

# KIC 009644683

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009644683-01	OBS	7214.01	0.585932	131.752530	0.0	3.215	16.1	0.0	0.80	5459	0.00	2914.22
009644683-02	OBS	No	55.556495	141.907607	391.3	7.232	7.4	6.6	0.80	5459	1.66	6.74

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009644683-01	OBS	FP	0.00	1	0	1	1	LPP_DV—CENT_RESOLVED_OFFSET—EPHEM_MATCH
009644683-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—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.

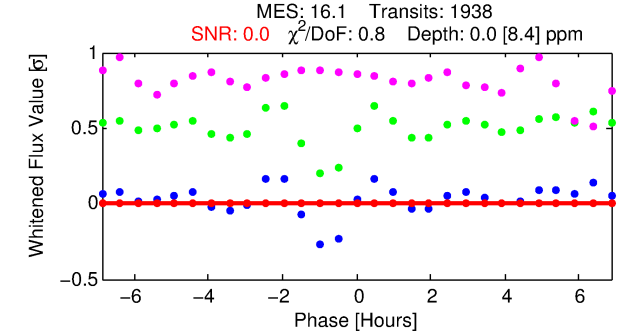
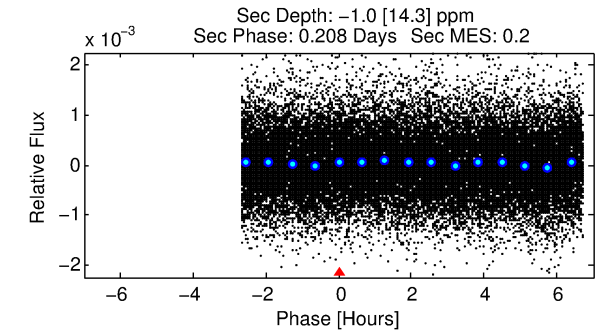
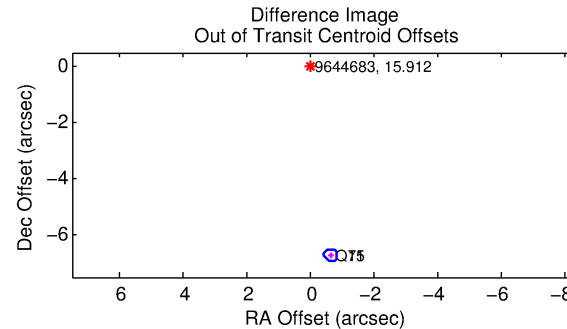
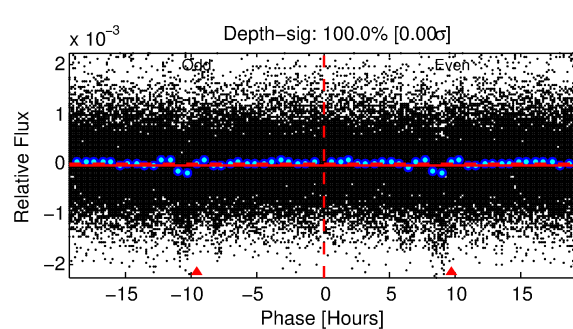
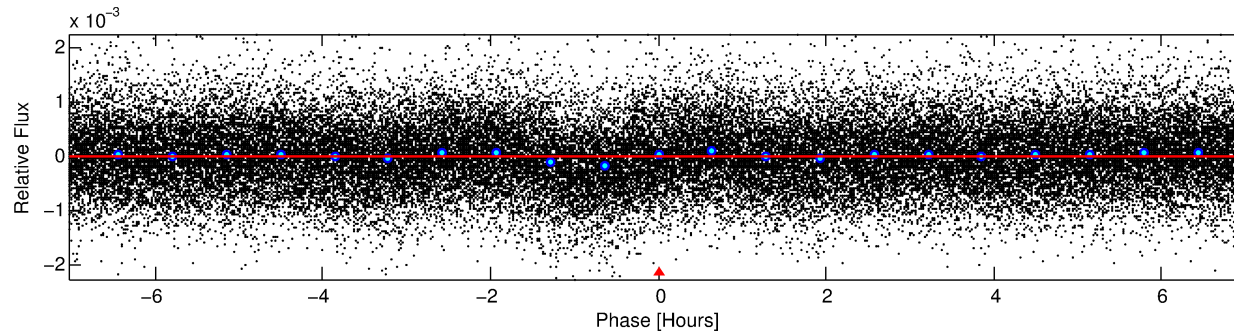
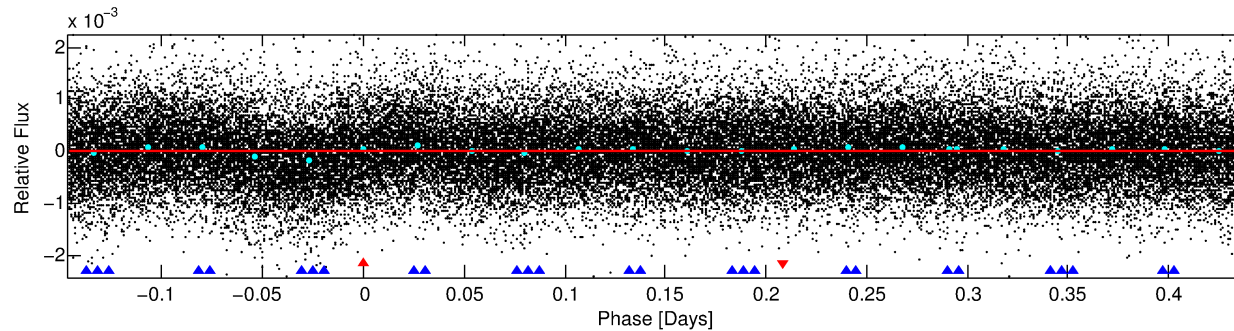
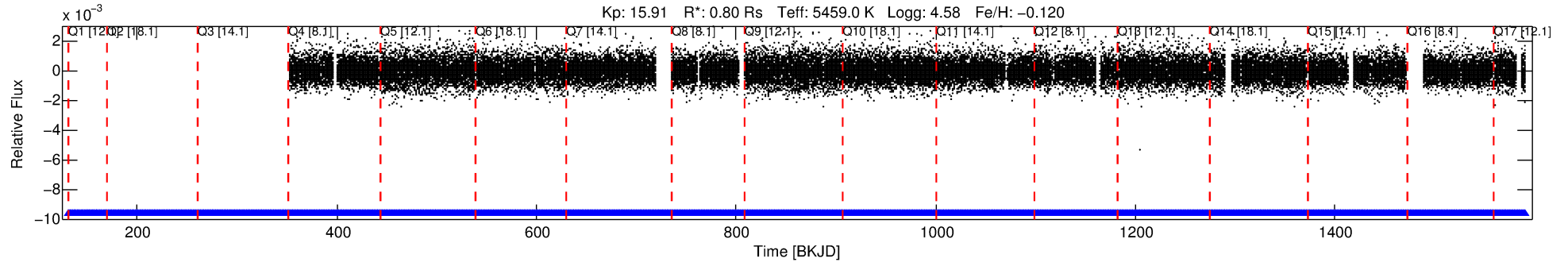
## Ephemeris Match Information For 009644683-01

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	$\sigma_P$	$\sigma_T$
009644683-01	9644683	009644680-pri	9644680	1:1	16.0	2	-4	13.44	15.92	280100.00	Direct-PRF	0	1.73	4.42

**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: 9644683 Candidate: 1 of 2 Period: 0.586 d  
KOI: K07214.01 Corr: 0.792



## DV Fit Results:

Period = 0.58593 [0.86689] d  
Epoch = 131.7525 [355.5048] BKJD  
Rp/R\* = 0.0000 [0.1443]  
a/R\* = 1.42 [859.47]  
b = 0.48 [2489.80]  
Seff = 2914.22 [5805.23]  
Teq = 1874 [933] K  
Rp = 0.00 [12.55] Re  
a = 0.0132 [0.0132] AU  
Ag = N/A  
Teffp = N/A

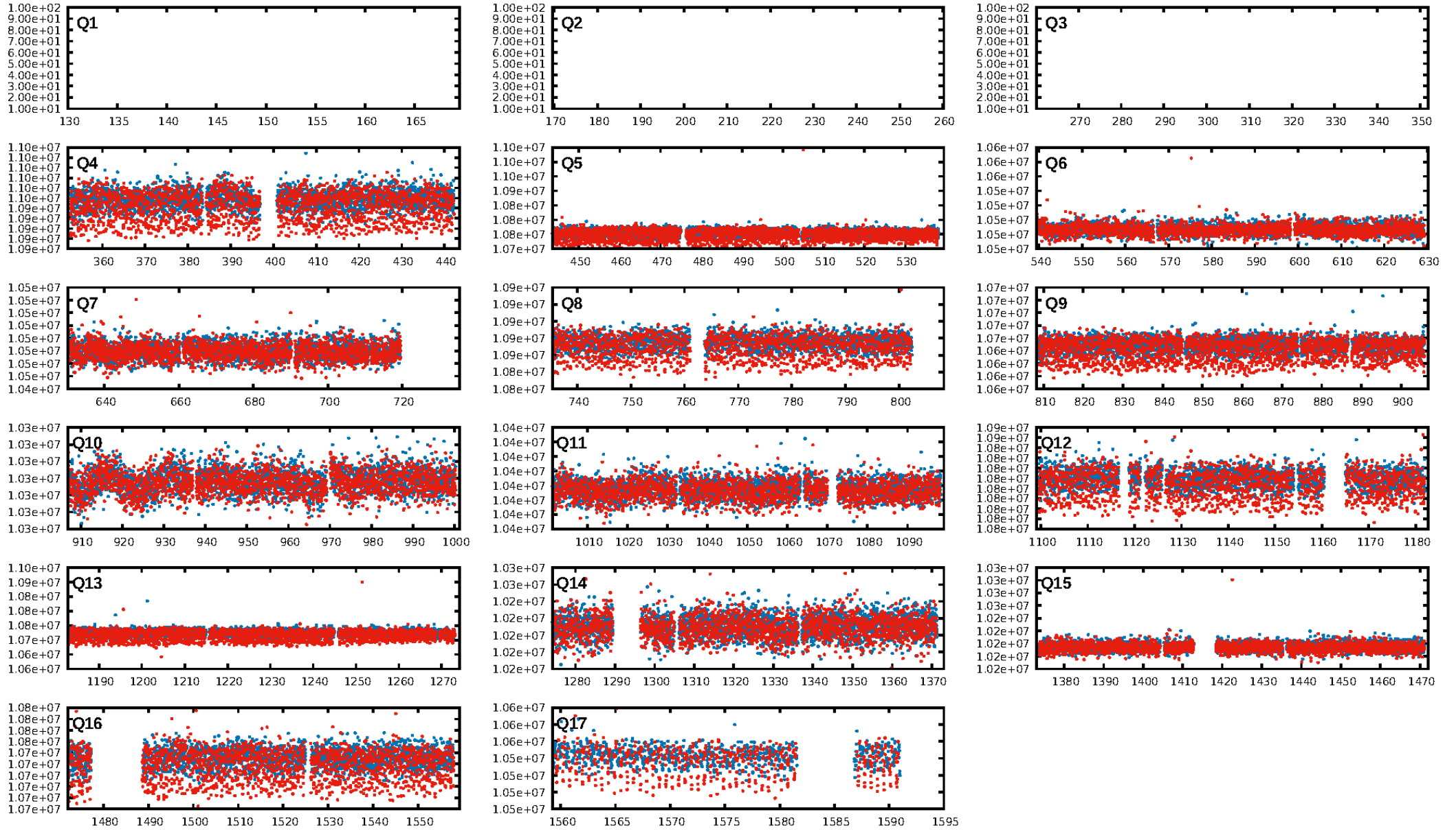
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [166.69σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 2.83e-44  
RollingBand-fgt: 1.00 [1893/1893]  
GhostDiagnostic-chr: N/A  
Centroid-sig: N/A  
Centroid-so: N/A  
OotOffset-rm: 6.751 arcsec [98.33σ]  
KicOffset-rm: 6.641 arcsec [84.85σ]  
OotOffset-st: 0/3/0/0 [3]  
KicOffset-st: 0/3/0/0 [3]  
DiffImageQuality-fgm: 1.00 [3/3]  
DiffImageOverlap-fno: 1.00 [14/14]

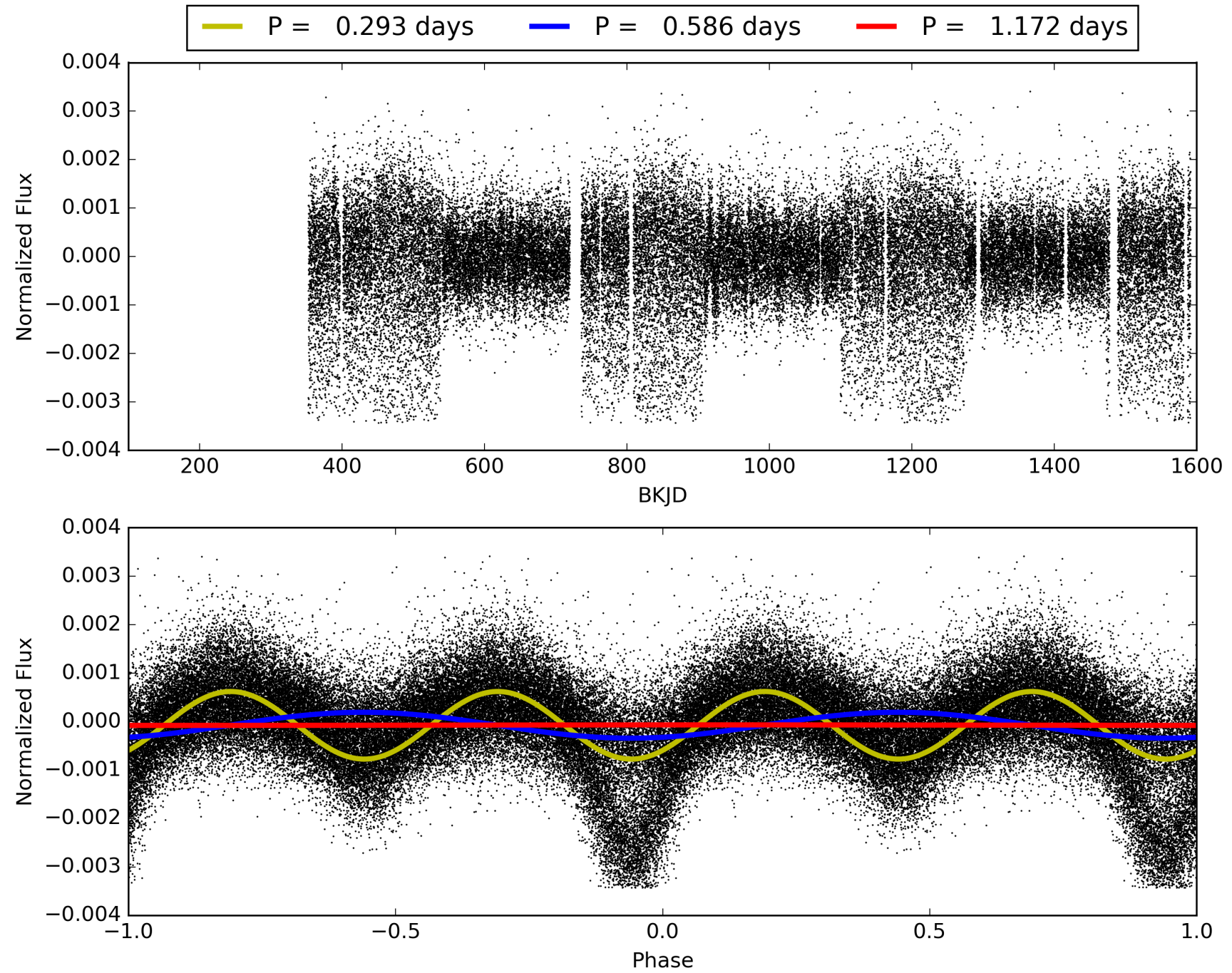
Software Revision: svn-ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 04:03:25 Z

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

# TCE 009644683-01, PDC Light Curves

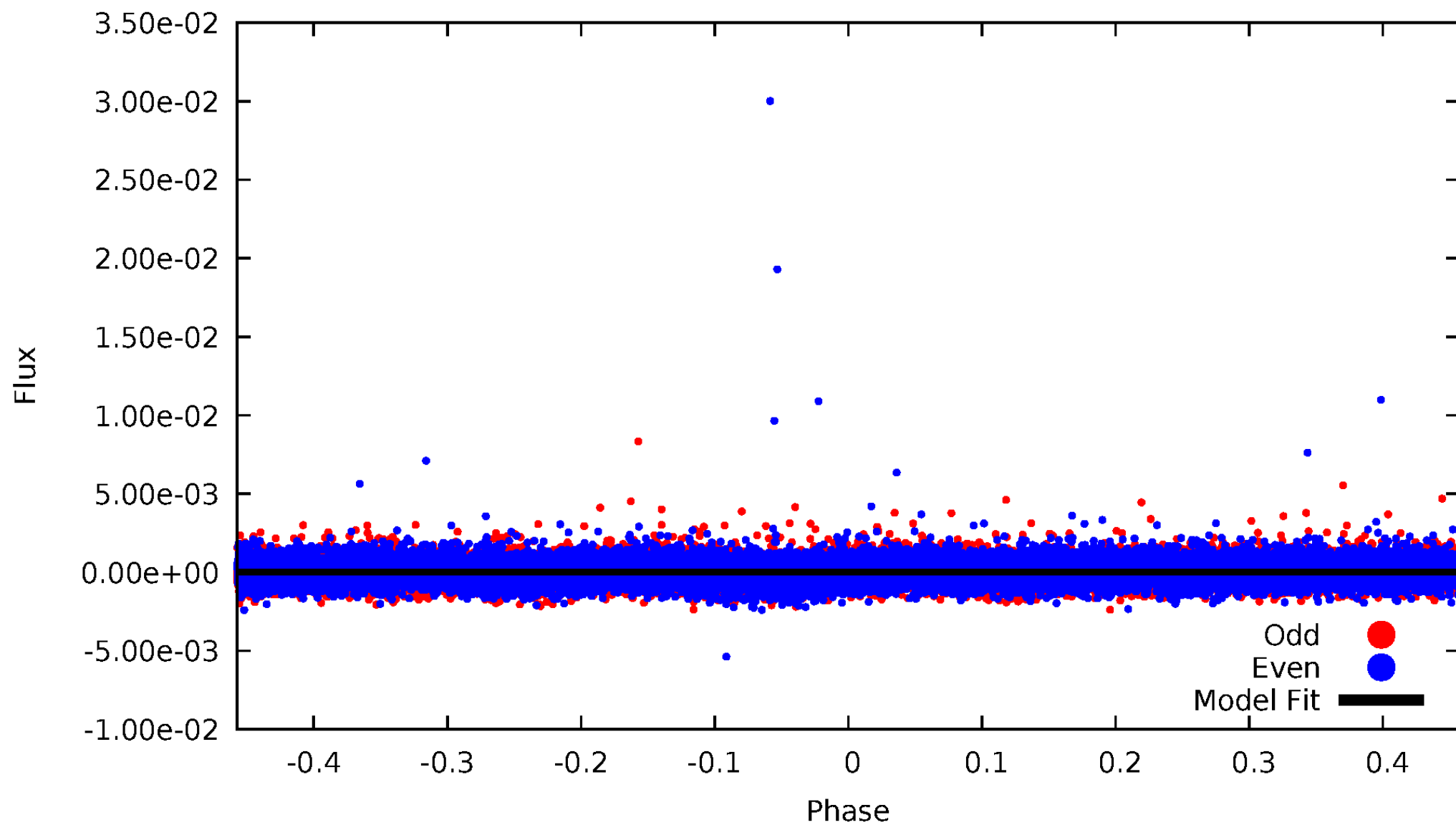


TCE 009644683-01



# DV Odd/Even

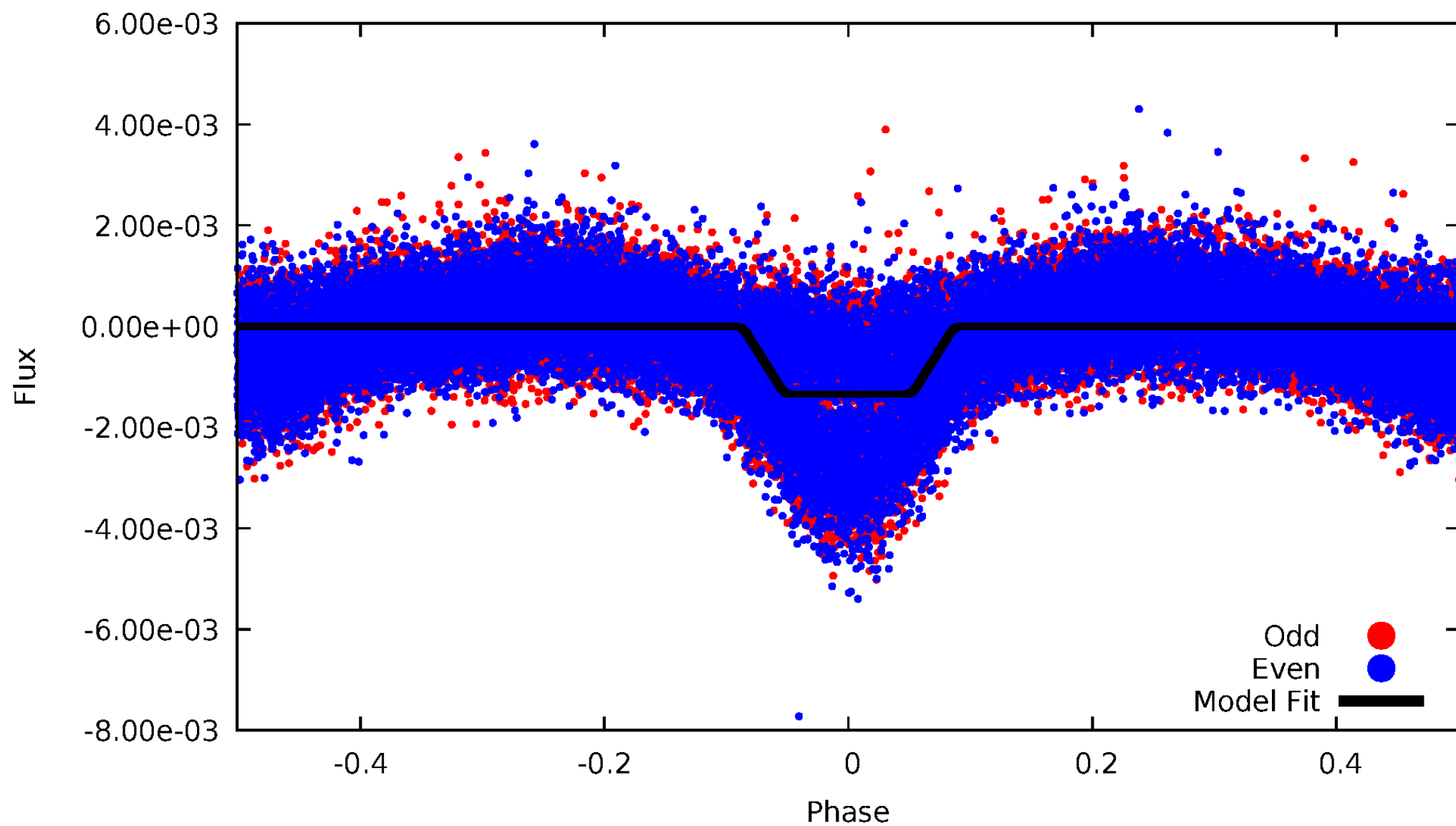
TCE 009644683-01



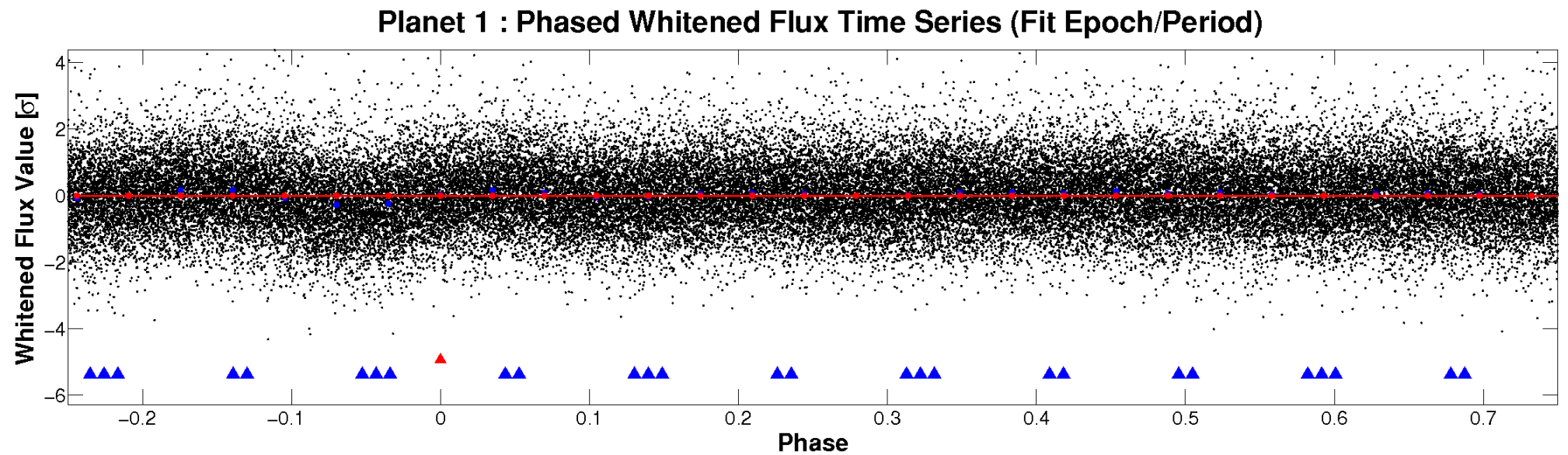
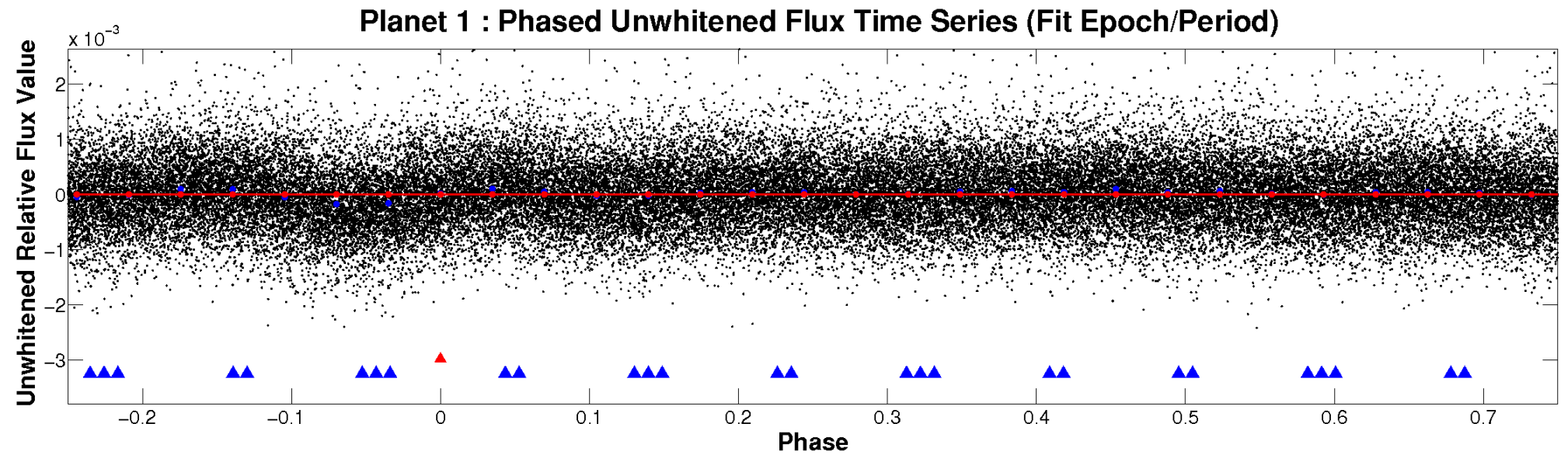


# ALT Odd/Even

TCE 009644683-01

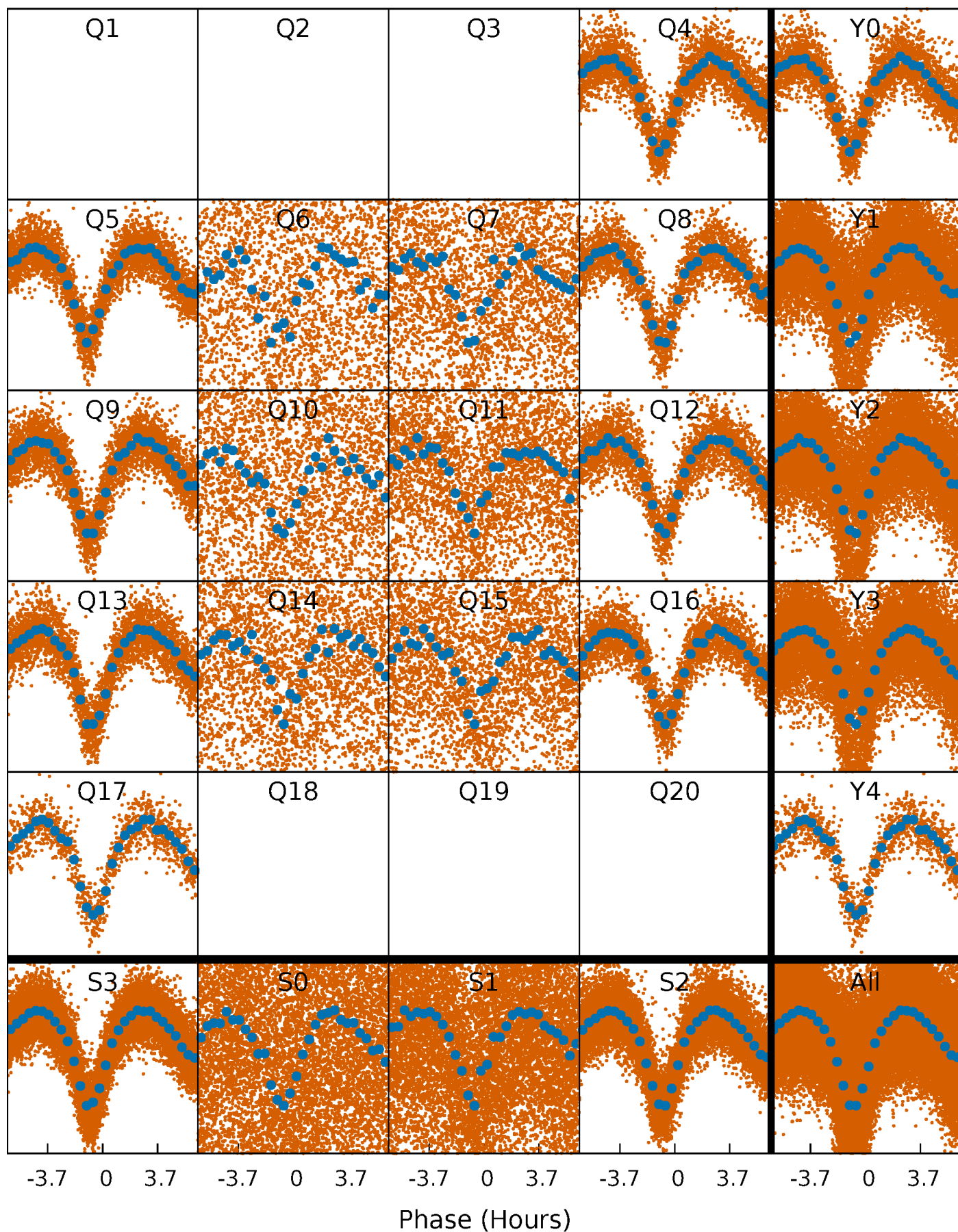


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

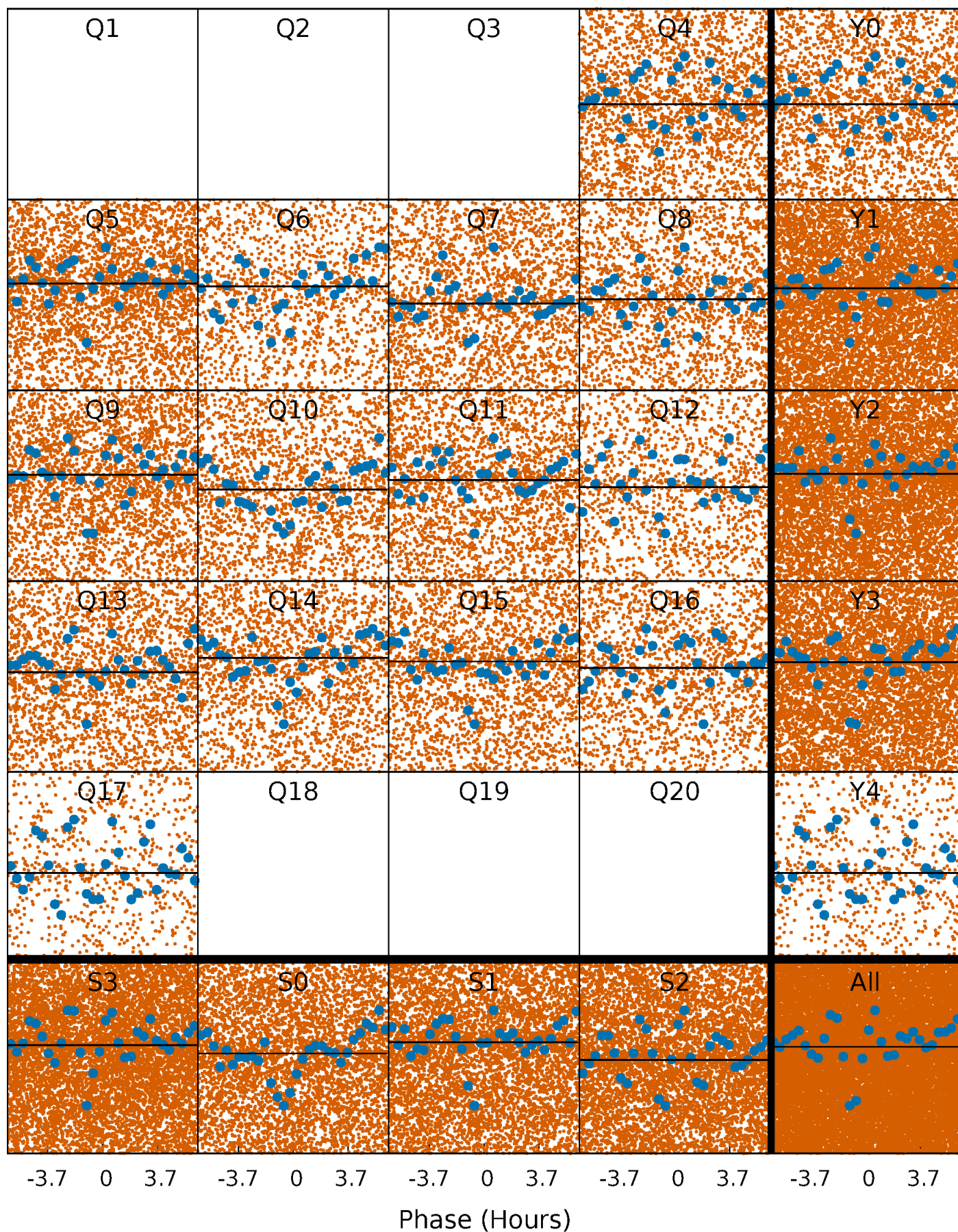
TCE 009644683-01 P= 0.585932 Days  $T_0=131.752530$  (BKJD)





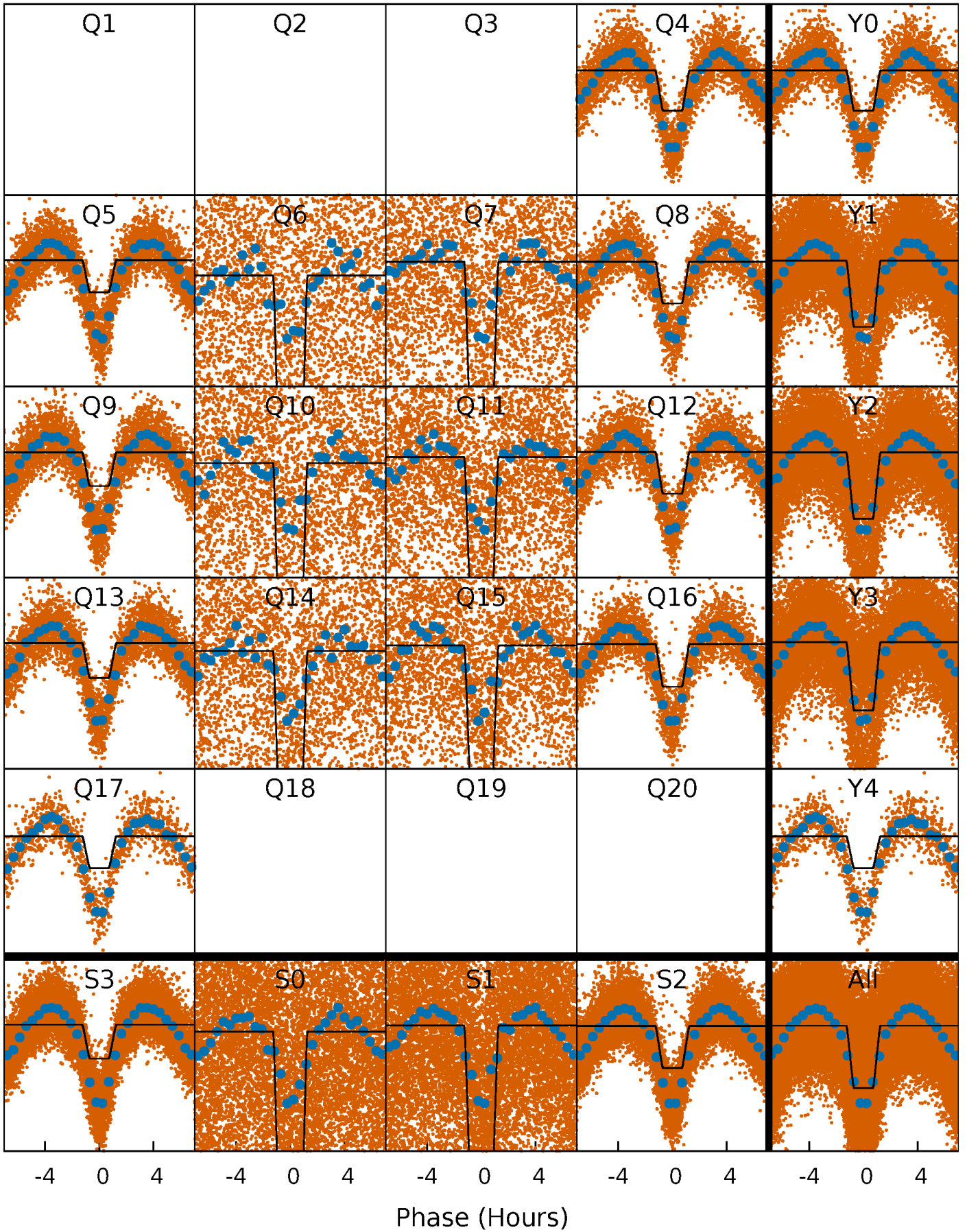
# DV Quarter-Phased Transit Curves

TCE 009644683-01 P= 0.585932 Days  $T_0=131.752530$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

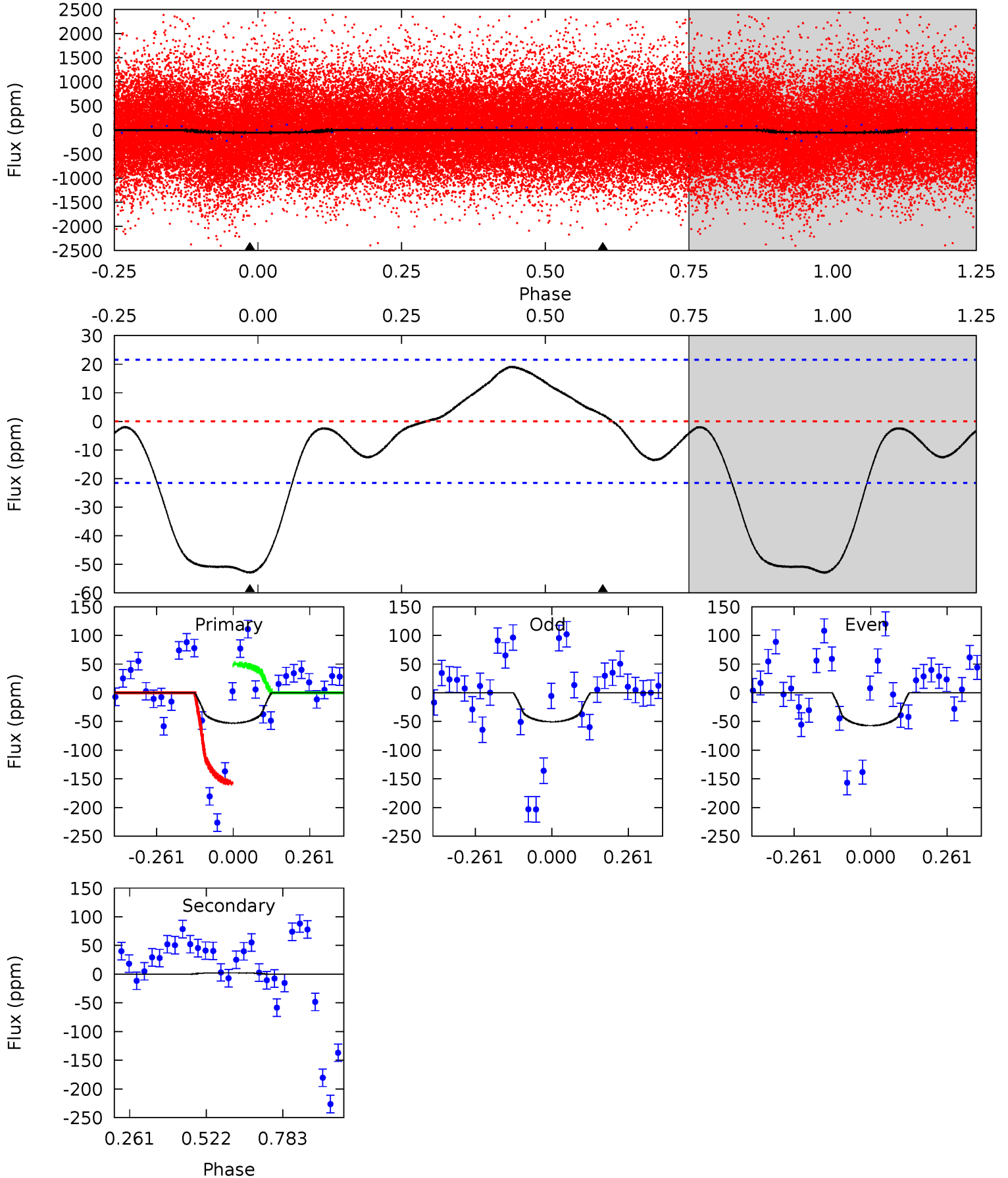
TCE 009644683-01 P= 0.585942 Days  $T_0=131.704181$  (BKJD)



# DV Model-Shift Uniqueness Test

009644683-01, P = 0.585932 Days, E = 131.752530 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.7	-0.46	0	0	4.36	1.12	0.47	10.7	10.7	-0.46	-0.46	0.68	0.73	0.27	10.6

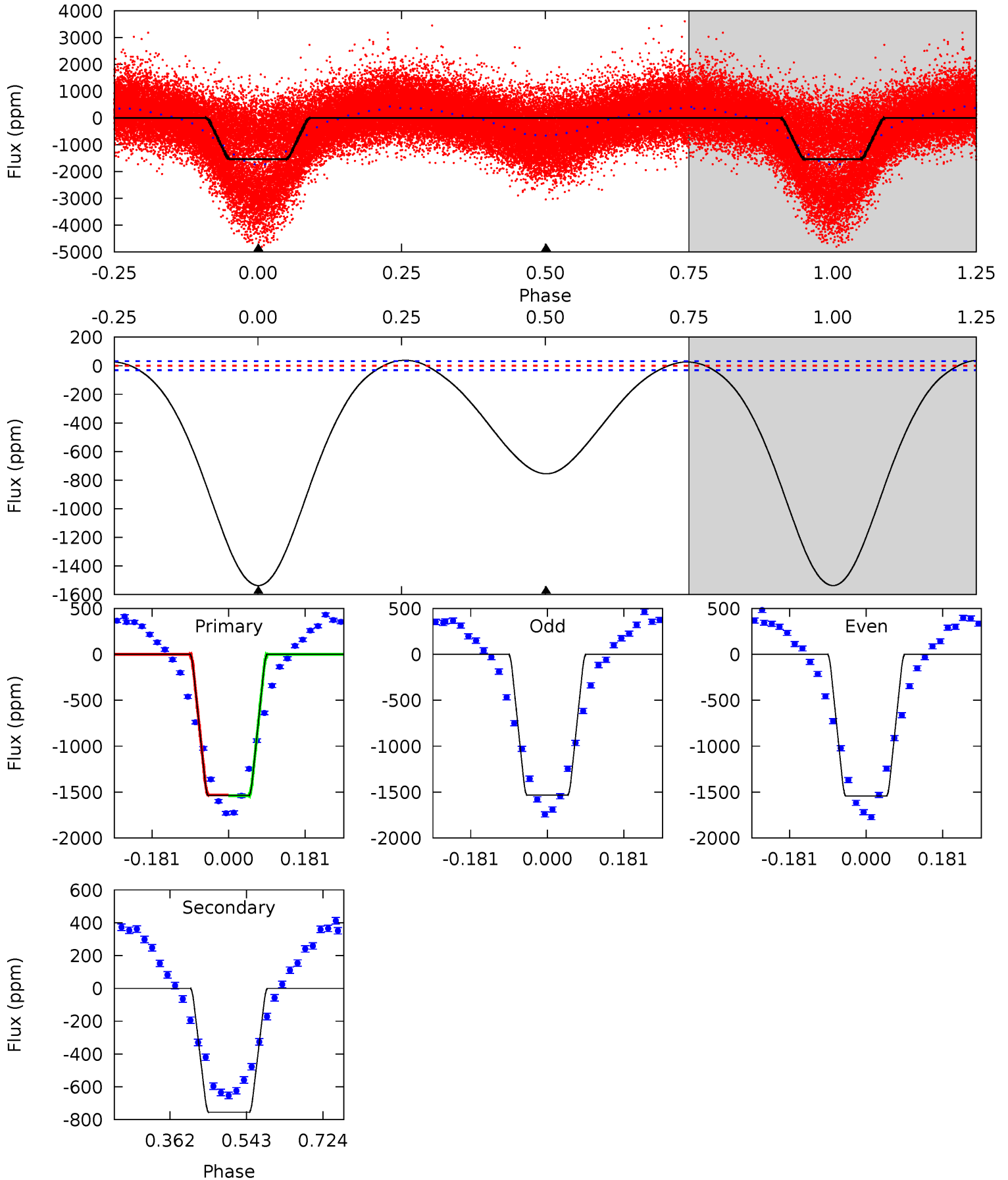




# Alt Model-Shift Uniqueness Test

009644683-01, P = 0.585942 Days, E = 131.704181 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
214.4	105.4	0	0	4.44	1.34	5.39	214.4	214.4	105.4	105.4	0.73	0.85	0.02	0.52





### Stellar Parameters For KIC 009644683

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5459^{+191}_{-191}$	$4.583^{+0.032}_{-0.128}$	$-0.120^{+0.300}_{-0.300}$	$0.797^{+0.163}_{-0.070}$	$0.893^{+0.082}_{-0.101}$	$2.489^{+0.430}_{-0.944}$
	+3%/-3%	+1%/-3%	+250%/-250%	+20%/-9%	+9%/-11%	+17%/-38%
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 009644683-01 / KOI 7214.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$2 \pm 5$	$8.90^{+9.71}_{-6.47}$	$2387^{+1062}_{-472}$	$-2751^{+313}_{-722}$	$-0.002^{+0.008}_{-0.043}$
Alt.	$-755 \pm 7$	$10.22^{+11.10}_{-6.94}$	$2395^{+1068}_{-476}$	$2954^{+1834}_{-5771}$	$1.007^{+10.248}_{-0.875}$

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

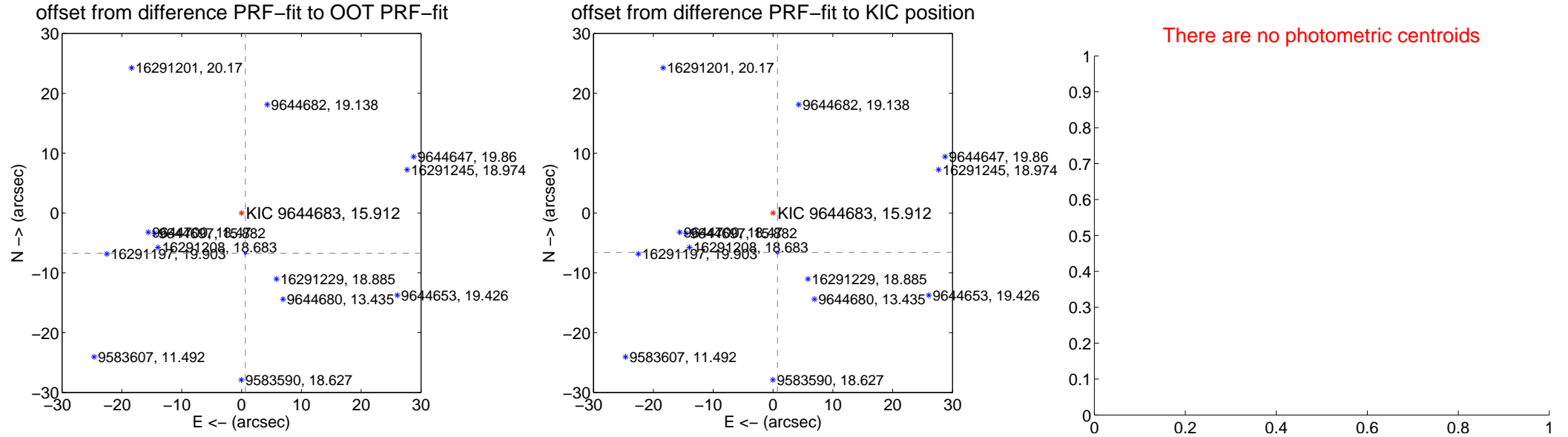
## DV Centroid Data

Supplemental centroid analysis for 009644683-01. Kepler magnitude: 15.91. Transit SNR 0.00

There are 3 quarters with good PRF difference image offsets

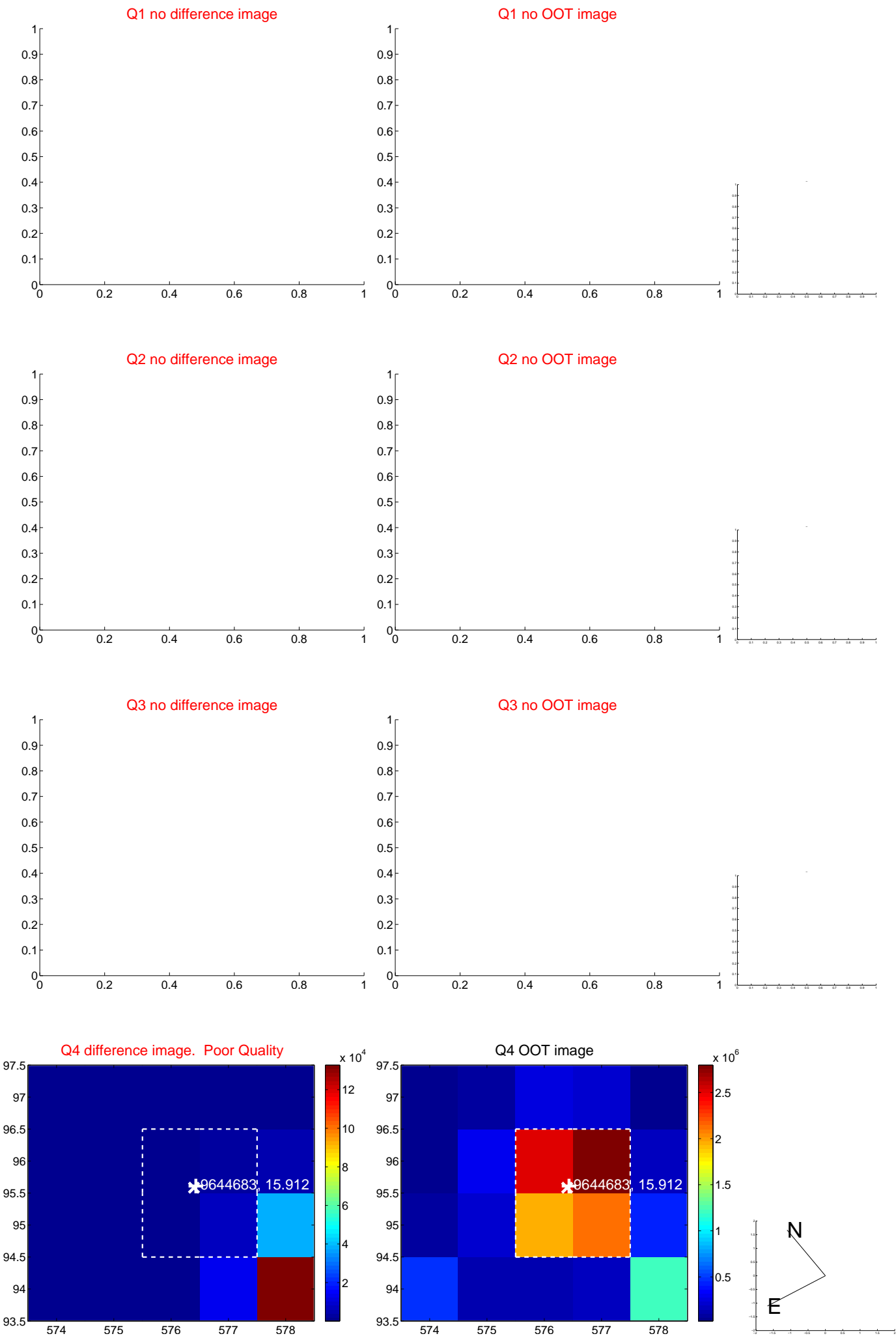
The direct PRF centroid is offset from the target star catalog position by about 0.18 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	6.751 $\pm$ 0.069	98.33	-0.636 $\pm$ 0.068	-6.721 $\pm$ 0.068
PRF-fit source offset from KIC position	6.641 $\pm$ 0.078	84.85	-0.747 $\pm$ 0.068	-6.599 $\pm$ 0.078
photometric centroid source offset	—	—	—	—

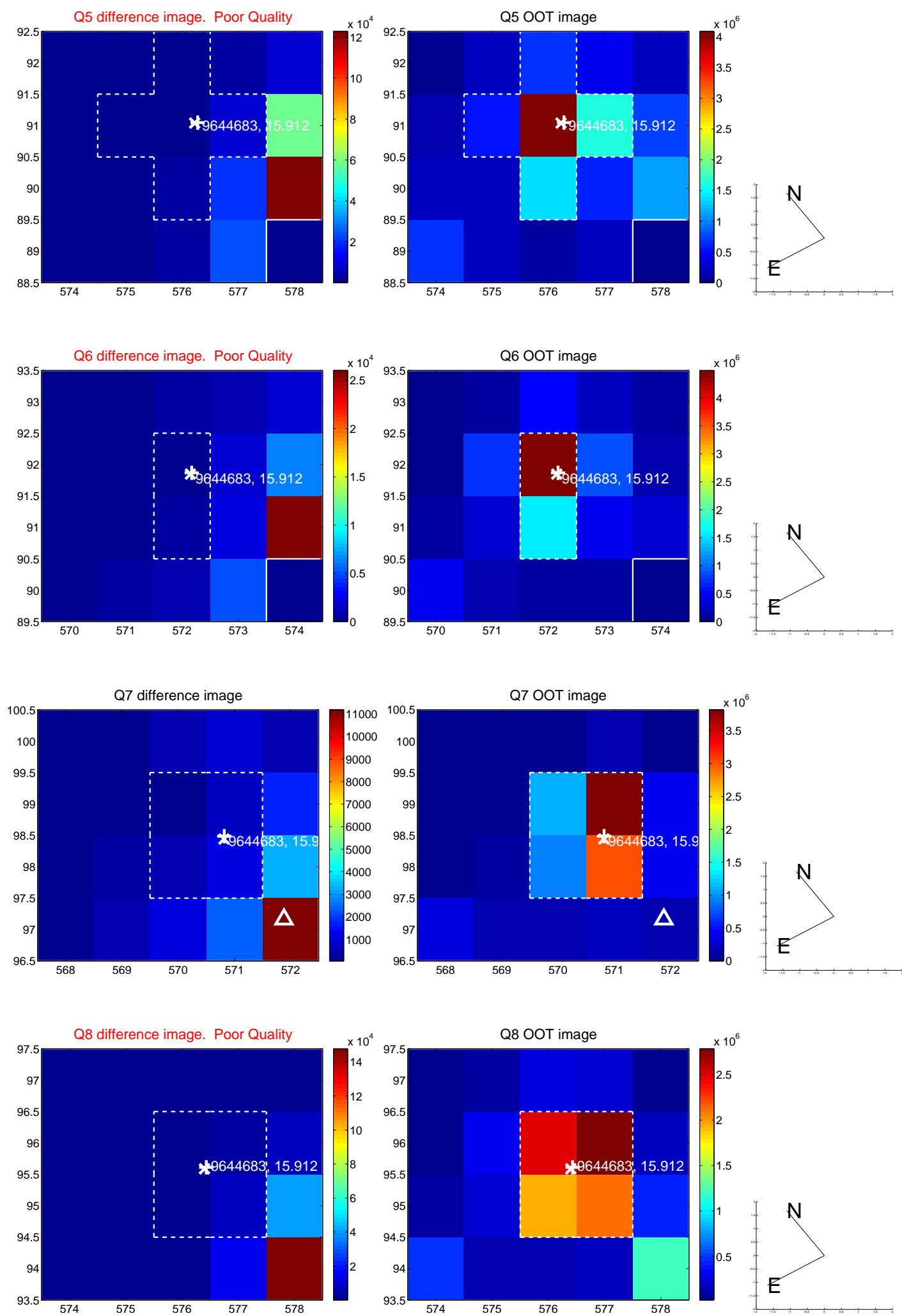


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . 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 ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.

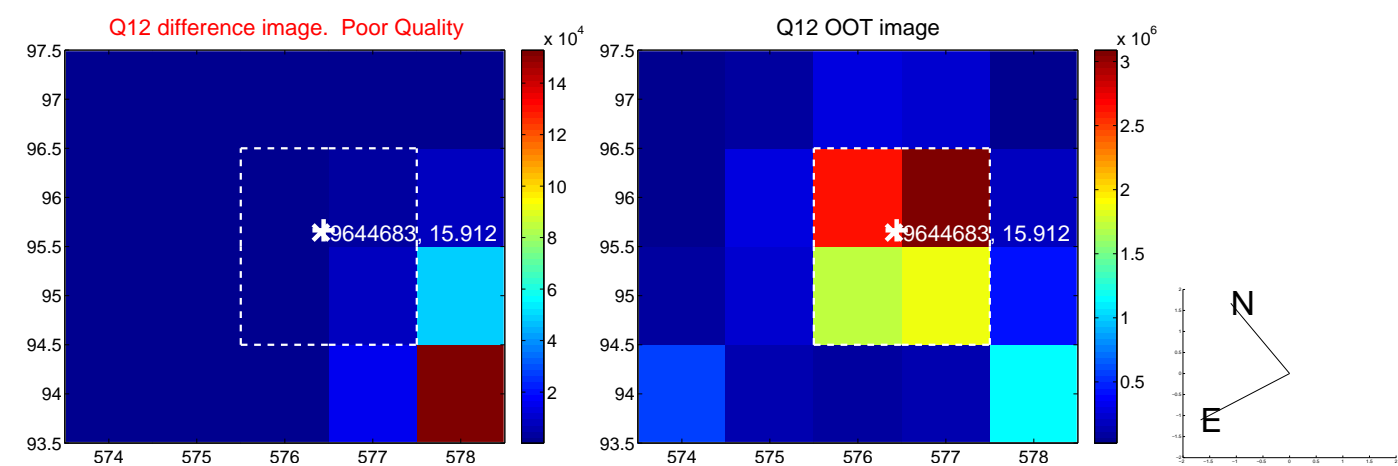
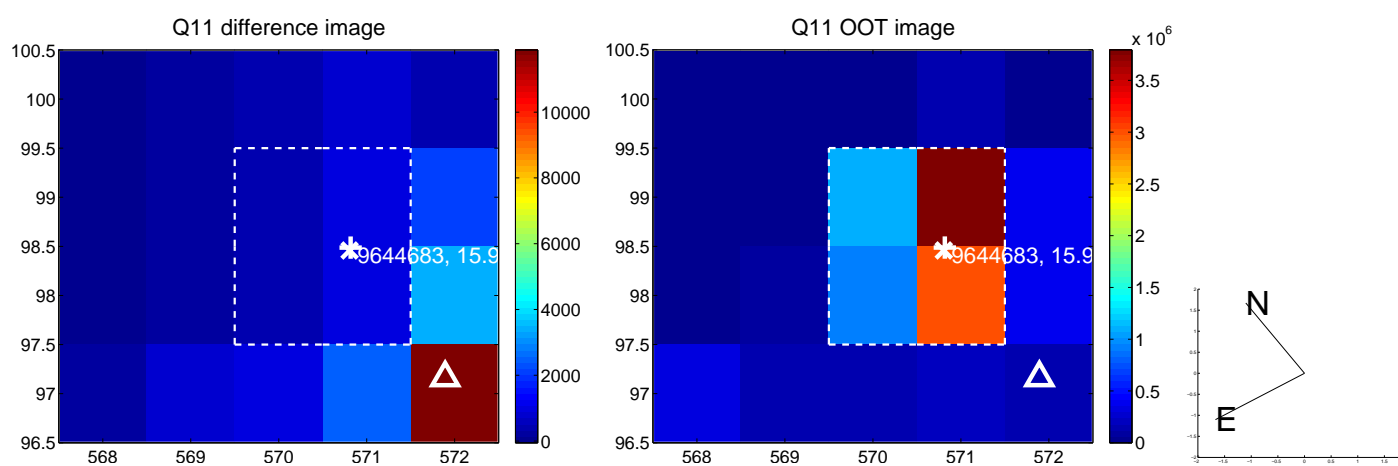
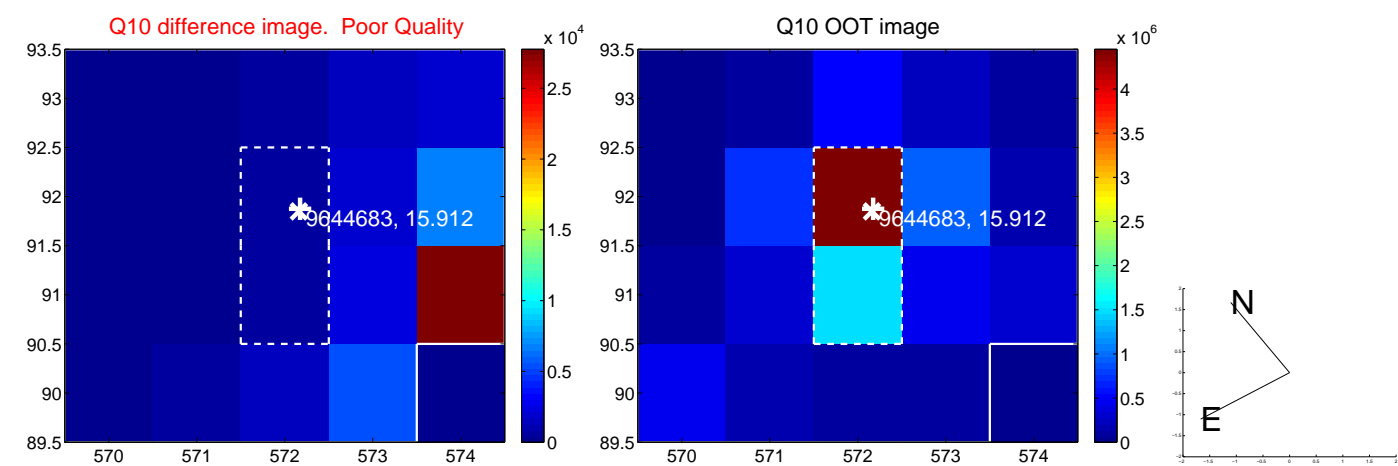
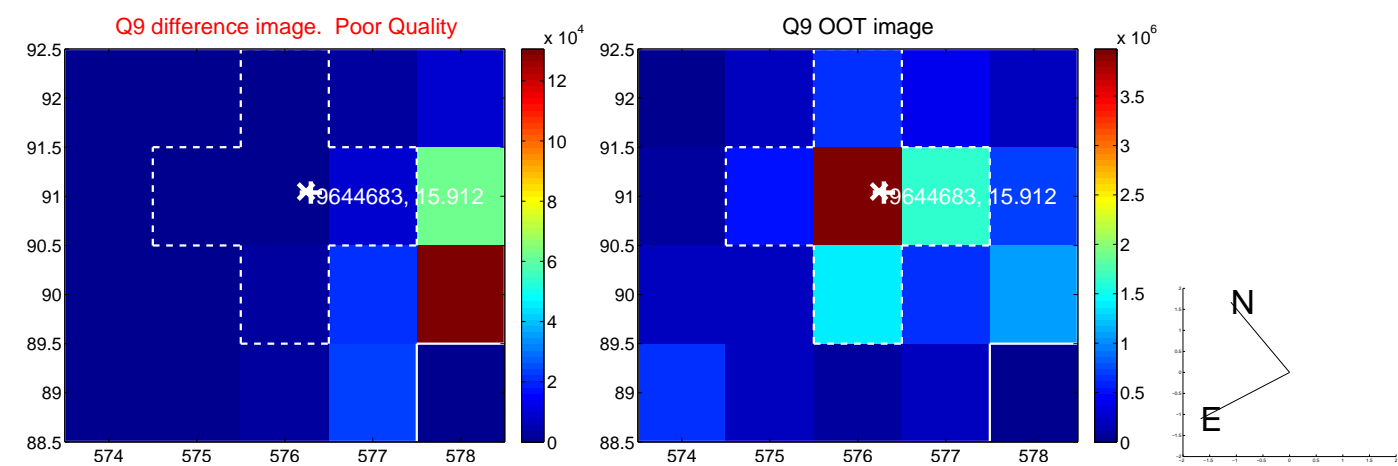


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

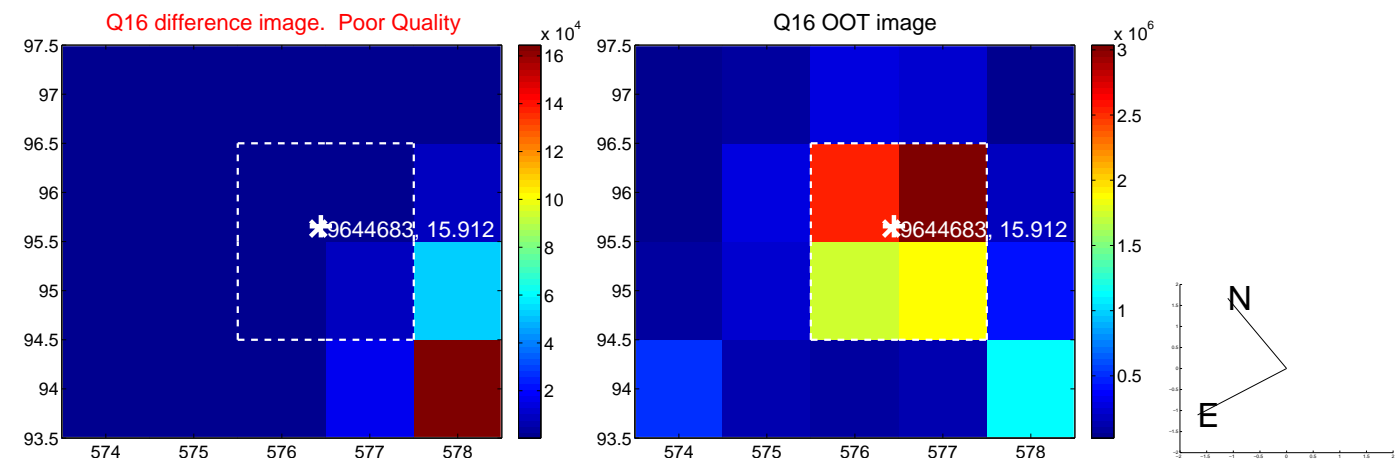
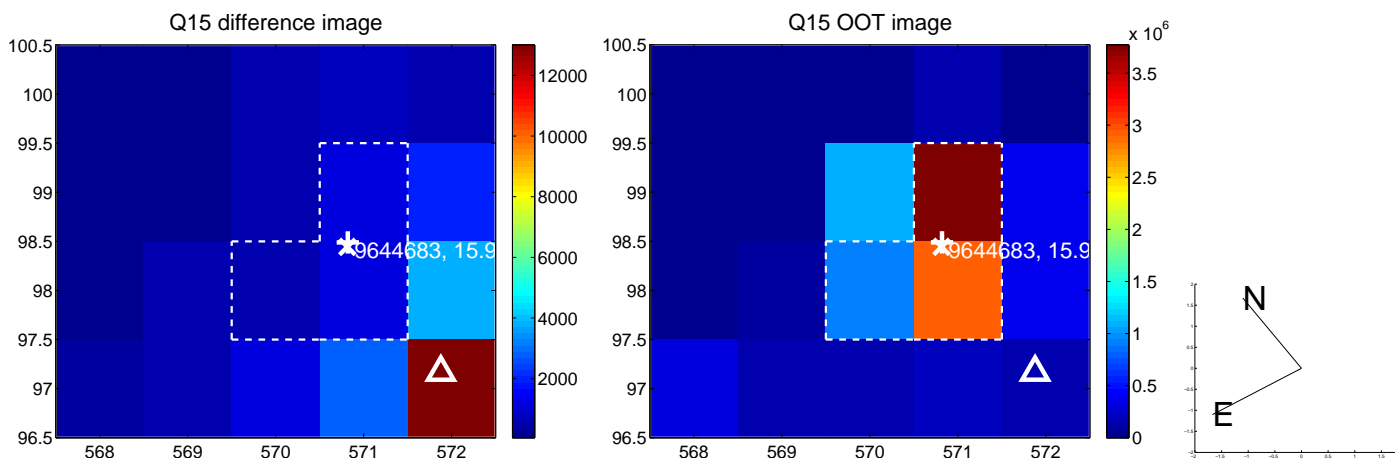
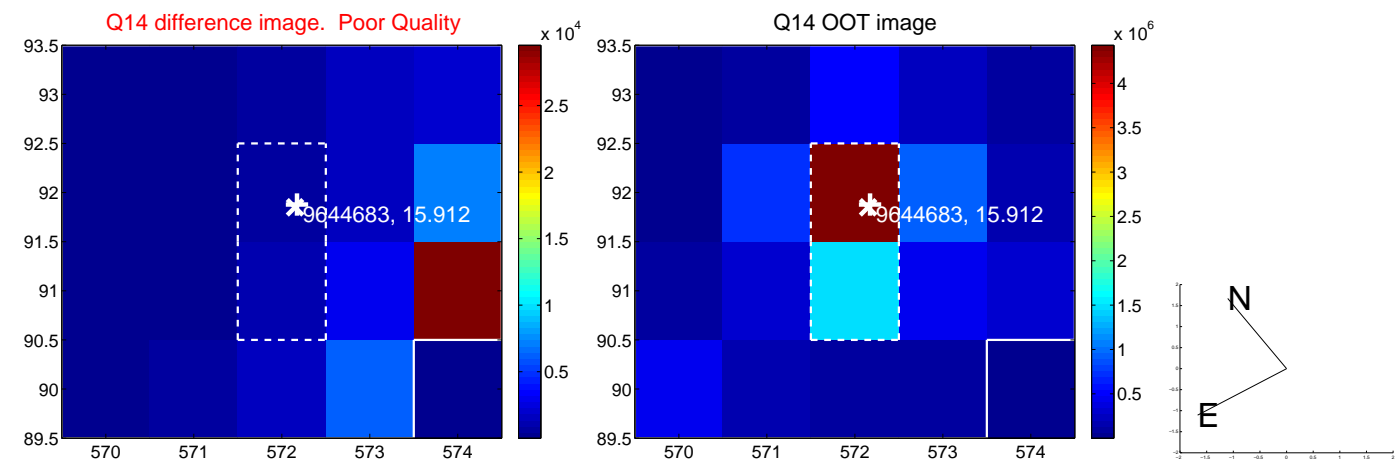
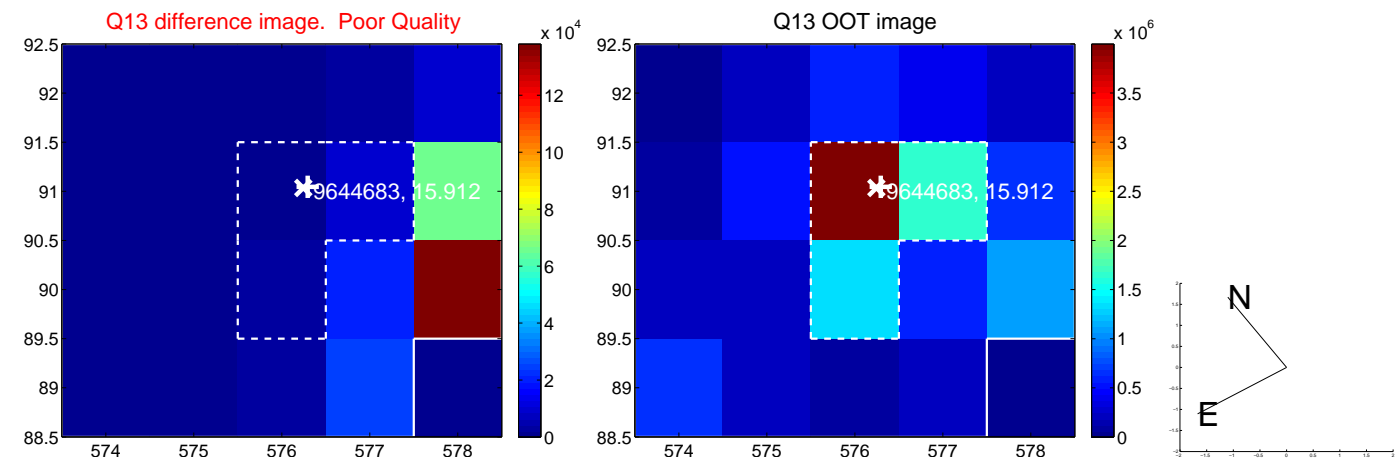




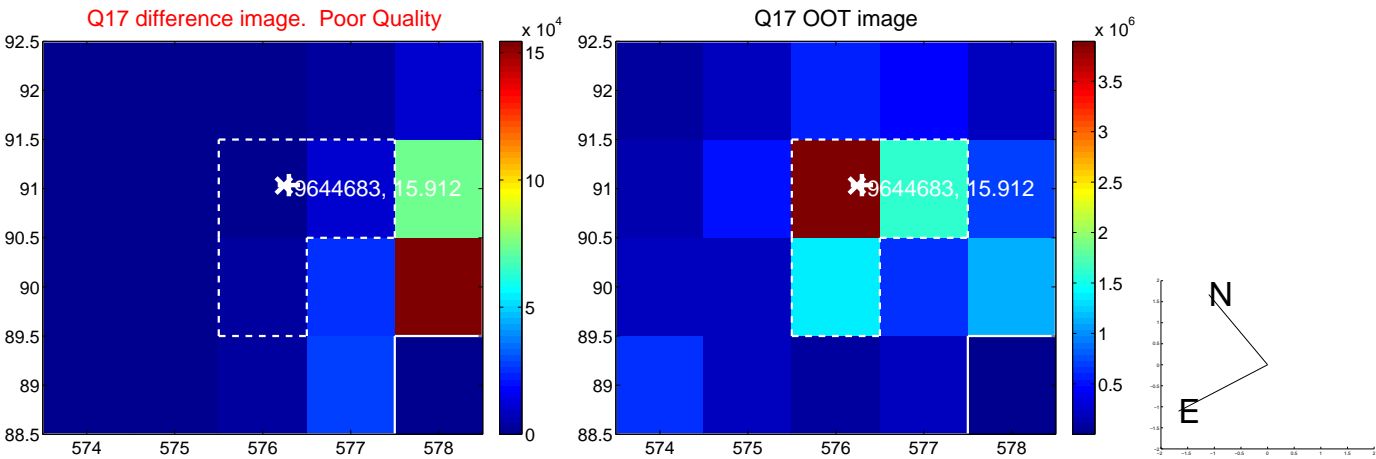
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



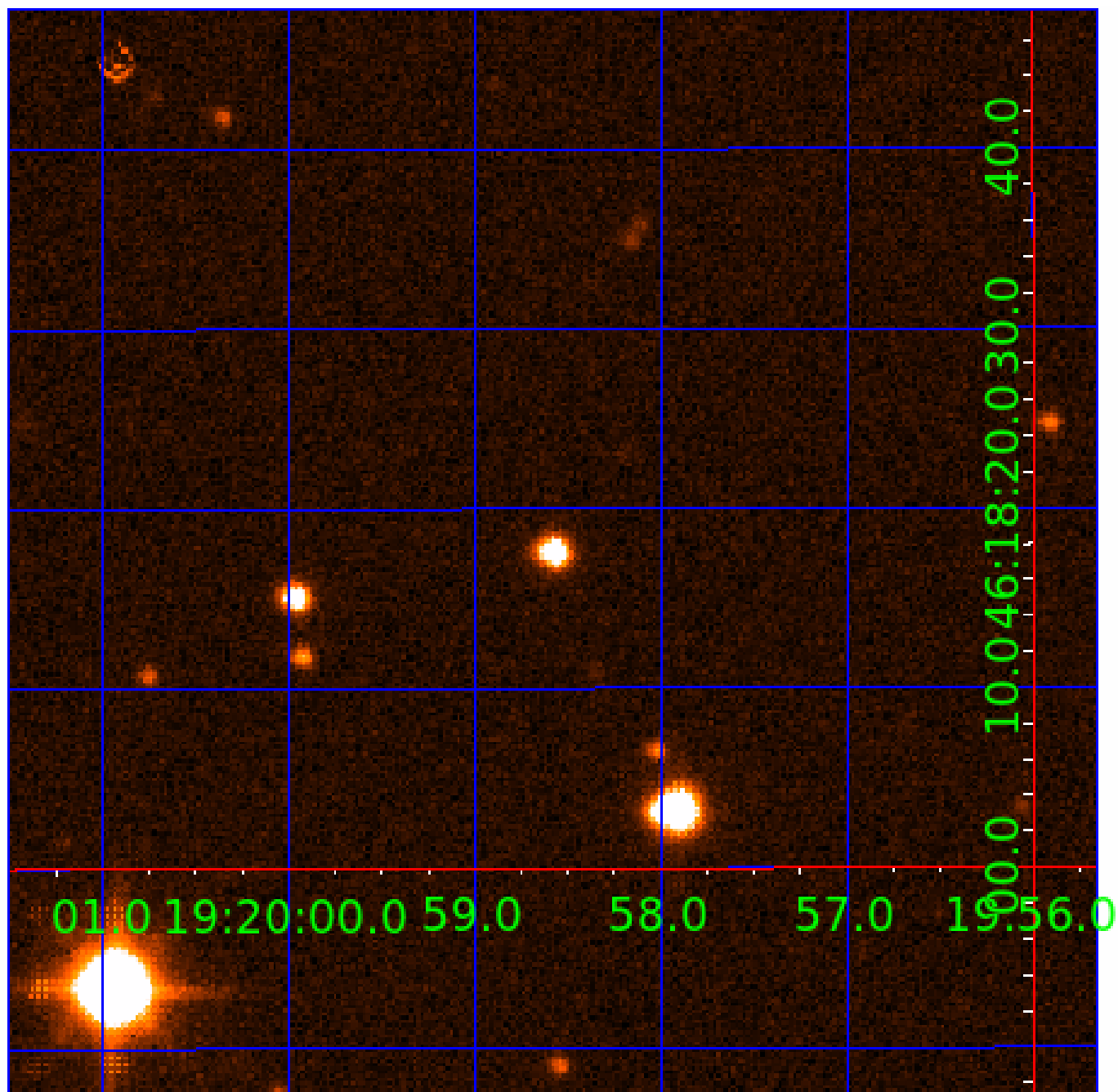
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



folded centroid time series figure for this object.

UKIRT Image

Declination





# KIC 009644683

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009644683-01	OBS	7214.01	0.585932	131.752530	0.0	3.215	16.1	0.0	0.80	5459	0.00	2914.22
009644683-02	OBS	No	55.556495	141.907607	391.3	7.232	7.4	6.6	0.80	5459	1.66	6.74

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009644683-01	OBS	FP	0.00	1	0	1	1	LPP_DV—CENT_RESOLVED_OFFSET—EPHEM_MATCH
009644683-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—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.

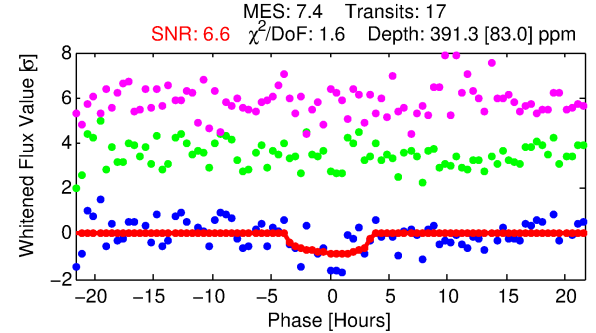
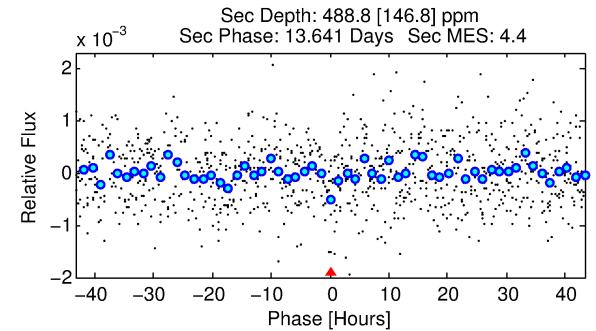
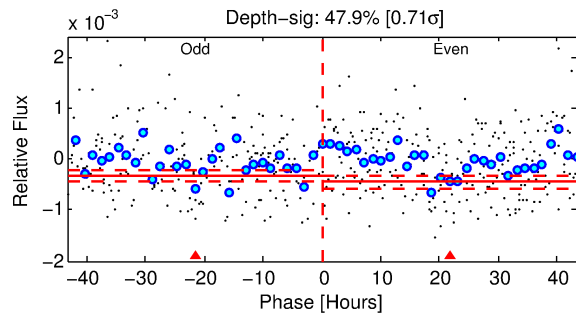
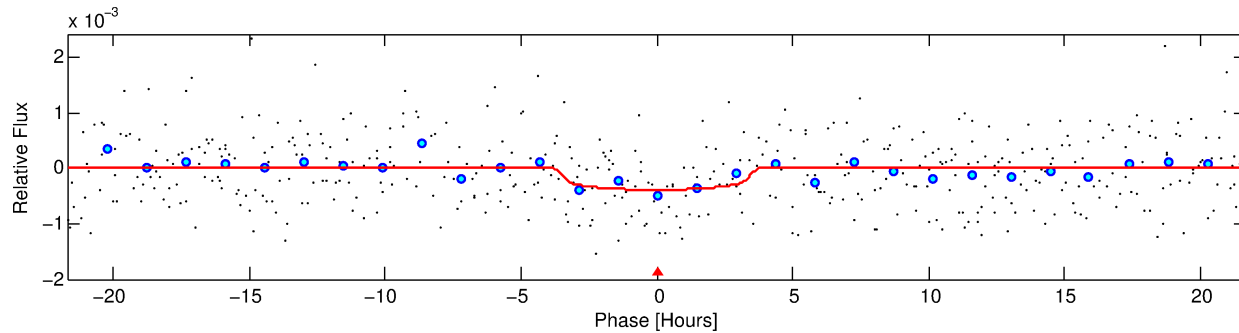
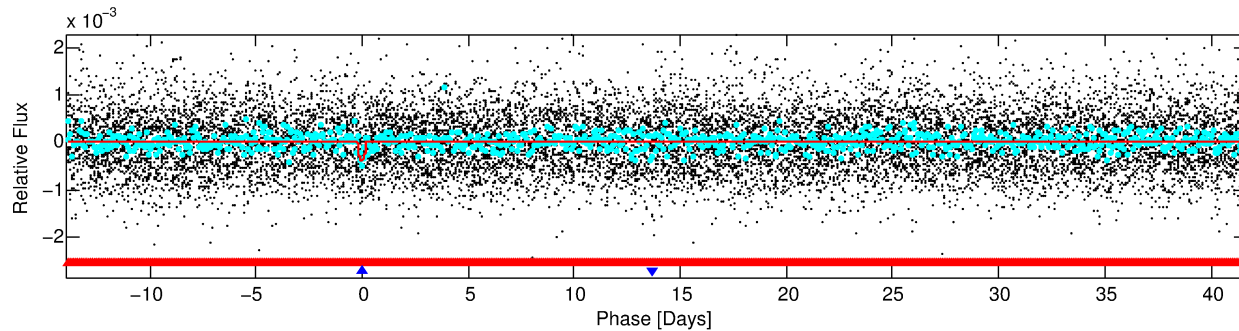
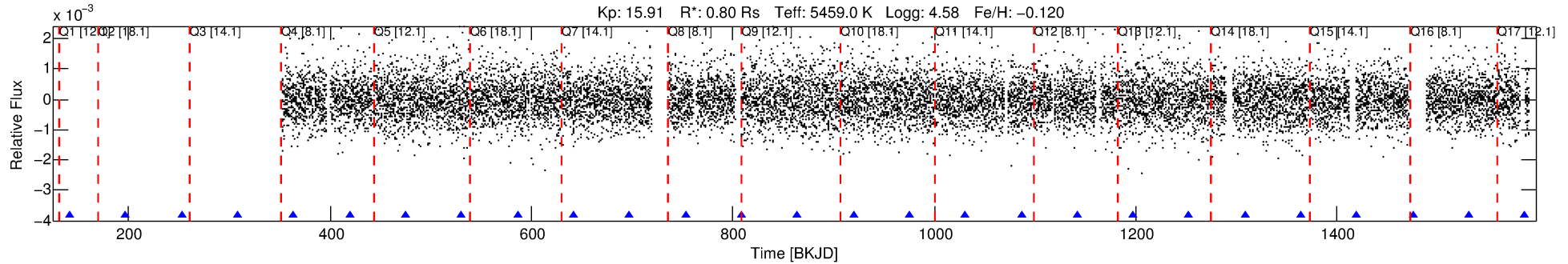
## Ephemeris Match Information For 009644683-02

No Significant Match Found

# DV One-Page Summary

KIC: 9644683 Candidate: 2 of 2 Period: 55.556 d  
KOI: K07214 Corr: No Ephemeris Match

Kp: 15.91 R\*: 0.80 Rs Teff: 5459.0 K Logg: 4.58 Fe/H: -0.120



## DV Fit Results:

Period = 55.55649 [0.00230] d  
Epoch = 141.9076 [0.0418] BKJD  
Rp/R\* = 0.0191 [0.0345]  
a/R\* = 45.29 [331.05]  
b = 0.67 [6.20]  
Seff = 6.74 [1.87]  
Teq = 411 [28] K  
Rp = 1.66 [3.02] Re  
a = 0.2738 [0.0460] AU  
Ag = 7285.27 [26419.06] [0.28σ]  
Teffp = 5869 [5313] K [1.03σ]

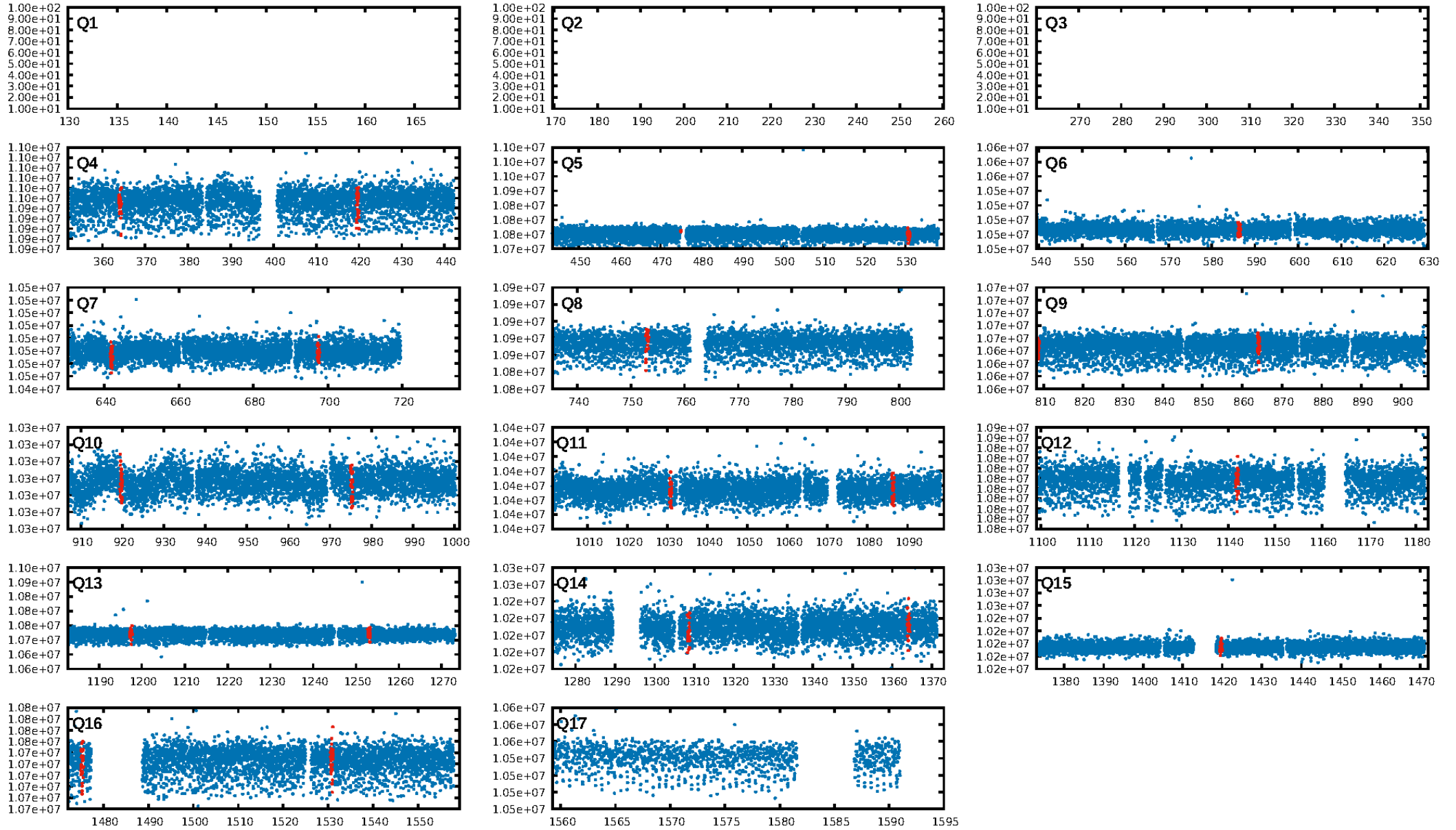
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [166.69σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 15.1%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 4.81e-10**  
RollingBand-fgt: 1.00 [17/17]  
**GhostDiagnostic-chr: 0.5089**  
Centroid-sig: 40.9%  
Centroid-so: 2.147 arcsec [1.10σ]  
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  
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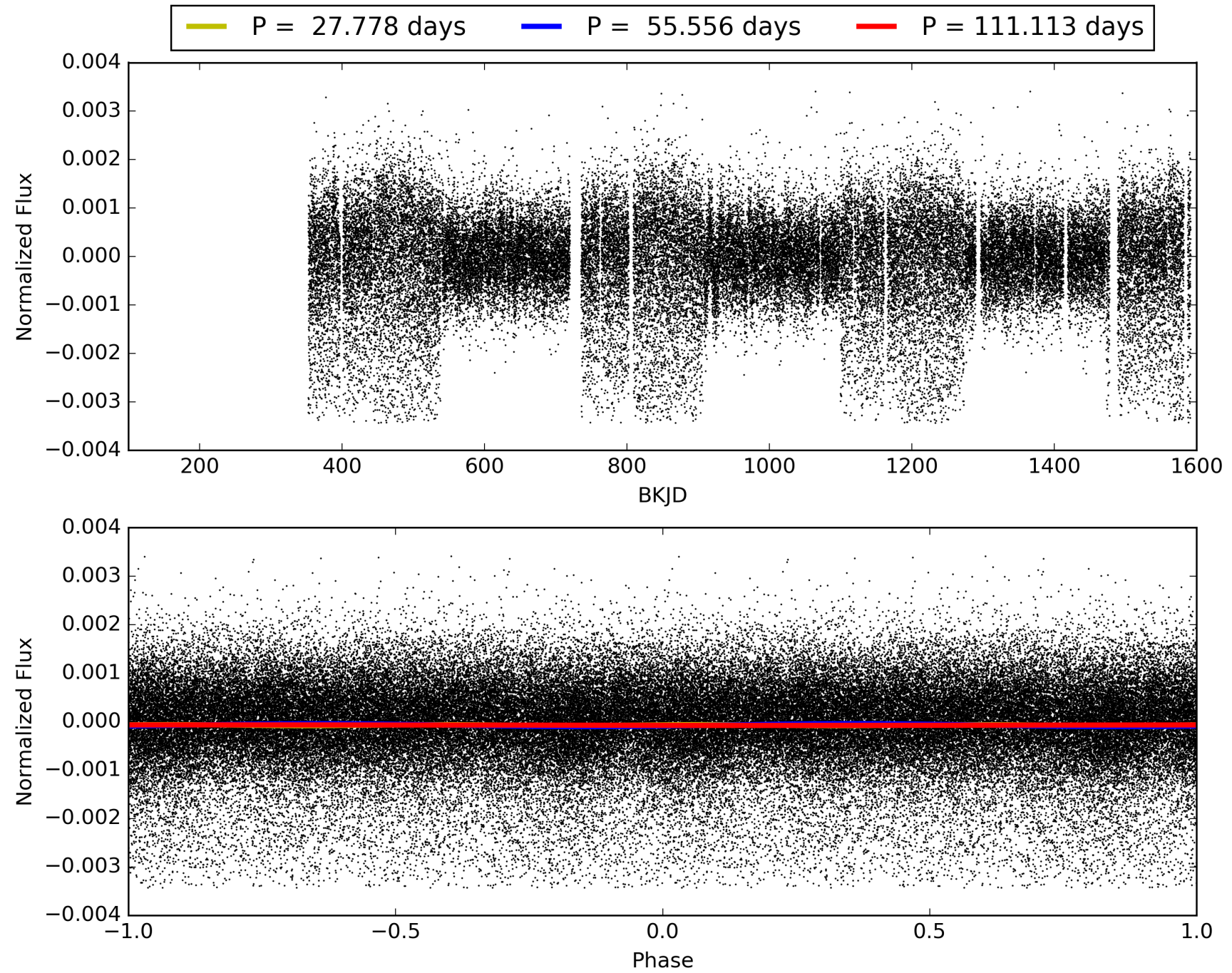
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 04:03:35 Z

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

# TCE 009644683-02, PDC Light Curves



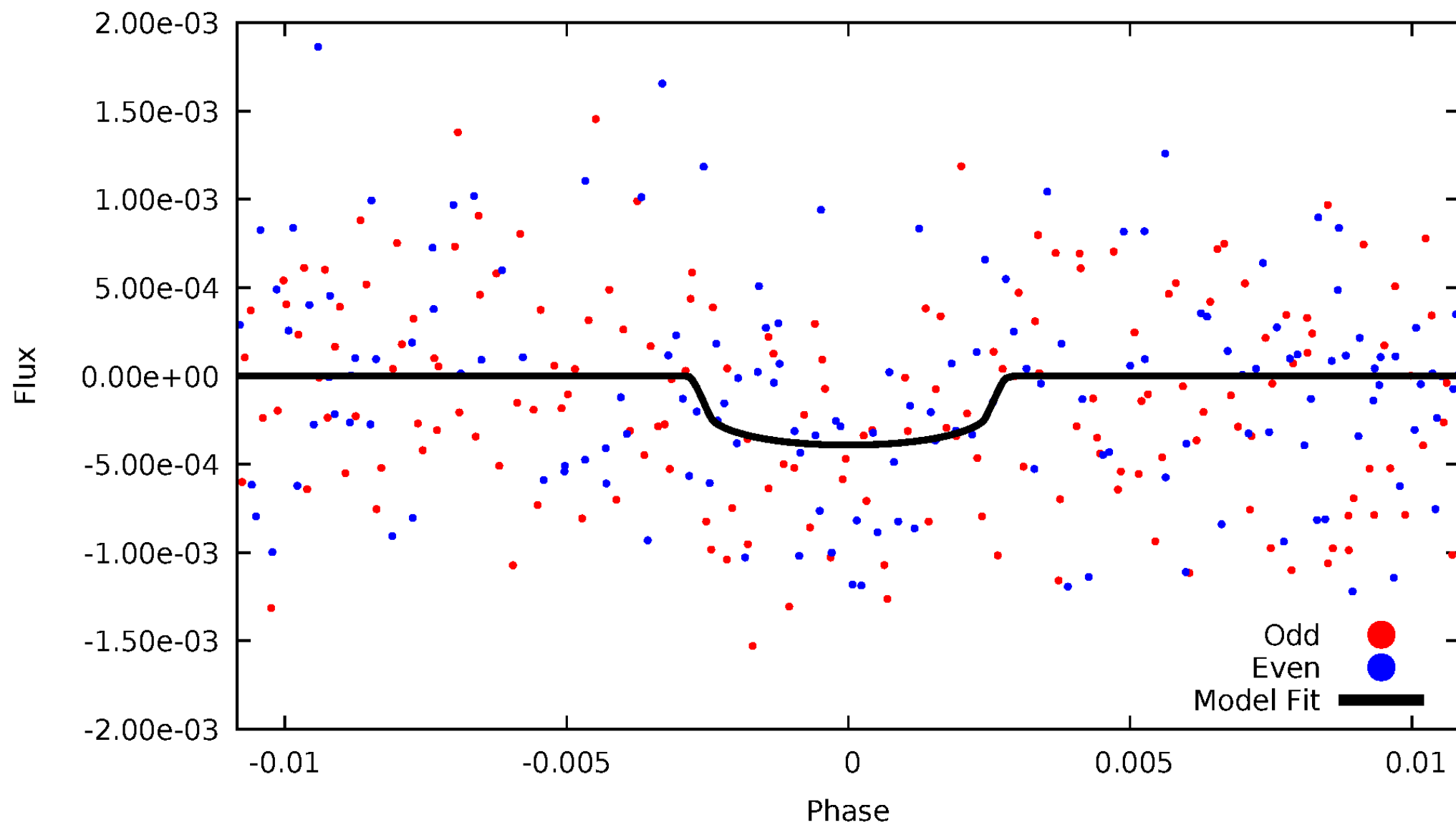
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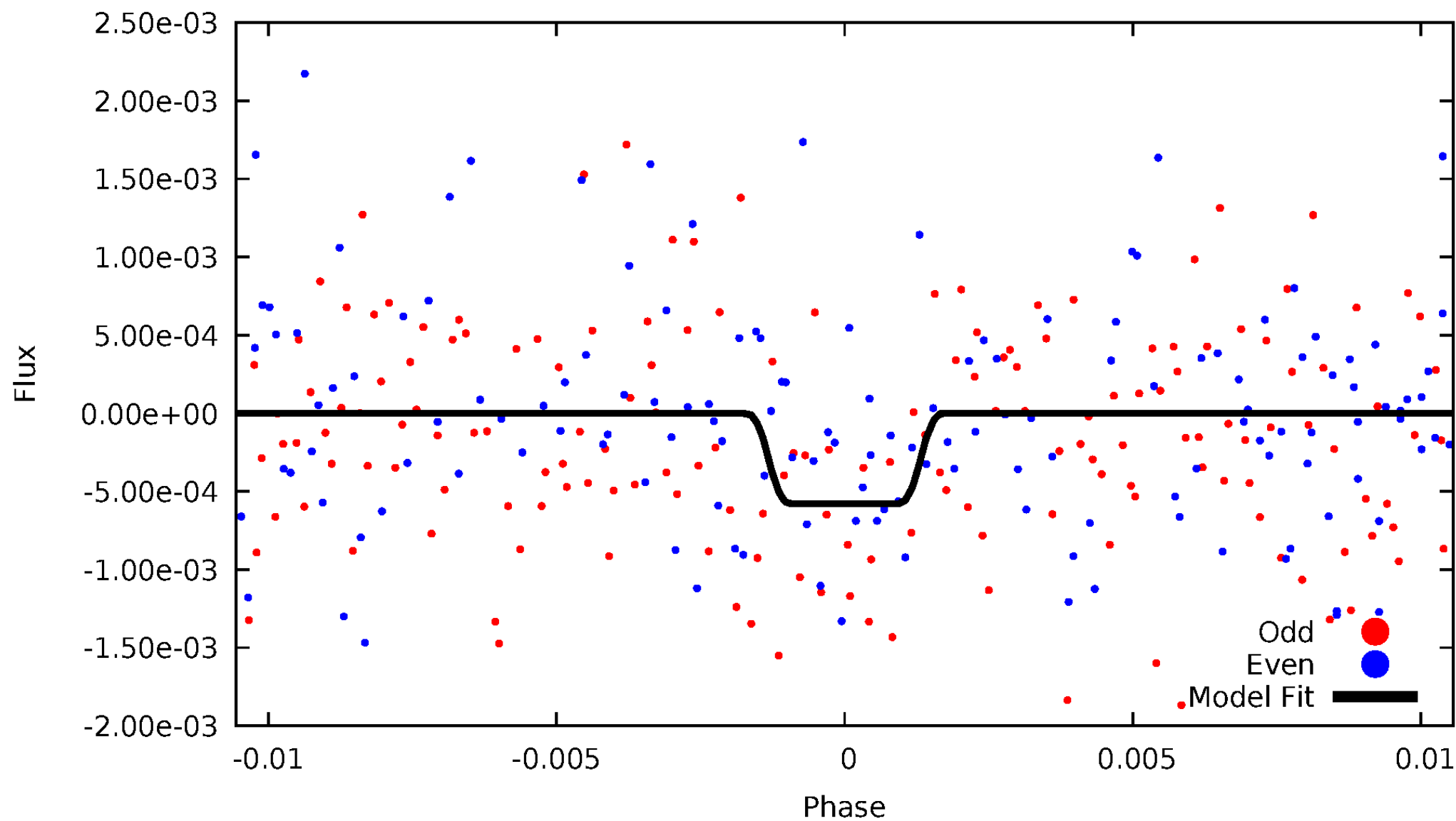
# DV Odd/Even

TCE 009644683-02



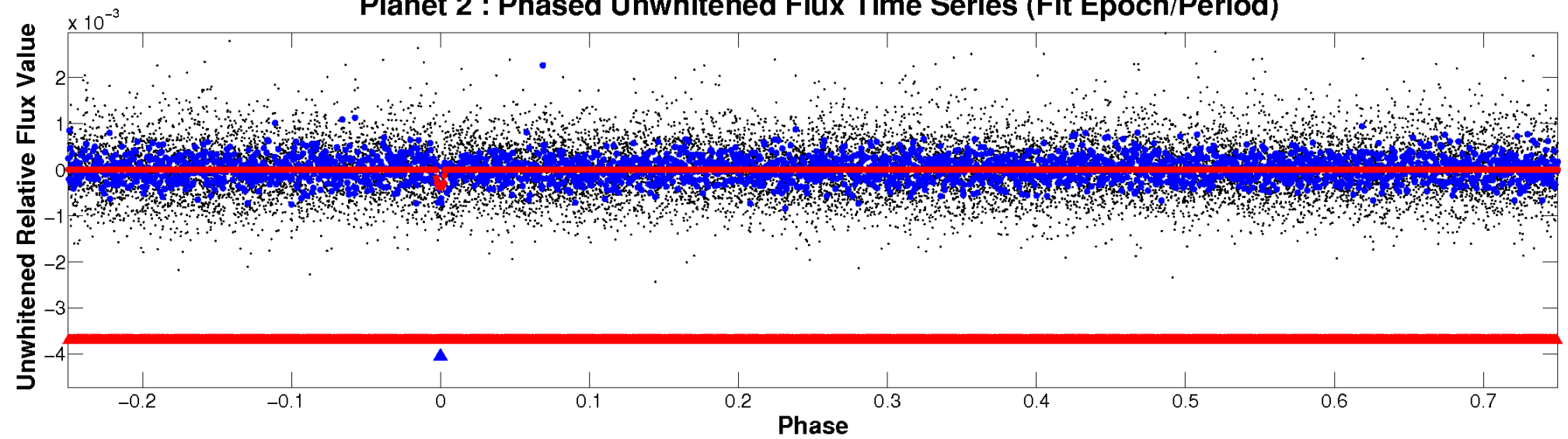
# ALT Odd/Even

TCE 009644683-02

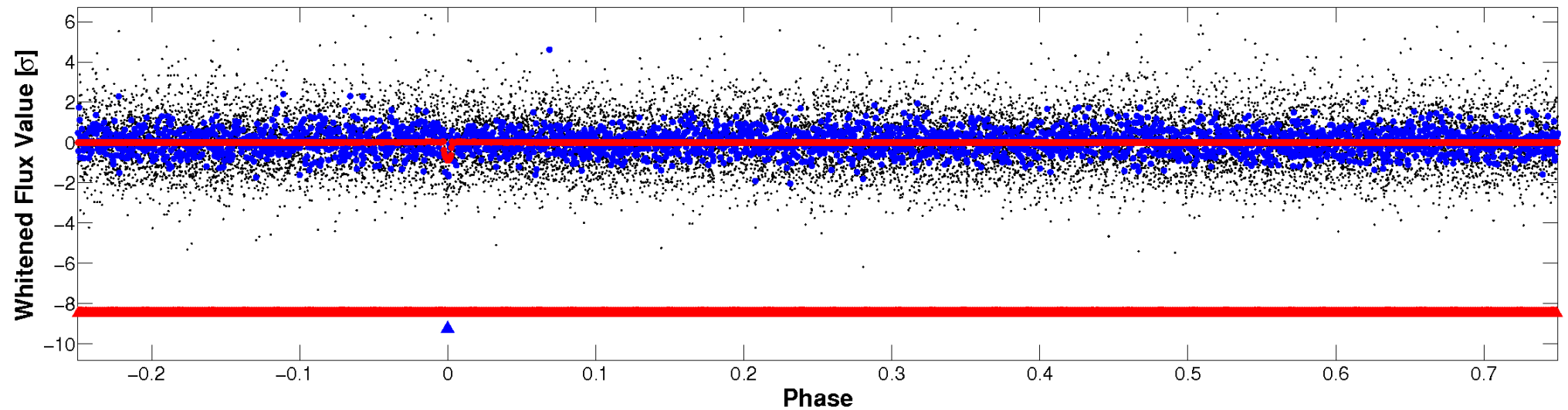


# Non-Whitened Vs. Whitened Light Curve

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

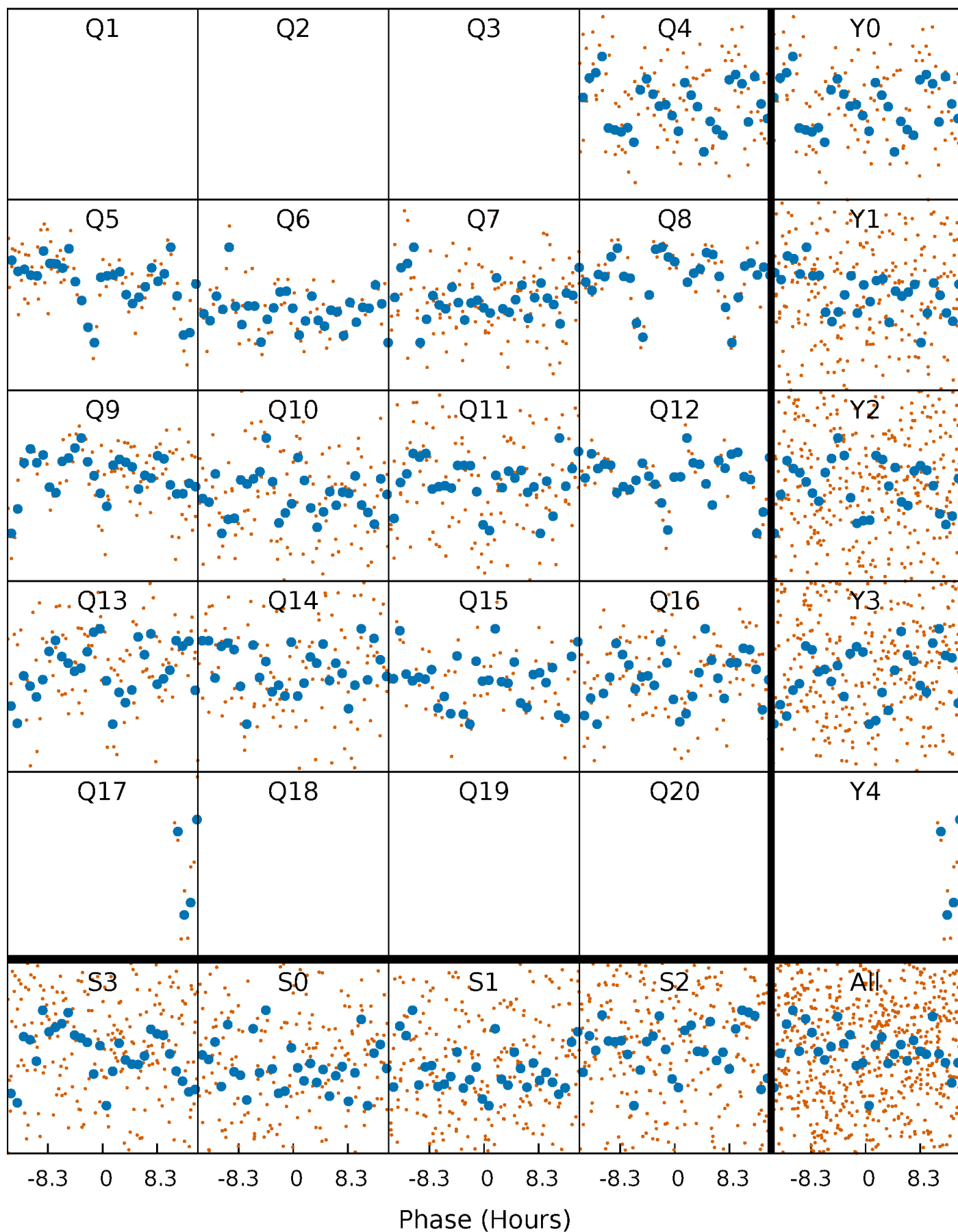


**Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



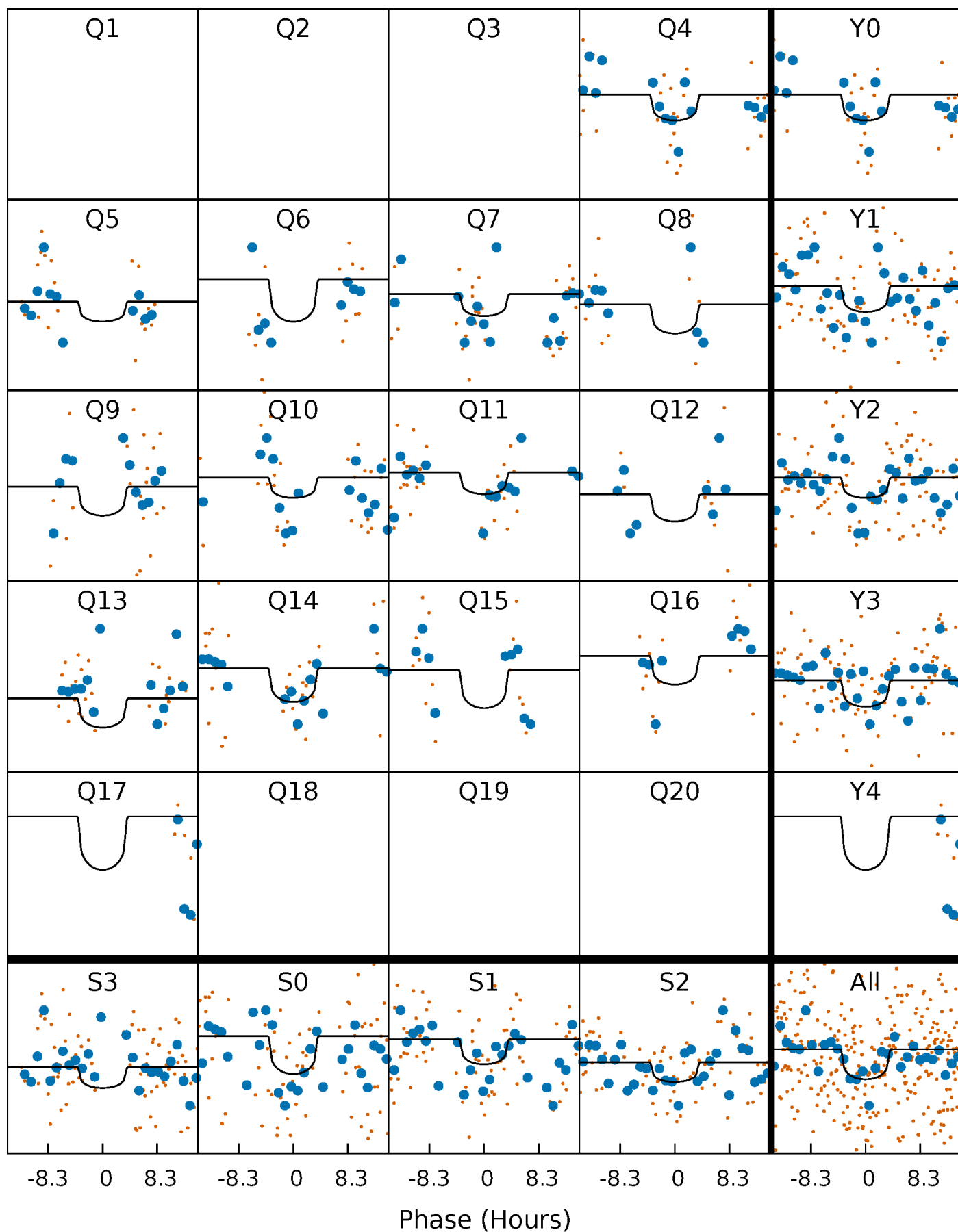
# PDC Quarter-Phased Transit Curves

TCE 009644683-02 P= 55.556495 Days  $T_0=141.907607$  (BKJD)



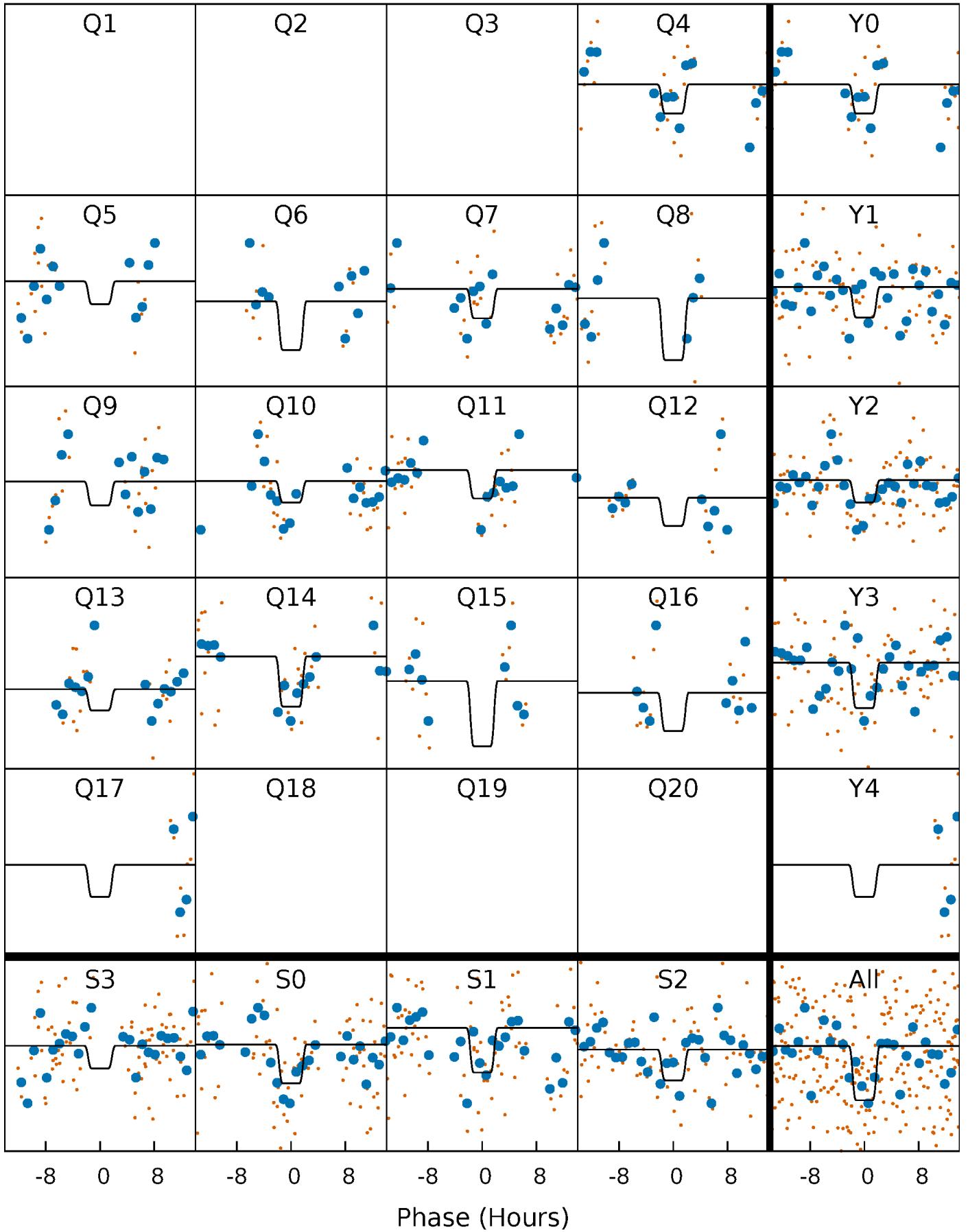
# DV Quarter-Phased Transit Curves

TCE 009644683-02 P= 55.556495 Days  $T_0=141.907607$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

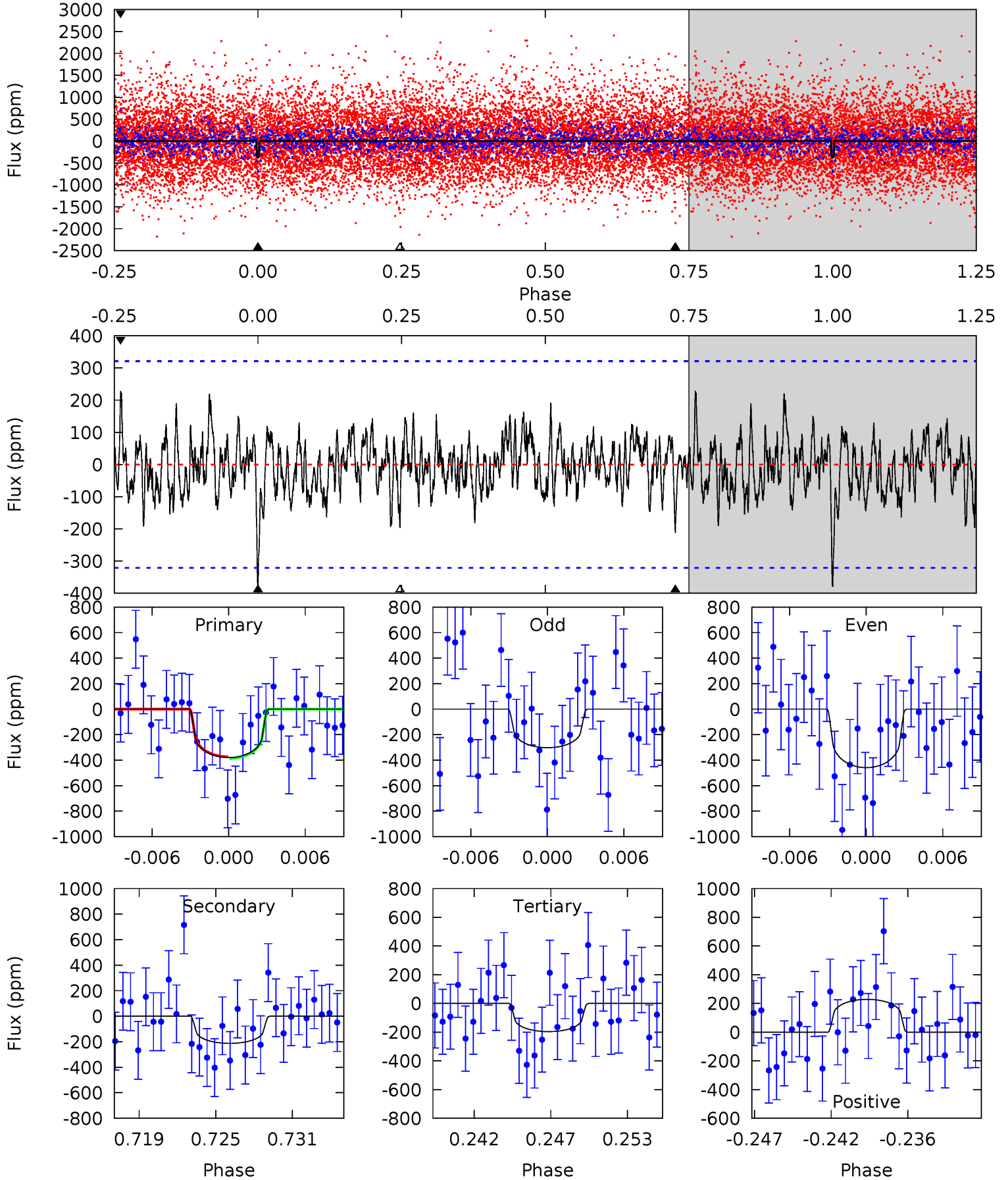
TCE 009644683-02   P= 55.558084 Days    $T_0=141.889079$  (BKJD)



# DV Model-Shift Uniqueness Test

009644683-02, P = 55.556495 Days, E = 141.907607 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
6.07	3.40	3.14	3.65	5.14	2.77	1.12	2.93	2.41	0.27	-0.25	1.25	0.57	0.38	0.10

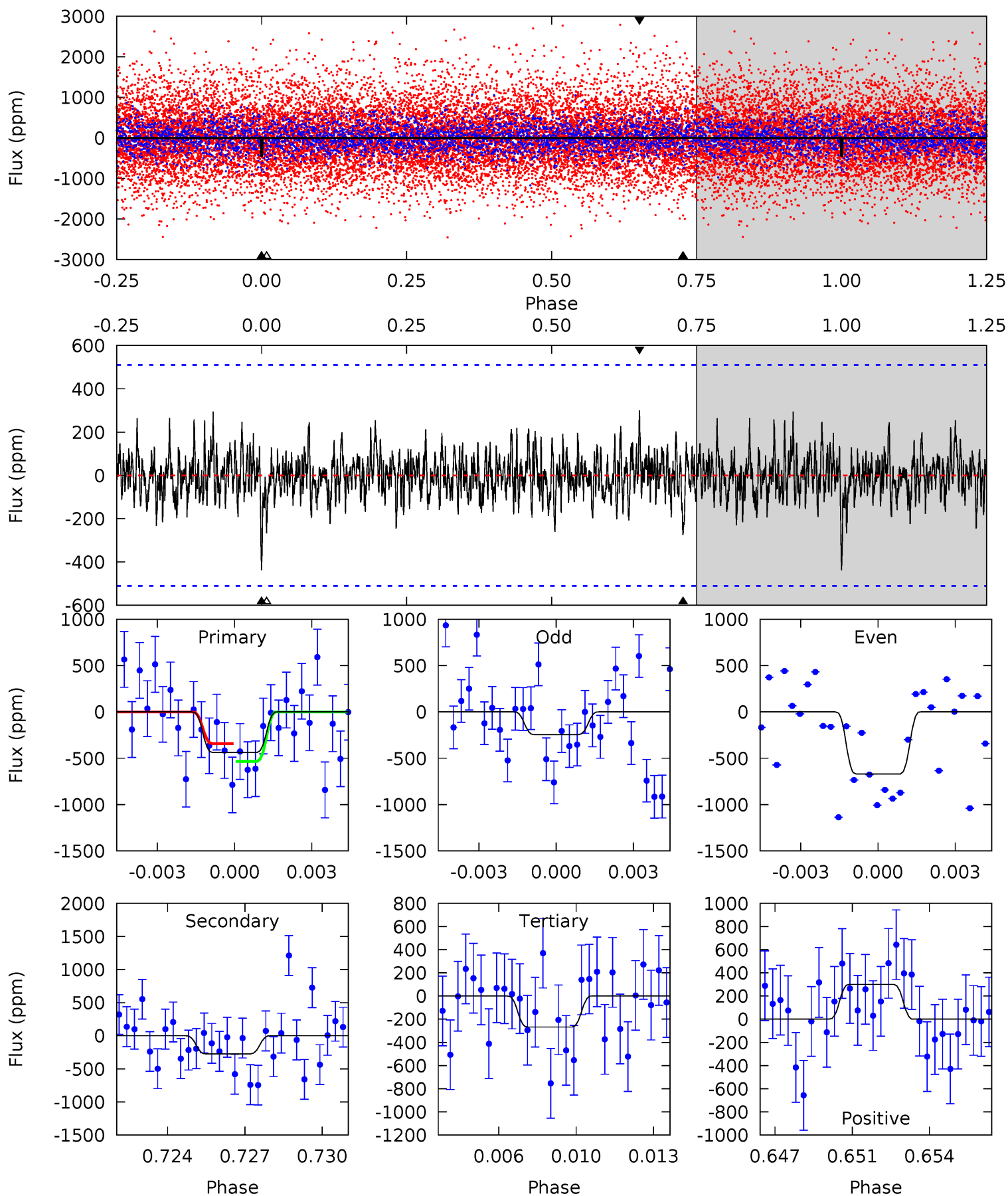




# Alt Model-Shift Uniqueness Test

009644683-02, P = 55.558084 Days, E = 141.889079 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
4.49	2.81	2.75	3.08	5.24	2.95	0.86	1.75	1.41	0.07	-0.27	2.18	0.95	0.41	0.99



### Stellar Parameters For KIC 009644683

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5459^{+191}_{-191}$	$4.583^{+0.032}_{-0.128}$	$-0.120^{+0.300}_{-0.300}$	$0.797^{+0.163}_{-0.070}$	$0.893^{+0.082}_{-0.101}$	$2.489^{+0.430}_{-0.944}$
	+3%/-3%	+1%/-3%	+250%/-250%	+20%/-9%	+9%/-11%	+17%/-38%
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 009644683-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-213 \pm 63$	$2.81^{+2.51}_{-1.92}$	$586^{+30}_{-27}$	$4004^{+2690}_{-768}$	$1072^{+9818}_{-771}$
Alt.	$-274 \pm 97$	$3.17^{+2.80}_{-2.05}$	$583^{+31}_{-26}$	$3964^{+2209}_{-765}$	$1060^{+6839}_{-788}$

$T_{\text{max}}$  = 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

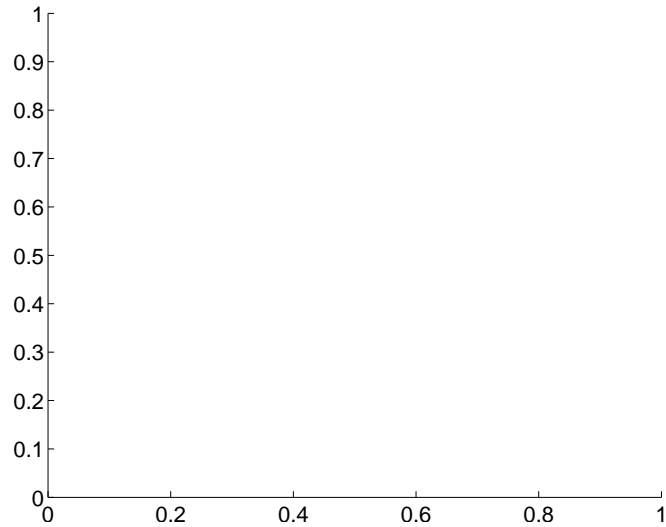
Supplemental centroid analysis for 009644683-02. Kepler magnitude: 15.91. Transit SNR 6.57

There are 0 quarters with good PRF difference image offsets

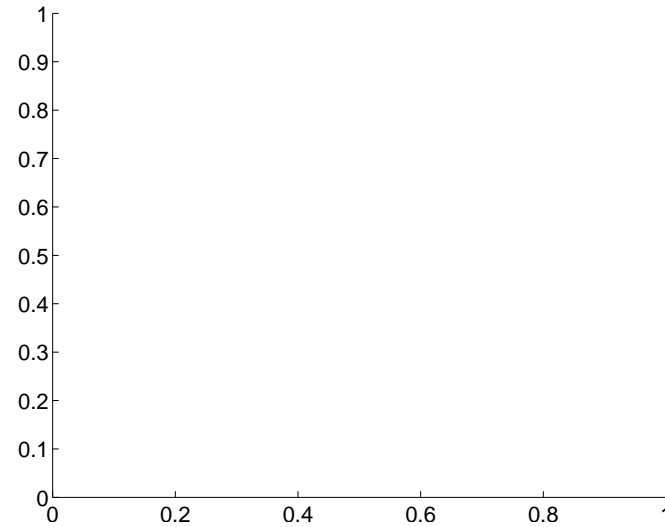
The direct PRF centroid is offset from the target star catalog position by about NaN arcsec

	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	$2.15 \pm 1.94$	1.10	$-1.65 \pm 1.85$	$-1.37 \pm 2.08$

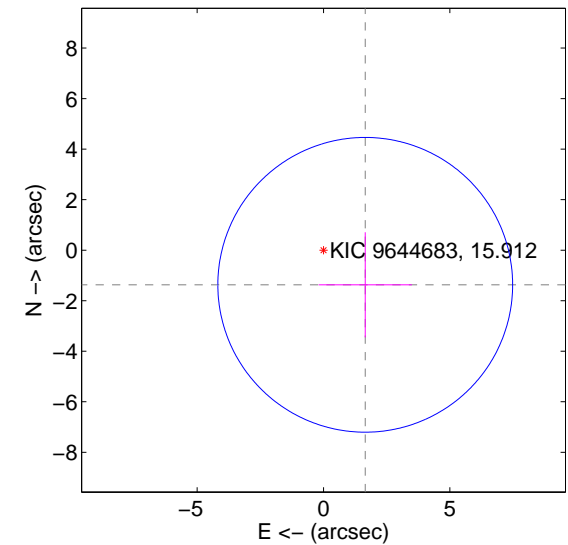
There is no PRF-fit offset from OOT-fit



There is no PRF-fit offset from KIC

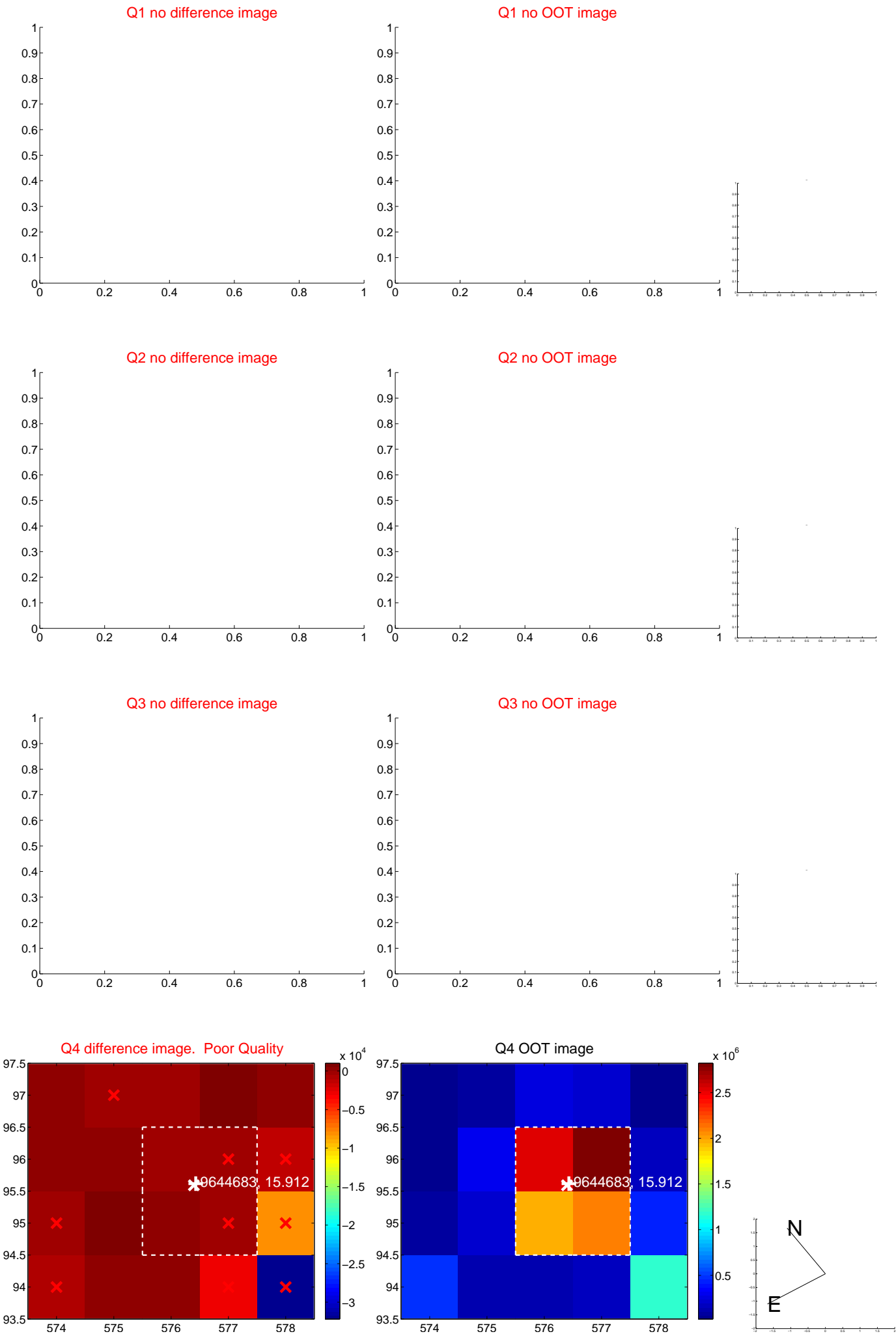


offset from photometric centroids

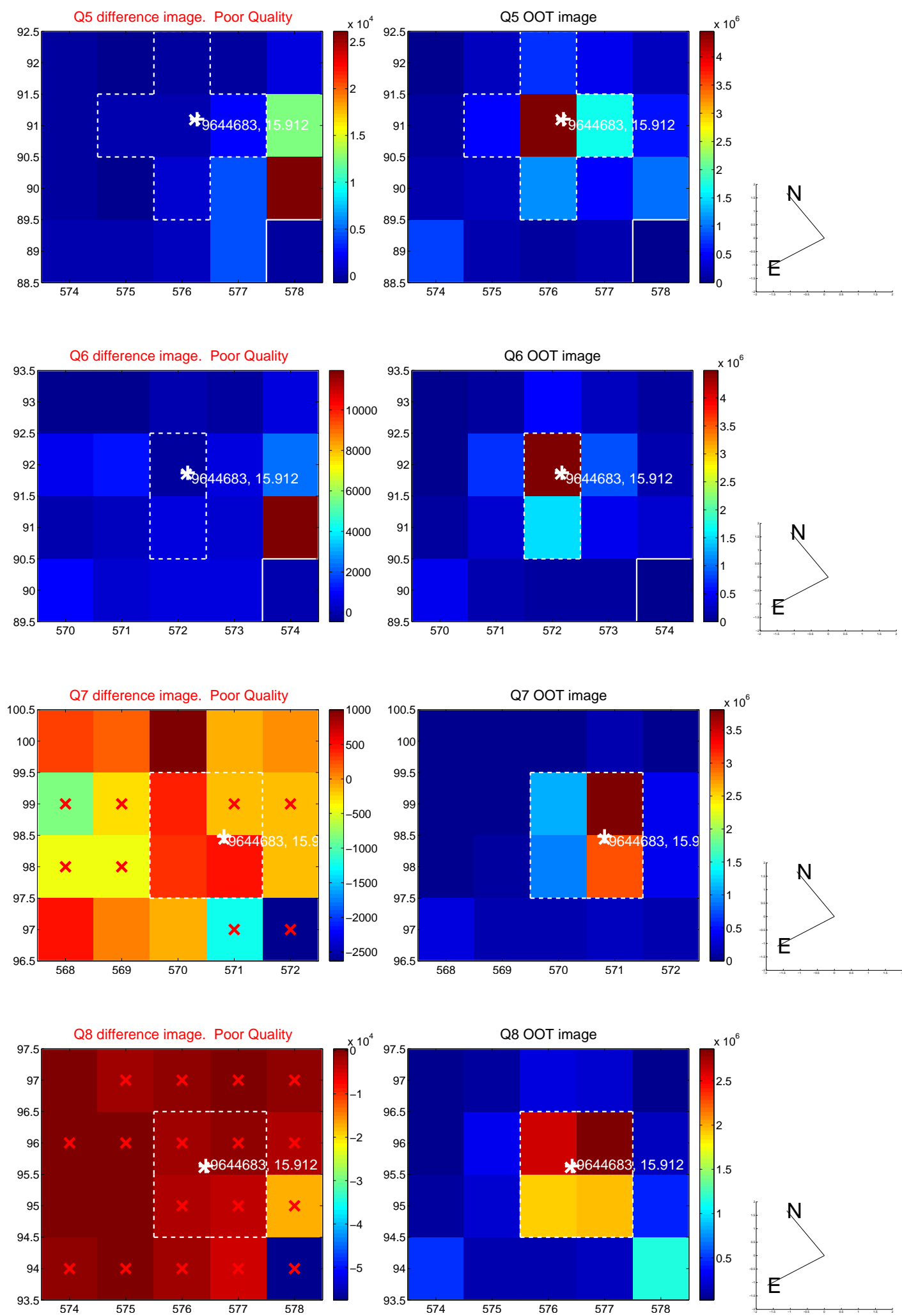


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

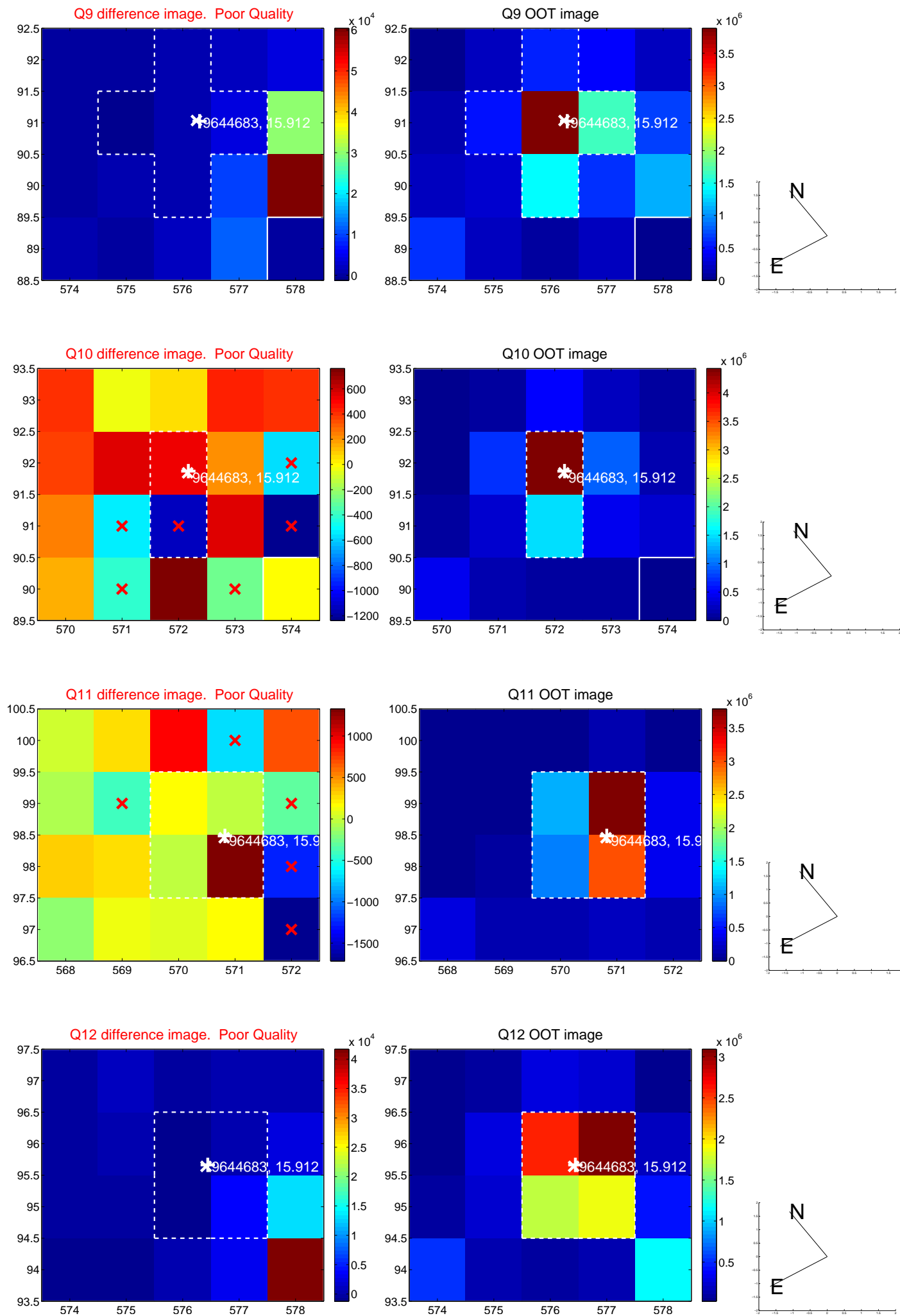
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



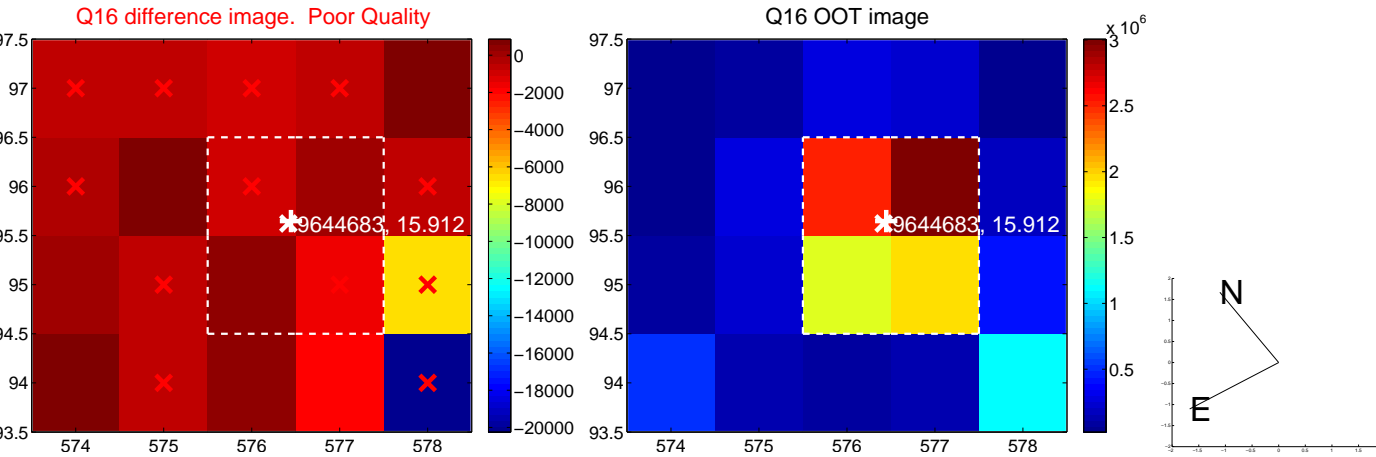
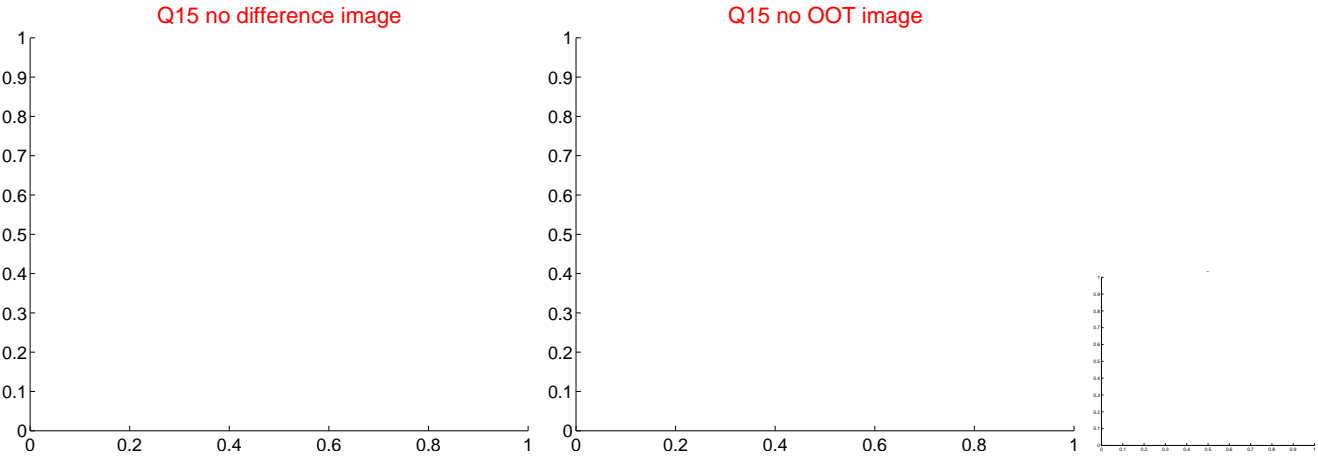
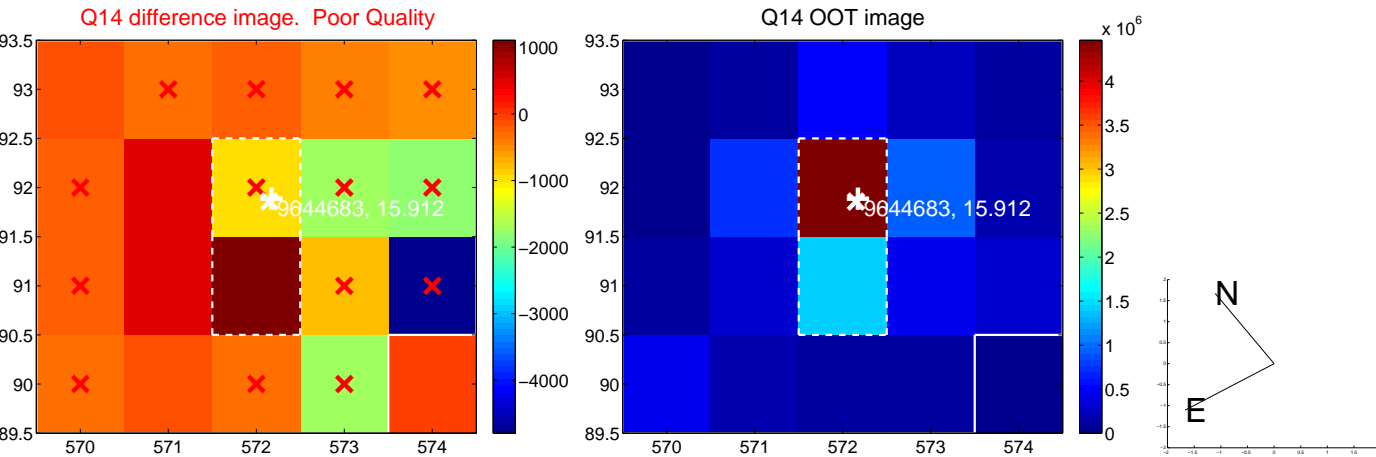
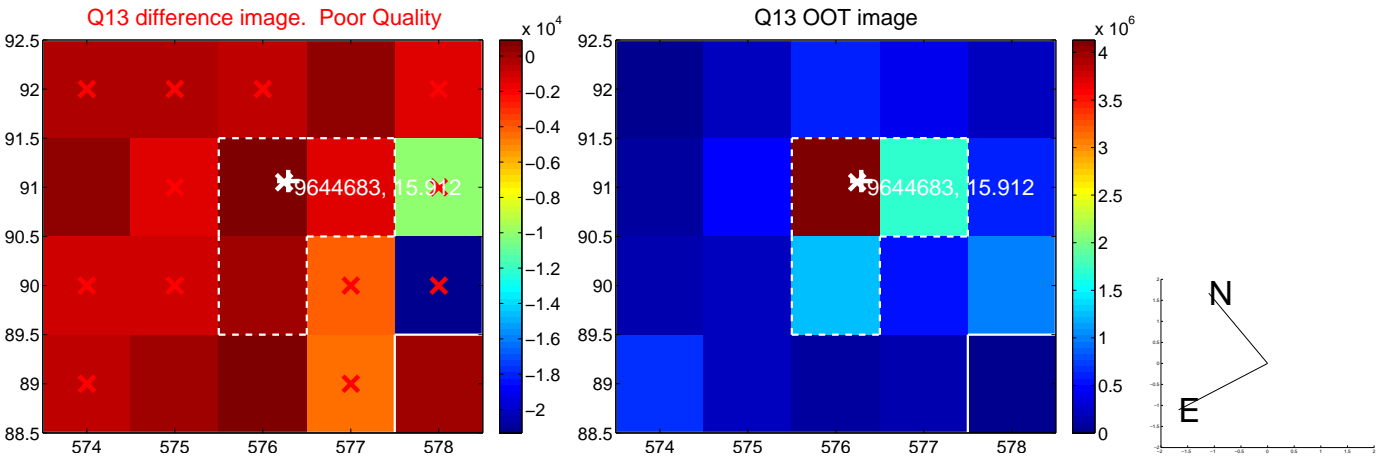
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

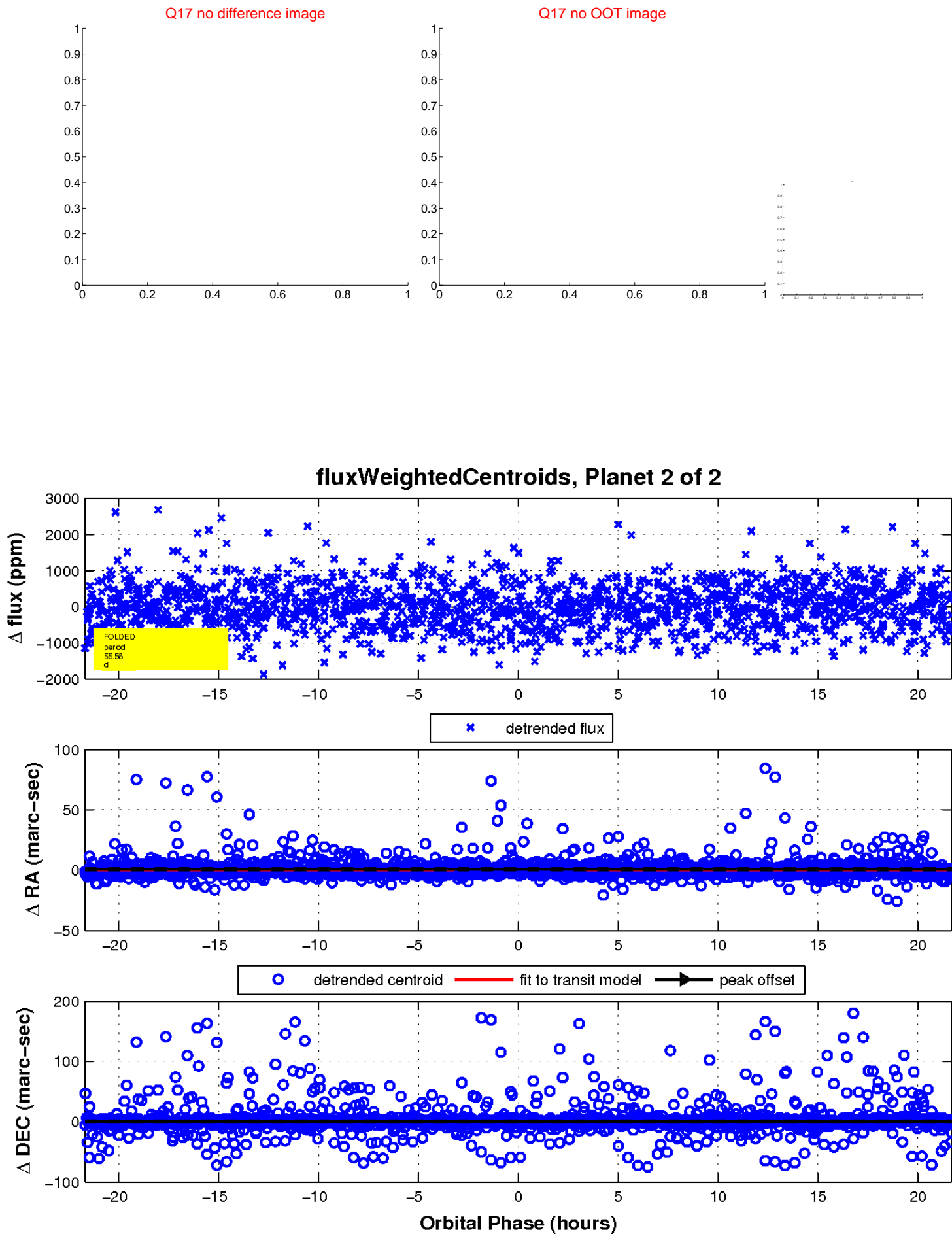


white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.





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



UKIRT Image

Declination

