

# KIC 003229073

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
003229073-01	OBS	No	0.730942	132.222622	39.0	2.892	7.6	8.3	1.00	6092	0.73	4643.48
003229073-02	OBS	No	181.531744	291.078855	261.2	13.732	8.3	4.4	1.00	6092	1.72	2.98

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003229073-01	OBS	FP	0.00	1	0	1	1	LPP_DV—CENT_RESOLVED_OFFSET—HALO_GHOST—EPHEM_MATCH
003229073-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_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.

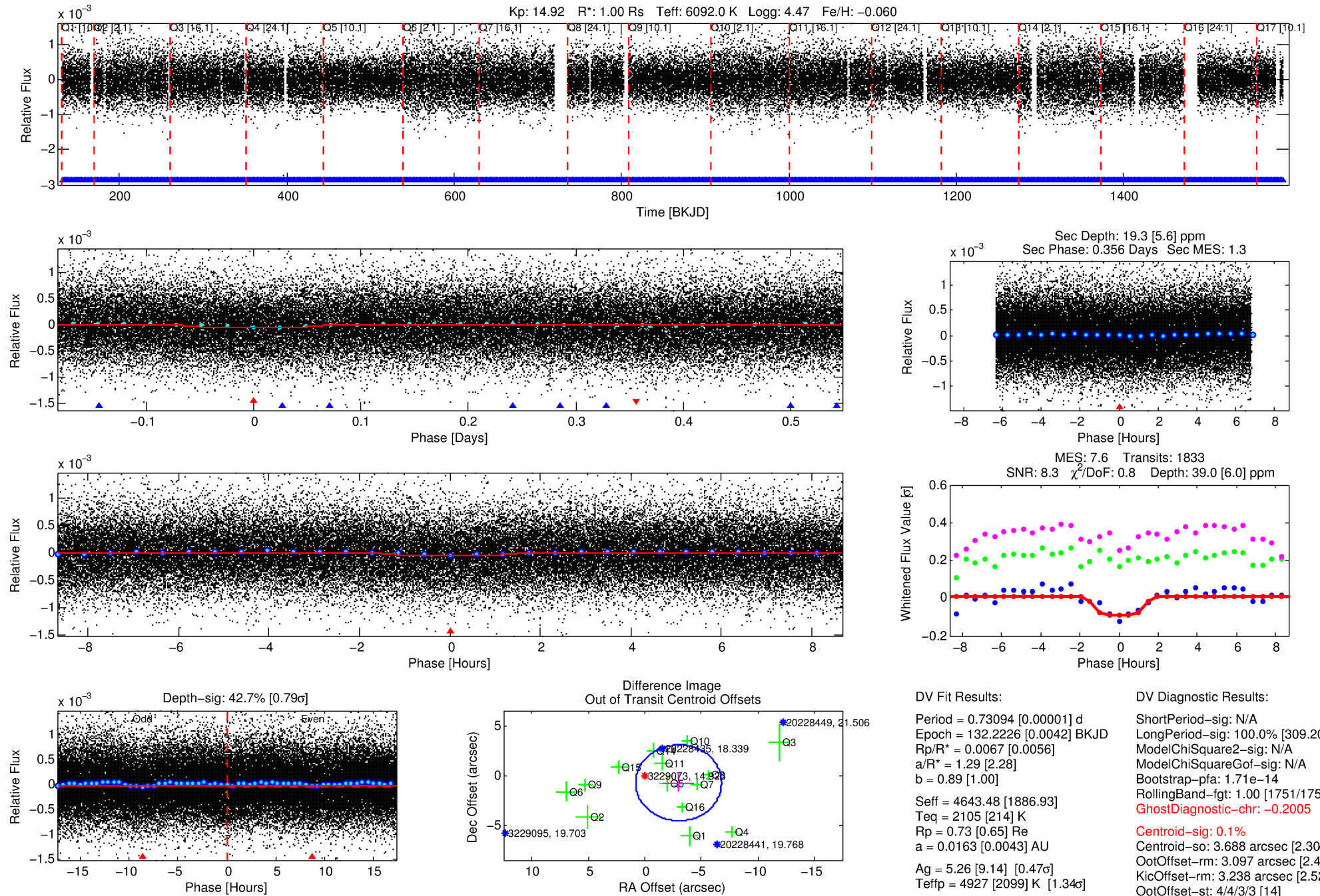
## Ephemeris Match Information For 003229073-01

TCE (1)	KIC	Parent (2)	Parent KIC	$P_1:P_2$	Dist ( $''$ )	$\Delta$ Row	$\Delta$ Col	$m_2$	$m_1$	$D_2/D_1$	Mechanism	Flag	$\sigma_P$	$\sigma_T$
003229073-01	3229073	V404-Lyr-pri	3228863	1:1	144.6	15	34	11.82	14.93	13368.00	Direct-PRF	0	0.12	0.50

**Notes:**  $P_1:P_2$  is the period ratio. Dist is the distance in arcseconds.  $\Delta$ Row and  $\Delta$ Col are the number of pixels apart in row and column.  $m_2$  and  $m_1$  are the magnitudes of the parent and child.  $D_2/D_1$  is the parent's transit depth divided by the child's.  $\sigma_P$  and  $\sigma_T$  are the significance of the match in period and epoch. For a match to be considered significant  $\sigma_P < 5.0$  and  $\sigma_T < 5.0$ . Matches which have  $\sigma_P$  and  $\sigma_T$  very close to this cutoff should receive extra scrutiny, especially if the period ratio is very large.

# DV One-Page Summary

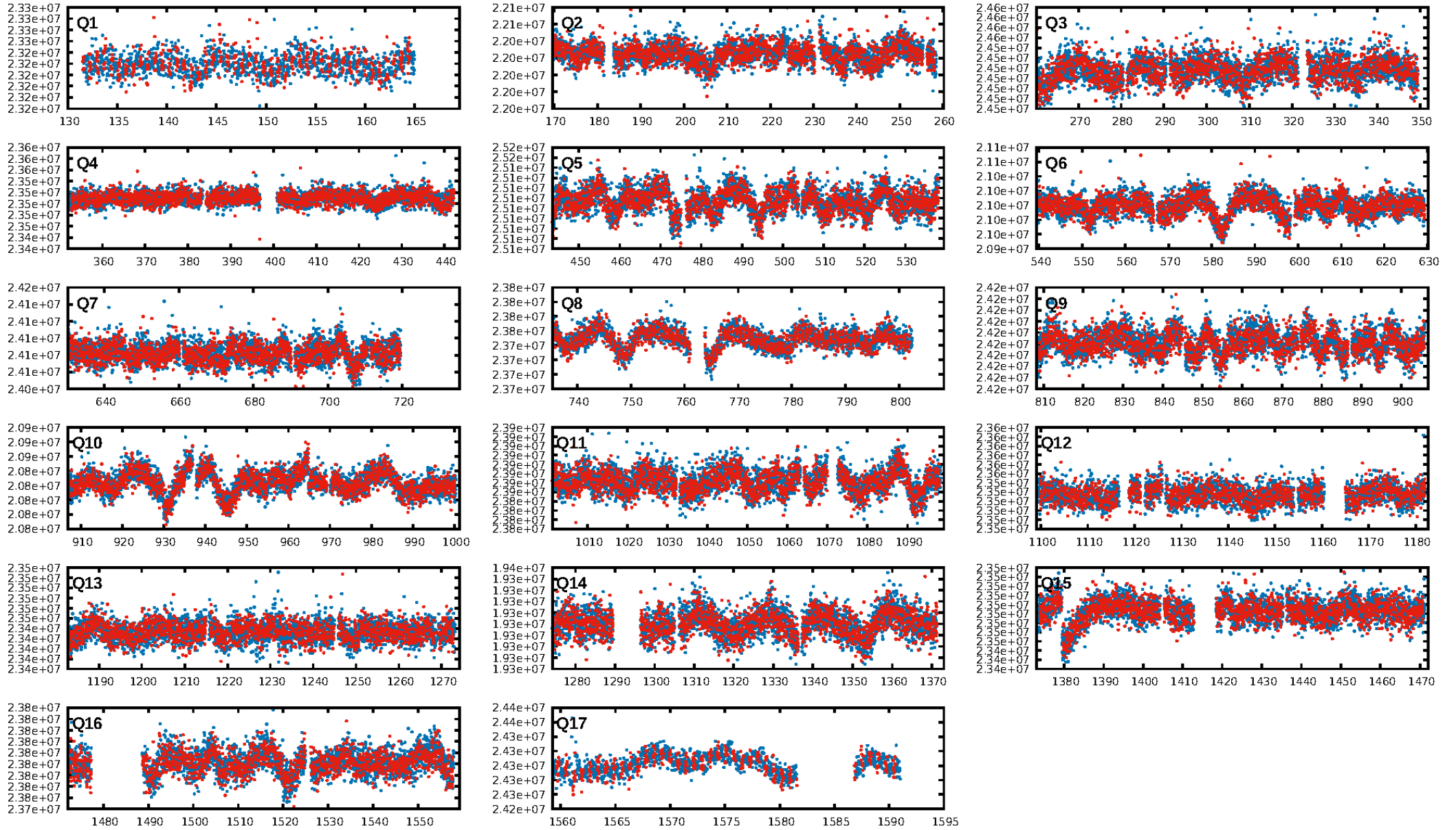
KIC: 3229073 Candidate: 1 of 2 Period: 0.731 d



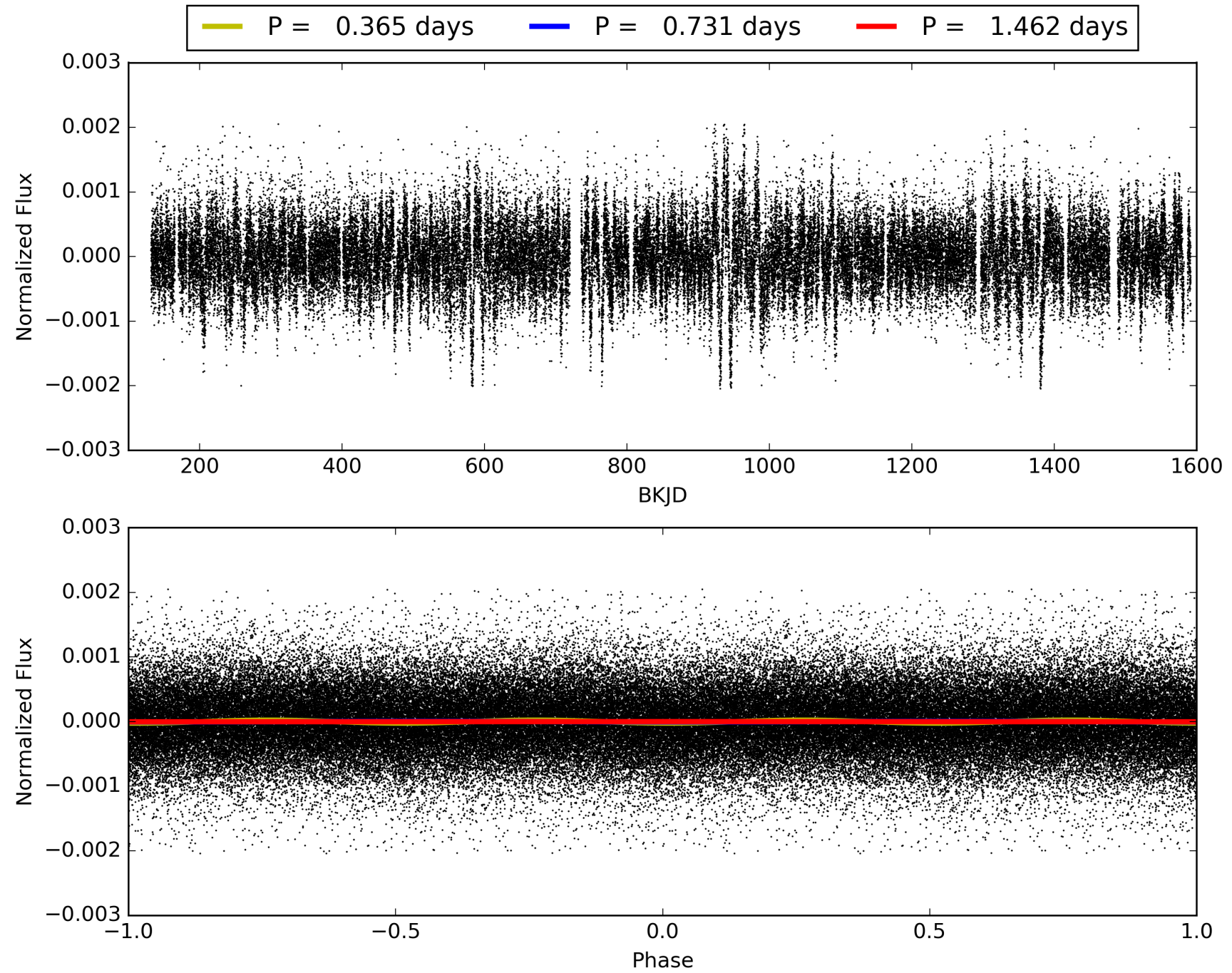
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 21:29:38 Z

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

# TCE 003229073-01, PDC Light Curves



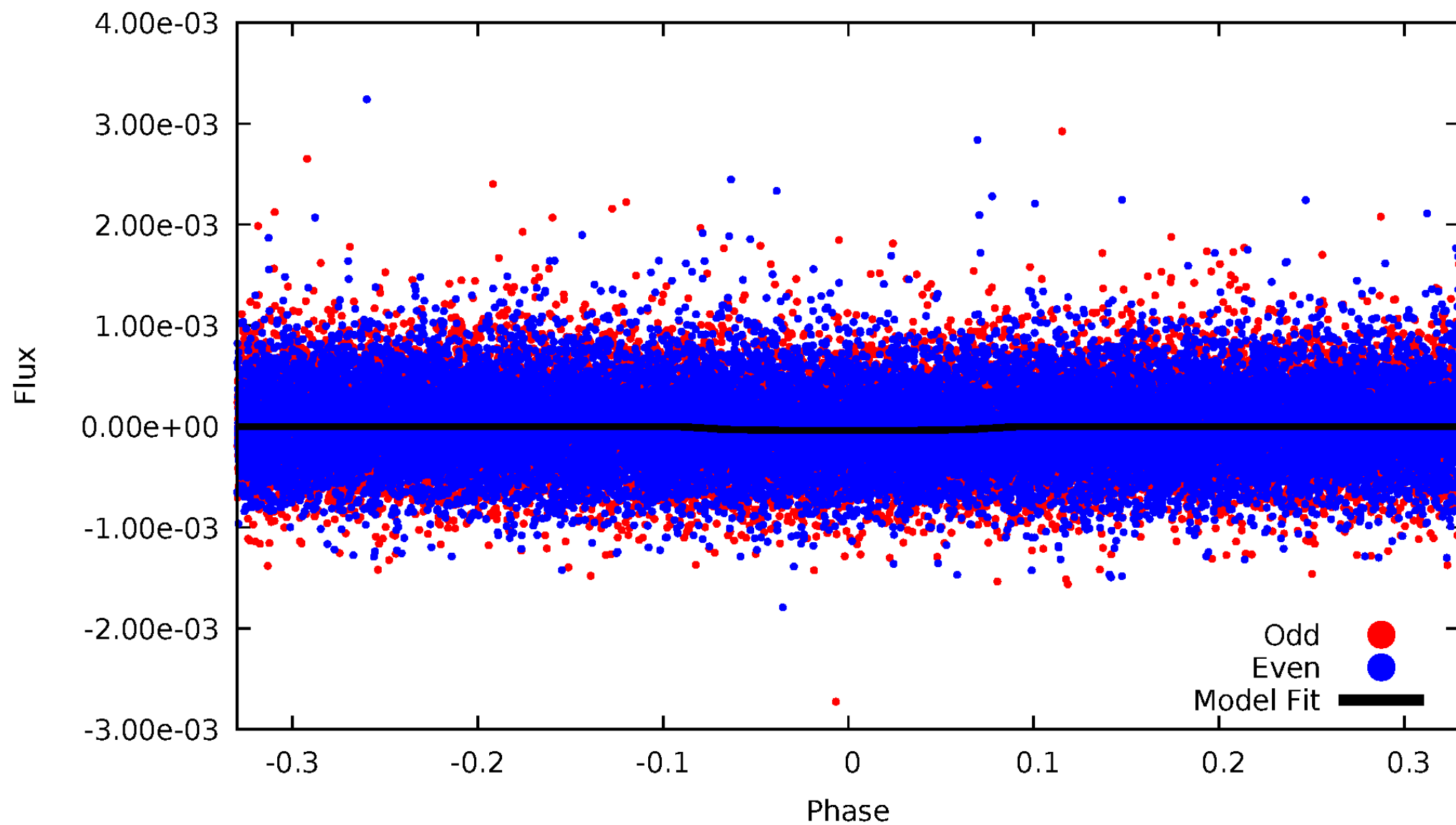
TCE 003229073-01





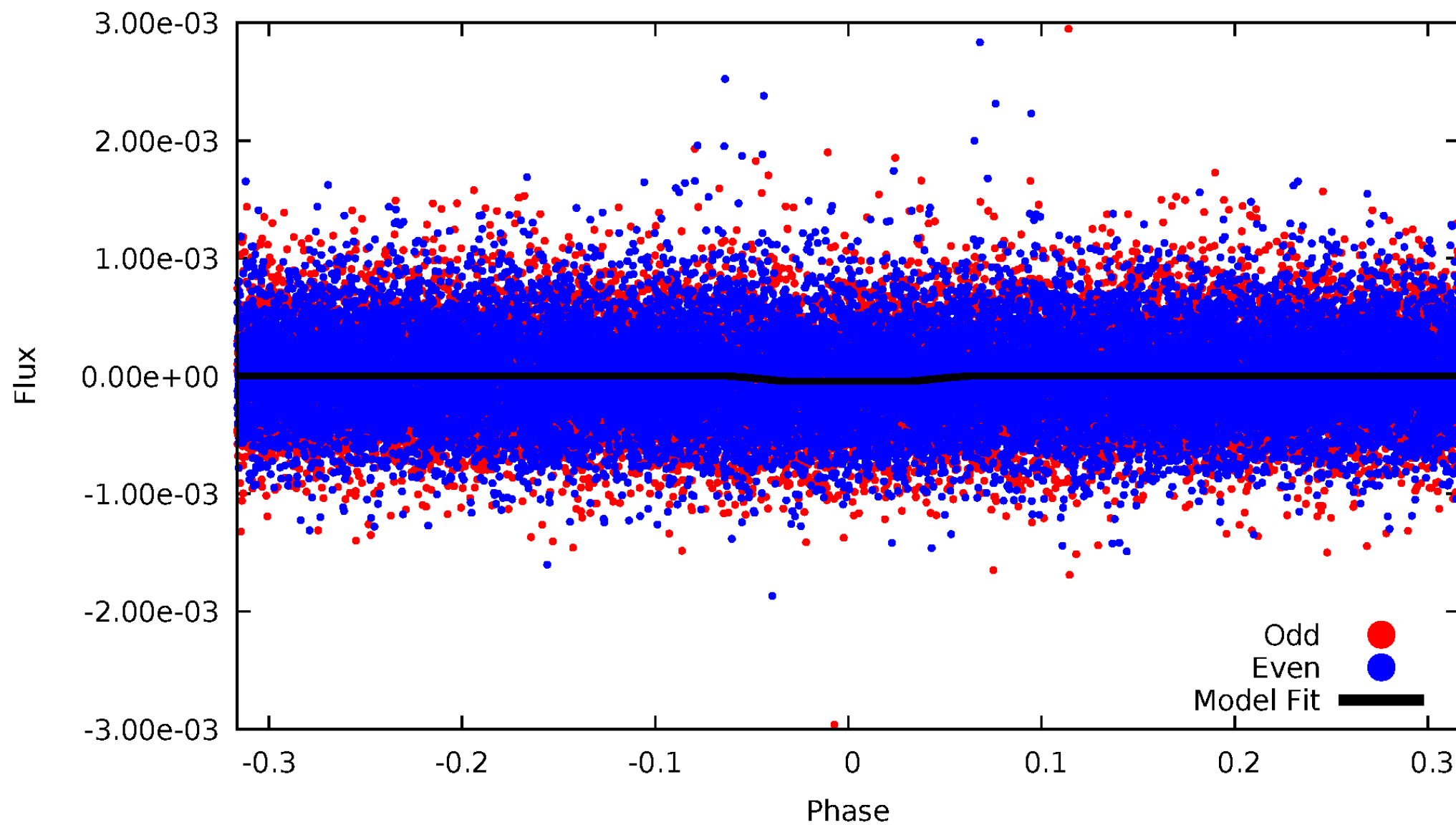
# DV Odd/Even

TCE 003229073-01



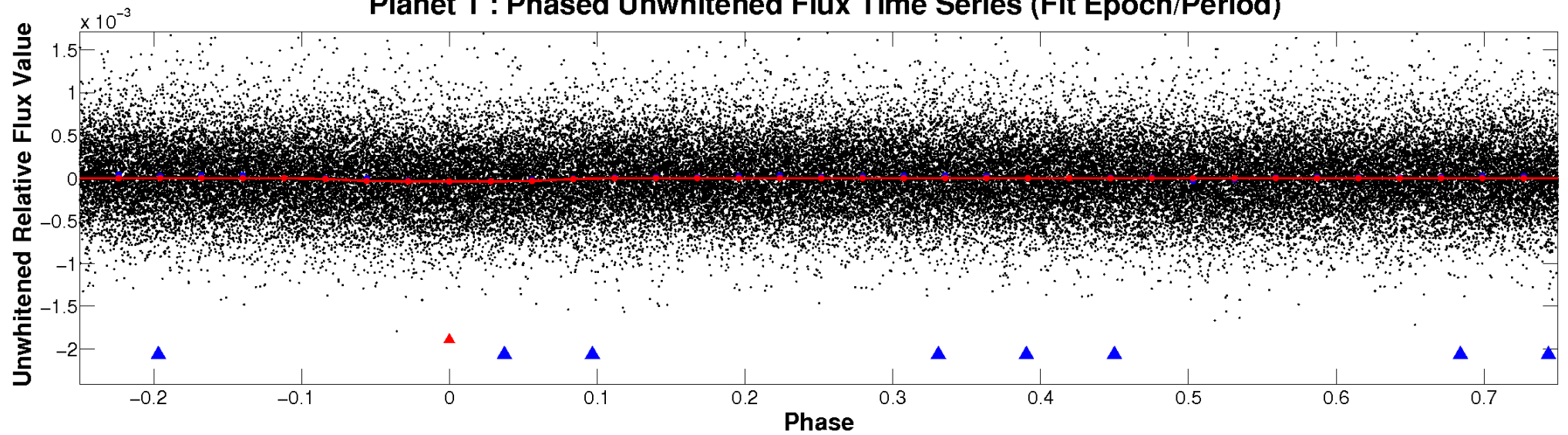
# ALT Odd/Even

TCE 003229073-01

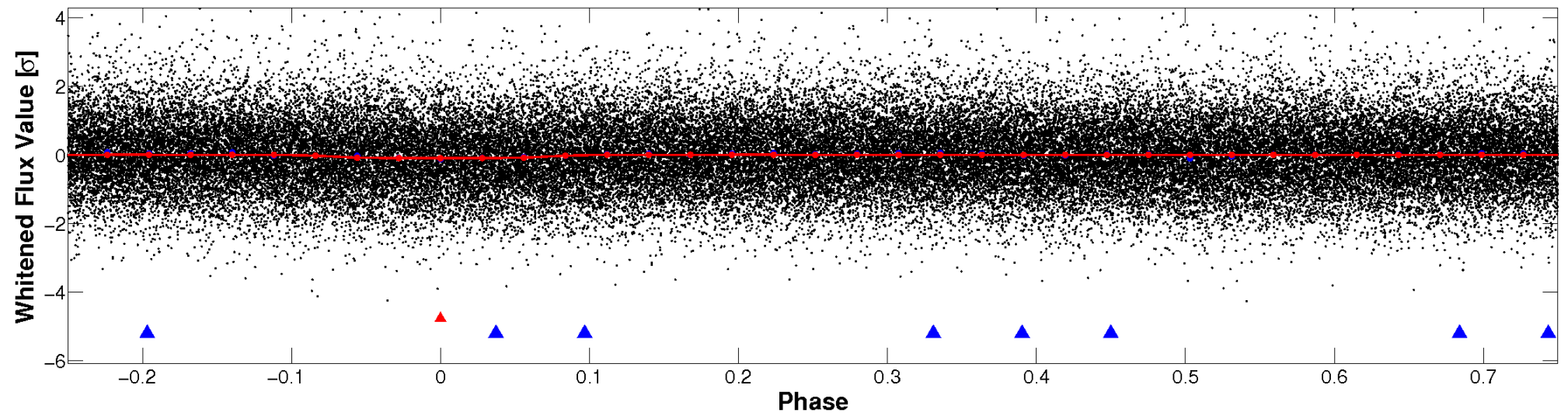


# Non-Whitened Vs. Whitened Light Curve

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

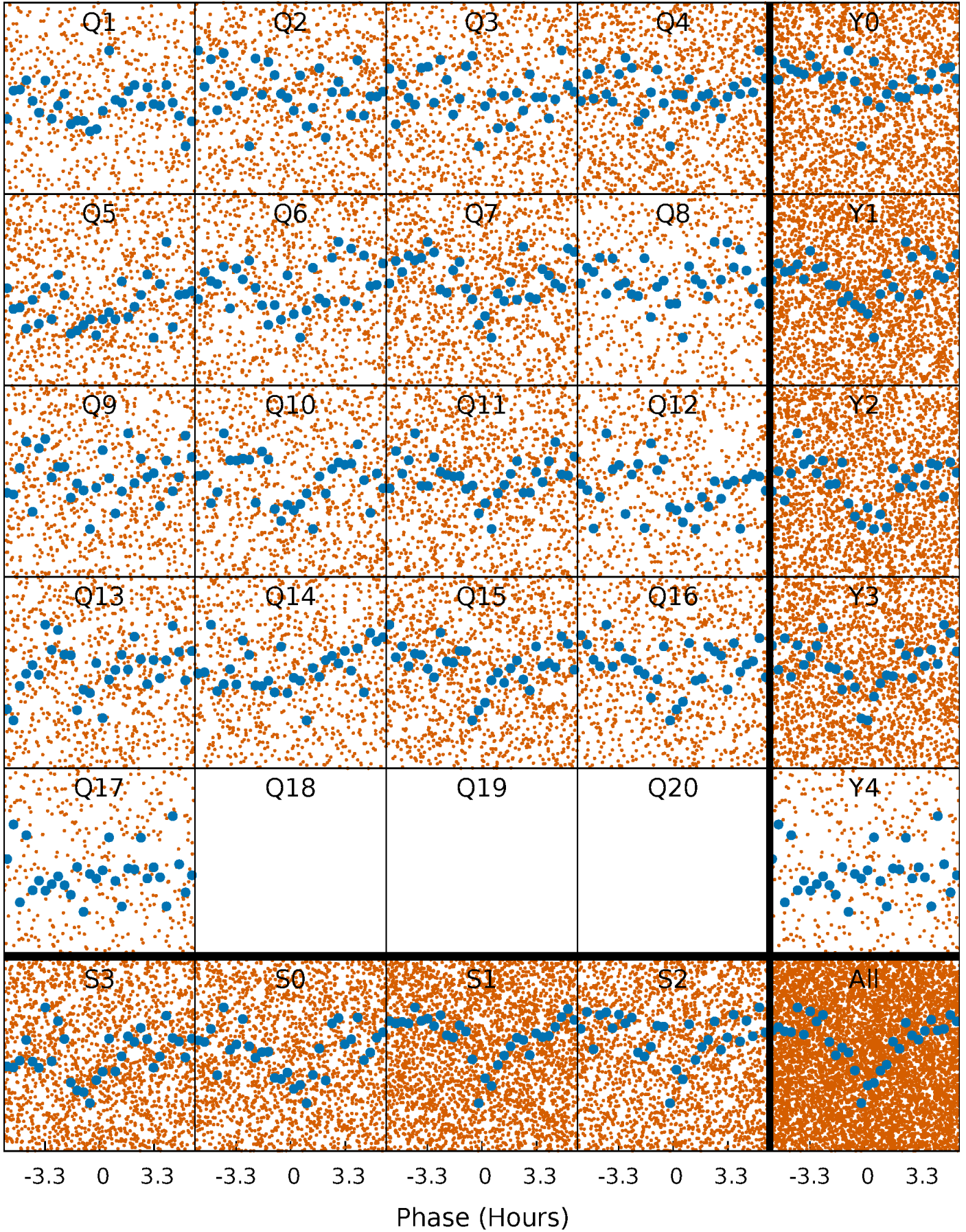


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

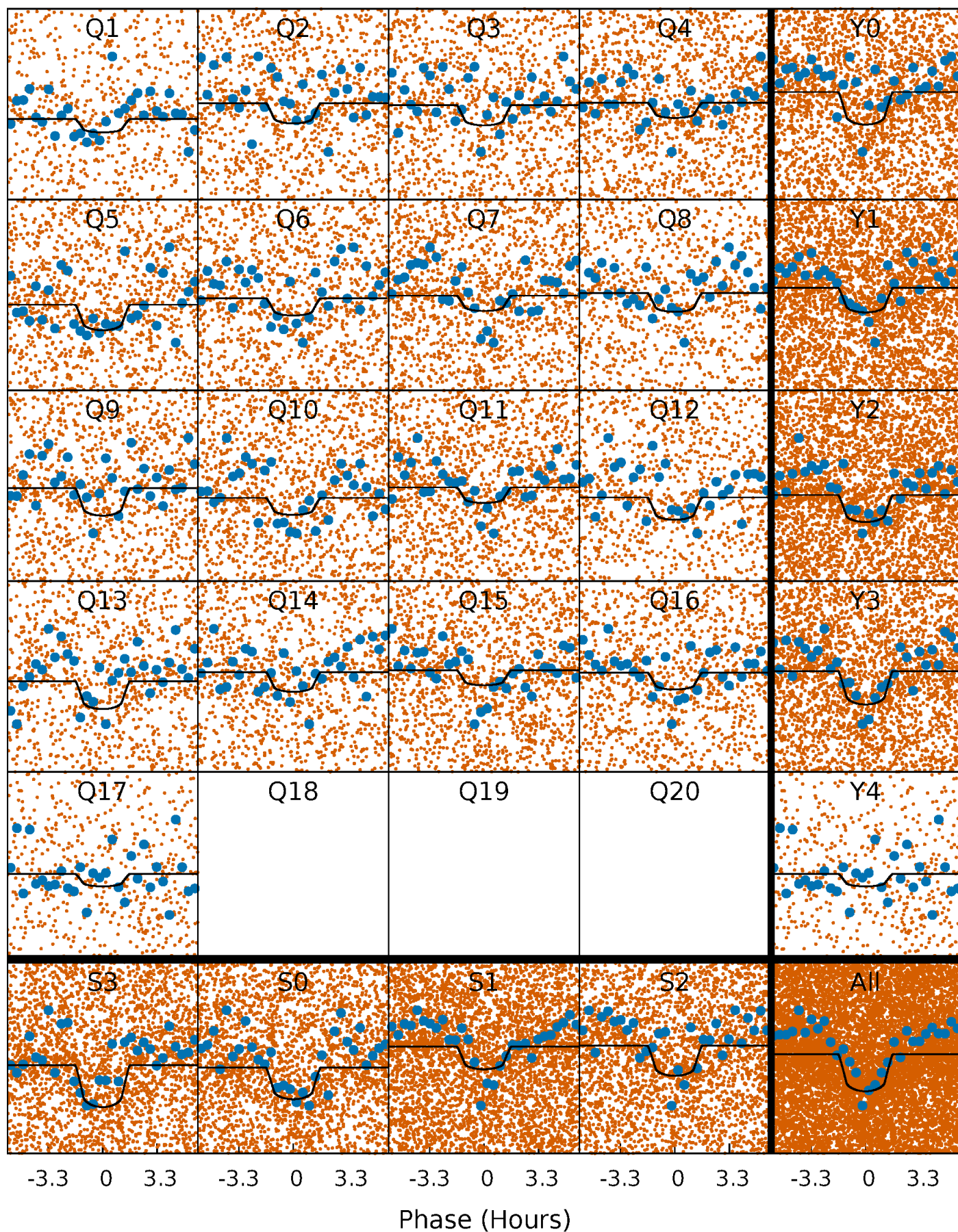
TCE 003229073-01 P= 0.730942 Days  $T_0=132.222622$  (BKJD)





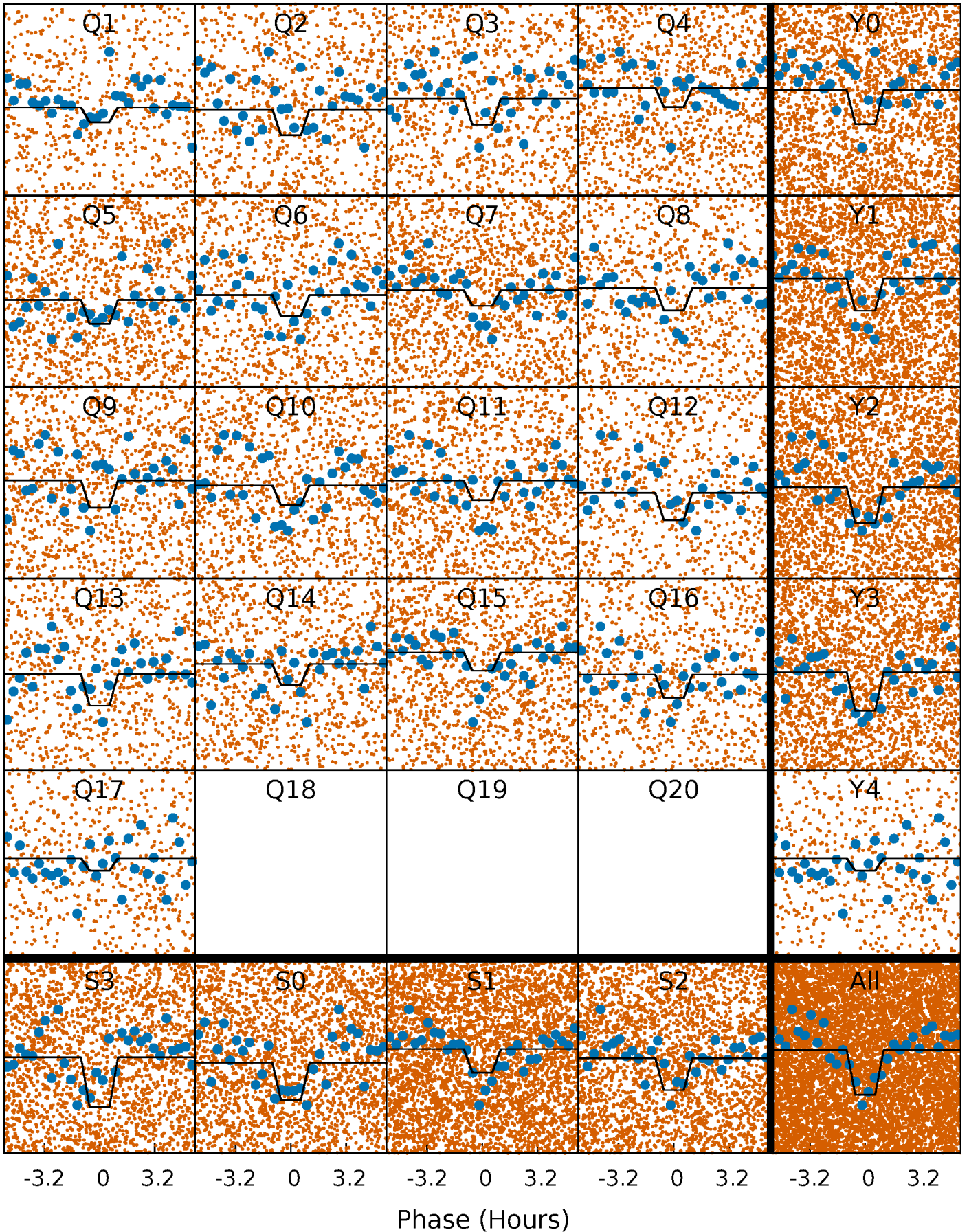
# DV Quarter-Phased Transit Curves

TCE 003229073-01 P= 0.730942 Days  $T_0=132.222622$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 003229073-01 P= 0.730945 Days  $T_0=132.221894$  (BKJD)

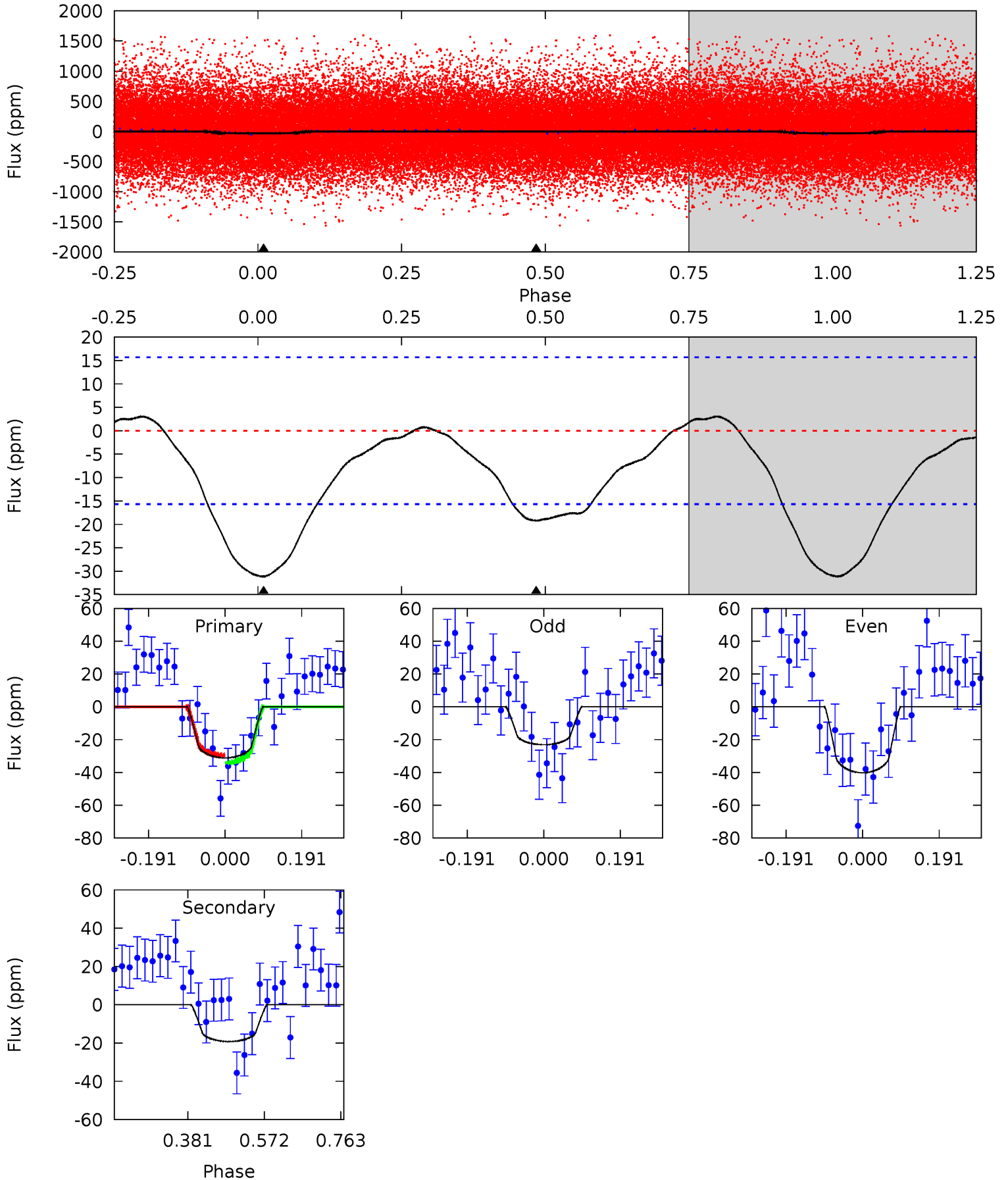




# DV Model-Shift Uniqueness Test

003229073-01, P = 0.730942 Days, E = 131.491680 Days

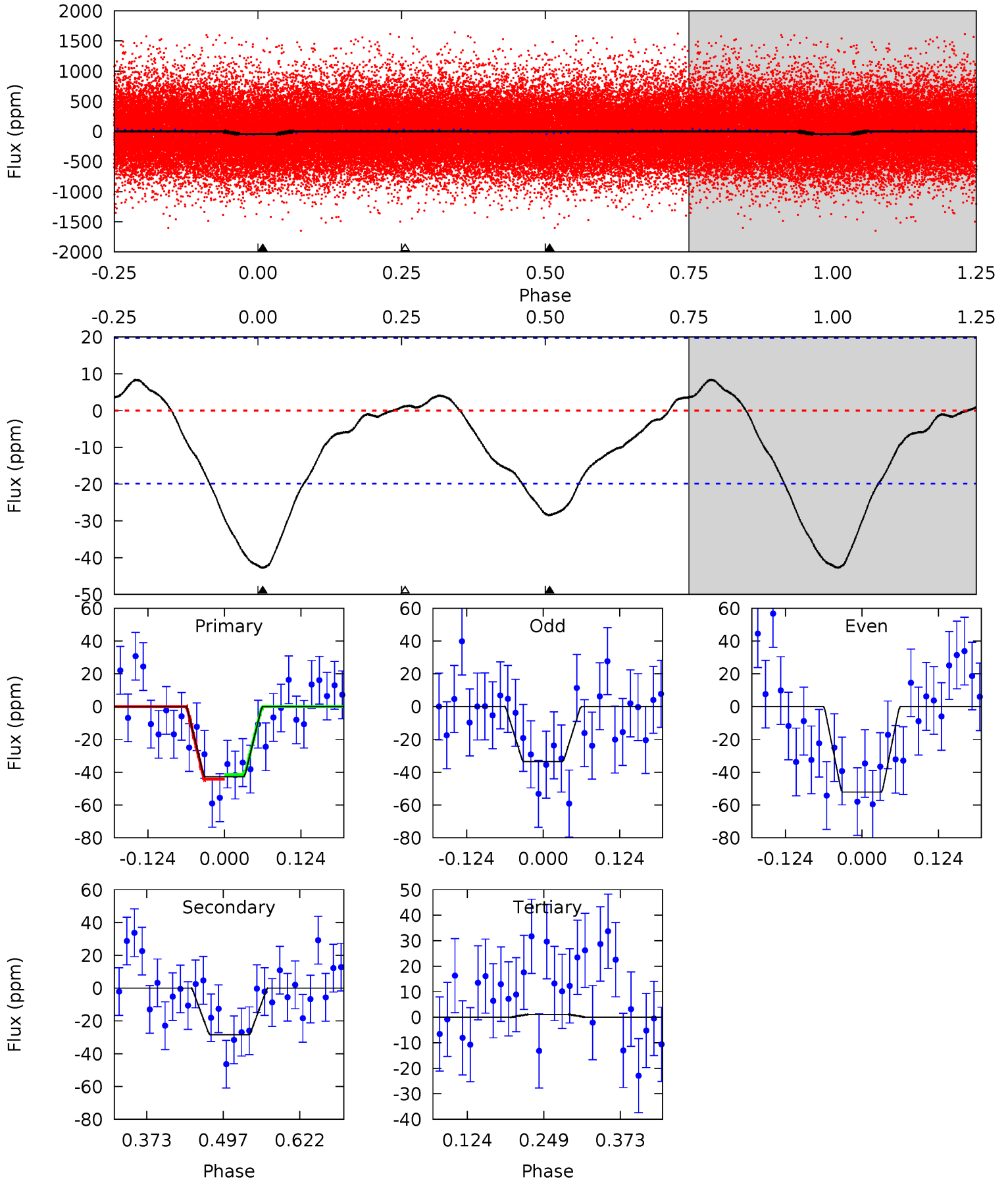
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.79	5.42	0	0	4.43	1.31	0.65	8.79	8.79	5.42	5.42	2.41	0.83	0.09	0.62



# Alt Model-Shift Uniqueness Test

003229073-01, P = 0.730945 Days, E = 131.490949 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
9.73	6.48	-0.26	0	4.52	1.54	1.02	9.98	9.73	6.73	6.48	2.12	0.91	0.16	0.32





### Stellar Parameters For KIC 003229073

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6092^{+192}_{-214}$	$4.471^{+0.052}_{-0.208}$	$-0.060^{+0.250}_{-0.350}$	$0.998^{+0.312}_{-0.104}$	$1.074^{+0.137}_{-0.150}$	$1.522^{+0.422}_{-0.795}$
	+3%/-4%	+1%/-5%	+417%/-583%	+31%/-10%	+13%/-14%	+28%/-52%
Source	PHO1	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 003229073-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-19 \pm 4$	$0.84^{+0.67}_{-0.51}$	$3011^{+217}_{-155}$	$4762^{+2896}_{-1085}$	$3.883^{+21.505}_{-2.717}$
Alt.	$-28 \pm 4$	$0.84^{+0.60}_{-0.50}$	$3006^{+191}_{-156}$	$5177^{+3416}_{-1092}$	$5.799^{+29.782}_{-3.845}$

$T_{\text{max}}$  = 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

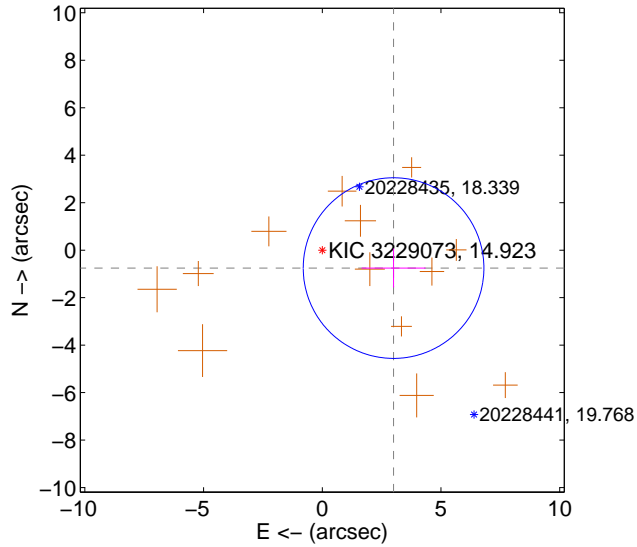
Supplemental centroid analysis for 003229073-01. Kepler magnitude: 14.92. Transit SNR 8.29

There are 0 quarters with good PRF difference image offsets

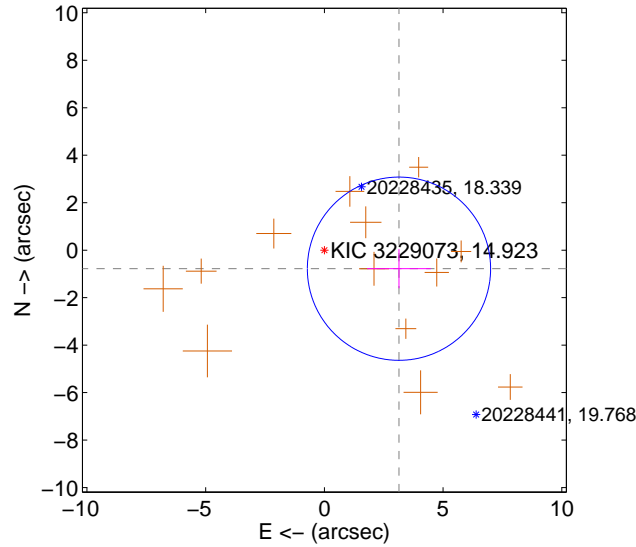
The direct PRF centroid is offset from the target star catalog position by about 0.13 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$3.097 \pm 1.268$	2.44	$-3.003 \pm 1.348$	$-0.755 \pm 0.819$
PRF-fit source offset from KIC position	$3.238 \pm 1.286$	2.52	$-3.142 \pm 1.341$	$-0.781 \pm 0.823$
photometric centroid source offset	$3.69 \pm 1.60$	2.30	$-0.69 \pm 1.64$	$-3.62 \pm 1.60$

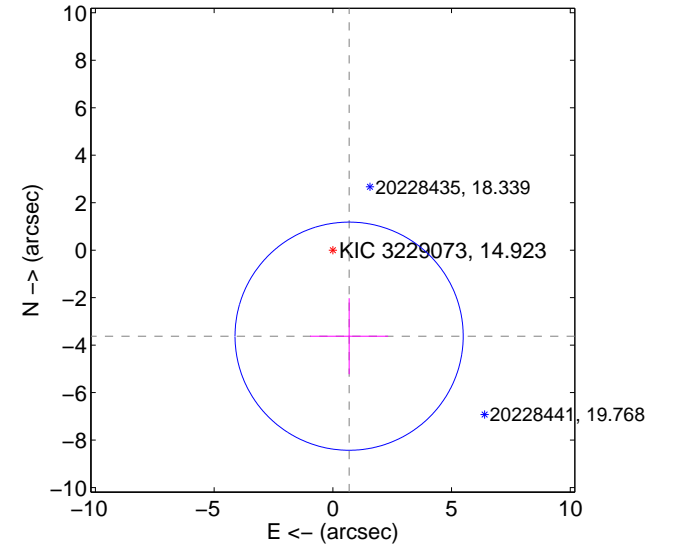
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

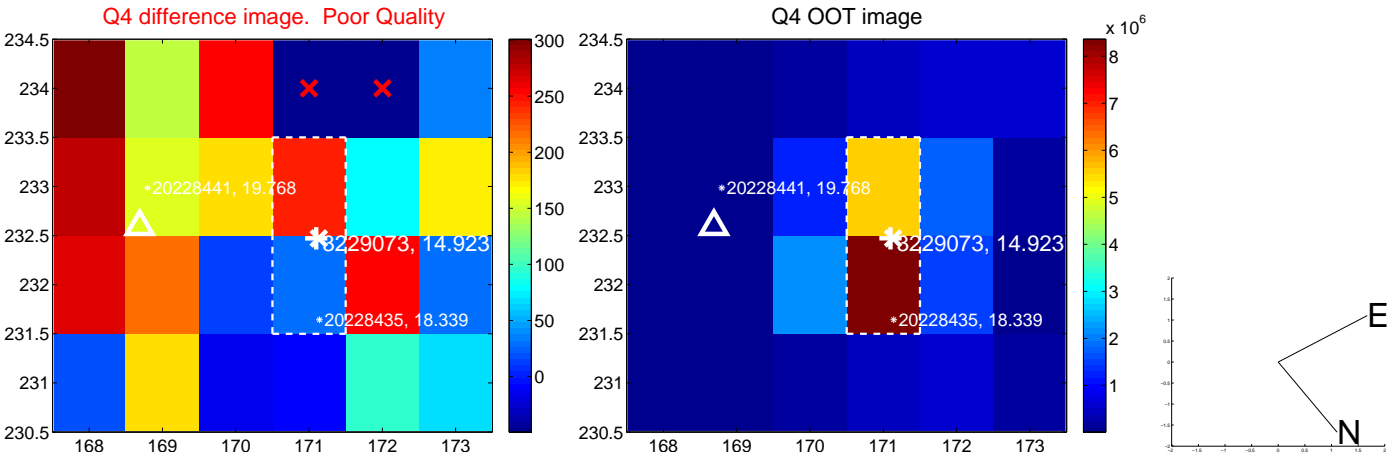
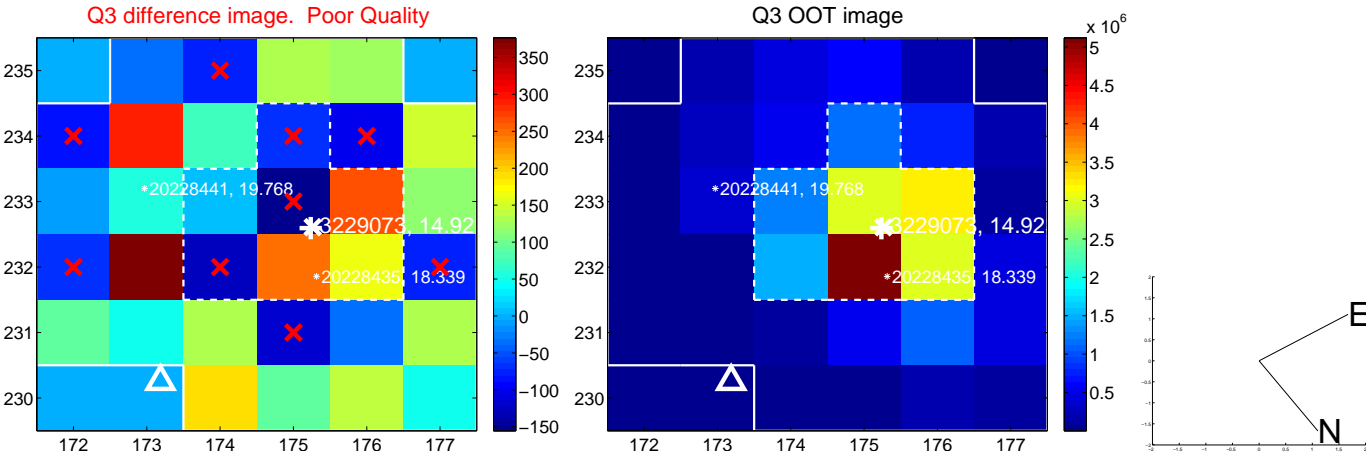
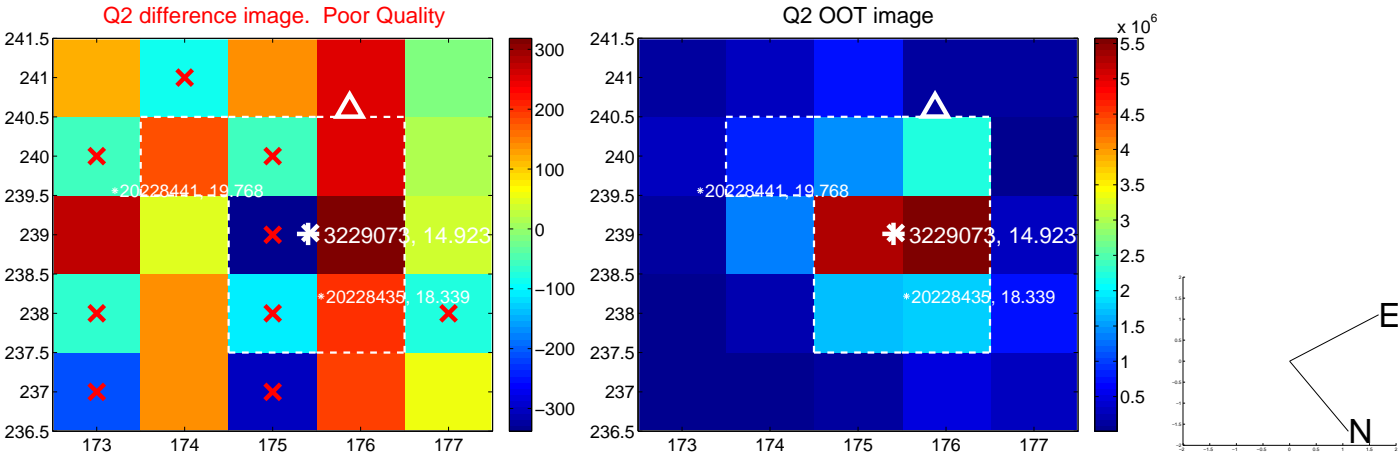
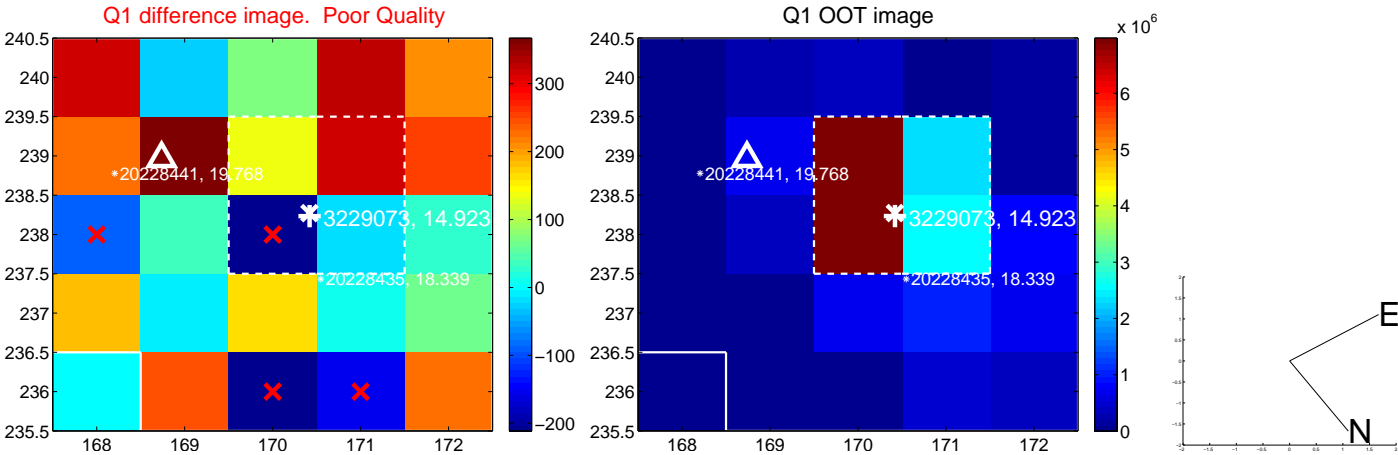


offset from photometric centroids

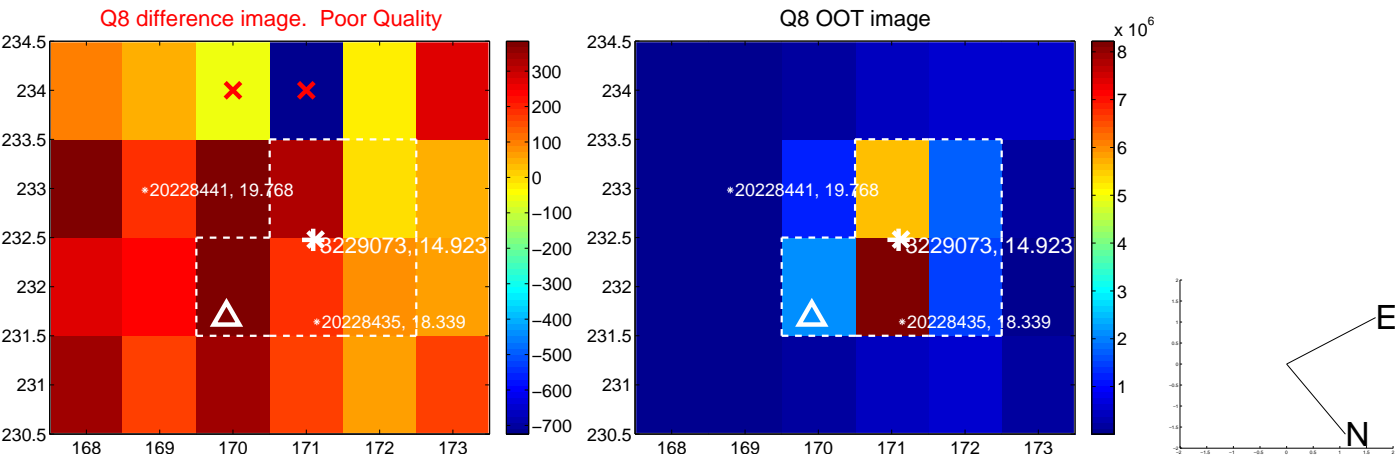
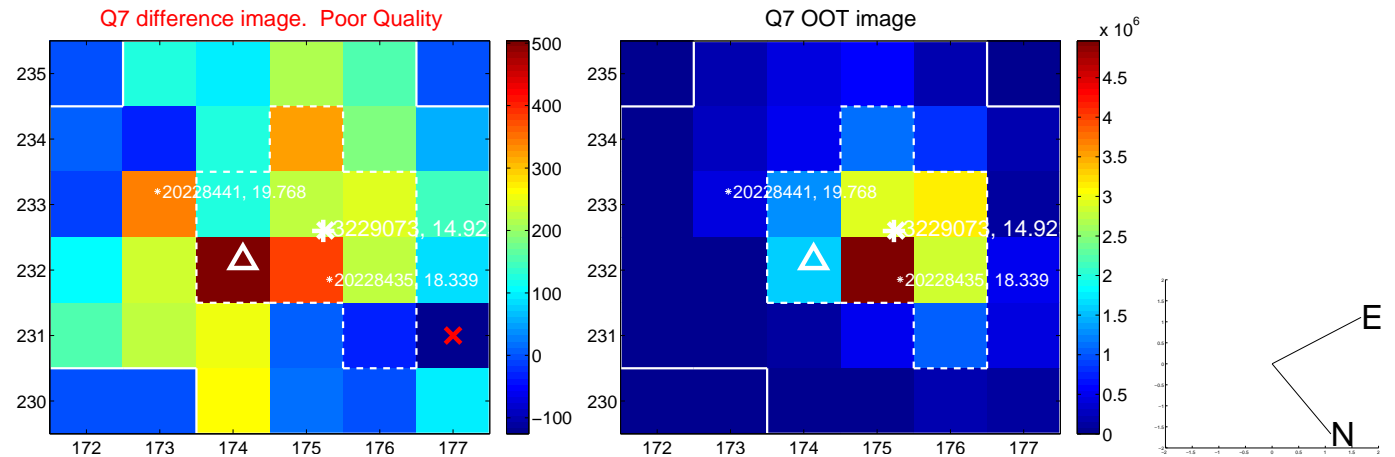
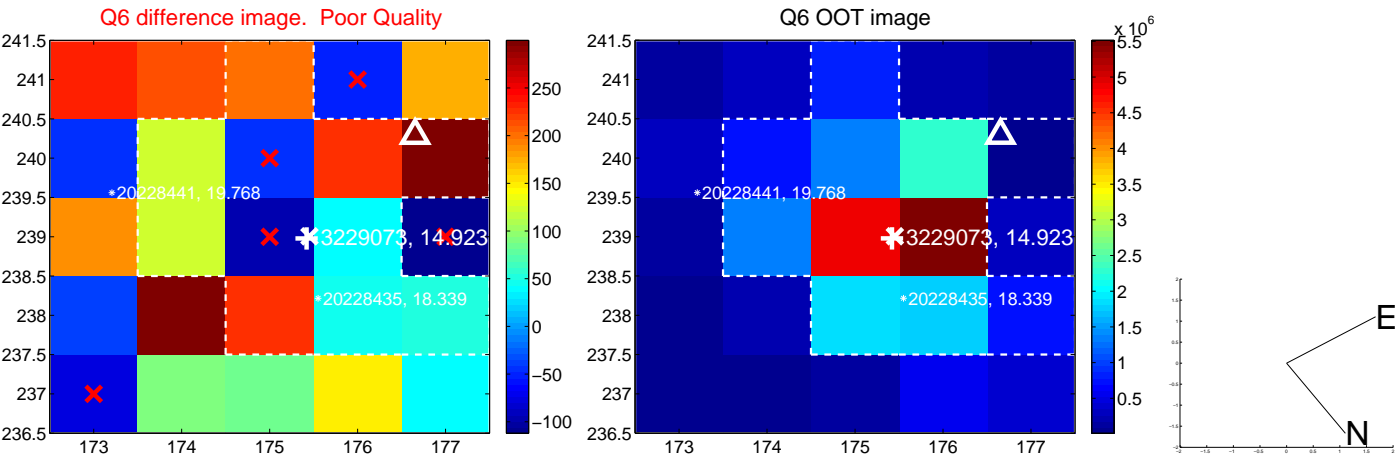
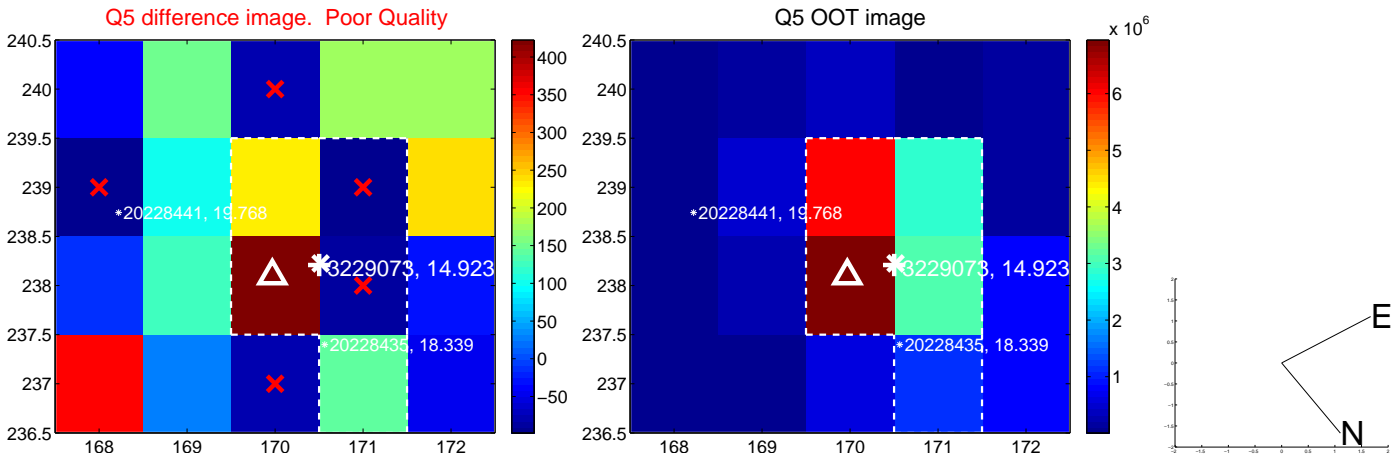


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

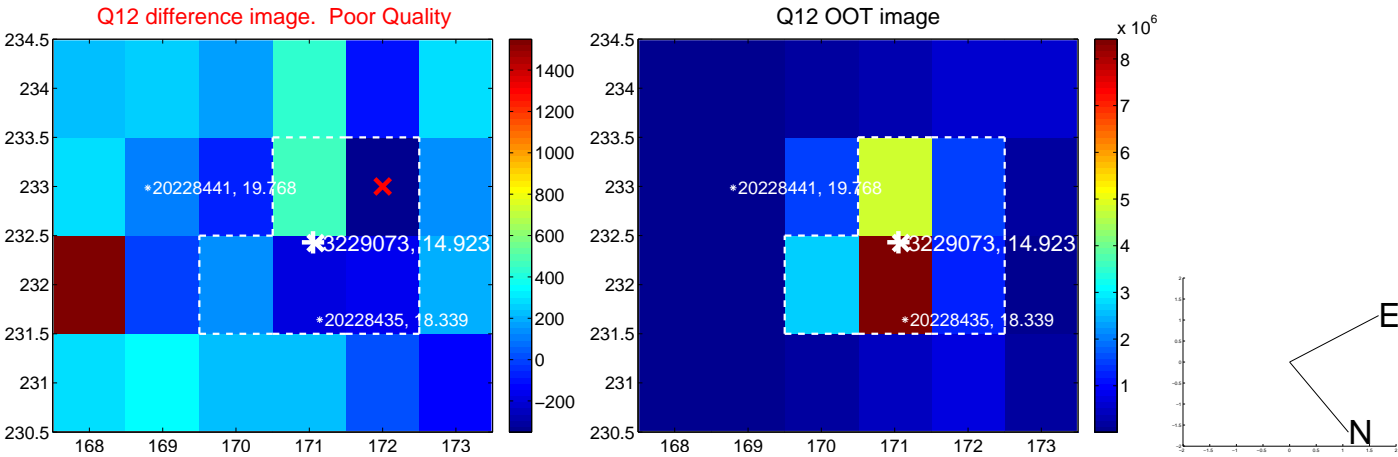
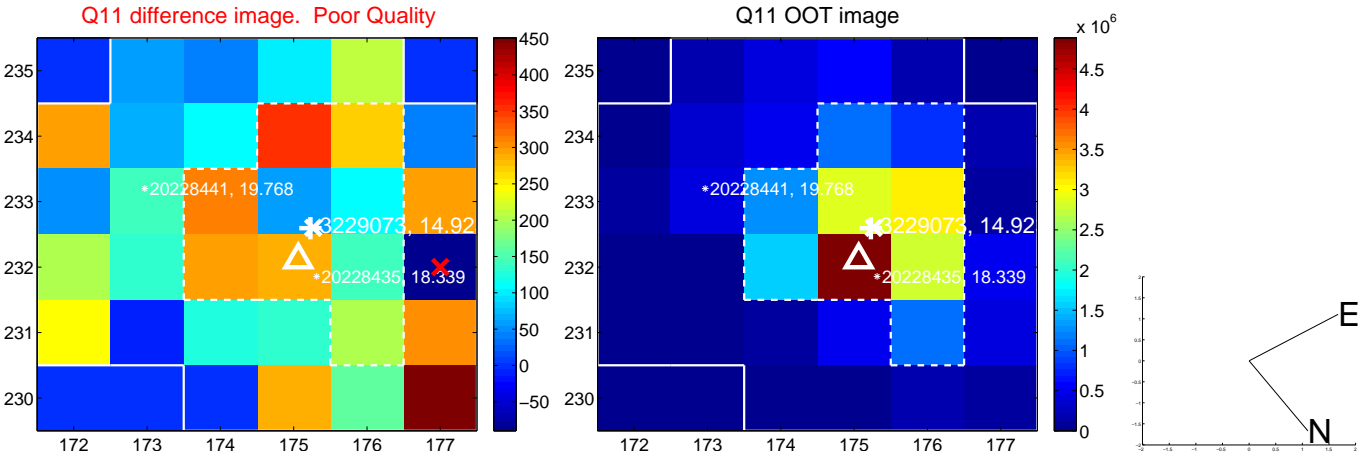
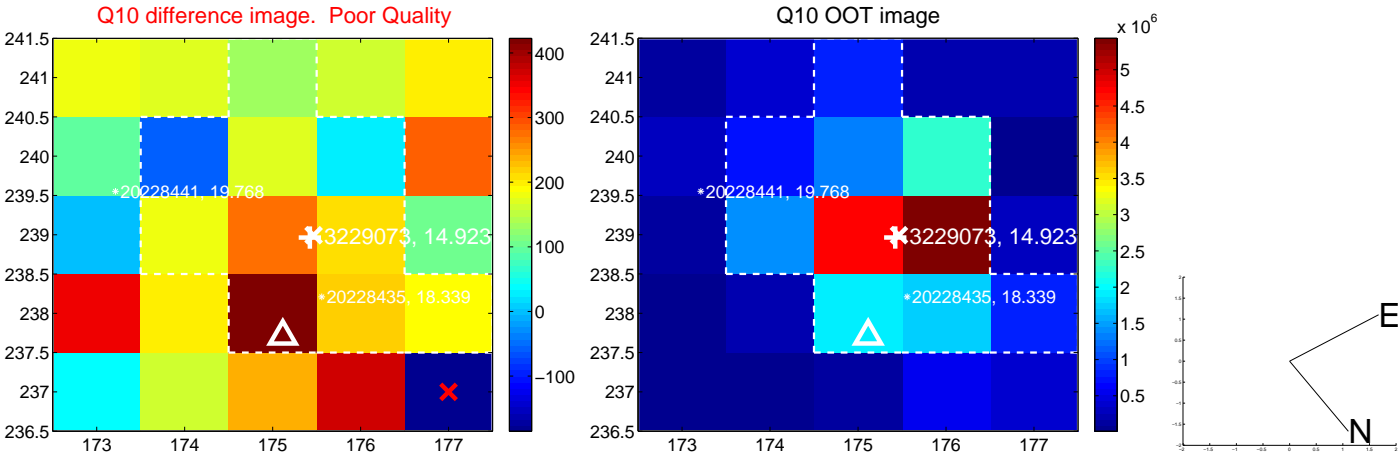
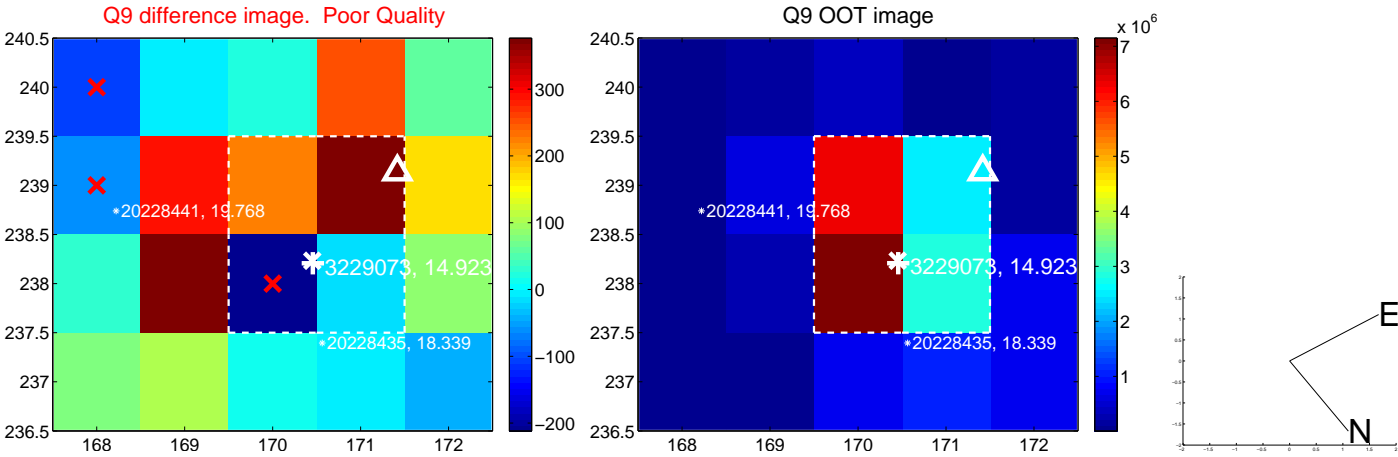


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

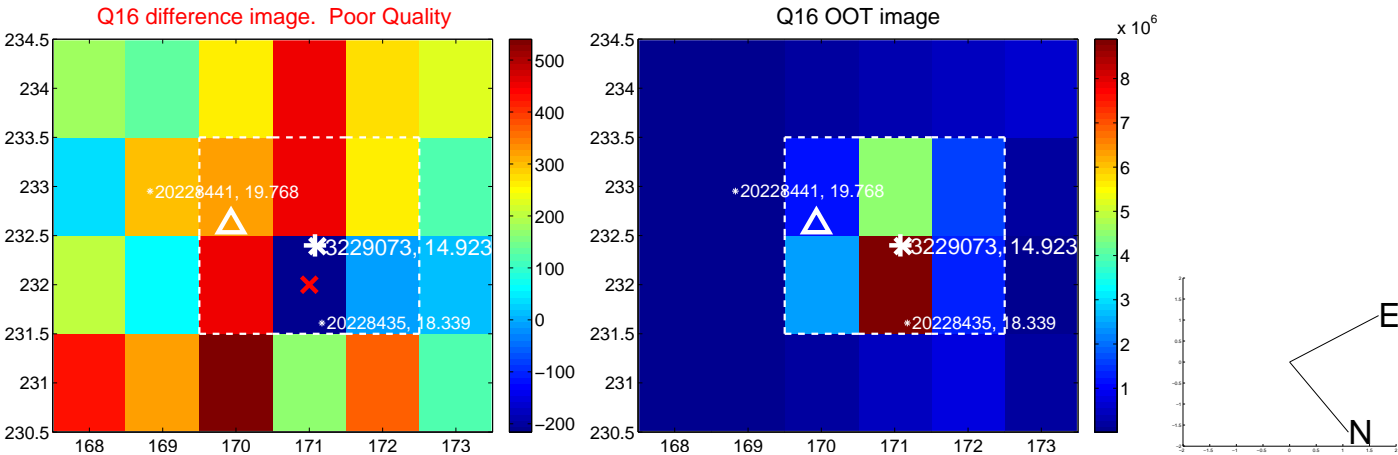
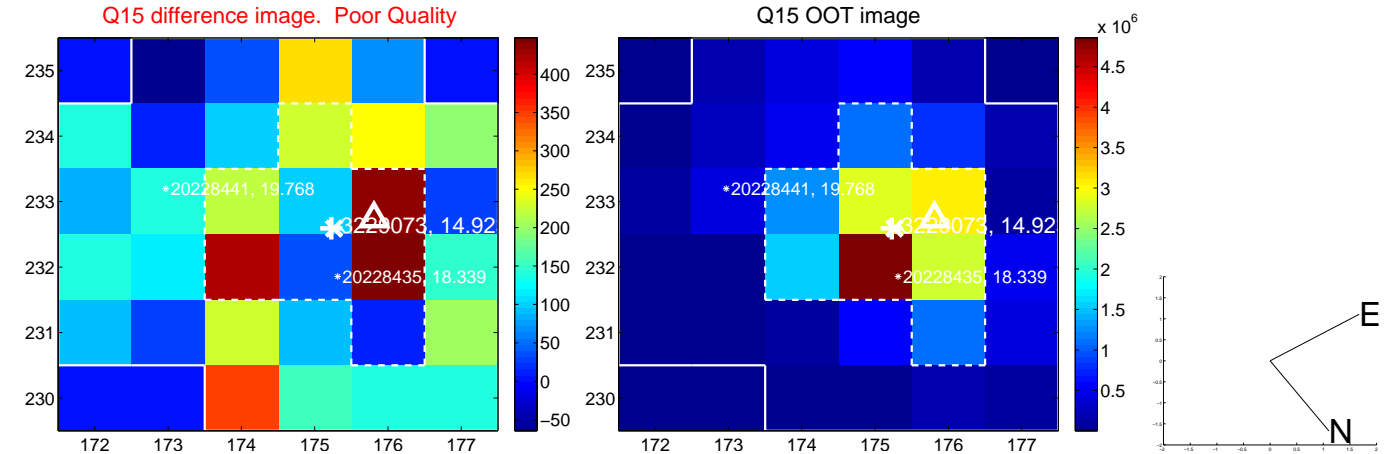
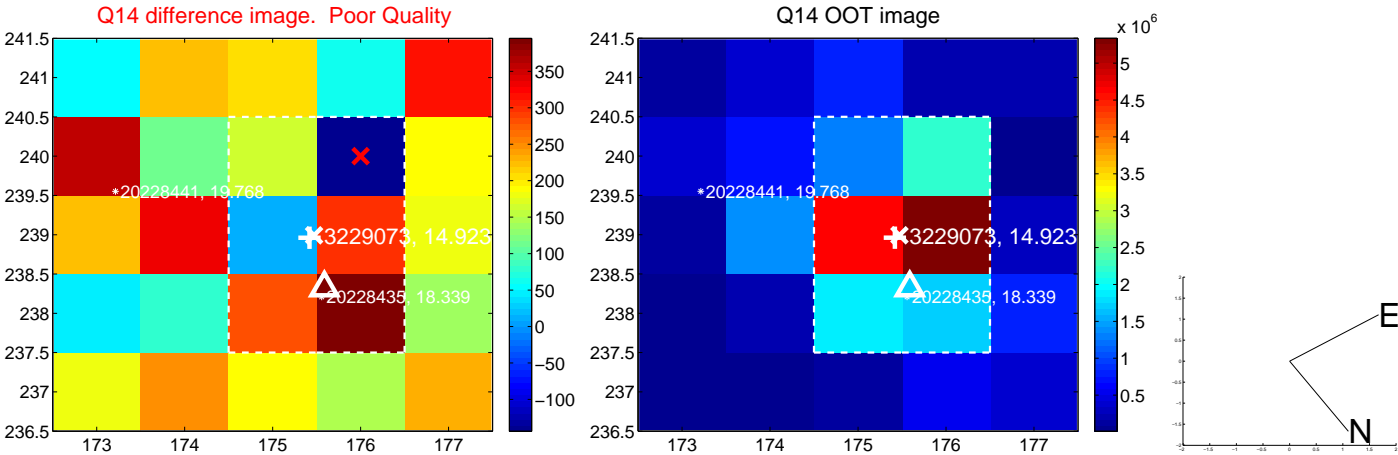
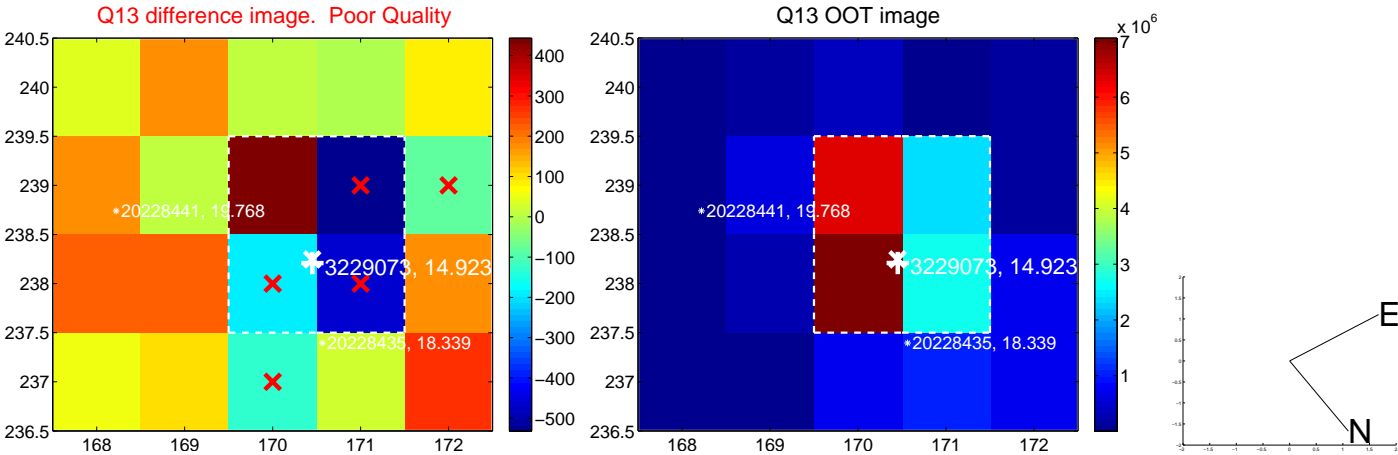




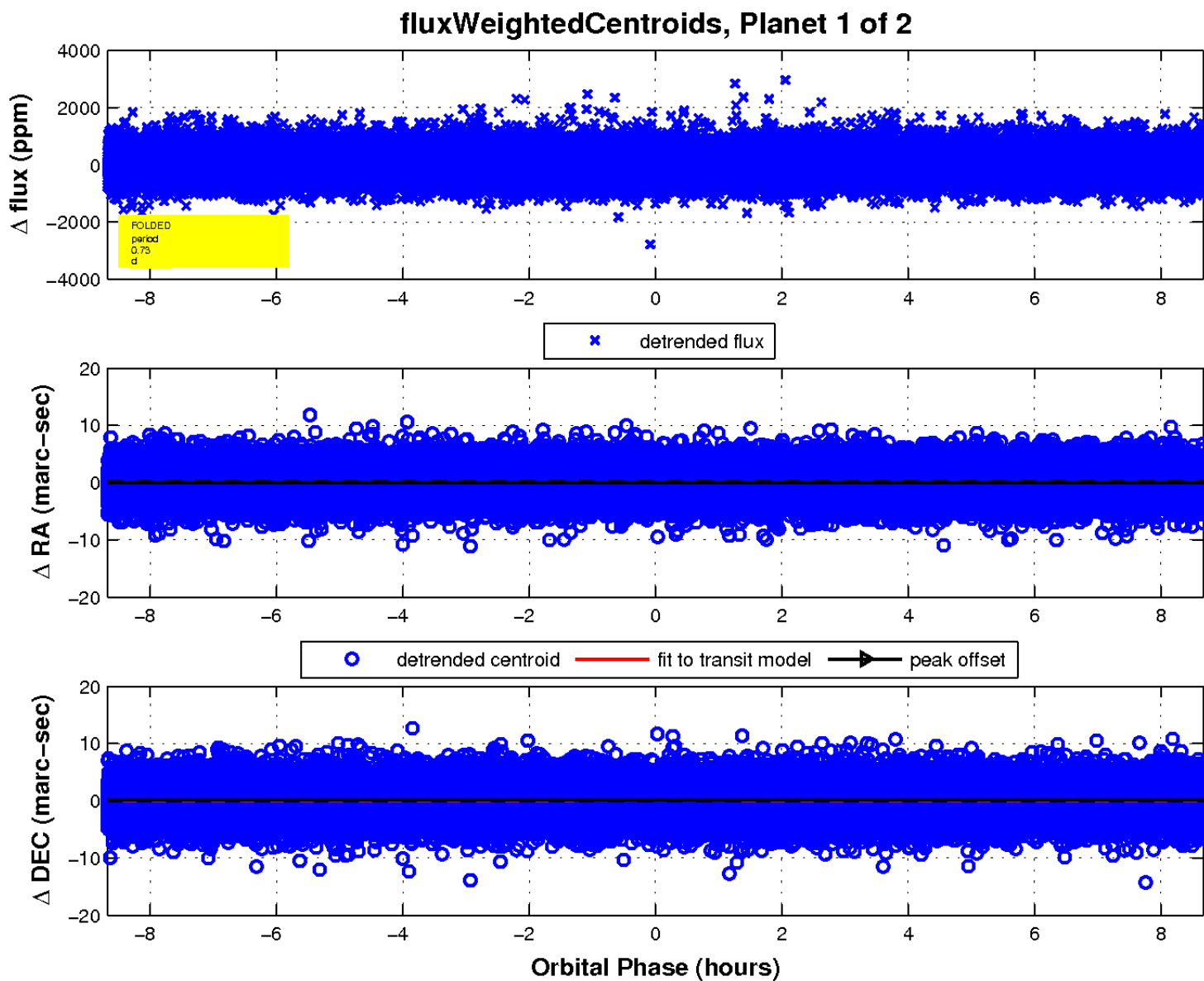
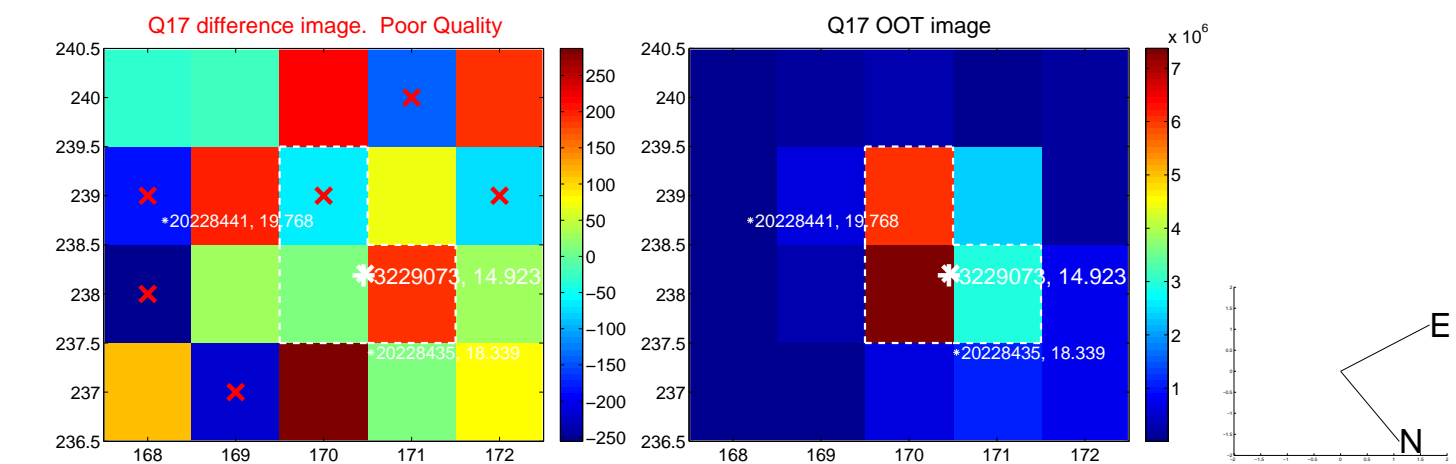
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

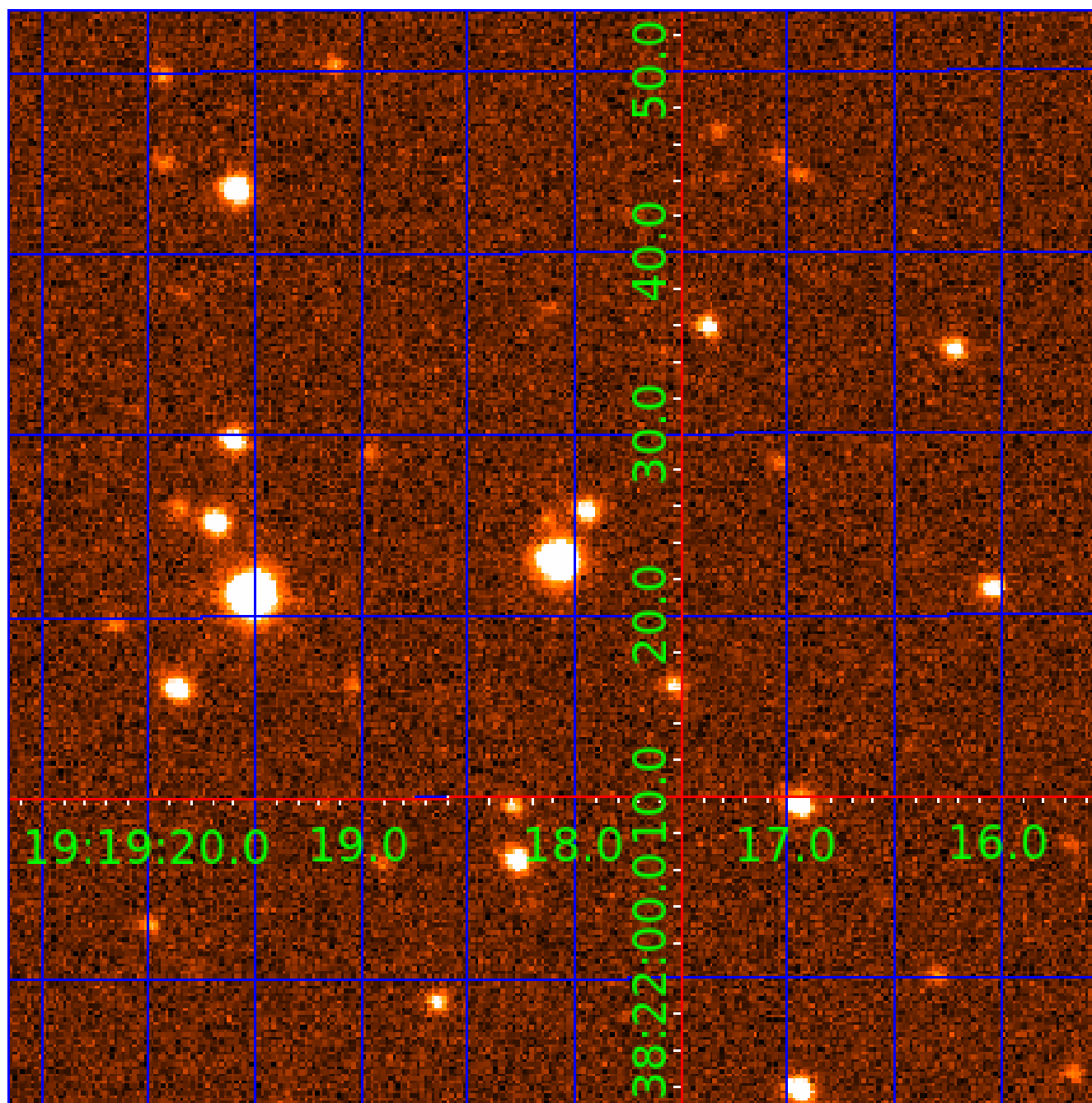


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 003229073

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
003229073-01	OBS	No	0.730942	132.222622	39.0	2.892	7.6	8.3	1.00	6092	0.73	4643.48
003229073-02	OBS	No	181.531744	291.078855	261.2	13.732	8.3	4.4	1.00	6092	1.72	2.98

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003229073-01	OBS	FP	0.00	1	0	1	1	LPP_DV—CENT_RESOLVED_OFFSET—HALO_GHOST—EPHEM_MATCH
003229073-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_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.

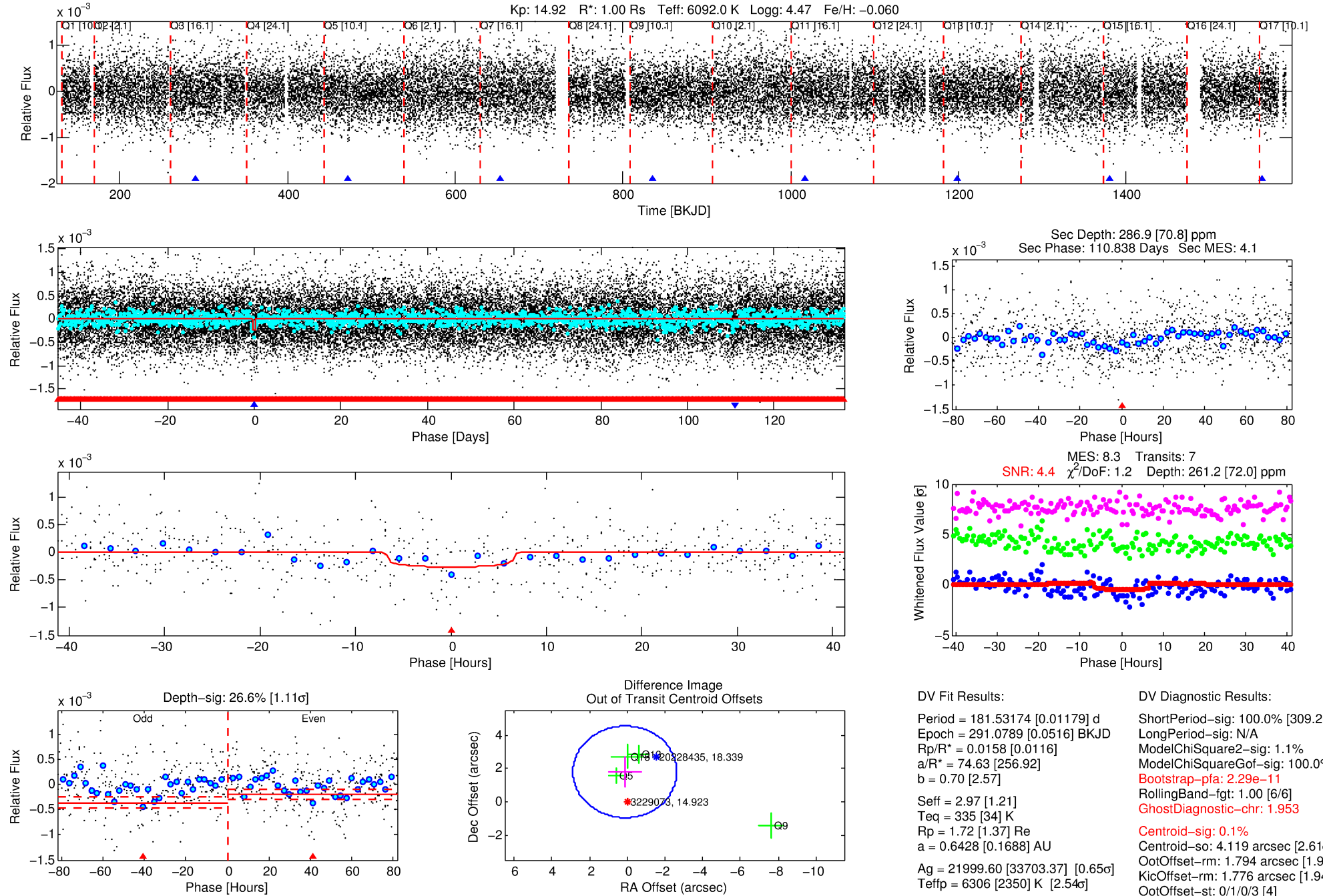
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 003229073-02

No Significant Match Found

# DV One-Page Summary

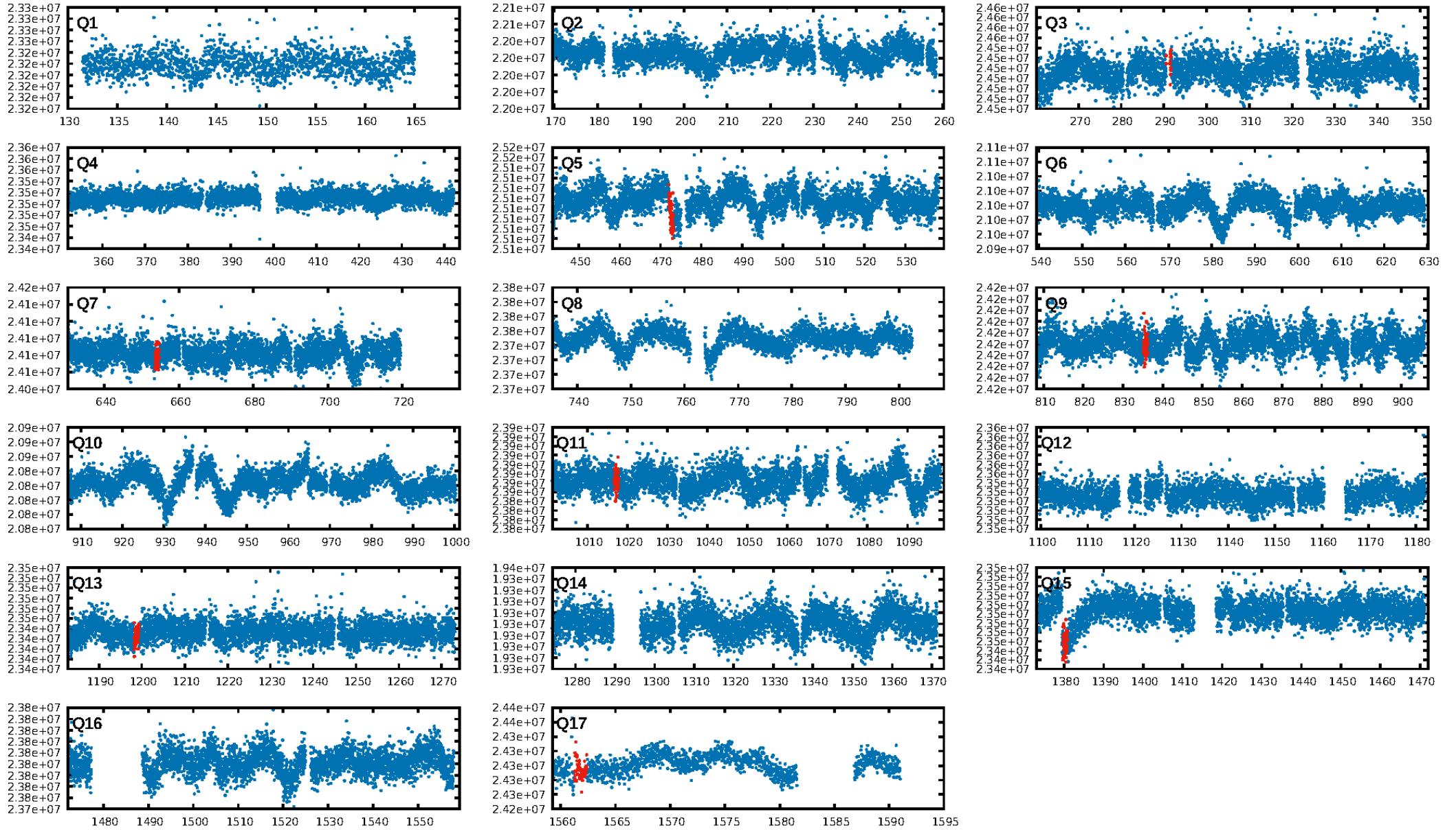
KIC: 3229073 Candidate: 2 of 2 Period: 181.532 d



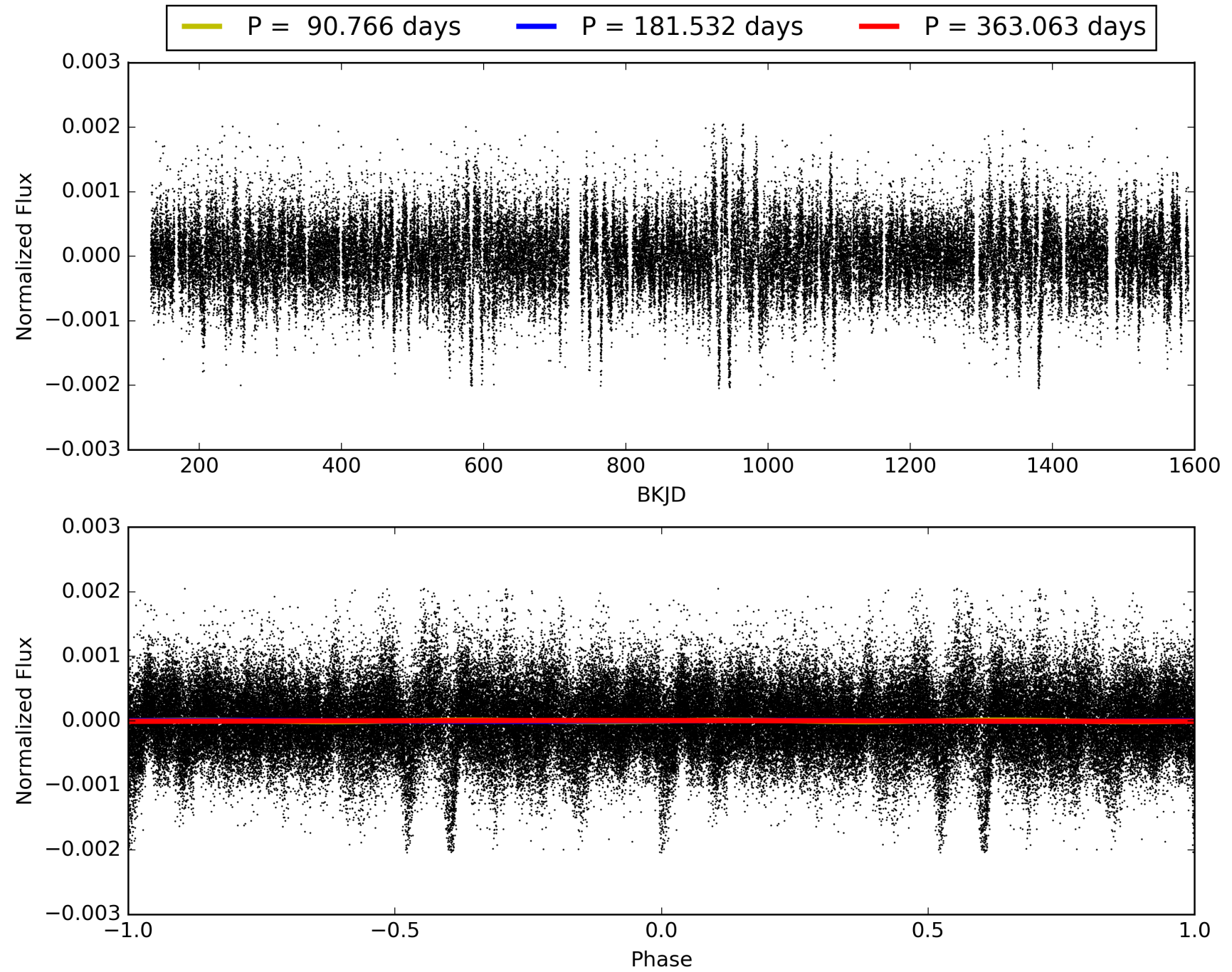
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 21:29:49 Z

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

# TCE 003229073-02, PDC Light Curves



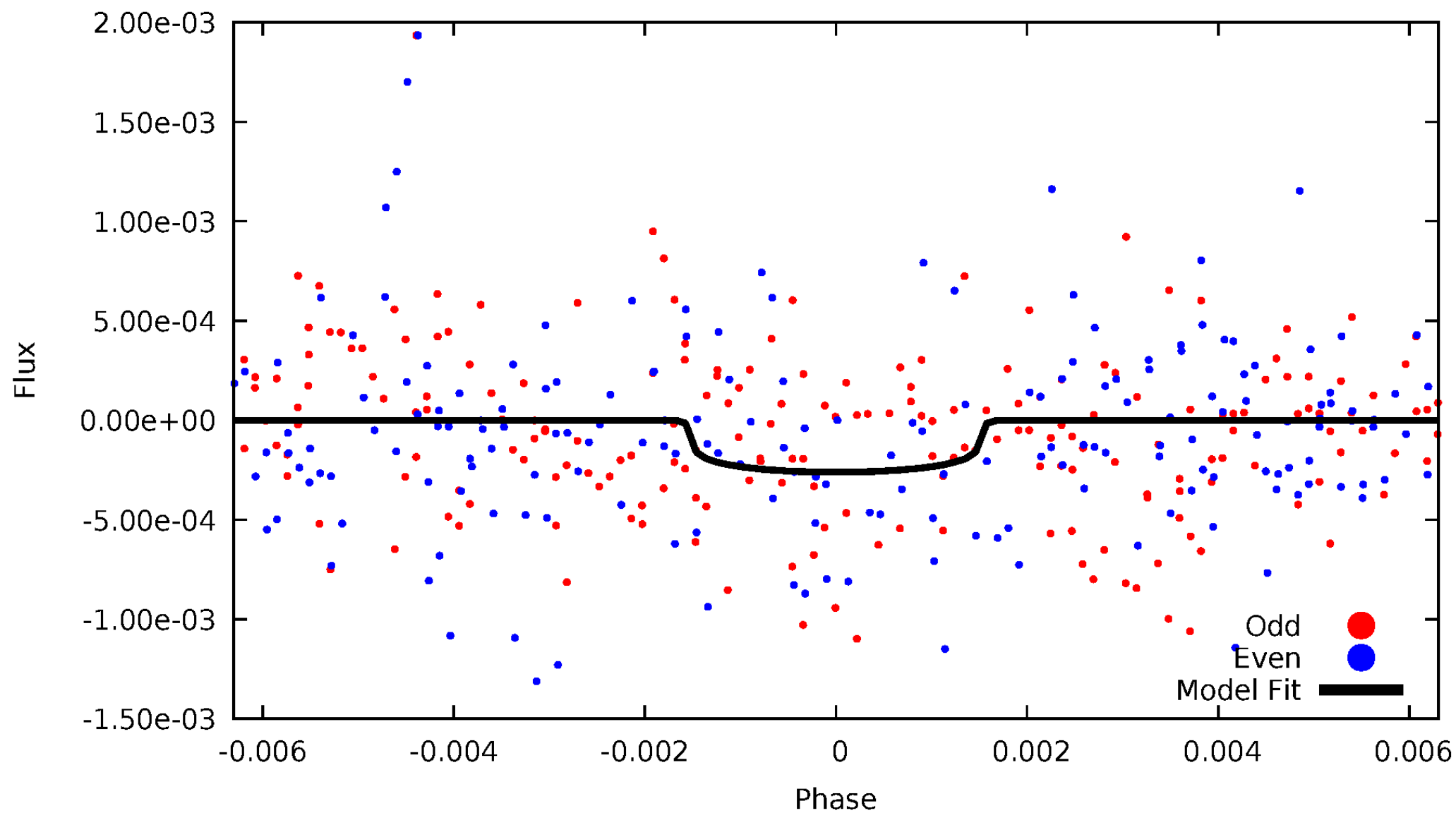
# TCE 003229073-02





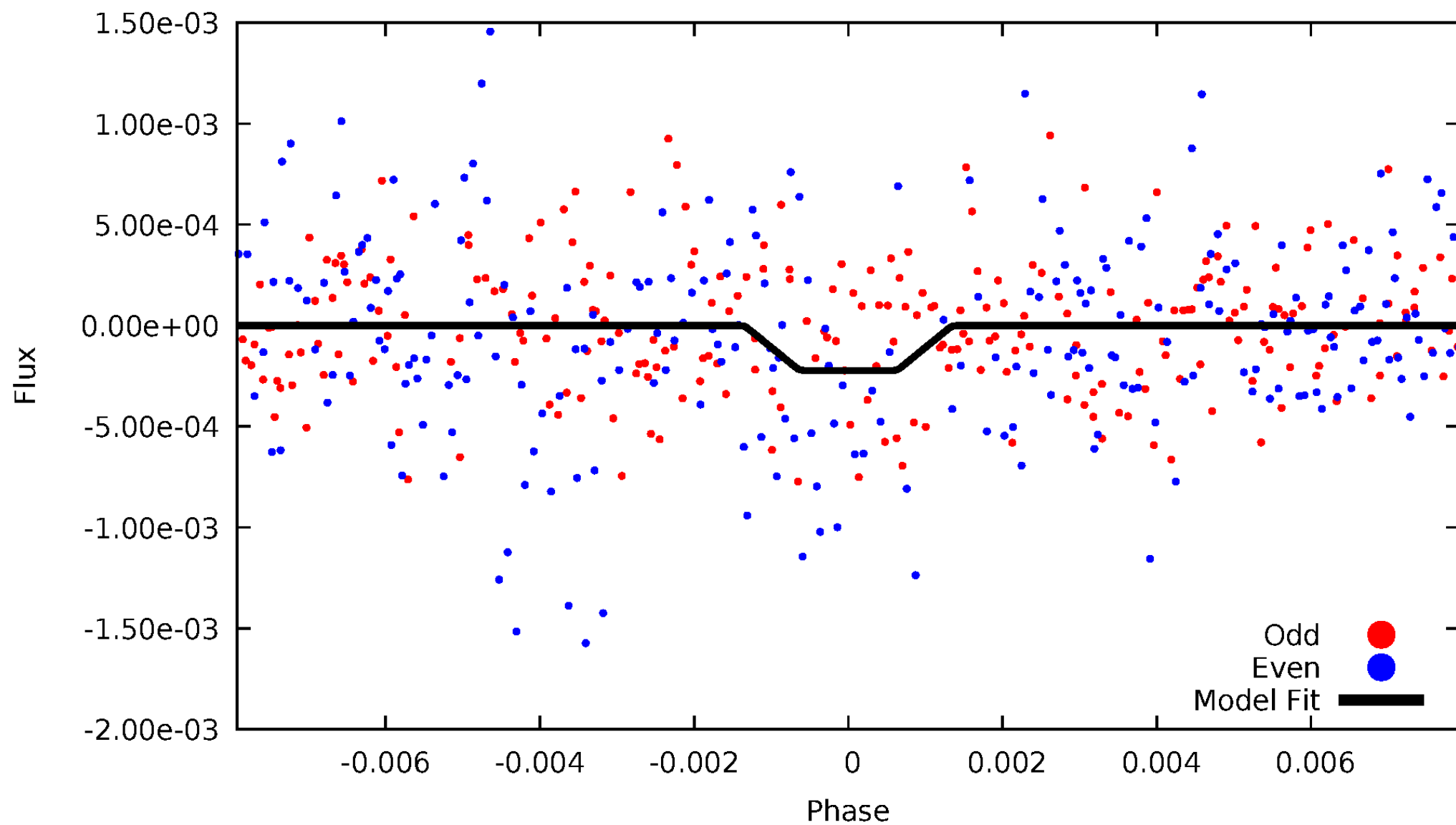
# DV Odd/Even

TCE 003229073-02



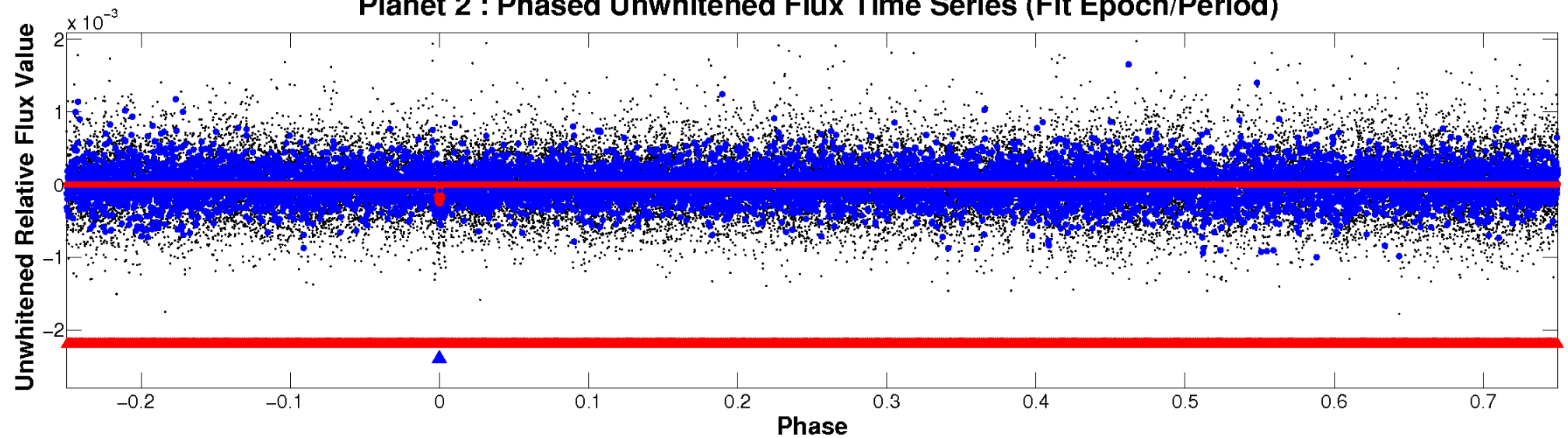
# ALT Odd/Even

TCE 003229073-02

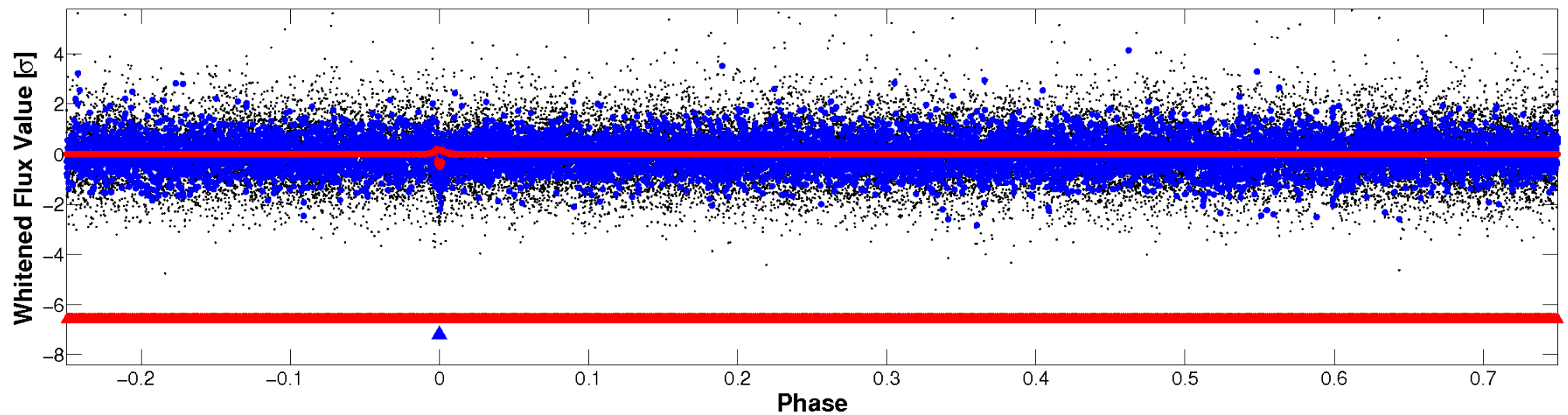


# Non-Whitened Vs. Whitened Light Curve

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

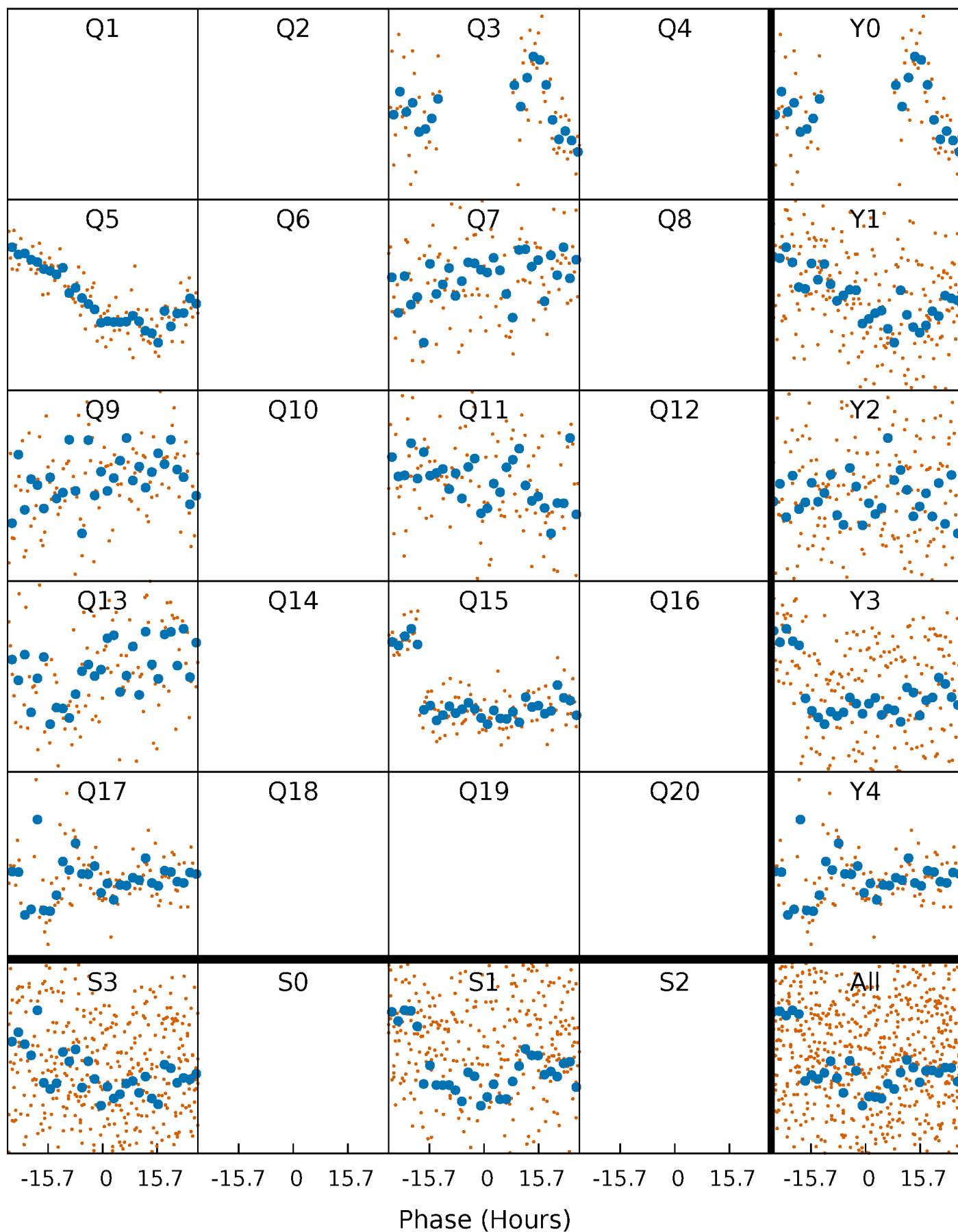


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



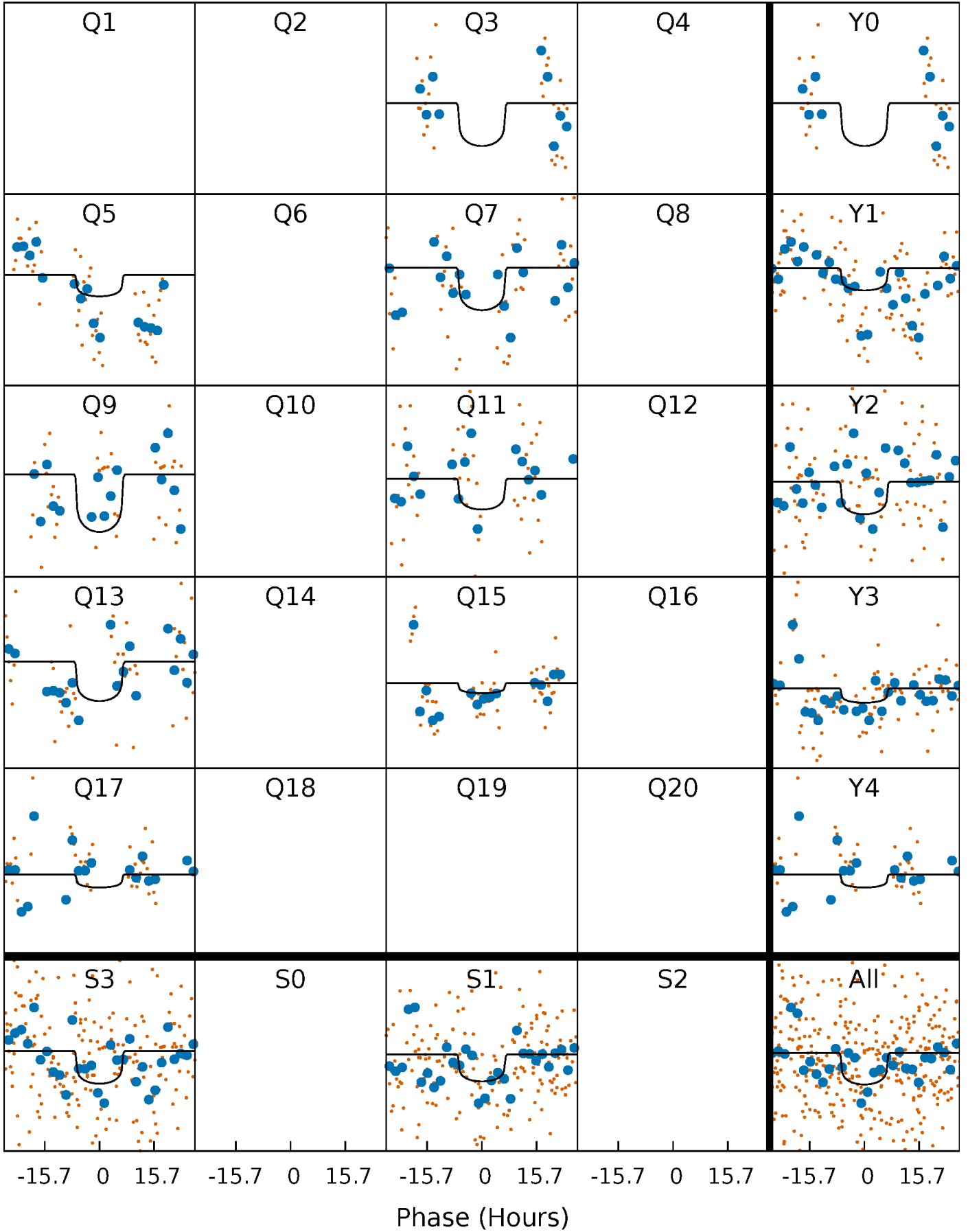
# PDC Quarter-Phased Transit Curves

TCE 003229073-02 P=181.531744 Days  $T_0=291.078855$  (BKJD)



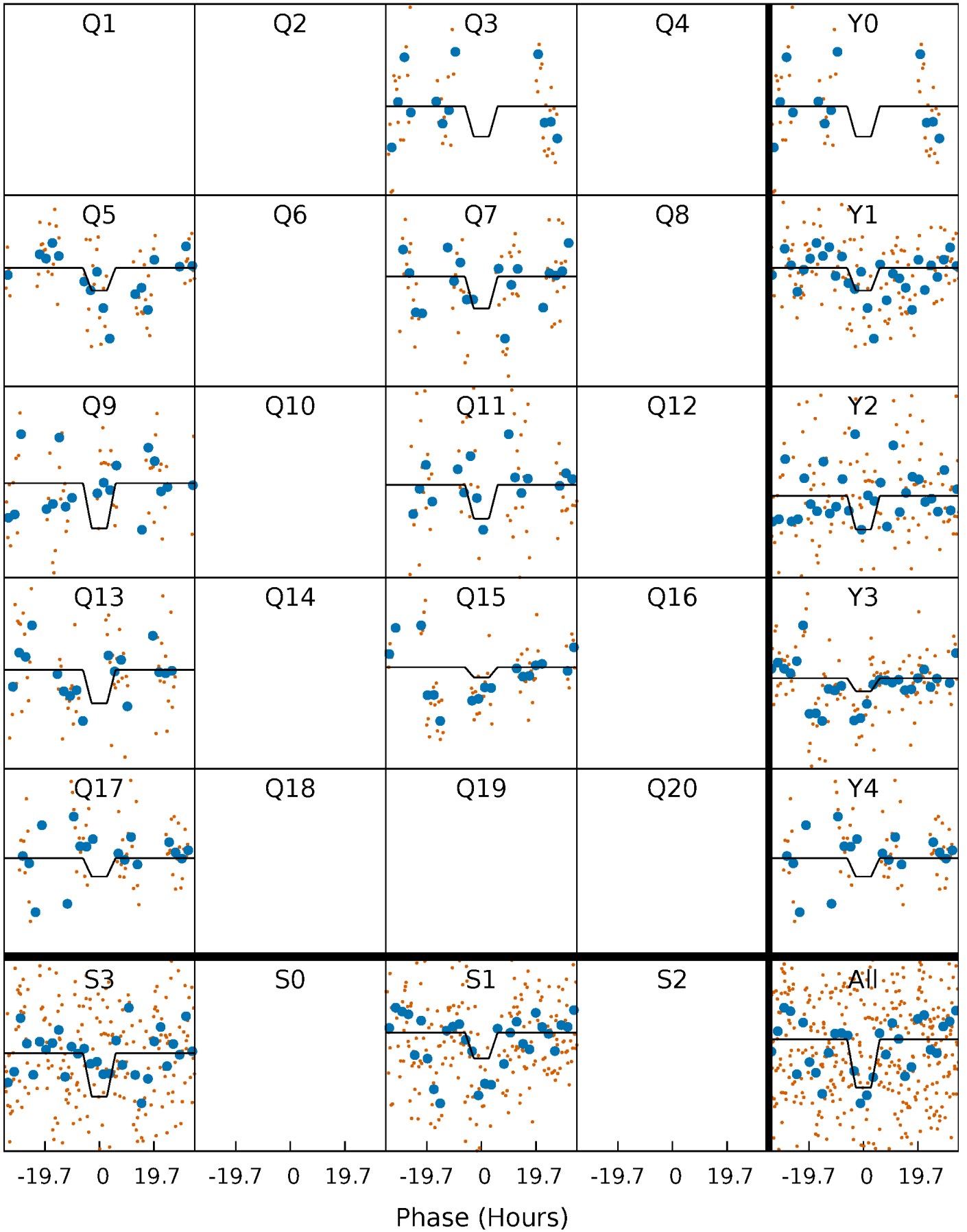
# DV Quarter-Phased Transit Curves

TCE 003229073-02   P=181.531744 Days    $T_0=291.078855$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 003229073-02   P=181.558992 Days    $T_0=290.964222$  (BKJD)

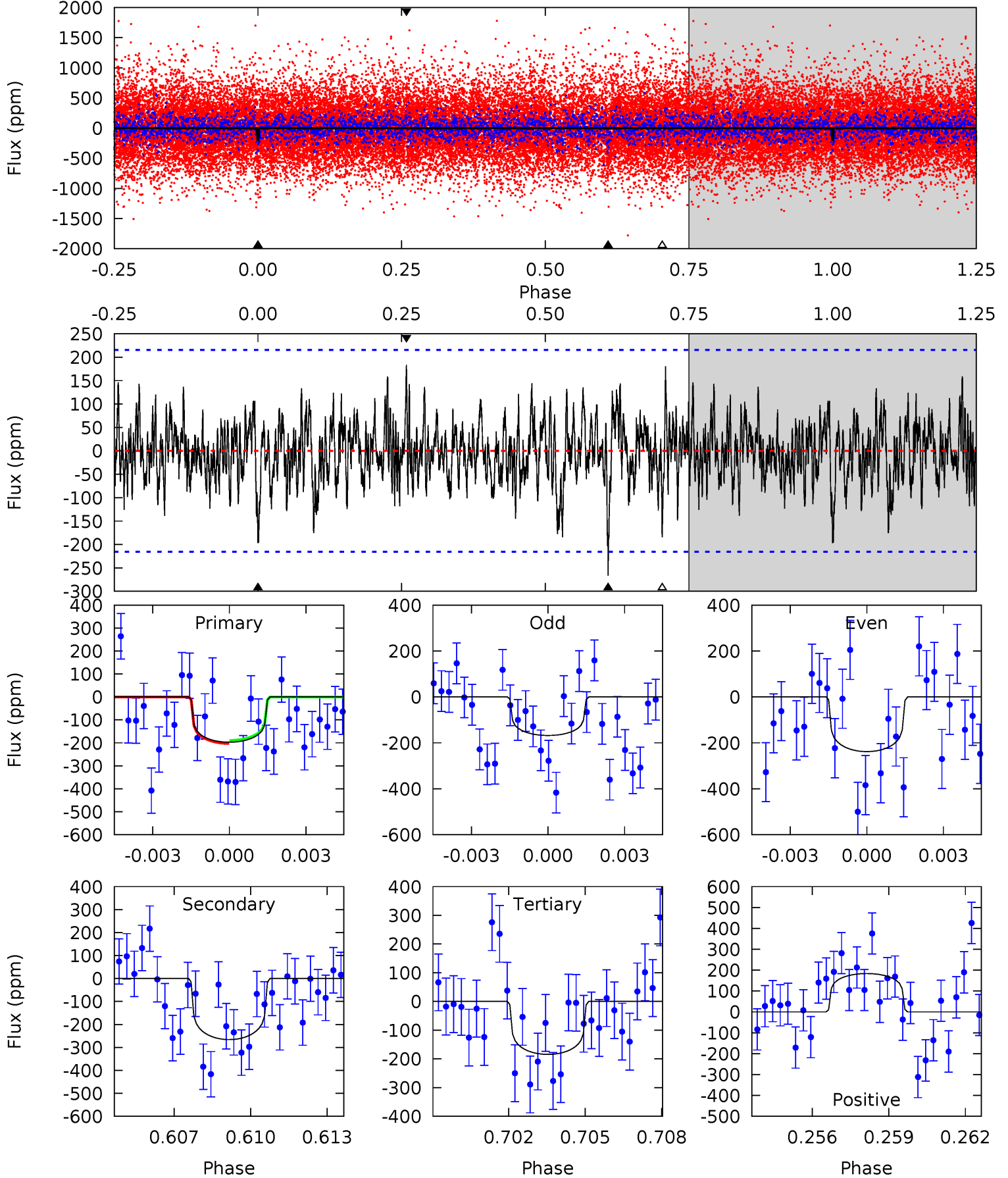




# DV Model-Shift Uniqueness Test

003229073-02, P = 181.531744 Days, E = 109.547111 Days

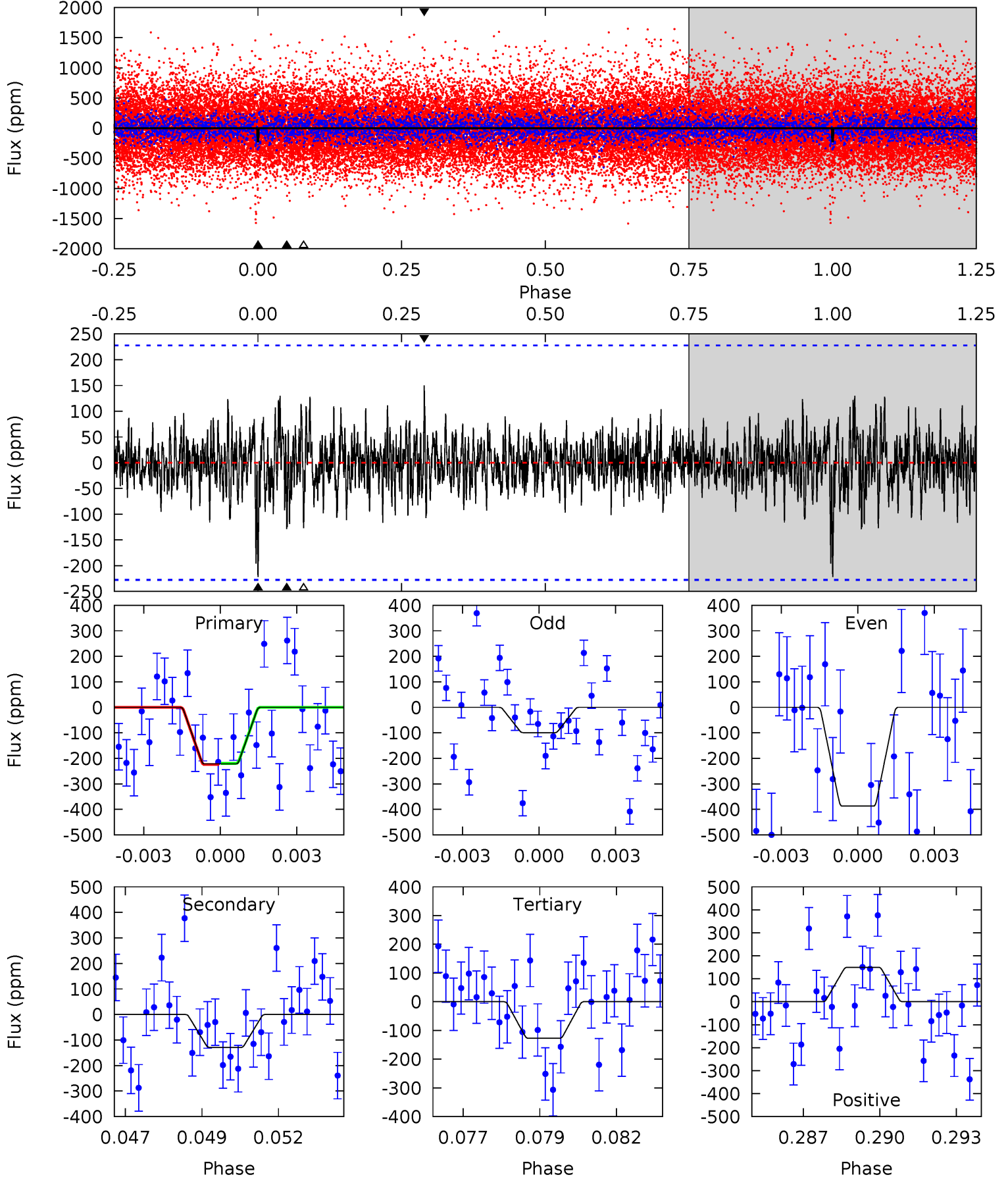
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
4.79	6.47	4.48	4.47	5.24	2.95	1.35	0.31	0.32	1.99	2.00	0.83	1.75	0.41	0.15



# Alt Model-Shift Uniqueness Test

003229073-02, P = 181.558992 Days, E = 109.405230 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
5.14	2.98	2.94	3.47	5.27	3.00	0.92	2.19	1.67	0.04	-0.48	3.27	3.05	0.40	0.05



### Stellar Parameters For KIC 003229073

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6092^{+192}_{-214}$	$4.471^{+0.052}_{-0.208}$	$-0.060^{+0.250}_{-0.350}$	$0.998^{+0.312}_{-0.104}$	$1.074^{+0.137}_{-0.150}$	$1.522^{+0.422}_{-0.795}$
	+3%/-4%	+1%/-5%	+417%/-583%	+31%/-10%	+13%/-14%	+28%/-52%
Source	PHO1	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 003229073-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-266 \pm 41$	$1.91^{+1.28}_{-1.09}$	$480^{+34}_{-27}$	$6021^{+3946}_{-1295}$	$15930^{+71886}_{-10255}$
Alt.	$-129 \pm 43$	$1.86^{+1.33}_{-1.04}$	$479^{+34}_{-24}$	$5162^{+2737}_{-1055}$	$8322^{+37991}_{-5794}$

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

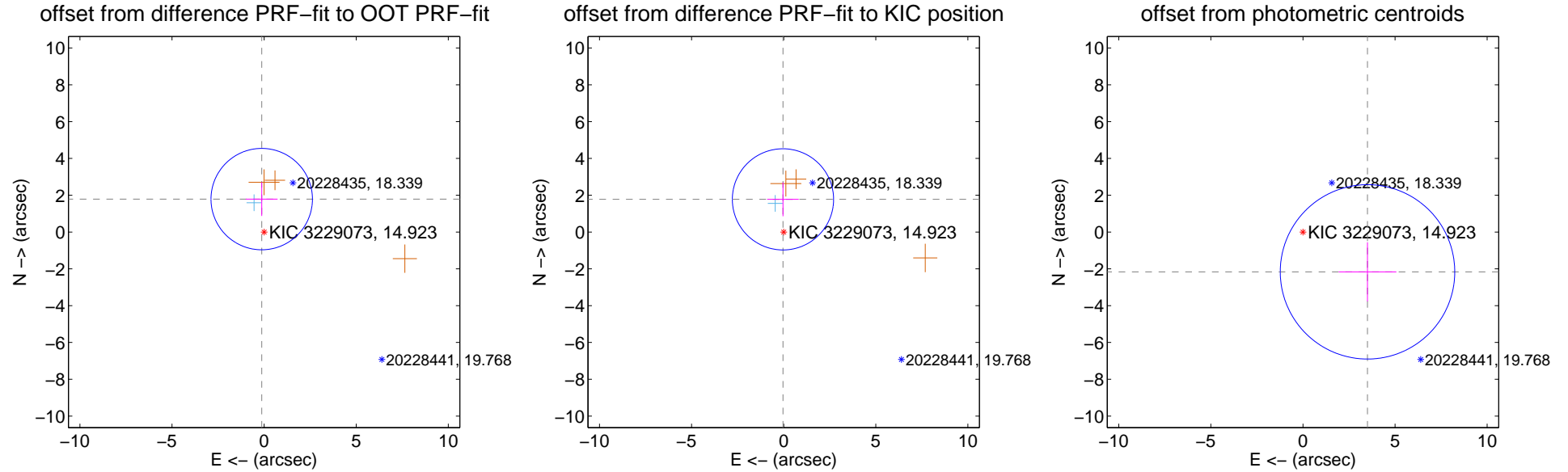
## DV Centroid Data

Supplemental centroid analysis for 003229073-02. Kepler magnitude: 14.92. Transit SNR 4.35

There are 1 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.14 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.794 \pm 0.918$	1.95	$0.130 \pm 0.862$	$1.789 \pm 0.918$
PRF-fit source offset from KIC position	$1.776 \pm 0.916$	1.94	$0.039 \pm 0.857$	$1.776 \pm 0.916$
photometric centroid source offset	$4.12 \pm 1.58$	2.61	$-3.51 \pm 1.57$	$-2.16 \pm 1.61$

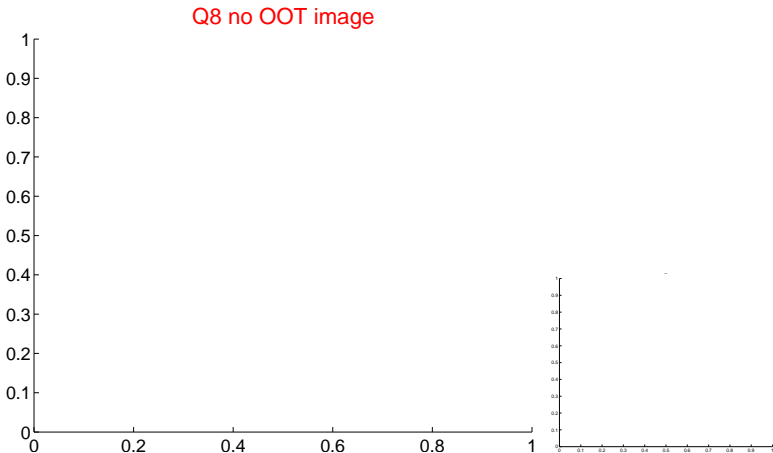
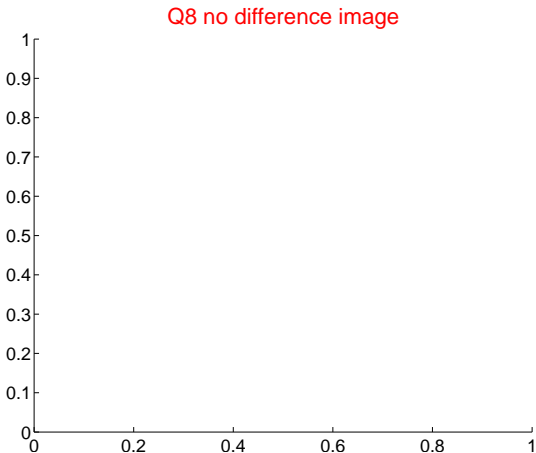
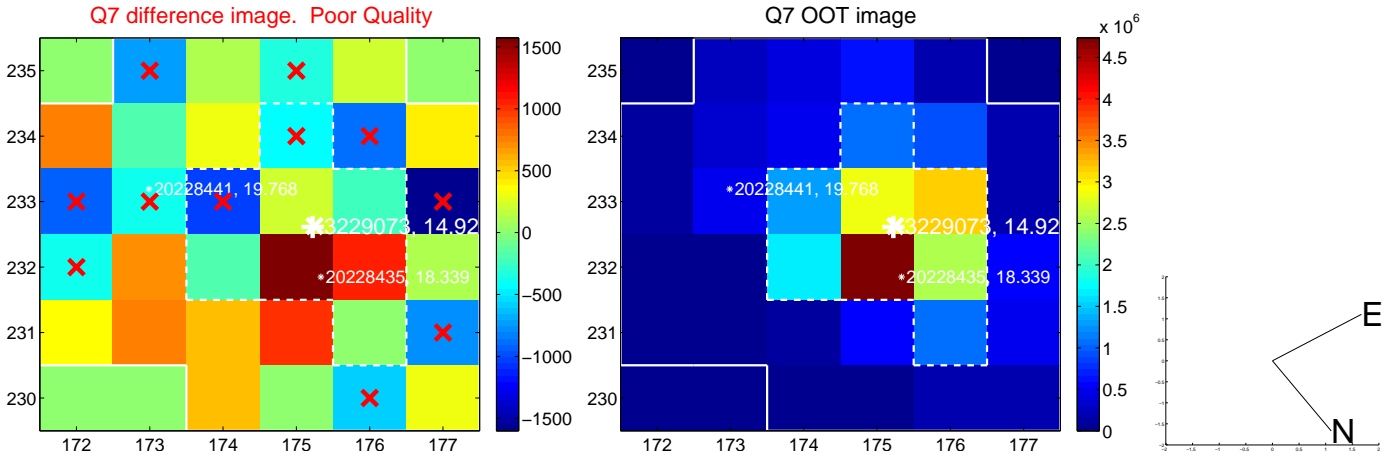
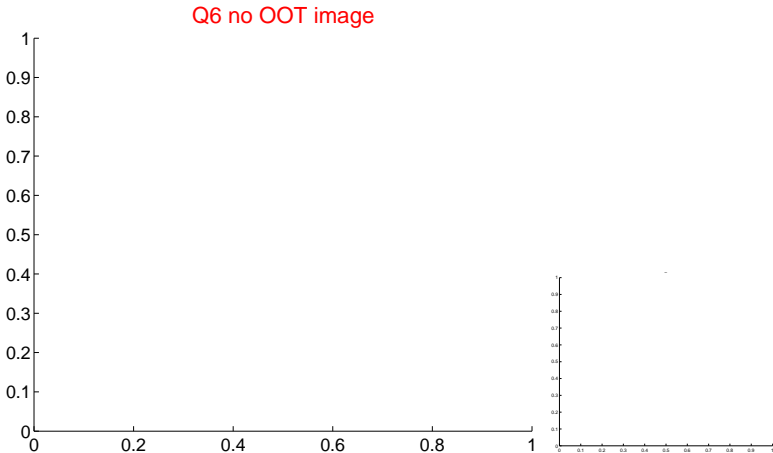
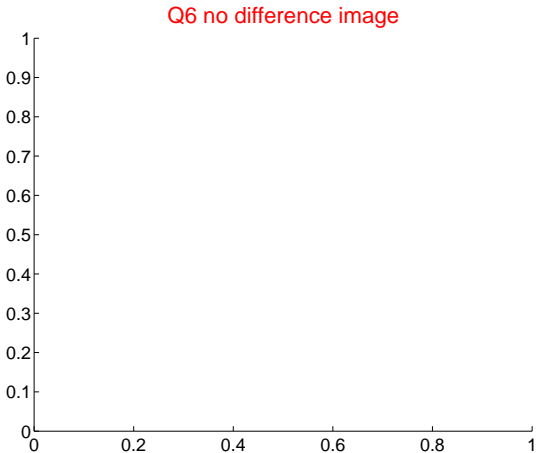
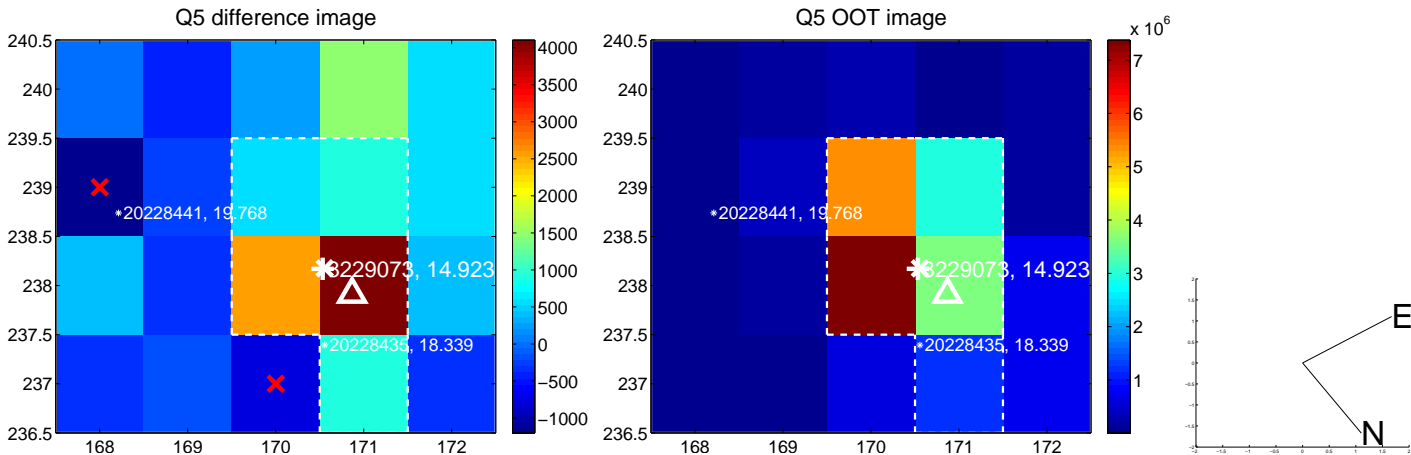


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000 are from the UKIRT catalog.

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

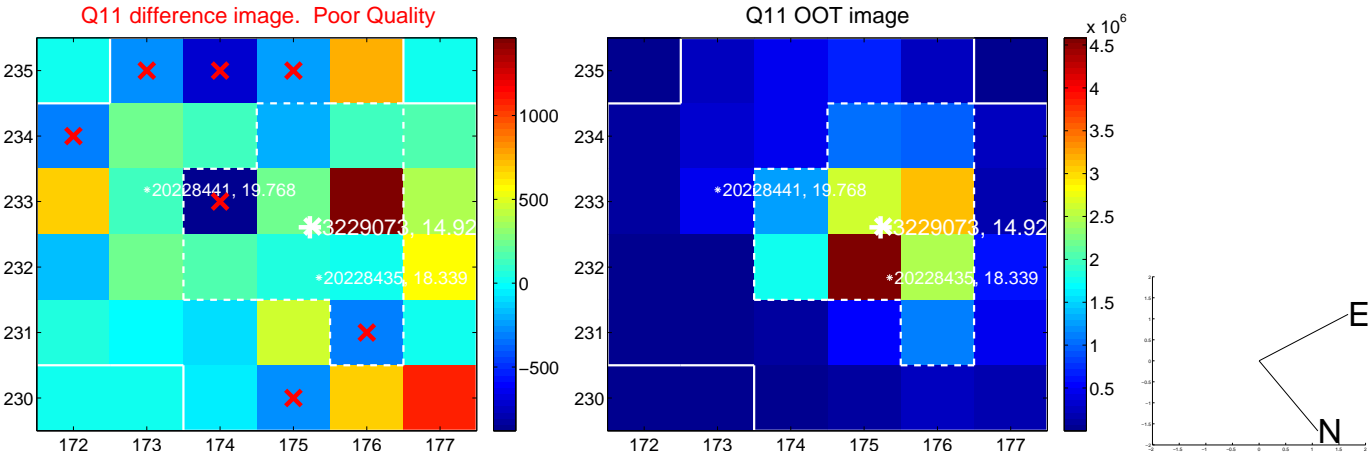
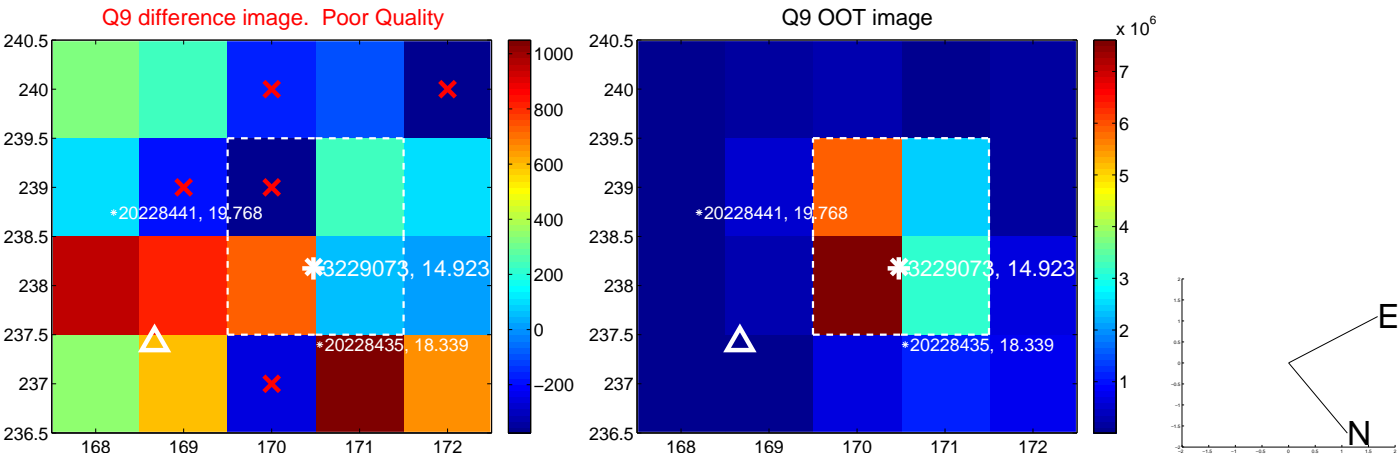


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value

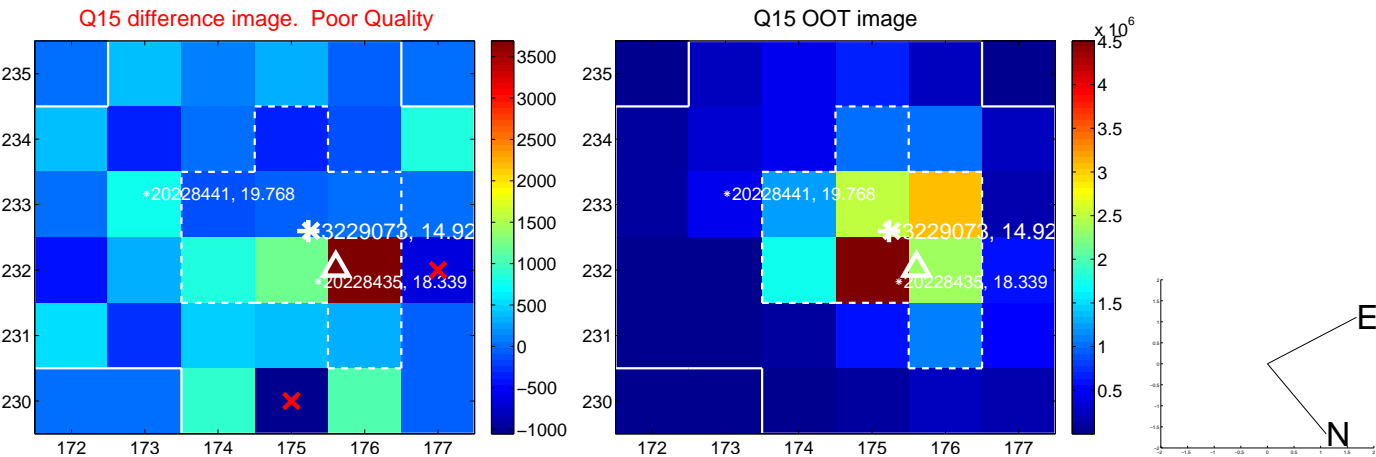
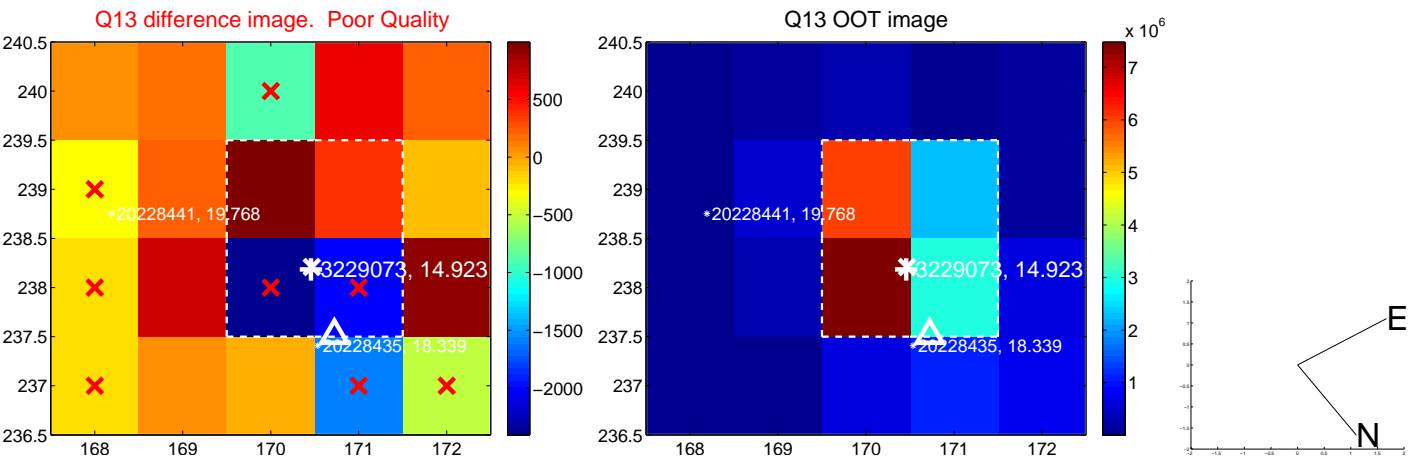




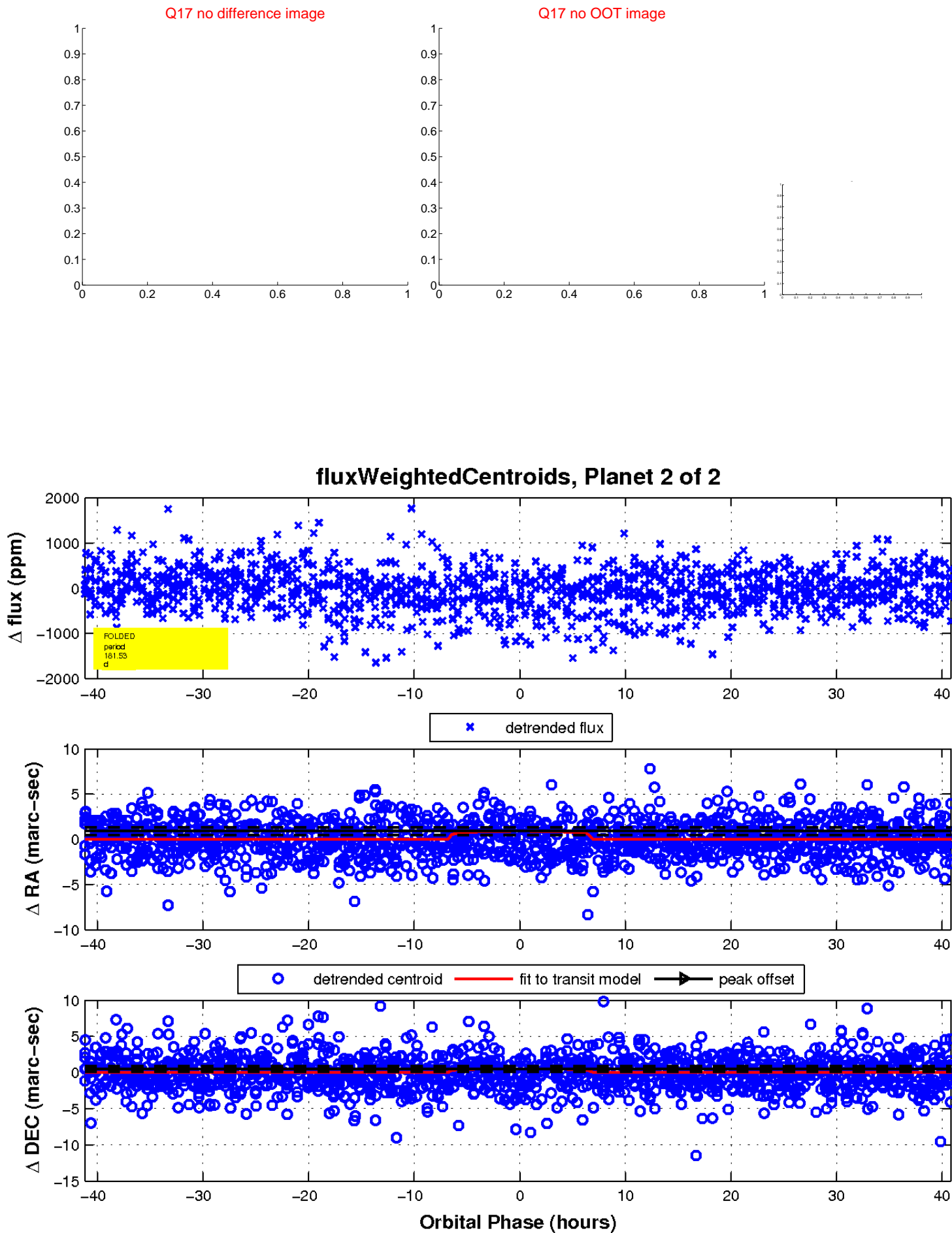
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

