

# KIC 008415004

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008415004-01	OBS	No	449.791607	367.282098	5459.8	5.875	15.4	7.1	0.50	3731	3.67	0.05
008415004-02	OBS	No	1.227839	132.226346	0.1	9.452	12.1	0.0	0.50	3731	0.02	136.87
008415004-04	OBS	No	8.555762	139.209360	512.8	7.561	15.5	4.7	0.50	3731	1.25	10.28

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008415004-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
008415004-02	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—LPP_ALT
008415004-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV

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

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

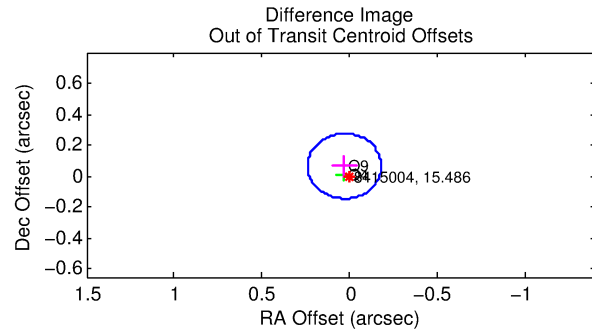
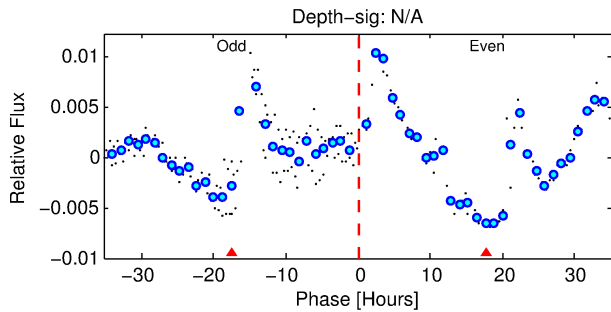
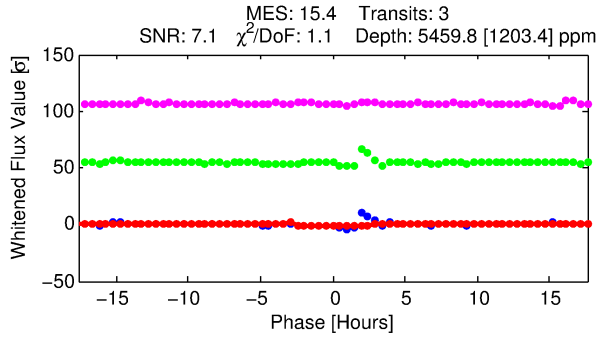
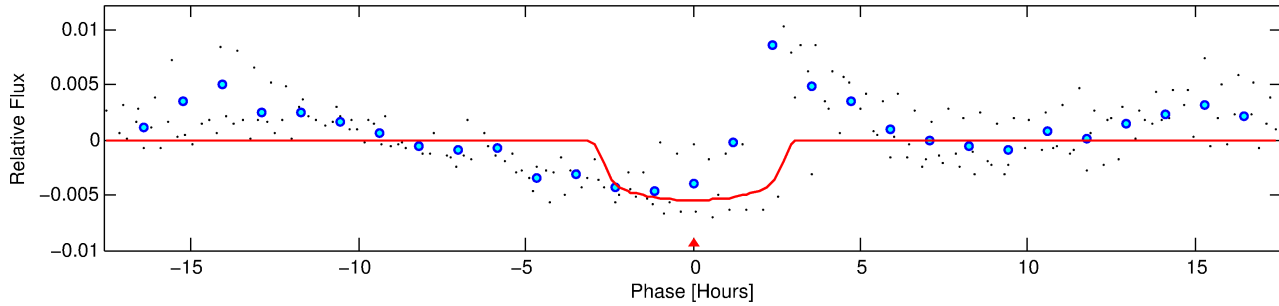
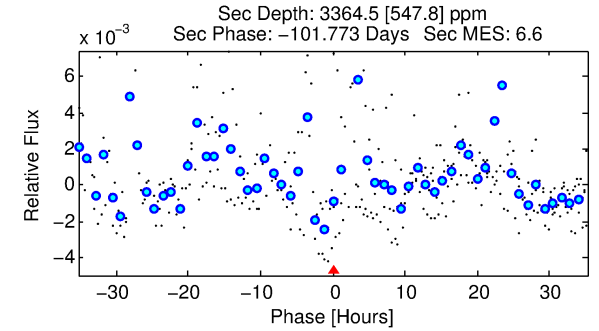
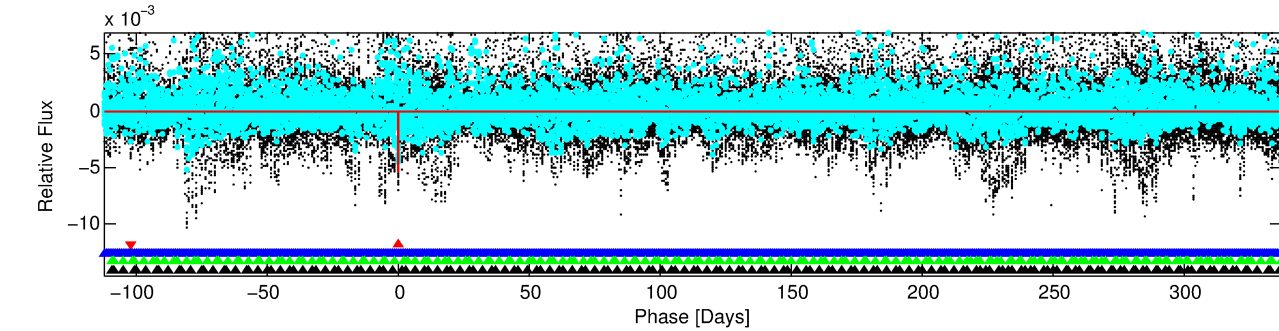
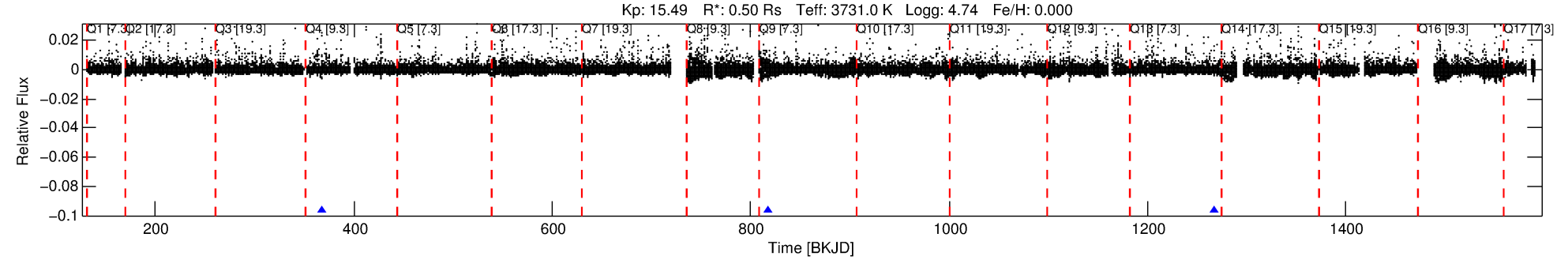
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008415004-01

No Significant Match Found

# DV One-Page Summary

KIC: 8415004 Candidate: 1 of 4 Period: 449.792 d



## DV Fit Results:

Period = 449.79161 [0.00584] d  
Epoch = 367.2821 [0.0065] BKJD  
Rp/R\* = 0.0668 [0.0260]  
a/R\* = 623.25 [896.03]  
b = 0.05 [29.66]  
Seff = 0.05 [0.00]  
Teq = 122 [2] K  
Rp = 3.67 [1.44] Re  
a = 0.9190 [0.0402] AU  
Ag = 115901.26 [92392.85] [1.25σ]  
Teffp = 3477 [692] K [4.85σ]

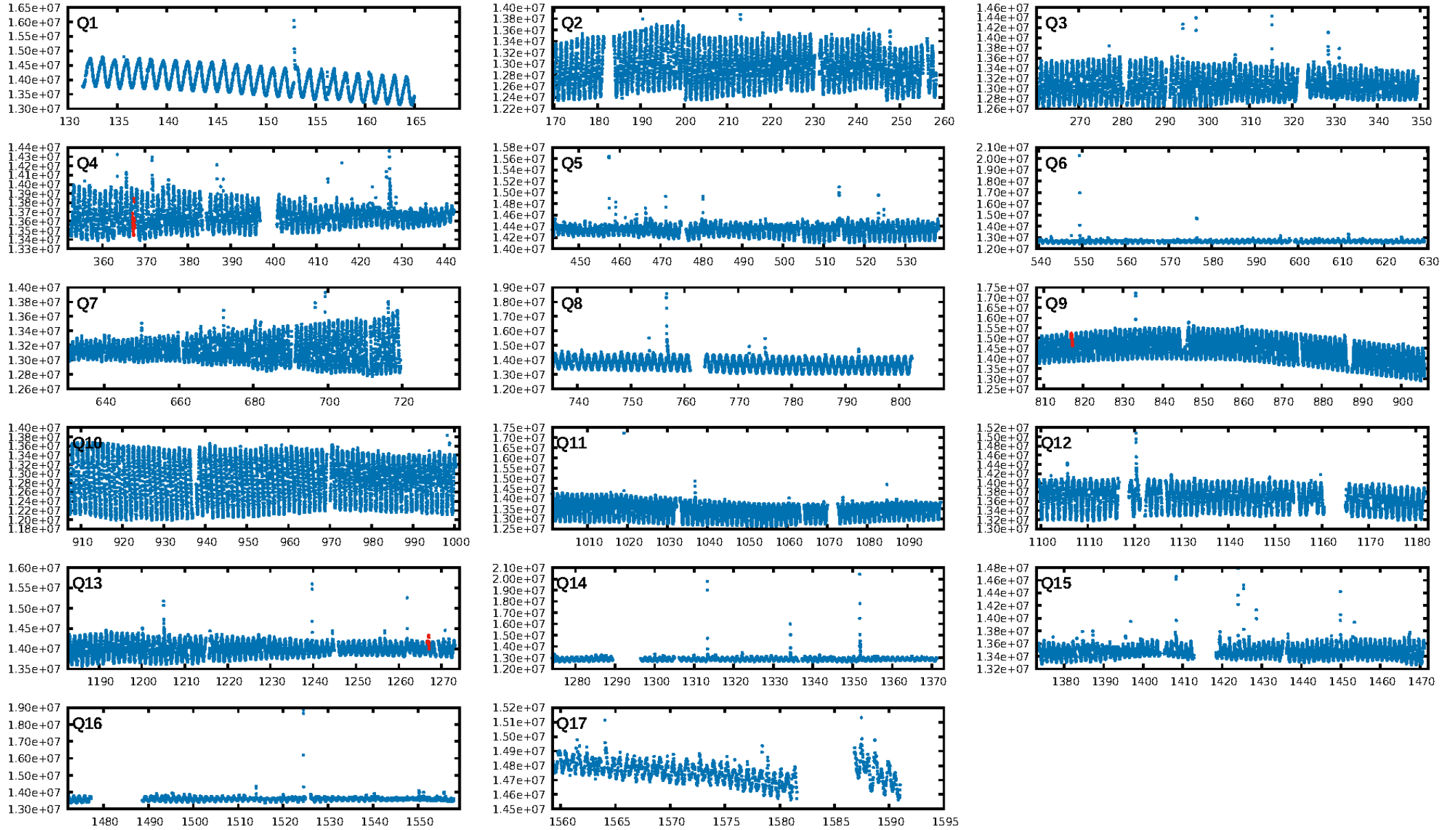
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [1105.87σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 89.9%  
ModelChiSquareGof-sig: 98.7%  
Bootstrap-pfa: 9.15e-107  
RollingBand-fgt: 1.00 [3/3]  
**GhostDiagnostic-chr: 0.9246**  
Centroid-sig: 1.1%  
Centroid-so: 0.378 arcsec [1.46σ]  
OotOffset-rm: 0.072 arcsec [1.03σ]  
KicOffset-rm: 0.131 arcsec [1.87σ]  
OotOffset-st: 0/0/1/1 [2]  
KicOffset-st: 0/0/1/1 [2]  
DiffImageQuality-fgm: 0.50 [1/2]  
DiffImageOverlap-fno: 0.00 [0/2]

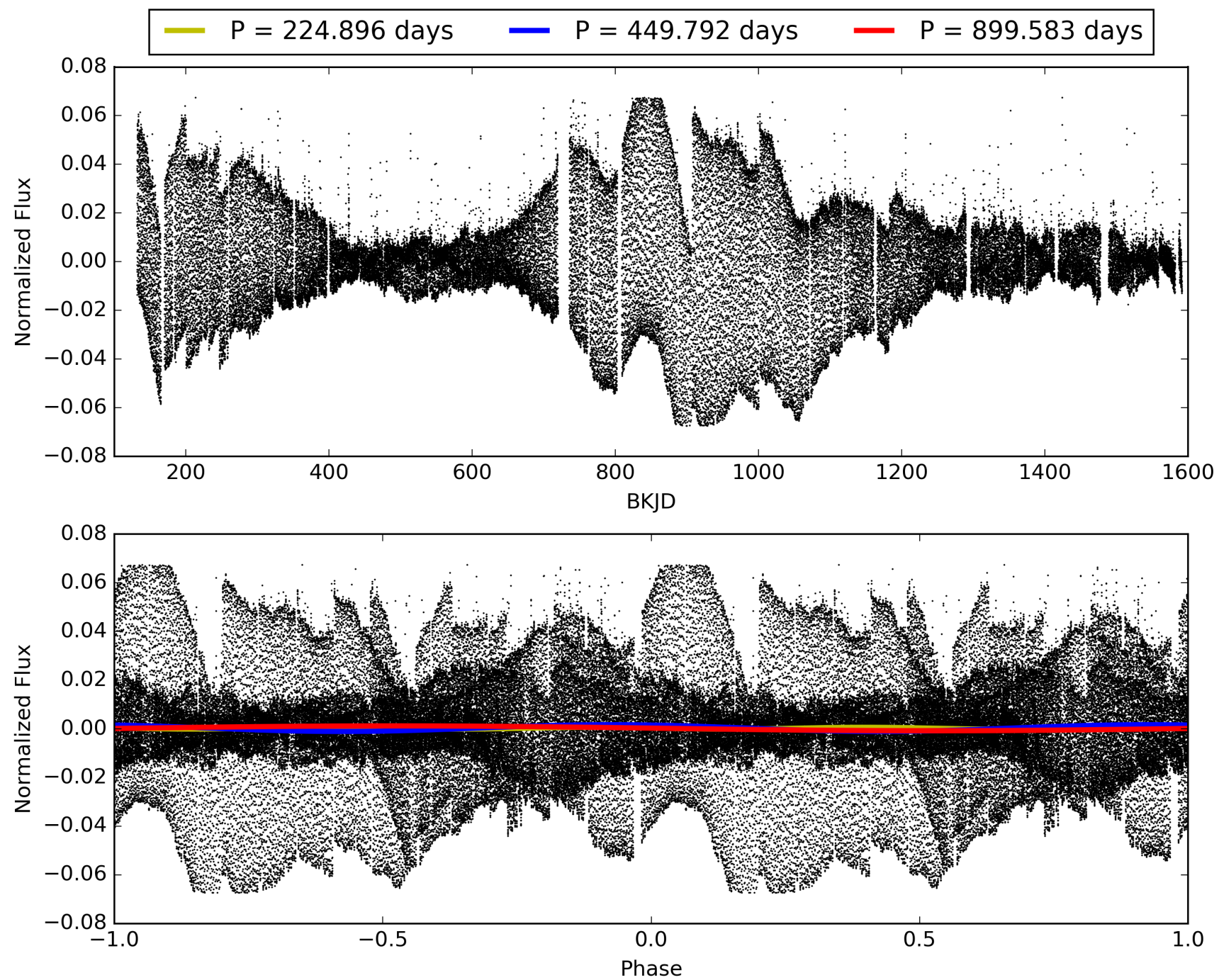
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 00:23:08 Z

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

# TCE 008415004-01, PDC Light Curves

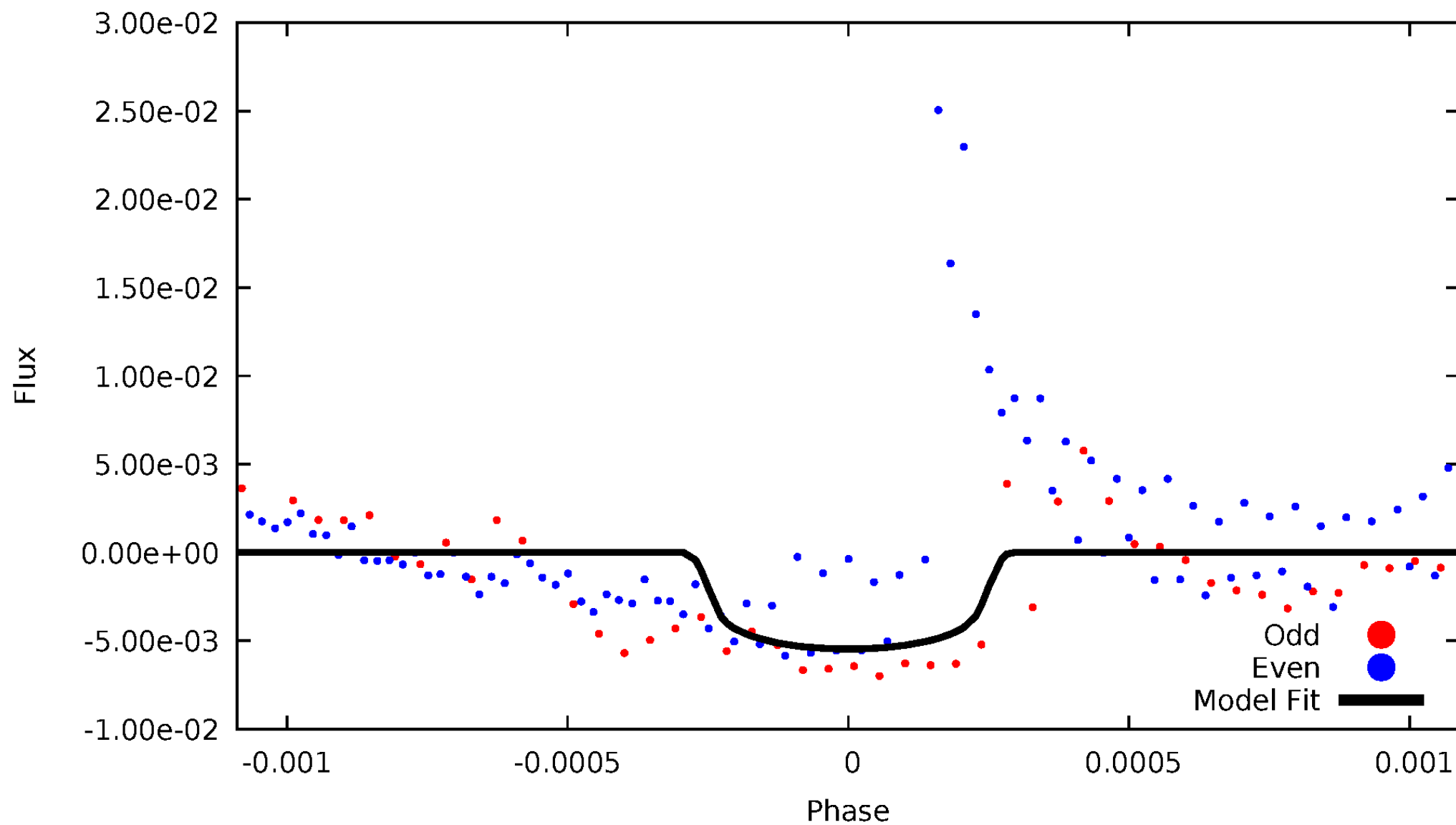


TCE 008415004-01



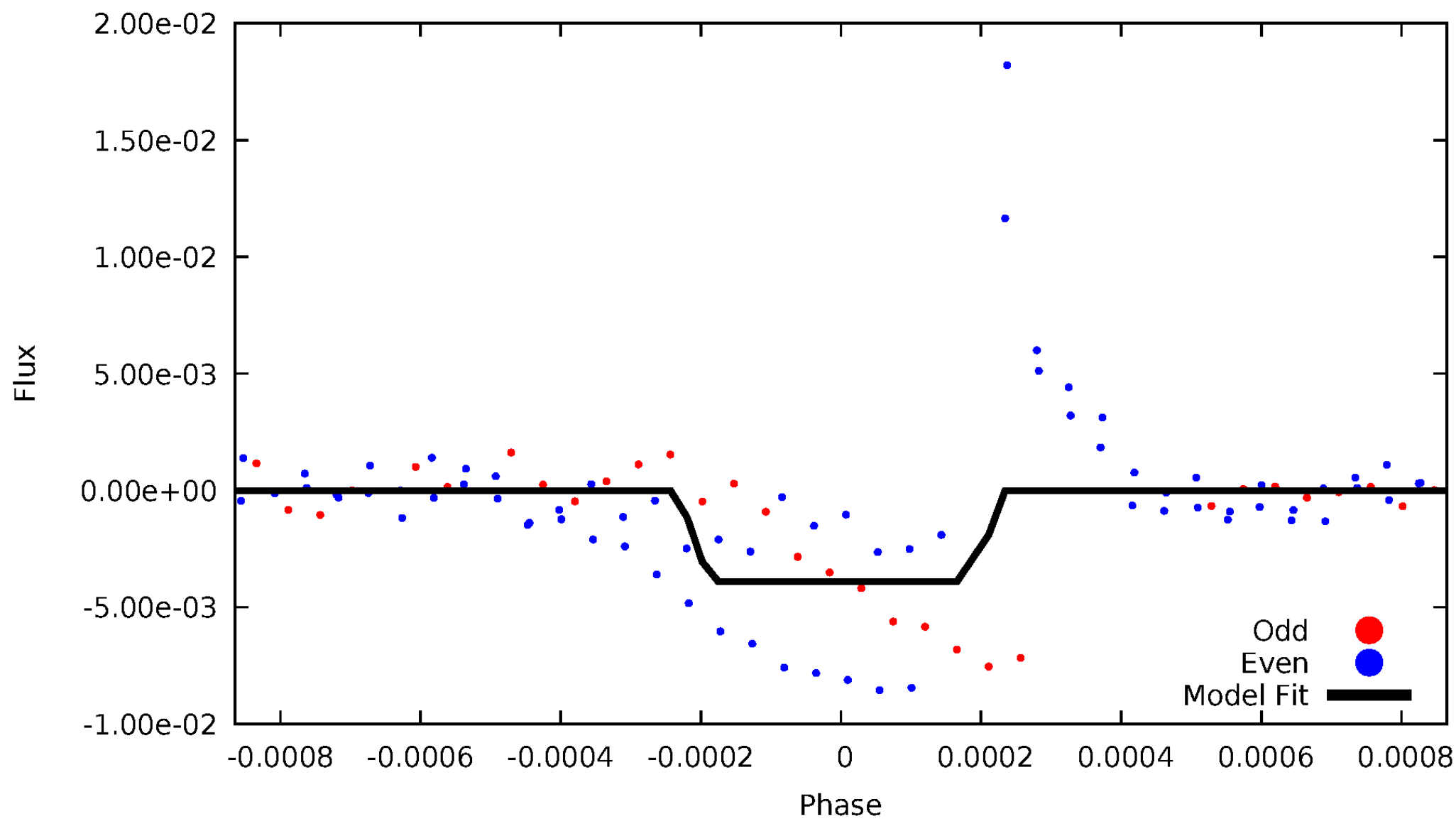
# DV Odd/Even

TCE 008415004-01



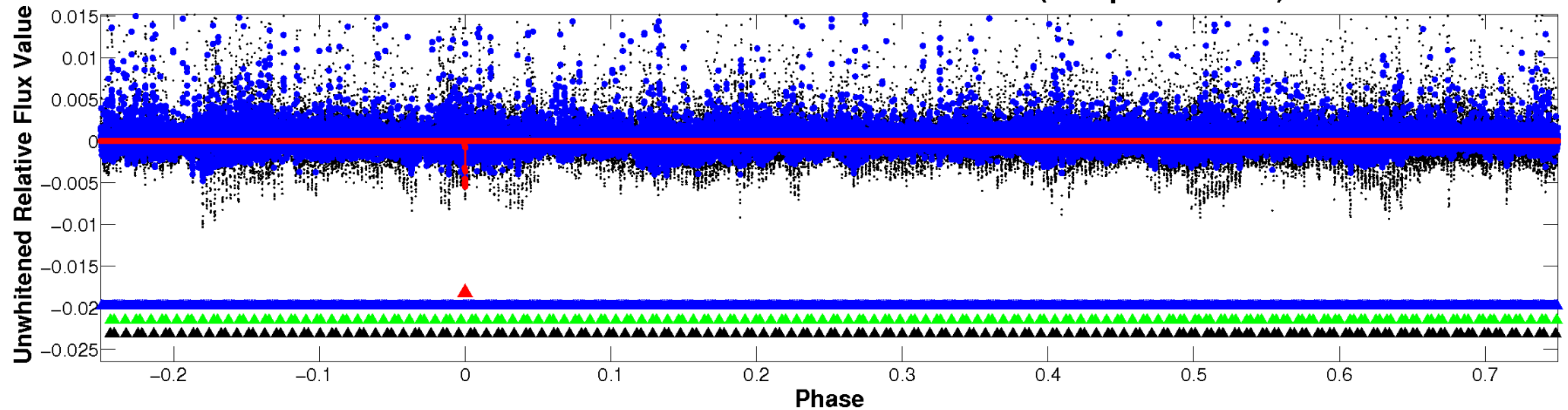
# ALT Odd/Even

TCE 008415004-01

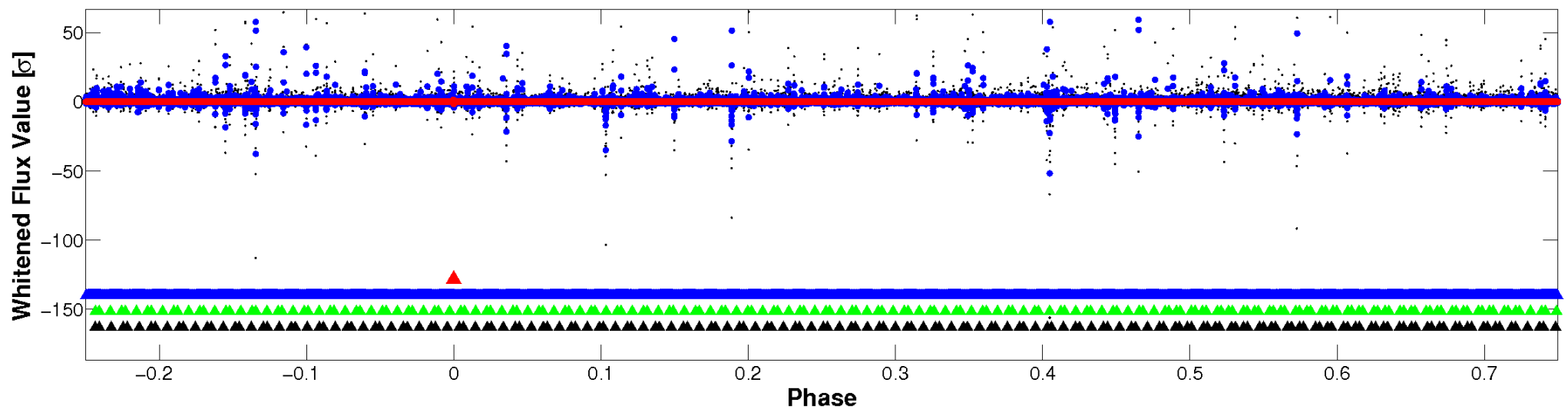


# Non-Whitened Vs. Whitened Light Curve

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



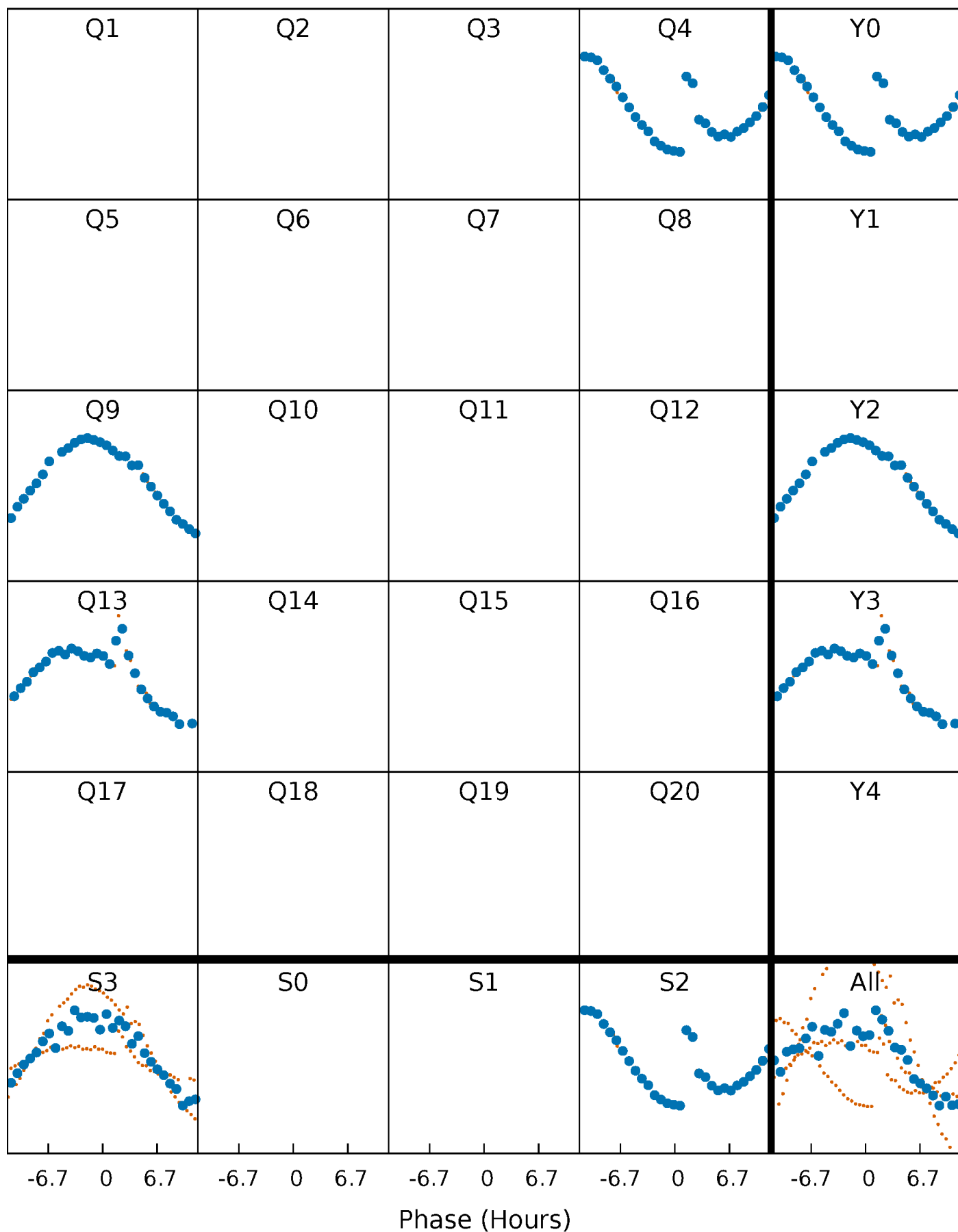
**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**





# PDC Quarter-Phased Transit Curves

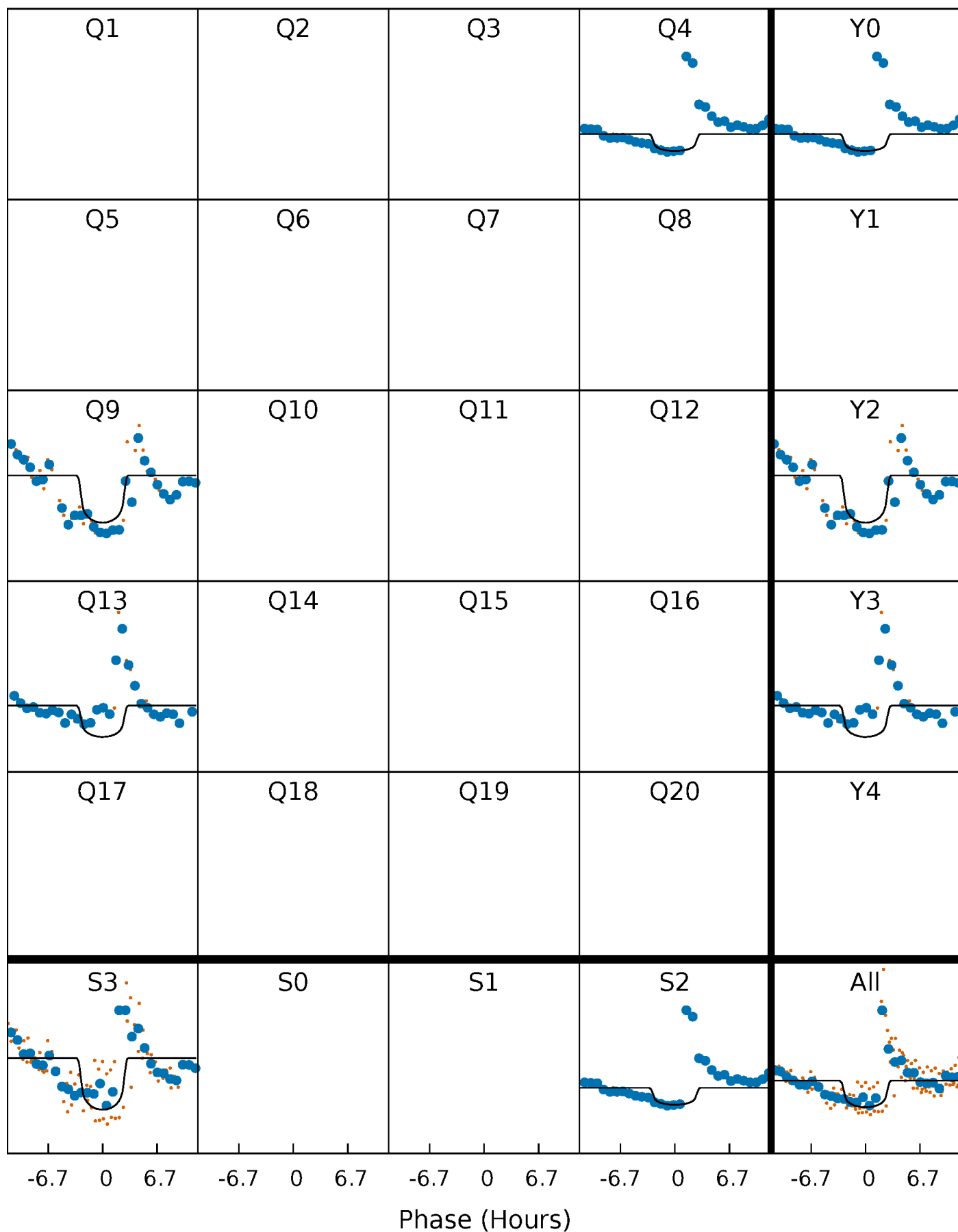
TCE 008415004-01 P=449.791607 Days  $T_0=367.282098$  (BKJD)





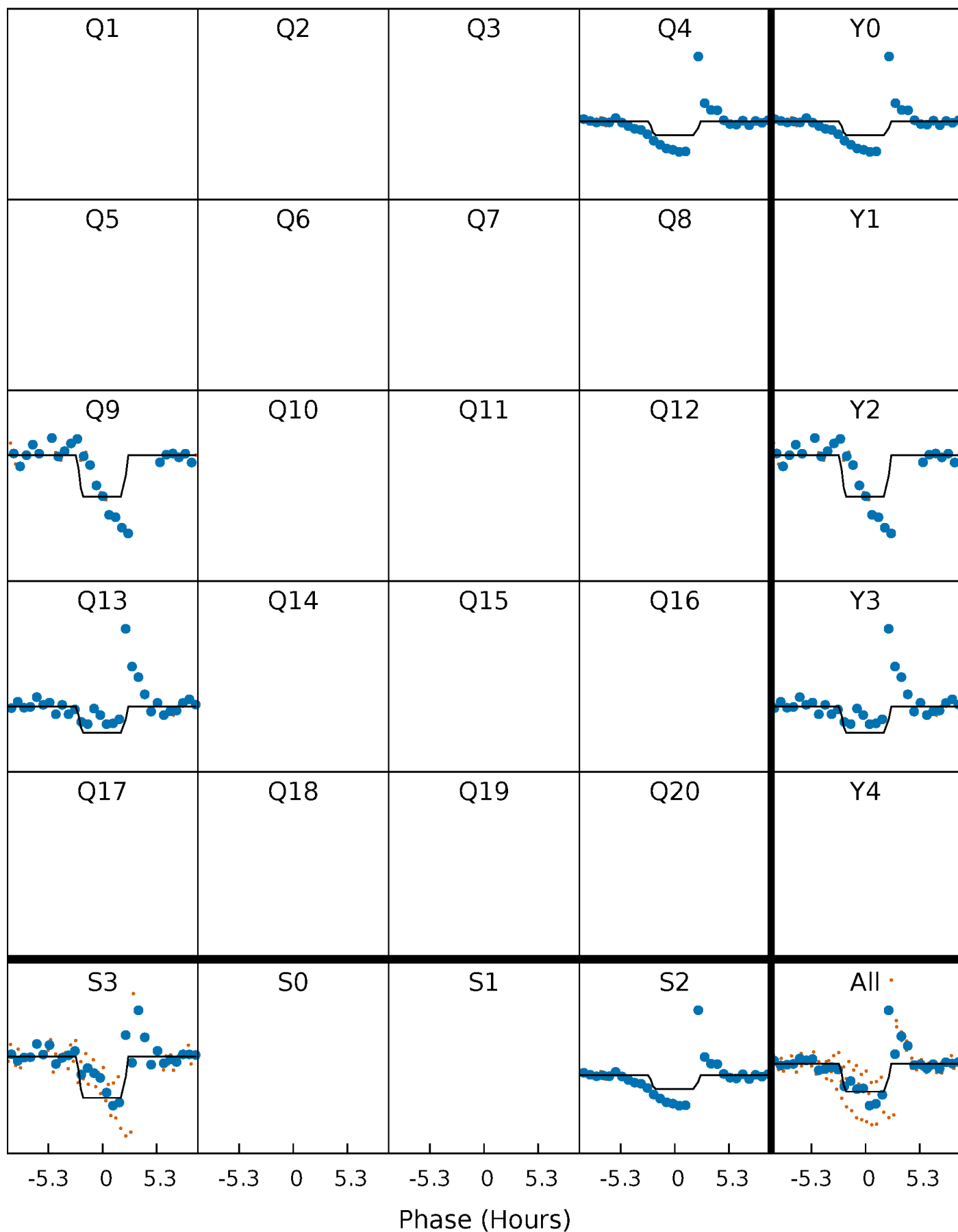
# DV Quarter-Phased Transit Curves

TCE 008415004-01 P=449.791607 Days  $T_0=367.282098$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

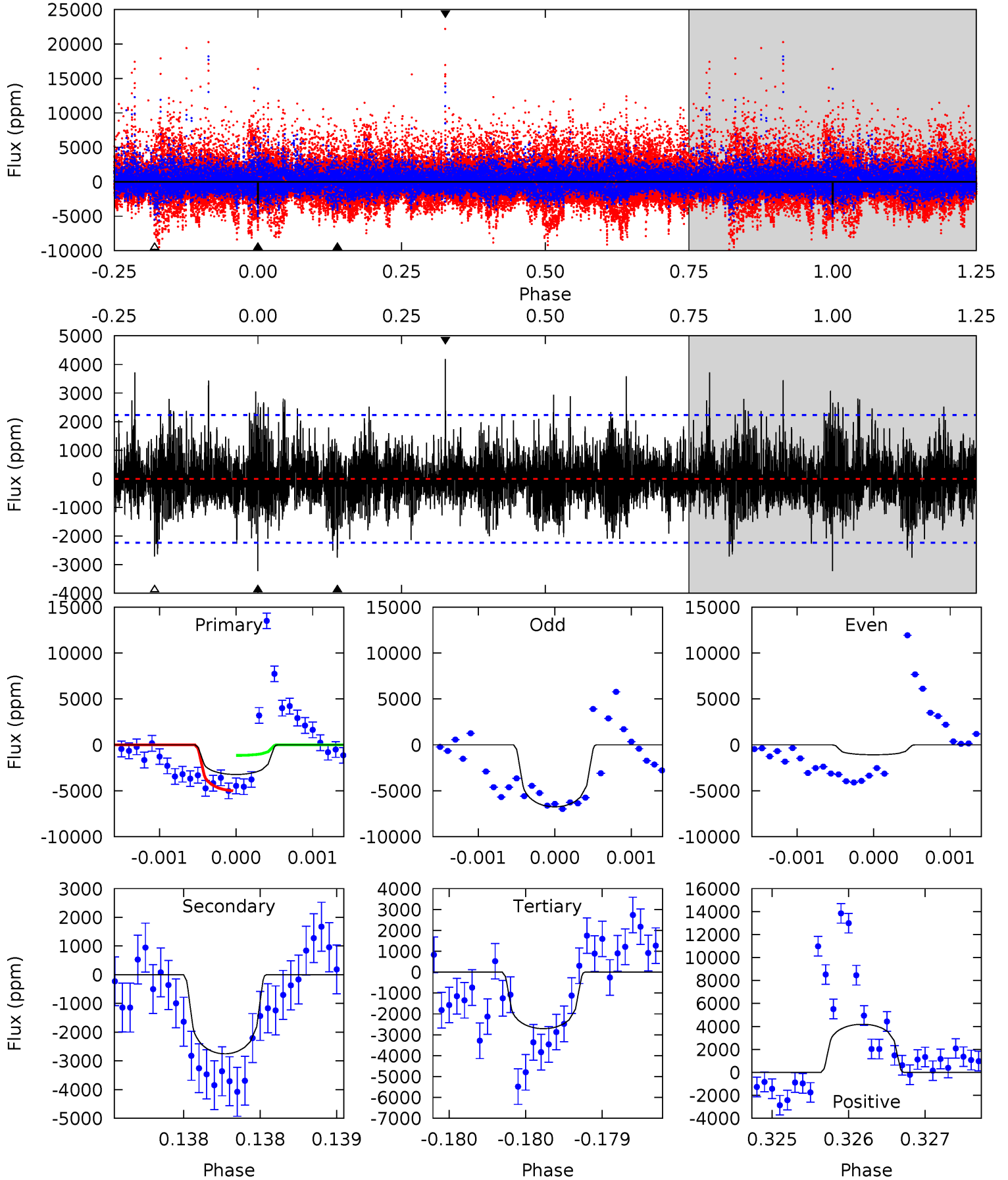
TCE 008415004-01 P=449.797145 Days  $T_0=367.267970$  (BKJD)



# DV Model-Shift Uniqueness Test

008415004-01, P = 449.791607 Days, E = 367.282098 Days

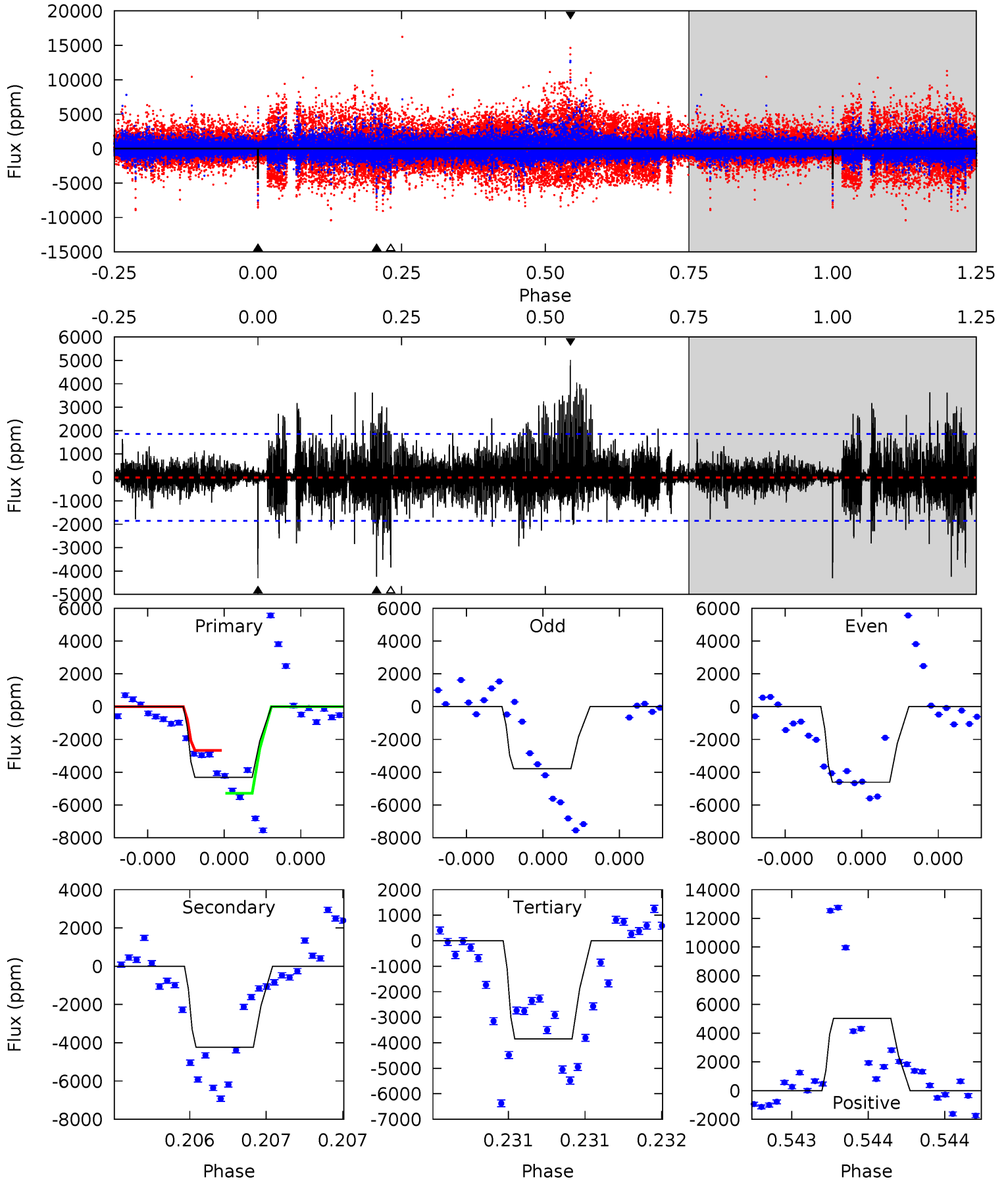
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.03	6.86	6.74	10.4	5.56	3.46	1.89	1.29	-2.40	0.12	-3.57	3.79	-1.98	0.56	4.82



# Alt Model-Shift Uniqueness Test

008415004-01, P = 449.797145 Days, E = 367.267970 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
13.0	12.8	11.6	15.1	5.59	3.51	2.23	1.40	-2.16	1.18	-2.37	0.89	1.18	0.54	3.77



### Stellar Parameters For KIC 008415004

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$3731^{+50}_{-50}$	$4.742^{+0.033}_{-0.015}$	$0.000^{+0.100}_{-0.100}$	$0.504^{+0.022}_{-0.027}$	$0.511^{+0.026}_{-0.023}$	$5.641^{+0.749}_{-0.396}$
	+1%/-1%	+1%/-0%	+inf%/-inf%	+4%/-5%	+5%/-5%	+13%/-7%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 008415004-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-2754 \pm 402$	$3.61^{+1.47}_{-1.38}$	$170^{+3}_{-3}$	$3461^{+603}_{-339}$	$96502^{+162232}_{-48270}$
Alt.	$-4237 \pm 332$	$3.36^{+1.55}_{-1.36}$	$170^{+3}_{-3}$	$3789^{+814}_{-420}$	$174066^{+311321}_{-92176}$

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

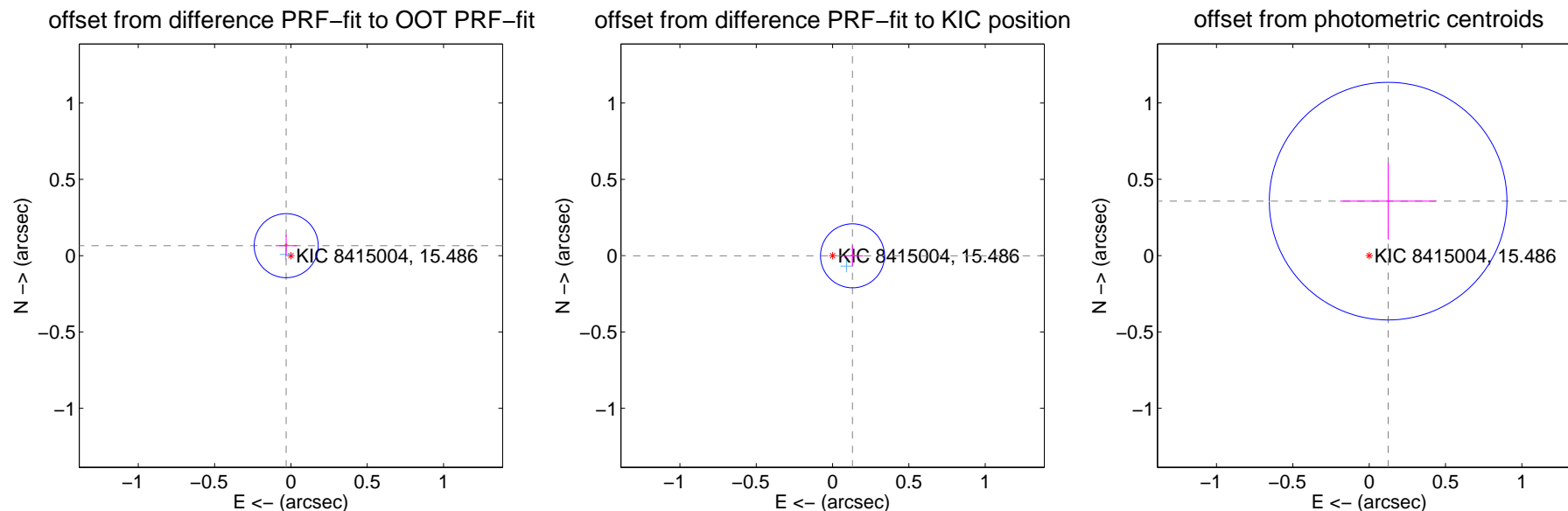
## DV Centroid Data

Supplemental centroid analysis for 008415004-01. Kepler magnitude: 15.49. Transit SNR 7.13

There are 1 quarters with good PRF difference image offsets

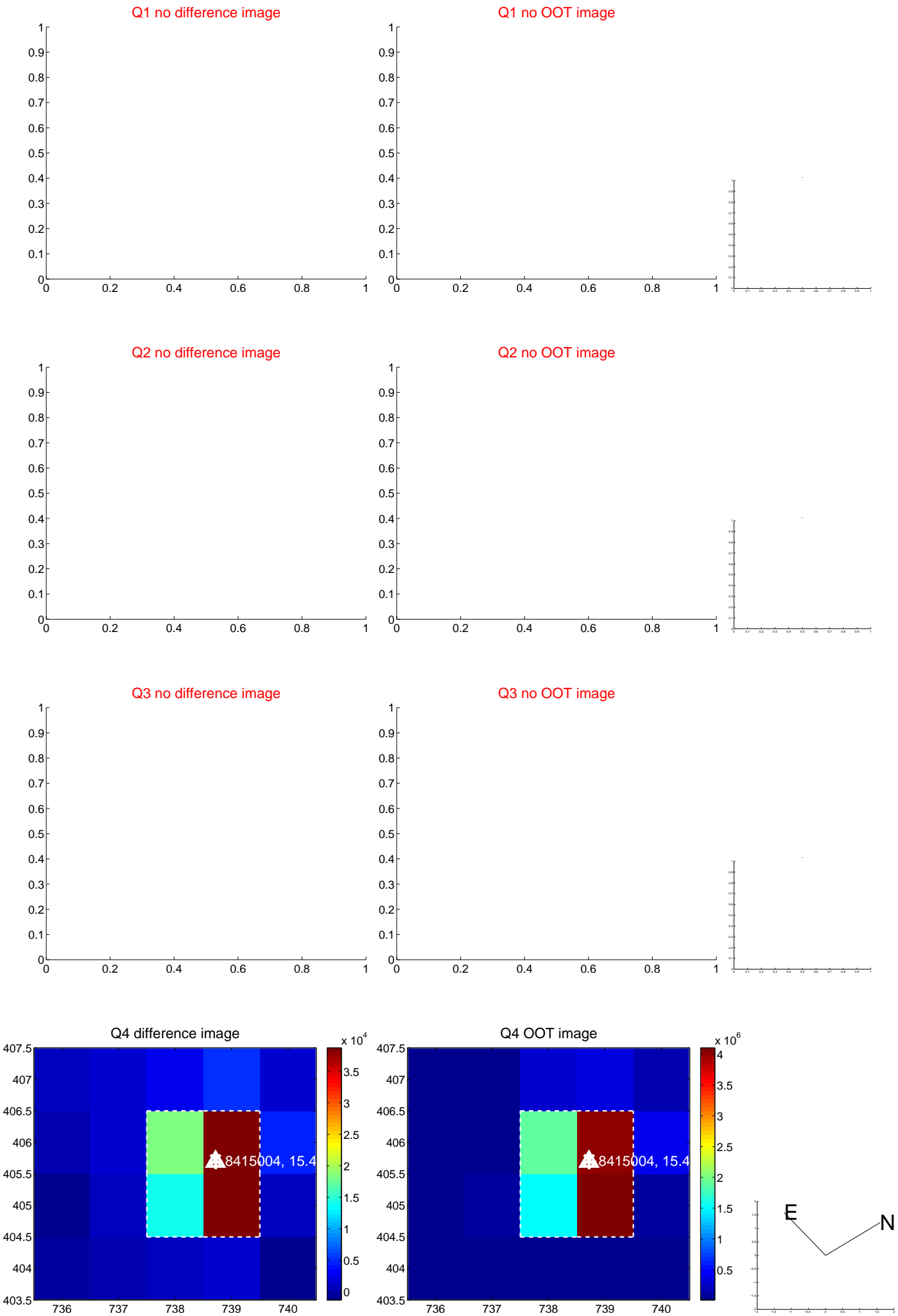
The direct PRF centroid is offset from the target star catalog position by about 0.18 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.072 \pm 0.070$	1.03	$0.031 \pm 0.070$	$0.065 \pm 0.070$
PRF-fit source offset from KIC position	$0.131 \pm 0.070$	1.87	$-0.131 \pm 0.070$	$-0.001 \pm 0.070$
photometric centroid source offset	$0.38 \pm 0.26$	1.46	$-0.12 \pm 0.31$	$0.36 \pm 0.25$



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

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

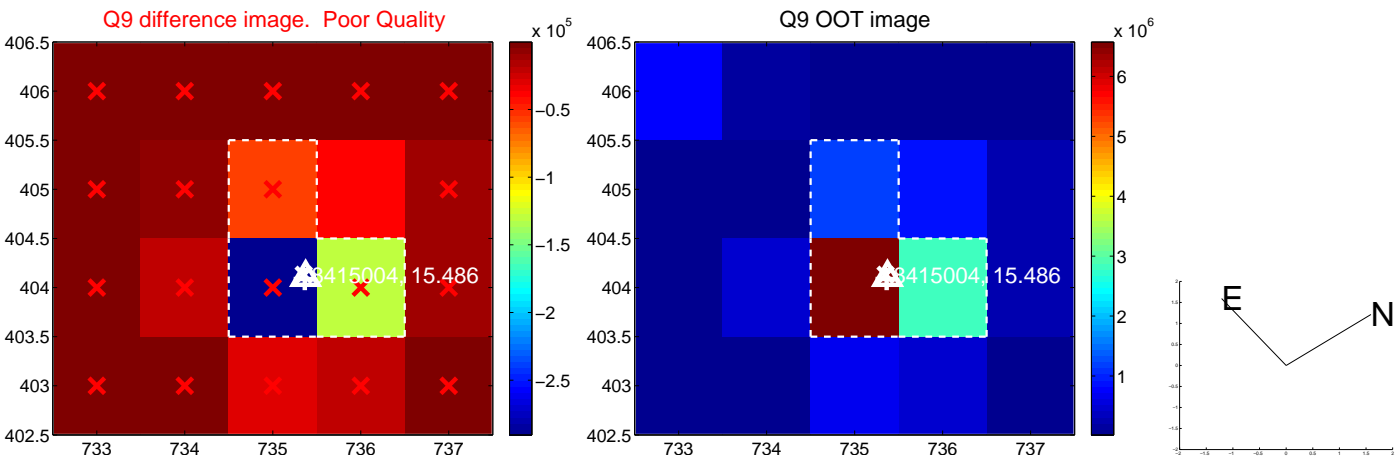




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



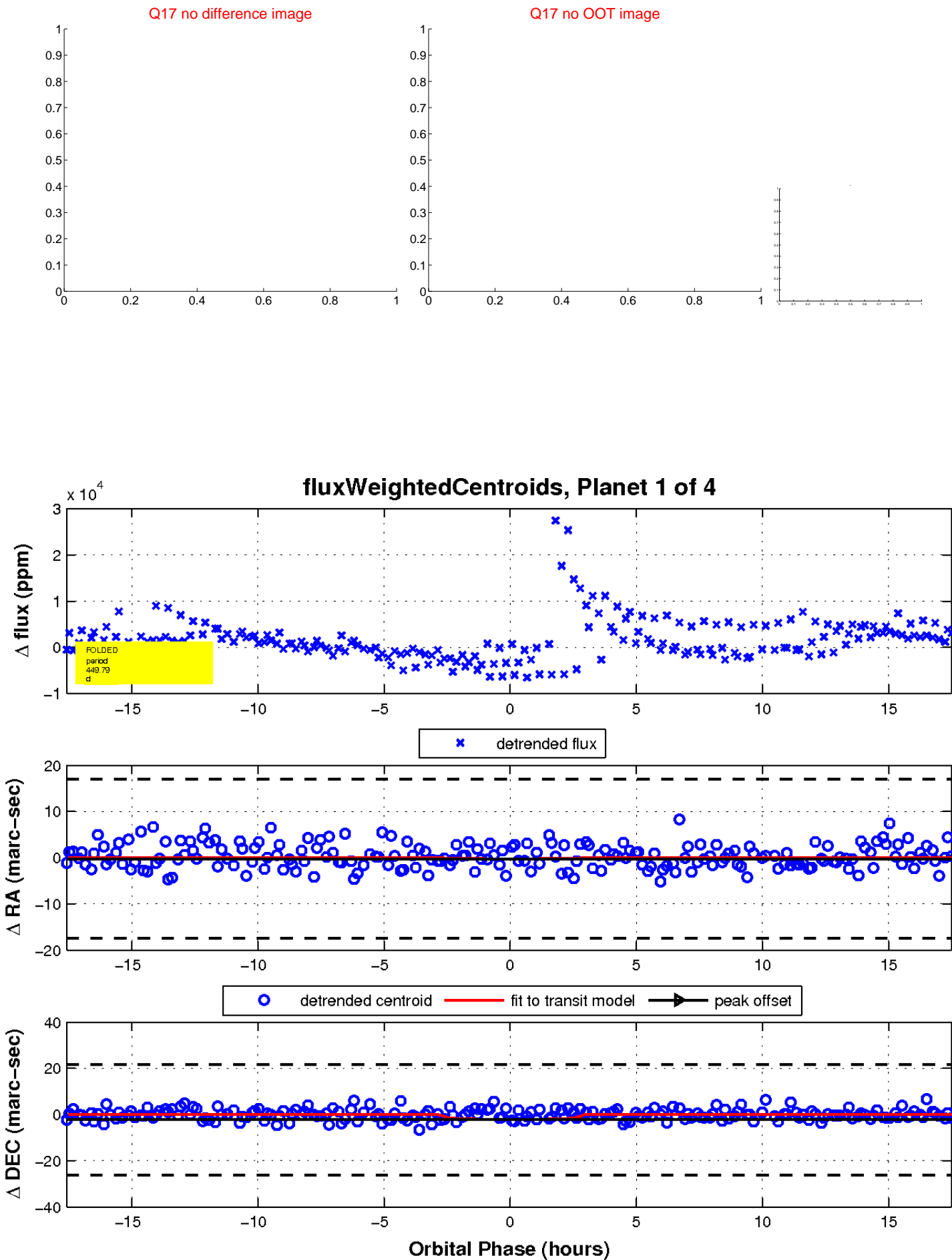
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.



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

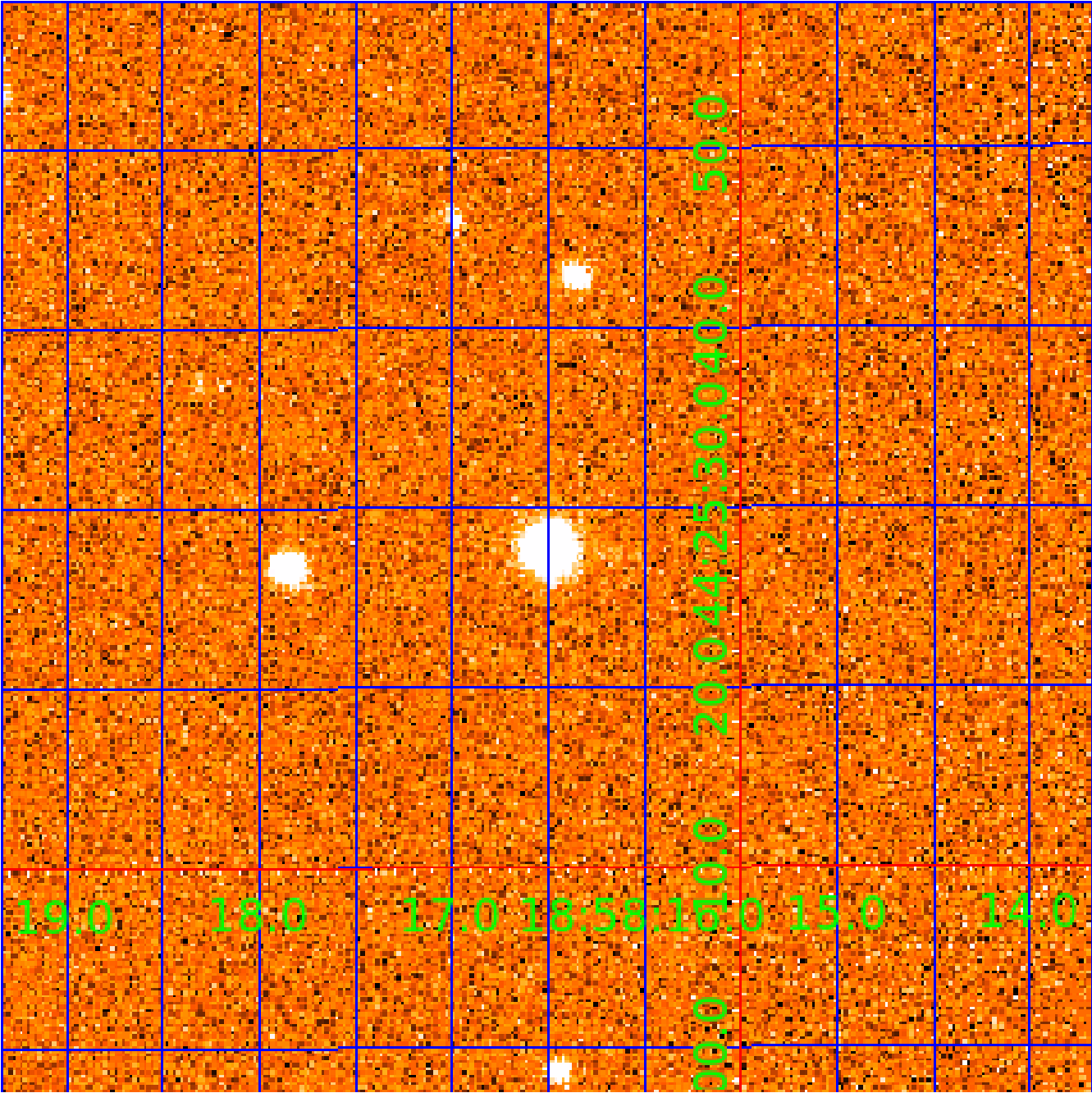


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 008415004

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008415004-01	OBS	No	449.791607	367.282098	5459.8	5.875	15.4	7.1	0.50	3731	3.67	0.05
008415004-02	OBS	No	1.227839	132.226346	0.1	9.452	12.1	0.0	0.50	3731	0.02	136.87
008415004-04	OBS	No	8.555762	139.209360	512.8	7.561	15.5	4.7	0.50	3731	1.25	10.28

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008415004-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
008415004-02	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—LPP_ALT
008415004-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV

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

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

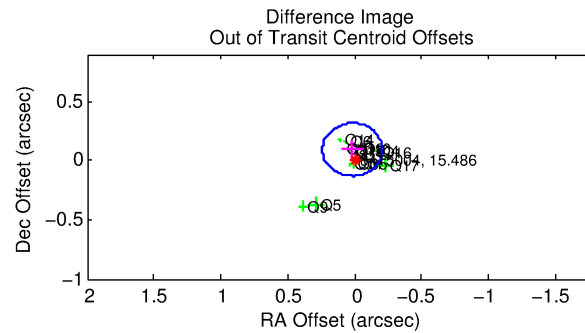
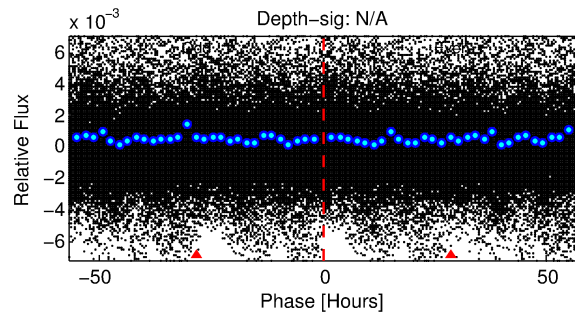
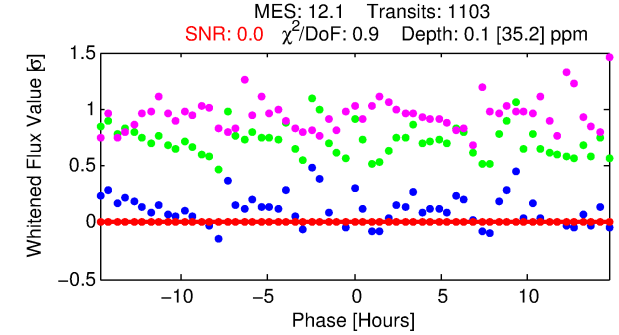
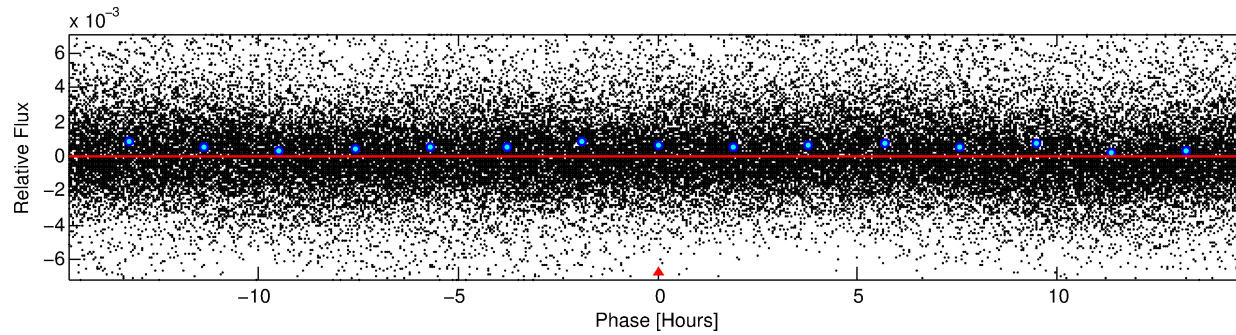
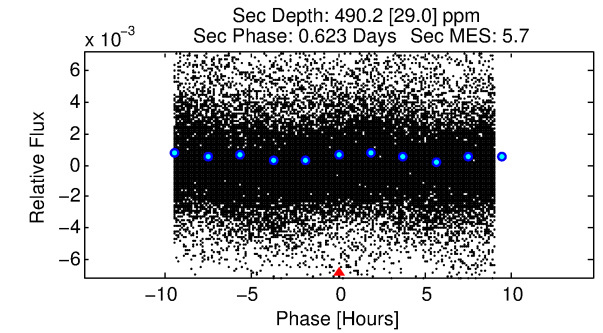
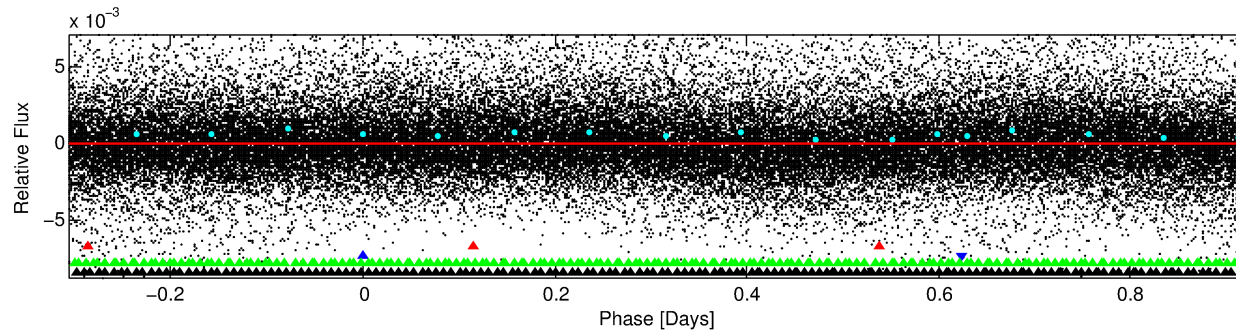
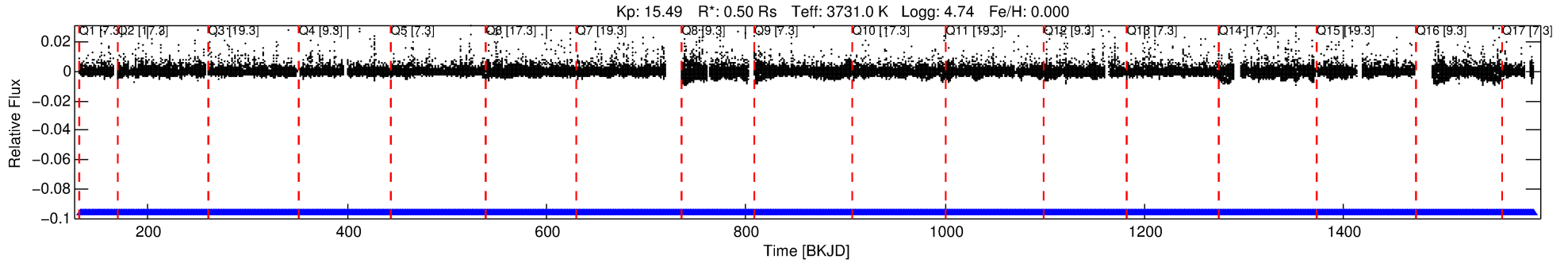
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008415004-02

No Significant Match Found

# DV One-Page Summary

KIC: 8415004 Candidate: 2 of 4 Period: 1.228 d



## DV Fit Results:

Period = 1.22784 [0.03428] d  
Epoch = 132.2263 [7.3124] BKJD  
Rp/R\* = 0.0003 [0.1673]  
a/R\* = 1.18 [766.77]  
b = 0.12 [19167.68]  
Seff = 136.87 [12.32]  
Teq = 872 [20] K  
Rp = 0.02 [9.20] Re  
a = 0.0180 [0.0009] AU  
Ag = 302728.07 [328751008.56] [0.00%]  
Teffp = 31630 [8587377] K [0.00%]

## DV Diagnostic Results:

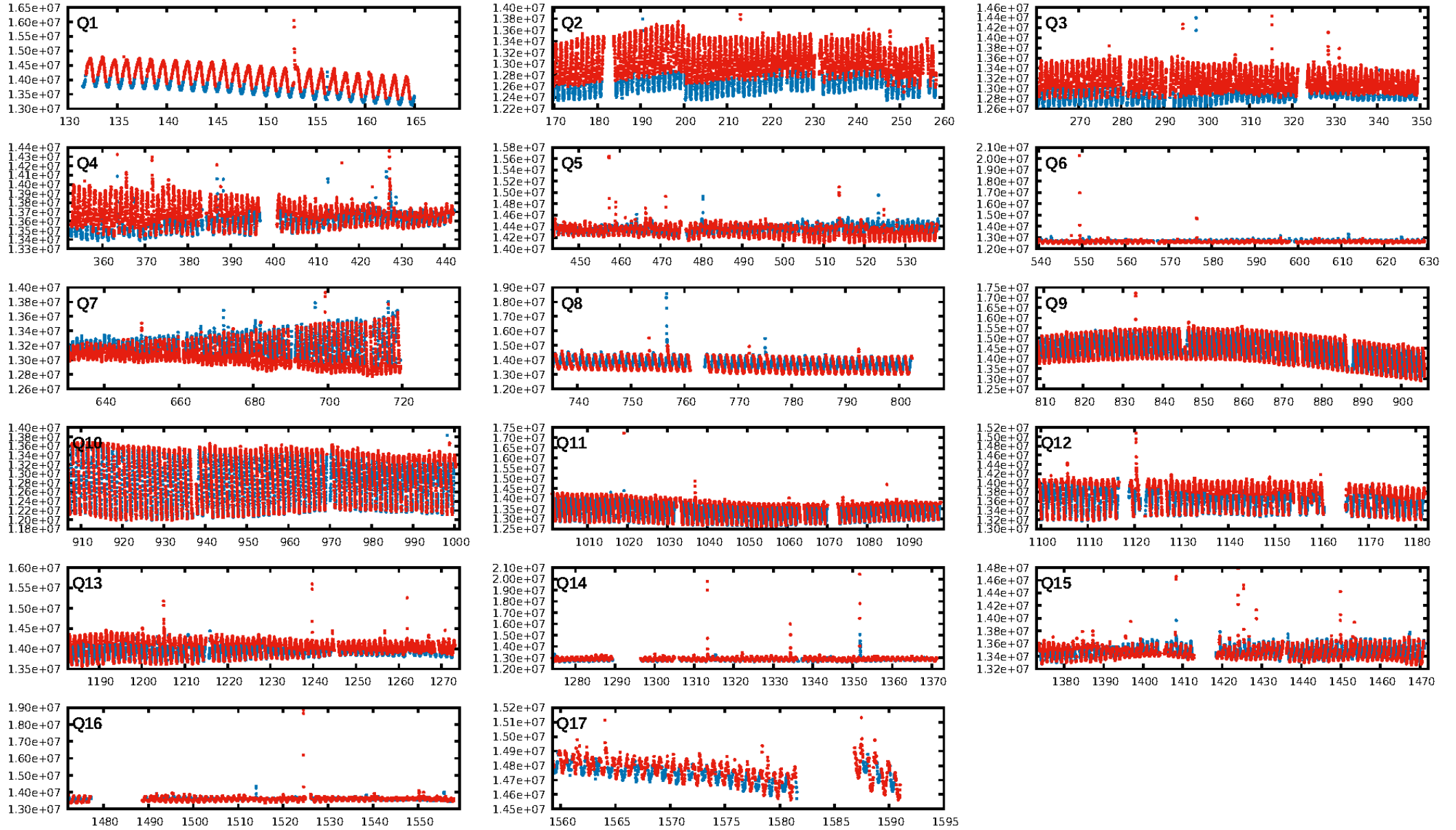
ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [16.82%]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 1.16e-181  
RollingBand-fgt: 1.00 [1054/1054]  
GhostDiagnostic-chr: N/A  
Centroid-sig: N/A  
Centroid-so: N/A  
OptOffset-rm: 0.096 arcsec [1.29%]  
KicOffset-rm: 0.151 arcsec [1.87%]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.41 [7/17]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 00:23:18 Z

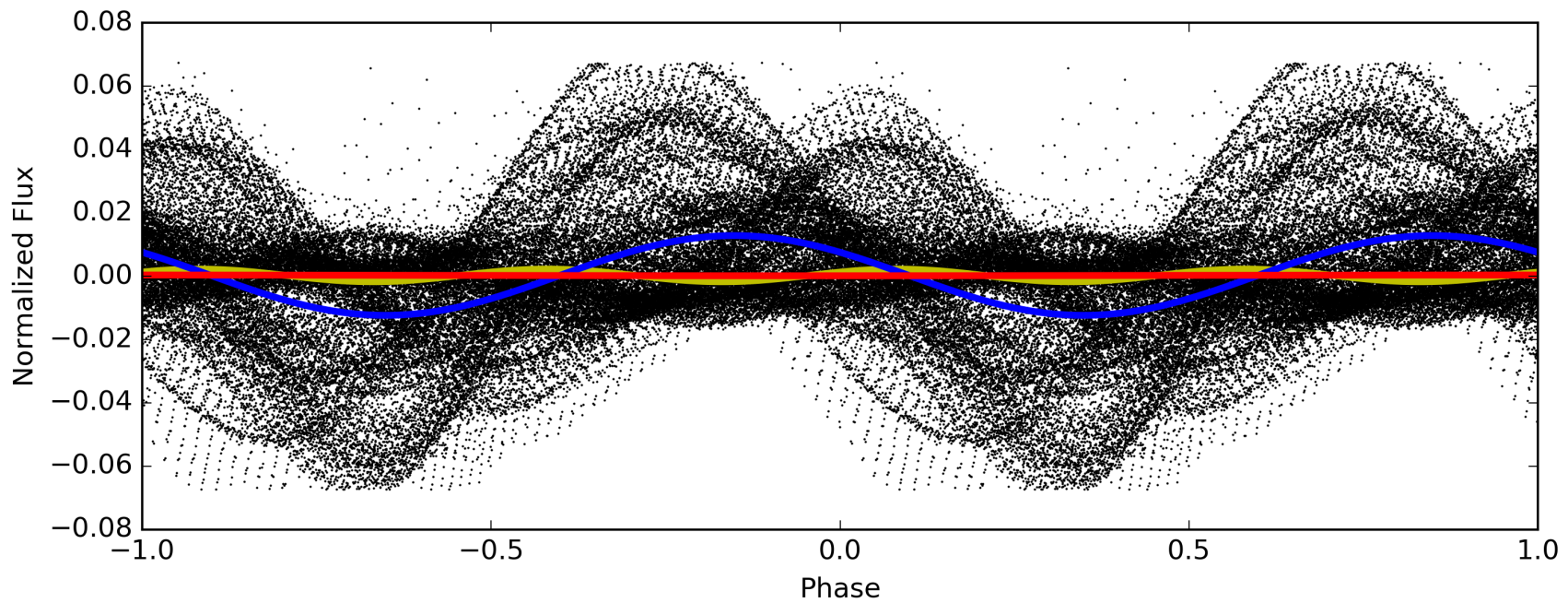
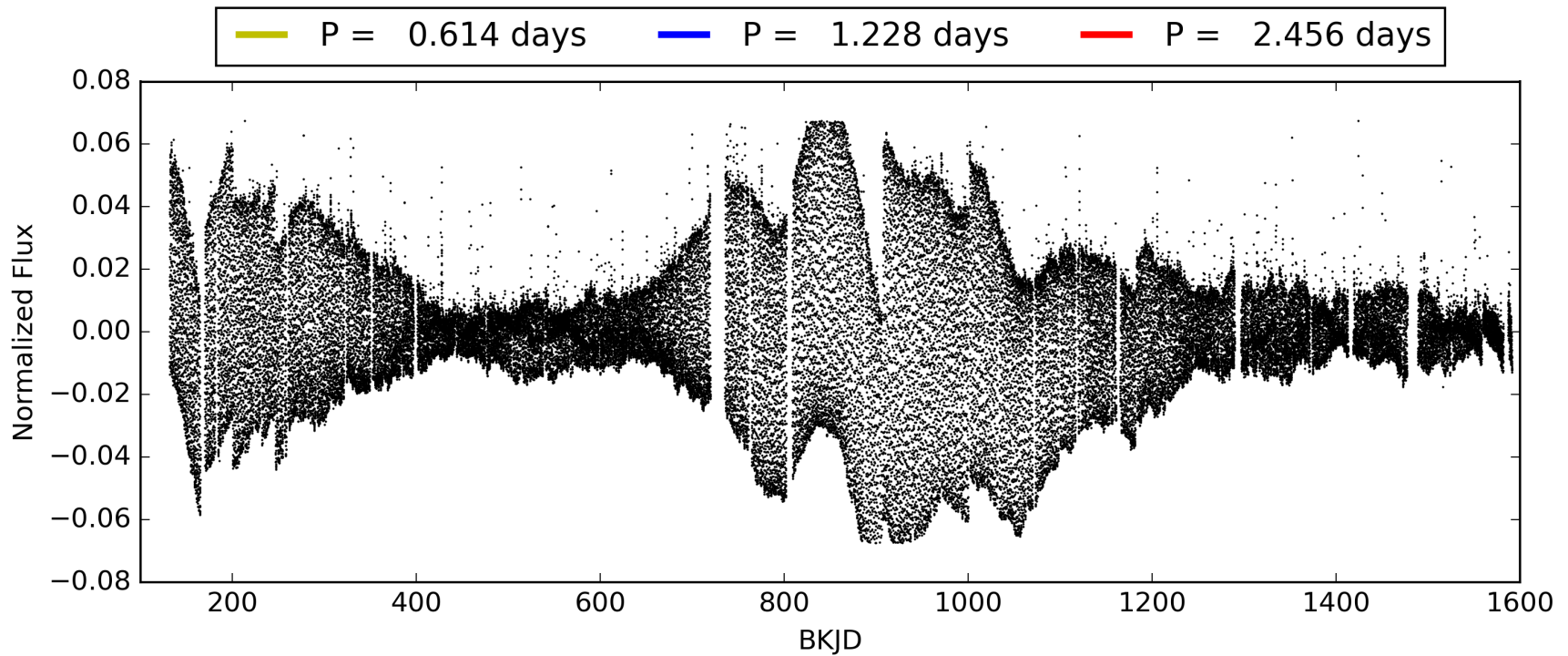
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 008415004-02, PDC Light Curves

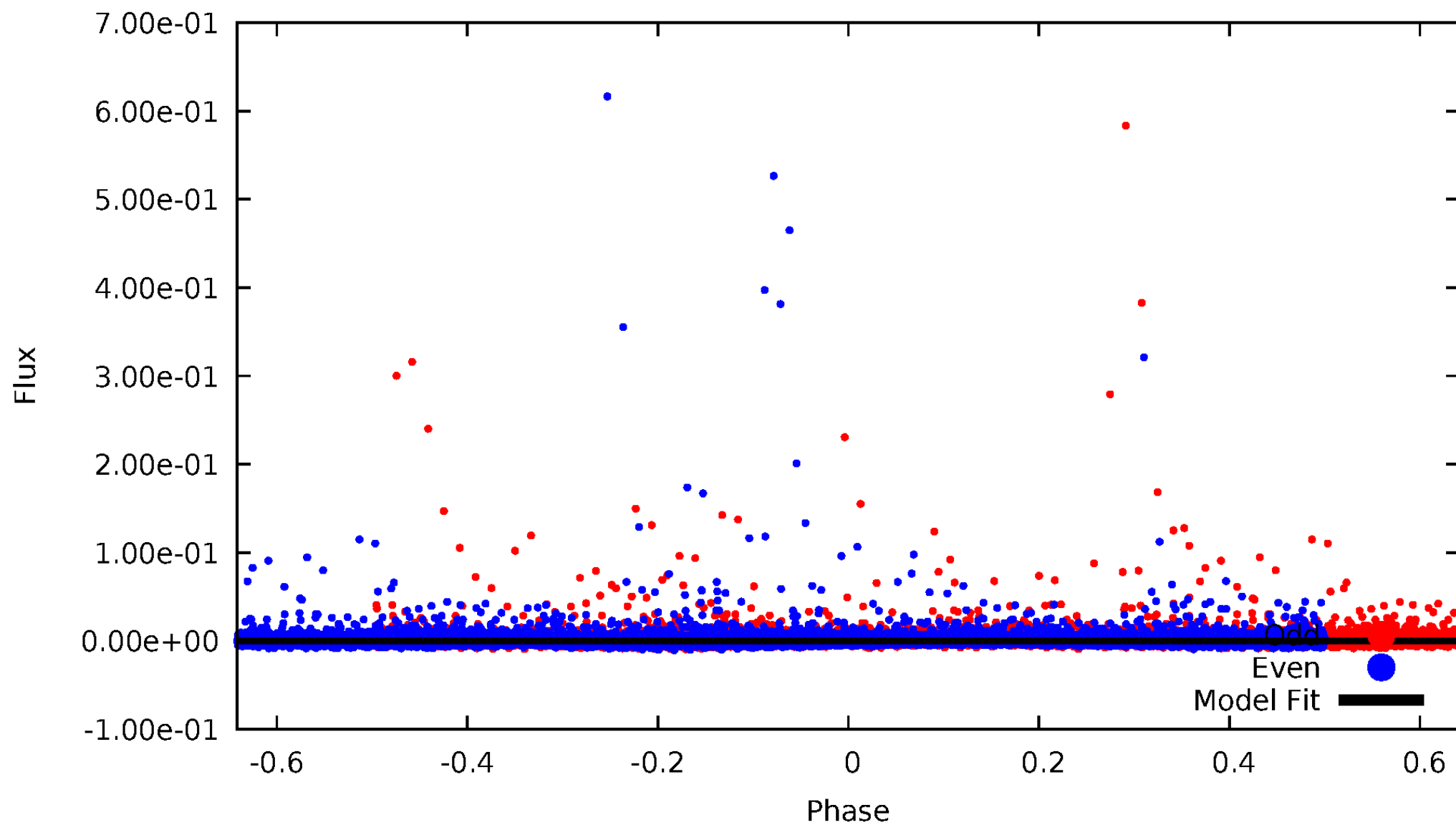


TCE 008415004-02



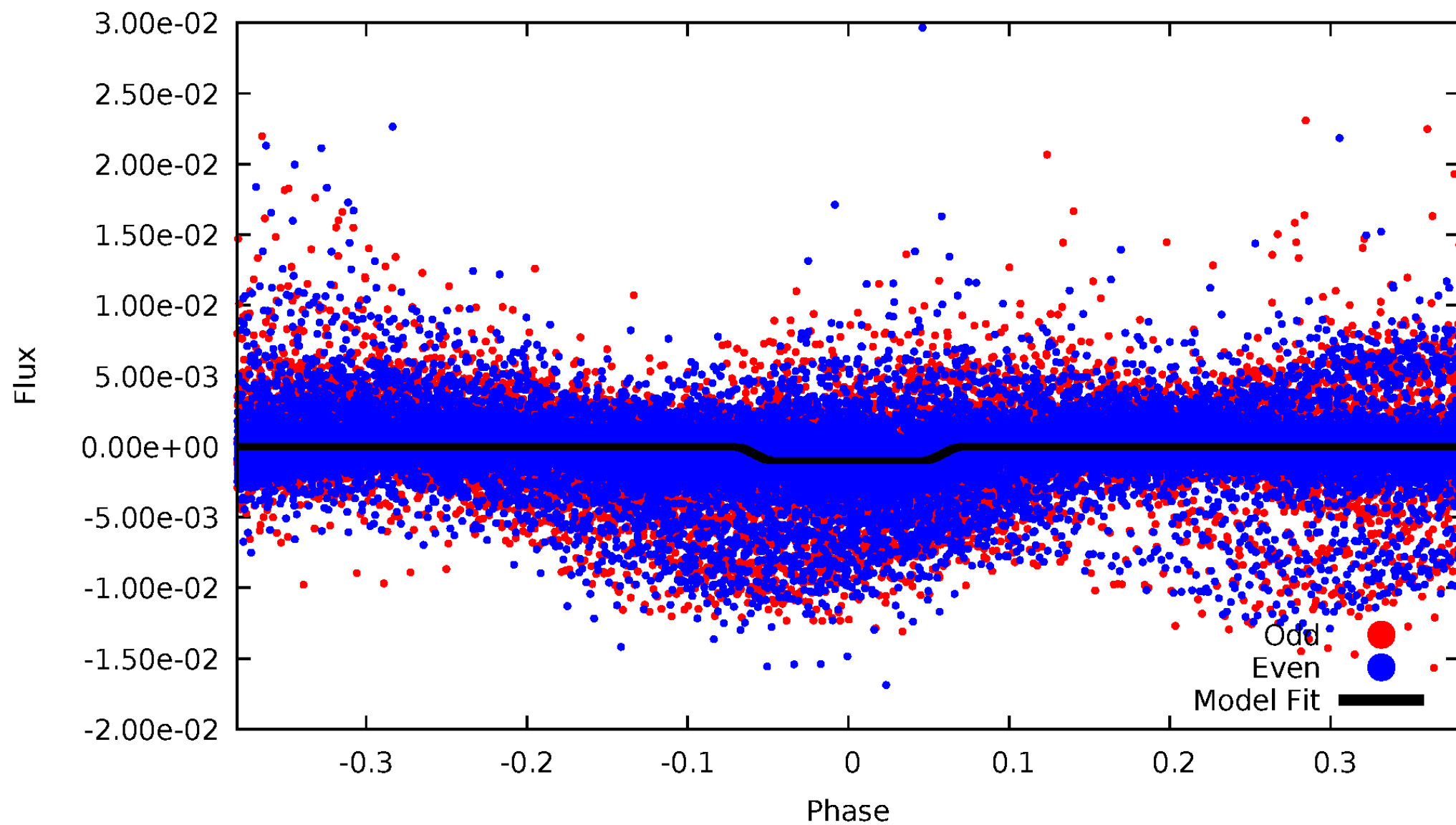
# DV Odd/Even

TCE 008415004-02



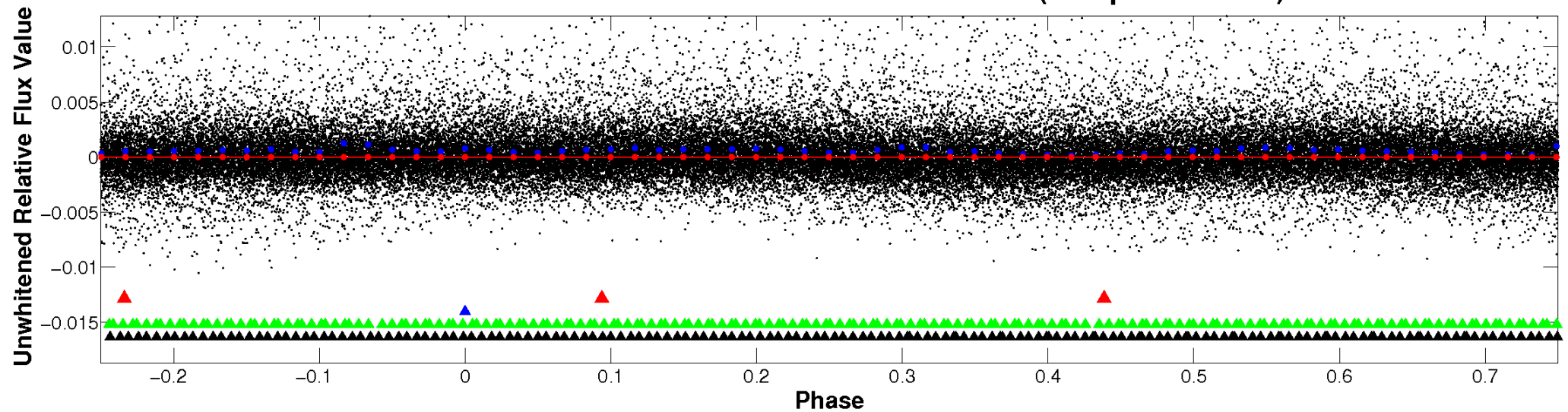
# ALT Odd/Even

TCE 008415004-02

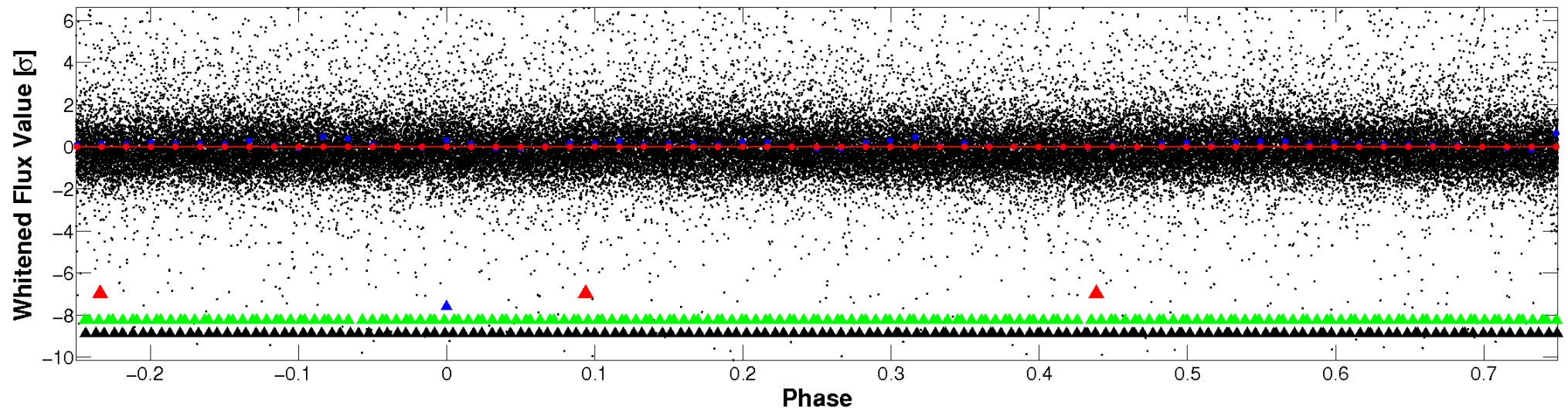


# Non-Whitened Vs. Whitened Light Curve

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



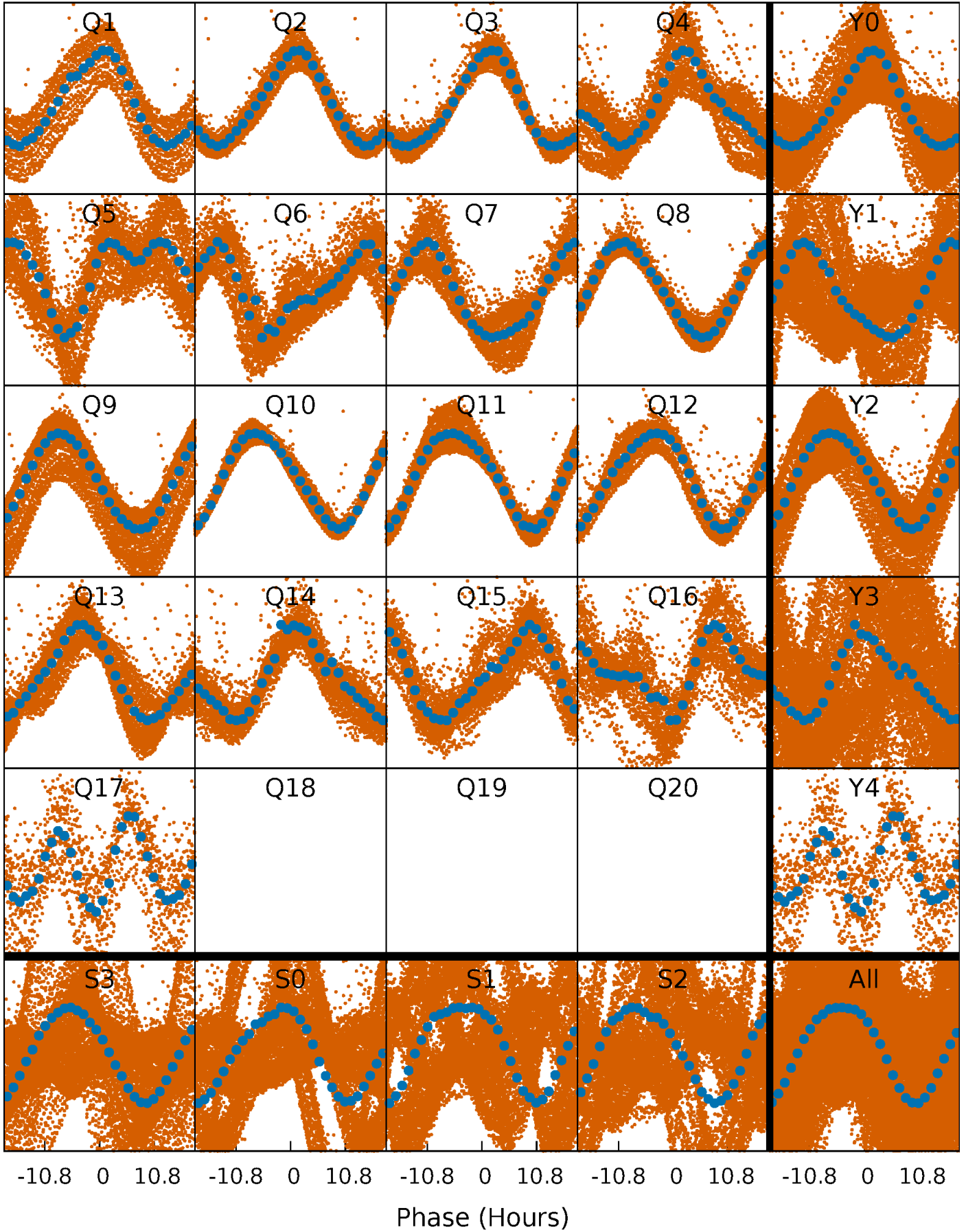
## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)





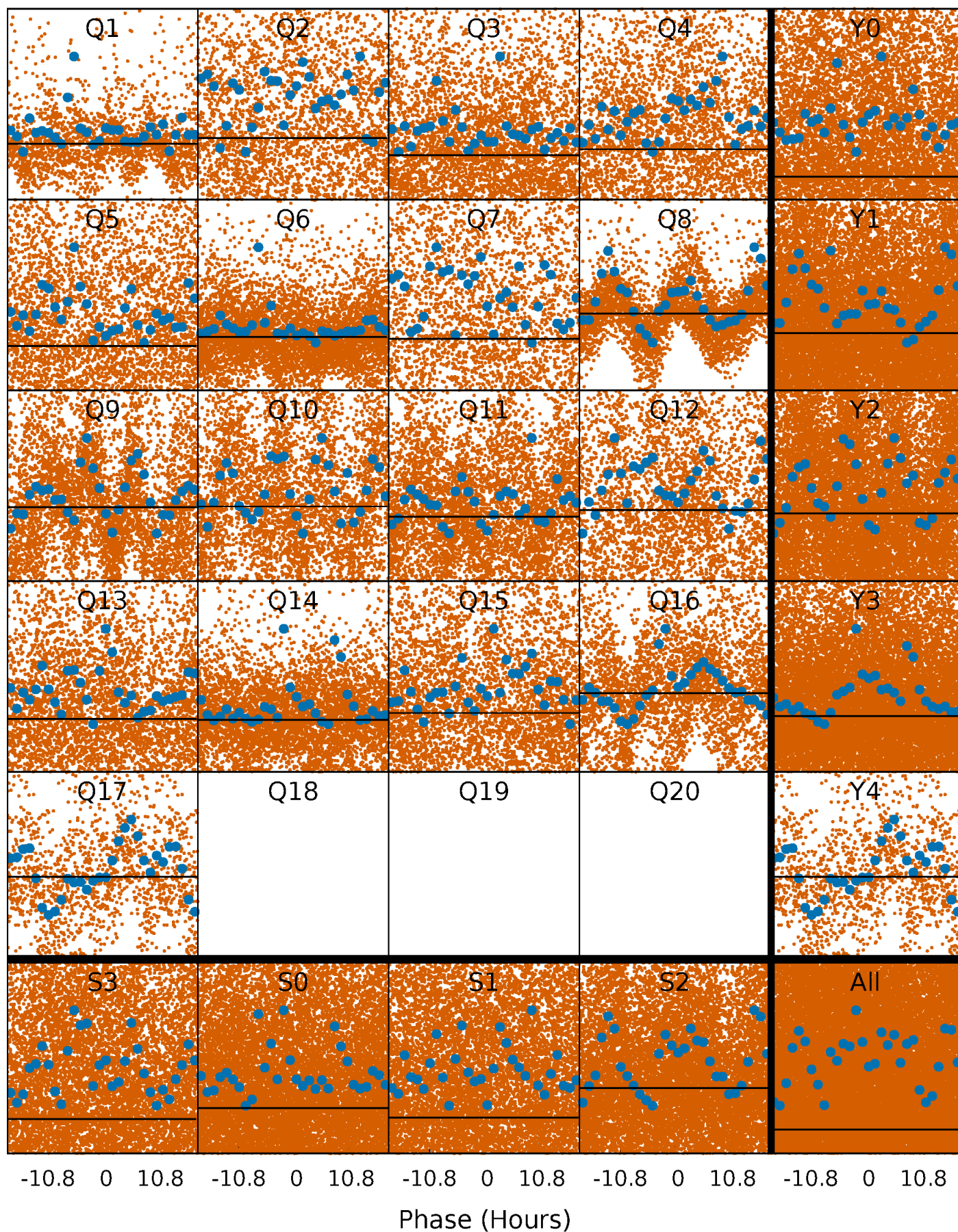
# PDC Quarter-Phased Transit Curves

TCE 008415004-02   P= 1.227839 Days    $T_0=132.226346$  (BKJD)



# DV Quarter-Phased Transit Curves

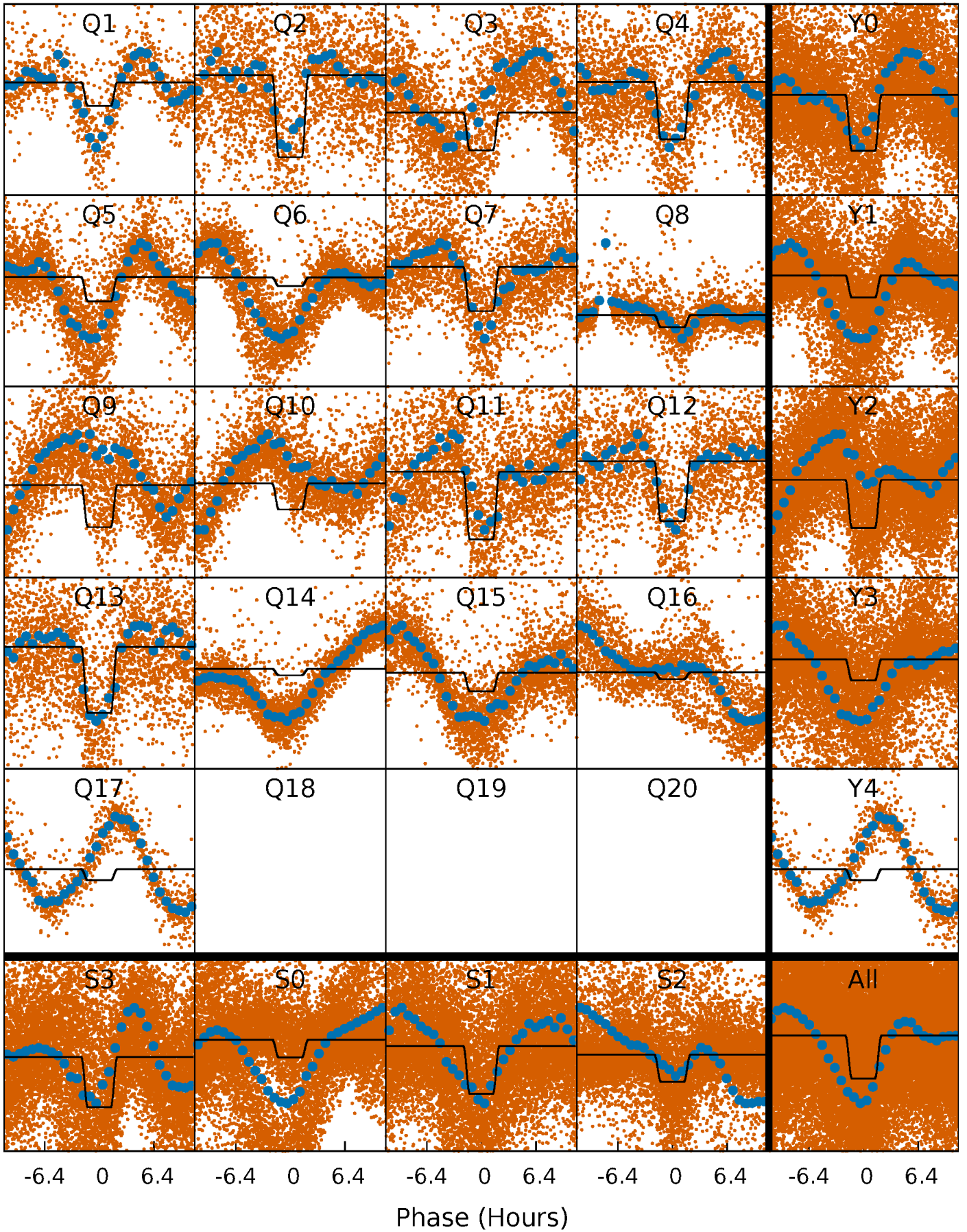
TCE 008415004-02     $P = 1.227839$  Days     $T_0 = 132.226346$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

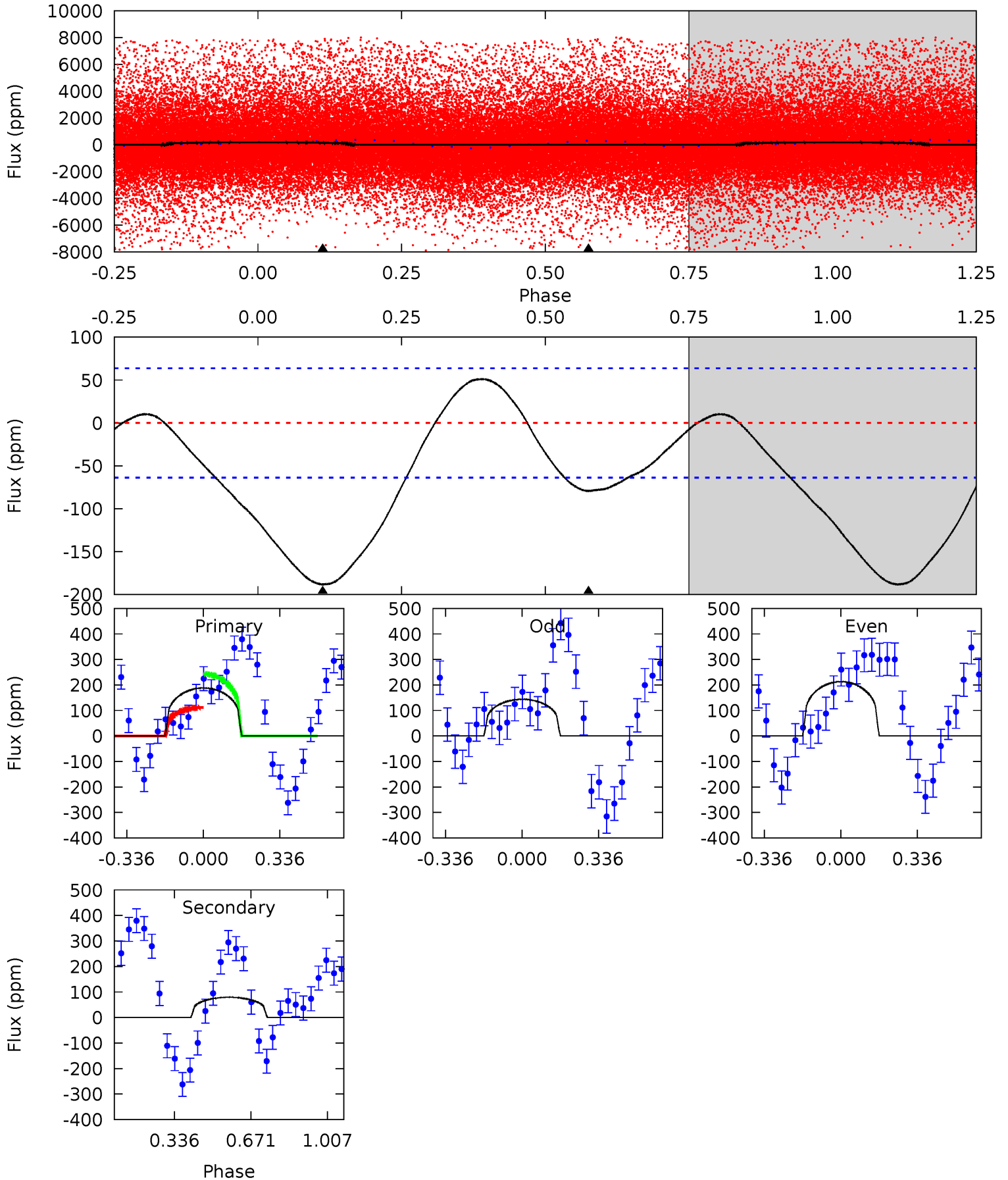
TCE 008415004-02   P= 1.227532 Days    $T_0=132.153030$  (BKJD)



# DV Model-Shift Uniqueness Test

008415004-02, P = 1.227839 Days, E = 130.998507 Days

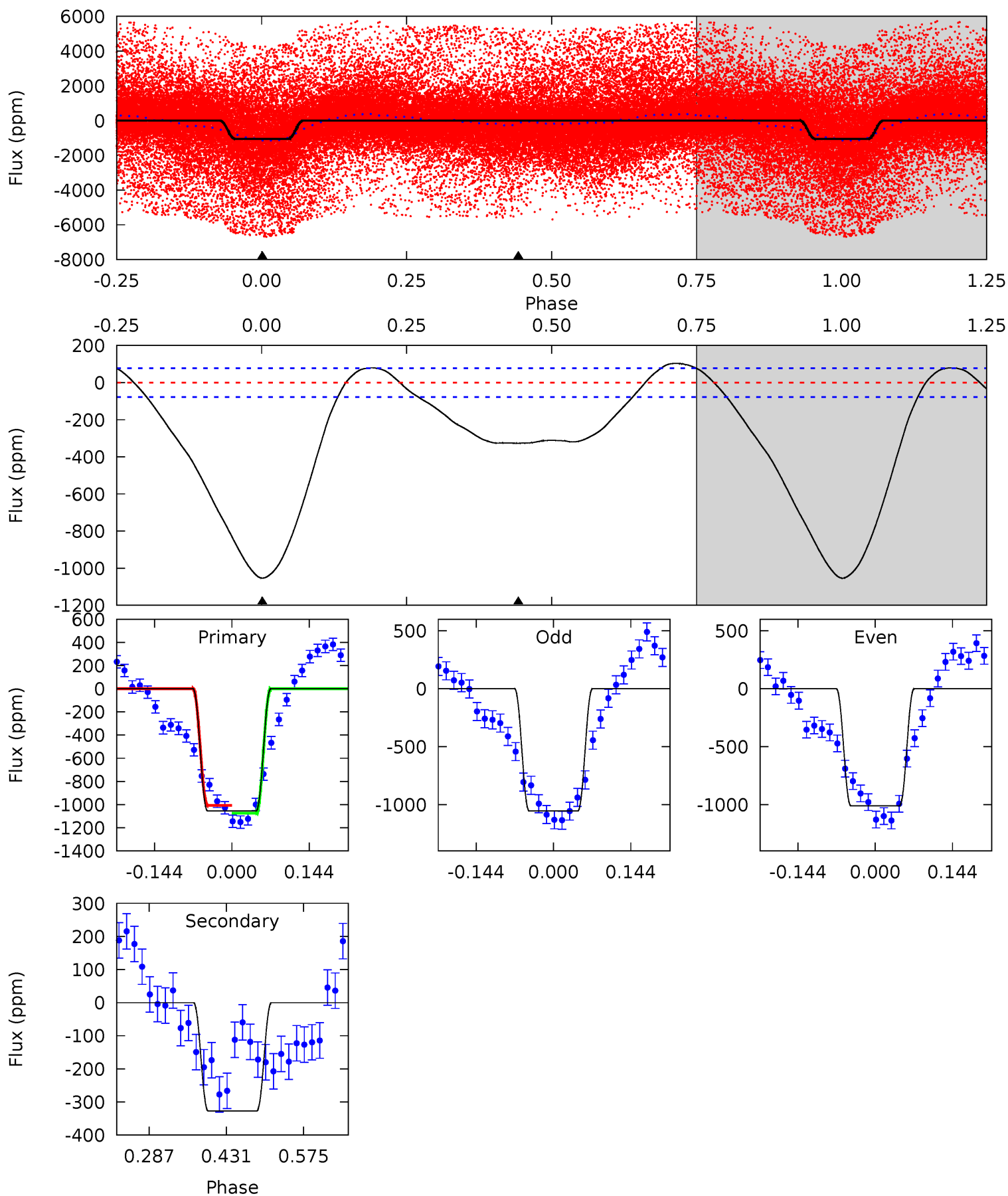
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.7	5.35	0	0	4.30	0.96	1.32	12.7	12.7	5.35	5.35	2.38	2.40	0.21	4.59



# Alt Model-Shift Uniqueness Test

008415004-02, P = 1.227532 Days, E = 130.925498 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
60.9	18.9	0	0	4.49	1.46	6.37	60.9	60.9	18.9	18.9	1.33	1.61	0.09	1.97



### Stellar Parameters For KIC 008415004

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3731^{+50}_{-50}$	$4.742^{+0.033}_{-0.015}$	$0.000^{+0.100}_{-0.100}$	$0.504^{+0.022}_{-0.027}$	$0.511^{+0.026}_{-0.023}$	$5.641^{+0.749}_{-0.396}$
	+1%/-1%	+1%/-0%	+inf%/-inf%	+4%/-5%	+5%/-5%	+13%/-7%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 008415004-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-79 \pm 15$	$6.40^{+6.61}_{-4.40}$	$1214^{+23}_{-24}$	$1592^{+904}_{-3442}$	$0.341^{+3.400}_{-0.259}$
Alt.	$-327 \pm 17$	$6.78^{+6.83}_{-4.93}$	$1215^{+22}_{-23}$	$2158^{+898}_{-700}$	$1.280^{+15.799}_{-0.967}$

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

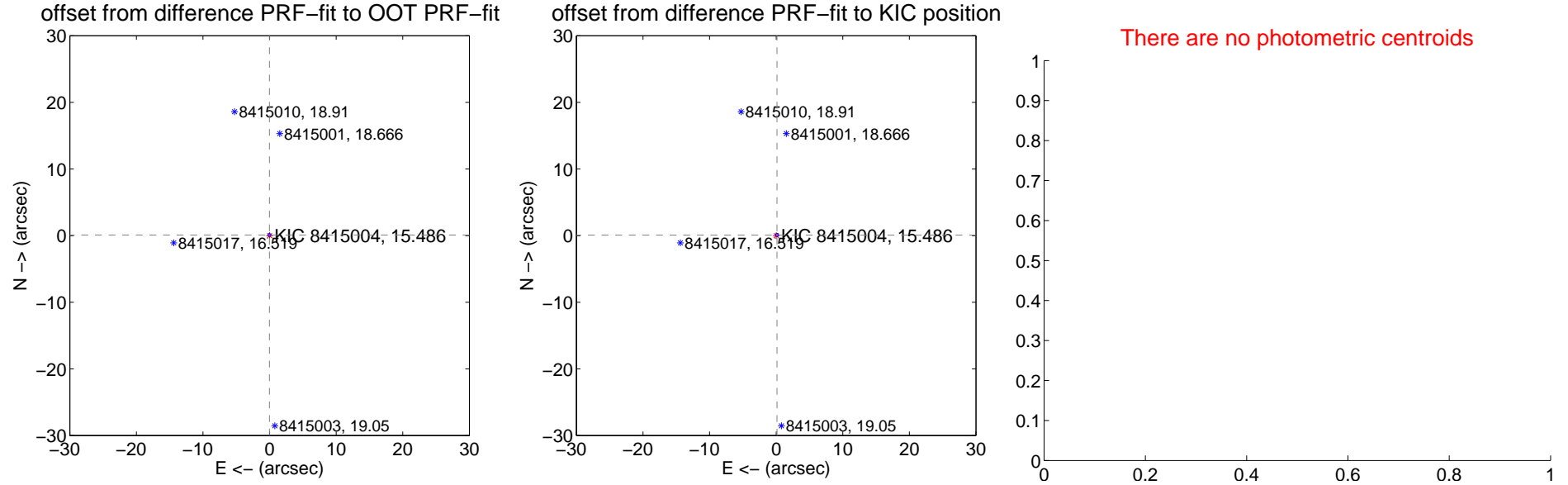
## DV Centroid Data

Supplemental centroid analysis for 008415004-02. Kepler magnitude: 15.49. Transit SNR 0.00

There are 7 quarters with good PRF difference image offsets

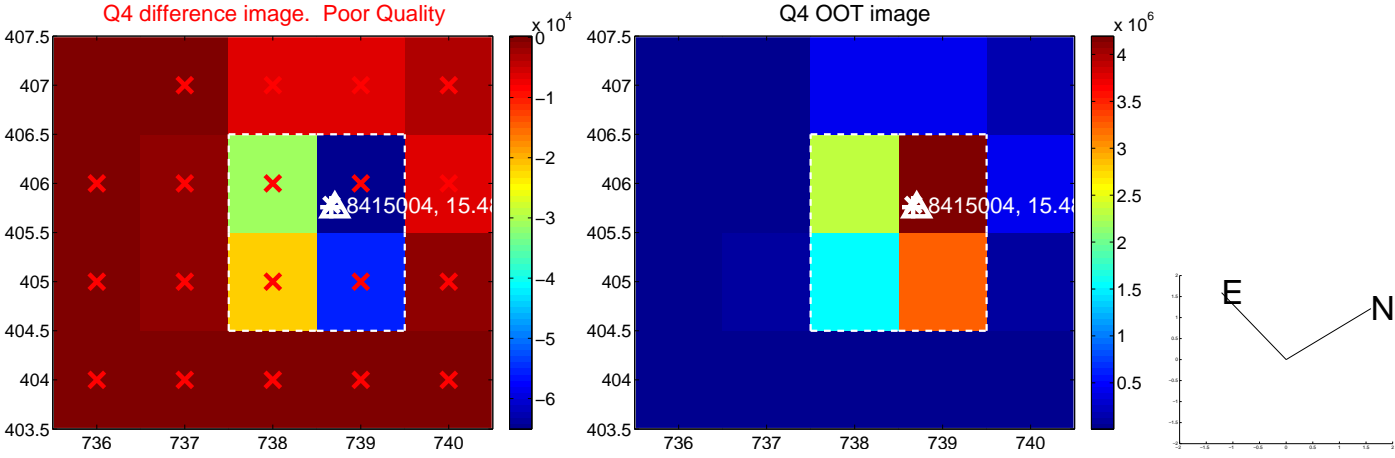
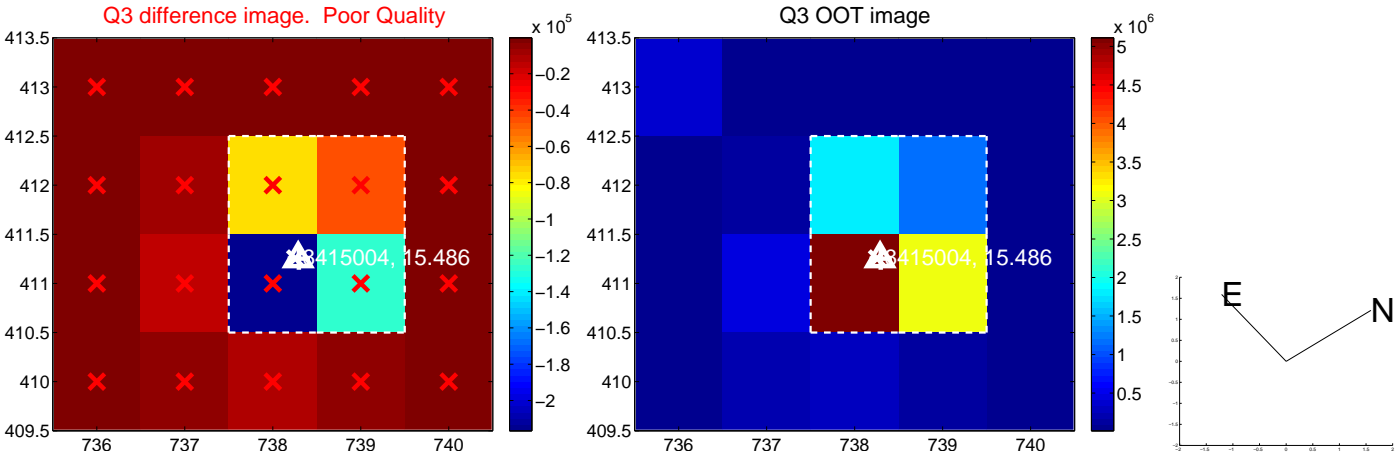
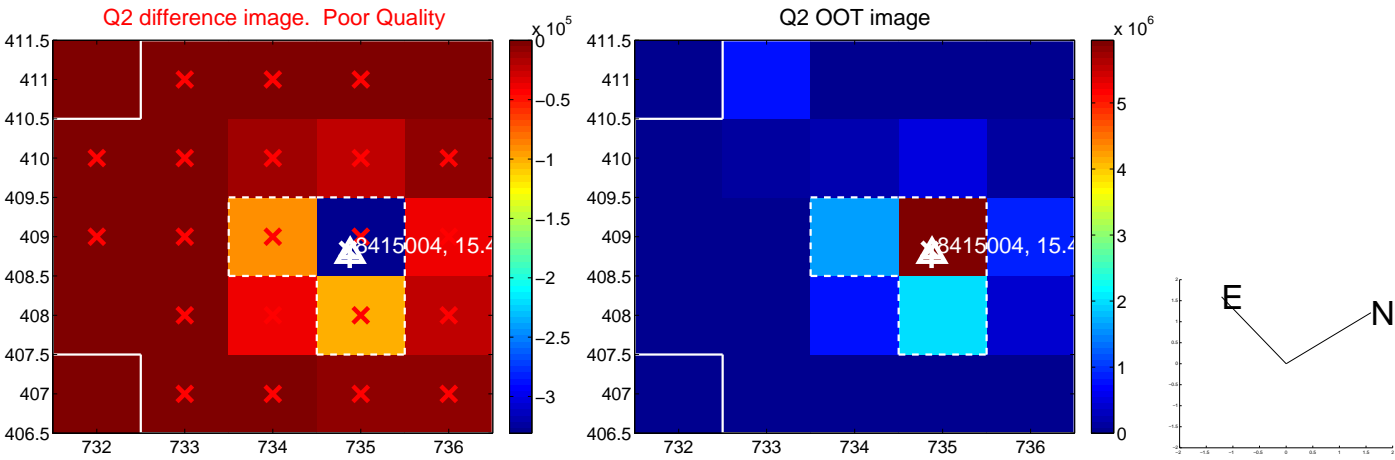
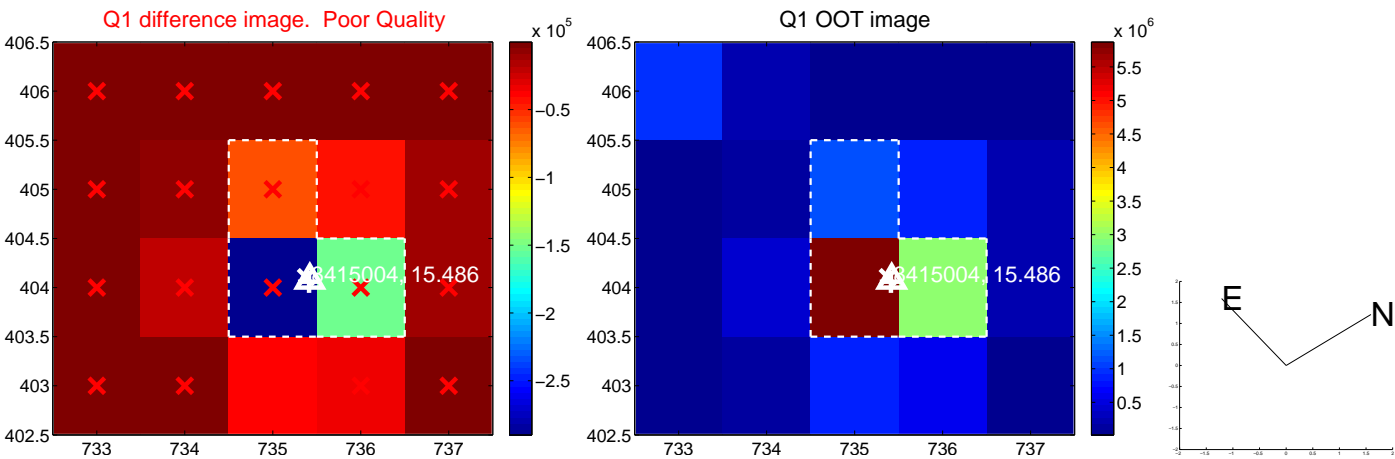
The direct PRF centroid is offset from the target star catalog position by about 0.20 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.096 \pm 0.075$	1.29	$0.020 \pm 0.075$	$0.094 \pm 0.077$
PRF-fit source offset from KIC position	$0.151 \pm 0.081$	1.87	$-0.125 \pm 0.078$	$0.085 \pm 0.078$
photometric centroid source offset	—	—	—	—

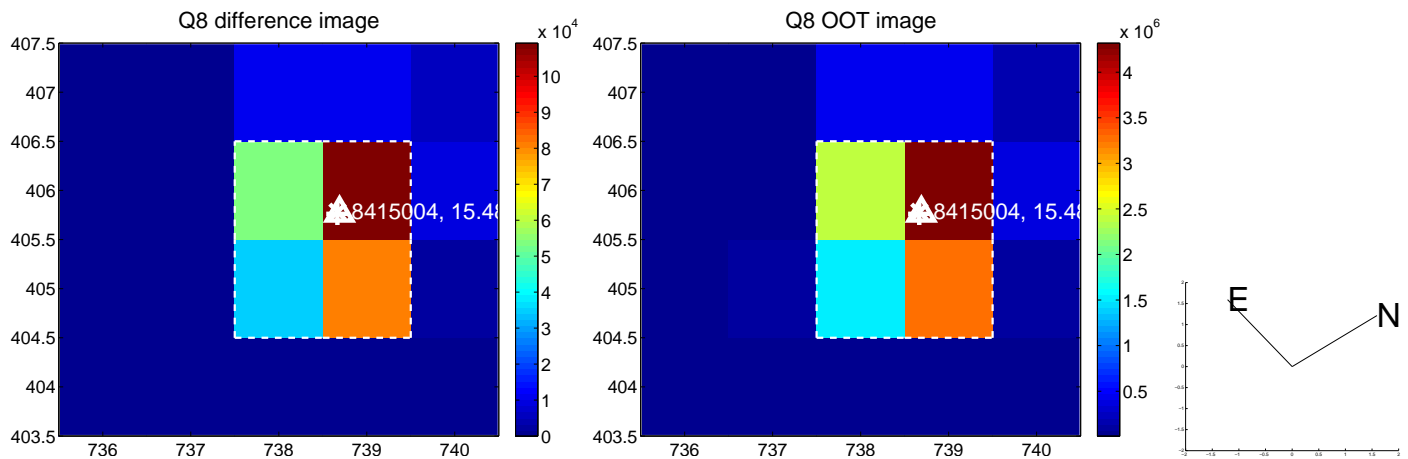
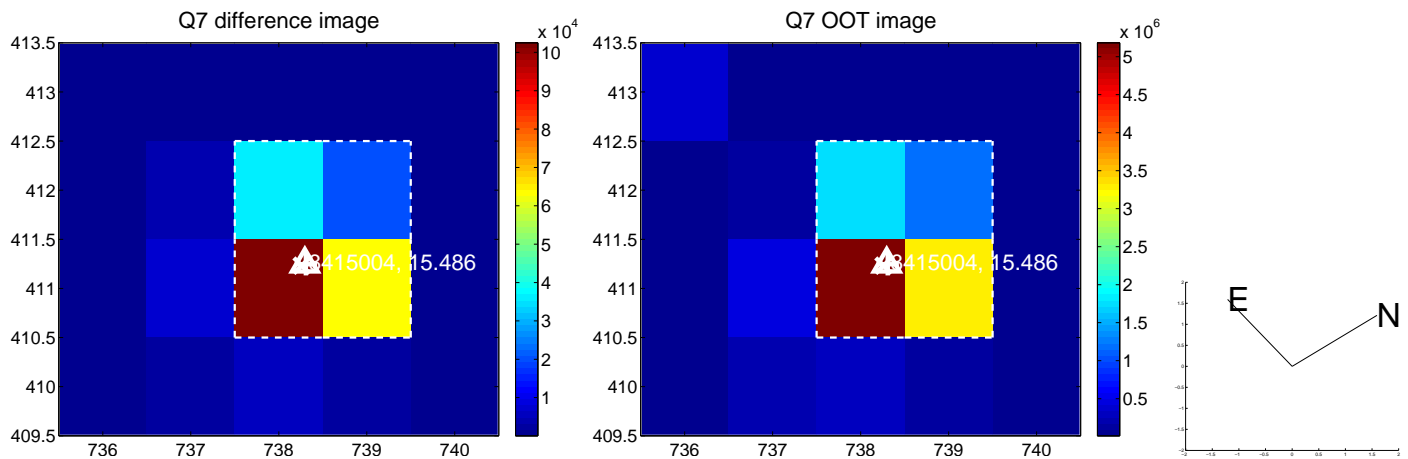
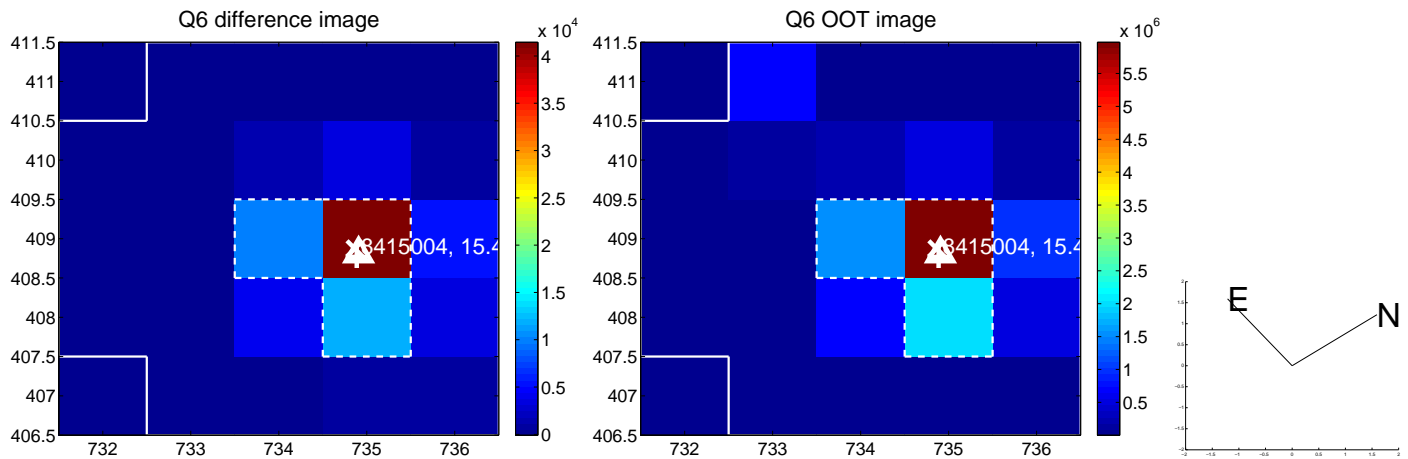
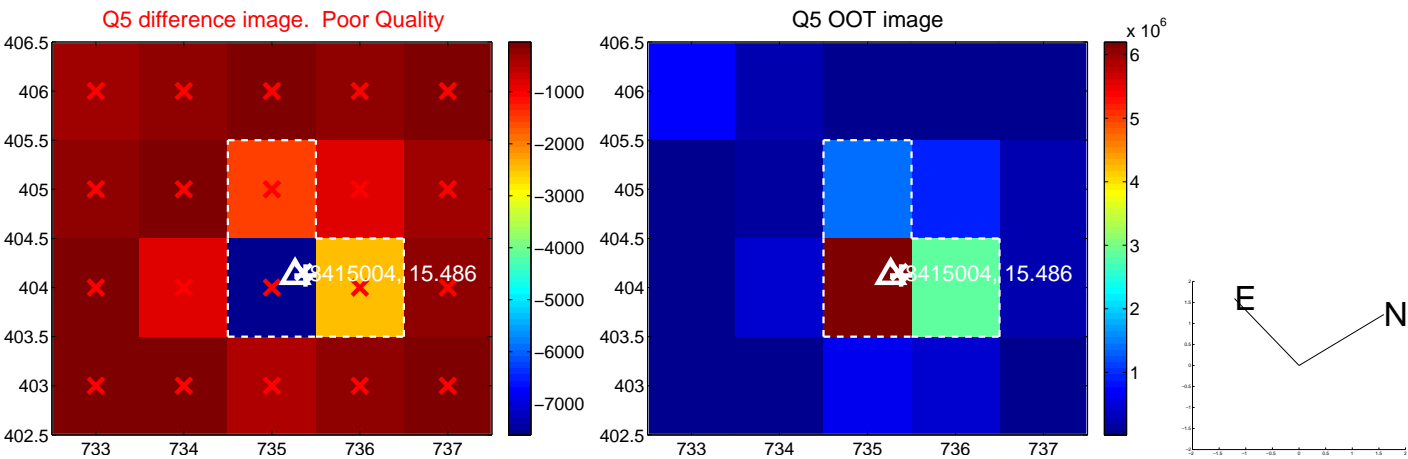


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

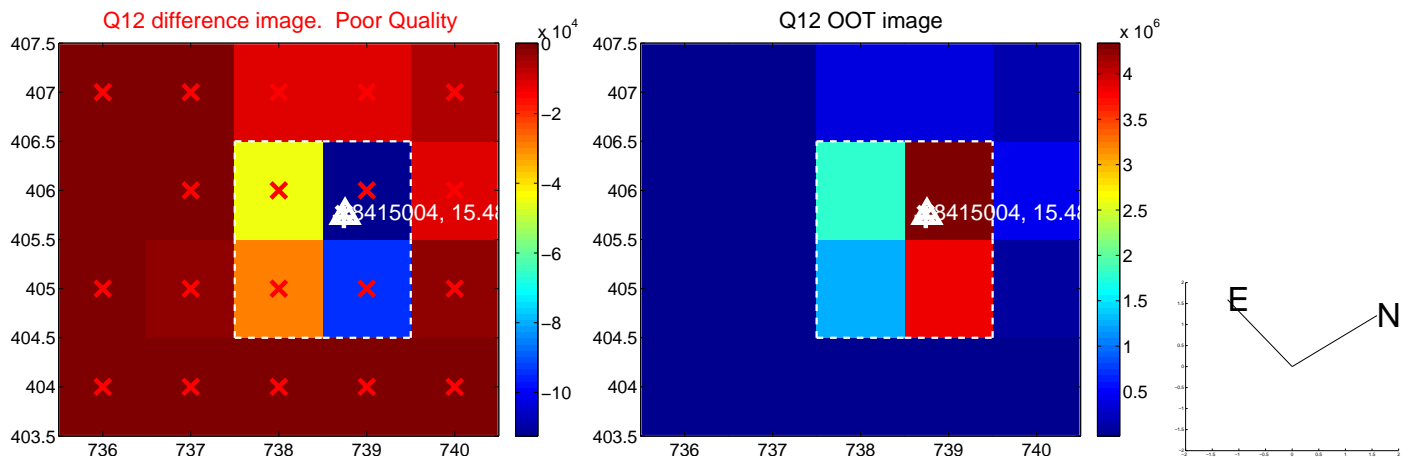
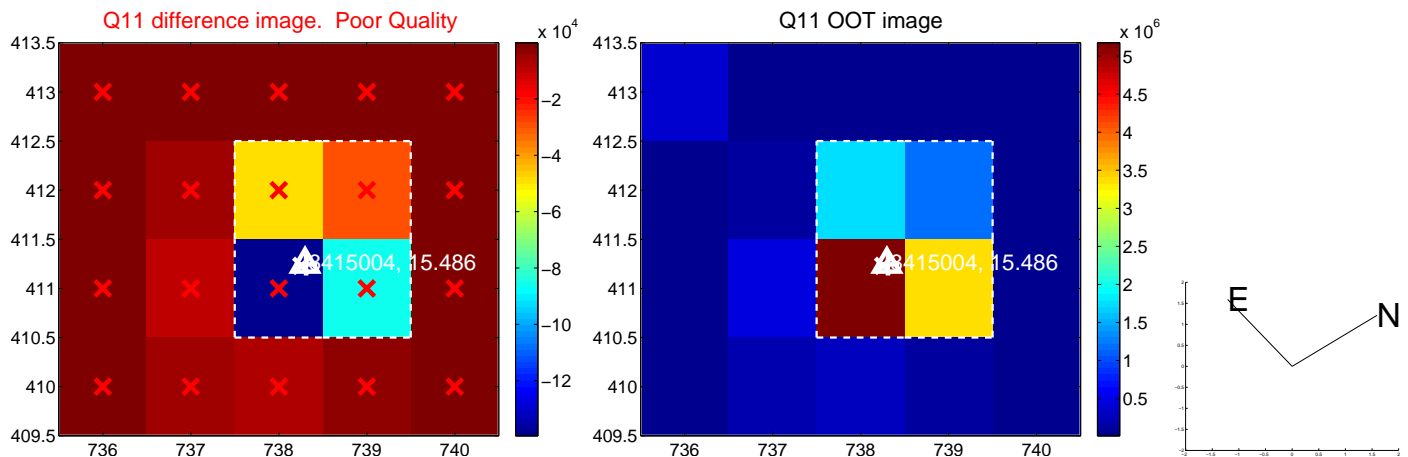
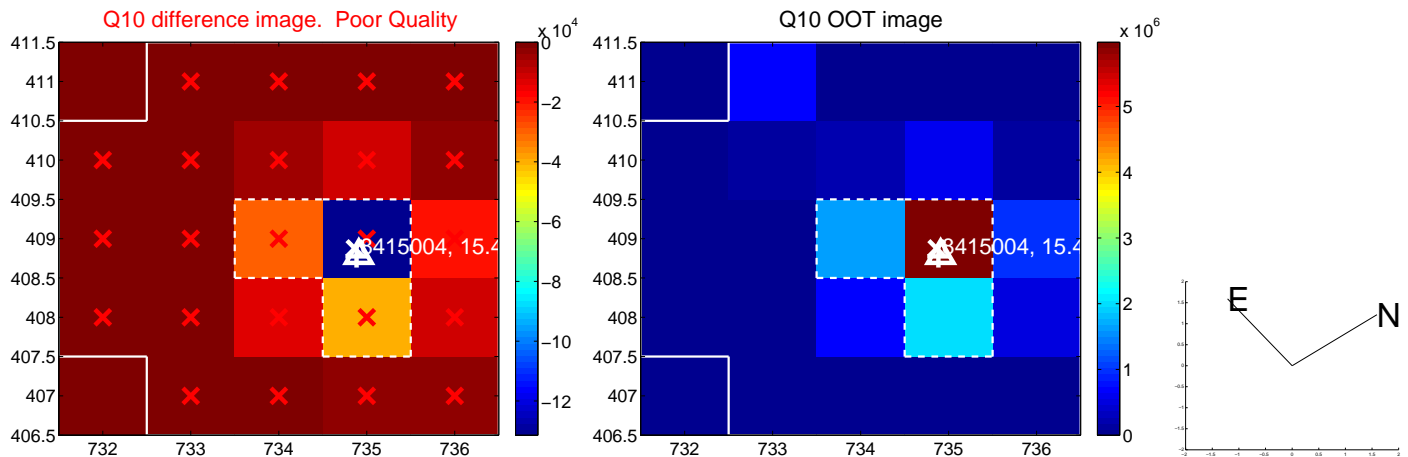
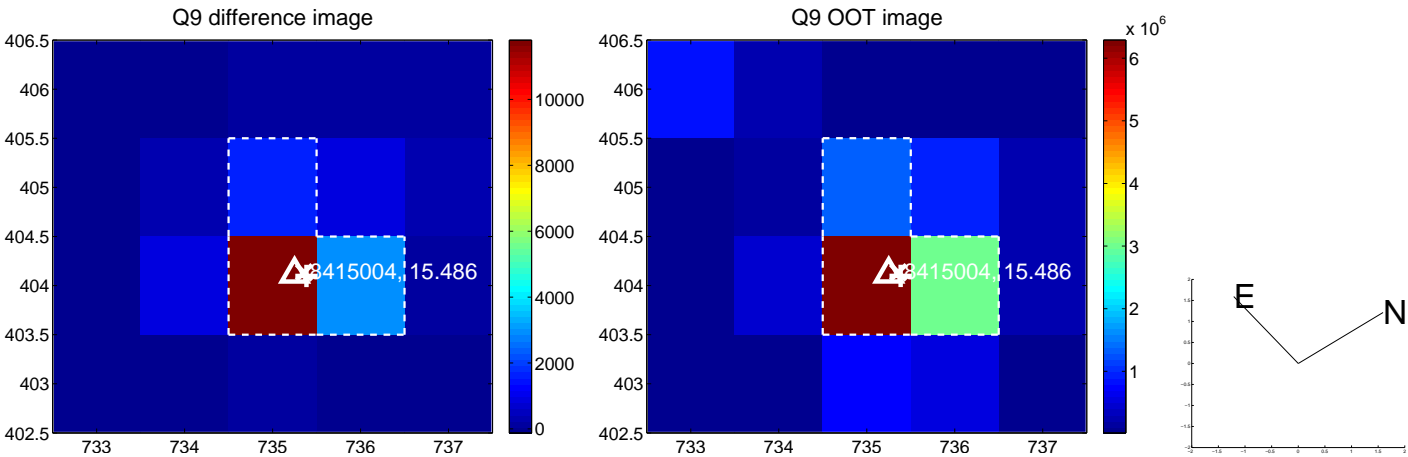


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

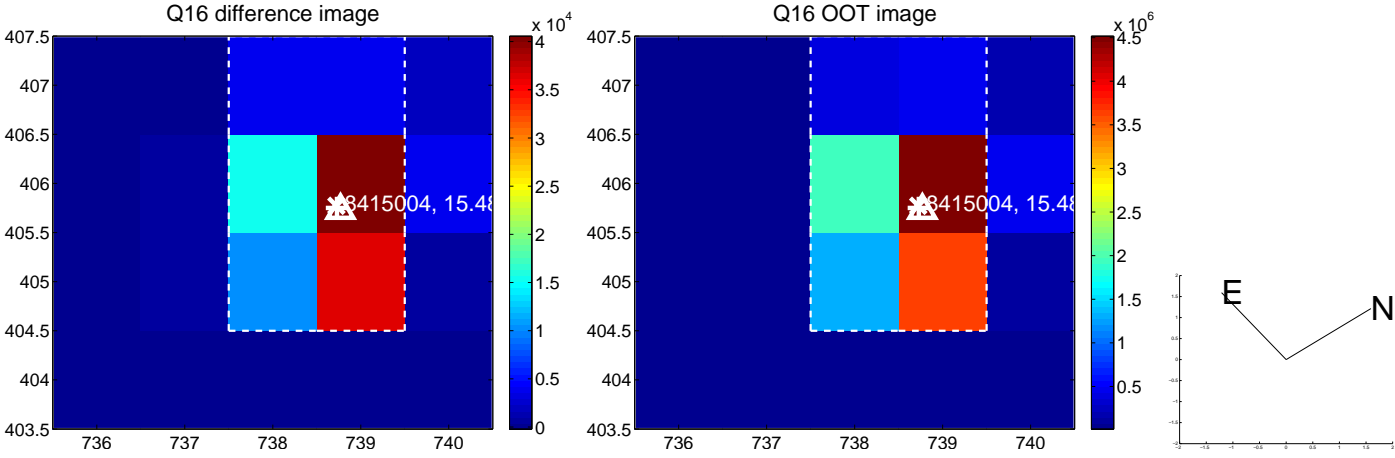
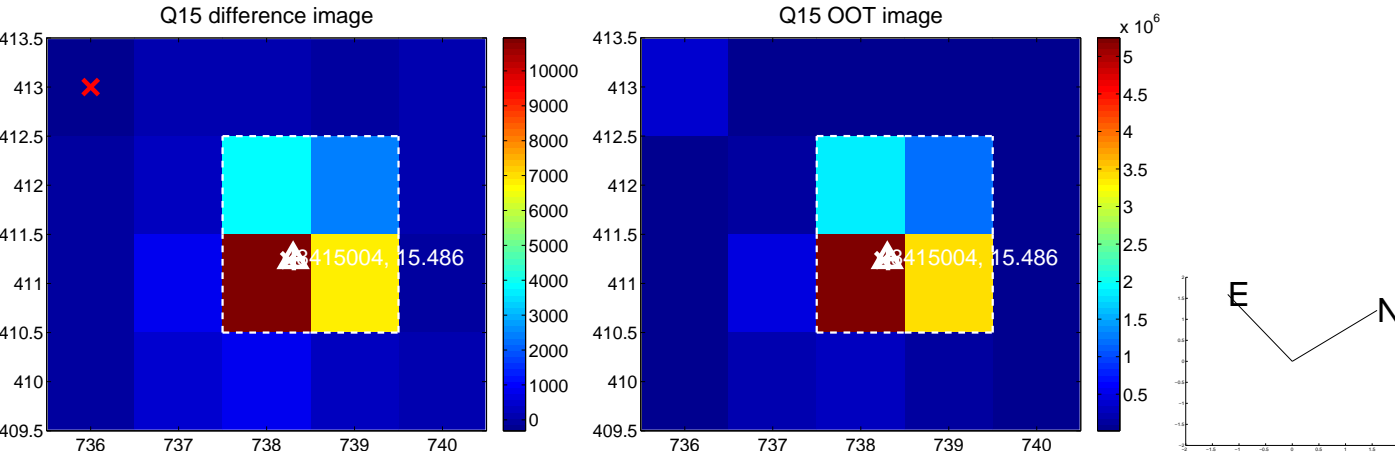
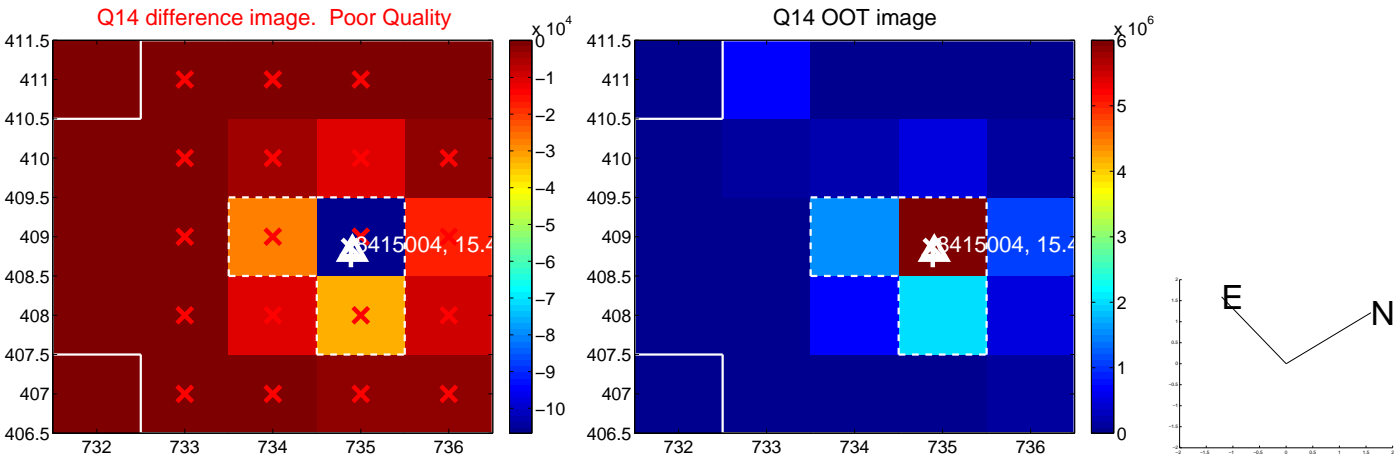
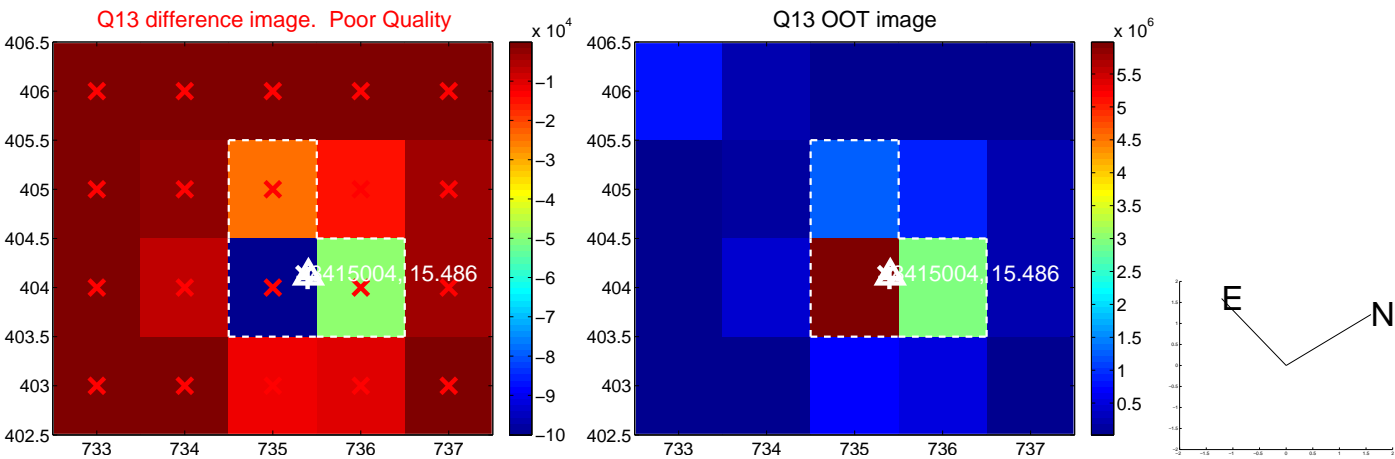




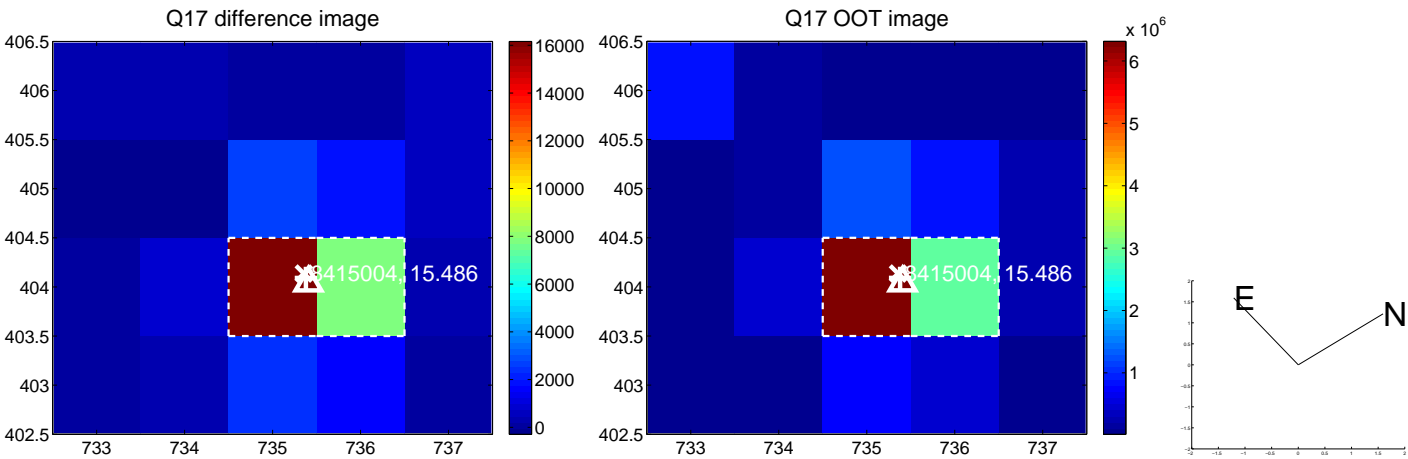
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



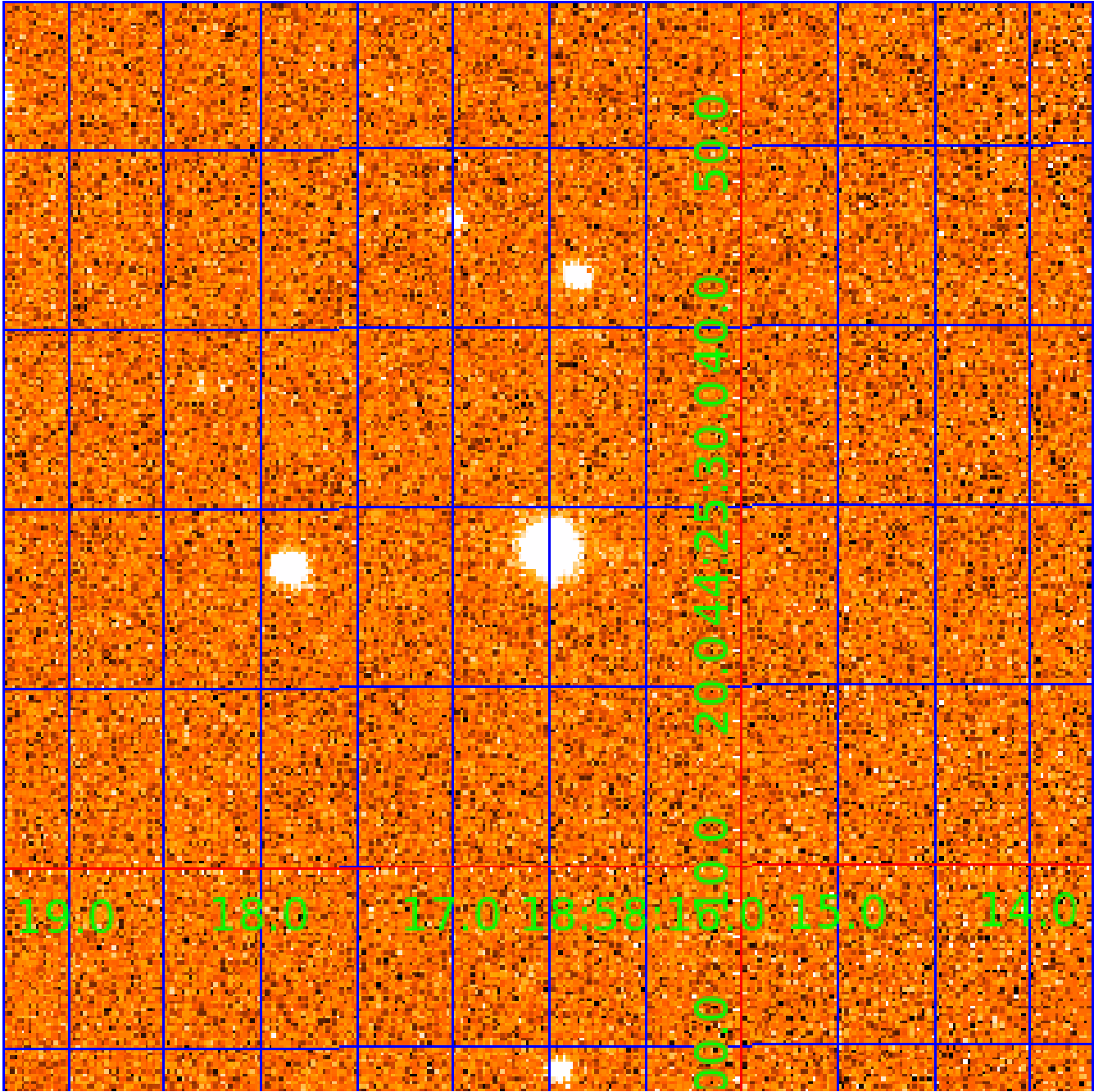
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



folded centroid time series figure for this object.

UKIRT Image

Declination



# KIC 008415004

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008415004-01	OBS	No	449.791607	367.282098	5459.8	5.875	15.4	7.1	0.50	3731	3.67	0.05
008415004-02	OBS	No	1.227839	132.226346	0.1	9.452	12.1	0.0	0.50	3731	0.02	136.87
008415004-04	OBS	No	8.555762	139.209360	512.8	7.561	15.5	4.7	0.50	3731	1.25	10.28

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008415004-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
008415004-02	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—LPP_ALT
008415004-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV

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

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

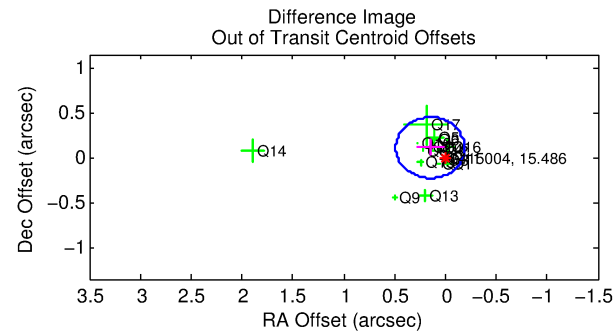
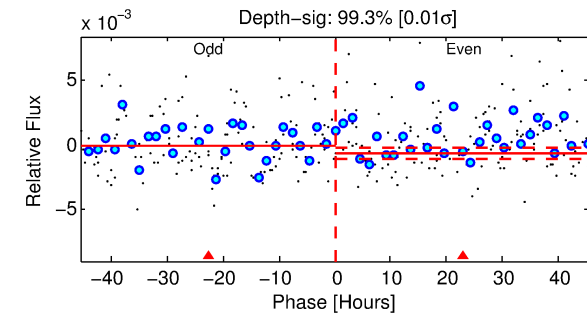
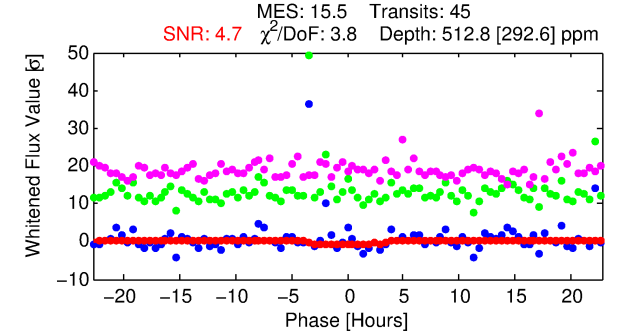
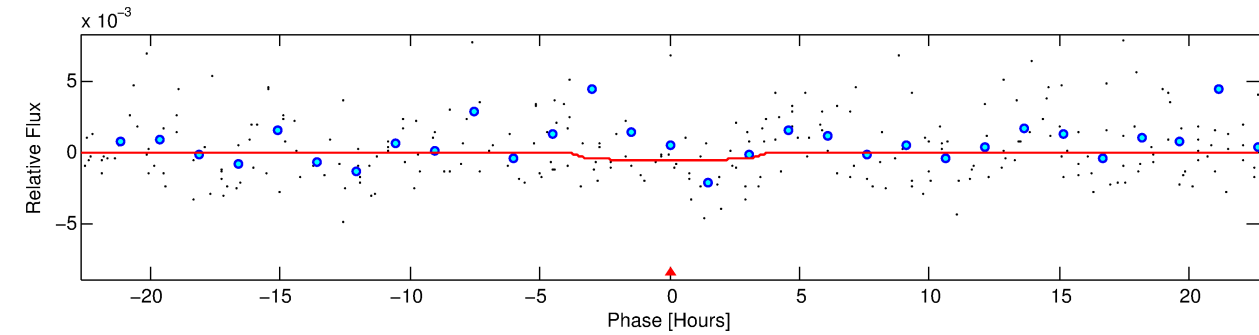
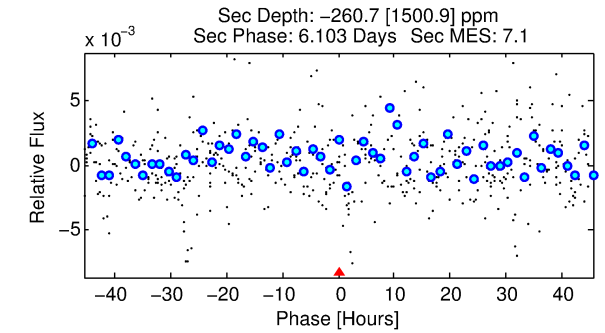
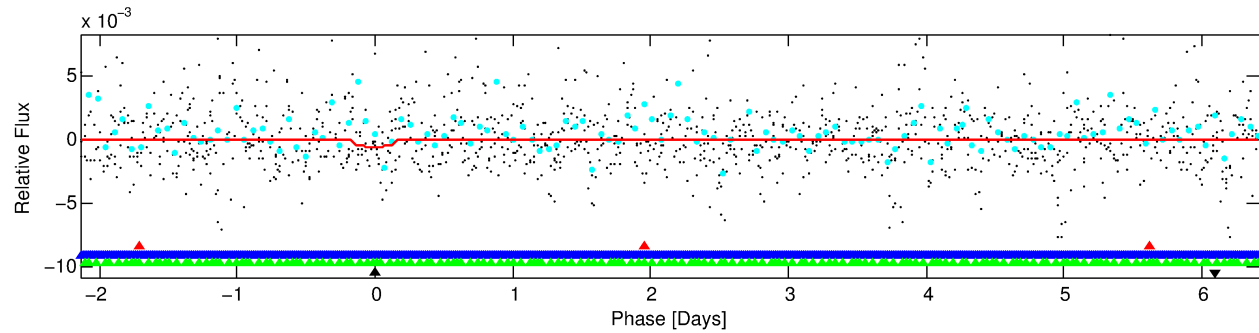
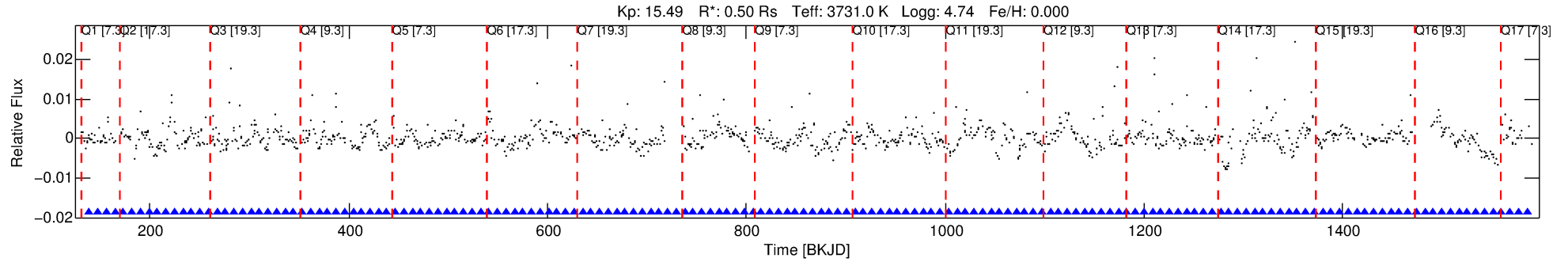
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008415004-04

No Significant Match Found

# DV One-Page Summary

KIC: 8415004 Candidate: 4 of 4 Period: 8.556 d



## DV Fit Results:

Period = 8.55576 [0.00063] d  
Epoch = 139.2094 [0.0459] BKJD  
Rp/R\* = 0.0228 [0.0574]  
a/R\* = 5.82 [62.36]  
b = 0.78 [5.65]  
Seff = 10.28 [0.84]  
Teq = 457 [9] K  
Rp = 1.25 [3.16] Re  
a = 0.0655 [0.0029] AU  
Ag = N/A  
Teffp = N/A

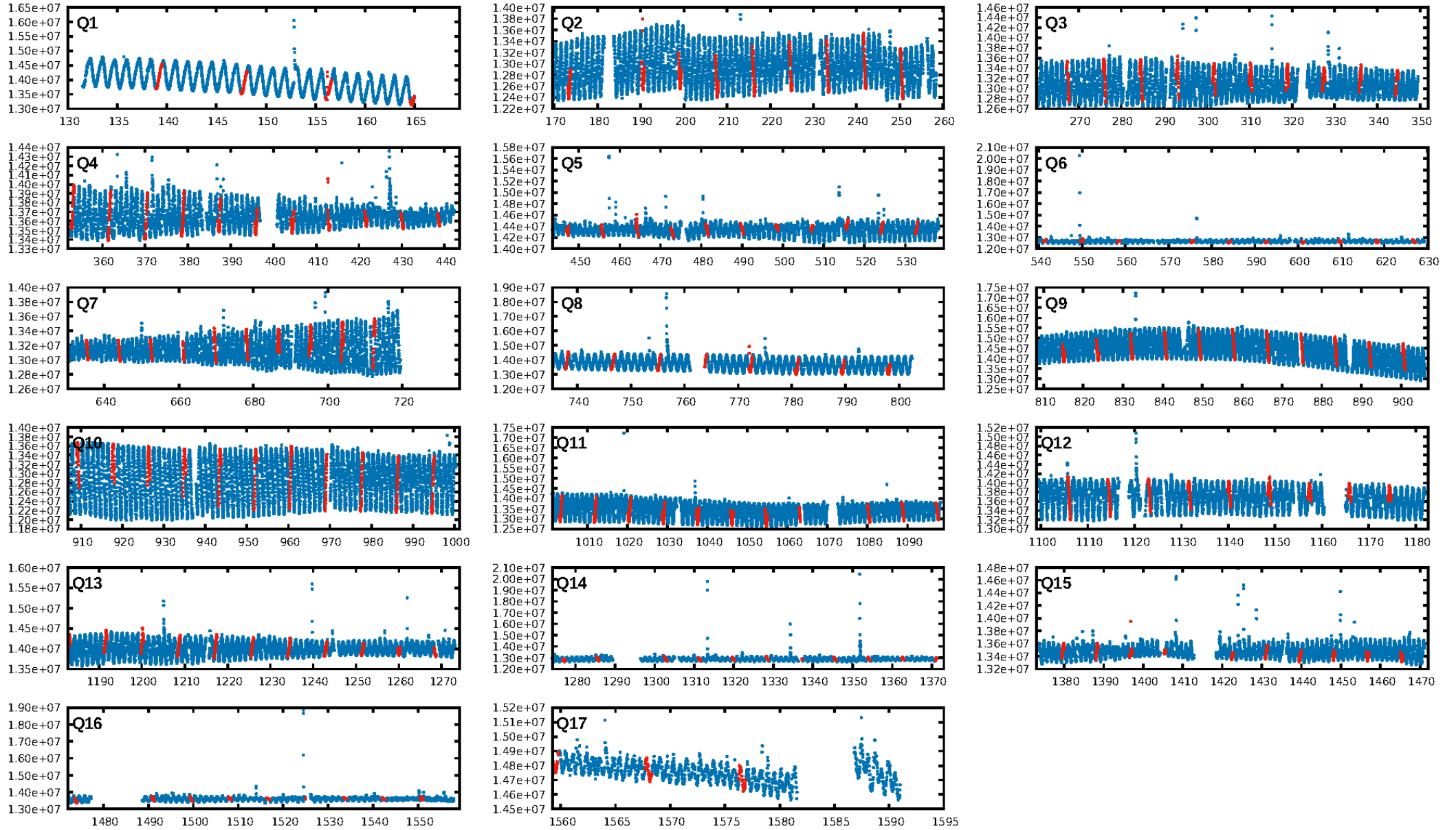
## DV Diagnostic Results:

ShortPeriod-sig: 92.9% [1.81σ]  
LongPeriod-sig: 100.0% [1105.87σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [41/41]  
GhostDiagnostic-chr: -8.315  
Centroid-sig: 43.2%  
Centroid-so: 0.250 arcsec [0.68σ]  
OotOffset-rm: 0.187 arcsec [1.65σ]  
KicOffset-rm: 0.088 arcsec [0.78σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.65 [11/17]  
DiffImageOverlap-fno: 0.00 [0/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 00:23:32 Z

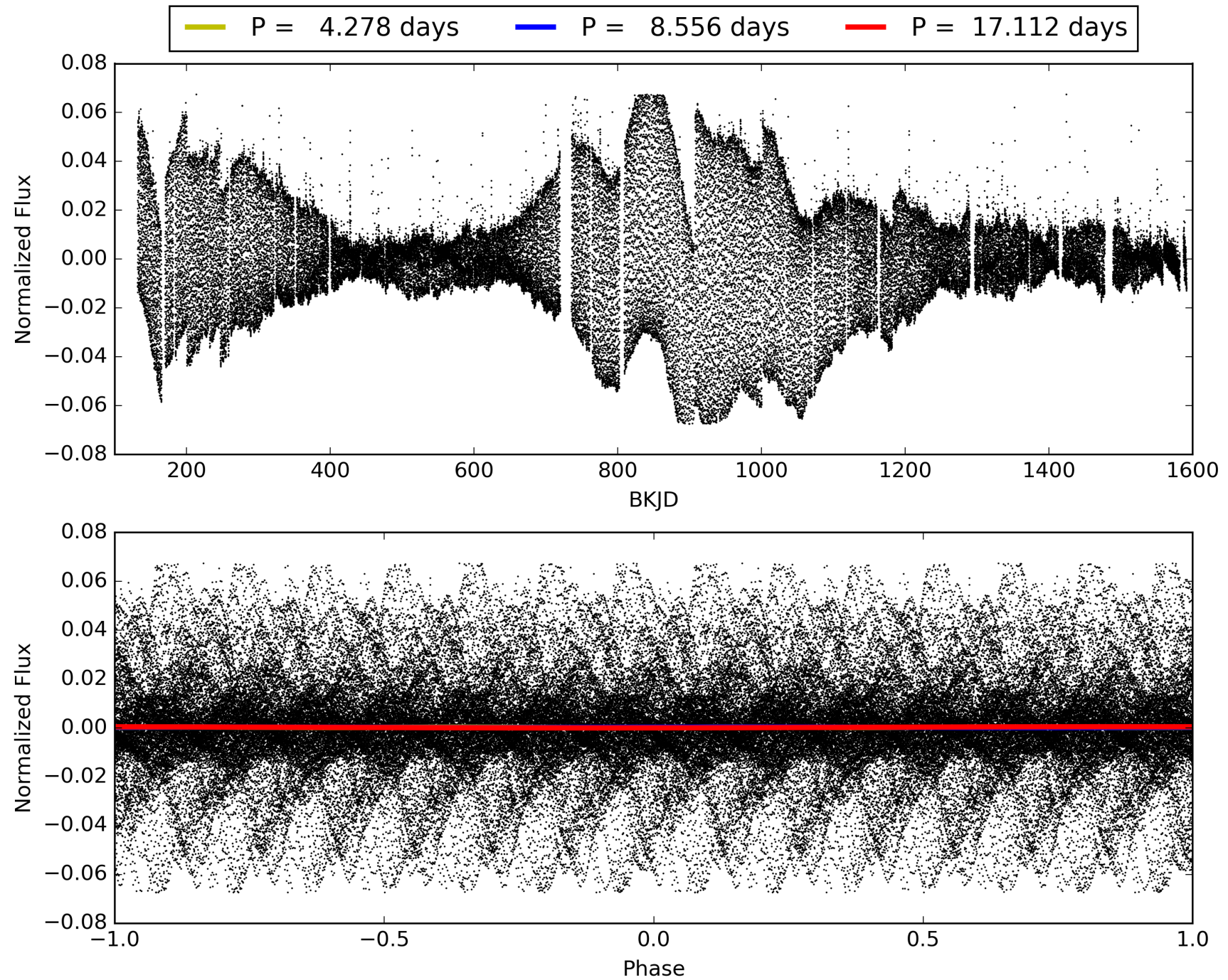
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 008415004-04, PDC Light Curves



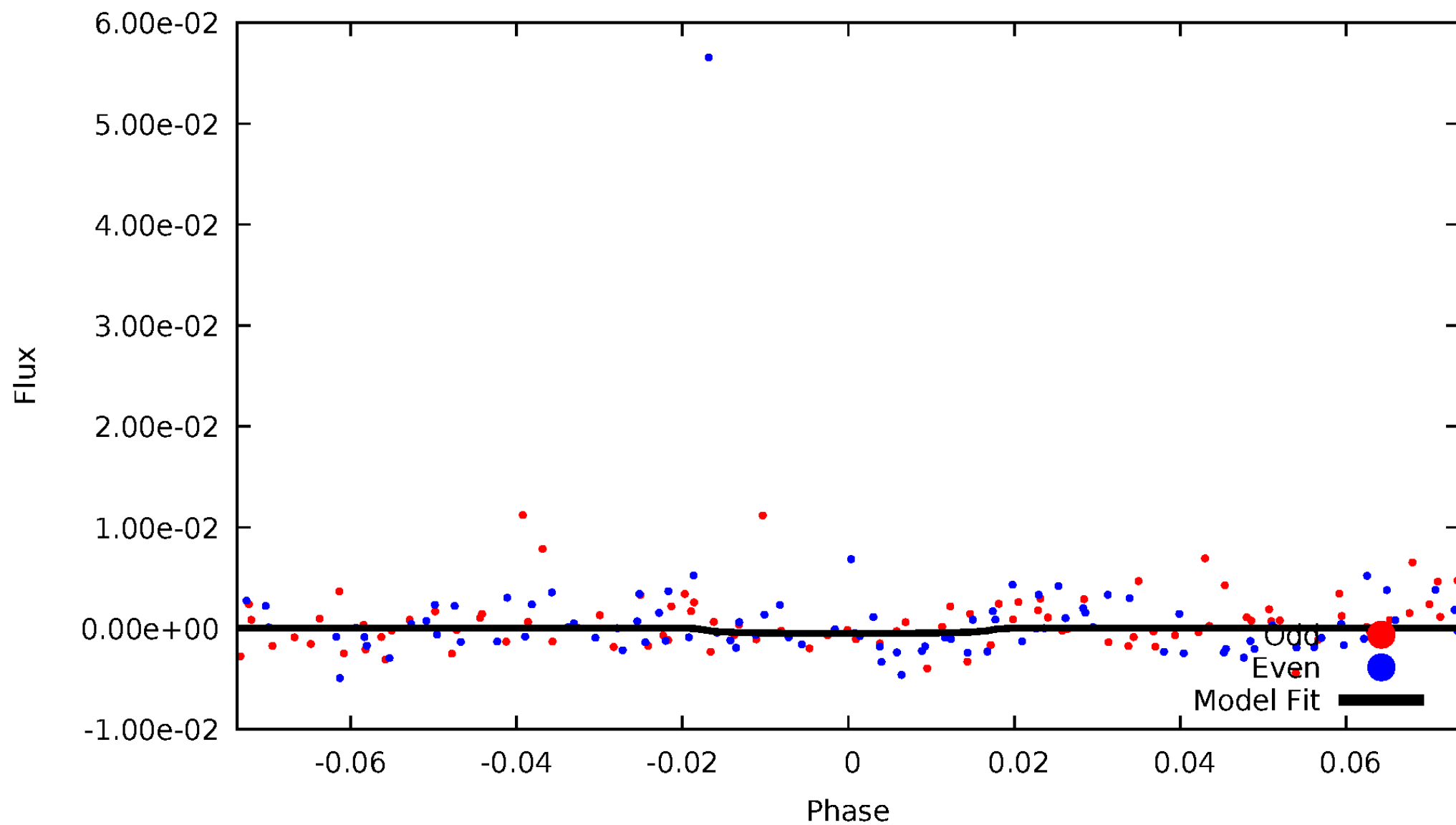


TCE 008415004-04



# DV Odd/Even

TCE 008415004-04



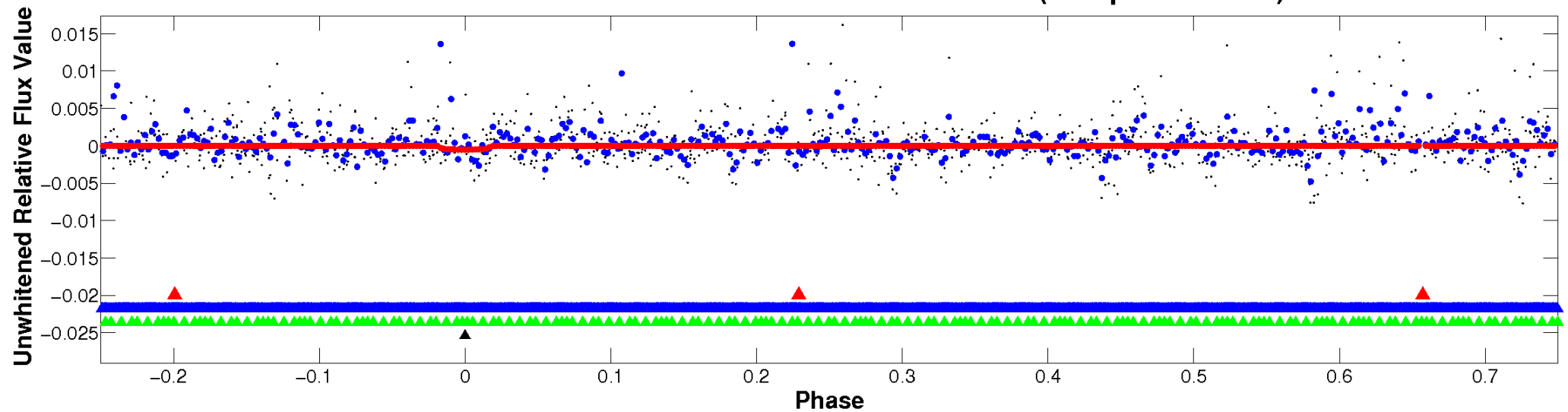


ALT Odd/Even

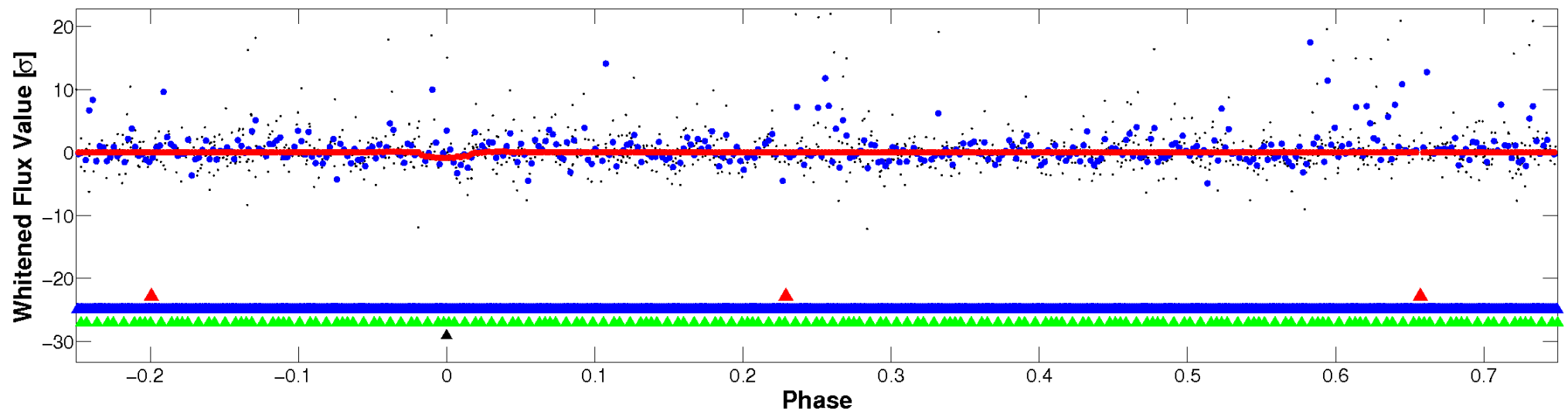
This plot does not exist for this TCE.

# Non-Whitened Vs. Whitened Light Curve

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

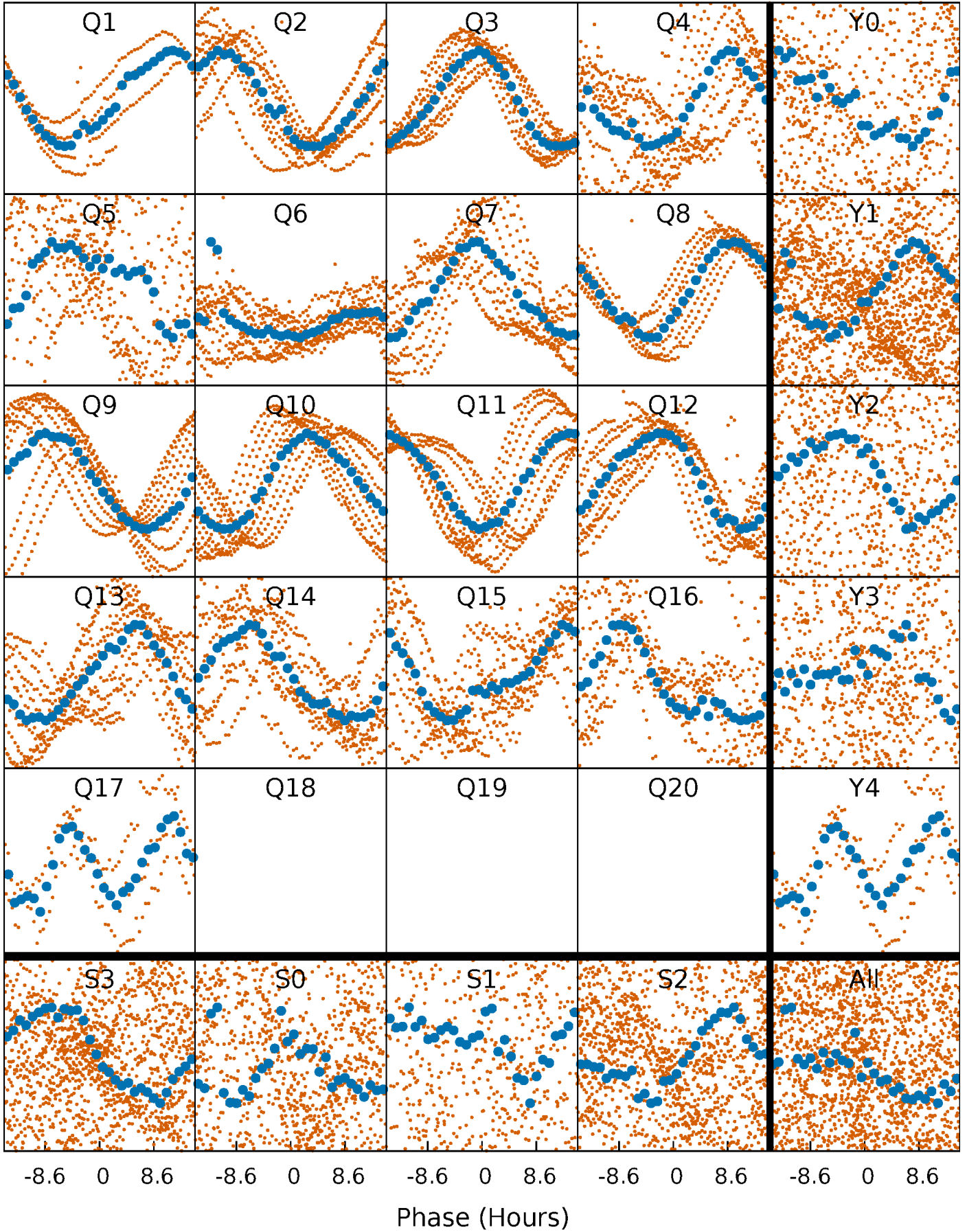


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



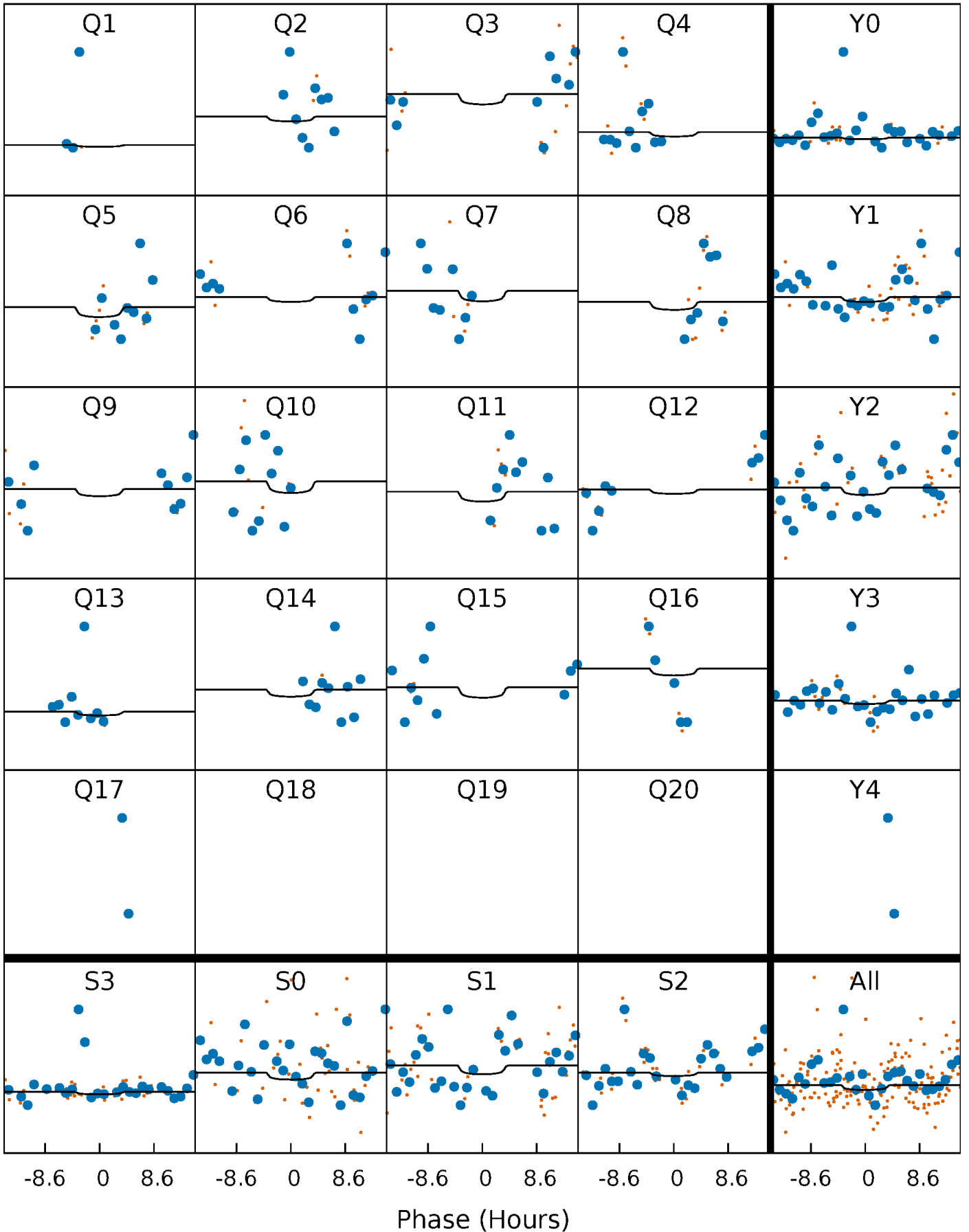
# PDC Quarter-Phased Transit Curves

TCE 008415004-04 P= 8.555762 Days  $T_0=139.209360$  (BKJD)



# DV Quarter-Phased Transit Curves

TCE 008415004-04     $P = 8.555762$  Days     $T_0 = 139.209360$  (BKJD)



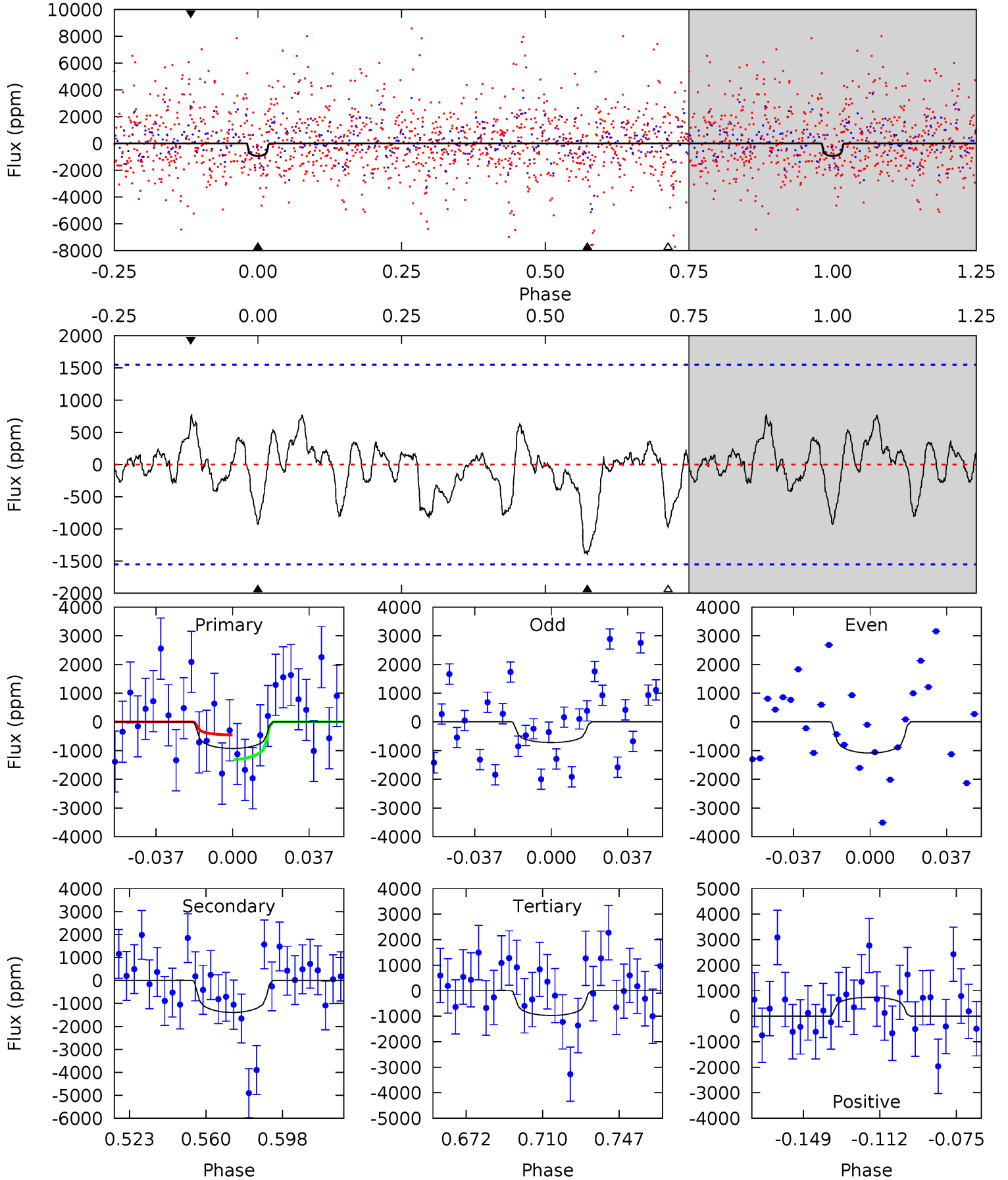


This plot does not exist for this TCE.

# DV Model-Shift Uniqueness Test

008415004-04, P = 8.555762 Days, E = 130.653598 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
2.84	4.28	2.99	2.27	4.77	2.08	1.02	-0.14	0.58	1.29	2.01	0.46	-30.6	0.36	1.33



## Alt Model-Shift Uniqueness Test

This plot does not exist for this TCE.

### Stellar Parameters For KIC 008415004

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$3731^{+50}_{-50}$	$4.742^{+0.033}_{-0.015}$	$0.000^{+0.100}_{-0.100}$	$0.504^{+0.022}_{-0.027}$	$0.511^{+0.026}_{-0.023}$	$5.641^{+0.749}_{-0.396}$
	+1%/-1%	+1%/-0%	+inf%/-inf%	+4%/-5%	+5%/-5%	+13%/-7%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 008415004-04 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-1393 \pm 326$	$2.54^{+2.70}_{-1.67}$	$636^{+10}_{-11}$	$3459^{+1703}_{-649}$	$492^{+3883}_{-377}$
Alt.	N/A	N/A	N/A	N/A	N/A

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

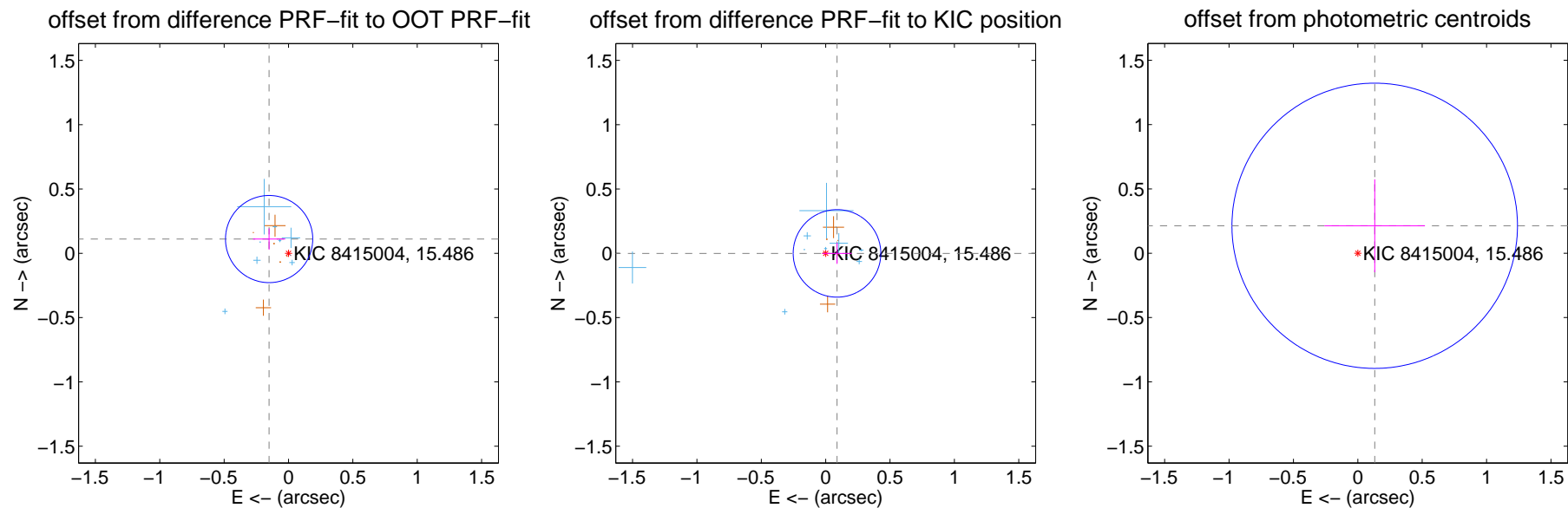
## DV Centroid Data

Supplemental centroid analysis for 008415004-04. Kepler magnitude: 15.49. Transit SNR 4.65

There are 11 quarters with good PRF difference image offsets

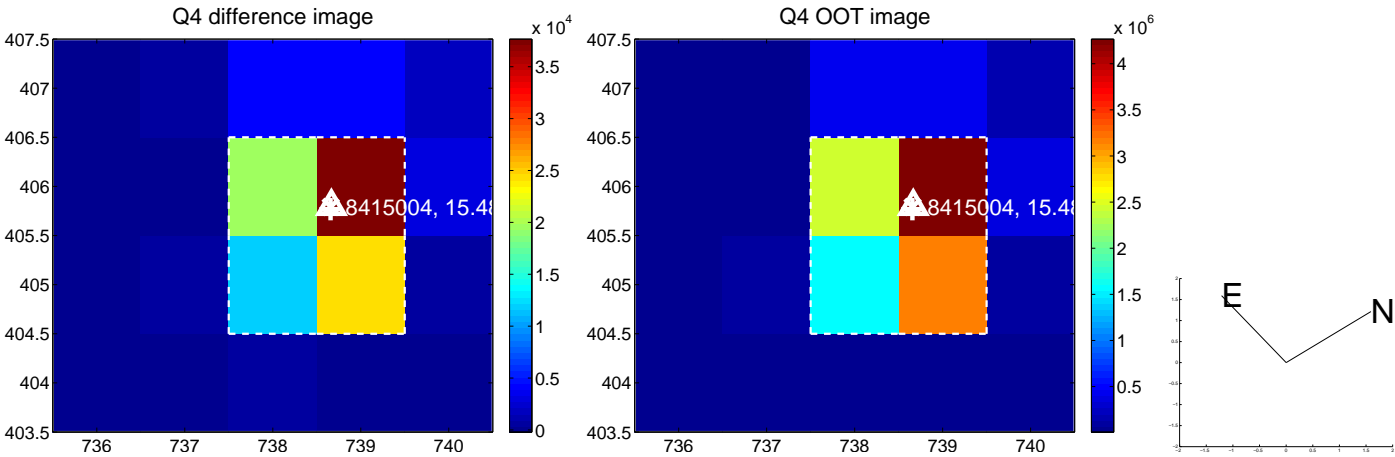
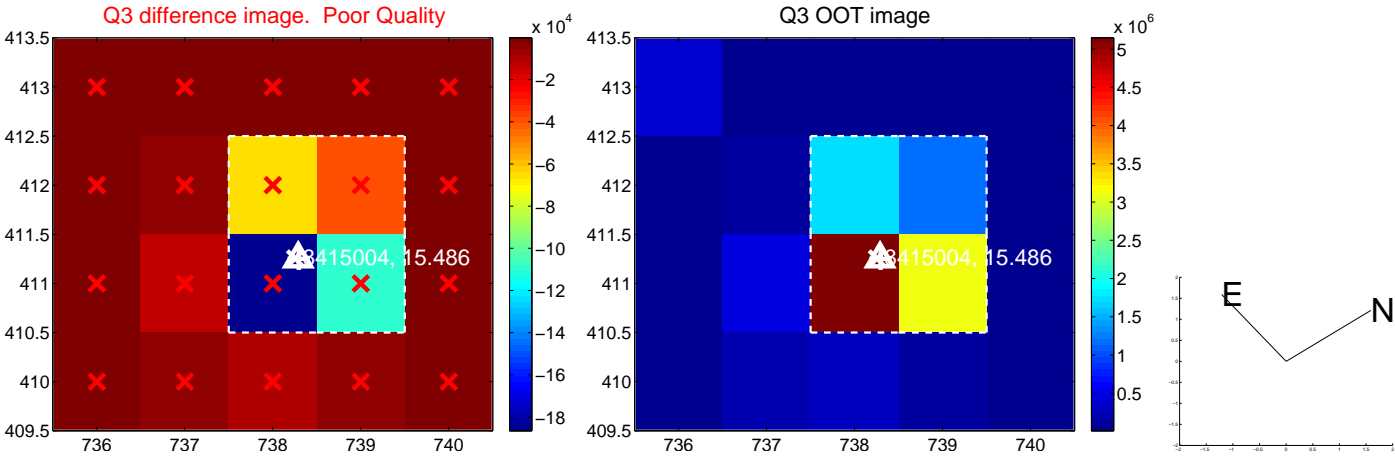
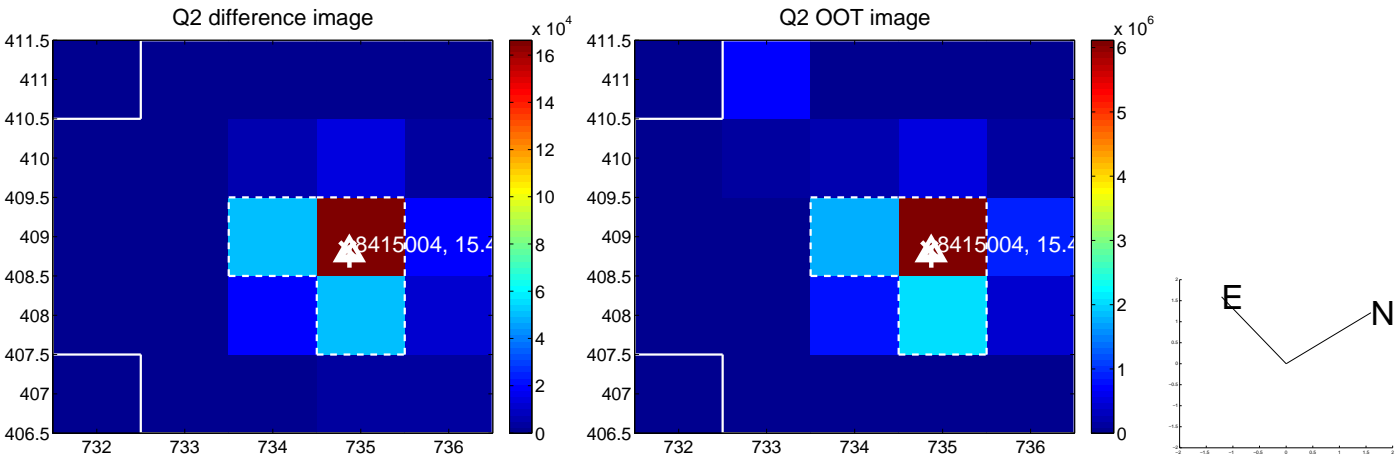
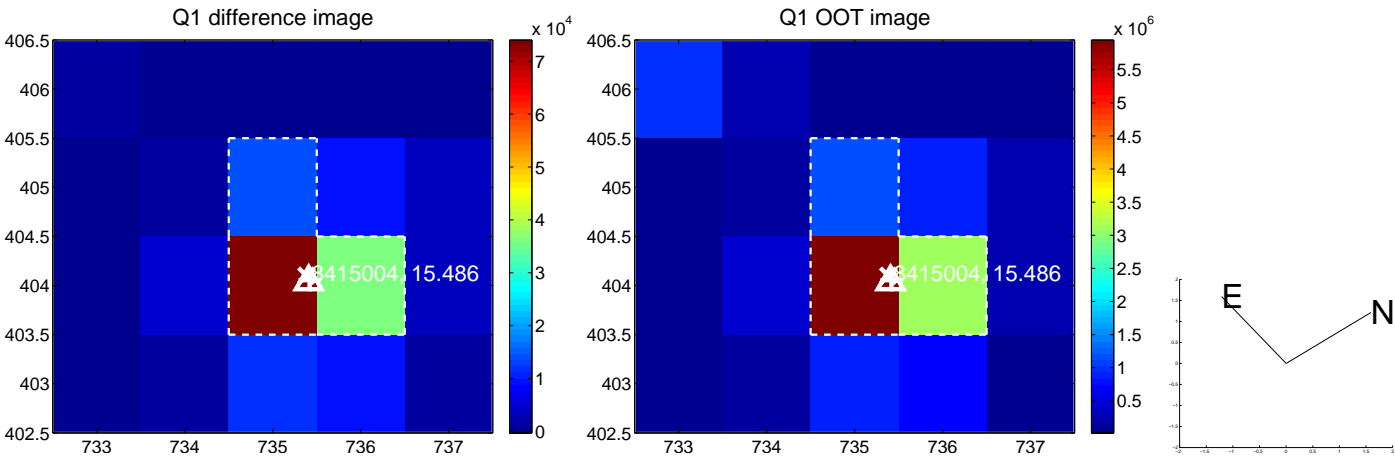
The direct PRF centroid is offset from the target star catalog position by about 0.20 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.187 \pm 0.113$	1.65	$0.151 \pm 0.125$	$0.111 \pm 0.082$
PRF-fit source offset from KIC position	$0.088 \pm 0.113$	0.78	$-0.088 \pm 0.114$	$-0.001 \pm 0.081$
photometric centroid source offset	$0.25 \pm 0.37$	0.68	$-0.13 \pm 0.39$	$0.21 \pm 0.36$

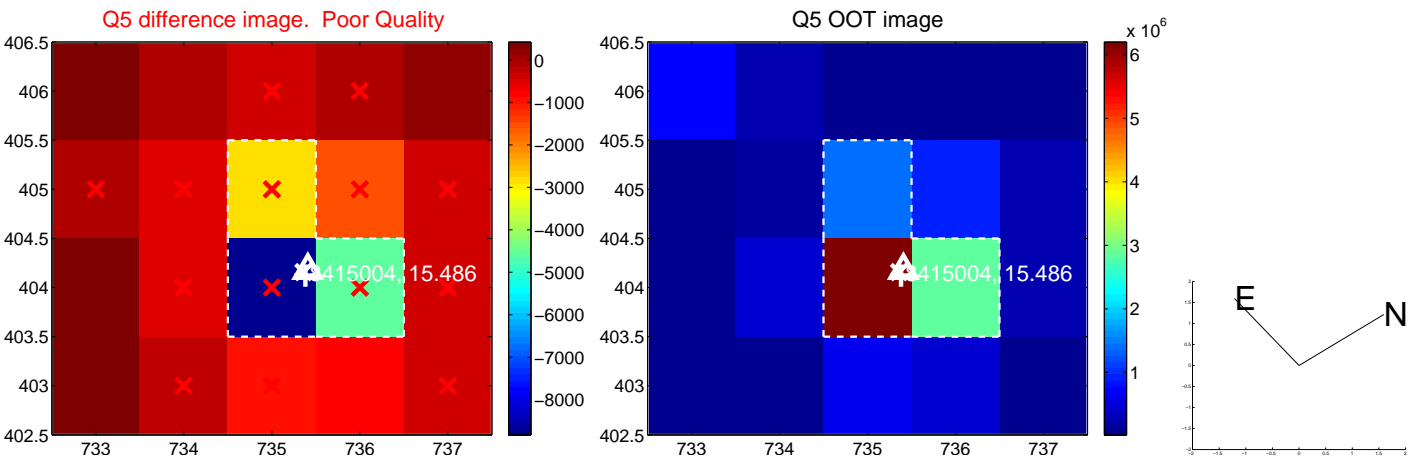


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

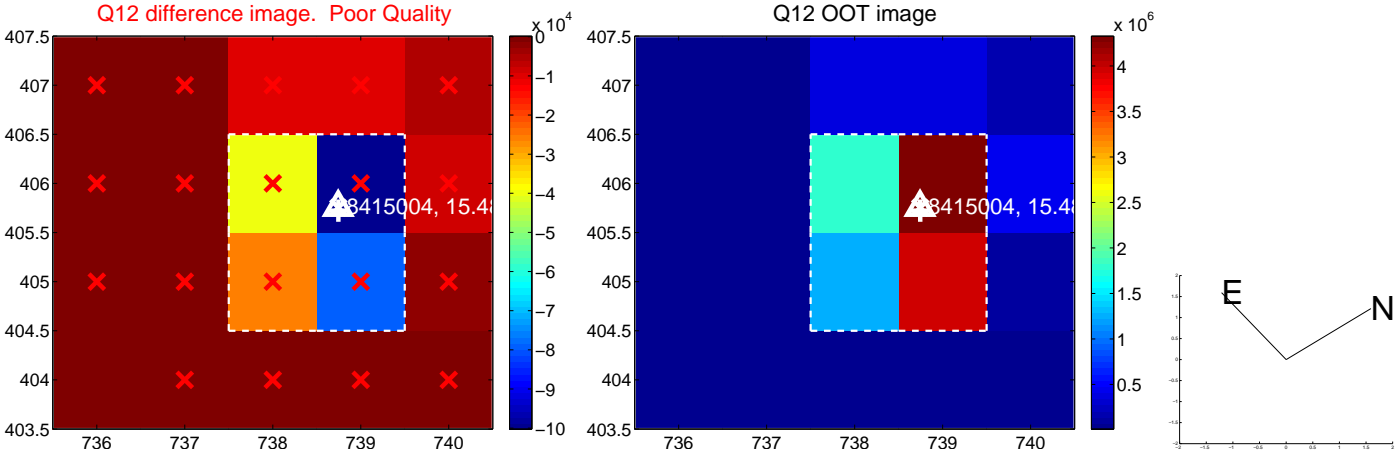
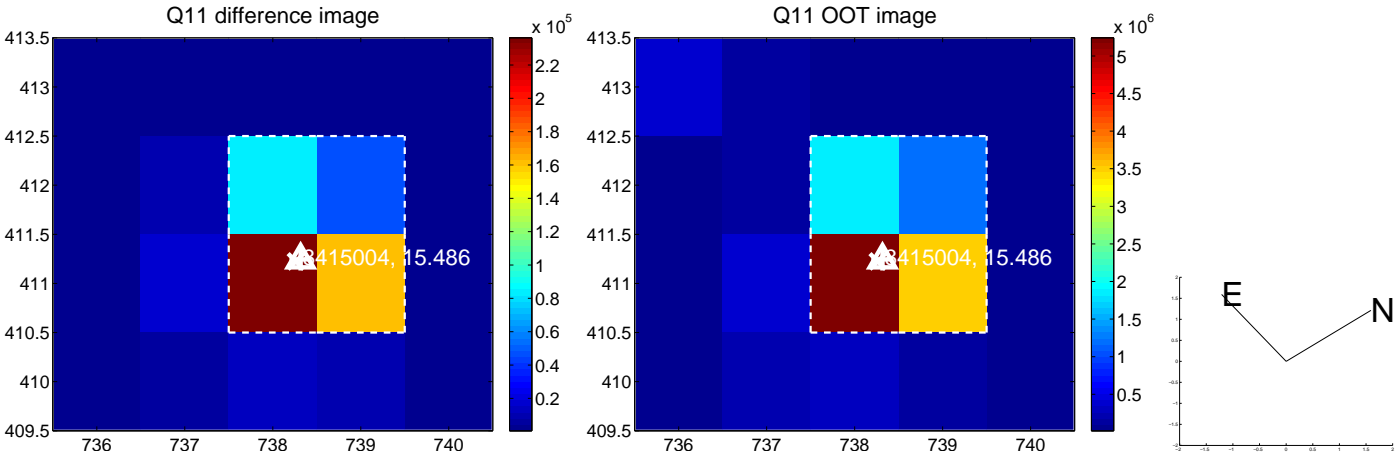
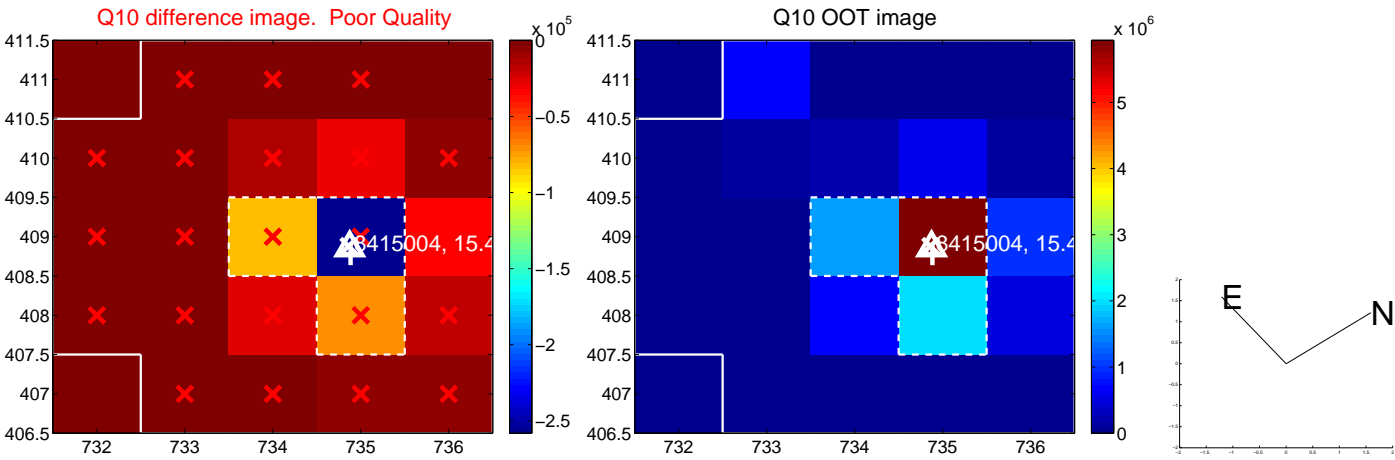
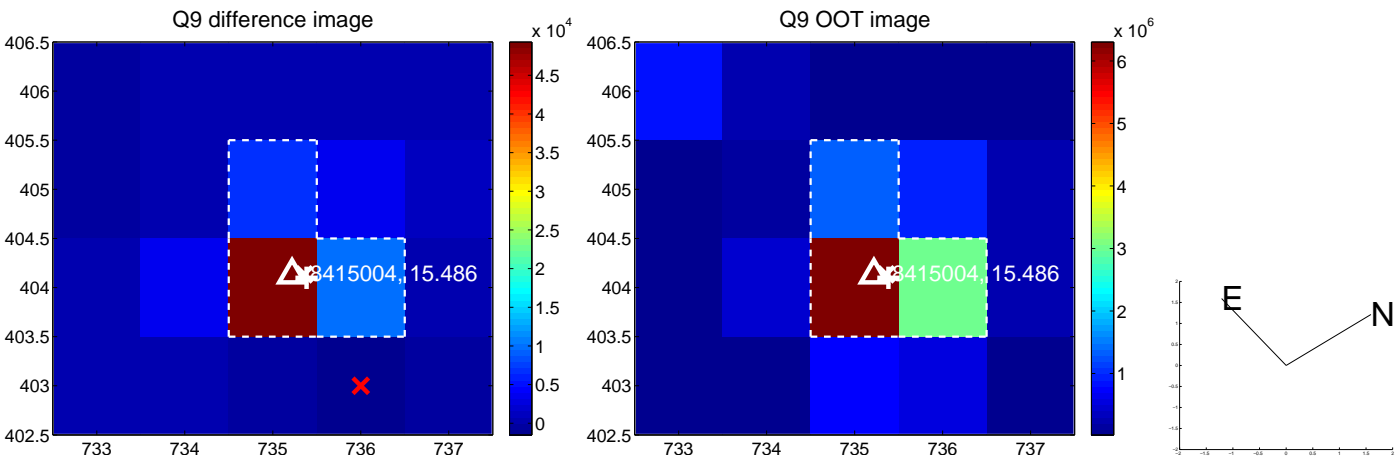


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

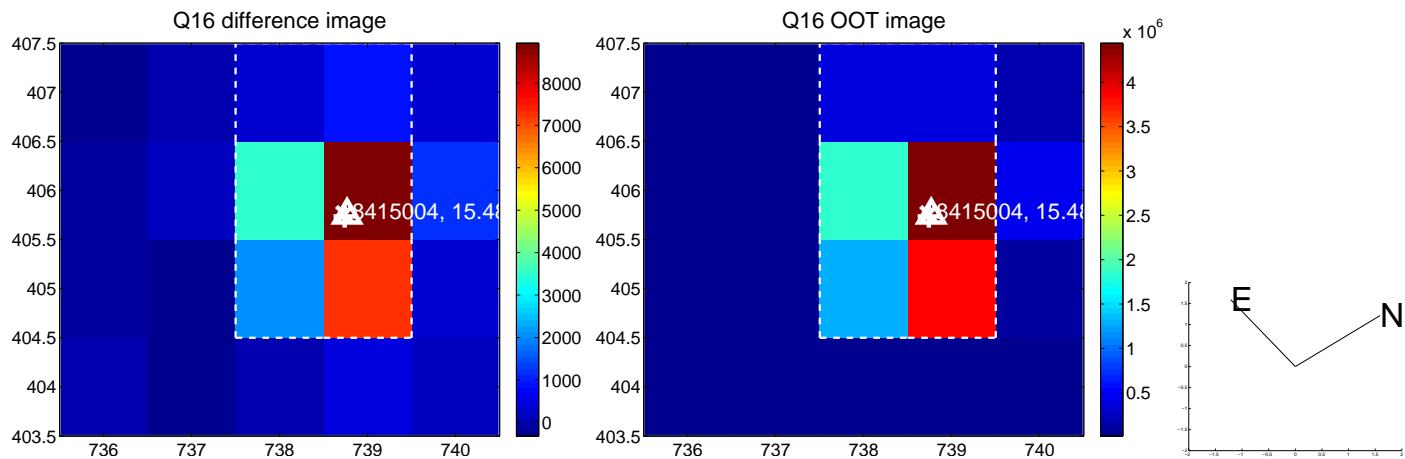
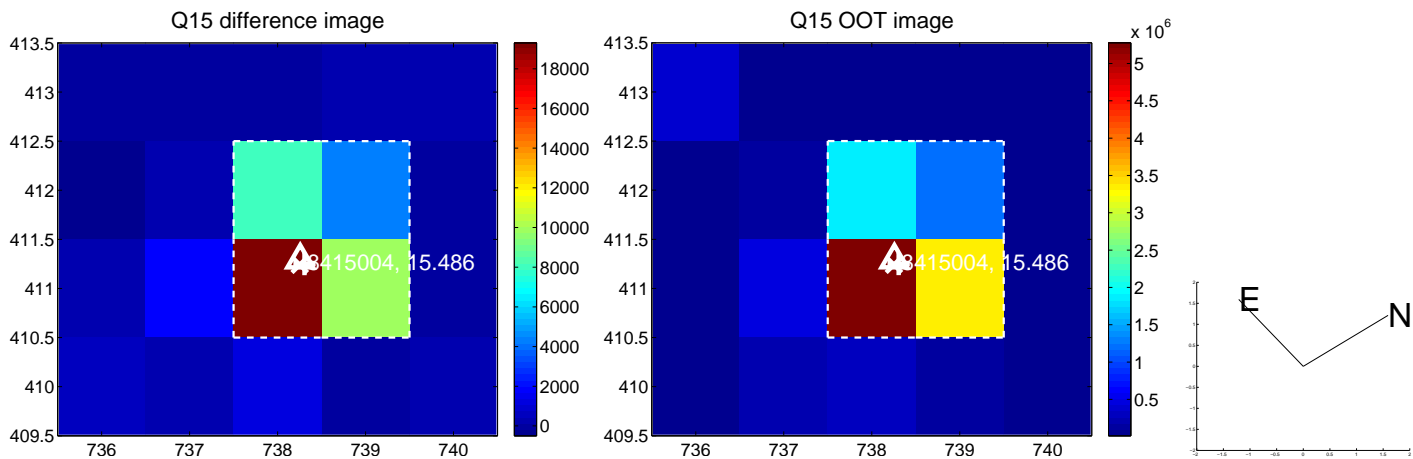
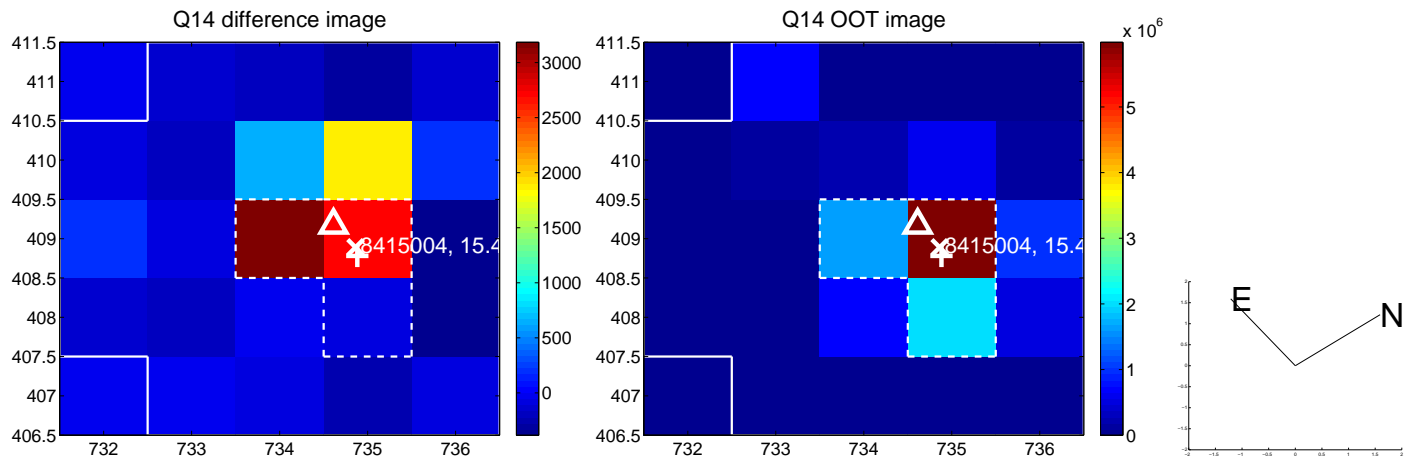
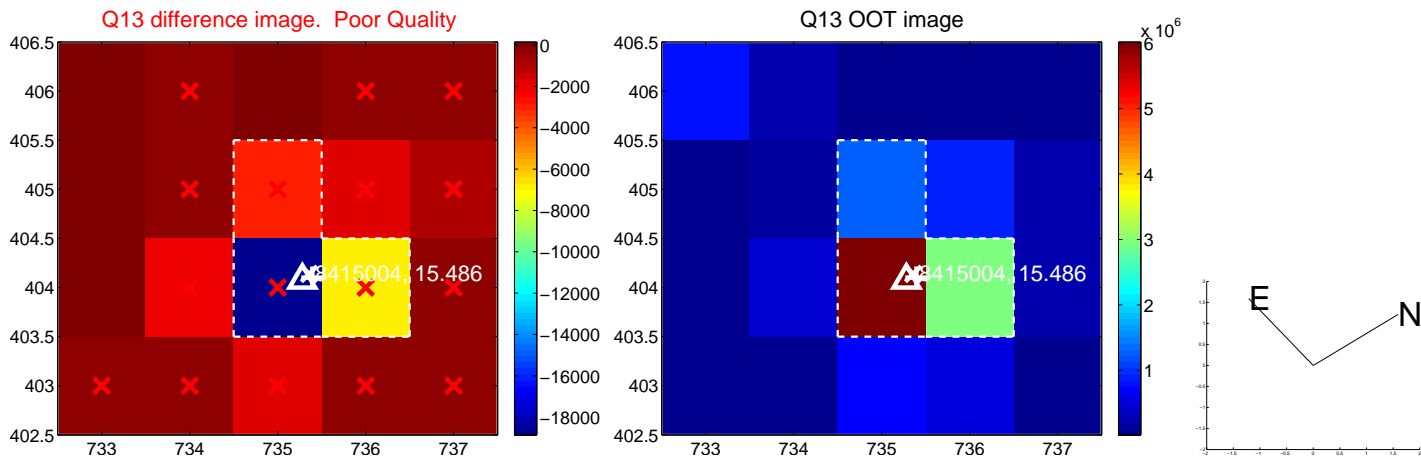




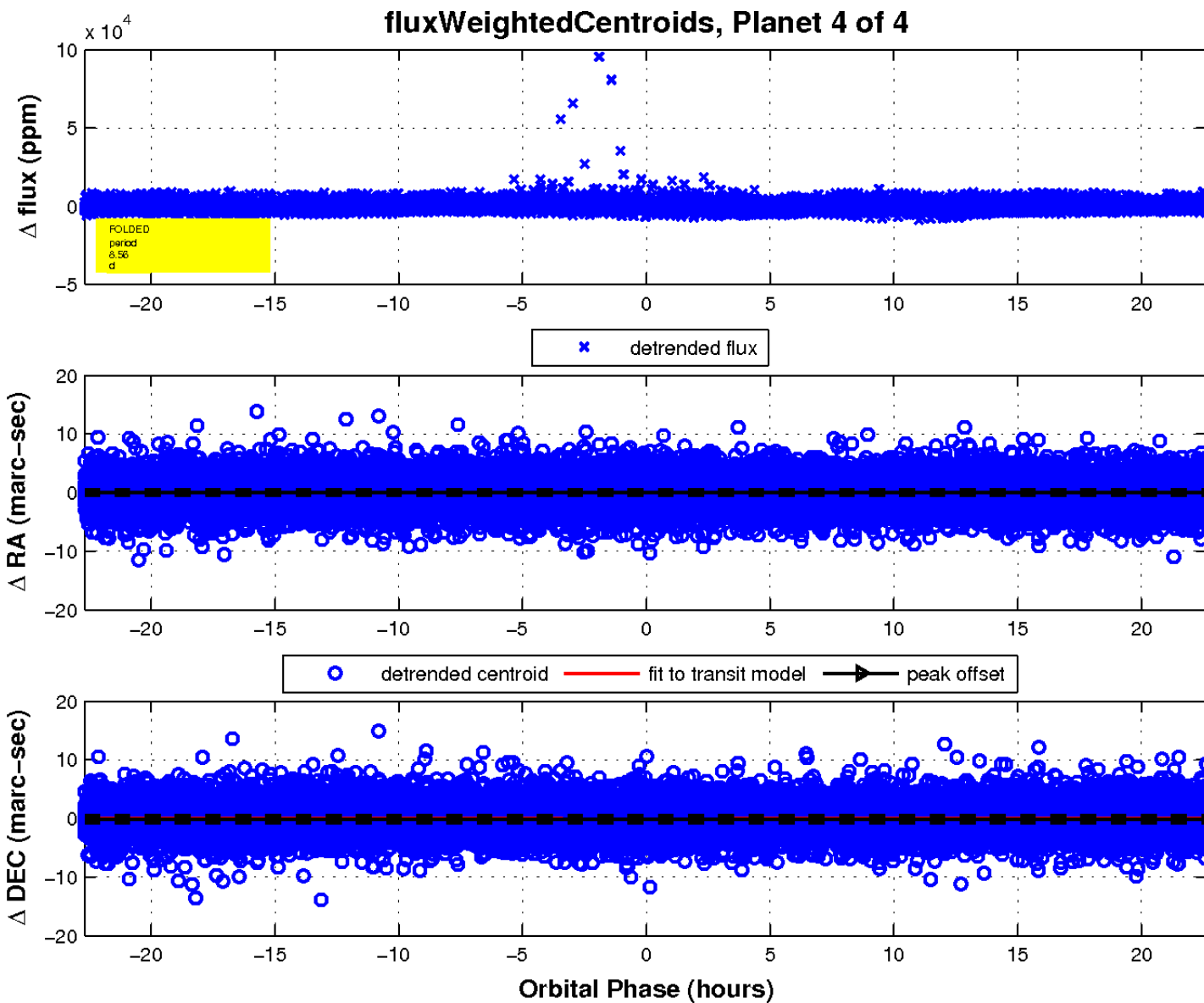
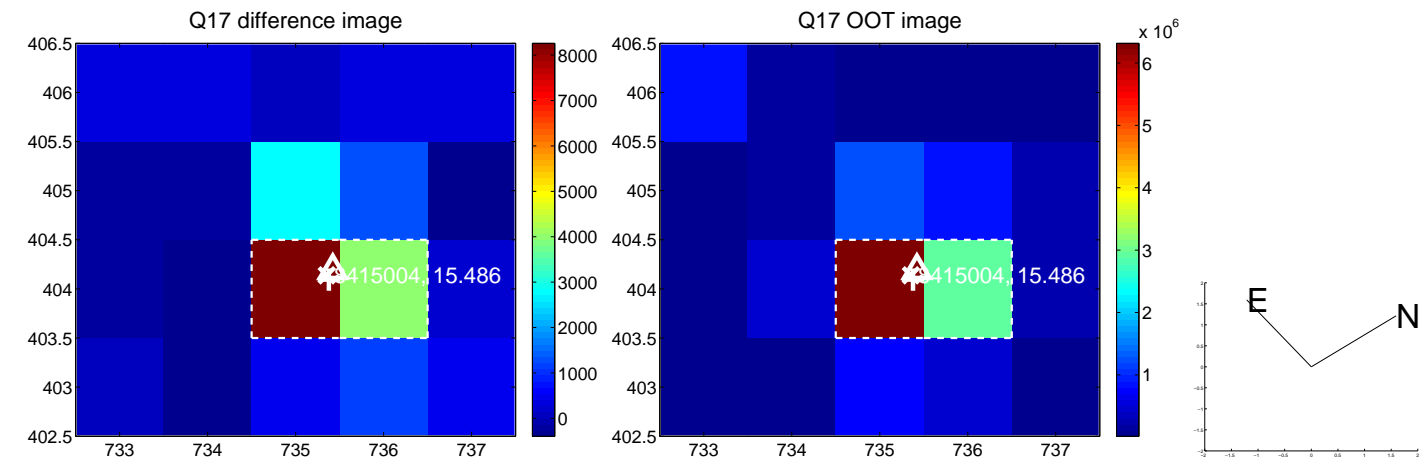
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

