

# KIC 007868889

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007868889-01	OBS	No	359.932350	457.105393	295.3	24.831	43.6	7.2	104.32	3834	239.31	2516.39
007868889-02	OBS	No	403.853071	283.176856	94.9	16.884	40.6	1.6	104.32	3834	102.79	2158.28
007868889-03	OBS	No	326.269464	356.375510	213.5	15.000	32.5	-1.0	104.32	3834	143.36	2868.39
007868889-04	OBS	No	507.912212	532.637597	6189.3	5.085	49.6	26.8	104.32	3834	1294.71	1589.84
007868889-05	OBS	No	313.649639	135.664594	3039.4	6.383	73.9	20.9	104.32	3834	550.34	3023.29
007868889-06	OBS	No	419.930092	256.128465	167.7	15.000	27.3	-1.0	104.32	3834	127.09	2048.82

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007868889-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
007868889-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
007868889-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
007868889-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_SKYE—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
007868889-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
007868889-06	OBS	FP	0.00	1	0	0	0	LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED

**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.

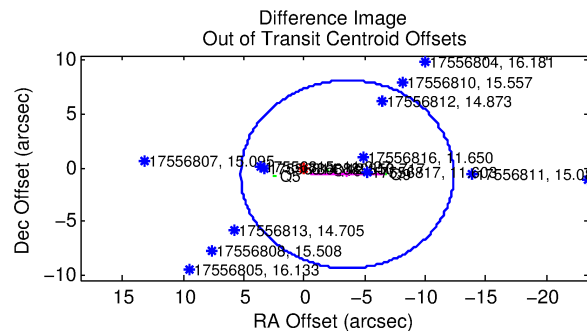
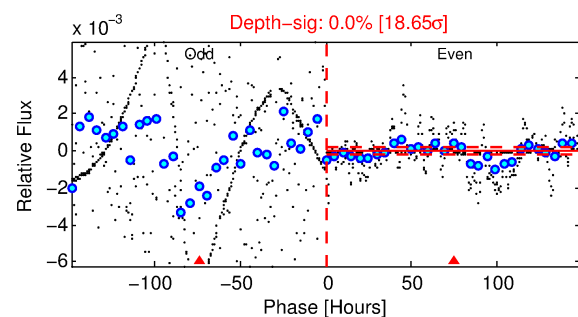
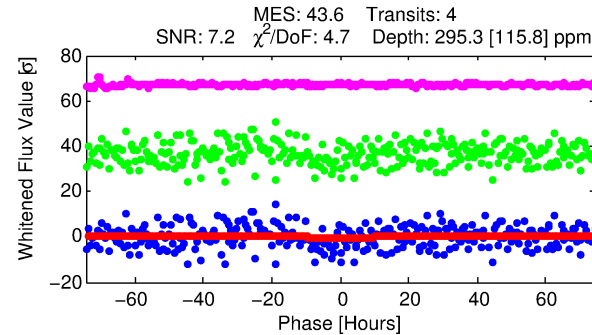
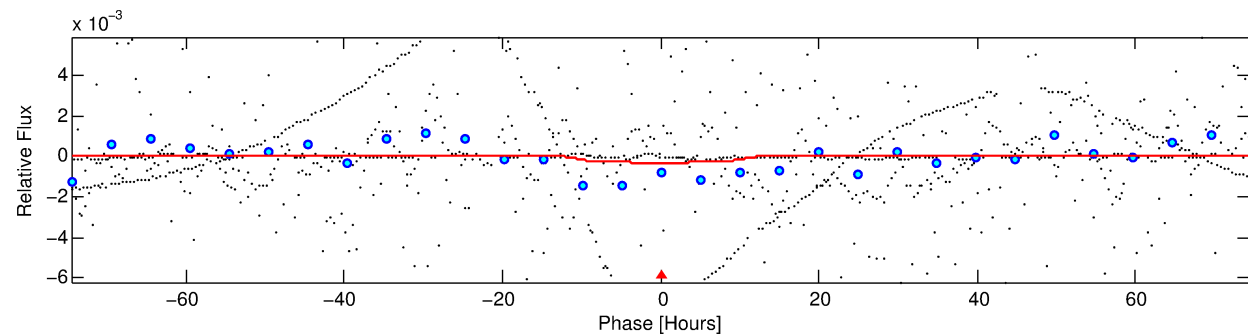
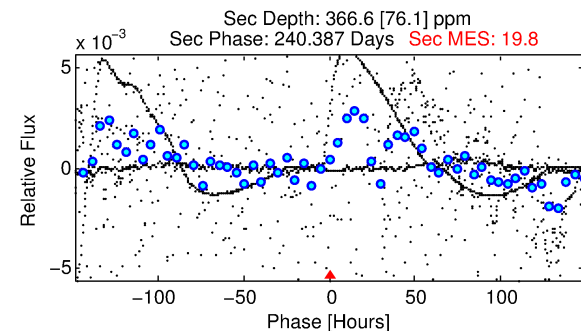
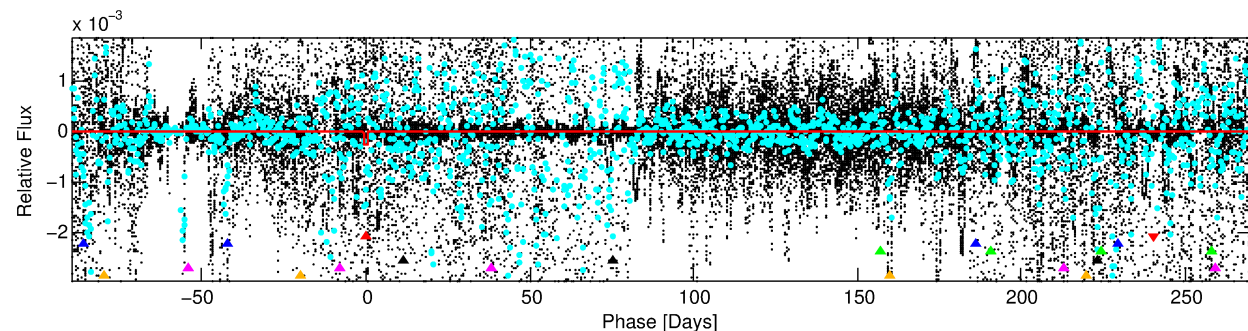
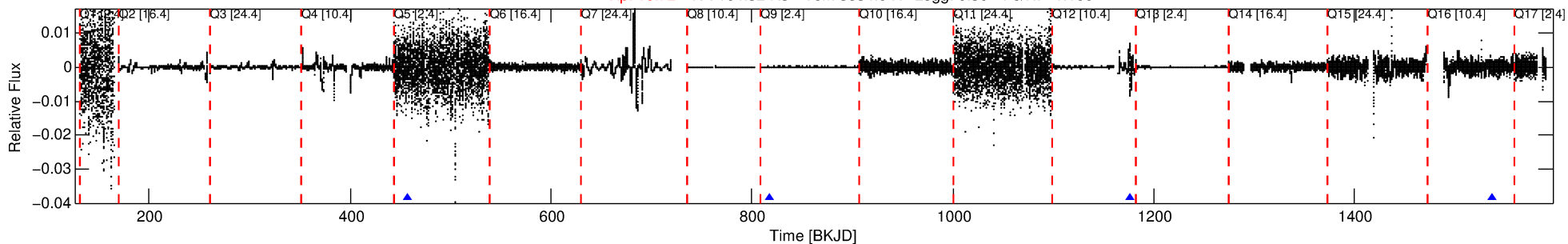
## Ephemeris Match Information For 007868889-01

No Significant Match Found

# DV One-Page Summary

KIC: 7868889 Candidate: 1 of 6 Period: 359.932 d

Kp: 10.72 R\*: 104.32 Rs Teff: 3834.0 K Logg: 0.30 Fe/H: -1.100



## DV Fit Results:

Period = 359.93235 [0.09490] d  
Epoch = 457.1054 [0.1294] BKJD  
Rp/R\* = 0.0210 [0.0044]  
a/R\* = 44.23 [15.69]  
b = 0.94 [0.05]  
Seff = 2516.39 [616.43]  
Teq = 1806 [111] K  
Rp = 239.30 [55.80] Re  
a = 0.9150 [0.1105] AU  
Ag = 2.95 [1.50] [1.30σ]  
Teffp = 3659 [441] K [4.07σ]

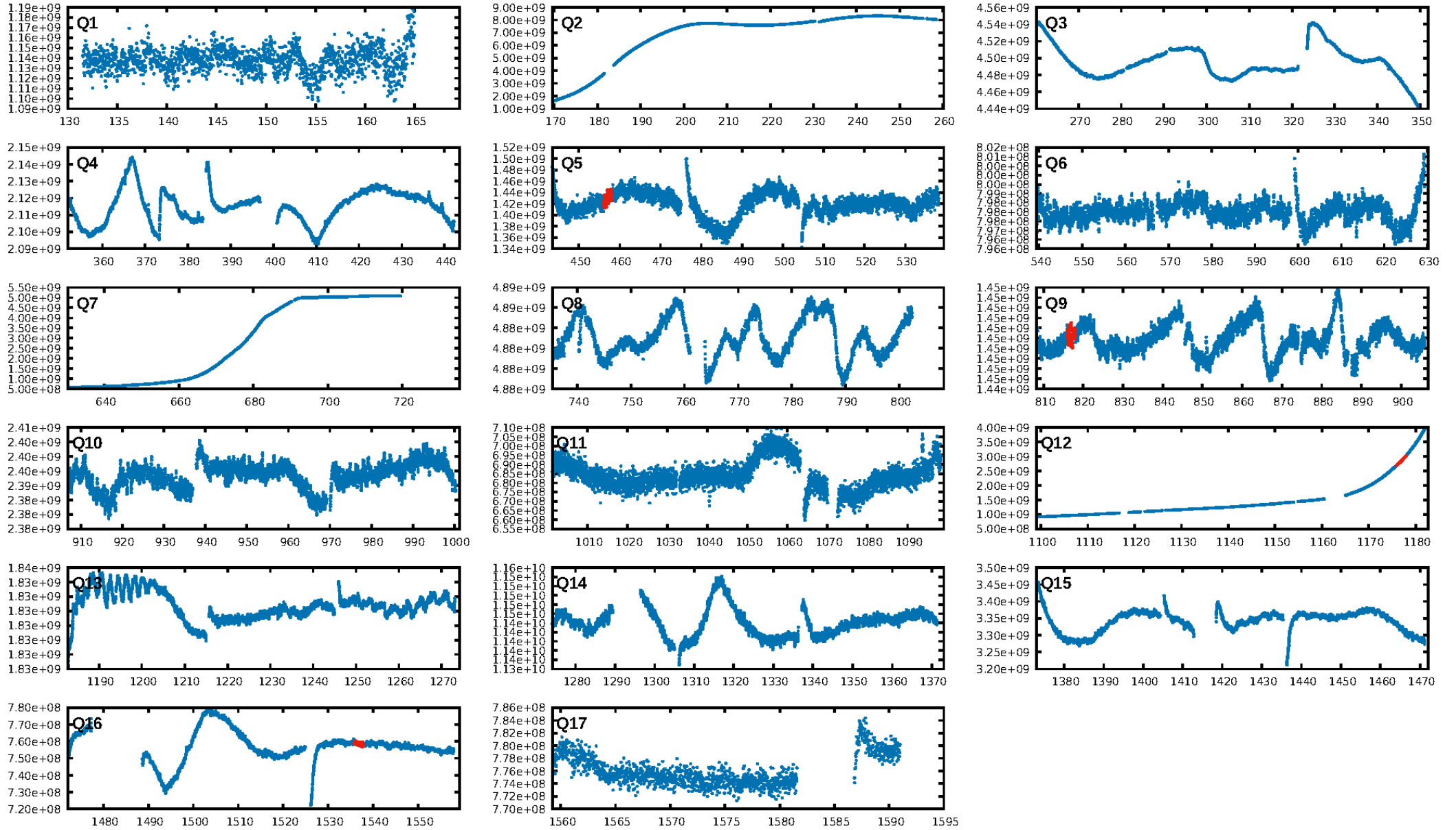
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [27.85σ]  
LongPeriod-sig: 100.0% [35.10σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 0.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: N/A  
Centroid-sig: N/A  
Centroid-so: 5.213 arcsec [2.18σ]  
OotOffset-rm: 3.602 arcsec [1.23σ]  
OotOffset-st: 0/0/1/2 [3]  
KicOffset-rm: 4.671 arcsec [1.48σ]  
KicOffset-st: 0/0/1/2 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 1.00 [3/3]

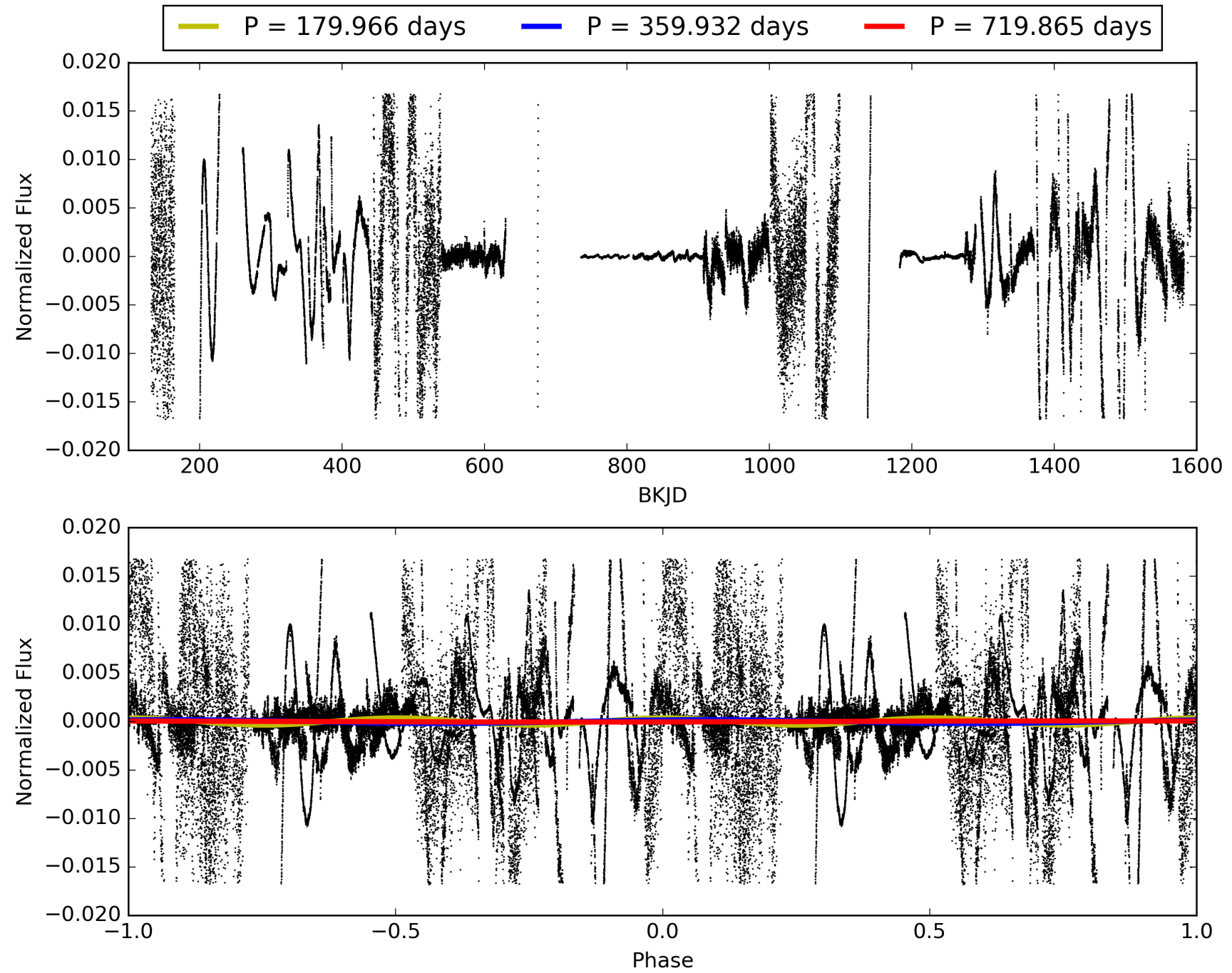
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 15:16:04 Z

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

# TCE 007868889-01, PDC Light Curves



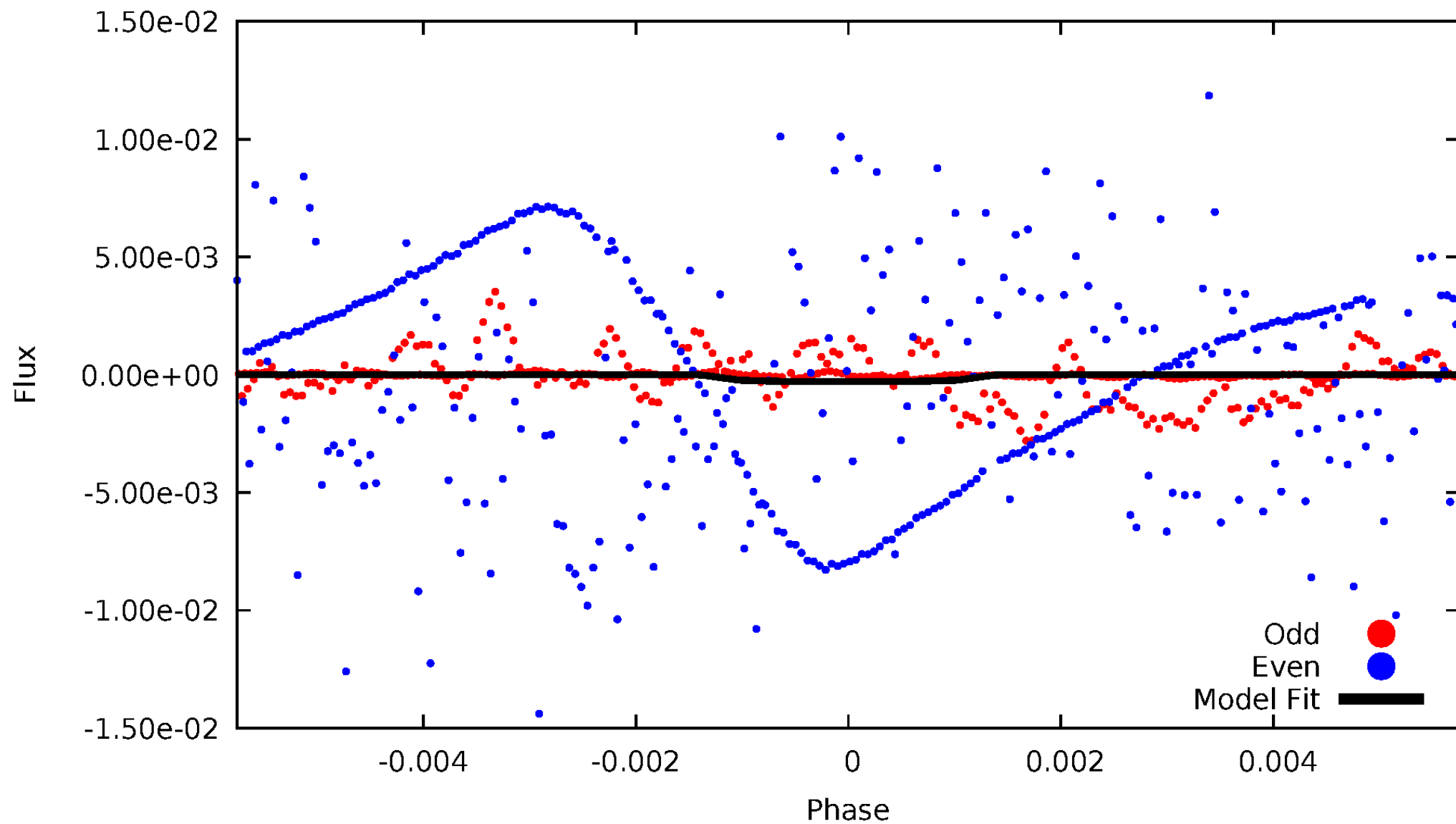
TCE 007868889-01





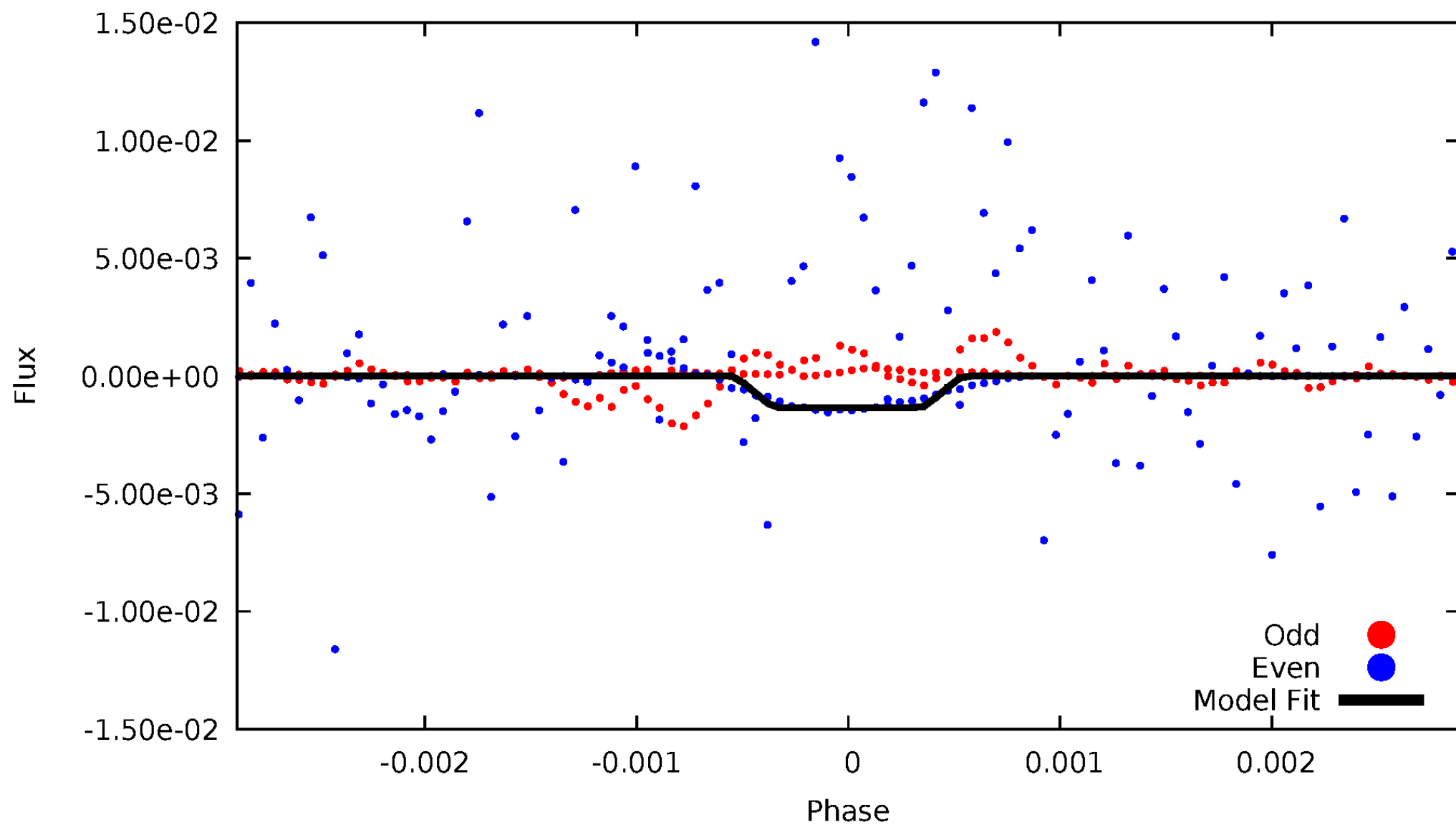
# DV Odd/Even

TCE 007868889-01



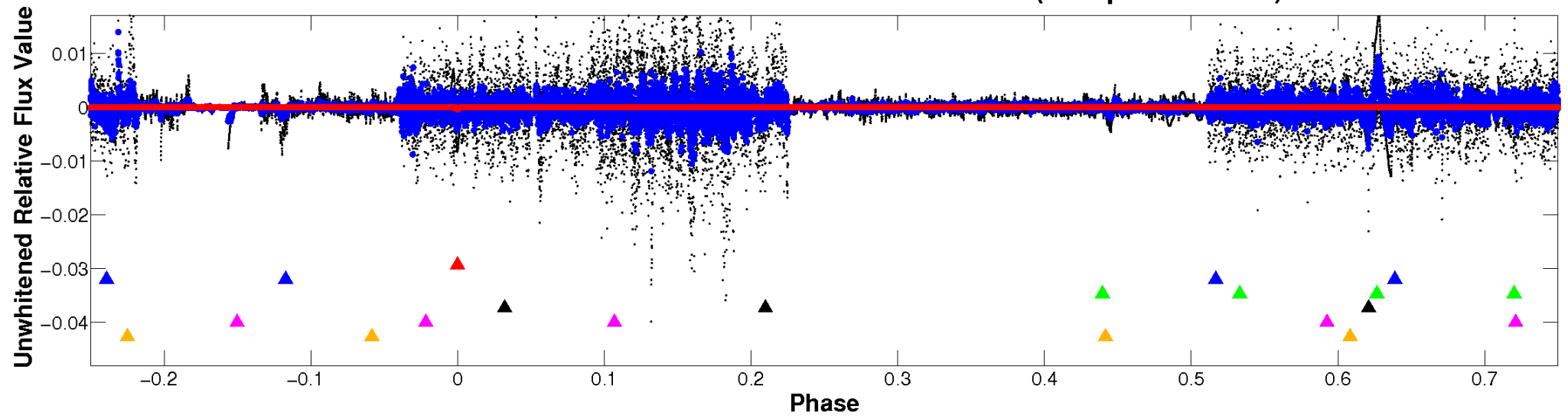
# ALT Odd/Even

TCE 007868889-01

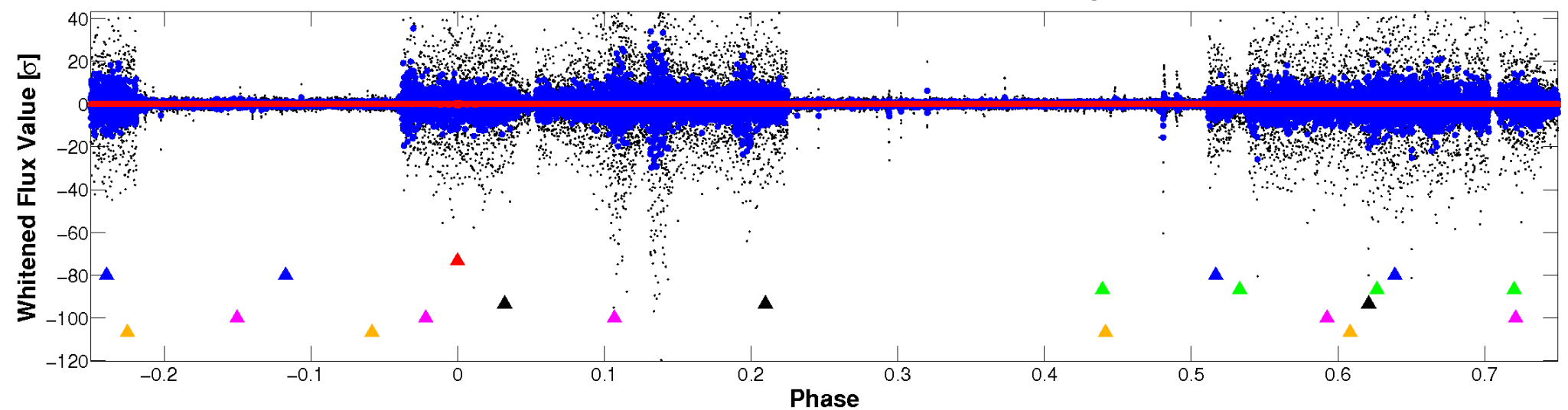


# Non-Whitened Vs. Whitened Light Curve

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

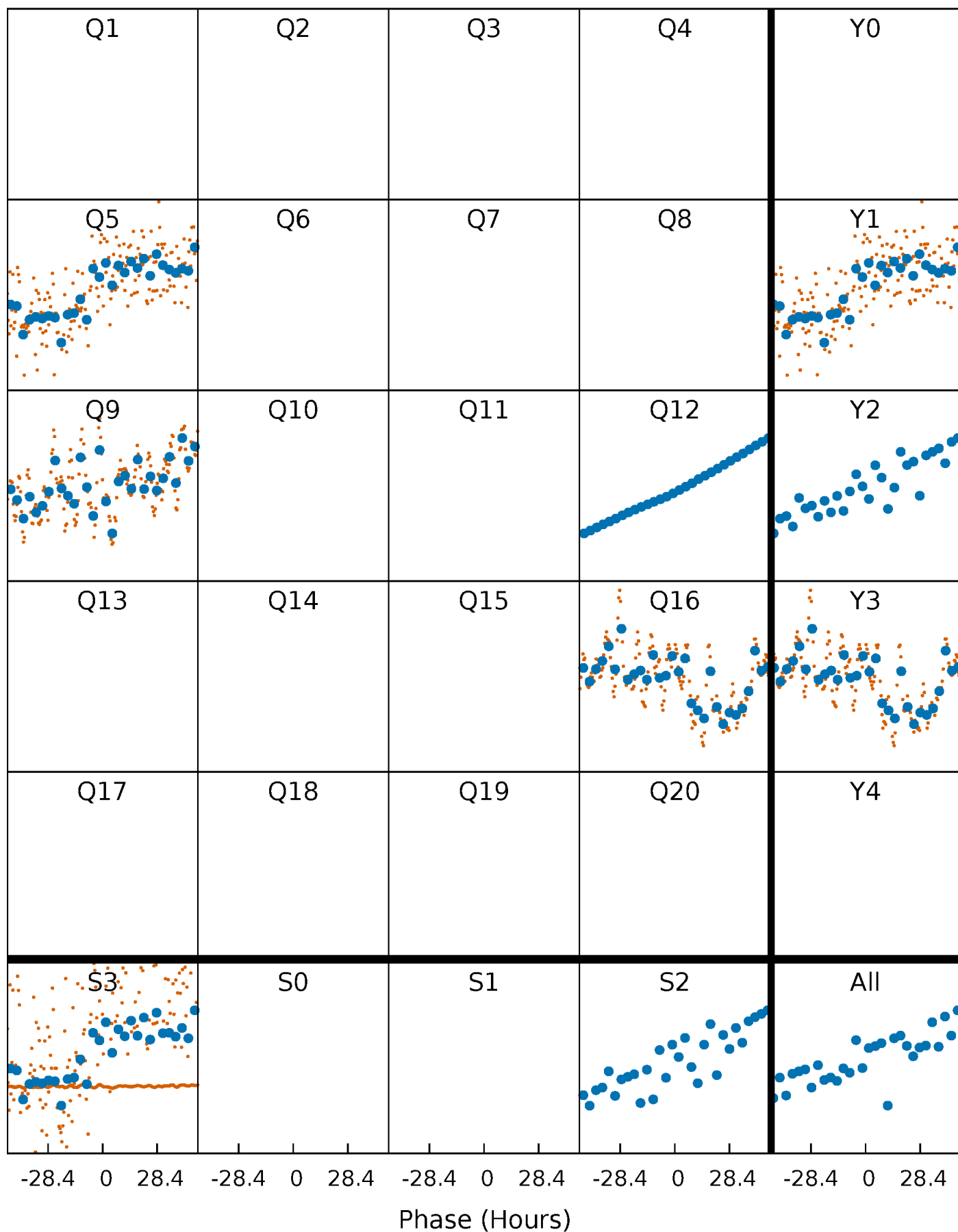


## Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



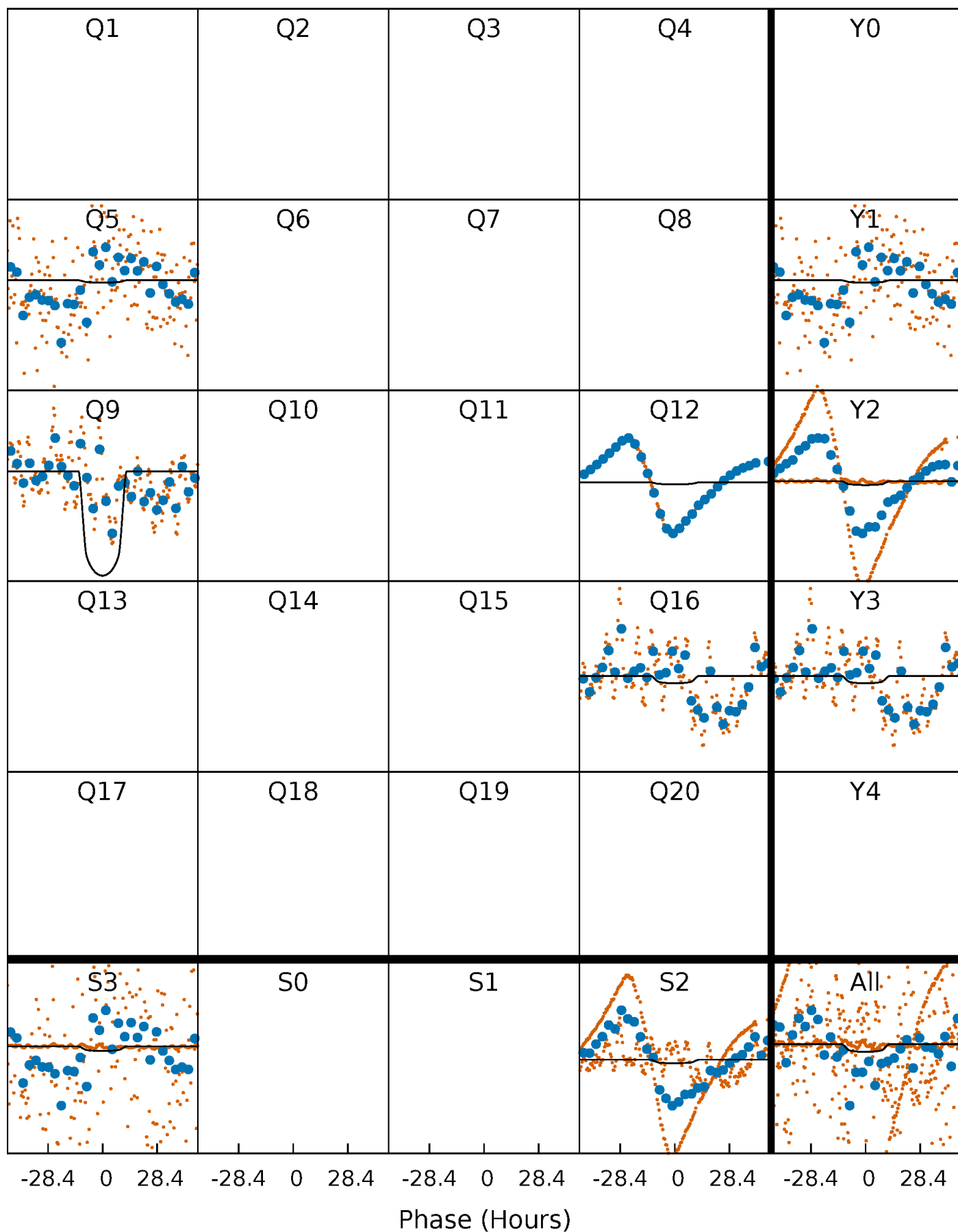
# PDC Quarter-Phased Transit Curves

TCE 007868889-01 P=359.932350 Days  $T_0=457.105393$  (BKJD)



# DV Quarter-Phased Transit Curves

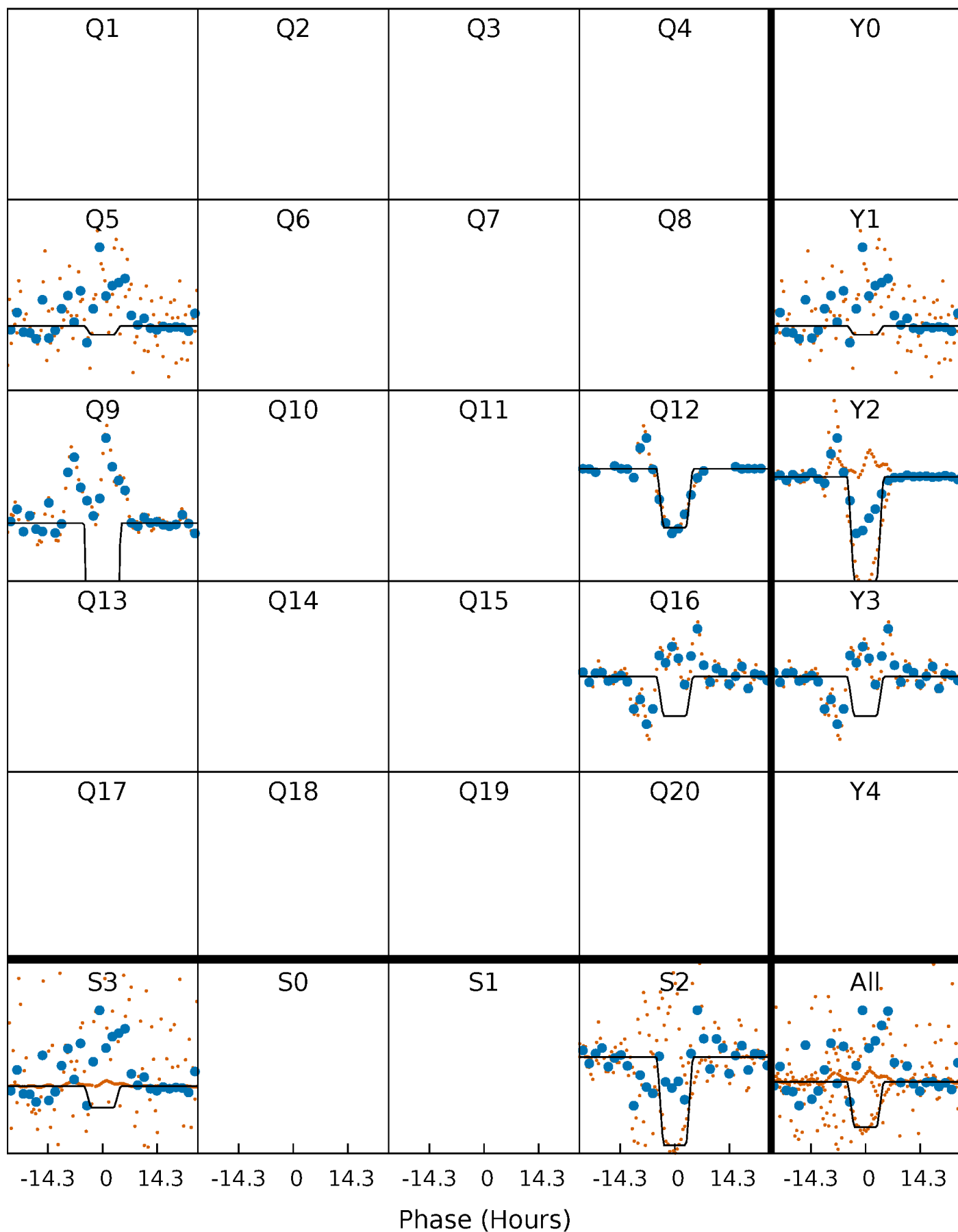
TCE 007868889-01 P=359.932350 Days  $T_0=457.105393$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

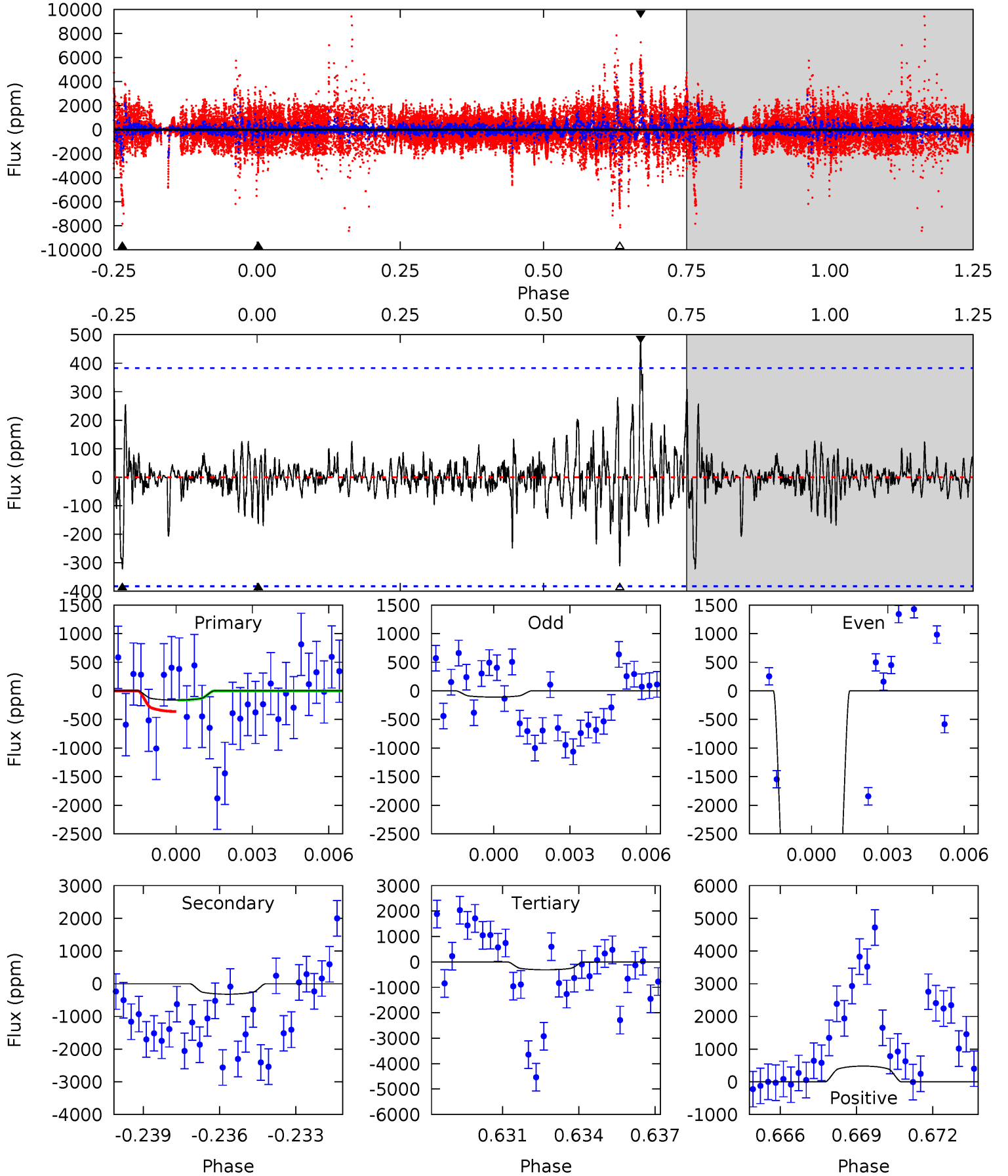
TCE 007868889-01 P=359.998460 Days  $T_0=456.931198$  (BKJD)



# DV Model-Shift Uniqueness Test

007868889-01, P = 359.932350 Days, E = 97.173043 Days

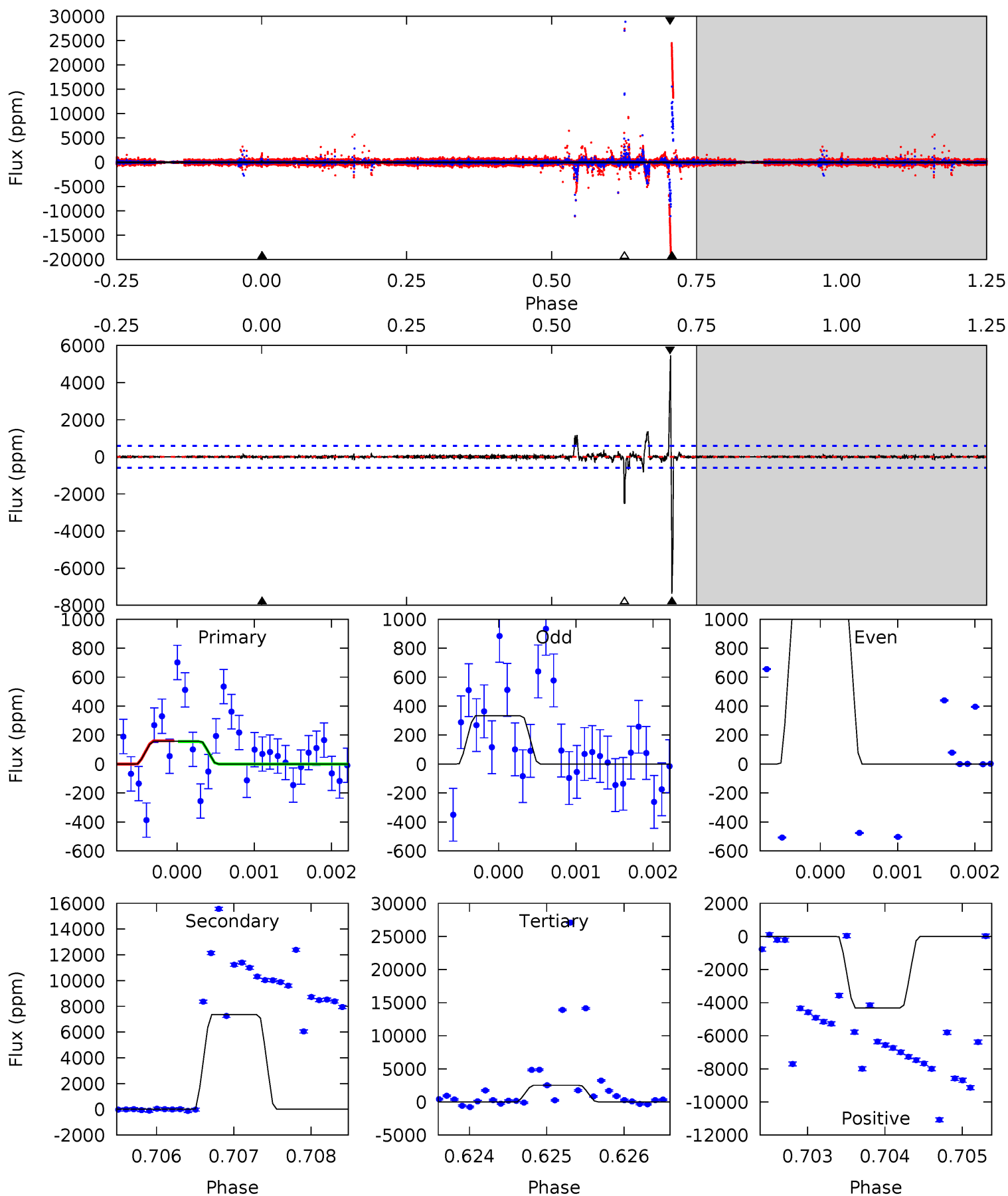
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
2.22	4.40	4.28	6.62	5.26	2.98	0.86	-2.05	-4.39	0.13	-2.21	27.1	-12.2	0.60	1.36



# Alt Model-Shift Uniqueness Test

007868889-01, P = 359.998460 Days, E = 96.932738 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
1.46	68.1	23.3	39.9	5.44	3.27	2.33	-21.8	-38.5	44.8	28.2	0.76	3.34	0.43	0.03



### Stellar Parameters For KIC 007868889

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$3834^{+123}_{-76}$	$0.298^{+0.128}_{-0.032}$	$-1.100^{+0.200}_{-0.150}$	$104.317^{+5.072}_{-10.990}$	$0.788^{+0.123}_{-0.016}$	$0.000^{+0.000}_{-0.000}$
	+3%/-2%	+43%/-11%	+18%/-14%	+5%/-11%	+16%/-2%	+50%/-12%
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 007868889-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-321 \pm 73$	$235.77^{+48.09}_{-51.85}$	$2503^{+82}_{-99}$	$3573^{+375}_{-281}$	$2.702^{+1.895}_{-0.968}$
Alt.	$-7364 \pm 108$	$409.89^{+56.62}_{-52.65}$	$2500^{+85}_{-92}$	$5357^{+385}_{-314}$	$21^{+7}_{-4}$

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

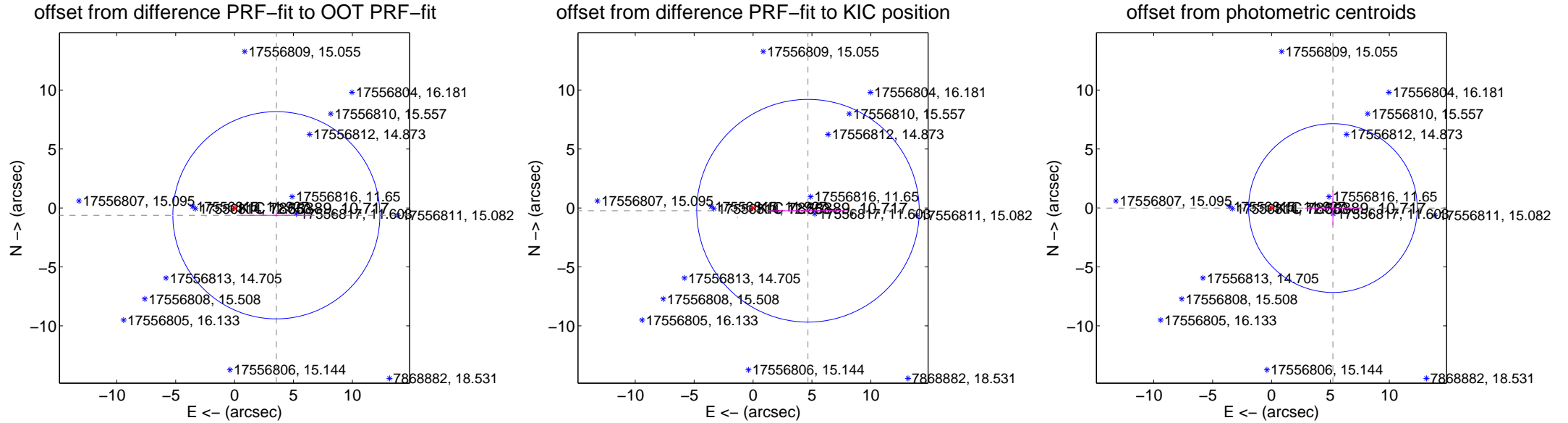
## DV Centroid Data

Supplemental centroid analysis for 007868889-01. **Kepler magnitude: 10.72.** Transit SNR 7.23

**There are 2 quarters with good PRF difference image offsets**

The direct PRF centroid is offset from the target star catalog position by about 0.51 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$3.602 \pm 2.929$	1.23	$-3.549 \pm 2.974$	$-0.620 \pm 0.131$
PRF-fit source offset from KIC position	$4.671 \pm 3.148$	1.48	$-4.665 \pm 3.152$	$-0.236 \pm 0.301$
photometric centroid source offset	$5.21 \pm 2.39$	2.18	$-5.21 \pm 2.39$	$-0.01 \pm 1.45$



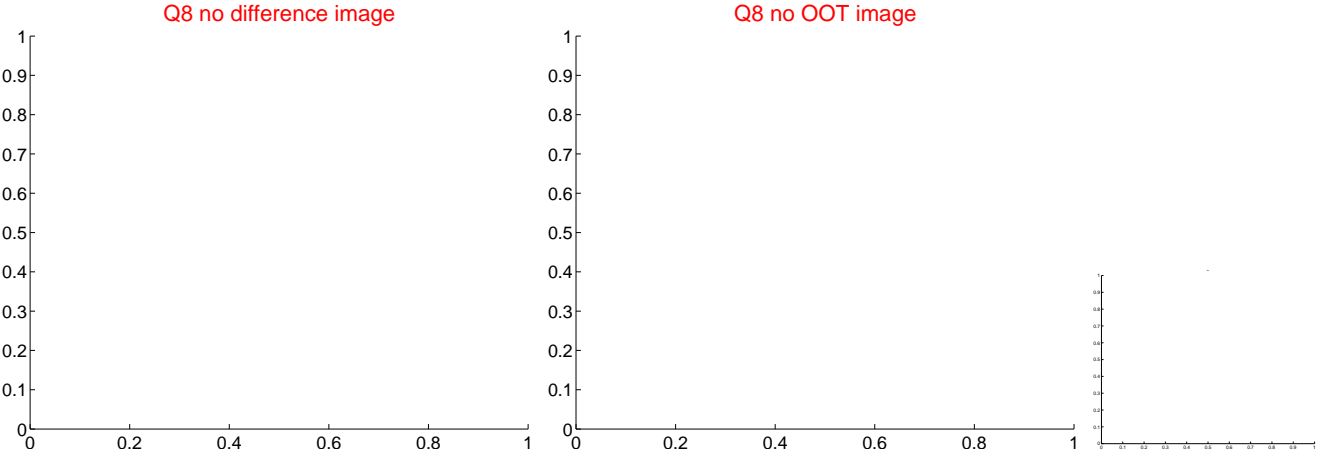
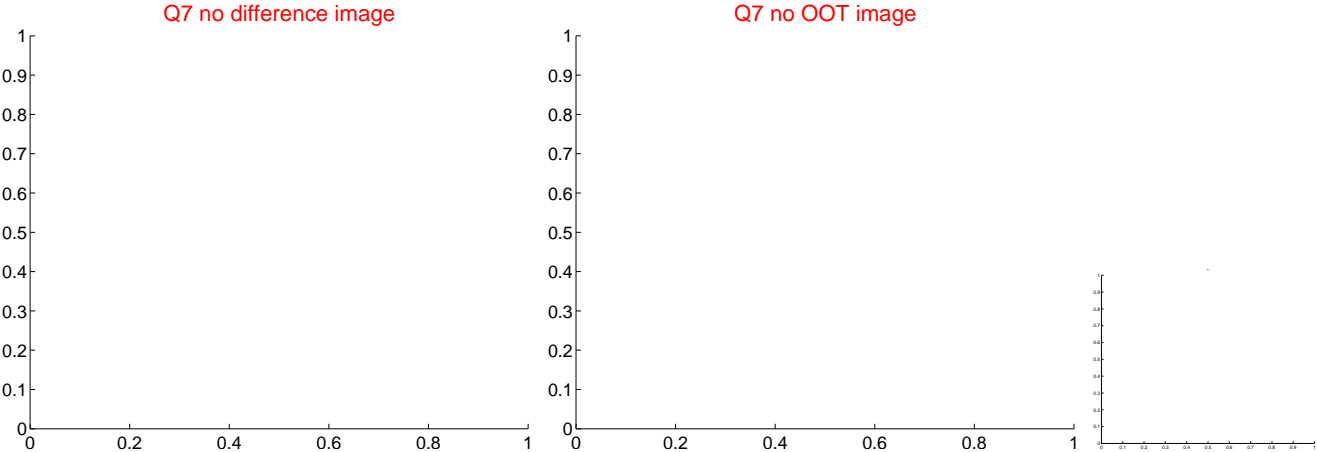
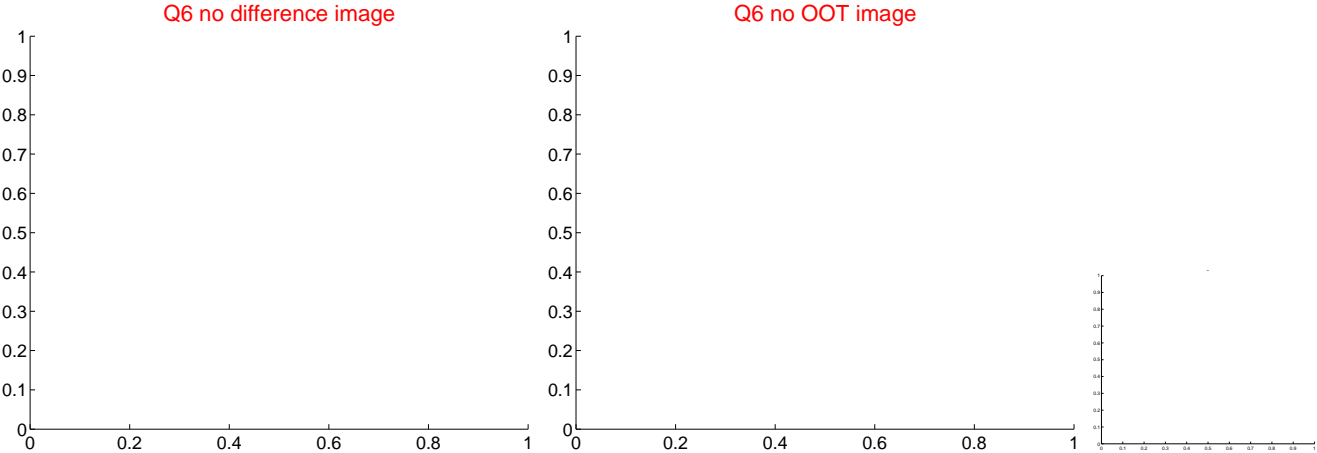
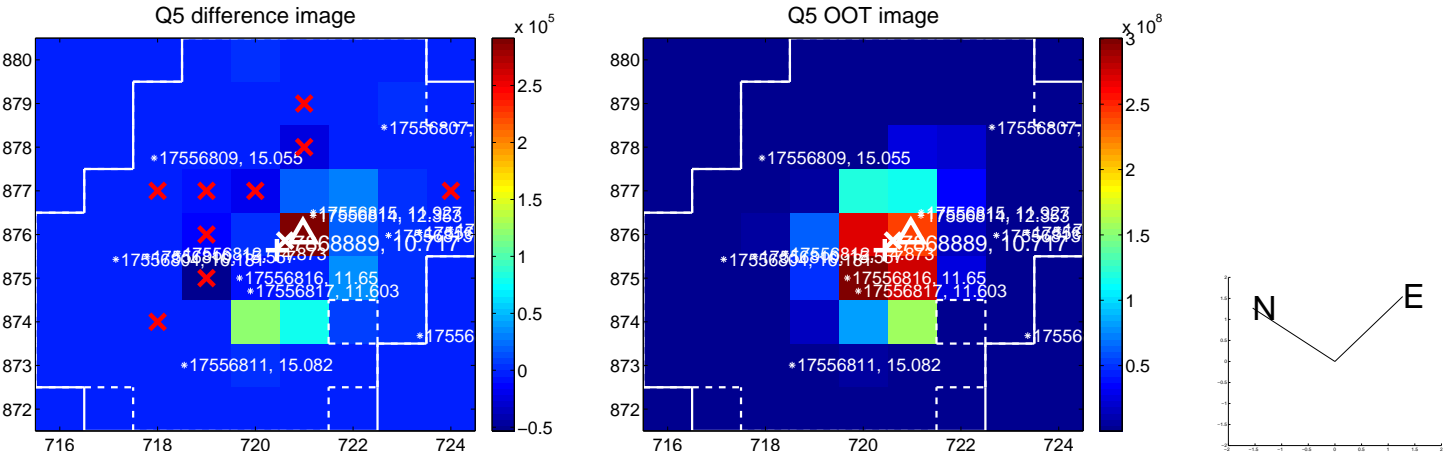
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



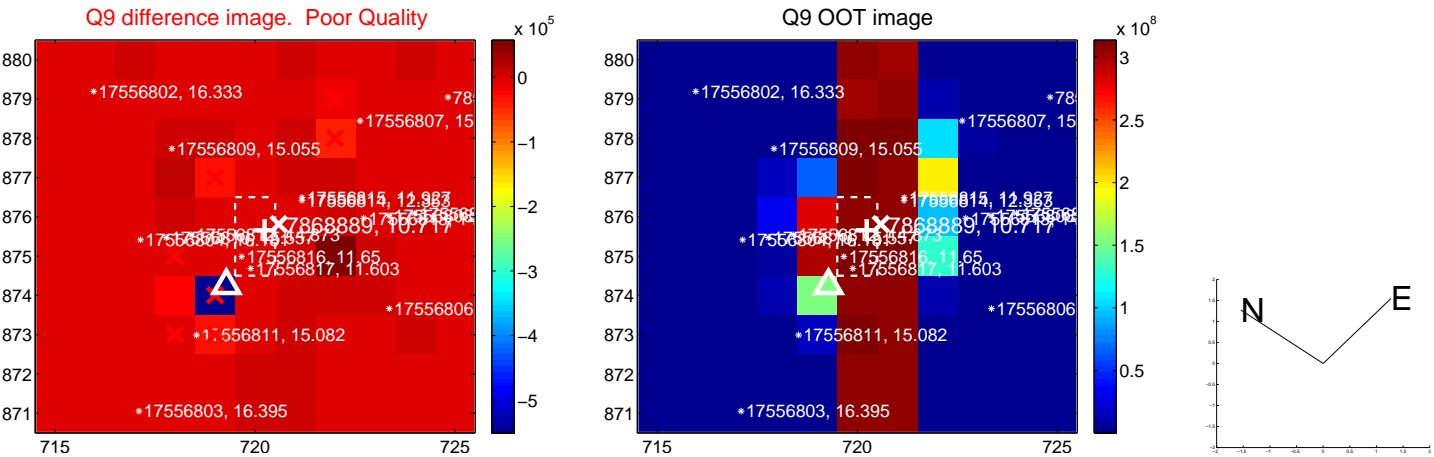
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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.



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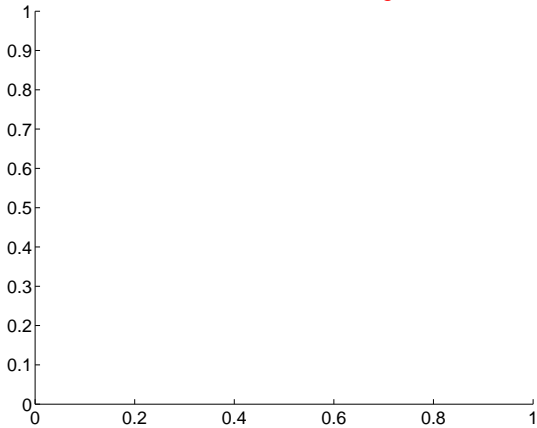
Q13 no difference image



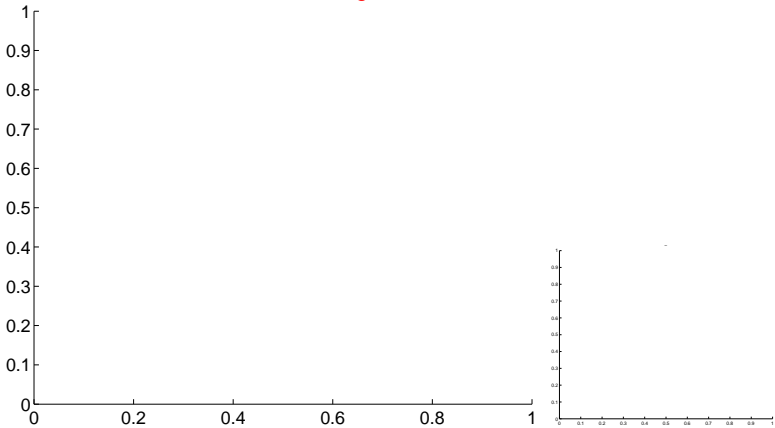
Q13 no OOT image



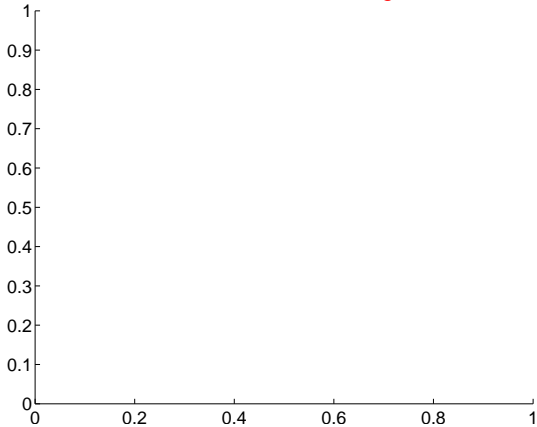
Q14 no difference image



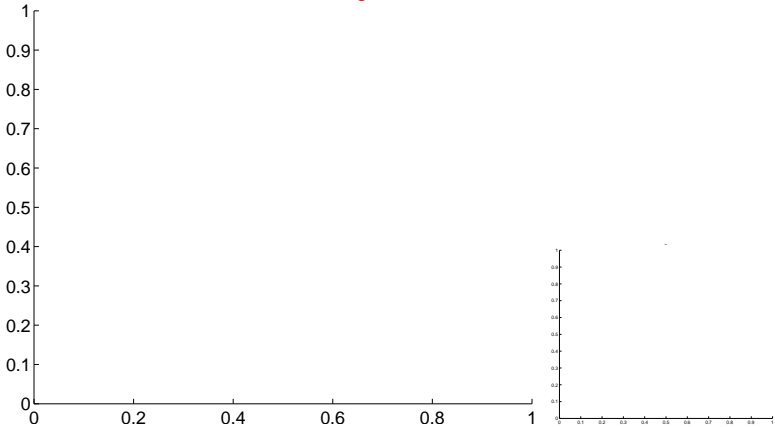
Q14 no OOT image



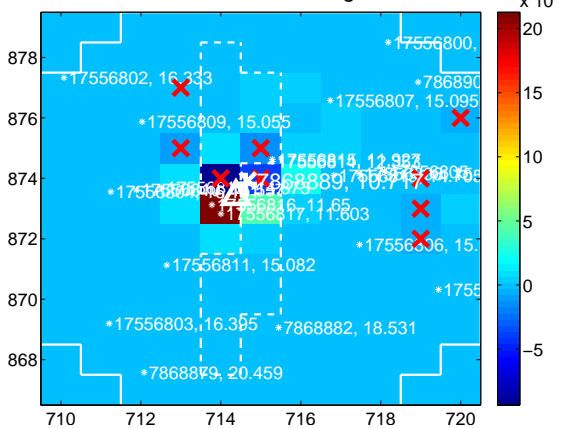
Q15 no difference image



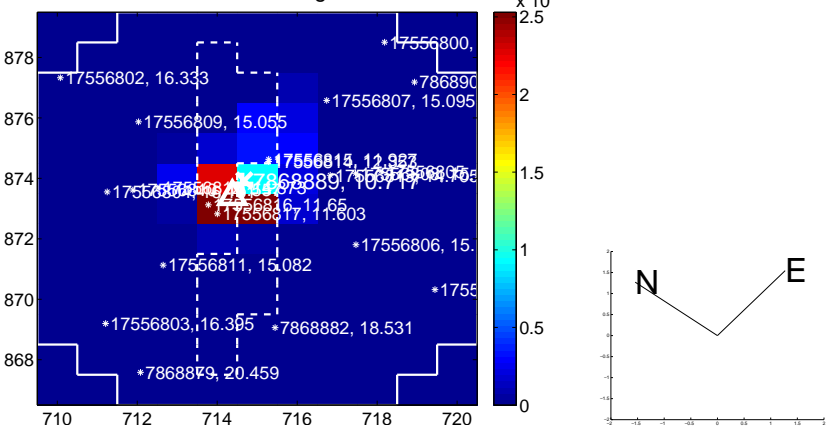
Q15 no OOT image



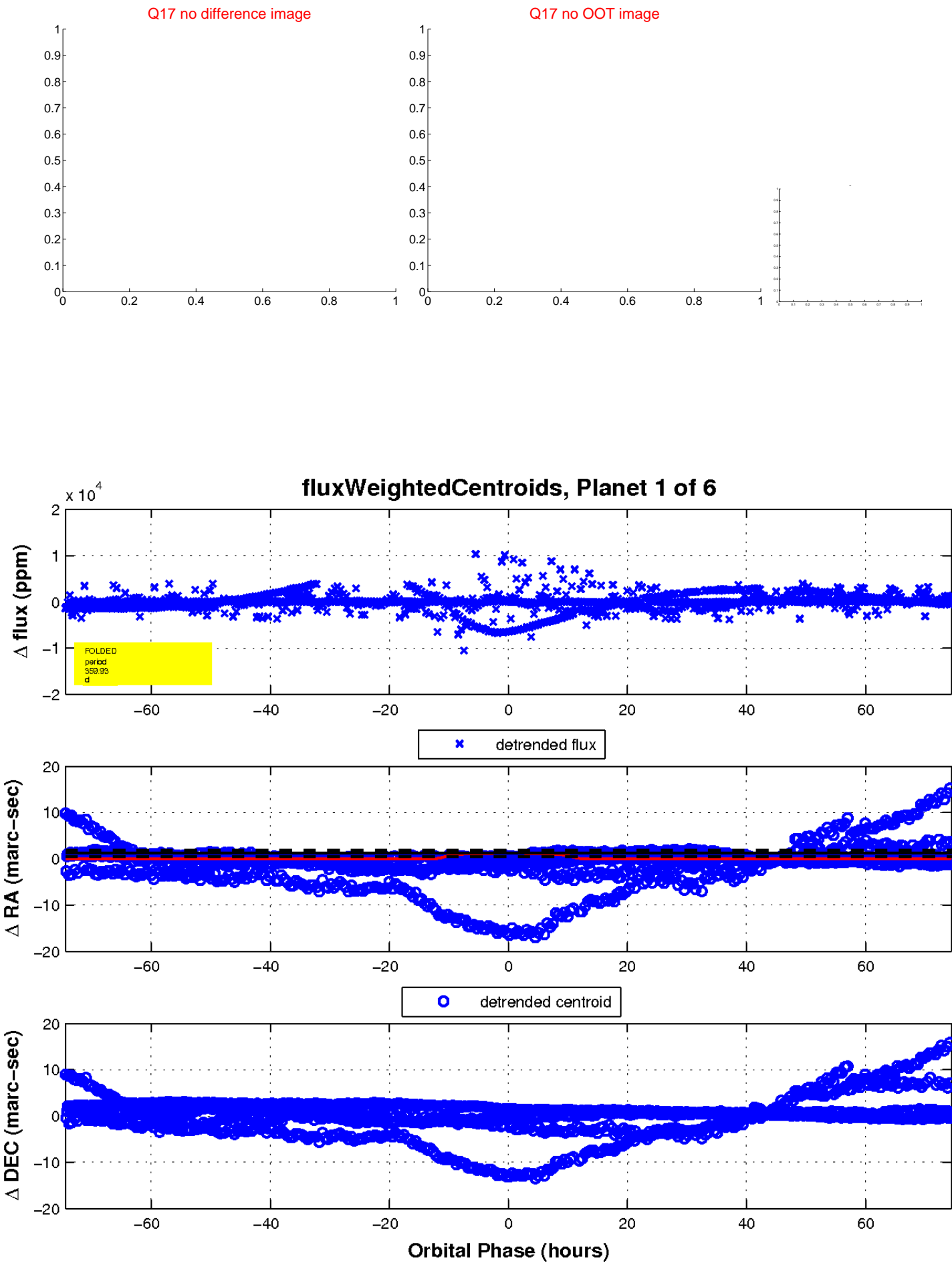
Q16 difference image



Q16 OOT image

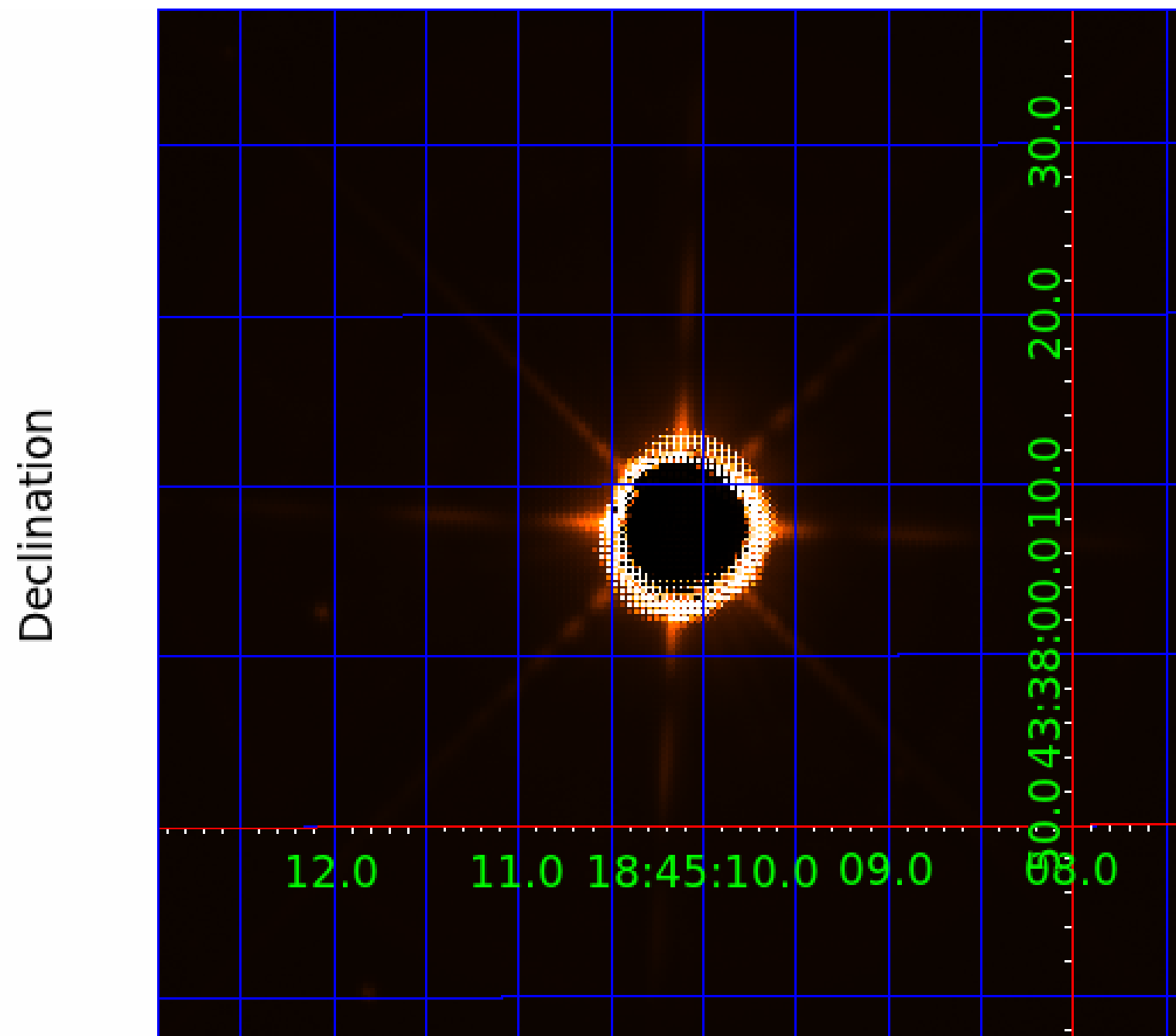


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image



## KIC 007868889

## 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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007868889-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
007868889-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
007868889-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_SKYE—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
007868889-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
007868889-06	OBS	FP	0.00	1	0	0	0	LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED

**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.

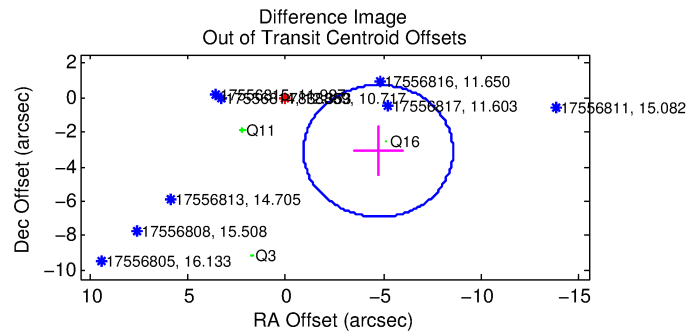
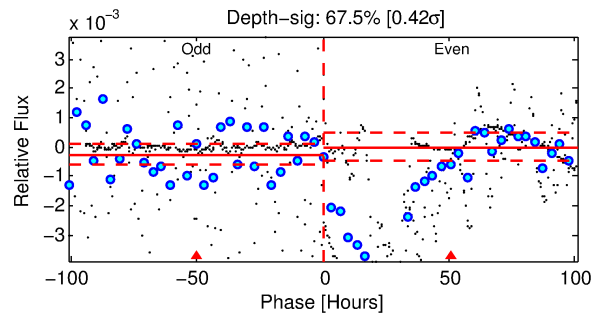
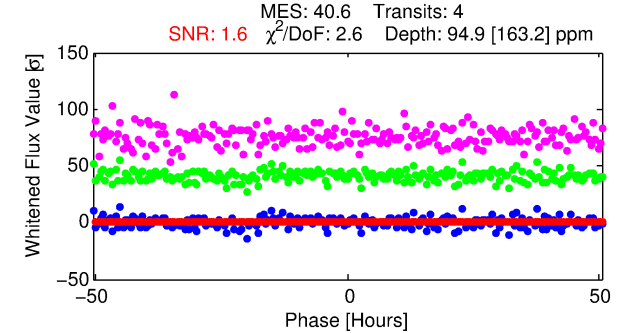
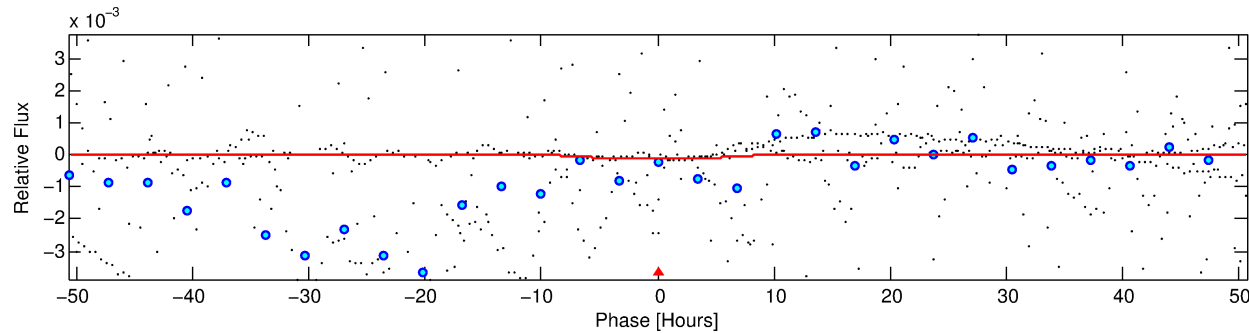
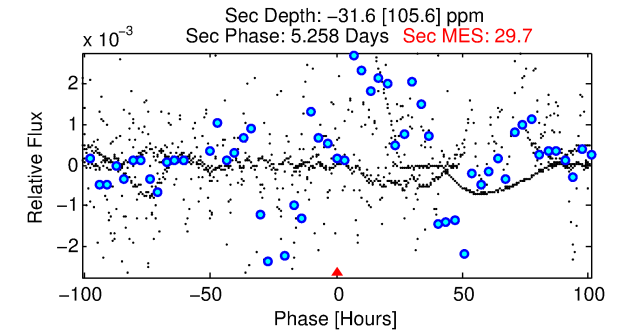
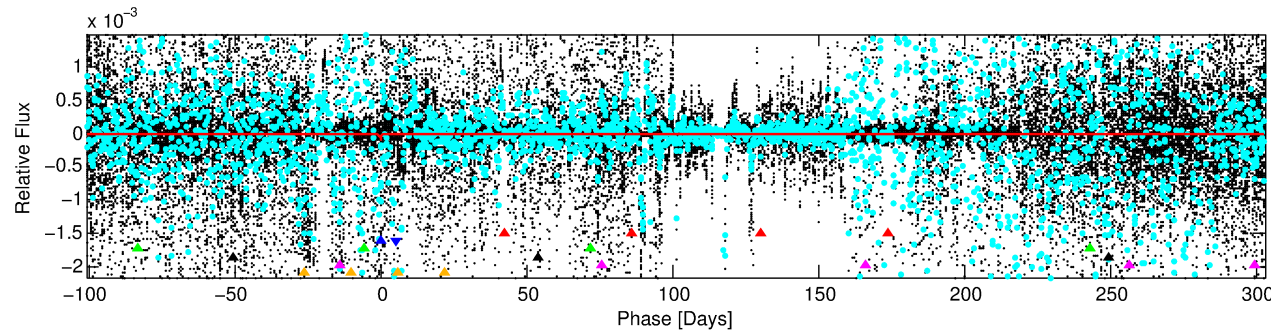
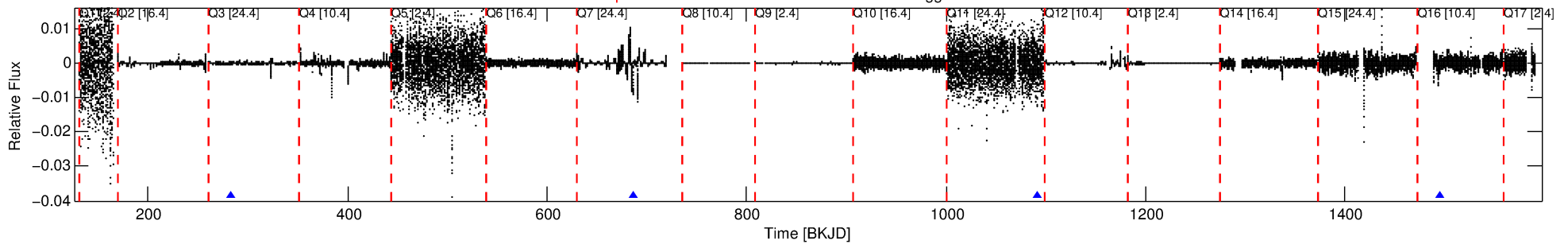
## Ephemeris Match Information For 007868889-02

No Significant Match Found

# DV One-Page Summary

KIC: 7868889 Candidate: 2 of 6 Period: 403.853 d

Kp: 10.72 R\*: 104.32 Rs Teff: 3834.0 K Logg: 0.30 Fe/H: -1.100



## DV Fit Results:

Period = 403.85307 [0.08184] d  
Epoch = 283.1769 [0.0760] BKJD  
Rp/R\* = 0.0090 [0.0231]  
a/R\* = 153.28 [1135.25]  
b = 0.56 [9.20]  
Seff = 2158.28 [528.70]  
Teq = 1738 [106] K  
Rp = 102.79 [262.62] Re  
a = 0.9880 [0.1193] AU  
Ag = N/A  
Teffp = N/A

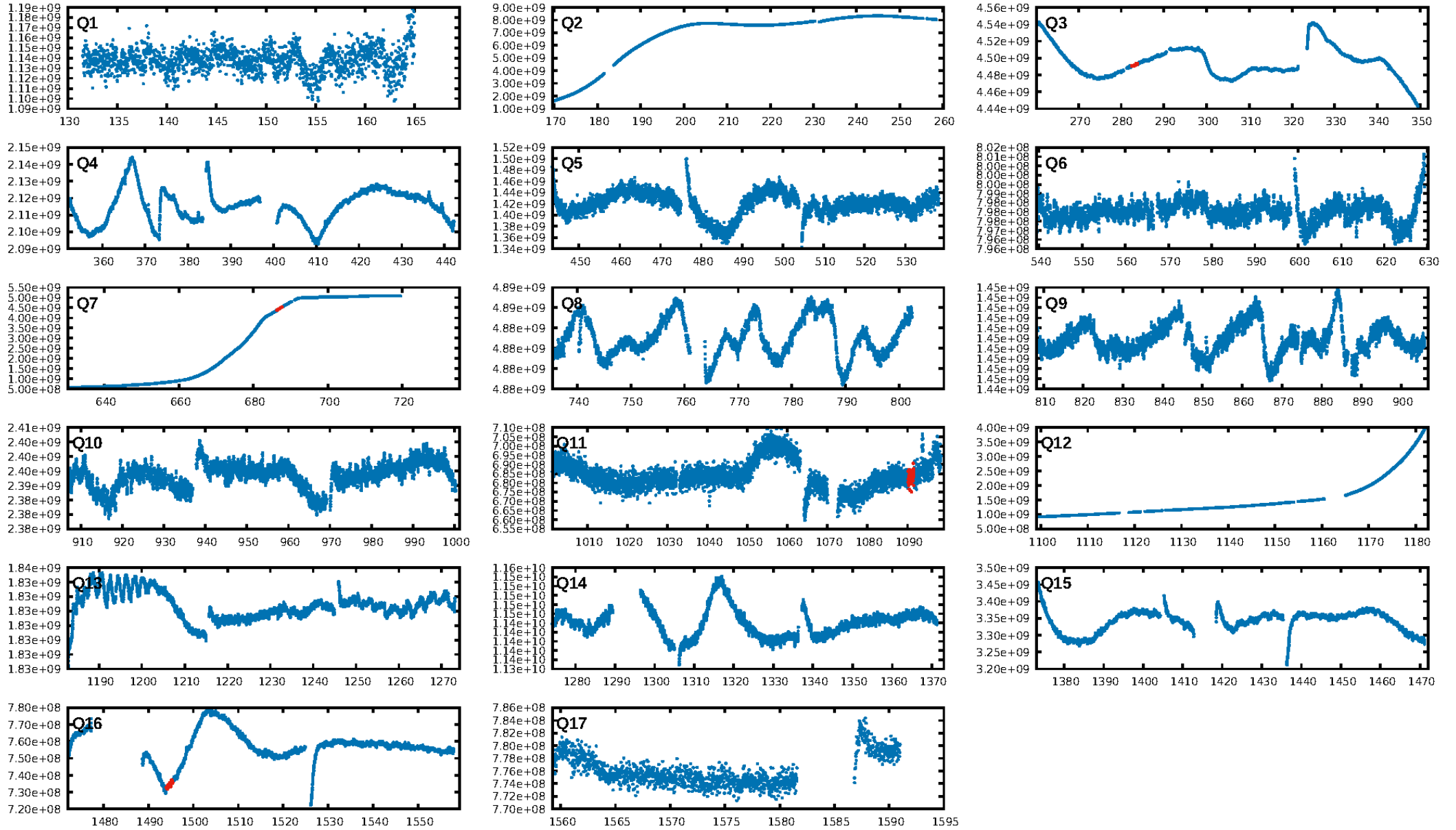
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [35.10σ]  
LongPeriod-sig: 100.0% [17.08σ]  
ModelChiSquare2-sig: 2.1%  
ModelChiSquareGof-sig: 0.4%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: N/A  
Centroid-sig: N/A  
Centroid-so: 28.002 arcsec [2.14σ]  
OotOffset-rm: 5.660 arcsec [4.44σ]  
KicOffset-rm: 8.612 arcsec [3.09σ]  
OotOffset-st: 0/2/1/0 [3]  
KicOffset-st: 0/2/1/0 [3]  
DiffImageQuality-fgm: 0.00 [0/3]  
DiffImageOverlap-fno: 1.00 [4/4]

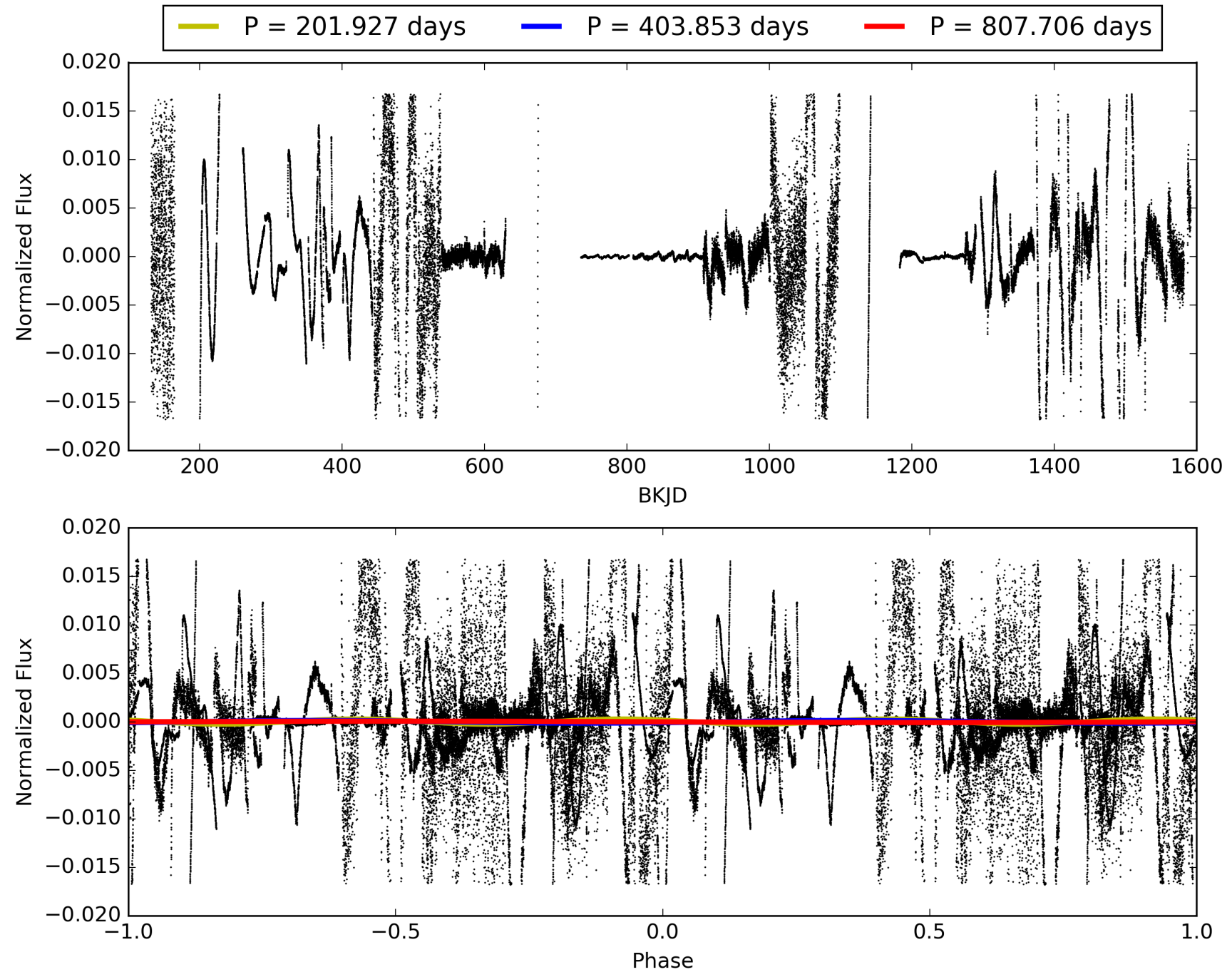
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 15:16:12 Z

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

# TCE 007868889-02, PDC Light Curves



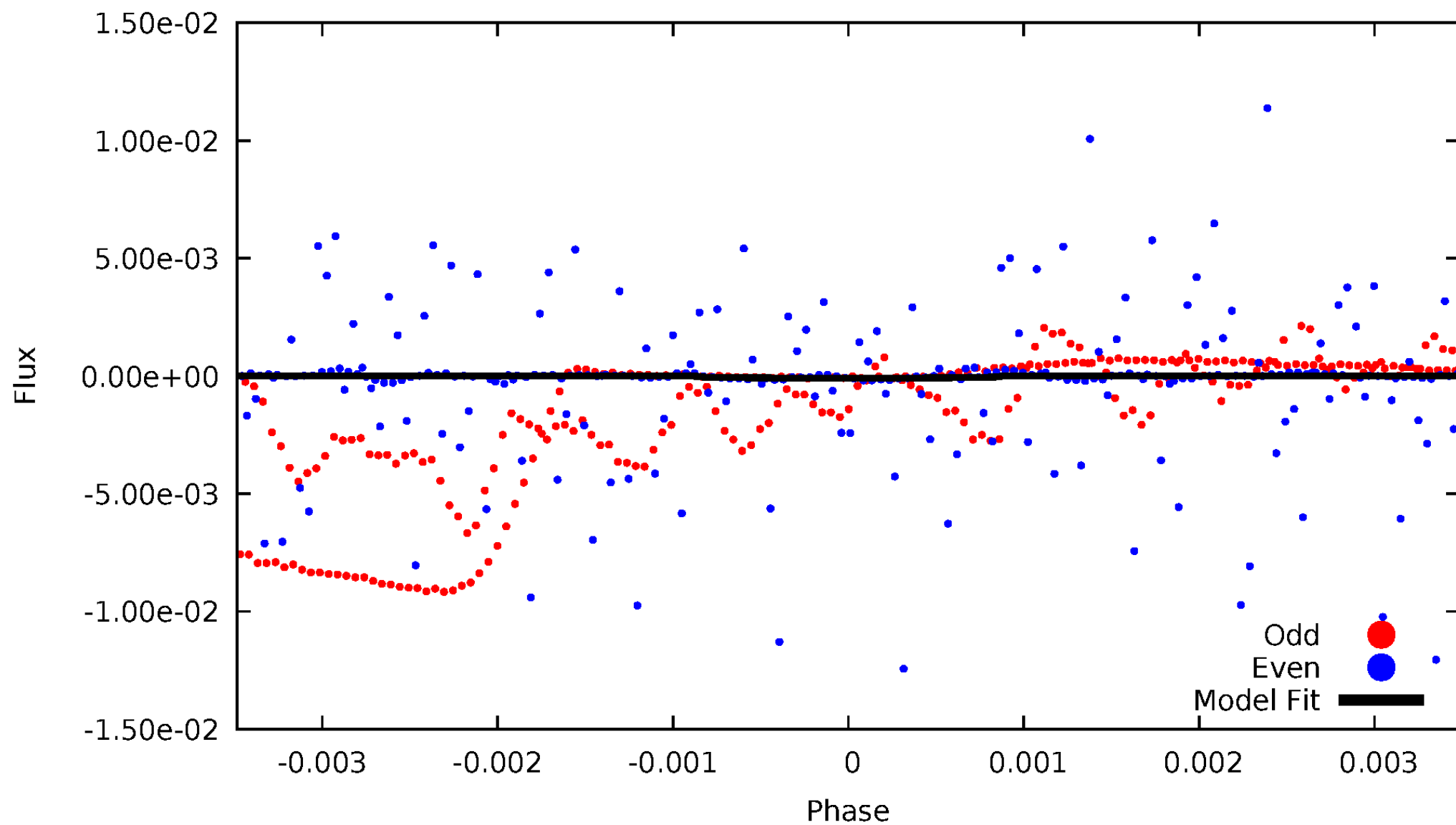
# TCE 007868889-02





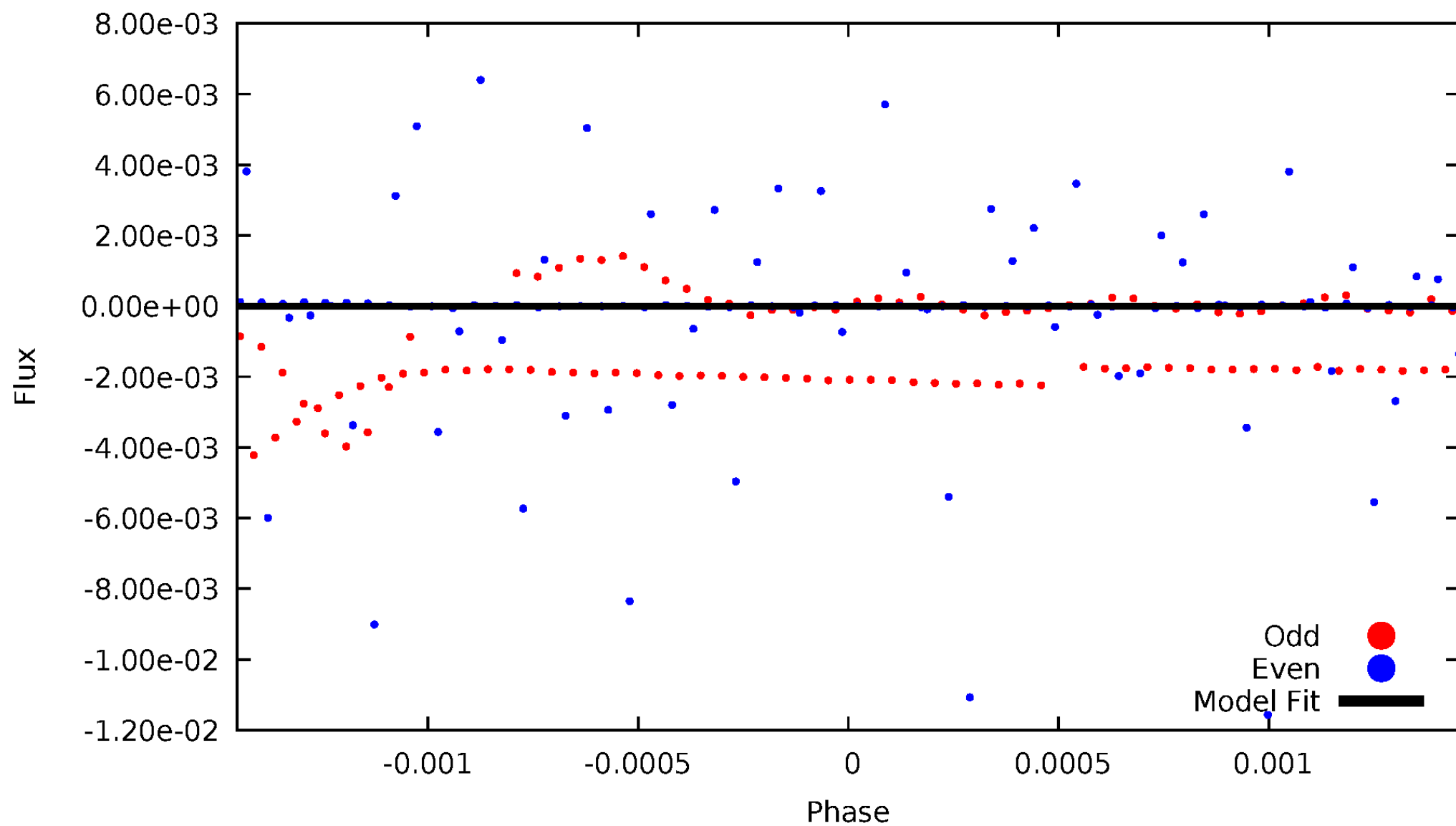
# DV Odd/Even

TCE 007868889-02



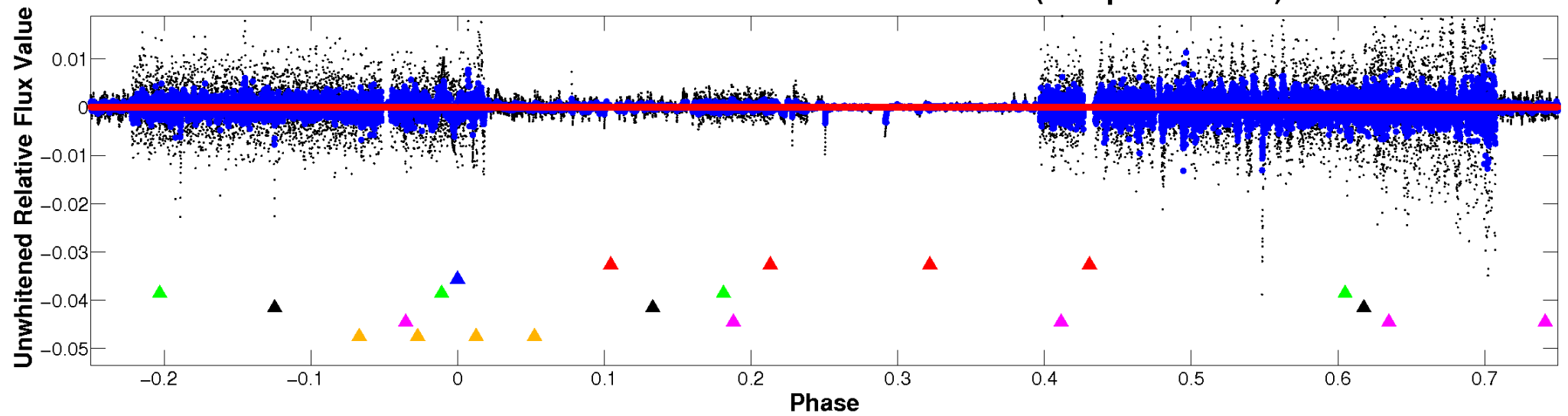
# ALT Odd/Even

TCE 007868889-02

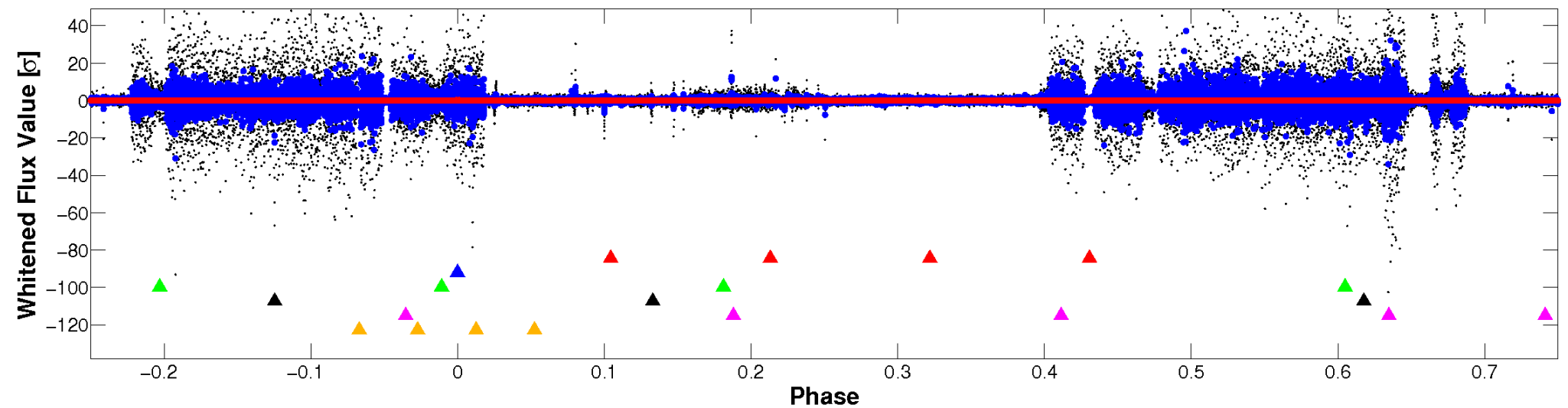


# Non-Whitened Vs. Whitened Light Curve

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

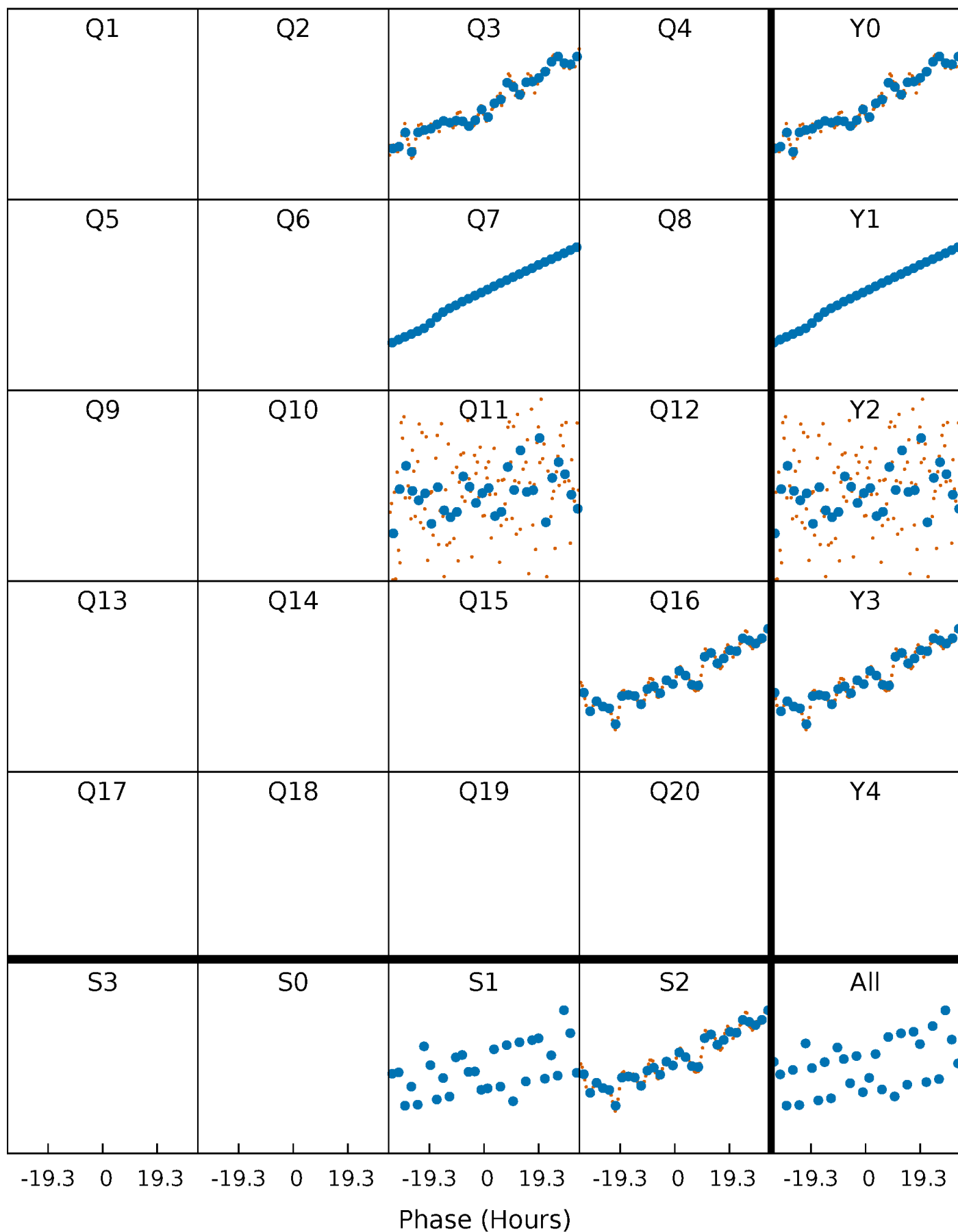


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



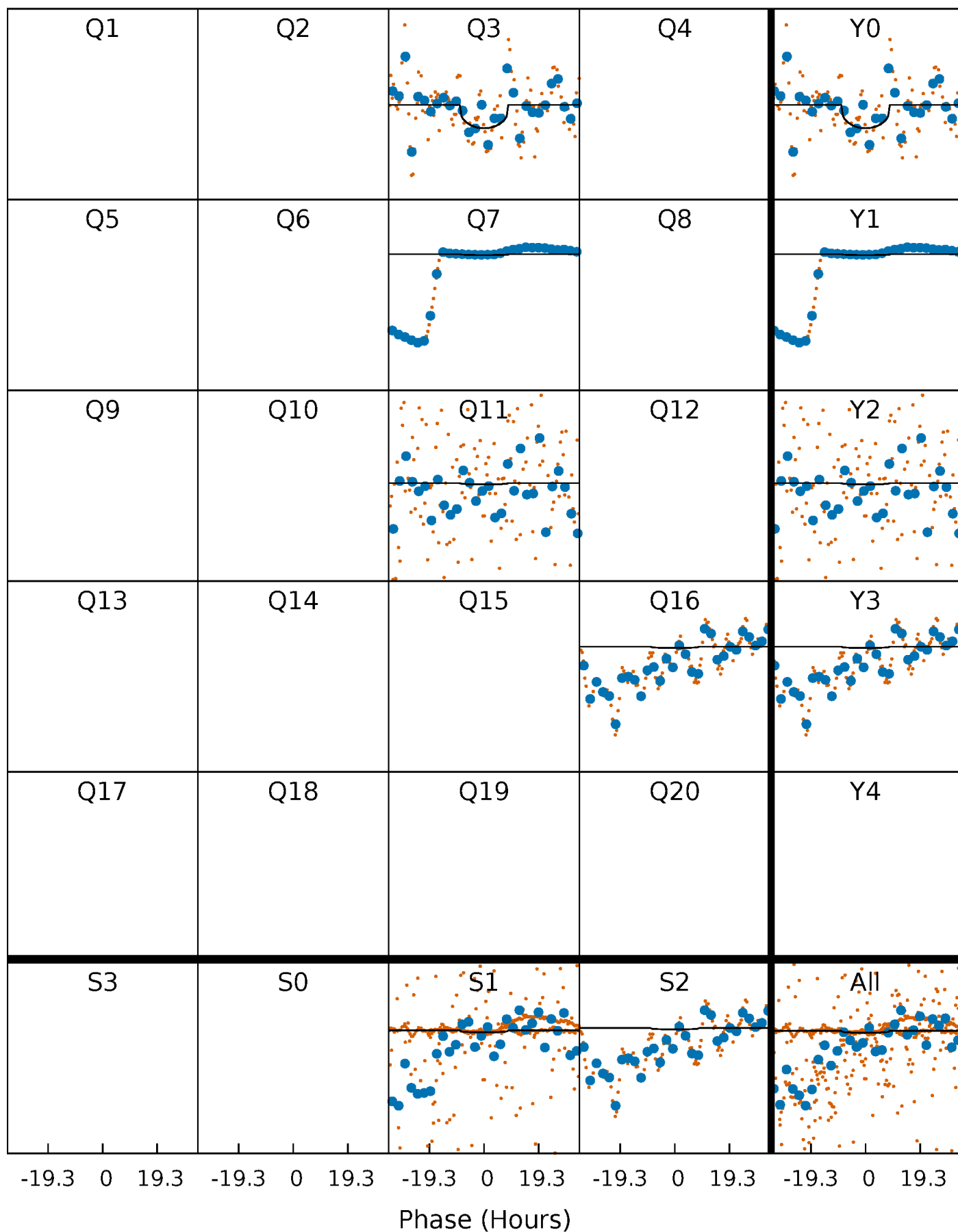
# PDC Quarter-Phased Transit Curves

TCE 007868889-02     $P=403.853071$  Days     $T_0=283.176856$  (BKJD)



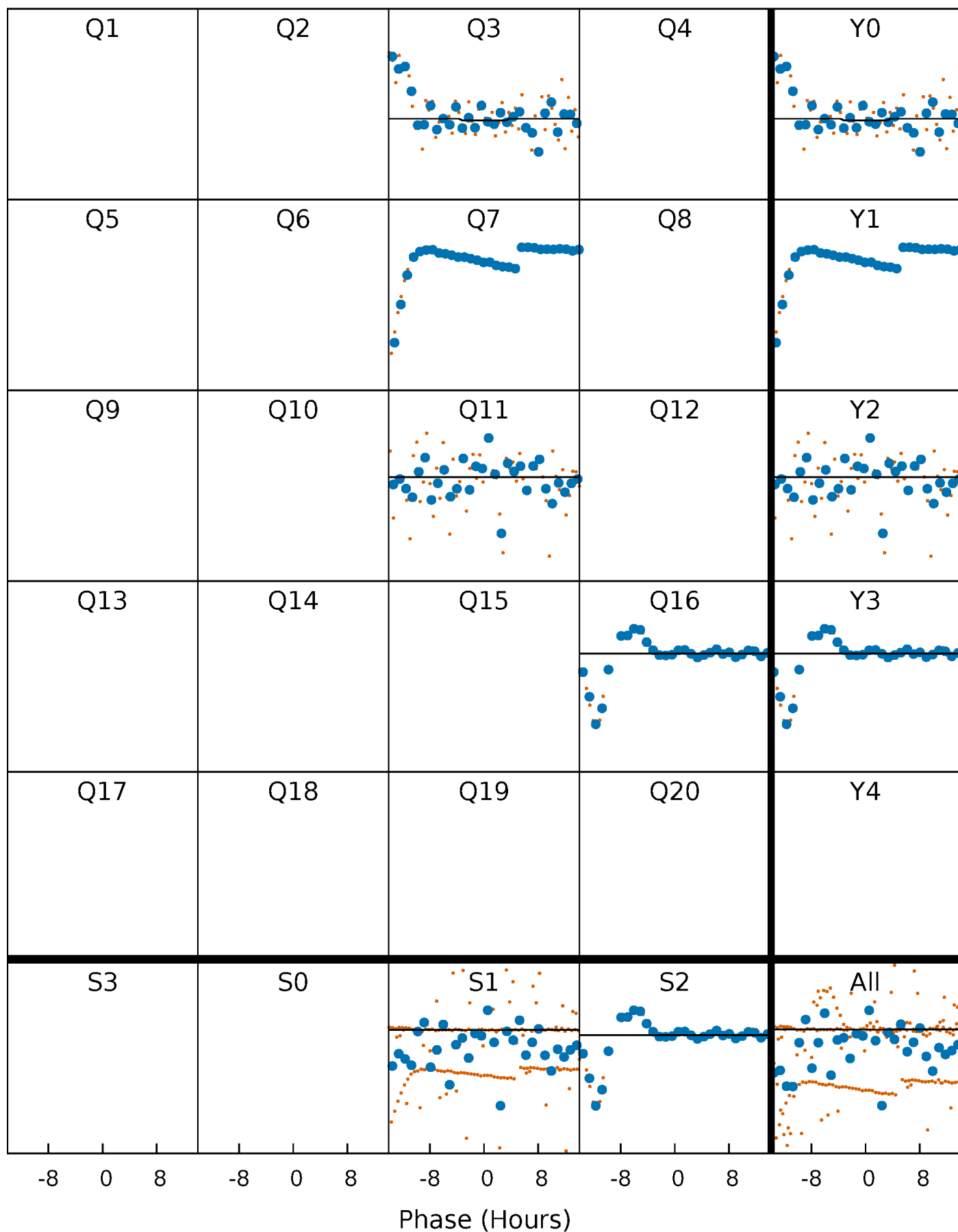
# DV Quarter-Phased Transit Curves

TCE 007868889-02 P=403.853071 Days  $T_0=283.176856$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

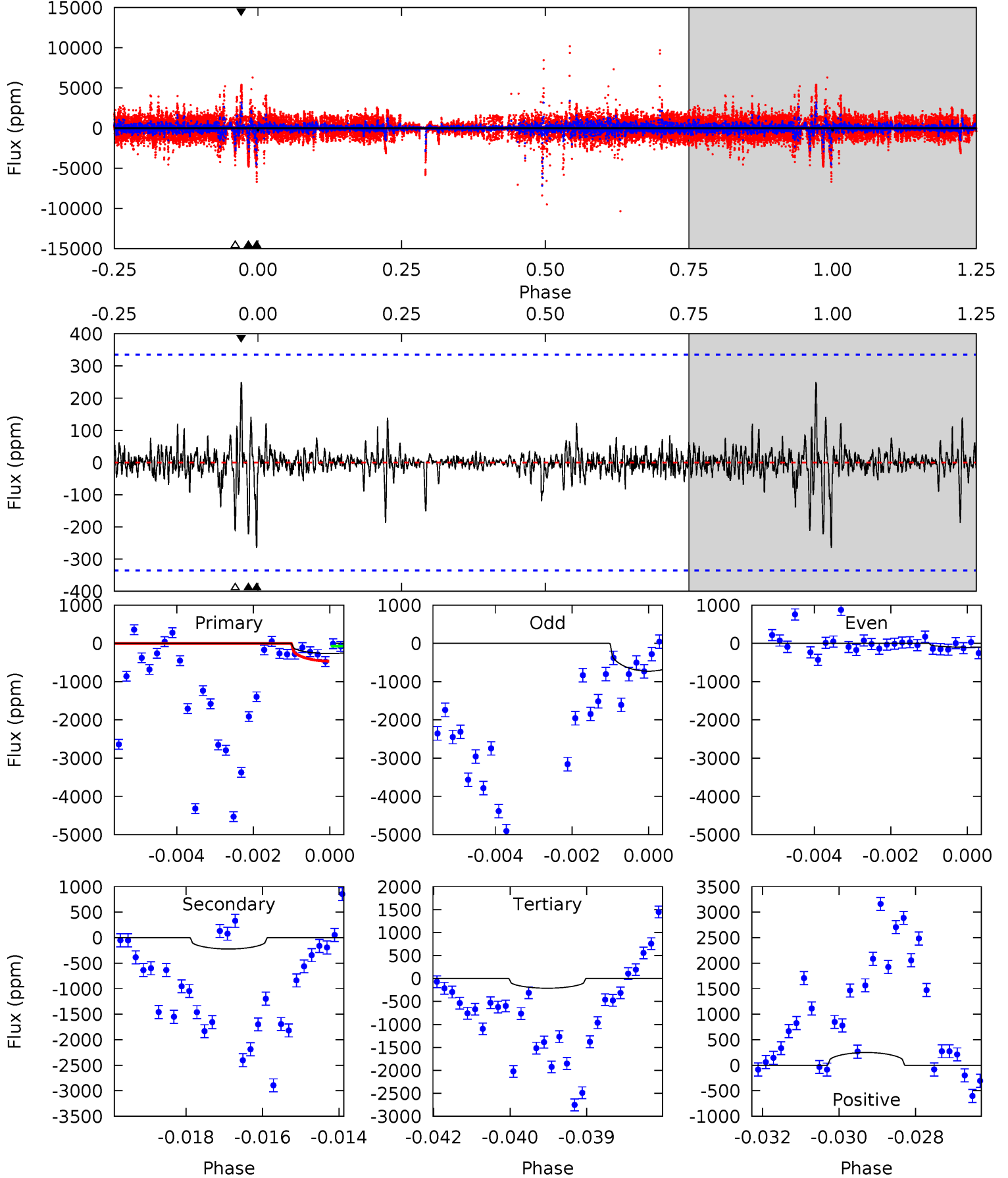
TCE 007868889-02 P=403.733090 Days  $T_0=283.141225$  (BKJD)



# DV Model-Shift Uniqueness Test

007868889-02, P = 403.853071 Days, E = 283.176856 Days

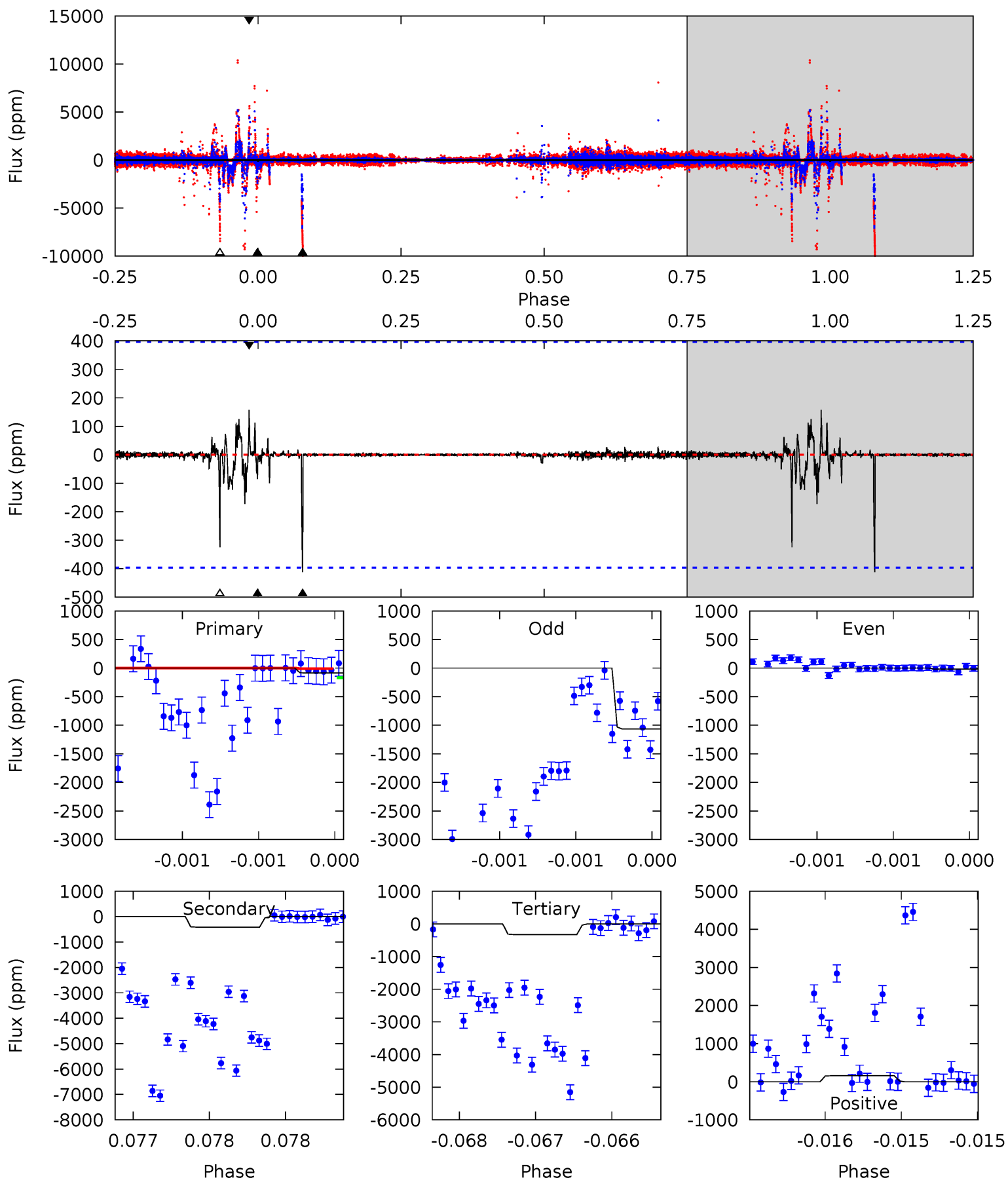
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
4.23	3.55	3.37	3.98	5.35	3.13	0.51	0.86	0.25	0.18	-0.43	3.04	1.06	0.49	2.73



# Alt Model-Shift Uniqueness Test

007868889-02, P = 403.733090 Days, E = 283.141225 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
1.18	5.73	4.51	2.19	5.51	3.38	0.25	-3.33	-1.01	1.22	3.54	0.77	4.91	0.28	0.95





### Stellar Parameters For KIC 007868889

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$3834^{+123}_{-76}$	$0.298^{+0.128}_{-0.032}$	$-1.100^{+0.200}_{-0.150}$	$104.317^{+5.072}_{-10.990}$	$0.788^{+0.123}_{-0.016}$	$0.000^{+0.000}_{-0.000}$
	+3%/-2%	+43%/-11%	+18%/-14%	+5%/-11%	+16%/-2%	+50%/-12%
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 007868889-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-222 \pm 63$	$202.98^{+205.04}_{-140.91}$	$2403^{+87}_{-87}$	$3509^{+2223}_{-870}$	$2.828^{+30.920}_{-2.185}$
Alt.	$-412 \pm 72$	$185.98^{+198.22}_{-127.74}$	$2406^{+80}_{-85}$	$4088^{+2849}_{-960}$	$6.465^{+58.477}_{-4.923}$

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

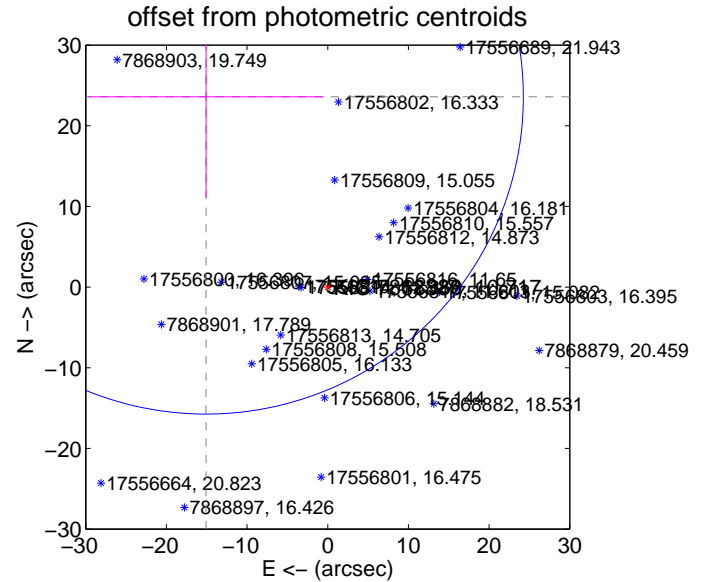
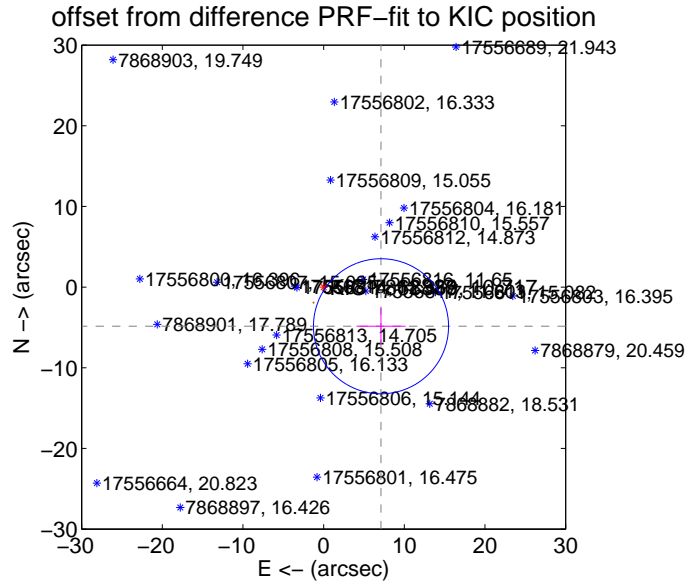
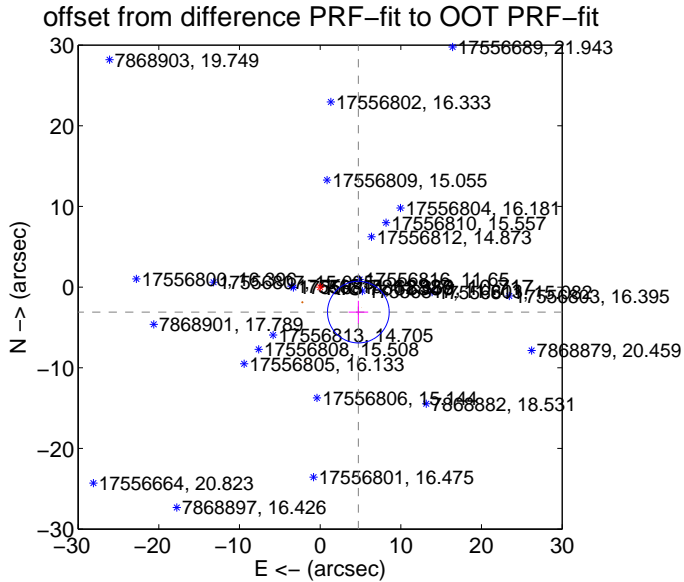
## DV Centroid Data

Supplemental centroid analysis for 007868889-02. **Kepler magnitude: 10.72.** Transit SNR 1.64

There are 0 quarters with good PRF difference image offsets

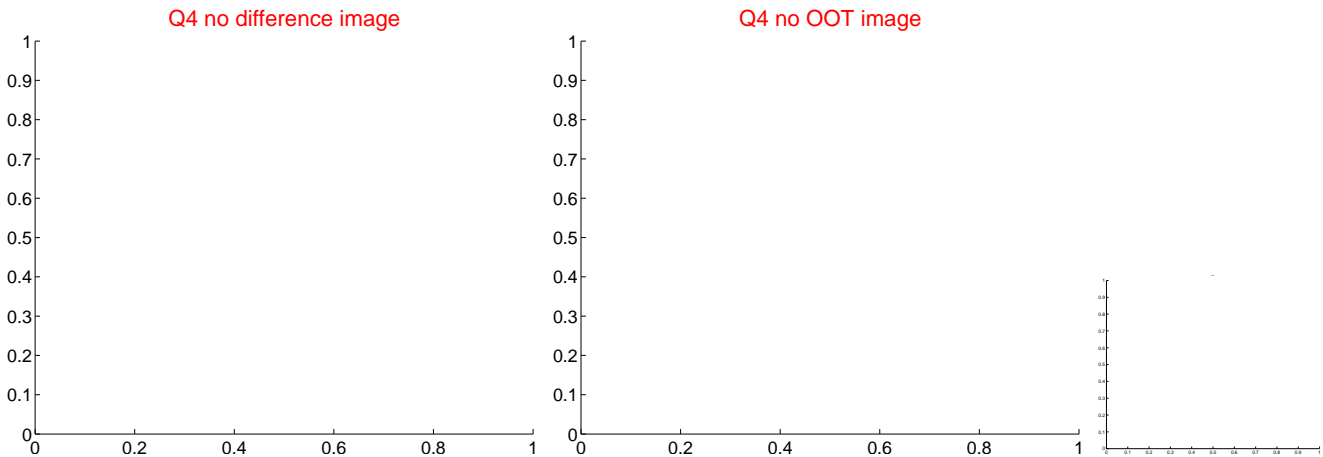
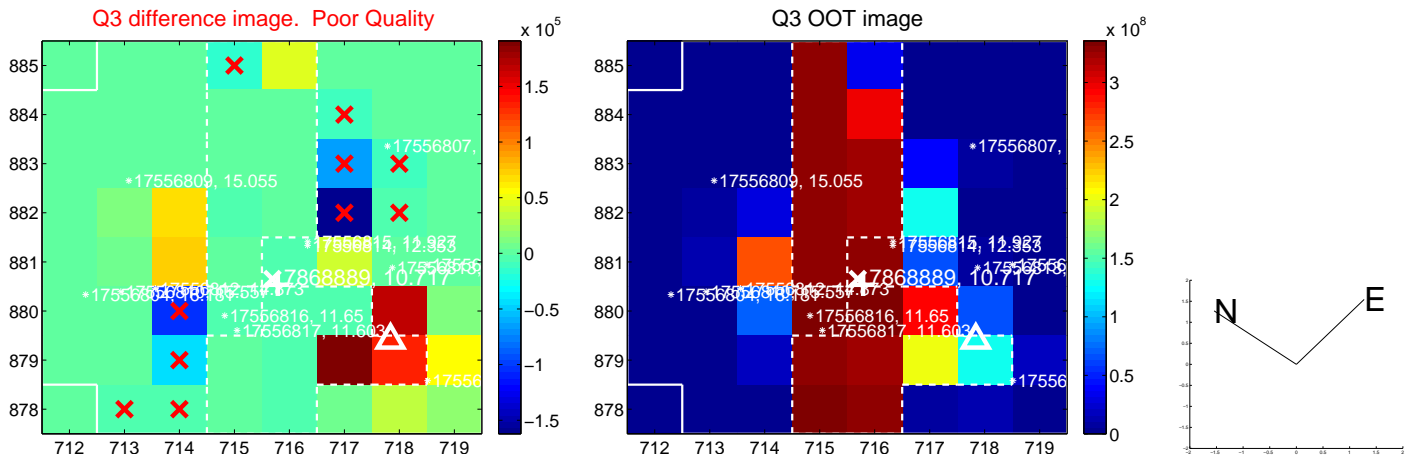
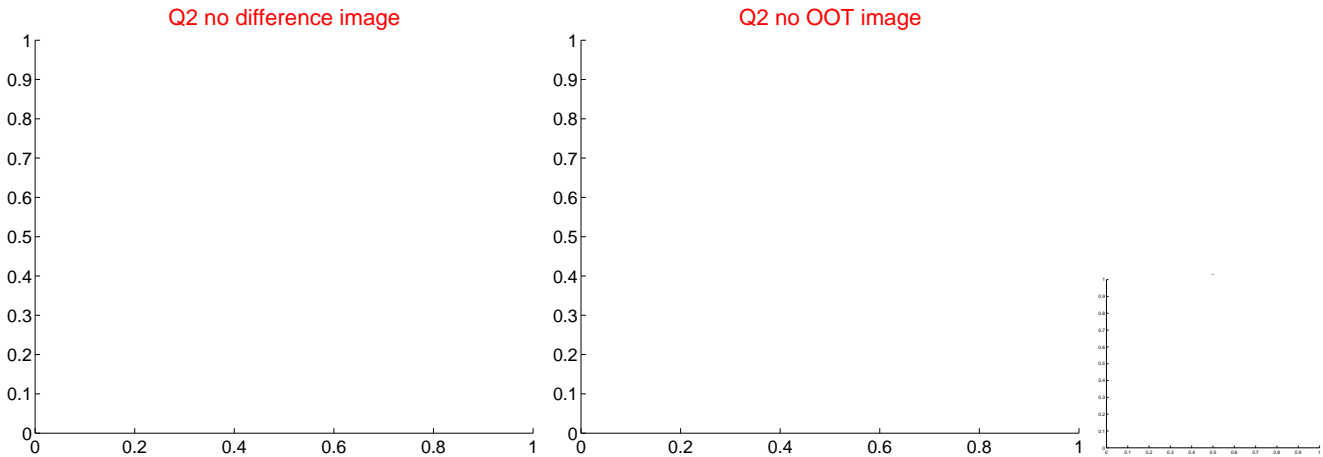
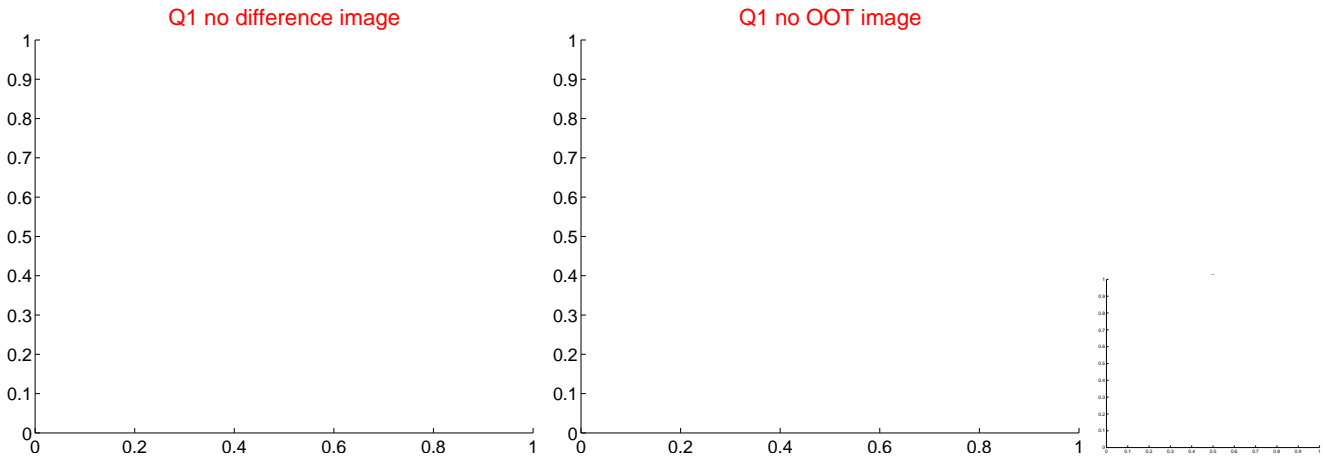
The OOT PRF centroid is offset from the target star catalog position by about 3.13 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b><math>5.660 \pm 1.275</math></b>	<b>4.44</b>	$-4.737 \pm 1.214$	$-3.098 \pm 1.406$
PRF-fit source offset from KIC position	<b><math>8.612 \pm 2.791</math></b>	<b>3.09</b>	$-7.112 \pm 3.043$	$-4.856 \pm 2.275$
photometric centroid source offset	$28.00 \pm 13.11$	2.14	$15.09 \pm 14.58$	$23.59 \pm 12.46$

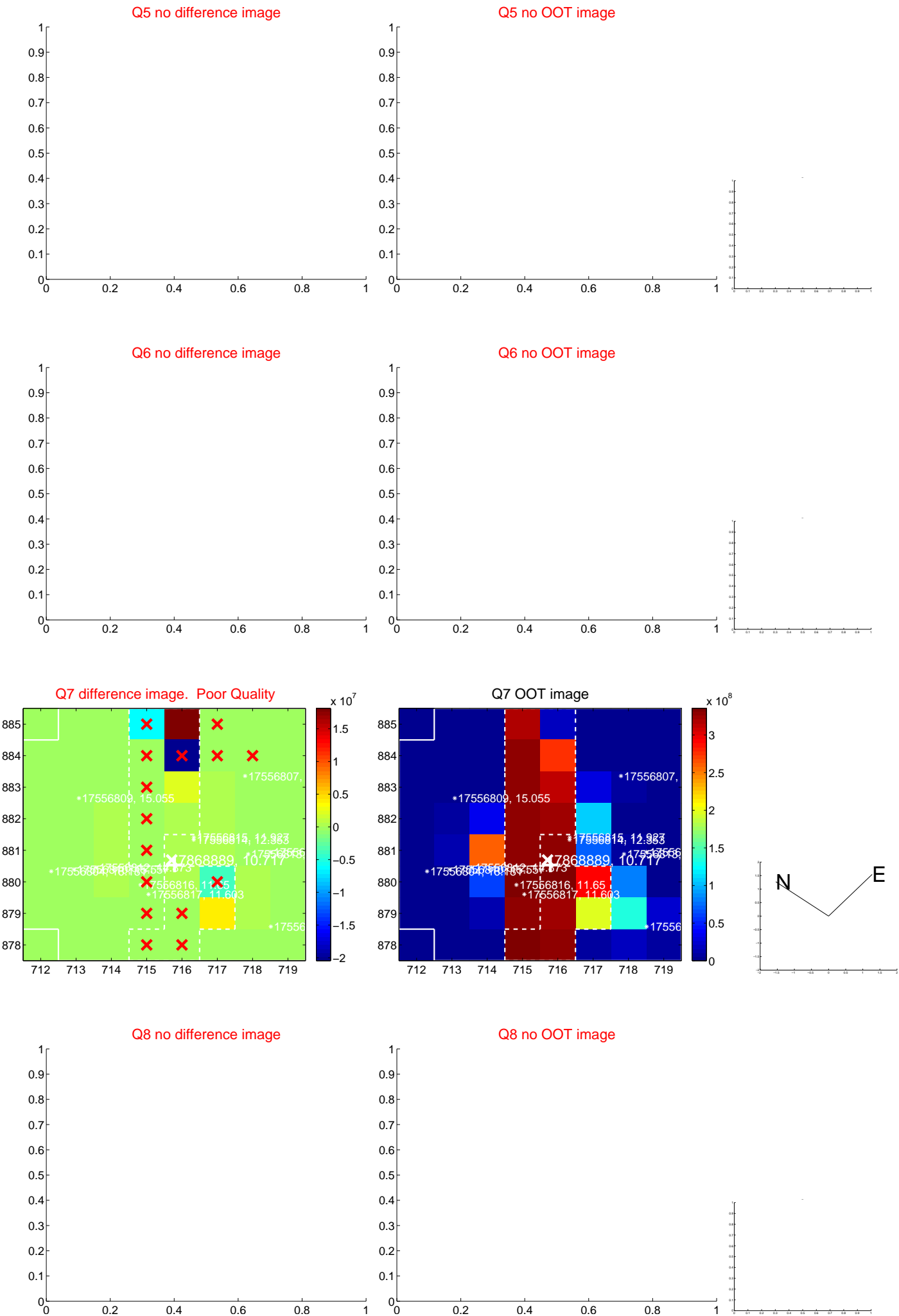


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

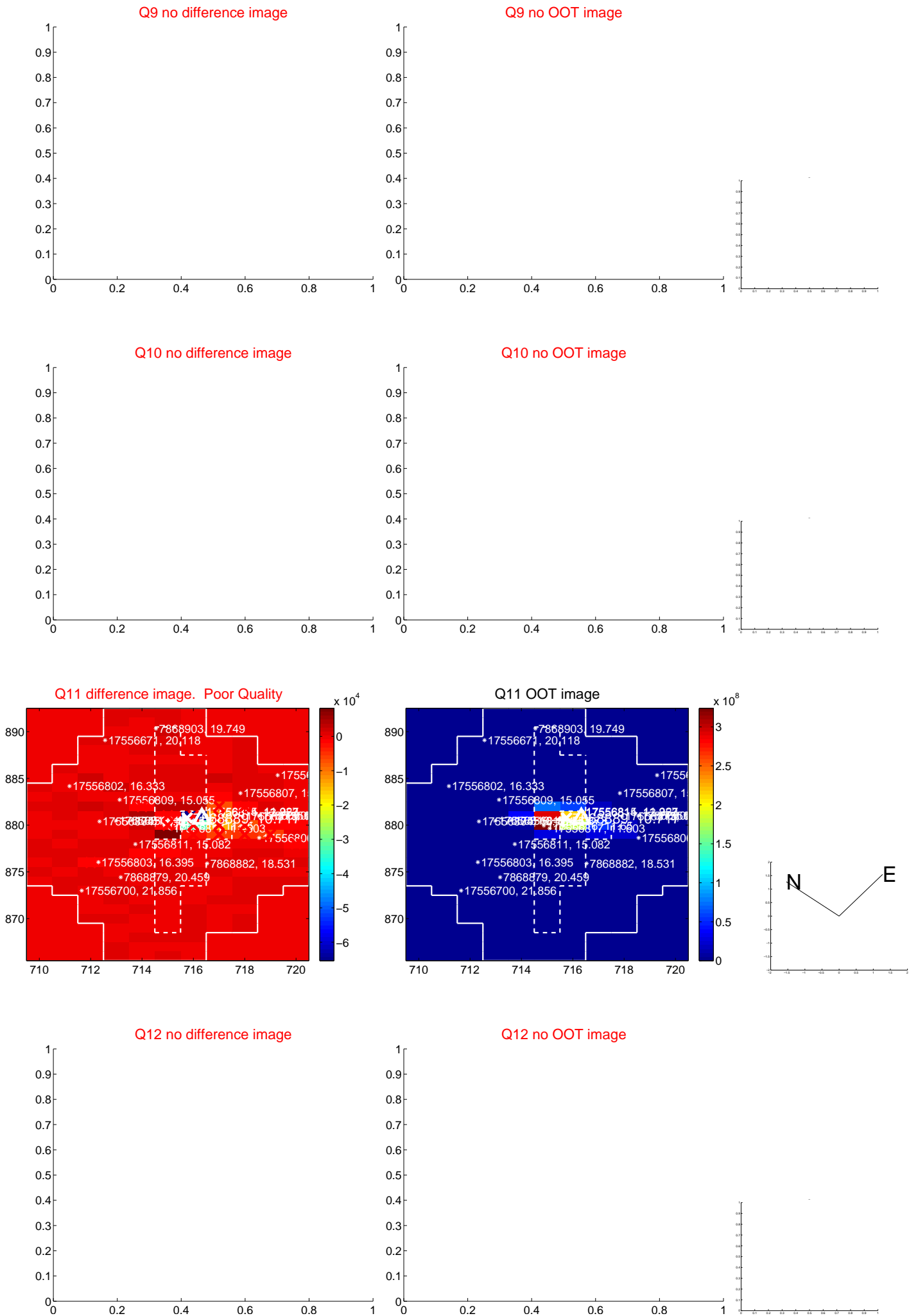
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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.

Q13 no difference image



Q13 no OOT image



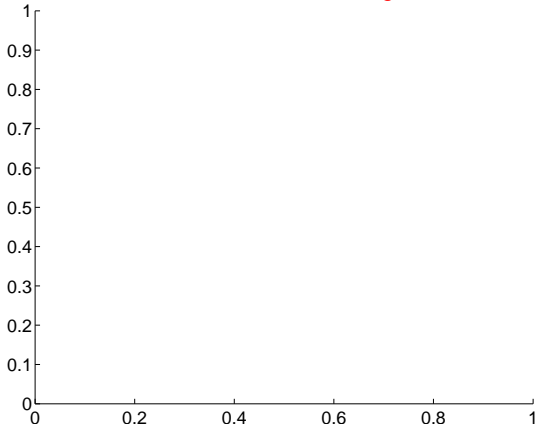
Q14 no difference image



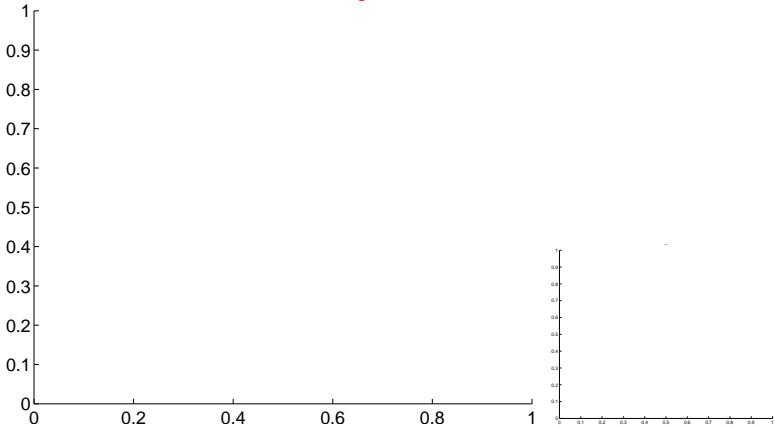
Q14 no OOT image



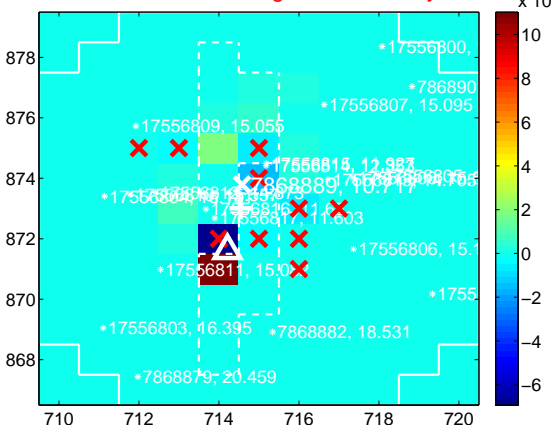
Q15 no difference image



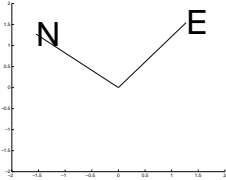
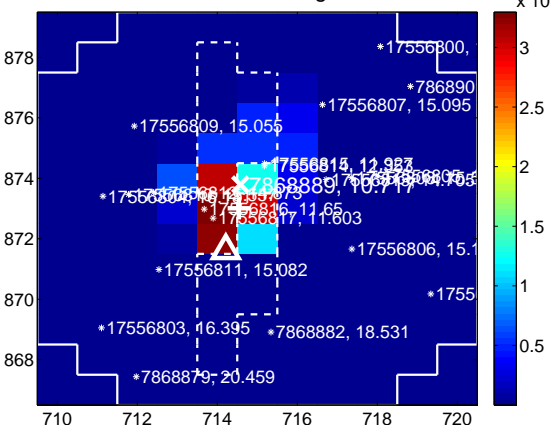
Q15 no OOT image



Q16 difference image. Poor Quality

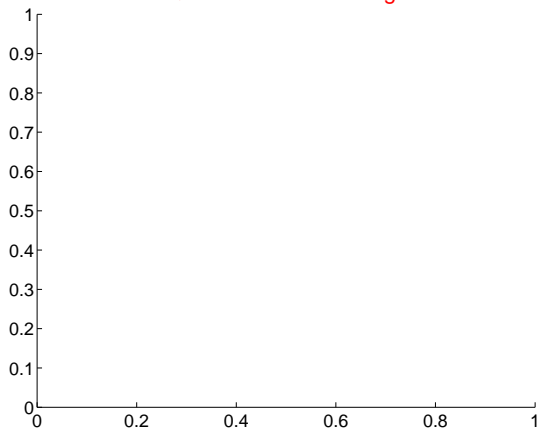


Q16 OOT image

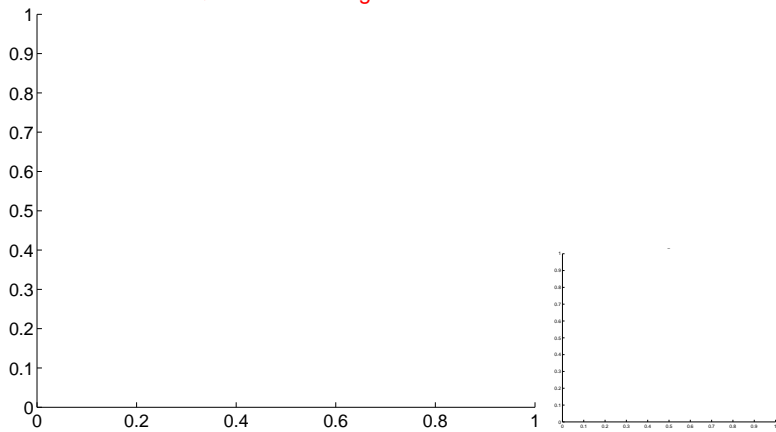


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

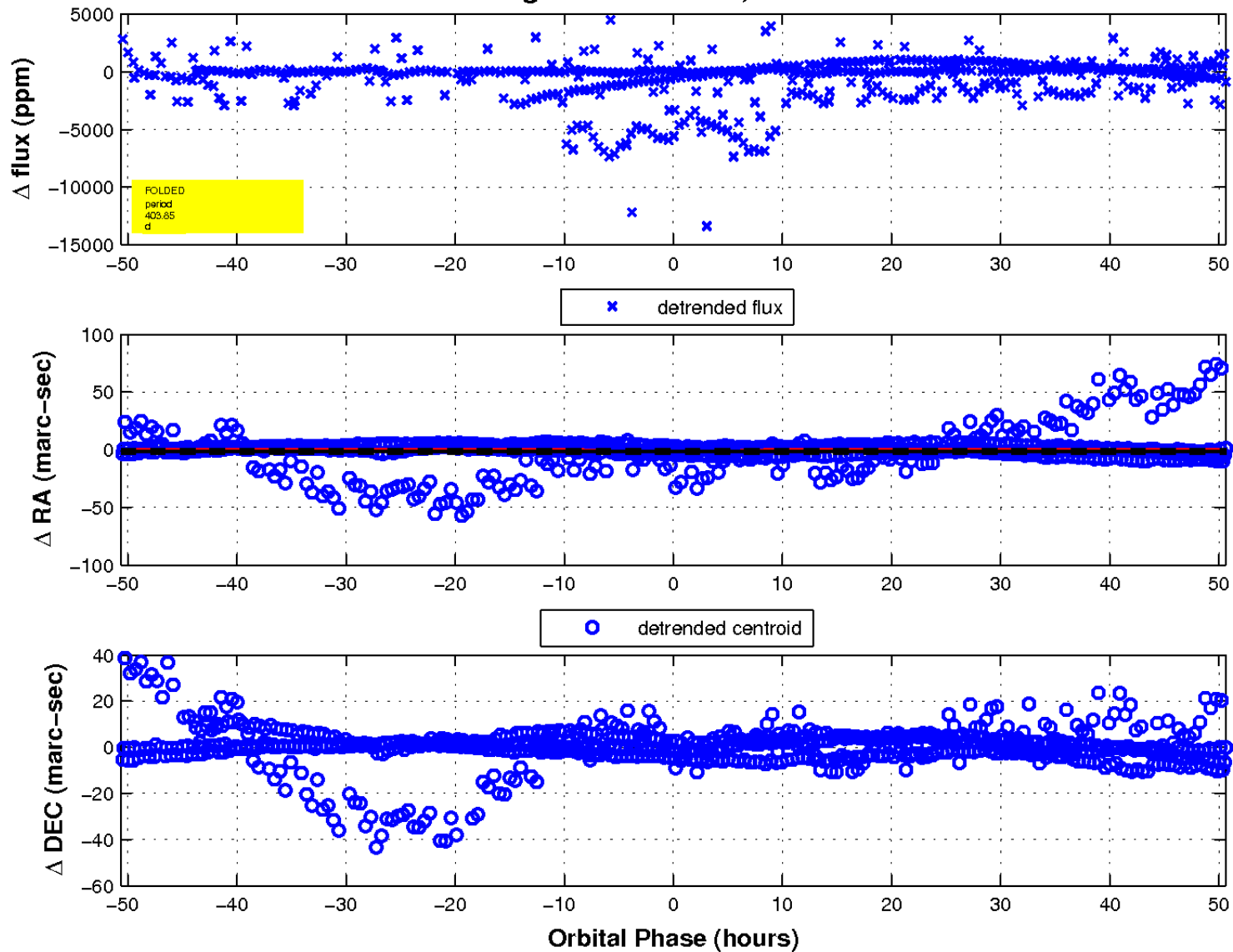
Q17 no difference image



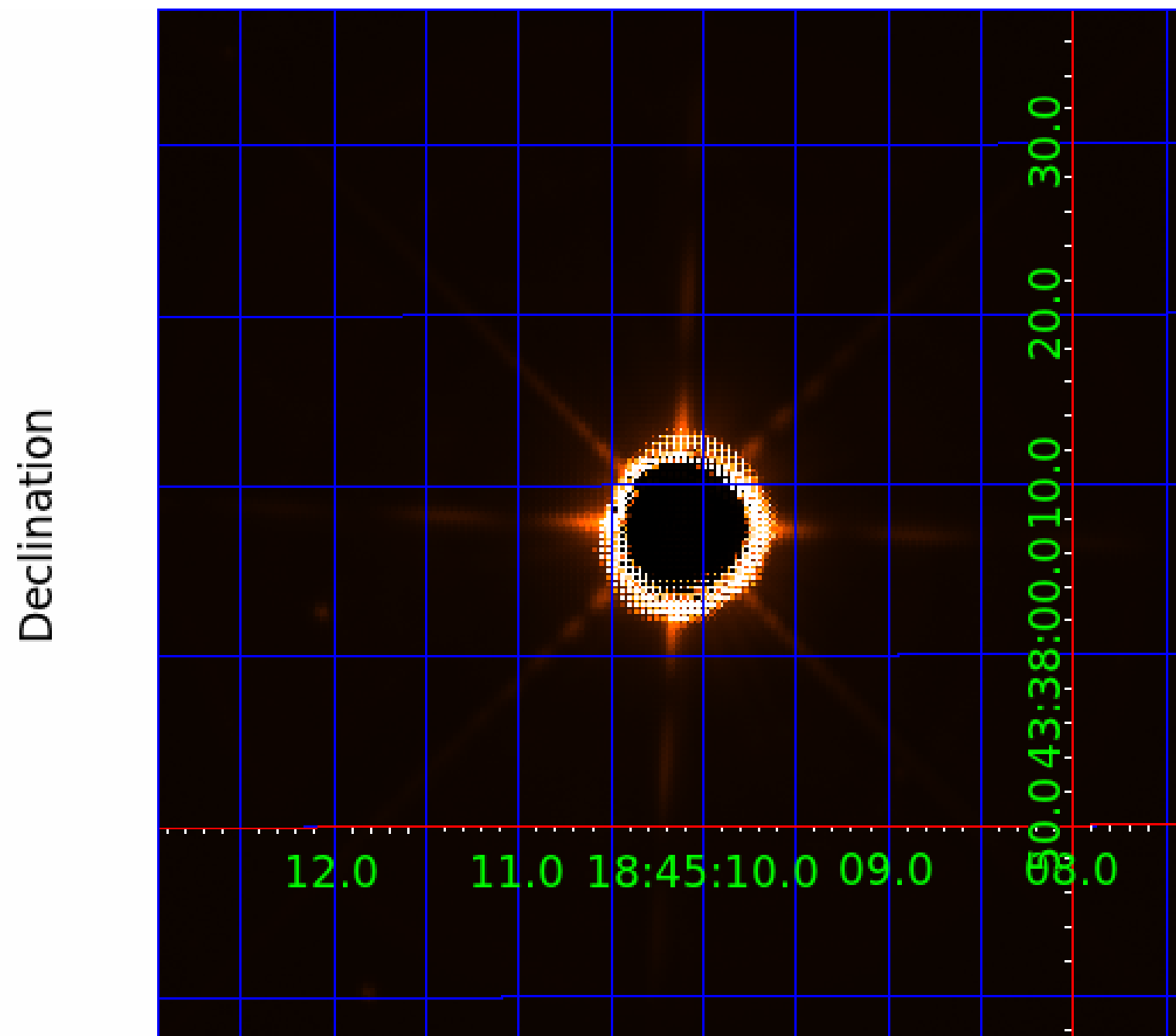
Q17 no OOT image



fluxWeightedCentroids, Planet 2 of 6



UKIRT Image





# KIC 007868889

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007868889-01	OBS	No	359.932350	457.105393	295.3	24.831	43.6	7.2	104.32	3834	239.31	2516.39
007868889-02	OBS	No	403.853071	283.176856	94.9	16.884	40.6	1.6	104.32	3834	102.79	2158.28
007868889-03	OBS	No	326.269464	356.375510	213.5	15.000	32.5	-1.0	104.32	3834	143.36	2868.39
007868889-04	OBS	No	507.912212	532.637597	6189.3	5.085	49.6	26.8	104.32	3834	1294.71	1589.84
007868889-05	OBS	No	313.649639	135.664594	3039.4	6.383	73.9	20.9	104.32	3834	550.34	3023.29
007868889-06	OBS	No	419.930092	256.128465	167.7	15.000	27.3	-1.0	104.32	3834	127.09	2048.82

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007868889-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
007868889-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
007868889-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
007868889-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_SKYE—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
007868889-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
007868889-06	OBS	FP	0.00	1	0	0	0	LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED

**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.

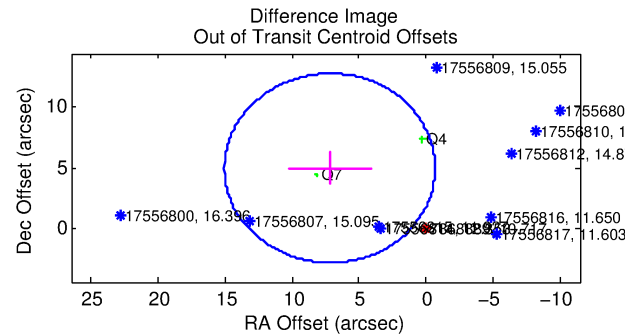
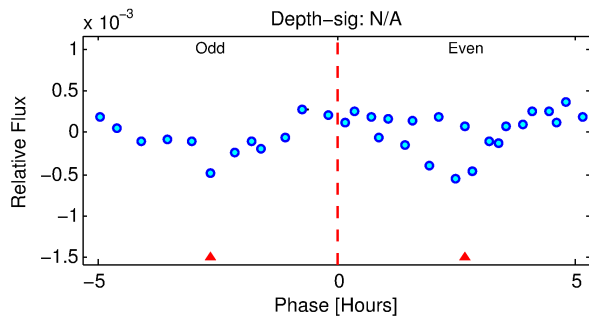
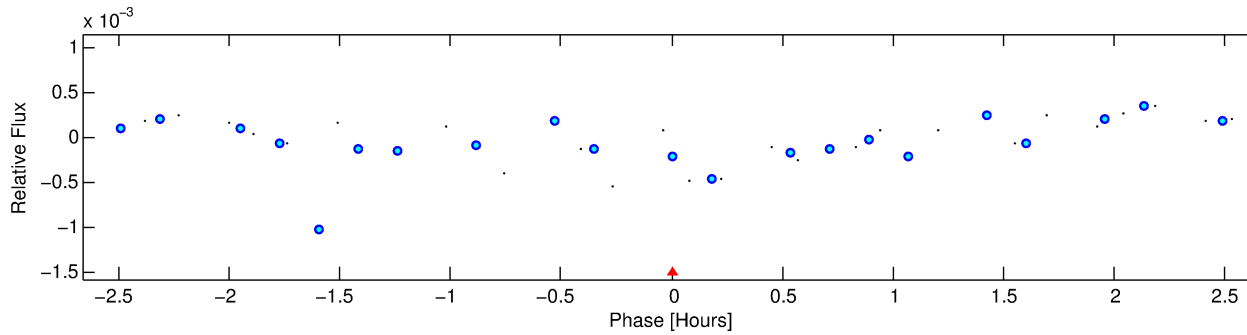
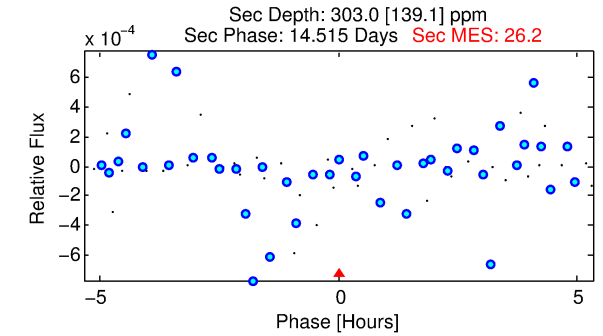
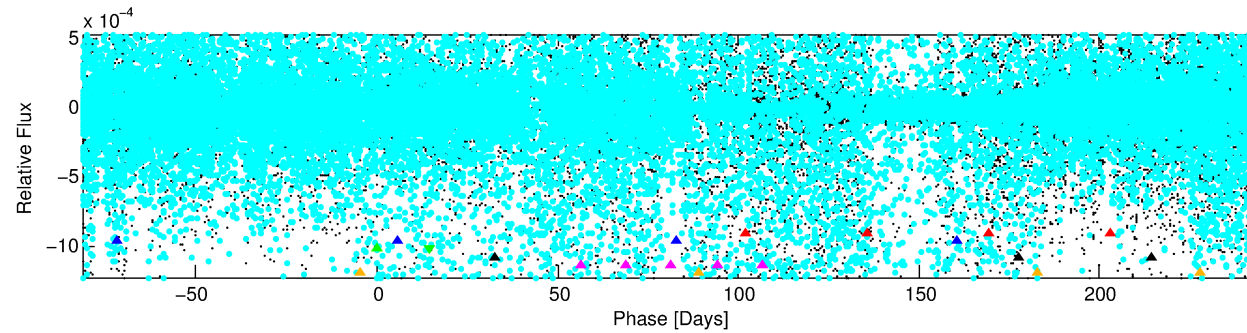
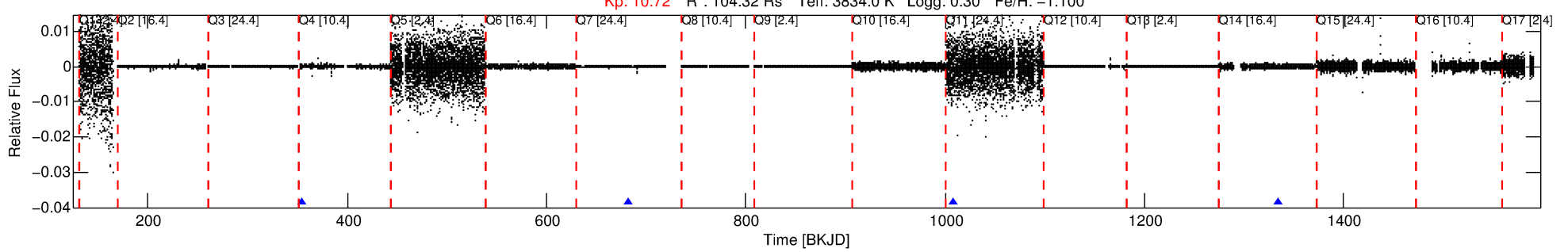
## Ephemeris Match Information For 007868889-03

No Significant Match Found

# DV One-Page Summary

KIC: 7868889 Candidate: 3 of 6 Period: 326.269 d

Kp: 10.72 R\*: 104.32 Rs Teff: 3834.0 K Logg: 0.30 Fe/H: -1.100



## TPS TCE Results:

Period = 326.26946 d  
Epoch = 356.3755 BKJD

DV fit results are unavailable

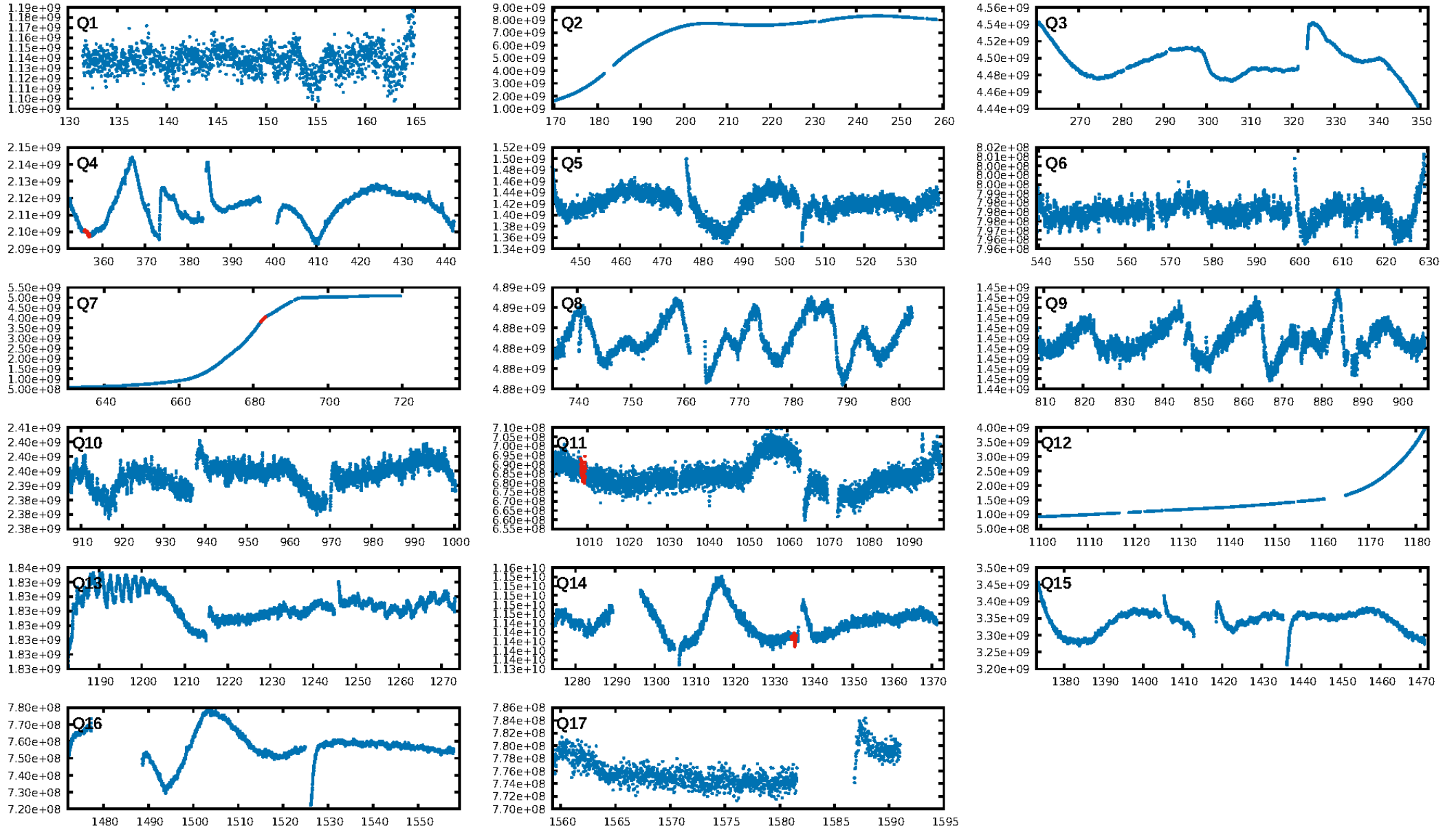
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [18.58σ]  
LongPeriod-sig: 100.0% [27.85σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: N/A  
Centroid-sig: N/A  
Centroid-so: 2.166 arcsec [0.44σ]  
OotOffset-rm: 8.735 arcsec [3.33σ]  
KicOffset-rm: 7.770 arcsec [2.05σ]  
OotOffset-st: 0/1/1/0 [2]  
KicOffset-st: 0/1/1/0 [2]  
DiffImageQuality-fgm: 0.00 [0/2]  
DiffImageOverlap-fno: 1.00 [3/3]

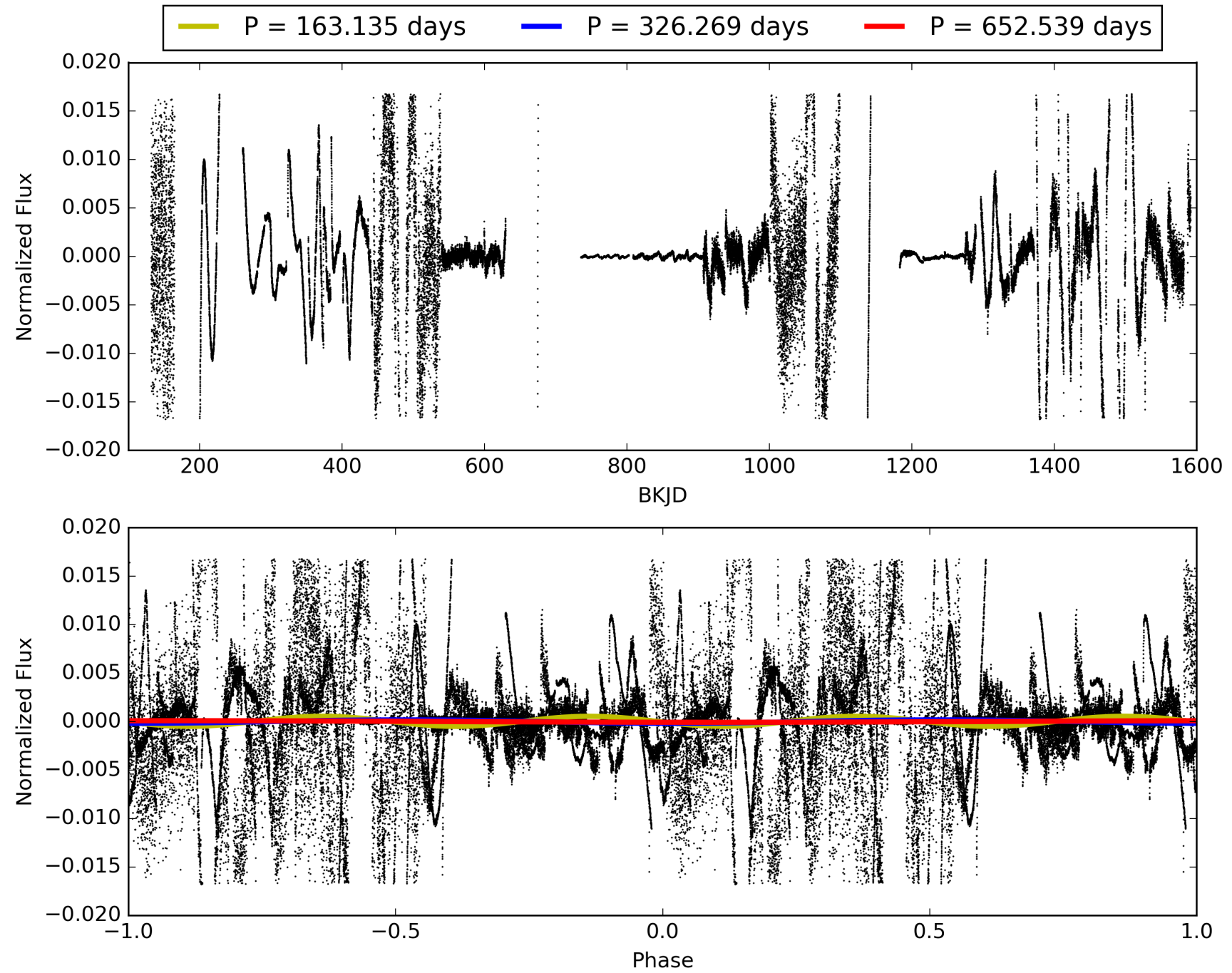
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 15:16:52 Z

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

# TCE 007868889-03, PDC Light Curves

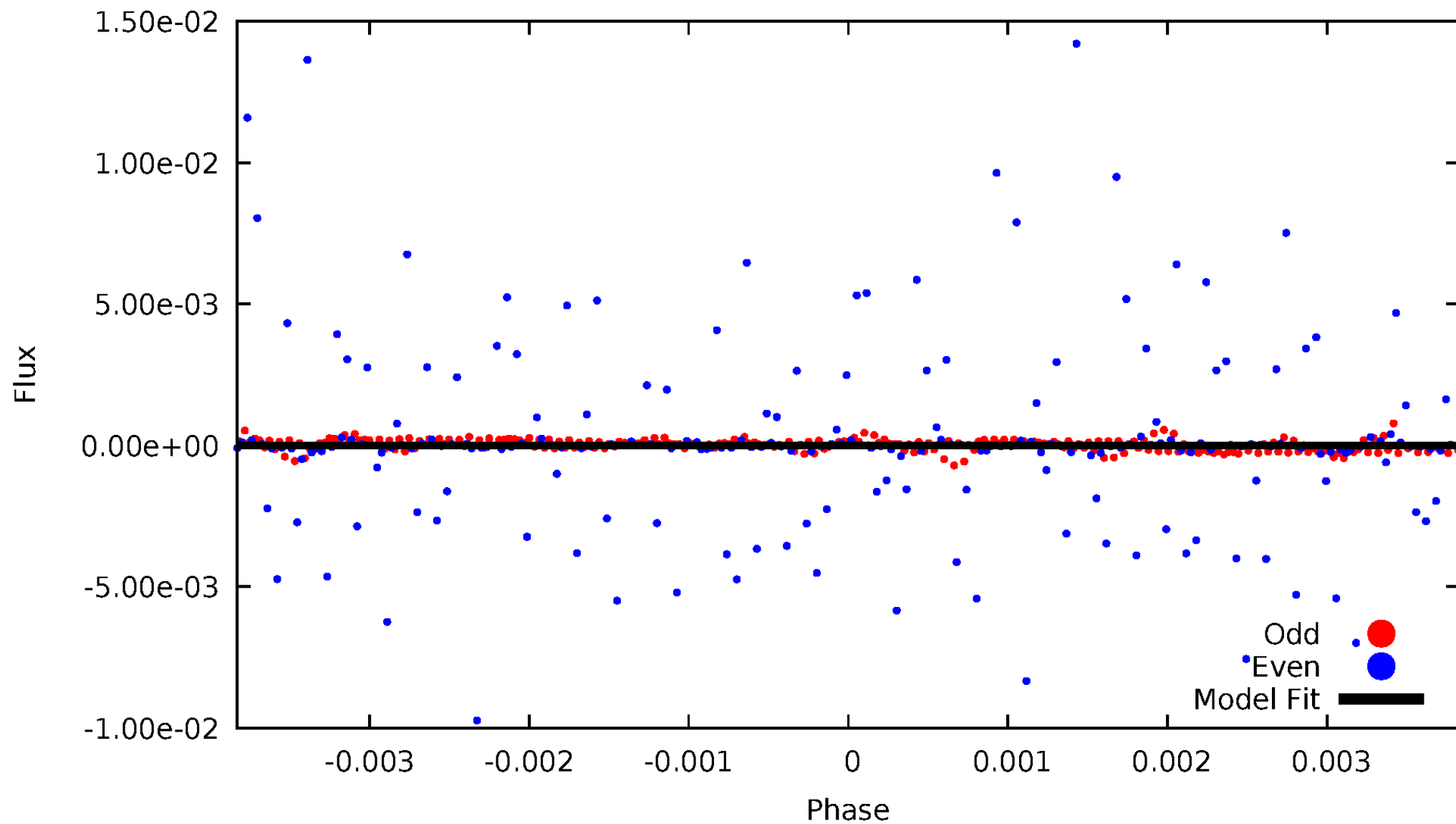


TCE 007868889-03



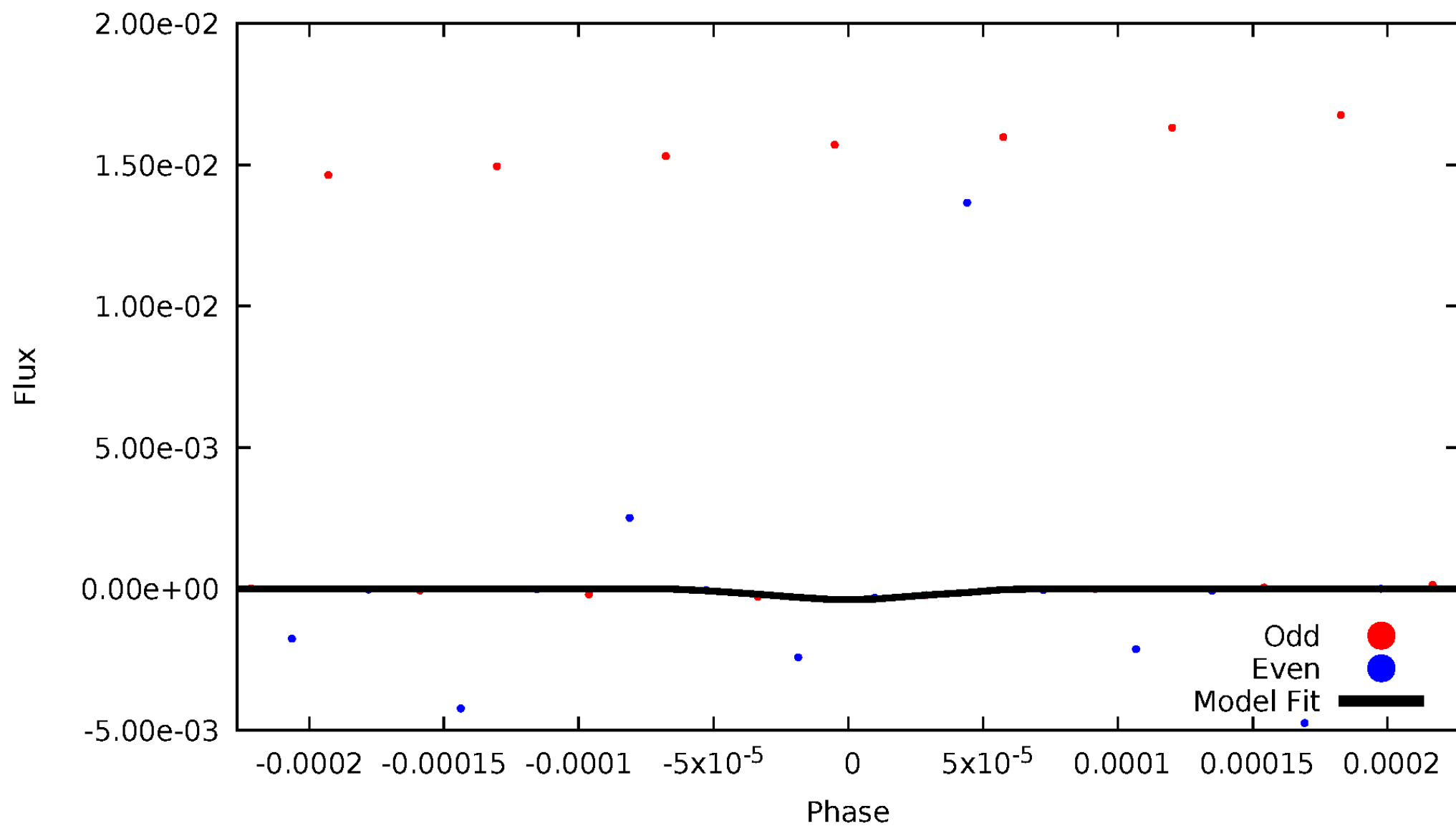
# DV Odd/Even

TCE 007868889-03



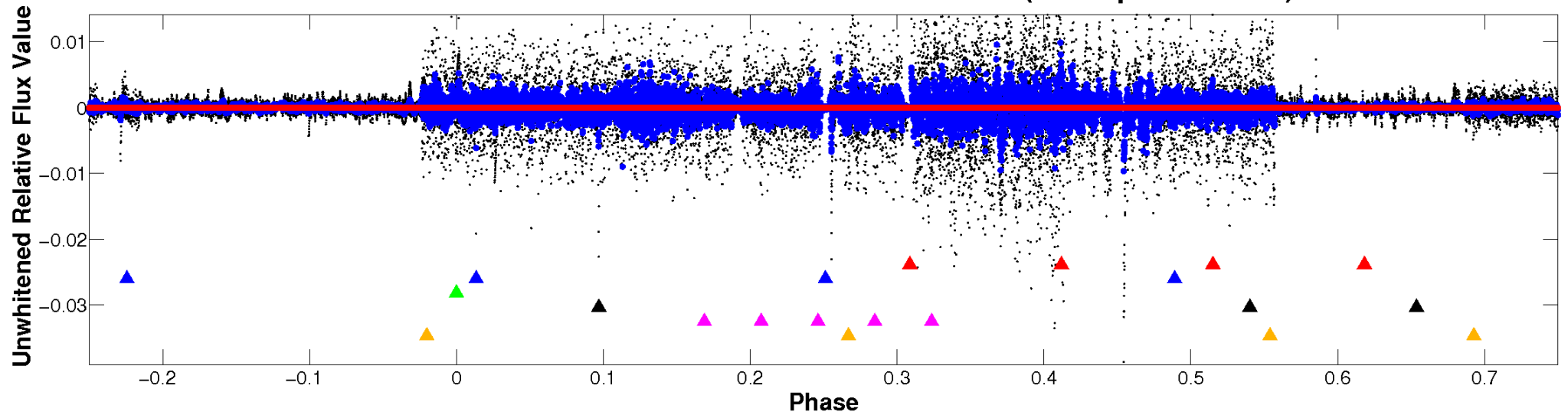
# ALT Odd/Even

TCE 007868889-03



# Non-Whitened Vs. Whitened Light Curve

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

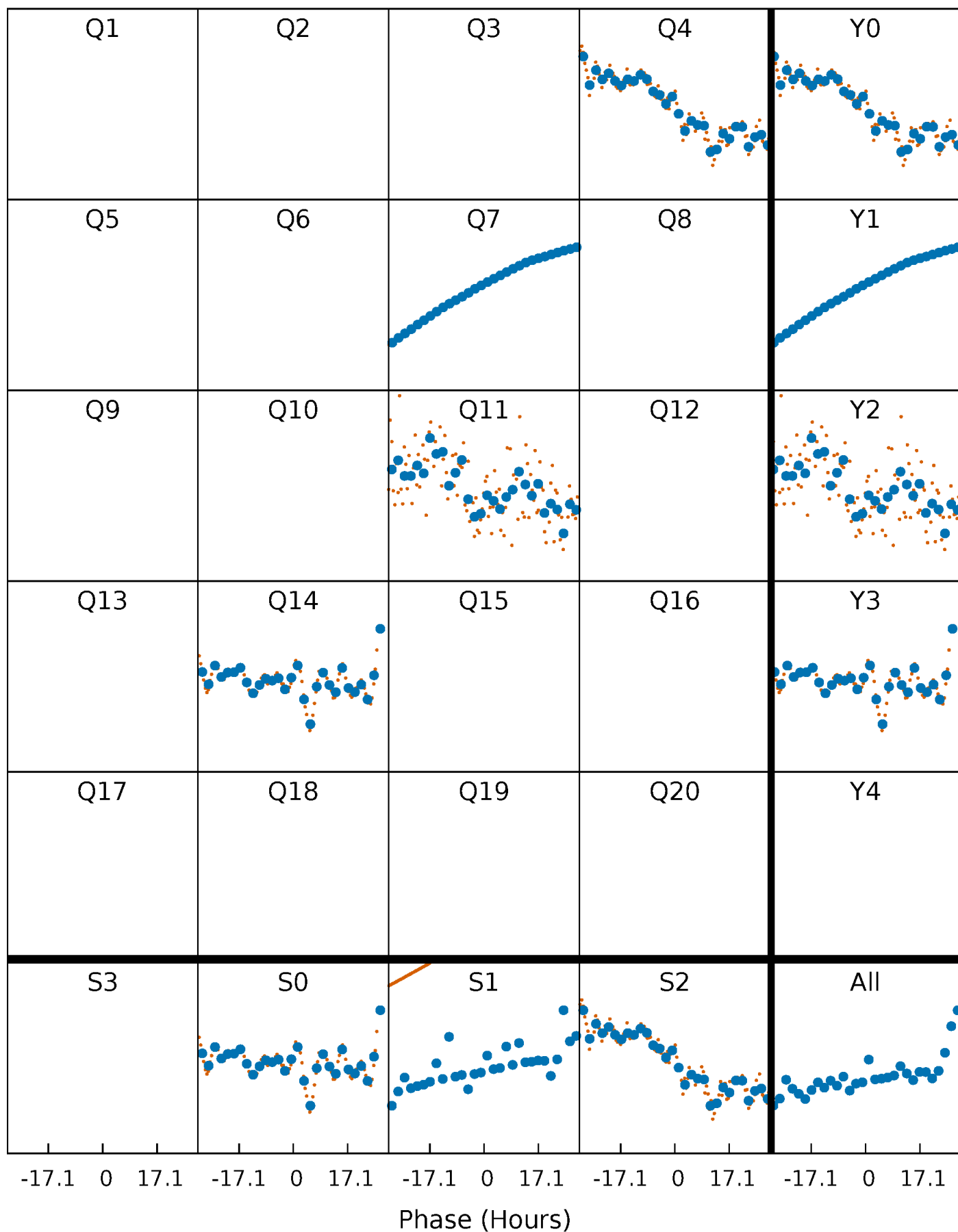


**Planet 3 : Phased Whitened Flux Time Series (TPS Epoch/Period)**



# PDC Quarter-Phased Transit Curves

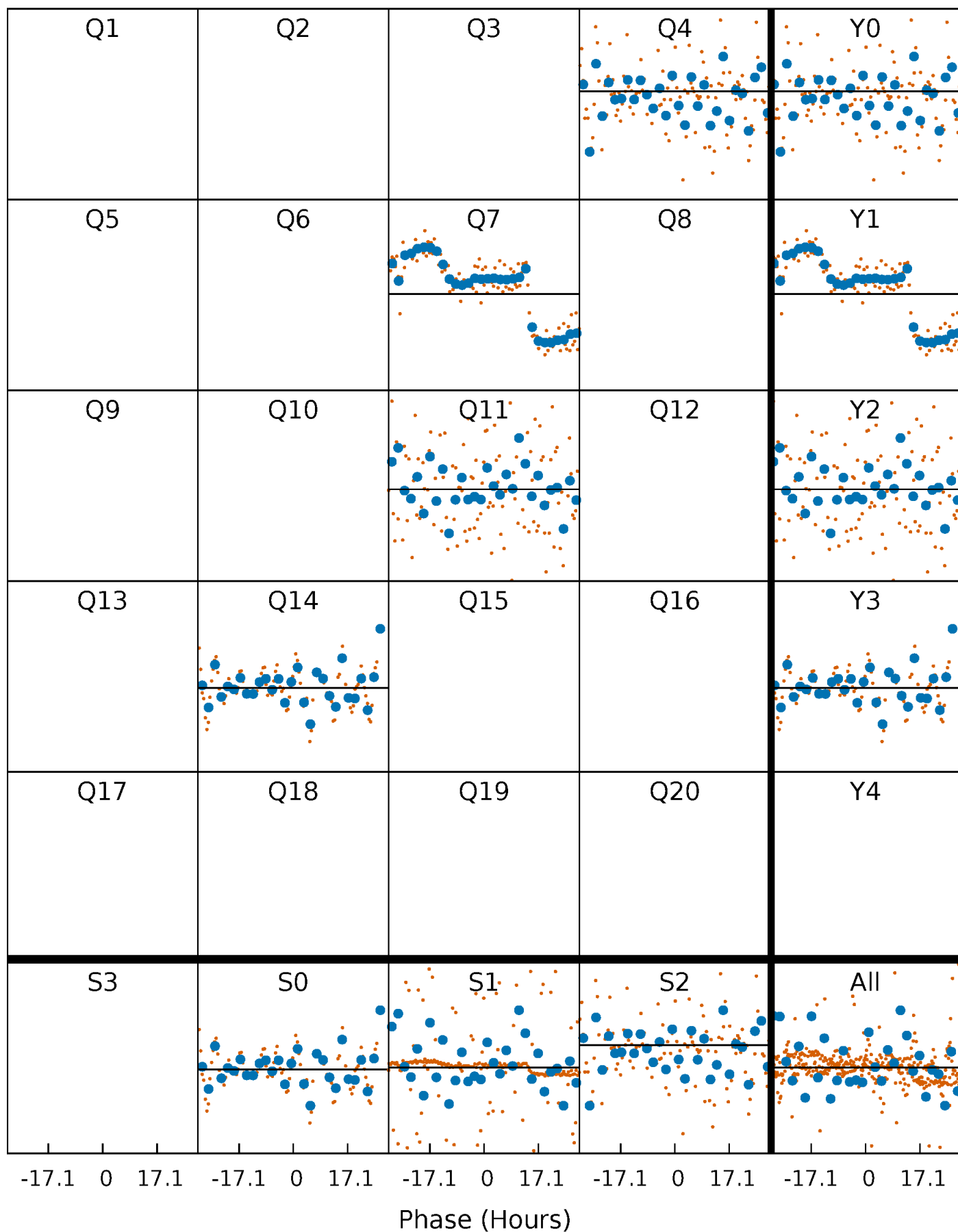
TCE 007868889-03     $P=326.269464$  Days     $T_0=356.375510$  (BKJD)





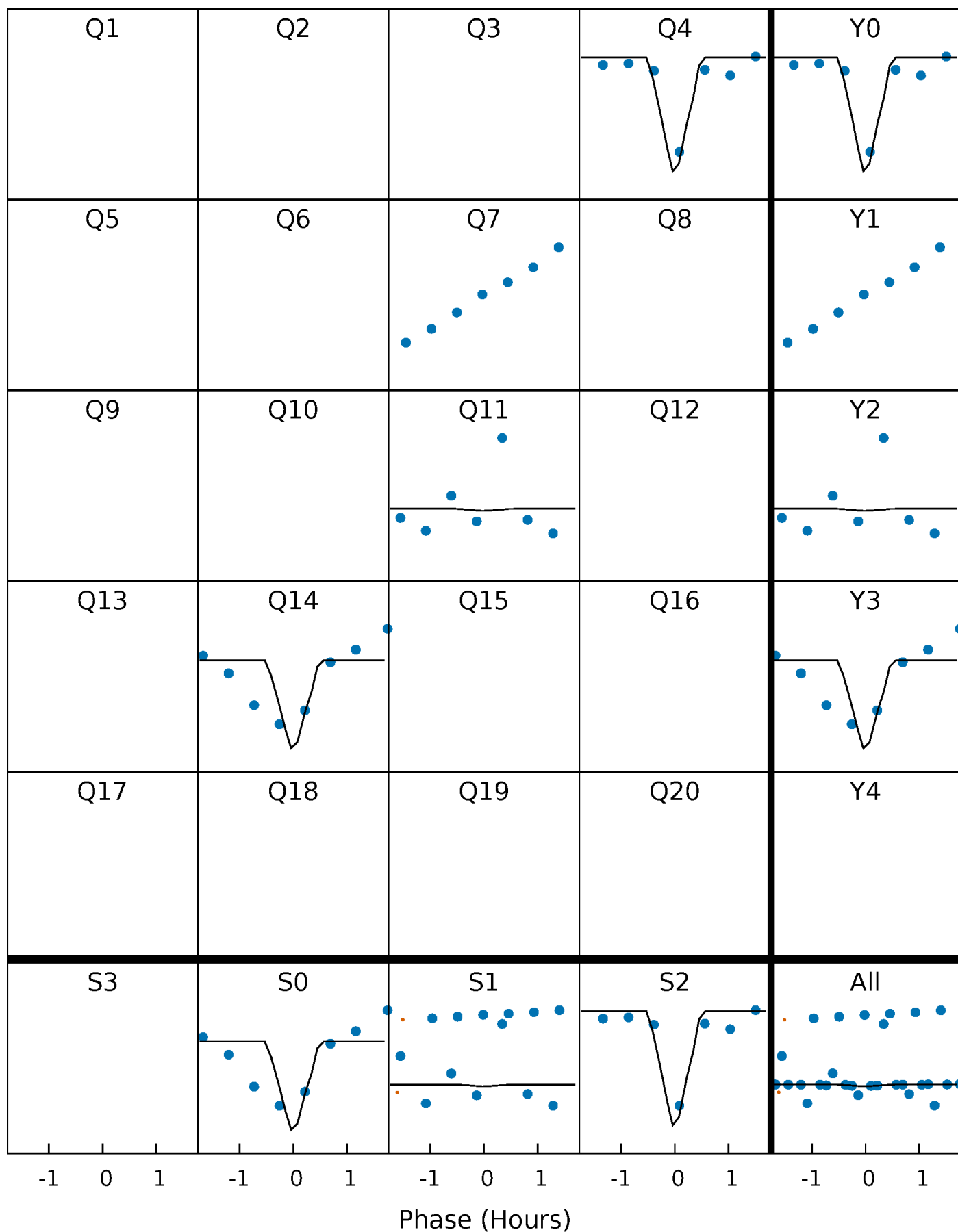
# DV Quarter-Phased Transit Curves

TCE 007868889-03     $P=326.269464$  Days     $T_0=356.375510$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

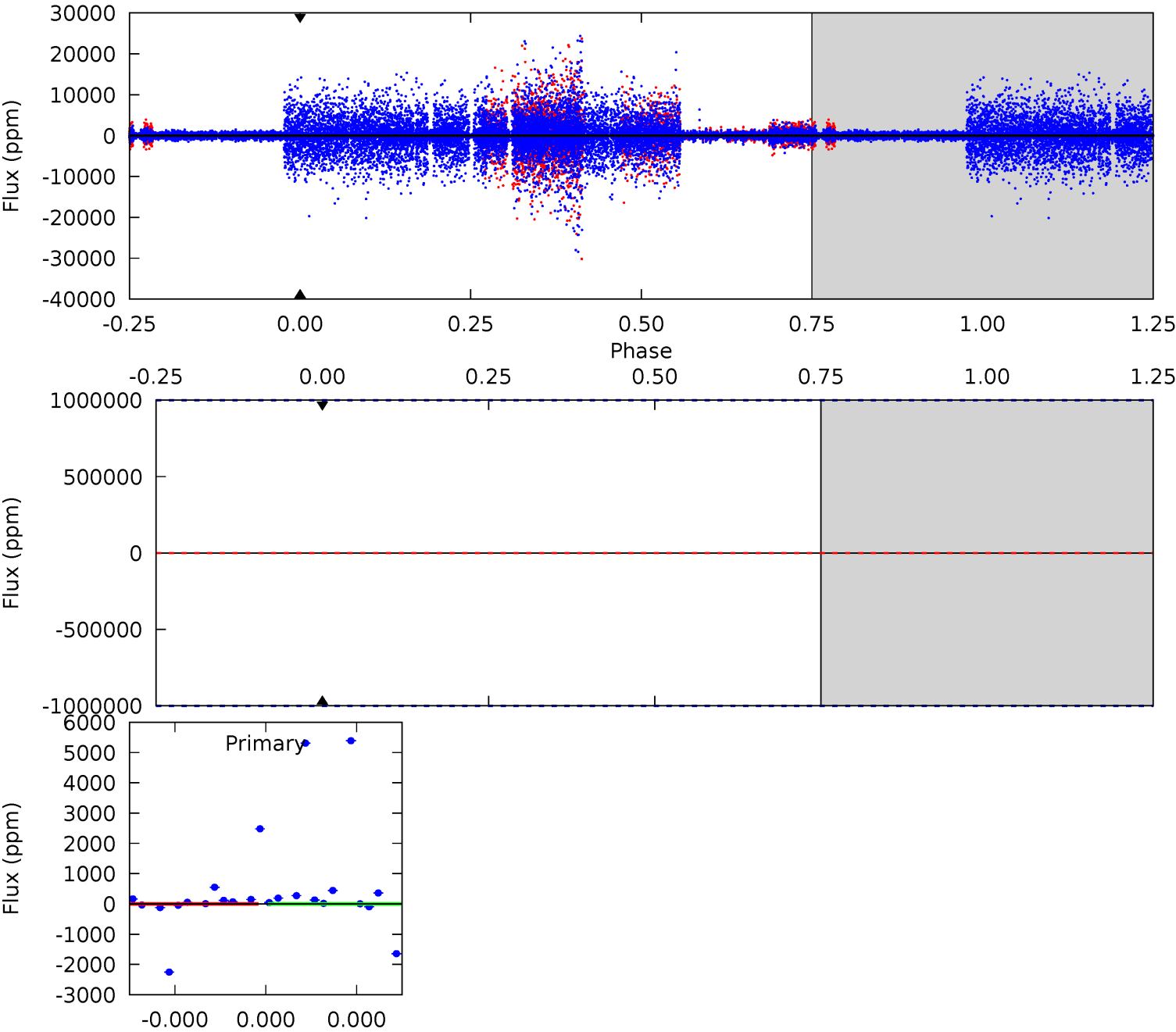
TCE 007868889-03 P=326.269464 Days  $T_0=355.254338$  (BKJD)



# DV Model-Shift Uniqueness Test

007868889-03, P = 326.269464 Days, E = 30.106046 Days

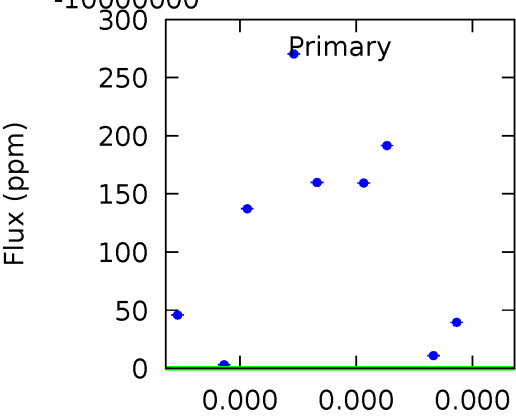
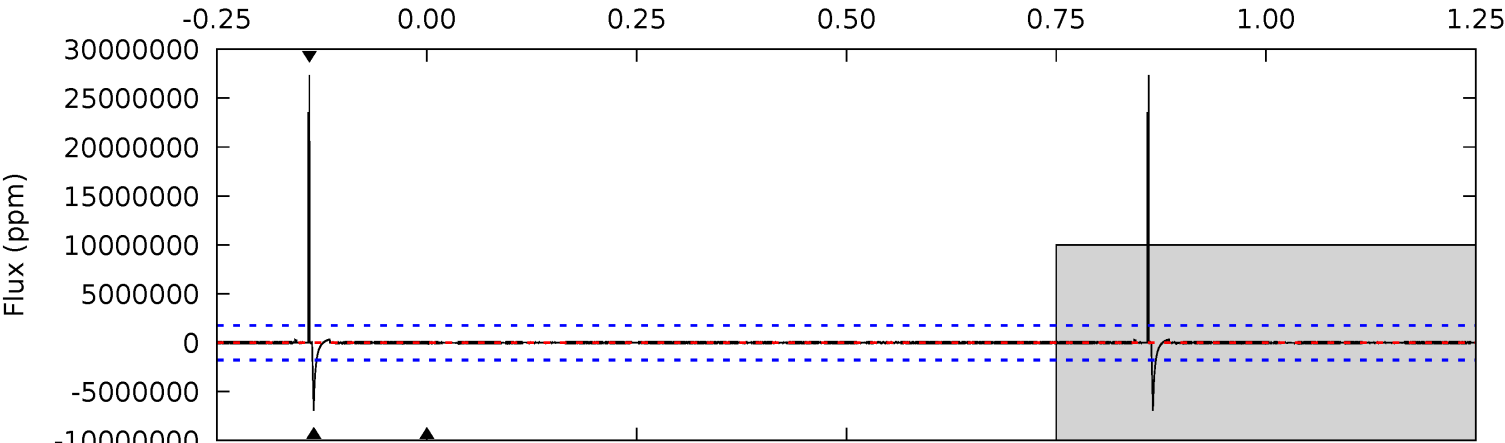
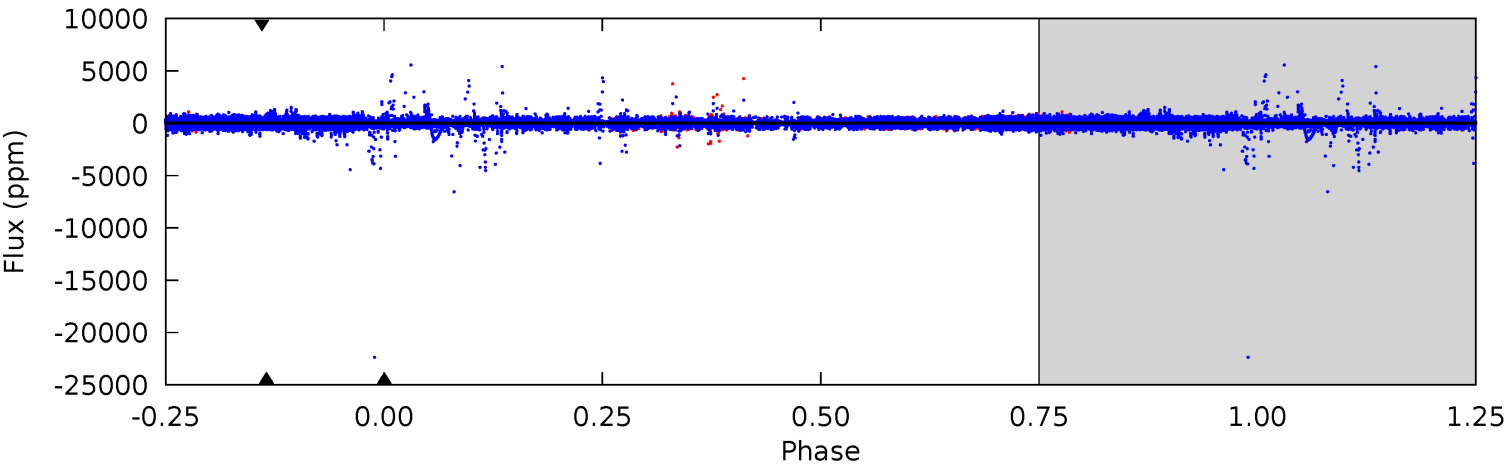
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



# Alt Model-Shift Uniqueness Test

007868889-03, P = 326.269464 Days, E = 28.984874 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
0.05	23.0	19.7	90.6	5.84	3.88	0.92	-19.7	-90.5	3.32	-67.5	0	2.82	0.80	0



### Stellar Parameters For KIC 007868889

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$3834^{+123}_{-76}$	$0.298^{+0.128}_{-0.032}$	$-1.100^{+0.200}_{-0.150}$	$104.317^{+5.072}_{-10.990}$	$0.788^{+0.123}_{-0.016}$	$0.000^{+0.000}_{-0.000}$
	+3%/-2%	+43%/-11%	+18%/-14%	+5%/-11%	+16%/-2%	+50%/-12%
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 007868889-03 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$0 \pm 1000000$	$859.02^{+889.79}_{-595.16}$	$2585^{+84}_{-96}$	$-2848^{+11563}_{-5056}$	$-0.109^{+103.681}_{-76.794}$
Alt.	$-0 \pm 302121$	$819.41^{+860.26}_{-544.69}$	$2584^{+100}_{-100}$	$-2462^{+19142}_{-9381}$	$0.140^{+522.465}_{-233.964}$

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

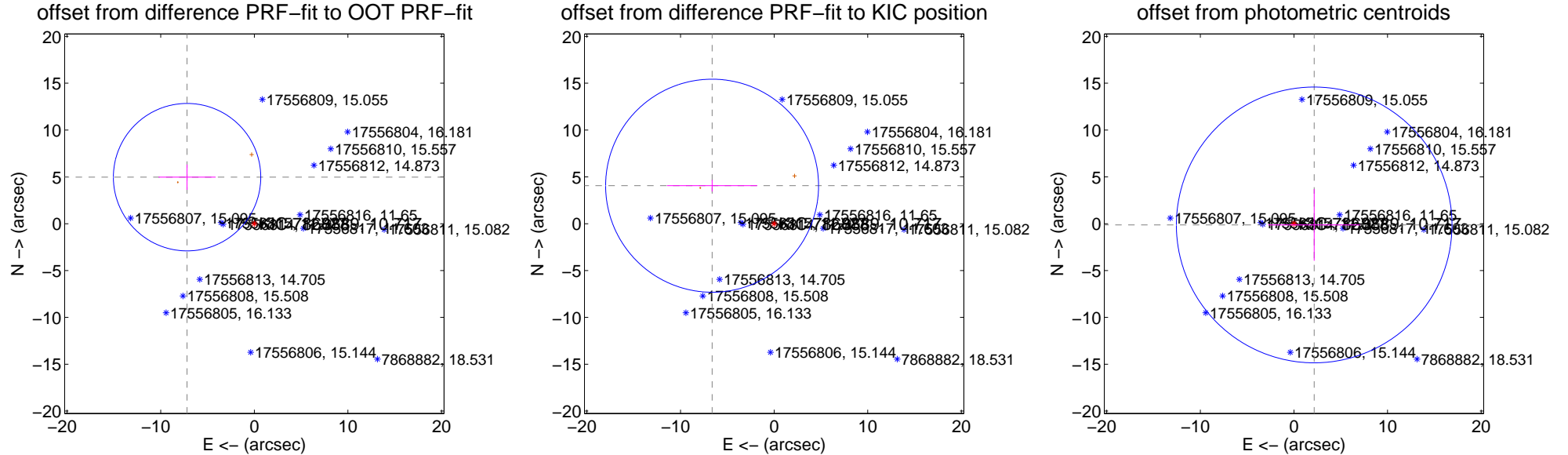
## DV Centroid Data

Supplemental centroid analysis for 007868889-03. **Kepler magnitude: 10.72**. Transit SNR -1.00

**There are 0 quarters with good PRF difference image offsets**

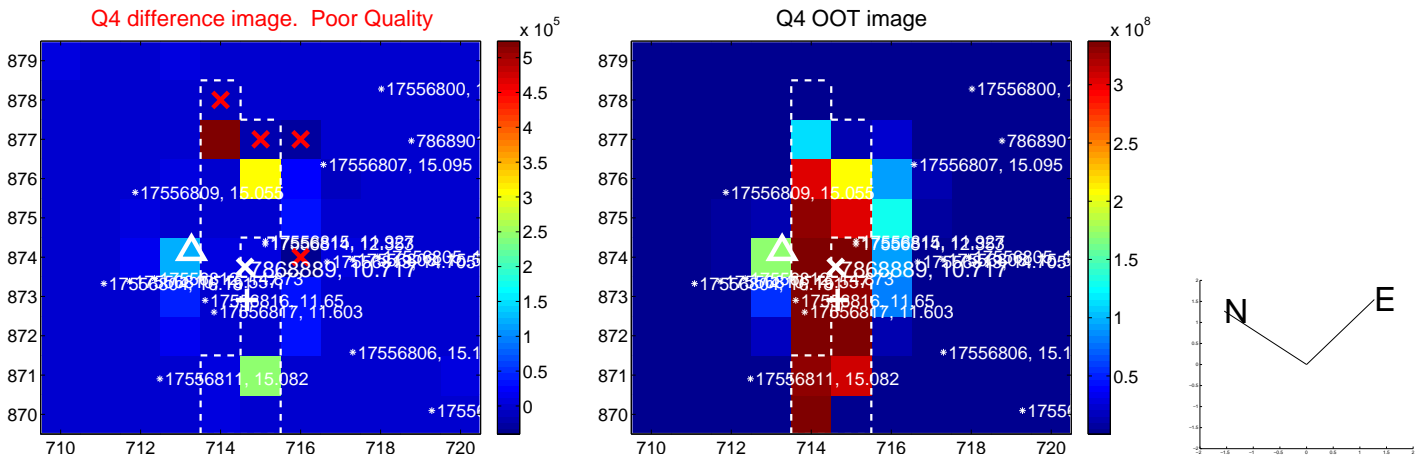
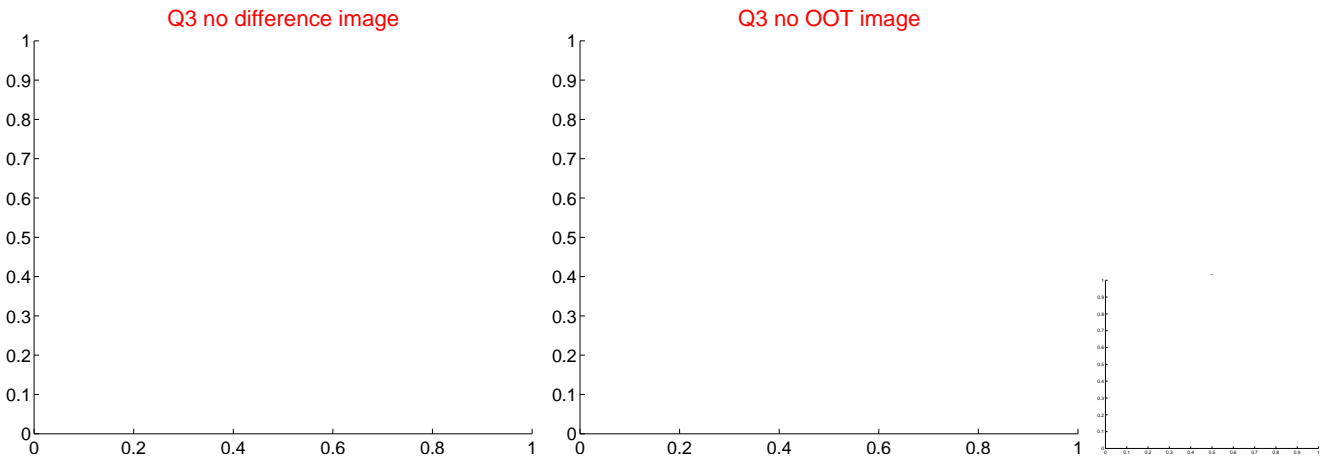
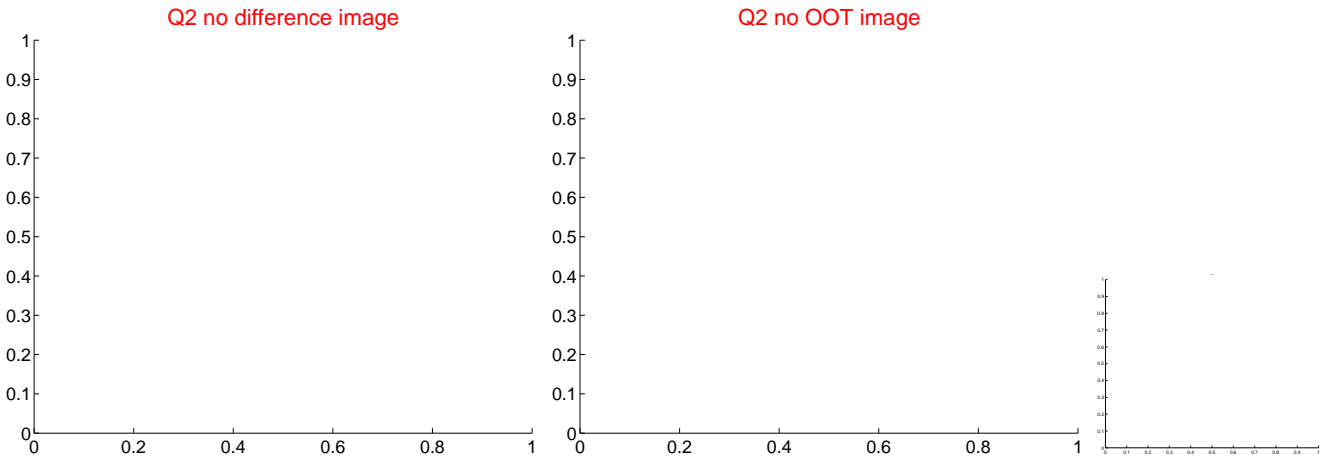
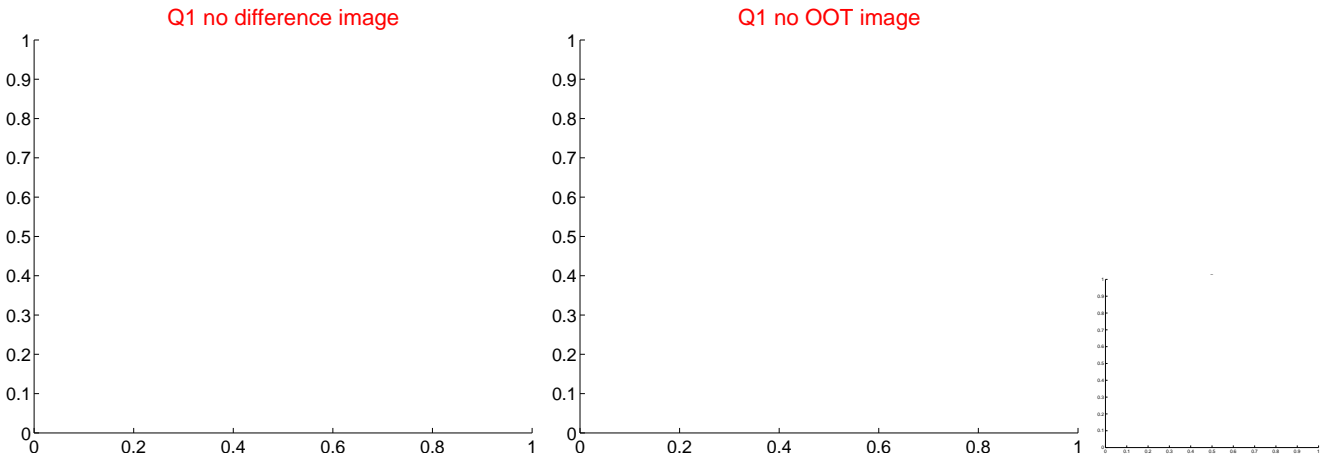
The direct PRF centroid is offset from the target star catalog position by about 0.67 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b>8.735 <math>\pm</math> 2.624</b>	<b>3.33</b>	7.184 $\pm$ 3.052	4.970 $\pm$ 1.345
PRF-fit source offset from KIC position	7.770 $\pm$ 3.791	2.05	6.626 $\pm$ 4.821	4.057 $\pm$ 0.618
photometric centroid source offset	2.17 $\pm$ 4.91	0.44	-2.16 $\pm$ 4.91	-0.13 $\pm$ 3.83



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.

Q5 no difference image



Q5 no OOT image



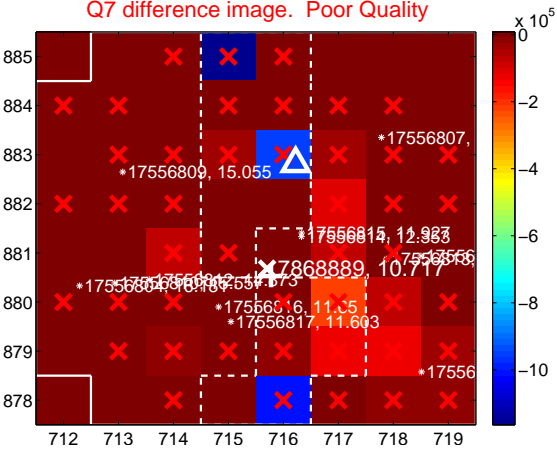
Q6 no difference image



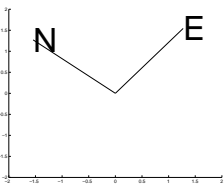
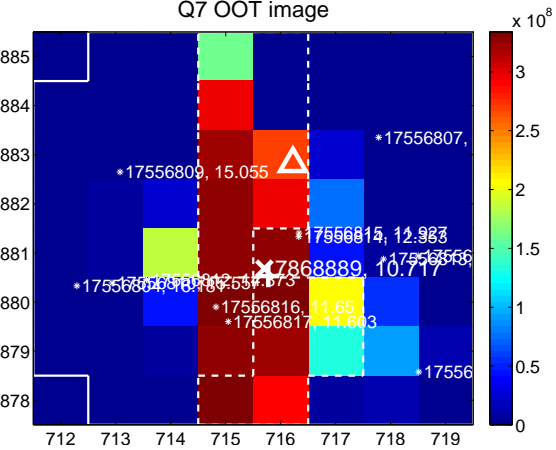
Q6 no OOT image



Q7 difference image. Poor Quality



Q7 OOT image



Q8 no difference image

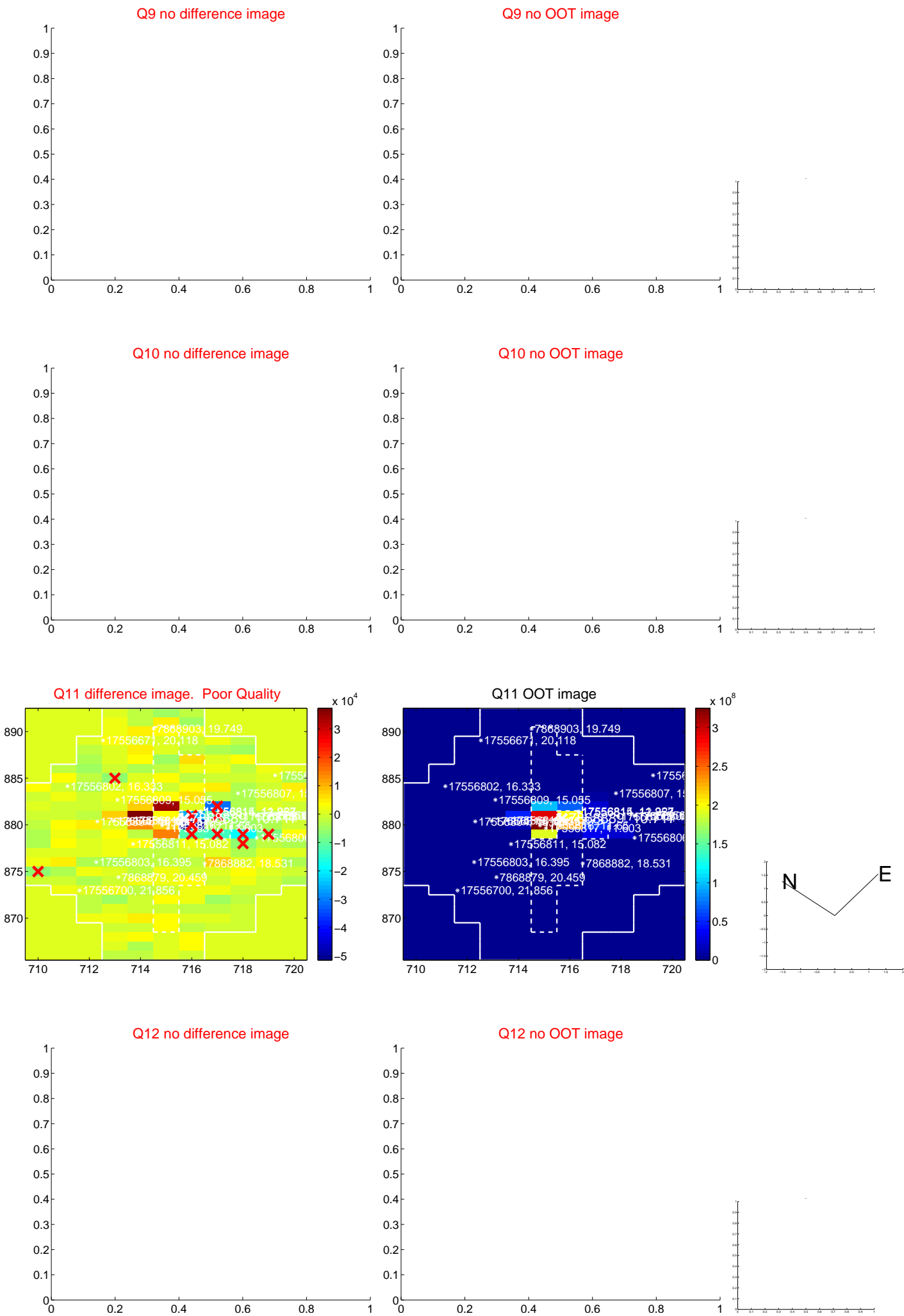


Q8 no OOT image





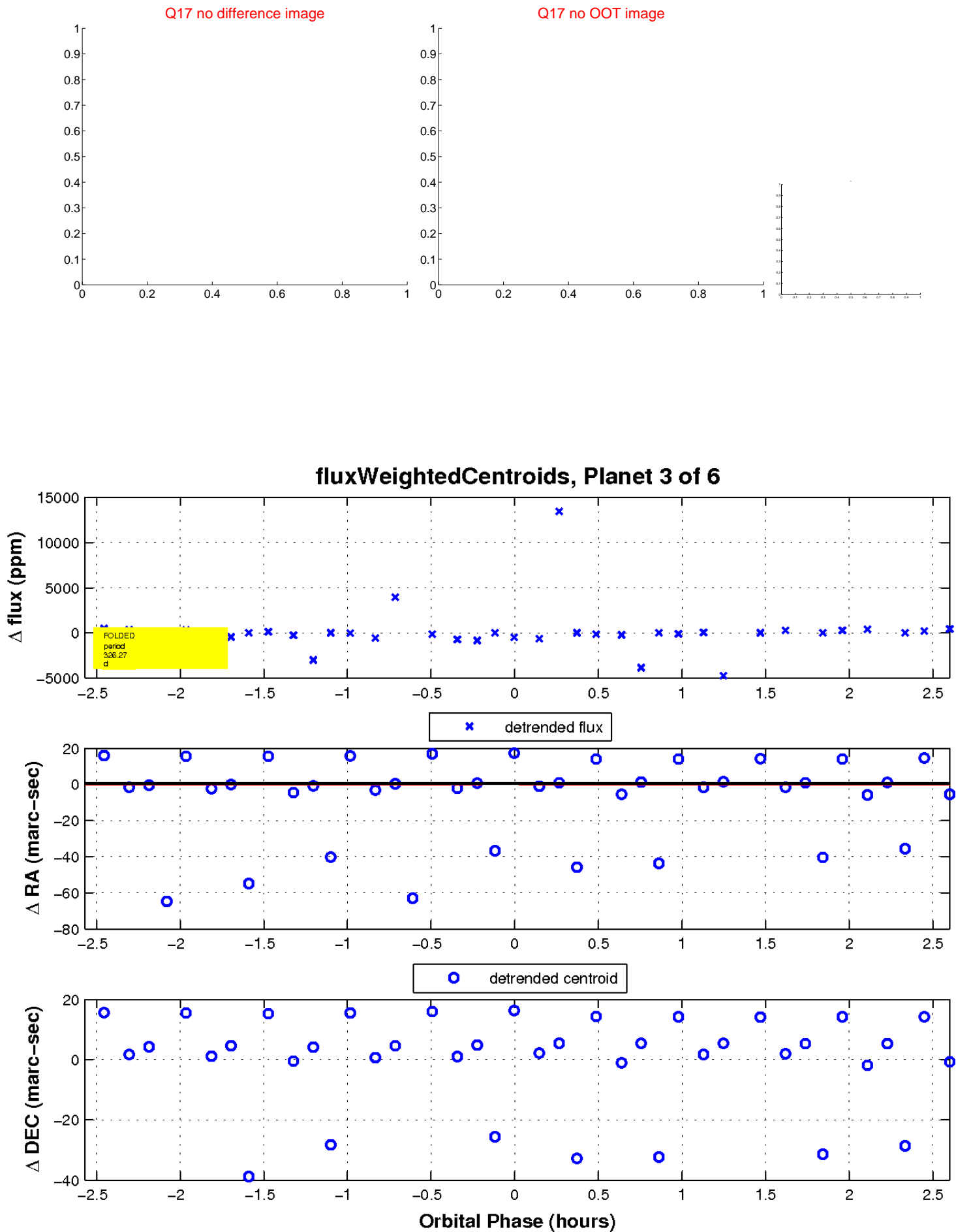
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



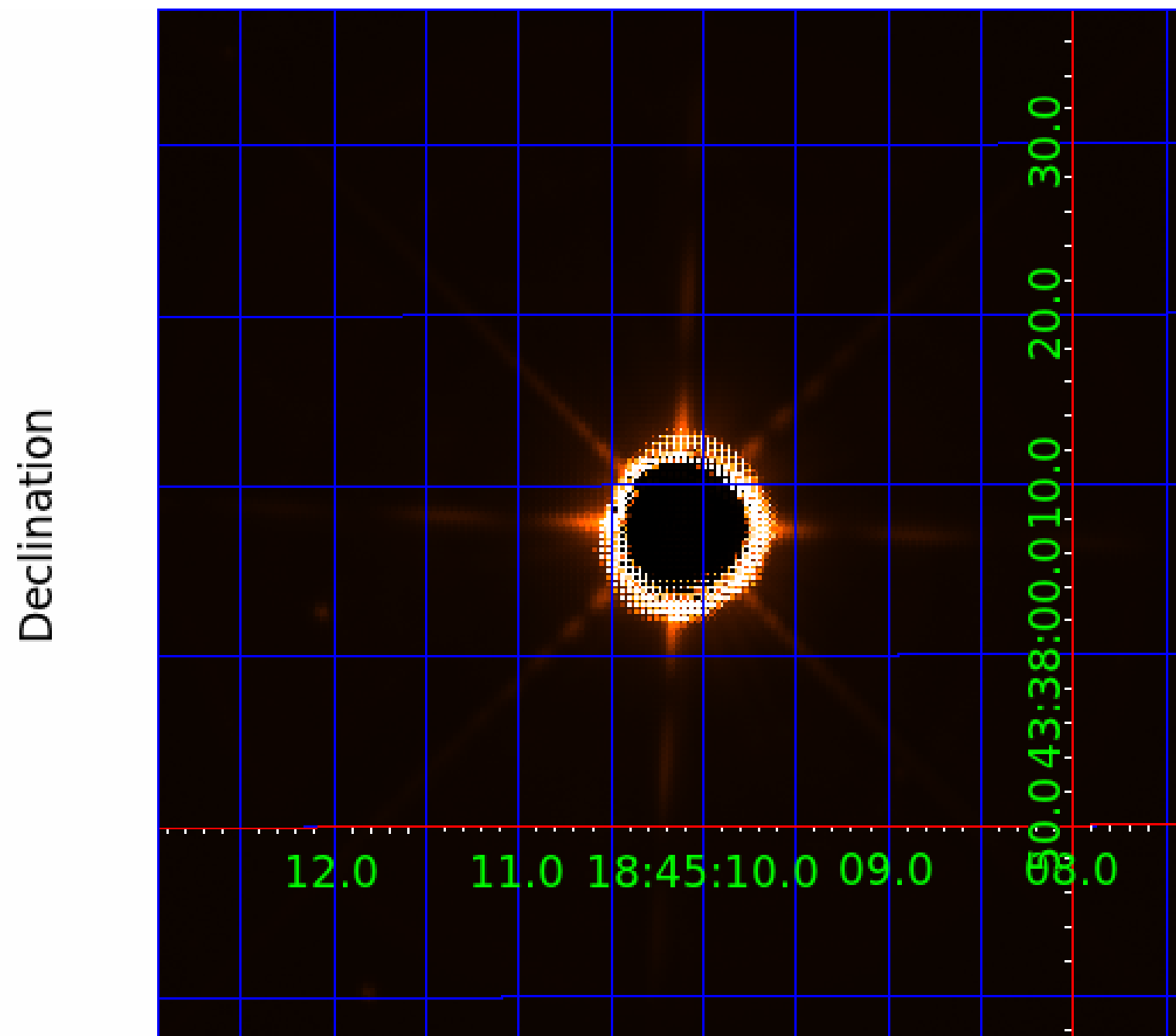
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image



# KIC 007868889

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007868889-01	OBS	No	359.932350	457.105393	295.3	24.831	43.6	7.2	104.32	3834	239.31	2516.39
007868889-02	OBS	No	403.853071	283.176856	94.9	16.884	40.6	1.6	104.32	3834	102.79	2158.28
007868889-03	OBS	No	326.269464	356.375510	213.5	15.000	32.5	-1.0	104.32	3834	143.36	2868.39
007868889-04	OBS	No	507.912212	532.637597	6189.3	5.085	49.6	26.8	104.32	3834	1294.71	1589.84
007868889-05	OBS	No	313.649639	135.664594	3039.4	6.383	73.9	20.9	104.32	3834	550.34	3023.29
007868889-06	OBS	No	419.930092	256.128465	167.7	15.000	27.3	-1.0	104.32	3834	127.09	2048.82

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007868889-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
007868889-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
007868889-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
007868889-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_SKYE—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
007868889-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
007868889-06	OBS	FP	0.00	1	0	0	0	LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED

**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.

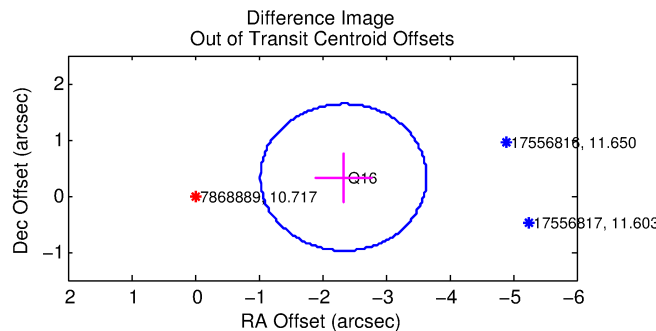
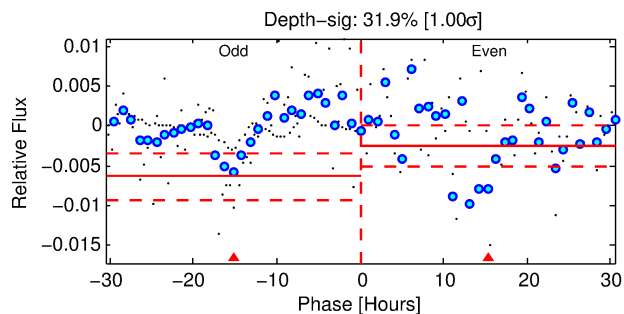
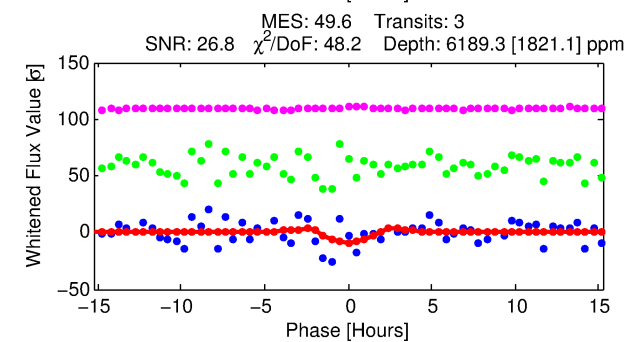
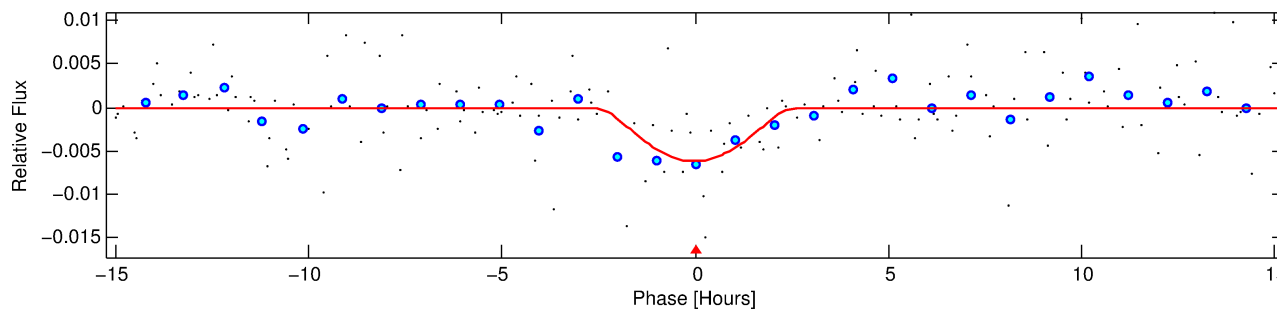
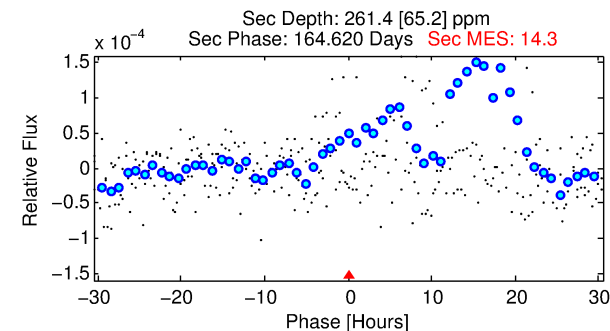
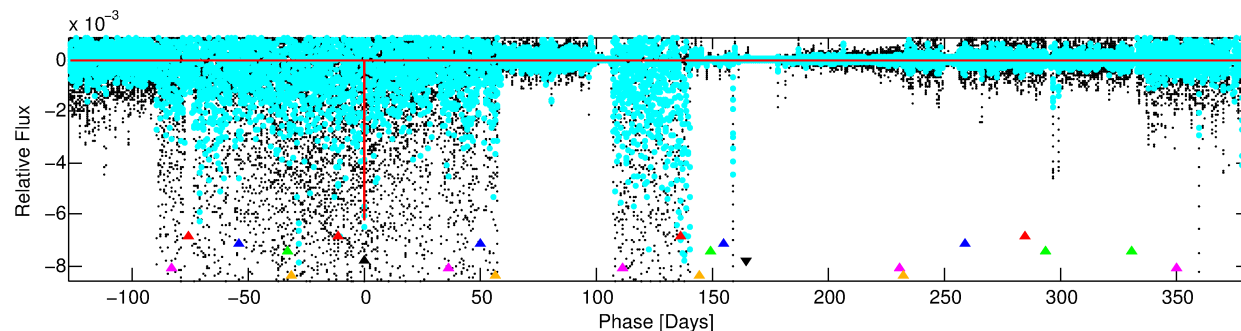
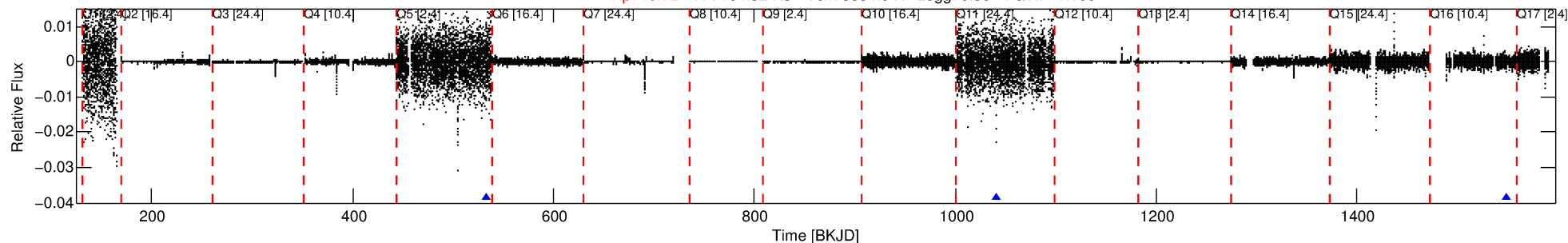
Ephemeris Match Information For 007868889-04

No Significant Match Found

# DV One-Page Summary

KIC: 7868889 Candidate: 4 of 6 Period: 507.912 d

Kp: 10.72 R\*: 104.32 Rs Teff: 3834.0 K Logg: 0.30 Fe/H: -1.100



## DV Fit Results:

Period = 507.91221 [0.01765] d  
Epoch = 532.6376 [0.0190] BKJD  
Rp/R\* = 0.1137 [0.3343]  
a/R\* = 433.95 [334.33]  
b = 0.96 [0.57]  
Seff = 1589.84 [389.46]  
Teq = 1610 [99] K  
Rp = 1294.71 [3807.62] Re  
a = 1.1511 [0.1390] AU  
Ag = 0.11 [0.67] [-1.32σ]  
Teffp = 1446 [2127] K [-0.08σ]

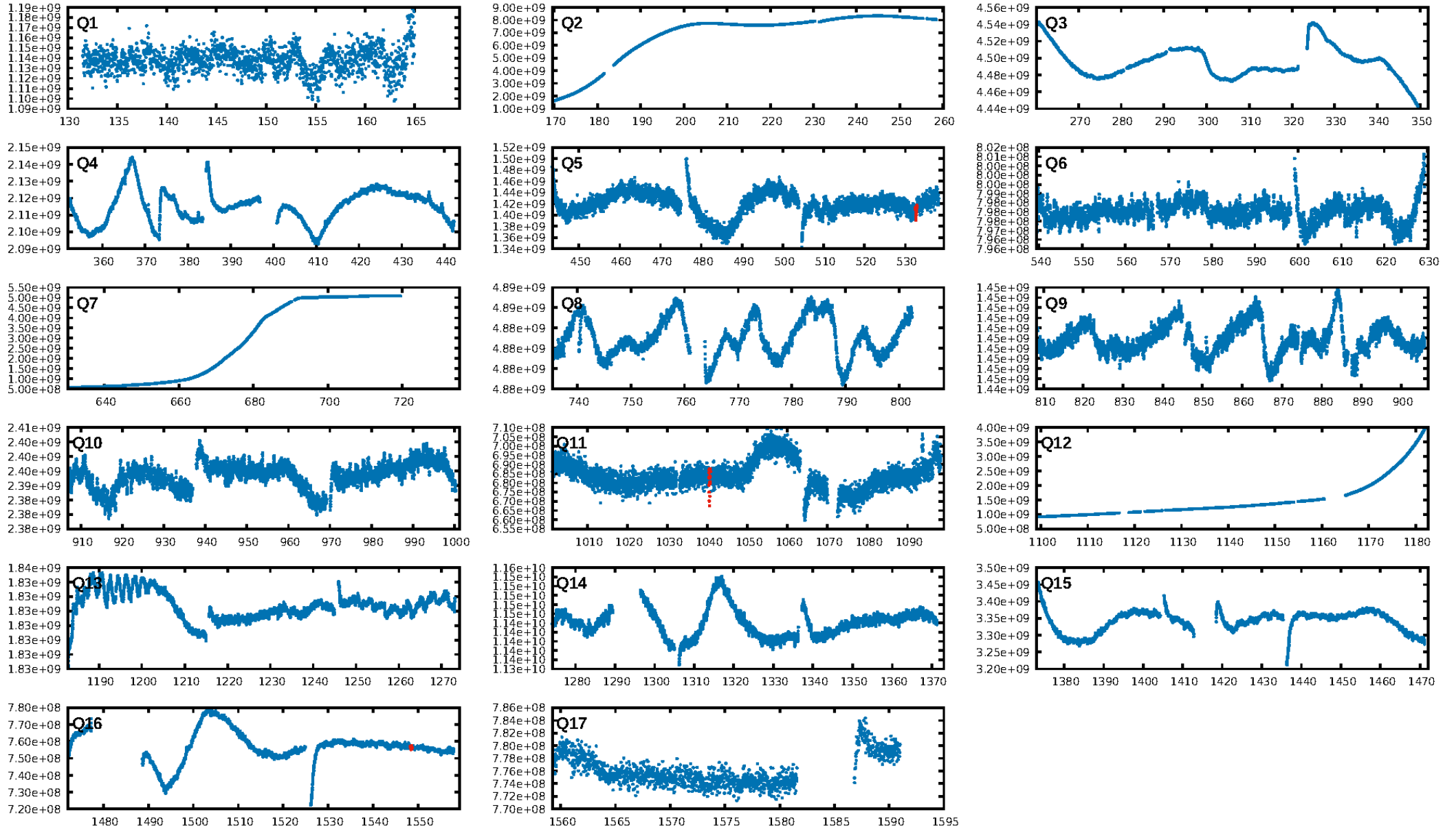
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [133.32σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 0.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: N/A  
Centroid-sig: N/A  
Centroid-so: 1.266 arcsec [10.07σ]  
OotOffset-rm: 2.357 arcsec [5.41σ]  
KicOffset-rm: 2.858 arcsec [6.56σ]  
OotOffset-st: 0/0/1/0 [1]  
KicOffset-st: 0/0/1/0 [1]  
DiffImageQuality-fgm: 1.00 [1/1]  
DiffImageOverlap-fno: 1.00 [3/3]

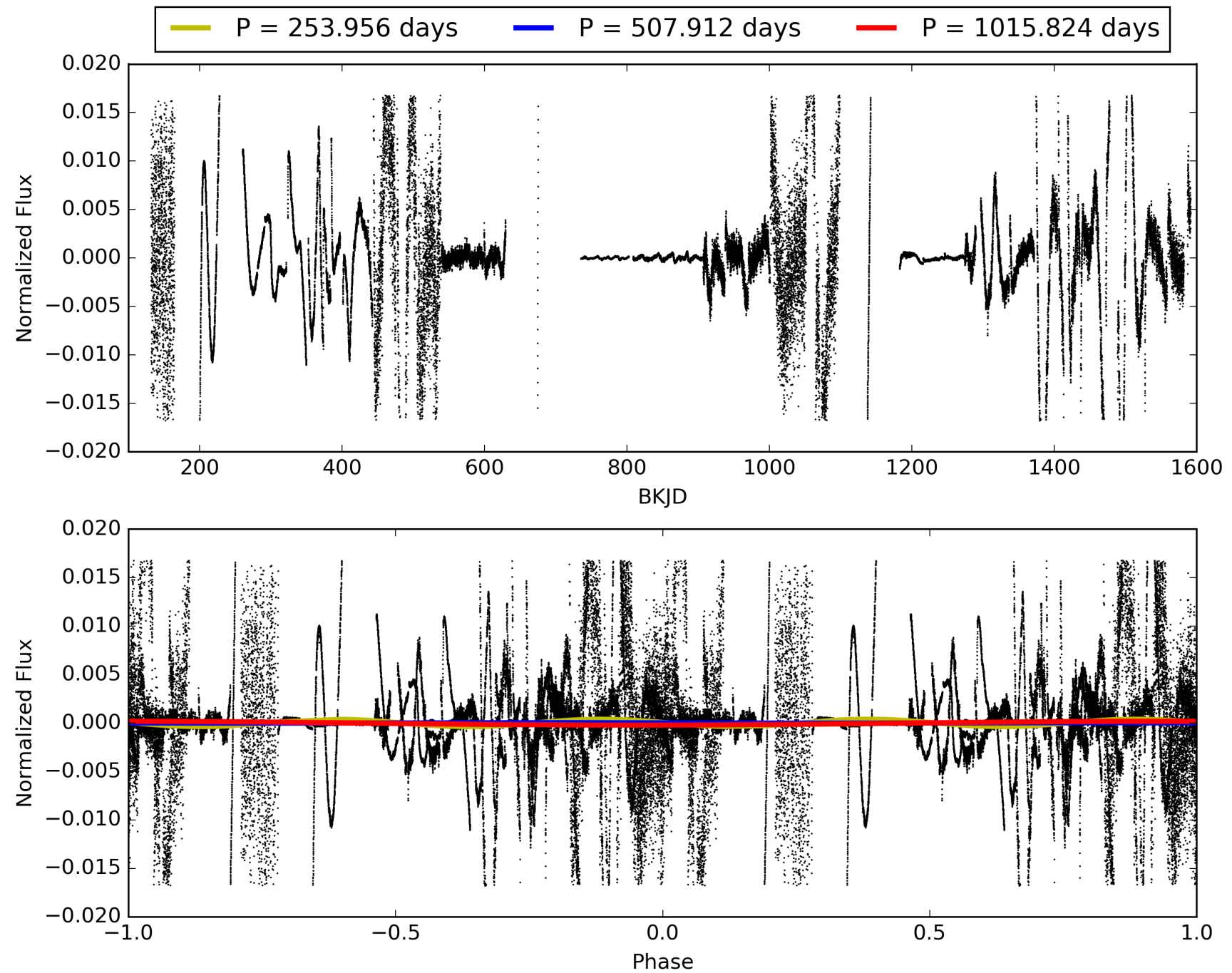
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 15:17:08 Z

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

# TCE 007868889-04, PDC Light Curves



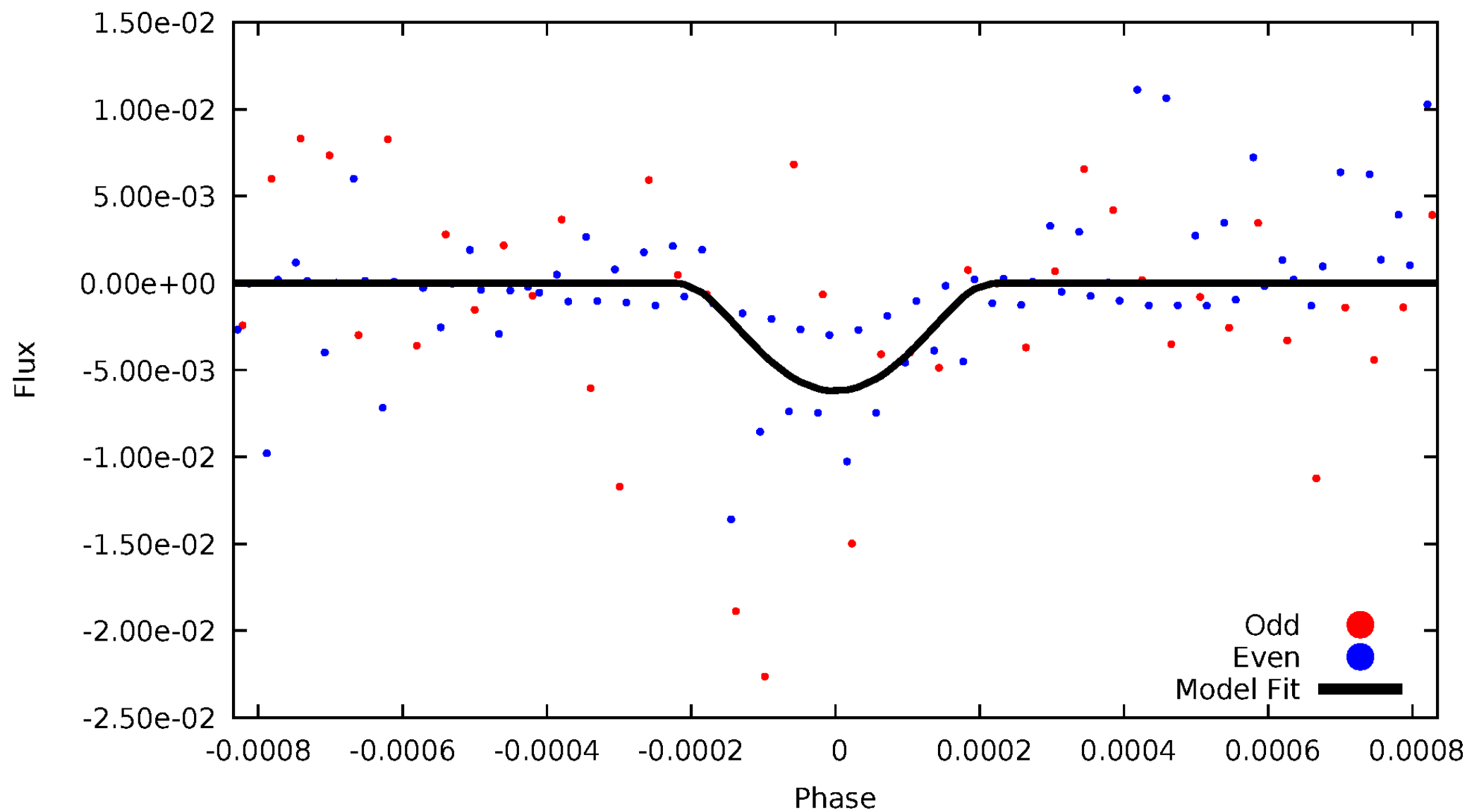
# TCE 007868889-04





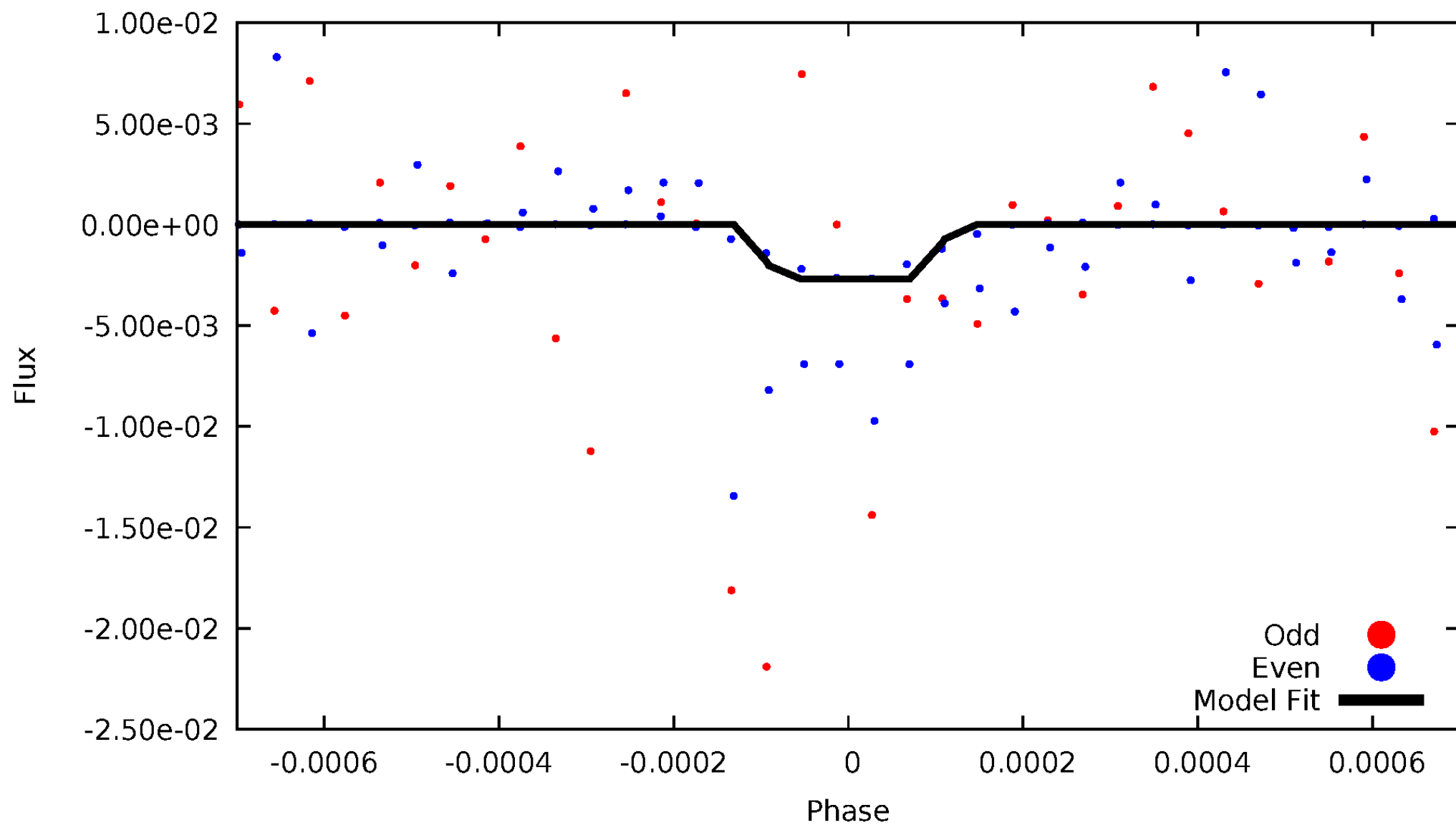
# DV Odd/Even

TCE 007868889-04



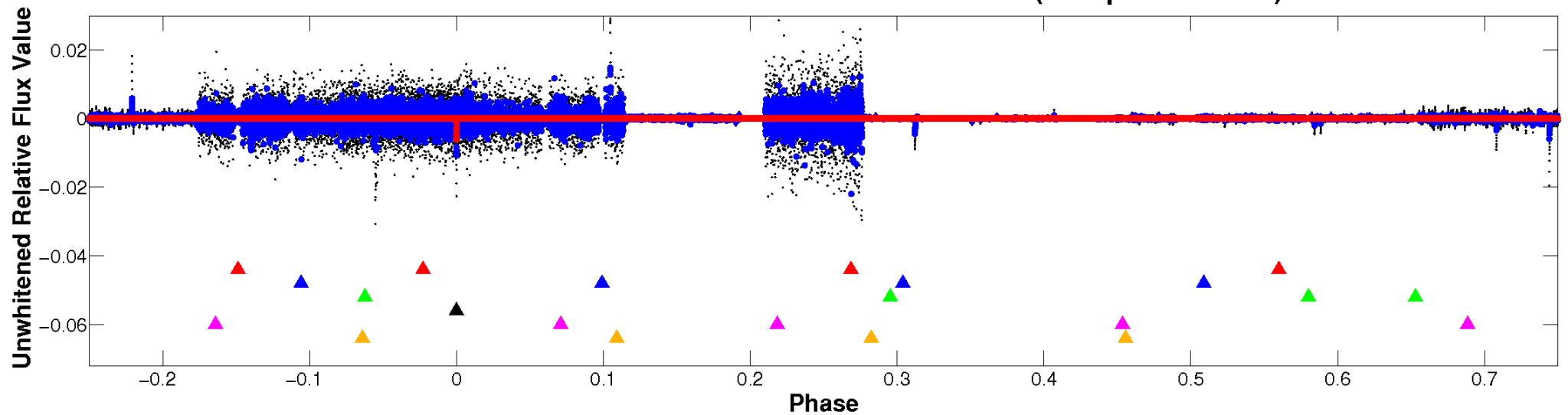
# ALT Odd/Even

TCE 007868889-04

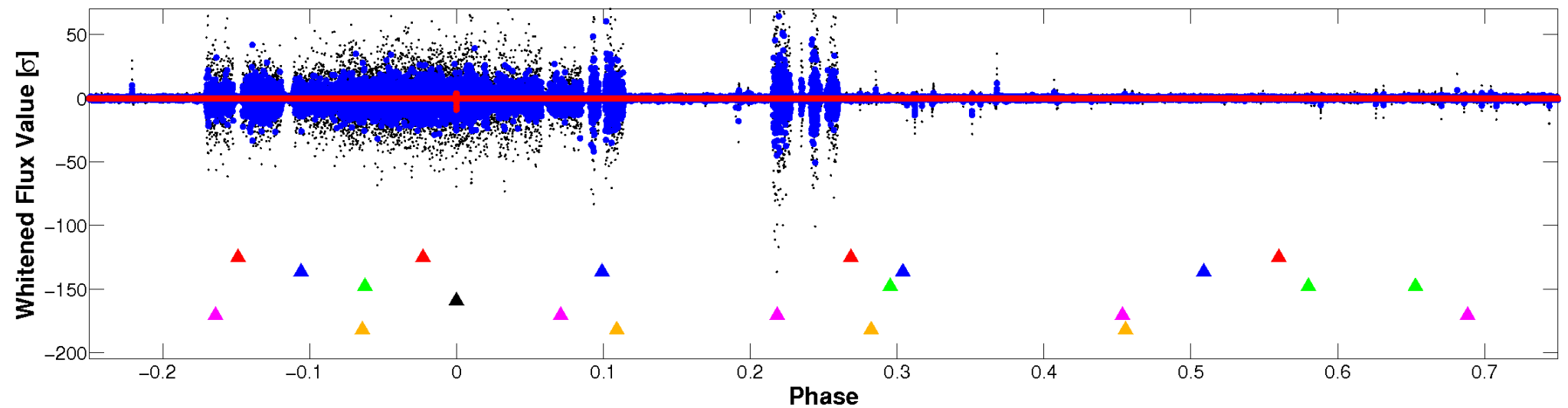


# Non-Whitened Vs. Whitened Light Curve

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

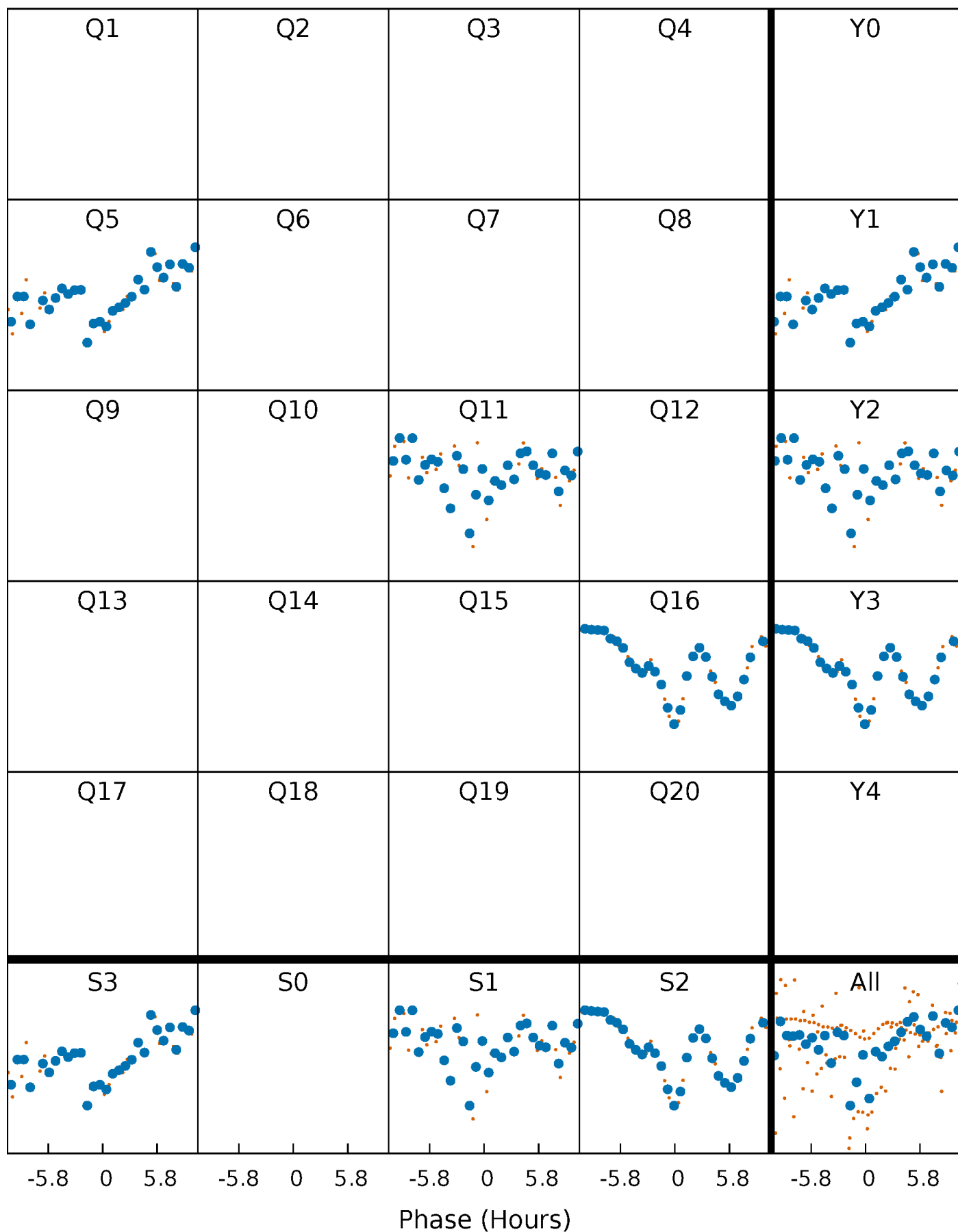


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



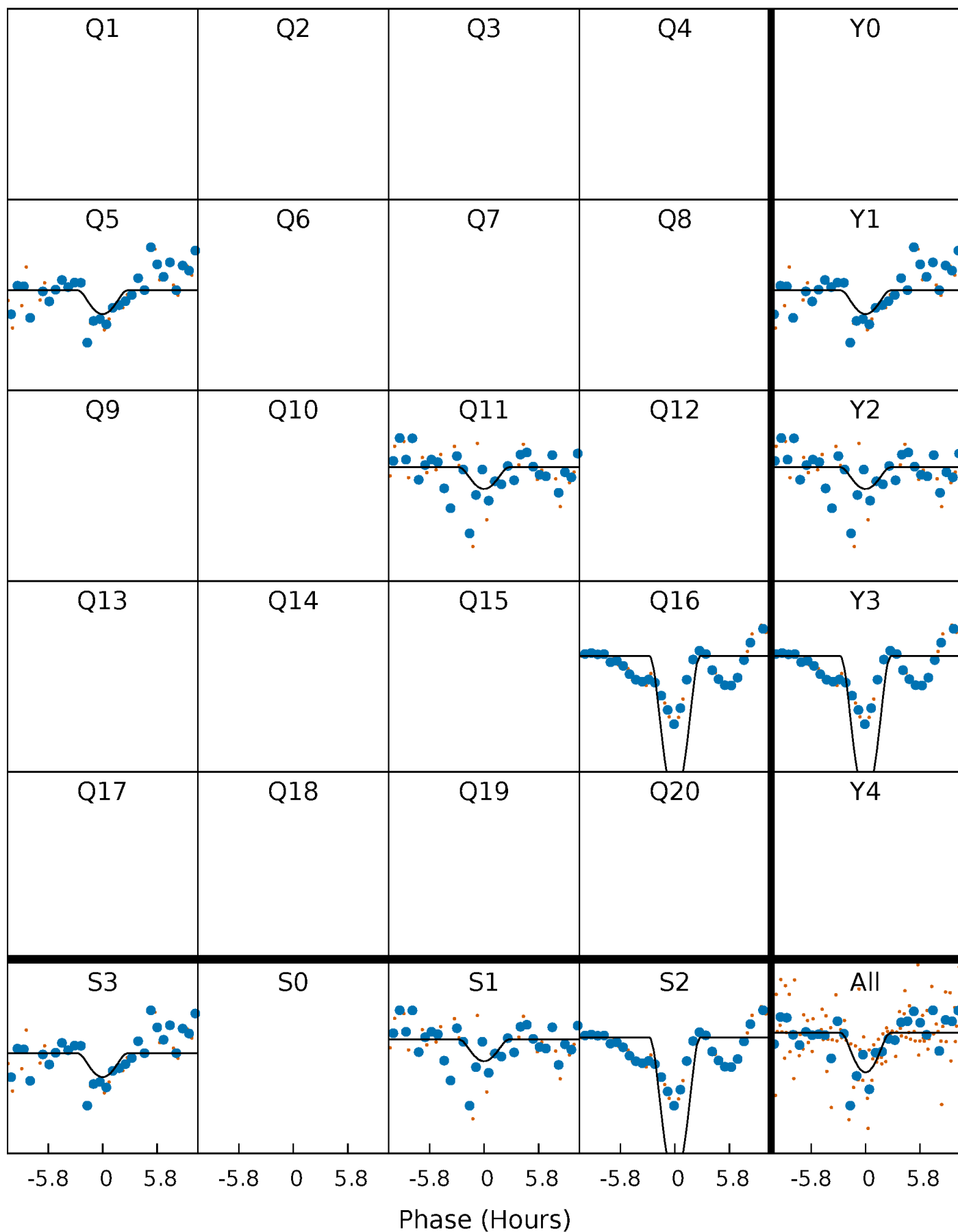
# PDC Quarter-Phased Transit Curves

TCE 007868889-04 P=507.912212 Days  $T_0=532.637597$  (BKJD)



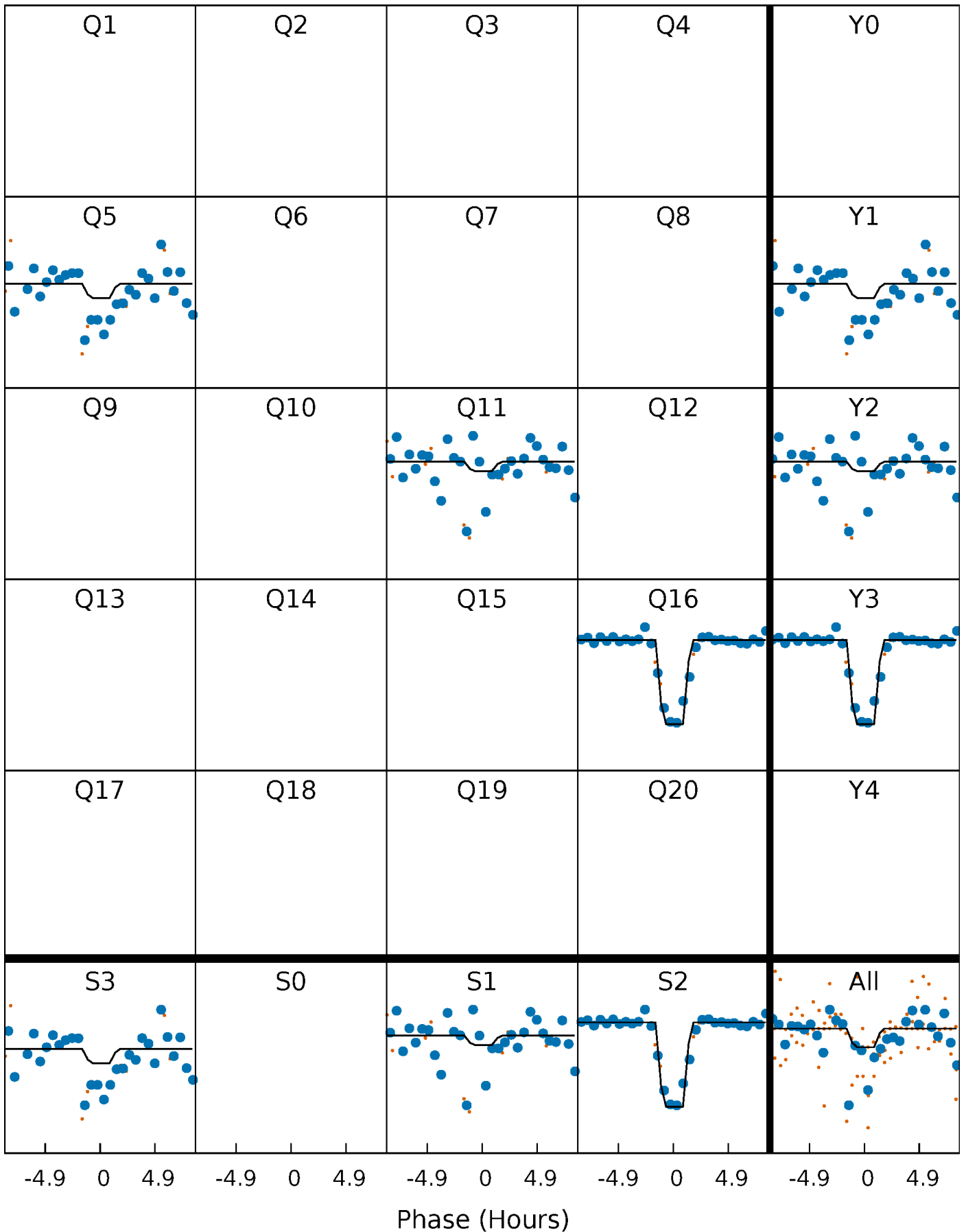
# DV Quarter-Phased Transit Curves

TCE 007868889-04 P=507.912212 Days  $T_0=532.637597$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

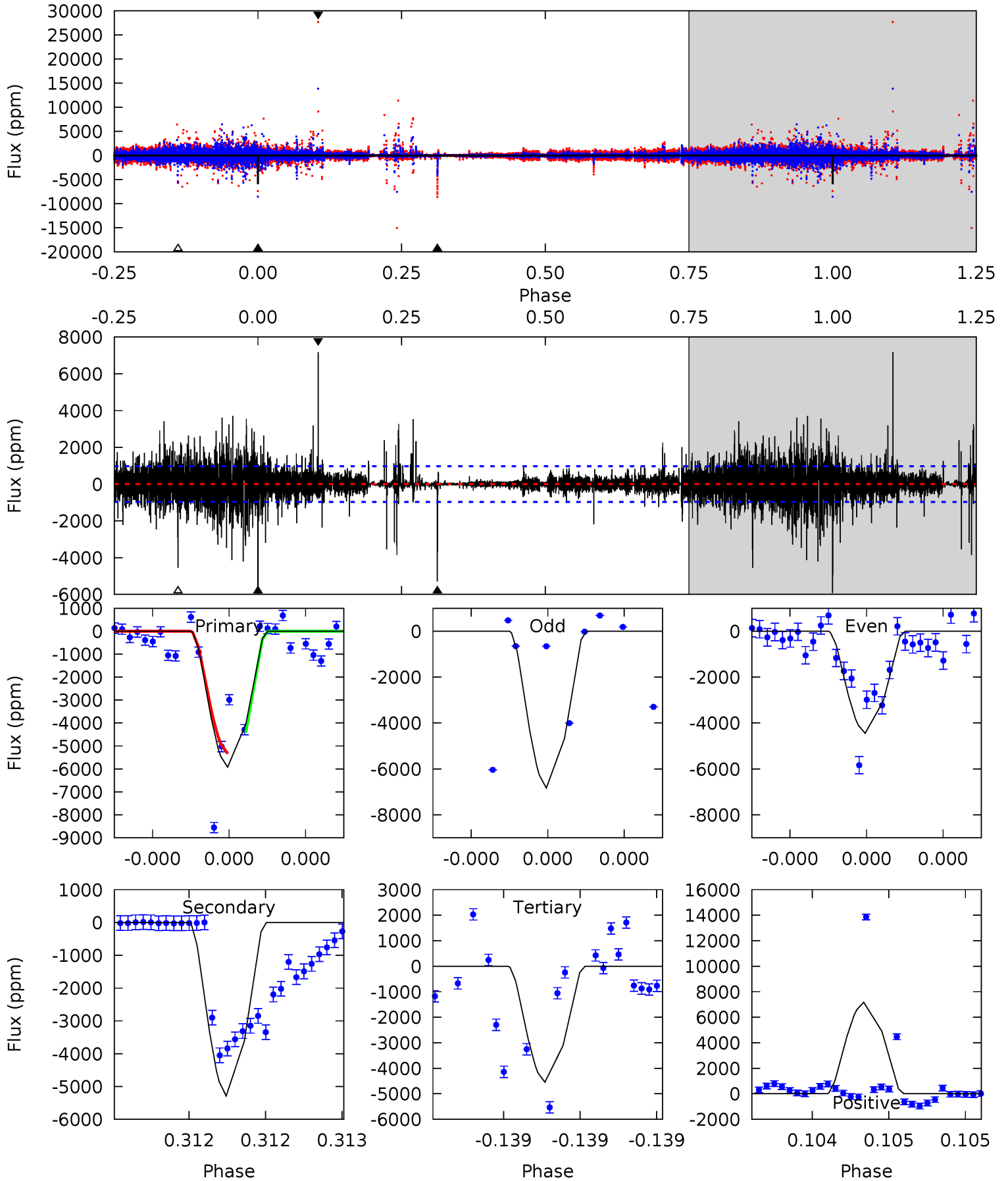
TCE 007868889-04 P=507.917001 Days  $T_0=532.630670$  (BKJD)



# DV Model-Shift Uniqueness Test

007868889-04, P = 507.912212 Days, E = 24.725385 Days

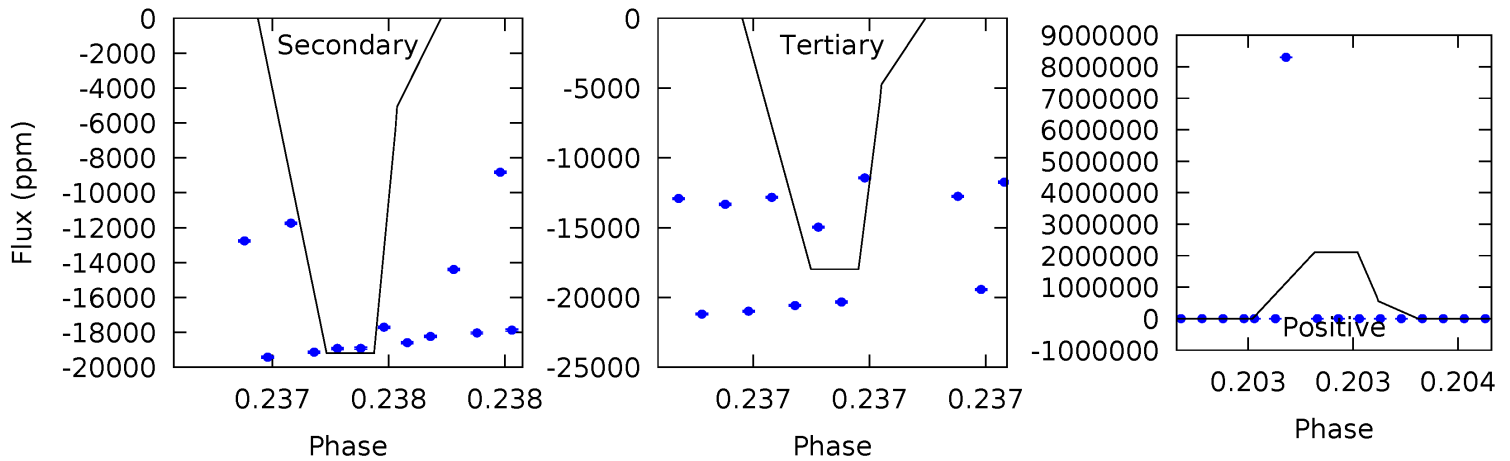
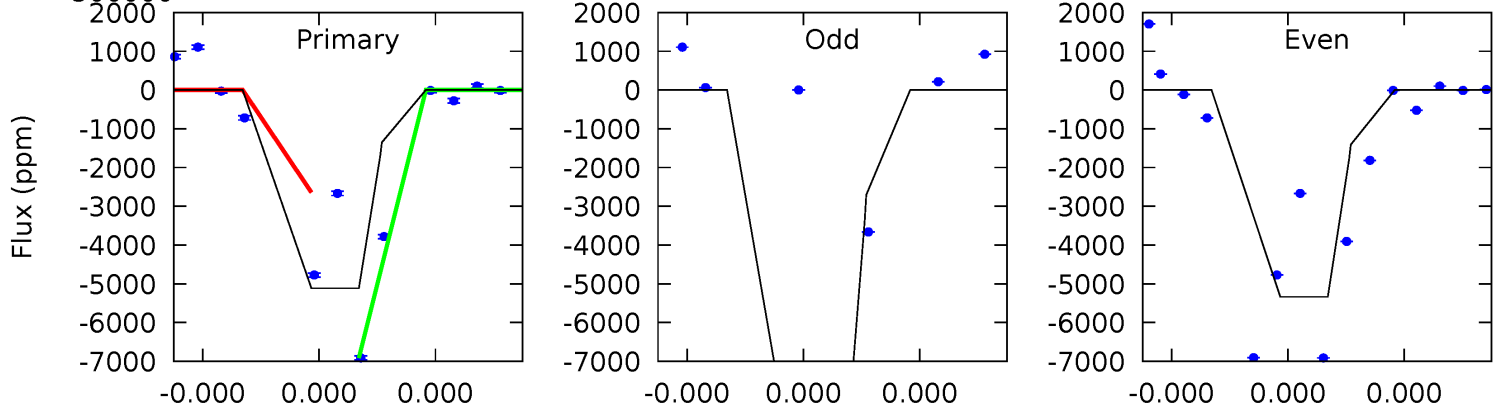
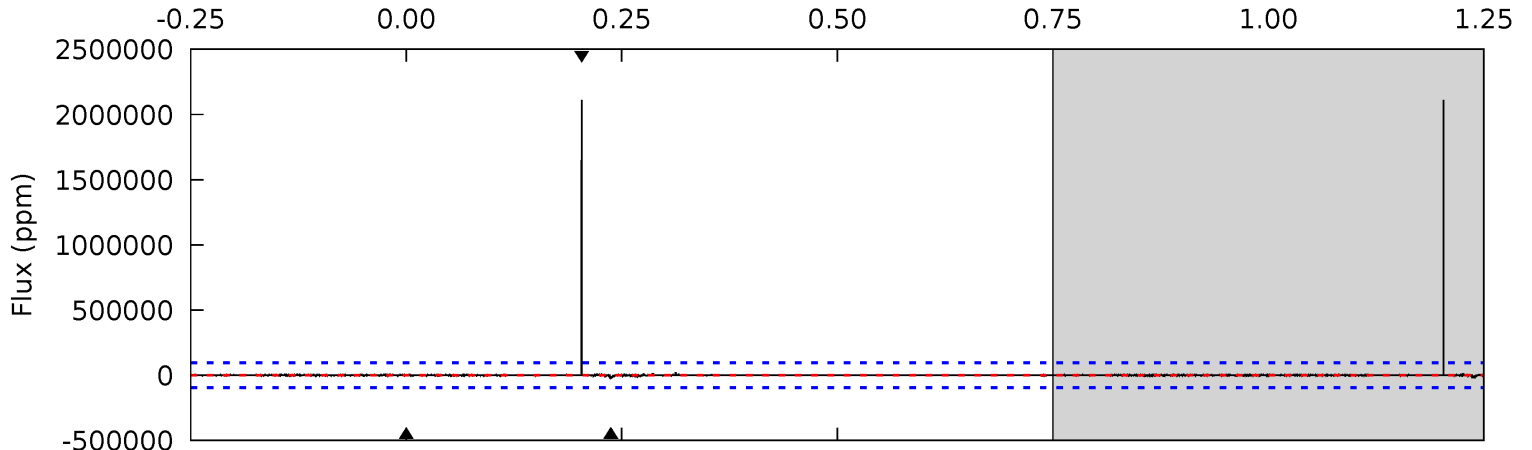
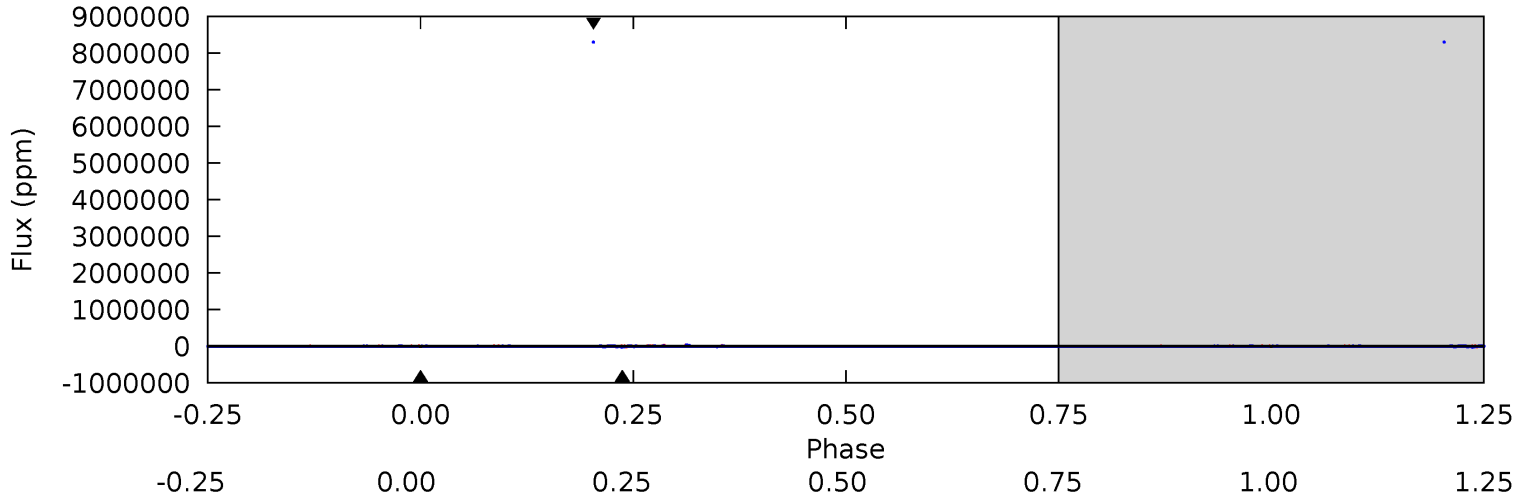
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
34.2	30.6	26.3	41.5	5.59	3.51	2.56	7.96	-7.22	4.30	-10.9	4.09	0.82	0.55	2.67



# Alt Model-Shift Uniqueness Test

007868889-04, P = 507.917001 Days, E = 24.713669 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
0.31	1.15	1.08	126.2	5.73	3.71	1.14	-0.77	-125.9	0.07	-125.1	0.06	0.93	0.99	0





### Stellar Parameters For KIC 007868889

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$3834^{+123}_{-76}$	$0.298^{+0.128}_{-0.032}$	$-1.100^{+0.200}_{-0.150}$	$104.317^{+5.072}_{-10.990}$	$0.788^{+0.123}_{-0.016}$	$0.000^{+0.000}_{-0.000}$
	+3%/-2%	+43%/-11%	+18%/-14%	+5%/-11%	+16%/-2%	+50%/-12%
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 007868889-04 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-5290 \pm 173$	$3058.58^{+2980.22}_{-2162.65}$	$2226^{+81}_{-77}$	$2280^{+1411}_{-4648}$	$0.428^{+4.714}_{-0.318}$
Alt.	$-19192 \pm 16694$	$2704.36^{+3205.82}_{-1905.70}$	$2227^{+79}_{-81}$	$2993^{+1733}_{-5320}$	$1.498^{+15.964}_{-1.352}$

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

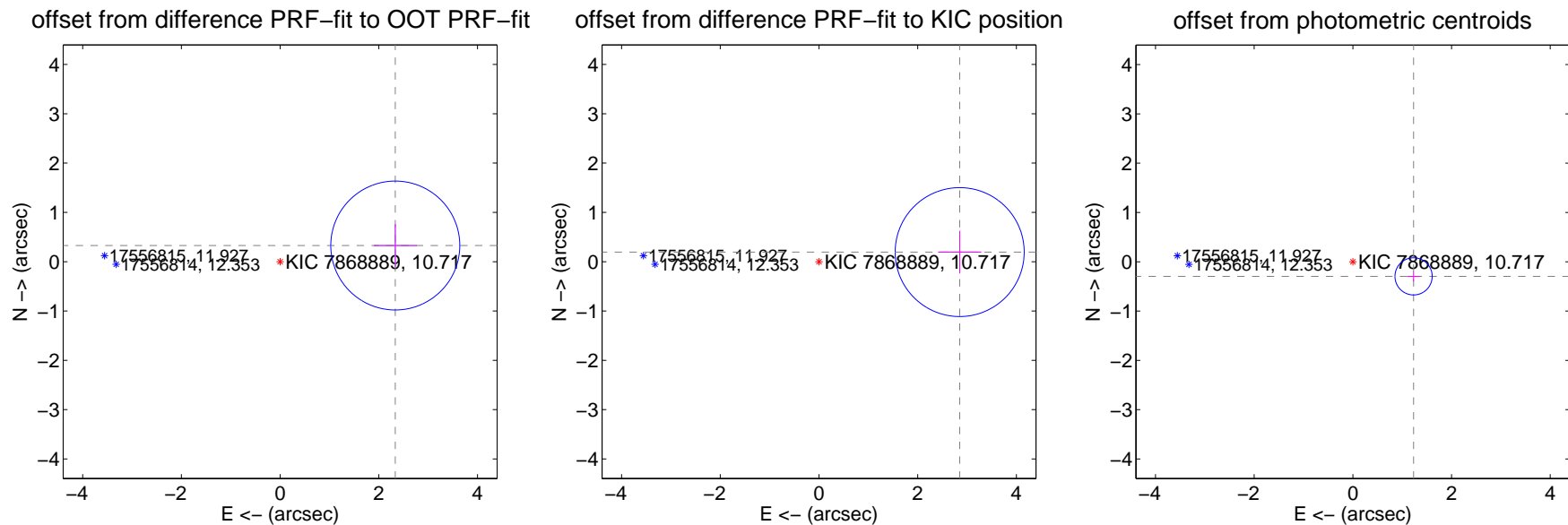
## DV Centroid Data

Supplemental centroid analysis for 007868889-04. **Kepler magnitude: 10.72.** Transit SNR 26.80

**There are 1 quarters with good PRF difference image offsets**

The direct PRF centroid is offset from the target star catalog position by about 0.53 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b><math>2.357 \pm 0.436</math></b>	<b>5.41</b>	$-2.334 \pm 0.436$	$0.328 \pm 0.432$
PRF-fit source offset from KIC position	<b><math>2.858 \pm 0.436</math></b>	<b>6.56</b>	$-2.851 \pm 0.436$	$0.195 \pm 0.432$
photometric centroid source offset	<b><math>1.27 \pm 0.13</math></b>	<b>10.07</b>	$-1.23 \pm 0.13$	$-0.30 \pm 0.10$

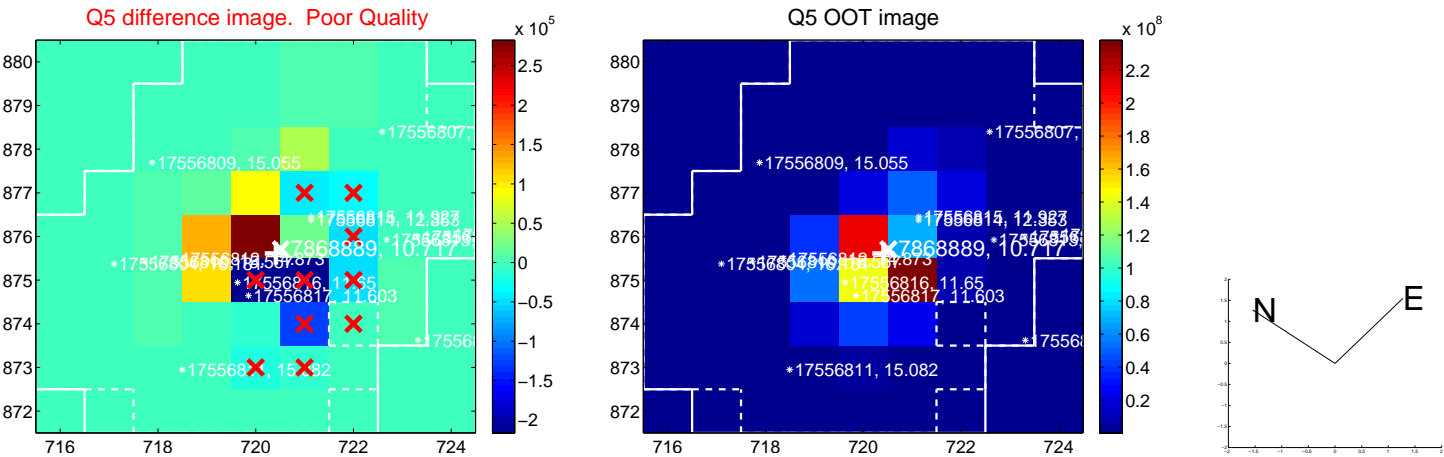


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

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



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



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

Q9 no difference image



Q9 no OOT image



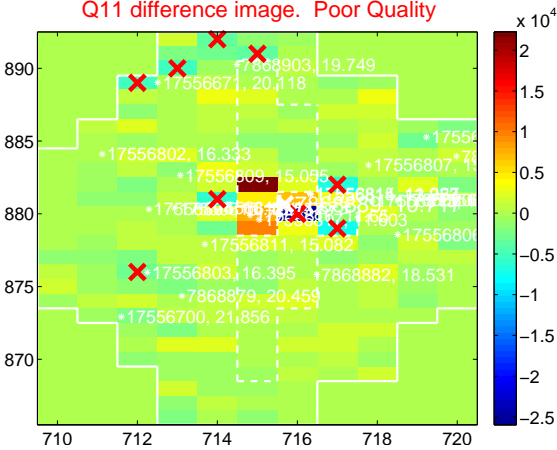
Q10 no difference image



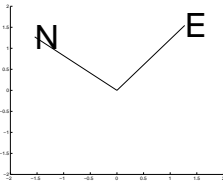
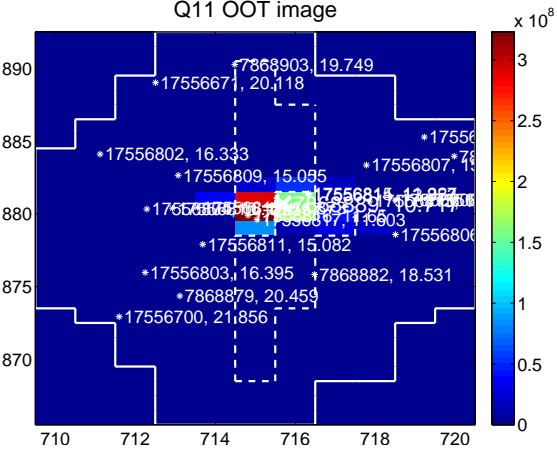
Q10 no OOT image



Q11 difference image. Poor Quality



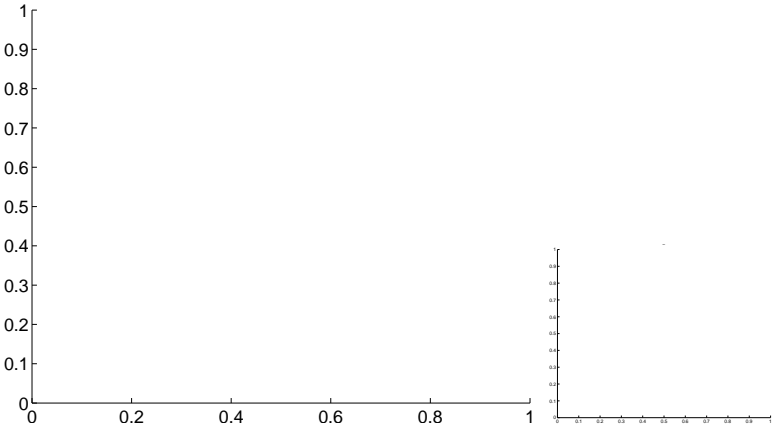
Q11 OOT image



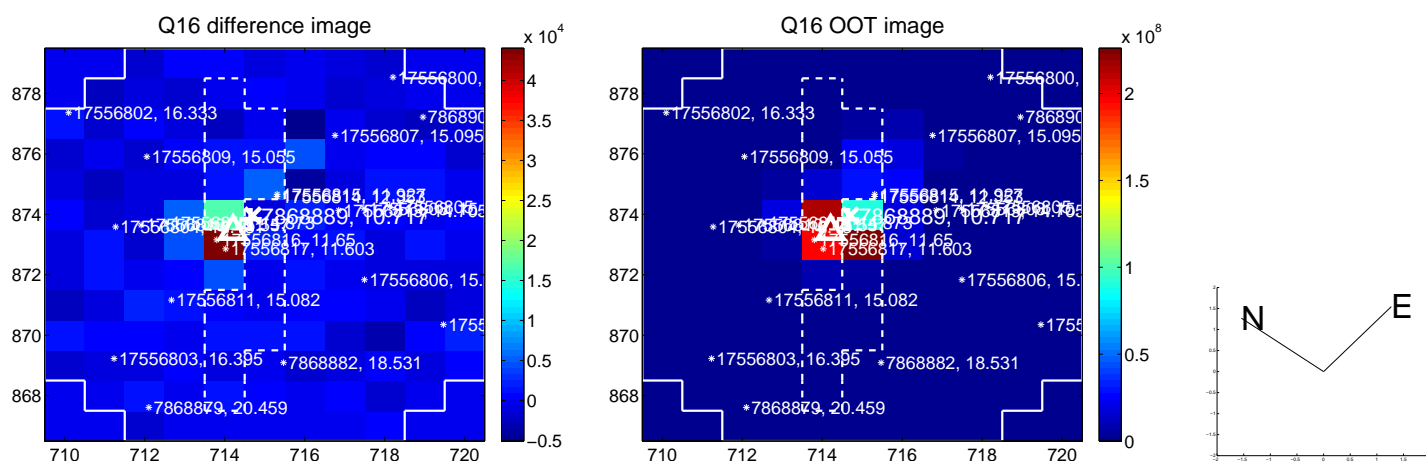
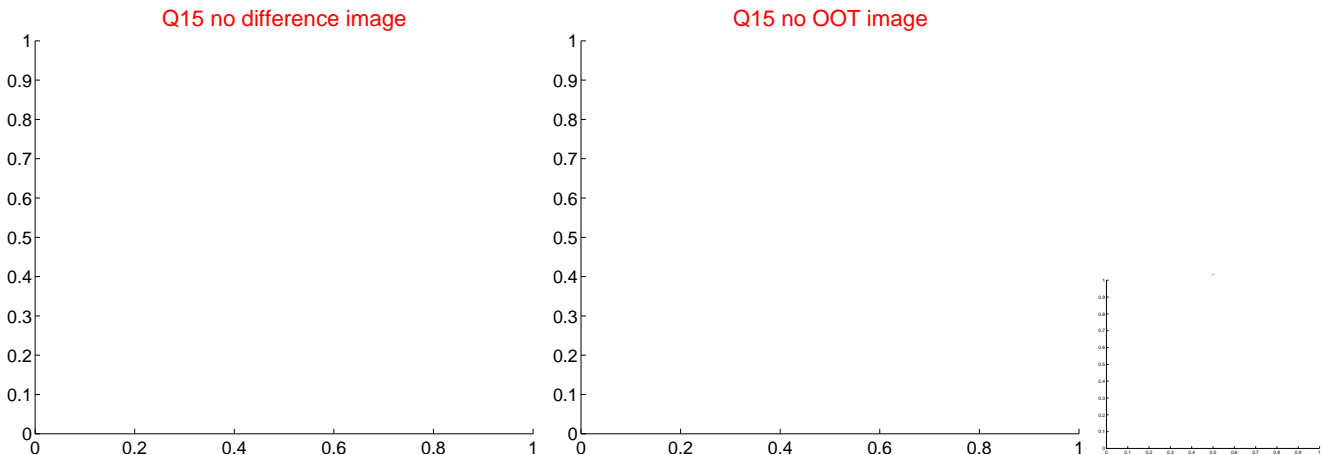
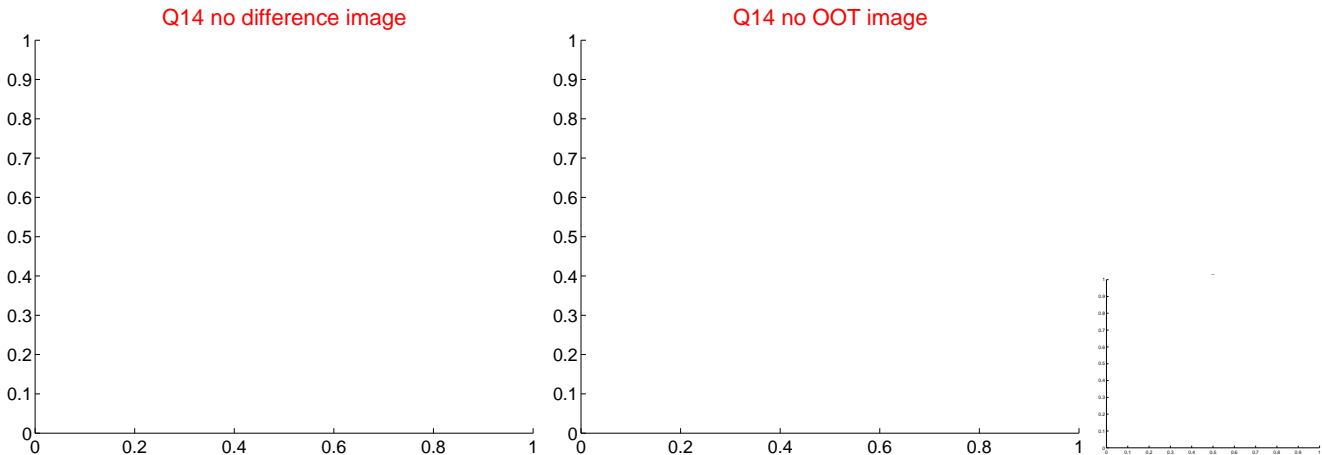
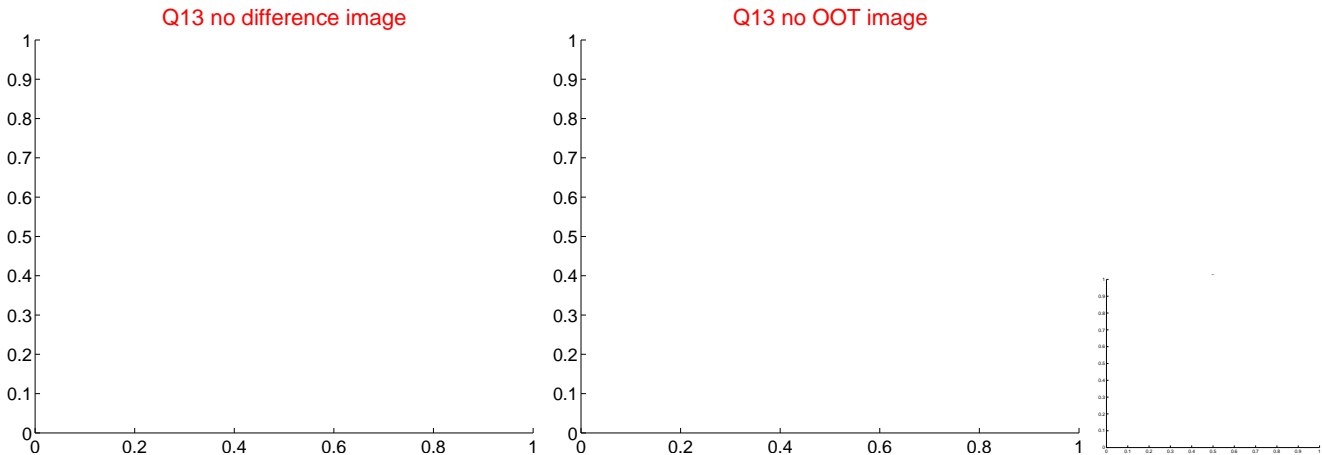
Q12 no difference image



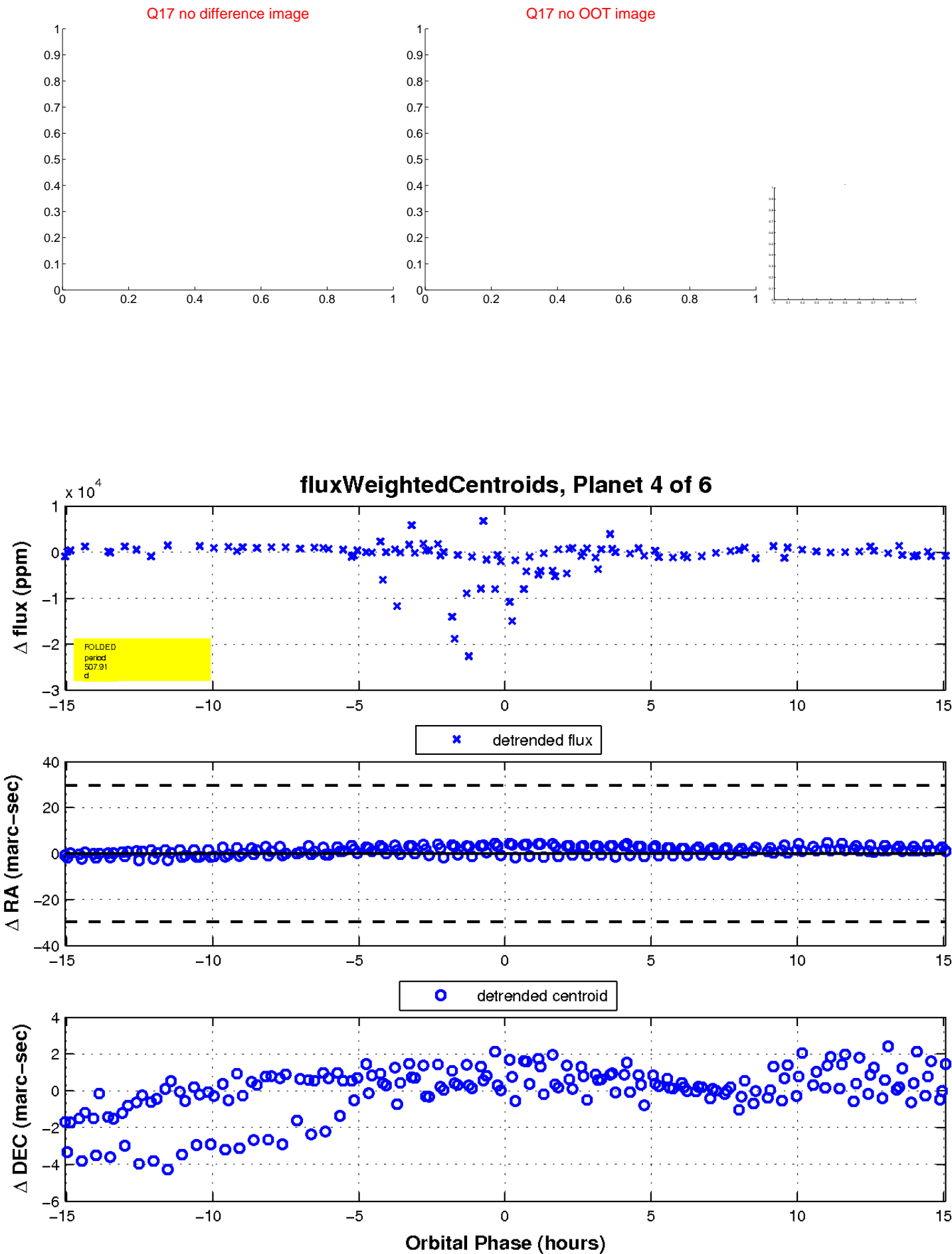
Q12 no OOT image



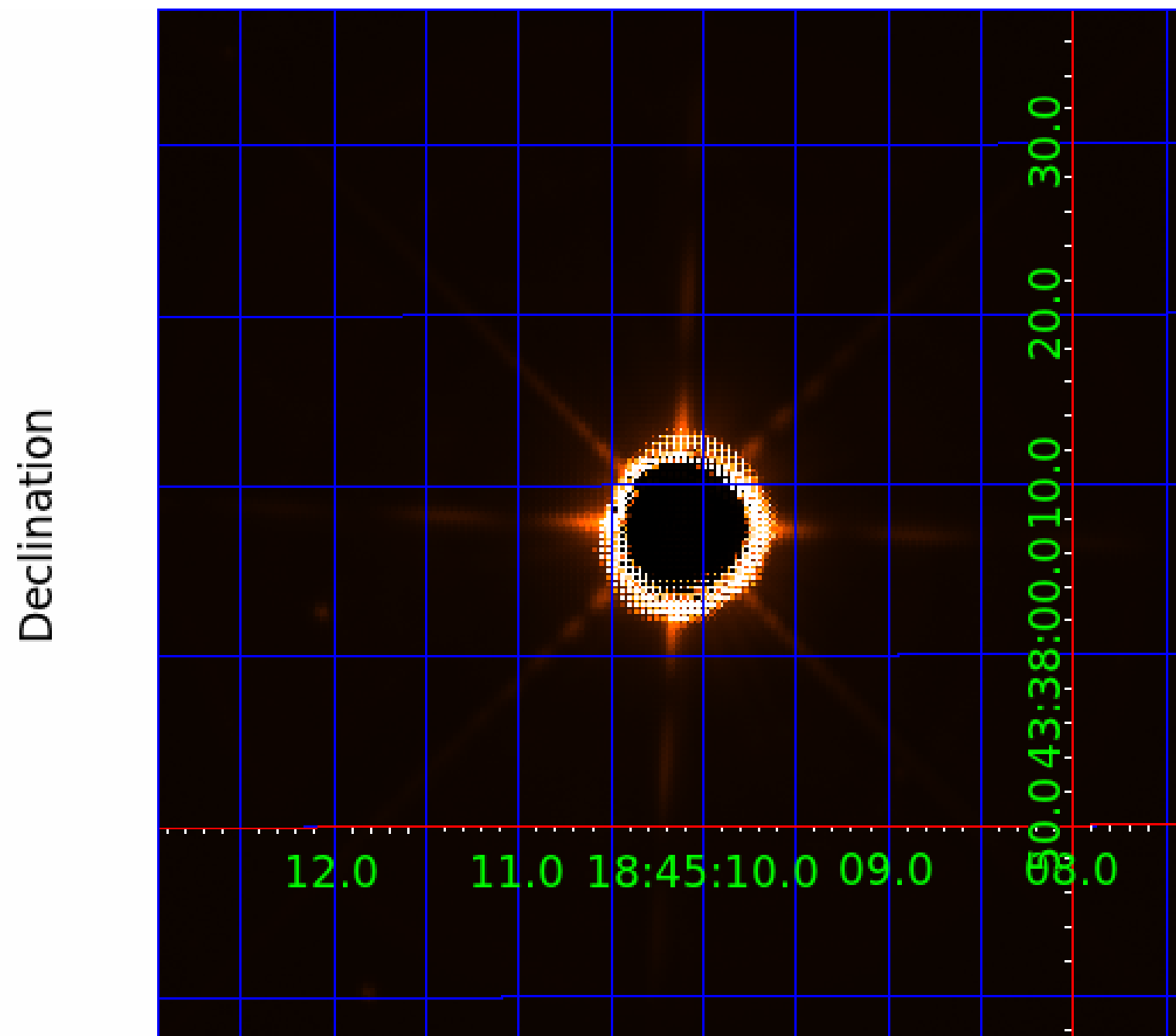
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



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



UKIRT Image





# KIC 007868889

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007868889-01	OBS	No	359.932350	457.105393	295.3	24.831	43.6	7.2	104.32	3834	239.31	2516.39
007868889-02	OBS	No	403.853071	283.176856	94.9	16.884	40.6	1.6	104.32	3834	102.79	2158.28
007868889-03	OBS	No	326.269464	356.375510	213.5	15.000	32.5	-1.0	104.32	3834	143.36	2868.39
007868889-04	OBS	No	507.912212	532.637597	6189.3	5.085	49.6	26.8	104.32	3834	1294.71	1589.84
007868889-05	OBS	No	313.649639	135.664594	3039.4	6.383	73.9	20.9	104.32	3834	550.34	3023.29
007868889-06	OBS	No	419.930092	256.128465	167.7	15.000	27.3	-1.0	104.32	3834	127.09	2048.82

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007868889-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
007868889-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
007868889-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
007868889-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_SKYE—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
007868889-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
007868889-06	OBS	FP	0.00	1	0	0	0	LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED

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

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

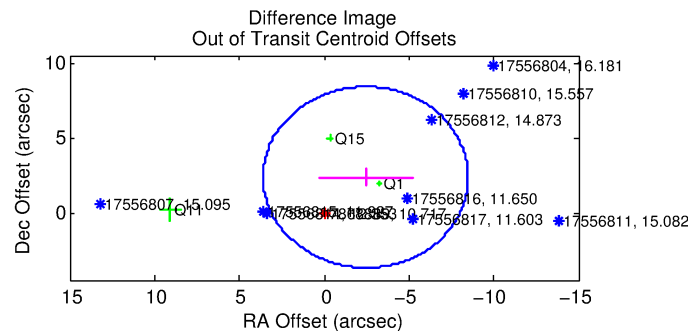
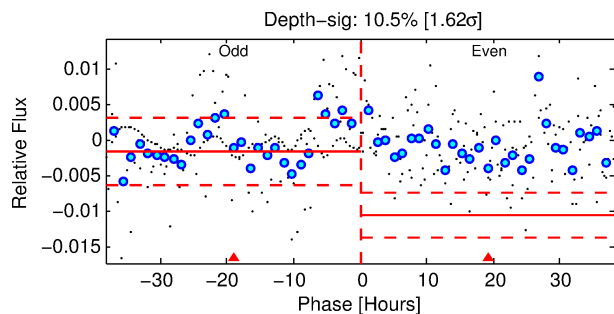
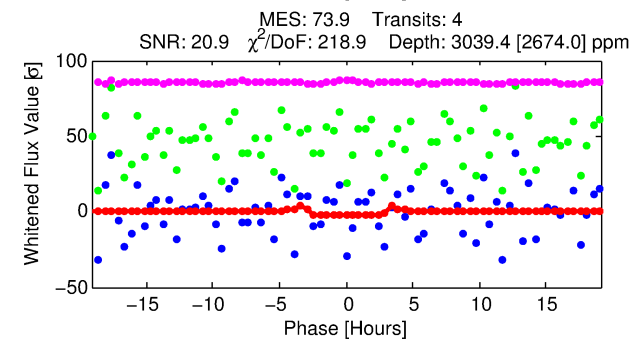
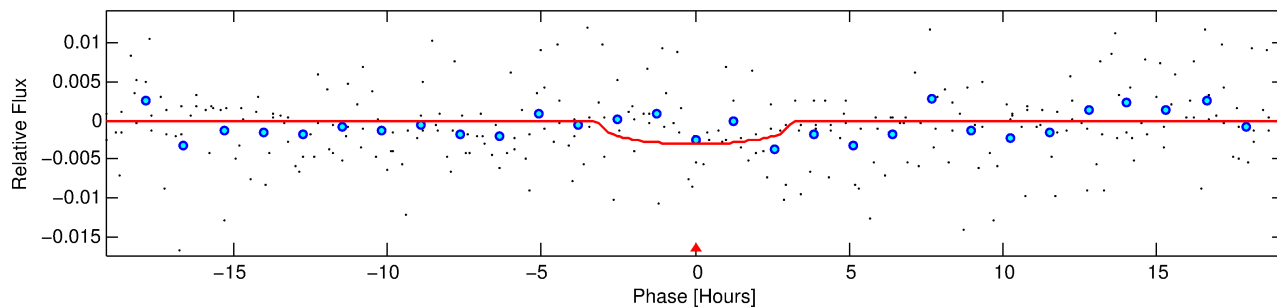
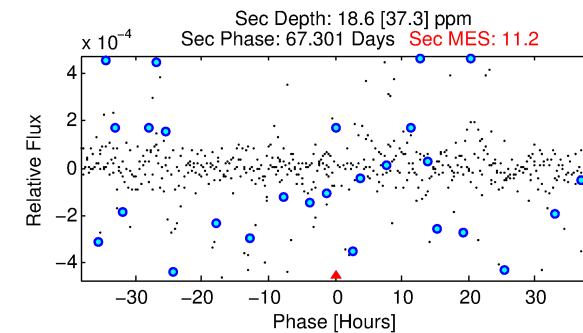
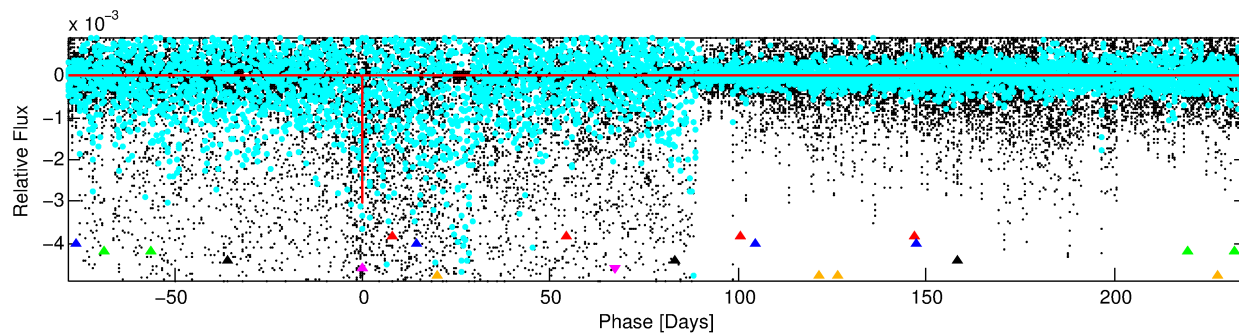
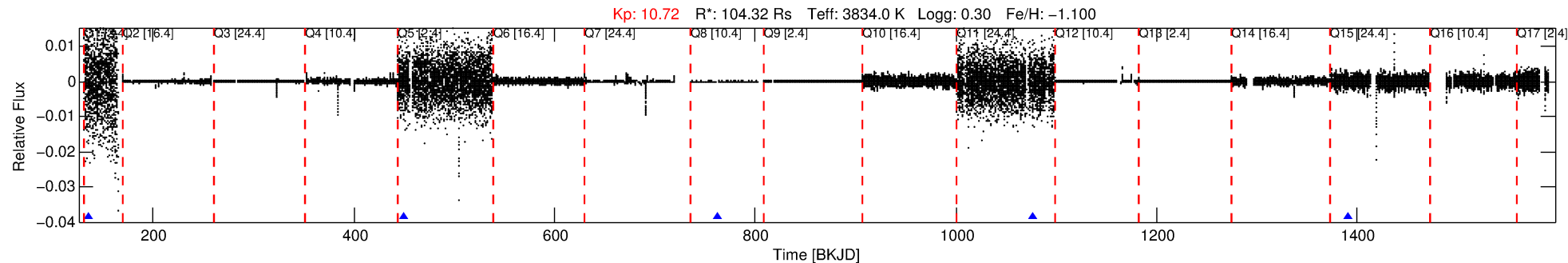
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 007868889-05

No Significant Match Found

# DV One-Page Summary

KIC: 7868889 Candidate: 5 of 6 Period: 313.650 d



## DV Fit Results:

Period = 313.64964 [0.01137] d  
Epoch = 135.6646 [0.0247] BKJD  
Rp/R\* = 0.0483 [0.1406]  
a/R\* = 377.48 [2811.91]  
b = 0.30 [23.49]  
Seff = 3023.29 [740.60]  
Teq = 1891 [116] K  
Rp = 550.33 [1601.79] Re  
a = 0.8348 [0.1008] AU  
Ag = 0.02 [0.15] [-6.72σ]  
Teff = 1146 [1763] K [-0.42σ]

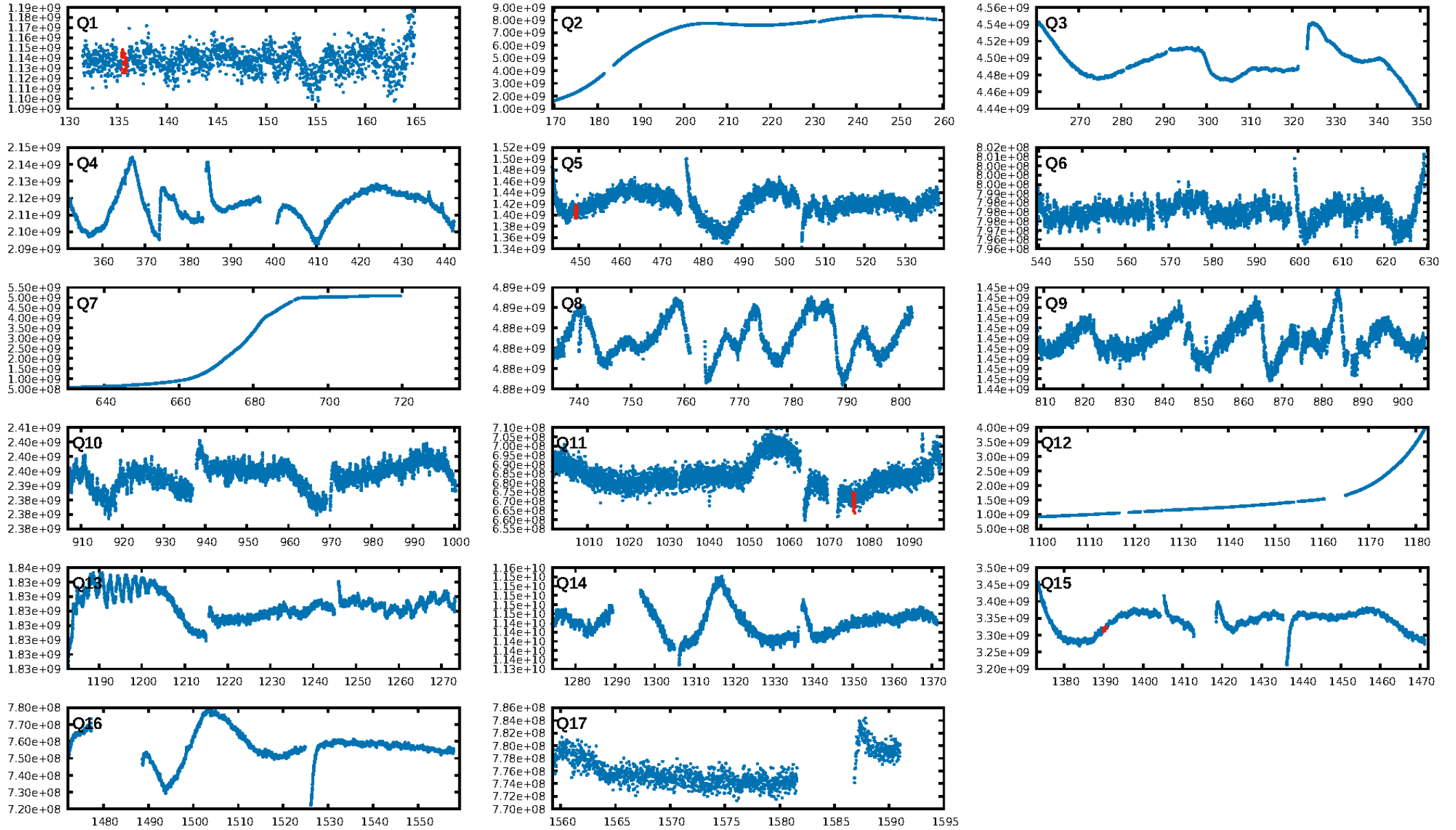
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [18.58σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 0.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: N/A  
Centroid-sig: N/A  
Centroid-so: 1.168 arcsec [5.92σ]  
OotOffset-rm: 3.395 arcsec [1.69σ]  
KicOffset-rm: 3.727 arcsec [1.54σ]  
OotOffset-st: 0/2/0/1 [3]  
KicOffset-st: 0/2/0/1 [3]  
DiffImageQuality-fgm: 0.33 [1/3]  
DiffImageOverlap-fno: 1.00 [4/4]

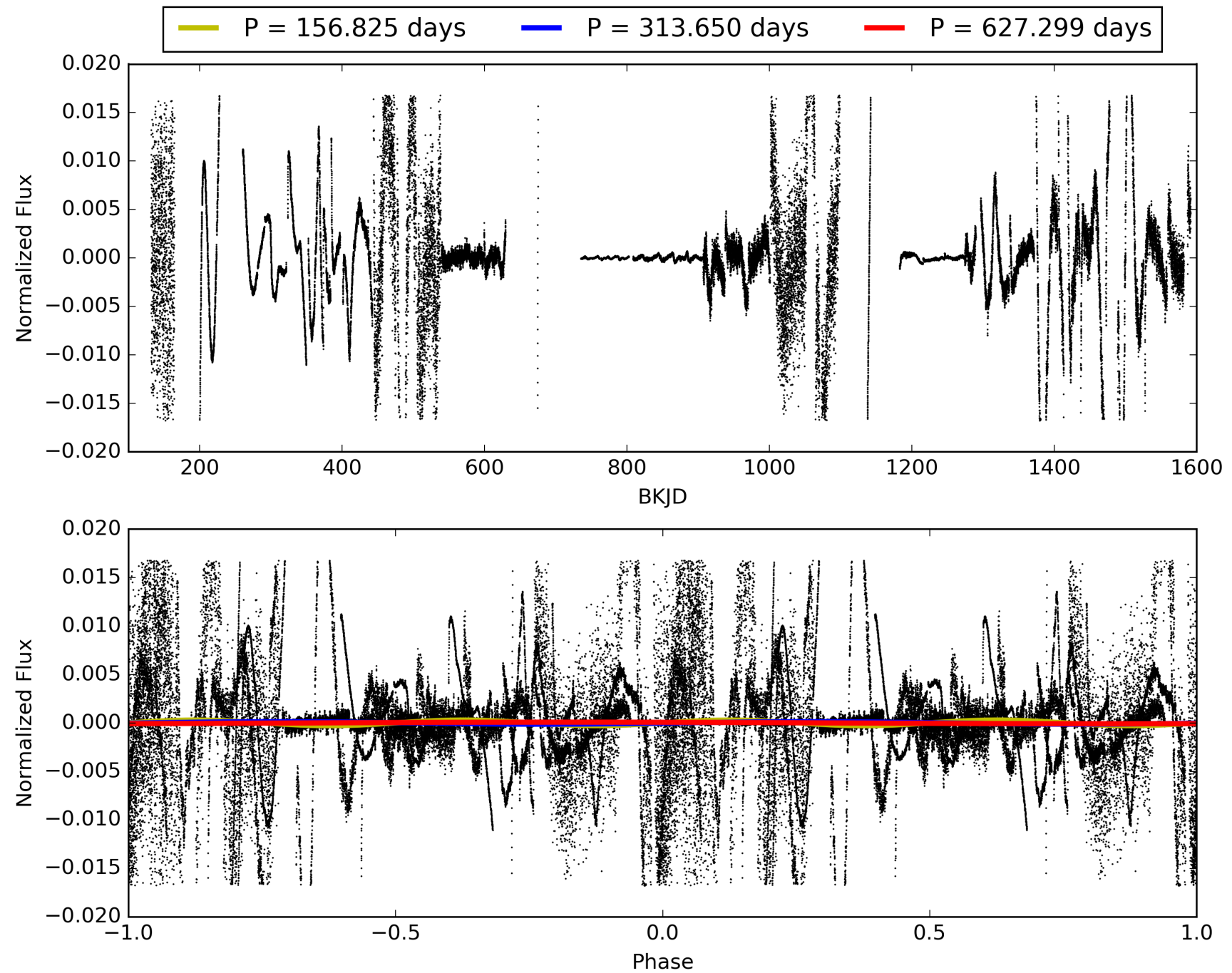
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 15:17:18 Z

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

# TCE 007868889-05, PDC Light Curves

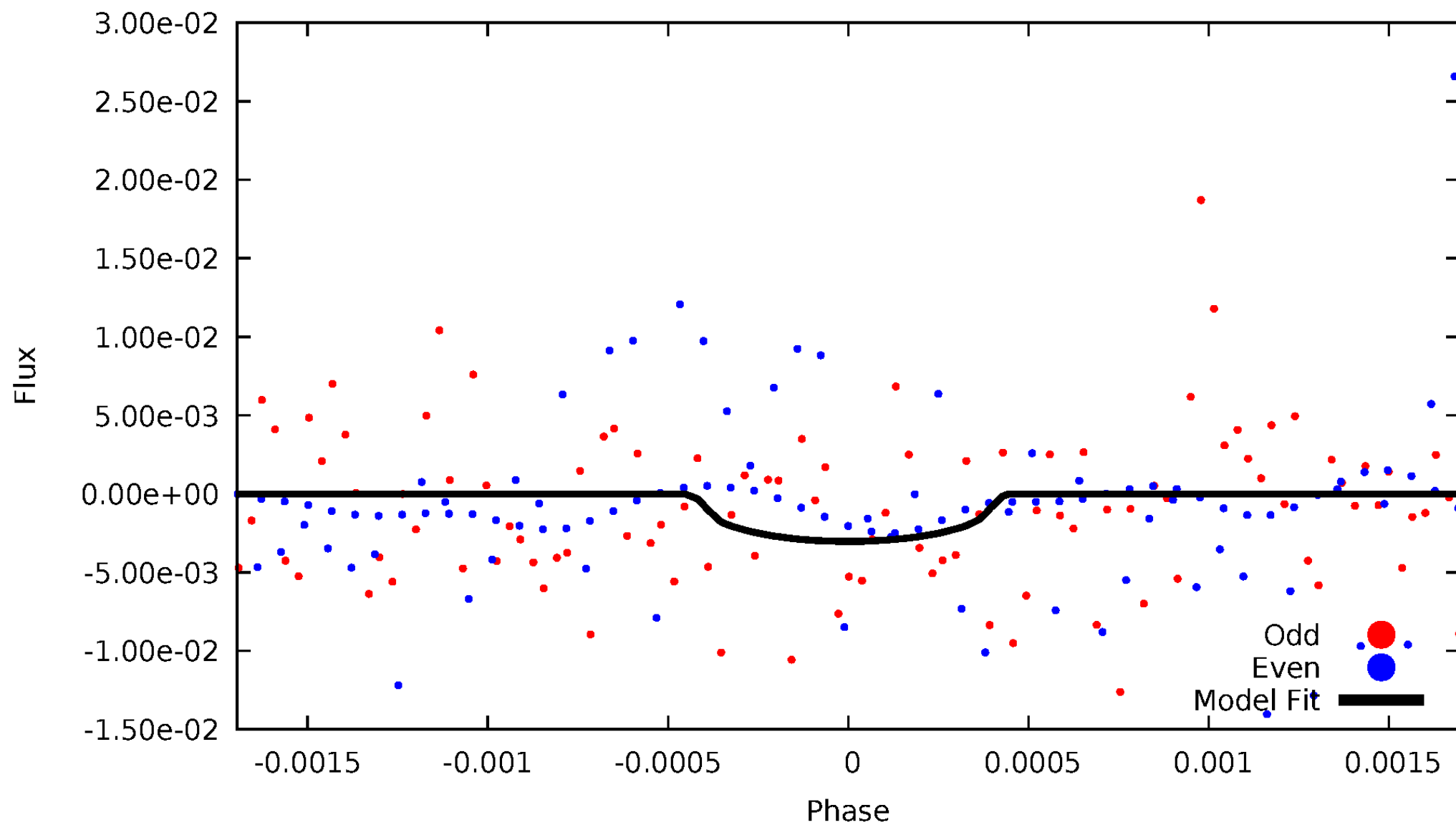


TCE 007868889-05



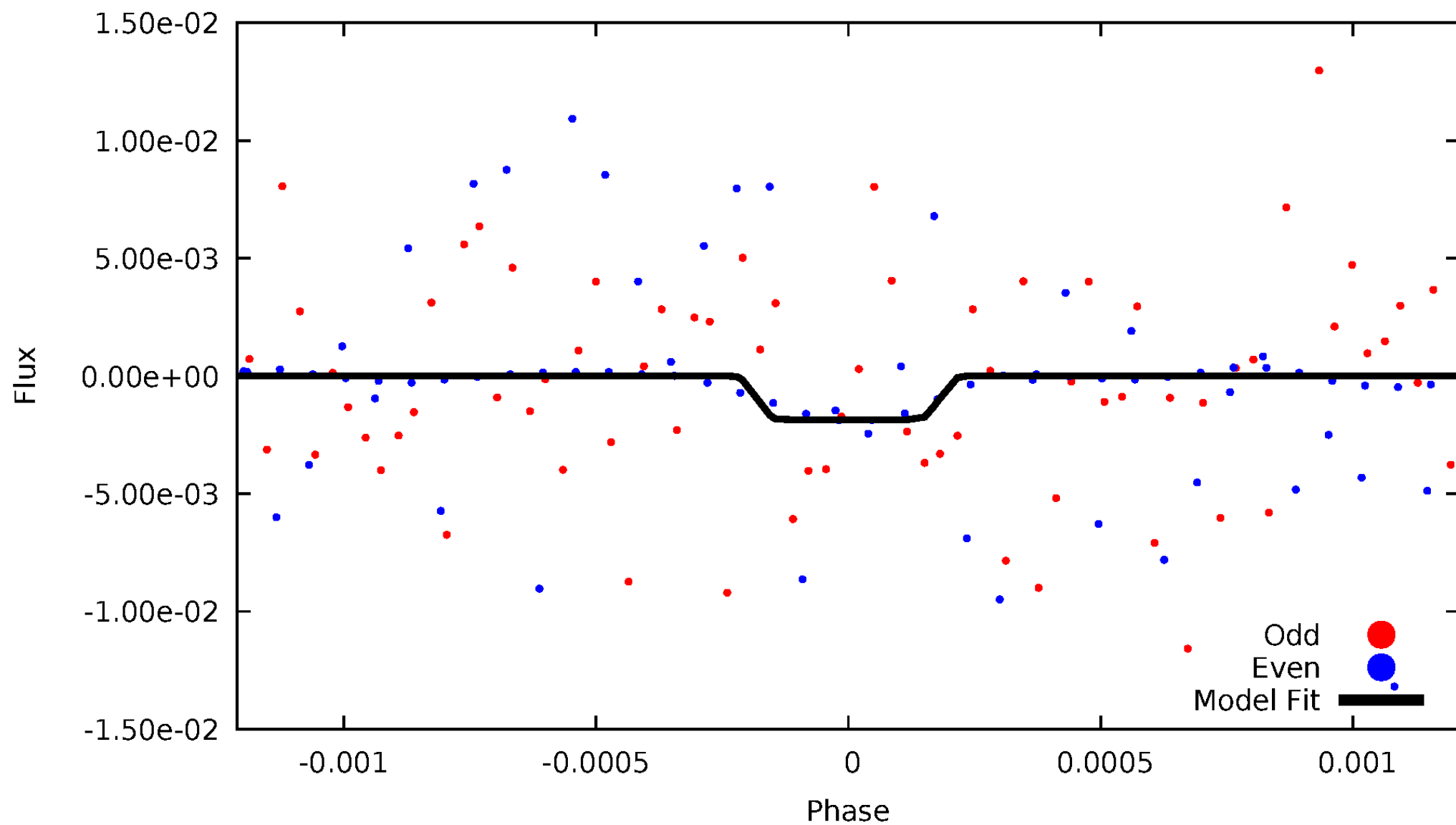
# DV Odd/Even

TCE 007868889-05



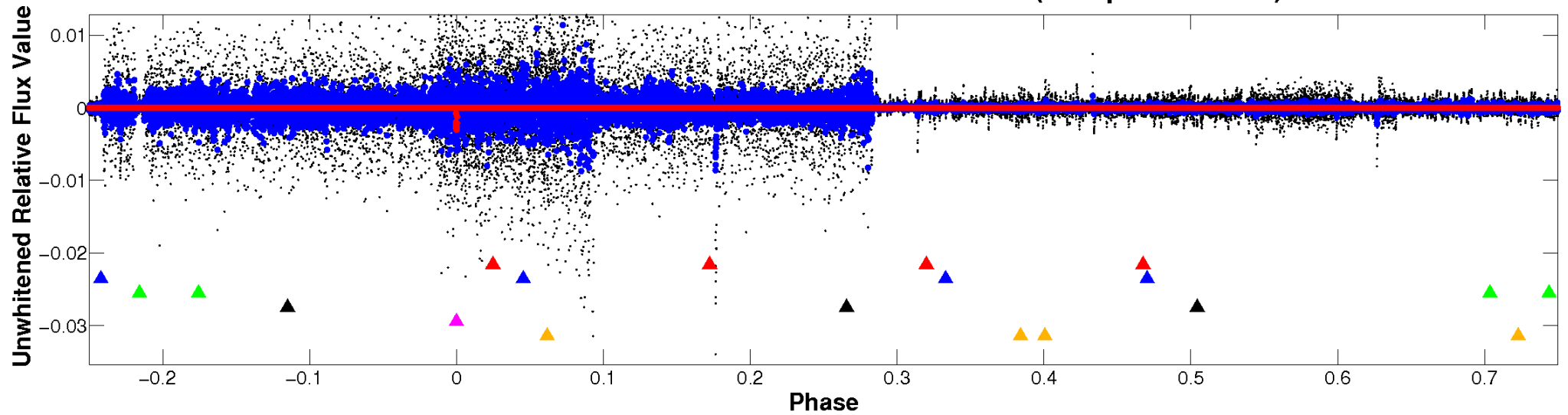
# ALT Odd/Even

TCE 007868889-05

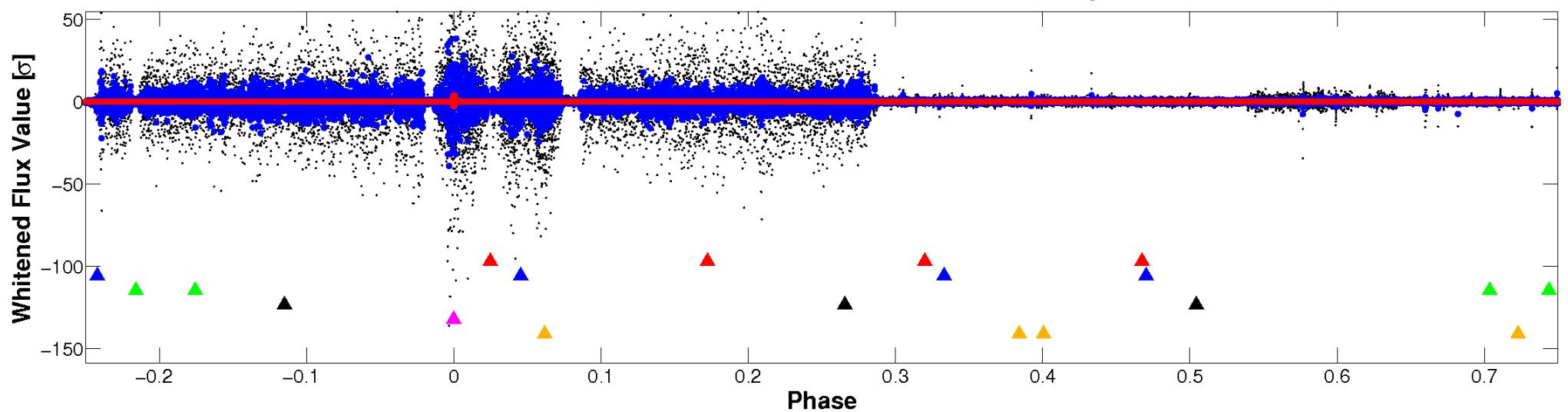


# Non-Whitened Vs. Whitened Light Curve

## Planet 5 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

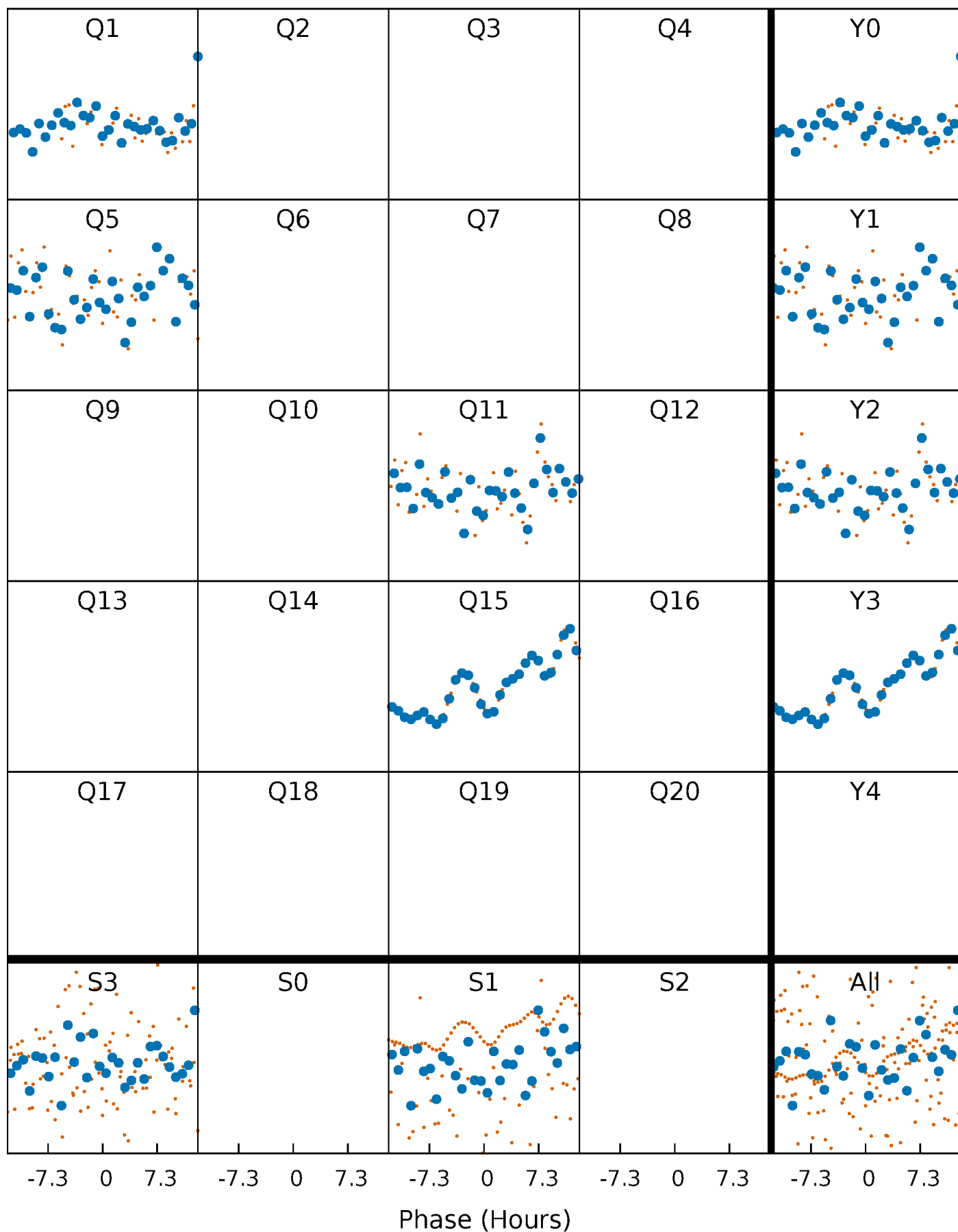


## Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

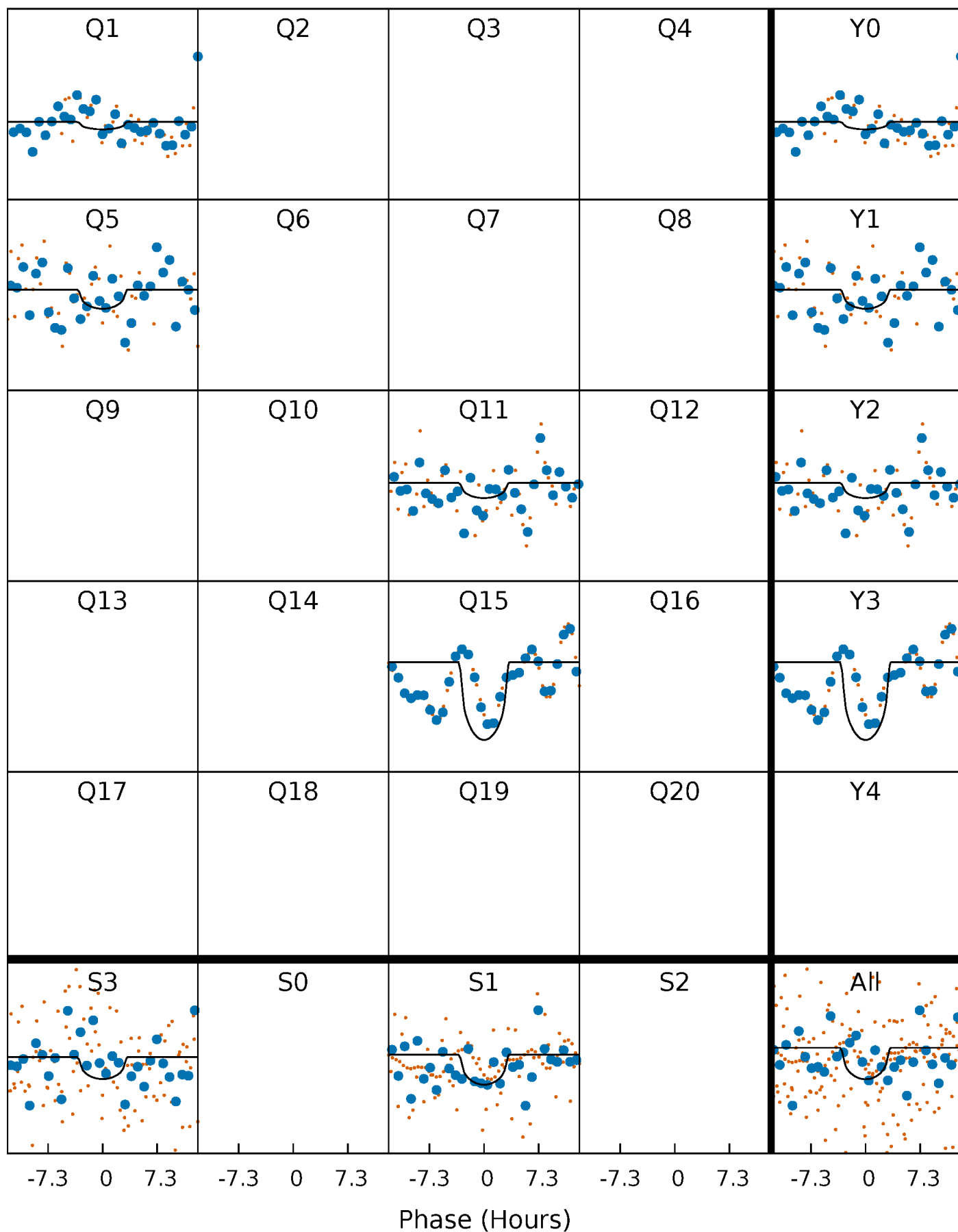
TCE 007868889-05     $P=313.649639$  Days     $T_0=135.664594$  (BKJD)





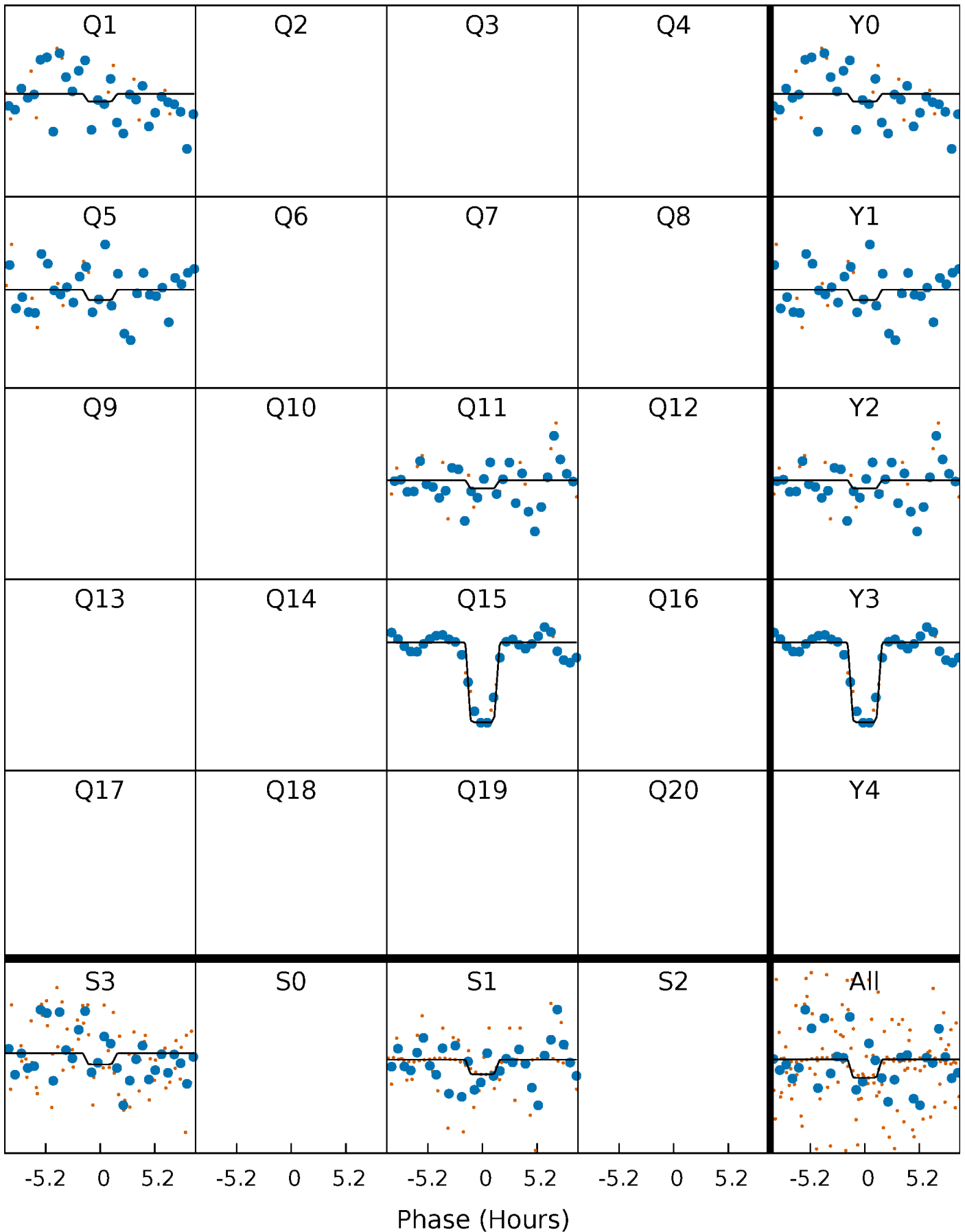
# DV Quarter-Phased Transit Curves

TCE 007868889-05     $P=313.649639$  Days     $T_0=135.664594$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

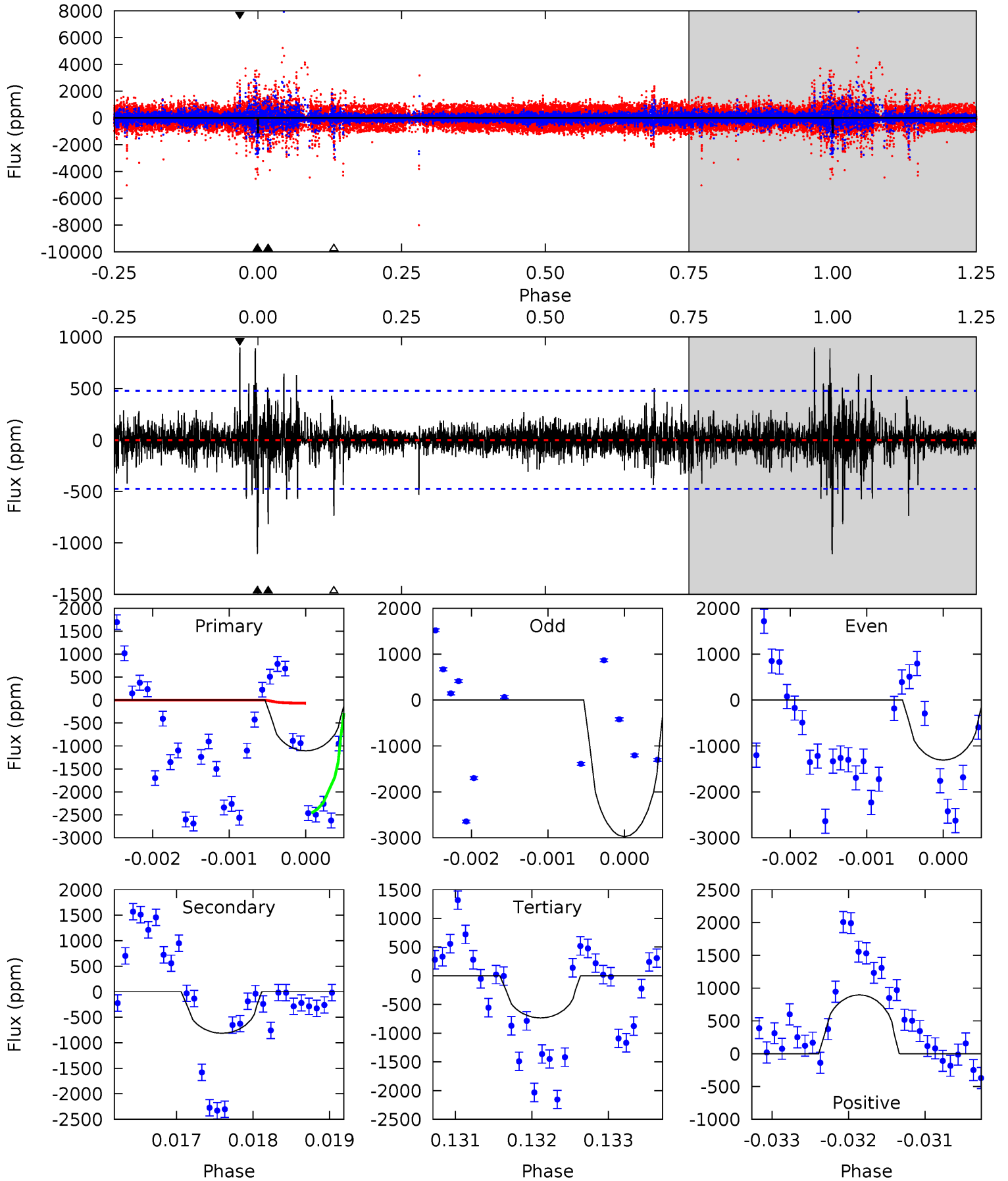
TCE 007868889-05     $P=313.649901$  Days     $T_0=135.689594$  (BKJD)



# DV Model-Shift Uniqueness Test

007868889-05, P = 313.649639 Days, E = 135.664594 Days

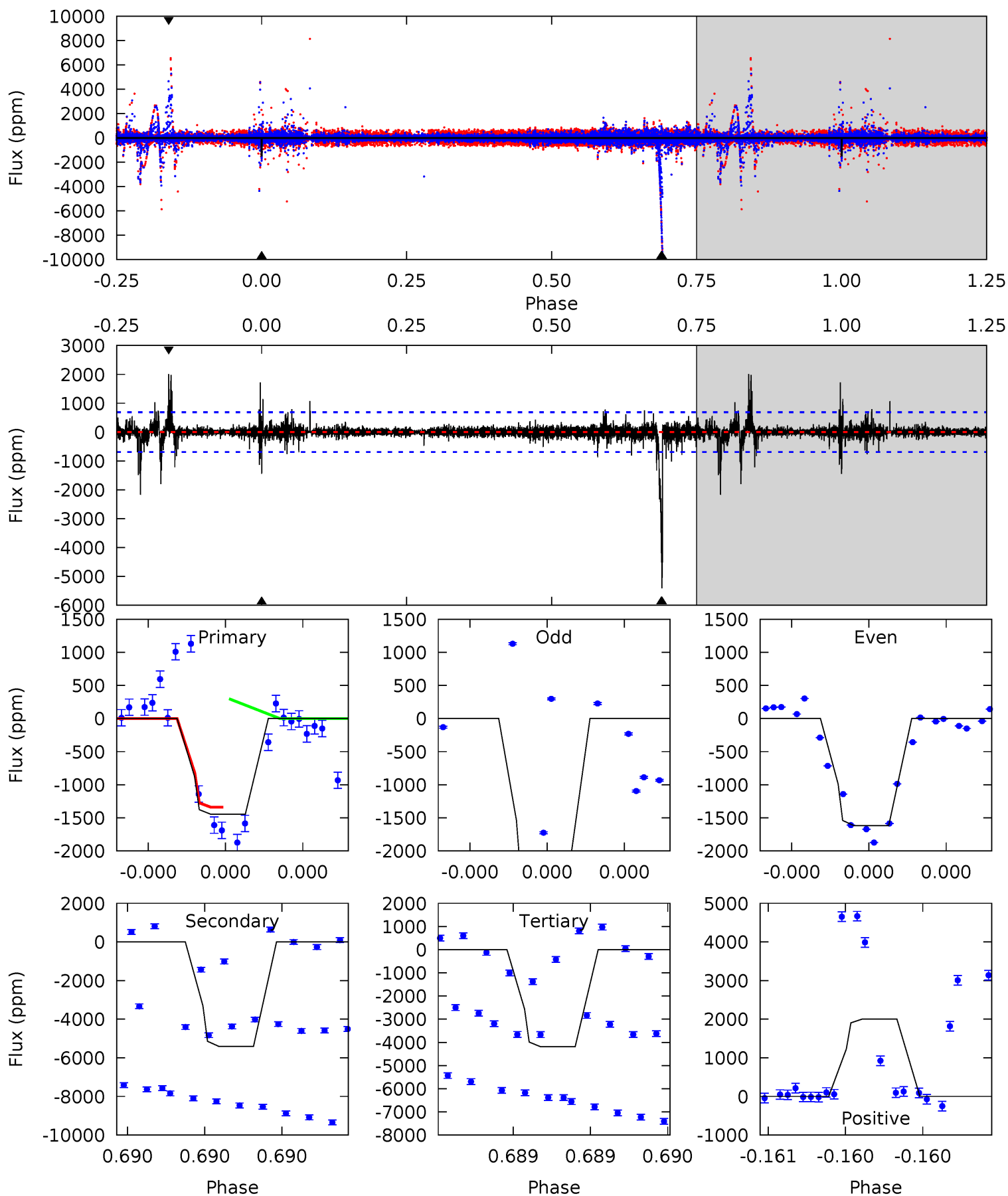
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.7	9.37	8.44	10.3	5.48	3.33	1.11	4.28	2.41	0.92	-0.95	4.92	0.96	0.45	13.7



# Alt Model-Shift Uniqueness Test

007868889-05, P = 313.649901 Days, E = 135.689594 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
11.8	44.1	34.2	16.3	5.60	3.52	1.66	-22.4	-4.54	9.94	27.8	0.32	0.89	0.27	3.99



### Stellar Parameters For KIC 007868889

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$3834^{+123}_{-76}$	$0.298^{+0.128}_{-0.032}$	$-1.100^{+0.200}_{-0.150}$	$104.317^{+5.072}_{-10.990}$	$0.788^{+0.123}_{-0.016}$	$0.000^{+0.000}_{-0.000}$
	+3%/-2%	+43%/-11%	+18%/-14%	+5%/-11%	+16%/-2%	+50%/-12%
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 007868889-05 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	-814 $\pm$ 87	$1302.68^{+1254.50}_{-913.86}$	$2616^{+99}_{-100}$	$-2374^{+5908}_{-284}$	$0.193^{+1.951}_{-0.144}$
Alt.	-5411 $\pm$ 123	$1220.95^{+1276.70}_{-852.42}$	$2613^{+90}_{-96}$	$3265^{+2000}_{-1140}$	$1.465^{+15.156}_{-1.126}$

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

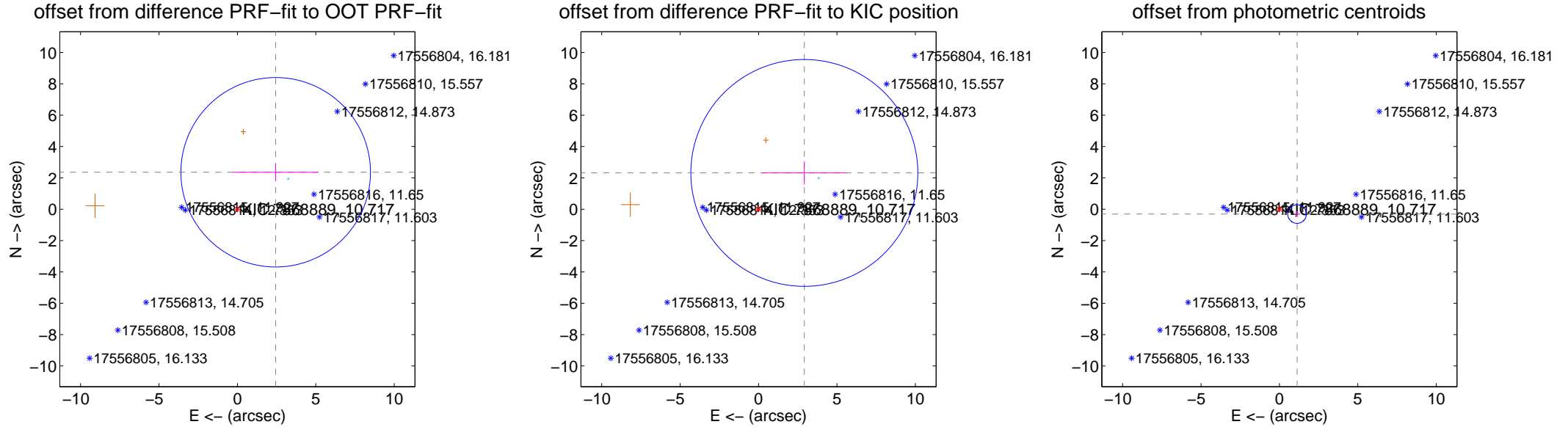
## DV Centroid Data

Supplemental centroid analysis for 007868889-05. **Kepler magnitude: 10.72.** Transit SNR 20.87

**There are 1 quarters with good PRF difference image offsets**

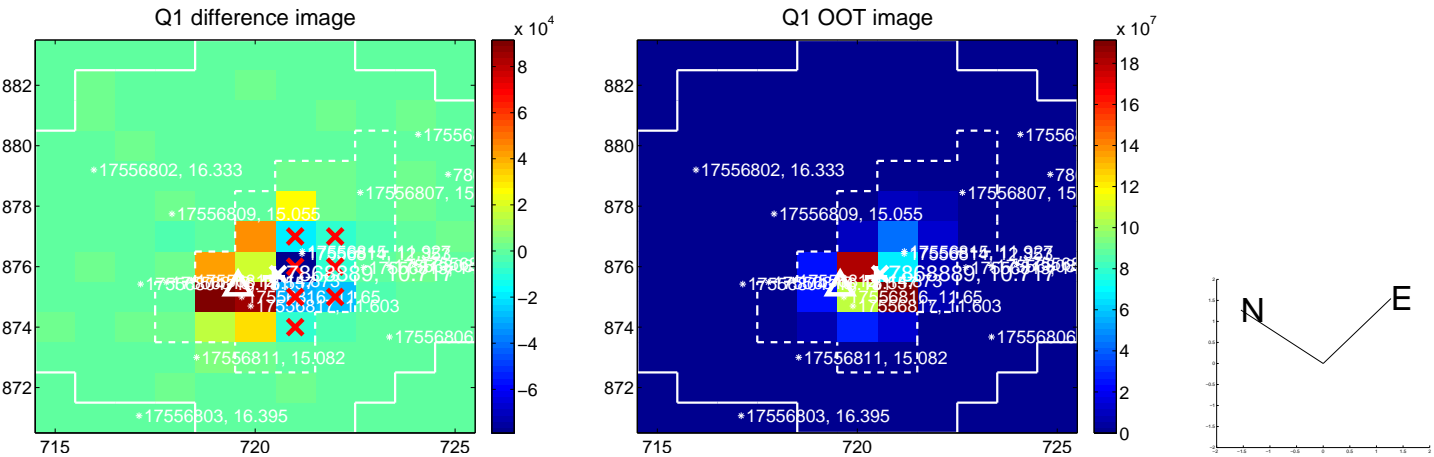
The direct PRF centroid is offset from the target star catalog position by about 0.55 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$3.395 \pm 2.015$	1.69	$-2.442 \pm 2.744$	$2.359 \pm 0.571$
PRF-fit source offset from KIC position	$3.727 \pm 2.412$	1.54	$-2.920 \pm 2.731$	$2.316 \pm 0.752$
photometric centroid source offset	$1.17 \pm 0.20$	<b>5.92</b>	$-1.13 \pm 0.20$	$-0.31 \pm 0.16$

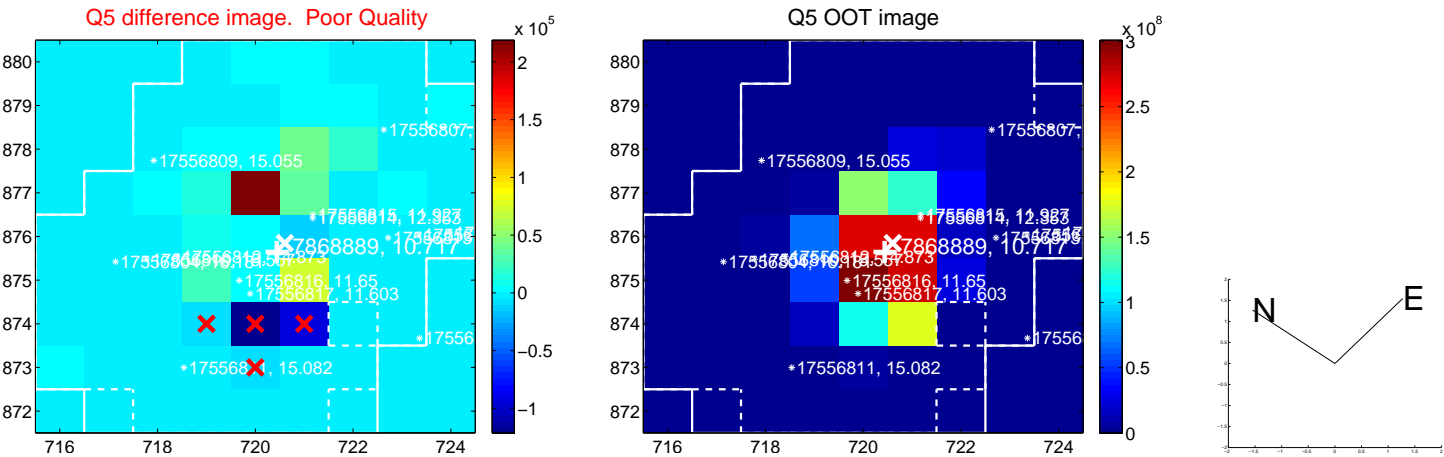


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

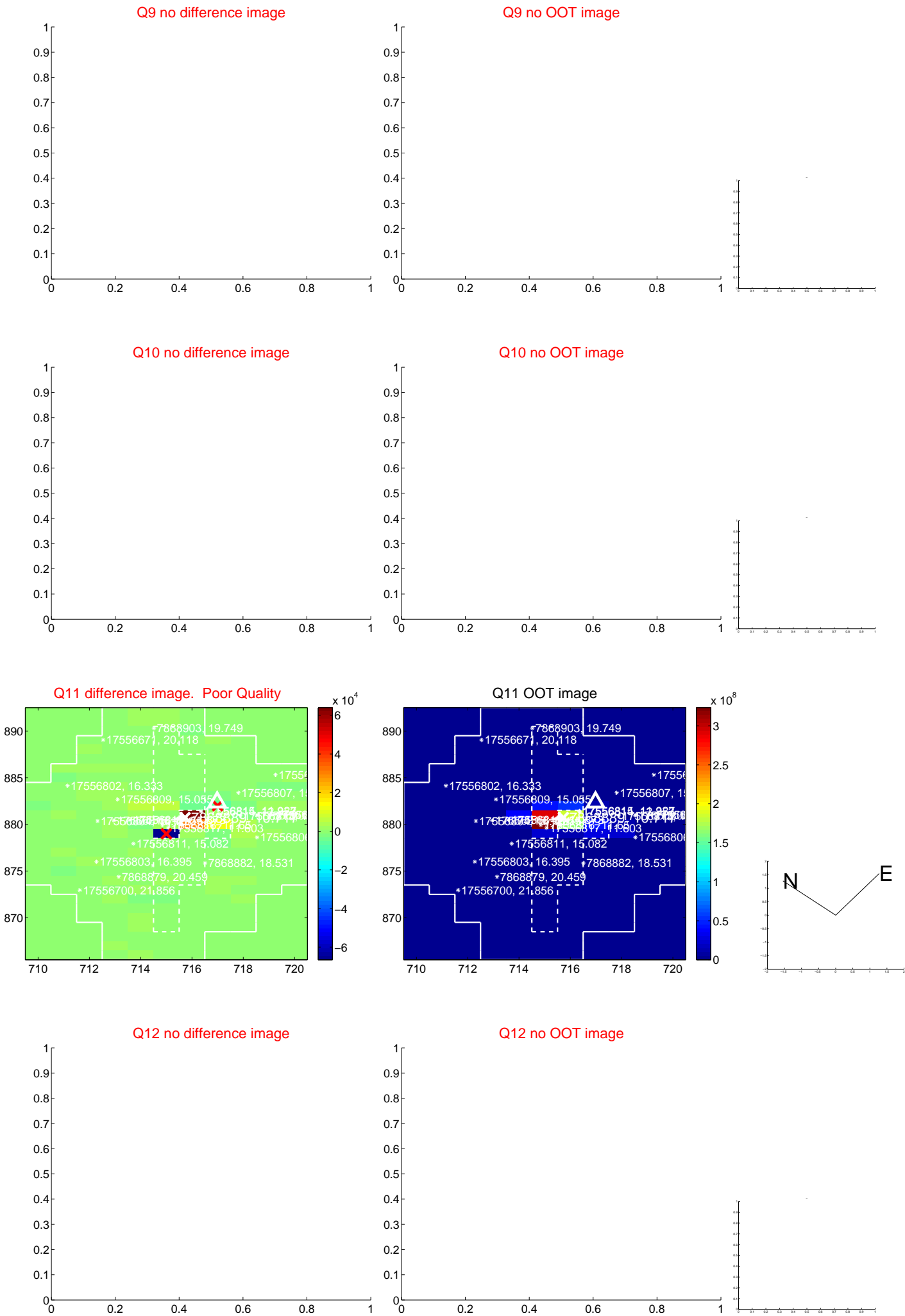


white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.





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



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

Q13 no difference image



Q13 no OOT image



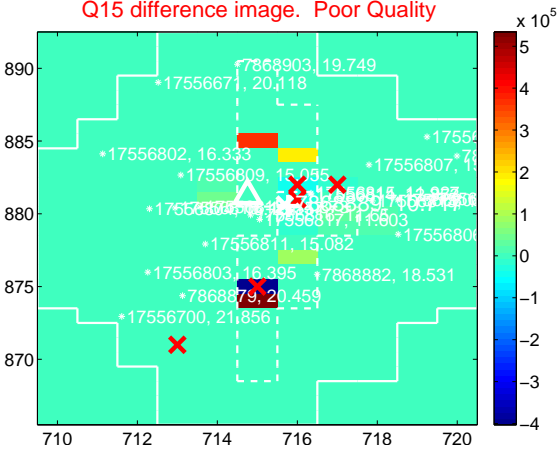
Q14 no difference image



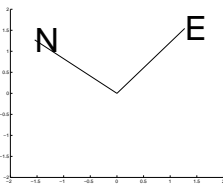
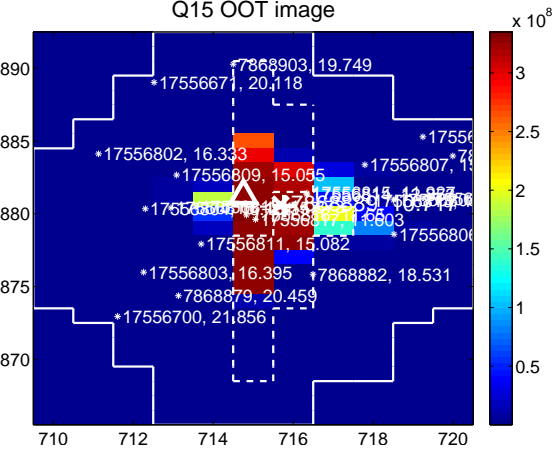
Q14 no OOT image



Q15 difference image. Poor Quality



Q15 OOT image



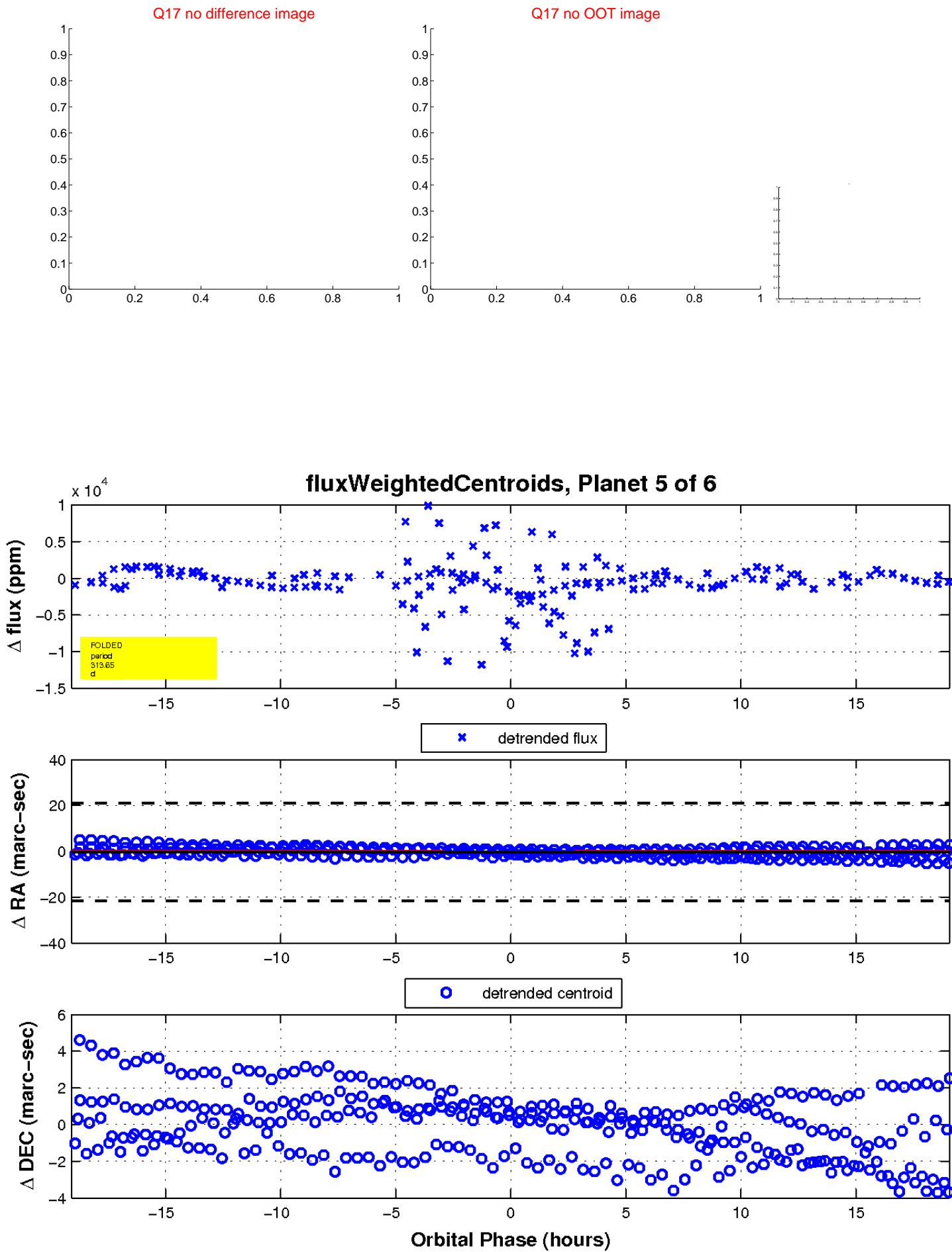
Q16 no difference image



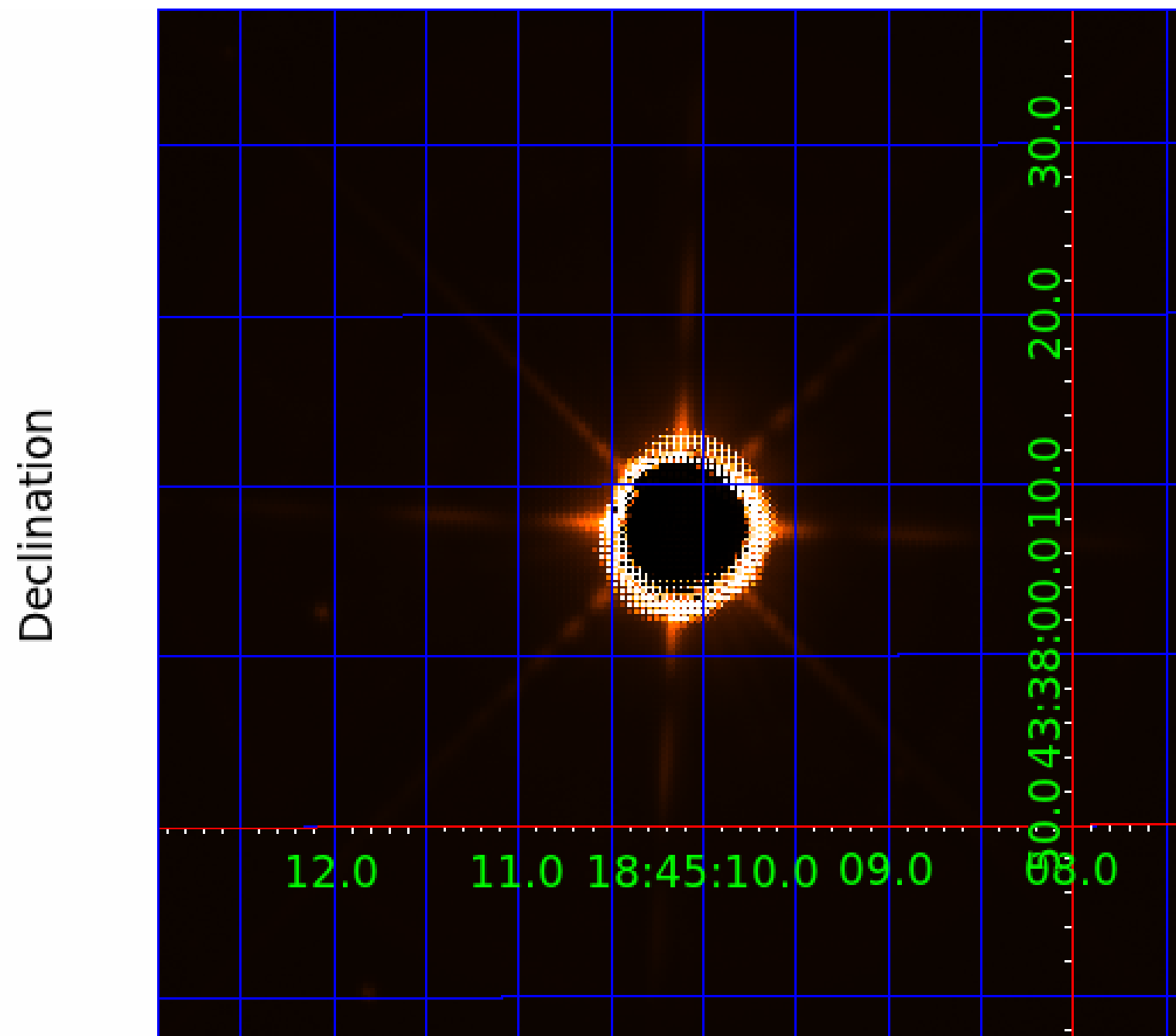
Q16 no OOT image



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



UKIRT Image



# KIC 007868889

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007868889-01	OBS	No	359.932350	457.105393	295.3	24.831	43.6	7.2	104.32	3834	239.31	2516.39
007868889-02	OBS	No	403.853071	283.176856	94.9	16.884	40.6	1.6	104.32	3834	102.79	2158.28
007868889-03	OBS	No	326.269464	356.375510	213.5	15.000	32.5	-1.0	104.32	3834	143.36	2868.39
007868889-04	OBS	No	507.912212	532.637597	6189.3	5.085	49.6	26.8	104.32	3834	1294.71	1589.84
007868889-05	OBS	No	313.649639	135.664594	3039.4	6.383	73.9	20.9	104.32	3834	550.34	3023.29
007868889-06	OBS	No	419.930092	256.128465	167.7	15.000	27.3	-1.0	104.32	3834	127.09	2048.82

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007868889-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
007868889-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
007868889-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
007868889-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_SKYE—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
007868889-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
007868889-06	OBS	FP	0.00	1	0	0	0	LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED

**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.

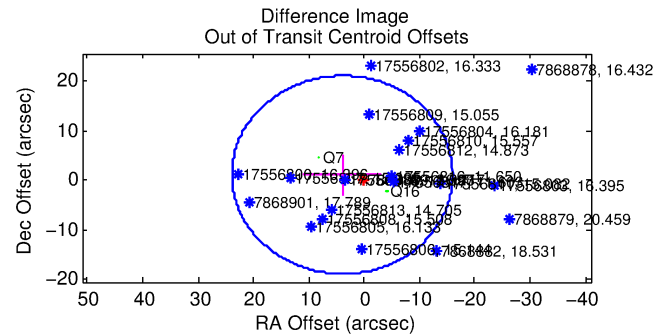
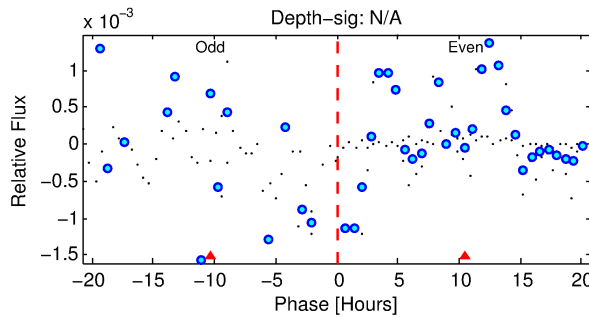
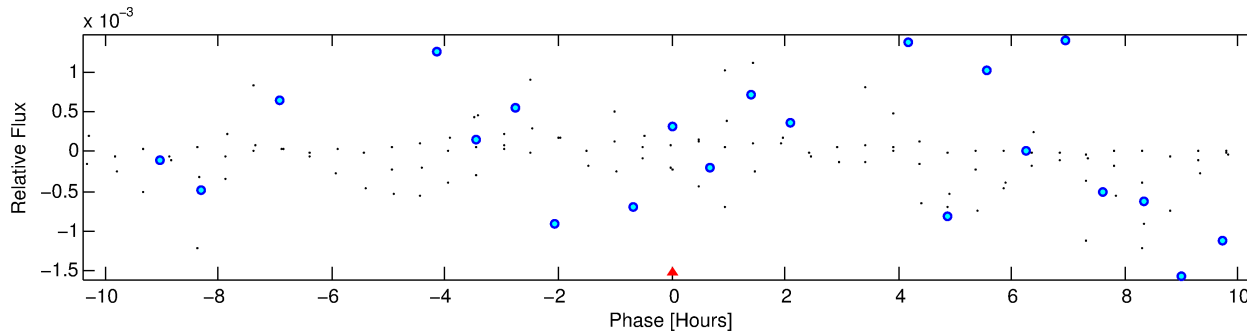
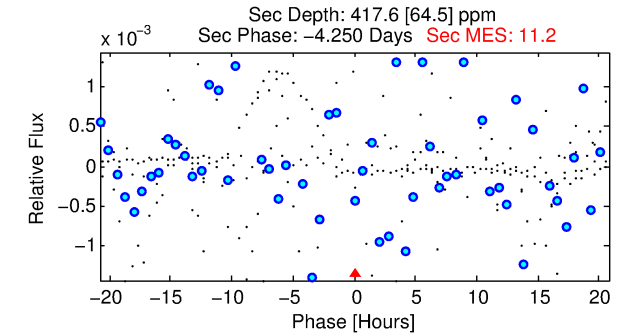
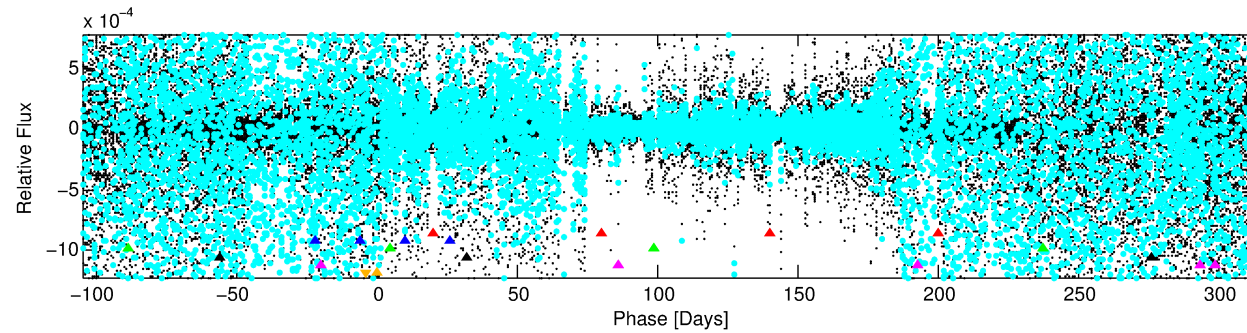
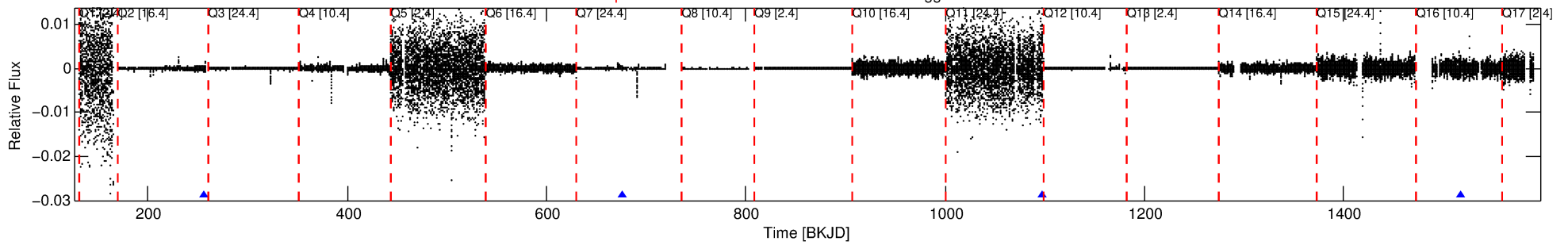
Ephemeris Match Information For 007868889-06

No Significant Match Found

# DV One-Page Summary

KIC: 7868889 Candidate: 6 of 6 Period: 419.930 d

Kp: 10.72 R\*: 104.32 Rs Teff: 3834.0 K Logg: 0.30 Fe/H: -1.100



## TPS TCE Results:

Period = 419.93009 d  
Epoch = 256.1285 BKJD

DV fit results are unavailable

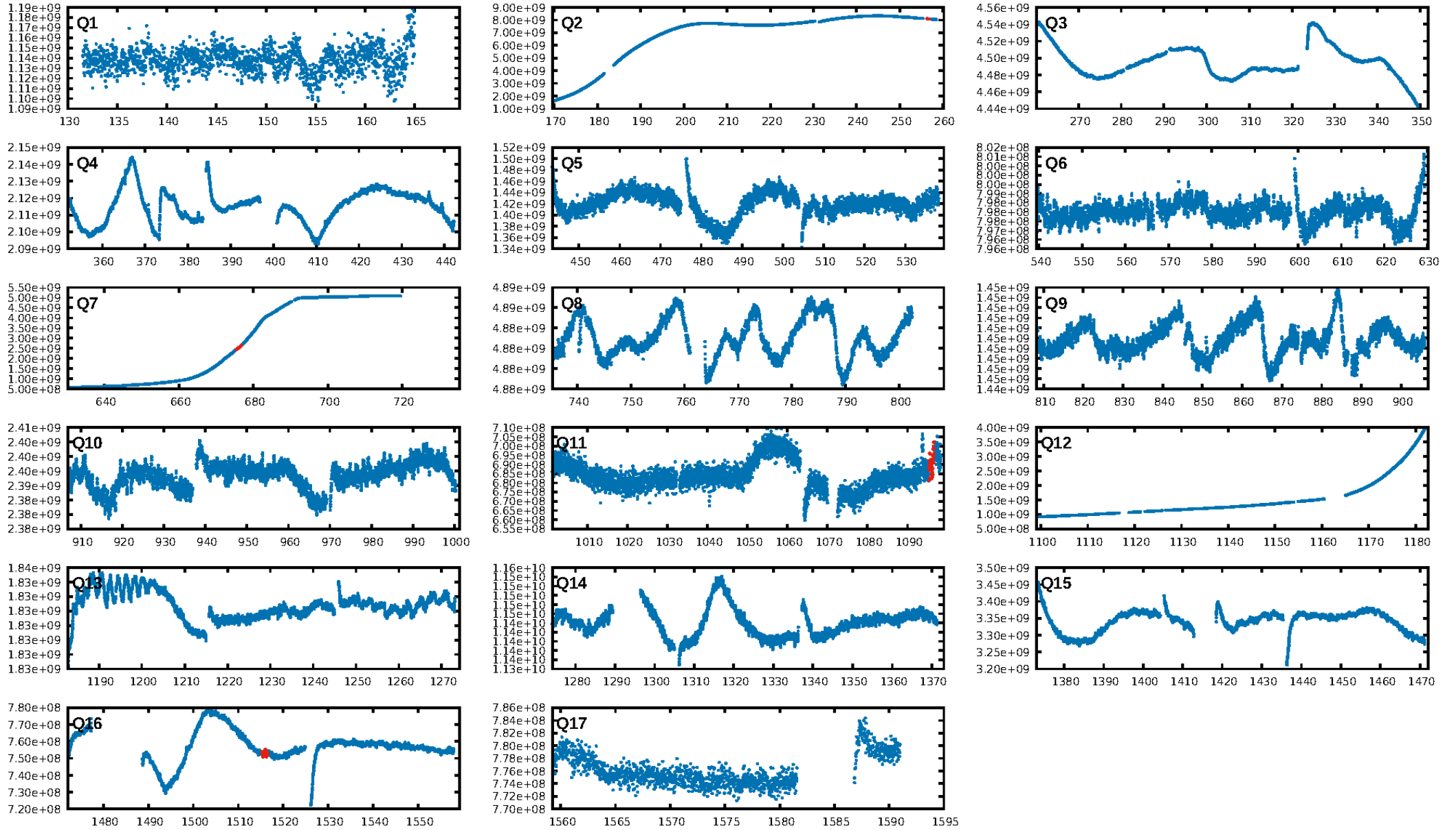
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [17.08 $\sigma$ ]  
LongPeriod-sig: 100.0% [133.32 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: N/A  
Centroid-sig: N/A  
Centroid-so: 9.639 arcsec [1.41 $\sigma$ ]  
OotOffset-rm: 4.105 arcsec [0.62 $\sigma$ ]  
KicOffset-rm: 3.743 arcsec [0.56 $\sigma$ ]  
OotOffset-st: 0/1/1/0 [2]  
KicOffset-st: 0/1/1/0 [2]  
DiffImageQuality-fgm: 0.50 [1/2]  
DiffImageOverlap-fno: 1.00 [3/3]

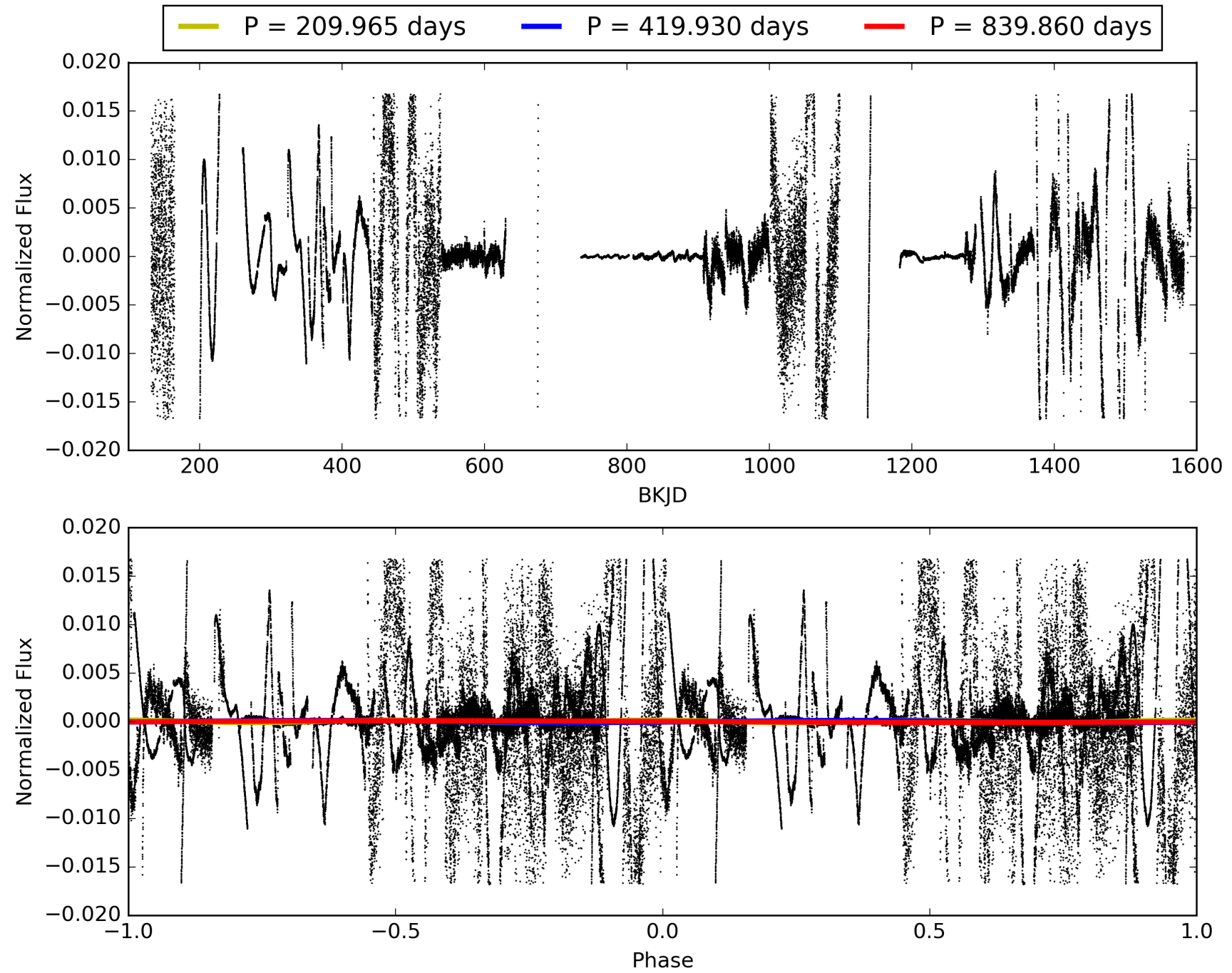
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 15:17:34 Z

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

# TCE 007868889-06, PDC Light Curves



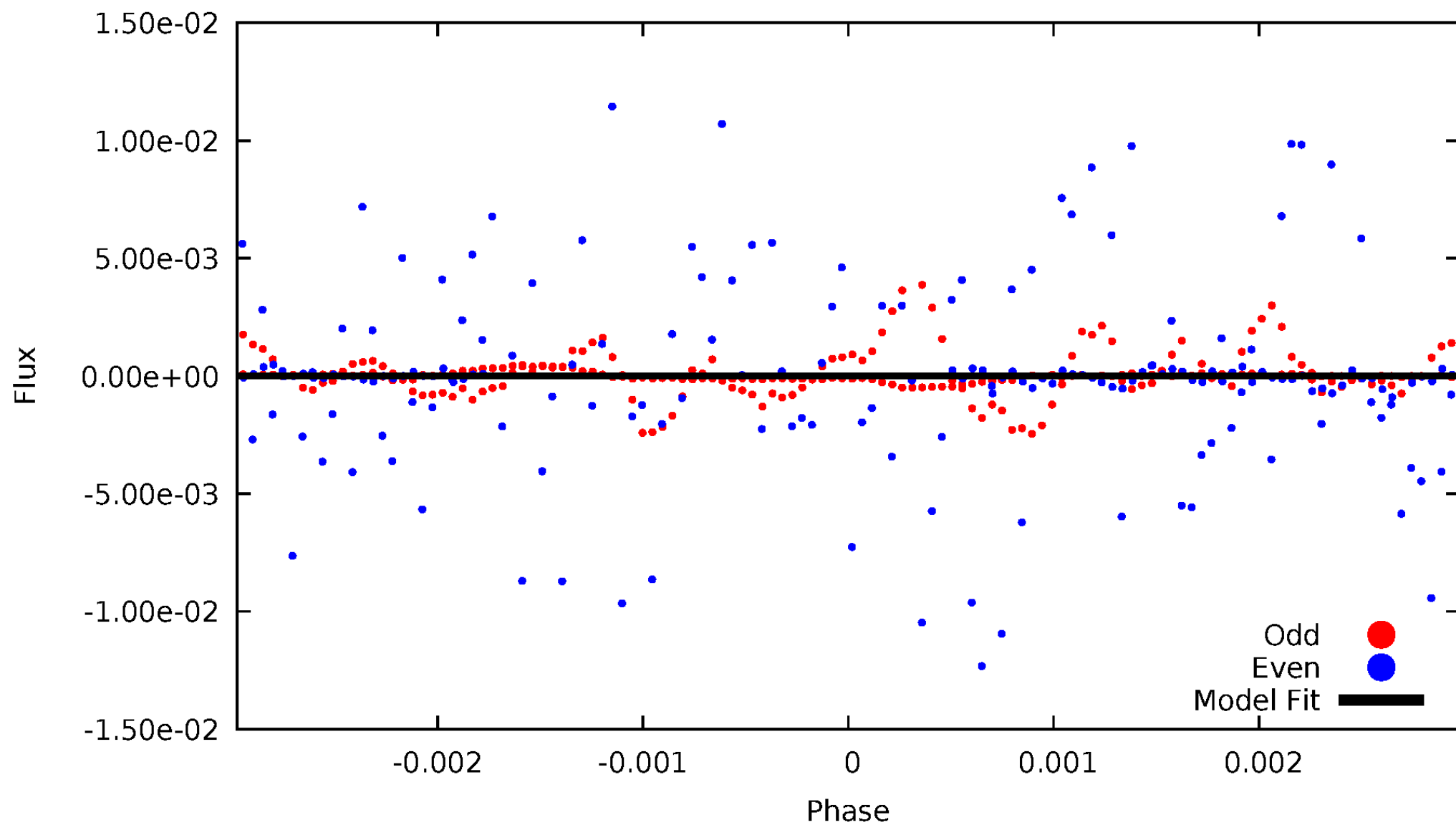
TCE 007868889-06





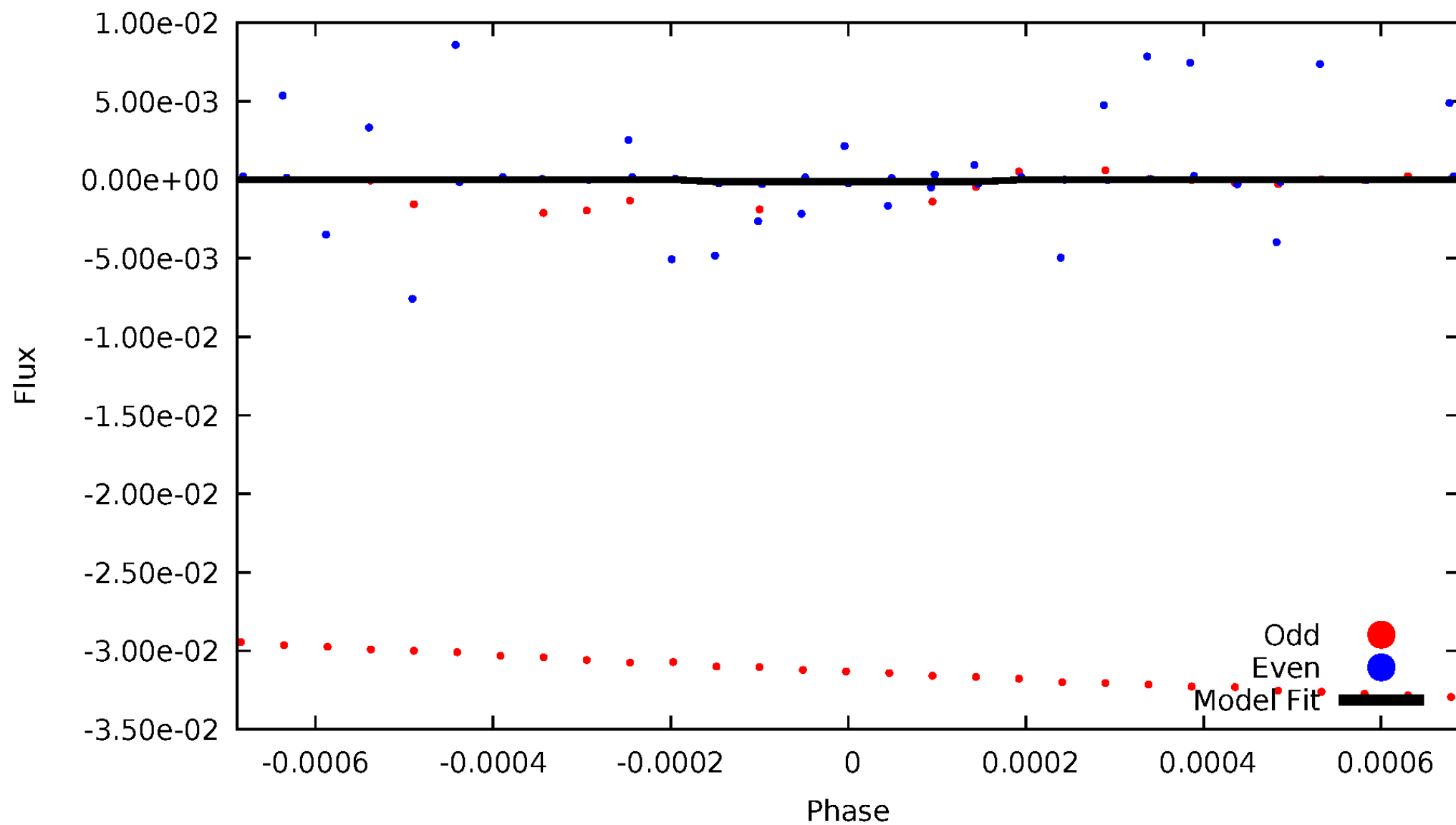
# DV Odd/Even

TCE 007868889-06



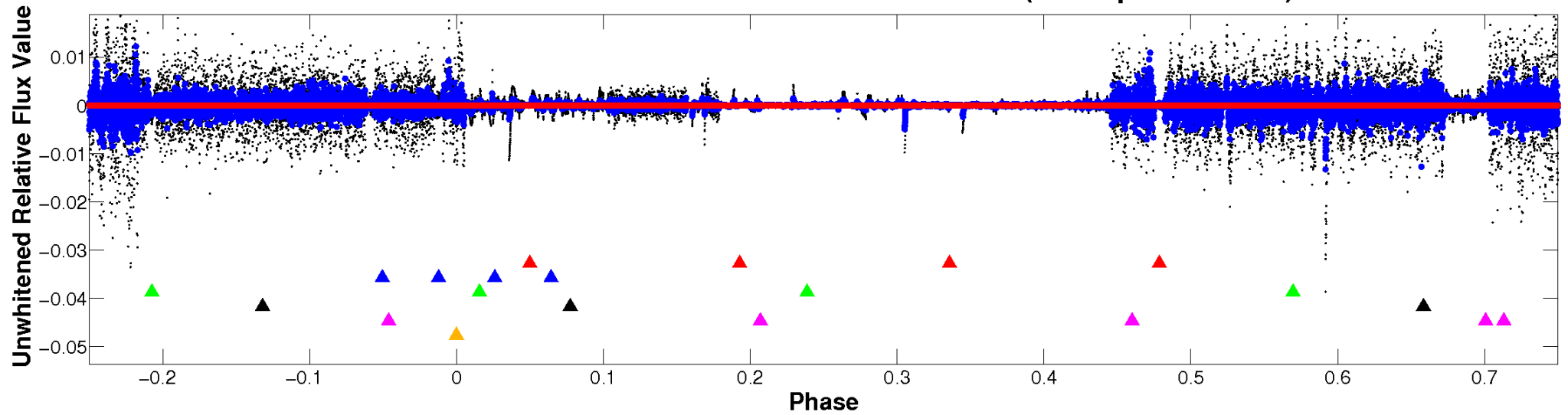
# ALT Odd/Even

TCE 007868889-06

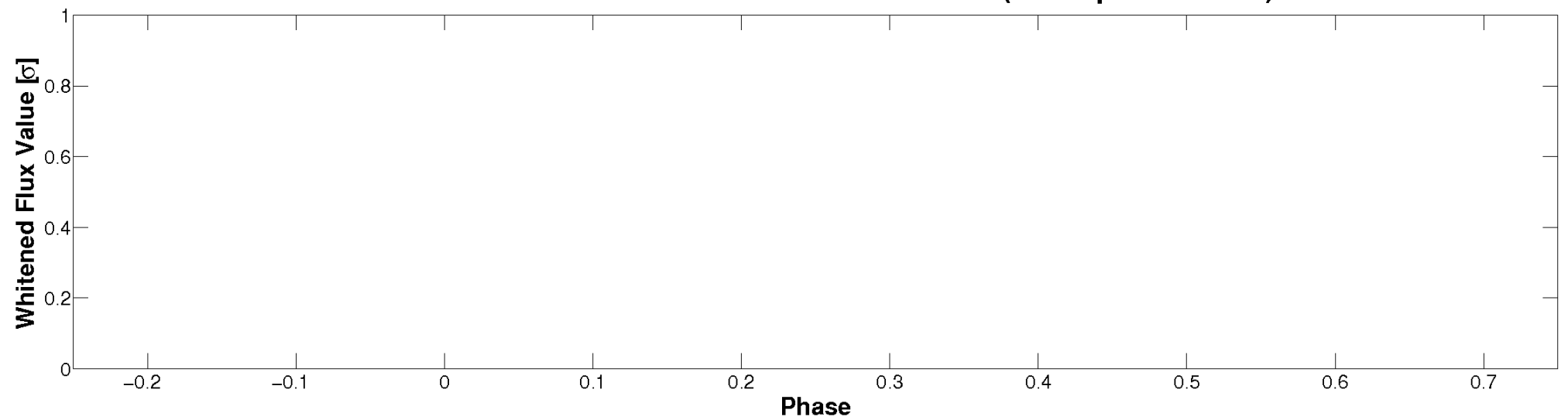


# Non-Whitened Vs. Whitened Light Curve

**Planet 6 : Phased Unwhitened Flux Time Series (TPS Epoch/Period)**

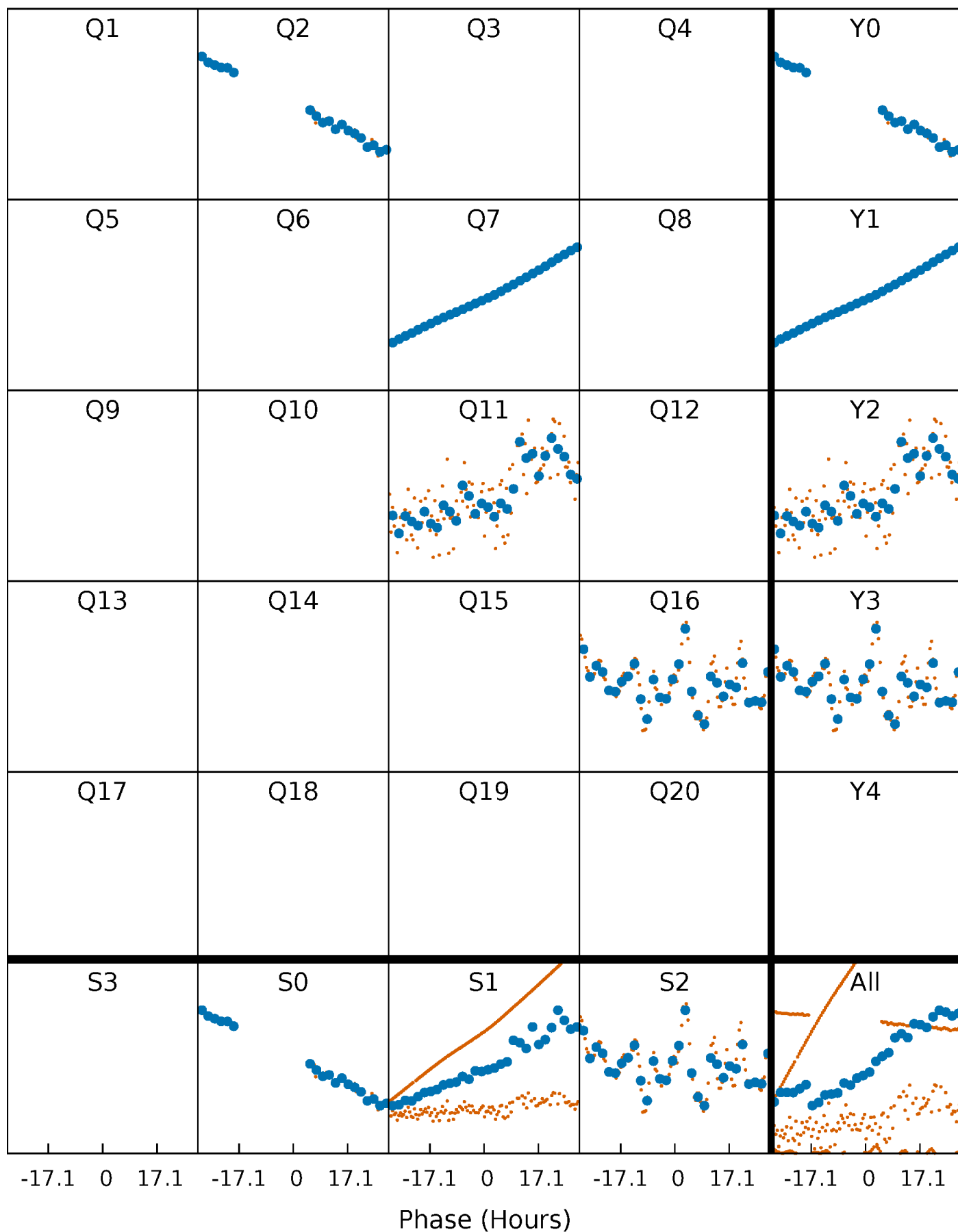


**Planet 6 : Phased Whitened Flux Time Series (TPS Epoch/Period)**



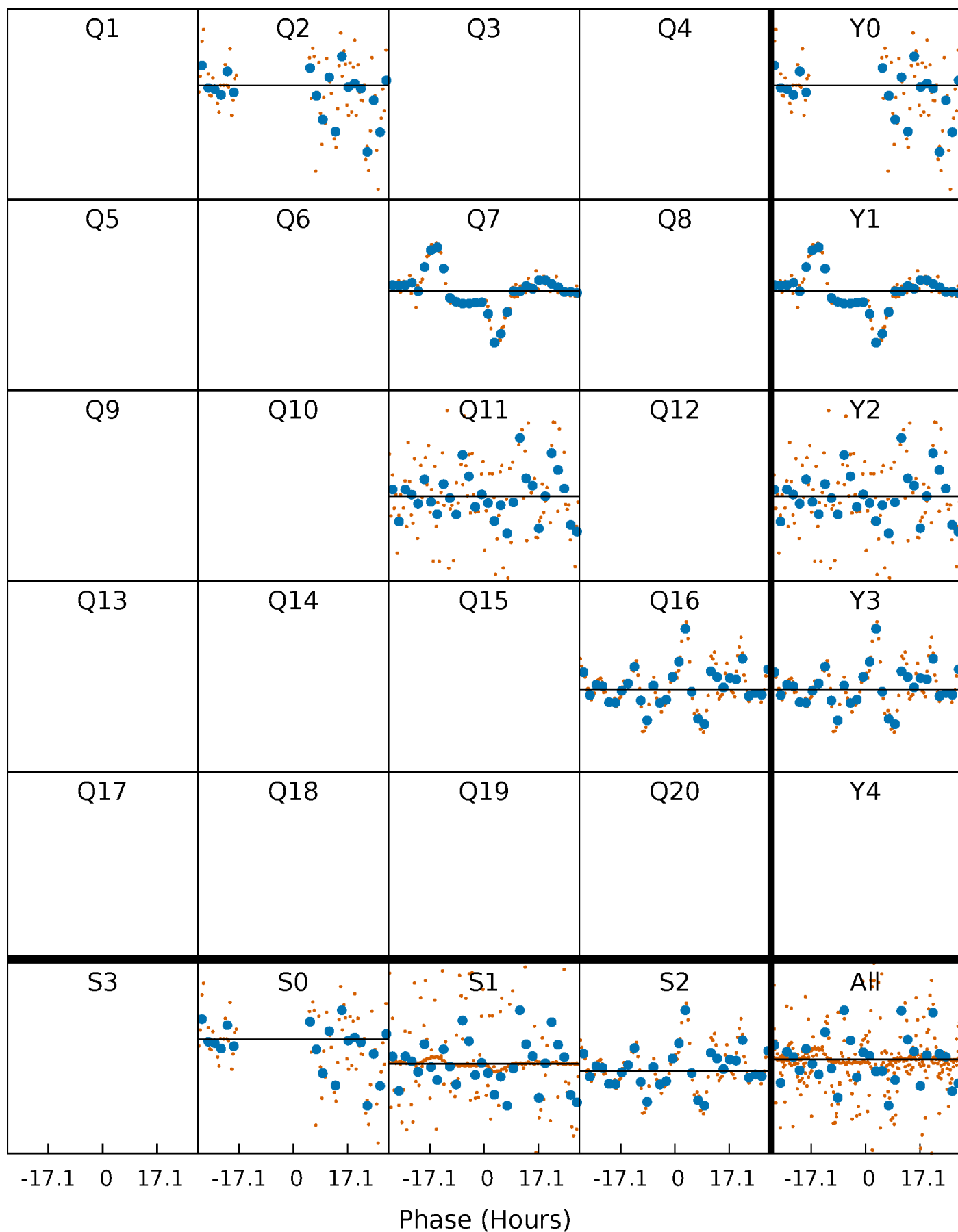
# PDC Quarter-Phased Transit Curves

TCE 007868889-06 P=419.930092 Days  $T_0=256.128465$  (BKJD)



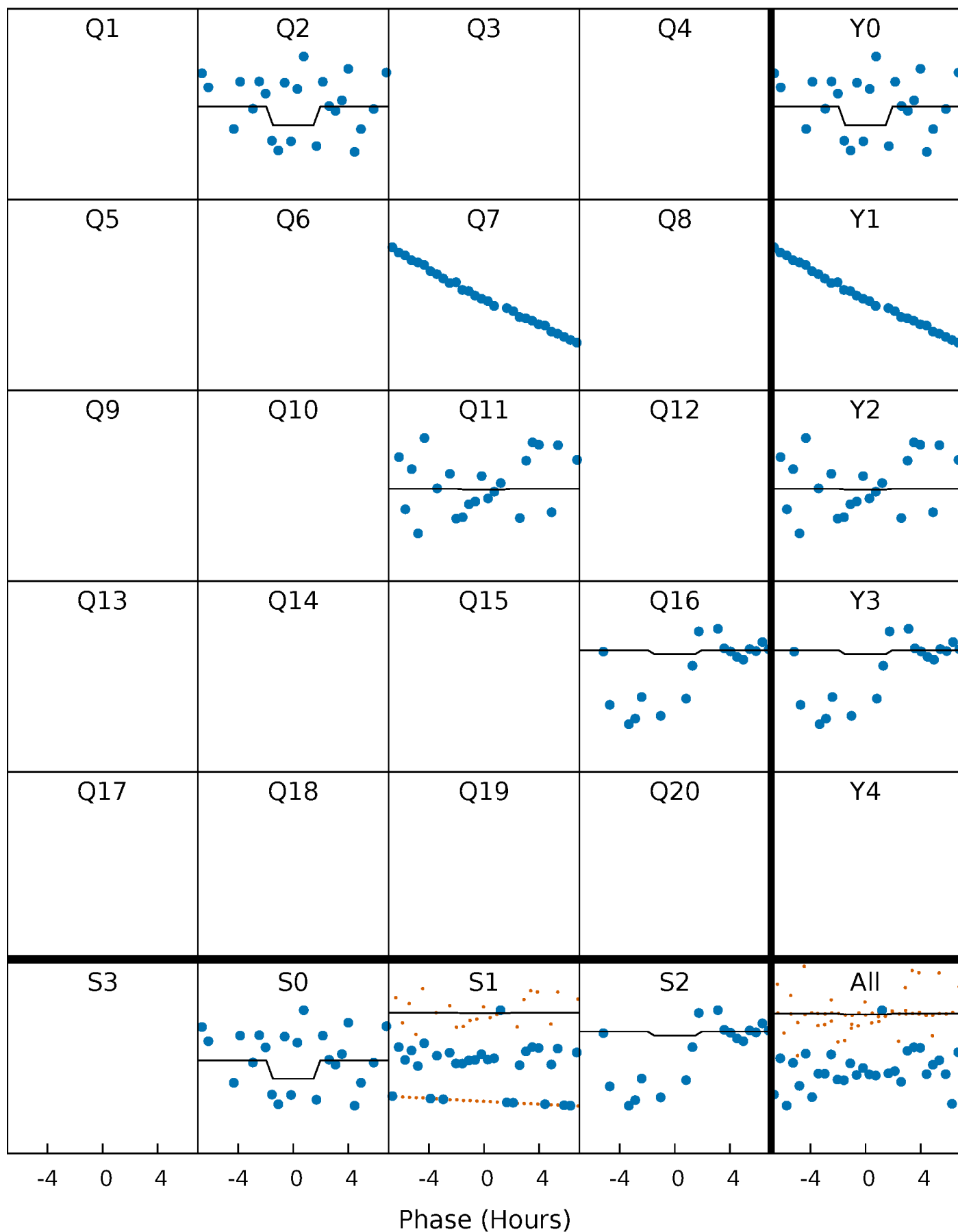
# DV Quarter-Phased Transit Curves

TCE 007868889-06 P=419.930092 Days  $T_0=256.128465$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

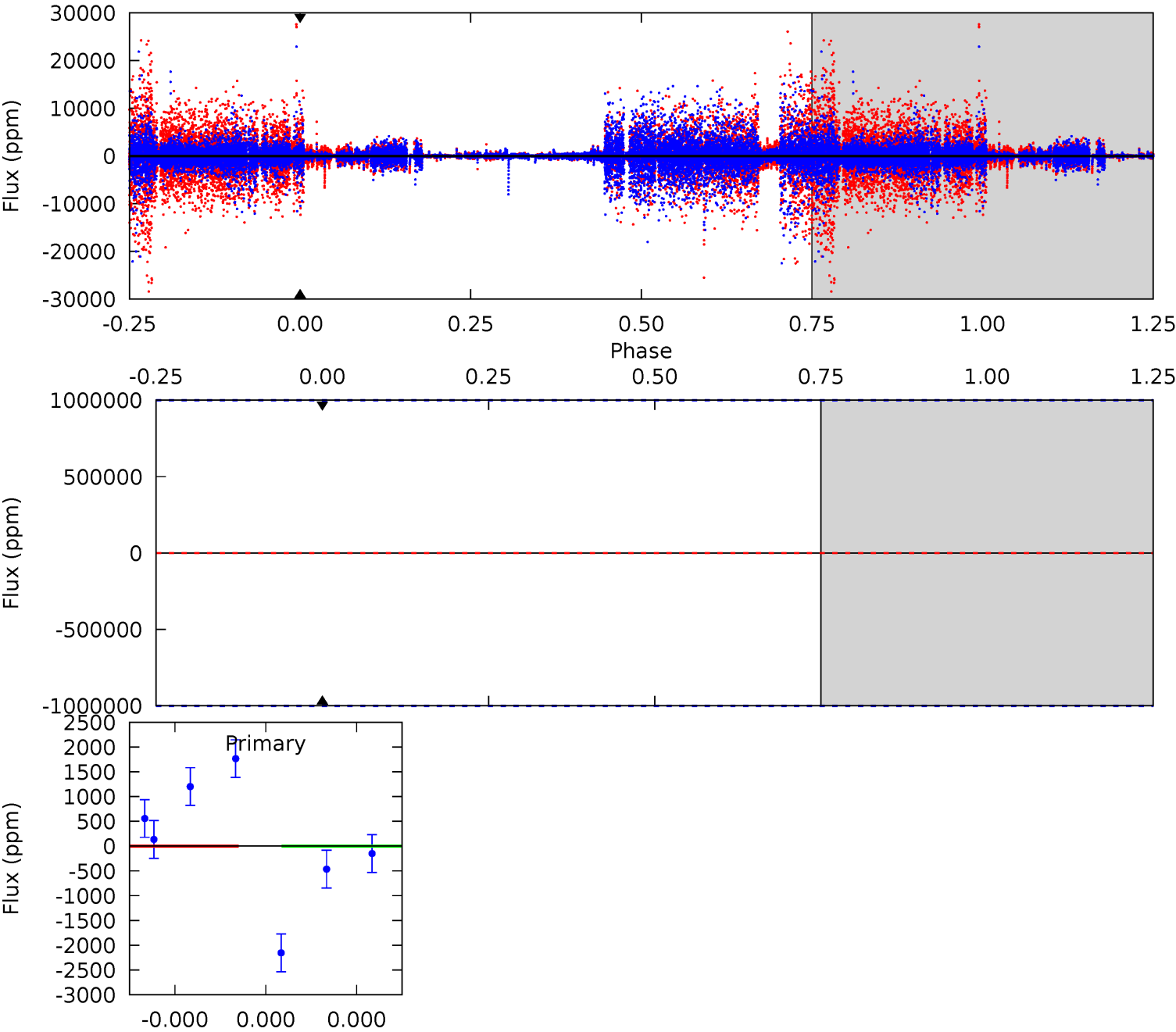
TCE 007868889-06 P=419.930092 Days  $T_0=256.893585$  (BKJD)



# DV Model-Shift Uniqueness Test

007868889-06, P = 419.930092 Days, E = 256.128465 Days

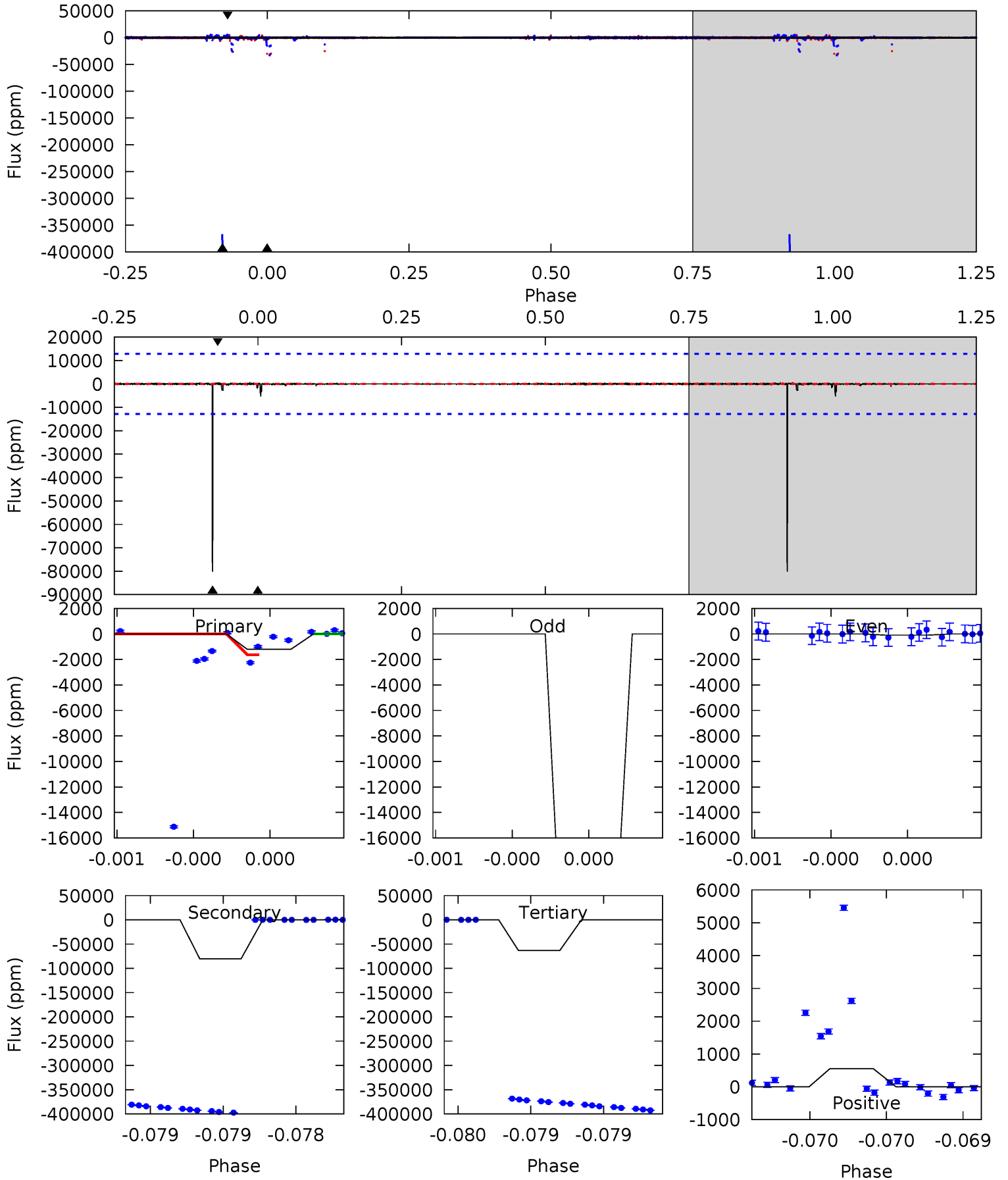
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



# Alt Model-Shift Uniqueness Test

007868889-06, P = 419.930092 Days, E = 256.893585 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
0.53	35.2	27.7	0.24	5.64	3.58	0.43	-27.2	0.29	7.46	34.9	0.32	7.03	0.01	0





### Stellar Parameters For KIC 007868889

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$3834^{+123}_{-76}$	$0.298^{+0.128}_{-0.032}$	$-1.100^{+0.200}_{-0.150}$	$104.317^{+5.072}_{-10.990}$	$0.788^{+0.123}_{-0.016}$	$0.000^{+0.000}_{-0.000}$
	+3%/-2%	+43%/-11%	+18%/-14%	+5%/-11%	+16%/-2%	+50%/-12%
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 007868889-06 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$0 \pm 1000000$	$827.87^{+891.05}_{-588.42}$	$2374^{+88}_{-84}$	$-2509^{+12019}_{-5830}$	$-0.015^{+191.552}_{-138.003}$
Alt.	$-80221 \pm 2280$	$857.44^{+838.13}_{-607.37}$	$2371^{+86}_{-83}$	$6951^{+11215}_{-1997}$	$71^{+733}_{-53}$

$T_{\text{max}}$  = 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

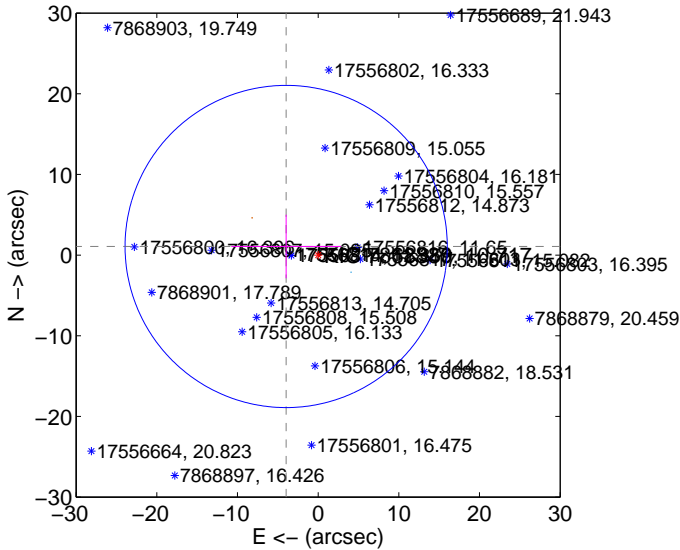
Supplemental centroid analysis for 007868889-06. **Kepler magnitude: 10.72.** Transit SNR -1.00

**There are 1 quarters with good PRF difference image offsets**

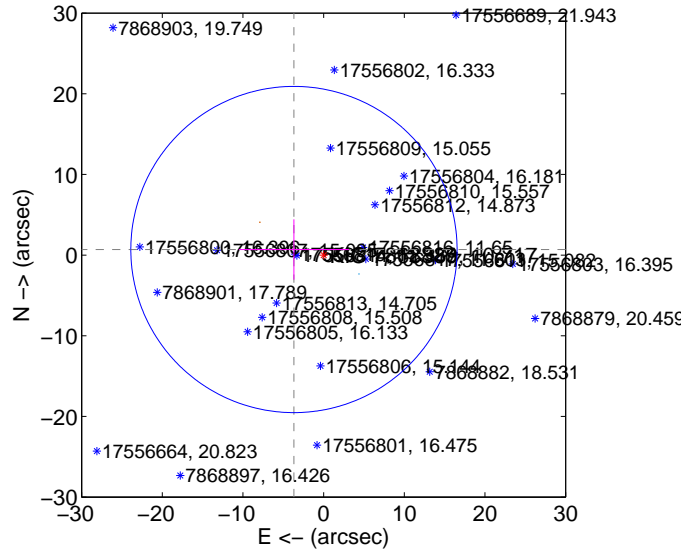
The direct PRF centroid is offset from the target star catalog position by about 0.37 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$4.105 \pm 6.657$	0.62	$3.964 \pm 6.812$	$1.067 \pm 3.939$
PRF-fit source offset from KIC position	$3.743 \pm 6.740$	0.56	$3.678 \pm 6.822$	$0.692 \pm 3.740$
photometric centroid source offset	$9.64 \pm 6.82$	1.41	$5.72 \pm 8.15$	$7.76 \pm 5.96$

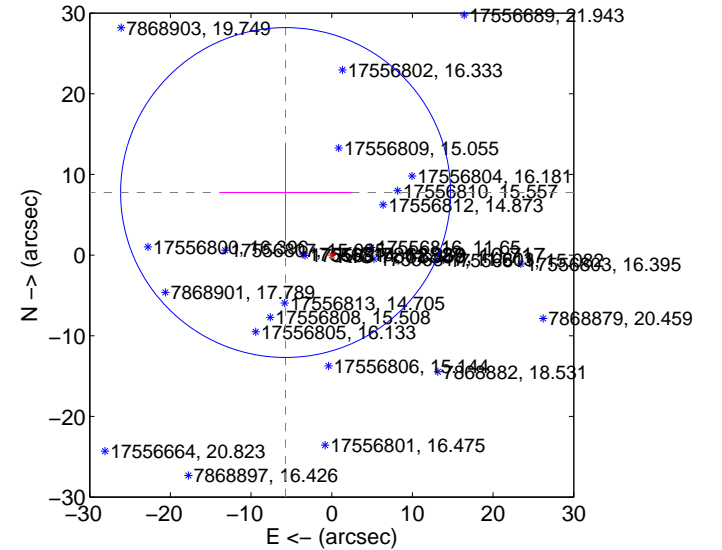
offset from difference PRF-fit to OOT PRF-fit



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.

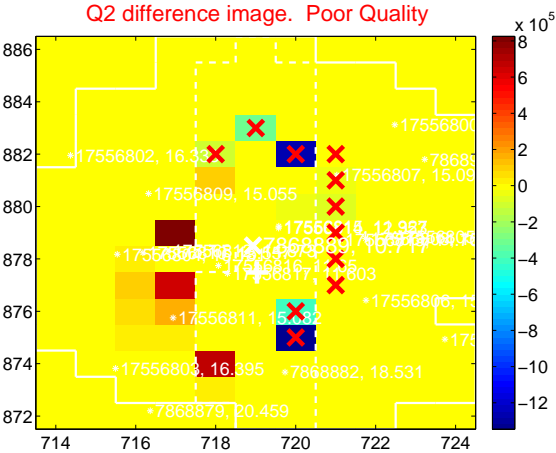
Q1 no difference image



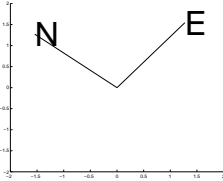
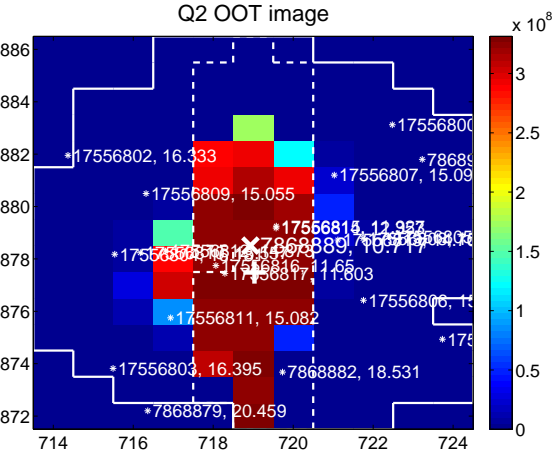
Q1 no OOT image



Q2 difference image. Poor Quality



Q2 OOT image



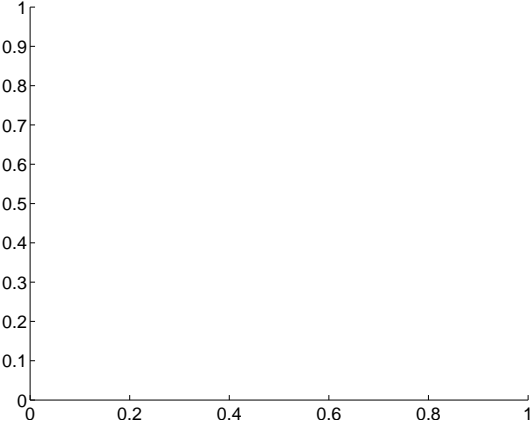
Q3 no difference image



Q3 no OOT image



Q4 no difference image



Q4 no OOT image



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

Q5 no difference image



Q5 no OOT image



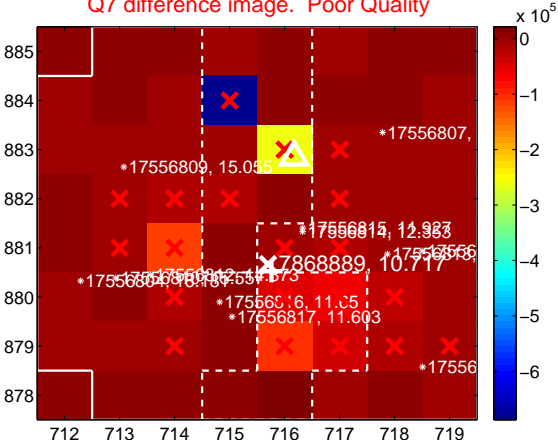
Q6 no difference image



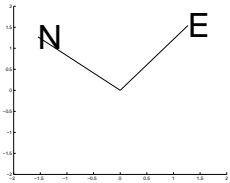
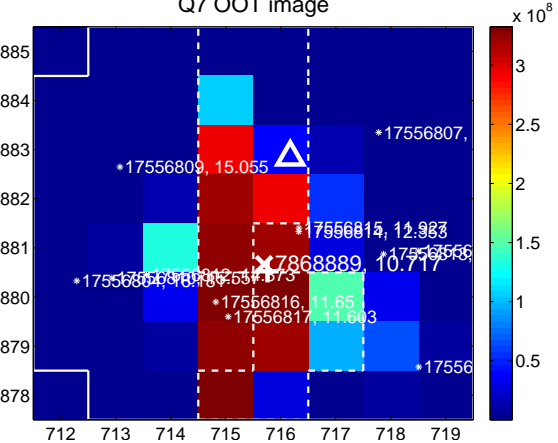
Q6 no OOT image



Q7 difference image. Poor Quality



Q7 OOT image



Q8 no difference image



Q8 no OOT image



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.

Q13 no difference image



Q13 no OOT image



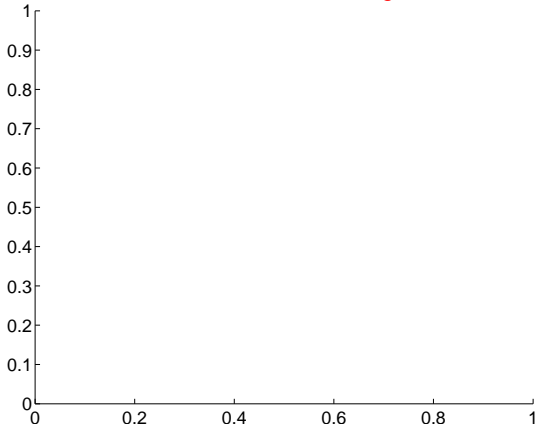
Q14 no difference image



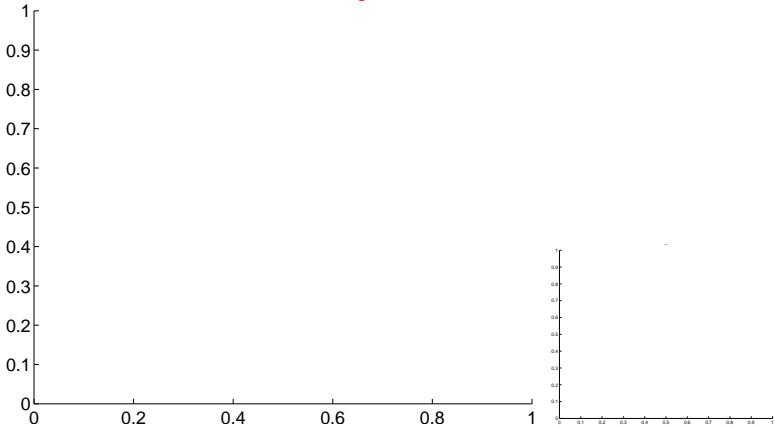
Q14 no OOT image



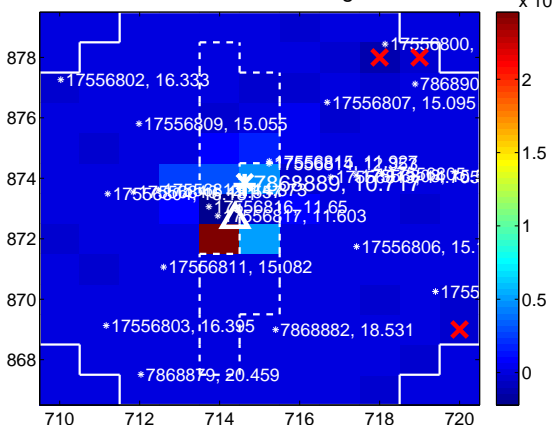
Q15 no difference image



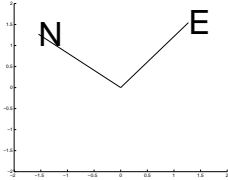
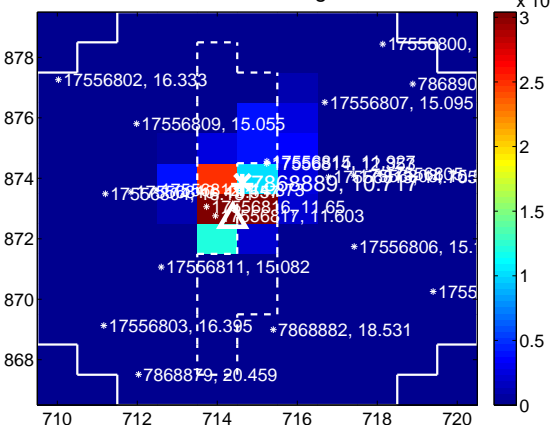
Q15 no OOT image



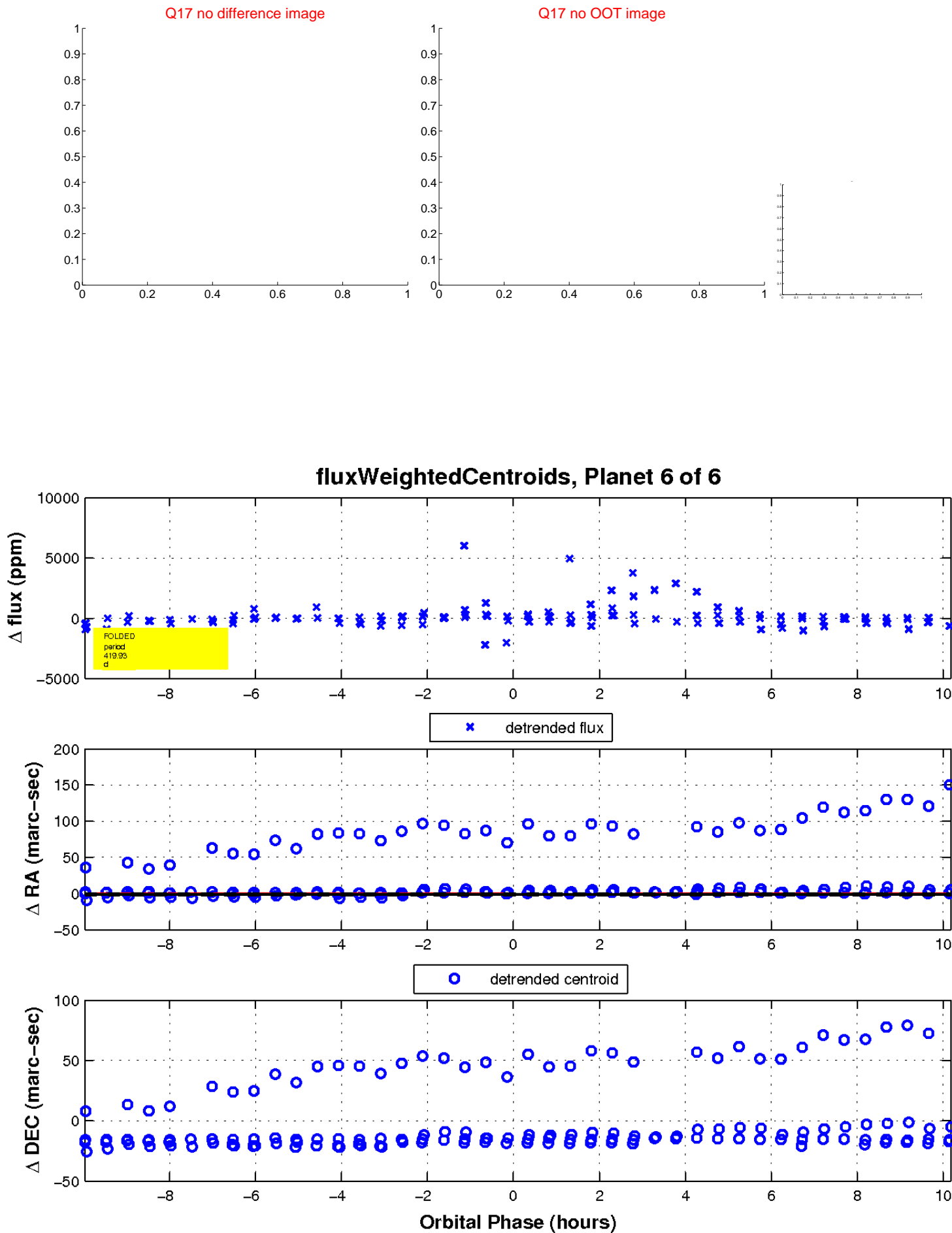
Q16 difference image



Q16 OOT image



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



UKIRT Image

