

# KIC 007282078

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007282078-01	OBS	No	0.566775	131.856415	50.0	3.718	7.8	8.4	0.55	3960	0.47	539.38
007282078-02	OBS	No	318.814732	265.417928	1984.3	6.781	9.6	8.3	0.55	3960	2.63	0.12
007282078-03	OBS	No	69.642459	196.832856	1596.4	2.189	9.1	9.6	0.55	3960	2.31	0.88
007282078-04	OBS	No	65.916949	194.388123	1337.4	2.554	8.7	9.6	0.55	3960	2.15	0.95

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007282078-01	OBS	FP	0.00	1	0	1	1	LPP_DV—HALO_GHOST—EPHEM_MATCH
007282078-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
007282078-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_FEW_DIFFS
007282078-04	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS—HALO_GHOST

**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.

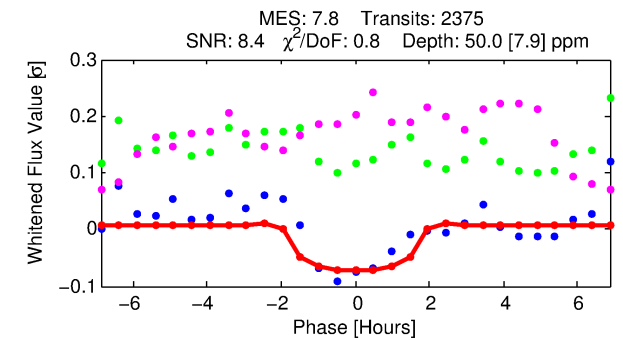
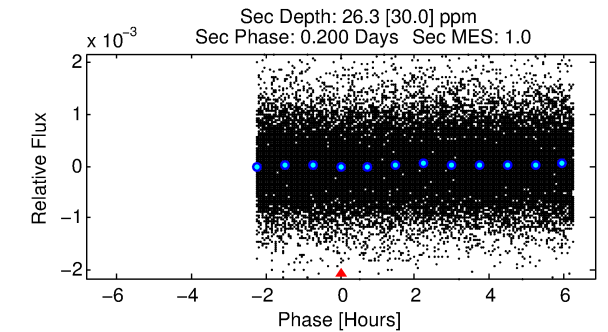
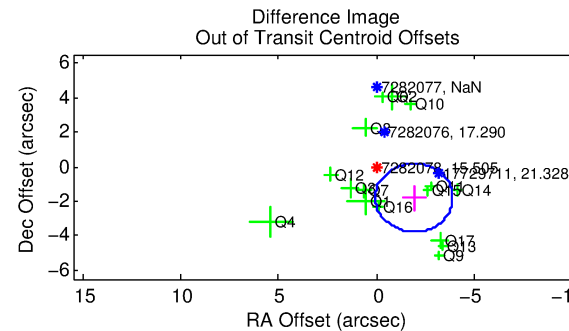
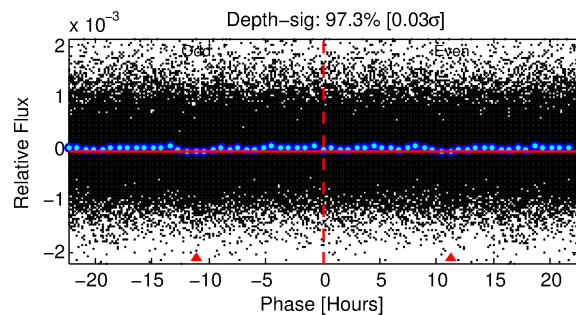
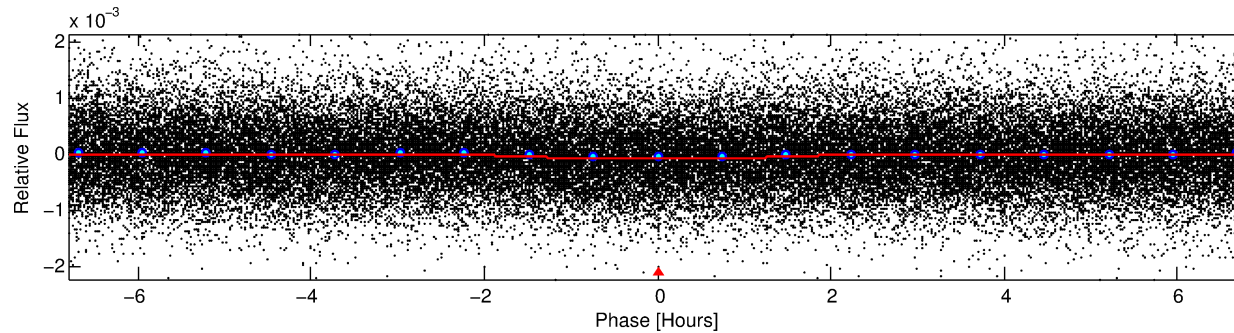
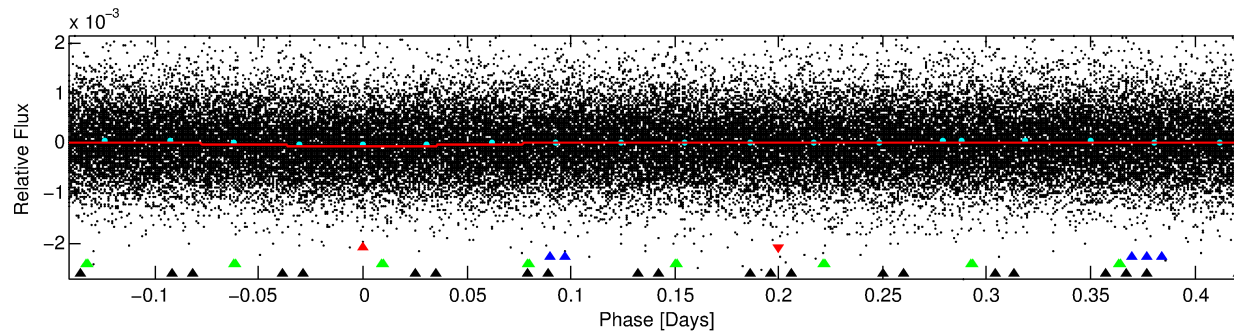
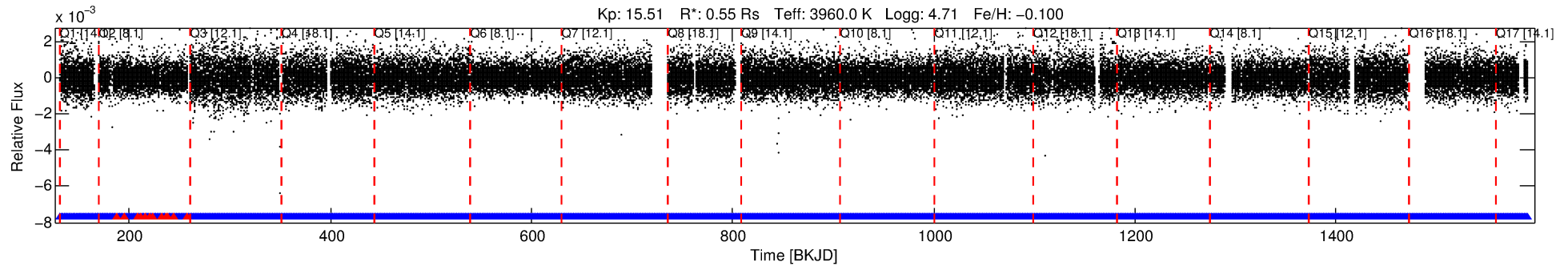
## Ephemeris Match Information For 007282078-01

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	$\sigma_P$	$\sigma_T$
007282078-01	7282078	RR-Lyr-pri	7198959	1:1	1210.2	71	295	7.86	15.50	12466.00	Direct-PRF	0	4.54	16.09

**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: 7282078 Candidate: 1 of 4 Period: 0.567 d



## DV Fit Results:

Period = 0.56678 [0.00001] d  
Epoch = 131.8564 [0.0047] BKJD  
Rp/R\* = 0.0078 [0.0075]  
a/R\* = 1.08 [0.68]  
b = 0.90 [0.94]  
Seff = 539.38 [71.21]  
Teq = 1229 [41] K  
Rp = 0.47 [0.45] Re  
a = 0.0111 [0.0008] AU  
Ag = 8.27 [18.63] [0.39 $\sigma$ ]  
Teffp = 3222 [1815] K [1.10 $\sigma$ ]

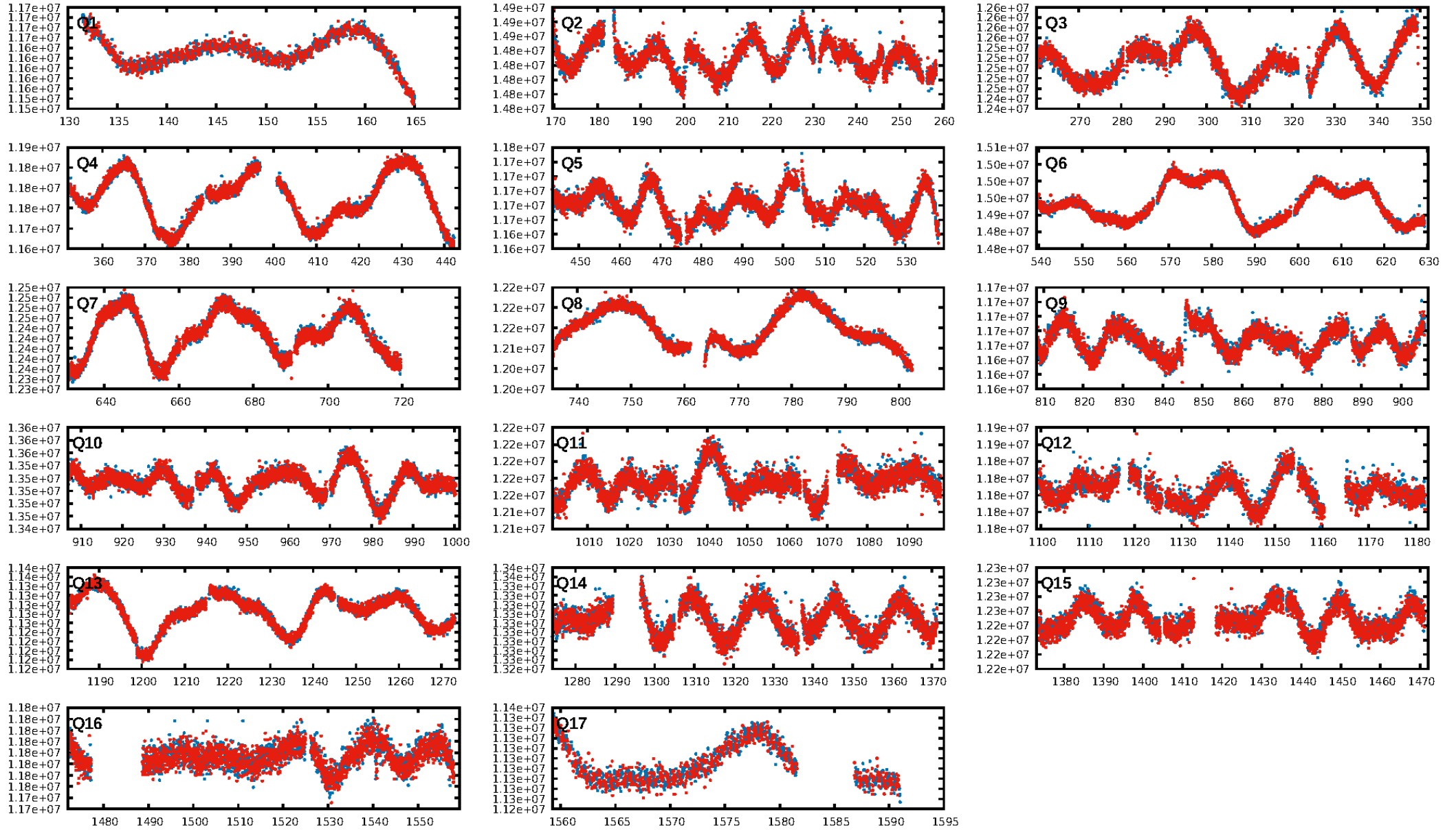
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [347.72 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 5.09e-08  
RollingBand-fgt: 0.99 [2255/2268]  
GhostDiagnostic-chr: -0.09592  
Centroid-sig: N/A  
Centroid-so: 3.056 arcsec [3.26 $\sigma$ ]  
OotOffset-rm: 2.628 arcsec [3.98 $\sigma$ ]  
KicOffset-rm: 2.373 arcsec [3.63 $\sigma$ ]  
OotOffset-st: 4/4/4 [16]  
KicOffset-st: 4/4/4 [16]  
DiffImageQuality-fgm: 0.00 [0/16]  
DiffImageOverlap-fno: 1.00 [17/17]

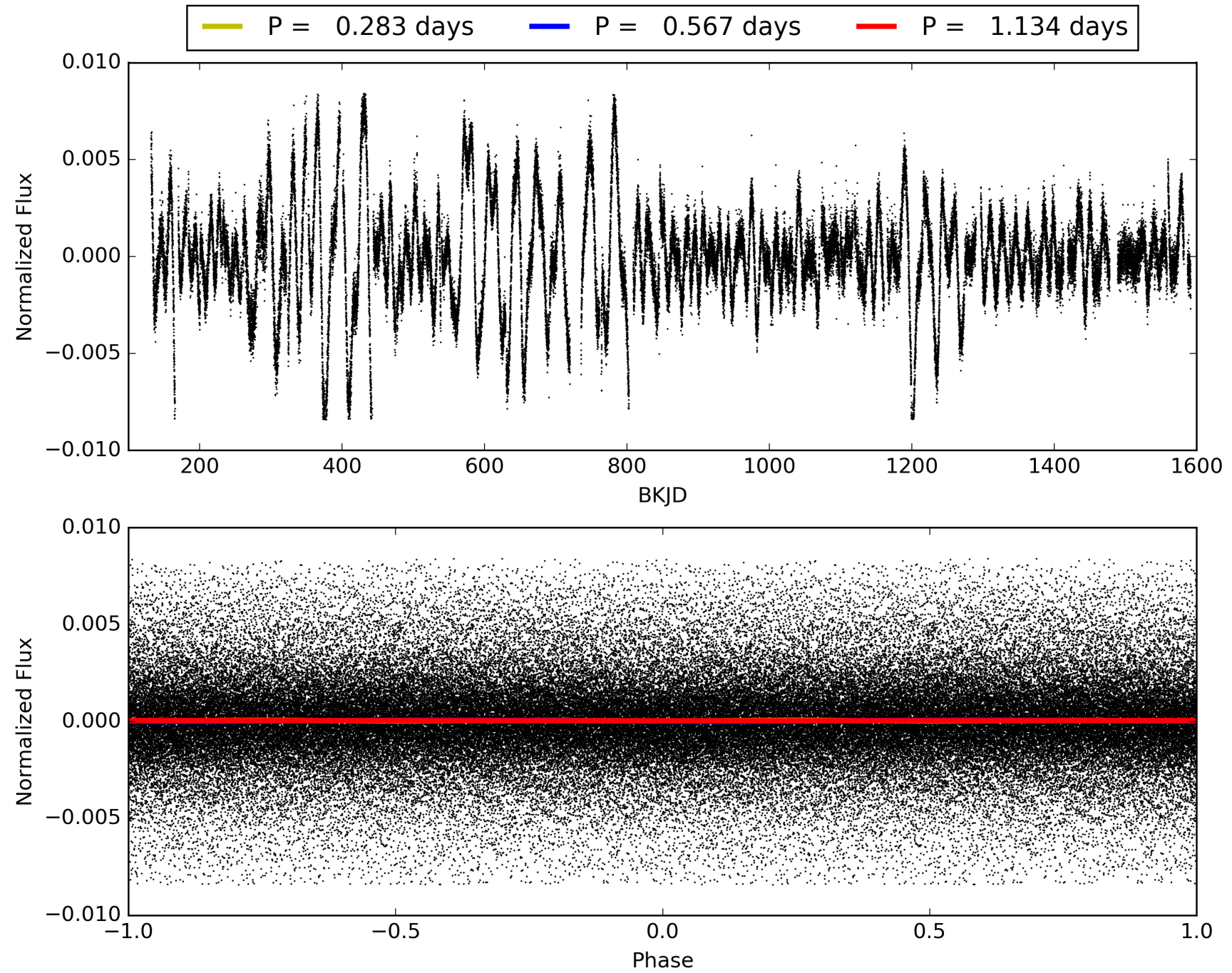
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 01:38:26 Z

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

# TCE 007282078-01, PDC Light Curves



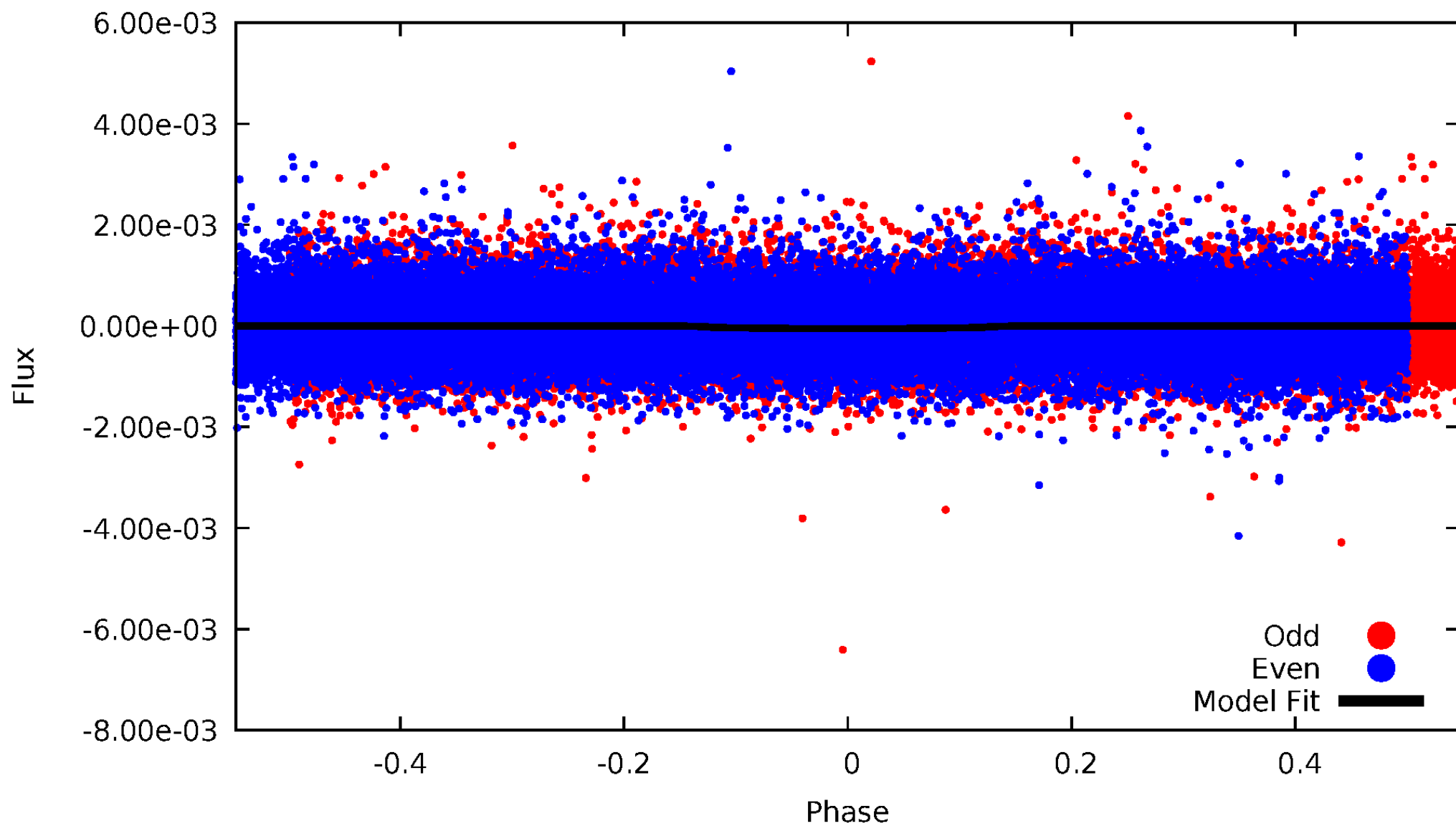
TCE 007282078-01





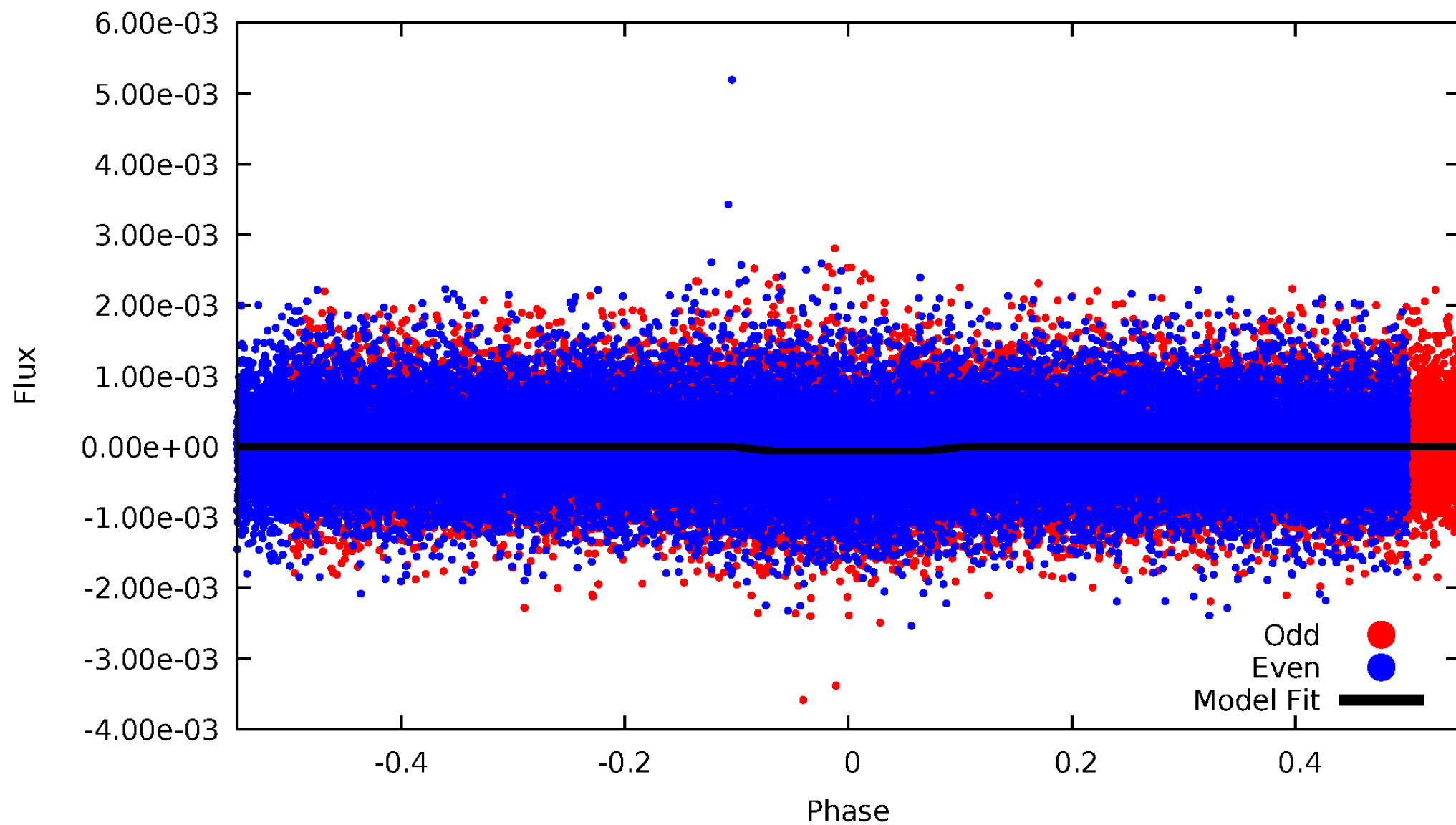
# DV Odd/Even

TCE 007282078-01



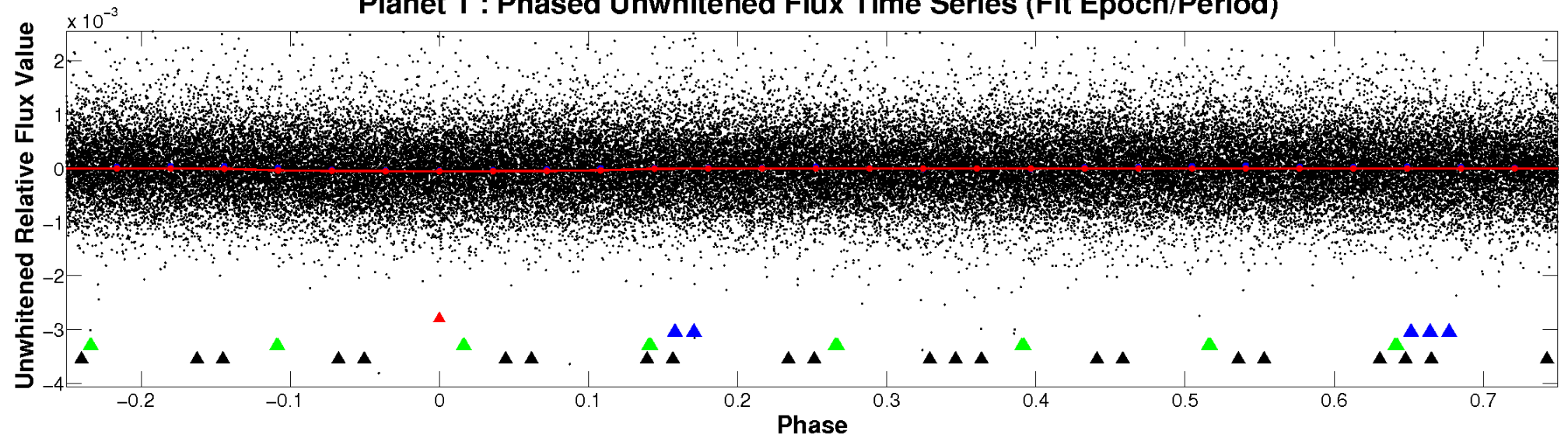
# ALT Odd/Even

TCE 007282078-01

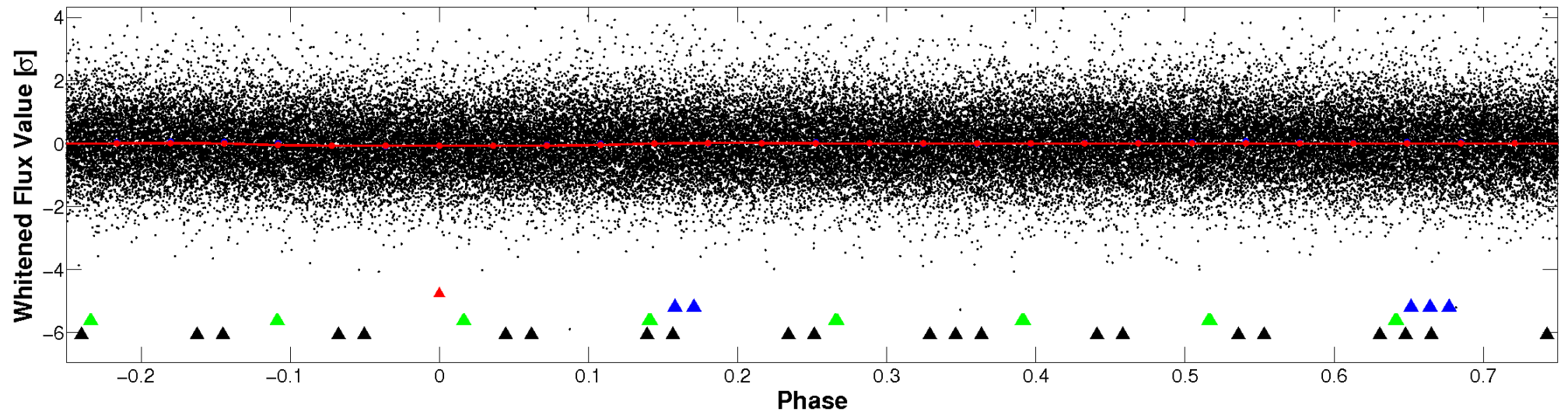


# Non-Whitened Vs. Whitened Light Curve

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

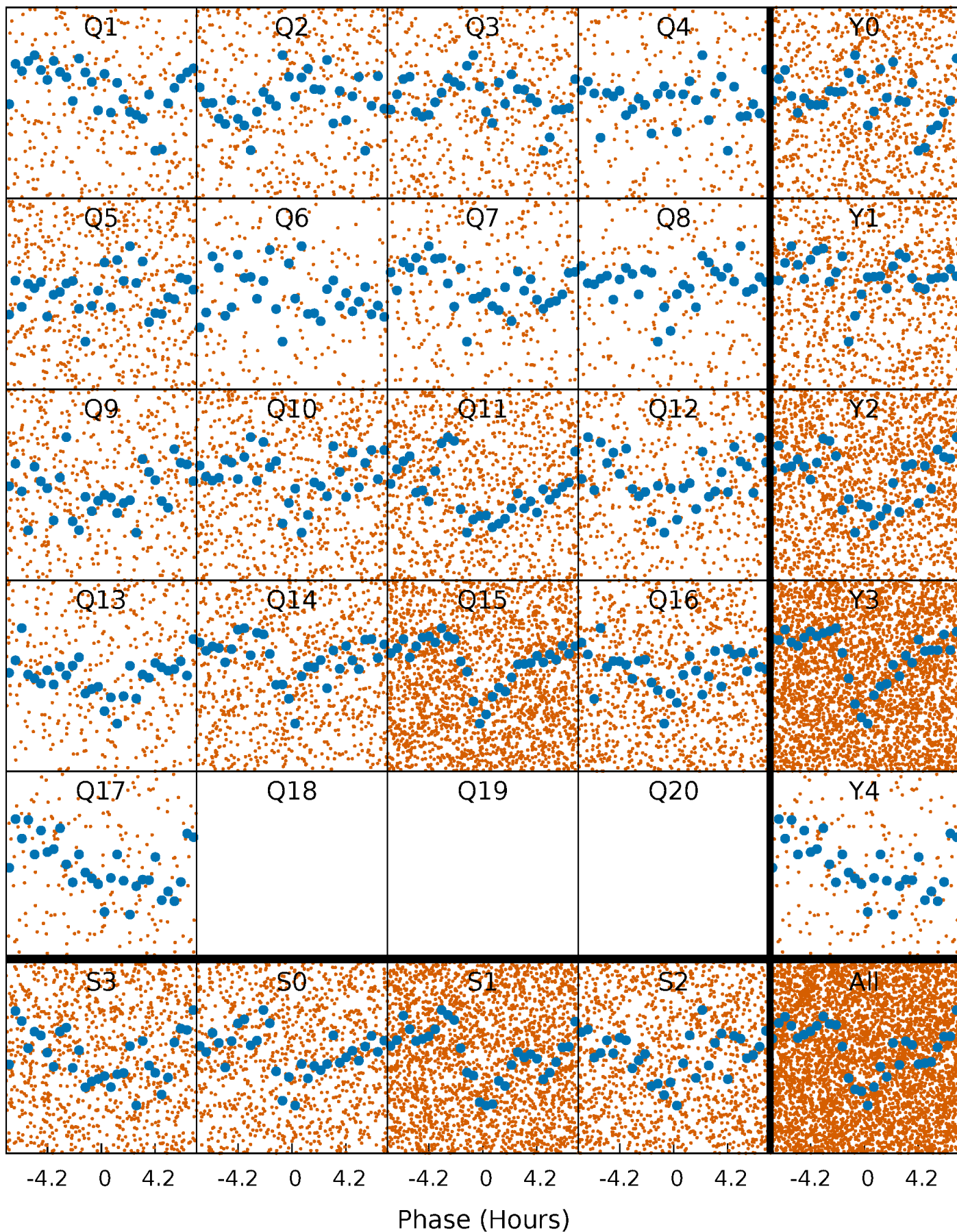


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

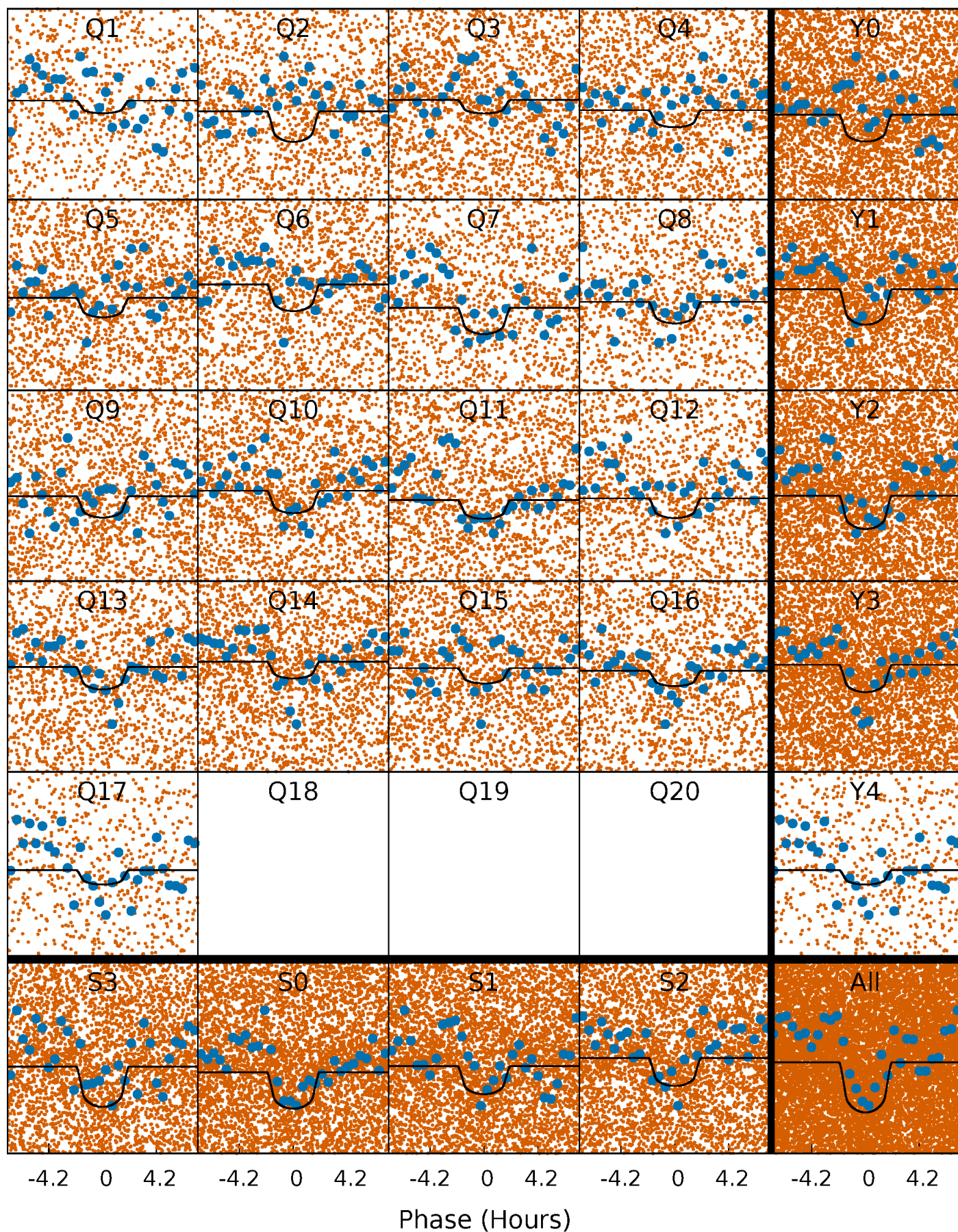
TCE 007282078-01 P= 0.566775 Days  $T_0=131.856415$  (BKJD)





# DV Quarter-Phased Transit Curves

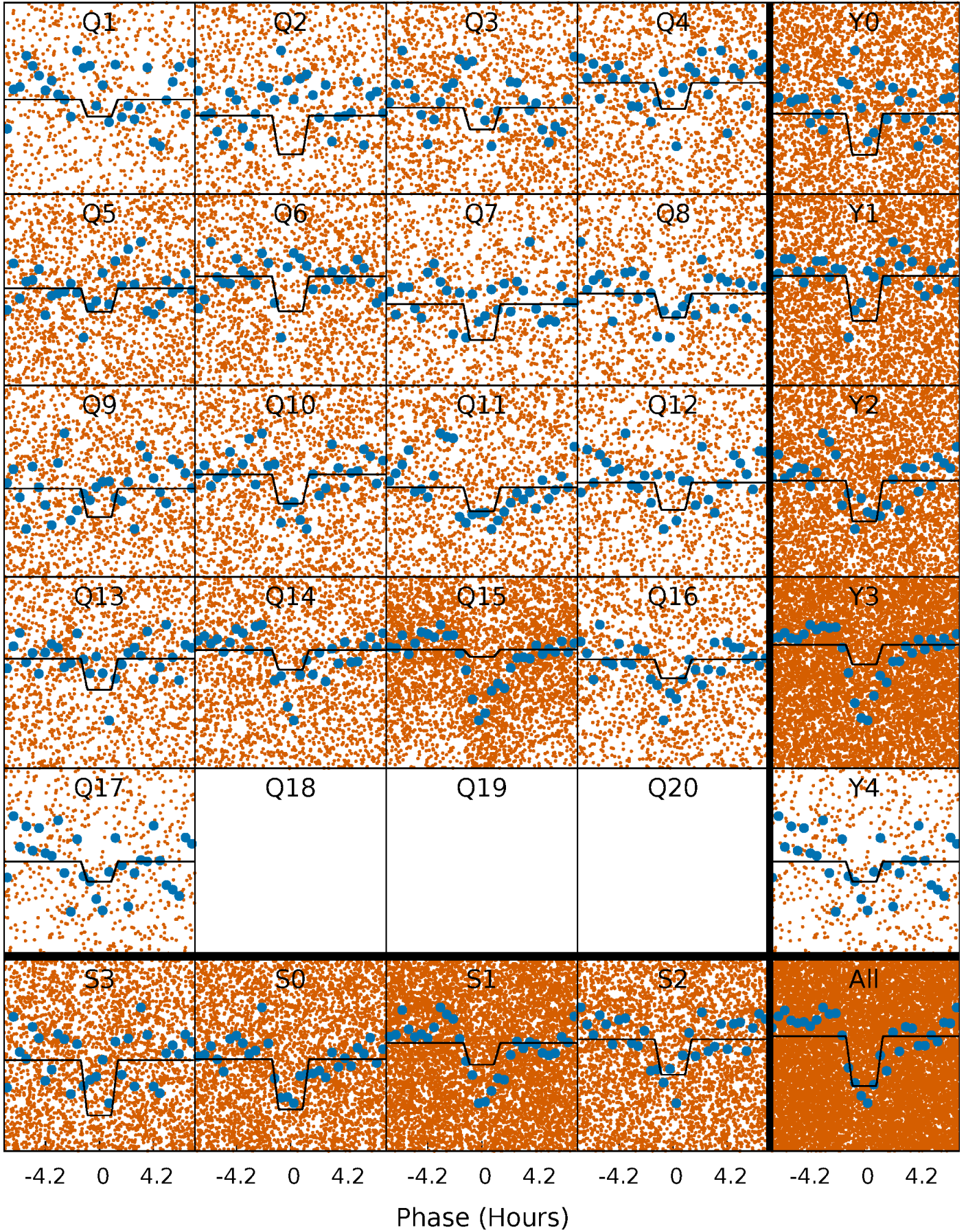
TCE 007282078-01 P= 0.566775 Days  $T_0=131.856415$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

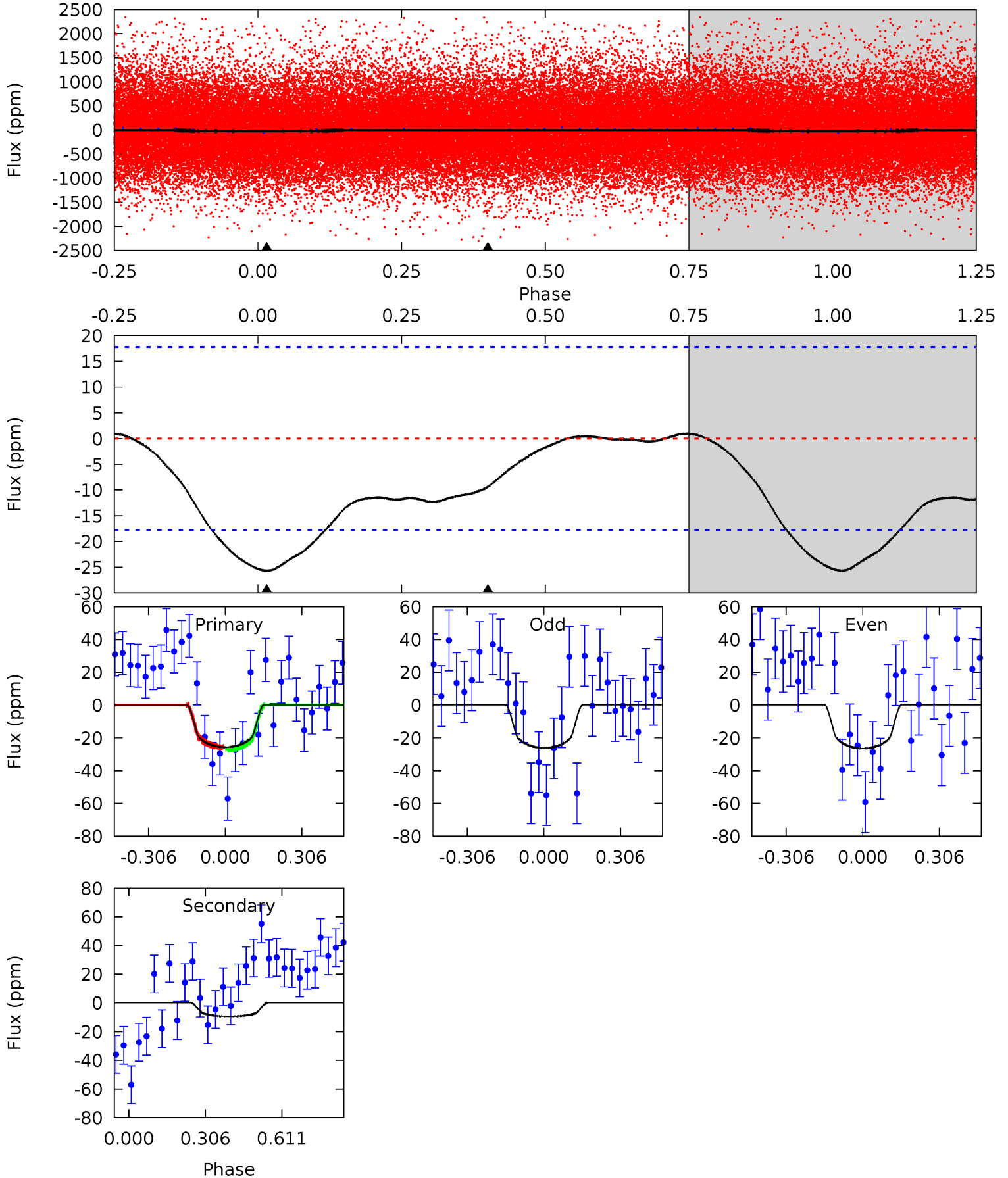
TCE 007282078-01 P= 0.566775 Days  $T_0=131.856415$  (BKJD)



# DV Model-Shift Uniqueness Test

007282078-01, P = 0.566775 Days, E = 131.289640 Days

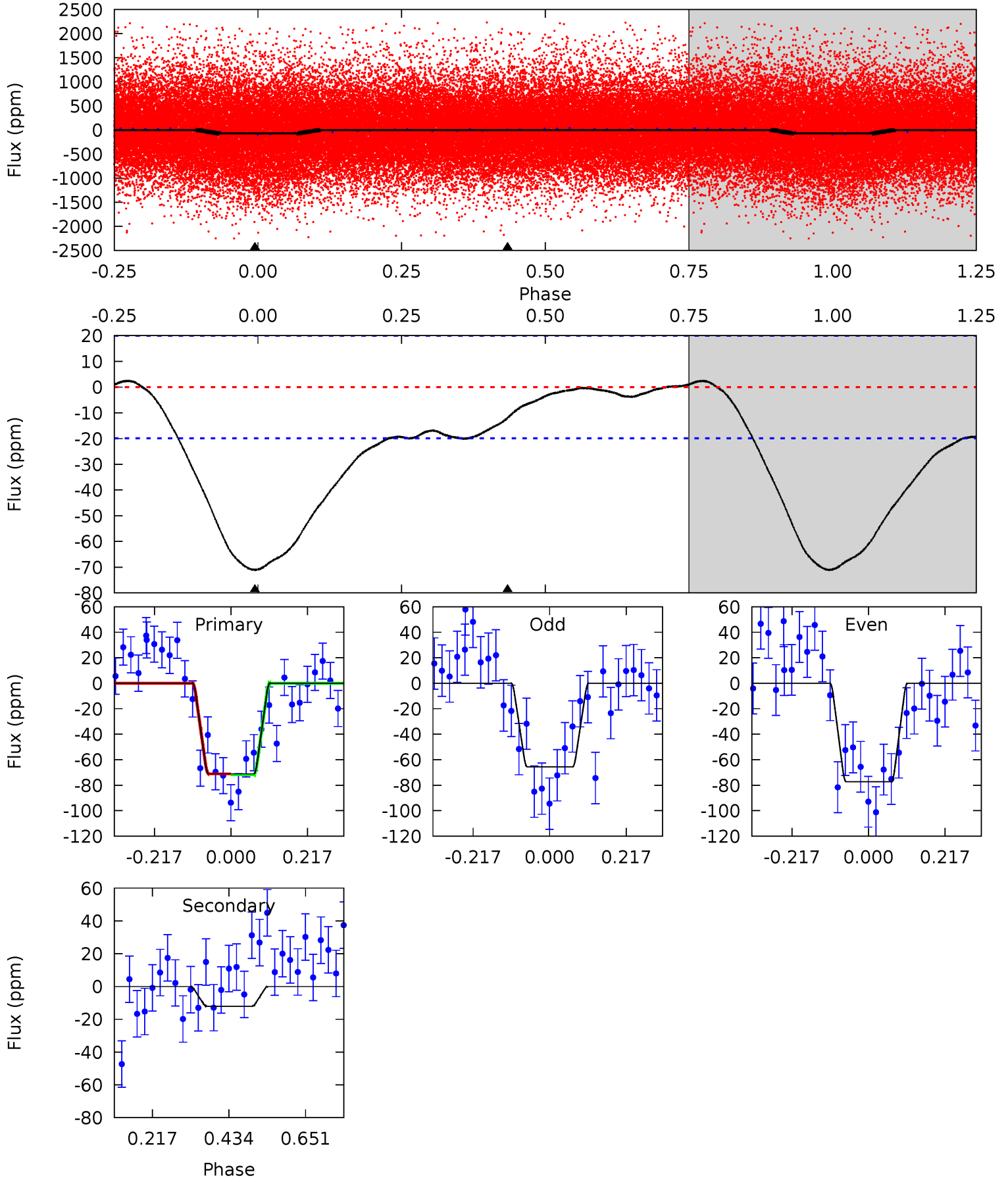
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.24	2.29	0	0	4.32	1.02	0.14	6.24	6.24	2.29	2.29	0.04	0.76	0.04	0.16



# Alt Model-Shift Uniqueness Test

007282078-01, P = 0.566775 Days, E = 131.289640 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
15.7	2.67	0	0	4.40	1.23	1.00	15.7	15.7	2.67	2.67	1.27	1.13	0.03	0.08





### Stellar Parameters For KIC 007282078

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (g \cdot \text{cm}^{-3})$
	$3960^{+89}_{-1}$	$4.714^{+0.040}_{-0.036}$	$-0.100^{+0.250}_{-0.300}$	$0.551^{+0.045}_{-0.050}$	$0.573^{+0.043}_{-0.059}$	$4.822^{+1.010}_{-0.695}$
	+2%/-0%	+1%/-1%	+250%/-300%	+8%/-9%	+8%/-10%	+21%/-14%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 007282078-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-9 \pm 4$	$0.53^{+0.43}_{-0.33}$	$1708^{+57}_{-74}$	$2730^{+993}_{-543}$	$1.998^{+12.911}_{-1.390}$
Alt.	$-12 \pm 5$	$0.57^{+0.41}_{-0.37}$	$1712^{+54}_{-85}$	$2813^{+1077}_{-514}$	$2.416^{+16.363}_{-1.696}$

$T_{max}$  = 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

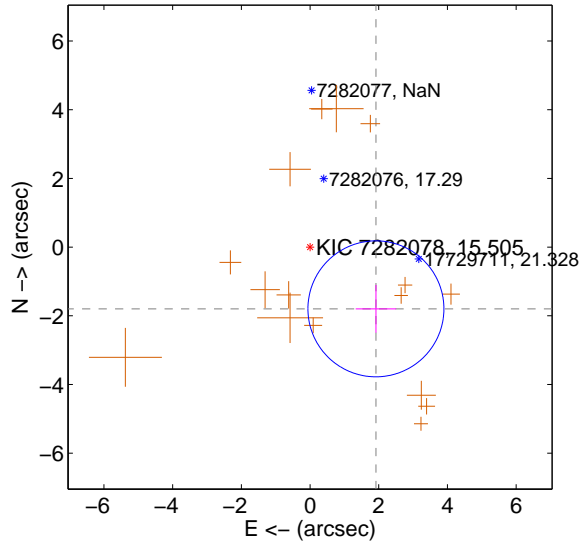
Supplemental centroid analysis for 007282078-01. Kepler magnitude: 15.51. Transit SNR 8.40

There are 0 quarters with good PRF difference image offsets

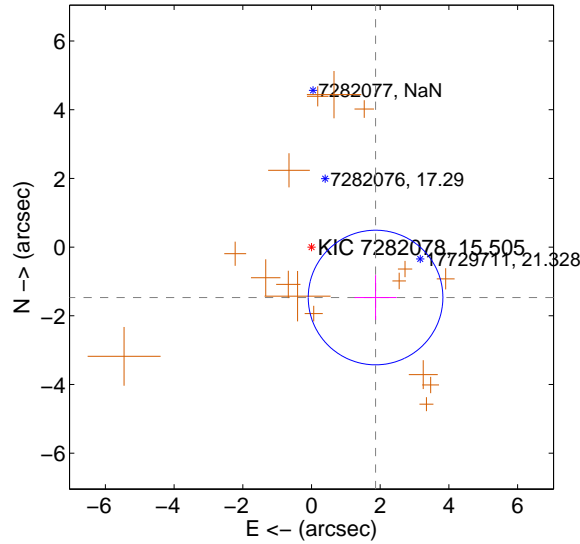
The direct PRF centroid is offset from the target star catalog position by about 0.60 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.628 \pm 0.660$	3.98	$-1.917 \pm 0.587$	$-1.797 \pm 0.695$
PRF-fit source offset from KIC position	$2.373 \pm 0.653$	3.63	$-1.865 \pm 0.612$	$-1.468 \pm 0.651$
photometric centroid source offset	$3.06 \pm 0.94$	3.26	$-2.20 \pm 0.90$	$2.13 \pm 0.98$

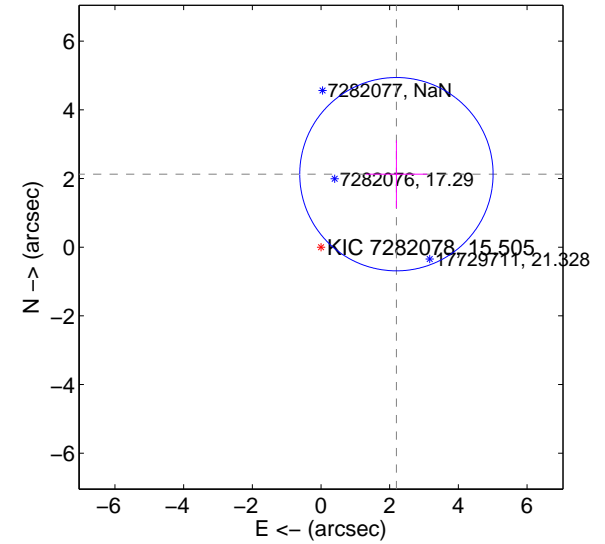
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

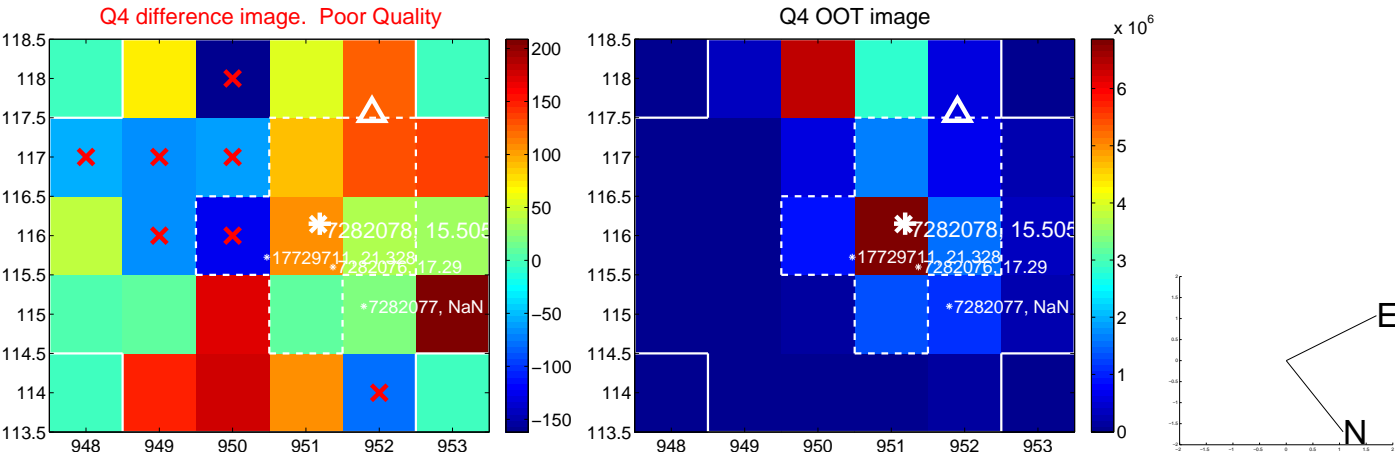
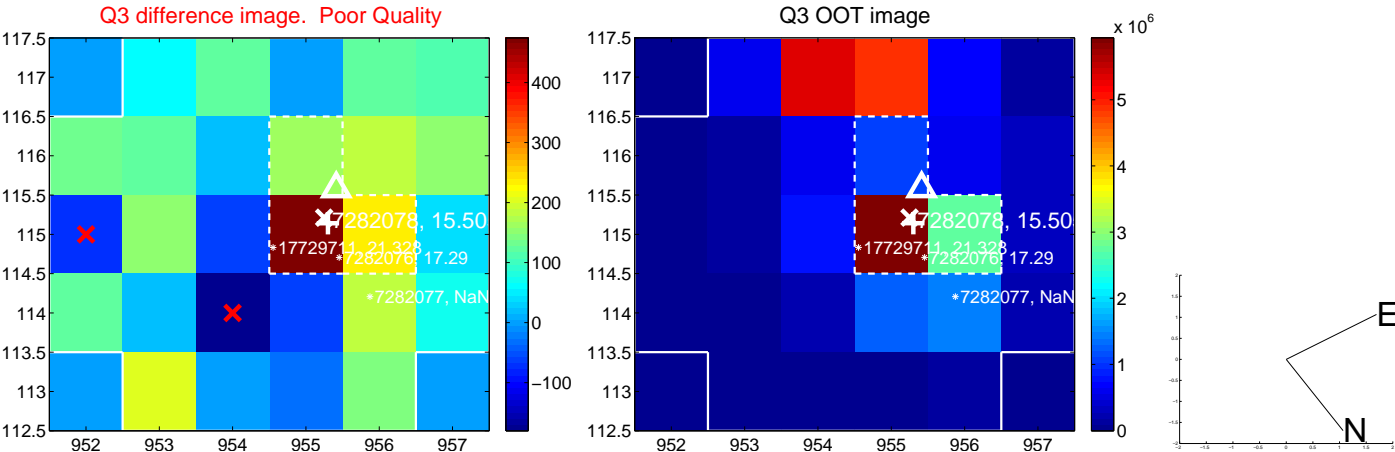
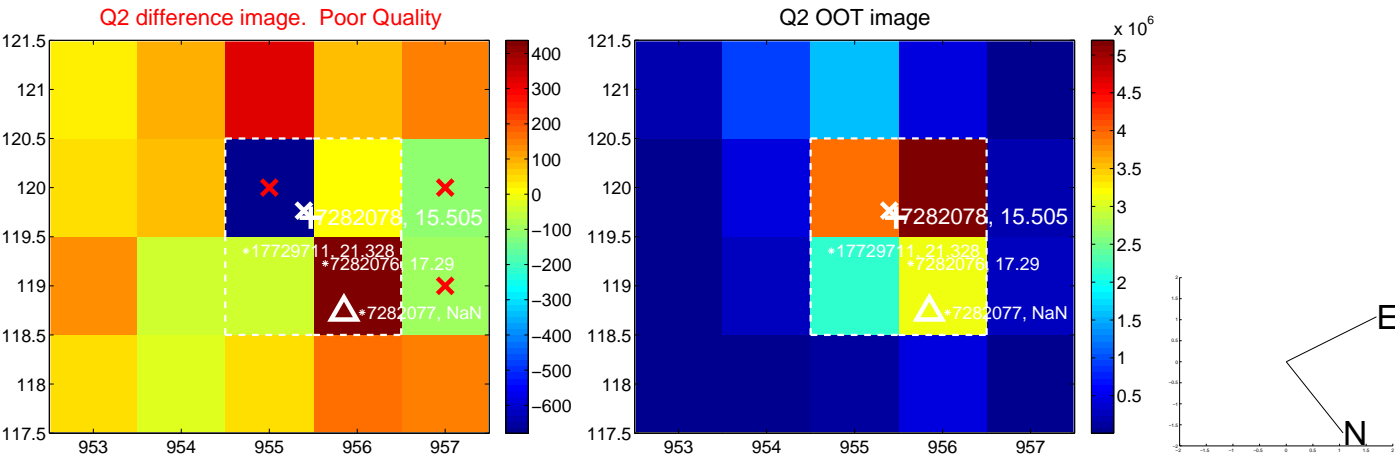
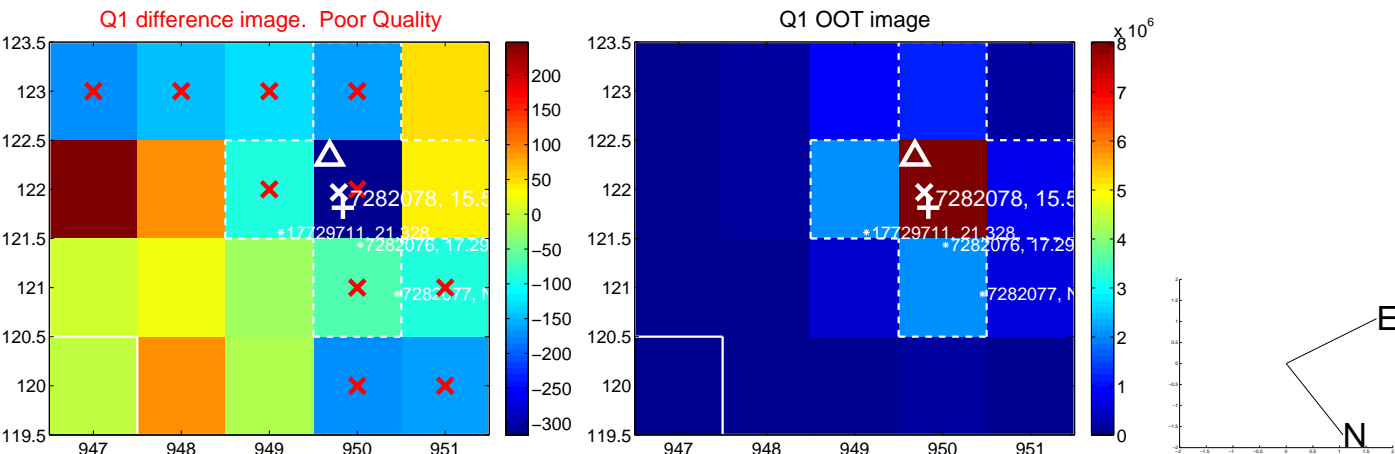


offset from photometric centroids

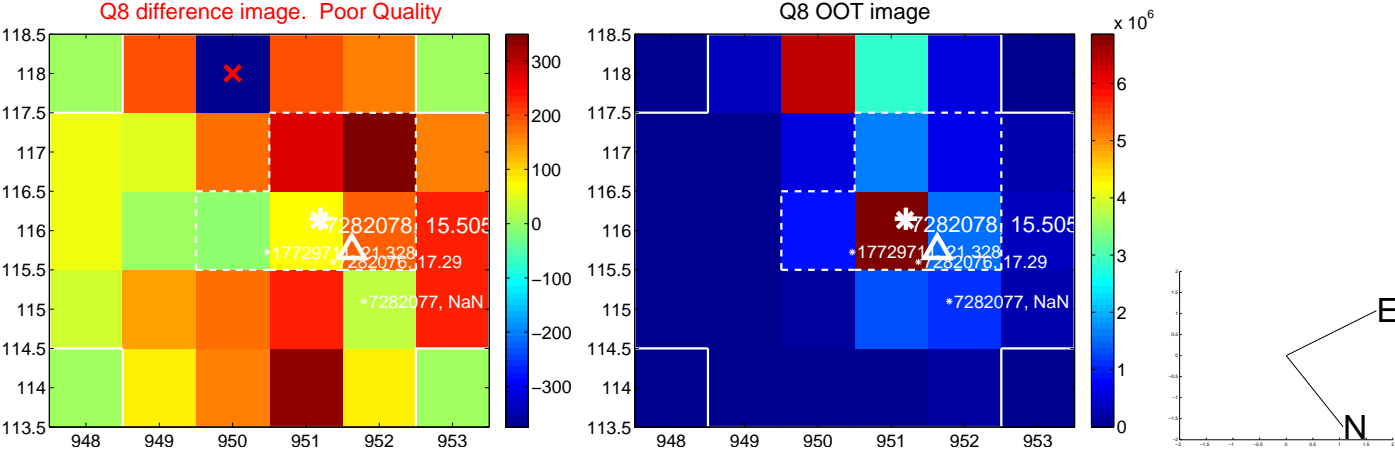
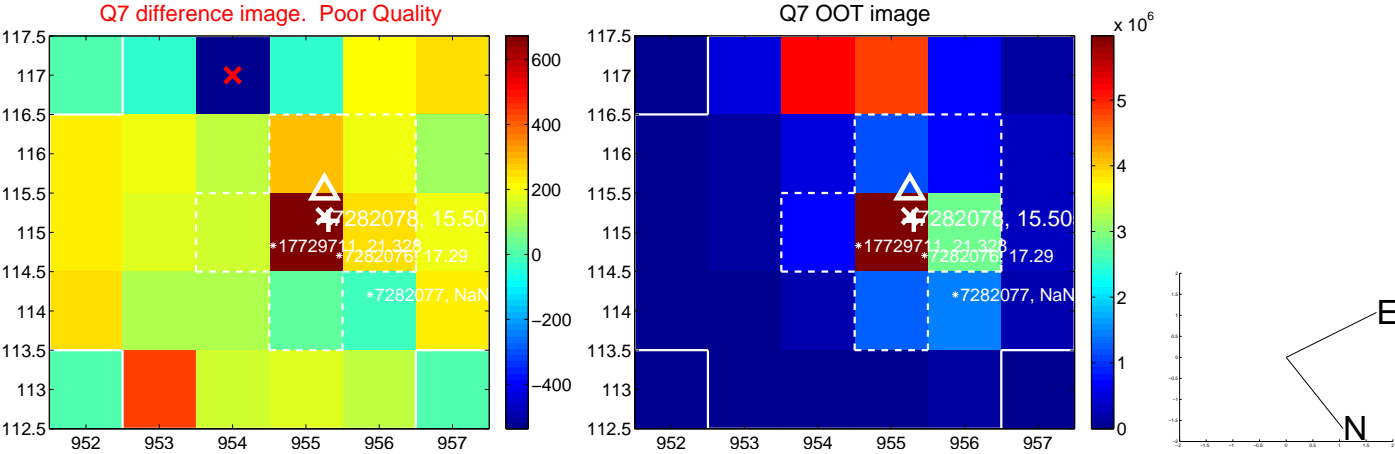
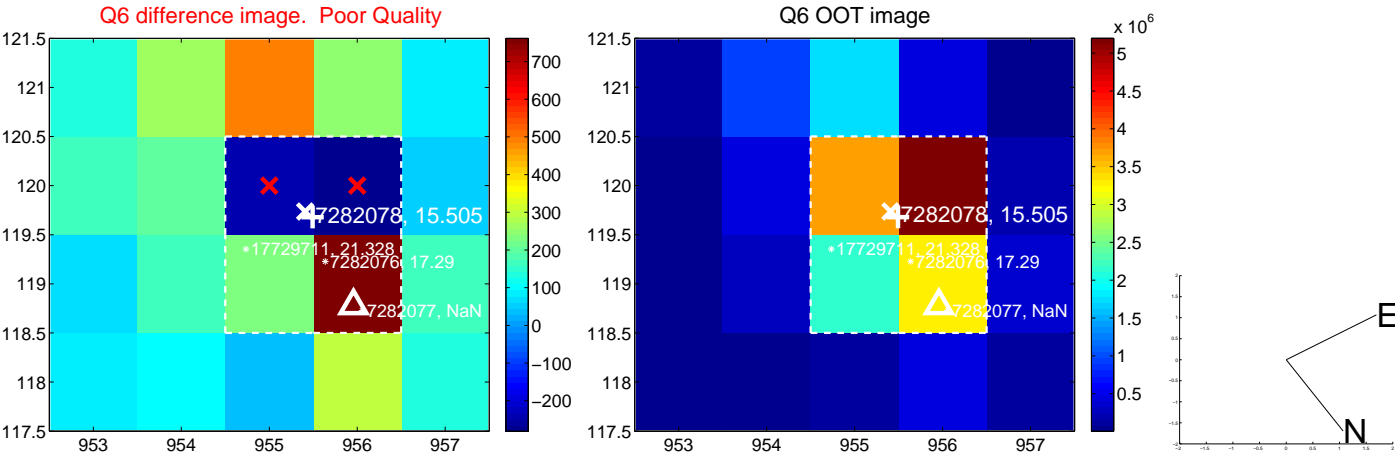
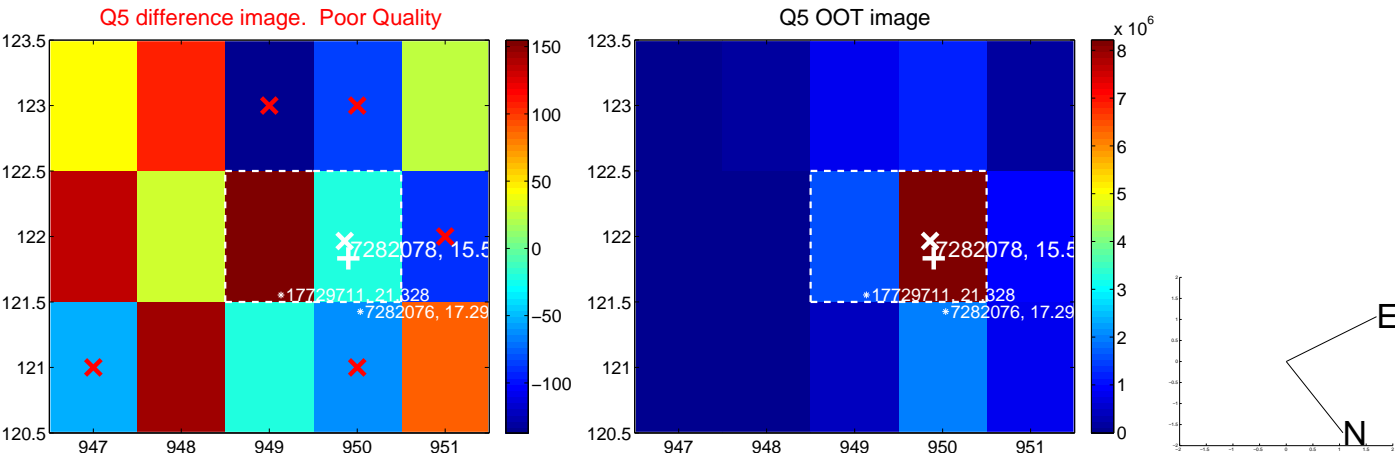


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

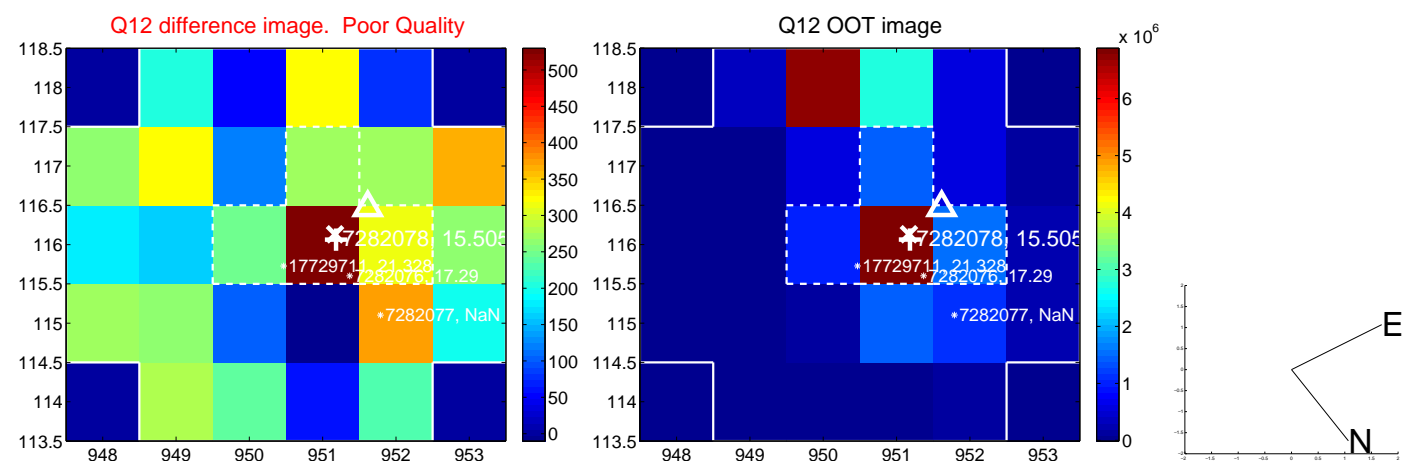
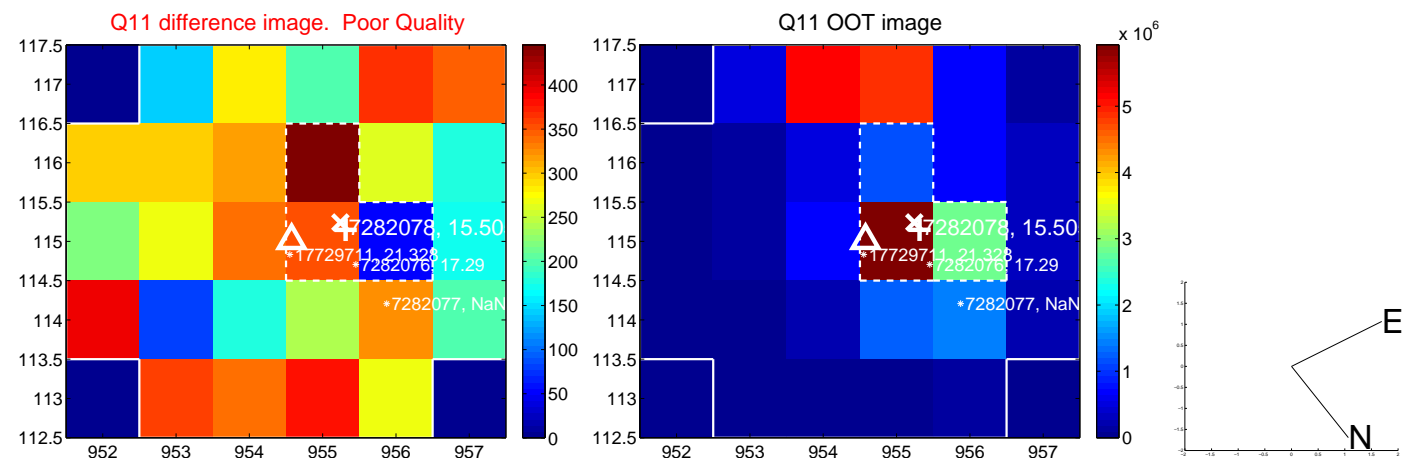
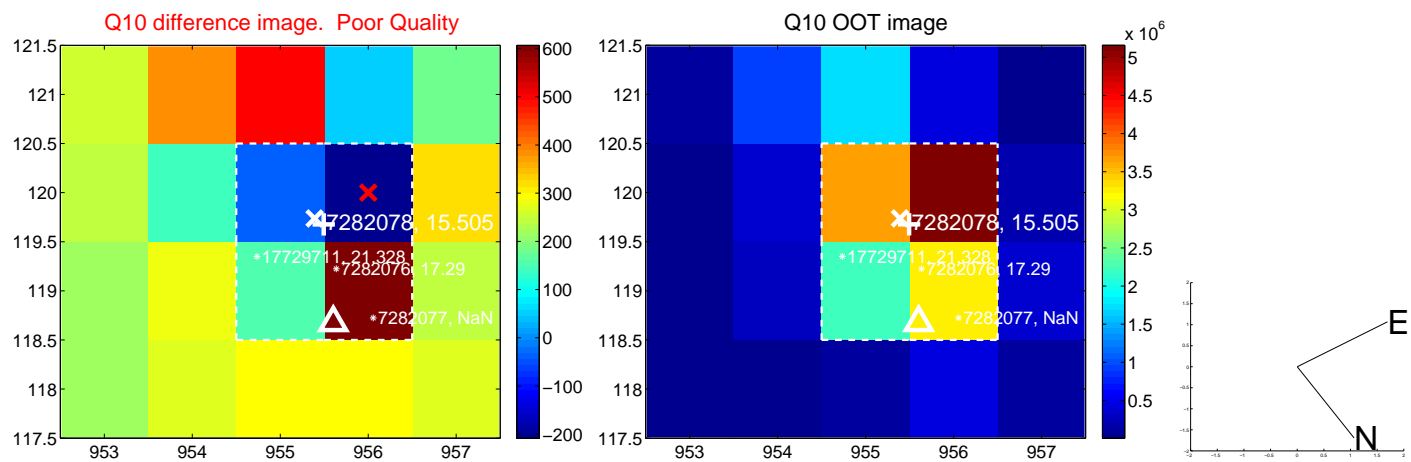
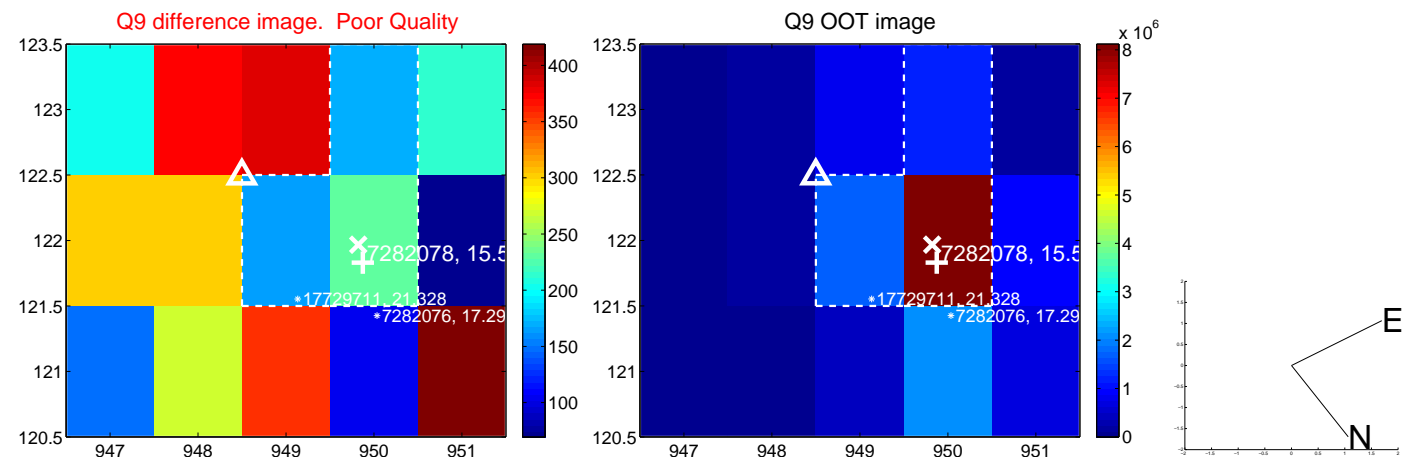


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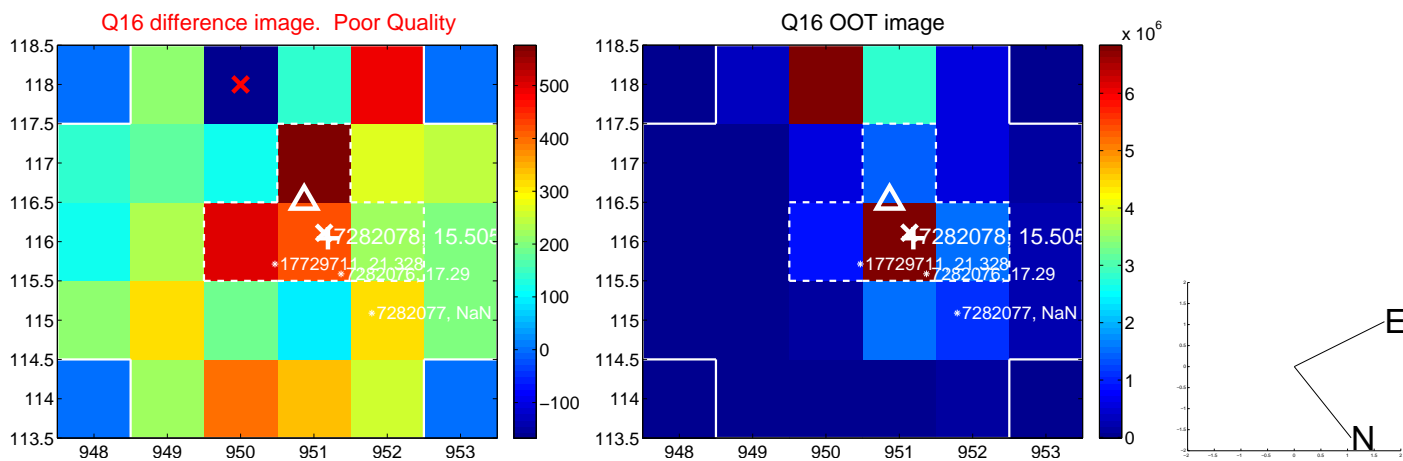
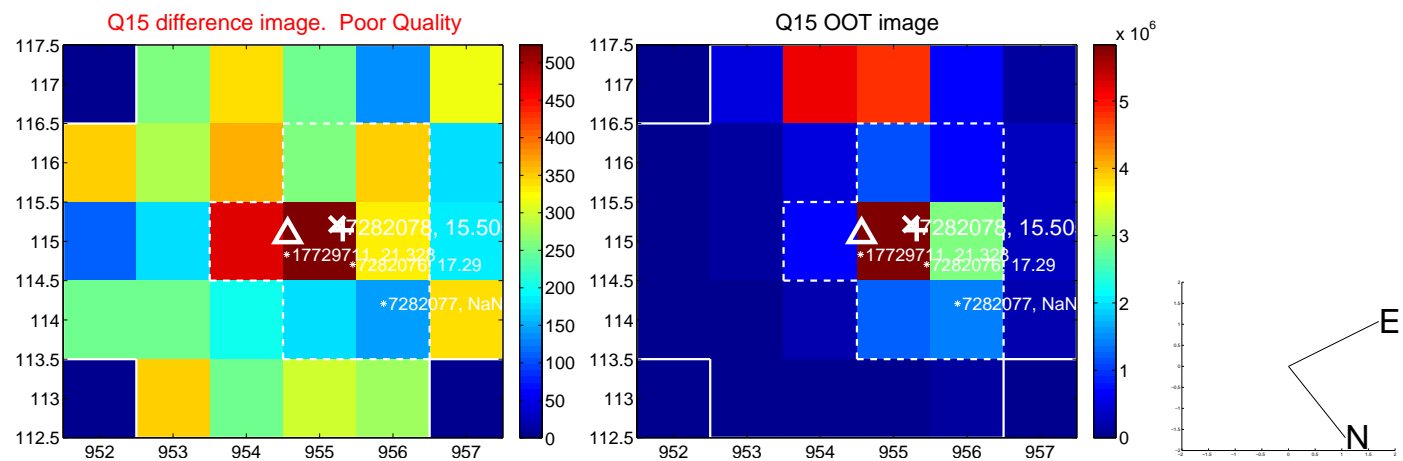
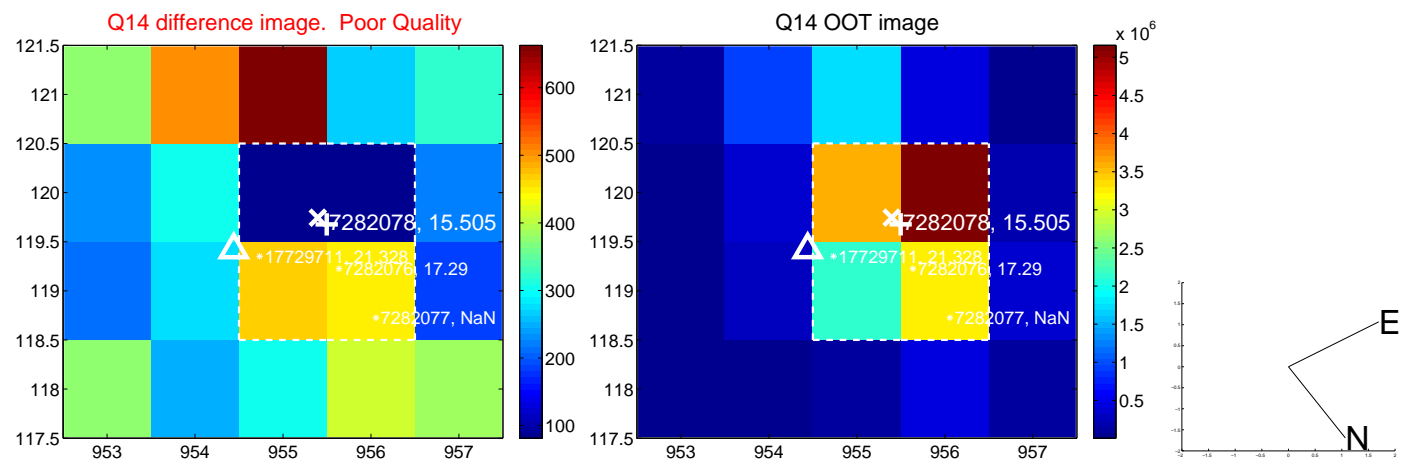
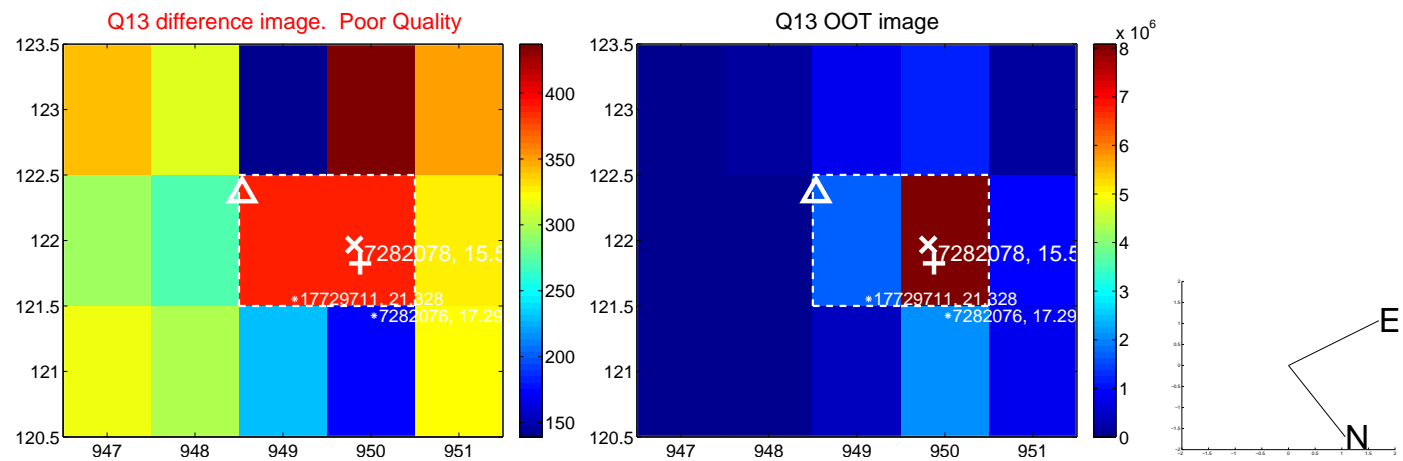




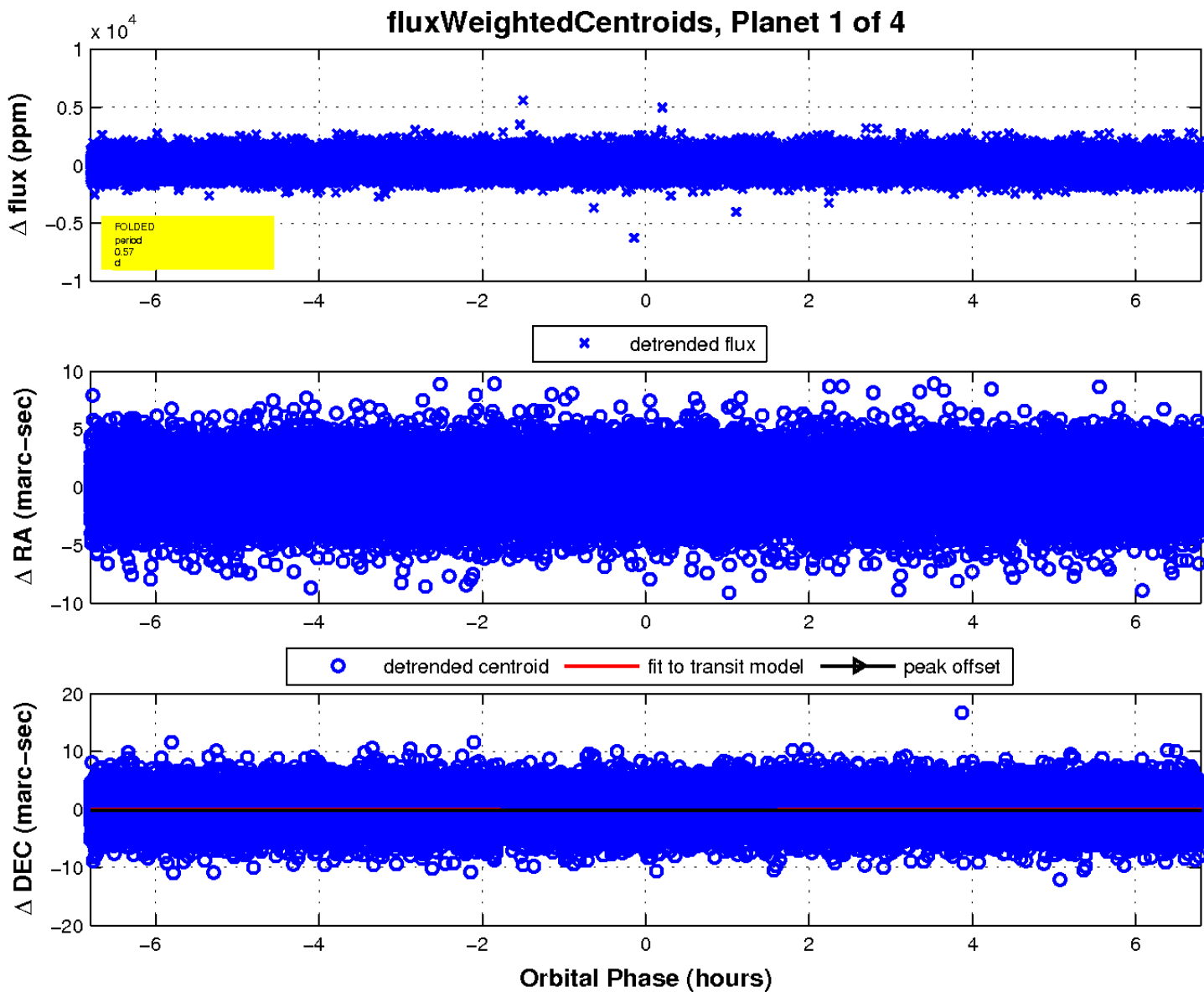
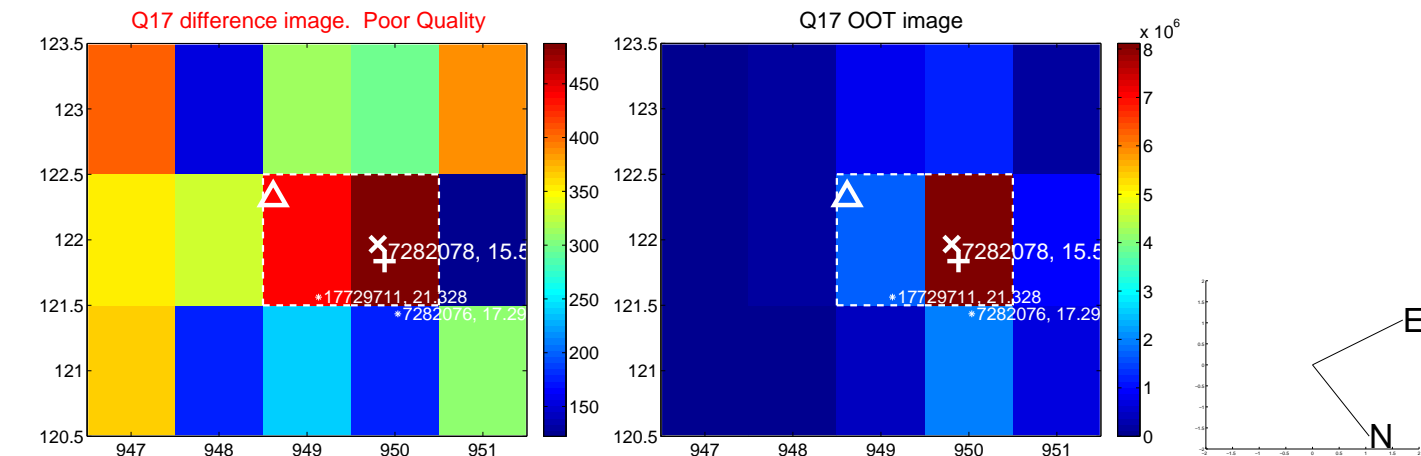
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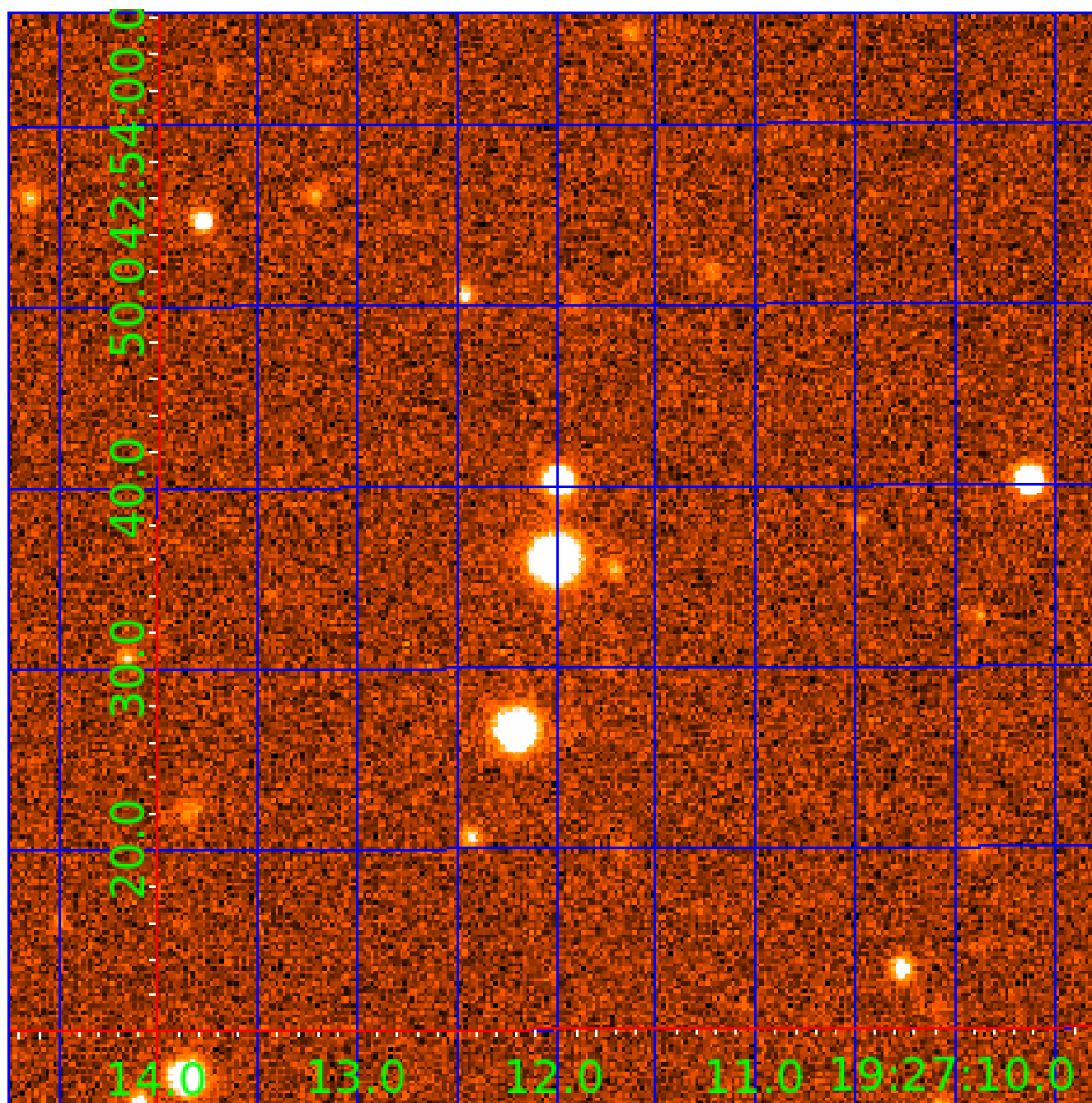


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 007282078

## 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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007282078-04	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS—HALO_GHOST

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

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

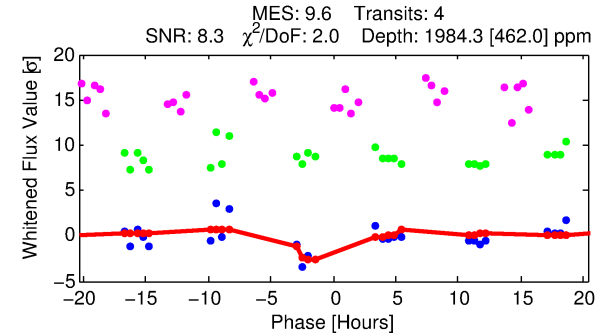
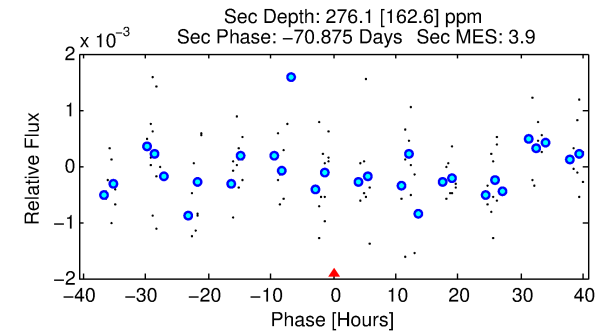
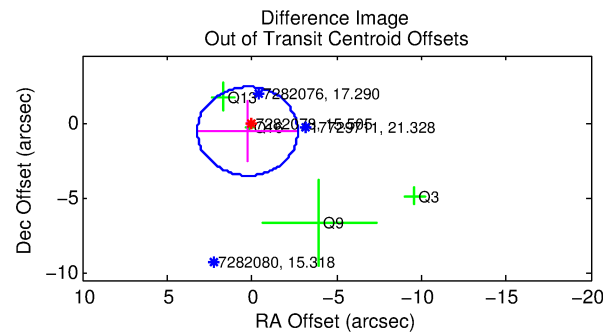
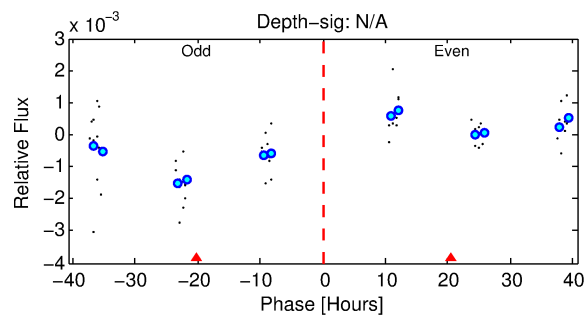
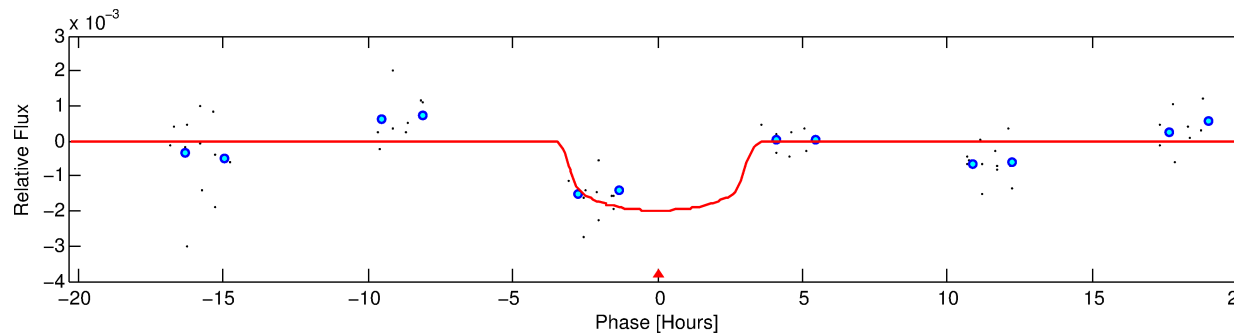
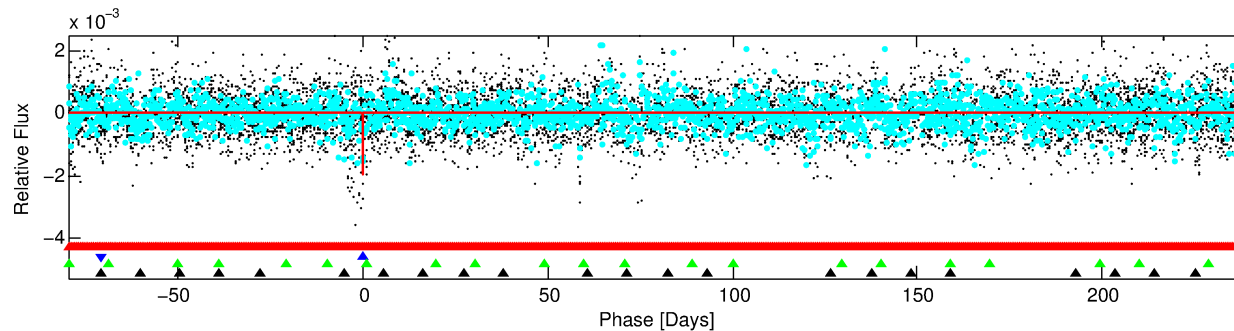
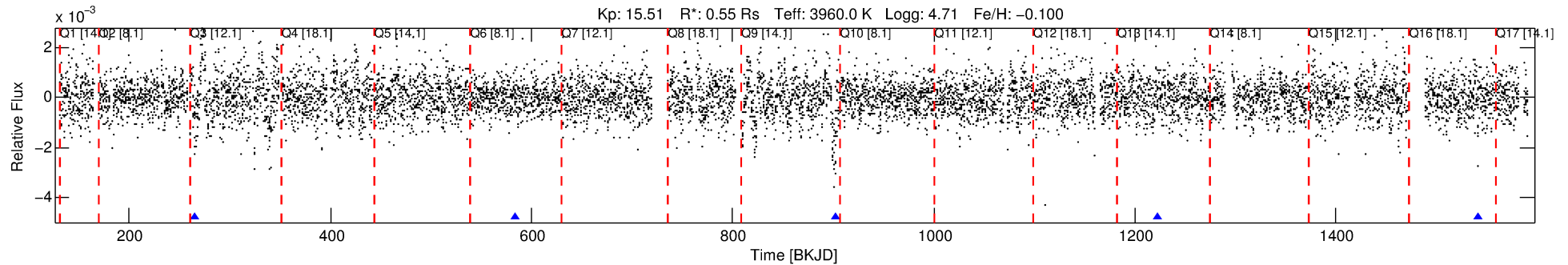
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 007282078-02

No Significant Match Found

# DV One-Page Summary

KIC: 7282078 Candidate: 2 of 4 Period: 318.815 d



## DV Fit Results:

Period = 318.81473 [0.00591] d  
Epoch = 265.4179 [0.0461] BKJD  
Rp/R\* = 0.0437 [0.1022]  
a/R\* = 274.66 [2738.30]  
b = 0.71 [6.99]  
Seff = 0.12 [0.02]  
Teq = 149 [5] K  
Rp = 2.63 [6.15] Re  
a = 0.7589 [0.0515] AU  
Ag = 12662.78 [59679.76] [0.21σ]  
Teffp = 2442 [2877] K [0.80σ]

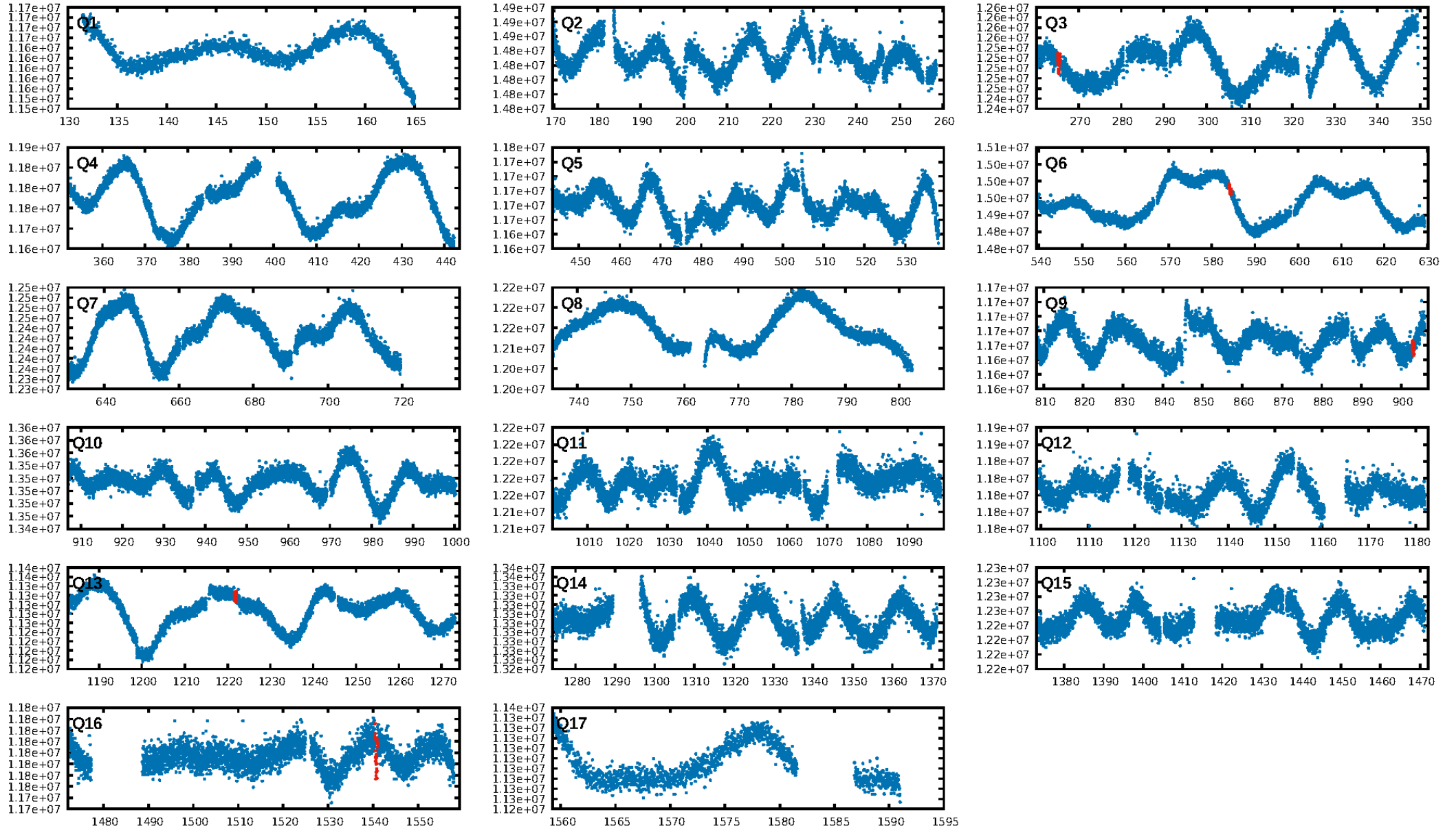
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [839.29σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 12.0%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 8.92e-14  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: -7.984  
Centroid-sig: N/A  
Centroid-so: 1.562 arcsec [3.60σ]  
OotOffset-rm: 0.618 arcsec [0.63σ]  
KicOffset-rm: 0.304 arcsec [0.21σ]  
OotOffset-st: 0/1/1/2 [4]  
KicOffset-st: 0/1/1/2 [4]  
DiffImageQuality-fgm: 0.00 [0/4]  
DiffImageOverlap-fno: 0.00 [0/5]

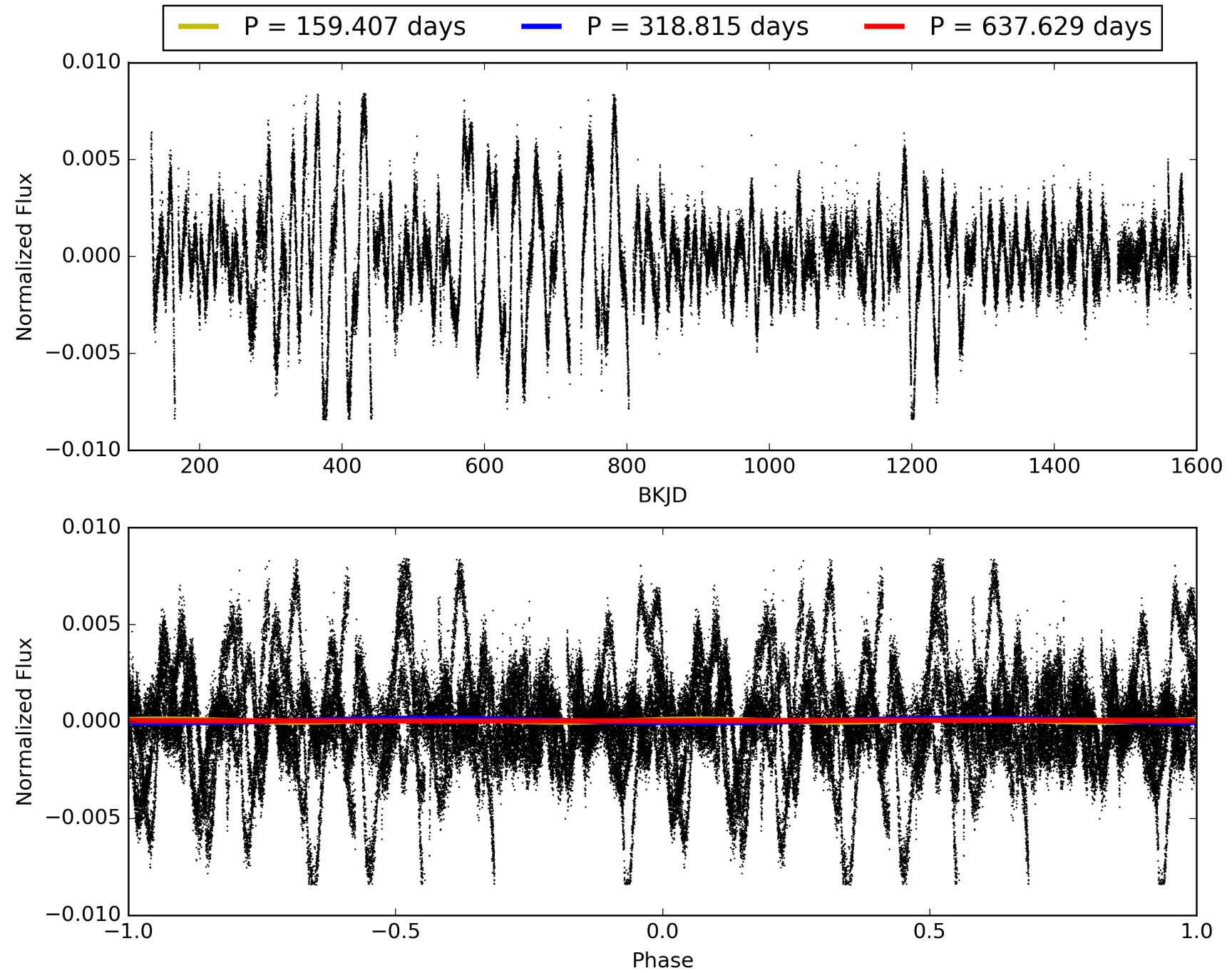
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 01:38:37 Z

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

# TCE 007282078-02, PDC Light Curves

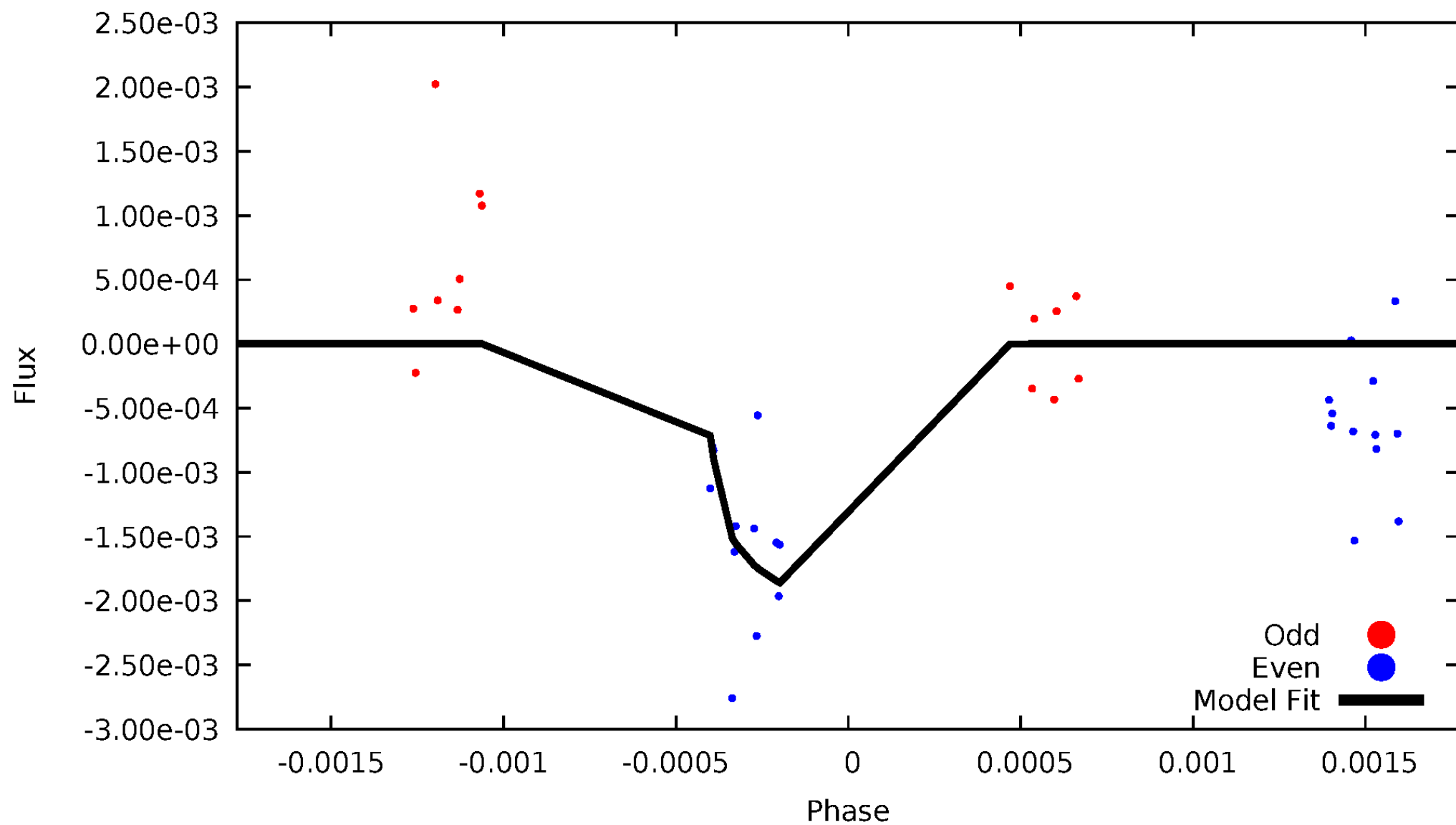


# TCE 007282078-02



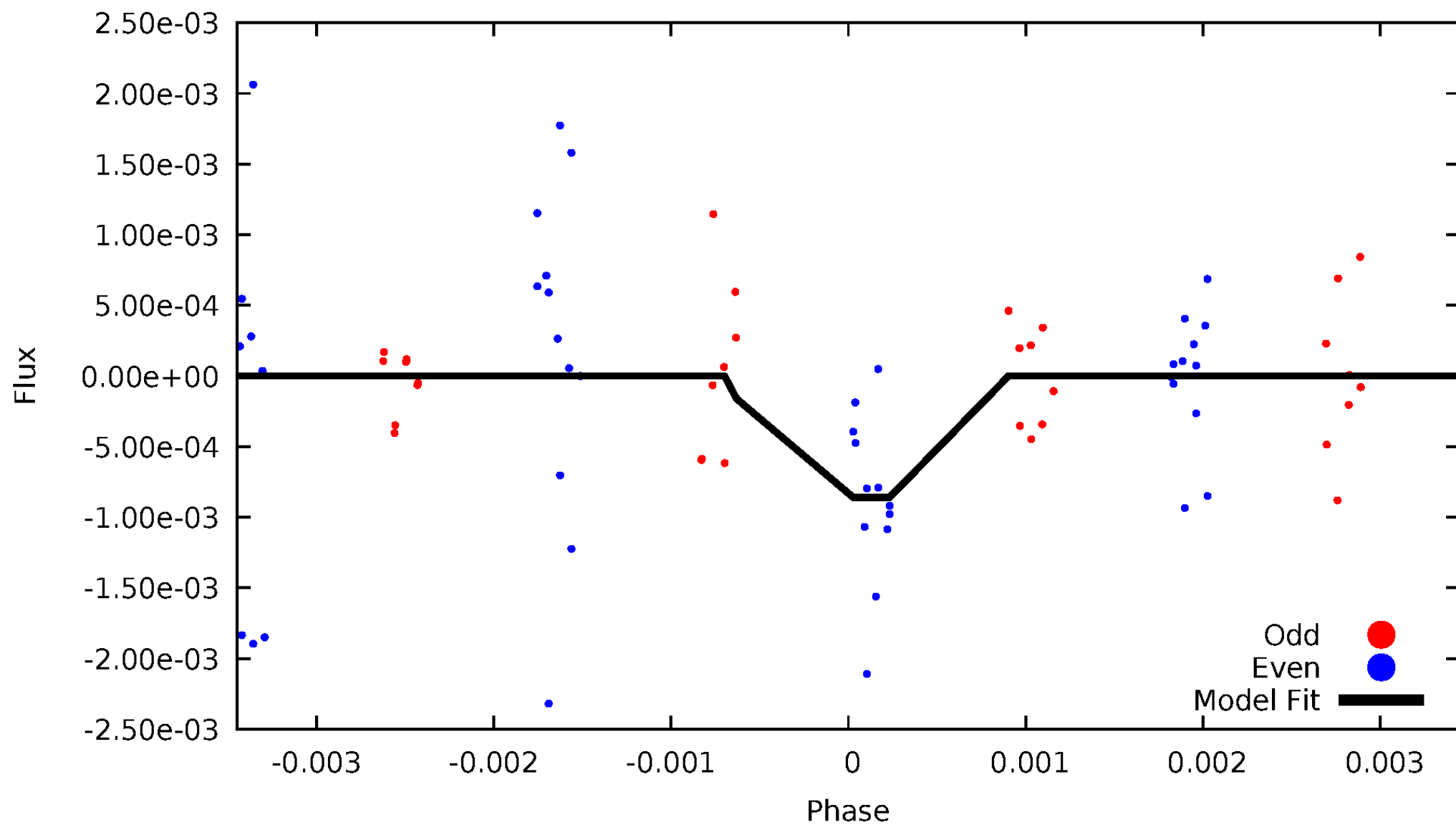
# DV Odd/Even

TCE 007282078-02



# ALT Odd/Even

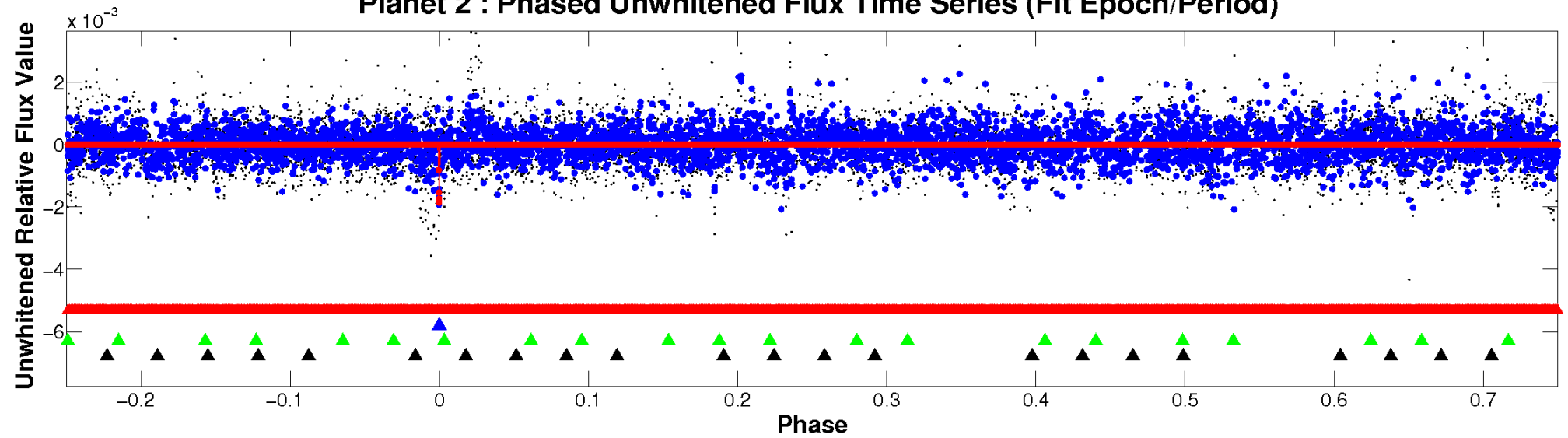
TCE 007282078-02



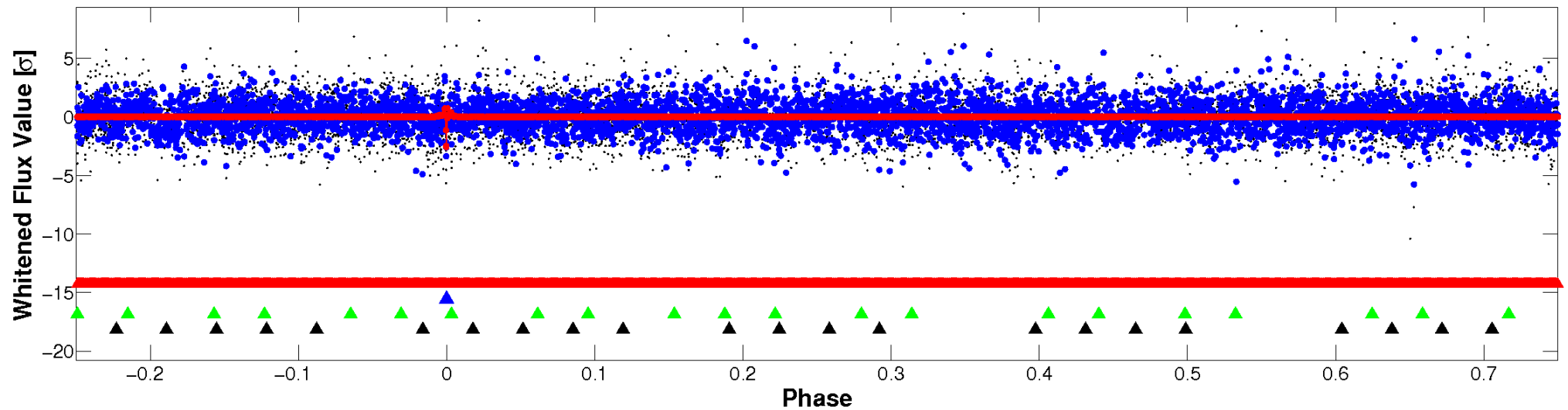


# Non-Whitened Vs. Whitened Light Curve

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

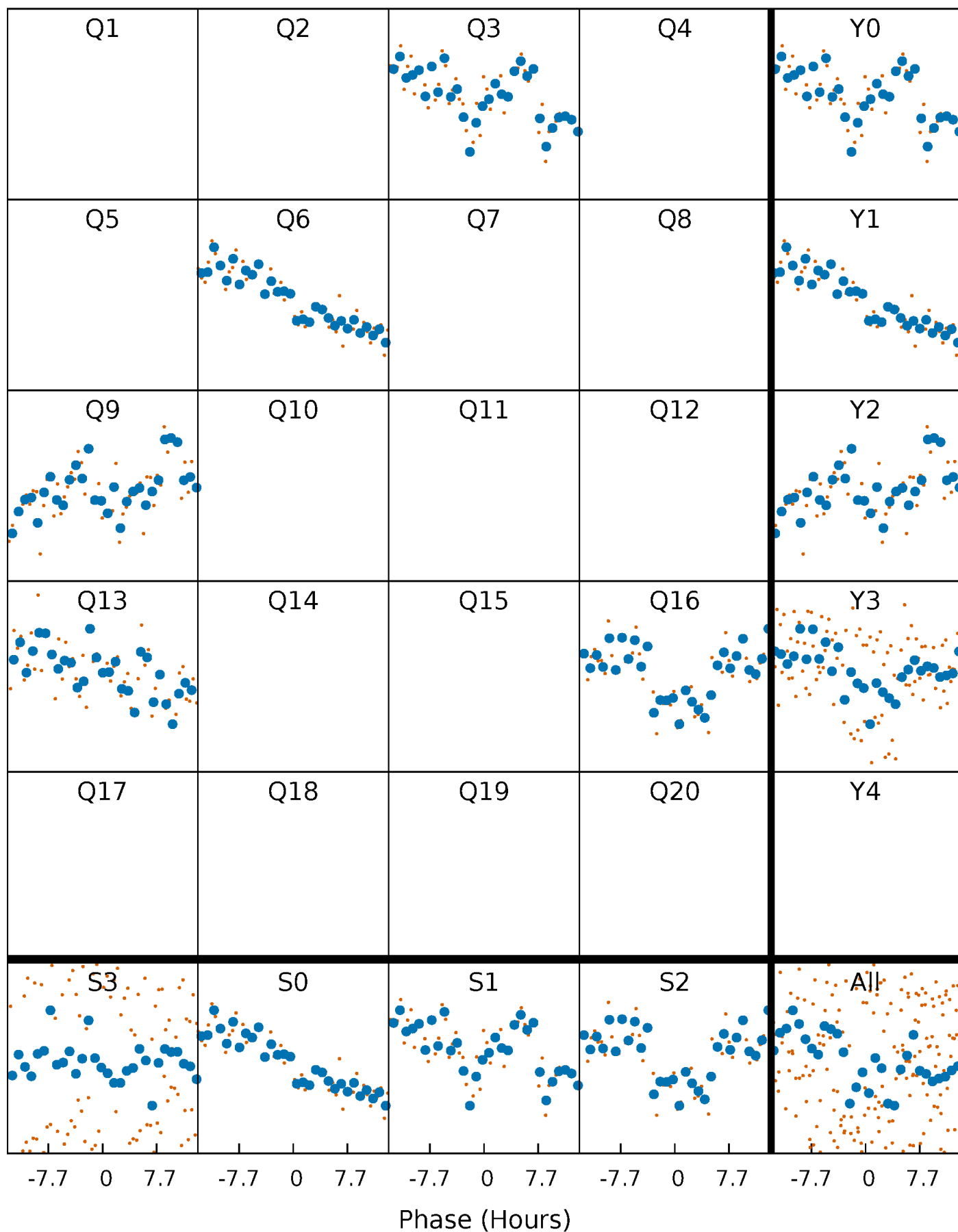


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



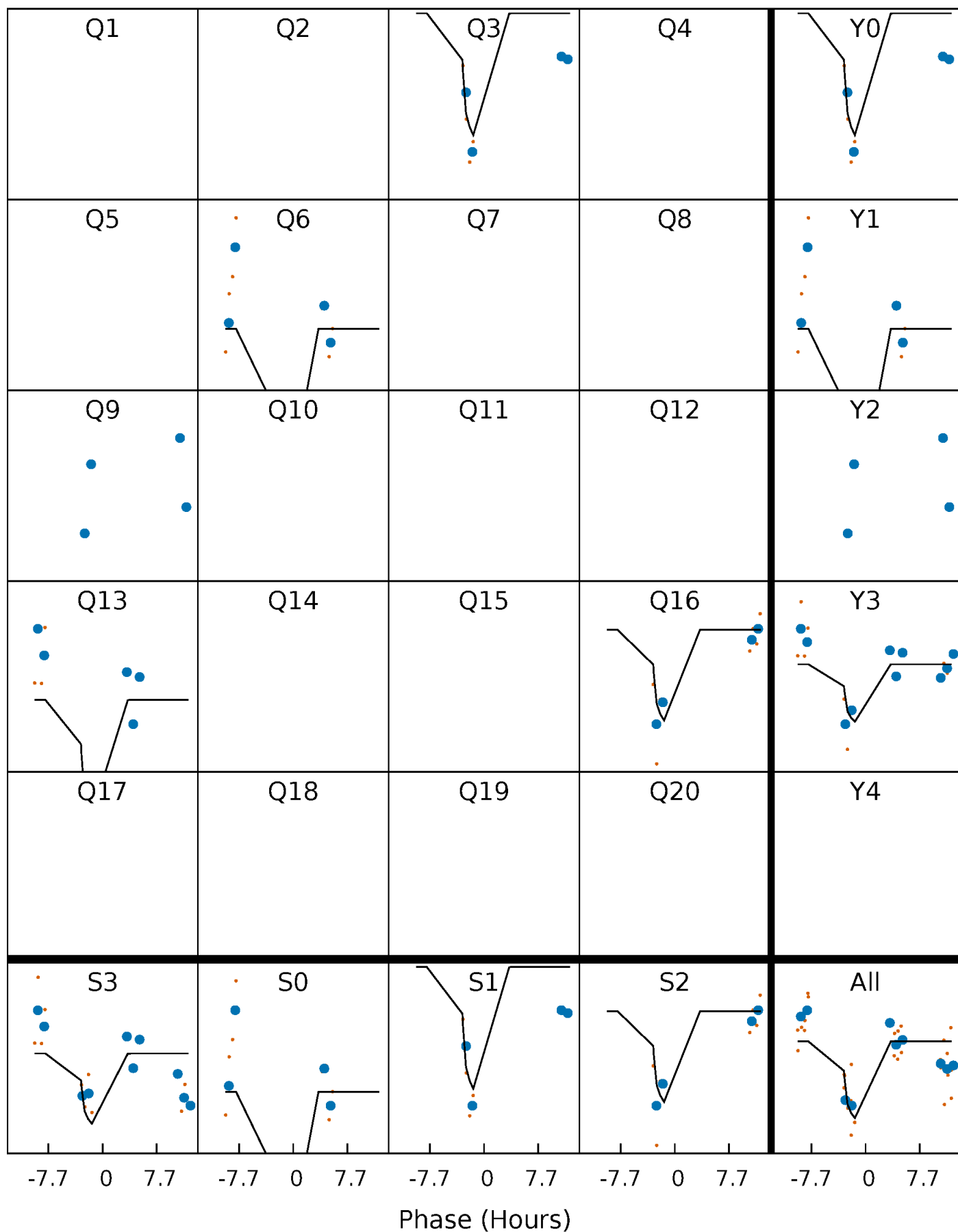
# PDC Quarter-Phased Transit Curves

TCE 007282078-02 P=318.814732 Days  $T_0=265.417928$  (BKJD)



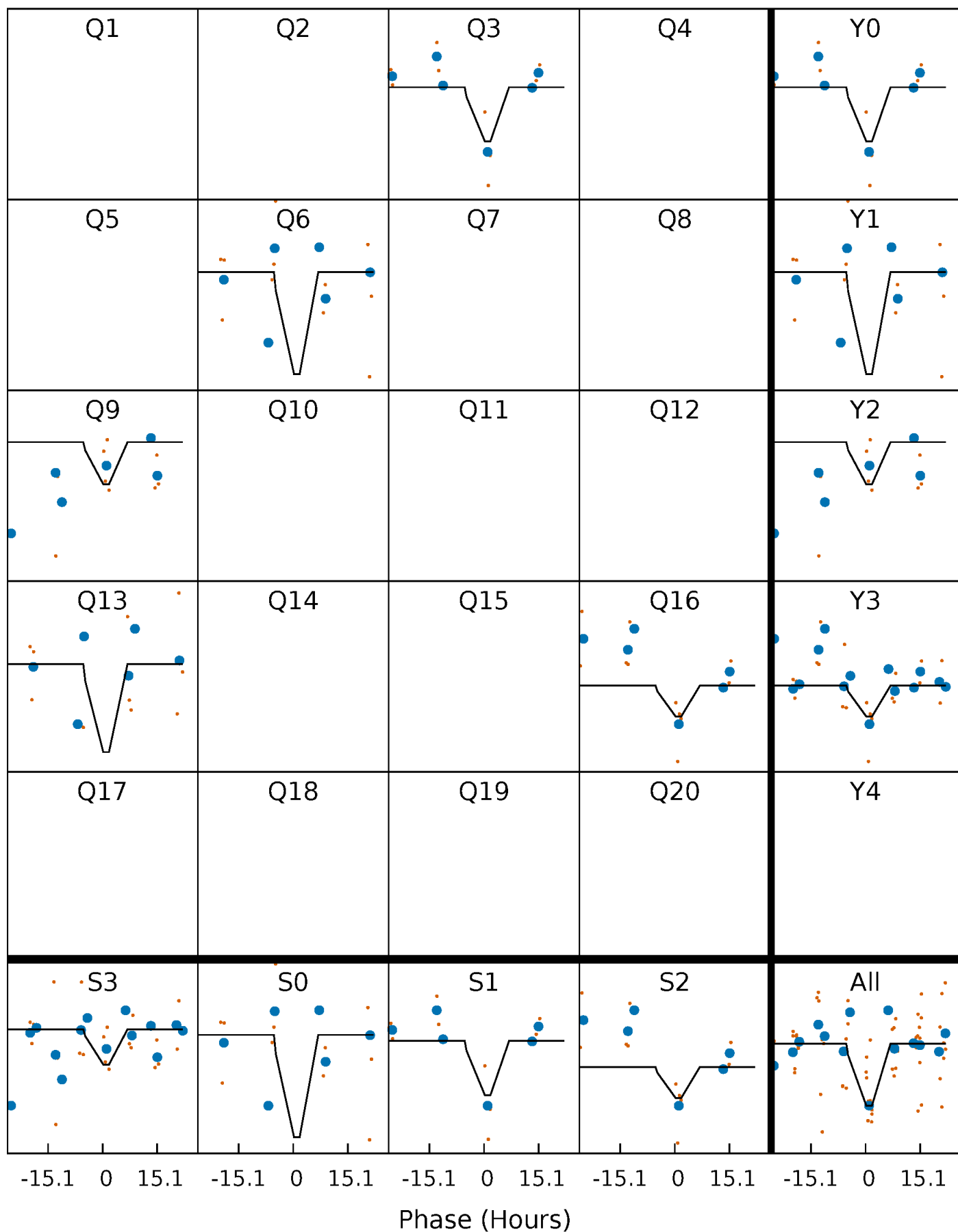
# DV Quarter-Phased Transit Curves

TCE 007282078-02     $P=318.814732$  Days     $T_0=265.417928$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

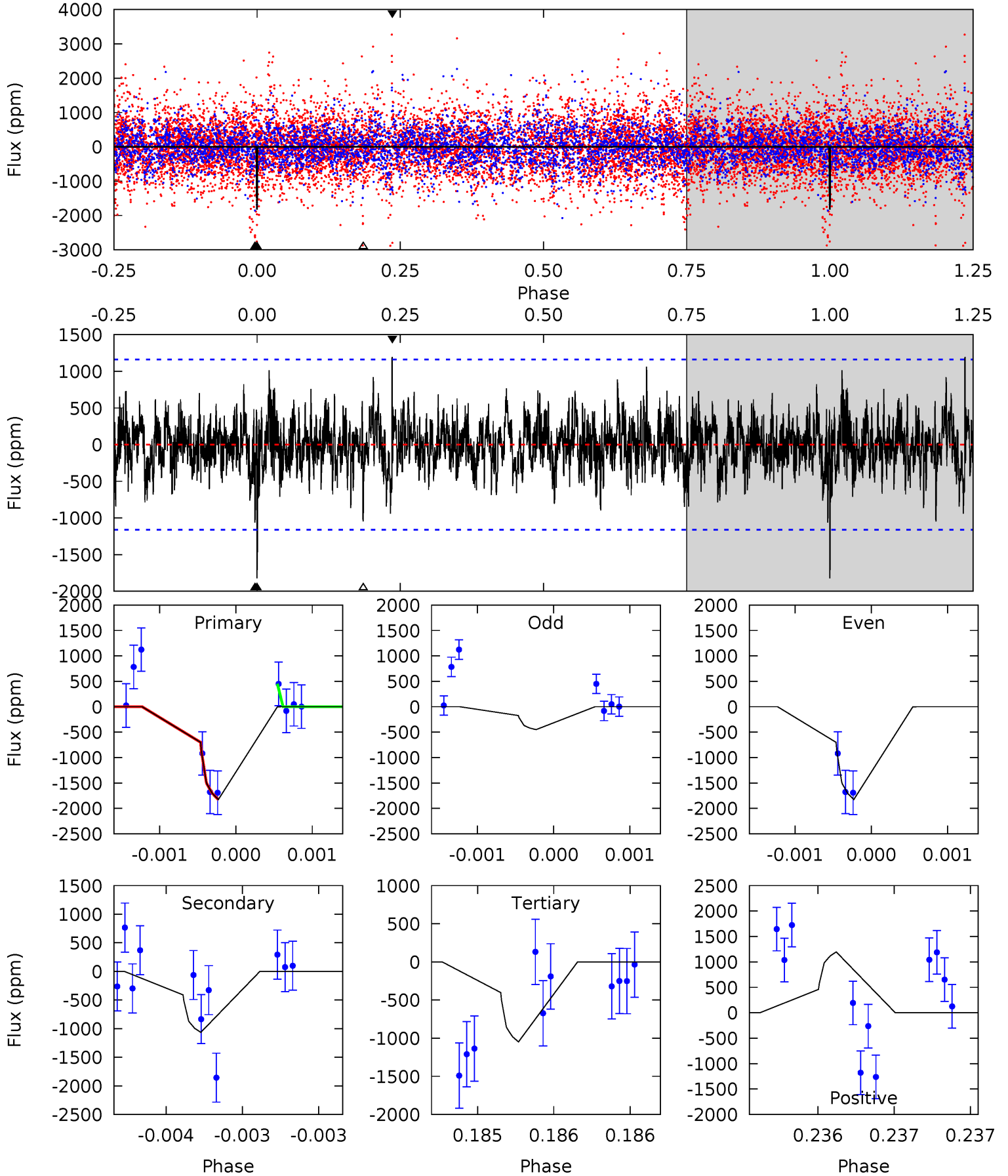
TCE 007282078-02 P=318.813176 Days  $T_0=265.283705$  (BKJD)



# DV Model-Shift Uniqueness Test

007282078-02, P = 318.814732 Days, E = 265.417928 Days

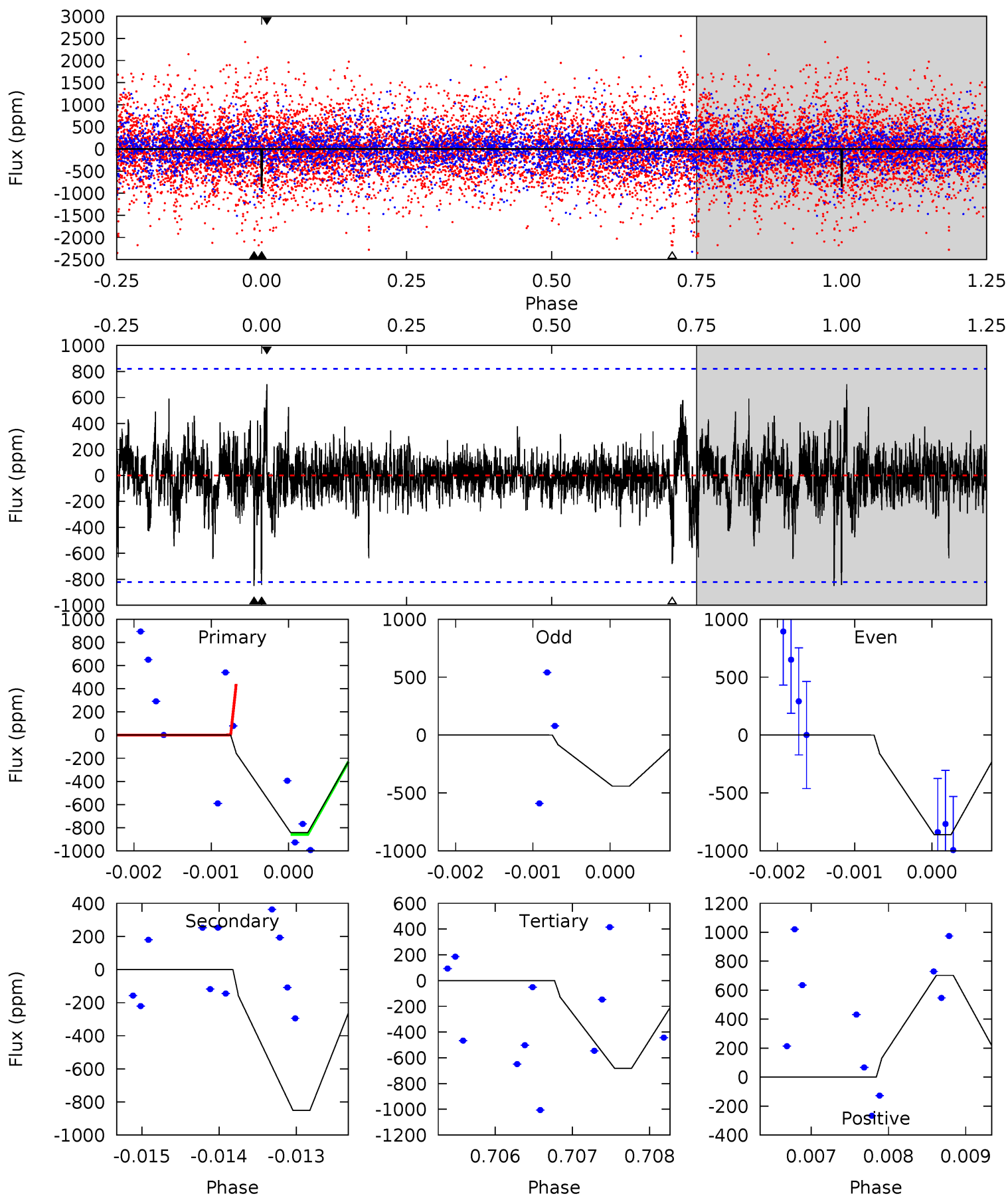
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.60	5.02	4.94	5.64	5.48	3.33	1.33	3.66	2.96	0.08	-0.62	4.44	0	0.40	4.51



# Alt Model-Shift Uniqueness Test

007282078-02, P = 318.813176 Days, E = 265.283705 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
5.61	5.67	4.54	4.68	5.46	3.31	0.98	1.07	0.93	1.13	0.99	1.26	-1.00	0.45	1.12



### Stellar Parameters For KIC 007282078

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (g \cdot \text{cm}^{-3})$
	$3960^{+89}_{-1}$	$4.714^{+0.040}_{-0.036}$	$-0.100^{+0.250}_{-0.300}$	$0.551^{+0.045}_{-0.050}$	$0.573^{+0.043}_{-0.059}$	$4.822^{+1.010}_{-0.695}$
	+2%/-0%	+1%/-1%	+250%/-300%	+8%/-9%	+8%/-10%	+21%/-14%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 007282078-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-1064 \pm 212$	$5.23^{+5.16}_{-3.63}$	$207^{+8}_{-9}$	$2881^{+1367}_{-456}$	$12240^{+126571}_{-9191}$
Alt.	$-851 \pm 150$	$4.78^{+5.12}_{-3.29}$	$207^{+7}_{-9}$	$2879^{+1250}_{-487}$	$11925^{+105134}_{-9135}$

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



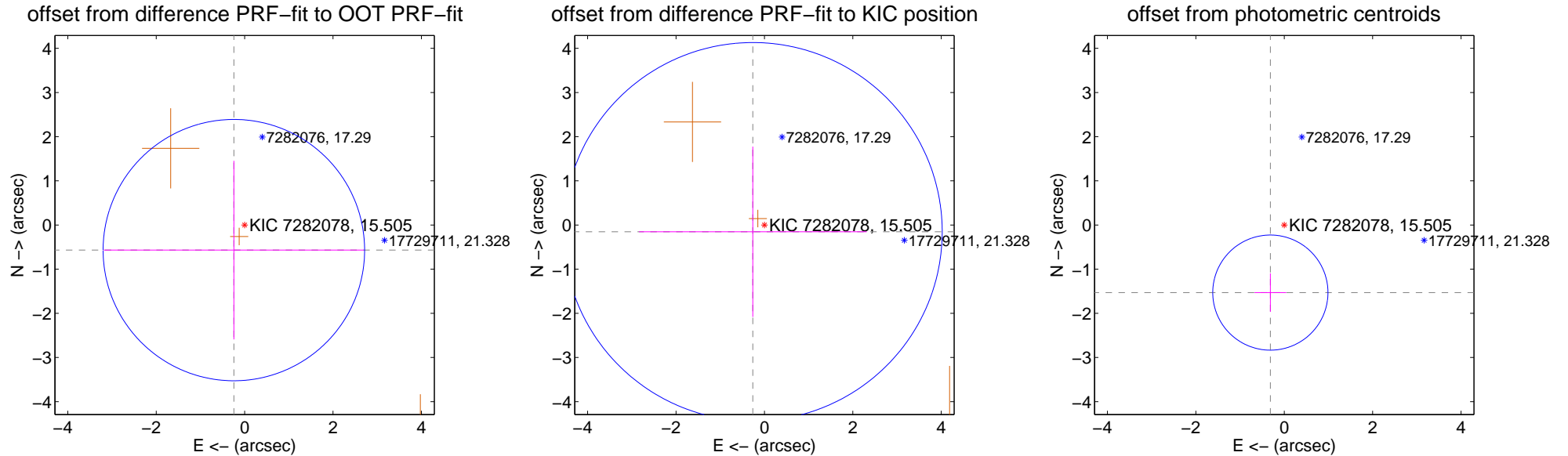
## DV Centroid Data

Supplemental centroid analysis for 007282078-02. Kepler magnitude: 15.51. Transit SNR 8.32

There are 0 quarters with good PRF difference image offsets

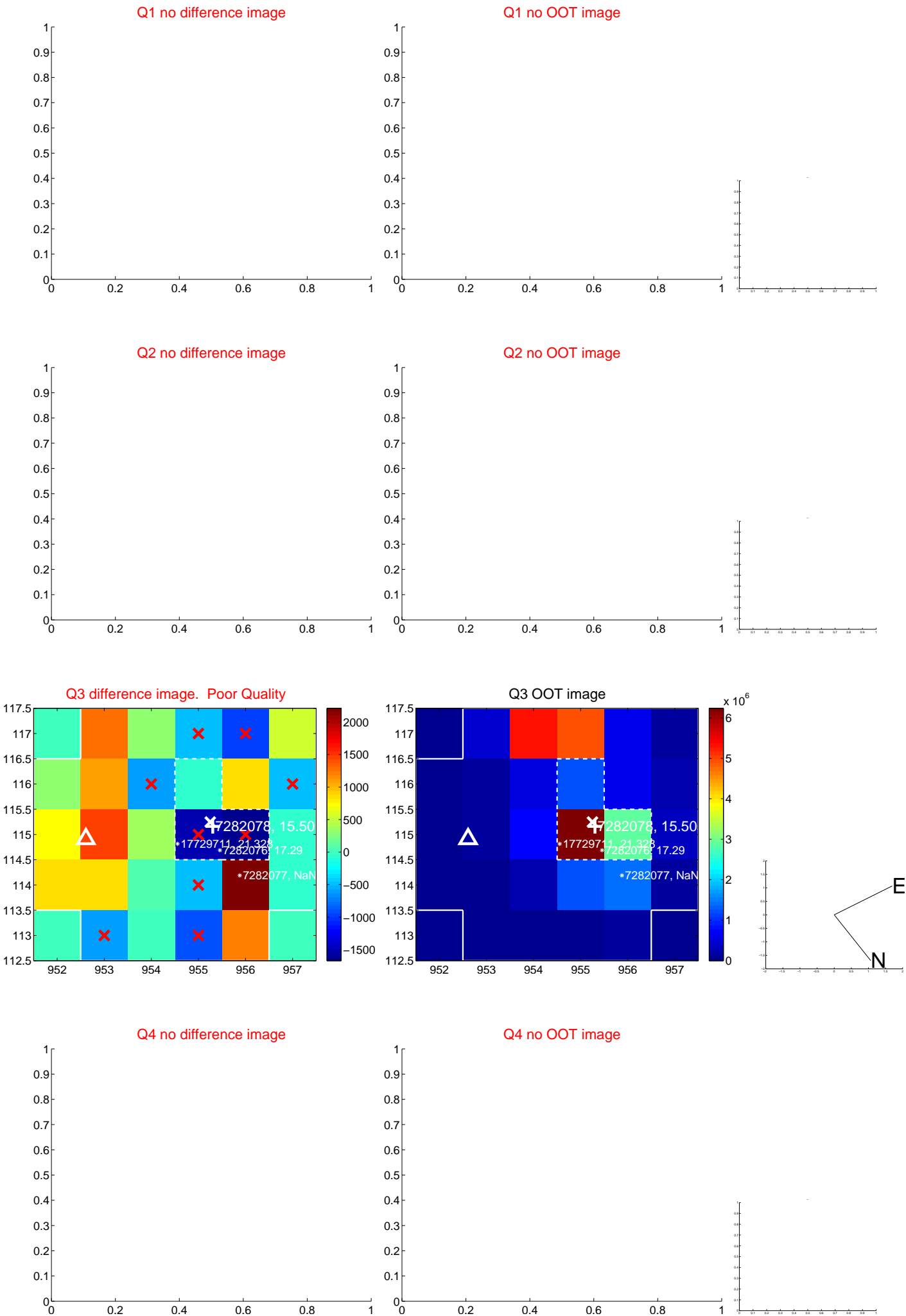
The direct PRF centroid is offset from the target star catalog position by about 0.41 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.618 \pm 0.986$	0.63	$0.244 \pm 2.942$	$-0.568 \pm 2.022$
PRF-fit source offset from KIC position	$0.304 \pm 1.428$	0.21	$0.262 \pm 2.576$	$-0.153 \pm 1.928$
photometric centroid source offset	$1.56 \pm 0.43$	3.60	$0.31 \pm 0.36$	$-1.53 \pm 0.44$

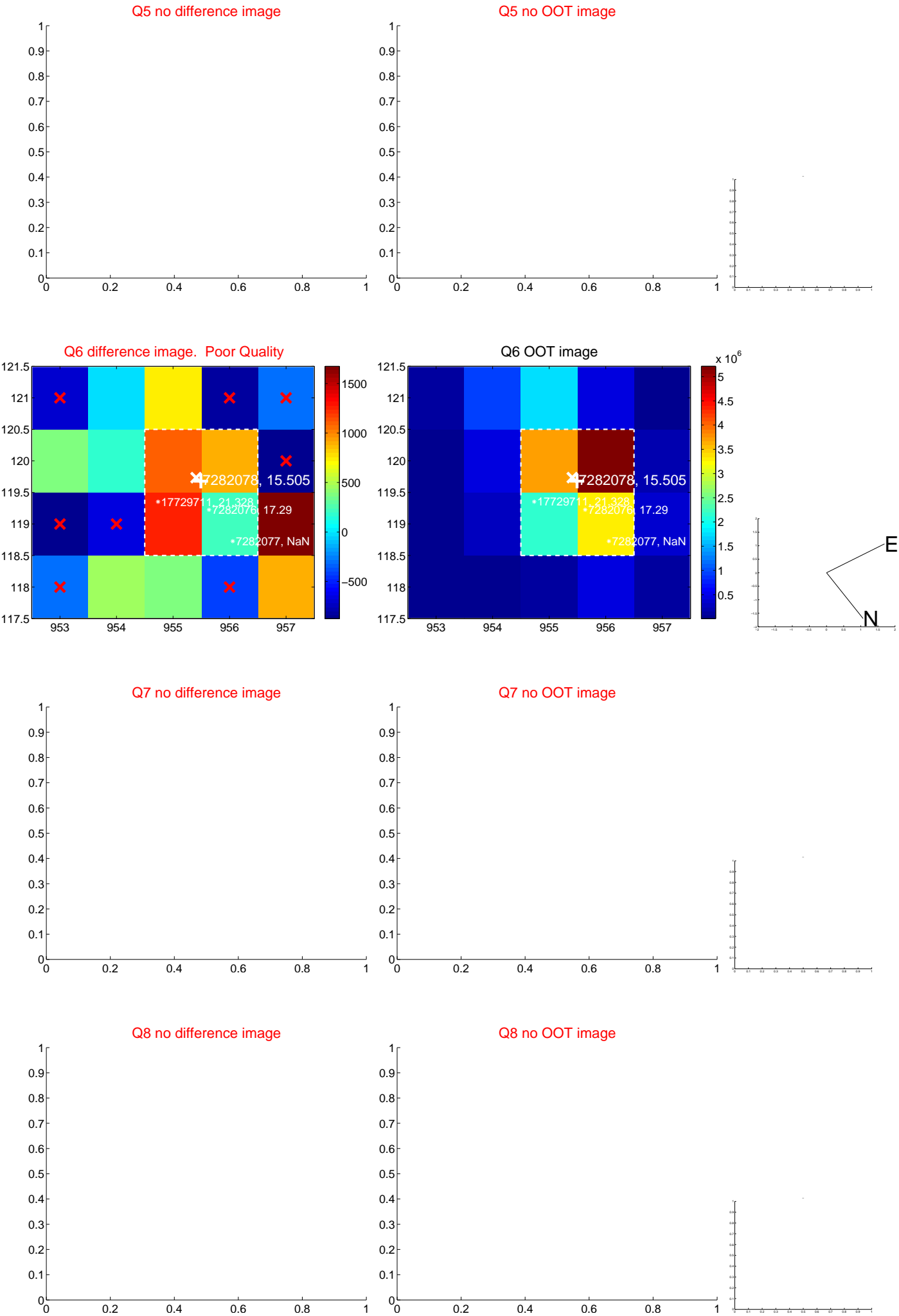


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

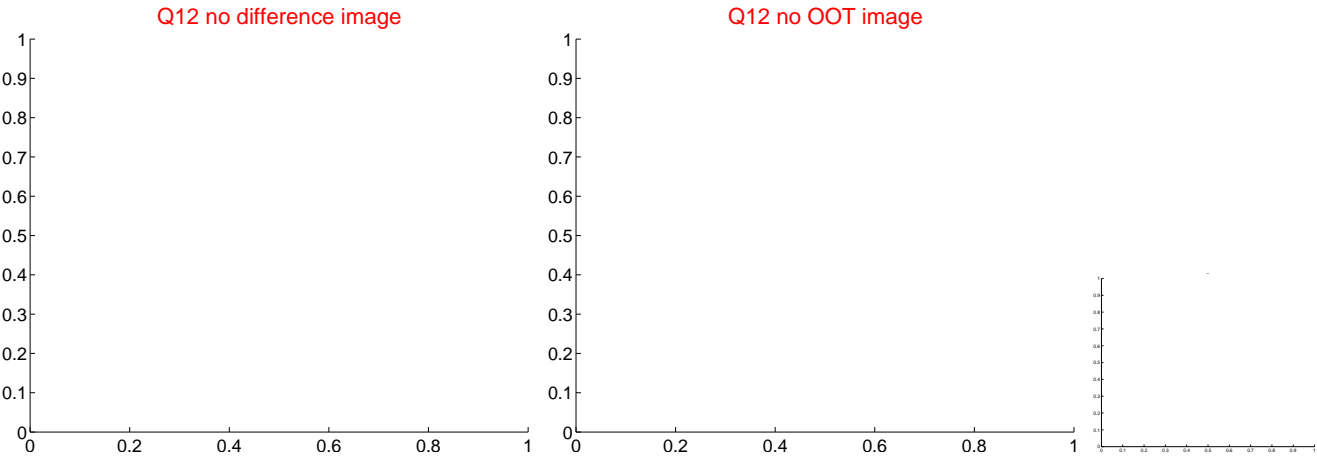
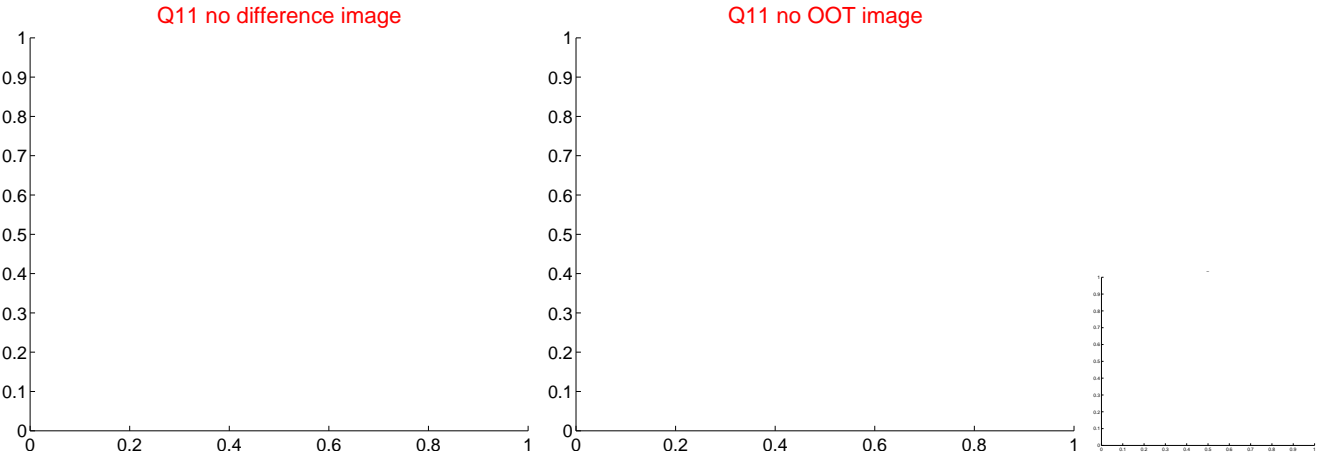
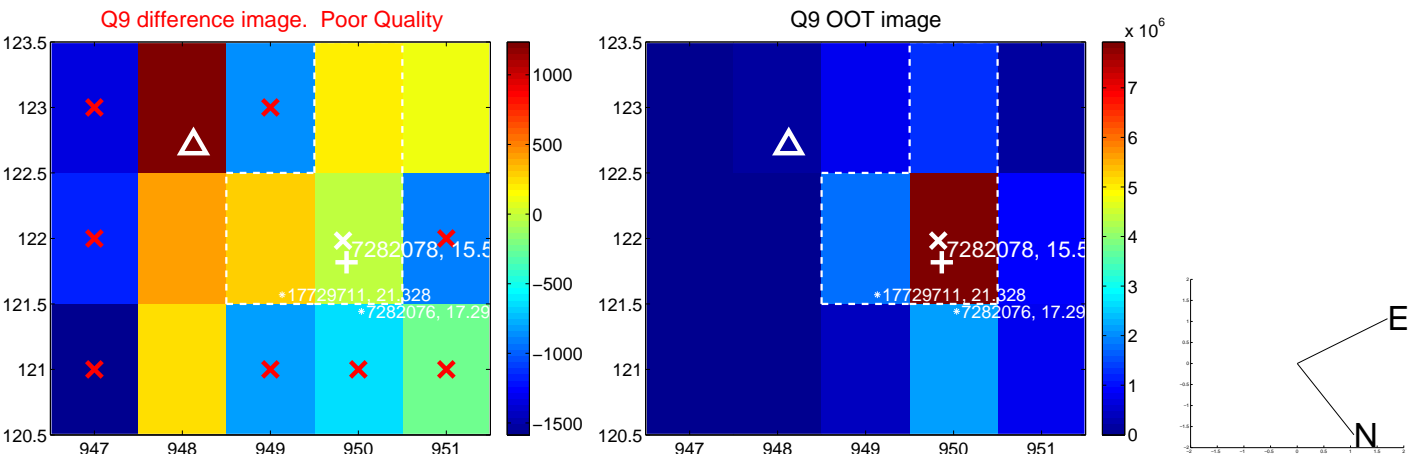
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



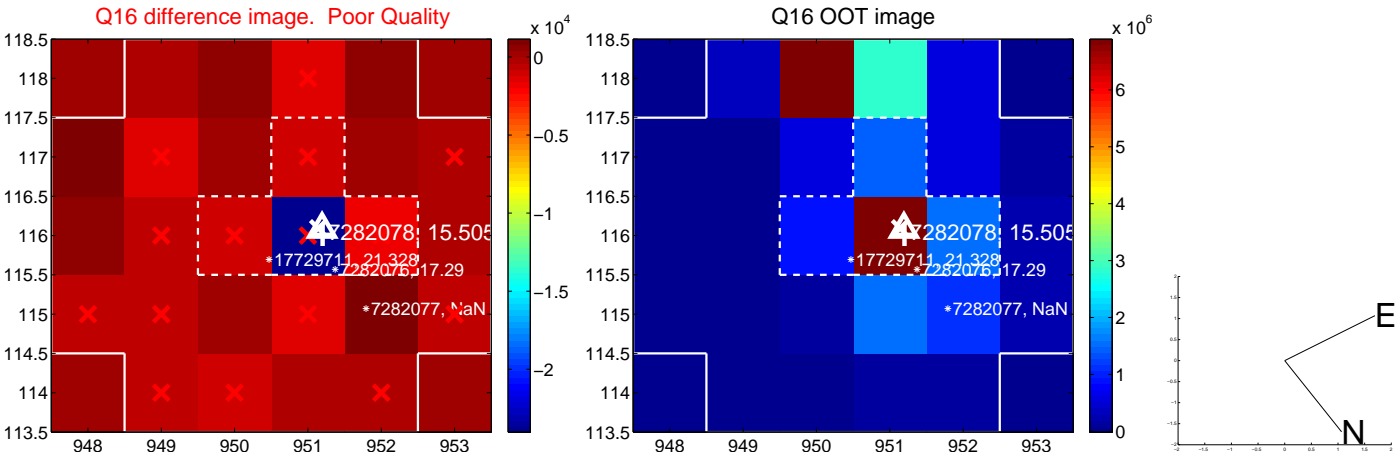
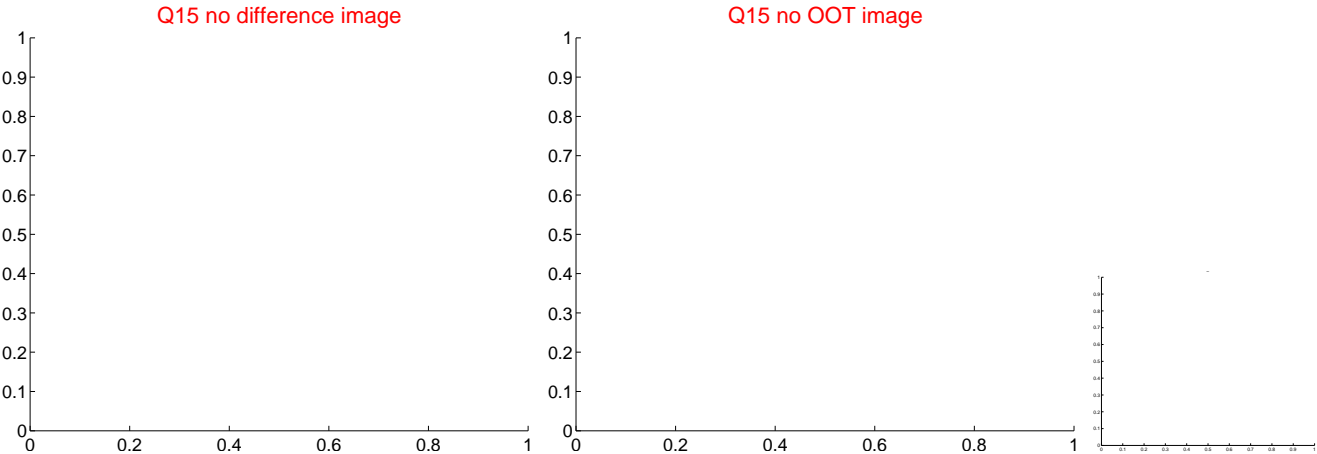
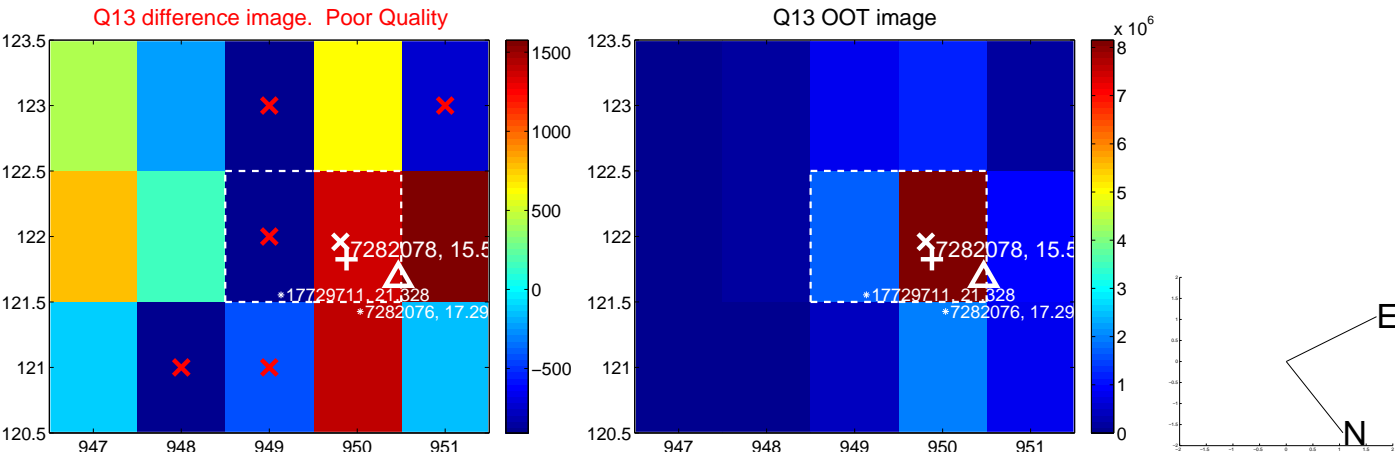
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



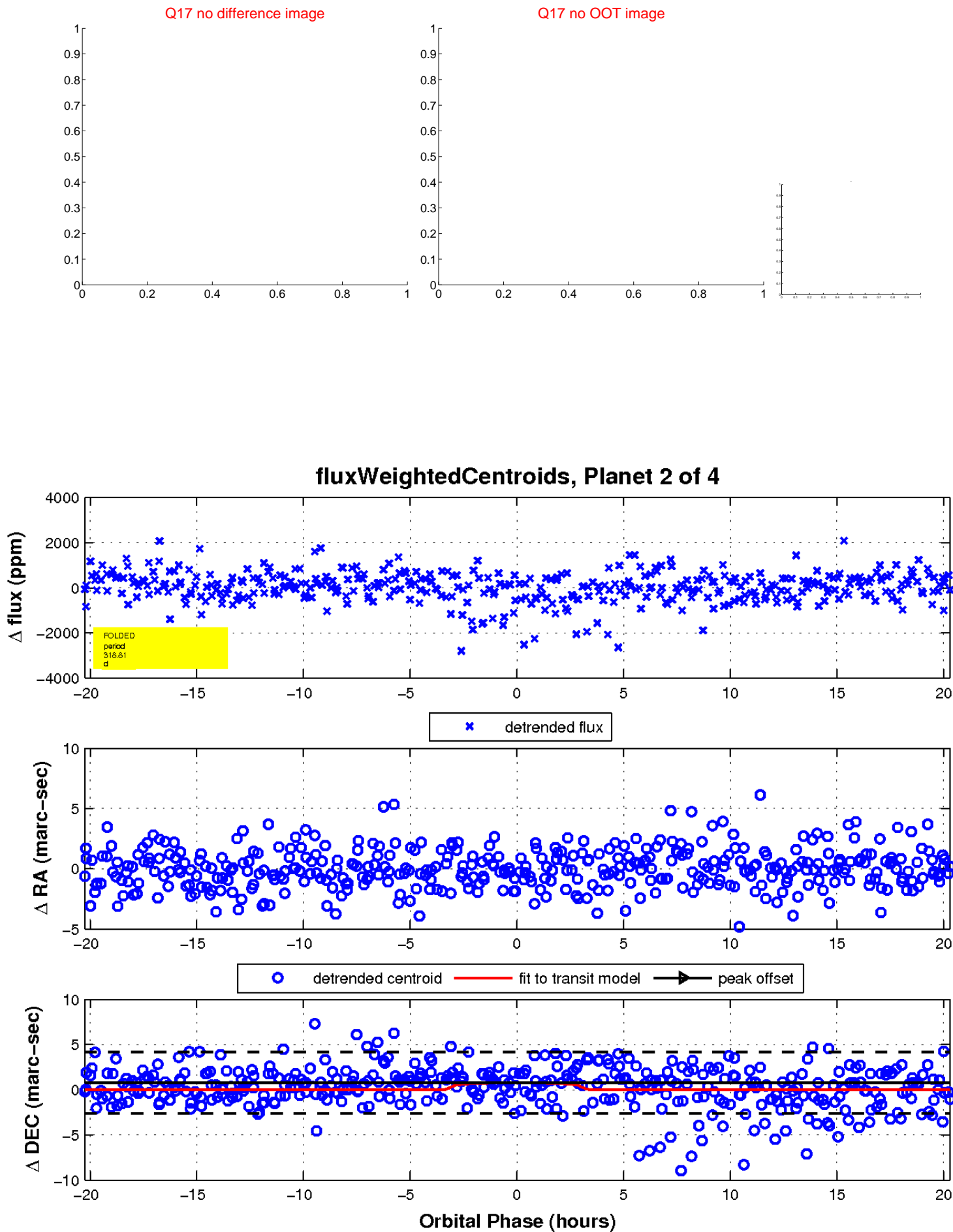
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

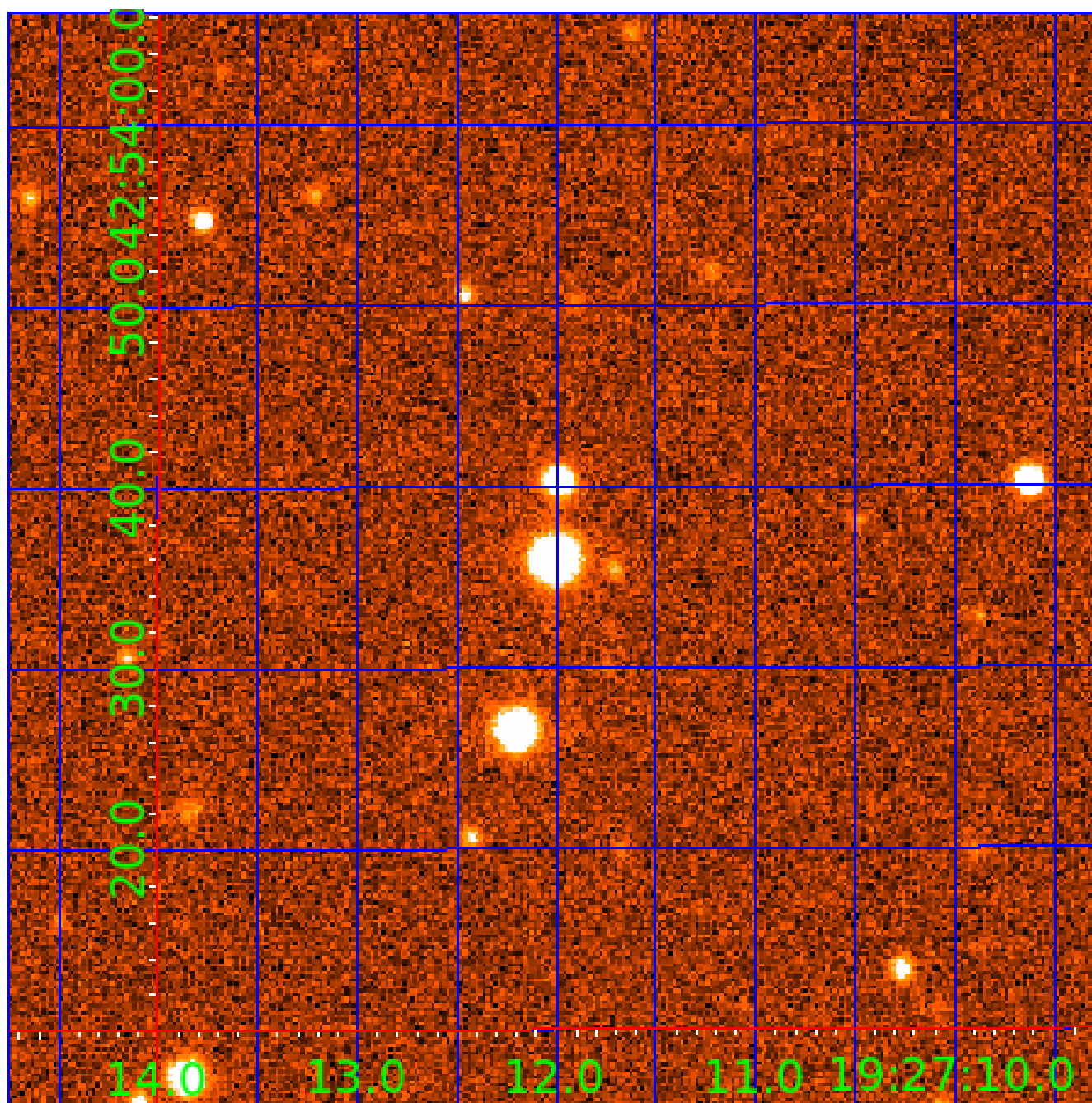


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 007282078

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007282078-01	OBS	No	0.566775	131.856415	50.0	3.718	7.8	8.4	0.55	3960	0.47	539.38
007282078-02	OBS	No	318.814732	265.417928	1984.3	6.781	9.6	8.3	0.55	3960	2.63	0.12
007282078-03	OBS	No	69.642459	196.832856	1596.4	2.189	9.1	9.6	0.55	3960	2.31	0.88
007282078-04	OBS	No	65.916949	194.388123	1337.4	2.554	8.7	9.6	0.55	3960	2.15	0.95

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007282078-01	OBS	FP	0.00	1	0	1	1	LPP_DV—HALO_GHOST—EPHEM_MATCH
007282078-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
007282078-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_FEW_DIFFS
007282078-04	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS—HALO_GHOST

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

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

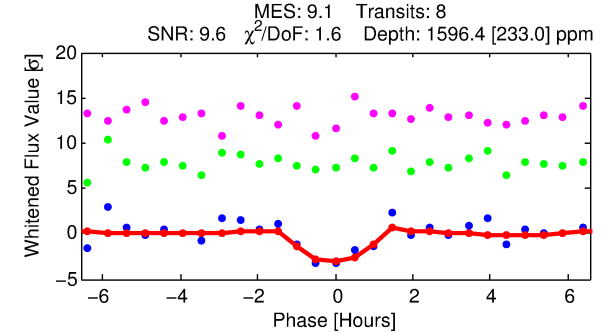
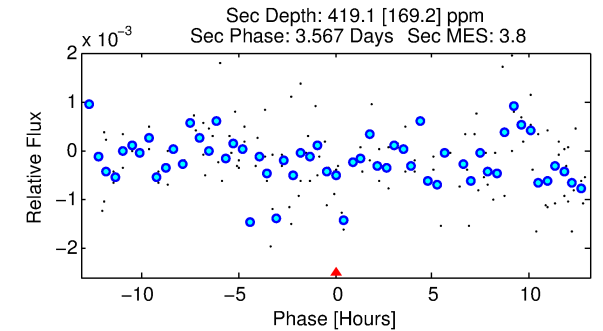
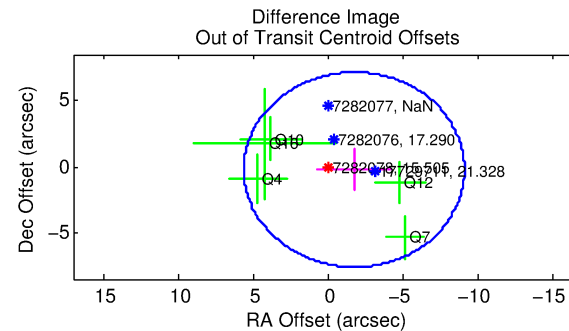
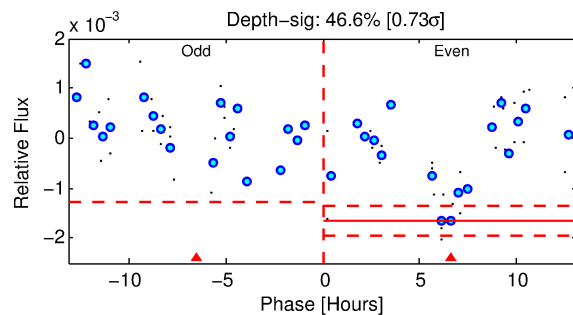
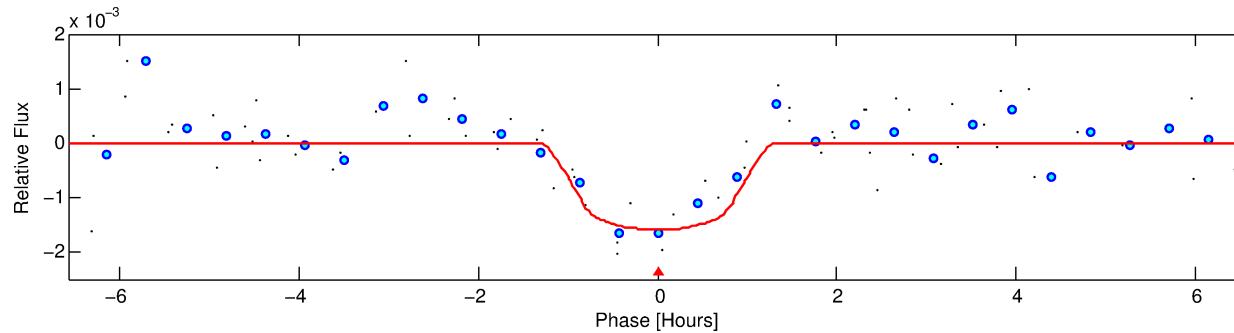
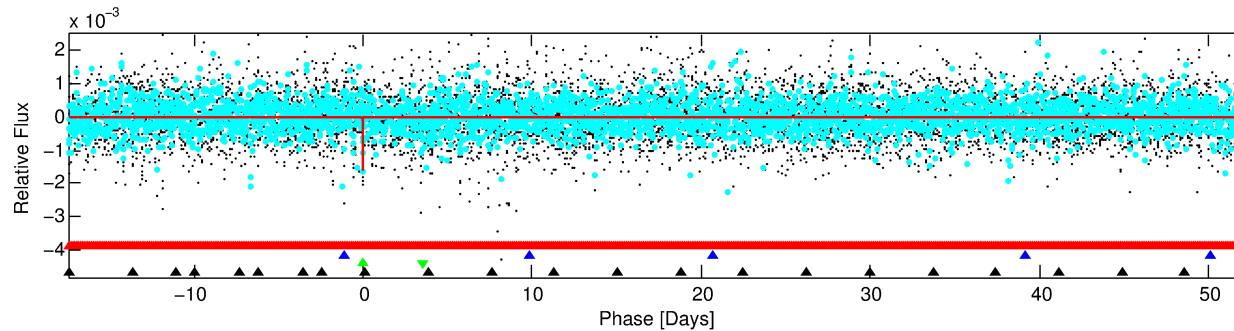
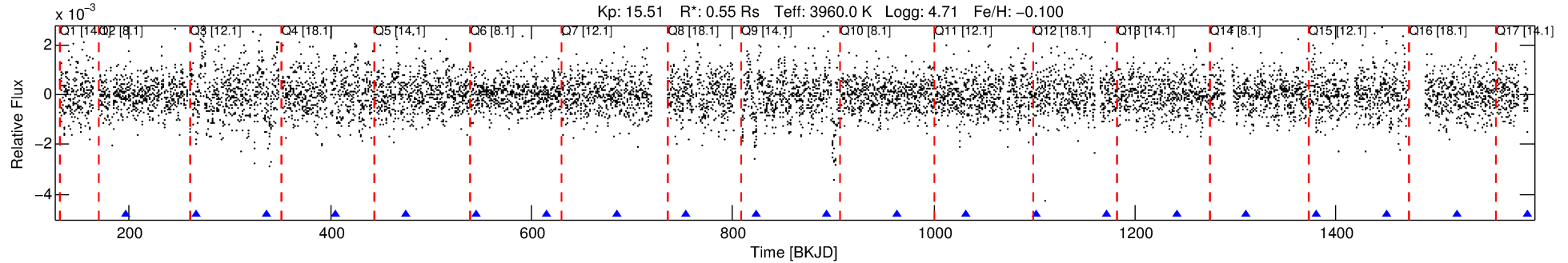
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 007282078-03

No Significant Match Found

# DV One-Page Summary

KIC: 7282078 Candidate: 3 of 4 Period: 69.642 d



## DV Fit Results:

Period = 69.64246 [0.00050] d  
Epoch = 196.8329 [0.0058] BKJD  
Rp/R\* = 0.0385 [0.0748]  
a/R\* = 198.42 [1568.73]  
b = 0.64 [7.33]  
Seff = 0.88 [0.12]  
Teq = 247 [8] K  
Rp = 2.31 [4.50] Re  
a = 0.2752 [0.0187] AU  
Ag = 3264.19 [12761.38] [0.26 $\sigma$ ]  
Teffp = 2889 [2824] K [0.94 $\sigma$ ]

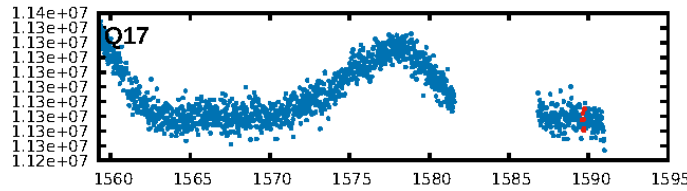
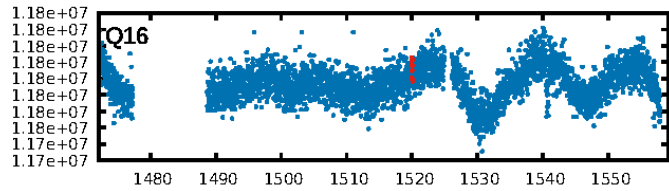
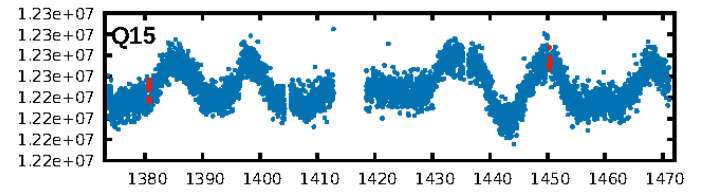
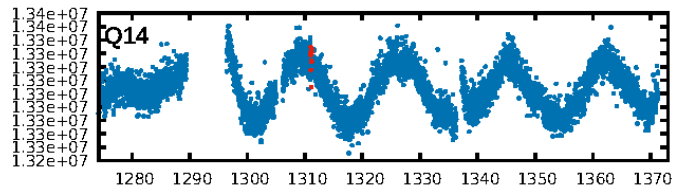
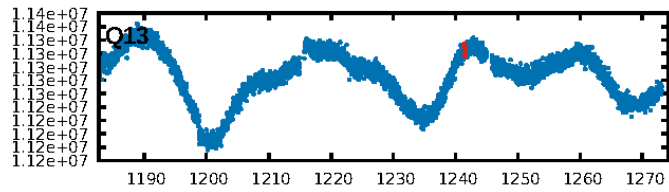
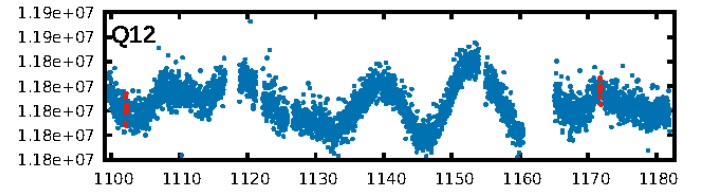
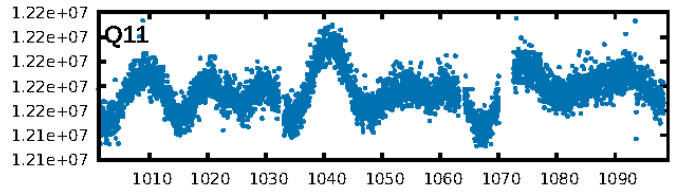
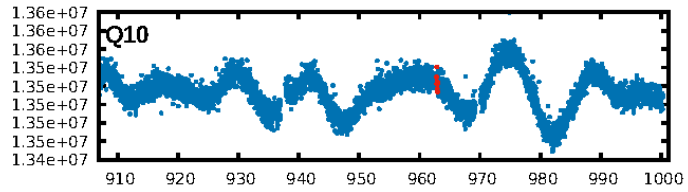
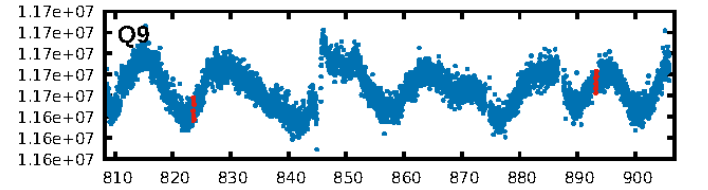
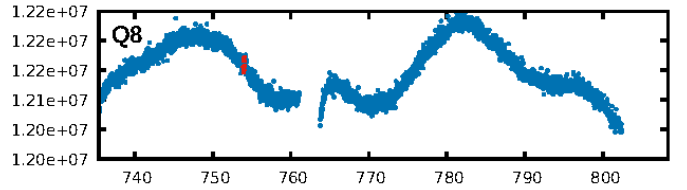
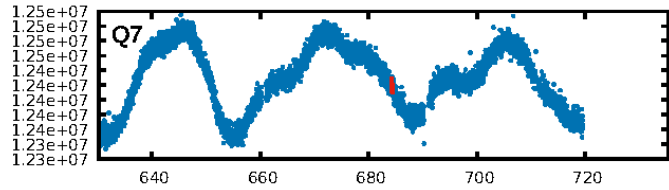
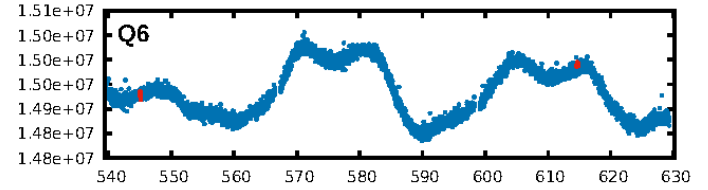
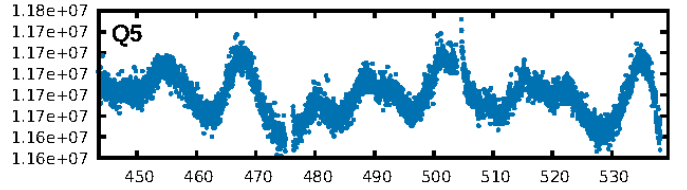
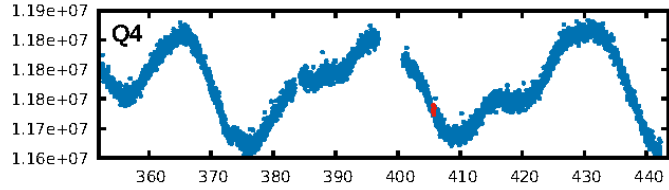
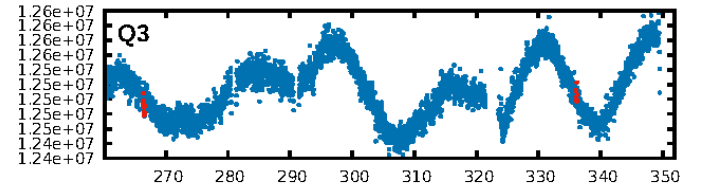
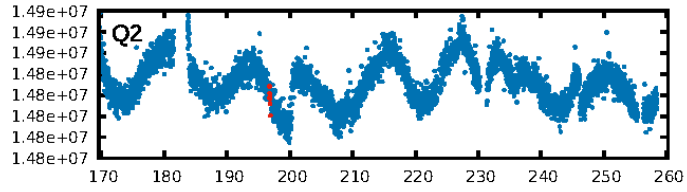
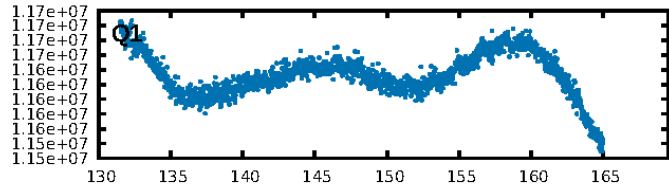
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [26.58 $\sigma$ ]  
LongPeriod-sig: 100.0% [839.29 $\sigma$ ]  
ModelChiSquare2-sig: 22.3%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 6.34e-10**  
RollingBand-fgt: 1.00 [8/8]  
GhostDiagnostic-chr: -2.931  
Centroid-sig: N/A  
**Centroid-so: 1.673 arcsec [3.84 $\sigma$ ]**  
OotOffset-rm: 1.794 arcsec [0.73 $\sigma$ ]  
KicOffset-rm: 1.733 arcsec [0.70 $\sigma$ ]  
OotOffset-st: 1/1/3/0 [5]  
KicOffset-st: 1/1/3/0 [5]  
DiffImageQuality-fgm: 0.00 [0/5]  
DiffImageOverlap-fno: 0.00 [0/13]

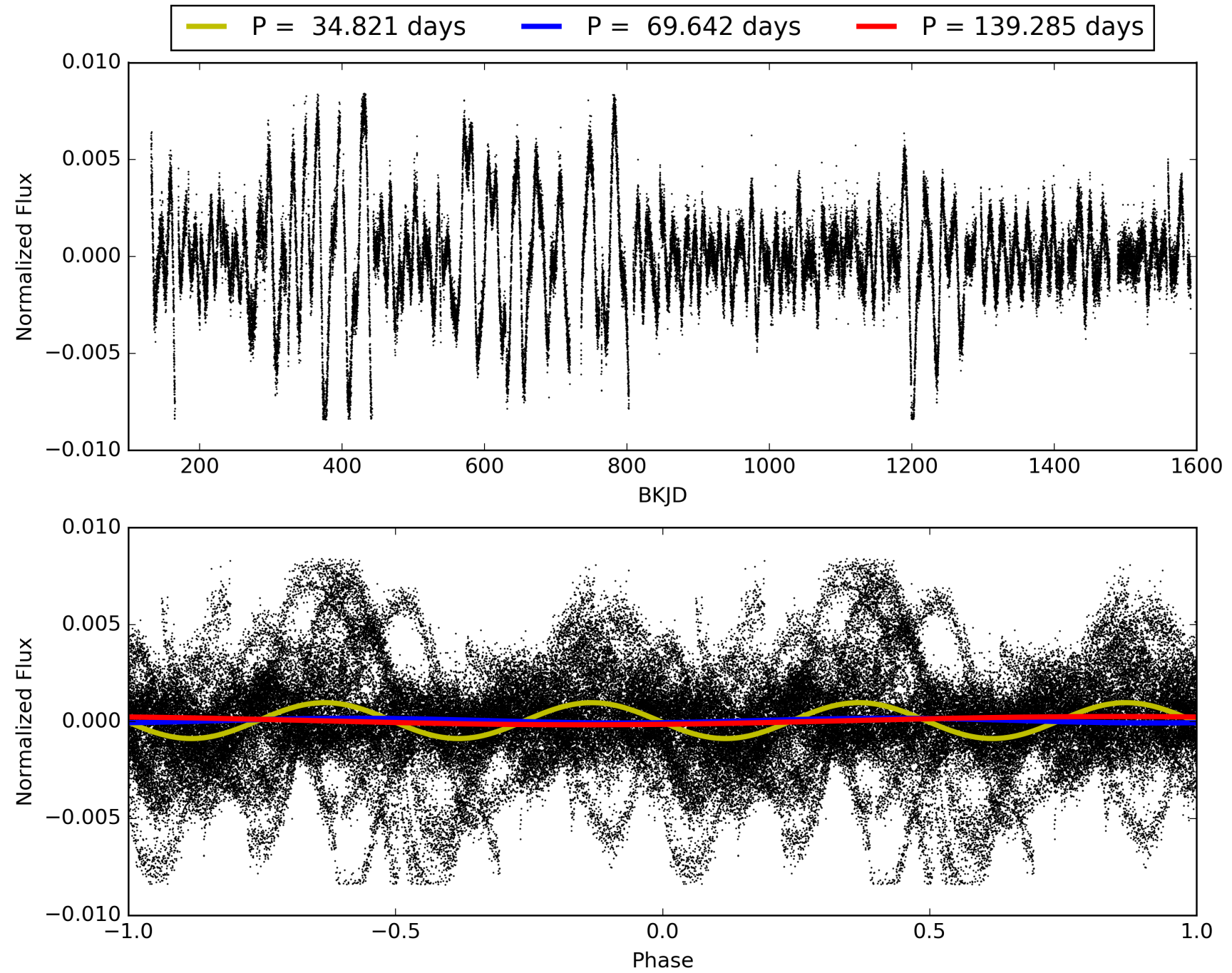
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 01:38:41 Z

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

## TCE 007282078-03, PDC Light Curves

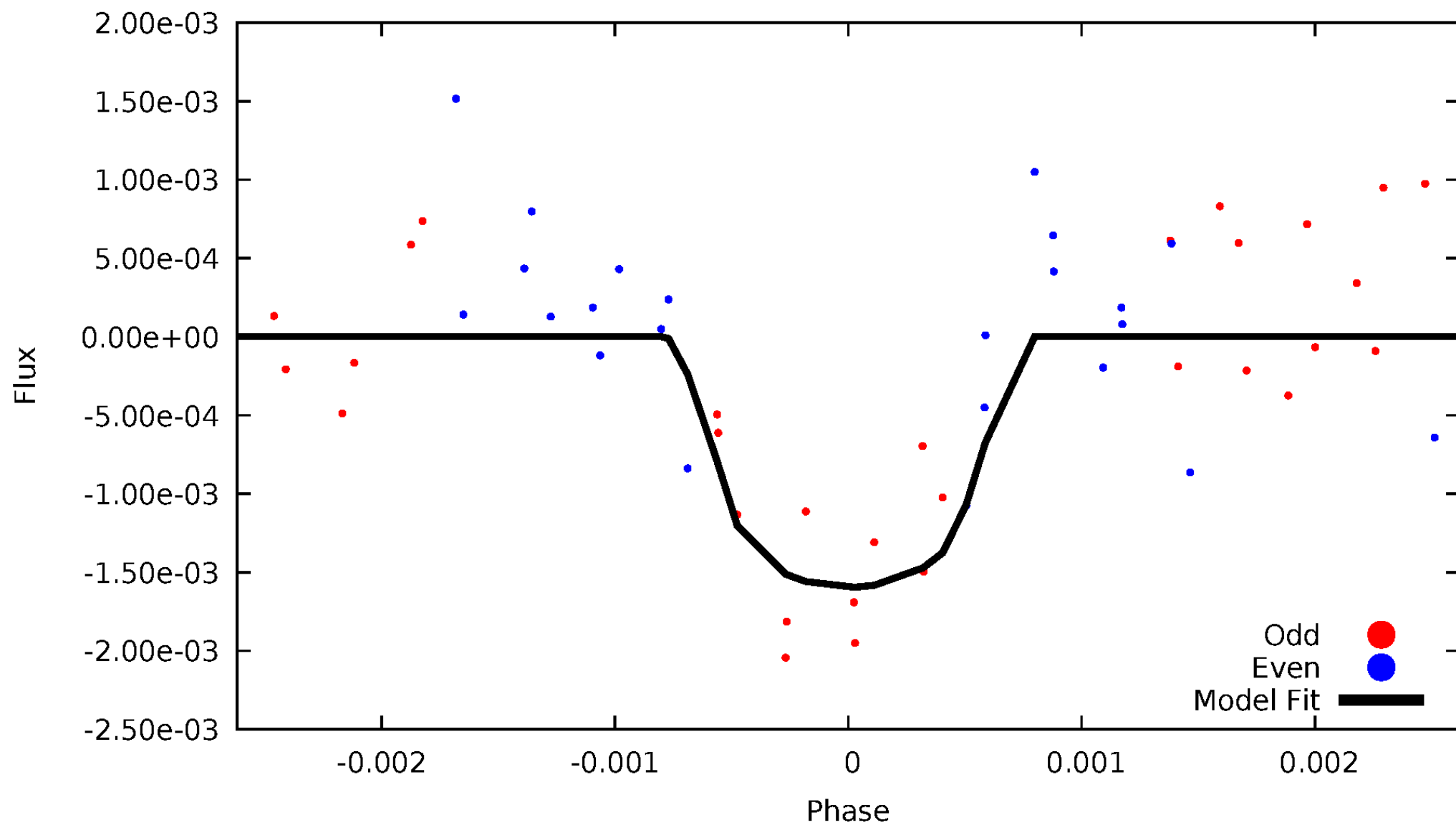


TCE 007282078-03



# DV Odd/Even

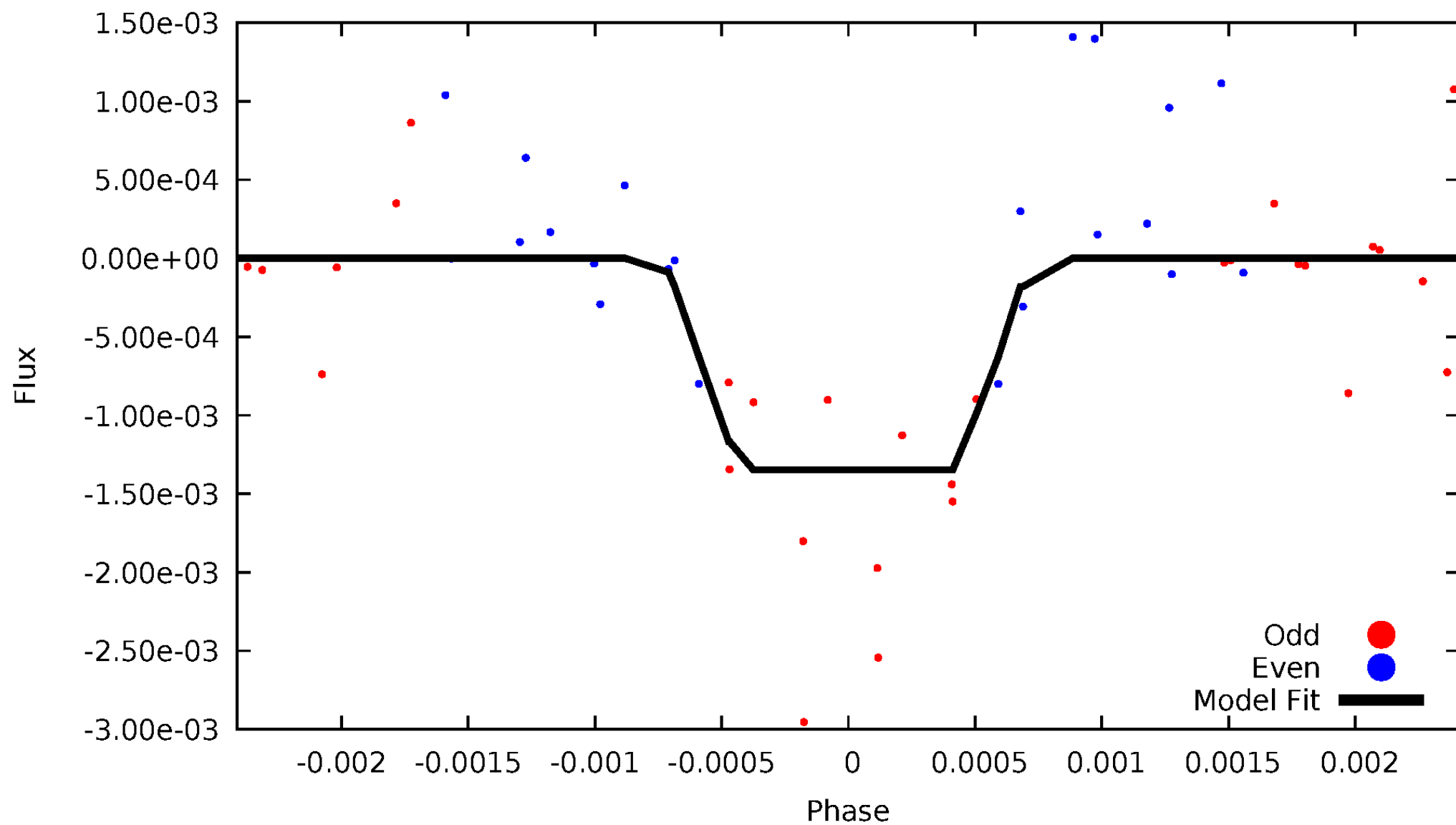
TCE 007282078-03





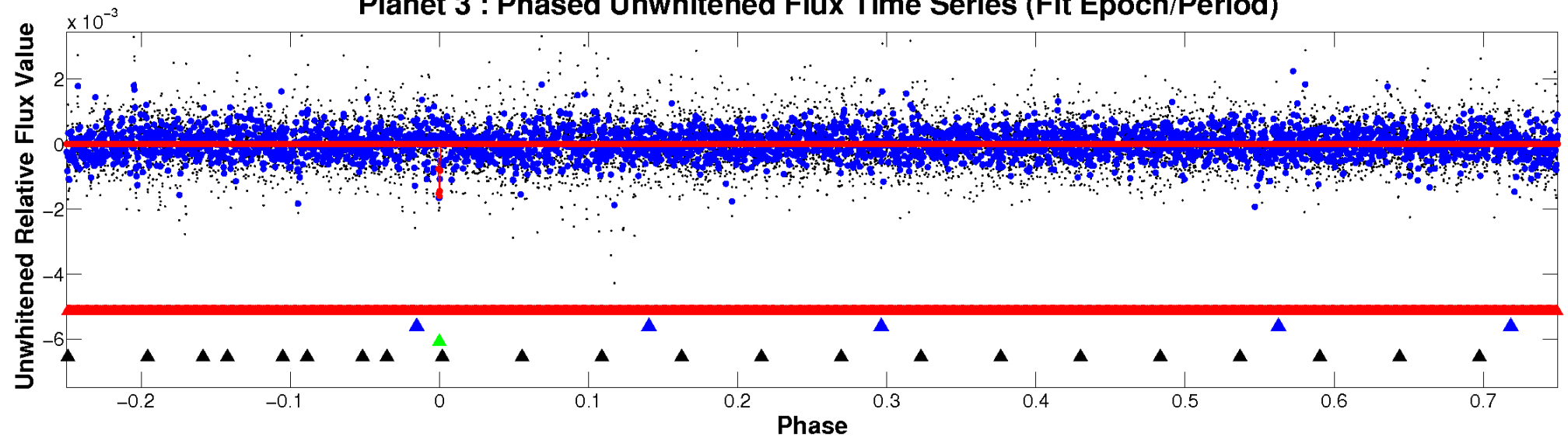
# ALT Odd/Even

TCE 007282078-03

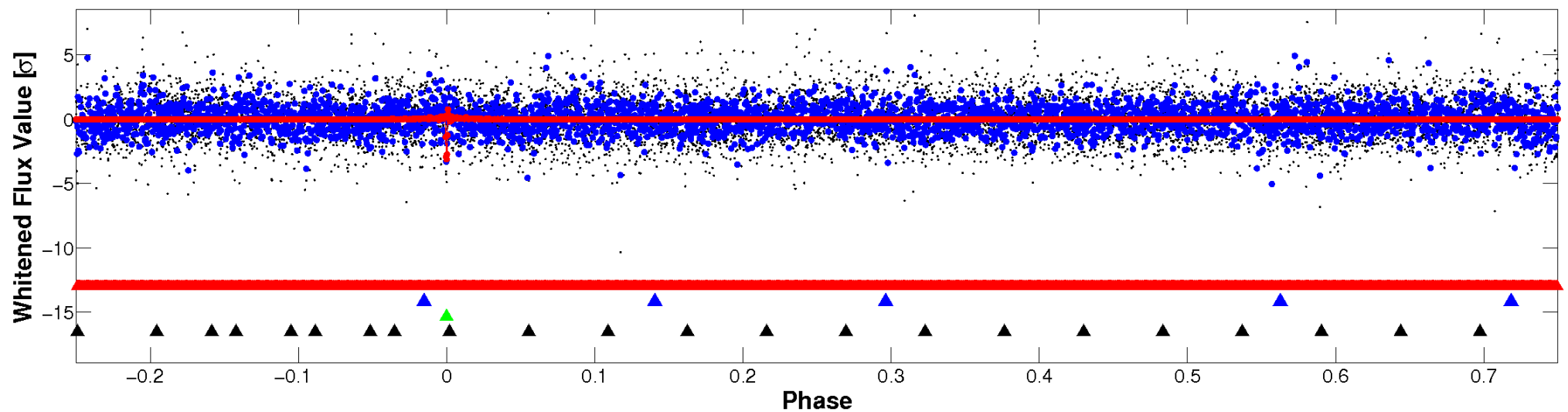


# Non-Whitened Vs. Whitened Light Curve

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

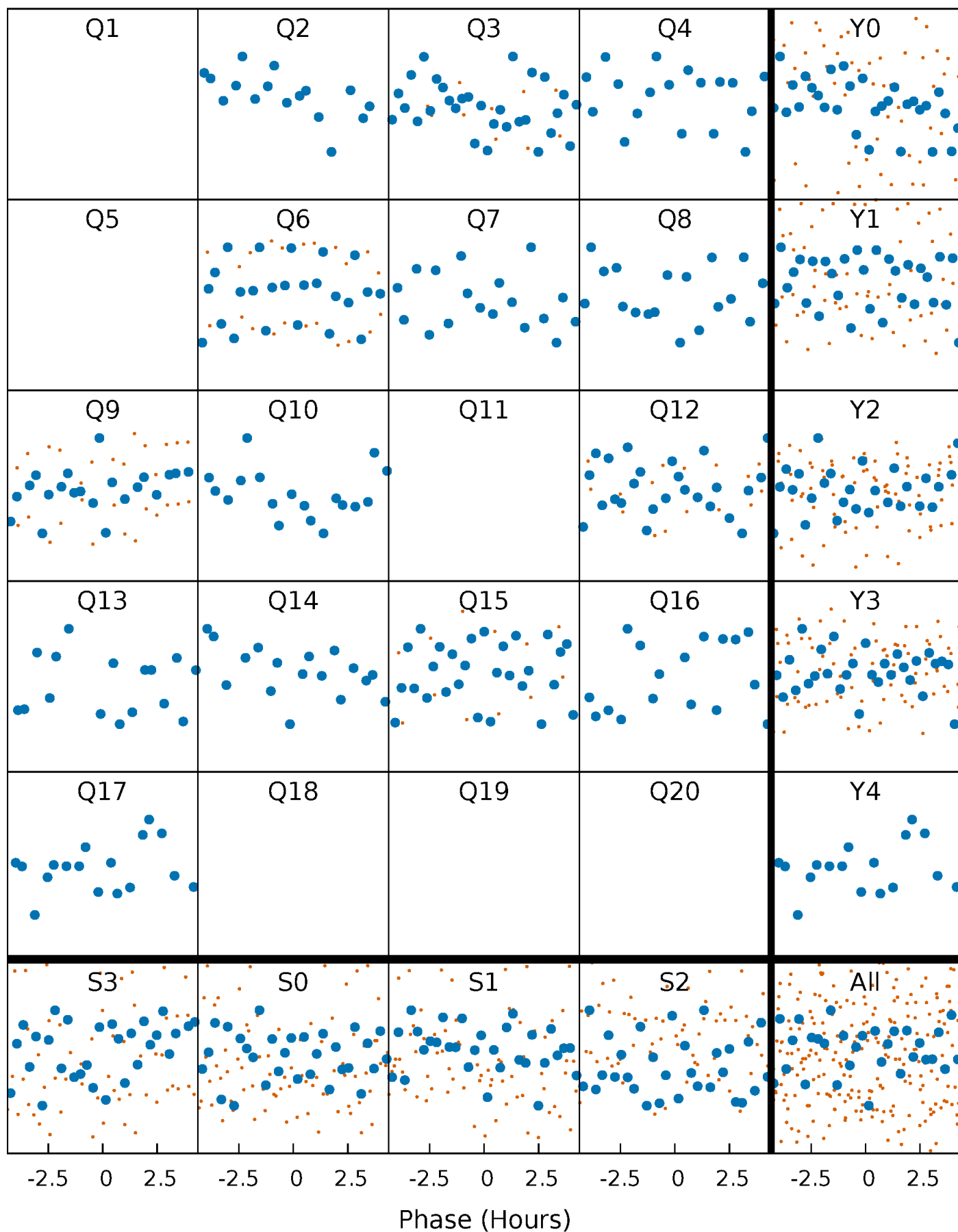


Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



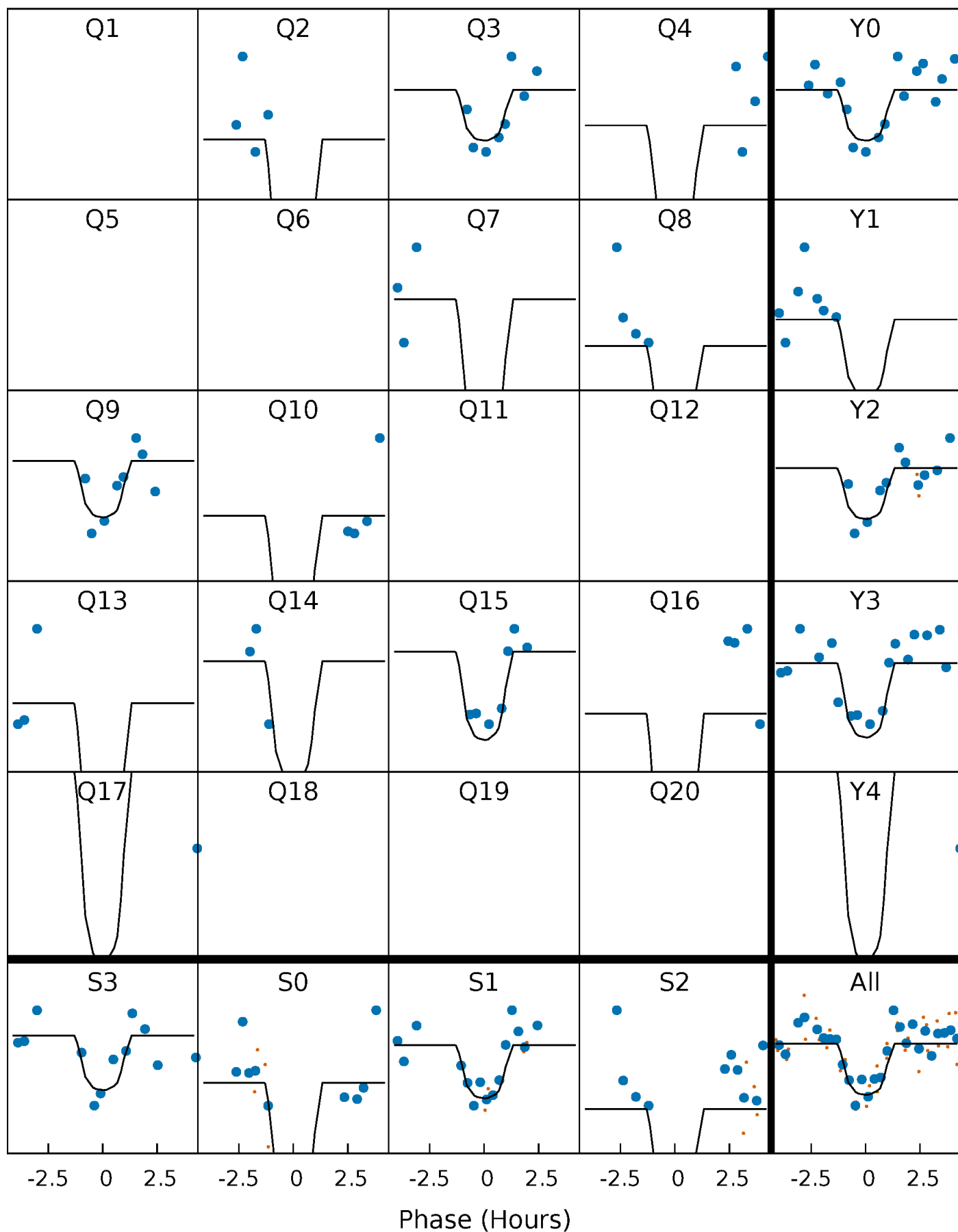
# PDC Quarter-Phased Transit Curves

TCE 007282078-03 P= 69.642459 Days  $T_0=196.832856$  (BKJD)



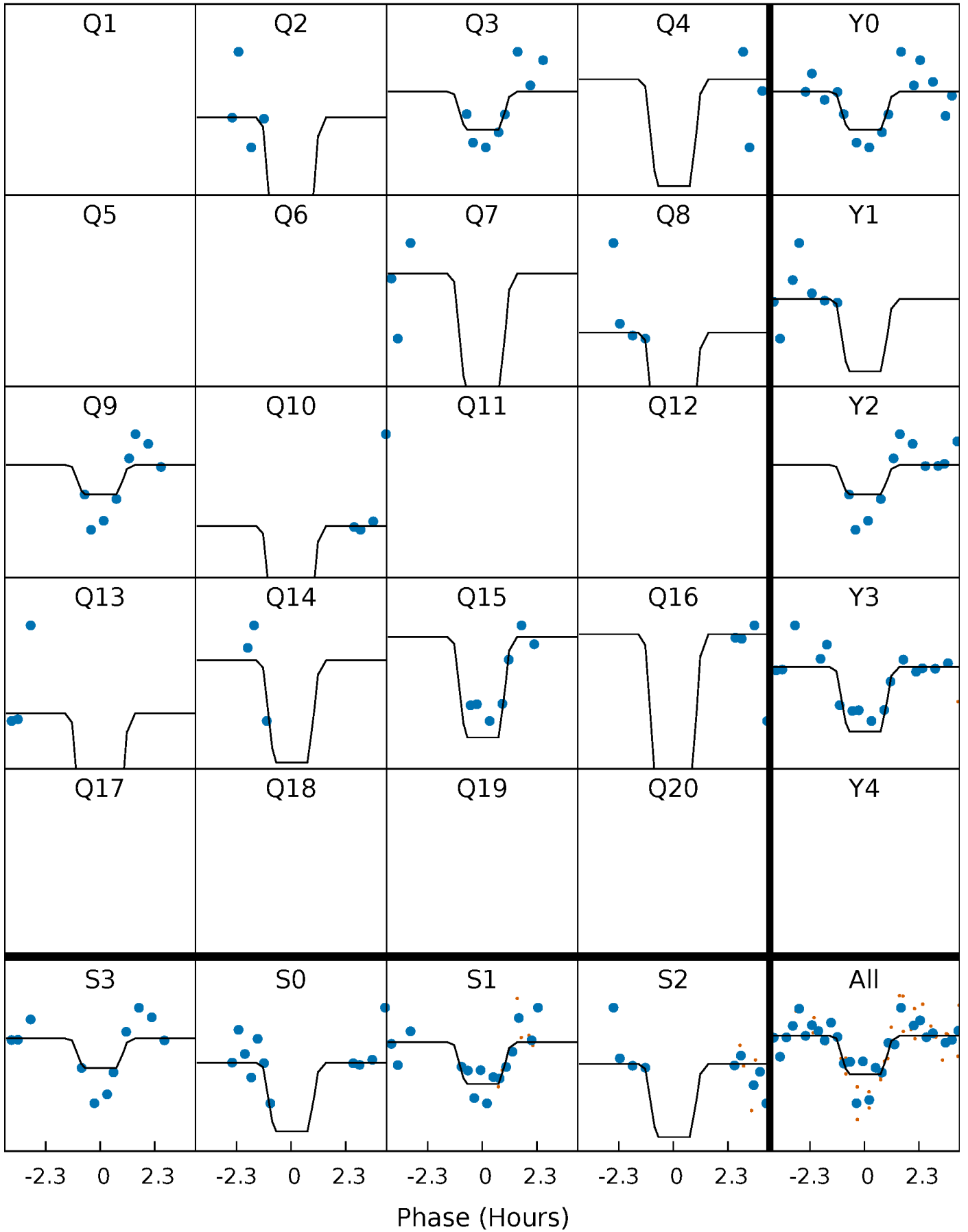
# DV Quarter-Phased Transit Curves

TCE 007282078-03 P= 69.642459 Days  $T_0=196.832856$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

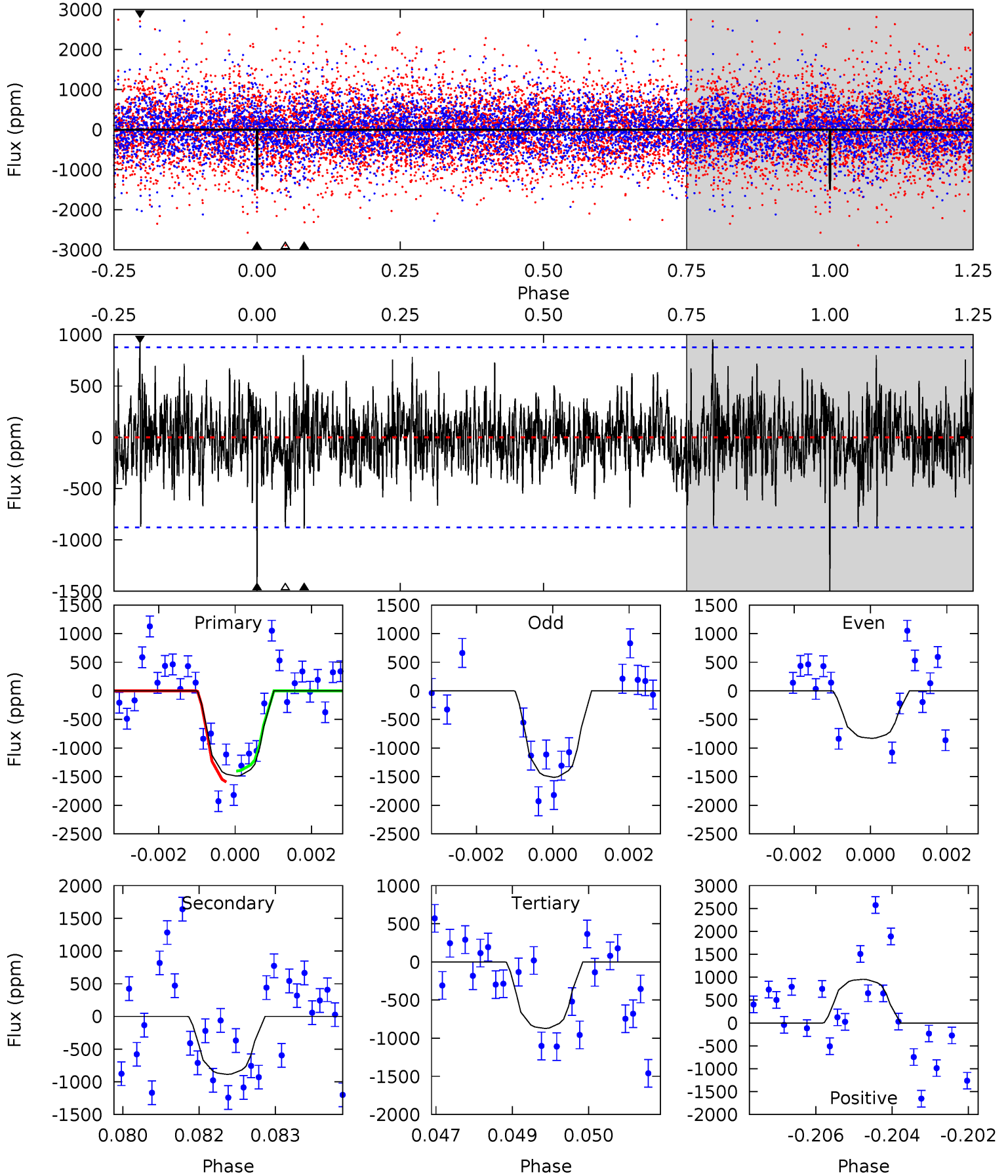
TCE 007282078-03   P= 69.642392 Days    $T_0=196.826957$  (BKJD)



# DV Model-Shift Uniqueness Test

007282078-03, P = 69.642459 Days, E = 127.190397 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.12	5.43	5.34	5.84	5.37	3.16	1.44	3.78	3.29	0.09	-0.41	1.81	1.01	0.39	0.58

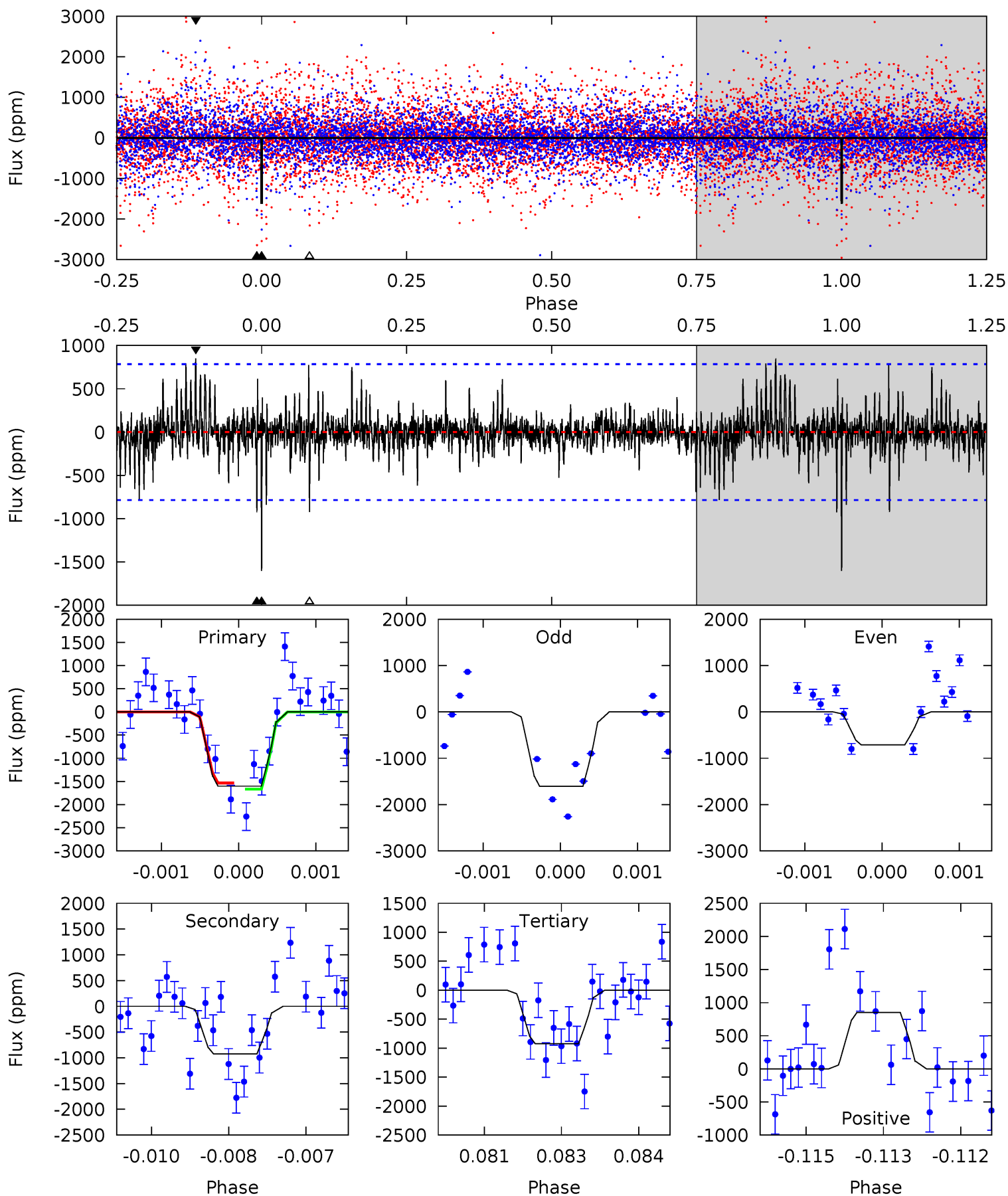




# Alt Model-Shift Uniqueness Test

007282078-03, P = 69.642392 Days, E = 127.184565 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.0	6.34	6.34	5.84	5.39	3.19	1.16	4.66	5.16	0.00	0.50	2.88	1.01	0.35	0.47



### Stellar Parameters For KIC 007282078

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (g \cdot \text{cm}^{-3})$
	$3960^{+89}_{-1}$	$4.714^{+0.040}_{-0.036}$	$-0.100^{+0.250}_{-0.300}$	$0.551^{+0.045}_{-0.050}$	$0.573^{+0.043}_{-0.059}$	$4.822^{+1.010}_{-0.695}$
	+2%/-0%	+1%/-1%	+250%/-300%	+8%/-9%	+8%/-10%	+21%/-14%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 007282078-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-887 \pm 163$	$4.01^{+3.60}_{-2.85}$	$344^{+11}_{-16}$	$3037^{+1581}_{-466}$	$2262^{+24246}_{-1618}$
Alt.	$-924 \pm 146$	$4.10^{+3.69}_{-2.78}$	$342^{+12}_{-16}$	$3013^{+1412}_{-467}$	$2266^{+20297}_{-1647}$

$T_{max}$  = 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

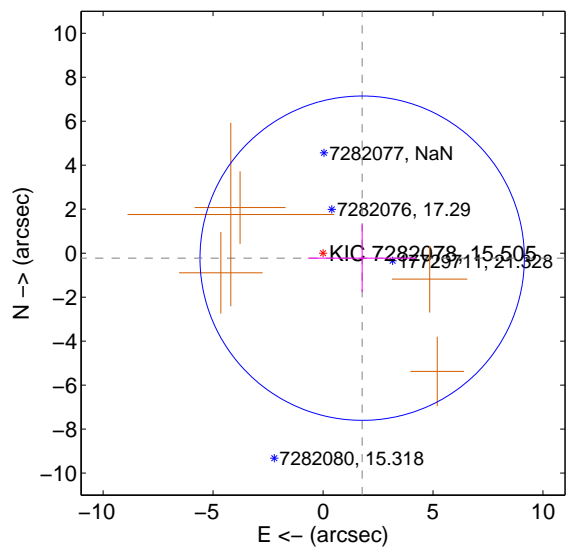
Supplemental centroid analysis for 007282078-03. Kepler magnitude: 15.51. Transit SNR 9.64

There are 0 quarters with good PRF difference image offsets

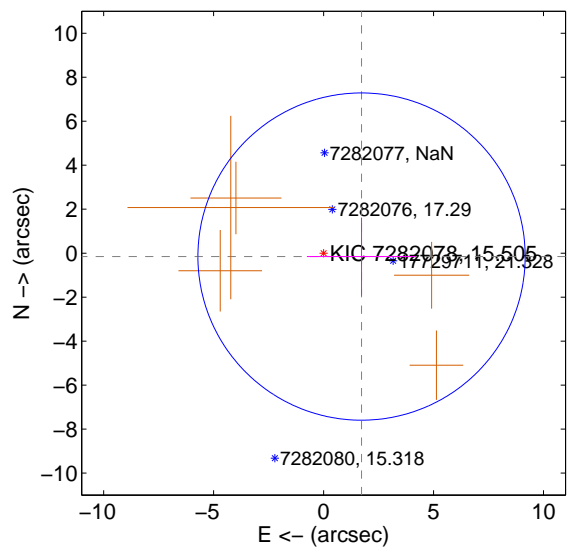
The direct PRF centroid is offset from the target star catalog position by about 0.32 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.794 \pm 2.458$	0.73	$-1.779 \pm 2.470$	$-0.227 \pm 1.538$
PRF-fit source offset from KIC position	$1.733 \pm 2.480$	0.70	$-1.726 \pm 2.485$	$-0.154 \pm 1.773$
photometric centroid source offset	$1.67 \pm 0.44$	3.84	$0.65 \pm 0.41$	$-1.54 \pm 0.44$

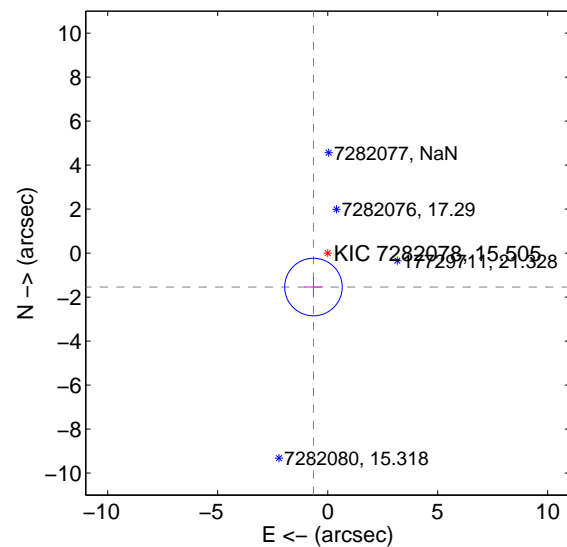
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

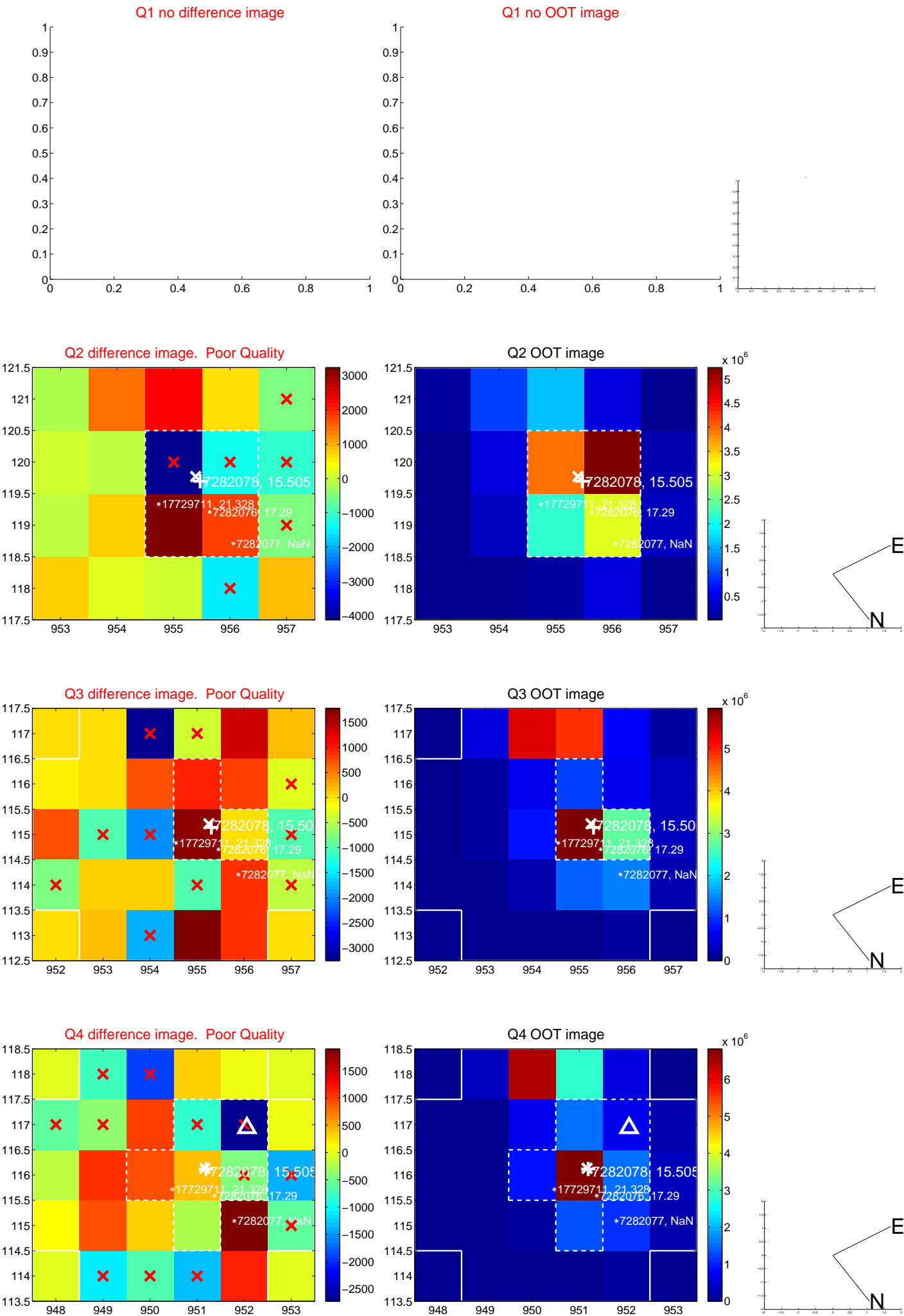


offset from photometric centroids

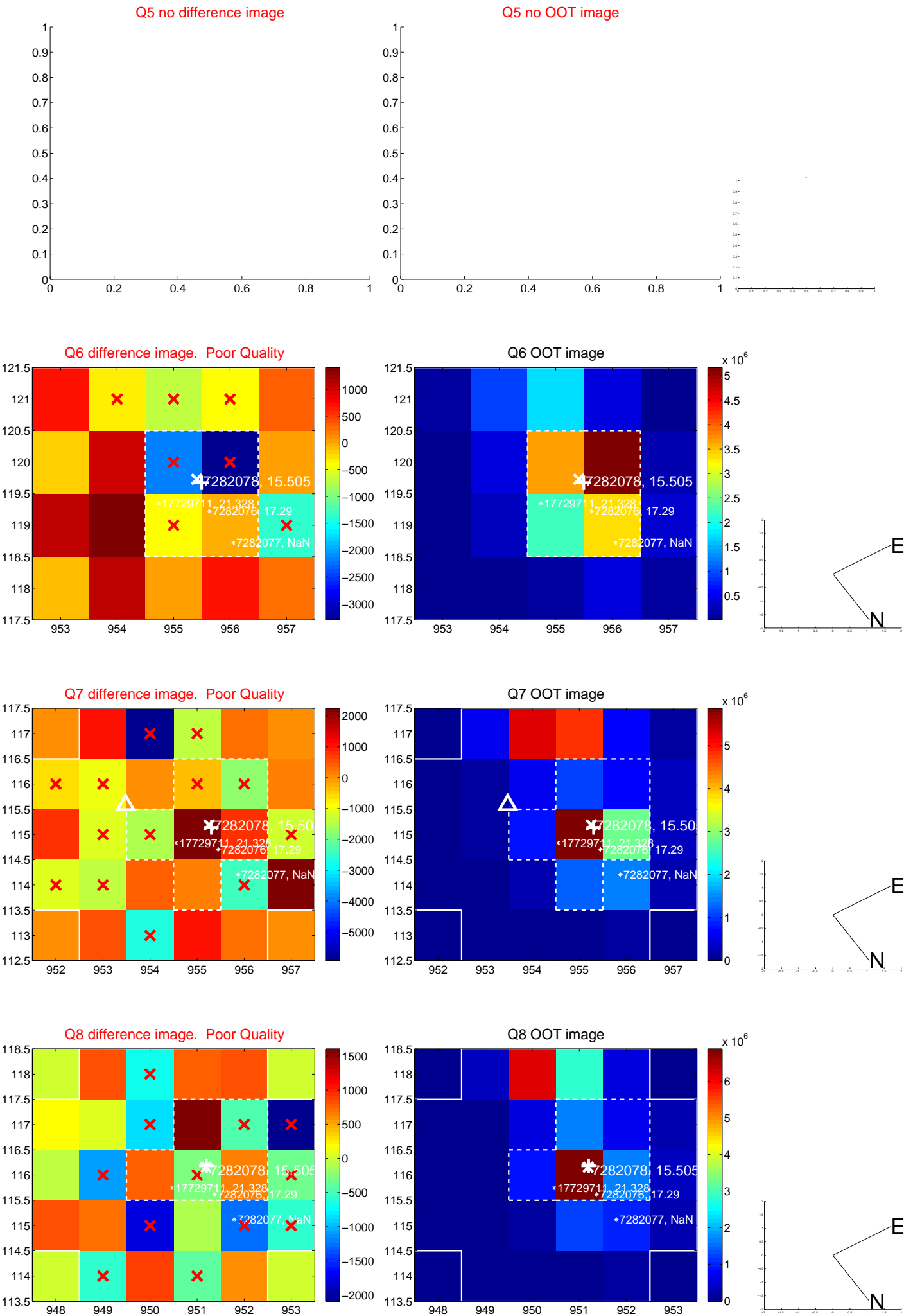


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

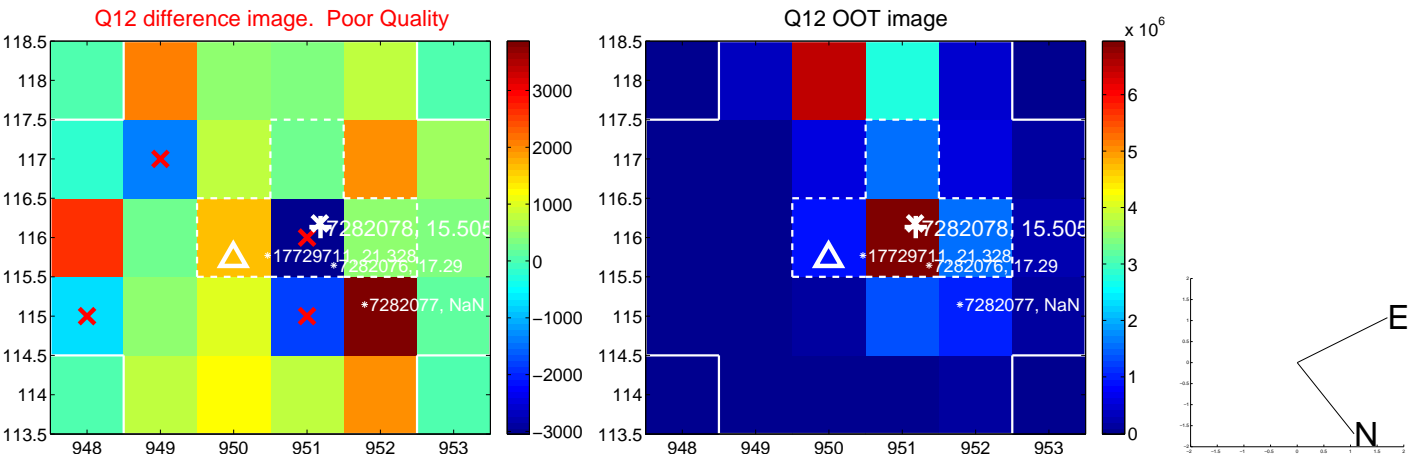
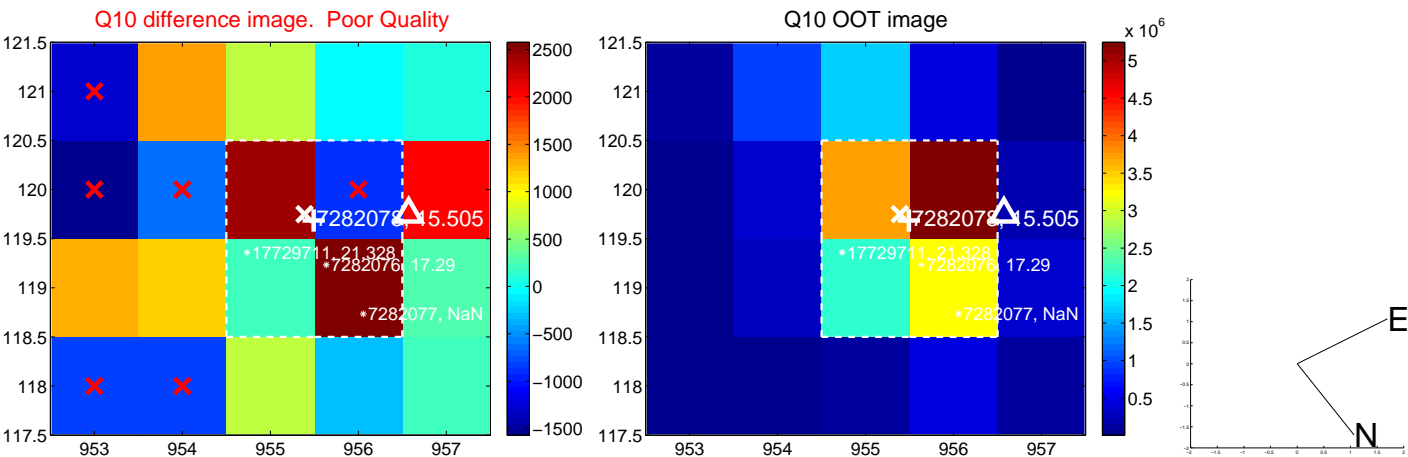
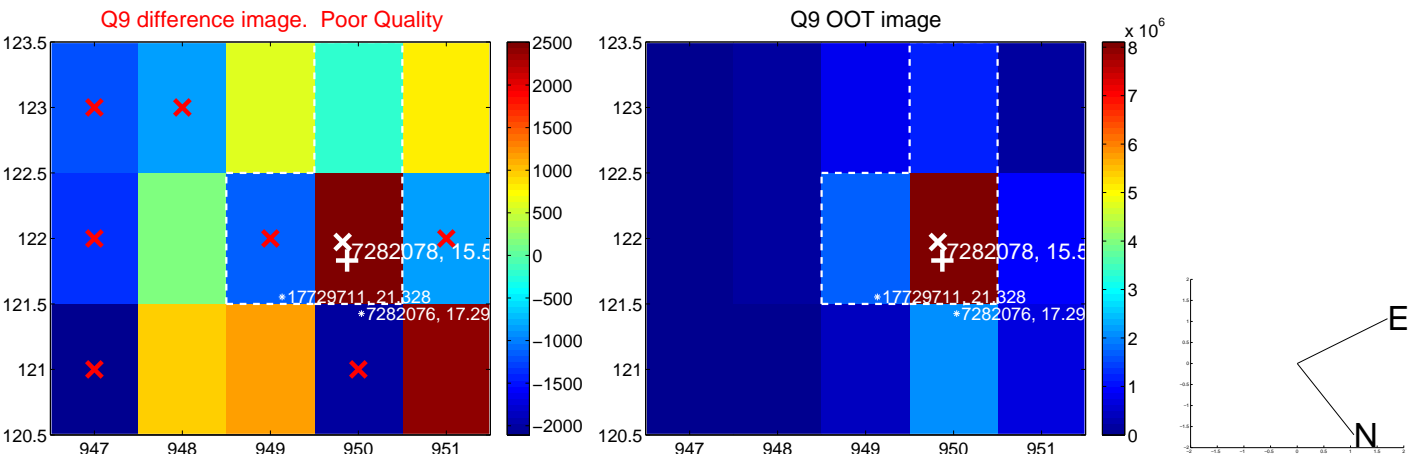
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



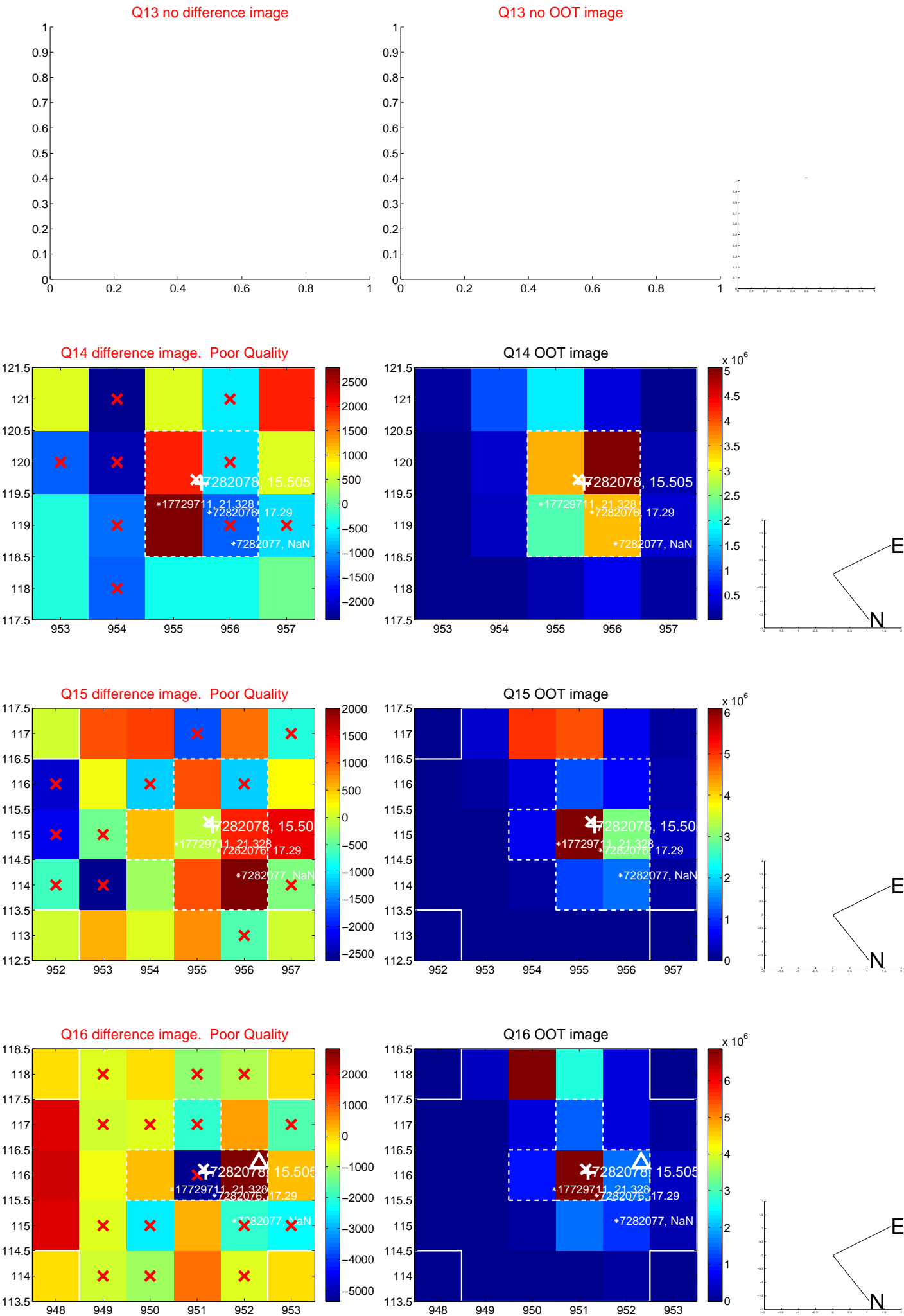
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

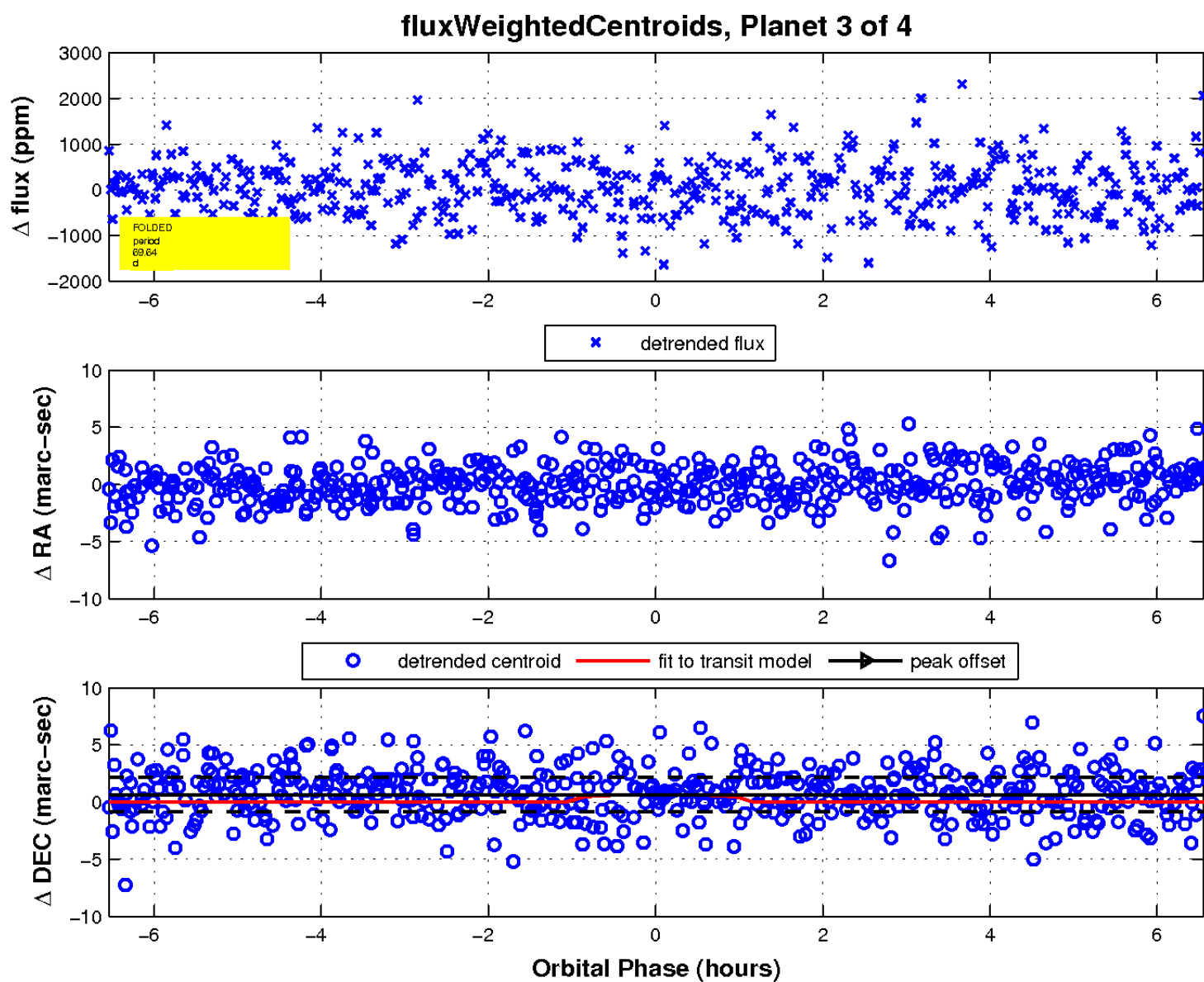
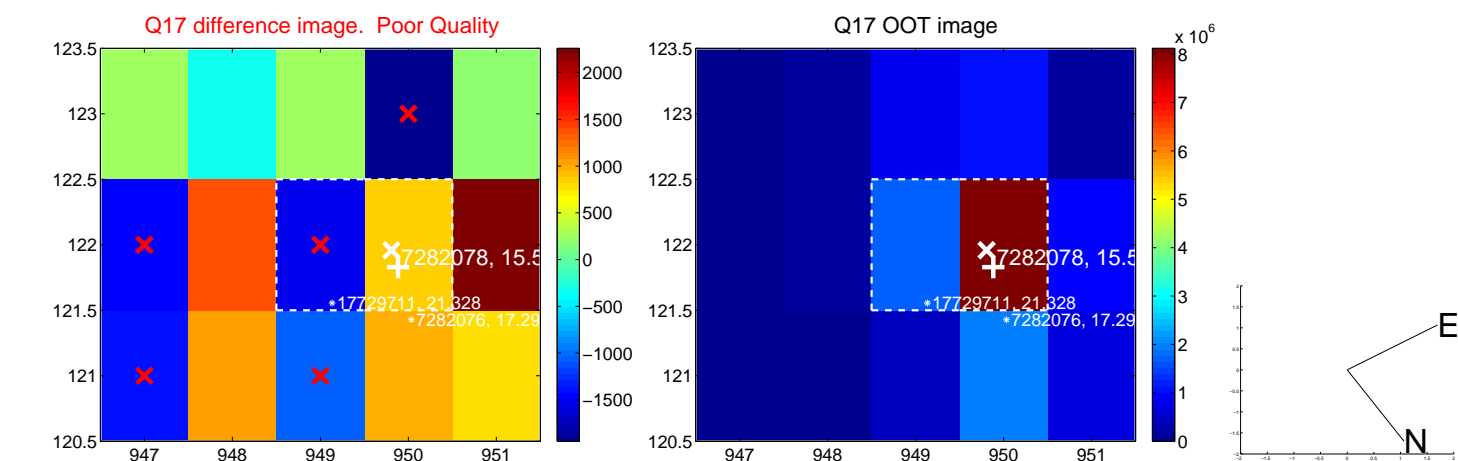


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



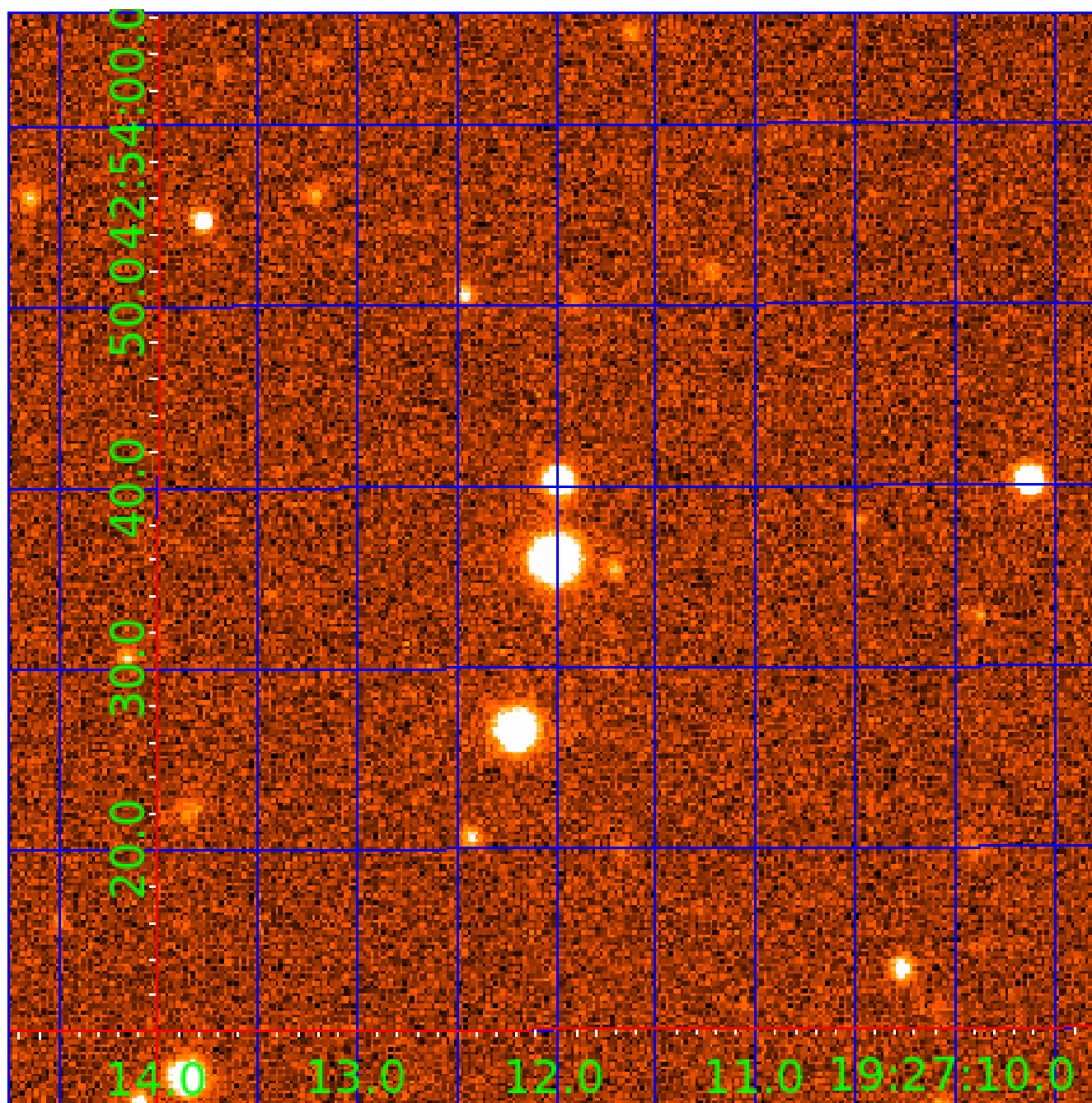


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\Delta$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 007282078

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007282078-01	OBS	No	0.566775	131.856415	50.0	3.718	7.8	8.4	0.55	3960	0.47	539.38
007282078-02	OBS	No	318.814732	265.417928	1984.3	6.781	9.6	8.3	0.55	3960	2.63	0.12
007282078-03	OBS	No	69.642459	196.832856	1596.4	2.189	9.1	9.6	0.55	3960	2.31	0.88
007282078-04	OBS	No	65.916949	194.388123	1337.4	2.554	8.7	9.6	0.55	3960	2.15	0.95

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007282078-01	OBS	FP	0.00	1	0	1	1	LPP_DV—HALO_GHOST—EPHEM_MATCH
007282078-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
007282078-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_FEW_DIFFS
007282078-04	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS—HALO_GHOST

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

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

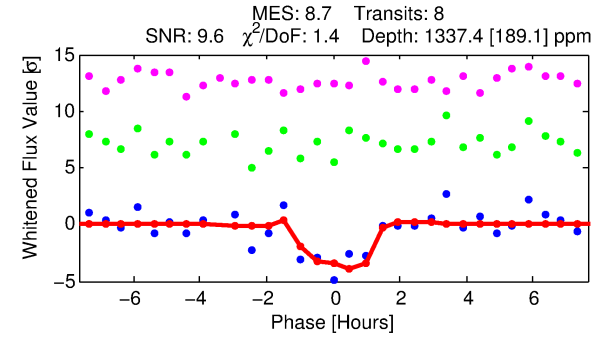
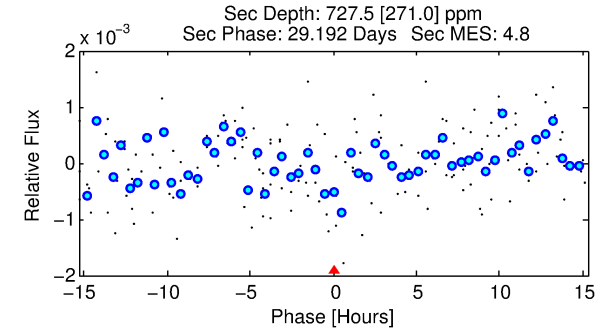
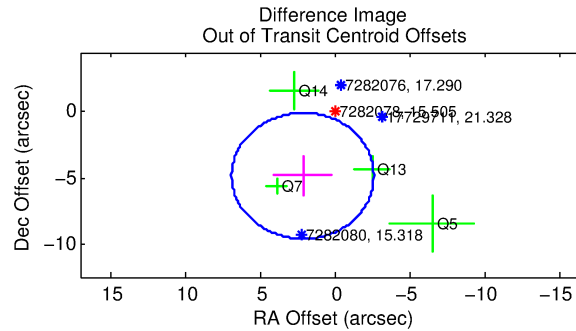
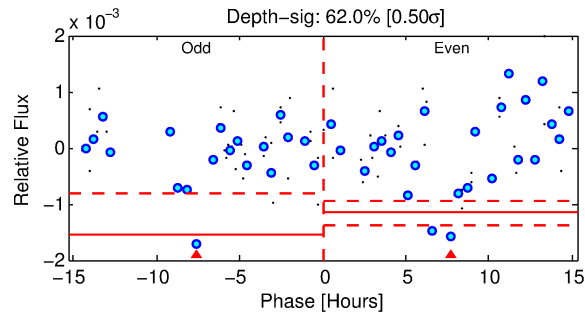
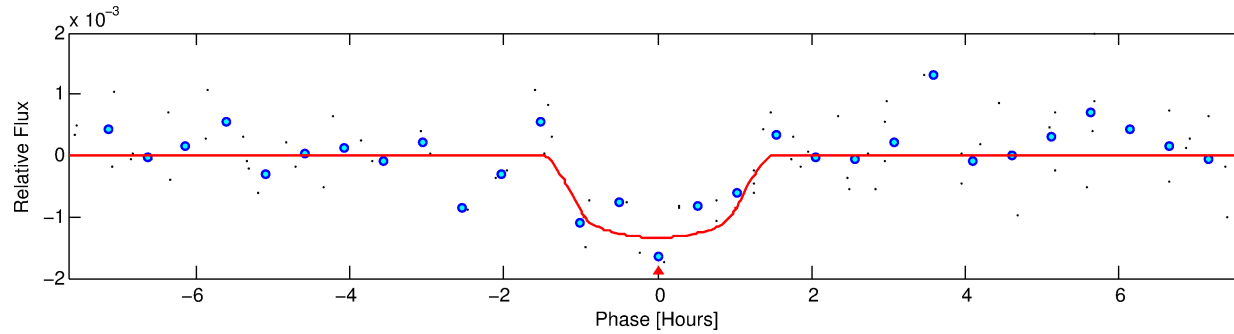
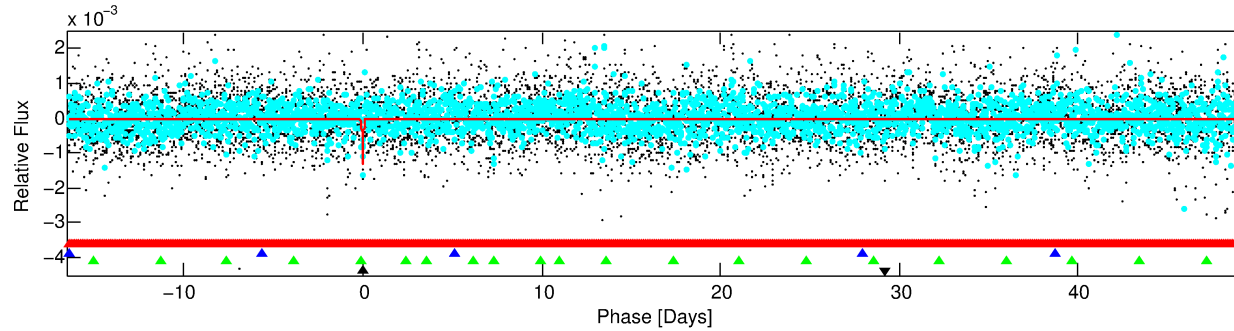
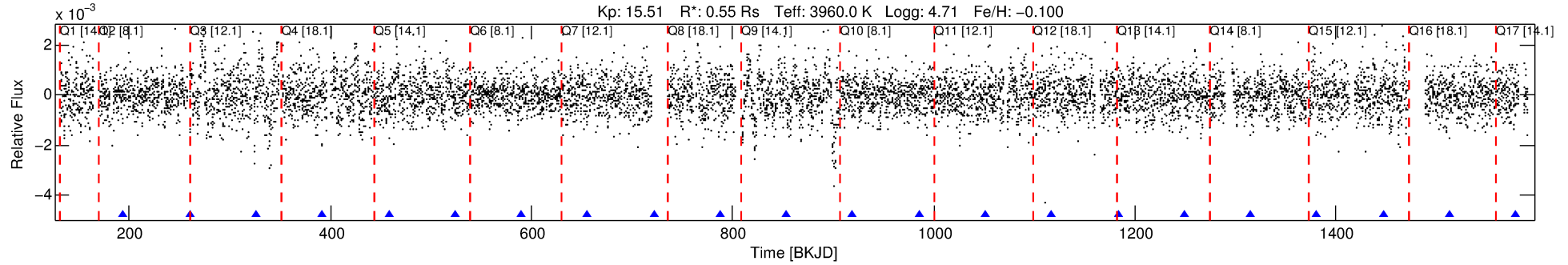
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 007282078-04

No Significant Match Found

# DV One-Page Summary

KIC: 7282078 Candidate: 4 of 4 Period: 65.917 d



## DV Fit Results:

Period = 65.91695 [0.00094] d  
Epoch = 194.3881 [0.0089] BKJD  
Rp/R\* = 0.0358 [0.0439]  
a/R\* = 151.24 [756.51]  
b = 0.70 [3.78]  
Seff = 0.95 [0.13]  
Teq = 252 [8] K  
Rp = 2.15 [2.65] Re  
a = 0.2653 [0.0180] AU  
Ag = 6095.04 [15159.31] [0.40 $\sigma$ ]  
Teffp = 3439 [2139] K [1.49 $\sigma$ ]

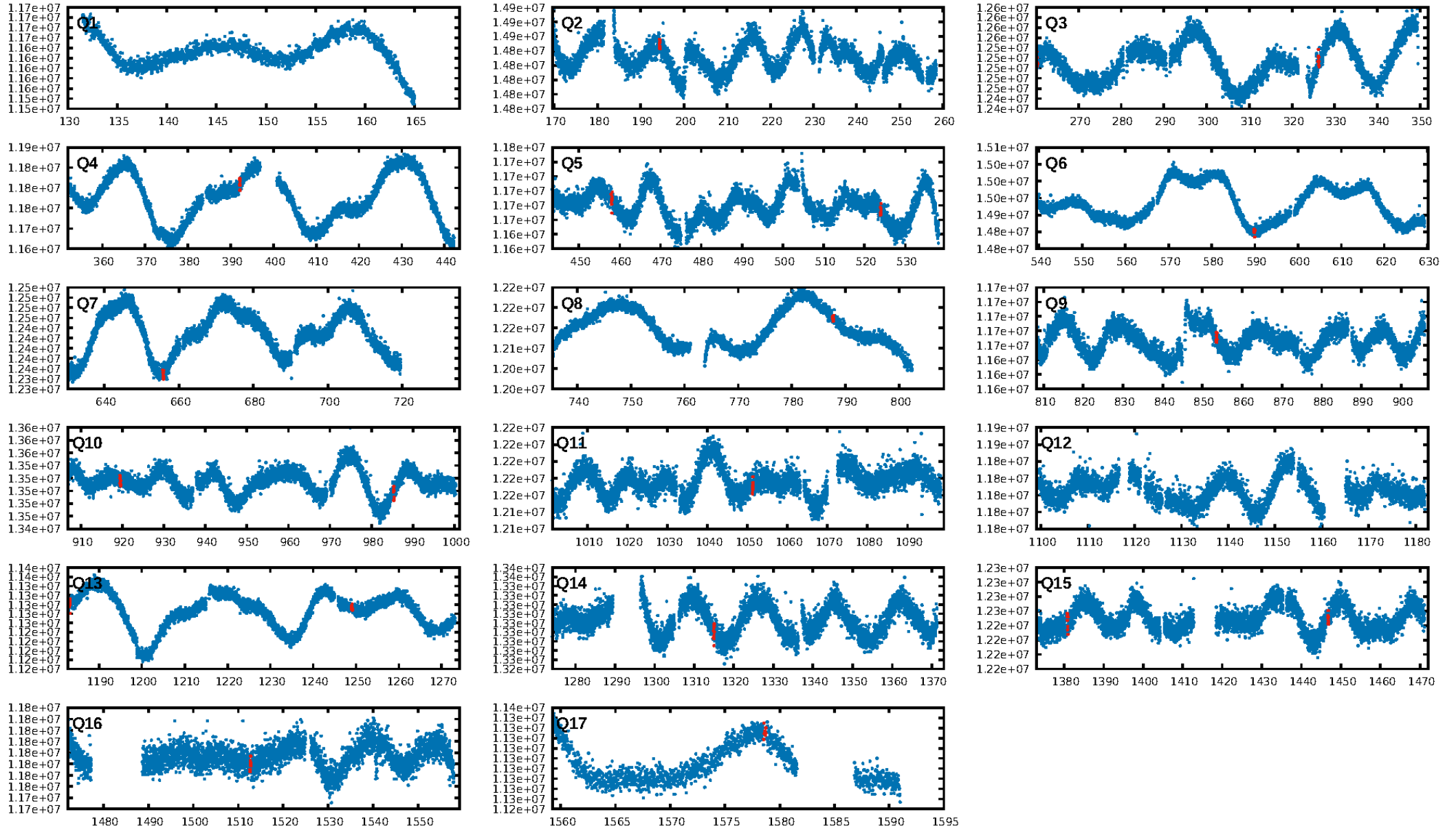
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [347.72 $\sigma$ ]  
LongPeriod-sig: 100.0% [26.58 $\sigma$ ]  
ModelChiSquare2-sig: 35.4%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 3.00e-09  
RollingBand-fgt: 1.00 [8/8]  
GhostDiagnostic-chr: -0.1036  
Centroid-sig: N/A  
Centroid-so: 1.340 arcsec [2.98 $\sigma$ ]  
OotOffset-rm: 5.294 arcsec [3.34 $\sigma$ ]  
KicOffset-rm: 4.895 arcsec [3.02 $\sigma$ ]  
OotOffset-st: 1/1/0/2 [4]  
KicOffset-st: 1/1/0/2 [4]  
DiffImageQuality-fgm: 0.00 [0/4]  
DiffImageOverlap-fno: 0.00 [0/15]

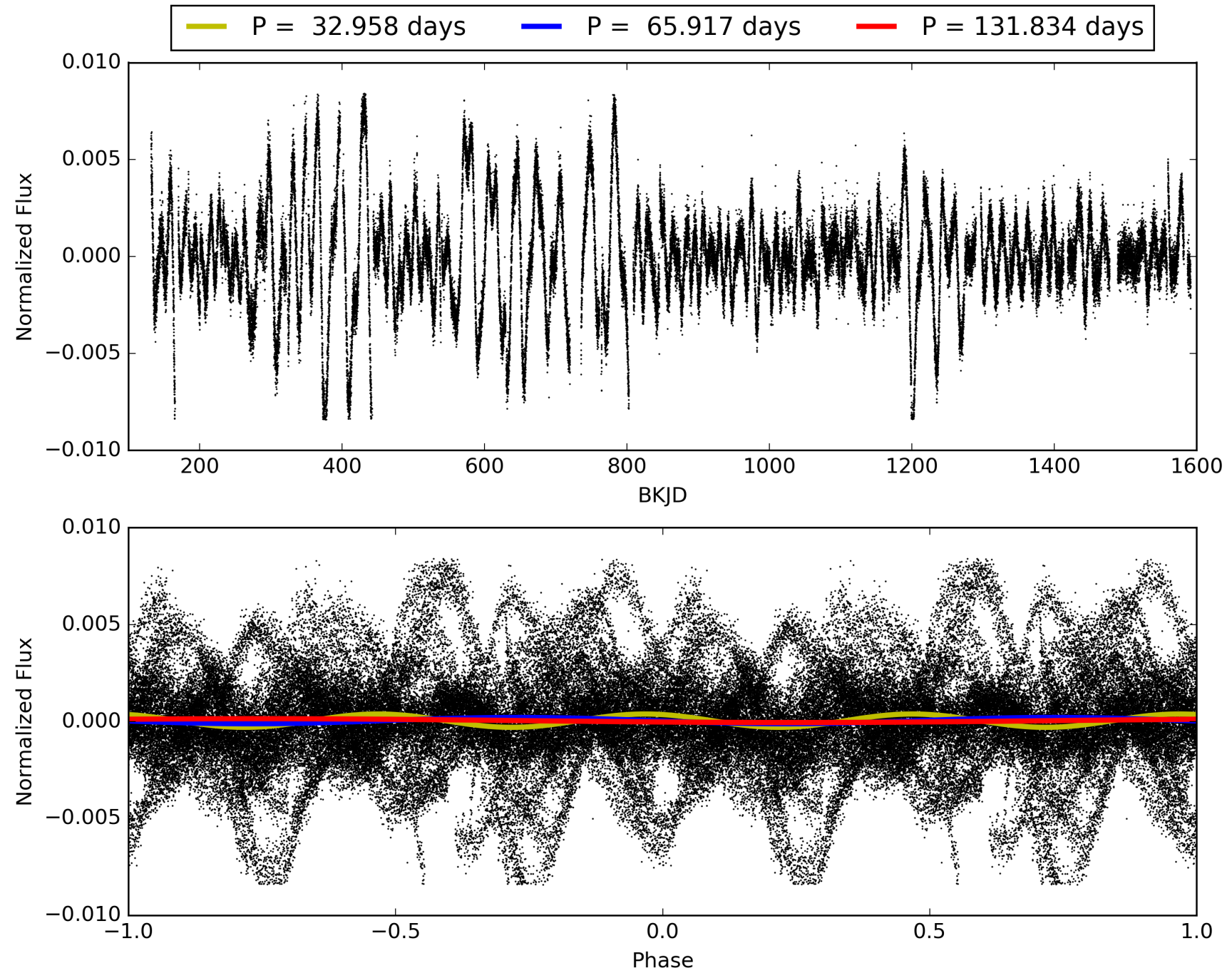
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 01:38:45 Z

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

# TCE 007282078-04, PDC Light Curves

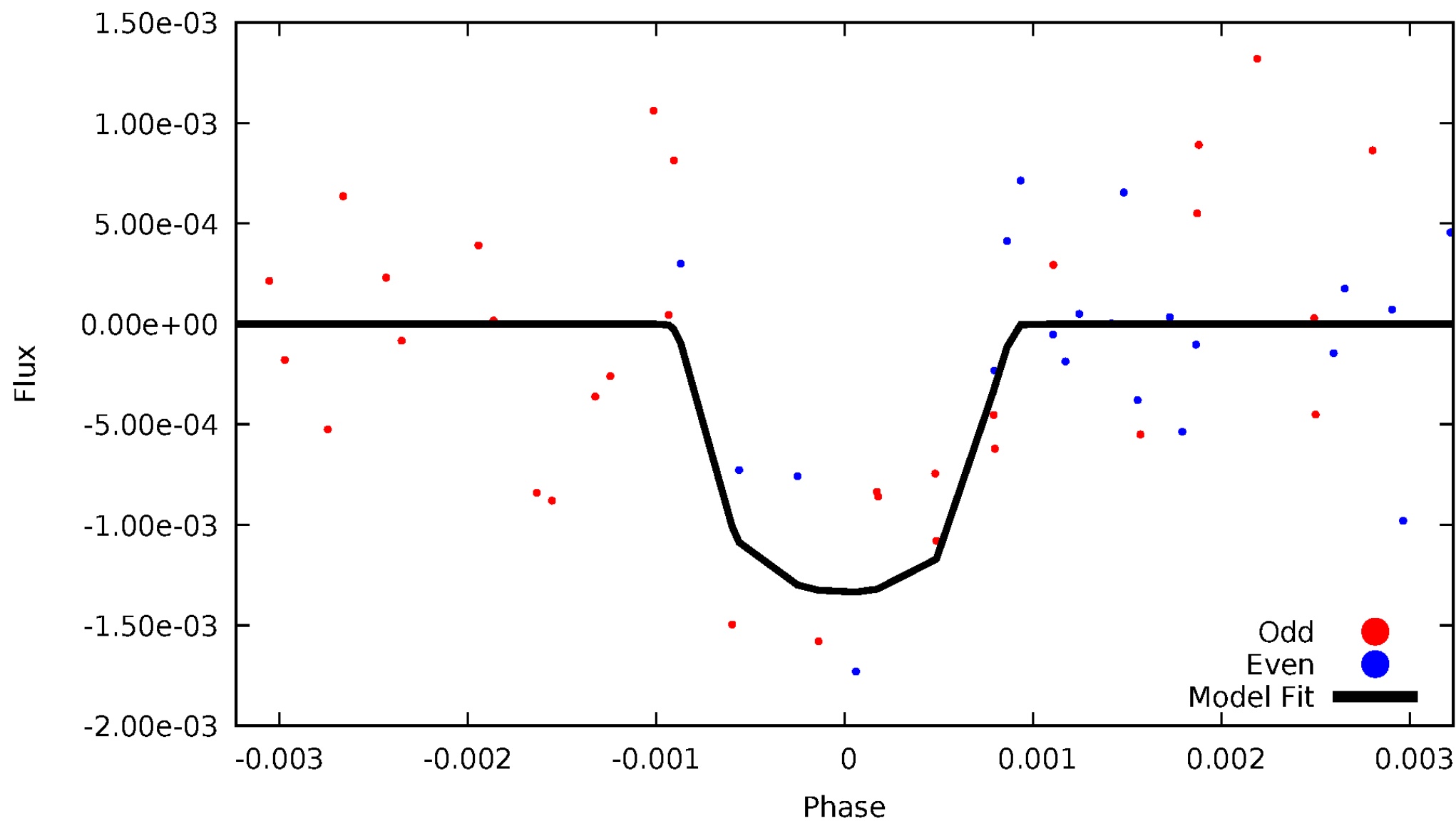


TCE 007282078-04



# DV Odd/Even

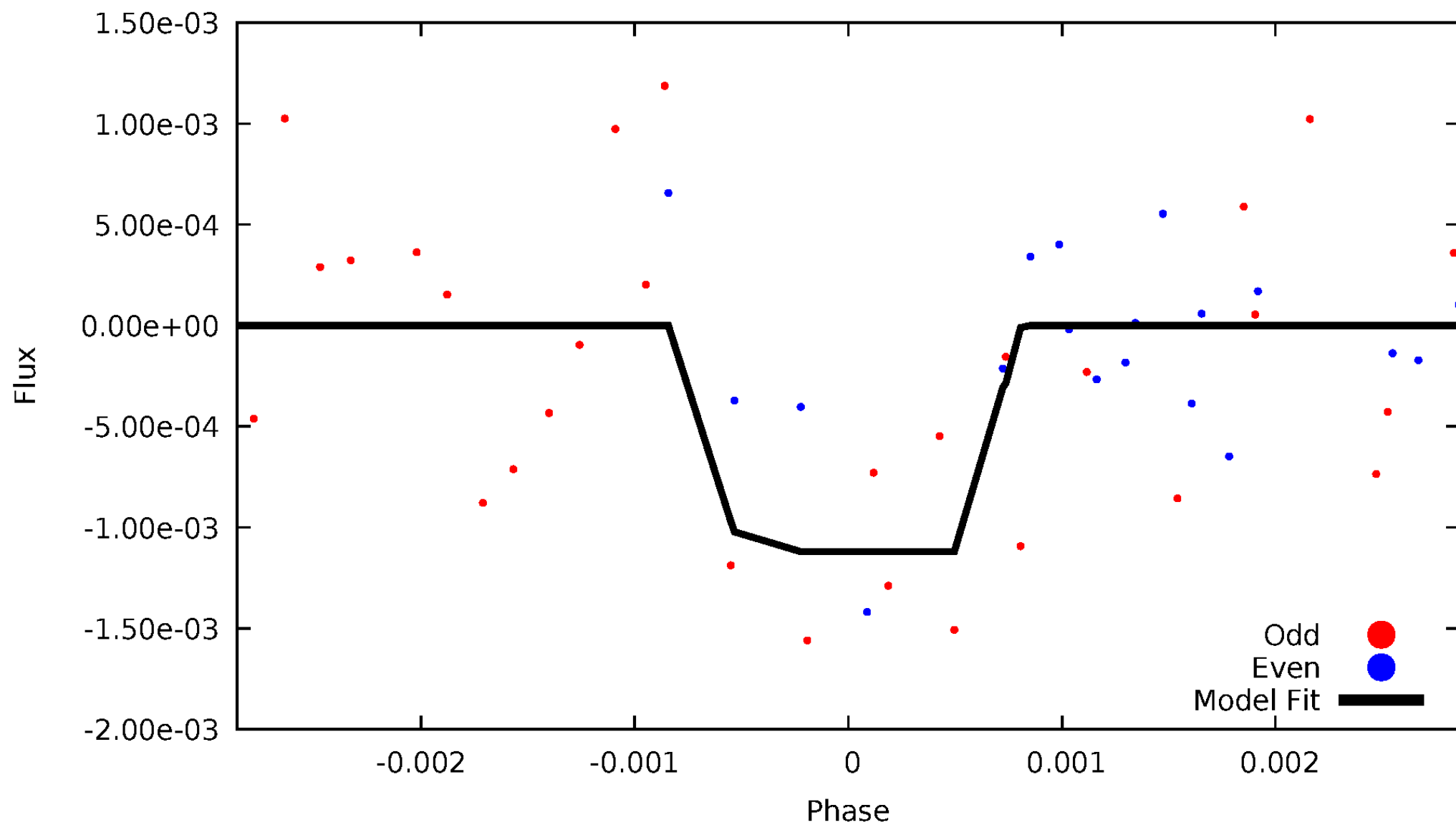
TCE 007282078-04





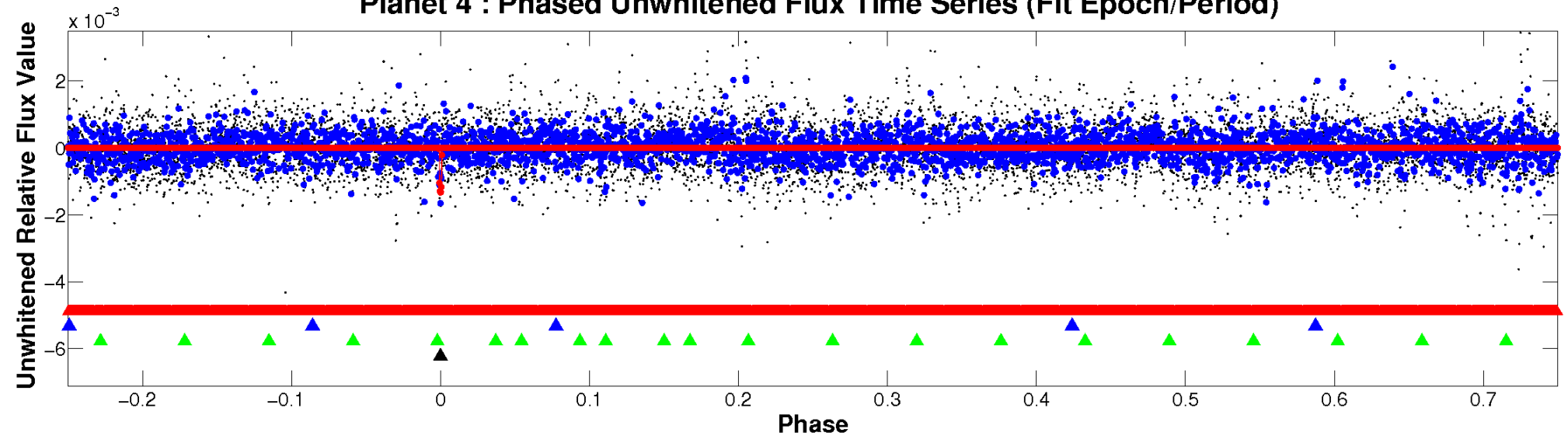
# ALT Odd/Even

TCE 007282078-04

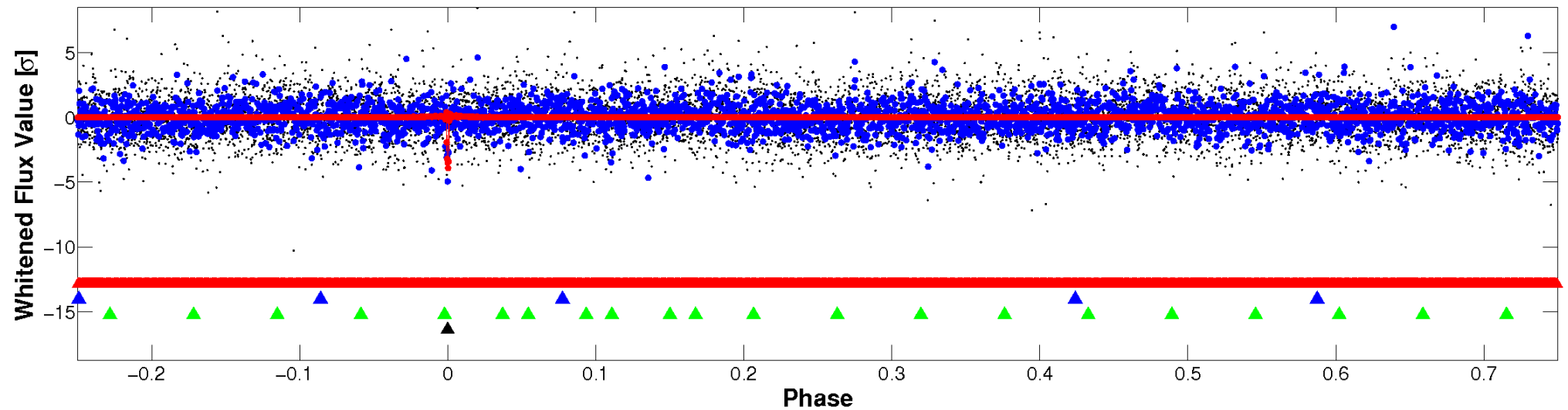


# Non-Whitened Vs. Whitened Light Curve

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

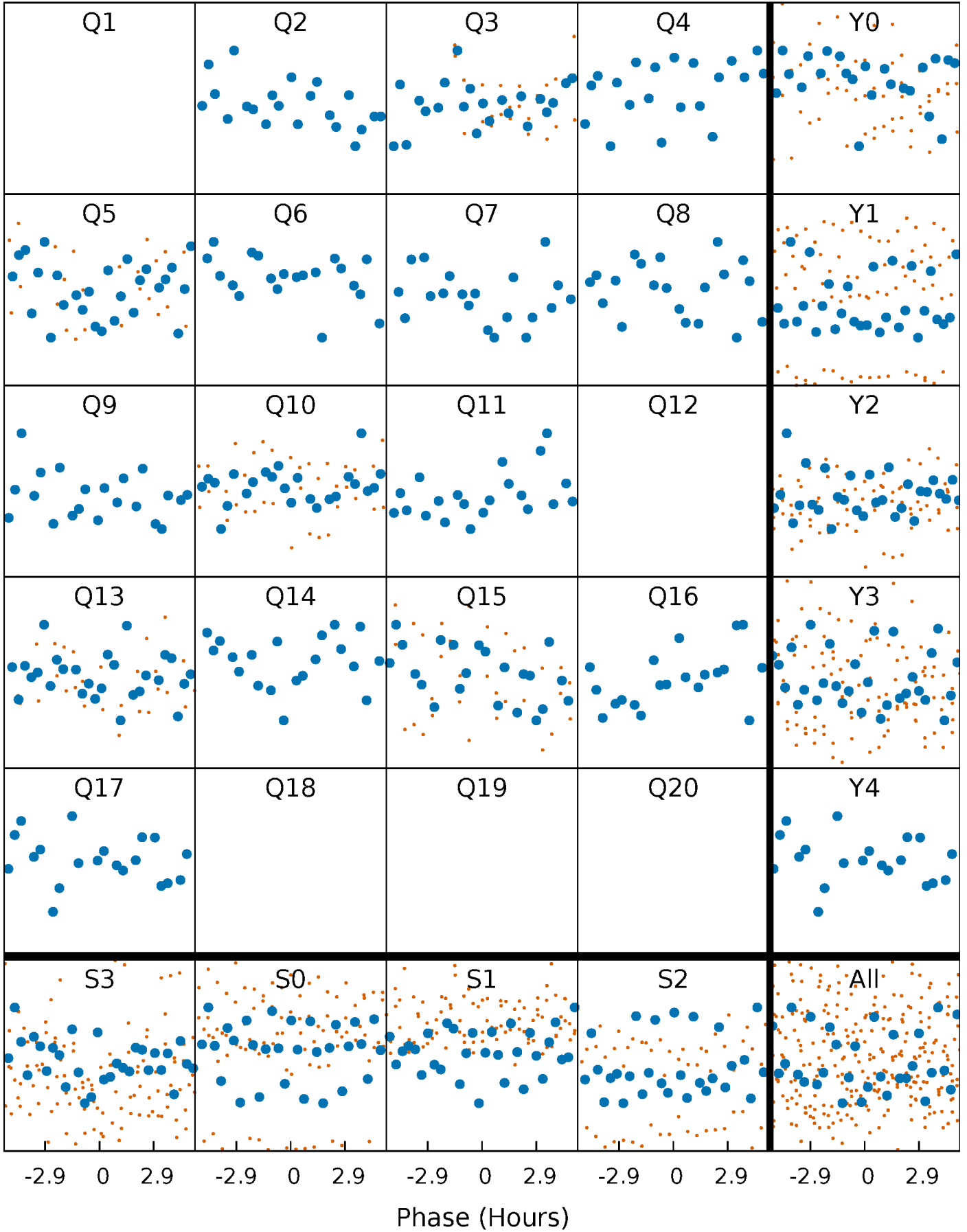


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



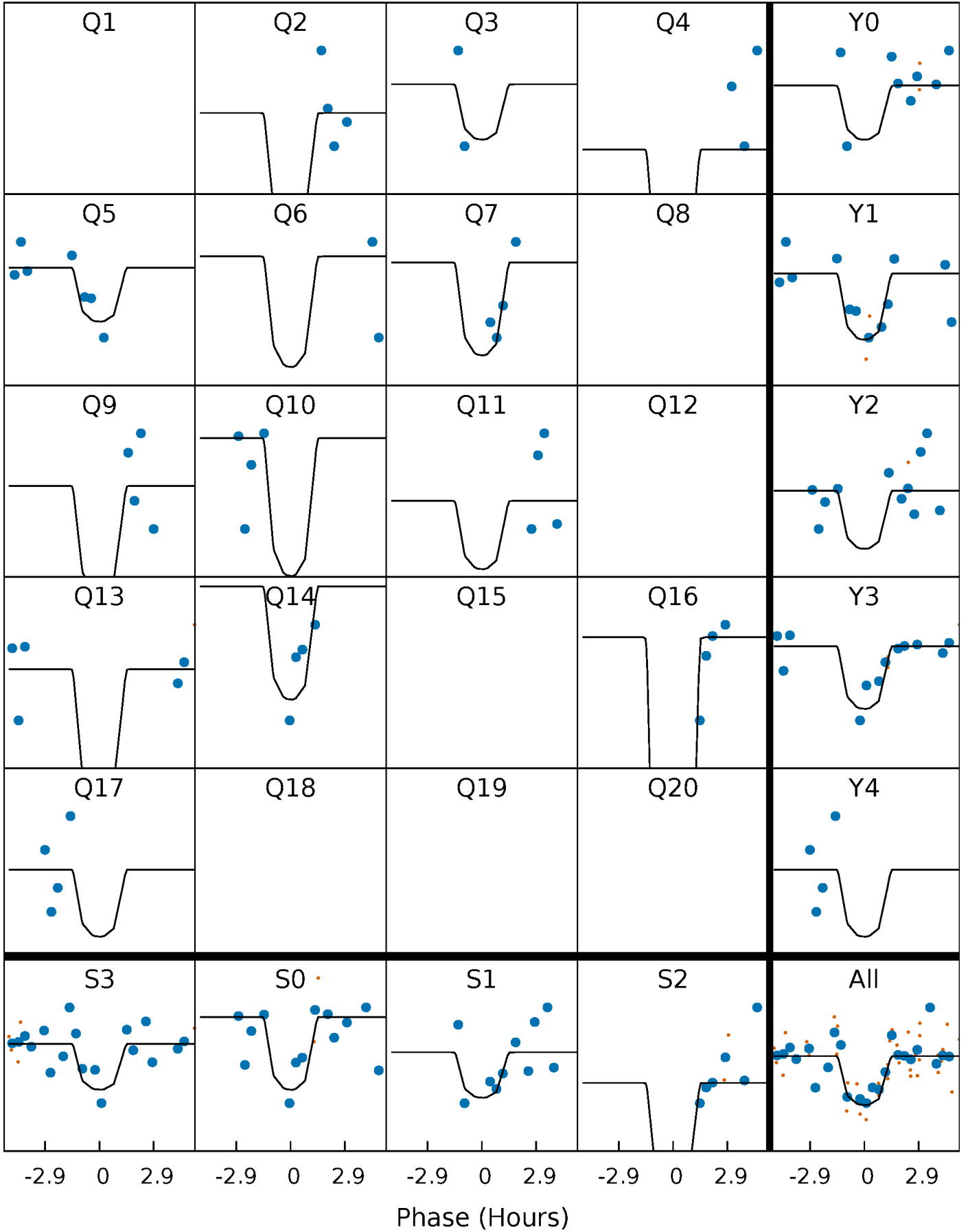
# PDC Quarter-Phased Transit Curves

TCE 007282078-04 P= 65.916949 Days  $T_0=194.388123$  (BKJD)



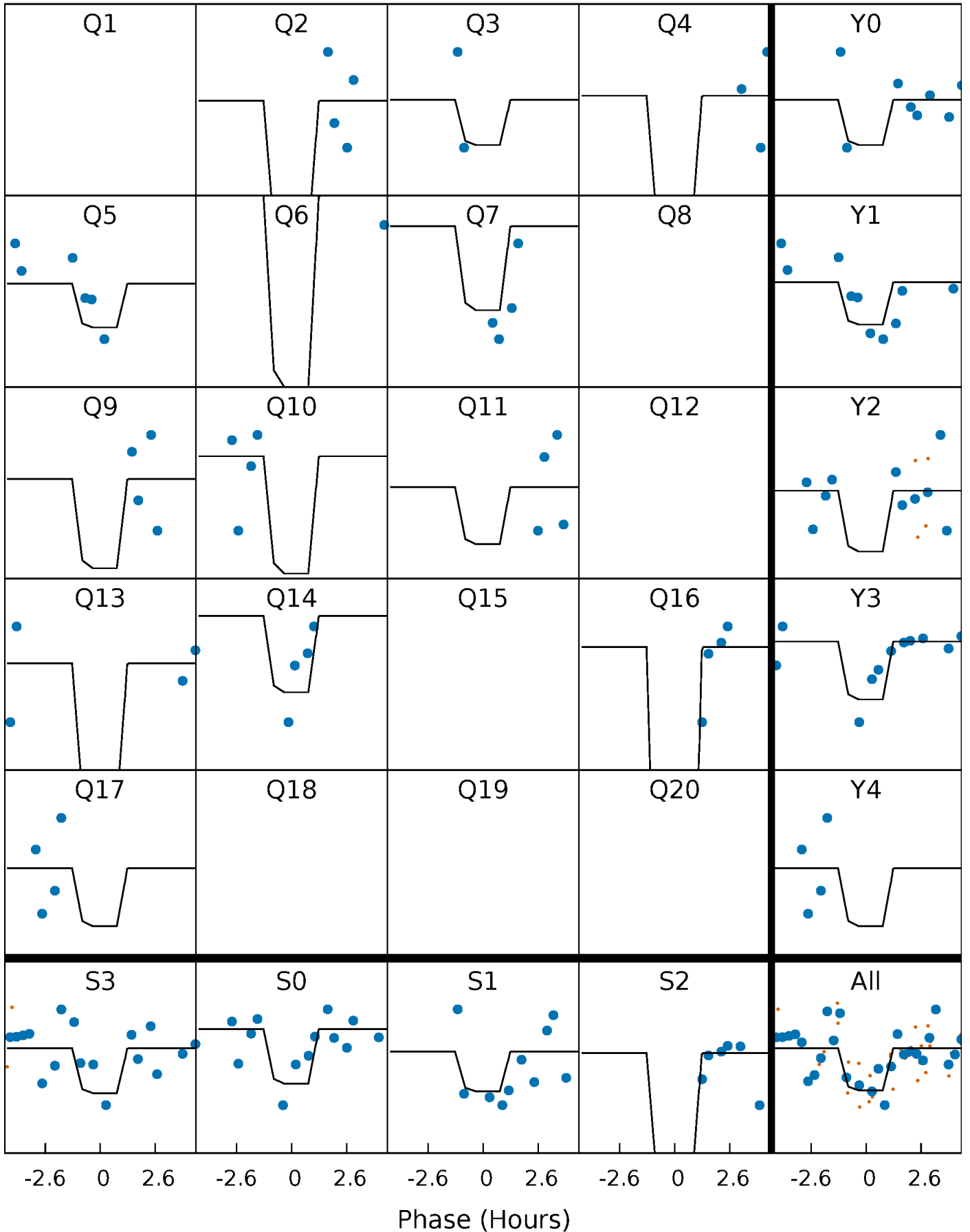
# DV Quarter-Phased Transit Curves

TCE 007282078-04 P= 65.916949 Days  $T_0=194.388123$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

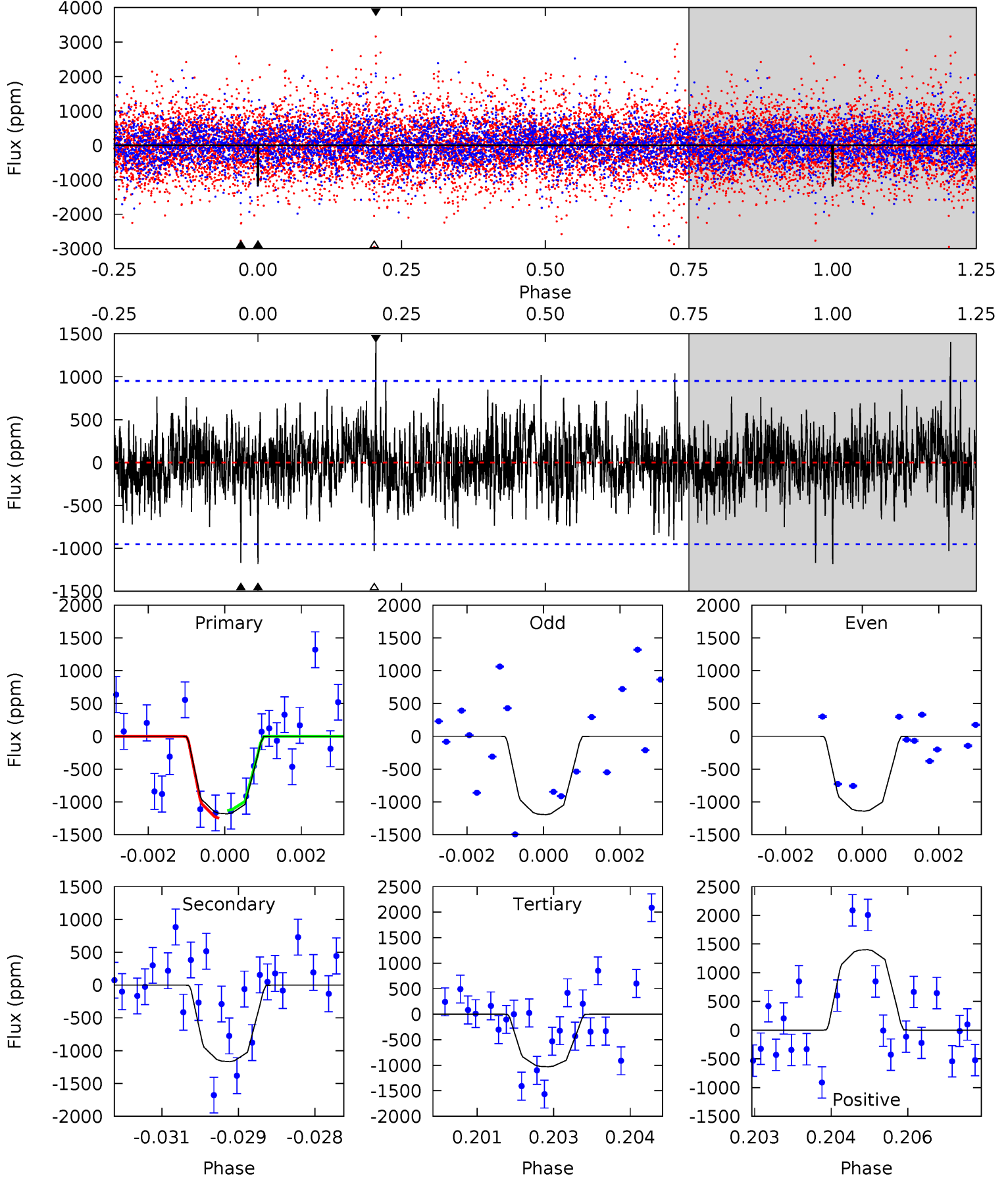
TCE 007282078-04     $P = 65.917359$  Days     $T_0 = 194.384637$  (BKJD)



# DV Model-Shift Uniqueness Test

007282078-04, P = 65.916949 Days, E = 128.471174 Days

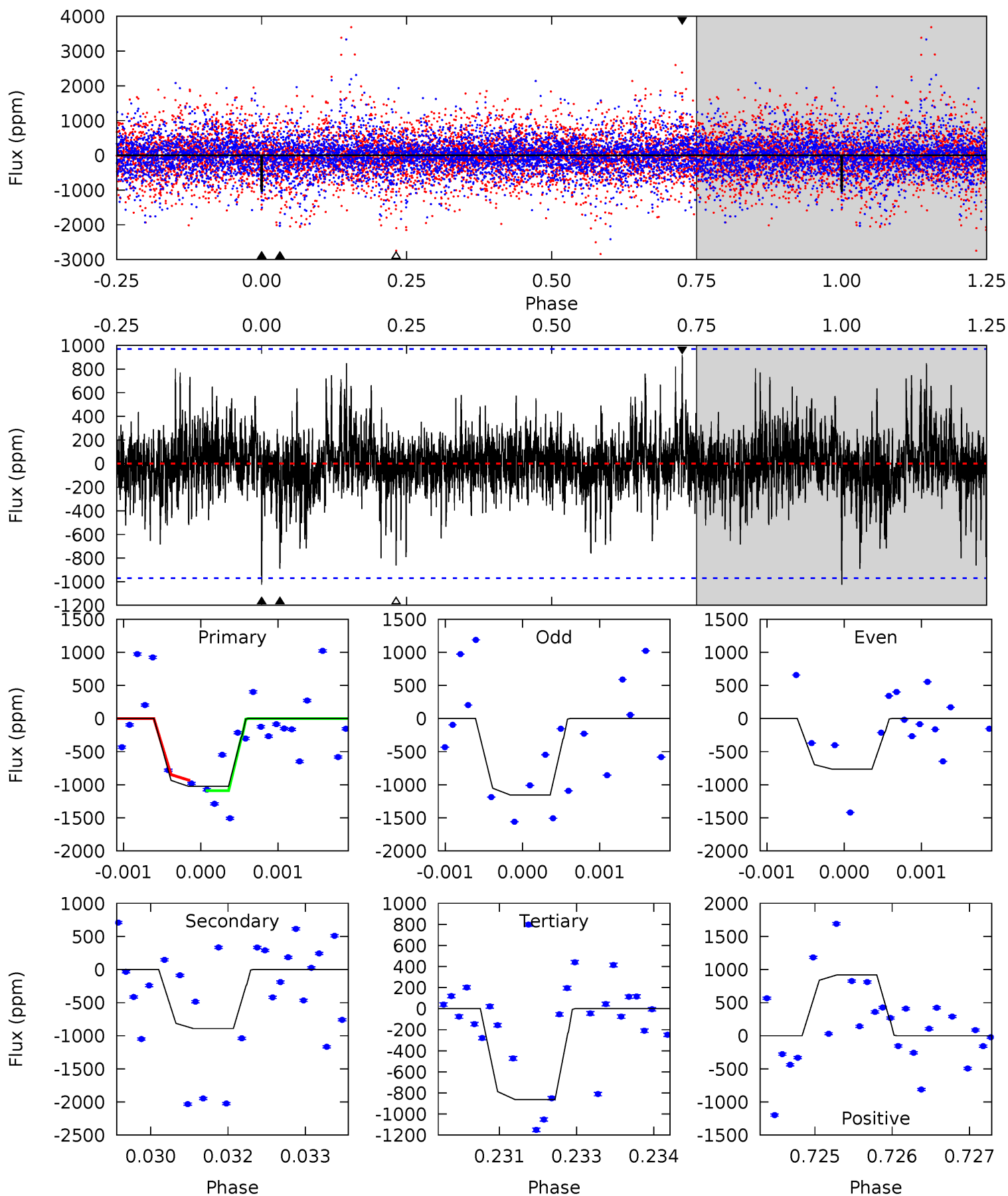
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.64	6.56	5.78	7.88	5.34	3.11	1.54	0.86	-1.24	0.77	-1.33	0.15	1.16	0.54	0.32



# Alt Model-Shift Uniqueness Test

007282078-04, P = 65.917359 Days, E = 128.467278 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
5.69	4.95	4.79	5.10	5.39	3.20	1.09	0.90	0.59	0.16	-0.15	1.03	1.10	0.47	0.36





### Stellar Parameters For KIC 007282078

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (g \cdot \text{cm}^{-3})$
	$3960^{+89}_{-1}$	$4.714^{+0.040}_{-0.036}$	$-0.100^{+0.250}_{-0.300}$	$0.551^{+0.045}_{-0.050}$	$0.573^{+0.043}_{-0.059}$	$4.822^{+1.010}_{-0.695}$
	+2%/-0%	+1%/-1%	+250%/-300%	+8%/-9%	+8%/-10%	+21%/-14%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 007282078-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-1167 \pm 178$	$2.92^{+2.53}_{-1.72}$	$350^{+11}_{-16}$	$3509^{+1272}_{-603}$	$5266^{+25113}_{-3723}$
Alt.	$-891 \pm 180$	$2.65^{+2.45}_{-1.61}$	$350^{+12}_{-18}$	$3425^{+1313}_{-607}$	$4738^{+25444}_{-3460}$

$T_{max}$  = 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

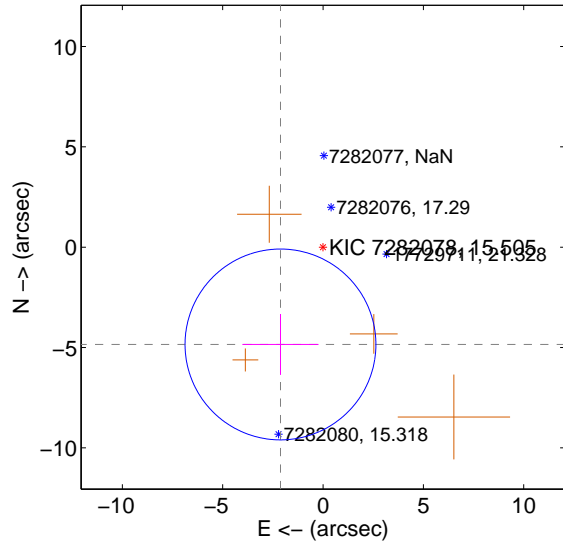
Supplemental centroid analysis for 007282078-04. Kepler magnitude: 15.51. Transit SNR 9.59

There are 0 quarters with good PRF difference image offsets

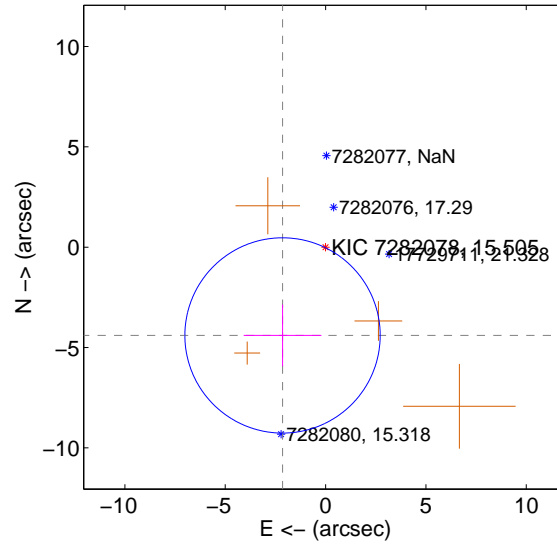
The direct PRF centroid is offset from the target star catalog position by about 0.47 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$5.294 \pm 1.586$	3.34	$2.121 \pm 1.897$	$-4.850 \pm 1.519$
PRF-fit source offset from KIC position	$4.895 \pm 1.623$	3.02	$2.146 \pm 1.936$	$-4.400 \pm 1.539$
photometric centroid source offset	$1.34 \pm 0.45$	2.98	$0.79 \pm 0.42$	$-1.08 \pm 0.46$

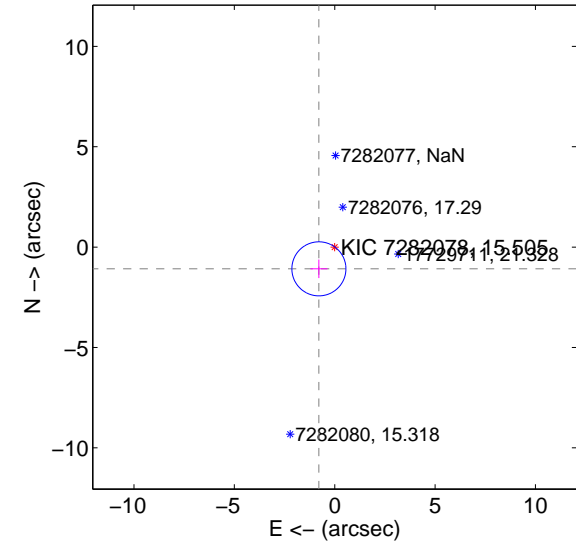
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

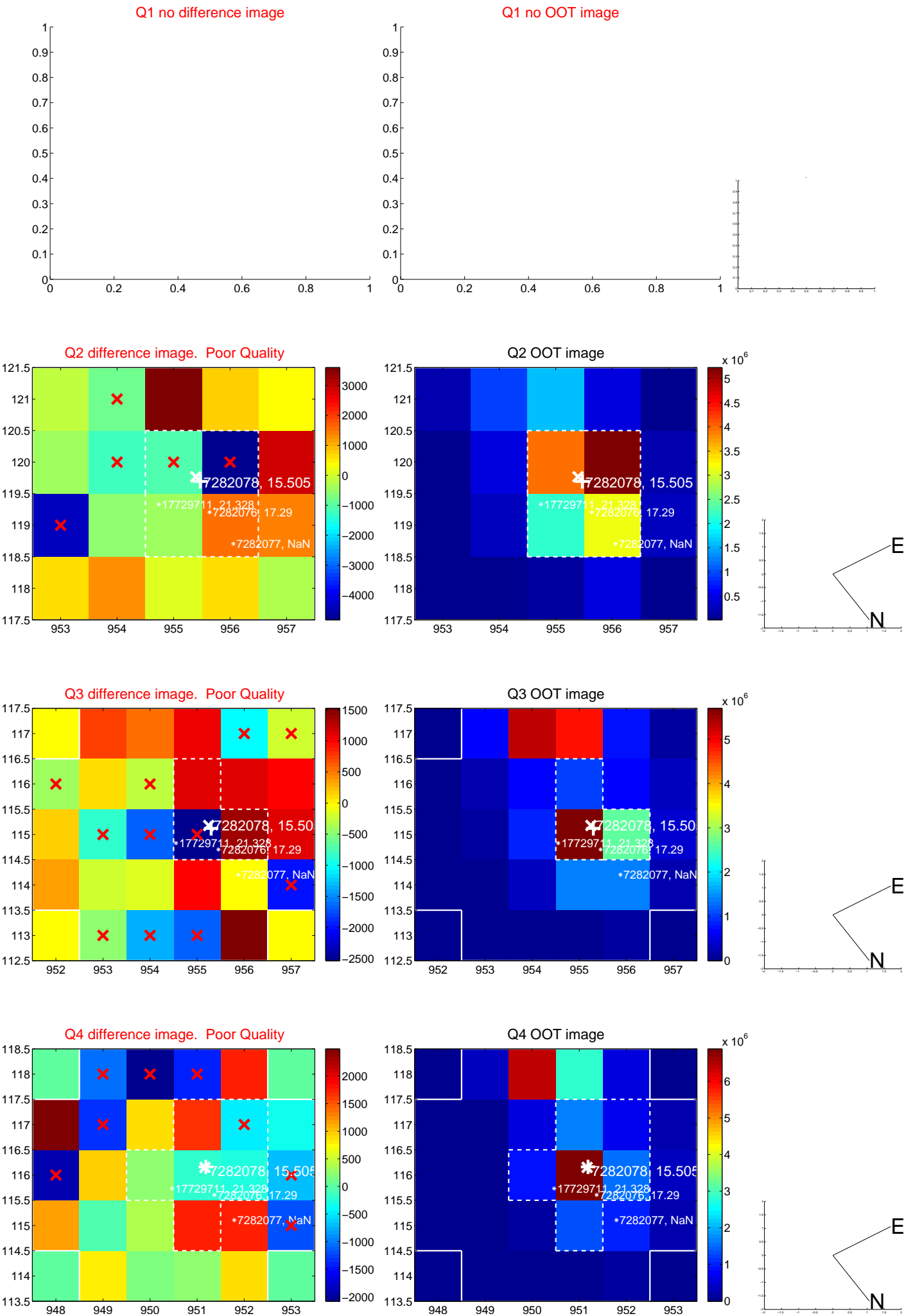


offset from photometric centroids

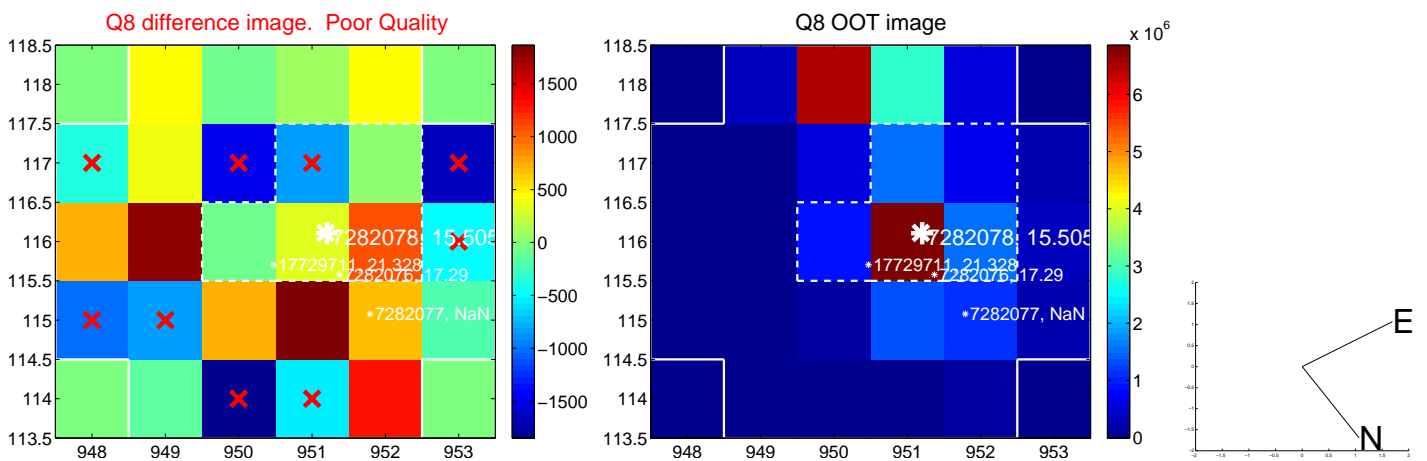
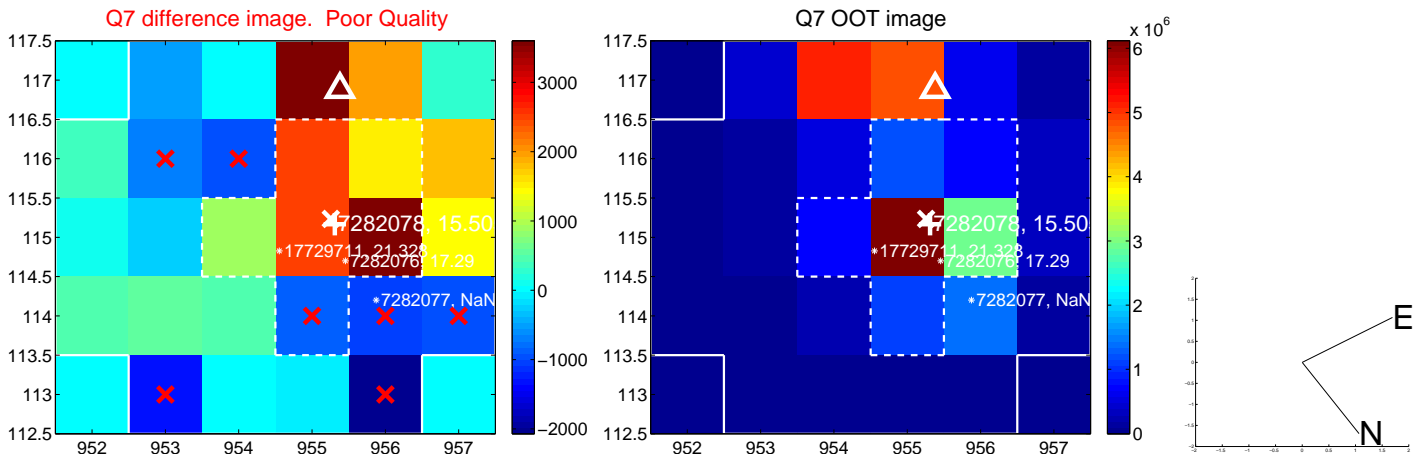
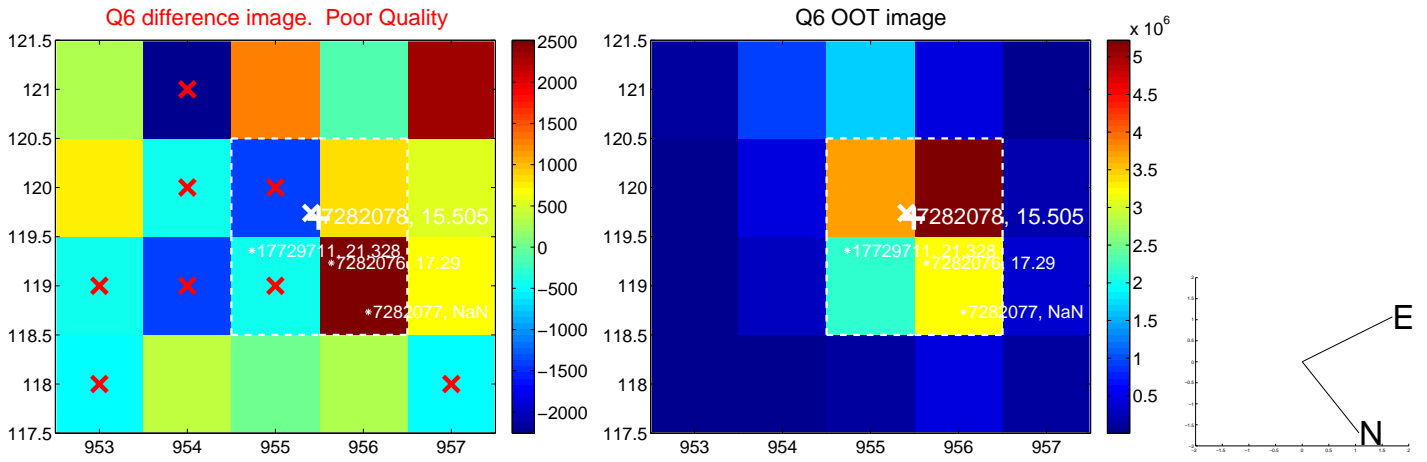
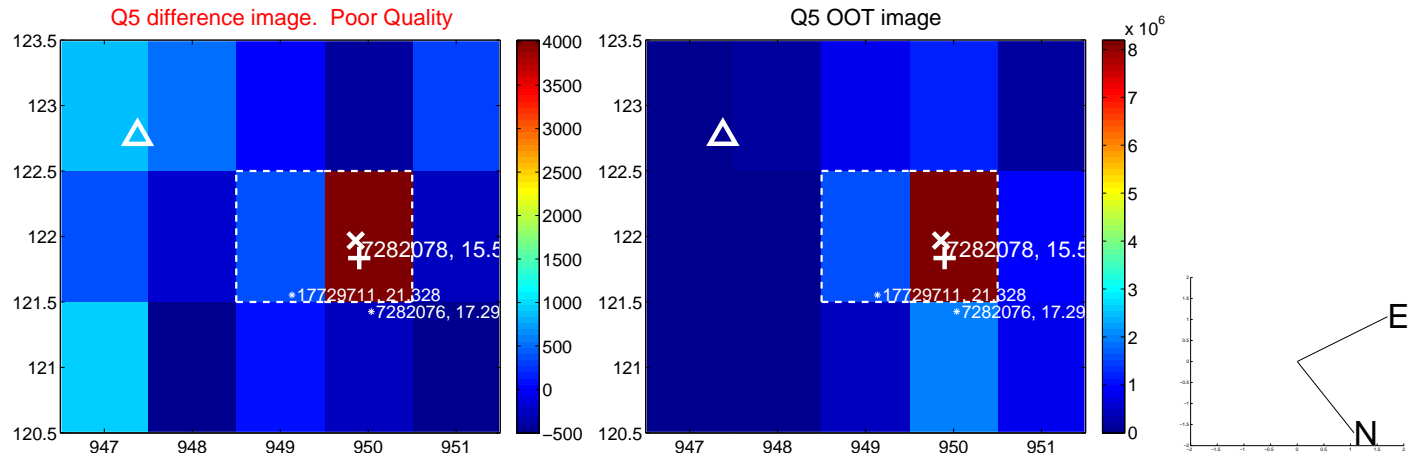


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

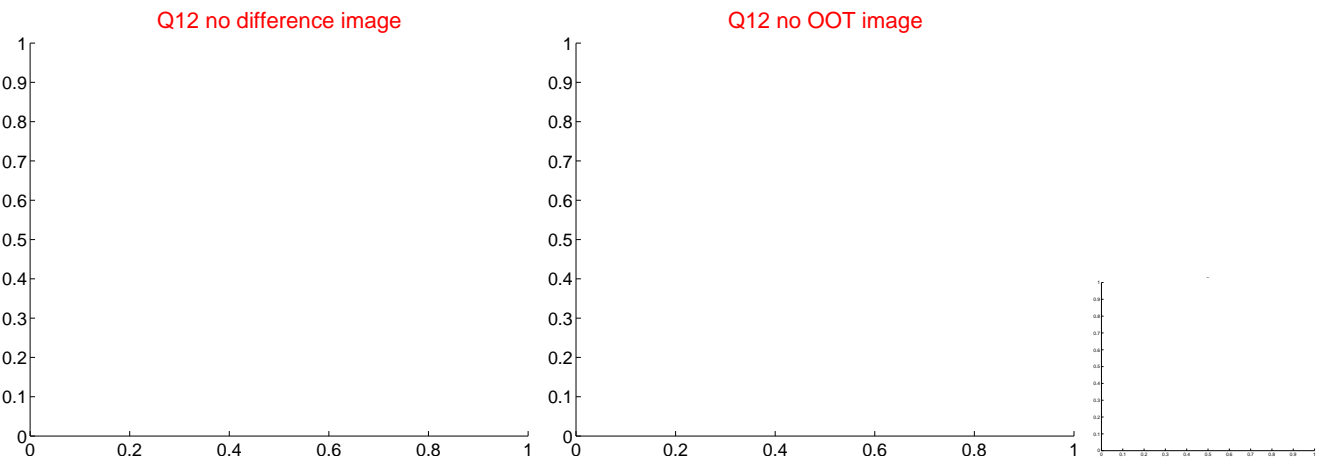
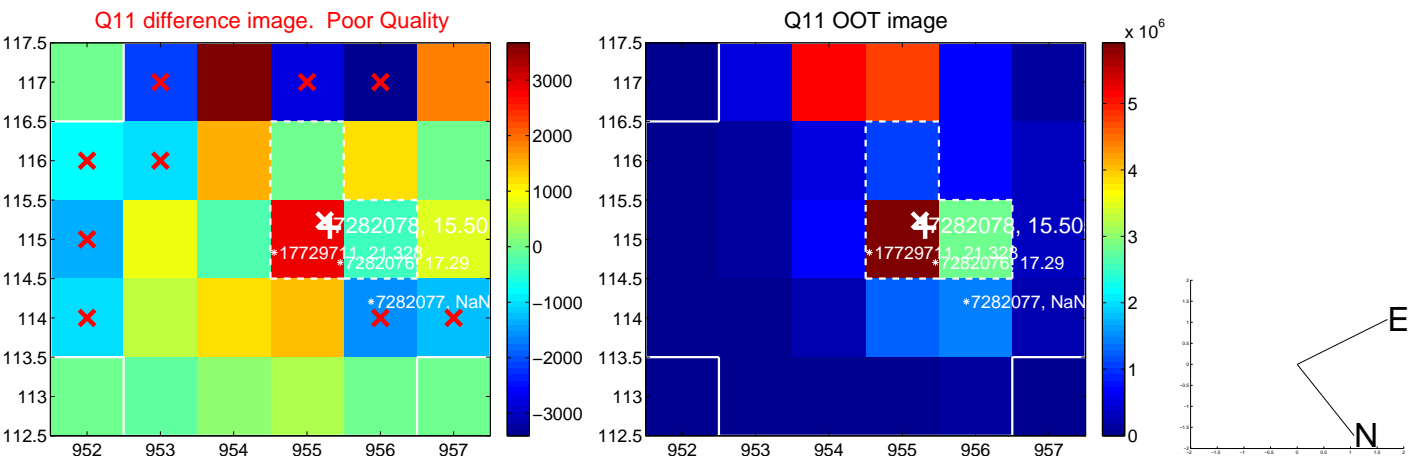
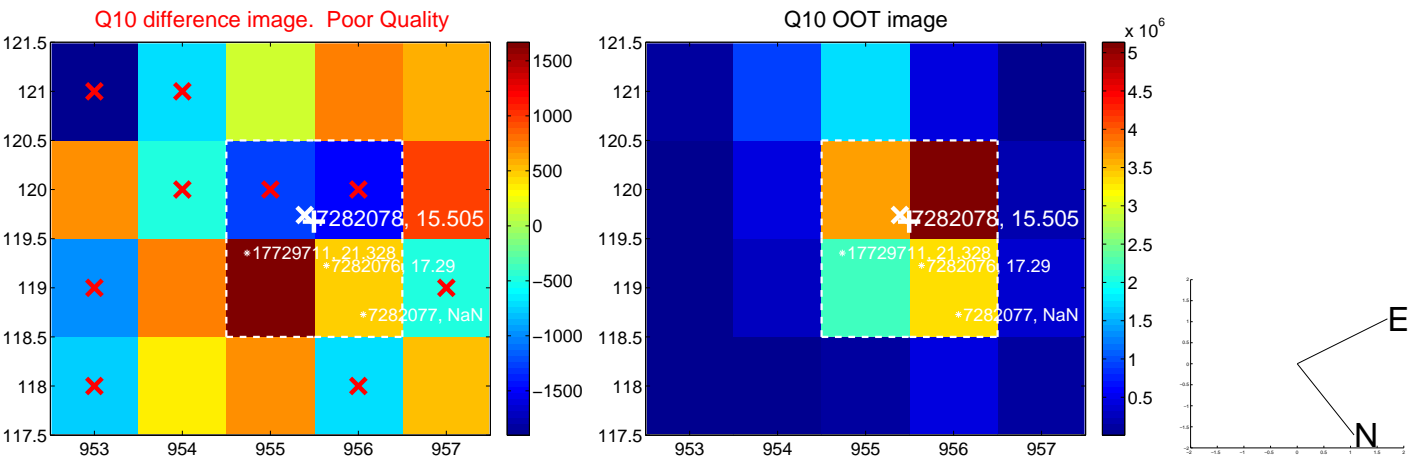
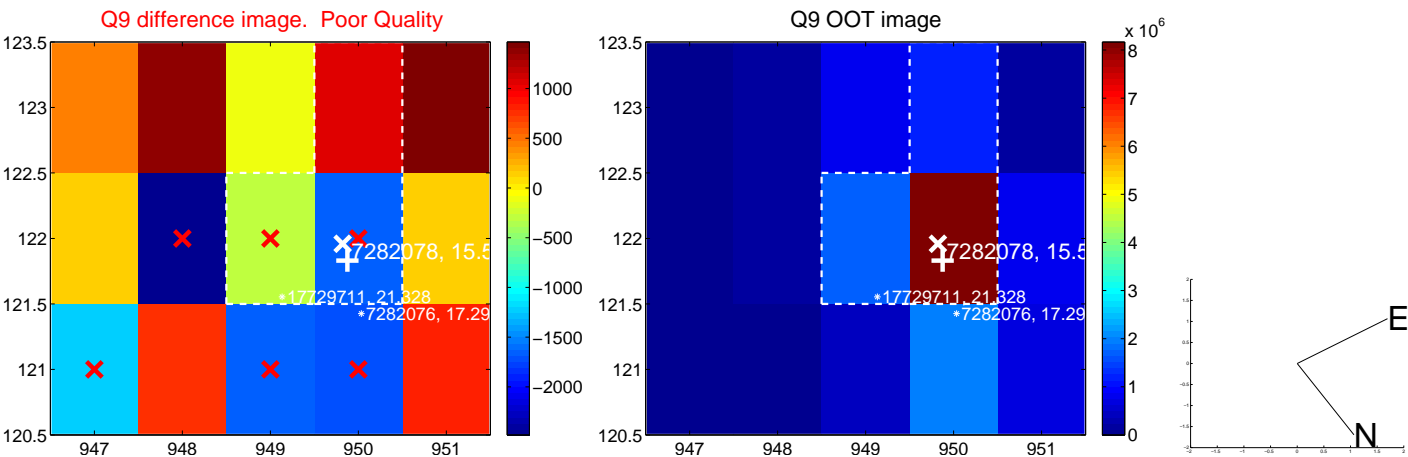
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



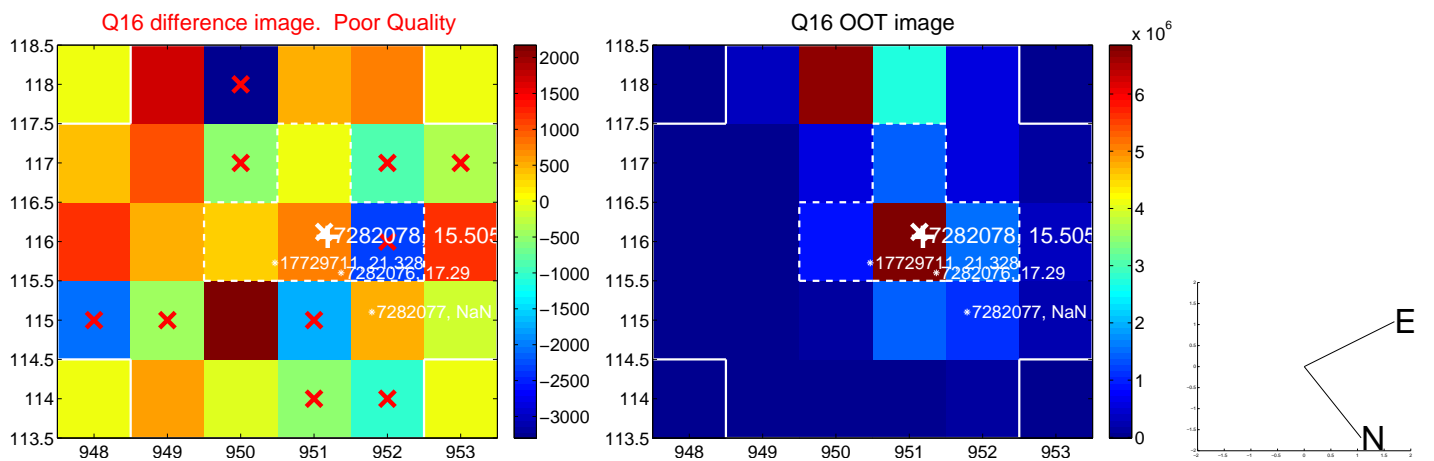
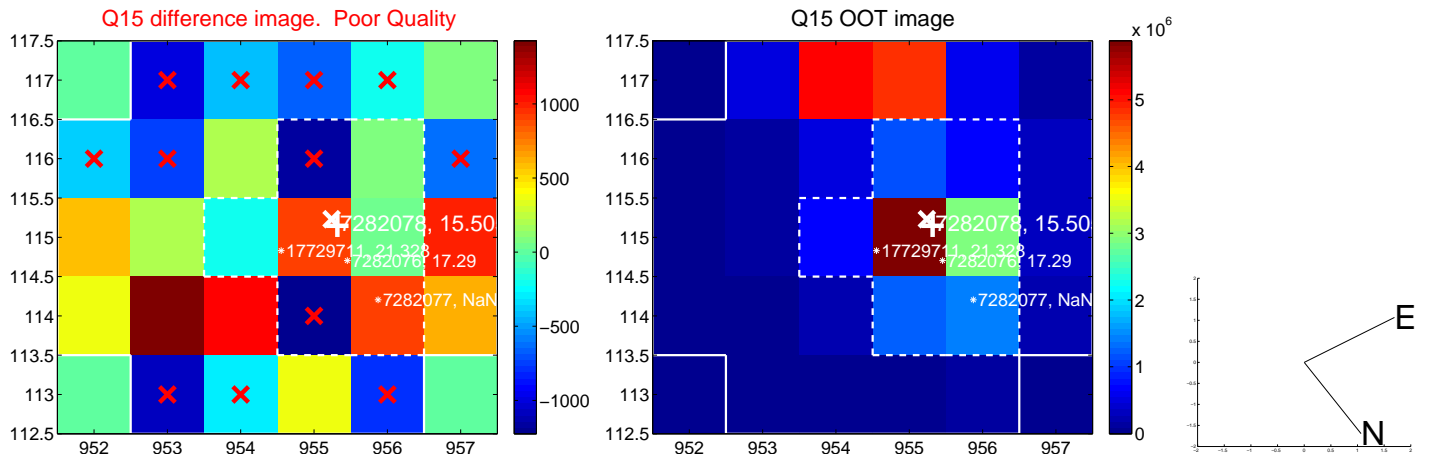
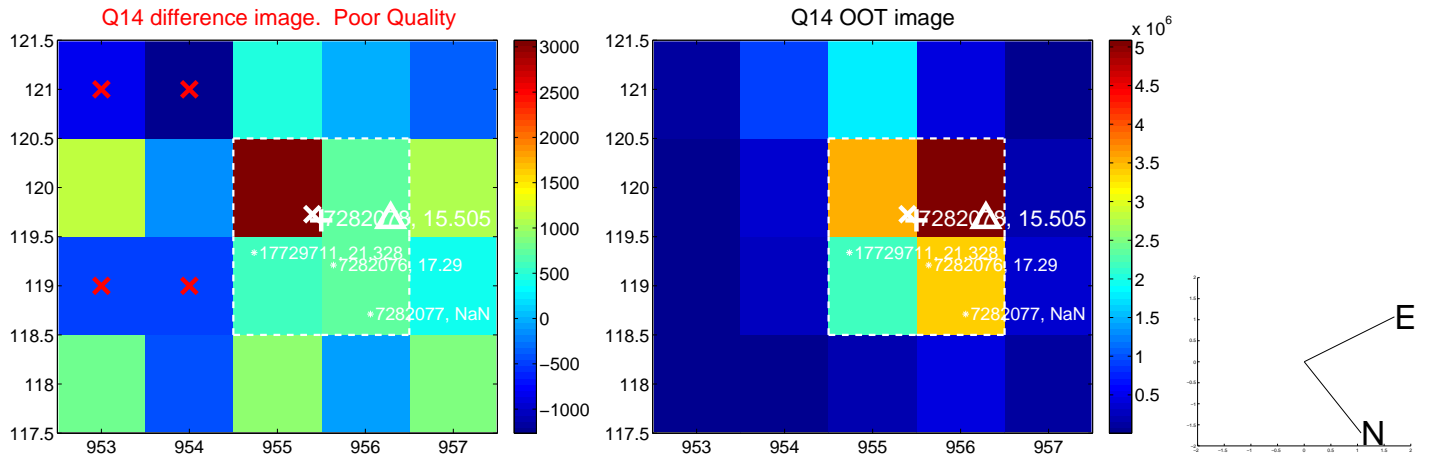
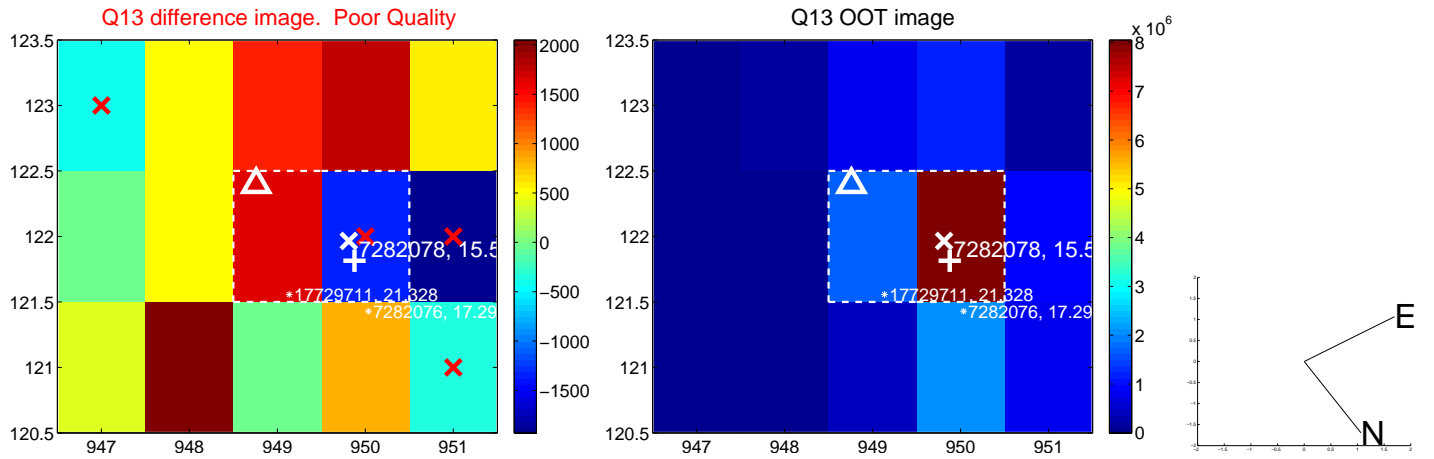
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



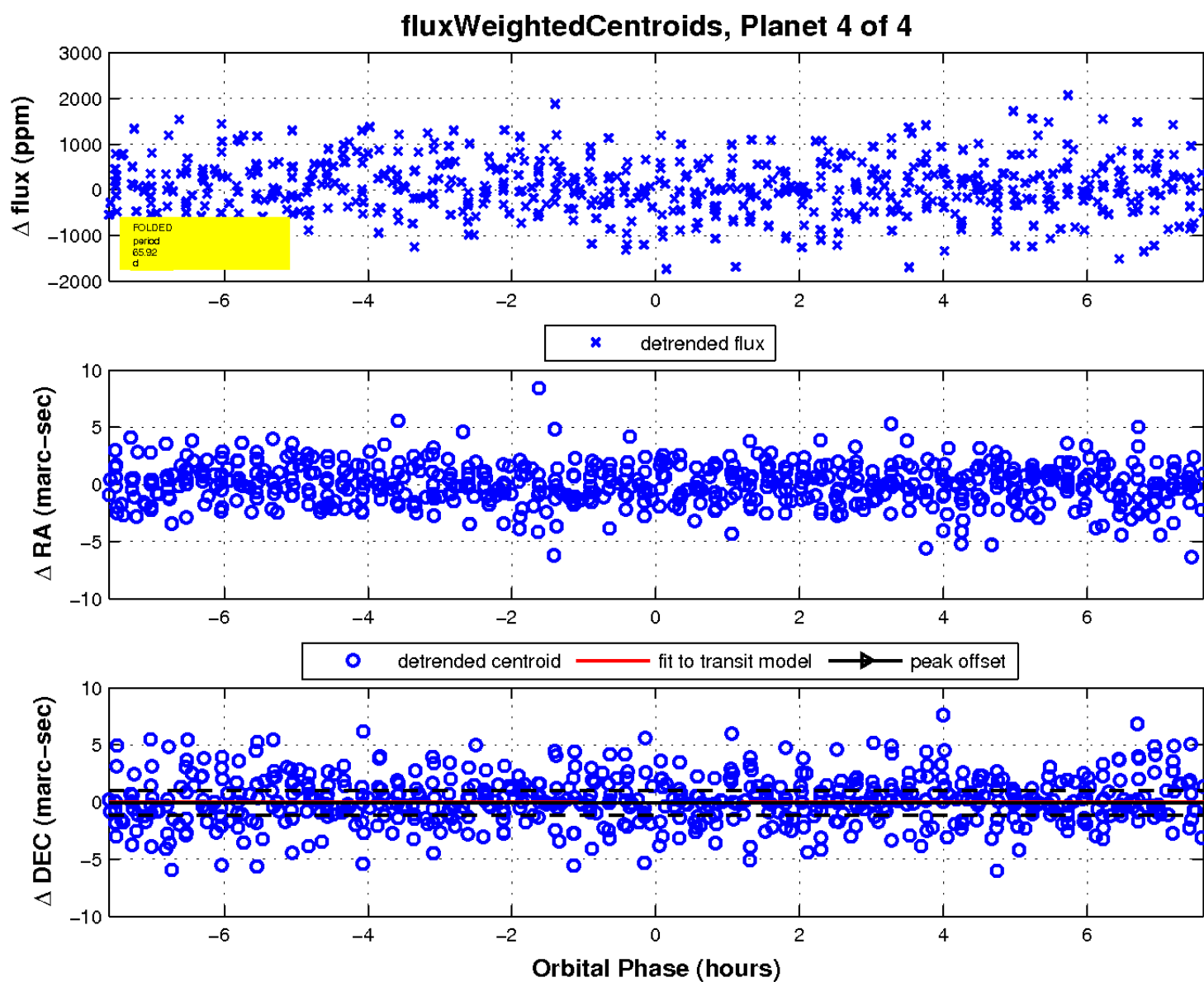
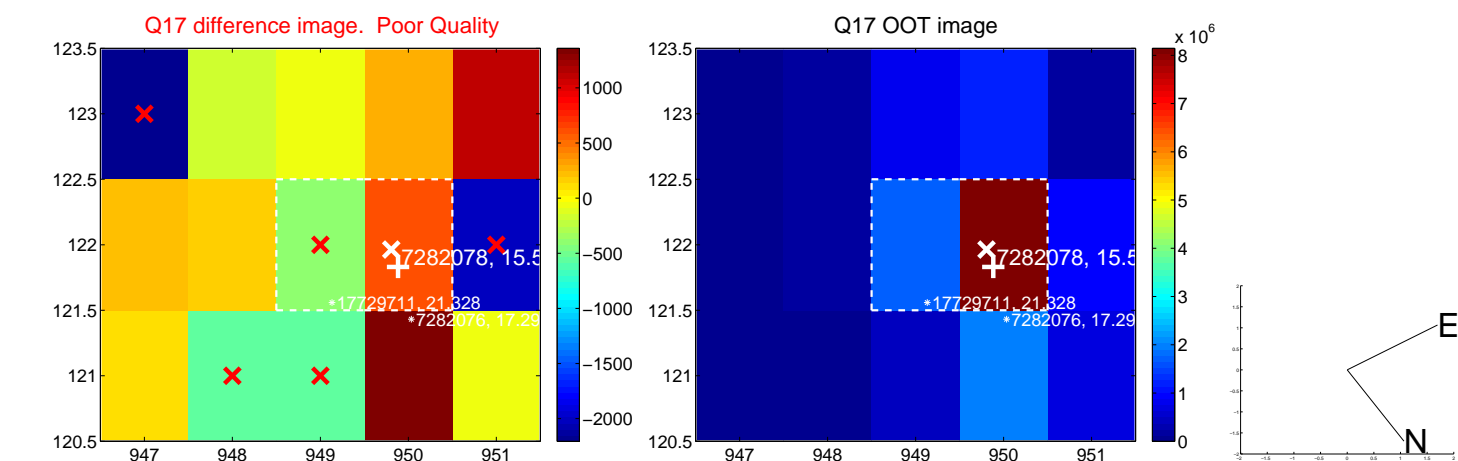
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



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





UKIRT Image

Declination

