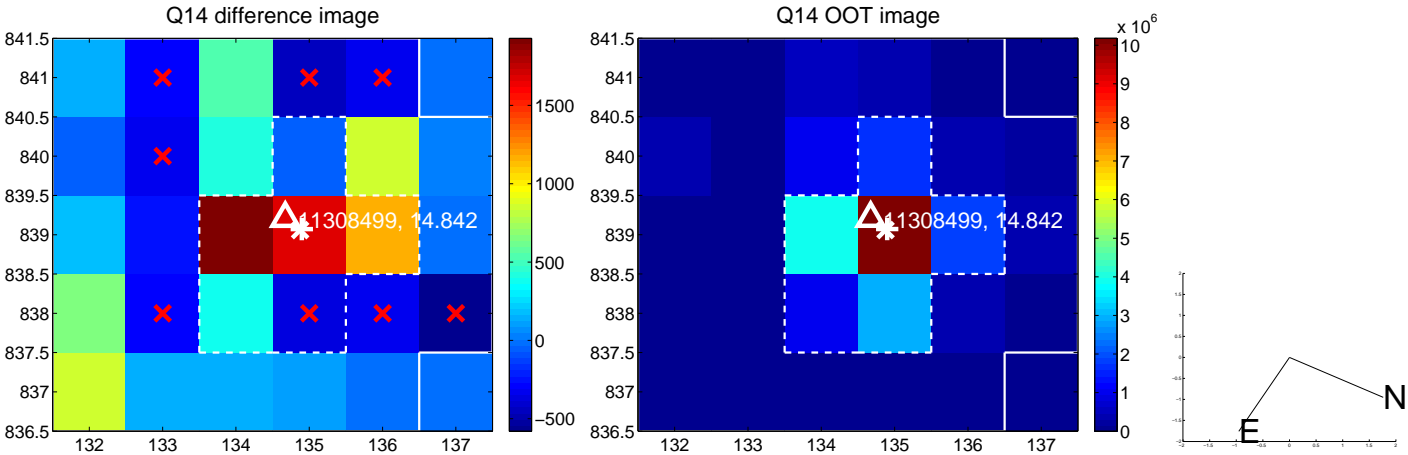
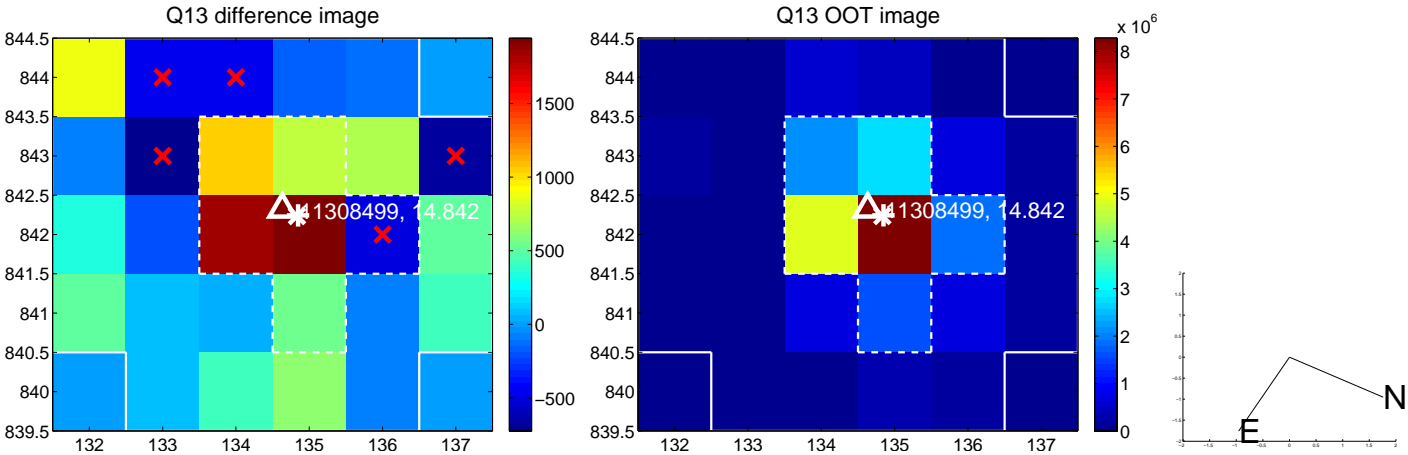




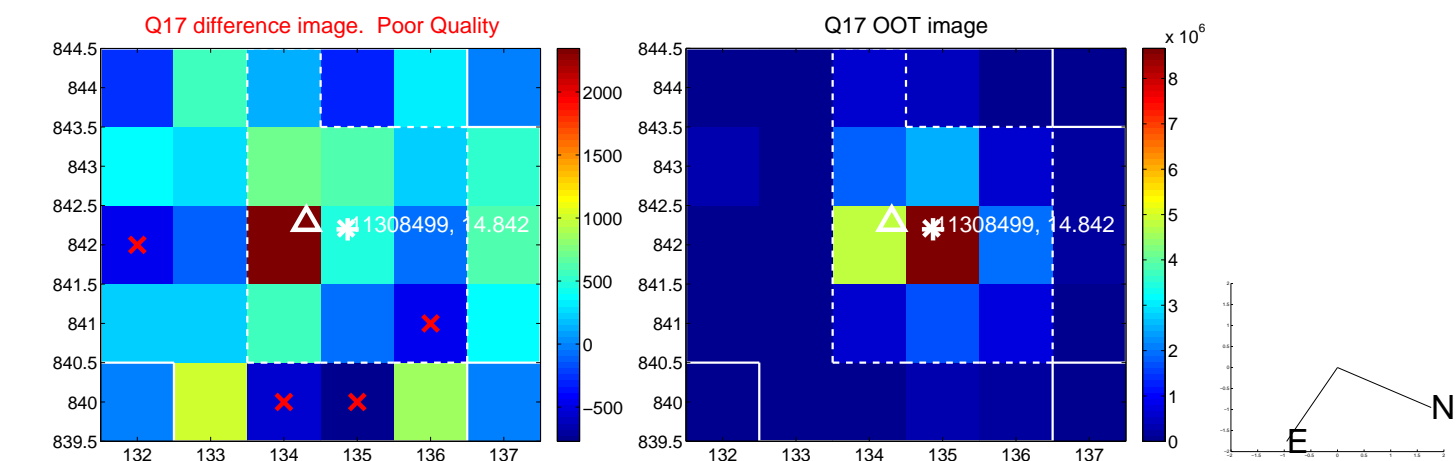
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



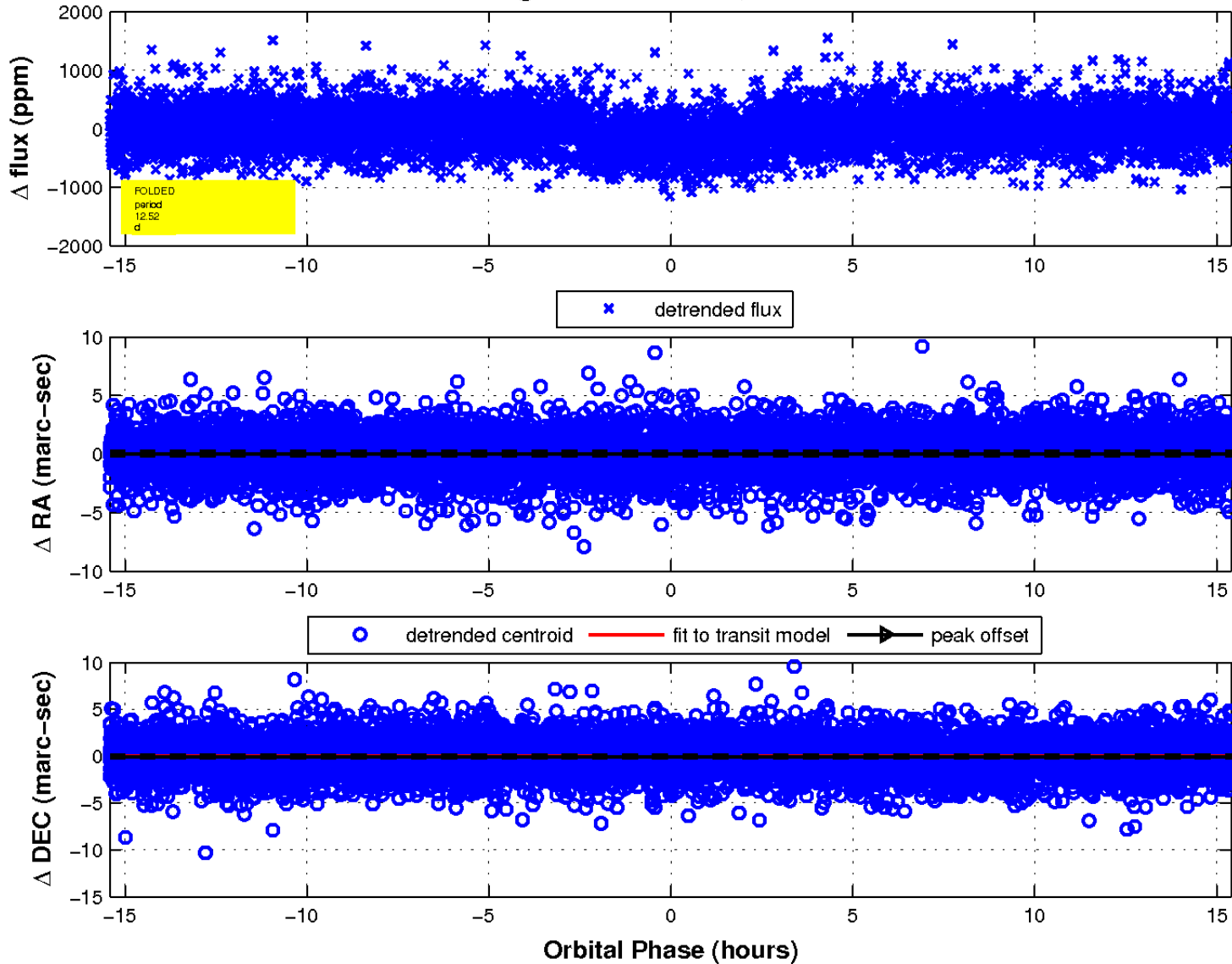
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



# UKIRT Image

Declination

