

# KIC 010026458

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010026458-01	OBS	6076.01	9.934427	132.872916	2801.4	7.752	107.2	88.2	1.00	5763	10.05	112.39
010026458-02	OBS	No	9.934419	138.493754	2473.2	6.743	95.1	80.2	1.00	5763	9.49	112.39

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010026458-01	OBS	FP	0.00	0	1	1	1	MOD_SEC_DV—MOD_SEC_ALT—DEEP_V_SHAPED—HAS_SEC_TCE—CENT_RESOLVED_OFFSET—EPHEM_MATCH
010026458-02	OBS	FP	0.00	1	1	1	1	IS_SEC_TCE—CENT_RESOLVED_OFFSET—EPHEM_MATCH

**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 010026458-01

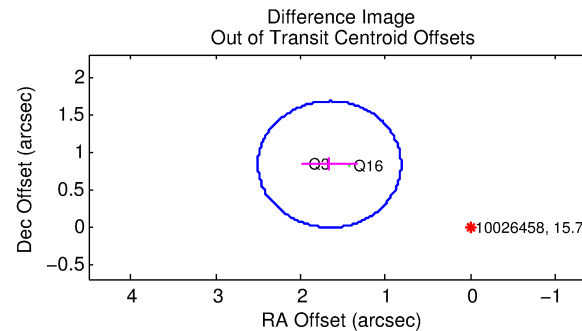
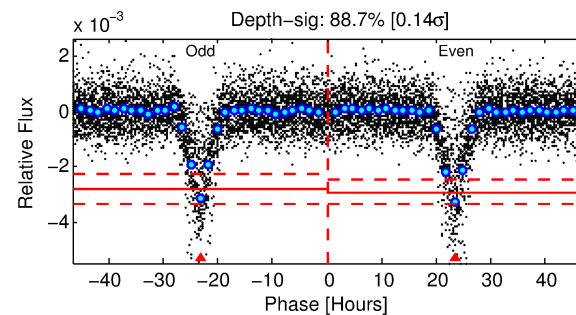
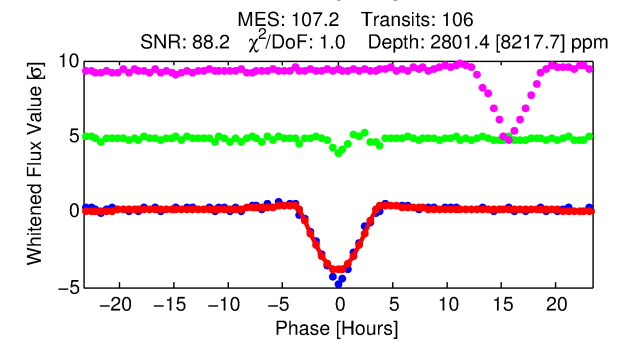
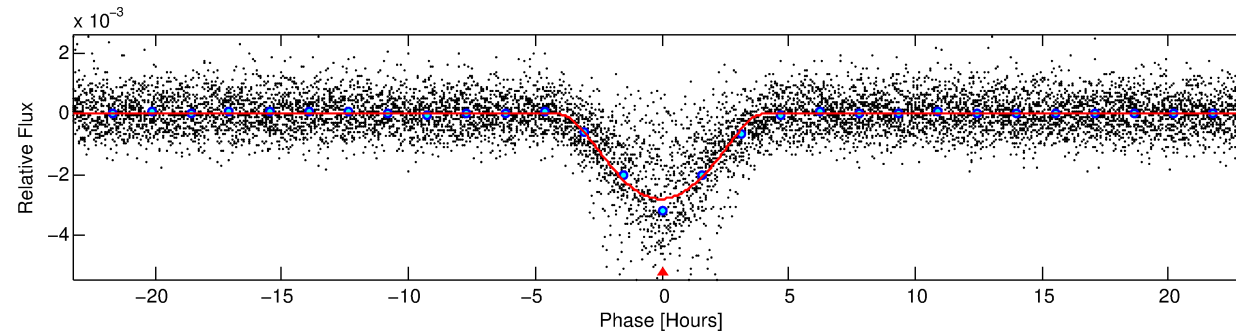
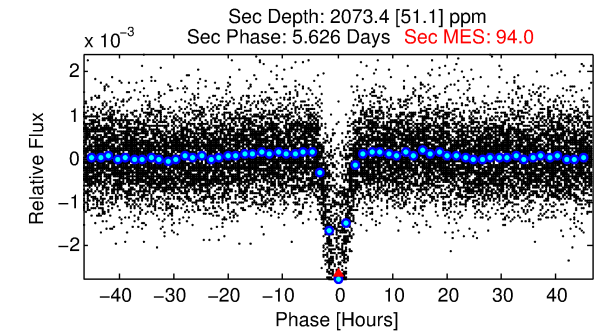
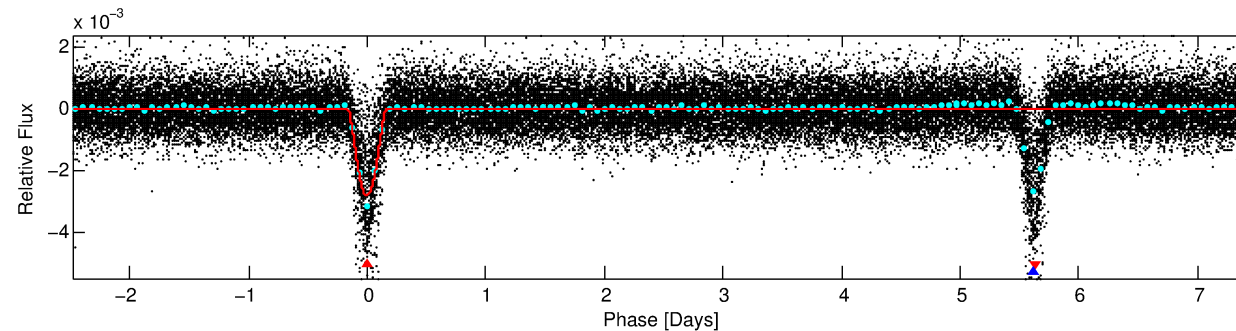
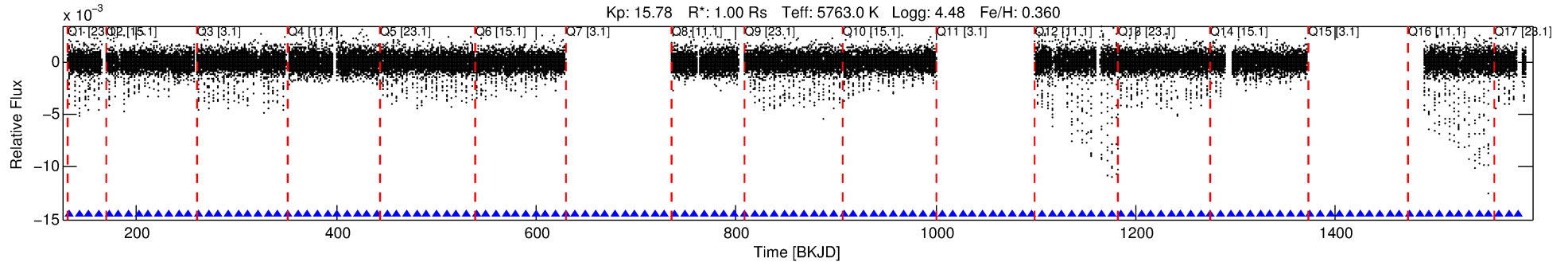
TCE (1)	KIC	Parent (2)	Parent KIC	$P_1:P_2$	Dist ( $''$ )	$\Delta$ Row	$\Delta$ Col	$m_2$	$m_1$	$D_2/D_1$	Mechanism	Flag	$\sigma_P$	$\sigma_T$
010026458-01	10026458	7275.01	10026457	1:1	7.4	-1	-2	15.39	15.78	23.71	Direct-PRF	0	0.02	0.06

**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: 10026458 Candidate: 1 of 2 Period: 9.934 d  
KOI: K06076.01 Corr: 0.995

Kp: 15.78 R\*: 1.00 Rs Teff: 5763.0 K Logg: 4.48 Fe/H: 0.360



## DV Fit Results:

Period = 9.93443 [0.00002] d  
Epoch = 132.8729 [0.0017] BKJD  
Rp/R\* = 0.0923 [0.0408]  
a/R\* = 4.42 [0.36]  
b = 1.00 [0.12]  
Seff = 112.39 [35.85]  
Teq = 830 [66] K  
Rp = 10.05 [4.95] Re  
a = 0.0936 [0.0178] AU  
Ag = 98.88 [91.87] [1.07σ]  
Teff = 4048 [906] K [3.54σ]

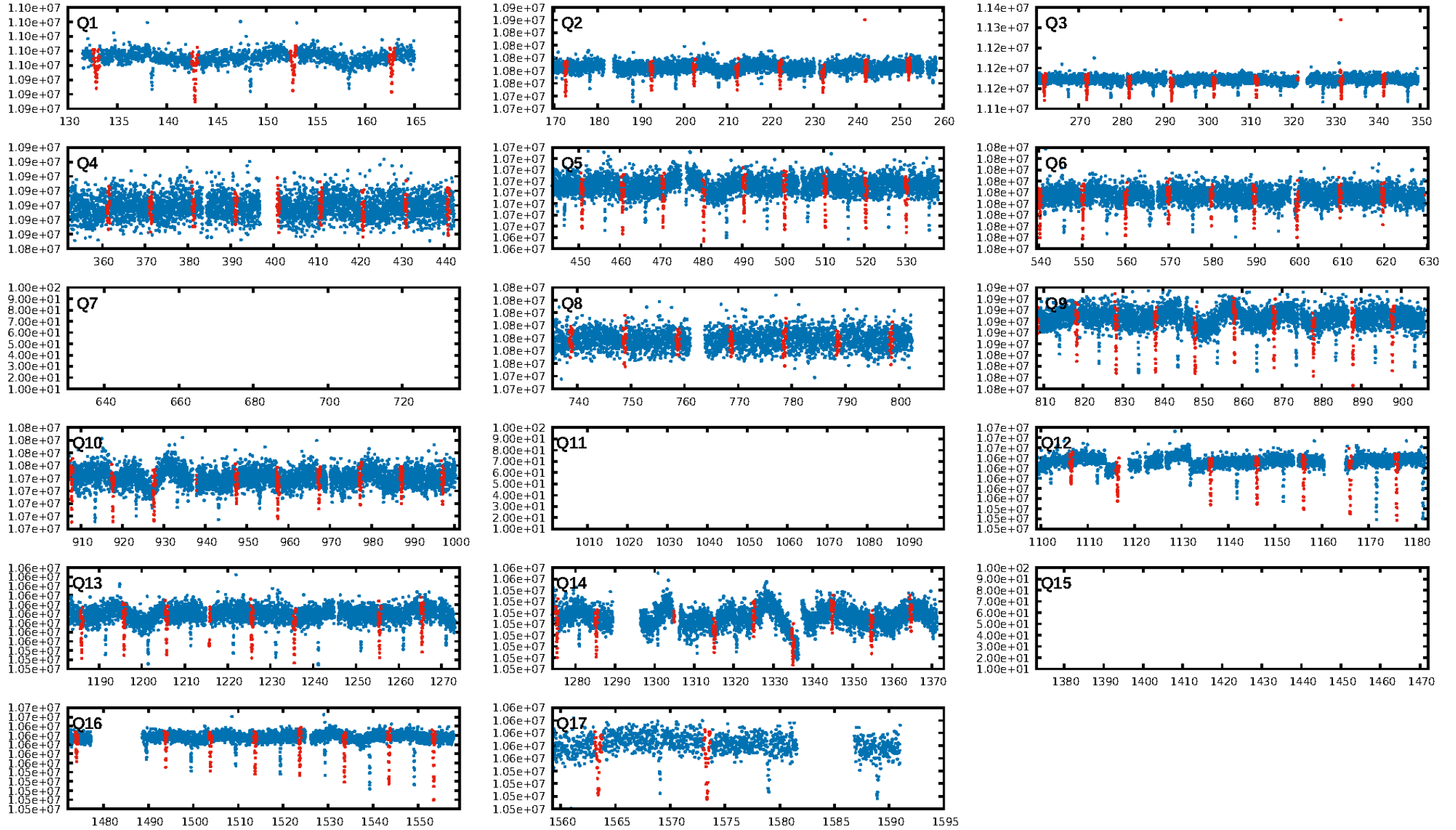
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [100/100]  
GhostDiagnostic-chr: -0.2838  
Centroid-sig: 0.0%  
Centroid-so: 49.160 arcsec [502.93σ]  
OotOffset-rm: 1.854 arcsec [6.59σ]  
KicOffset-rm: 7.436 arcsec [83.89σ]  
OotOffset-st: 0/1/1/0 [2]  
KicOffset-st: 0/1/1/0 [2]  
DiffImageQuality-fgm: 1.00 [2/2]  
DiffImageOverlap-fno: 1.00 [14/14]

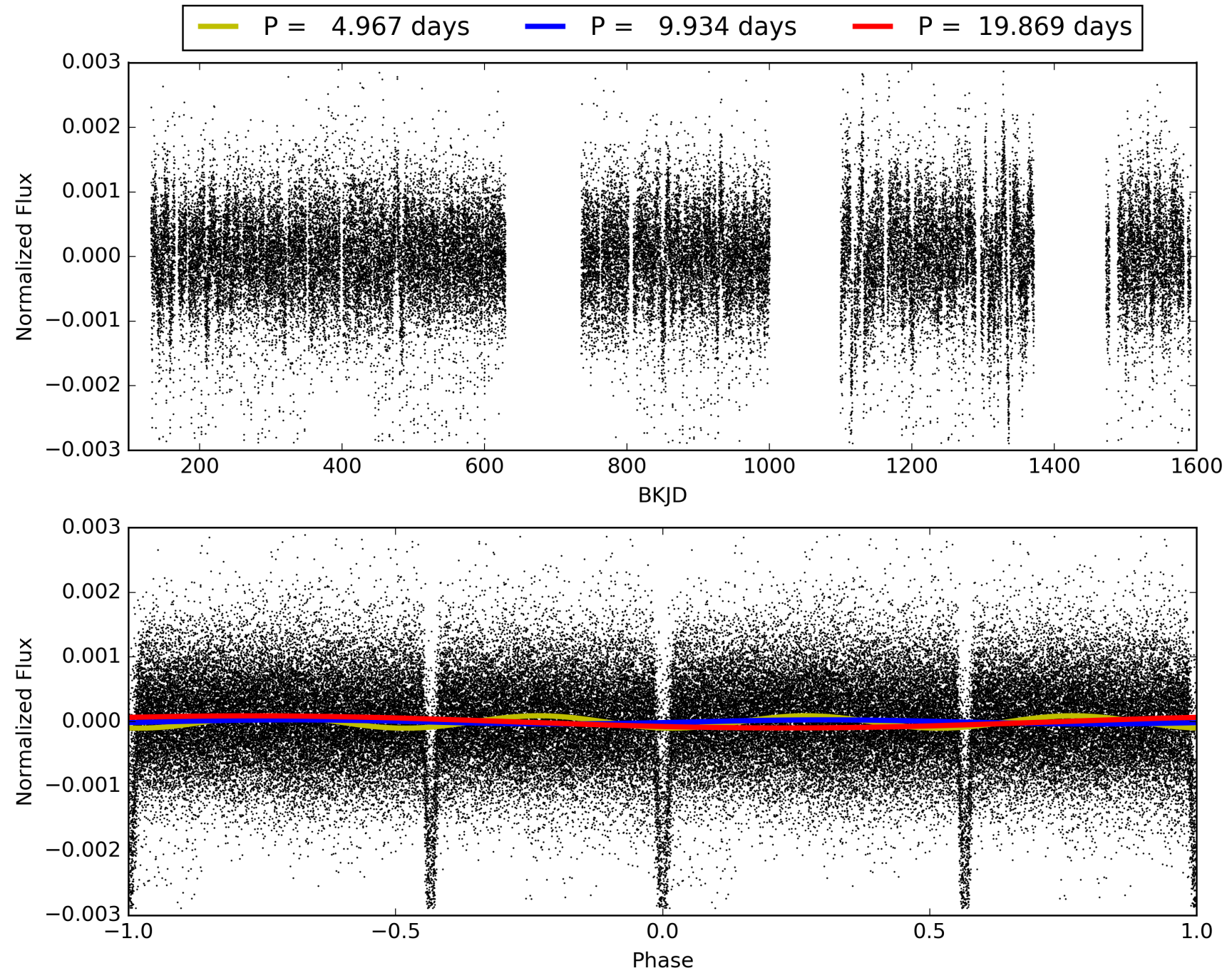
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 18:15:35 Z

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

# TCE 010026458-01, PDC Light Curves

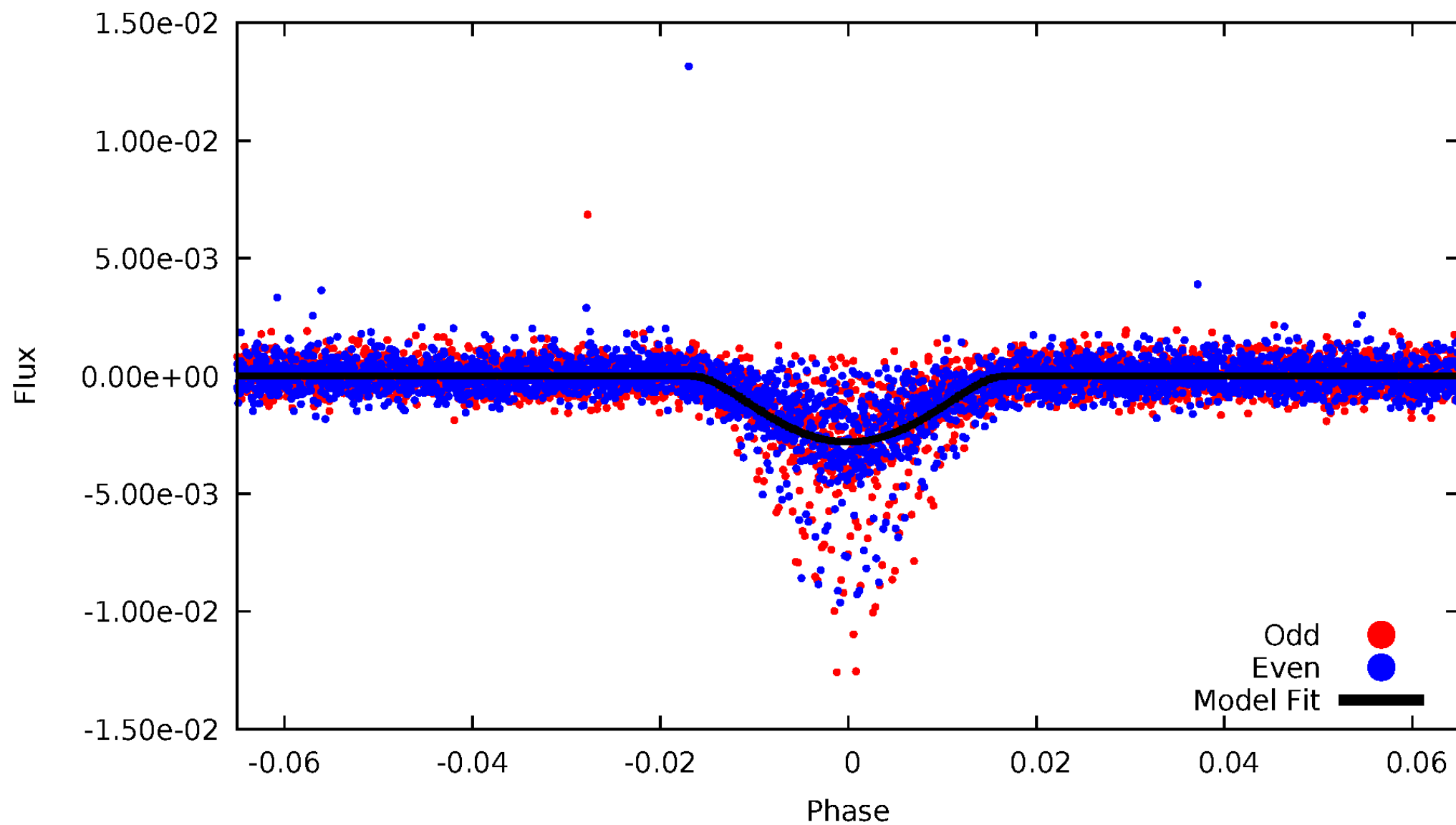


TCE 010026458-01



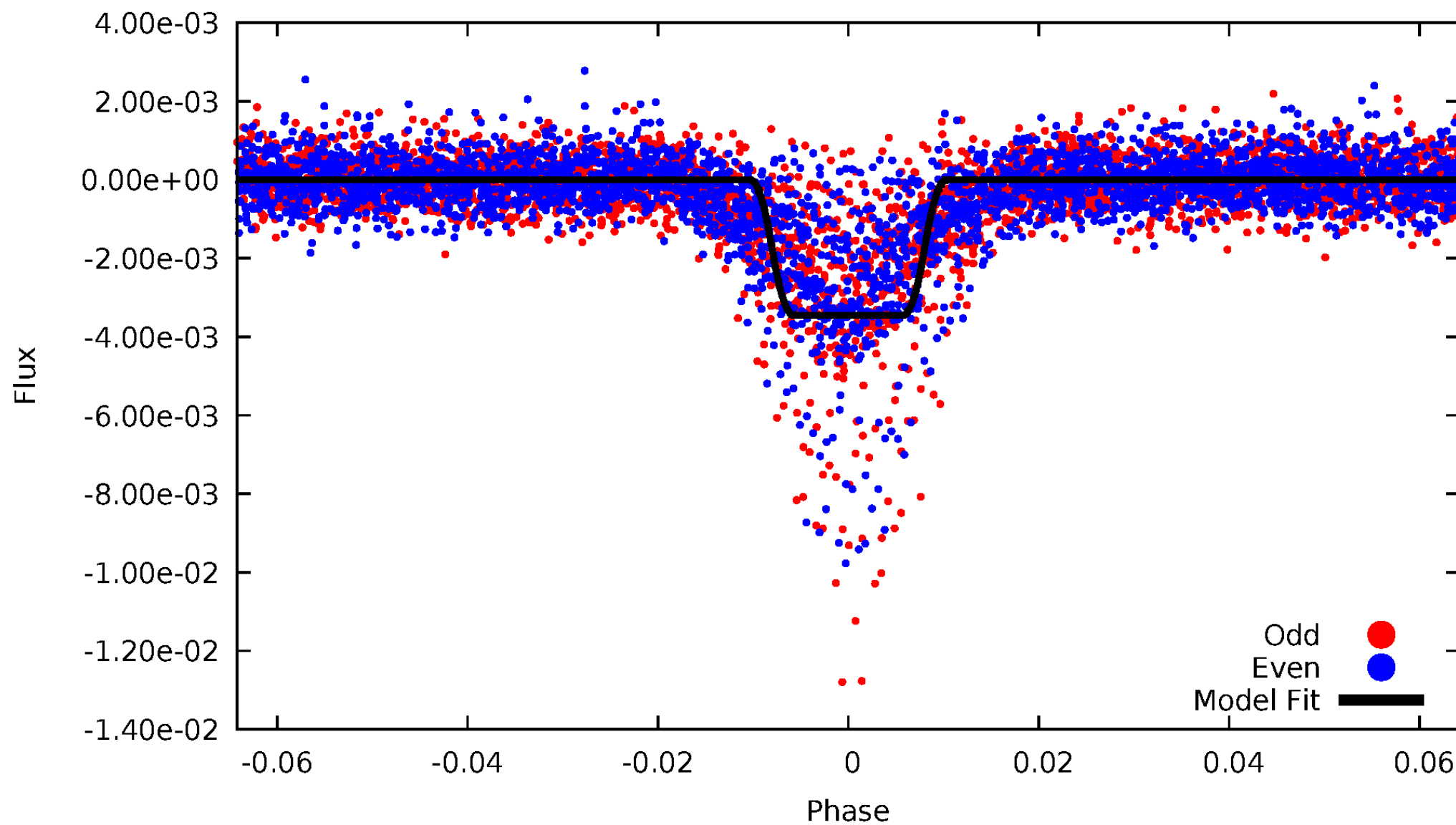
# DV Odd/Even

TCE 010026458-01



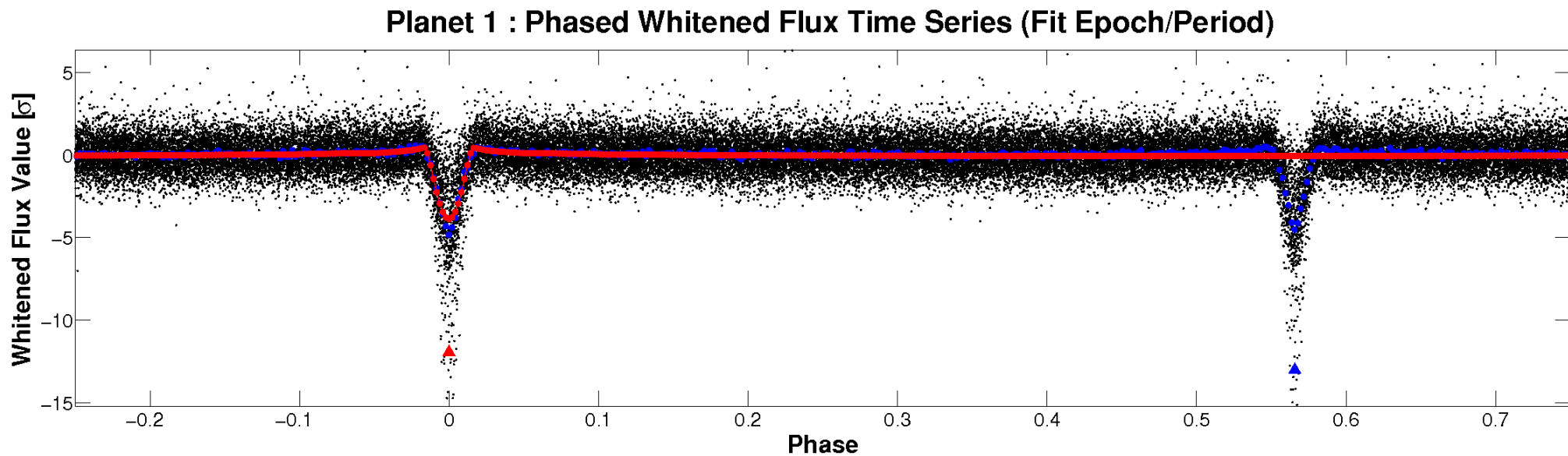
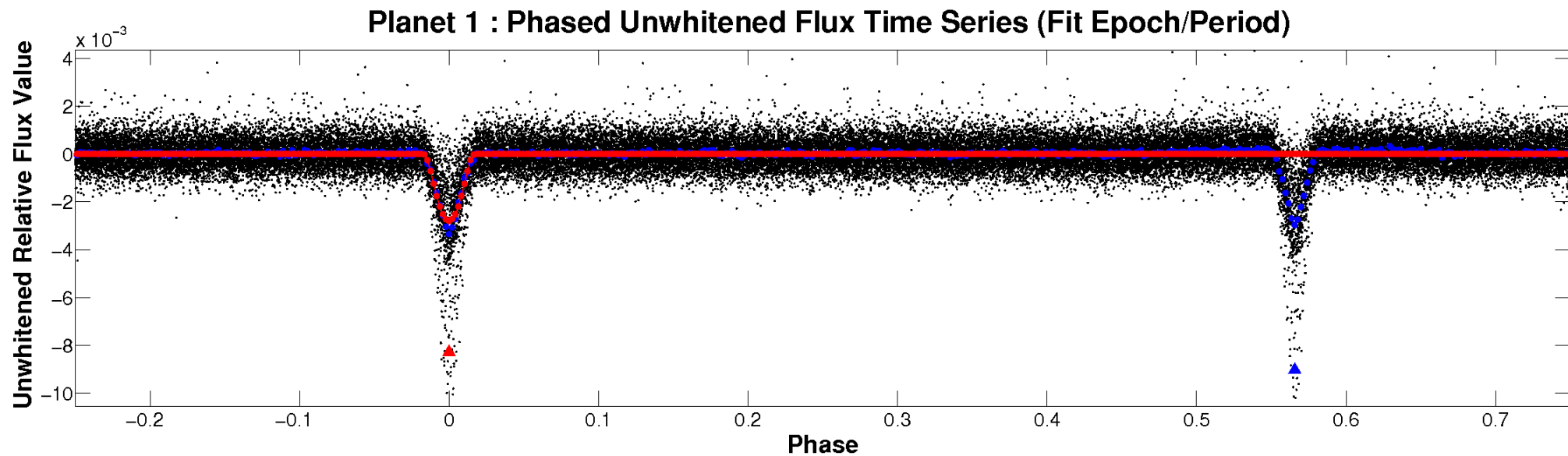
# ALT Odd/Even

TCE 010026458-01



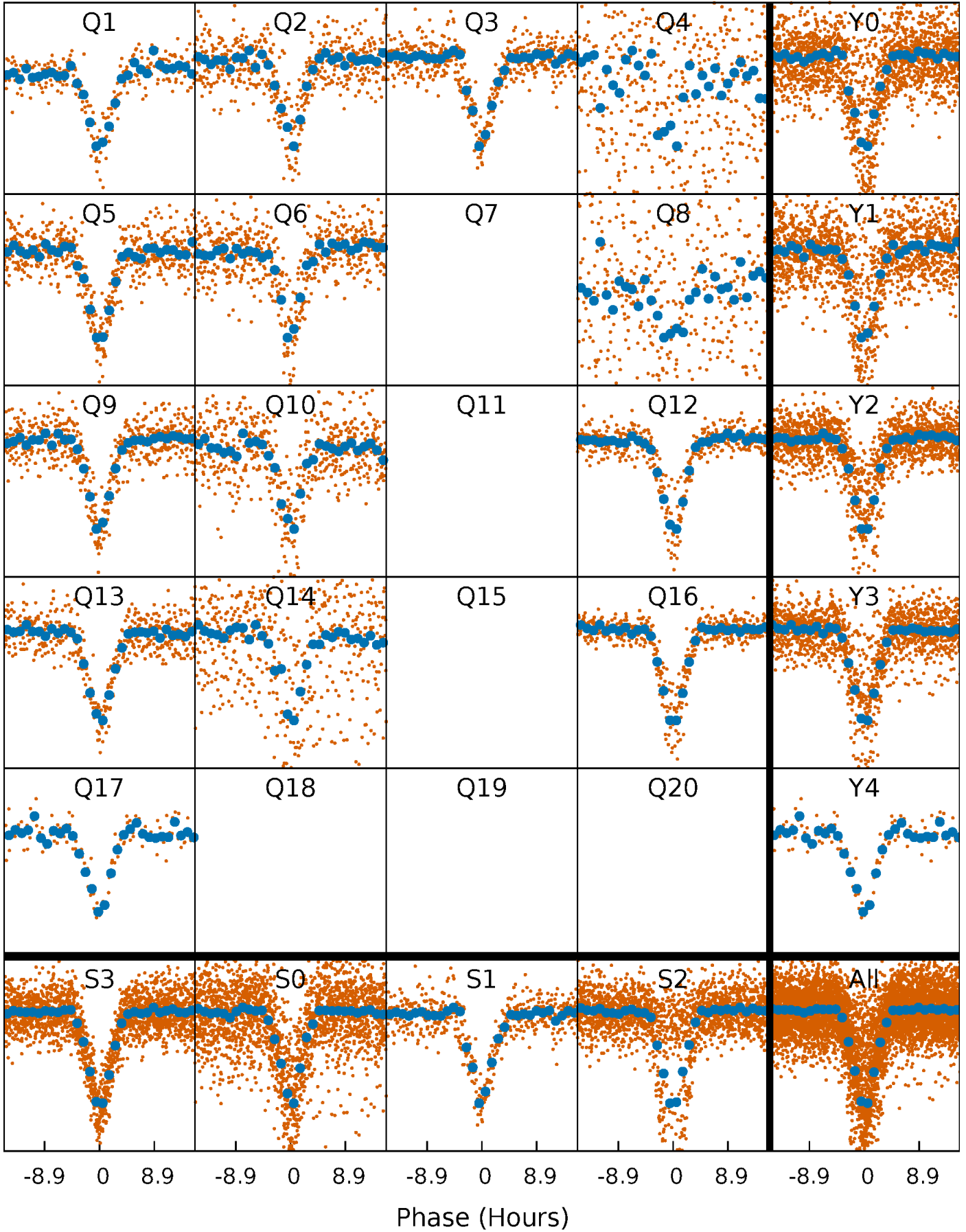


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

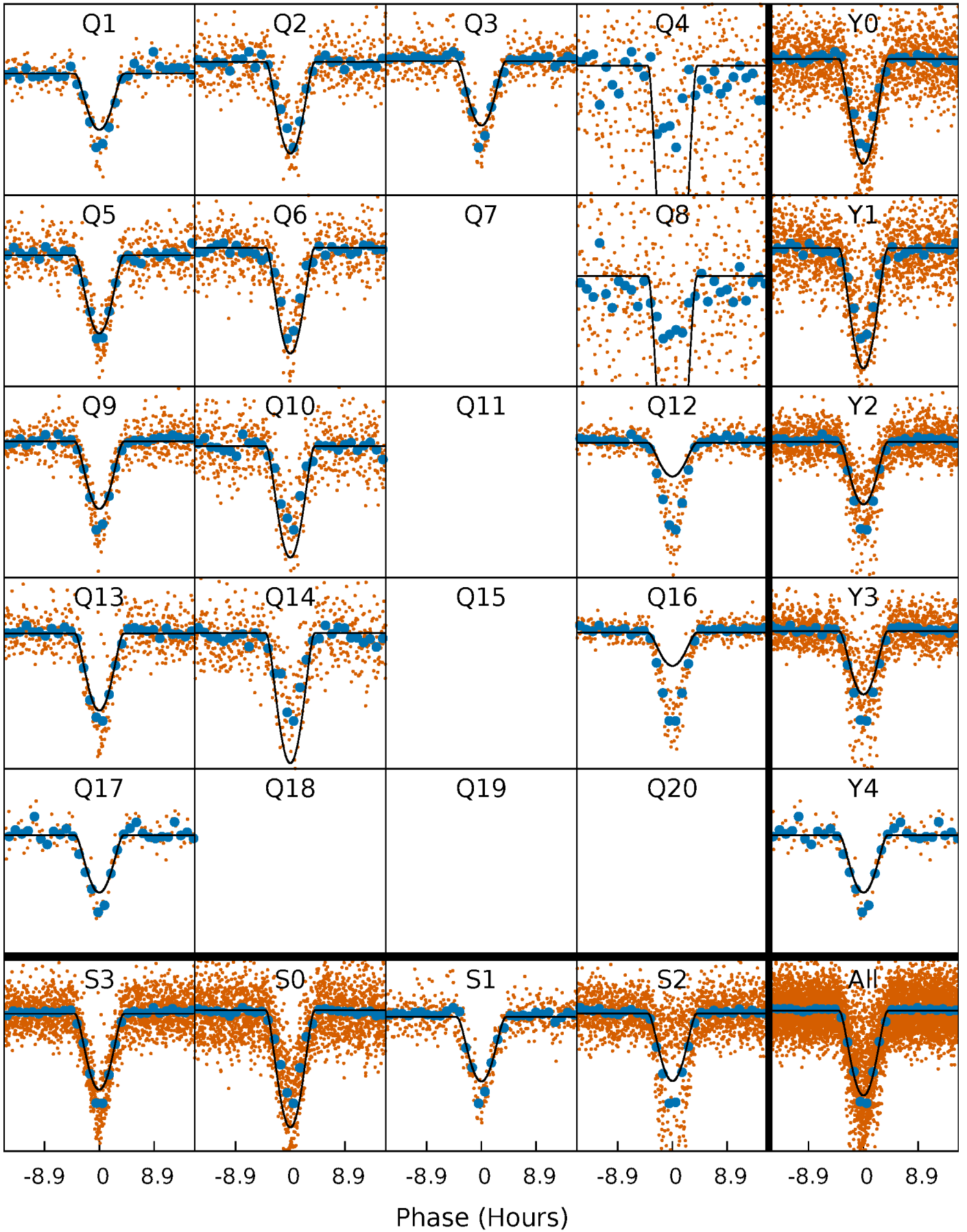
TCE 010026458-01   P= 9.934427 Days    $T_0=132.872916$  (BKJD)





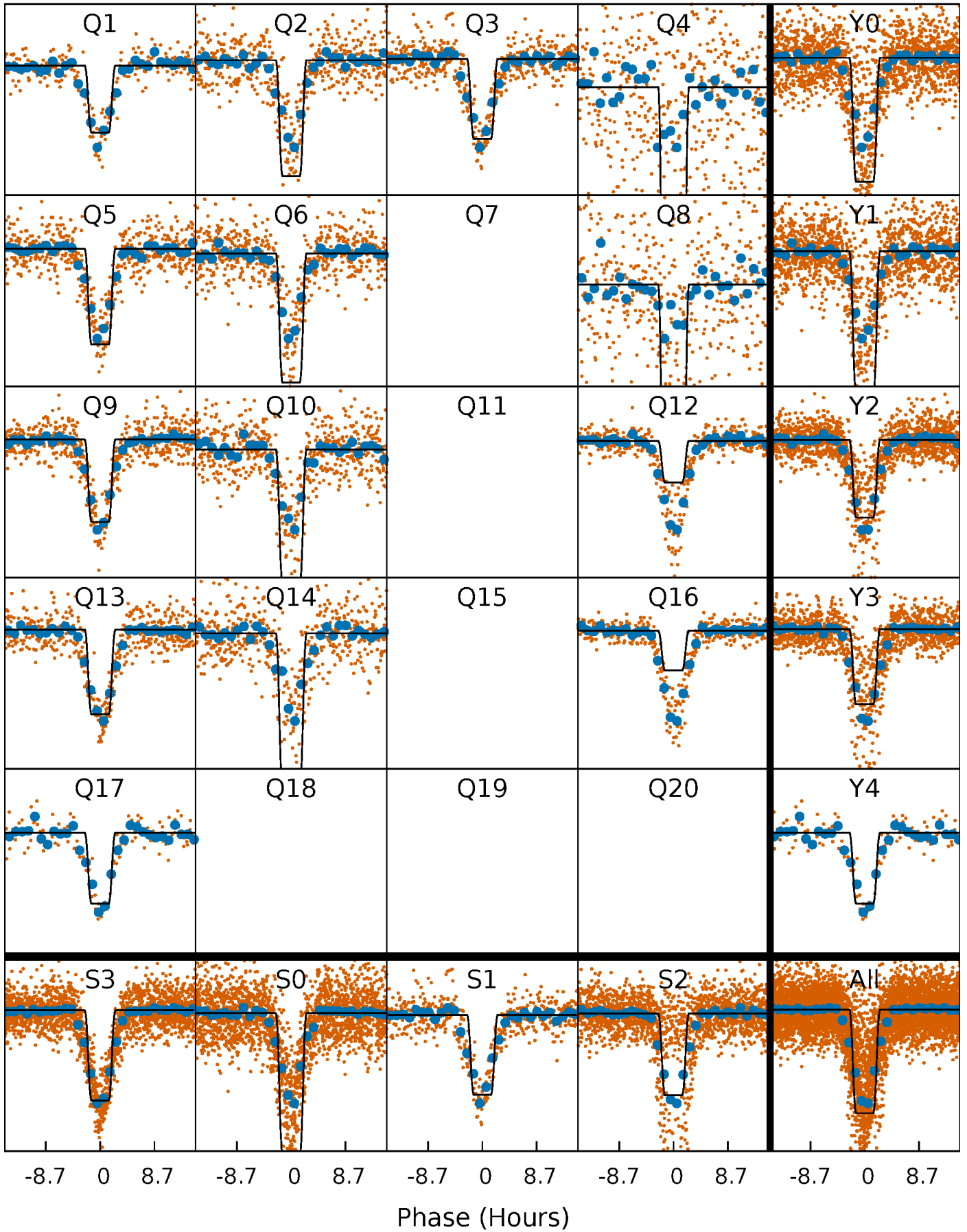
# DV Quarter-Phased Transit Curves

TCE 010026458-01 P= 9.934427 Days  $T_0=132.872916$  (BKJD)



## Alt. Detrend Quarter-Phased Transit Curves

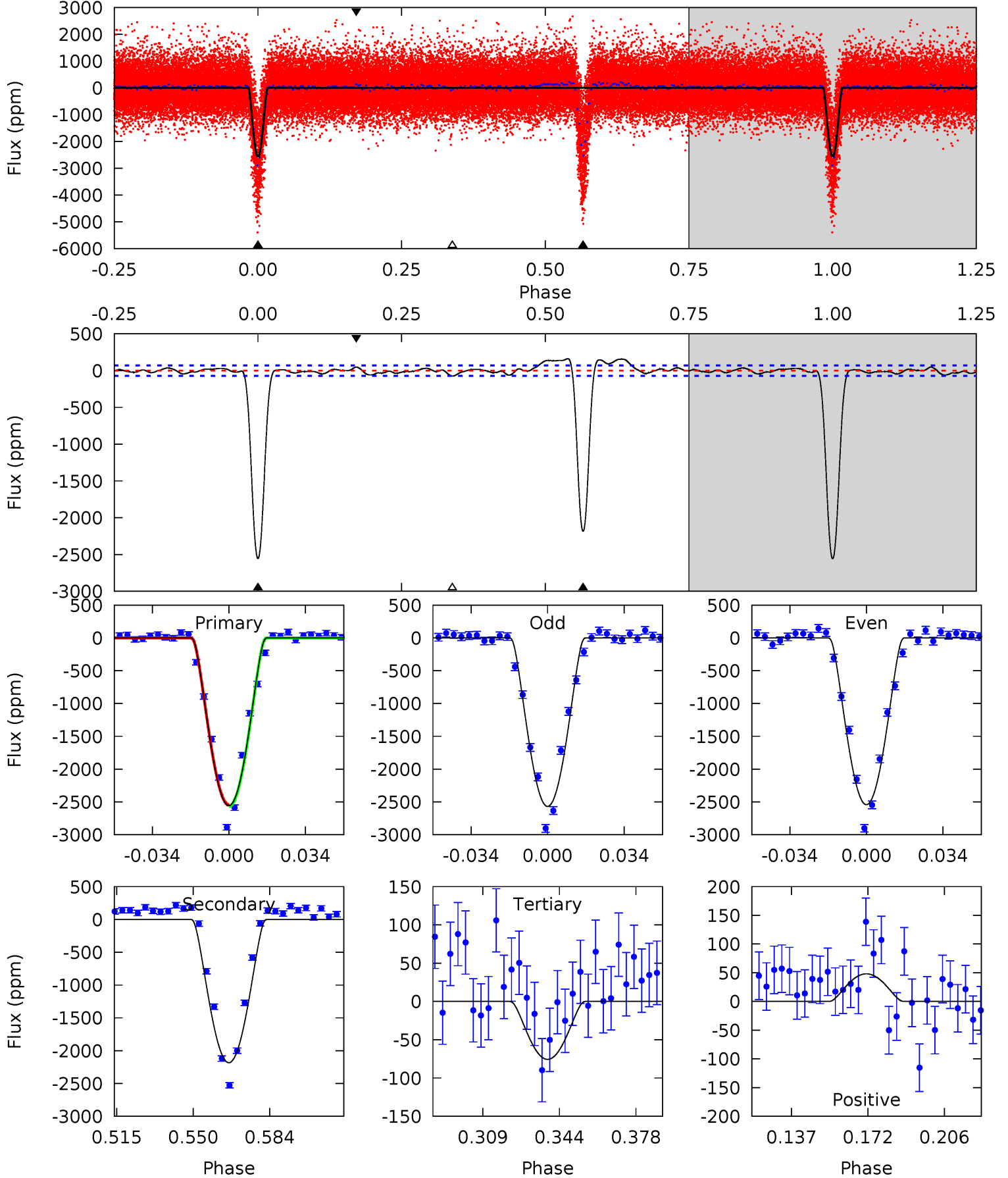
TCE 010026458-01     $P = 9.934320$  Days     $T_0 = 132.882420$  (BKJD)



# DV Model-Shift Uniqueness Test

010026458-01, P = 9.934427 Days, E = 122.938489 Days

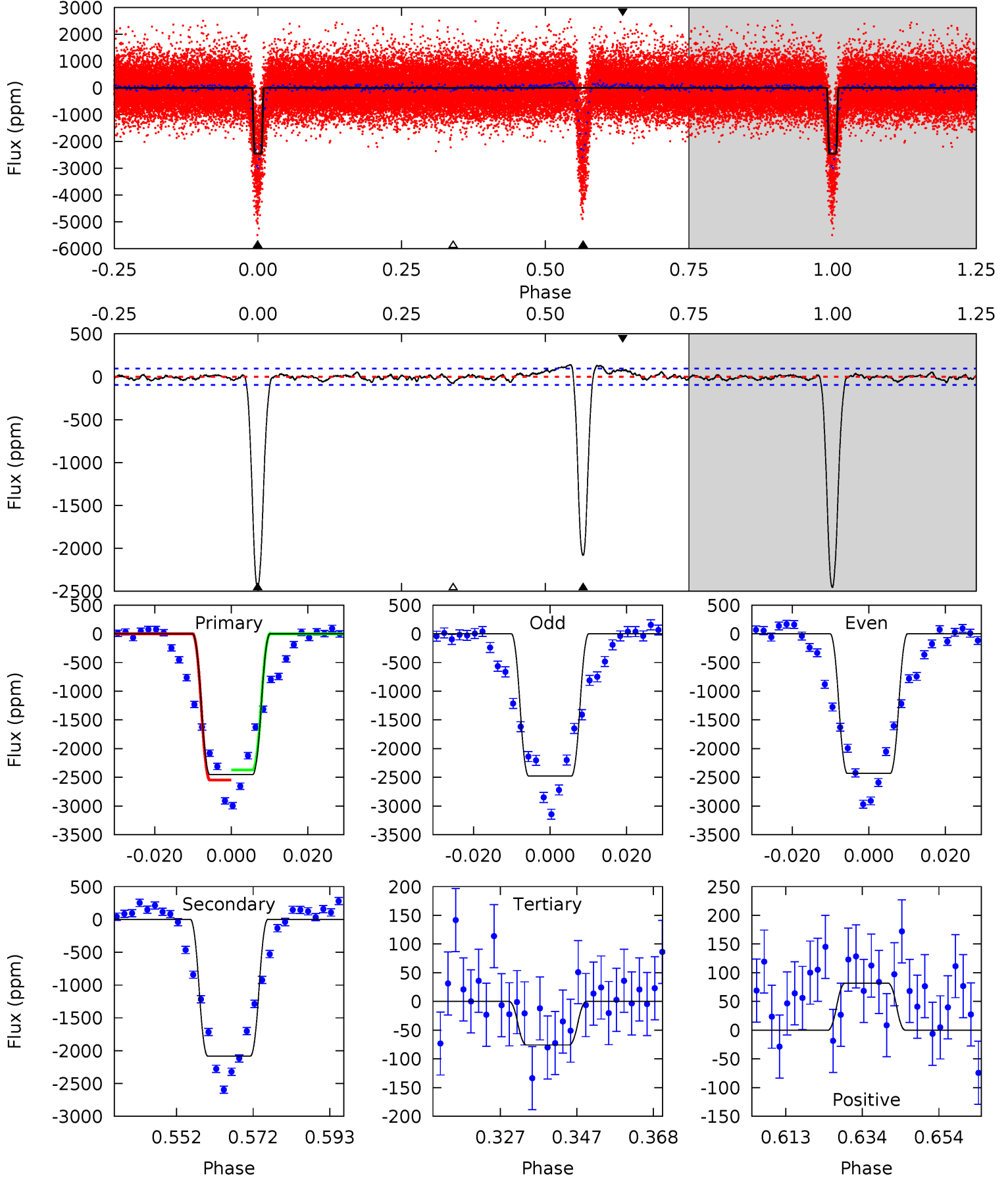
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
172.7	147.5	5.11	3.25	4.78	2.12	3.21	167.6	169.4	142.4	144.2	0.90	1.05	0.06	0.80



# Alt Model-Shift Uniqueness Test

010026458-01, P = 9.934320 Days, E = 122.948100 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
125.7	106.6	3.88	4.20	4.89	2.32	1.97	121.8	121.5	102.7	102.4	1.15	1.05	0.05	4.11



### Stellar Parameters For KIC 010026458

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5763^{+154}_{-206}$	$4.484^{+0.040}_{-0.160}$	$0.360^{+0.100}_{-0.250}$	$0.998^{+0.217}_{-0.093}$	$1.107^{+0.080}_{-0.120}$	$1.568^{+0.313}_{-0.656}$
	+3%/-4%	+1%/-4%	+28%/-69%	+22%/-9%	+7%/-11%	+20%/-42%
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 010026458-01 / KOI 6076.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	-2183±15	$10.59^{+4.44}_{-4.58}$	$1178^{+67}_{-50}$	$4299^{+1072}_{-532}$	$93^{+190}_{-47}$
Alt.	-2081±20	$7.15^{+4.48}_{-3.87}$	$1183^{+65}_{-51}$	$4978^{+2424}_{-866}$	$190^{+686}_{-117}$

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



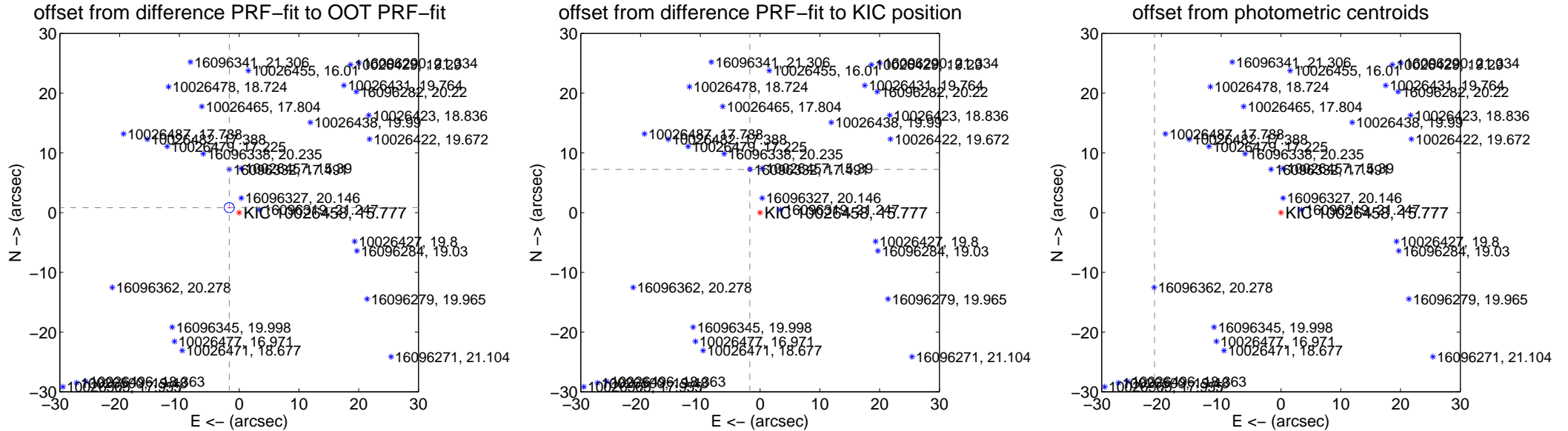
## DV Centroid Data

Supplemental centroid analysis for 010026458-01. Kepler magnitude: 15.78. Transit SNR 88.18

There are 2 quarters with good PRF difference image offsets

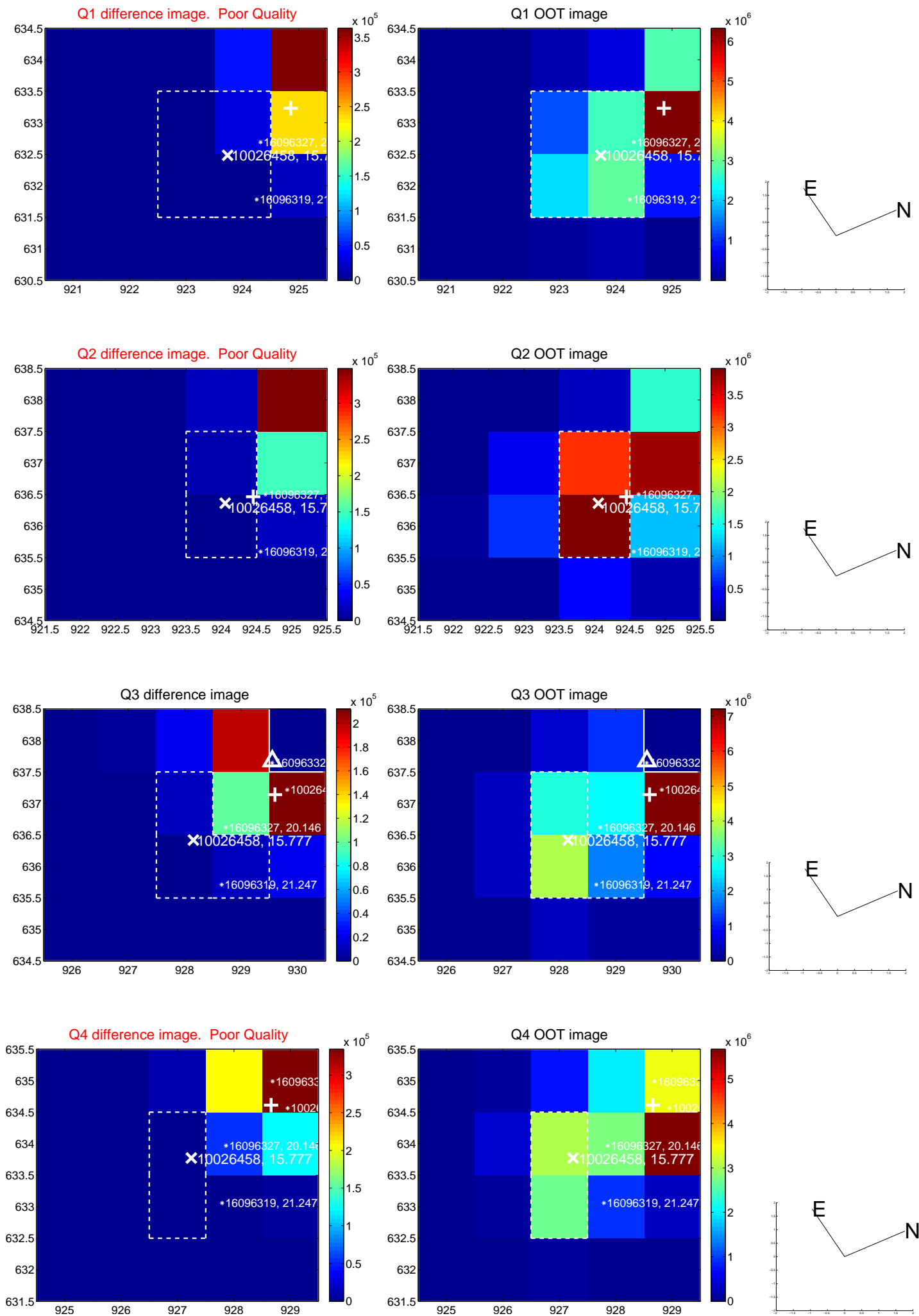
The OOT PRF centroid is offset from the target star catalog position by about 6.37 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.854 \pm 0.281$	6.59	$1.657 \pm 0.313$	$0.832 \pm 0.069$
PRF-fit source offset from KIC position	$7.436 \pm 0.089$	83.89	$1.714 \pm 0.080$	$7.236 \pm 0.083$
photometric centroid source offset	$49.16 \pm 0.10$	502.92	$21.15 \pm 0.08$	$44.38 \pm 0.10$

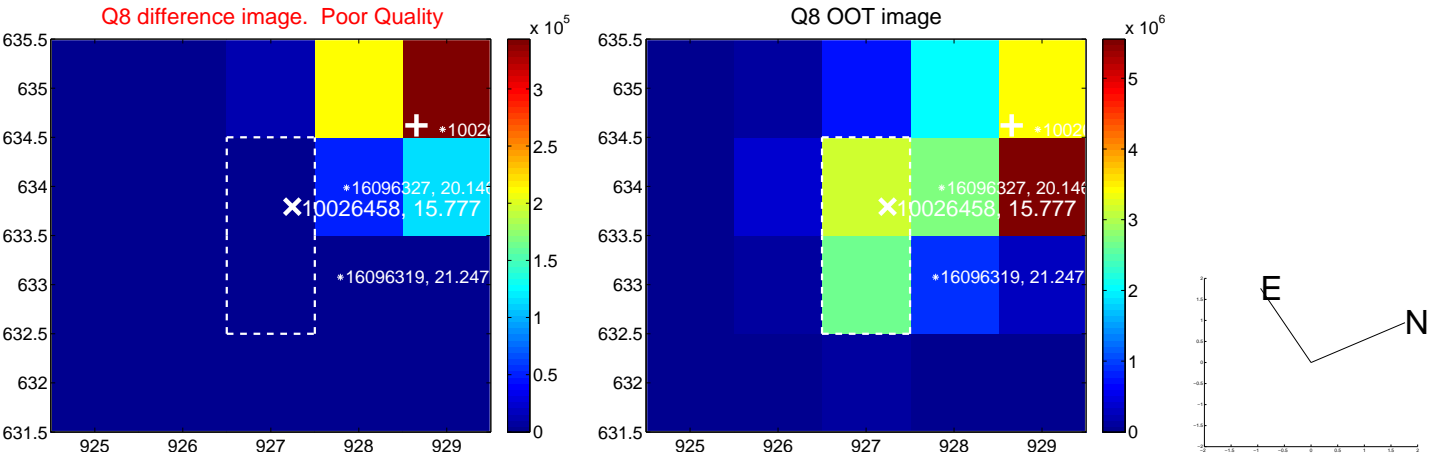
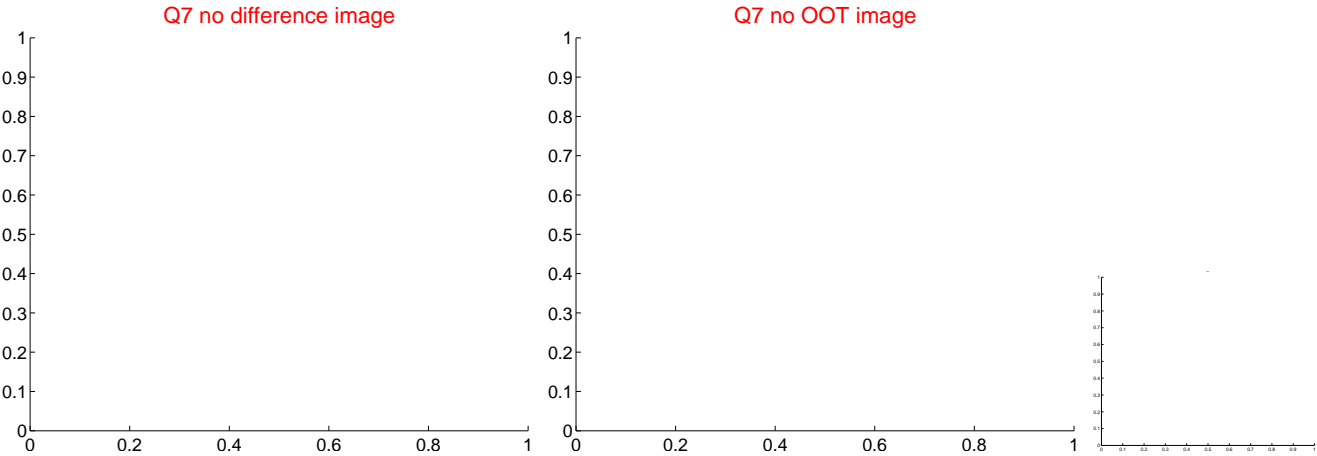
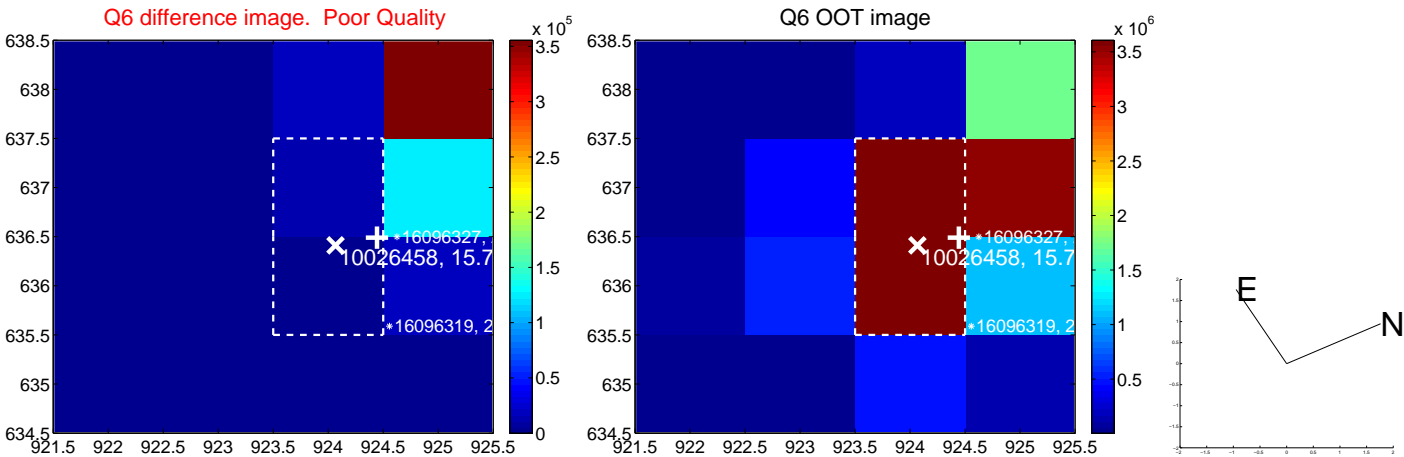
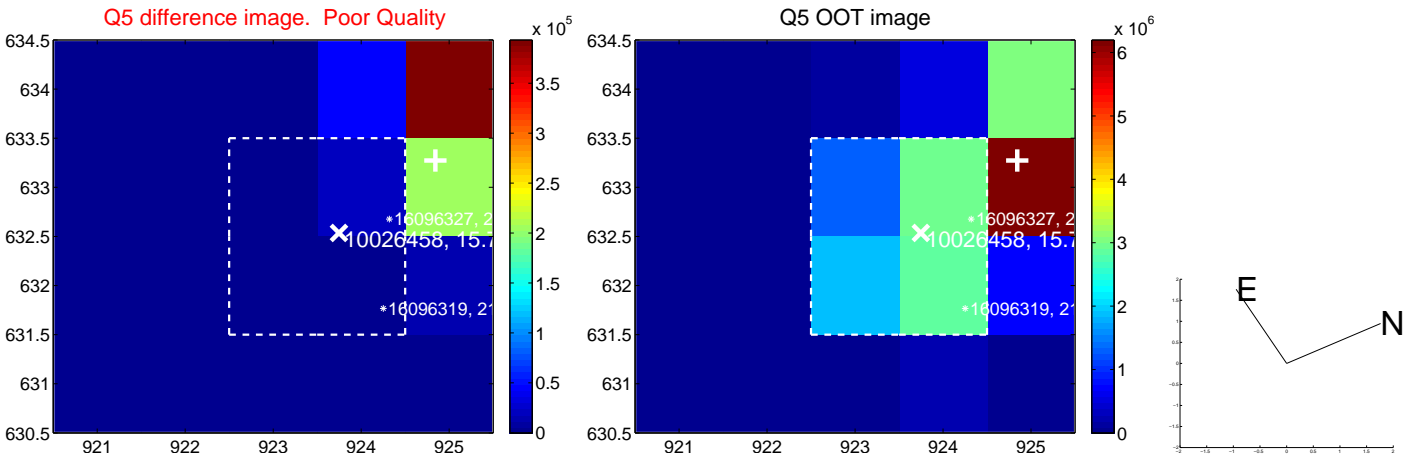


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

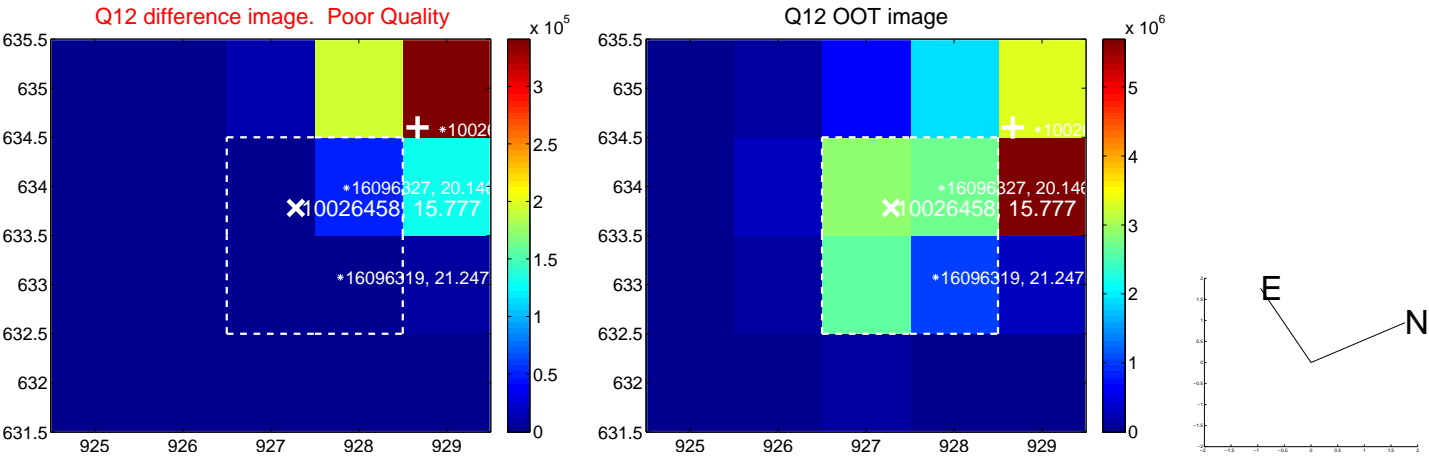
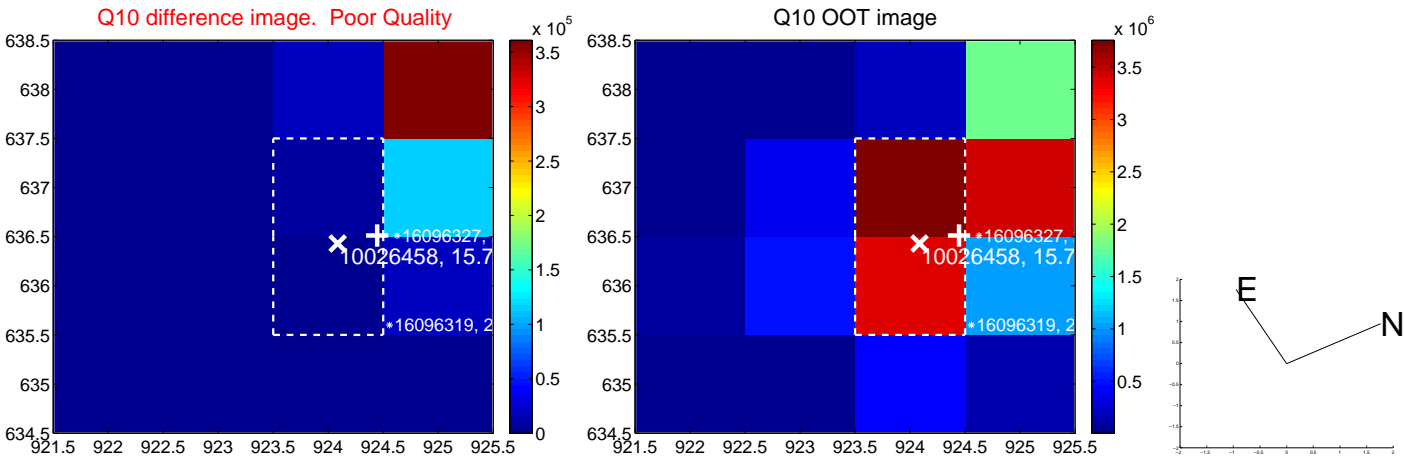
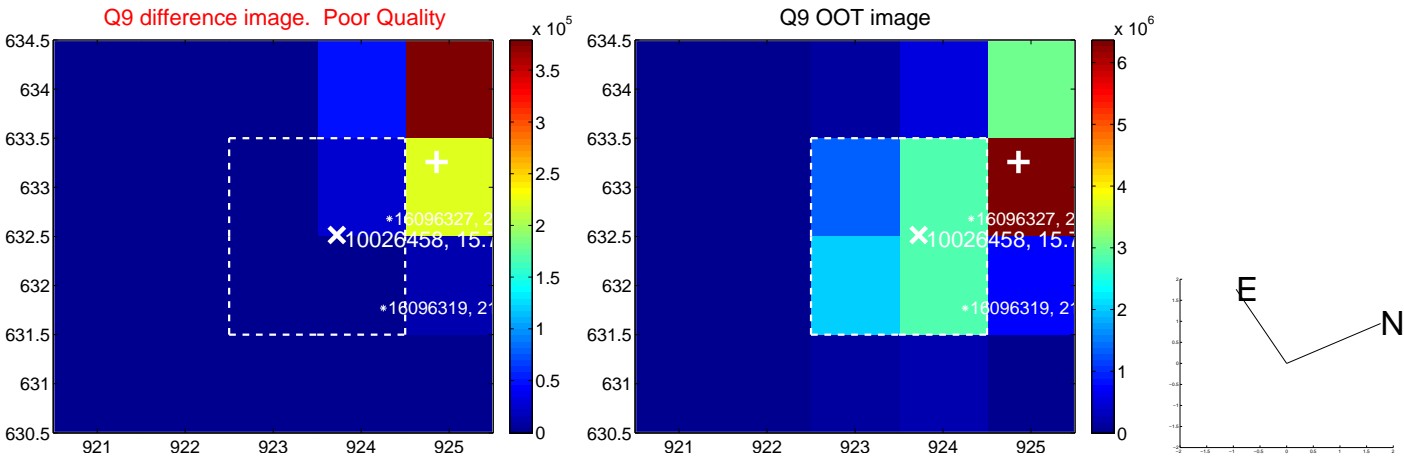
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



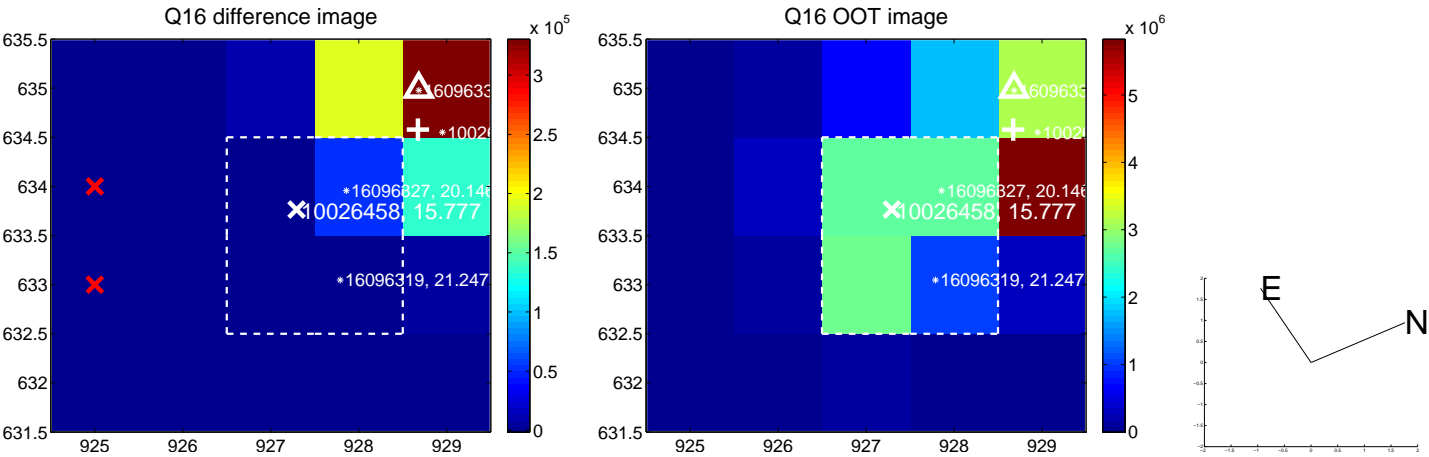
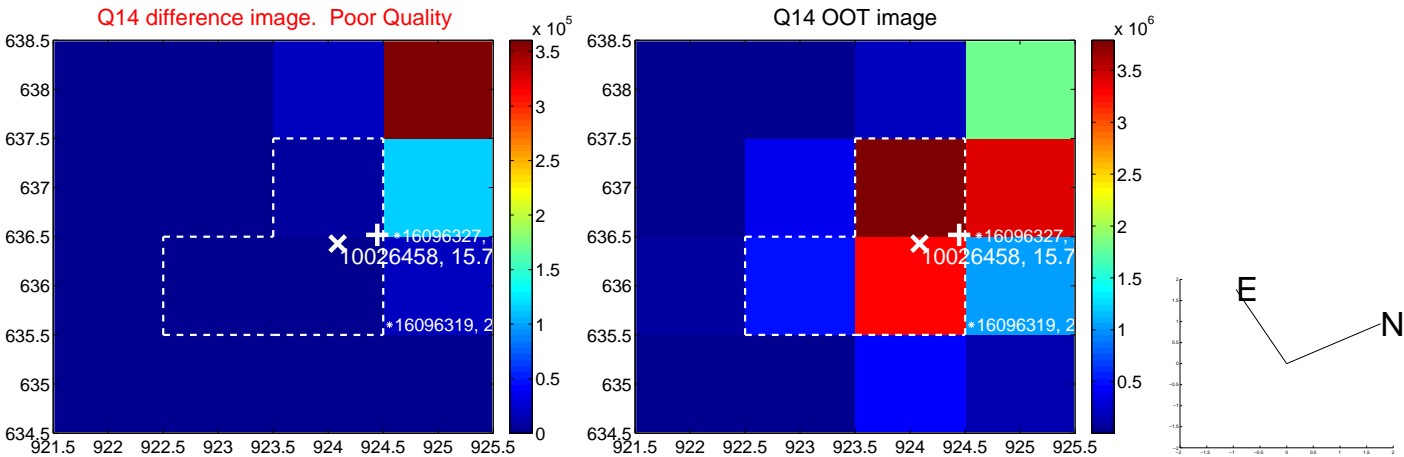
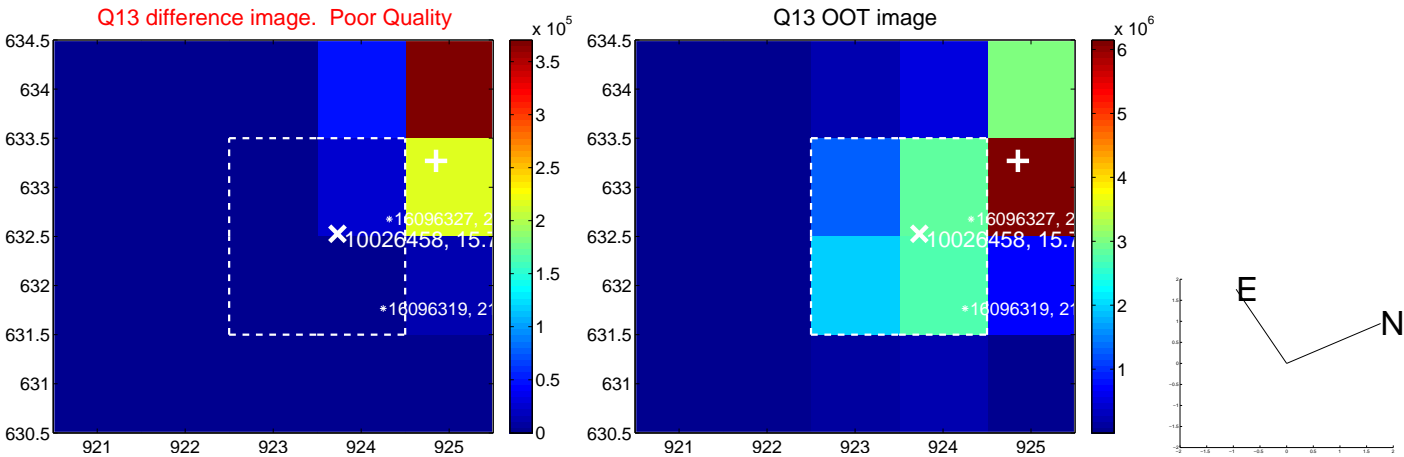
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

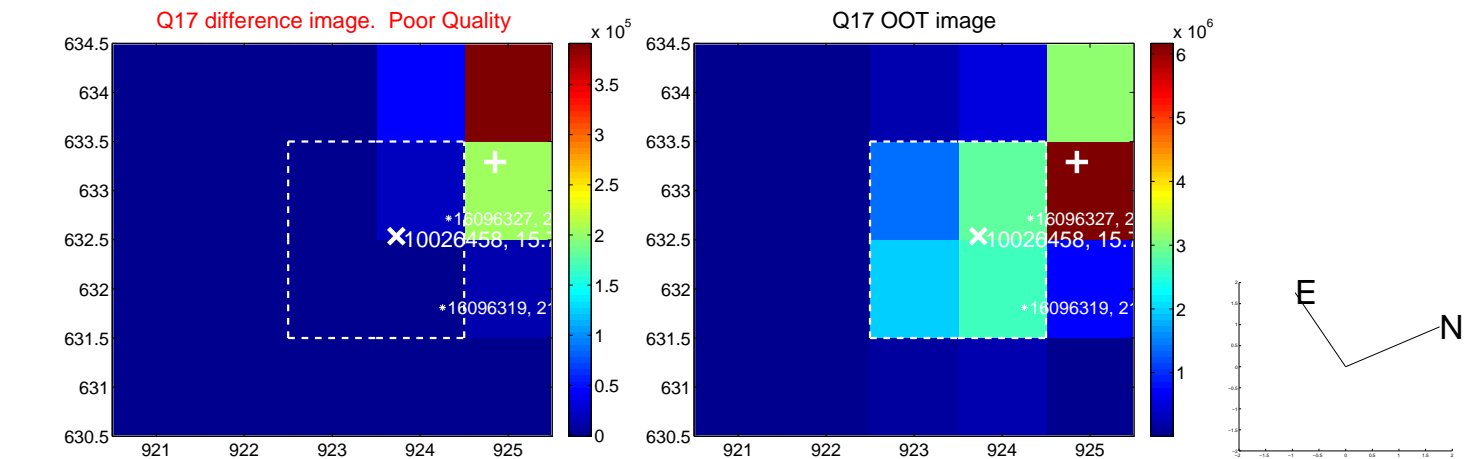


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

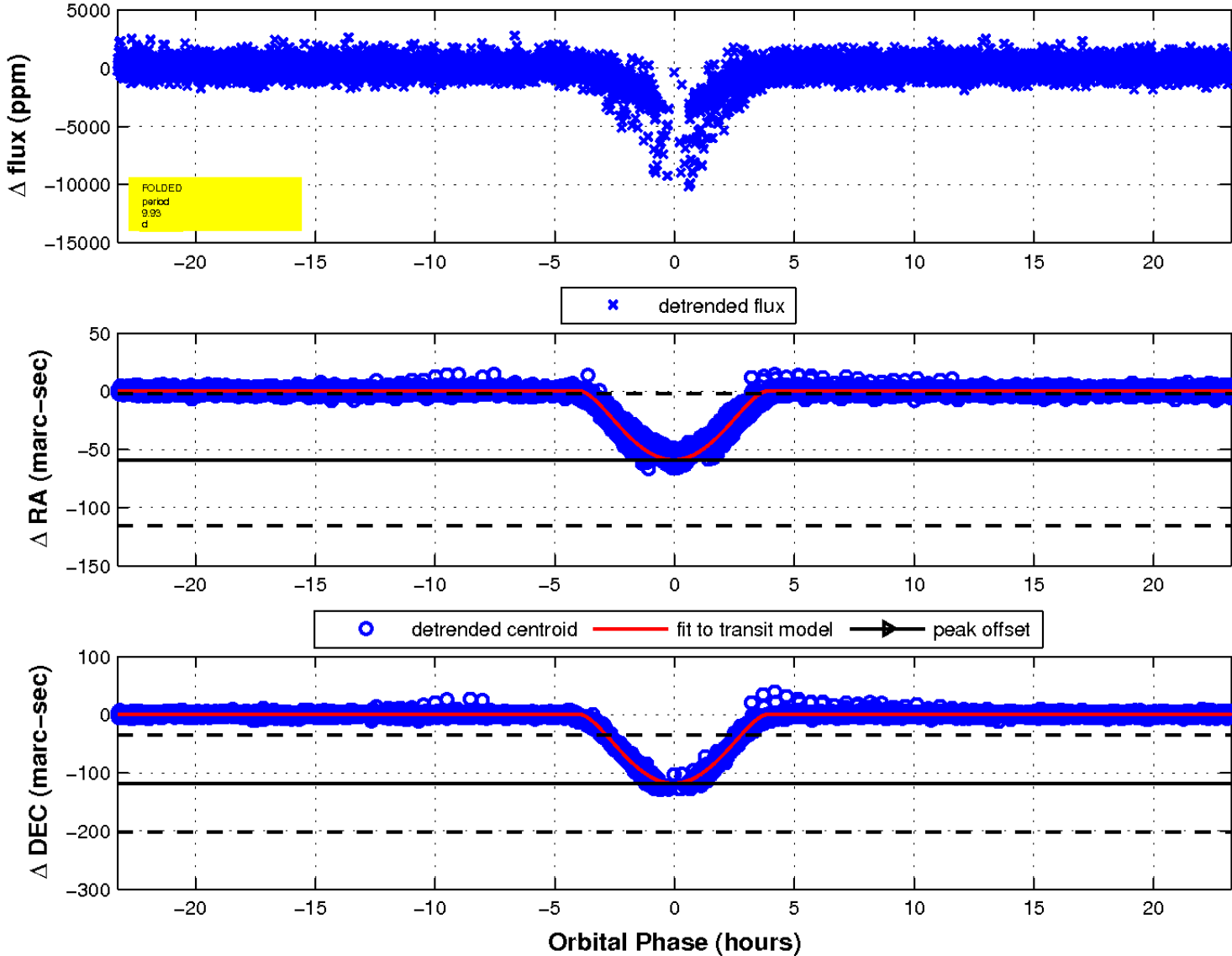




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

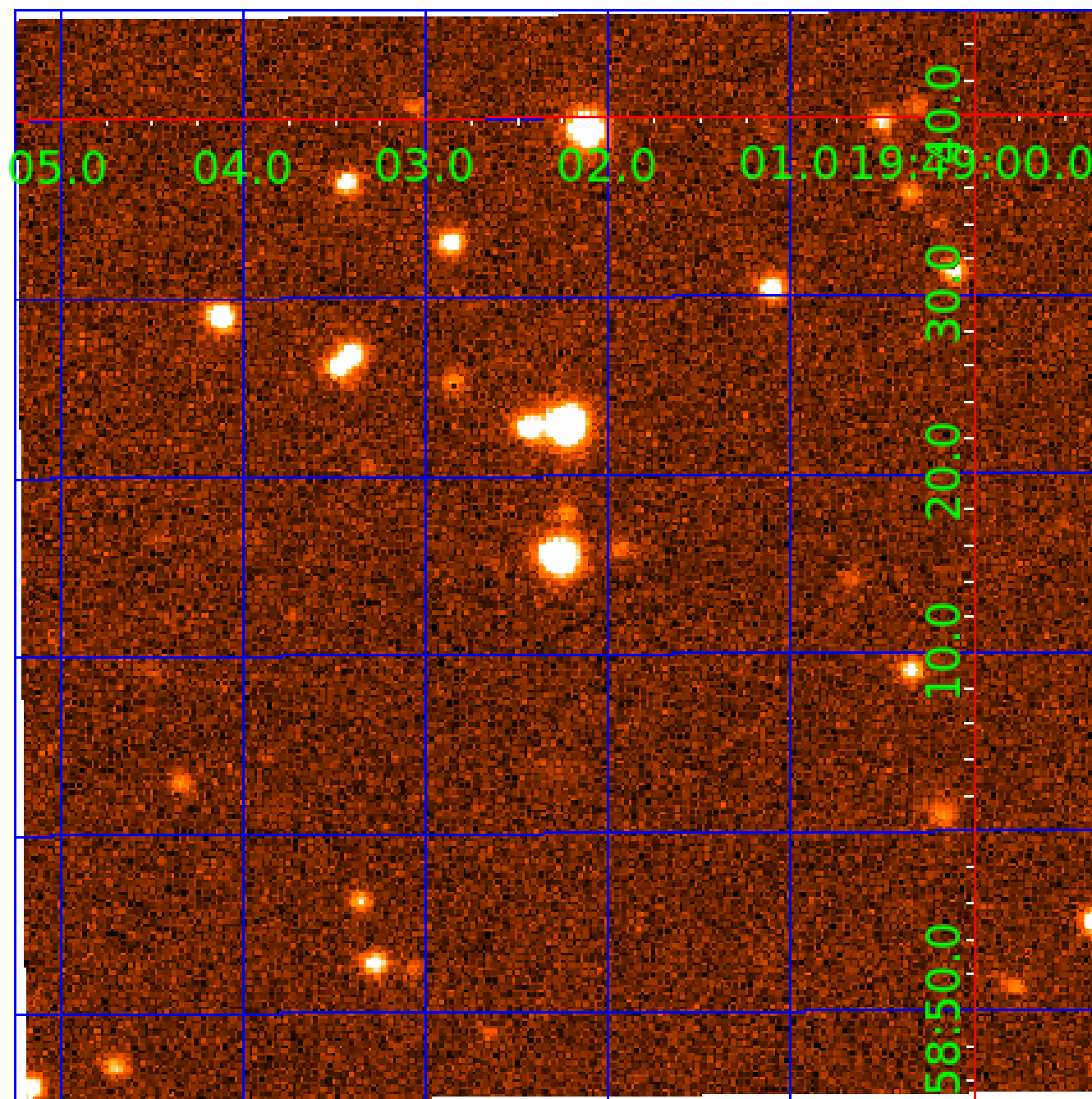


fluxWeightedCentroids, Planet 1 of 2



UKIRT Image

Declination



# KIC 010026458

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010026458-01	OBS	6076.01	9.934427	132.872916	2801.4	7.752	107.2	88.2	1.00	5763	10.05	112.39
010026458-02	OBS	No	9.934419	138.493754	2473.2	6.743	95.1	80.2	1.00	5763	9.49	112.39

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010026458-01	OBS	FP	0.00	0	1	1	1	MOD_SEC_DV—MOD_SEC_ALT—DEEP_V_SHAPED—HAS_SEC_TCE—CENT_RESOLVED_OFFSET—EPHEM_MATCH
010026458-02	OBS	FP	0.00	1	1	1	1	IS_SEC_TCE—CENT_RESOLVED_OFFSET—EPHEM_MATCH

**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 010026458-02

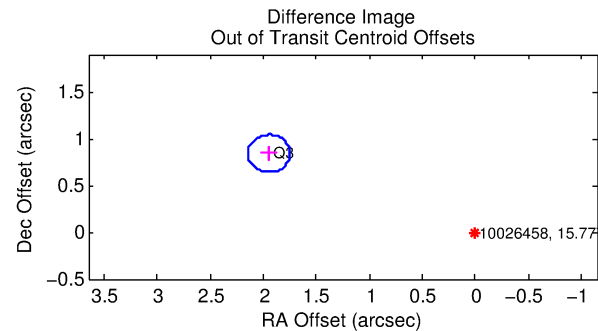
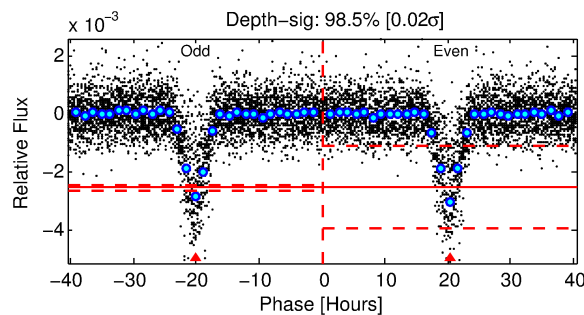
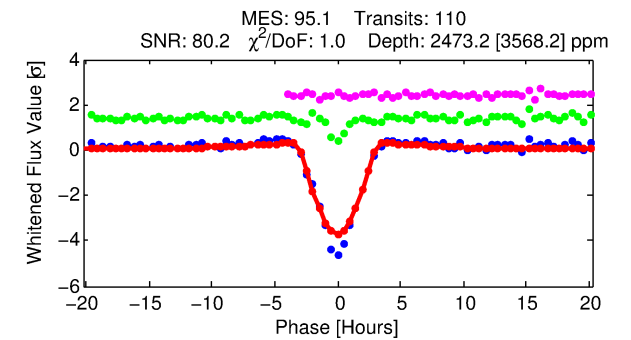
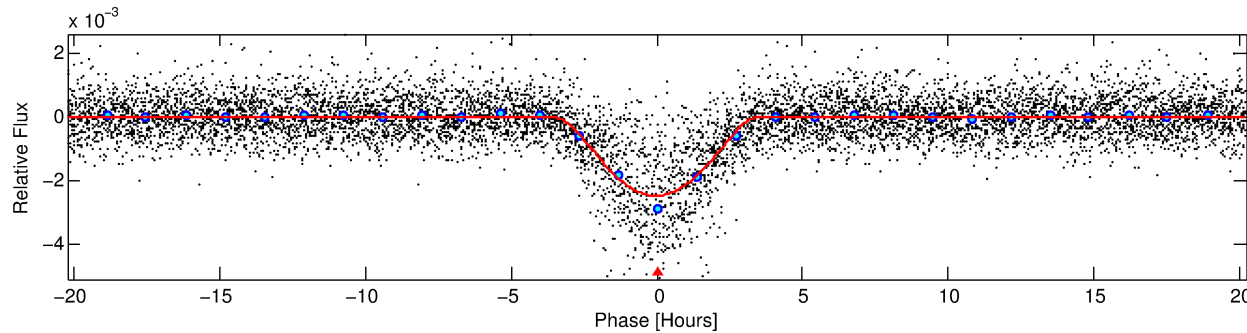
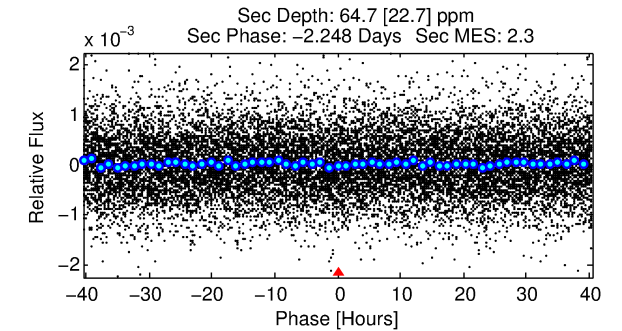
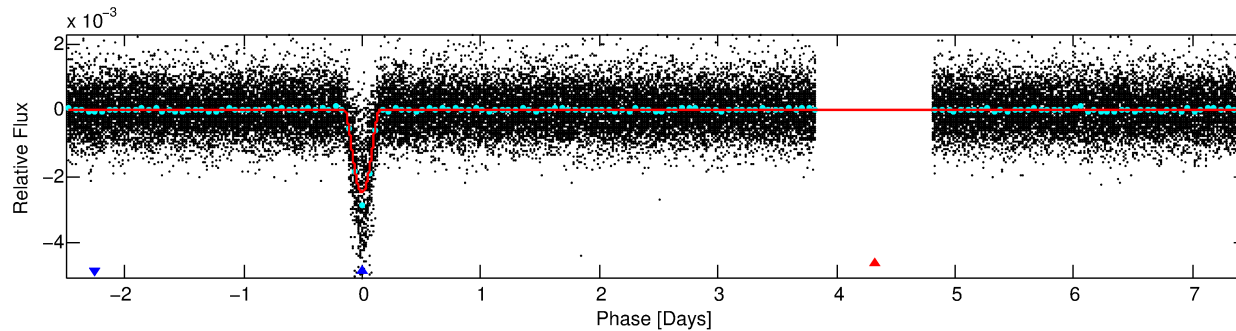
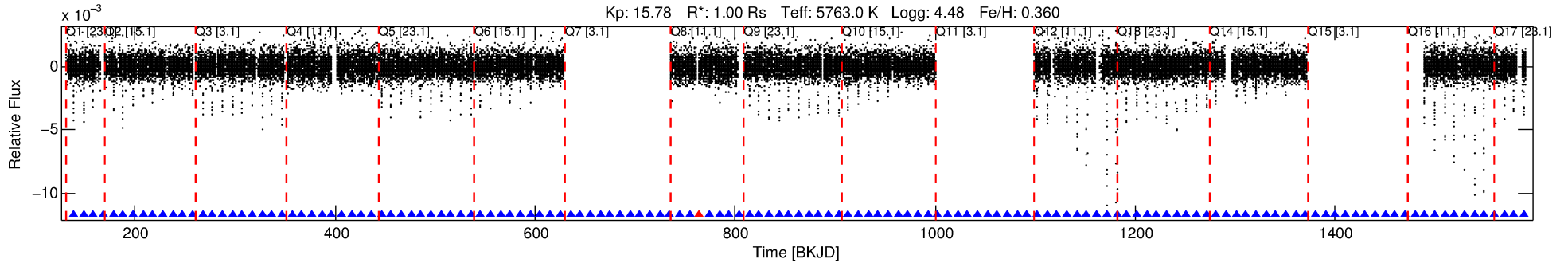
TCE (1)	KIC	Parent (2)	Parent KIC	$P_1:P_2$	Dist ( $''$ )	$\Delta$ Row	$\Delta$ Col	$m_2$	$m_1$	$D_2/D_1$	Mechanism	Flag	$\sigma_P$	$\sigma_T$
010026458-02	10026458	010026457-sec	10026457	1:1	7.4	-1	-2	15.39	15.78	24.26	Direct-PRF	0	0.01	0.01

**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: 10026458 Candidate: 2 of 2 Period: 9.934 d  
KOI: K06076 Corr: No Ephemeris Match

Kp: 15.78 R\*: 1.00 Rs Teff: 5763.0 K Logg: 4.48 Fe/H: 0.360



## DV Fit Results:

Period = 9.93442 [0.00002] d  
Epoch = 138.4938 [0.0017] BKJD  
Rp/R\* = 0.0871 [0.0457]  
a/R\* = 4.91 [0.49]  
b = 1.00 [0.02]  
Seff = 112.39 [35.86]  
Teq = 830 [66] K  
Rp = 9.49 [5.39] Re  
a = 0.0936 [0.0178] AU  
Ag = 3.46 [3.95] [0.62σ]  
Teff = 1751 [488] K [1.87σ]

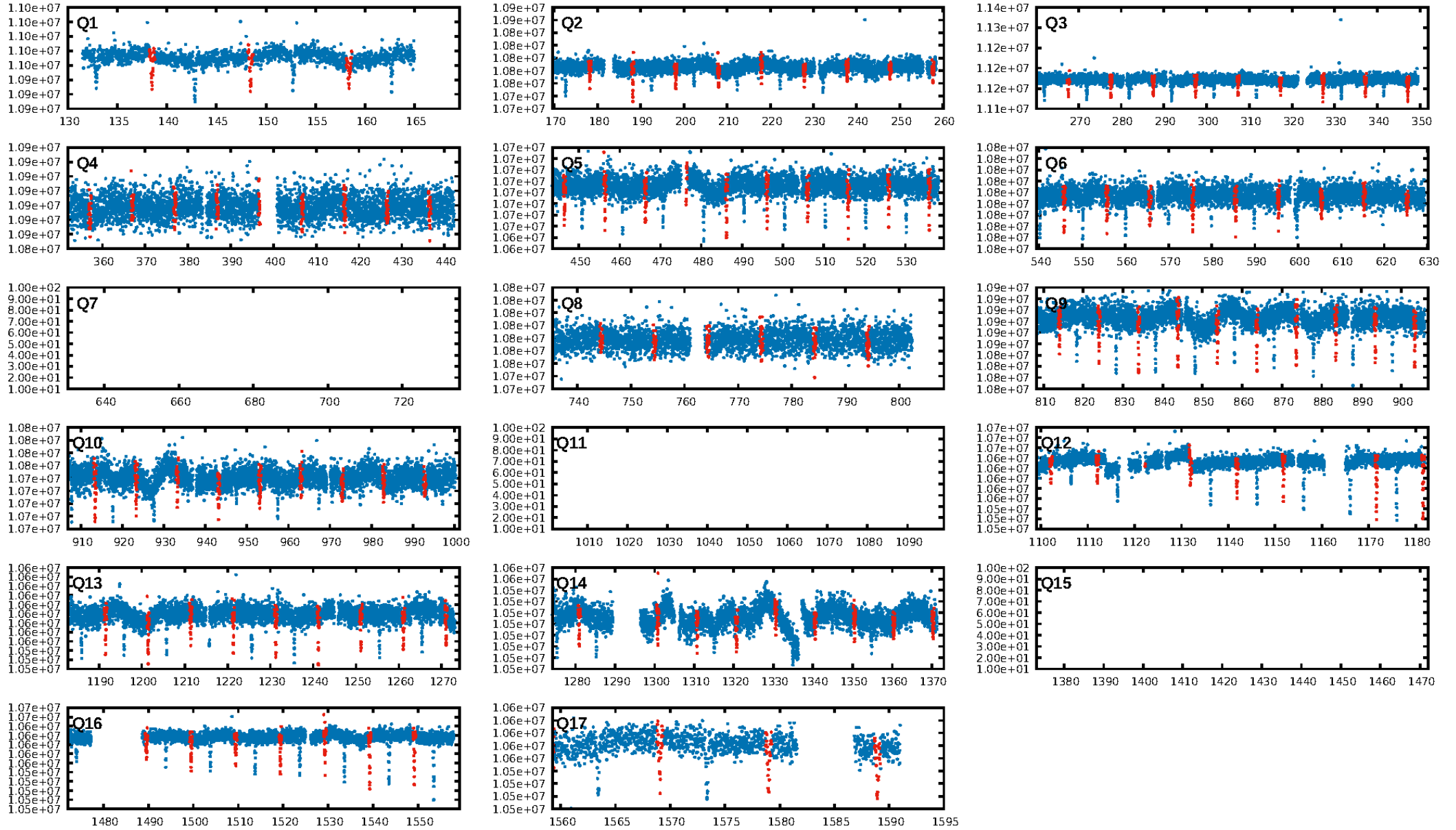
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 0.99 [102/103]  
GhostDiagnostic-chr: -0.3177  
Centroid-sig: 0.0%  
Centroid-so: 53.528 arcsec [466.63σ]  
OotOffset-rm: 2.122 arcsec [31.76σ]  
KicOffset-rm: 7.474 arcsec [111.97σ]  
OotOffset-st: 0/1/0/0 [1]  
KicOffset-st: 0/1/0/0 [1]  
DiffImageQuality-fgm: 1.00 [1/1]  
DiffImageOverlap-fno: 1.00 [14/14]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 18:15:41 Z

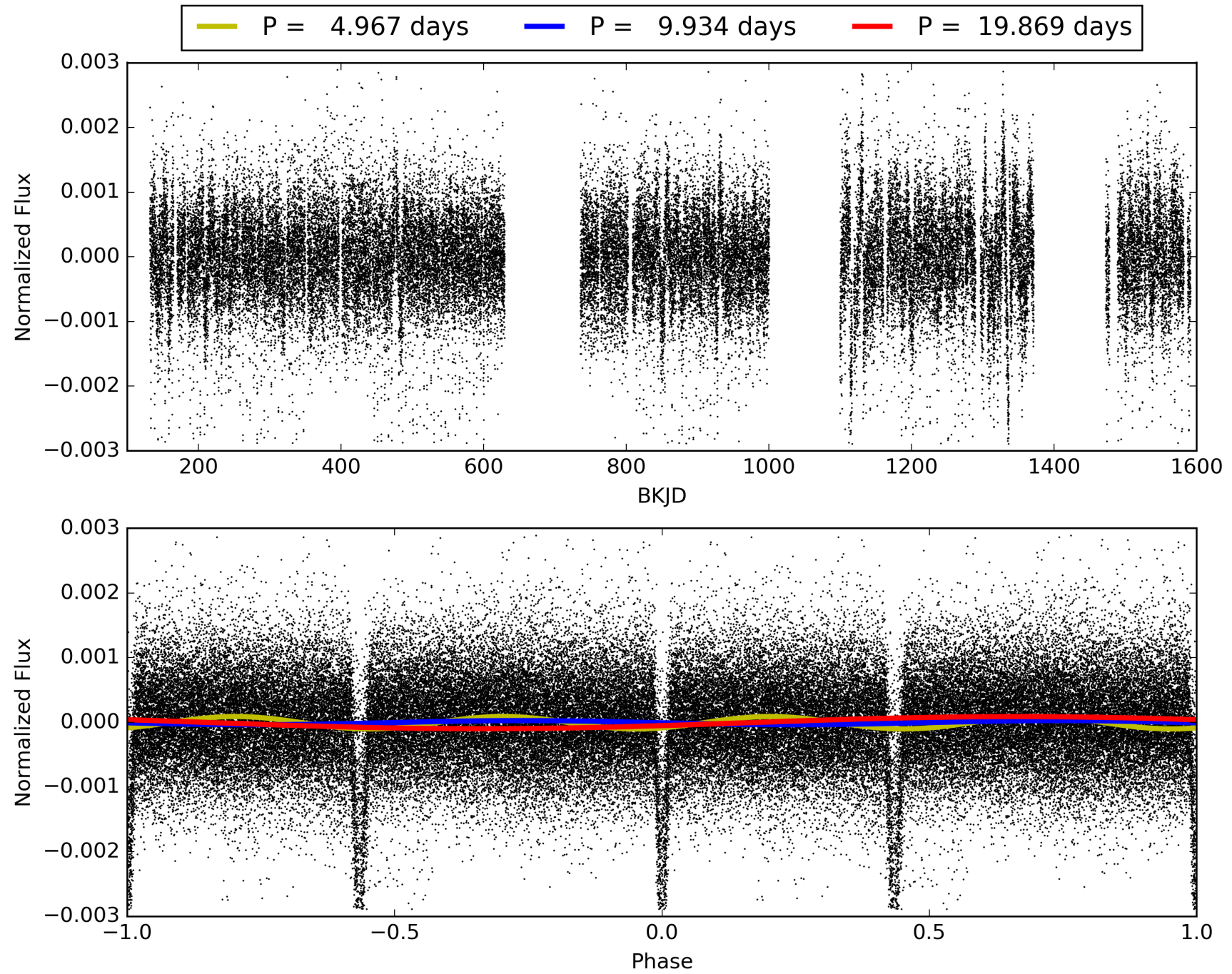
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 010026458-02, PDC Light Curves



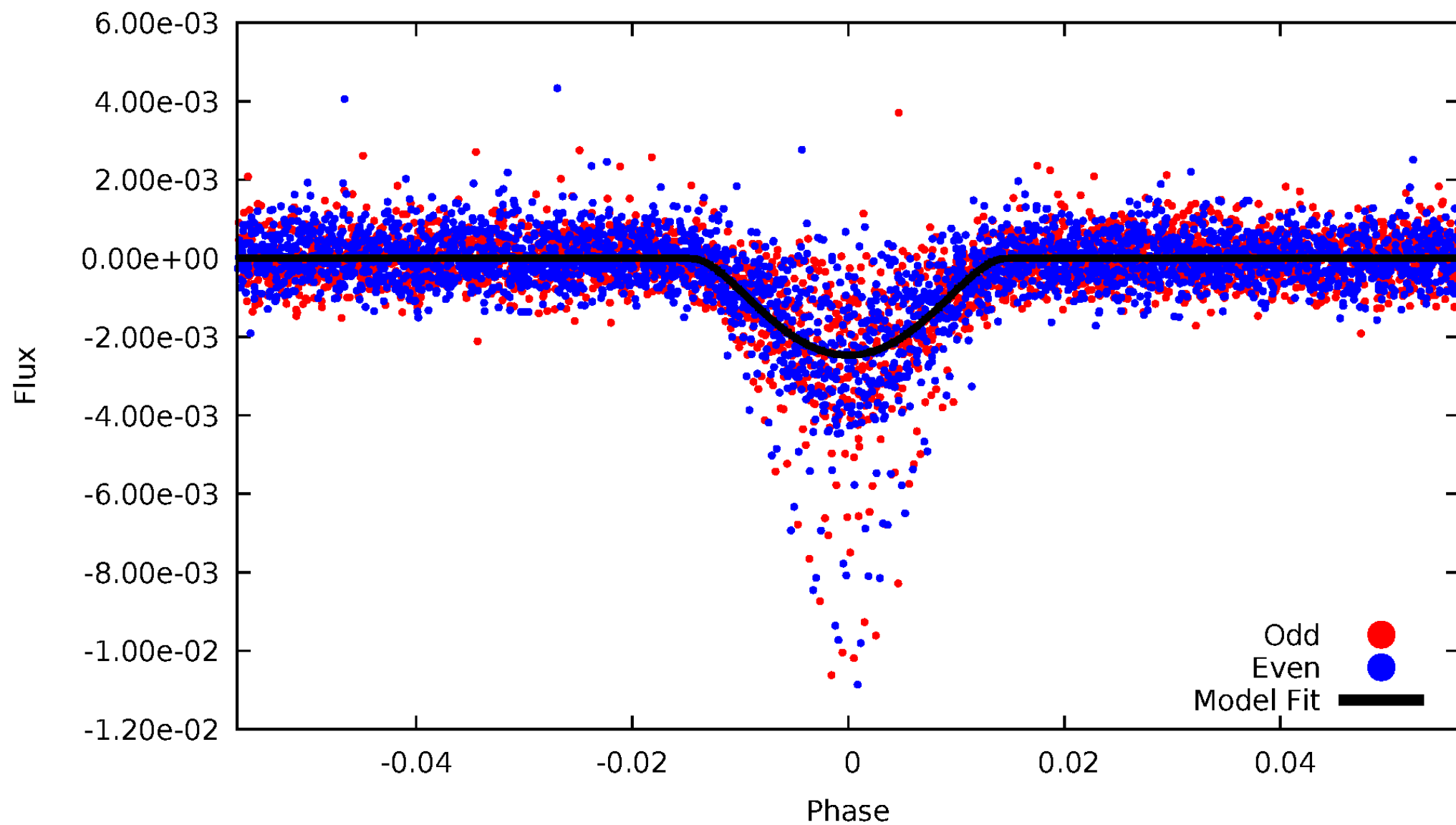


TCE 010026458-02



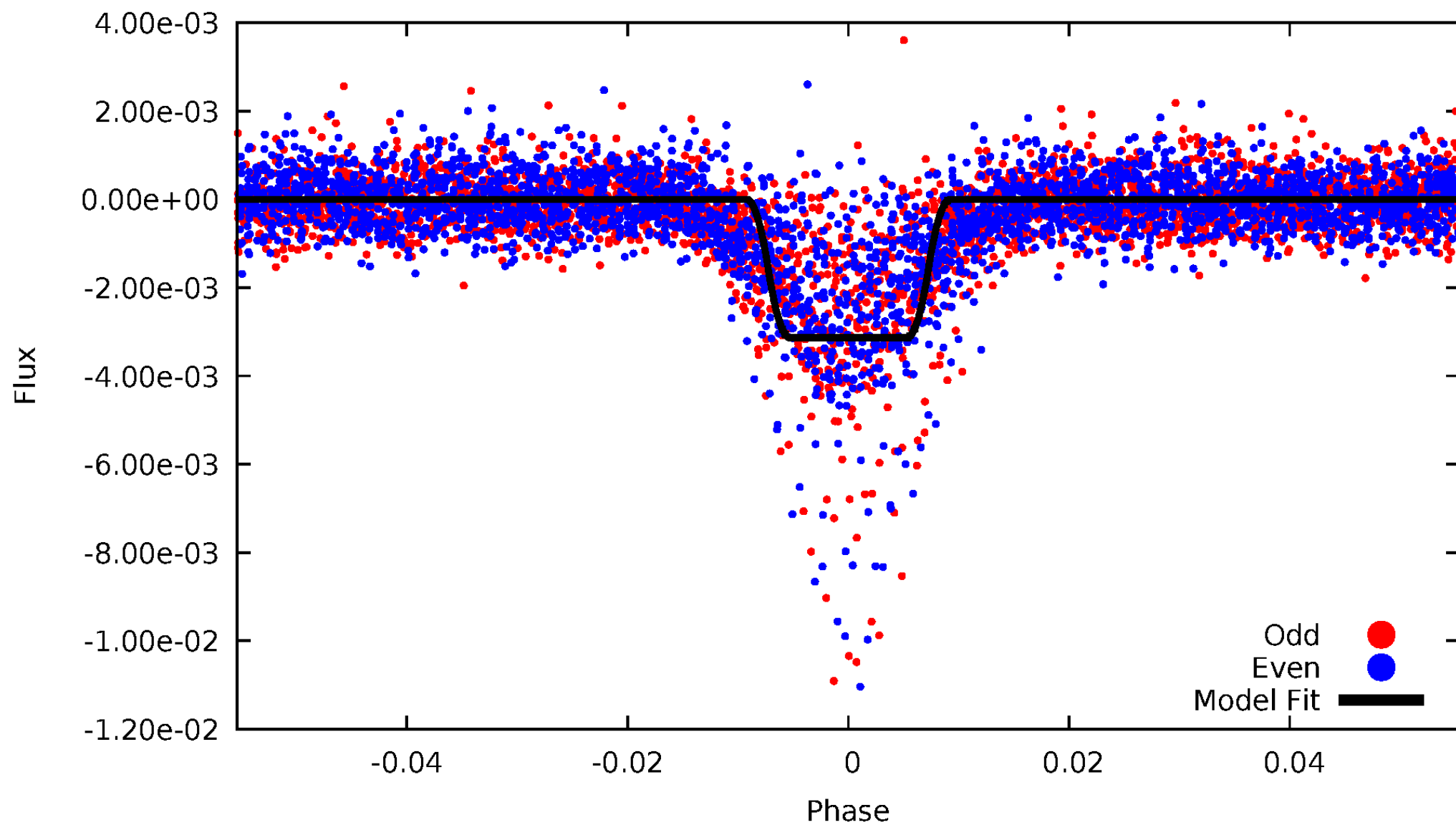
# DV Odd/Even

TCE 010026458-02



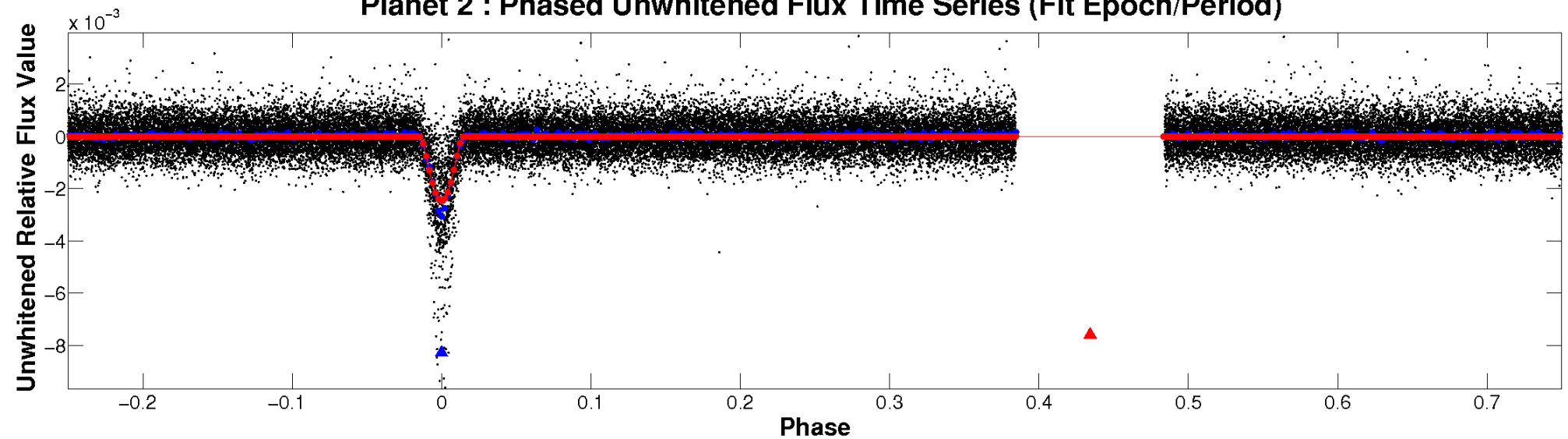
# ALT Odd/Even

TCE 010026458-02

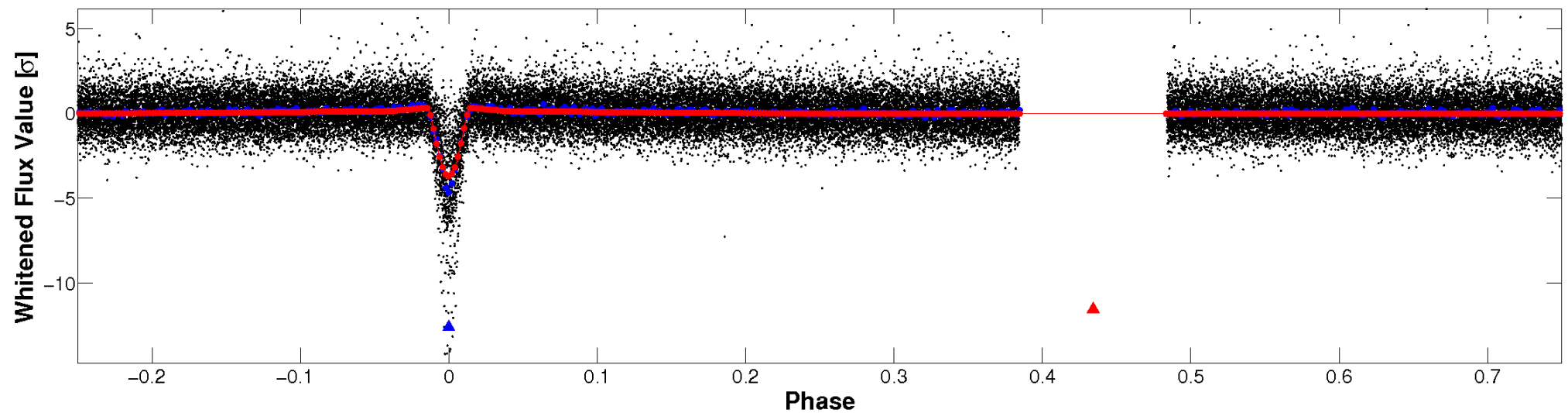


# Non-Whitened Vs. Whitened Light Curve

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

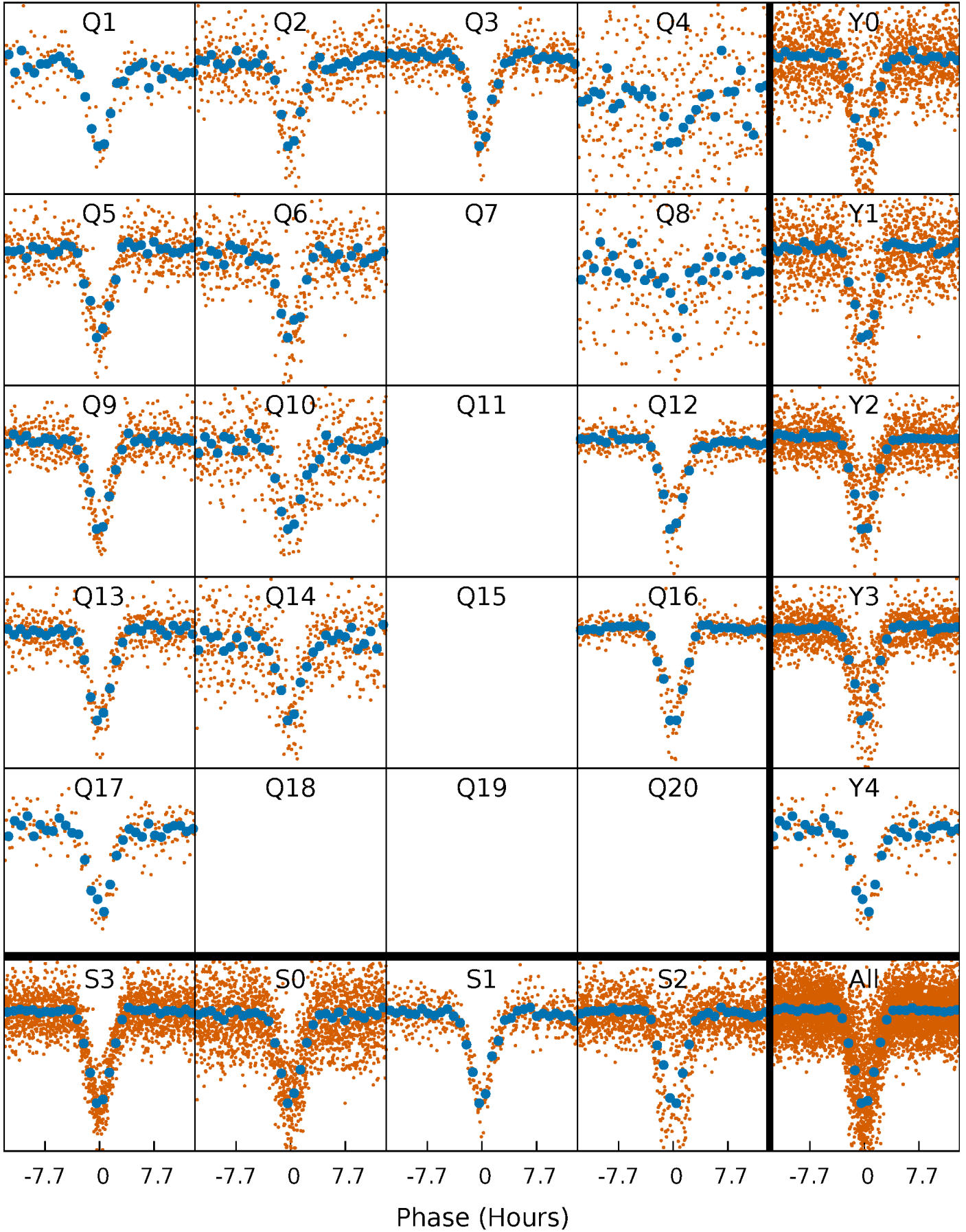


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

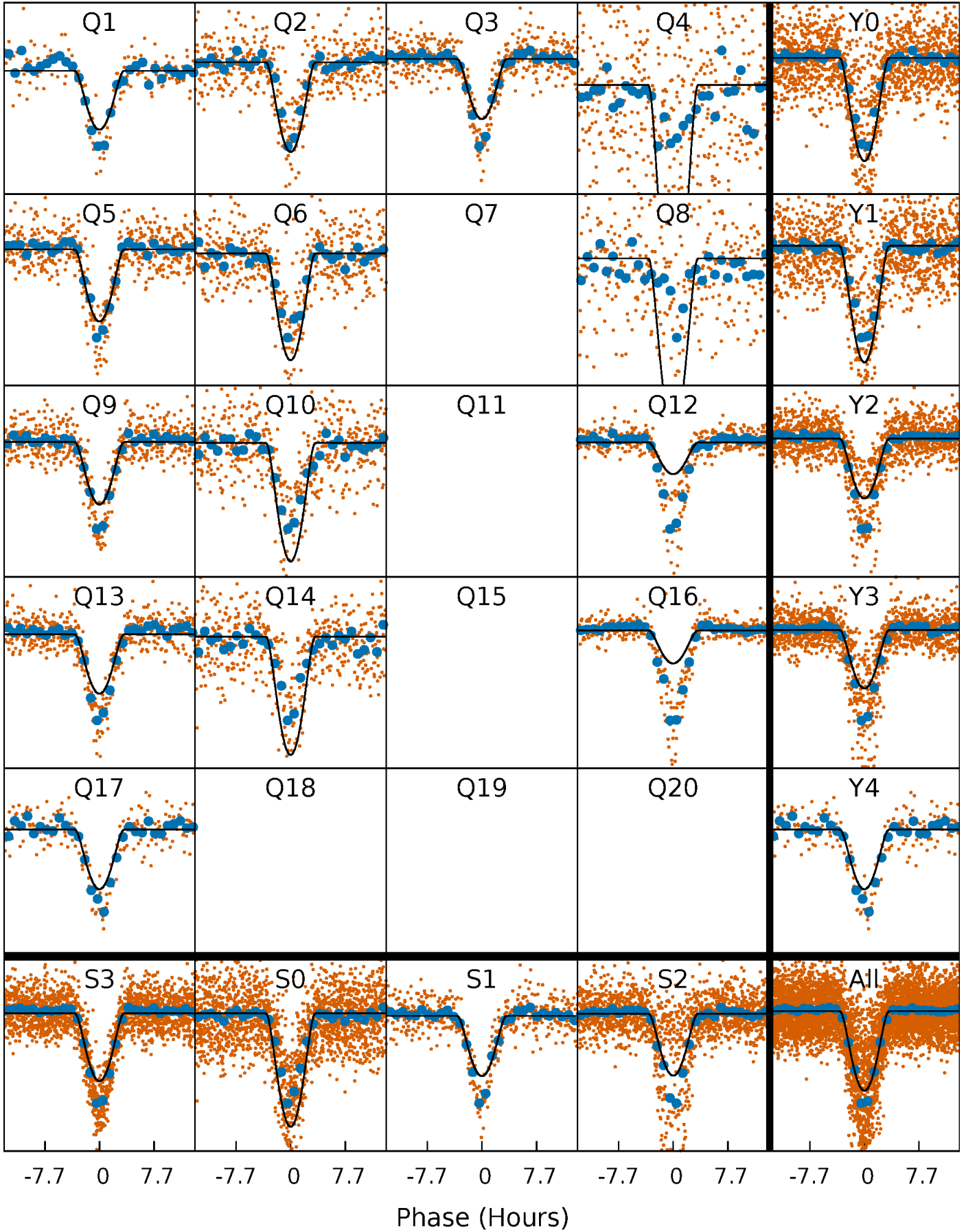
TCE 010026458-02   P= 9.934419 Days    $T_0=138.493754$  (BKJD)





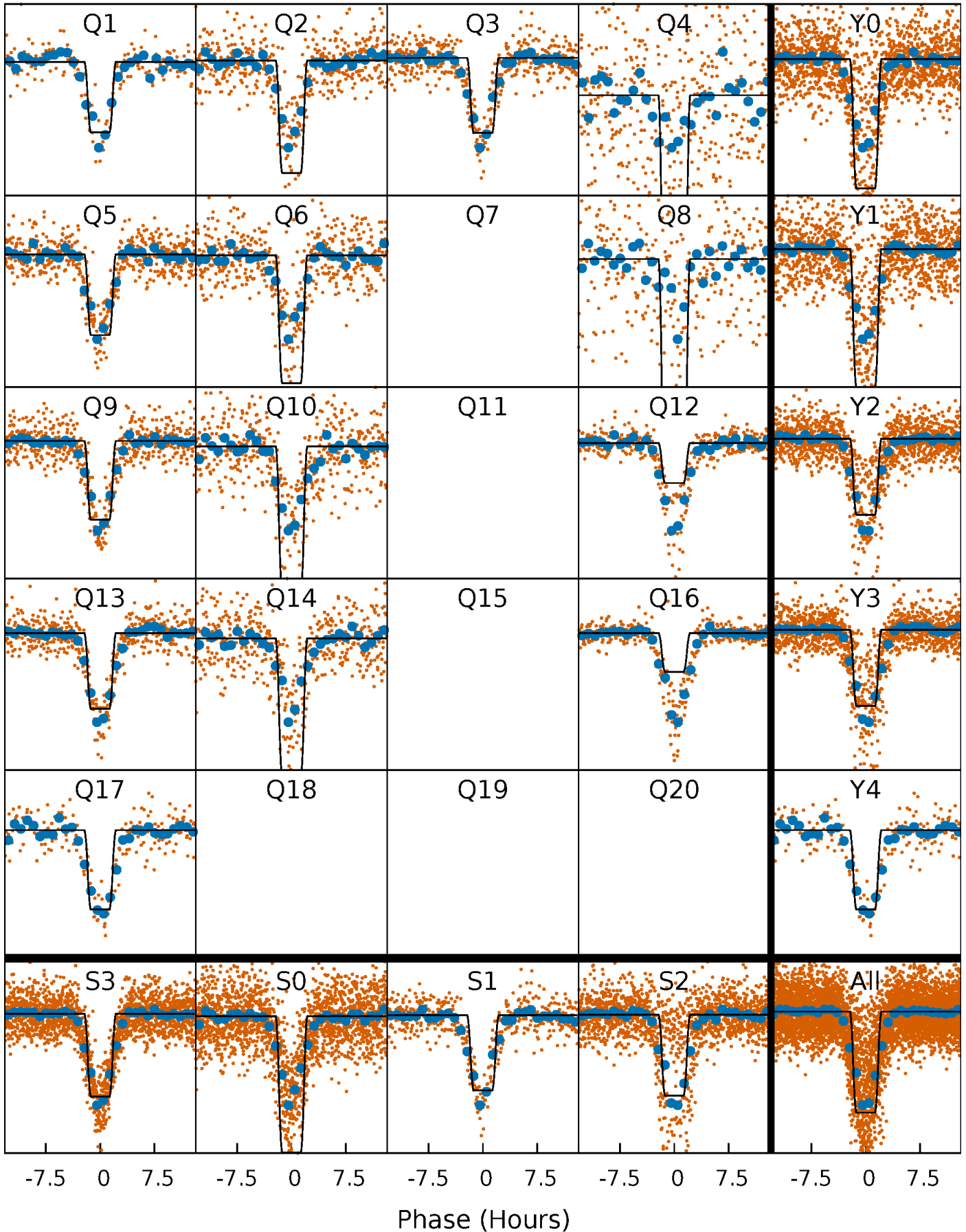
# DV Quarter-Phased Transit Curves

TCE 010026458-02   P= 9.934419 Days    $T_0=138.493754$  (BKJD)



## Alt. Detrend Quarter-Phased Transit Curves

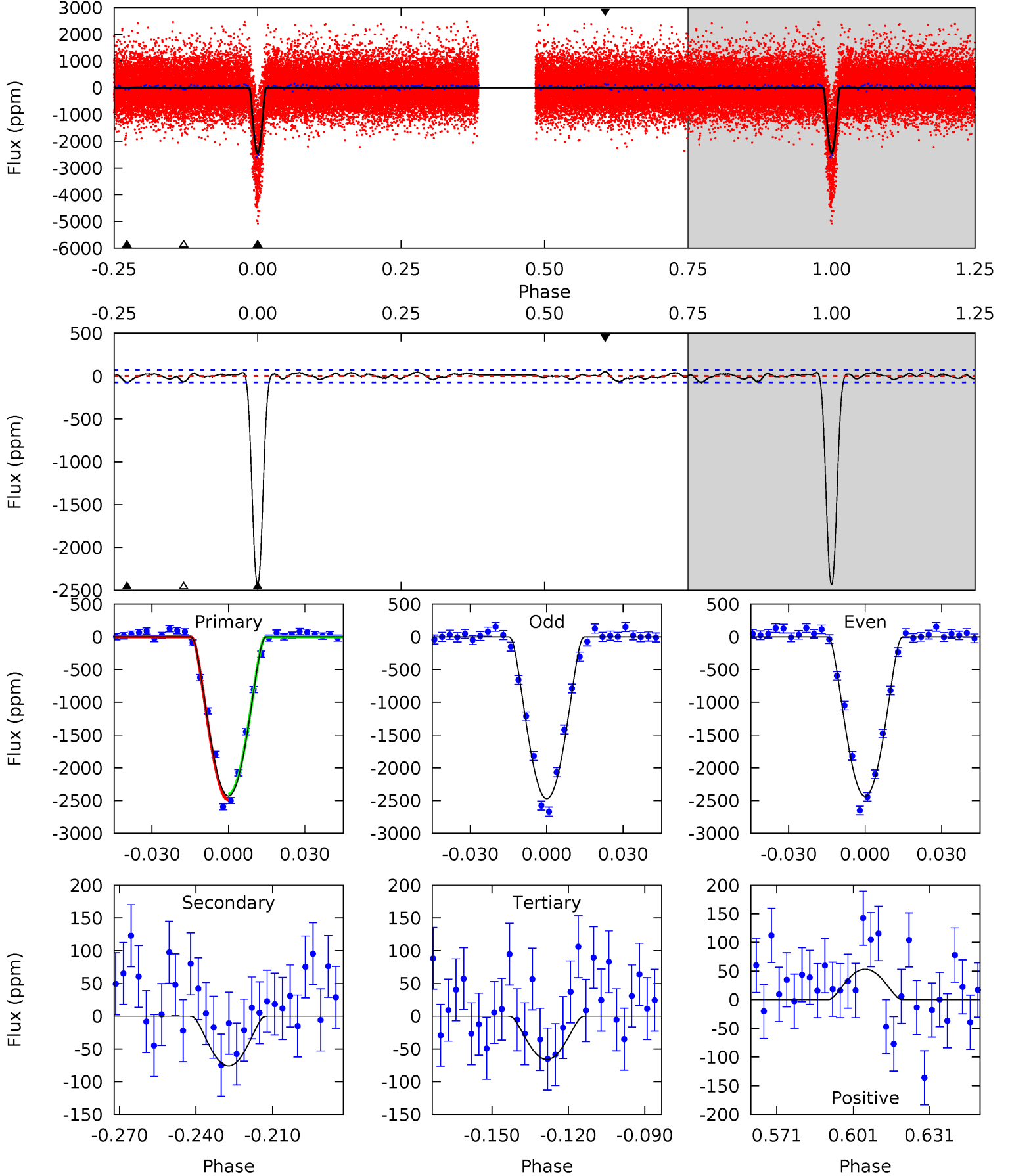
TCE 010026458-02   P= 9.934320 Days    $T_0=138.501757$  (BKJD)



# DV Model-Shift Uniqueness Test

010026458-02, P = 9.934419 Days, E = 128.559335 Days

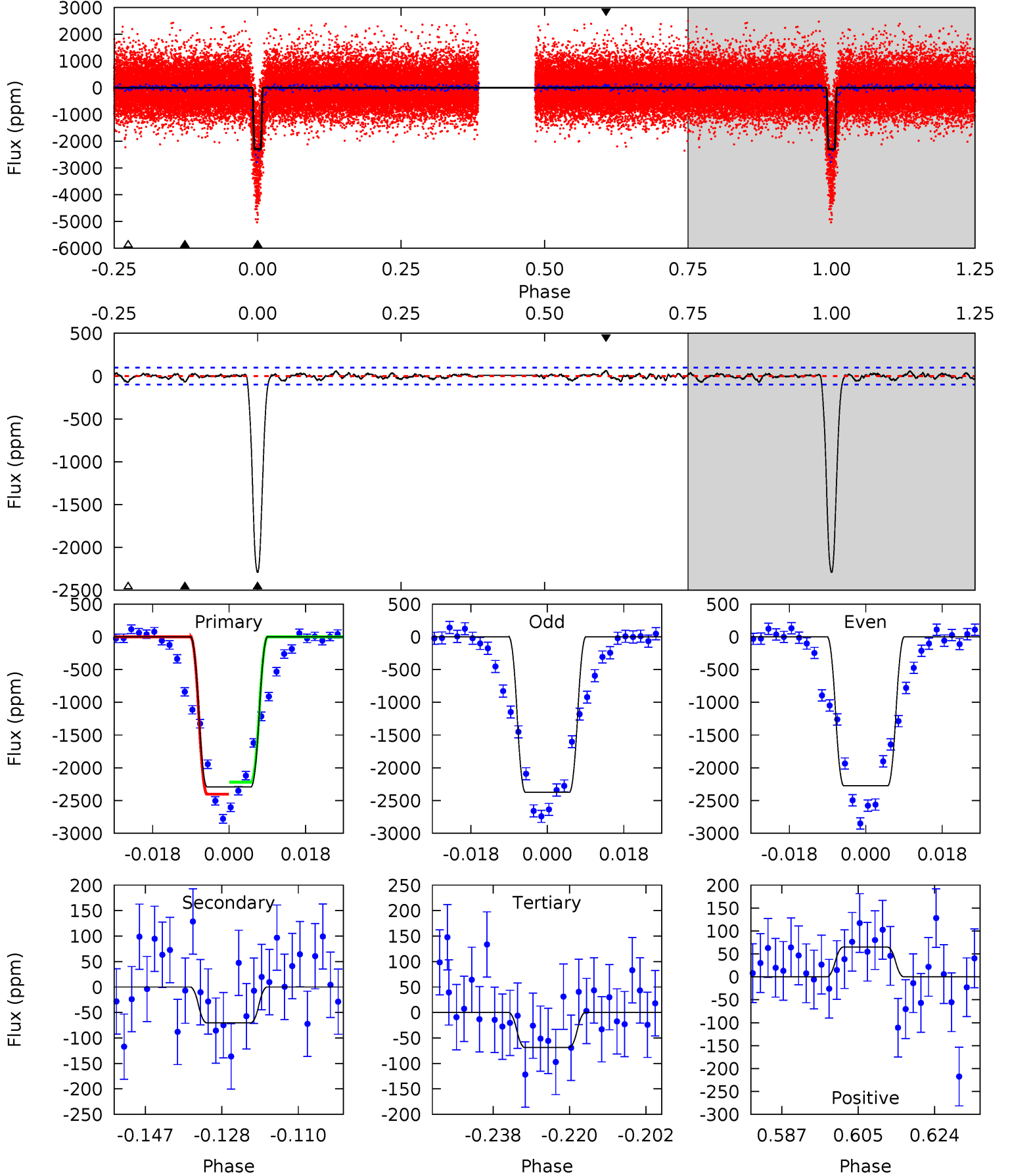
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
158.2	4.95	4.30	3.47	4.81	2.17	1.53	153.9	154.8	0.65	1.48	1.15	1.02	0.02	2.64



# Alt Model-Shift Uniqueness Test

010026458-02, P = 9.934320 Days, E = 128.567437 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
114.1	3.49	3.43	3.24	4.91	2.36	1.06	110.7	110.9	0.07	0.26	2.46	0.98	0.03	0



### Stellar Parameters For KIC 010026458

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5763^{+154}_{-206}$	$4.484^{+0.040}_{-0.160}$	$0.360^{+0.100}_{-0.250}$	$0.998^{+0.217}_{-0.093}$	$1.107^{+0.080}_{-0.120}$	$1.568^{+0.313}_{-0.656}$
	+3%/-4%	+1%/-4%	+28%/-69%	+22%/-9%	+7%/-11%	+20%/-42%
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 010026458-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-76 \pm 15$	$9.90^{+4.95}_{-4.69}$	$1178^{+70}_{-51}$	$2580^{+521}_{-267}$	$3.533^{+9.958}_{-1.952}$
Alt.	$-70 \pm 20$	$6.96^{+5.12}_{-4.16}$	$1178^{+63}_{-50}$	$2807^{+863}_{-410}$	$6.557^{+31.548}_{-4.532}$

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

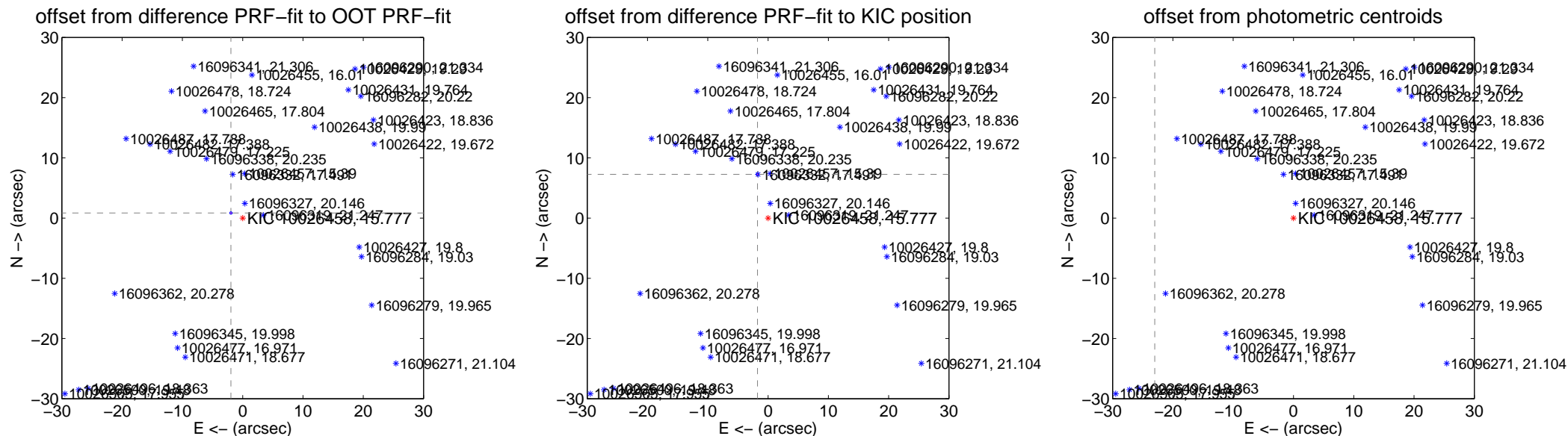
## DV Centroid Data

Supplemental centroid analysis for 010026458-02. Kepler magnitude: 15.78. Transit SNR 80.22

There are 1 quarters with good PRF difference image offsets

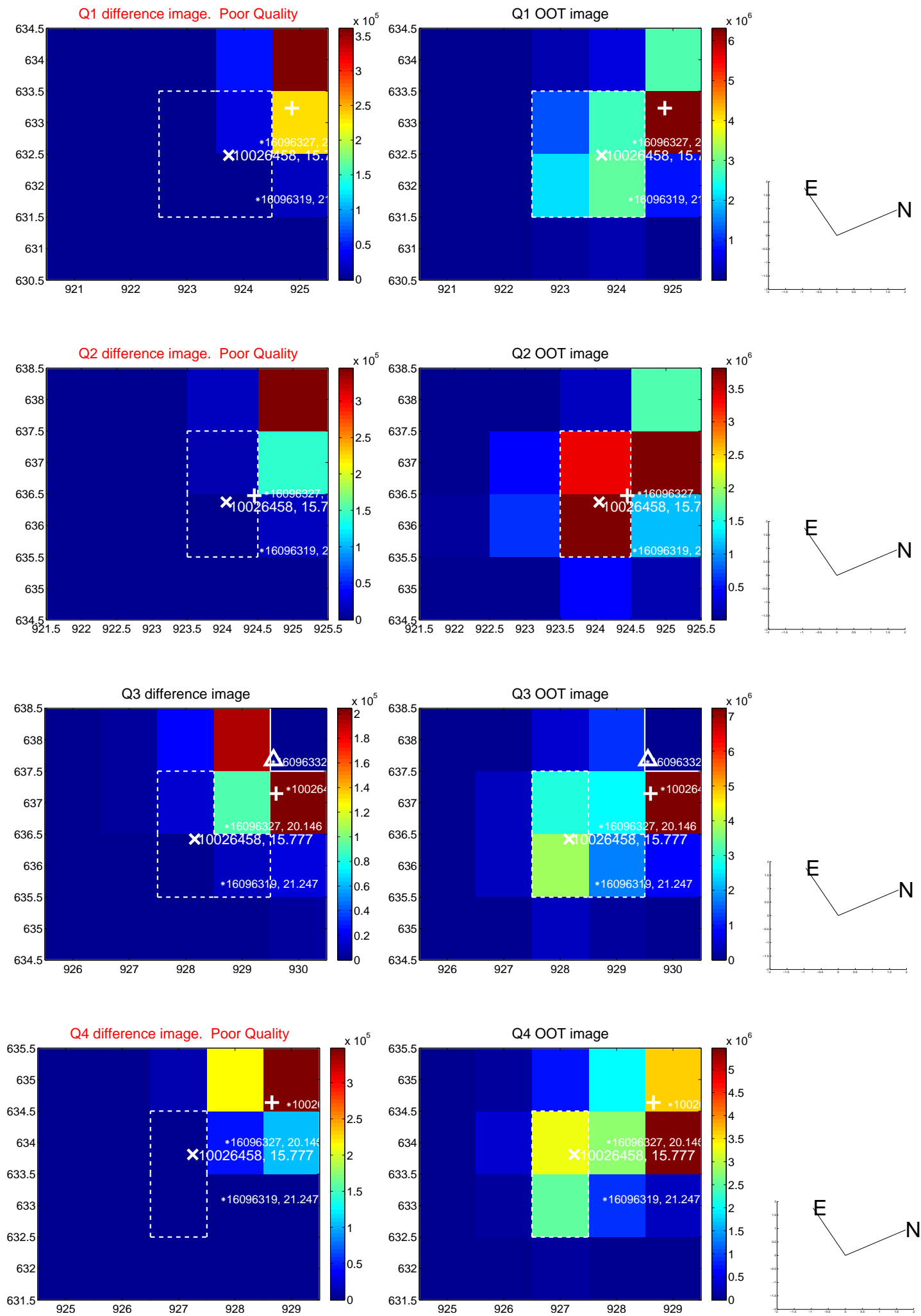
The OOT PRF centroid is offset from the target star catalog position by about 6.43 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b>2.122 <math>\pm</math> 0.067</b>	<b>31.76</b>	$1.948 \pm 0.067$	$0.841 \pm 0.067$
PRF-fit source offset from KIC position	<b>7.474 <math>\pm</math> 0.067</b>	<b>111.97</b>	$1.760 \pm 0.067$	$7.264 \pm 0.067$
photometric centroid source offset	<b>53.53 <math>\pm</math> 0.11</b>	<b>466.62</b>	$23.00 \pm 0.09$	$48.33 \pm 0.12$



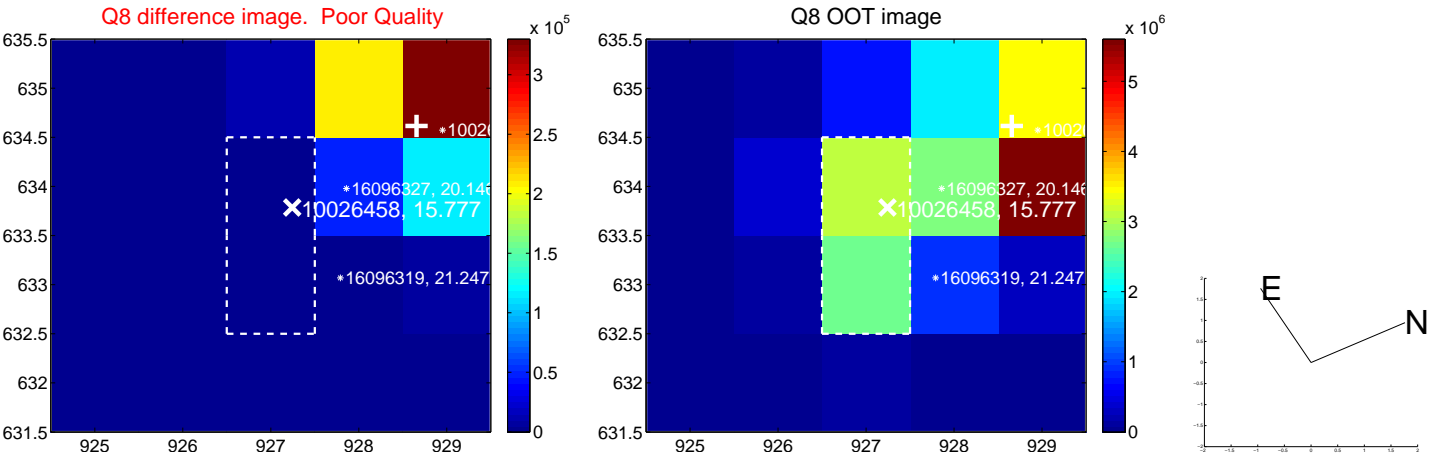
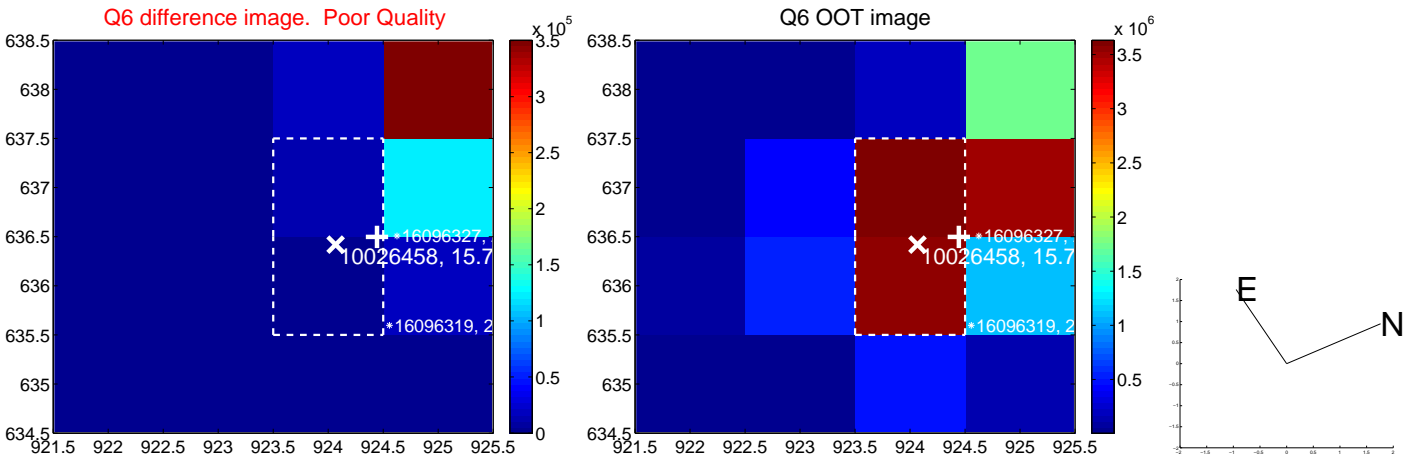
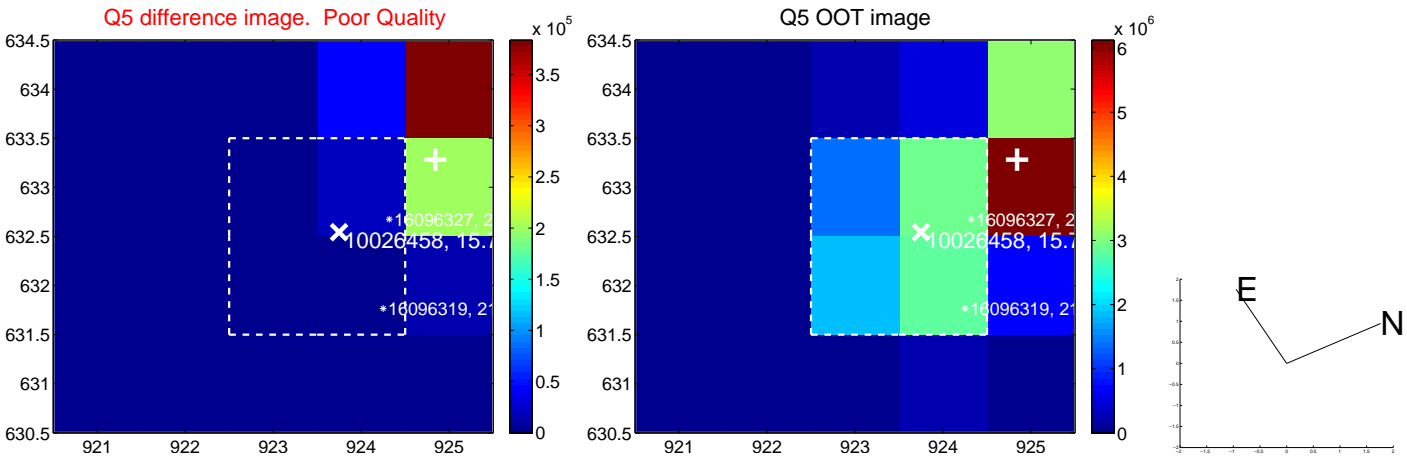
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

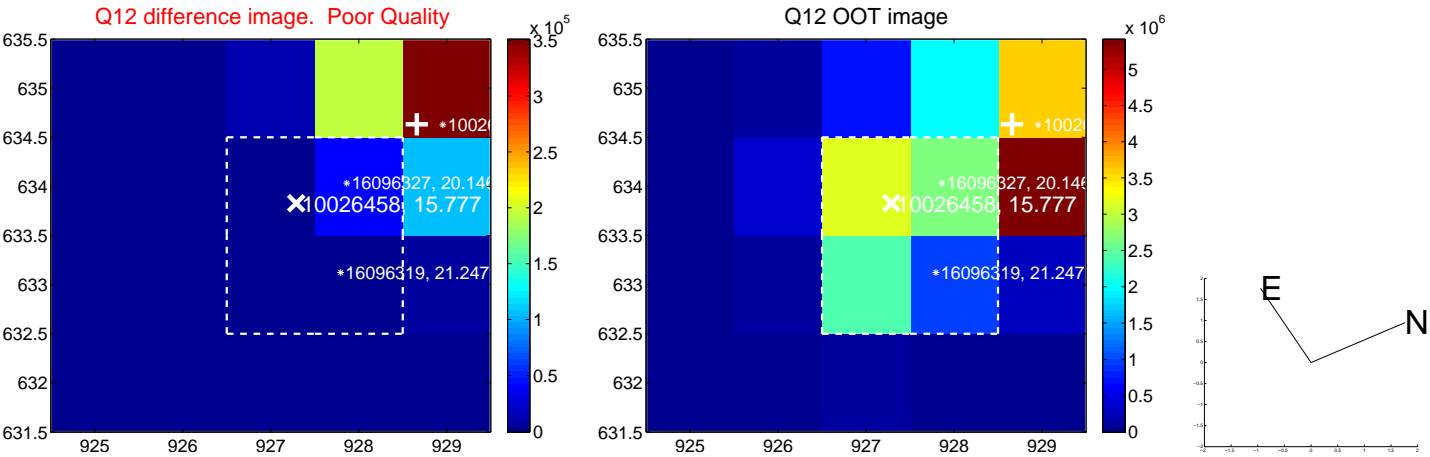
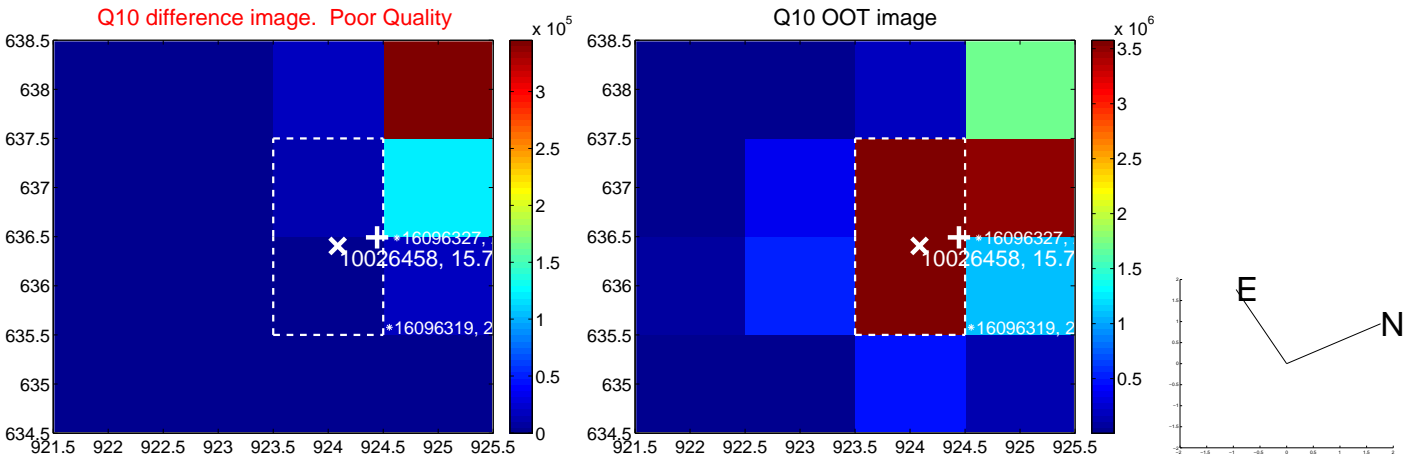
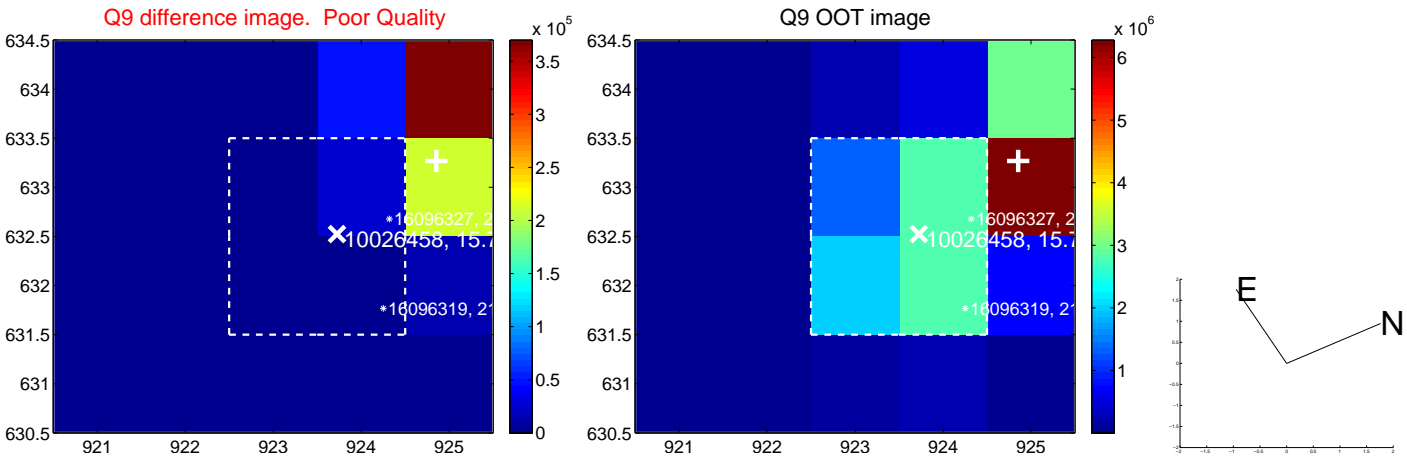




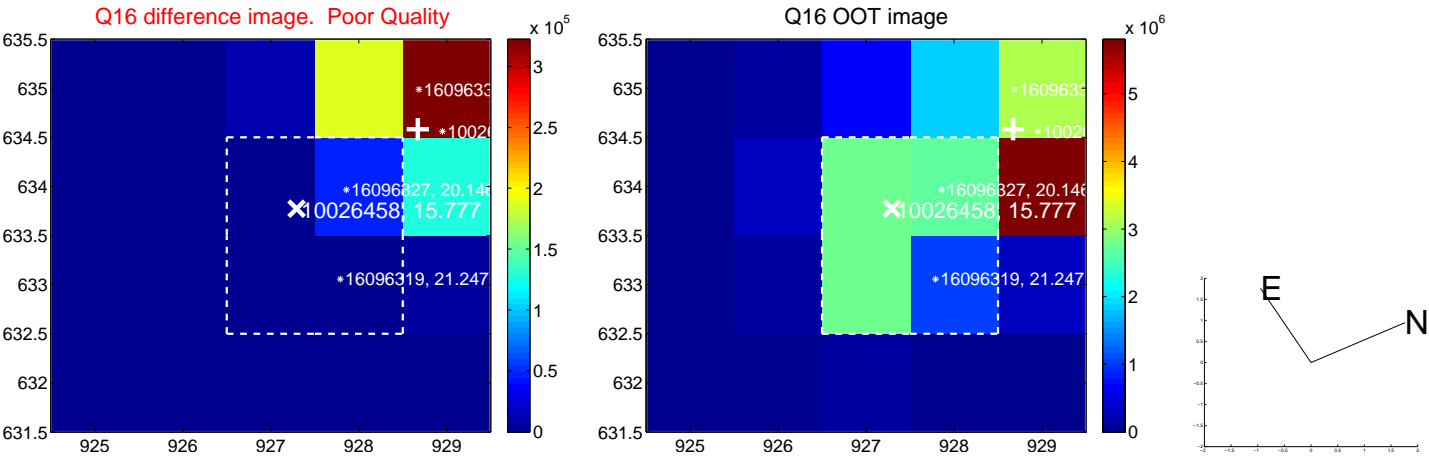
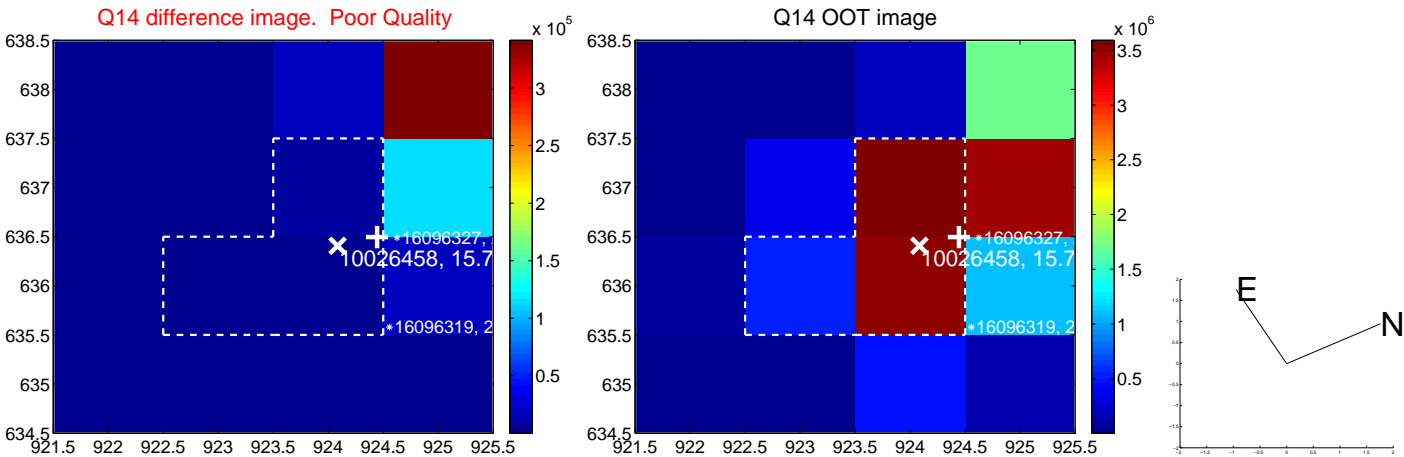
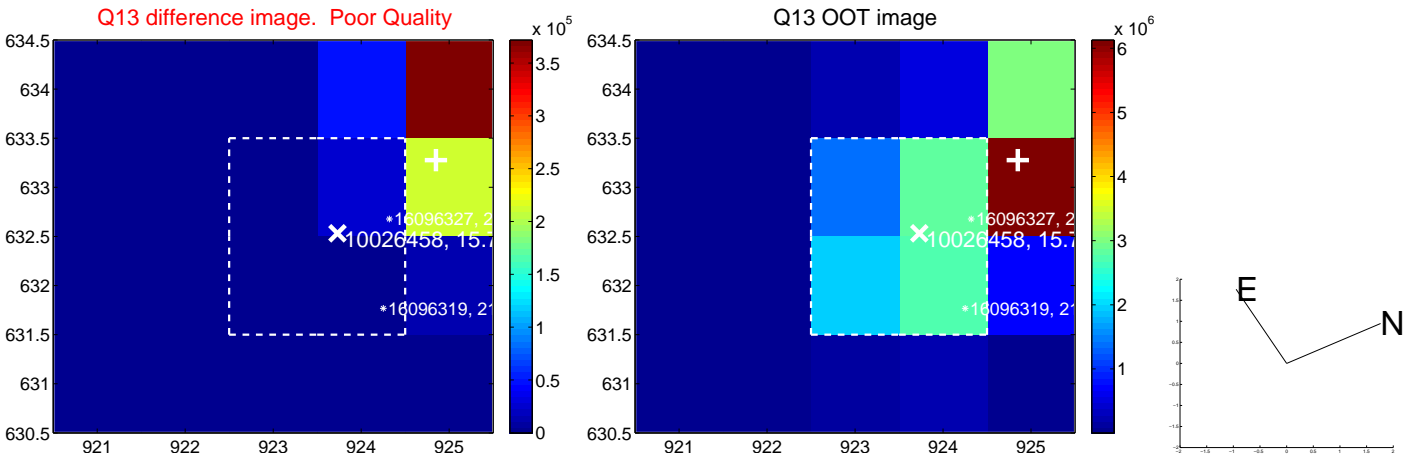
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



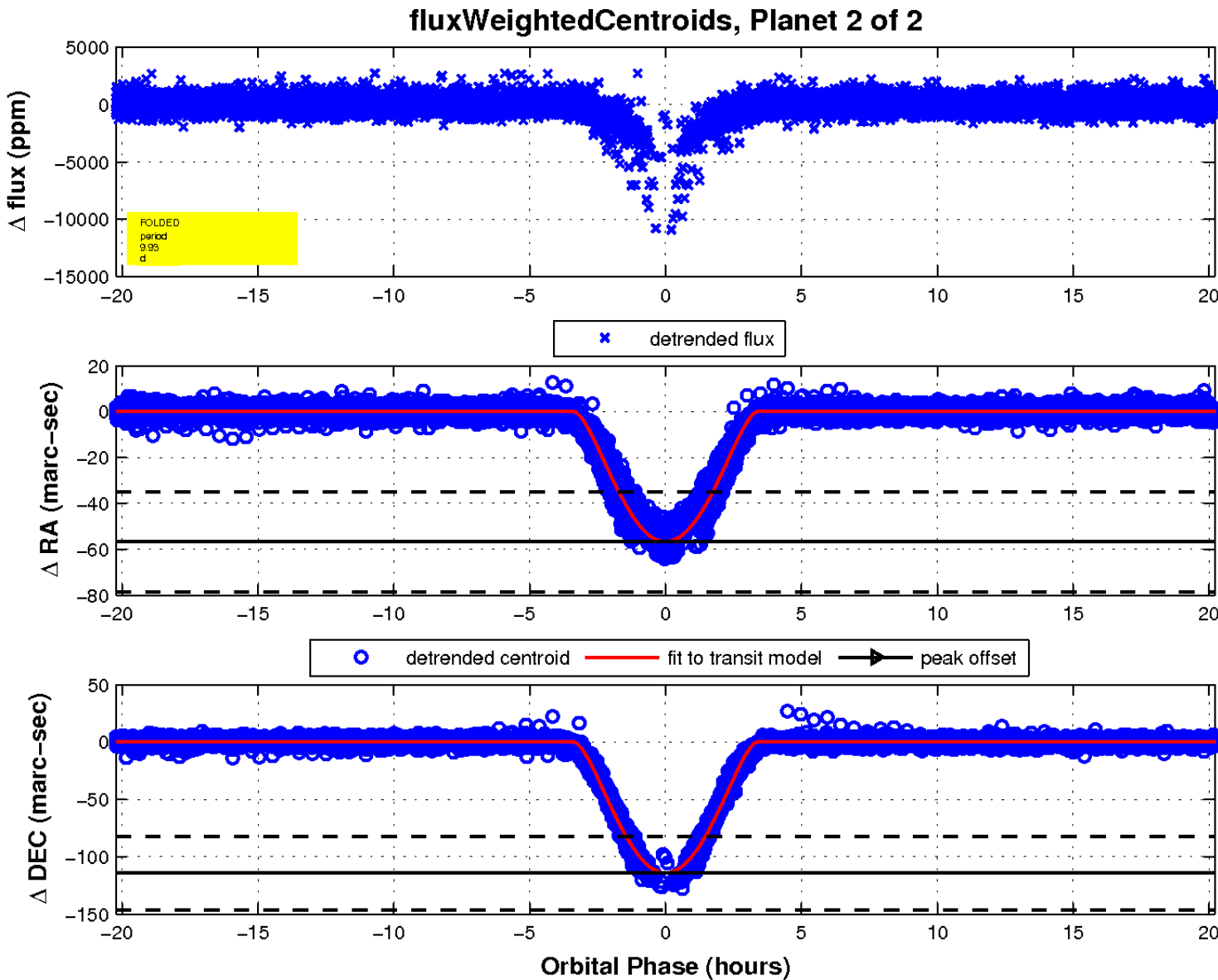
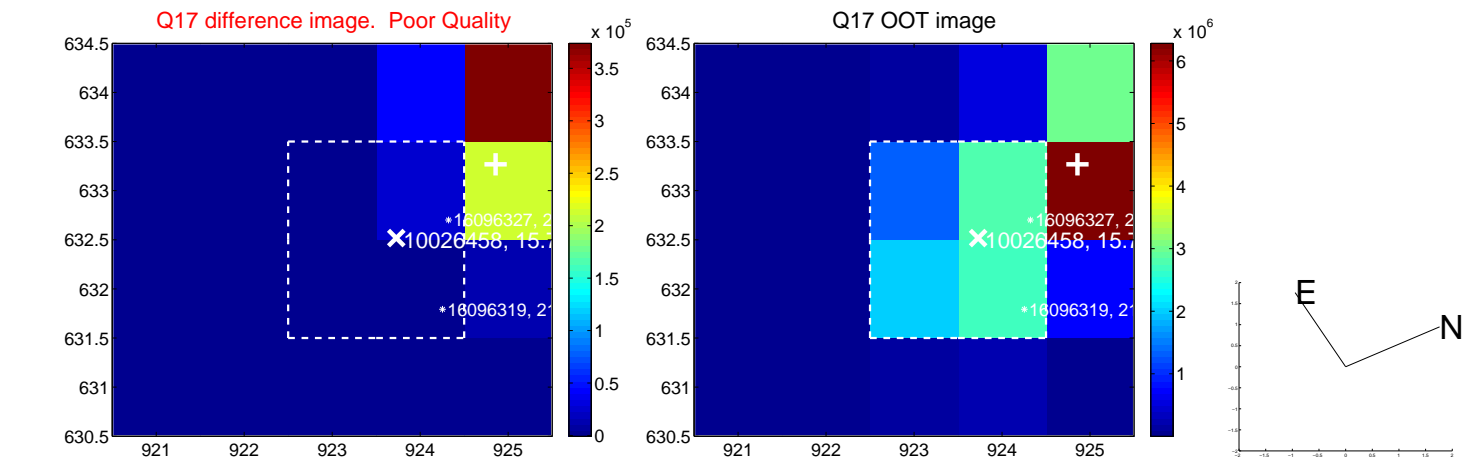
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

