

# KIC 007282108

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007282108-01	OBS	No	0.566790	131.827684	79.1	3.322	9.3	10.8	0.94	5888	0.98	5210.16
007282108-02	OBS	No	140.406125	159.954307	638.5	22.305	8.3	3.8	0.94	5888	2.67	3.35

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007282108-01	OBS	FP	0.00	1	0	1	1	LPP_DV—CENT_FEW_DIFFS—HALO_GHOST—EPHEM_MATCH
007282108-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS

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

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

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

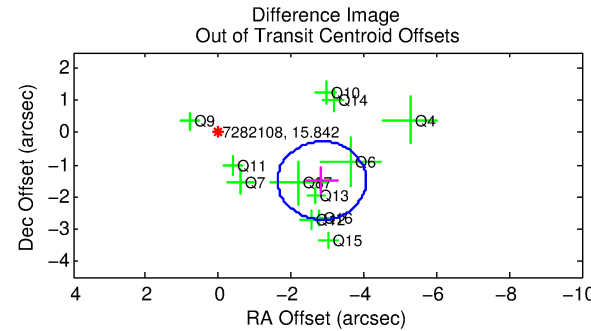
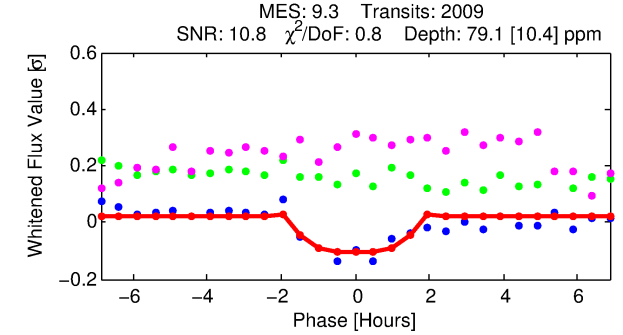
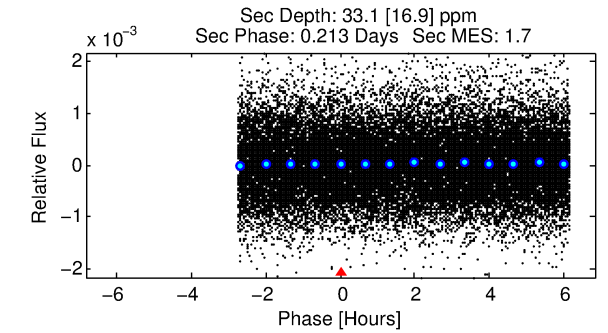
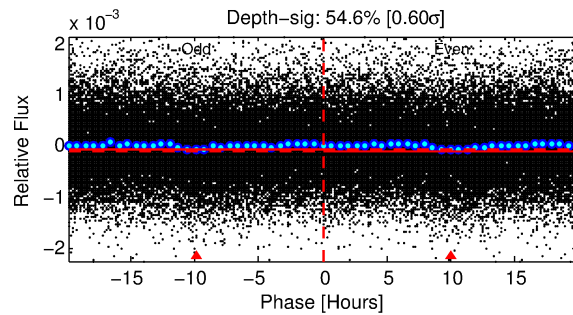
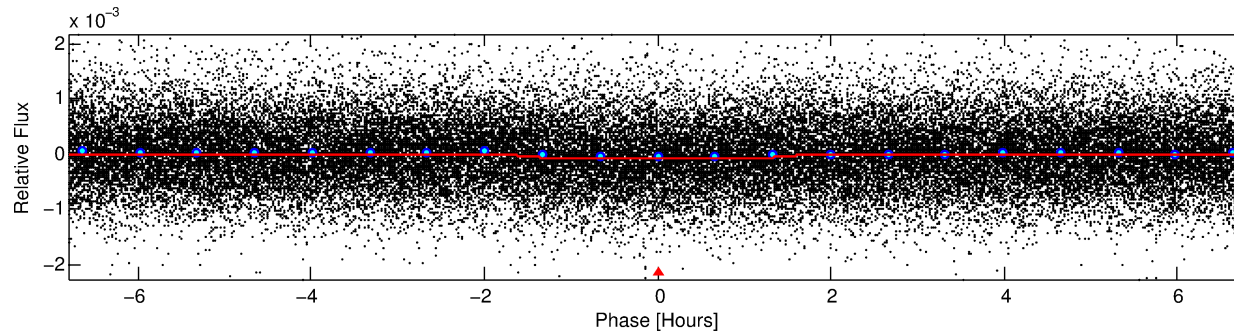
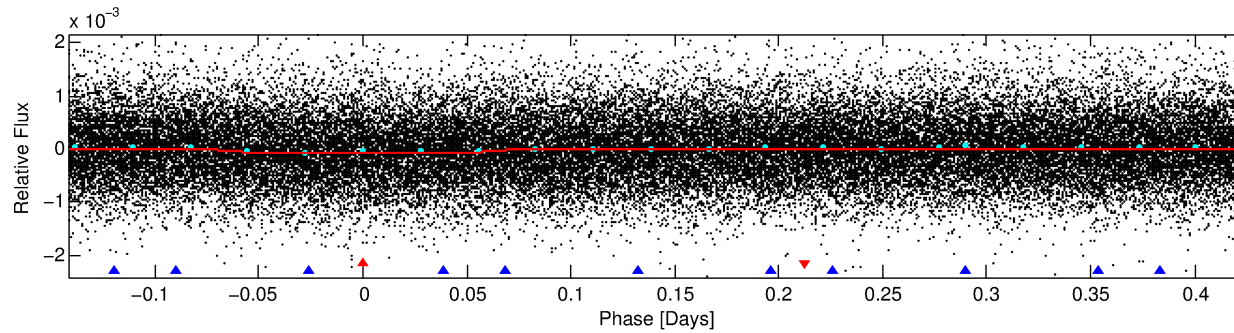
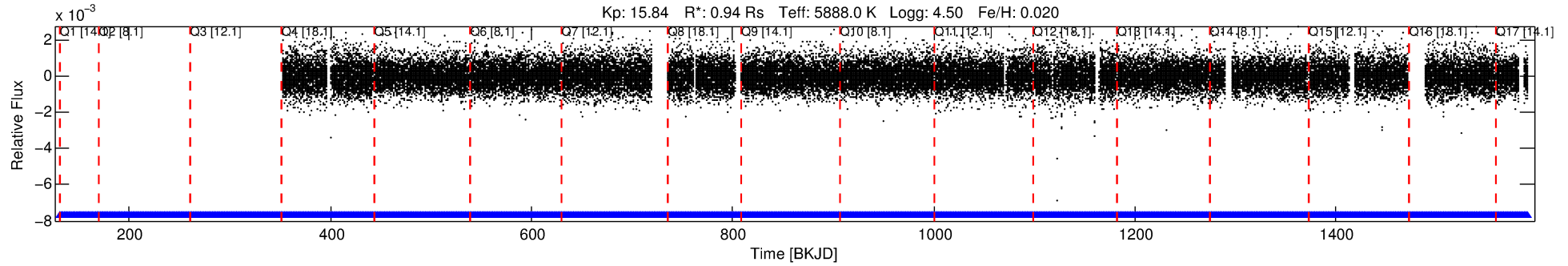
## Ephemeris Match Information For 007282108-01

TCE (1)	KIC	Parent (2)	Parent KIC	$P_1:P_2$	Dist ( $''$ )	$\Delta$ Row	$\Delta$ Col	$m_2$	$m_1$	$D_2/D_1$	Mechanism	Flag	$\sigma_P$	$\sigma_T$
007282108-01	7282108	RR-Lyr-pri	7198959	1:1	1182.7	119	272	7.86	15.84	7889.80	Direct-PRF	0	1.63	18.80

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

# DV One-Page Summary

KIC: 7282108 Candidate: 1 of 2 Period: 0.567 d



## DV Fit Results:

Period = 0.56679 [0.00001] d  
Epoch = 131.8277 [0.0031] BKJD  
Rp/R\* = 0.0095 [0.0065]  
a/R\* = 1.13 [0.83]  
b = 0.88 [0.87]  
Seff = 5210.16 [2118.53]  
Teq = 2166 [220] K  
Rp = 0.98 [0.74] Re  
a = 0.0136 [0.0036] AU  
Ag = 3.49 [5.30] [0.47 $\sigma$ ]  
Teffp = 4579 [1689] K [1.42 $\sigma$ ]

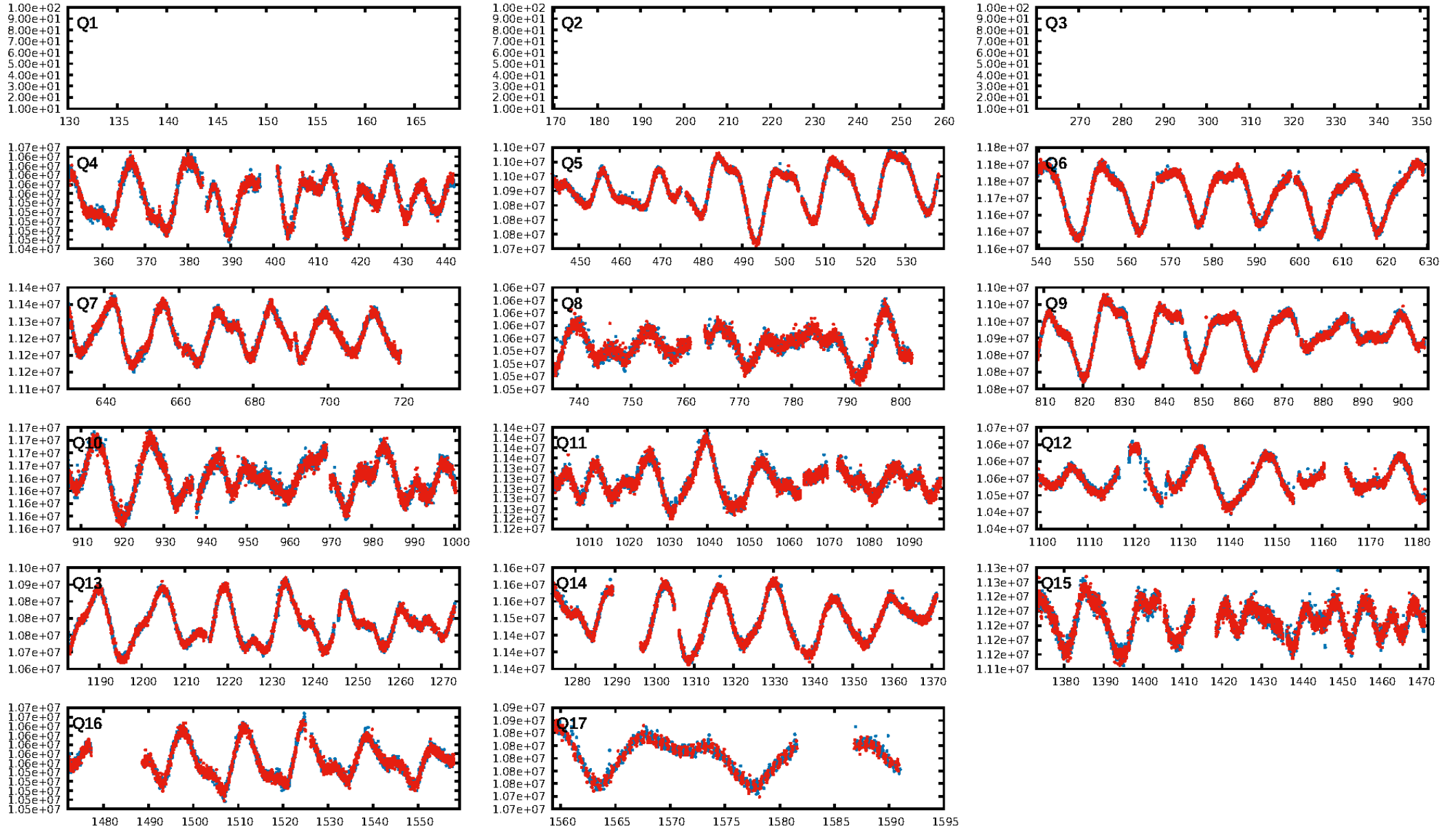
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [148.82 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 7.19e-15  
RollingBand-fgt: 1.00 [1962/1962]  
**GhostDiagnostic-chr: 0.1175**  
Centroid-sig: 1.6%  
Centroid-so: 1.899 arcsec [1.50 $\sigma$ ]  
**OotOffset-rm: 3.212 arcsec [7.91 $\sigma$ ]**  
**KicOffset-rm: 3.280 arcsec [8.27 $\sigma$ ]**  
OotOffset-st: 3/3/4/3 [13]  
KicOffset-st: 3/3/4/3 [13]  
DiffImageQuality-fgm: 0.00 [0/13]  
DiffImageOverlap-fno: 1.00 [14/14]

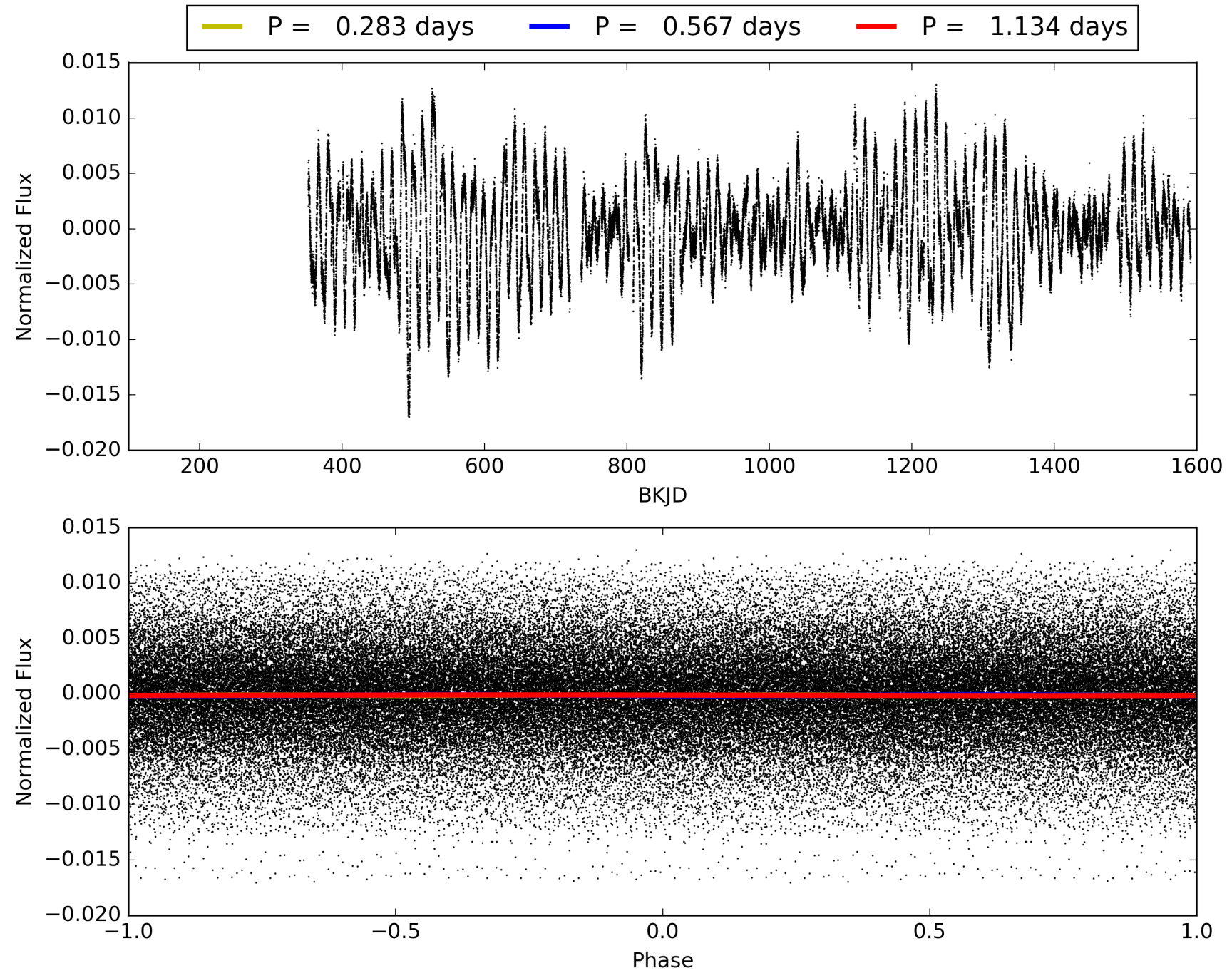
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 11:36:29 Z

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

# TCE 007282108-01, PDC Light Curves

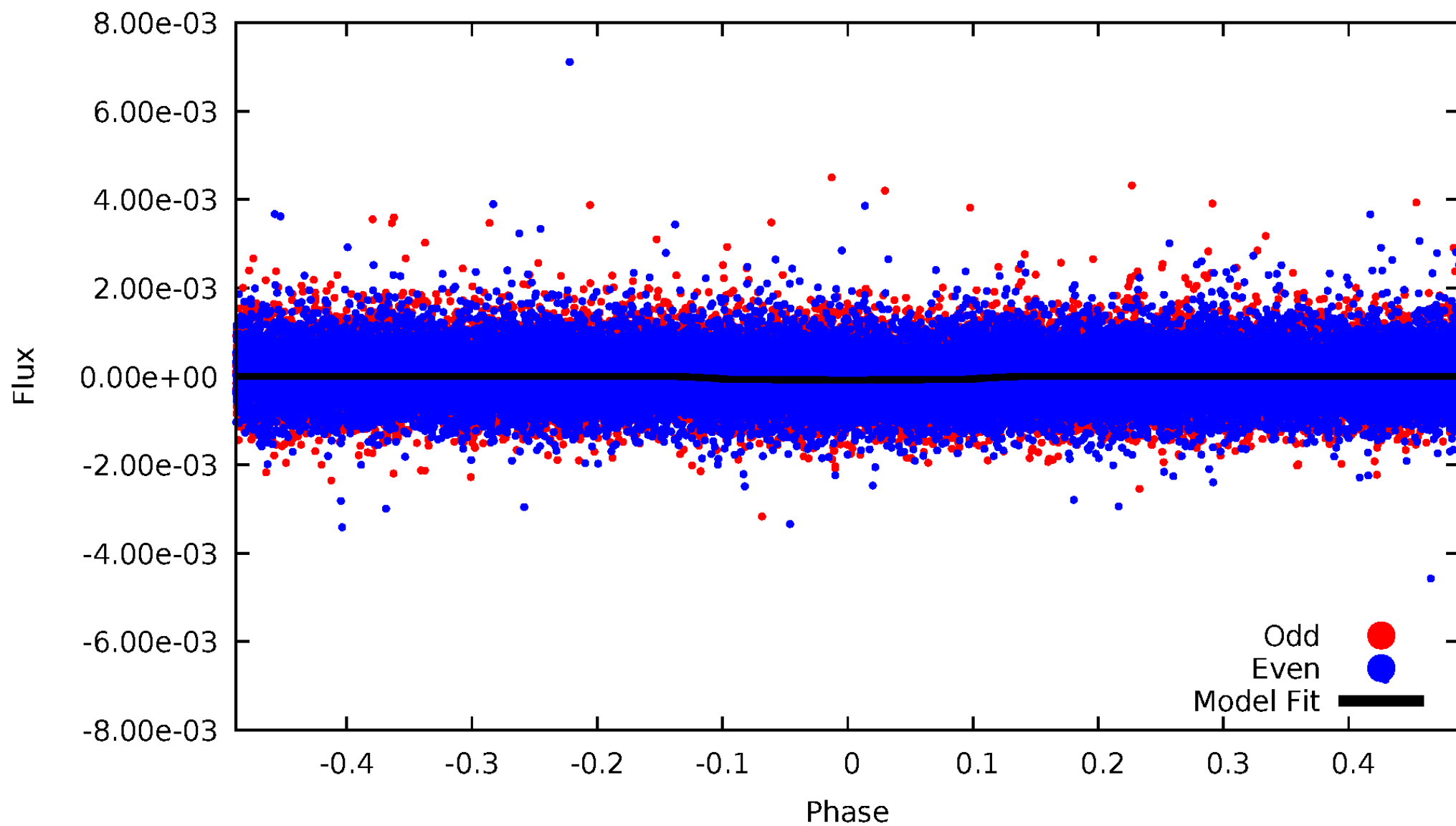


TCE 007282108-01



# DV Odd/Even

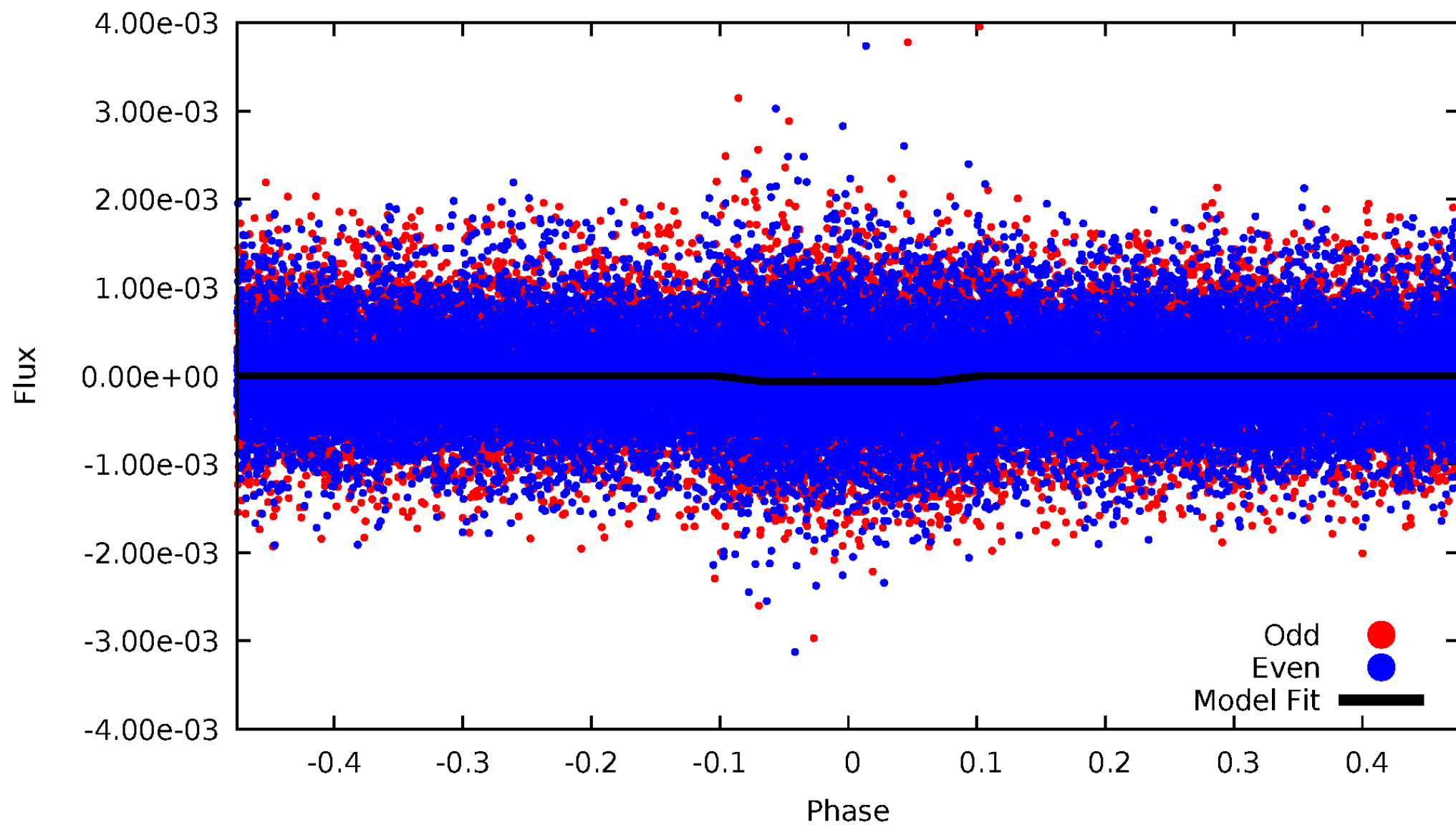
TCE 007282108-01





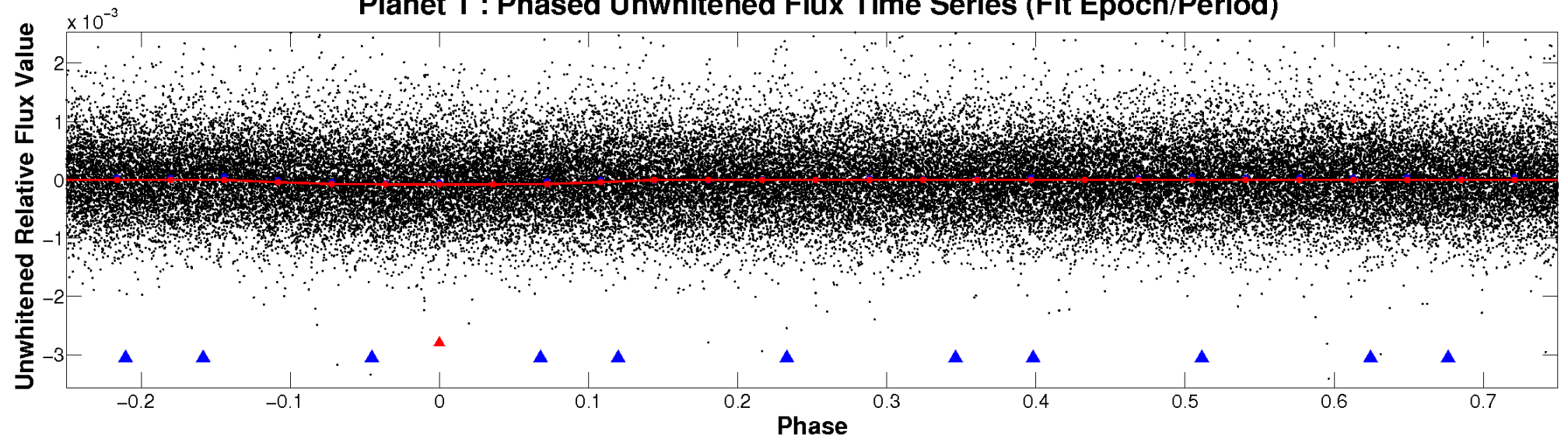
# ALT Odd/Even

TCE 007282108-01

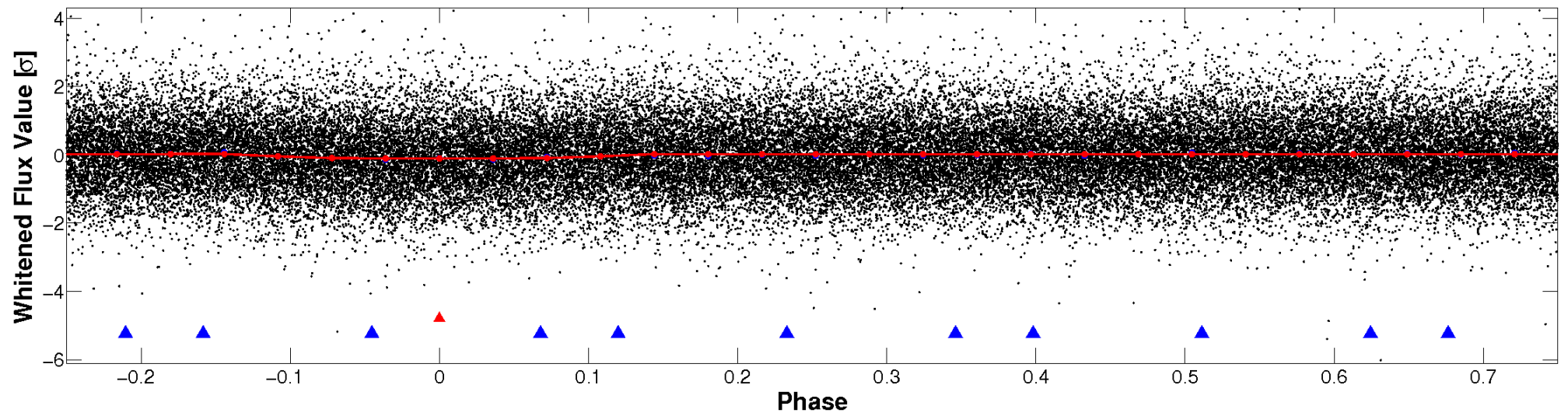


# Non-Whitened Vs. Whitened Light Curve

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

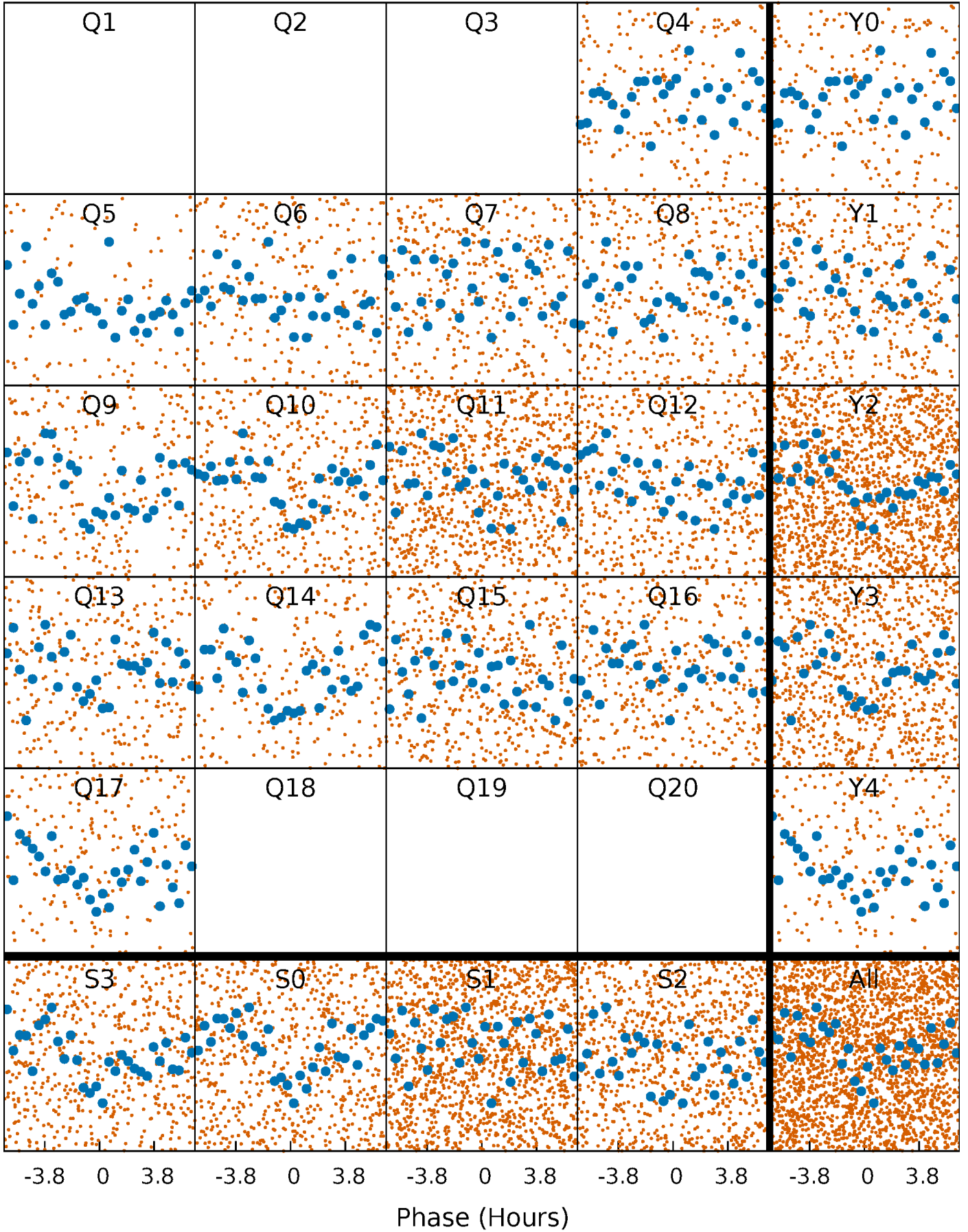


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

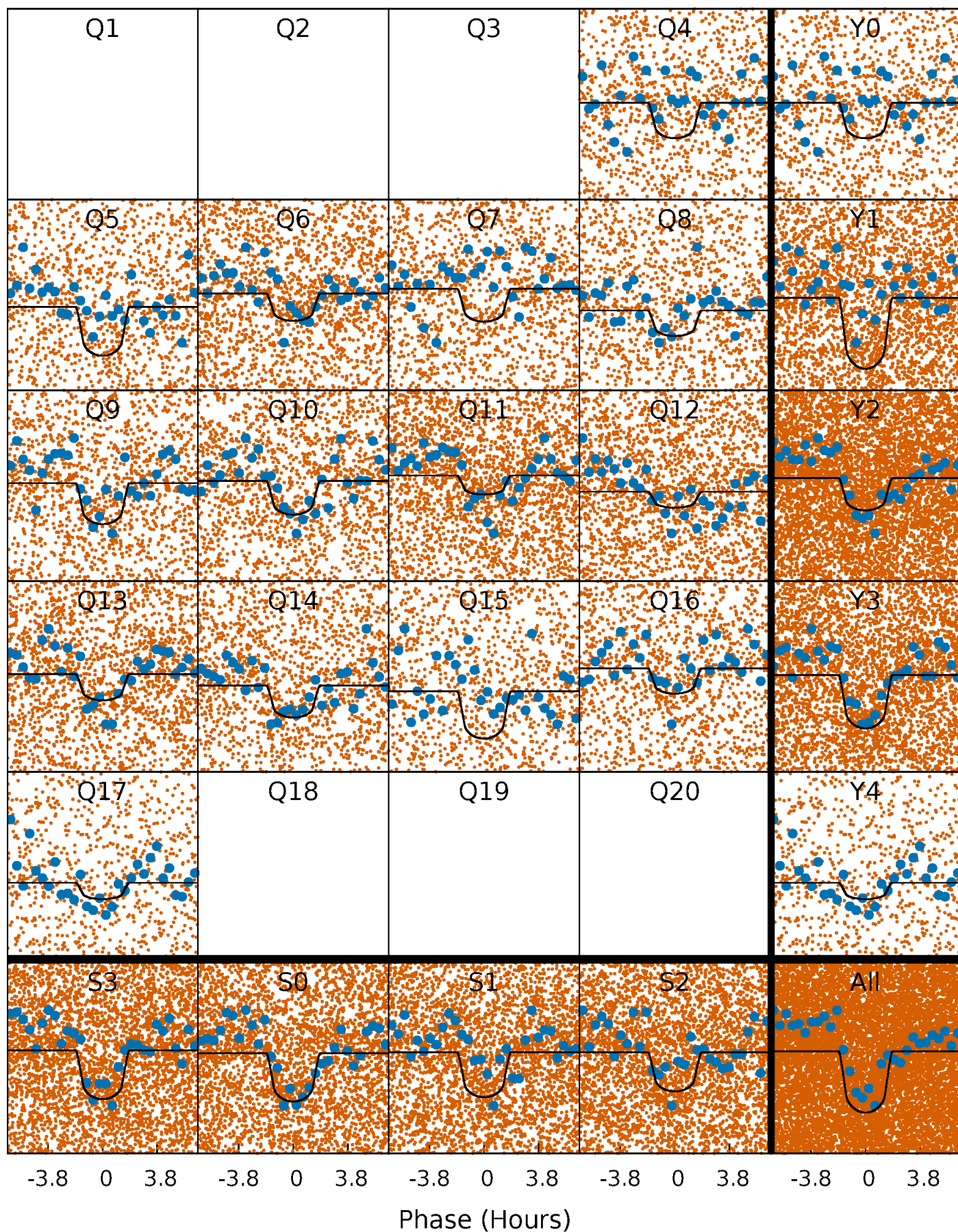
TCE 007282108-01 P= 0.566790 Days  $T_0=131.827684$  (BKJD)





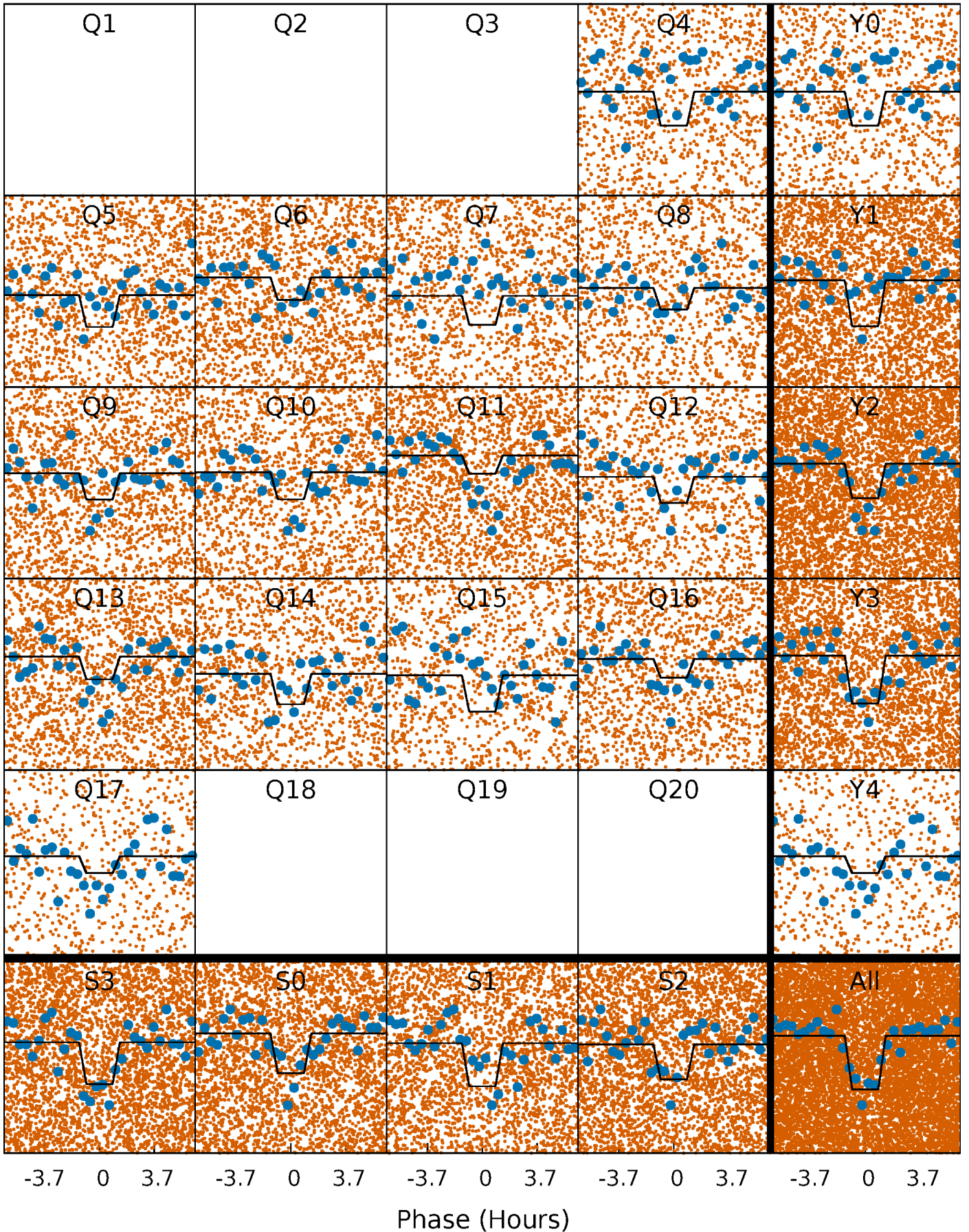
# DV Quarter-Phased Transit Curves

TCE 007282108-01 P= 0.566790 Days  $T_0=131.827684$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 007282108-01 P= 0.566795 Days  $T_0=131.816028$  (BKJD)

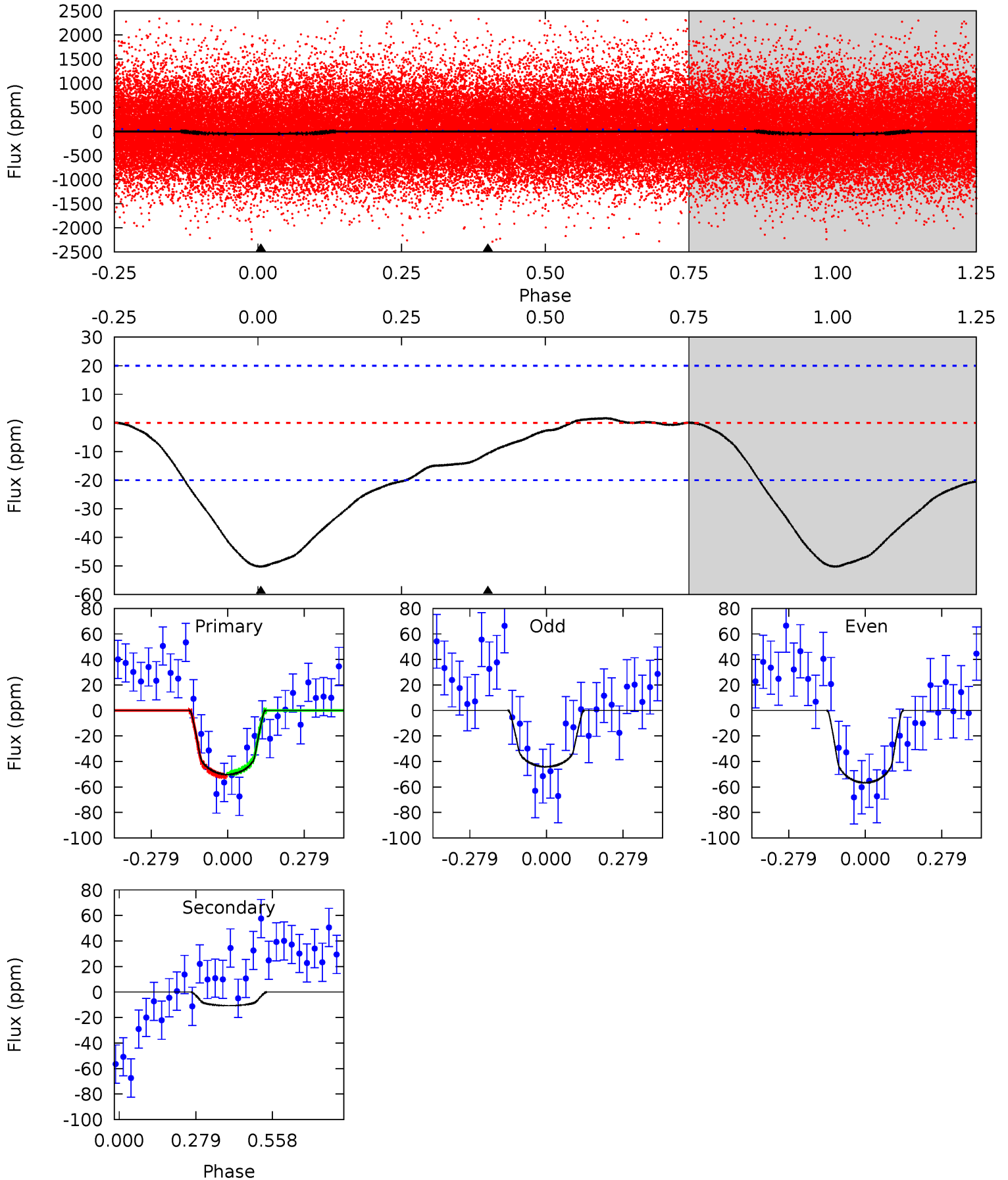




# DV Model-Shift Uniqueness Test

007282108-01, P = 0.566790 Days, E = 131.827684 Days

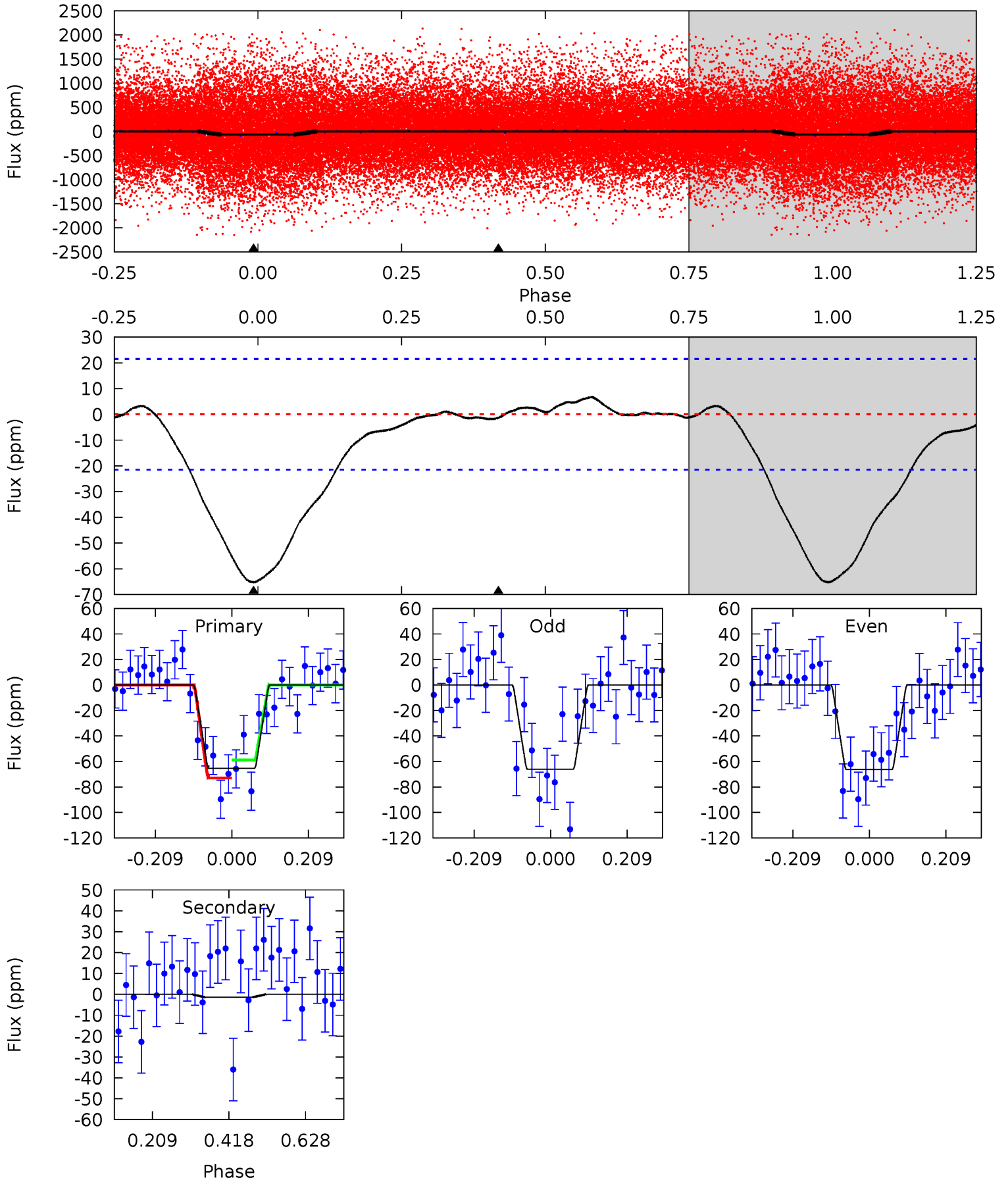
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.9	2.32	0	0	4.34	1.08	0.07	10.9	10.9	2.32	2.32	1.36	0.84	0.03	0.24



# Alt Model-Shift Uniqueness Test

007282108-01, P = 0.566795 Days, E = 131.816028 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
13.4	0.29	0	0	4.41	1.26	0.32	13.4	13.4	0.29	0.29	0.02	0.91	0.09	1.44



### Stellar Parameters For KIC 007282108

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5888^{+184}_{-205}$	$4.504^{+0.052}_{-0.208}$	$0.020^{+0.250}_{-0.300}$	$0.944^{+0.297}_{-0.099}$	$1.037^{+0.127}_{-0.140}$	$1.736^{+0.367}_{-0.926}$
	+3%/-3%	+1%/-5%	+1250%/-1500%	+31%/-10%	+12%/-14%	+21%/-53%
Source	KIC0	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 007282108-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-11 \pm 5$	$1.11^{+0.71}_{-0.61}$	$3099^{+221}_{-152}$	$3409^{+1553}_{-5957}$	$0.784^{+3.295}_{-0.545}$
Alt.	$-1 \pm 5$	$0.98^{+0.69}_{-0.57}$	$3084^{+234}_{-154}$	$-2908^{+6690}_{-719}$	$0.120^{+1.134}_{-0.533}$

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



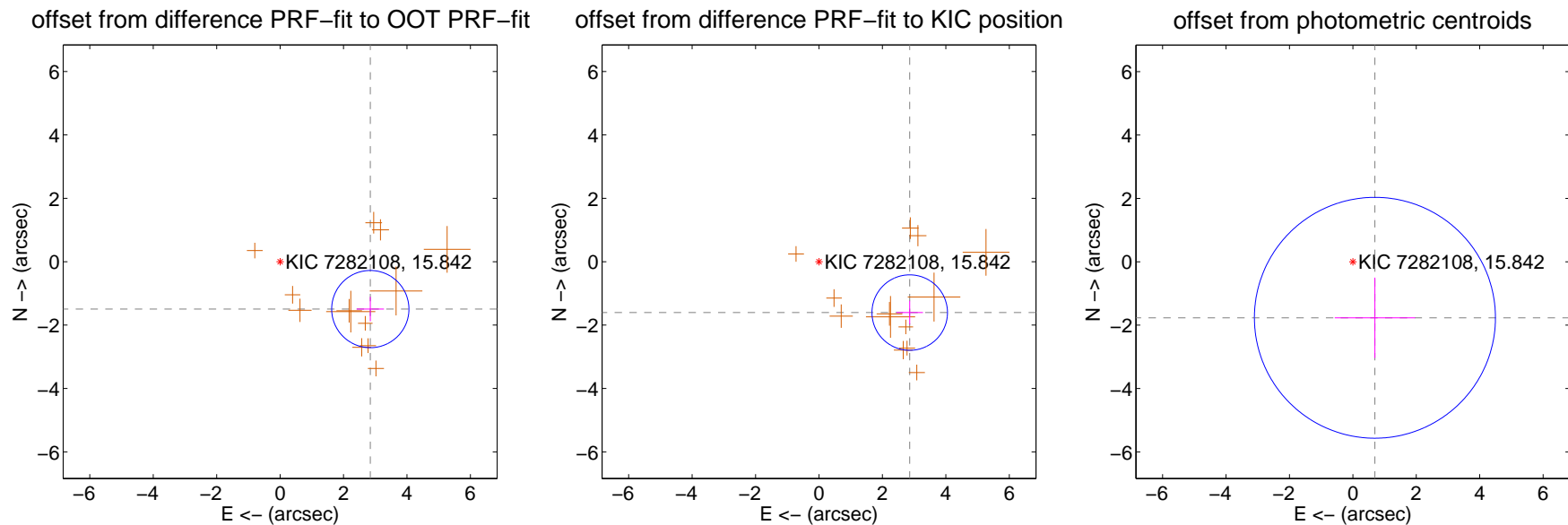
## DV Centroid Data

Supplemental centroid analysis for 007282108-01. Kepler magnitude: 15.84. Transit SNR 10.84

There are 0 quarters with good PRF difference image offsets

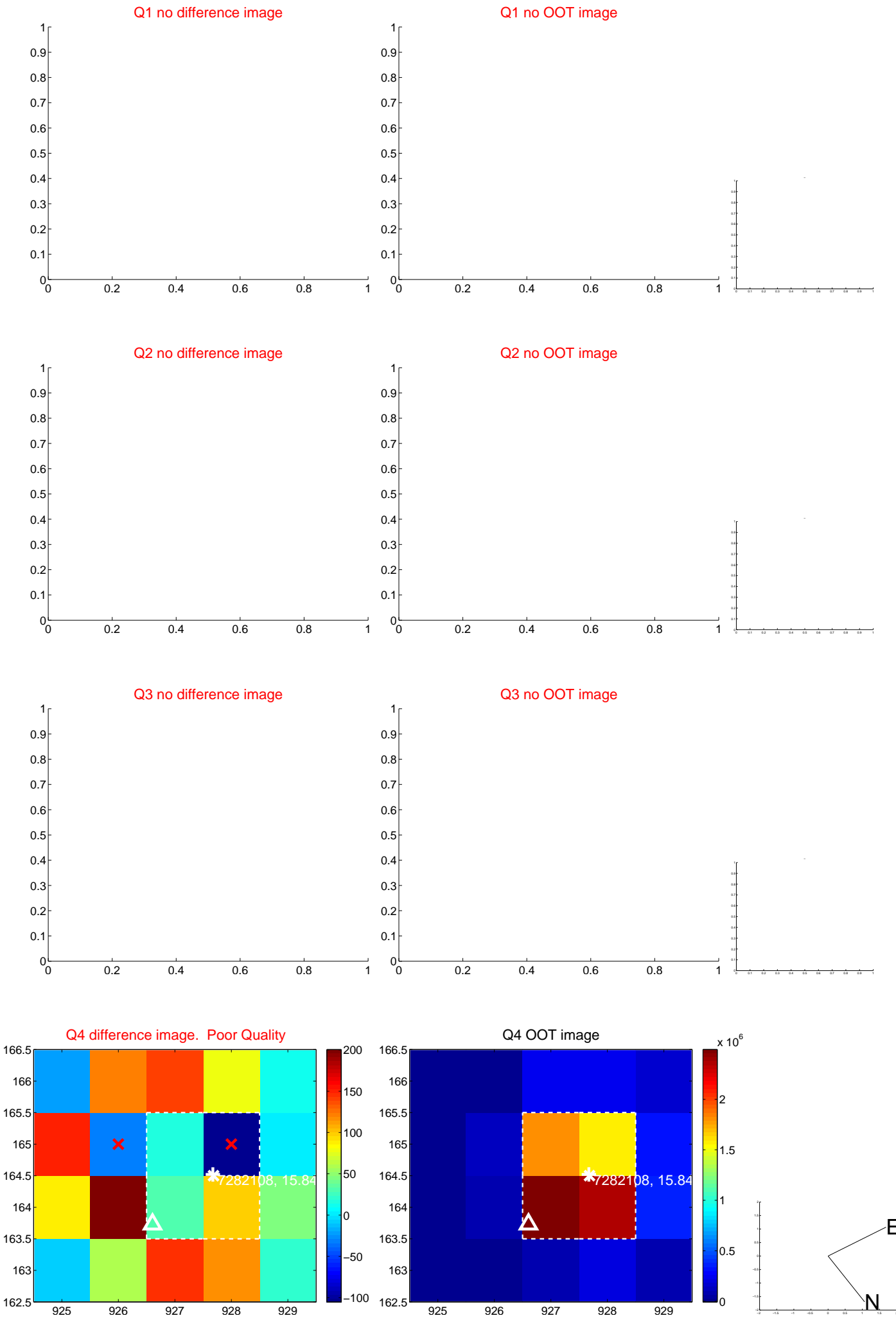
The direct PRF centroid is offset from the target star catalog position by about 0.11 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$3.212 \pm 0.406$	7.91	$-2.843 \pm 0.430$	$-1.495 \pm 0.385$
PRF-fit source offset from KIC position	$3.280 \pm 0.397$	8.27	$-2.860 \pm 0.416$	$-1.605 \pm 0.373$
photometric centroid source offset	$1.90 \pm 1.27$	1.50	$-0.70 \pm 1.27$	$-1.77 \pm 1.27$

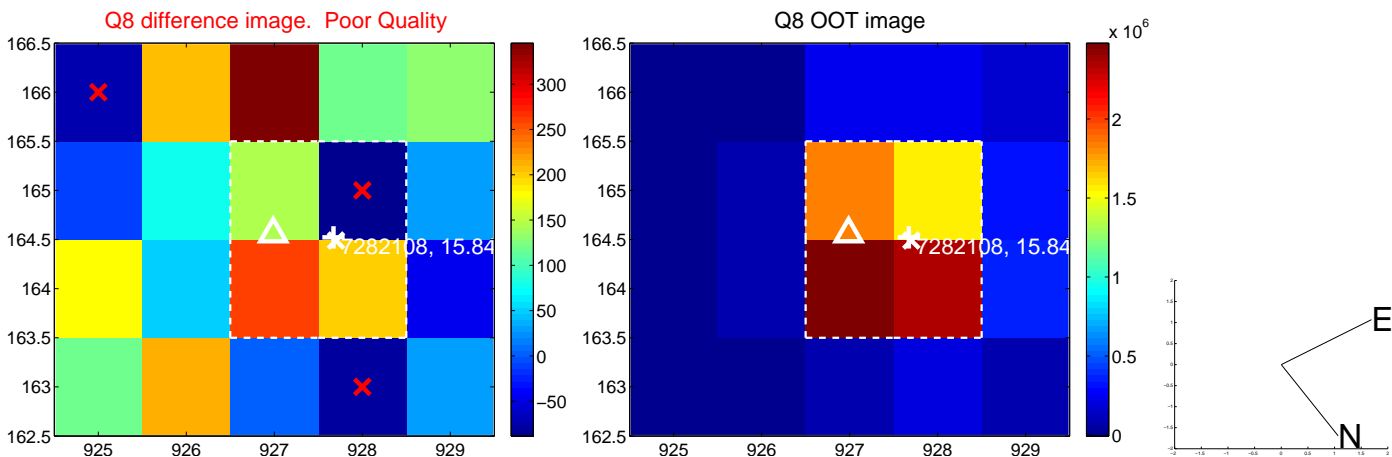
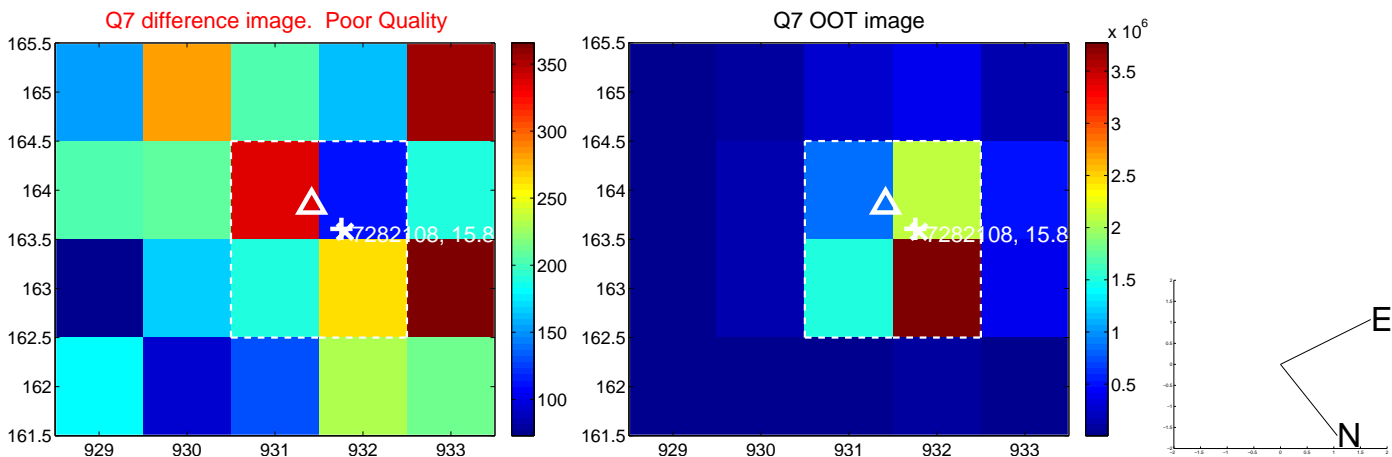
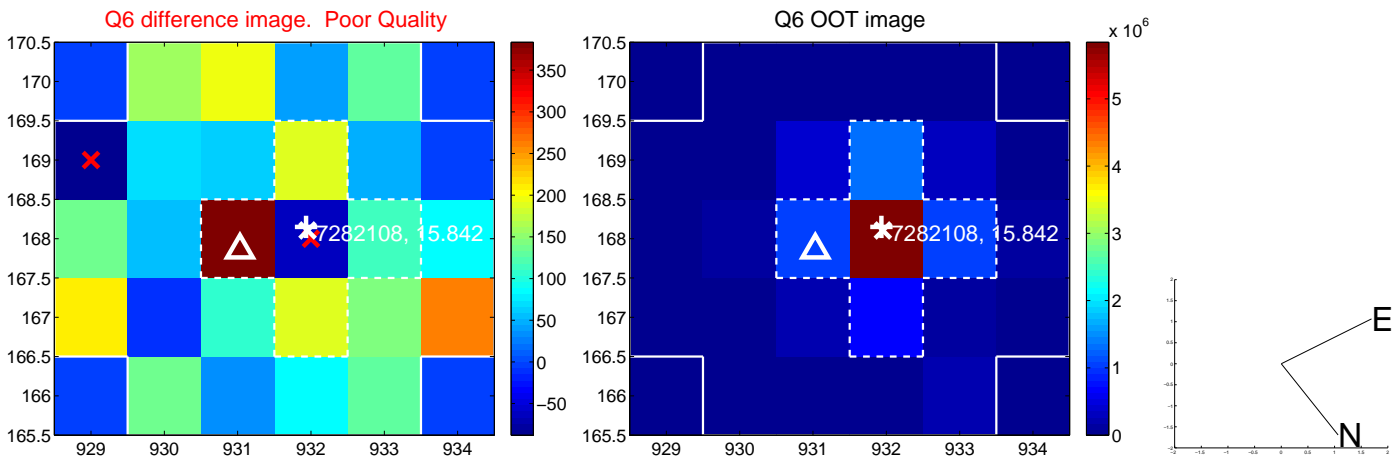
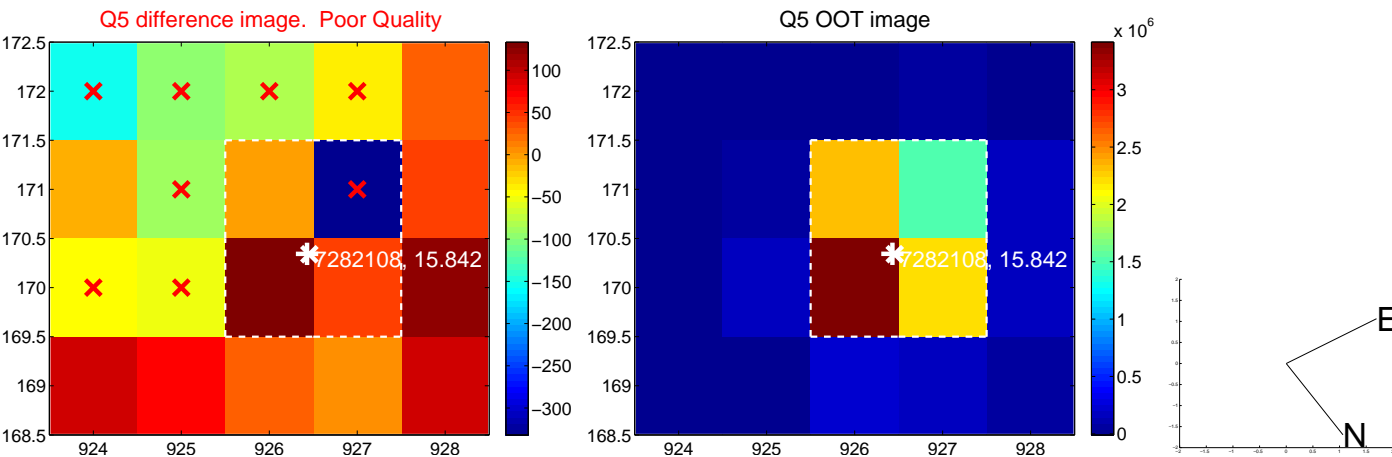


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

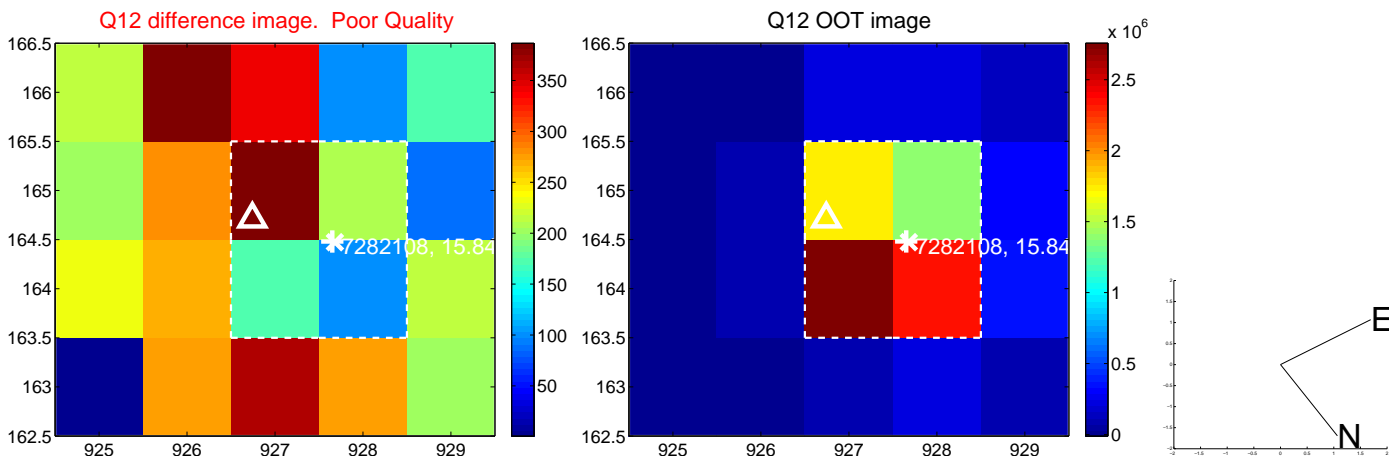
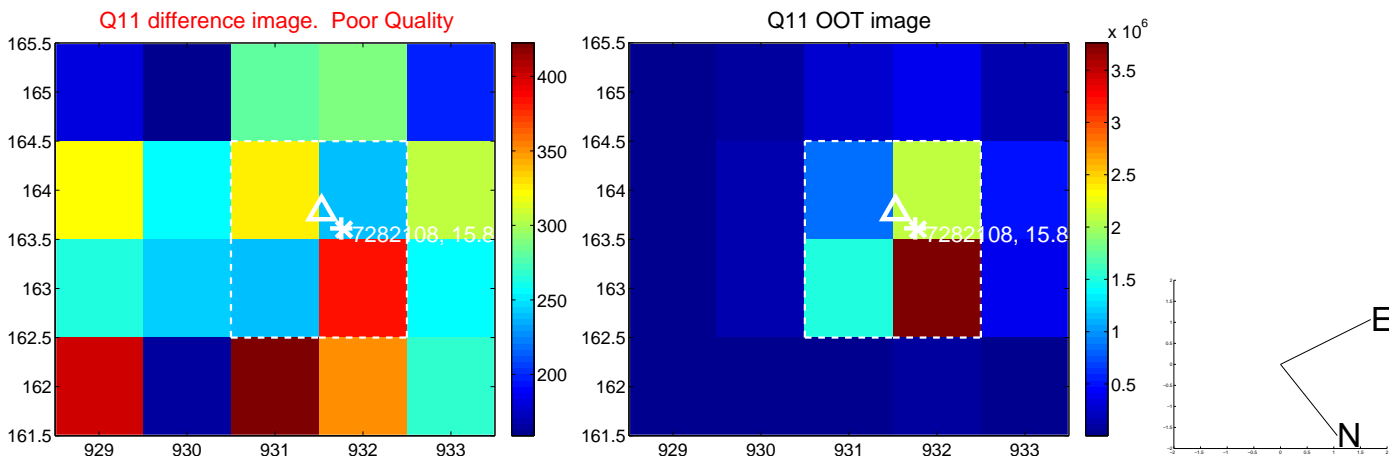
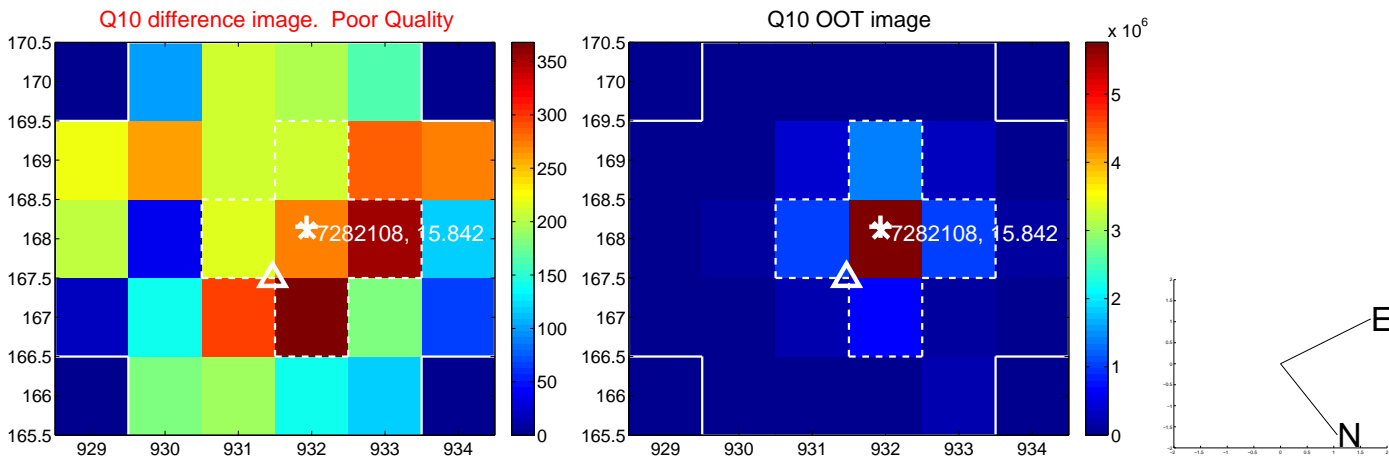
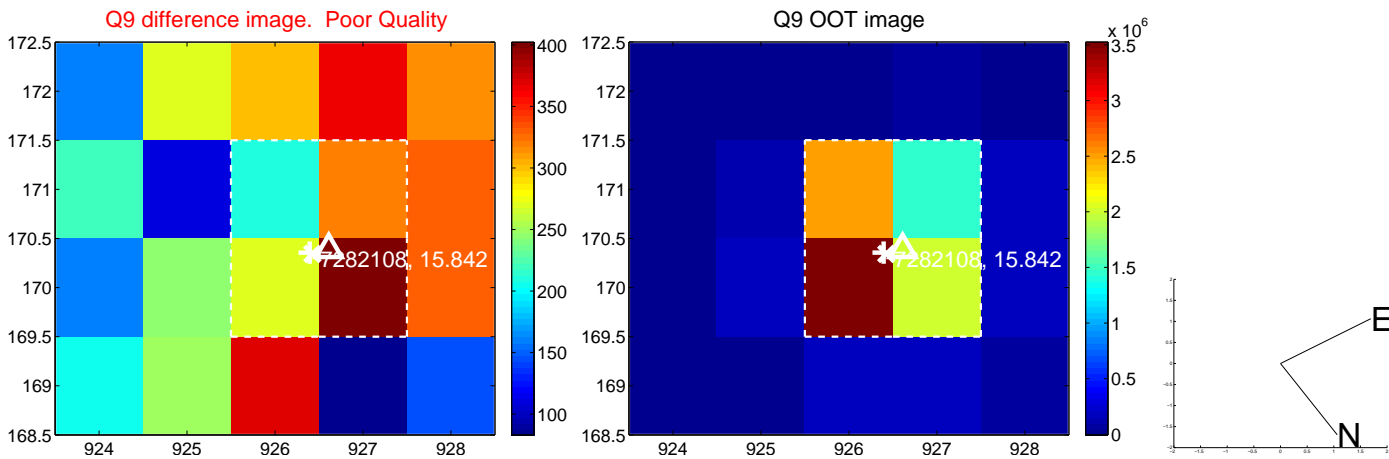
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



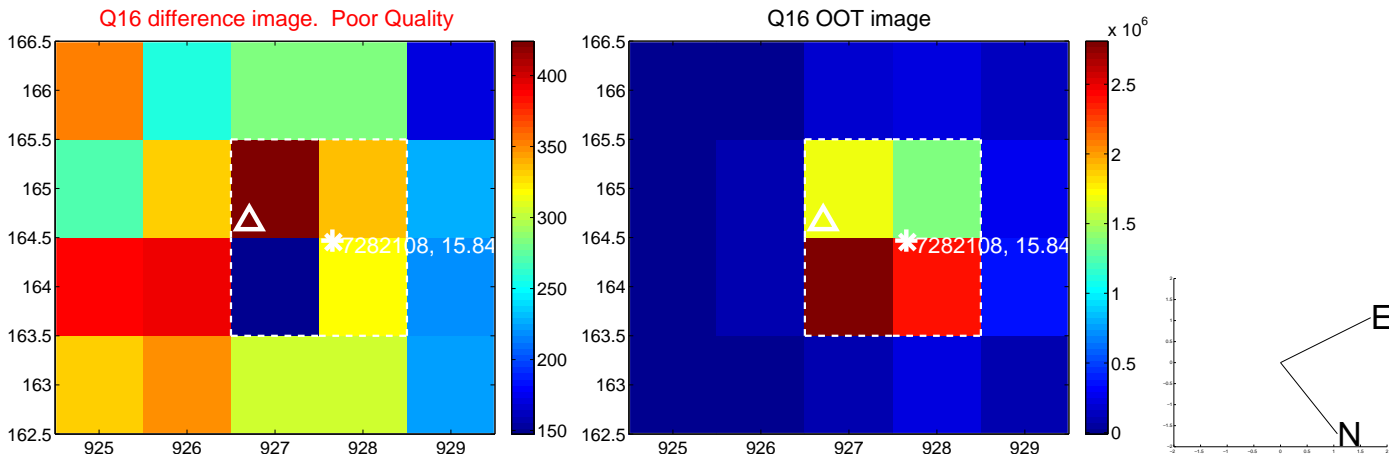
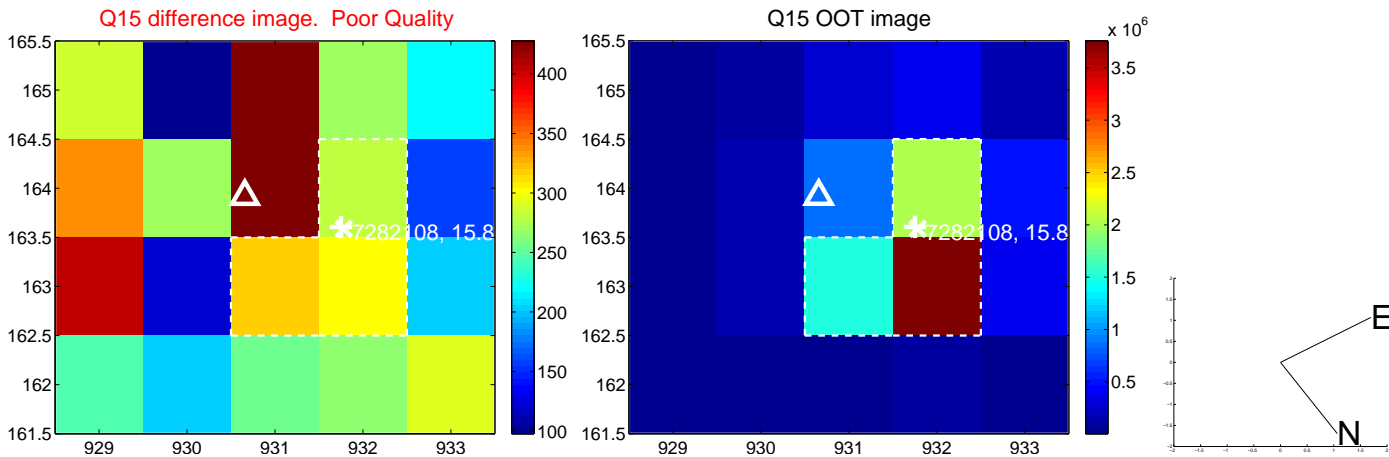
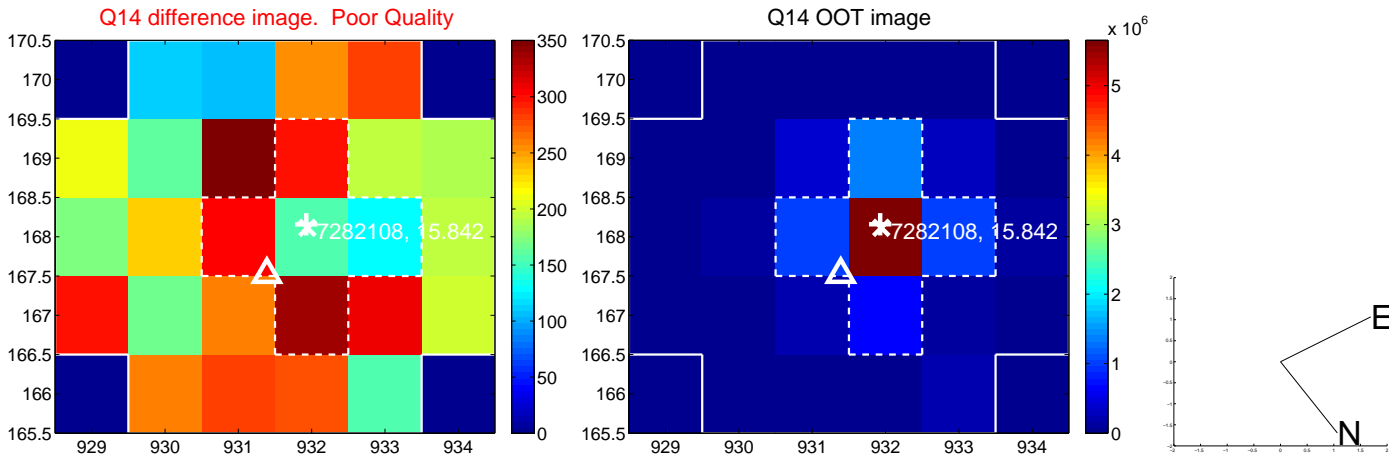
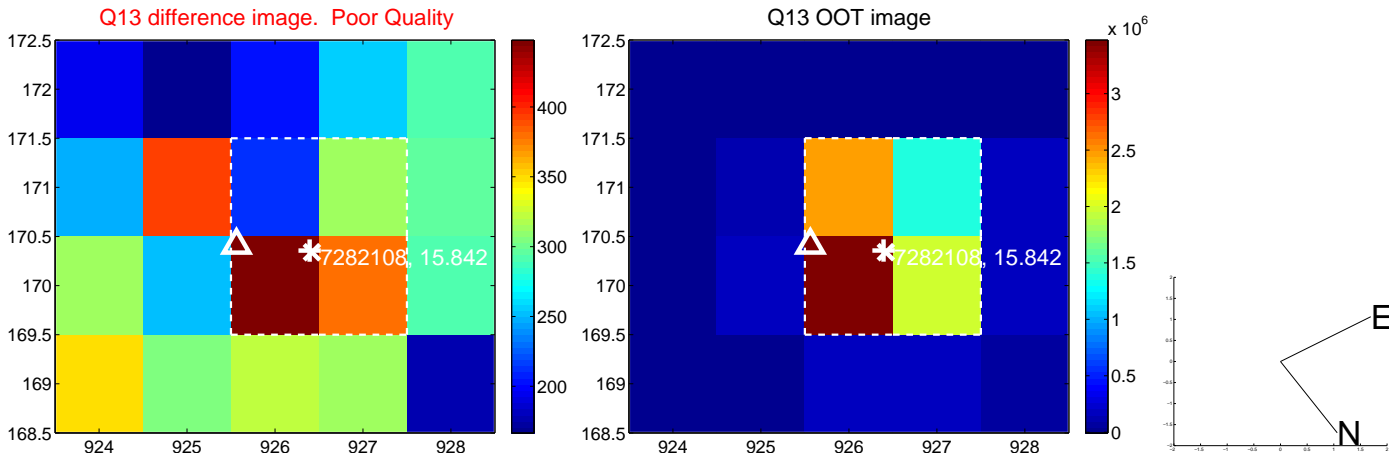
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

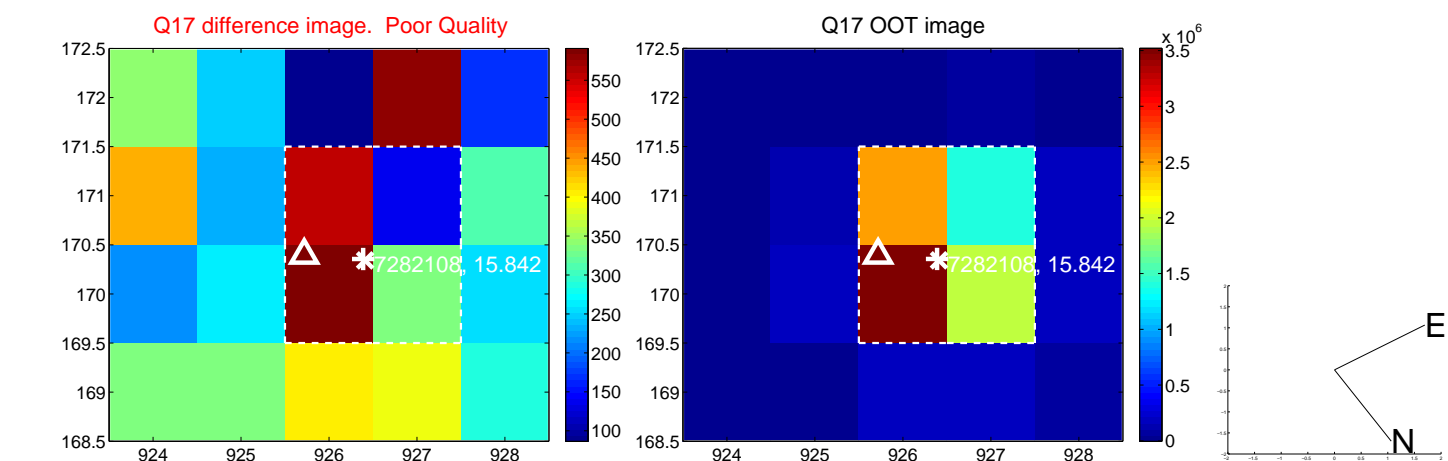


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

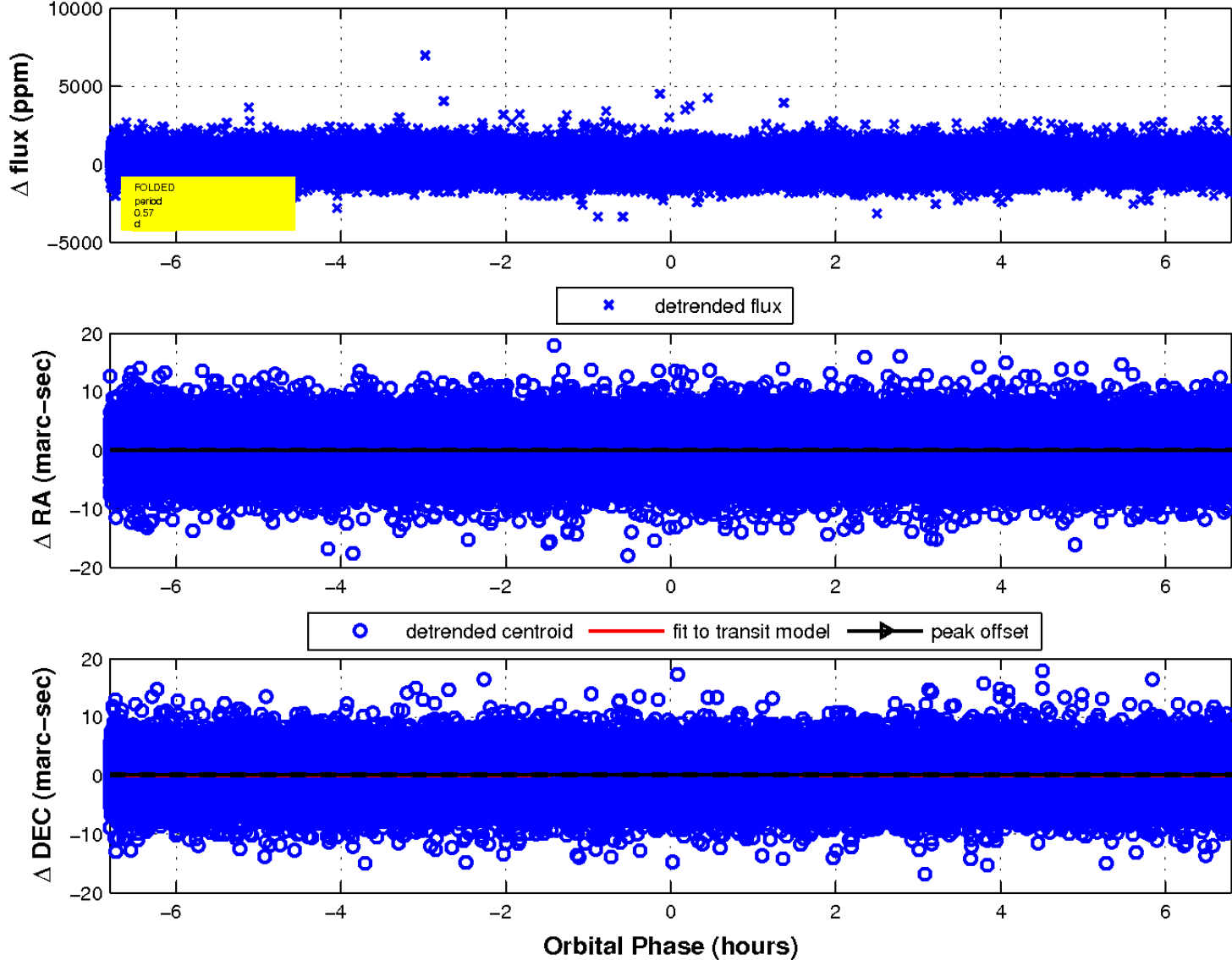




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

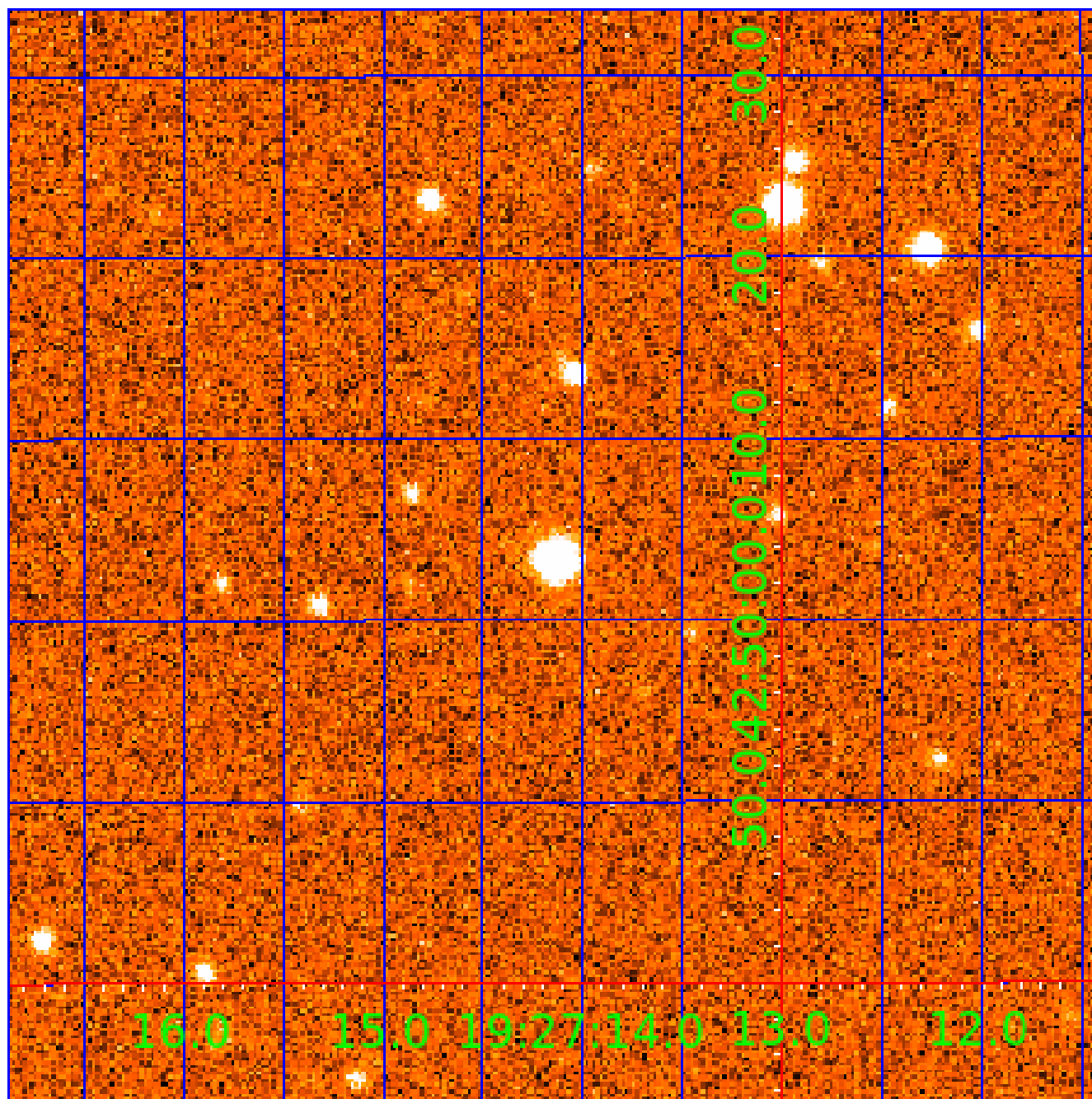


fluxWeightedCentroids, Planet 1 of 2



# UKIRT Image

Declination



# KIC 007282108

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007282108-01	OBS	No	0.566790	131.827684	79.1	3.322	9.3	10.8	0.94	5888	0.98	5210.16
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## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007282108-01	OBS	FP	0.00	1	0	1	1	LPP_DV—CENT_FEW_DIFFS—HALO_GHOST—EPHEM_MATCH
007282108-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS

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

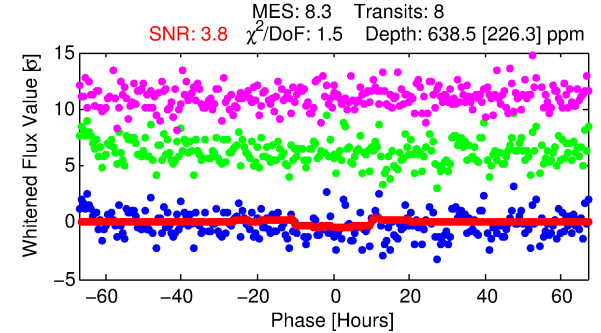
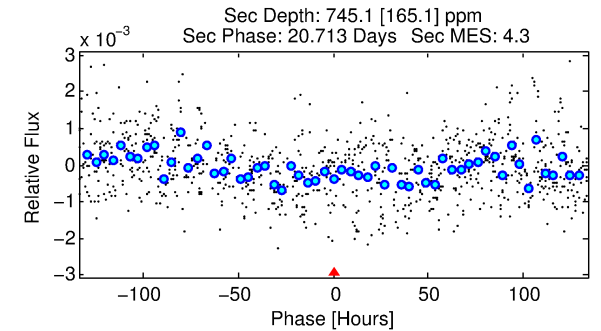
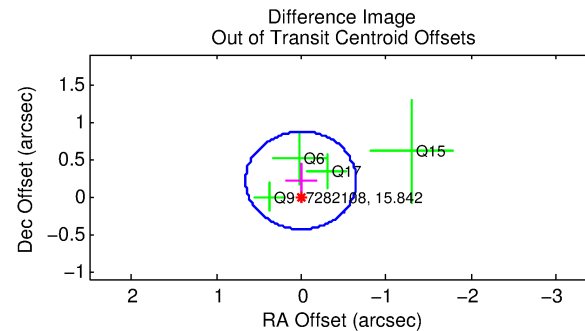
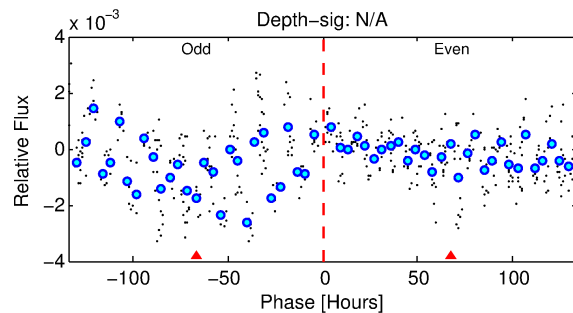
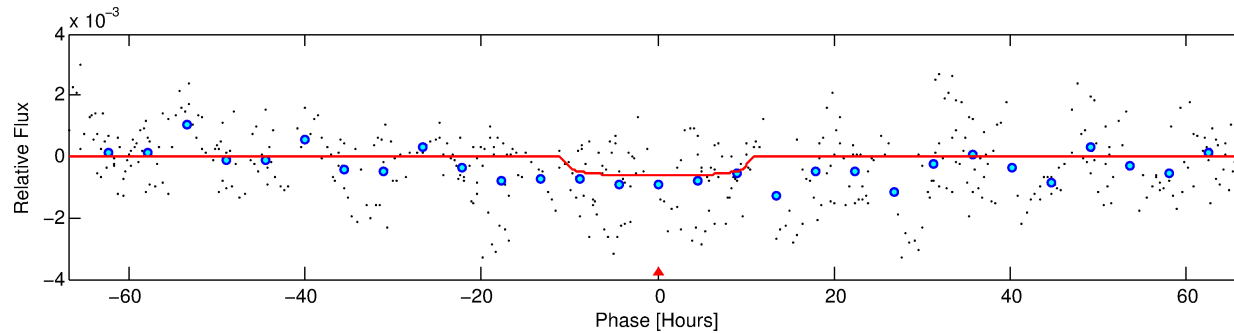
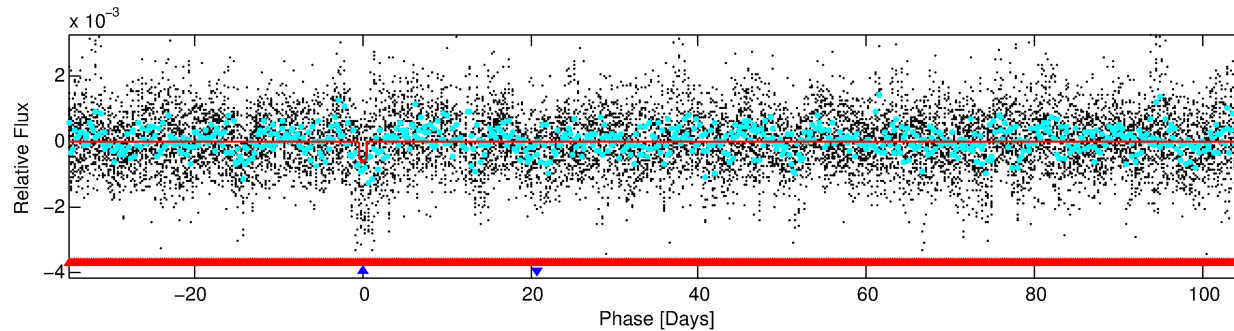
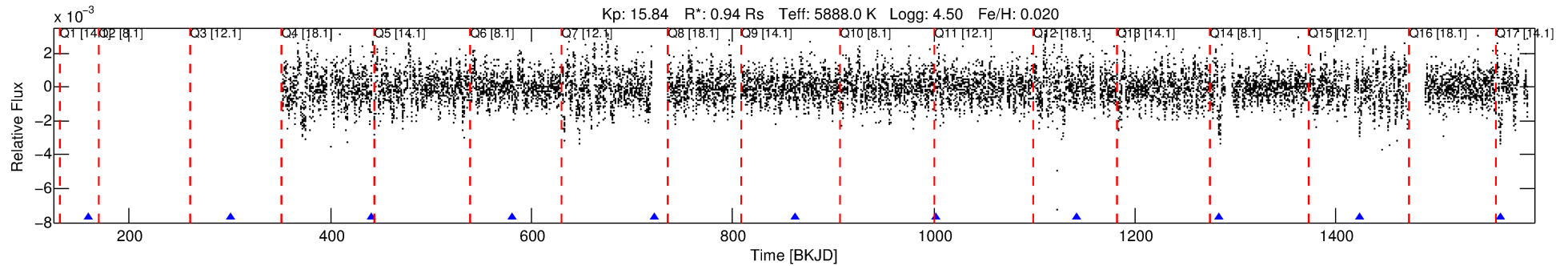
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 007282108-02

No Significant Match Found

# DV One-Page Summary

KIC: 7282108 Candidate: 2 of 2 Period: 140.406 d



## DV Fit Results:

Period = 140.40613 [0.01336] d  
Epoch = 159.9543 [0.0841] BKJD  
Rp/R\* = 0.0259 [0.0072]  
a/R\* = 29.99 [28.23]  
b = 0.81 [0.39]  
Seff = 3.35 [1.36]  
Teq = 345 [35] K  
Rp = 2.66 [1.12] Re  
a = 0.5353 [0.1411] AU  
Ag = 16541.31 [11771.26] [1.41σ]  
Teffp = 6048 [932] K [6.12σ]

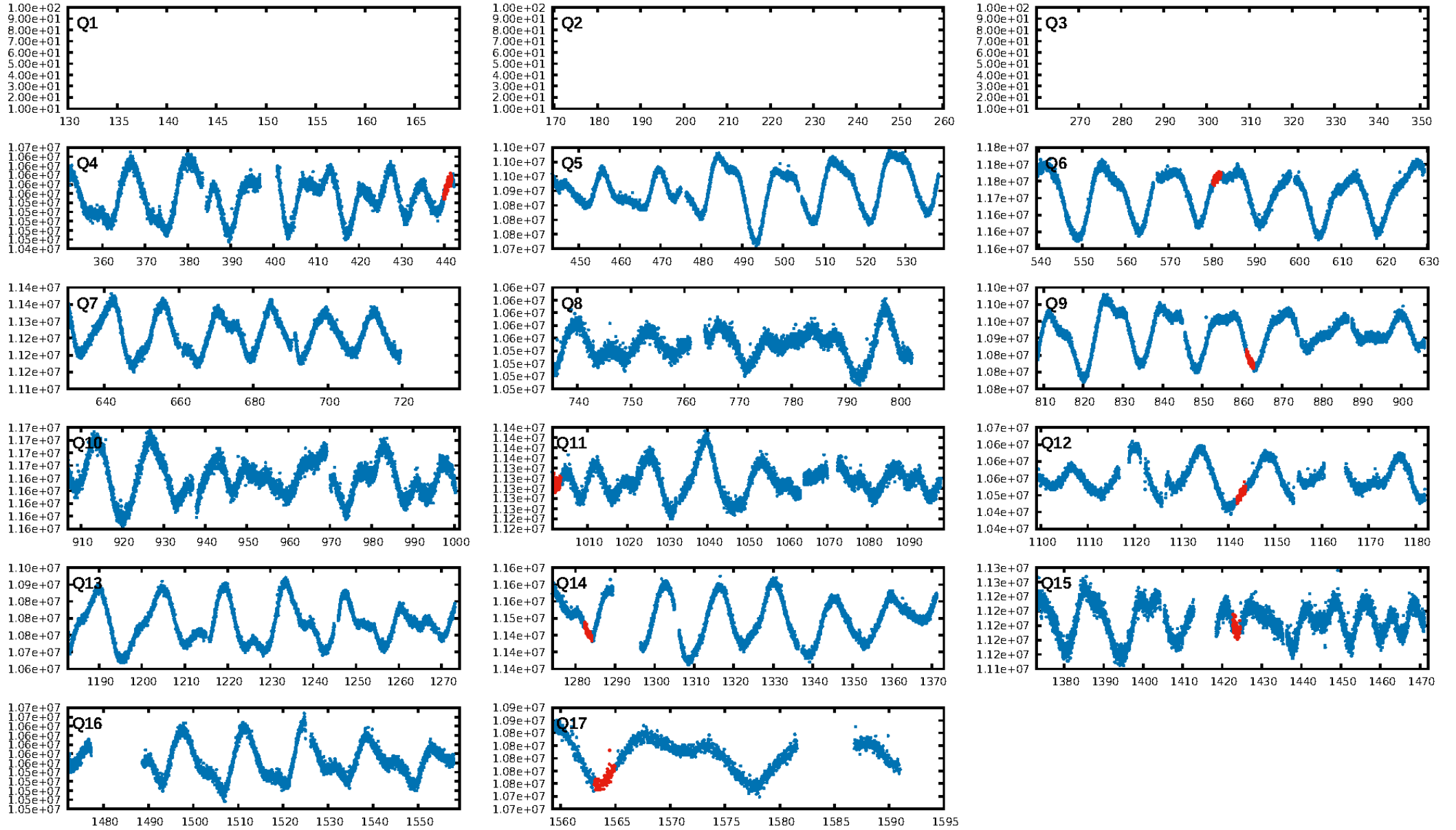
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [148.82σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.1%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 1.63e-11  
RollingBand-fgt: 1.00 [7/7]  
GhostDiagnostic-chr: -0.4235  
Centroid-sig: 9.7%  
Centroid-so: 1.384 arcsec [1.46σ]  
OotOffset-rm: 0.216 arcsec [0.99σ]  
OotOffset-st: 1/1/0/2 [4]  
KicOffset-rm: 0.114 arcsec [0.50σ]  
KicOffset-st: 1/1/0/2 [4]  
DiffImageQuality-fgm: 0.75 [3/4]  
DiffImageOverlap-fno: 0.00 [0/5]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 11:36:39 Z

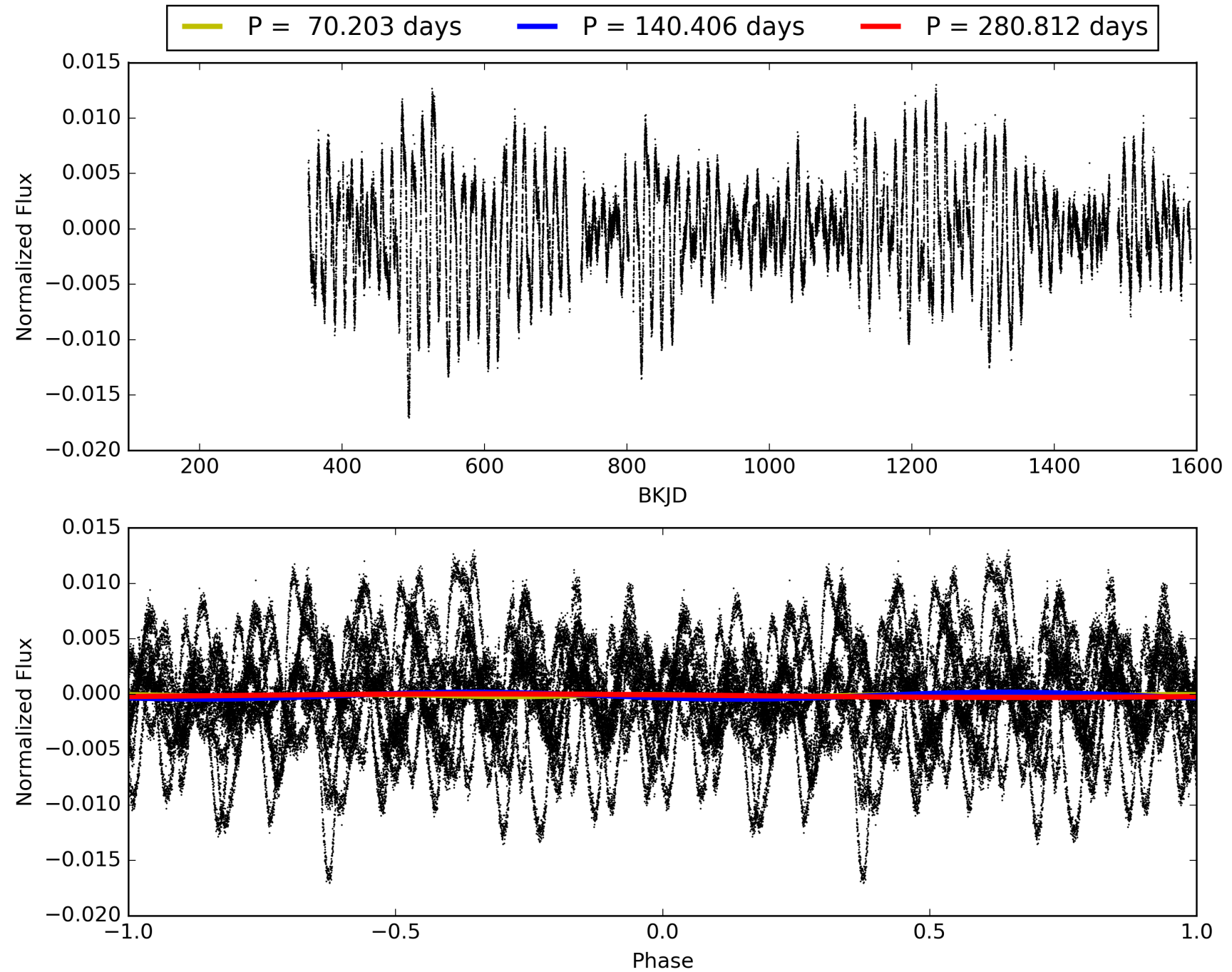
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 007282108-02, PDC Light Curves



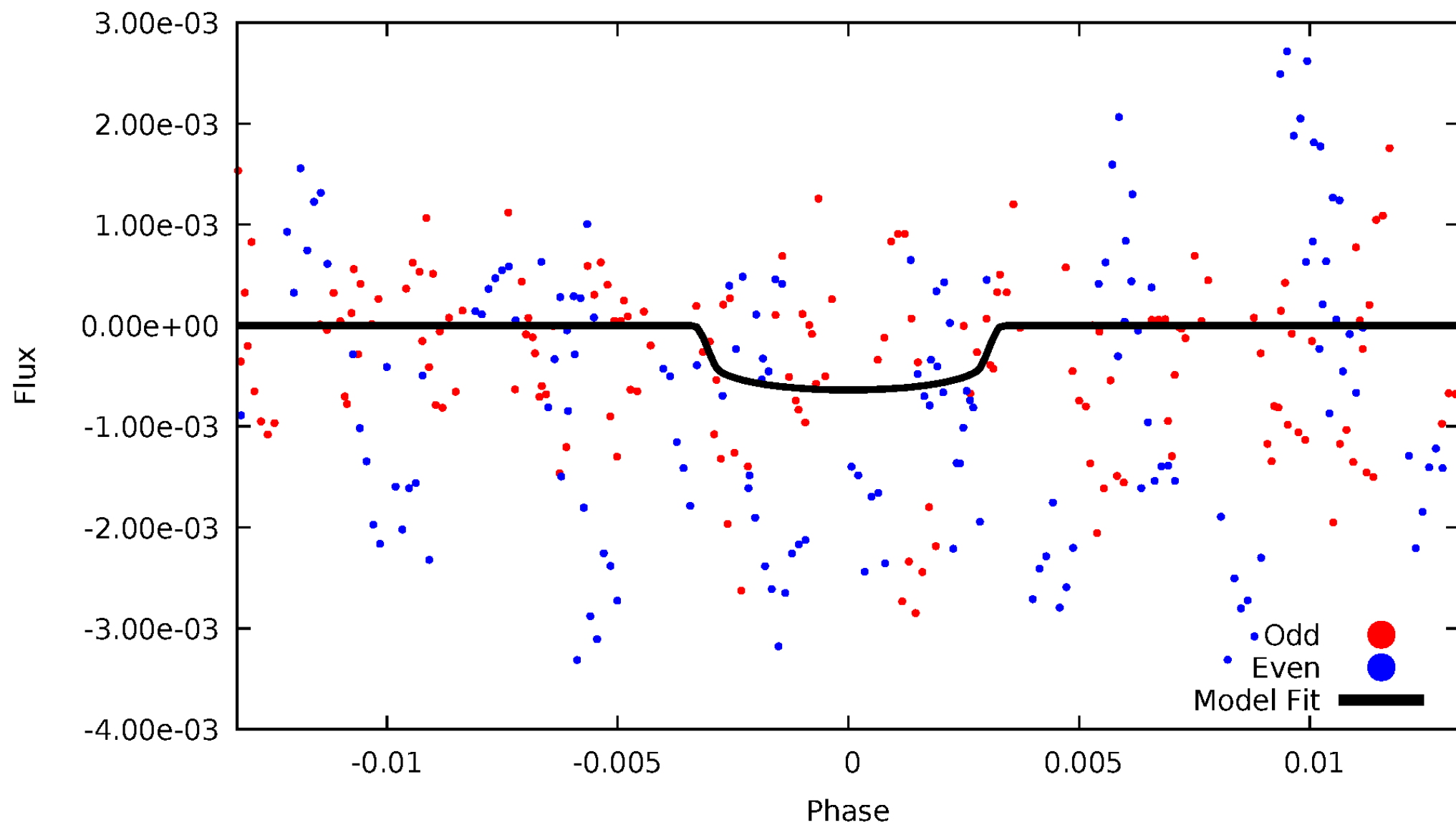


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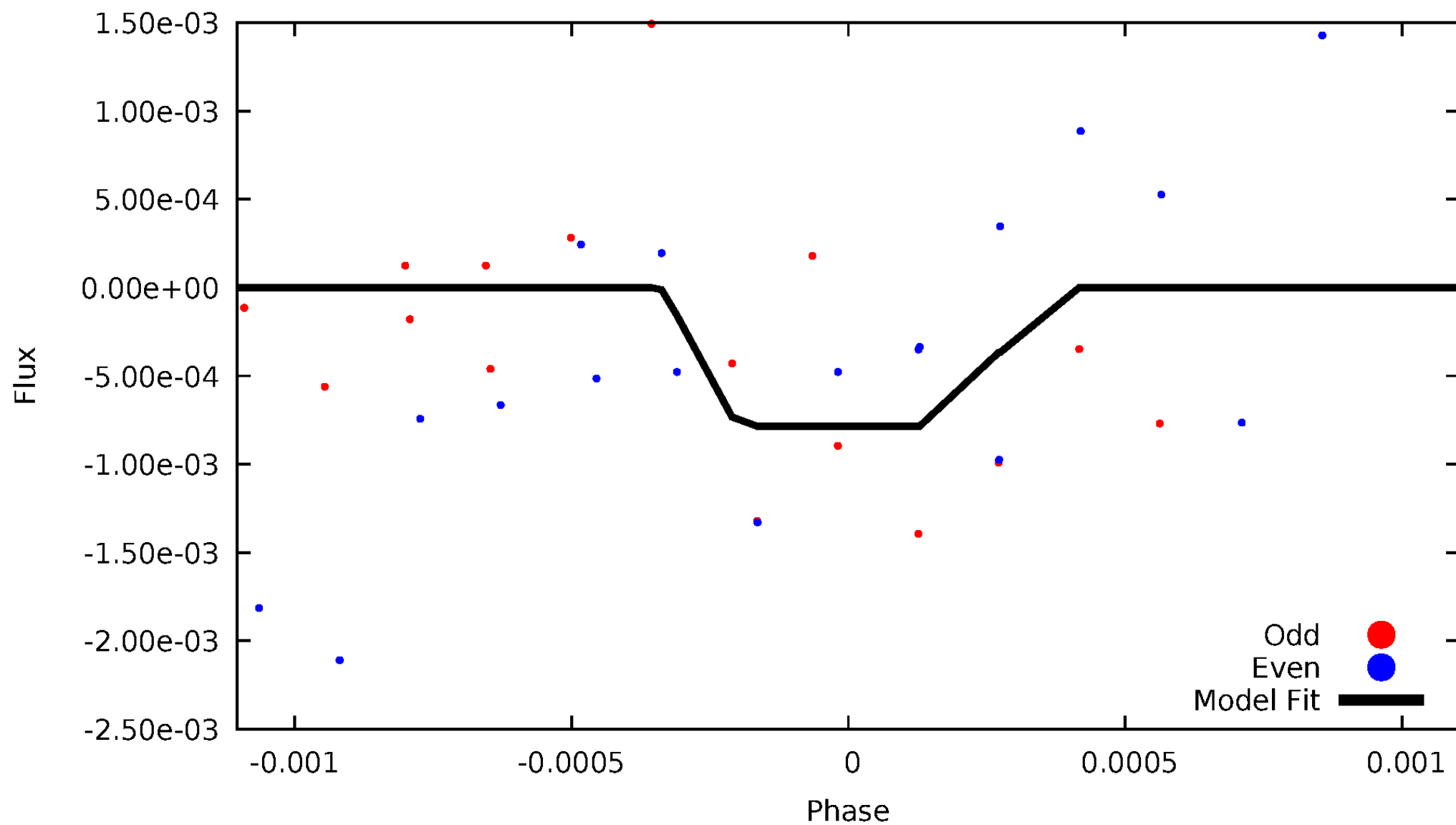
# DV Odd/Even

TCE 007282108-02



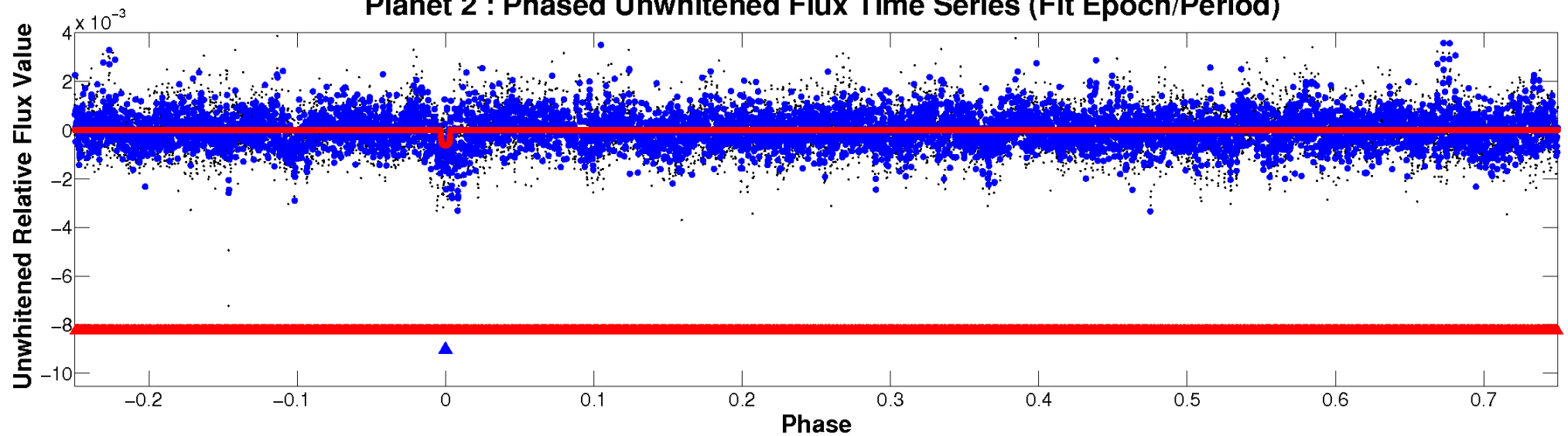
# ALT Odd/Even

TCE 007282108-02

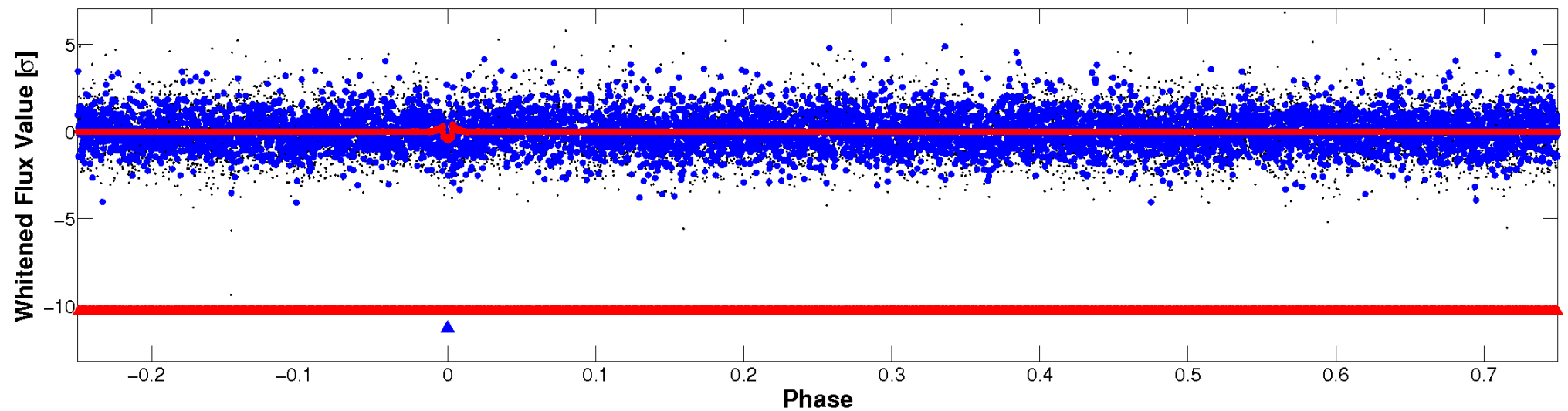


# Non-Whitened Vs. Whitened Light Curve

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

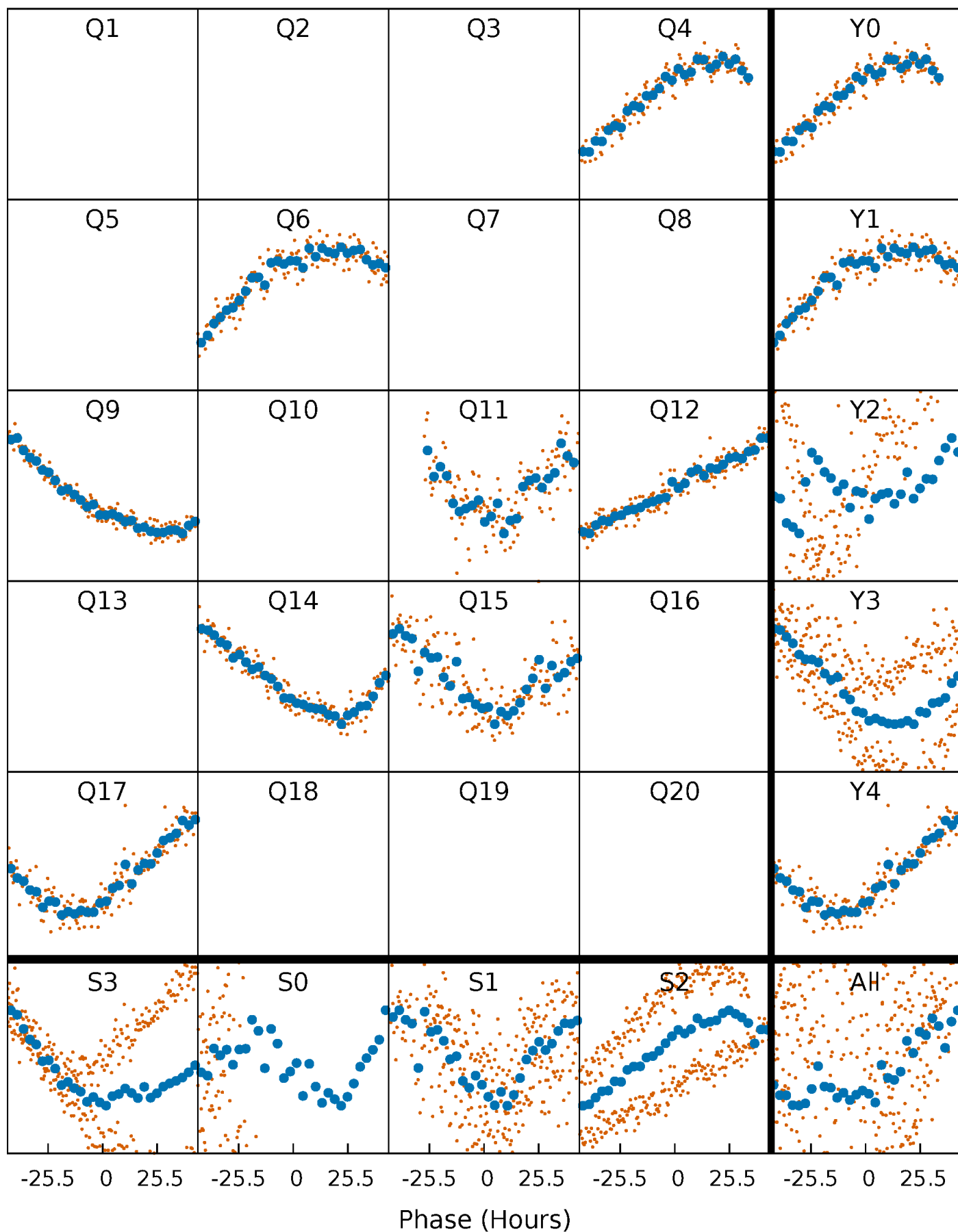


**Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

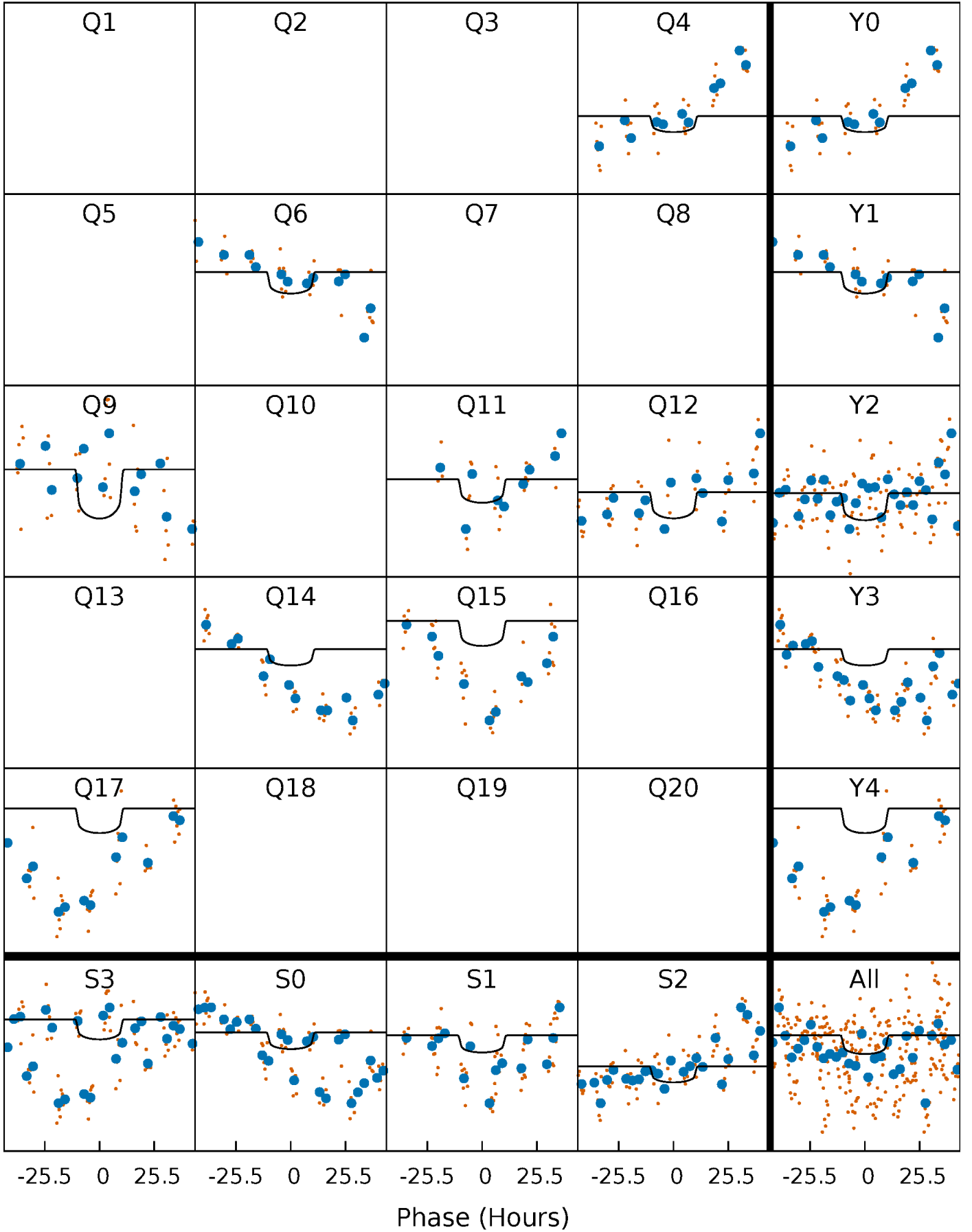
TCE 007282108-02 P=140.406125 Days  $T_0=159.954307$  (BKJD)





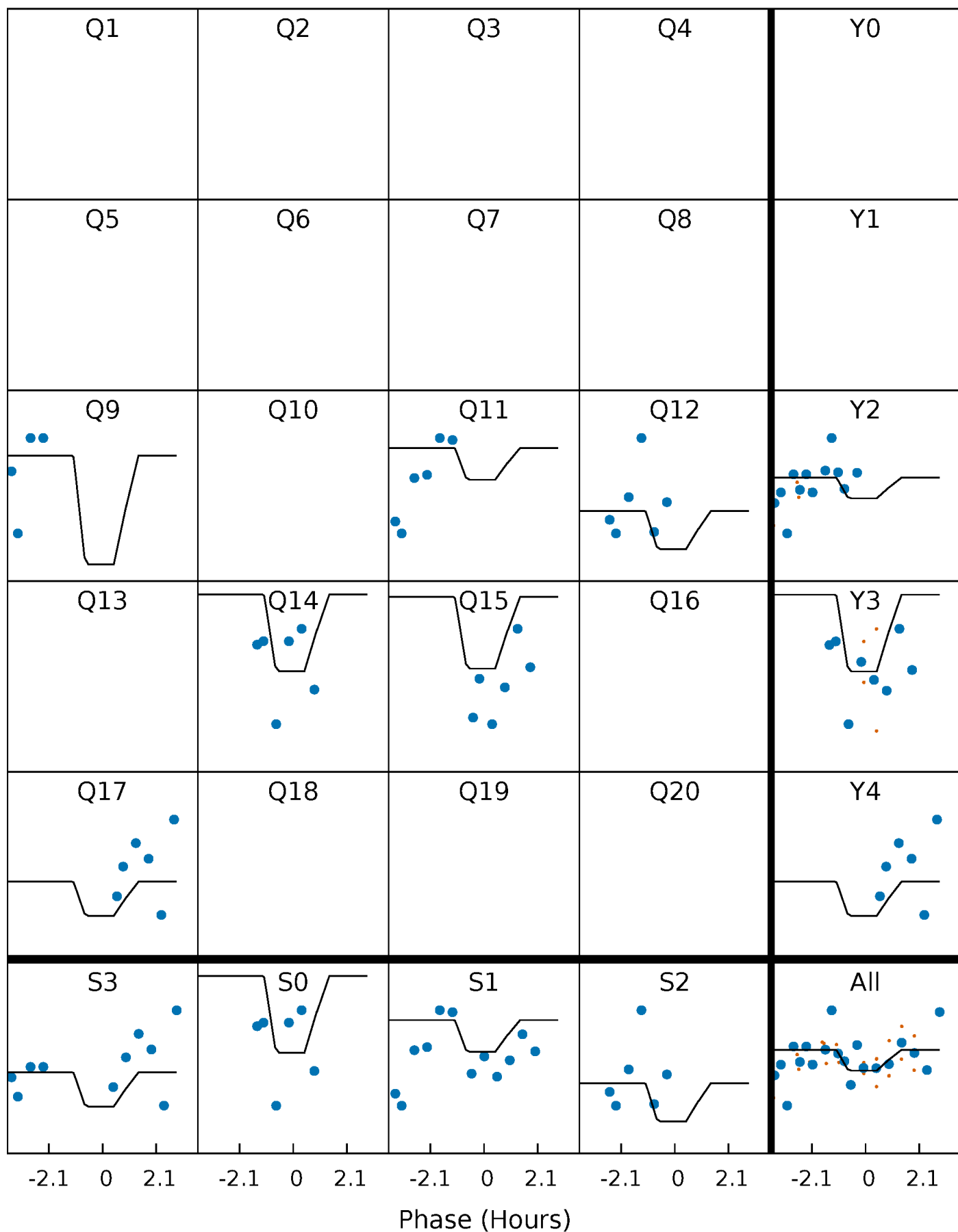
# DV Quarter-Phased Transit Curves

TCE 007282108-02     $P=140.406125$  Days     $T_0=159.954307$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

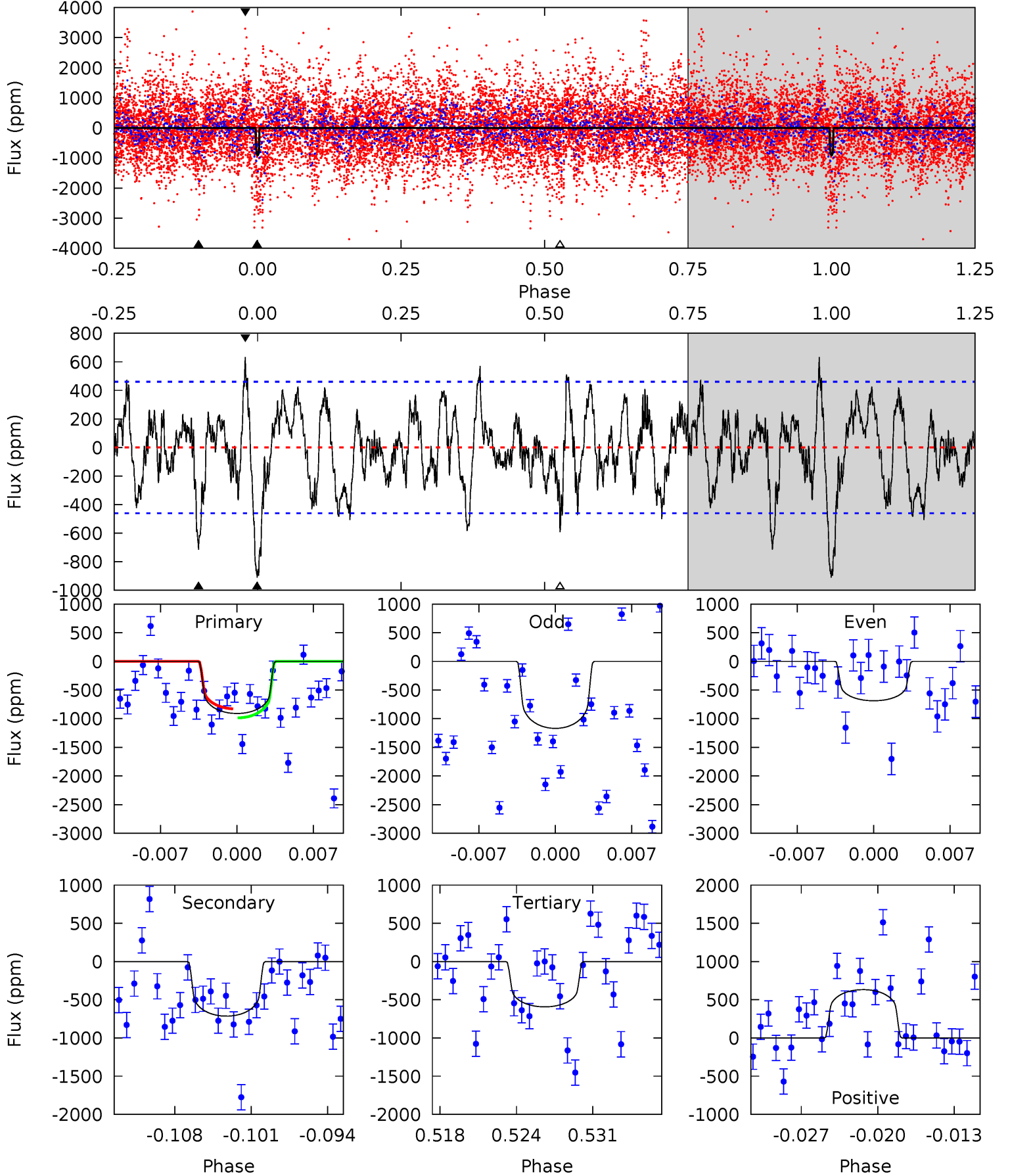
TCE 007282108-02 P=140.519922 Days  $T_0=159.117160$  (BKJD)



# DV Model-Shift Uniqueness Test

007282108-02, P = 140.406125 Days, E = 159.954307 Days

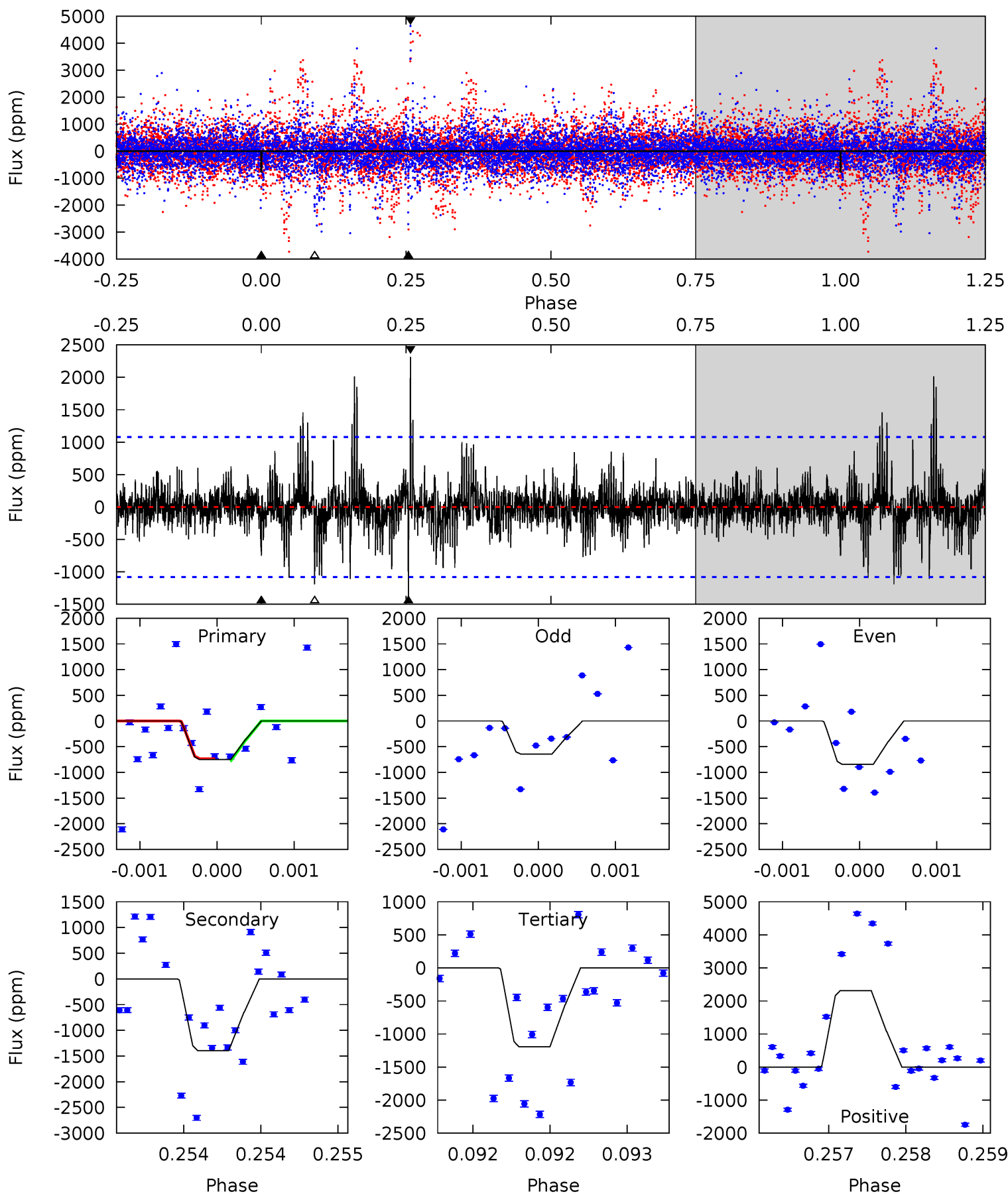
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.1	7.91	6.56	7.01	5.10	2.71	2.41	3.51	3.07	1.35	0.90	2.69	2.13	0.41	0.87



# Alt Model-Shift Uniqueness Test

007282108-02, P = 140.519922 Days, E = 159.117160 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
3.82	7.10	6.08	11.8	5.51	3.38	1.37	-2.25	-7.97	1.02	-4.69	0.49	1.21	0.62	0.11



### Stellar Parameters For KIC 007282108

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5888^{+184}_{-205}$	$4.504^{+0.052}_{-0.208}$	$0.020^{+0.250}_{-0.300}$	$0.944^{+0.297}_{-0.099}$	$1.037^{+0.127}_{-0.140}$	$1.736^{+0.367}_{-0.926}$
	+3%/-3%	+1%/-5%	+1250%/-1500%	+31%/-10%	+12%/-14%	+21%/-53%
Source	KIC0	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 007282108-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-714 \pm 90$	$2.85^{+0.93}_{-0.83}$	$493^{+34}_{-26}$	$5873^{+1169}_{-650}$	$13199^{+13519}_{-5524}$
Alt.	$-1393 \pm 196$	$3.02^{+0.90}_{-0.76}$	$492^{+35}_{-26}$	$6790^{+1243}_{-840}$	$22975^{+18568}_{-9114}$

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

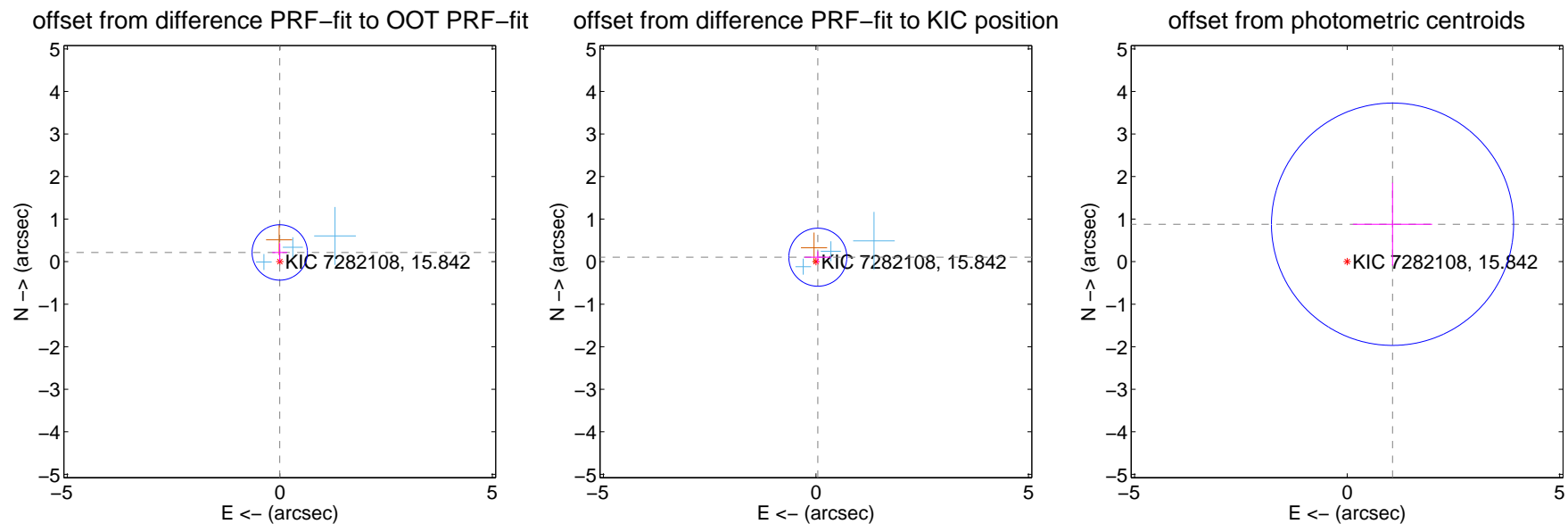
## DV Centroid Data

Supplemental centroid analysis for 007282108-02. Kepler magnitude: 15.84. Transit SNR 3.78

There are 3 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.10 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.216 \pm 0.217$	0.99	$0.001 \pm 0.176$	$0.216 \pm 0.217$
PRF-fit source offset from KIC position	$0.114 \pm 0.227$	0.50	$-0.045 \pm 0.310$	$0.104 \pm 0.139$
photometric centroid source offset	$1.38 \pm 0.95$	1.46	$-1.07 \pm 0.93$	$0.88 \pm 0.97$



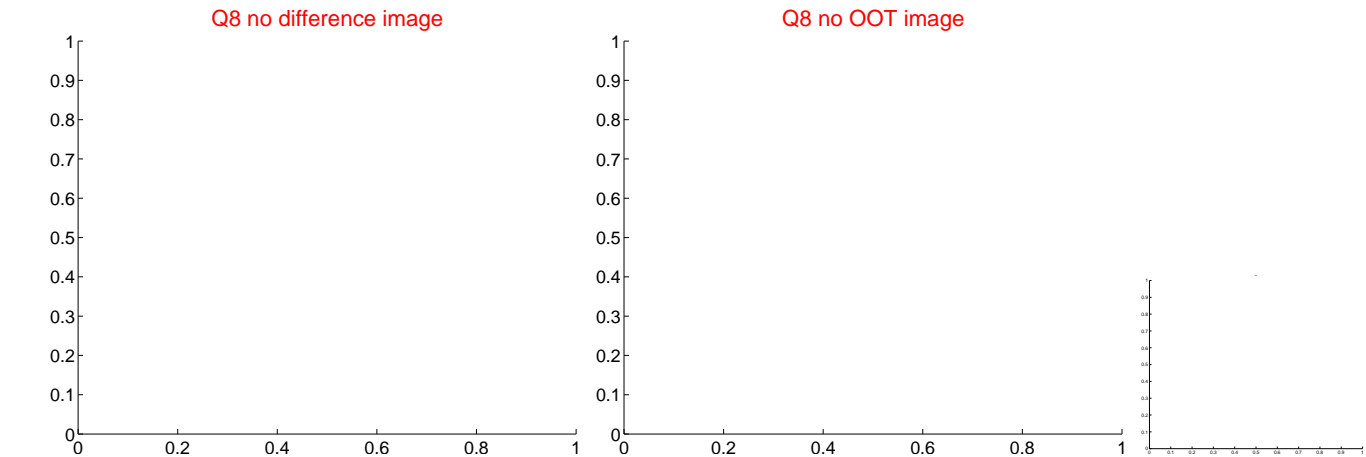
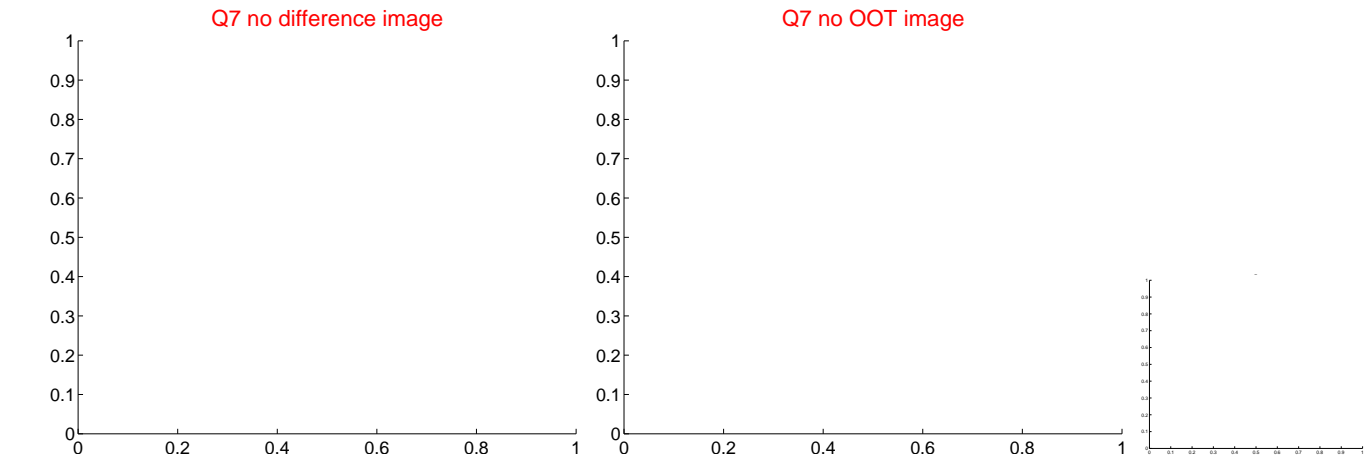
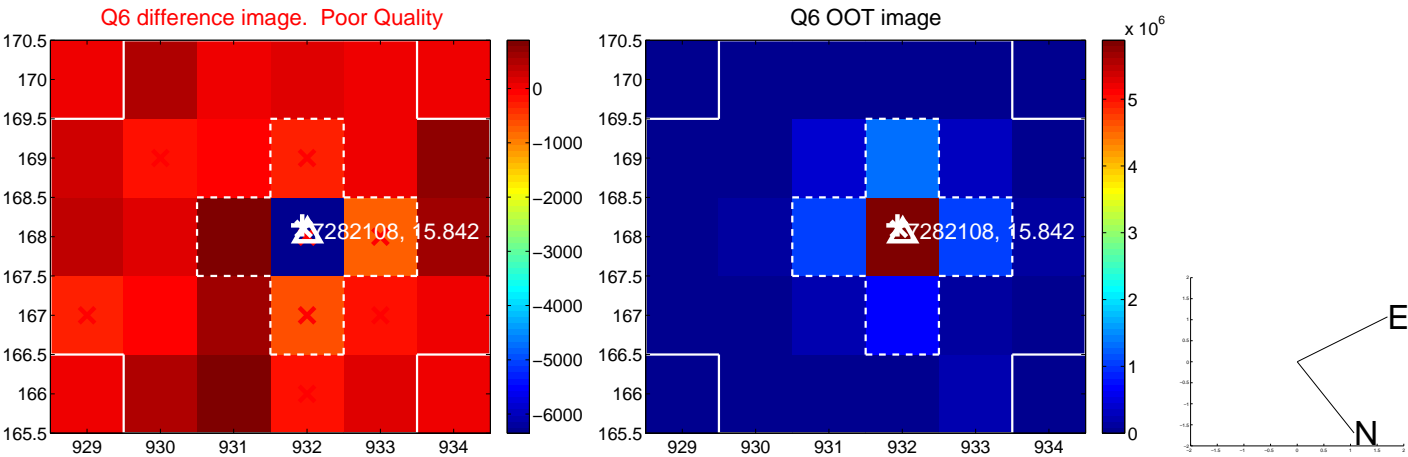
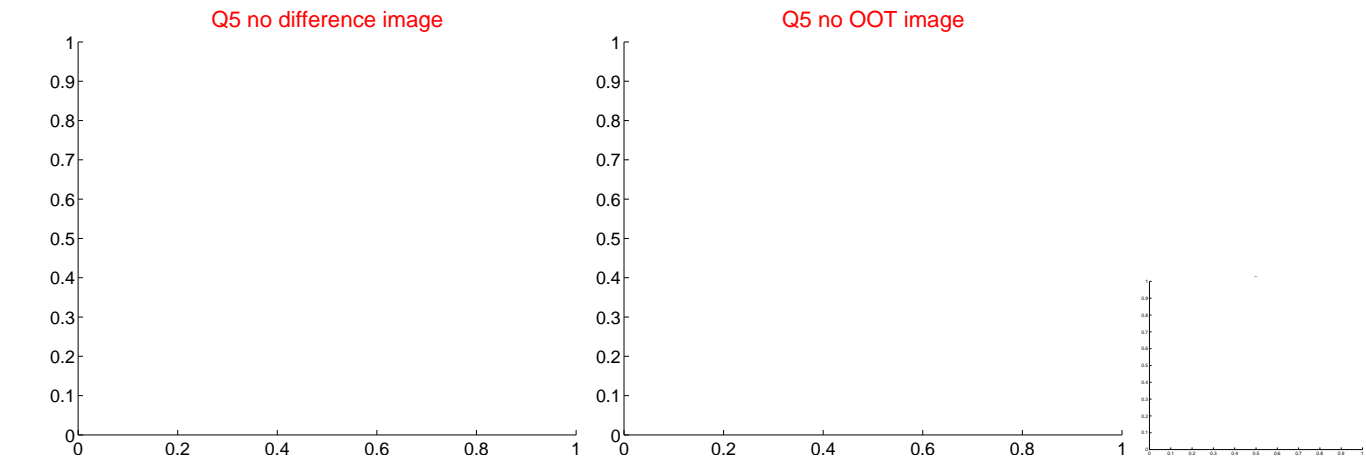
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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



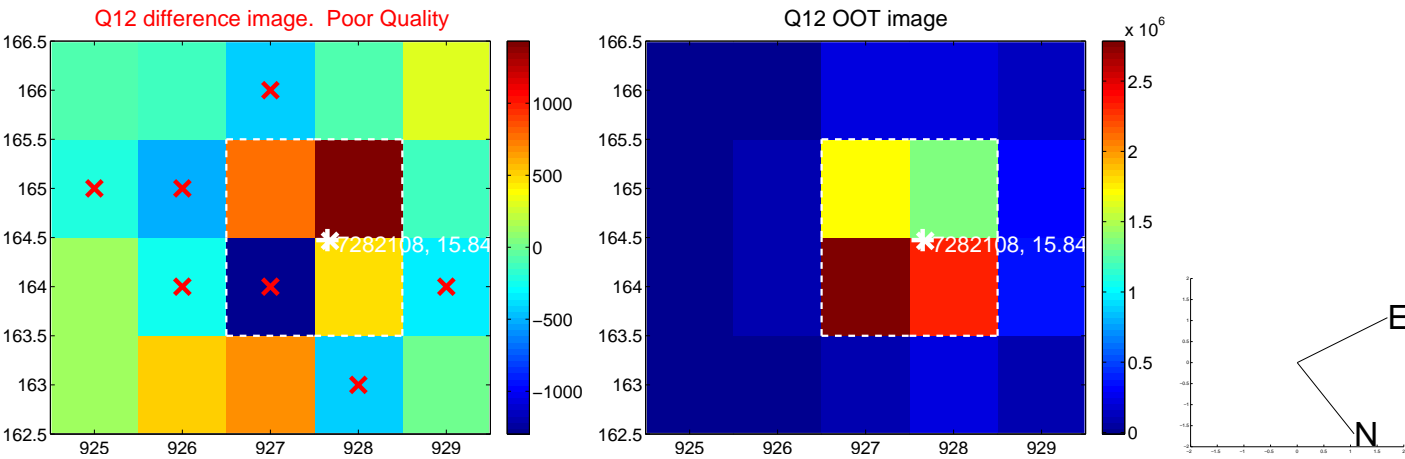
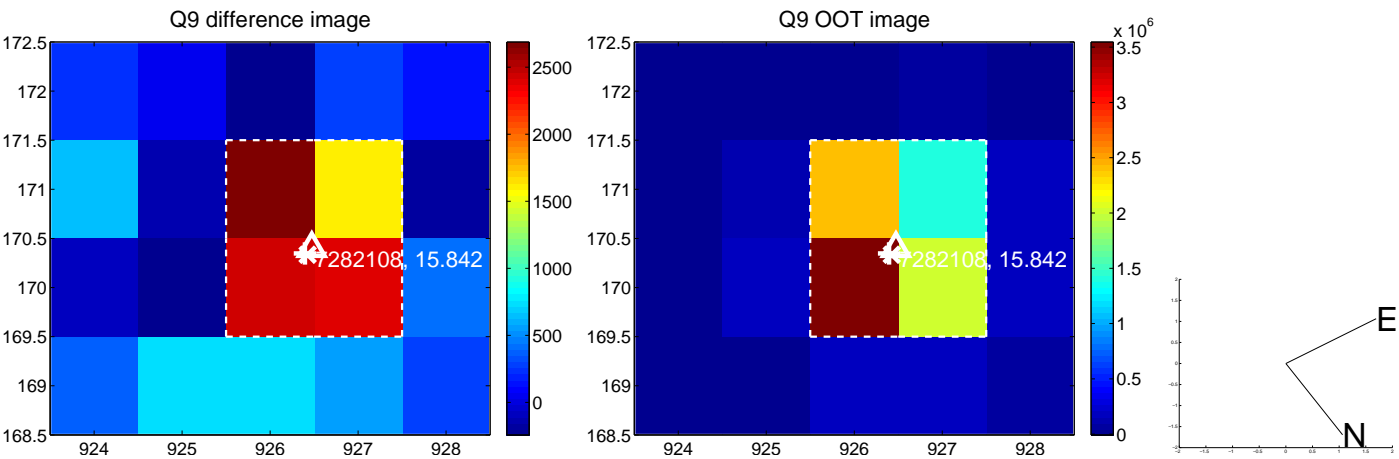
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



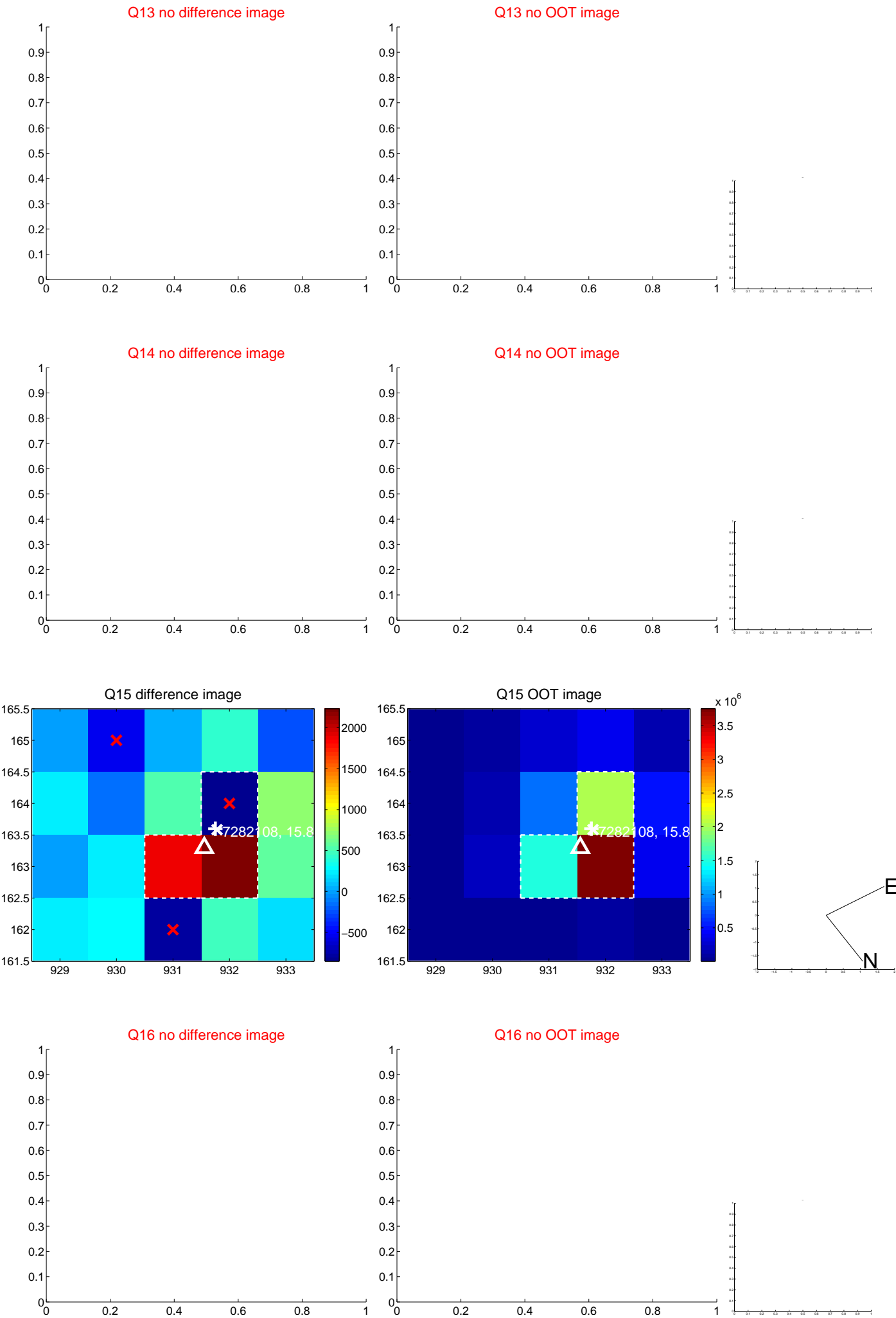
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



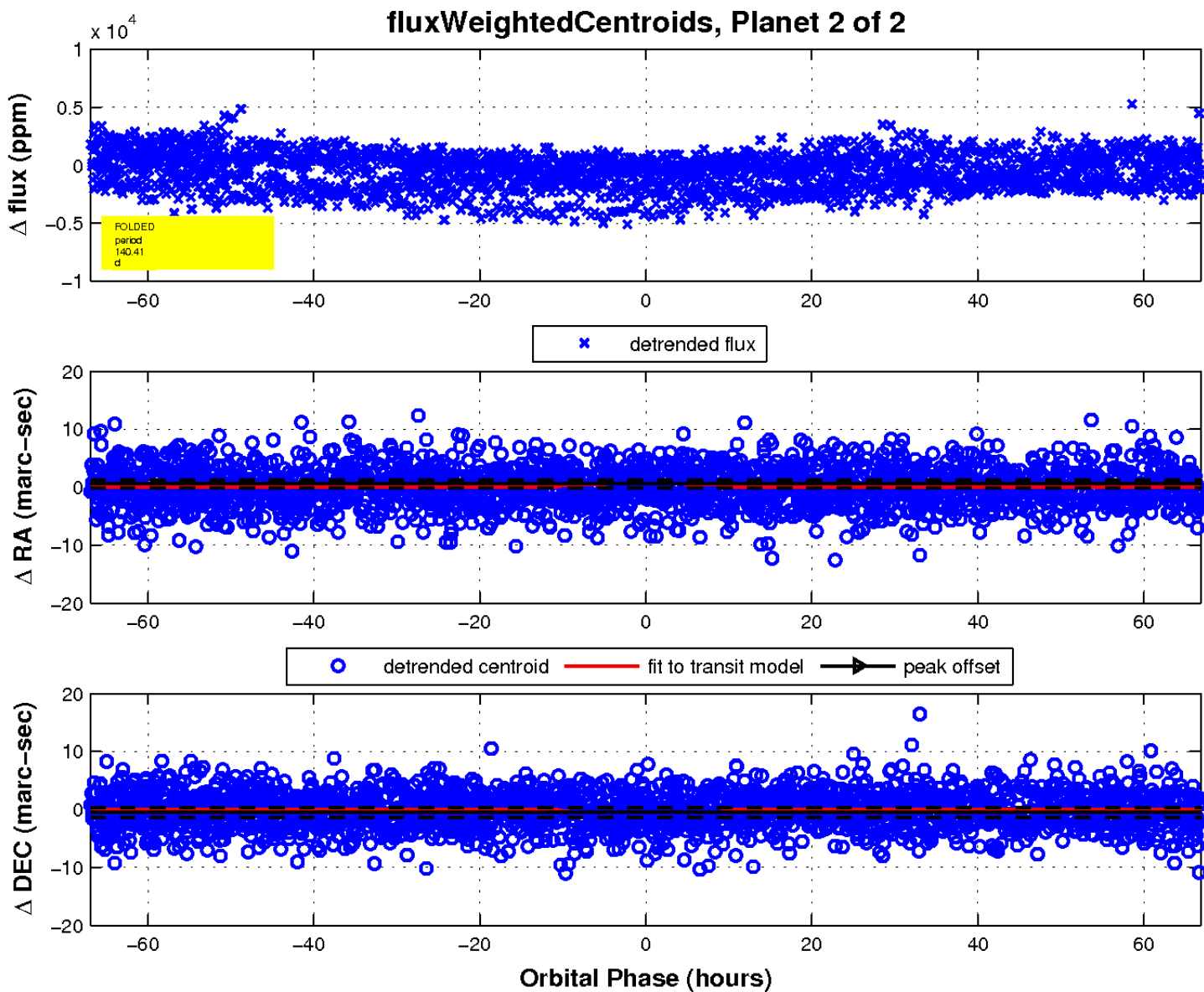
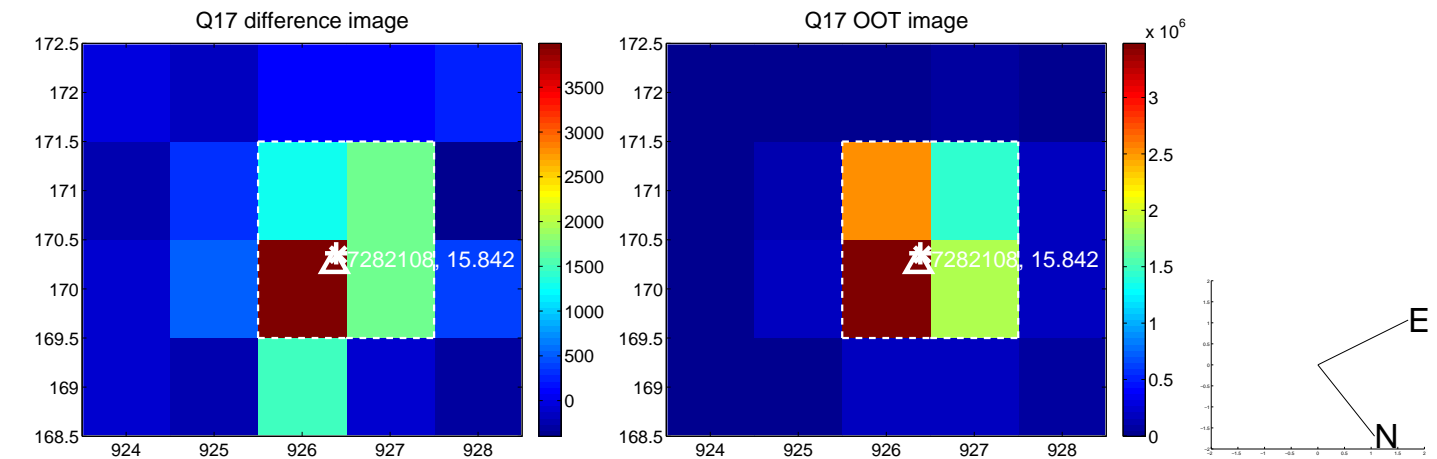
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.



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



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



# UKIRT Image

Declination

