

# KIC 011412044

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
011412044-01	OBS	No	392.316863	189.867641	10821.9	19.439	20.2	18.4	0.72	4713	8.63	0.26
011412044-02	OBS	No	429.932868	228.232852	5577.4	15.710	19.8	12.1	0.72	4713	6.74	0.23
011412044-03	OBS	No	327.228963	308.514574	9609.8	17.960	18.9	15.3	0.72	4713	13.25	0.33
011412044-04	OBS	No	497.309634	433.712106	6509.3	14.267	18.4	15.5	0.72	4713	6.38	0.19
011412044-05	OBS	No	379.431472	254.543571	7842.6	13.668	18.1	13.7	0.72	4713	8.89	0.27
011412044-06	OBS	No	371.644294	241.608392	6772.4	13.431	17.6	13.4	0.72	4713	11.28	0.28
011412044-07	OBS	No	367.441035	215.105554	12056.7	23.794	18.9	15.9	0.72	4713	14.70	0.28
011412044-08	OBS	No	407.377075	136.506999	2052.6	9.000	18.2	-1.0	0.72	4713	3.13	0.24

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
011412044-01	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—CENT_RESOLVED_OFFSET
011412044-02	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_RESOLVED_OFFSET
011412044-03	OBS	FP	0.00	1	0	0	0	LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS
011412044-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
011412044-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
011412044-06	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_RESOLVED_OFFSET
011412044-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS
011412044-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—CENT_NOFITS

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

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

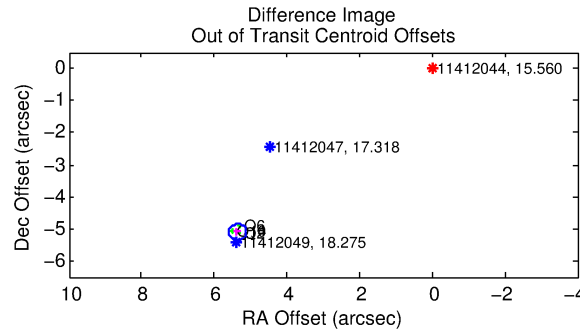
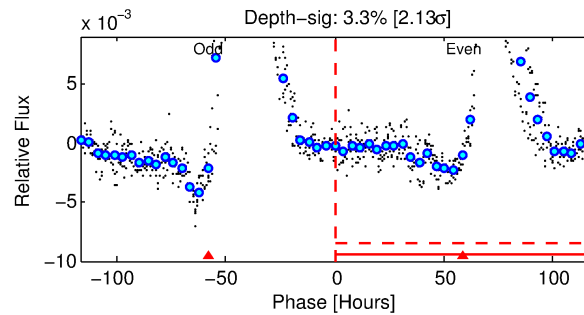
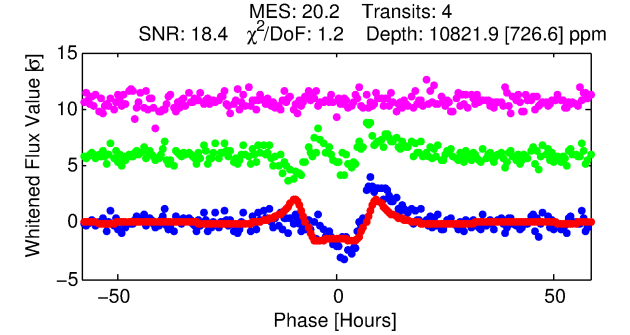
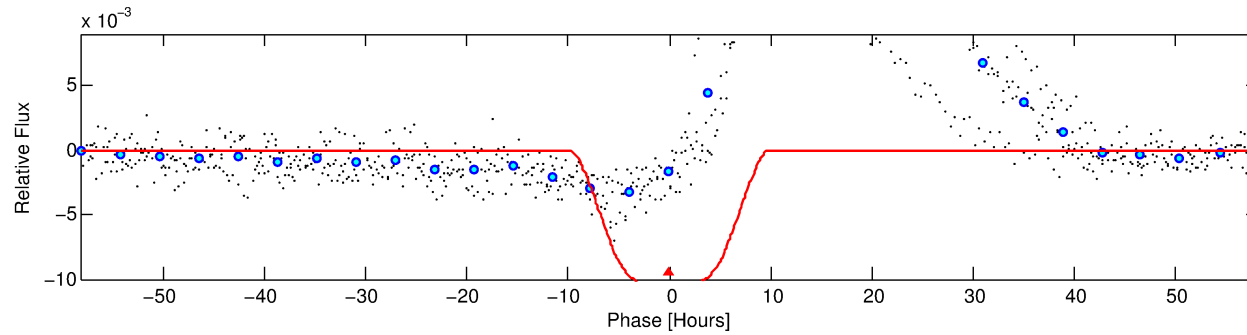
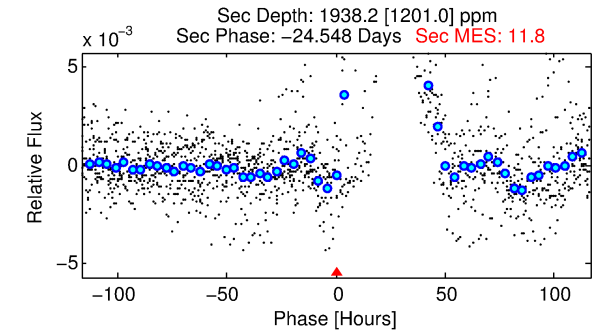
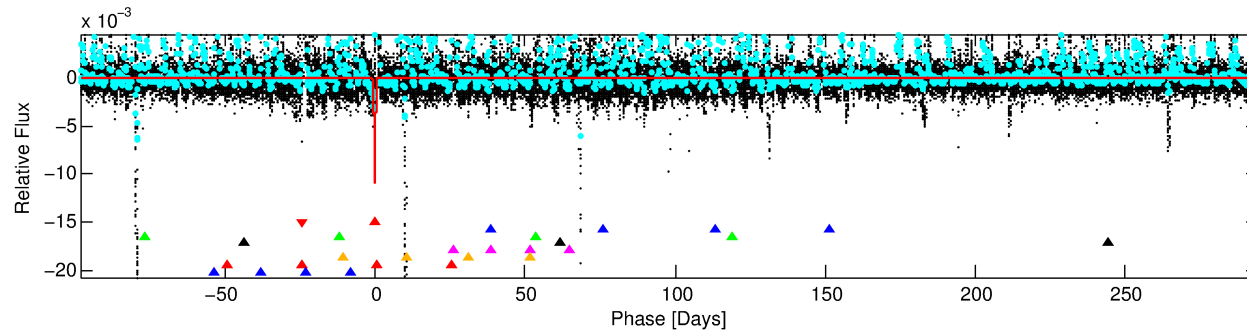
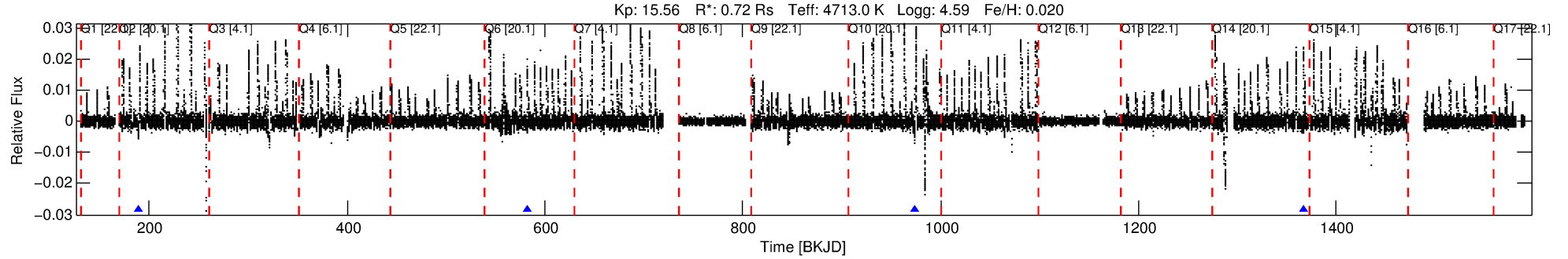
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 011412044-01

No Significant Match Found

# DV One-Page Summary

KIC: 11412044 Candidate: 1 of 8 Period: 392.317 d



## DV Fit Results:

Period = 392.31686 [0.00574] d  
Epoch = 189.8676 [0.0101] BKJD  
Rp/R\* = 0.1098 [0.0043]  
a/R\* = 114.06 [5.16]  
b = 0.83 [0.02]  
Seff = 0.26 [0.04]  
Teq = 181 [7] K  
Rp = 8.63 [0.80] Re  
a = 0.9455 [0.0615] AU  
Ag = 12798.15 [8067.34] [1.59 $\sigma$ ]  
Teff = 2984 [474] K [5.91 $\sigma$ ]

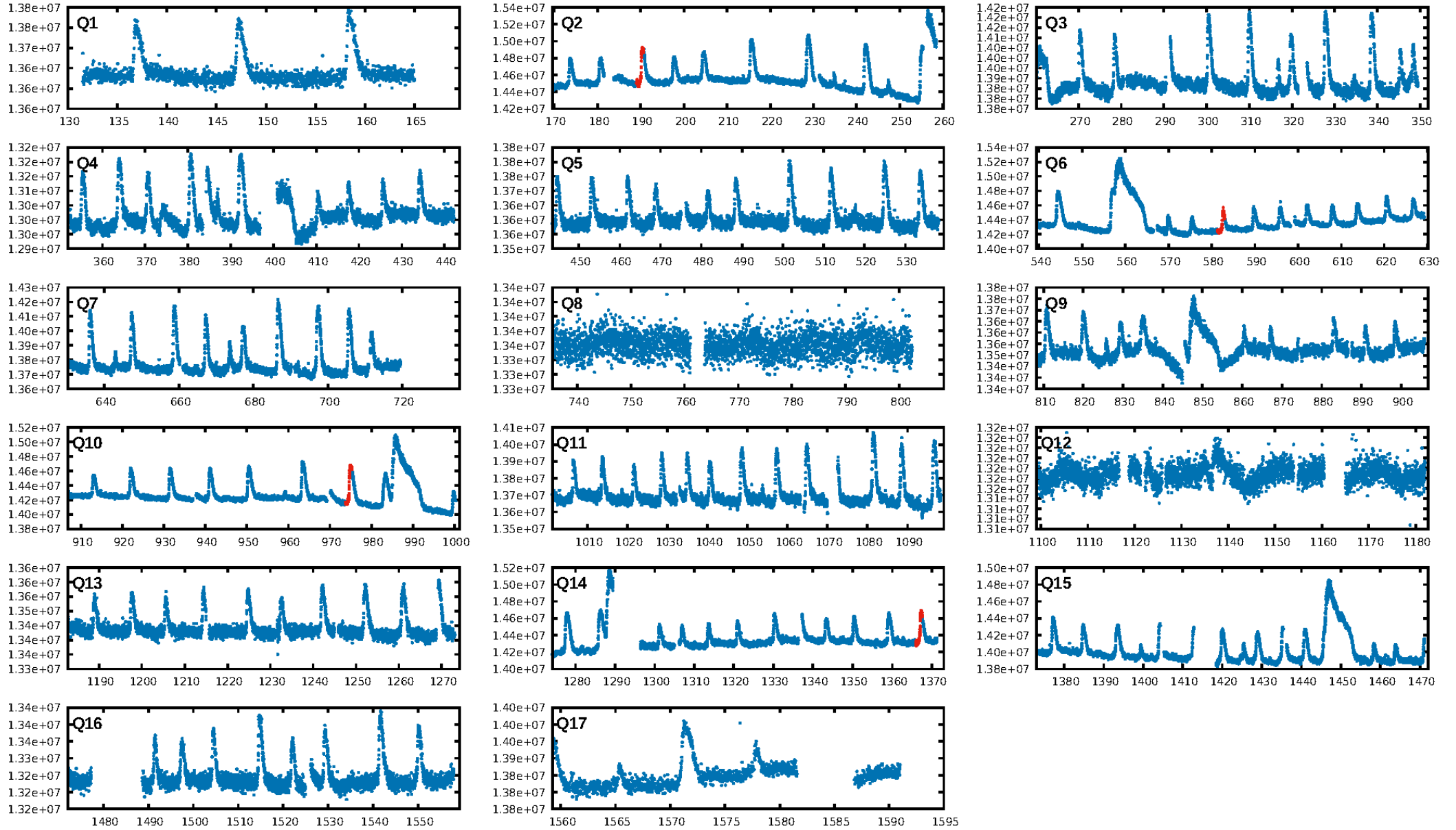
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [13.01 $\sigma$ ]  
LongPeriod-sig: 100.0% [16.87 $\sigma$ ]  
ModelChiSquare2-sig: 92.0%  
ModelChiSquareGof-sig: 62.4%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: 2.384  
Centroid-sig: N/A  
Centroid-so: 6.090 arcsec [6.70 $\sigma$ ]  
OotOffset-rm: 7.407 arcsec [89.61 $\sigma$ ]  
KicOffset-rm: 7.304 arcsec [94.97 $\sigma$ ]  
OotOffset-st: 4/0/0/0 [4]  
KicOffset-st: 4/0/0/0 [4]  
DiffImageQuality-fgm: 1.00 [4/4]  
DiffImageOverlap-fno: 0.75 [3/4]

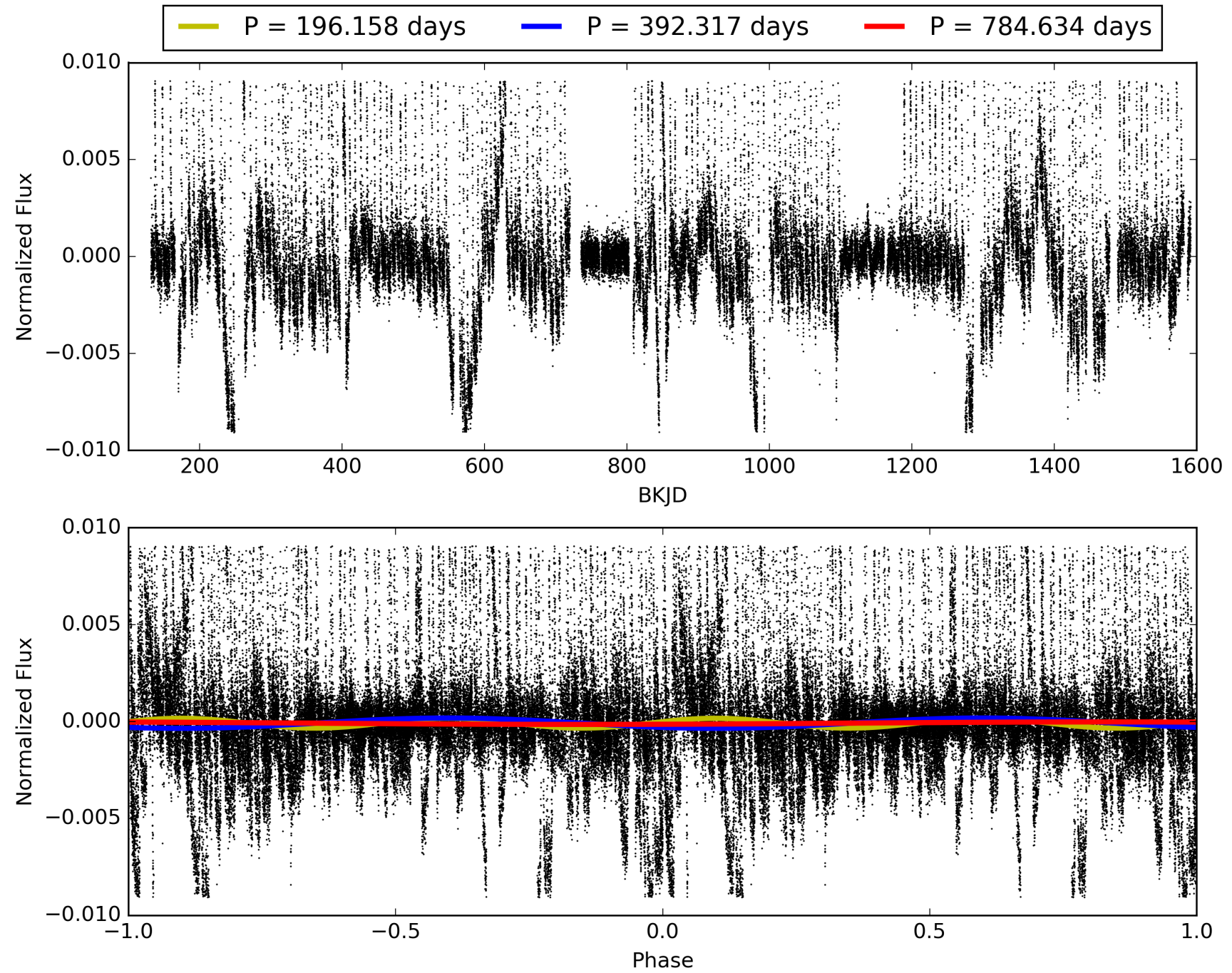
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:14:08 Z

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

# TCE 011412044-01, PDC Light Curves



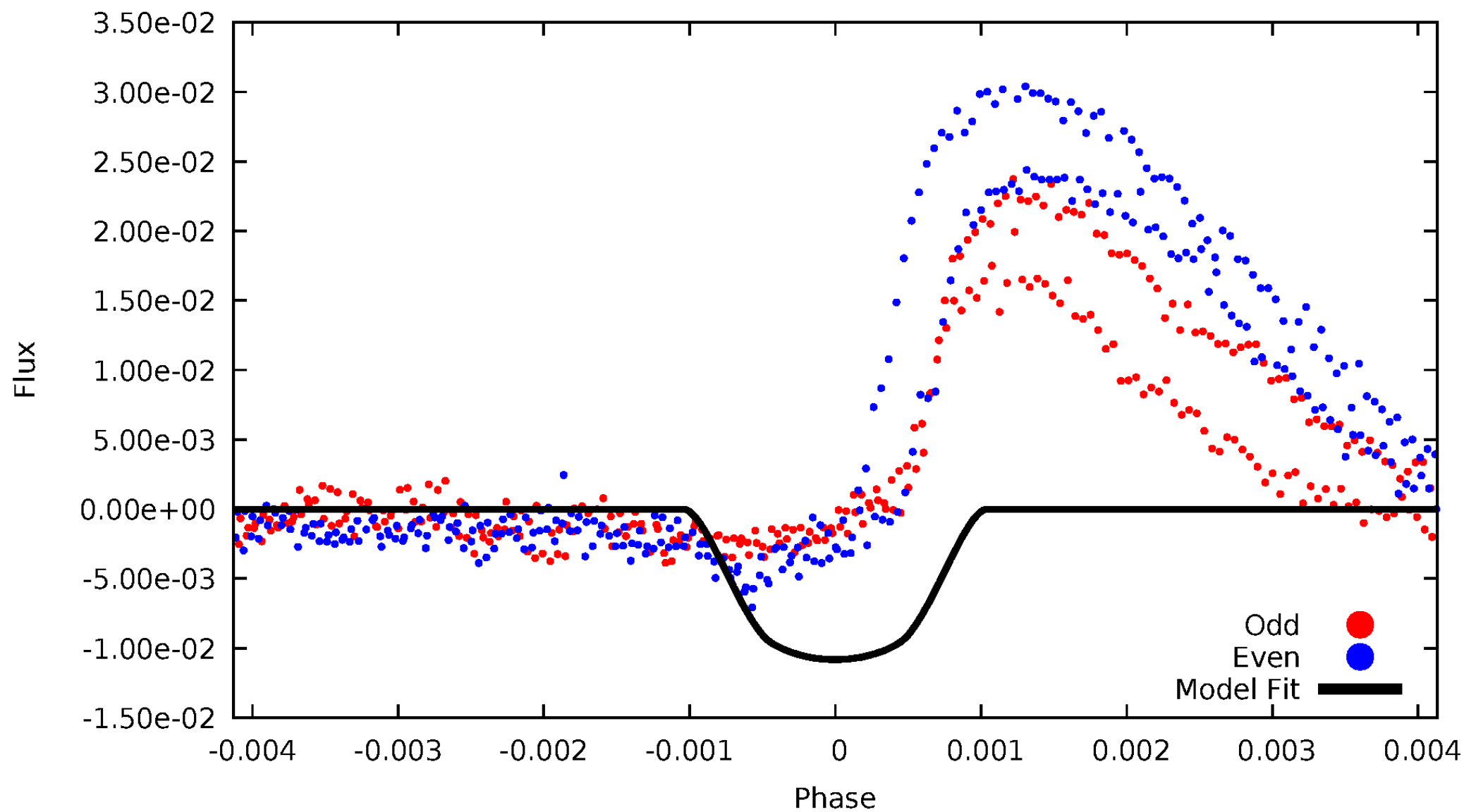
TCE 011412044-01





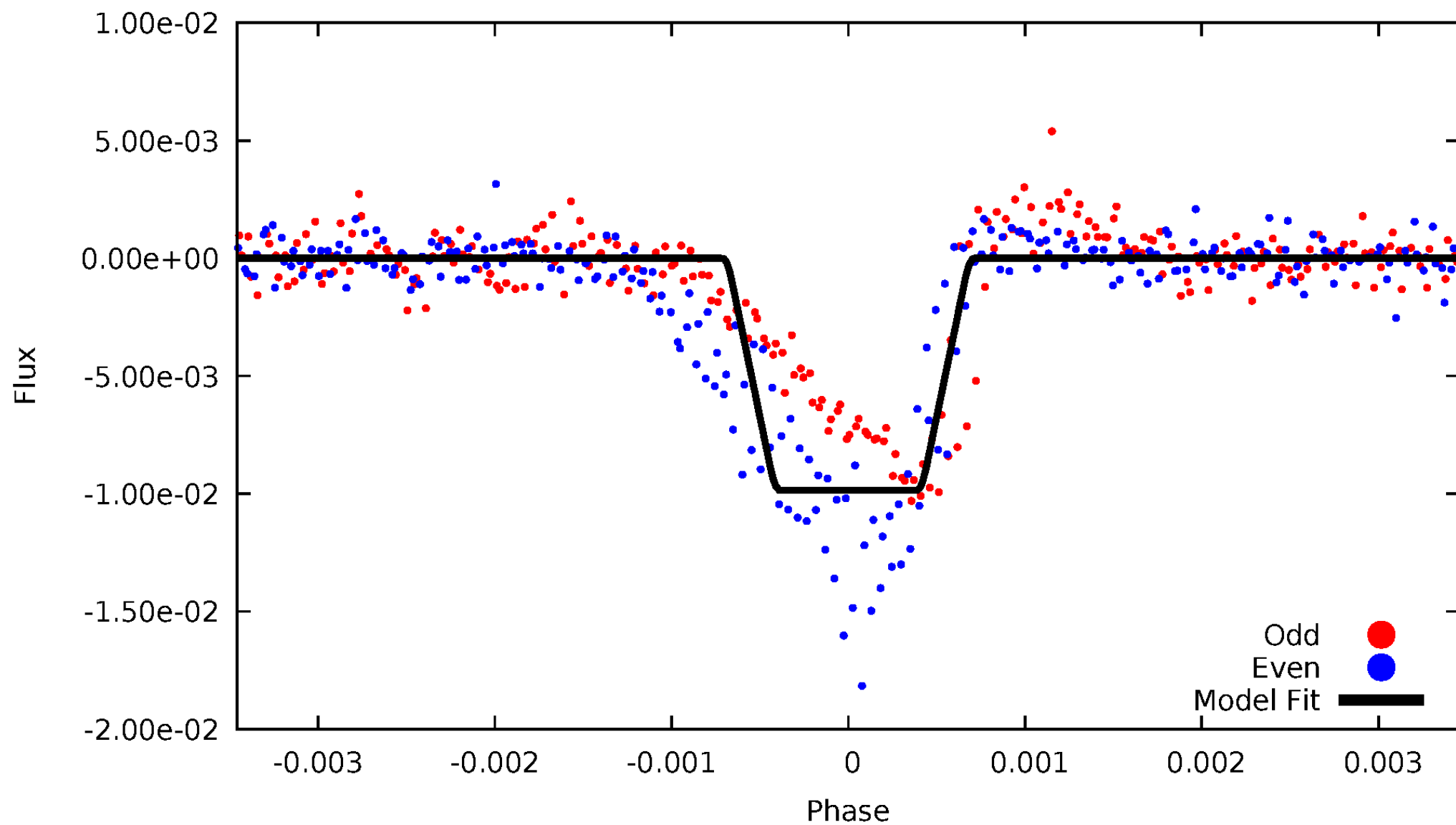
# DV Odd/Even

TCE 011412044-01



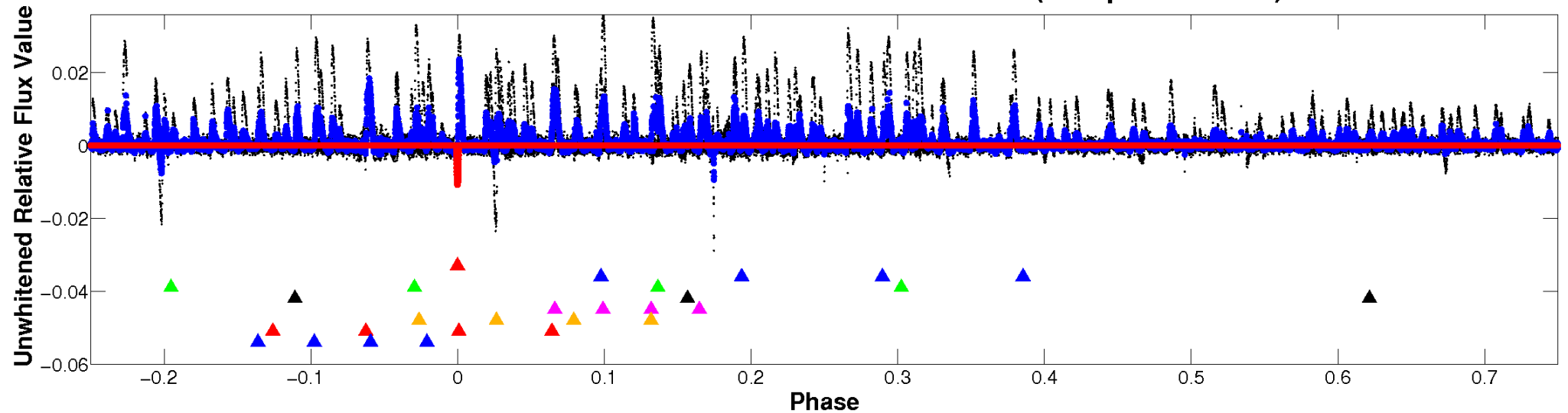
# ALT Odd/Even

TCE 011412044-01

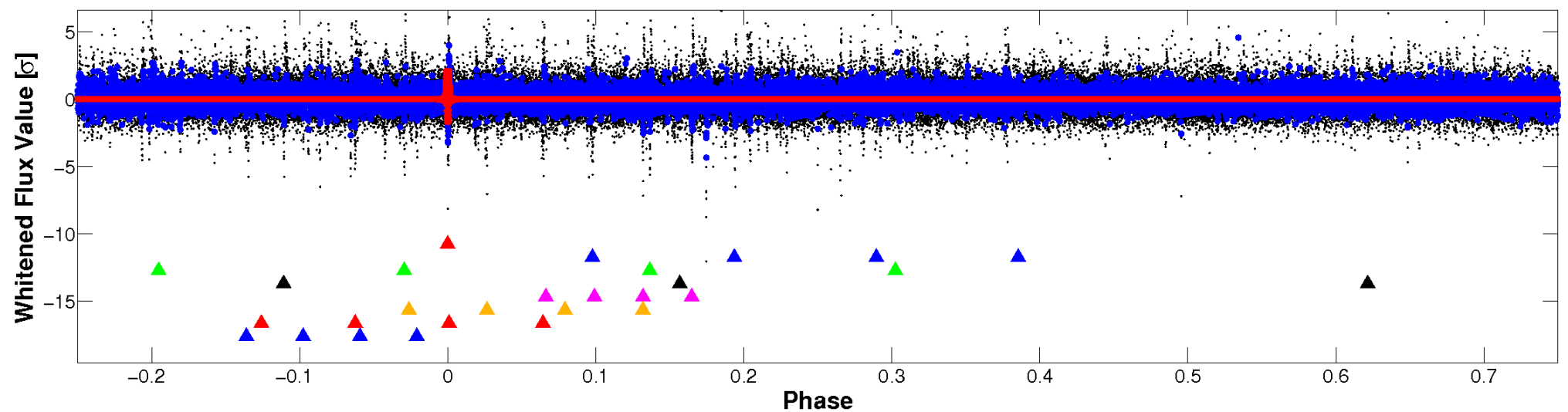


# Non-Whitened Vs. Whitened Light Curve

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

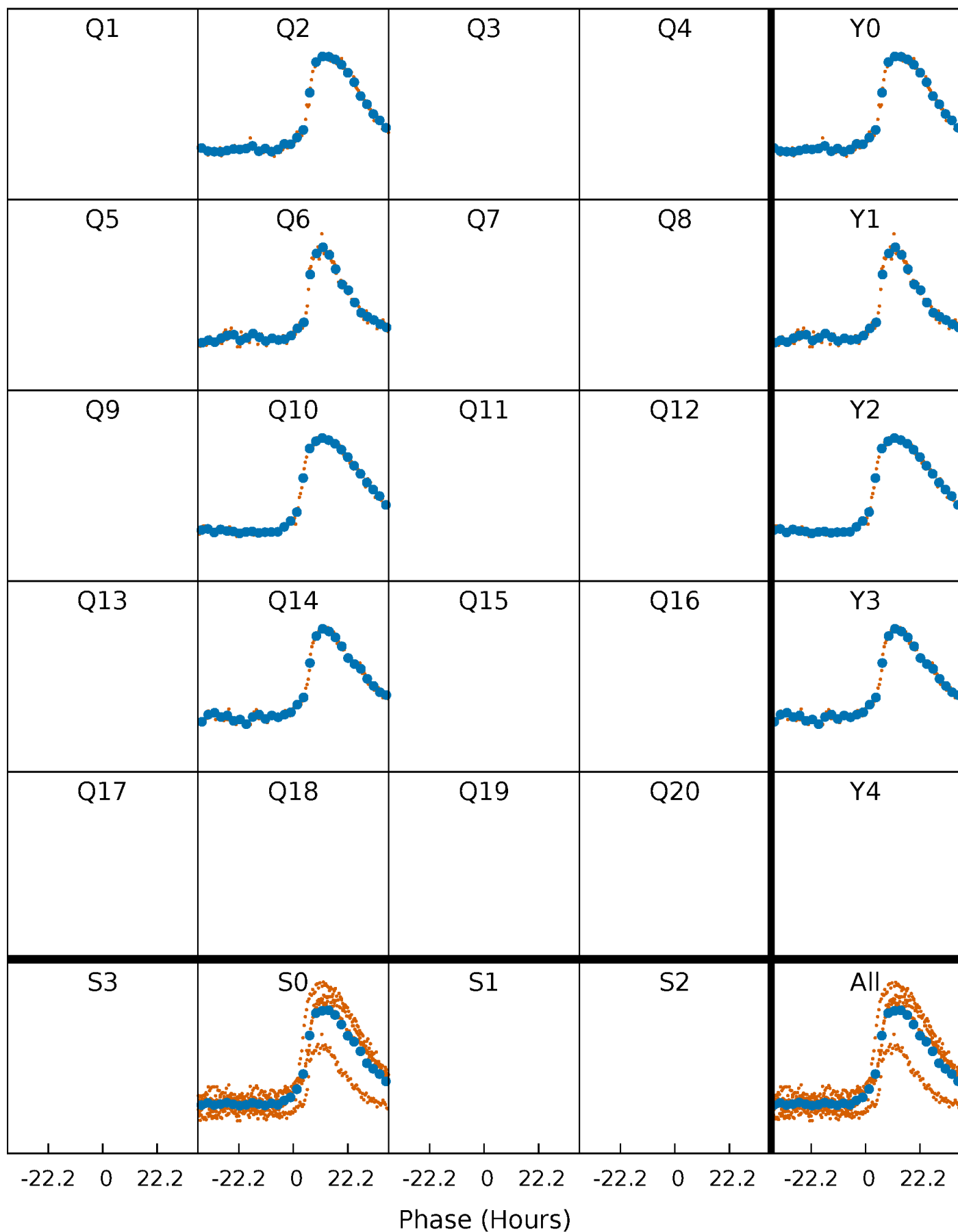


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



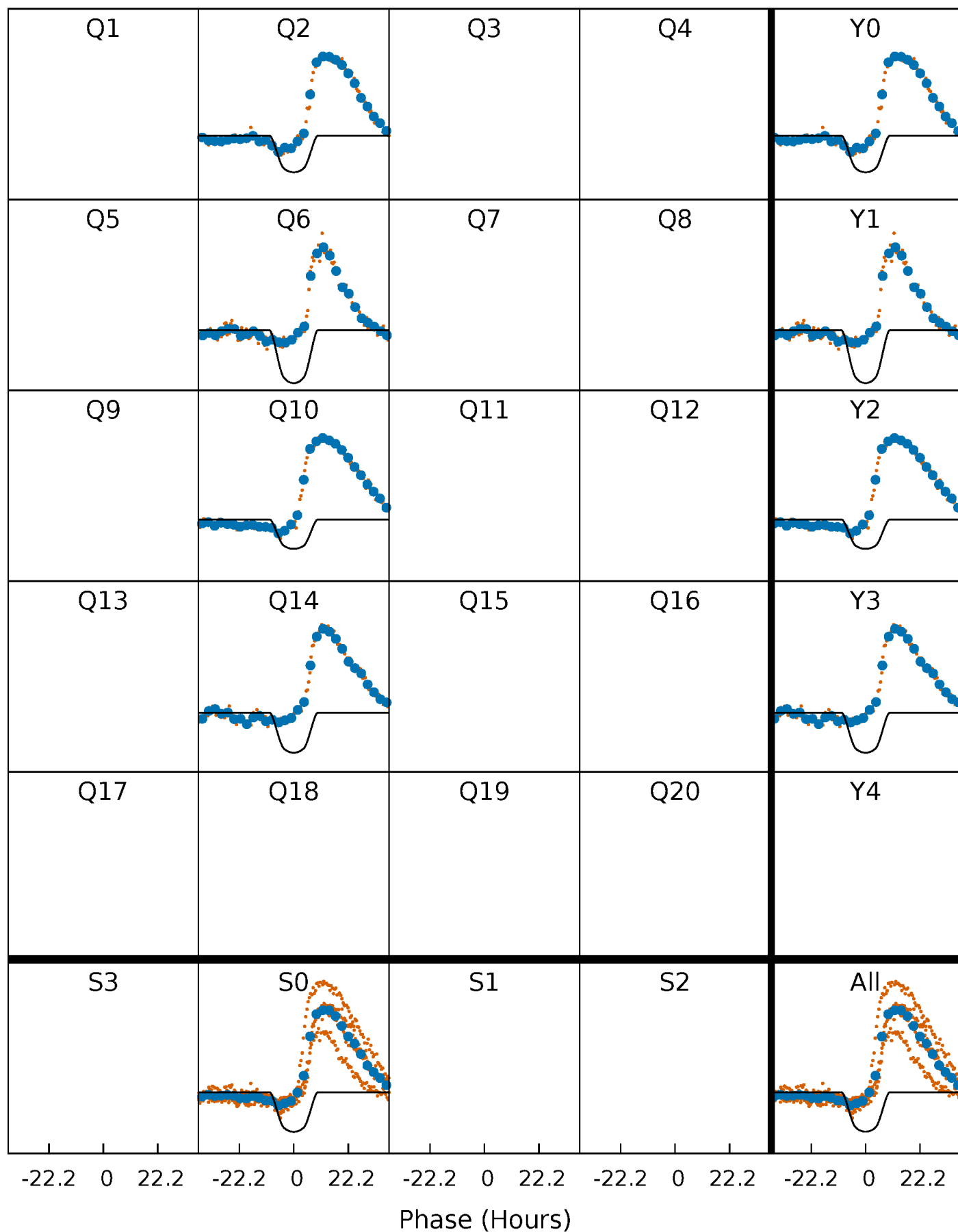
# PDC Quarter-Phased Transit Curves

TCE 011412044-01 P=392.316863 Days  $T_0=189.867640$  (BKJD)



# DV Quarter-Phased Transit Curves

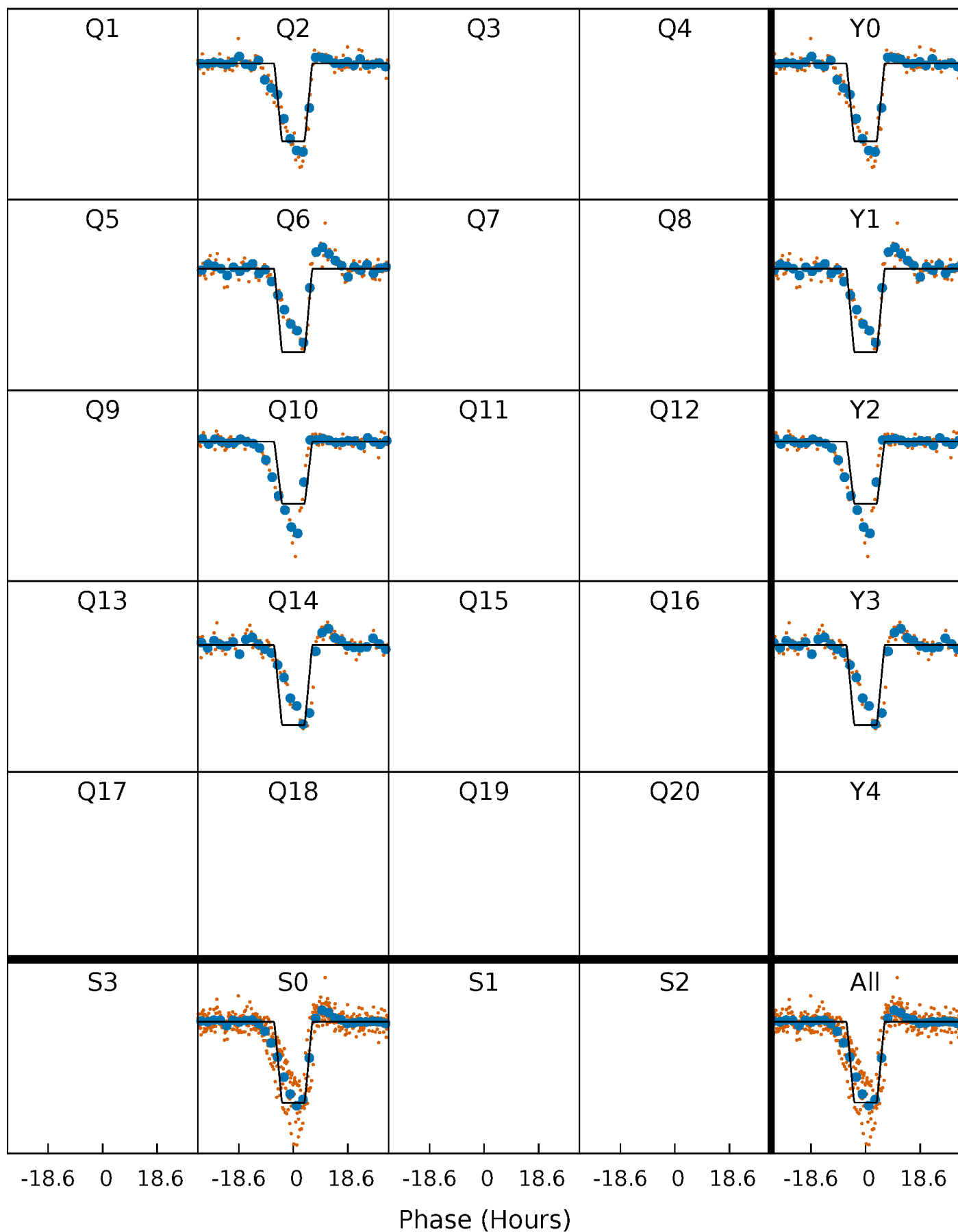
TCE 011412044-01 P=392.316863 Days  $T_0=189.867640$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

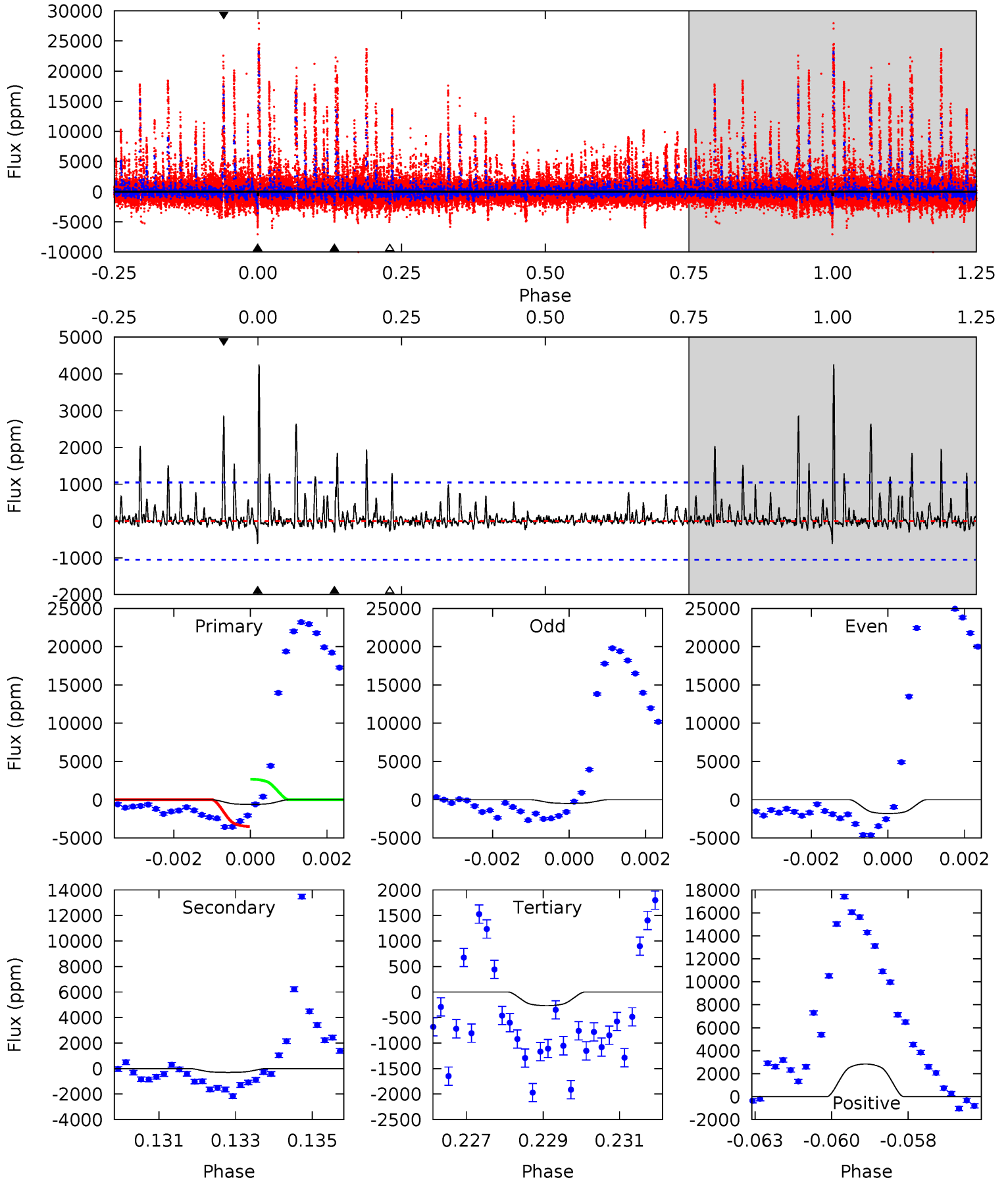
TCE 011412044-01 P=392.297107 Days  $T_0=189.918314$  (BKJD)



# DV Model-Shift Uniqueness Test

011412044-01, P = 392.316863 Days, E = 189.867640 Days

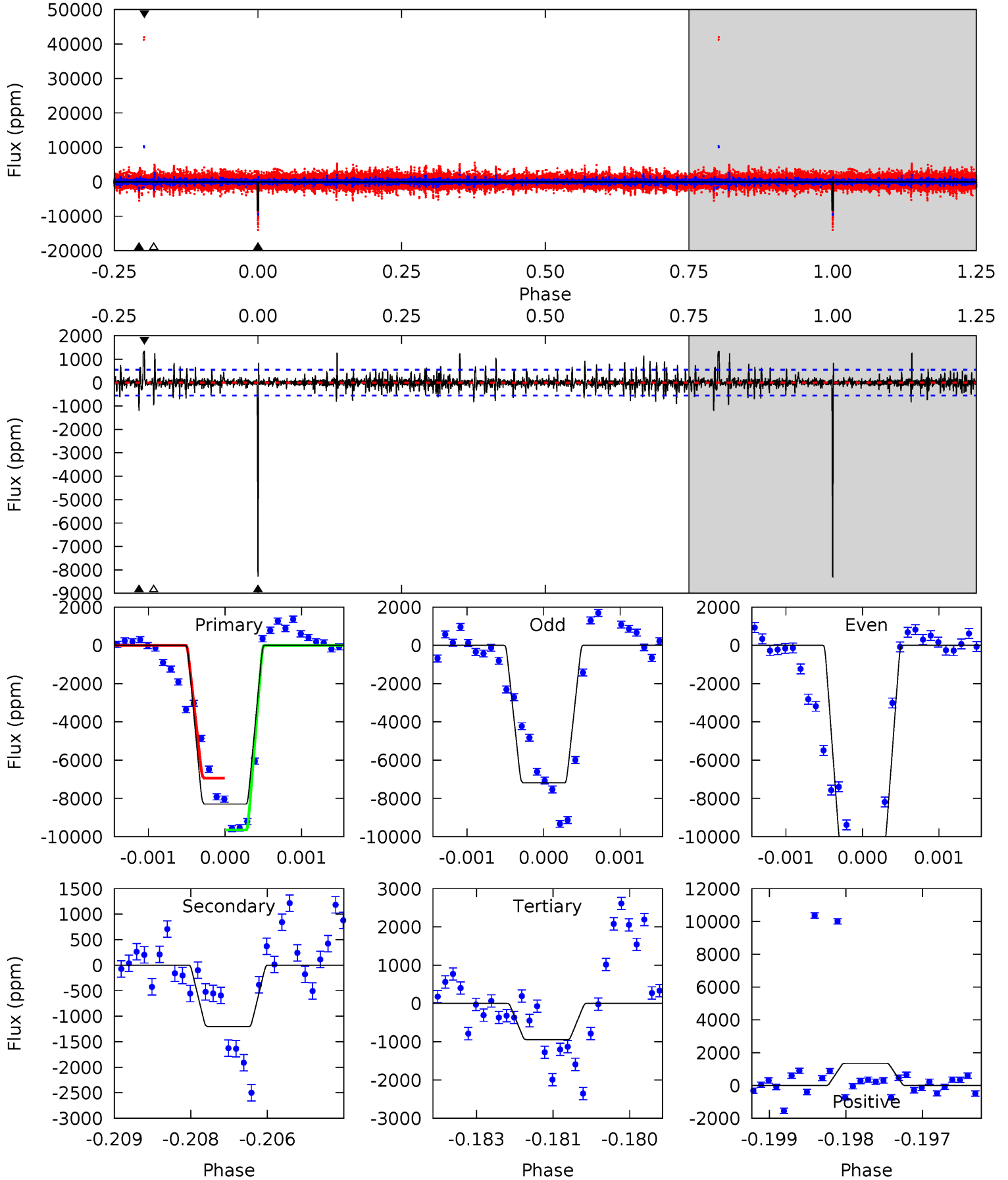
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
3.10	1.51	1.36	14.4	5.32	3.08	1.57	1.75	-11.3	0.15	-12.9	1.84	2.52	0.87	2.19



# Alt Model-Shift Uniqueness Test

011412044-01, P = 392.297107 Days, E = 189.918314 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
81.5	11.8	9.28	13.3	5.39	3.20	1.93	72.2	68.2	2.52	-1.48	14.0	1.03	0.14	13.3



### Stellar Parameters For KIC 011412044

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$4713^{+125}_{-139}$	$4.588^{+0.042}_{-0.035}$	$0.020^{+0.250}_{-0.300}$	$0.720^{+0.051}_{-0.061}$	$0.733^{+0.064}_{-0.058}$	$2.764^{+0.592}_{-0.374}$
	+3%/-3%	+1%/-1%	+1250%/-1500%	+7%/-8%	+9%/-8%	+21%/-14%
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 011412044-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-298 \pm 197$	$8.64^{+0.52}_{-0.52}$	$253^{+8}_{-9}$	$2621^{+176}_{-287}$	$1971^{+1303}_{-1197}$
Alt.	$-1201 \pm 102$	$7.82^{+0.51}_{-0.49}$	$253^{+8}_{-8}$	$3266^{+88}_{-95}$	$9791^{+1388}_{-1290}$

$T_{max}$  = 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

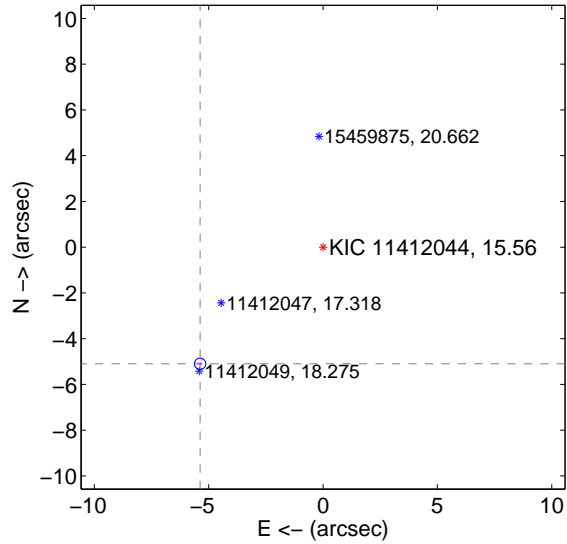
Supplemental centroid analysis for 011412044-01. Kepler magnitude: 15.56. Transit SNR 18.44

There are 4 quarters with good PRF difference image offsets

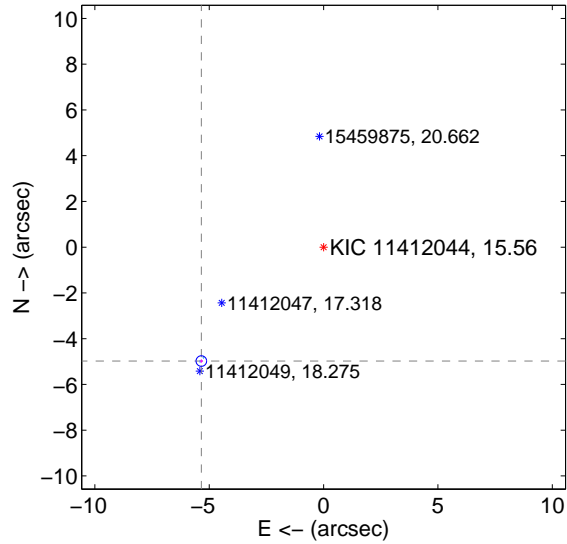
The direct PRF centroid is offset from the target star catalog position by about 0.14 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$7.407 \pm 0.083$	89.61	$5.374 \pm 0.076$	$-5.098 \pm 0.075$
PRF-fit source offset from KIC position	$7.304 \pm 0.077$	94.97	$5.344 \pm 0.071$	$-4.979 \pm 0.074$
photometric centroid source offset	$6.09 \pm 0.91$	6.70	$1.82 \pm 1.04$	$-5.81 \pm 0.89$

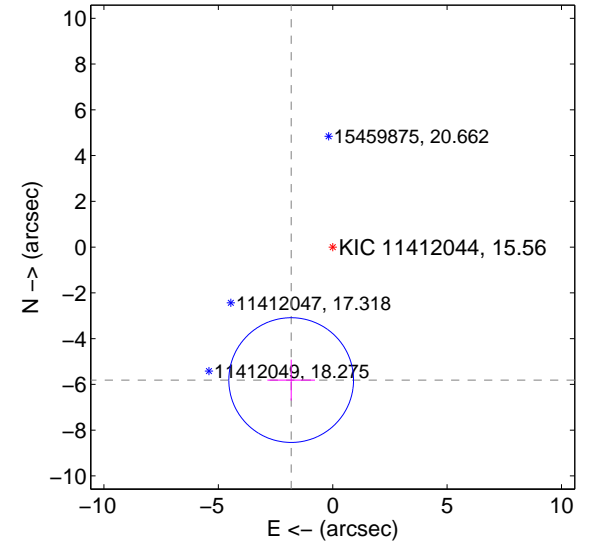
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



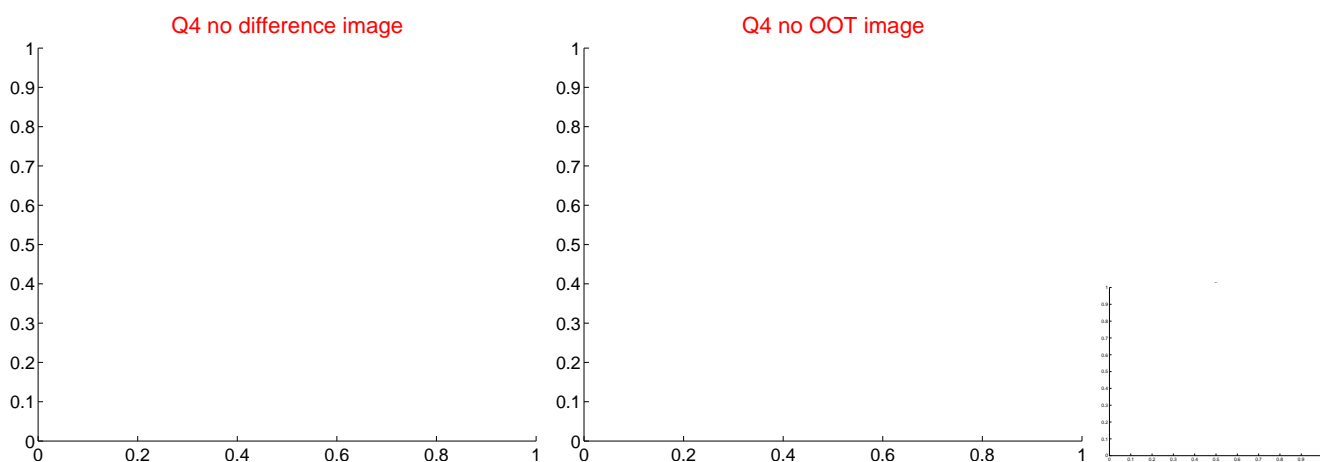
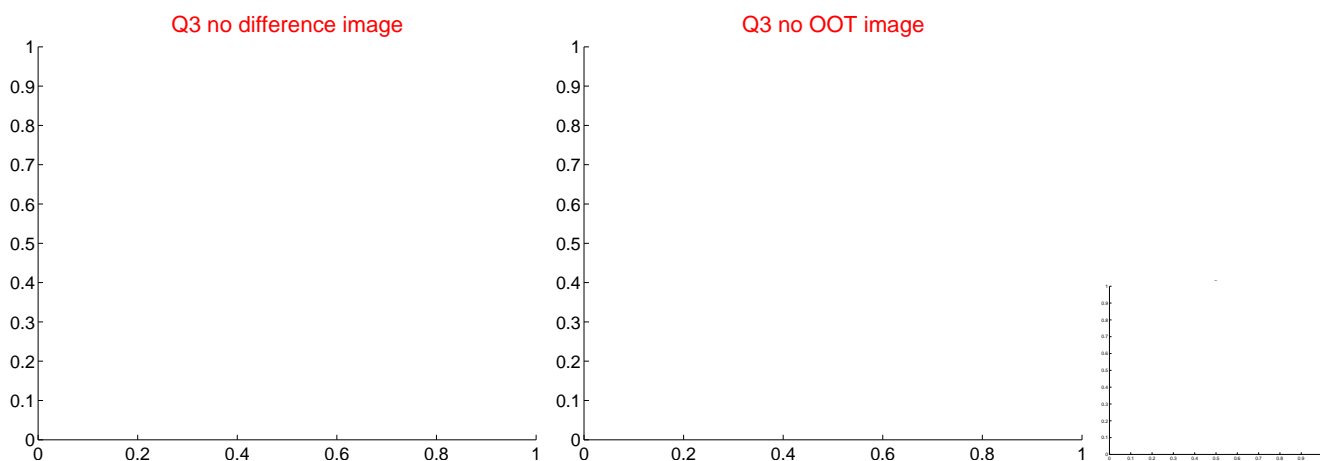
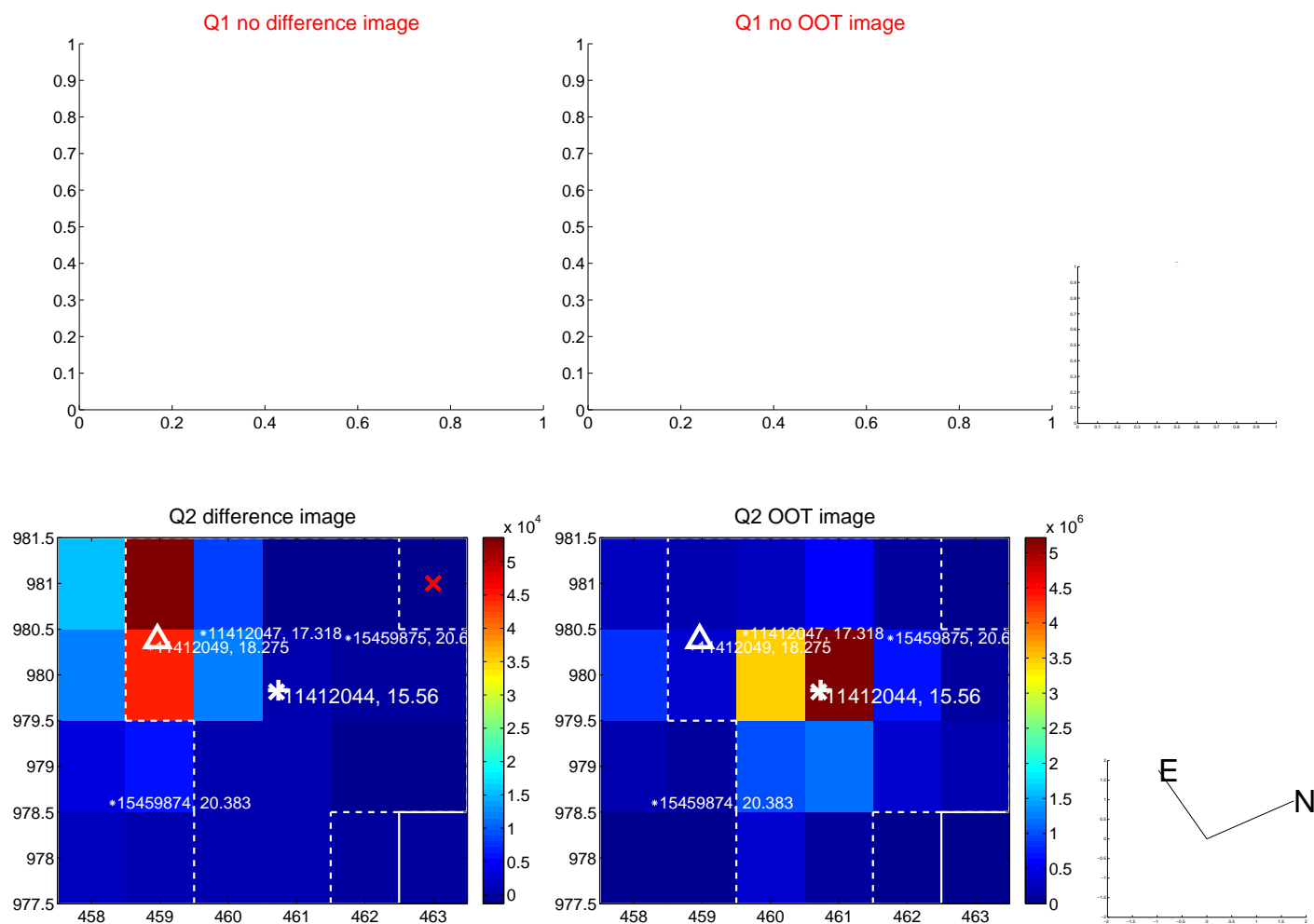
offset from photometric centroids



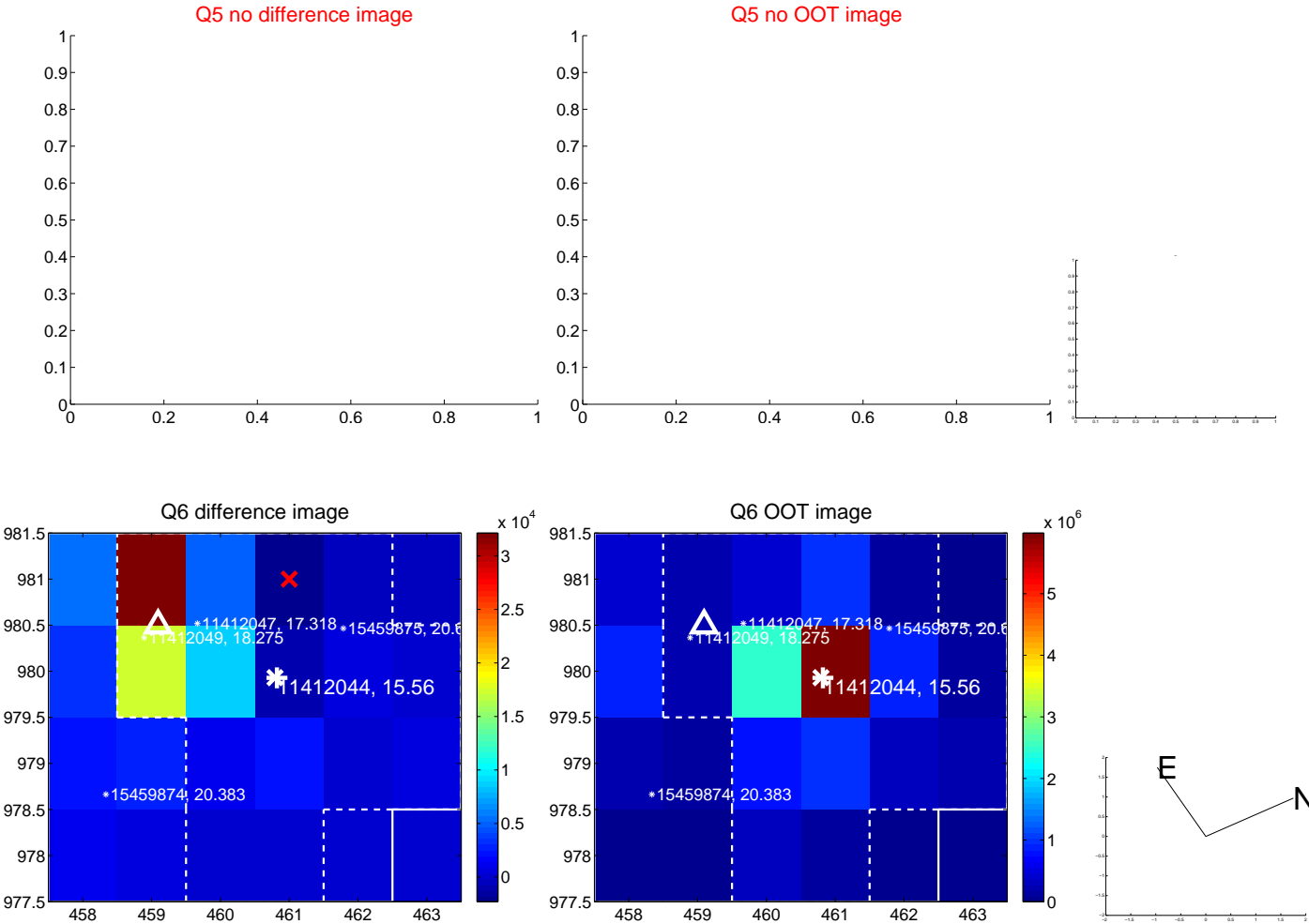
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



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



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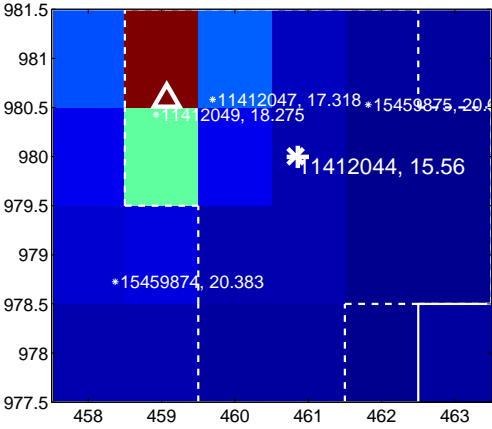
Q9 no difference image



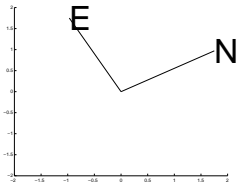
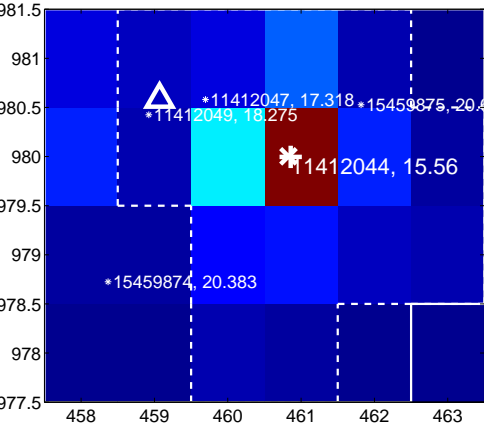
Q9 no OOT image



Q10 difference image



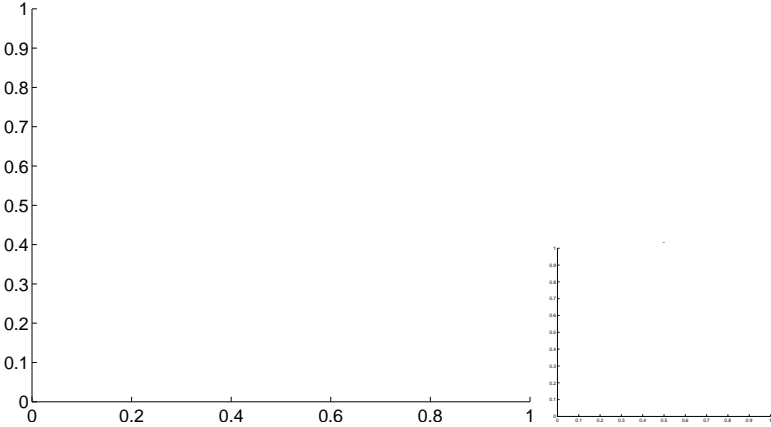
Q10 OOT image



Q11 no difference image



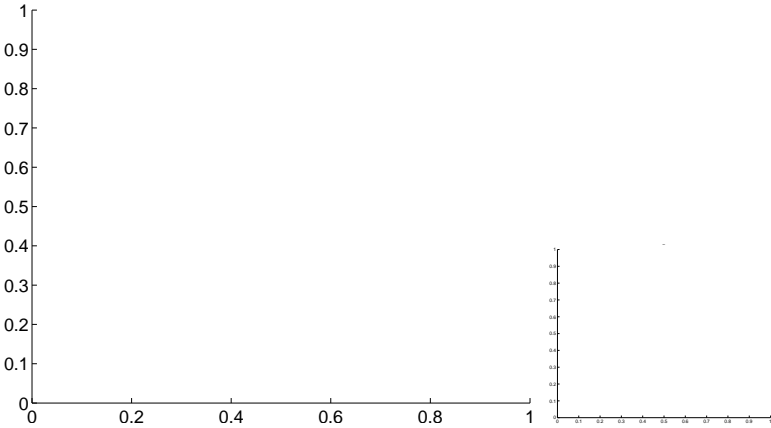
Q11 no OOT image



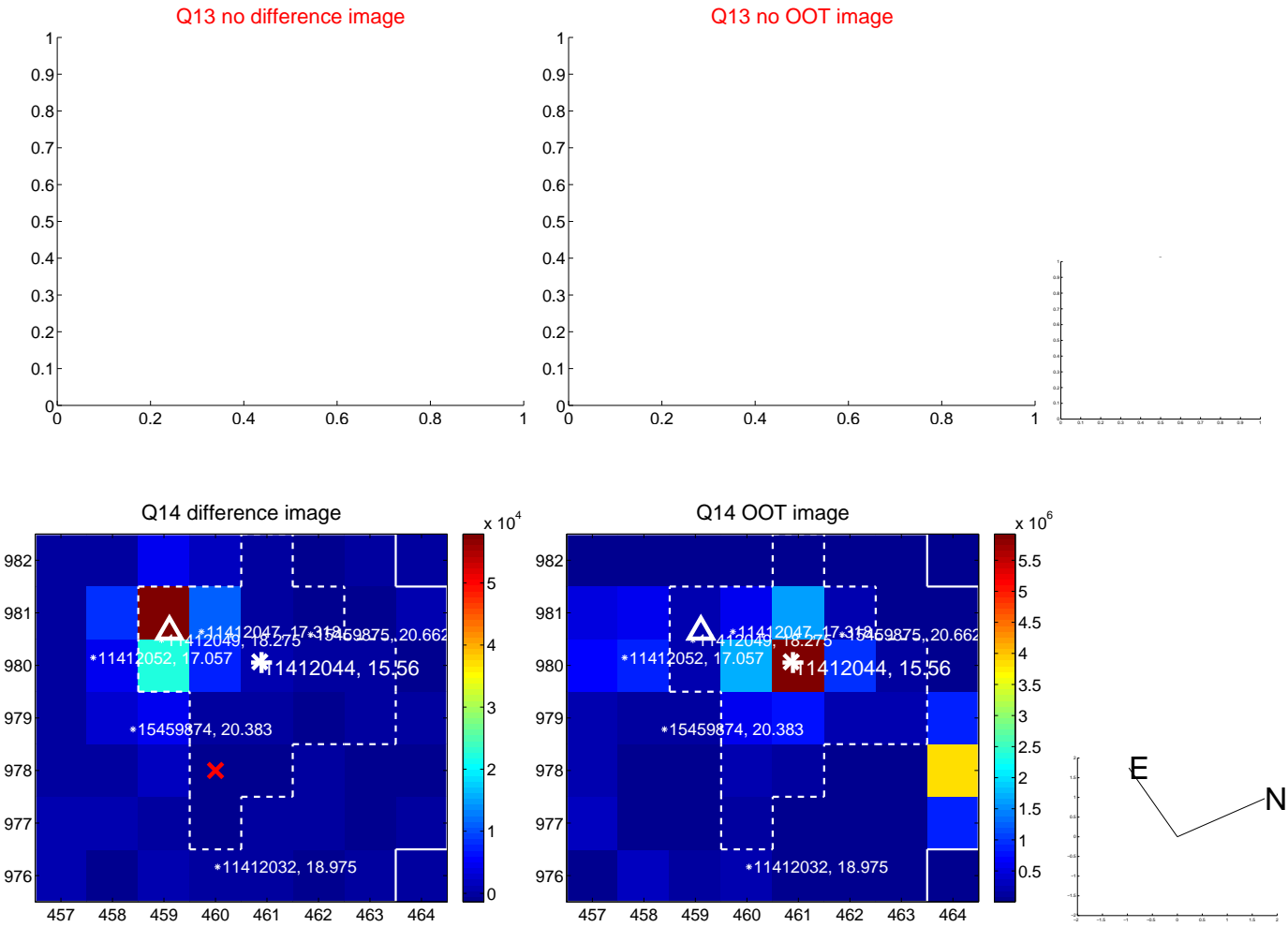
Q12 no difference image



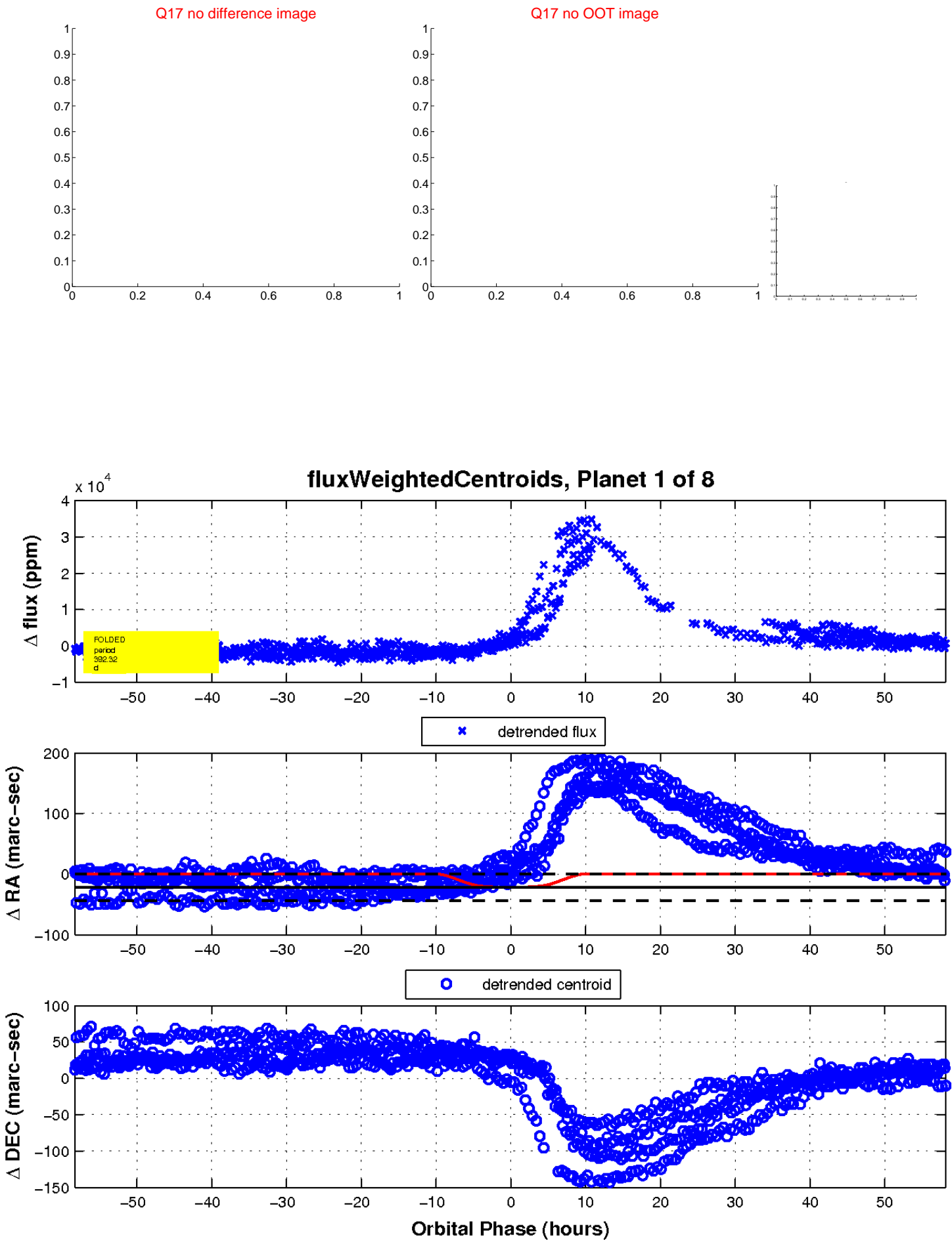
Q12 no OOT image



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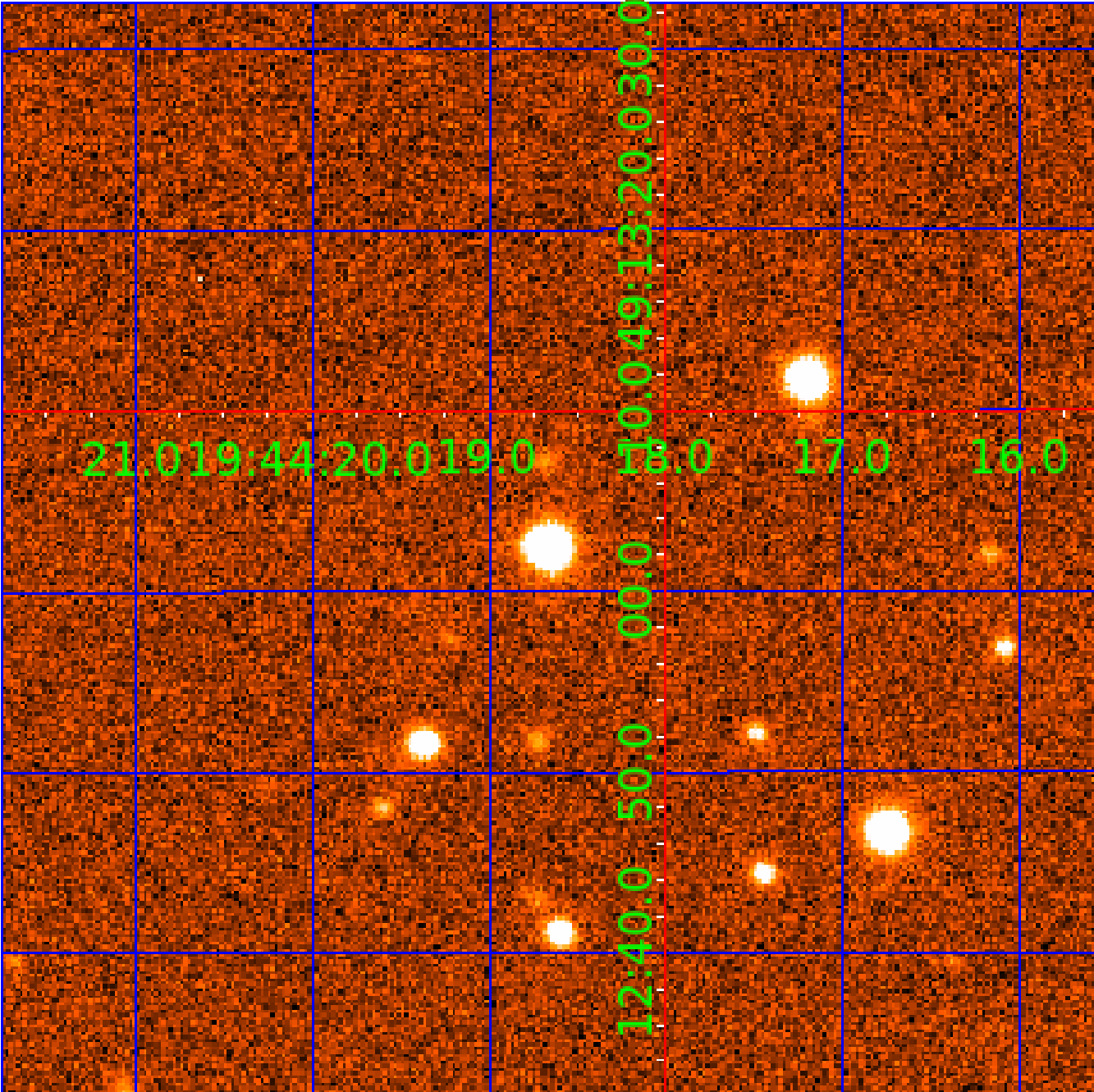
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UKIRT Image

Declination



# KIC 011412044

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011412044-03	OBS	FP	0.00	1	0	0	0	LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS
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011412044-06	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_RESOLVED_OFFSET
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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.

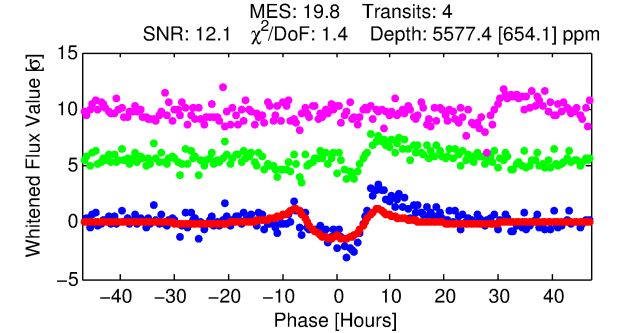
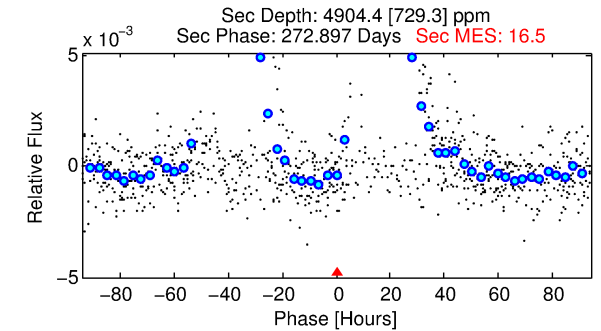
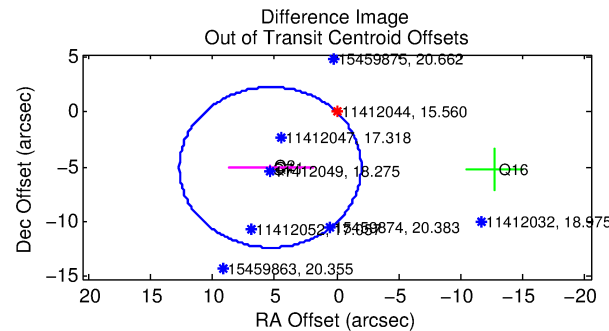
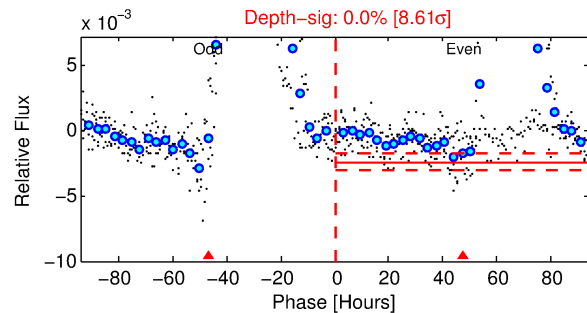
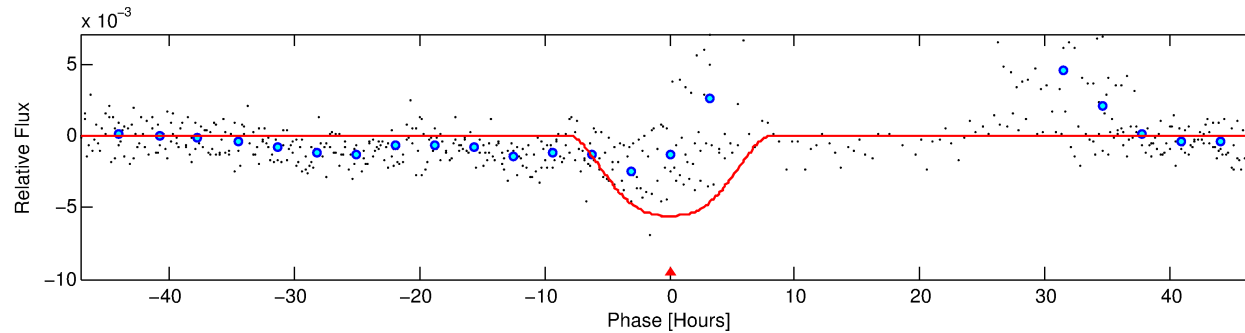
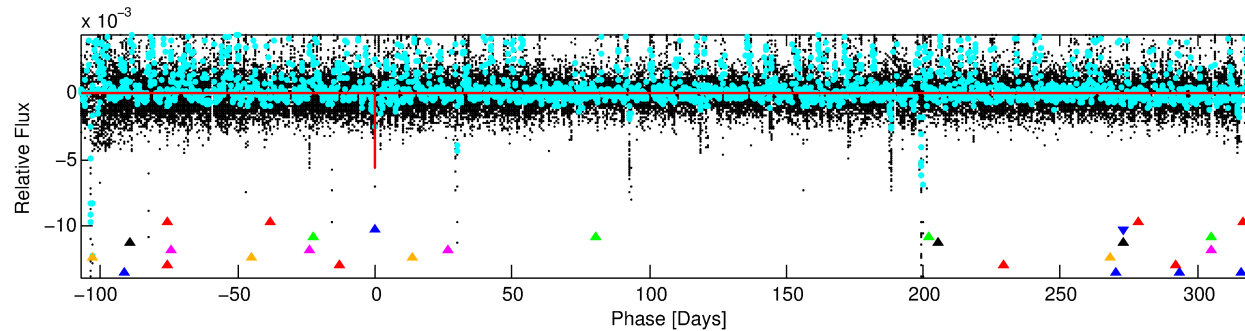
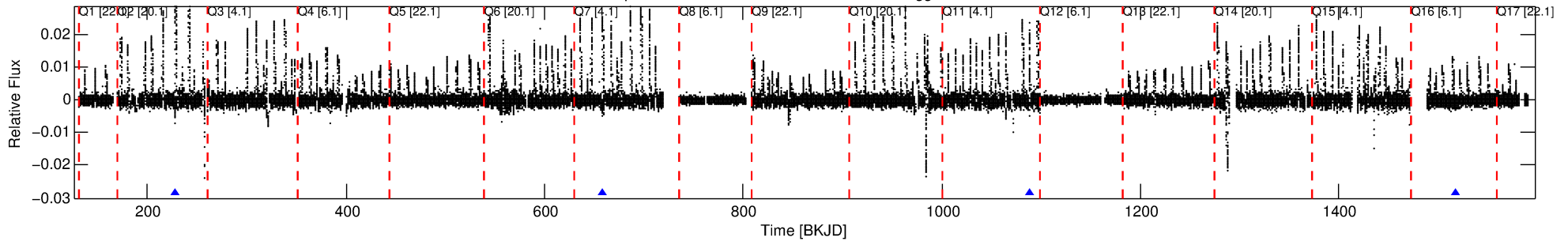
Ephemeris Match Information For 011412044-02

No Significant Match Found

# DV One-Page Summary

KIC: 11412044 Candidate: 2 of 8 Period: 429.933 d

Kp: 15.56 R\*: 0.72 Rs Teff: 4713.0 K Logg: 4.59 Fe/H: 0.020



## DV Fit Results:

Period = 429.93287 [0.00913] d  
Epoch = 228.2329 [0.0185] BKJD  
Rp/R\* = 0.0857 [0.0066]  
a/R\* = 124.61 [9.92]  
b = 0.91 [0.02]  
Seff = 0.23 [0.03]  
Teq = 176 [6] K  
Rp = 6.73 [0.77] Re  
a = 1.0050 [0.0654] AU  
Ag = 60085.35 [13831.90] [4.34σ]  
Teffp = 4260 [260] K [15.71σ]

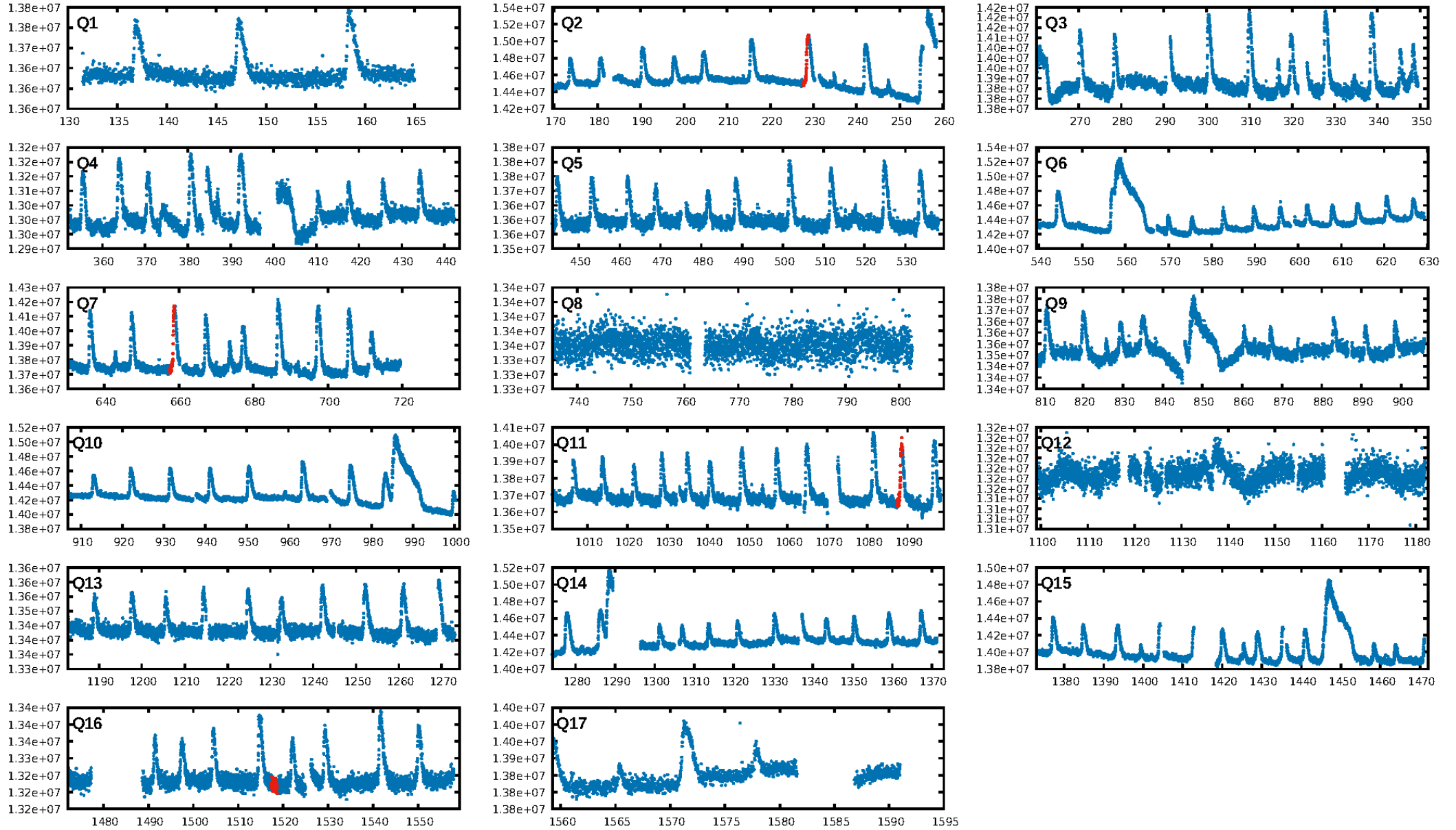
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [29.90σ]  
LongPeriod-sig: 100.0% [76.20σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 2.8%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: 0.4391  
Centroid-sig: N/A  
Centroid-so: 8.525 arcsec [5.94σ]  
OotOffset-rm: 7.357 arcsec [3.01σ]  
KicOffset-rm: 7.265 arcsec [2.58σ]  
OotOffset-st: 1/2/1/0 [4]  
KicOffset-st: 1/2/1/0 [4]  
DiffImageQuality-fgm: 0.75 [3/4]  
DiffImageOverlap-fno: 1.00 [4/4]

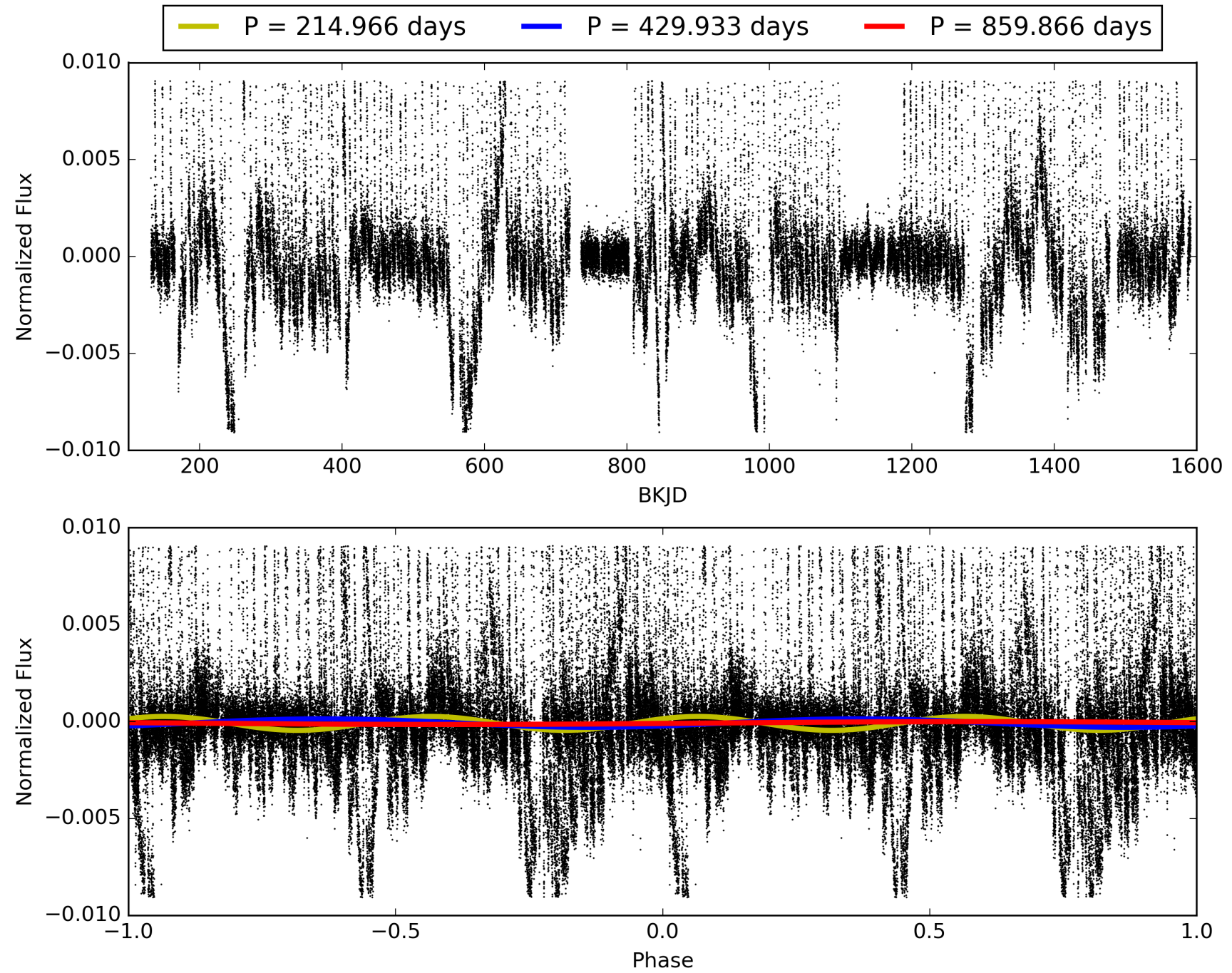
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:14:16 Z

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

# TCE 011412044-02, PDC Light Curves



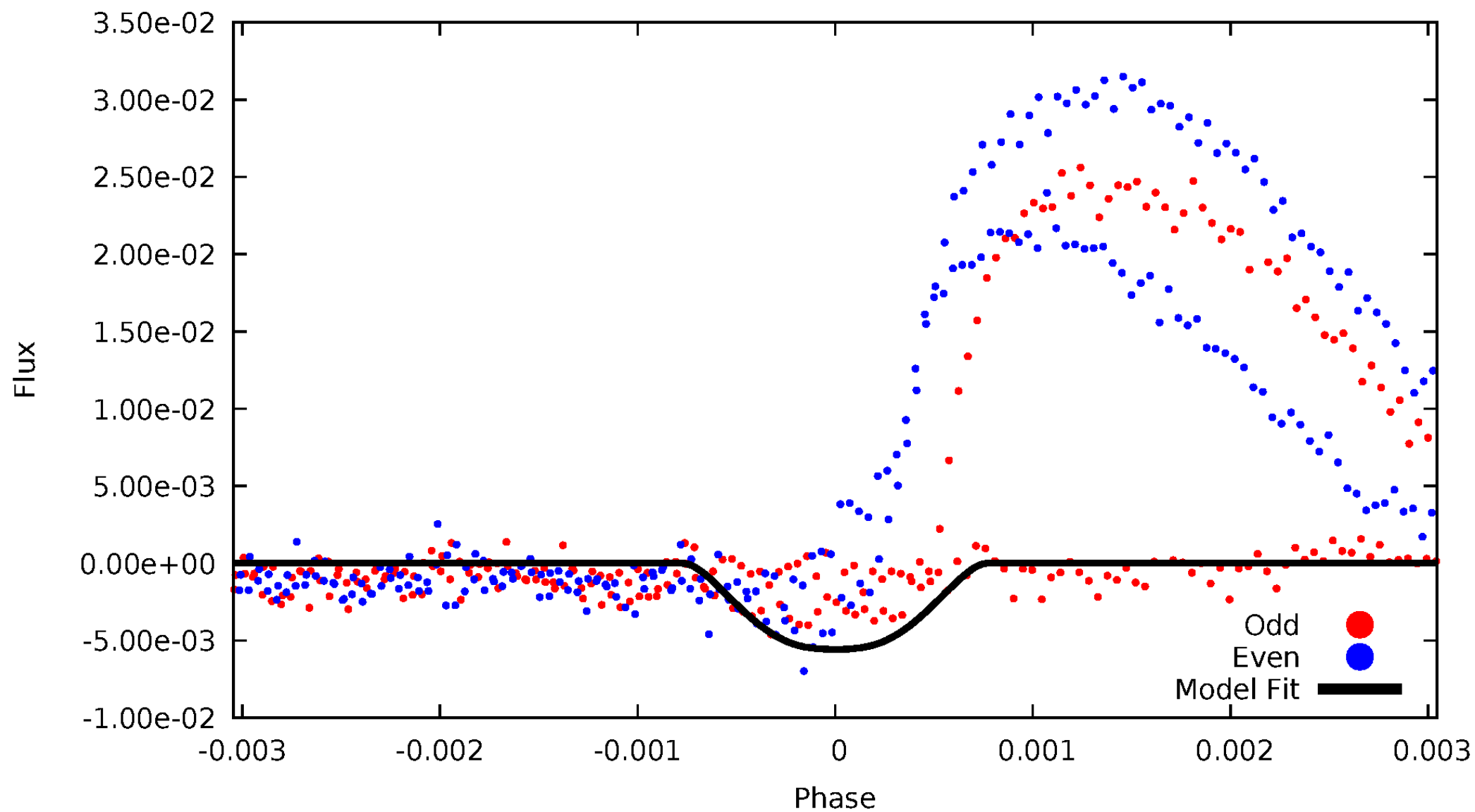
TCE 011412044-02





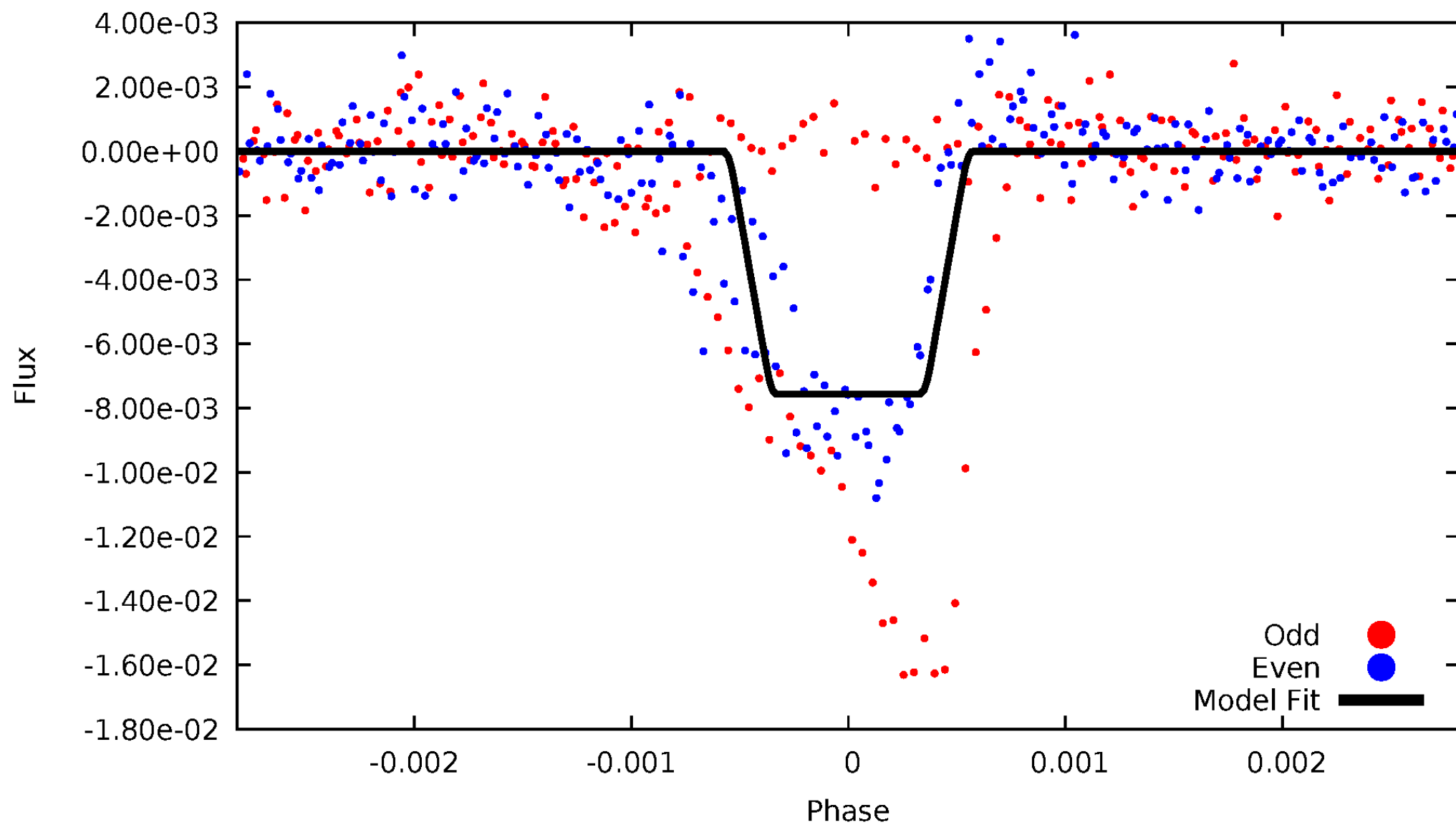
# DV Odd/Even

TCE 011412044-02



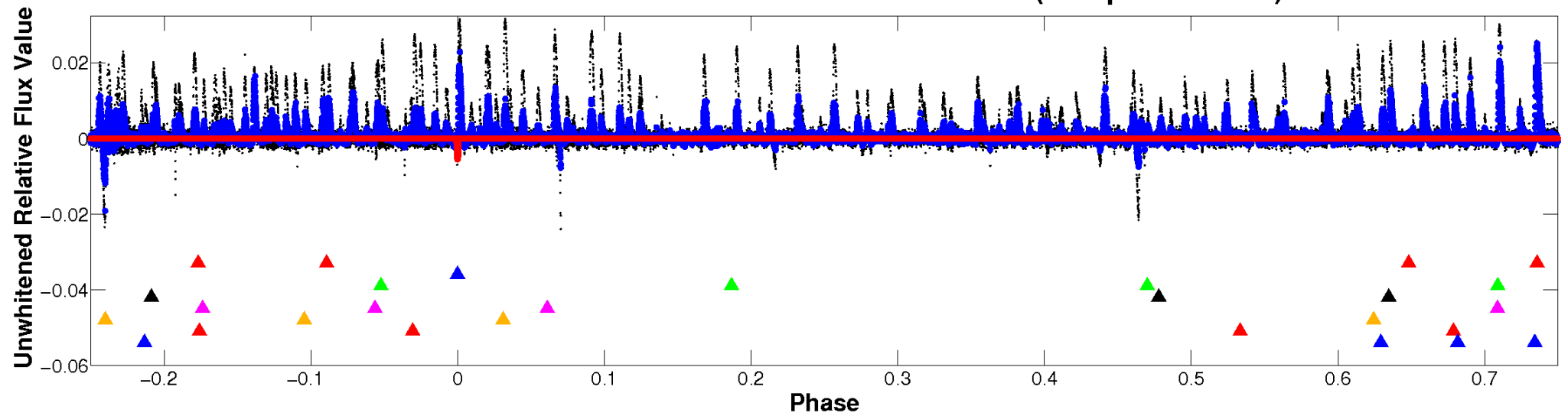
# ALT Odd/Even

TCE 011412044-02

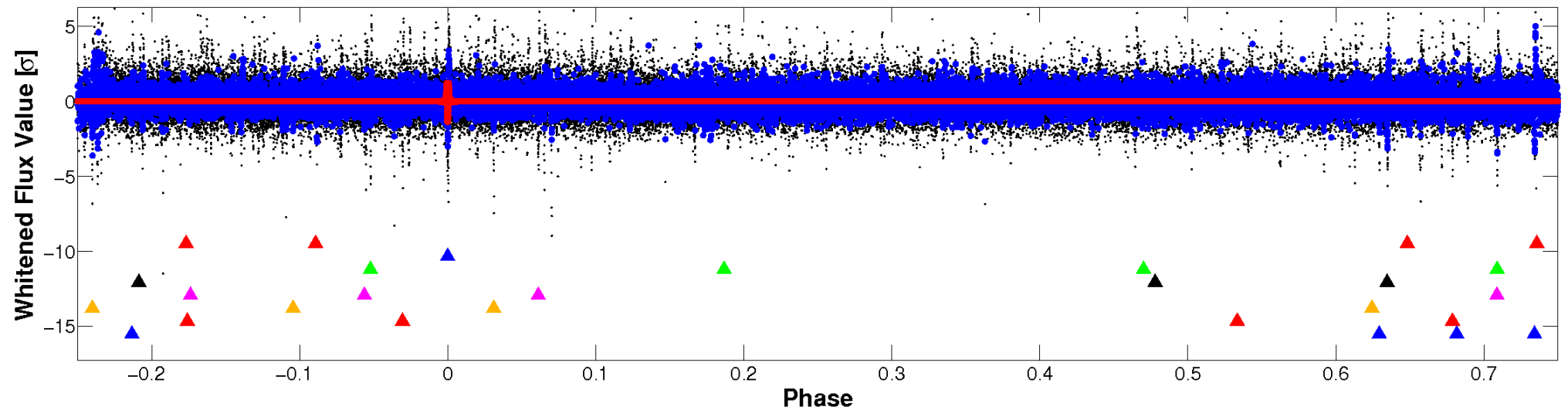


# Non-Whitened Vs. Whitened Light Curve

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

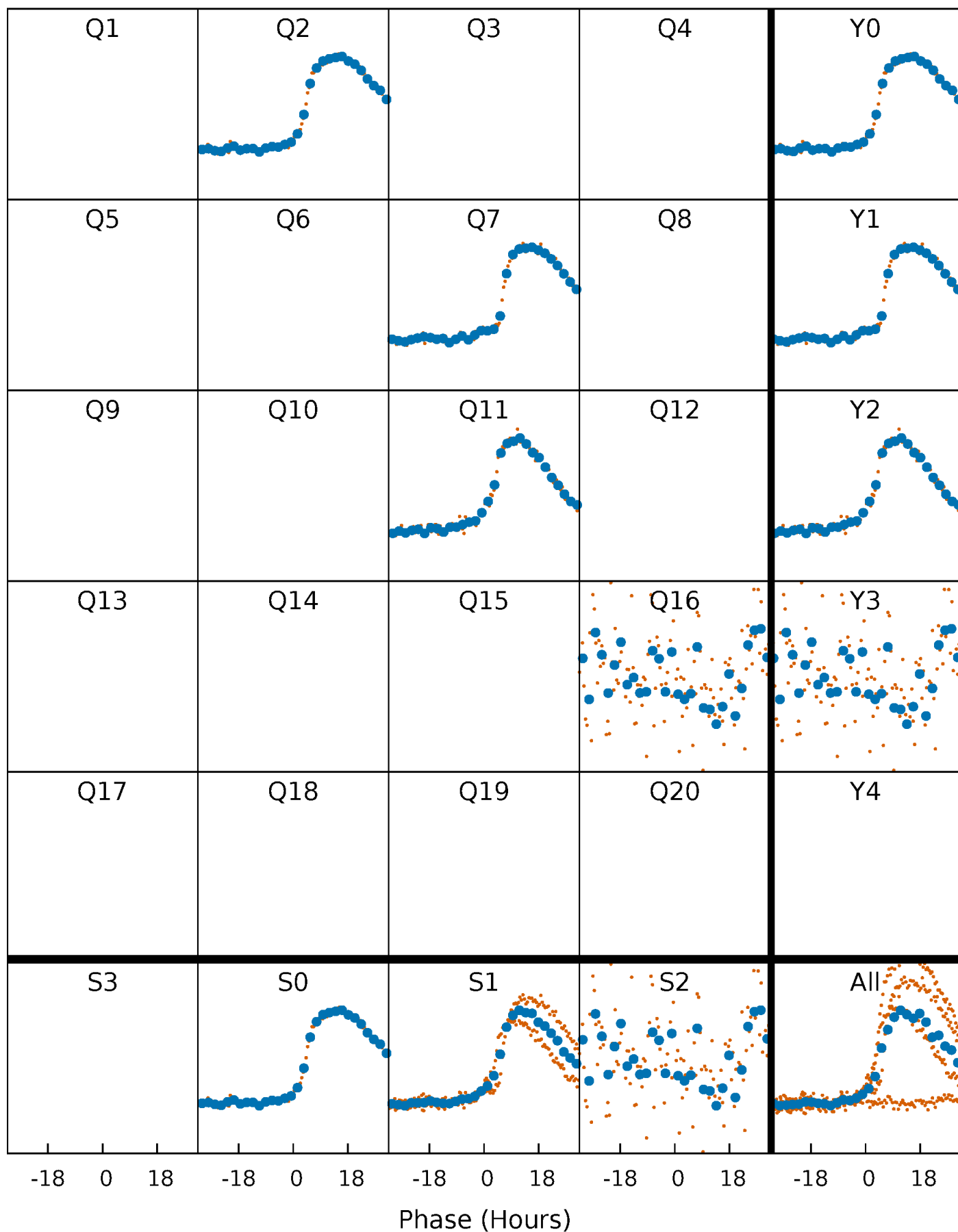


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



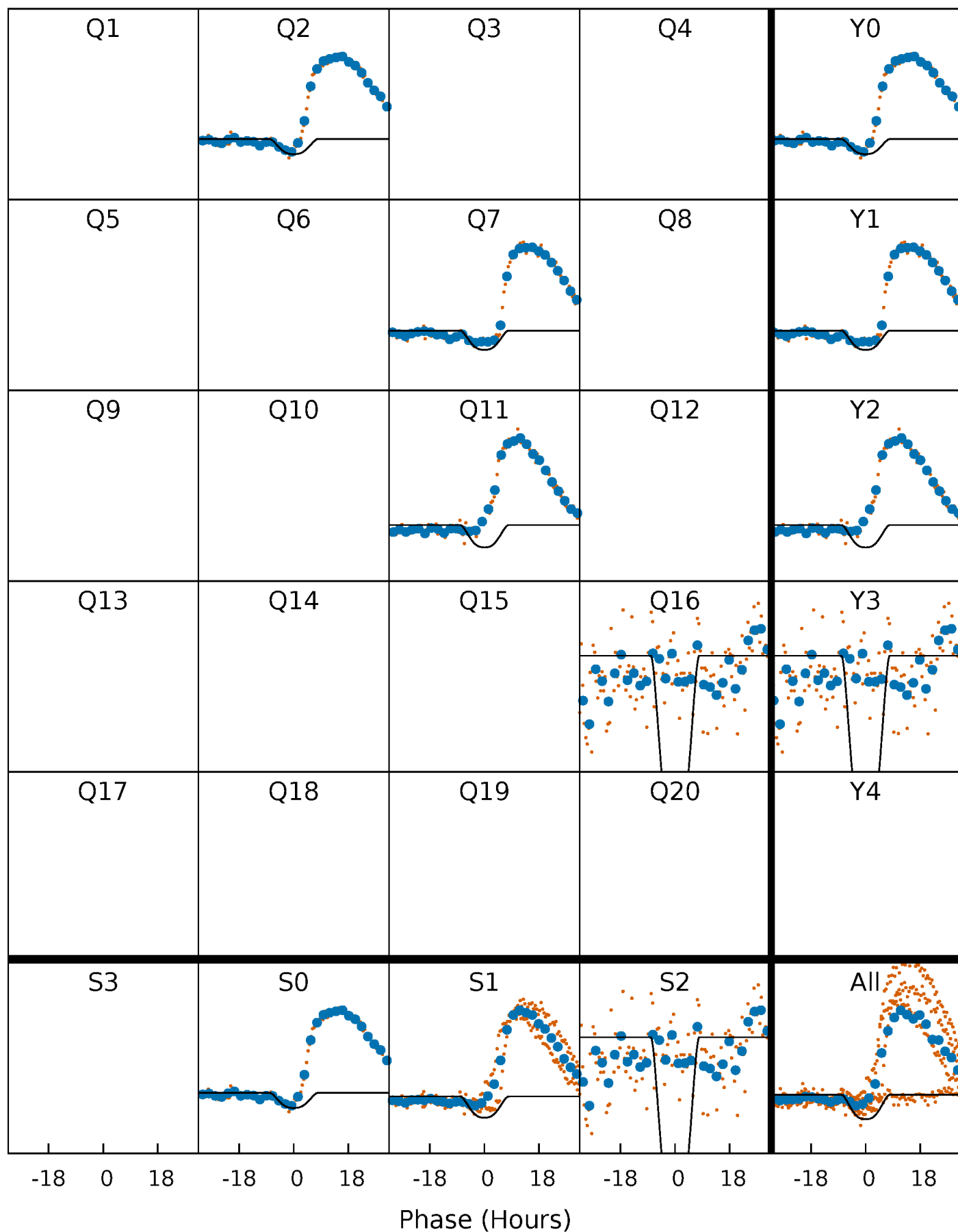
# PDC Quarter-Phased Transit Curves

TCE 011412044-02 P=429.932868 Days  $T_0=228.232852$  (BKJD)



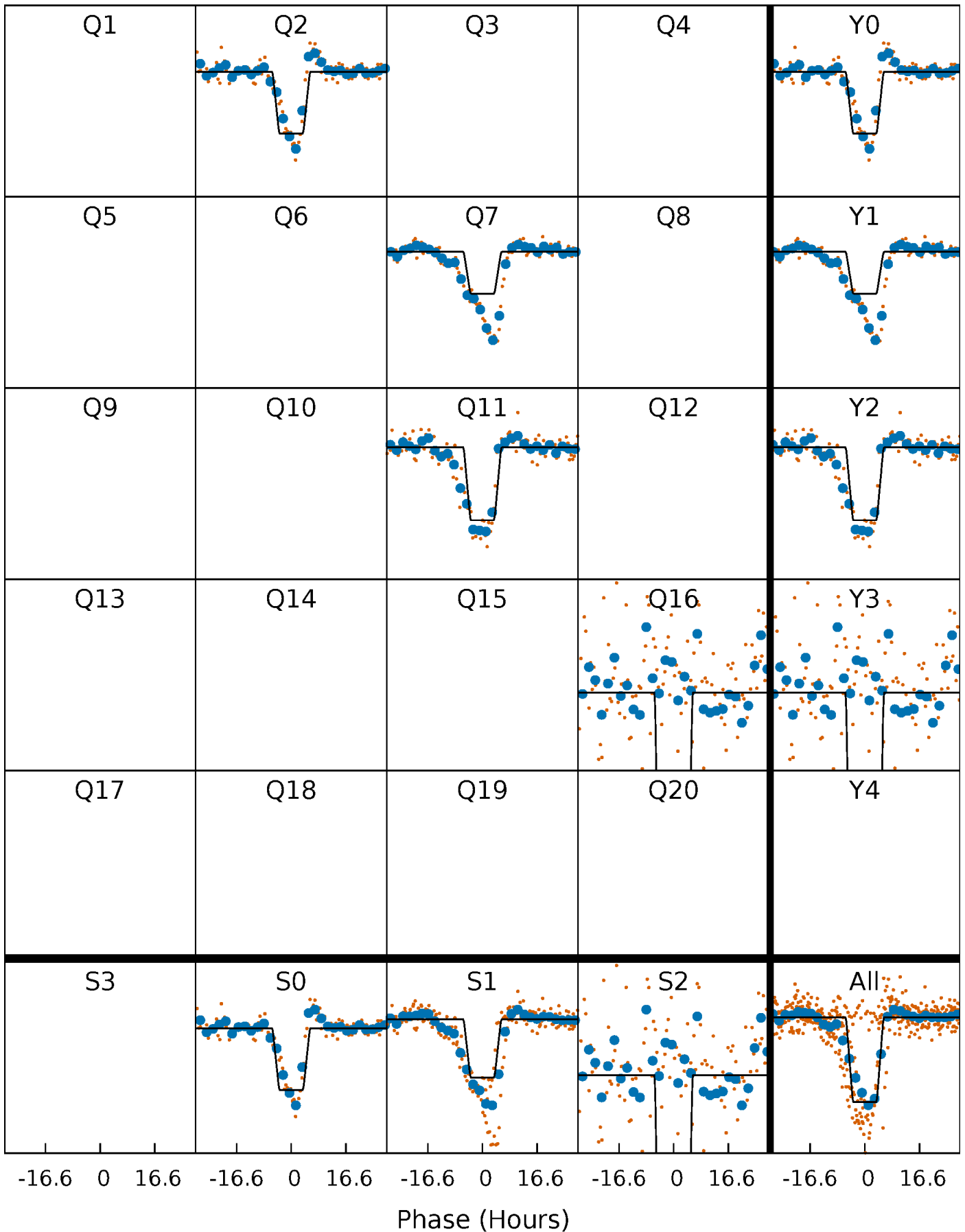
# DV Quarter-Phased Transit Curves

TCE 011412044-02 P=429.932868 Days  $T_0=228.232852$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

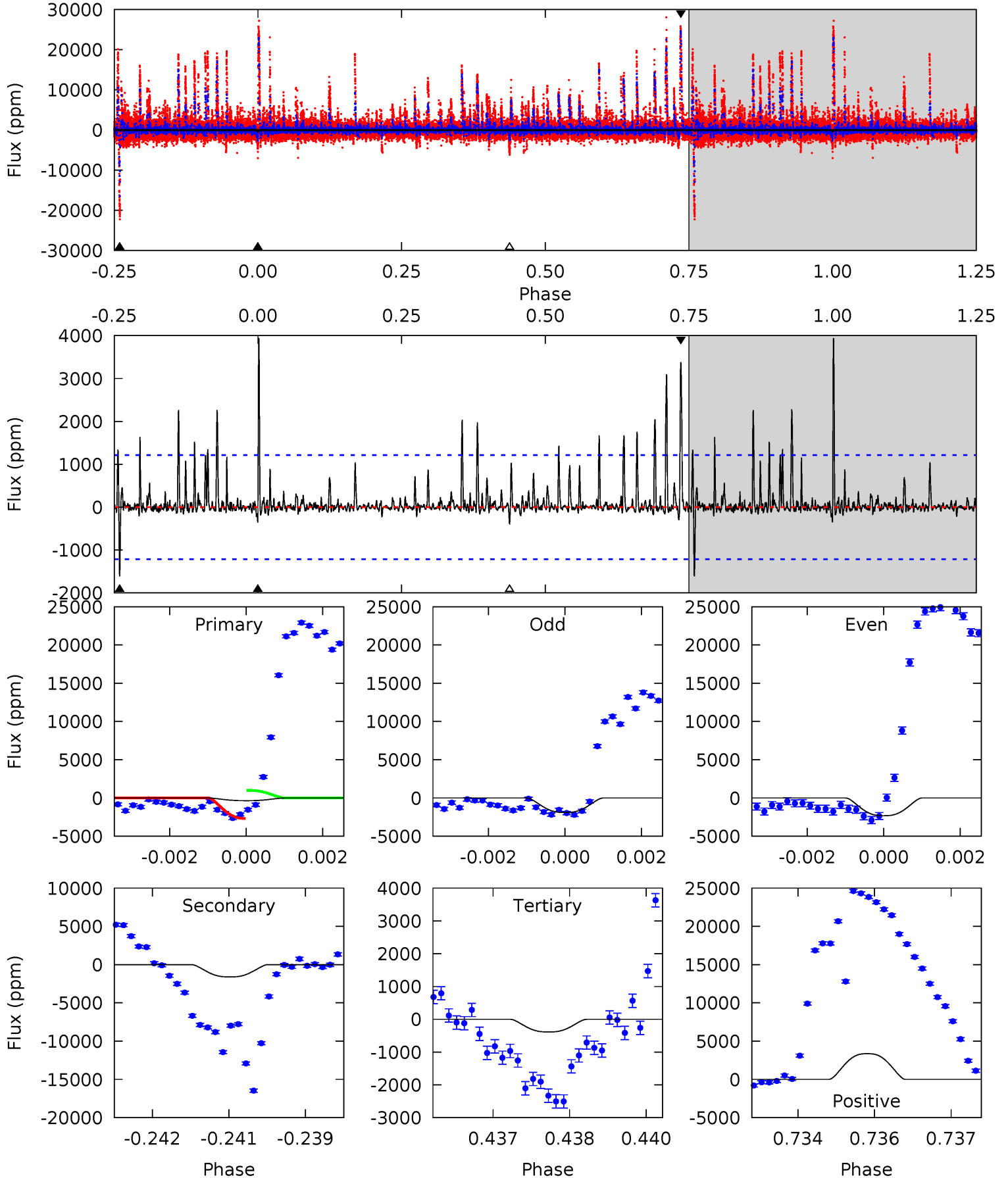
TCE 011412044-02     $P=429.928914$  Days     $T_0=228.252680$  (BKJD)



# DV Model-Shift Uniqueness Test

011412044-02, P = 429.932868 Days, E = 228.232852 Days

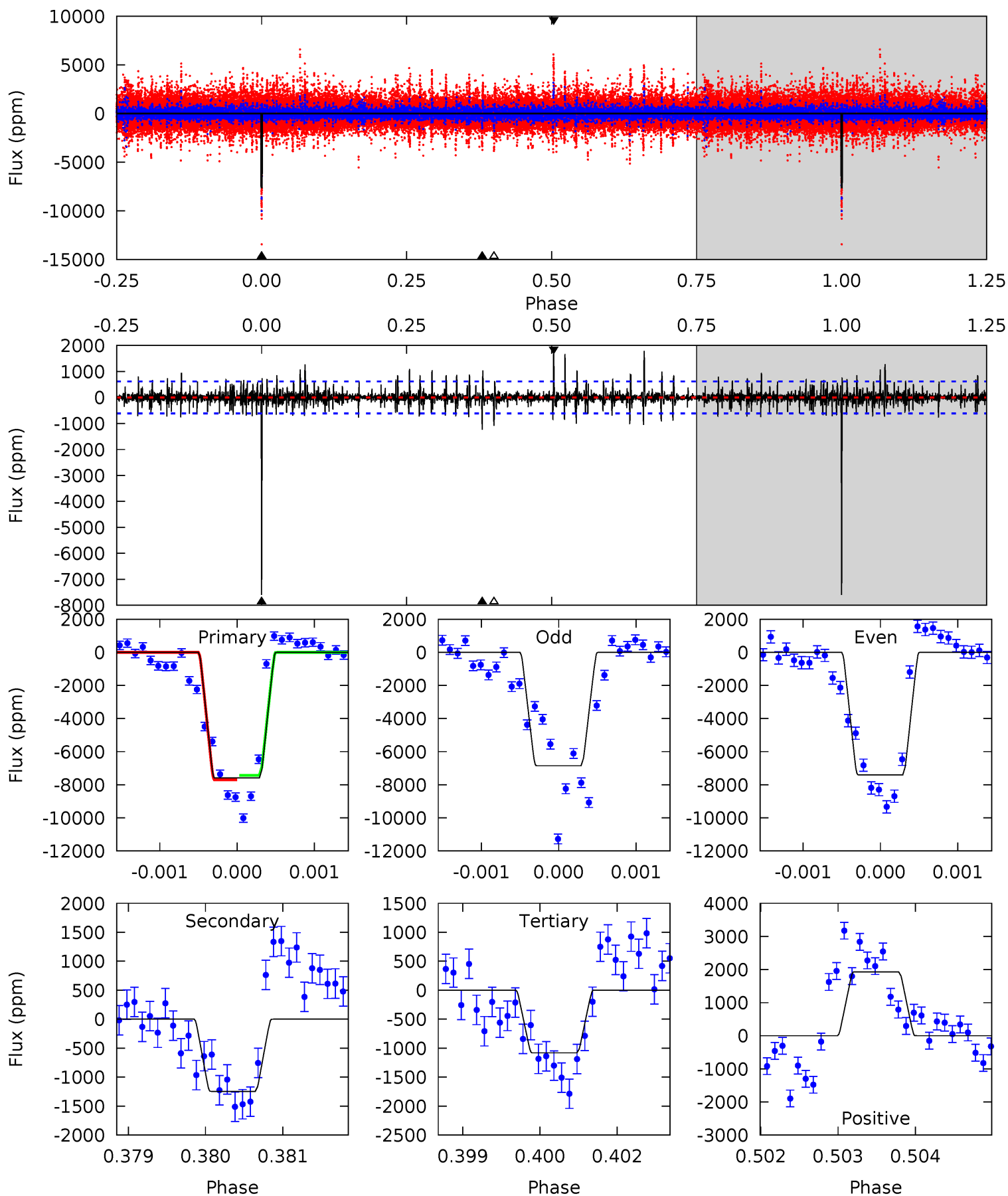
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
1.55	7.14	1.72	14.9	5.37	3.17	1.43	-0.17	-13.4	5.42	-7.77	0.59	-1.51	0.71	3.82



# Alt Model-Shift Uniqueness Test

011412044-02, P = 429.928914 Days, E = 228.252680 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
67.0	11.0	9.54	17.0	5.43	3.25	1.95	57.4	49.9	1.44	-6.05	2.60	0.92	0.20	1.25





### Stellar Parameters For KIC 011412044

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$4713^{+125}_{-139}$	$4.588^{+0.042}_{-0.035}$	$0.020^{+0.250}_{-0.300}$	$0.720^{+0.051}_{-0.061}$	$0.733^{+0.064}_{-0.058}$	$2.764^{+0.592}_{-0.374}$
	+3%/-3%	+1%/-1%	+1250%/-1500%	+7%/-8%	+9%/-8%	+21%/-14%
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 011412044-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-1612 \pm 226$	$6.77^{+0.62}_{-0.57}$	$246^{+8}_{-9}$	$3579^{+154}_{-144}$	$19666^{+4571}_{-3654}$
Alt.	$-1245 \pm 113$	$6.88^{+0.57}_{-0.64}$	$246^{+8}_{-8}$	$3426^{+116}_{-115}$	$14712^{+3319}_{-2385}$

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

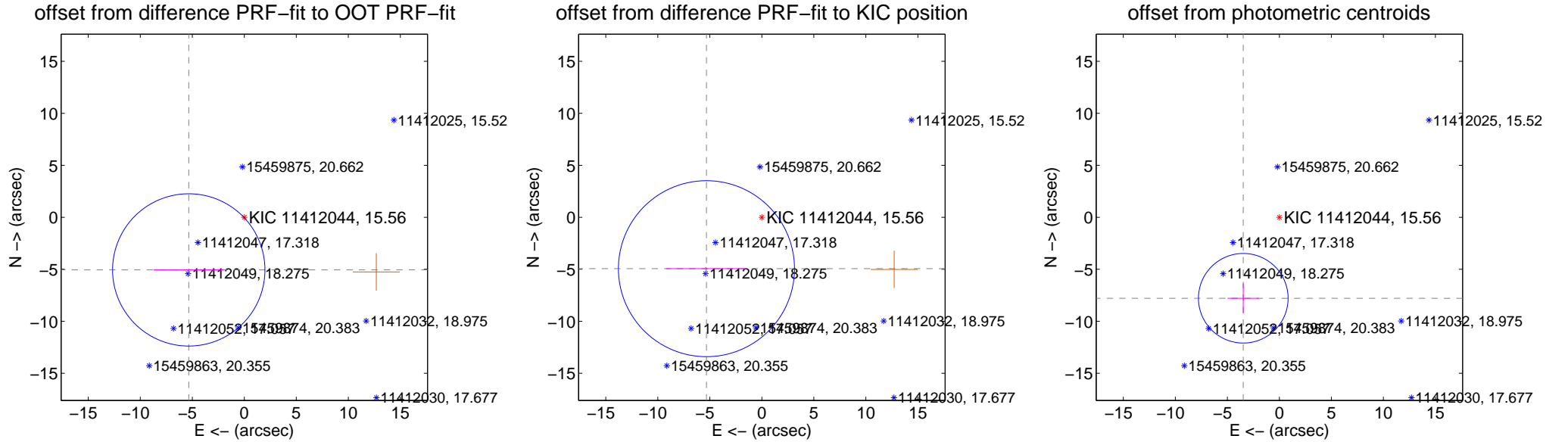
## DV Centroid Data

Supplemental centroid analysis for 011412044-02. Kepler magnitude: 15.56. Transit SNR 12.05

There are 3 quarters with good PRF difference image offsets

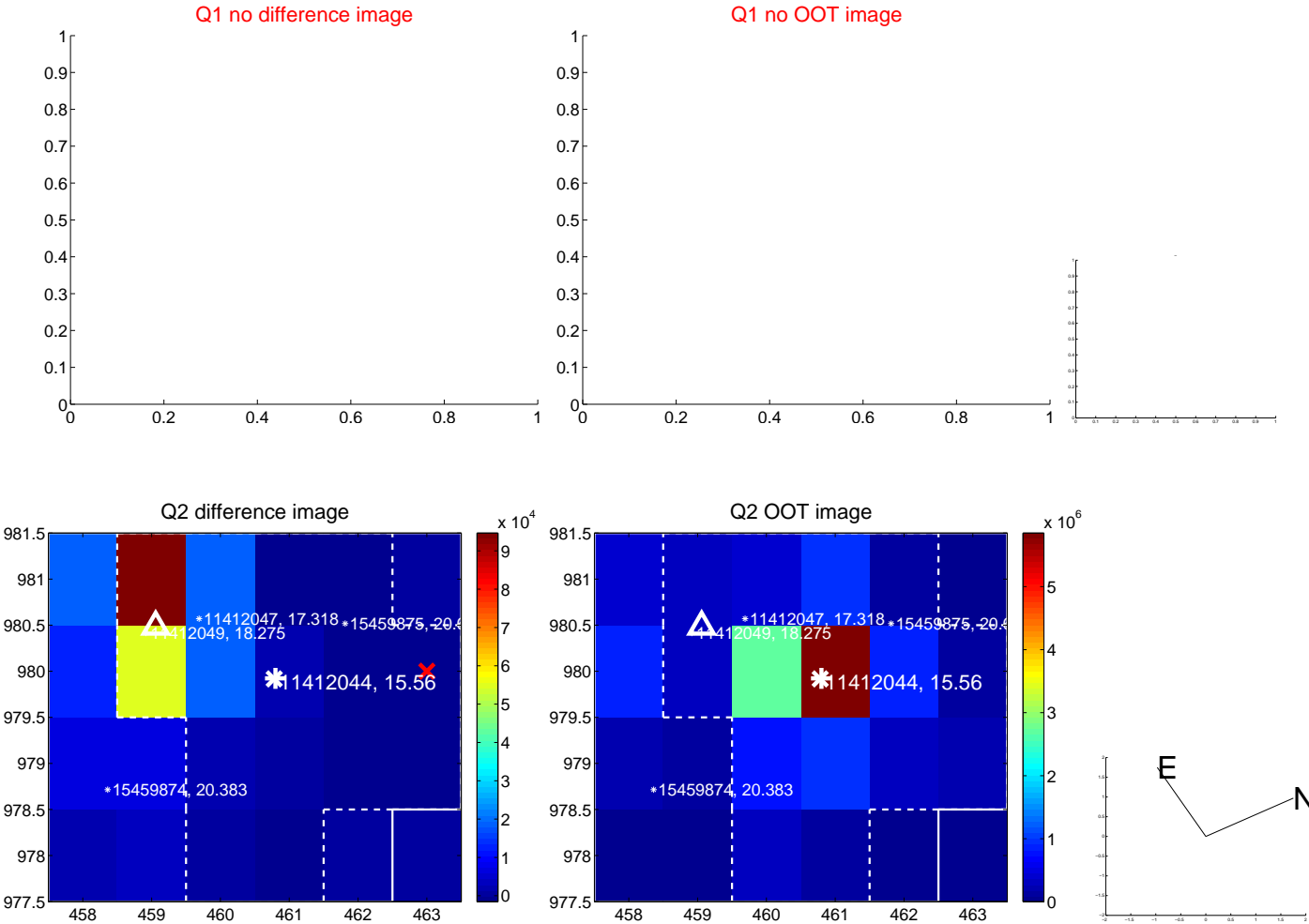
The direct PRF centroid is offset from the target star catalog position by about 0.24 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$7.357 \pm 2.441$	3.01	$5.340 \pm 3.392$	$-5.060 \pm 0.079$
PRF-fit source offset from KIC position	$7.265 \pm 2.821$	2.58	$5.324 \pm 3.862$	$-4.943 \pm 0.073$
photometric centroid source offset	$8.53 \pm 1.44$	5.94	$3.47 \pm 1.51$	$-7.79 \pm 1.42$



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



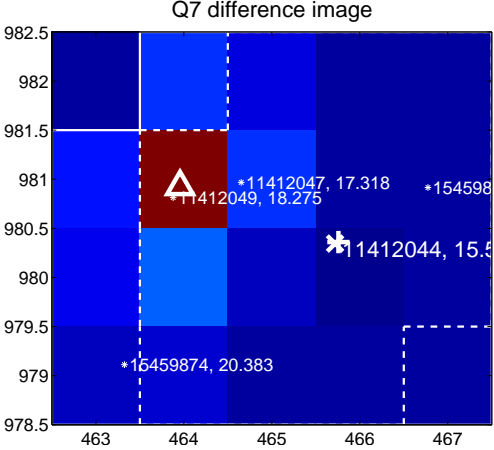
Q6 no difference image



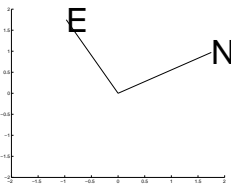
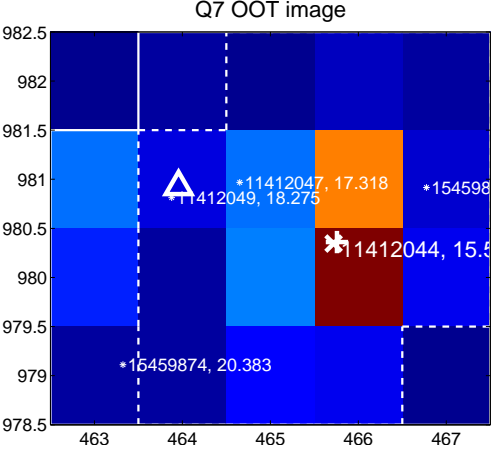
Q6 no OOT image



Q7 difference image



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.

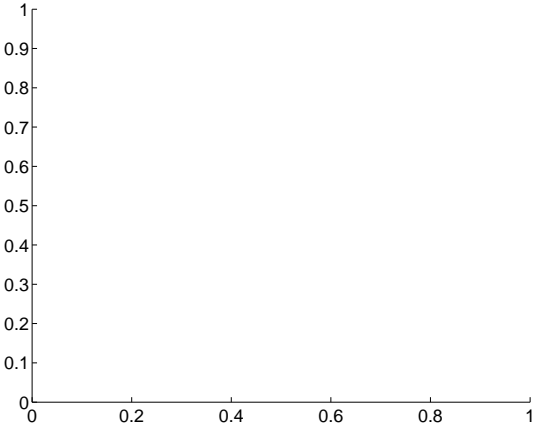
Q9 no difference image



Q9 no OOT image



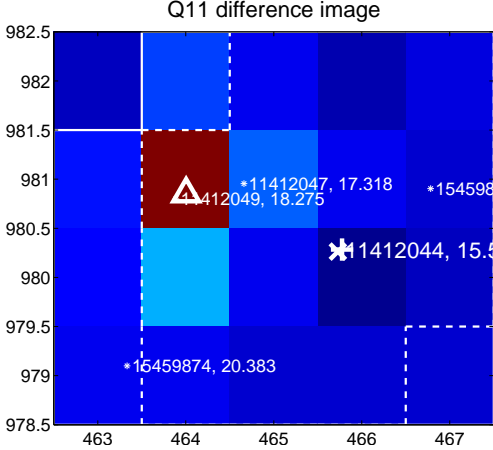
Q10 no difference image



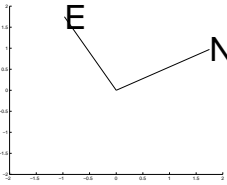
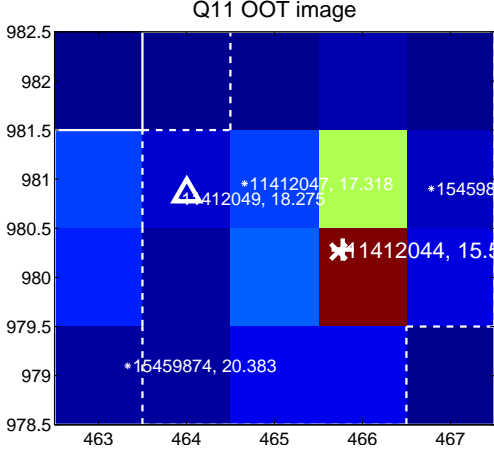
Q10 no OOT image



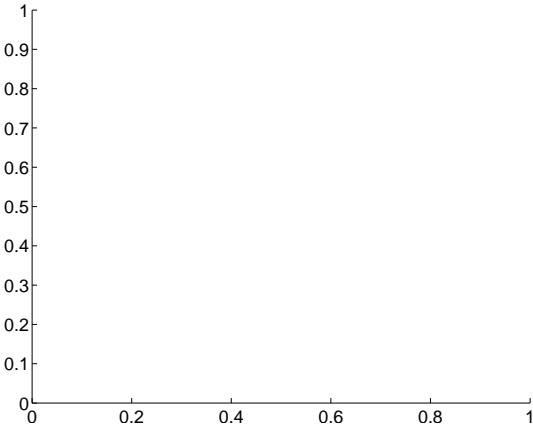
Q11 difference image



Q11 OOT image



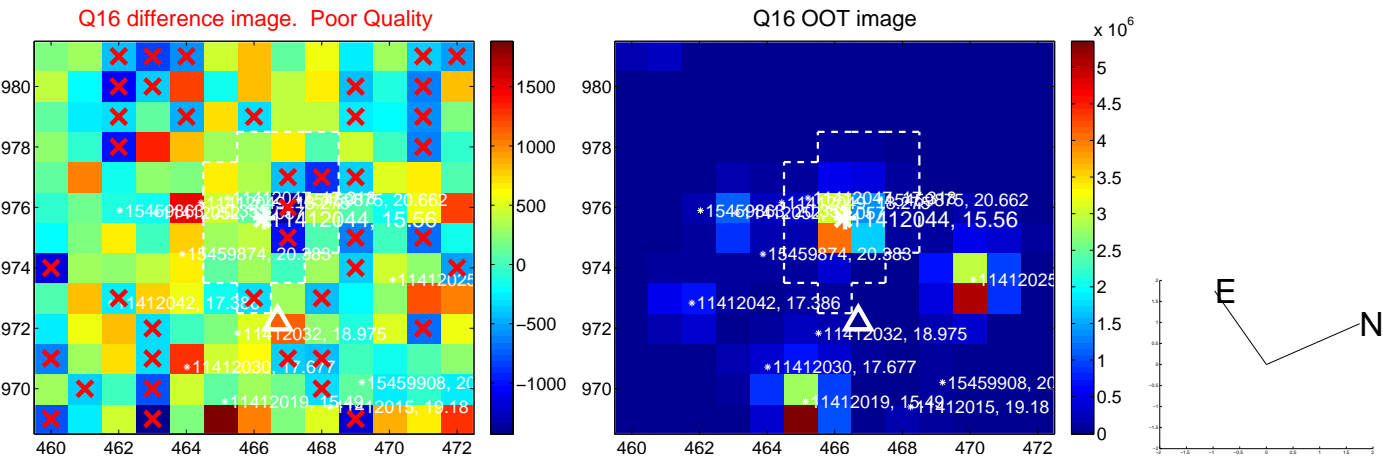
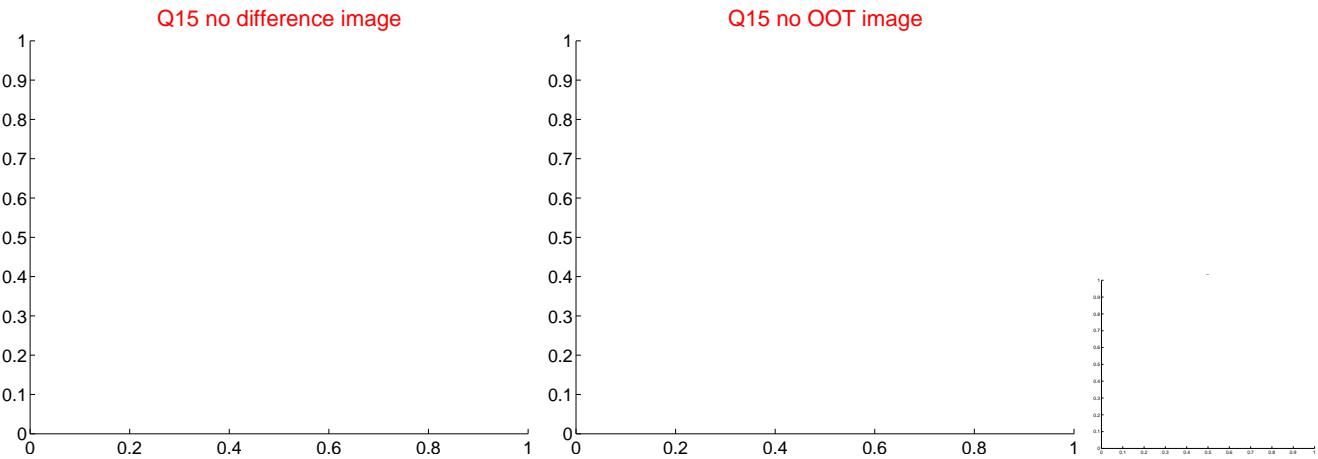
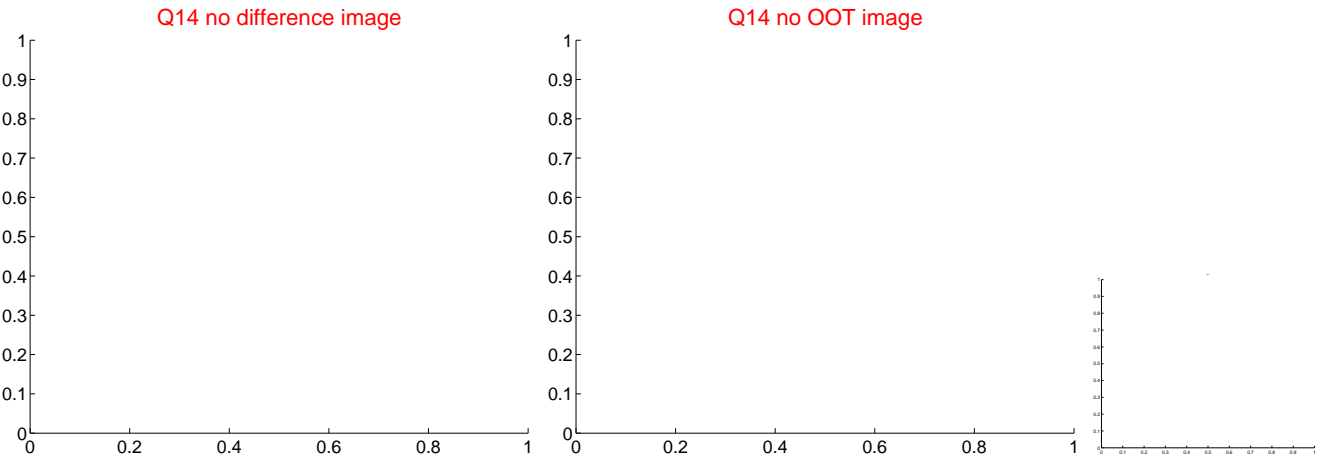
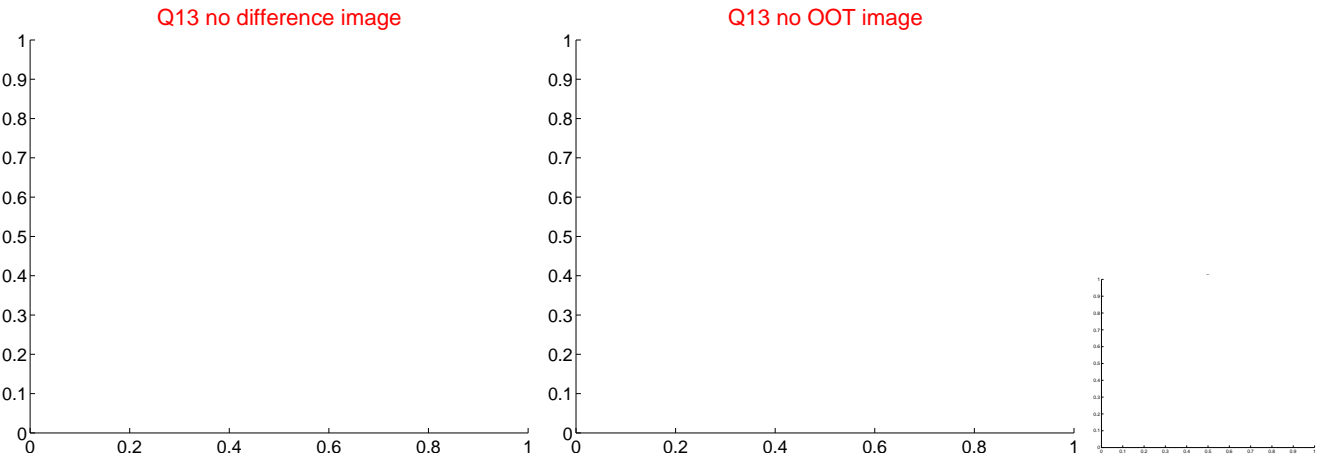
Q12 no difference image



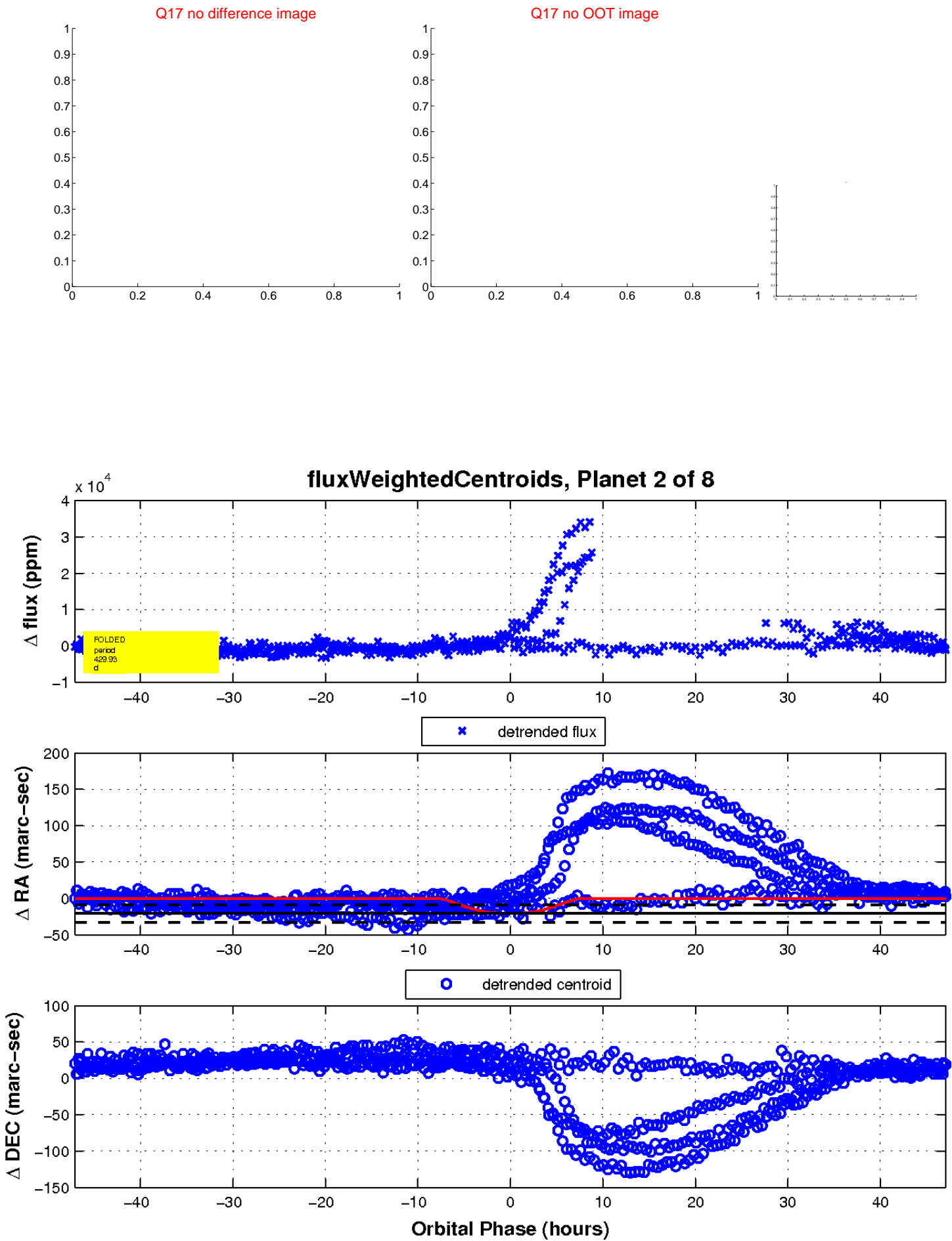
Q12 no OOT image



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

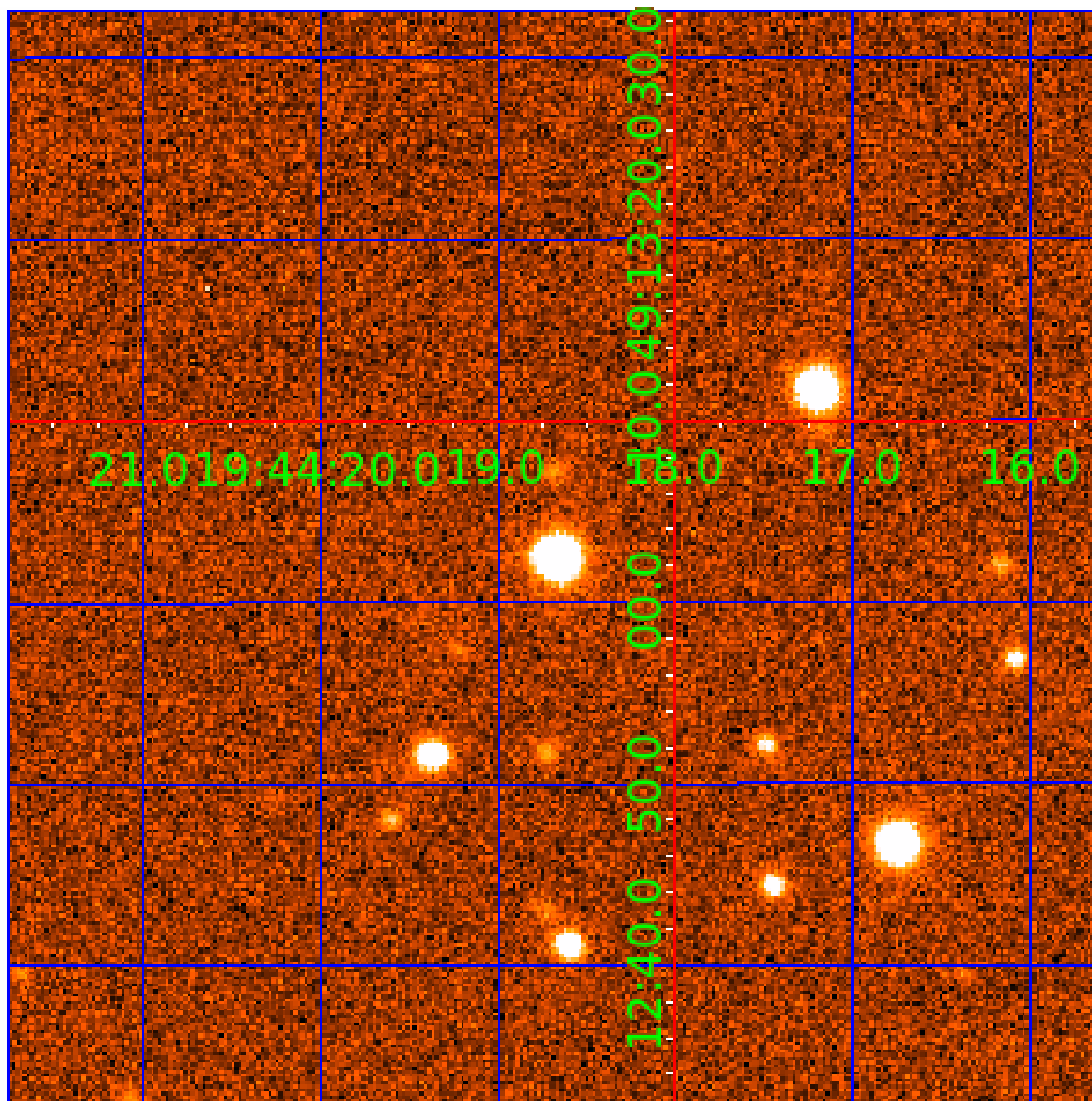


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 011412044

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
011412044-01	OBS	No	392.316863	189.867641	10821.9	19.439	20.2	18.4	0.72	4713	8.63	0.26
011412044-02	OBS	No	429.932868	228.232852	5577.4	15.710	19.8	12.1	0.72	4713	6.74	0.23
011412044-03	OBS	No	327.228963	308.514574	9609.8	17.960	18.9	15.3	0.72	4713	13.25	0.33
011412044-04	OBS	No	497.309634	433.712106	6509.3	14.267	18.4	15.5	0.72	4713	6.38	0.19
011412044-05	OBS	No	379.431472	254.543571	7842.6	13.668	18.1	13.7	0.72	4713	8.89	0.27
011412044-06	OBS	No	371.644294	241.608392	6772.4	13.431	17.6	13.4	0.72	4713	11.28	0.28
011412044-07	OBS	No	367.441035	215.105554	12056.7	23.794	18.9	15.9	0.72	4713	14.70	0.28
011412044-08	OBS	No	407.377075	136.506999	2052.6	9.000	18.2	-1.0	0.72	4713	3.13	0.24

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
011412044-01	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—CENT_RESOLVED_OFFSET
011412044-02	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_RESOLVED_OFFSET
011412044-03	OBS	FP	0.00	1	0	0	0	LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS
011412044-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
011412044-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
011412044-06	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_RESOLVED_OFFSET
011412044-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS
011412044-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—CENT_NOFITS

**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.

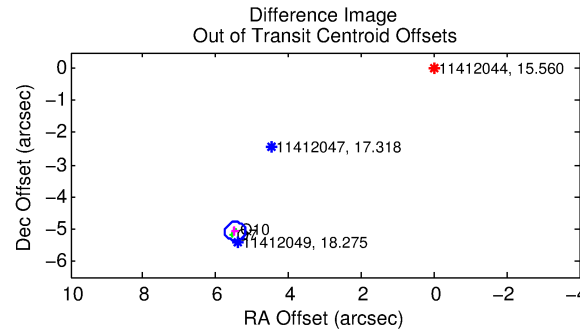
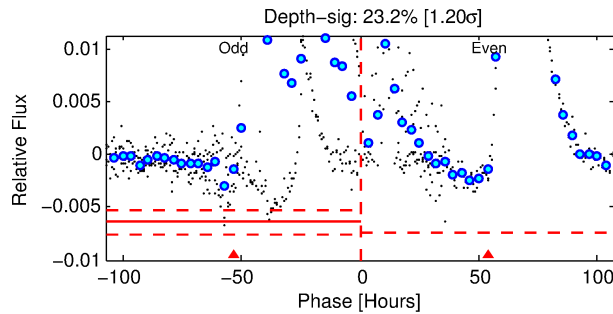
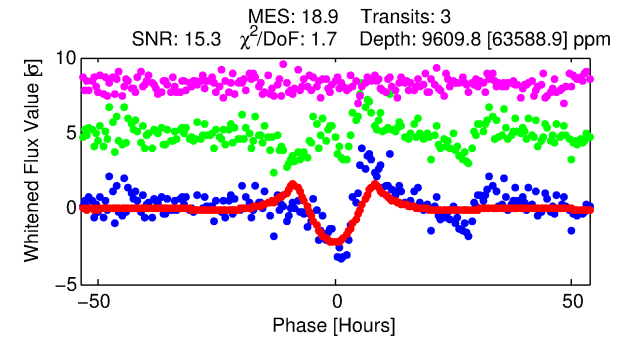
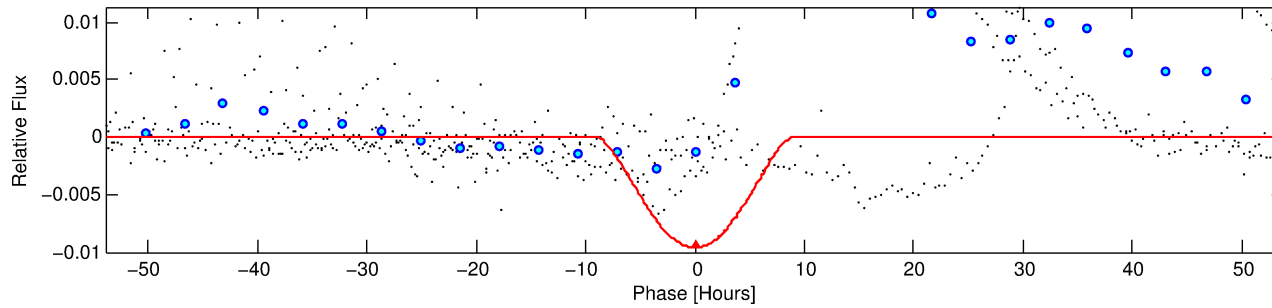
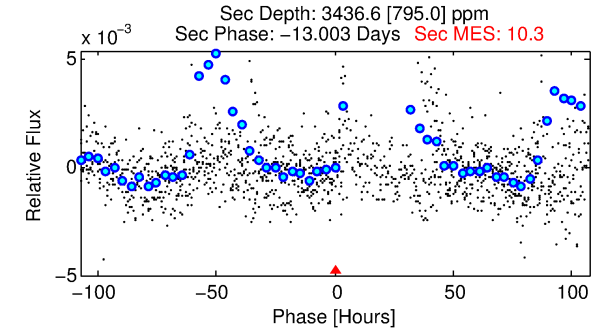
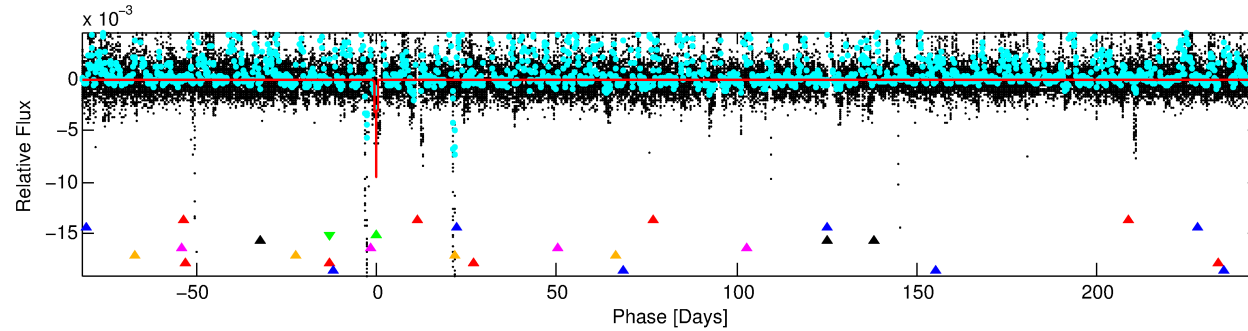
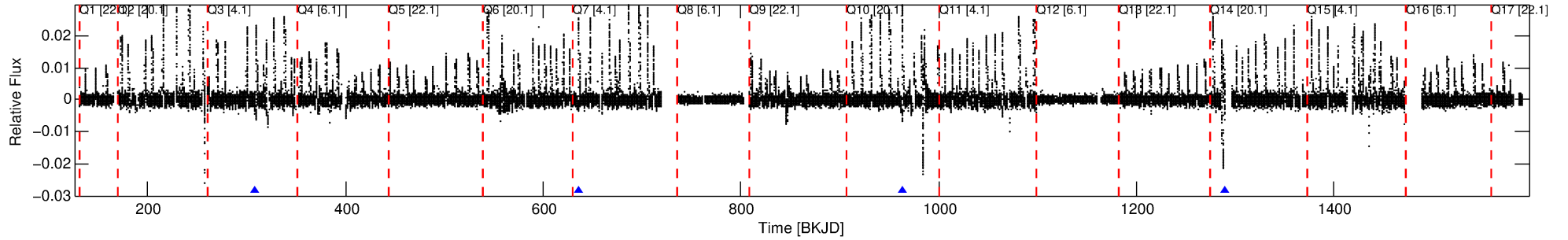
Ephemeris Match Information For 011412044-03

No Significant Match Found

# DV One-Page Summary

KIC: 11412044 Candidate: 3 of 8 Period: 327.229 d

Kp: 15.56 R\*: 0.72 Rs Teff: 4713.0 K Logg: 4.59 Fe/H: 0.020



## DV Fit Results:

Period = 327.22896 [0.01511] d  
Epoch = 308.5146 [0.0197] BKJD  
Rp/R\* = 0.1687 [0.3076]  
a/R\* = 84.19 [20.08]  
b = 1.00 [1.13]  
Seff = 0.33 [0.05]  
Teq = 193 [7] K  
Rp = 13.25 [24.19] Re  
a = 0.8378 [0.0545] AU  
Ag = 7557.39 [27628.51] [0.27σ]  
Teffp = 2779 [2540] K [1.02σ]

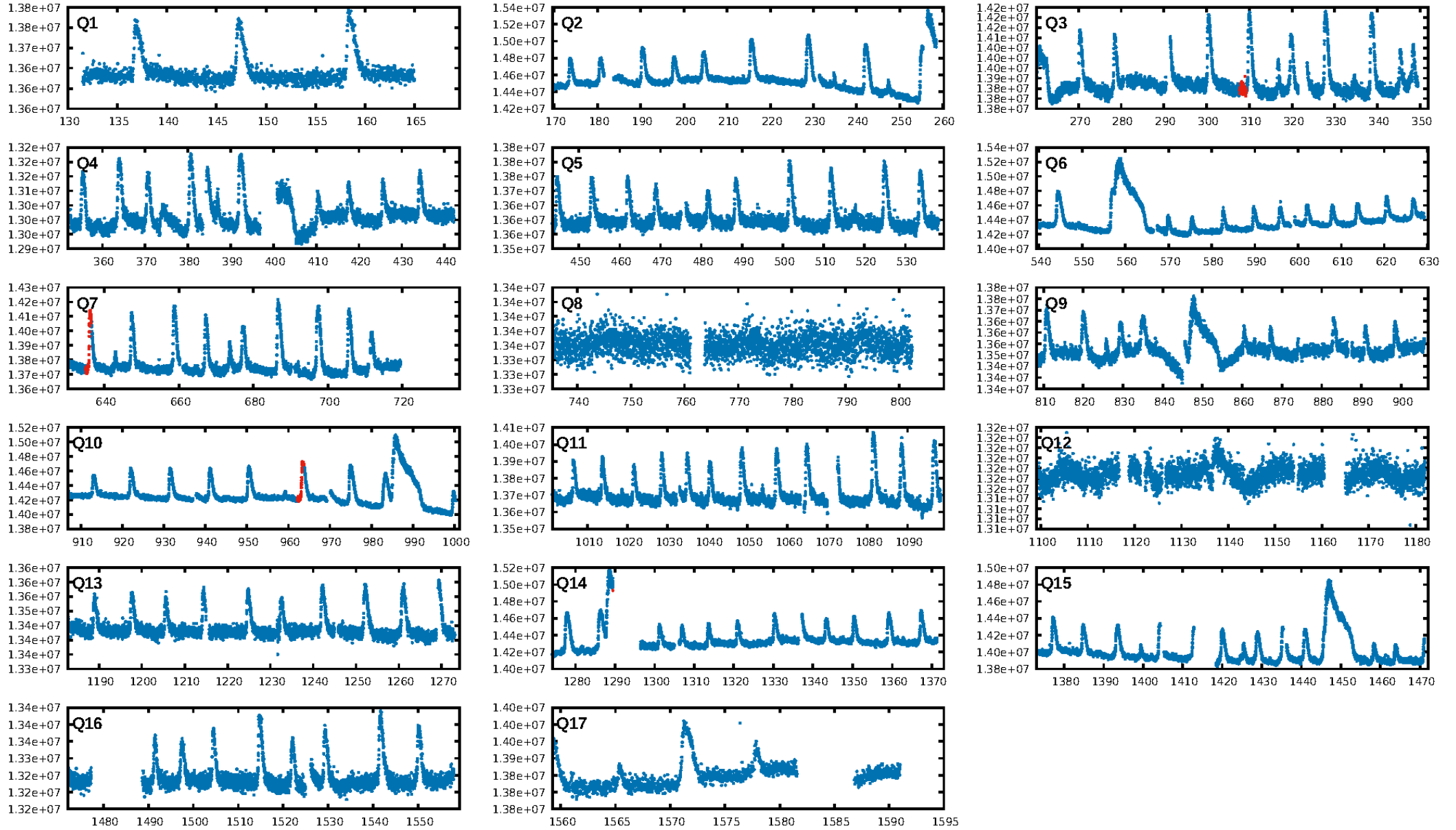
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [32.37σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 0.2%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -2.399  
Centroid-sig: N/A  
Centroid-so: 6.371 arcsec [5.57σ]  
OotOffset-rm: 7.468 arcsec [76.75σ]  
KicOffset-rm: 7.347 arcsec [89.83σ]  
OotOffset-st: 1/1/0/0 [2]  
KicOffset-st: 1/1/0/0 [2]  
DiffImageQuality-fgm: 1.00 [2/2]  
DiffImageOverlap-fno: 1.00 [3/3]

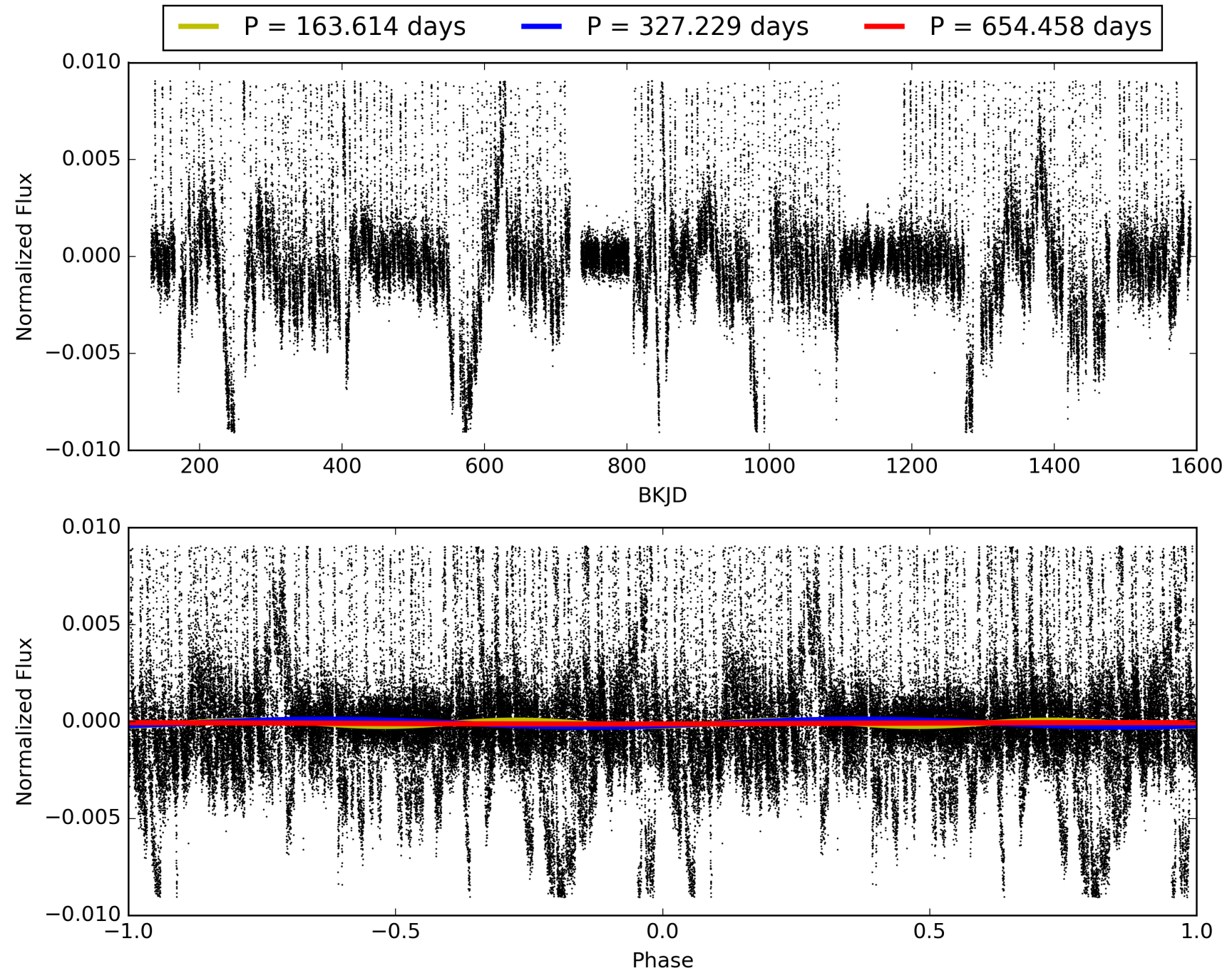
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:14:24 Z

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

# TCE 011412044-03, PDC Light Curves

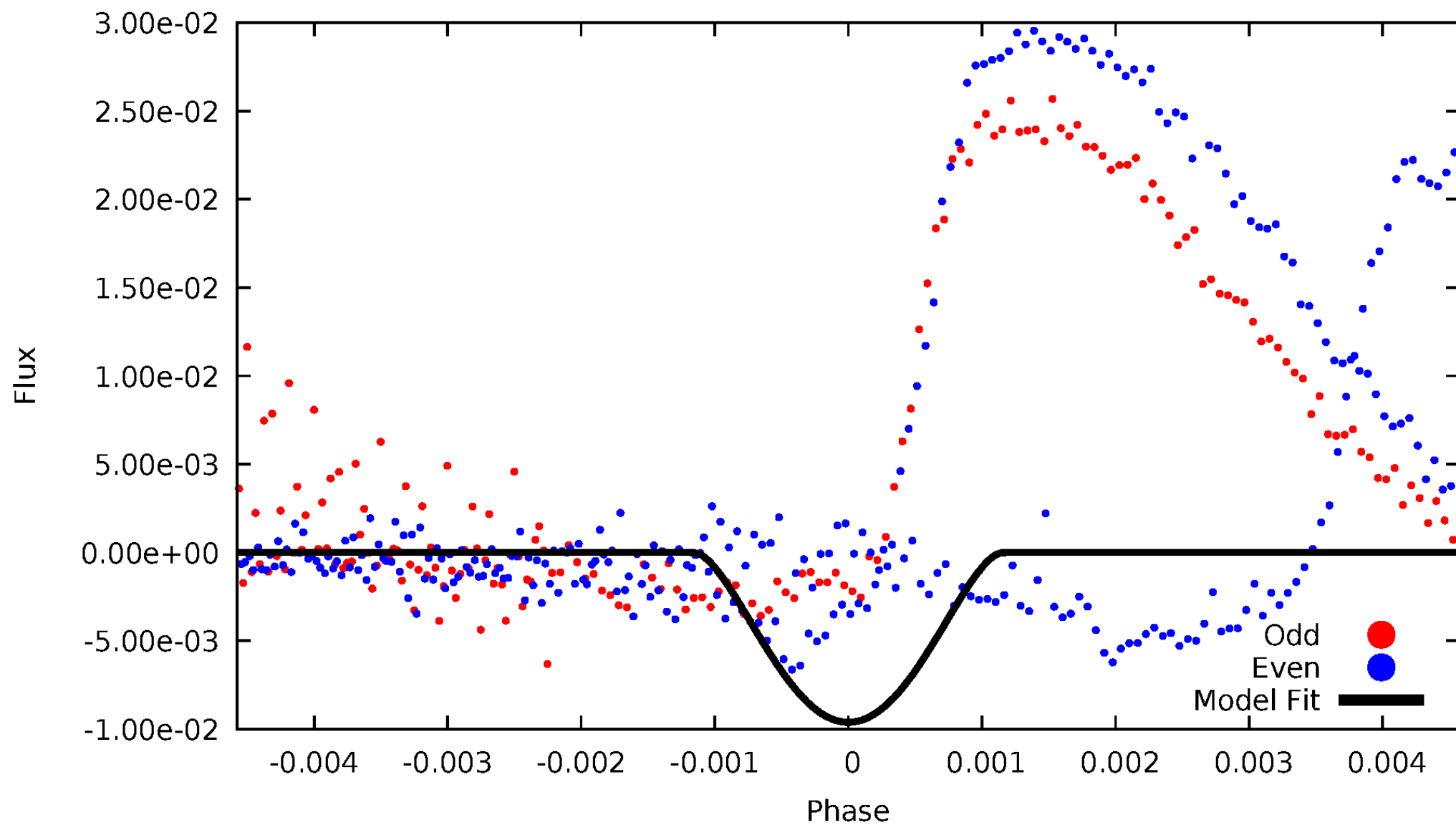


TCE 011412044-03



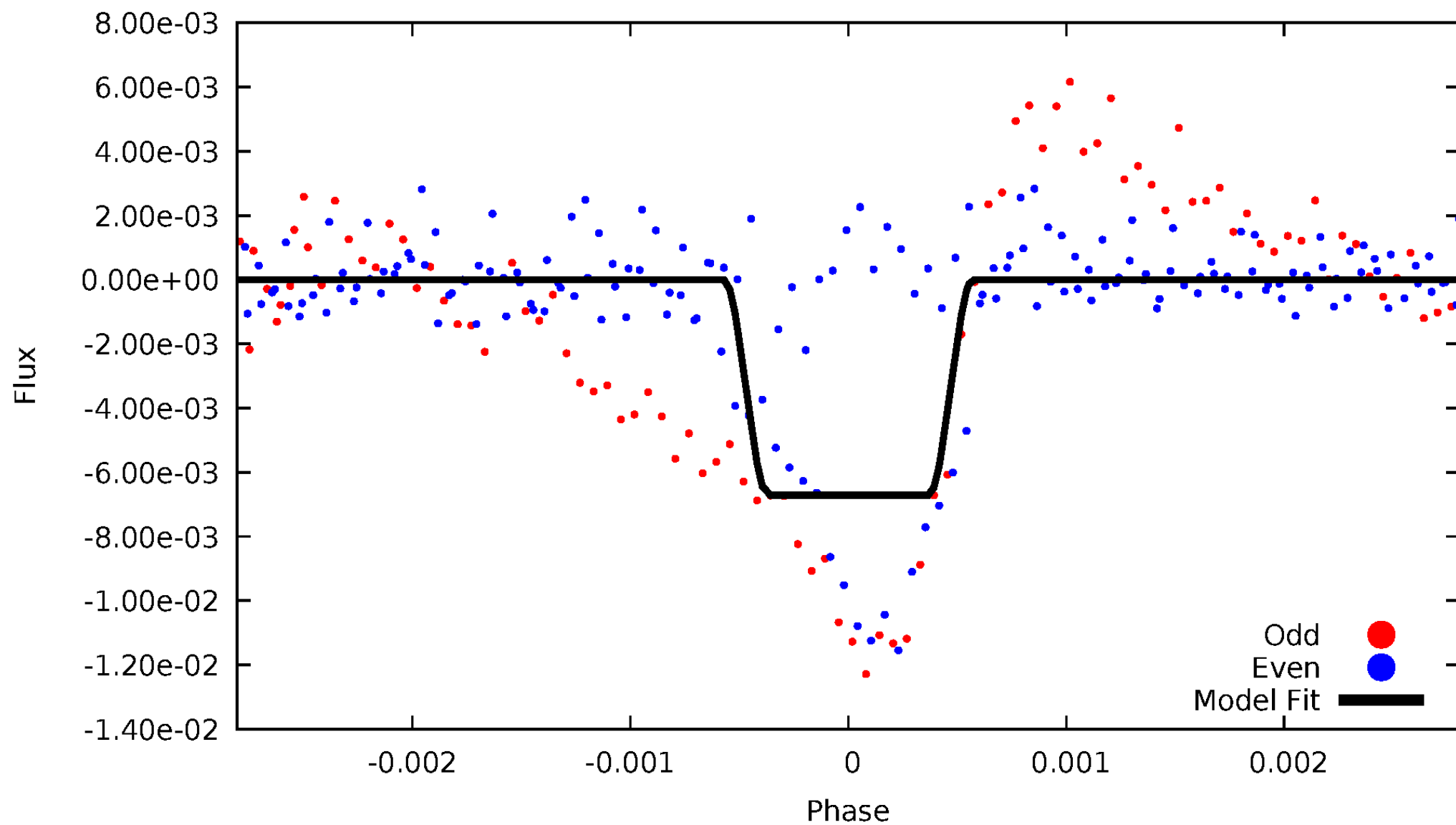
# DV Odd/Even

TCE 011412044-03



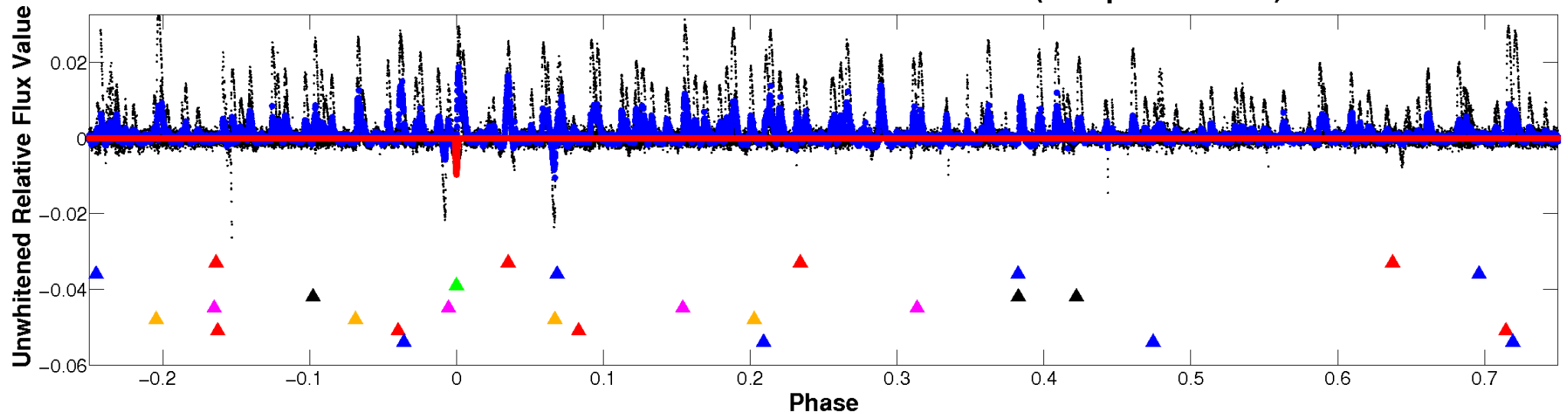
# ALT Odd/Even

TCE 011412044-03

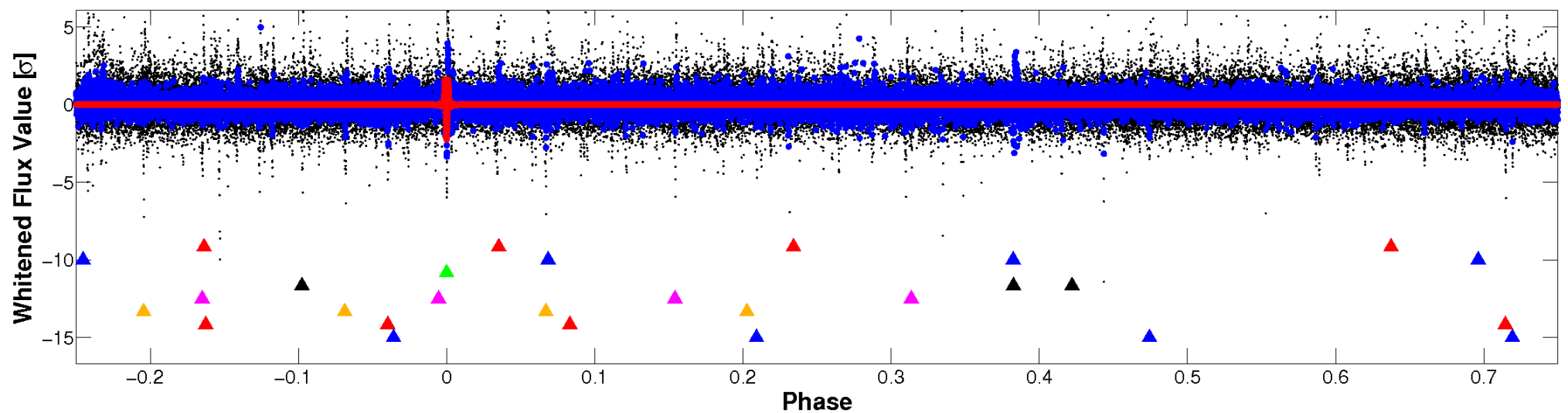


# Non-Whitened Vs. Whitened Light Curve

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



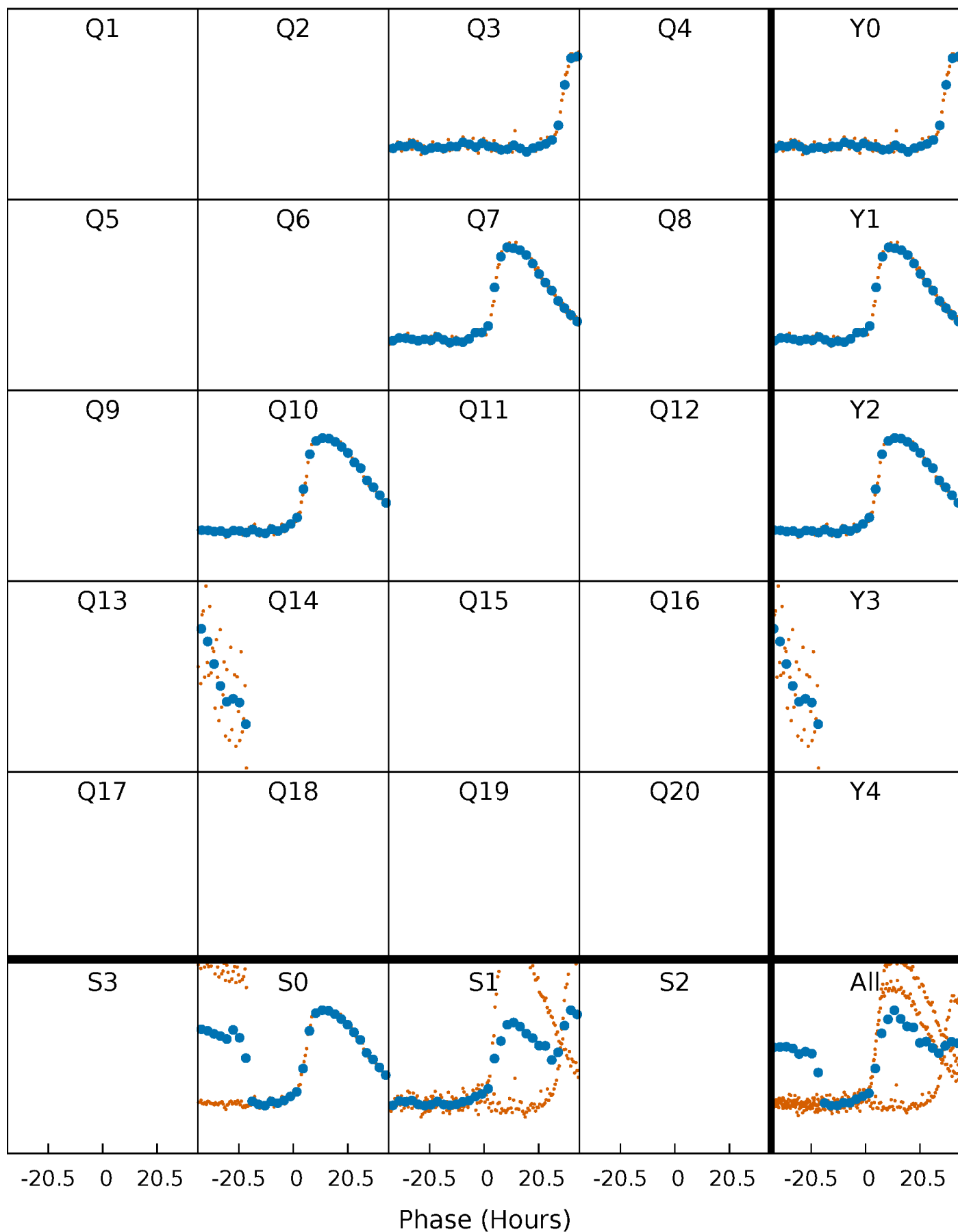
Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)





# PDC Quarter-Phased Transit Curves

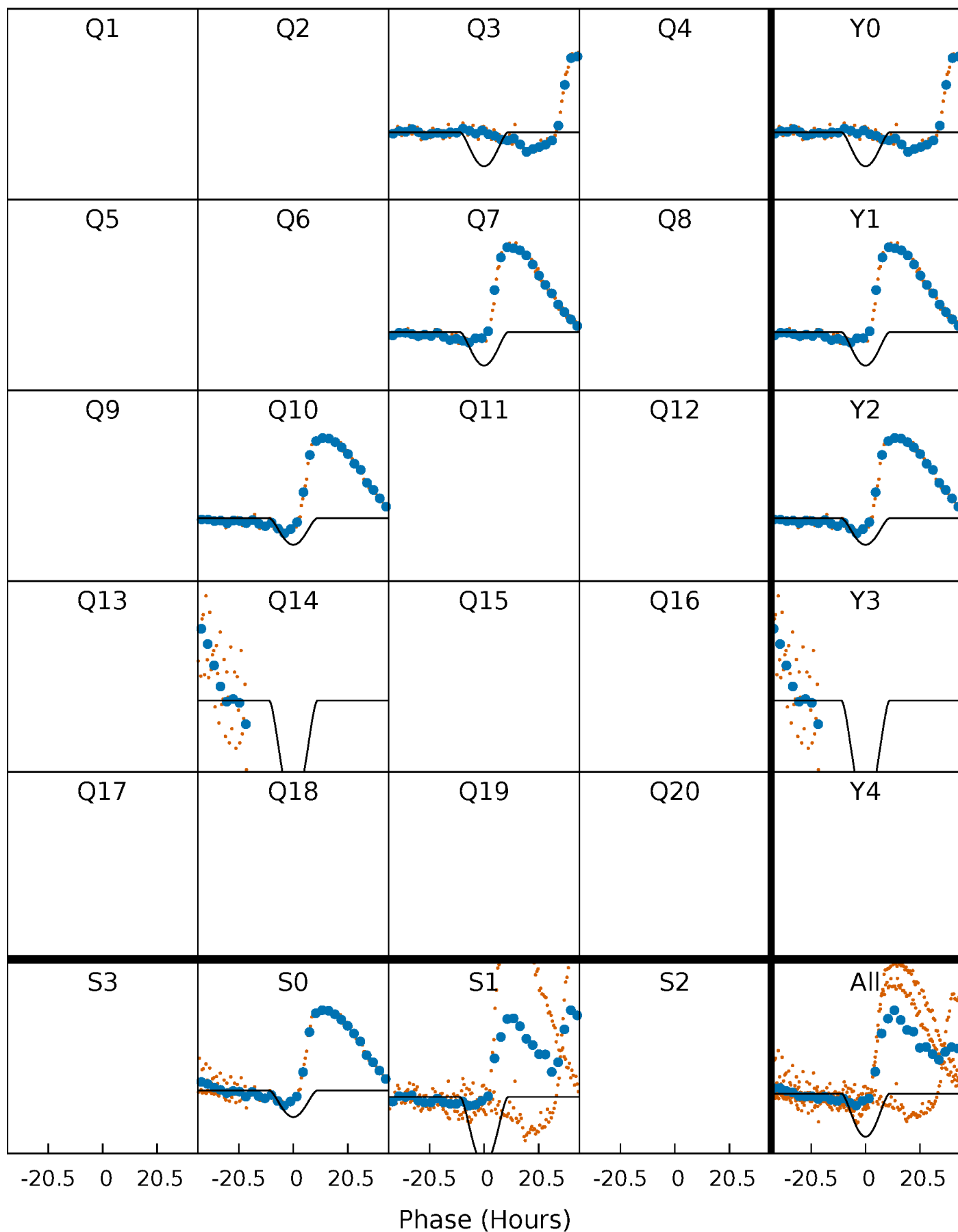
TCE 011412044-03     $P=327.228963$  Days     $T_0=308.514574$  (BKJD)





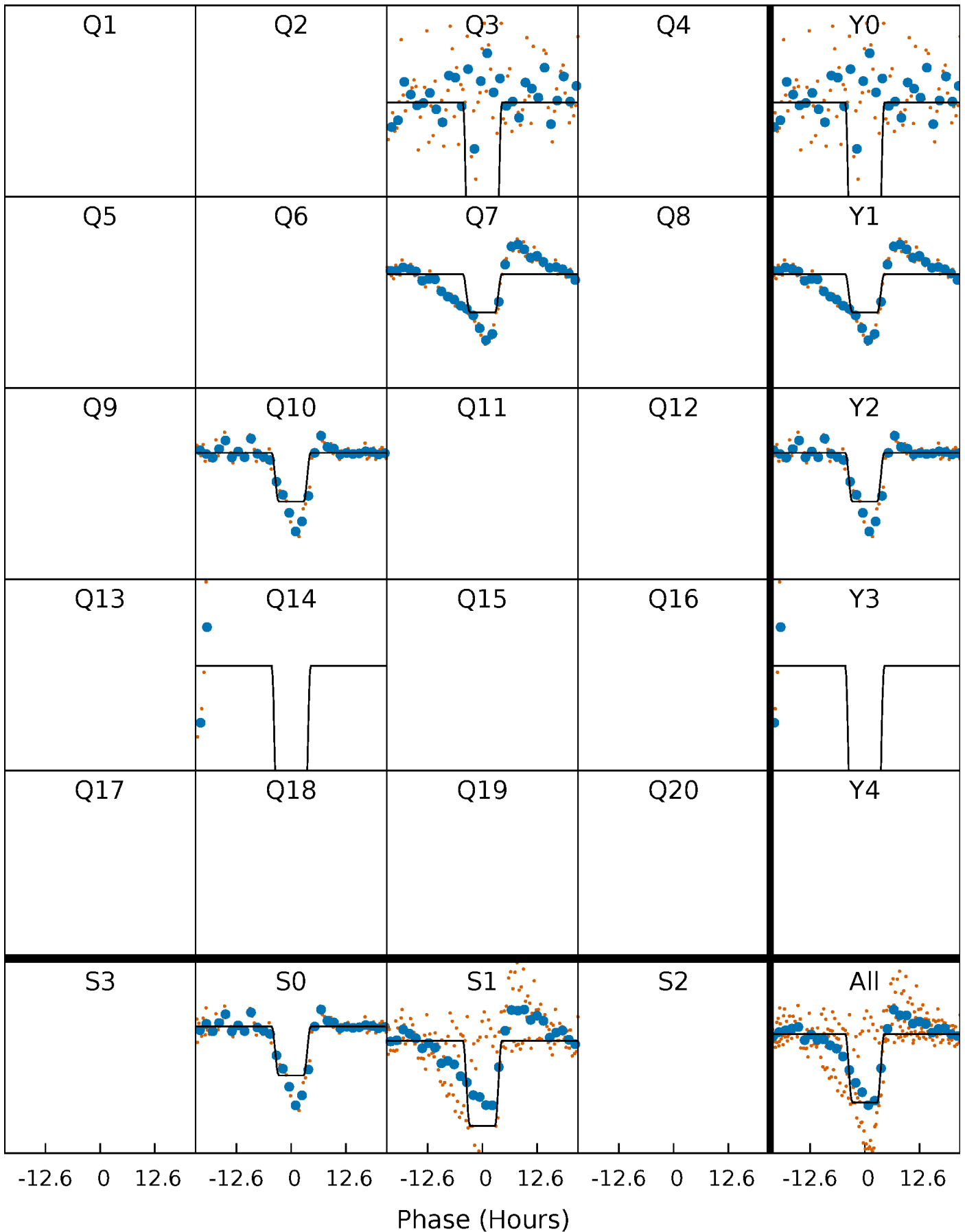
# DV Quarter-Phased Transit Curves

TCE 011412044-03 P=327.228963 Days  $T_0=308.514574$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

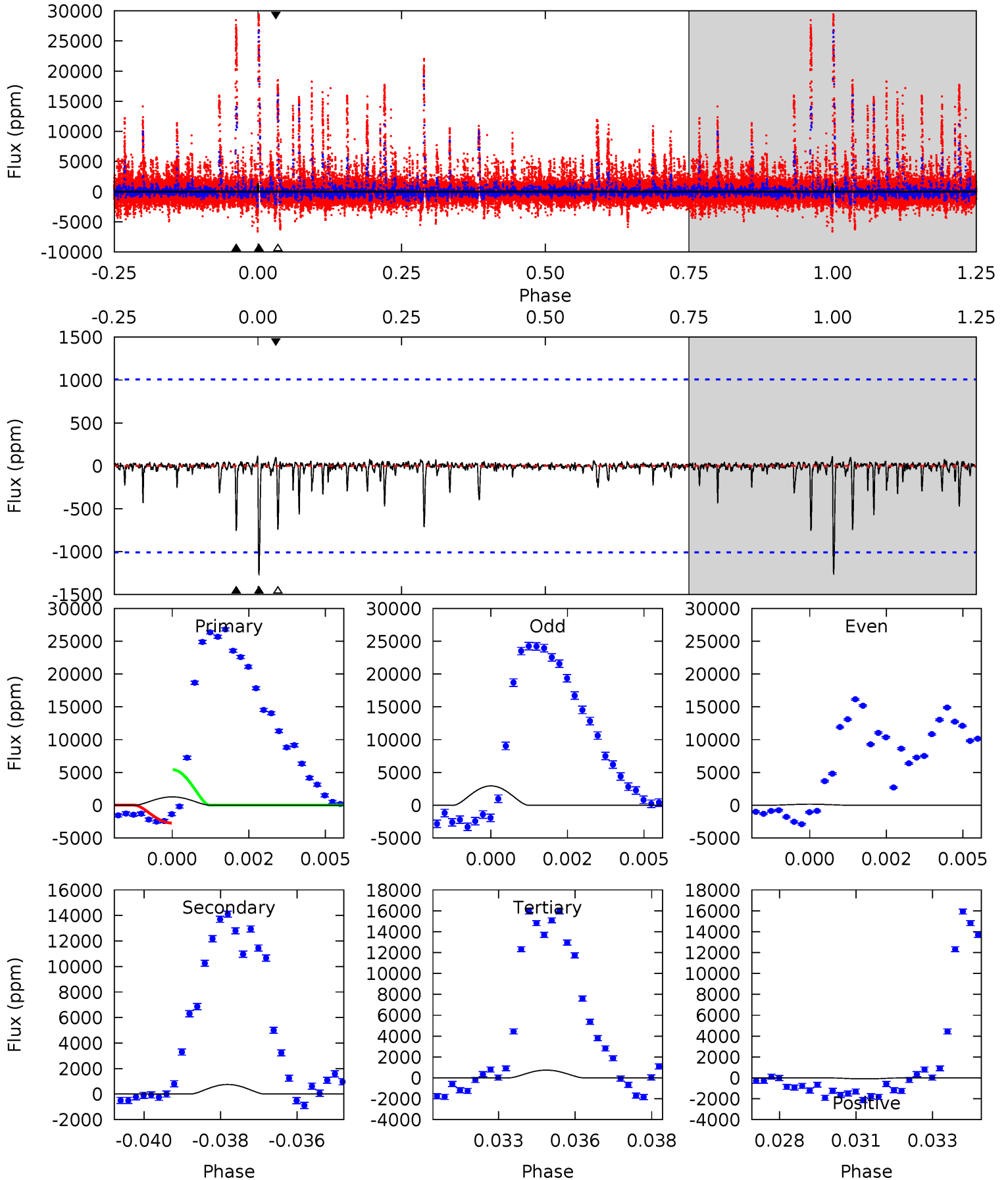
TCE 011412044-03 P=327.257086 Days  $T_0=308.490398$  (BKJD)



# DV Model-Shift Uniqueness Test

011412044-03, P = 327.228963 Days, E = 308.514574 Days

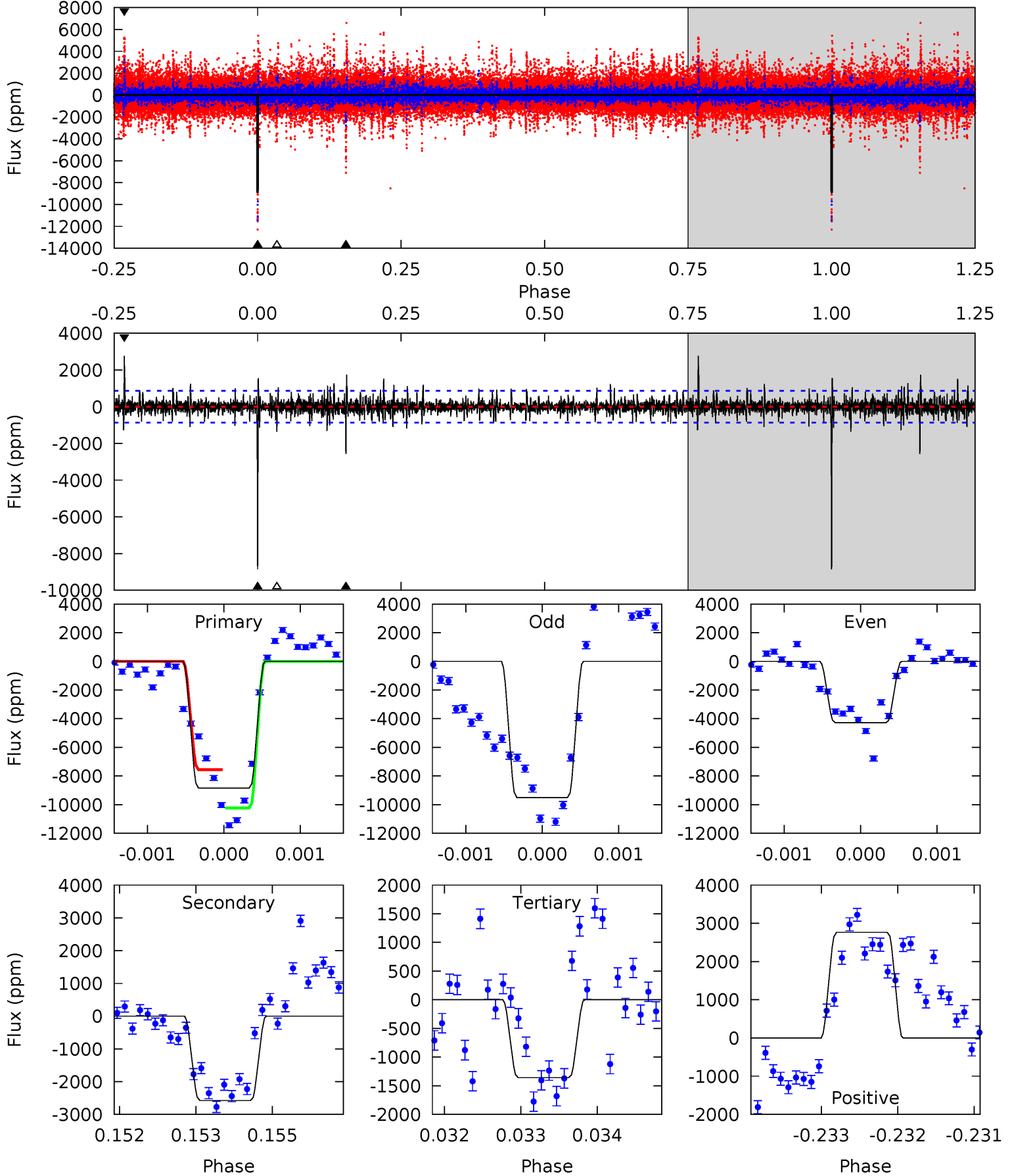
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.66	3.95	3.90	0.52	5.30	3.04	0.32	2.75	6.14	0.05	3.44	3.43	1.89	0.08	6.59



# Alt Model-Shift Uniqueness Test

011412044-03, P = 327.257086 Days, E = 308.490398 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
55.7	16.2	8.55	17.4	5.44	3.27	1.74	47.1	38.3	7.65	-1.19	16.5	0.70	0.24	0



### Stellar Parameters For KIC 011412044

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$4713^{+125}_{-139}$	$4.588^{+0.042}_{-0.035}$	$0.020^{+0.250}_{-0.300}$	$0.720^{+0.051}_{-0.061}$	$0.733^{+0.064}_{-0.058}$	$2.764^{+0.592}_{-0.374}$
	+3%/-3%	+1%/-1%	+1250%/-1500%	+7%/-8%	+9%/-8%	+21%/-14%
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 011412044-03 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-752 \pm 190$	$22.43^{+20.00}_{-14.36}$	$269^{+10}_{-9}$	$2315^{+728}_{-305}$	$552^{+3975}_{-401}$
Alt.	$-2576 \pm 159$	$17.72^{+19.69}_{-12.57}$	$269^{+8}_{-9}$	$2891^{+1388}_{-502}$	$3169^{+36292}_{-2456}$

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

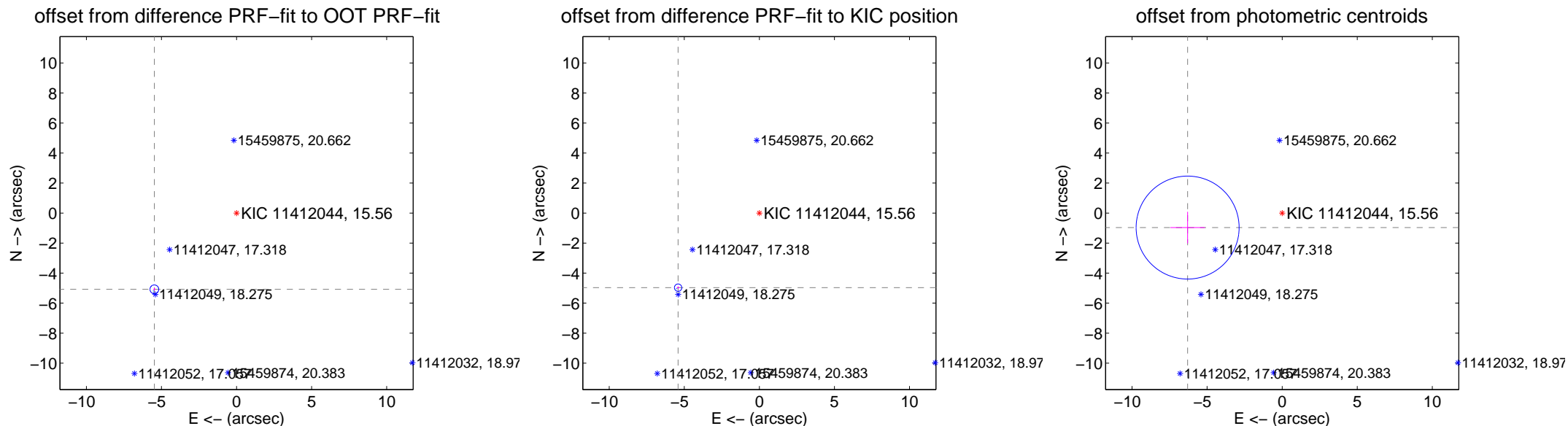
## DV Centroid Data

Supplemental centroid analysis for 011412044-03. Kepler magnitude: 15.56. Transit SNR 15.26

There are 2 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.12 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	7.468 $\pm$ 0.097	76.75	5.474 $\pm$ 0.074	-5.080 $\pm$ 0.097
PRF-fit source offset from KIC position	7.347 $\pm$ 0.082	89.83	5.412 $\pm$ 0.082	-4.969 $\pm$ 0.082
photometric centroid source offset	6.37 $\pm$ 1.14	5.57	6.30 $\pm$ 1.15	-0.97 $\pm$ 1.05



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



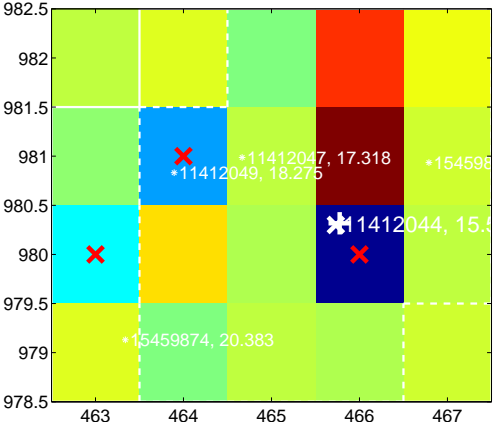
Q2 no difference image



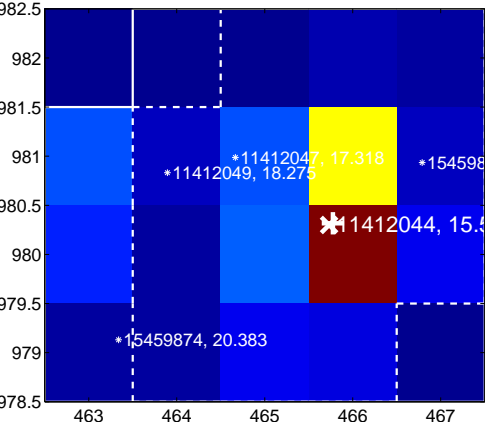
Q2 no OOT image



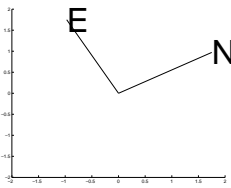
Q3 difference image. Poor Quality



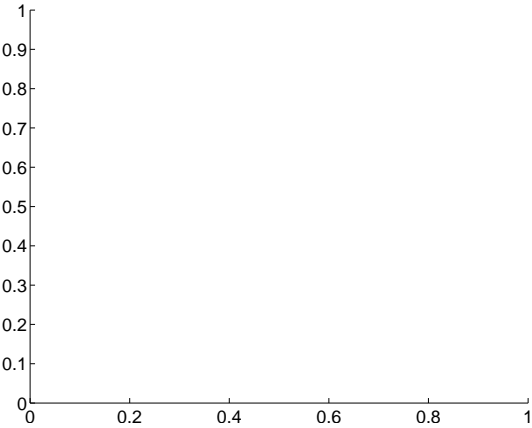
Q3 OOT image



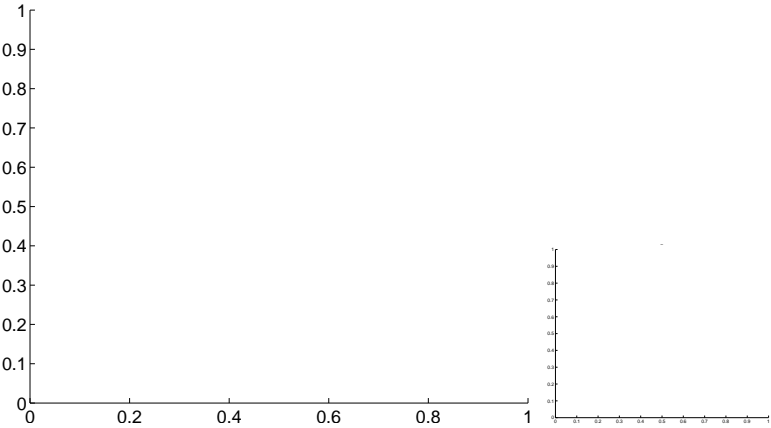
$\times 10^6$



Q4 no difference image



Q4 no OOT image



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

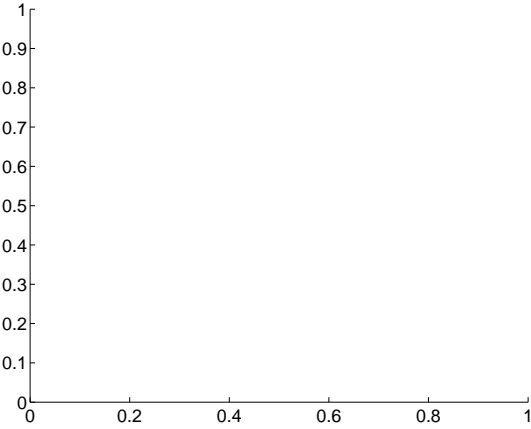
Q5 no difference image



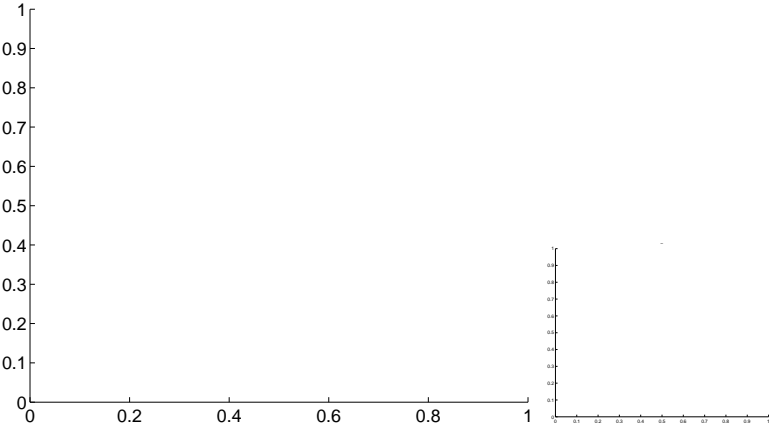
Q5 no OOT image



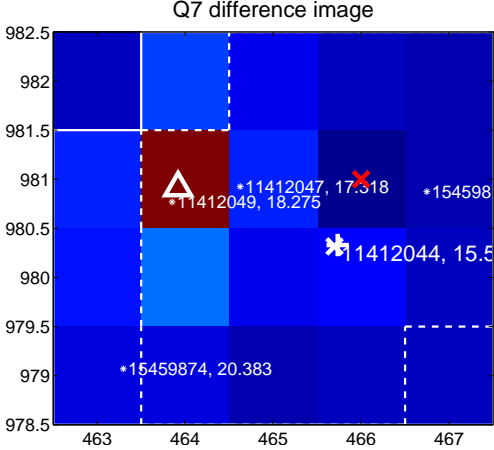
Q6 no difference image



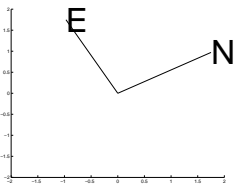
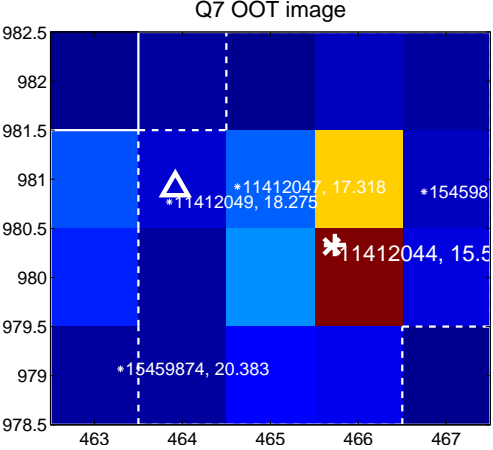
Q6 no OOT image



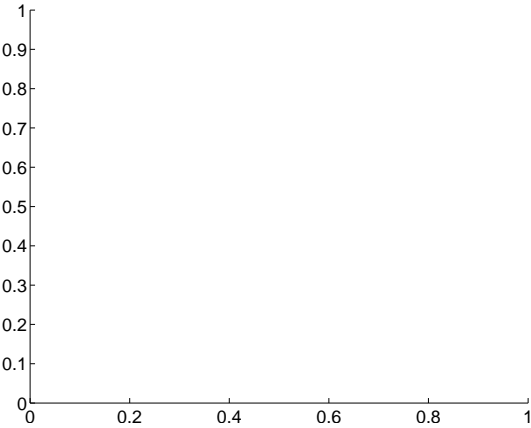
Q7 difference image



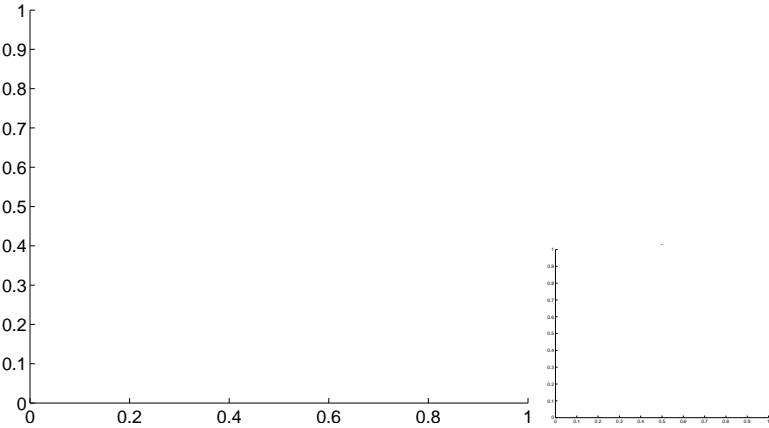
Q7 OOT image



Q8 no difference image

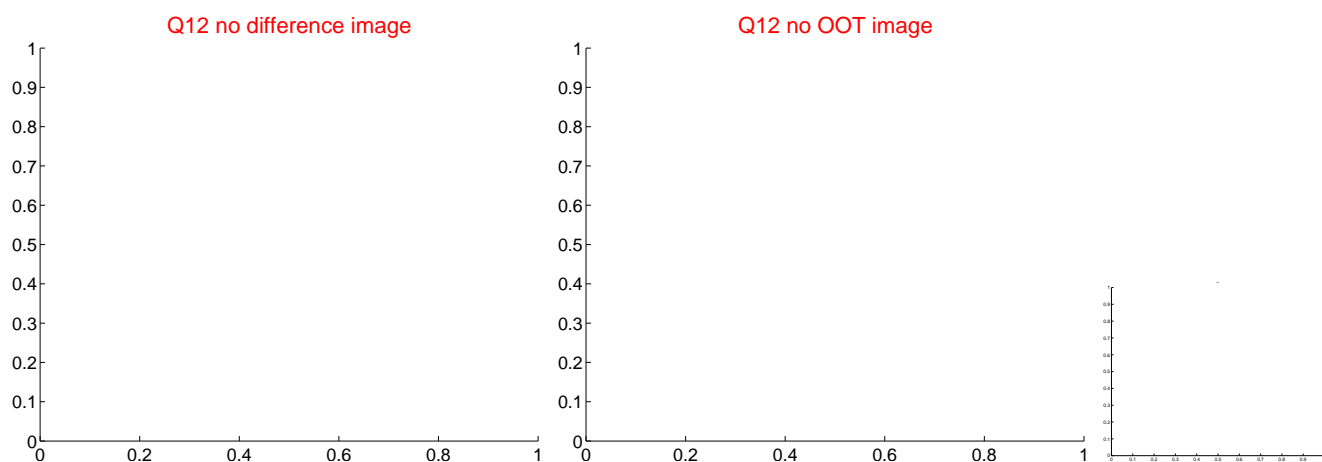
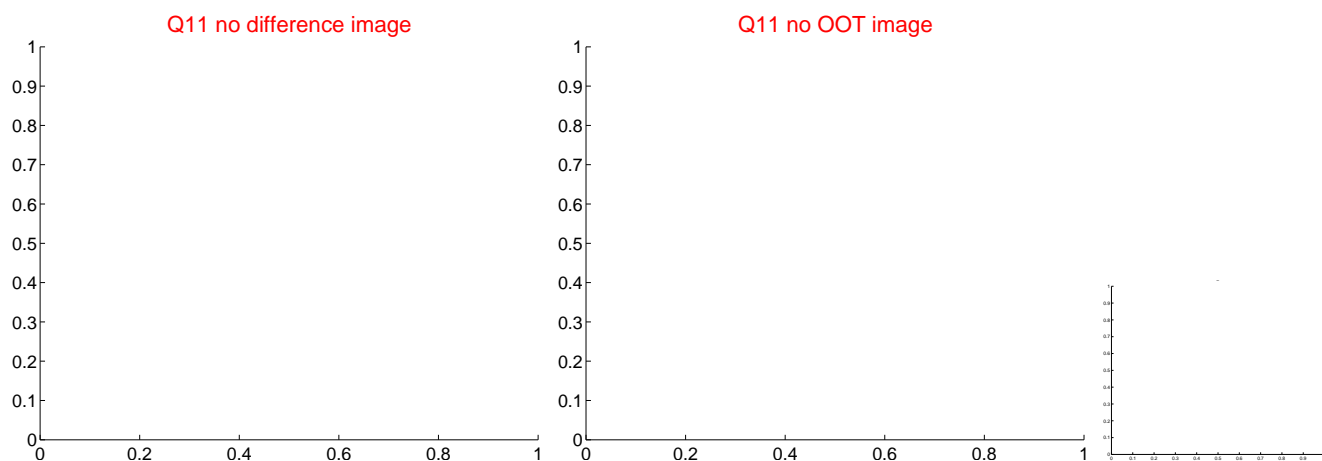
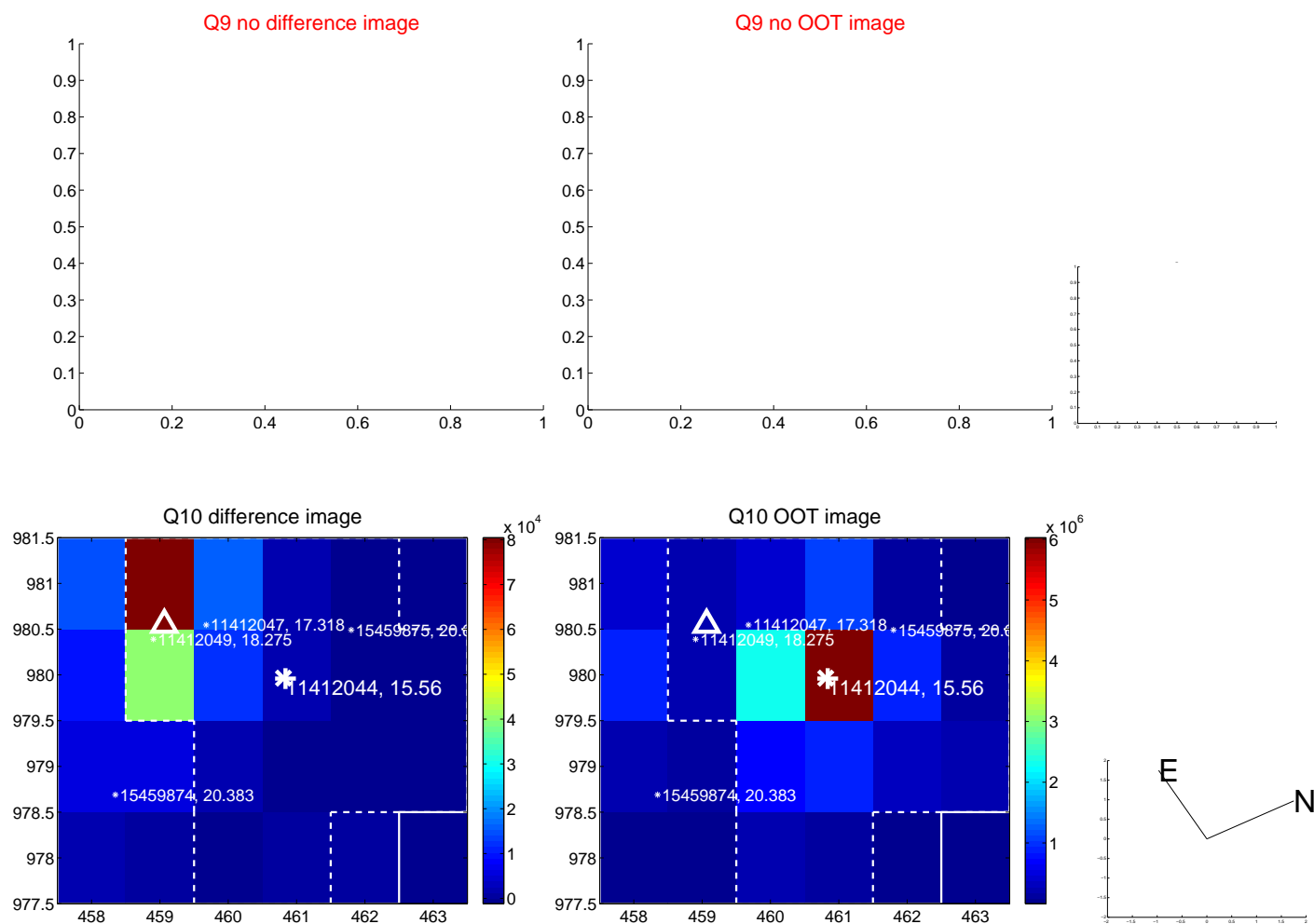


Q8 no OOT image





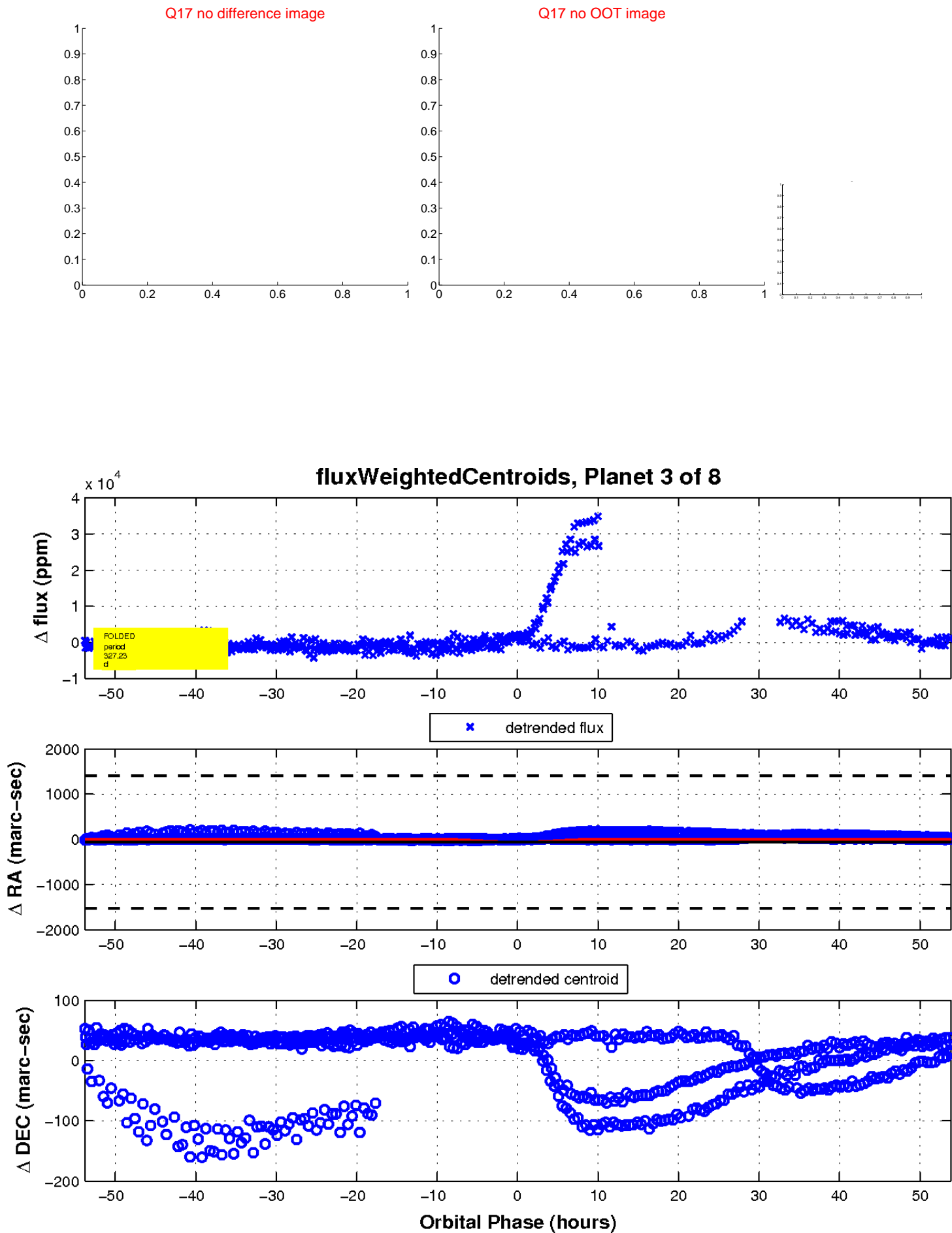
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



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

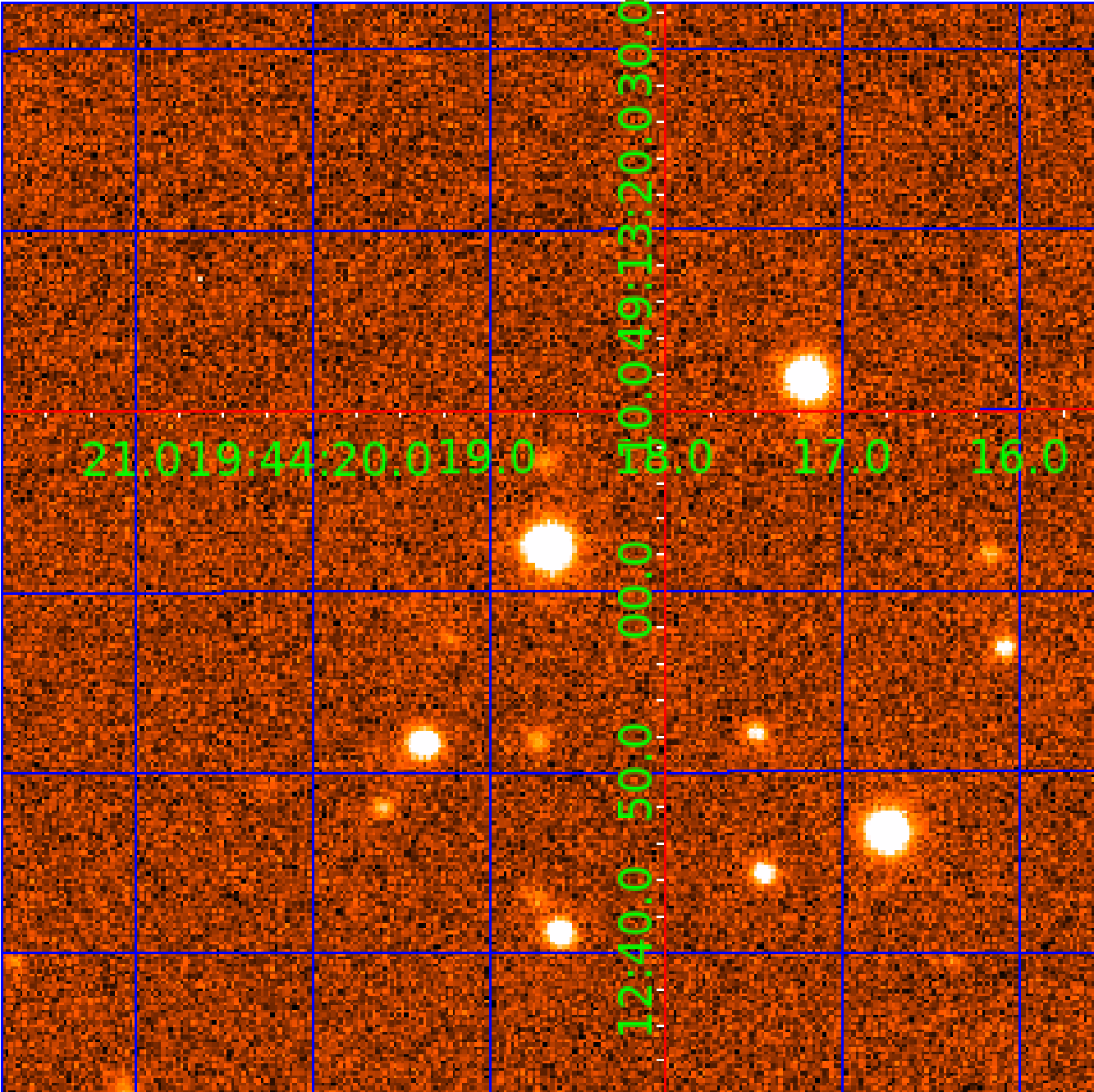


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 011412044

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
011412044-01	OBS	No	392.316863	189.867641	10821.9	19.439	20.2	18.4	0.72	4713	8.63	0.26
011412044-02	OBS	No	429.932868	228.232852	5577.4	15.710	19.8	12.1	0.72	4713	6.74	0.23
011412044-03	OBS	No	327.228963	308.514574	9609.8	17.960	18.9	15.3	0.72	4713	13.25	0.33
011412044-04	OBS	No	497.309634	433.712106	6509.3	14.267	18.4	15.5	0.72	4713	6.38	0.19
011412044-05	OBS	No	379.431472	254.543571	7842.6	13.668	18.1	13.7	0.72	4713	8.89	0.27
011412044-06	OBS	No	371.644294	241.608392	6772.4	13.431	17.6	13.4	0.72	4713	11.28	0.28
011412044-07	OBS	No	367.441035	215.105554	12056.7	23.794	18.9	15.9	0.72	4713	14.70	0.28
011412044-08	OBS	No	407.377075	136.506999	2052.6	9.000	18.2	-1.0	0.72	4713	3.13	0.24

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
011412044-01	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—CENT_RESOLVED_OFFSET
011412044-02	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_RESOLVED_OFFSET
011412044-03	OBS	FP	0.00	1	0	0	0	LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS
011412044-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
011412044-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
011412044-06	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_RESOLVED_OFFSET
011412044-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS
011412044-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—CENT_NOFITS

**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.

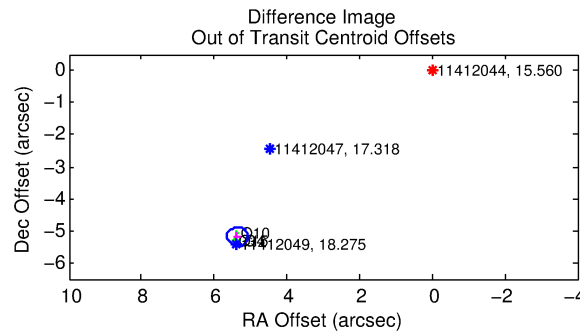
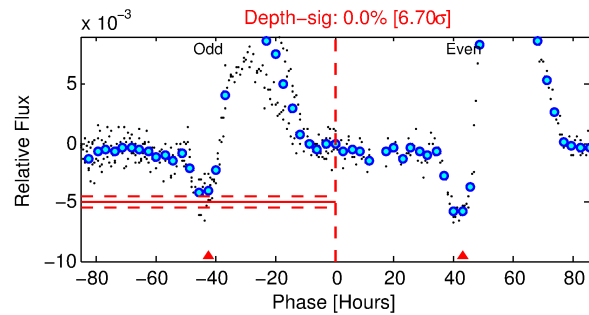
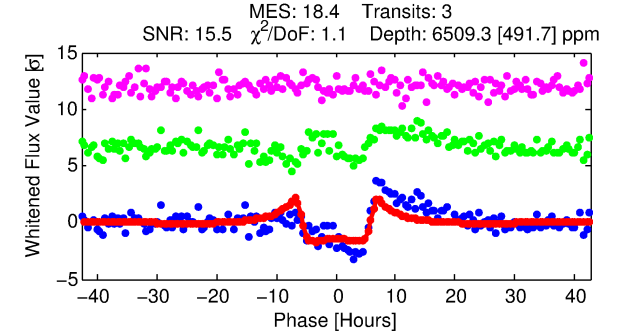
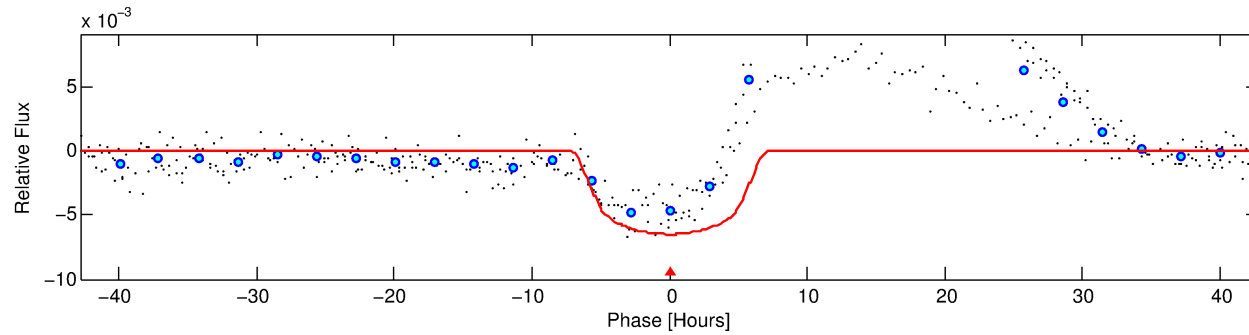
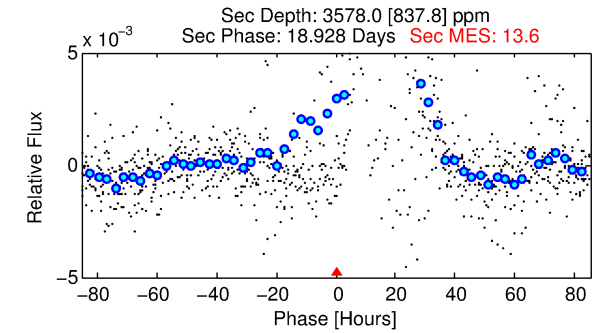
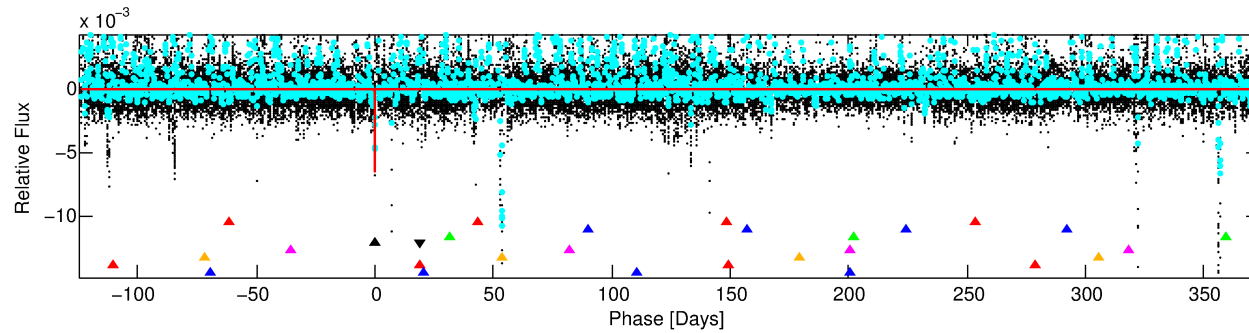
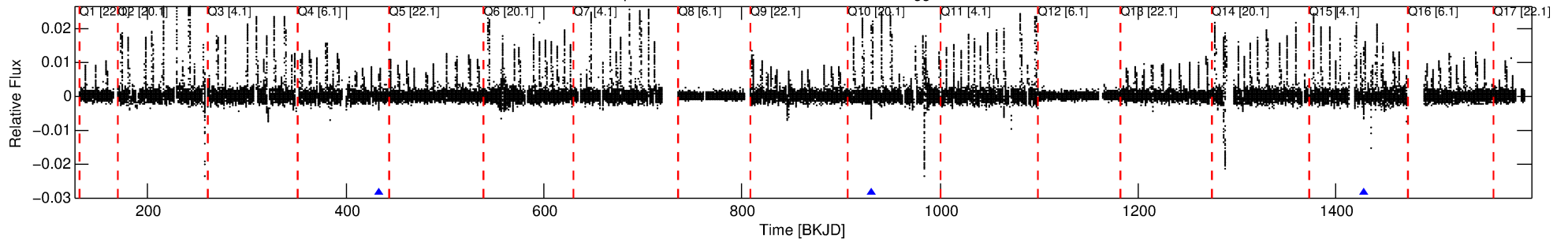
Ephemeris Match Information For 011412044-04

No Significant Match Found

# DV One-Page Summary

KIC: 11412044 Candidate: 4 of 8 Period: 497.310 d

Kp: 15.56 R\*: 0.72 Rs Teff: 4713.0 K Logg: 4.59 Fe/H: 0.020



## DV Fit Results:

Period = 497.30963 [0.00636] d  
Epoch = 433.7121 [0.0071] BKJD  
Rp/R\* = 0.0812 [0.0044]  
a/R\* = 205.51 [20.99]  
b = 0.76 [0.06]  
Seff = 0.19 [0.03]  
Teq = 168 [6] K  
Rp = 6.38 [0.64] Re  
a = 1.1075 [0.0720] AU  
Ag = 59376.48 [16115.88] [3.68σ]  
Teffp = 4046 [287] K [13.53σ]

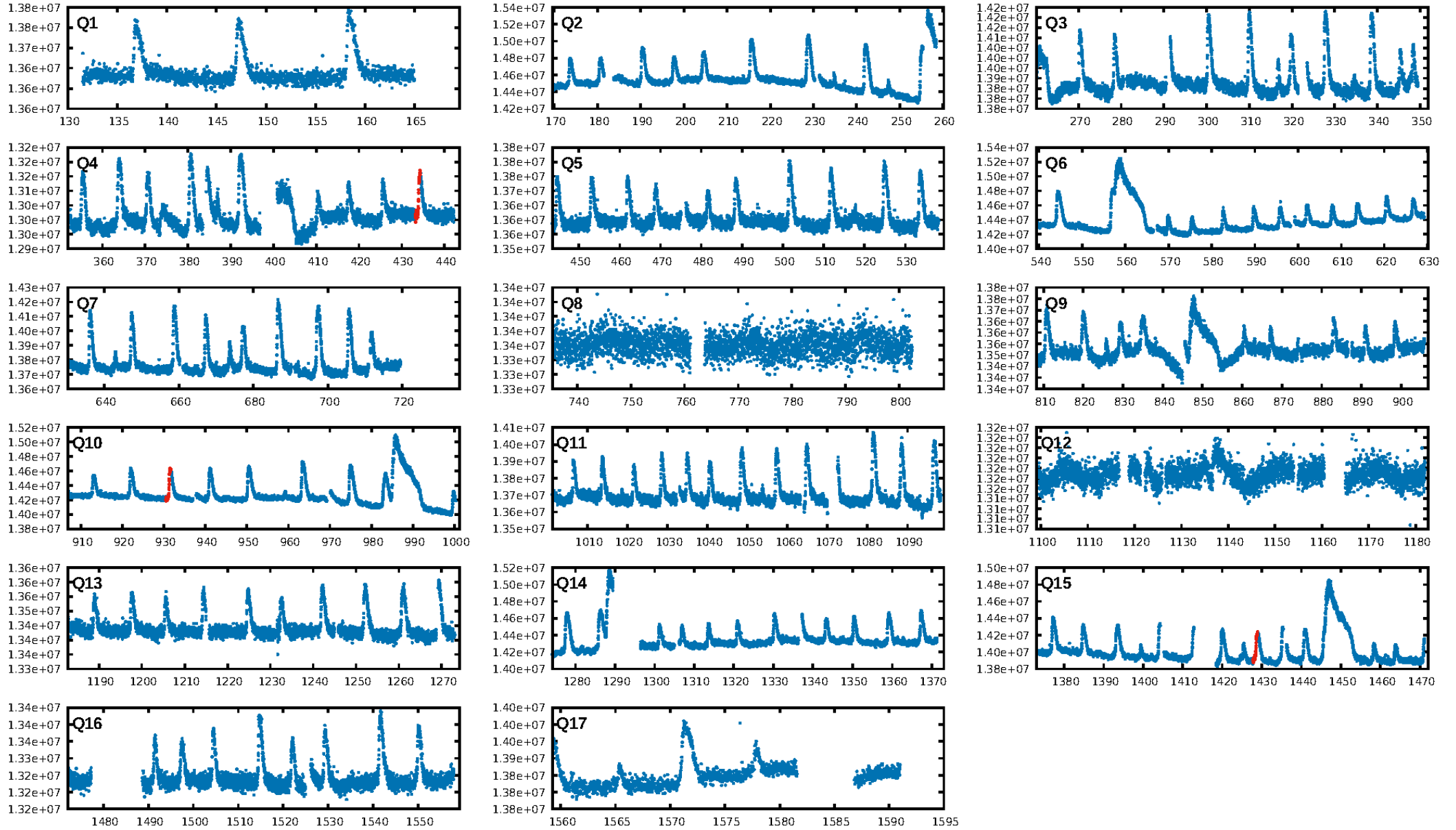
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [76.20σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 91.2%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 0.4807  
Centroid-sig: N/A  
Centroid-so: 7.841 arcsec [5.46σ]  
OotOffset-rm: 7.463 arcsec [77.54σ]  
KicOffset-rm: 7.332 arcsec [82.82σ]  
OotOffset-st: 1/1/1/0 [3]  
KicOffset-st: 1/1/1/0 [3]  
DiffImageQuality-fgm: 1.00 [3/3]  
DiffImageOverlap-fno: 1.00 [3/3]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:14:33 Z

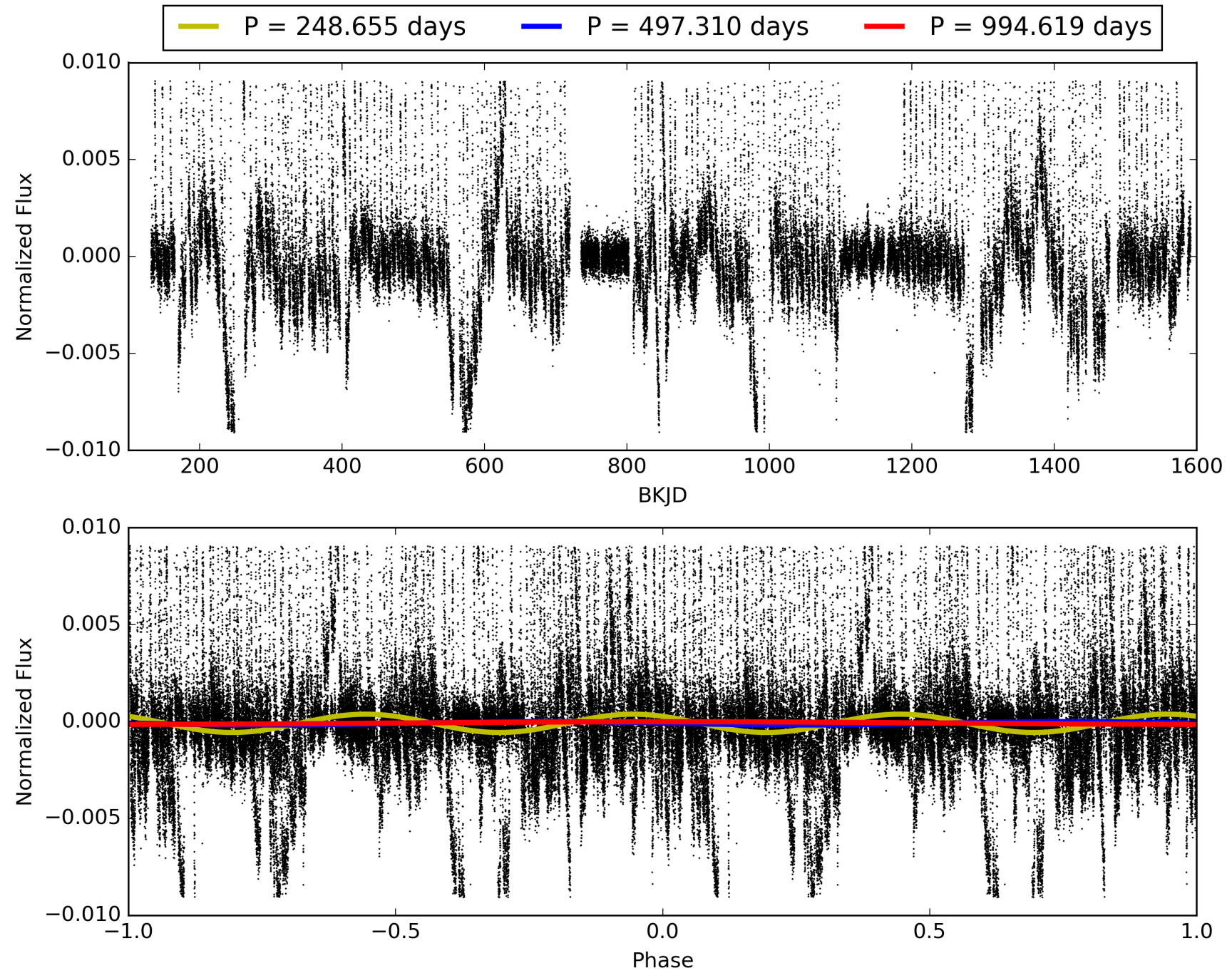
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 011412044-04, PDC Light Curves





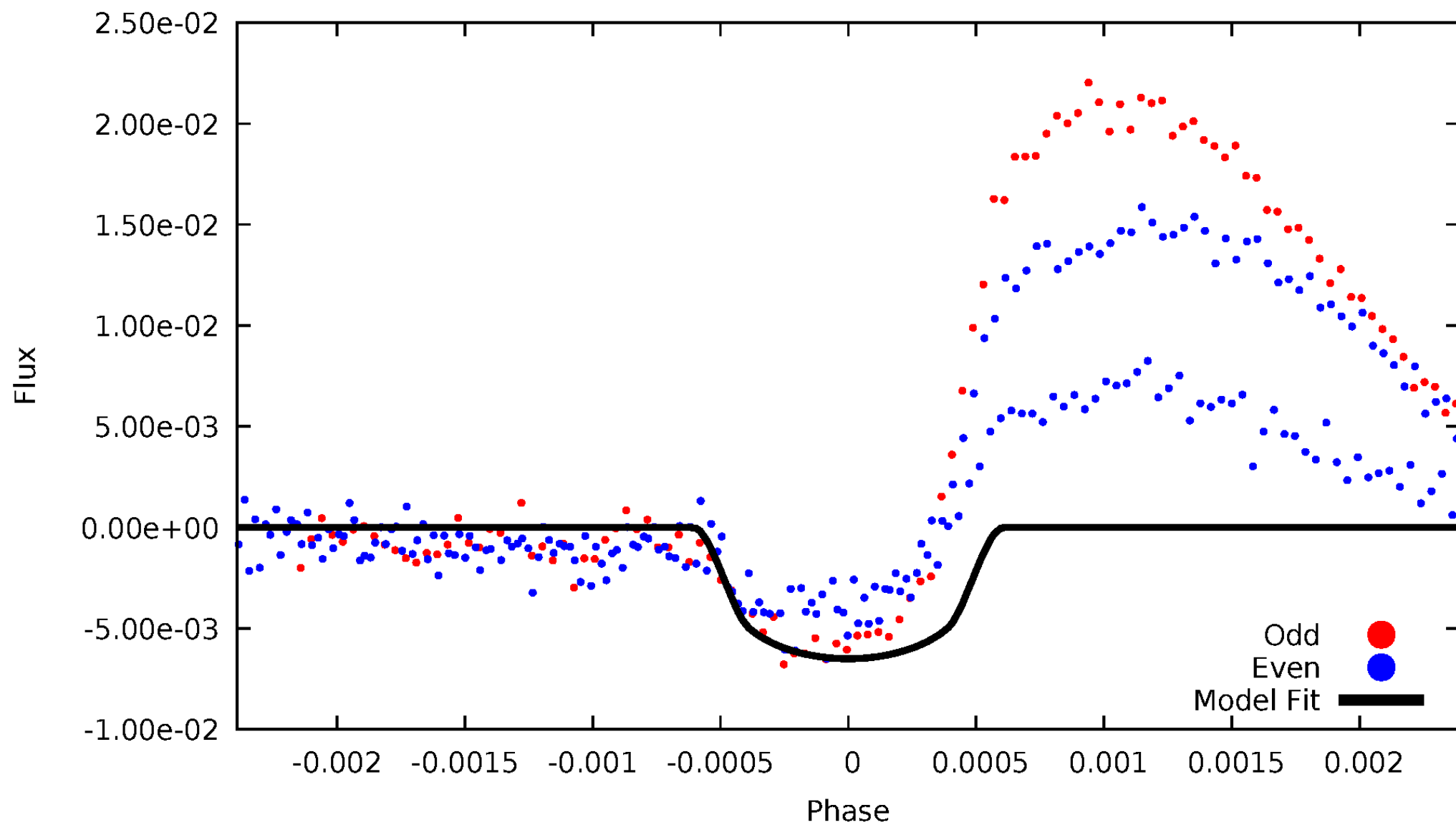
TCE 011412044-04





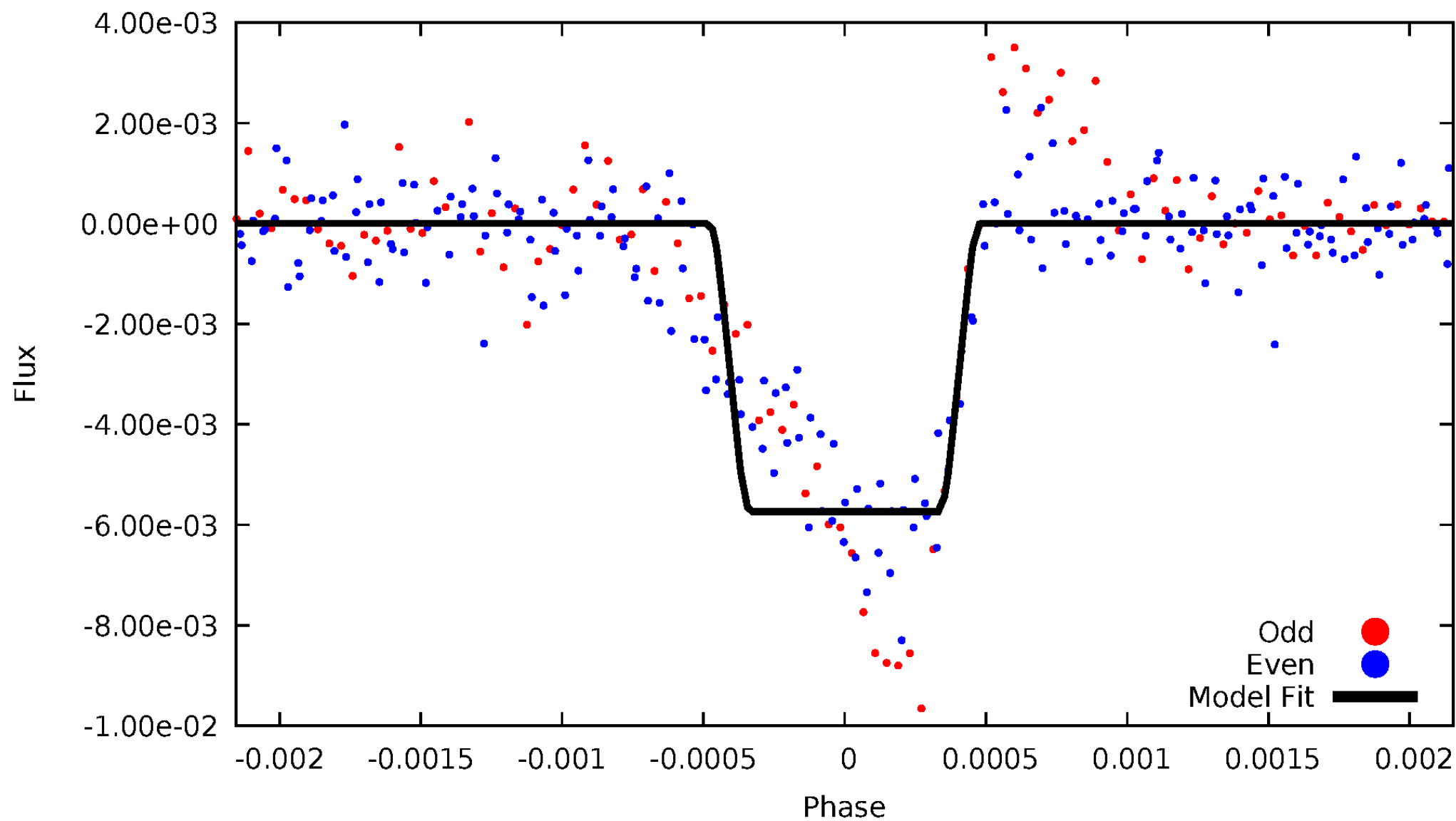
# DV Odd/Even

TCE 011412044-04



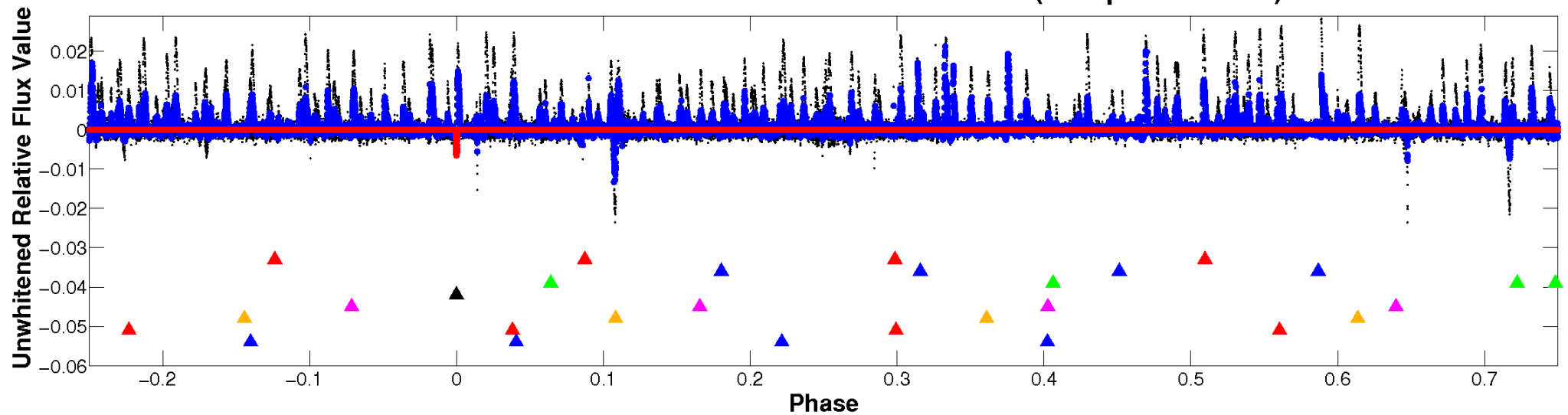
# ALT Odd/Even

TCE 011412044-04

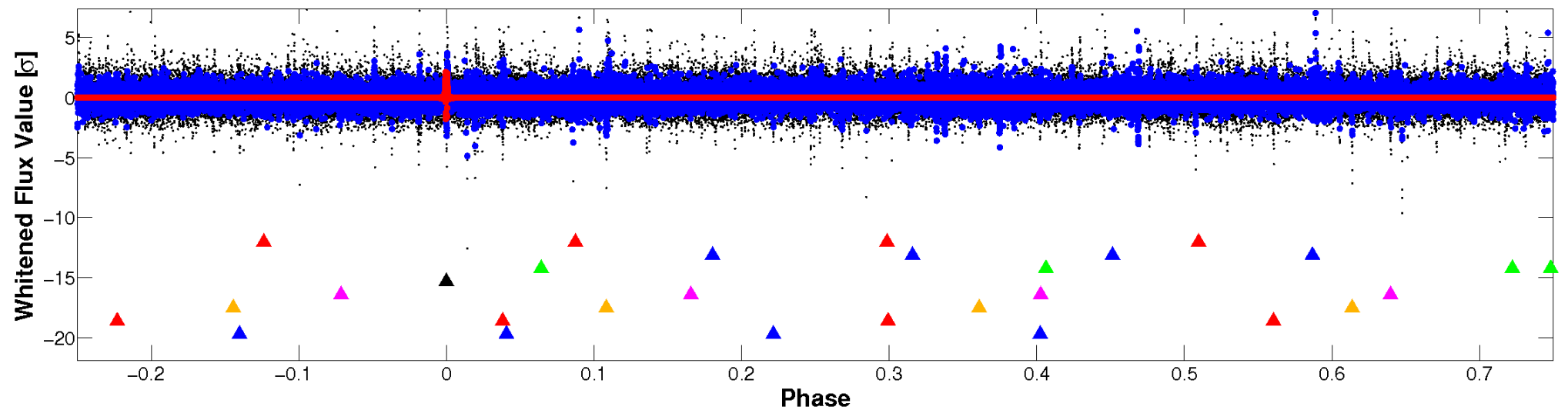


# Non-Whitened Vs. Whitened Light Curve

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

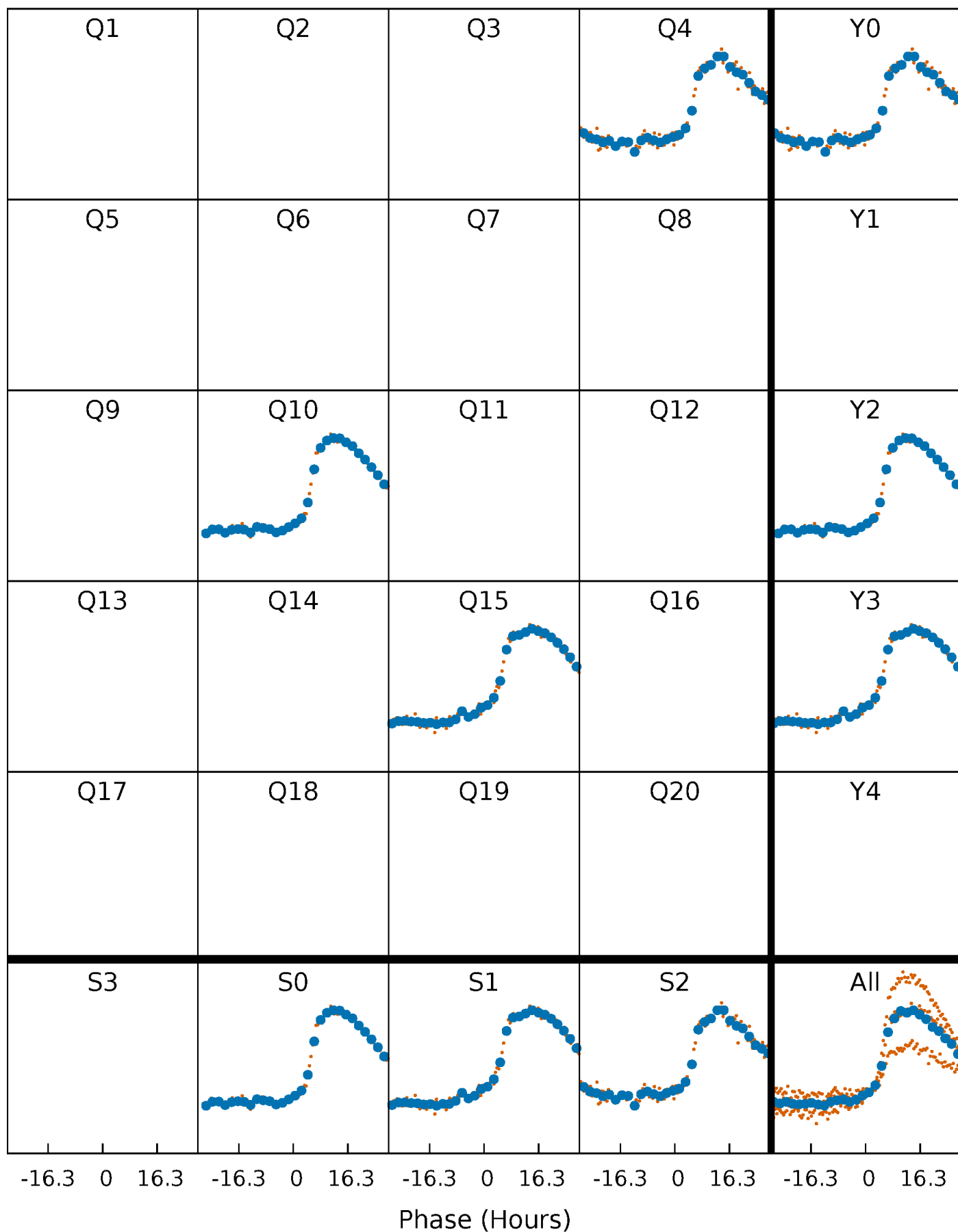


Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



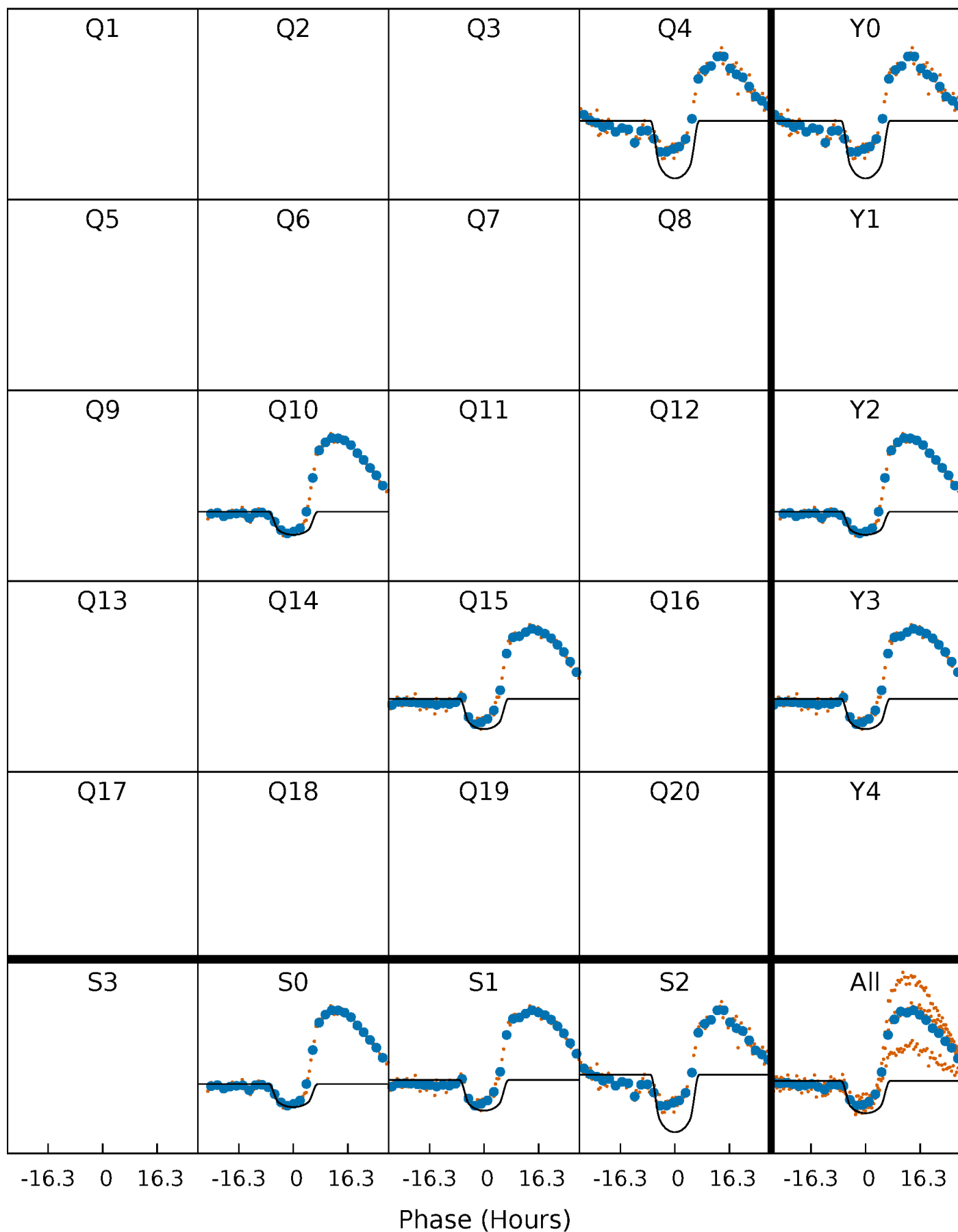
# PDC Quarter-Phased Transit Curves

TCE 011412044-04     $P=497.309634$  Days     $T_0=433.712106$  (BKJD)



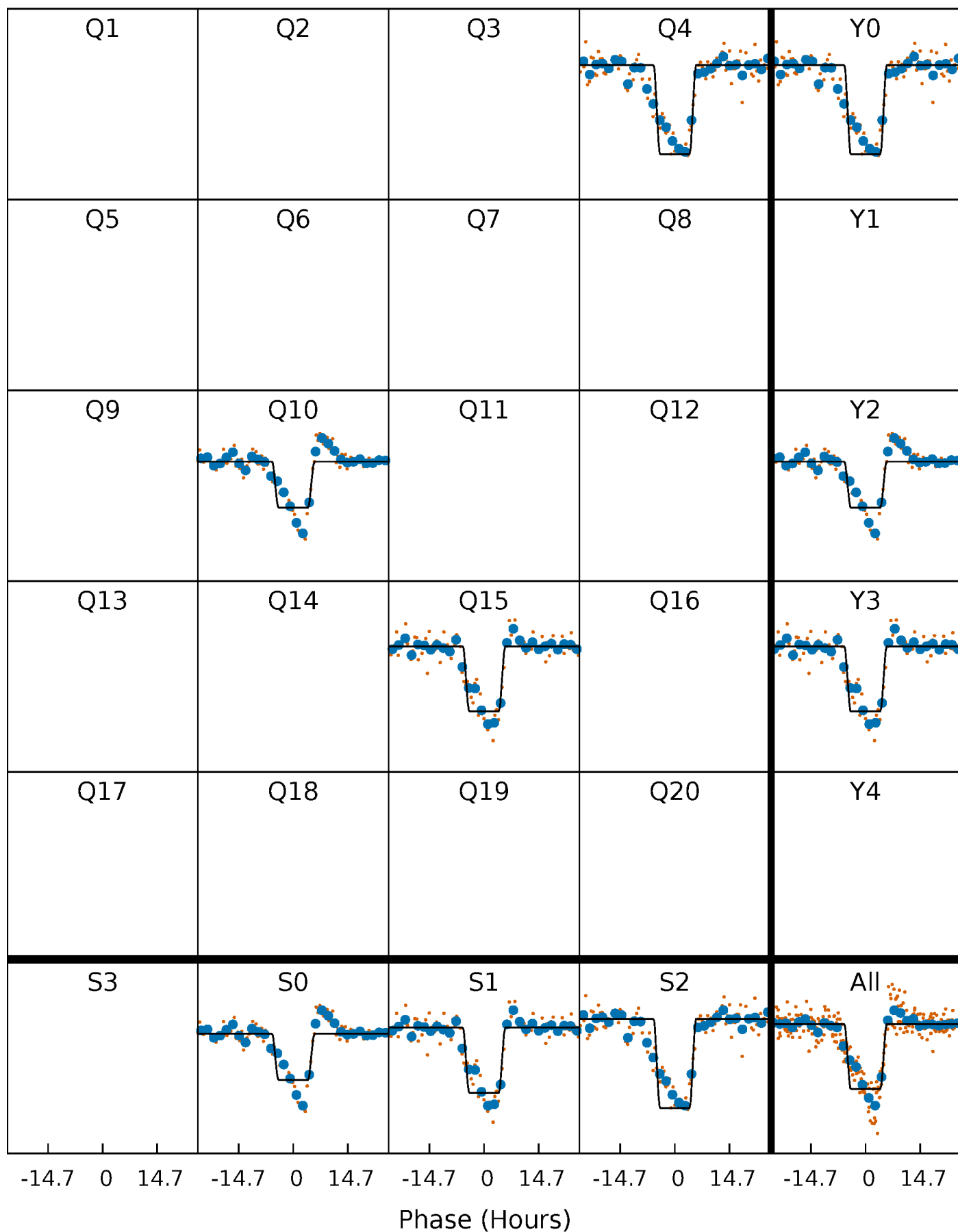
# DV Quarter-Phased Transit Curves

TCE 011412044-04     $P=497.309634$  Days     $T_0=433.712106$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

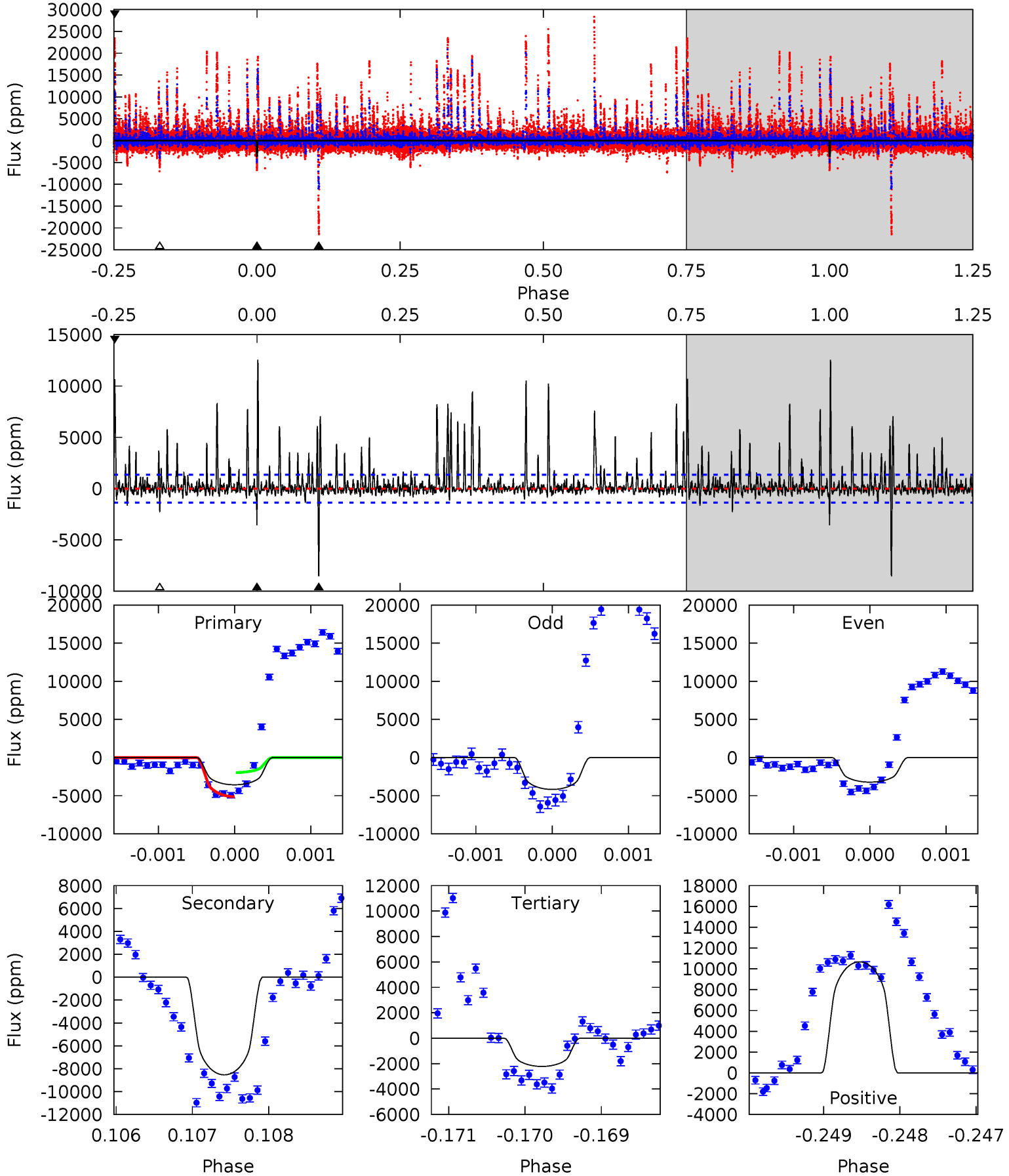
TCE 011412044-04     $P=497.305172$  Days     $T_0=433.741877$  (BKJD)



# DV Model-Shift Uniqueness Test

011412044-04, P = 497.309634 Days, E = 433.712106 Days

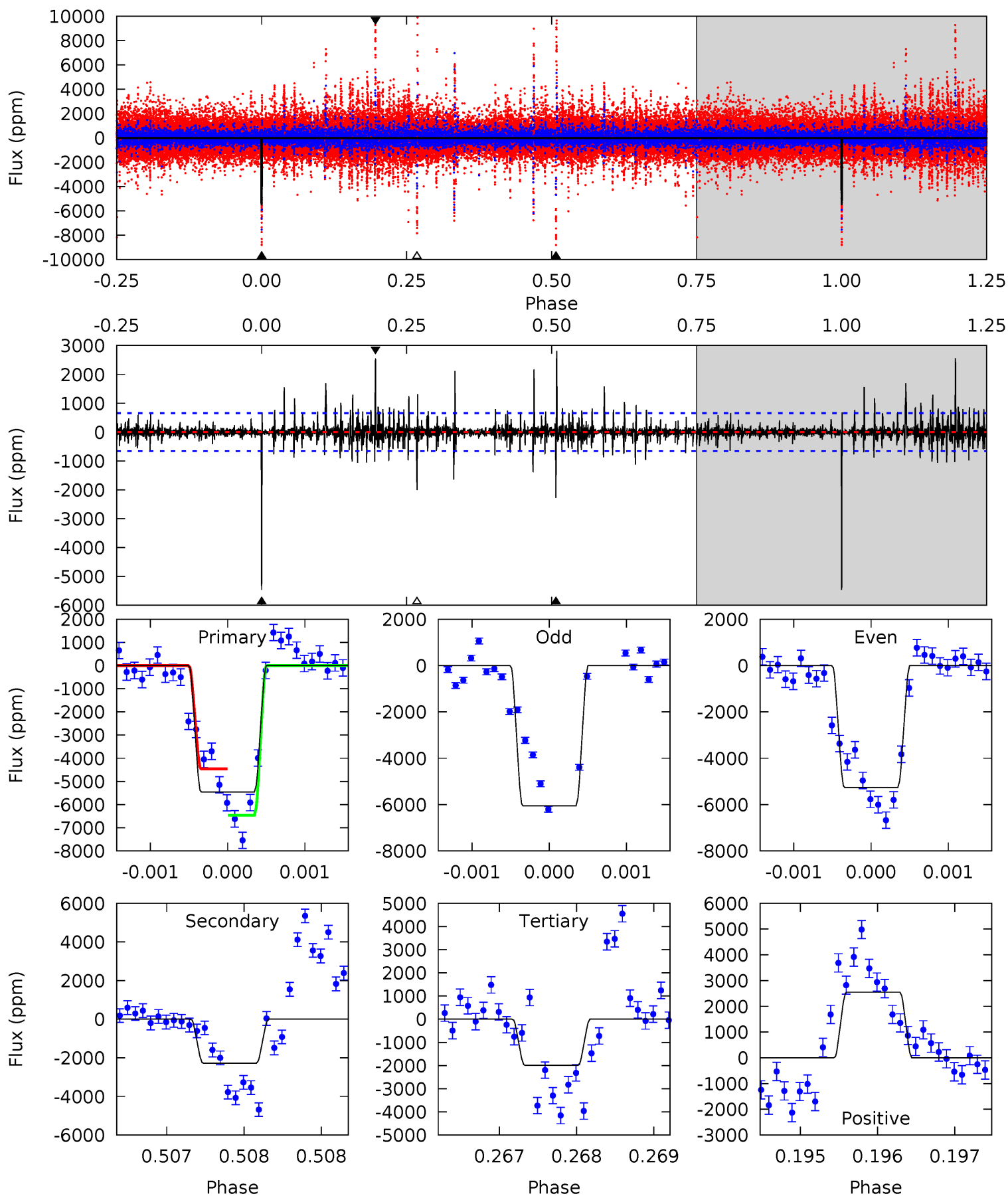
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
14.2	34.0	8.84	42.5	5.41	3.23	5.07	5.37	-28.3	25.1	-8.51	1.14	1.01	0.60	6.34



# Alt Model-Shift Uniqueness Test

011412044-04, P = 497.305172 Days, E = 433.741877 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
45.1	18.8	16.5	21.1	5.46	3.30	2.06	28.7	24.0	2.36	-2.25	2.81	0.96	0.34	8.21





### Stellar Parameters For KIC 011412044

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (g \cdot \text{cm}^{-3})$
	$4713^{+125}_{-139}$	$4.588^{+0.042}_{-0.035}$	$0.020^{+0.250}_{-0.300}$	$0.720^{+0.051}_{-0.061}$	$0.733^{+0.064}_{-0.058}$	$2.764^{+0.592}_{-0.374}$
	+3%/-3%	+1%/-1%	+1250%/-1500%	+7%/-8%	+9%/-8%	+21%/-14%
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 011412044-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-8536 \pm 251$	$6.38^{+0.45}_{-0.43}$	$234^{+7}_{-8}$	$4975^{+183}_{-185}$	$143726^{+19996}_{-16617}$
Alt.	$-2277 \pm 121$	$5.94^{+0.46}_{-0.41}$	$234^{+7}_{-8}$	$3963^{+121}_{-136}$	$43845^{+6858}_{-6132}$

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

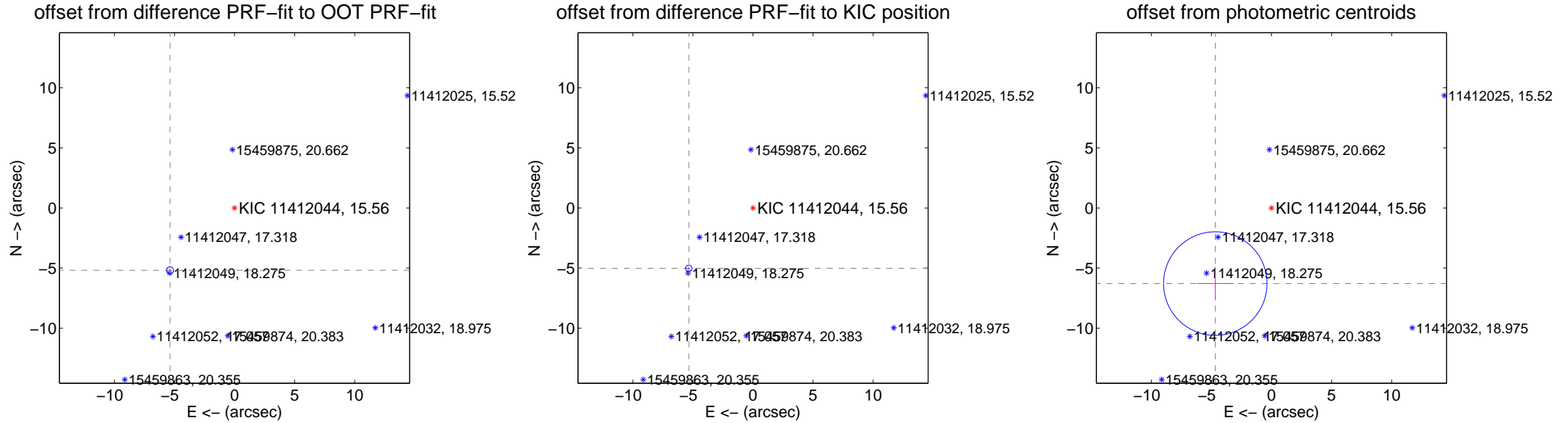
## DV Centroid Data

Supplemental centroid analysis for 011412044-04. Kepler magnitude: 15.56. Transit SNR 15.49

There are 3 quarters with good PRF difference image offsets

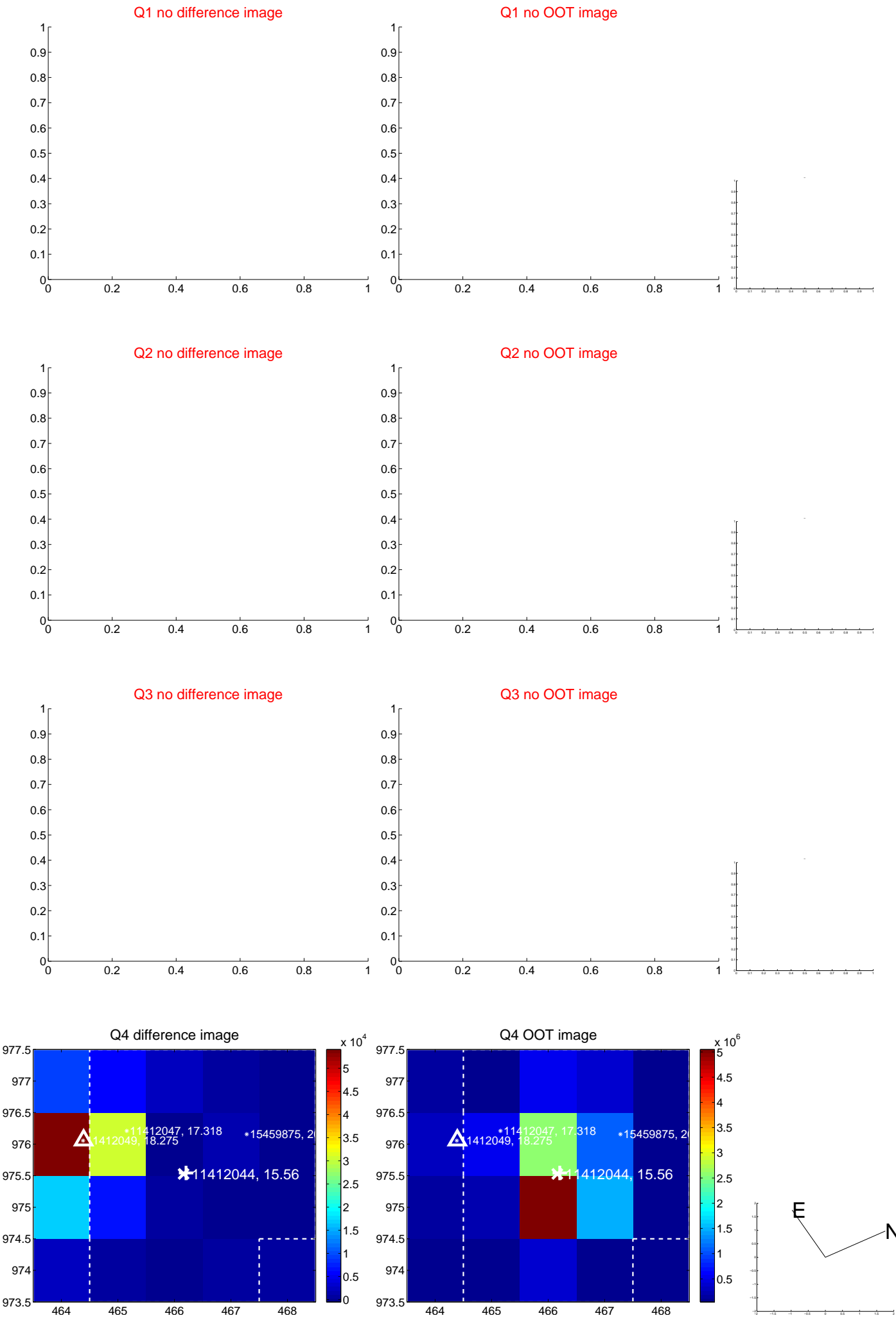
The direct PRF centroid is offset from the target star catalog position by about 0.21 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	7.463 $\pm$ 0.096	77.54	5.369 $\pm$ 0.075	-5.183 $\pm$ 0.115
PRF-fit source offset from KIC position	7.332 $\pm$ 0.089	82.82	5.345 $\pm$ 0.076	-5.019 $\pm$ 0.101
photometric centroid source offset	7.84 $\pm$ 1.44	5.46	4.68 $\pm$ 1.52	-6.29 $\pm$ 1.39



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.

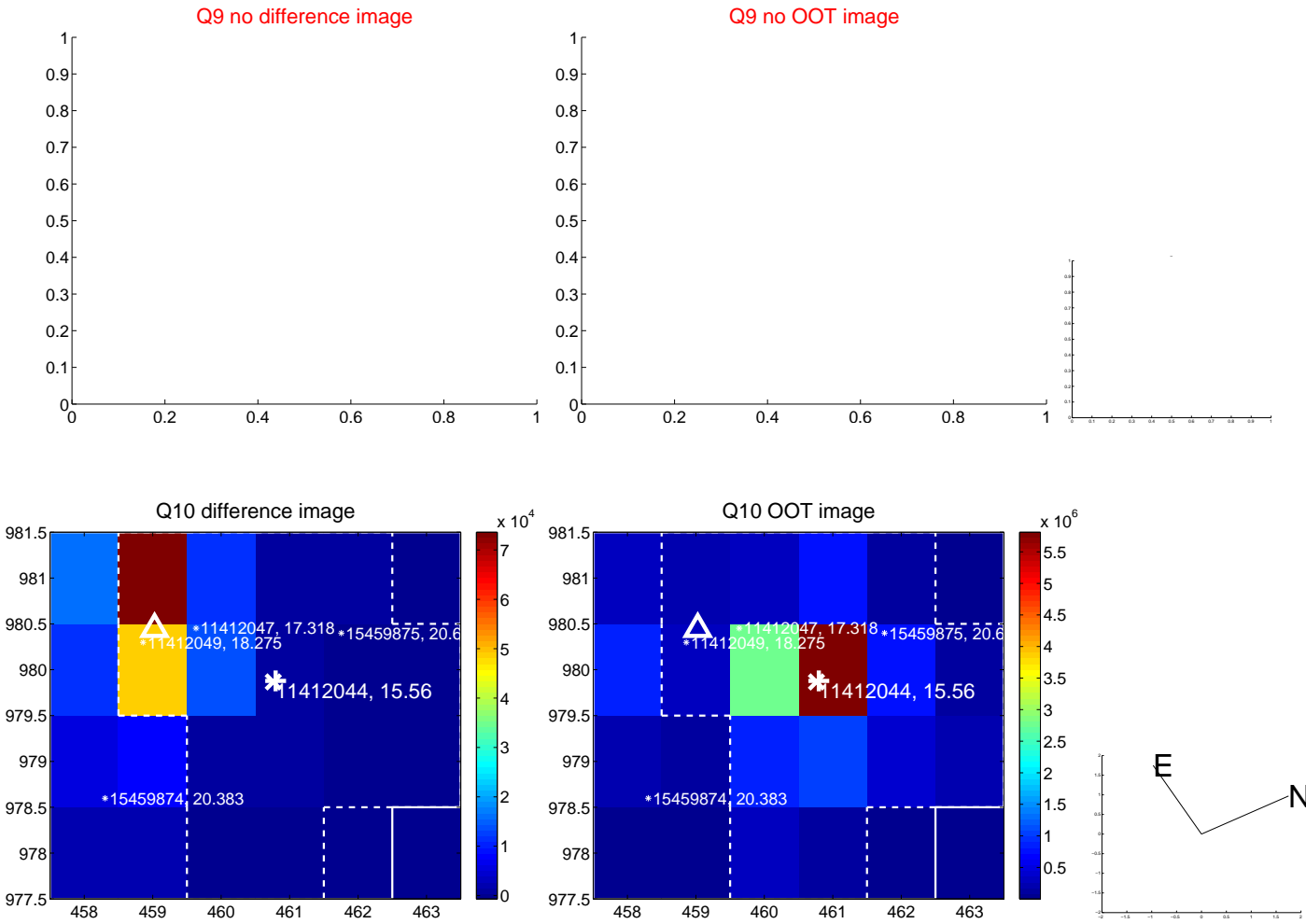
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



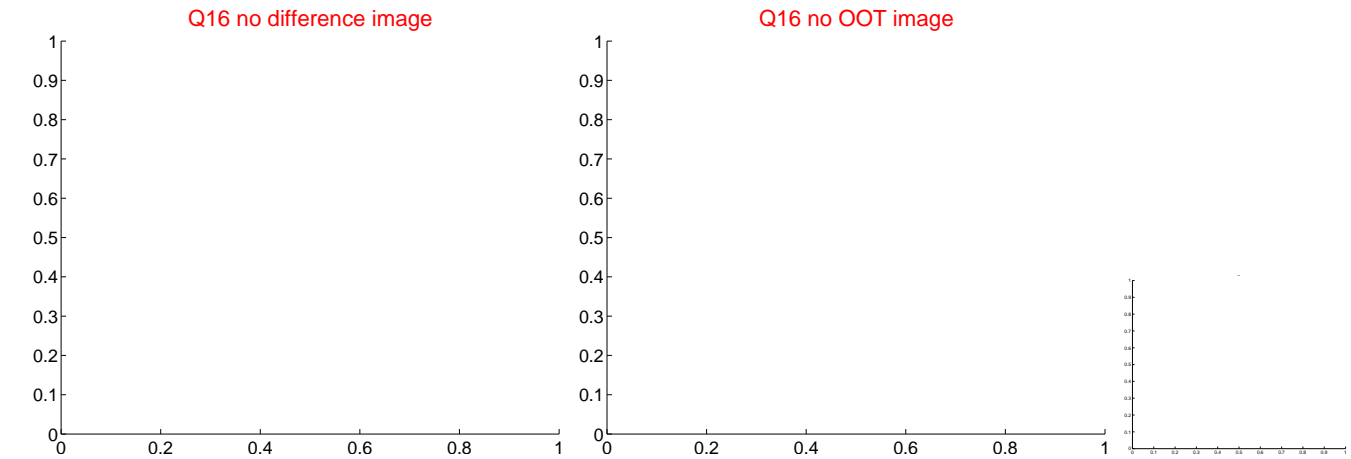
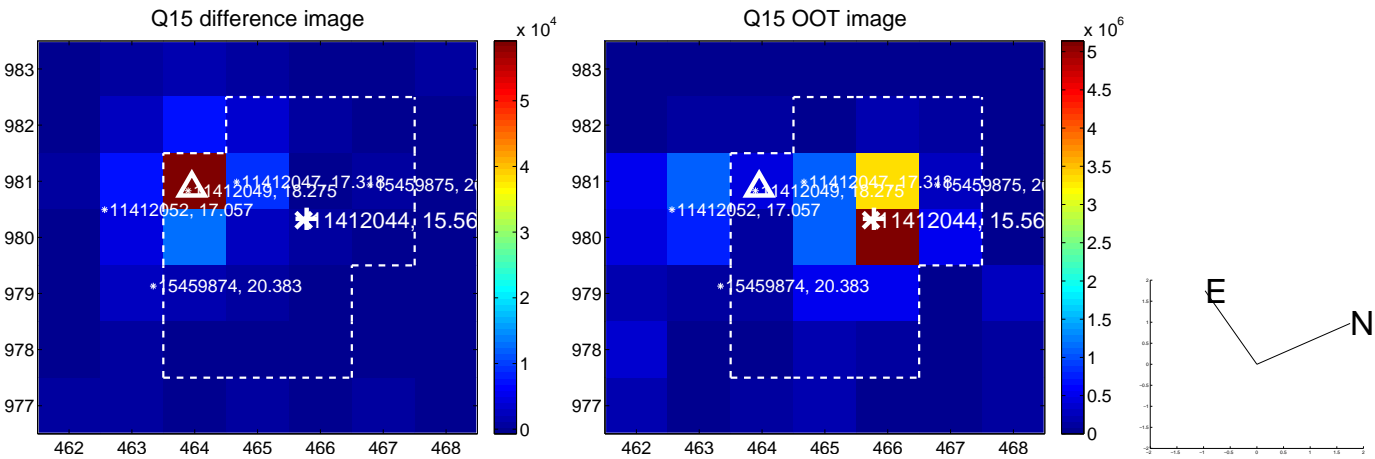
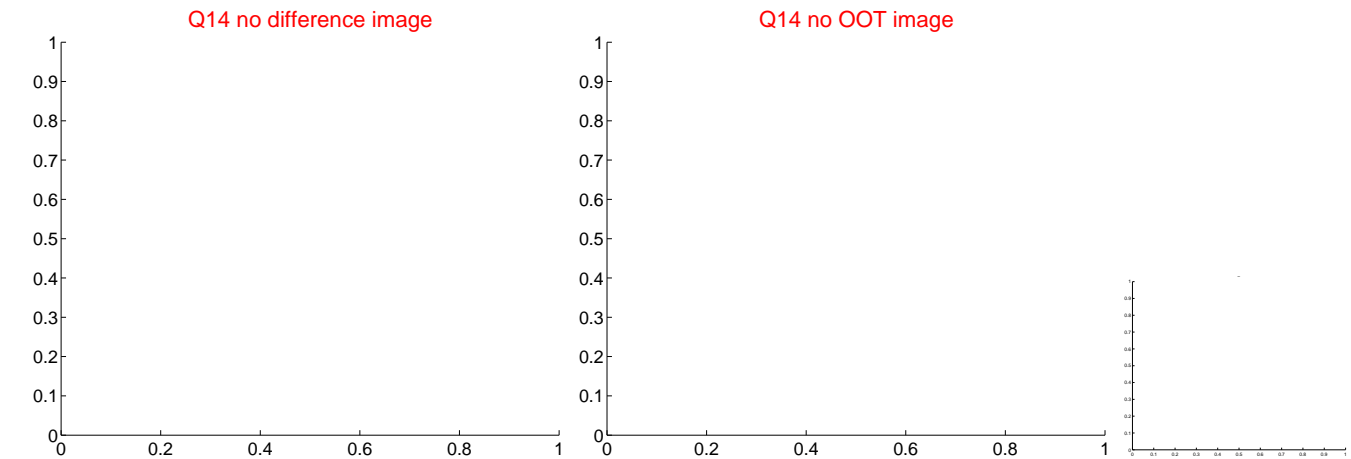
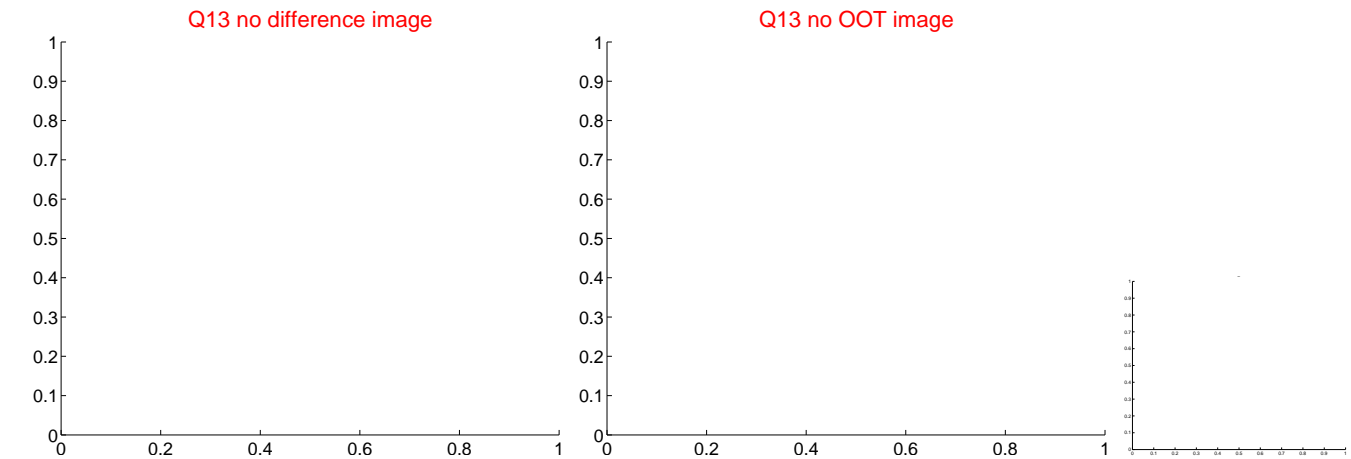
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



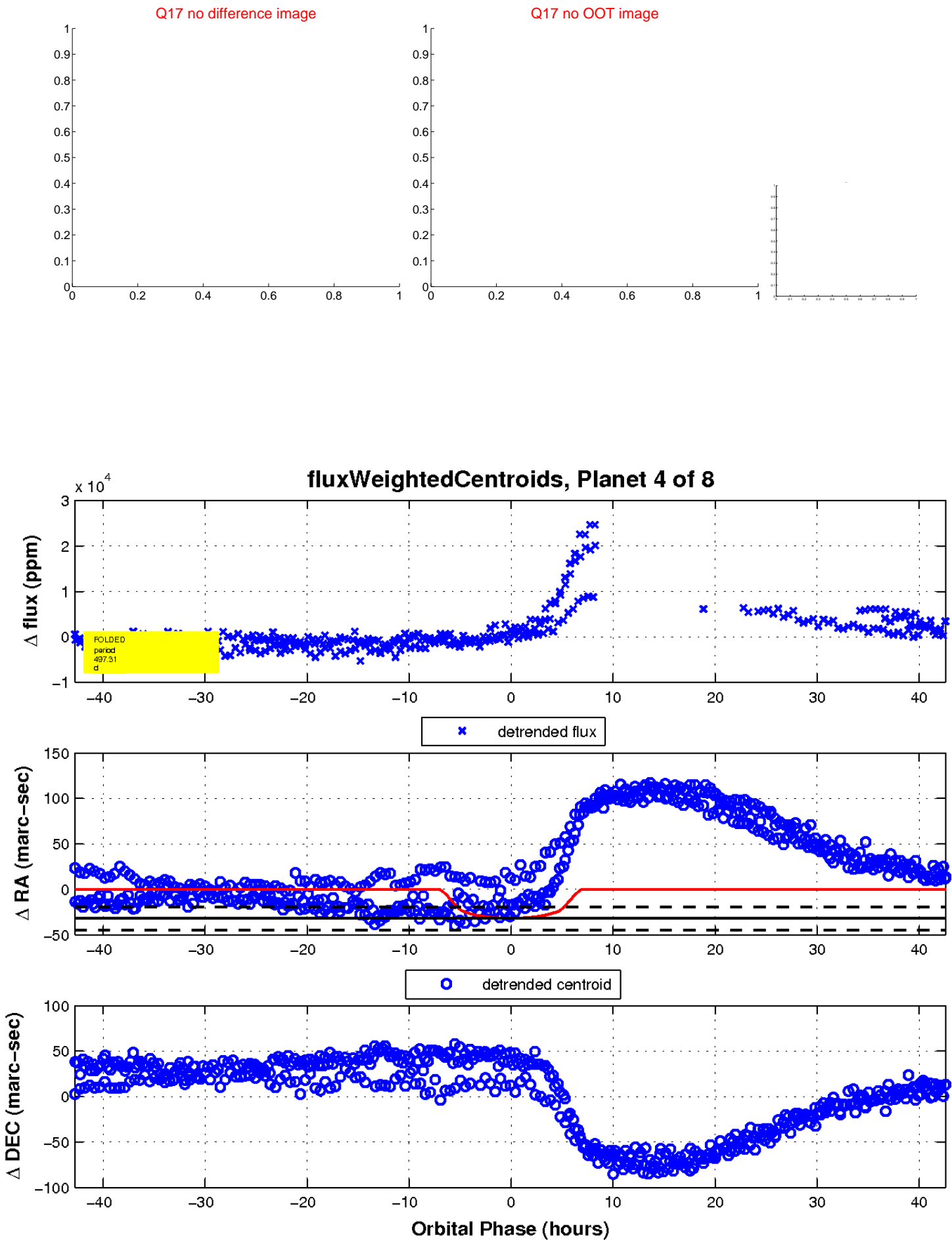
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

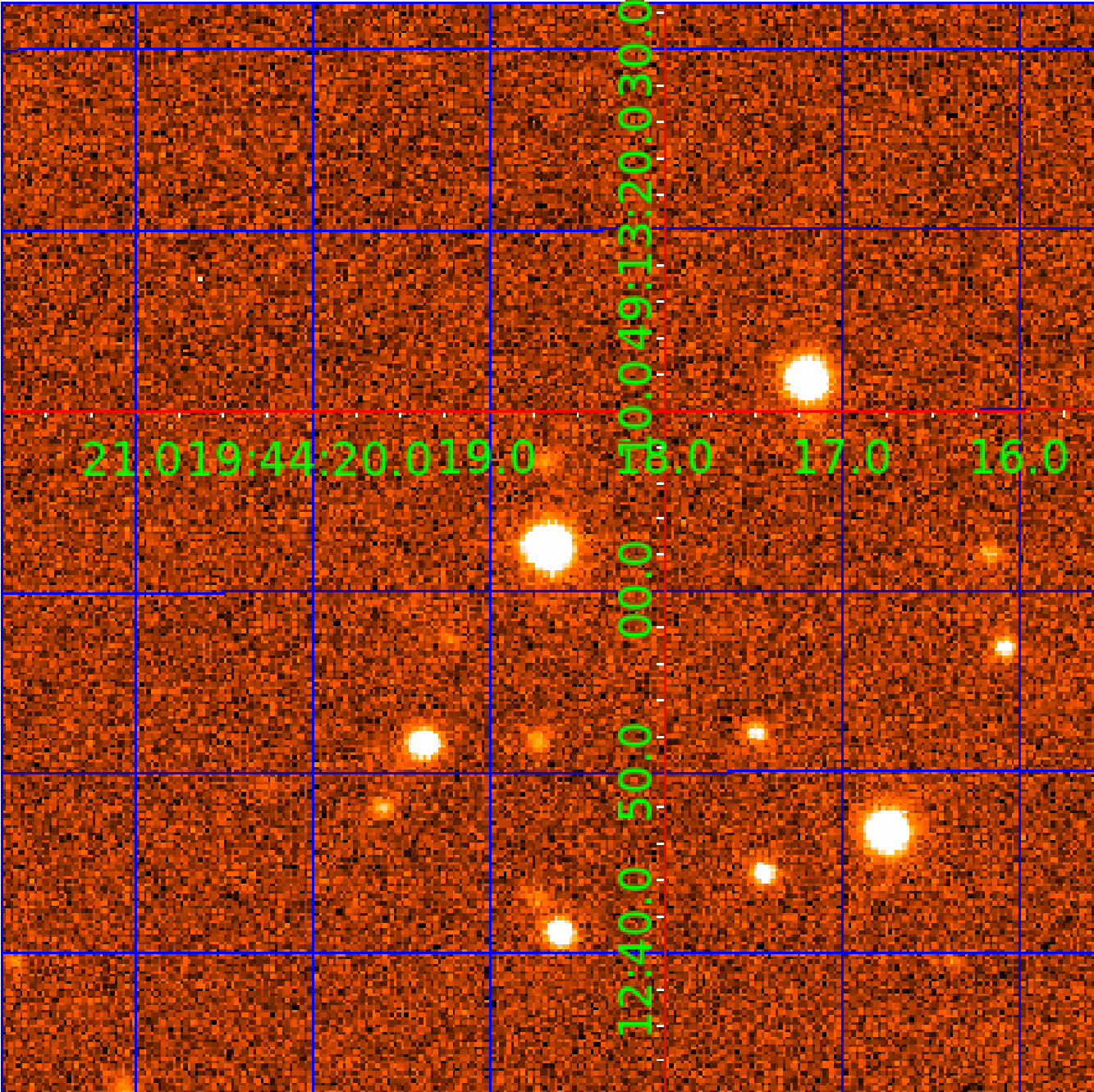


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 011412044

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
011412044-01	OBS	No	392.316863	189.867641	10821.9	19.439	20.2	18.4	0.72	4713	8.63	0.26
011412044-02	OBS	No	429.932868	228.232852	5577.4	15.710	19.8	12.1	0.72	4713	6.74	0.23
011412044-03	OBS	No	327.228963	308.514574	9609.8	17.960	18.9	15.3	0.72	4713	13.25	0.33
011412044-04	OBS	No	497.309634	433.712106	6509.3	14.267	18.4	15.5	0.72	4713	6.38	0.19
011412044-05	OBS	No	379.431472	254.543571	7842.6	13.668	18.1	13.7	0.72	4713	8.89	0.27
011412044-06	OBS	No	371.644294	241.608392	6772.4	13.431	17.6	13.4	0.72	4713	11.28	0.28
011412044-07	OBS	No	367.441035	215.105554	12056.7	23.794	18.9	15.9	0.72	4713	14.70	0.28
011412044-08	OBS	No	407.377075	136.506999	2052.6	9.000	18.2	-1.0	0.72	4713	3.13	0.24

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
011412044-01	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—CENT_RESOLVED_OFFSET
011412044-02	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_RESOLVED_OFFSET
011412044-03	OBS	FP	0.00	1	0	0	0	LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS
011412044-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
011412044-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
011412044-06	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_RESOLVED_OFFSET
011412044-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS
011412044-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—CENT_NOFITS

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

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

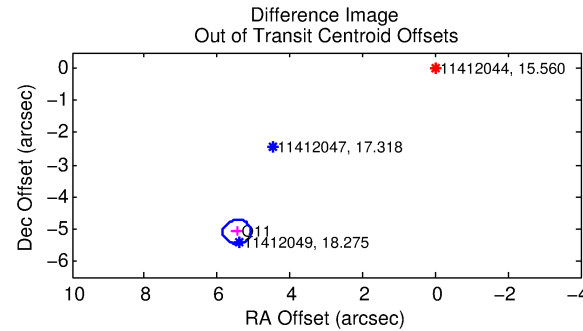
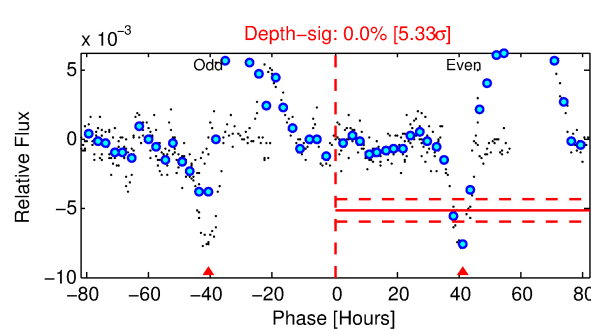
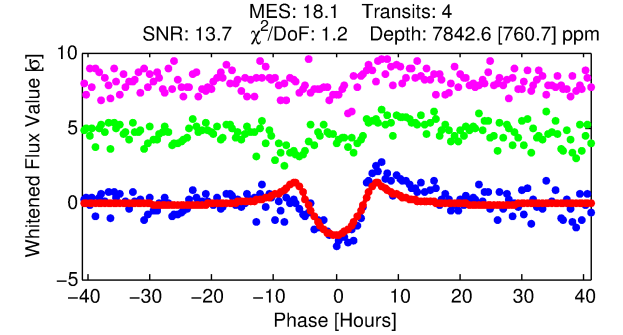
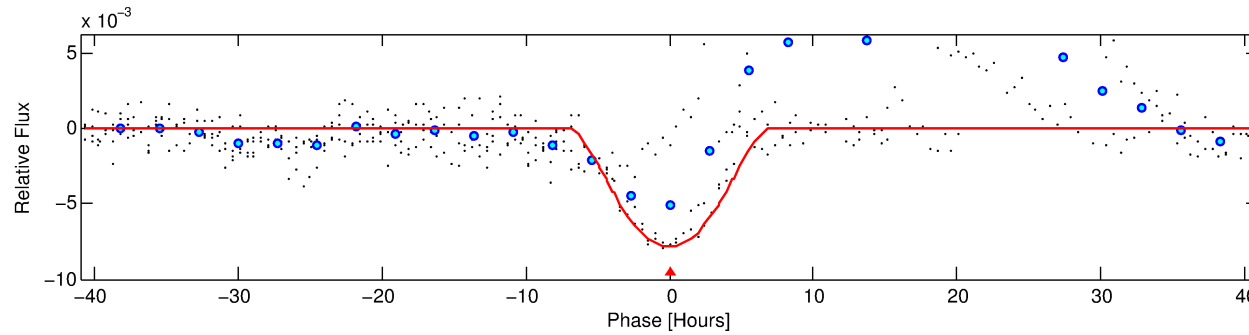
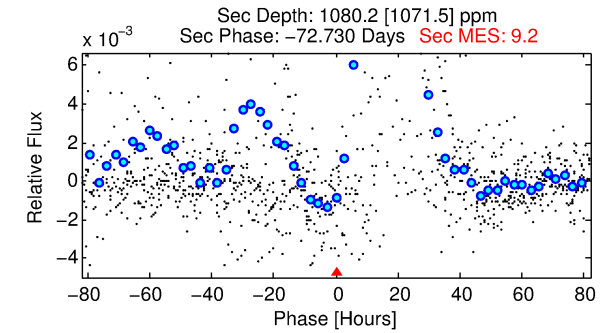
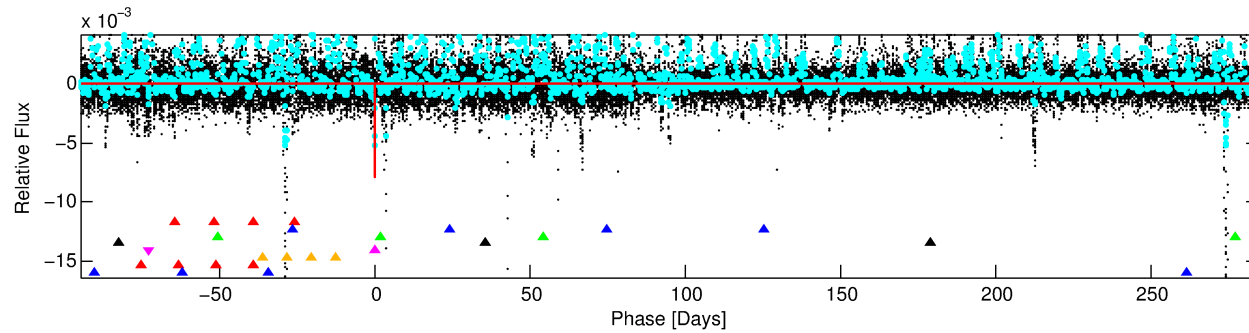
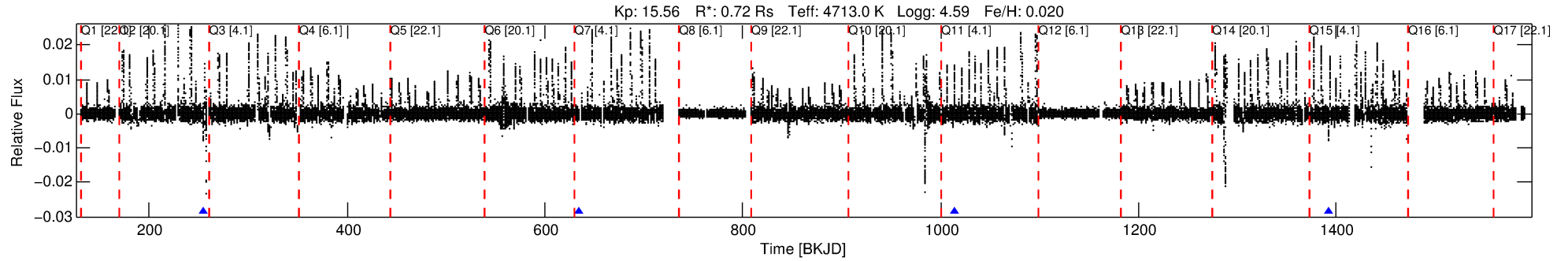
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 011412044-05

No Significant Match Found

# DV One-Page Summary

KIC: 11412044 Candidate: 5 of 8 Period: 379.431 d



## DV Fit Results:

Period = 379.43147 [0.00693] d  
Epoch = 254.5436 [0.0137] BKJD  
Rp/R\* = 0.1132 [0.0469]  
a/R\* = 128.61 [18.27]  
b = 0.93 [0.09]  
Seff = 0.27 [0.04]  
Teq = 183 [7] K  
Rp = 8.89 [3.76] Re  
a = 0.9247 [0.0601] AU  
Ag = 6424.10 [8319.05] [0.77 $\sigma$ ]  
Teffp = 2540 [824] K [2.86 $\sigma$ ]

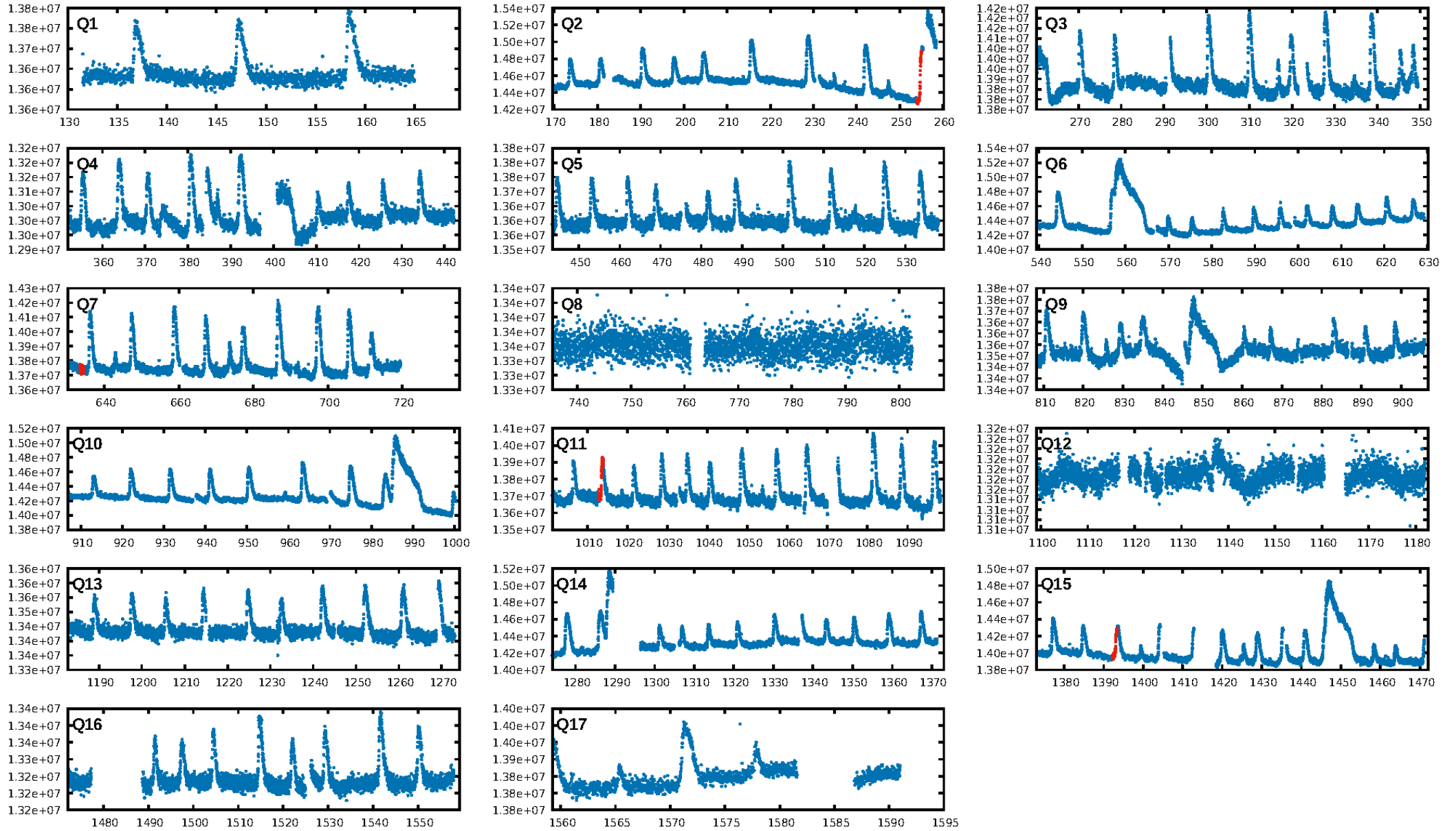
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [9.75 $\sigma$ ]  
LongPeriod-sig: 100.0% [13.01 $\sigma$ ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 77.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: 0.9215  
Centroid-sig: N/A  
Centroid-so: 5.659 arcsec [4.89 $\sigma$ ]  
OotOffset-rm: 7.467 arcsec [59.15 $\sigma$ ]  
KicOffset-rm: 7.355 arcsec [58.15 $\sigma$ ]  
OotOffset-st: 0/1/0/0 [1]  
KicOffset-st: 0/1/0/0 [1]  
DiffImageQuality-fgm: 1.00 [1/1]  
DiffImageOverlap-fno: 1.00 [1/1]

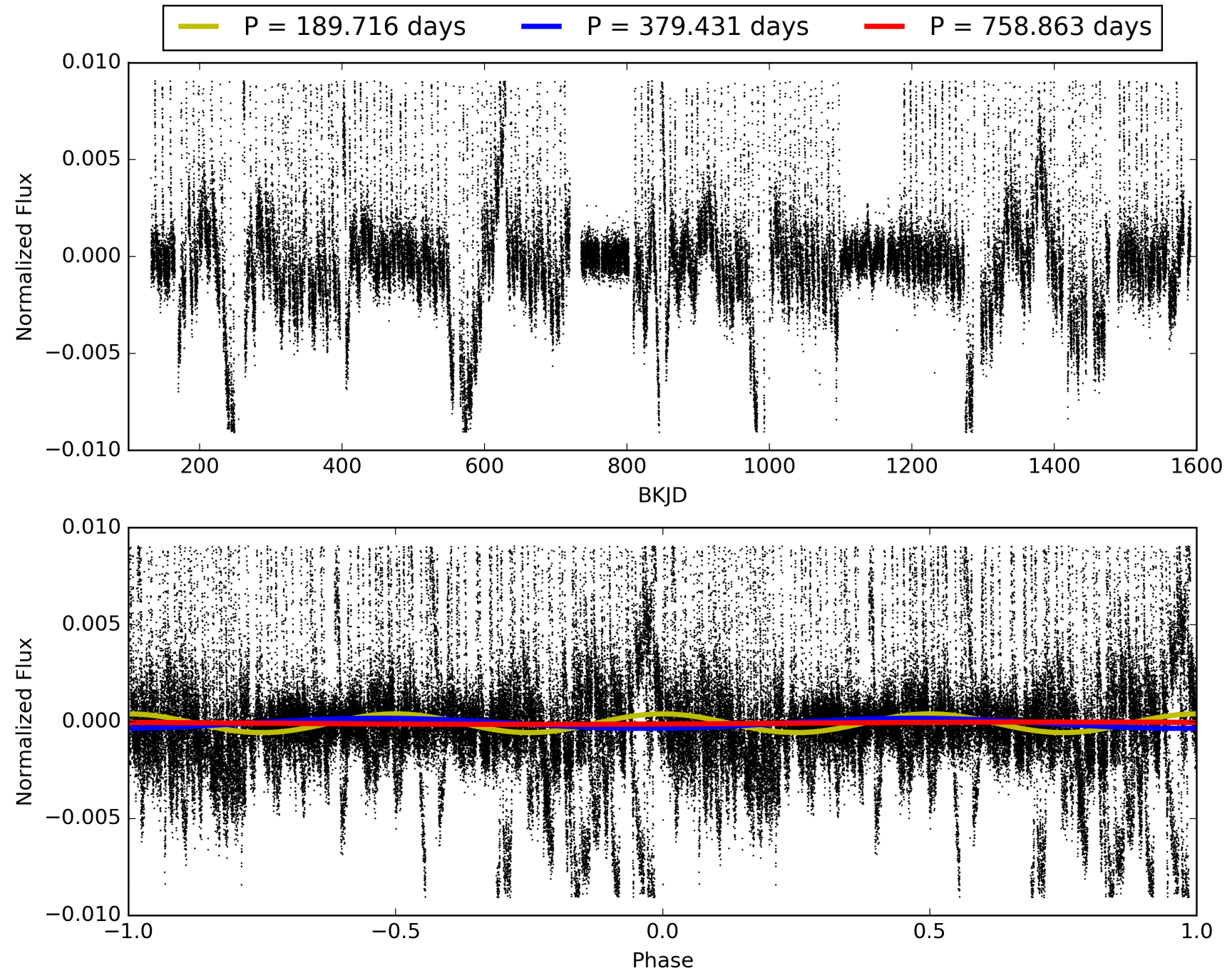
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:14:41 Z

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

# TCE 011412044-05, PDC Light Curves

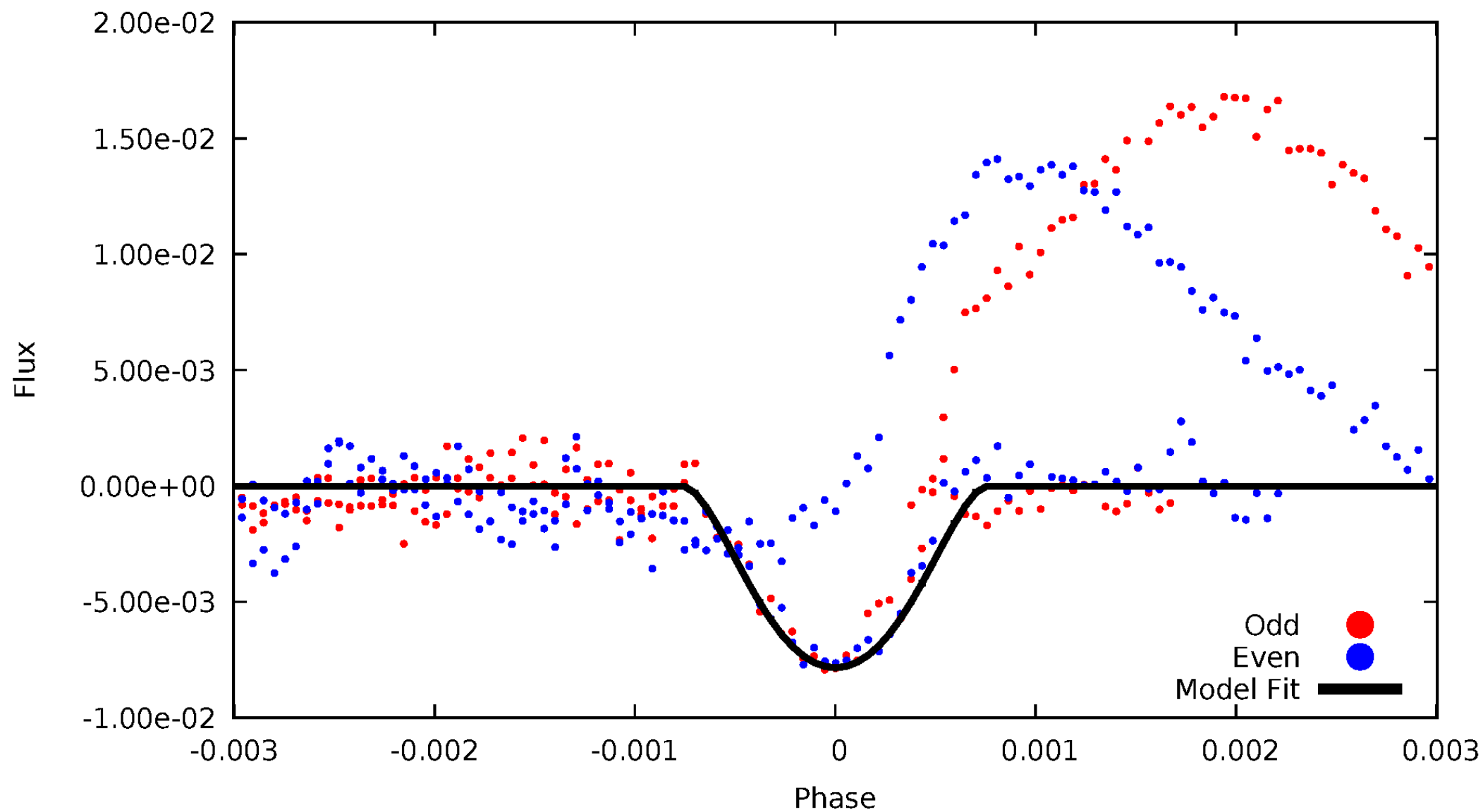


TCE 011412044-05



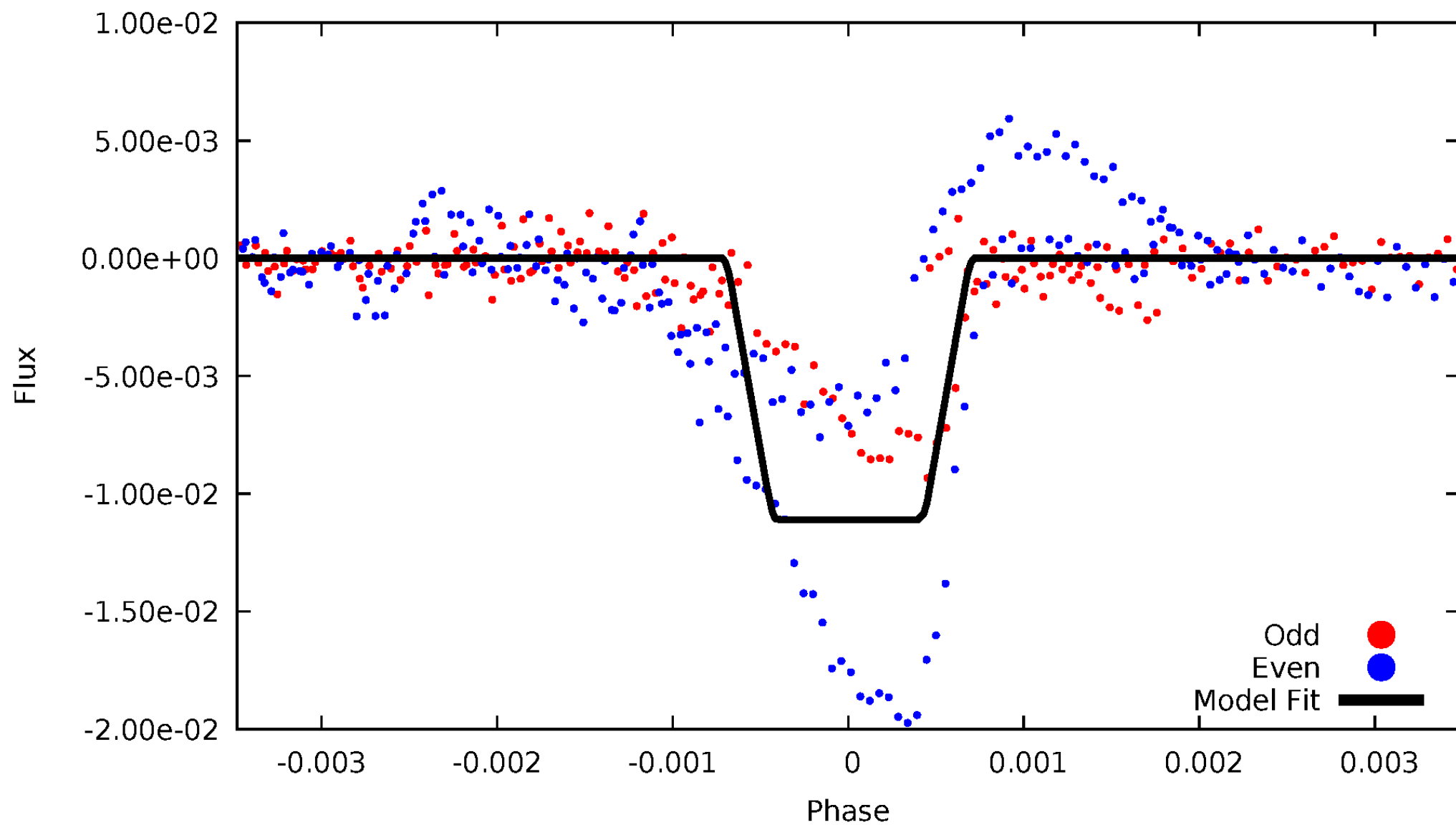
# DV Odd/Even

TCE 011412044-05



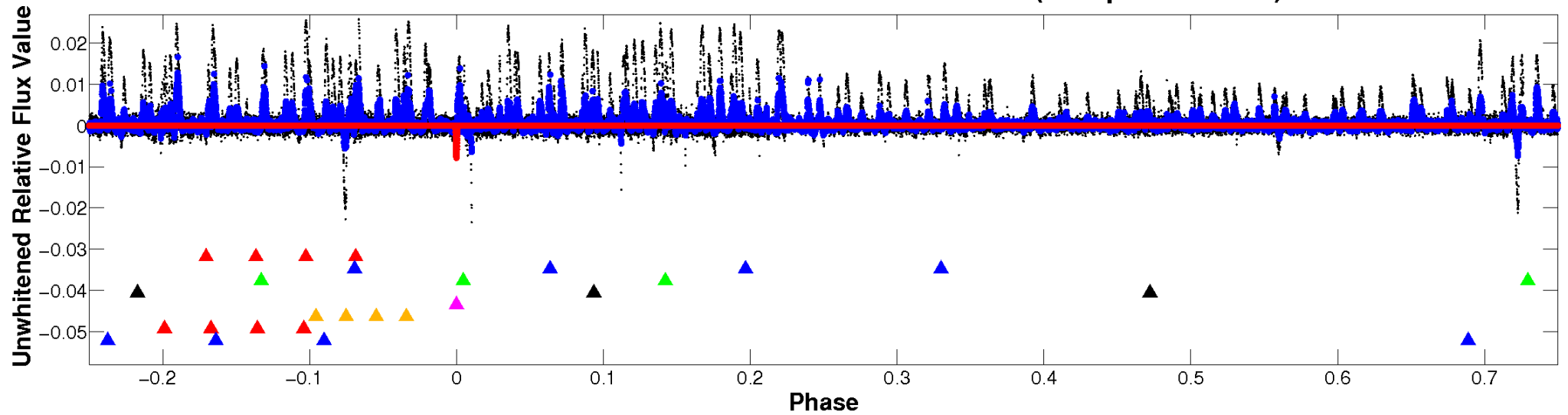
# ALT Odd/Even

TCE 011412044-05

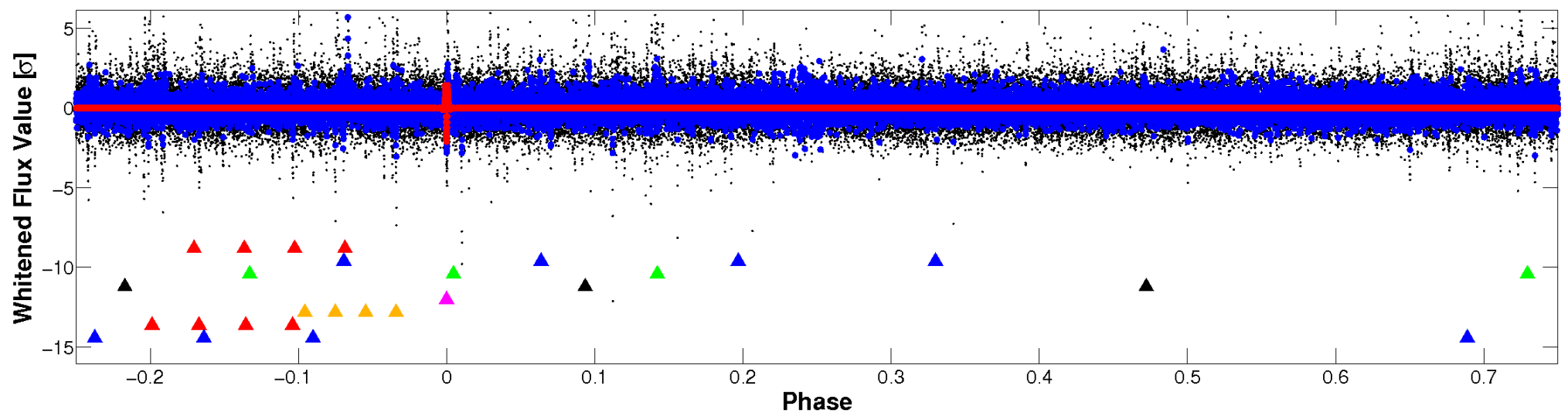


# Non-Whitened Vs. Whitened Light Curve

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



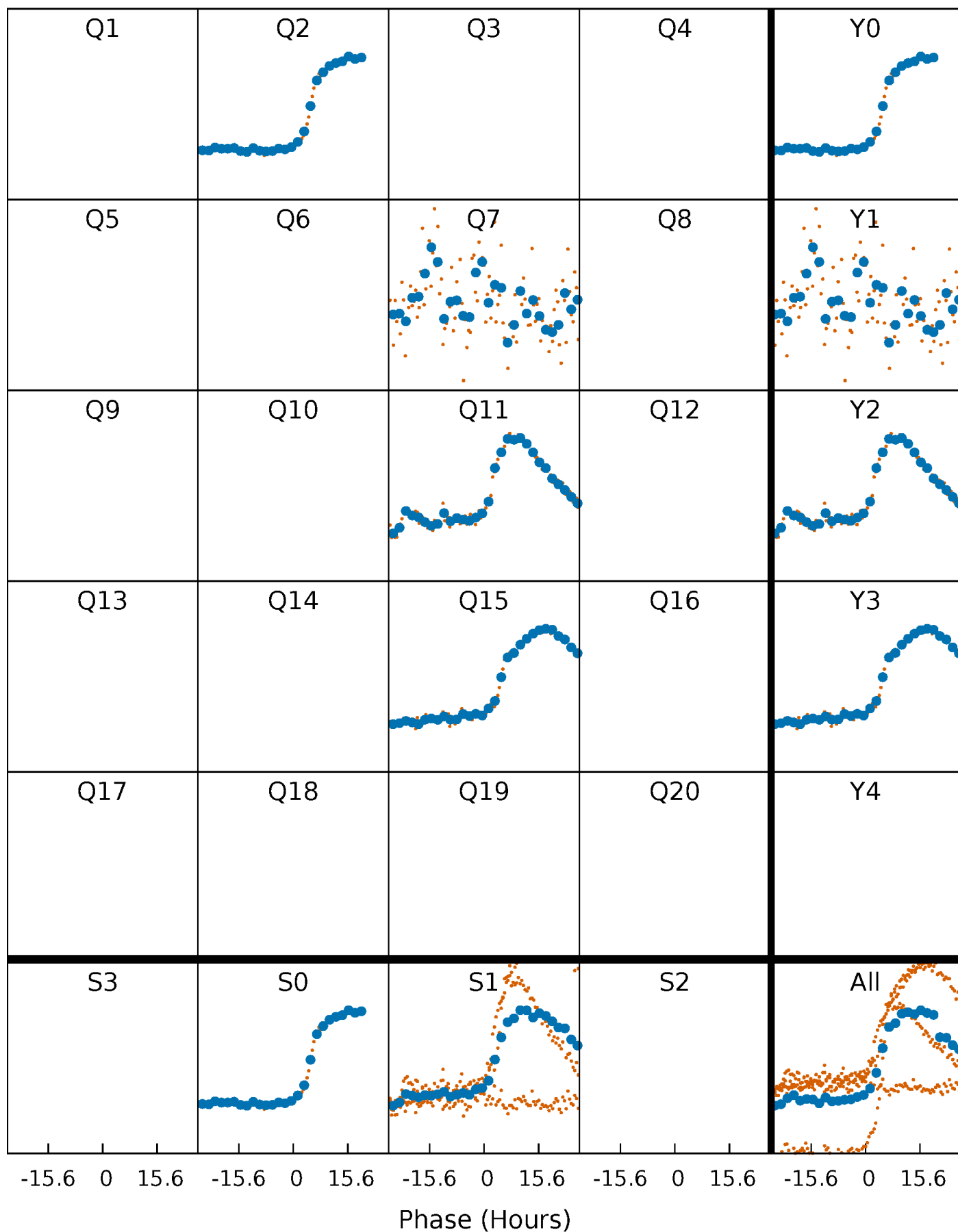
## Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)





# PDC Quarter-Phased Transit Curves

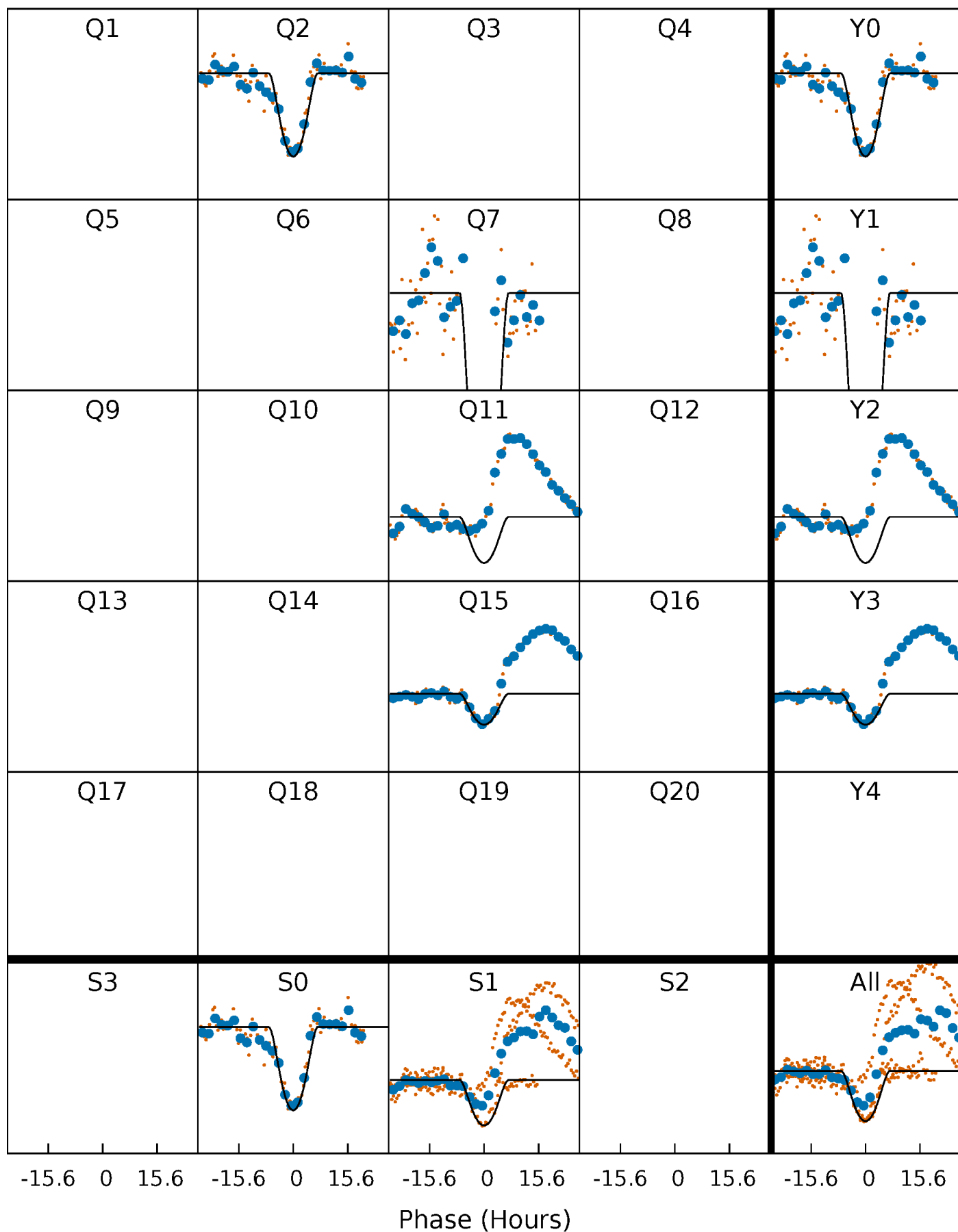
TCE 011412044-05     $P=379.431472$  Days     $T_0=254.543571$  (BKJD)





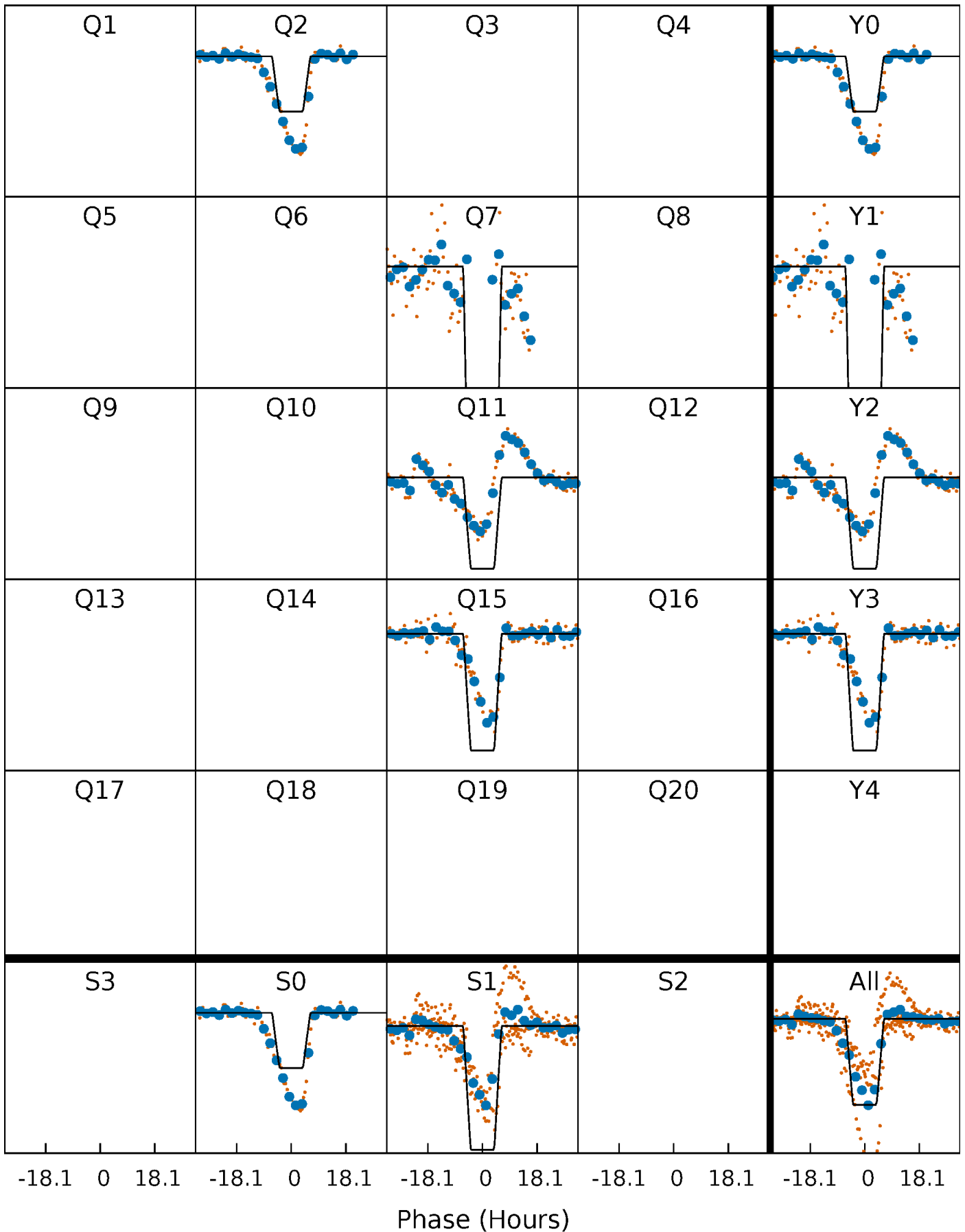
# DV Quarter-Phased Transit Curves

TCE 011412044-05     $P=379.431472$  Days     $T_0=254.543571$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

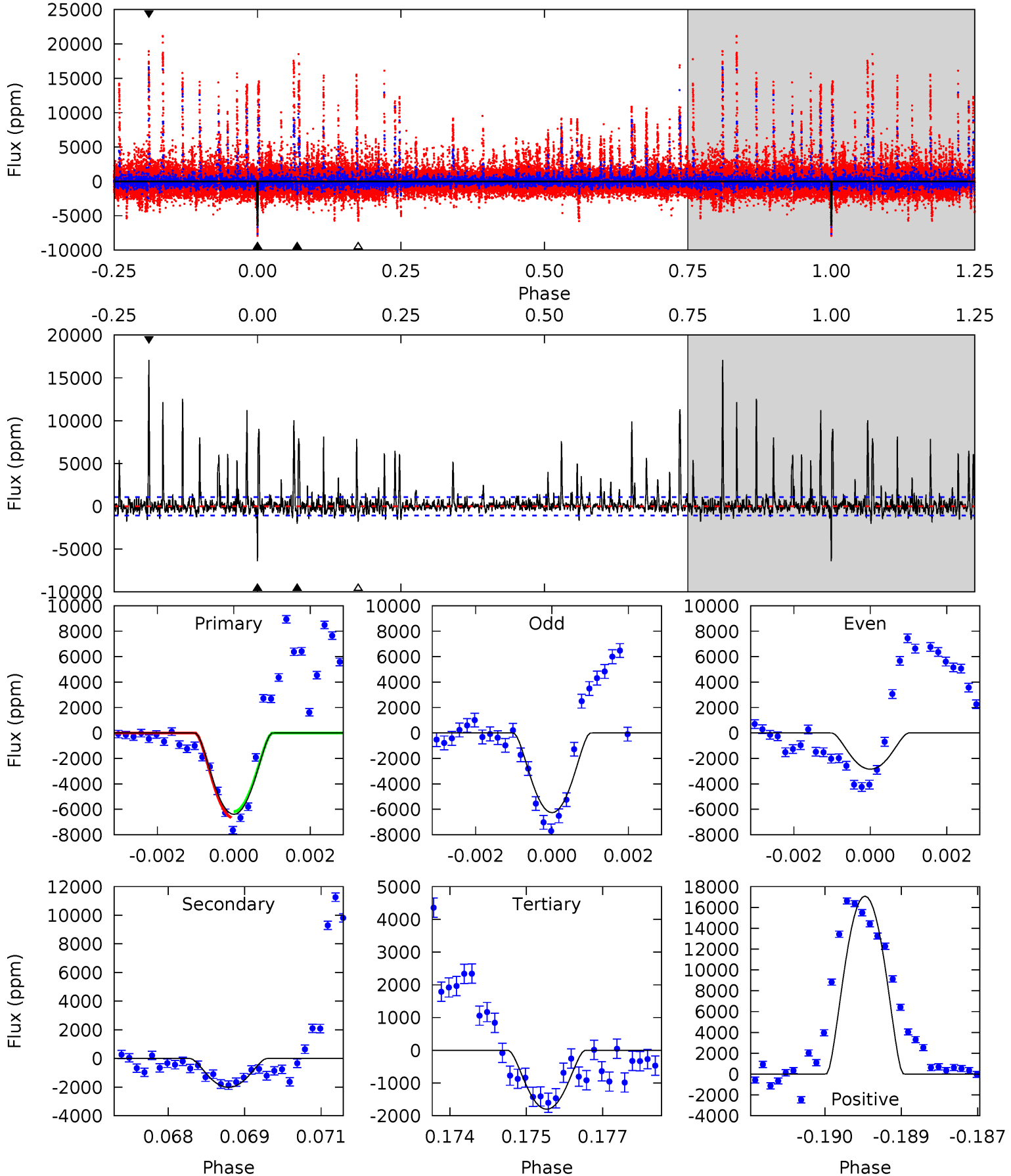
TCE 011412044-05     $P=379.423964$  Days     $T_0=254.518481$  (BKJD)



# DV Model-Shift Uniqueness Test

011412044-05, P = 379.431472 Days, E = 254.543571 Days

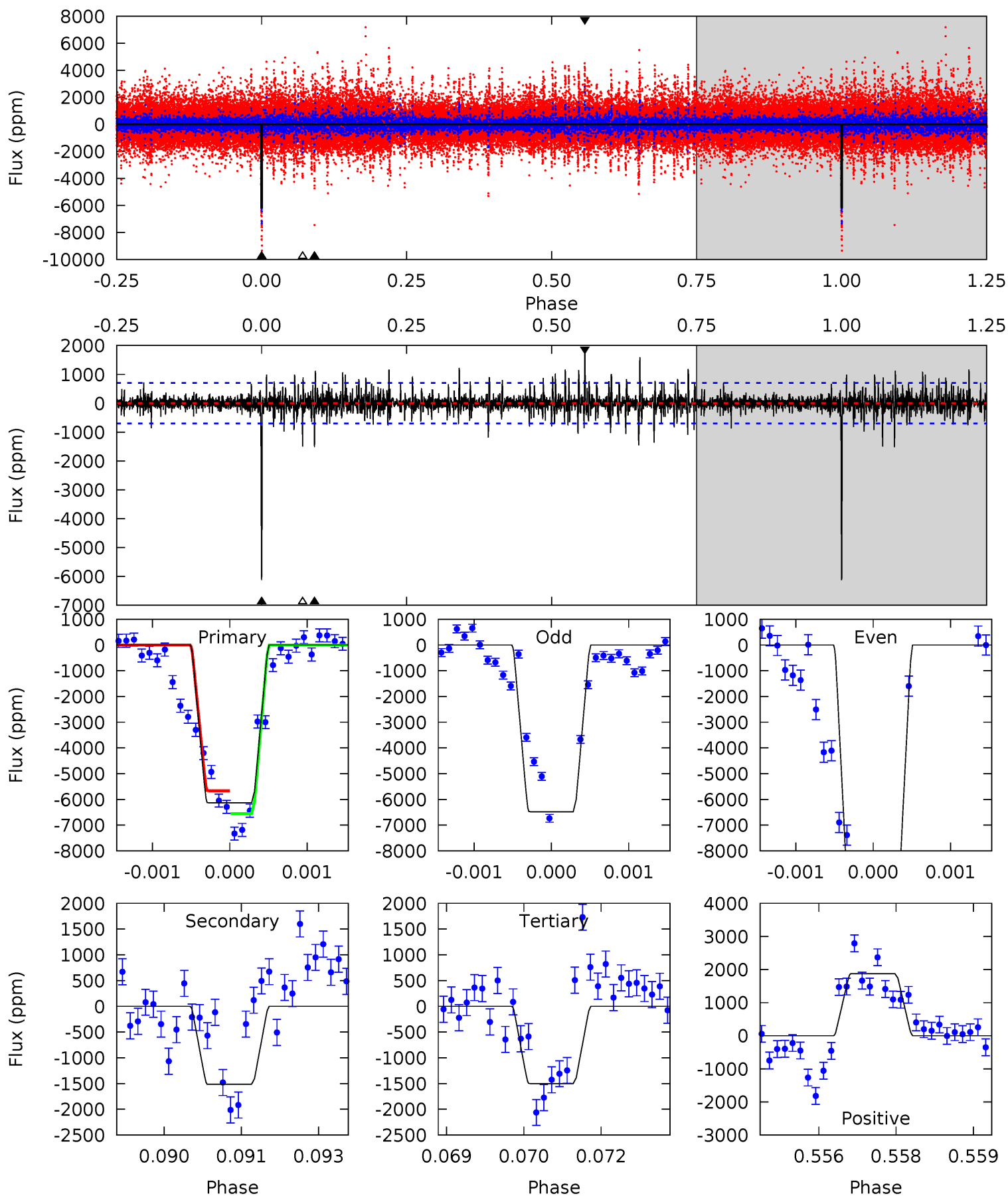
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
31.8	10.0	8.95	84.9	5.38	3.17	6.54	22.8	-53.1	1.06	-74.9	4.43	0.90	0.73	1.19



# Alt Model-Shift Uniqueness Test

011412044-05, P = 379.423964 Days, E = 254.518481 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
47.1	11.6	11.5	14.4	5.39	3.19	1.98	35.6	32.7	0.10	-2.77	18.6	1.22	0.23	3.40



### Stellar Parameters For KIC 011412044

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (g \cdot \text{cm}^{-3})$
	$4713^{+125}_{-139}$	$4.588^{+0.042}_{-0.035}$	$0.020^{+0.250}_{-0.300}$	$0.720^{+0.051}_{-0.061}$	$0.733^{+0.064}_{-0.058}$	$2.764^{+0.592}_{-0.374}$
	+3%/-3%	+1%/-1%	+1250%/-1500%	+7%/-8%	+9%/-8%	+21%/-14%
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 011412044-05 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-2015 \pm 201$	$9.11^{+3.39}_{-3.93}$	$256^{+9}_{-9}$	$3389^{+687}_{-321}$	$11397^{+22690}_{-5308}$
Alt.	$-1514 \pm 130$	$8.20^{+3.94}_{-3.53}$	$256^{+9}_{-9}$	$3310^{+720}_{-342}$	$10440^{+22166}_{-5720}$

$T_{max}$  = 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

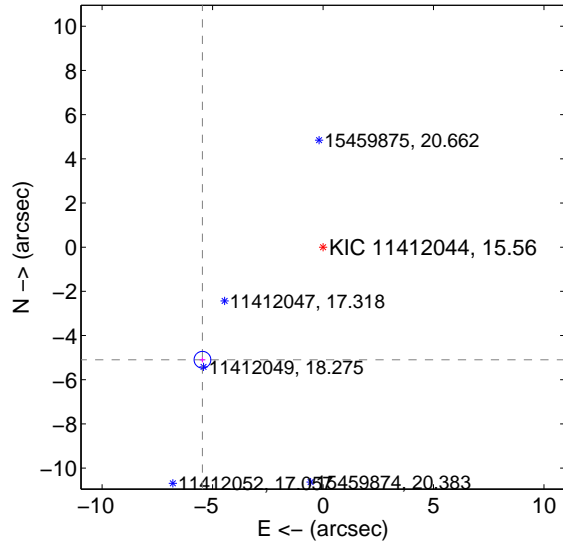
Supplemental centroid analysis for 011412044-05. Kepler magnitude: 15.56. Transit SNR 13.74

There are 1 quarters with good PRF difference image offsets

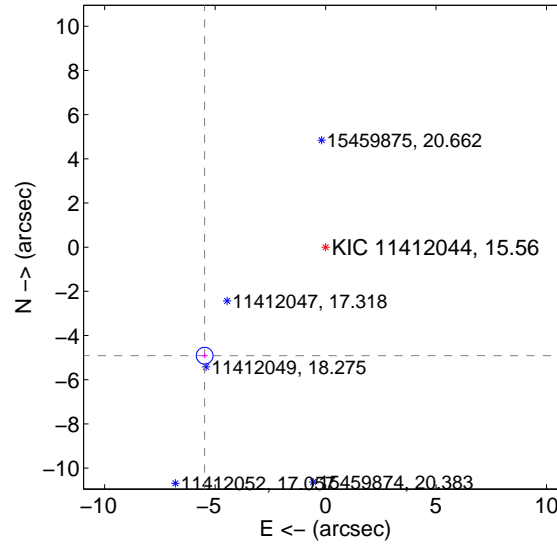
The direct PRF centroid is offset from the target star catalog position by about 0.18 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$7.467 \pm 0.126$	59.15	$5.458 \pm 0.131$	$-5.096 \pm 0.120$
PRF-fit source offset from KIC position	$7.355 \pm 0.126$	58.15	$5.474 \pm 0.131$	$-4.912 \pm 0.120$
photometric centroid source offset	$5.66 \pm 1.16$	4.89	$1.77 \pm 1.25$	$-5.38 \pm 1.15$

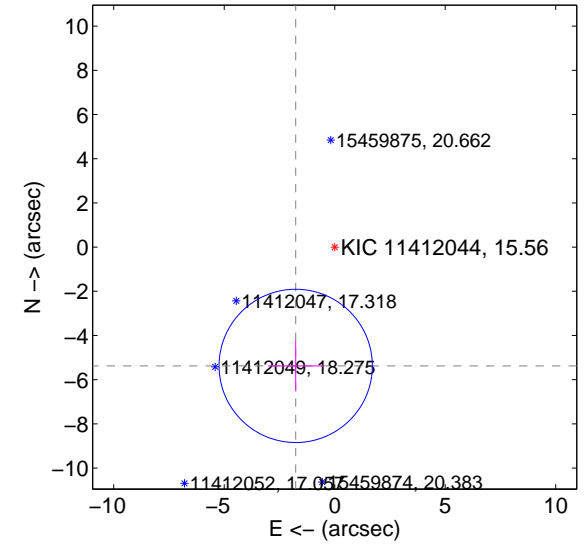
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



offset from photometric centroids



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

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



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





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

Q9 no difference image



Q9 no OOT image



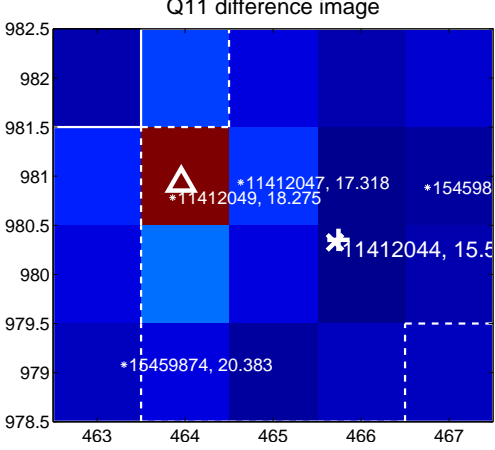
Q10 no difference image



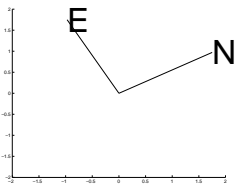
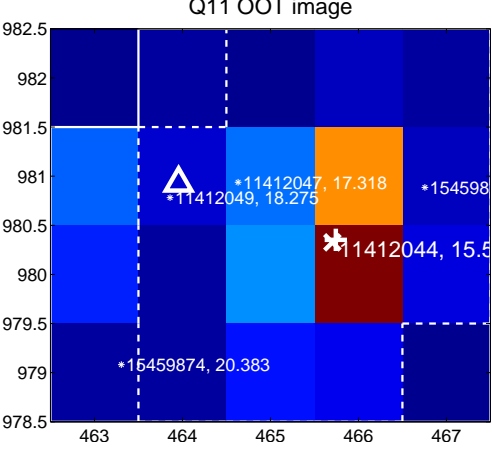
Q10 no OOT image



Q11 difference image



Q11 OOT image



Q12 no difference image



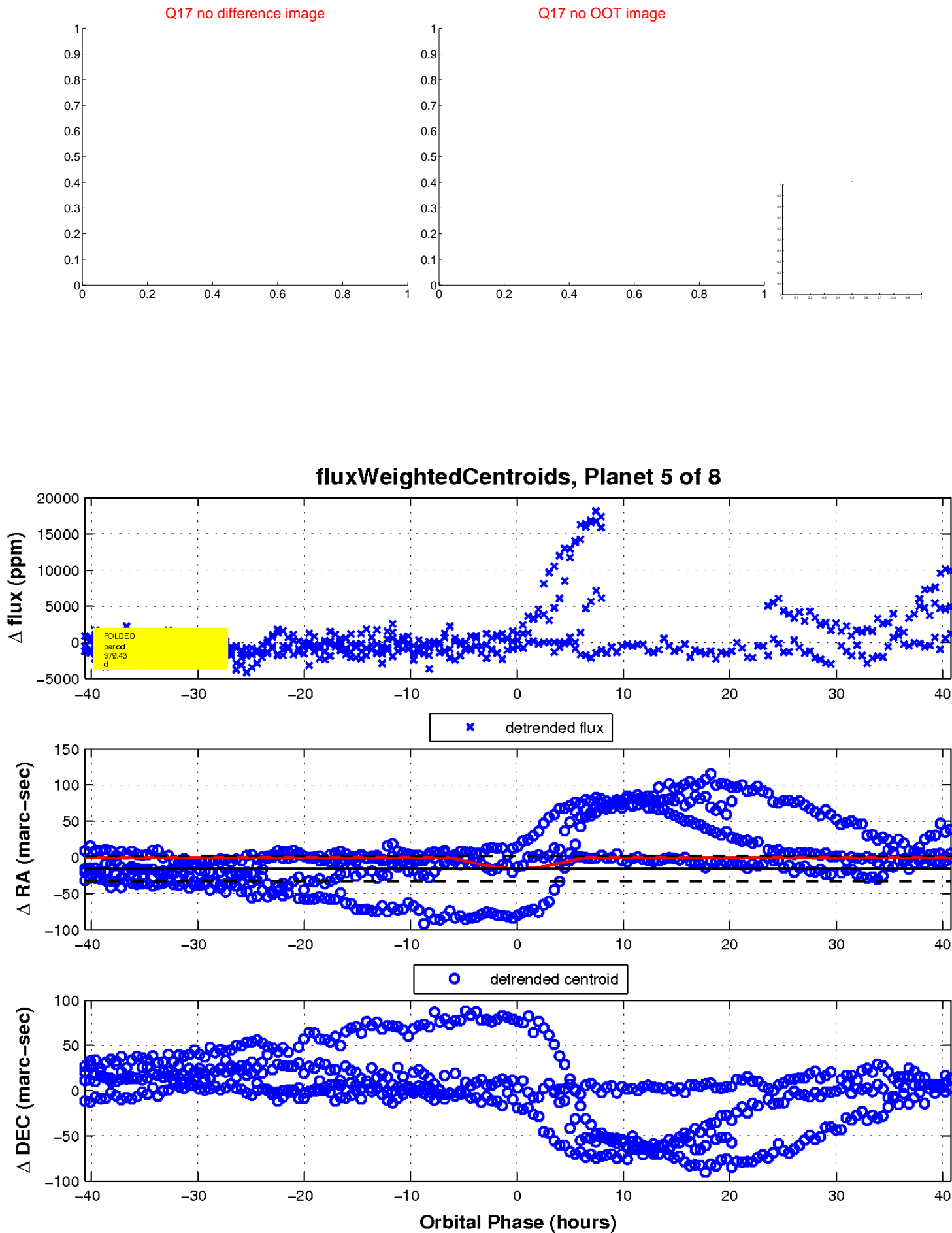
Q12 no OOT image



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

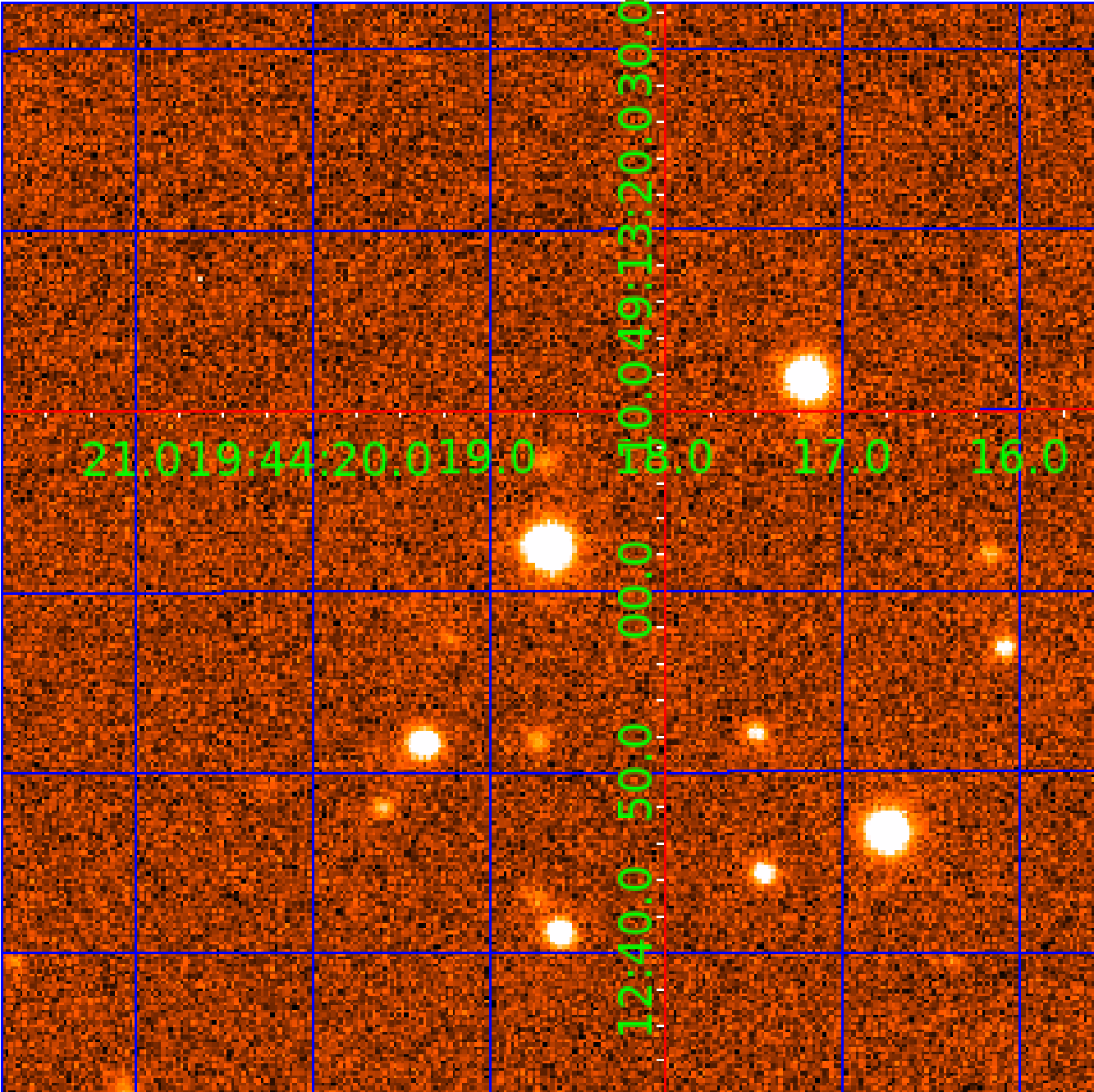


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 011412044

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
011412044-01	OBS	No	392.316863	189.867641	10821.9	19.439	20.2	18.4	0.72	4713	8.63	0.26
011412044-02	OBS	No	429.932868	228.232852	5577.4	15.710	19.8	12.1	0.72	4713	6.74	0.23
011412044-03	OBS	No	327.228963	308.514574	9609.8	17.960	18.9	15.3	0.72	4713	13.25	0.33
011412044-04	OBS	No	497.309634	433.712106	6509.3	14.267	18.4	15.5	0.72	4713	6.38	0.19
011412044-05	OBS	No	379.431472	254.543571	7842.6	13.668	18.1	13.7	0.72	4713	8.89	0.27
011412044-06	OBS	No	371.644294	241.608392	6772.4	13.431	17.6	13.4	0.72	4713	11.28	0.28
011412044-07	OBS	No	367.441035	215.105554	12056.7	23.794	18.9	15.9	0.72	4713	14.70	0.28
011412044-08	OBS	No	407.377075	136.506999	2052.6	9.000	18.2	-1.0	0.72	4713	3.13	0.24

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
011412044-01	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—CENT_RESOLVED_OFFSET
011412044-02	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_RESOLVED_OFFSET
011412044-03	OBS	FP	0.00	1	0	0	0	LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS
011412044-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
011412044-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
011412044-06	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_RESOLVED_OFFSET
011412044-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS
011412044-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—CENT_NOFITS

**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.

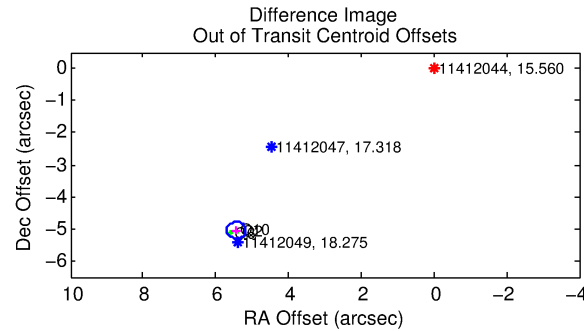
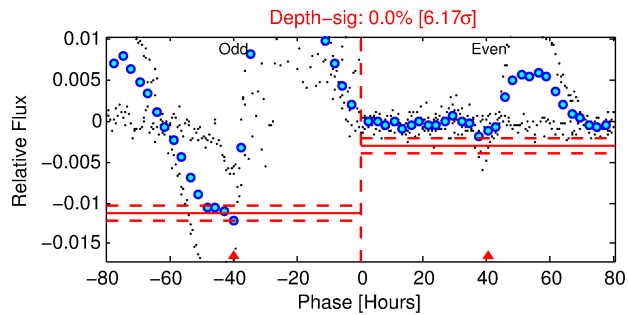
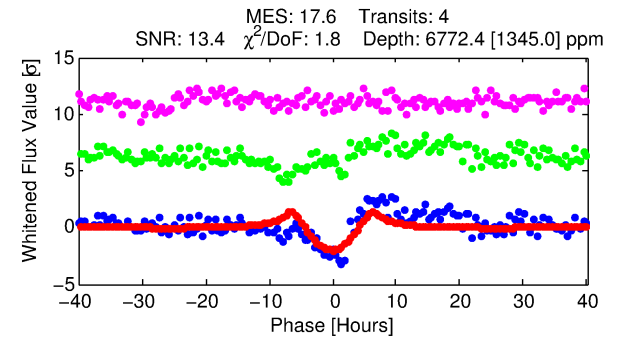
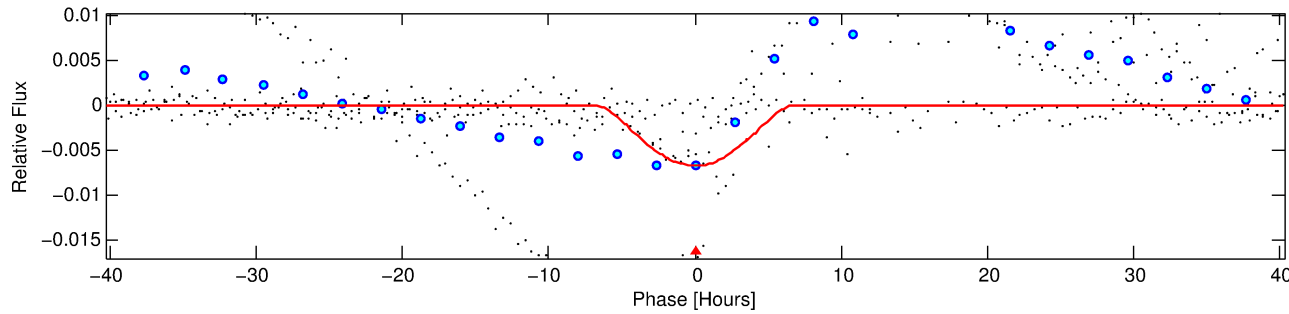
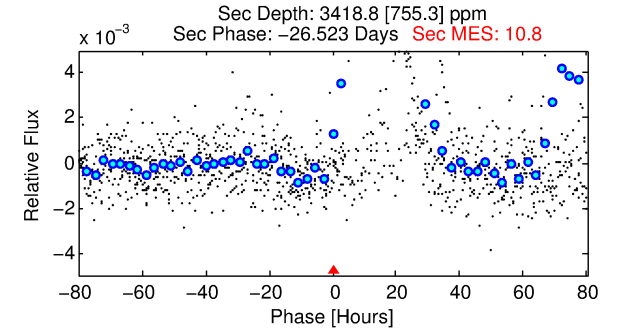
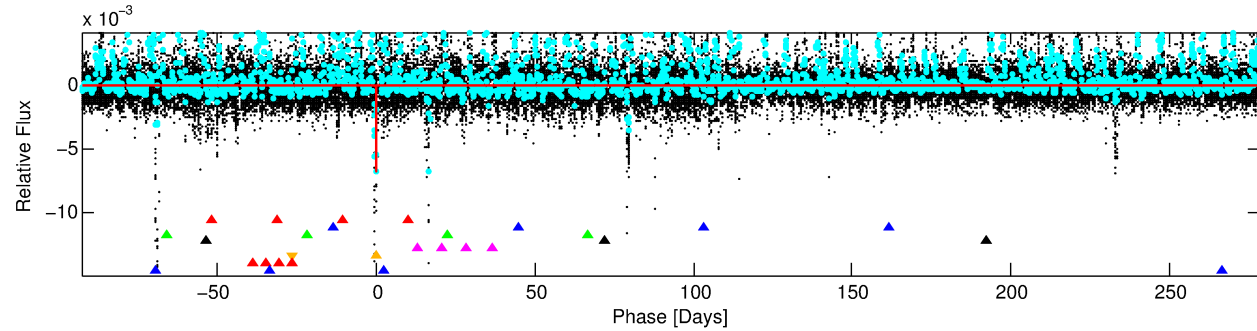
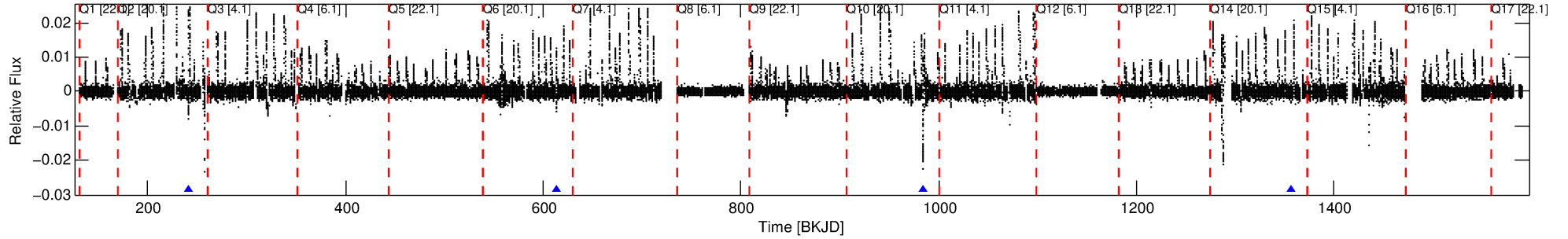
Ephemeris Match Information For 011412044-06

No Significant Match Found

# DV One-Page Summary

KIC: 11412044 Candidate: 6 of 8 Period: 371.644 d

Kp: 15.56 R\*: 0.72 Rs Teff: 4713.0 K Logg: 4.59 Fe/H: 0.020



## DV Fit Results:

Period = 371.64429 [0.00914] d  
Epoch = 241.6084 [0.0161] BKJD  
Rp/R\* = 0.1436 [0.3041]  
a/R\* = 117.34 [37.94]  
b = 1.00 [0.41]  
Seff = 0.28 [0.04]  
Teq = 185 [7] K  
Rp = 11.28 [23.91] Re  
a = 0.9120 [0.0593] AU  
Ag = 12289.17 [52121.81] [0.24σ]  
Teffp = 3007 [3189] K [0.89σ]

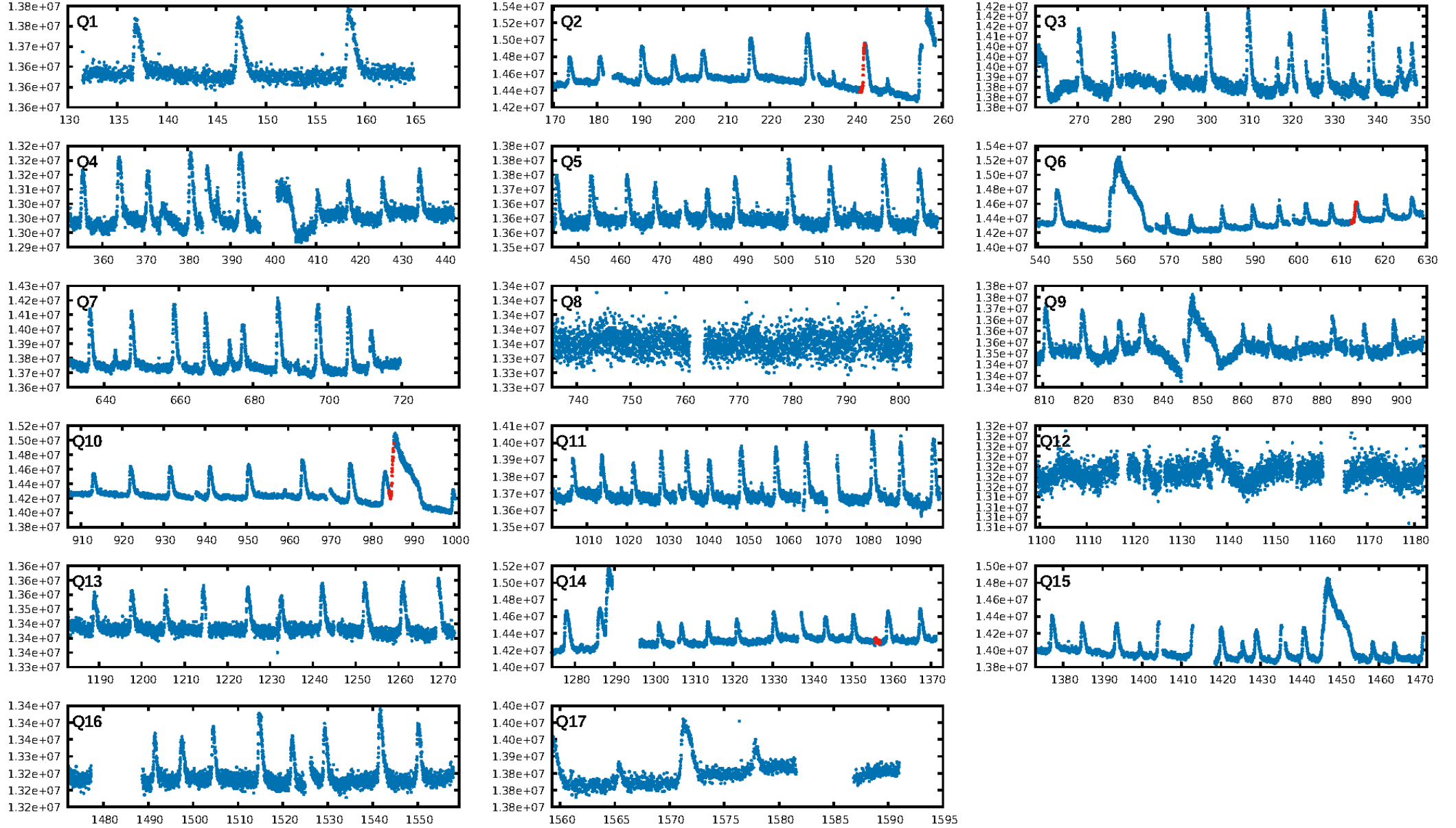
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [3.69σ]  
LongPeriod-sig: 100.0% [9.75σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 0.2%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: 1.567  
Centroid-sig: N/A  
Centroid-so: 7.987 arcsec [6.31σ]  
OotOffset-rm: 7.424 arcsec [85.89σ]  
KicOffset-rm: 7.336 arcsec [89.50σ]  
OotOffset-st: 3/0/0/0 [3]  
KicOffset-st: 3/0/0/0 [3]  
DiffImageQuality-fgm: 1.00 [3/3]  
DiffImageOverlap-fno: 1.00 [4/4]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:14:50 Z

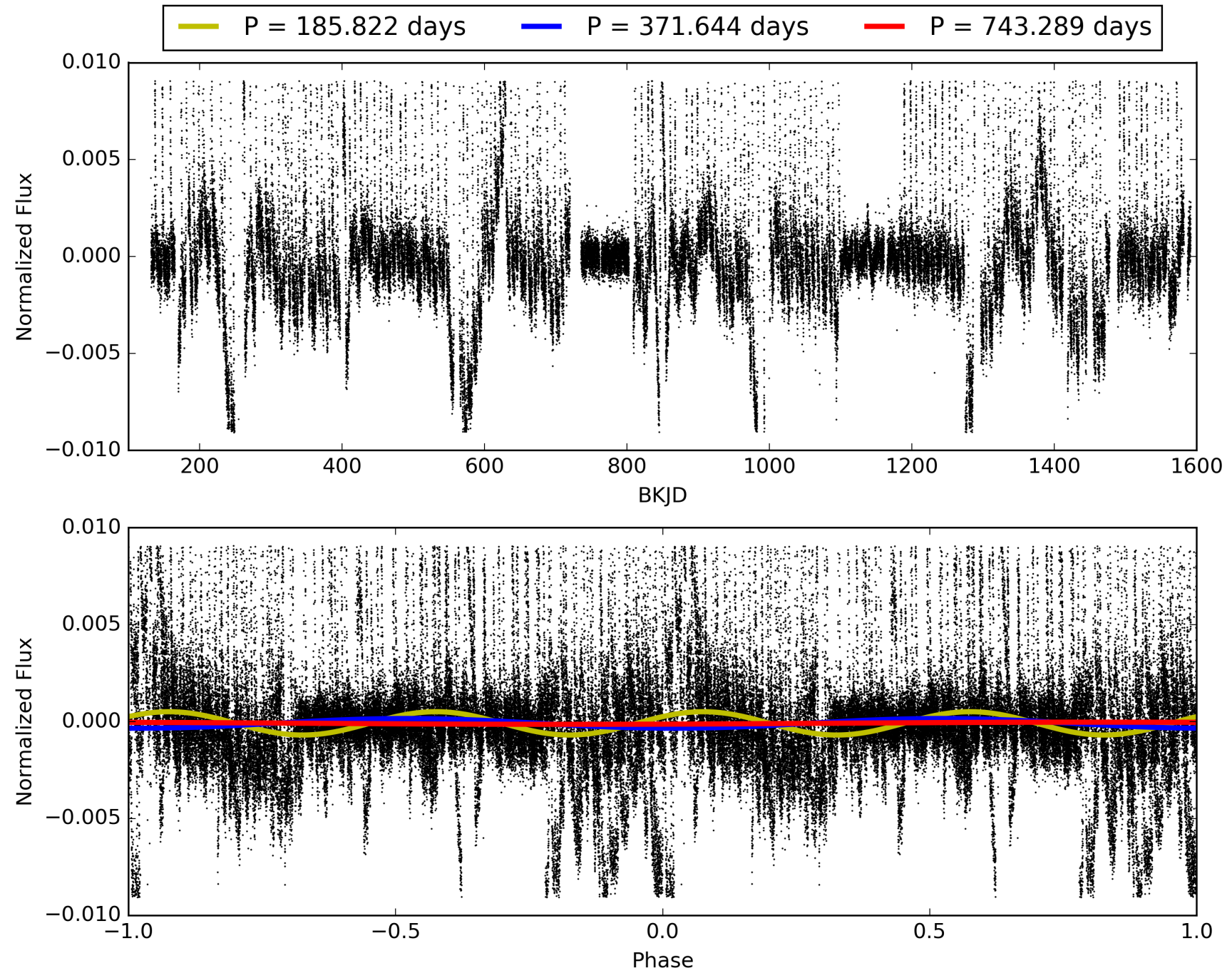
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 011412044-06, PDC Light Curves





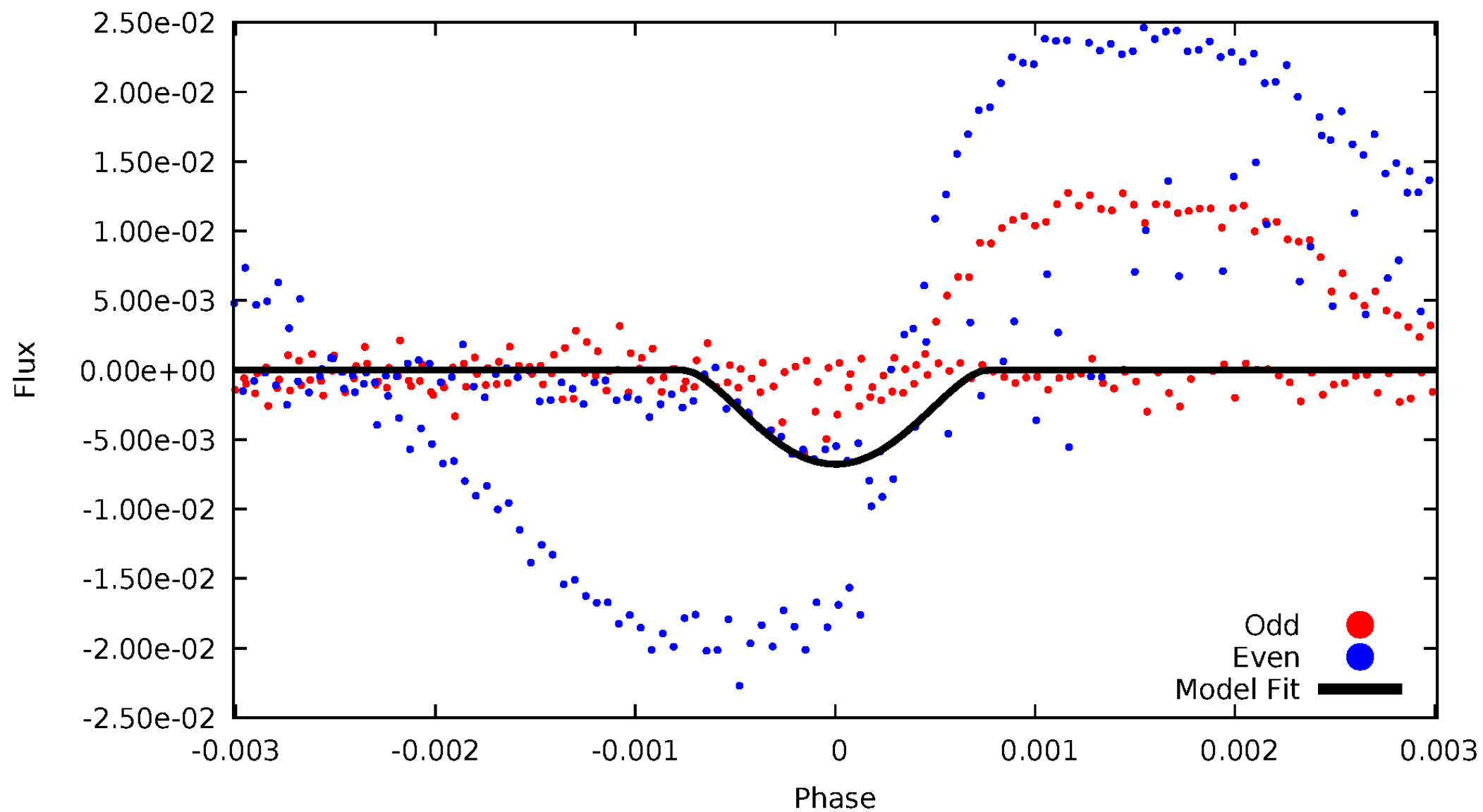
TCE 011412044-06





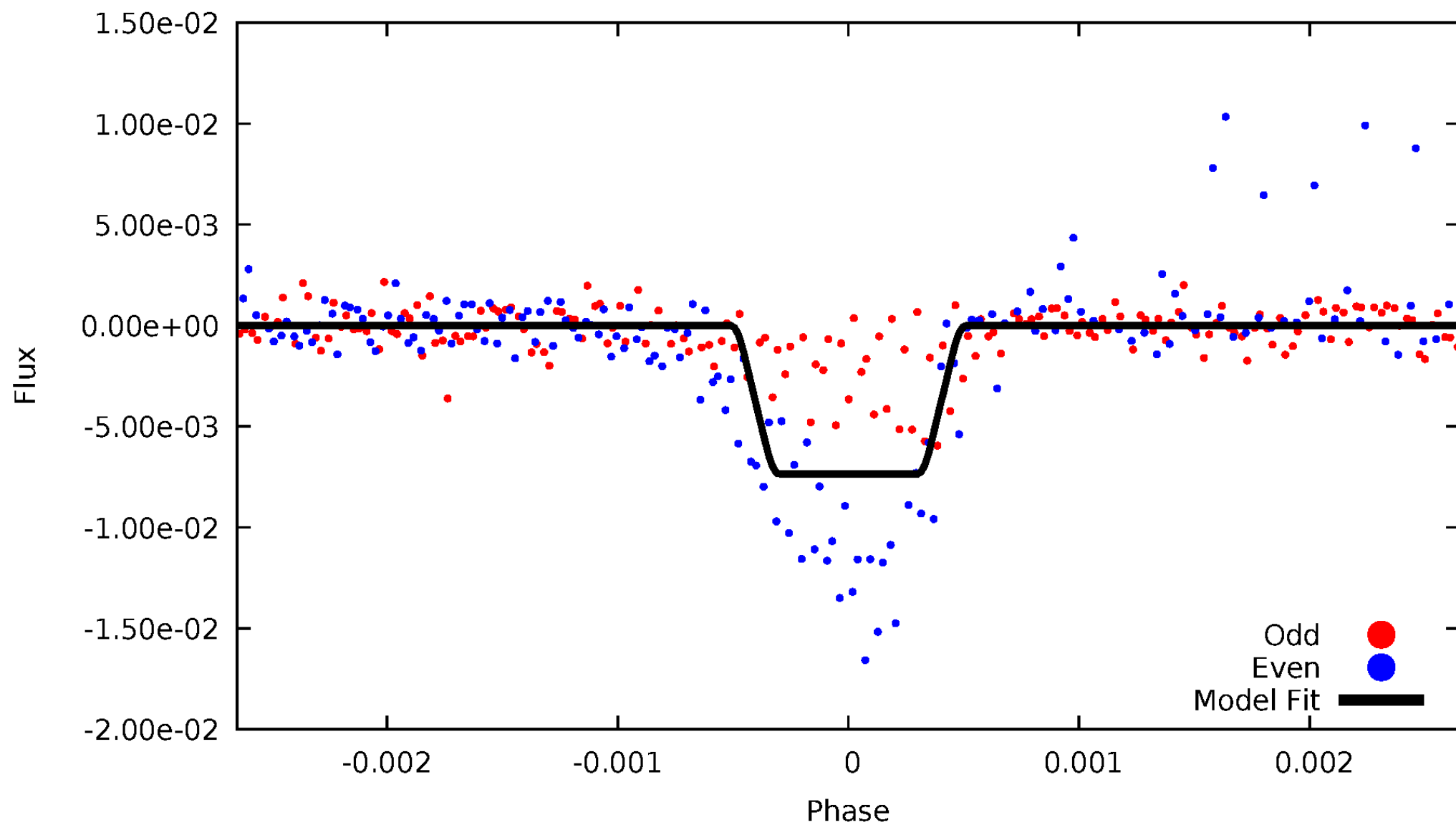
# DV Odd/Even

TCE 011412044-06



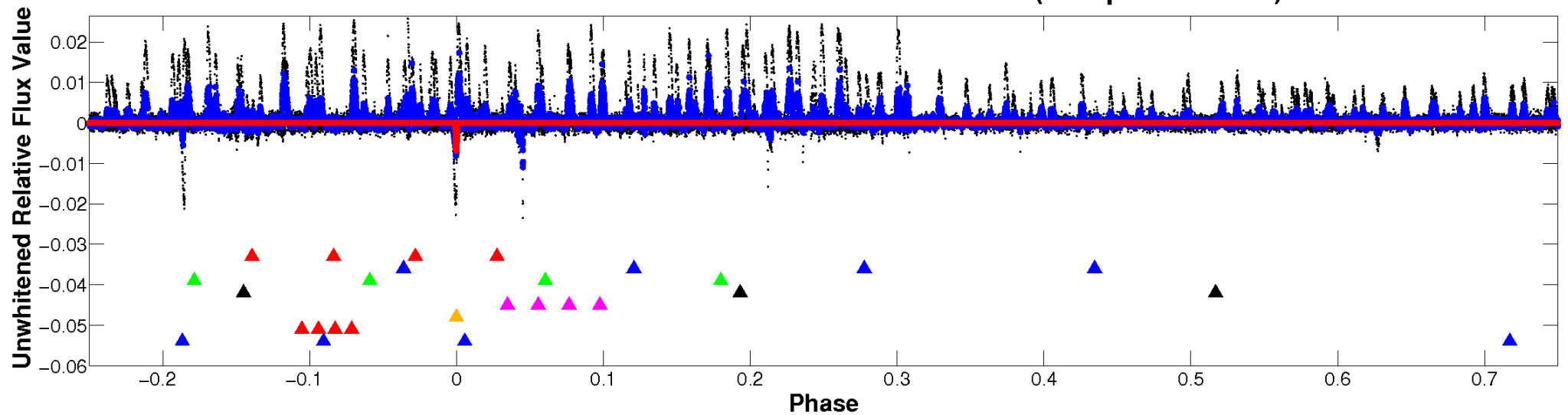
# ALT Odd/Even

TCE 011412044-06

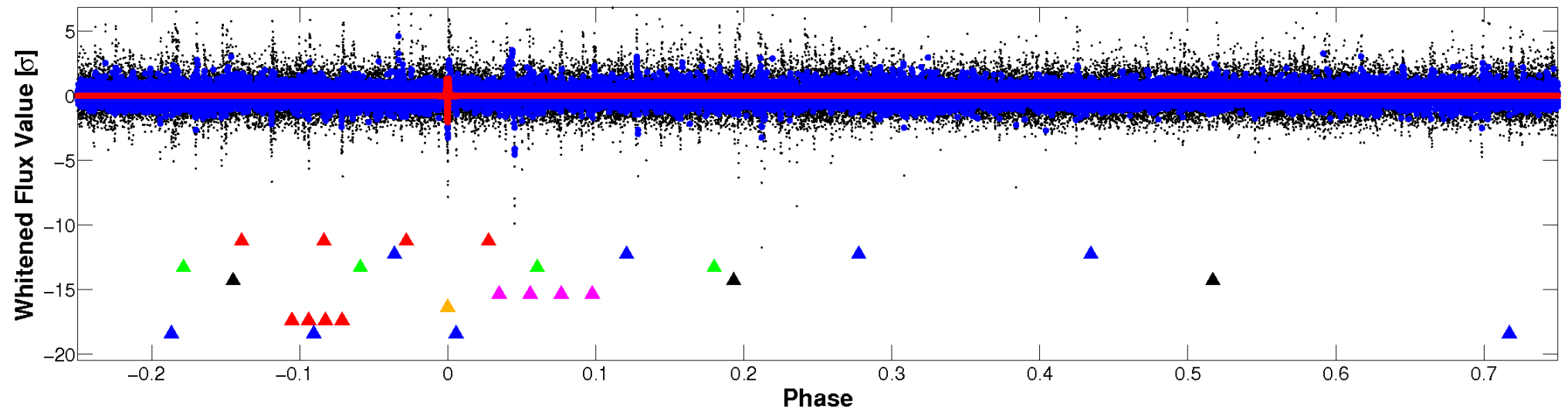


# Non-Whitened Vs. Whitened Light Curve

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

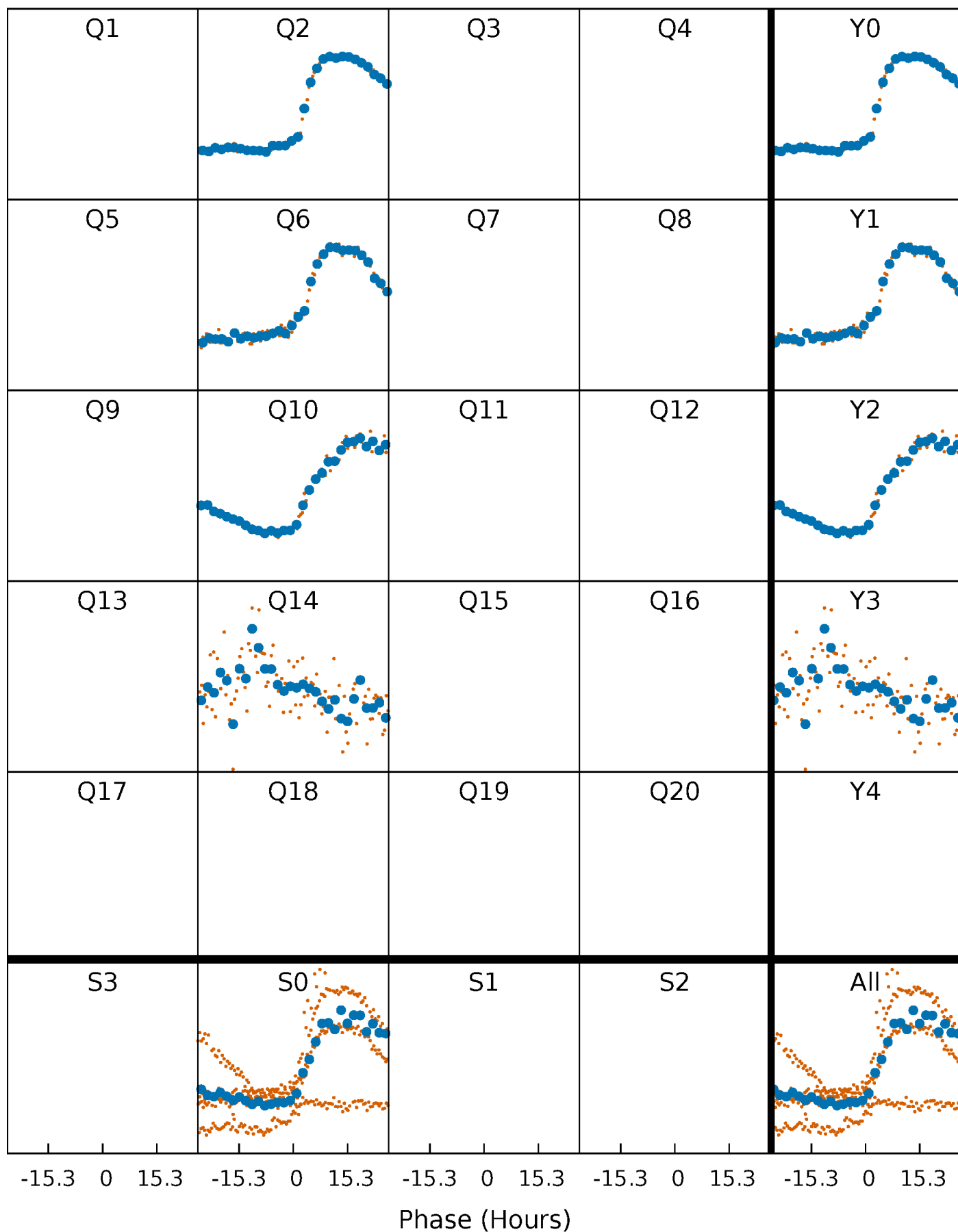


**Planet 6 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



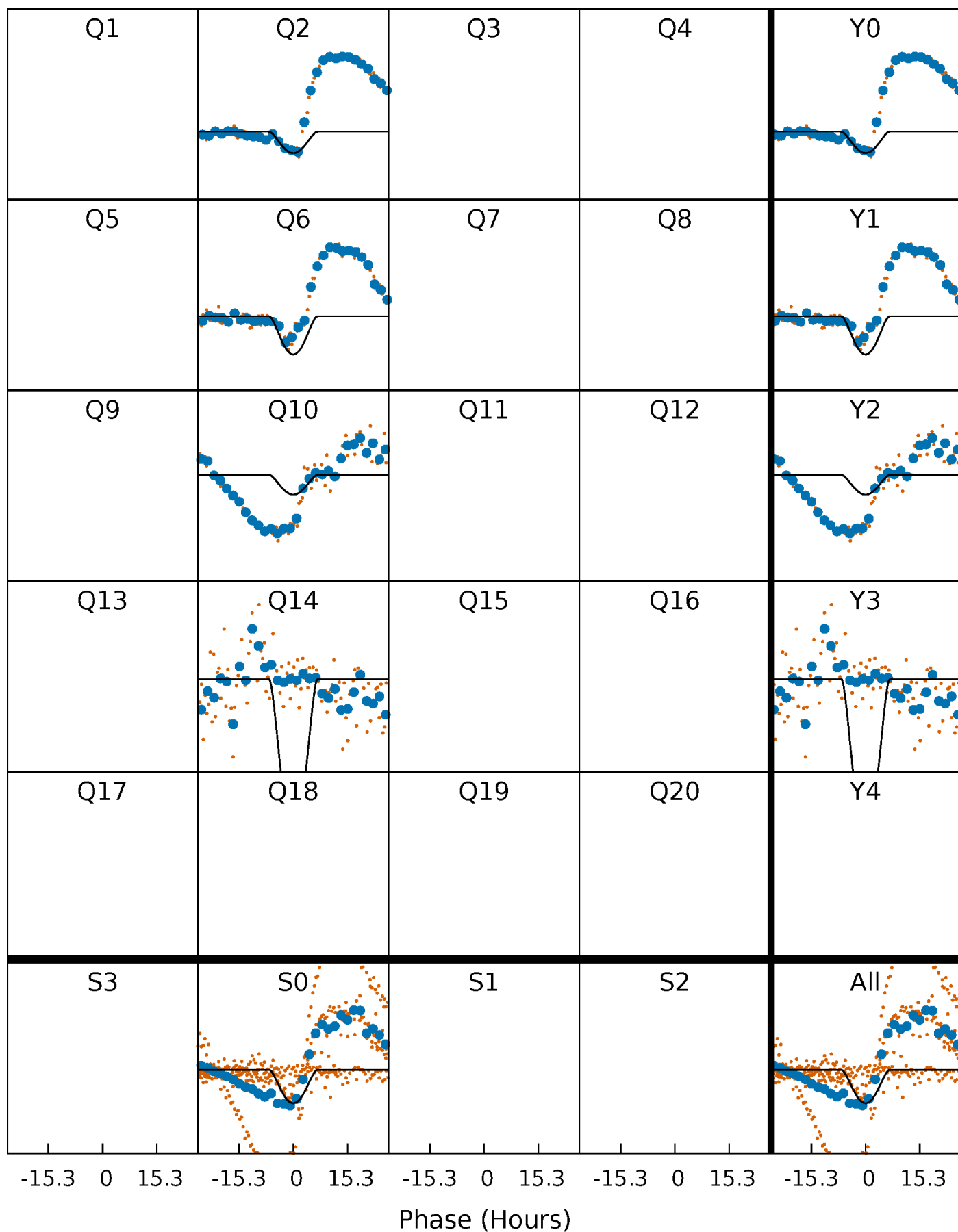
# PDC Quarter-Phased Transit Curves

TCE 011412044-06 P=371.644294 Days  $T_0=241.608392$  (BKJD)



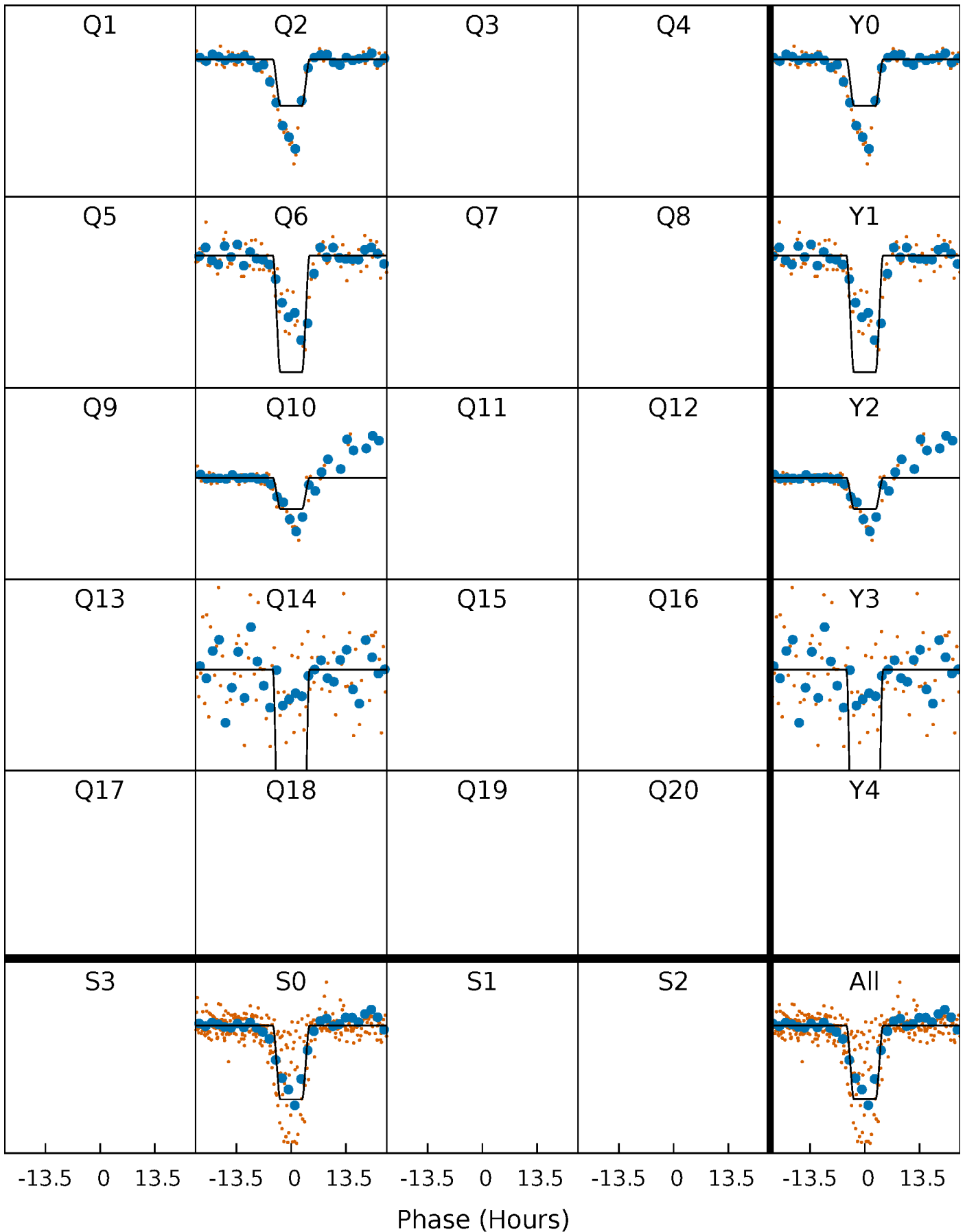
# DV Quarter-Phased Transit Curves

TCE 011412044-06 P=371.644294 Days  $T_0=241.608392$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

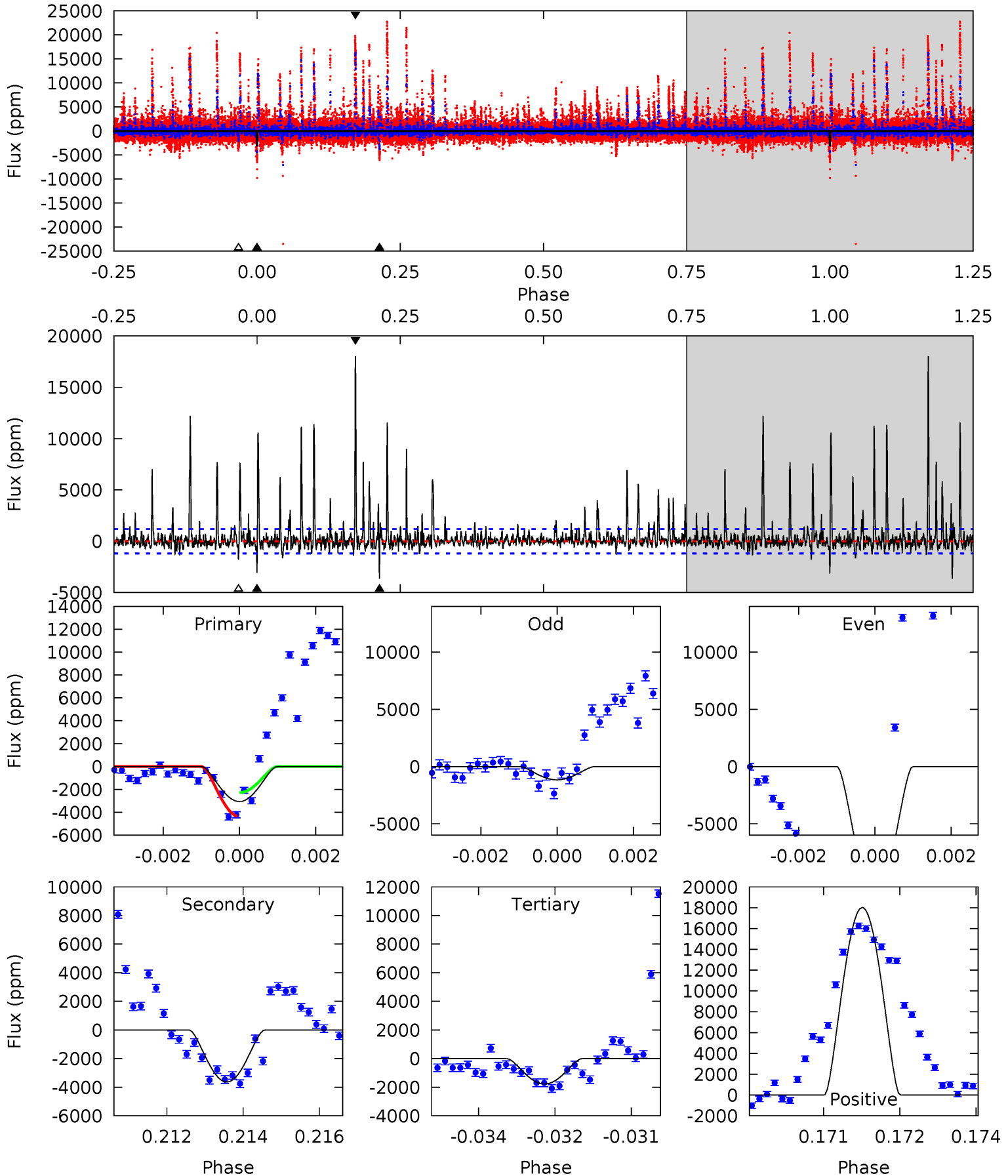
TCE 011412044-06 P=371.611533 Days  $T_0=241.644276$  (BKJD)



# DV Model-Shift Uniqueness Test

011412044-06, P = 371.644294 Days, E = 241.608392 Days

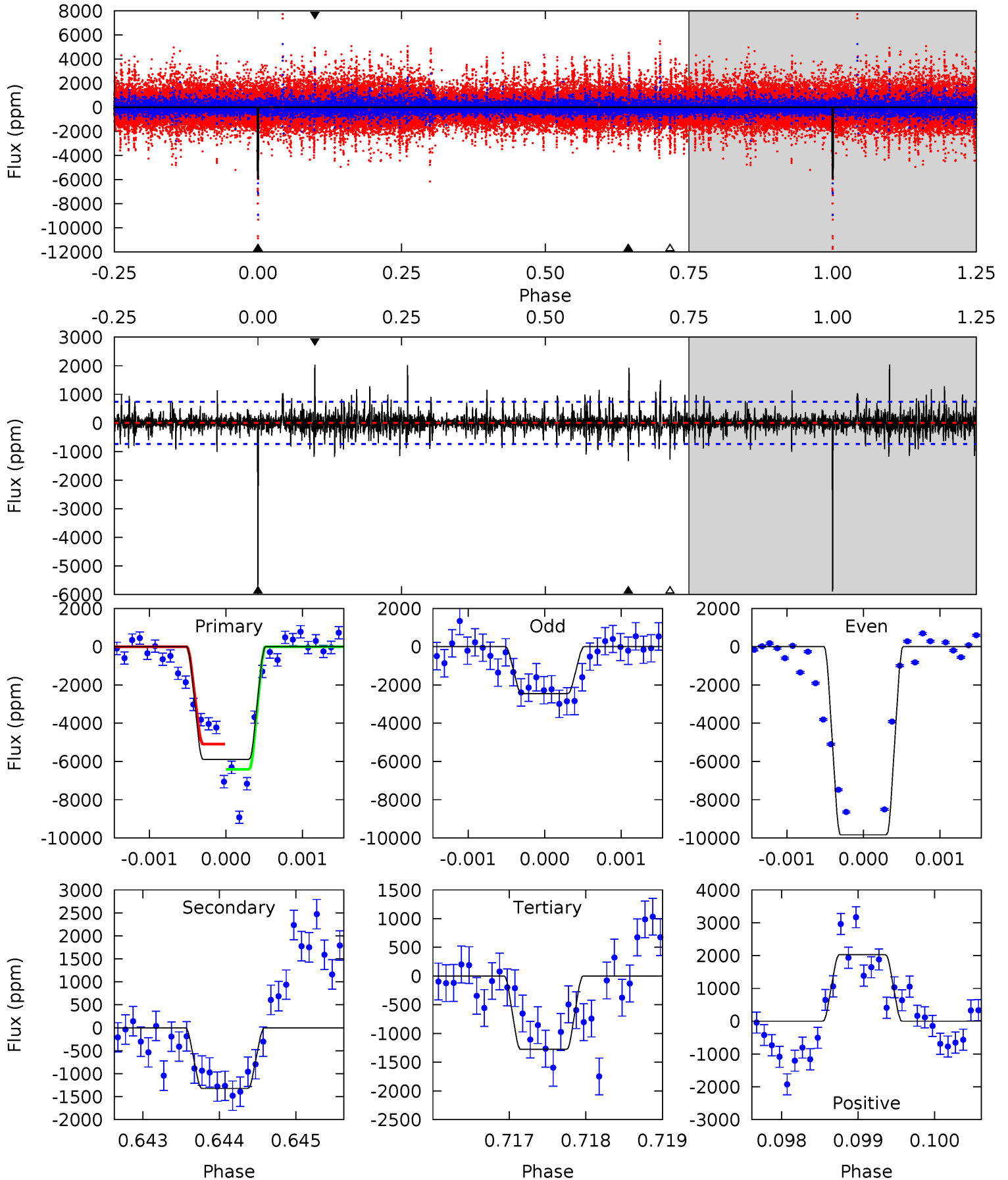
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
13.7	16.3	7.97	80.9	5.37	3.17	6.05	5.76	-67.1	8.35	-64.6	14.0	1.80	0.83	0



# Alt Model-Shift Uniqueness Test

011412044-06, P = 371.611533 Days, E = 241.644276 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
43.3	9.73	9.40	14.9	5.45	3.29	1.96	33.9	28.4	0.33	-5.19	23.5	0.95	0.26	4.81





### Stellar Parameters For KIC 011412044

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$4713^{+125}_{-139}$	$4.588^{+0.042}_{-0.035}$	$0.020^{+0.250}_{-0.300}$	$0.720^{+0.051}_{-0.061}$	$0.733^{+0.064}_{-0.058}$	$2.764^{+0.592}_{-0.374}$
	+3%/-3%	+1%/-1%	+1250%/-1500%	+7%/-8%	+9%/-8%	+21%/-14%
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 011412044-06 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-3637 \pm 223$	$22.35^{+21.37}_{-15.36}$	$257^{+8}_{-9}$	$2830^{+1253}_{-445}$	$3375^{+32069}_{-2505}$
Alt.	$-1322 \pm 136$	$19.33^{+19.06}_{-12.78}$	$257^{+8}_{-8}$	$2577^{+954}_{-373}$	$1623^{+12312}_{-1210}$

$T_{max}$  = 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

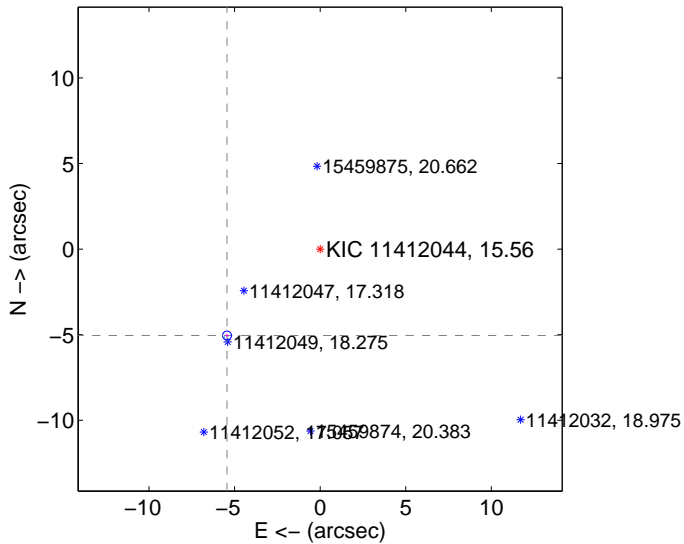
Supplemental centroid analysis for 011412044-06. Kepler magnitude: 15.56. Transit SNR 13.37

There are 3 quarters with good PRF difference image offsets

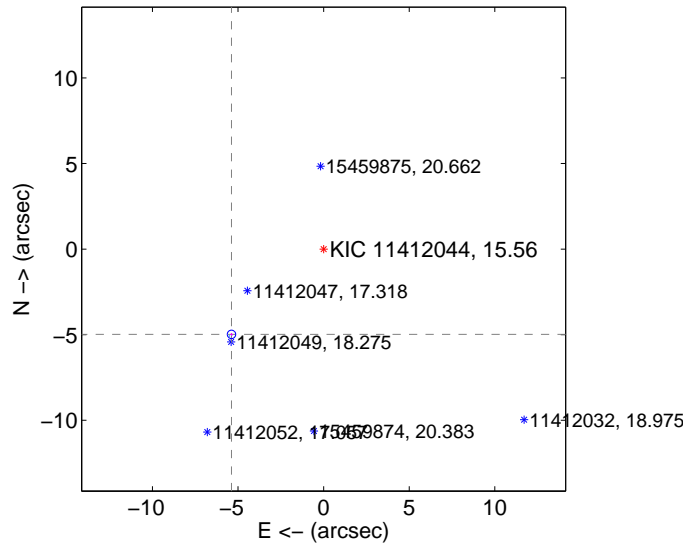
The direct PRF centroid is offset from the target star catalog position by about 0.10 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$7.424 \pm 0.086$	85.89	$5.443 \pm 0.085$	$-5.049 \pm 0.073$
PRF-fit source offset from KIC position	$7.336 \pm 0.082$	89.50	$5.384 \pm 0.076$	$-4.983 \pm 0.076$
photometric centroid source offset	$7.99 \pm 1.27$	6.31	$1.53 \pm 1.47$	$-7.84 \pm 1.26$

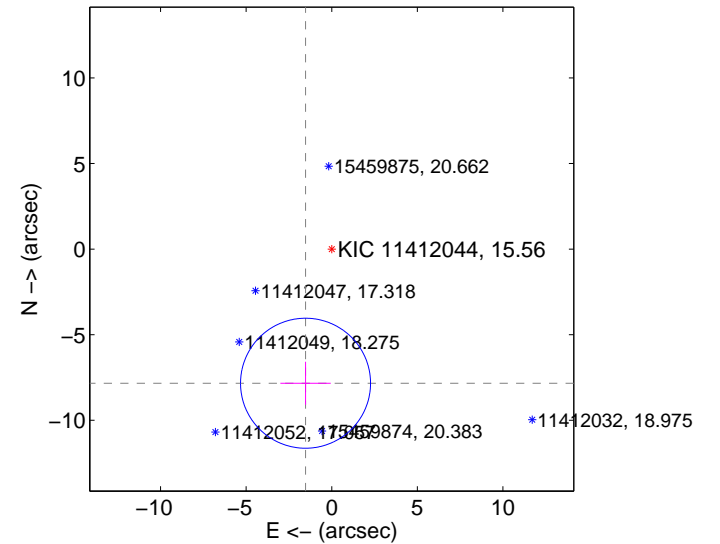
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

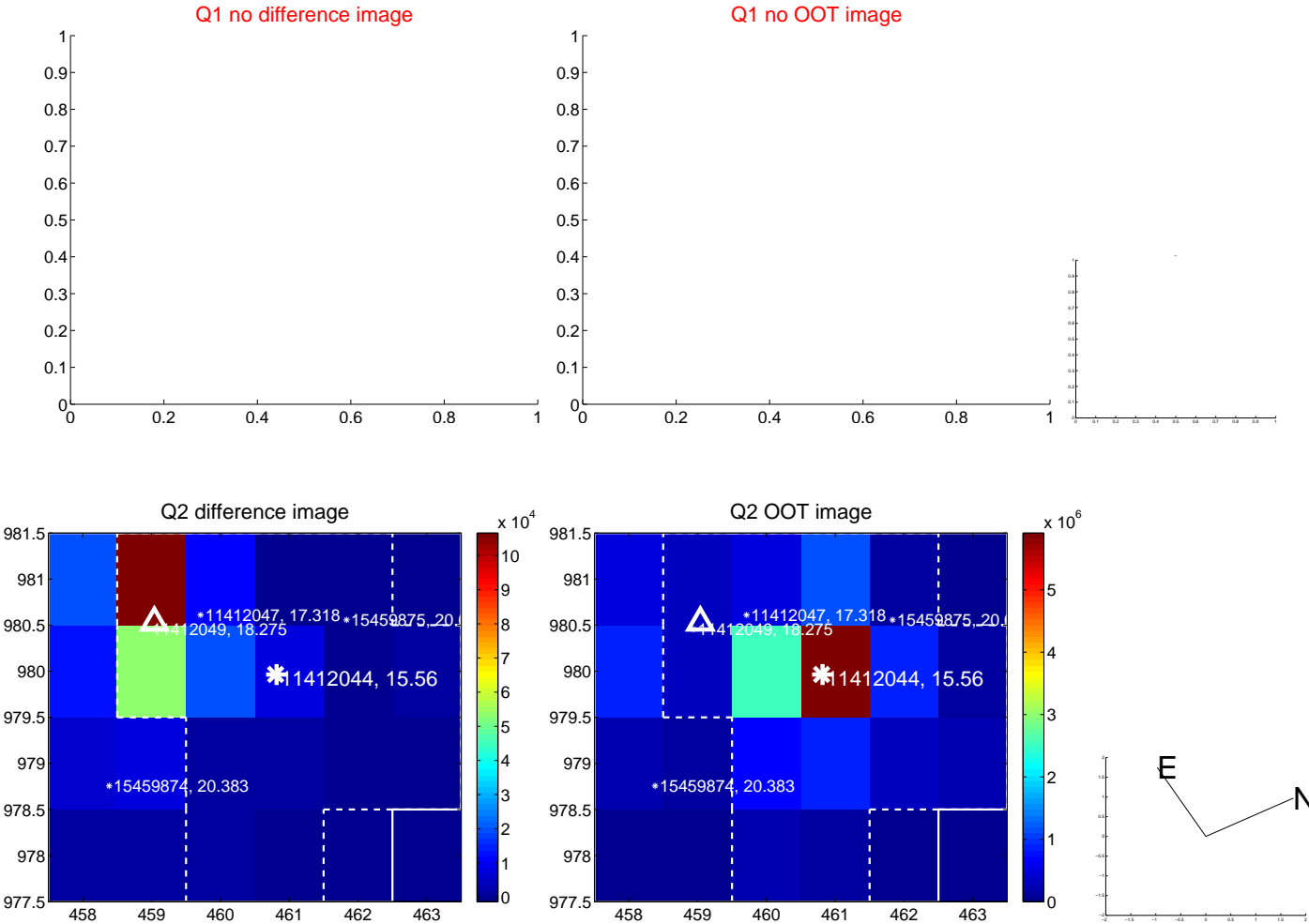


offset from photometric centroids

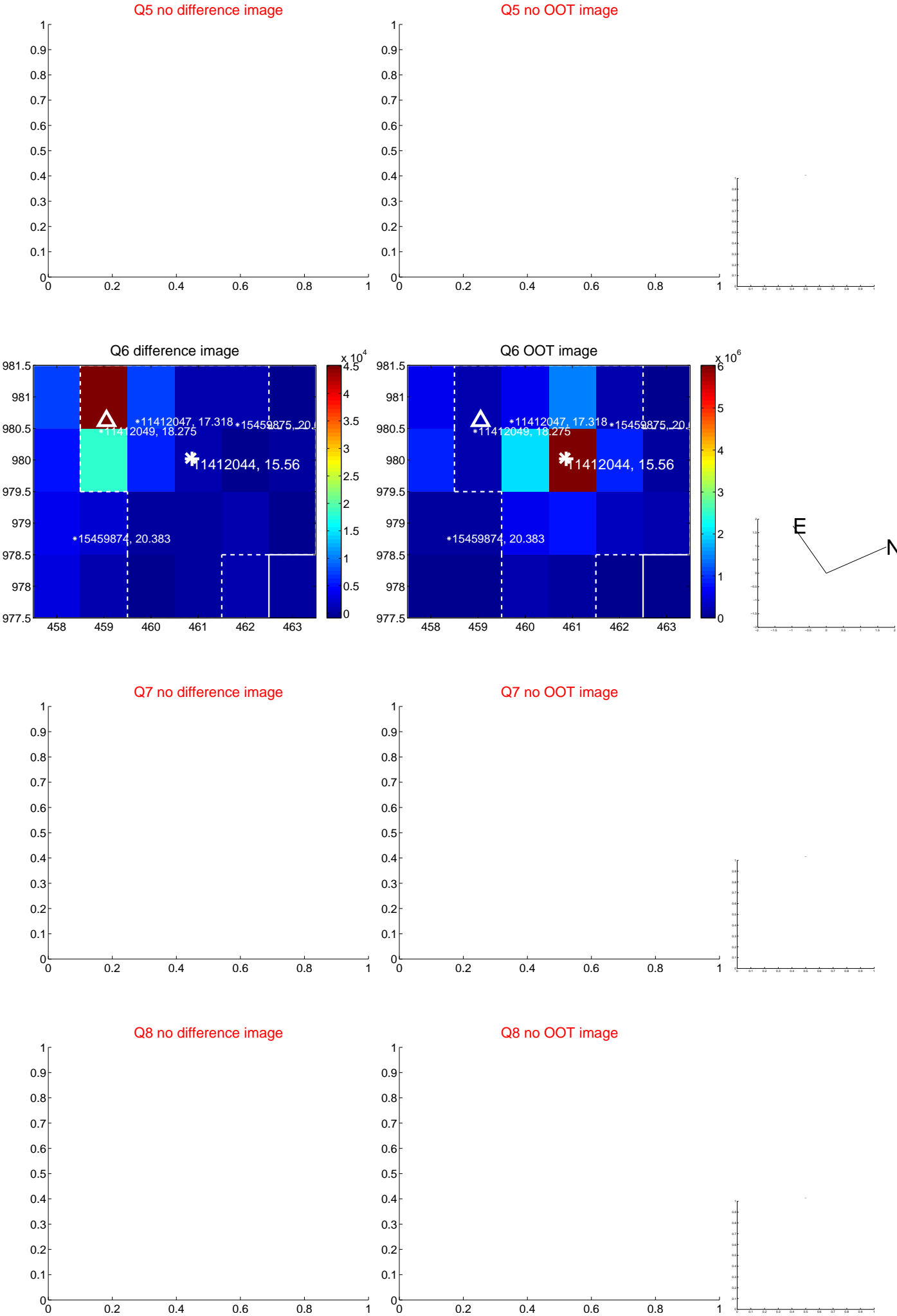


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

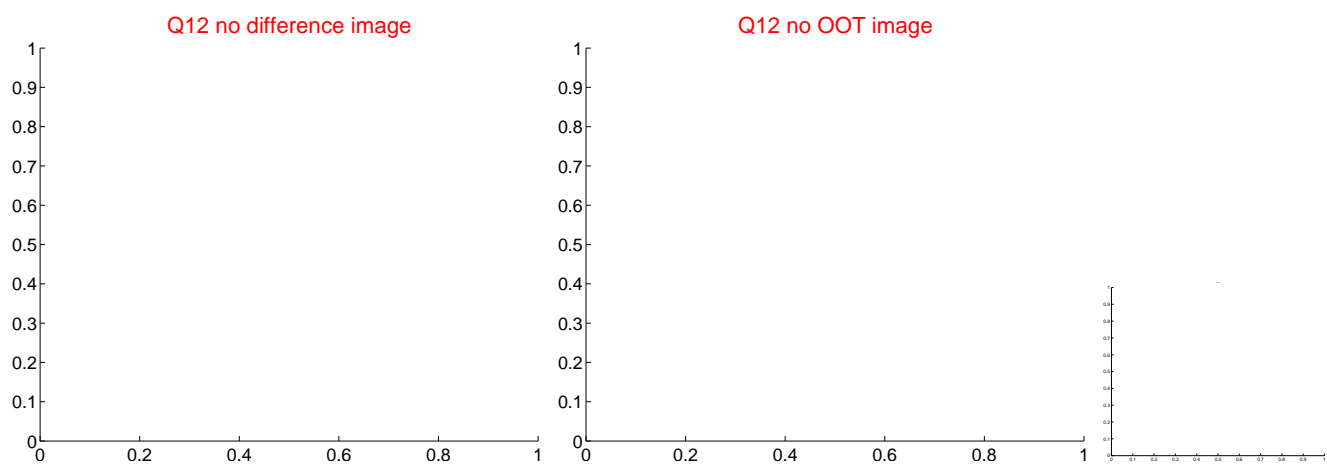
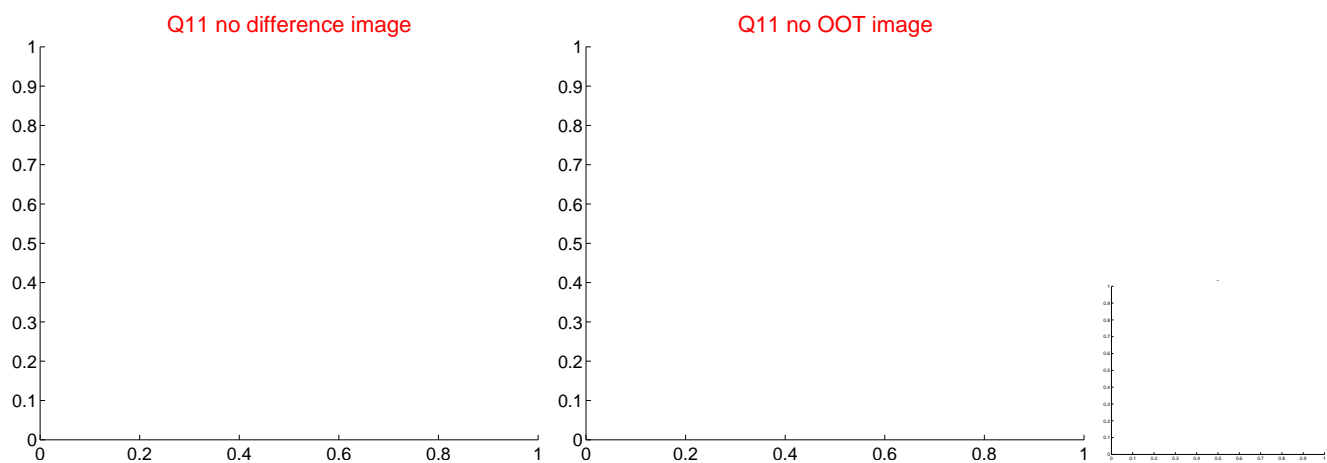
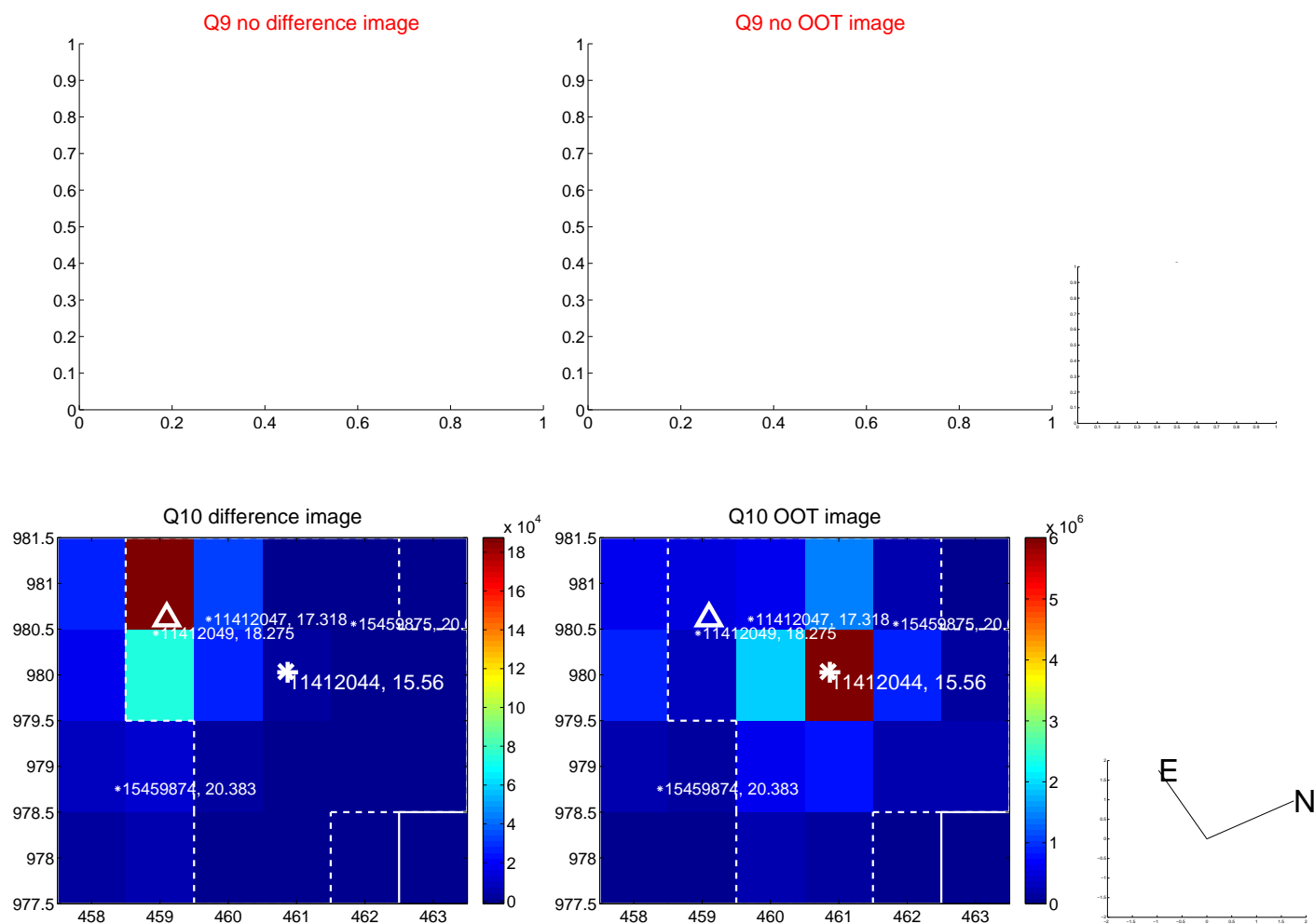
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



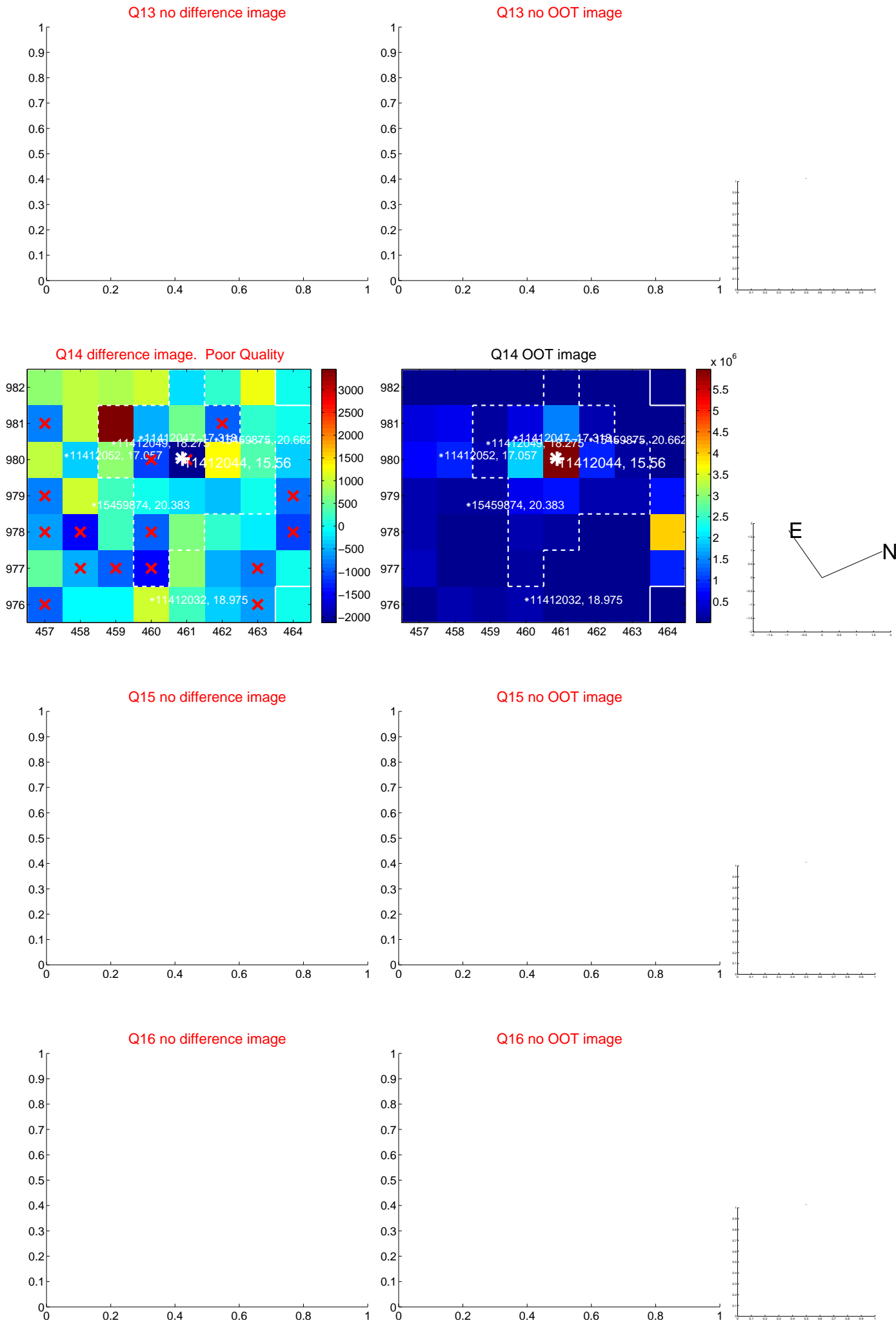
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



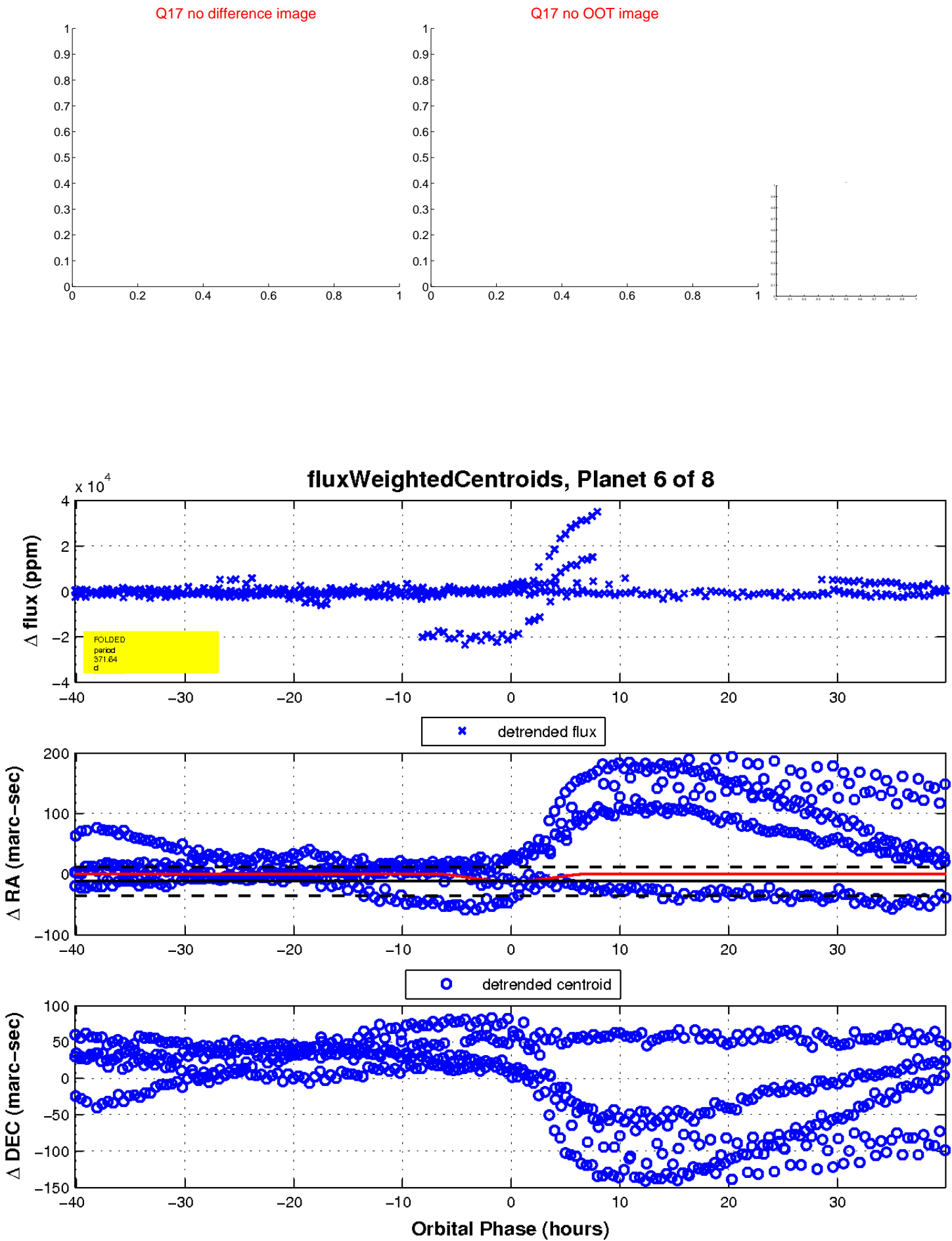
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



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

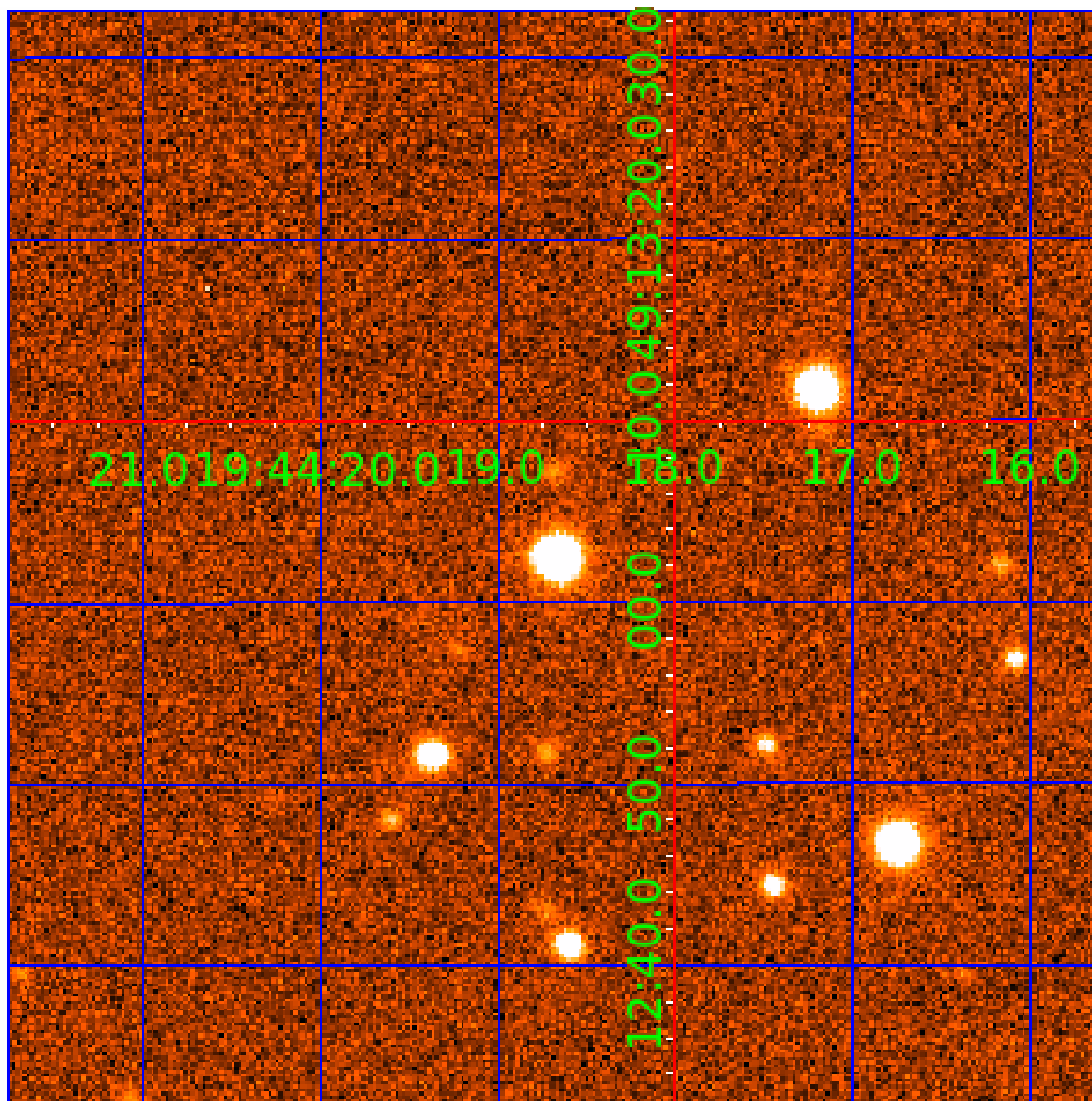


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 011412044

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
011412044-01	OBS	No	392.316863	189.867641	10821.9	19.439	20.2	18.4	0.72	4713	8.63	0.26
011412044-02	OBS	No	429.932868	228.232852	5577.4	15.710	19.8	12.1	0.72	4713	6.74	0.23
011412044-03	OBS	No	327.228963	308.514574	9609.8	17.960	18.9	15.3	0.72	4713	13.25	0.33
011412044-04	OBS	No	497.309634	433.712106	6509.3	14.267	18.4	15.5	0.72	4713	6.38	0.19
011412044-05	OBS	No	379.431472	254.543571	7842.6	13.668	18.1	13.7	0.72	4713	8.89	0.27
011412044-06	OBS	No	371.644294	241.608392	6772.4	13.431	17.6	13.4	0.72	4713	11.28	0.28
011412044-07	OBS	No	367.441035	215.105554	12056.7	23.794	18.9	15.9	0.72	4713	14.70	0.28
011412044-08	OBS	No	407.377075	136.506999	2052.6	9.000	18.2	-1.0	0.72	4713	3.13	0.24

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
011412044-01	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—CENT_RESOLVED_OFFSET
011412044-02	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_RESOLVED_OFFSET
011412044-03	OBS	FP	0.00	1	0	0	0	LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS
011412044-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
011412044-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
011412044-06	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_RESOLVED_OFFSET
011412044-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS
011412044-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—CENT_NOFITS

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

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

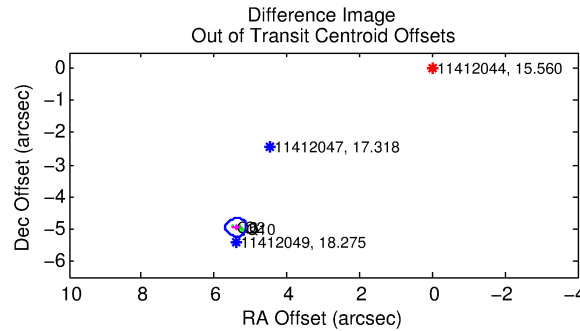
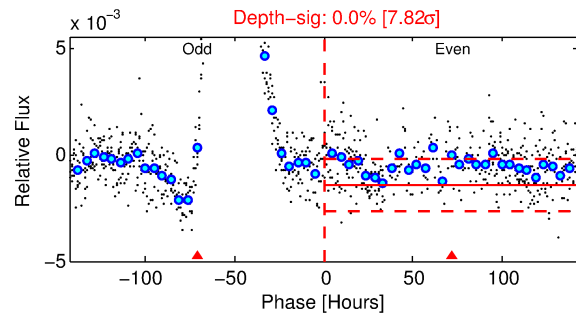
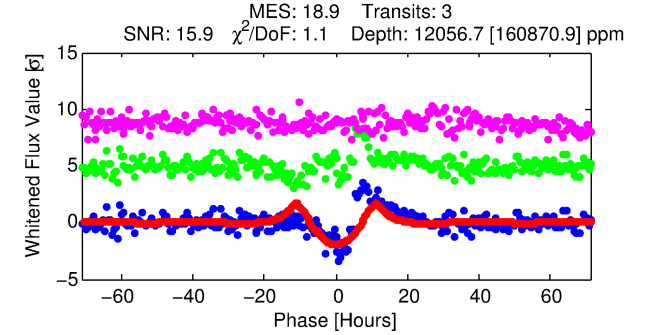
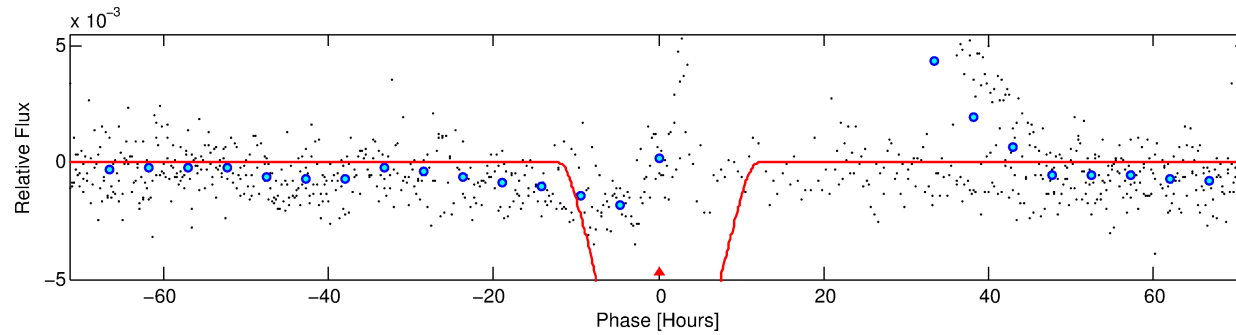
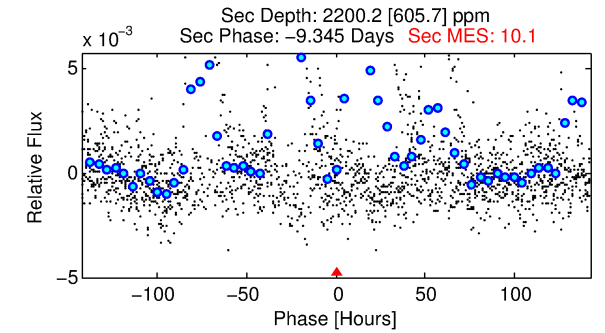
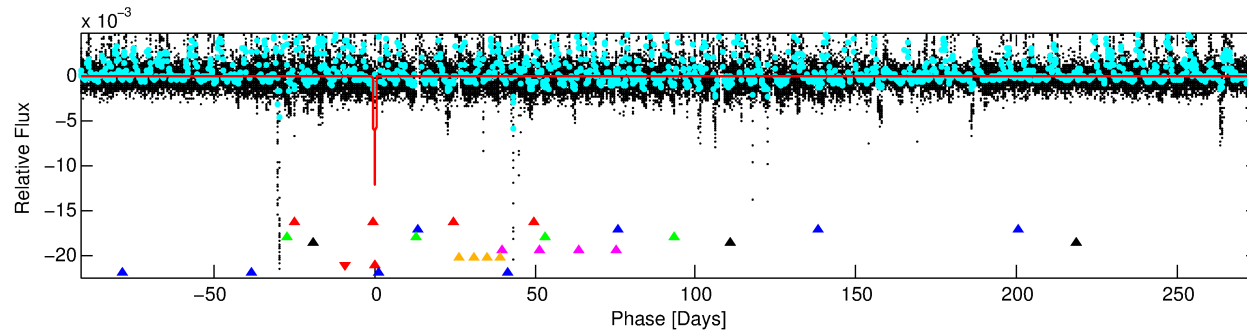
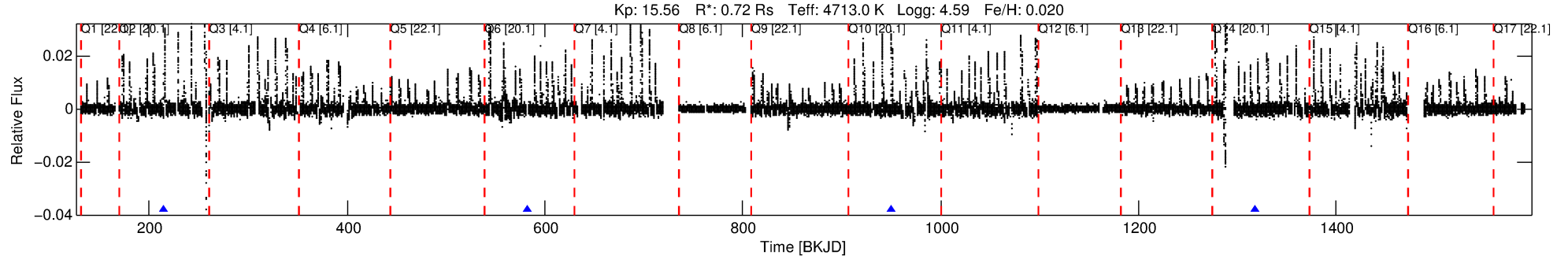
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 011412044-07

No Significant Match Found

# DV One-Page Summary

KIC: 11412044 Candidate: 7 of 8 Period: 367.441 d



## DV Fit Results:

Period = 367.44103 [0.00875] d  
Epoch = 215.1056 [0.0165] BKJD  
Rp/R\* = 0.1871 [0.2244]  
a/R\* = 75.48 [10.54]  
b = 1.00 [1.27]  
Seff = 0.28 [0.04]  
Teq = 185 [7] K  
Rp = 14.70 [17.67] Re  
a = 0.9051 [0.0589] AU  
Ag = 4587.39 [11079.78] [0.41 $\sigma$ ]  
Teffp = 2360 [1426] K [1.53 $\sigma$ ]

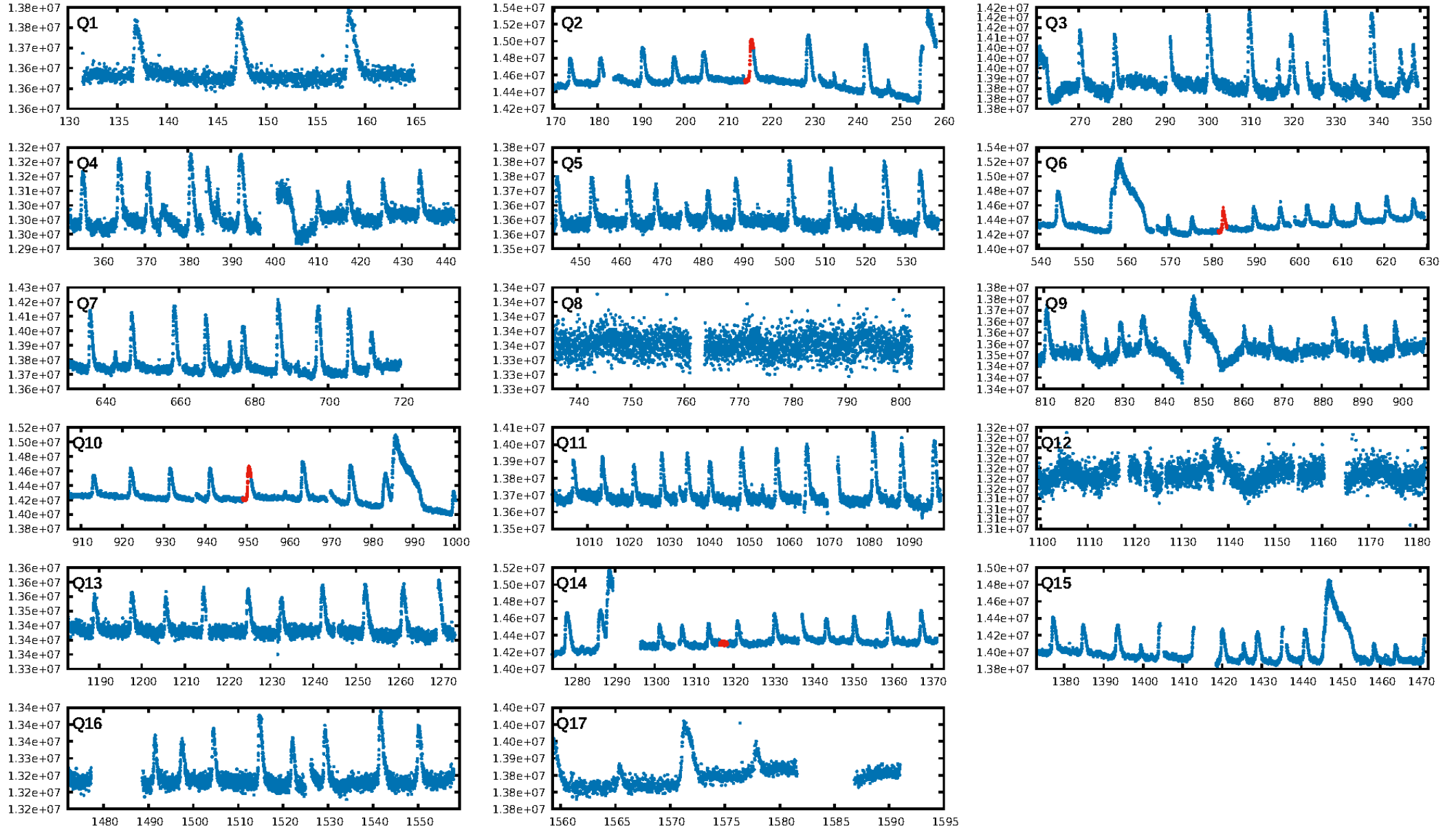
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [32.37 $\sigma$ ]  
LongPeriod-sig: 100.0% [3.69 $\sigma$ ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 62.4%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 0.398  
Centroid-sig: N/A  
Centroid-so: 4.278 arcsec [3.78 $\sigma$ ]  
OotOffset-rm: 7.328 arcsec [77.38 $\sigma$ ]  
KicOffset-rm: 7.227 arcsec [83.40 $\sigma$ ]  
OotOffset-st: 3/0/0/0 [3]  
KicOffset-st: 3/0/0/0 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 0.50 [2/4]

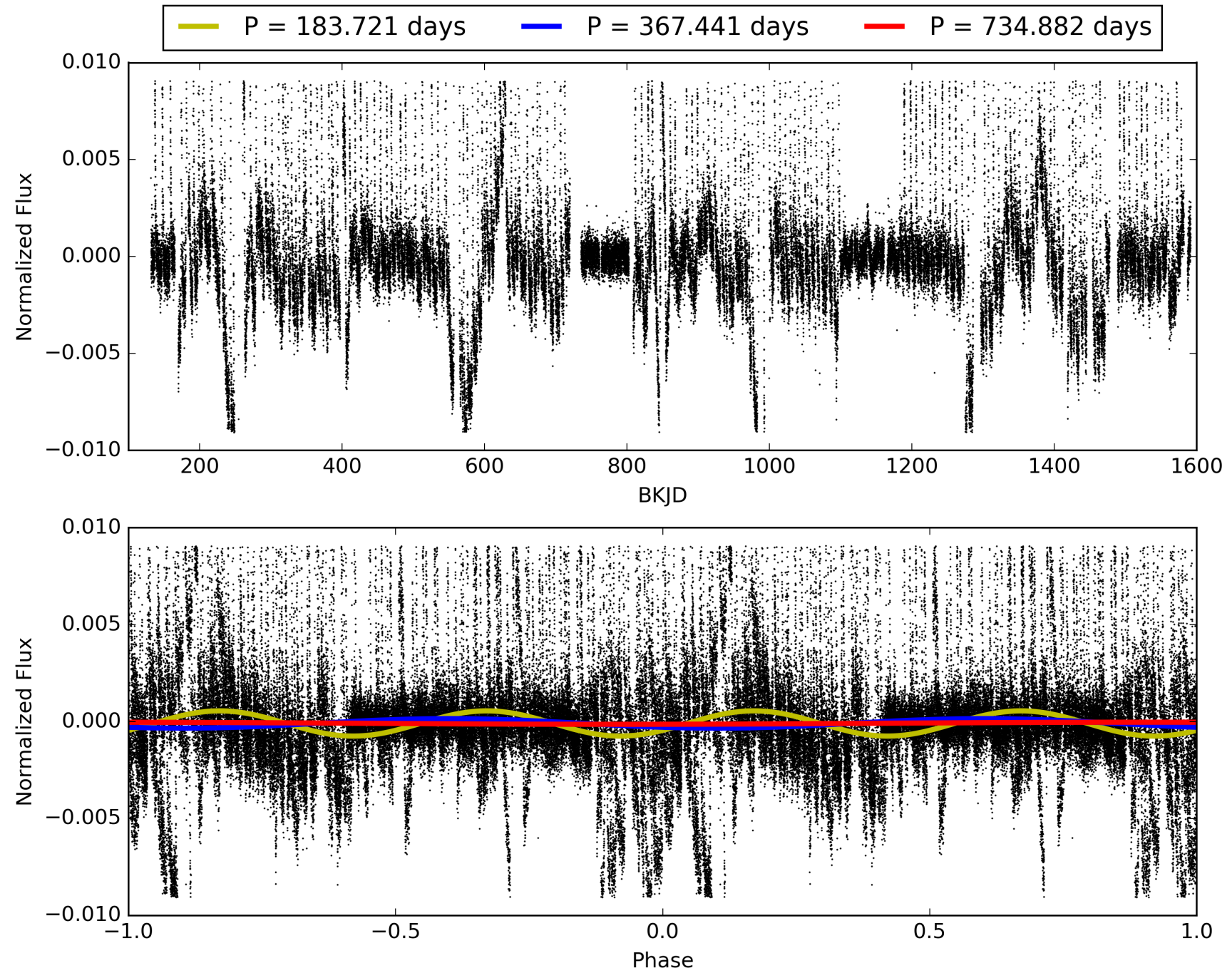
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:14:57 Z

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

# TCE 011412044-07, PDC Light Curves

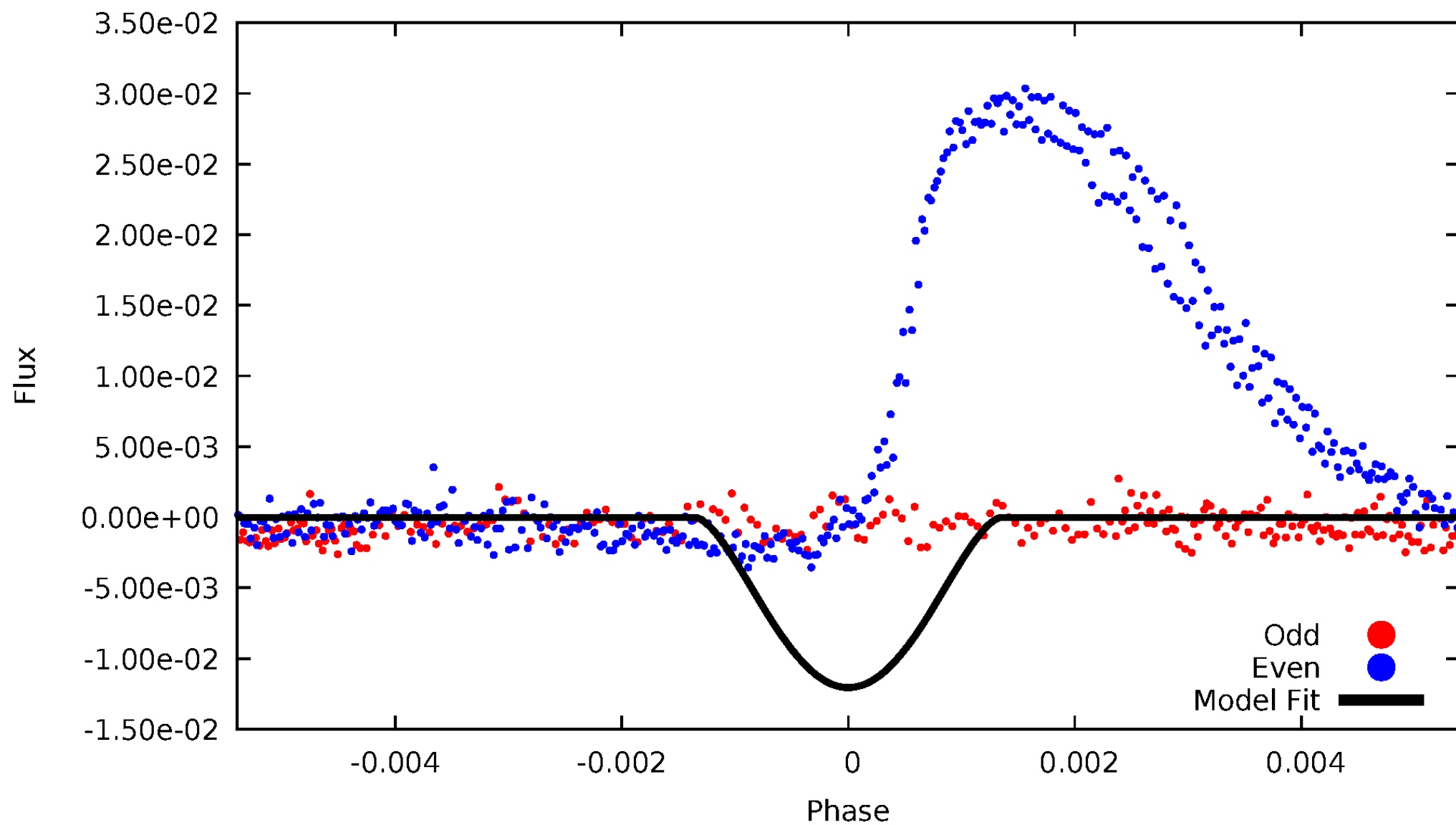


TCE 011412044-07



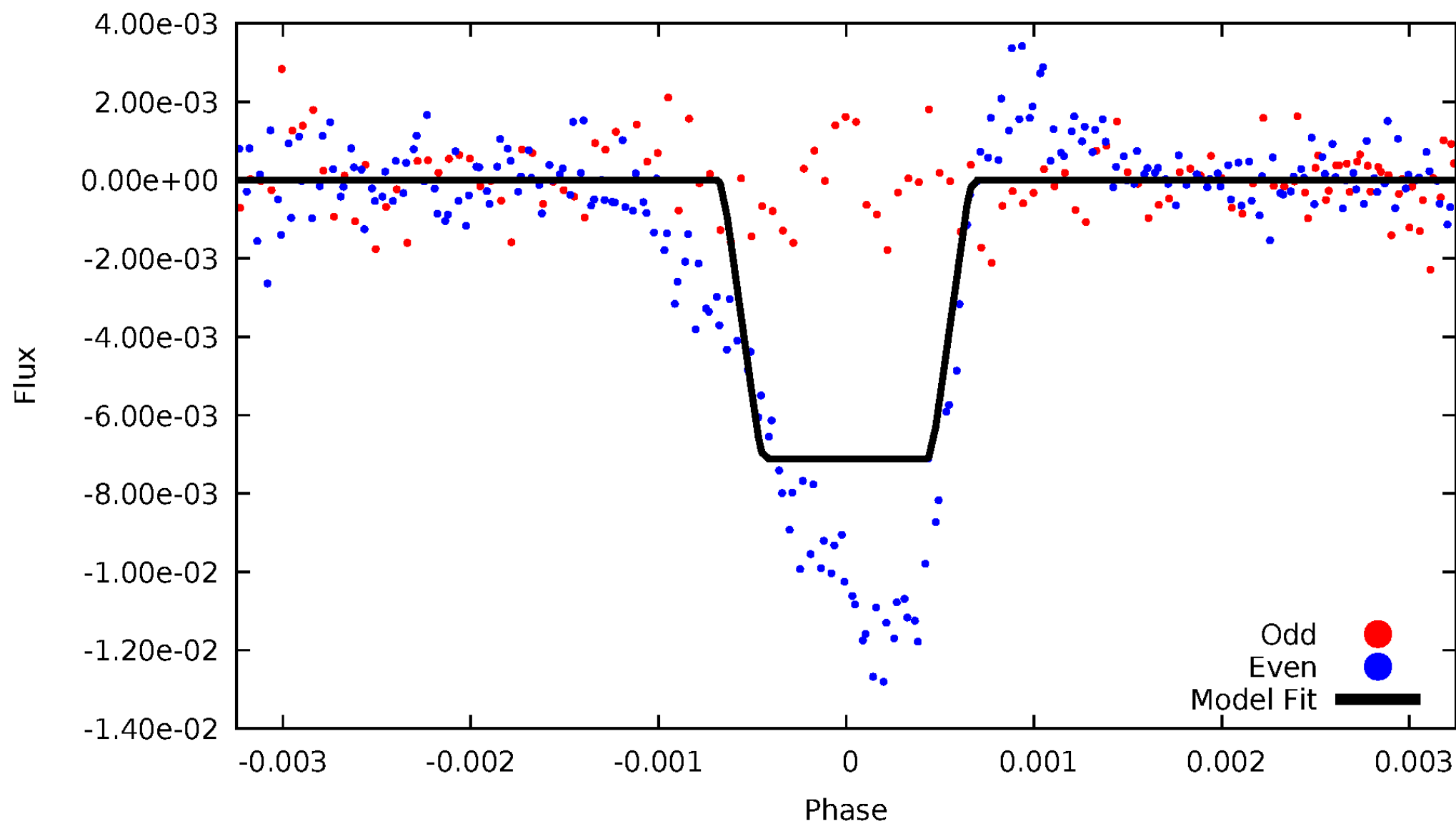
# DV Odd/Even

TCE 011412044-07



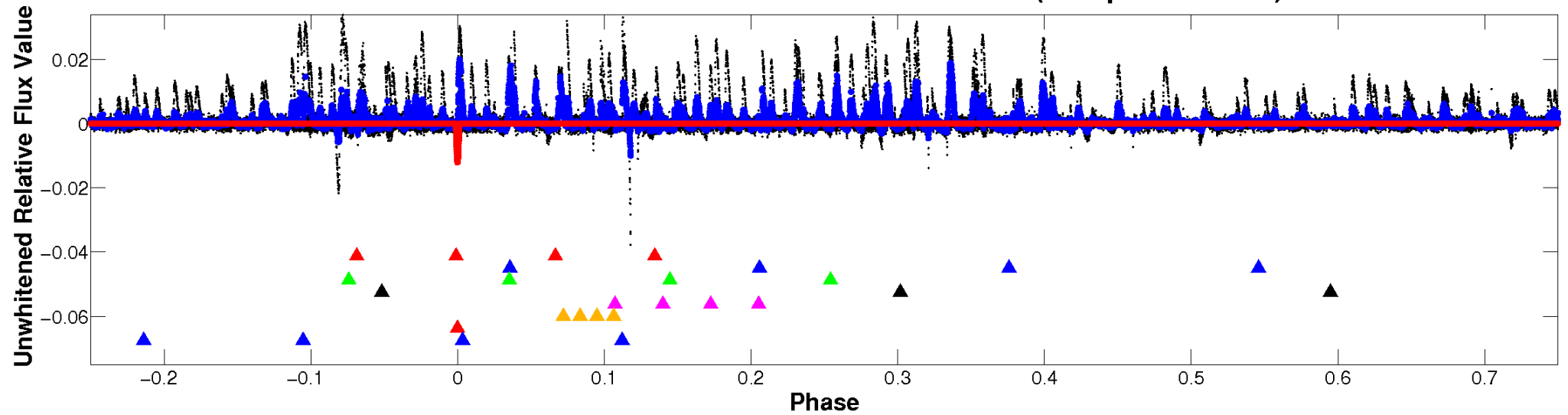
# ALT Odd/Even

TCE 011412044-07

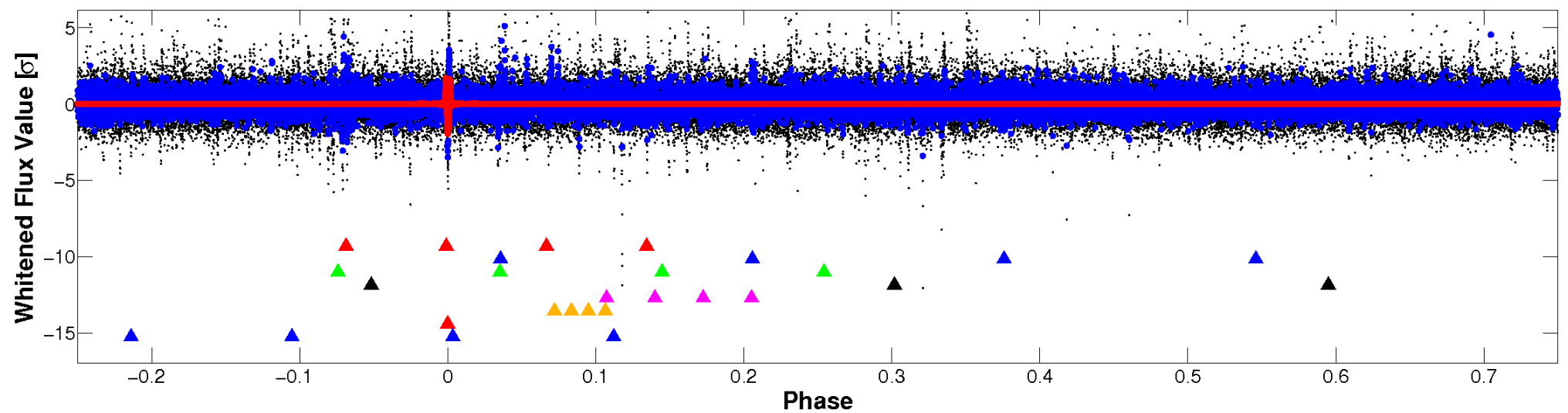


# Non-Whitened Vs. Whitened Light Curve

Planet 7 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)



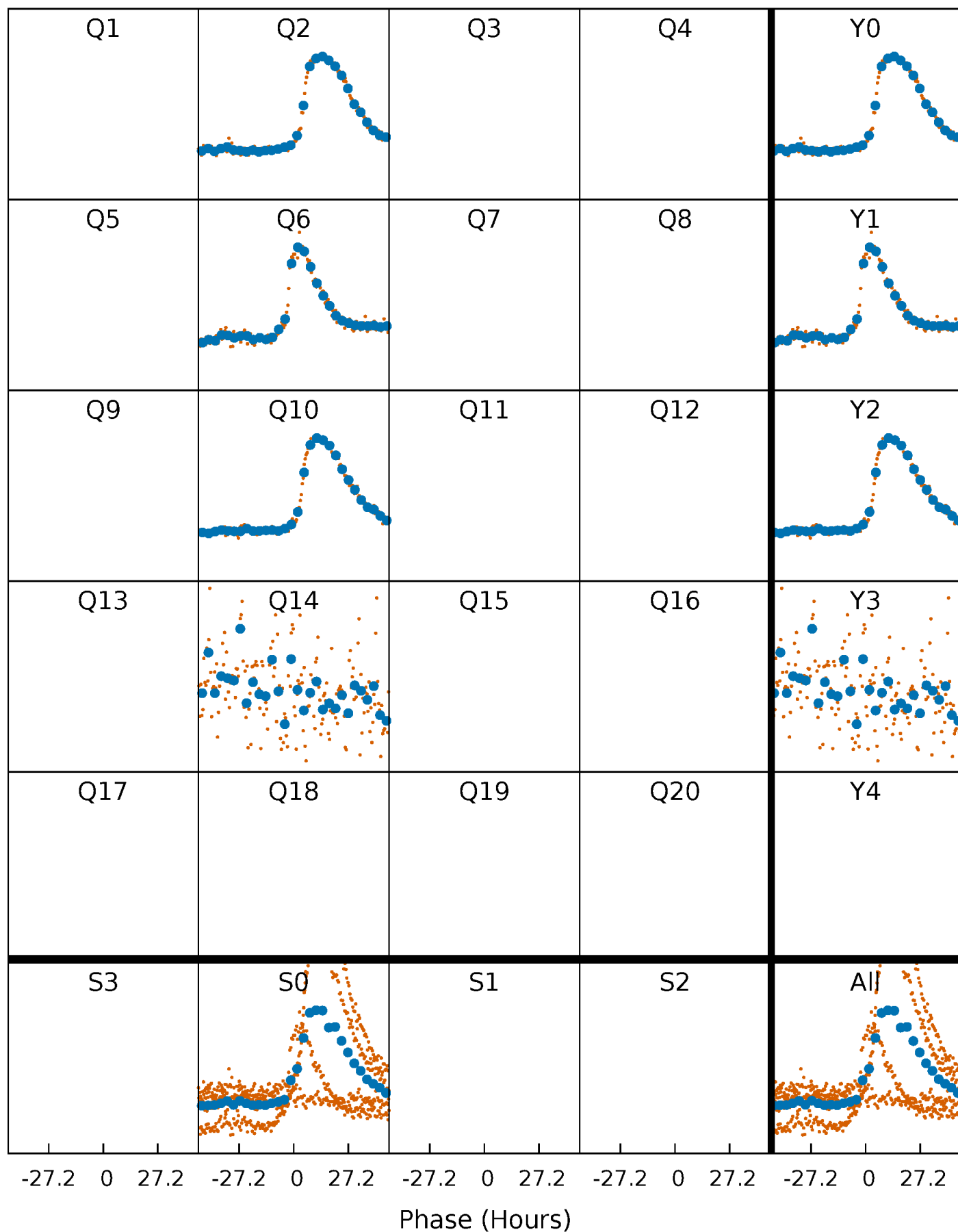
Planet 7 : Phased Whitened Flux Time Series (Fit Epoch/Period)





# PDC Quarter-Phased Transit Curves

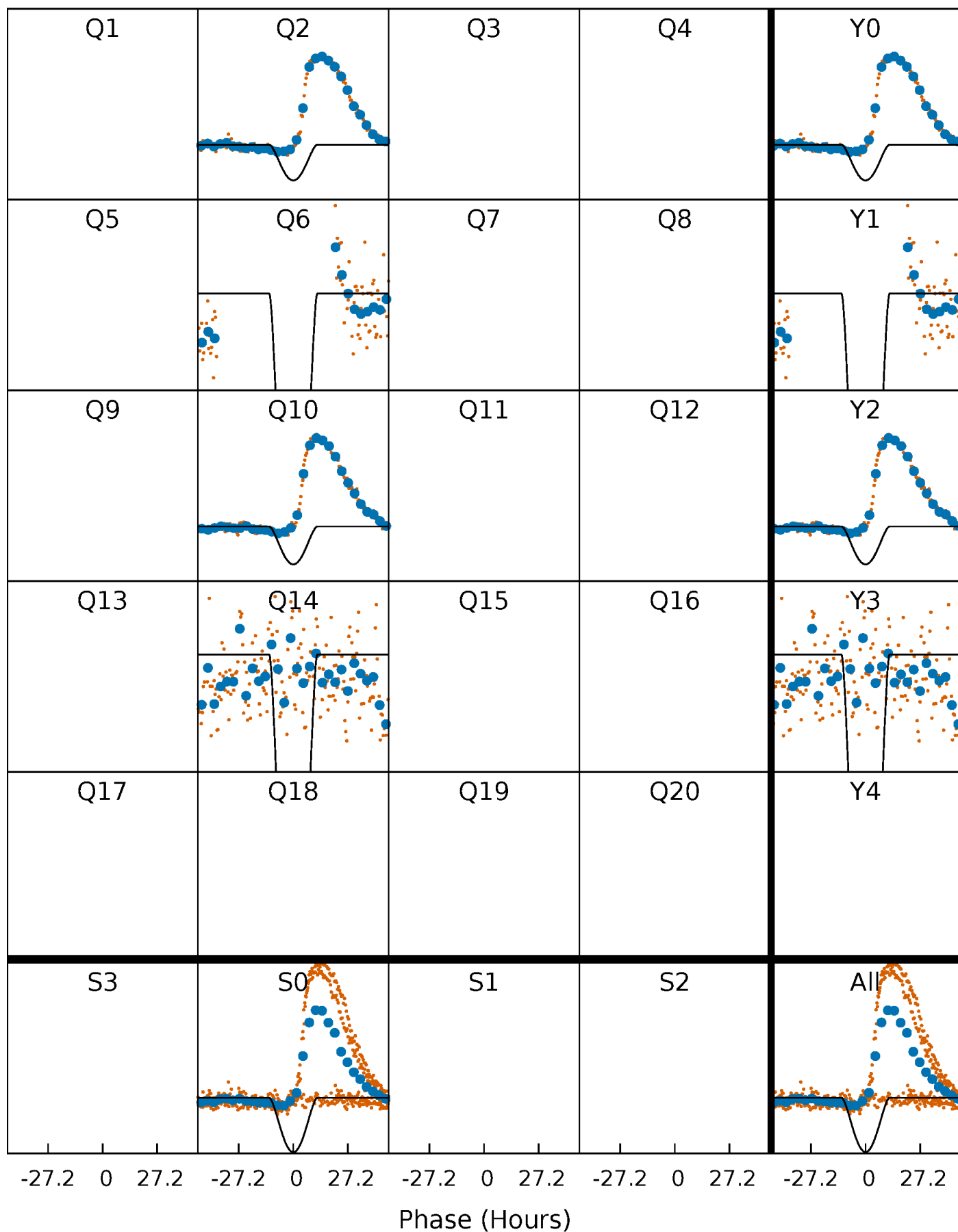
TCE 011412044-07 P=367.441035 Days  $T_0=215.105554$  (BKJD)





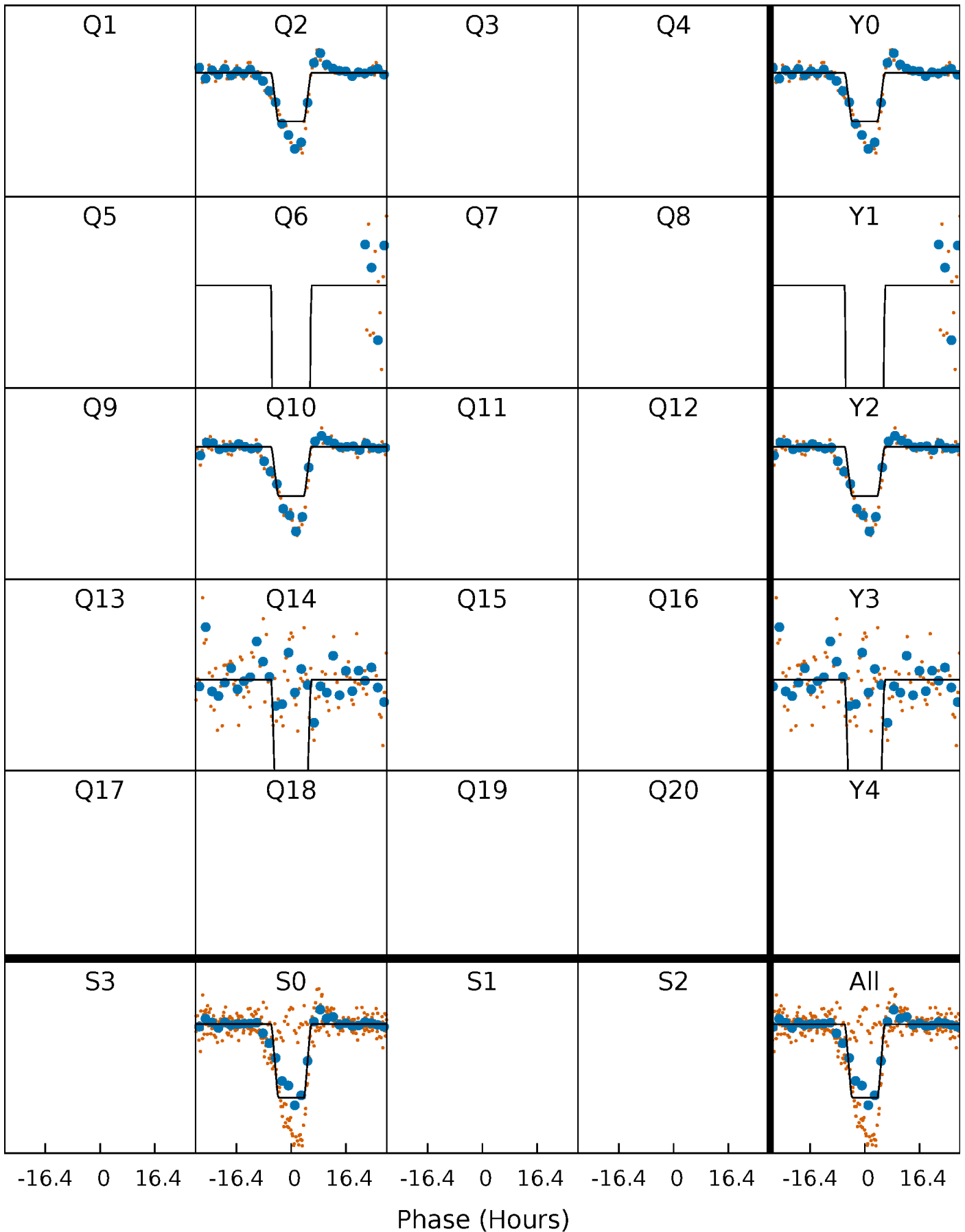
# DV Quarter-Phased Transit Curves

TCE 011412044-07 P=367.441035 Days  $T_0=215.105554$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

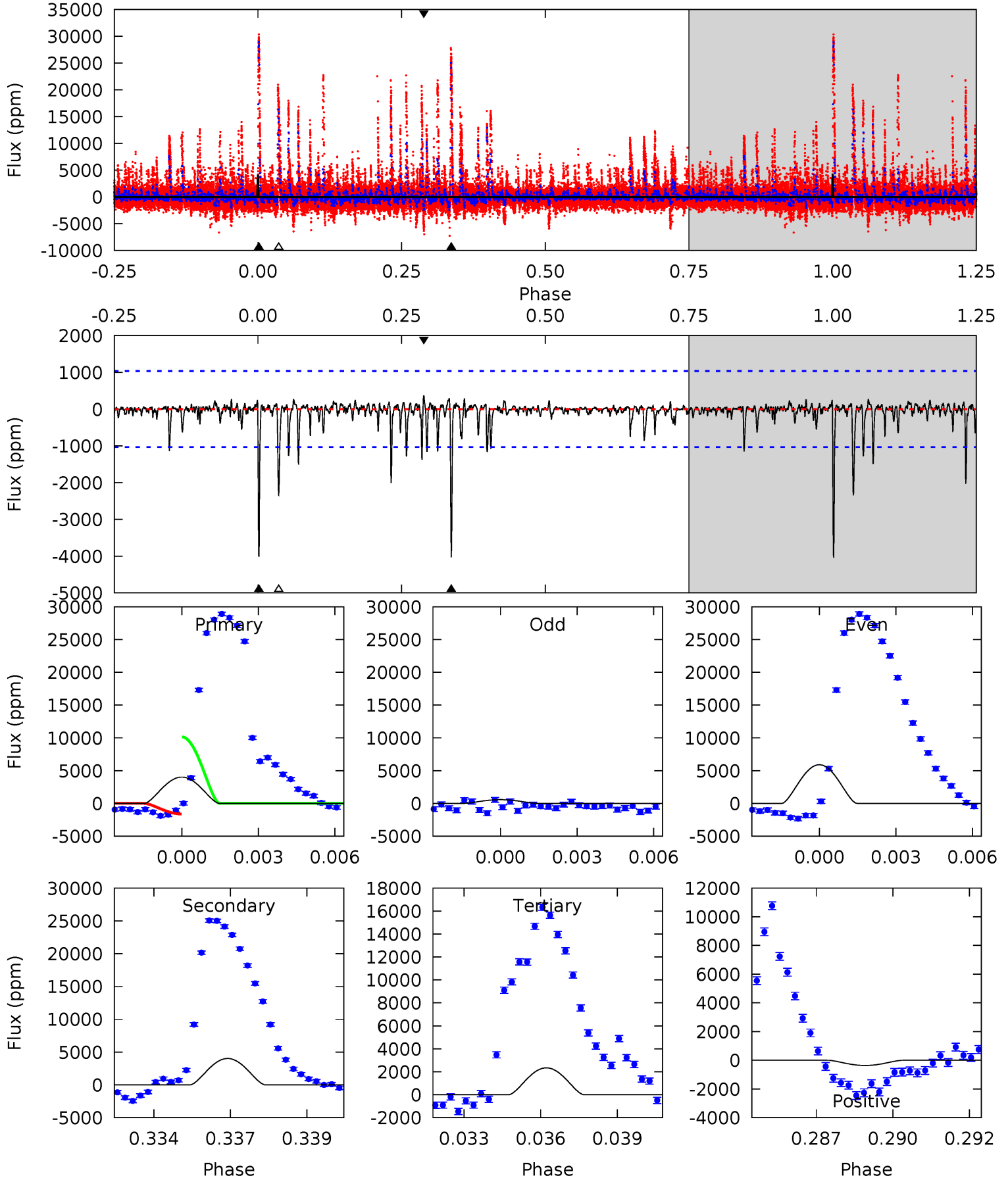
TCE 011412044-07 P=367.429465 Days  $T_0=215.110893$  (BKJD)



# DV Model-Shift Uniqueness Test

011412044-07, P = 367.441035 Days, E = 215.105554 Days

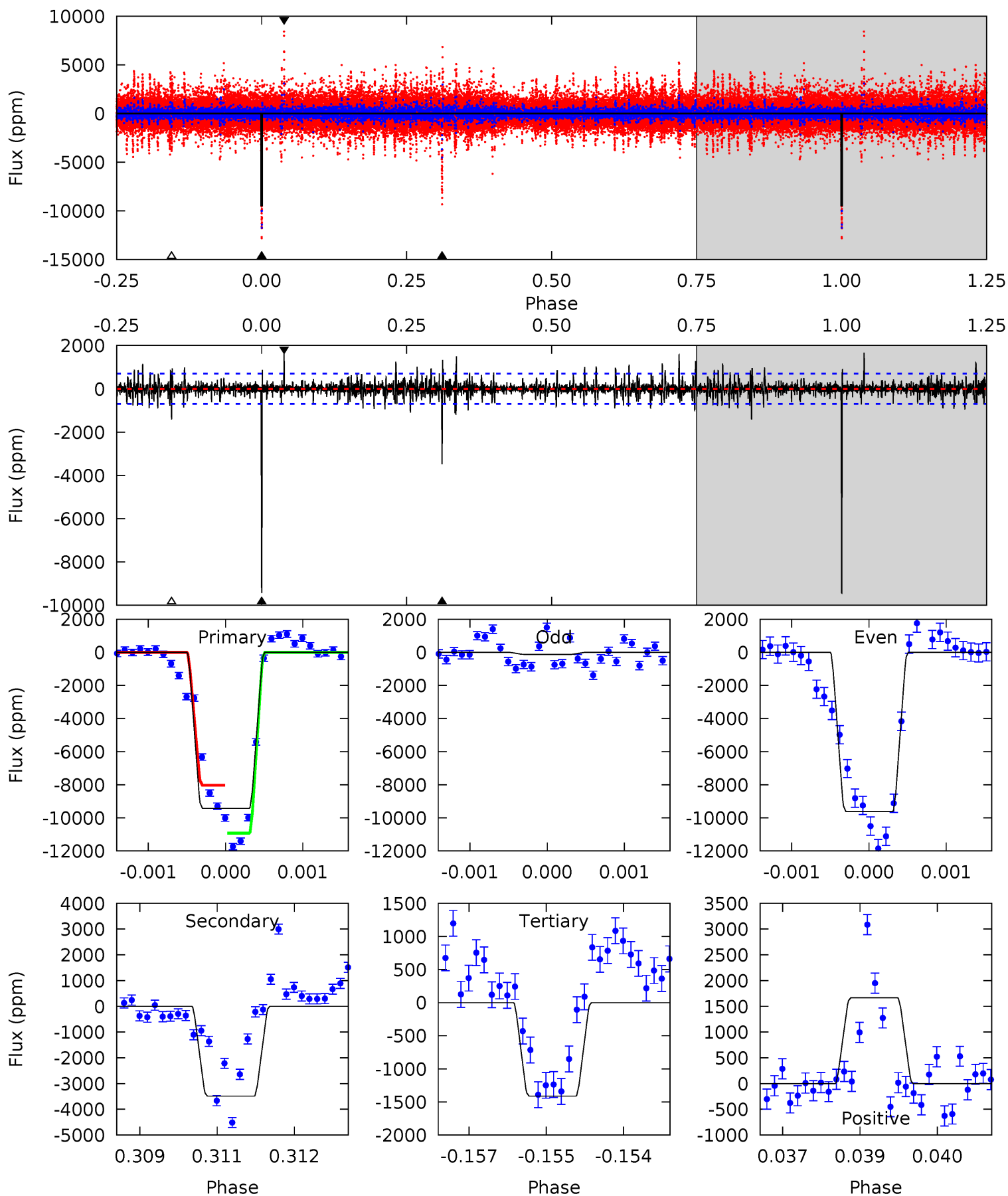
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
20.5	20.5	11.9	1.86	5.27	2.99	1.12	8.57	18.6	8.57	18.6	6.75	0.70	0.08	20.9



# Alt Model-Shift Uniqueness Test

011412044-07, P = 367.429465 Days, E = 215.110893 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
72.7	26.9	10.9	12.8	5.39	3.20	1.96	61.8	59.8	16.0	14.0	34.2	0.70	0.15	0



### Stellar Parameters For KIC 011412044

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$4713^{+125}_{-139}$	$4.588^{+0.042}_{-0.035}$	$0.020^{+0.250}_{-0.300}$	$0.720^{+0.051}_{-0.061}$	$0.733^{+0.064}_{-0.058}$	$2.764^{+0.592}_{-0.374}$
	+3%/-3%	+1%/-1%	+1250%/-1500%	+7%/-8%	+9%/-8%	+21%/-14%
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 011412044-07 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-4018 \pm 196$	$18.18^{+15.39}_{-11.35}$	$259^{+9}_{-9}$	$3049^{+1101}_{-467}$	$5600^{+34155}_{-3976}$
Alt.	$-3486 \pm 130$	$15.25^{+15.50}_{-11.21}$	$259^{+8}_{-10}$	$3148^{+1822}_{-544}$	$6902^{+93018}_{-5239}$

$T_{max}$  = 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

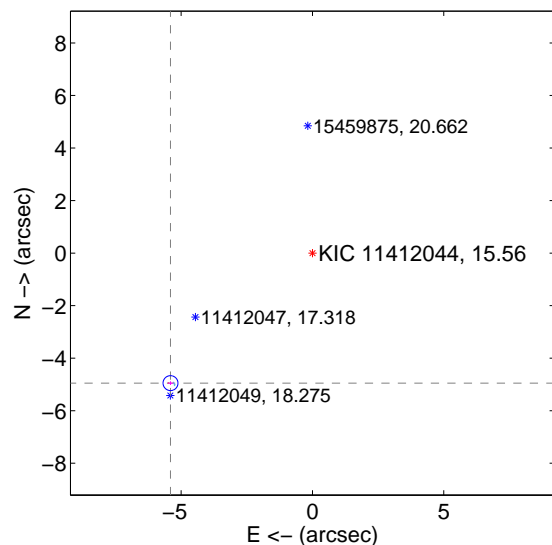
Supplemental centroid analysis for 011412044-07. Kepler magnitude: 15.56. Transit SNR 15.89

There are 2 quarters with good PRF difference image offsets

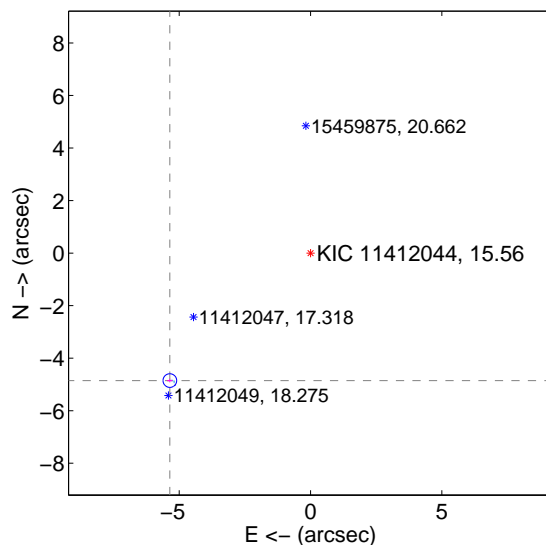
The direct PRF centroid is offset from the target star catalog position by about 0.13 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$7.328 \pm 0.095$	77.38	$5.403 \pm 0.112$	$-4.951 \pm 0.070$
PRF-fit source offset from KIC position	$7.227 \pm 0.087$	83.40	$5.356 \pm 0.100$	$-4.853 \pm 0.067$
photometric centroid source offset	$4.28 \pm 1.13$	3.78	$3.15 \pm 1.21$	$-2.89 \pm 1.03$

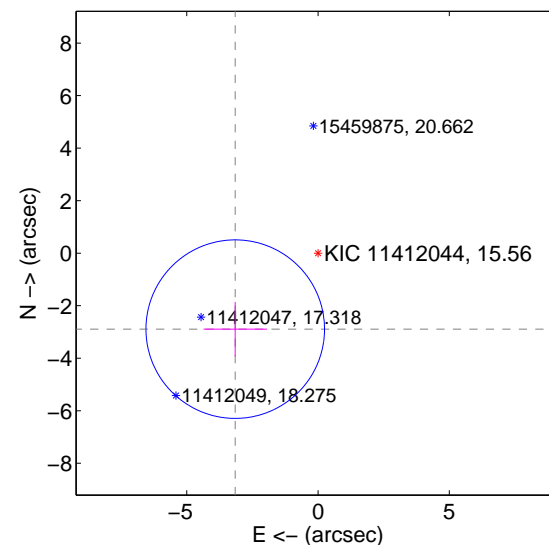
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

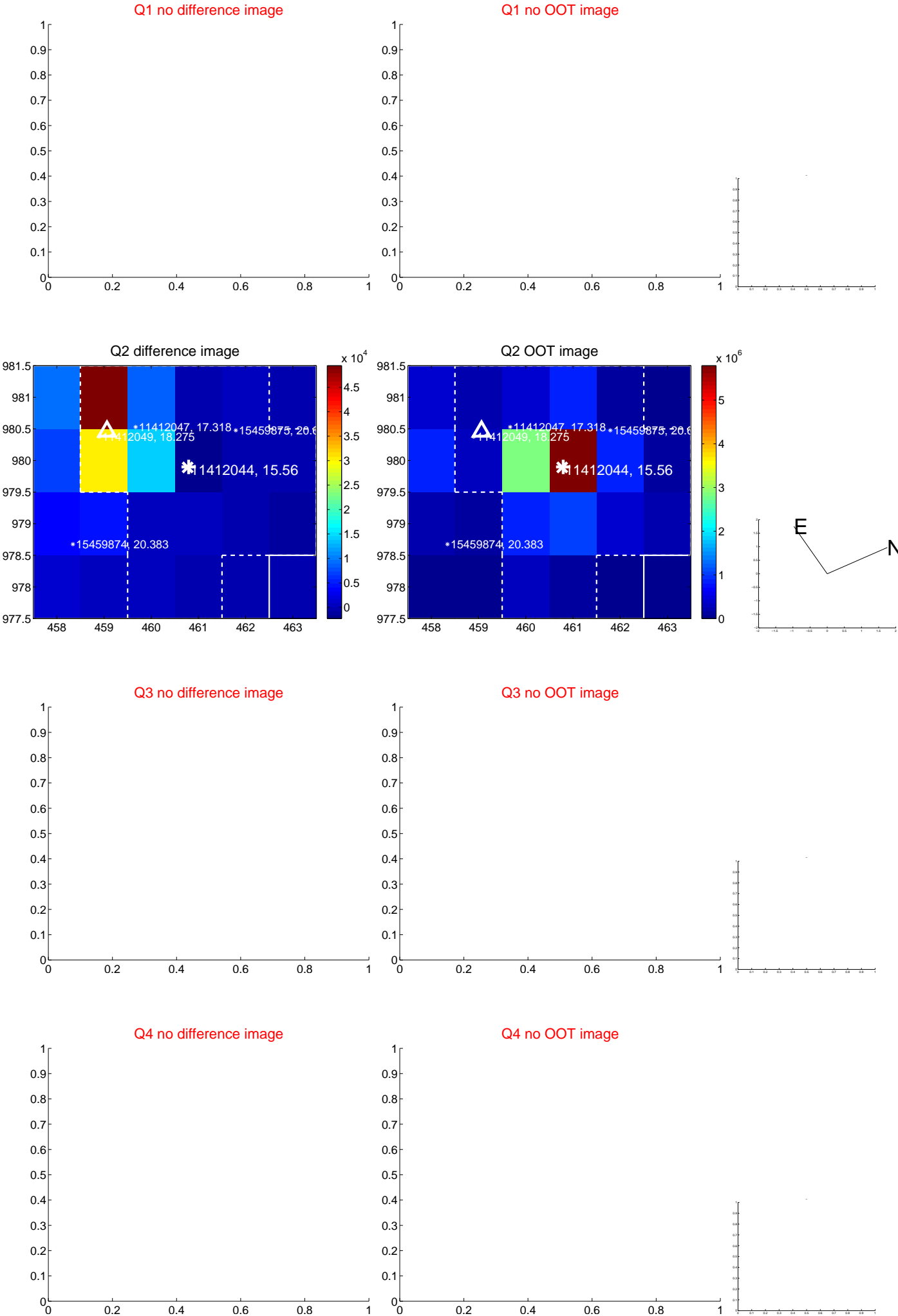


offset from photometric centroids

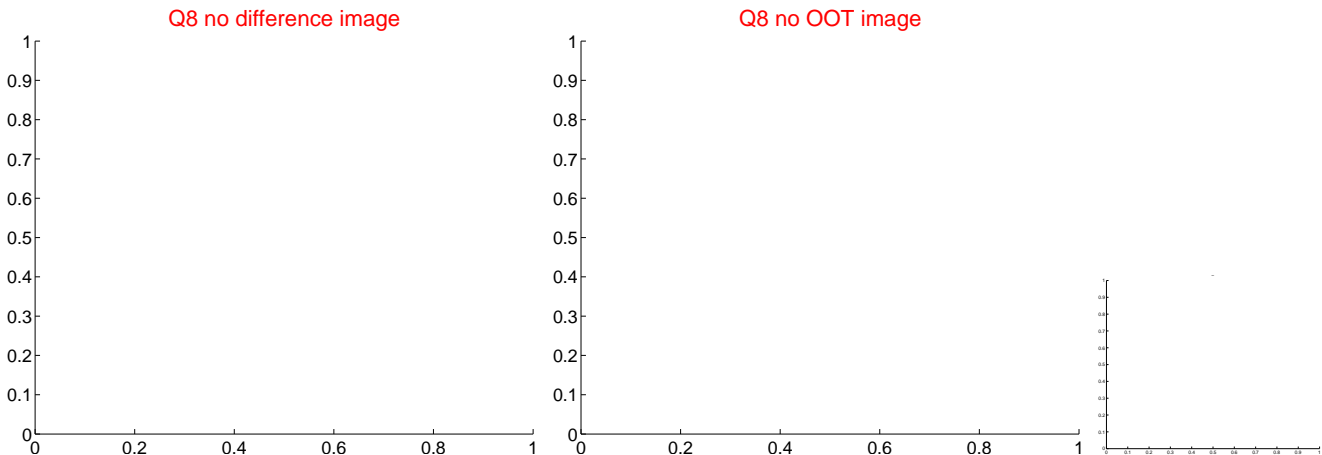
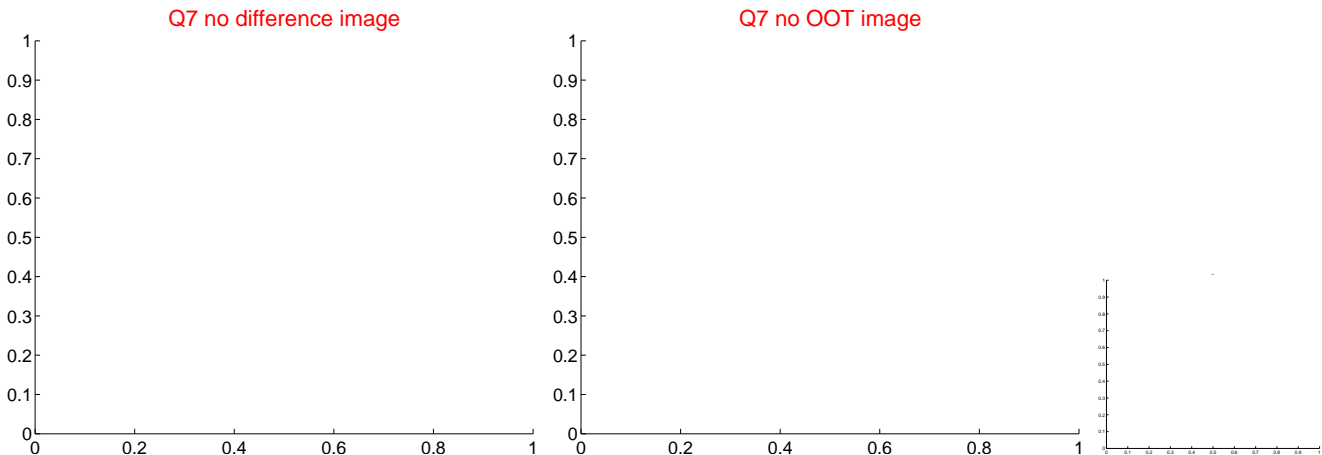
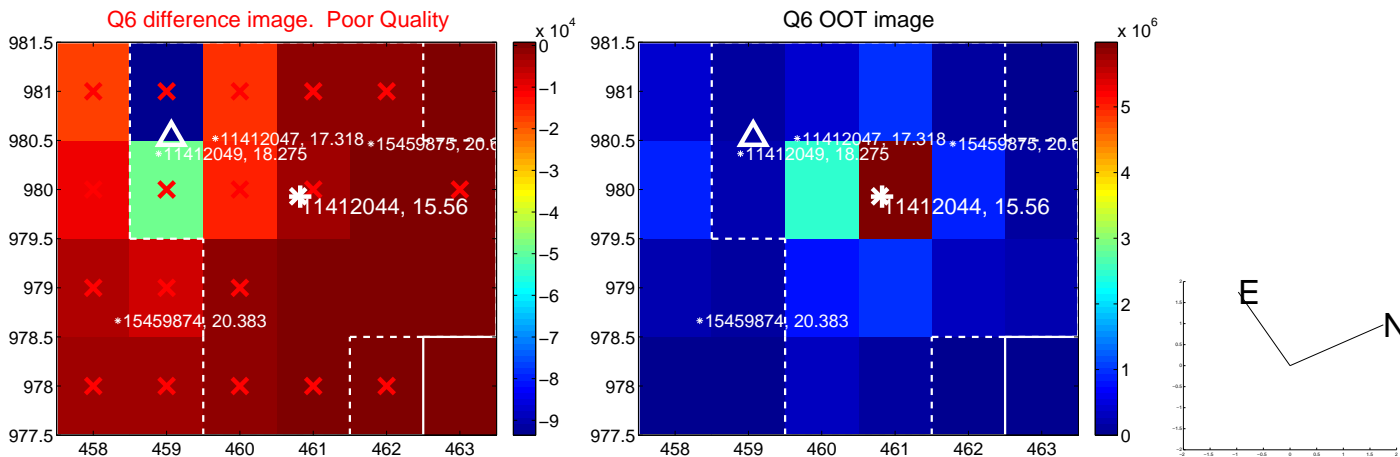
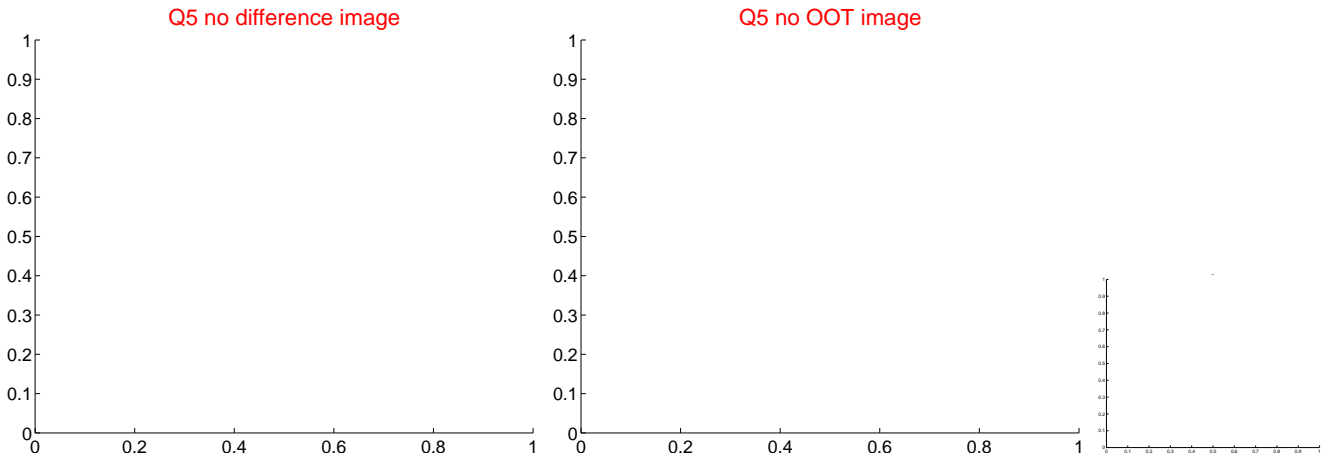


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

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

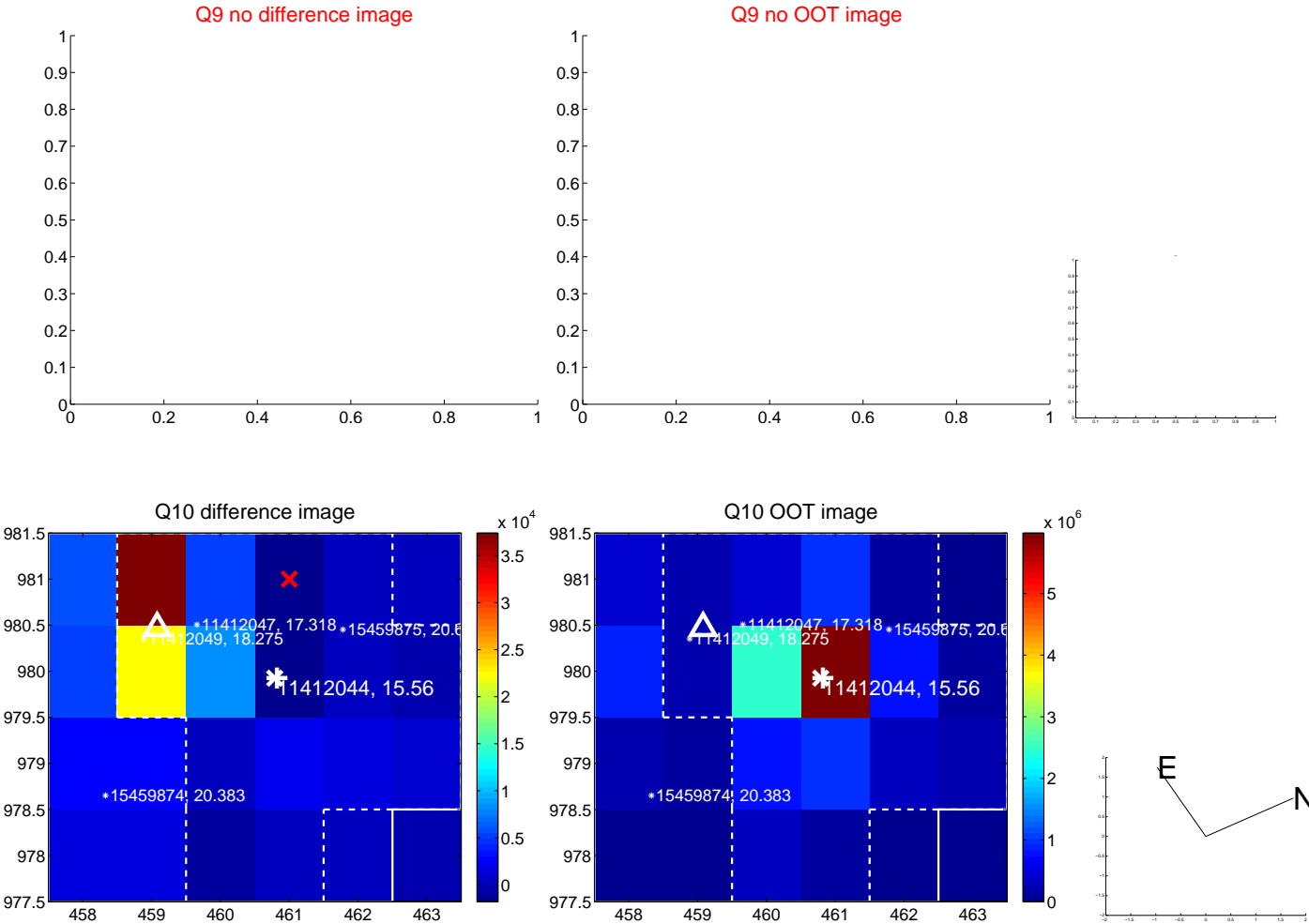


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value





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



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

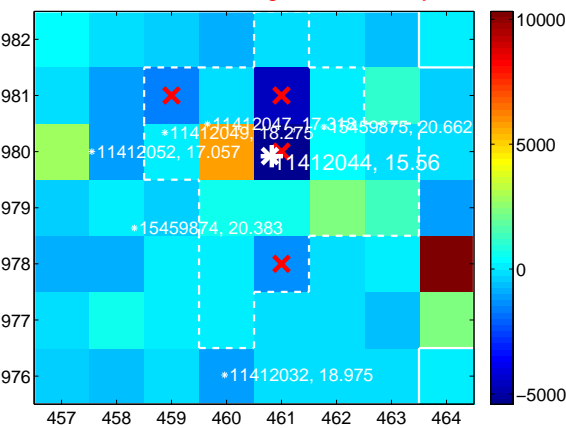
Q13 no difference image



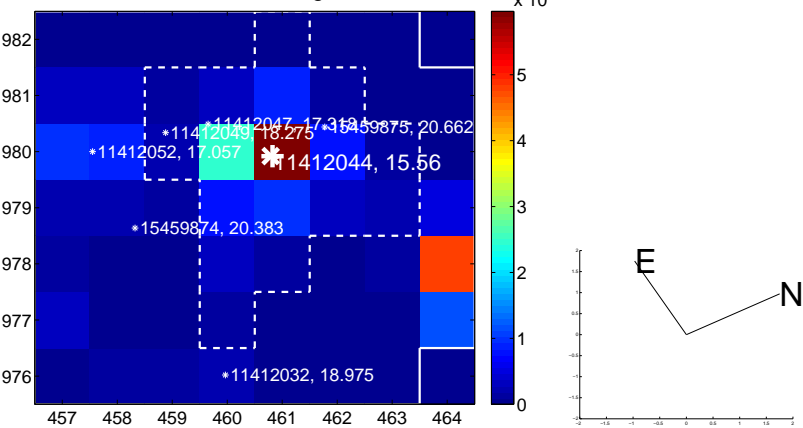
Q13 no OOT image



Q14 difference image. Poor Quality



Q14 OOT image



Q15 no difference image



Q15 no OOT image



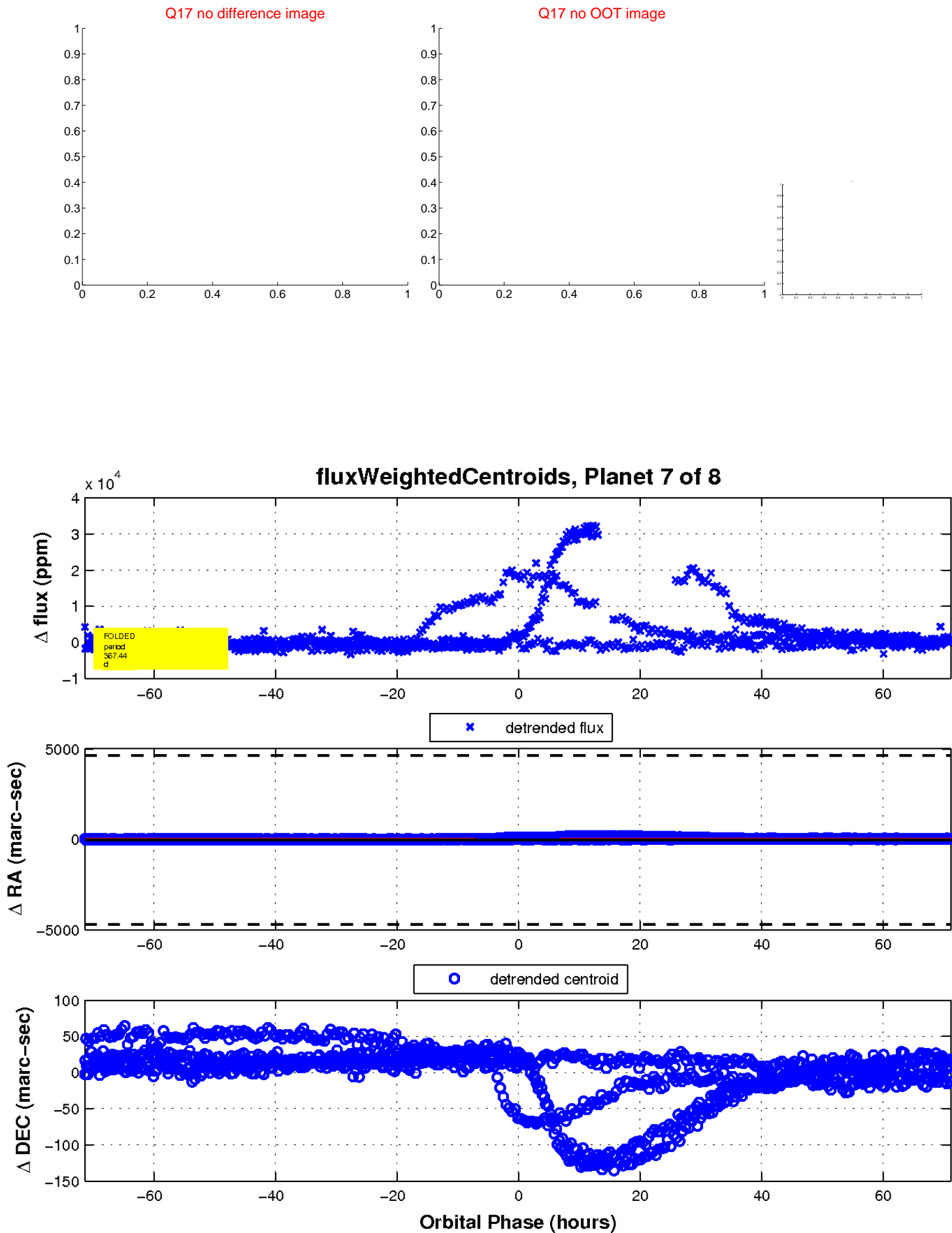
Q16 no difference image



Q16 no OOT image

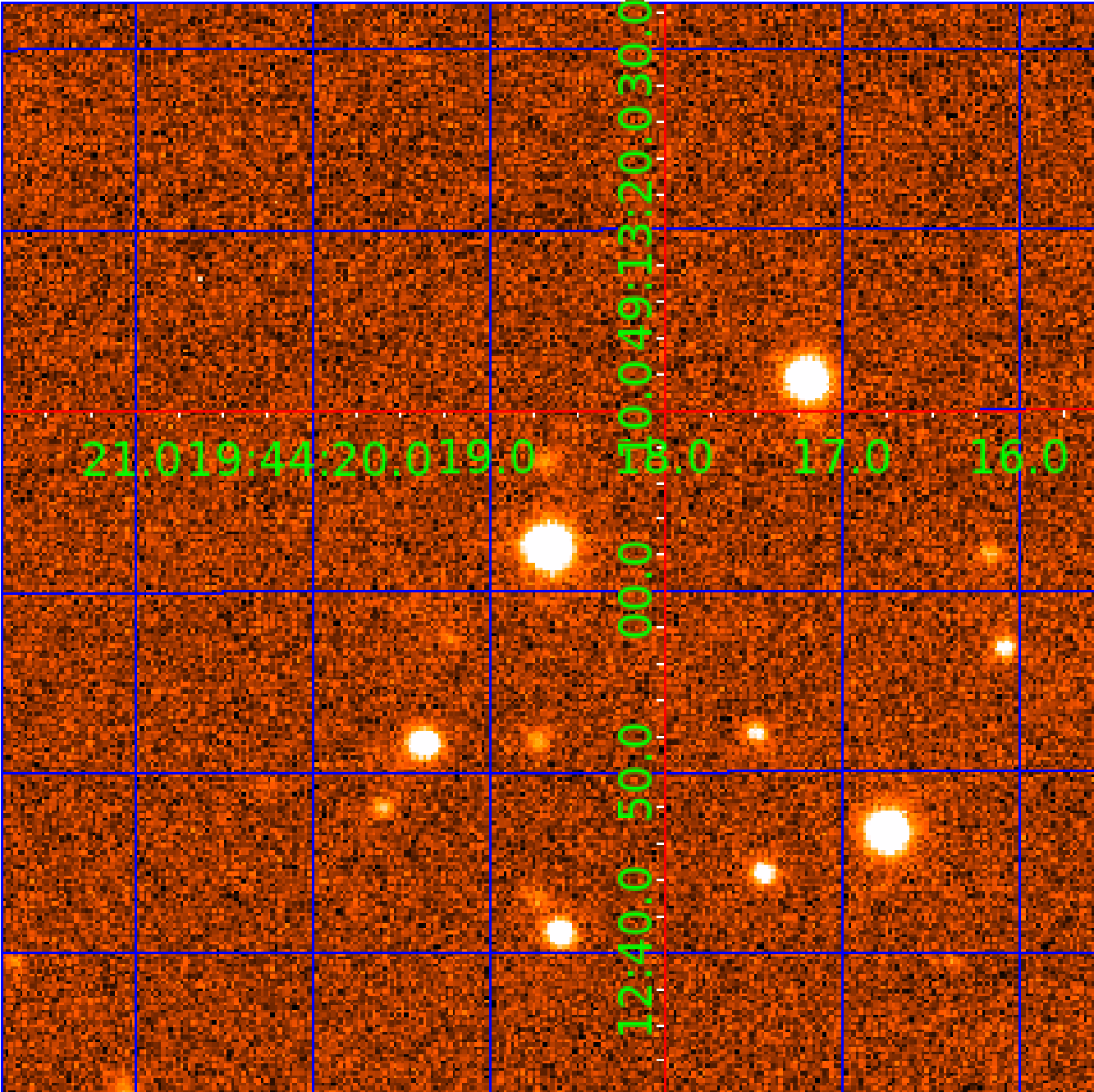


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 011412044

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
011412044-01	OBS	No	392.316863	189.867641	10821.9	19.439	20.2	18.4	0.72	4713	8.63	0.26
011412044-02	OBS	No	429.932868	228.232852	5577.4	15.710	19.8	12.1	0.72	4713	6.74	0.23
011412044-03	OBS	No	327.228963	308.514574	9609.8	17.960	18.9	15.3	0.72	4713	13.25	0.33
011412044-04	OBS	No	497.309634	433.712106	6509.3	14.267	18.4	15.5	0.72	4713	6.38	0.19
011412044-05	OBS	No	379.431472	254.543571	7842.6	13.668	18.1	13.7	0.72	4713	8.89	0.27
011412044-06	OBS	No	371.644294	241.608392	6772.4	13.431	17.6	13.4	0.72	4713	11.28	0.28
011412044-07	OBS	No	367.441035	215.105554	12056.7	23.794	18.9	15.9	0.72	4713	14.70	0.28
011412044-08	OBS	No	407.377075	136.506999	2052.6	9.000	18.2	-1.0	0.72	4713	3.13	0.24

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
011412044-01	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—CENT_RESOLVED_OFFSET
011412044-02	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_RESOLVED_OFFSET
011412044-03	OBS	FP	0.00	1	0	0	0	LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS
011412044-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
011412044-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
011412044-06	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_RESOLVED_OFFSET
011412044-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS
011412044-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—CENT_NOFITS

**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.

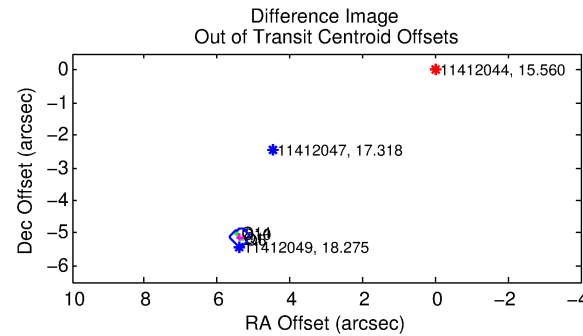
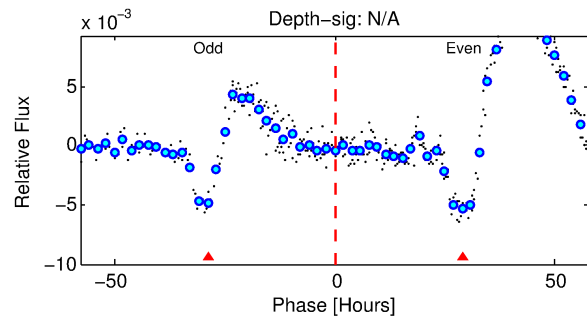
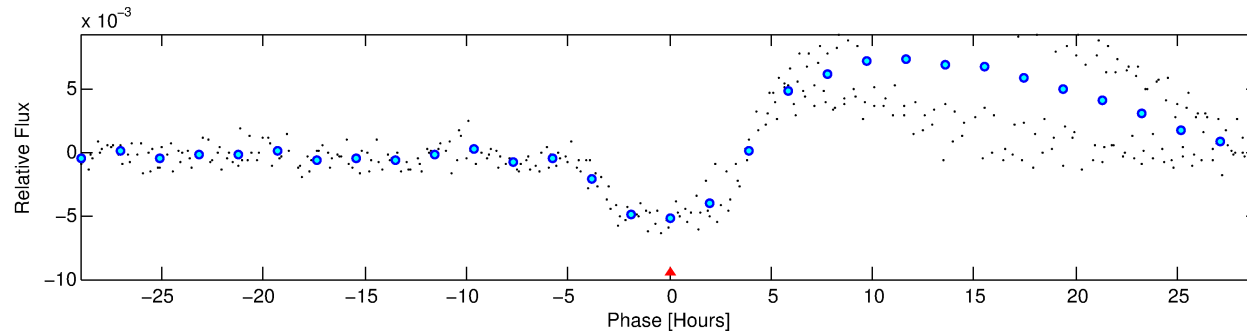
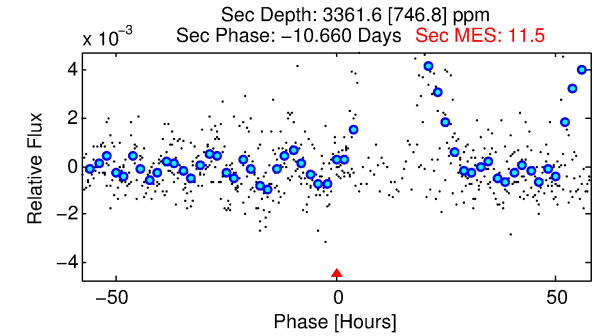
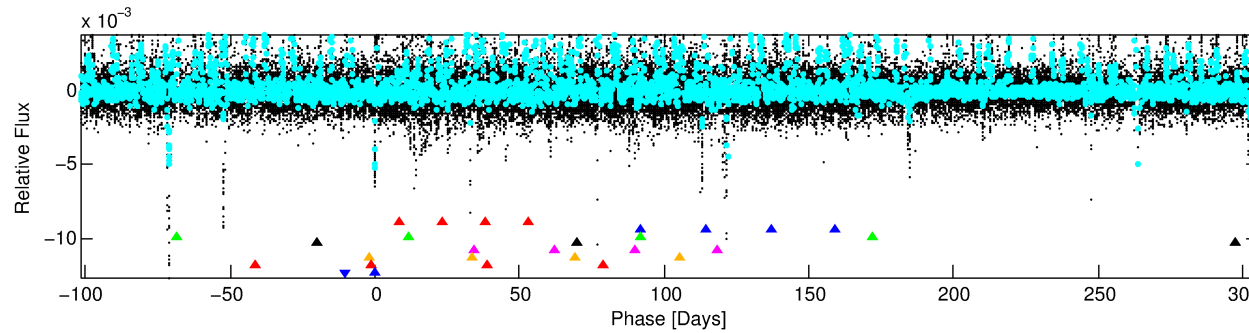
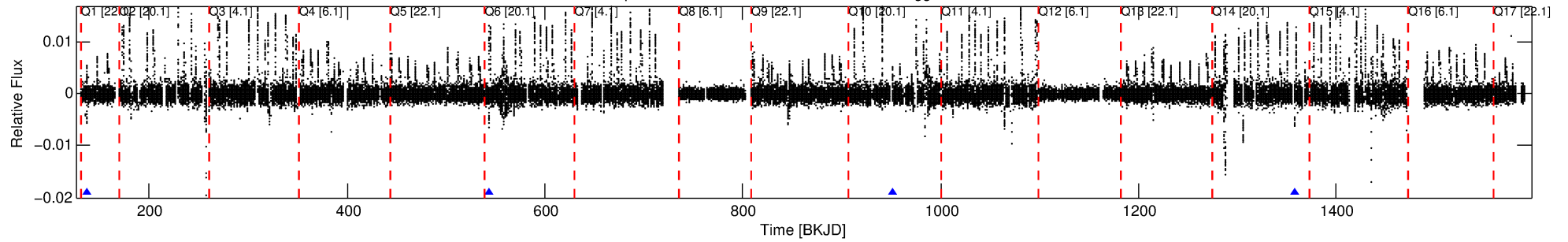
Ephemeris Match Information For 011412044-08

No Significant Match Found

# DV One-Page Summary

KIC: 11412044 Candidate: 8 of 8 Period: 407.377 d

Kp: 15.56 R\*: 0.72 Rs Teff: 4713.0 K Logg: 4.59 Fe/H: 0.020



## TPS TCE Results:

Period = 407.37707 d  
Epoch = 136.5070 BKJD

DV fit results are unavailable

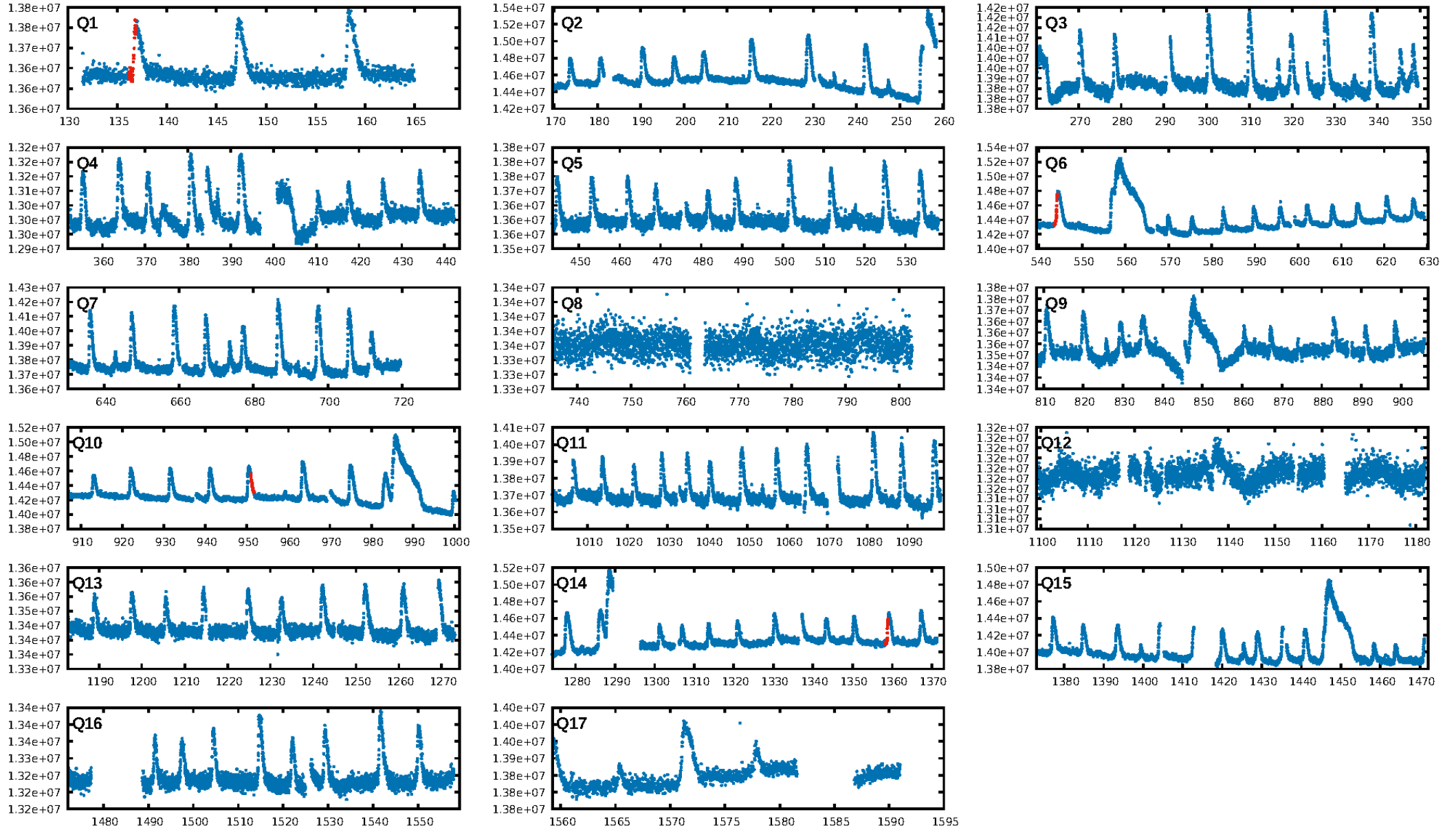
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [16.87σ]  
LongPeriod-sig: 100.0% [29.90σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [2/2]  
GhostDiagnostic-chr: -0.3666  
Centroid-sig: N/A  
Centroid-so: 4.445 arcsec [4.29σ]  
OotOffset-rm: 7.434 arcsec [90.25σ]  
KicOffset-rm: 7.320 arcsec [98.88σ]  
OotOffset-st: 3/0/0/1 [4]  
KicOffset-st: 3/0/0/1 [4]  
DiffImageQuality-fgm: 1.00 [4/4]  
DiffImageOverlap-fno: 1.00 [4/4]

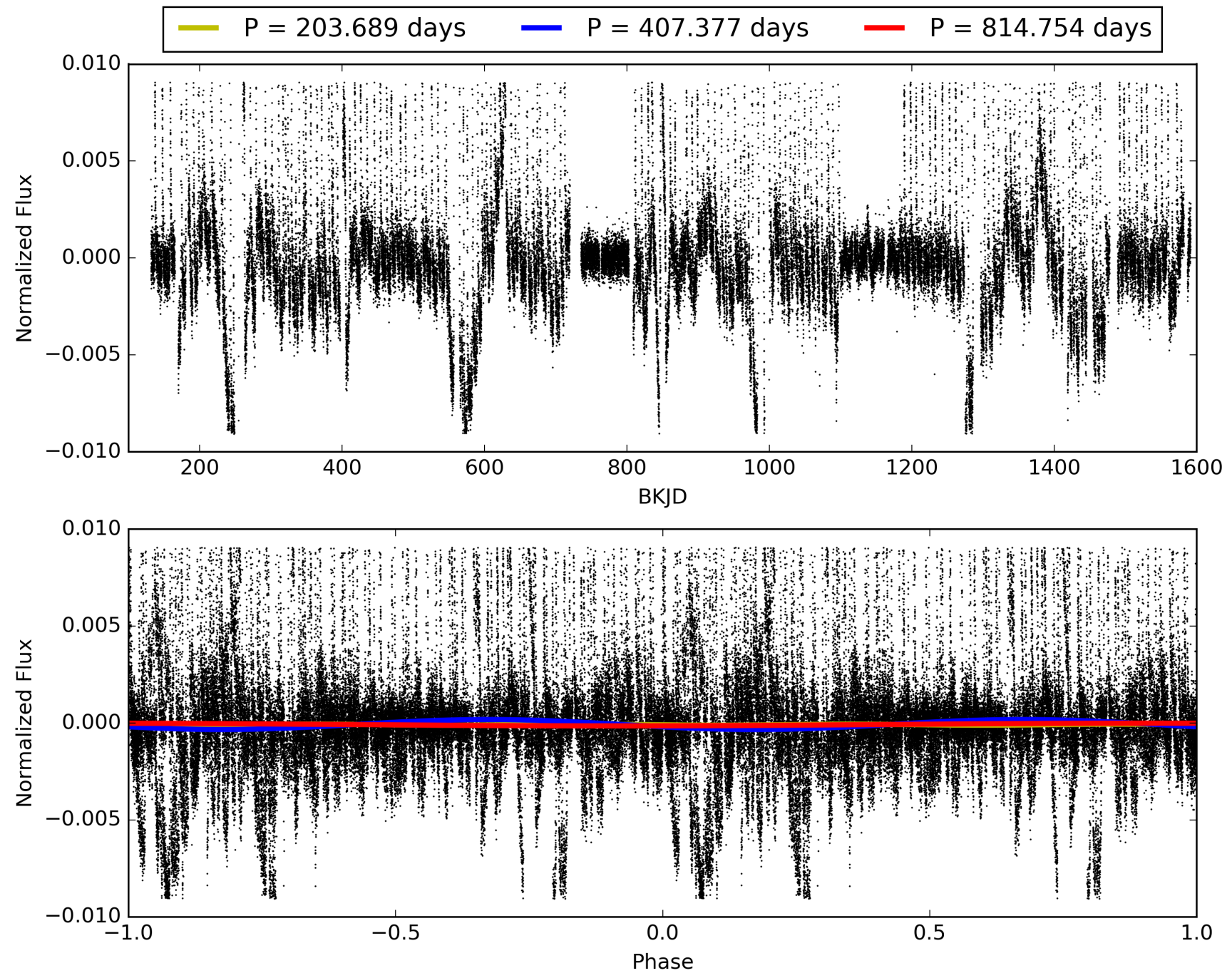
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:15:06 Z

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

# TCE 011412044-08, PDC Light Curves



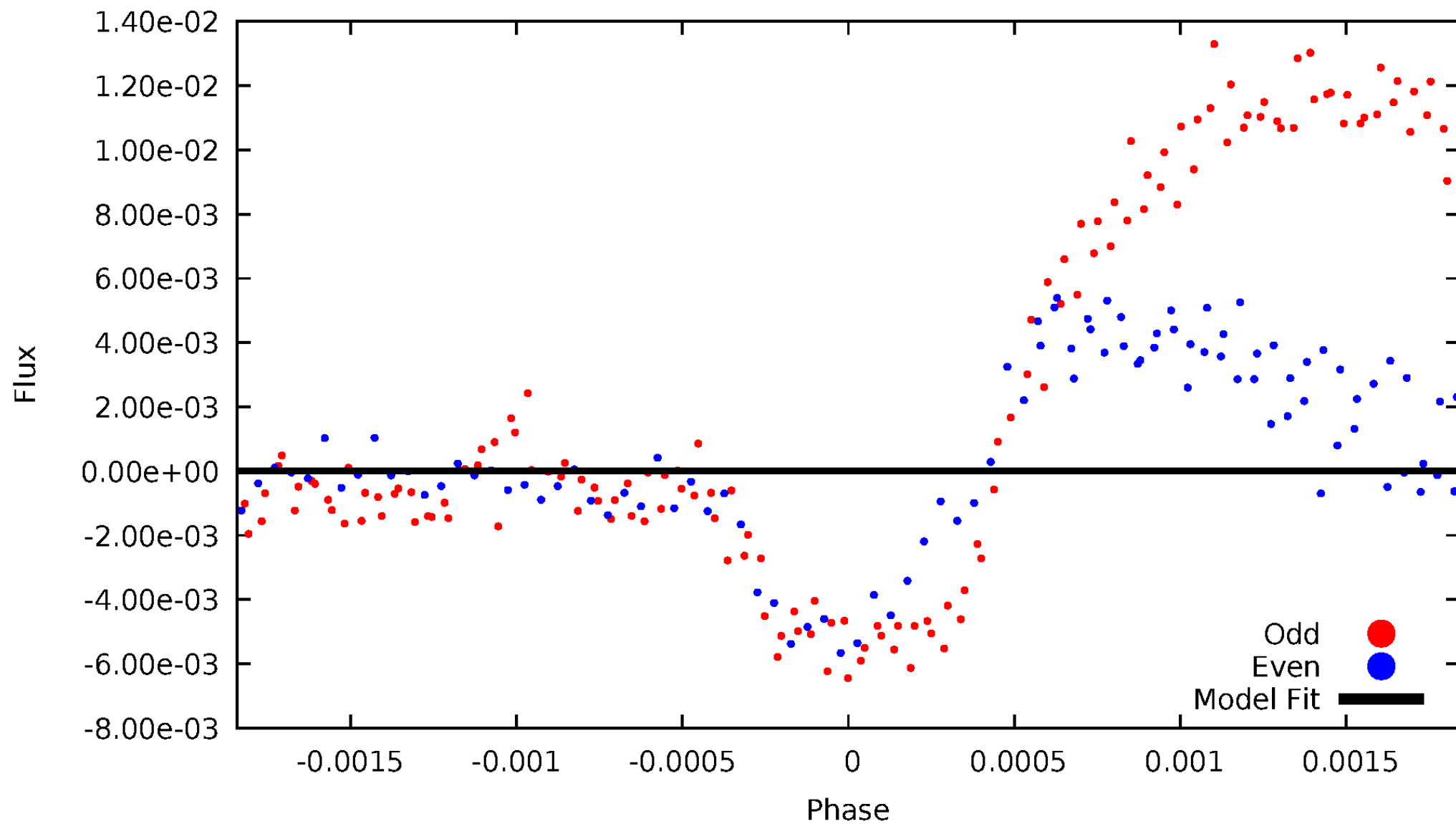
TCE 011412044-08





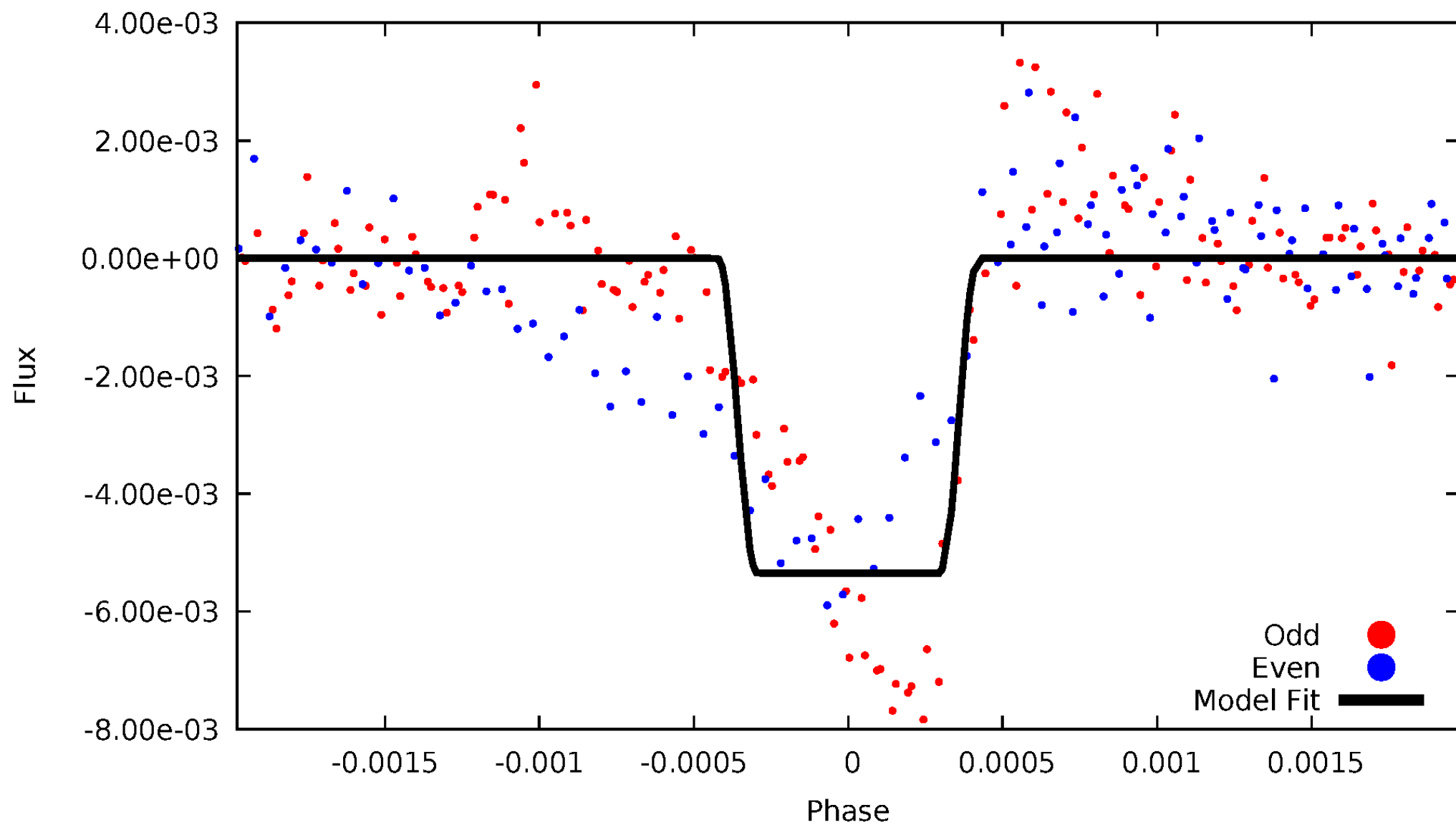
# DV Odd/Even

TCE 011412044-08



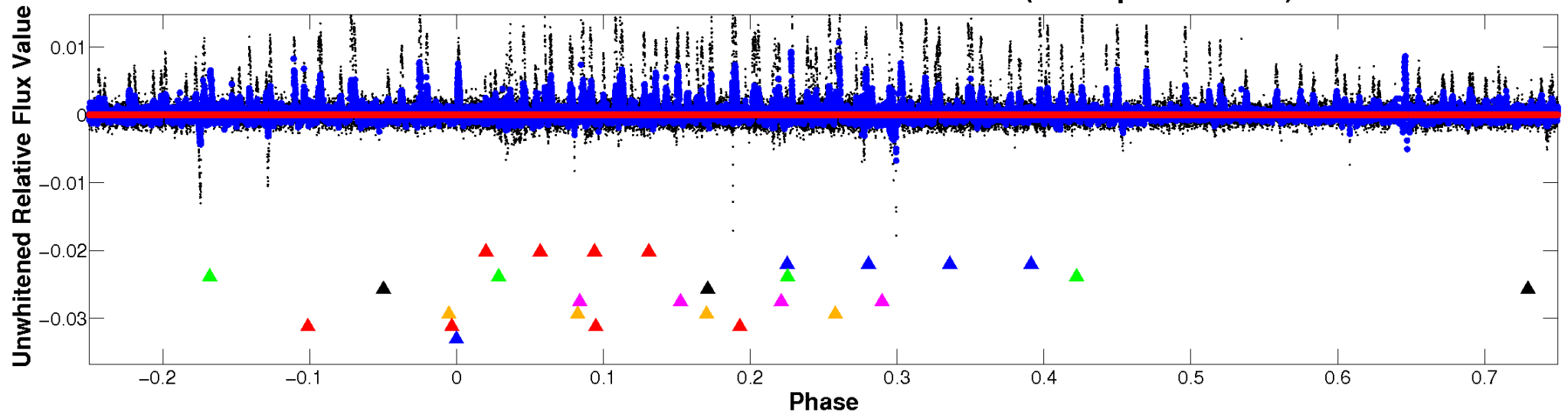
# ALT Odd/Even

TCE 011412044-08



# Non-Whitened Vs. Whitened Light Curve

**Planet 8 : Phased Unwhitened Flux Time Series (TPS Epoch/Period)**

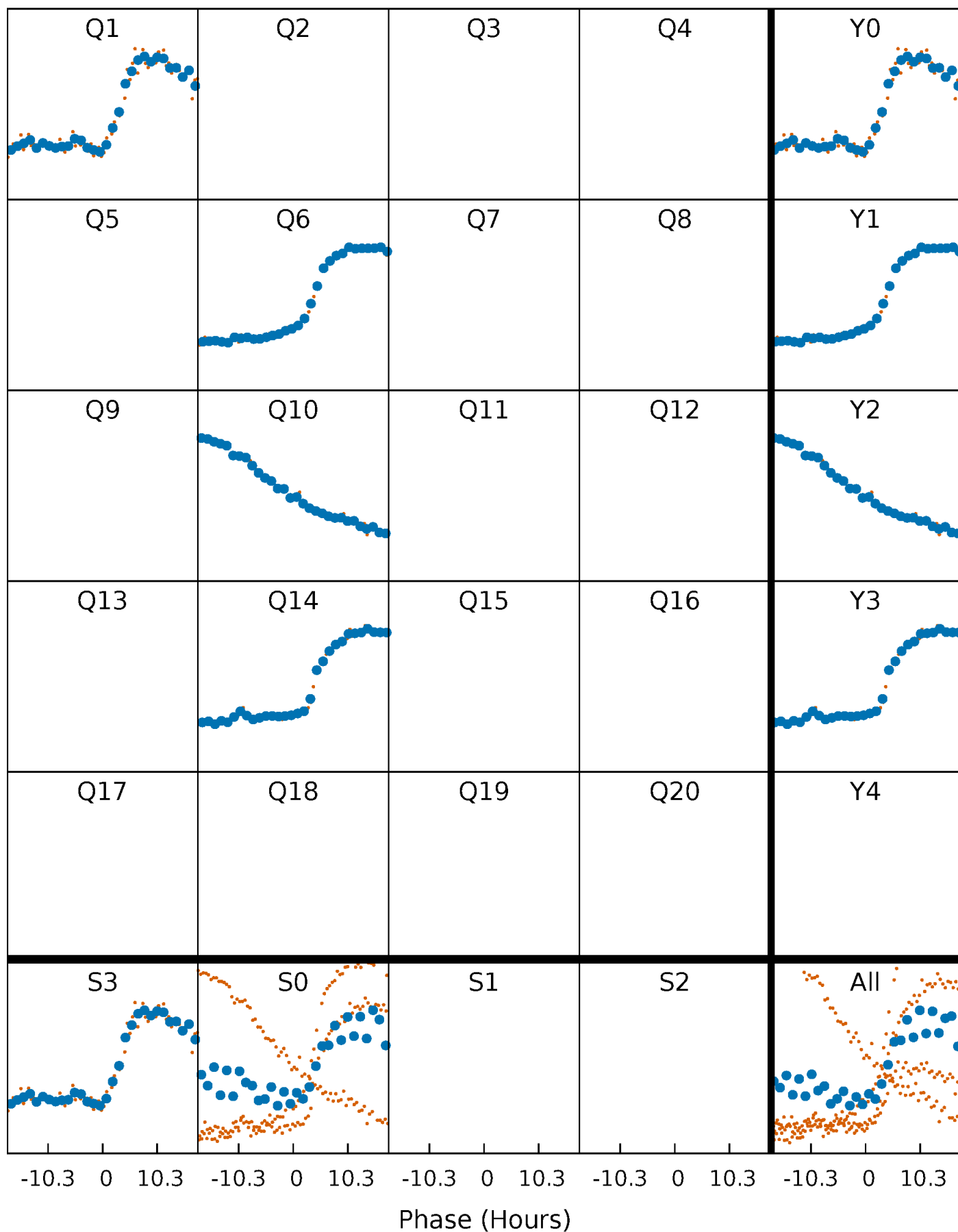


**Planet 8 : Phased Whitened Flux Time Series (TPS Epoch/Period)**



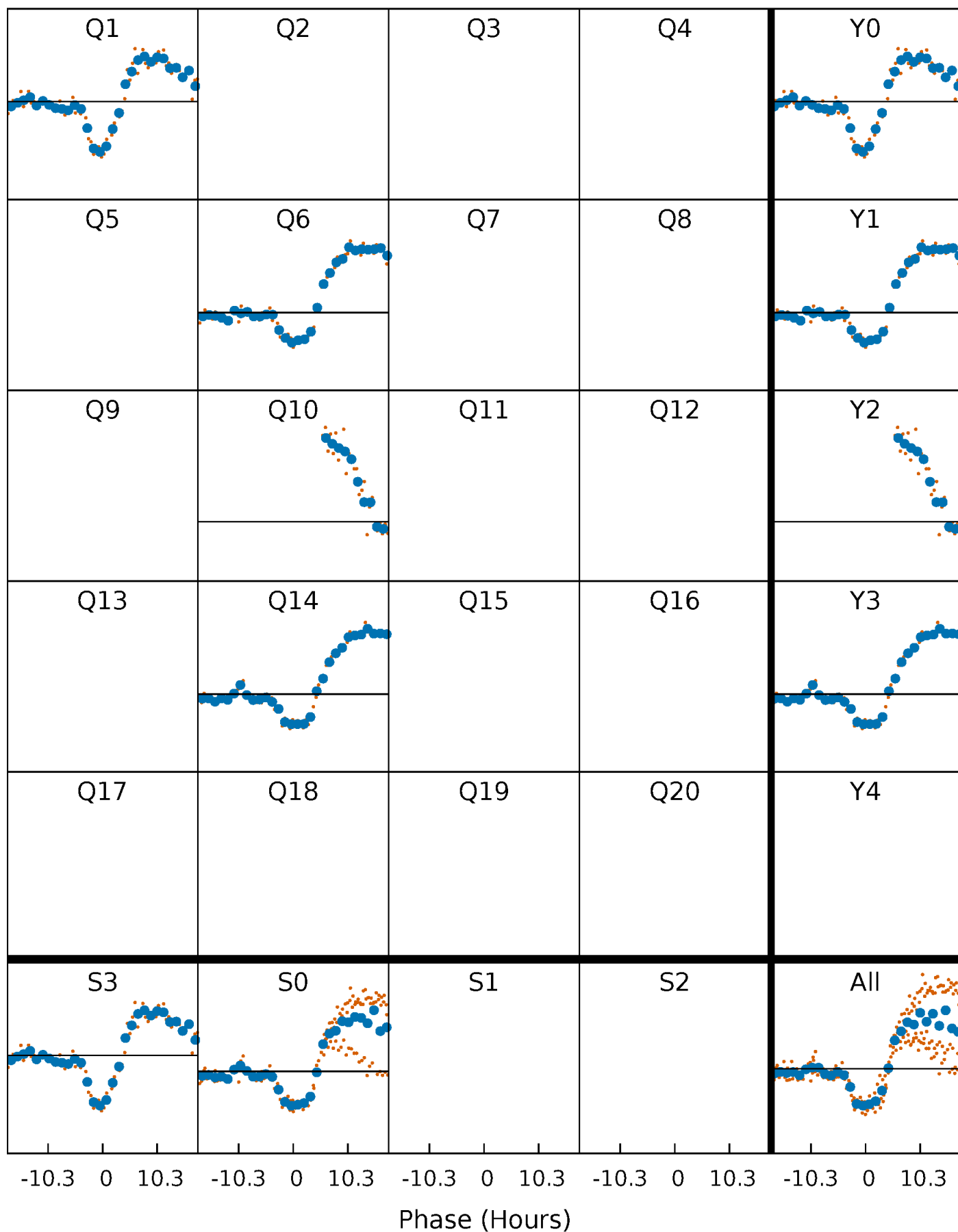
# PDC Quarter-Phased Transit Curves

TCE 011412044-08 P=407.377074 Days  $T_0=136.506999$  (BKJD)



# DV Quarter-Phased Transit Curves

TCE 011412044-08 P=407.377074 Days  $T_0=136.506999$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

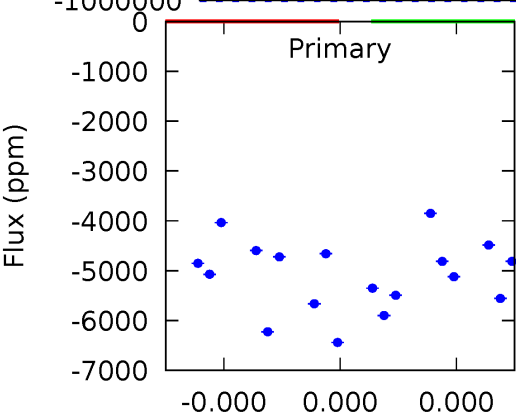
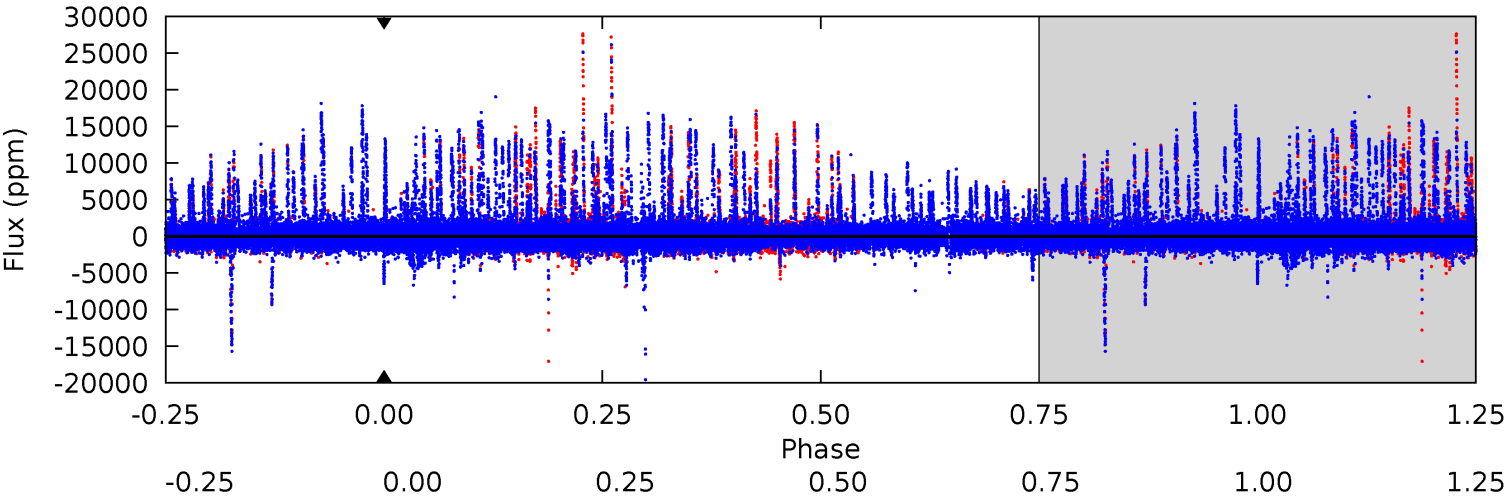
TCE 011412044-08 P=407.377074 Days  $T_0=136.525439$  (BKJD)



# DV Model-Shift Uniqueness Test

011412044-08, P = 407.377074 Days, E = 136.506999 Days

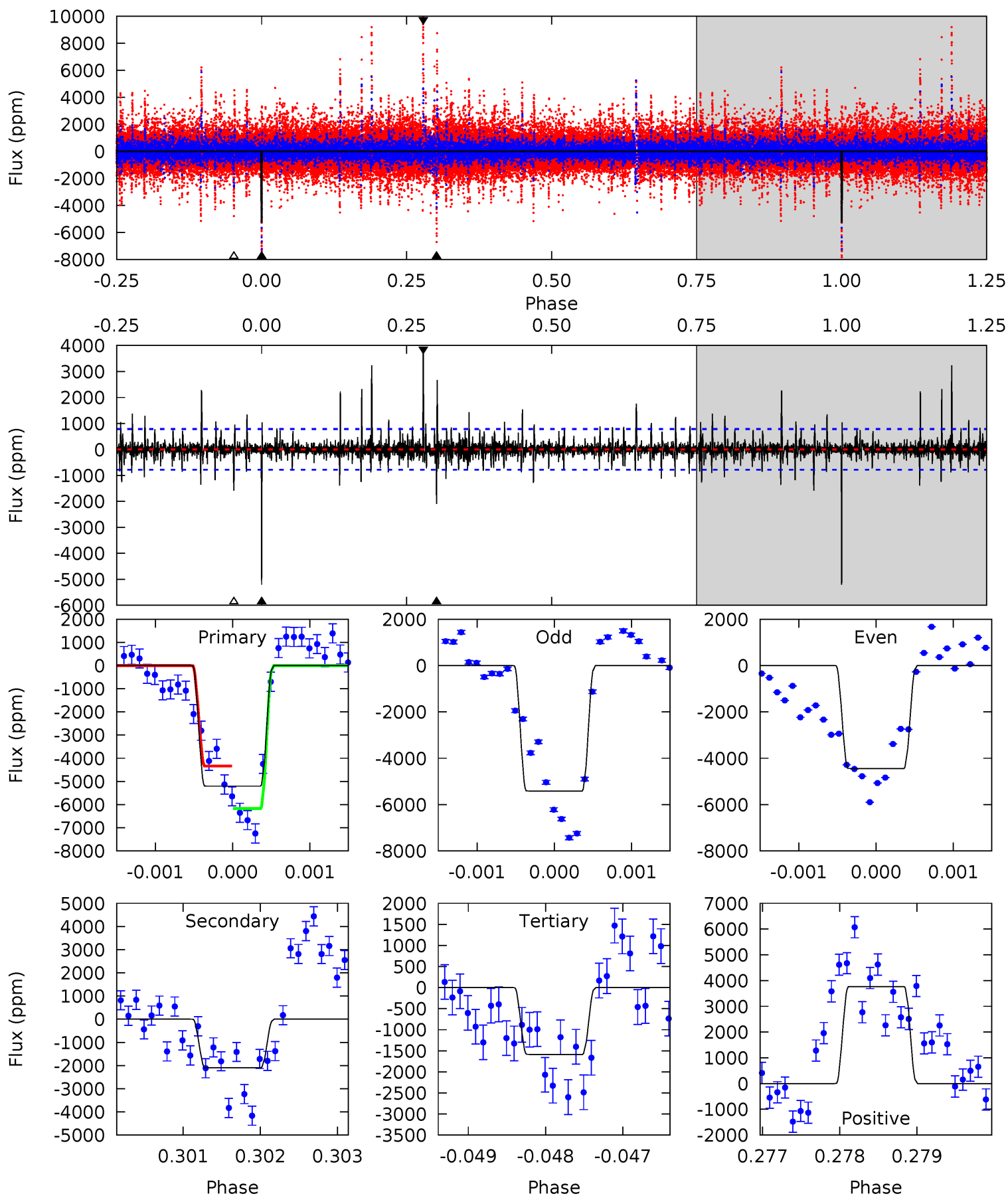
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



# Alt Model-Shift Uniqueness Test

011412044-08, P = 407.377074 Days, E = 136.525439 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
36.4	14.6	11.1	26.3	5.49	3.35	2.06	25.3	10.1	3.55	-11.7	3.01	0.94	0.42	6.41





### Stellar Parameters For KIC 011412044

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$4713^{+125}_{-139}$	$4.588^{+0.042}_{-0.035}$	$0.020^{+0.250}_{-0.300}$	$0.720^{+0.051}_{-0.061}$	$0.733^{+0.064}_{-0.058}$	$2.764^{+0.592}_{-0.374}$
	+3%/-3%	+1%/-1%	+1250%/-1500%	+7%/-8%	+9%/-8%	+21%/-14%
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 011412044-08 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$0 \pm 1000000$	$6.82^{+6.62}_{-4.44}$	$250^{+8}_{-9}$	$4230^{+8979}_{-14260}$	$46056^{+2741136}_{-1396202}$
Alt.	$-2094 \pm 143$	$7.84^{+7.05}_{-5.24}$	$250^{+8}_{-8}$	$3561^{+1791}_{-622}$	$17629^{+140161}_{-12699}$

$T_{\text{max}}$  = 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

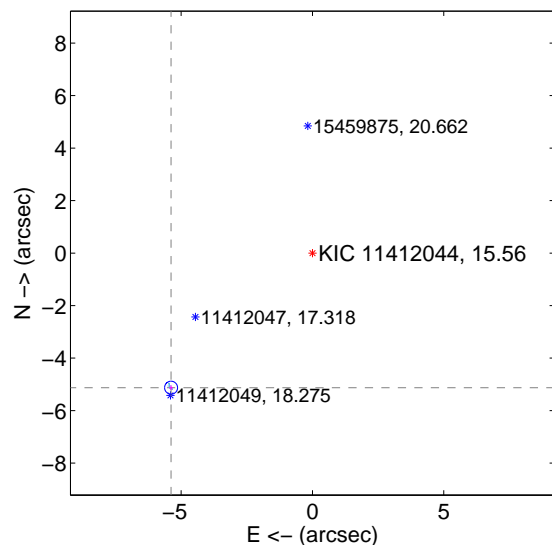
Supplemental centroid analysis for 011412044-08. Kepler magnitude: 15.56. Transit SNR -1.00

There are 4 quarters with good PRF difference image offsets

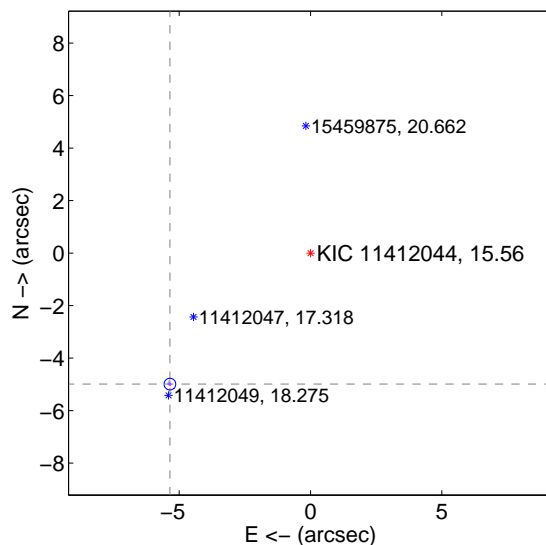
The direct PRF centroid is offset from the target star catalog position by about 0.14 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$7.434 \pm 0.082$	90.25	$5.384 \pm 0.077$	$-5.126 \pm 0.088$
PRF-fit source offset from KIC position	$7.320 \pm 0.074$	98.88	$5.356 \pm 0.070$	$-4.990 \pm 0.078$
photometric centroid source offset	$4.45 \pm 1.04$	4.29	$3.54 \pm 1.07$	$-2.69 \pm 0.97$

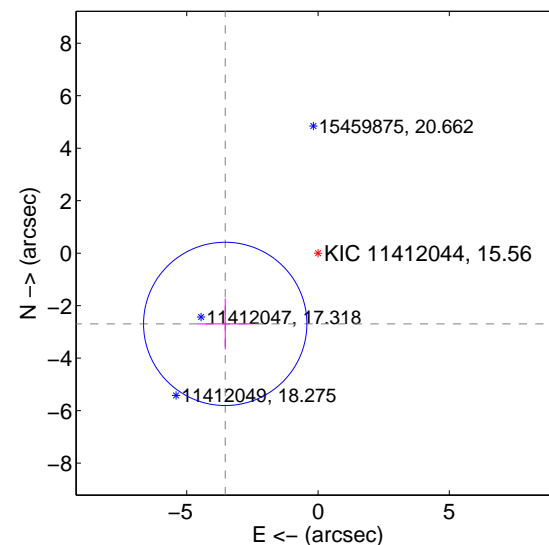
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

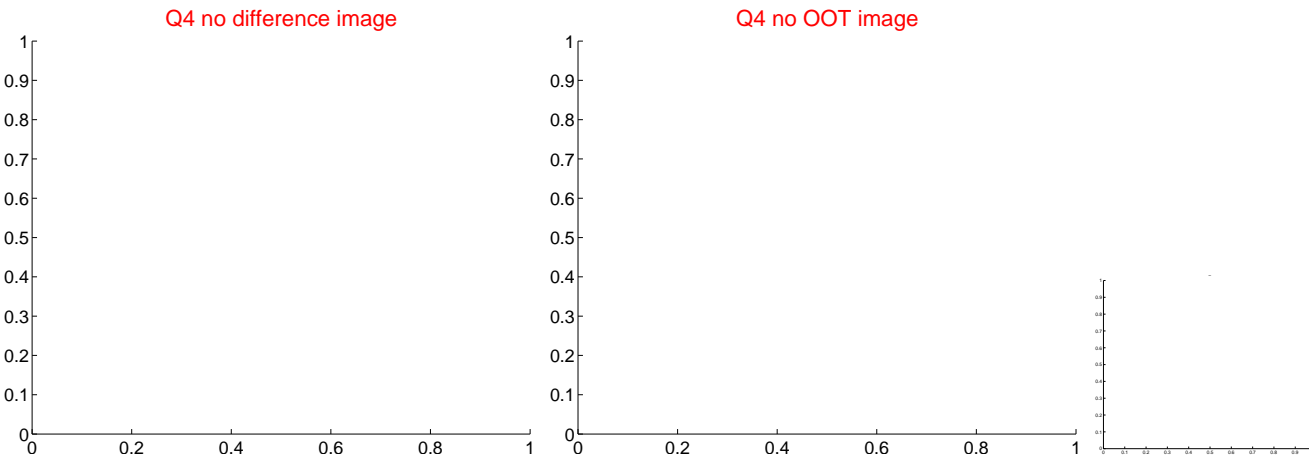
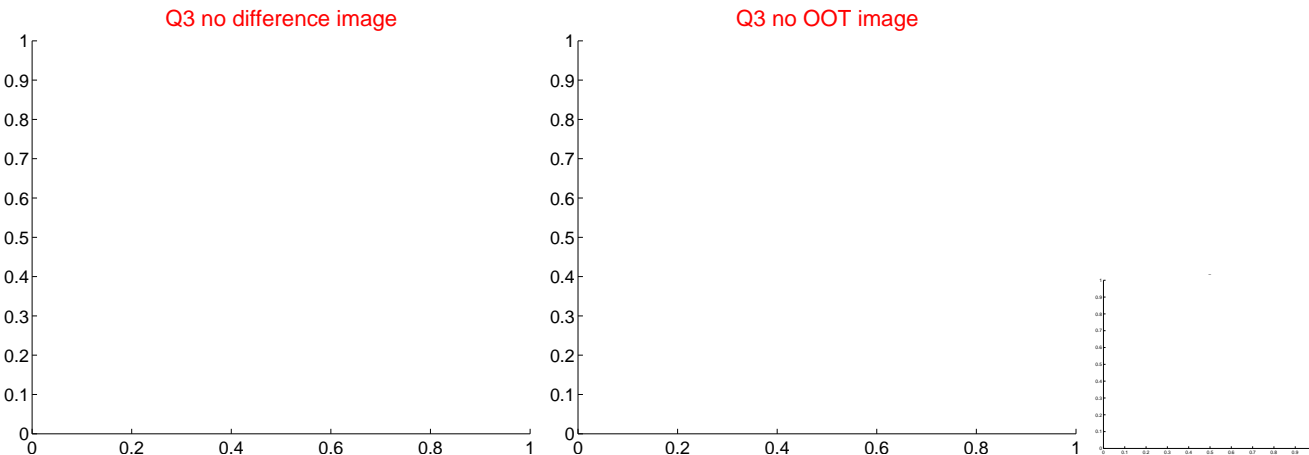
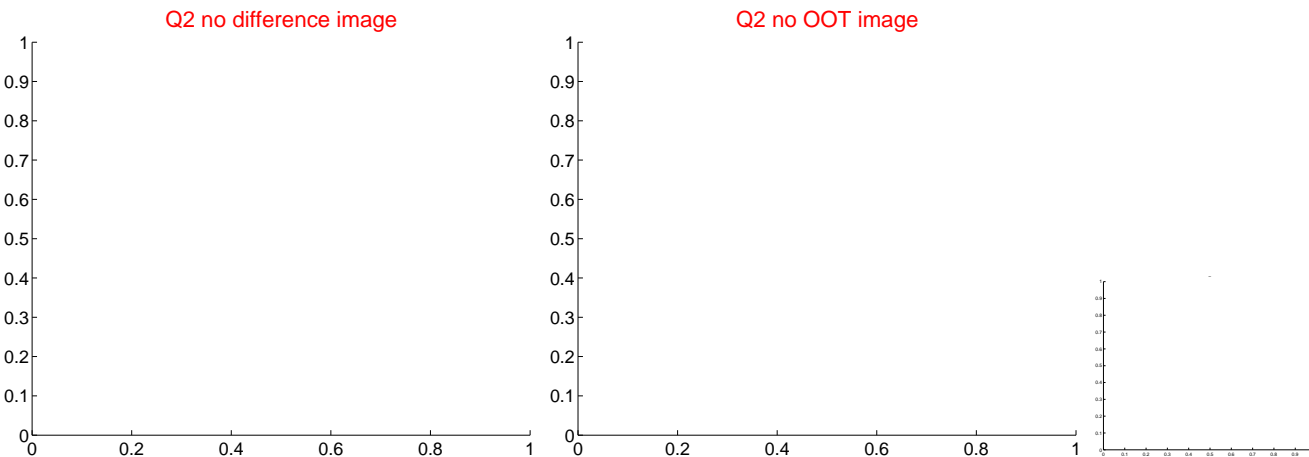
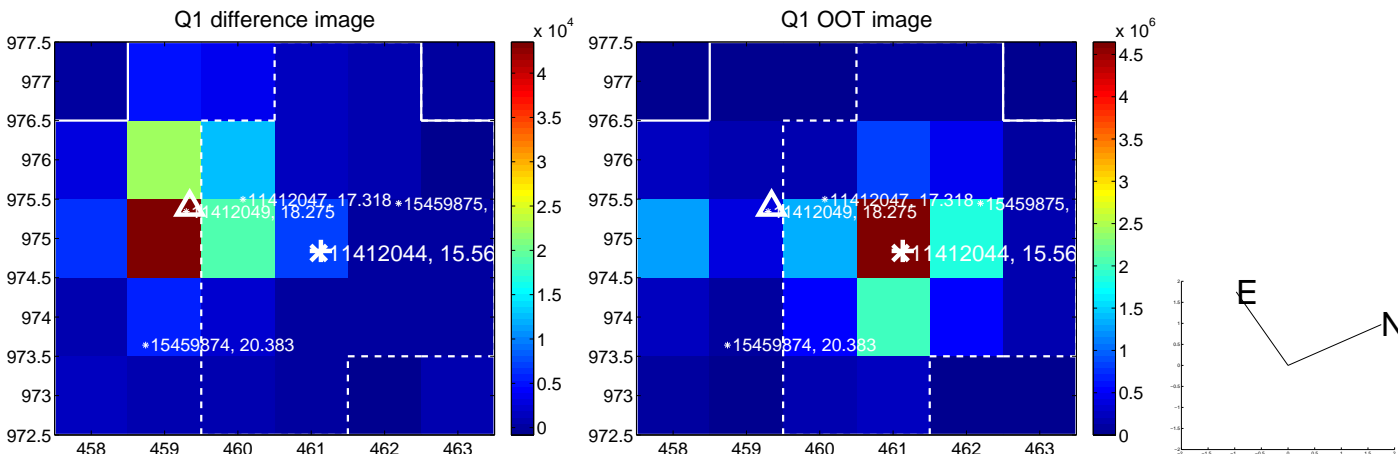


offset from photometric centroids

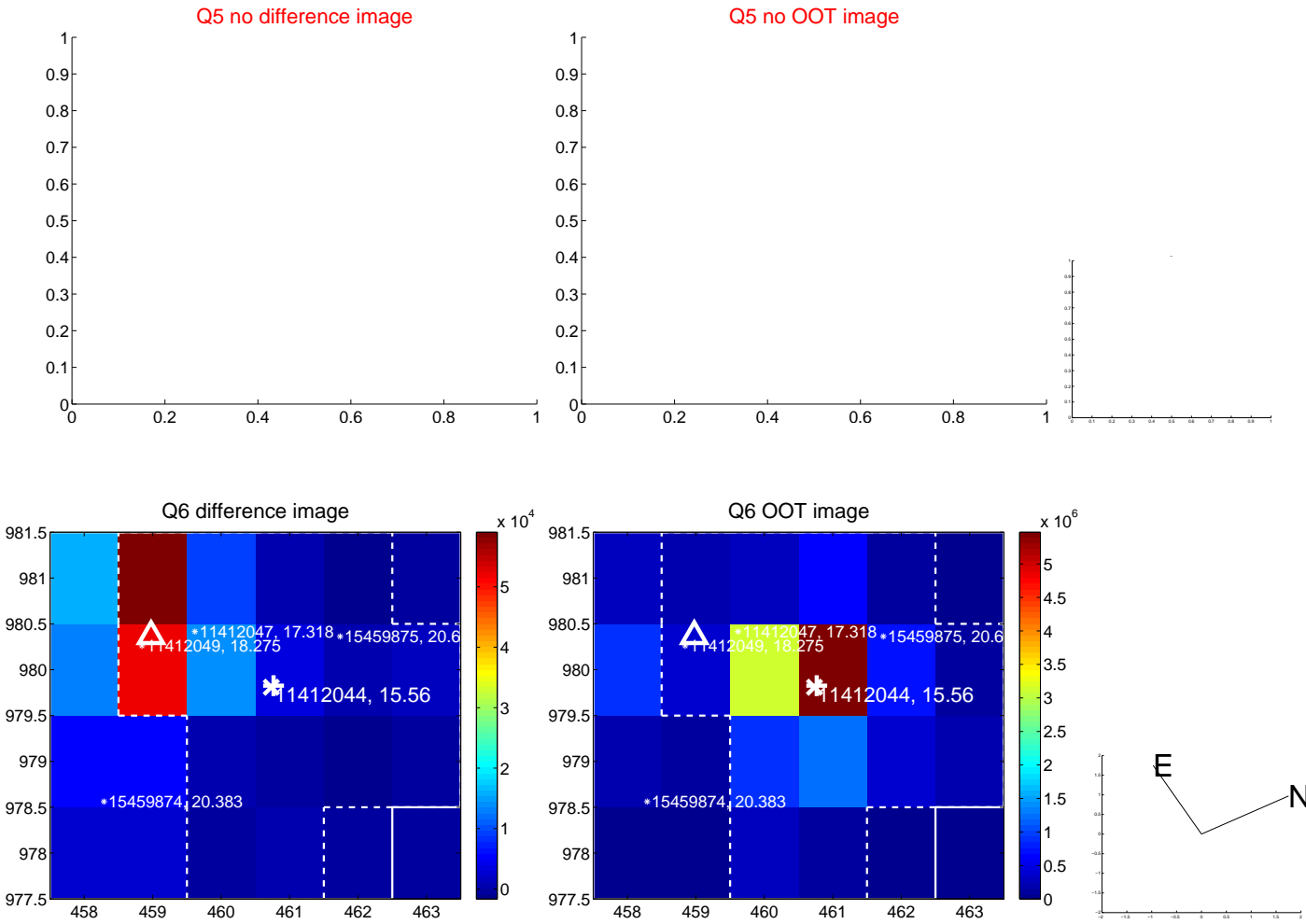


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

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



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



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

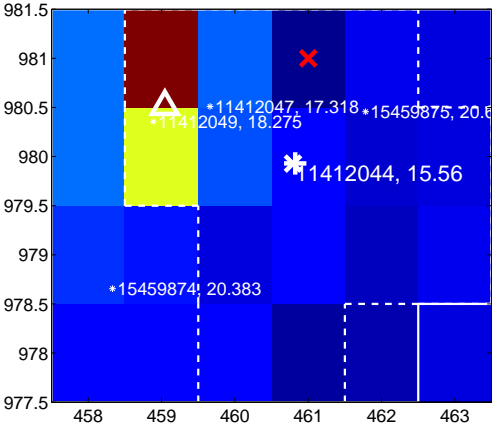
Q9 no difference image



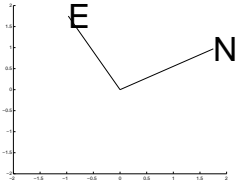
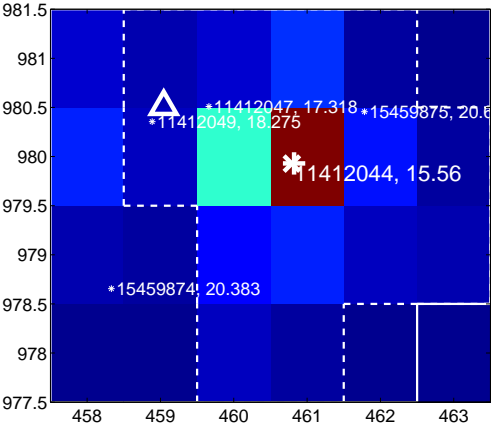
Q9 no OOT image



Q10 difference image



Q10 OOT image



Q11 no difference image



Q11 no OOT image



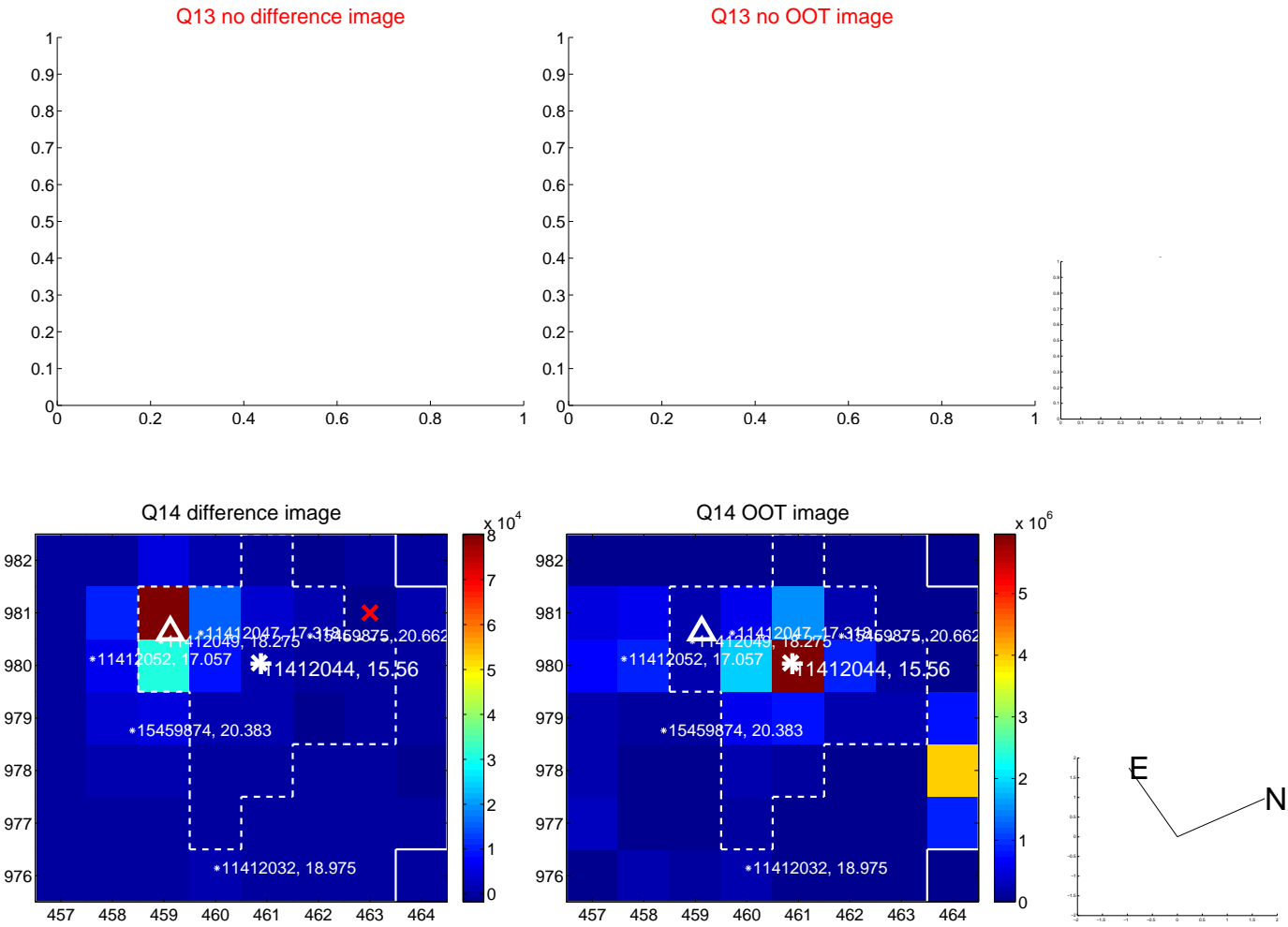
Q12 no difference image



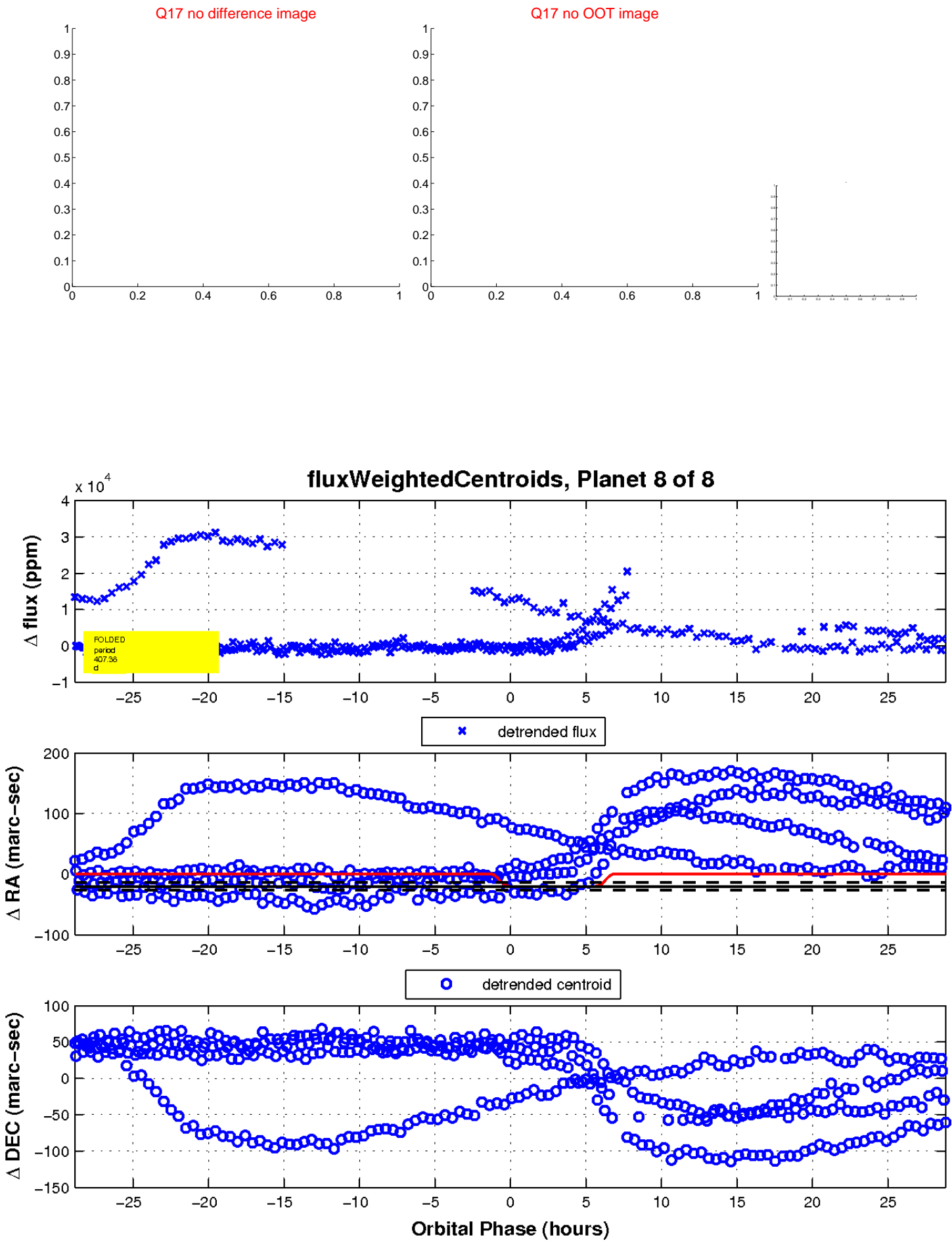
Q12 no OOT image



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

Declination

