

# KIC 004069213

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004069213-01	OBS	6382.01	5.194256	134.572550	38088.4	7.178	5434.6	5208.1	2.09	6100	41.34	1352.26
004069213-02	OBS	No	5.194250	131.899373	2016.9	6.791	318.7	315.2	2.09	6100	10.52	1352.26

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004069213-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE
004069213-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE

**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.

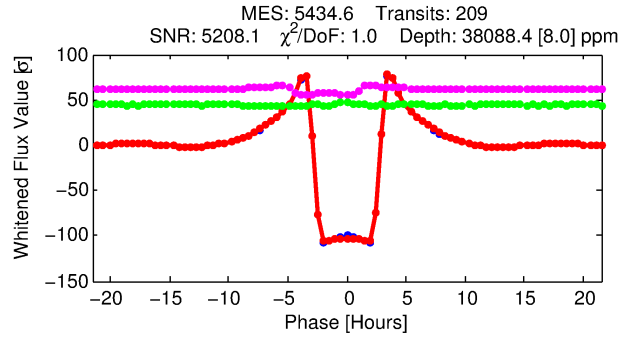
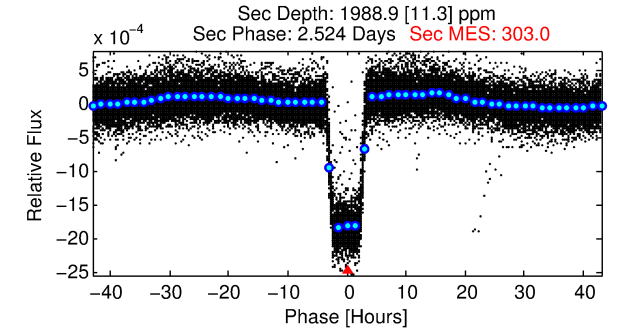
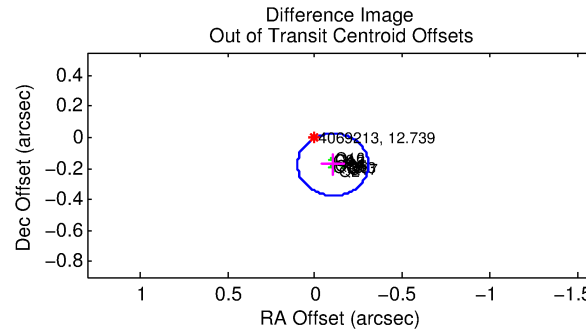
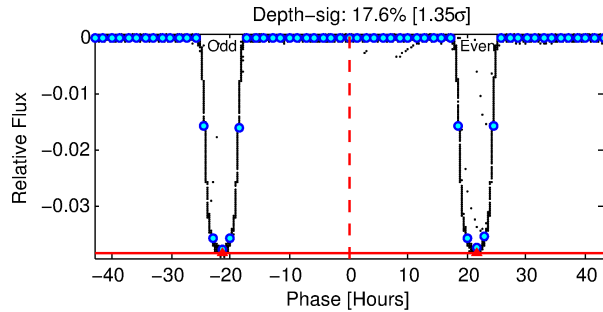
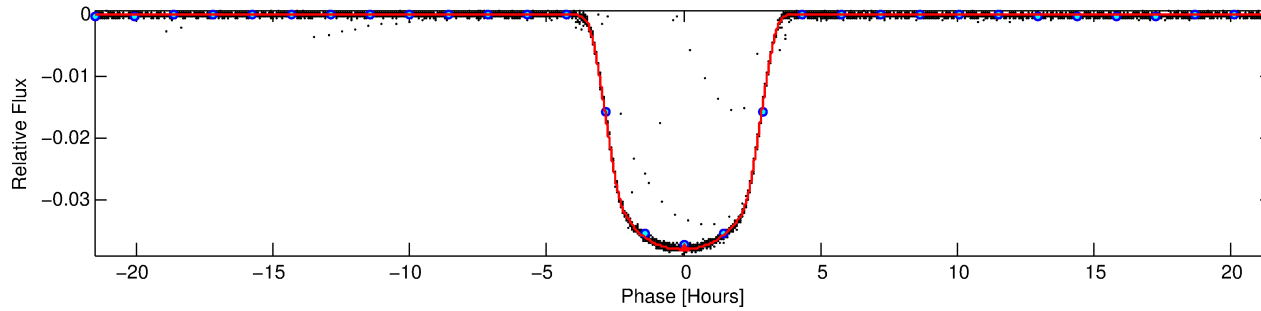
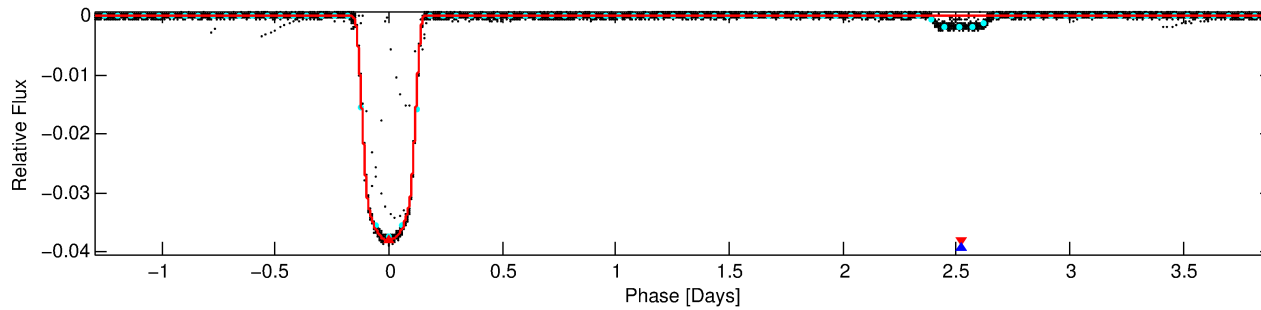
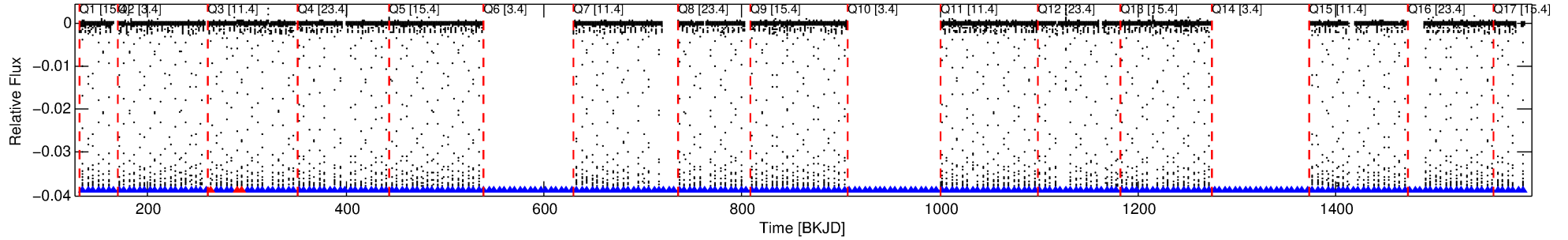
## Ephemeris Match Information For 004069213-01

No Significant Match Found

# DV One-Page Summary

KIC: 4069213 Candidate: 1 of 2 Period: 5.194 d  
KOI: K06382.01 Corr: 0.994

Kp: 12.74 R\*: 2.09 Rs Teff: 6100.0 K Logg: 3.90 Fe/H: -0.060



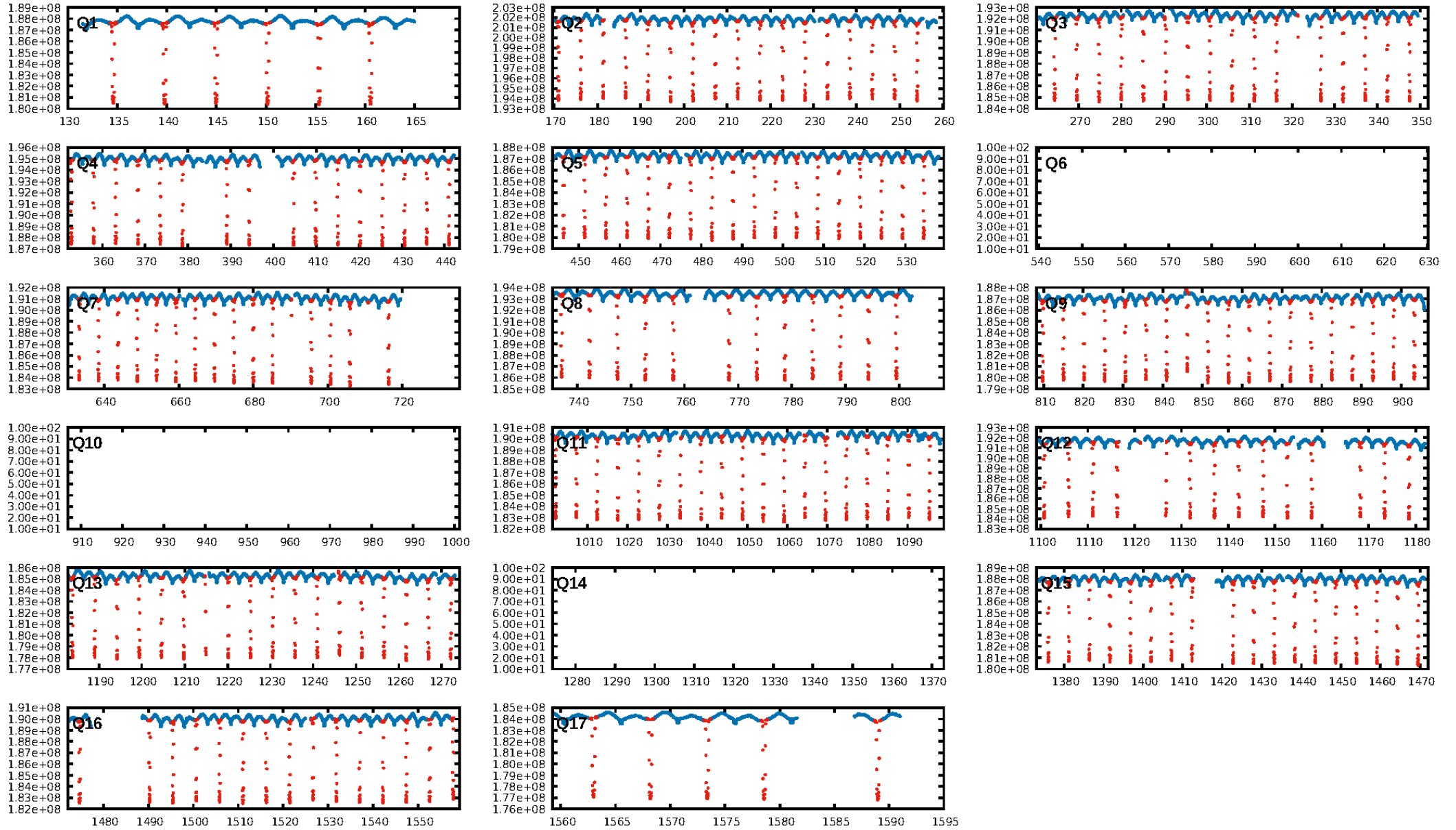
## DV Fit Results:

Period = 5.19426 [0.00000] d  
Epoch = 134.5725 [0.0000] BKJD  
Rp/R\* = 0.1816 [0.0000]  
a/R\* = 6.25 [0.00]  
b = 0.37 [0.00]  
Seff = 1352.26 [472.99]  
Teff = 1546 [135] K  
Rp = 41.34 [10.42] Re  
a = 0.0632 [0.0143] AU  
Ag = 2.56 [0.88] [1.77σ]  
Teffp = 3023 [45] K [10.35σ]

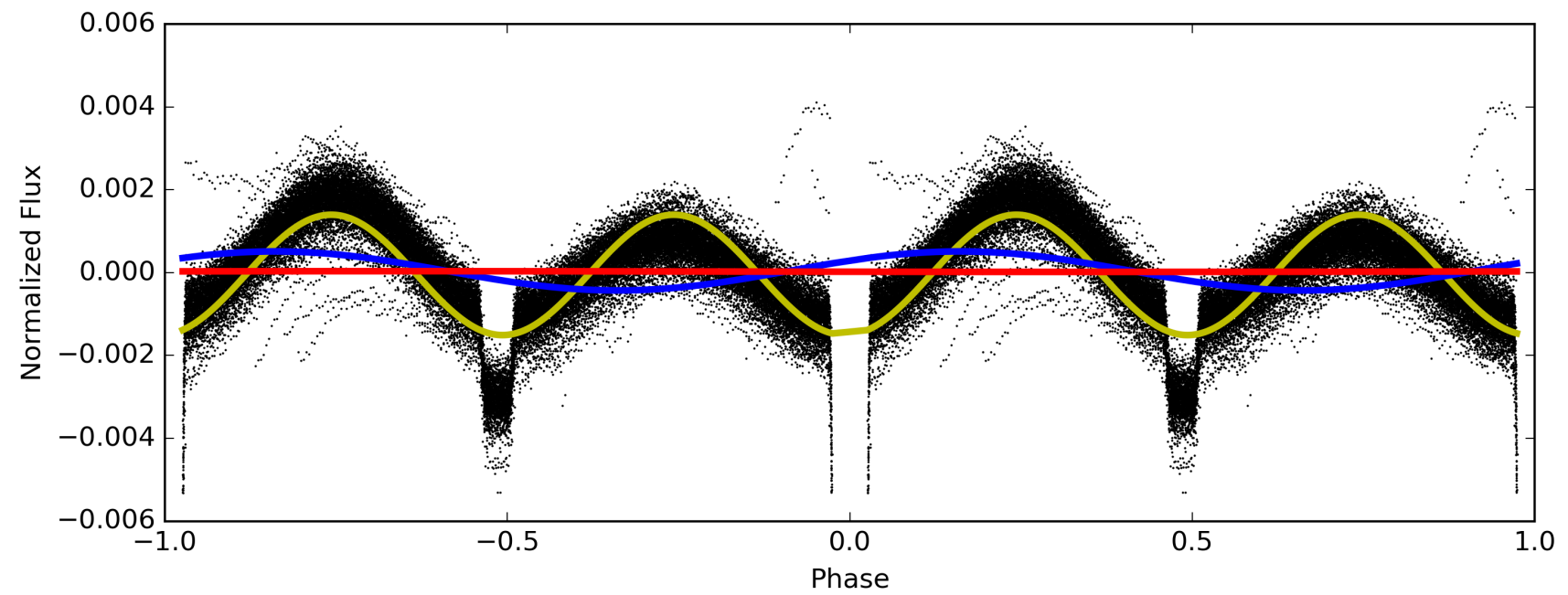
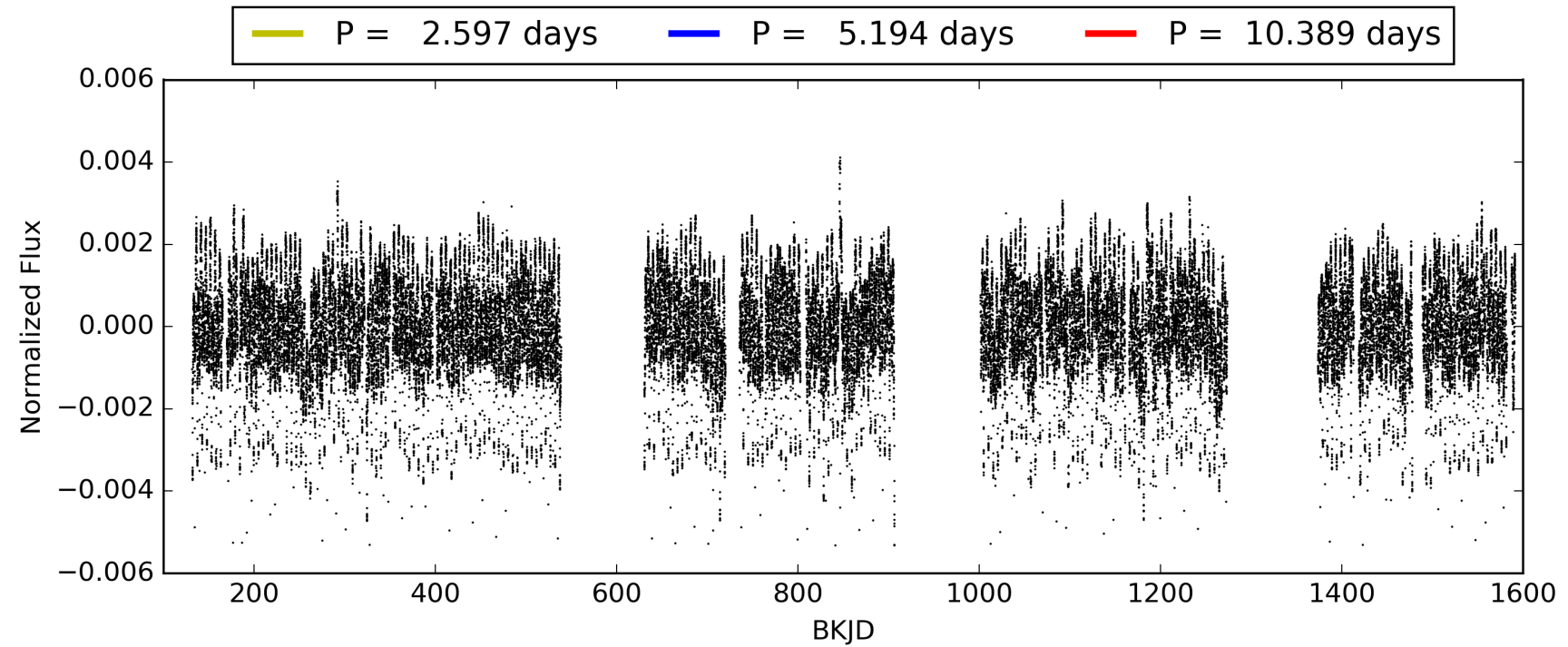
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 0.98 [195/198]  
GhostDiagnostic-chr: 3.589  
Centroid-sig: 0.0%  
Centroid-so: 0.264 arcsec [220.00σ]  
OotOffset-rm: 0.203 arcsec [3.01σ]  
KicOffset-rm: 0.114 arcsec [1.69σ]  
OotOffset-st: 1/4/4/5 [14]  
KicOffset-st: 1/4/4/5 [14]  
DiffImageQuality-fgm: 1.00 [14/14]  
DiffImageOverlap-fno: 1.00 [14/14]

# TCE 004069213-01, PDC Light Curves

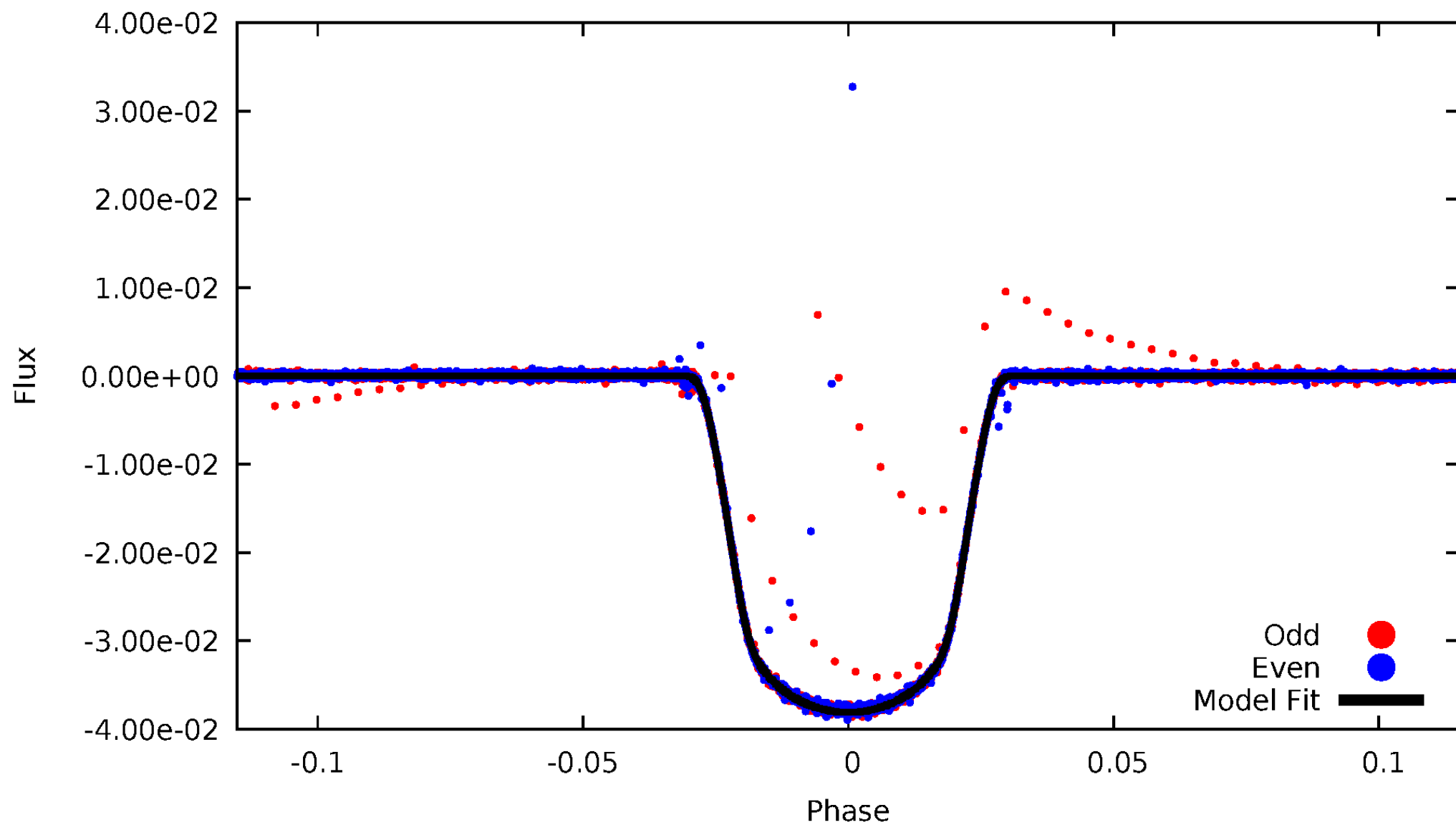


TCE 004069213-01



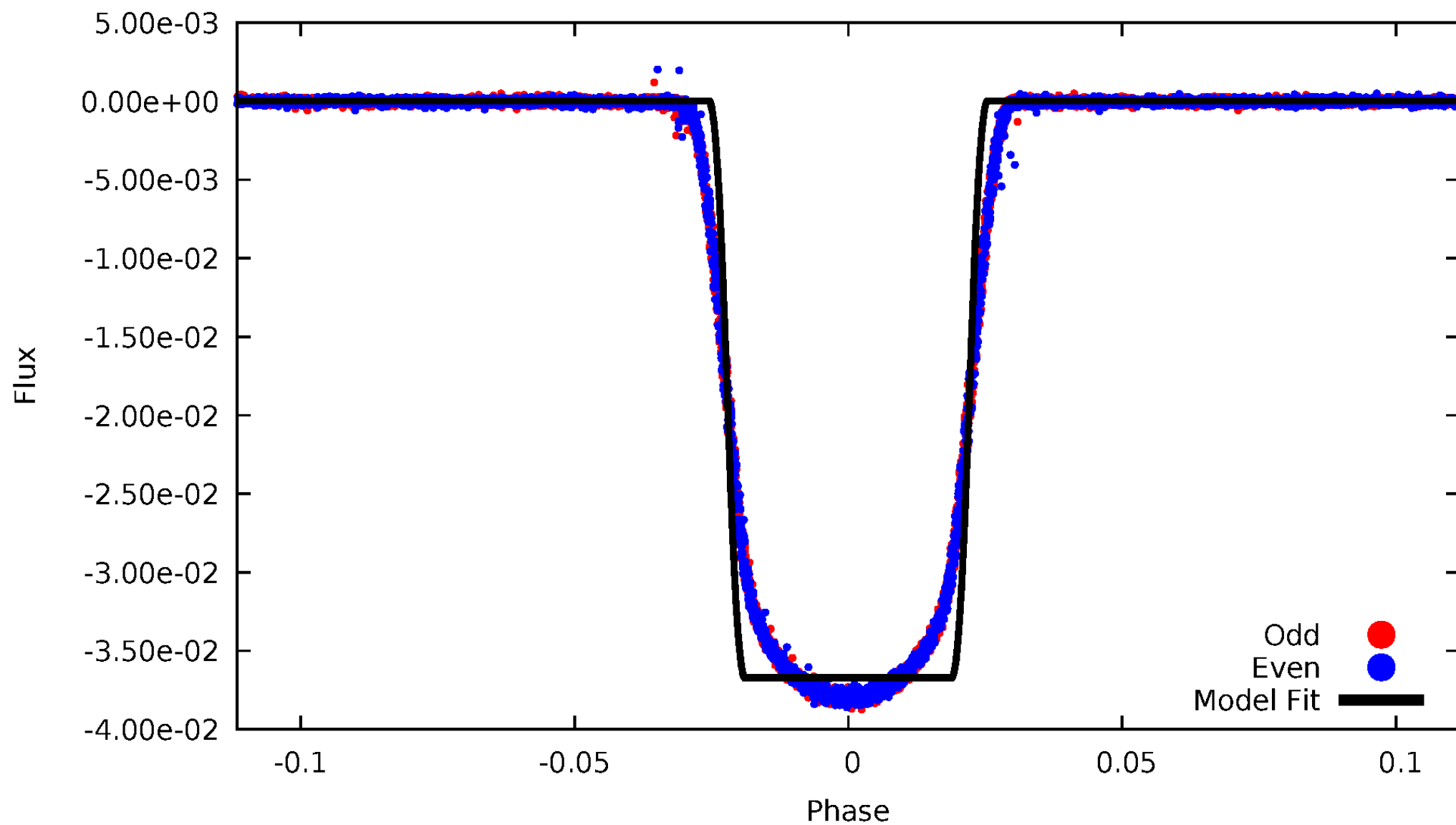
# DV Odd/Even

TCE 004069213-01



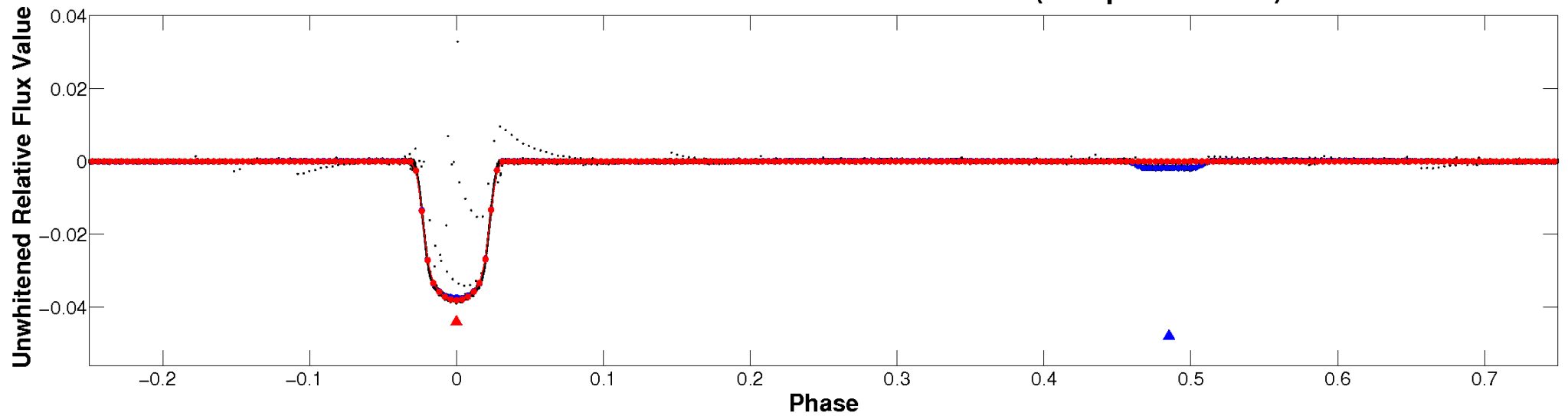
# ALT Odd/Even

TCE 004069213-01

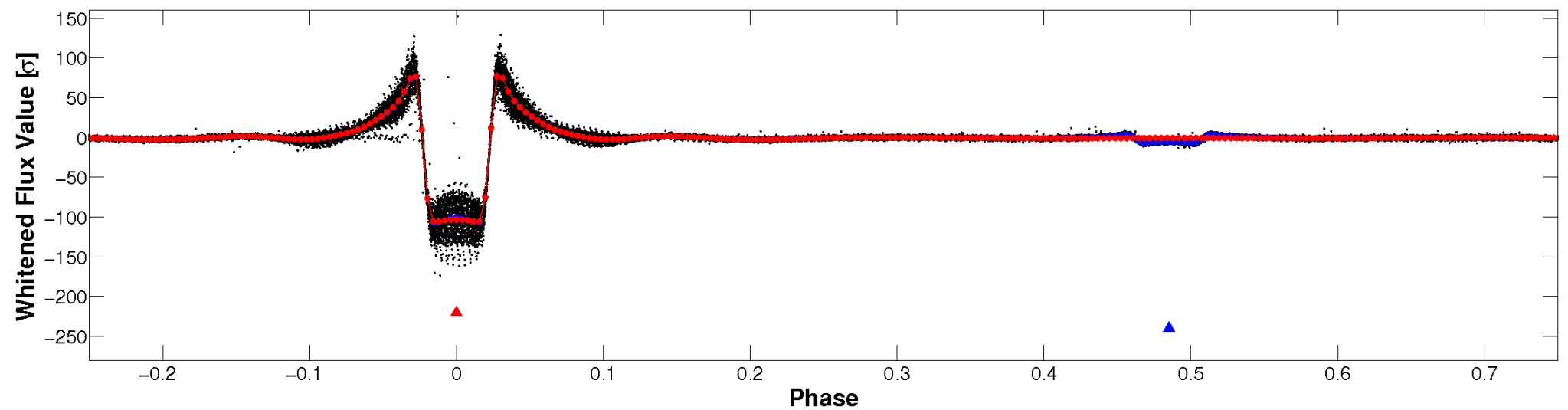


# Non-Whitened Vs. Whitened Light Curve

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

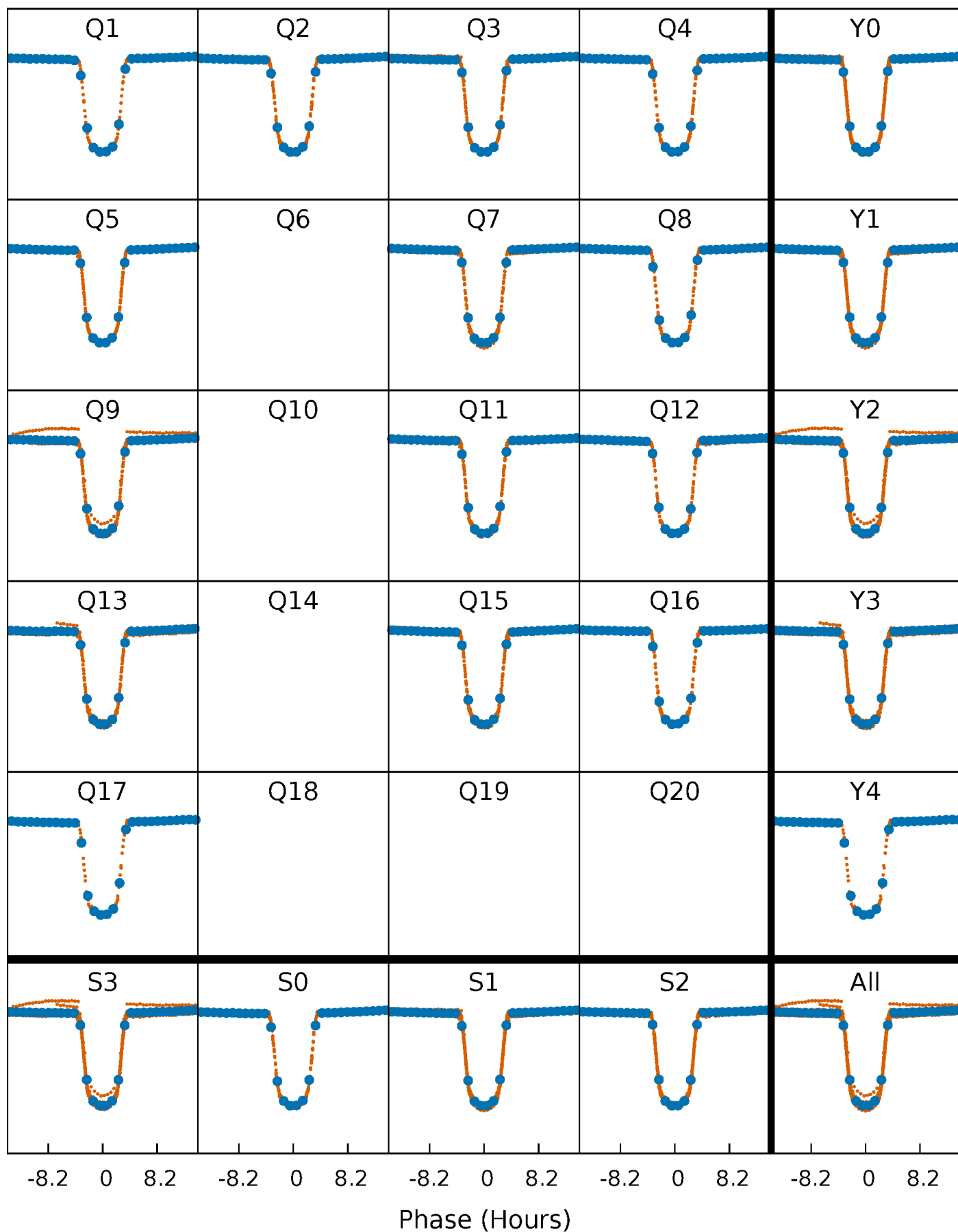


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

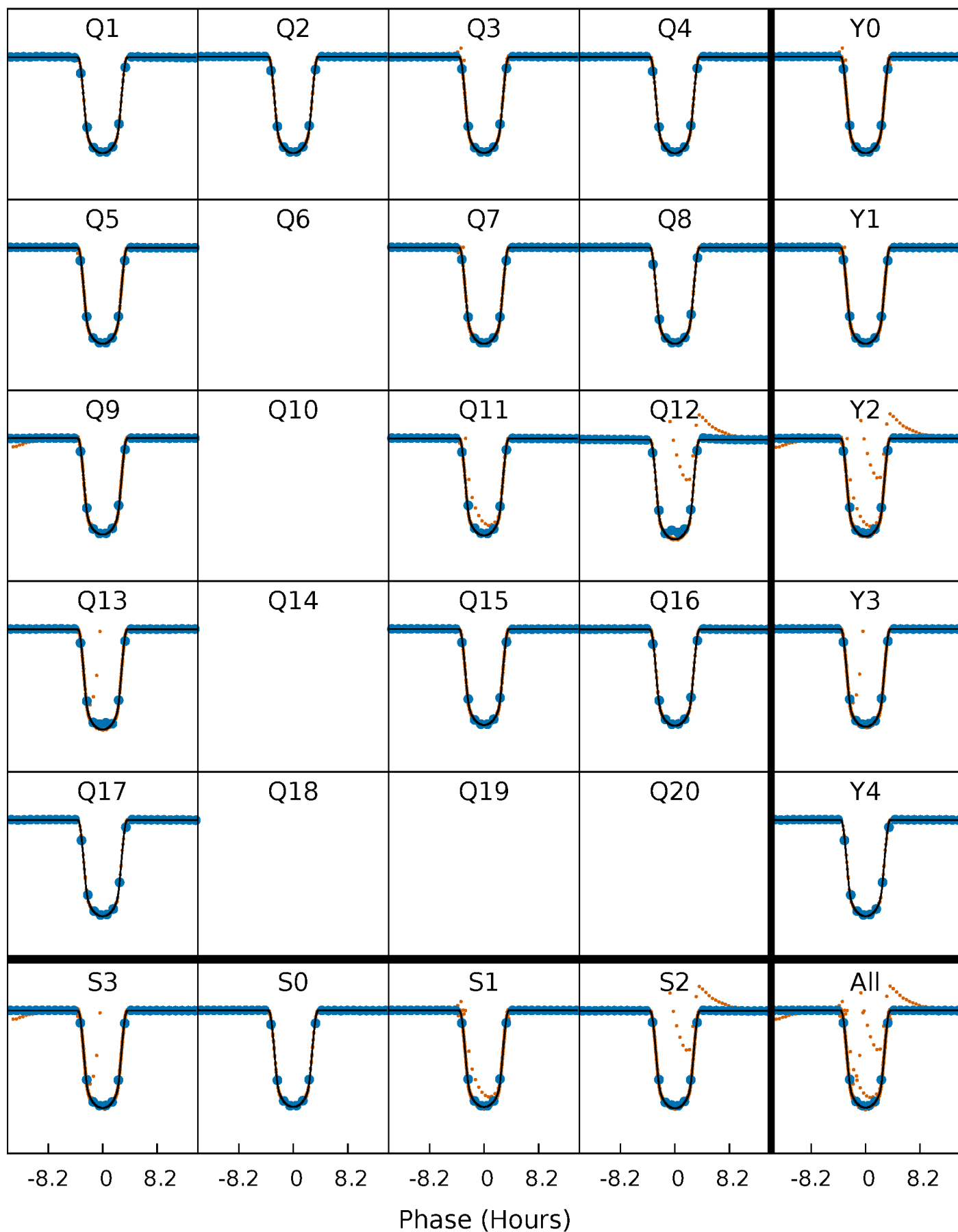
TCE 004069213-01 P= 5.194256 Days  $T_0=134.572550$  (BKJD)





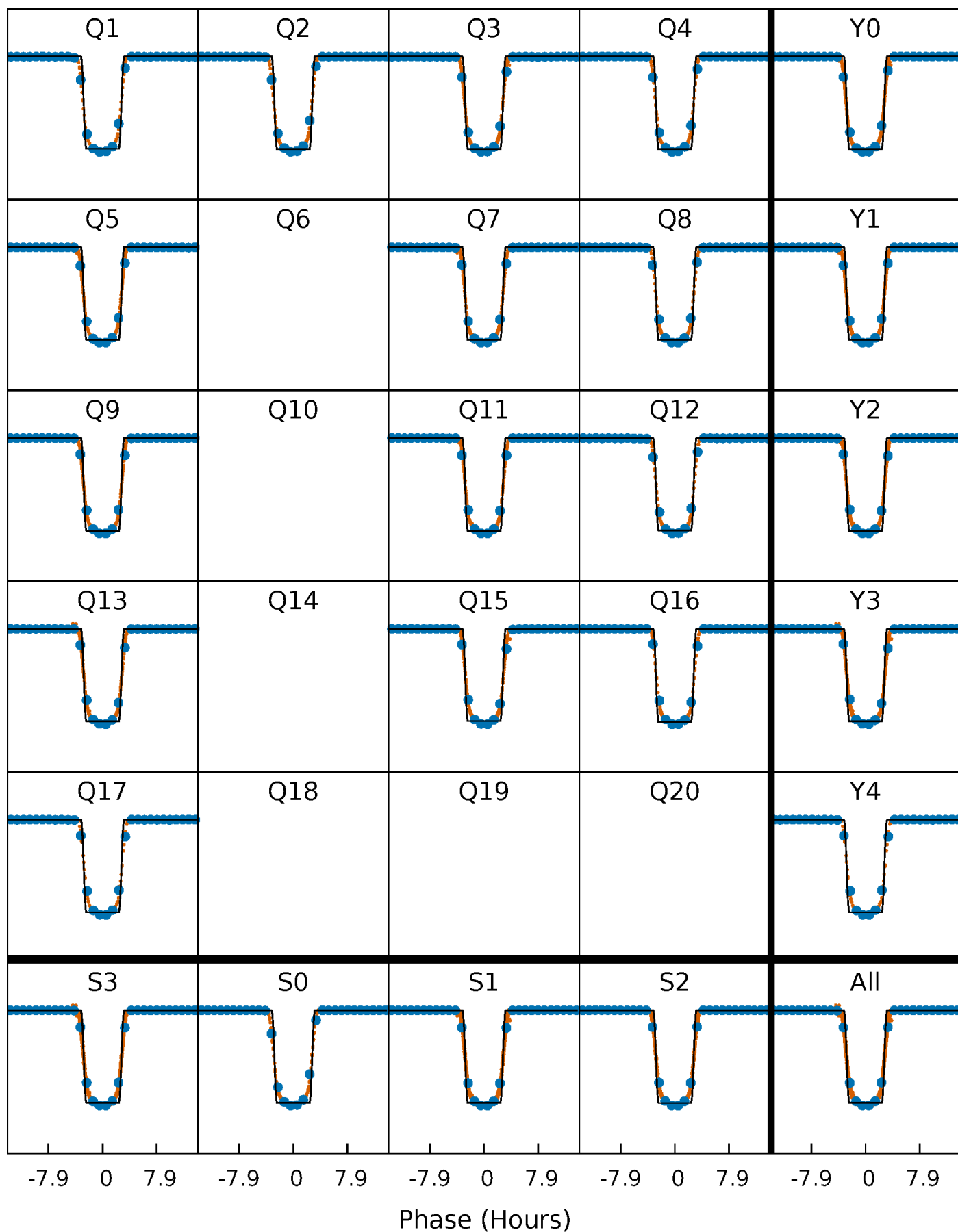
# DV Quarter-Phased Transit Curves

TCE 004069213-01 P= 5.194256 Days  $T_0=134.572550$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

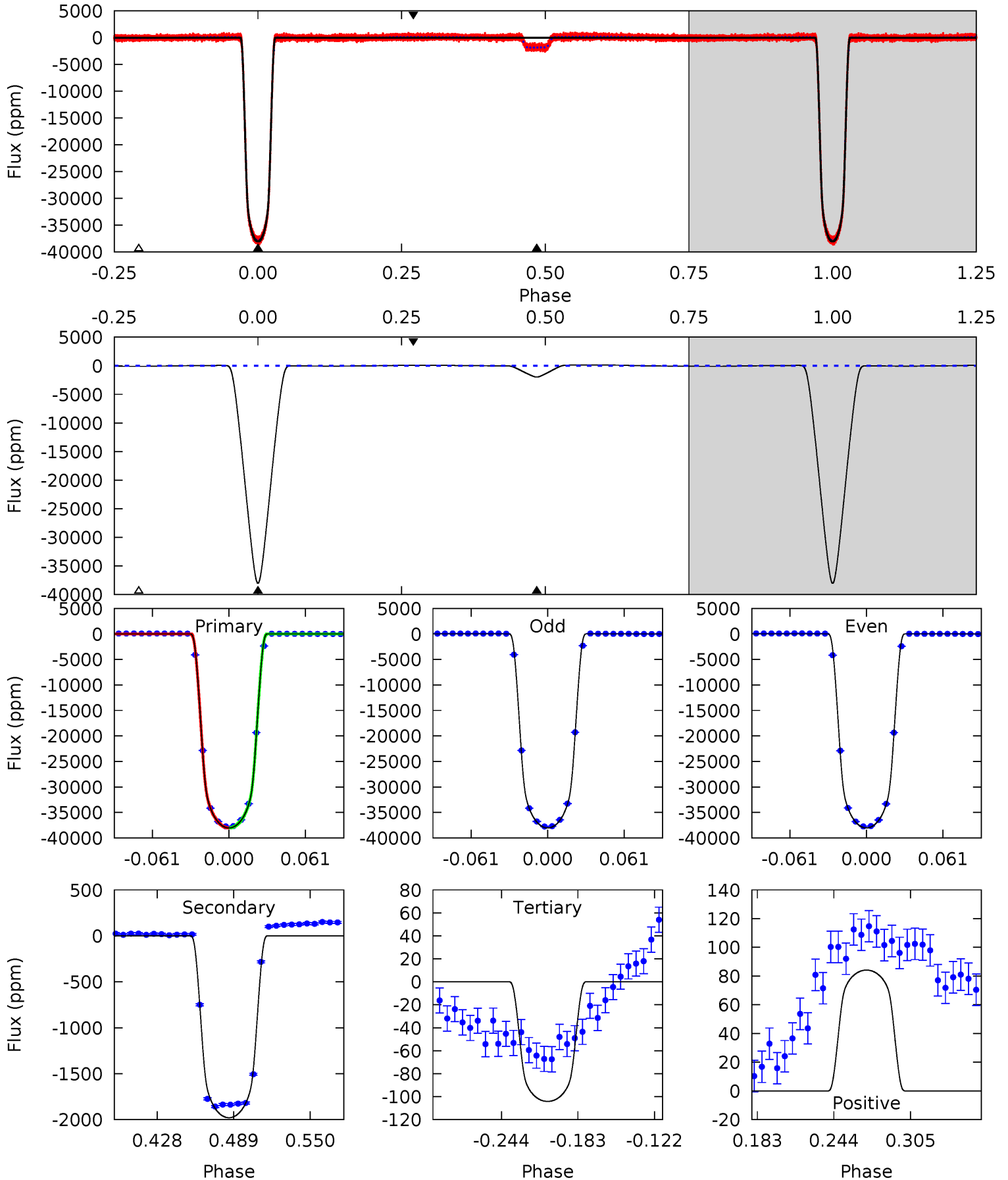
TCE 004069213-01 P= 5.194236 Days  $T_0=134.575191$  (BKJD)



# DV Model-Shift Uniqueness Test

004069213-01, P = 5.194256 Days, E = 129.378294 Days

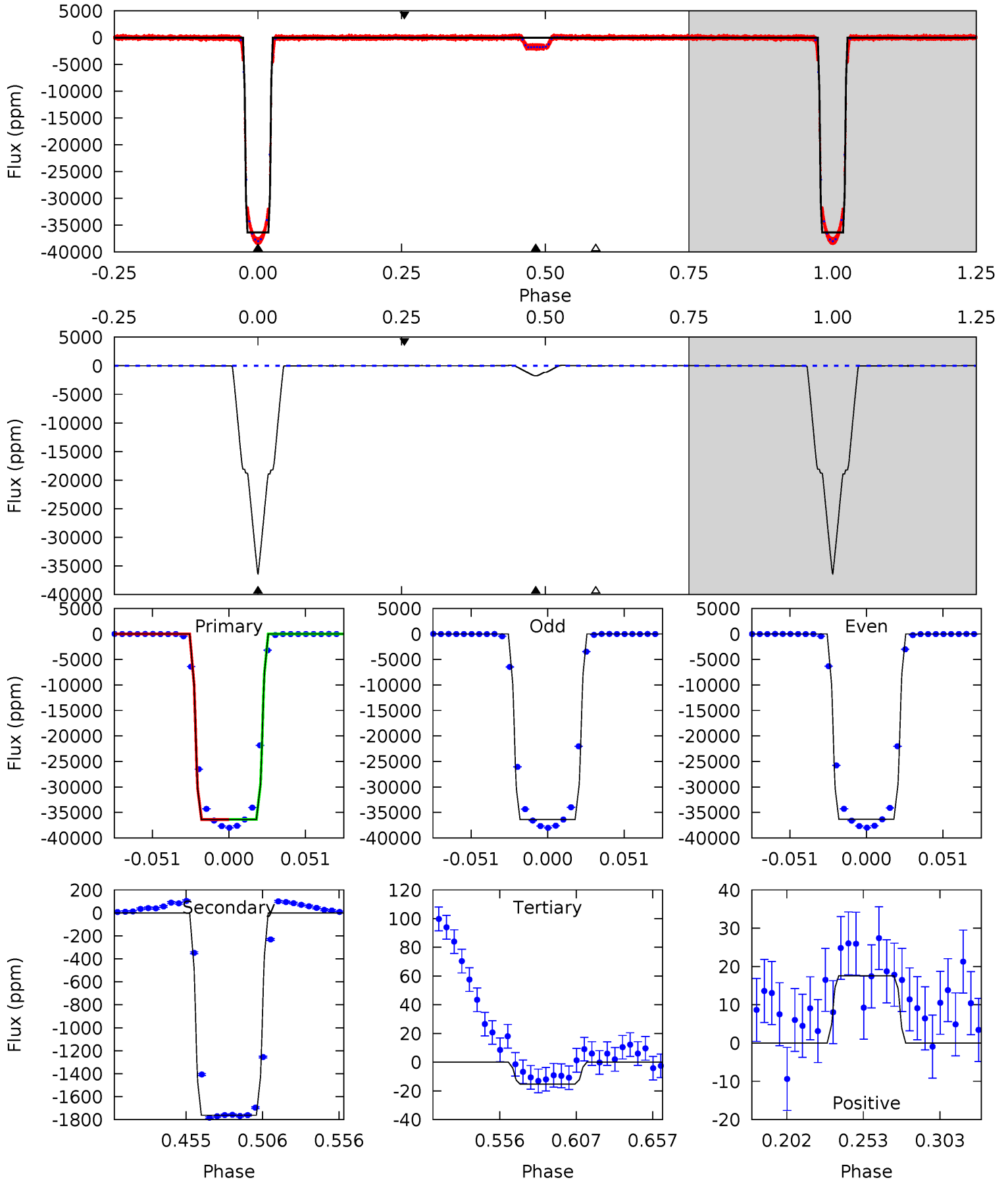
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10995	572.3	30.1	24.3	4.67	1.87	19.8	10965	10971	542.2	548.0	0.73	0.98	0.00	0.33



# Alt Model-Shift Uniqueness Test

004069213-01, P = 5.194236 Days, E = 129.380955 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
12635	612.1	5.30	6.12	4.71	1.96	3.76	12630	12629	606.8	606.0	10.4	1.00	0.00	3.57



### Stellar Parameters For KIC 004069213

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6100^{+91}_{-73}$	$3.895^{+0.196}_{-0.084}$	$-0.060^{+0.150}_{-0.150}$	$2.086^{+0.283}_{-0.526}$	$1.244^{+0.160}_{-0.160}$	$0.193^{+0.208}_{-0.052}$
	+1%/-1%	+5%/-2%	+250%/-250%	+14%/-25%	+13%/-13%	+108%/-27%
Source	SPE68	SPE68	SPE68	DSEP		

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

### Secondary Eclipse Parameters for KIC 004069213-01 / KOI 6382.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-1979 \pm 3$	$41.11^{+3.58}_{-5.52}$	$2142^{+92}_{-129}$	$3444^{+34}_{-32}$	$2.642^{+0.728}_{-0.374}$
Alt.	$-1762 \pm 3$	$43.80^{+3.49}_{-5.77}$	$2149^{+96}_{-122}$	$3306^{+36}_{-30}$	$2.077^{+0.554}_{-0.300}$

$T_{\text{max}}$  = 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

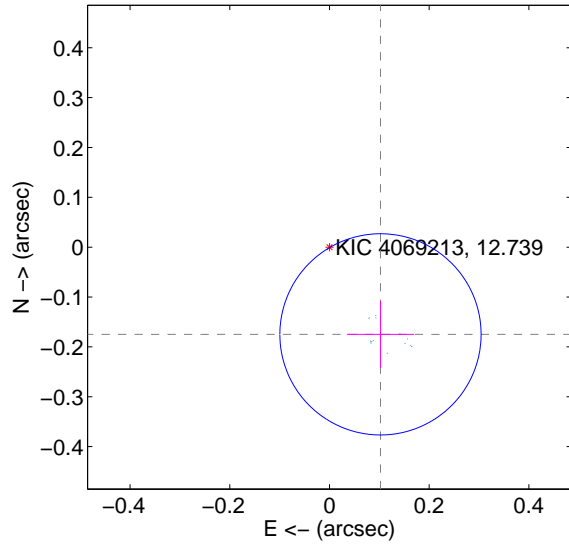
Supplemental centroid analysis for 004069213-01. Kepler magnitude: 12.74. Transit SNR 5208.09

There are 14 quarters with good PRF difference image offsets

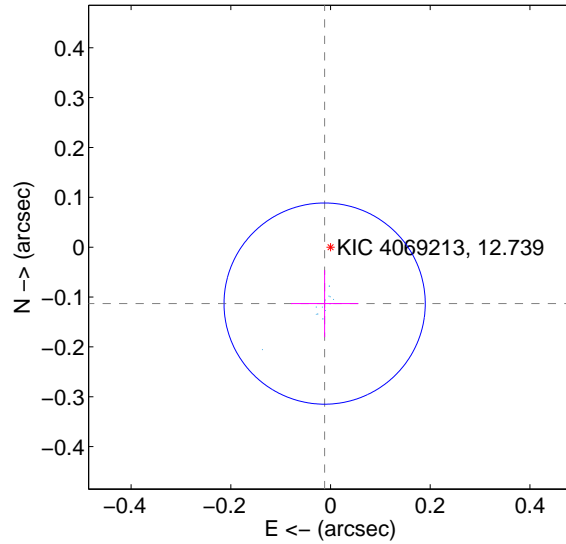
The direct PRF centroid is offset from the target star catalog position by about 0.19 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.203 \pm 0.067$	3.01	$-0.102 \pm 0.067$	$-0.175 \pm 0.067$
PRF-fit source offset from KIC position	$0.114 \pm 0.067$	1.69	$0.012 \pm 0.067$	$-0.113 \pm 0.067$
photometric centroid source offset	$0.26 \pm 0.00$	220.00	$0.02 \pm 0.00$	$-0.26 \pm 0.00$

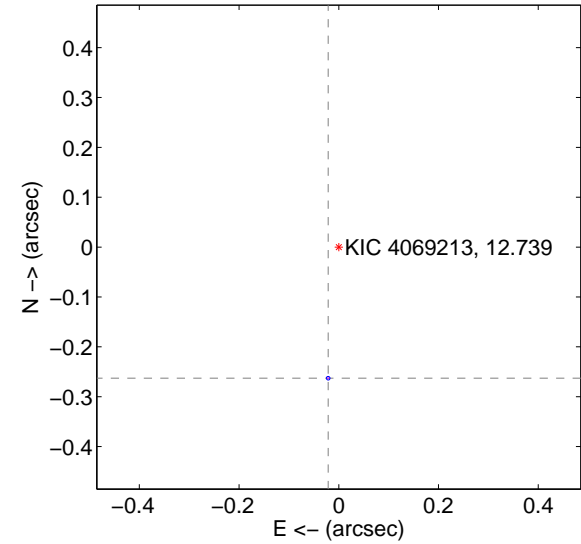
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

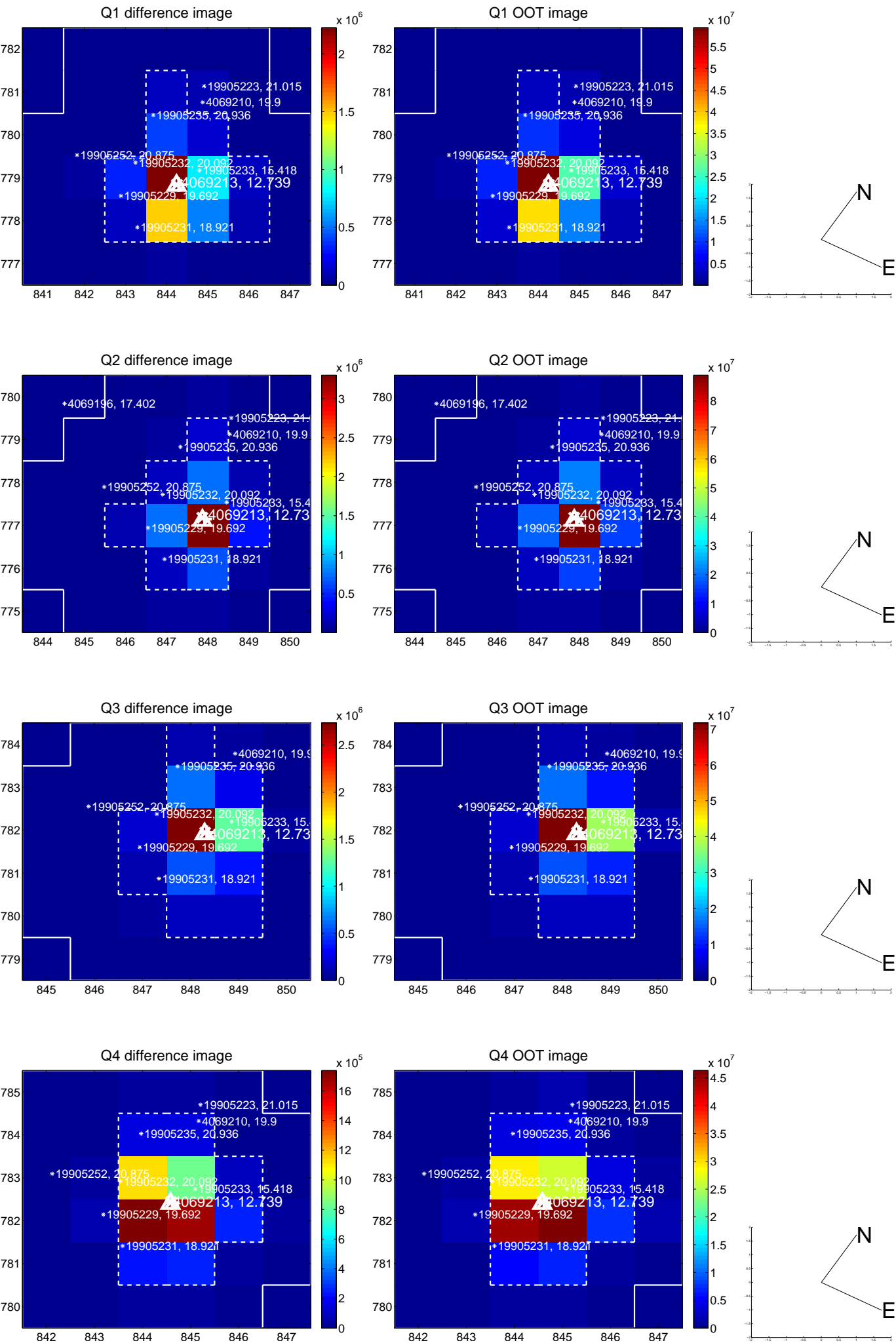


offset from photometric centroids

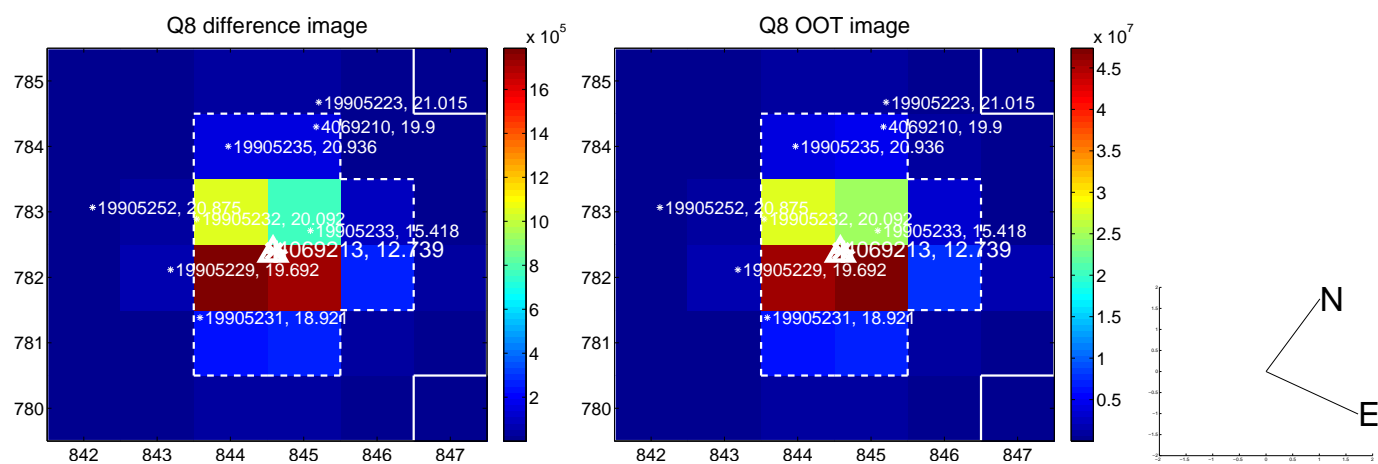
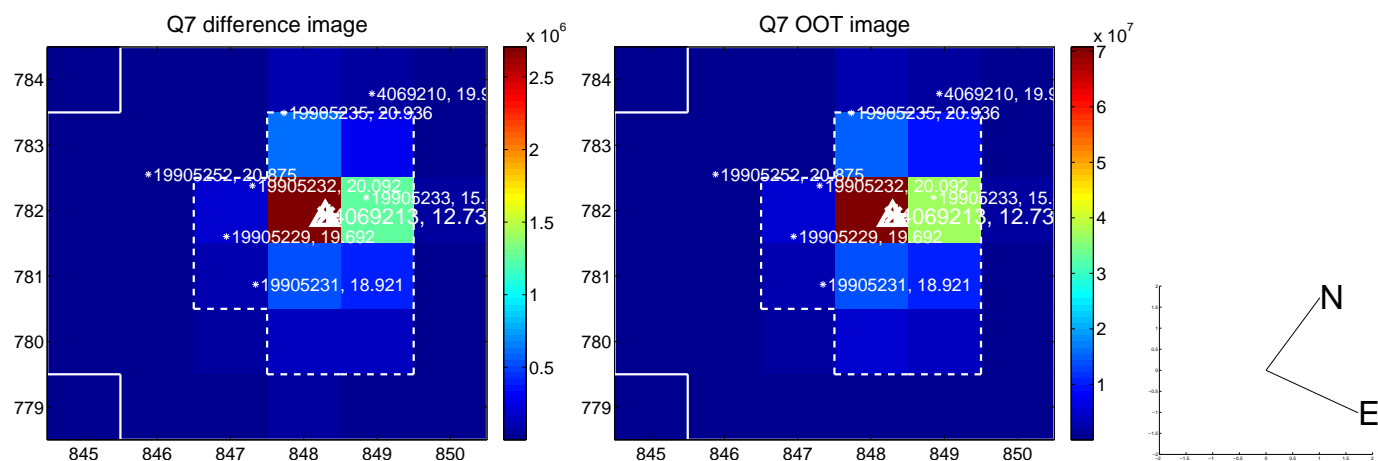
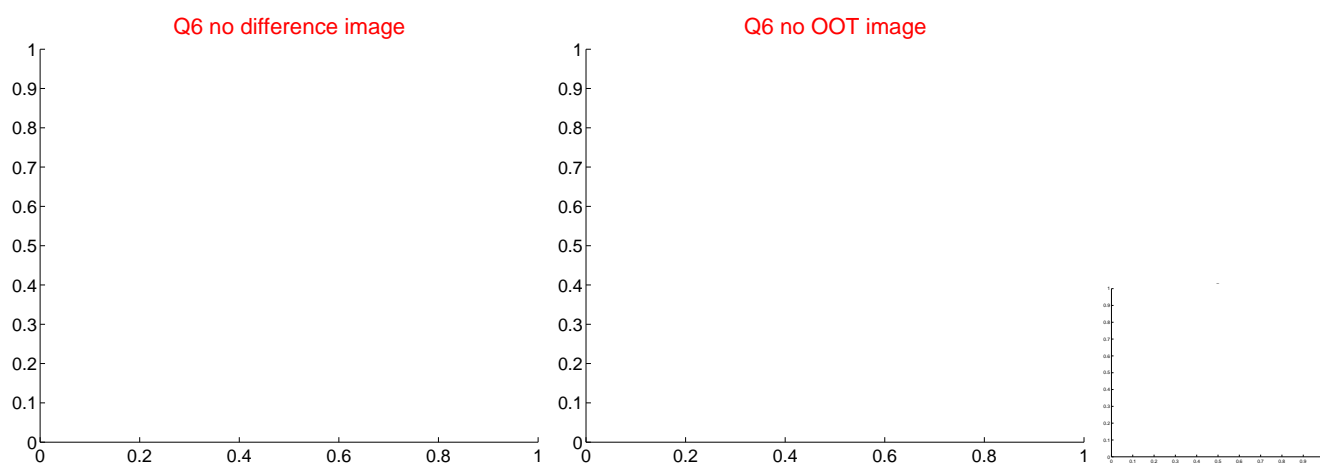
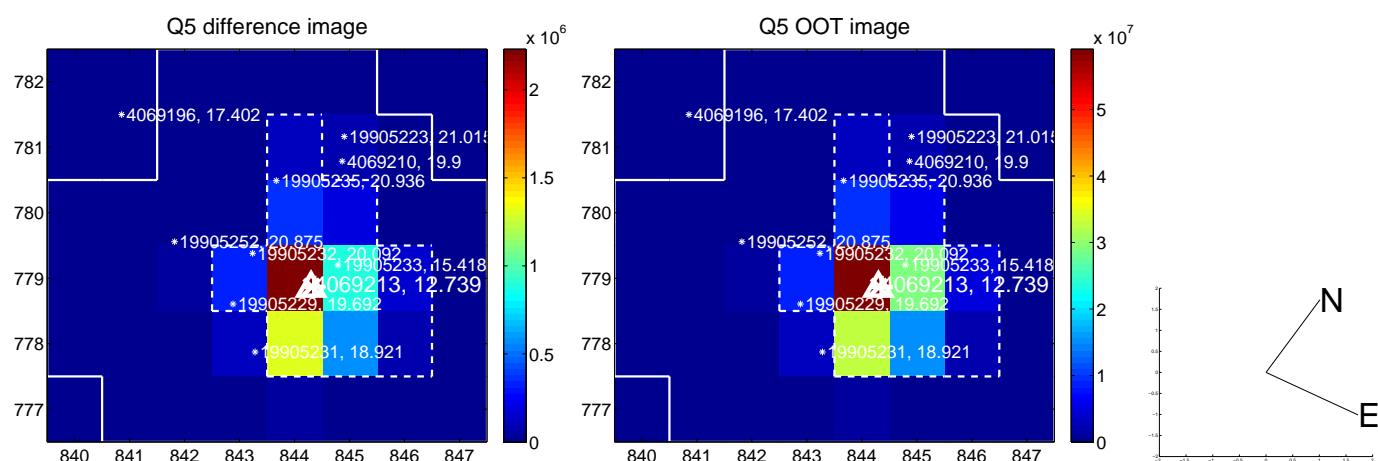


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

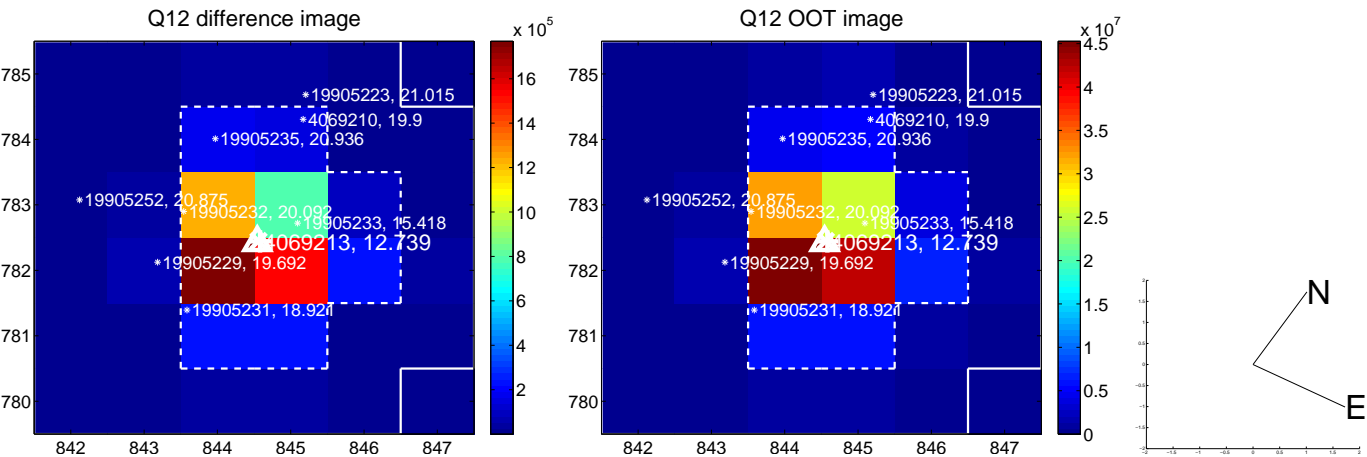
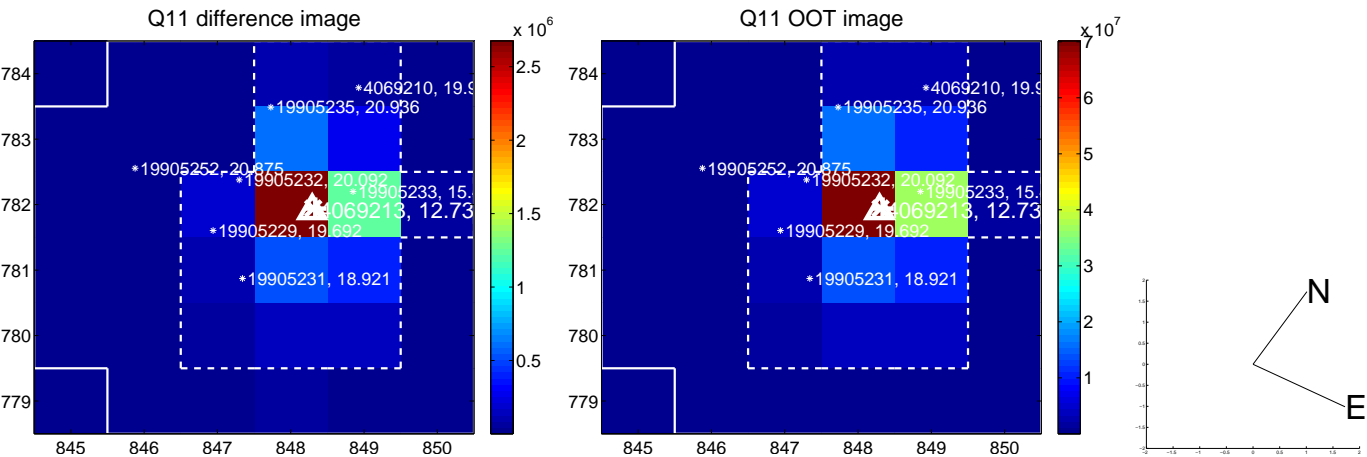
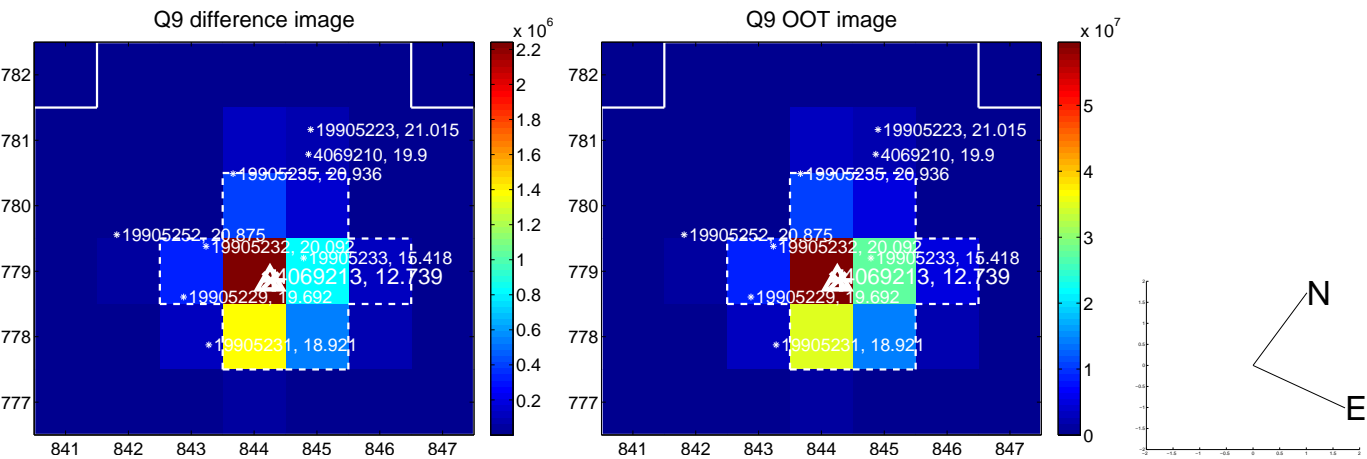


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value

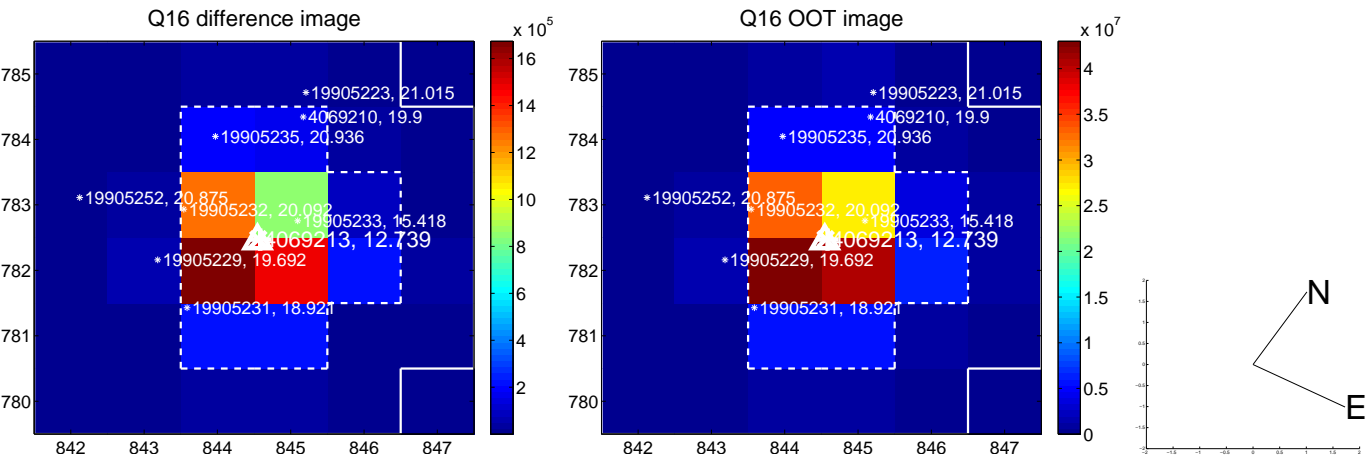
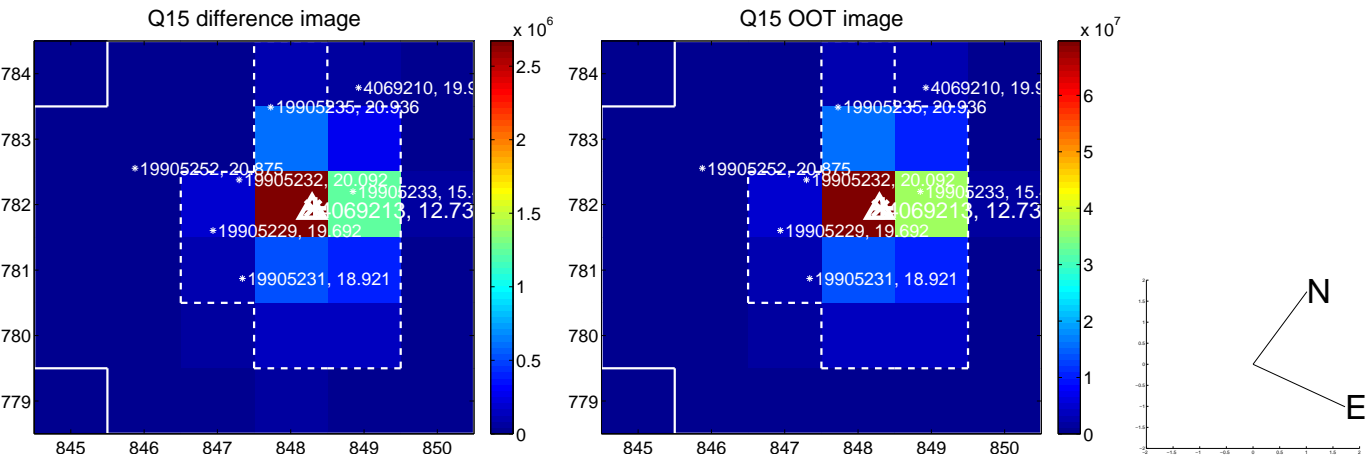
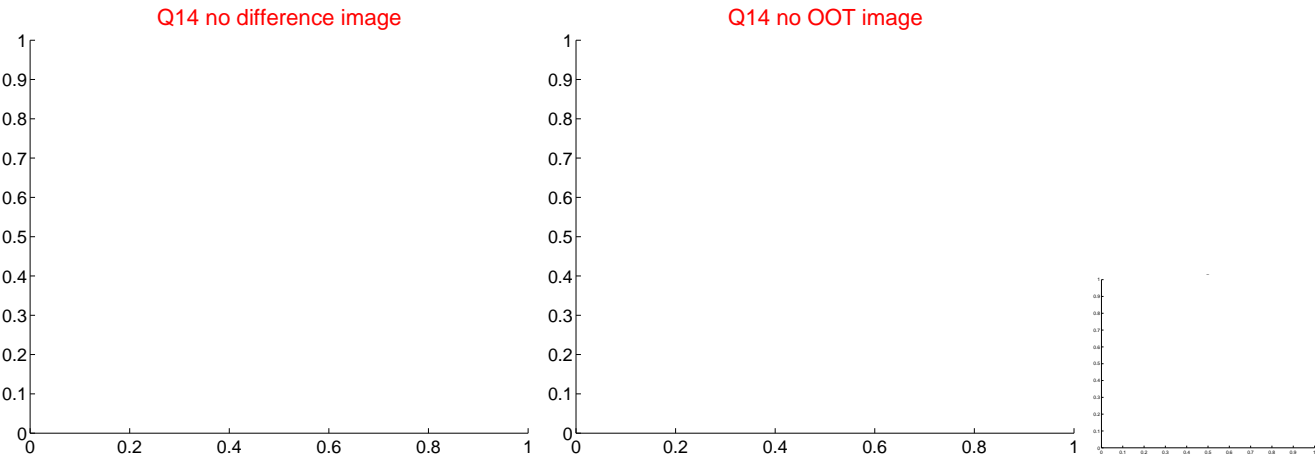
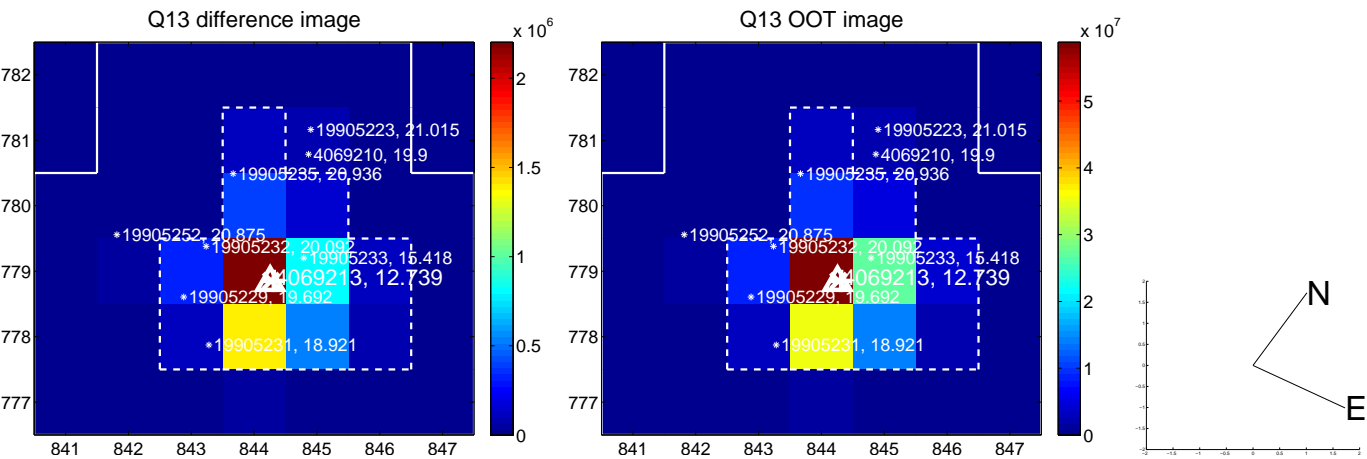




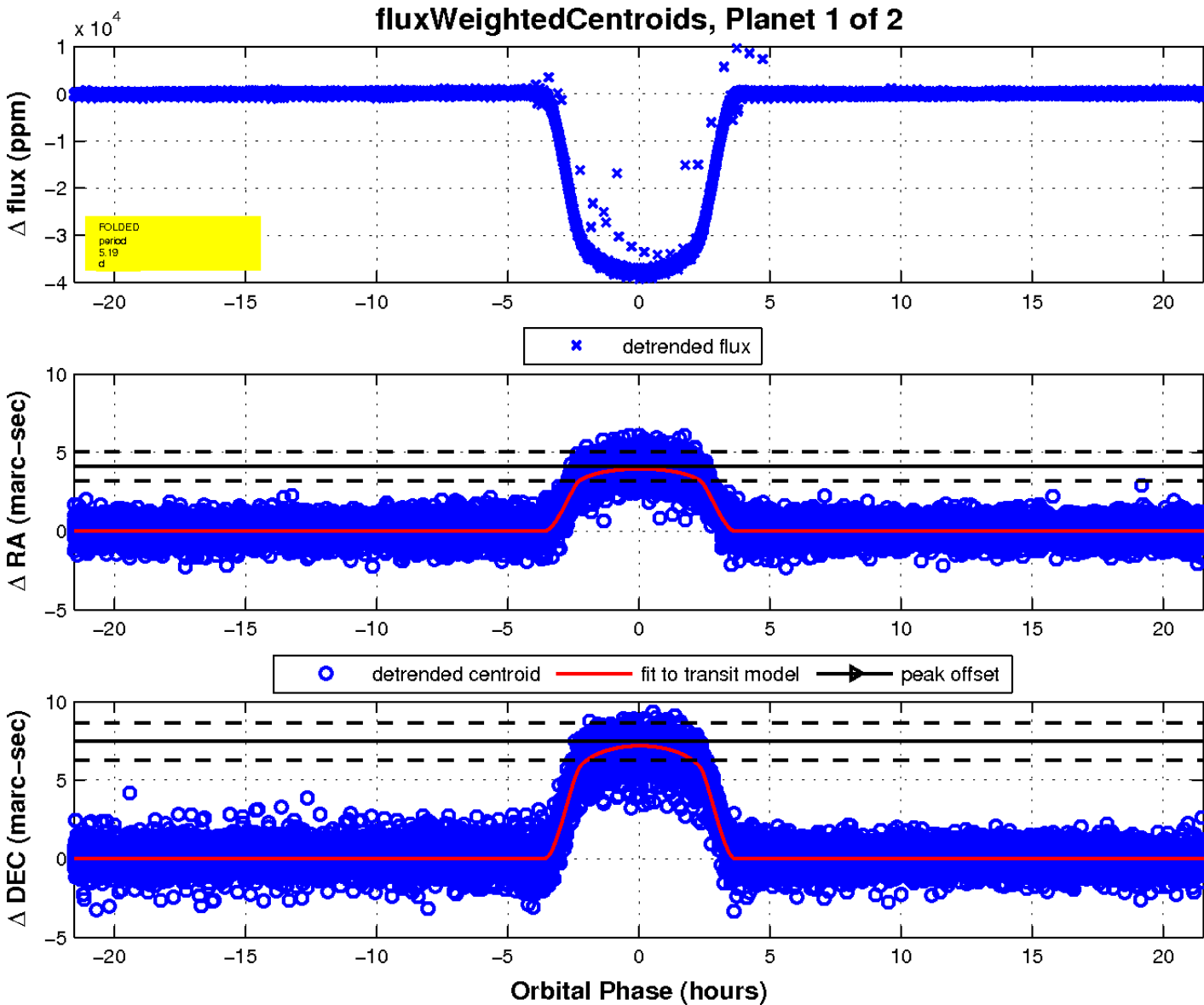
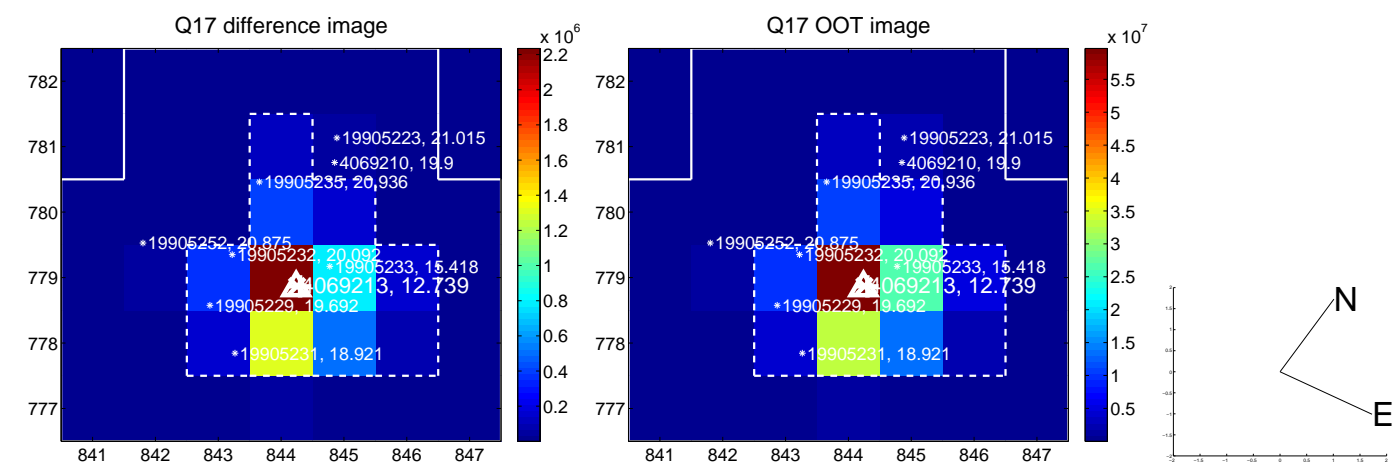
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

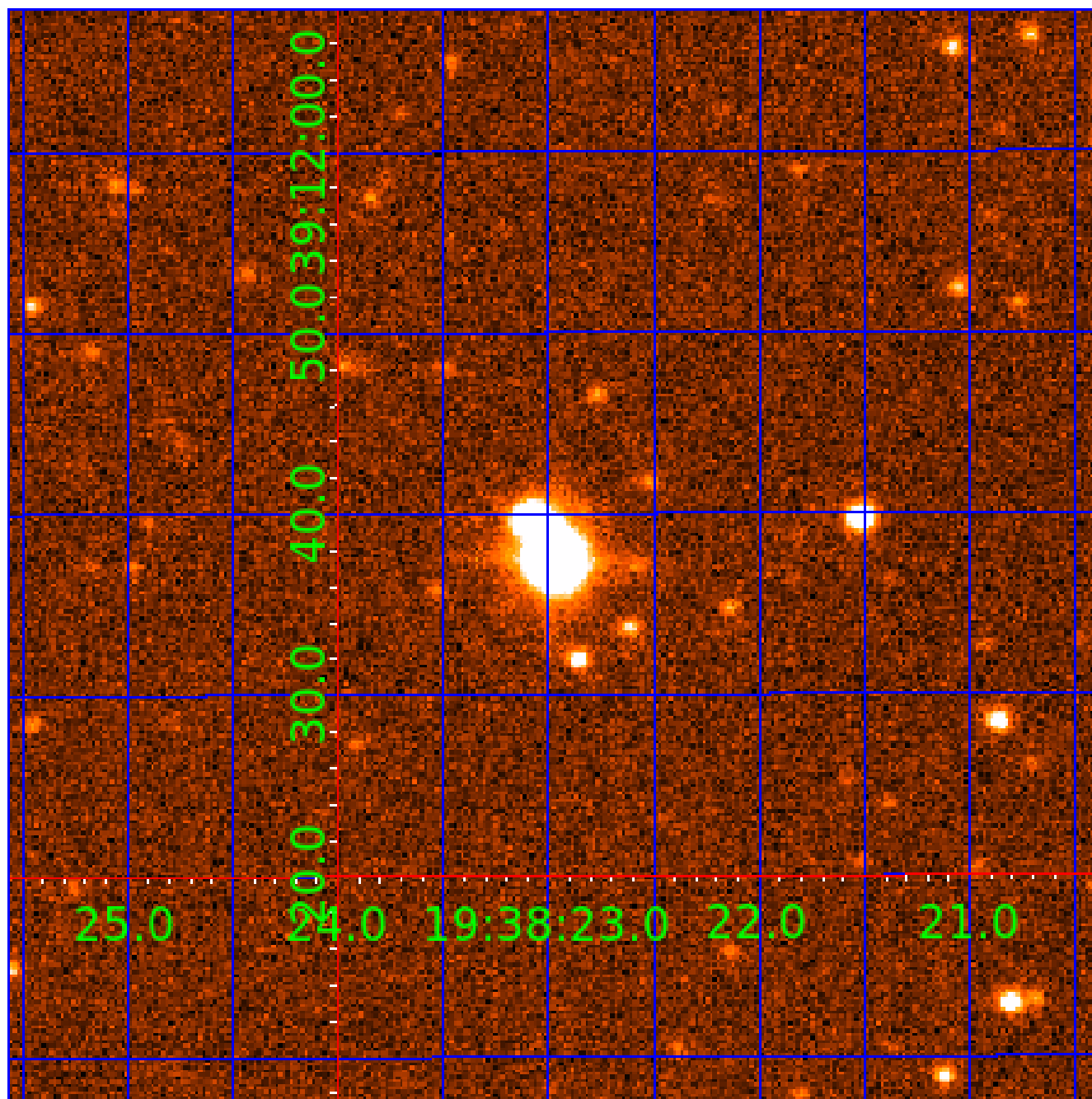


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 004069213

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004069213-01	OBS	6382.01	5.194256	134.572550	38088.4	7.178	5434.6	5208.1	2.09	6100	41.34	1352.26
004069213-02	OBS	No	5.194250	131.899373	2016.9	6.791	318.7	315.2	2.09	6100	10.52	1352.26

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004069213-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE
004069213-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE

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

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

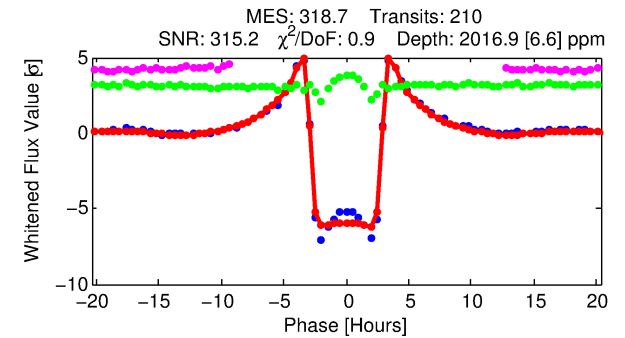
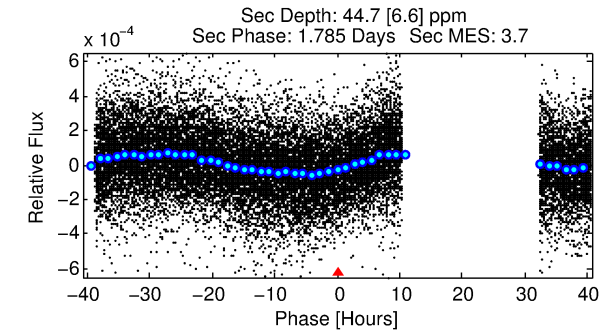
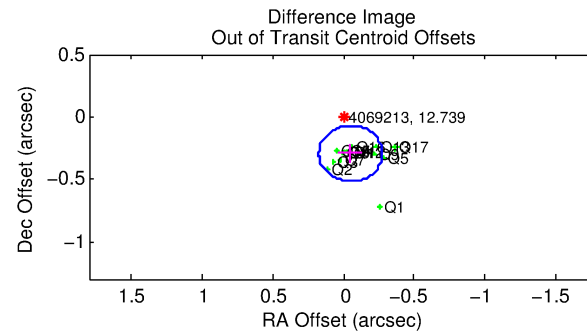
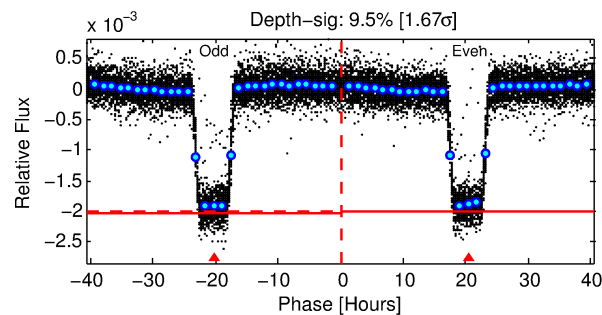
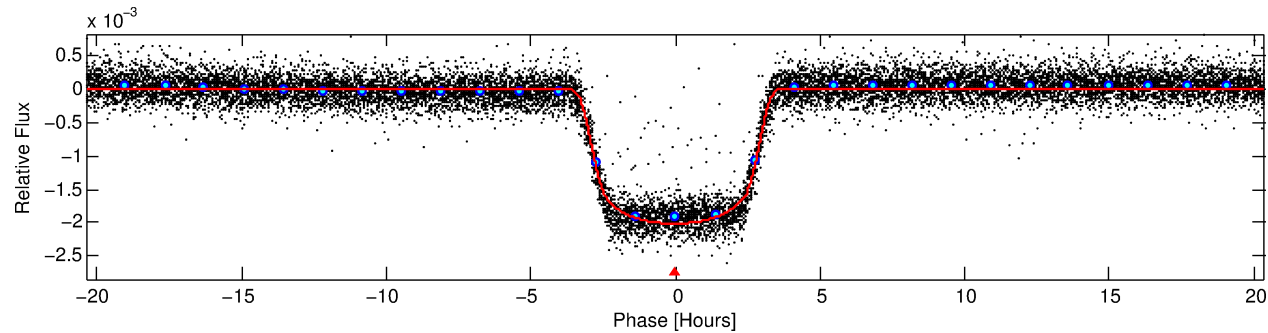
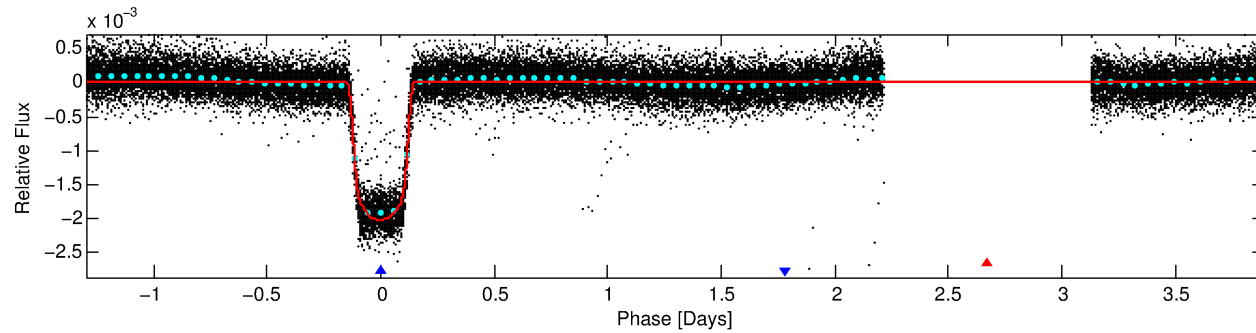
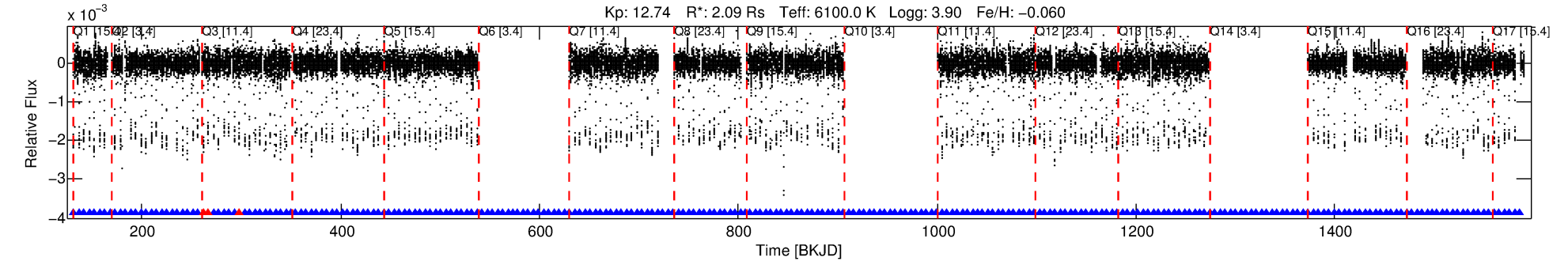
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 004069213-02

No Significant Match Found

# DV One-Page Summary

KIC: 4069213 Candidate: 2 of 2 Period: 5.194 d  
KOI: K06382 Corr: No Ephemeris Match



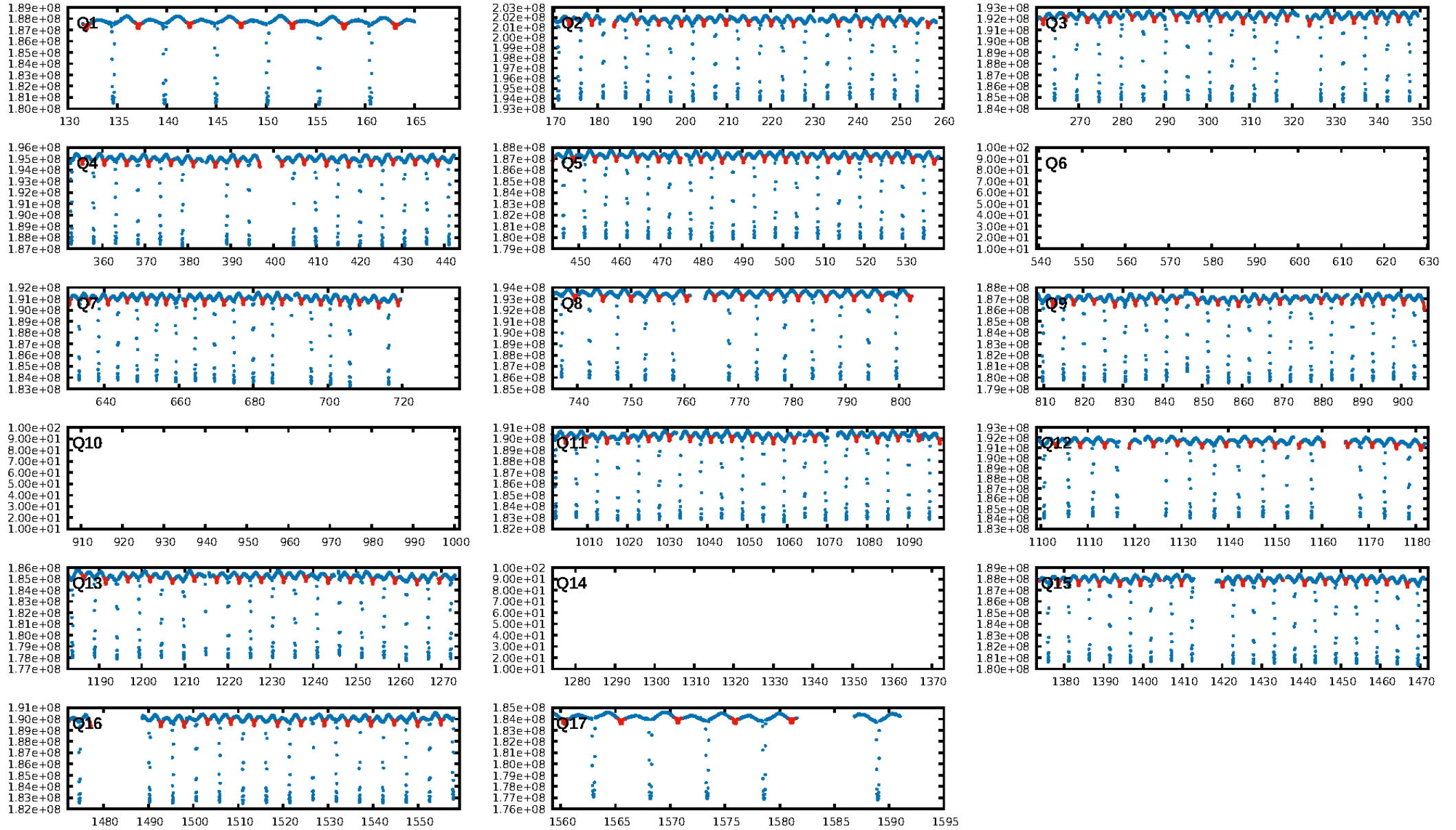
## DV Fit Results:

Period = 5.19425 [0.00000] d  
Epoch = 131.8994 [0.0002] BKJD  
Rp/R\* = 0.0462 [0.0001]  
a/R\* = 3.83 [0.03]  
b = 0.83 [0.00]  
Seff = 1352.26 [472.99]  
Teq = 1546 [135] K  
Rp = 10.52 [2.65] Re  
a = 0.0632 [0.0143] AU  
Ag = 0.89 [0.33] [-0.34 $\sigma$ ]  
Teffp = 2320 [92] K [4.72 $\sigma$ ]

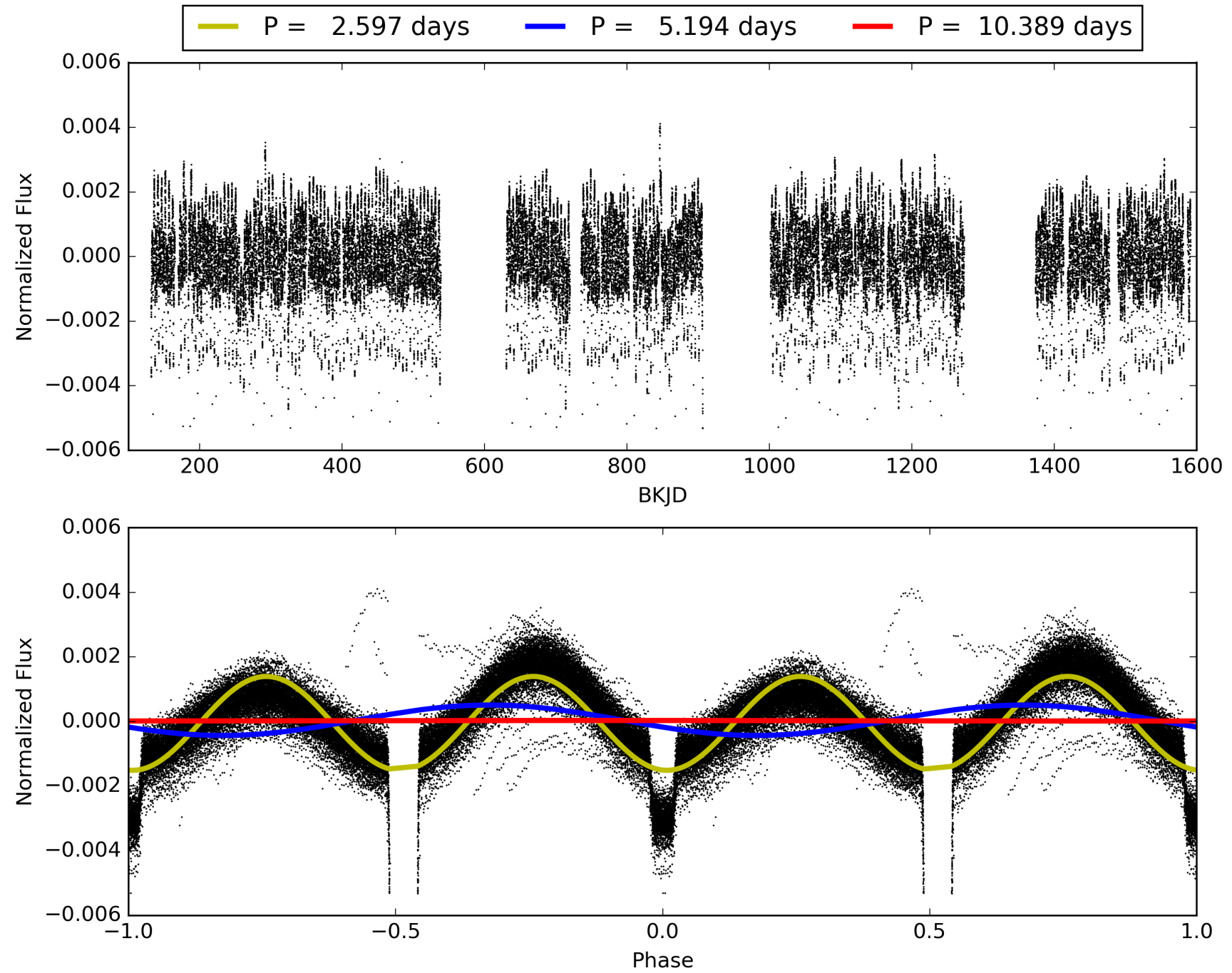
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 0.98 [195/198]  
GhostDiagnostic-chr: 3.786  
Centroid-sig: 0.0%  
Centroid-so: 0.404 arcsec [18.62 $\sigma$ ]  
OotOffset-rm: 0.299 arcsec [4.00 $\sigma$ ]  
KicOffset-rm: 0.253 arcsec [3.42 $\sigma$ ]  
OotOffset-st: 1/4/4/5 [14]  
KicOffset-st: 1/4/4/5 [14]  
DiffImageQuality-fgm: 1.00 [14/14]  
DiffImageOverlap-fno: 1.00 [14/14]

# TCE 004069213-02, PDC Light Curves



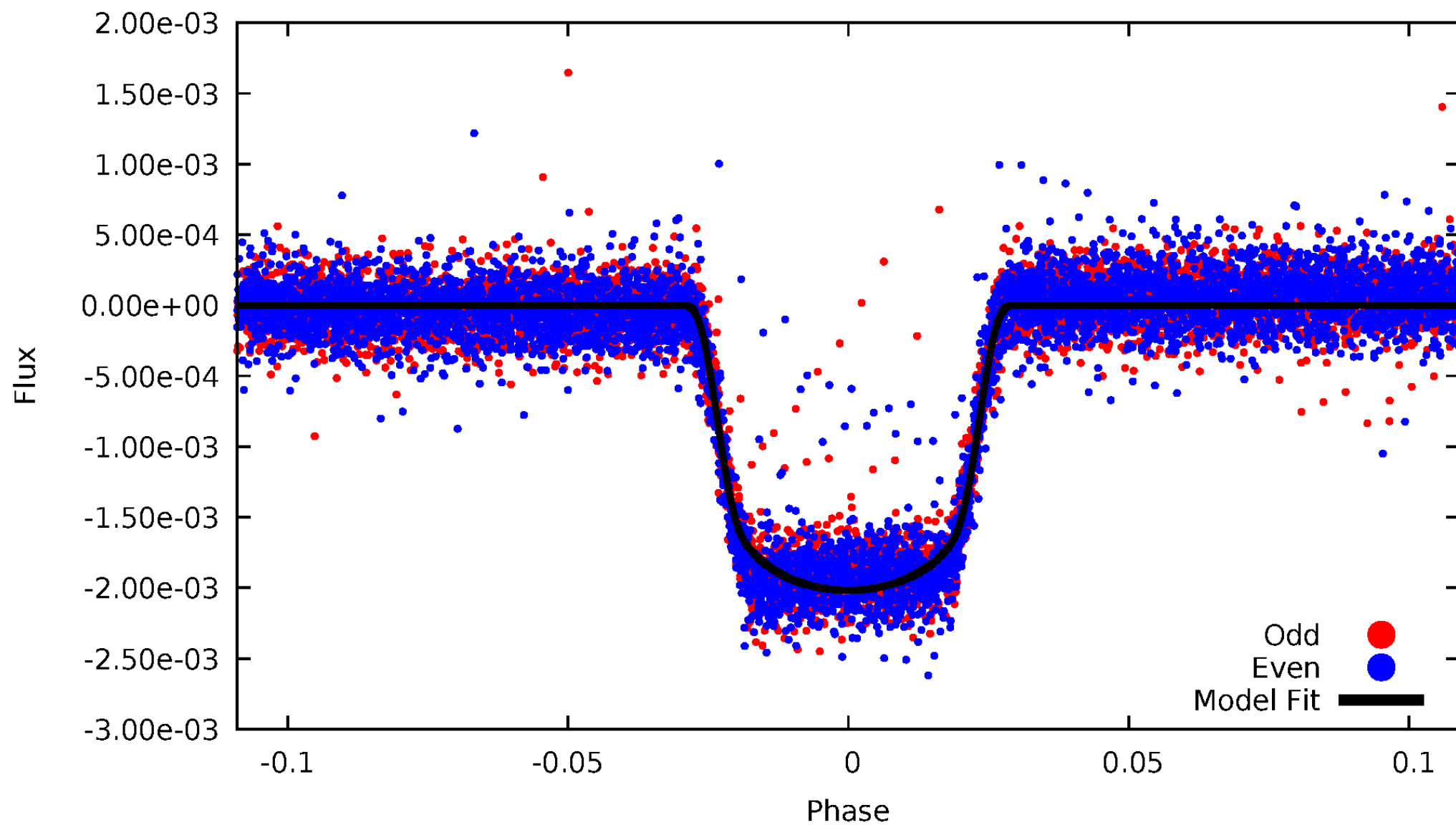
TCE 004069213-02





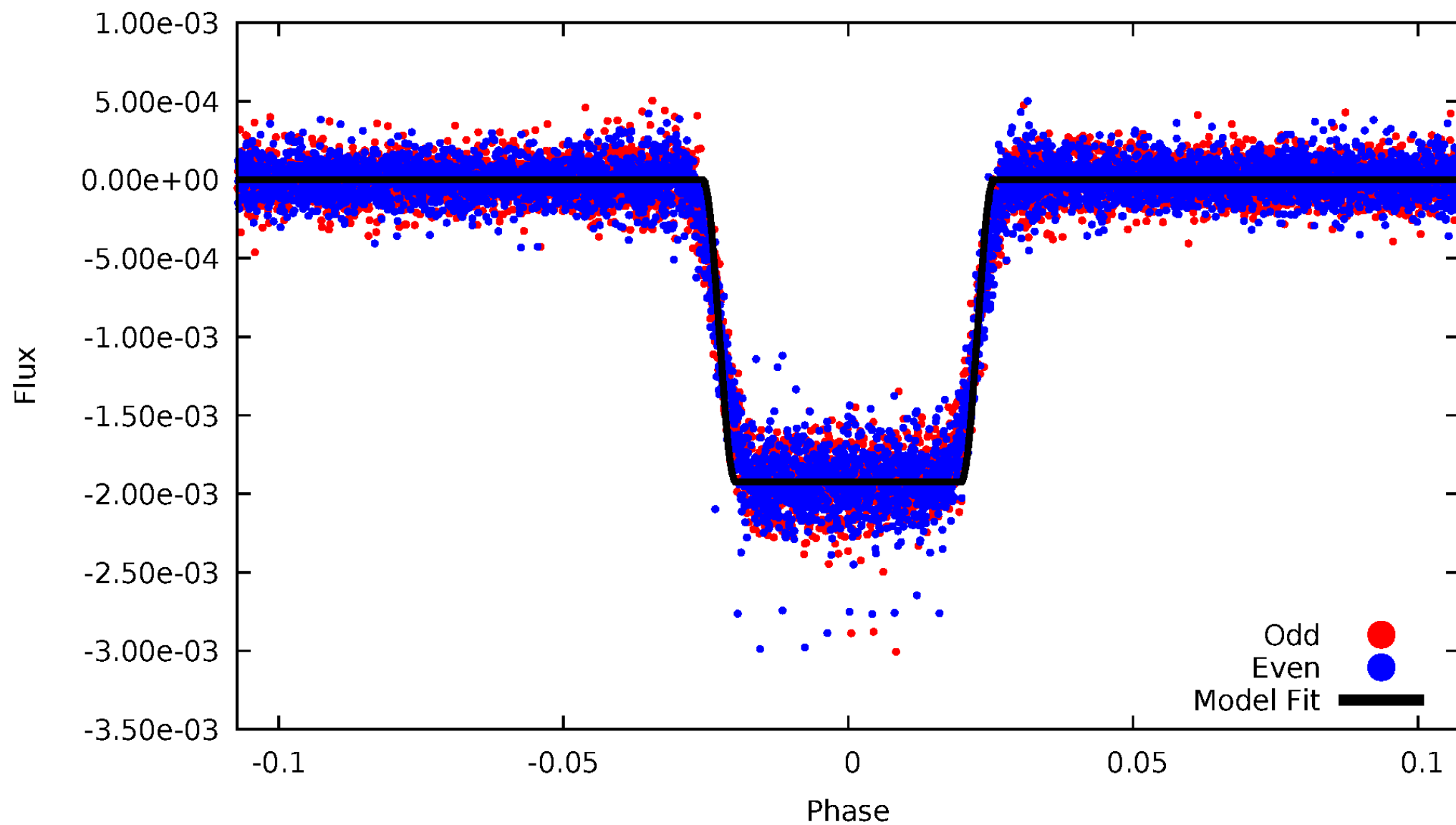
# DV Odd/Even

TCE 004069213-02



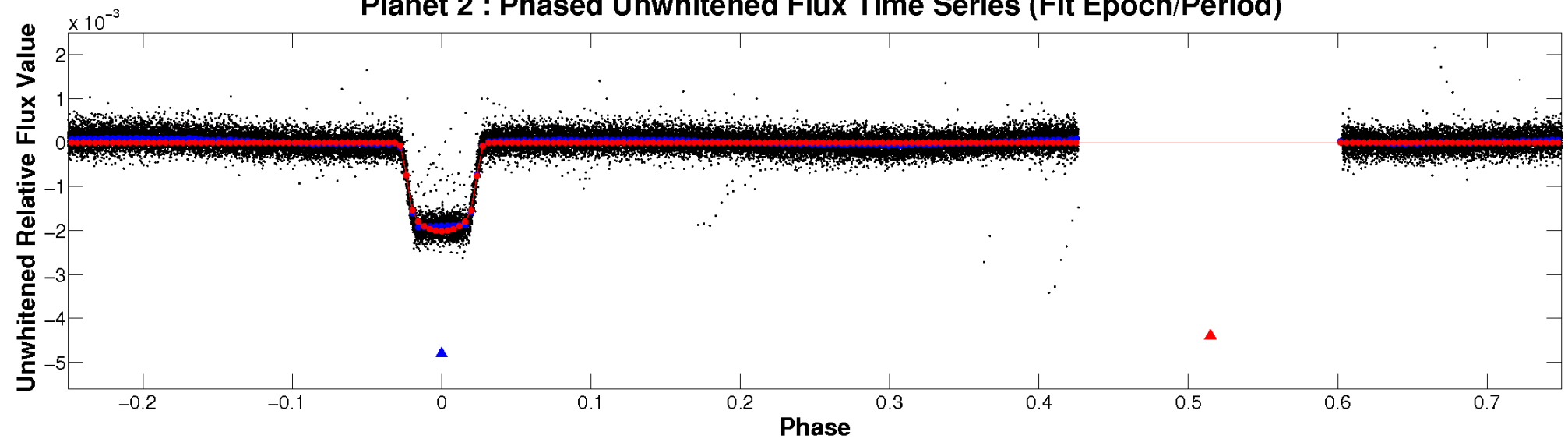
# ALT Odd/Even

TCE 004069213-02

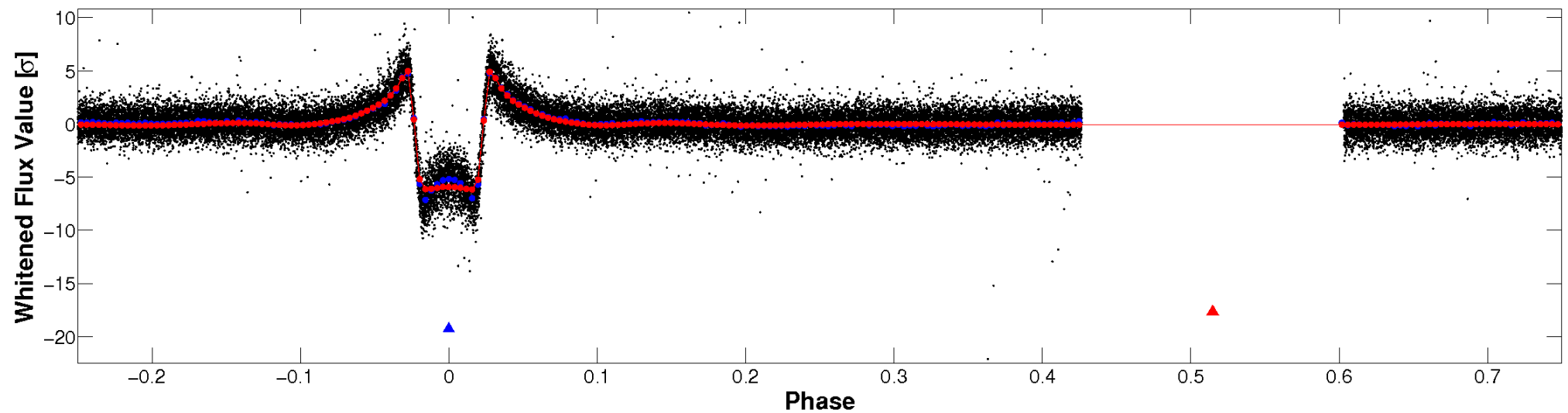


# Non-Whitened Vs. Whitened Light Curve

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

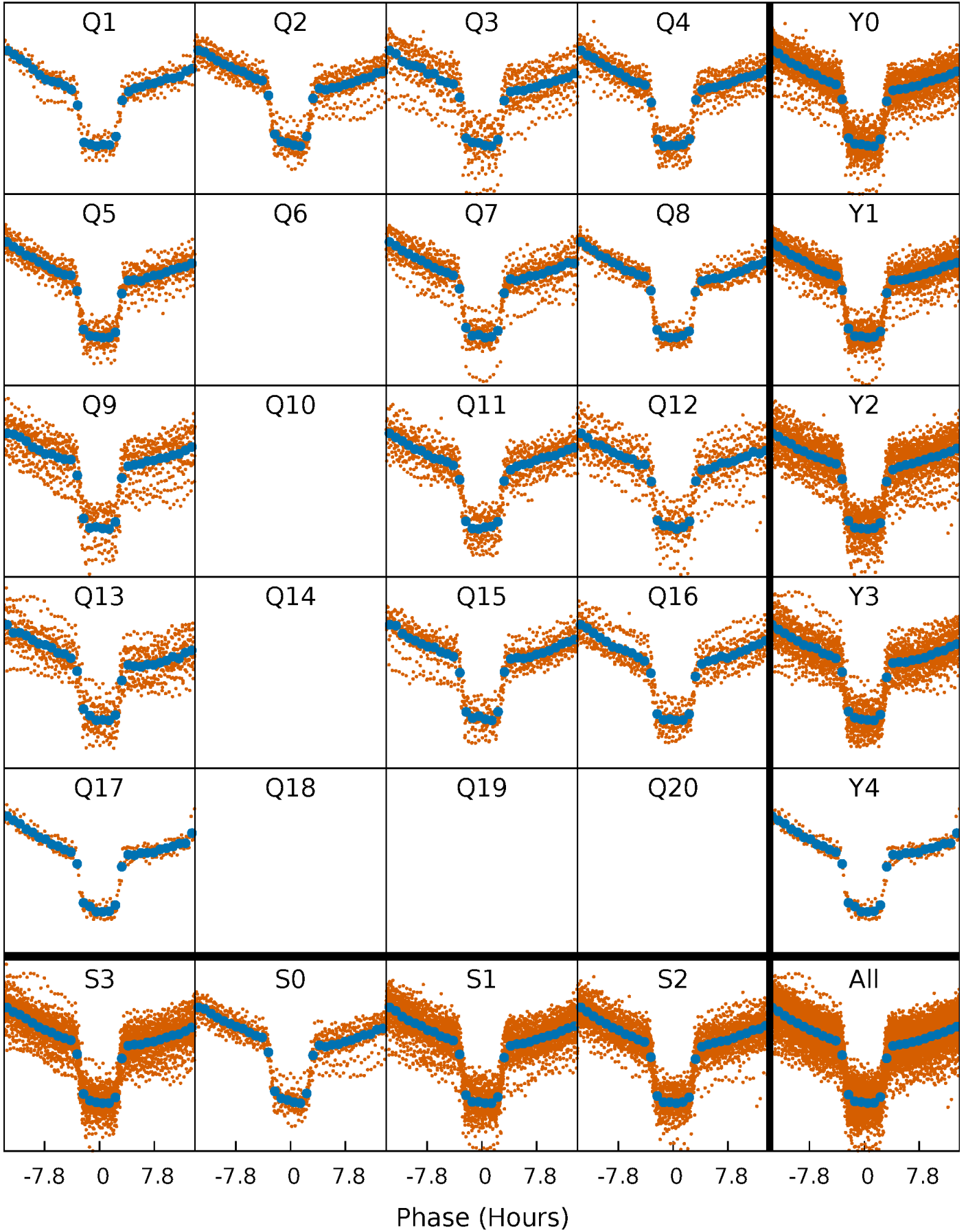


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



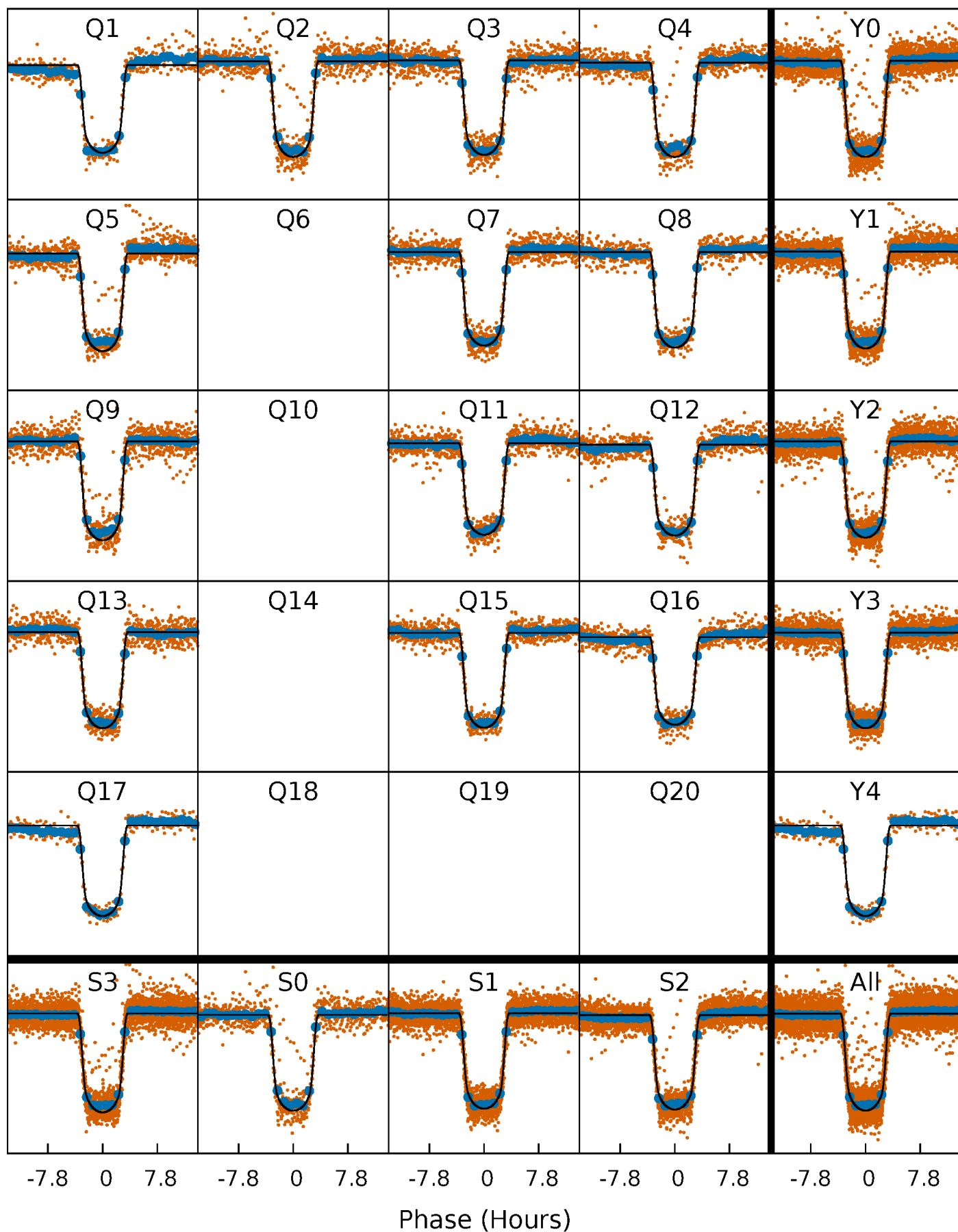
# PDC Quarter-Phased Transit Curves

TCE 004069213-02   P= 5.194250 Days    $T_0=131.899373$  (BKJD)



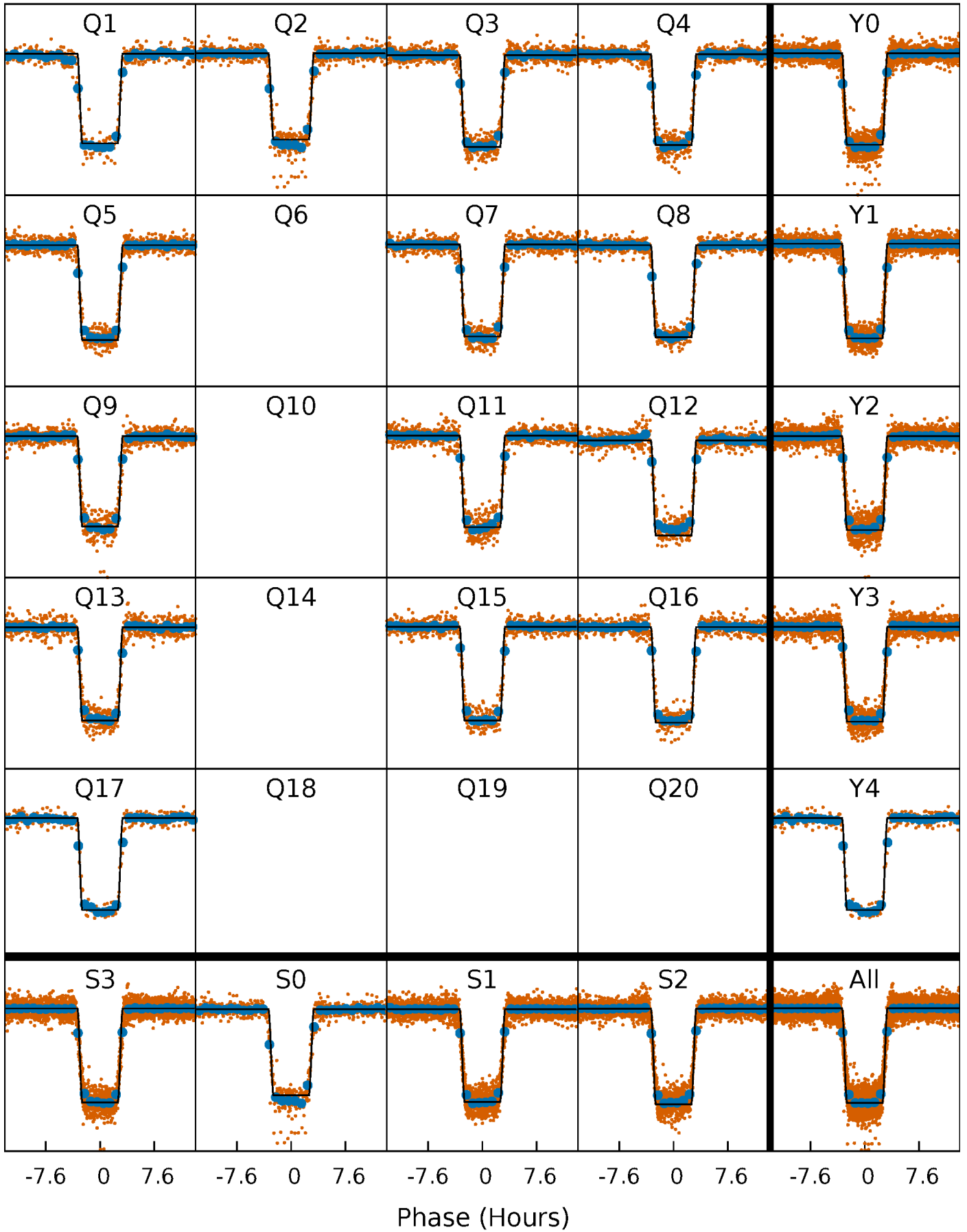
# DV Quarter-Phased Transit Curves

TCE 004069213-02 P= 5.194250 Days  $T_0=131.899373$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

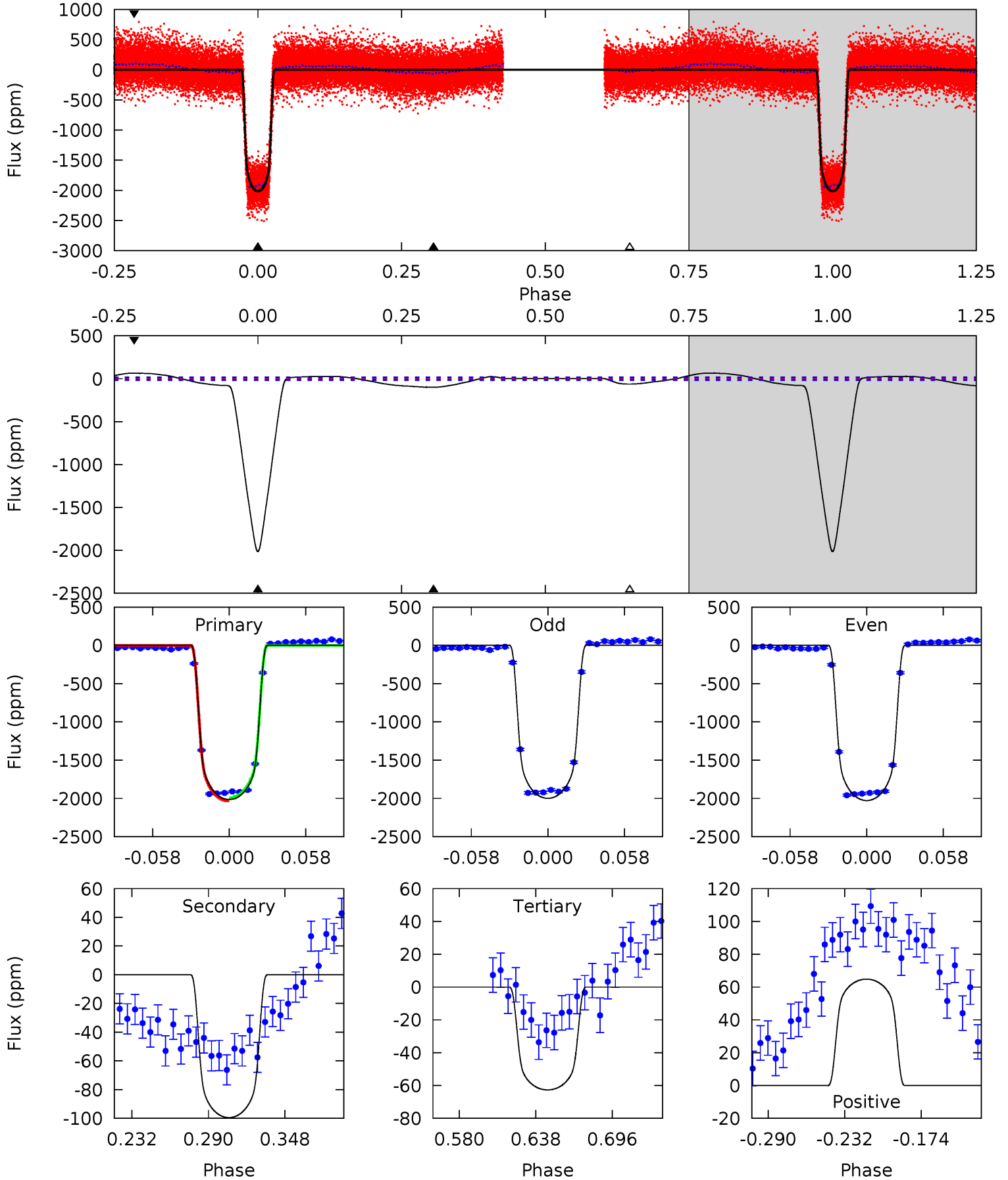
TCE 004069213-02 P= 5.194236 Days  $T_0=131.901208$  (BKJD)



# DV Model-Shift Uniqueness Test

004069213-02, P = 5.194250 Days, E = 126.705123 Days

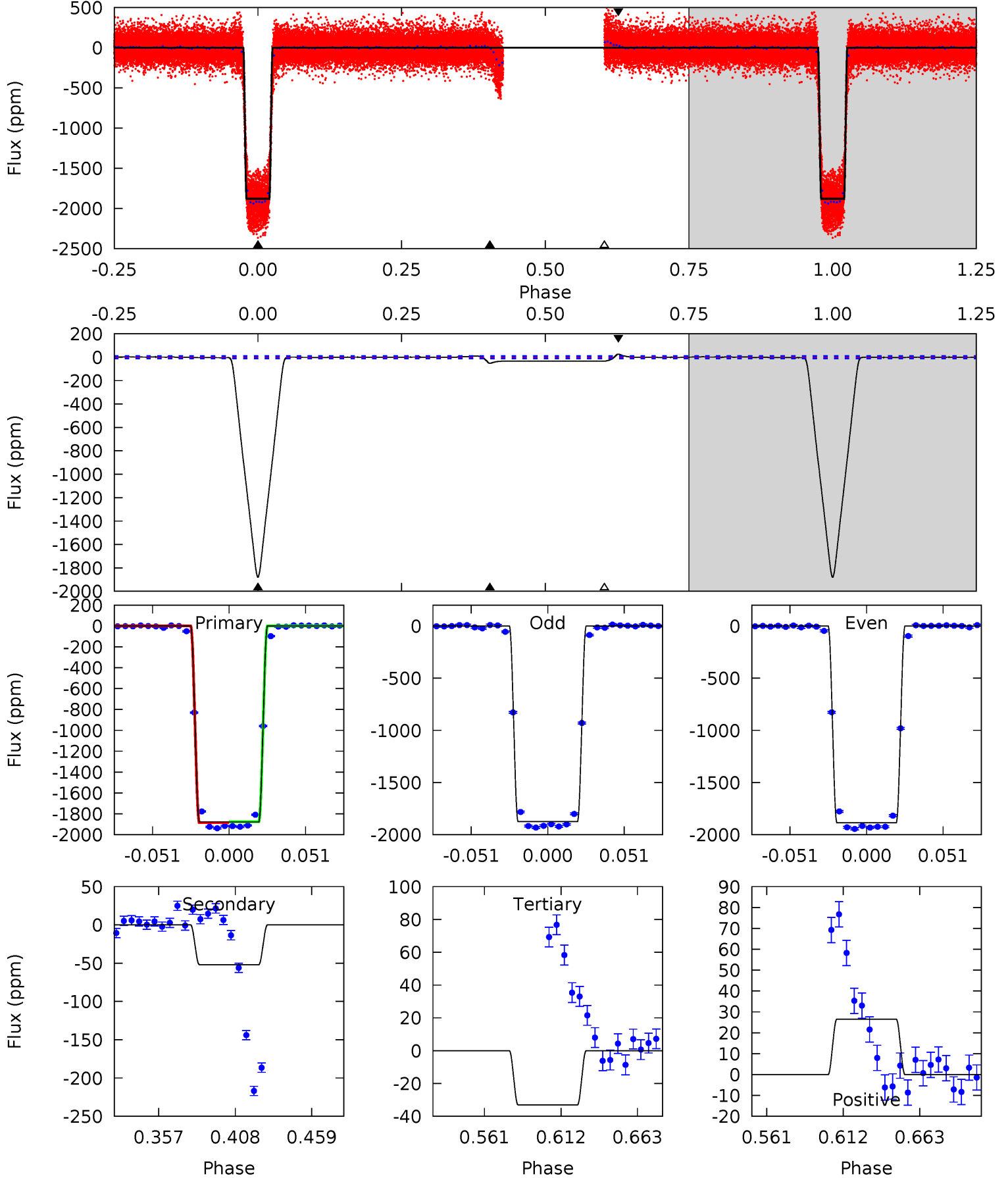
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
612.3	30.3	19.1	19.7	4.68	1.90	12.6	593.2	592.6	11.2	10.5	4.41	0.99	0.03	5.59



# Alt Model-Shift Uniqueness Test

004069213-02, P = 5.194236 Days, E = 126.706972 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
875.8	24.2	15.4	12.4	4.70	1.95	2.41	860.4	863.4	8.81	11.8	2.60	1.01	0.01	1.98





### Stellar Parameters For KIC 004069213

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6100^{+91}_{-73}$	$3.895^{+0.196}_{-0.084}$	$-0.060^{+0.150}_{-0.150}$	$2.086^{+0.283}_{-0.526}$	$1.244^{+0.160}_{-0.160}$	$0.193^{+0.208}_{-0.052}$
	+1%/-1%	+5%/-2%	+250%/-250%	+14%/-25%	+13%/-13%	+108%/-27%
Source	SPE68	SPE68	SPE68	DSEP		

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

### Secondary Eclipse Parameters for KIC 004069213-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-100 \pm 3$	$10.47^{+0.86}_{-1.40}$	$2147^{+90}_{-132}$	$3289^{+37}_{-39}$	$2.025^{+0.555}_{-0.280}$
Alt.	$-52 \pm 2$	$9.94^{+0.87}_{-1.19}$	$2150^{+84}_{-119}$	$2978^{+46}_{-41}$	$1.171^{+0.311}_{-0.175}$

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

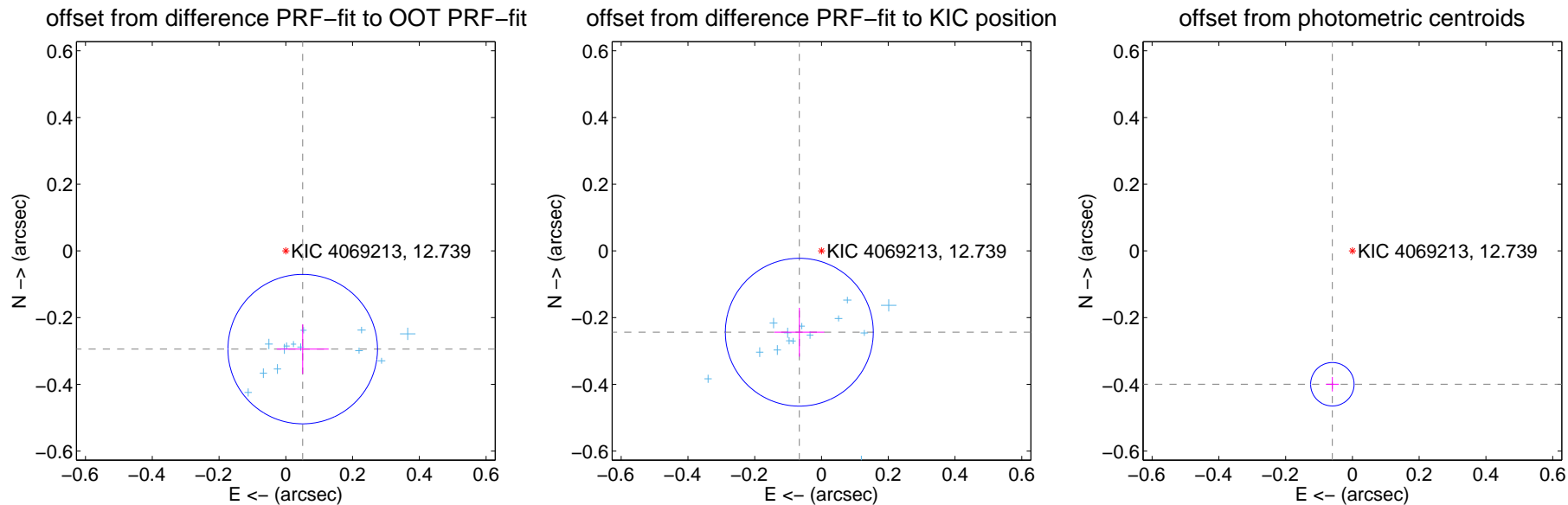
## DV Centroid Data

Supplemental centroid analysis for 004069213-02. Kepler magnitude: 12.74. Transit SNR 315.24

There are 14 quarters with good PRF difference image offsets

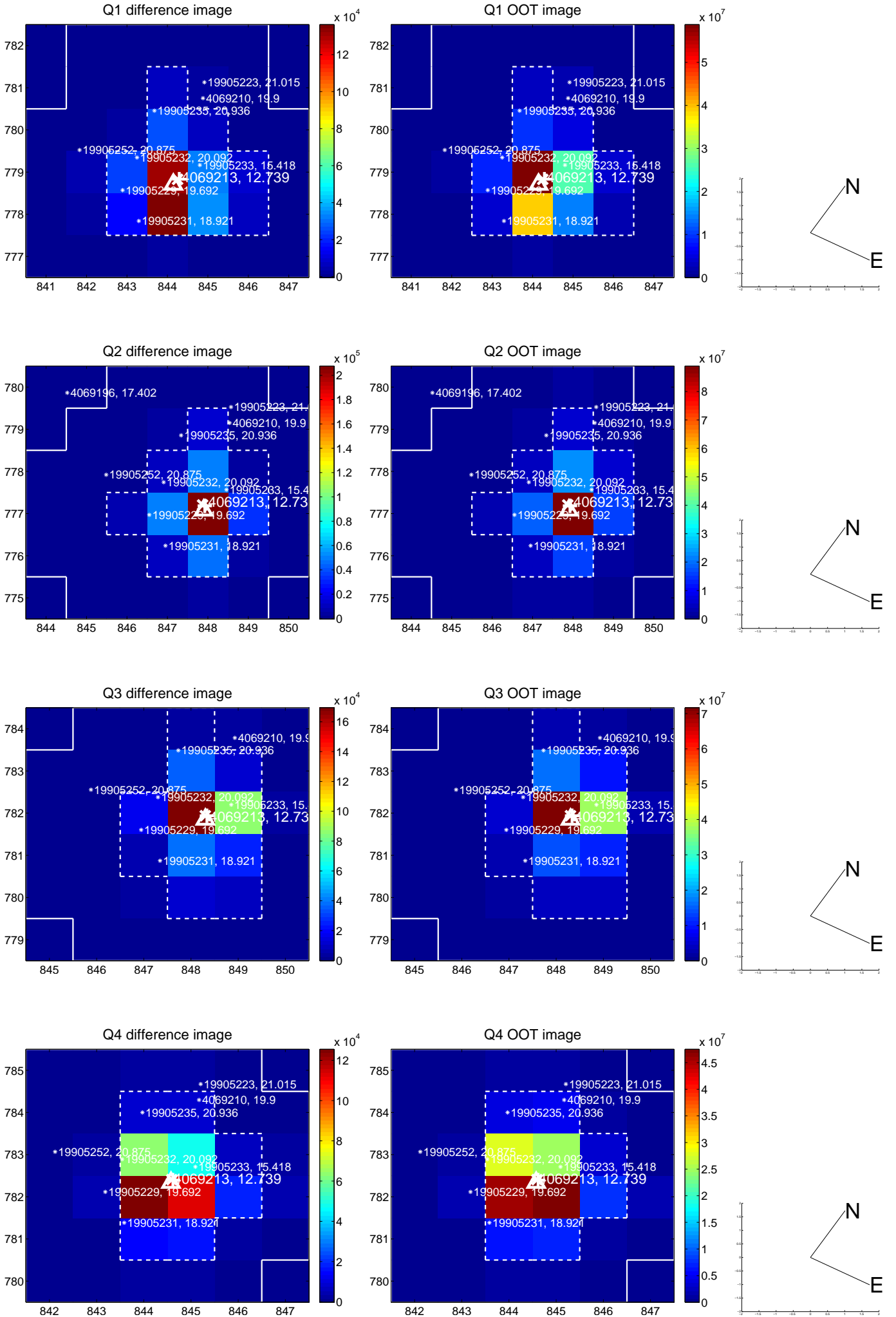
The direct PRF centroid is offset from the target star catalog position by about 0.18 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.299 \pm 0.075$	4.00	$-0.051 \pm 0.078$	$-0.294 \pm 0.074$
PRF-fit source offset from KIC position	$0.253 \pm 0.074$	3.42	$0.066 \pm 0.075$	$-0.244 \pm 0.073$
photometric centroid source offset	$0.40 \pm 0.02$	18.62	$0.06 \pm 0.02$	$-0.40 \pm 0.02$

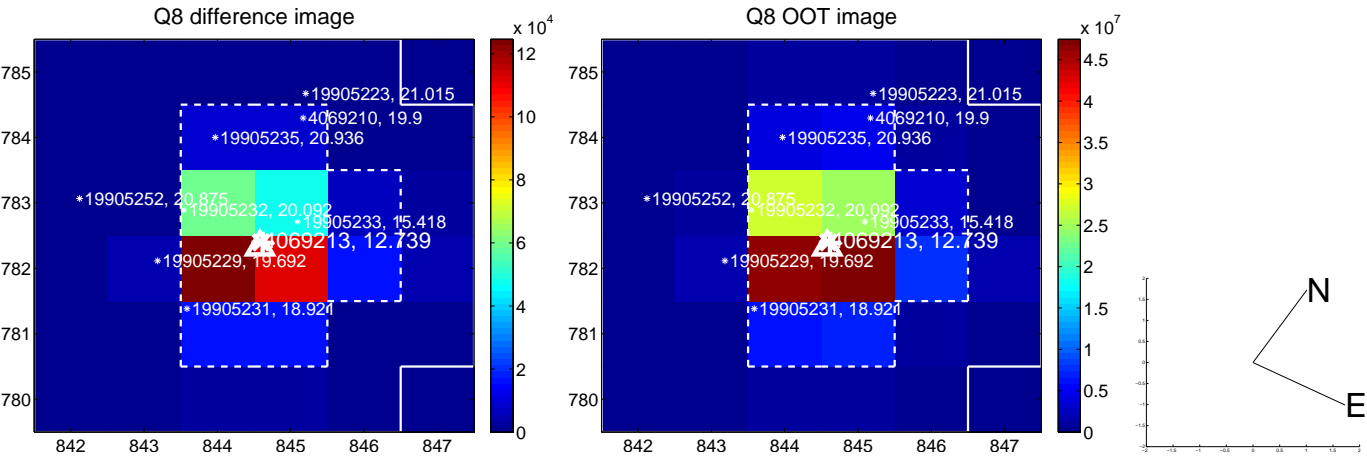
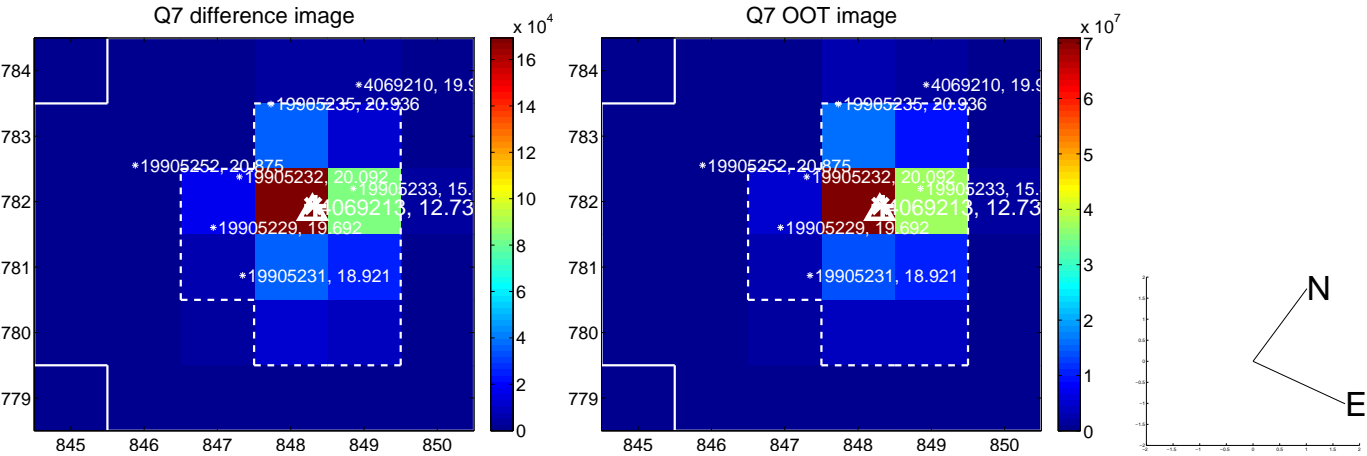
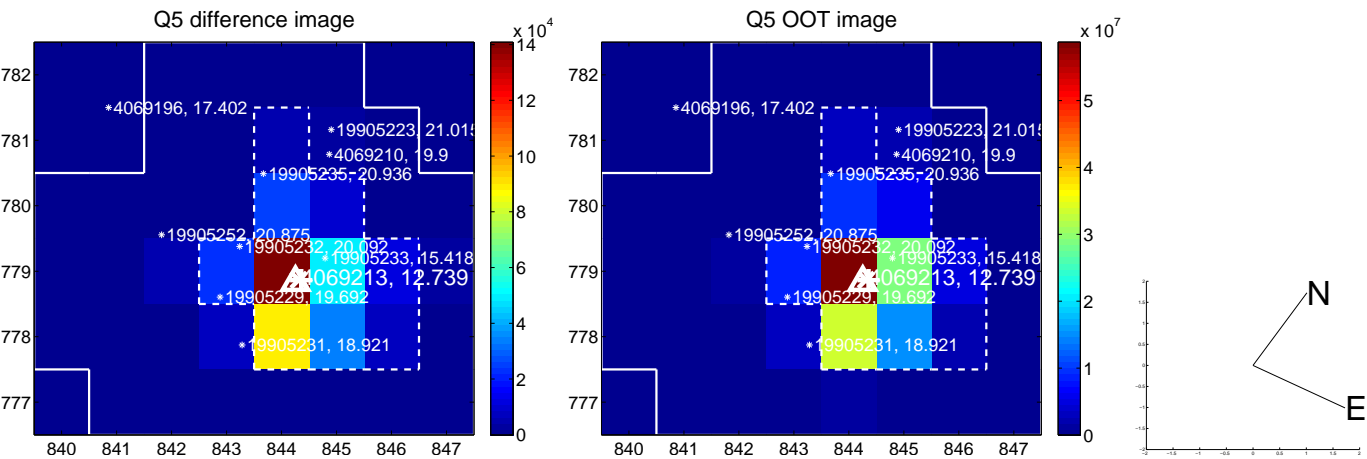


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

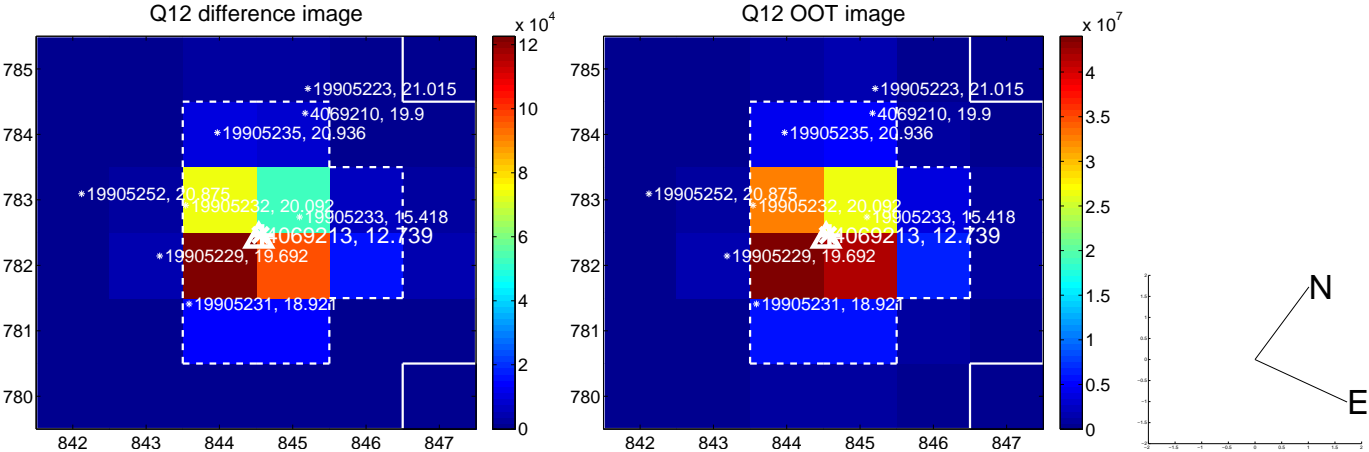
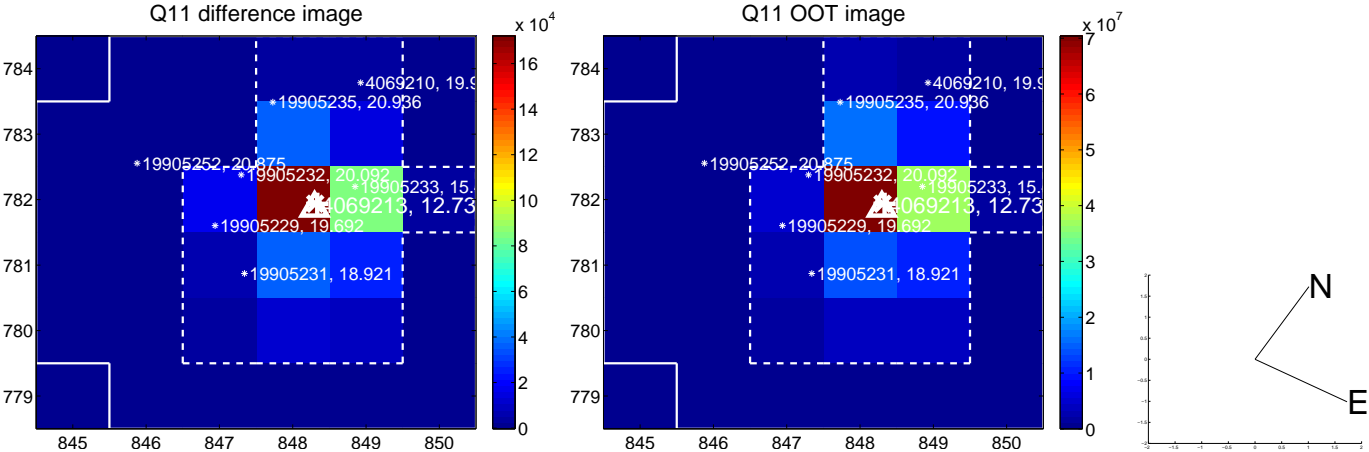
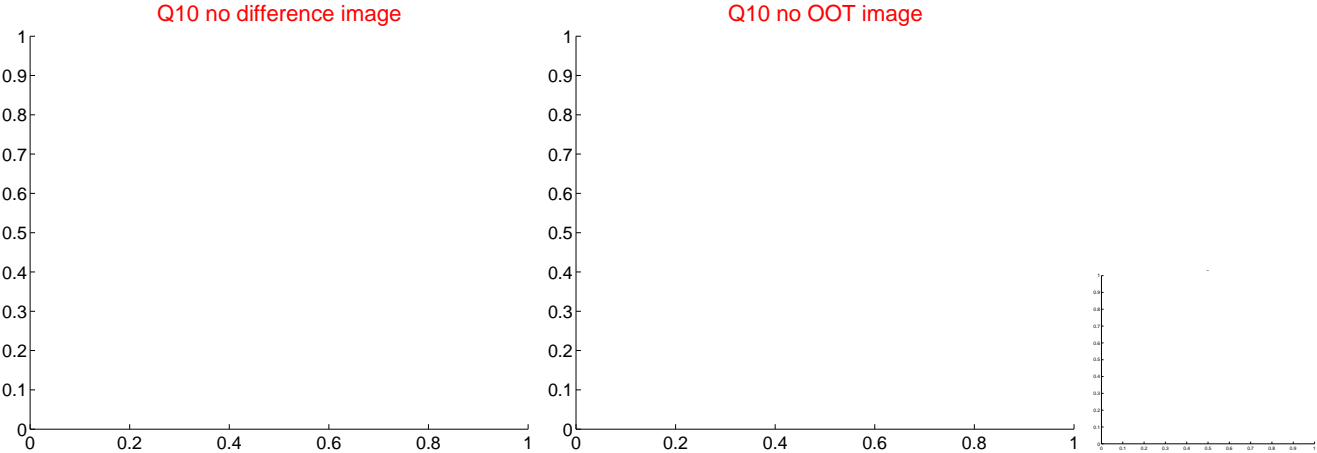
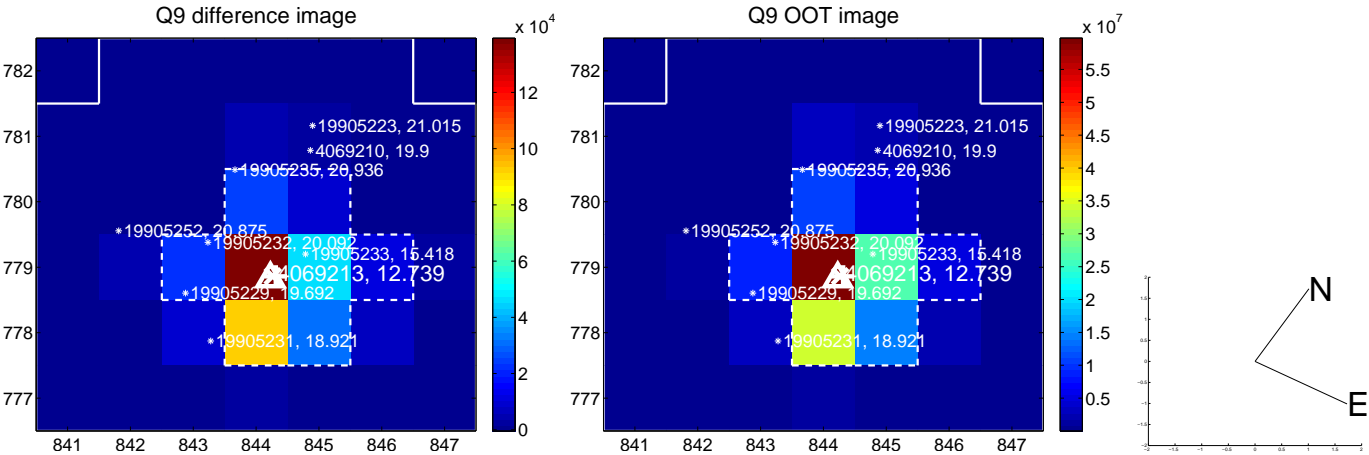
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



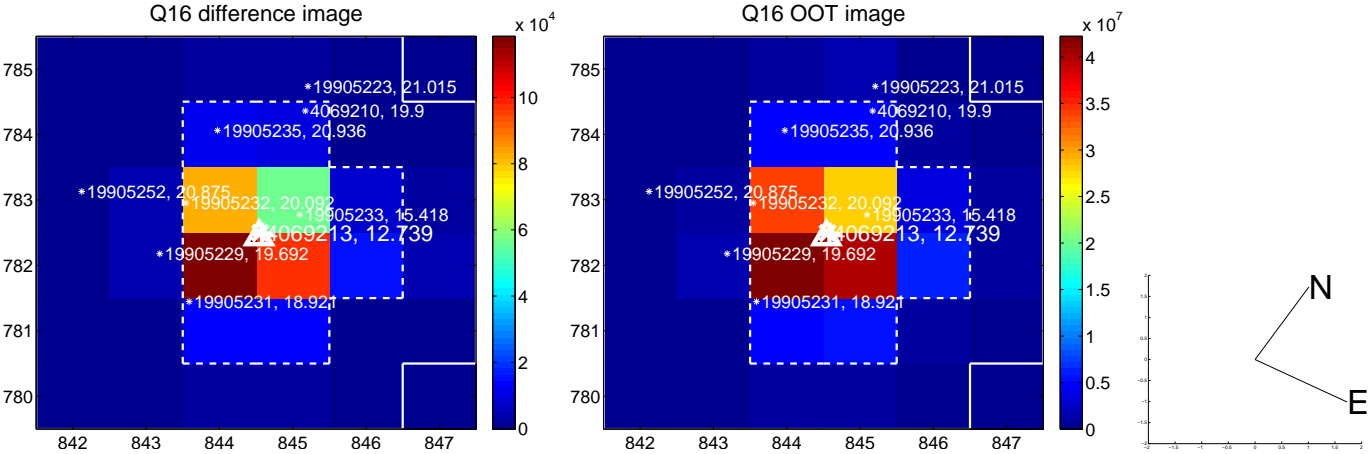
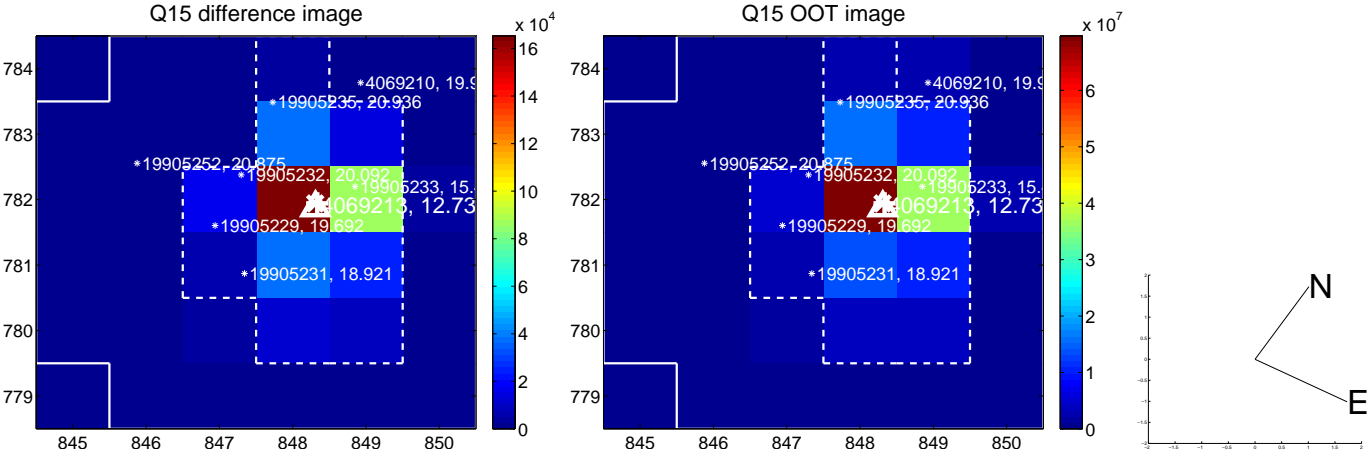
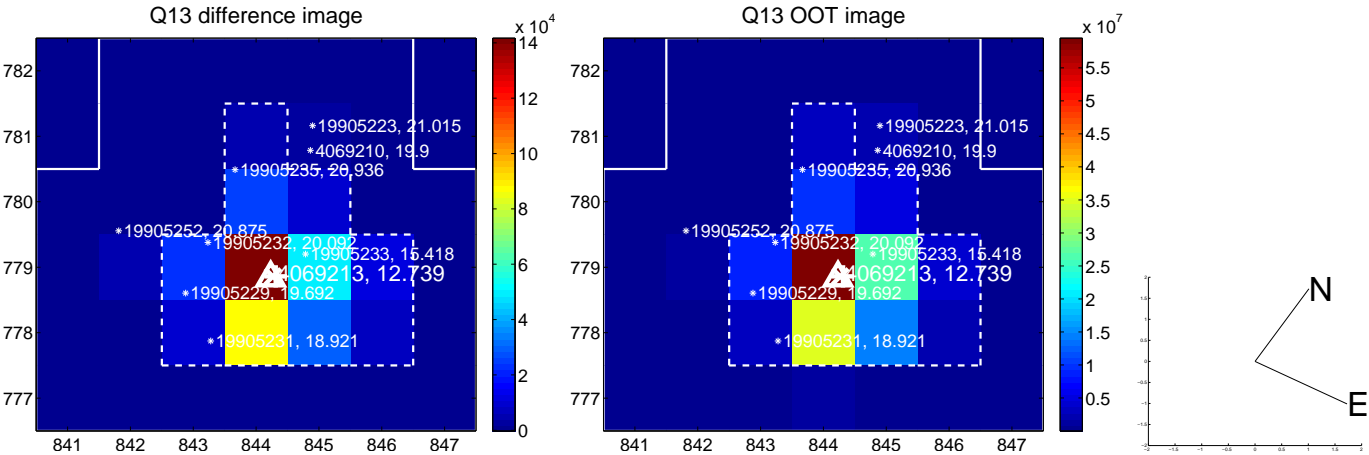
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



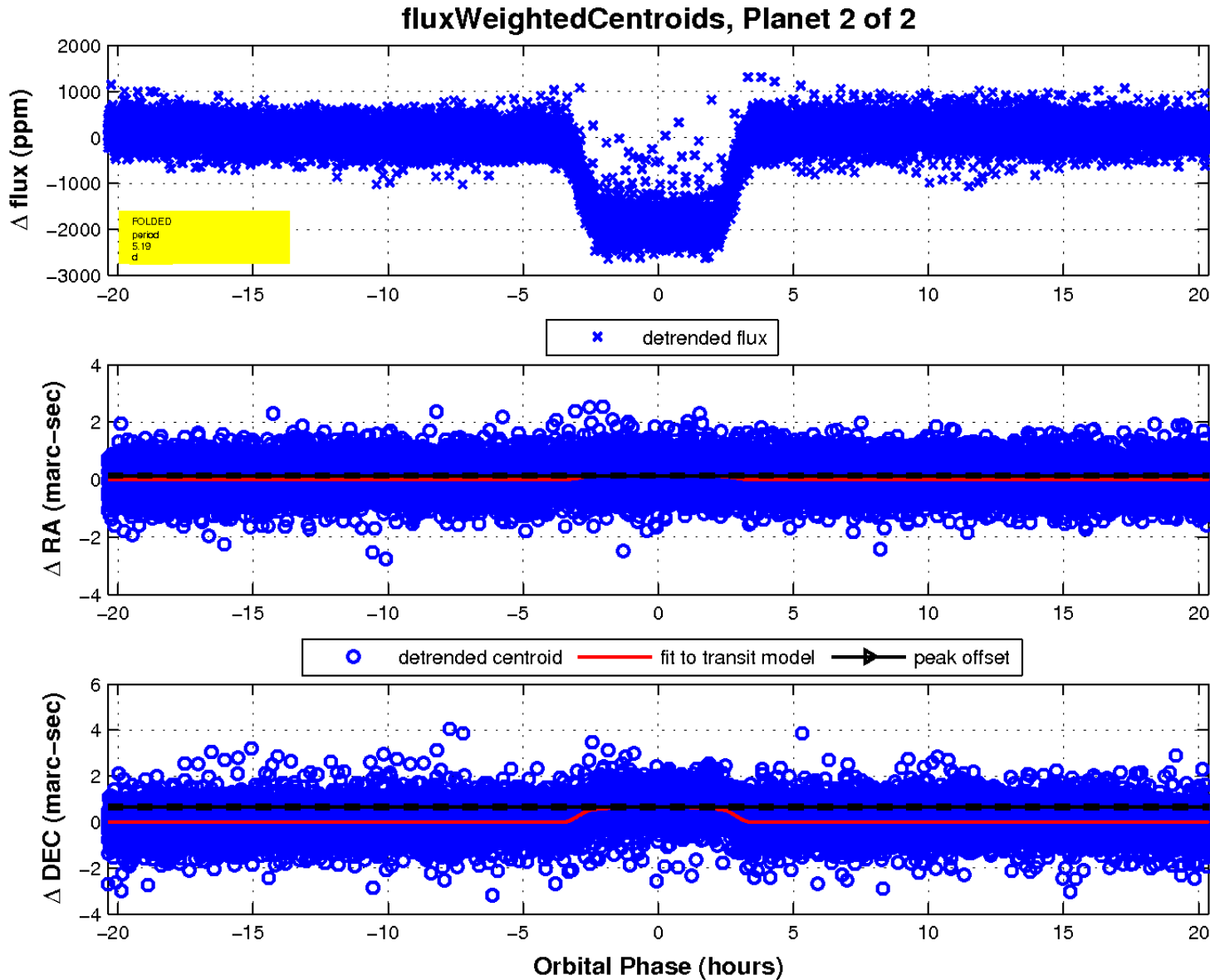
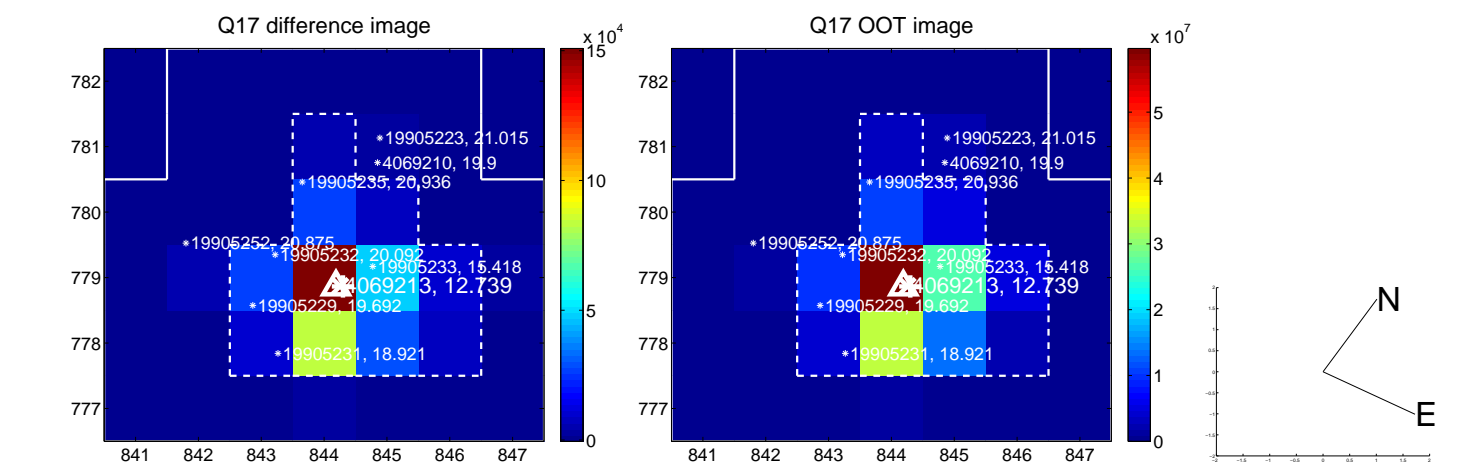
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

