

# KIC 007938180

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007938180-01	OBS	No	0.959331	131.755238	56.8	6.726	8.2	9.3	1.41	6549	1.20	7928.04
007938180-02	OBS	No	52.843608	147.961565	3.5	0.862	20.8	0.0	1.41	6549	0.27	37.83
007938180-03	OBS	No	52.829553	148.375781	1572.5	3.000	18.3	-1.0	1.41	6549	5.62	37.84
007938180-04	OBS	No	41.356164	134.760722	5456.9	0.629	14.4	3.5	1.41	6549	10.84	52.45

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007938180-01	OBS	FP	0.00	1	0	1	1	LPP_DV—LPP_ALT—CENT_RESOLVED_OFFSET—EPHEM_MATCH
007938180-02	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_SKYE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_RESOLVED_OFFSET
007938180-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—NO_FITS—SAME_NTL_PERIOD—CENT_NOFITS
007938180-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_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.

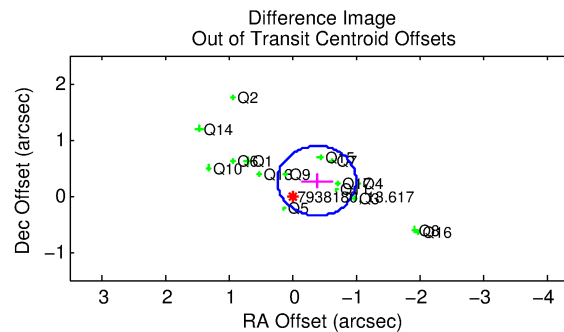
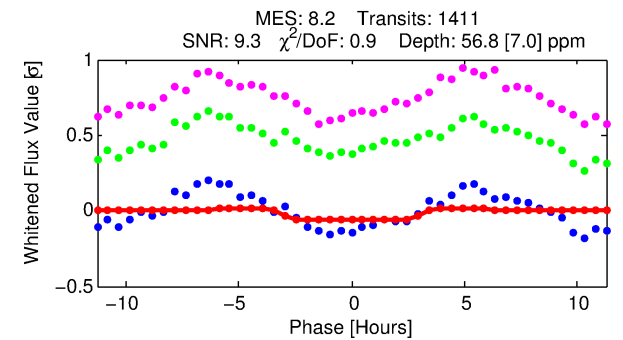
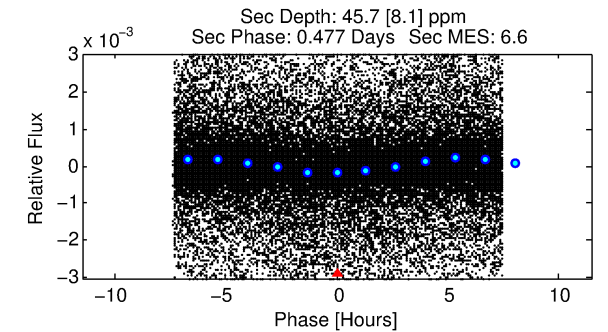
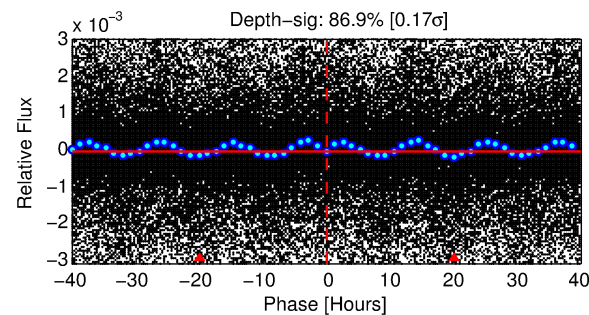
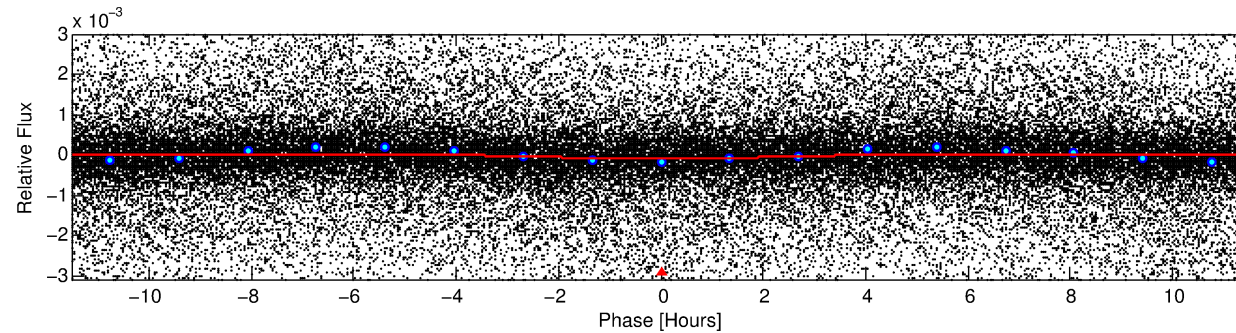
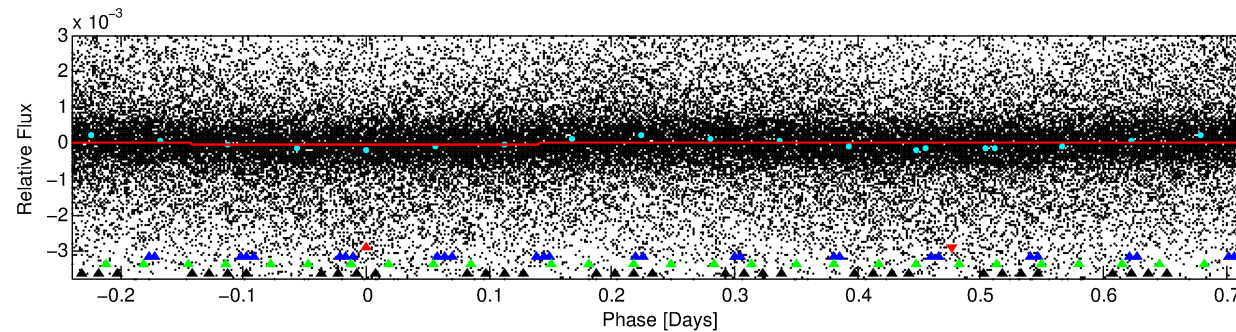
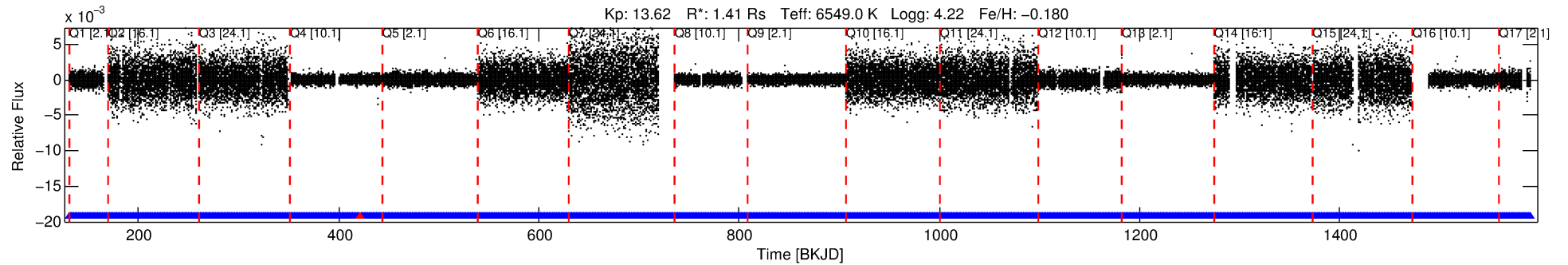
## Ephemeris Match Information For 007938180-01

TCE (1)	KIC	Parent (2)	Parent KIC	P <sub>1</sub> :P <sub>2</sub>	Dist ( $''$ )	$\Delta$ Row	$\Delta$ Col	m <sub>2</sub>	m <sub>1</sub>	D <sub>2</sub> /D <sub>1</sub>	Mechanism	Flag	$\sigma_P$	$\sigma_T$
007938180-01	7938180	007938179-01	7938179	1:1	5.3	0	1	11.45	13.62	3.58	Direct-PRF	0	1.67	2.22

**Notes:** P<sub>1</sub>:P<sub>2</sub> 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<sub>2</sub> and m<sub>1</sub> are the magnitudes of the parent and child. D<sub>2</sub>/D<sub>1</sub> 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: 7938180 Candidate: 1 of 4 Period: 0.959 d



## DV Fit Results:

Period = 0.95933 [0.00002] d  
Epoch = 131.7552 [0.0063] BKJD  
Rp/R\* = 0.0078 [0.0044]  
a/R\* = 1.09 [0.54]  
b = 0.85 [1.03]  
Seff = 7928.04 [2990.42]  
Teq = 2406 [227] K  
Rp = 1.20 [0.77] Re  
a = 0.0203 [0.0051] AU  
Ag = 7.18 [8.56] [0.72 $\sigma$ ]  
Teffp = 6089 [1744] K [2.09 $\sigma$ ]

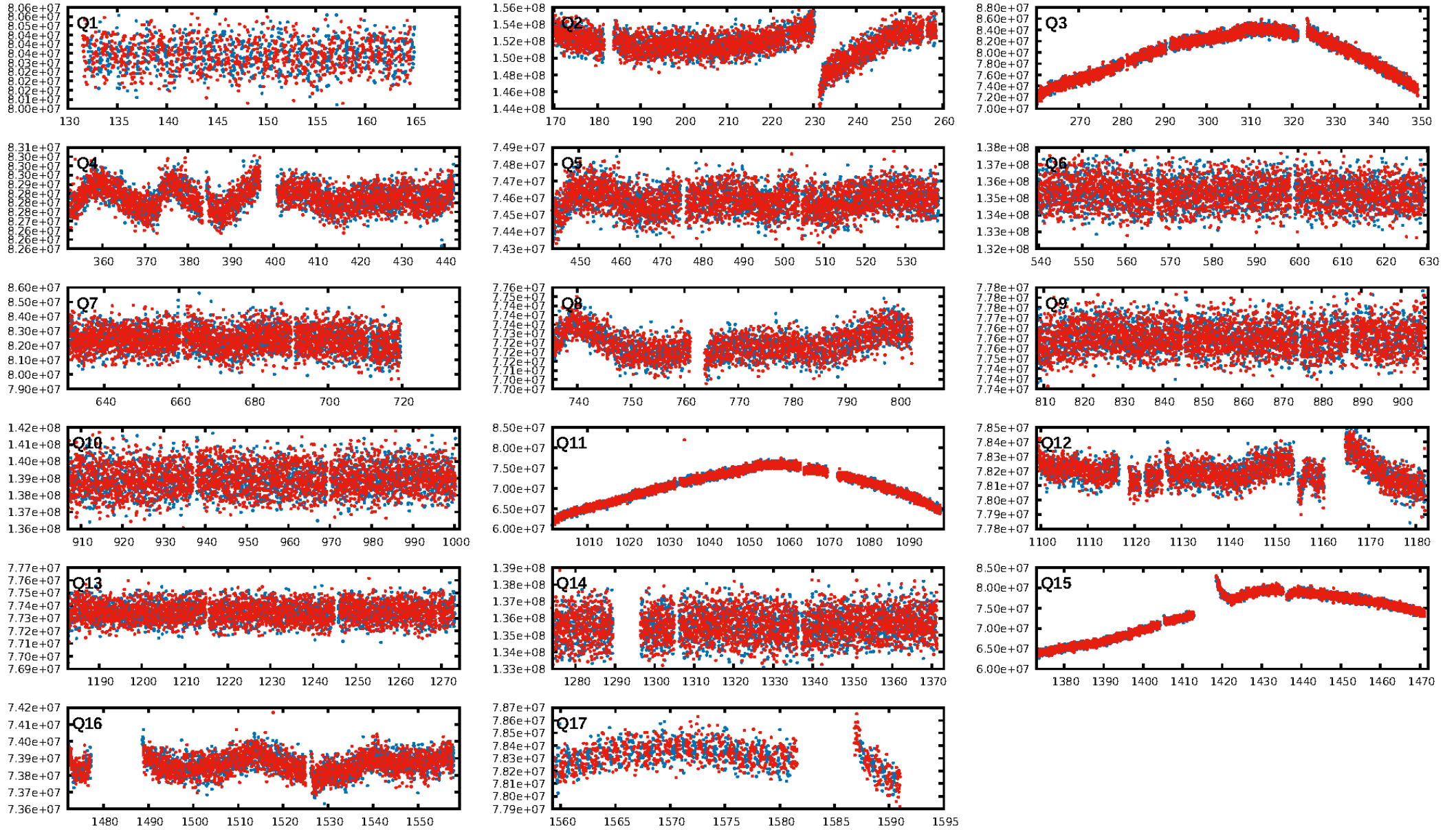
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [143.52 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
**Bootstrap-pfa: 1.10e-09**  
RollingBand-fgt: 1.00 [1346/1347]  
**GhostDiagnostic-chr: -0.7528**  
Centroid-sig: 0.0%  
Centroid-so: 4.247 arcsec [12.48 $\sigma$ ]  
OotOffset-rm: 0.468 arcsec [2.26 $\sigma$ ]  
KicOffset-rm: 5.225 arcsec [42.14 $\sigma$ ]  
OotOffset-st: 4/4/3/5 [16]  
KicOffset-st: 4/4/3/5 [16]  
DiffImageQuality-fgm: 1.00 [16/16]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 07:58:20 Z

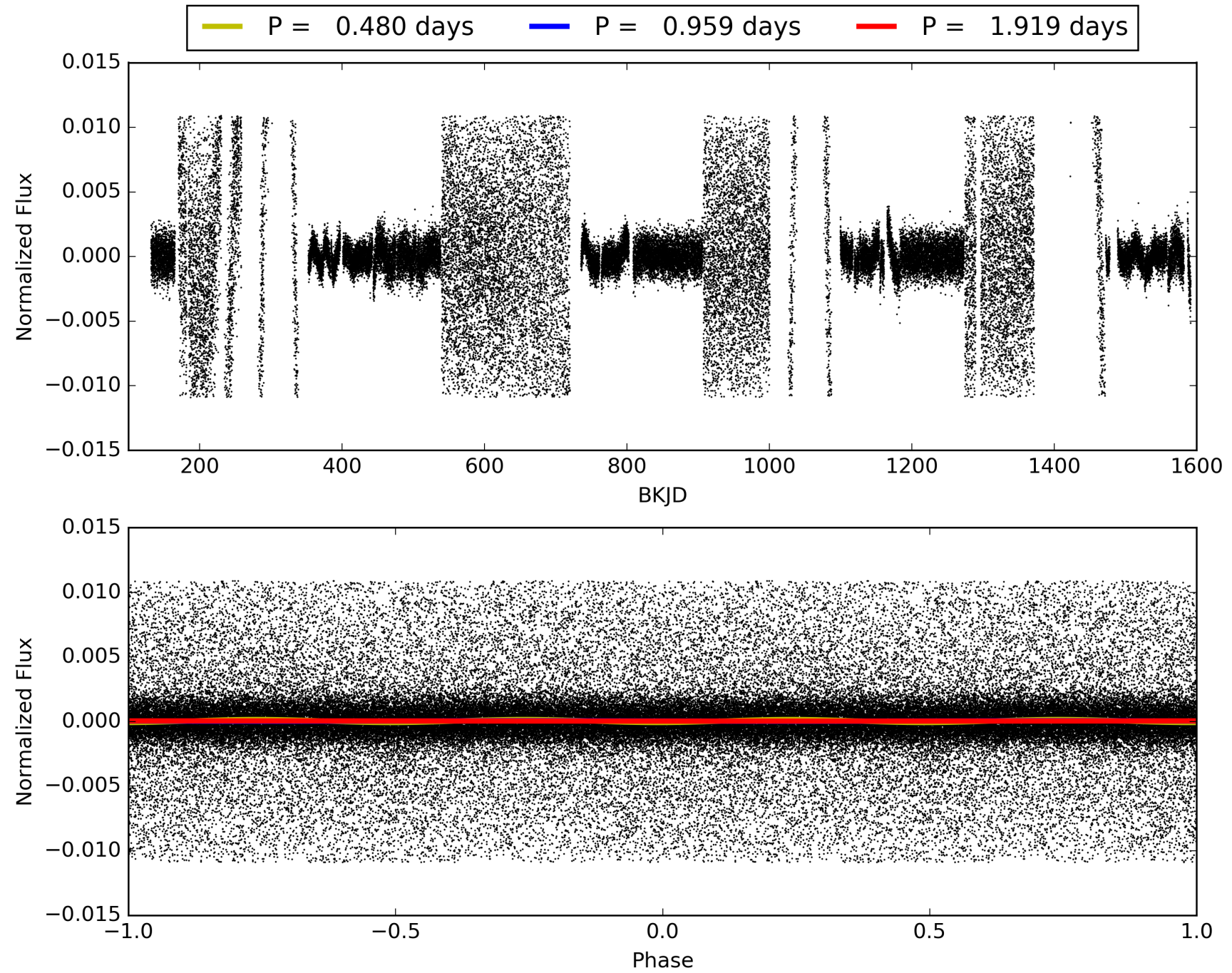
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 007938180-01, PDC Light Curves





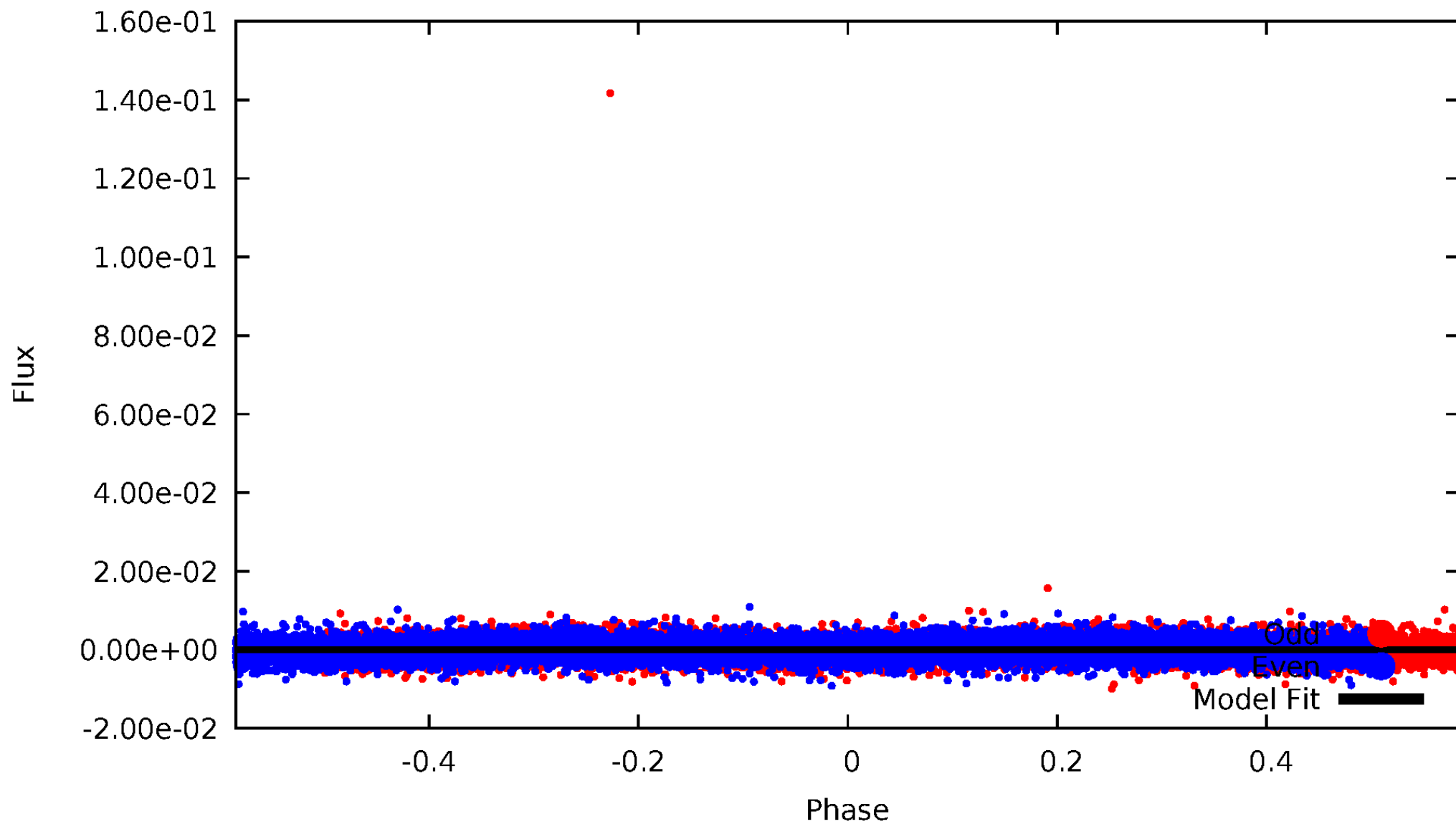
TCE 007938180-01





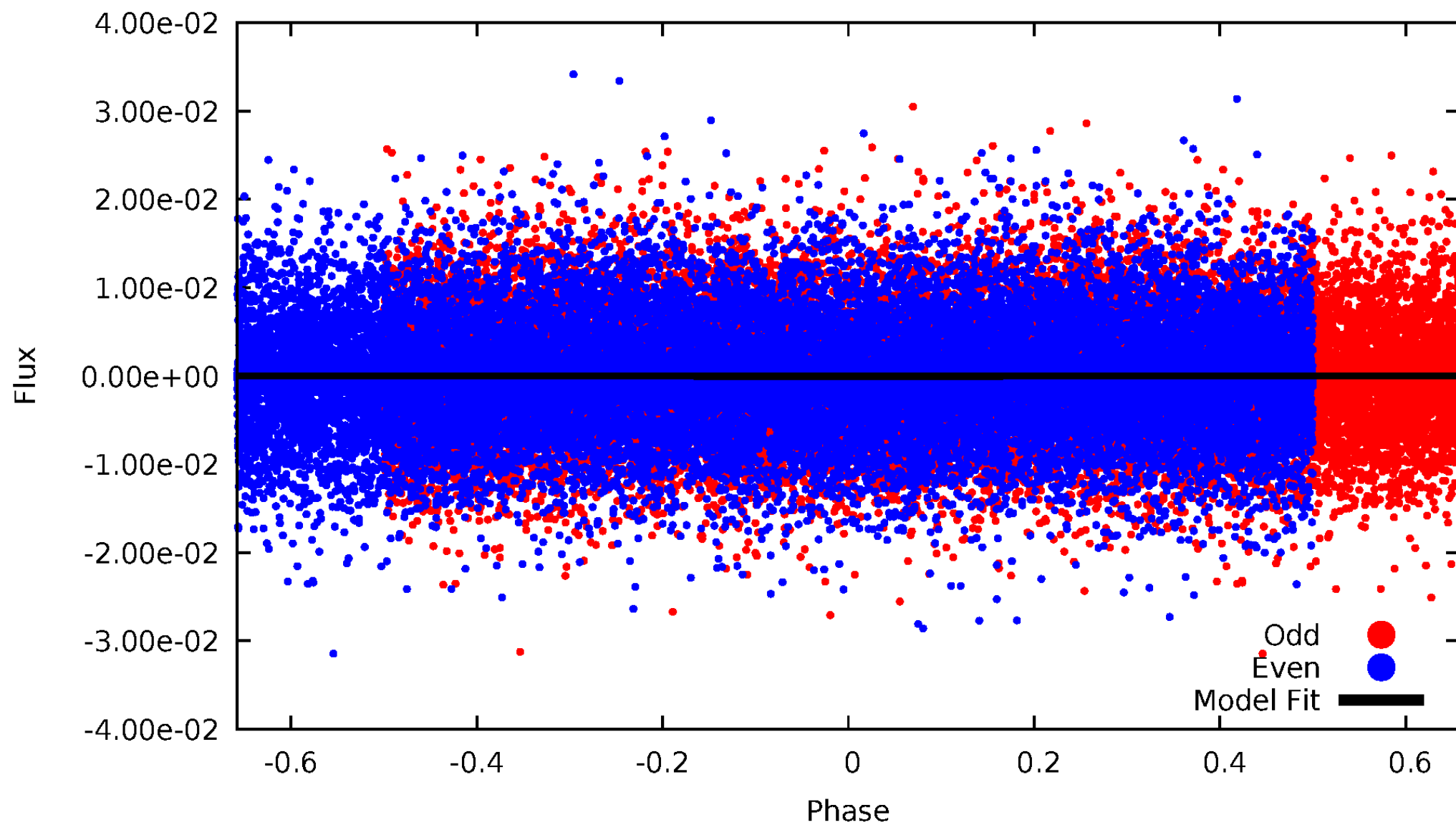
# DV Odd/Even

TCE 007938180-01



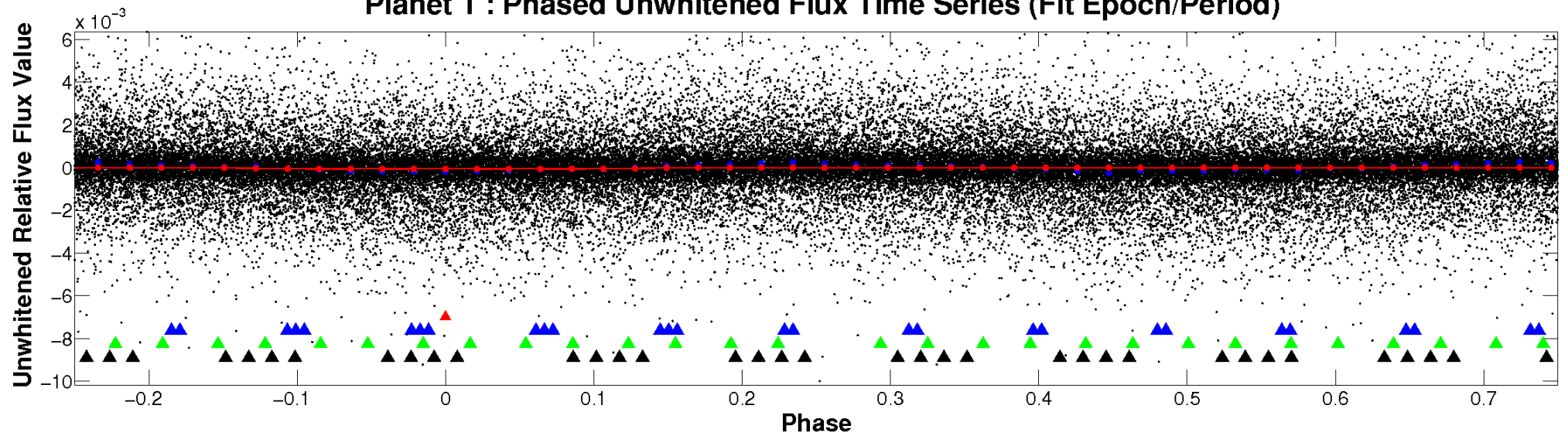
# ALT Odd/Even

TCE 007938180-01

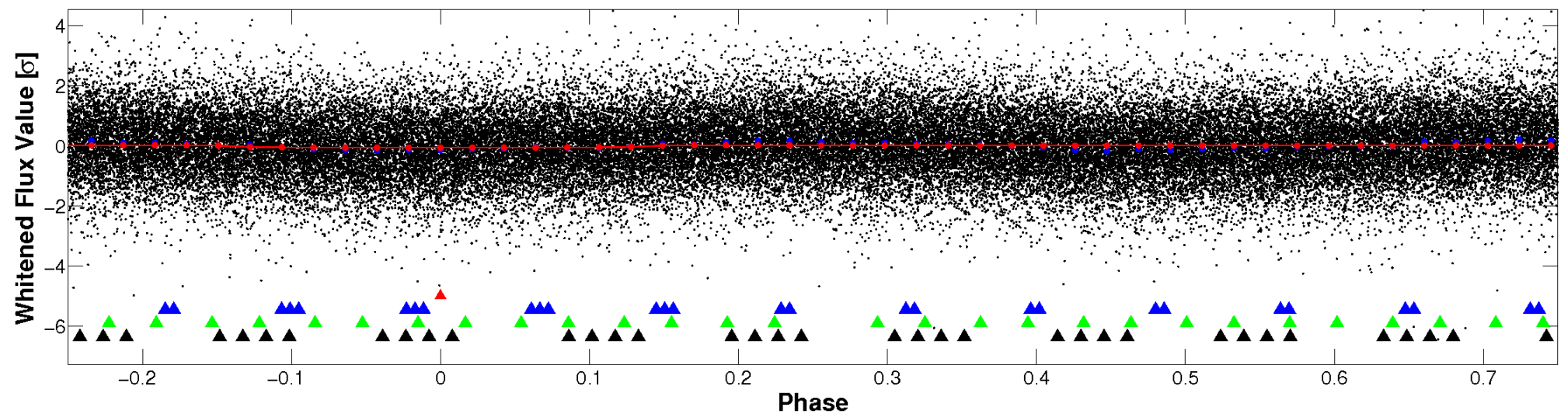


# Non-Whitened Vs. Whitened Light Curve

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



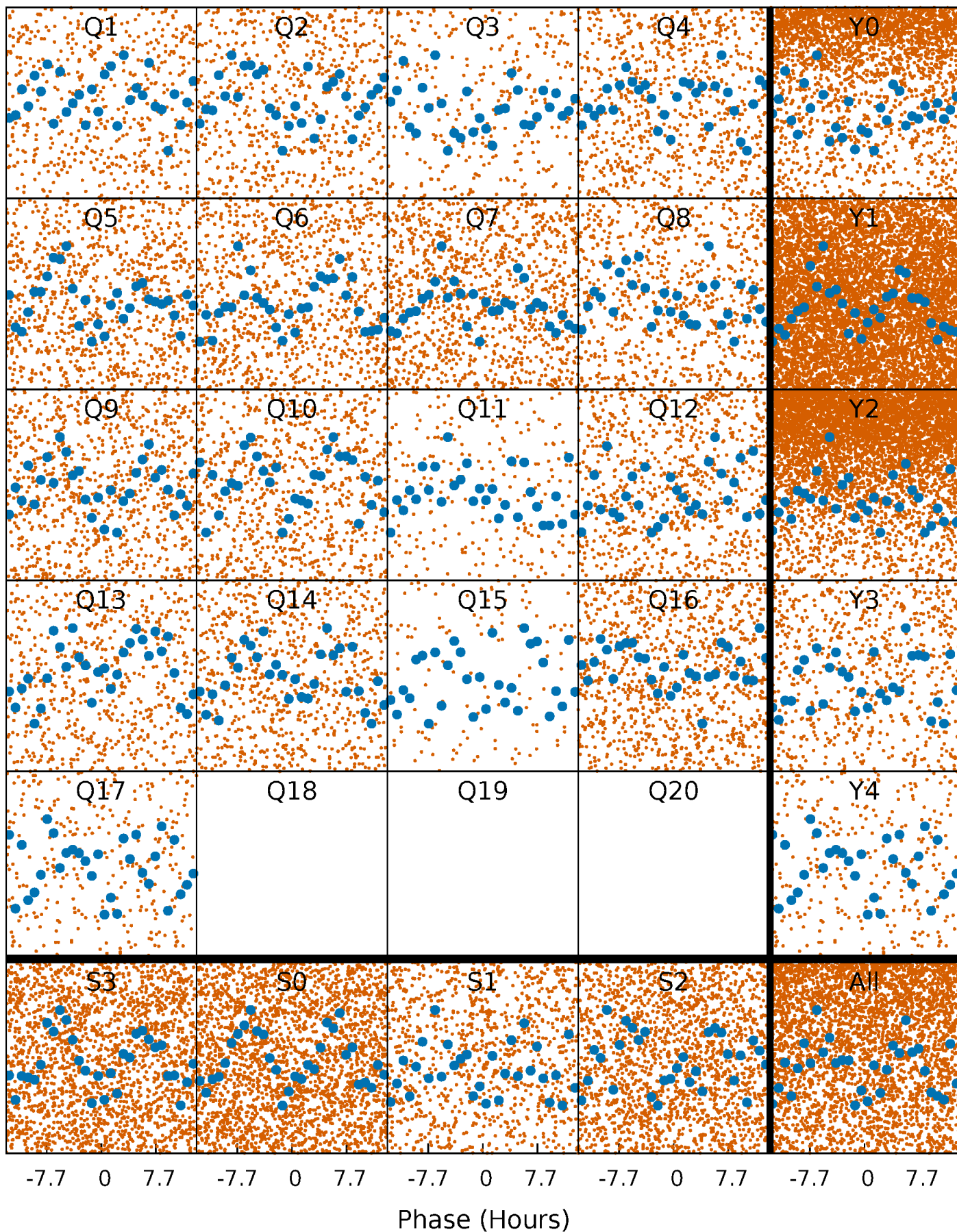
**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**





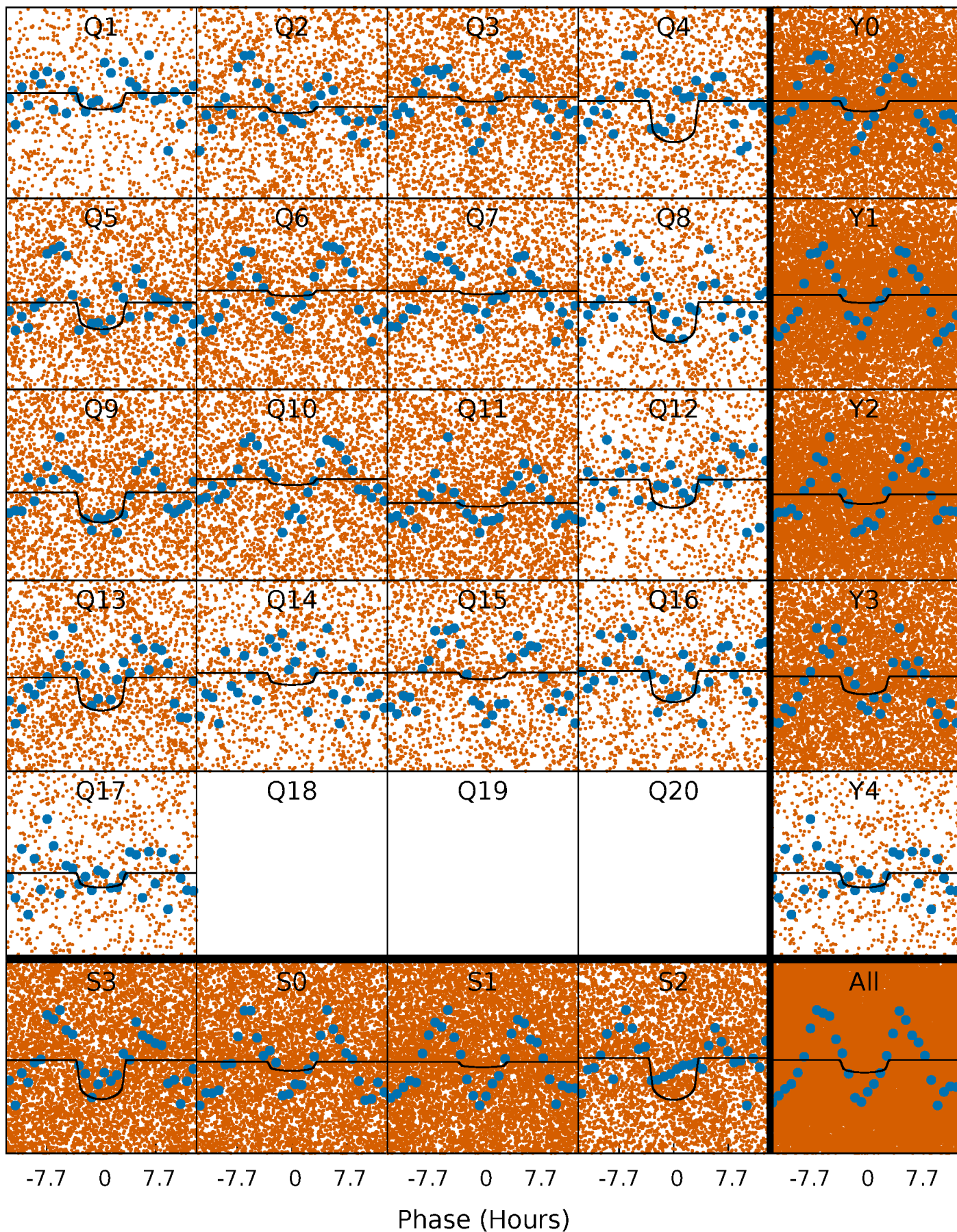
# PDC Quarter-Phased Transit Curves

TCE 007938180-01 P= 0.959331 Days  $T_0=131.755238$  (BKJD)



# DV Quarter-Phased Transit Curves

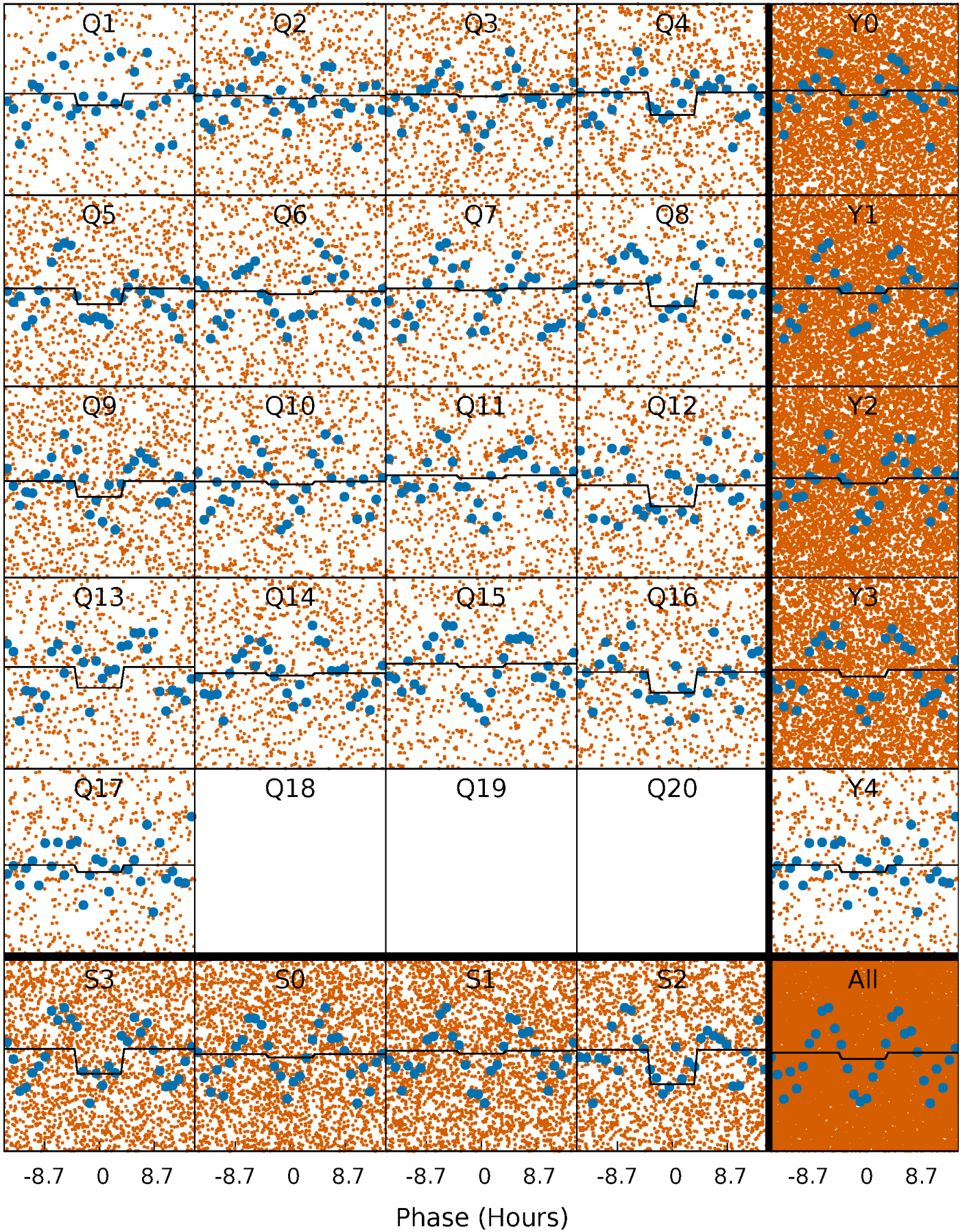
TCE 007938180-01 P= 0.959331 Days  $T_0=131.755238$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

TCE 007938180-01 P= 0.959361 Days  $T_0=131.731748$  (BKJD)

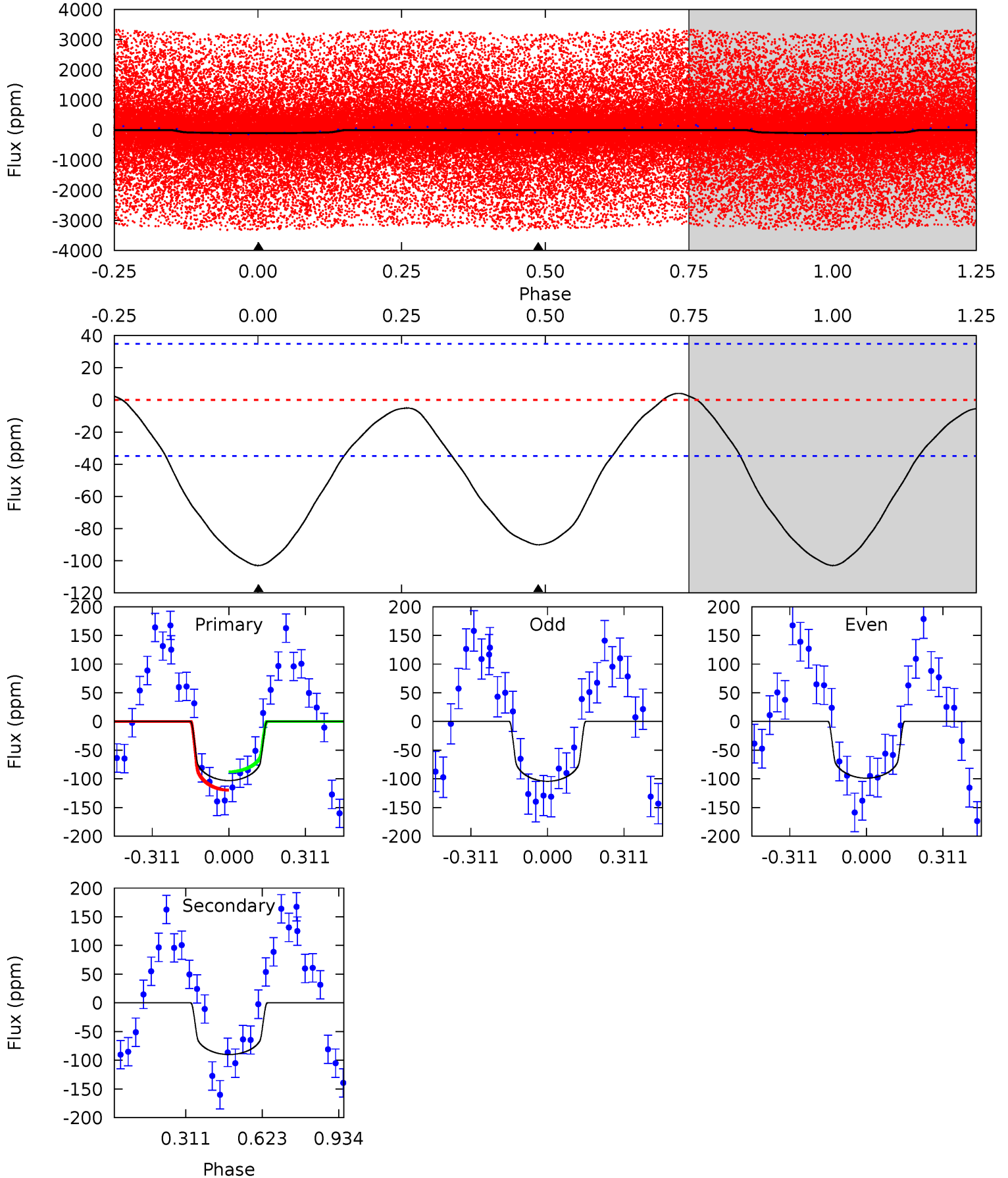




# DV Model-Shift Uniqueness Test

007938180-01, P = 0.959331 Days, E = 130.795907 Days

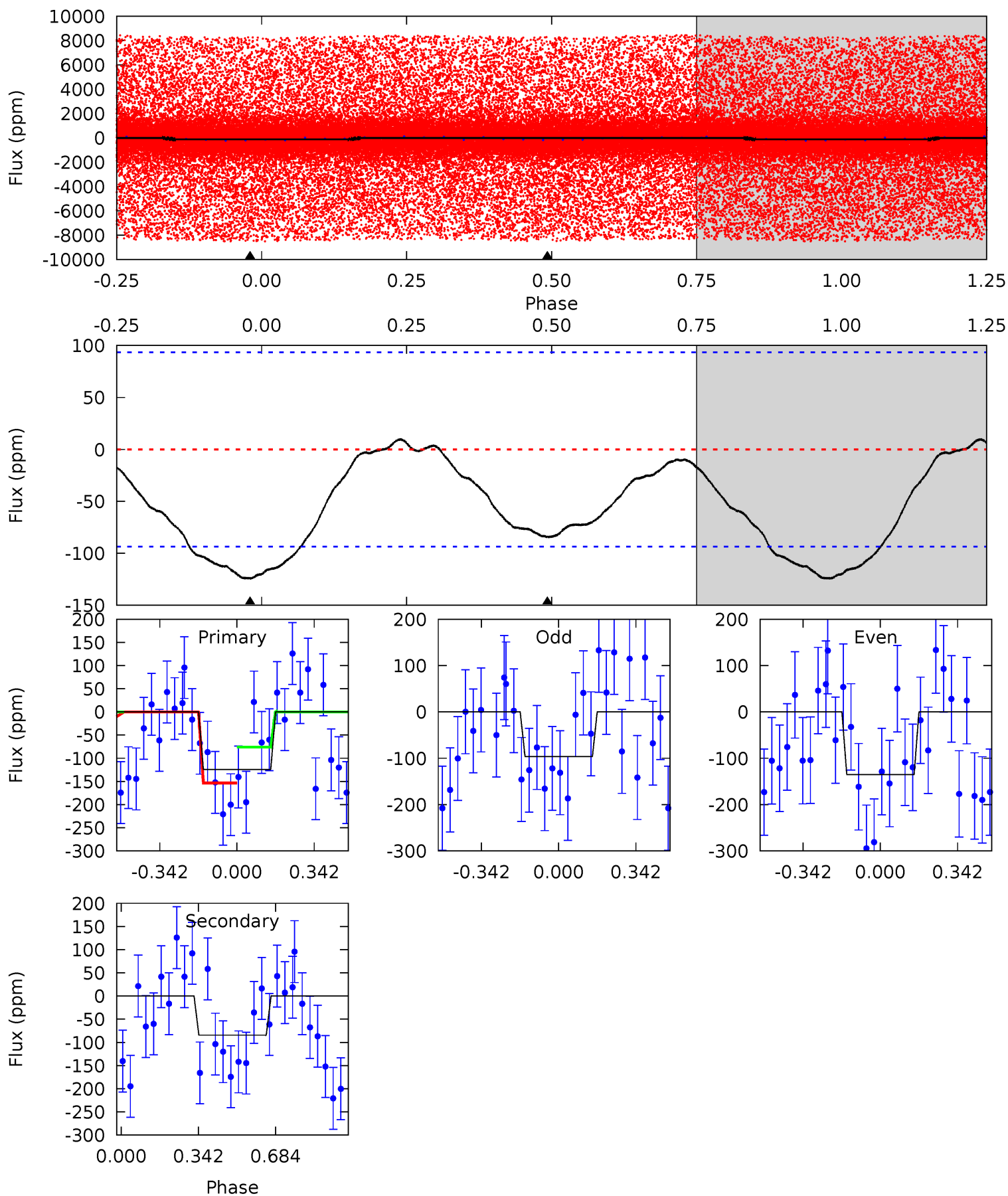
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.8	11.2	0	0	4.32	1.01	0.54	12.8	12.8	11.2	11.2	0.34	1.66	0.04	2.08



# Alt Model-Shift Uniqueness Test

007938180-01, P = 0.959361 Days, E = 130.772387 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
5.71	3.88	0	0	4.30	0.95	0.41	5.71	5.71	3.88	3.88	0.92	1.86	0.07	1.83



### Stellar Parameters For KIC 007938180

	$T_{\text{eff}} (K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6549^{+146}_{-211}$	$4.224^{+0.153}_{-0.187}$	$-0.180^{+0.250}_{-0.300}$	$1.407^{+0.439}_{-0.293}$	$1.215^{+0.192}_{-0.174}$	$0.614^{+0.461}_{-0.304}$
	+2%/-3%	+4%/-4%	+139%/-167%	+31%/-21%	+16%/-14%	+75%/-50%
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 007938180-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-90 \pm 8$	$1.24^{+0.72}_{-0.59}$	$3371^{+250}_{-215}$	$7089^{+3867}_{-1426}$	$13^{+34}_{-8}$
Alt.	$-84 \pm 22$	$0.94^{+0.68}_{-0.58}$	$3364^{+239}_{-214}$	$8275^{+10127}_{-2373}$	$21^{+130}_{-15}$

$T_{max}$  = 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

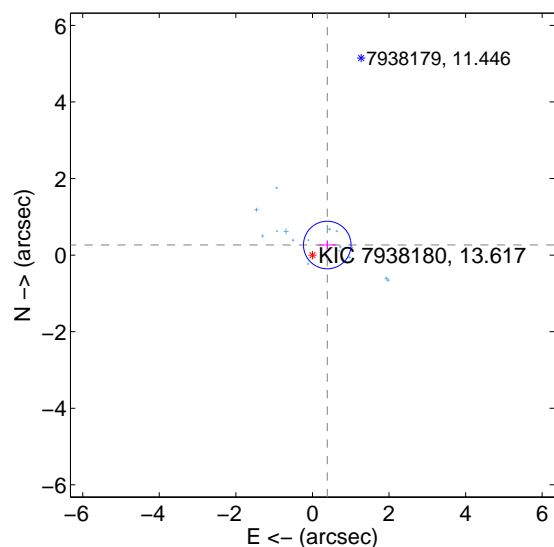
Supplemental centroid analysis for 007938180-01. Kepler magnitude: 13.62. Transit SNR 9.30

There are 16 quarters with good PRF difference image offsets

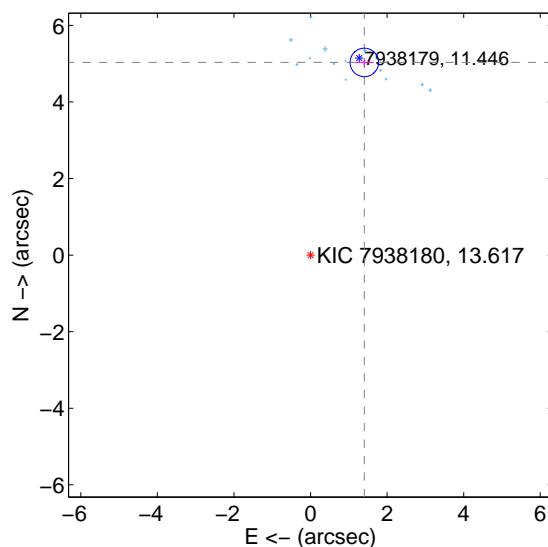
The OOT PRF centroid is offset from the target star catalog position by about 4.74 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.468 \pm 0.207$	2.26	$-0.387 \pm 0.236$	$0.264 \pm 0.123$
PRF-fit source offset from KIC position	$5.225 \pm 0.124$	42.14	$-1.405 \pm 0.248$	$5.032 \pm 0.109$
photometric centroid source offset	$4.25 \pm 0.34$	12.48	$-0.39 \pm 0.13$	$4.23 \pm 0.34$

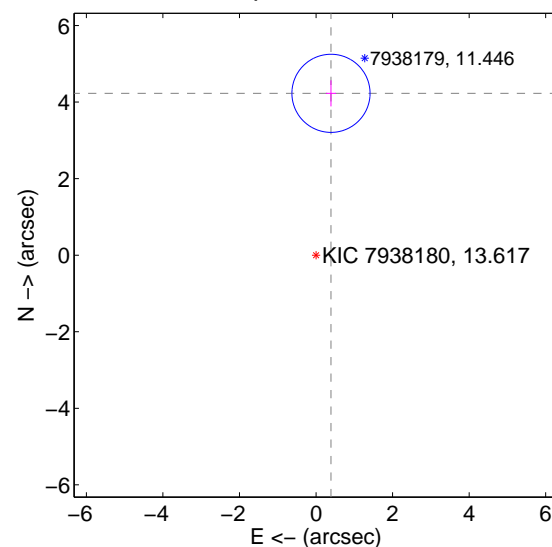
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

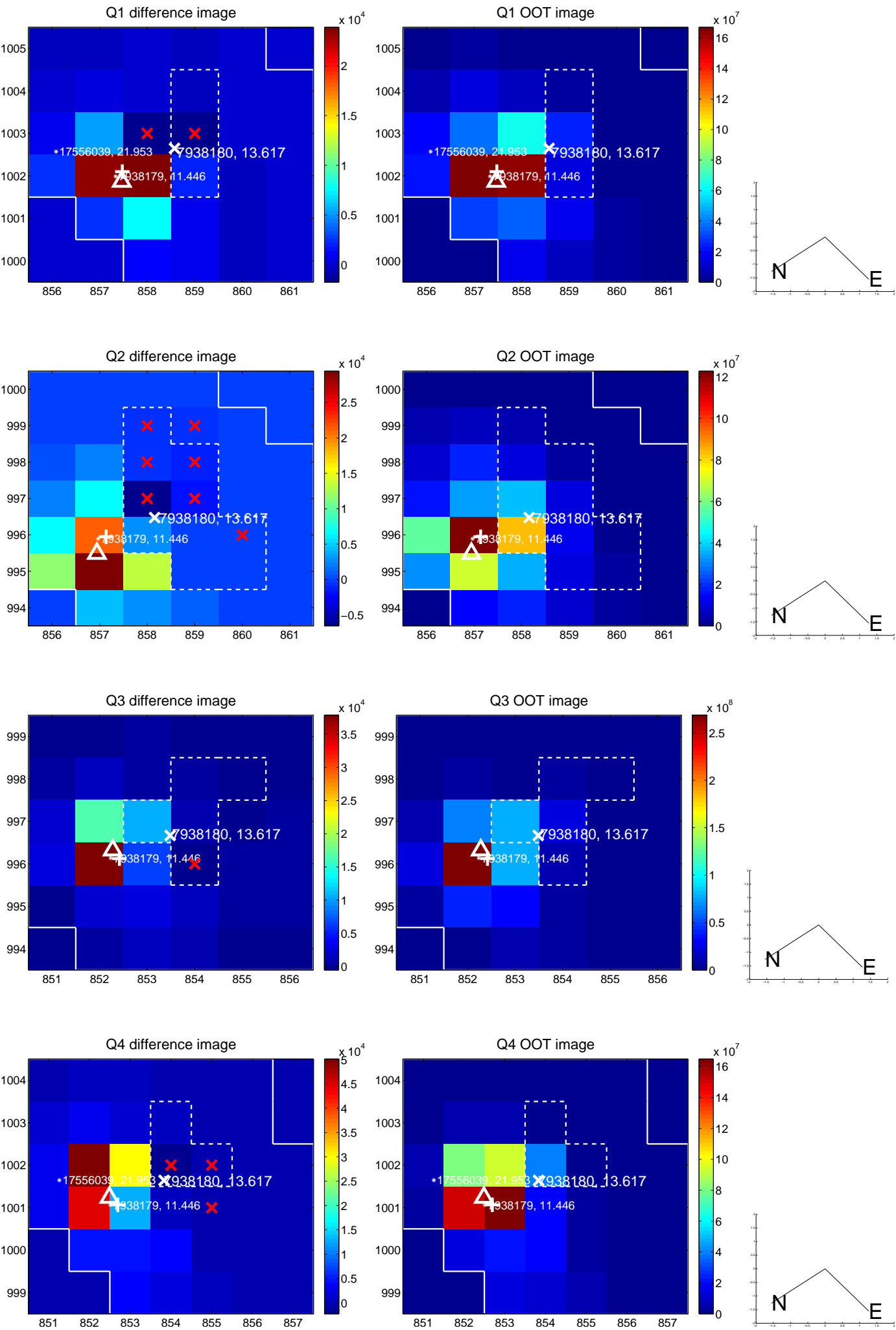


offset from photometric centroids

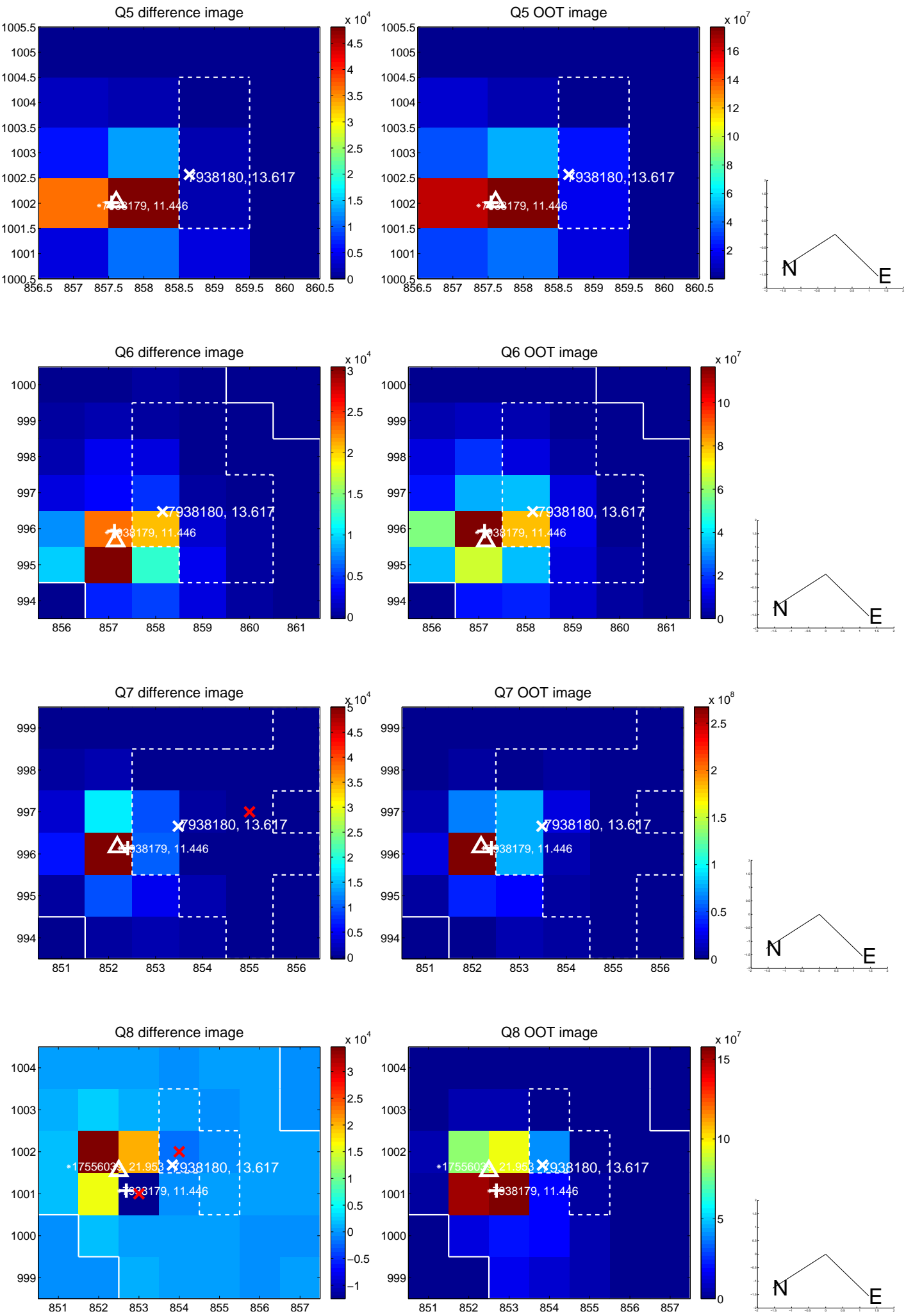


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

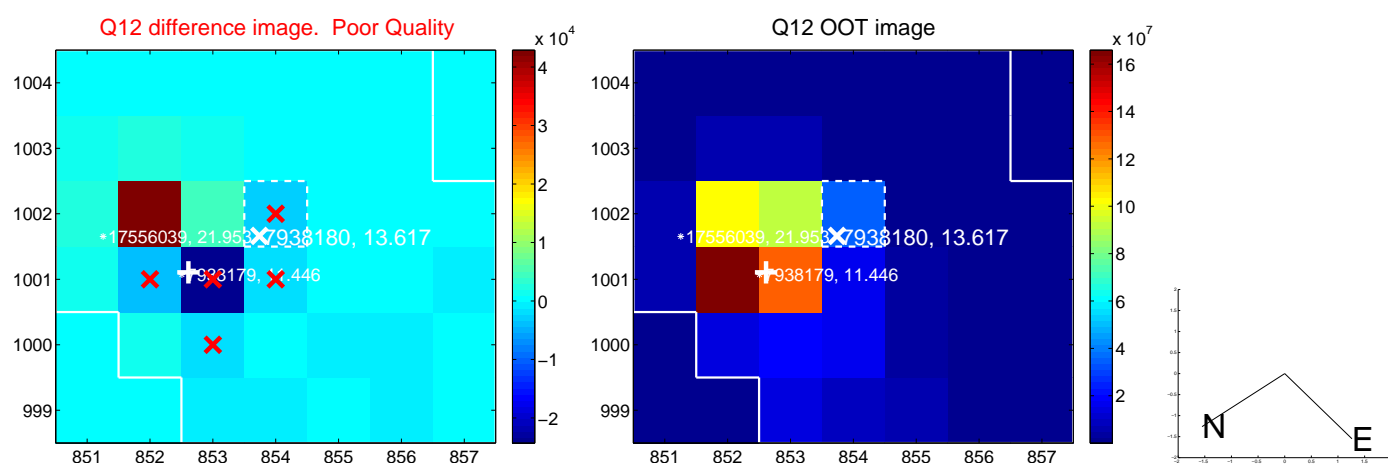
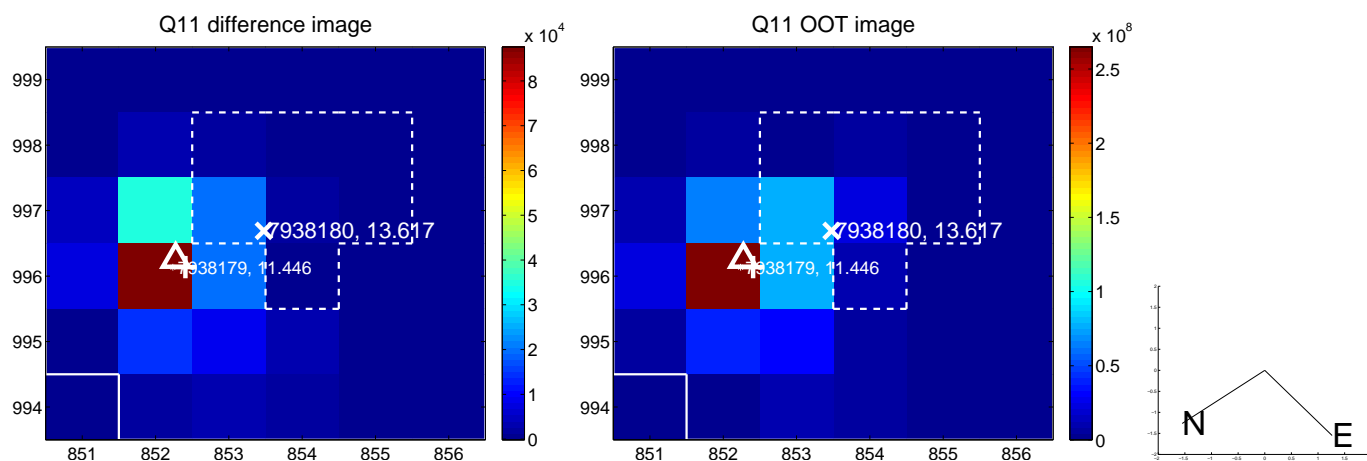
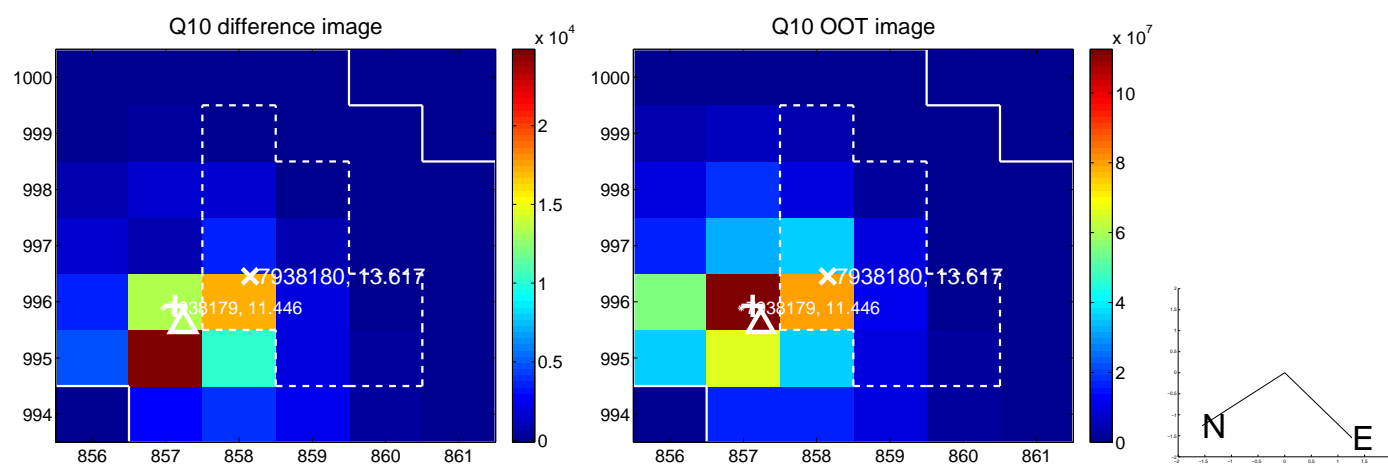
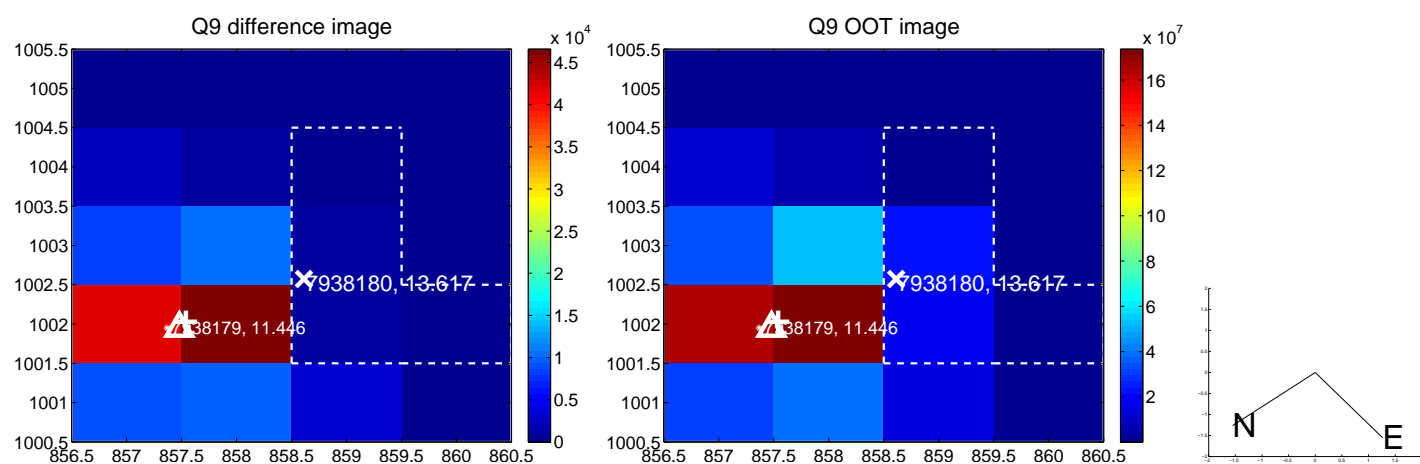


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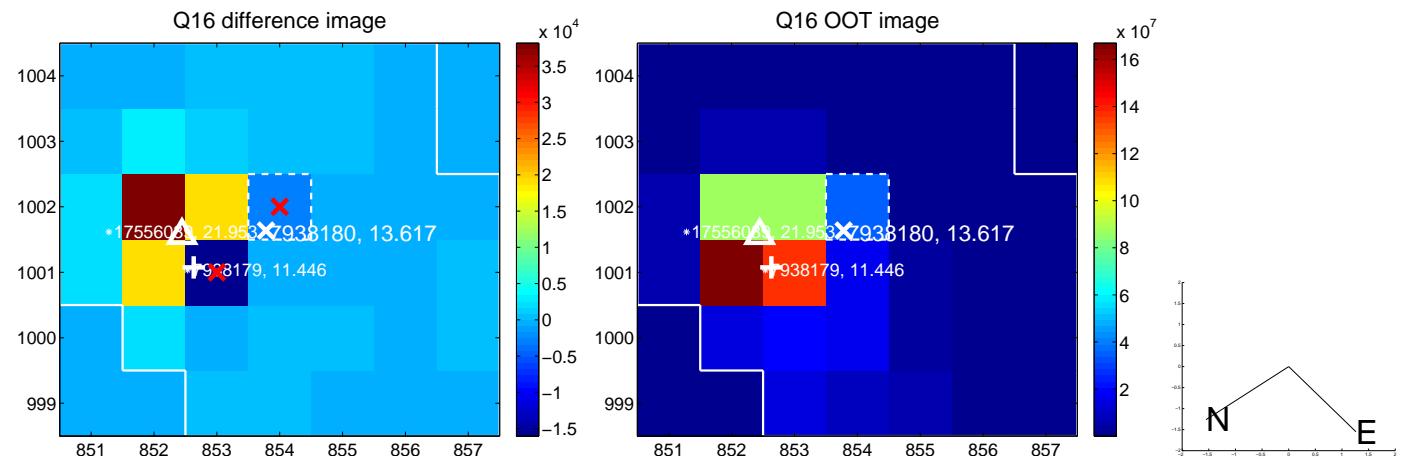
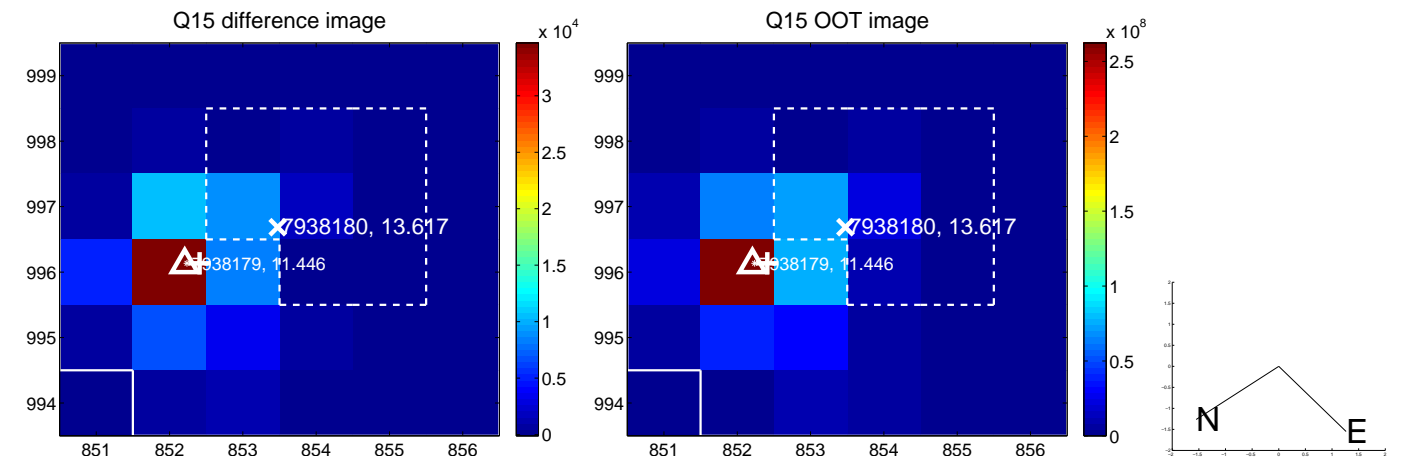
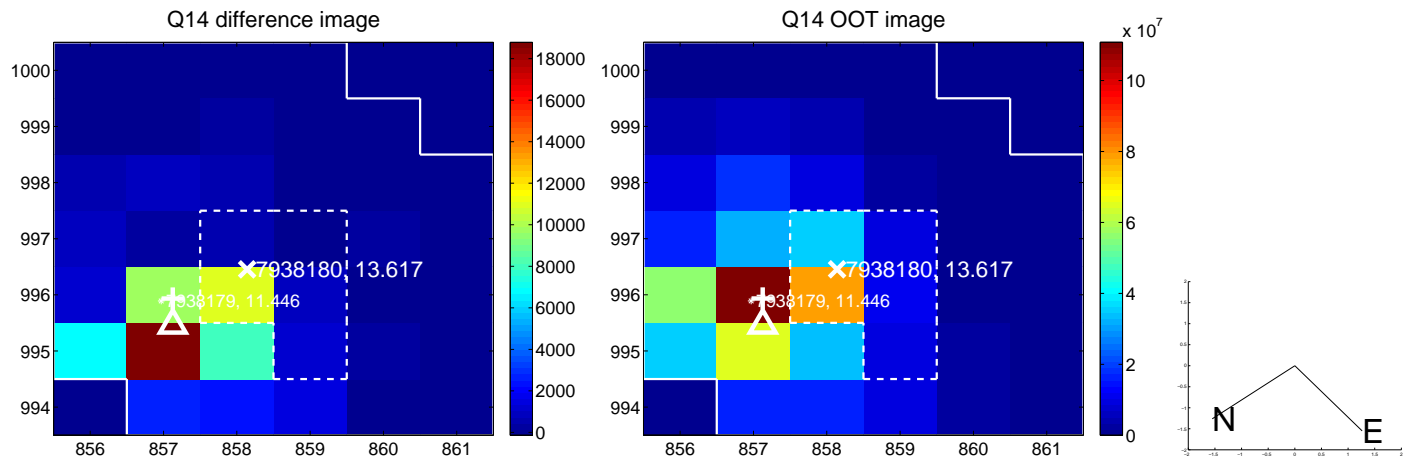
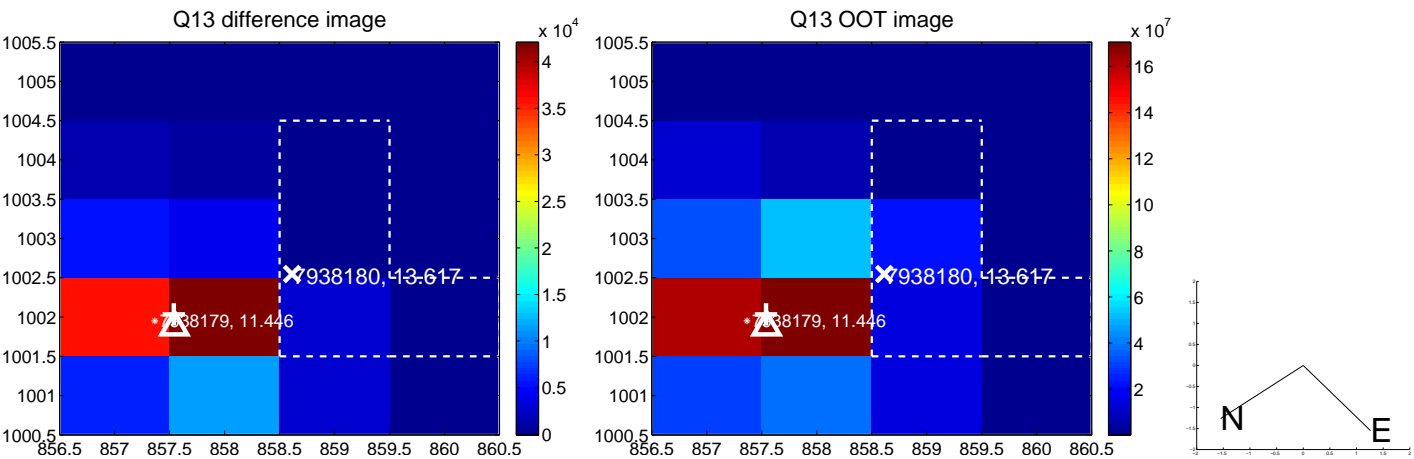




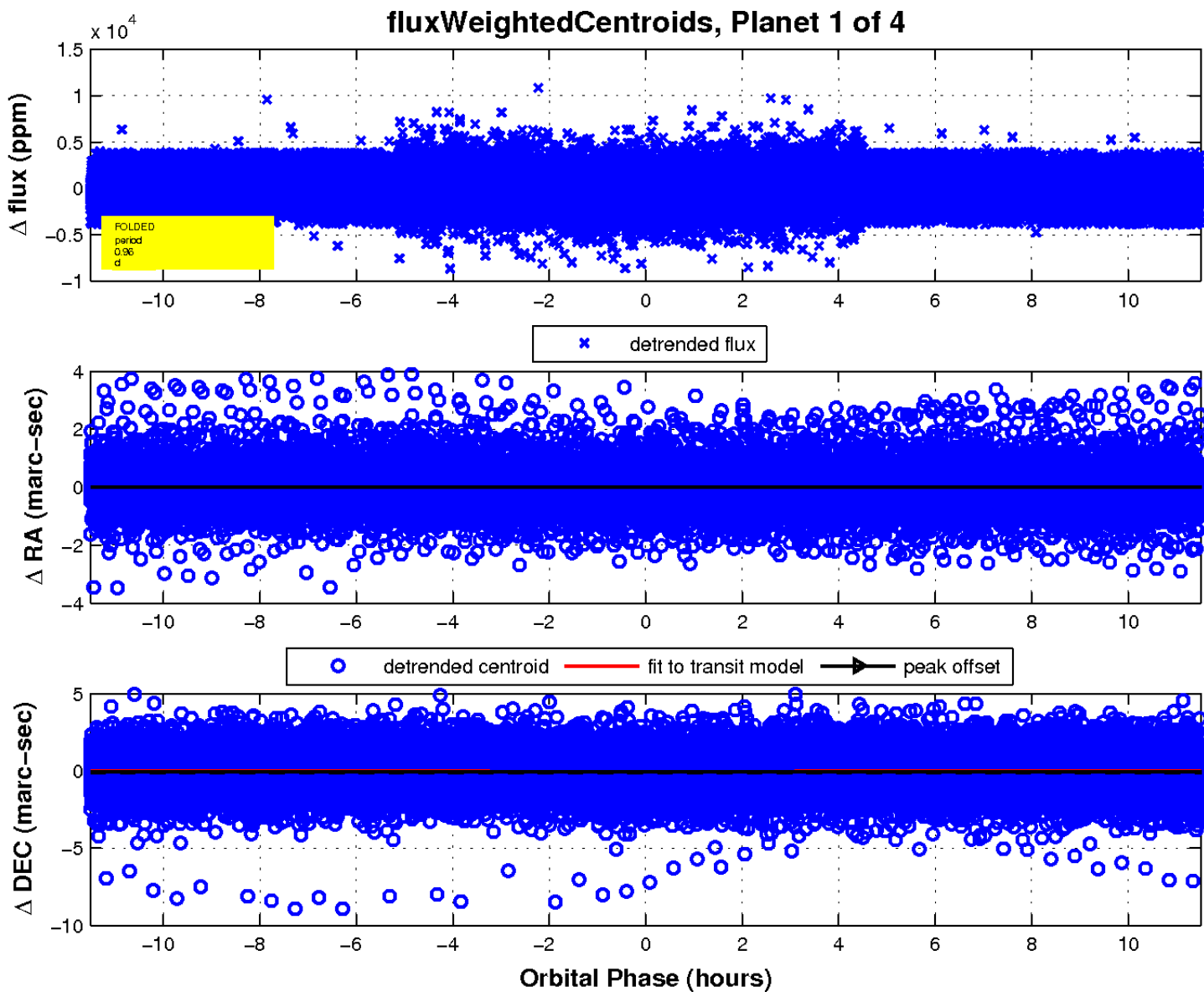
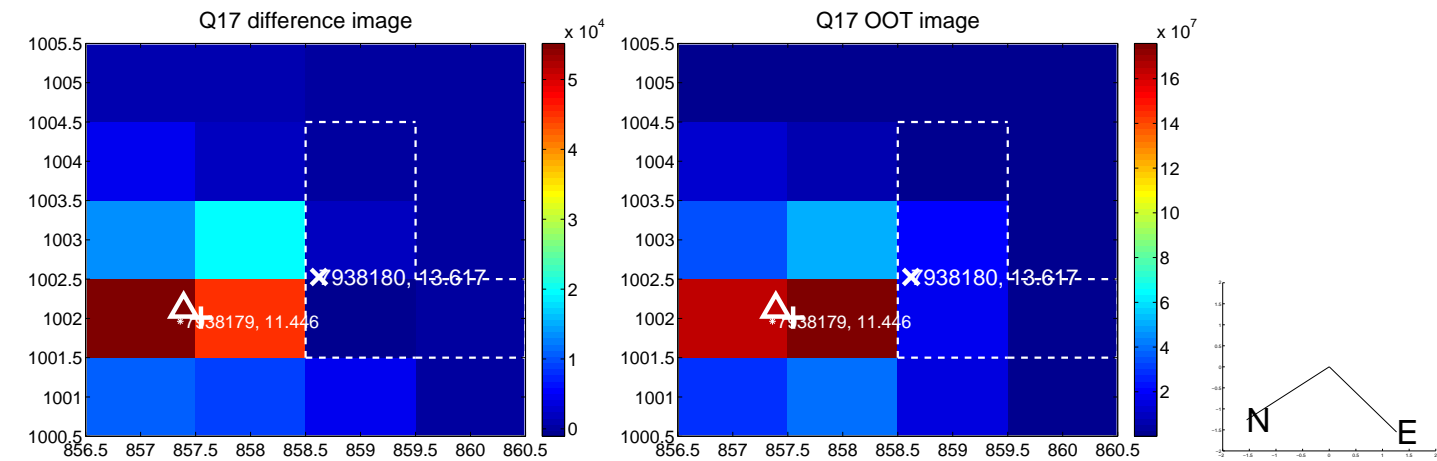
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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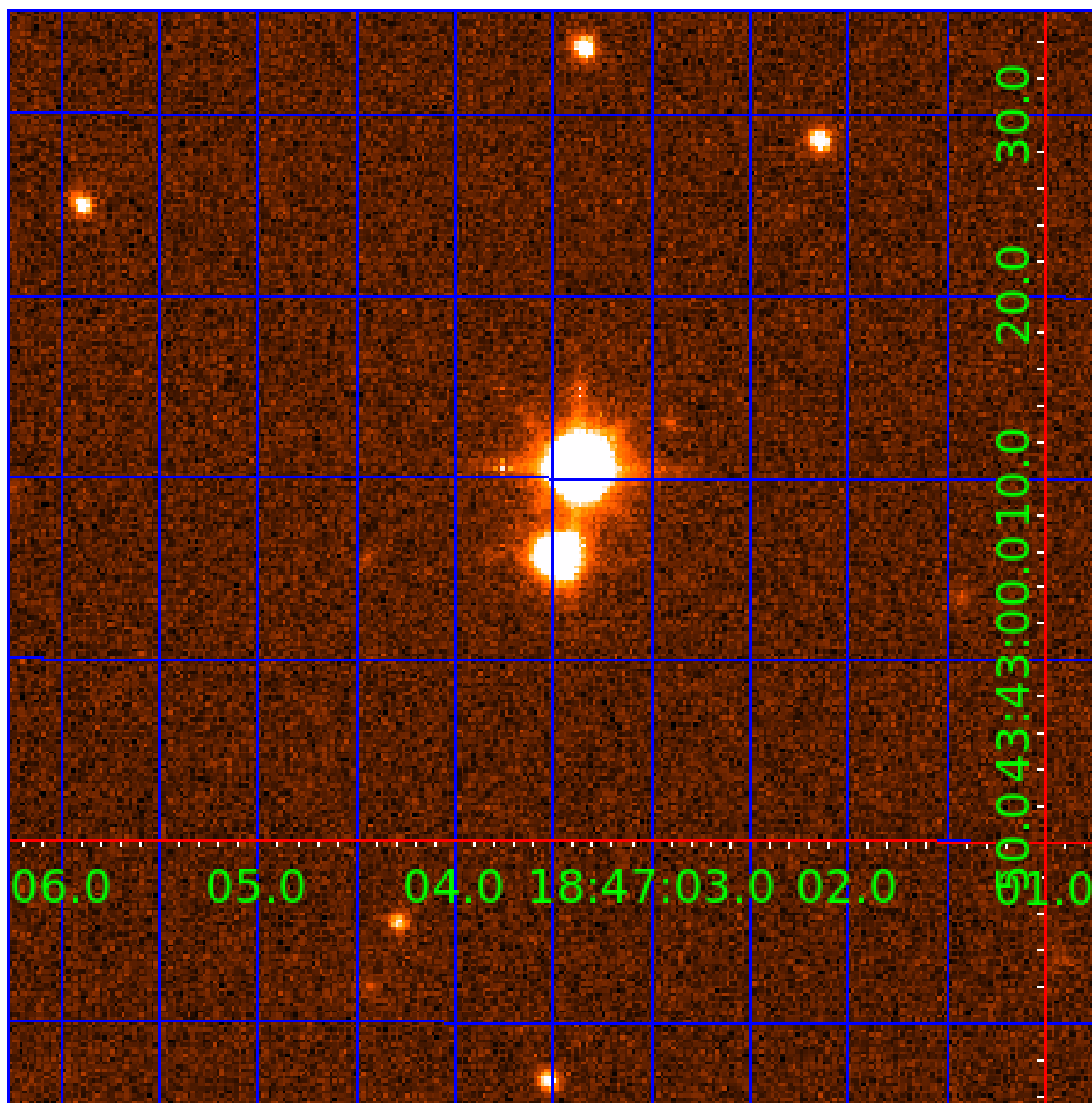


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\Delta$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 007938180

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
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## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
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007938180-02	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_SKYE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_RESOLVED_OFFSET
007938180-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—NO_FITS—SAME_NTL_PERIOD—CENT_NOFITS
007938180-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_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.

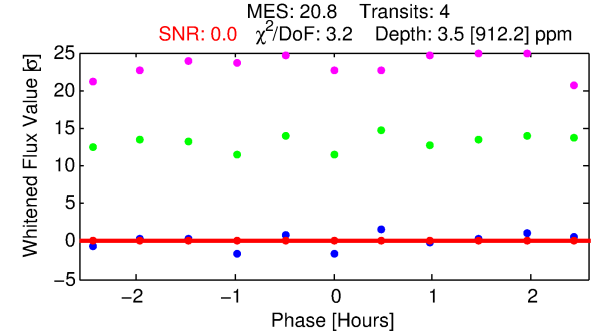
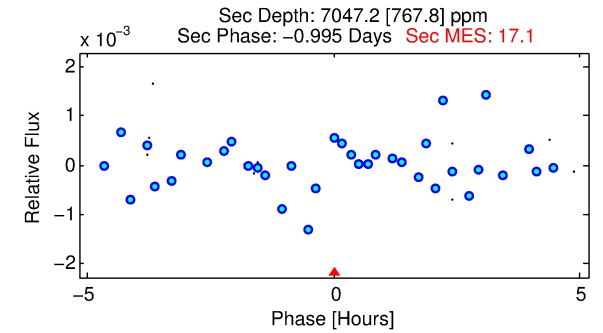
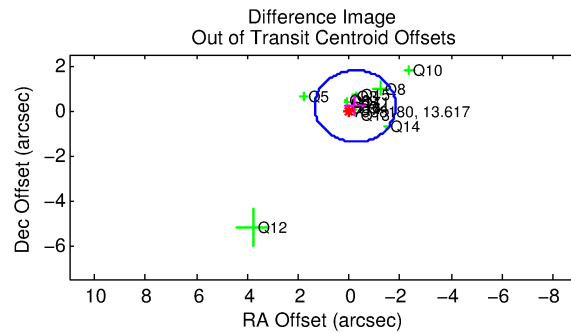
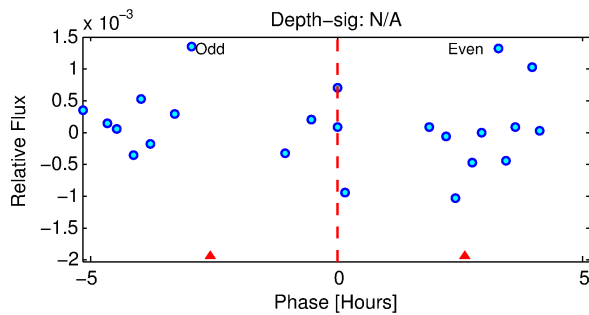
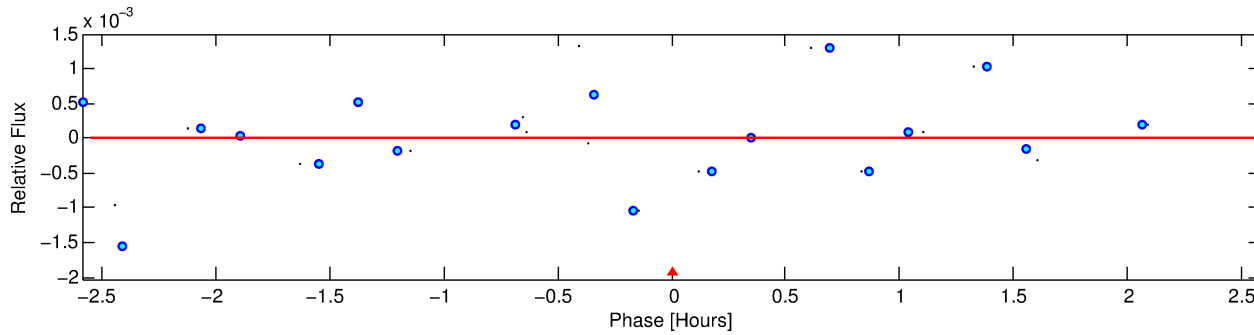
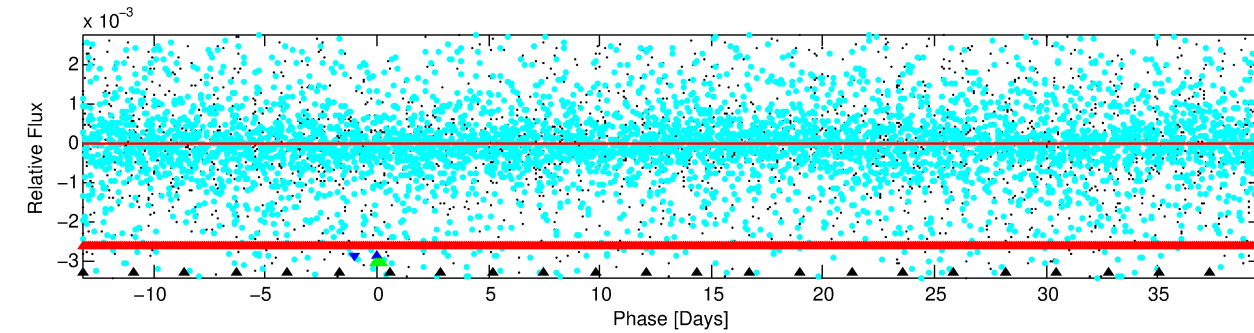
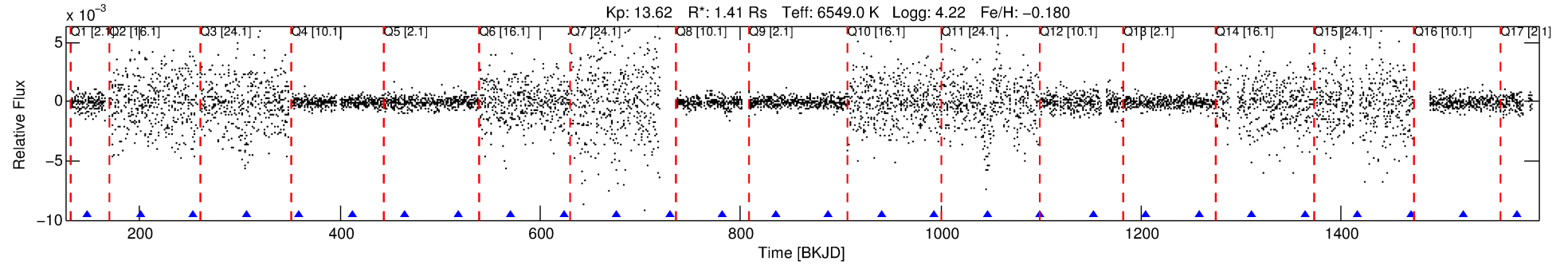
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 007938180-02

No Significant Match Found

# DV One-Page Summary

KIC: 7938180 Candidate: 2 of 4 Period: 52.844 d



## DV Fit Results:

Period = 52.84361 [0.73609] d  
Epoch = 147.9616 [8.7339] BKJD  
Rp/R\* = 0.0017 [14.0556]  
a/R\* = 463.83 [19889189.36]  
b = 0.15 [287244.65]  
Seff = 37.83 [14.29]  
Teq = 632 [60] K  
Rp = 0.27 [2158.04] Re  
a = 0.2937 [0.0743] AU  
Ag = 4700544.99 [76063531081.36]  
Teffp = 45525 [184171226] K [0.005]

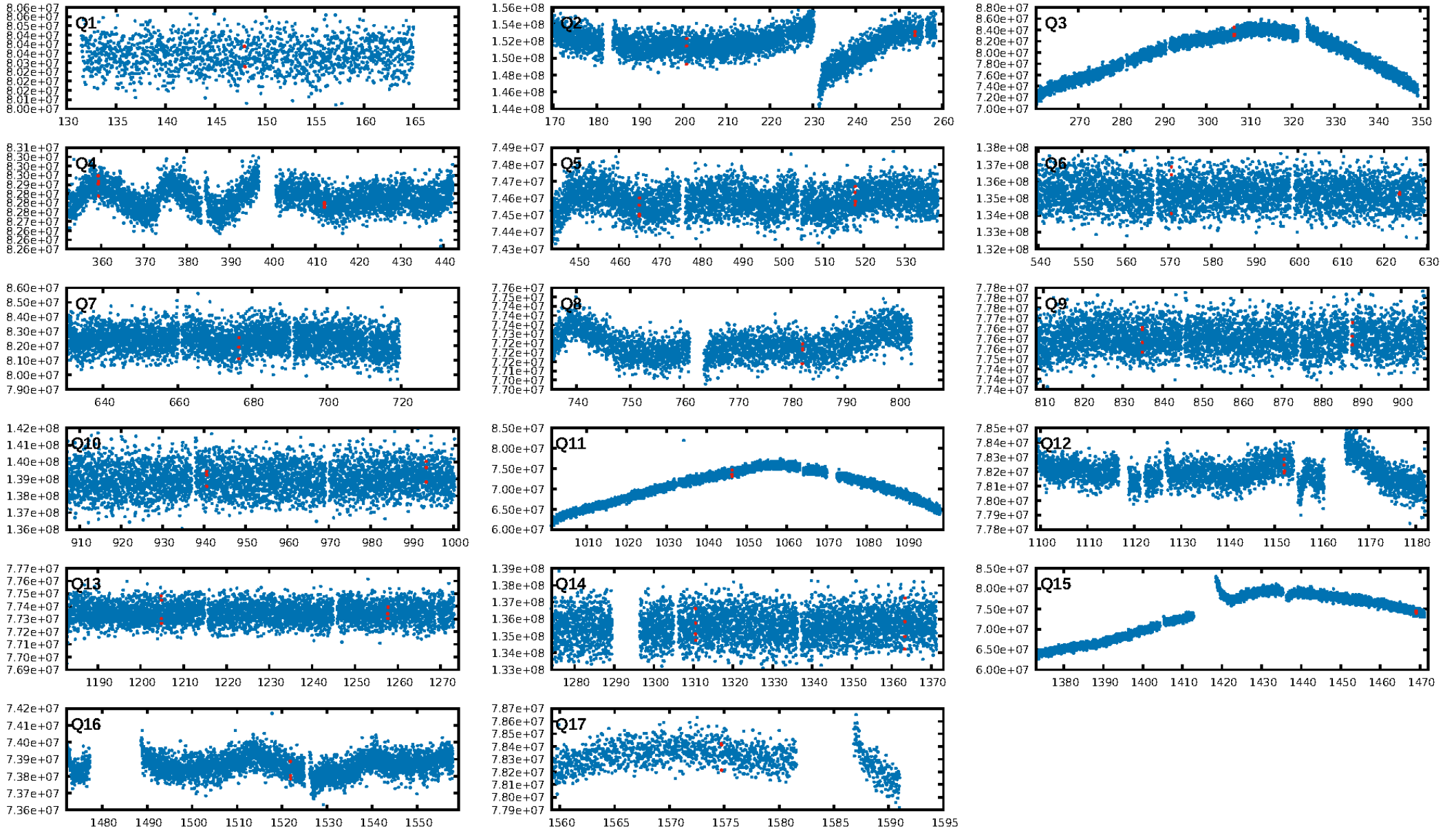
## DV Diagnostic Results:

ShortPeriod-sig: 8.6% [0.11σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 40.3%  
ModelChiSquareGof-sig: 97.7%  
Bootstrap-pfa: 2.42e-24  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: N/A  
Centroid-sig: N/A  
Centroid-so: N/A  
OotOffset-rm: 0.303 arcsec [0.57σ]  
KicOffset-rm: 5.191 arcsec [10.60σ]  
OotOffset-st: 3/4/4/3 [14]  
KicOffset-st: 3/4/4/3 [14]  
DiffImageQuality-fgm: 0.43 [6/14]  
DiffImageOverlap-fno: 0.00 [0/17]

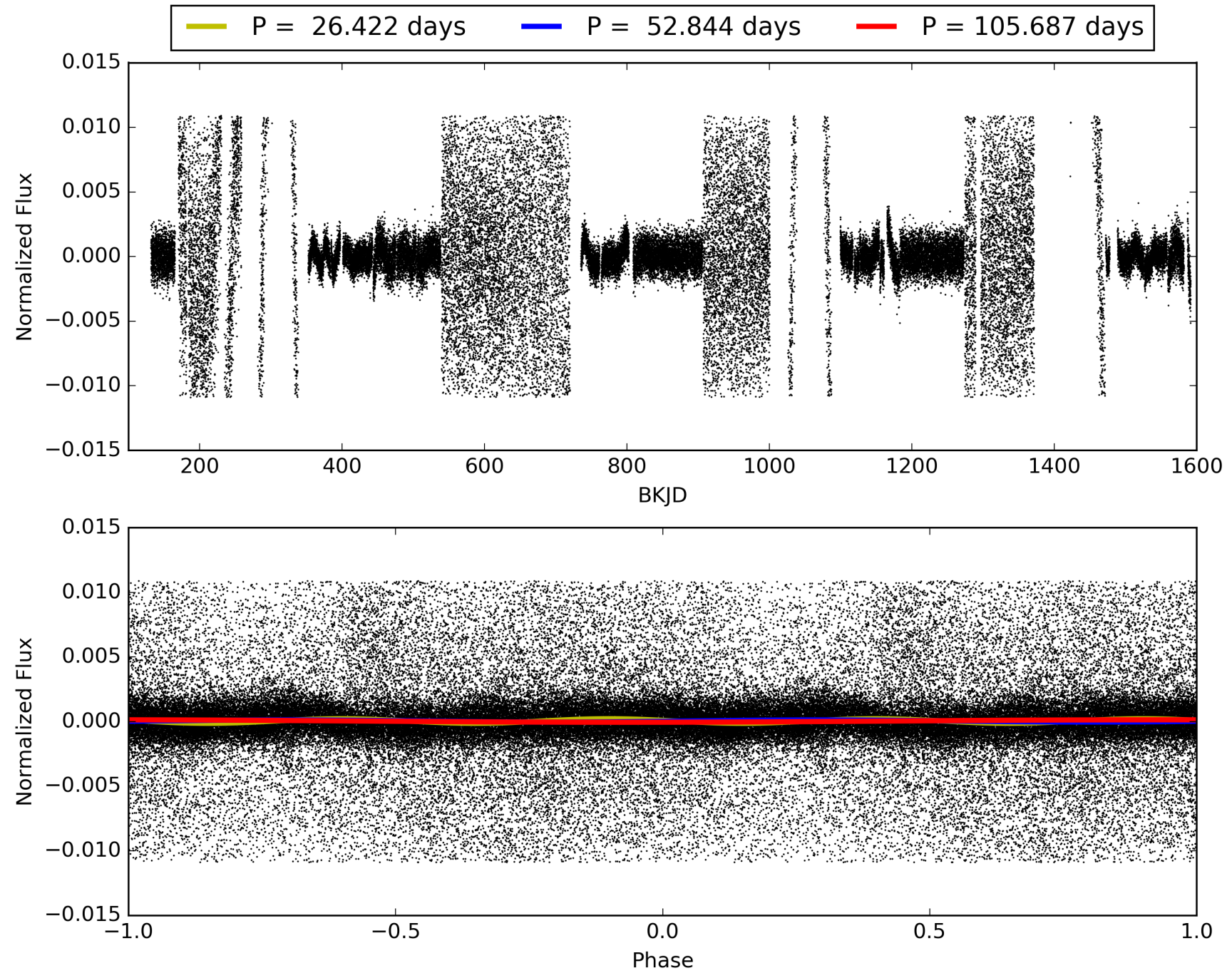
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 07:58:31 Z

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

# TCE 007938180-02, PDC Light Curves



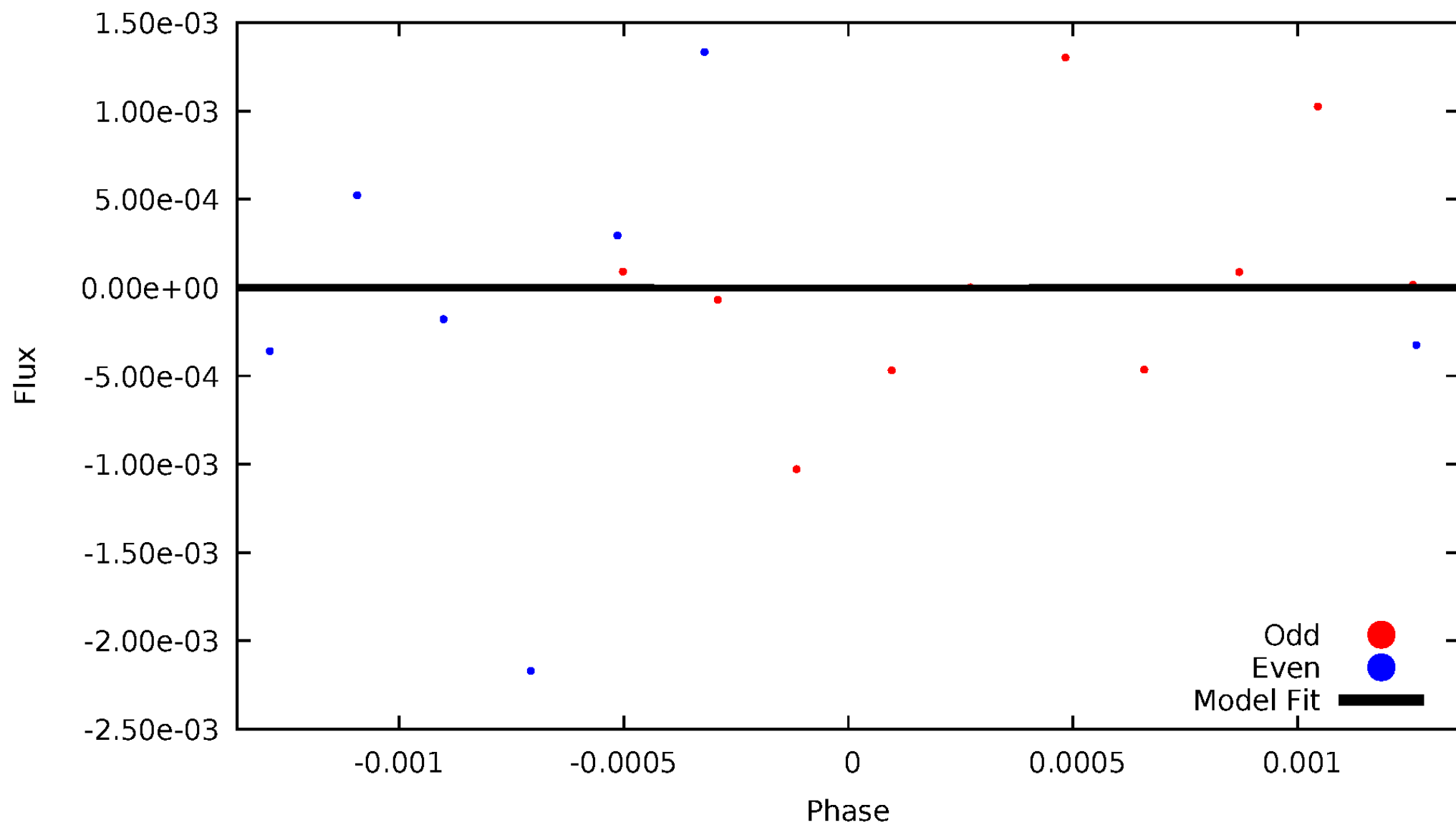
TCE 007938180-02





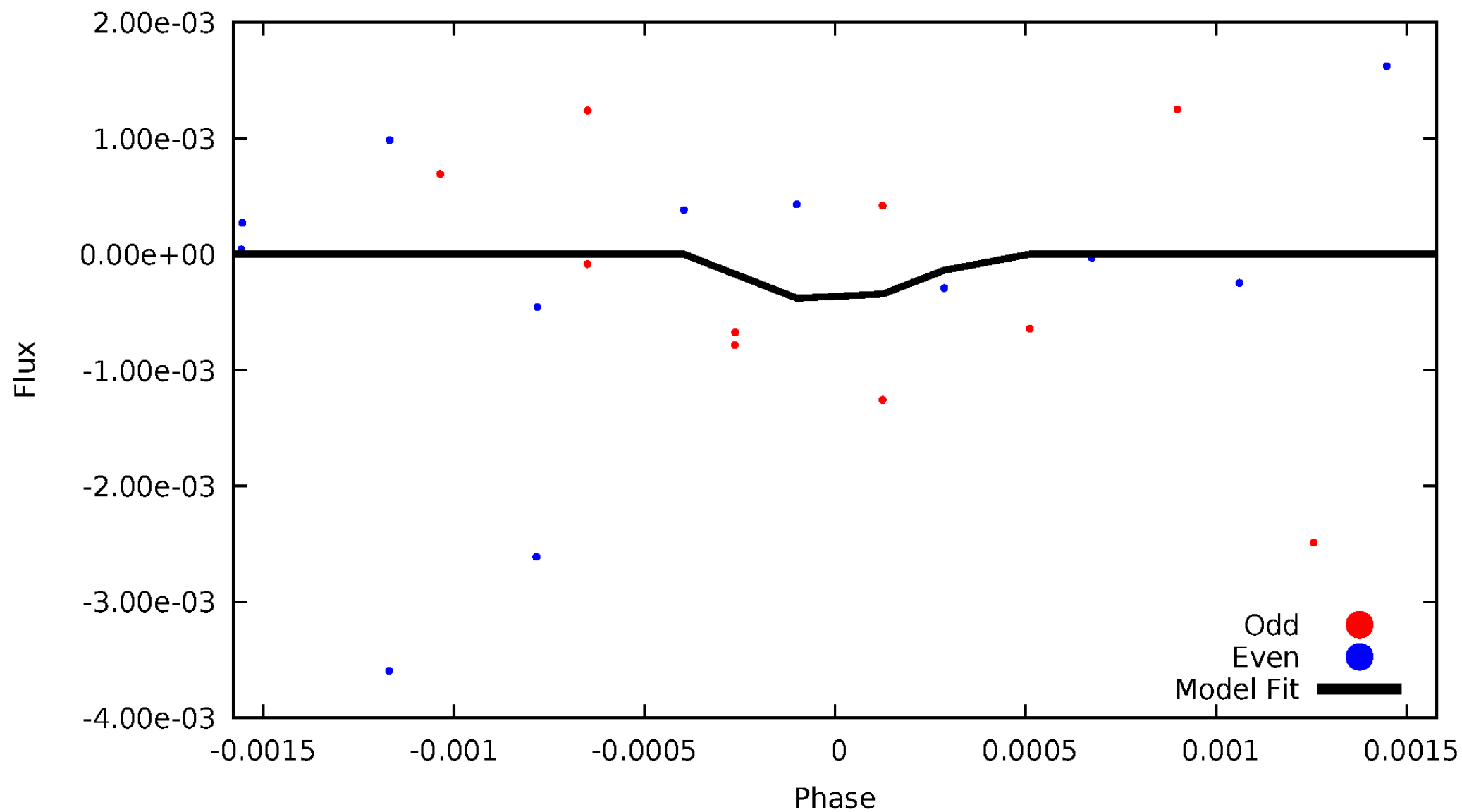
# DV Odd/Even

TCE 007938180-02



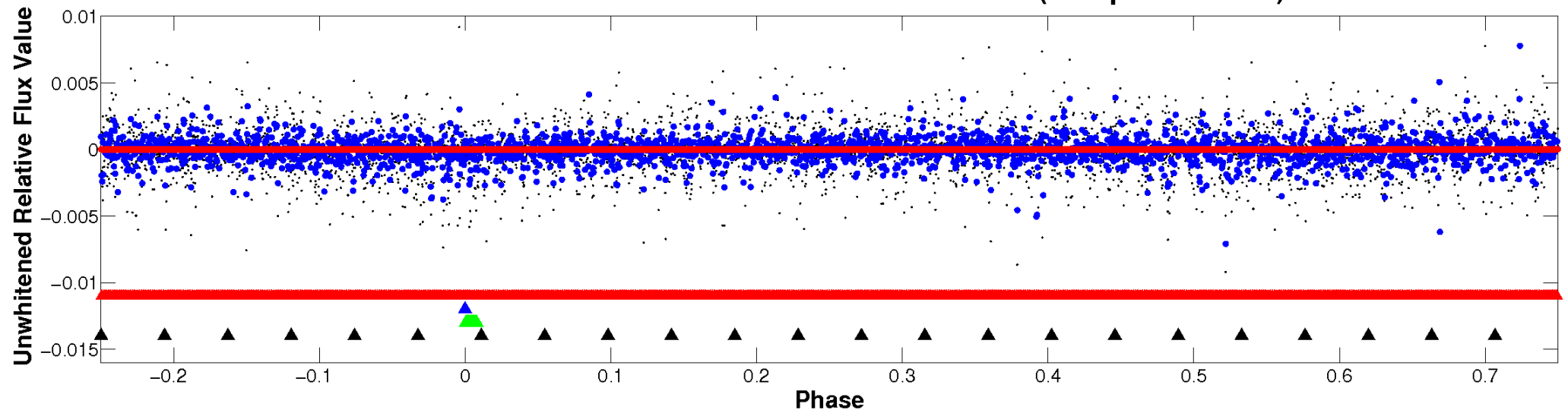
# ALT Odd/Even

TCE 007938180-02

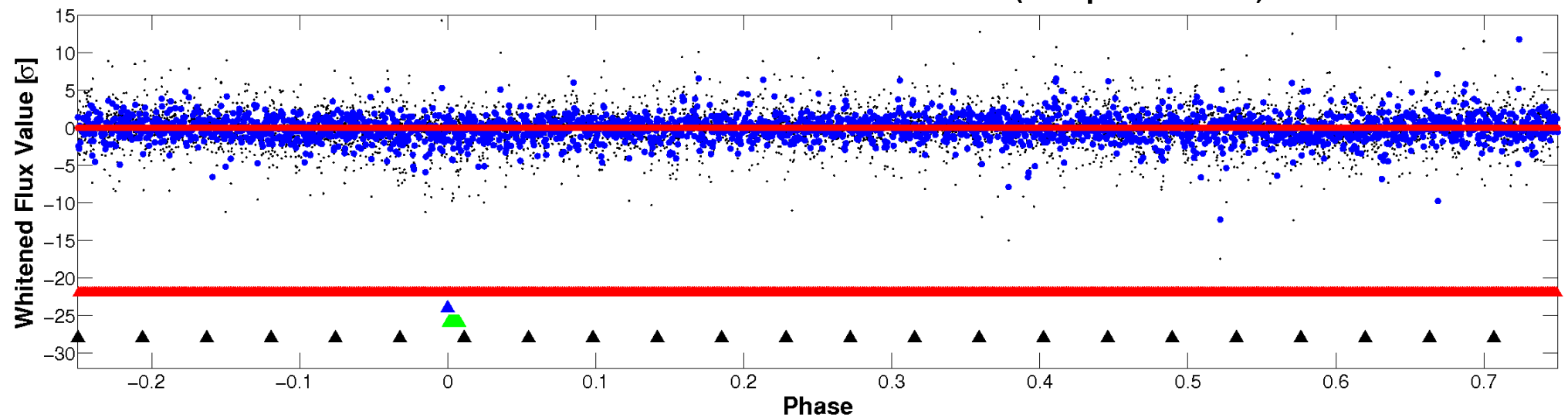


# Non-Whitened Vs. Whitened Light Curve

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

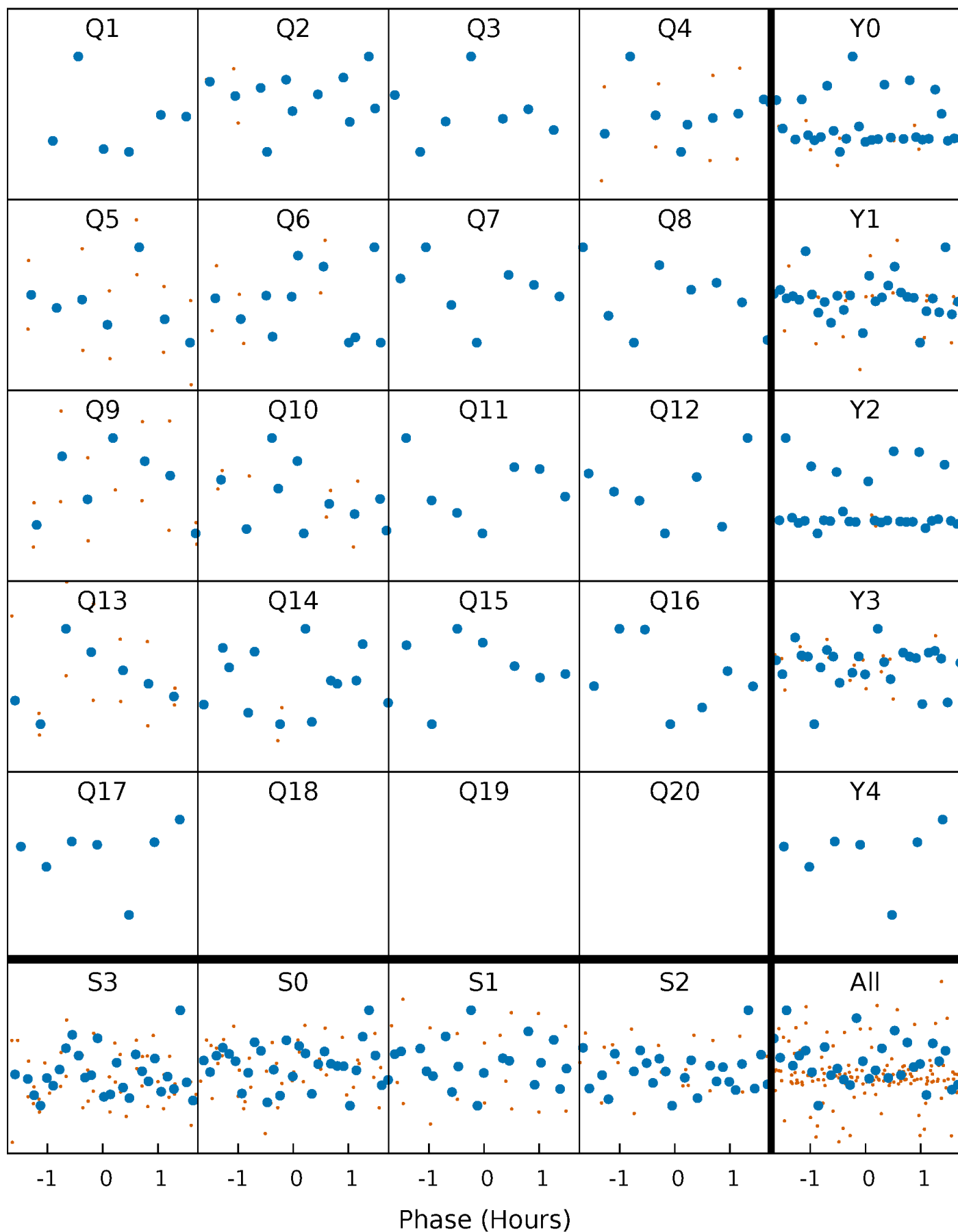


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

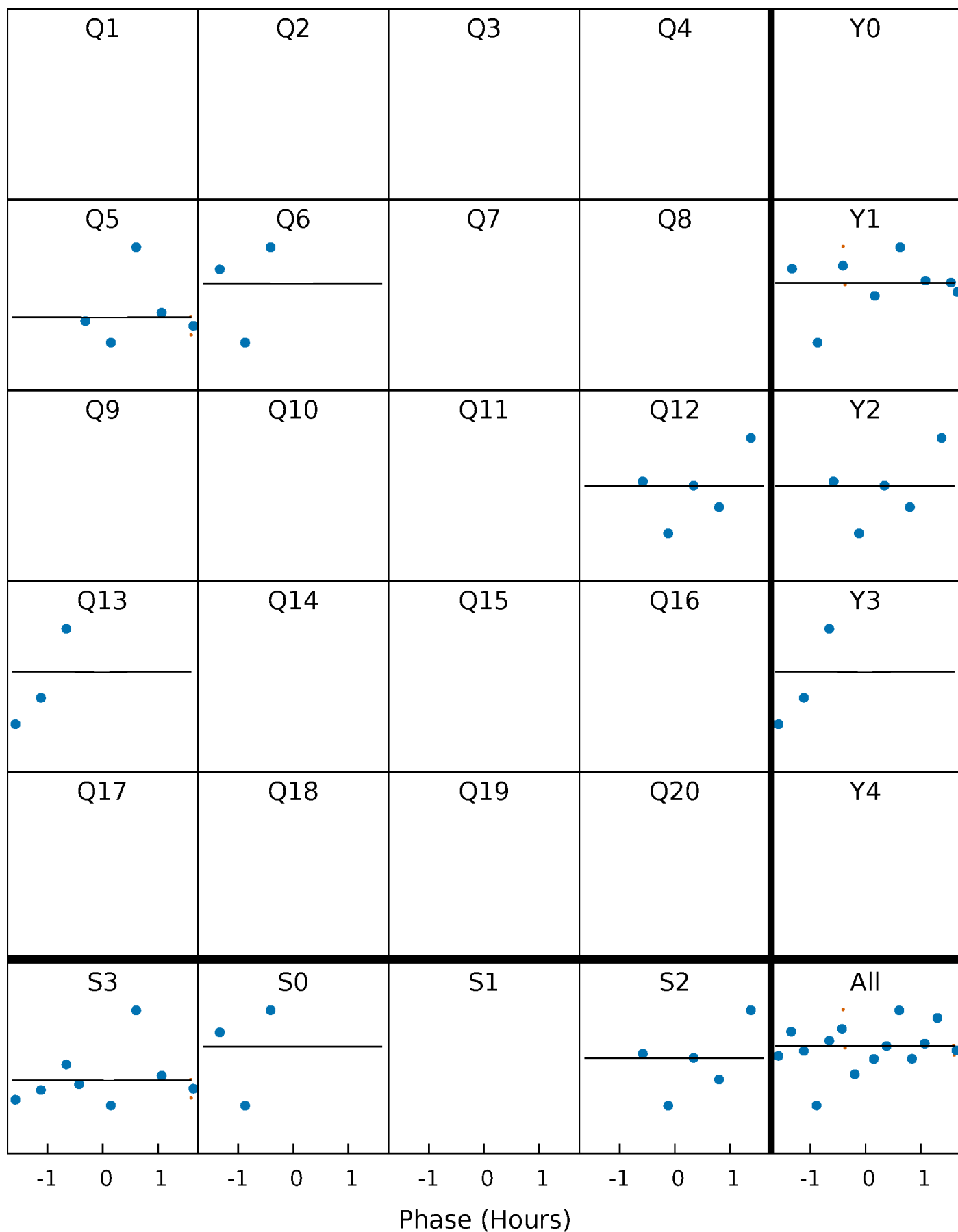
TCE 007938180-02   P= 52.843608 Days    $T_0=147.961565$  (BKJD)





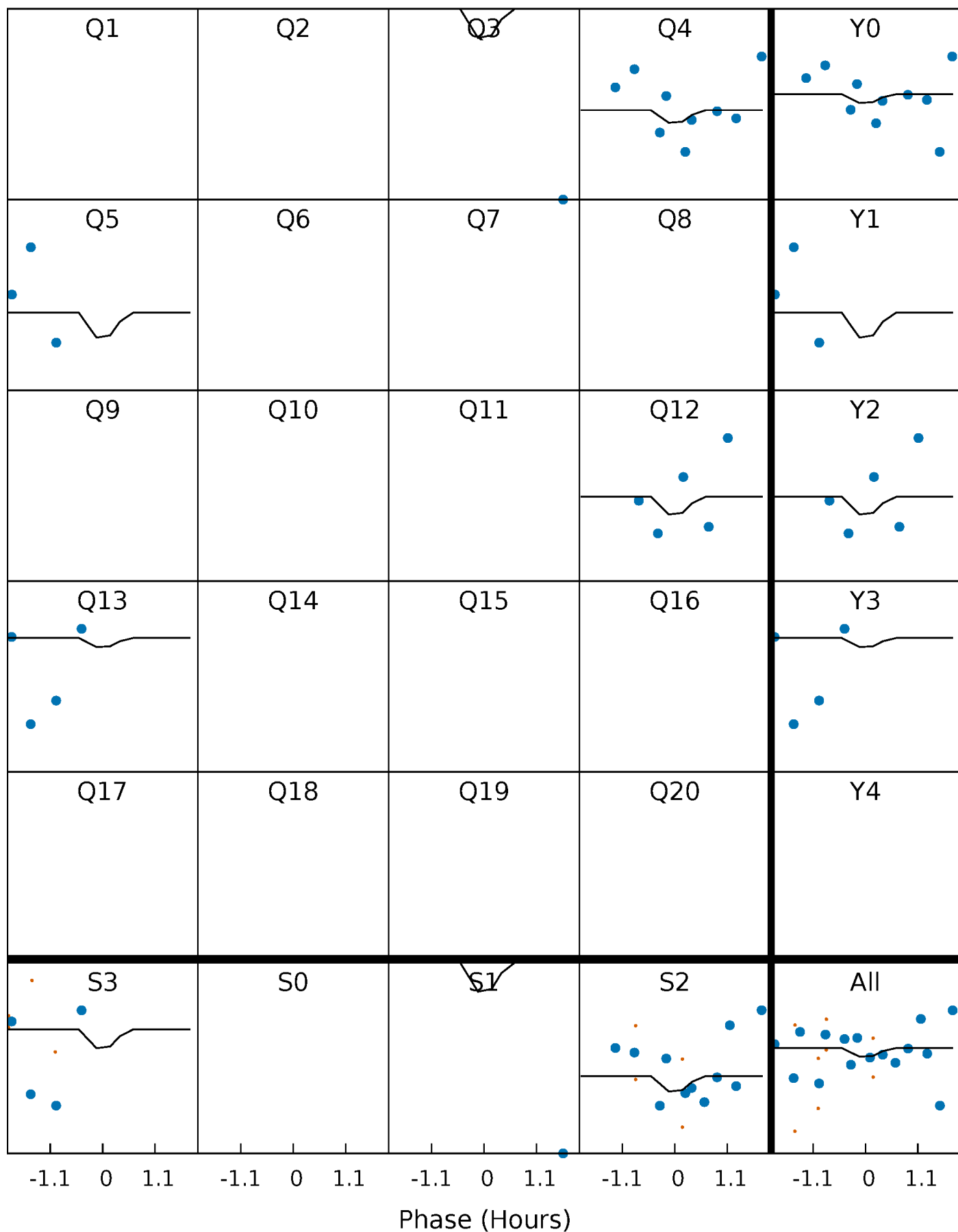
# DV Quarter-Phased Transit Curves

TCE 007938180-02   P= 52.843608 Days    $T_0=147.961565$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

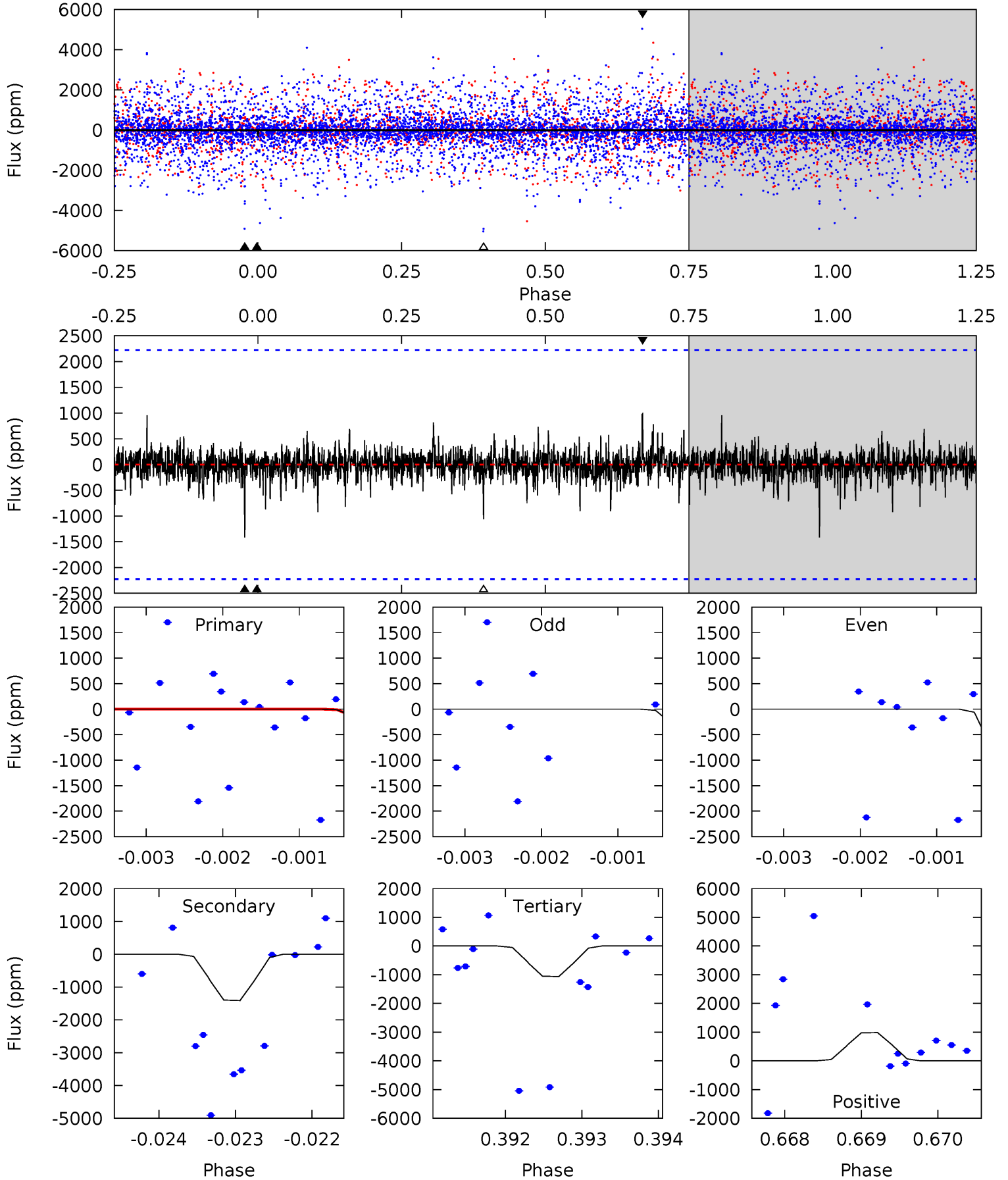
TCE 007938180-02 P= 52.829606 Days  $T_0=148.235370$  (BKJD)



# DV Model-Shift Uniqueness Test

007938180-02, P = 52.843608 Days, E = 95.117957 Days

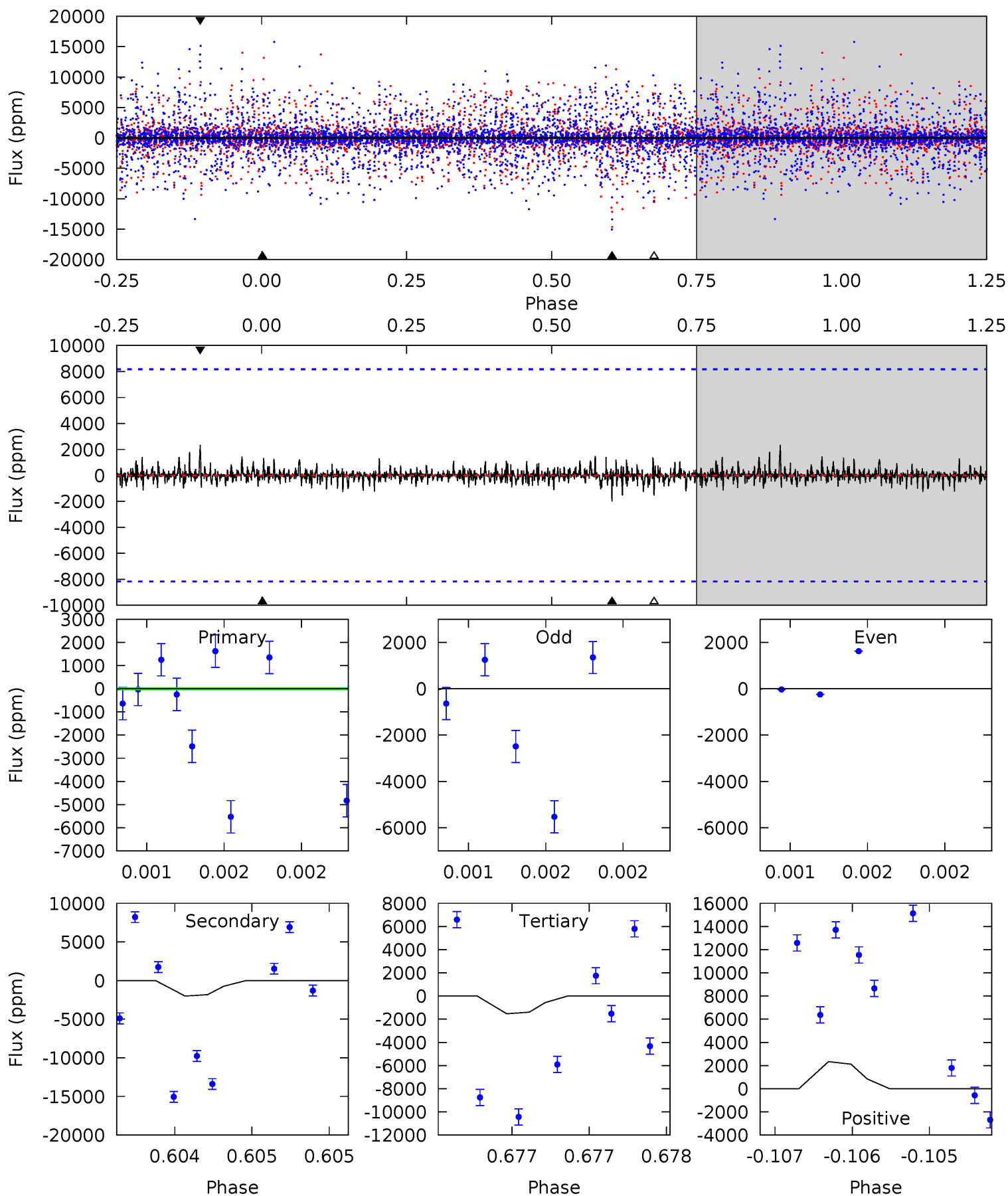
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0.64	3.46	2.60	2.42	5.45	3.29	0.48	-1.97	-1.78	0.85	1.04	0.74	1.00	0.41	0.04



# Alt Model-Shift Uniqueness Test

007938180-02, P = 52.829606 Days, E = 95.405764 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
0.23	1.35	1.03	1.57	5.50	3.36	0.22	-0.80	-1.34	0.32	-0.22	0.10	-15.1	0.54	0.08





### Stellar Parameters For KIC 007938180

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6549^{+146}_{-211}$	$4.224^{+0.153}_{-0.187}$	$-0.180^{+0.250}_{-0.300}$	$1.407^{+0.439}_{-0.293}$	$1.215^{+0.192}_{-0.174}$	$0.614^{+0.461}_{-0.304}$
	+2%/-3%	+4%/-4%	+139%/-167%	+31%/-21%	+16%/-14%	+75%/-50%
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 007938180-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	-1411 $\pm$ 408	$1453.03^{+1599.86}_{-1008.90}$	$884^{+66}_{-54}$	$-1729^{+3212}_{-62}$	$0.031^{+0.307}_{-0.024}$
Alt.	-2006 $\pm$ 1486	$1410.50^{+1629.85}_{-966.63}$	$884^{+70}_{-60}$	$-1732^{+3317}_{-70}$	$0.031^{+0.370}_{-0.027}$

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

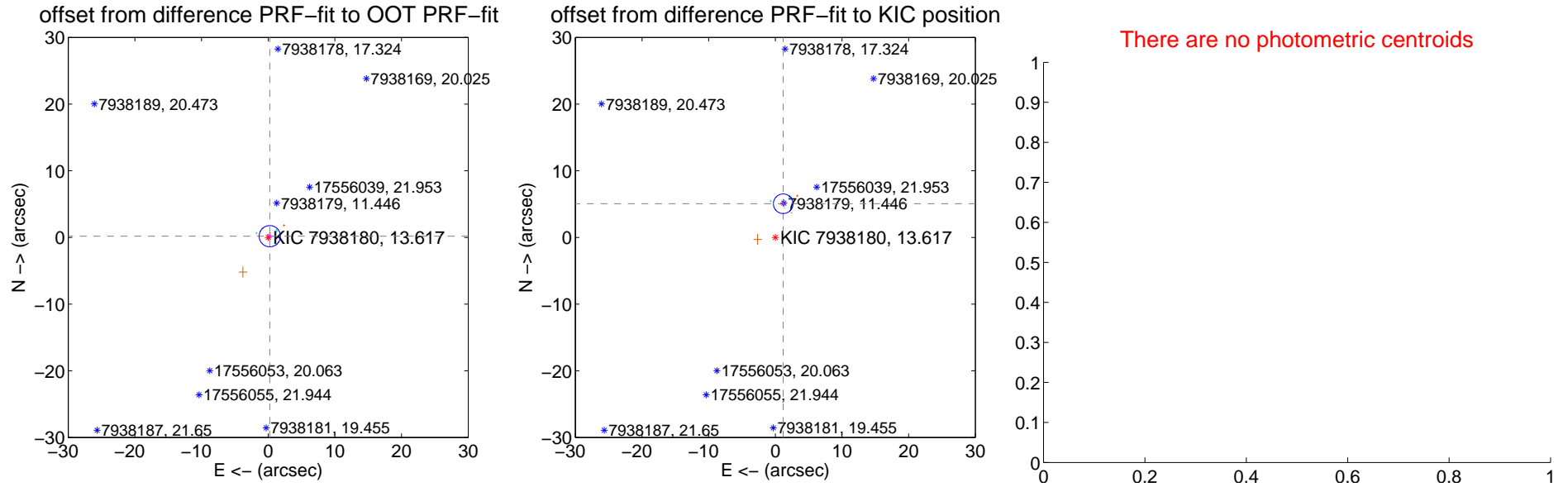
## DV Centroid Data

Supplemental centroid analysis for 007938180-02. Kepler magnitude: 13.62. Transit SNR 0.01

There are 6 quarters with good PRF difference image offsets

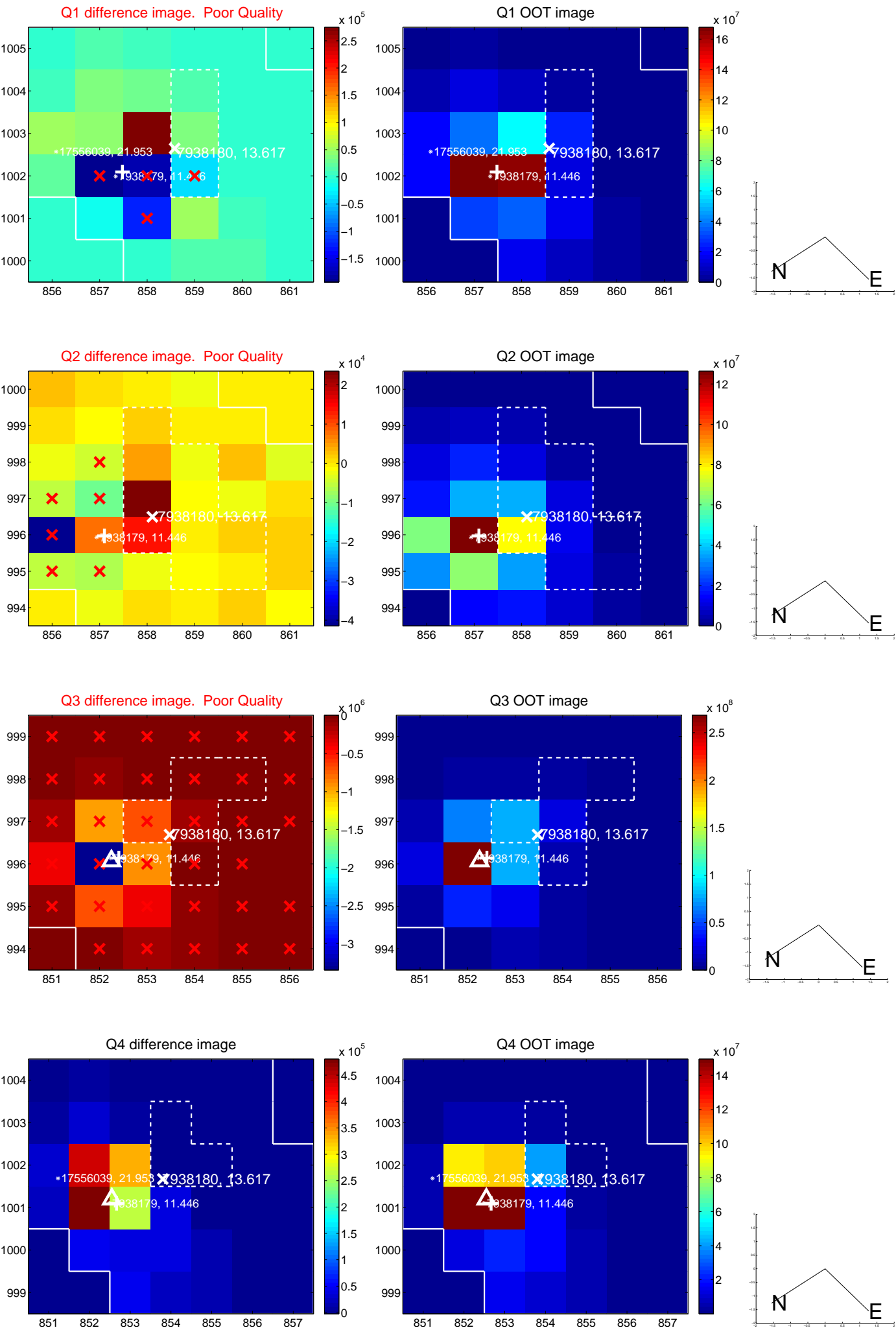
The OOT PRF centroid is offset from the target star catalog position by about 4.74 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.303 \pm 0.531$	0.57	$-0.238 \pm 0.386$	$0.188 \pm 0.428$
PRF-fit source offset from KIC position	$5.191 \pm 0.490$	10.60	$-1.178 \pm 0.376$	$5.055 \pm 0.434$
photometric centroid source offset	—	—	—	—

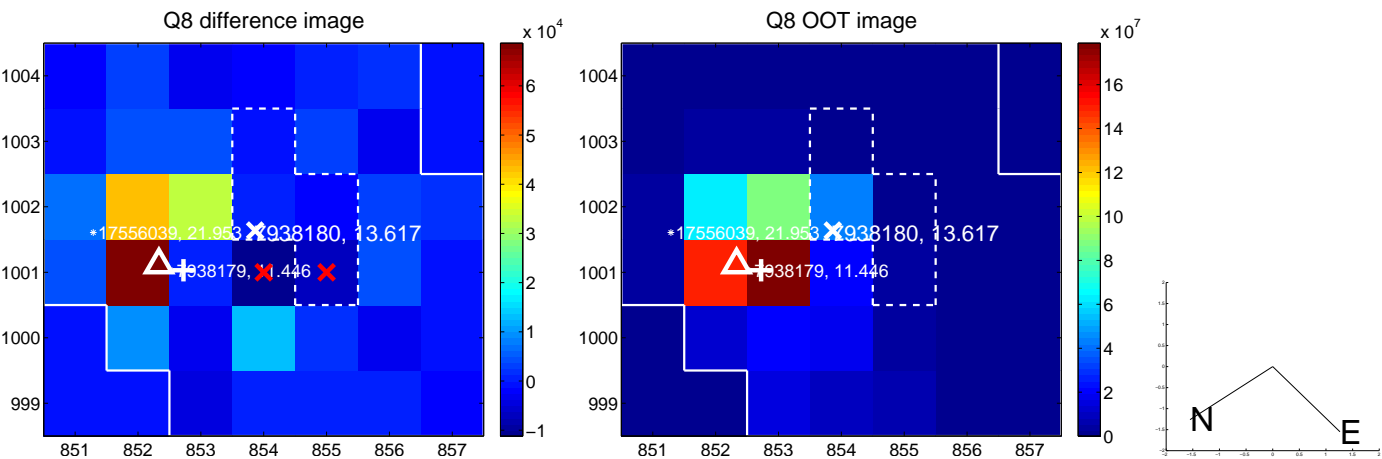
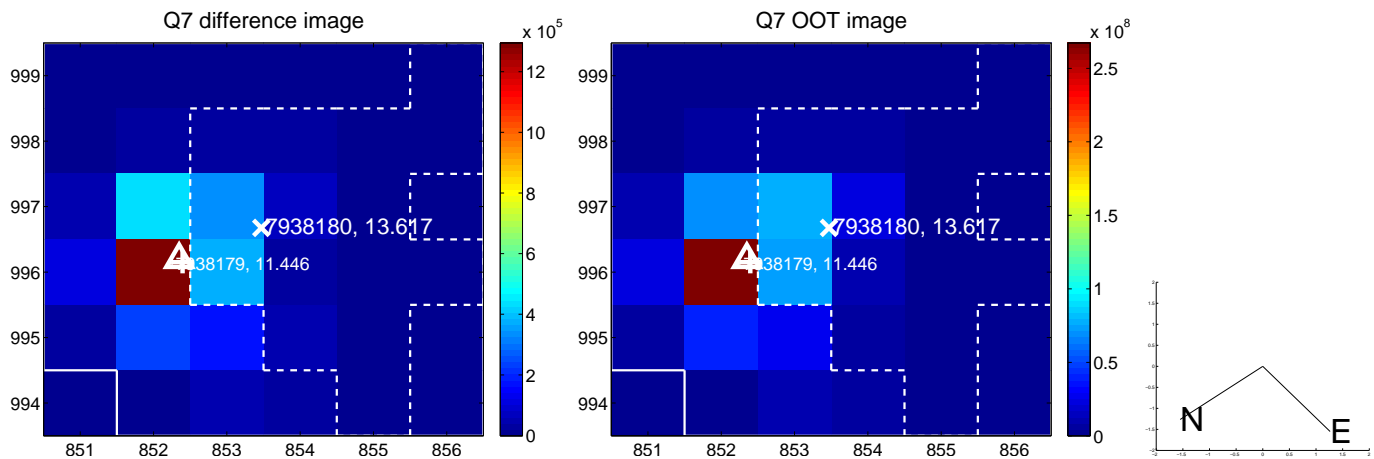
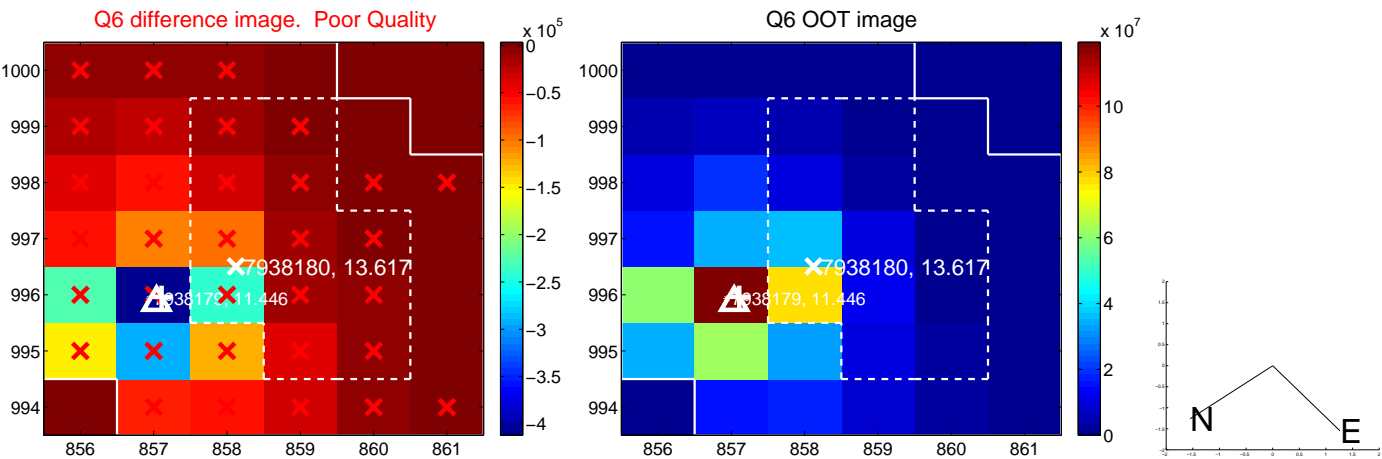
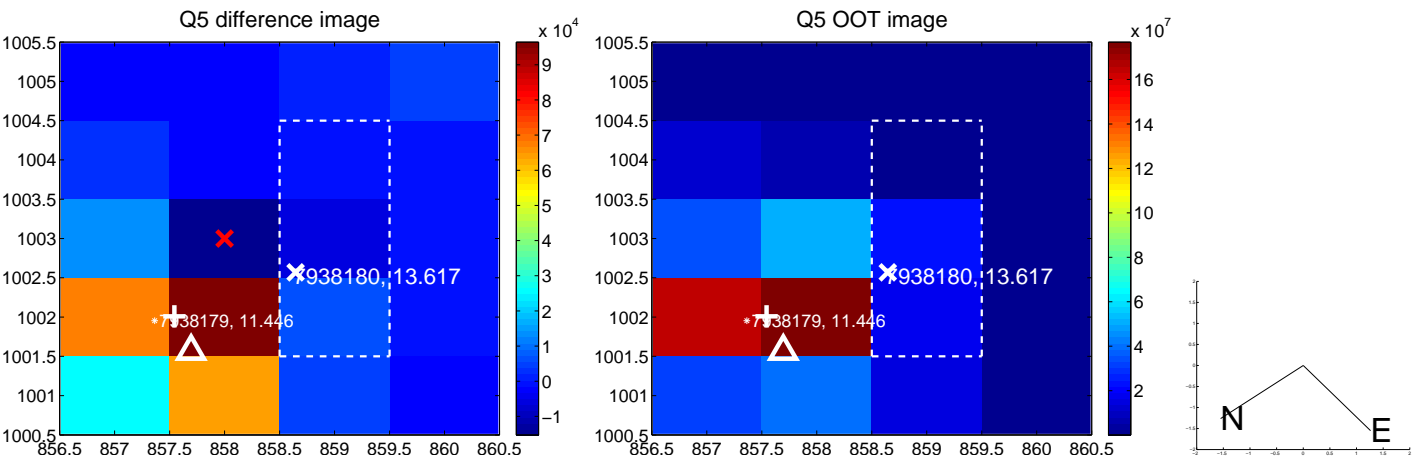


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

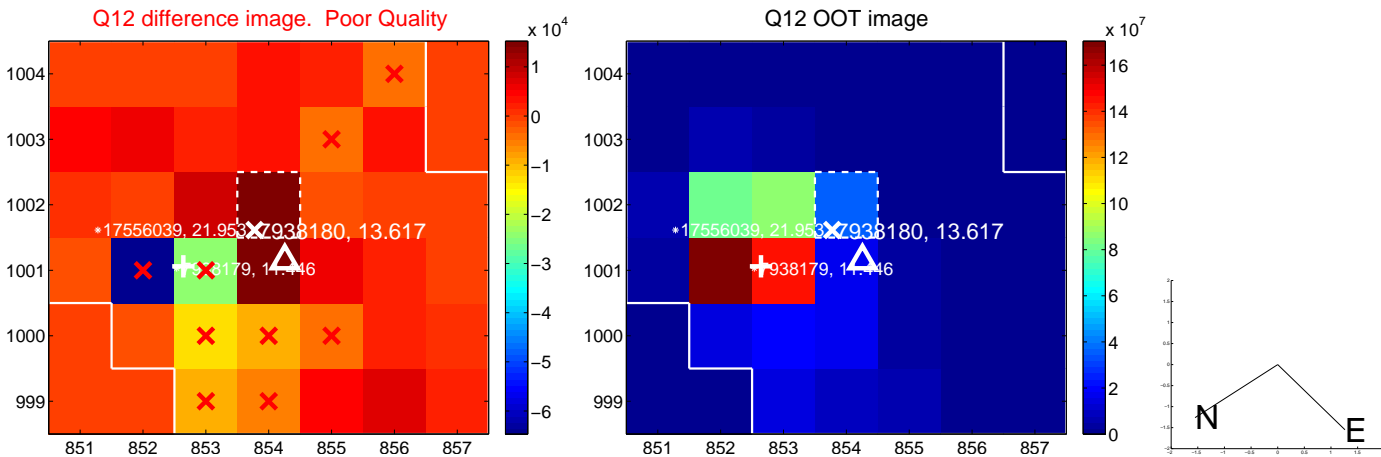
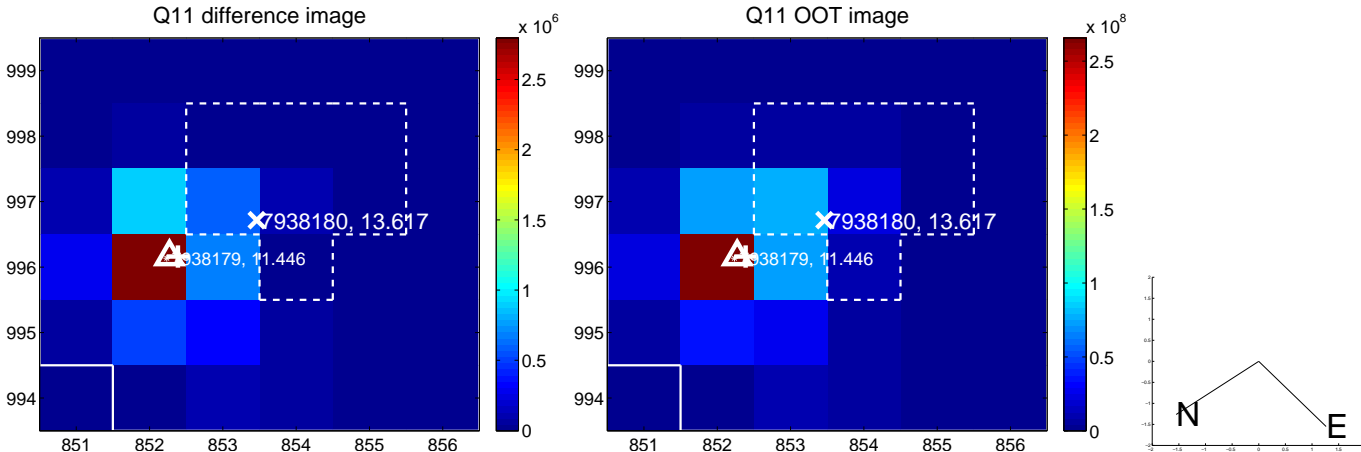
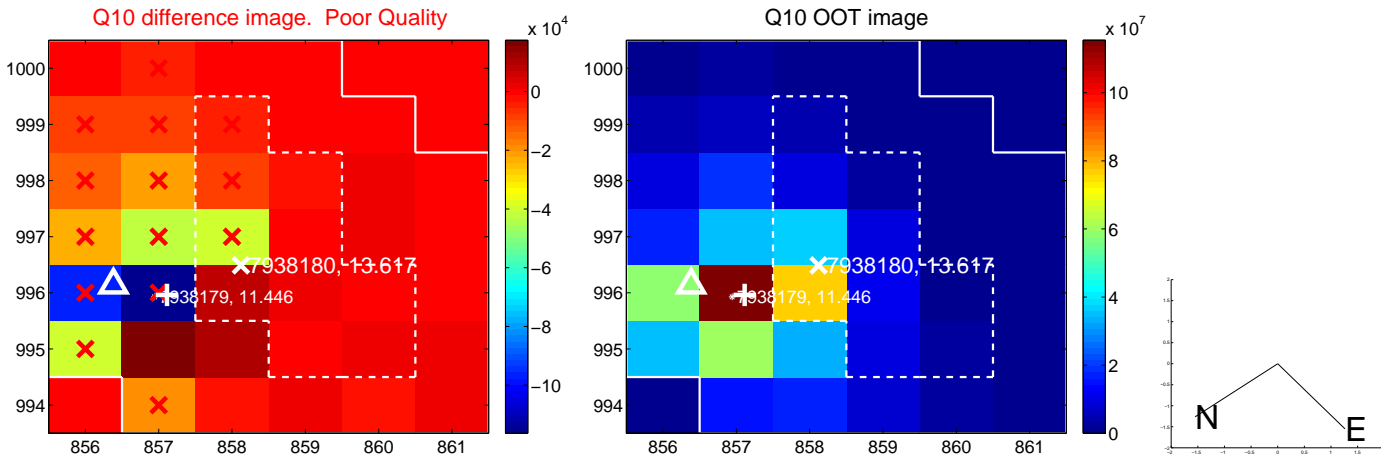
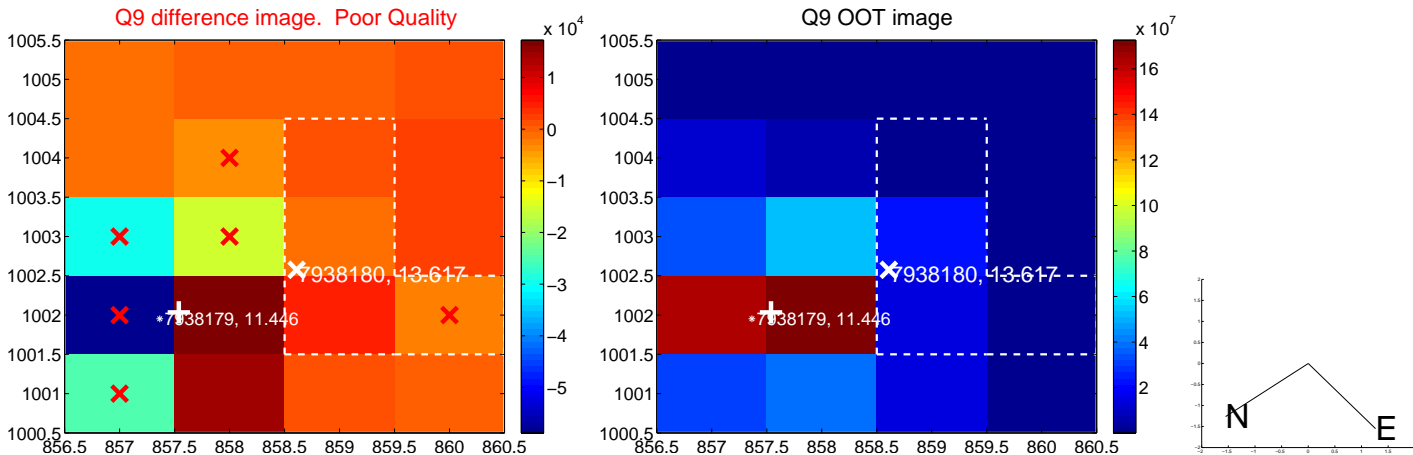
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



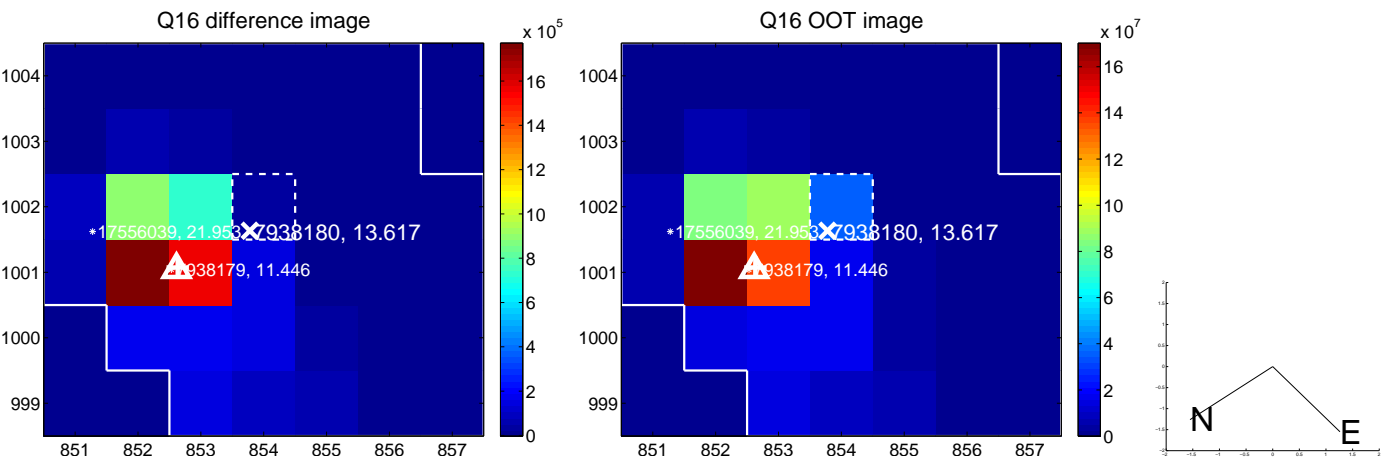
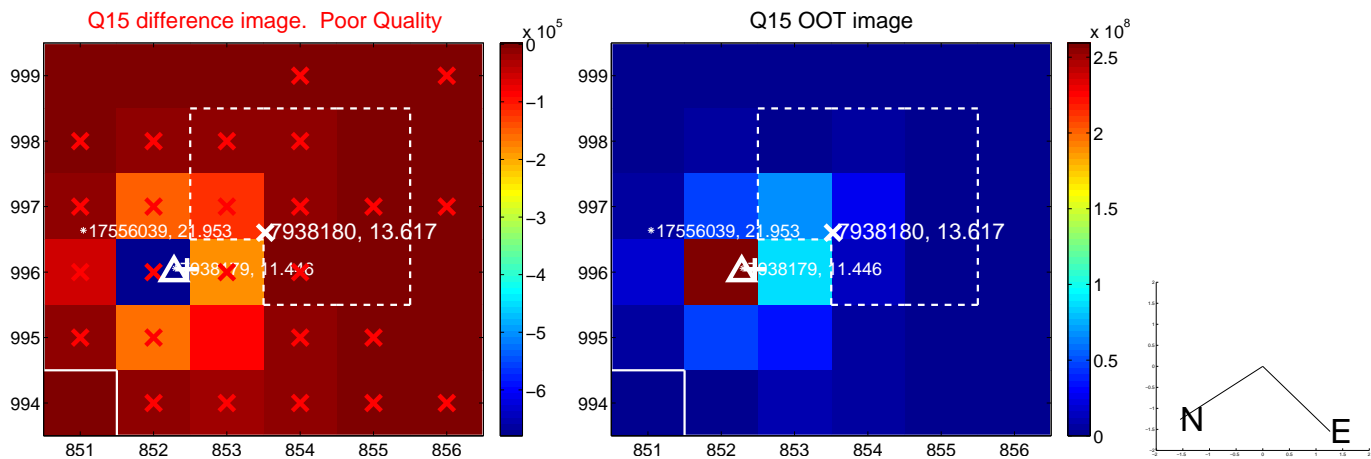
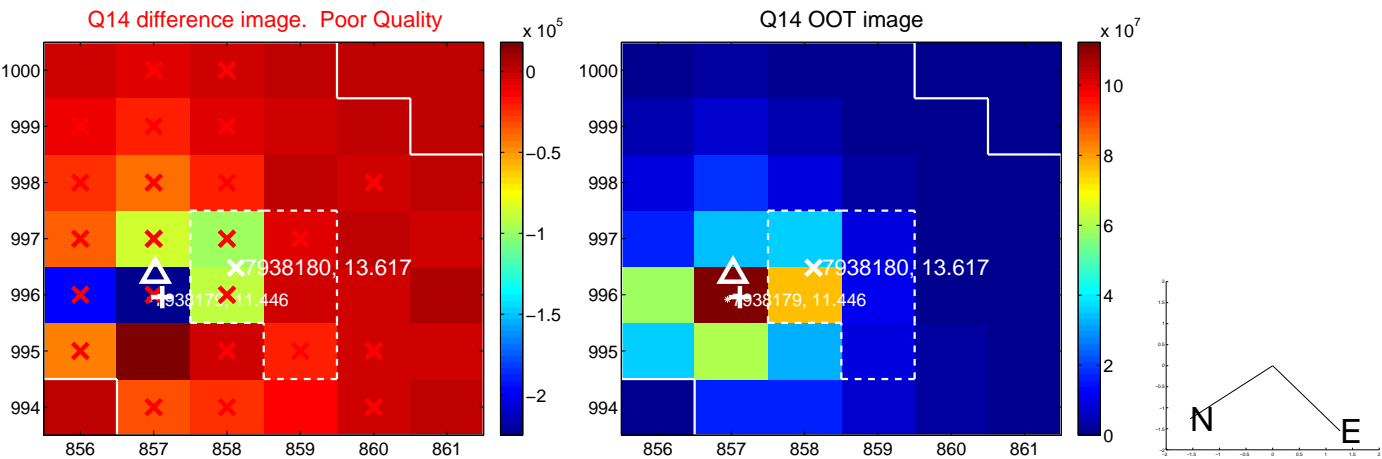
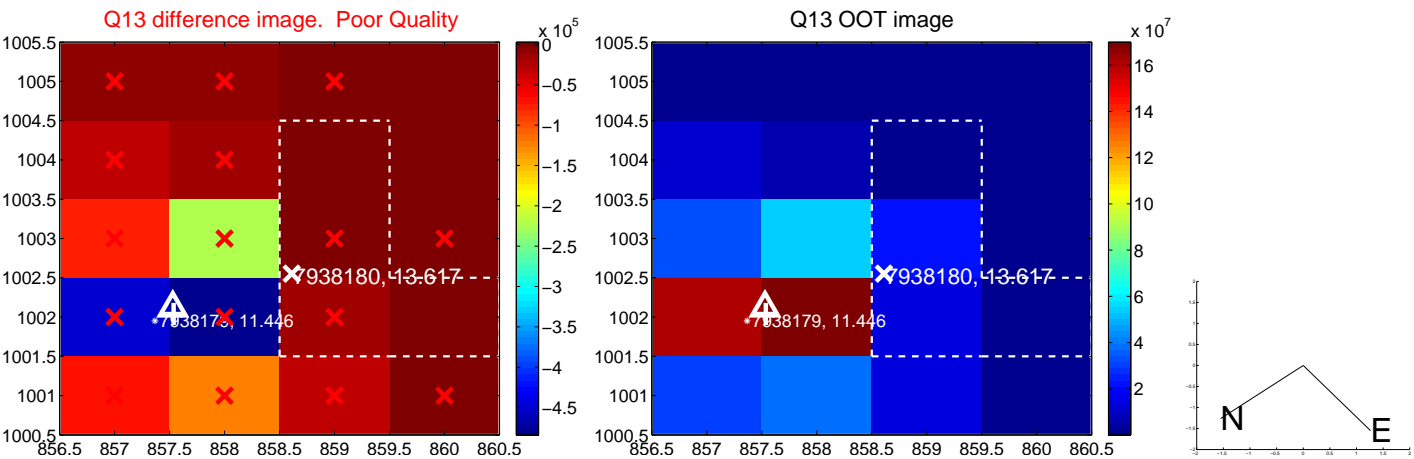
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

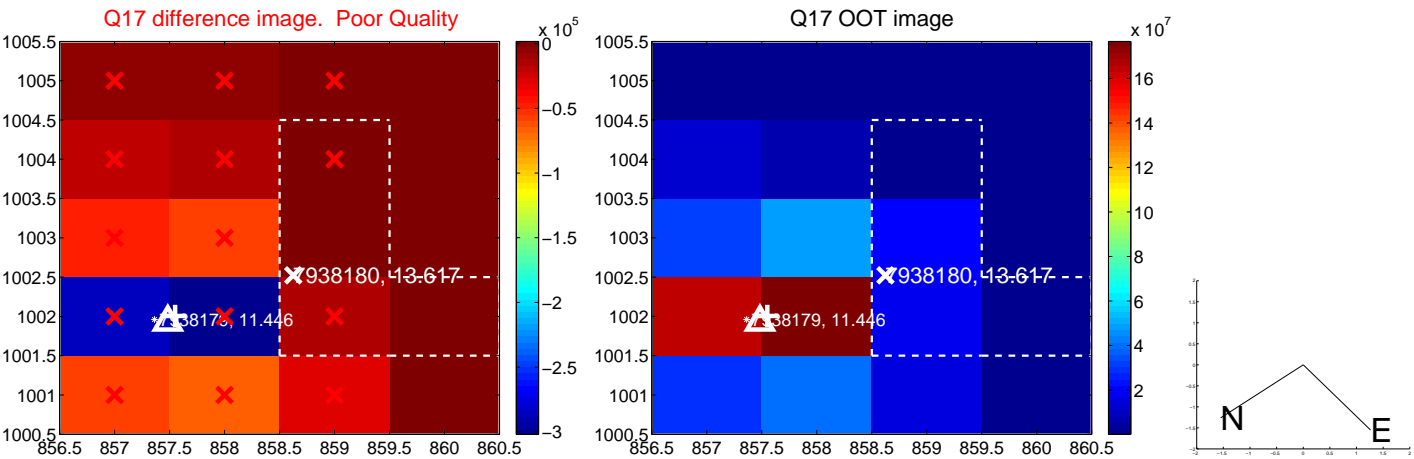


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





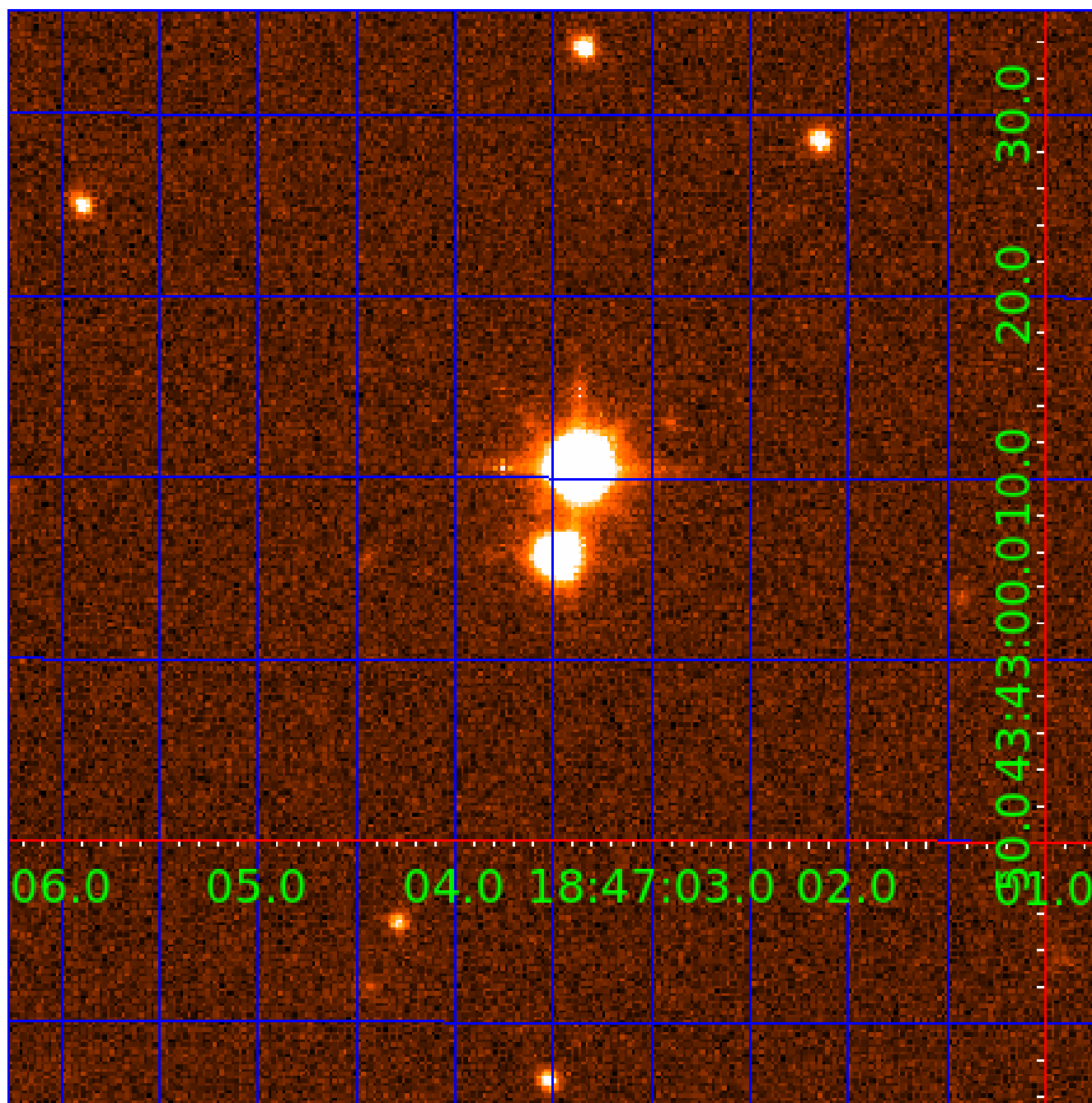
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



folded centroid time series figure for this object.

UKIRT Image

Declination



# KIC 007938180

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007938180-01	OBS	No	0.959331	131.755238	56.8	6.726	8.2	9.3	1.41	6549	1.20	7928.04
007938180-02	OBS	No	52.843608	147.961565	3.5	0.862	20.8	0.0	1.41	6549	0.27	37.83
007938180-03	OBS	No	52.829553	148.375781	1572.5	3.000	18.3	-1.0	1.41	6549	5.62	37.84
007938180-04	OBS	No	41.356164	134.760722	5456.9	0.629	14.4	3.5	1.41	6549	10.84	52.45

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007938180-01	OBS	FP	0.00	1	0	1	1	LPP_DV—LPP_ALT—CENT_RESOLVED_OFFSET—EPHEM_MATCH
007938180-02	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_SKYE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_RESOLVED_OFFSET
007938180-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—NO_FITS—SAME_NTL_PERIOD—CENT_NOFITS
007938180-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_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.

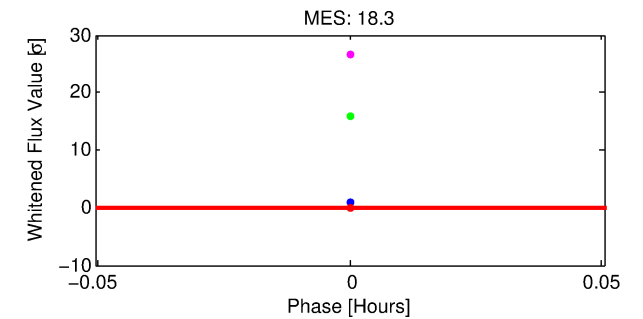
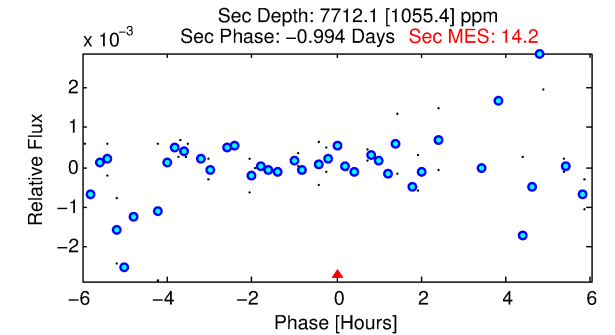
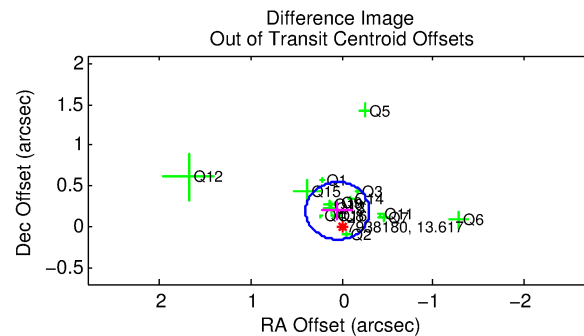
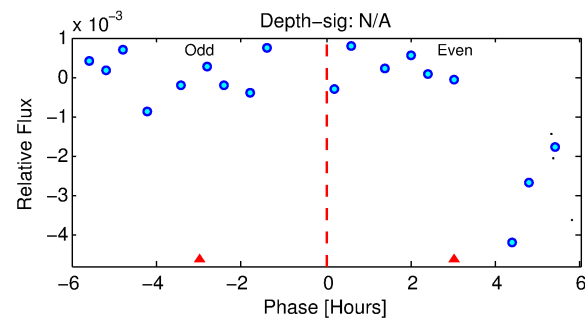
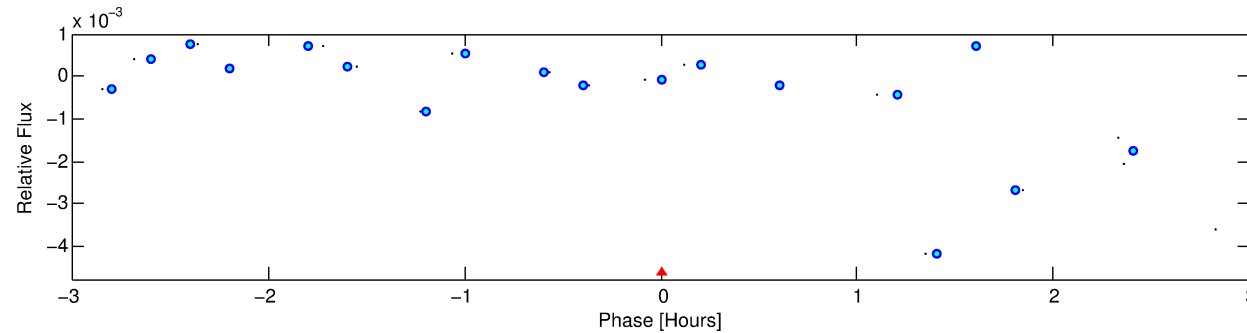
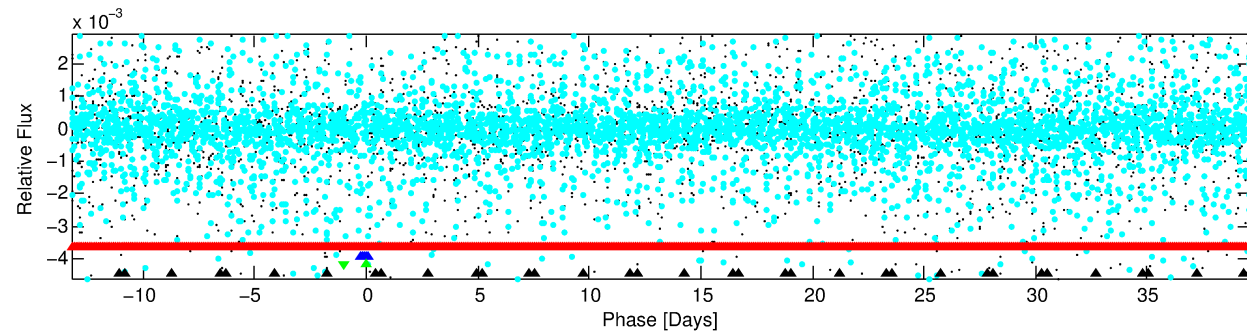
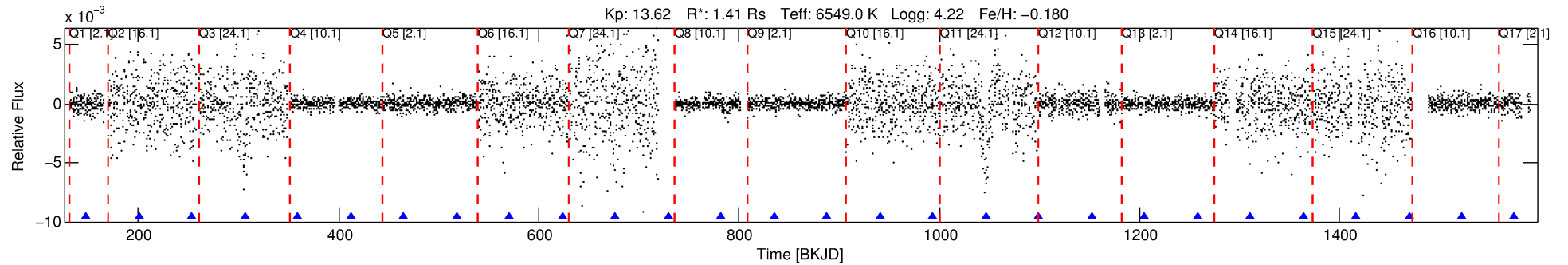
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 007938180-03

No Significant Match Found

# DV One-Page Summary

KIC: 7938180 Candidate: 3 of 4 Period: 52.830 d



## TPS TCE Results:

Period = 52.82955 d  
Epoch = 148.3758 BKJD

DV fit results are unavailable

## DV Diagnostic Results:

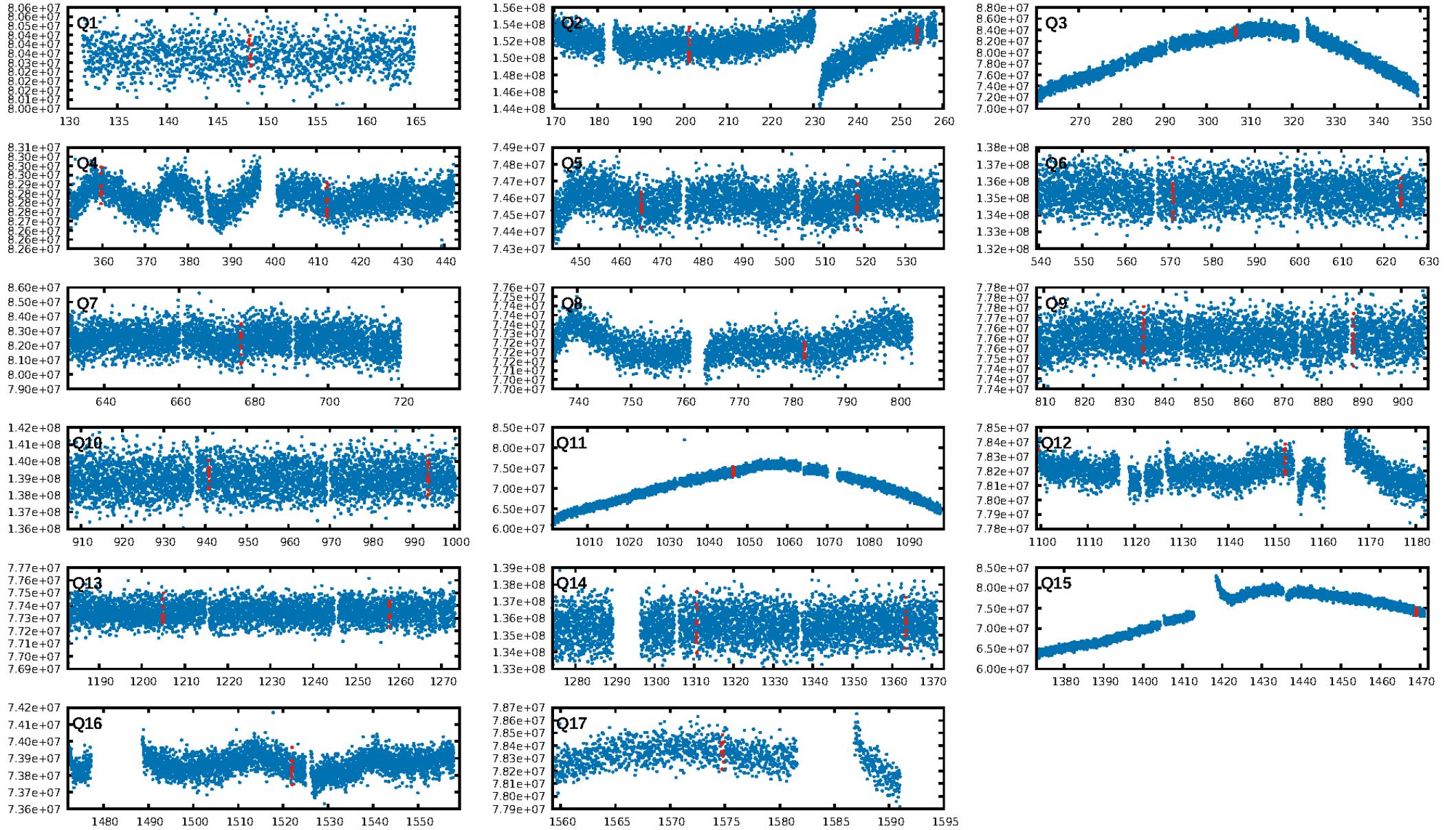
ShortPeriod-sig: 100.0% [89.84σ]  
LongPeriod-sig: 8.6% [0.11σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 1.13e-20  
RollingBand-fgt: 1.00 [2/2]  
GhostDiagnostic-chr: 0.3089

Centroid-sig: 70.1%  
Centroid-so: 2.608 arcsec [4.52σ]  
OotOffset-rm: 0.203 arcsec [1.73σ]  
KicOffset-rm: 5.157 arcsec [42.25σ]  
OotOffset-st: 4/4/4/4 [16]  
KicOffset-st: 4/4/4/4 [16]  
DiffImageQuality-fgm: 0.56 [9/16]  
DiffImageOverlap-fno: 0.00 [0/16]

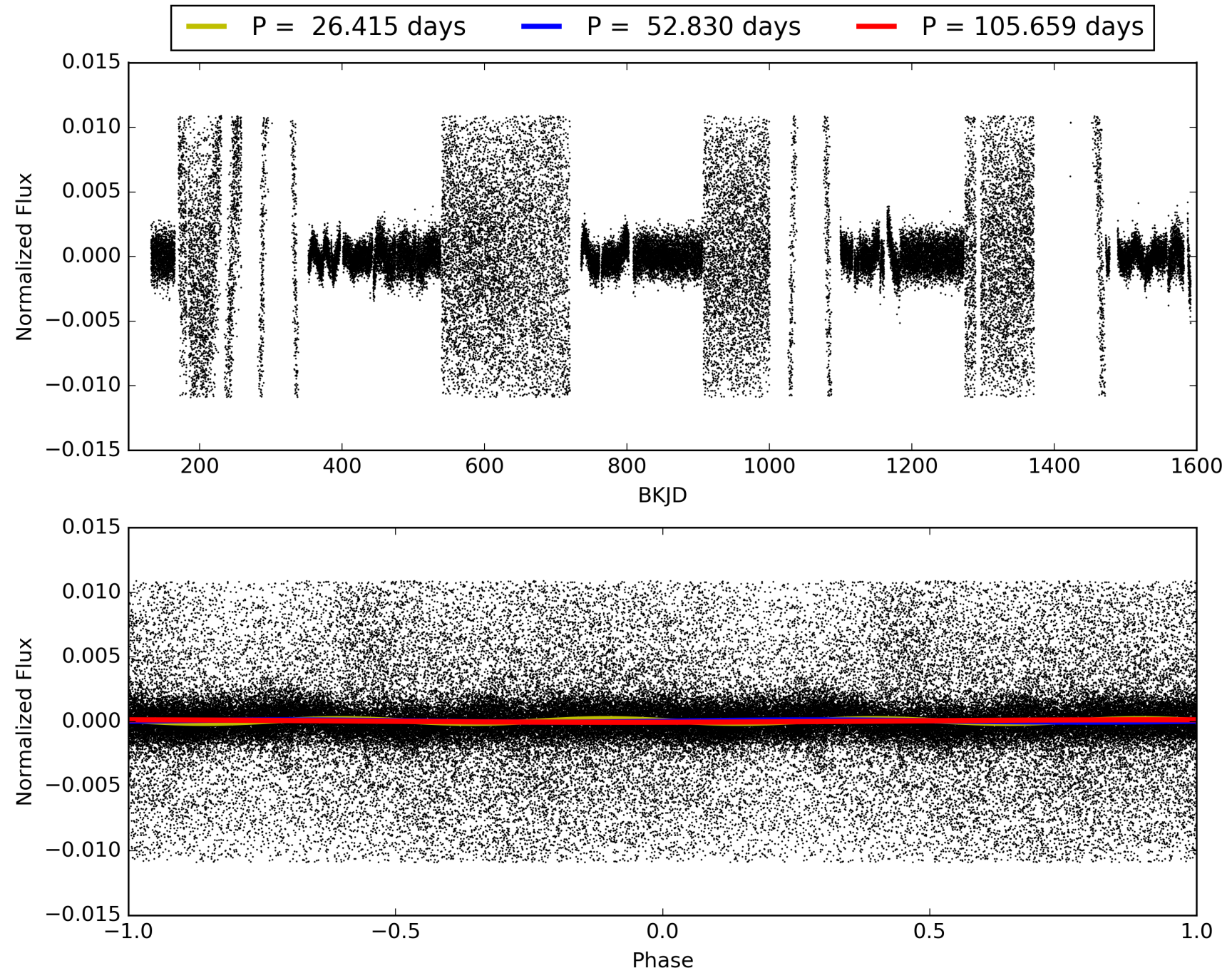
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 07:58:35 Z

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

# TCE 007938180-03, PDC Light Curves



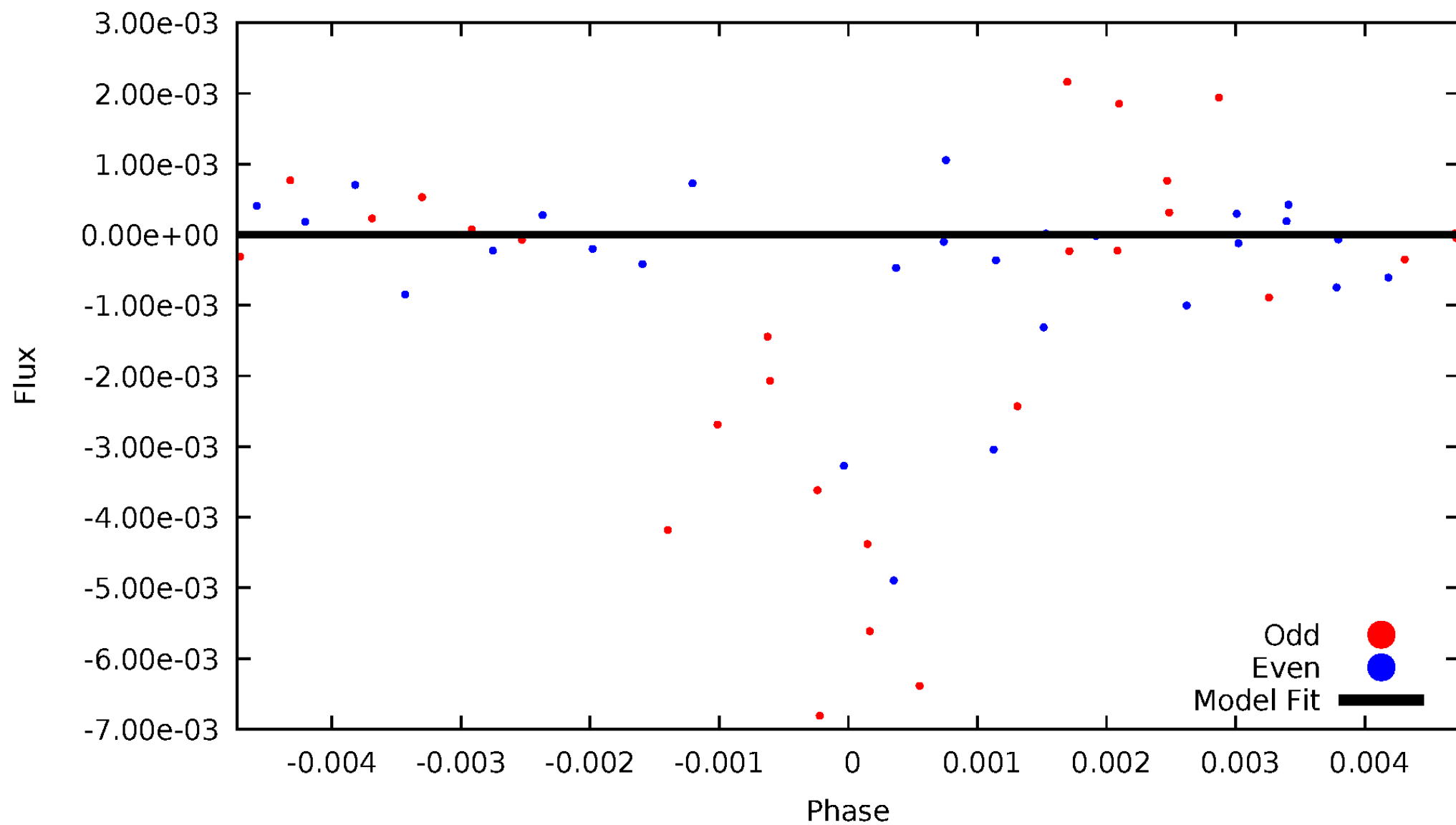
# TCE 007938180-03





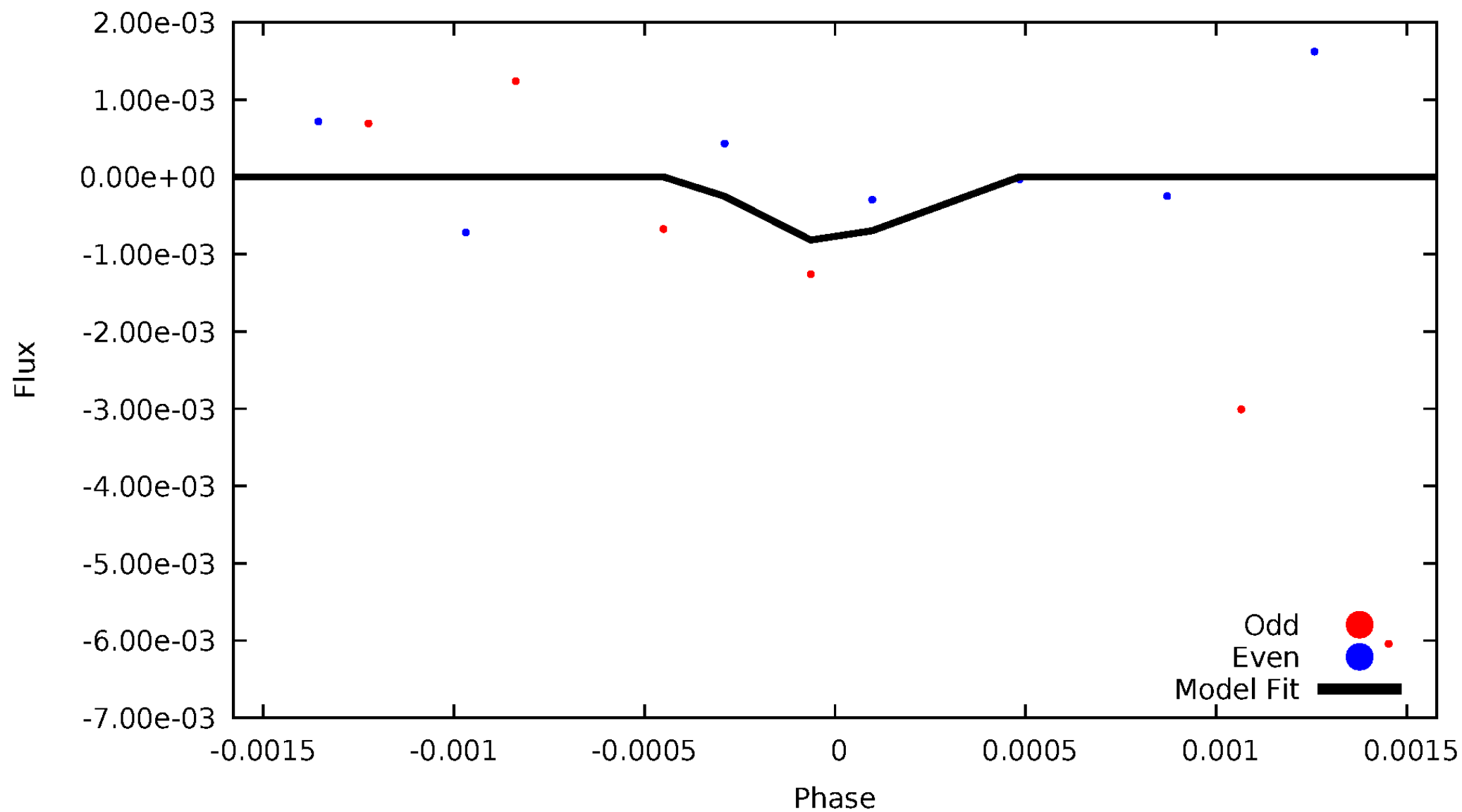
# DV Odd/Even

TCE 007938180-03



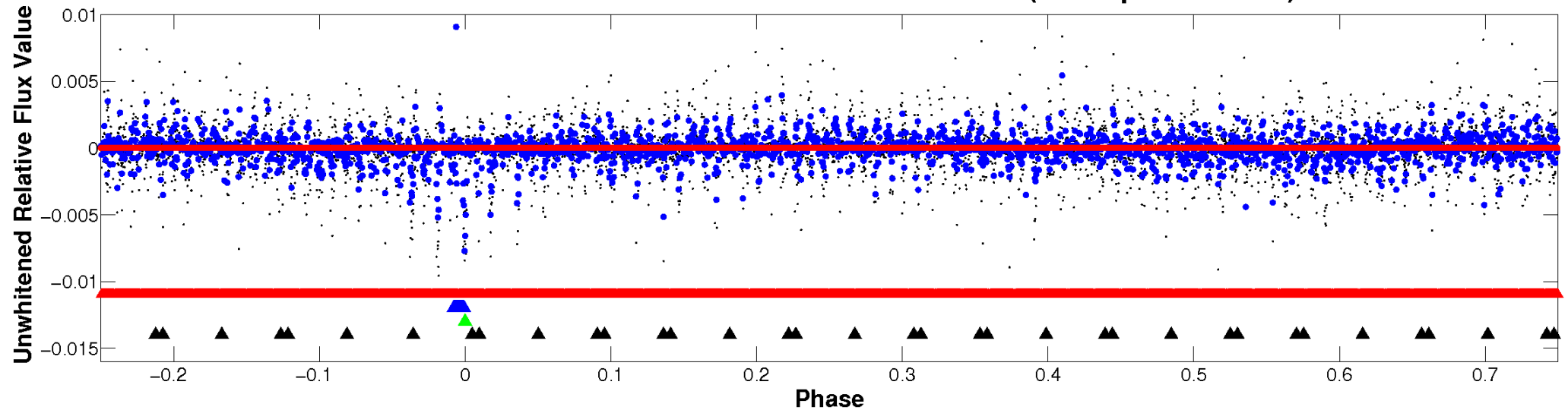
# ALT Odd/Even

TCE 007938180-03

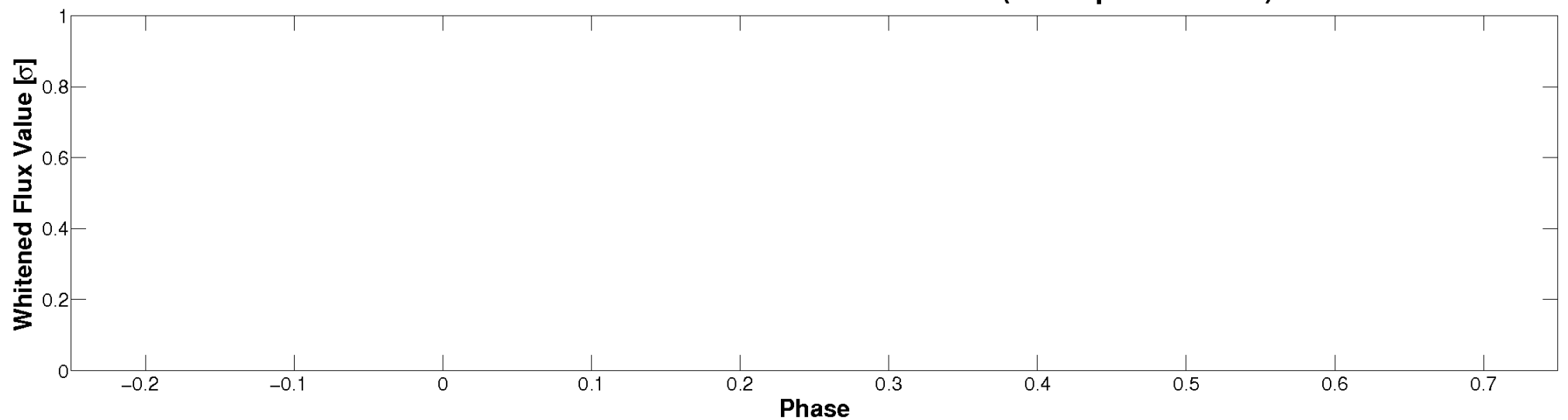


# Non-Whitened Vs. Whitened Light Curve

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

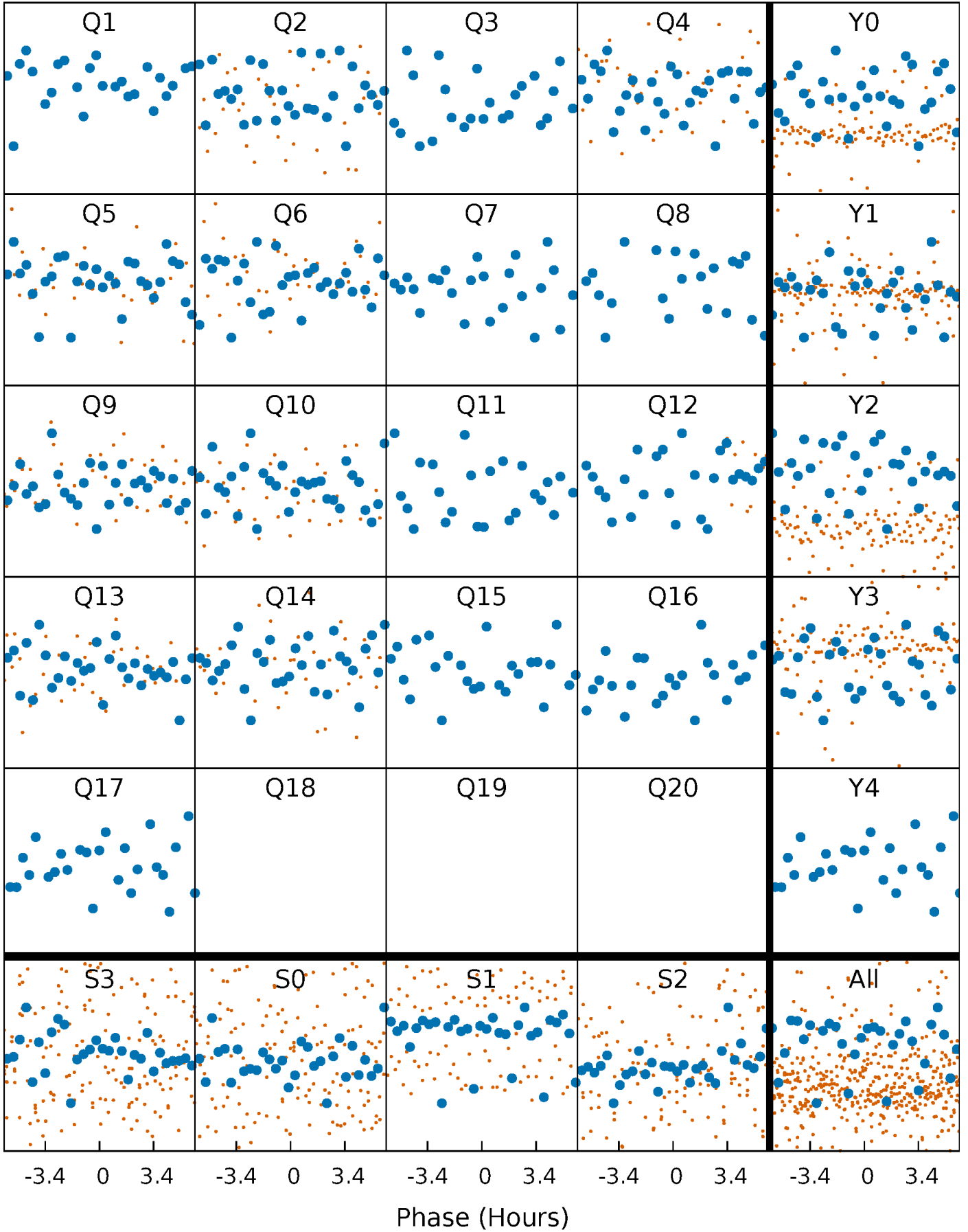


**Planet 3 : Phased Whitened Flux Time Series (TPS Epoch/Period)**



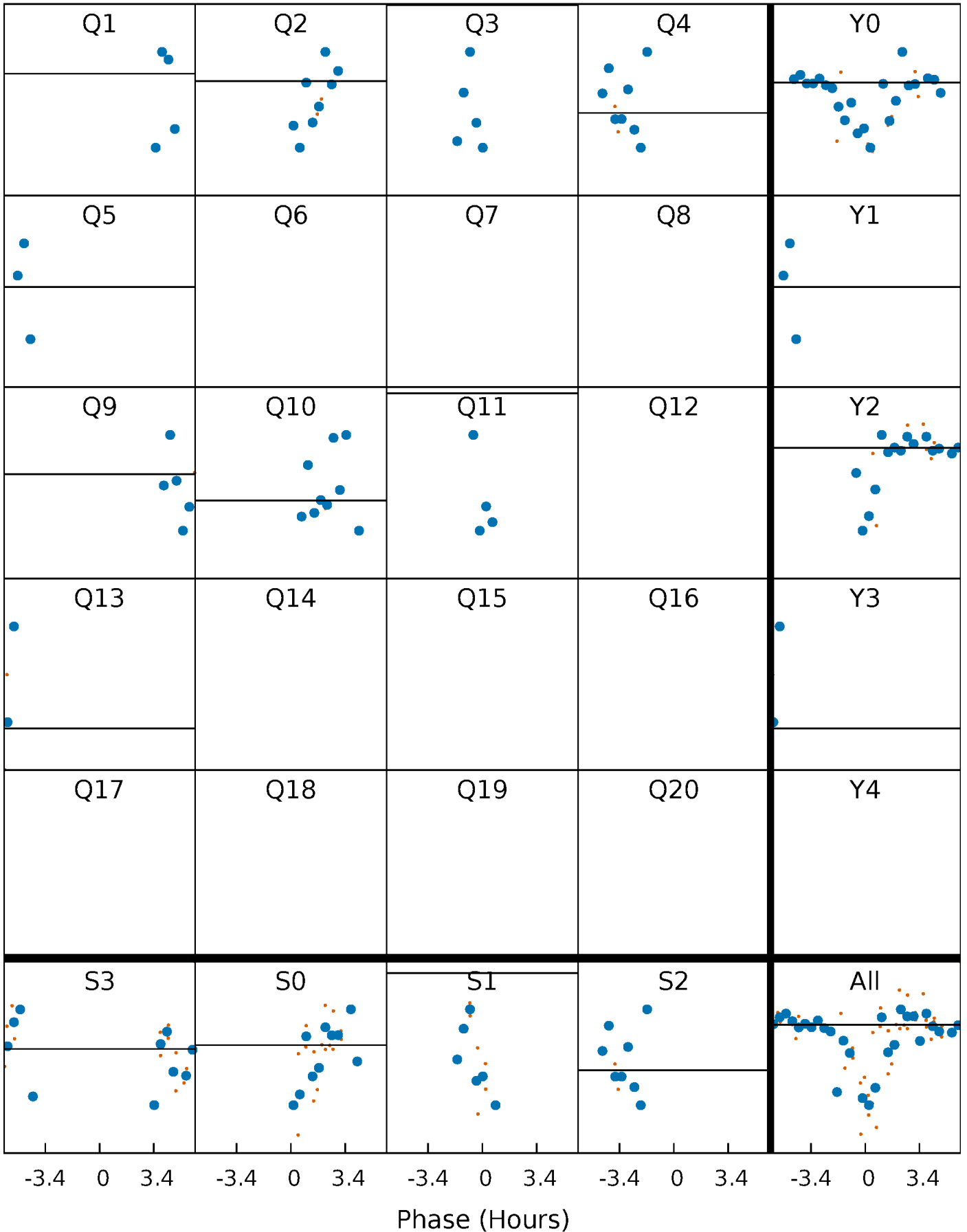
# PDC Quarter-Phased Transit Curves

TCE 007938180-03   P= 52.829553 Days    $T_0=148.375781$  (BKJD)



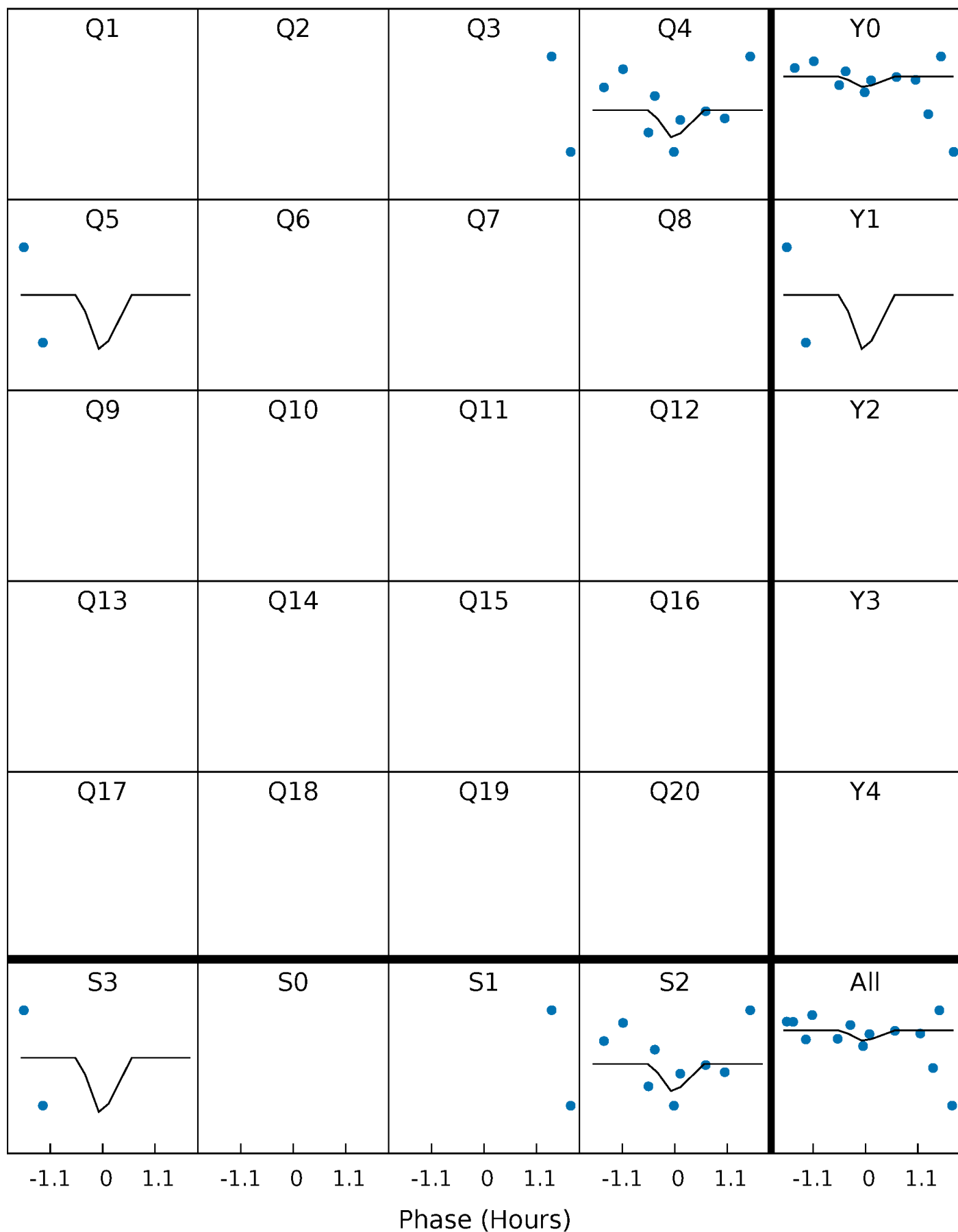
# DV Quarter-Phased Transit Curves

TCE 007938180-03    P= 52.829553 Days     $T_0=148.375781$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 007938180-03 P= 52.829553 Days  $T_0=148.245585$  (BKJD)

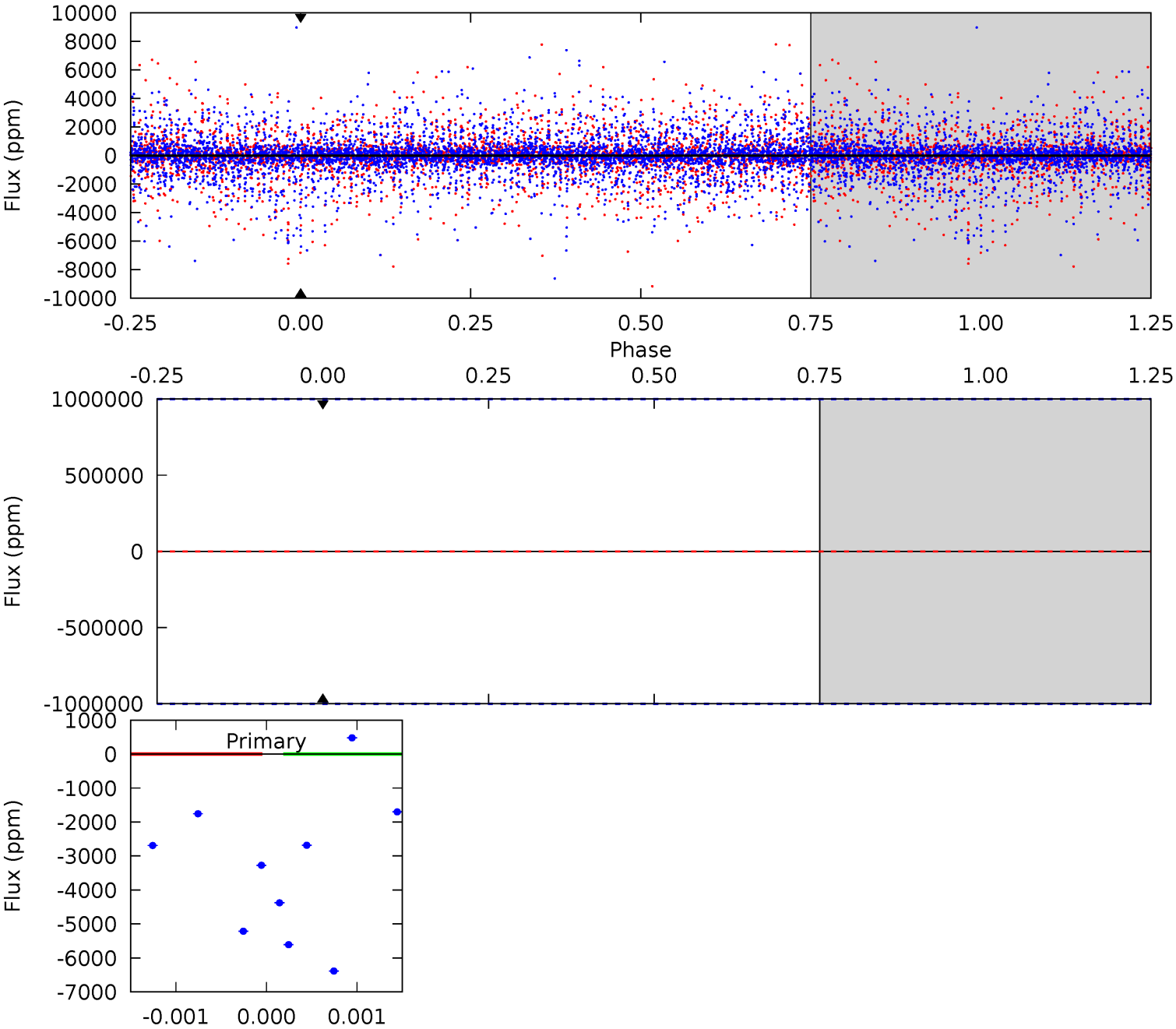




# DV Model-Shift Uniqueness Test

007938180-03, P = 52.829553 Days, E = 95.546228 Days

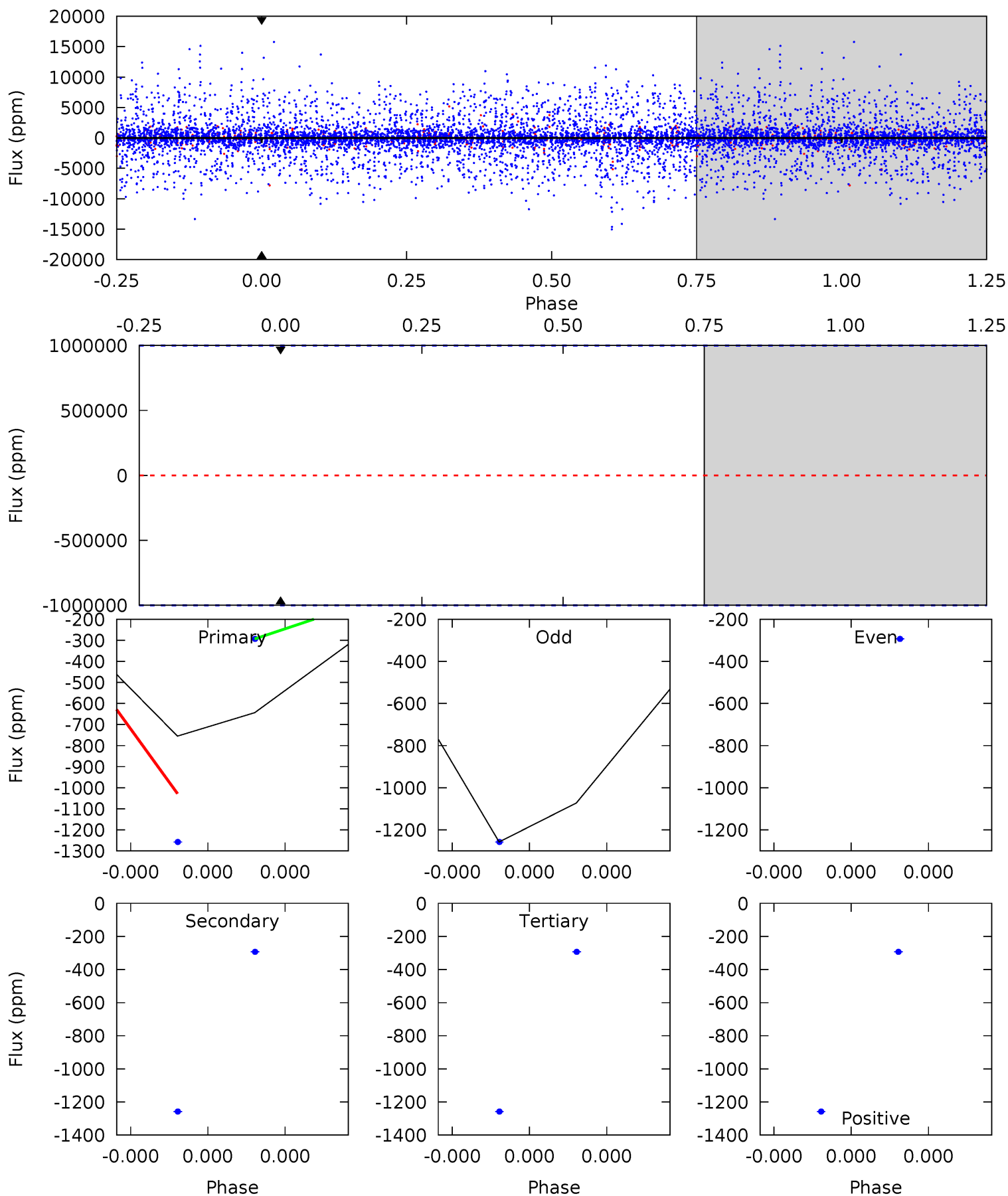
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



# Alt Model-Shift Uniqueness Test

007938180-03, P = 52.829553 Days, E = 95.416032 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
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0.00	0	0	0.00



### Stellar Parameters For KIC 007938180

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6549^{+146}_{-211}$	$4.224^{+0.153}_{-0.187}$	$-0.180^{+0.250}_{-0.300}$	$1.407^{+0.439}_{-0.293}$	$1.215^{+0.192}_{-0.174}$	$0.614^{+0.461}_{-0.304}$
	+2%/-3%	+4%/-4%	+139%/-167%	+31%/-21%	+16%/-14%	+75%/-50%
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 007938180-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$0 \pm 1000000$	$13.18^{+13.40}_{-9.23}$	$882^{+59}_{-52}$	$-3992^{+30018}_{-17930}$	$-206.260^{+53884.565}_{-41435.691}$
Alt.	$-0 \pm 1000000$	$12.58^{+14.11}_{-8.78}$	$892^{+63}_{-61}$	$5145^{+21069}_{-28004}$	$711^{+57107}_{-47420}$

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

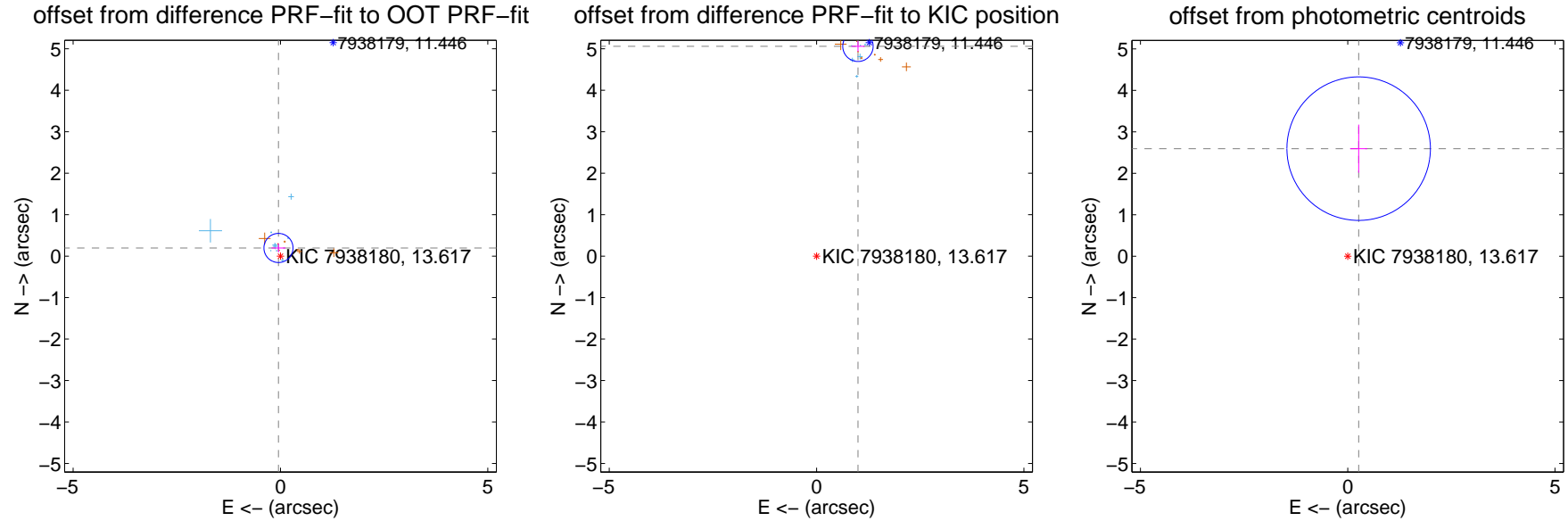
## DV Centroid Data

Supplemental centroid analysis for 007938180-03. Kepler magnitude: 13.62. Transit SNR -1.00

There are 9 quarters with good PRF difference image offsets

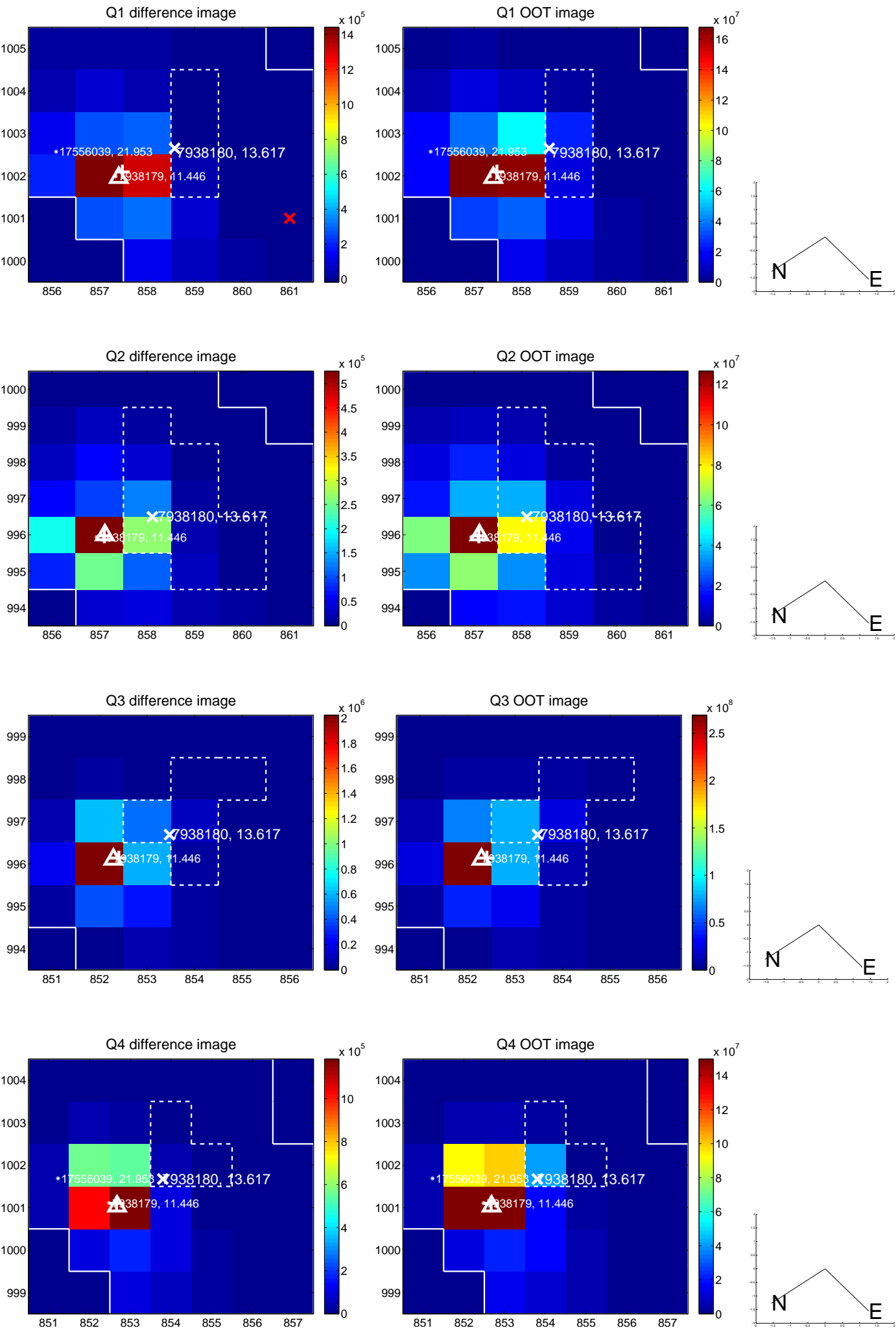
The OOT PRF centroid is offset from the target star catalog position by about 5.08 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.203 \pm 0.117$	1.73	$0.048 \pm 0.167$	$0.197 \pm 0.107$
PRF-fit source offset from KIC position	$5.157 \pm 0.122$	42.25	$-0.998 \pm 0.159$	$5.060 \pm 0.129$
photometric centroid source offset	$2.61 \pm 0.58$	4.52	$-0.26 \pm 0.21$	$2.59 \pm 0.58$

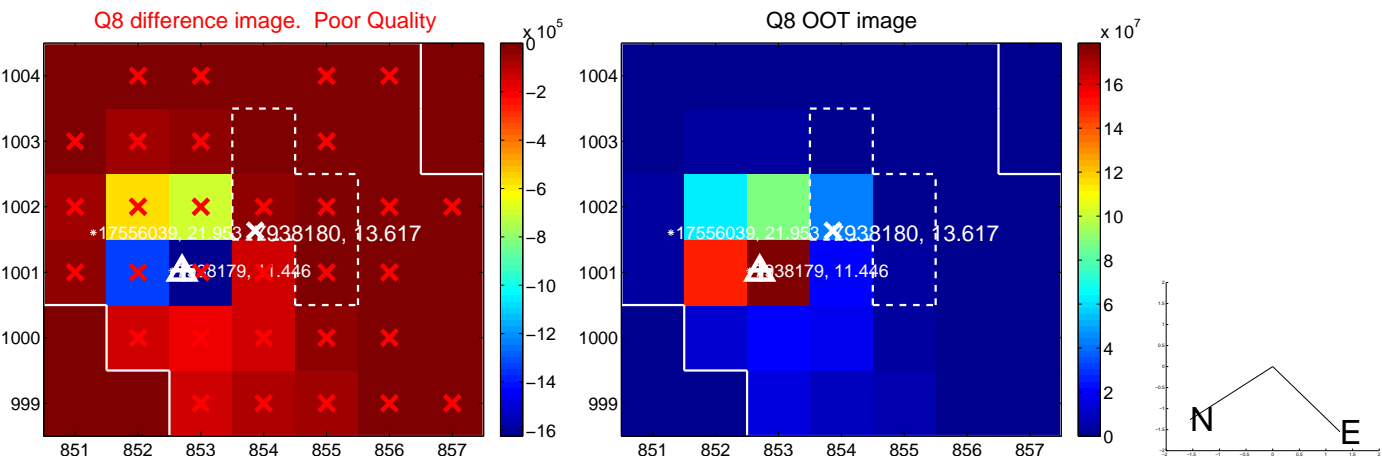
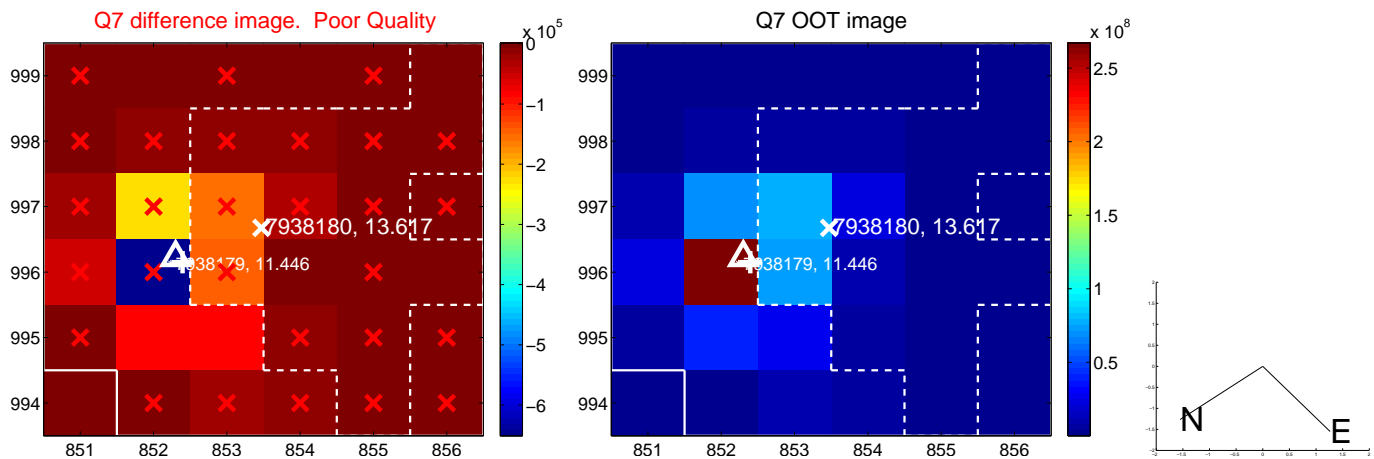
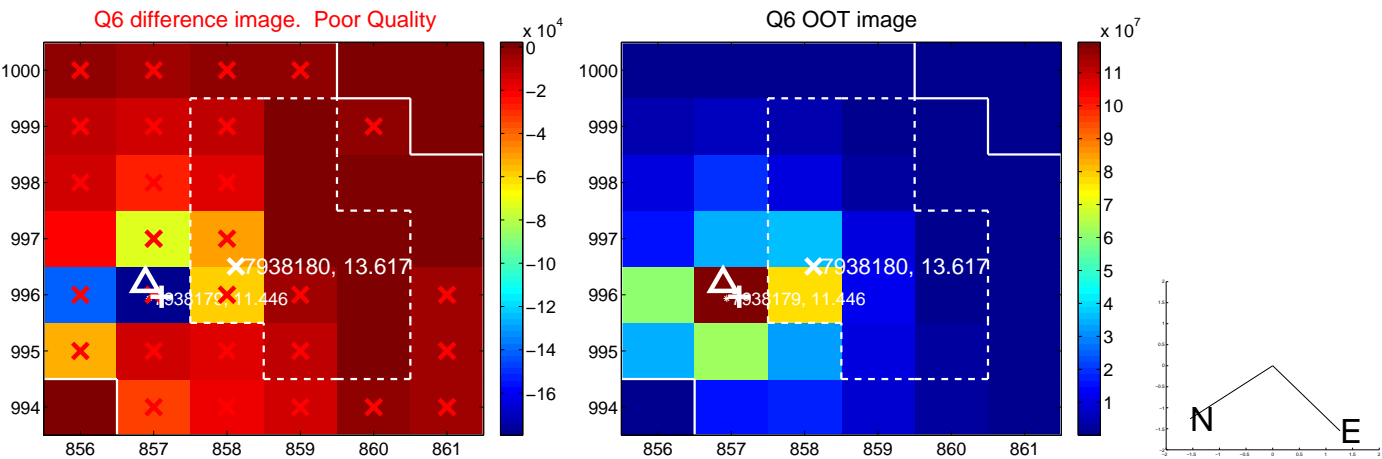
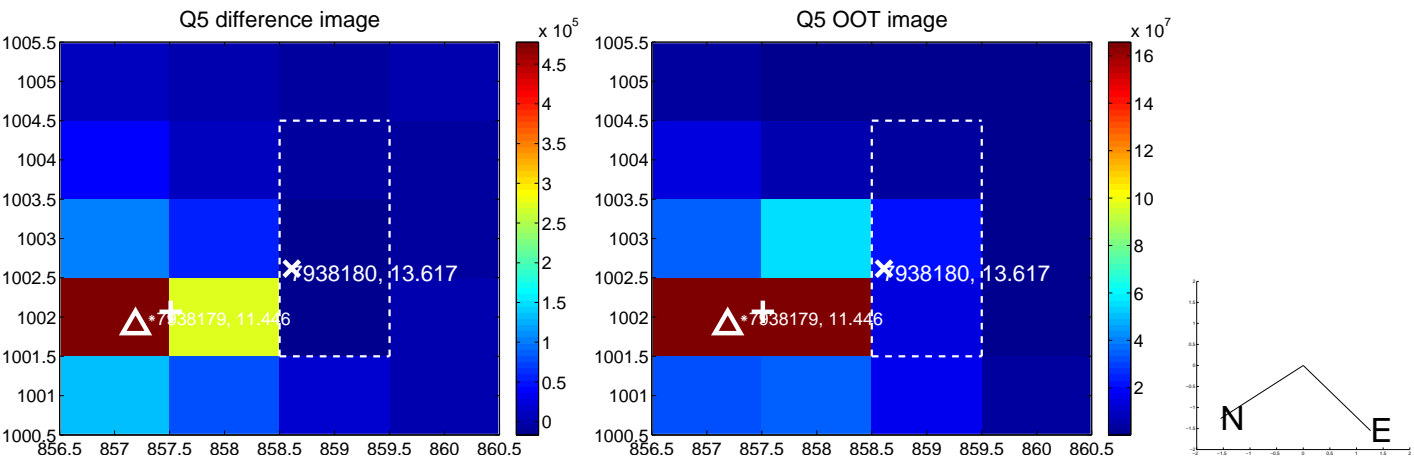


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

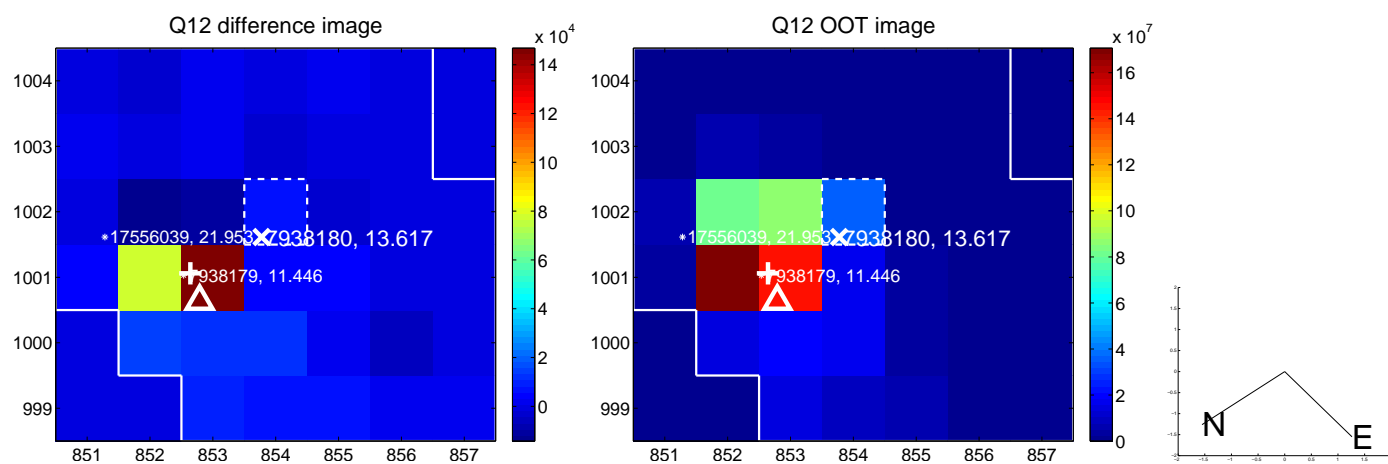
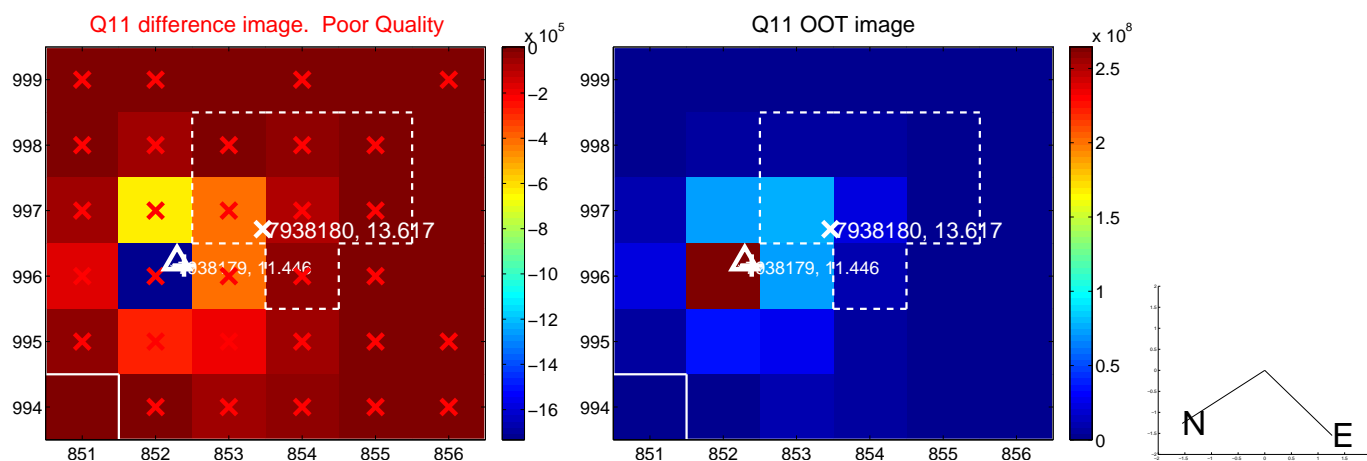
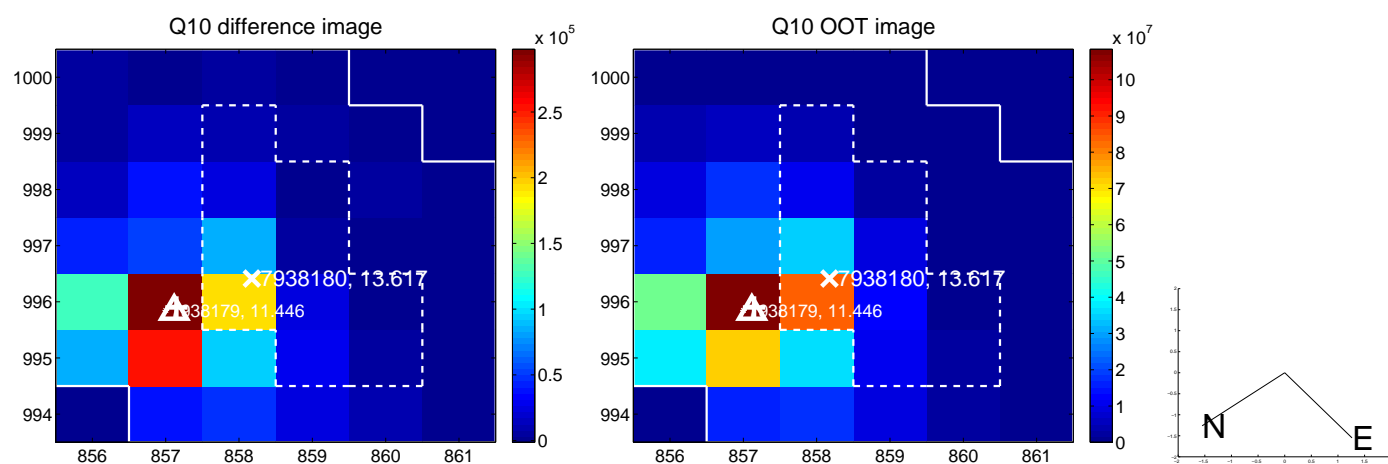
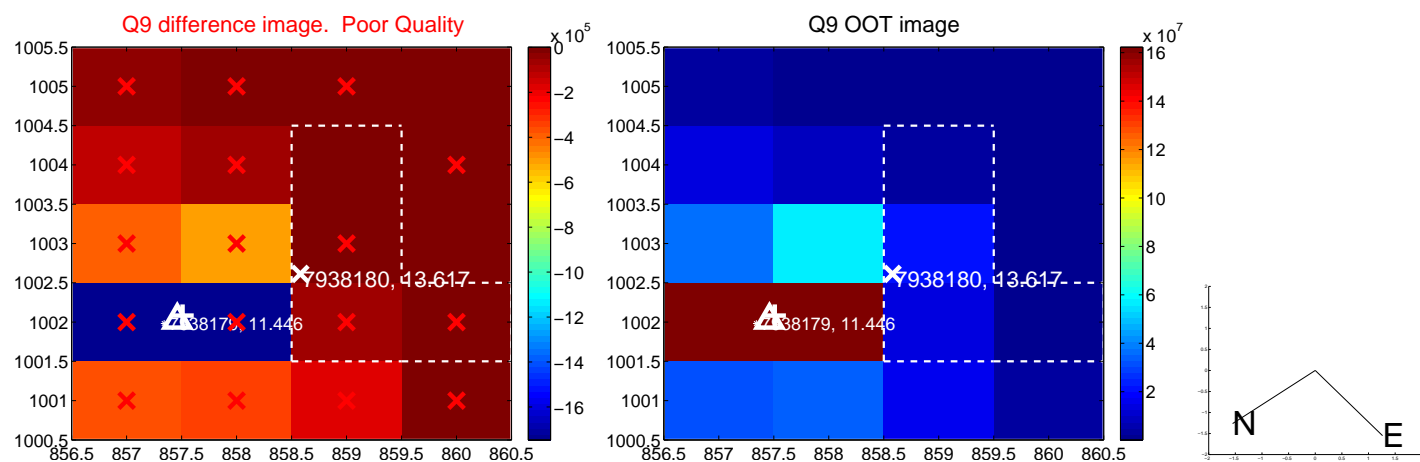


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

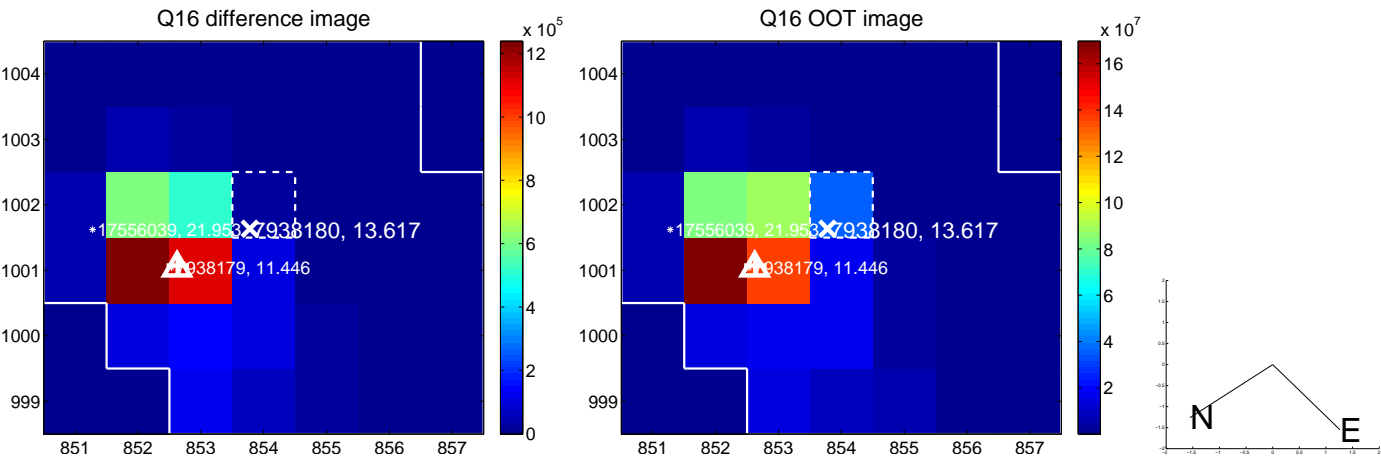
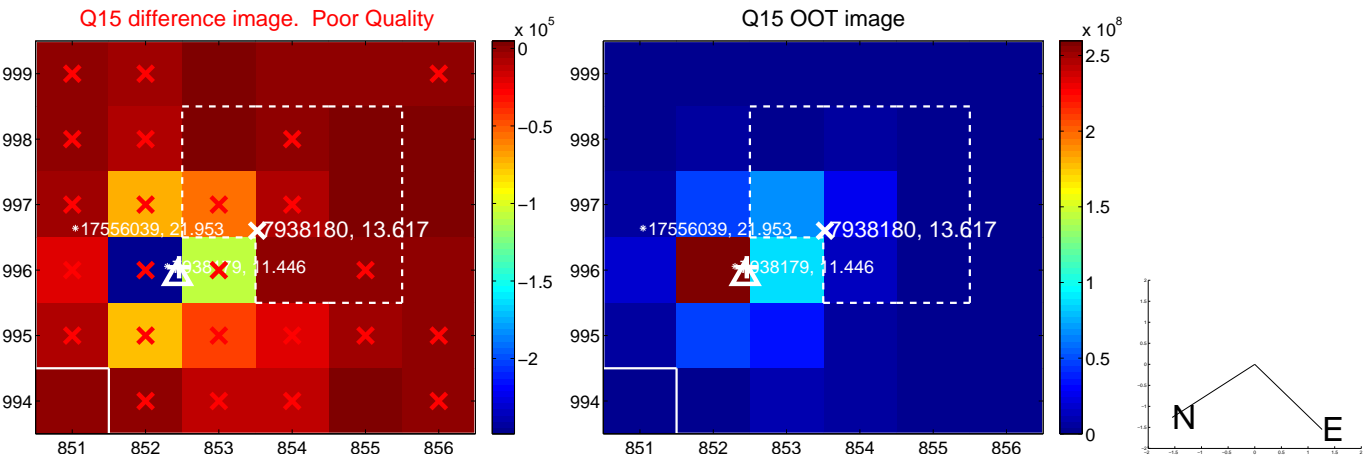
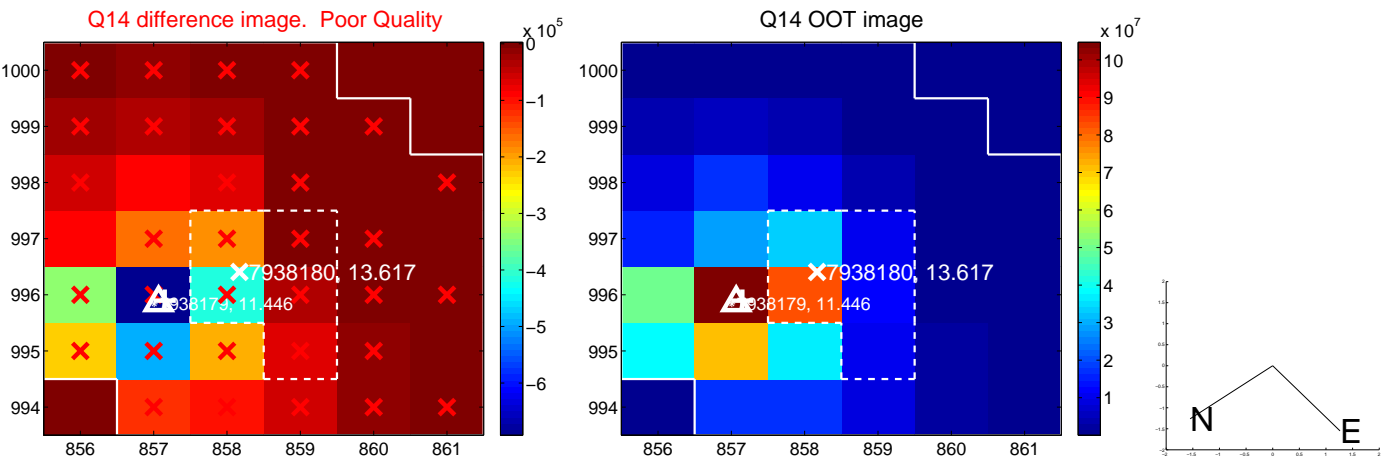
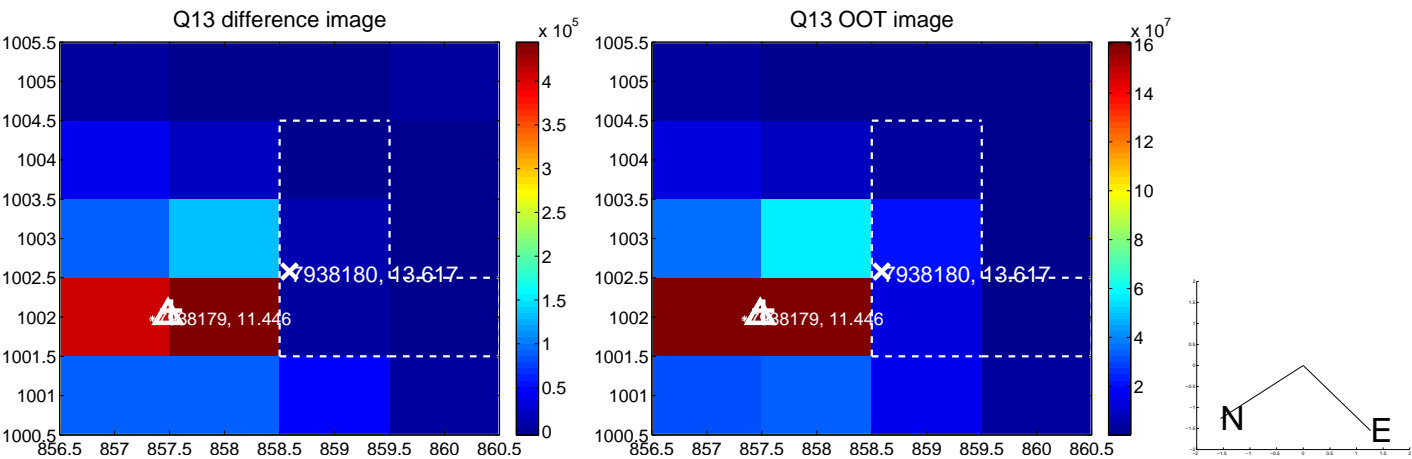




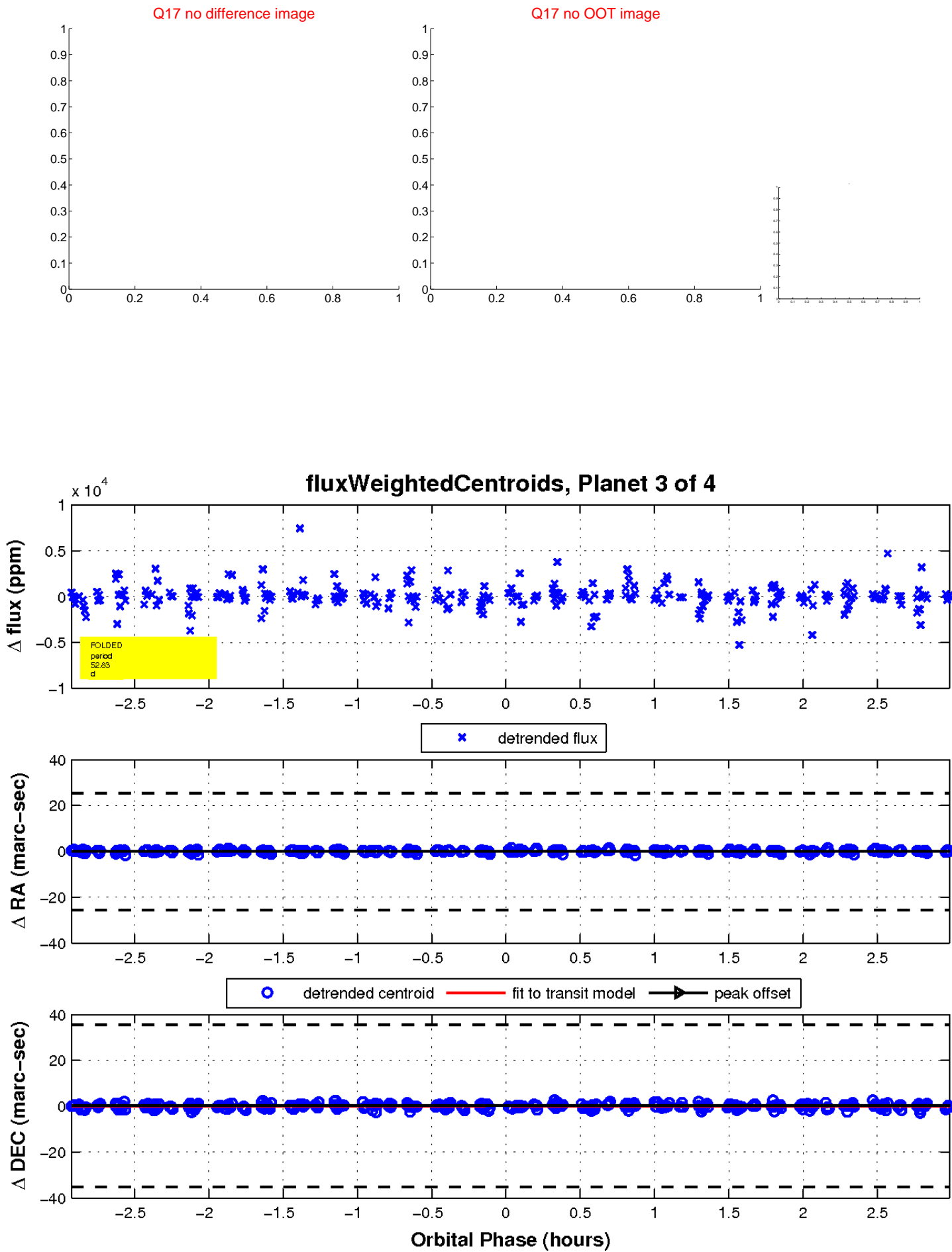
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

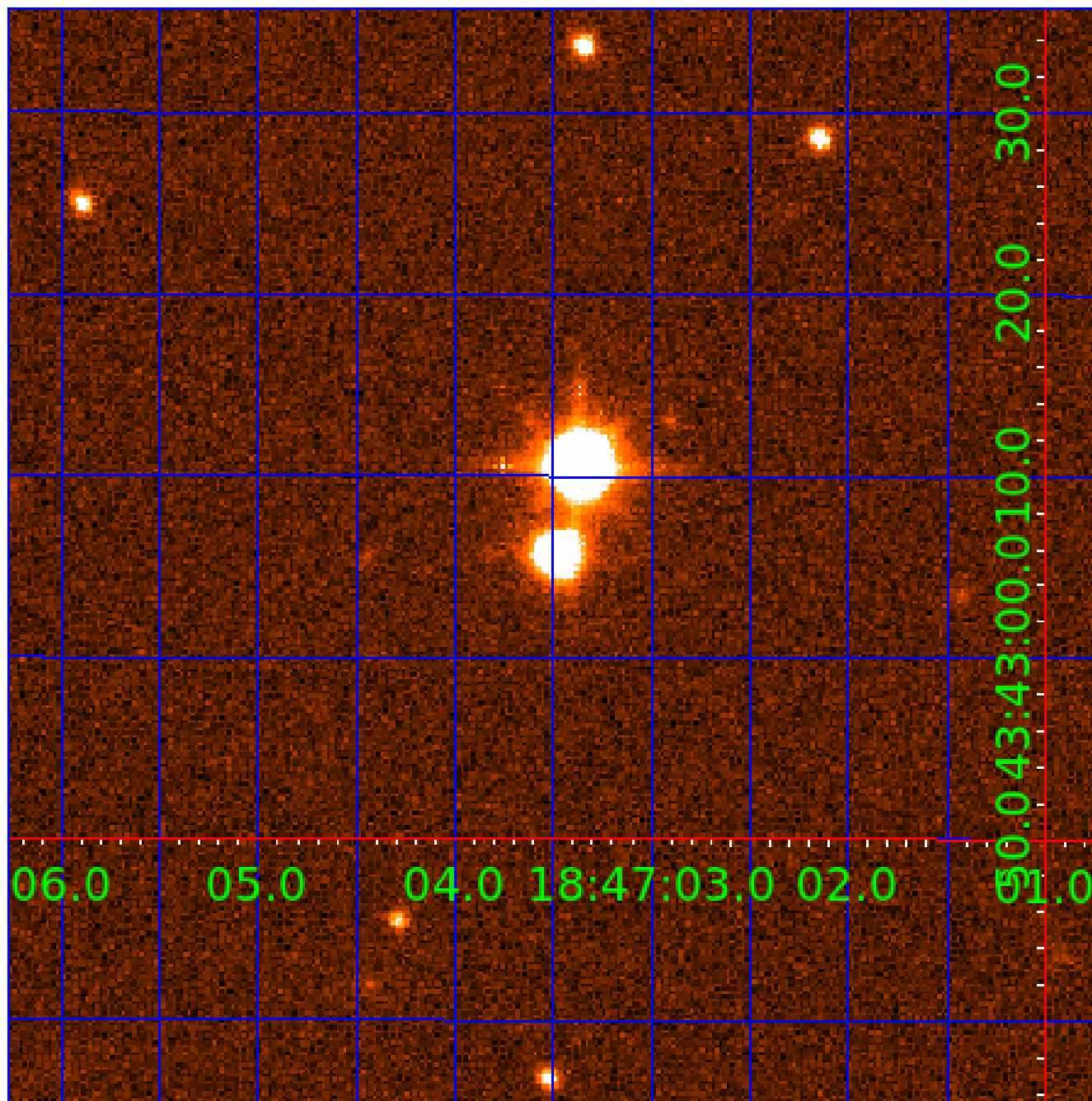


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 007938180

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007938180-01	OBS	No	0.959331	131.755238	56.8	6.726	8.2	9.3	1.41	6549	1.20	7928.04
007938180-02	OBS	No	52.843608	147.961565	3.5	0.862	20.8	0.0	1.41	6549	0.27	37.83
007938180-03	OBS	No	52.829553	148.375781	1572.5	3.000	18.3	-1.0	1.41	6549	5.62	37.84
007938180-04	OBS	No	41.356164	134.760722	5456.9	0.629	14.4	3.5	1.41	6549	10.84	52.45

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007938180-01	OBS	FP	0.00	1	0	1	1	LPP_DV—LPP_ALT—CENT_RESOLVED_OFFSET—EPHEM_MATCH
007938180-02	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_SKYE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_RESOLVED_OFFSET
007938180-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—NO_FITS—SAME_NTL_PERIOD—CENT_NOFITS
007938180-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_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.

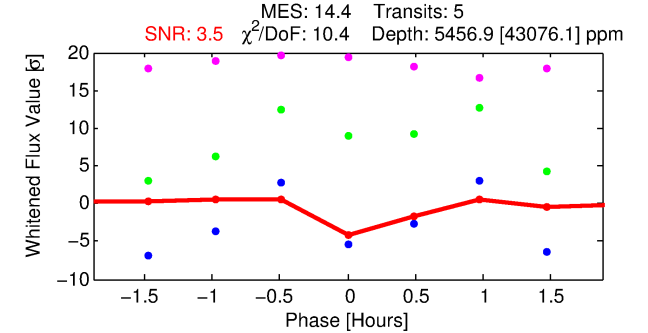
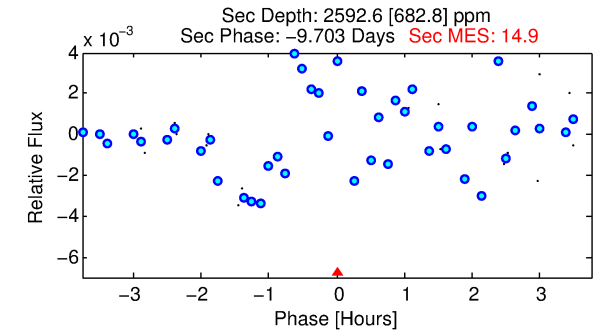
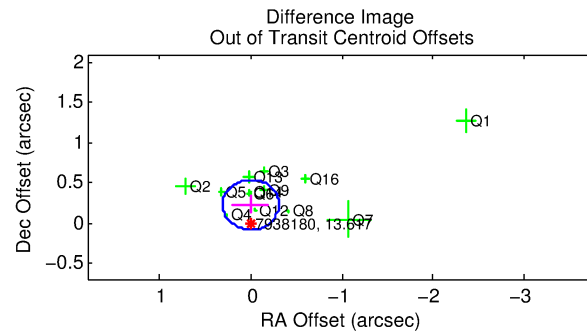
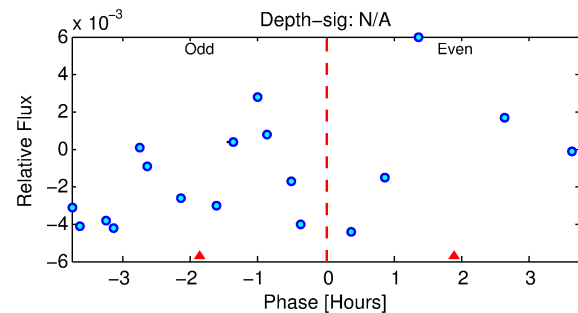
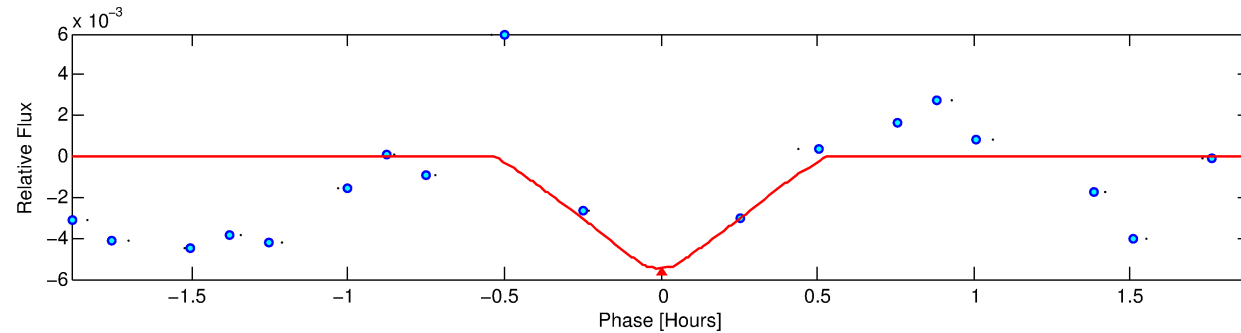
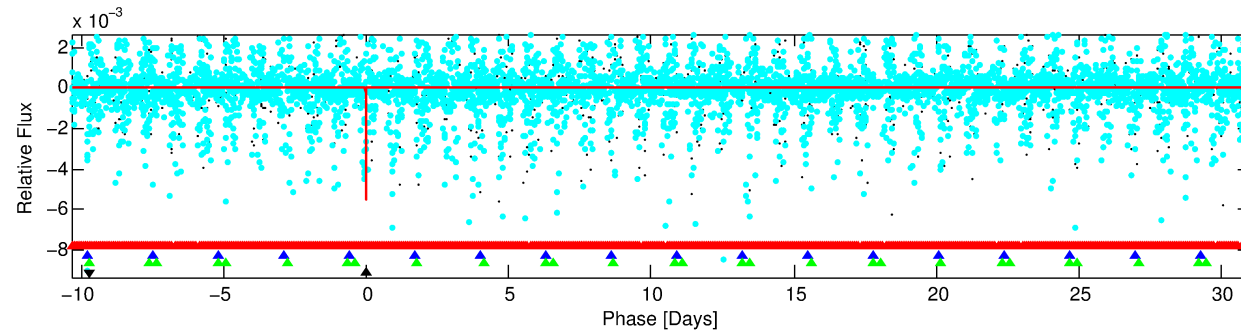
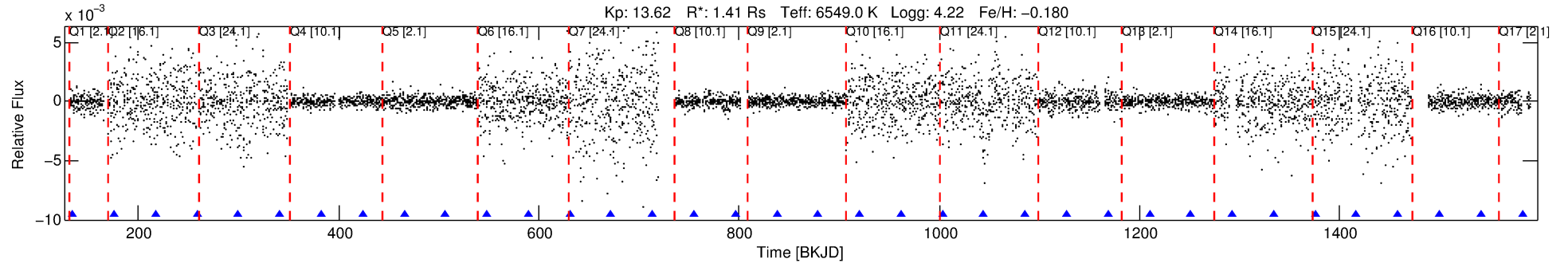
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 007938180-04

No Significant Match Found

# DV One-Page Summary

KIC: 7938180 Candidate: 4 of 4 Period: 41.356 d



## DV Fit Results:

Period = 41.35616 [0.00626] d  
Epoch = 134.7607 [0.1904] BKJD  
Rp/R\* = 0.0706 [1.7992]  
a/R\* = 519.43 [74734.09]  
b = 0.28 [465.65]  
Seff = 52.45 [19.78]  
Teq = 686 [65] K  
Rp = 10.84 [276.27] Re  
a = 0.2494 [0.0630] AU  
Ag = 755.40 [38511.58] [0.02σ]  
Teffp = 5562 [70891] K [0.07σ]

## DV Diagnostic Results:

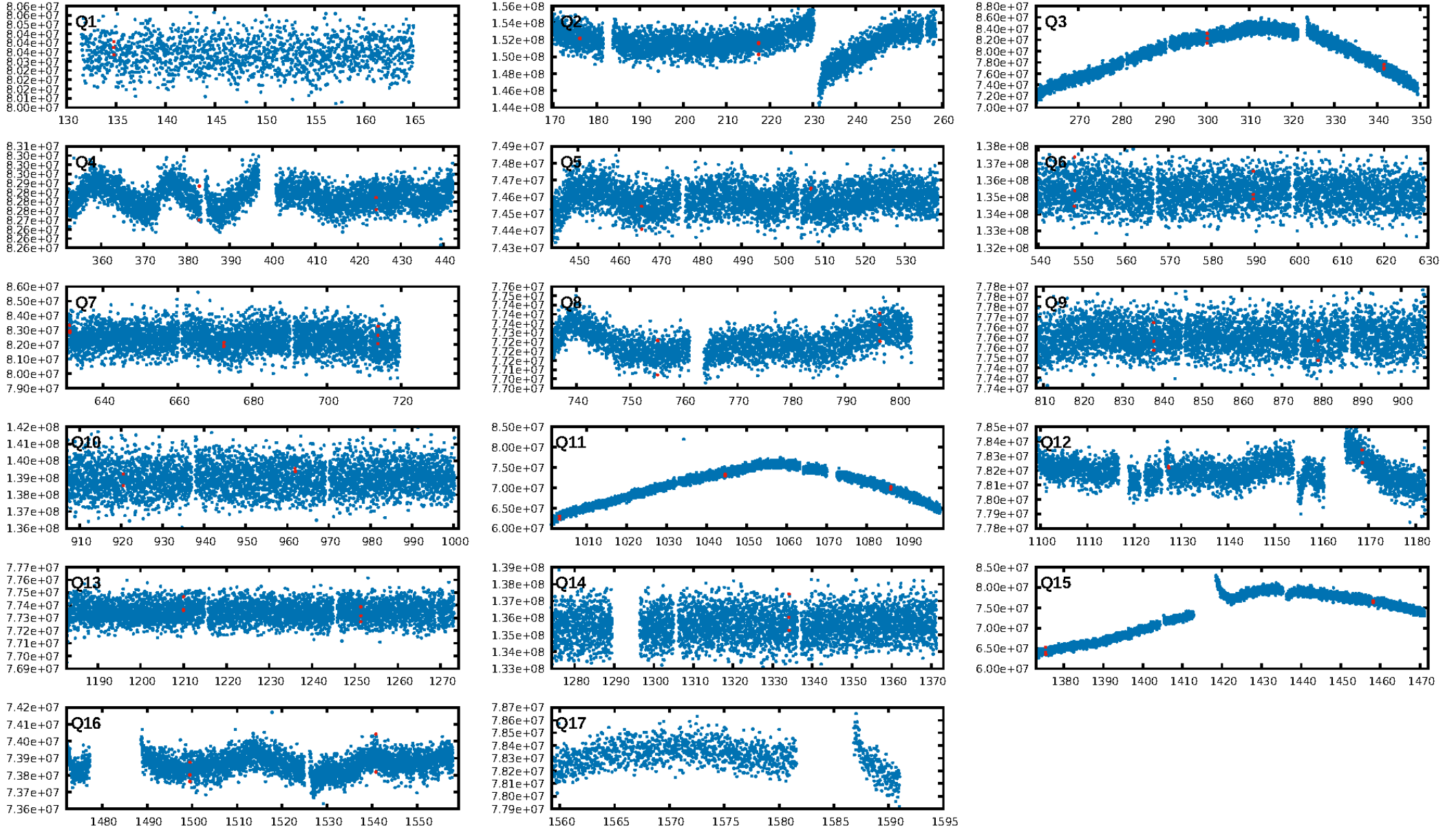
ShortPeriod-sig: 100.0% [143.52σ]  
LongPeriod-sig: 100.0% [89.84σ]  
ModelChiSquare2-sig: 94.5%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 6.59e-12**  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: -1.533  
Centroid-sig: 63.7%  
**Centroid-so: 2.779 arcsec [37.01σ]**  
OotOffset-rm: 0.224 arcsec [2.16σ]  
**KicOffset-rm: 5.189 arcsec [36.38σ]**  
OotOffset-st: 3/2/4/4 [13]  
KicOffset-st: 3/2/4/4 [13]  
DiffImageQuality-fgm: 0.15 [2/13]  
DiffImageOverlap-fno: 0.21 [3/14]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 07:58:39 Z

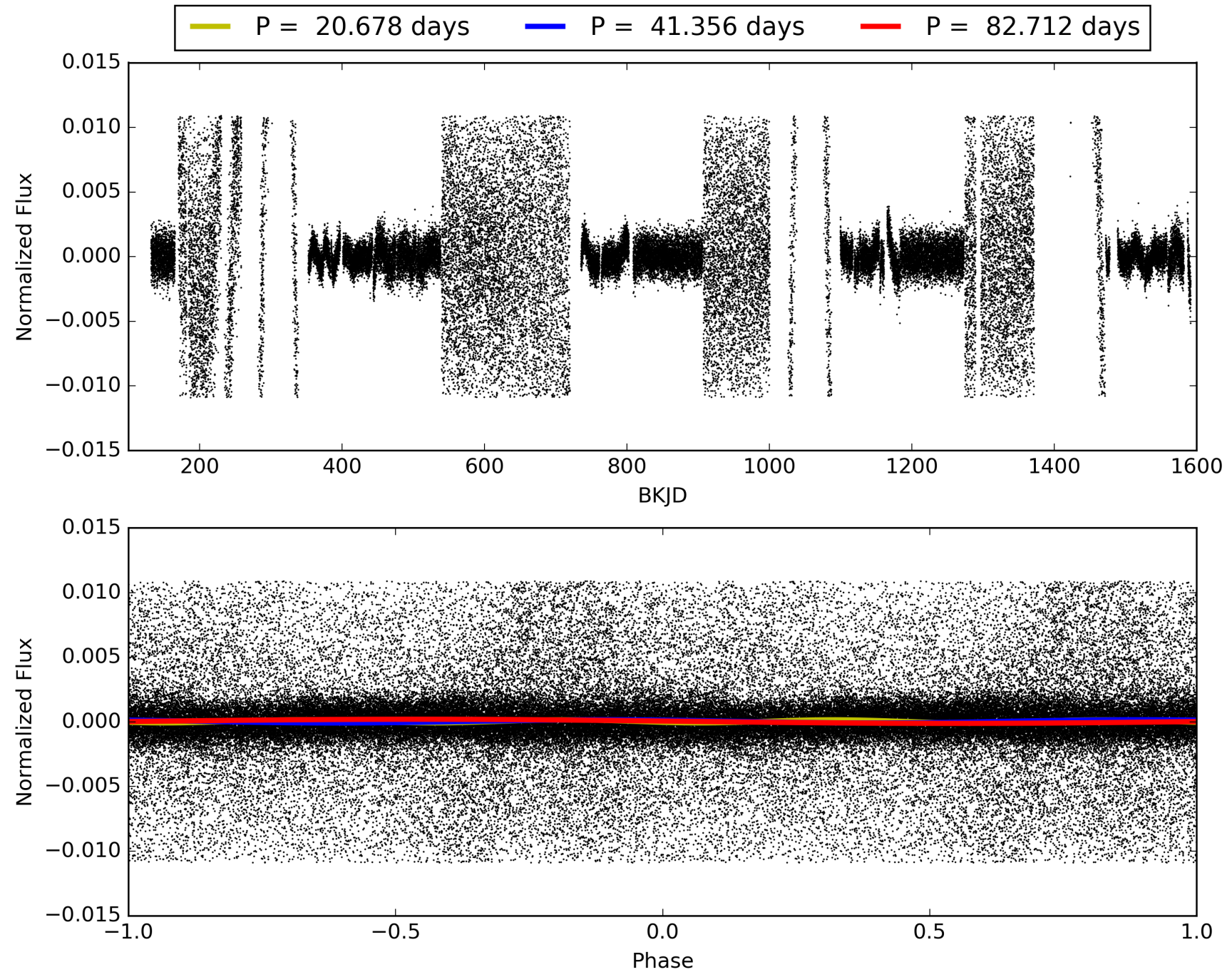
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 007938180-04, PDC Light Curves

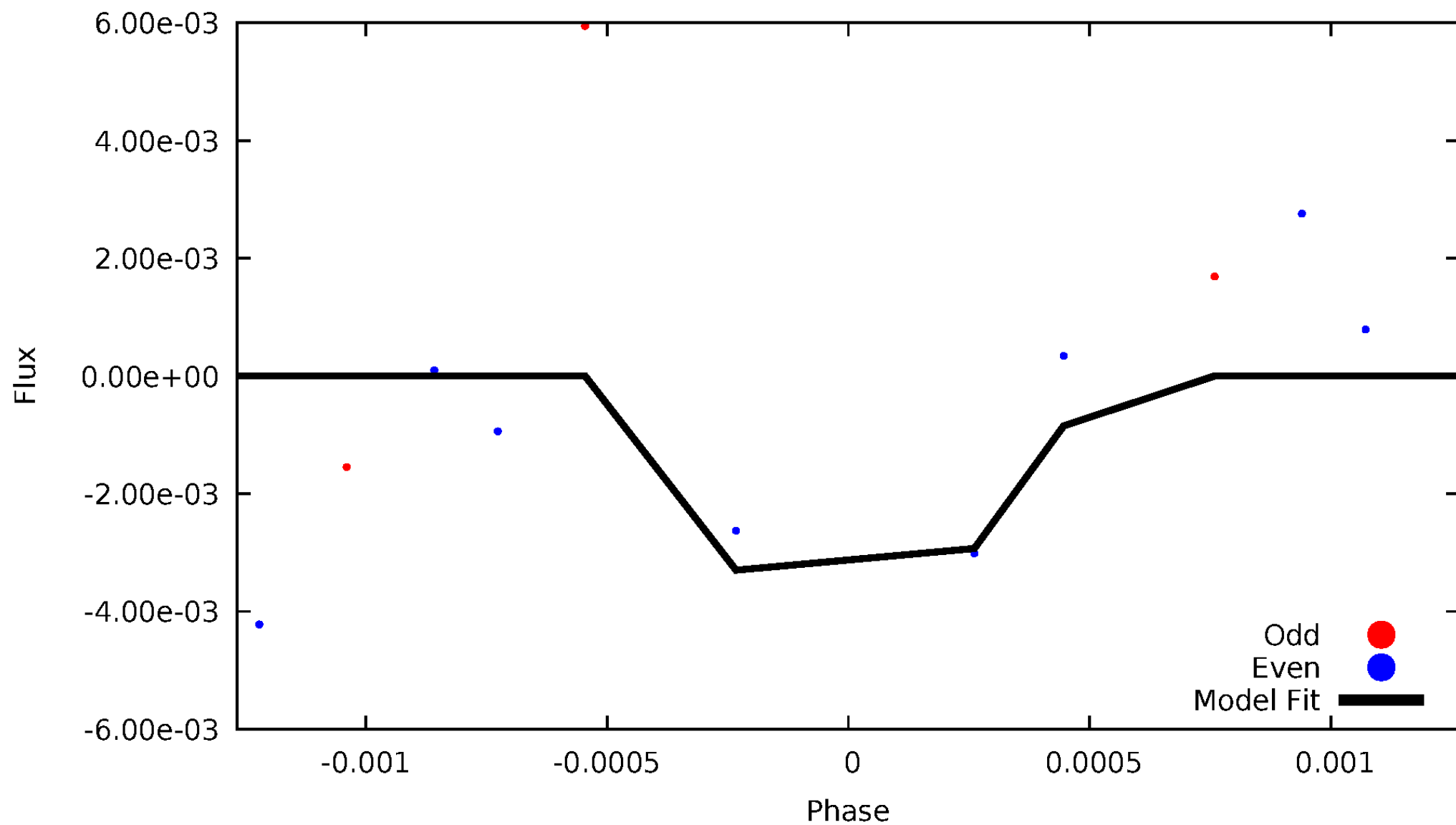


# TCE 007938180-04



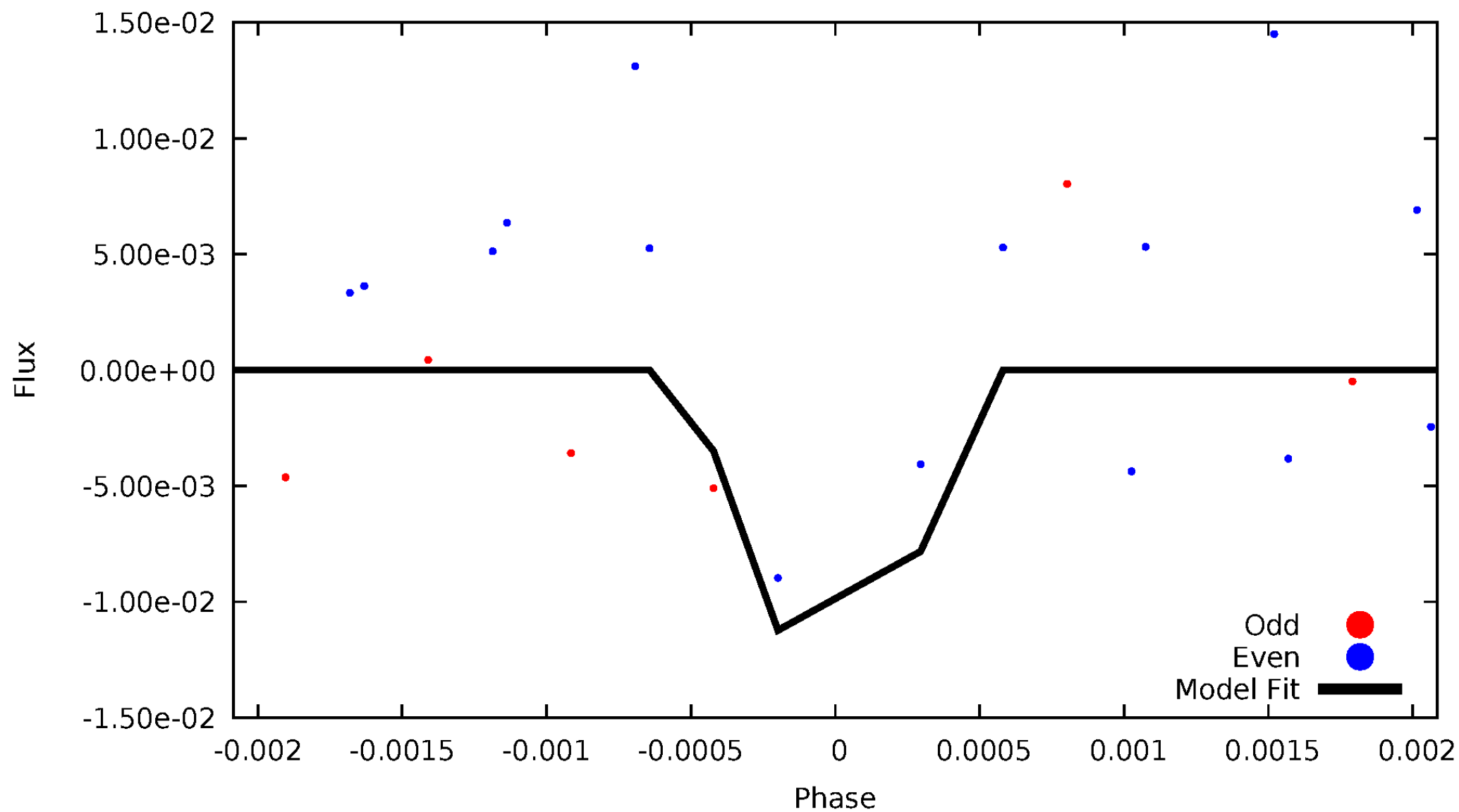
# DV Odd/Even

TCE 007938180-04



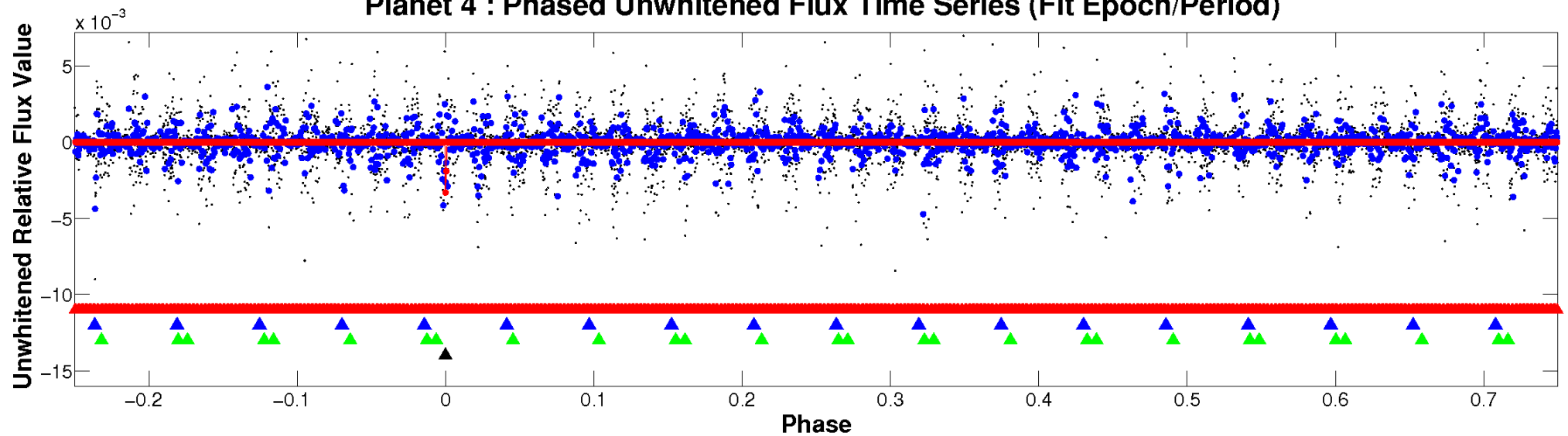
# ALT Odd/Even

TCE 007938180-04

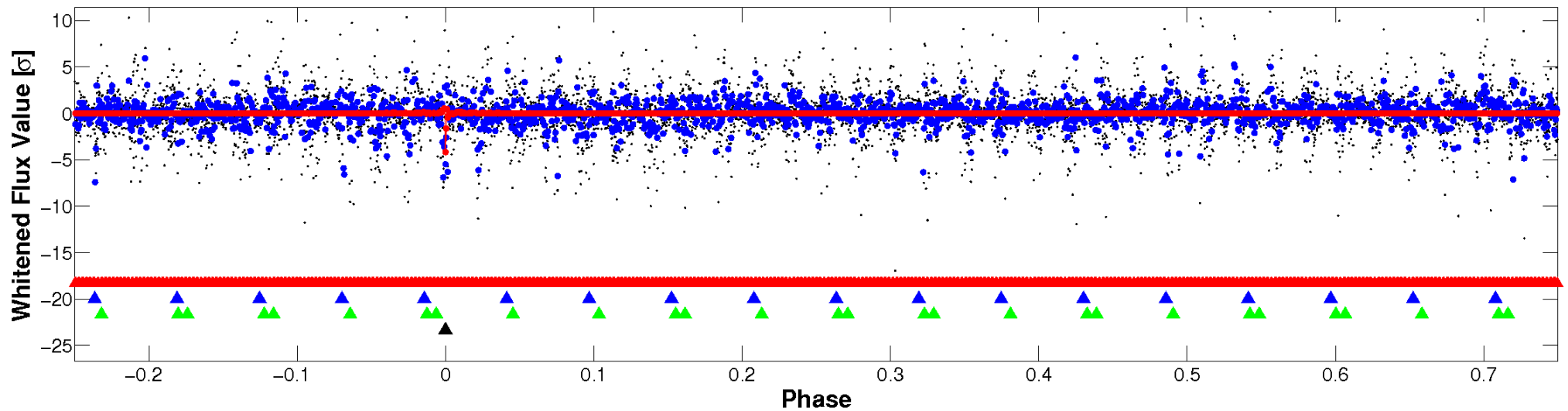


# Non-Whitened Vs. Whitened Light Curve

## Planet 4 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

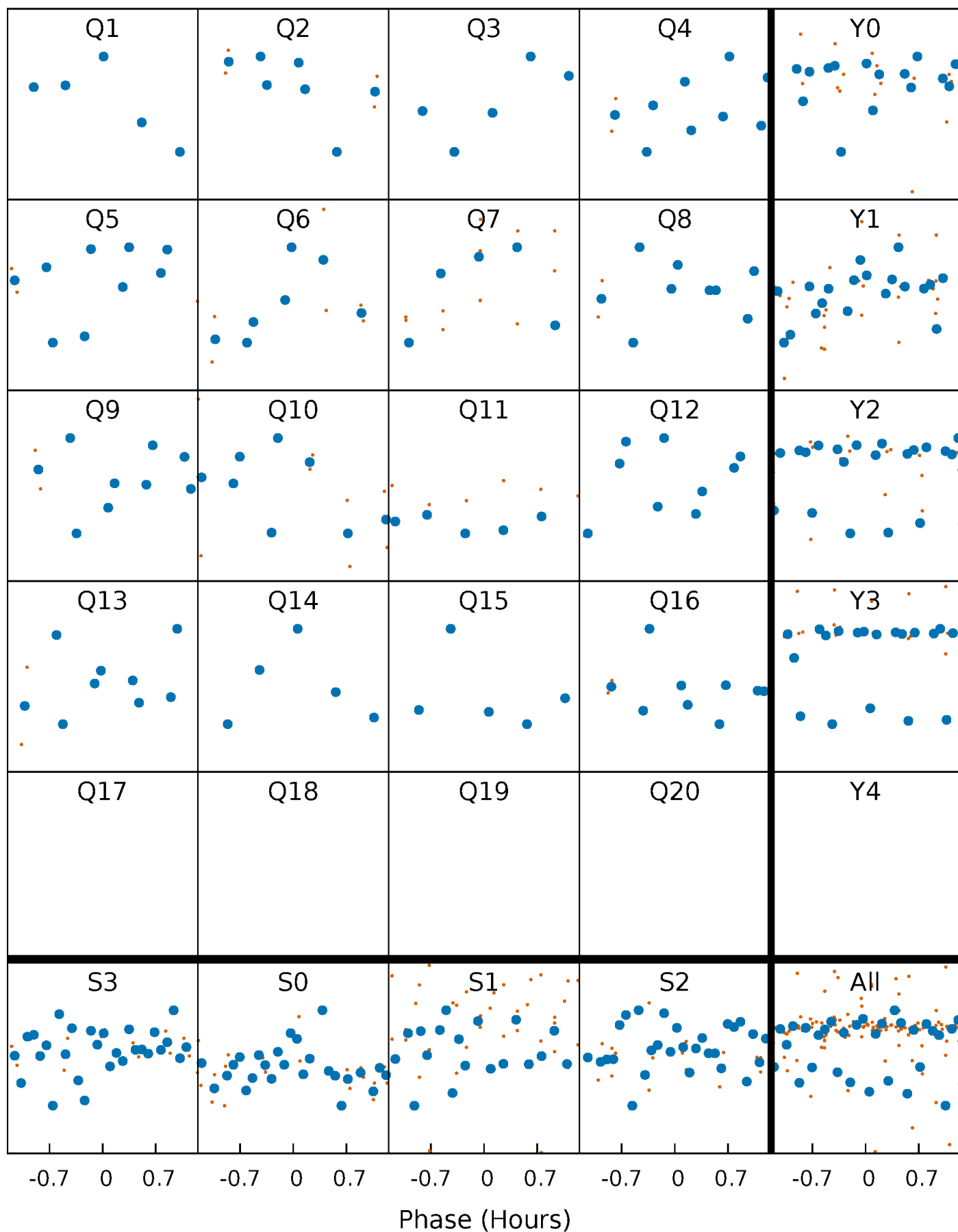


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



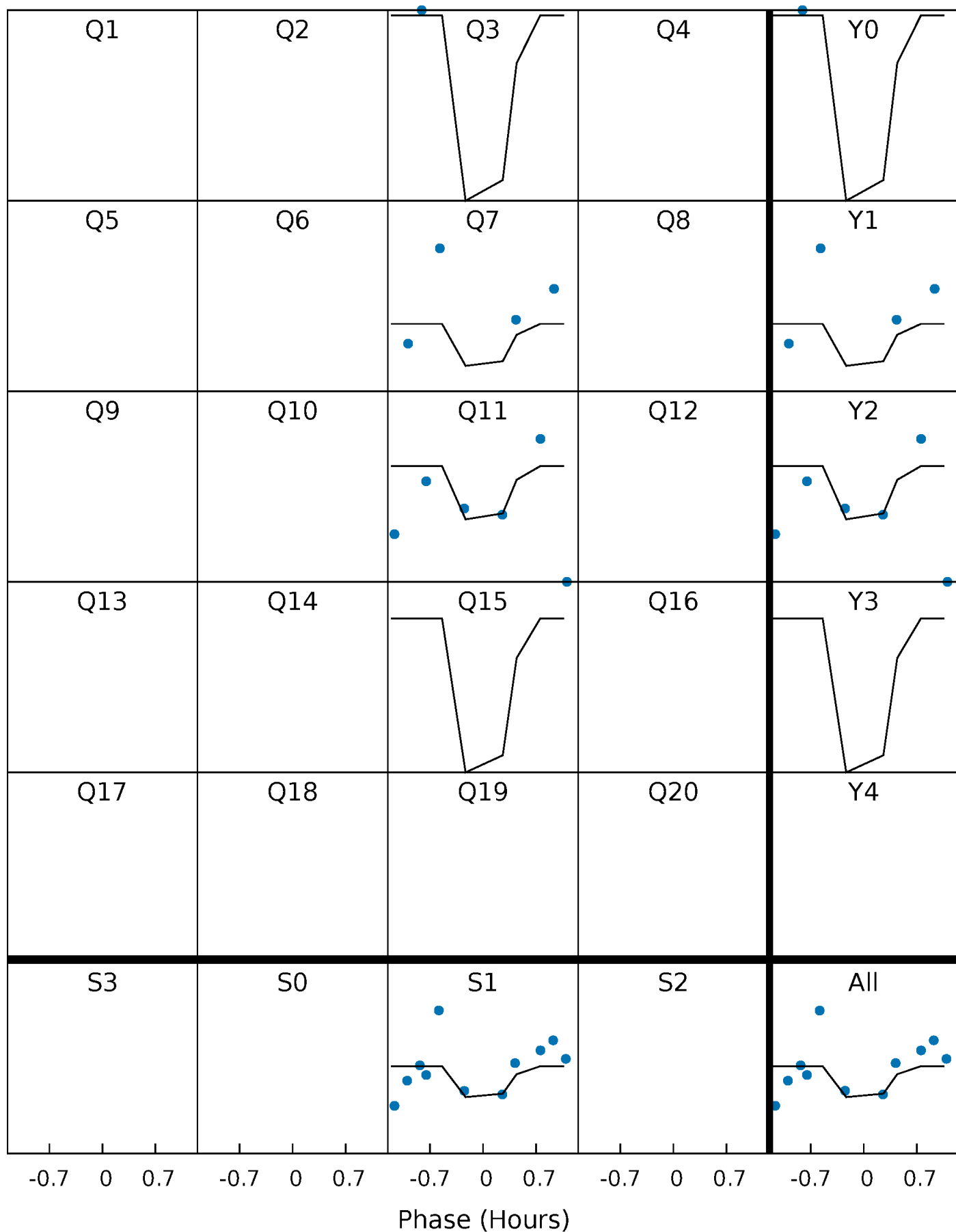
# PDC Quarter-Phased Transit Curves

TCE 007938180-04 P= 41.356164 Days  $T_0=134.760722$  (BKJD)



# DV Quarter-Phased Transit Curves

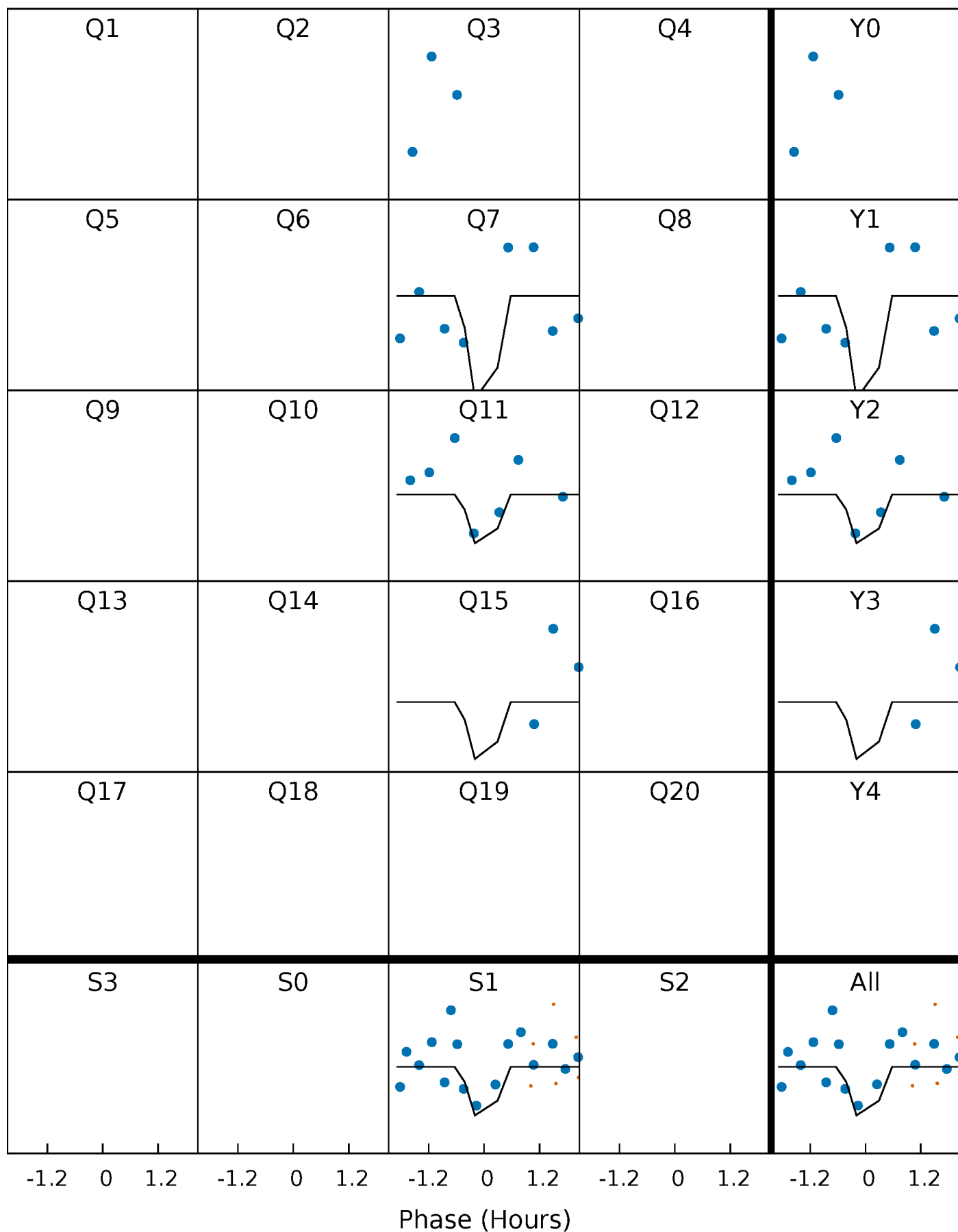
TCE 007938180-04   P= 41.356164 Days    $T_0=134.760722$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

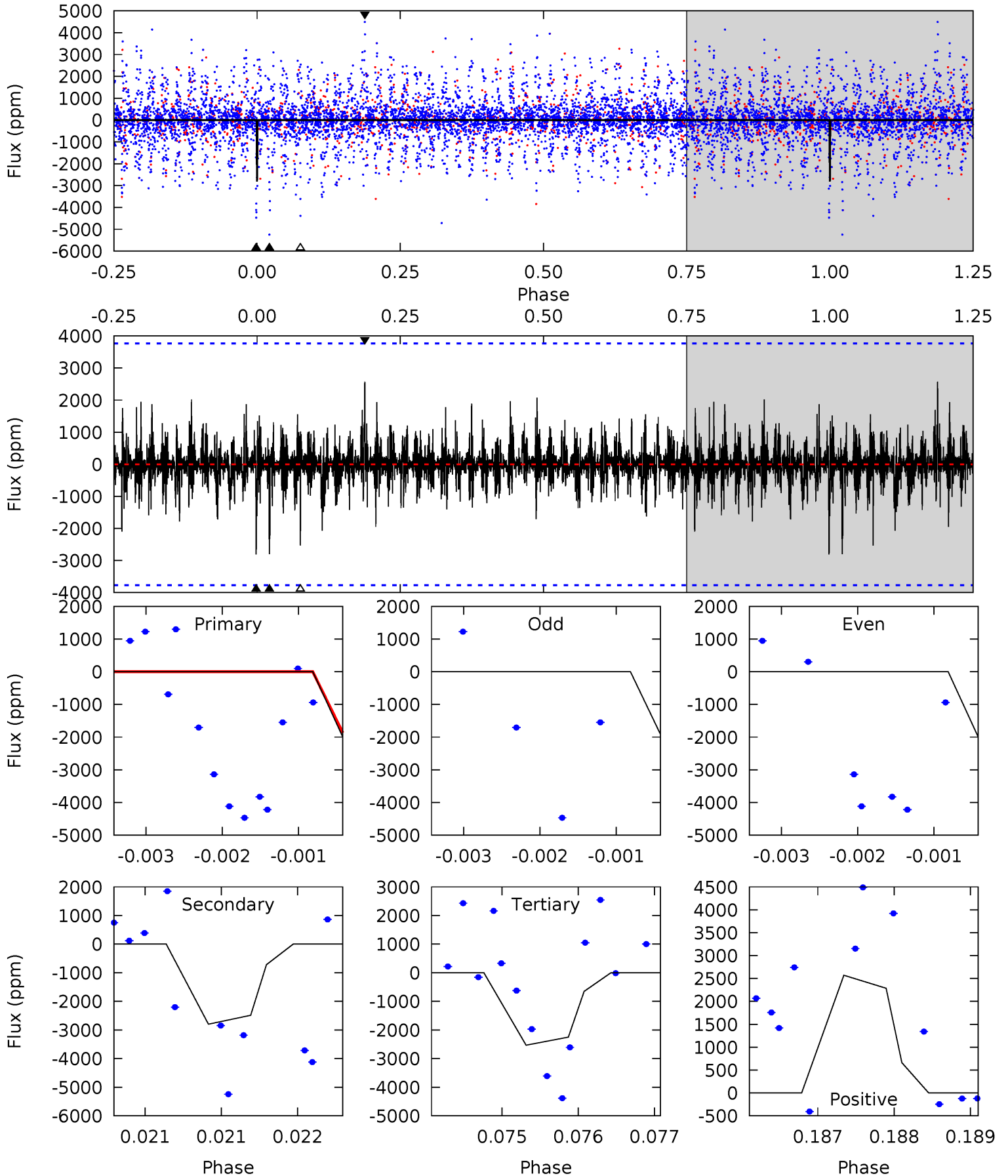
TCE 007938180-04     $P = 41.356581$  Days     $T_0 = 134.750157$  (BKJD)



# DV Model-Shift Uniqueness Test

007938180-04, P = 41.356164 Days, E = 93.404558 Days

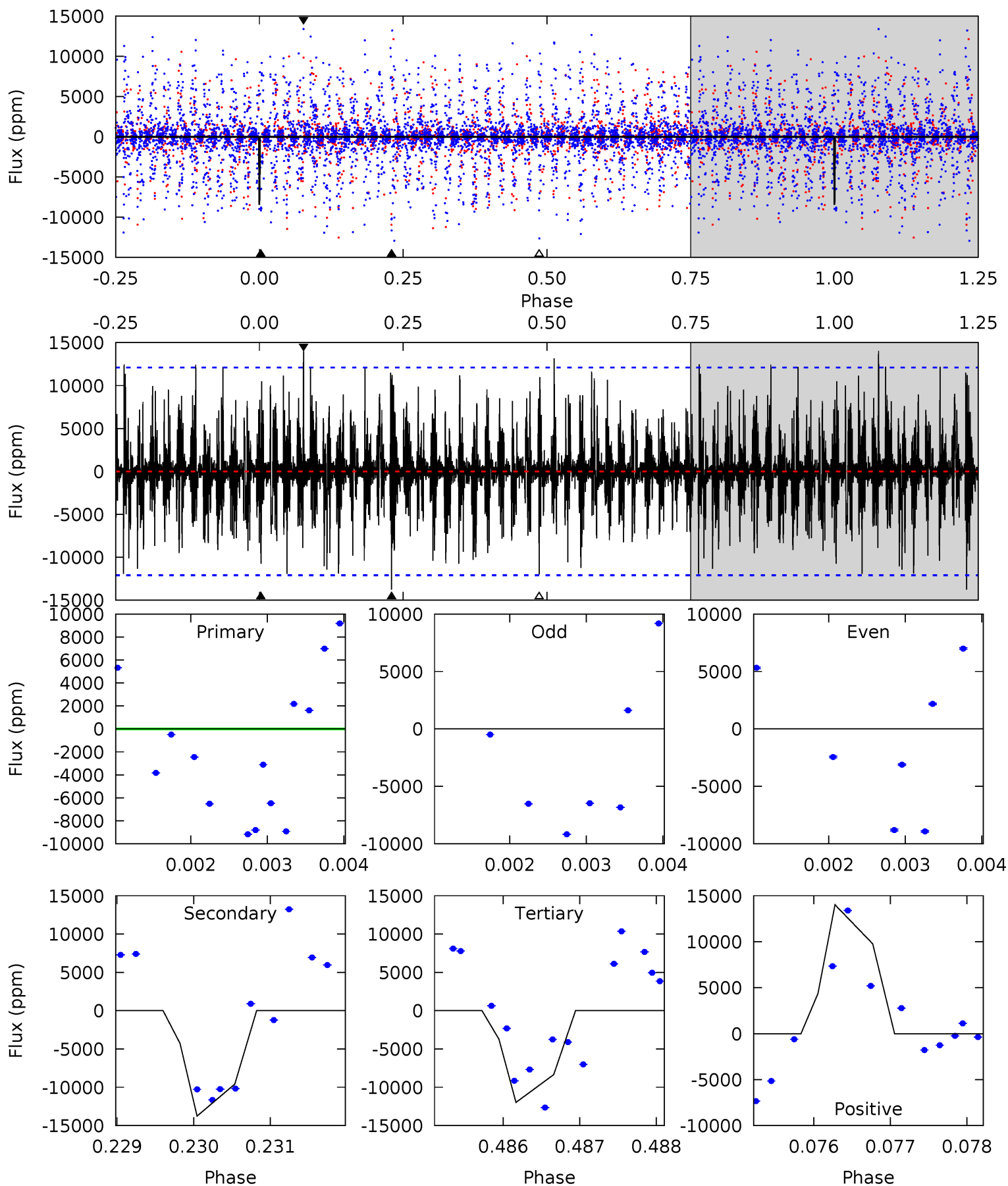
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
4.08	4.06	3.68	3.73	5.47	3.32	0.66	0.40	0.35	0.38	0.33	0.11	1.00	0.48	0.05



# Alt Model-Shift Uniqueness Test

007938180-04, P = 41.356581 Days, E = 93.393576 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
3.81	6.20	5.40	6.32	5.45	3.29	1.36	-1.58	-2.50	0.80	-0.12	0.72	1.00	0.50	1.28



### Stellar Parameters For KIC 007938180

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6549^{+146}_{-211}$	$4.224^{+0.153}_{-0.187}$	$-0.180^{+0.250}_{-0.300}$	$1.407^{+0.439}_{-0.293}$	$1.215^{+0.192}_{-0.174}$	$0.614^{+0.461}_{-0.304}$
	+2%/-3%	+4%/-4%	+139%/-167%	+31%/-21%	+16%/-14%	+75%/-50%
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 007938180-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-2797 \pm 689$	$204.45^{+200.50}_{-145.30}$	$958^{+70}_{-53}$	$2205^{+808}_{-407}$	$2.267^{+24.654}_{-1.693}$
Alt.	$-13761 \pm 2220$	$200.75^{+203.32}_{-138.80}$	$965^{+66}_{-64}$	$2739^{+1133}_{-458}$	$12^{+112}_{-9}$

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

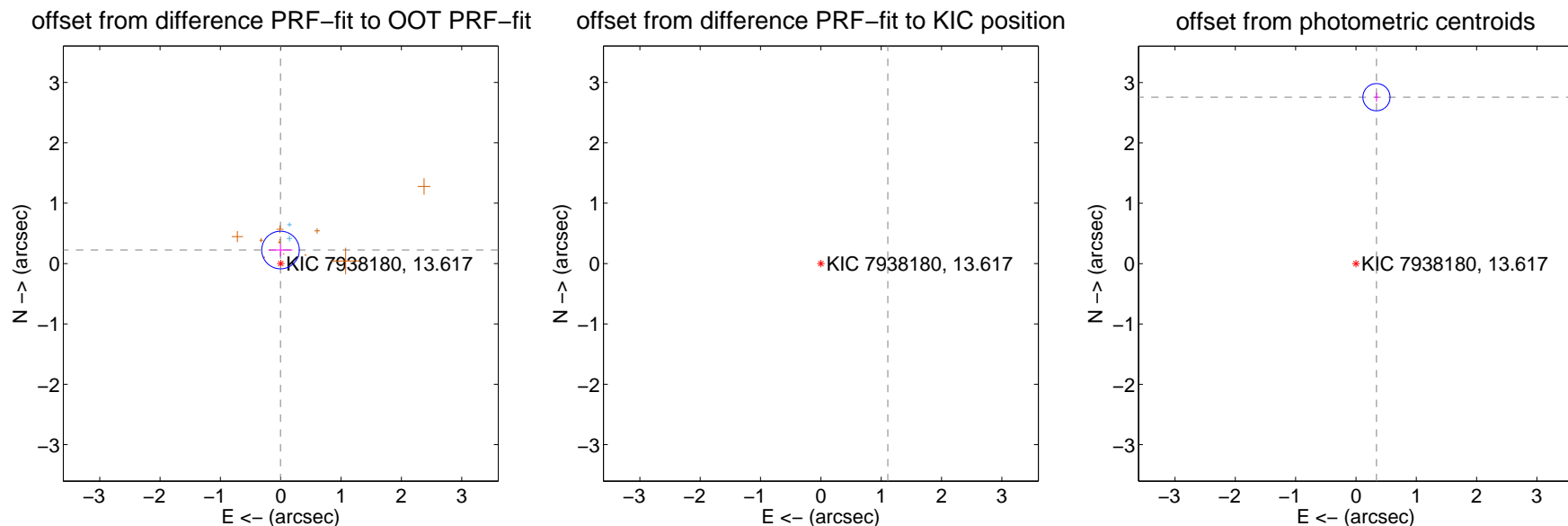
## DV Centroid Data

Supplemental centroid analysis for 007938180-04. Kepler magnitude: 13.62. Transit SNR 3.51

There are 2 quarters with good PRF difference image offsets

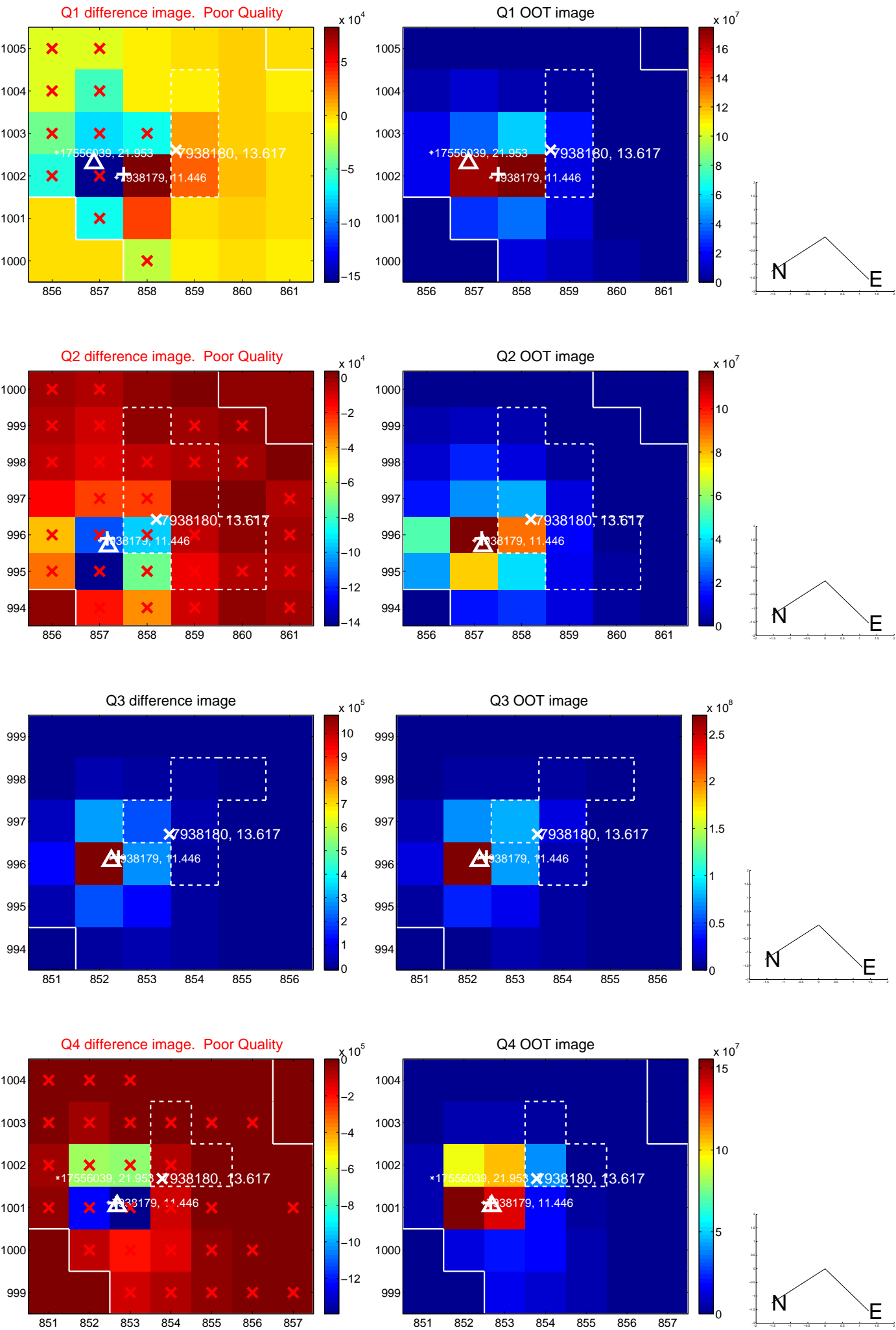
The OOT PRF centroid is offset from the target star catalog position by about 5.09 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.224 \pm 0.104$	2.16	$0.004 \pm 0.199$	$0.224 \pm 0.105$
PRF-fit source offset from KIC position	$5.189 \pm 0.143$	36.38	$-1.109 \pm 0.223$	$5.069 \pm 0.113$
photometric centroid source offset	$2.78 \pm 0.08$	37.01	$-0.34 \pm 0.03$	$2.76 \pm 0.08$

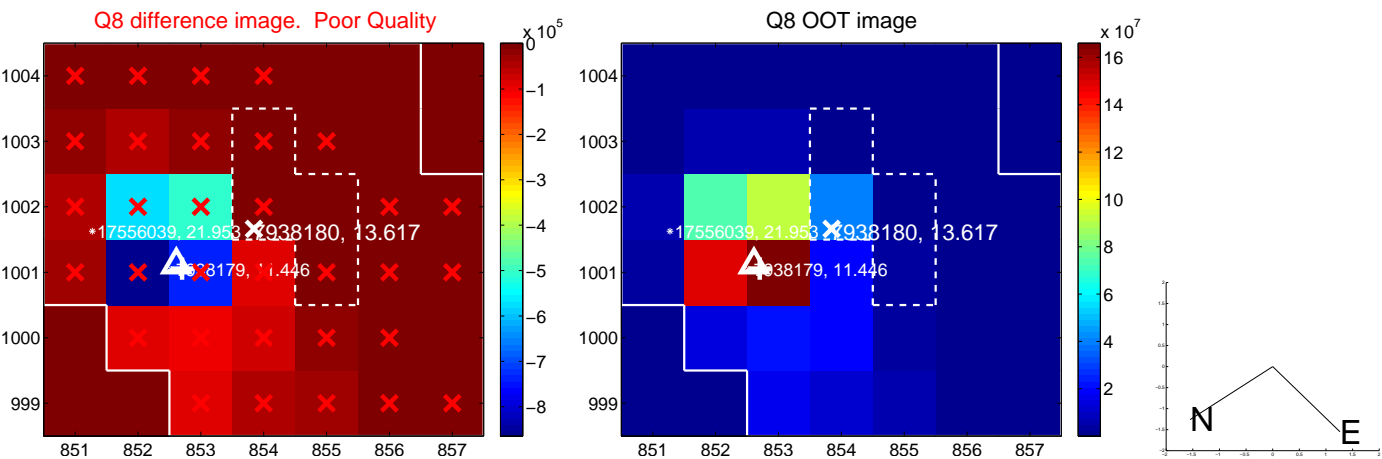
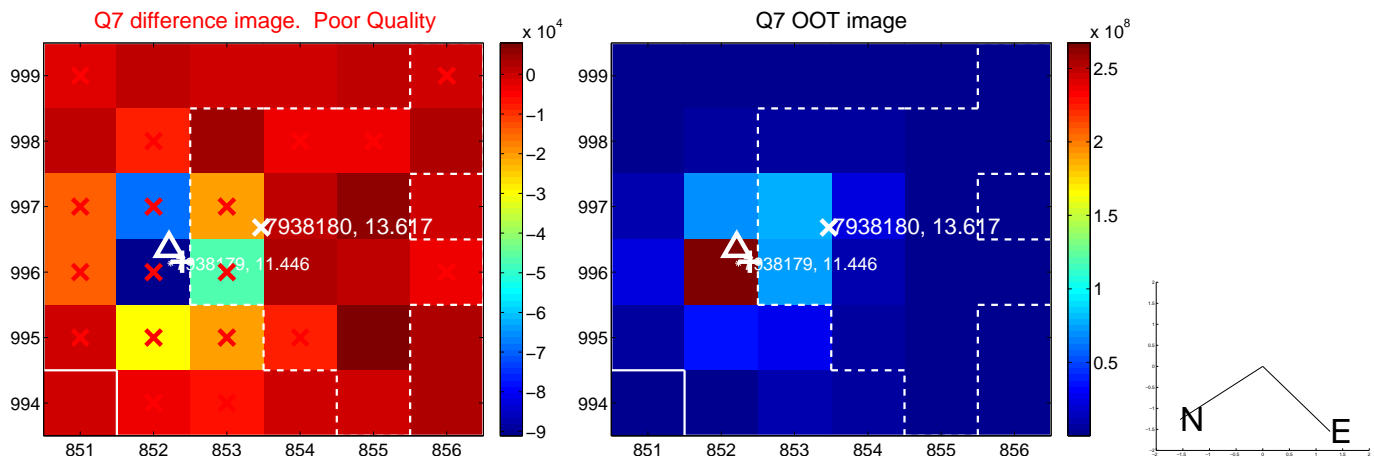
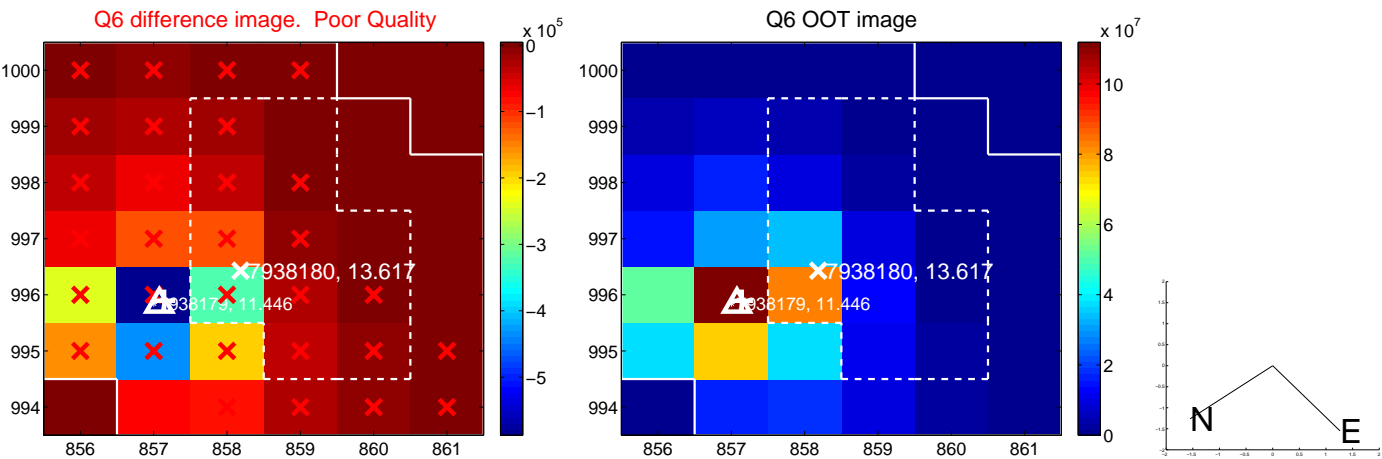
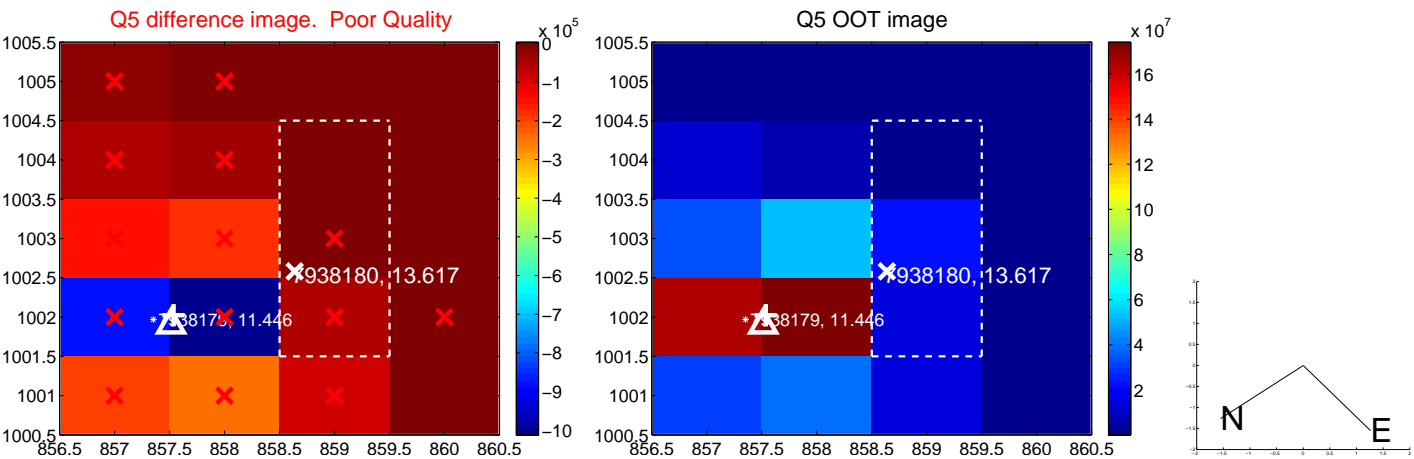


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

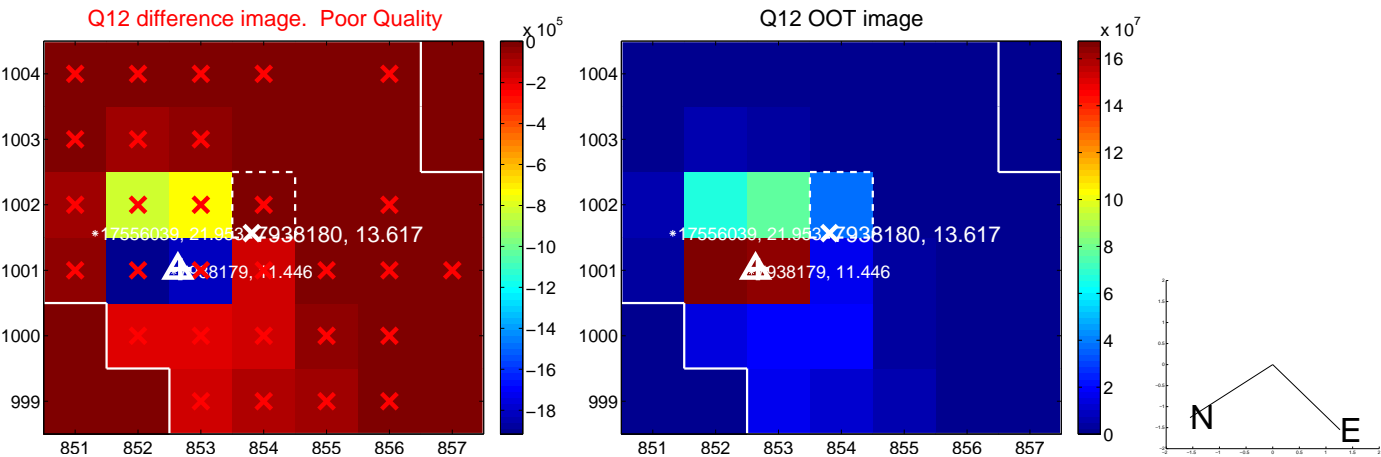
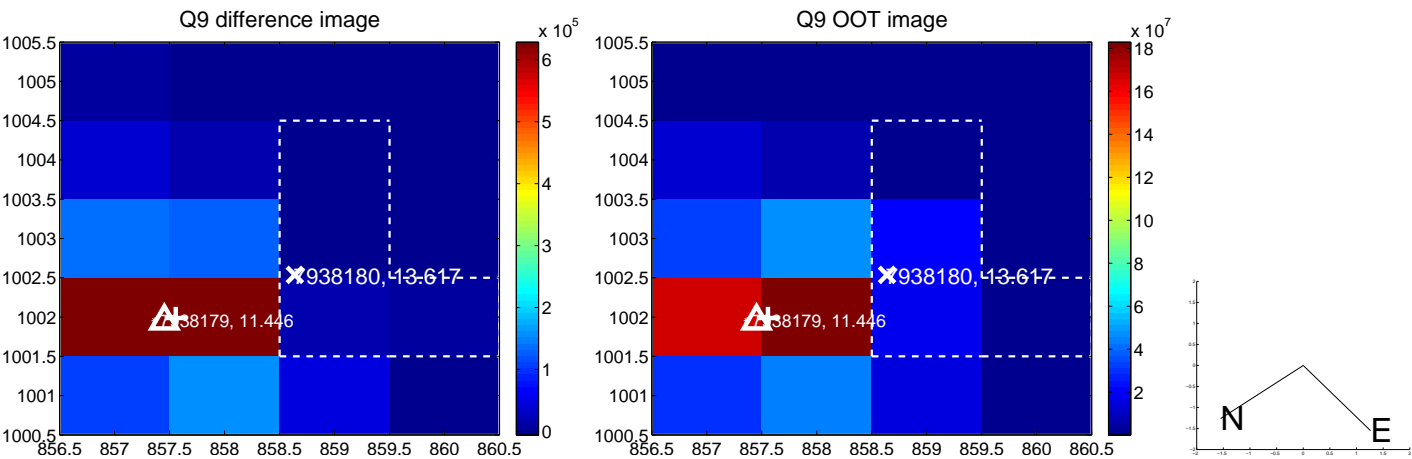


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

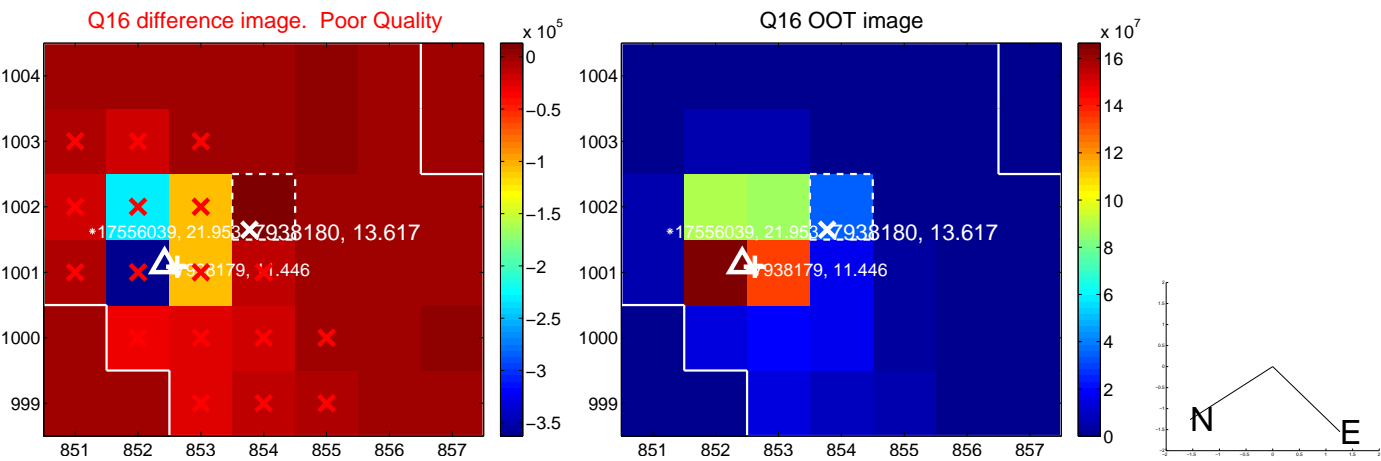
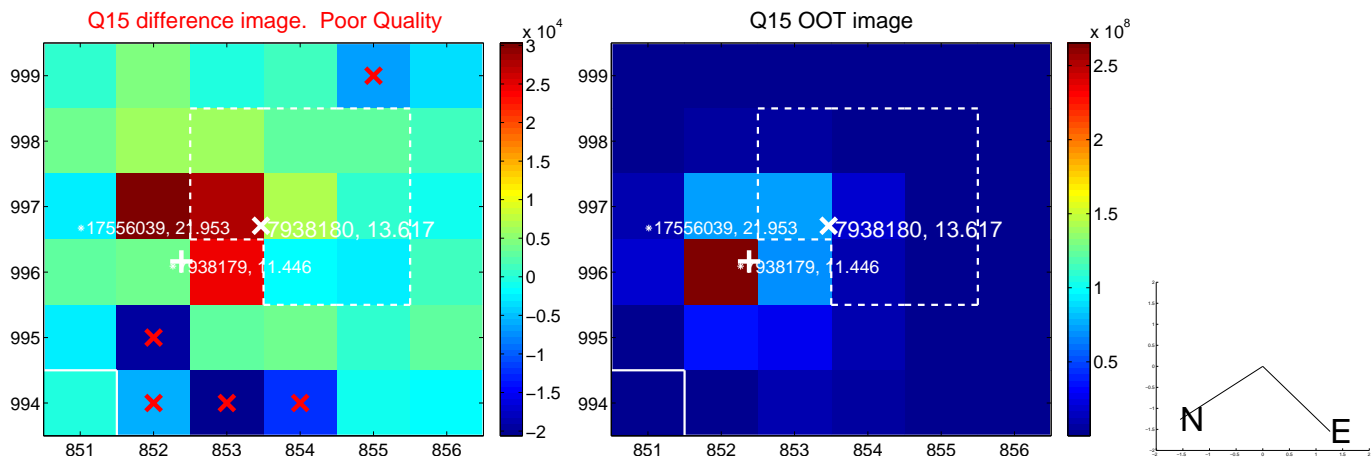
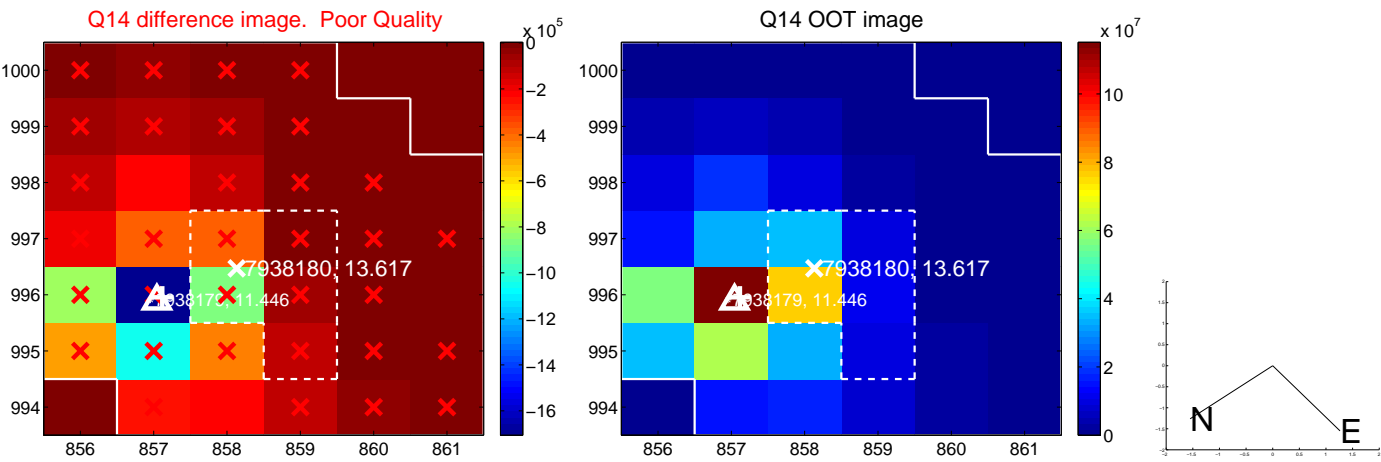
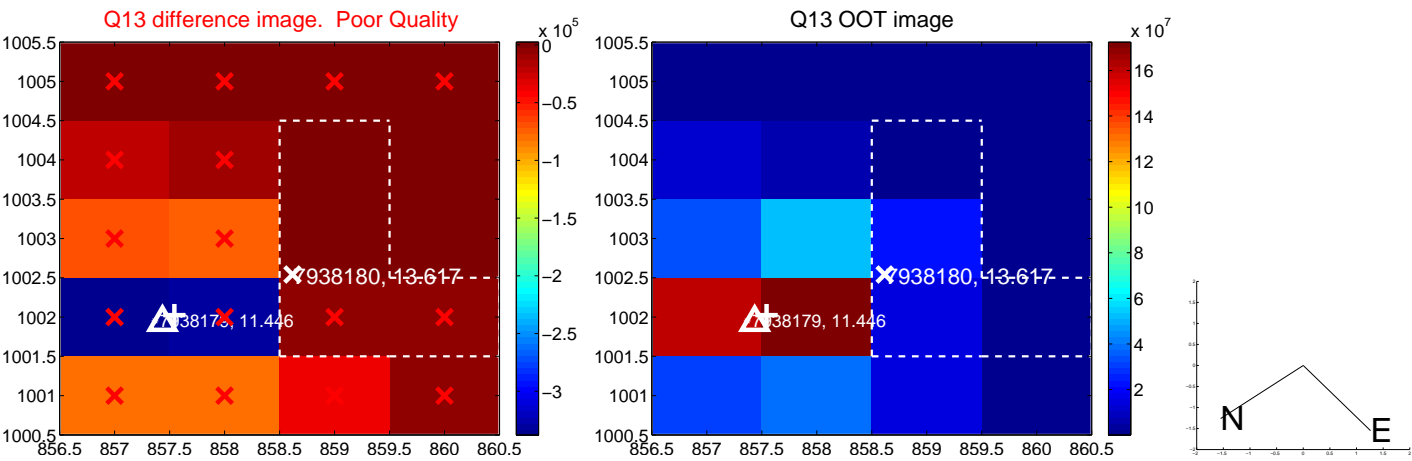




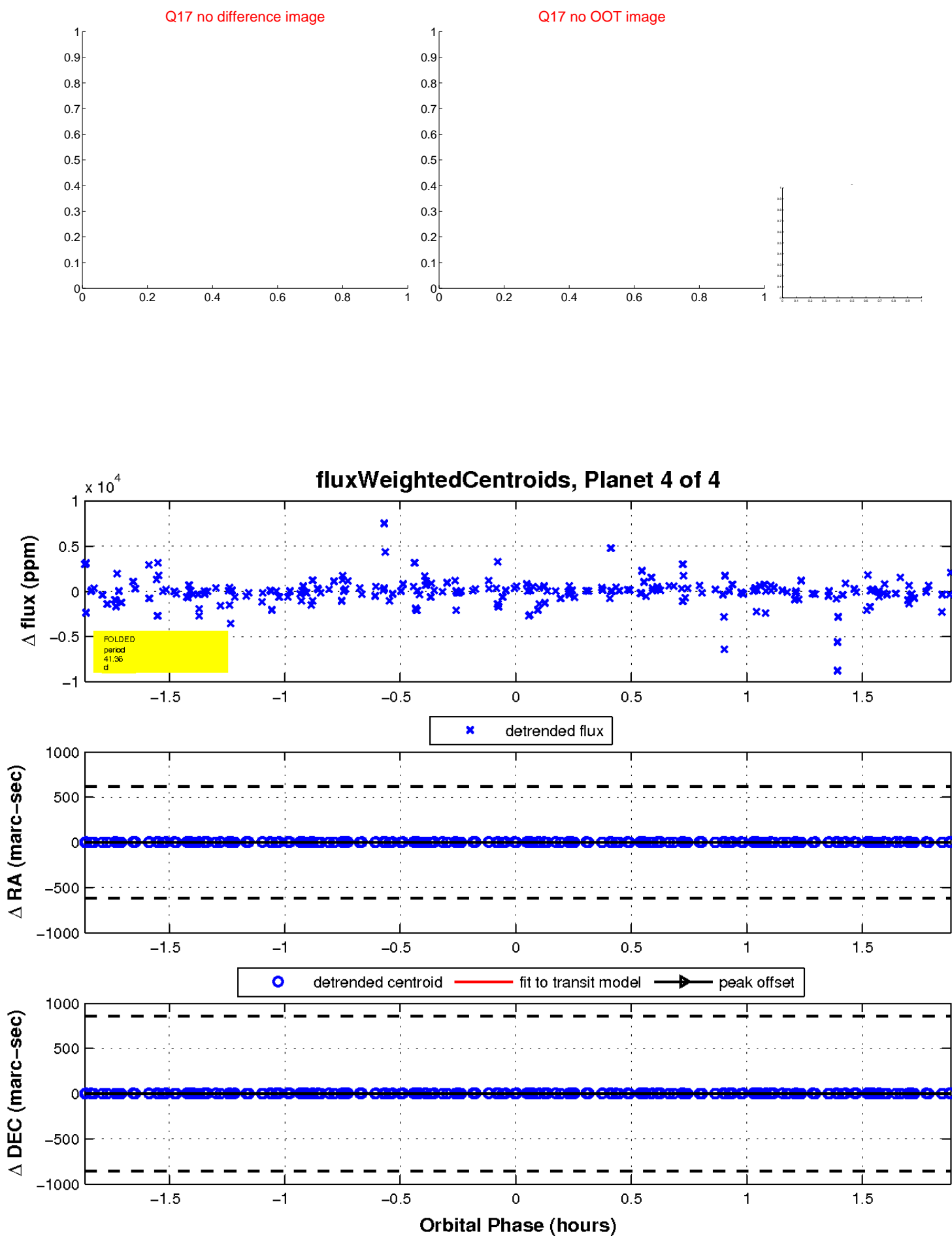
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.



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.



UKIRT Image

Declination

