

# KIC 008761550

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008761550-01	OBS	No	295.346694	312.116742	146.5	4.239	7.3	7.9	1.77	5786	2.71	3.87
008761550-02	OBS	7912.01	224.594455	208.785034	124.3	3.544	7.2	7.8	1.77	5786	2.27	5.57

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008761550-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—ALL_TRANS_CHASES
008761550-02	OBS	FP	0.01	1	0	0	0	INDIV_TRANS_SKYE—MOD_NONUNIQ_ALT

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

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

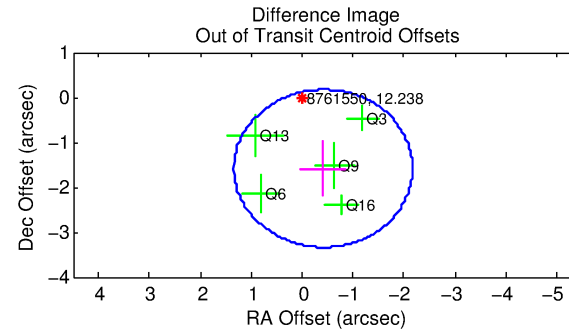
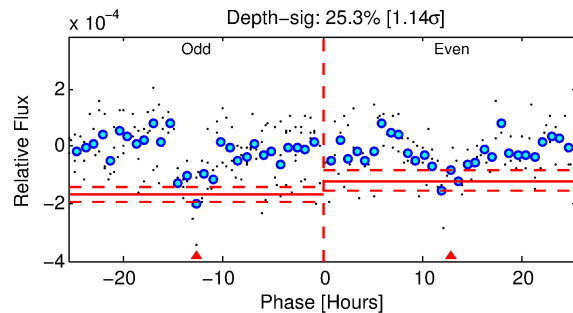
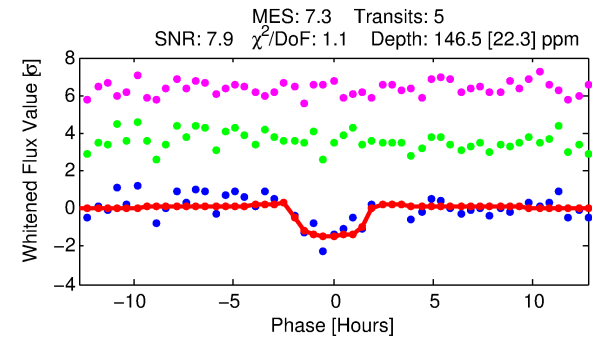
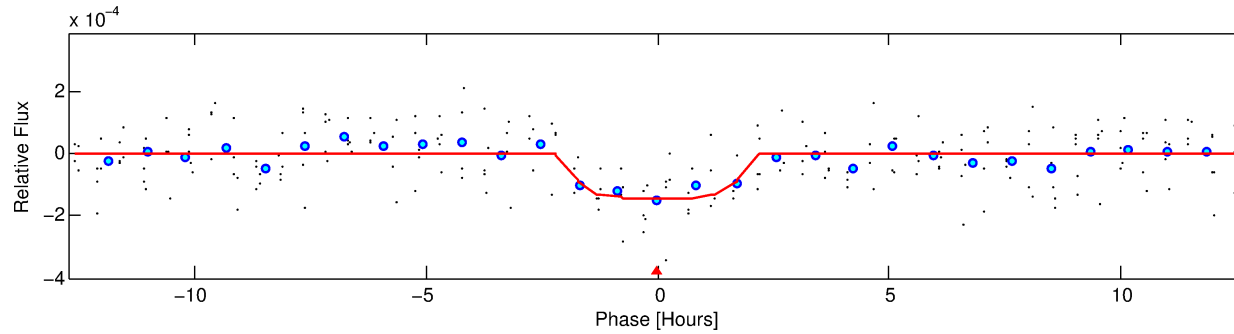
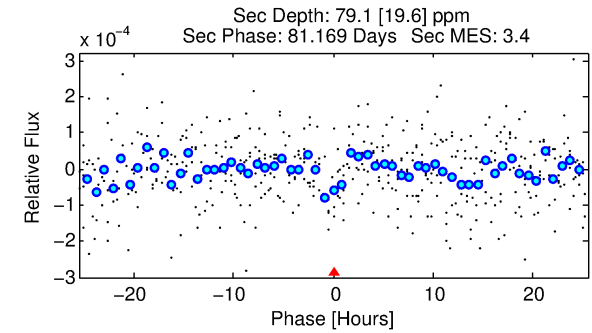
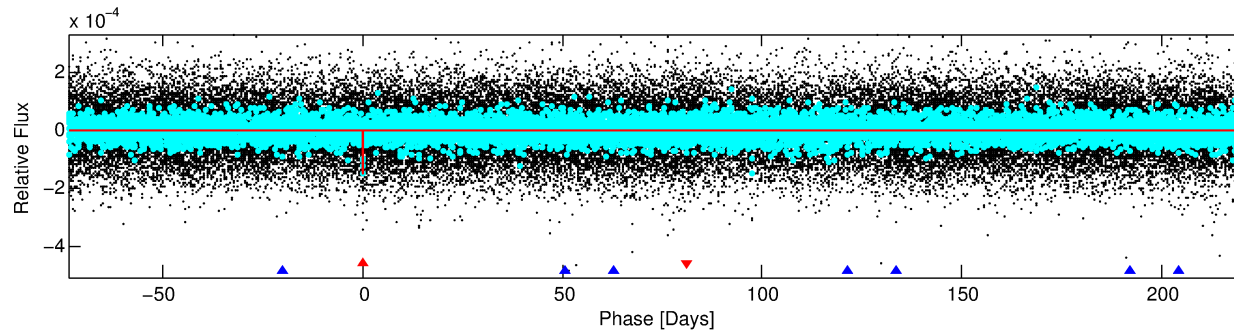
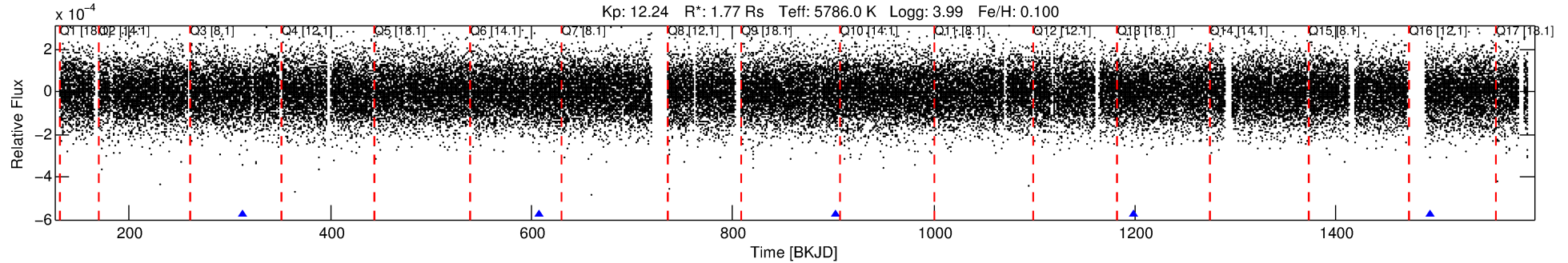
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008761550-01

No Significant Match Found

# DV One-Page Summary

KIC: 8761550 Candidate: 1 of 2 Period: 295.347 d



## DV Fit Results:

Period = 295.34669 [0.00424] d  
Epoch = 312.1167 [0.0110] BKJD  
Rp/R\* = 0.0140 [0.0034]  
a/R\* = 191.90 [224.55]  
b = 0.95 [0.12]  
Seff = 3.87 [1.92]  
Teq = 358 [44] K  
Rp = 2.71 [1.07] Re  
a = 0.9024 [0.2734] AU  
Ag = 4809.51 [3483.76] [1.38σ]  
Teffp = 4604 [632] K [6.71σ]

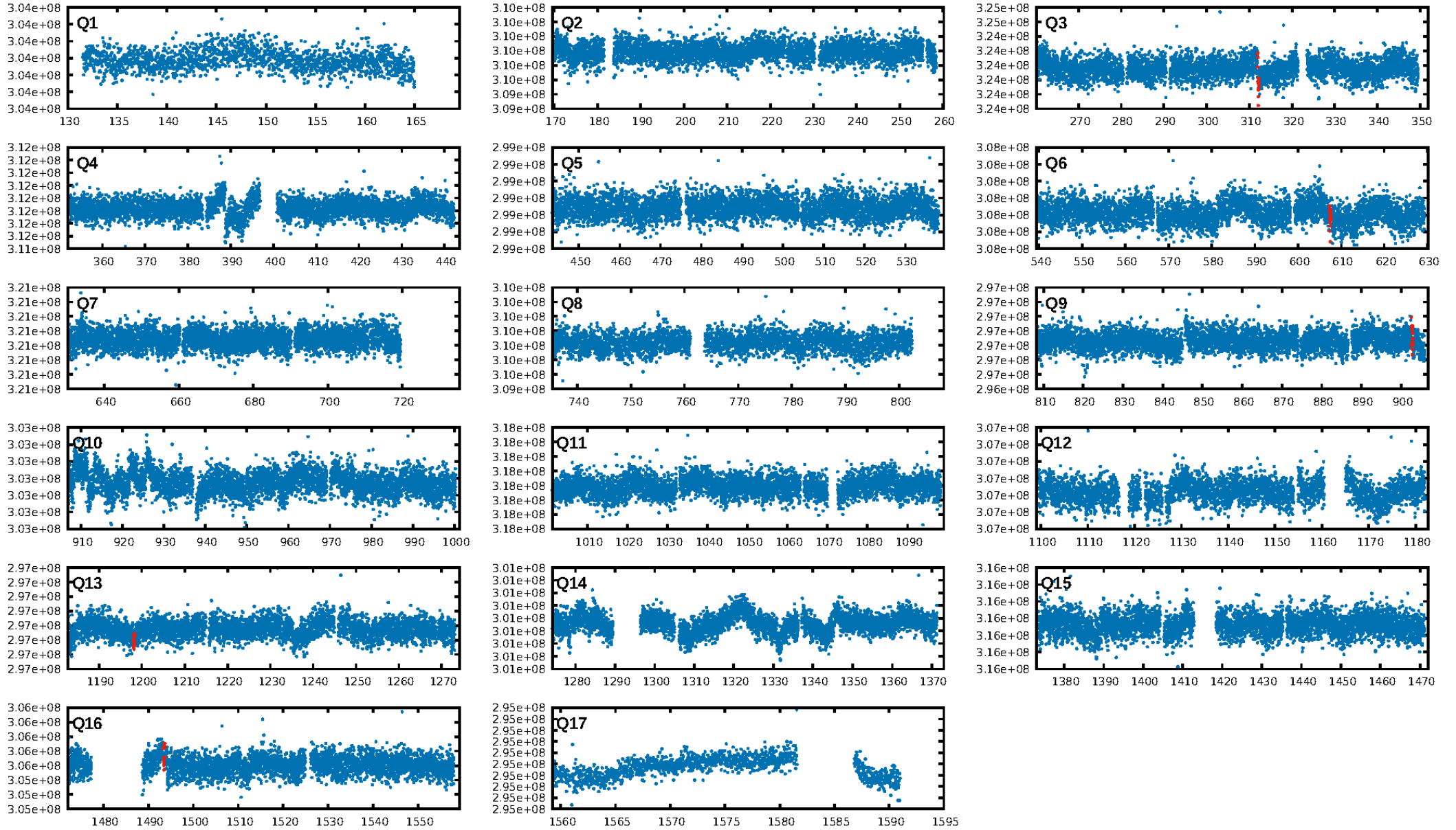
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [307.35σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 13.7%  
ModelChiSquareGof-sig: 97.0%  
**Bootstrap-pfa: 6.73e-12**  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: -2.405  
Centroid-sig: N/A  
Centroid-so: 0.953 arcsec [0.77σ]  
OotOffset-rm: 1.638 arcsec [2.80σ]  
OotOffset-st: 1/1/1/2 [5]  
**KicOffset-rm: 1.697 arcsec [3.12σ]**  
KicOffset-st: 1/1/1/2 [5]  
DiffImageQuality-fgm: 0.80 [4/5]  
DiffImageOverlap-fno: 1.00 [5/5]

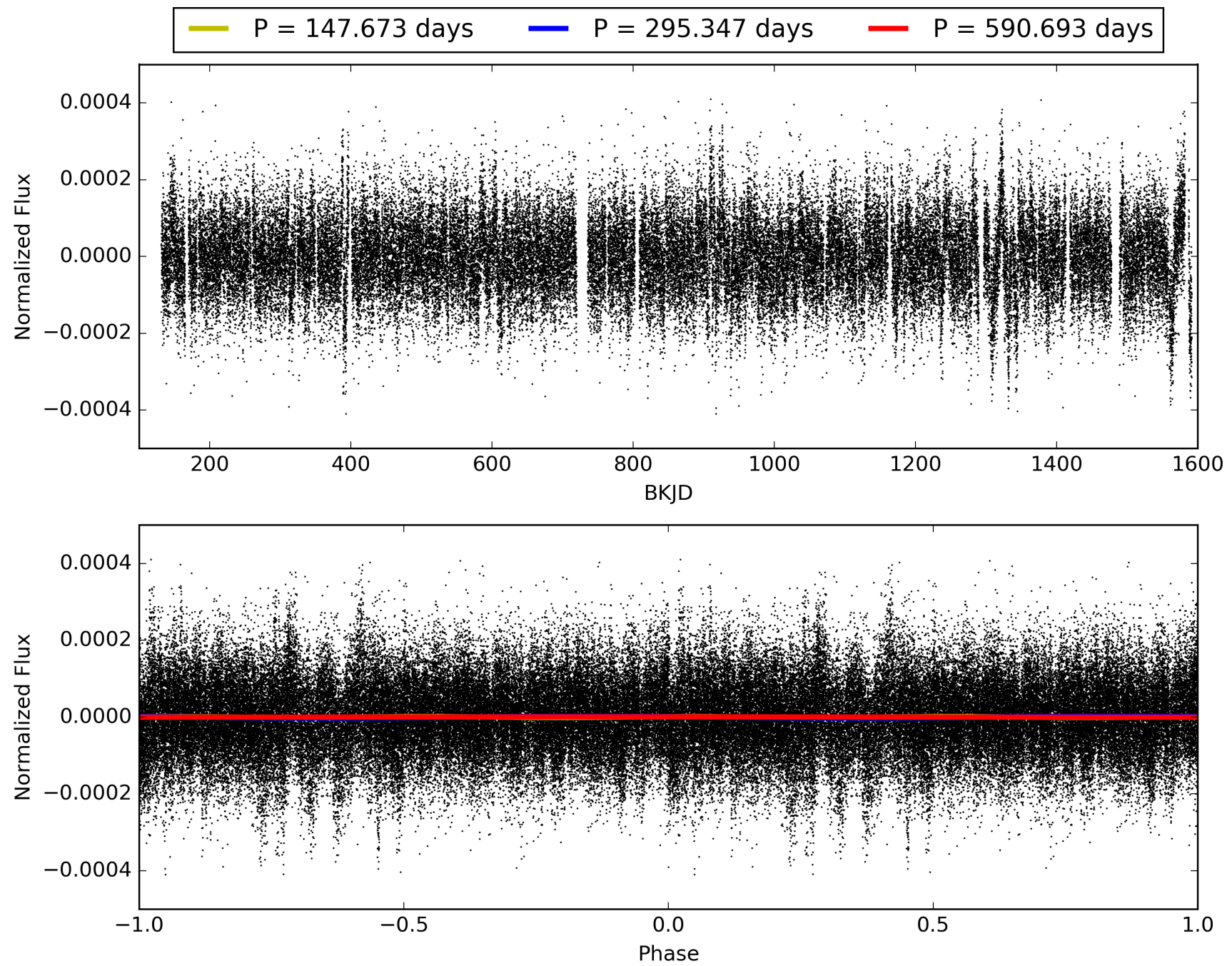
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 18:47:11 Z

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

# TCE 008761550-01, PDC Light Curves

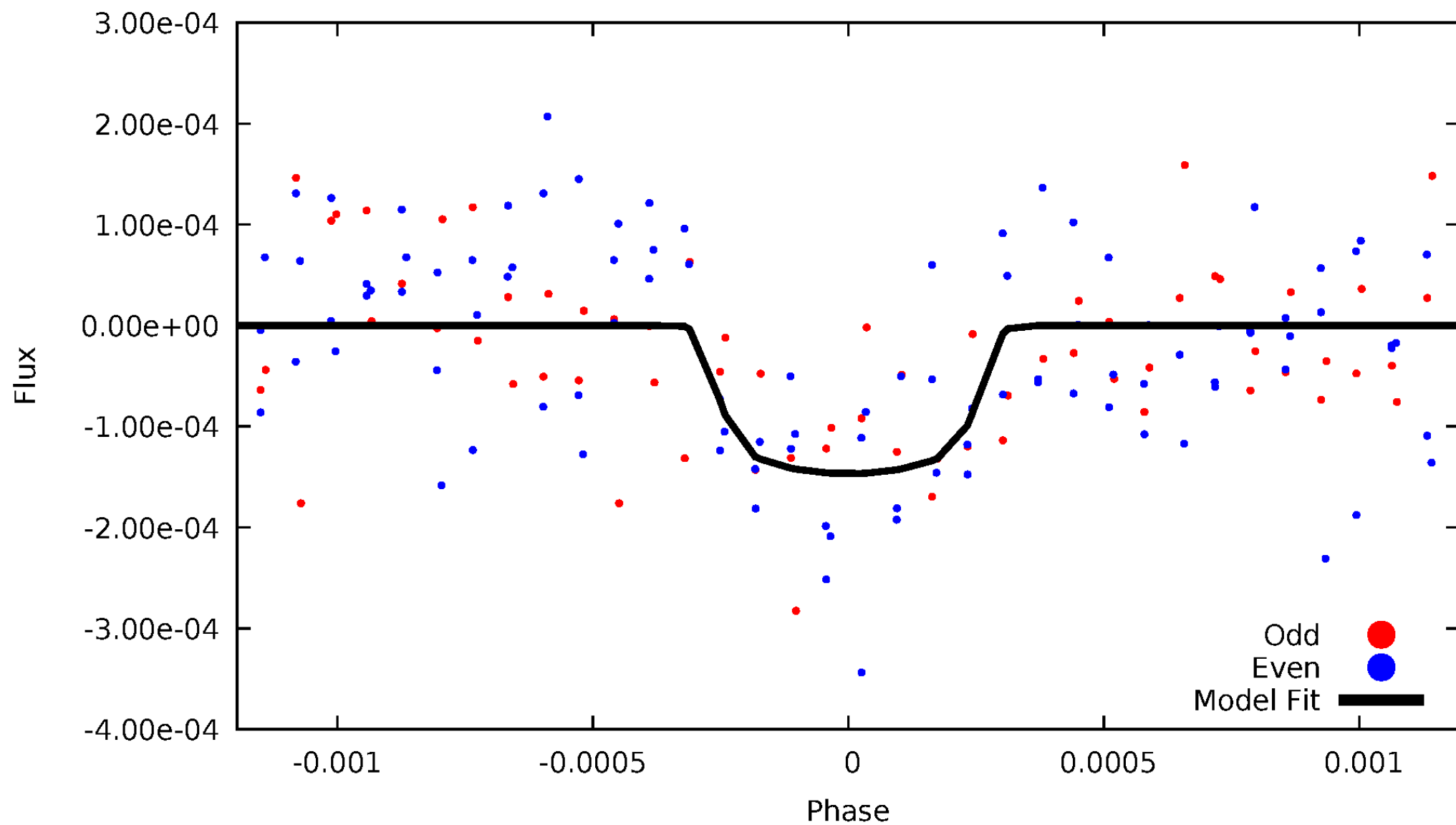


TCE 008761550-01



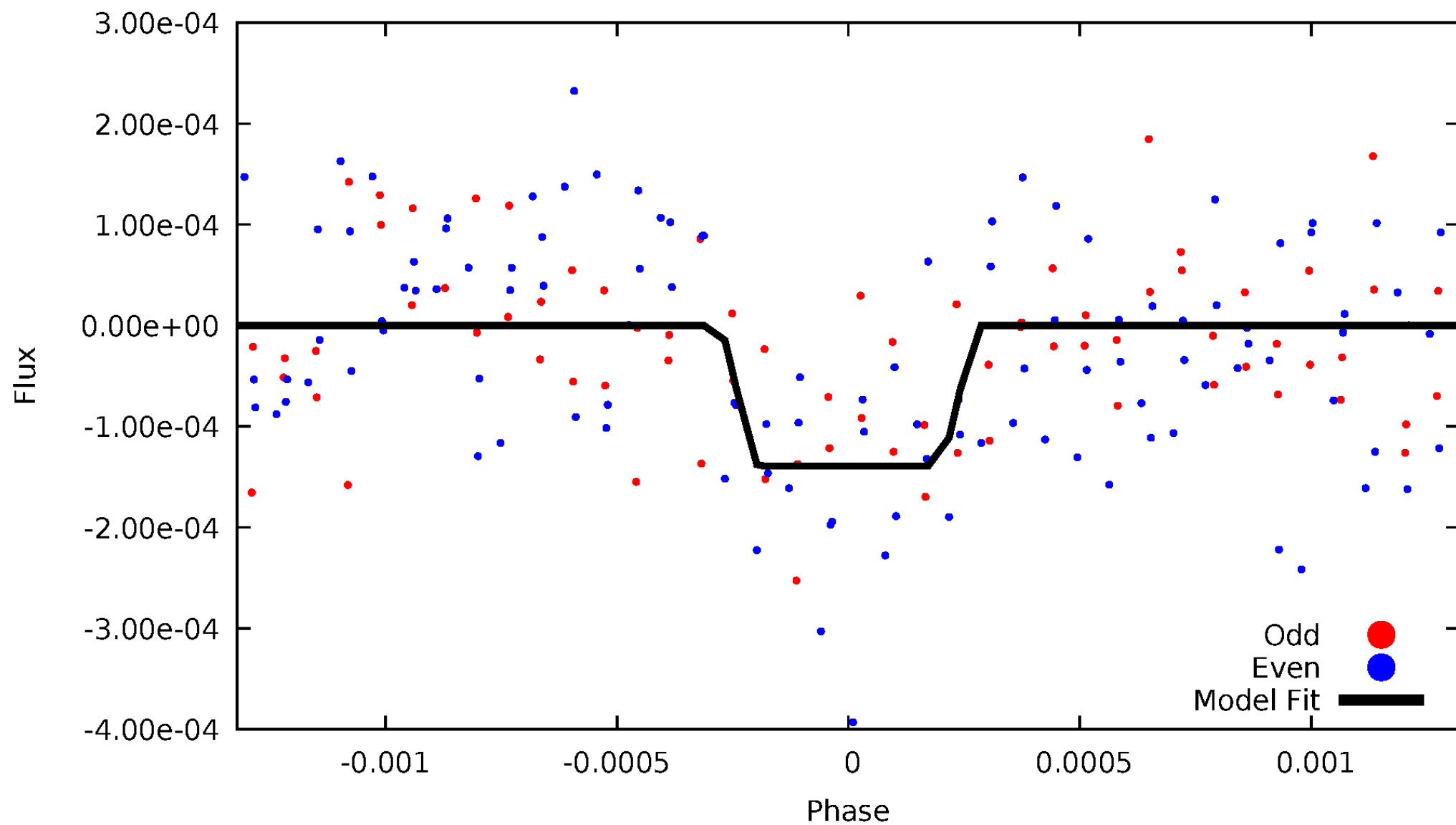
# DV Odd/Even

TCE 008761550-01



# ALT Odd/Even

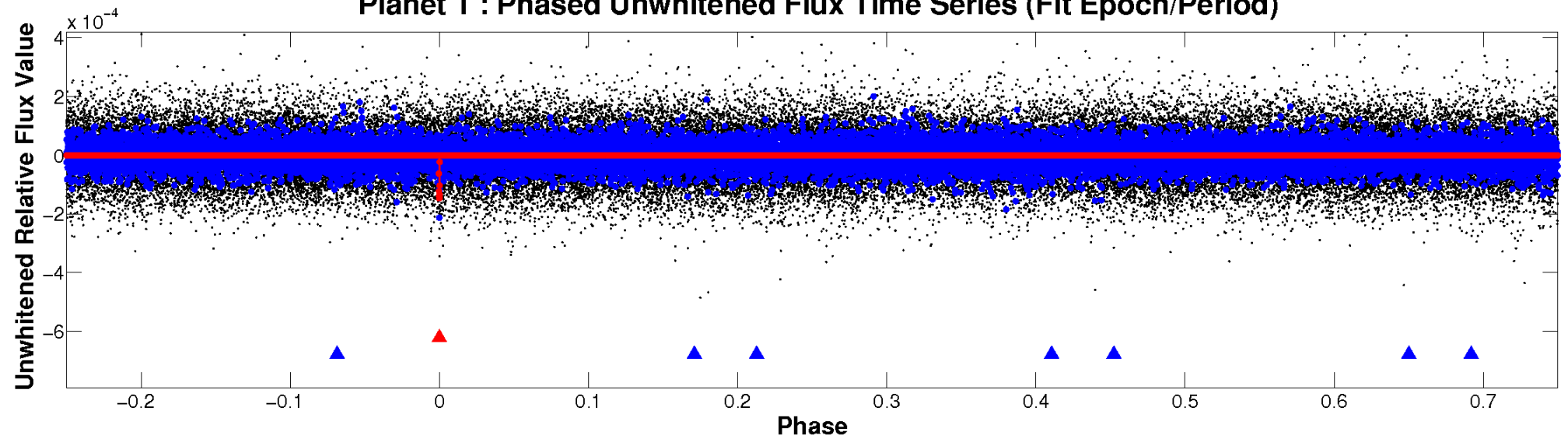
TCE 008761550-01



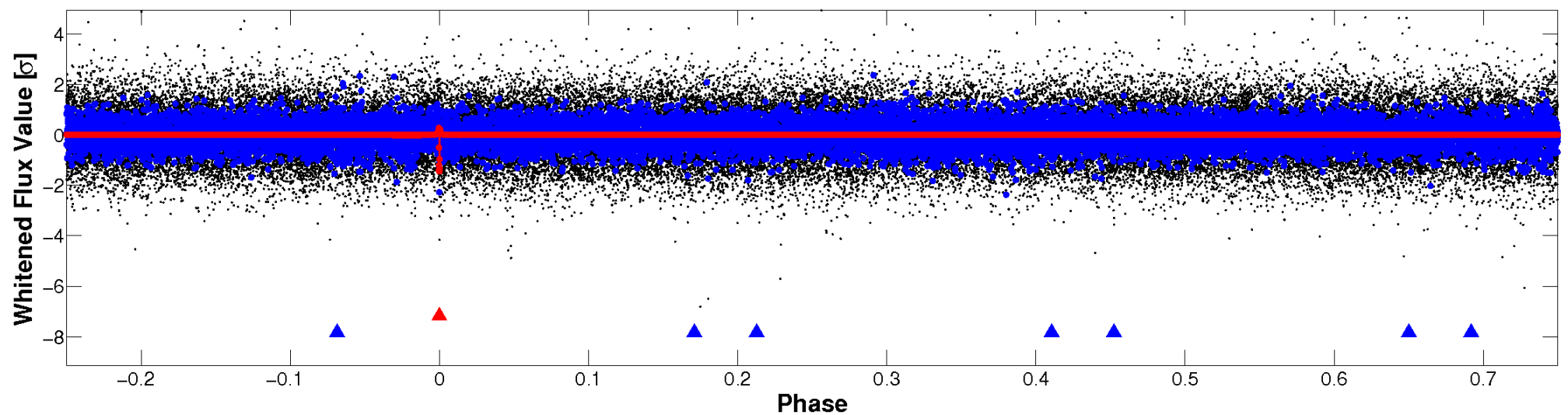


# Non-Whitened Vs. Whitened Light Curve

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

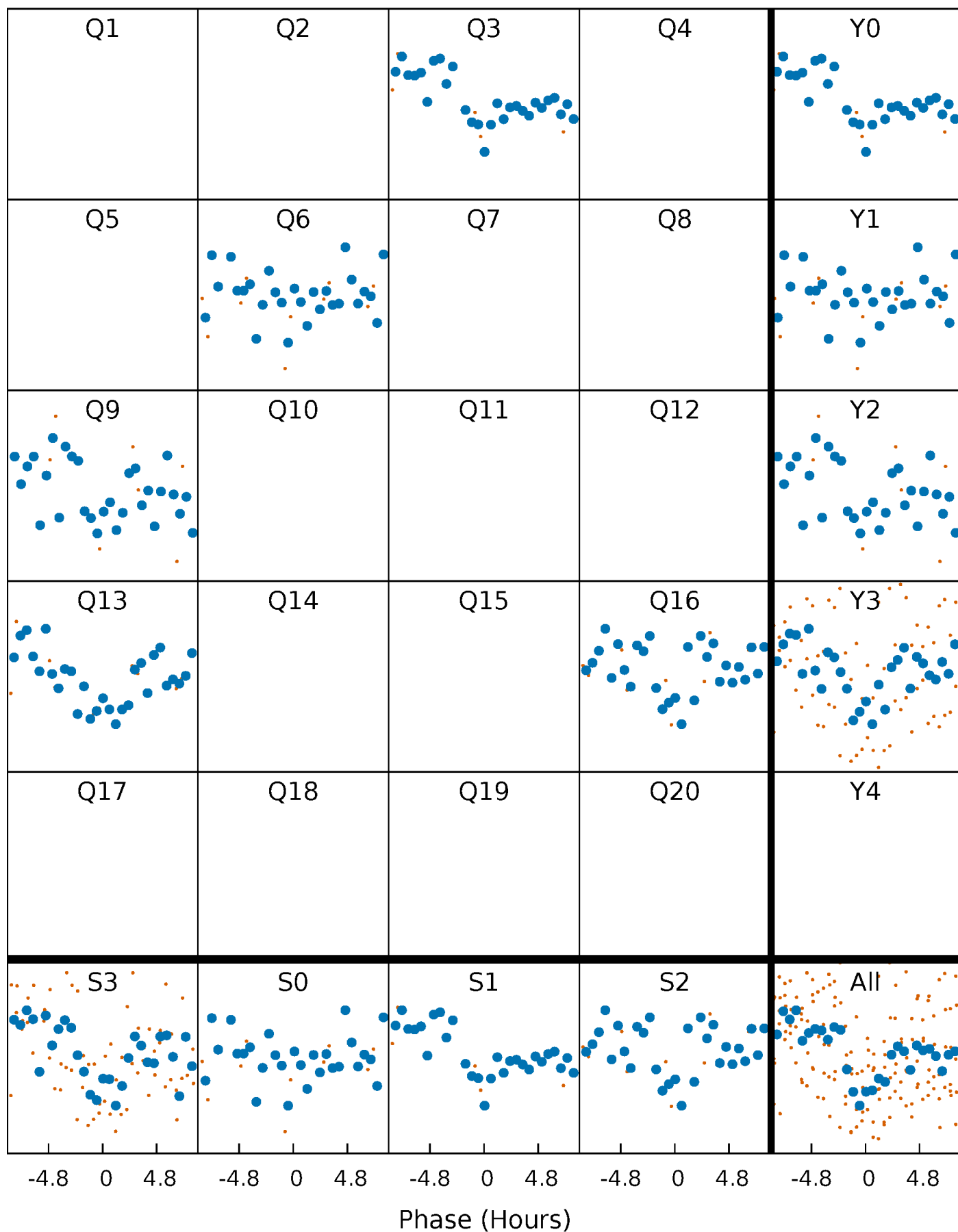


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

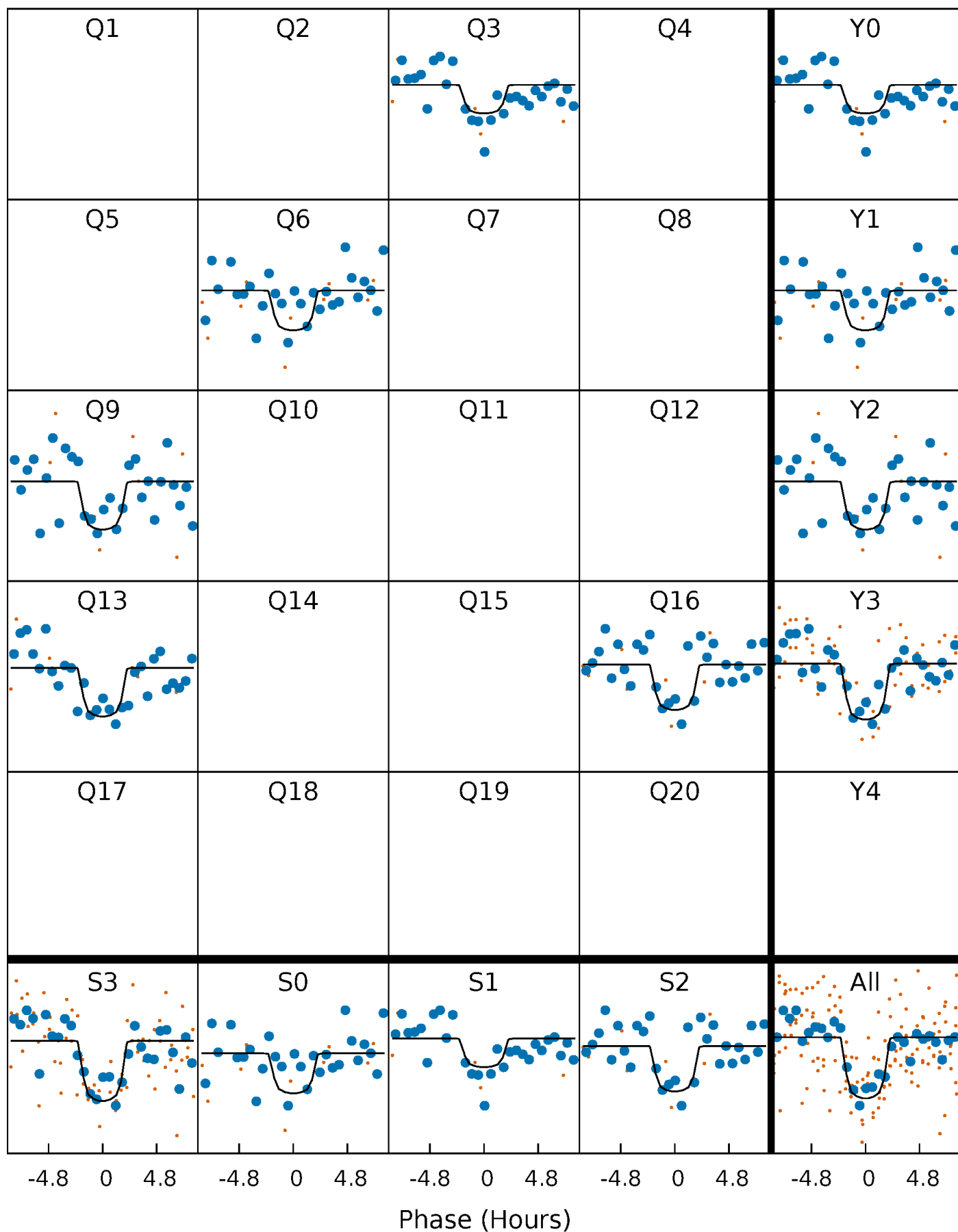
TCE 008761550-01 P=295.346694 Days  $T_0=312.116742$  (BKJD)





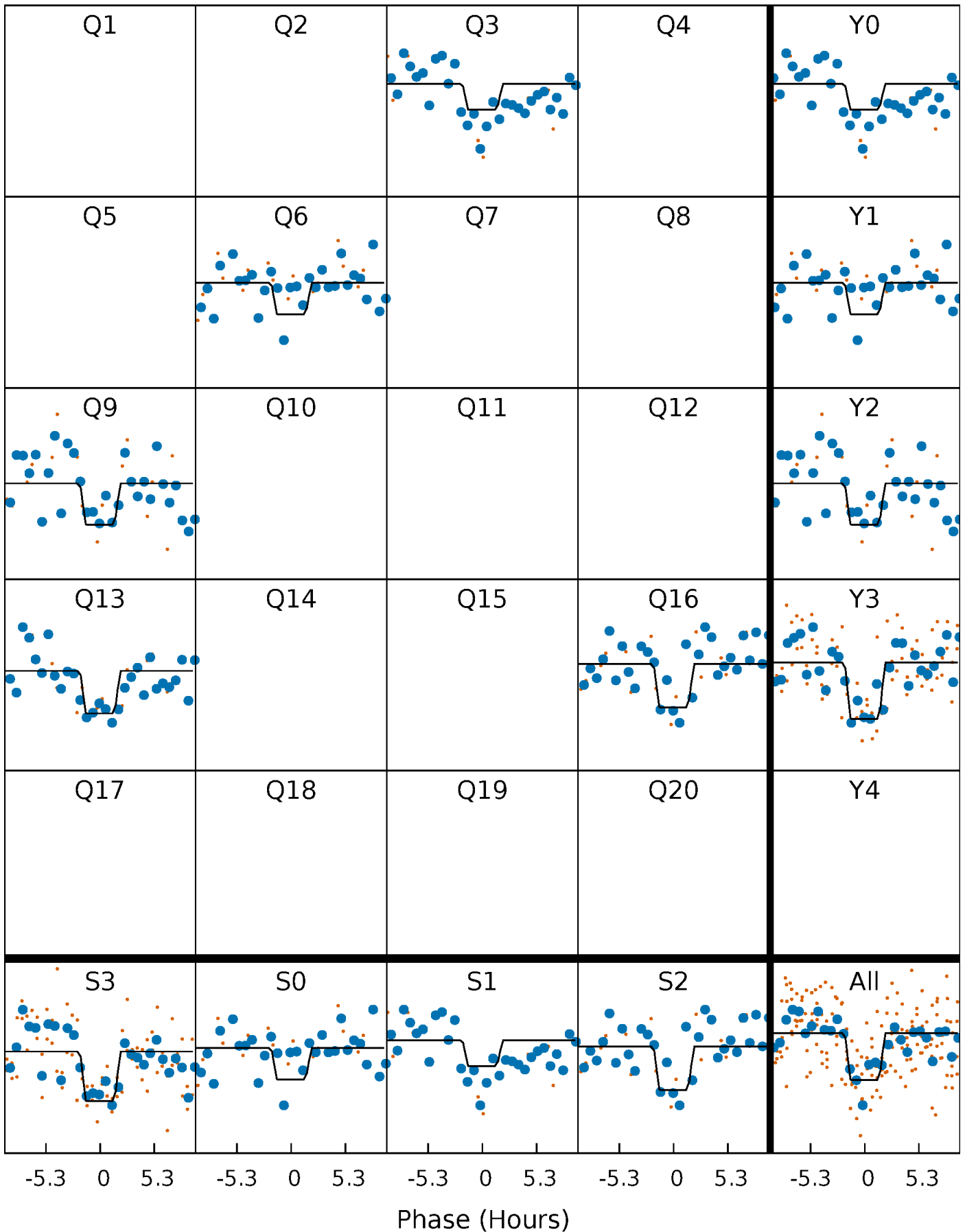
# DV Quarter-Phased Transit Curves

TCE 008761550-01 P=295.346694 Days  $T_0=312.116742$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

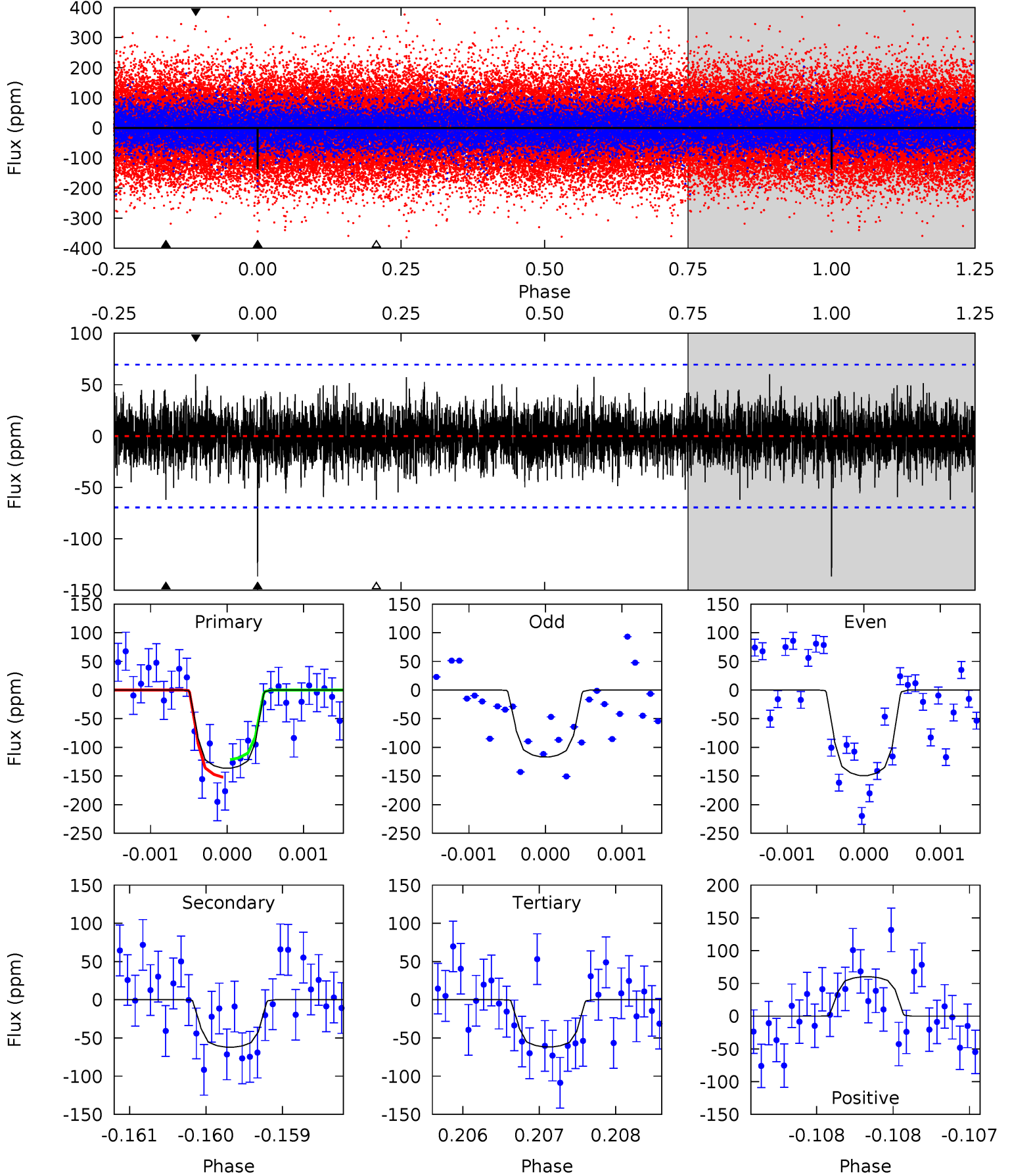
TCE 008761550-01 P=295.344897 Days  $T_0=312.121379$  (BKJD)



# DV Model-Shift Uniqueness Test

008761550-01,  $P = 295.346694$  Days,  $E = 16.770048$  Days

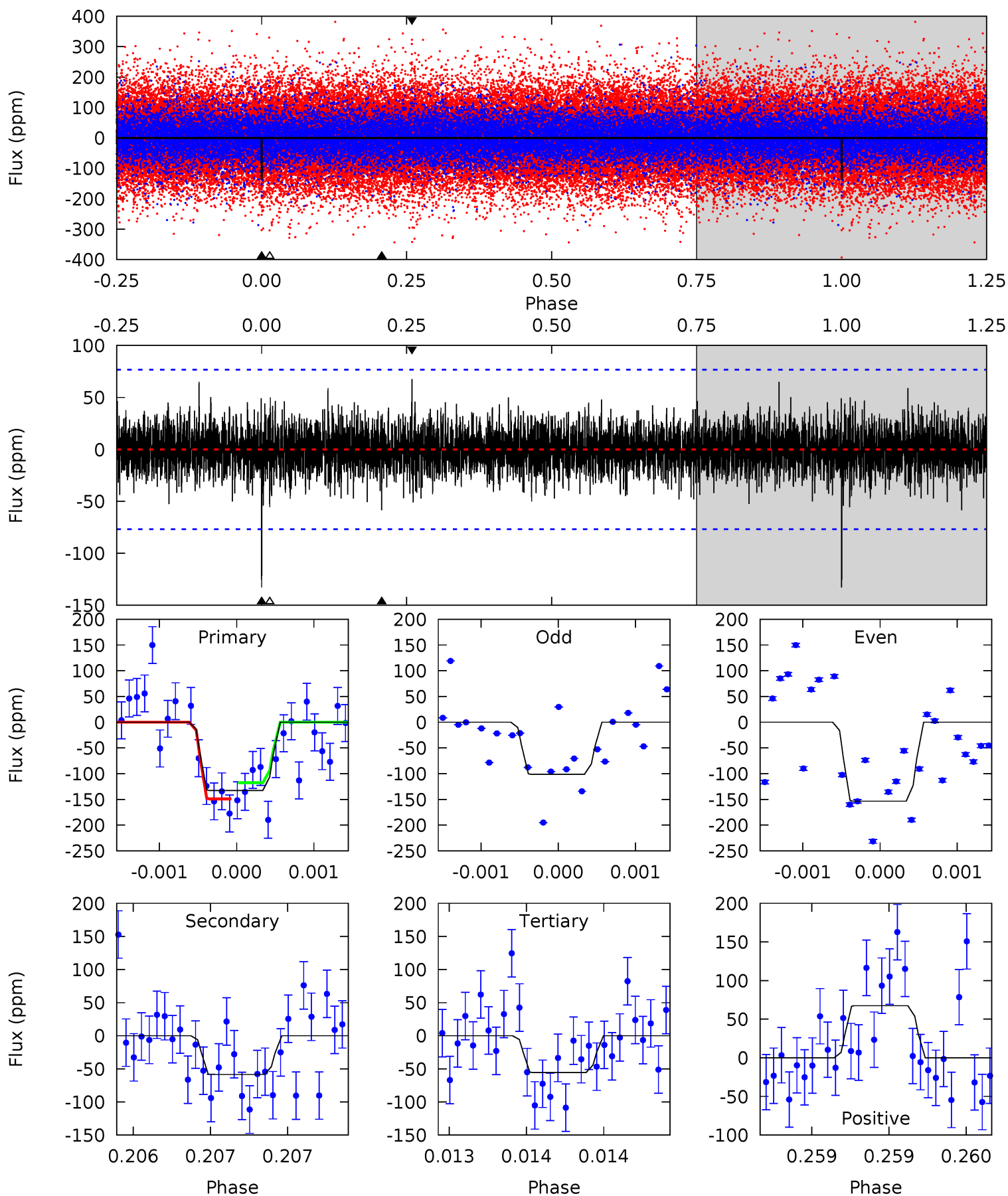
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.9	4.94	4.92	4.79	5.53	3.42	1.26	5.95	6.07	0.02	0.15	1.26	1.07	0.31	1.22



# Alt Model-Shift Uniqueness Test

008761550-01,  $P = 295.344897$  Days,  $E = 16.776482$  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
9.63	4.25	4.03	4.90	5.57	3.48	1.13	5.60	4.73	0.23	-0.64	1.89	1.20	0.34	1.15



### Stellar Parameters For KIC 008761550

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5786^{+157}_{-157}$	$3.992^{+0.285}_{-0.095}$	$0.100^{+0.250}_{-0.250}$	$1.771^{+0.300}_{-0.557}$	$1.124^{+0.163}_{-0.163}$	$0.285^{+0.491}_{-0.101}$
	+3%/-3%	+7%/-2%	+250%/-250%	+17%/-31%	+15%/-15%	+172%/-35%
Source	PHO1	FLK73	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 008761550-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-62 \pm 13$	$2.60^{+0.74}_{-0.71}$	$493^{+28}_{-41}$	$4491^{+573}_{-385}$	$4202^{+3591}_{-1785}$
Alt.	$-59 \pm 14$	$2.17^{+0.72}_{-0.65}$	$493^{+29}_{-41}$	$4747^{+784}_{-488}$	$5511^{+6284}_{-2490}$

$T_{max}$  = 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

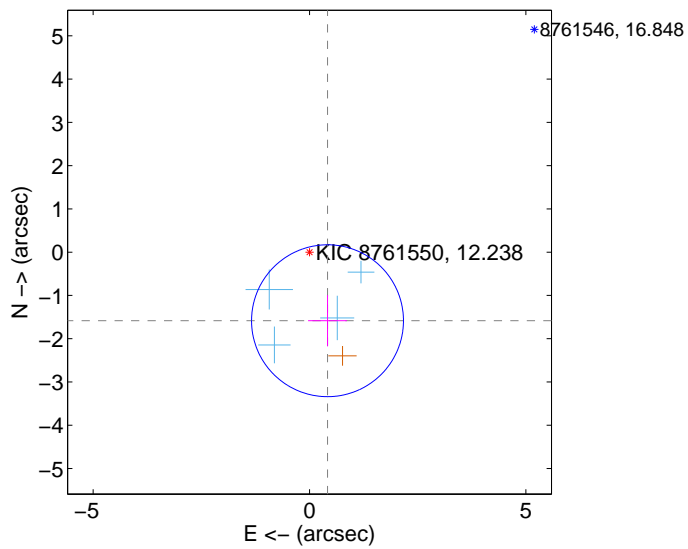
Supplemental centroid analysis for 008761550-01. Kepler magnitude: 12.24. Transit SNR 7.86

There are 4 quarters with good PRF difference image offsets

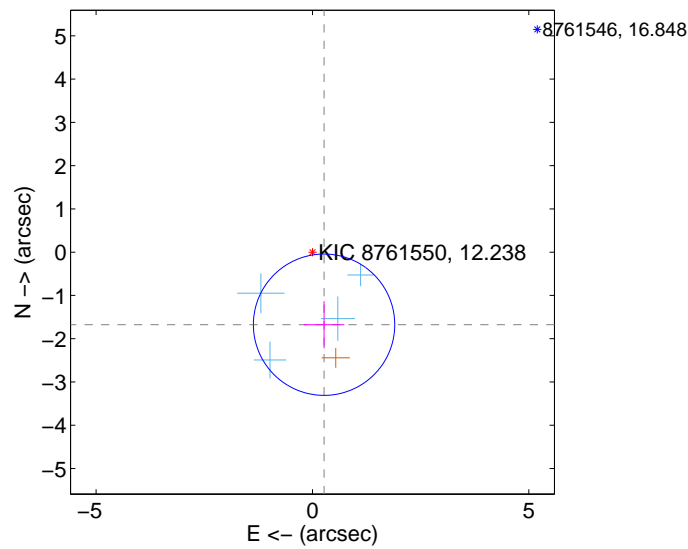
The direct PRF centroid is offset from the target star catalog position by about 0.23 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.638 \pm 0.585$	2.80	$-0.416 \pm 0.448$	$-1.584 \pm 0.593$
PRF-fit source offset from KIC position	$1.697 \pm 0.544$	3.12	$-0.268 \pm 0.468$	$-1.676 \pm 0.546$
photometric centroid source offset	$0.95 \pm 1.24$	0.77	$0.28 \pm 1.19$	$-0.91 \pm 1.24$

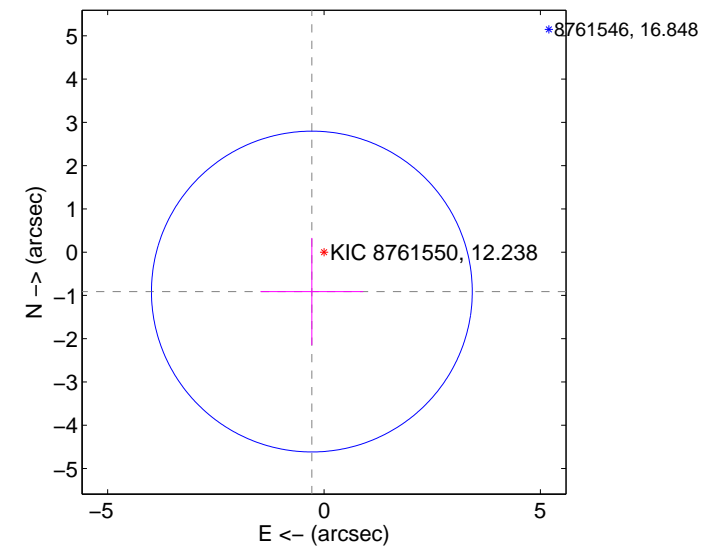
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



offset from photometric centroids



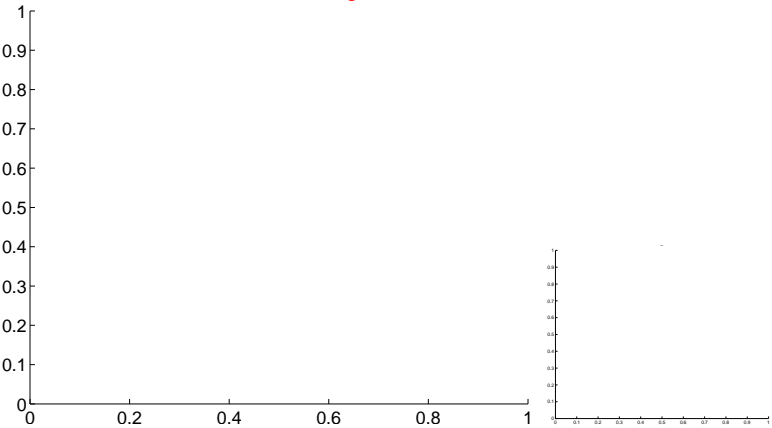
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

Q1 no difference image



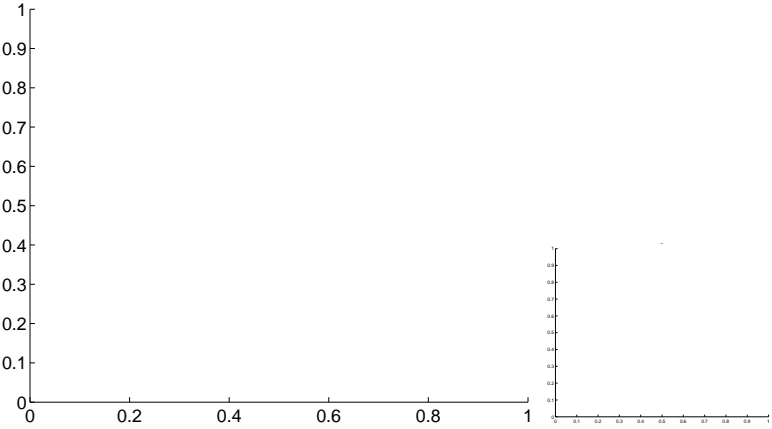
Q1 no OOT image



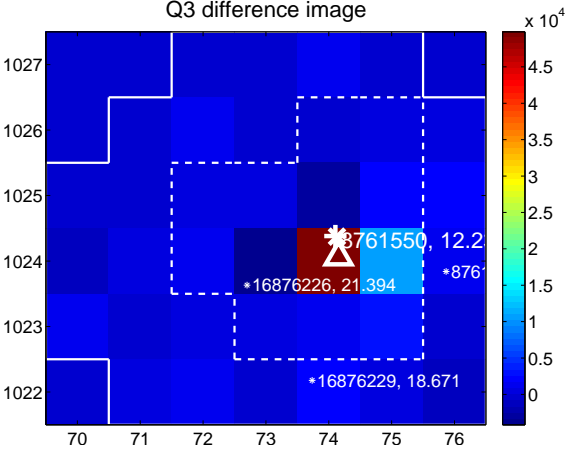
Q2 no difference image



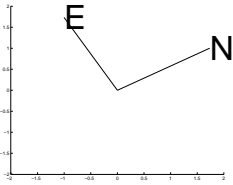
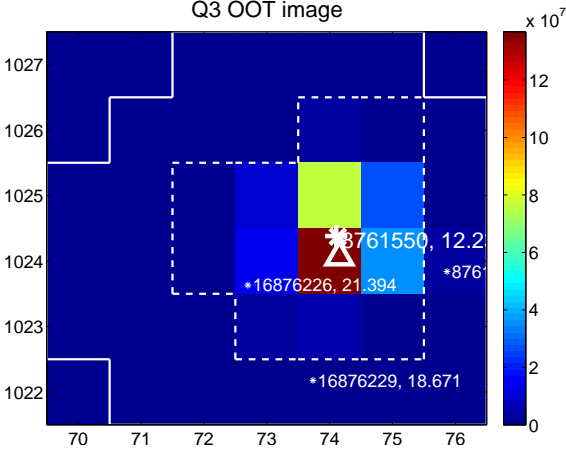
Q2 no OOT image



Q3 difference image



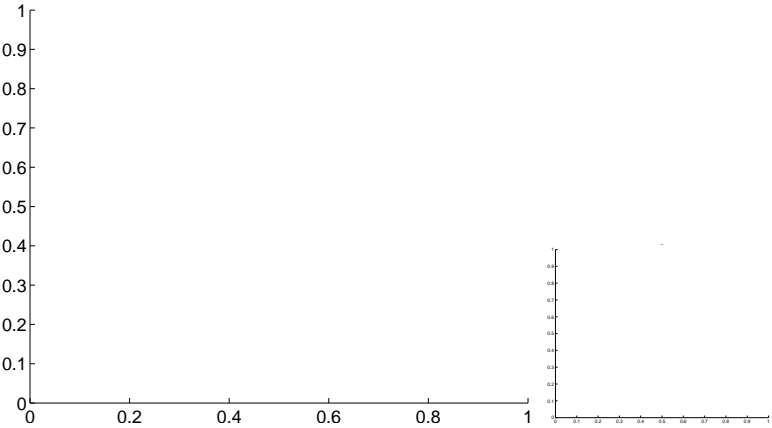
Q3 OOT image



Q4 no difference image



Q4 no OOT image





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

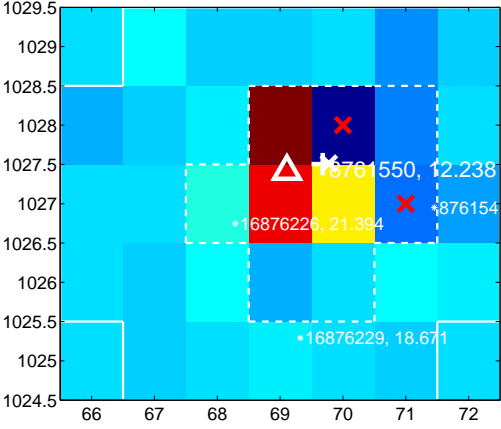
Q5 no difference image



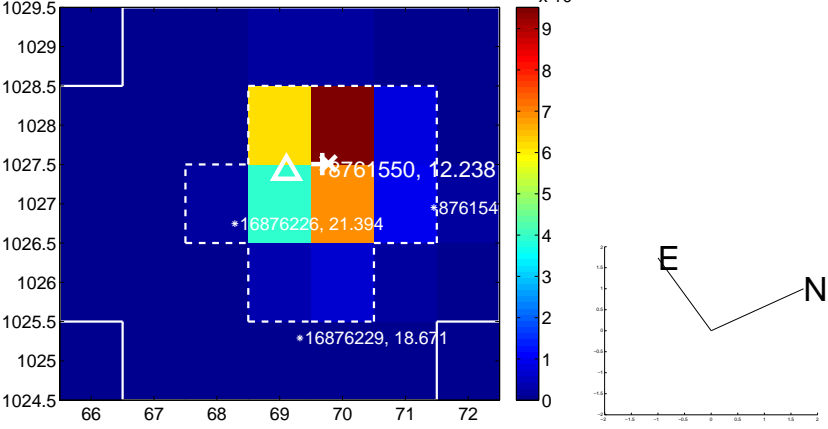
Q5 no OOT image



Q6 difference image



Q6 OOT image



Q7 no difference image



Q7 no OOT image



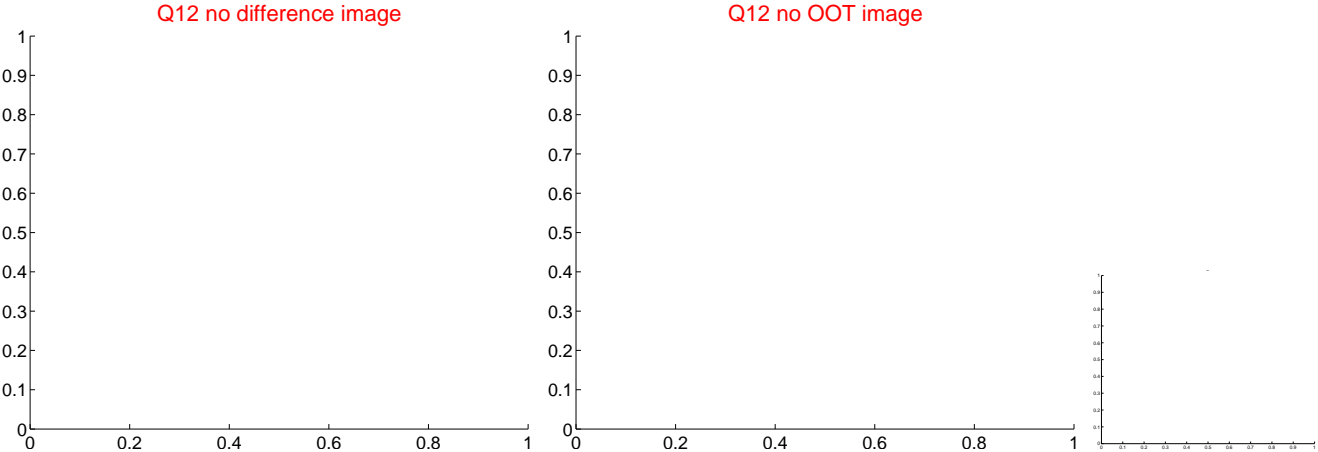
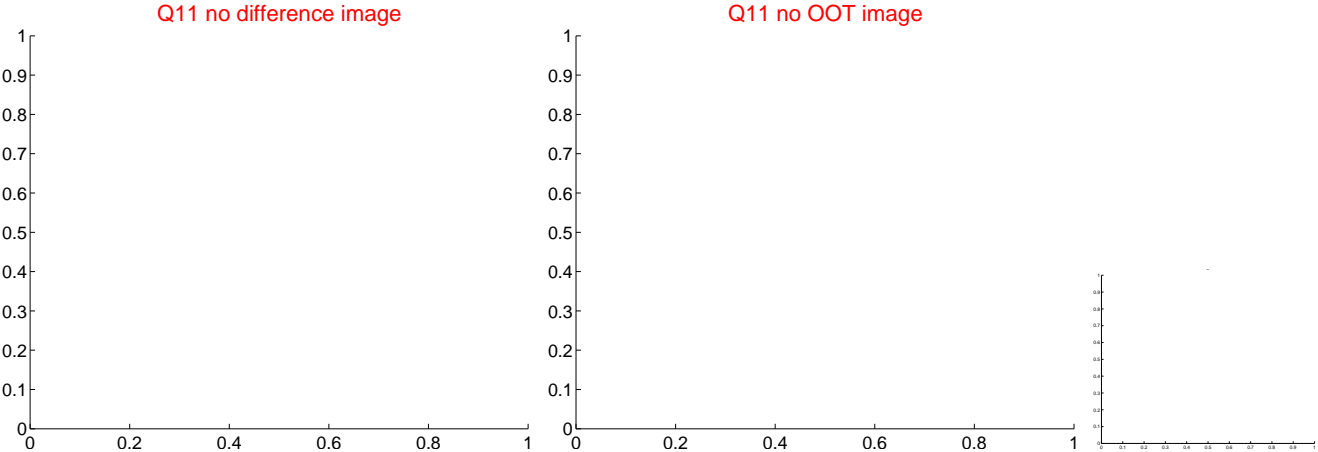
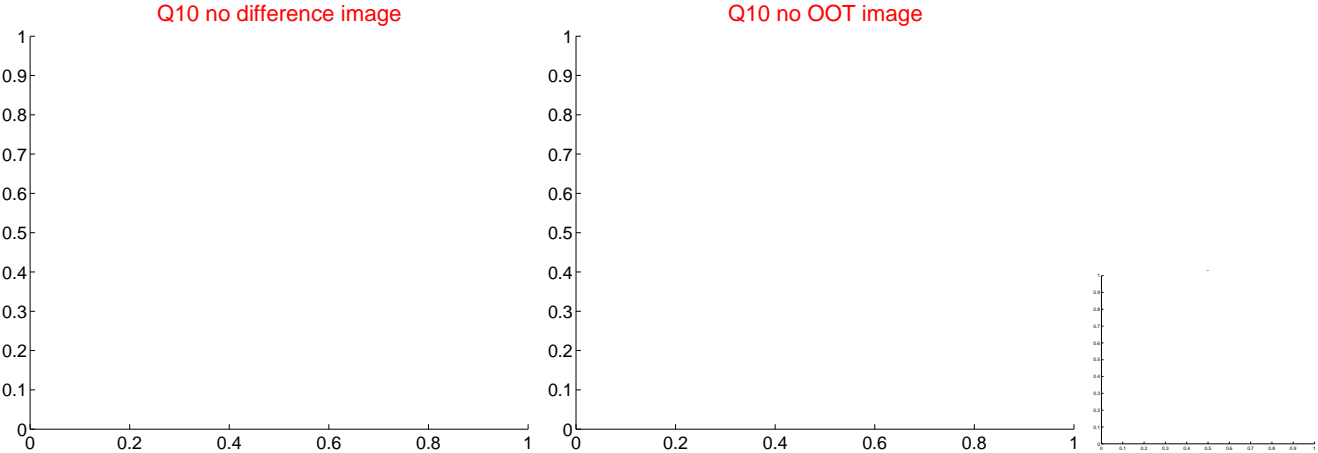
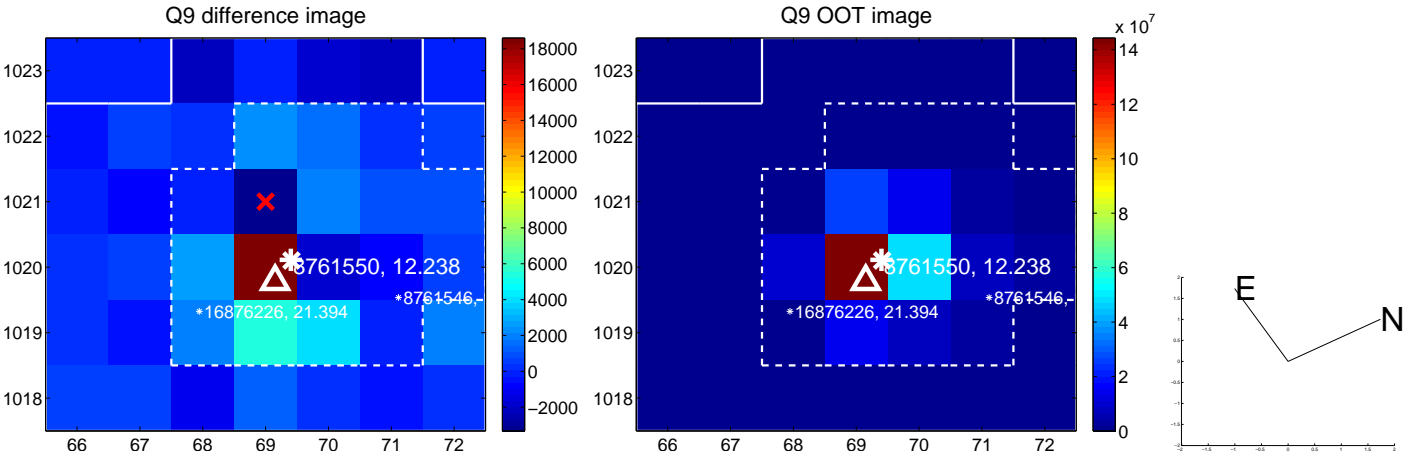
Q8 no difference image



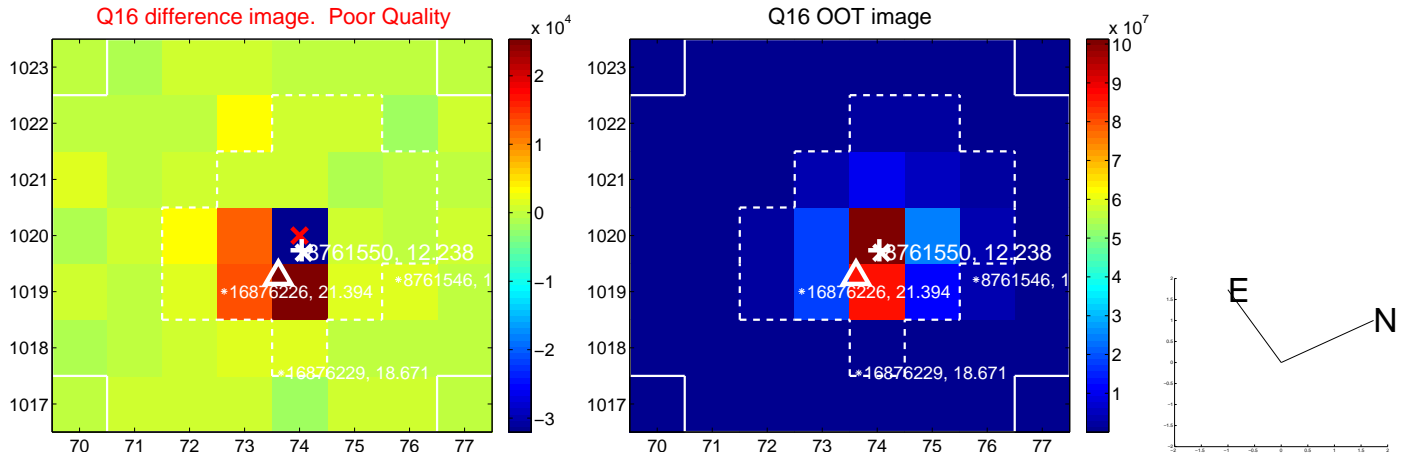
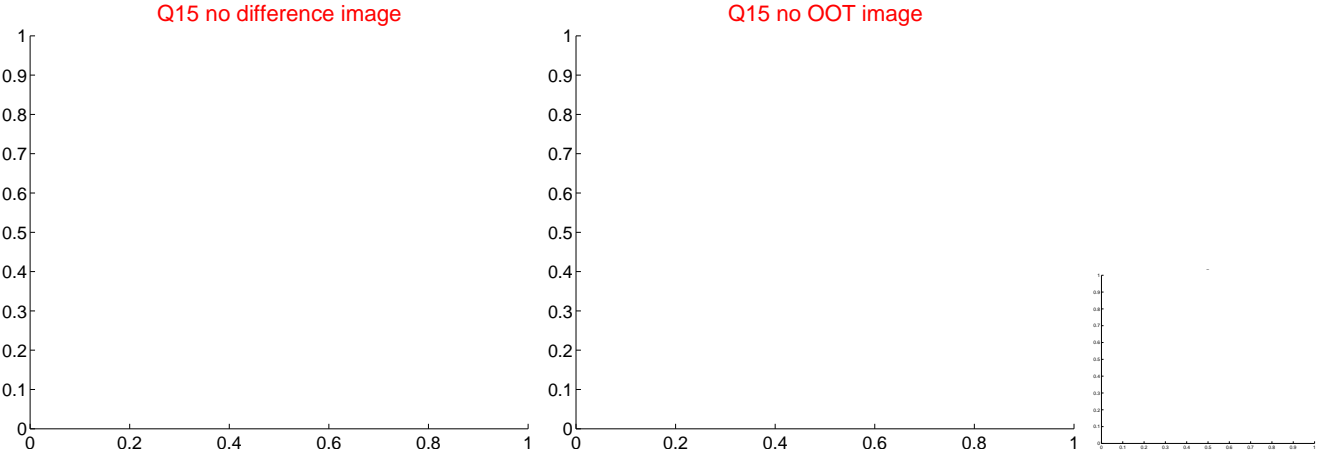
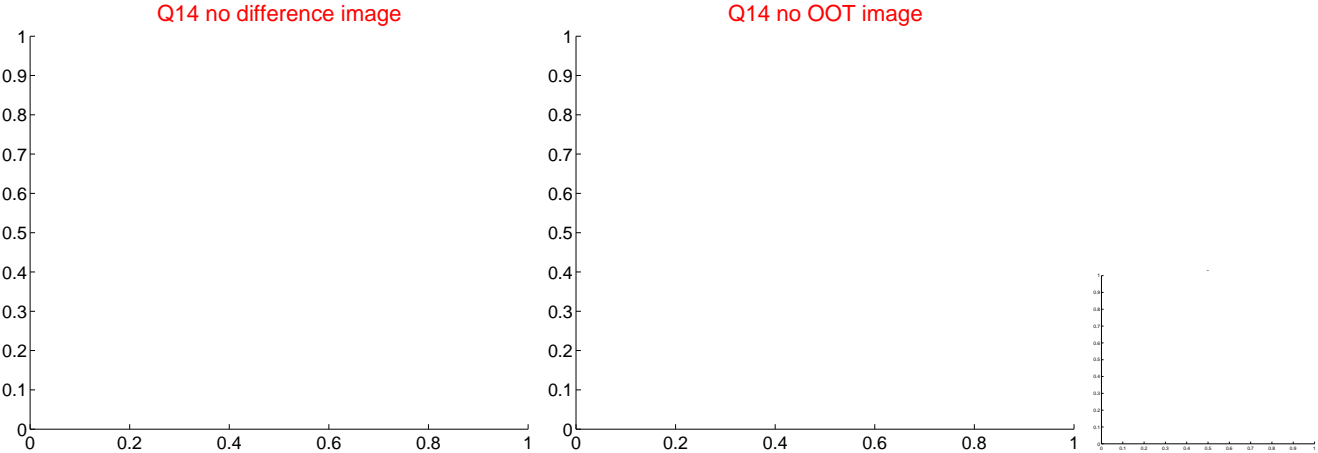
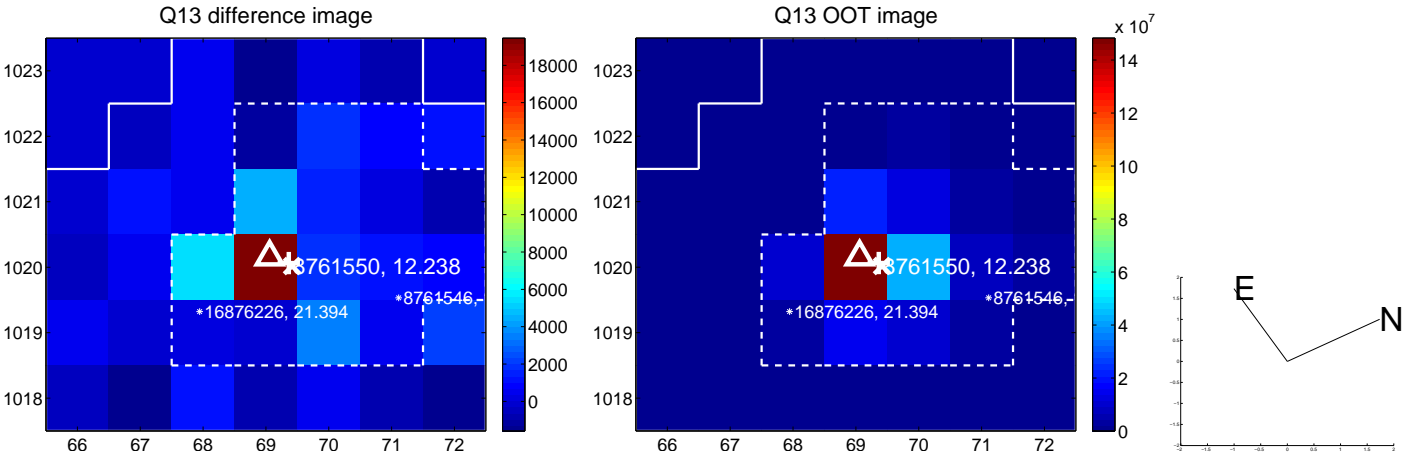
Q8 no OOT image



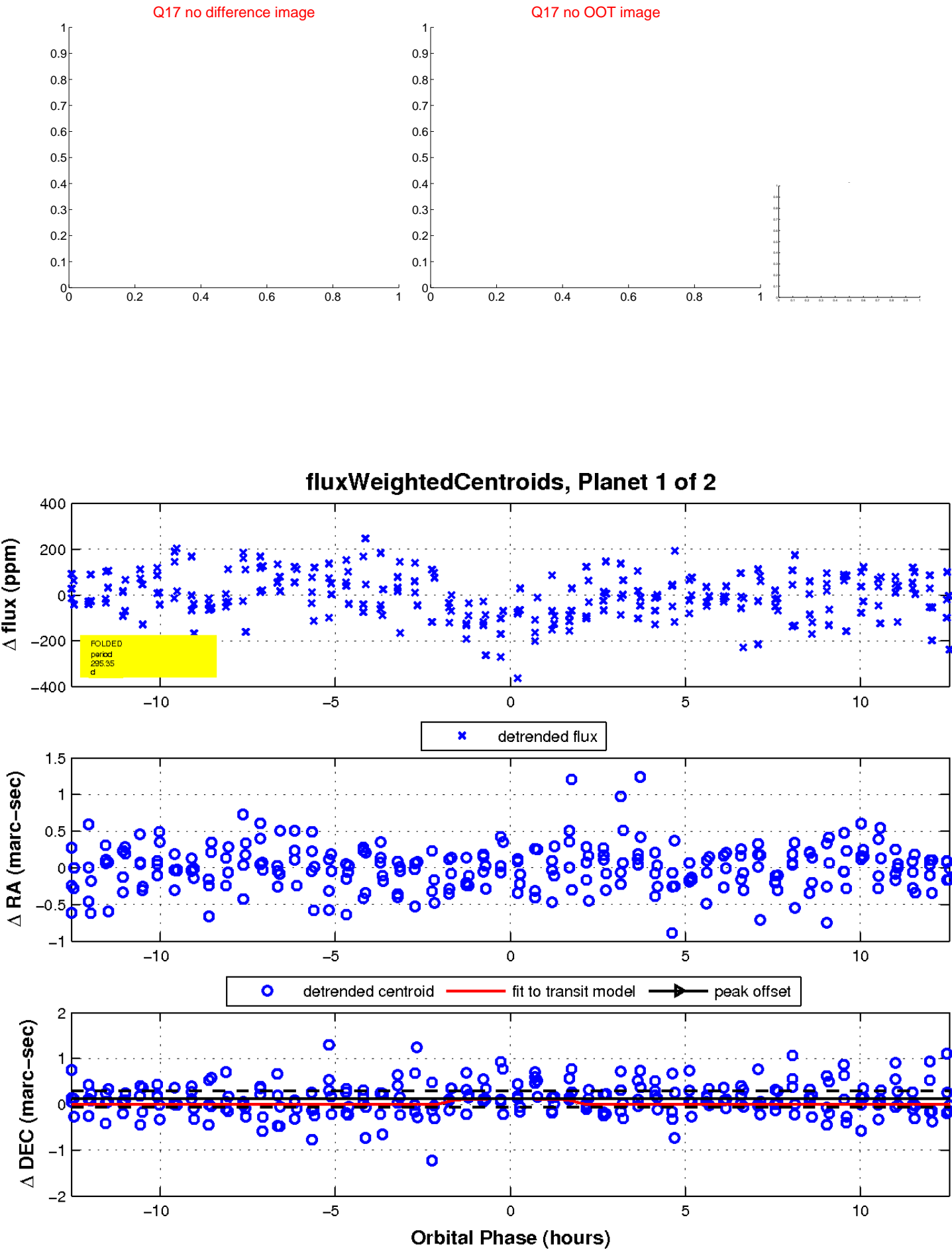
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

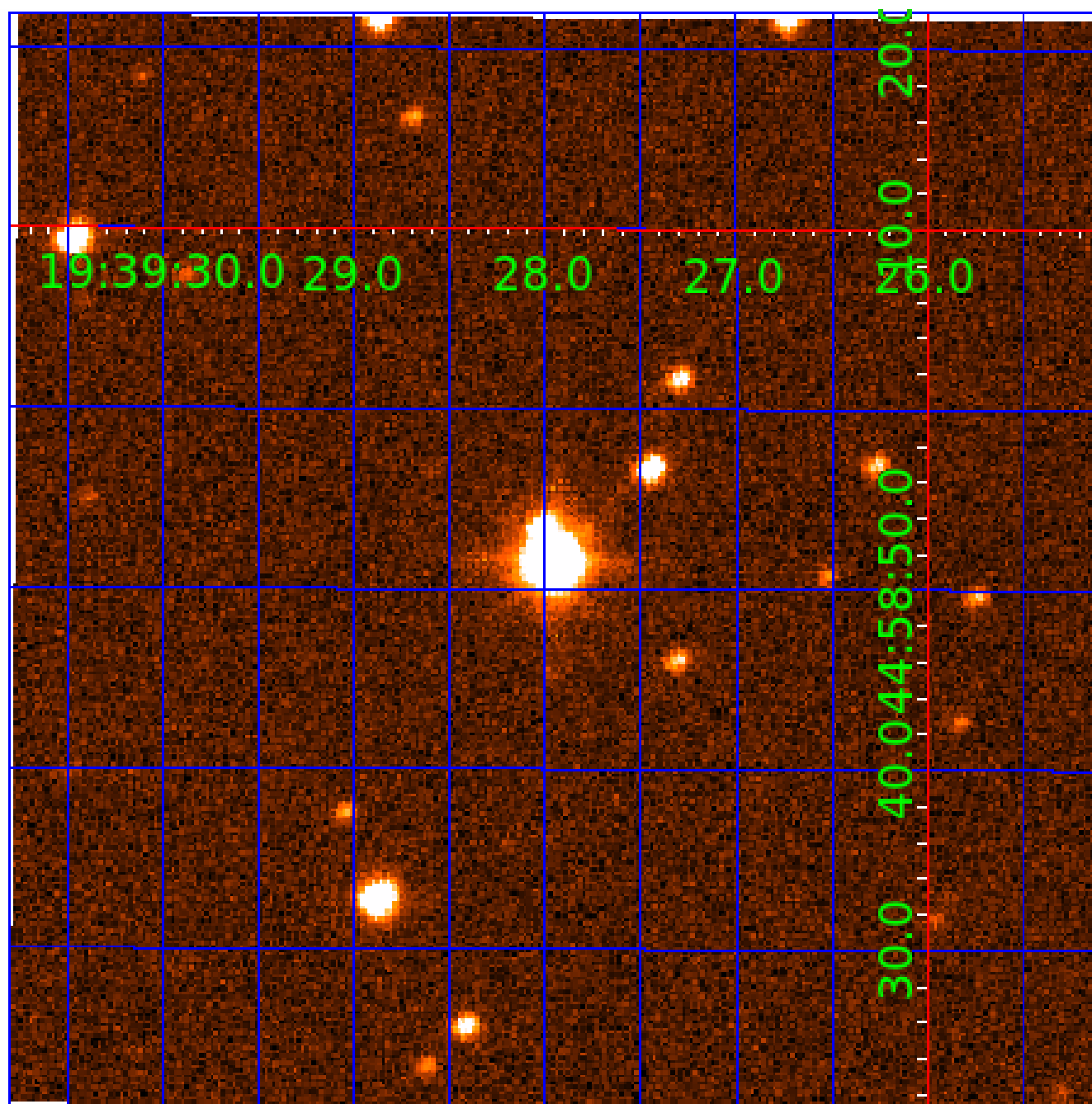


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 008761550

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008761550-01	OBS	No	295.346694	312.116742	146.5	4.239	7.3	7.9	1.77	5786	2.71	3.87
008761550-02	OBS	7912.01	224.594455	208.785034	124.3	3.544	7.2	7.8	1.77	5786	2.27	5.57

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008761550-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—ALL_TRANS_CHASES
008761550-02	OBS	FP	0.01	1	0	0	0	INDIV_TRANS_SKYE—MOD_NONUNIQ_ALT

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

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

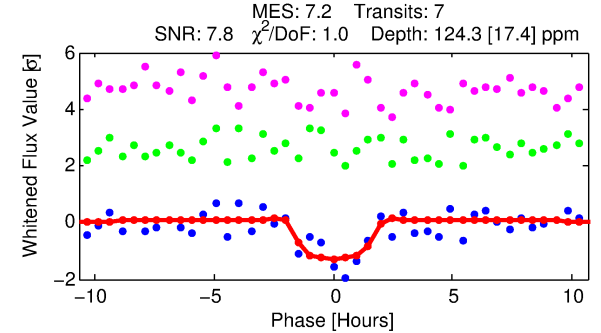
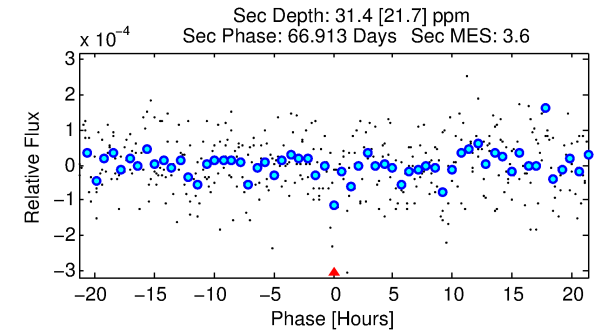
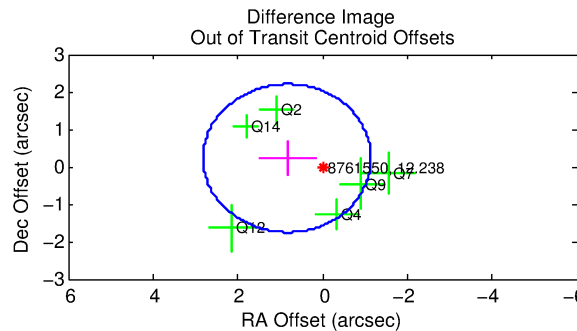
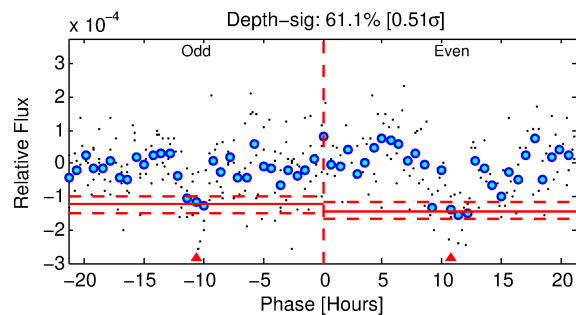
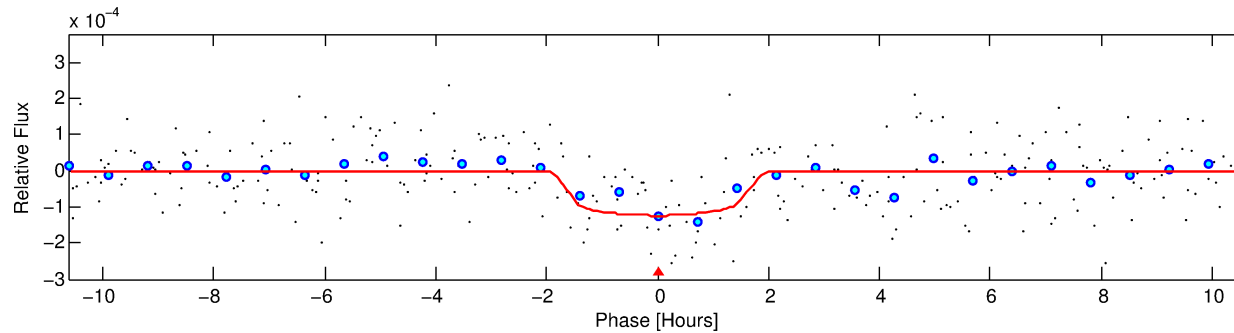
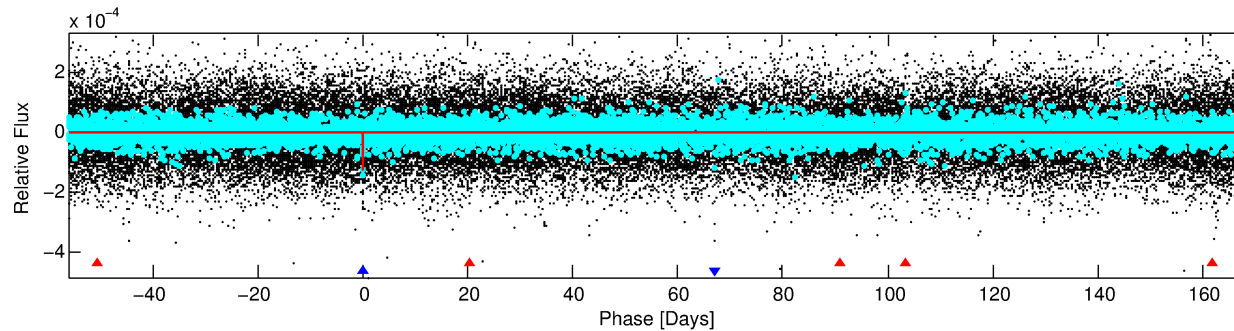
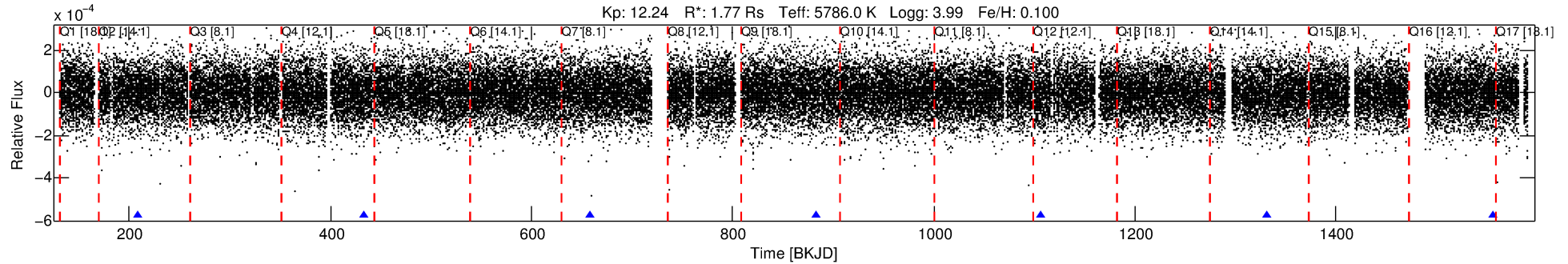
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008761550-02

No Significant Match Found

# DV One-Page Summary

KIC: 8761550 Candidate: 2 of 2 Period: 224.594 d



## DV Fit Results:

Period = 224.59445 [0.00263] d  
Epoch = 208.7850 [0.0095] BKJD  
Rp/R\* = 0.0117 [0.0157]  
a/R\* = 260.17 [1619.16]  
b = 0.86 [1.96]  
Seff = 5.57 [2.77]  
Teq = 392 [49] K  
Rp = 2.27 [3.11] Re  
a = 0.7518 [0.2278] AU  
Ag = 1901.02 [5329.88] [0.36 $\sigma$ ]  
Teffp = 4000 [2763] K [1.31 $\sigma$ ]

## DV Diagnostic Results:

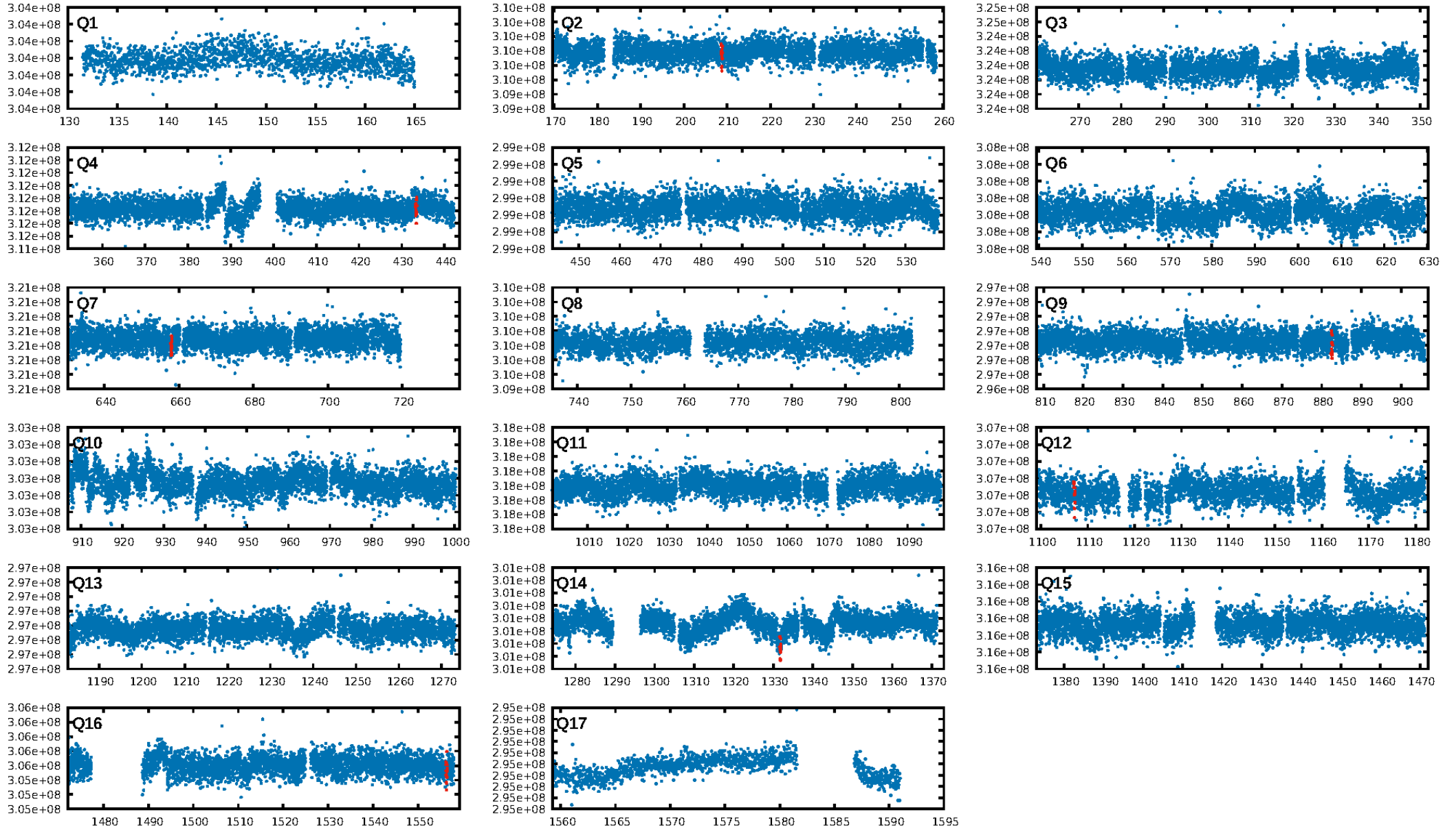
ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [307.35 $\sigma$ ]  
ModelChiSquare2-sig: 80.4%  
ModelChiSquareGof-sig: 95.0%  
**Bootstrap-pfa: 2.96e-12**  
RollingBand-fgt: 1.00 [7/7]  
GhostDiagnostic-chr: -5.183  
Centroid-sig: N/A  
Centroid-so: 1.697 arcsec [1.40 $\sigma$ ]  
OotOffset-rm: 0.865 arcsec [1.31 $\sigma$ ]  
KicOffset-rm: 0.996 arcsec [1.58 $\sigma$ ]  
OotOffset-st: 2/1/2/1 [6]  
KicOffset-st: 2/1/2/1 [6]  
DiffImageQuality-fgm: 1.00 [6/6]  
DiffImageOverlap-fno: 1.00 [7/7]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 18:47:23 Z

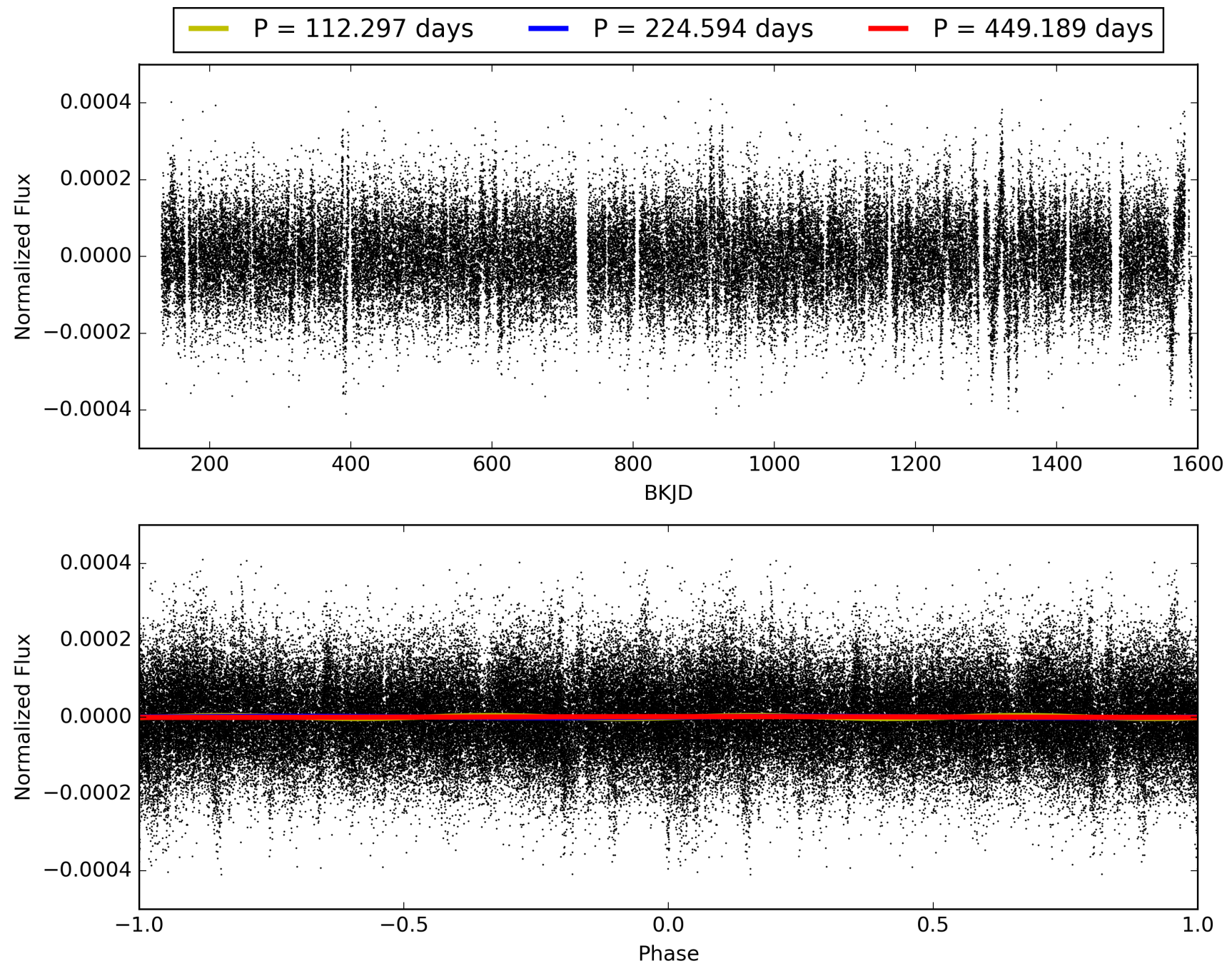
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 008761550-02, PDC Light Curves

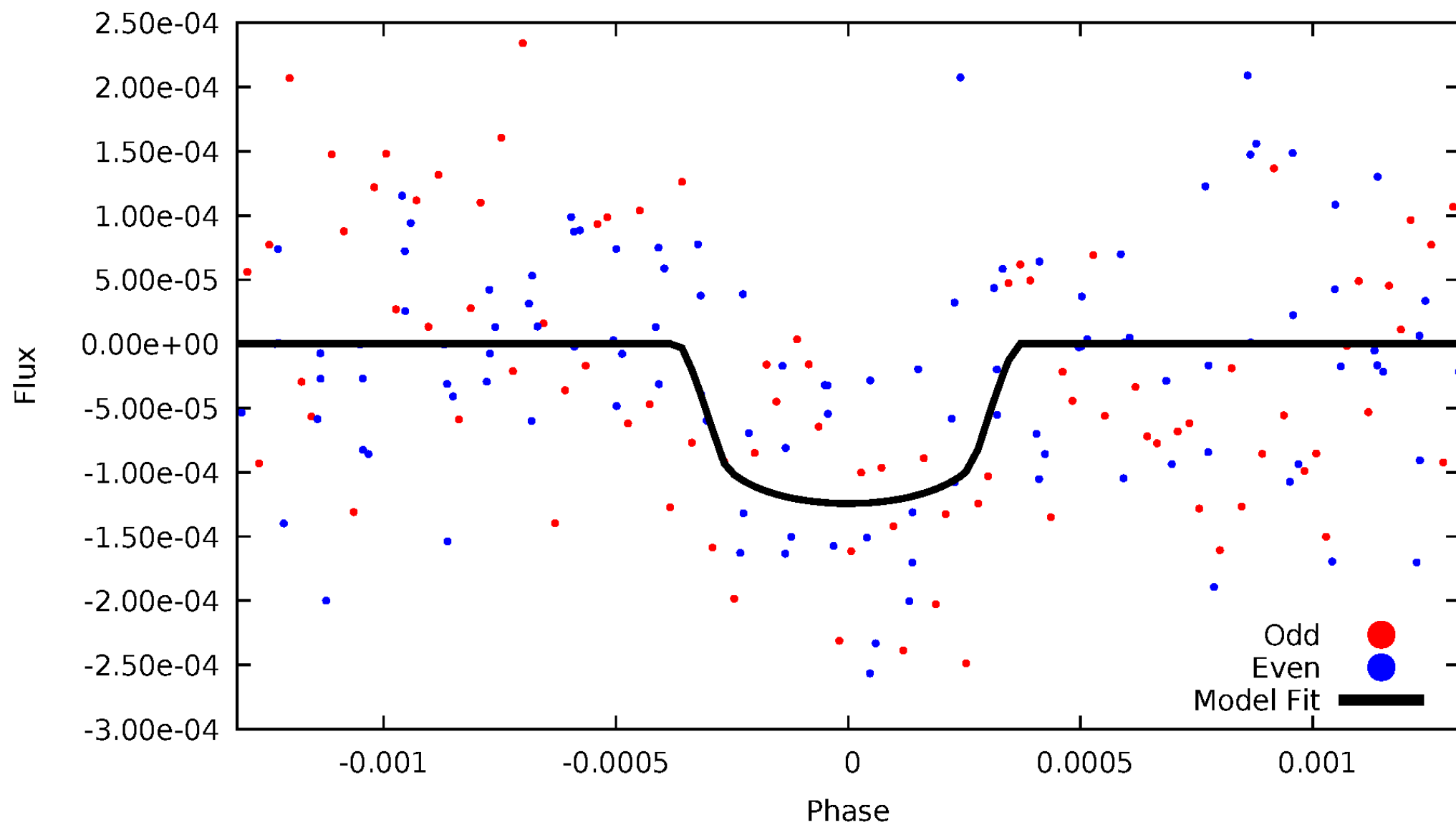


TCE 008761550-02



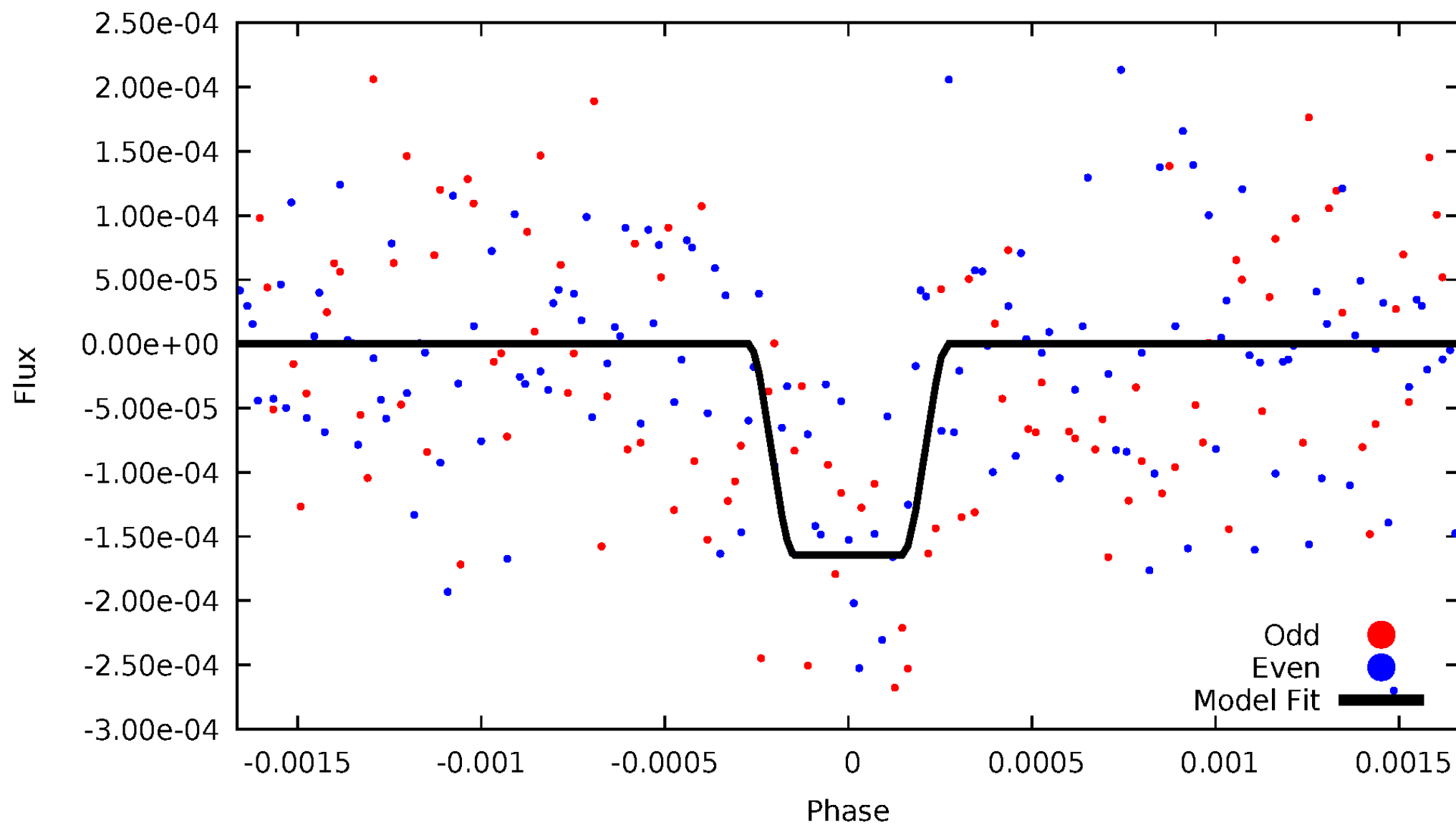
# DV Odd/Even

TCE 008761550-02



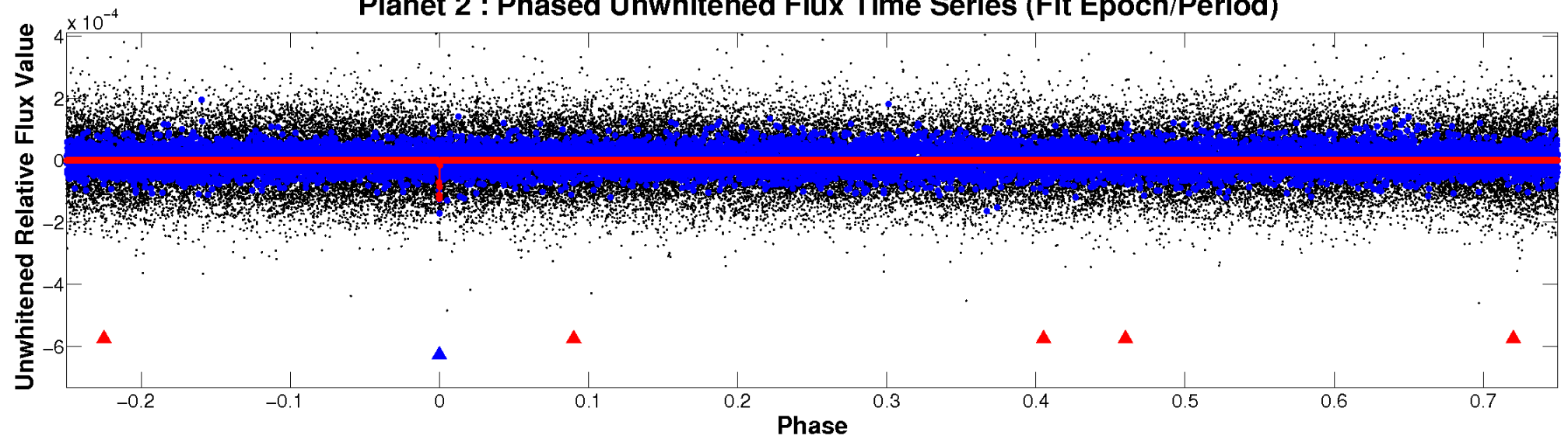
# ALT Odd/Even

TCE 008761550-02

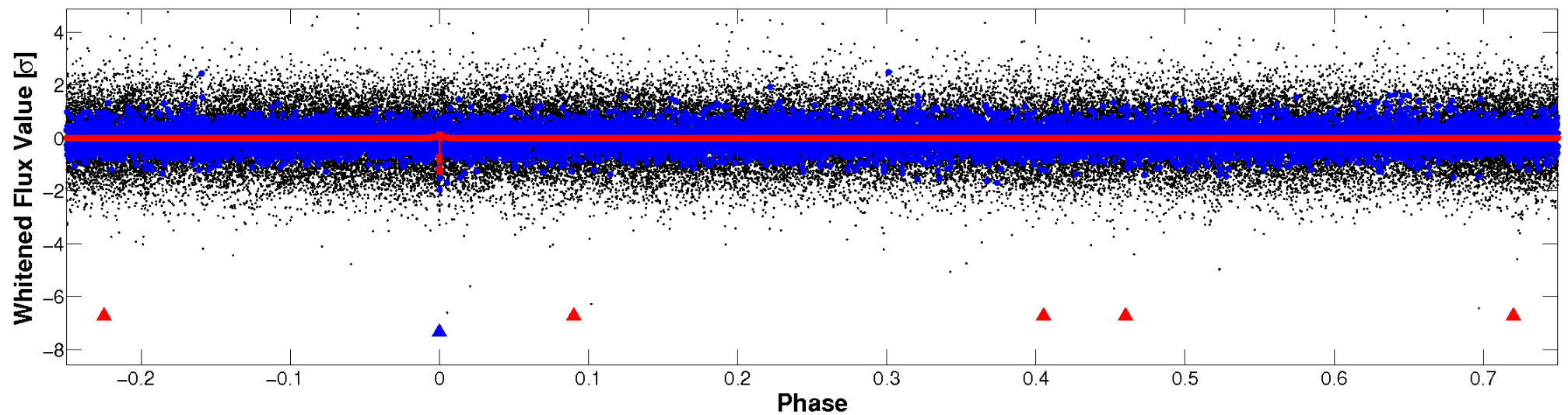


# Non-Whitened Vs. Whitened Light Curve

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

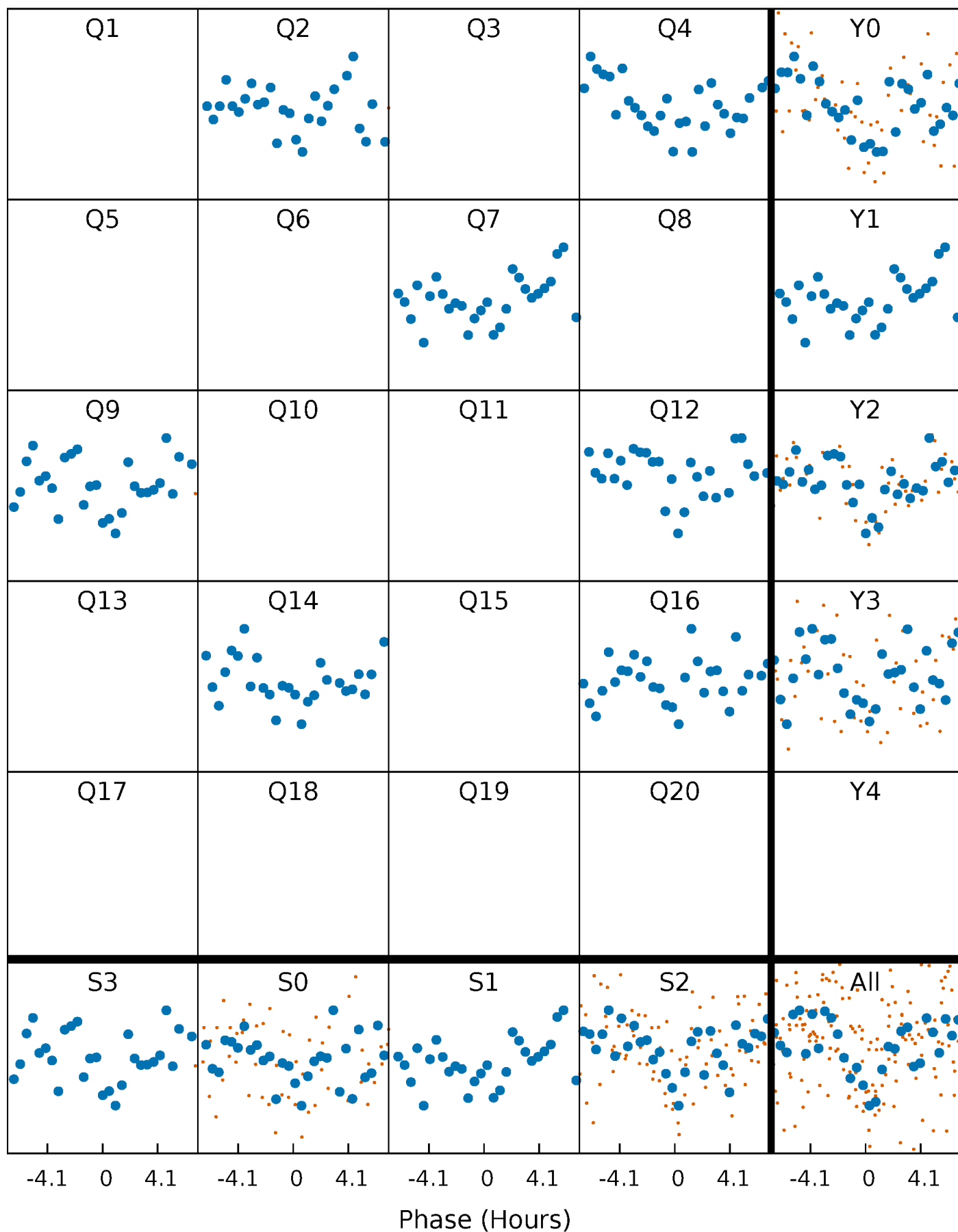


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



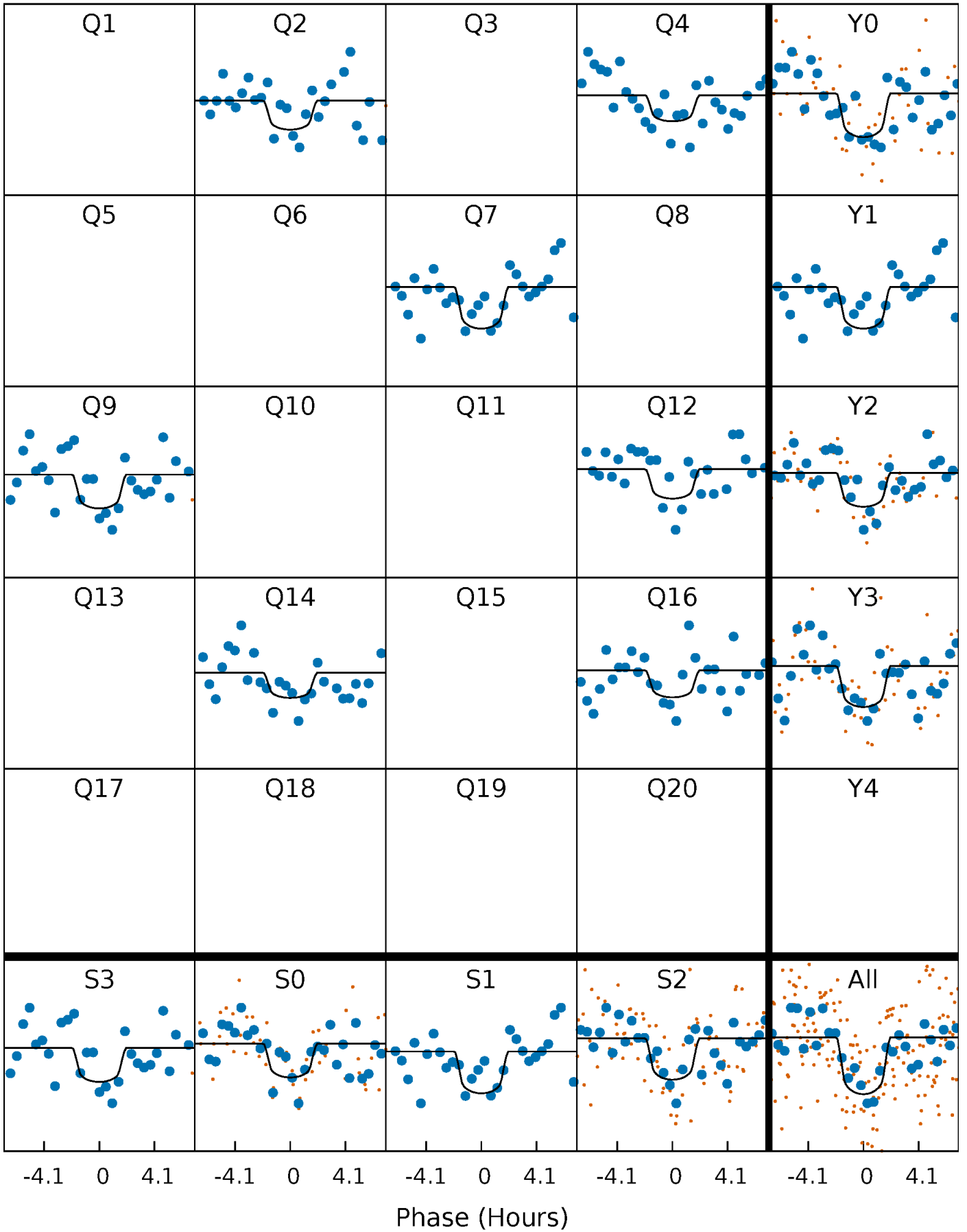
# PDC Quarter-Phased Transit Curves

TCE 008761550-02 P=224.594455 Days  $T_0=208.785034$  (BKJD)



# DV Quarter-Phased Transit Curves

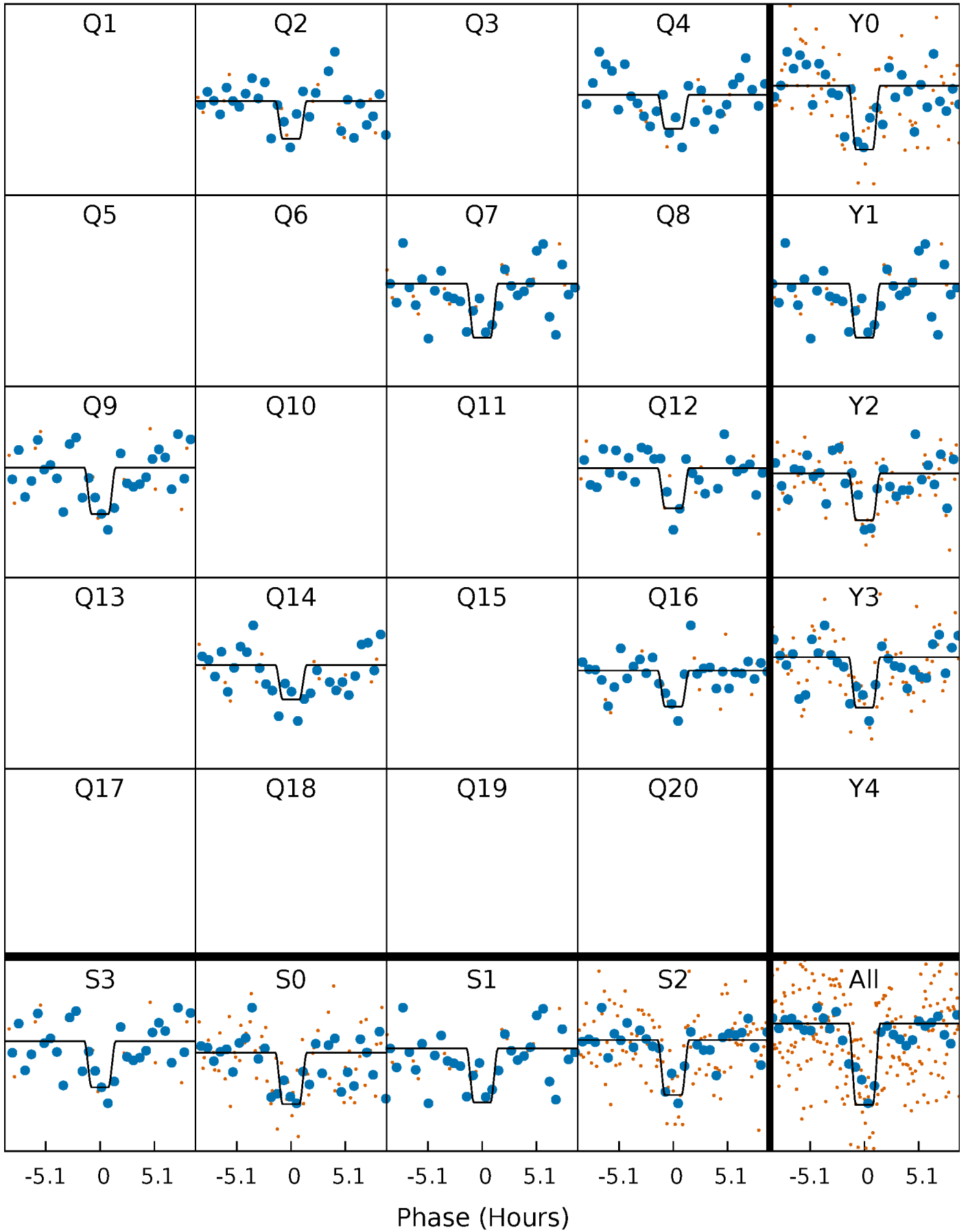
TCE 008761550-02     $P=224.594455$  Days     $T_0=208.785034$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

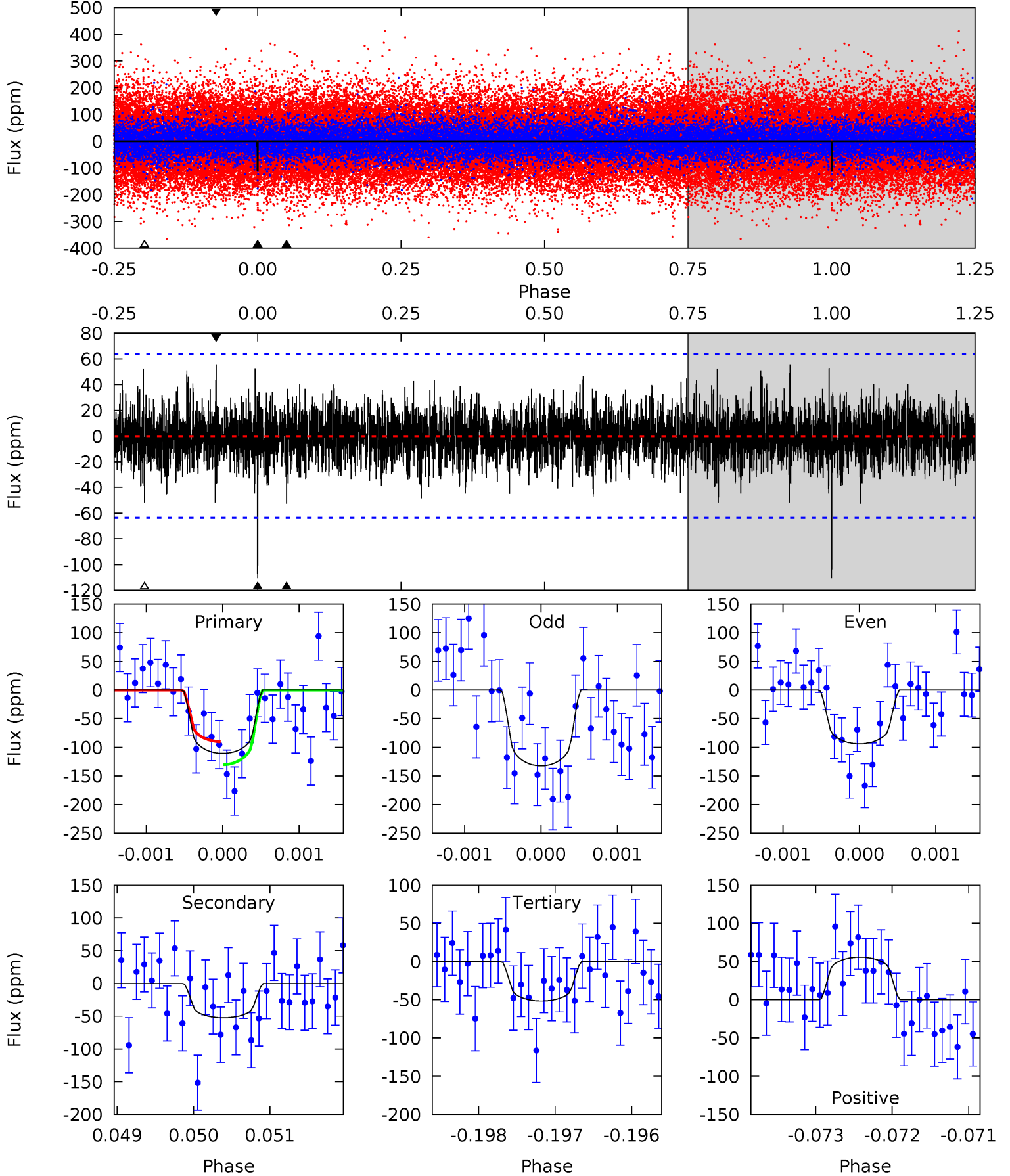
TCE 008761550-02 P=224.588868 Days  $T_0=208.811149$  (BKJD)



# DV Model-Shift Uniqueness Test

008761550-02, P = 224.594455 Days, E = 208.785034 Days

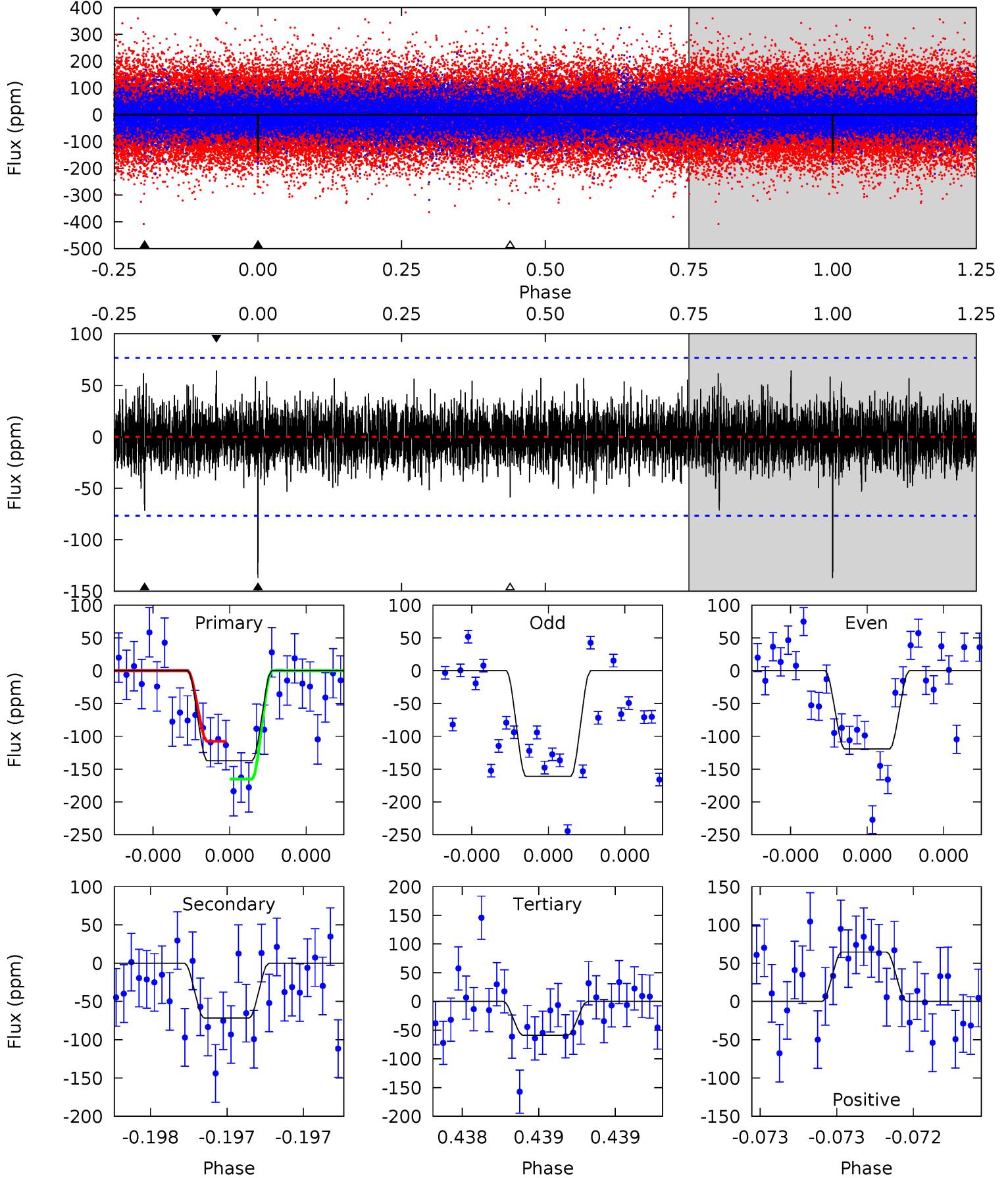
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.58	4.54	4.47	4.83	5.51	3.39	1.24	5.11	4.75	0.08	-0.28	1.64	1.11	0.34	1.73



# Alt Model-Shift Uniqueness Test

008761550-02, P = 224.588868 Days, E = 208.811149 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
9.96	5.20	4.27	4.69	5.57	3.48	1.20	5.69	5.28	0.93	0.51	1.52	0.99	0.32	2.09



### Stellar Parameters For KIC 008761550

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5786^{+157}_{-157}$	$3.992^{+0.285}_{-0.095}$	$0.100^{+0.250}_{-0.250}$	$1.771^{+0.300}_{-0.557}$	$1.124^{+0.163}_{-0.163}$	$0.285^{+0.491}_{-0.101}$
	+3%/-3%	+7%/-2%	+250%/-250%	+17%/-31%	+15%/-15%	+172%/-35%
Source	PHO1	FLK73	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 008761550-02 / KOI 7912.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-52 \pm 12$	$2.87^{+2.58}_{-1.95}$	$539^{+33}_{-46}$	$4176^{+2715}_{-793}$	$1999^{+17055}_{-1452}$
Alt.	$-72 \pm 14$	$3.16^{+2.43}_{-2.07}$	$538^{+35}_{-40}$	$4276^{+2587}_{-751}$	$2345^{+17535}_{-1625}$

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

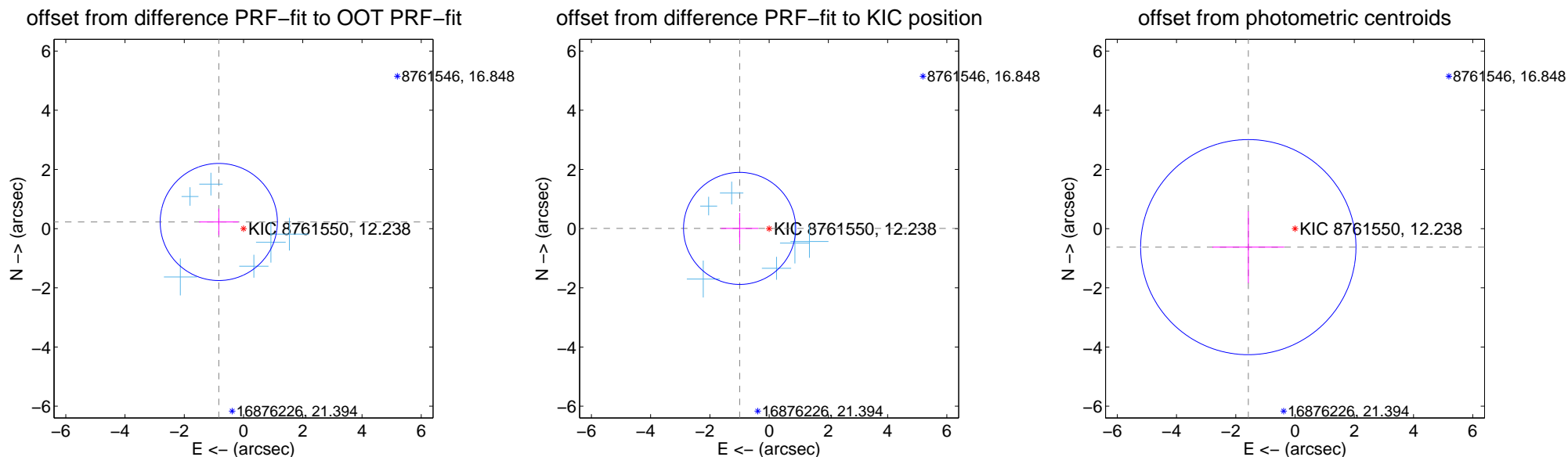
## DV Centroid Data

Supplemental centroid analysis for 008761550-02. Kepler magnitude: 12.24. Transit SNR 7.77

There are 6 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.40 arcsec

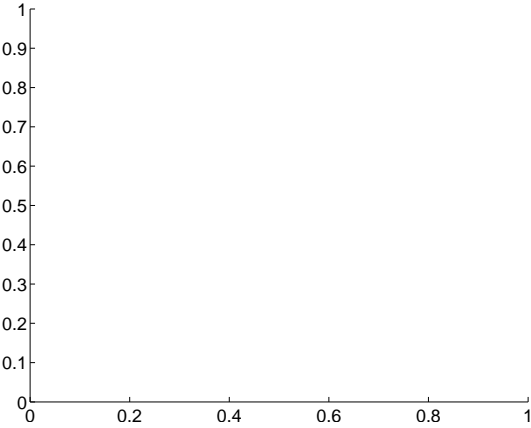
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.865 \pm 0.659$	1.31	$0.835 \pm 0.665$	$0.225 \pm 0.448$
PRF-fit source offset from KIC position	$0.996 \pm 0.631$	1.58	$0.996 \pm 0.631$	$0.008 \pm 0.523$
photometric centroid source offset	$1.70 \pm 1.21$	1.40	$1.58 \pm 1.21$	$-0.62 \pm 1.21$



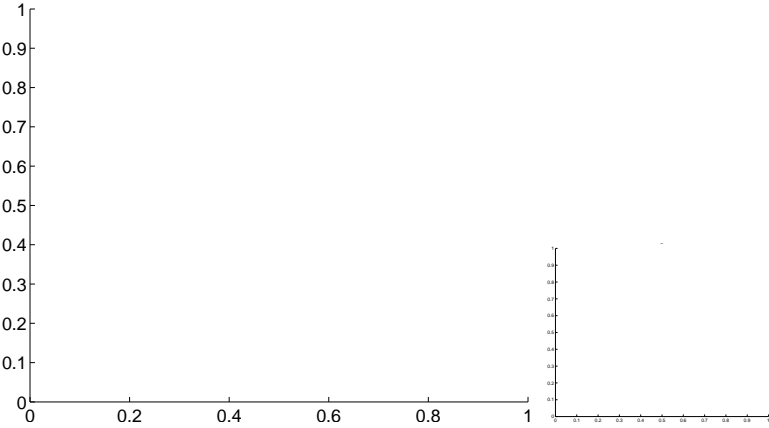
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

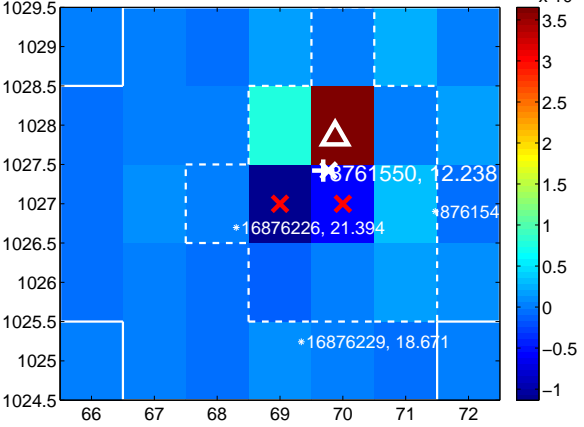
Q1 no difference image



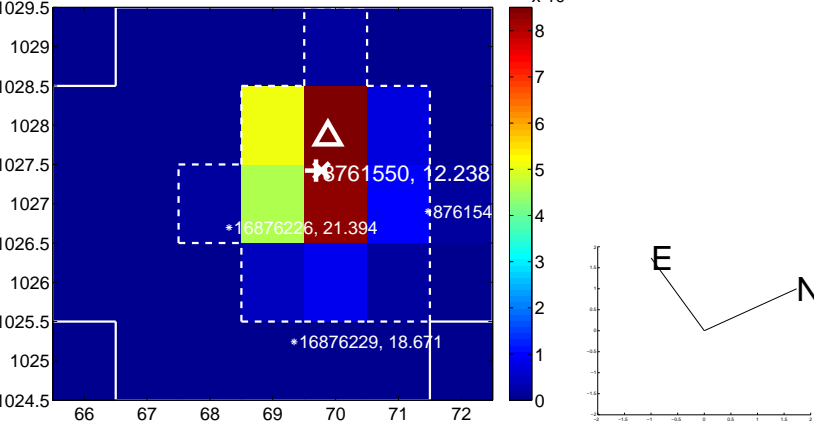
Q1 no OOT image



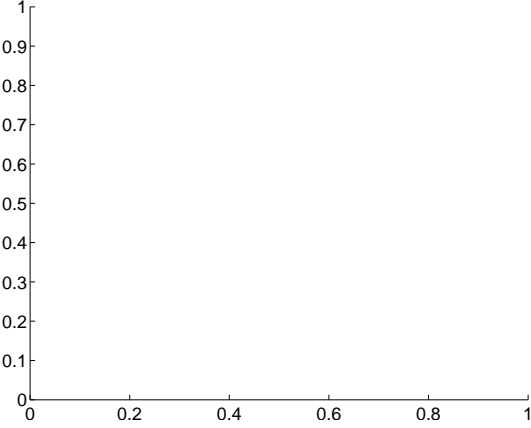
Q2 difference image



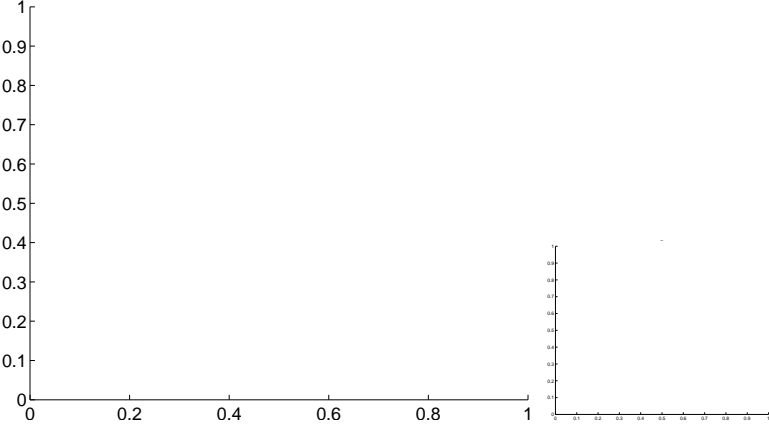
Q2 OOT image



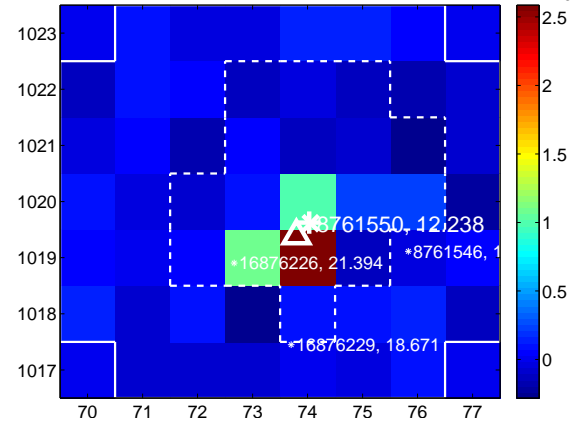
Q3 no difference image



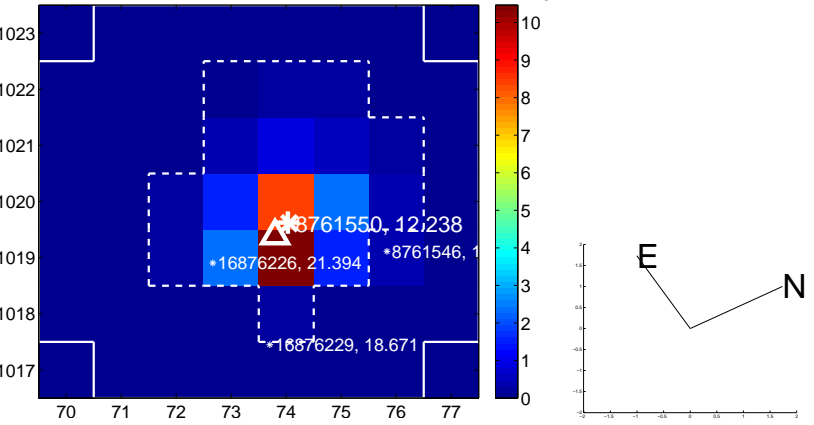
Q3 no OOT image



Q4 difference image



Q4 OOT image



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

Q5 no difference image



Q5 no OOT image



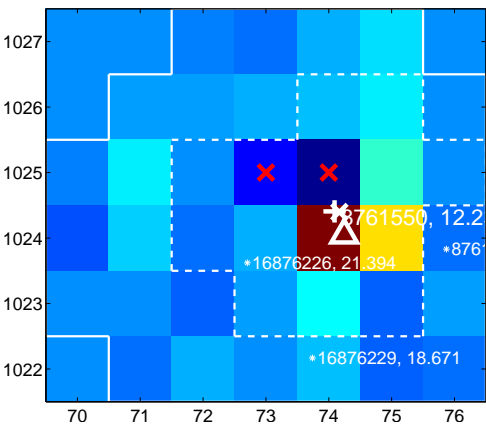
Q6 no difference image



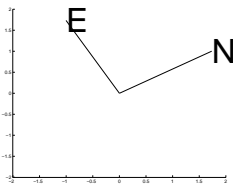
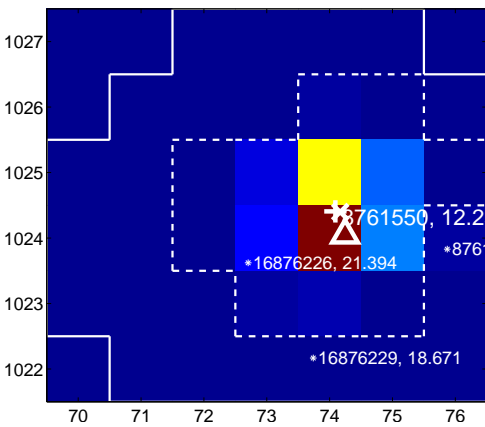
Q6 no OOT image



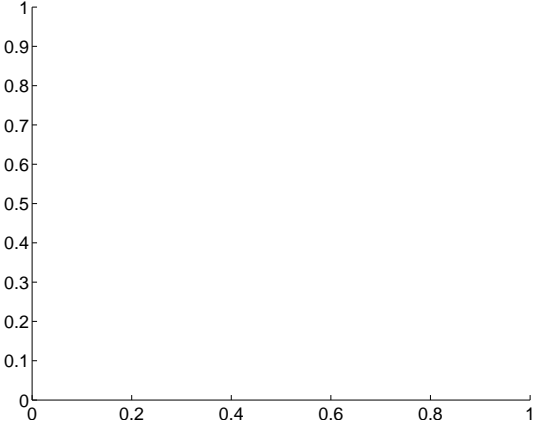
Q7 difference image



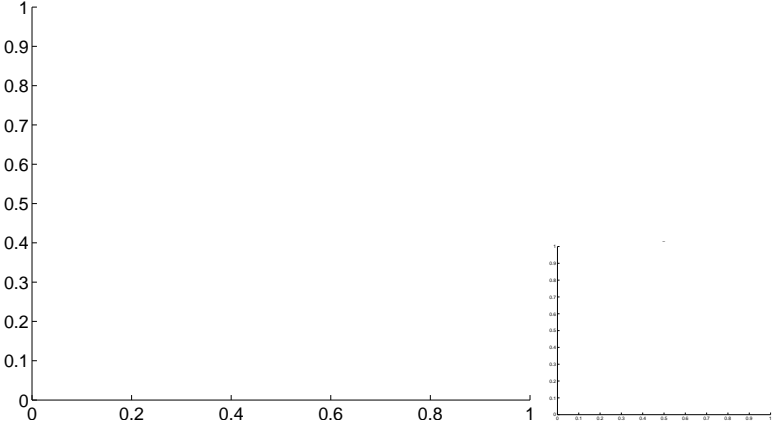
Q7 OOT image



Q8 no difference image

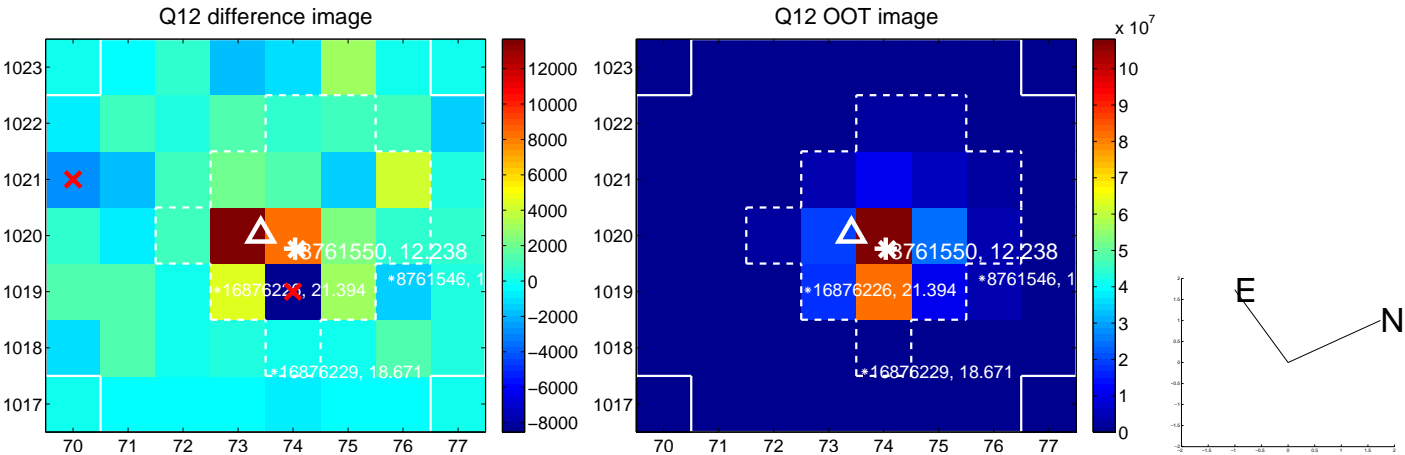
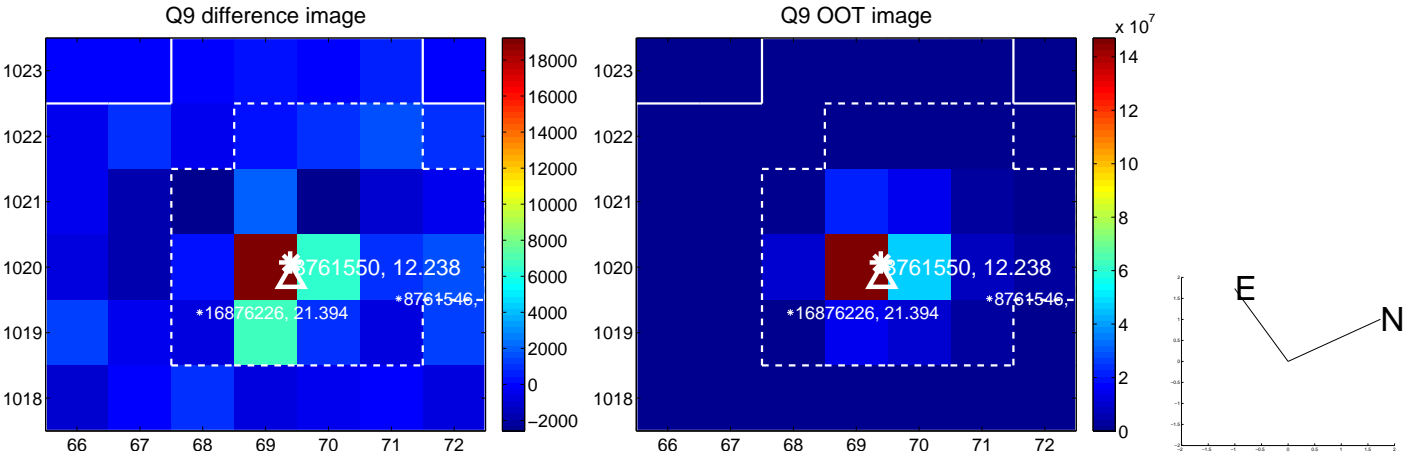


Q8 no OOT image





white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.



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

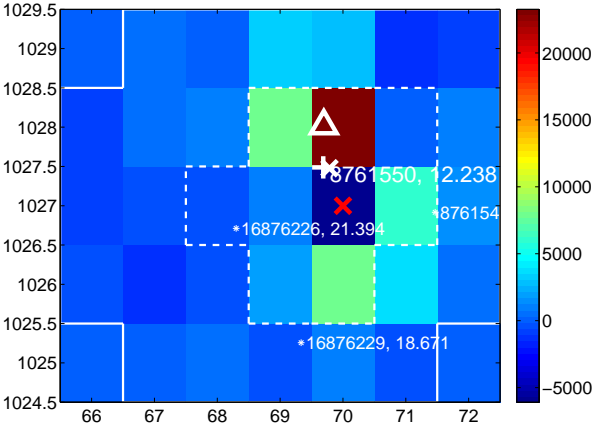
Q13 no difference image



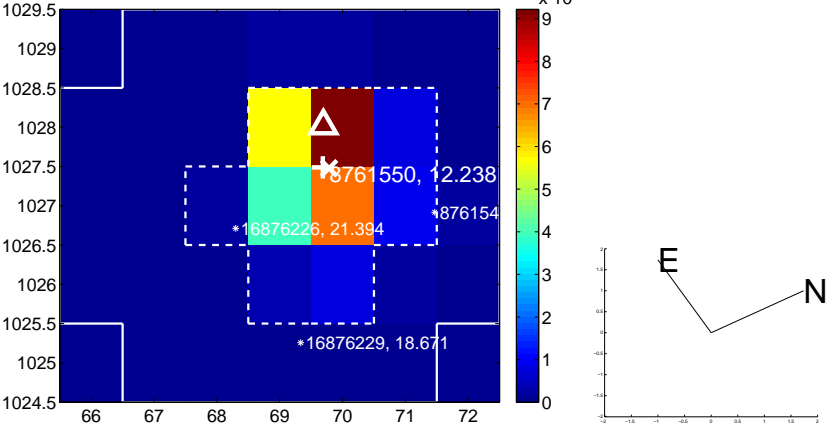
Q13 no OOT image



Q14 difference image



Q14 OOT image



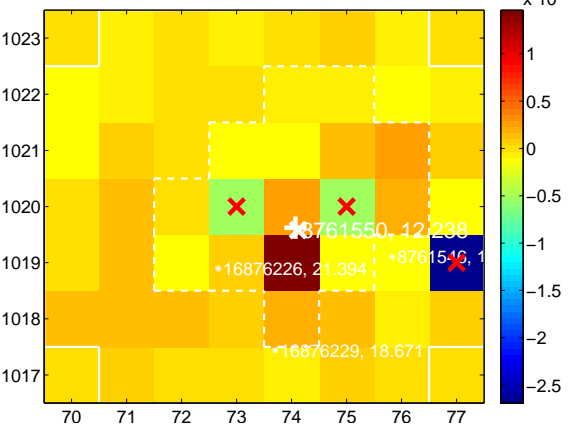
Q15 no difference image



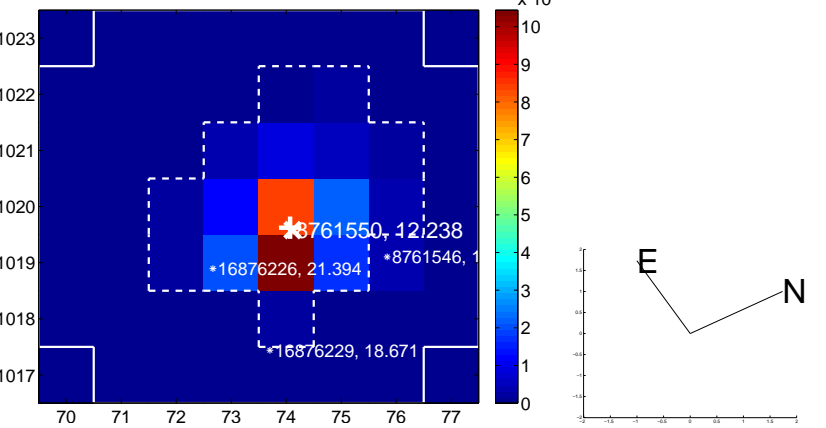
Q15 no OOT image



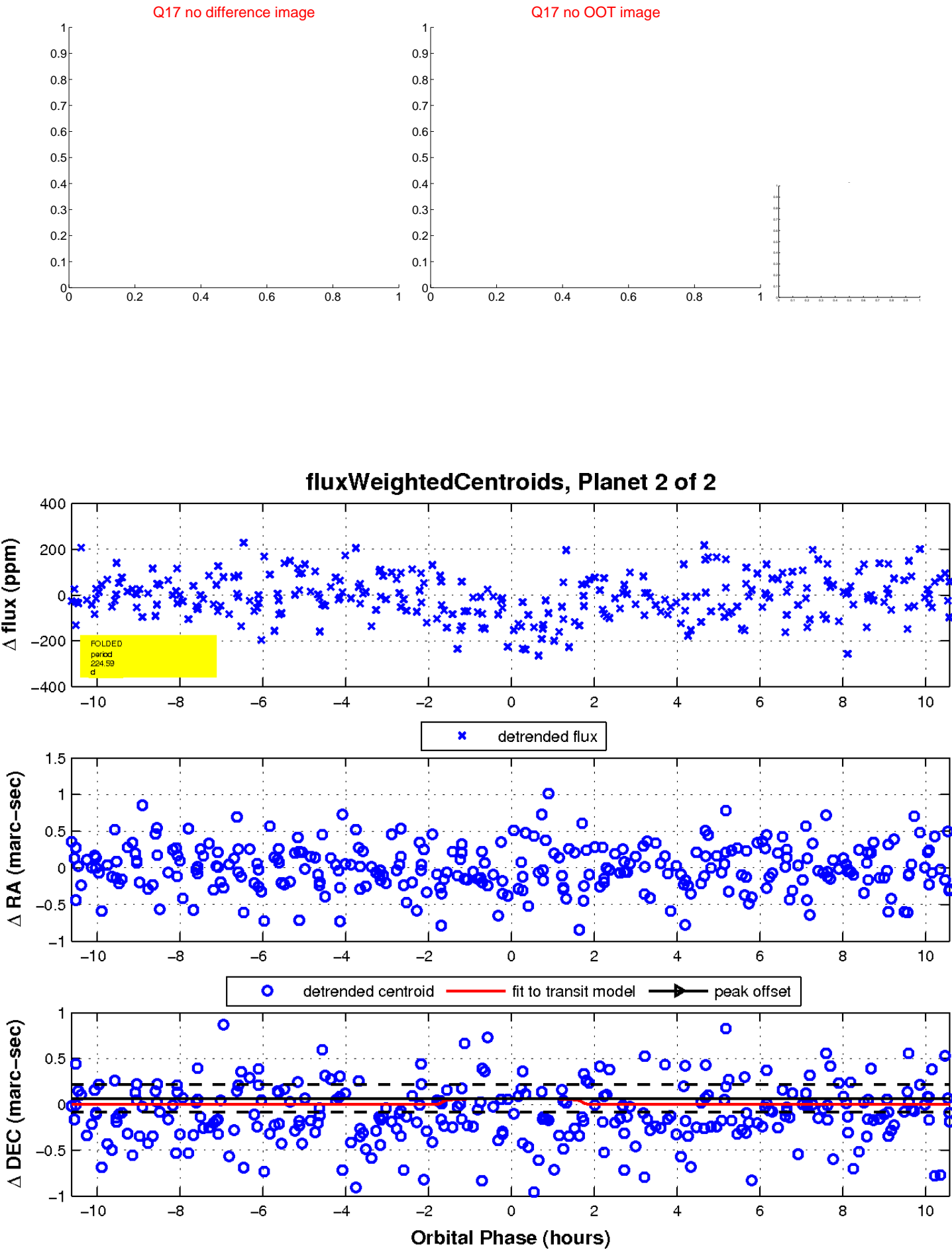
Q16 difference image. Poor Quality



Q16 OOT image



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



UKIRT Image

Declination

