

# KIC 010729645

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010729645-01	OBS	No	0.584091	131.940554	18.0	2.053	12.4	9.7	3.11	8195	1.54	121954.14
010729645-03	OBS	No	243.330125	204.252022	151.6	67.614	7.4	7.8	3.11	8195	4.16	39.20

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010729645-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT
010729645-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS

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

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

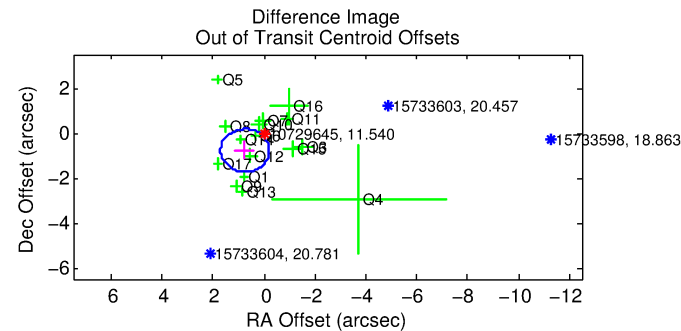
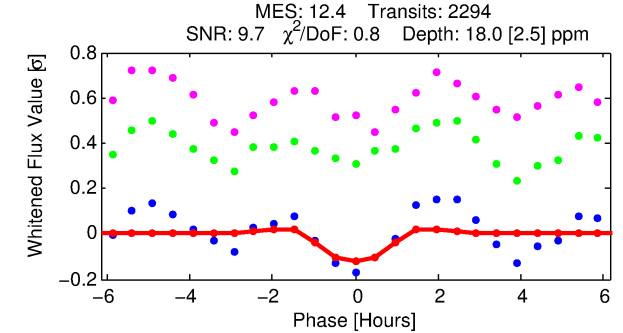
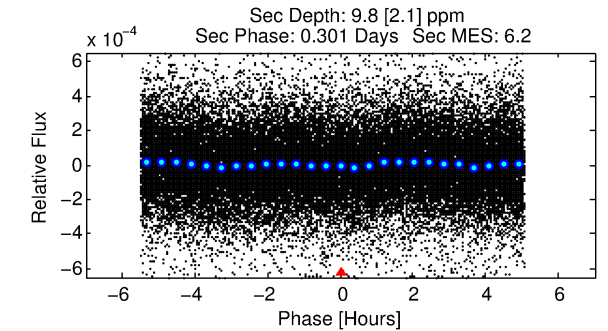
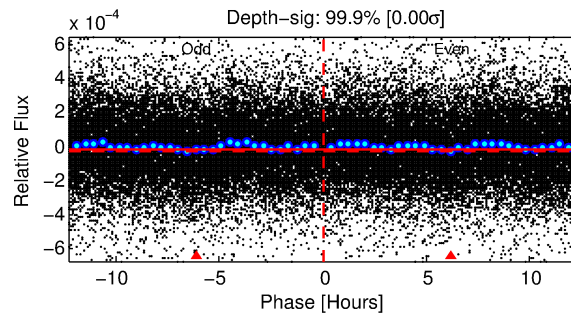
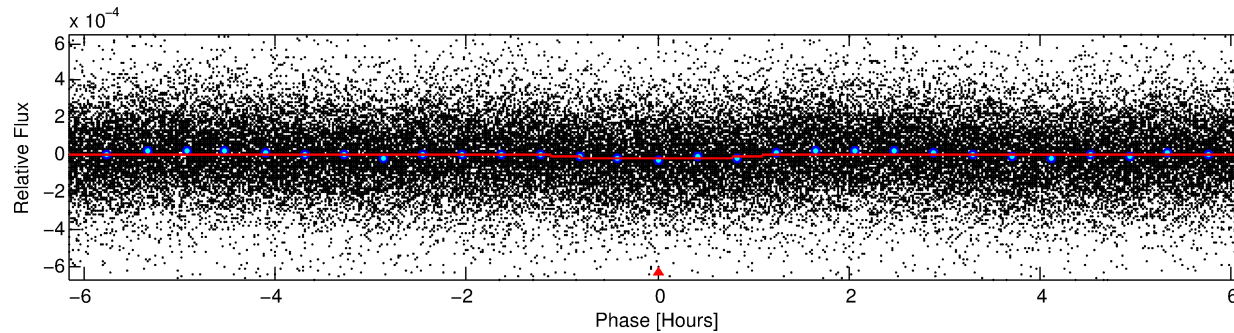
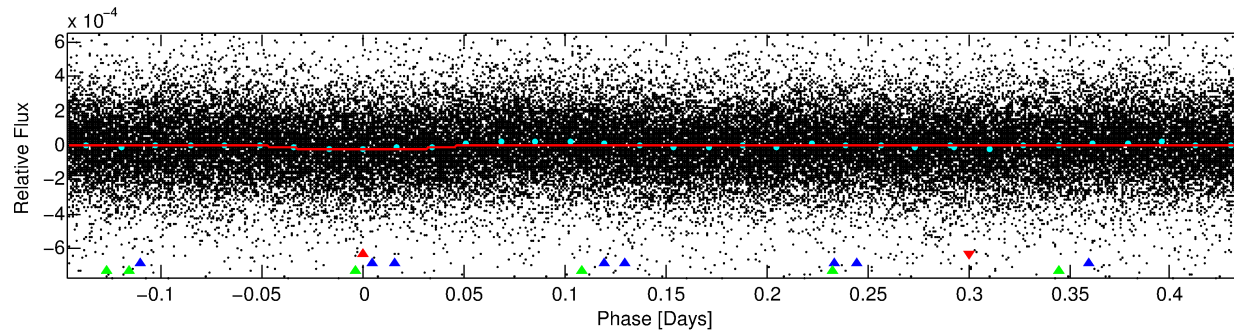
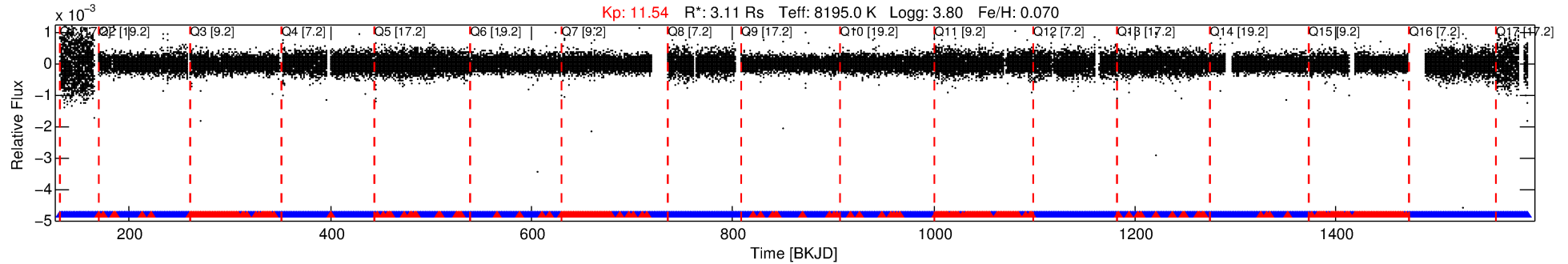
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010729645-01

No Significant Match Found

# DV One-Page Summary

KIC: 10729645 Candidate: 1 of 3 Period: 0.584 d



## DV Fit Results:

Period = 0.58409 [0.00001] d  
Epoch = 131.9406 [0.0027] BKJD  
Rp/R\* = 0.0045 [0.0016]  
a/R\* = 1.35 [1.31]  
b = 0.90 [0.46]  
Seff = 121954.14 [77812.63]  
Teq = 4765 [760] K  
Rp = 1.54 [0.84] Re  
a = 0.0179 [0.0070] AU  
Ag = 0.73 [0.69] [-0.39σ]  
Teffp = 6811 [1264] K [1.39σ]

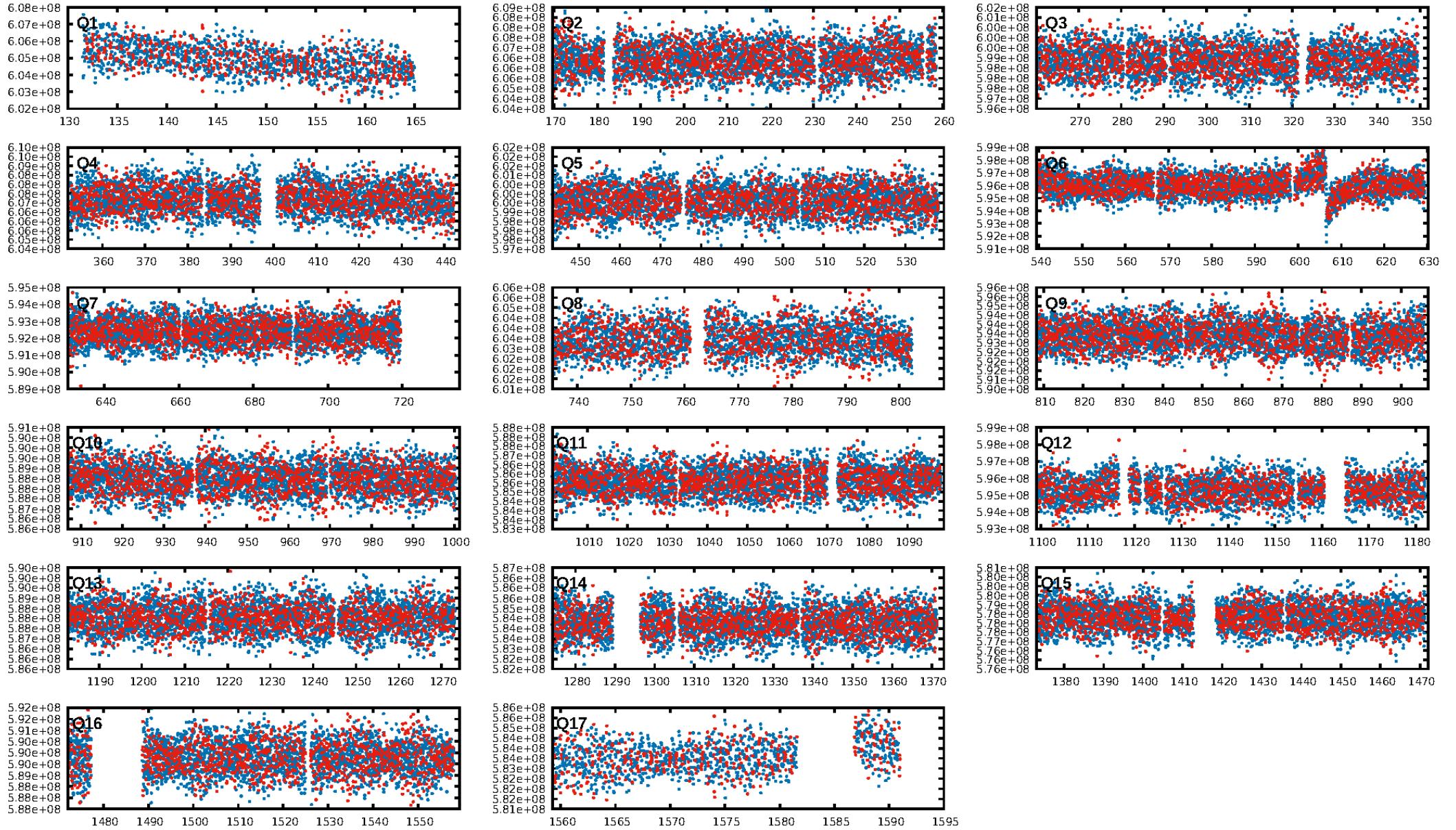
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [706.66σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 1.74e-31  
RollingBand-fgt: 0.80 [1747/2191]  
GhostDiagnostic-chr: 1.553  
Centroid-sig: 25.5%  
Centroid-so: 0.466 arcsec [1.08σ]  
OotOffset-rm: 1.084 arcsec [3.39σ]  
KicOffset-rm: 1.266 arcsec [3.76σ]  
OotOffset-st: 3/4/4/5 [16]  
KicOffset-st: 3/4/4/5 [16]  
DiffImageQuality-fgm: 0.56 [9/16]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 10:07:28 Z

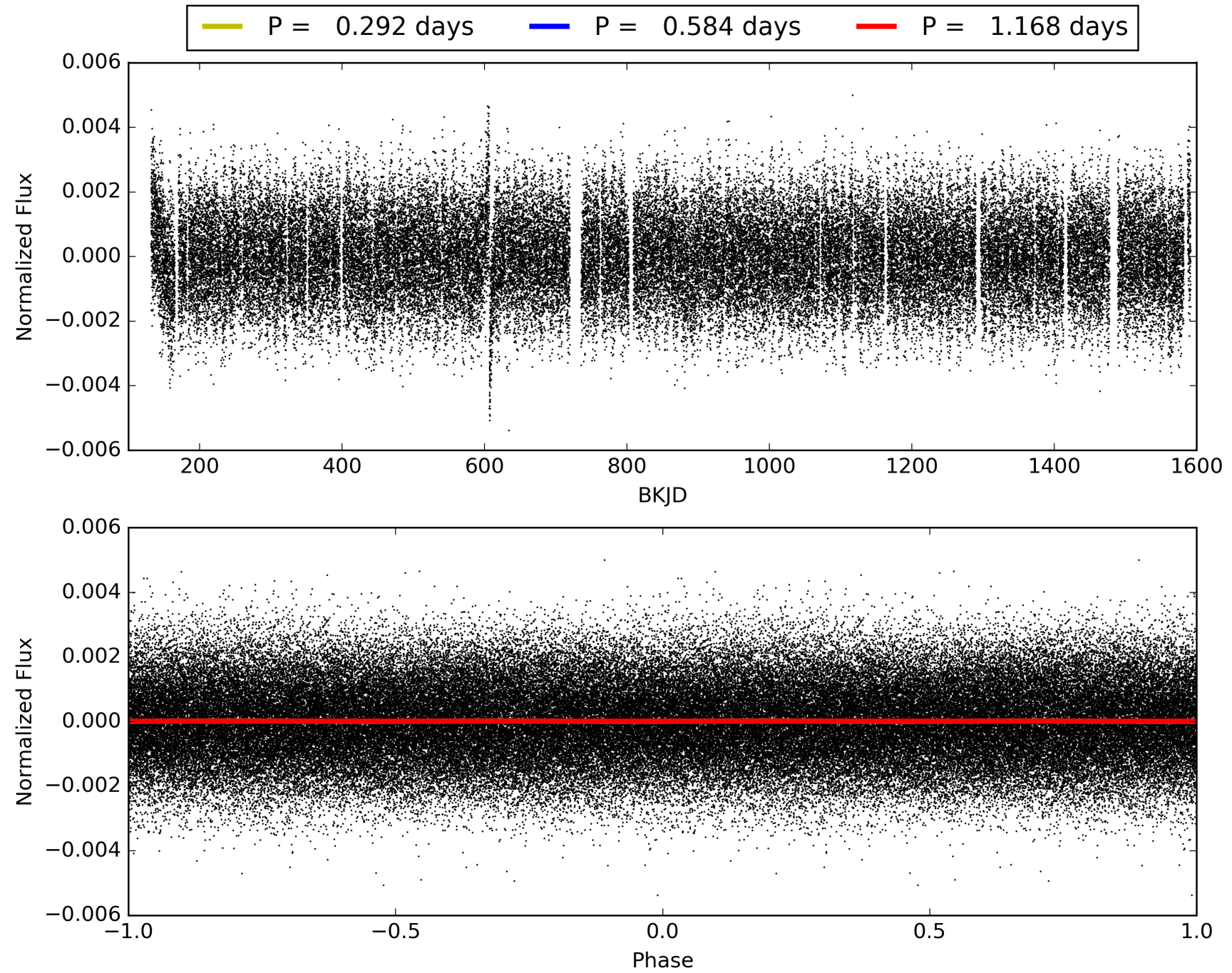
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 010729645-01, PDC Light Curves



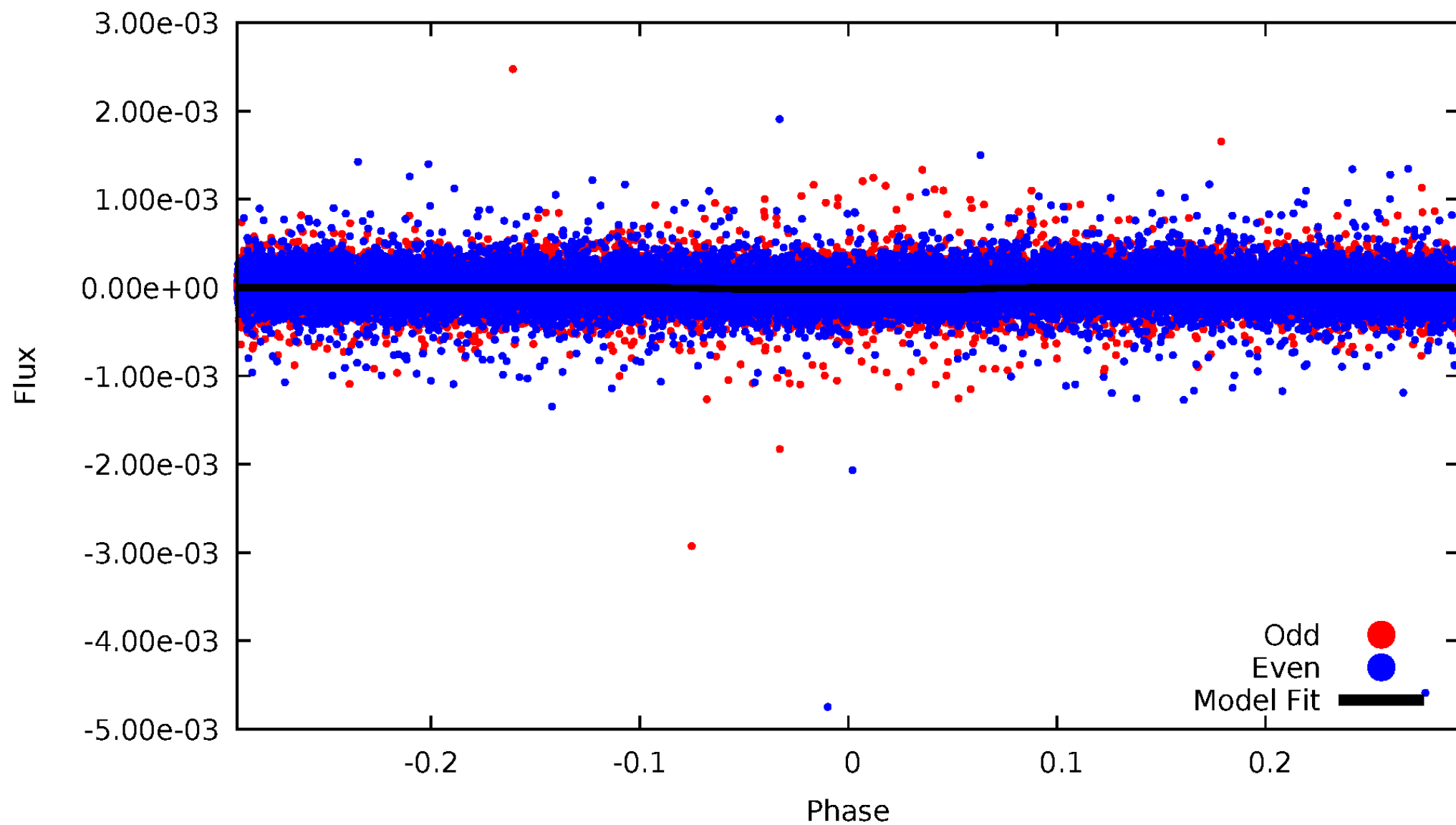


# TCE 010729645-01



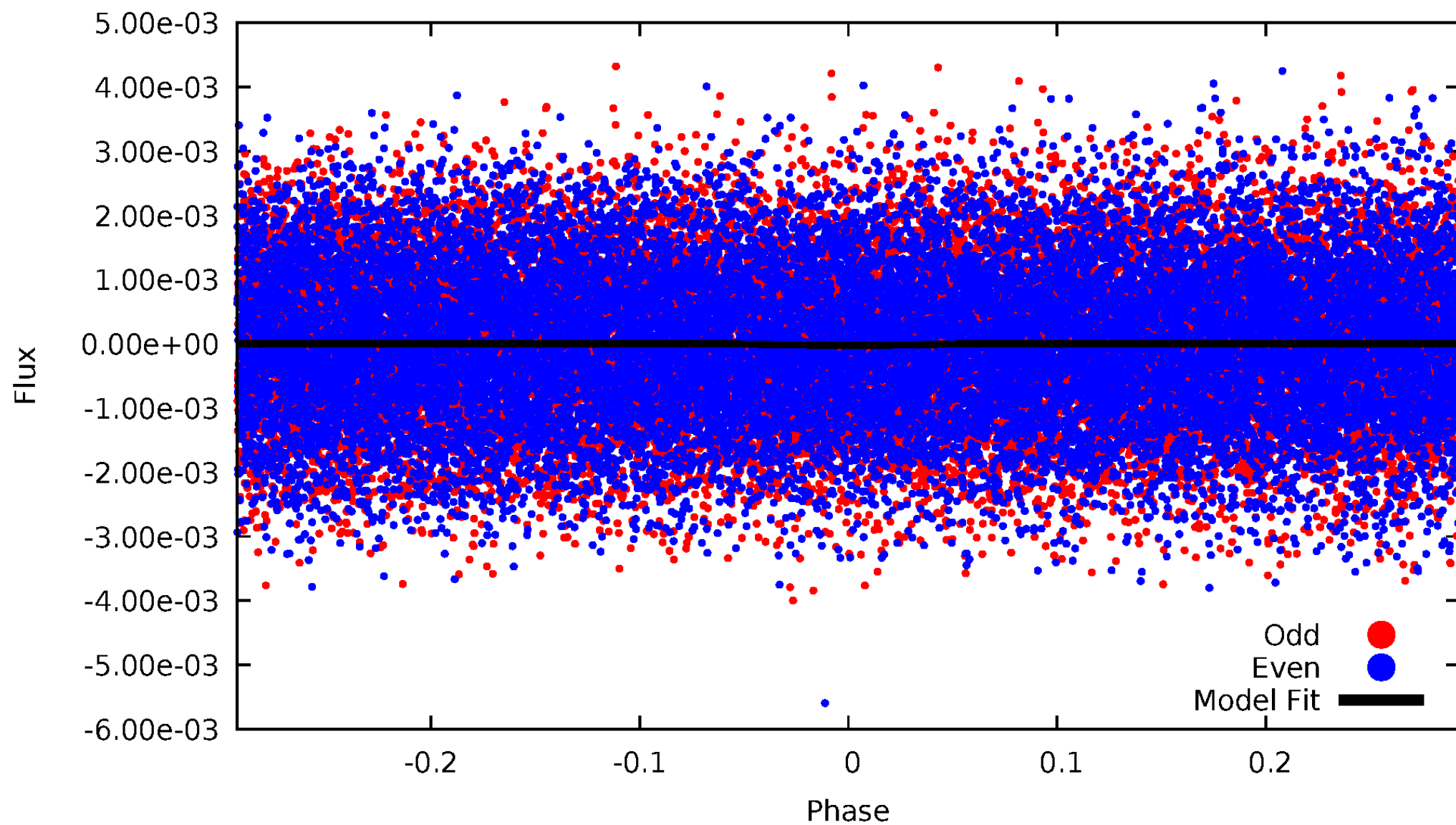
# DV Odd/Even

TCE 010729645-01



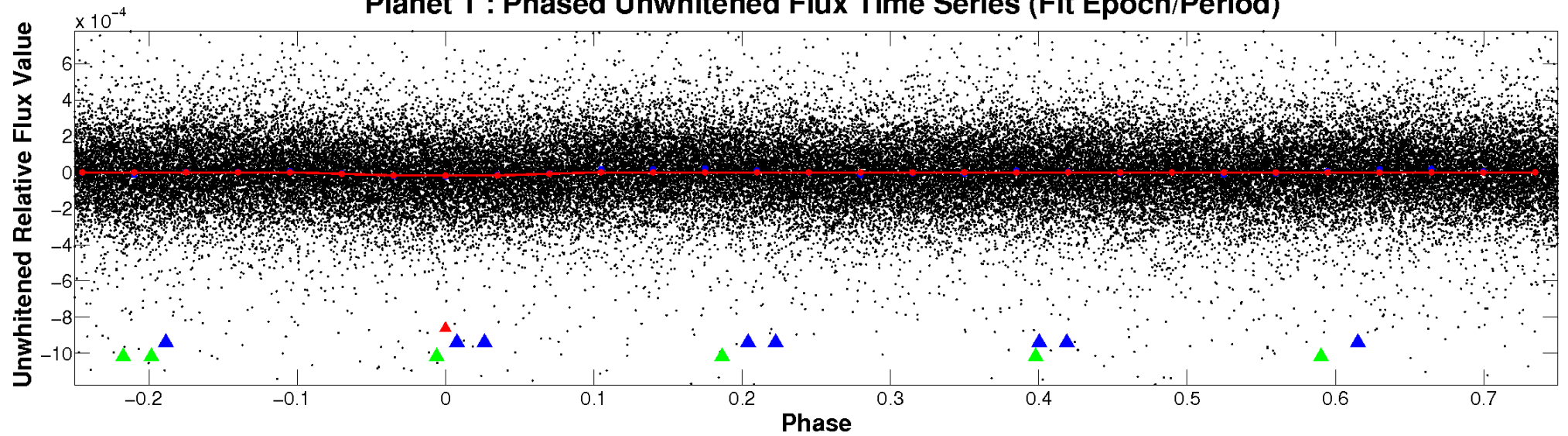
# ALT Odd/Even

TCE 010729645-01

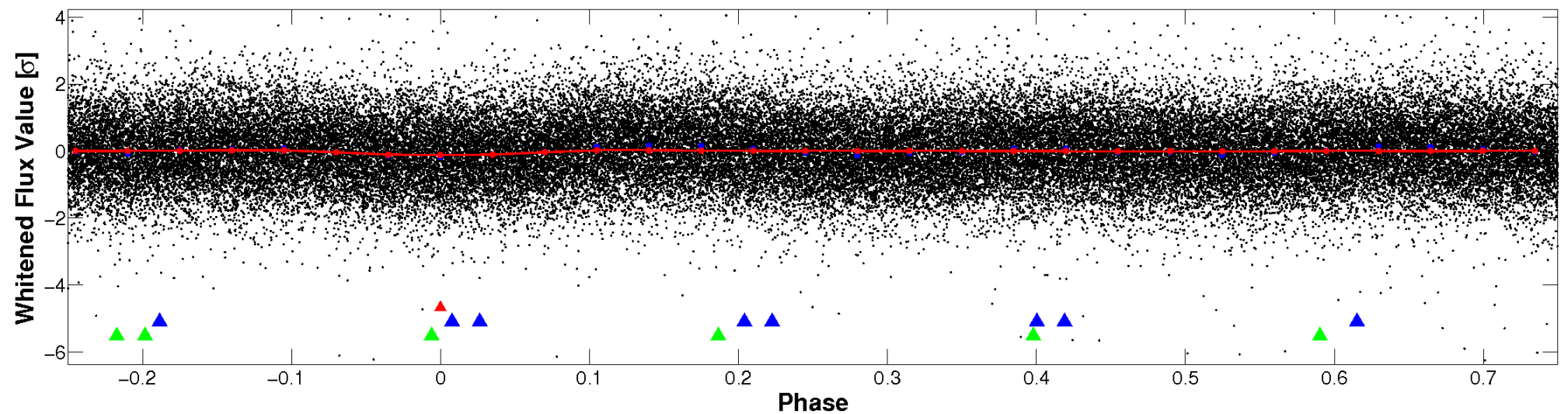


# Non-Whitened Vs. Whitened Light Curve

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



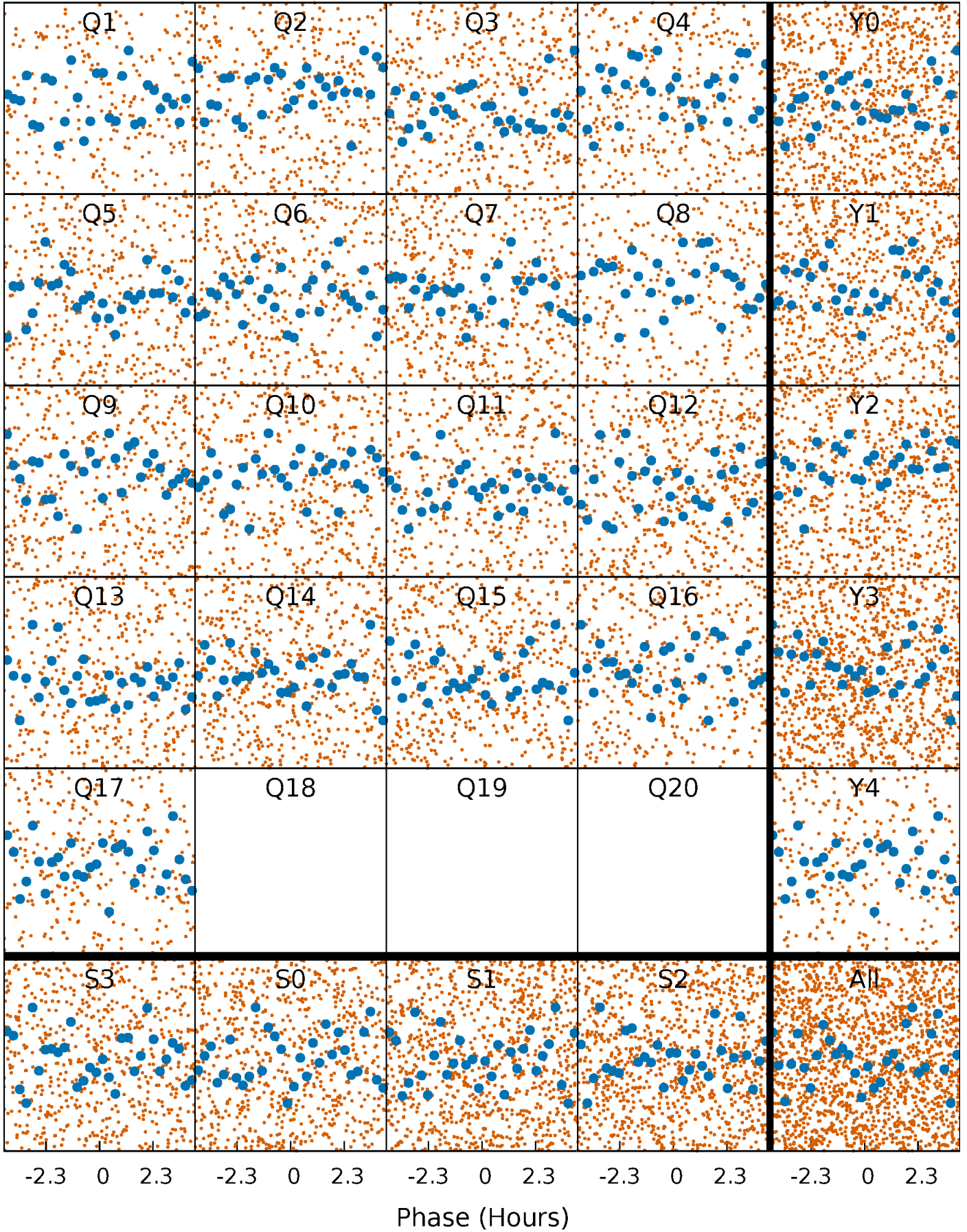
**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**





# PDC Quarter-Phased Transit Curves

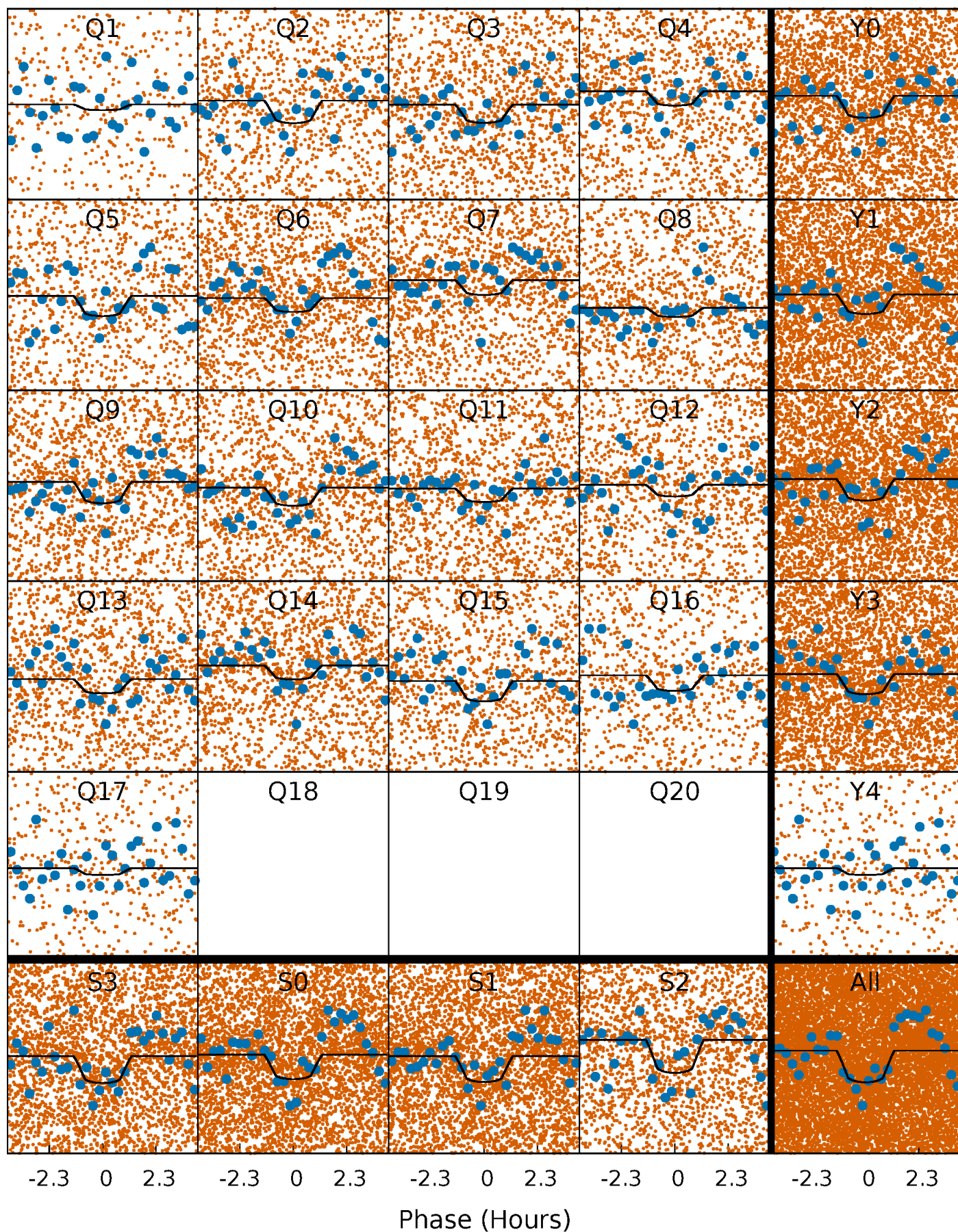
TCE 010729645-01 P= 0.584091 Days  $T_0=131.940554$  (BKJD)





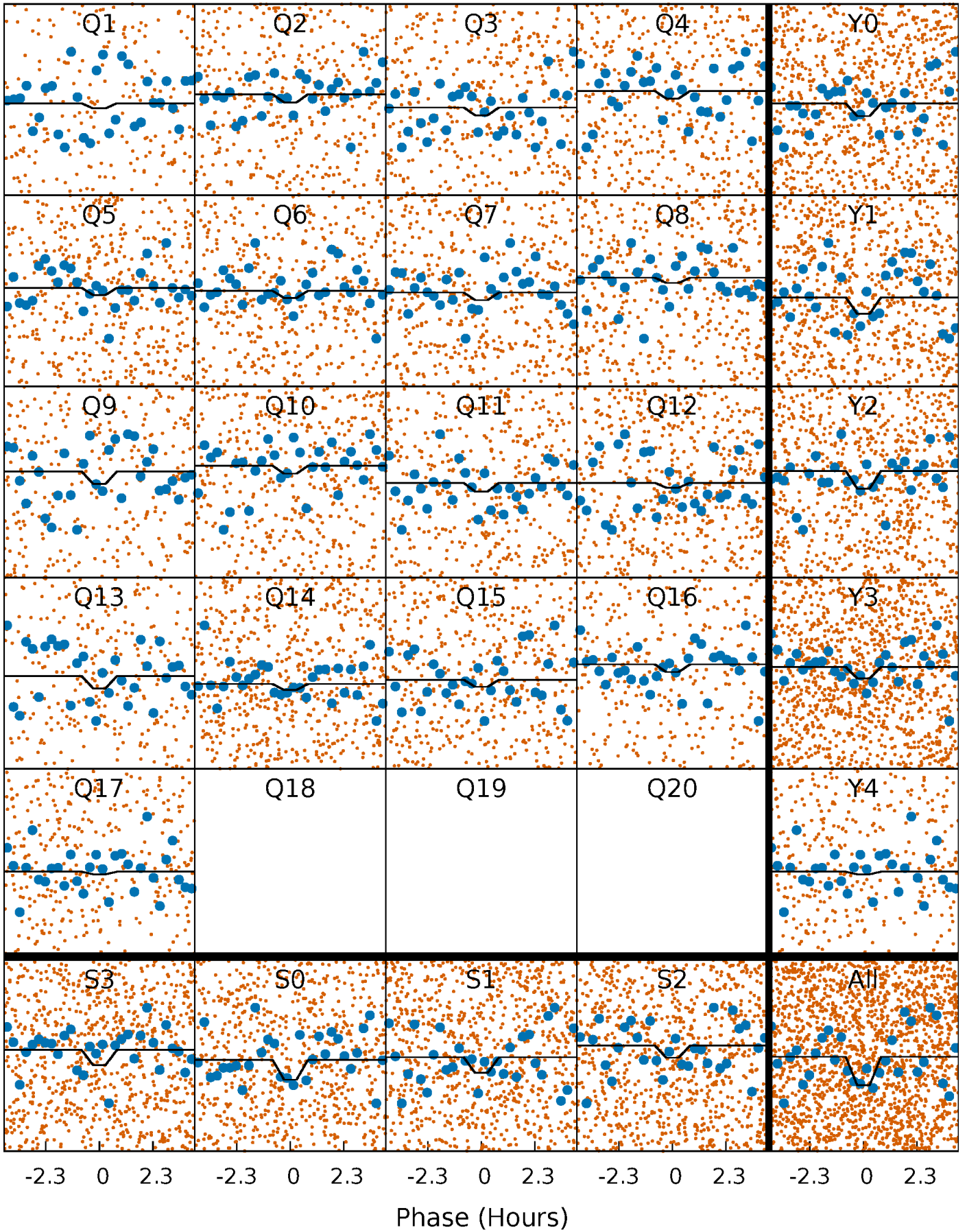
# DV Quarter-Phased Transit Curves

TCE 010729645-01 P= 0.584091 Days  $T_0=131.940554$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

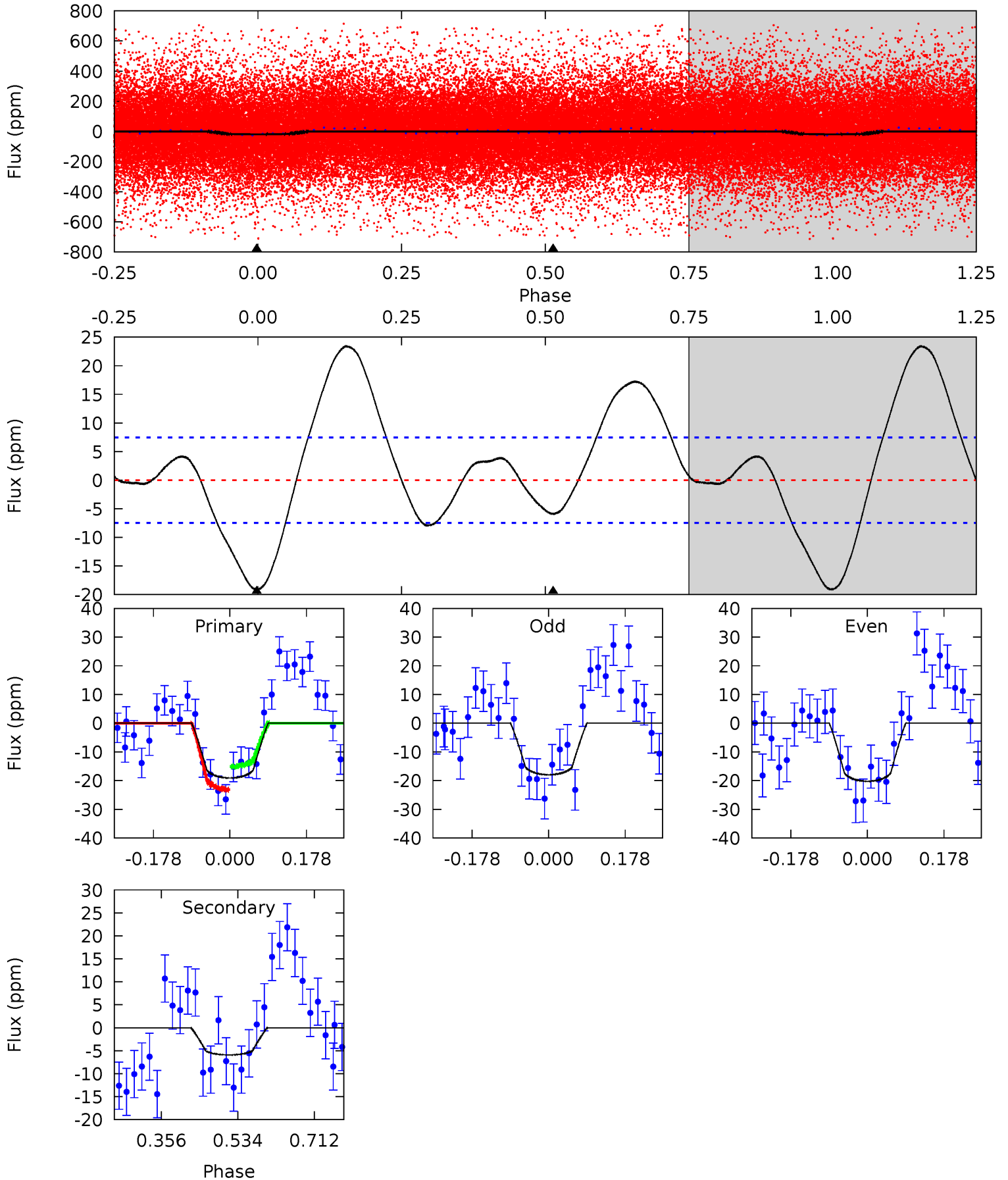
TCE 010729645-01 P= 0.584092 Days  $T_0=131.940612$  (BKJD)



# DV Model-Shift Uniqueness Test

010729645-01, P = 0.584091 Days, E = 131.356463 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
11.3	3.51	0	0	4.44	1.35	4.55	11.3	11.3	3.51	3.51	0.69	1.12	0.55	2.40

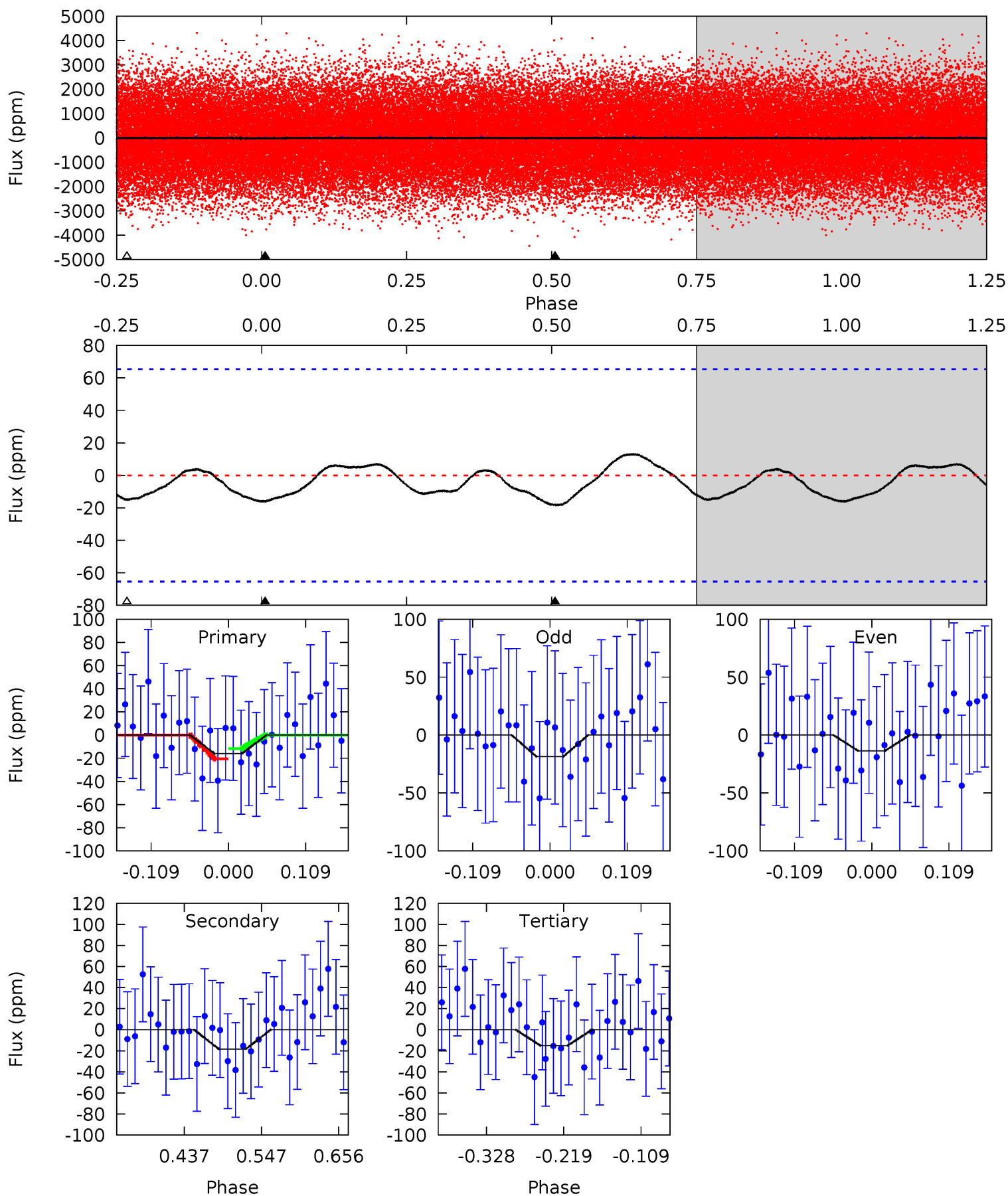




# Alt Model-Shift Uniqueness Test

010729645-01, P = 0.584092 Days, E = 131.356520 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
1.12	1.28	1.05	0	4.55	1.60	0.56	0.07	1.12	0.23	1.28	0.18	0.75	0.42	0.31





### Stellar Parameters For KIC 010729645

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$8195^{+227}_{-368}$	$3.803^{+0.353}_{-0.118}$	$0.070^{+0.250}_{-0.450}$	$3.109^{+0.886}_{-1.329}$	$2.239^{+0.291}_{-0.631}$	$0.105^{+0.293}_{-0.046}$
	+3%/-4%	+9%/-3%	+357%/-643%	+28%/-43%	+13%/-28%	+279%/-44%
Source	KIC0	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 010729645-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-6 \pm 2$	$1.40^{+0.62}_{-0.52}$	$6426^{+562}_{-604}$	$4746^{+1763}_{-8764}$	$0.525^{+0.766}_{-0.302}$
Alt.	$-18 \pm 14$	$1.41^{+0.56}_{-0.56}$	$6432^{+518}_{-731}$	$7104^{+3395}_{-10534}$	$1.465^{+2.726}_{-1.191}$

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

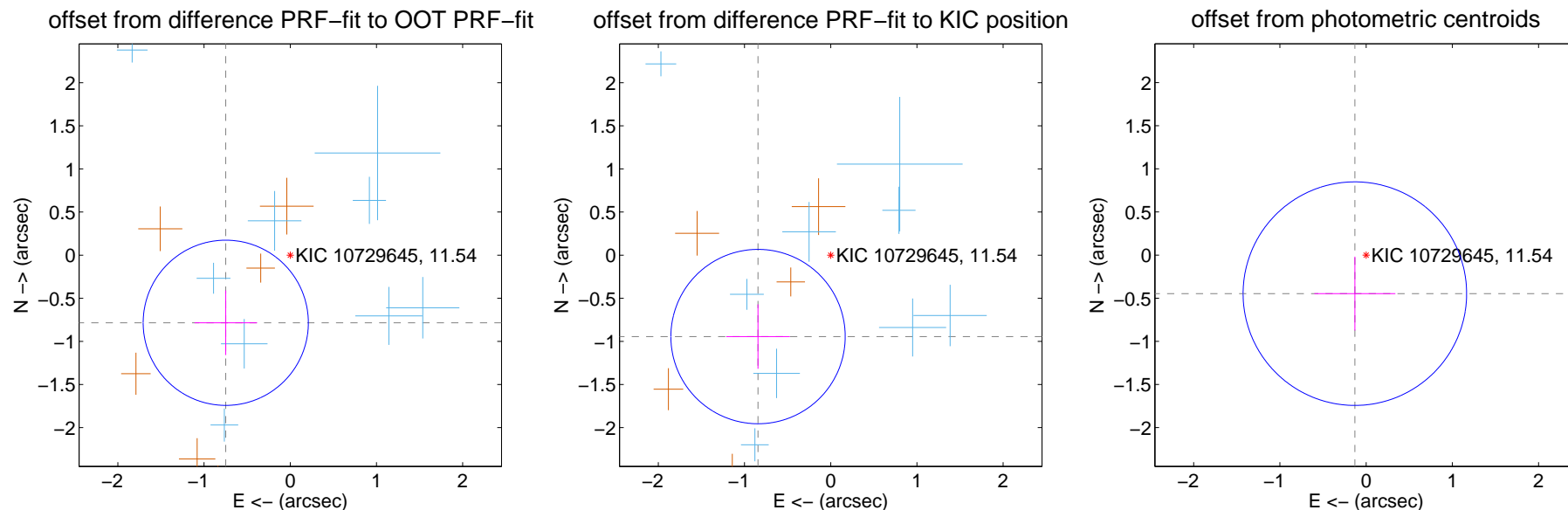
## DV Centroid Data

Supplemental centroid analysis for 010729645-01. **Kepler magnitude: 11.54.** Transit SNR 9.73

There are 9 quarters with good PRF difference image offsets

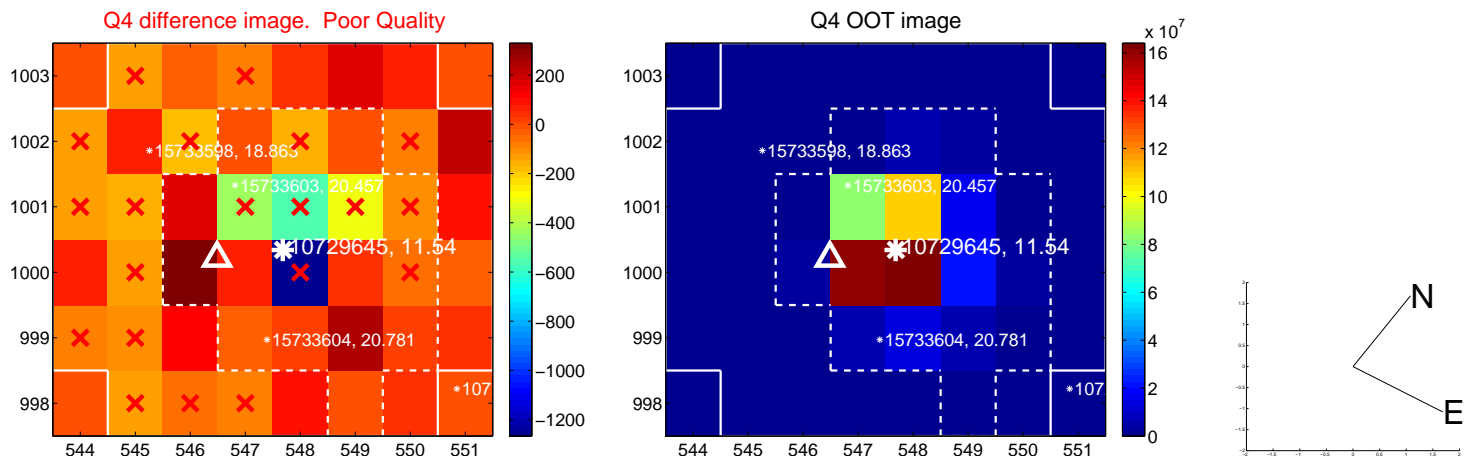
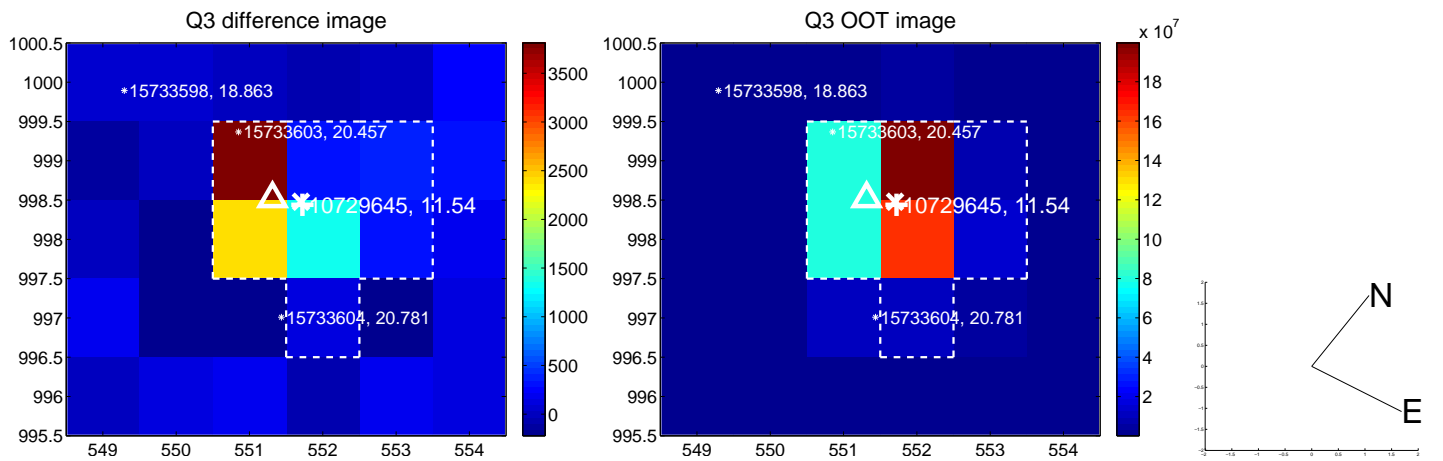
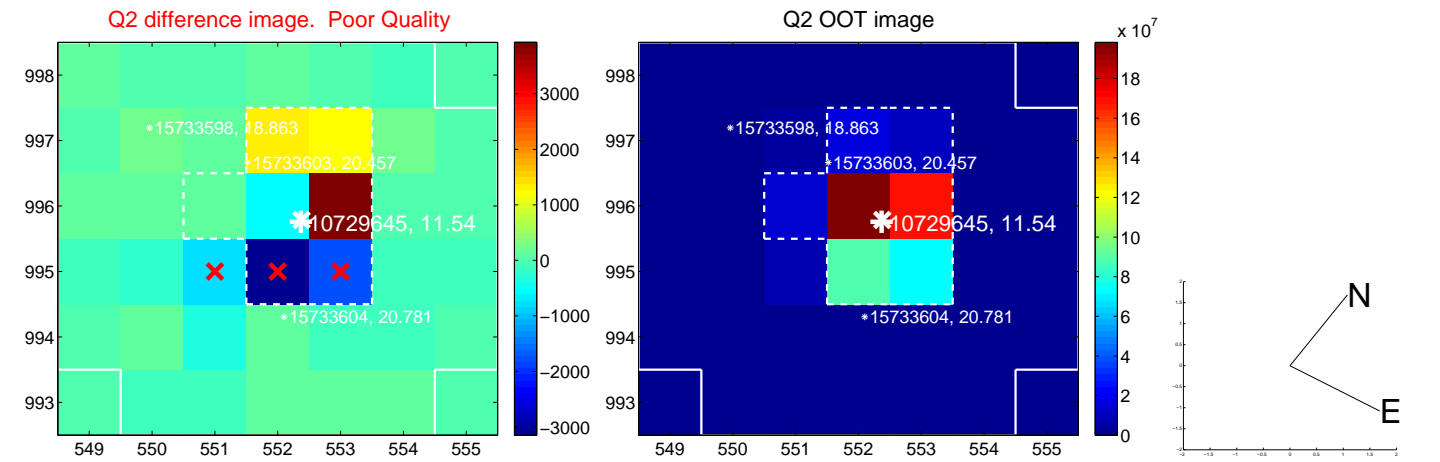
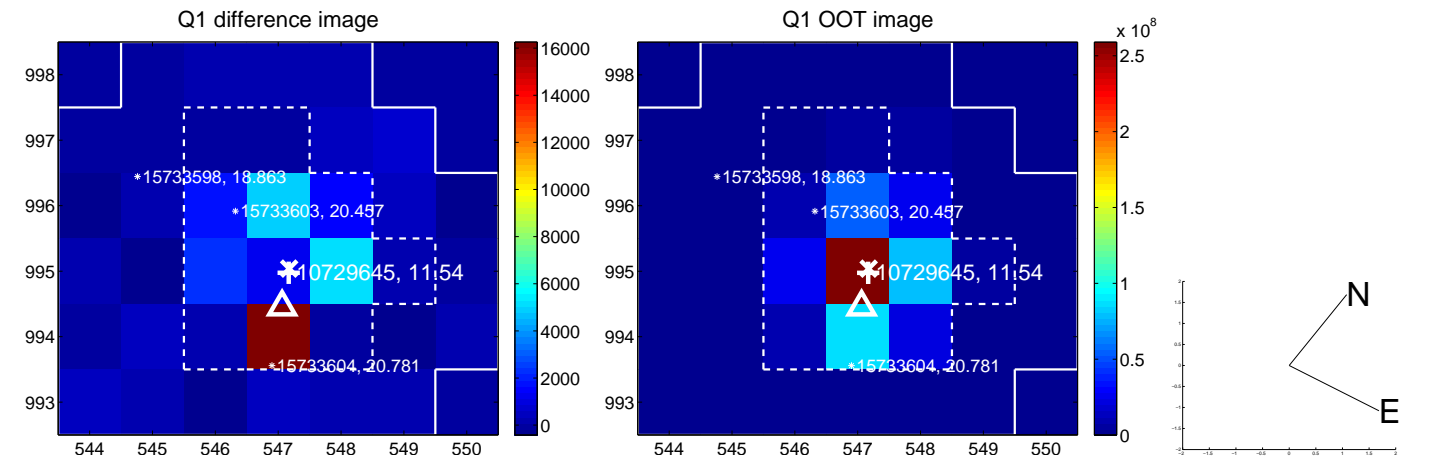
The direct PRF centroid is offset from the target star catalog position by about 0.20 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b><math>1.084 \pm 0.319</math></b>	<b>3.39</b>	$0.748 \pm 0.362$	$-0.784 \pm 0.374$
PRF-fit source offset from KIC position	<b><math>1.266 \pm 0.337</math></b>	<b>3.76</b>	$0.843 \pm 0.369$	$-0.944 \pm 0.374$
photometric centroid source offset	$0.47 \pm 0.43$	1.08	$0.13 \pm 0.47$	$-0.45 \pm 0.43$

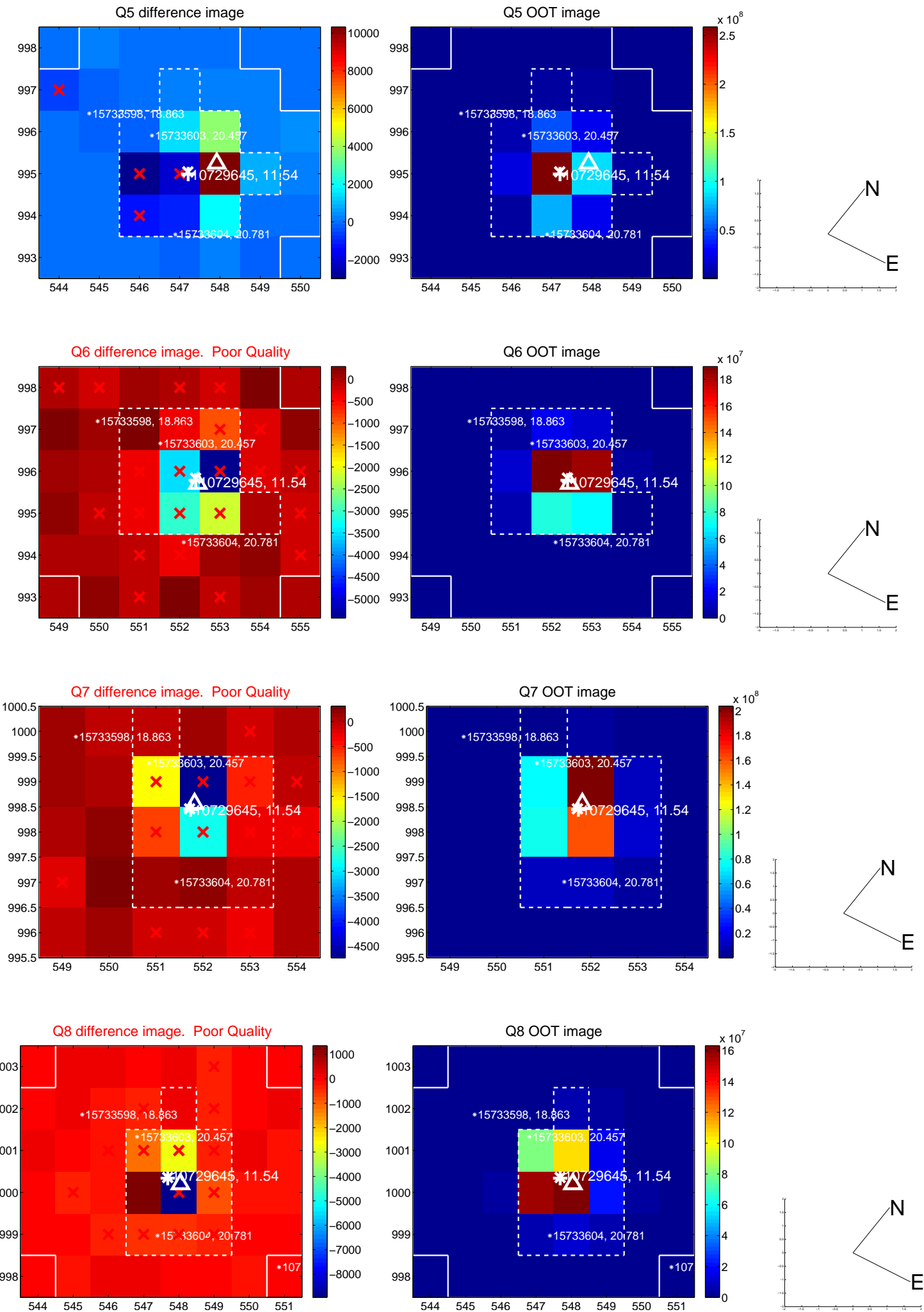


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

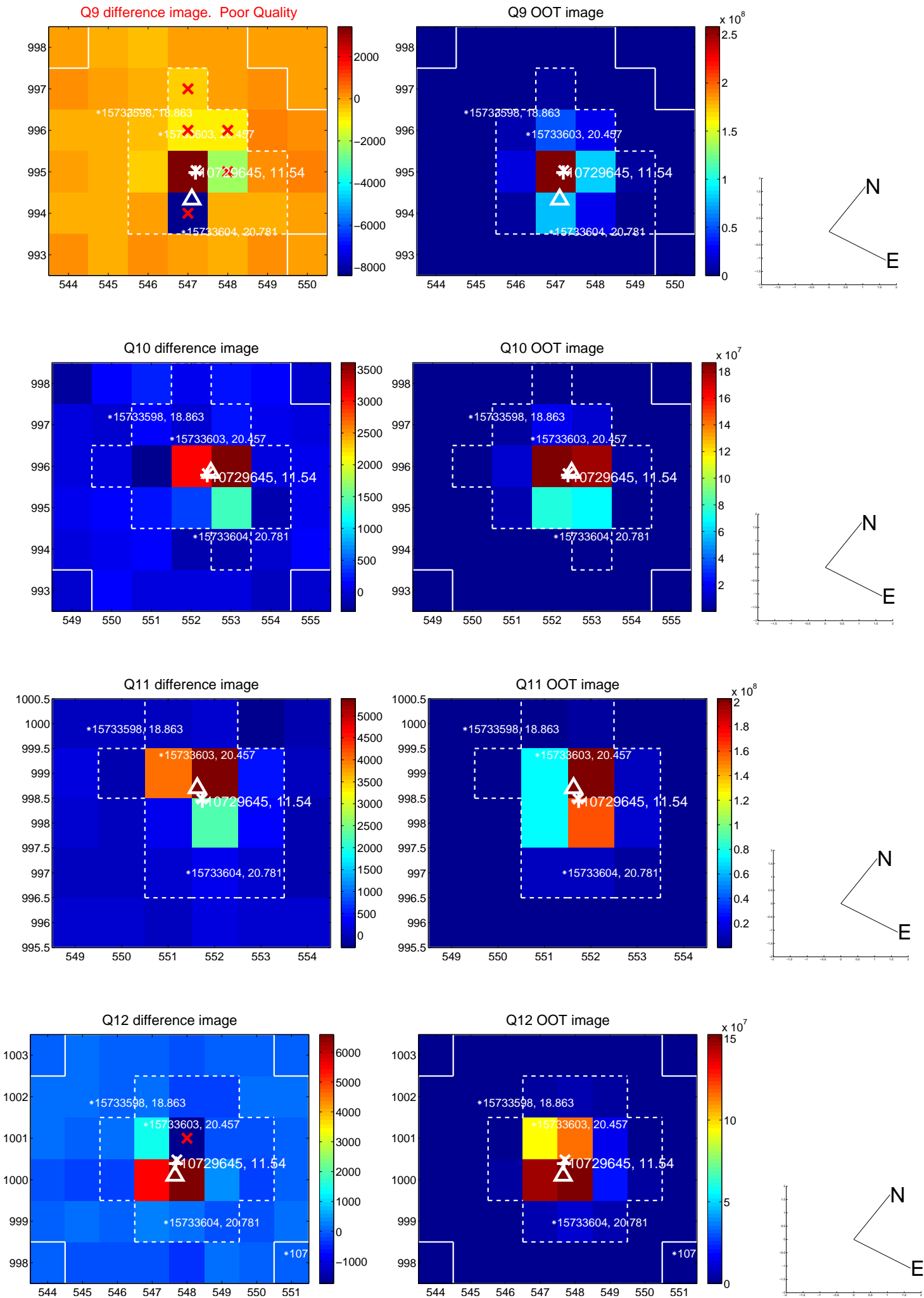


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

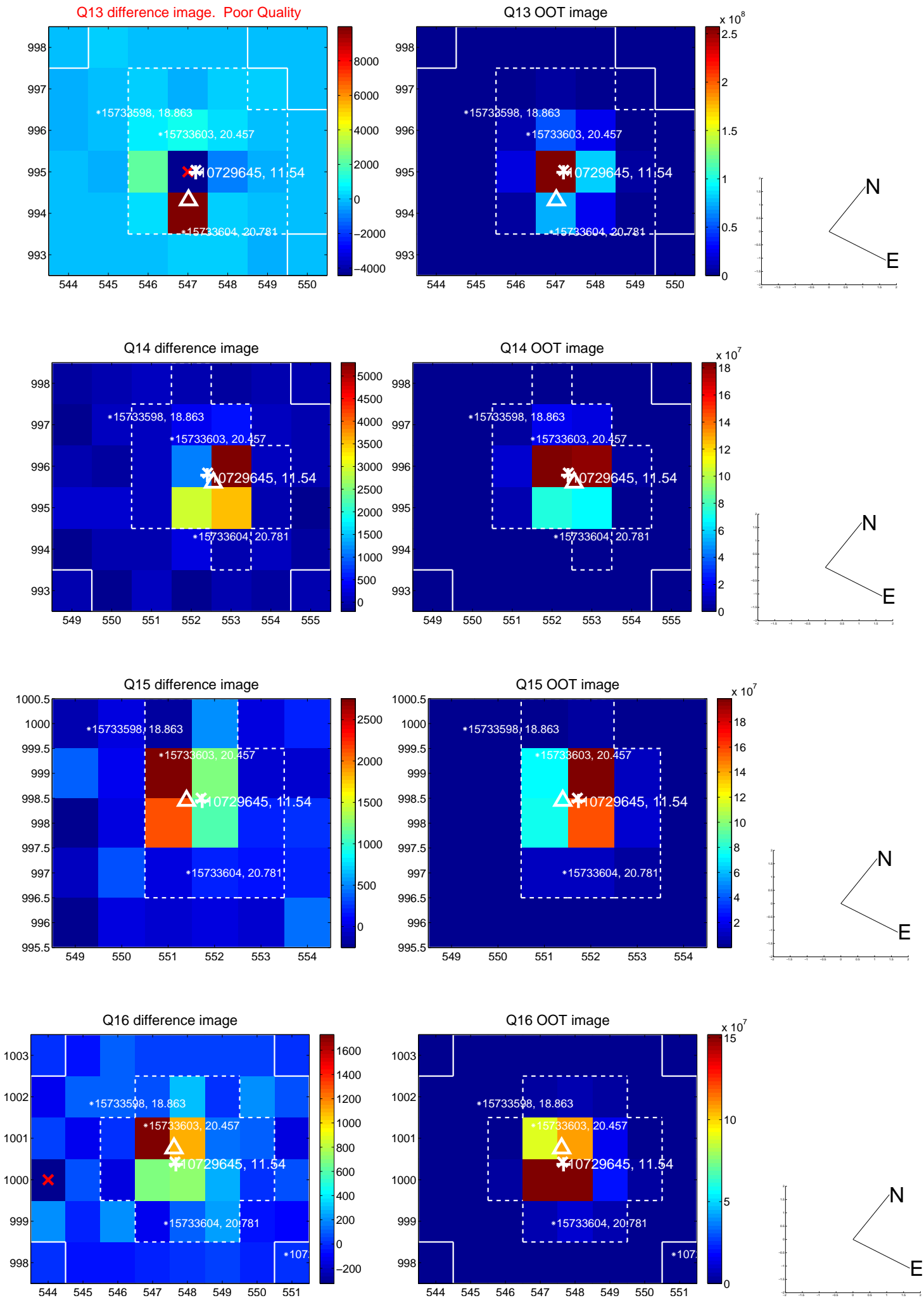




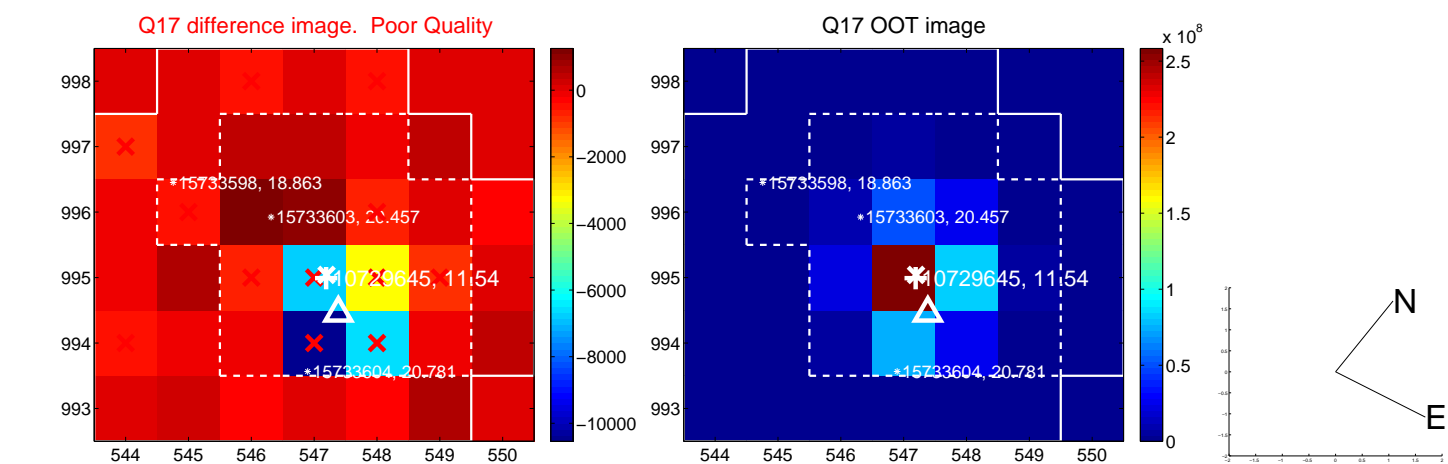
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



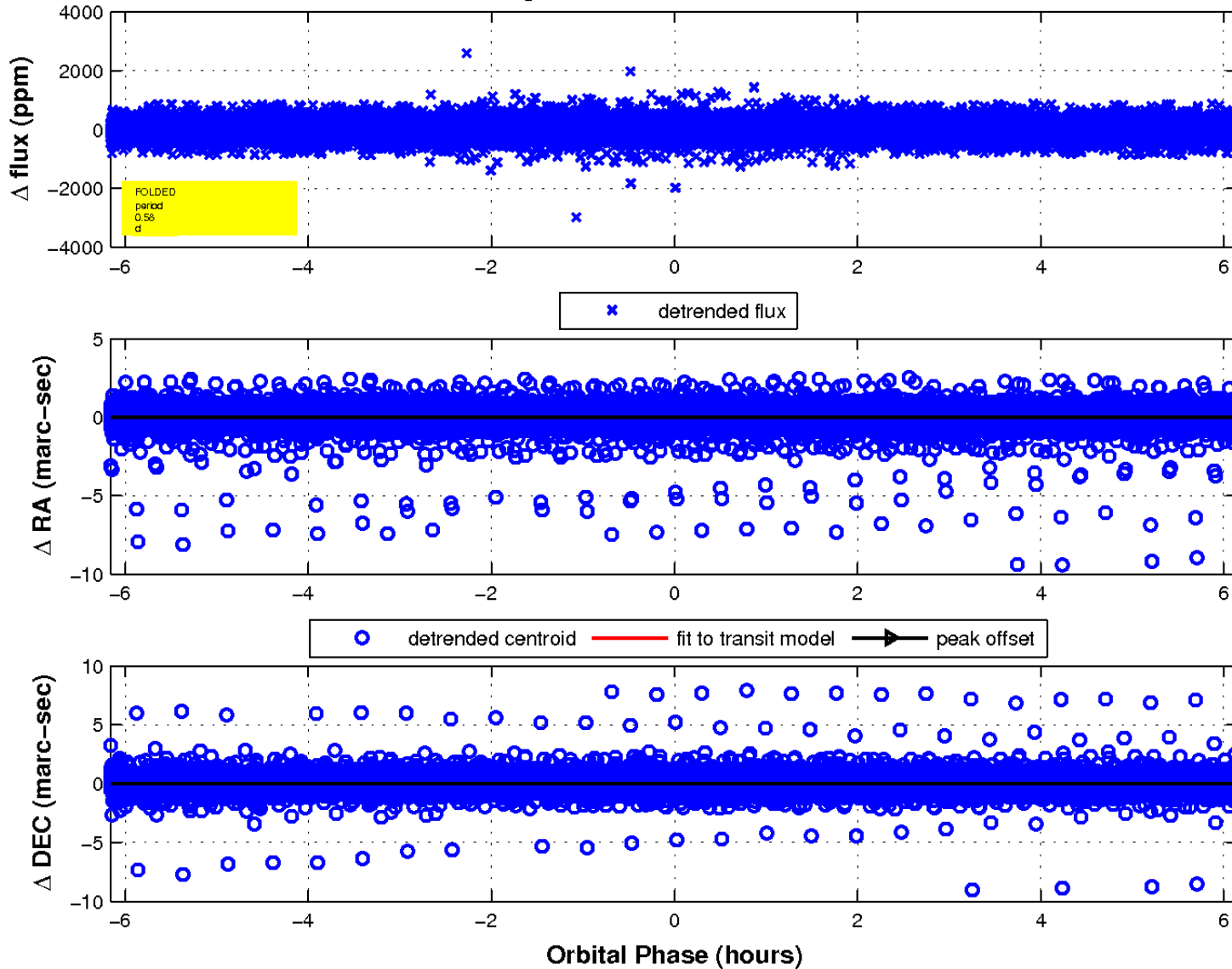
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

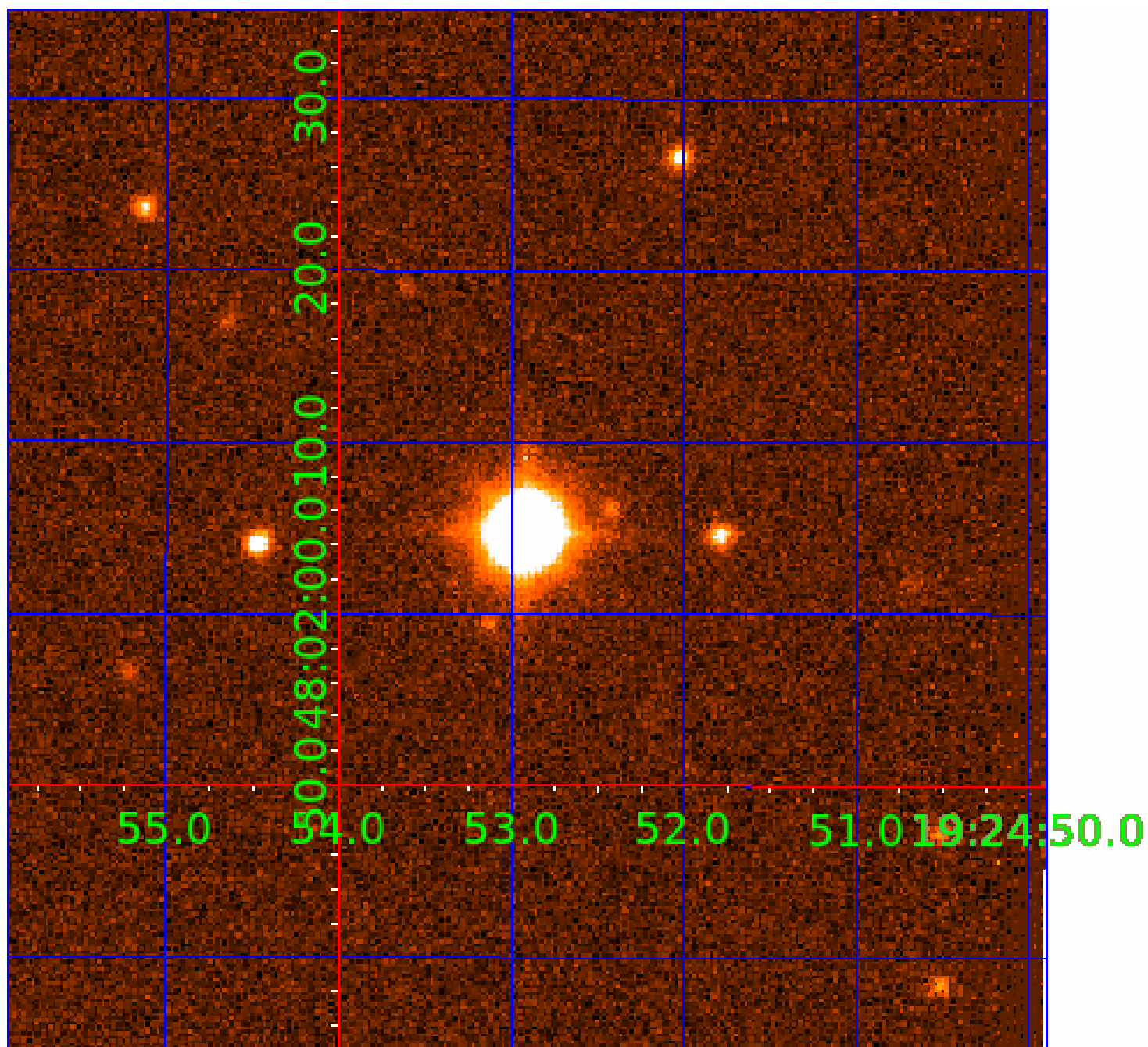


fluxWeightedCentroids, Planet 1 of 3



UKIRT Image

Declination





# KIC 010729645

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010729645-01	OBS	No	0.584091	131.940554	18.0	2.053	12.4	9.7	3.11	8195	1.54	121954.14
010729645-03	OBS	No	243.330125	204.252022	151.6	67.614	7.4	7.8	3.11	8195	4.16	39.20

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010729645-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT
010729645-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS

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

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

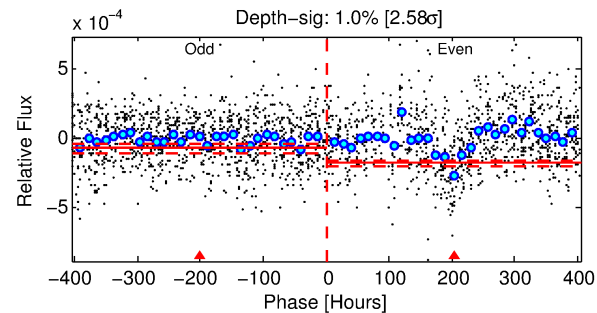
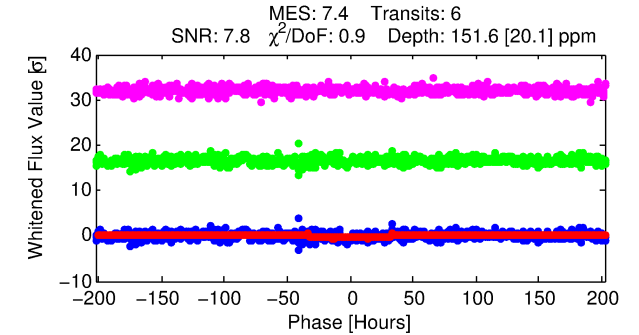
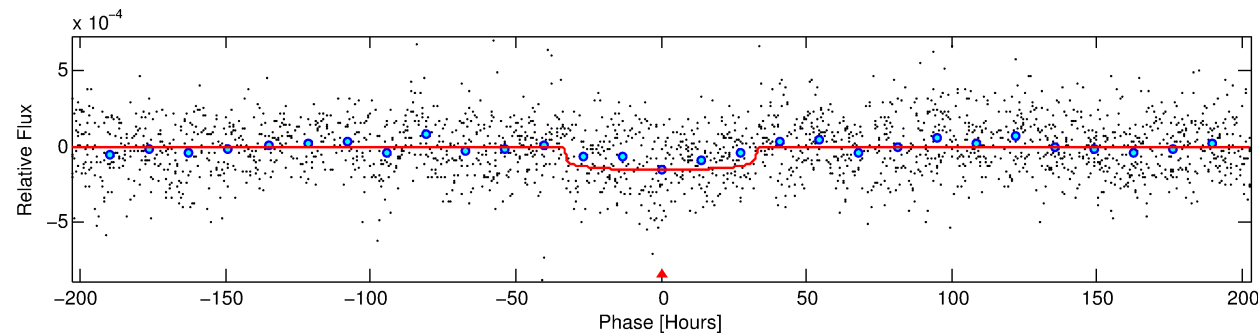
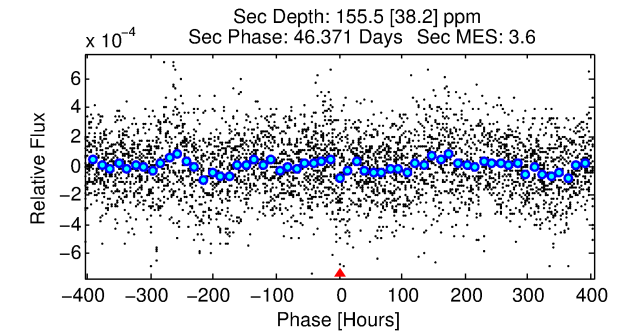
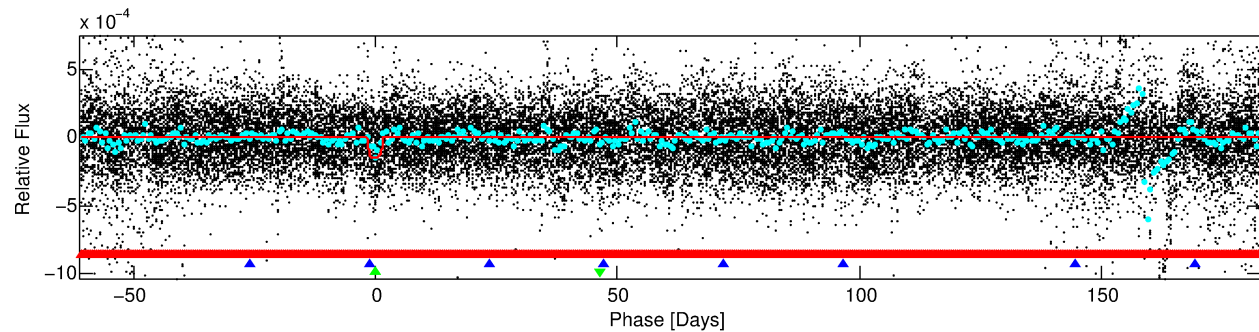
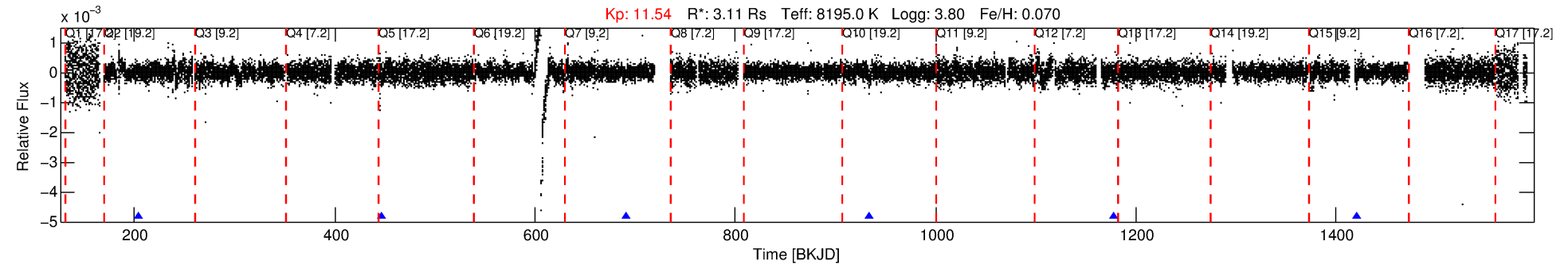
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010729645-03

No Significant Match Found

# DV One-Page Summary

KIC: 10729645 Candidate: 3 of 3 Period: 243.330 d



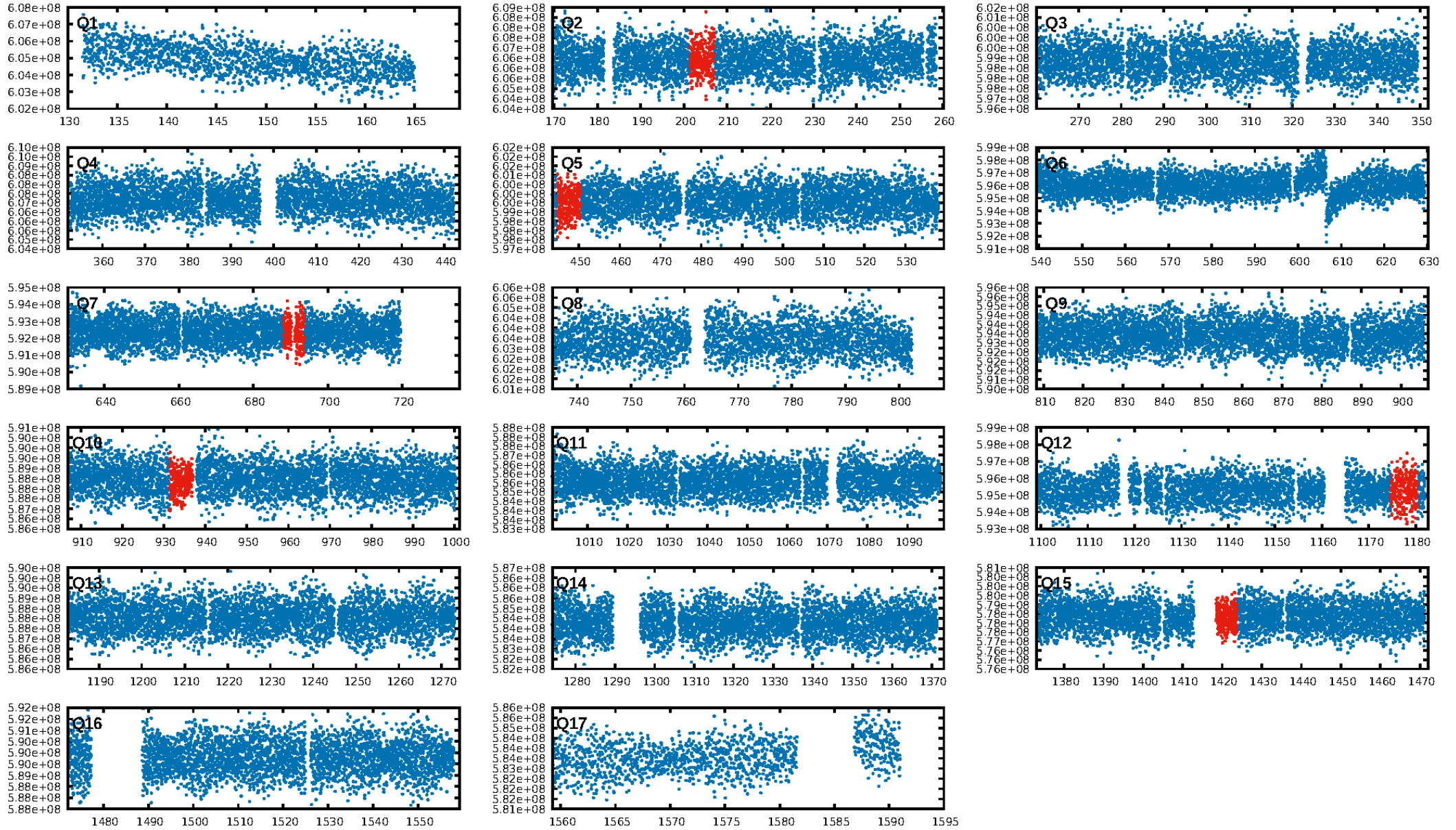
## DV Fit Results:

Period = 243.33012 [0.01722] d  
Epoch = 204.2520 [0.0447] BKJD  
Rp/R\* = 0.0123 [0.0012]  
a/R\* = 18.66 [7.83]  
b = 0.75 [0.24]  
Seff = 39.20 [25.01]  
Teq = 638 [102] K  
Rp = 4.16 [1.83] Re  
a = 0.9983 [0.3925] AU  
Ag = 4931.32 [3400.50] [1.45σ]  
Teffp = 8266 [753] K [10.03σ]

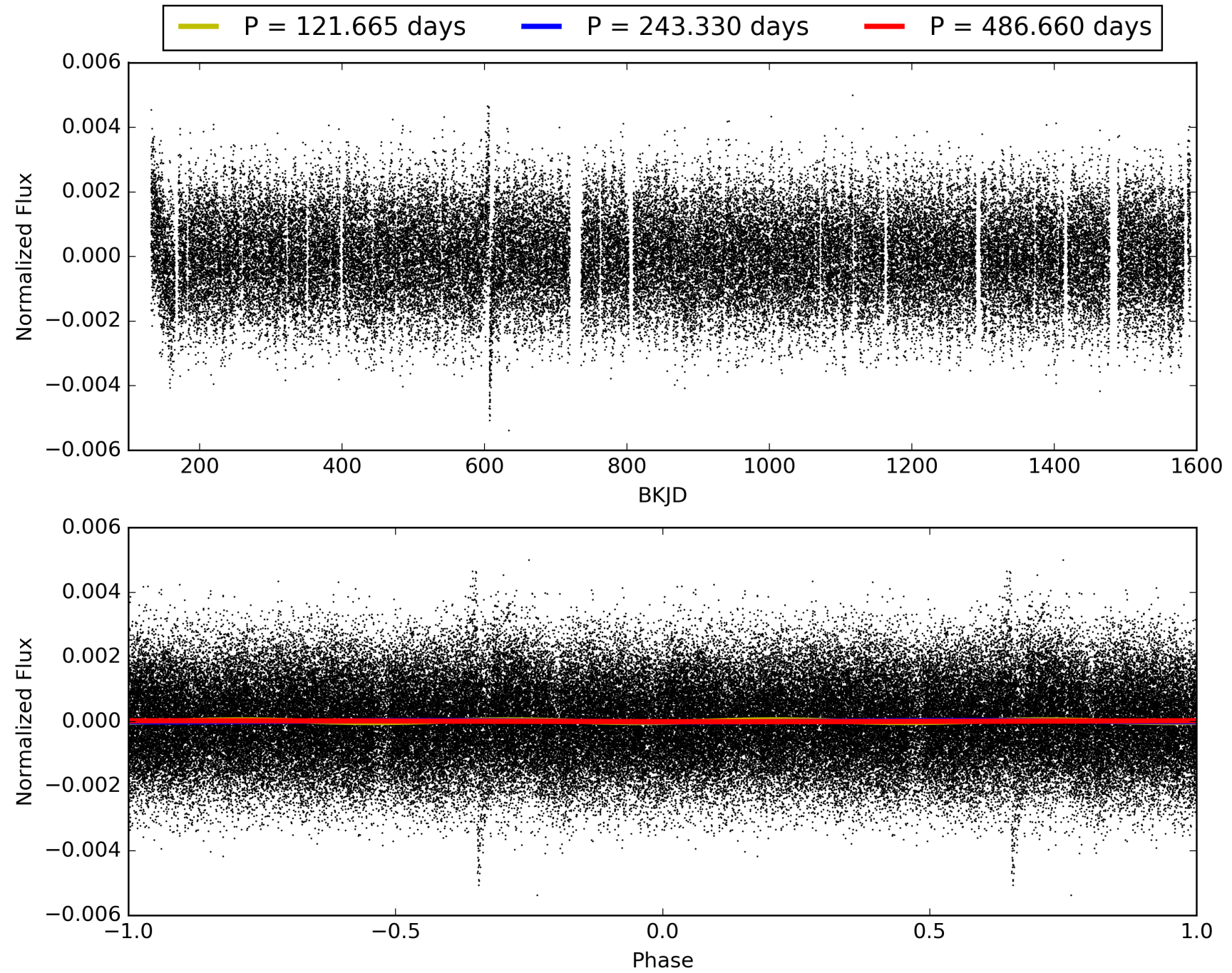
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [25.79σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 53.2%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 2.08e-09**  
RollingBand-fgt: 1.00 [6/6]  
GhostDiagnostic-chr: -1.394  
Centroid-sig: 97.5%  
Centroid-so: 0.167 arcsec [0.28σ]  
OotOffset-rm: N/A  
KicOffset-rm: N/A  
OotOffset-st: 0/0/0/0 [0]  
KicOffset-st: 0/0/0/0 [0]  
DiffImageQuality-fgm: N/A  
DiffImageOverlap-fno: N/A

# TCE 010729645-03, PDC Light Curves



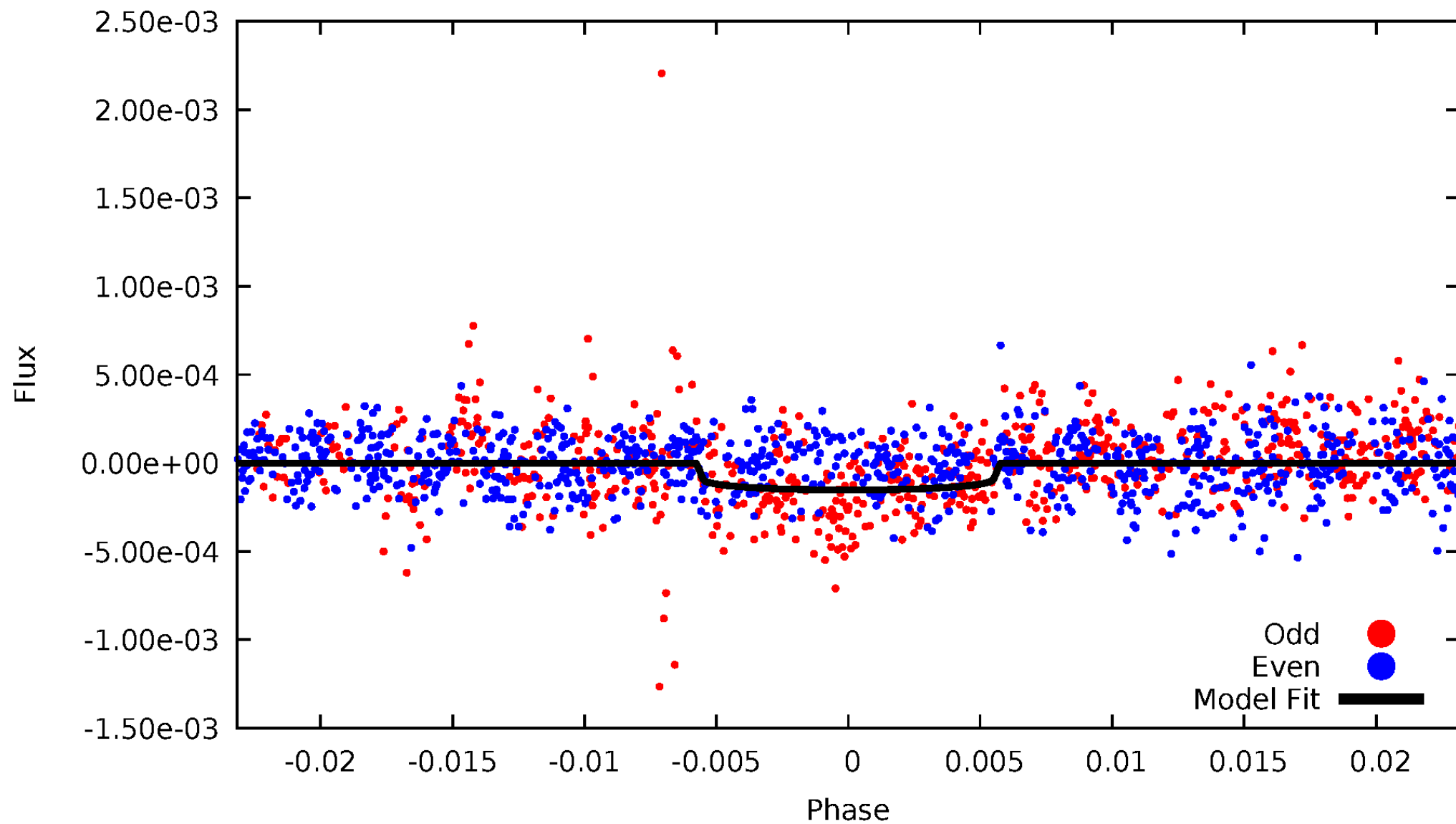
TCE 010729645-03





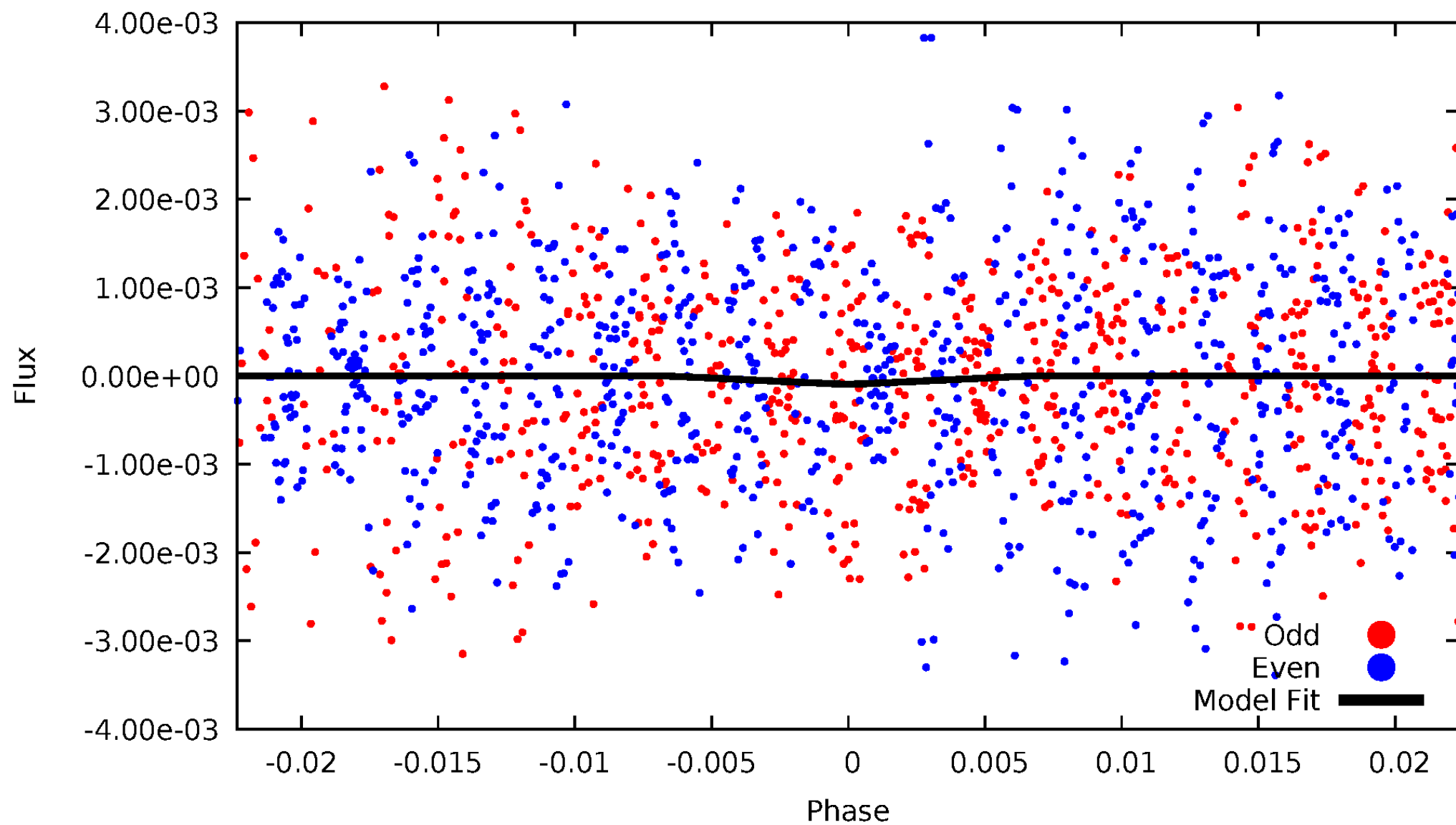
# DV Odd/Even

TCE 010729645-03



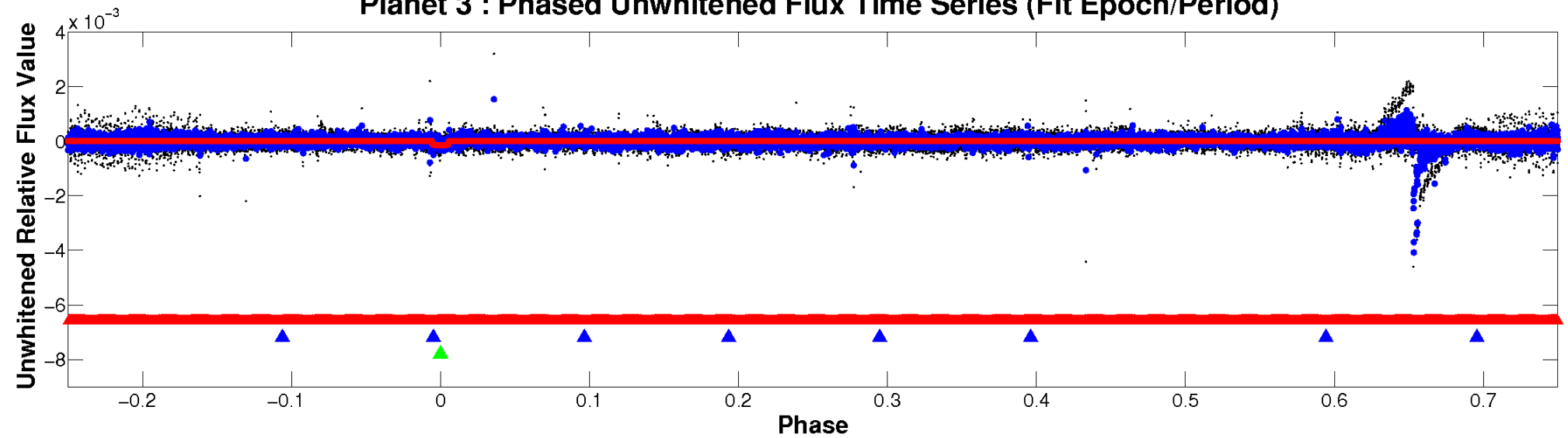
# ALT Odd/Even

TCE 010729645-03

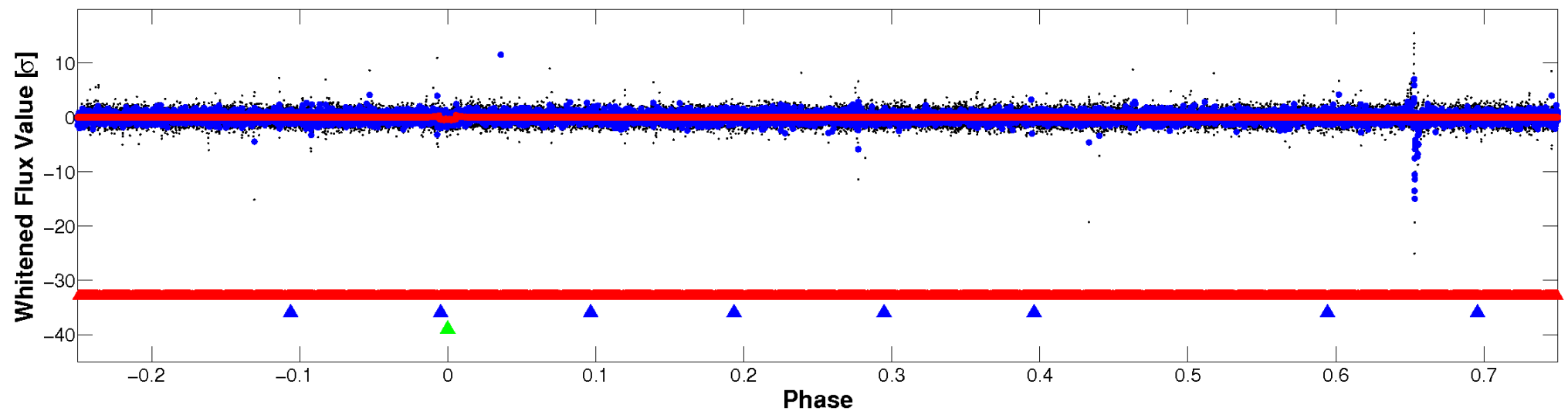


# Non-Whitened Vs. Whitened Light Curve

Planet 3 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

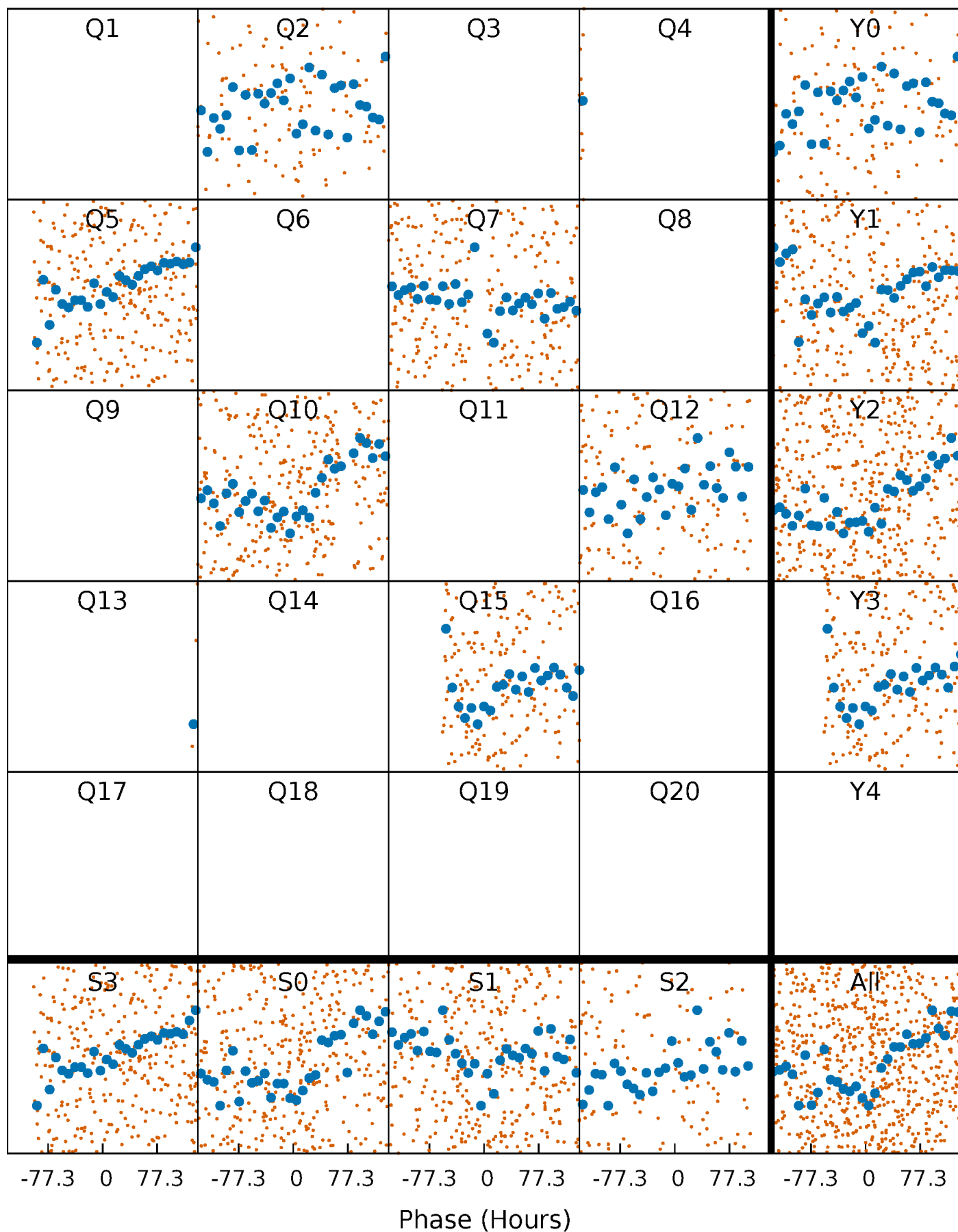


Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

TCE 010729645-03 P=243.330125 Days  $T_0=204.252022$  (BKJD)



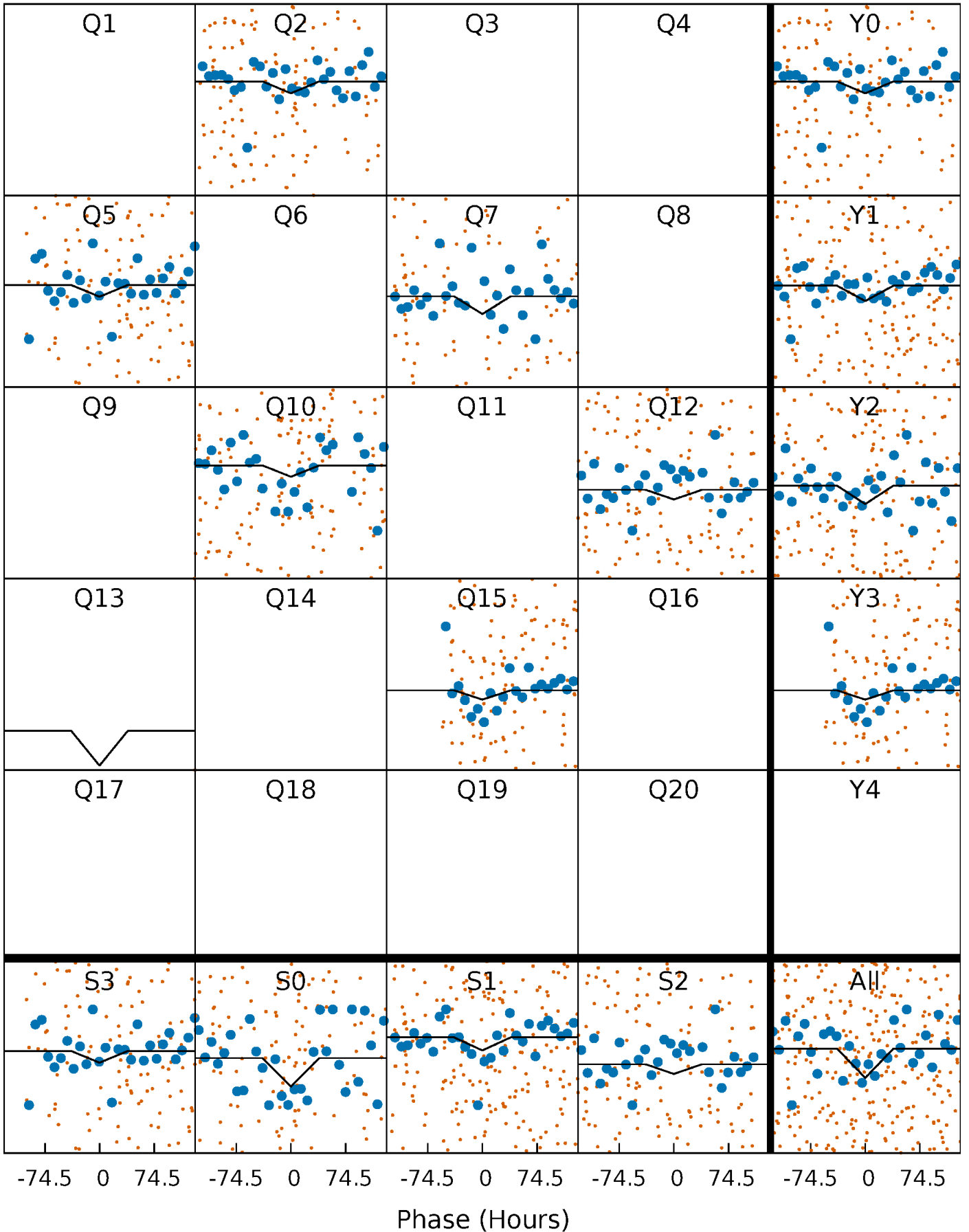
# DV Quarter-Phased Transit Curves

TCE 010729645-03     $P=243.330125$  Days     $T_0=204.252022$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 010729645-03     $P=243.254721$  Days     $T_0=204.443099$  (BKJD)

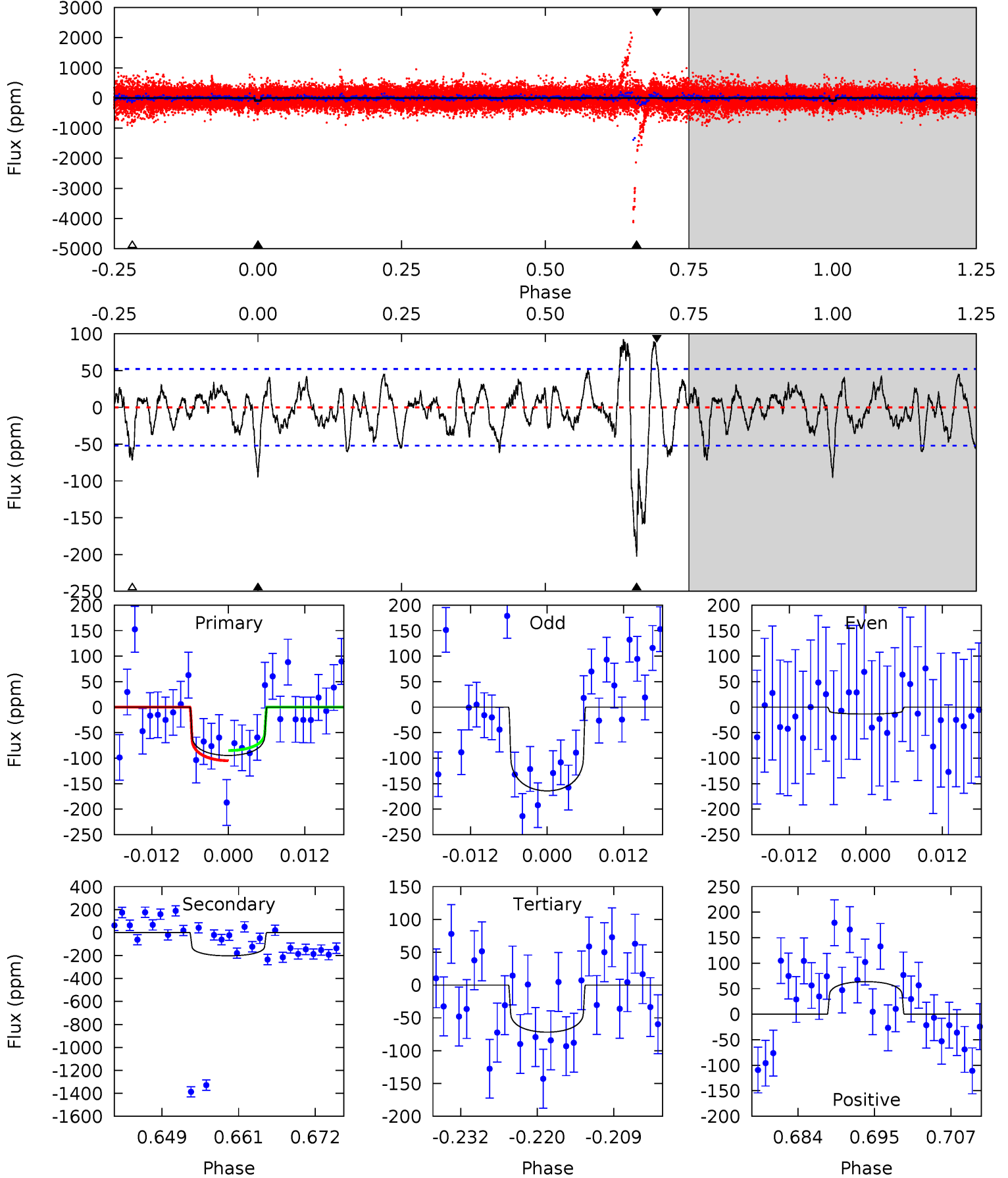




# DV Model-Shift Uniqueness Test

010729645-03, P = 243.330125 Days, E = 204.252022 Days

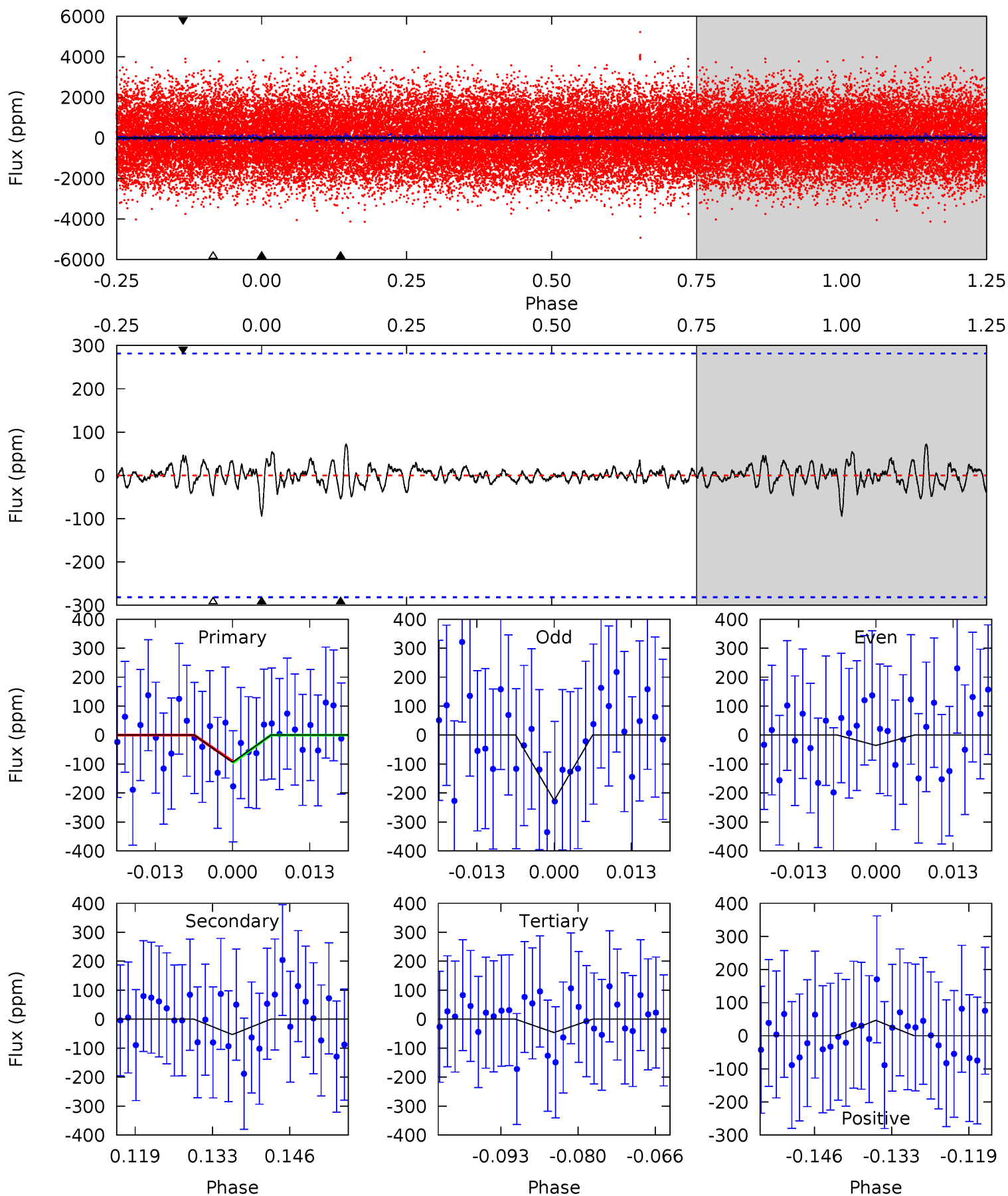
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.09	19.4	6.89	6.13	5.00	2.52	2.74	2.20	2.96	12.6	13.3	7.04	0.96	0.31	0.96



# Alt Model-Shift Uniqueness Test

010729645-03, P = 243.254721 Days, E = 204.443099 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
1.65	0.94	0.81	0.82	4.97	2.48	0.27	0.84	0.83	0.12	0.12	1.67	1.57	0.43	0.05



### Stellar Parameters For KIC 010729645

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$8195^{+227}_{-368}$	$3.803^{+0.353}_{-0.118}$	$0.070^{+0.250}_{-0.450}$	$3.109^{+0.886}_{-1.329}$	$2.239^{+0.291}_{-0.631}$	$0.105^{+0.293}_{-0.046}$
	+3%/-4%	+9%/-3%	+357%/-643%	+28%/-43%	+13%/-28%	+279%/-44%
Source	KIC0	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 010729645-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-203 \pm 10$	$3.89^{+0.79}_{-0.89}$	$862^{+74}_{-91}$	$8980^{+773}_{-655}$	$7237^{+4363}_{-2099}$
Alt.	$-53 \pm 57$	$3.31^{+0.76}_{-0.70}$	$865^{+71}_{-89}$	$6595^{+1594}_{-10459}$	$2552^{+3616}_{-2737}$

$T_{\text{max}}$  = 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

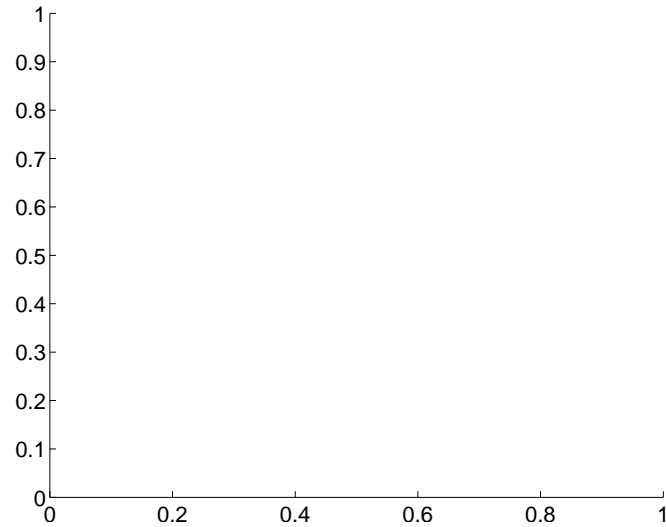
Supplemental centroid analysis for 010729645-03. **Kepler magnitude: 11.54.** Transit SNR 7.79

**There are 0 quarters with good PRF difference image offsets**

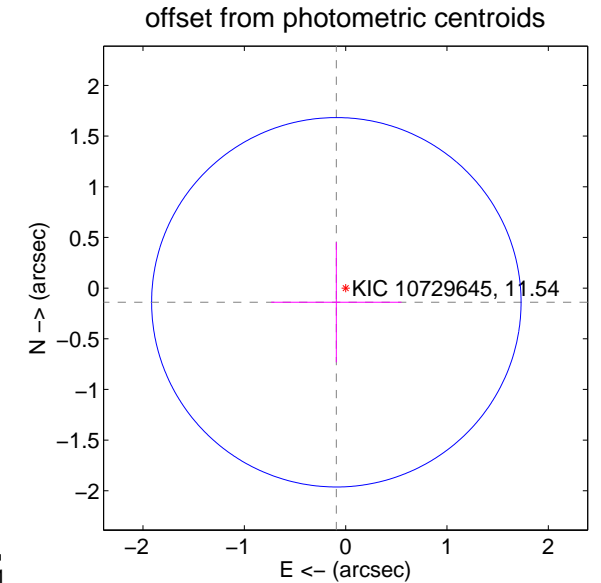
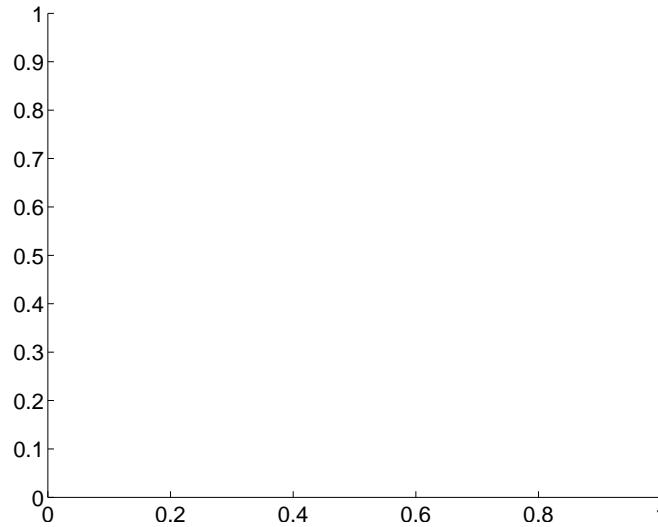
The direct PRF centroid is offset from the target star catalog position by about NaN arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	—	—	—	—
PRF-fit source offset from KIC position	—	—	—	—
photometric centroid source offset	$0.17 \pm 0.61$	0.28	$0.09 \pm 0.64$	$-0.14 \pm 0.59$

There is no PRF-fit offset from OOT-fit



There is no PRF-fit offset from KIC



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.





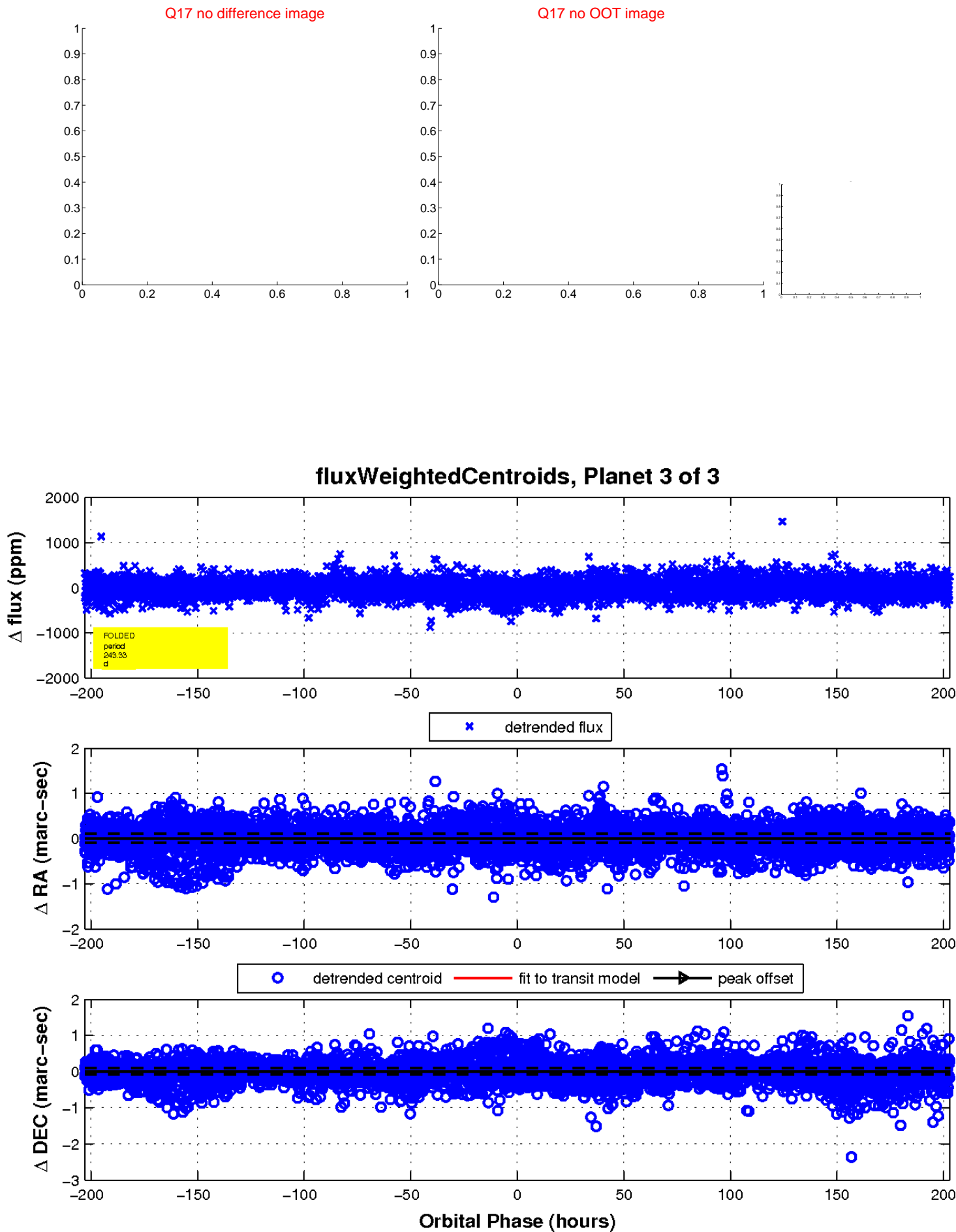
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

