

# KIC 004909707

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004909707-01	OBS	No	2.302299	132.437587	373.7	7.224	37.4	22.3	1.23	5948	2.80	1431.74
004909707-02	OBS	3175.01	2.300227	132.883448	84.0	6.000	19.9	-1.0	1.23	5948	1.12	1433.46

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004909707-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE_ZUMA_TRACKER—LPP_DV—MOD_NONUNIQ_DV—CENT_SATURATED
004909707-02	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_ALT—CENT_SATURATED

**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 004909707-01

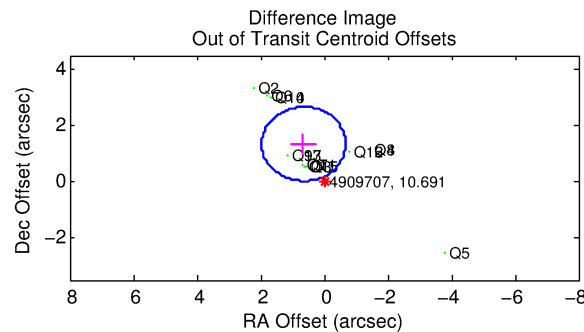
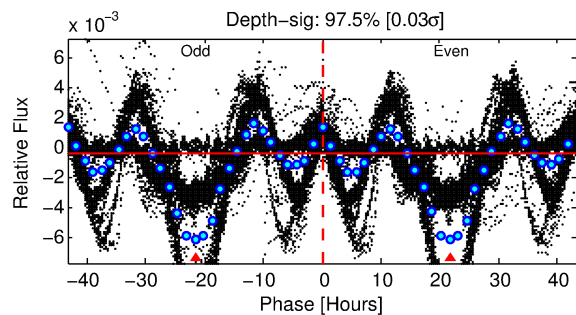
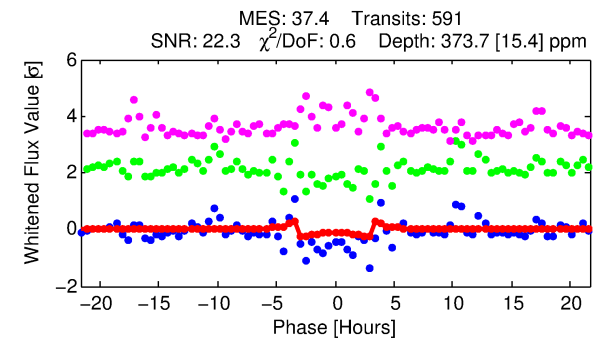
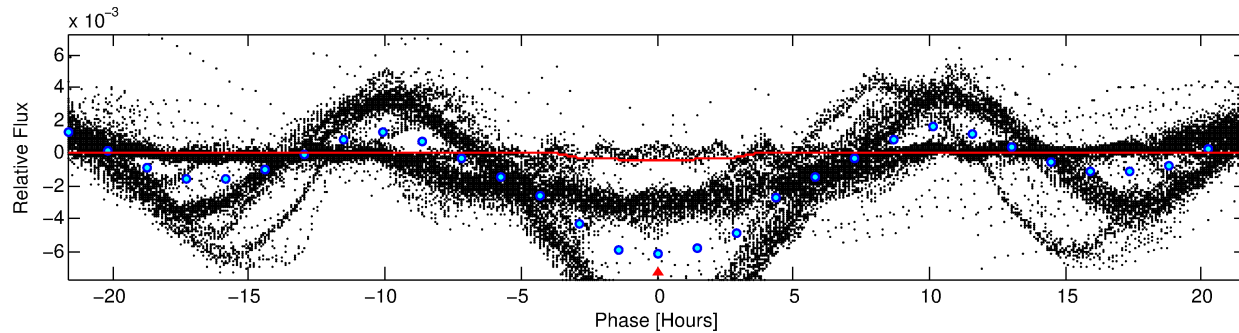
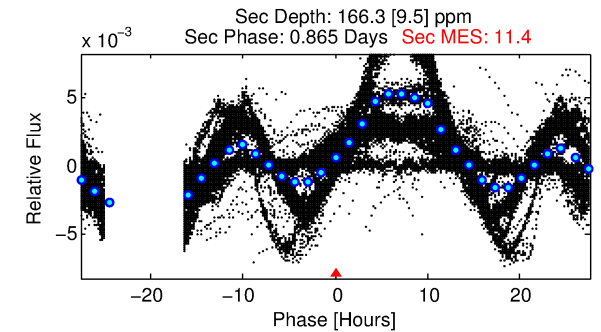
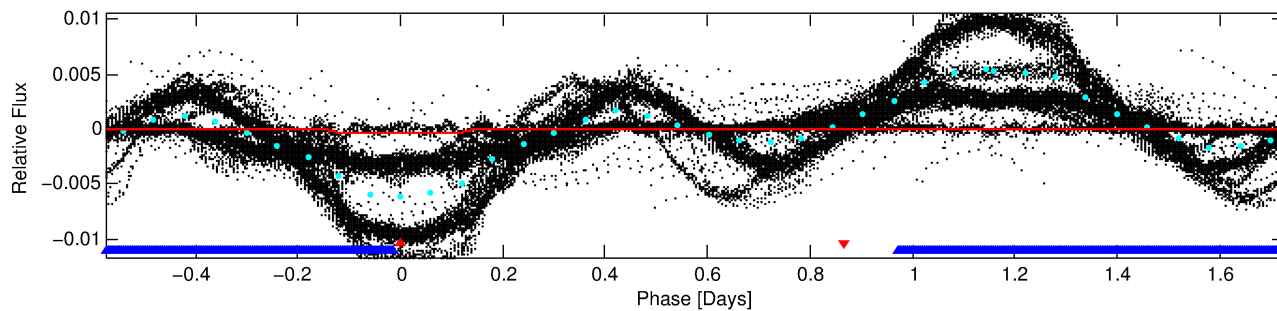
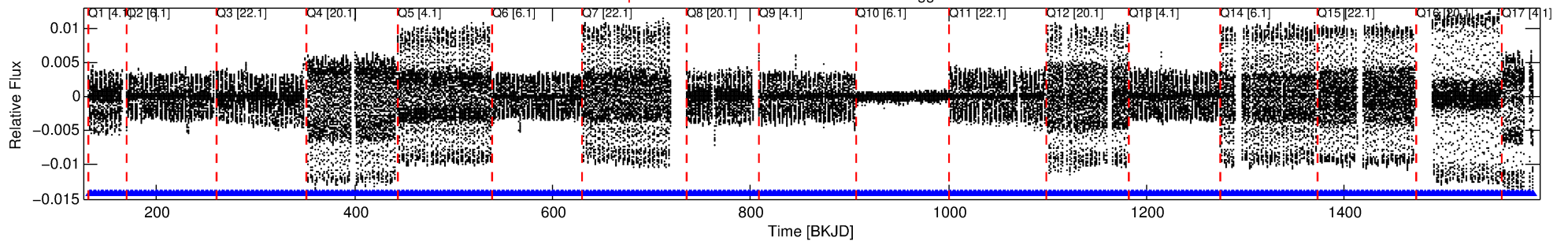
No Significant Match Found

# DV One-Page Summary

KIC: 4909707 Candidate: 1 of 2 Period: 2.302 d

KOI: K03175.01 Corr: 0.919

Kp: 10.69 R\*: 1.23 Rs Teff: 5948.0 K Logg: 4.27 Fe/H: -0.020



## DV Fit Results:

Period = 2.30230 [0.00001] d  
Epoch = 132.4376 [0.0009] BKJD  
Rp/R\* = 0.0209 [0.0005]  
a/R\* = 1.51 [0.05]  
b = 0.90 [0.01]  
Seff = 1431.74 [526.61]  
Teff = 1569 [144] K  
Rp = 2.80 [0.80] Re  
a = 0.0344 [0.0081] AU  
Ag = 13.79 [4.73] [2.70σ]  
Teffp = 4674 [198] K [12.67σ]

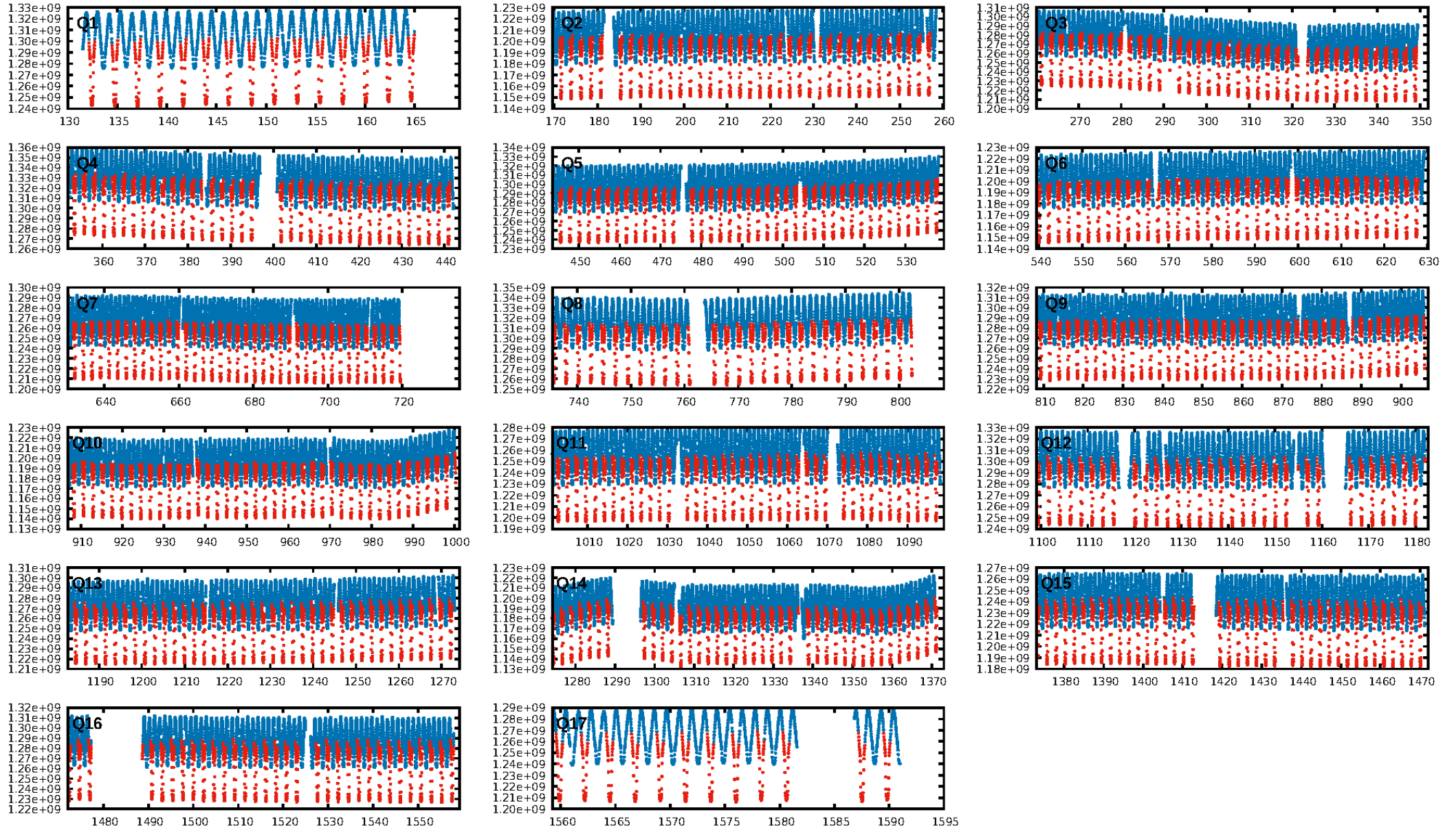
## DV Diagnostic Results:

ShortPeriod-sig: 0.4% [0.01σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [564/564]  
GhostDiagnostic-chr: 0.7758  
Centroid-sig: N/A  
Centroid-so: 0.878 arcsec [4.42σ]  
OotOffset-rm: 1.494 arcsec [3.40σ]  
KicOffset-rm: 1.895 arcsec [5.40σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.65 [11/17]  
DiffImageOverlap-fno: 0.53 [9/17]

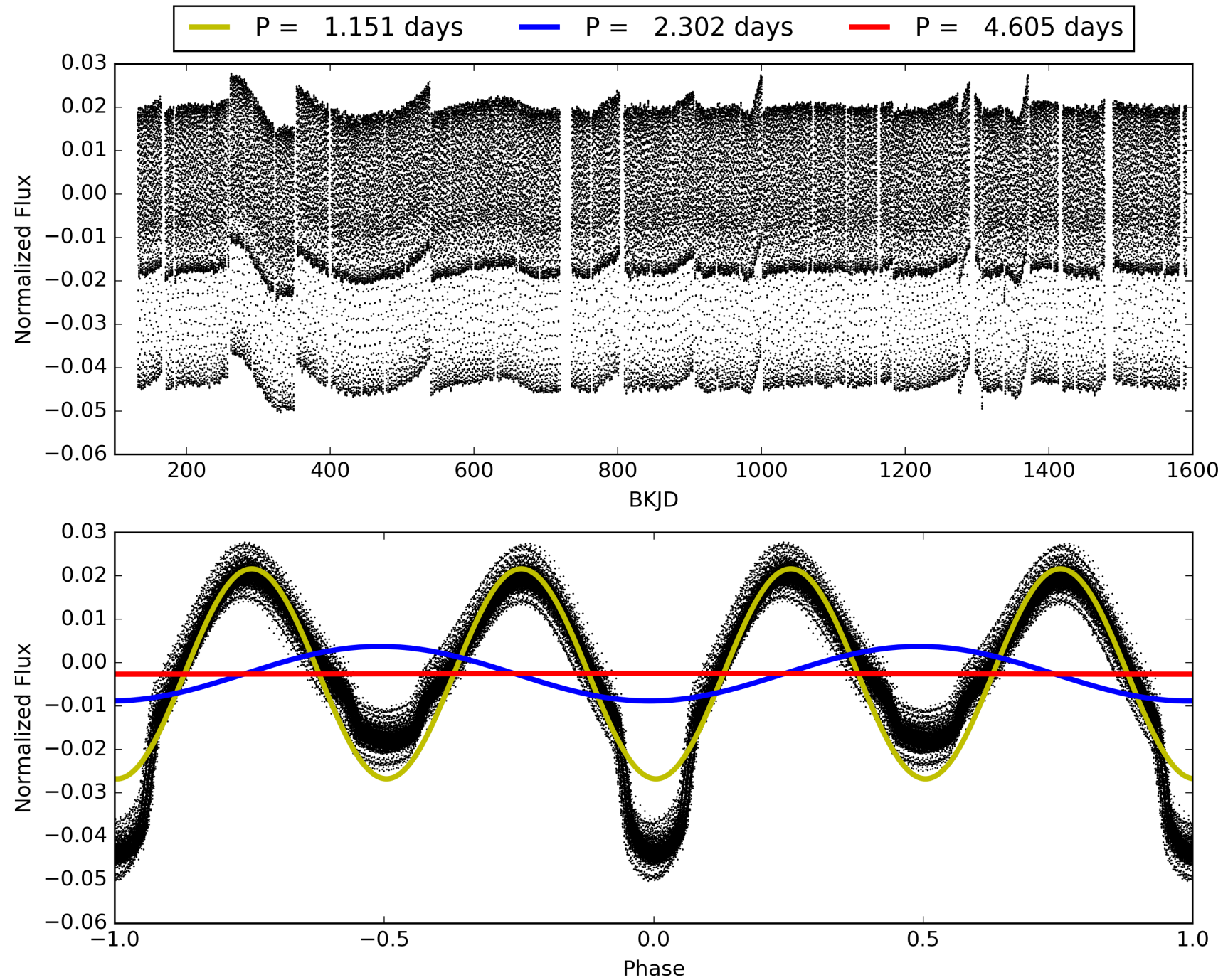
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 07:59:15 Z

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

# TCE 004909707-01, PDC Light Curves



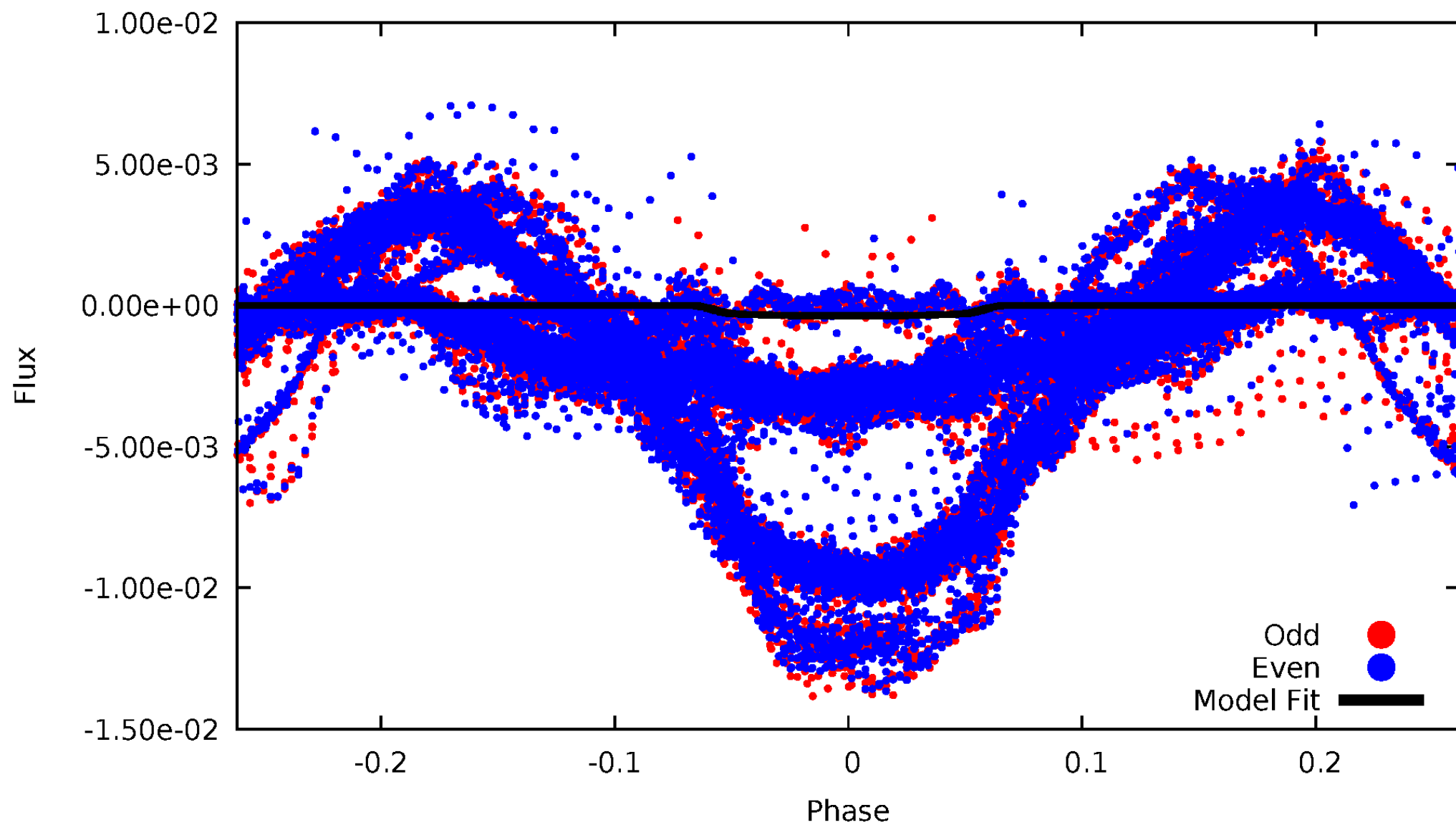
TCE 004909707-01





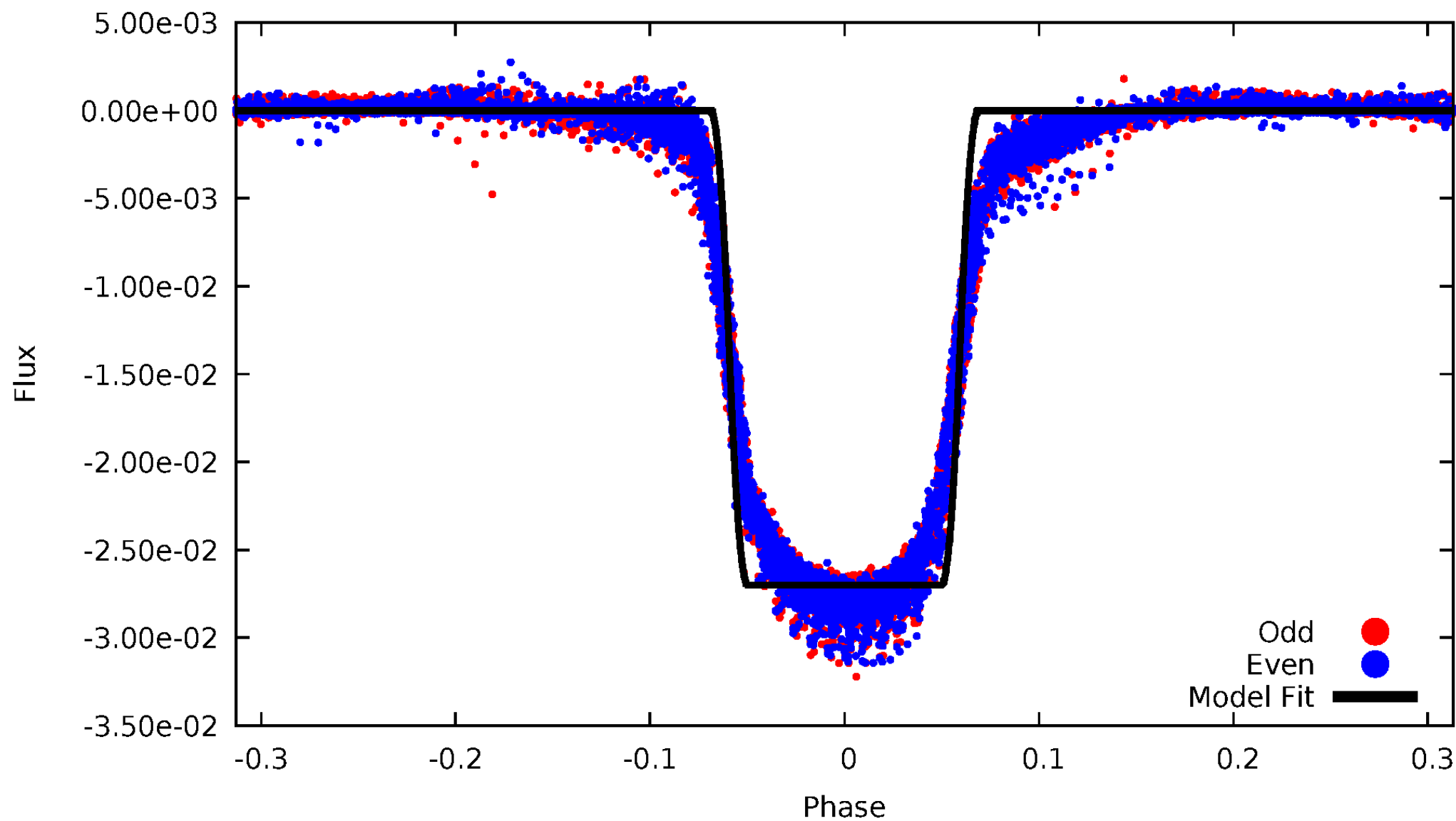
# DV Odd/Even

TCE 004909707-01



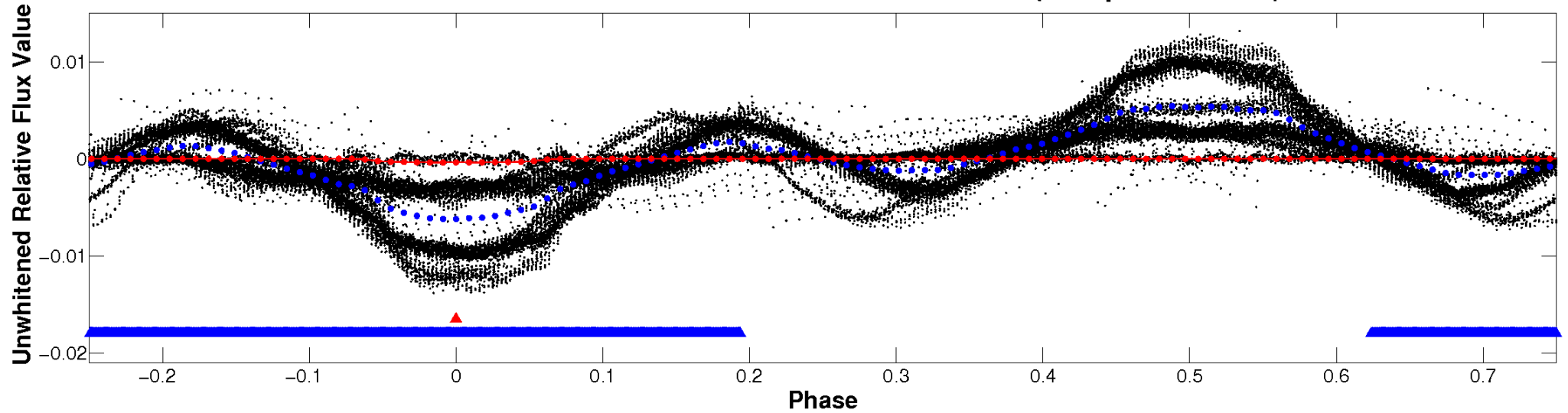
# ALT Odd/Even

TCE 004909707-01

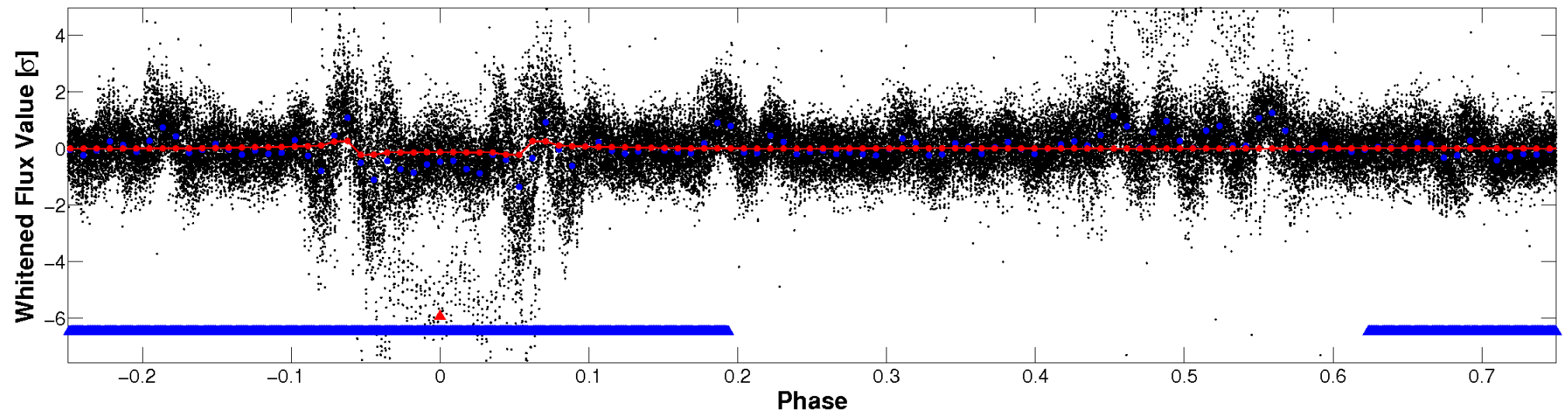


# Non-Whitened Vs. Whitened Light Curve

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

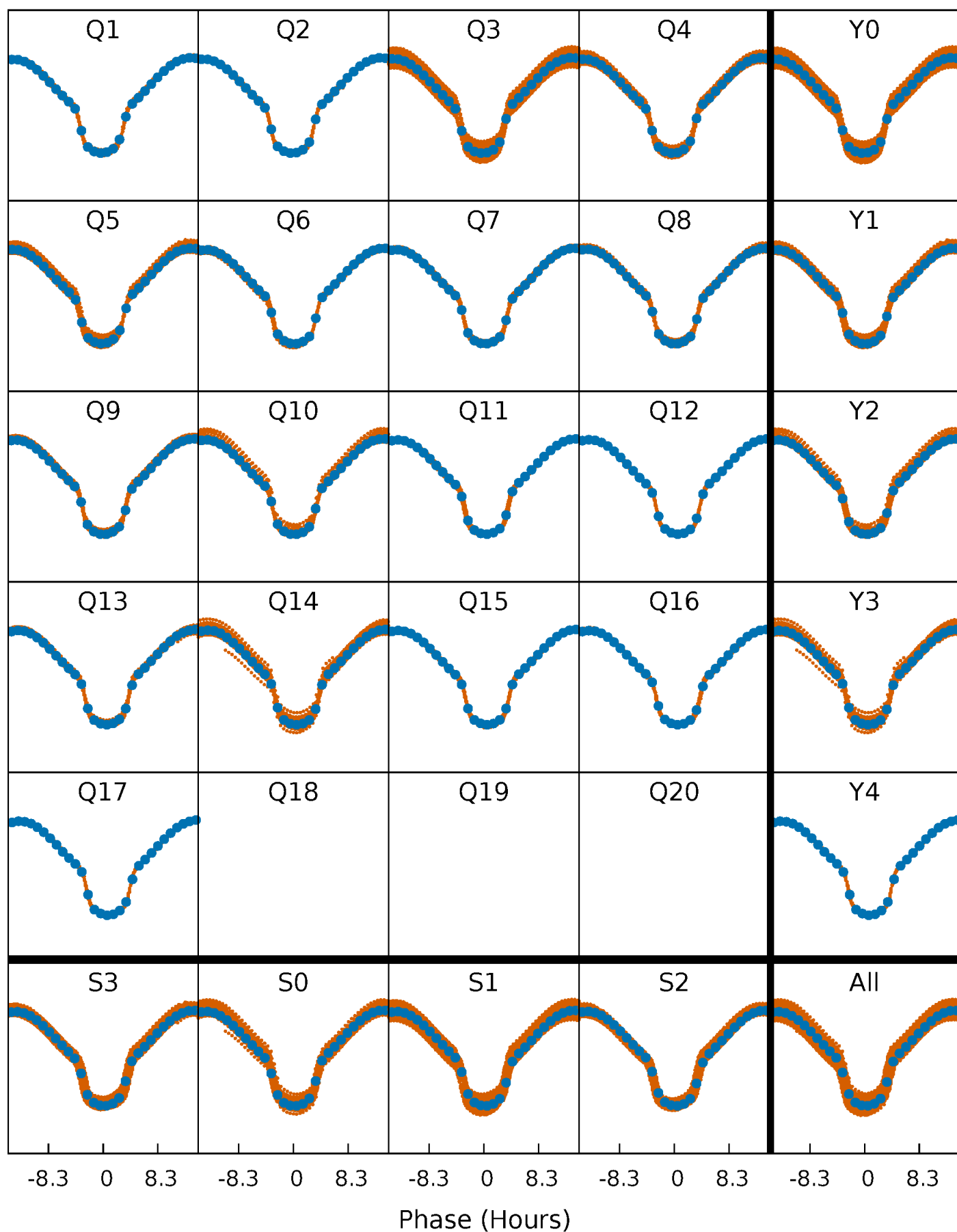


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

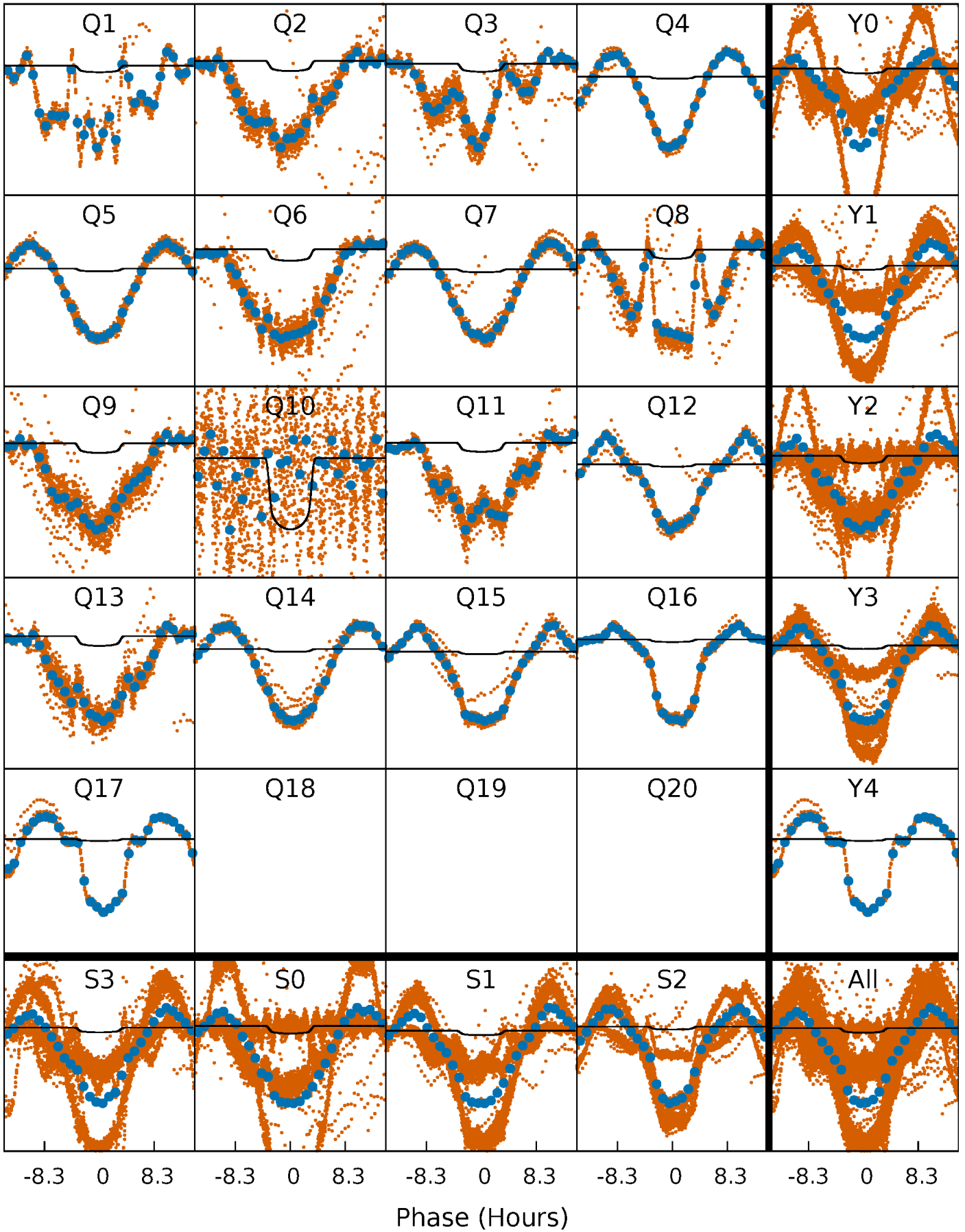
TCE 004909707-01 P= 2.302299 Days  $T_0=132.437587$  (BKJD)





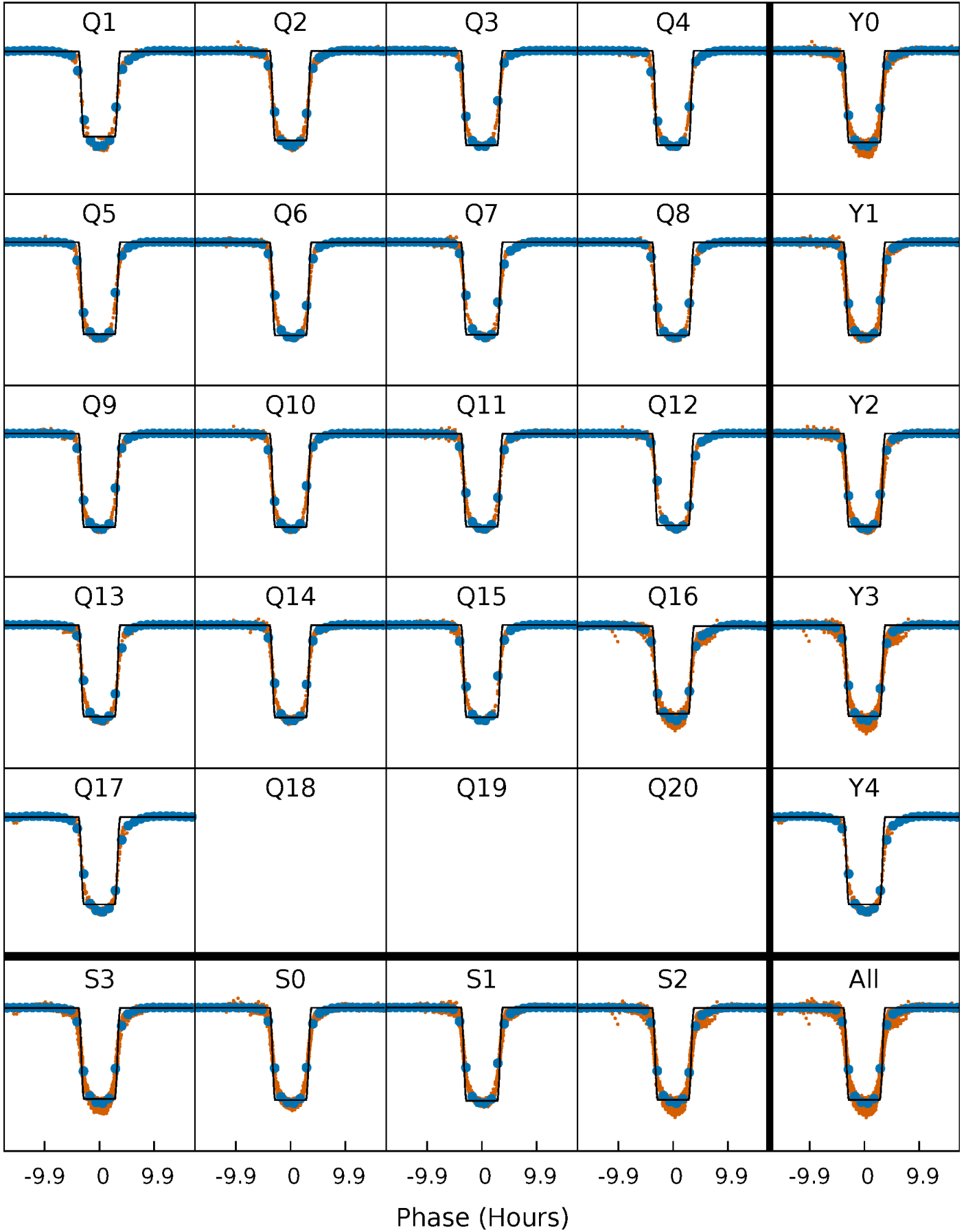
# DV Quarter-Phased Transit Curves

TCE 004909707-01 P= 2.302299 Days  $T_0=132.437587$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

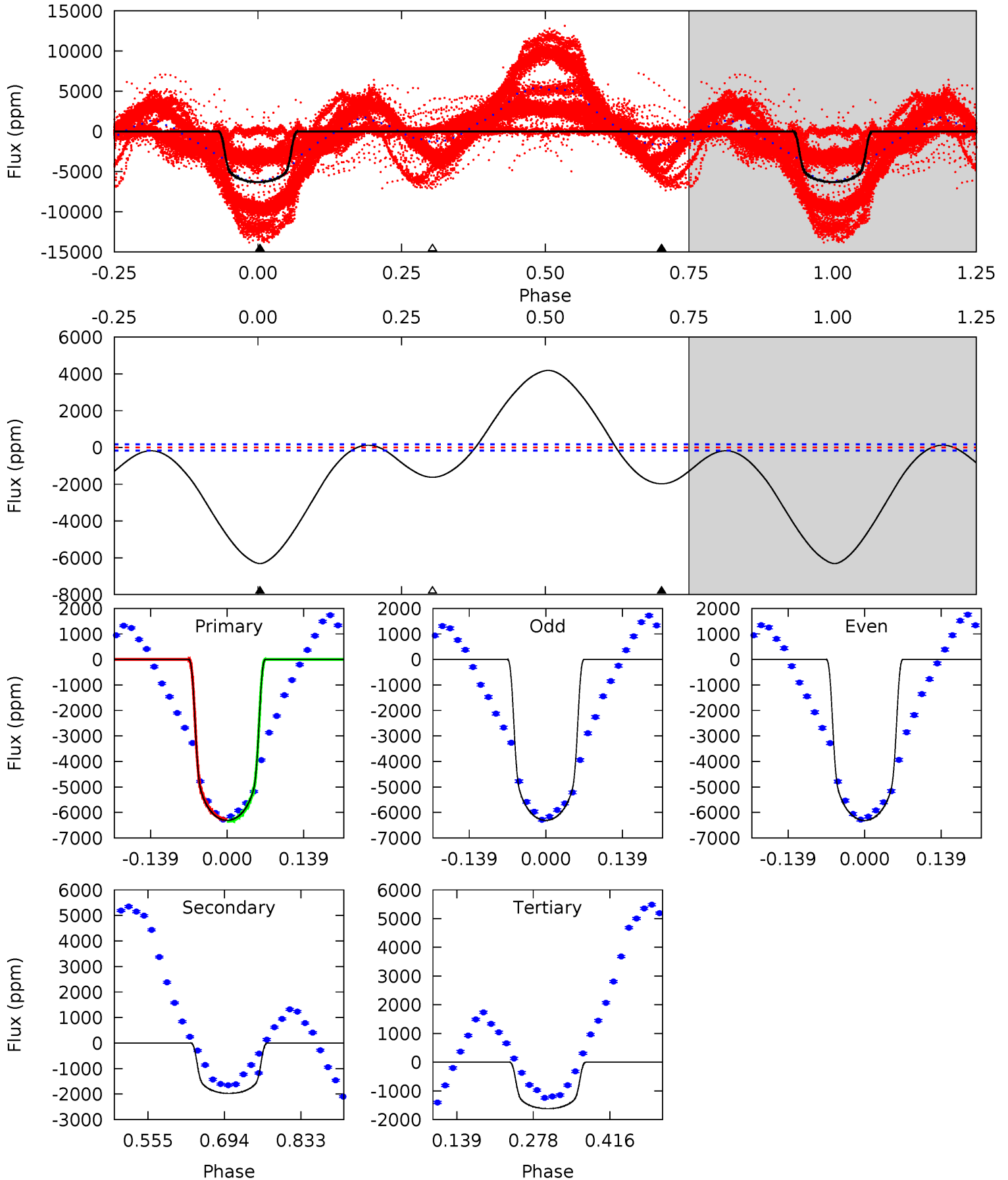
TCE 004909707-01   P= 2.302353 Days    $T_0=132.431320$  (BKJD)



# DV Model-Shift Uniqueness Test

004909707-01, P = 2.302299 Days, E = 130.135288 Days

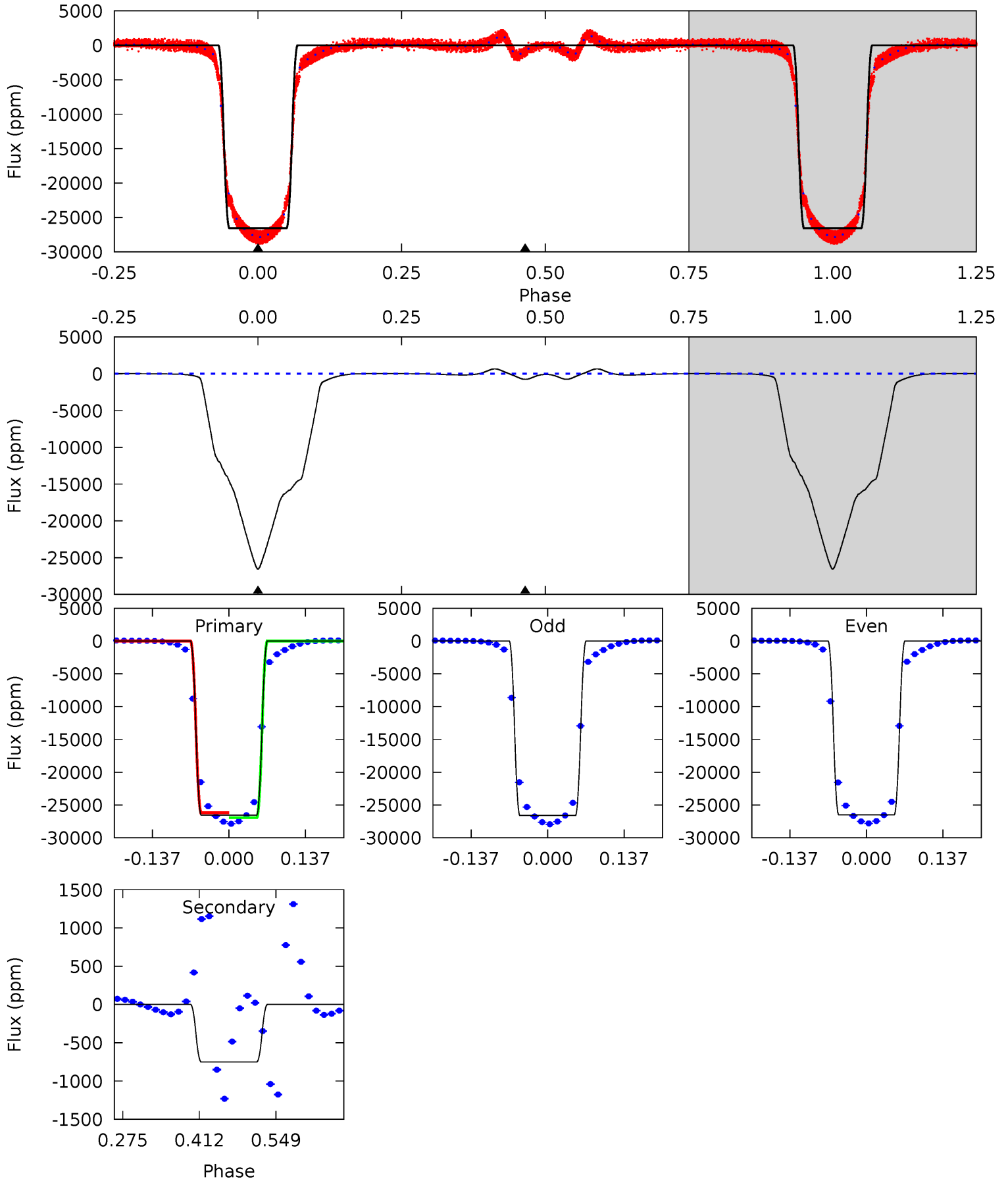
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
164.3	51.4	42.2	0	4.50	1.48	52.2	122.1	164.3	9.26	51.4	0.03	1.62	0.40	1.70



# Alt Model-Shift Uniqueness Test

004909707-01, P = 2.302353 Days, E = 130.128967 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
9730	275.3	0	0	4.50	1.49	31.0	9730	9730	275.3	275.3	20.8	1.06	0.02	0



### Stellar Parameters For KIC 004909707

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5948^{+184}_{-226}$	$4.269^{+0.180}_{-0.180}$	$-0.020^{+0.250}_{-0.300}$	$1.229^{+0.349}_{-0.254}$	$1.025^{+0.152}_{-0.124}$	$0.777^{+0.725}_{-0.372}$
	+3%/-4%	+4%/-4%	+1250%/-1500%	+28%/-21%	+15%/-12%	+93%/-48%
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 004909707-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-1976 \pm 38$	$2.78^{+0.50}_{-0.33}$	$2188^{+172}_{-159}$	$9199^{+413}_{-543}$	$164^{+50}_{-41}$
Alt.	$-751 \pm 3$	$22.00^{+3.58}_{-2.65}$	$2185^{+167}_{-154}$	$2916^{+72}_{-84}$	$1.010^{+0.282}_{-0.228}$

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

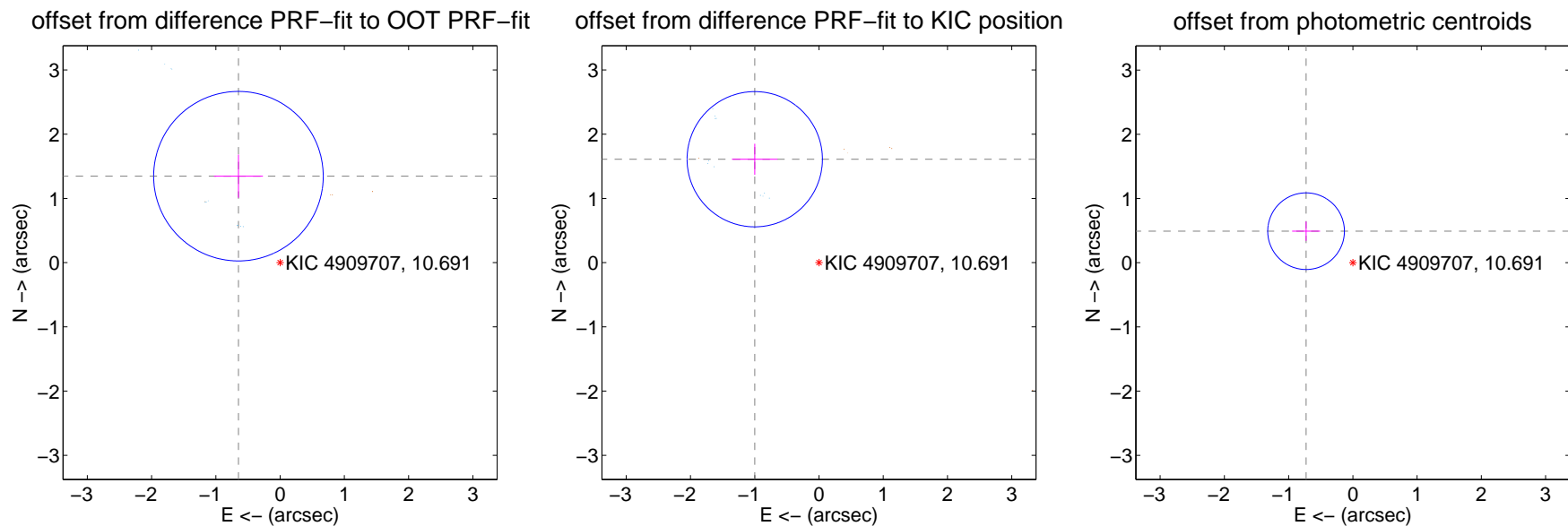
## DV Centroid Data

Supplemental centroid analysis for 004909707-01. **Kepler magnitude: 10.69.** Transit SNR 22.29

There are 11 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.74 arcsec

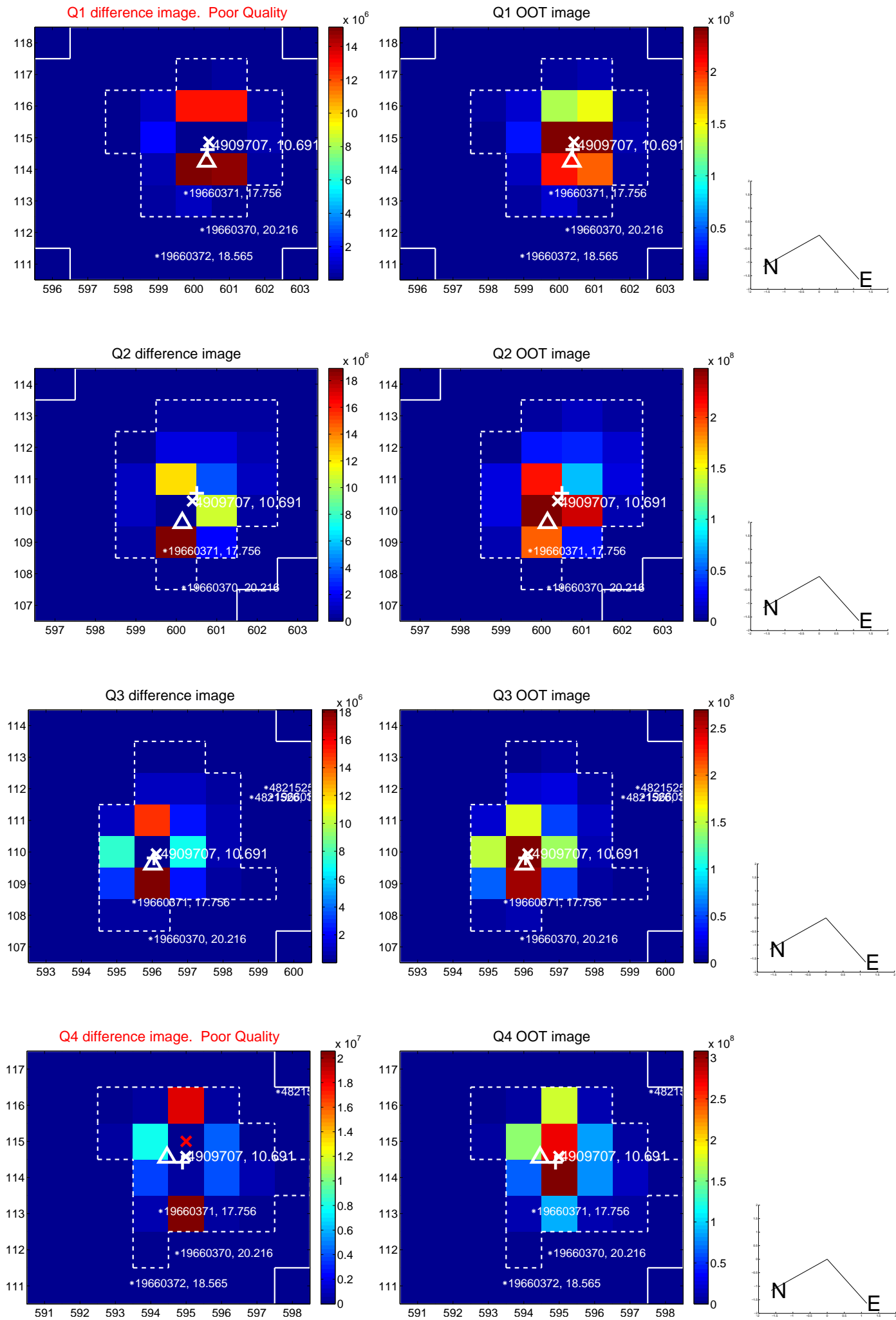
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b><math>1.494 \pm 0.440</math></b>	<b>3.40</b>	$0.648 \pm 0.380$	$1.346 \pm 0.335$
PRF-fit source offset from KIC position	<b><math>1.895 \pm 0.351</math></b>	<b>5.40</b>	$1.000 \pm 0.354$	$1.610 \pm 0.241$
photometric centroid source offset	<b><math>0.88 \pm 0.20</math></b>	<b>4.42</b>	$0.73 \pm 0.22$	$0.49 \pm 0.15$



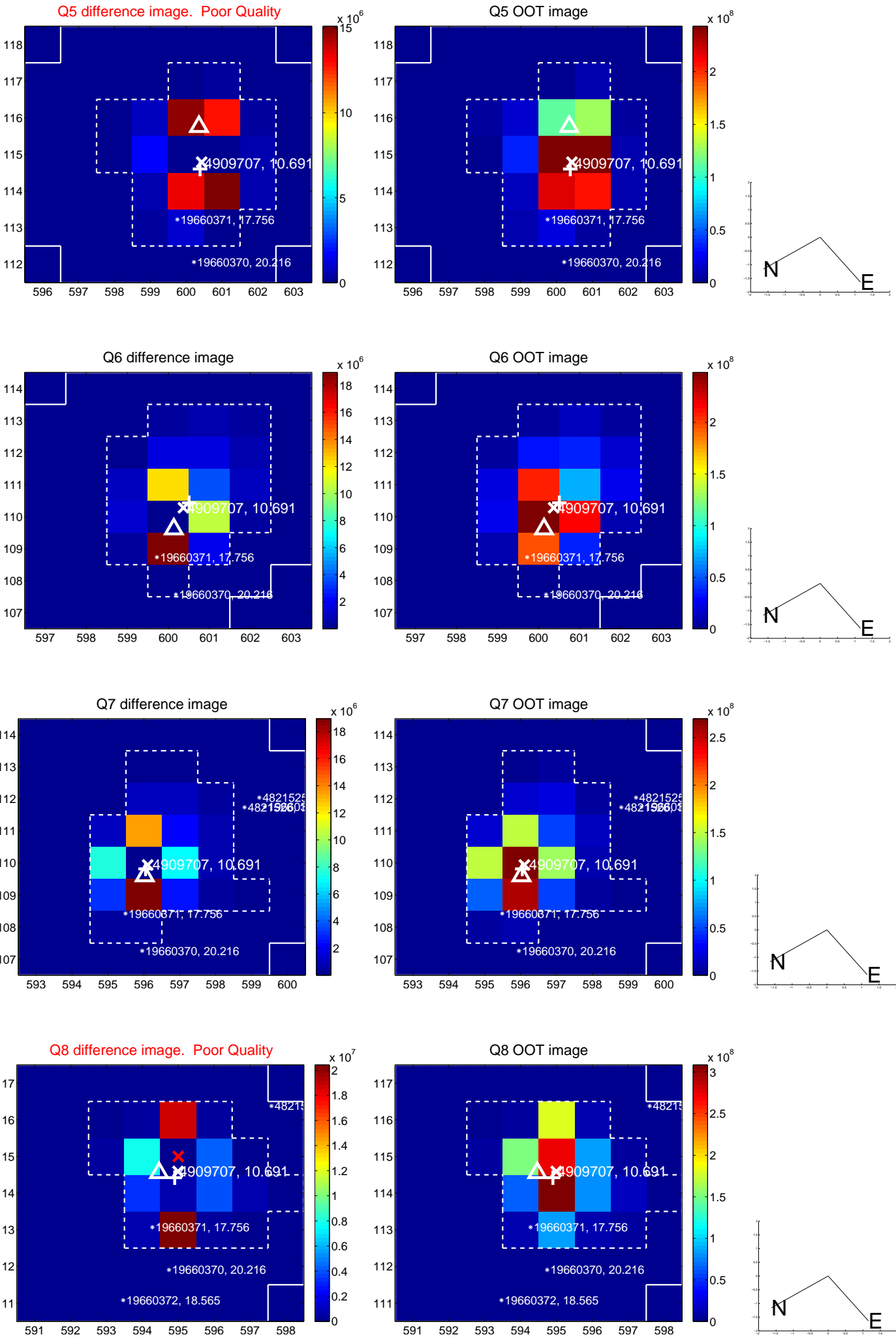
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



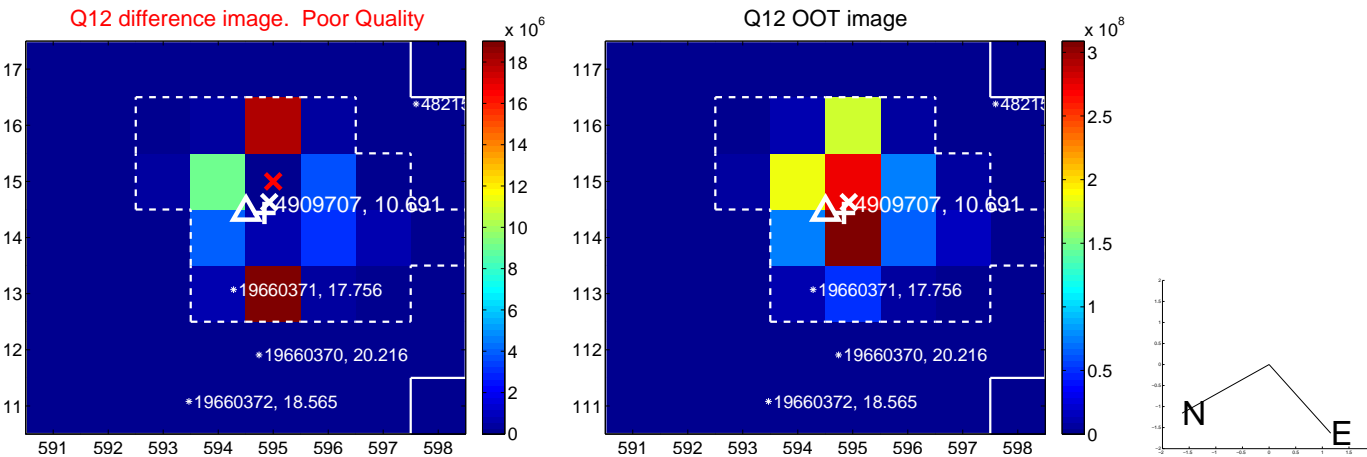
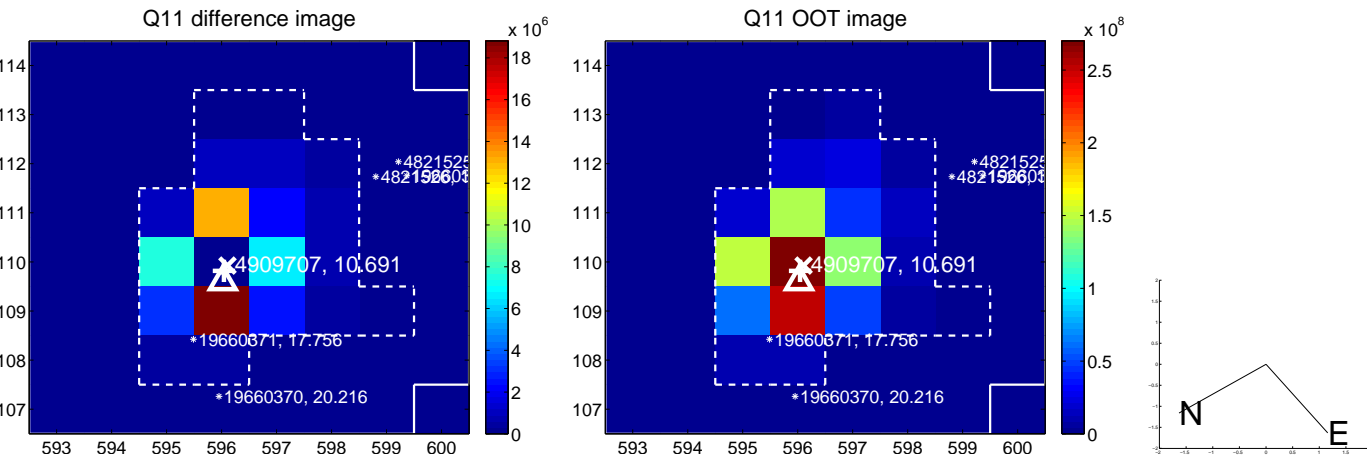
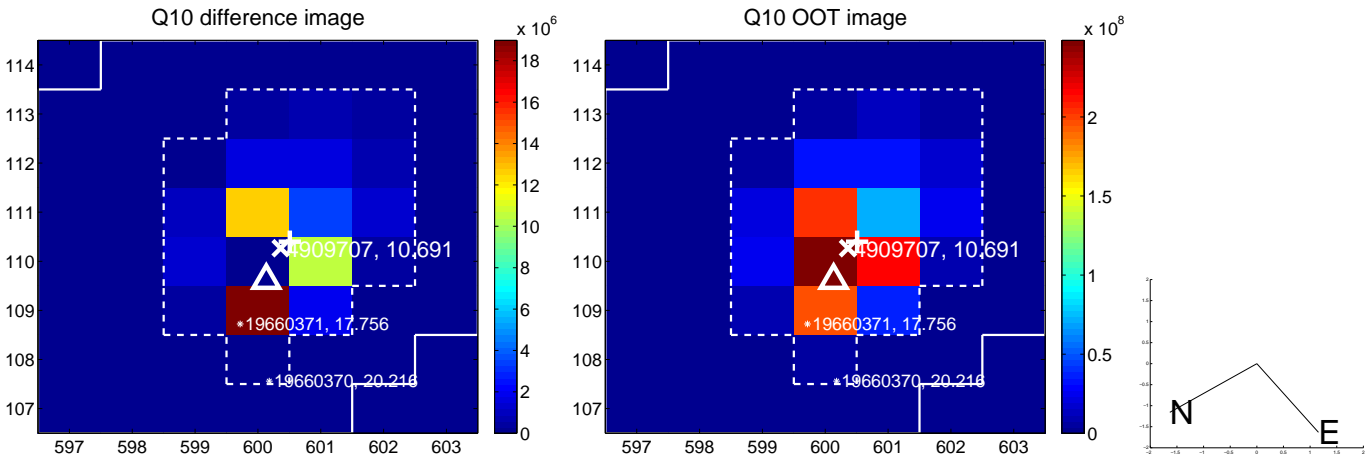
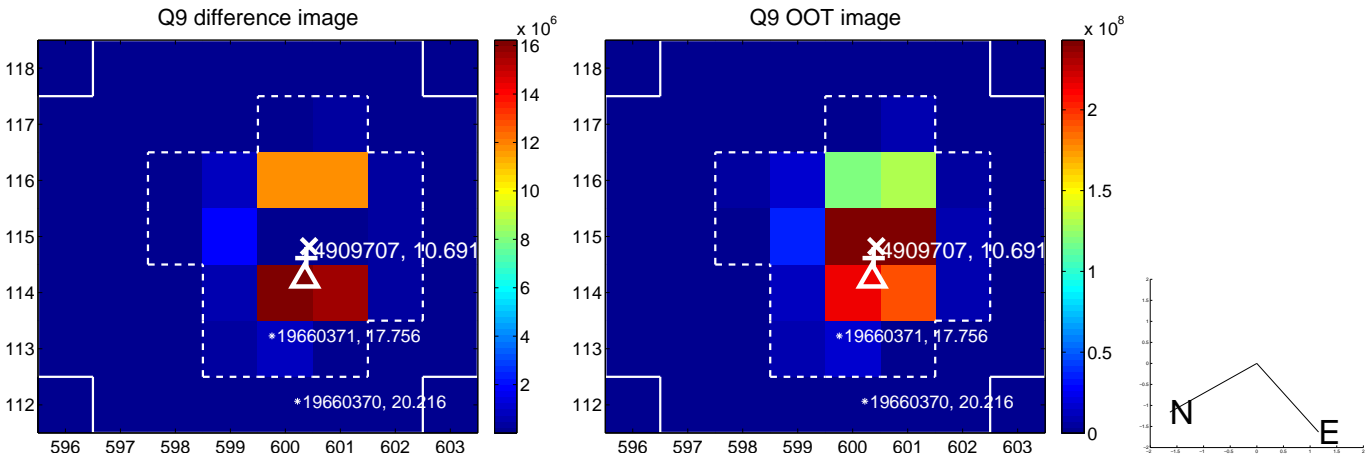
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



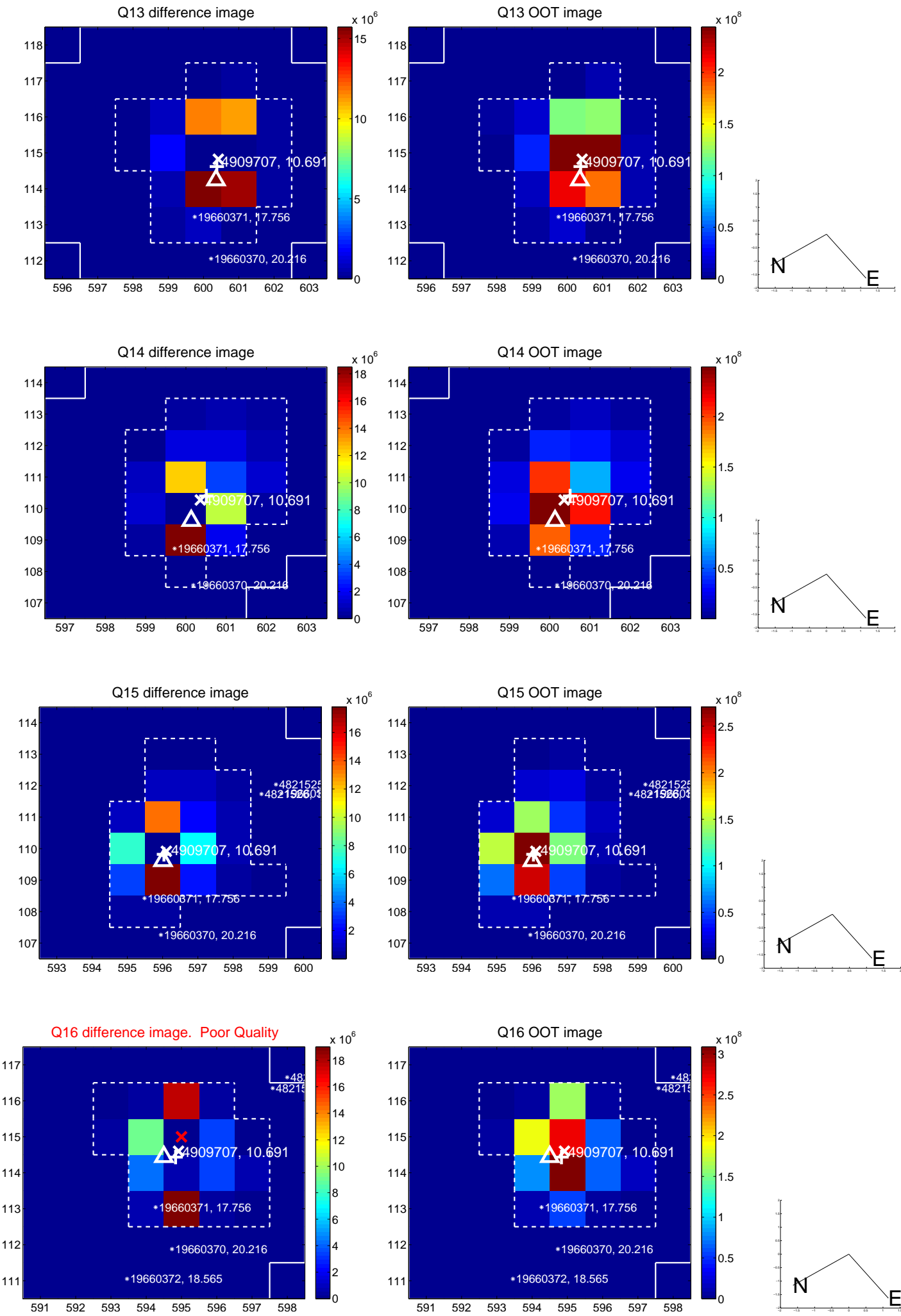
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



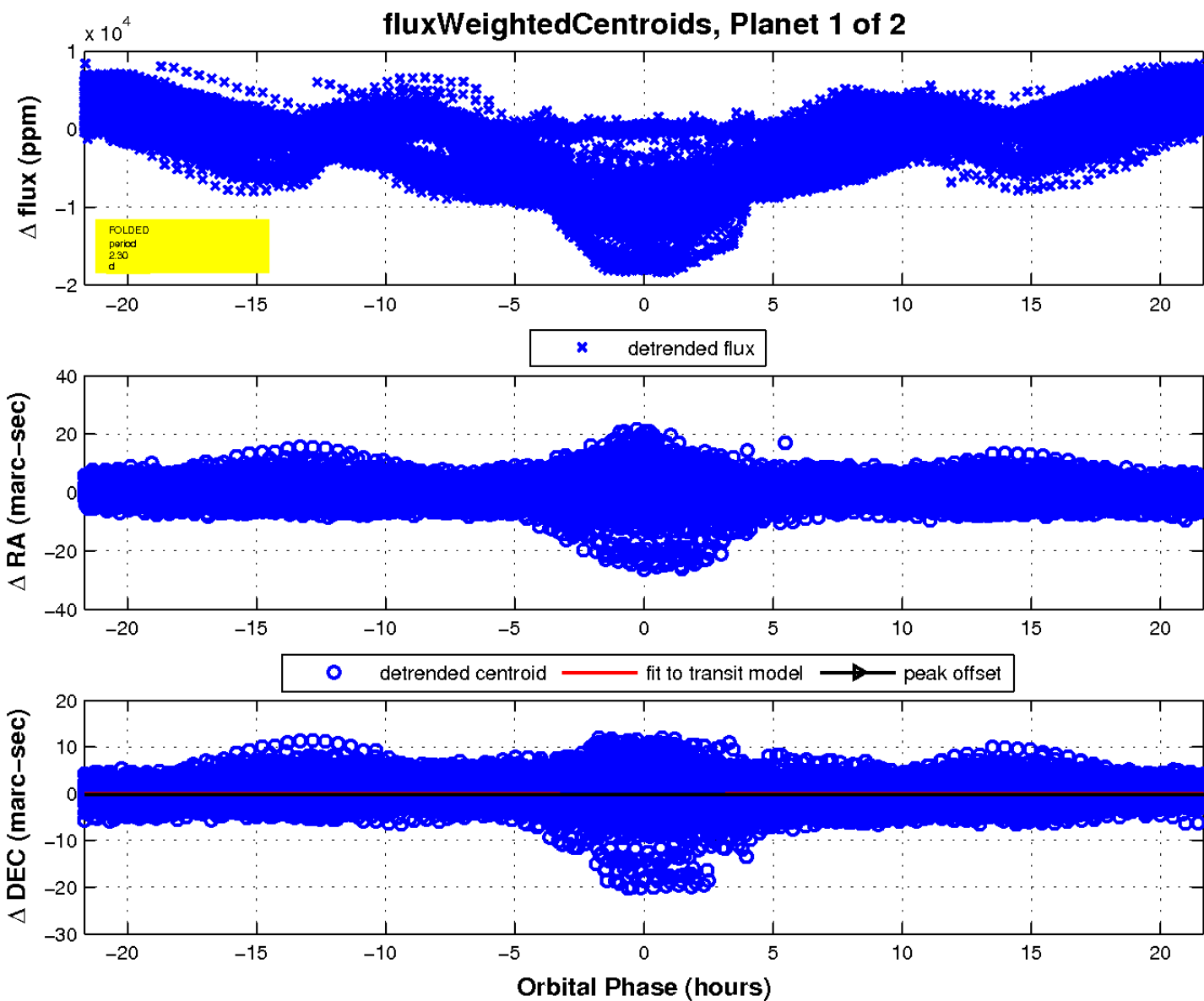
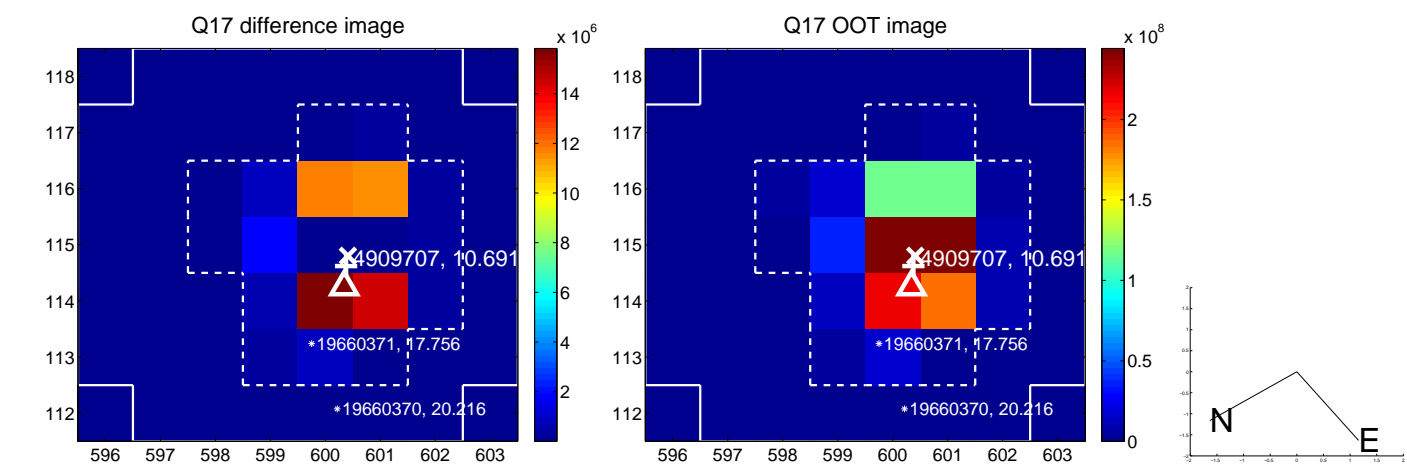
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



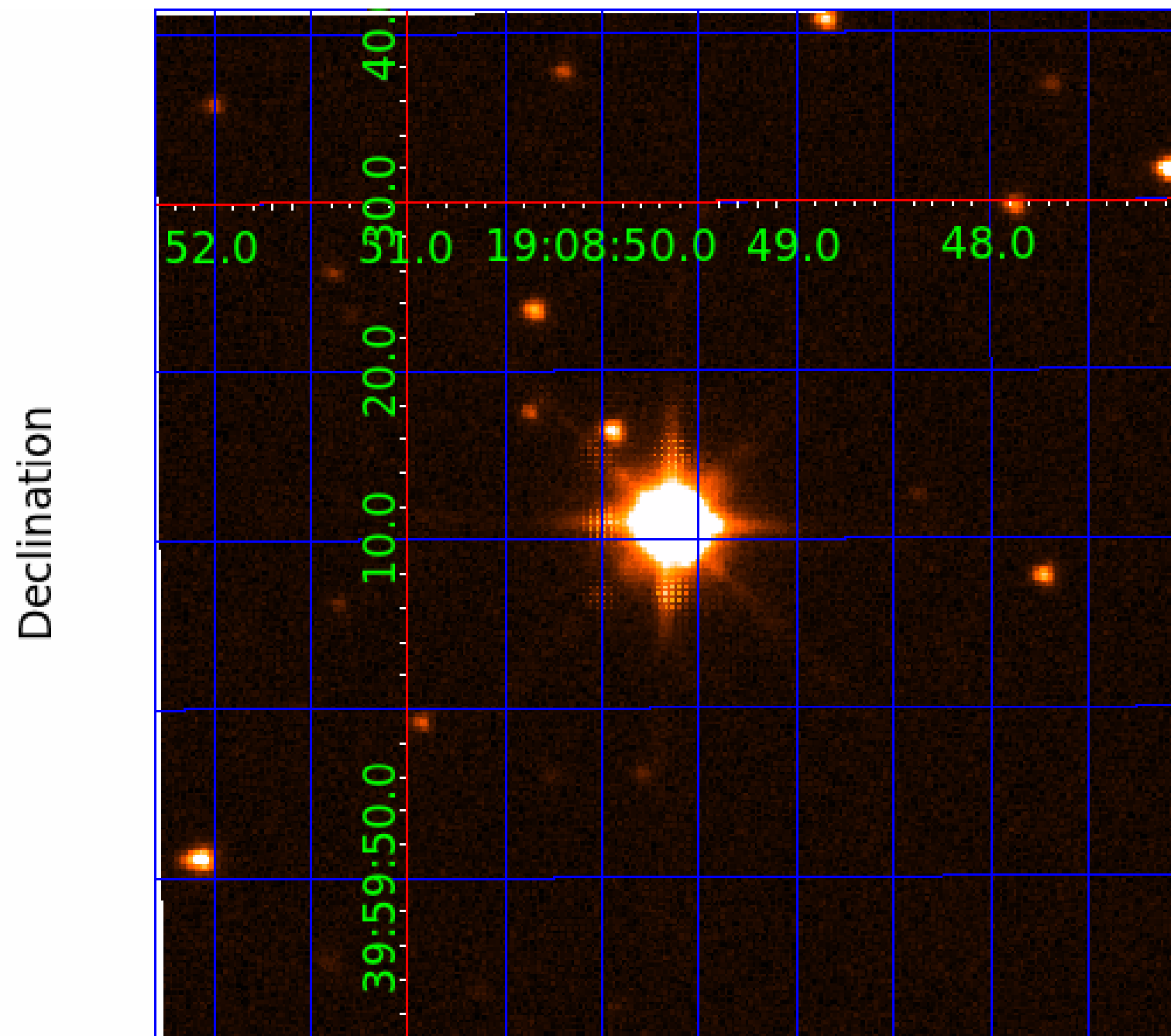
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image





# KIC 004909707

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004909707-01	OBS	No	2.302299	132.437587	373.7	7.224	37.4	22.3	1.23	5948	2.80	1431.74
004909707-02	OBS	3175.01	2.300227	132.883448	84.0	6.000	19.9	-1.0	1.23	5948	1.12	1433.46

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004909707-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE_ZUMA_TRACKER—LPP_DV—MOD_NONUNIQ_DV—CENT_SATURATED
004909707-02	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_ALT—CENT_SATURATED

**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.

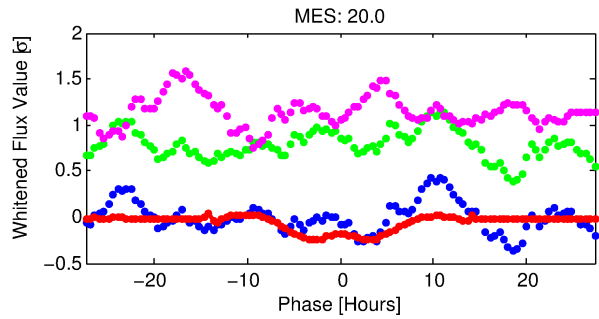
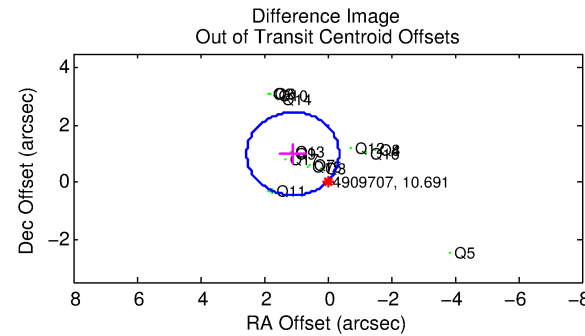
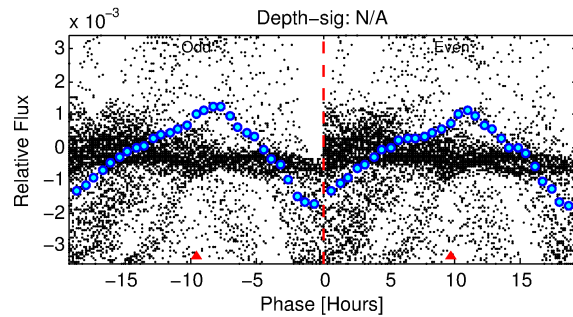
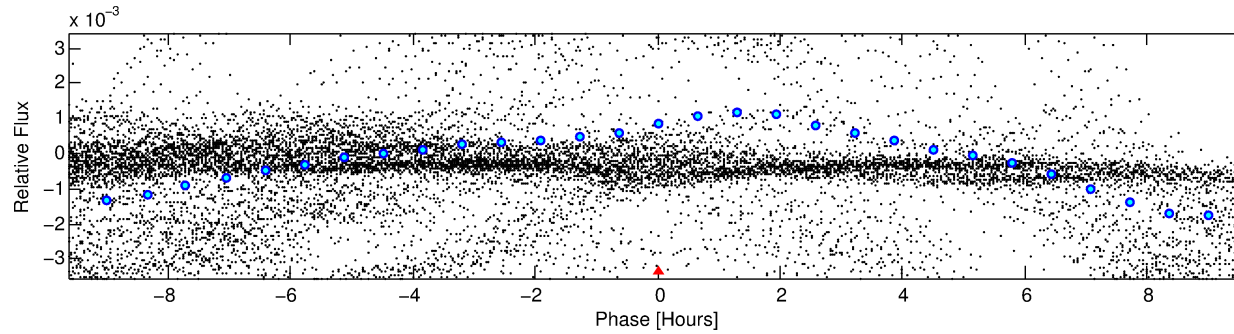
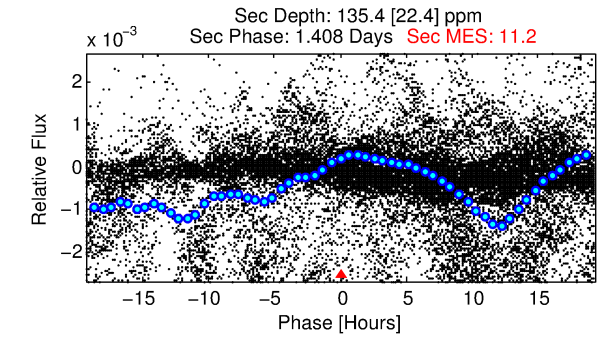
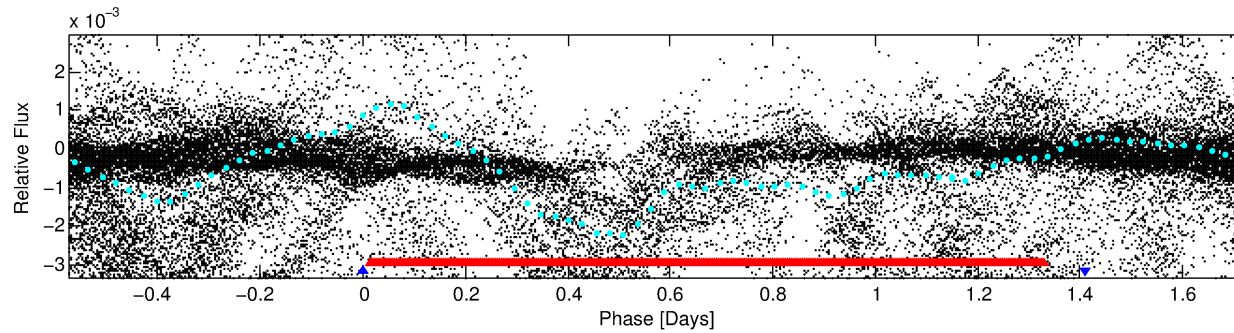
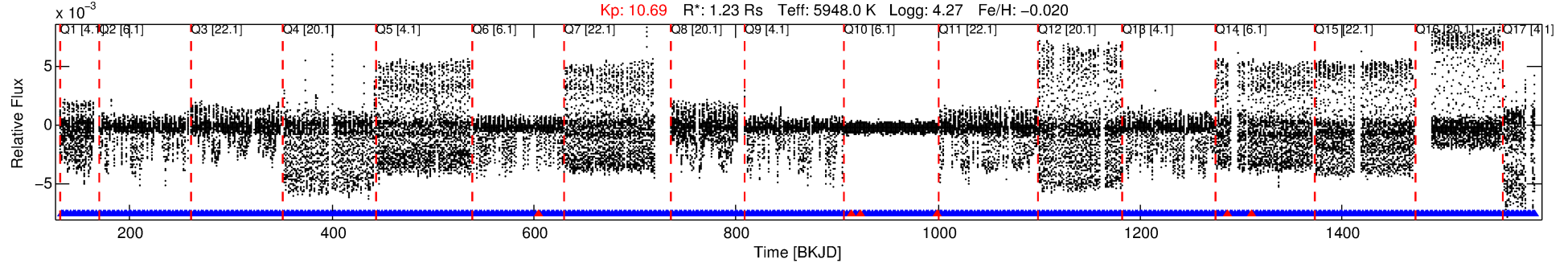
## Ephemeris Match Information For 004909707-02

No Significant Match Found

# DV One-Page Summary

KIC: 4909707 Candidate: 2 of 2 Period: 2.300 d  
KOI: K03175 Corr: No Ephemeris Match

Kp: 10.69 R\*: 1.23 Rs Teff: 5948.0 K Logg: 4.27 Fe/H: -0.020



## TPS TCE Results:

Period = 2.30023 d  
Epoch = 132.8834 BKJD

DV fit results are unavailable

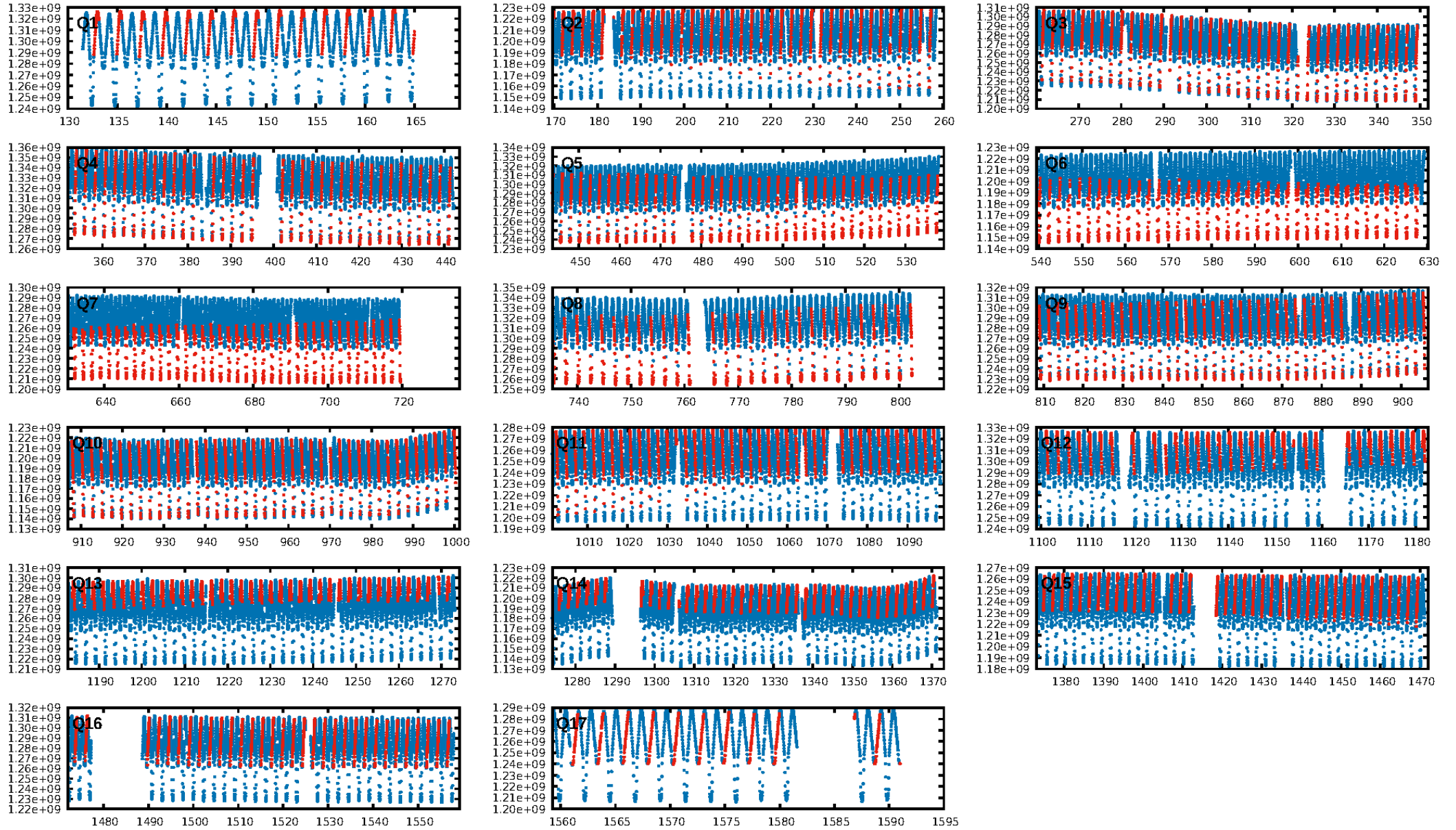
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.4% [0.01σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 0.98 [389/395]  
GhostDiagnostic-chr: 0.5097  
Centroid-sig: N/A  
Centroid-so: 0.771 arcsec [1.55σ]  
OotOffset-rm: 1.475 arcsec [3.04σ]  
KicOffset-rm: 2.283 arcsec [6.32σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.35 [6/17]  
DiffImageOverlap-fno: 0.65 [11/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 07:59:25 Z

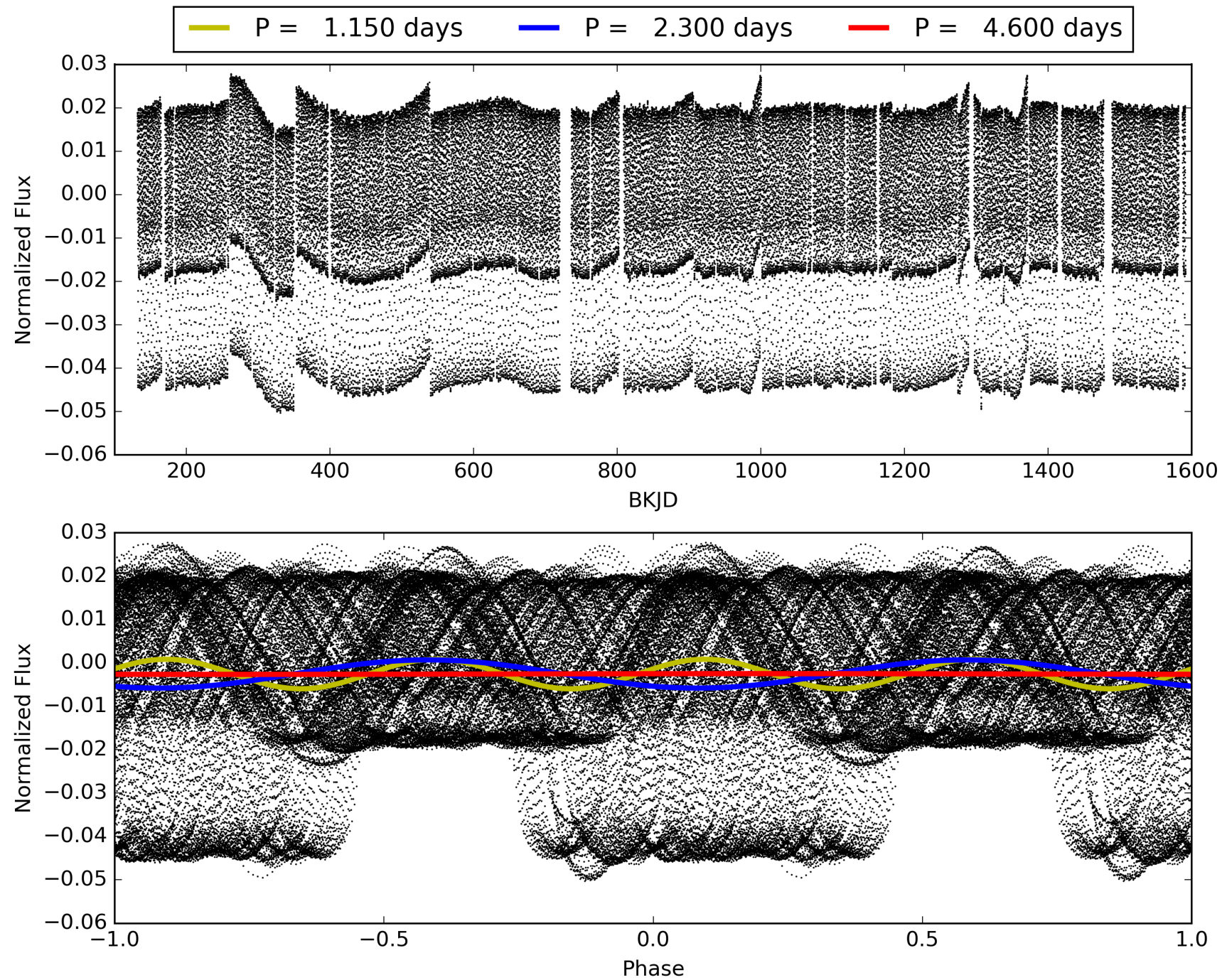
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 004909707-02, PDC Light Curves



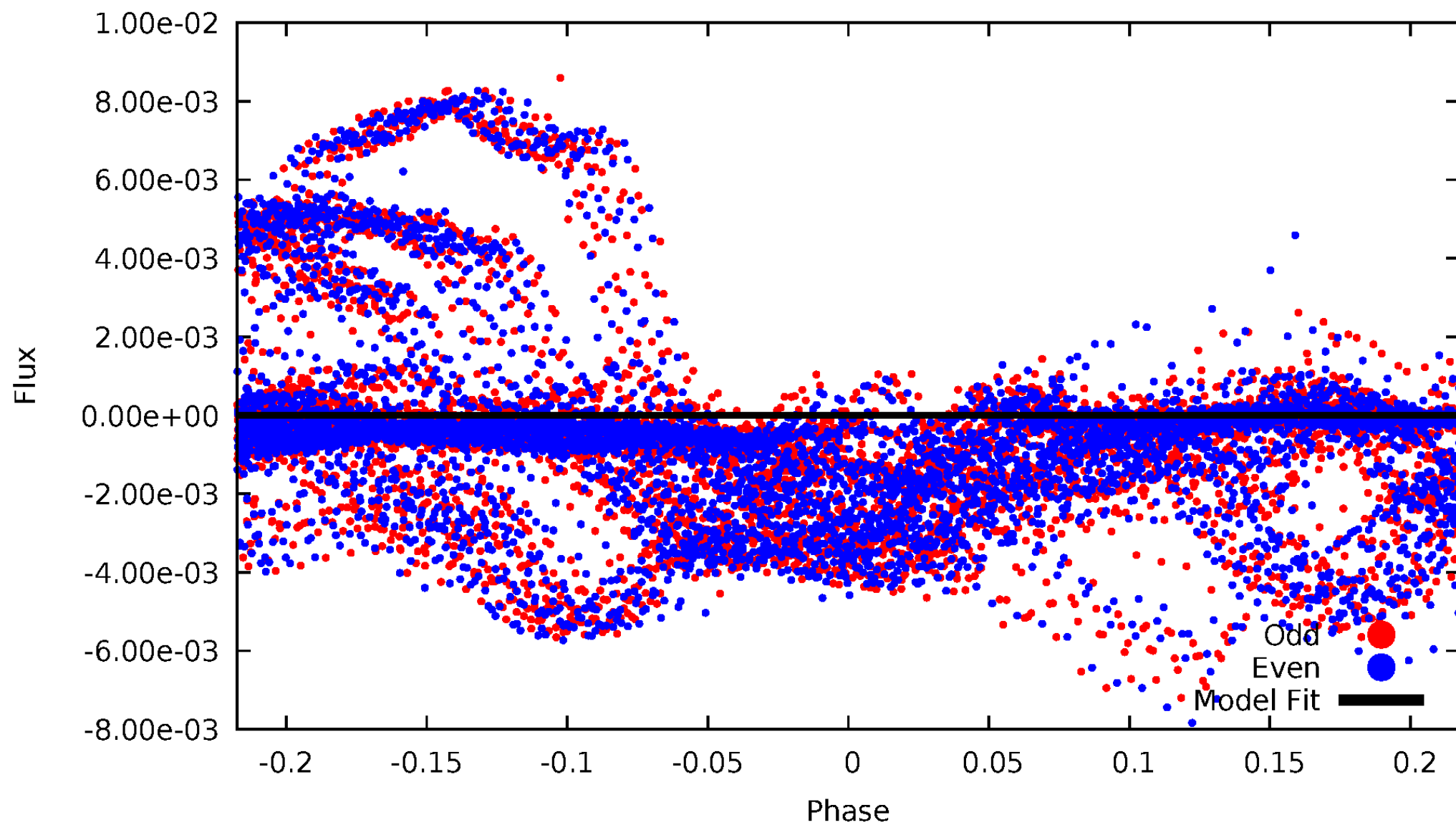


TCE 004909707-02



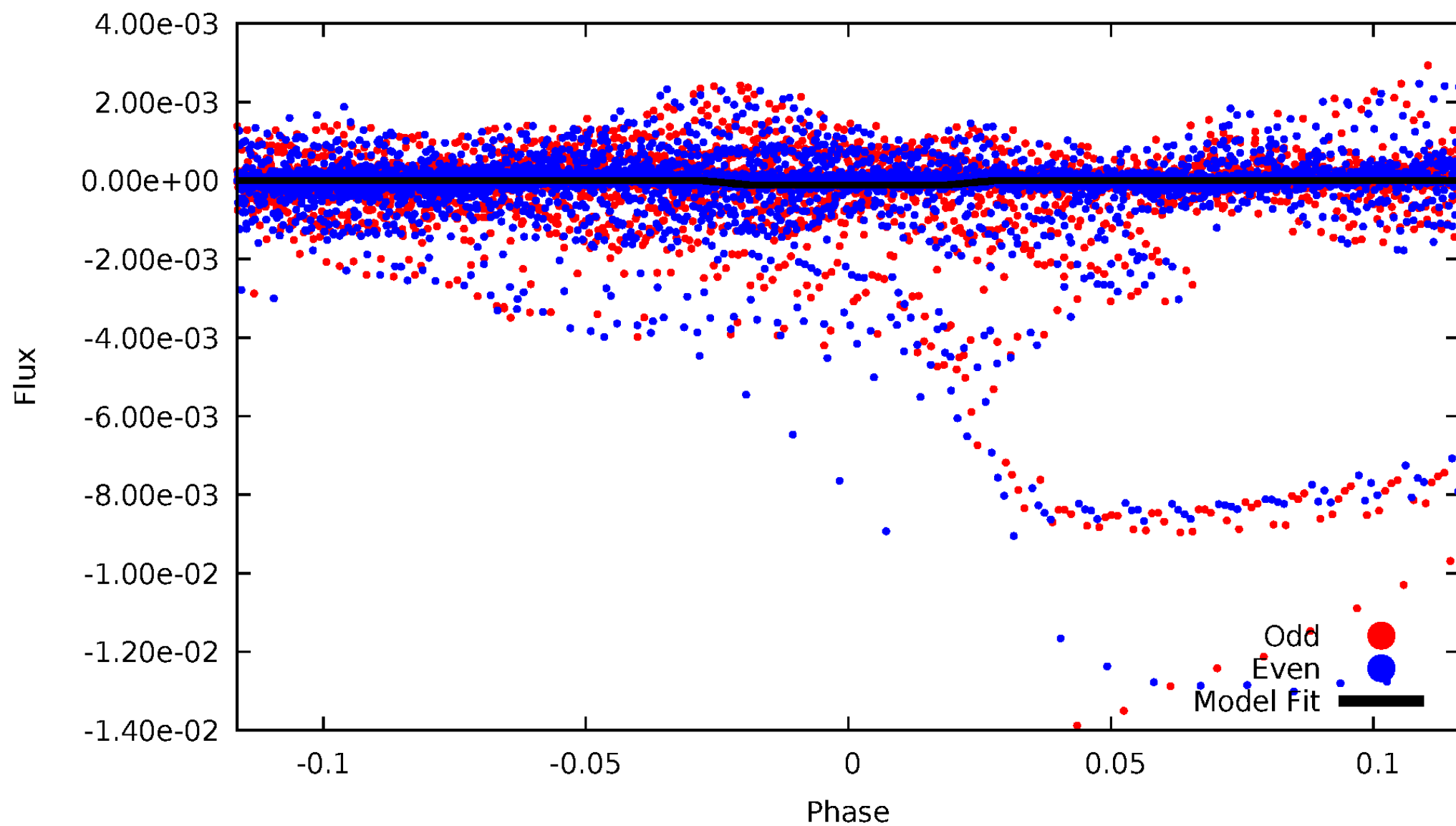
# DV Odd/Even

TCE 004909707-02



# ALT Odd/Even

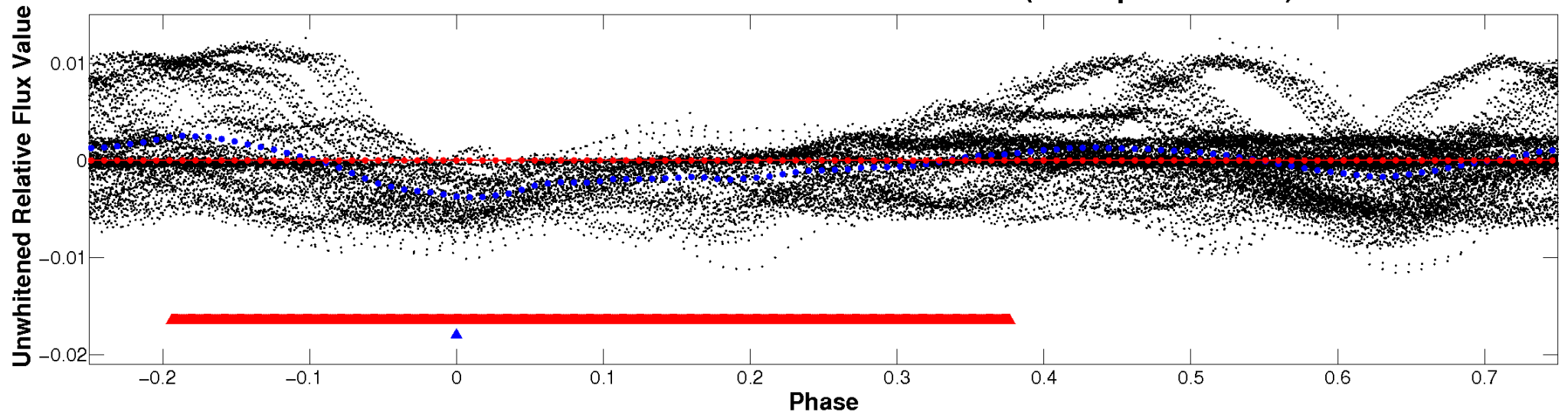
TCE 004909707-02



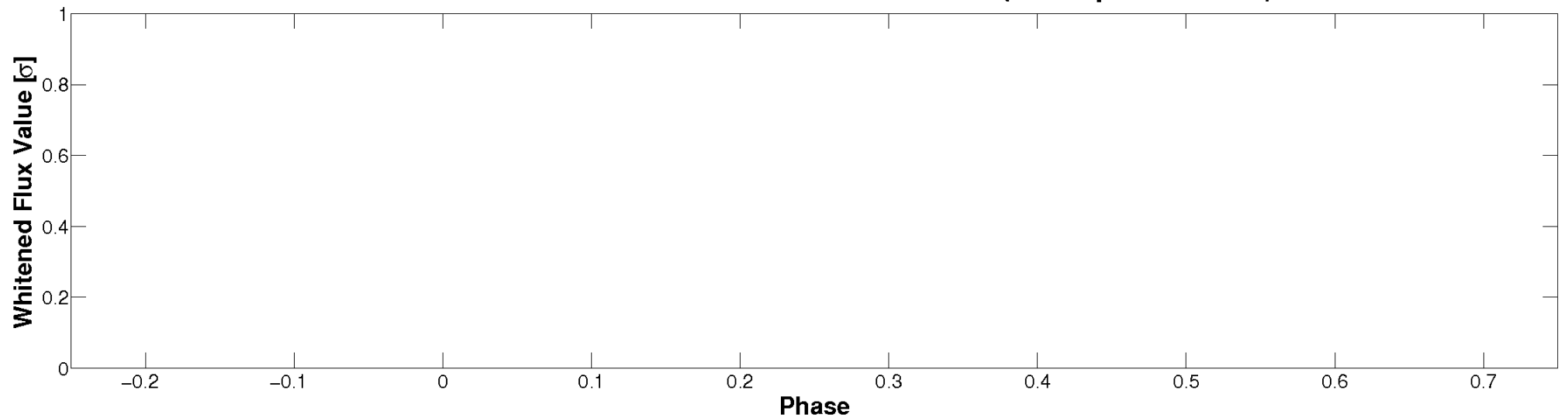


# Non-Whitened Vs. Whitened Light Curve

**Planet 2 : Phased Unwhitened Flux Time Series (TPS Epoch/Period)**

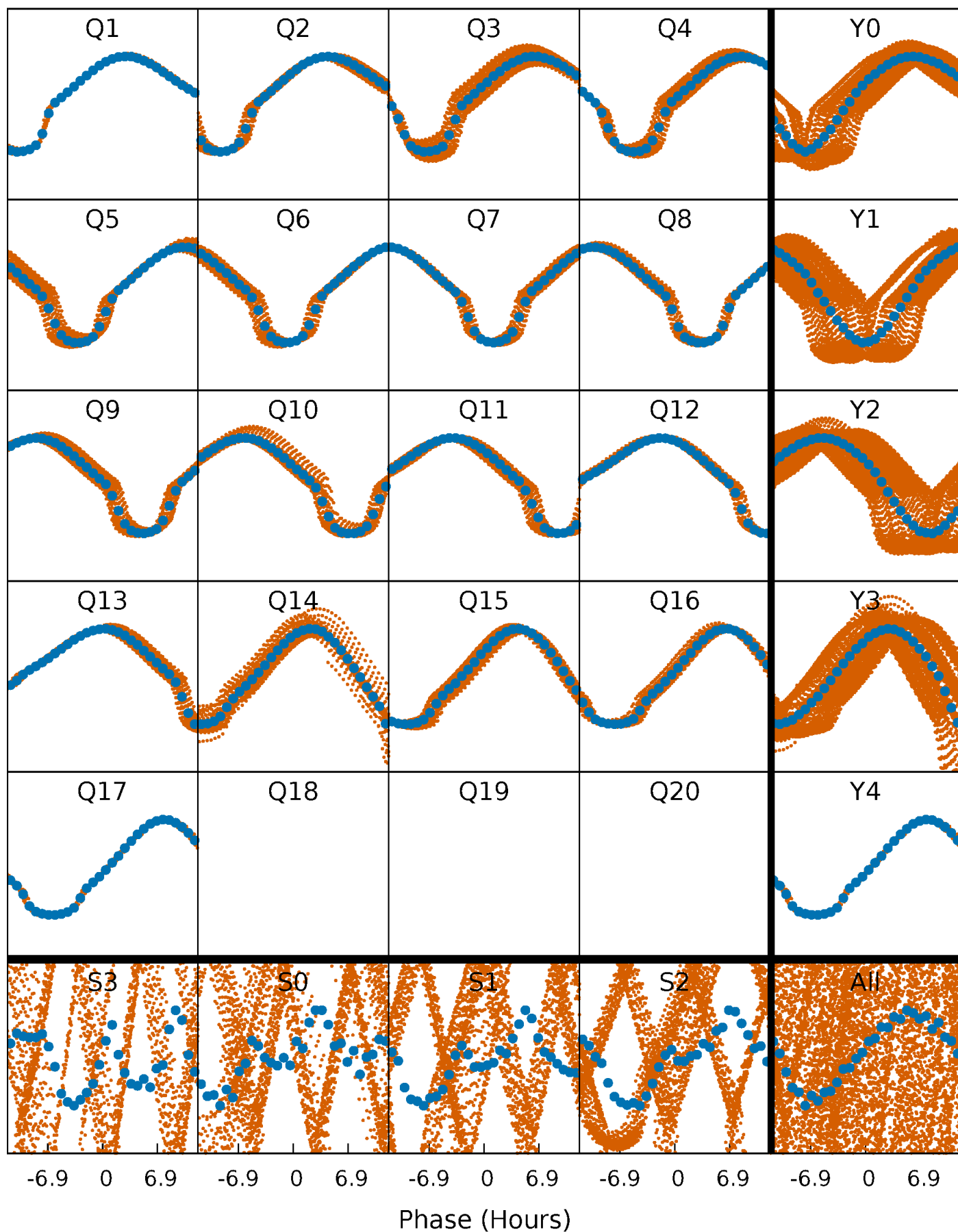


**Planet 2 : Phased Whitened Flux Time Series (TPS Epoch/Period)**



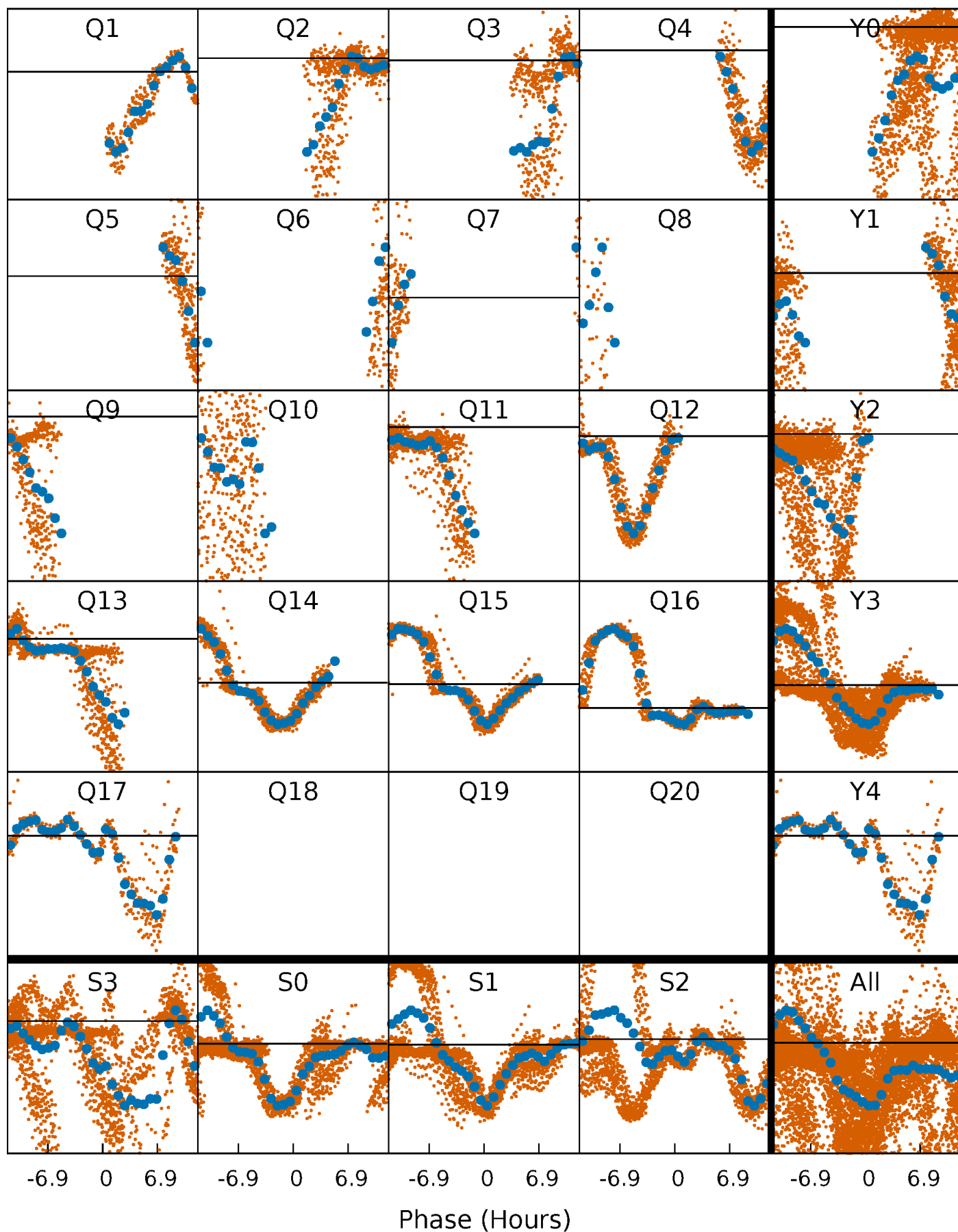
# PDC Quarter-Phased Transit Curves

TCE 004909707-02     $P = 2.300227$  Days     $T_0 = 132.883448$  (BKJD)



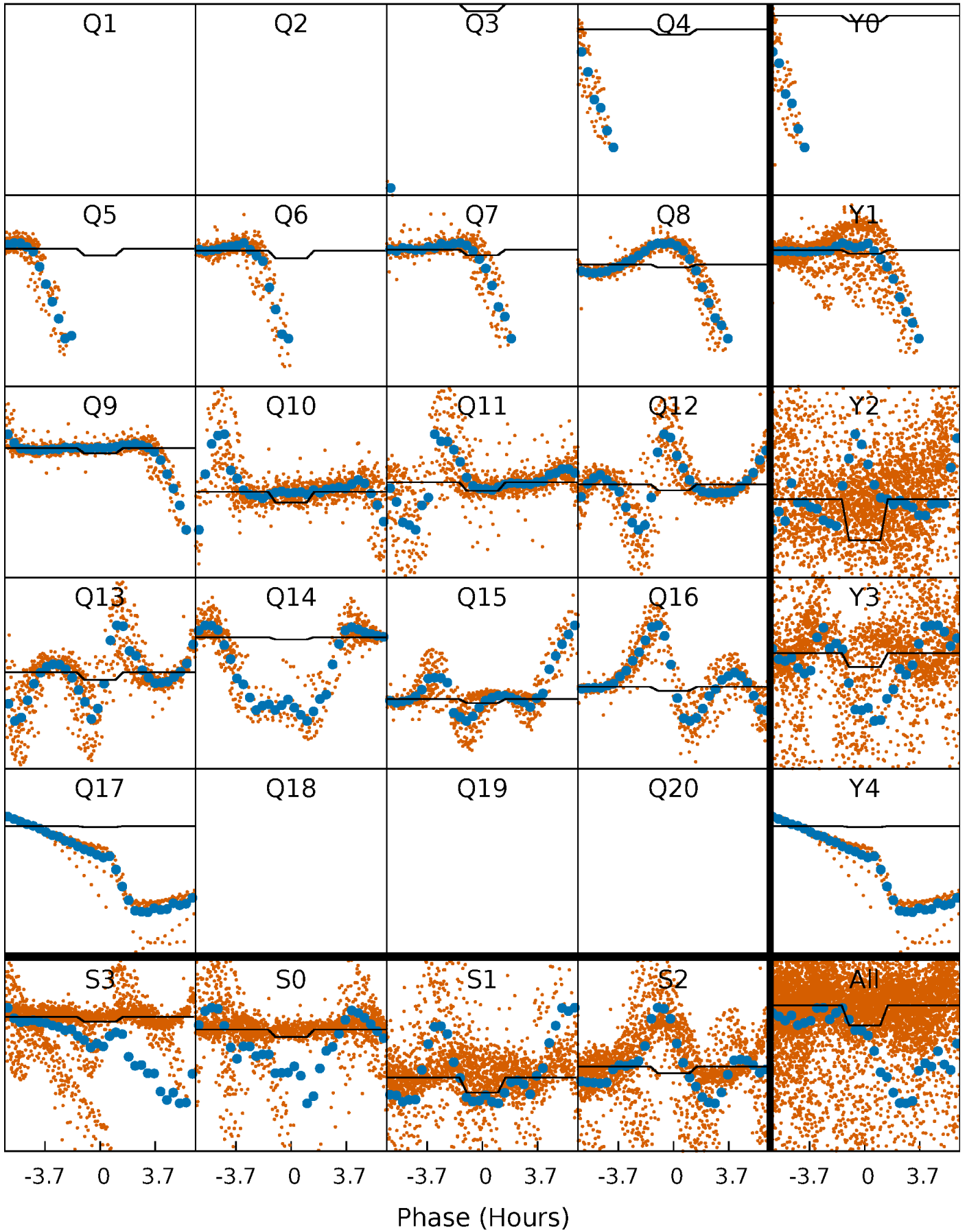
# DV Quarter-Phased Transit Curves

TCE 004909707-02     $P = 2.300227$  Days     $T_0 = 132.883448$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

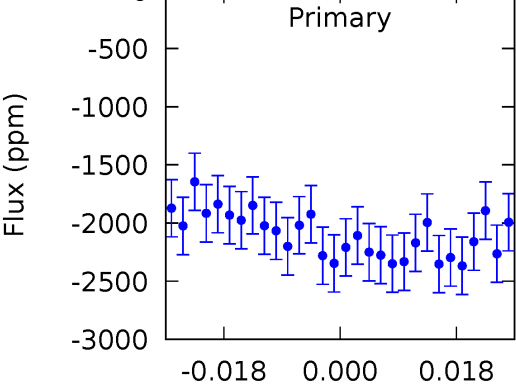
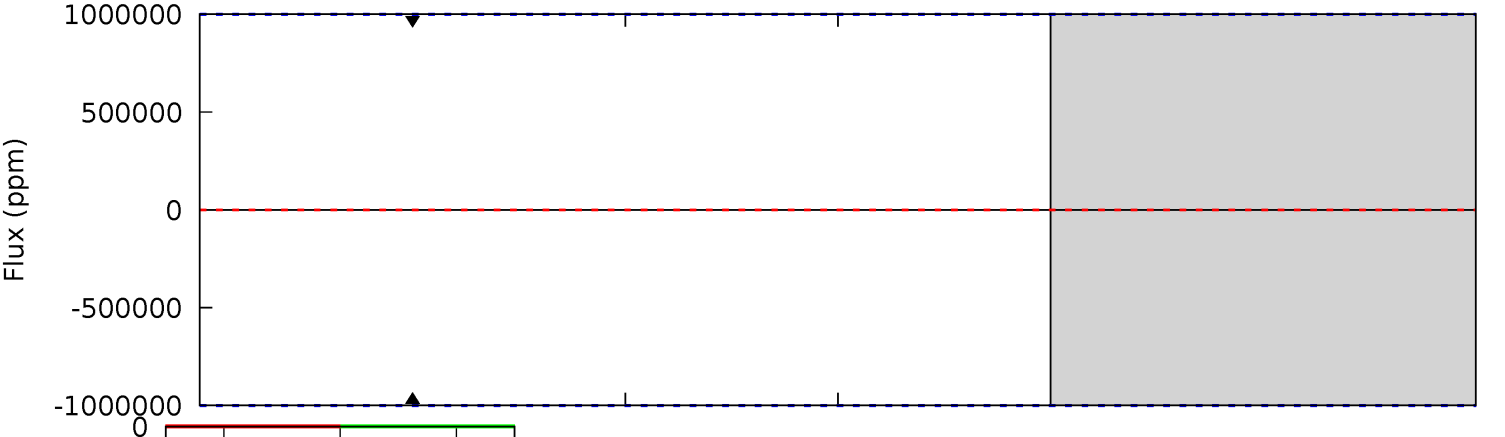
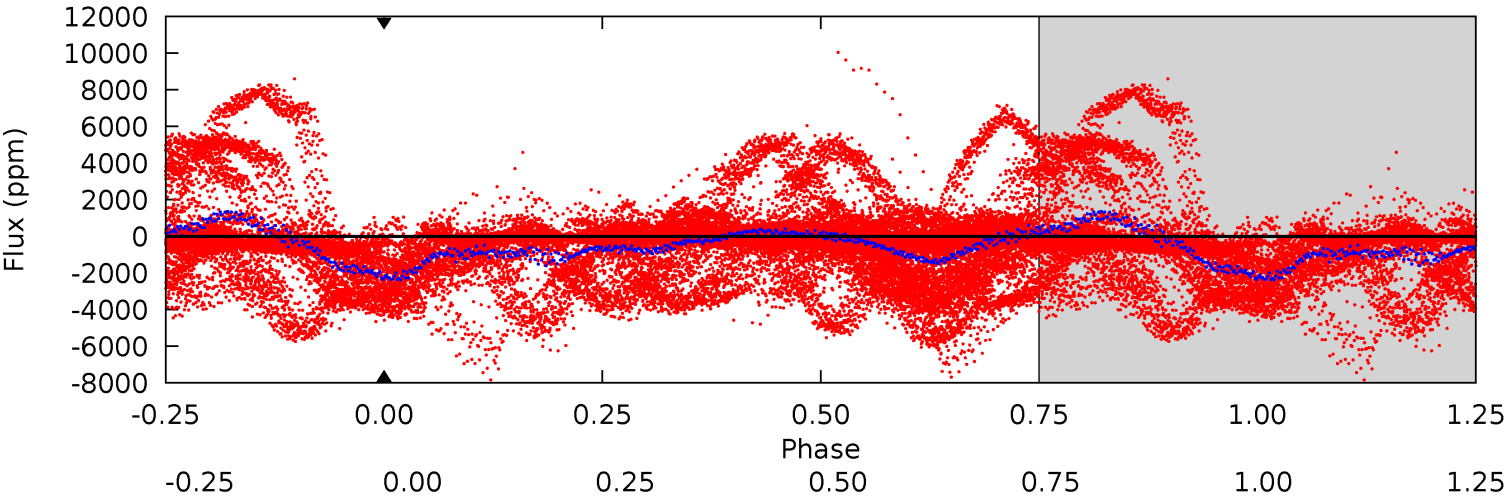
TCE 004909707-02     $P = 2.300227$  Days     $T_0 = 132.422135$  (BKJD)



DV Model-Shift Uniqueness Test

004909707-02, P = 2.300227 Days, E = 130.583221 Days

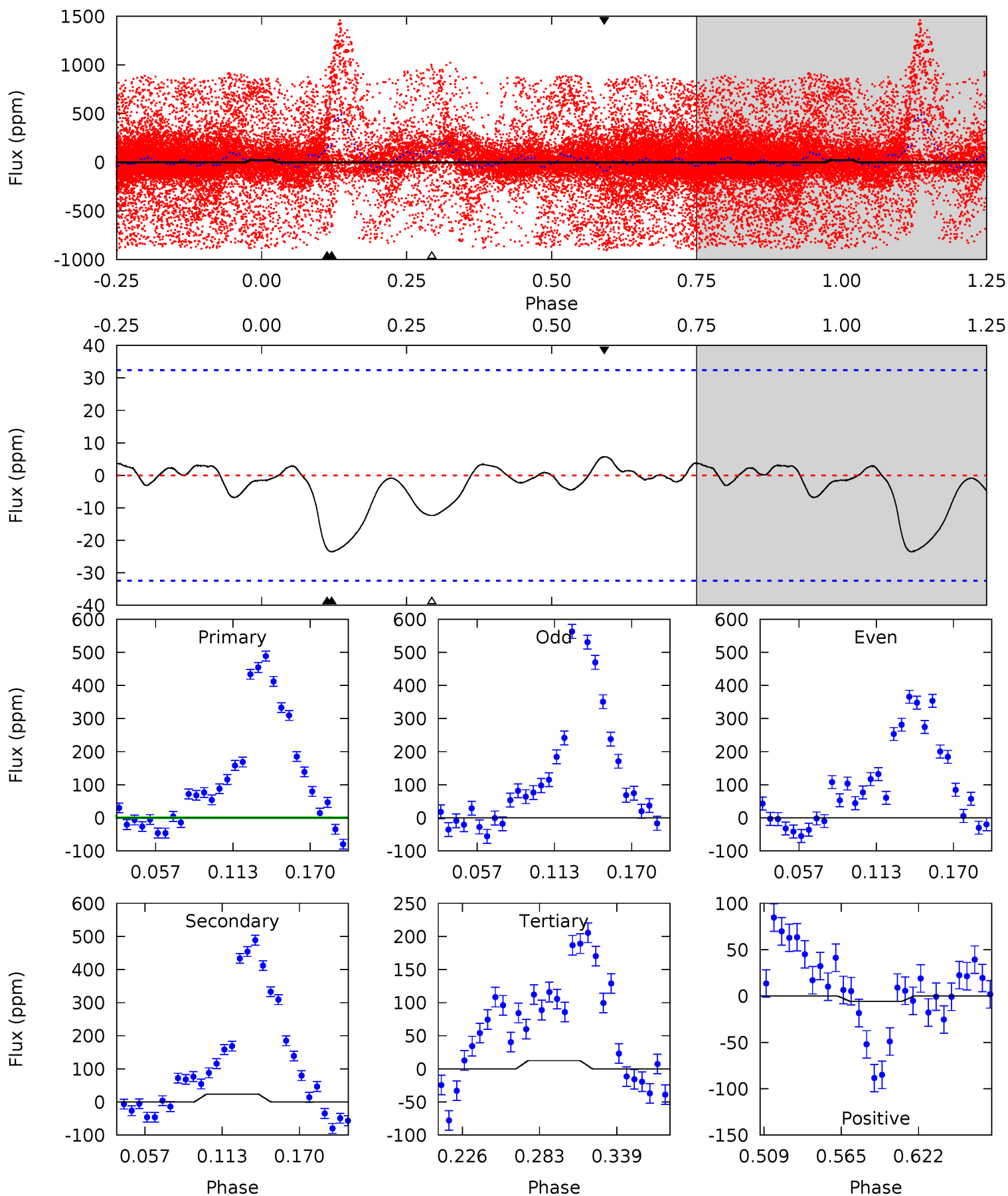
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



# Alt Model-Shift Uniqueness Test

004909707-02, P = 2.300227 Days, E = 130.121908 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
3.26	3.39	1.79	0.83	4.68	1.91	0.49	1.48	2.44	1.61	2.57	0.12	17.2	0.20	2.36





### Stellar Parameters For KIC 004909707

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5948^{+184}_{-226}$	$4.269^{+0.180}_{-0.180}$	$-0.020^{+0.250}_{-0.300}$	$1.229^{+0.349}_{-0.254}$	$1.025^{+0.152}_{-0.124}$	$0.777^{+0.725}_{-0.372}$
	+3%/-4%	+4%/-4%	+1250%/-1500%	+28%/-21%	+15%/-12%	+93%/-48%
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 004909707-02 / KOI 3175.01

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$0 \pm 1000000$	$9.80^{+9.71}_{-6.80}$	$2184^{+157}_{-153}$	$4710^{+20163}_{-23323}$	$14^{+1376}_{-836}$
Alt.	$-23 \pm 7$	$9.86^{+10.69}_{-6.70}$	$2188^{+158}_{-143}$	$-2354^{+5457}_{-251}$	$0.158^{+1.319}_{-0.125}$

$T_{max}$  = 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

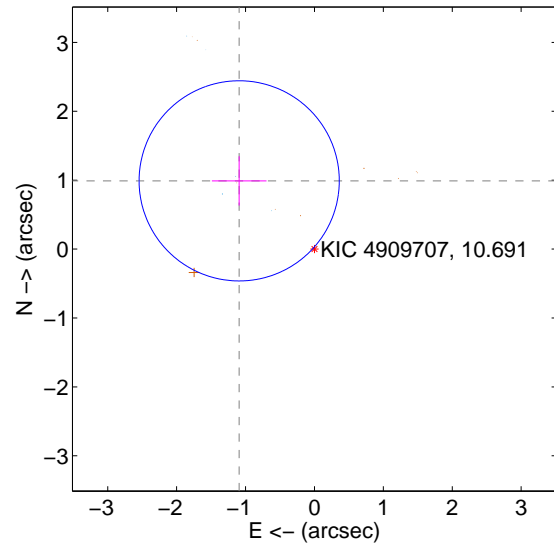
Supplemental centroid analysis for 004909707-02. **Kepler magnitude: 10.69**. Transit SNR -1.00

There are 6 quarters with good PRF difference image offsets

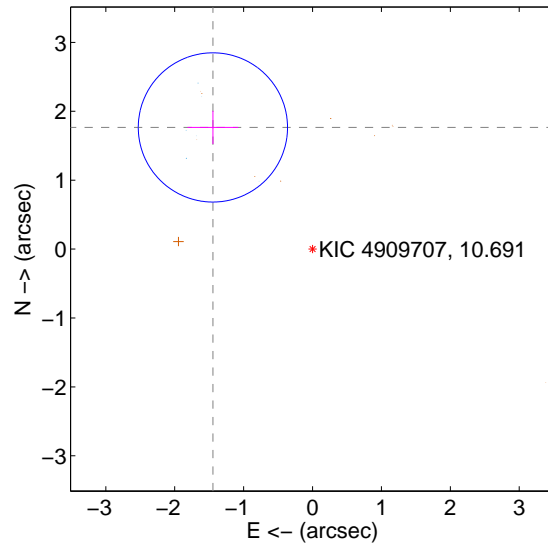
The direct PRF centroid is offset from the target star catalog position by about 0.72 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b><math>1.475 \pm 0.484</math></b>	<b>3.04</b>	$1.092 \pm 0.396$	$0.991 \pm 0.357$
PRF-fit source offset from KIC position	<b><math>2.283 \pm 0.361</math></b>	<b>6.32</b>	$1.446 \pm 0.368$	$1.766 \pm 0.241$
photometric centroid source offset	$0.77 \pm 0.50$	1.55	$-0.40 \pm 0.63$	$-0.66 \pm 0.44$

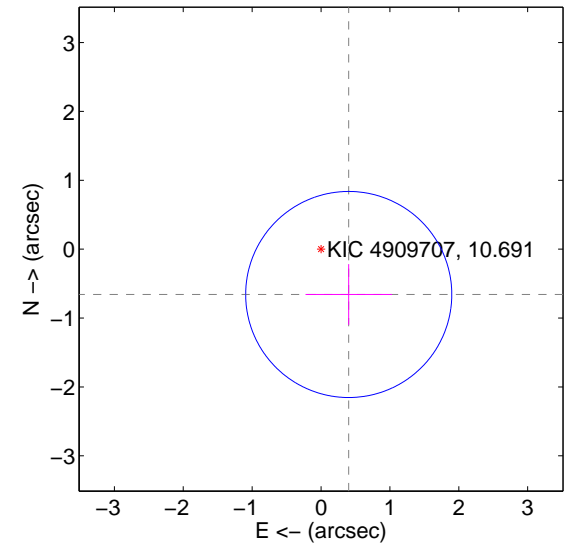
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

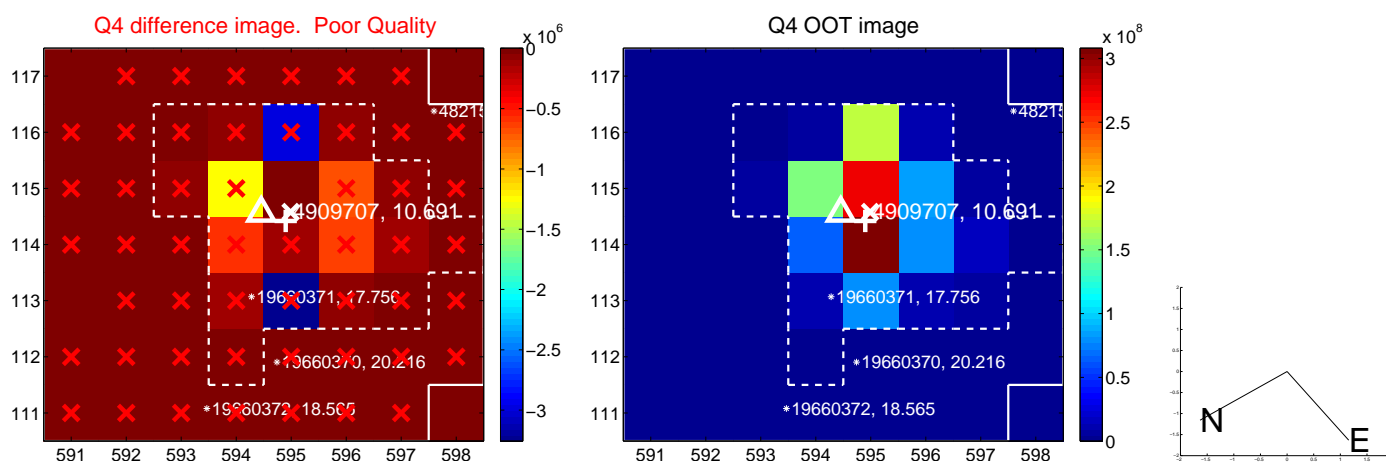
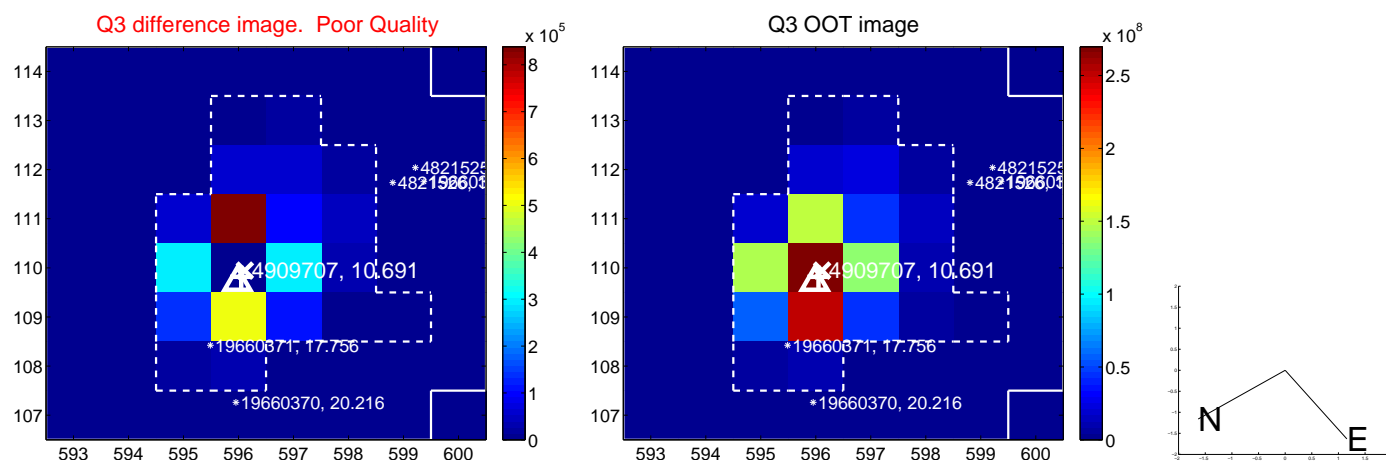
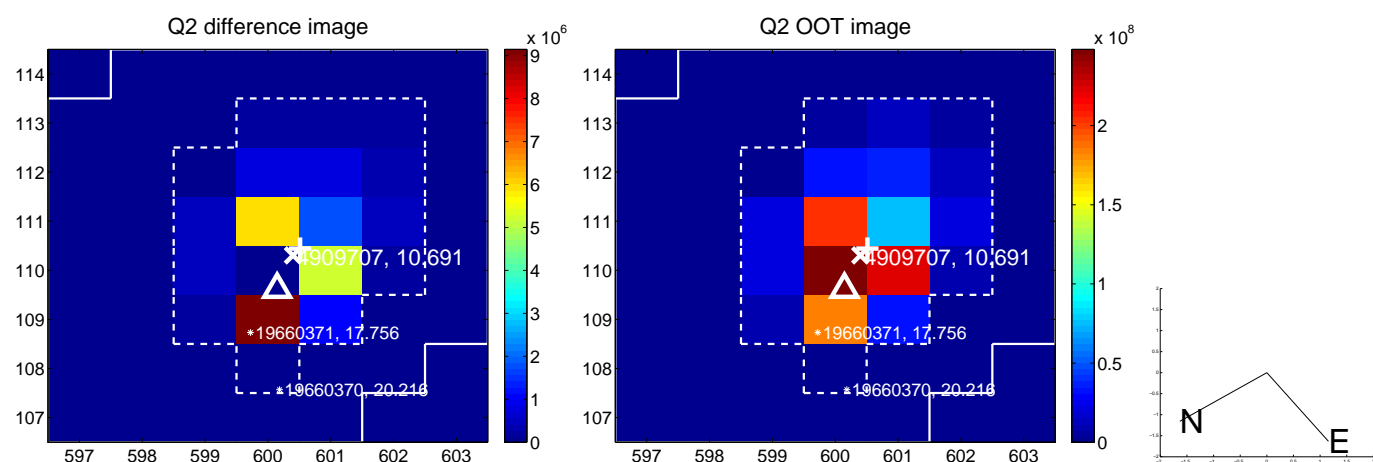
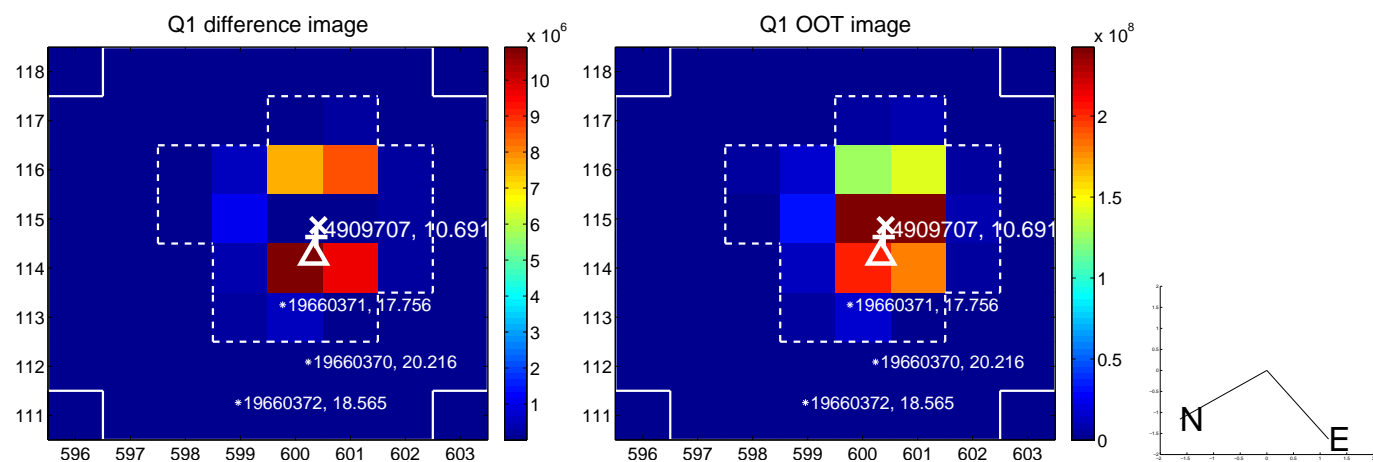


offset from photometric centroids

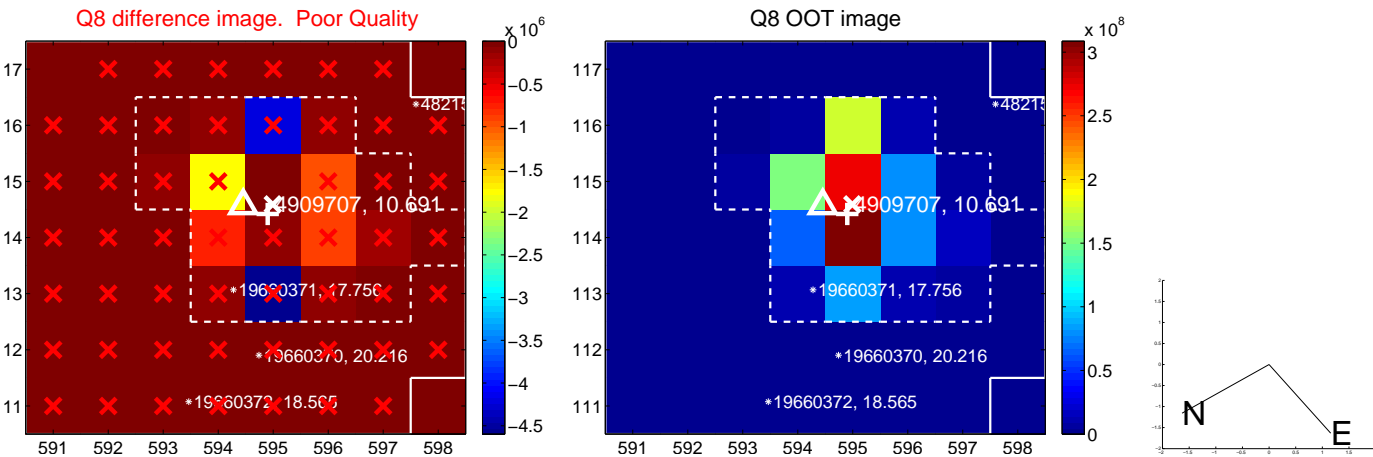
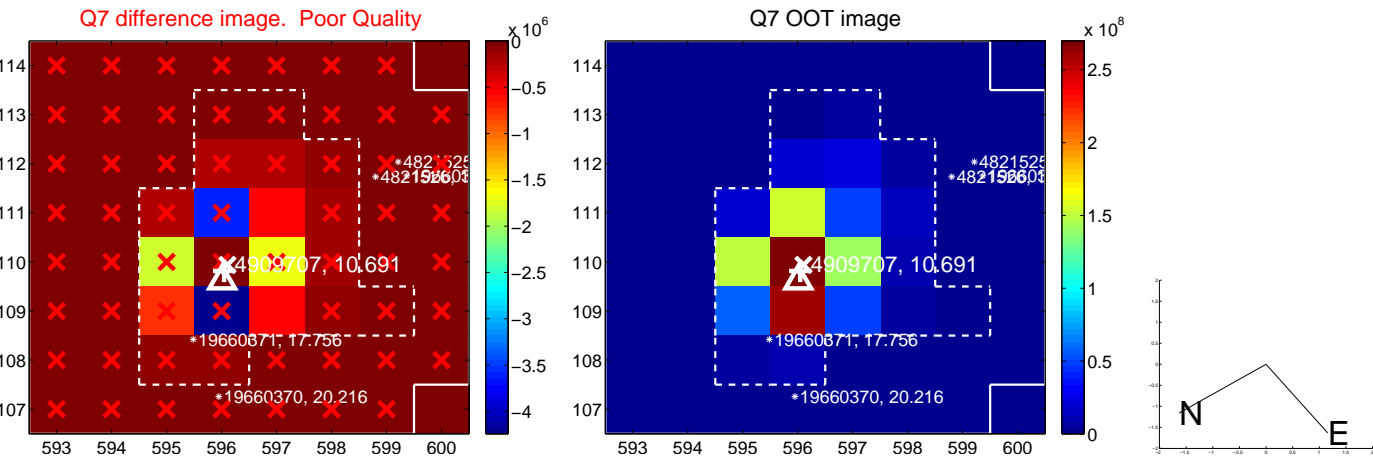
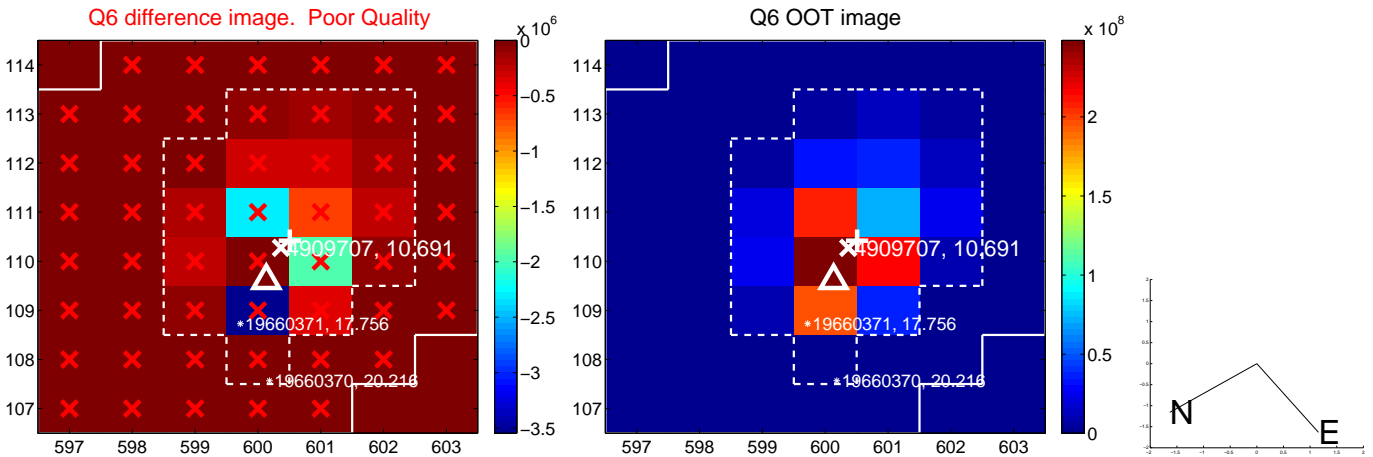
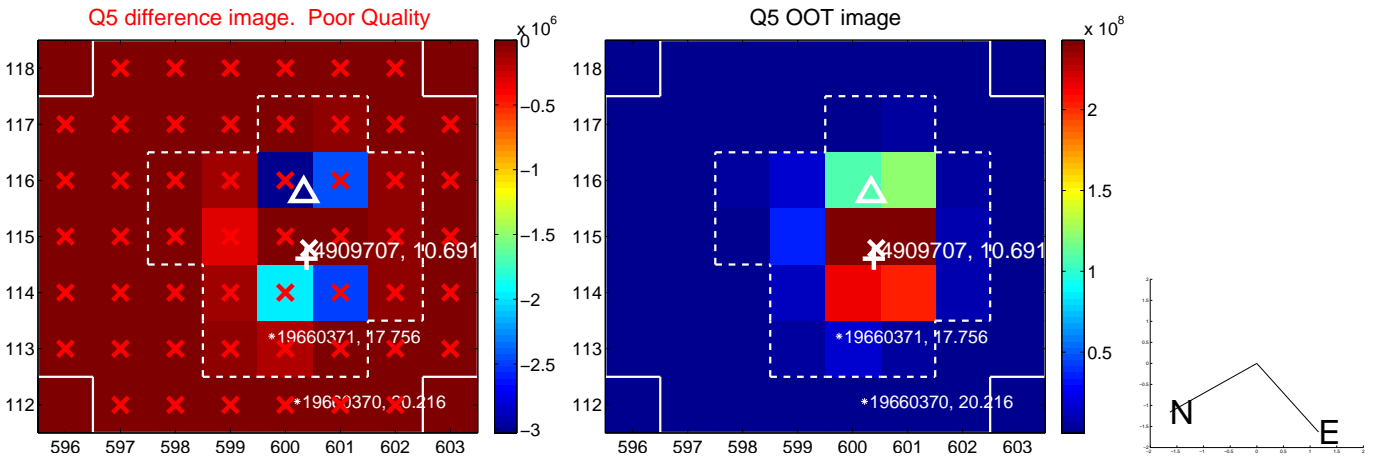


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

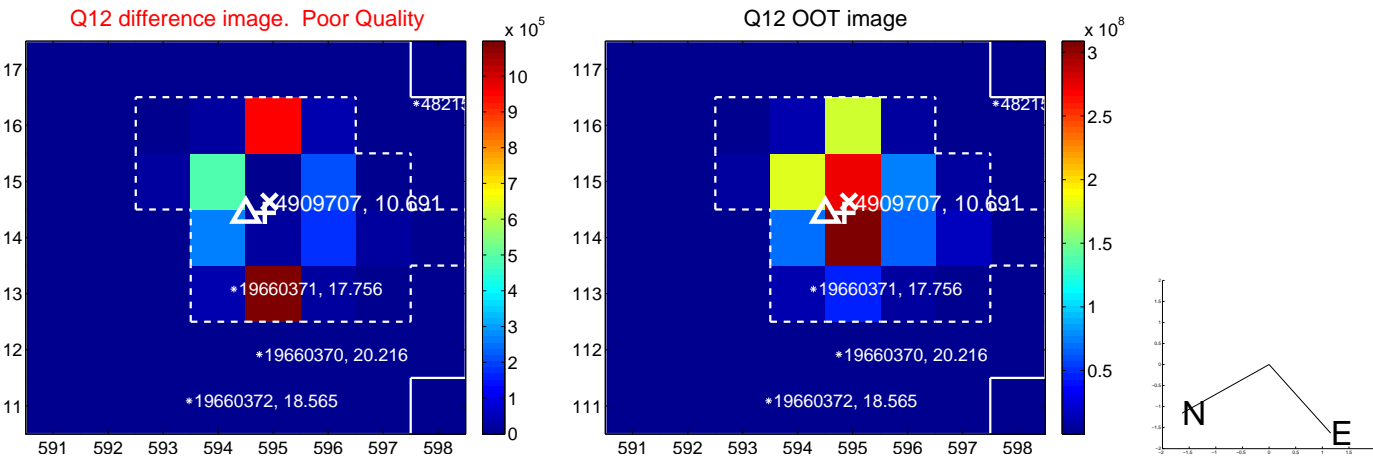
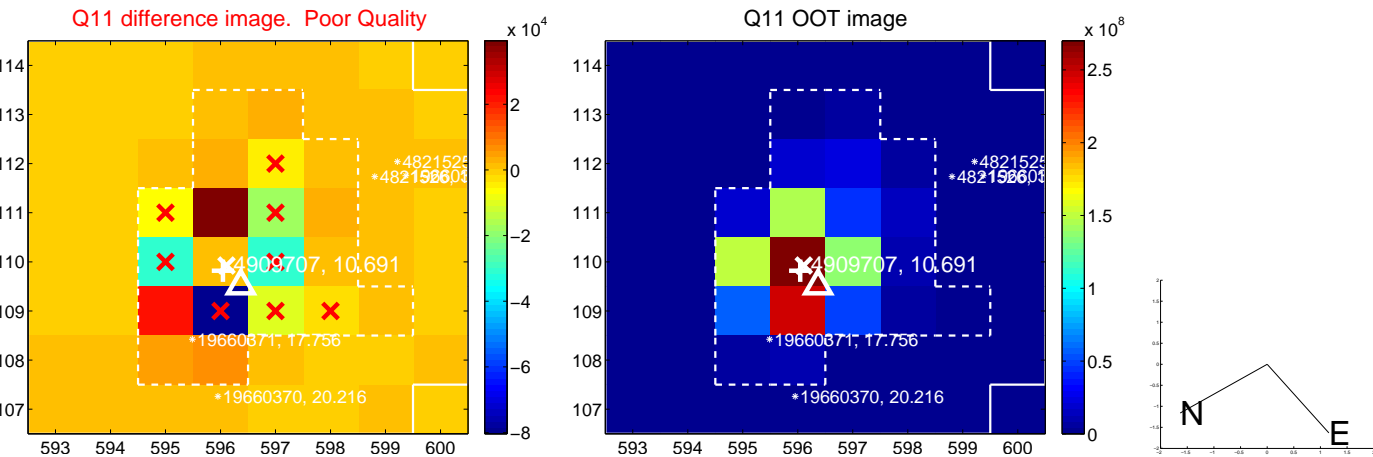
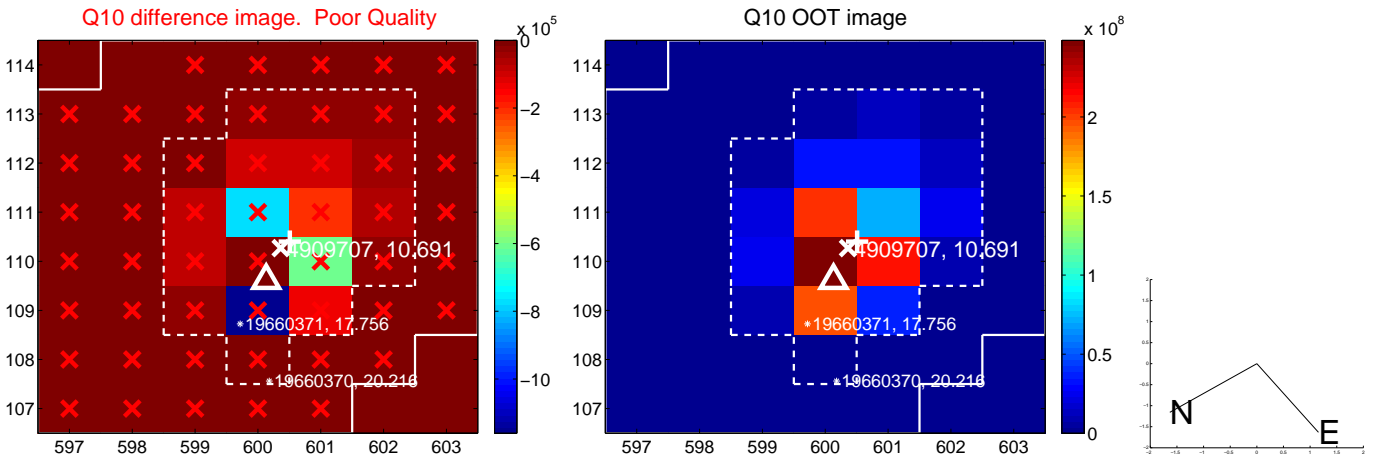
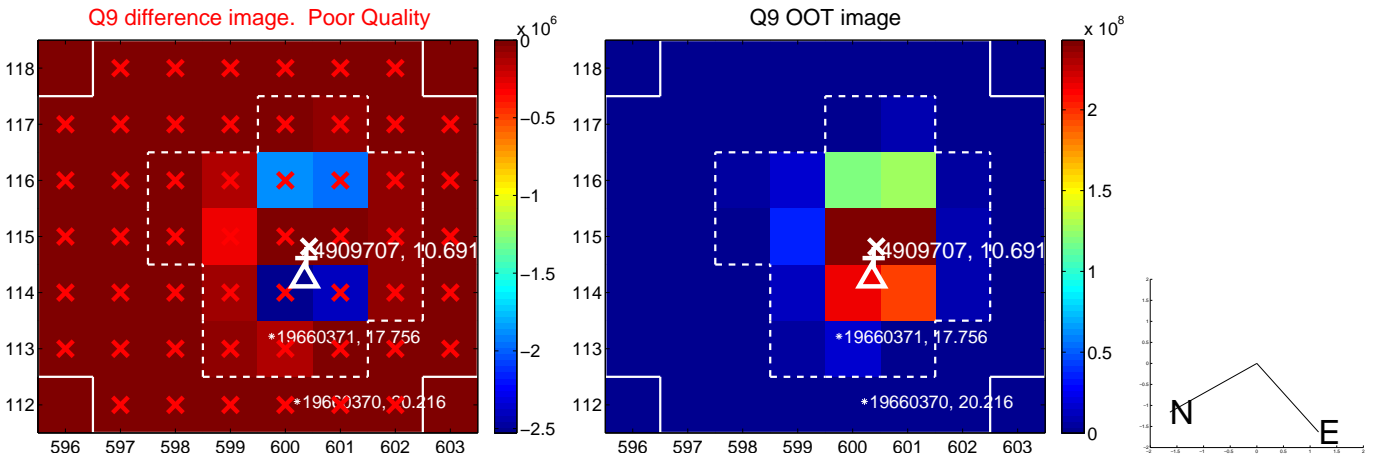
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



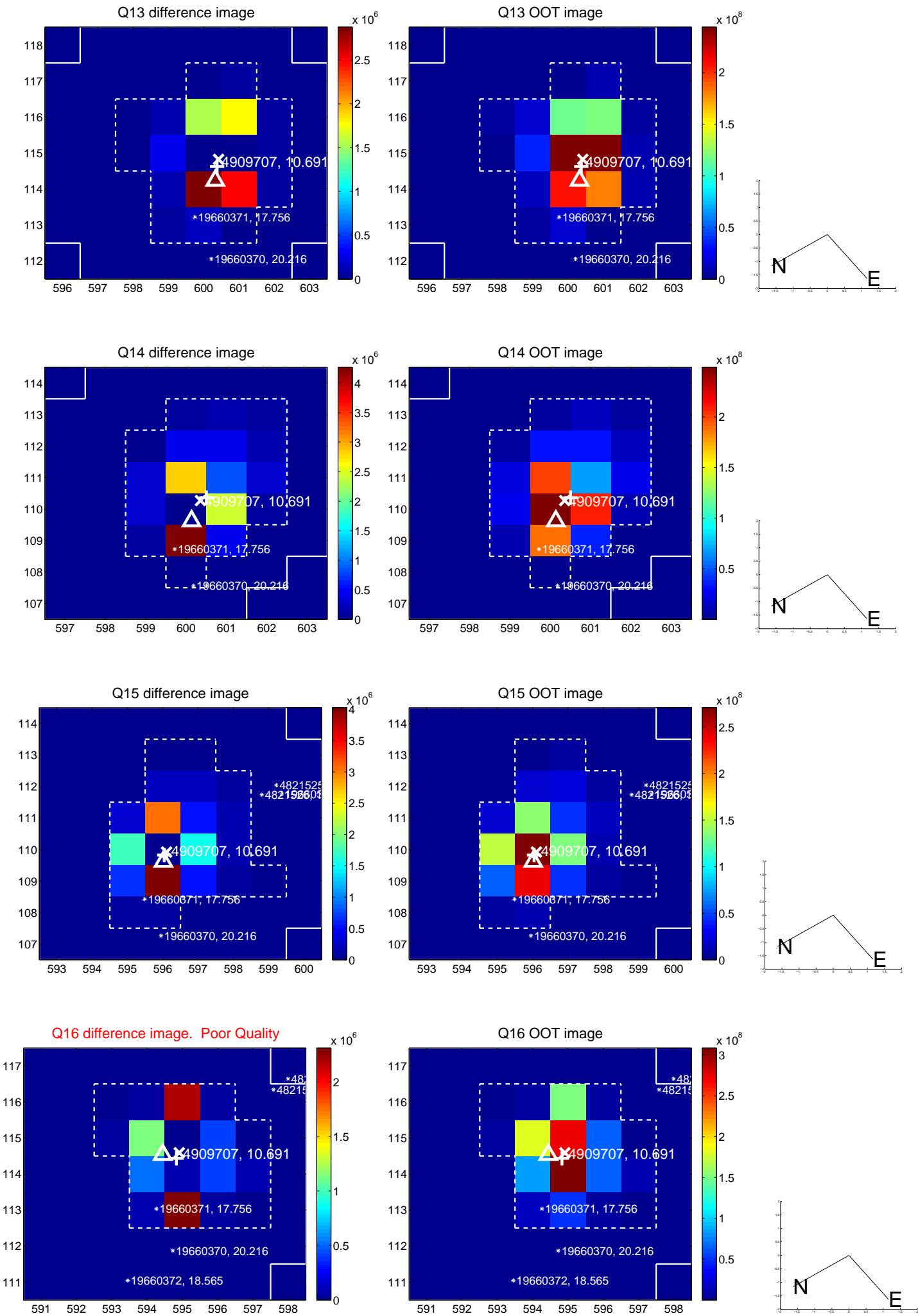
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



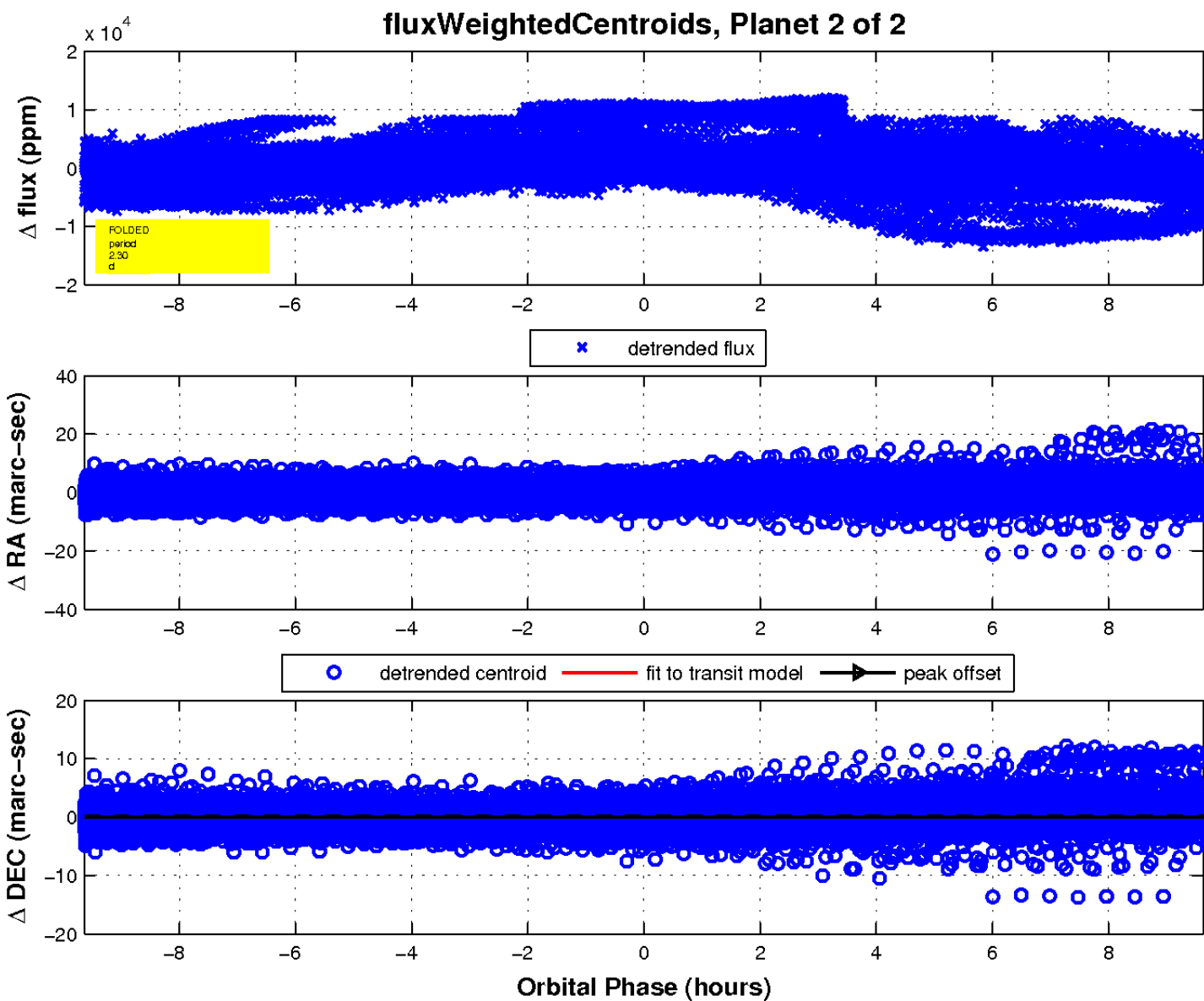
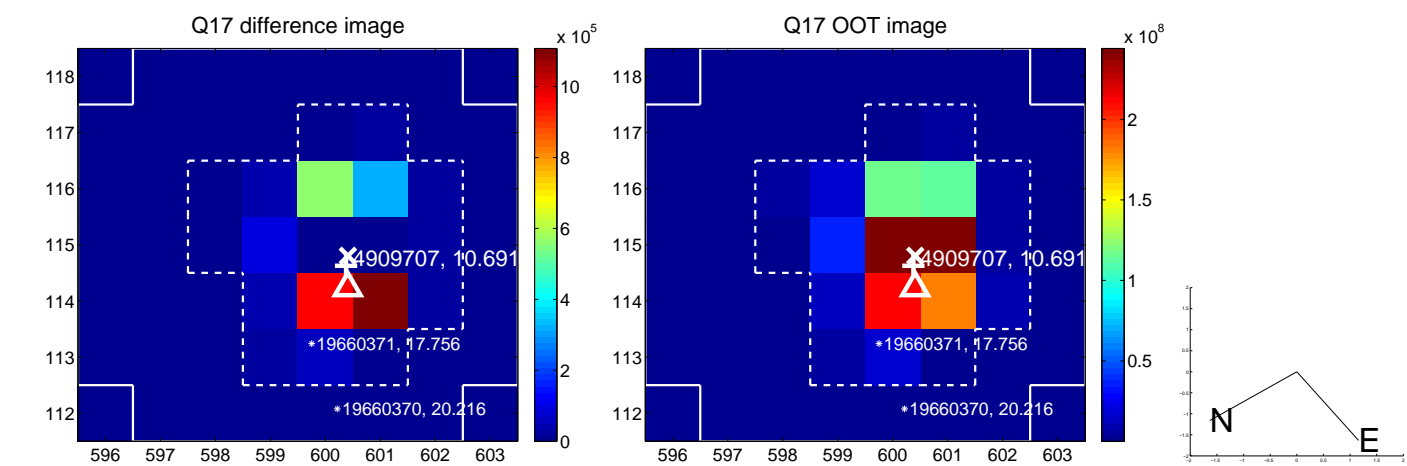
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

