

# KIC 008822612

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008822612-01	OBS	No	463.786254	328.358444	1789.8	4.366	13.9	7.4	0.65	4612	2.67	0.17
008822612-03	OBS	No	486.825666	529.064394	1785.2	3.788	11.4	8.0	0.65	4612	2.94	0.16
008822612-04	OBS	No	347.552096	362.307012	1649.4	8.533	11.7	6.7	0.65	4612	2.85	0.25

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008822612-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
008822612-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
008822612-04	OBS	FP	0.00	1	0	1	0	LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST

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

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

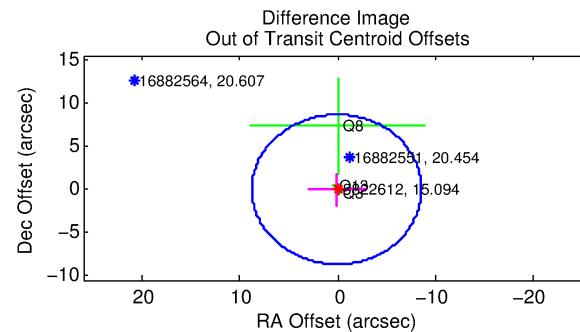
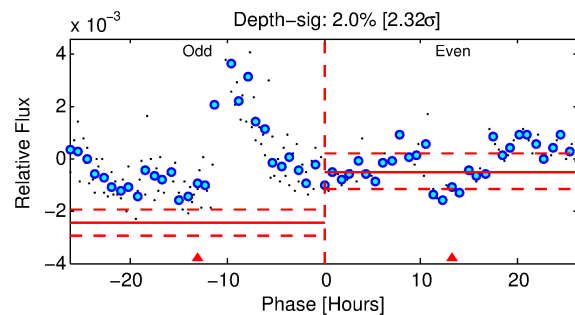
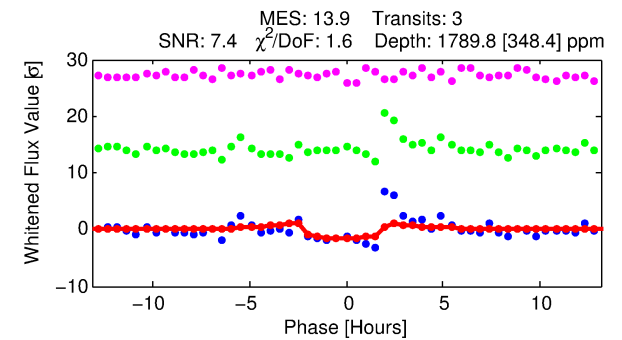
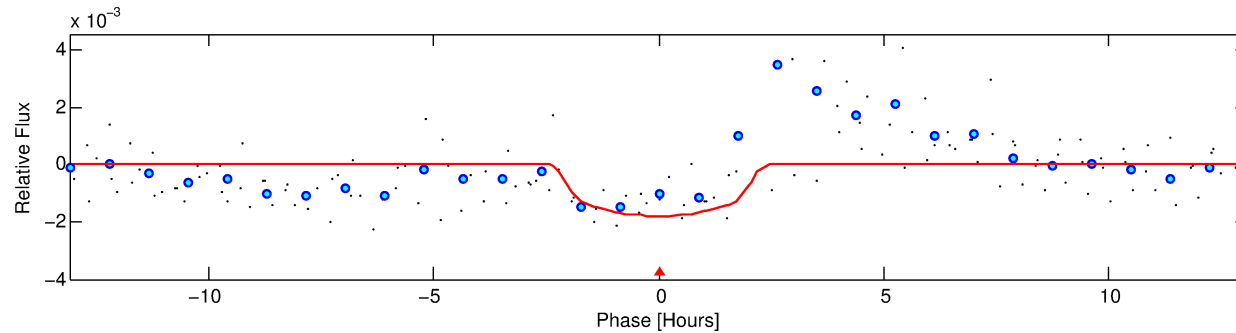
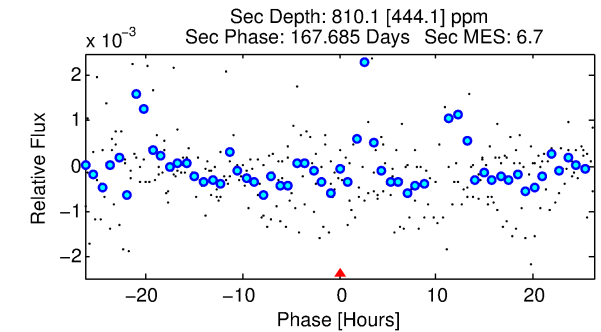
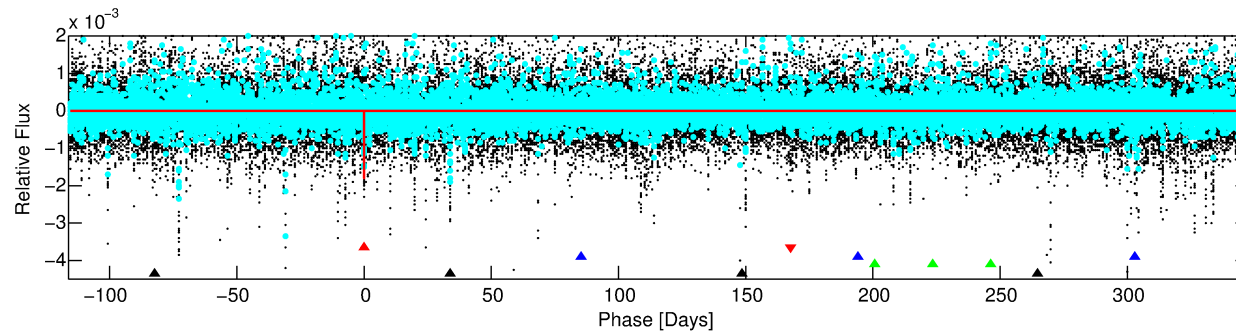
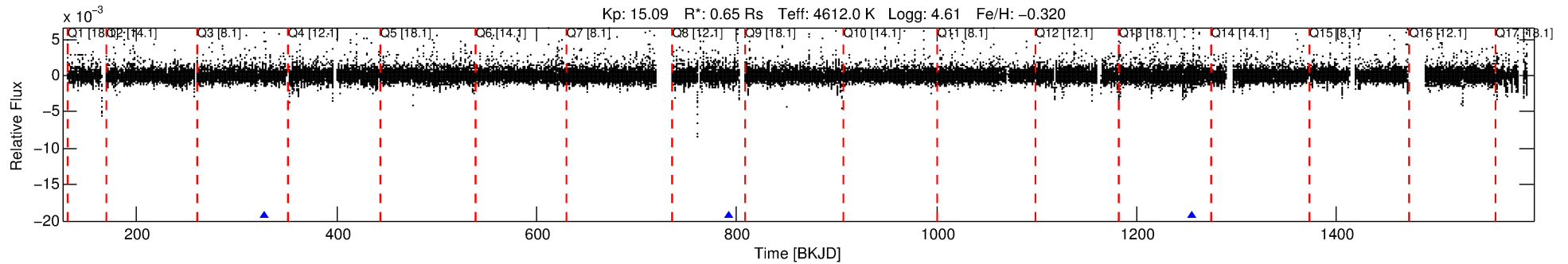
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008822612-01

No Significant Match Found

# DV One-Page Summary

KIC: 8822612 Candidate: 1 of 4 Period: 463.786 d



## DV Fit Results:

Period = 463.78625 [0.00703] d  
Epoch = 328.3584 [0.0088] BKJD  
Rp/R\* = 0.0375 [0.0909]  
a/R\* = 823.40 [6257.55]  
b = 0.22 [34.12]  
Seff = 0.17 [0.03]  
Teq = 164 [7] K  
Rp = 2.68 [6.48] Re  
a = 1.0097 [0.0773] AU  
Ag = 63476.02 [309248.77] [0.21 $\sigma$ ]  
Teffp = 4016 [4891] K [0.79 $\sigma$ ]

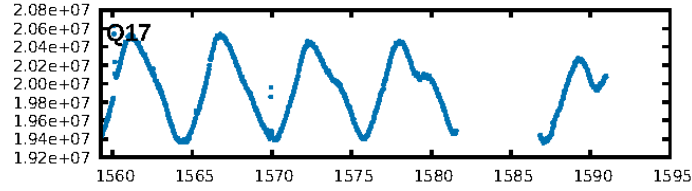
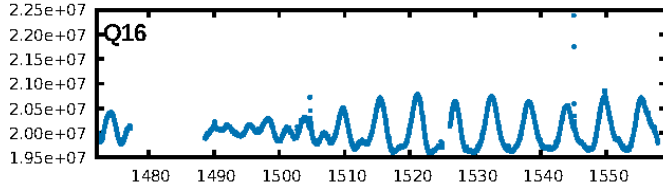
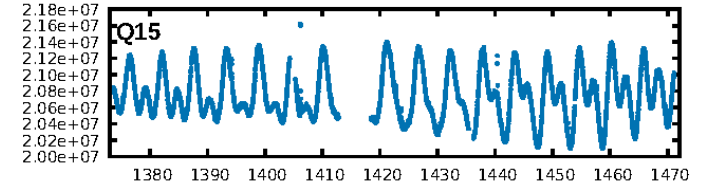
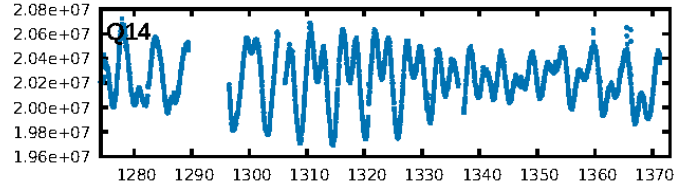
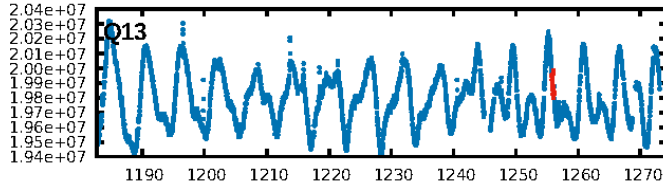
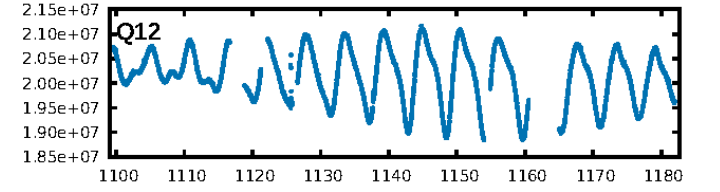
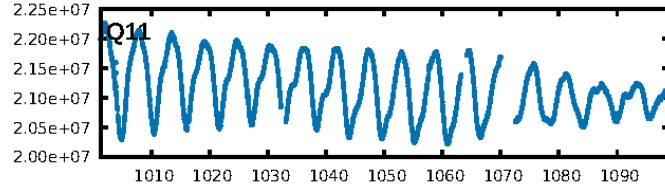
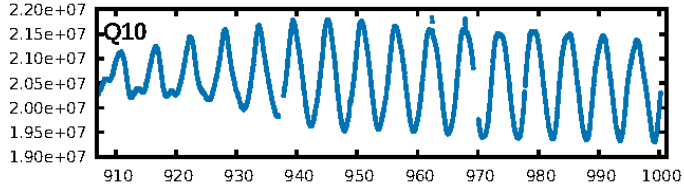
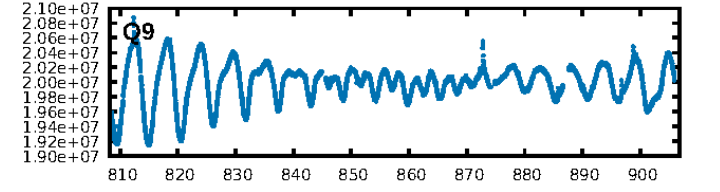
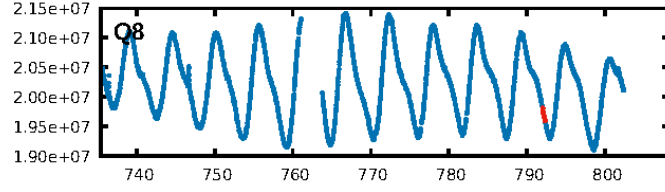
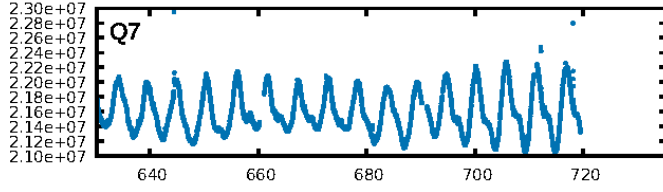
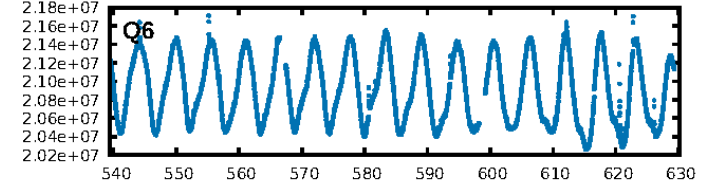
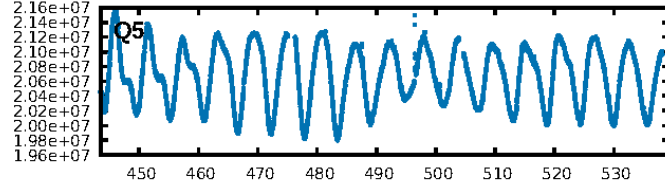
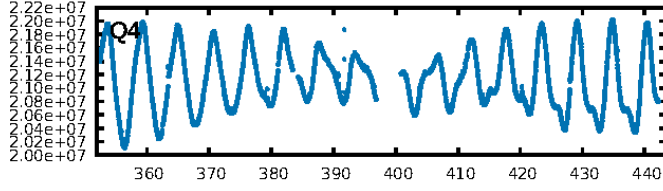
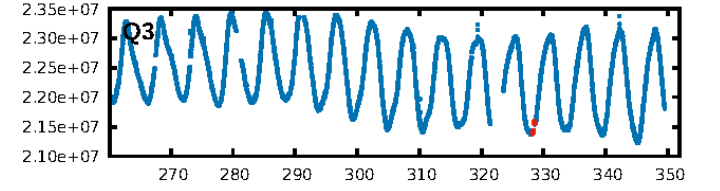
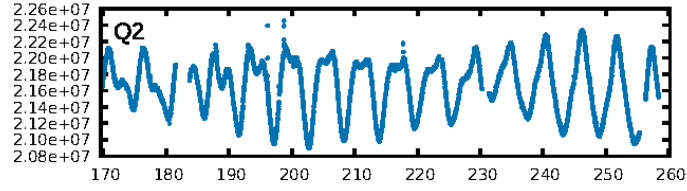
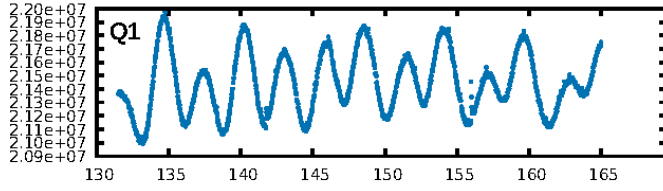
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [291.04 $\sigma$ ]  
LongPeriod-sig: 100.0% [95.66 $\sigma$ ]  
ModelChiSquare2-sig: 0.3%  
ModelChiSquareGof-sig: 56.9%  
Bootstrap-pfa: 8.57e-13  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 4.41  
Centroid-sig: 54.0%  
Centroid-so: 0.806 arcsec [0.93 $\sigma$ ]  
OotOffset-rm: 0.094 arcsec [0.03 $\sigma$ ]  
OotOffset-st: 0/1/1/1 [3]  
KicOffset-rm: 0.281 arcsec [0.10 $\sigma$ ]  
KicOffset-st: 0/1/1/1 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 1.00 [3/3]

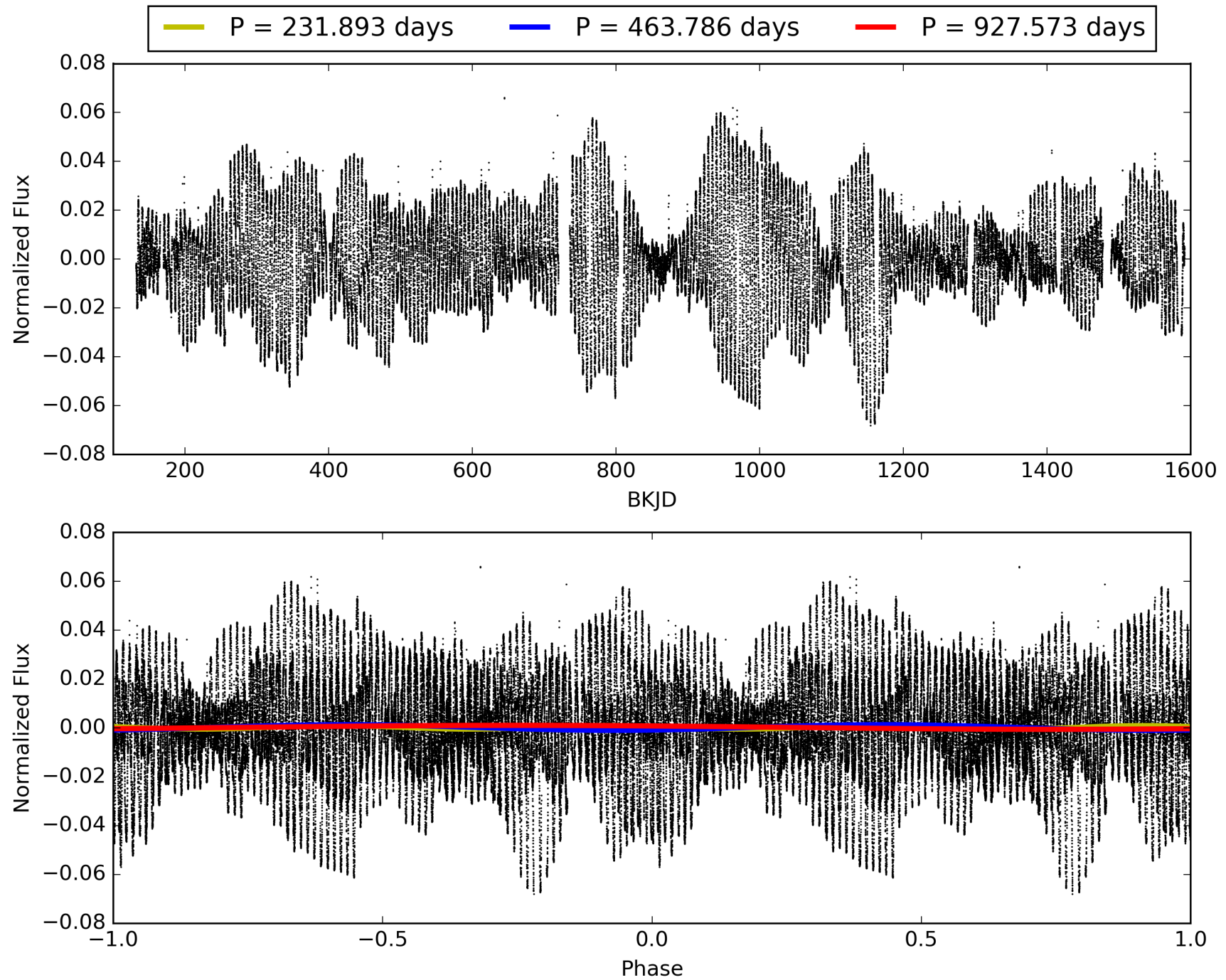
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 23:02:03 Z

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

# TCE 008822612-01, PDC Light Curves

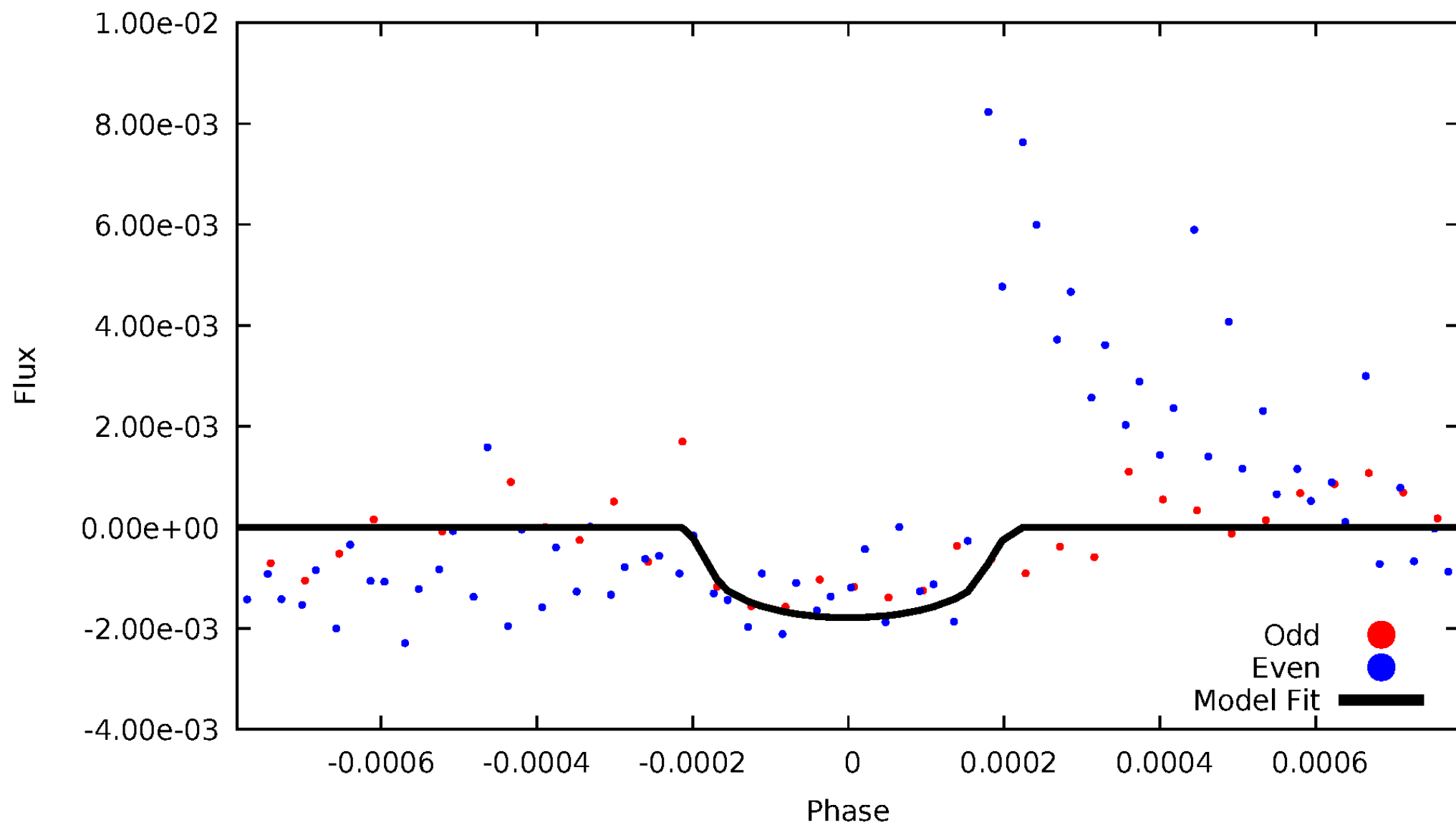


TCE 008822612-01



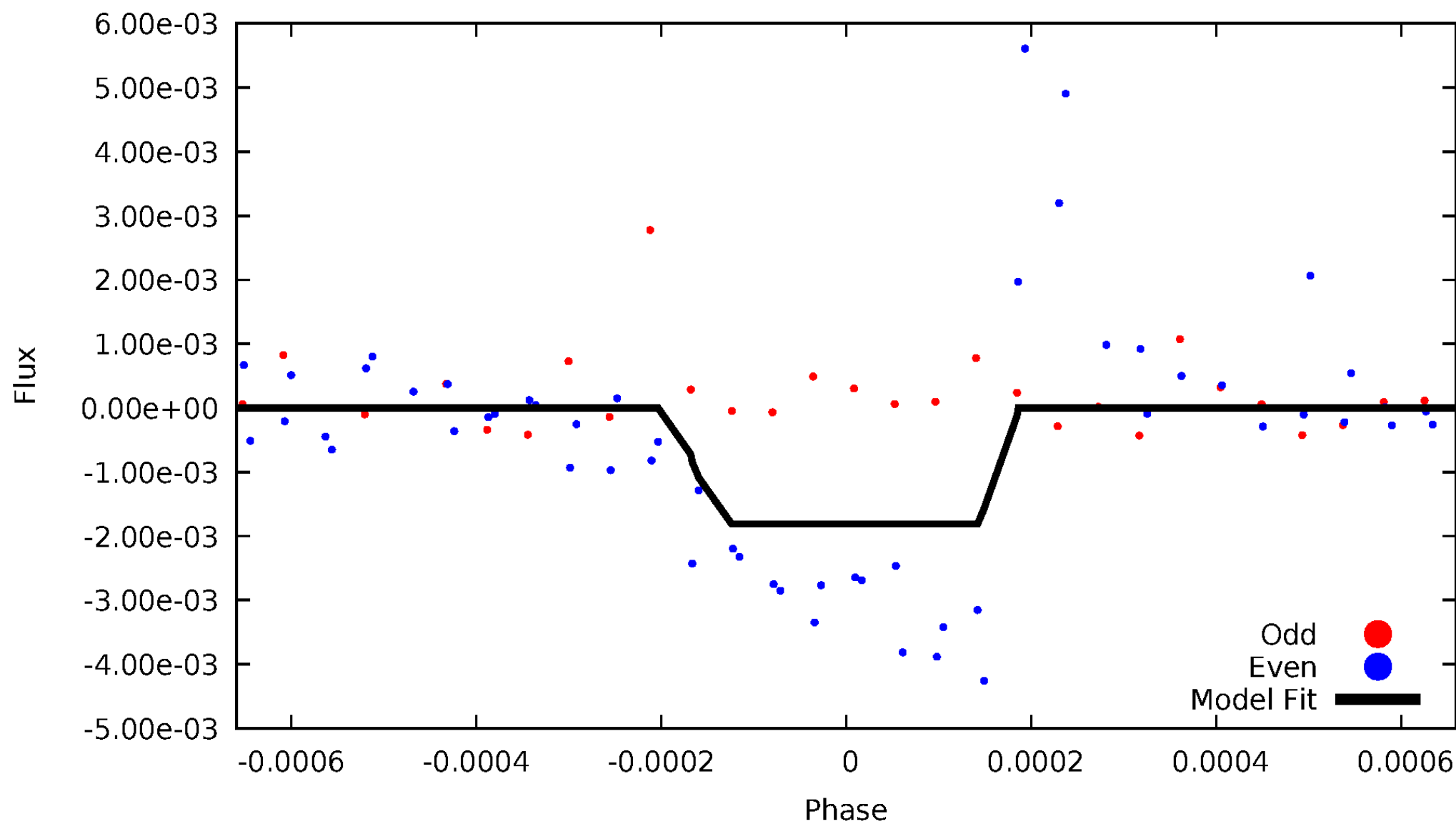
# DV Odd/Even

TCE 008822612-01



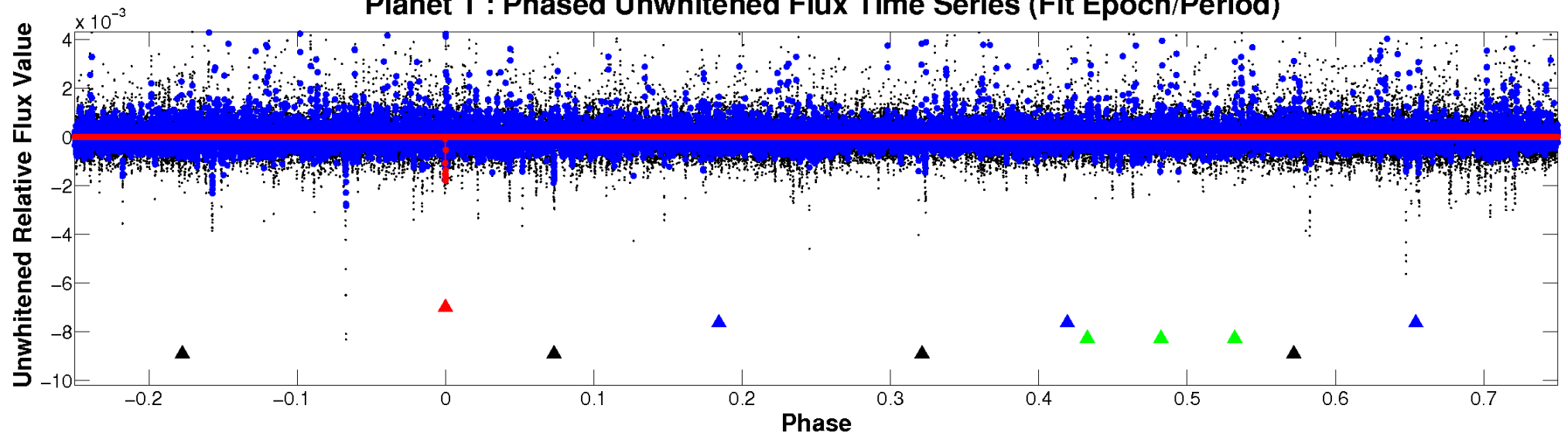
# ALT Odd/Even

TCE 008822612-01

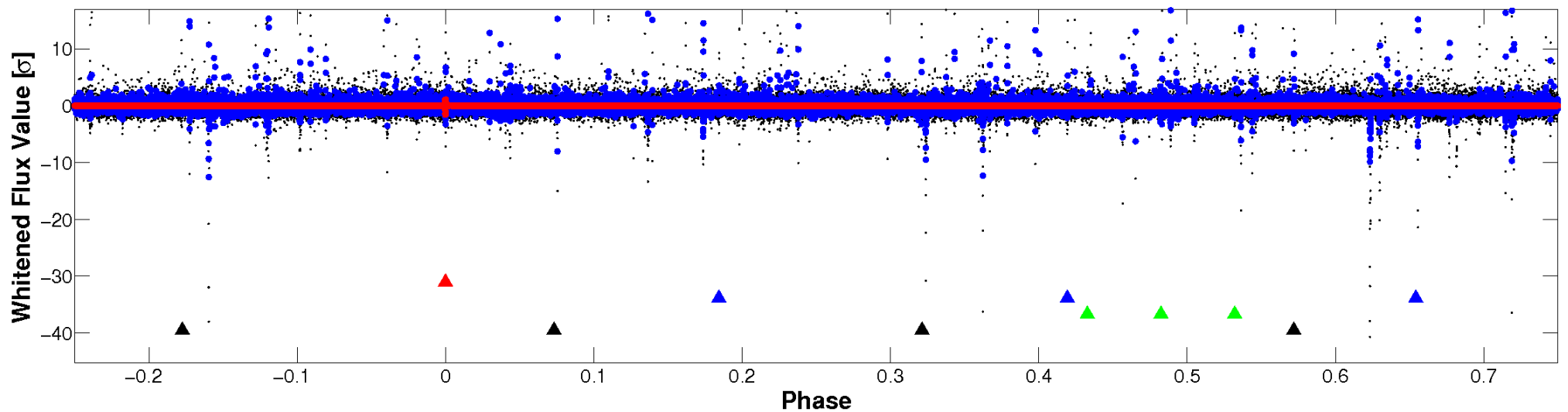


# Non-Whitened Vs. Whitened Light Curve

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

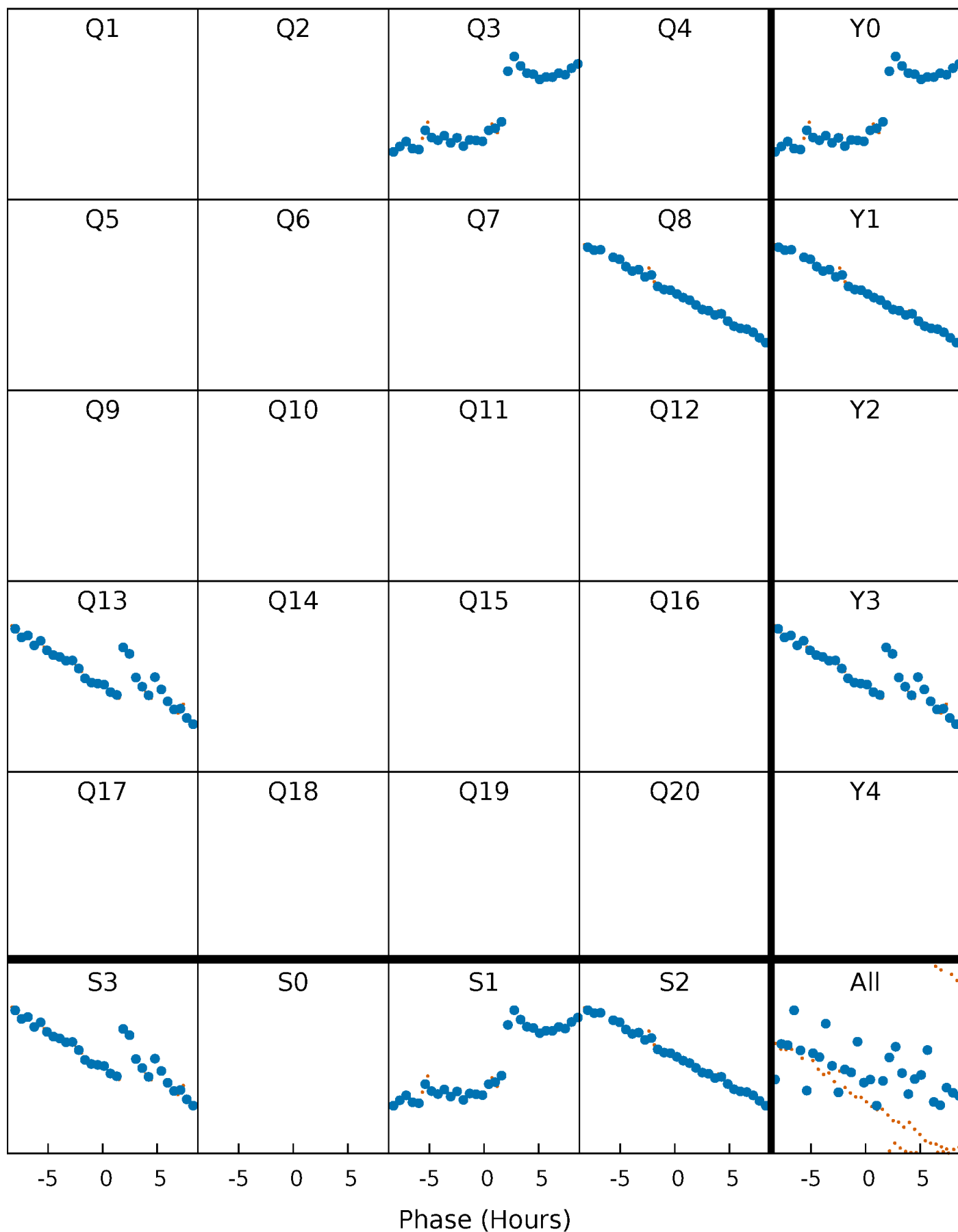


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

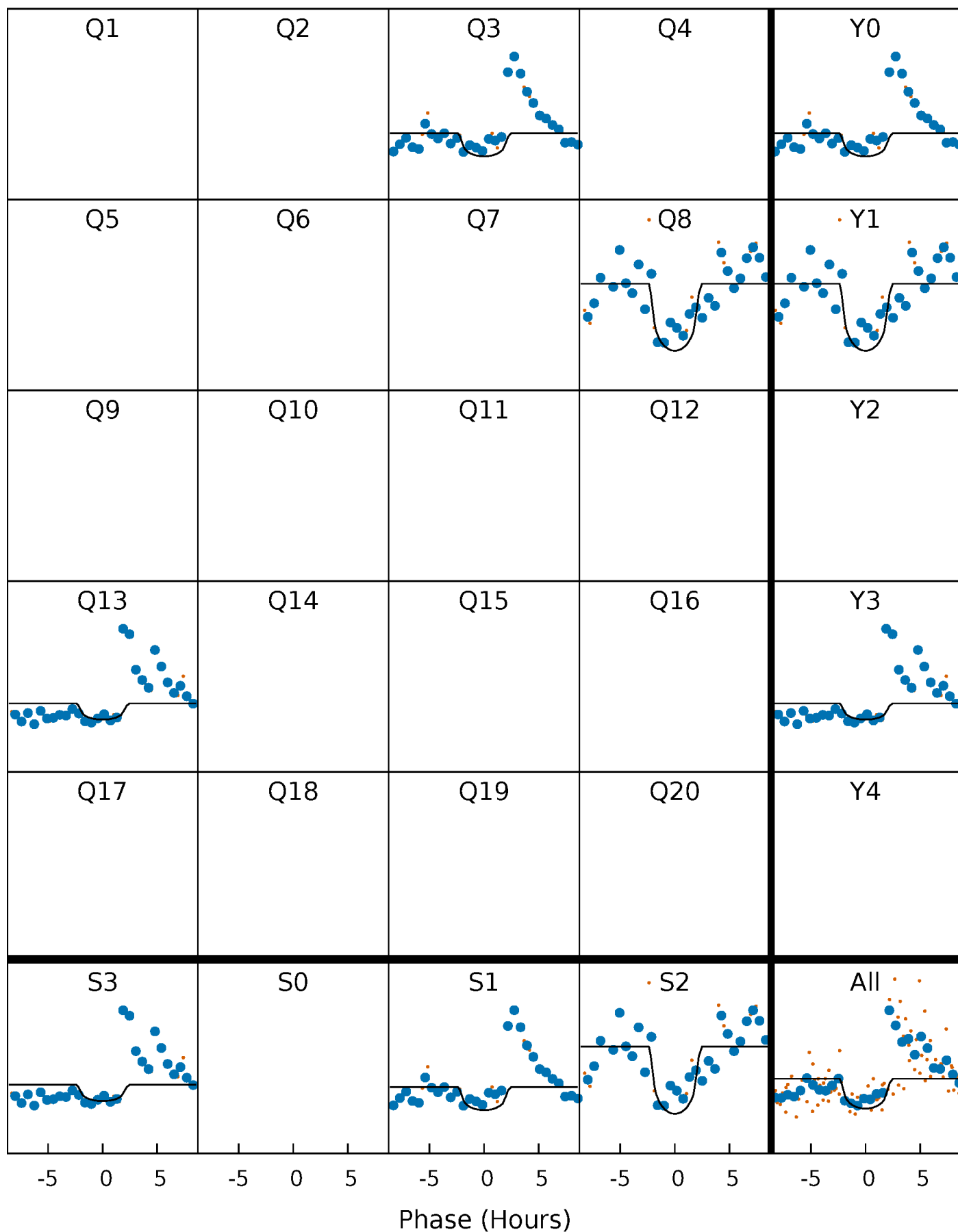
TCE 008822612-01 P=463.786254 Days  $T_0=328.358444$  (BKJD)





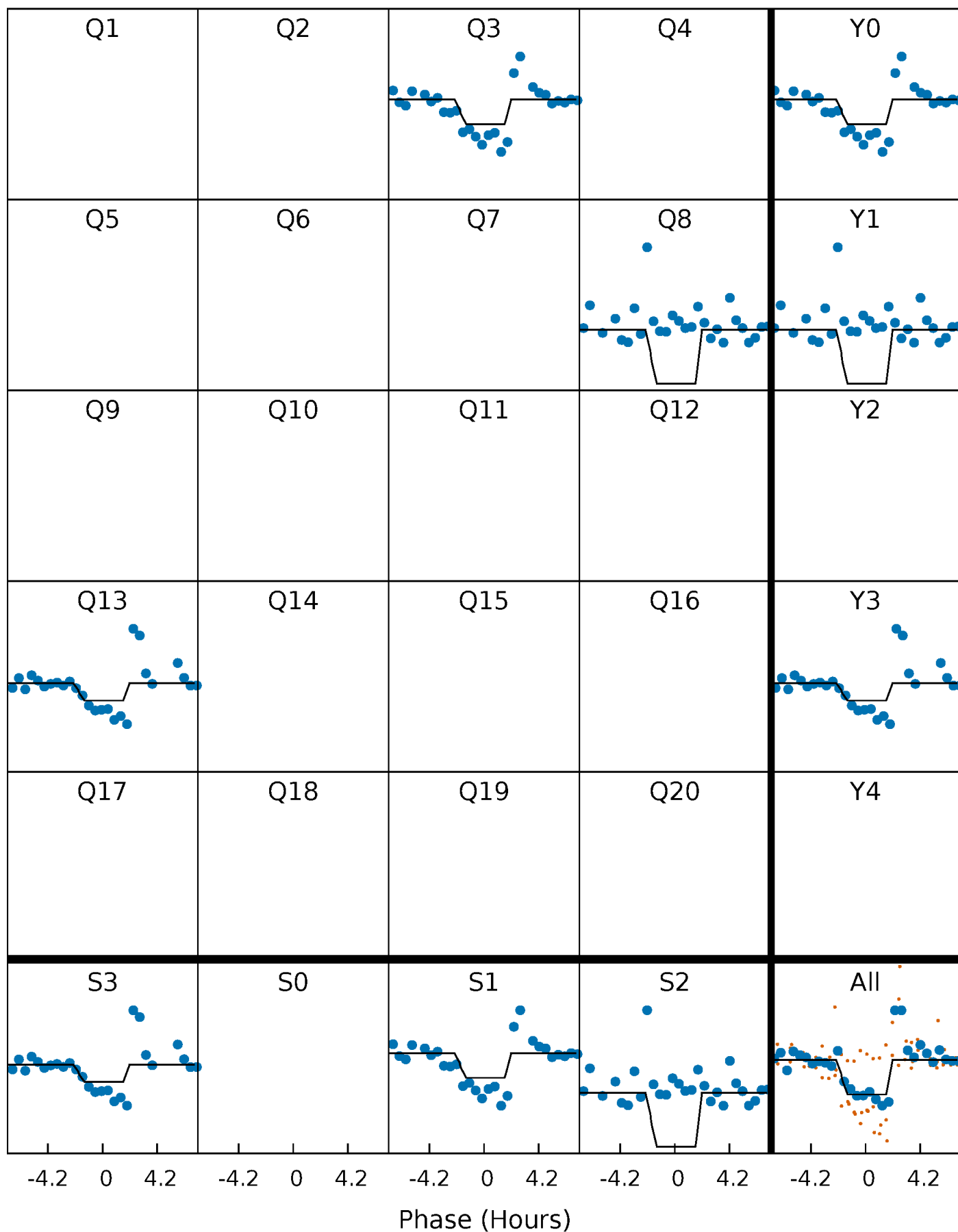
# DV Quarter-Phased Transit Curves

TCE 008822612-01 P=463.786254 Days  $T_0=328.358444$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

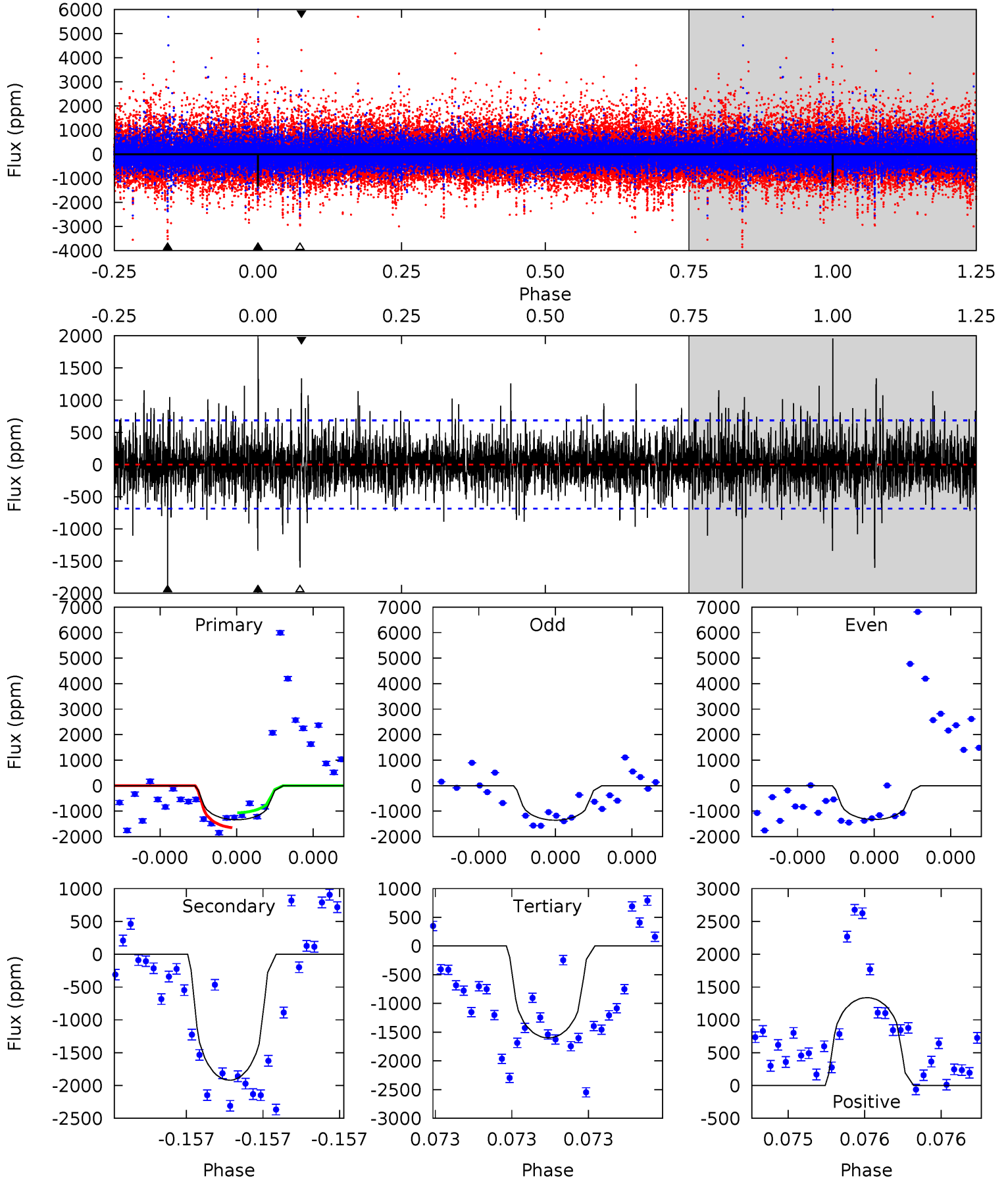
TCE 008822612-01 P=463.780511 Days  $T_0=328.363770$  (BKJD)



# DV Model-Shift Uniqueness Test

008822612-01, P = 463.786254 Days, E = 328.358444 Days

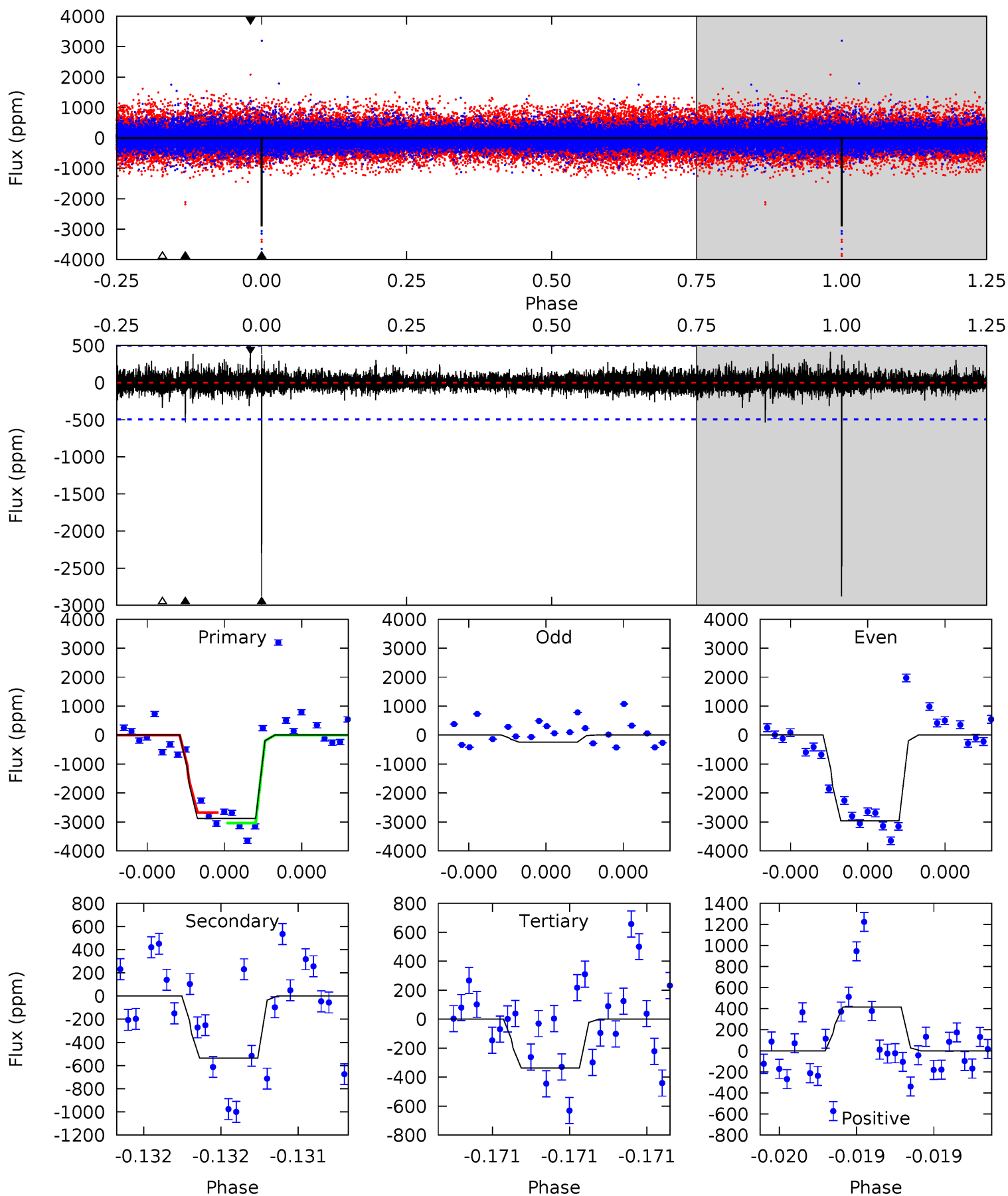
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.0	15.7	13.1	11.0	5.61	3.54	2.15	-2.16	-0.02	2.63	4.77	0.08	0.89	0.50	2.41



# Alt Model-Shift Uniqueness Test

008822612-01, P = 463.780511 Days, E = 328.363770 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
32.7	6.08	3.82	4.72	5.63	3.57	0.69	28.9	28.0	2.26	1.36	17.6	0.66	0.13	2.01



### Stellar Parameters For KIC 008822612

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$4612^{+138}_{-152}$	$4.613^{+0.054}_{-0.027}$	$-0.320^{+0.300}_{-0.300}$	$0.653^{+0.052}_{-0.063}$	$0.638^{+0.071}_{-0.045}$	$3.231^{+0.799}_{-0.391}$
	+3%/-3%	+1%/-1%	+94%/-94%	+8%/-10%	+11%/-7%	+25%/-12%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 008822612-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-1921 \pm 122$	$5.46^{+5.85}_{-3.55}$	$227^{+8}_{-8}$	$3736^{+1927}_{-727}$	$37037^{+247557}_{-28561}$
Alt.	$-536 \pm 88$	$5.63^{+4.90}_{-3.78}$	$227^{+8}_{-8}$	$3035^{+1346}_{-479}$	$9243^{+79027}_{-6651}$

$T_{max}$  = 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

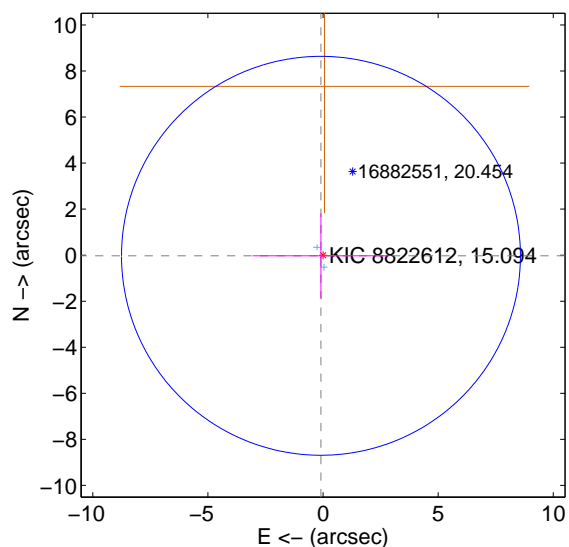
Supplemental centroid analysis for 008822612-01. Kepler magnitude: 15.09. Transit SNR 7.45

There are 2 quarters with good PRF difference image offsets

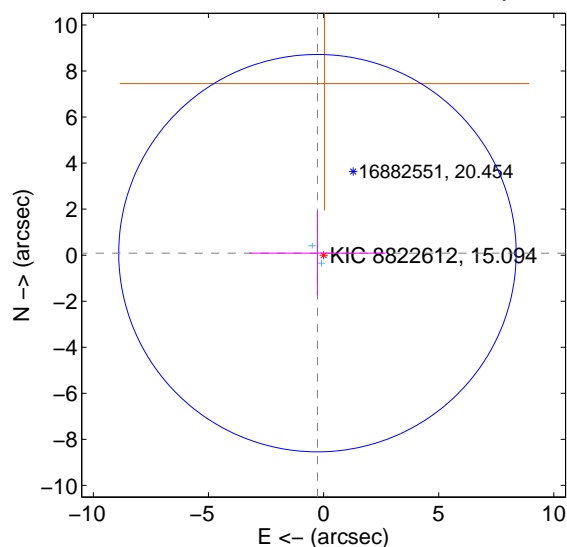
The direct PRF centroid is offset from the target star catalog position by about 0.24 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.094 \pm 2.888$	0.03	$0.090 \pm 2.966$	$-0.027 \pm 1.839$
PRF-fit source offset from KIC position	$0.281 \pm 2.877$	0.10	$0.267 \pm 2.966$	$0.087 \pm 1.839$
photometric centroid source offset	$0.81 \pm 0.87$	0.93	$0.80 \pm 0.87$	$-0.05 \pm 0.83$

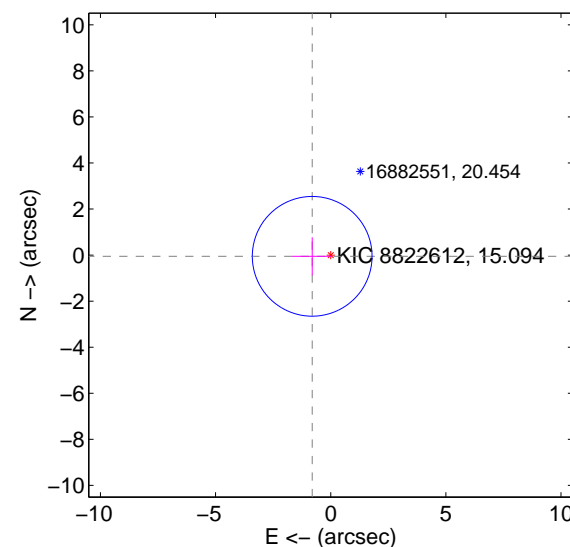
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

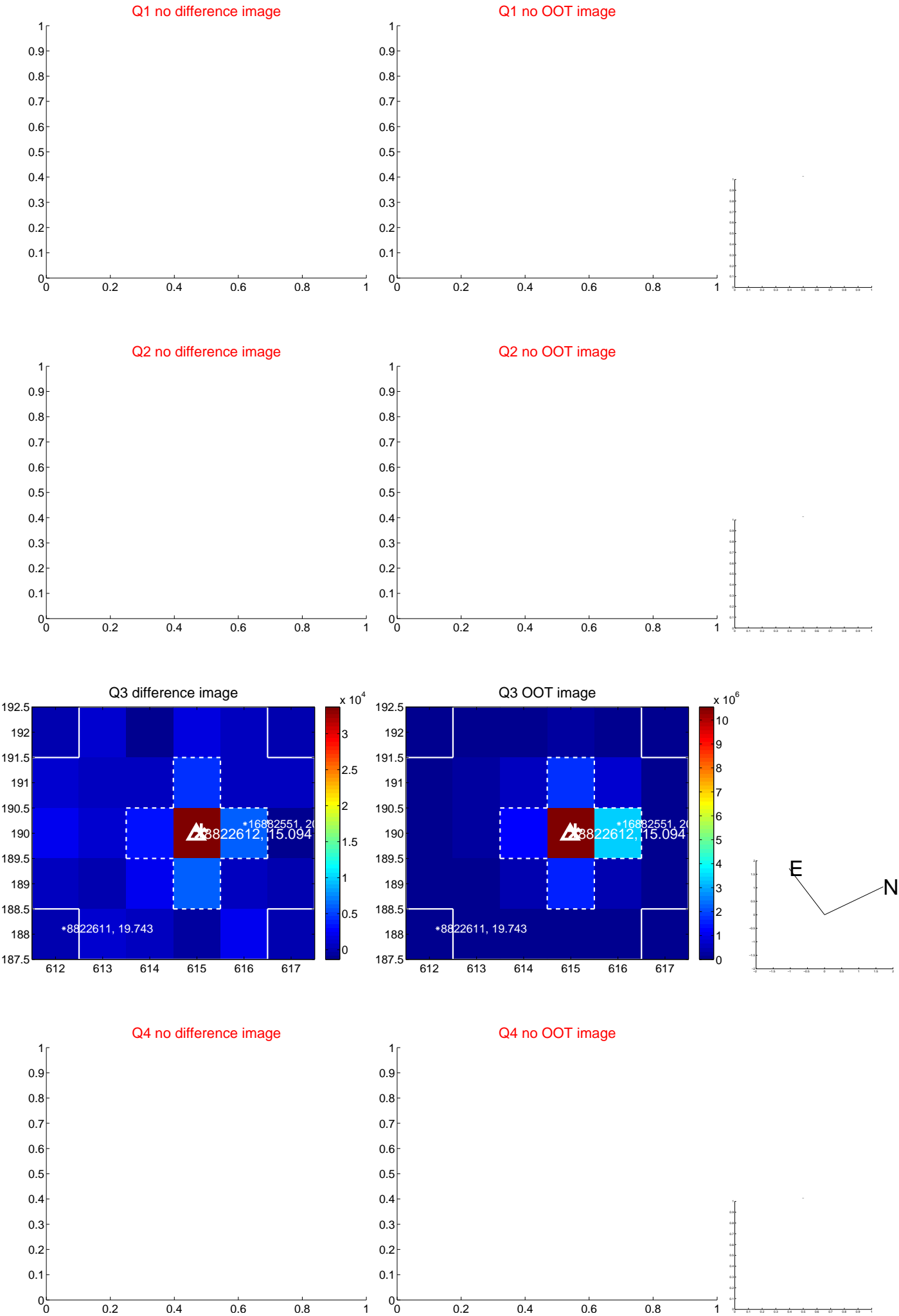


offset from photometric centroids



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

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



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

Q5 no difference image



Q5 no OOT image



Q6 no difference image



Q6 no OOT image



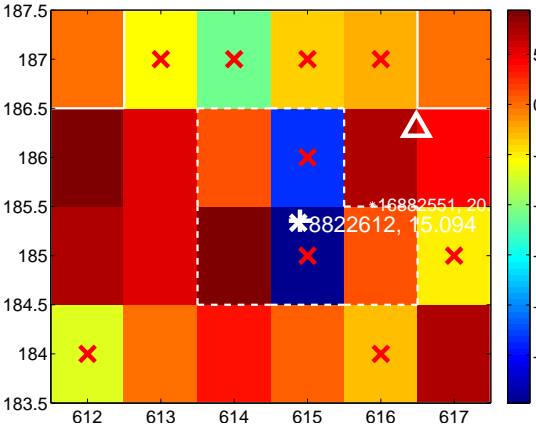
Q7 no difference image



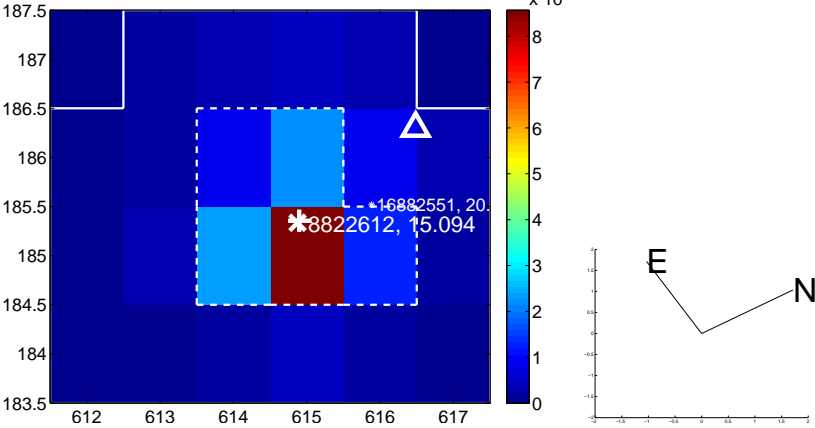
Q7 no OOT image



Q8 difference image. Poor Quality



Q8 OOT image

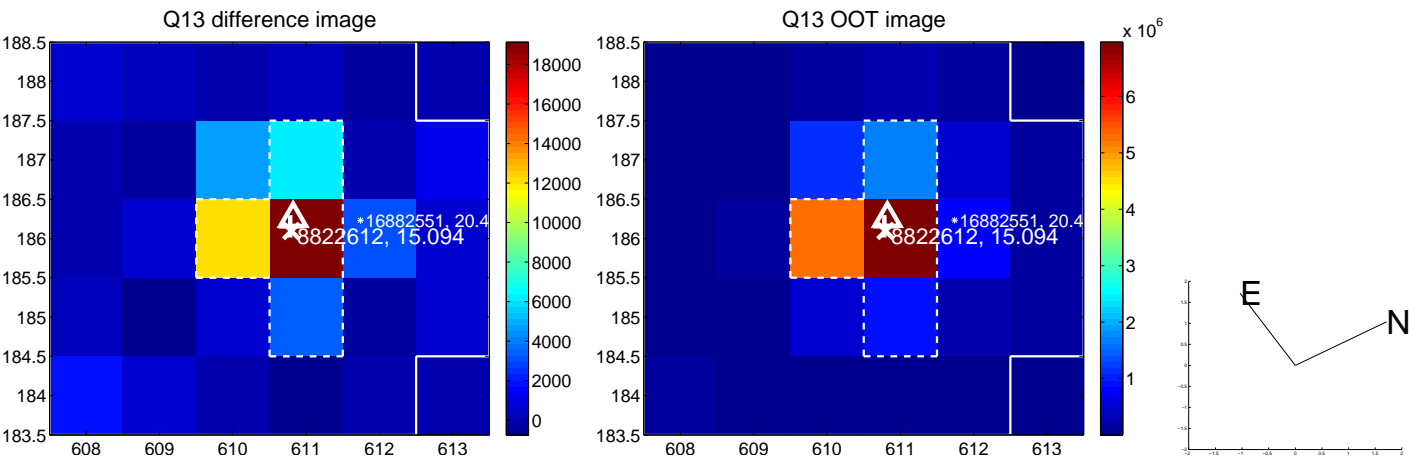




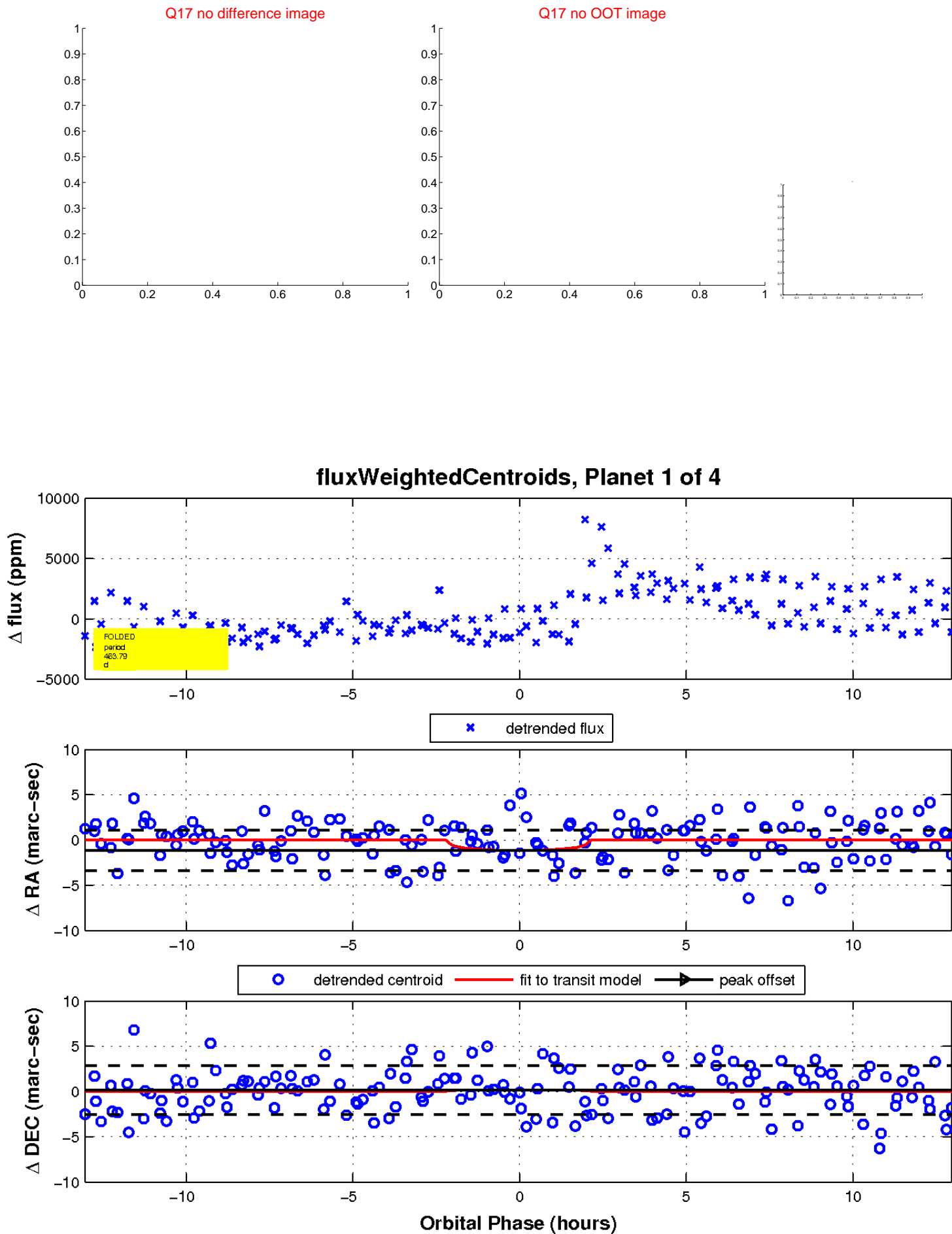
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

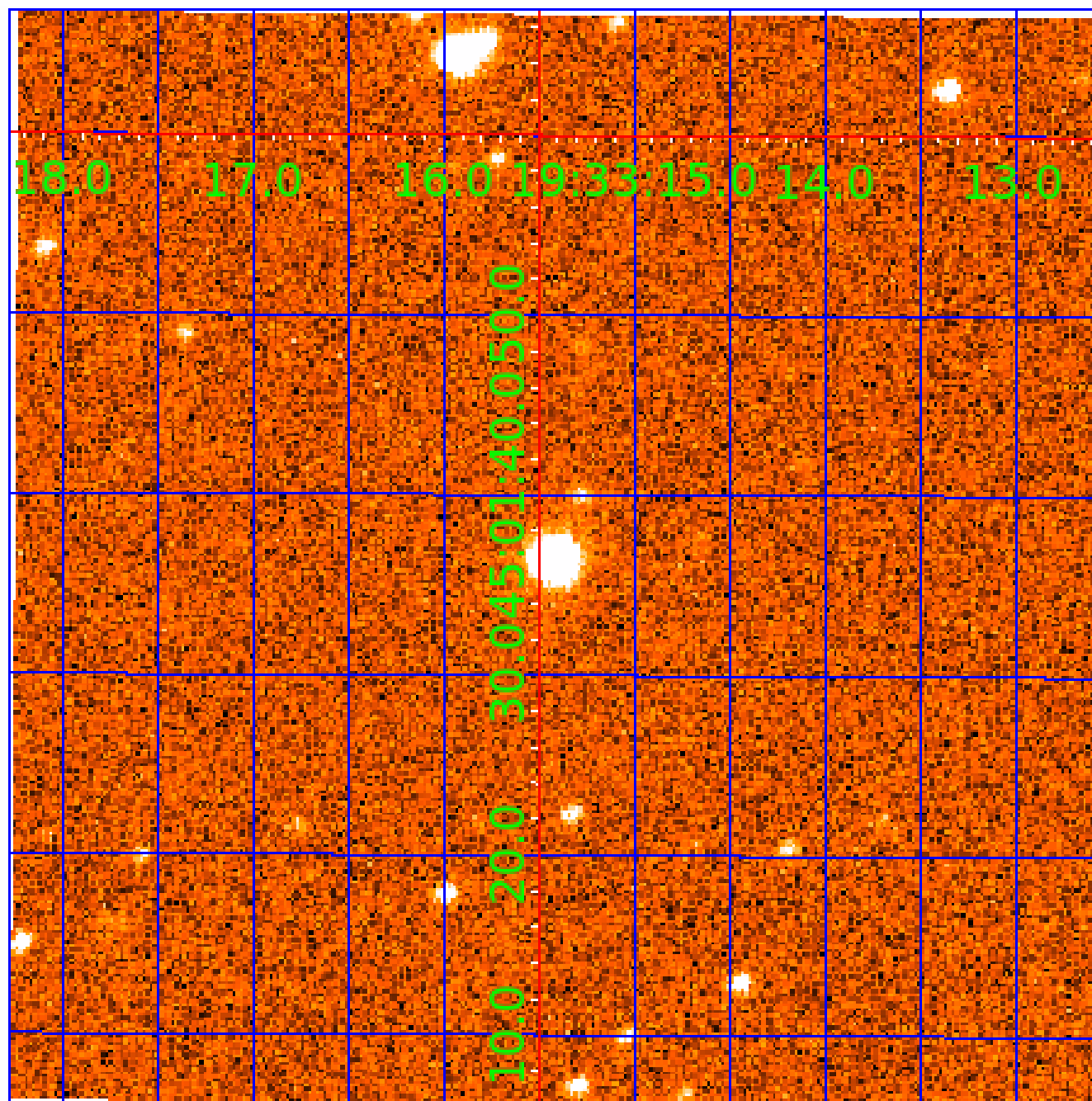


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



# UKIRT Image

Declination



# KIC 008822612

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008822612-01	OBS	No	463.786254	328.358444	1789.8	4.366	13.9	7.4	0.65	4612	2.67	0.17
008822612-03	OBS	No	486.825666	529.064394	1785.2	3.788	11.4	8.0	0.65	4612	2.94	0.16
008822612-04	OBS	No	347.552096	362.307012	1649.4	8.533	11.7	6.7	0.65	4612	2.85	0.25

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008822612-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
008822612-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
008822612-04	OBS	FP	0.00	1	0	1	0	LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST

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

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

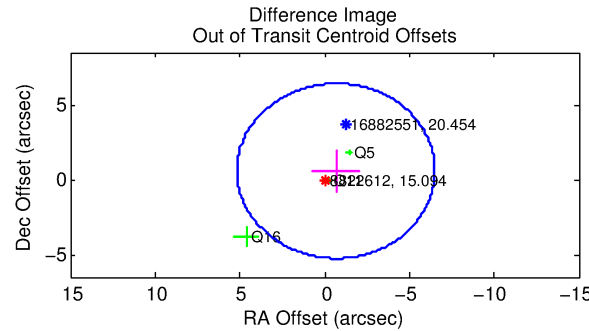
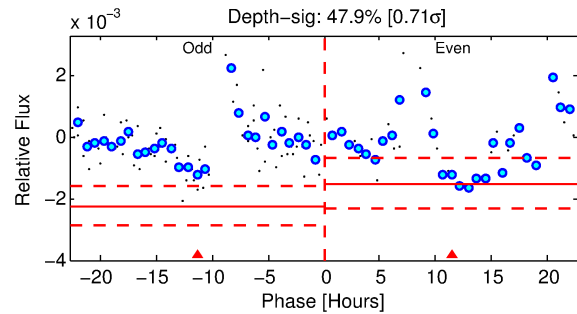
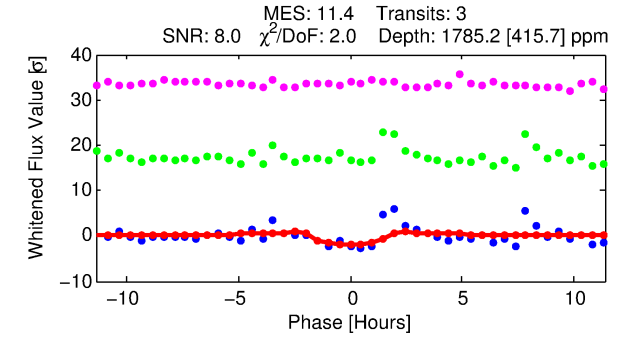
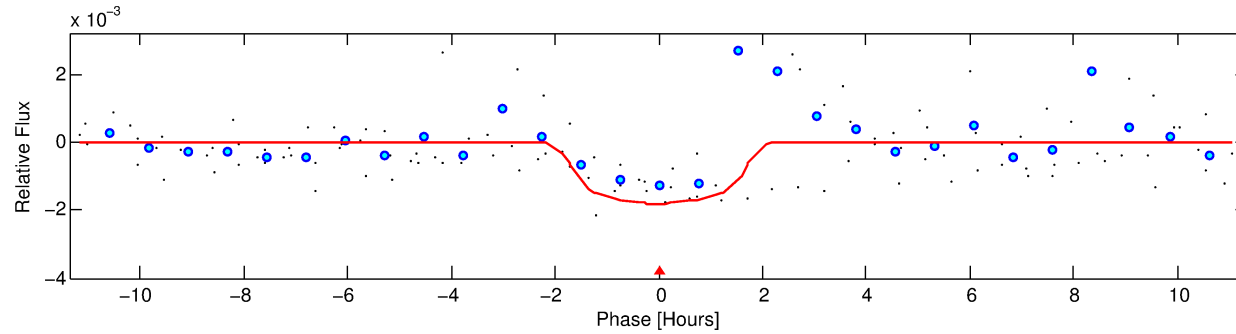
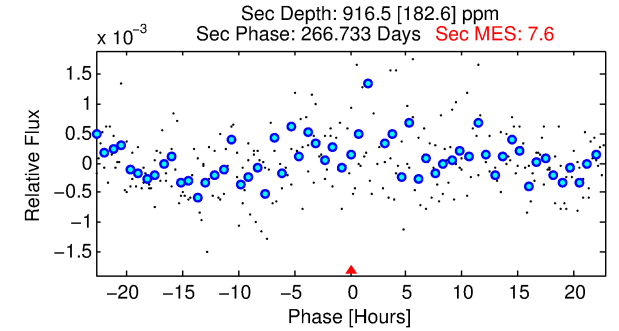
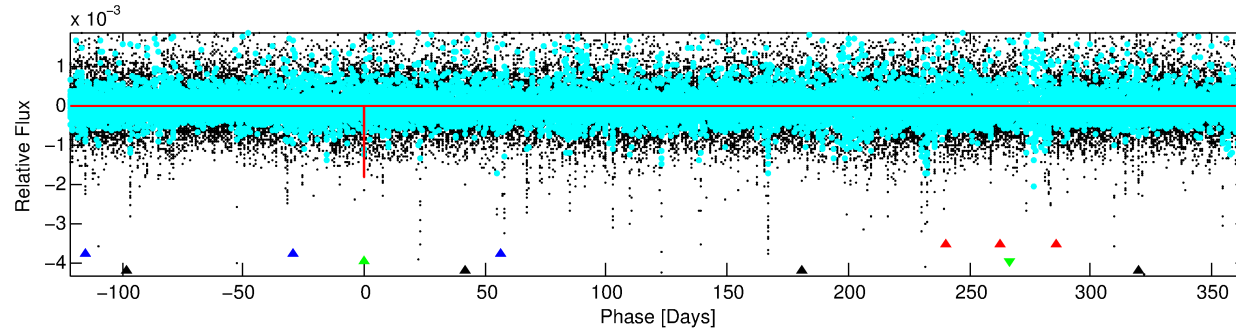
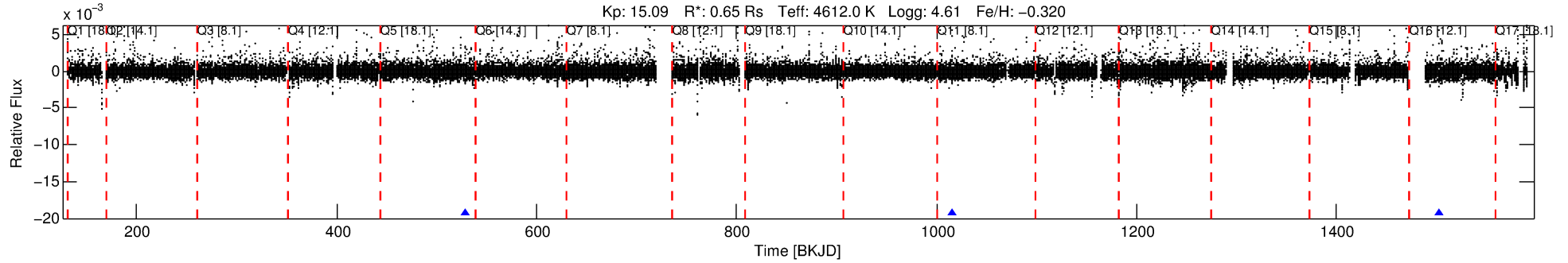
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008822612-03

No Significant Match Found

# DV One-Page Summary

KIC: 8822612 Candidate: 3 of 4 Period: 486.826 d



## DV Fit Results:

Period = 486.82567 [0.00891] d  
Epoch = 529.0644 [0.0111] BKJD  
Rp/R\* = 0.0413 [0.0894]  
a/R\* = 758.88 [5376.12]  
b = 0.70 [5.34]  
Seff = 0.16 [0.03]  
Teq = 161 [7] K  
Rp = 2.94 [6.37] Re  
a = 1.0428 [0.0798] AU  
Ag = 63242.41 [273905.07] [0.23 $\sigma$ ]  
Teffp = 3948 [4275] K [0.89 $\sigma$ ]

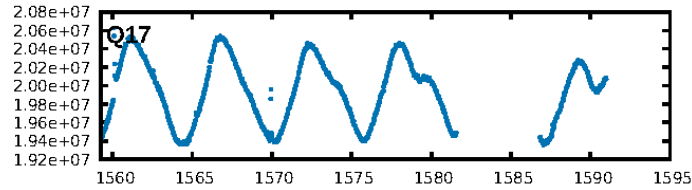
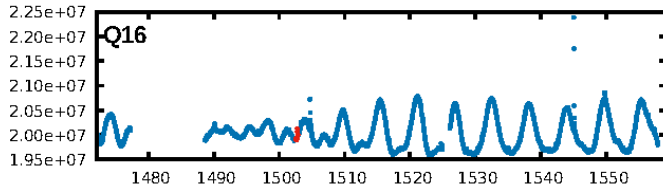
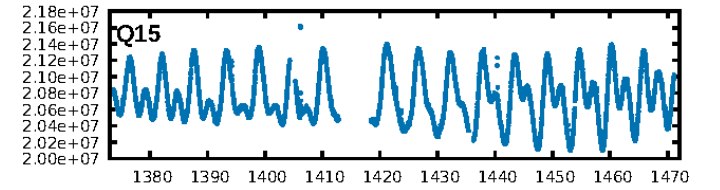
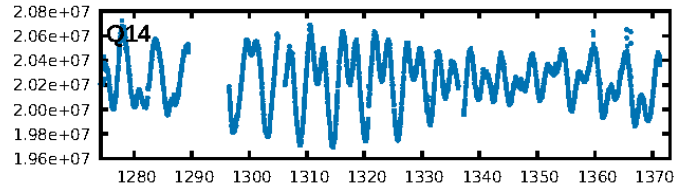
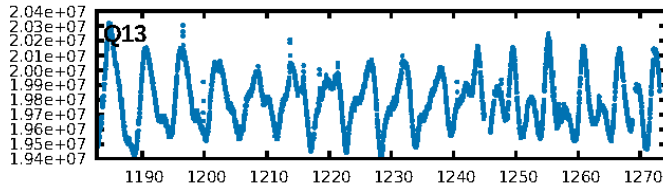
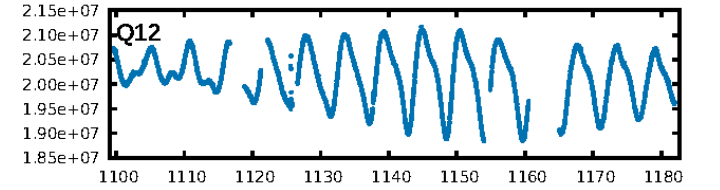
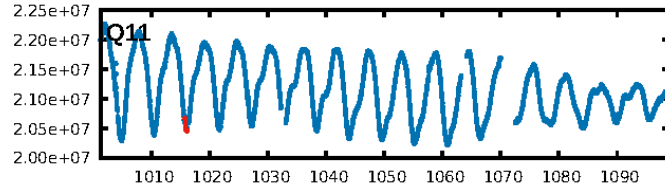
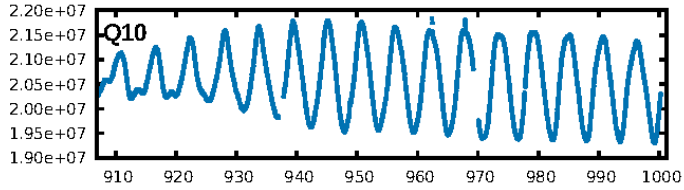
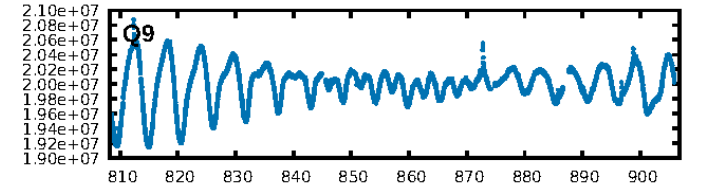
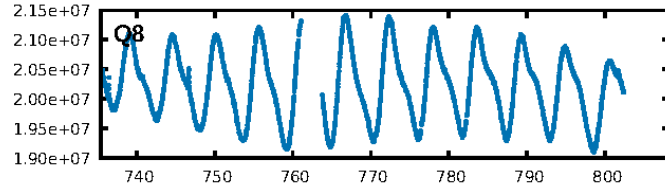
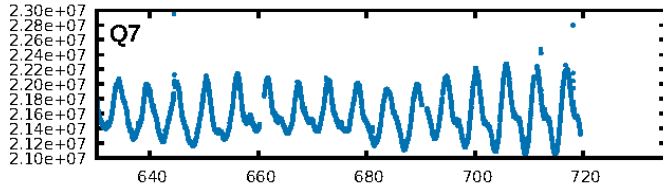
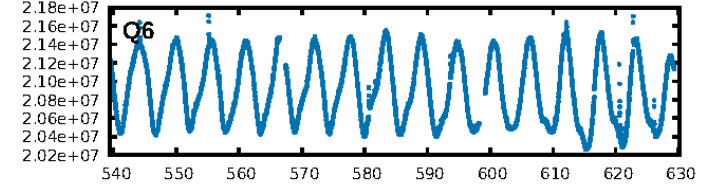
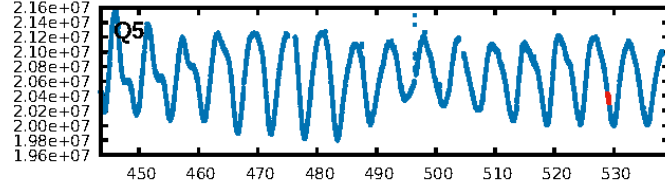
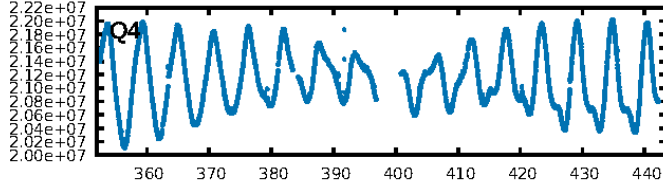
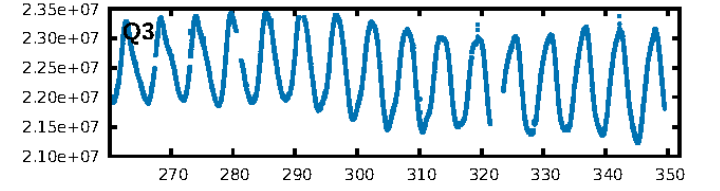
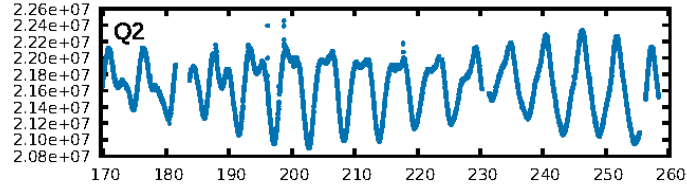
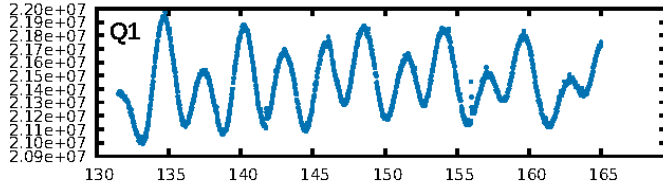
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [95.66 $\sigma$ ]  
LongPeriod-sig: 100.0% [459.18 $\sigma$ ]  
ModelChiSquare2-sig: 1.5%  
ModelChiSquareGof-sig: 46.8%  
**Bootstrap-pfa: 9.12e-10**  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 1.331  
Centroid-sig: 67.7%  
Centroid-so: 0.300 arcsec [0.32 $\sigma$ ]  
OotOffset-rm: 0.879 arcsec [0.45 $\sigma$ ]  
OotOffset-st: 0/1/1/1 [3]  
KicOffset-rm: 0.942 arcsec [0.67 $\sigma$ ]  
KicOffset-st: 0/1/1/1 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 1.00 [3/3]

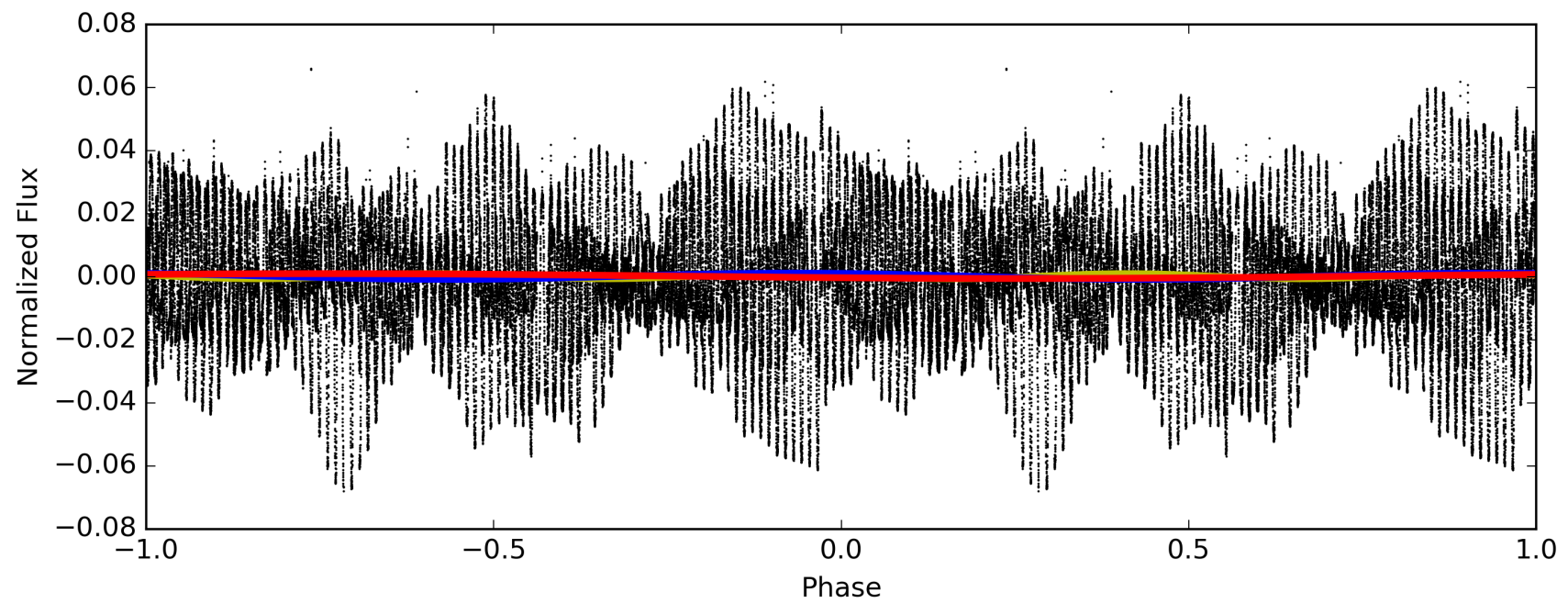
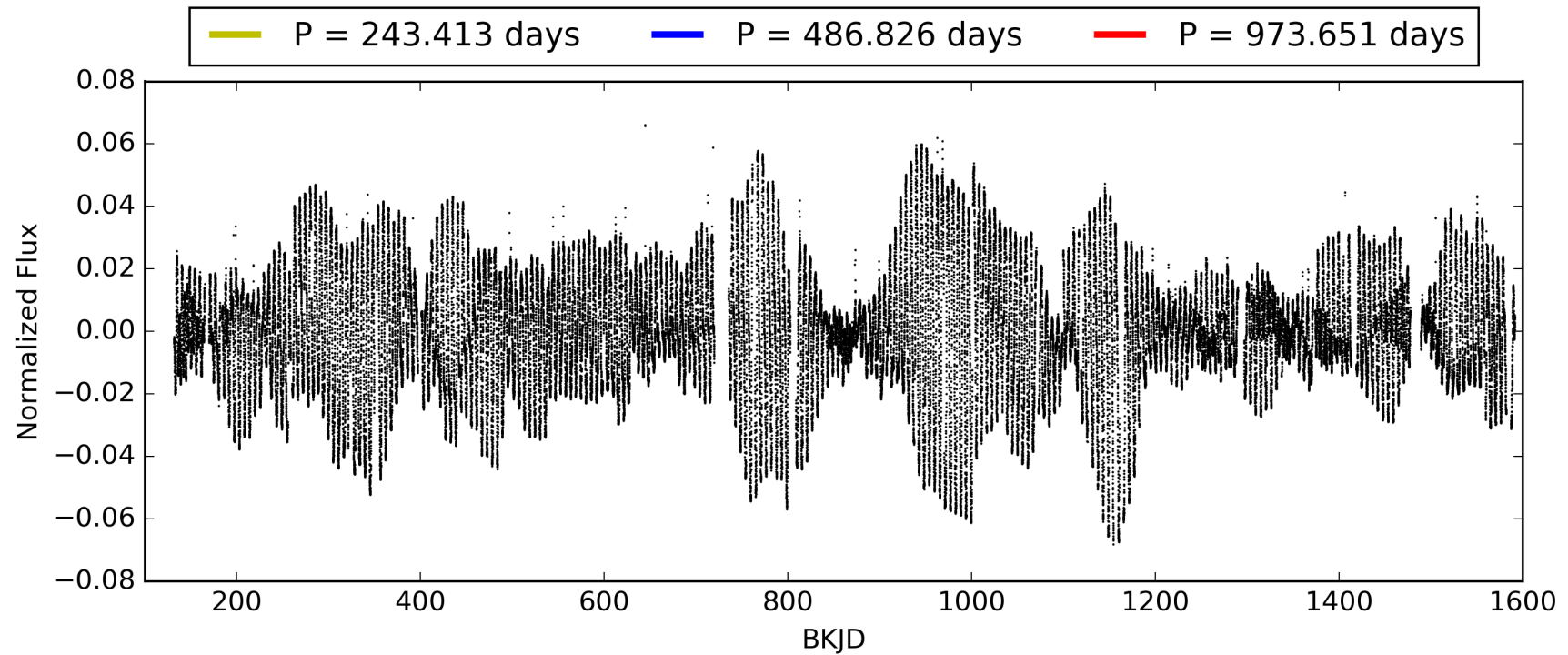
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 23:02:52 Z

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

# TCE 008822612-03, PDC Light Curves



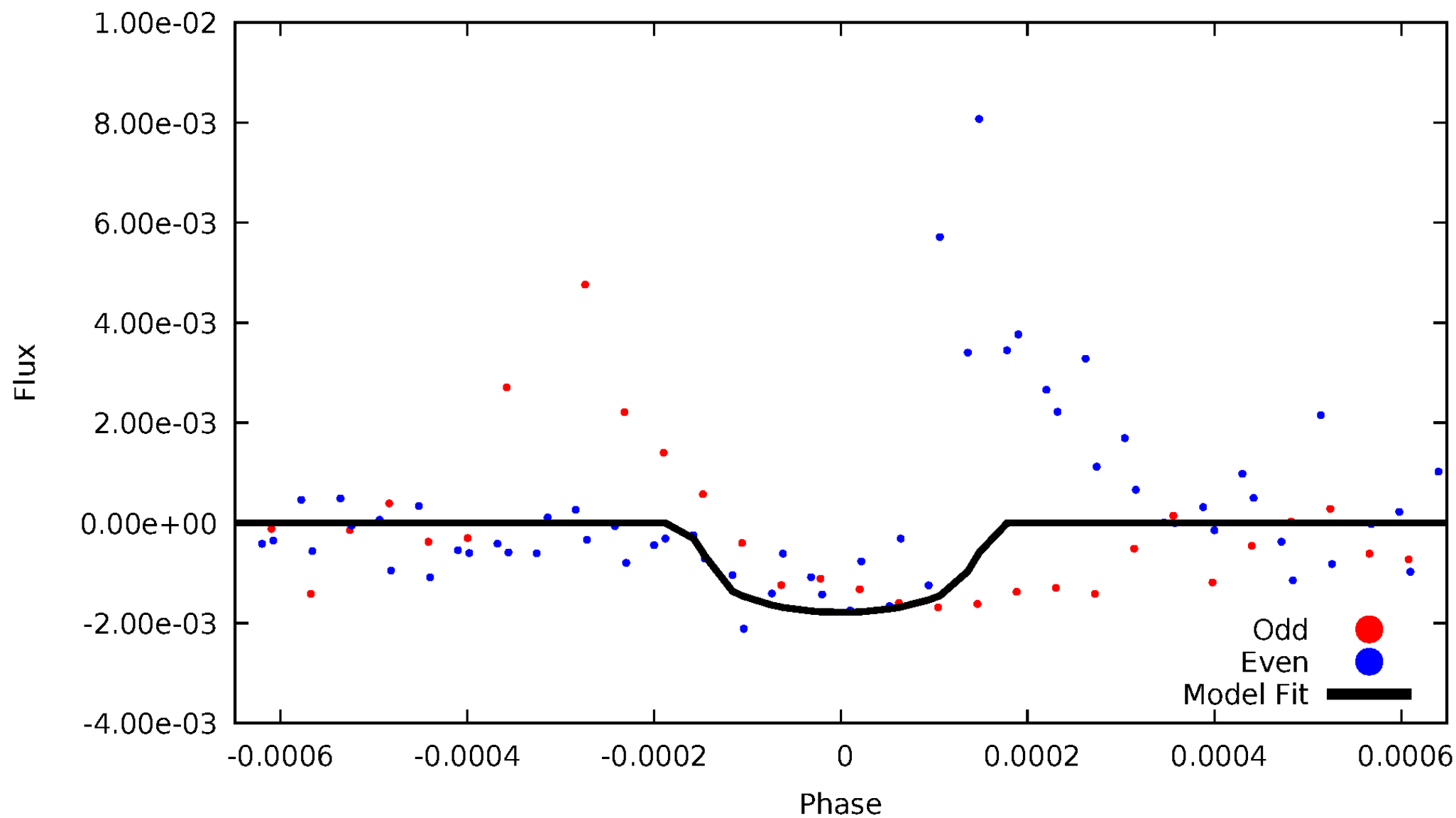
TCE 008822612-03





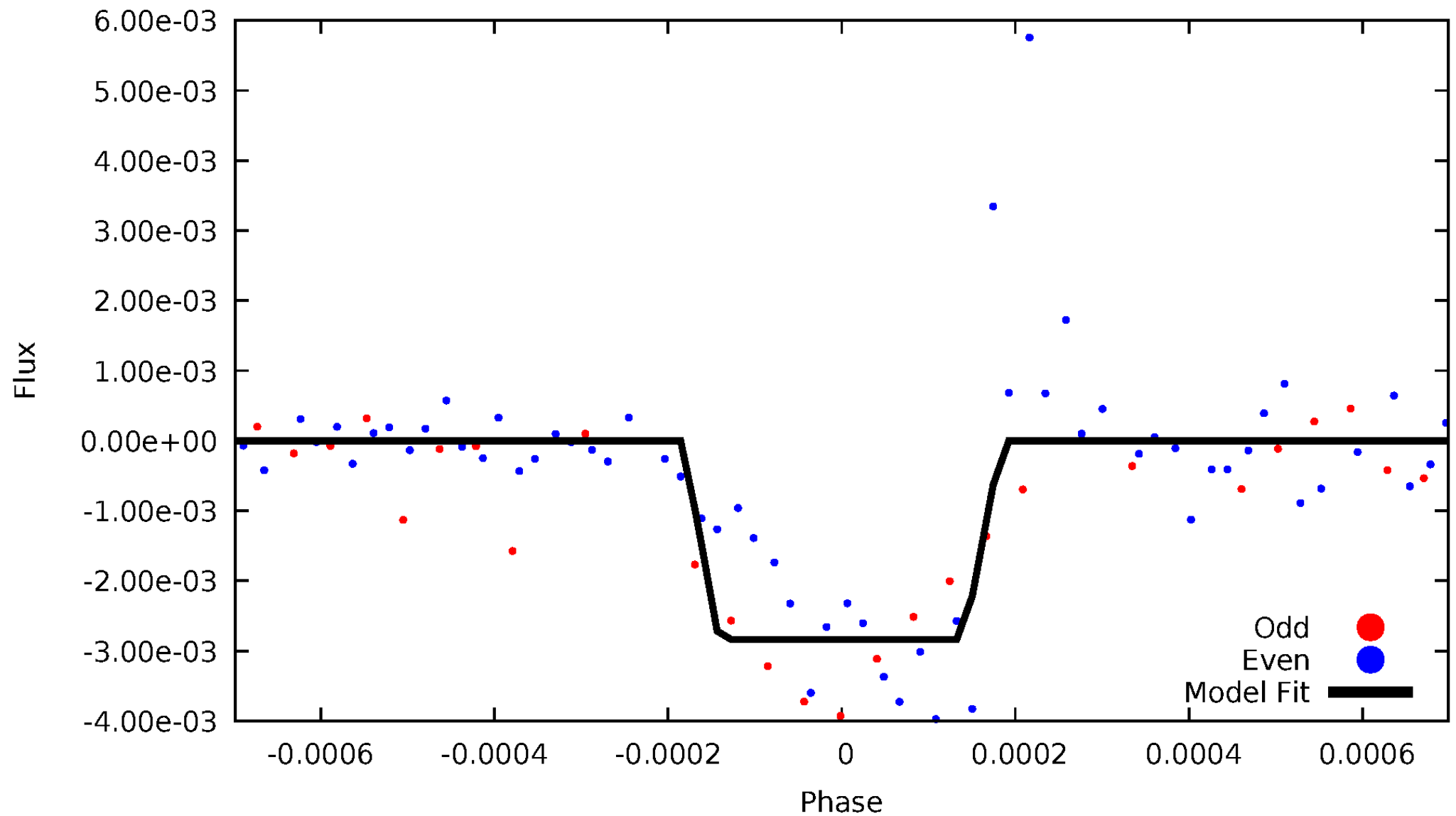
# DV Odd/Even

TCE 008822612-03



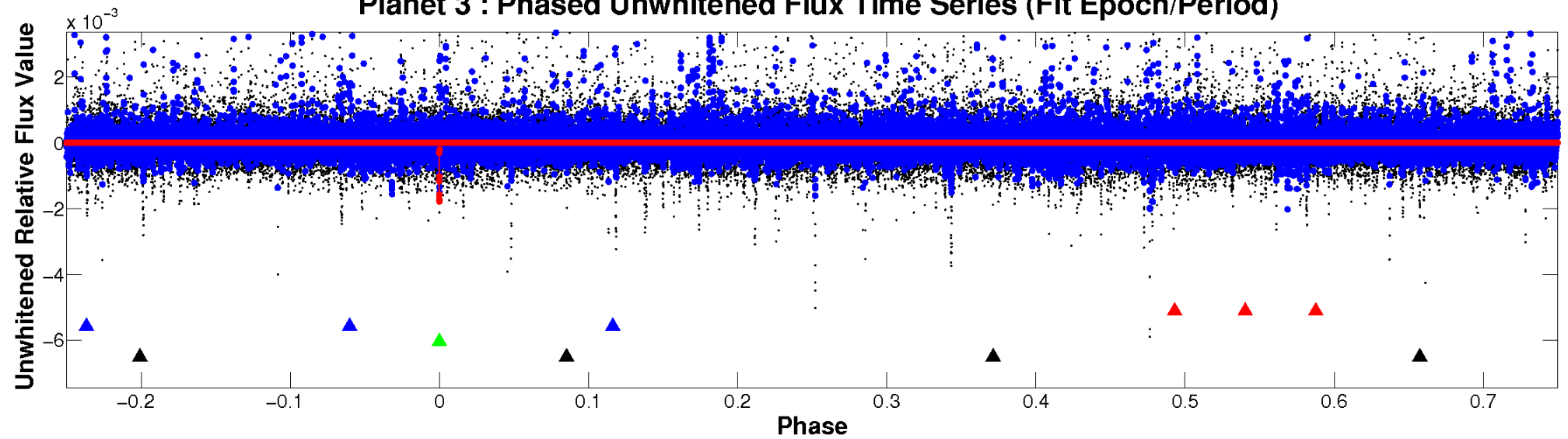
# ALT Odd/Even

TCE 008822612-03

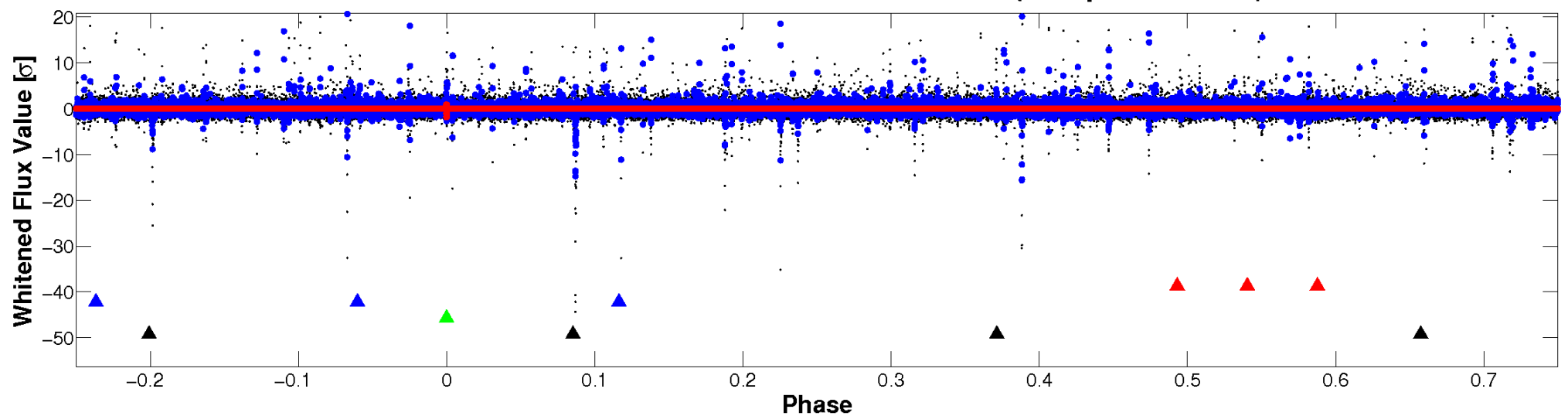


# Non-Whitened Vs. Whitened Light Curve

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

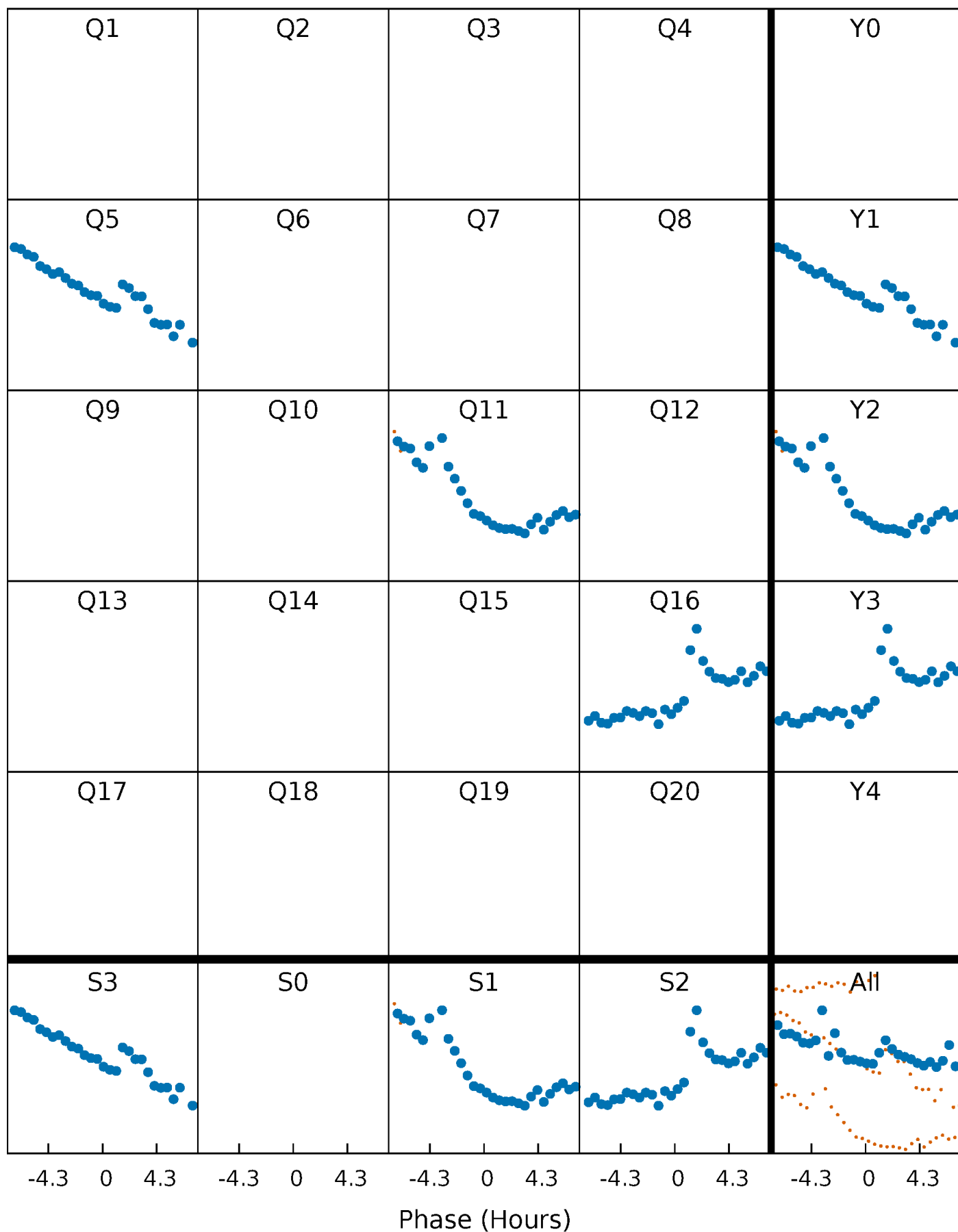


## Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



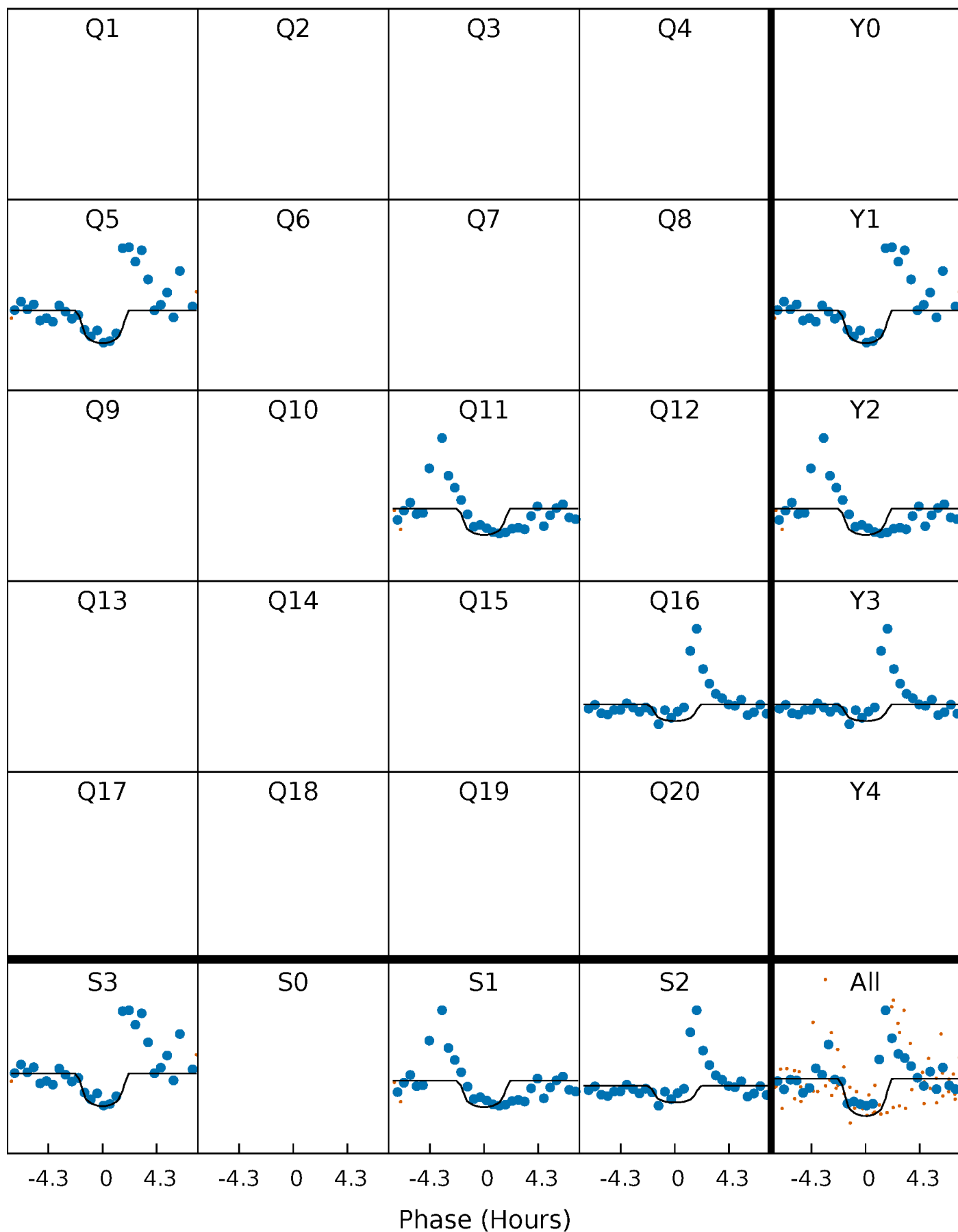
# PDC Quarter-Phased Transit Curves

TCE 008822612-03     $P=486.825666$  Days     $T_0=529.064394$  (BKJD)



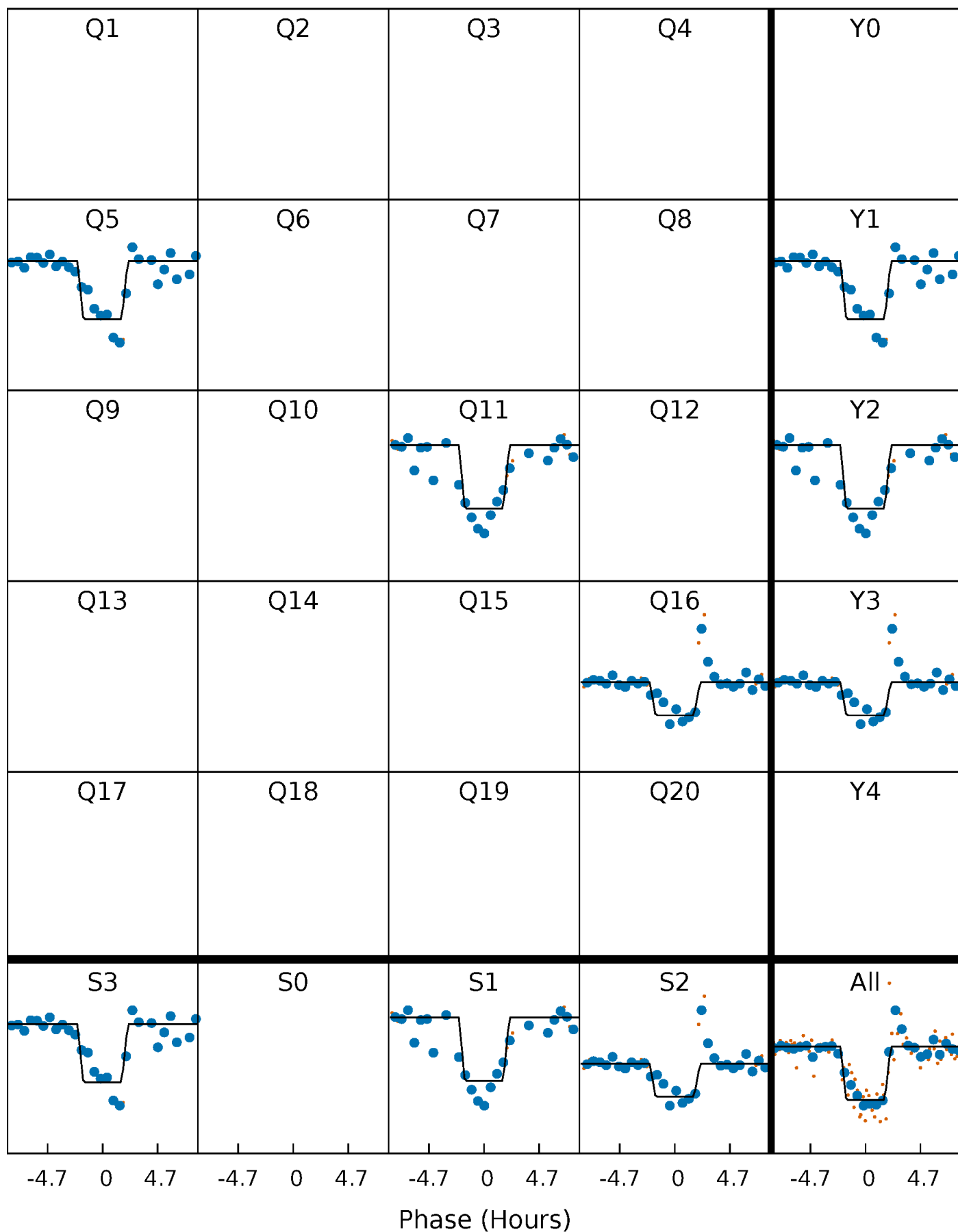
# DV Quarter-Phased Transit Curves

TCE 008822612-03     $P=486.825666$  Days     $T_0=529.064394$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

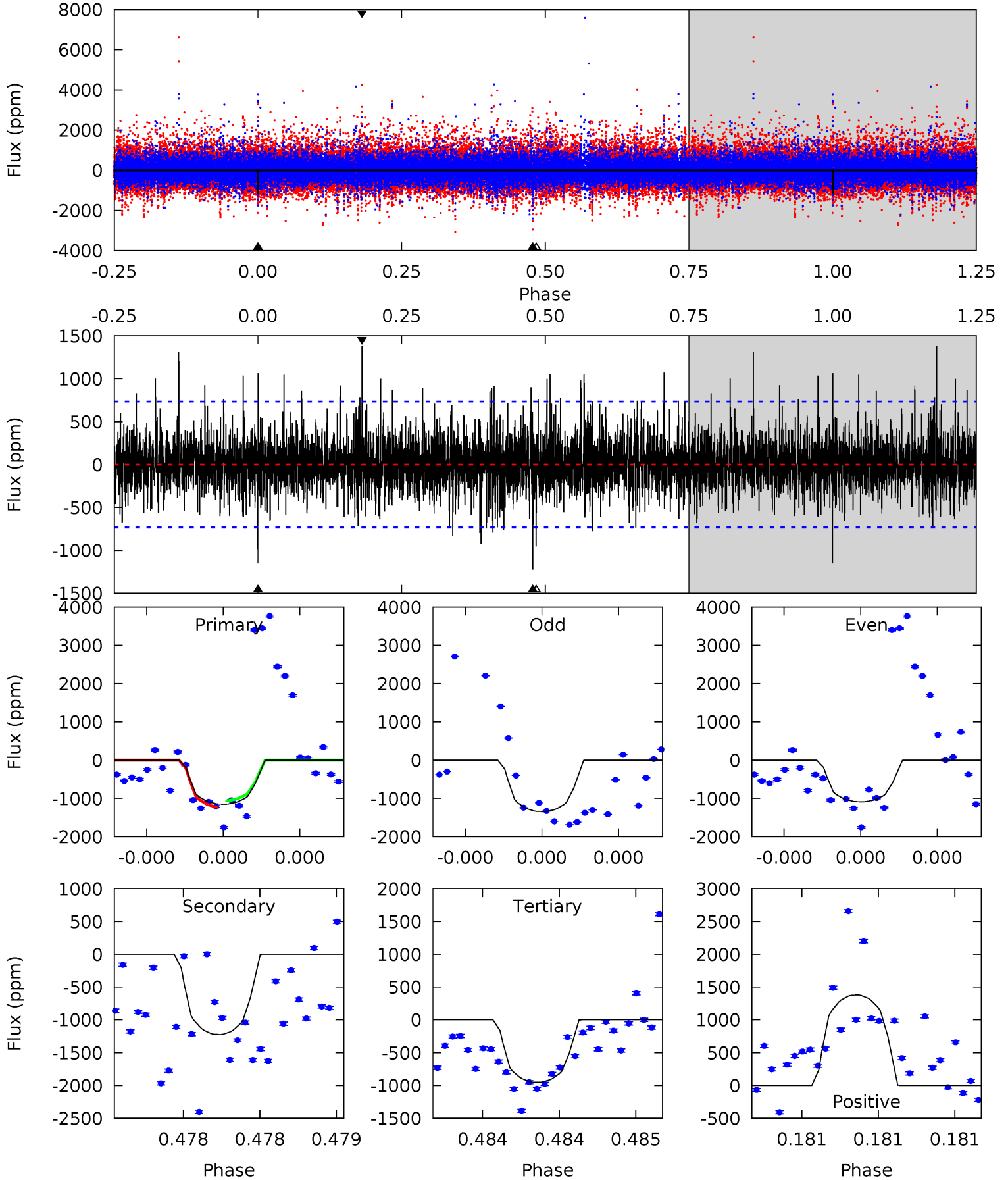
TCE 008822612-03     $P=486.822756$  Days     $T_0=529.036901$  (BKJD)



# DV Model-Shift Uniqueness Test

008822612-03, P = 486.825666 Days, E = 42.238728 Days

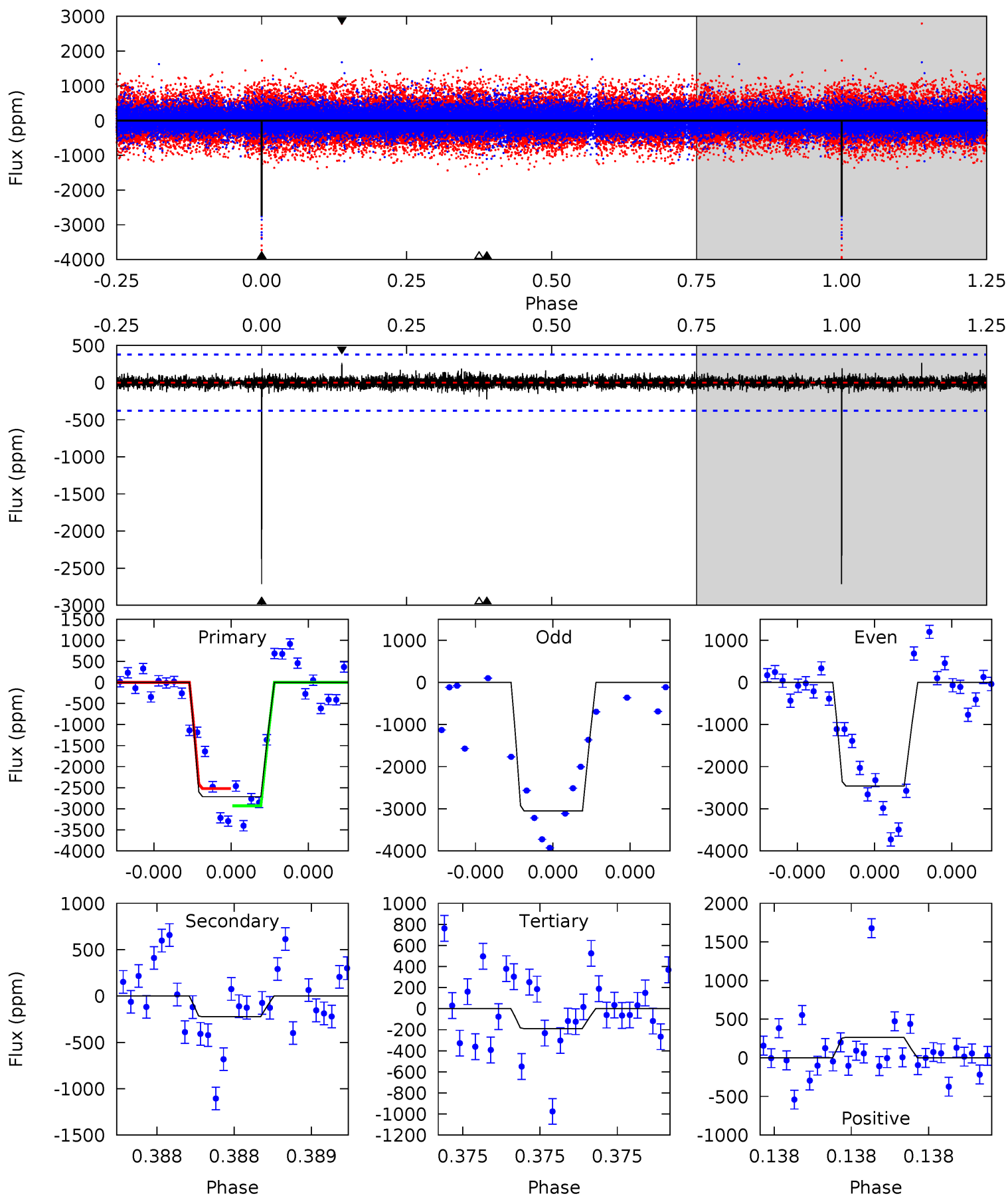
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.85	9.41	7.32	10.6	5.65	3.59	1.70	1.53	-1.75	2.09	-1.19	0.76	0.62	0.53	0.66



# Alt Model-Shift Uniqueness Test

008822612-03, P = 486.822756 Days, E = 42.214145 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
40.4	3.34	2.82	3.94	5.64	3.58	0.55	37.6	36.5	0.52	-0.60	4.18	0.99	0.09	3.04





### Stellar Parameters For KIC 008822612

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$4612^{+138}_{-152}$	$4.613^{+0.054}_{-0.027}$	$-0.320^{+0.300}_{-0.300}$	$0.653^{+0.052}_{-0.063}$	$0.638^{+0.071}_{-0.045}$	$3.231^{+0.799}_{-0.391}$
	+3%/-3%	+1%/-1%	+94%/-94%	+8%/-10%	+11%/-7%	+25%/-12%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 008822612-03 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-1224 \pm 130$	$5.74^{+5.01}_{-4.19}$	$224^{+8}_{-8}$	$3444^{+2154}_{-589}$	$22476^{+289788}_{-16193}$
Alt.	$-224 \pm 67$	$5.95^{+4.98}_{-3.97}$	$224^{+8}_{-9}$	$2658^{+991}_{-387}$	$3620^{+27811}_{-2624}$

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

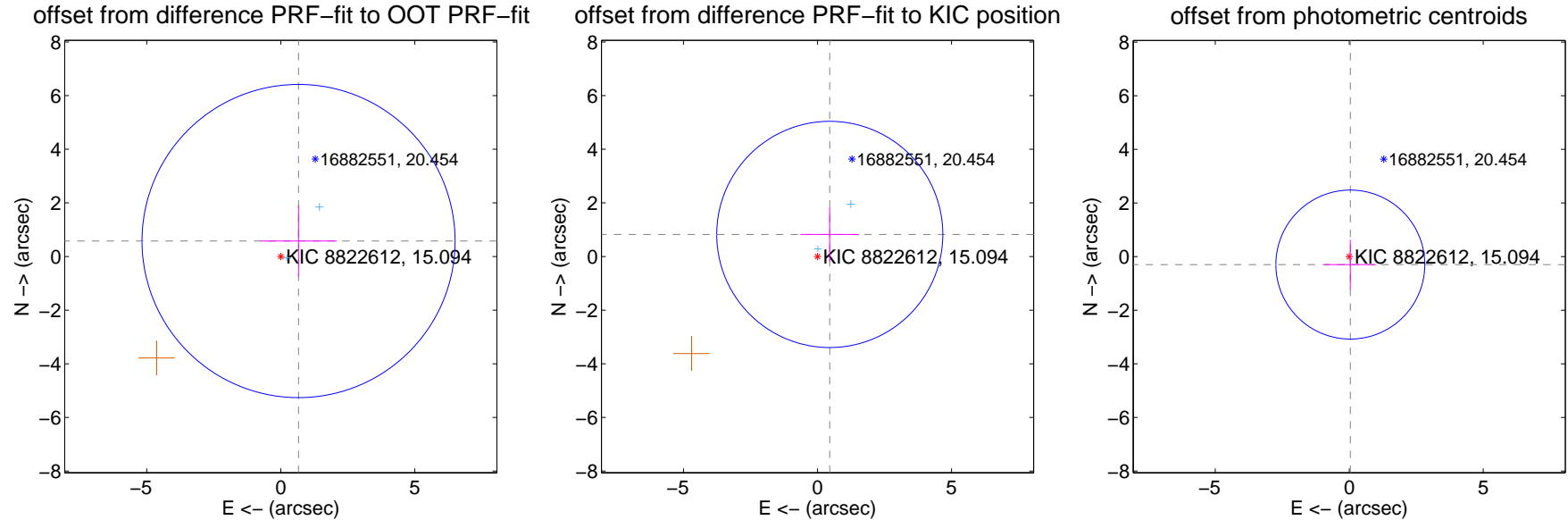
## DV Centroid Data

Supplemental centroid analysis for 008822612-03. Kepler magnitude: 15.09. Transit SNR 8.00

There are 2 quarters with good PRF difference image offsets

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

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.879 \pm 1.946$	0.45	$-0.663 \pm 1.426$	$0.578 \pm 1.332$
PRF-fit source offset from KIC position	$0.942 \pm 1.406$	0.67	$-0.458 \pm 1.093$	$0.823 \pm 1.005$
photometric centroid source offset	$0.30 \pm 0.93$	0.32	$-0.04 \pm 0.97$	$-0.30 \pm 0.93$

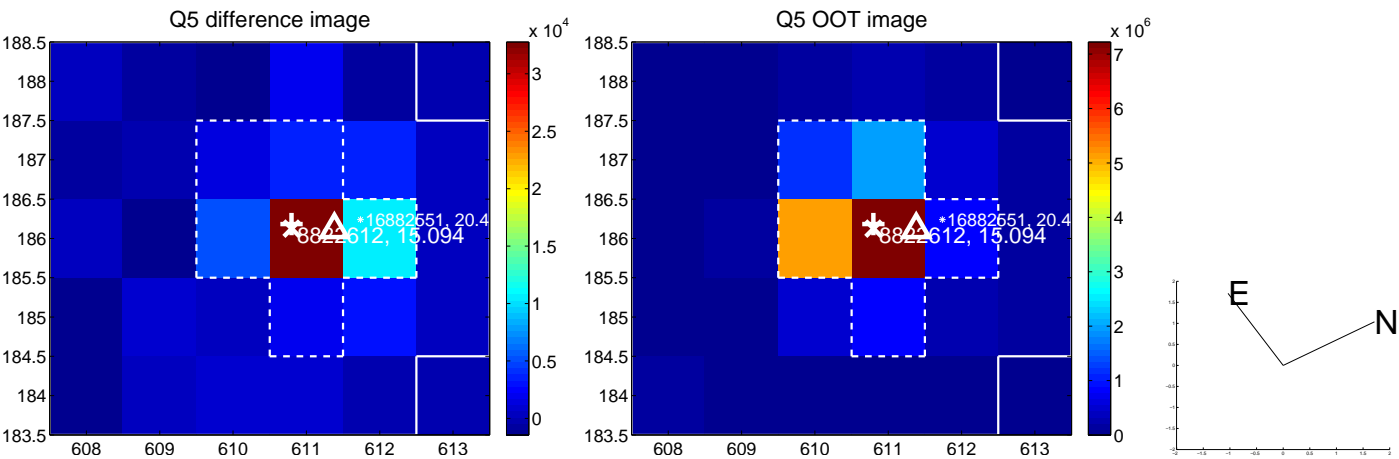


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

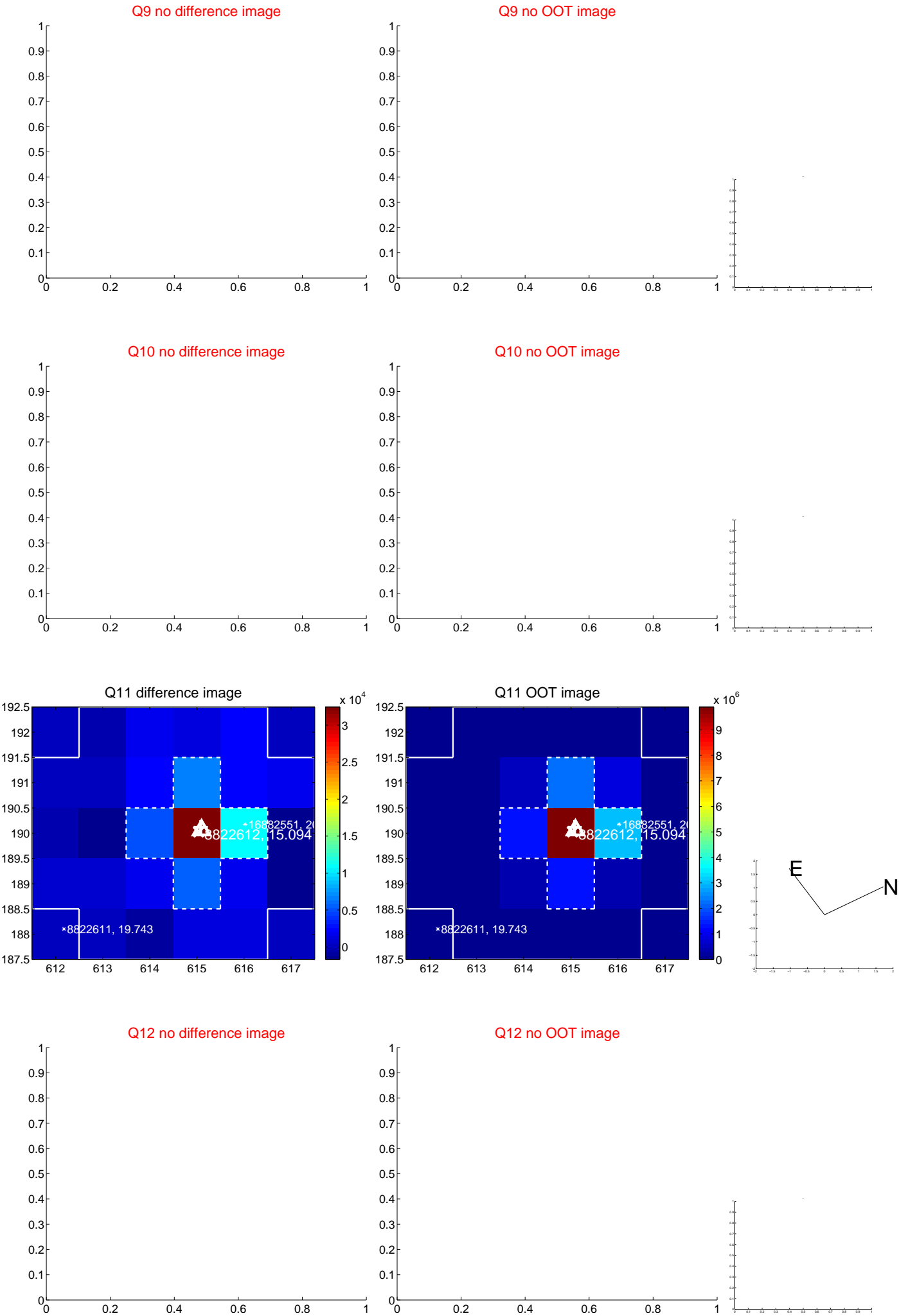
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



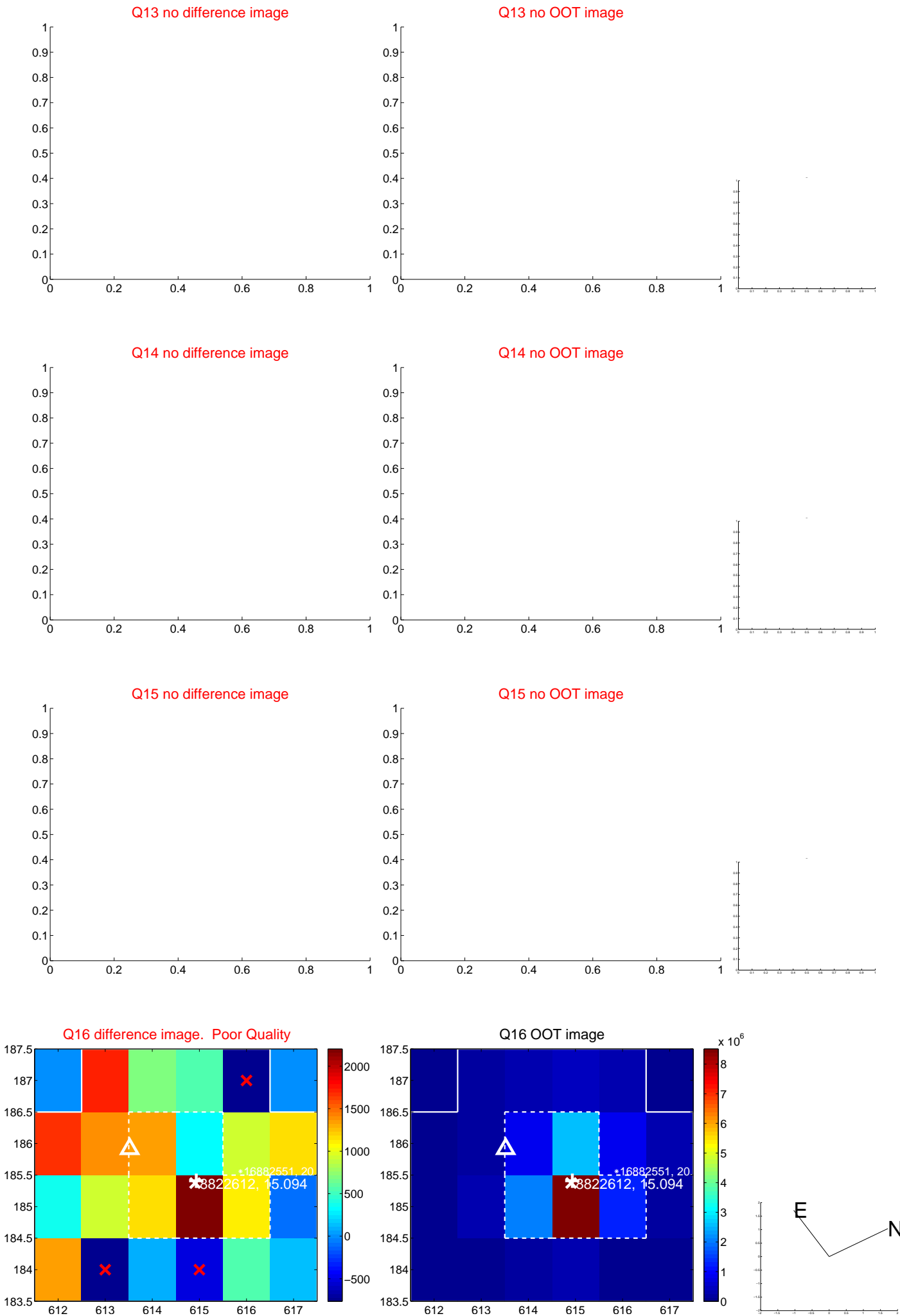
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



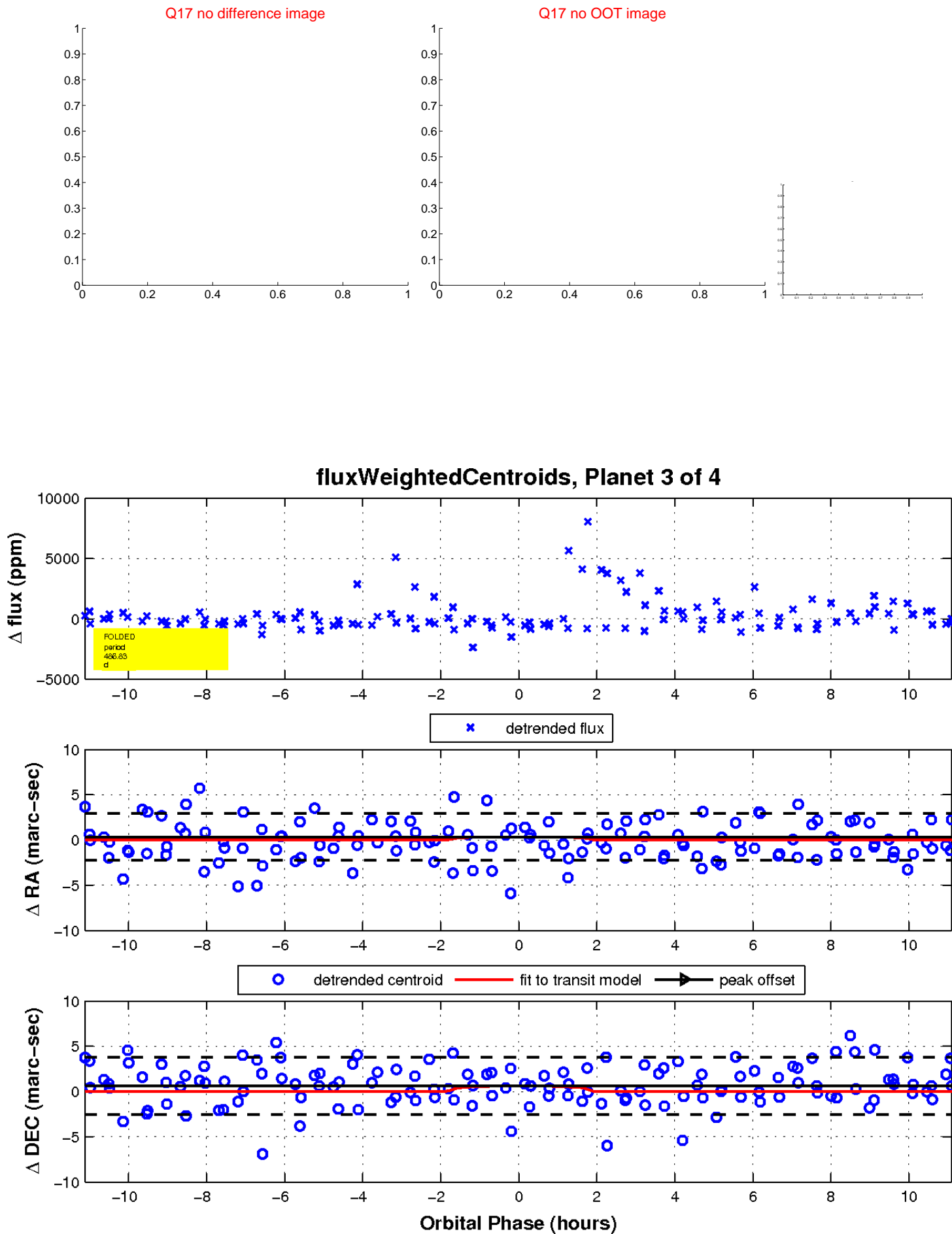
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

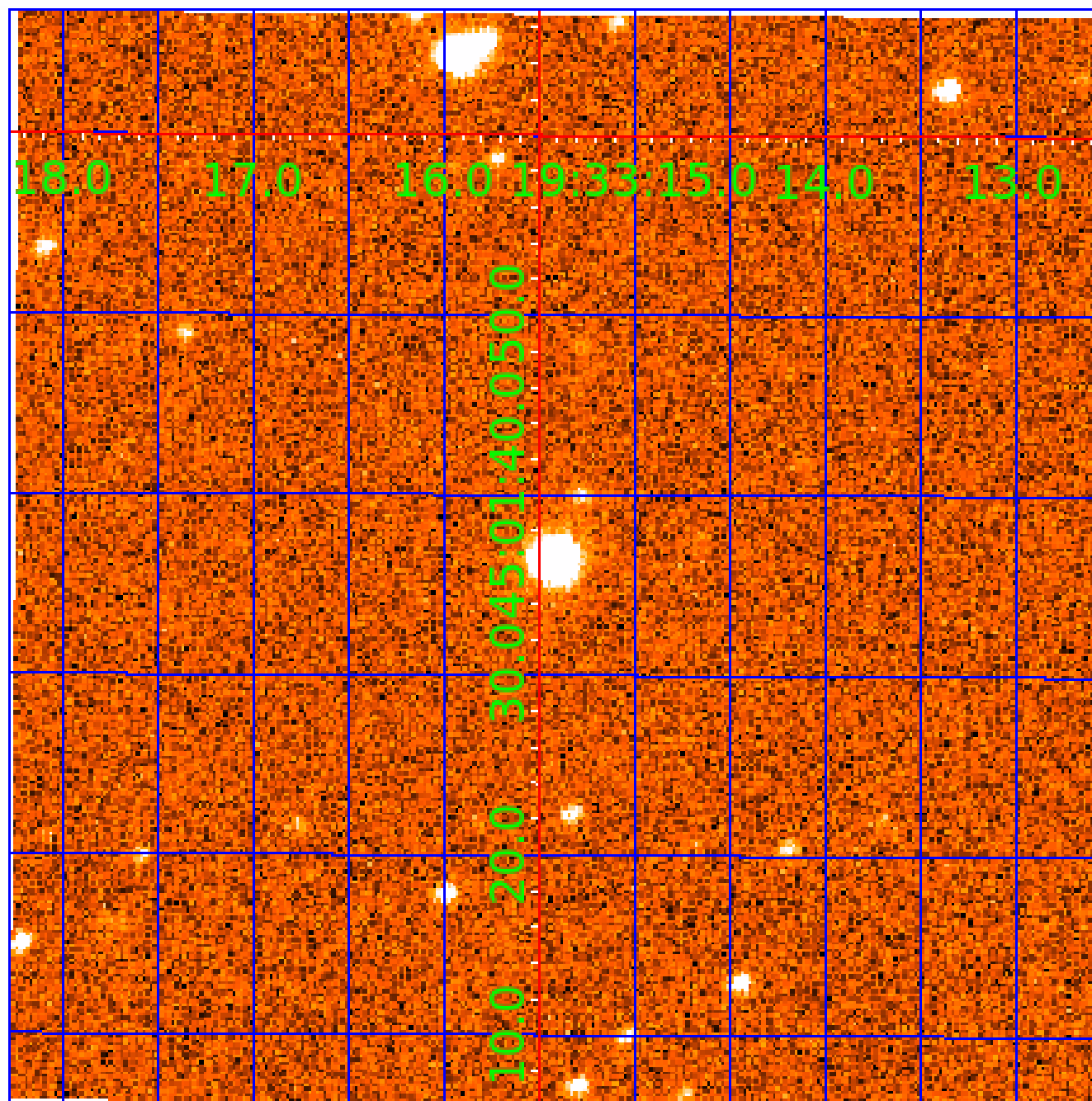


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



# UKIRT Image

Declination





# KIC 008822612

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008822612-01	OBS	No	463.786254	328.358444	1789.8	4.366	13.9	7.4	0.65	4612	2.67	0.17
008822612-03	OBS	No	486.825666	529.064394	1785.2	3.788	11.4	8.0	0.65	4612	2.94	0.16
008822612-04	OBS	No	347.552096	362.307012	1649.4	8.533	11.7	6.7	0.65	4612	2.85	0.25

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008822612-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
008822612-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
008822612-04	OBS	FP	0.00	1	0	1	0	LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST

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

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

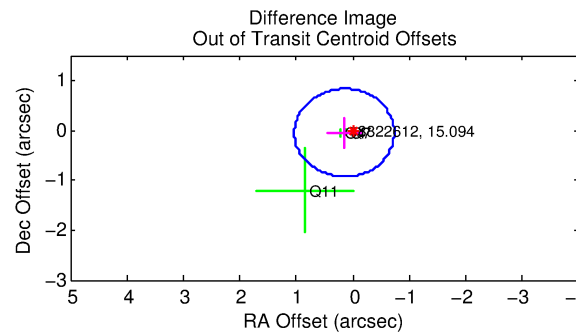
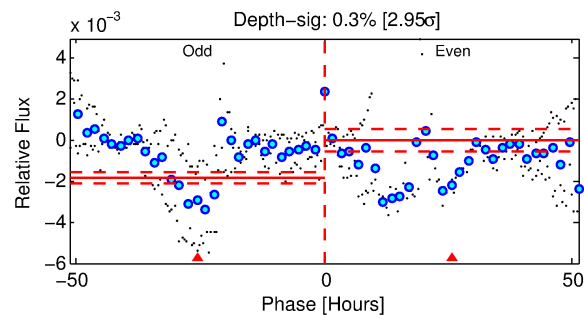
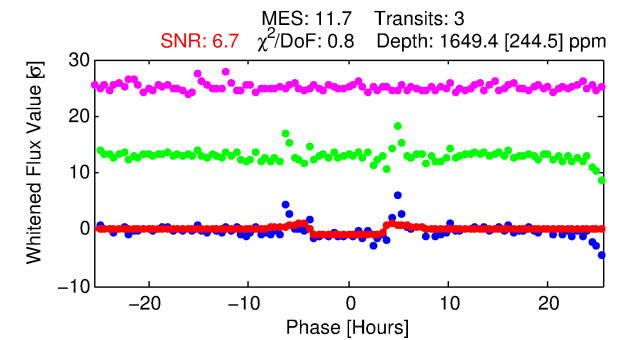
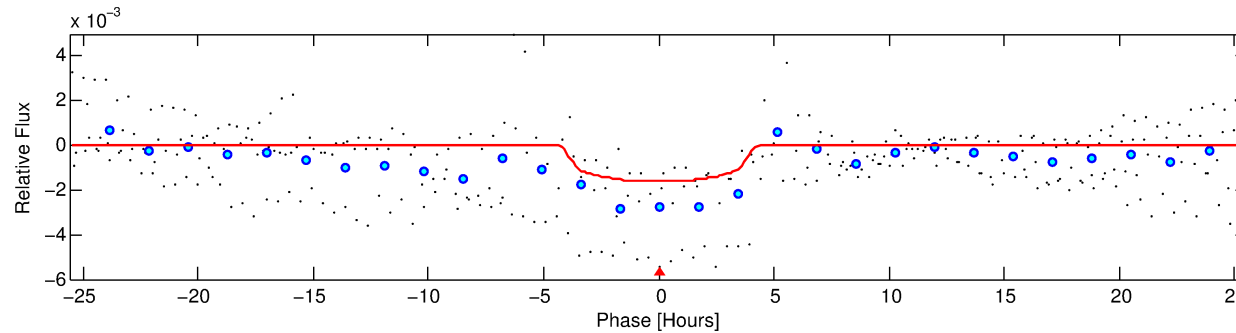
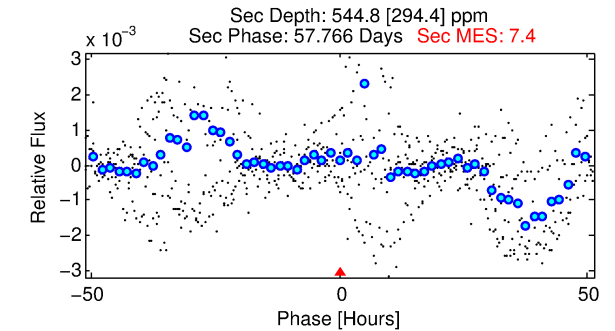
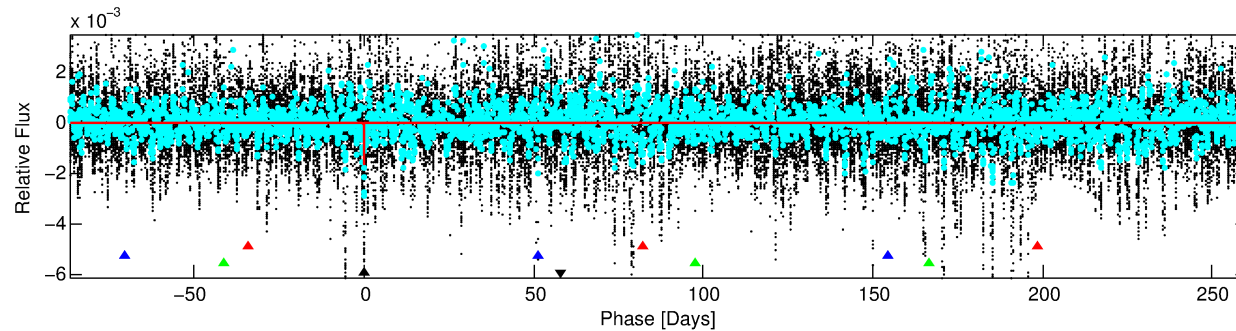
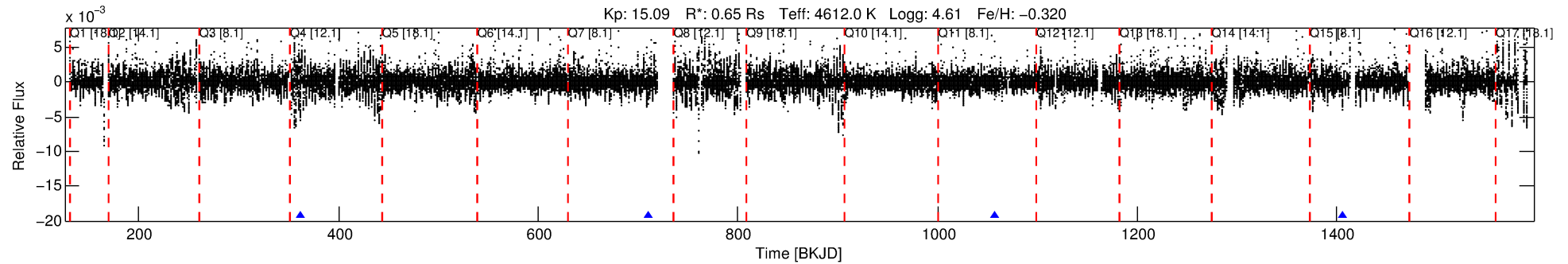
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008822612-04

No Significant Match Found

# DV One-Page Summary

KIC: 8822612 Candidate: 4 of 4 Period: 347.552 d



## DV Fit Results:

Period = 347.55210 [0.00639] d  
Epoch = 362.3070 [0.0077] BKJD  
Rp/R\* = 0.0401 [0.0098]  
a/R\* = 233.27 [171.26]  
b = 0.72 [0.50]  
Seff = 0.25 [0.04]  
Teq = 180 [8] K  
Rp = 2.85 [0.75] Re  
a = 0.8330 [0.0637] AU  
Ag = 25528.83 [18823.96] [1.36 $\sigma$ ]  
**Teffp = 3521 [653] K [5.12 $\sigma$ ]**

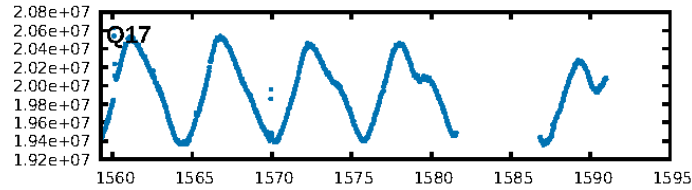
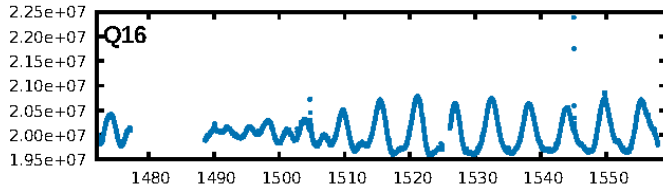
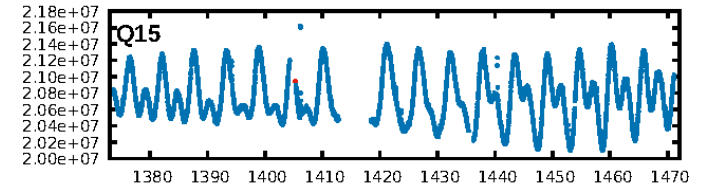
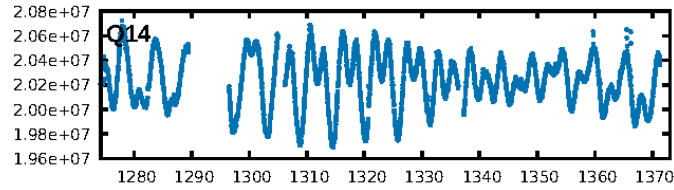
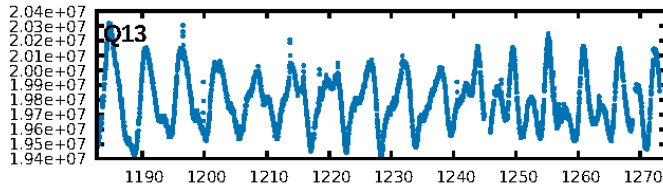
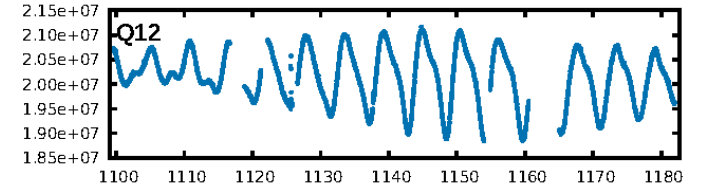
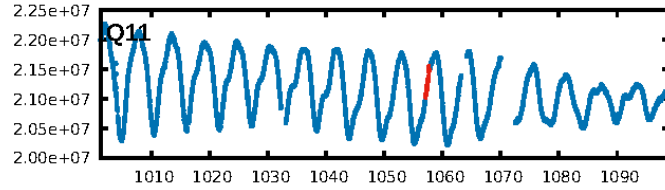
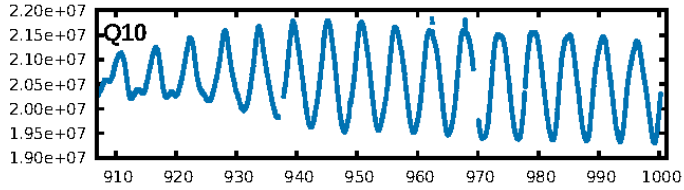
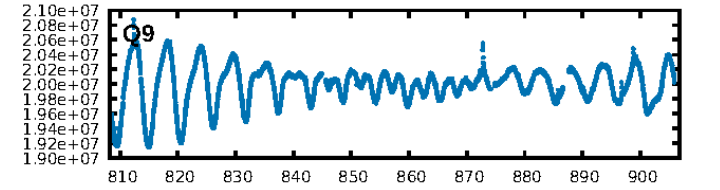
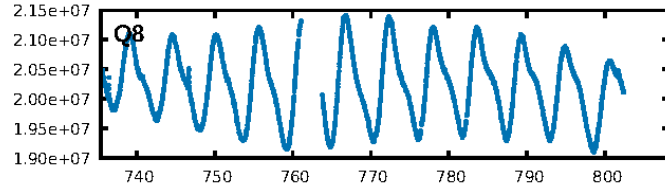
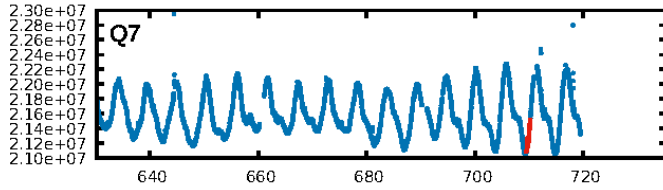
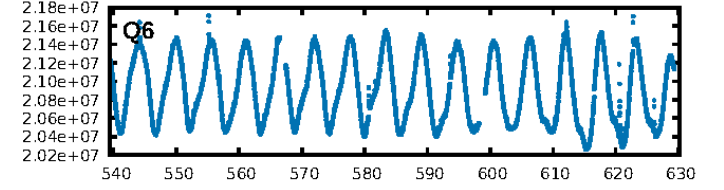
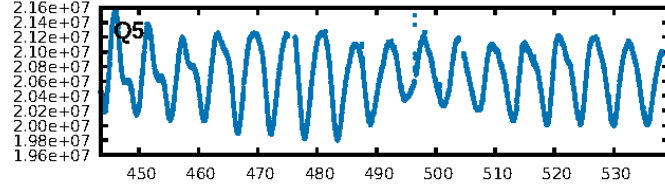
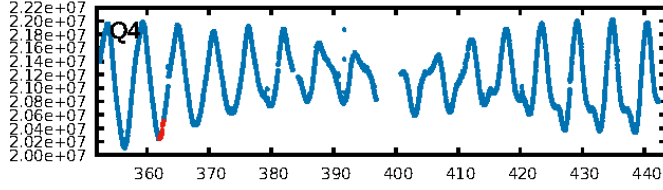
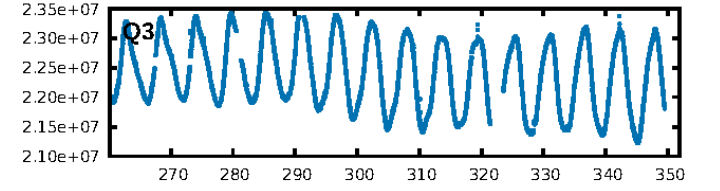
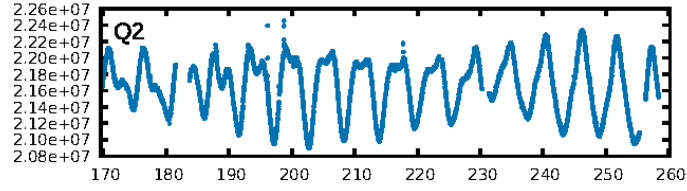
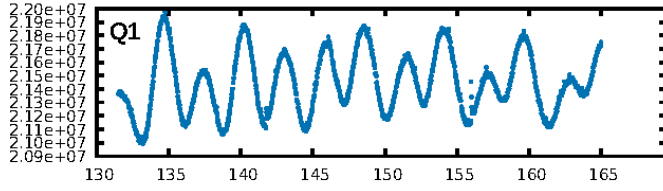
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [291.04 $\sigma$ ]  
ModelChiSquare2-sig: 74.5%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 4.30e-09**  
RollingBand-fgt: 1.00 [3/3]  
**GhostDiagnostic-chr: 0.00414**  
Centroid-sig: 6.2%  
Centroid-so: 0.917 arcsec [1.28 $\sigma$ ]  
OotOffset-rm: 0.160 arcsec [0.54 $\sigma$ ]  
OotOffset-st: 0/2/1/0 [3]  
KicOffset-rm: 0.271 arcsec [0.92 $\sigma$ ]  
KicOffset-st: 0/2/1/0 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 1.00 [3/3]

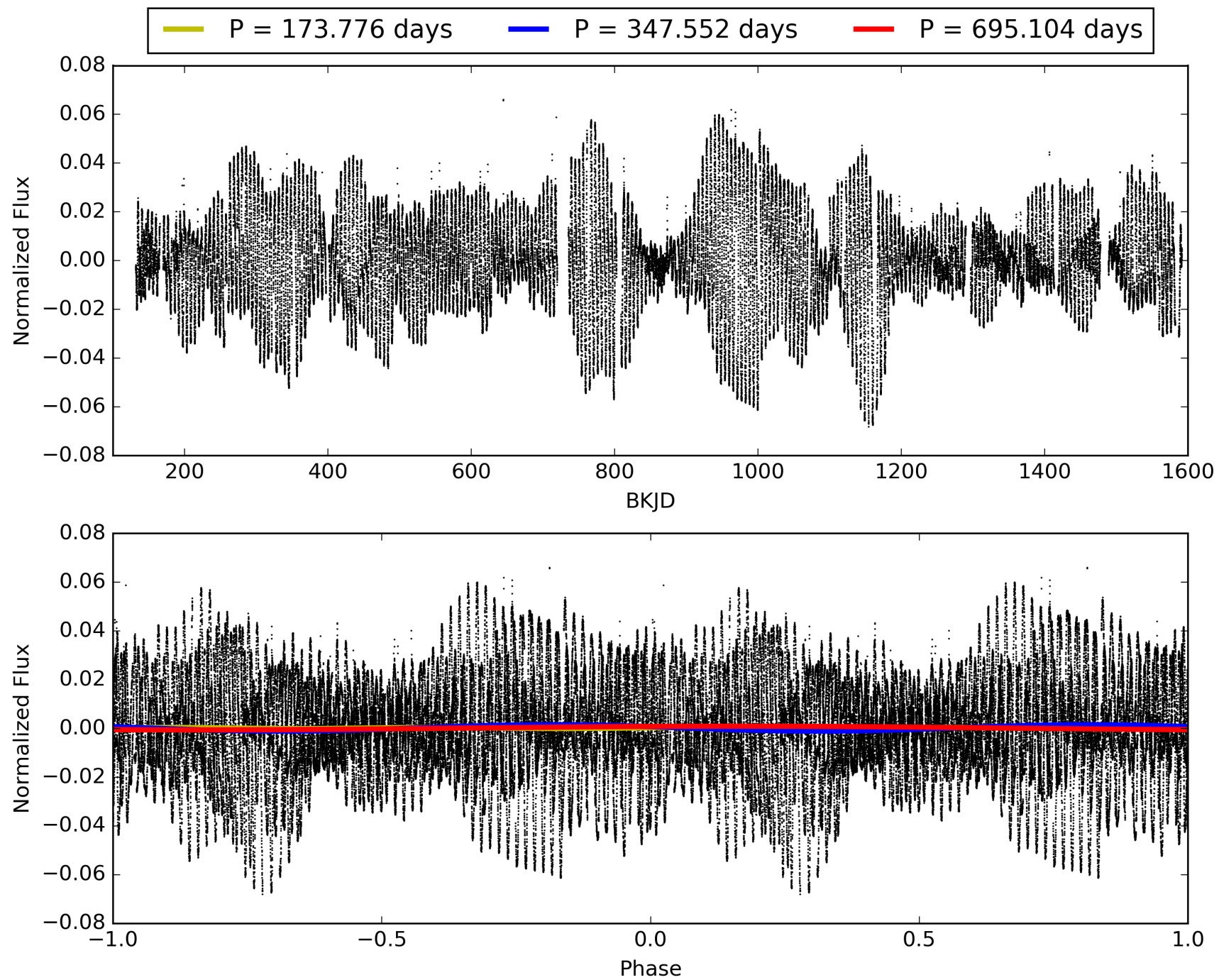
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 23:03:03 Z

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

# TCE 008822612-04, PDC Light Curves

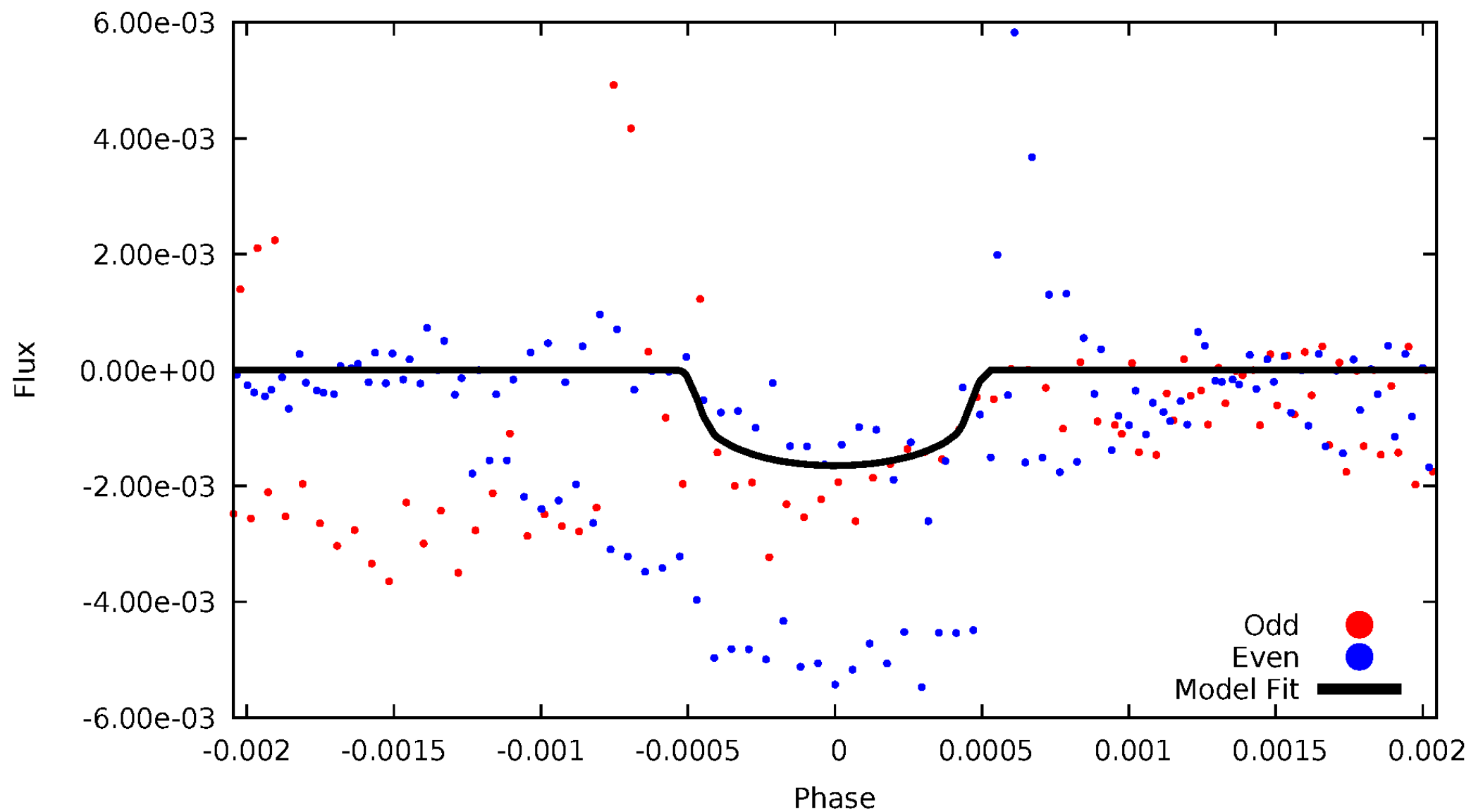


TCE 008822612-04



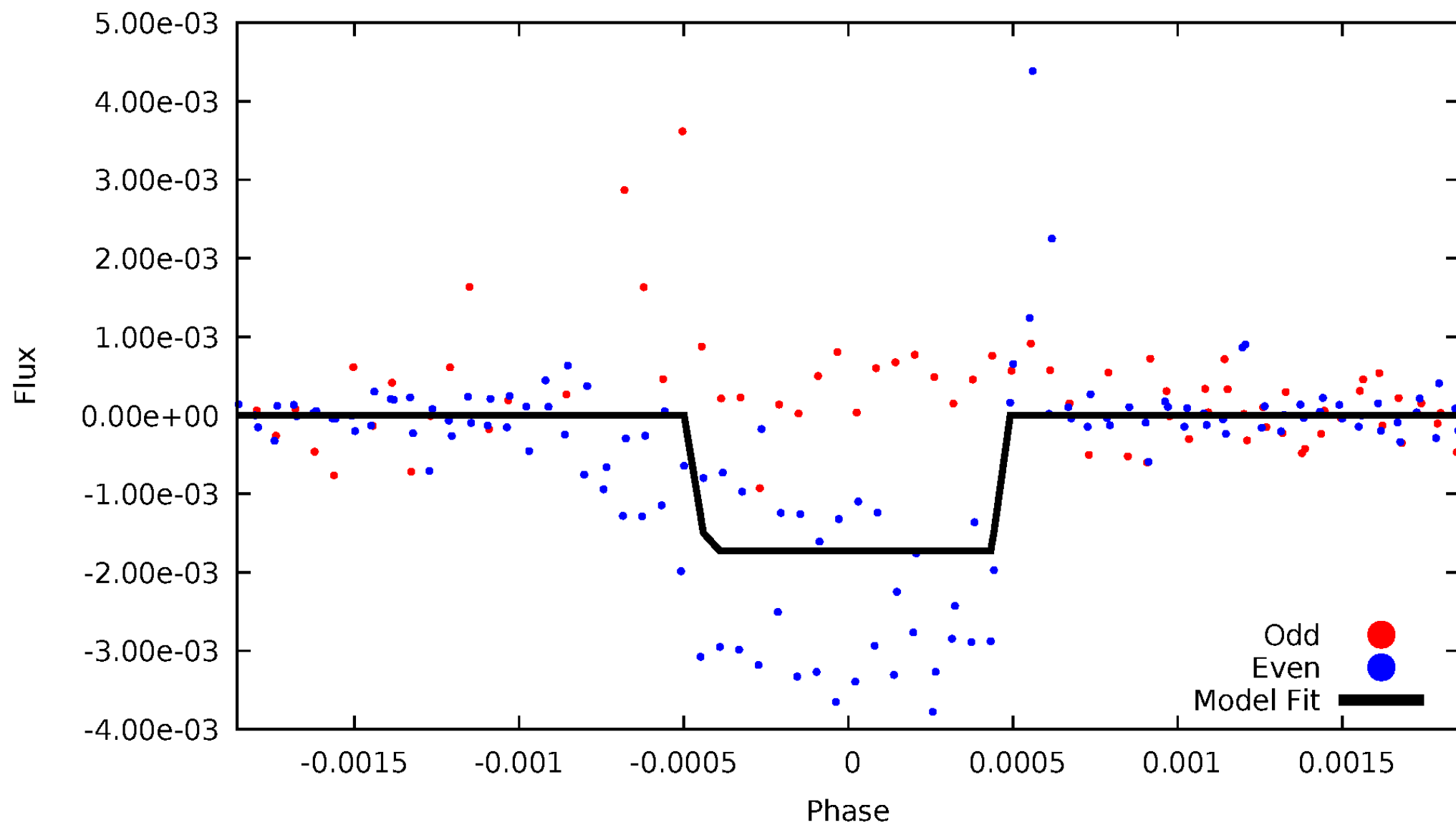
# DV Odd/Even

TCE 008822612-04



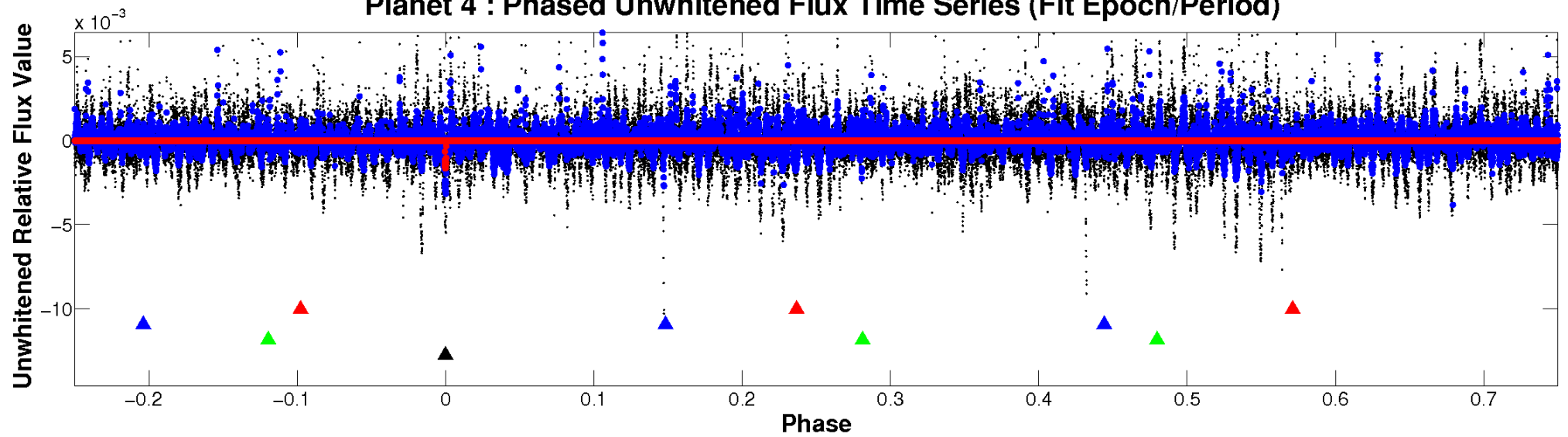
# ALT Odd/Even

TCE 008822612-04

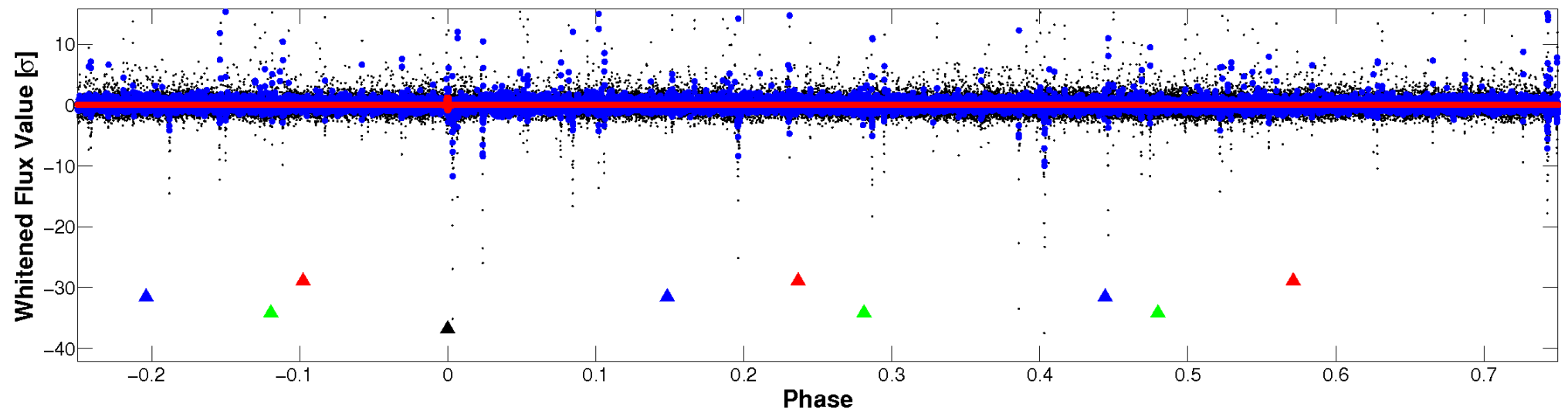


# Non-Whitened Vs. Whitened Light Curve

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



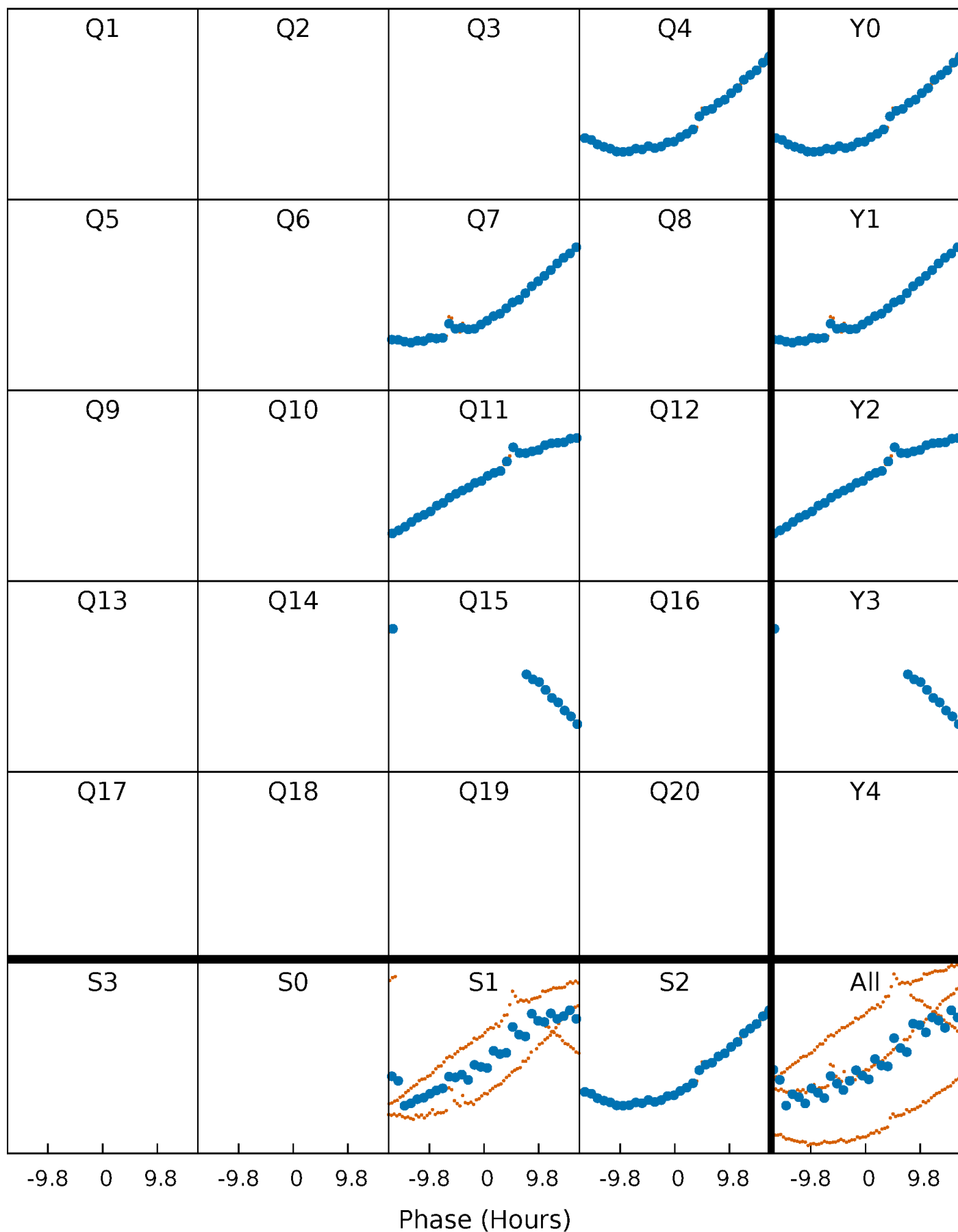
## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)





# PDC Quarter-Phased Transit Curves

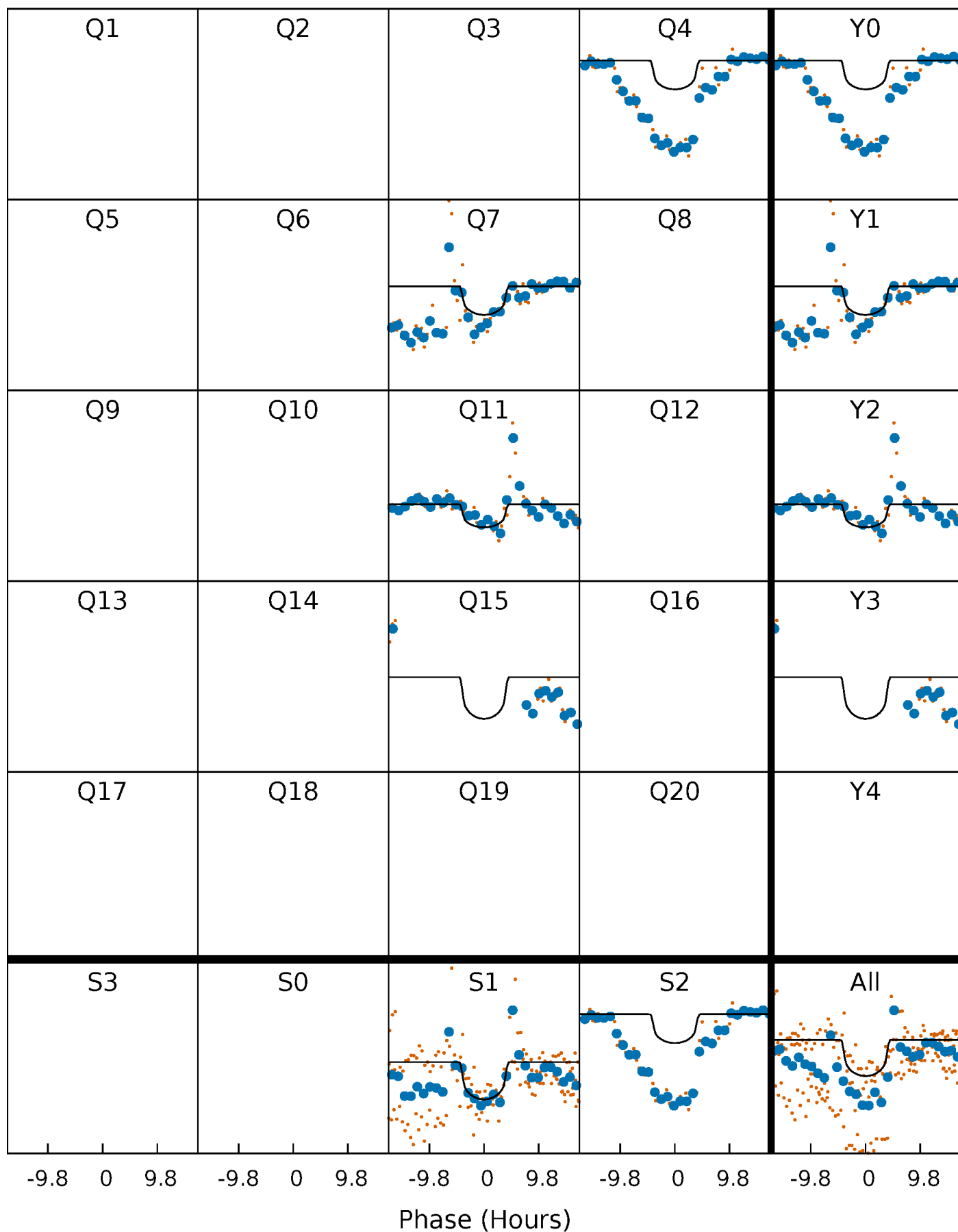
TCE 008822612-04 P=347.552096 Days  $T_0=362.307012$  (BKJD)





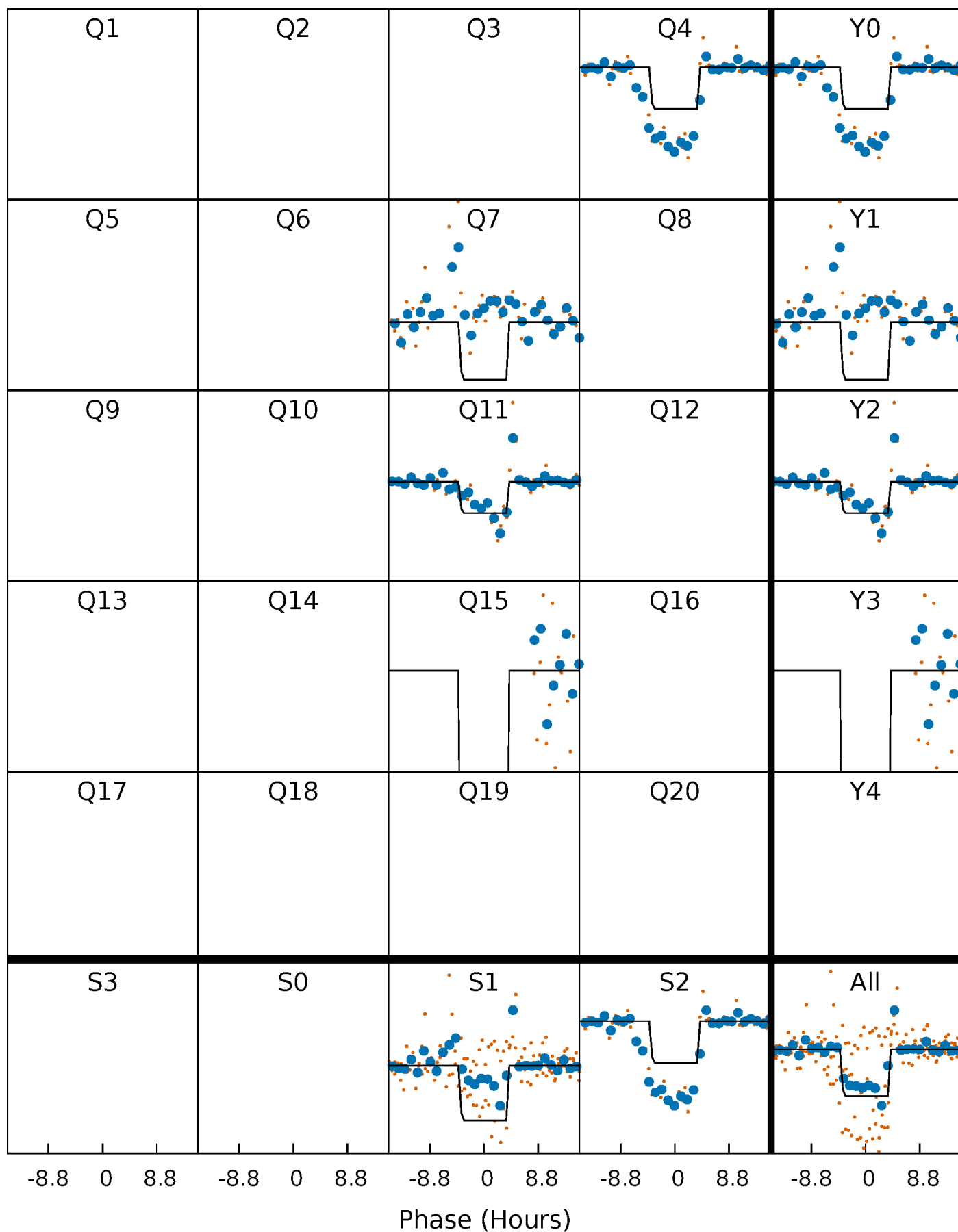
# DV Quarter-Phased Transit Curves

TCE 008822612-04     $P=347.552096$  Days     $T_0=362.307012$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

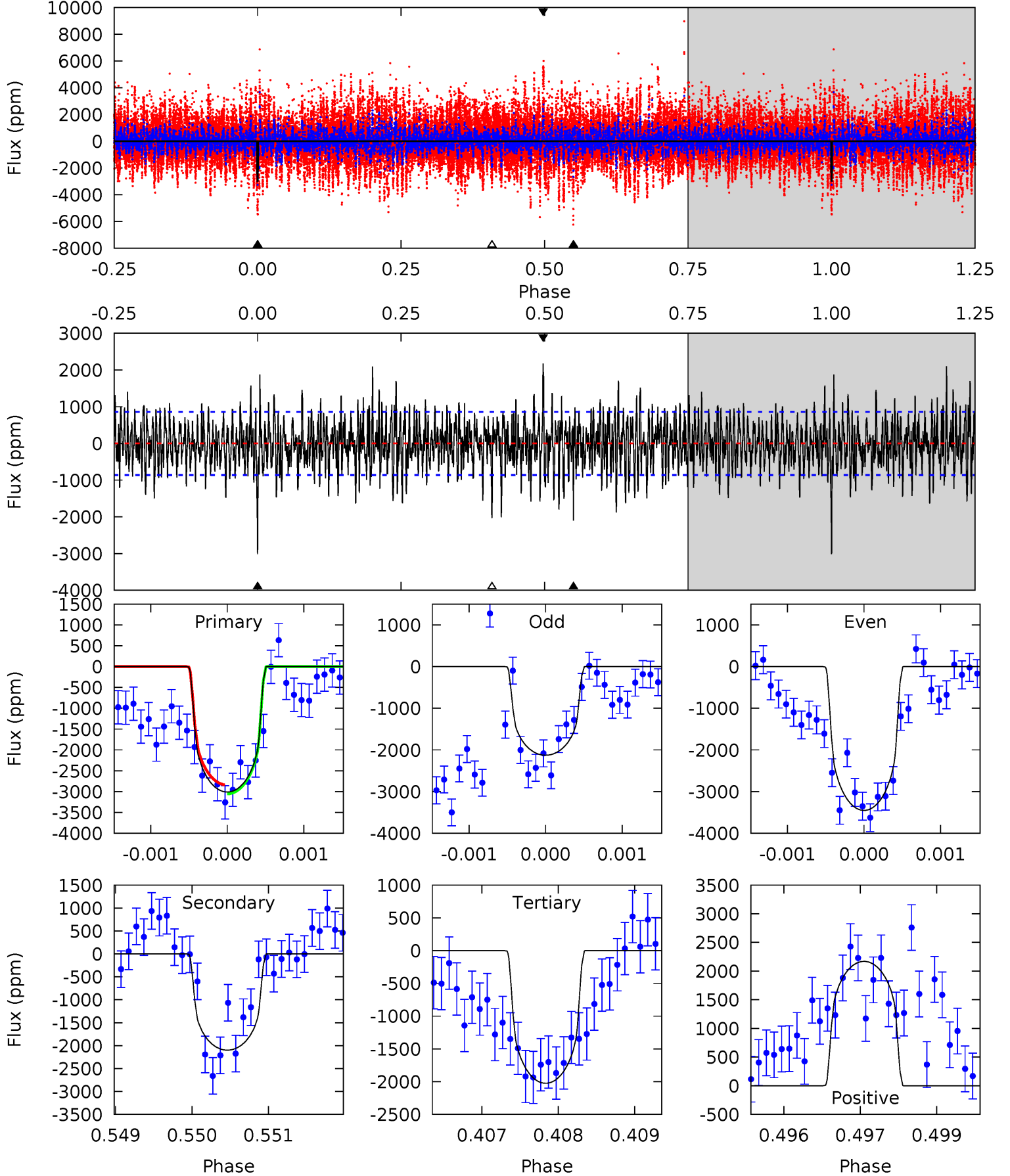
TCE 008822612-04     $P=347.554422$  Days     $T_0=362.320415$  (BKJD)



# DV Model-Shift Uniqueness Test

008822612-04, P = 347.552096 Days, E = 14.754916 Days

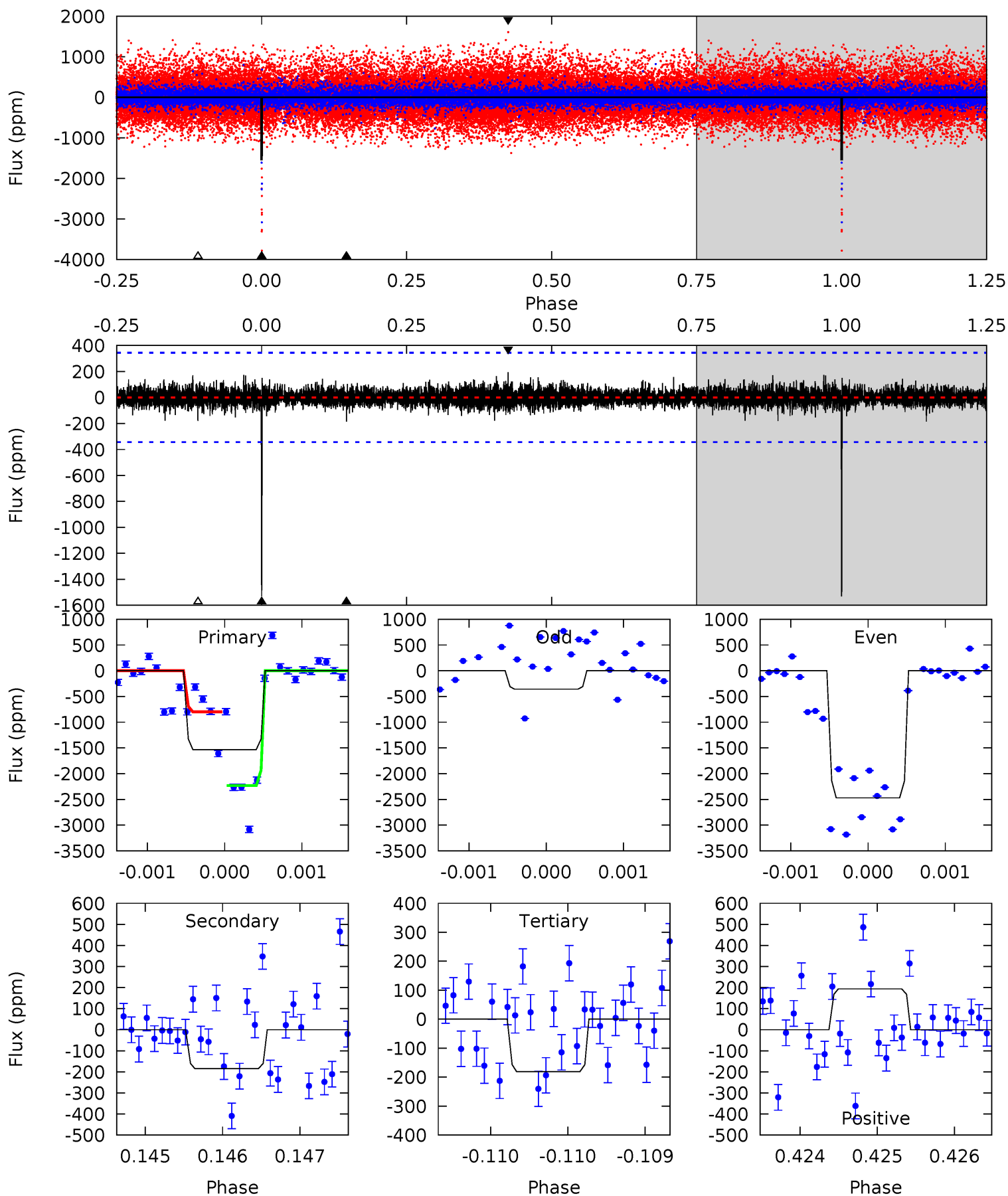
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
19.1	13.3	12.8	13.7	5.44	3.28	3.61	6.24	5.32	0.47	-0.44	3.55	1.41	0.42	0.68



# Alt Model-Shift Uniqueness Test

008822612-04,  $P = 347.554422$  Days,  $E = 14.765993$  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
24.3	2.93	2.87	3.08	5.46	3.31	0.59	21.4	21.2	0.06	-0.14	20.0	0.96	0.11	11.2



### Stellar Parameters For KIC 008822612

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$4612^{+138}_{-152}$	$4.613^{+0.054}_{-0.027}$	$-0.320^{+0.300}_{-0.300}$	$0.653^{+0.052}_{-0.063}$	$0.638^{+0.071}_{-0.045}$	$3.231^{+0.799}_{-0.391}$
	+3%/-3%	+1%/-1%	+94%/-94%	+8%/-10%	+11%/-7%	+25%/-12%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 008822612-04 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-2100 \pm 158$	$2.81^{+0.69}_{-0.69}$	$250^{+9}_{-9}$	$4883^{+621}_{-447}$	$103424^{+74695}_{-38618}$
Alt.	$-185 \pm 63$	$2.94^{+0.77}_{-0.72}$	$250^{+8}_{-10}$	$3148^{+306}_{-262}$	$8191^{+6757}_{-3754}$

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

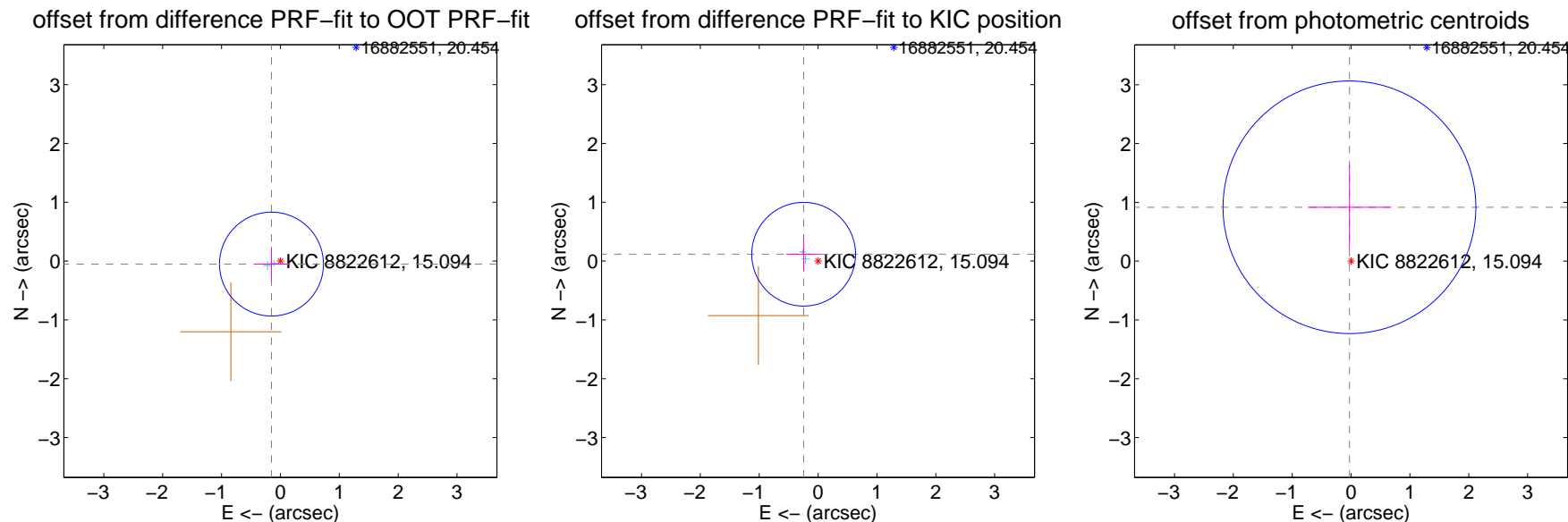
## DV Centroid Data

Supplemental centroid analysis for 008822612-04. Kepler magnitude: 15.09. Transit SNR 6.72

There are 2 quarters with good PRF difference image offsets

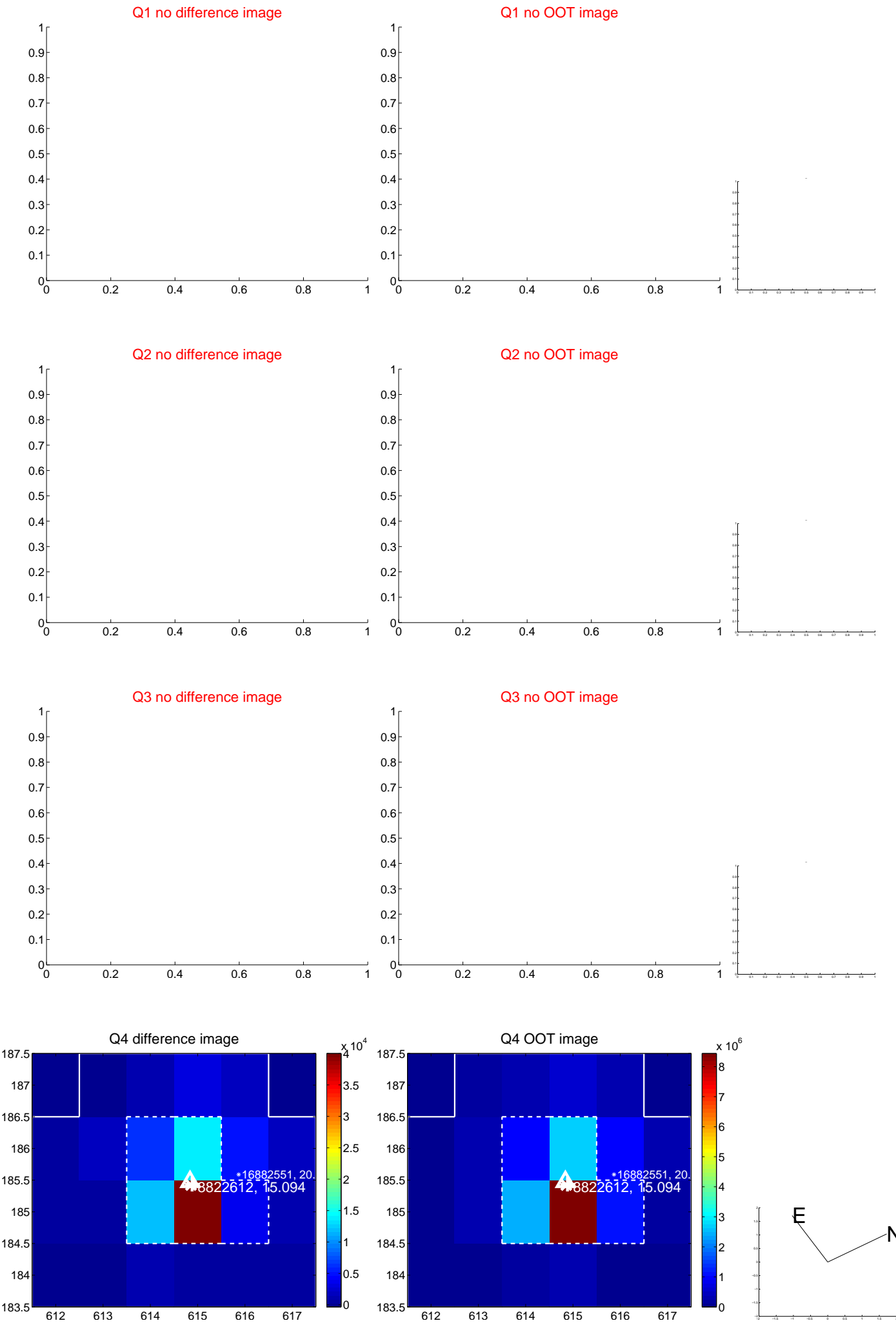
The direct PRF centroid is offset from the target star catalog position by about 0.32 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.160 \pm 0.294$	0.54	$0.152 \pm 0.295$	$-0.051 \pm 0.290$
PRF-fit source offset from KIC position	$0.271 \pm 0.294$	0.92	$0.245 \pm 0.295$	$0.117 \pm 0.290$
photometric centroid source offset	$0.92 \pm 0.72$	1.28	$0.03 \pm 0.71$	$0.92 \pm 0.72$

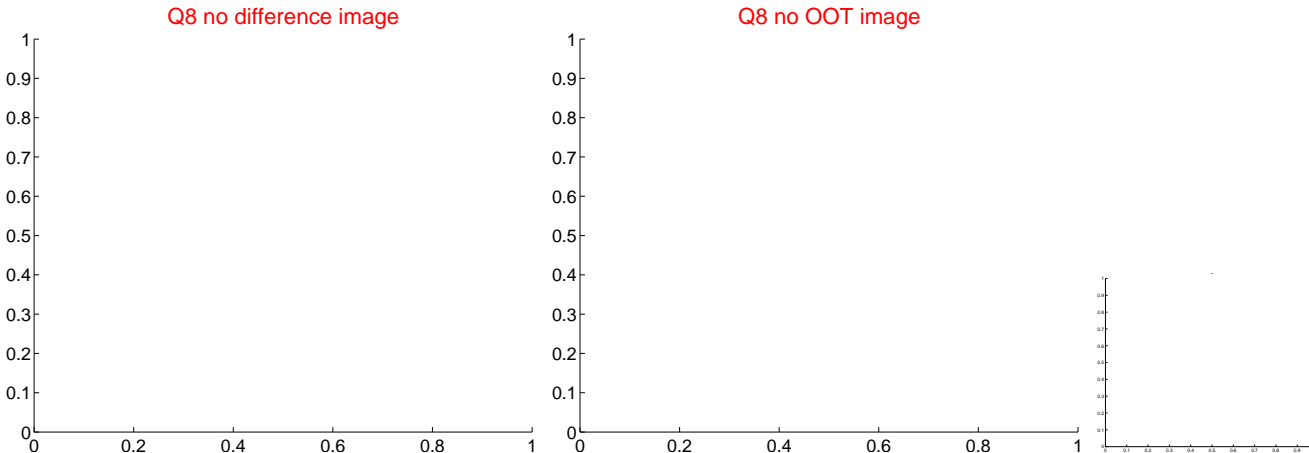
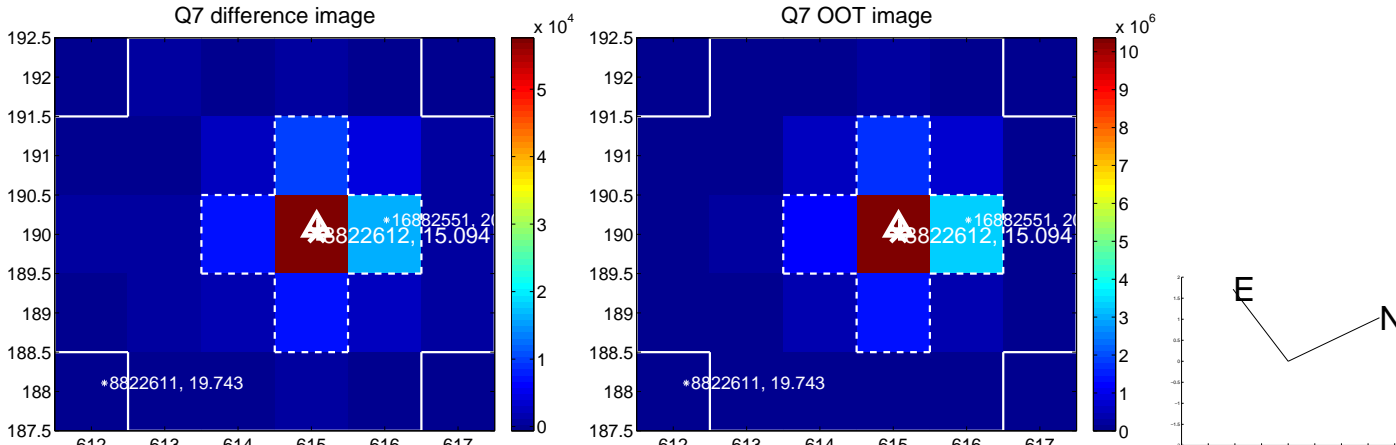
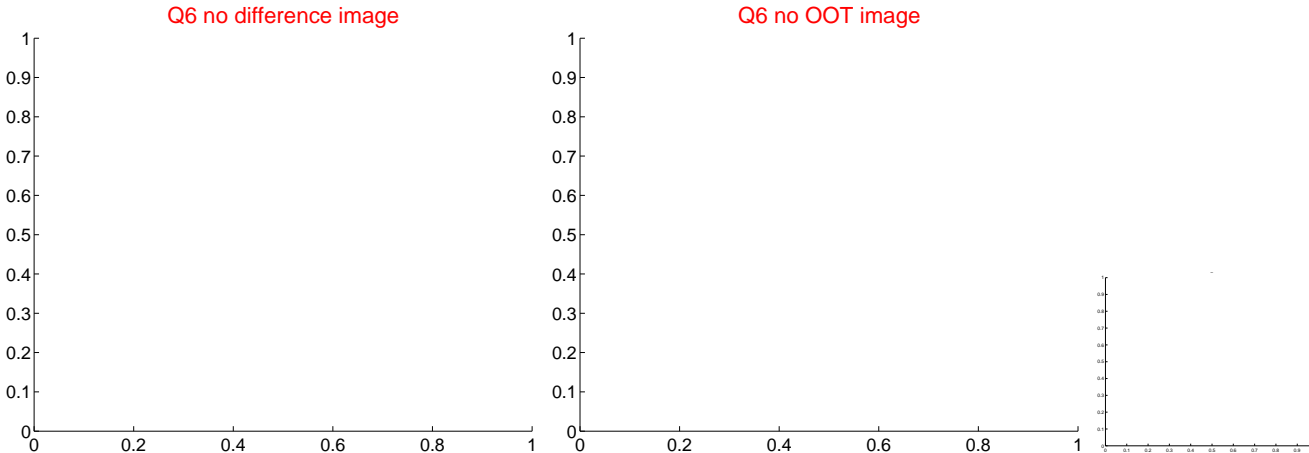
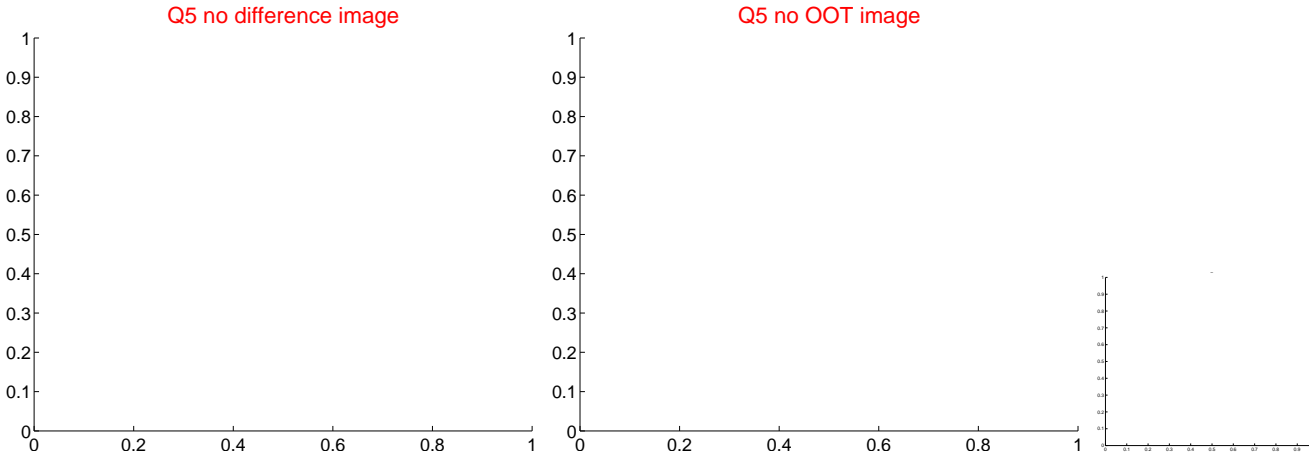


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

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

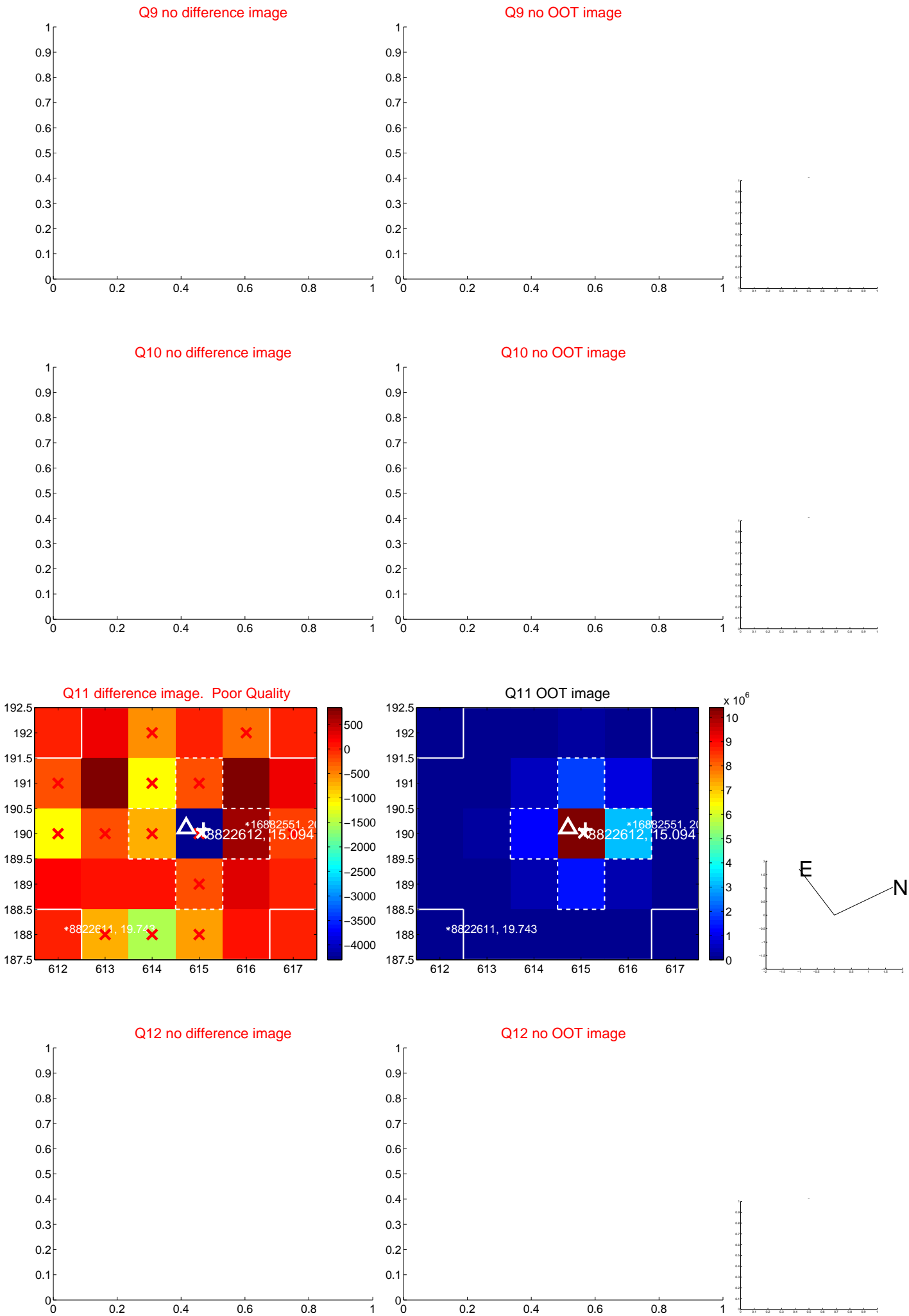


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value





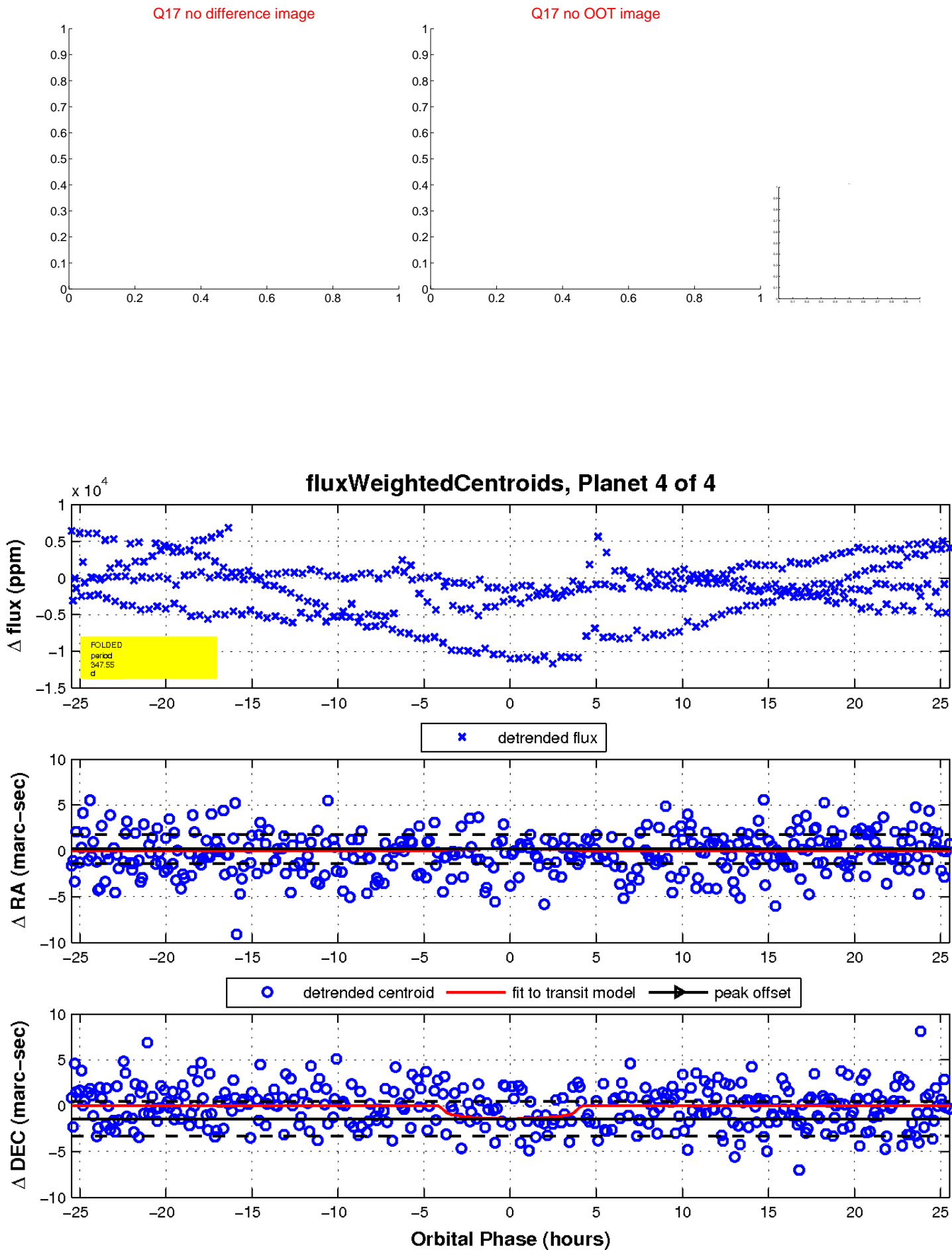
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



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



# UKIRT Image

Declination

