

# KIC 003645438

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
003645438-01	OBS	4385.02	386.371506	452.871398	1367.6	11.213	13.0	13.0	0.83	5119	3.20	0.45
003645438-02	OBS	4385.01	7.298049	137.866515	366.1	3.213	12.2	13.1	0.83	5119	1.93	90.25
003645438-03	OBS	4385.03	17.369336	136.633845	350.9	3.661	8.2	8.3	0.83	5119	1.83	28.40

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003645438-01	OBS	PC	0.91	0	0	0	0	CENT_FEW_DIFFS
003645438-02	OBS	PC	1.00	0	0	0	0	CENT_FEW_DIFFS
003645438-03	OBS	PC	0.95	0	0	0	0	CENT_FEW_DIFFS

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

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

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

Ephemeris Match Information For 003645438-01

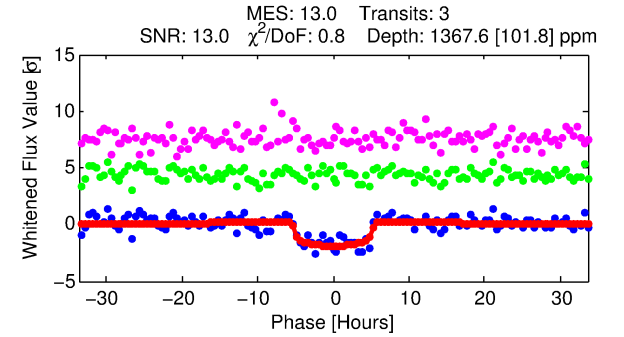
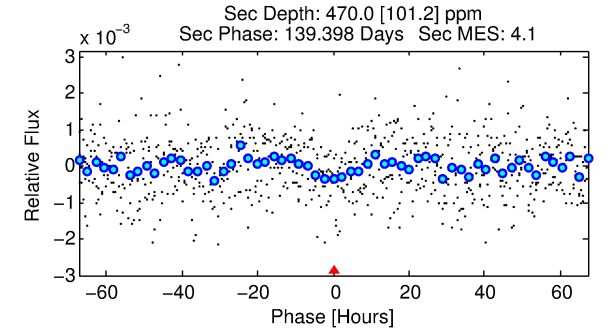
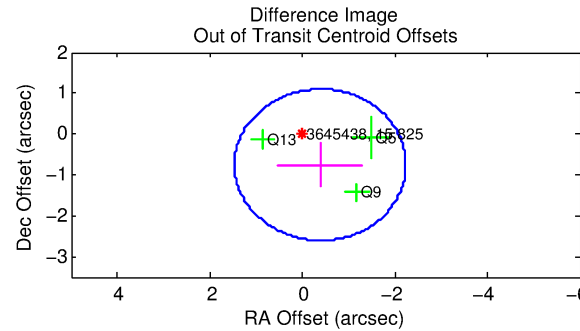
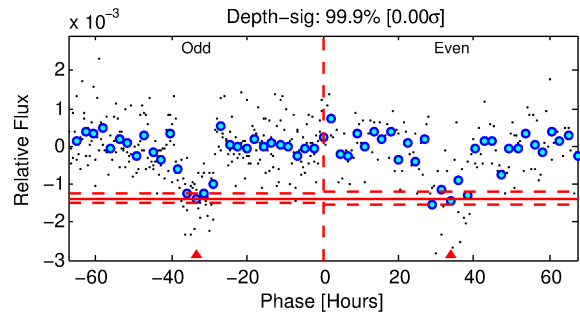
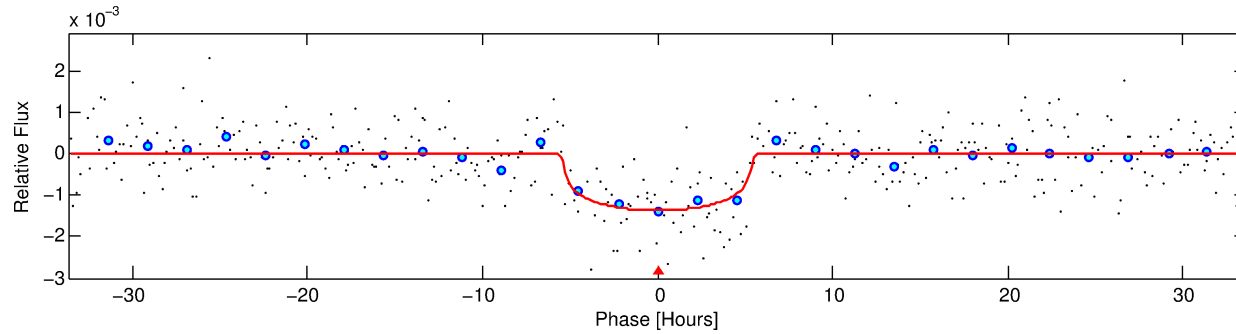
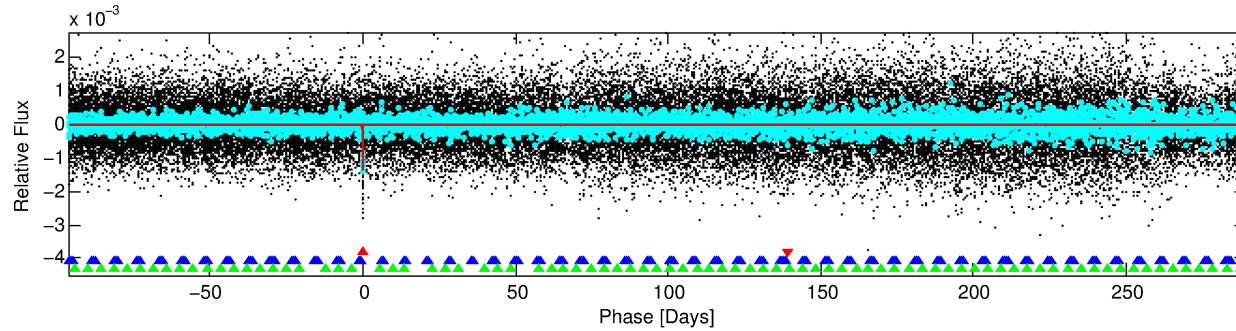
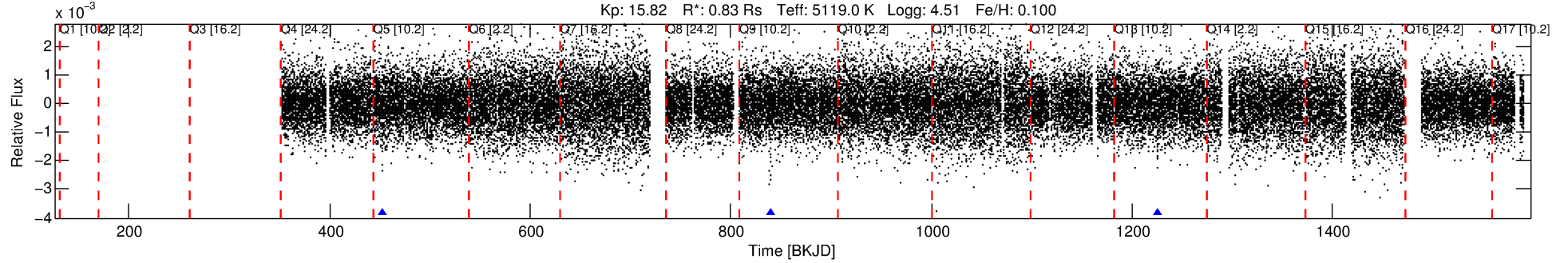
No Significant Match Found

# DV One-Page Summary

KIC: 3645438 Candidate: 1 of 3 Period: 386.372 d

KOI: K04385.02 Corr: 0.988

Kp: 15.82 R\*: 0.83 Rs Teff: 5119.0 K Logg: 4.51 Fe/H: 0.100



## DV Fit Results:

Period = 386.37151 [0.00892] d  
Epoch = 452.8714 [0.0119] BKJD  
Rp/R\* = 0.0352 [0.0127]  
a/R\* = 218.18 [275.03]  
b = 0.62 [1.27]  
Seff = 0.45 [0.05]  
Teq = 209 [6] K  
Rp = 3.20 [1.17] Re  
a = 0.9708 [0.0602] AU  
Ag = 23756.17 [18059.35] [1.32σ]  
Teff = 4018 [760] K [5.01σ]

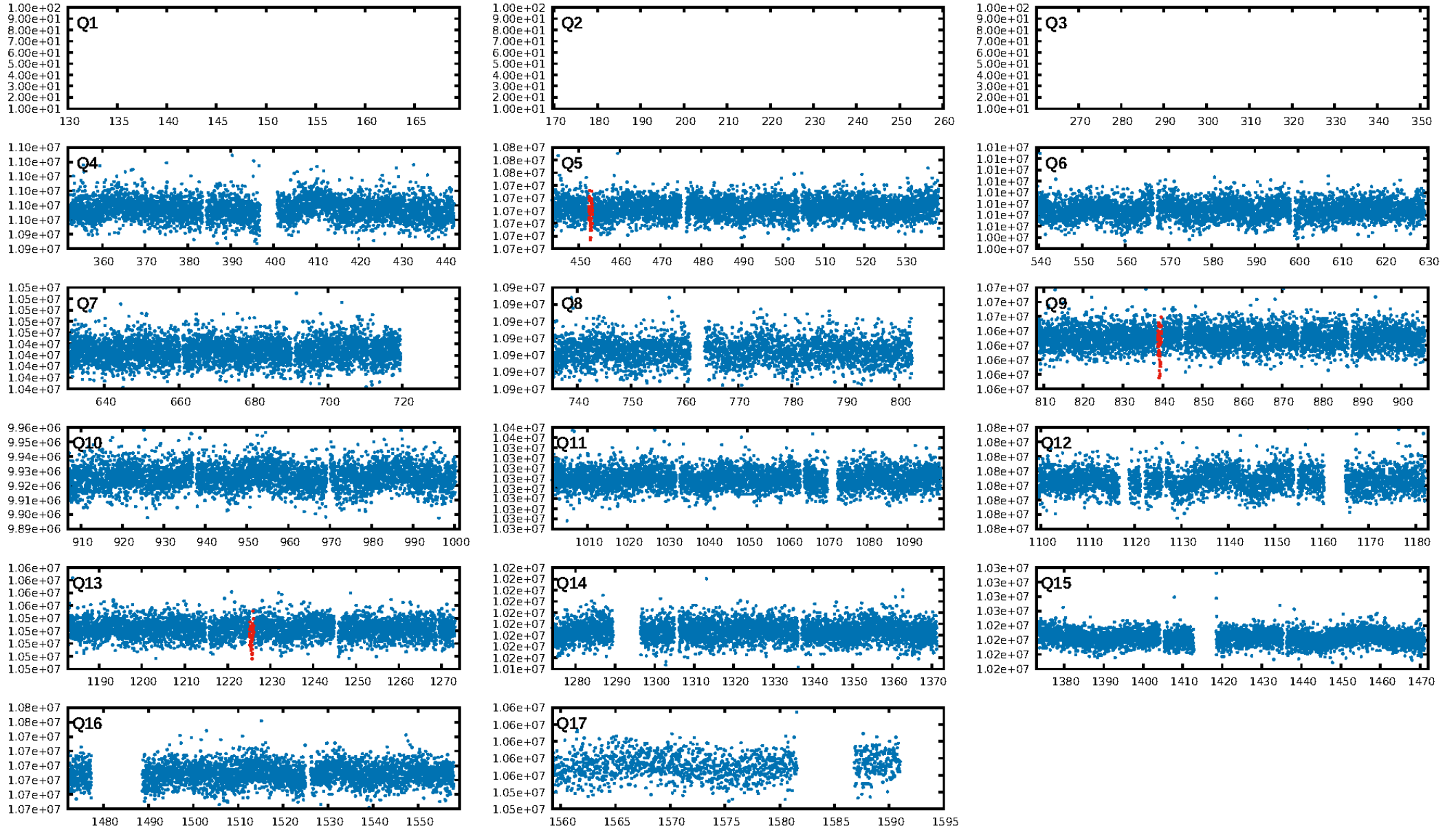
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [750.78σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 65.5%  
ModelChiSquareGof-sig: 99.3%  
Bootstrap-pfa: 3.14e-51  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 5.412  
Centroid-sig: 8.6%  
Centroid-so: 1.404 arcsec [1.07σ]  
OotOffset-rm: 0.847 arcsec [1.37σ]  
OotOffset-st: 0/0/0/3 [3]  
KicOffset-rm: 0.782 arcsec [1.18σ]  
KicOffset-st: 0/0/0/3 [3]  
DiffImageQuality-fgm: 1.00 [3/3]  
DiffImageOverlap-fno: 0.33 [1/3]

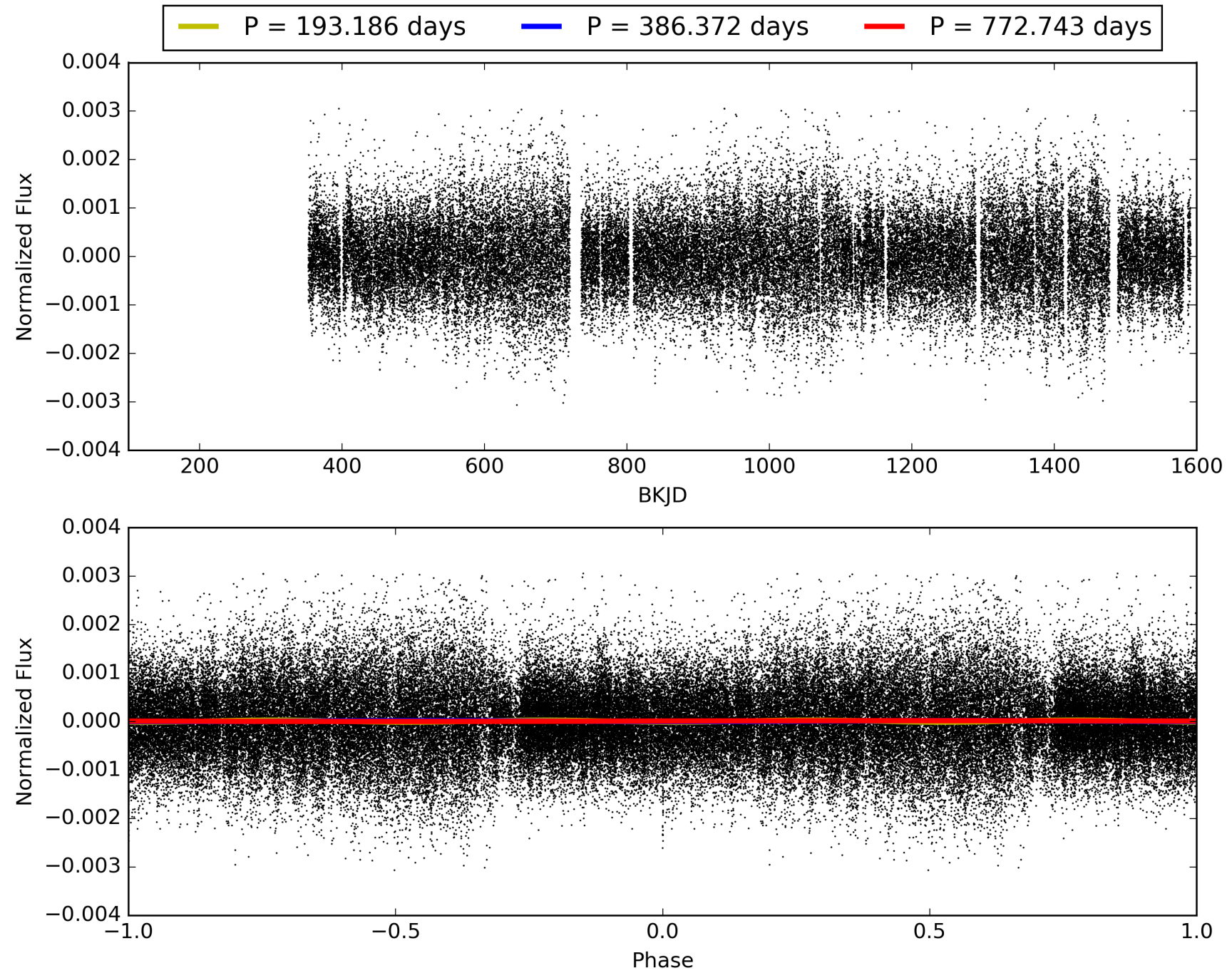
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 02:50:50 Z

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

# TCE 003645438-01, PDC Light Curves

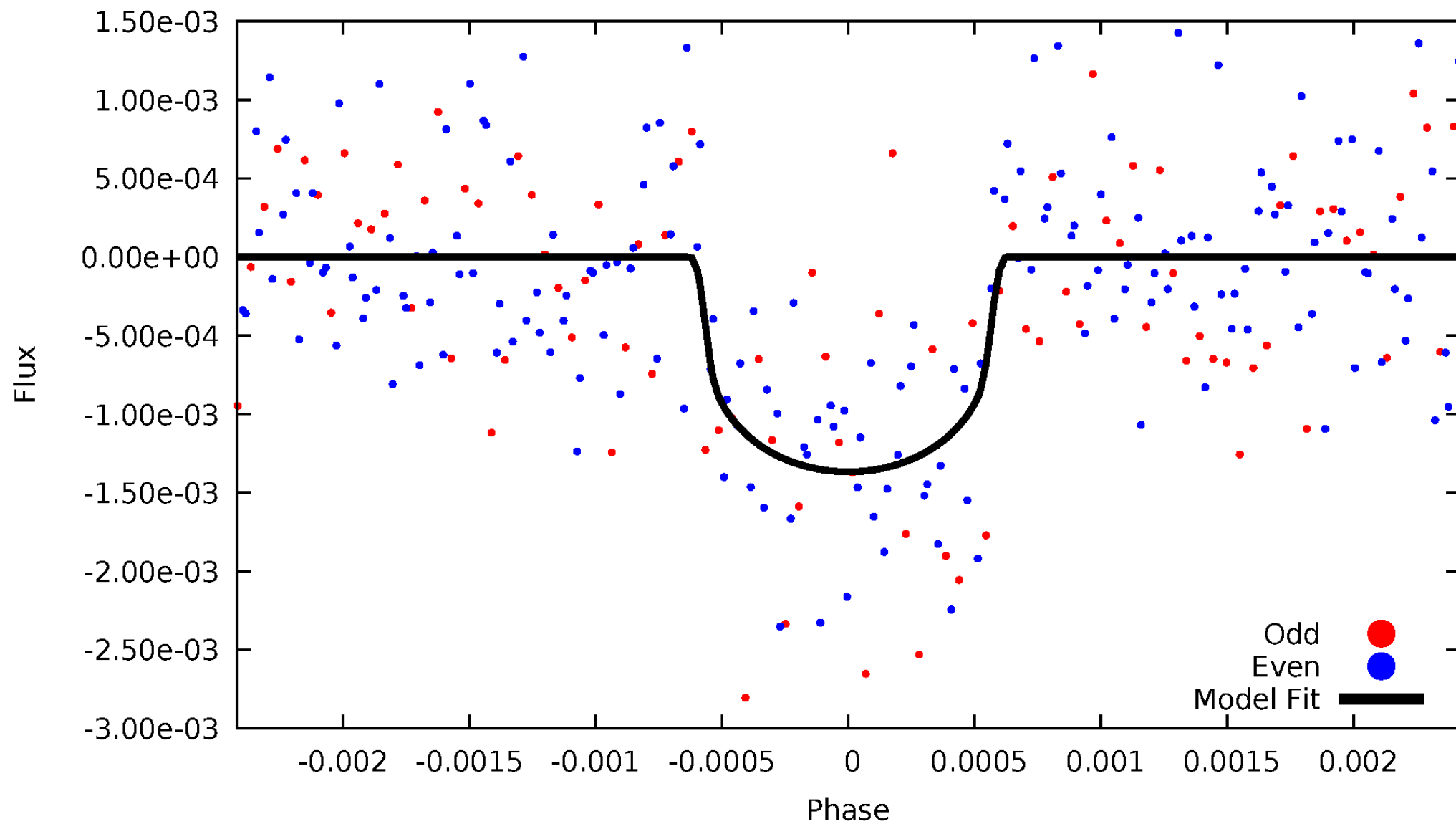


TCE 003645438-01



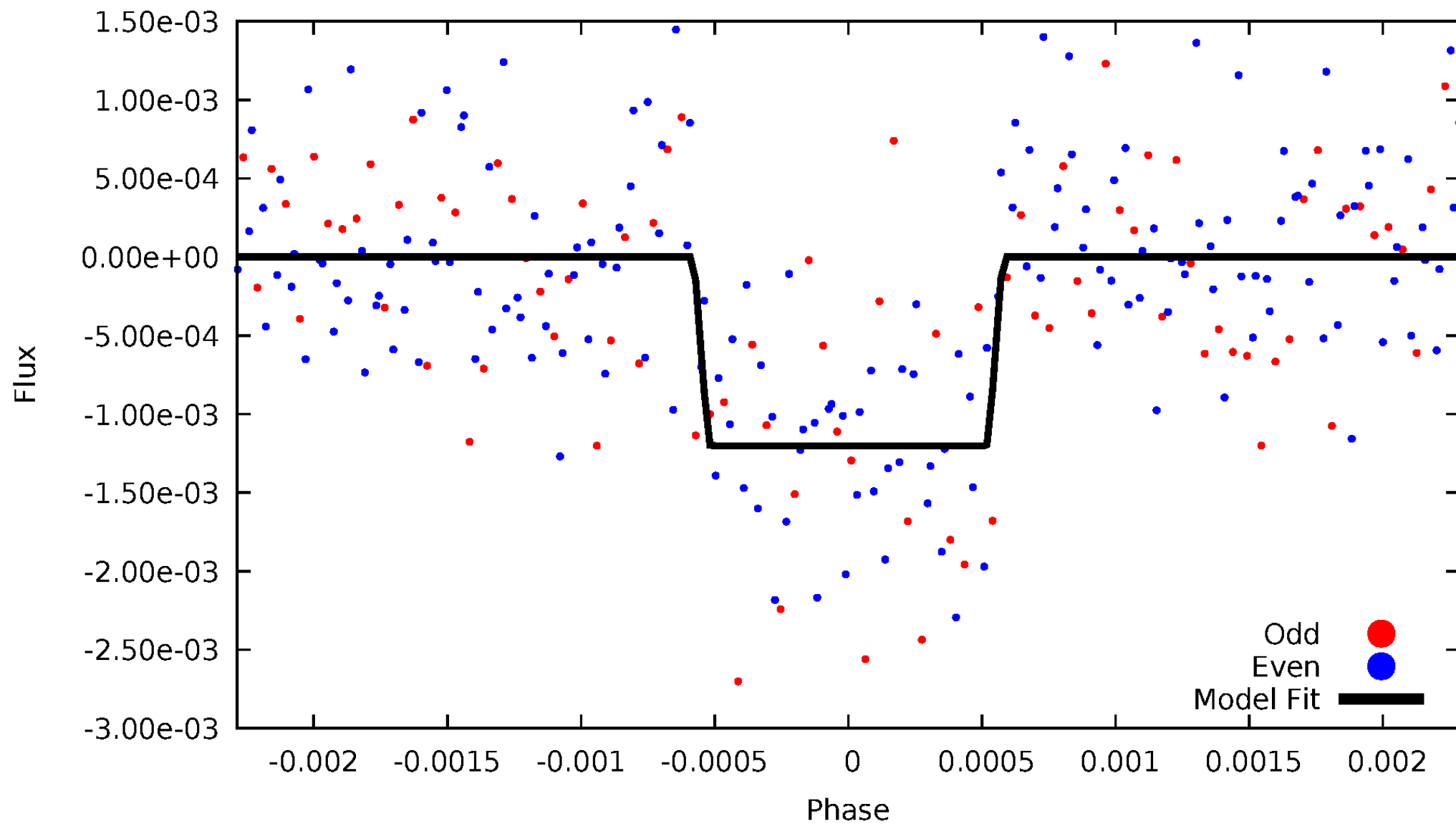
# DV Odd/Even

TCE 003645438-01



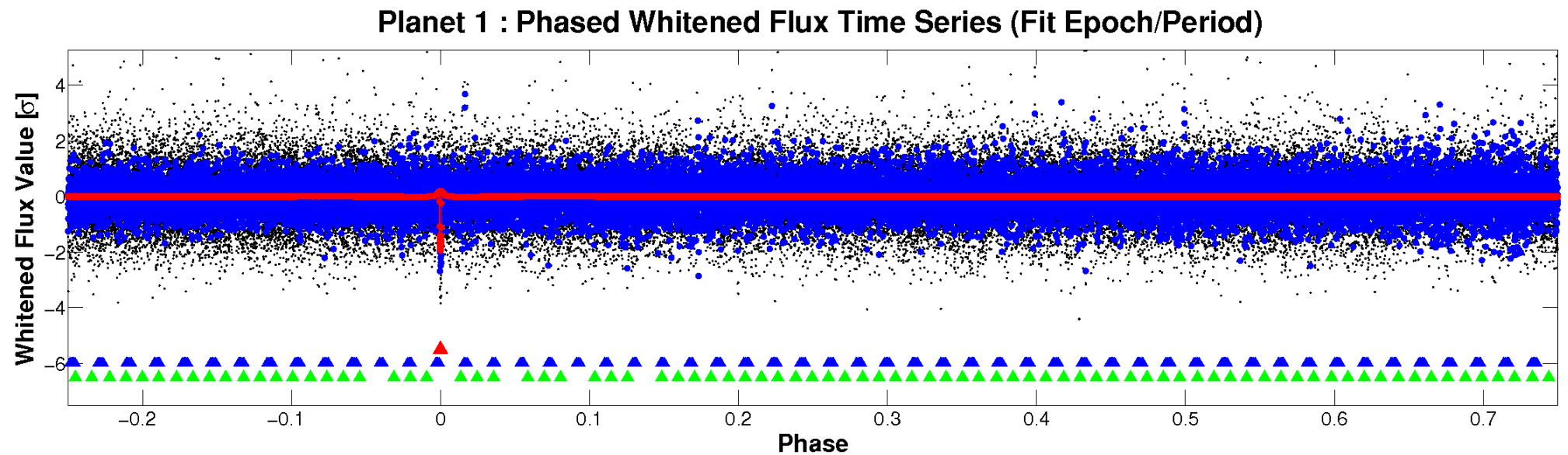
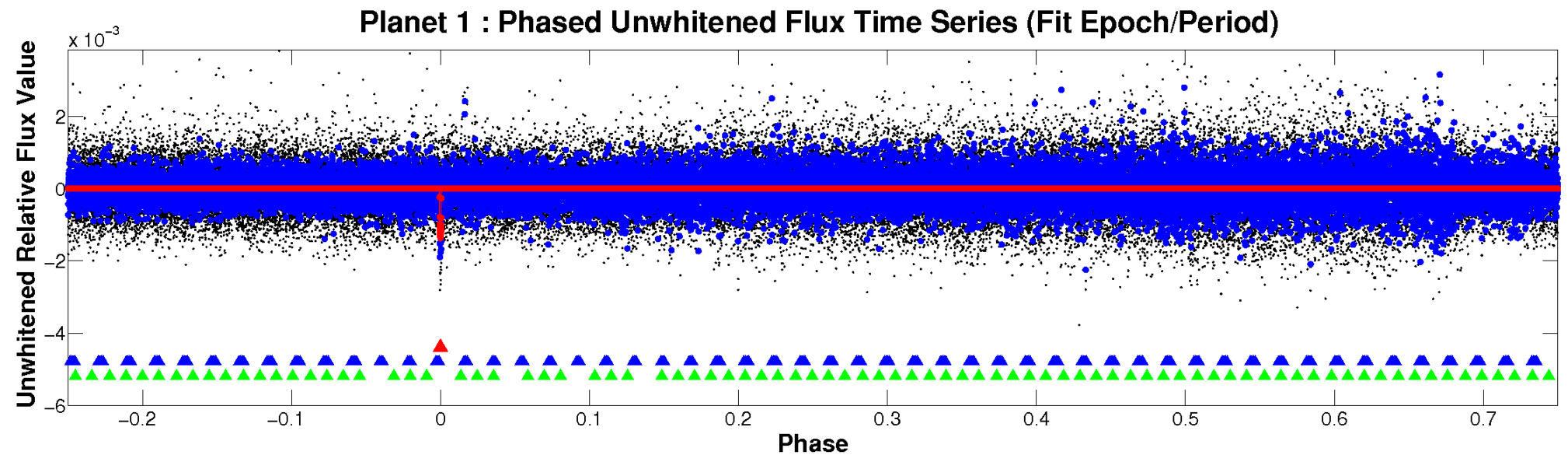
# ALT Odd/Even

TCE 003645438-01



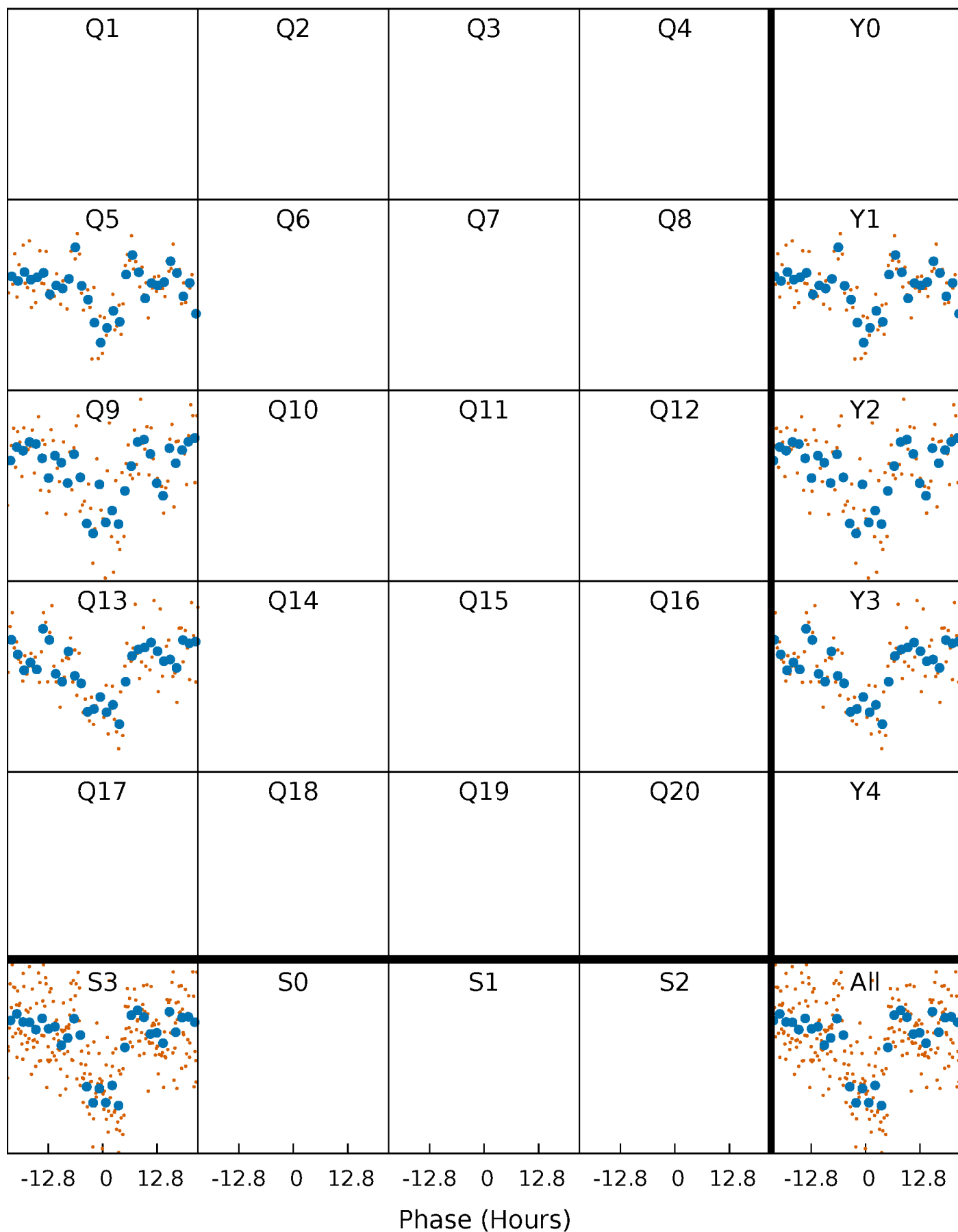


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

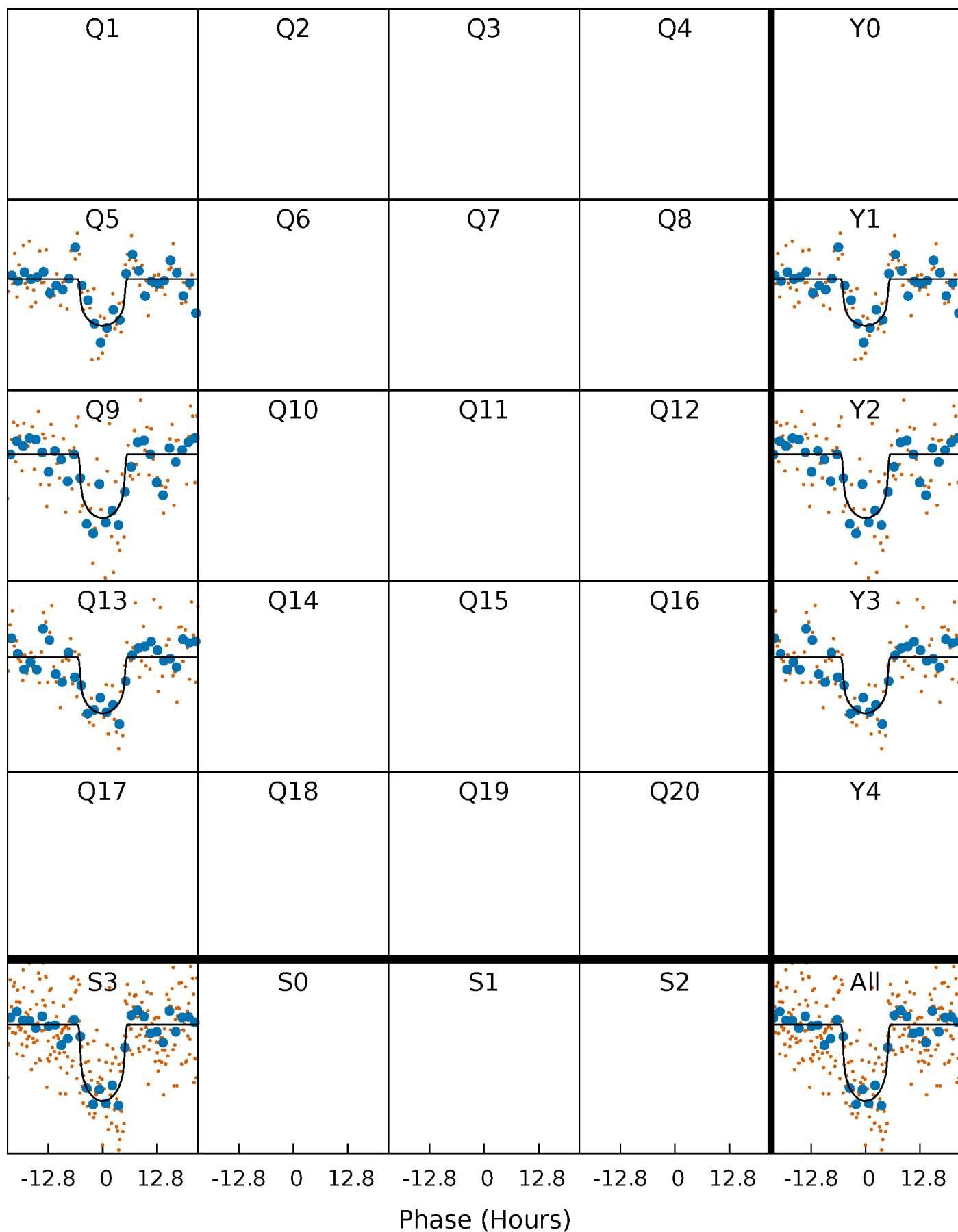
TCE 003645438-01   P=386.371506 Days    $T_0=452.871398$  (BKJD)





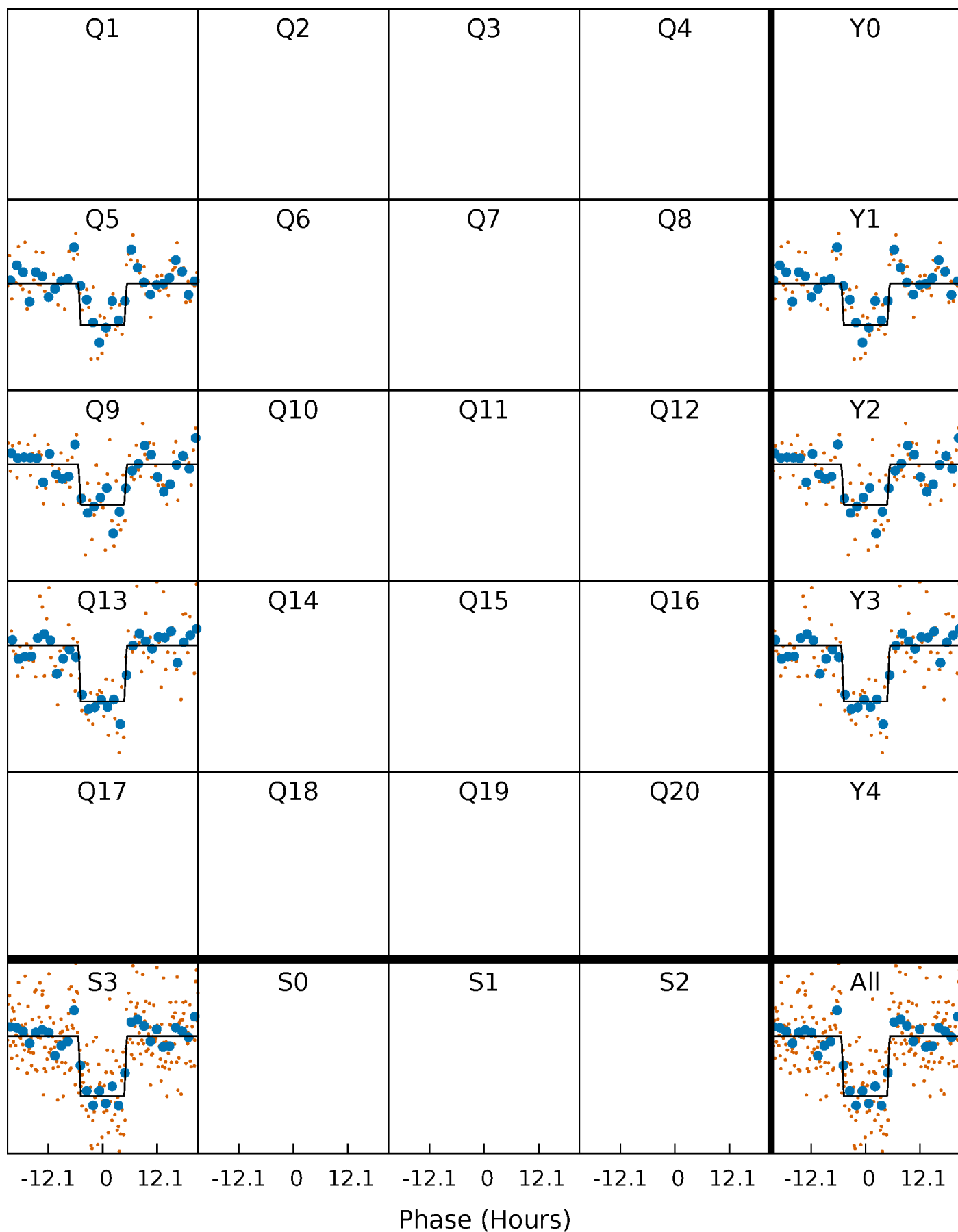
# DV Quarter-Phased Transit Curves

TCE 003645438-01     $P=386.371506$  Days     $T_0=452.871398$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

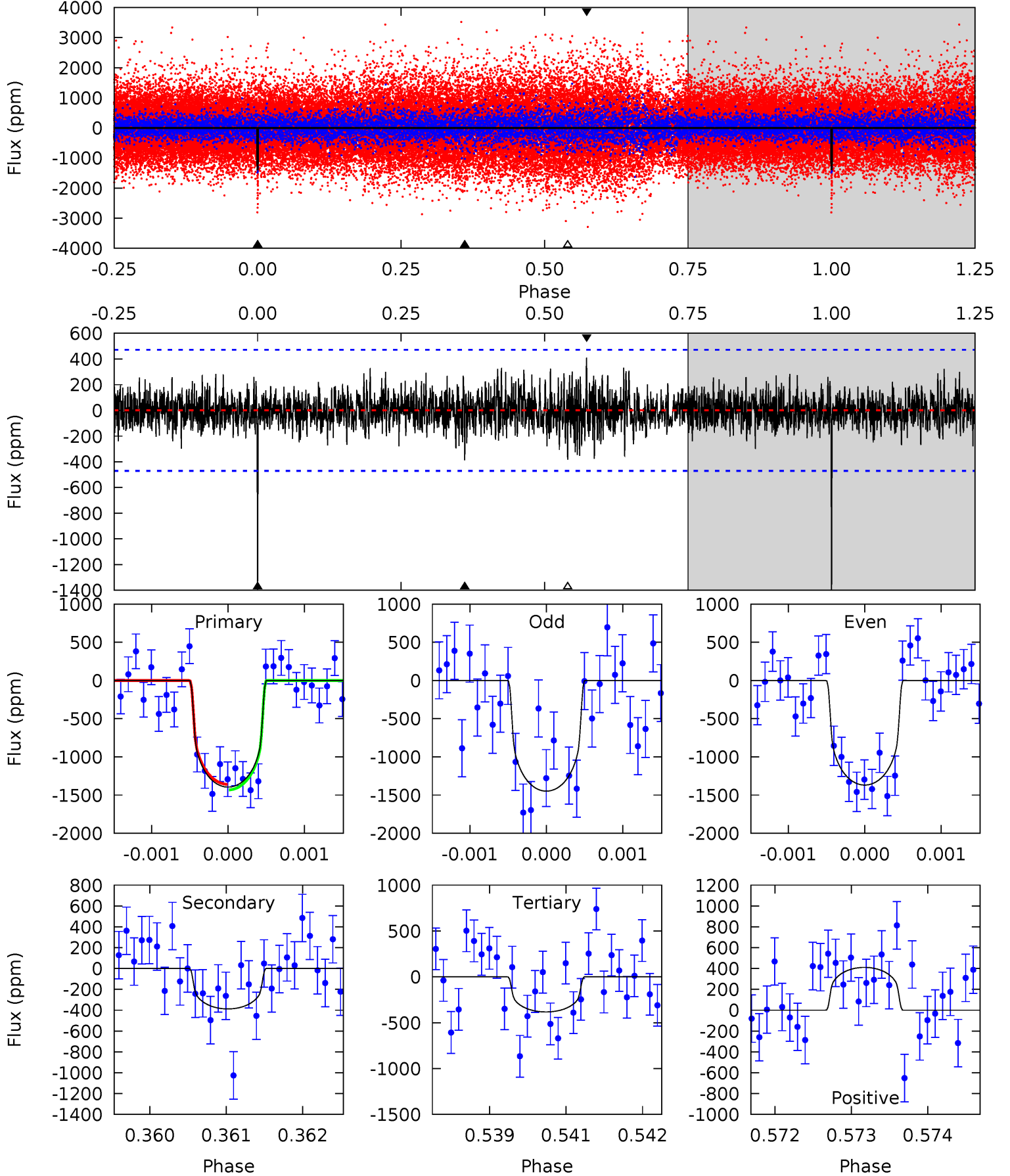
TCE 003645438-01 P=386.371375 Days  $T_0=452.873415$  (BKJD)



# DV Model-Shift Uniqueness Test

003645438-01, P = 386.371506 Days, E = 66.499892 Days

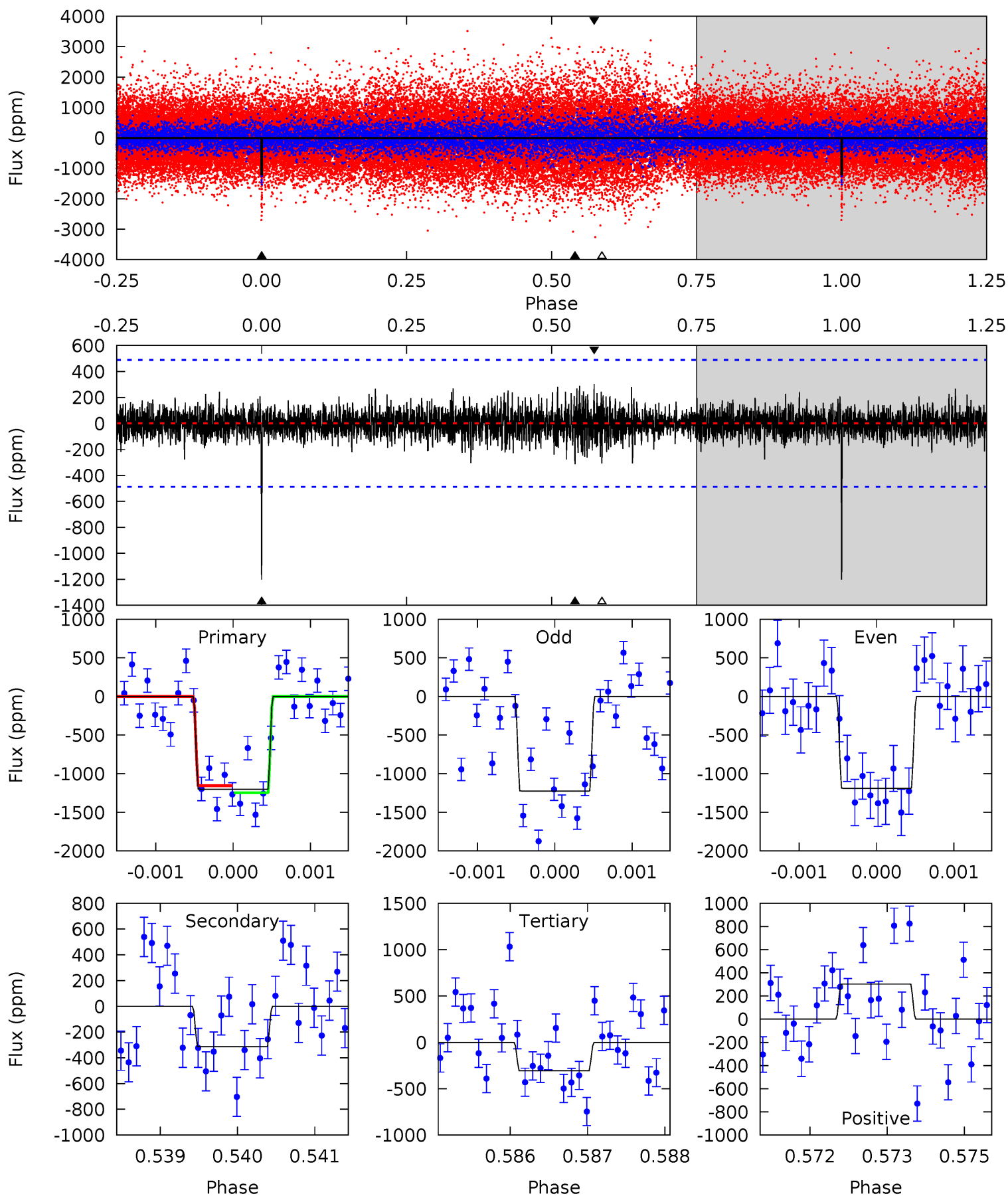
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
16.0	4.45	4.40	4.71	5.41	3.23	1.14	11.6	11.3	0.06	-0.26	0.43	0.97	0.23	0.42



# Alt Model-Shift Uniqueness Test

003645438-01,  $P = 386.371375$  Days,  $E = 66.502040$  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
13.3	3.48	3.41	3.36	5.43	3.25	0.84	9.92	9.97	0.07	0.12	0.18	0.98	0.20	0.51



### Stellar Parameters For KIC 003645438

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5119^{+82}_{-82}$	$4.508^{+0.060}_{-0.040}$	$0.100^{+0.150}_{-0.150}$	$0.834^{+0.047}_{-0.052}$	$0.818^{+0.053}_{-0.035}$	$1.983^{+0.457}_{-0.256}$
	+2%/-2%	+1%/-1%	+150%/-150%	+6%/-6%	+6%/-4%	+23%/-13%
Source	SPE90	SPE90	SPE90	DSEP		

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

### Secondary Eclipse Parameters for KIC 003645438-01 / KOI 4385.02

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-388 \pm 87$	$3.07^{+1.30}_{-1.07}$	$292^{+7}_{-7}$	$4118^{+795}_{-472}$	$21355^{+30093}_{-11135}$
Alt.	$-314 \pm 90$	$3.19^{+1.07}_{-1.11}$	$292^{+6}_{-7}$	$3908^{+686}_{-406}$	$15633^{+22051}_{-7522}$

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

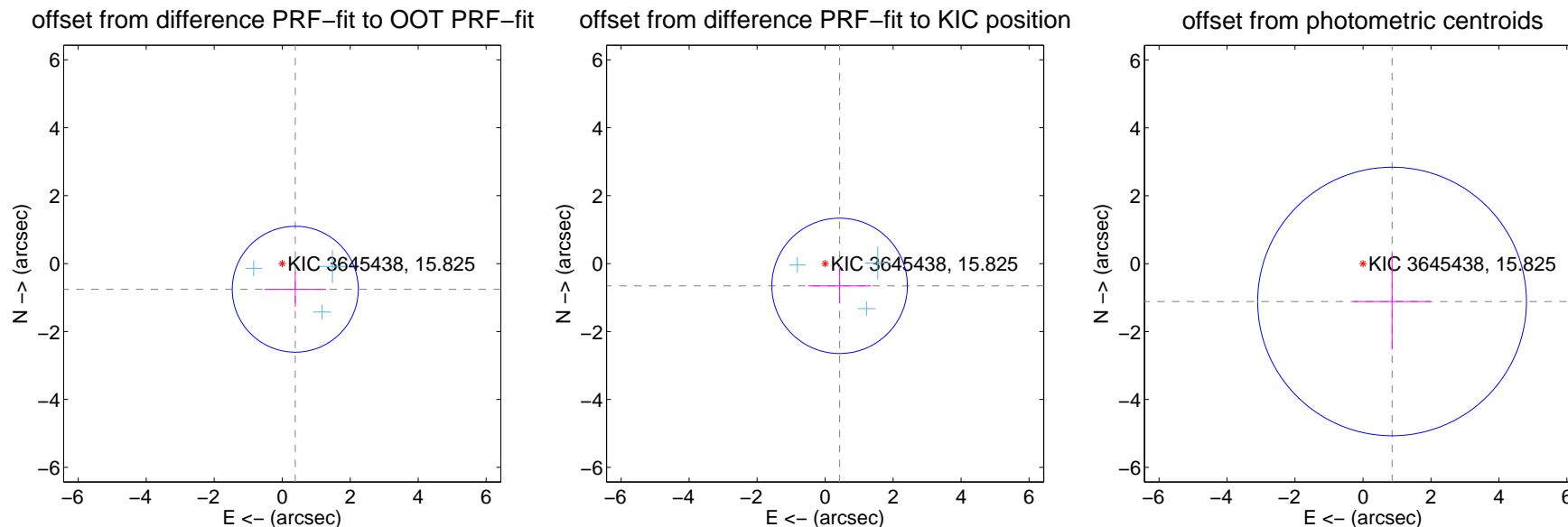
## DV Centroid Data

Supplemental centroid analysis for 003645438-01. Kepler magnitude: 15.82. Transit SNR 13.00

There are 3 quarters with good PRF difference image offsets

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

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.847 \pm 0.618$	1.37	$-0.385 \pm 0.908$	$-0.755 \pm 0.516$
PRF-fit source offset from KIC position	$0.782 \pm 0.664$	1.18	$-0.426 \pm 0.926$	$-0.655 \pm 0.515$
photometric centroid source offset	$1.40 \pm 1.32$	1.07	$-0.86 \pm 1.14$	$-1.11 \pm 1.41$



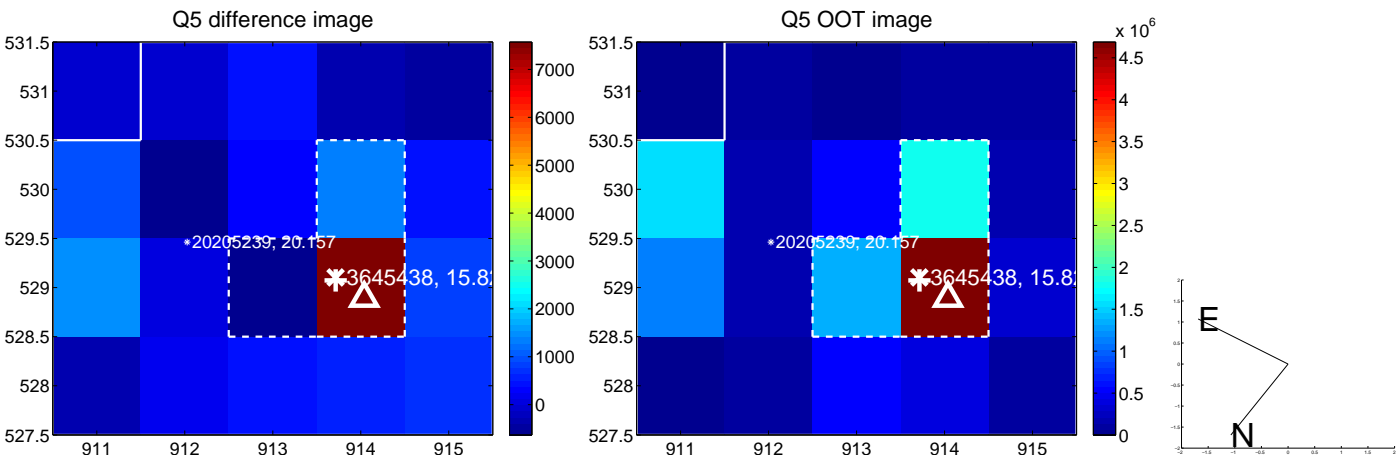
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

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

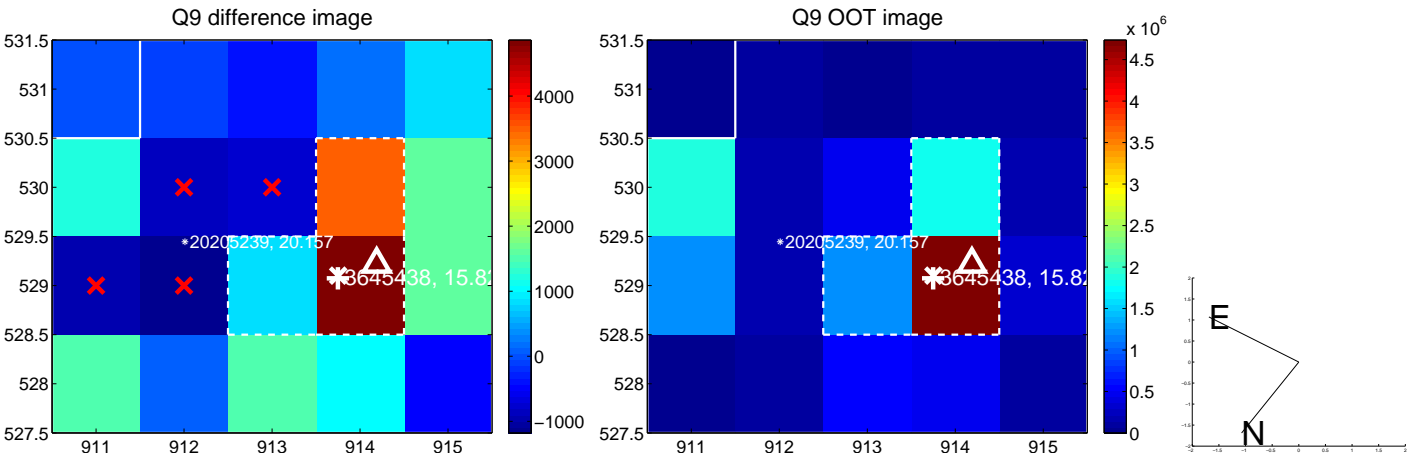




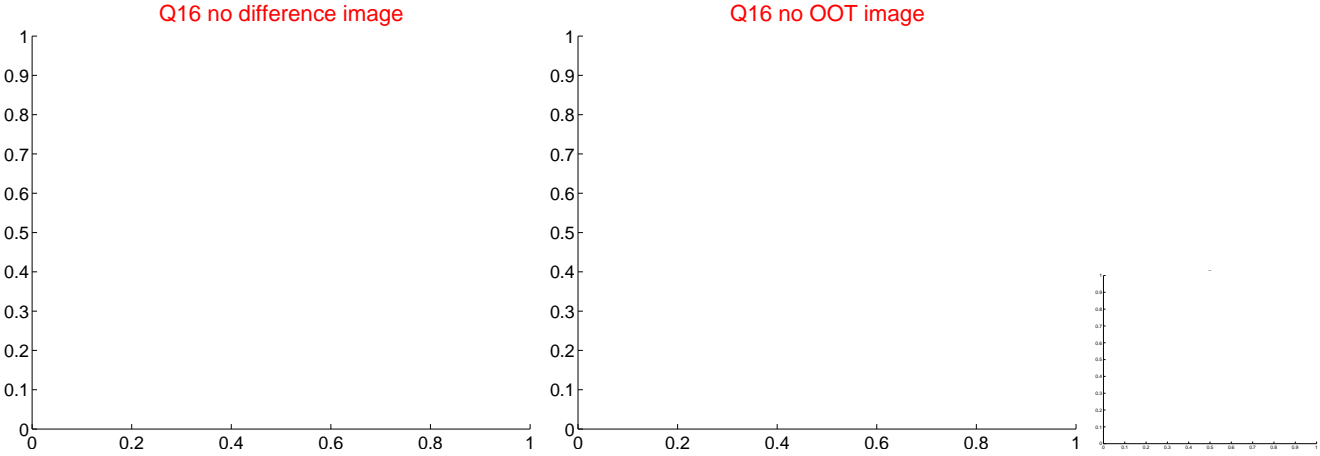
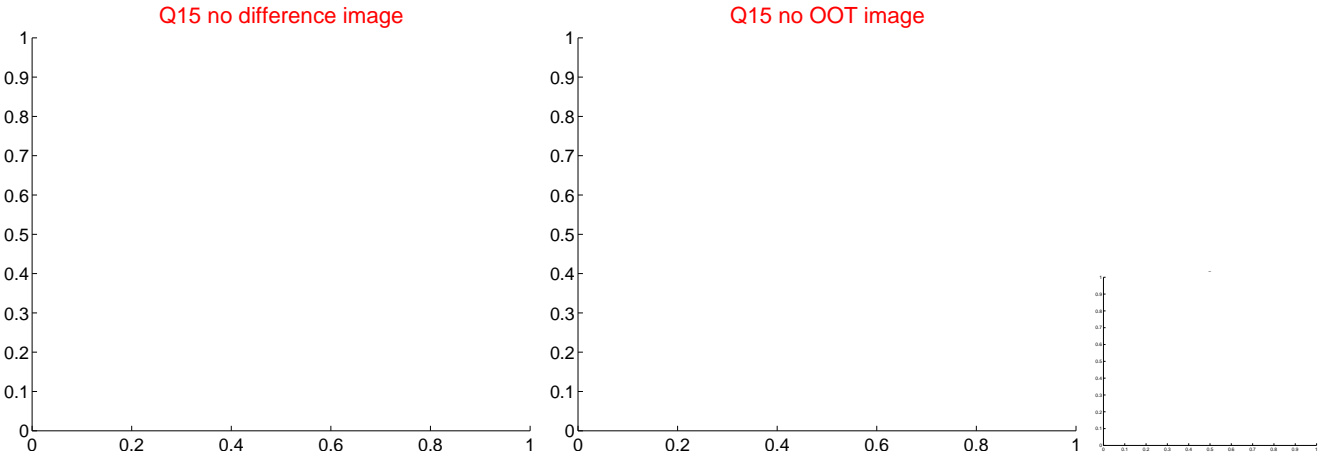
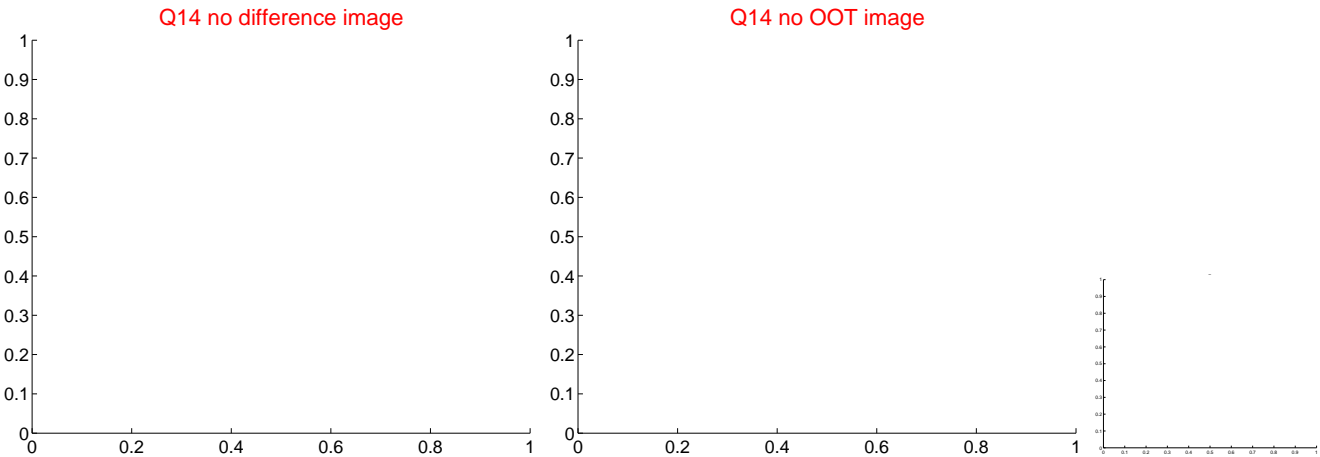
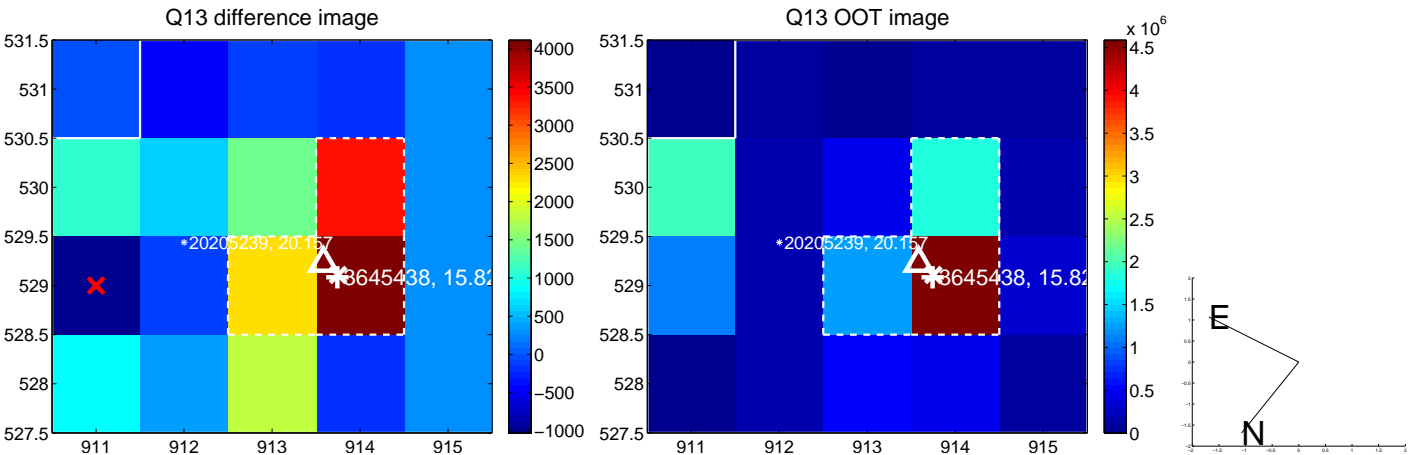
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.



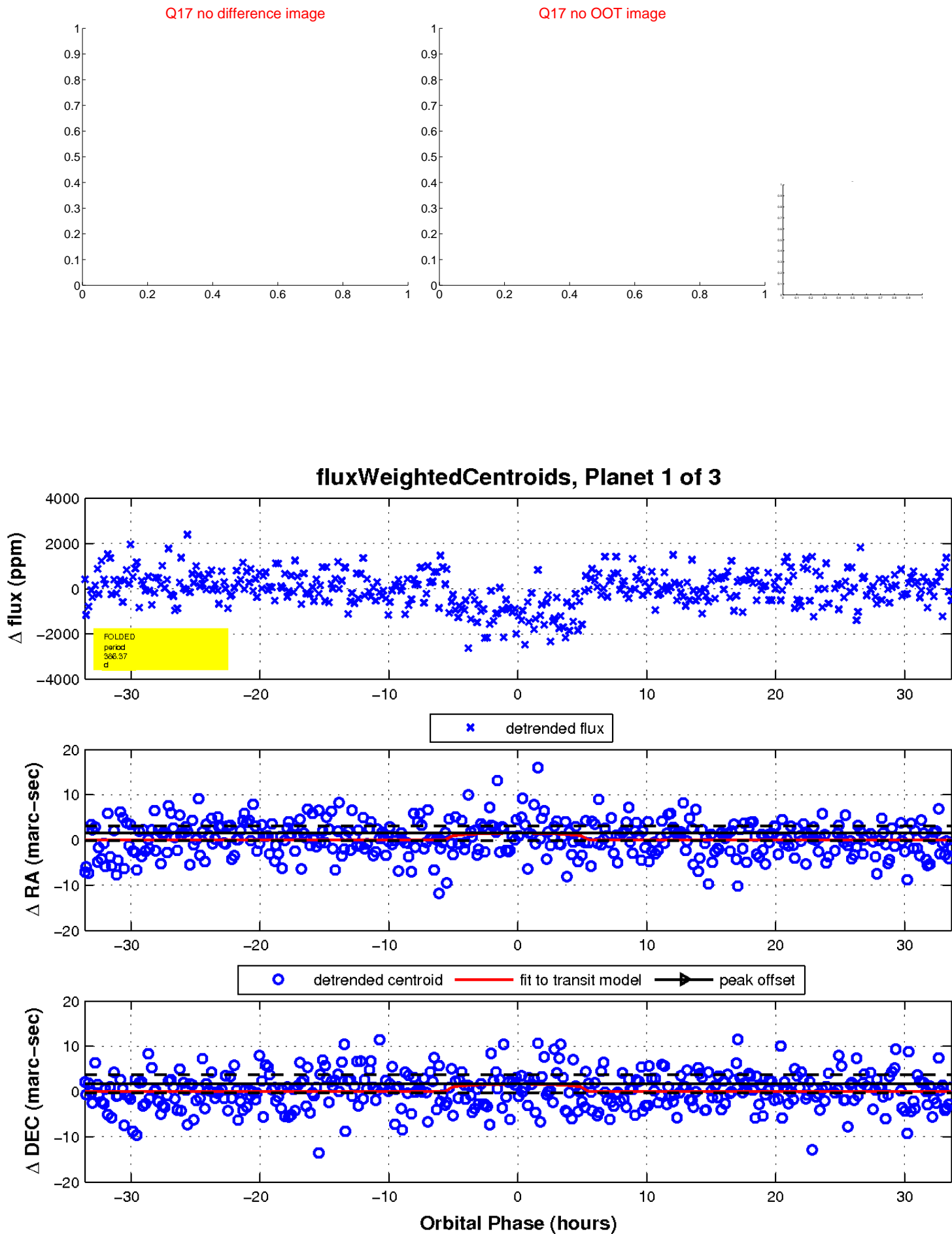
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

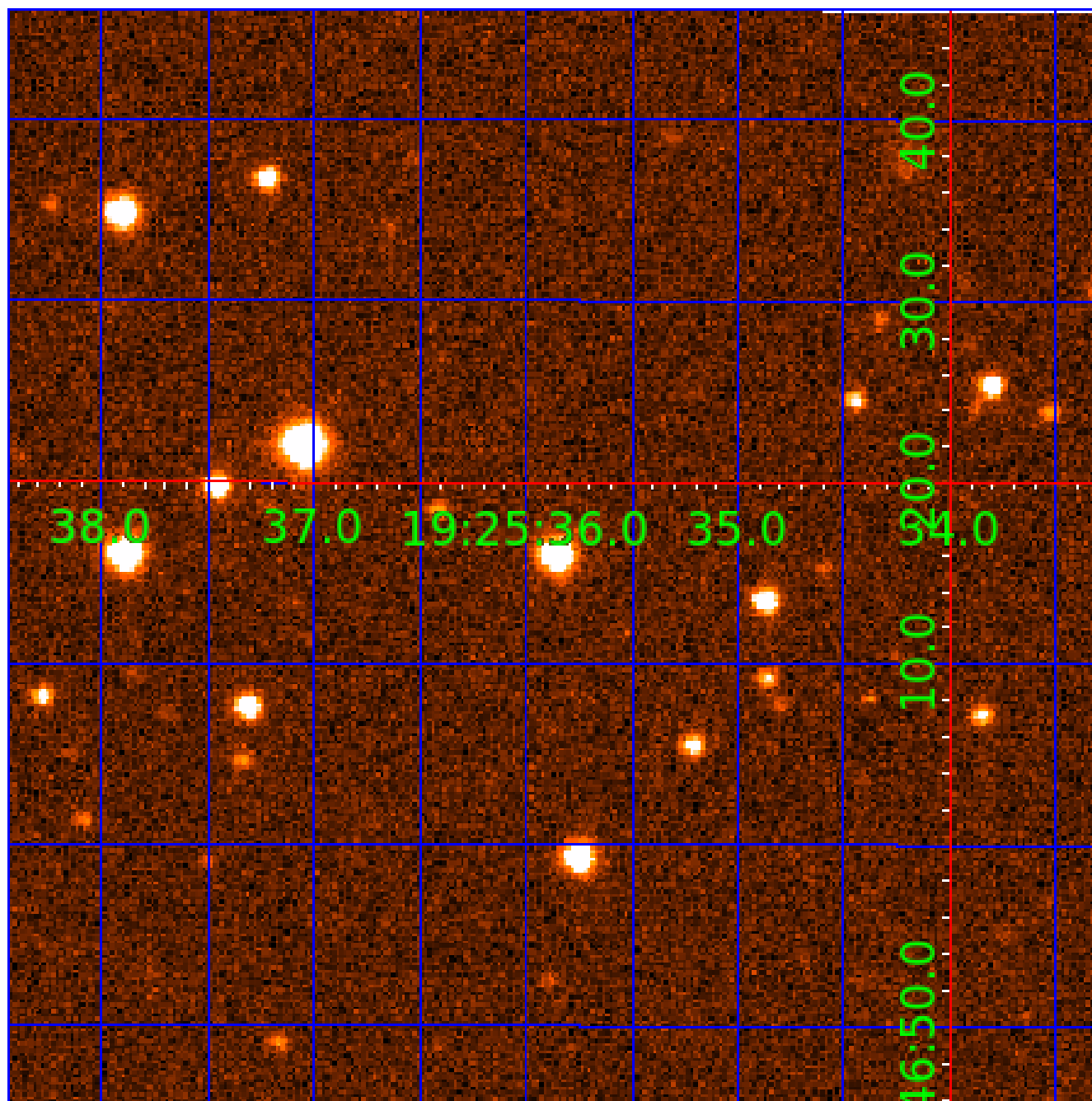


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 003645438

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
003645438-01	OBS	4385.02	386.371506	452.871398	1367.6	11.213	13.0	13.0	0.83	5119	3.20	0.45
003645438-02	OBS	4385.01	7.298049	137.866515	366.1	3.213	12.2	13.1	0.83	5119	1.93	90.25
003645438-03	OBS	4385.03	17.369336	136.633845	350.9	3.661	8.2	8.3	0.83	5119	1.83	28.40

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003645438-01	OBS	PC	0.91	0	0	0	0	CENT_FEW_DIFFS
003645438-02	OBS	PC	1.00	0	0	0	0	CENT_FEW_DIFFS
003645438-03	OBS	PC	0.95	0	0	0	0	CENT_FEW_DIFFS

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

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

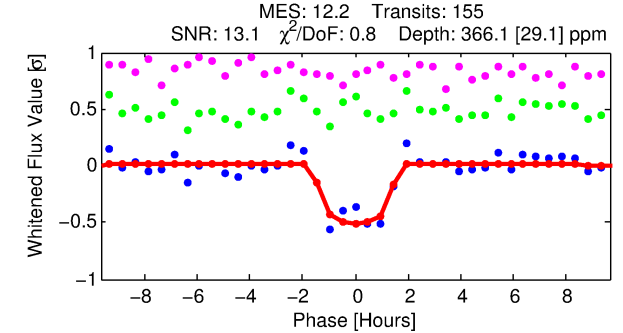
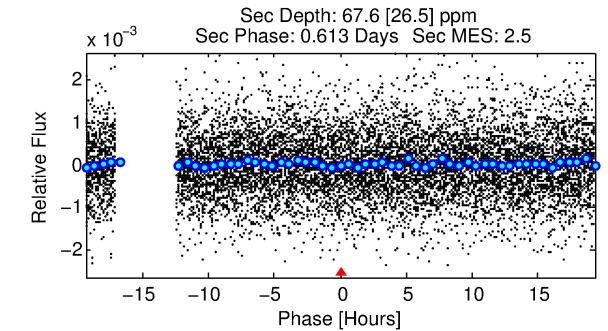
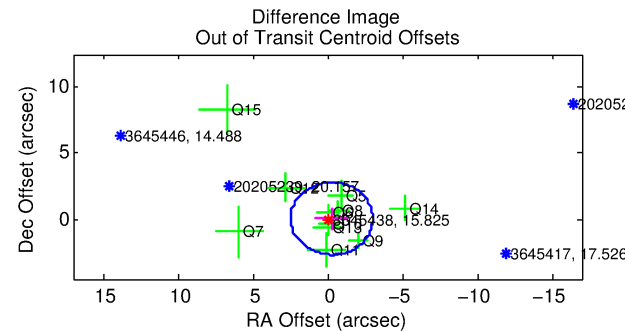
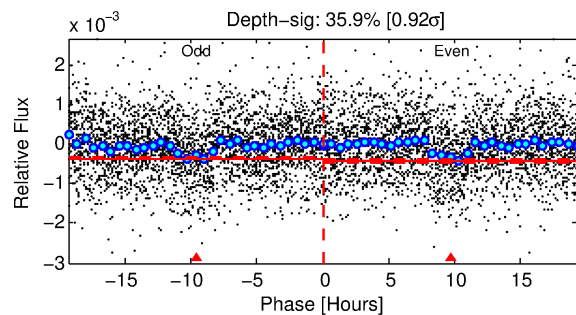
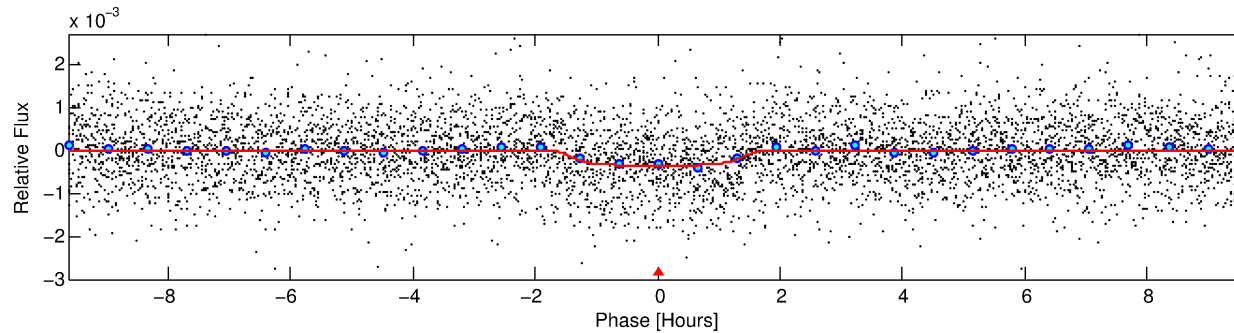
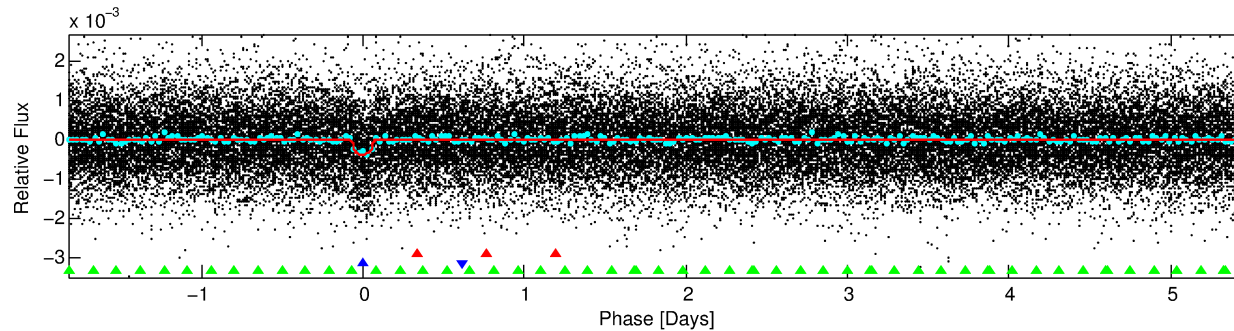
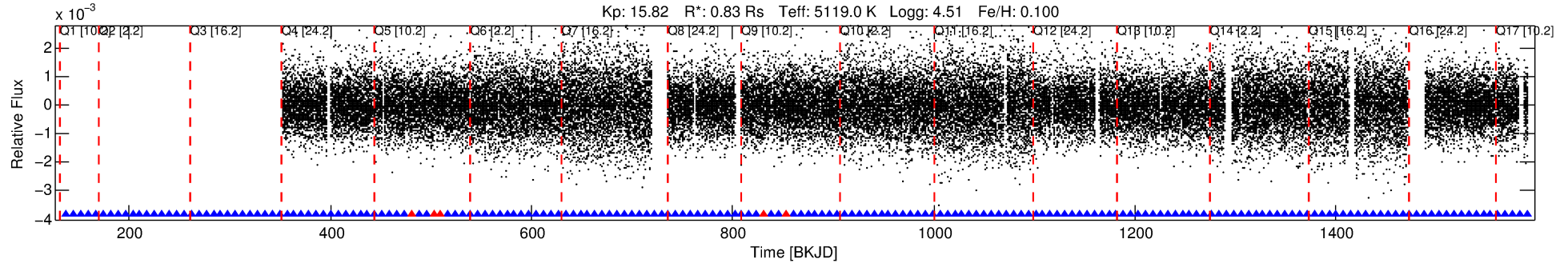
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 003645438-02

No Significant Match Found

# DV One-Page Summary

KIC: 3645438 Candidate: 2 of 3 Period: 7.298 d  
KOI: K04385.01 Corr: 0.959



## DV Fit Results:

Period = 7.29805 [0.00005] d  
Epoch = 137.8665 [0.0058] BKJD  
Rp/R\* = 0.0212 [0.0085]  
a/R\* = 8.60 [13.64]  
b = 0.89 [0.37]  
Seff = 90.25 [10.80]  
Teq = 786 [24] K  
Rp = 1.93 [0.79] Re  
a = 0.0689 [0.0043] AU  
Ag = 47.46 [42.83] [1.08 $\sigma$ ]  
Teffp = 3190 [717] K [3.35 $\sigma$ ]

## DV Diagnostic Results:

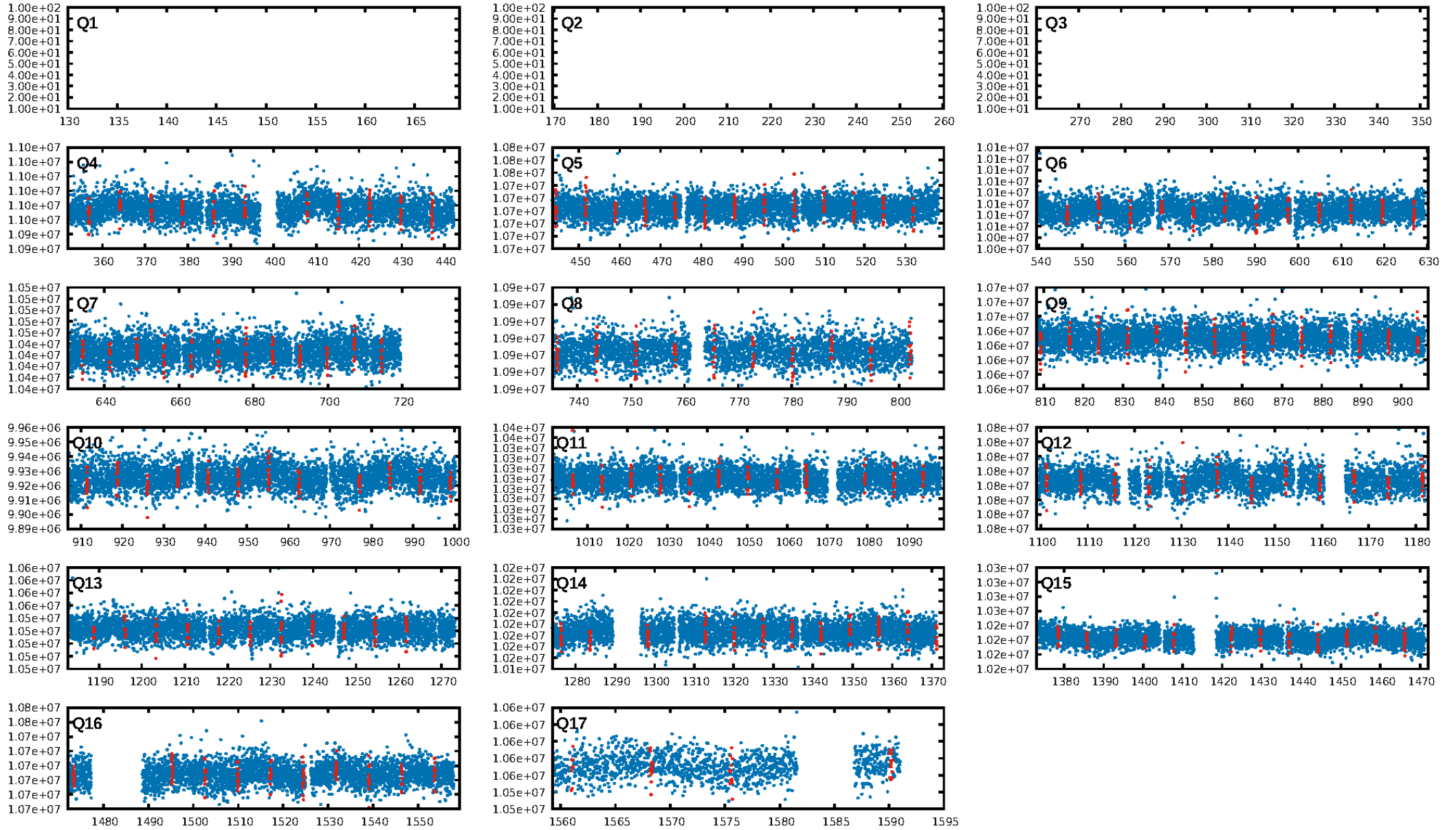
ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [49.62 $\sigma$ ]  
ModelChiSquare2-sig: 100.0%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 2.32e-34  
RollingBand-fgt: 0.97 [146/151]  
GhostDiagnostic-chr: -95.47  
Centroid-sig: 58.9%  
Centroid-so: 0.570 arcsec [0.50 $\sigma$ ]  
OotOffset-rm: 0.288 arcsec [0.32 $\sigma$ ]  
KicOffset-rm: 0.339 arcsec [0.44 $\sigma$ ]  
OotOffset-st: 3/3/2/3 [11]  
KicOffset-st: 3/3/2/3 [11]  
DiffImageQuality-fgm: 0.27 [3/11]  
DiffImageOverlap-fno: 1.00 [14/14]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 02:50:58 Z

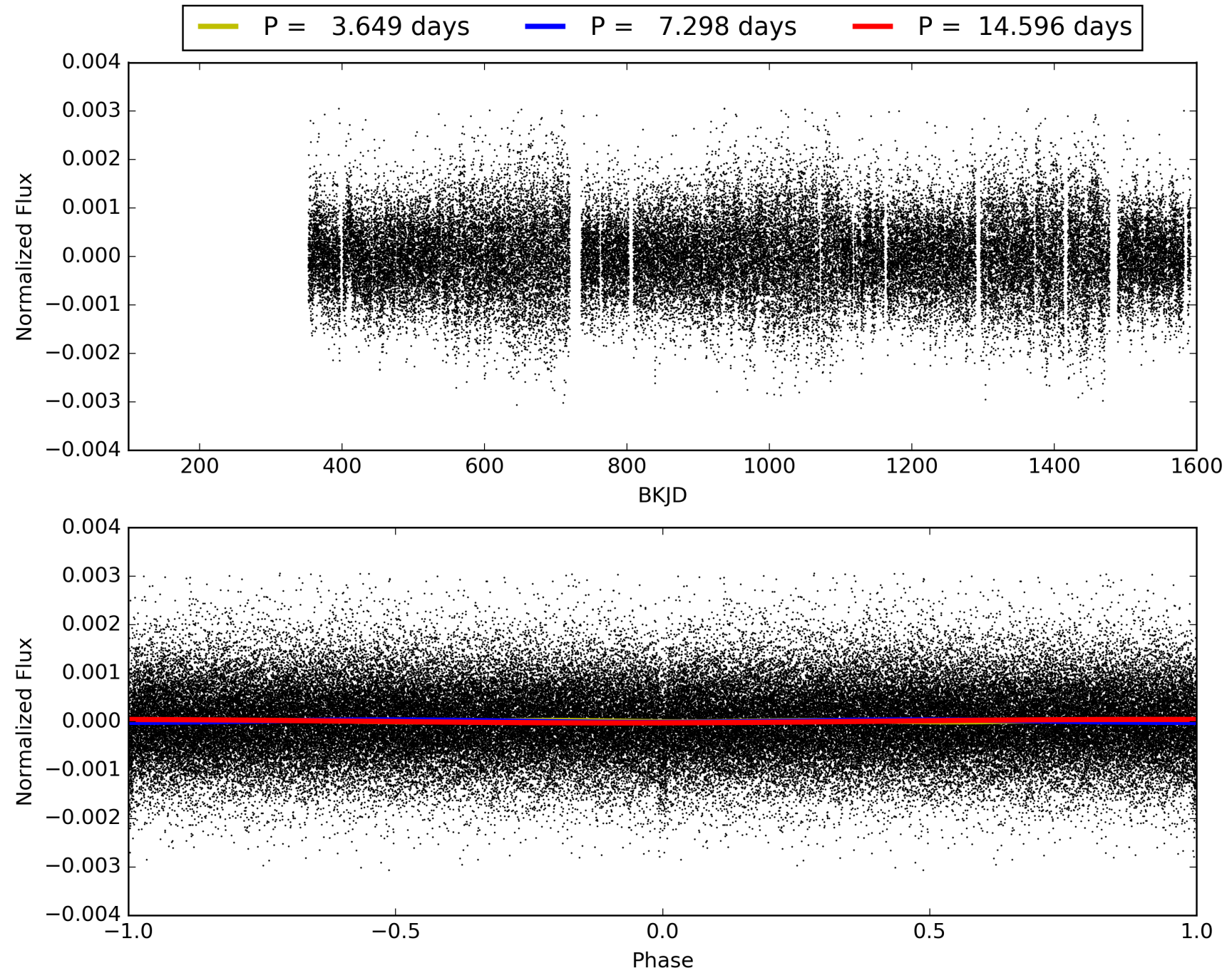
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 003645438-02, PDC Light Curves

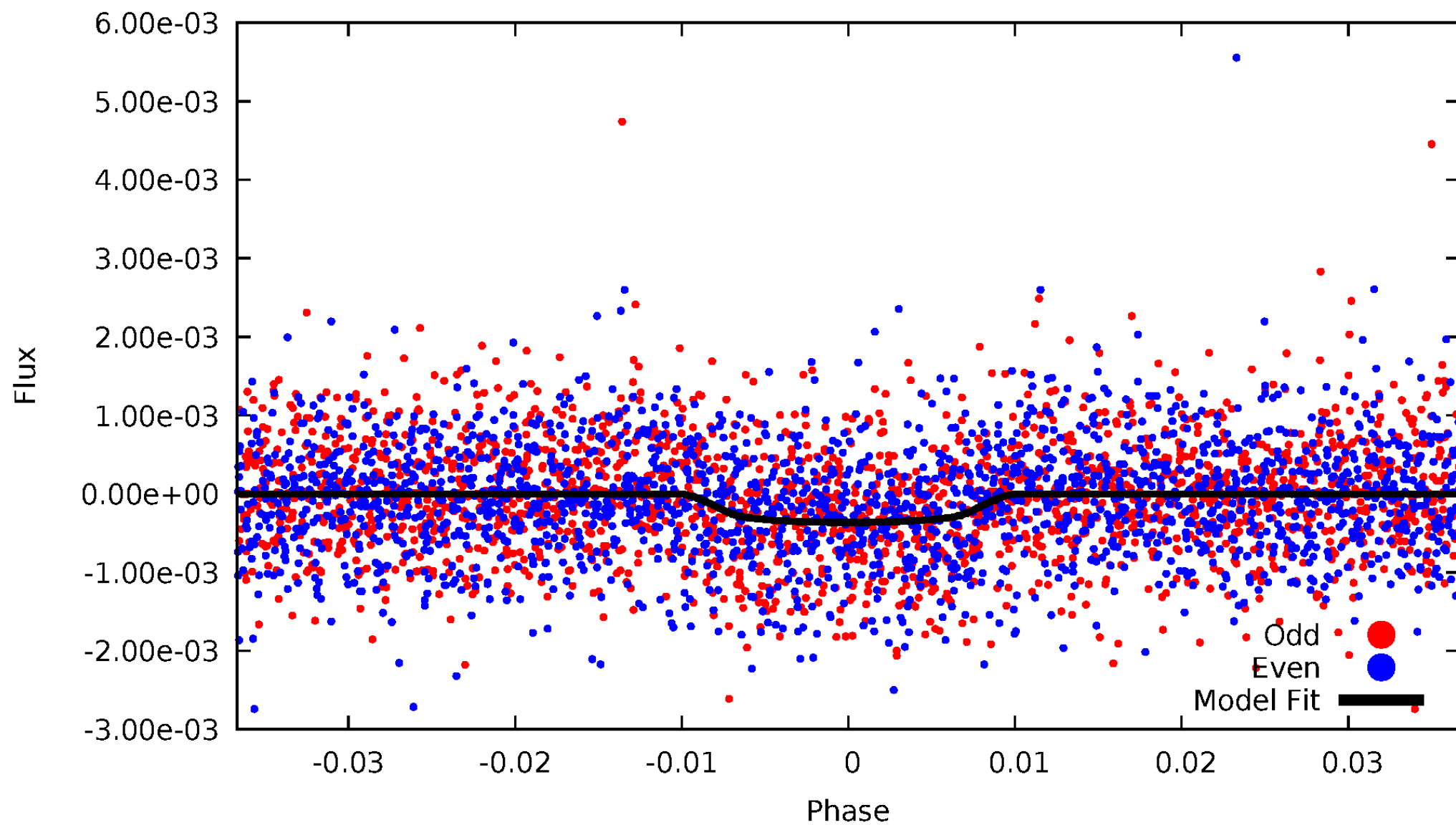


# TCE 003645438-02



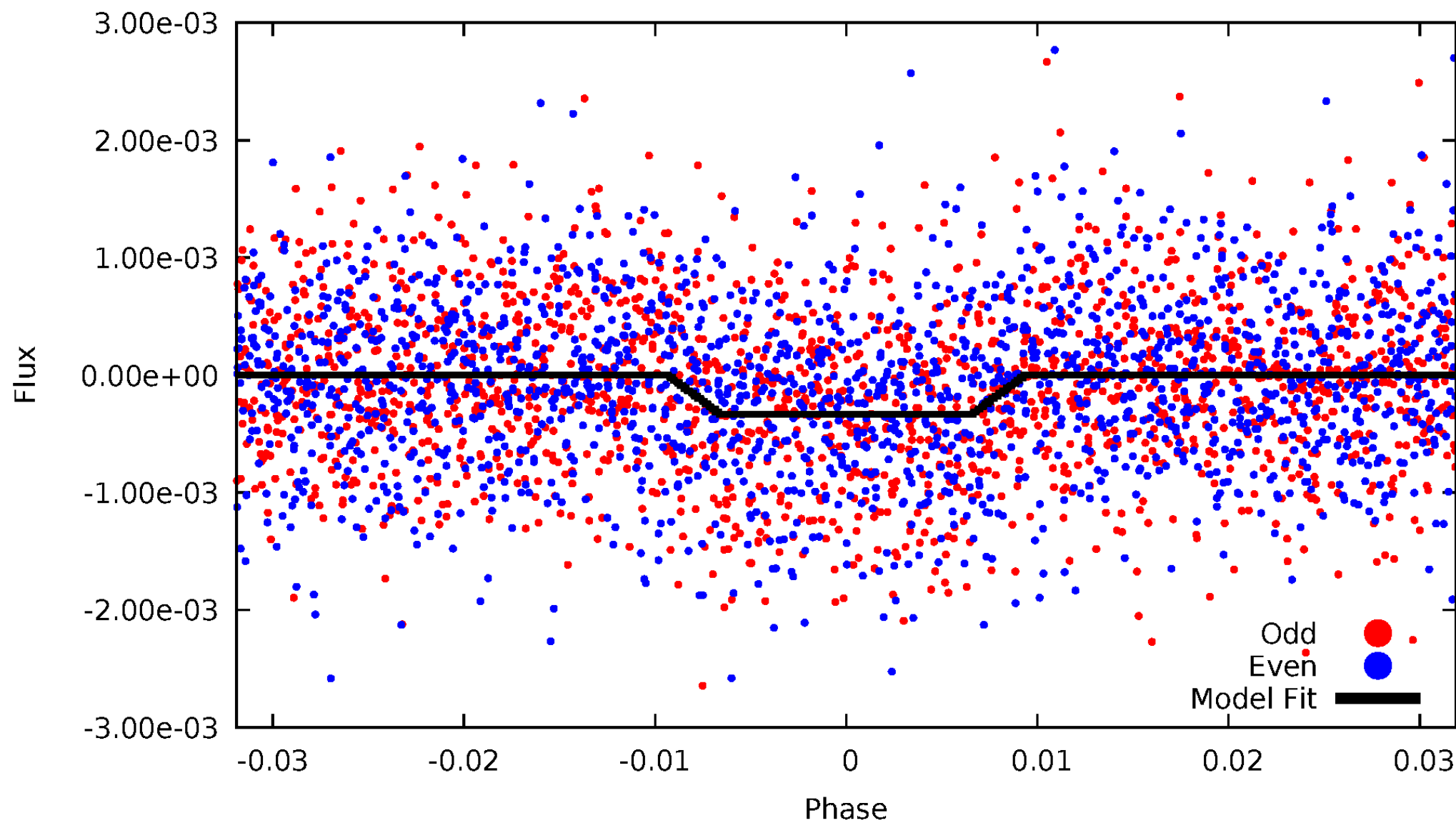
# DV Odd/Even

TCE 003645438-02



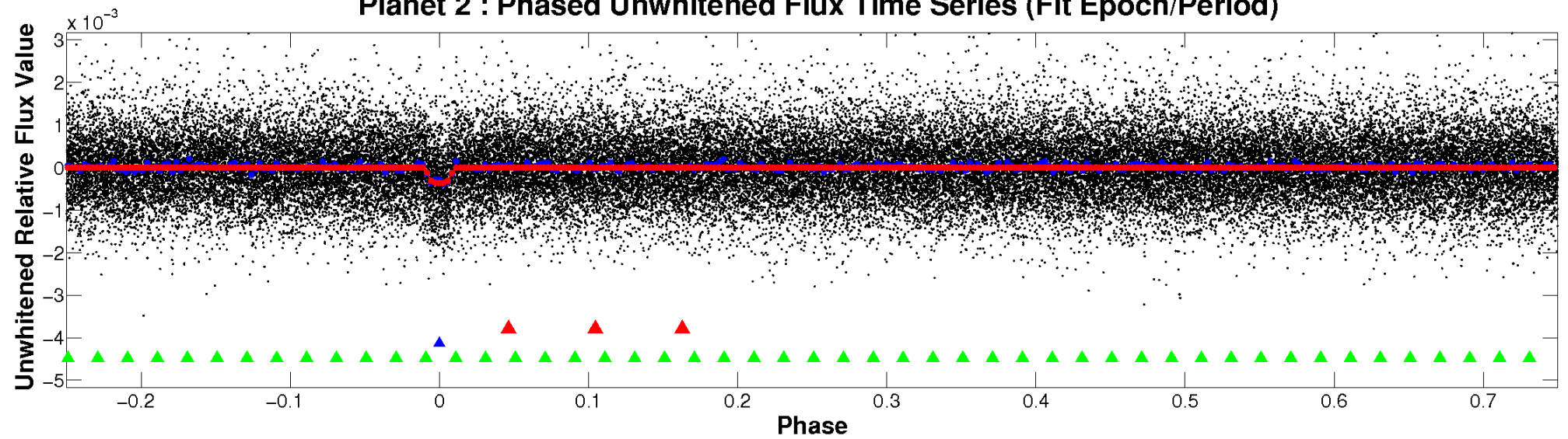
# ALT Odd/Even

TCE 003645438-02

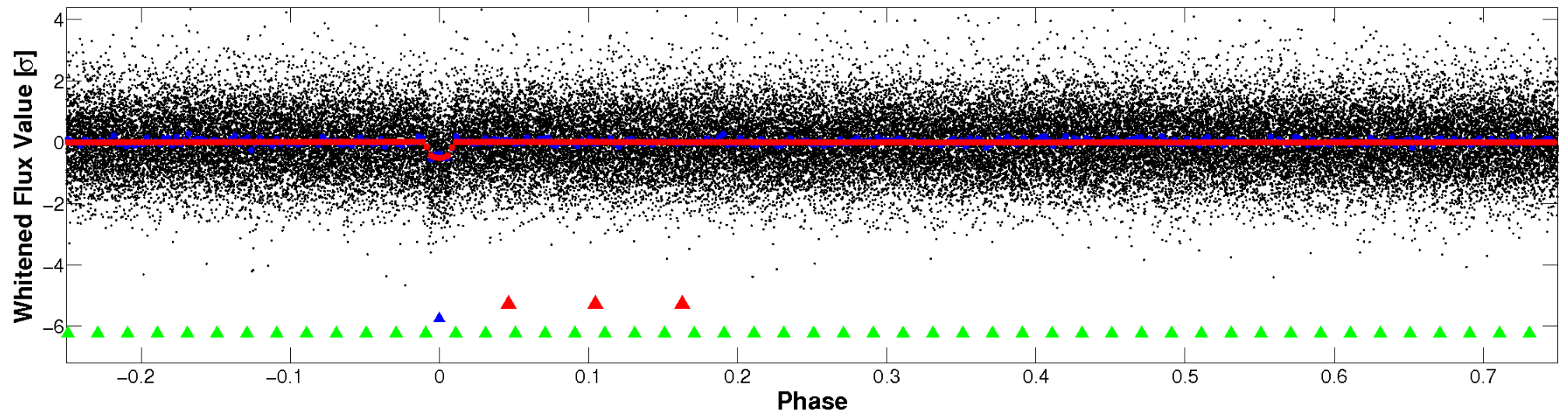


# Non-Whitened Vs. Whitened Light Curve

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



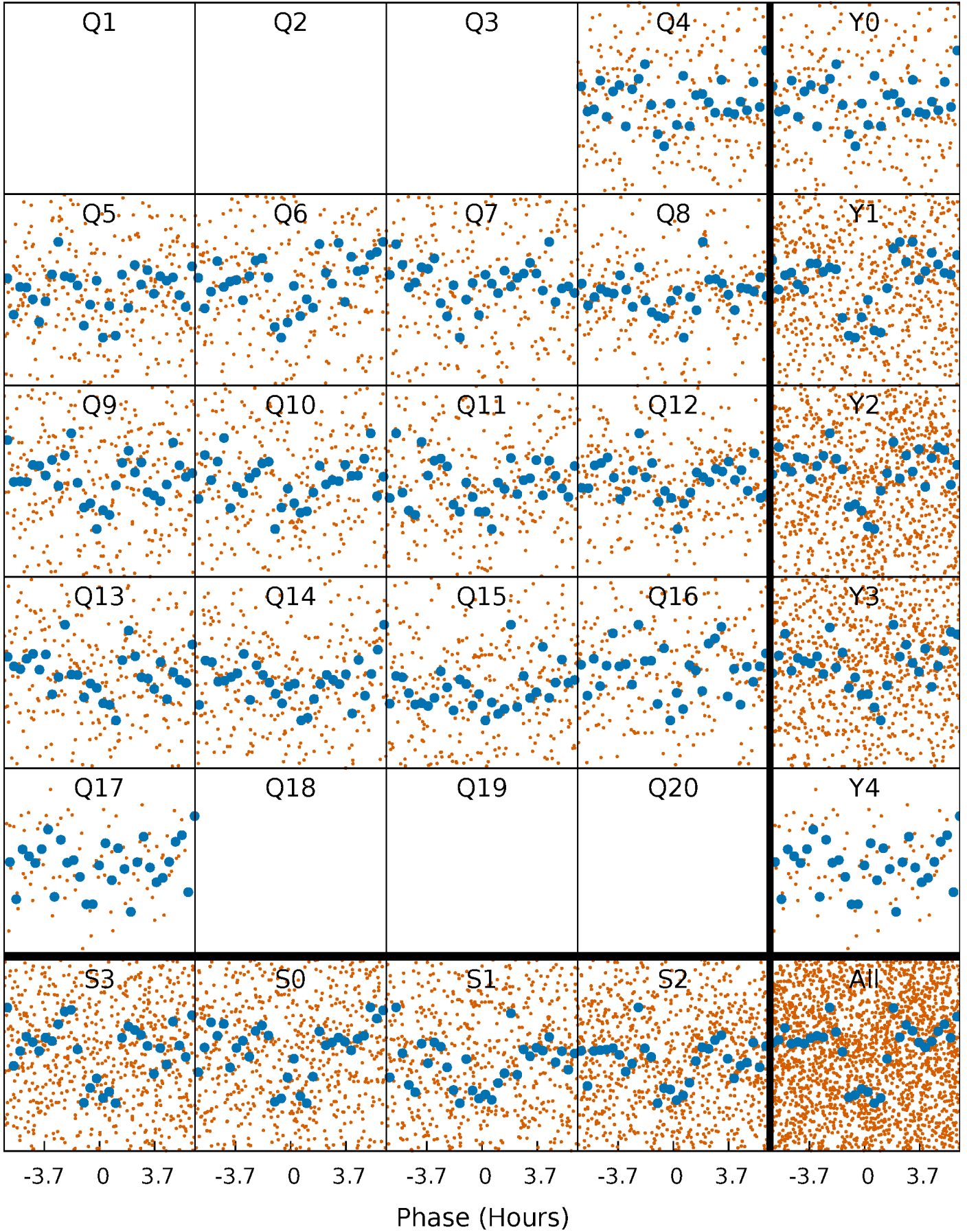
## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)





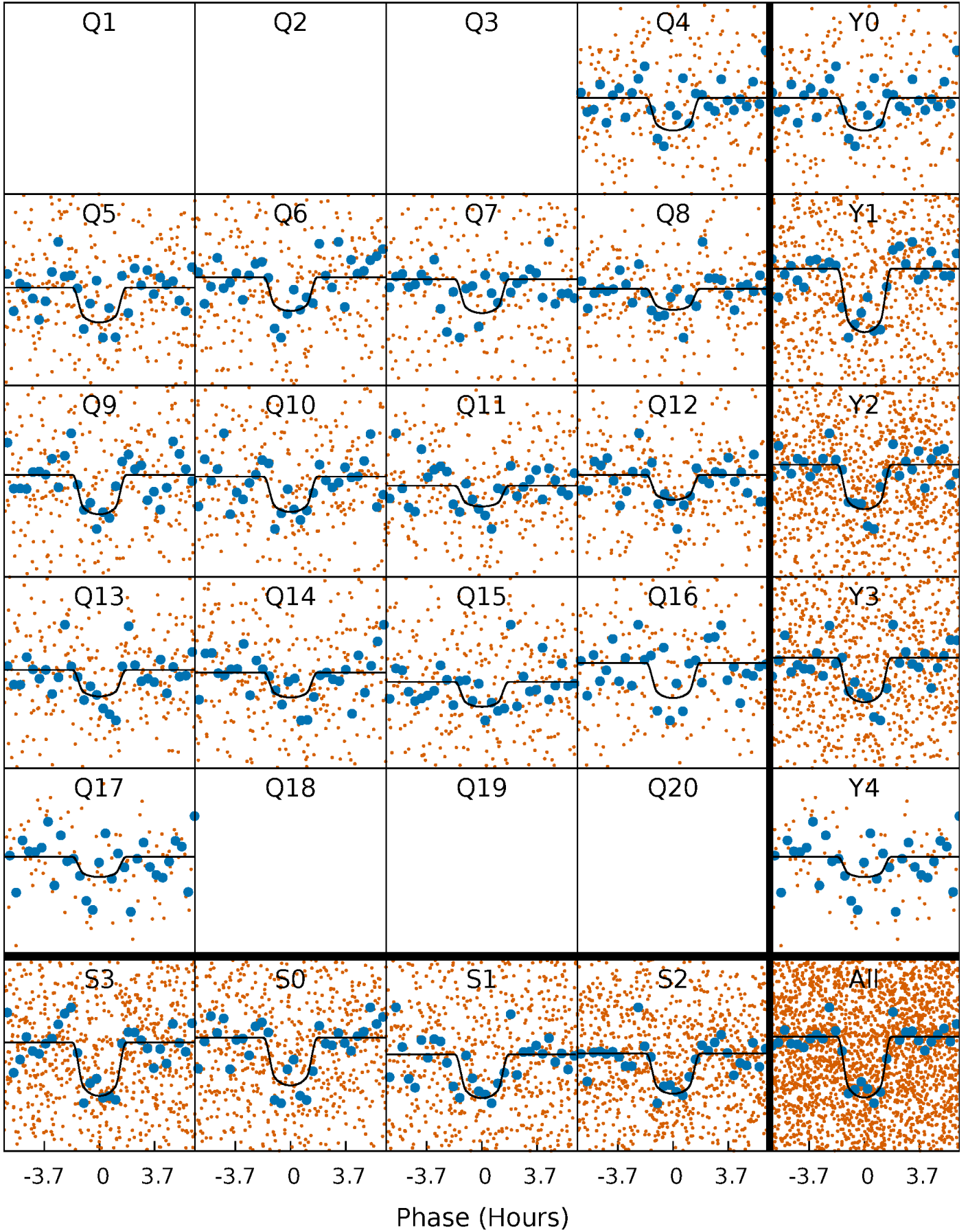
# PDC Quarter-Phased Transit Curves

TCE 003645438-02   P= 7.298049 Days    $T_0=137.866515$  (BKJD)



# DV Quarter-Phased Transit Curves

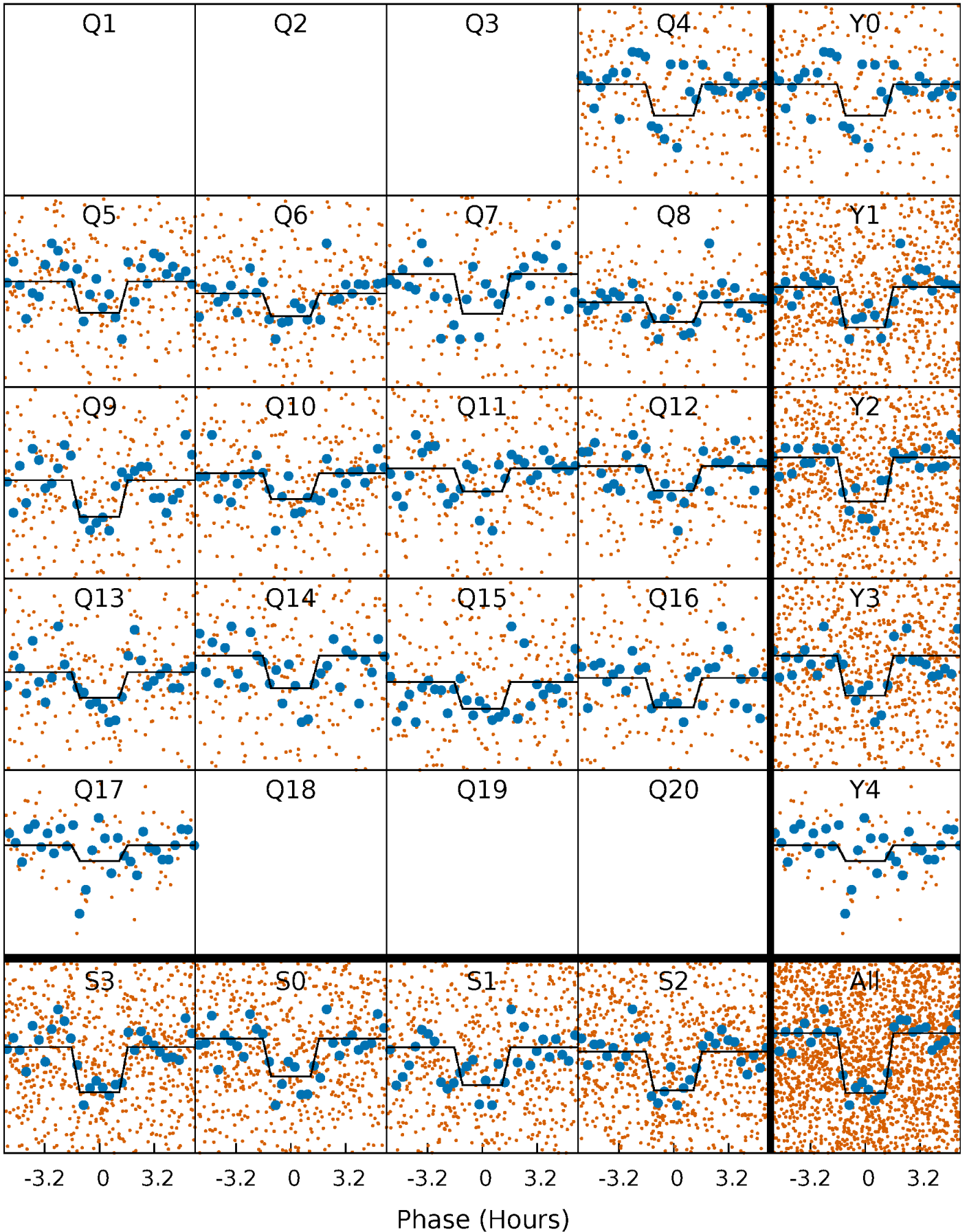
TCE 003645438-02    P= 7.298049 Days     $T_0=137.866515$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

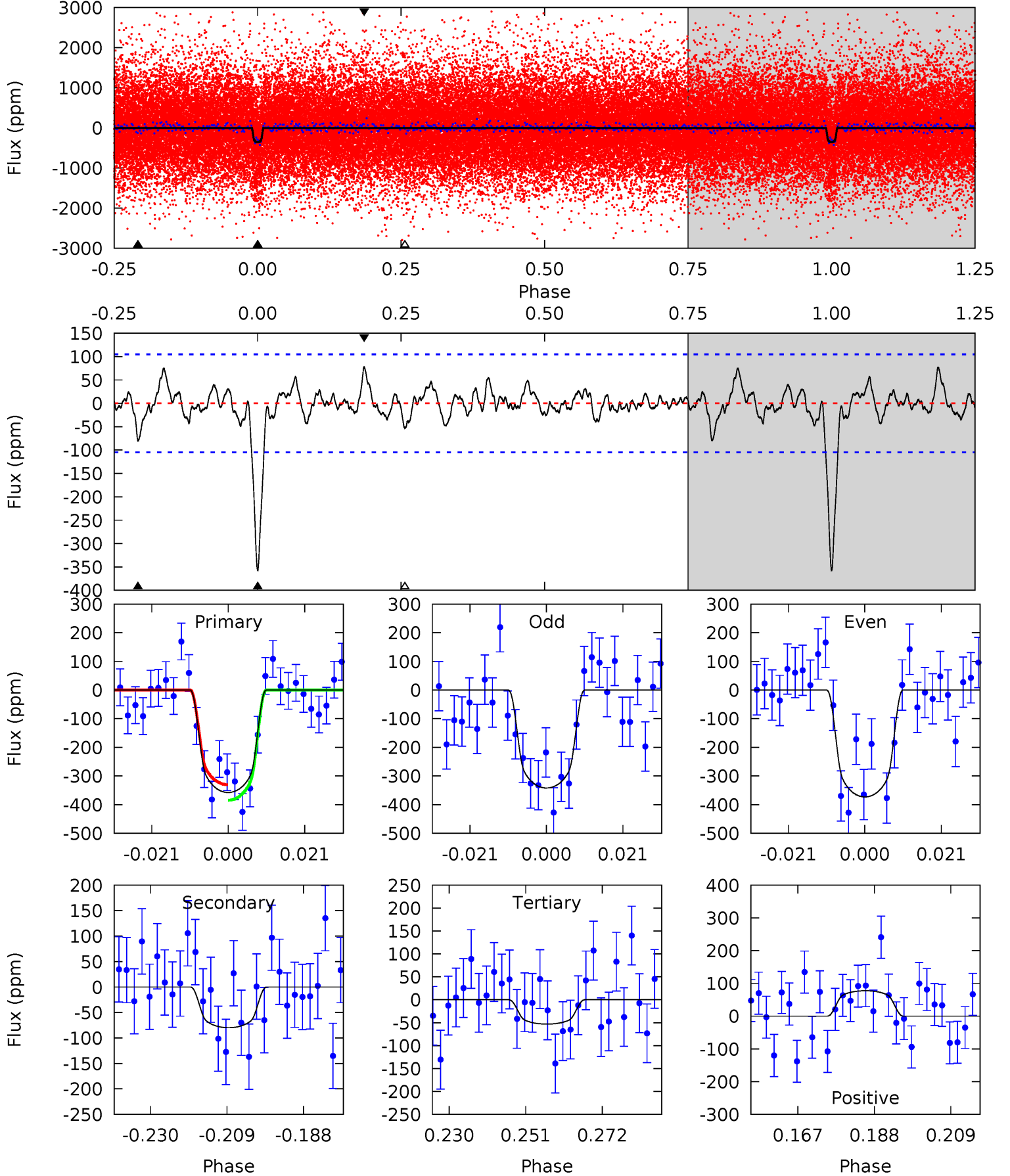
TCE 003645438-02   P= 7.298121 Days    $T_0=137.860349$  (BKJD)



# DV Model-Shift Uniqueness Test

003645438-02, P = 7.298049 Days, E = 137.866515 Days

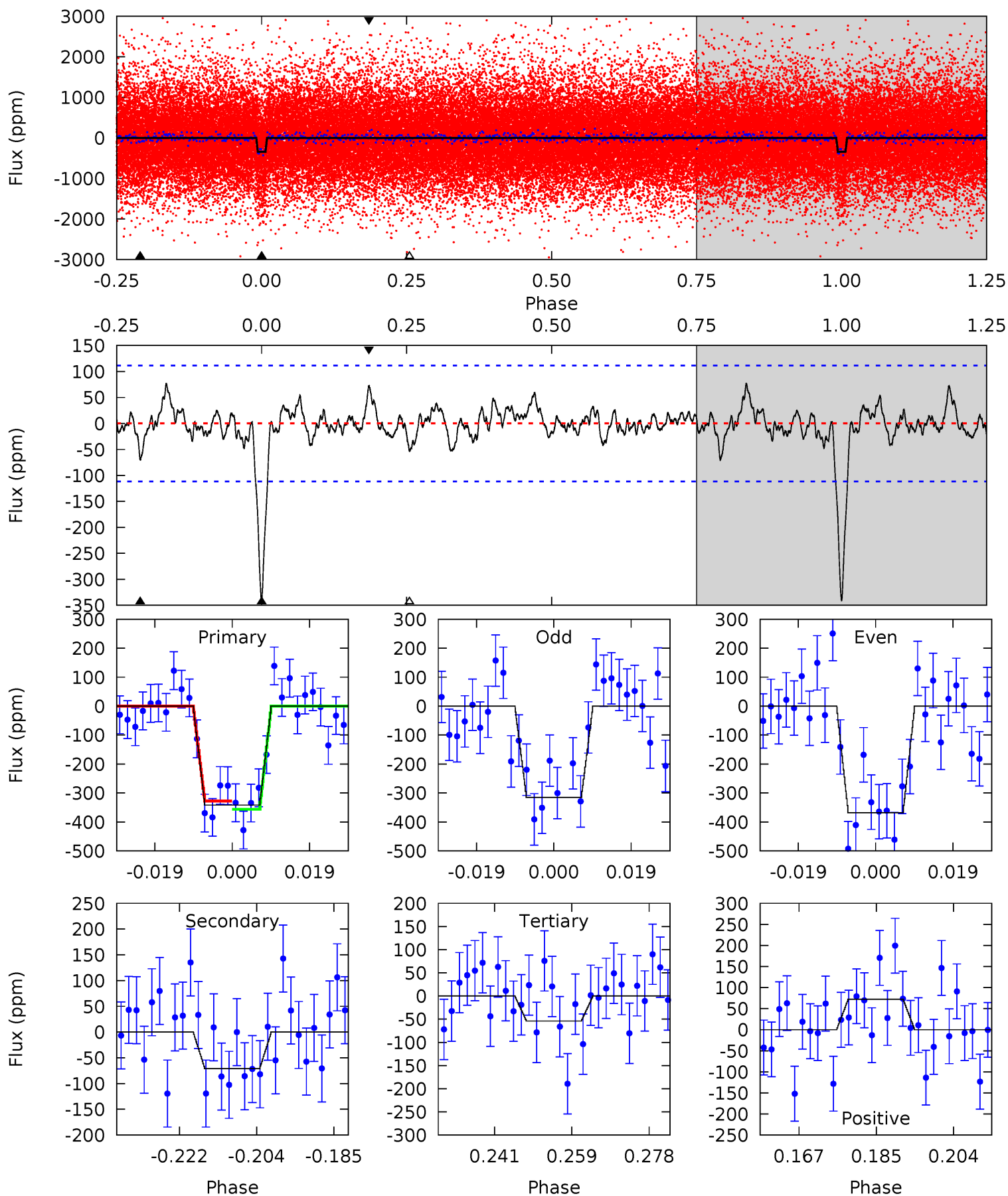
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
16.7	3.73	2.48	3.62	4.88	2.31	1.05	14.2	13.1	1.25	0.11	0.73	0.95	0.18	1.27



# Alt Model-Shift Uniqueness Test

003645438-02, P = 7.298121 Days, E = 137.860349 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
15.0	3.13	2.38	3.19	4.91	2.36	0.97	12.7	11.9	0.76	-0.06	1.16	1.01	0.18	0.62



### Stellar Parameters For KIC 003645438

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5119^{+82}_{-82}$	$4.508^{+0.060}_{-0.040}$	$0.100^{+0.150}_{-0.150}$	$0.834^{+0.047}_{-0.052}$	$0.818^{+0.053}_{-0.035}$	$1.983^{+0.457}_{-0.256}$
	+2%/-2%	+1%/-1%	+150%/-150%	+6%/-6%	+6%/-4%	+23%/-13%
Source	SPE90	SPE90	SPE90	DSEP		

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

### Secondary Eclipse Parameters for KIC 003645438-02 / KOI 4385.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-80 \pm 21$	$1.94^{+0.76}_{-0.80}$	$1095^{+28}_{-27}$	$3663^{+774}_{-401}$	$54^{+101}_{-27}$
Alt.	$-71 \pm 23$	$1.66^{+0.77}_{-0.74}$	$1096^{+25}_{-28}$	$3780^{+951}_{-474}$	$64^{+159}_{-37}$

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

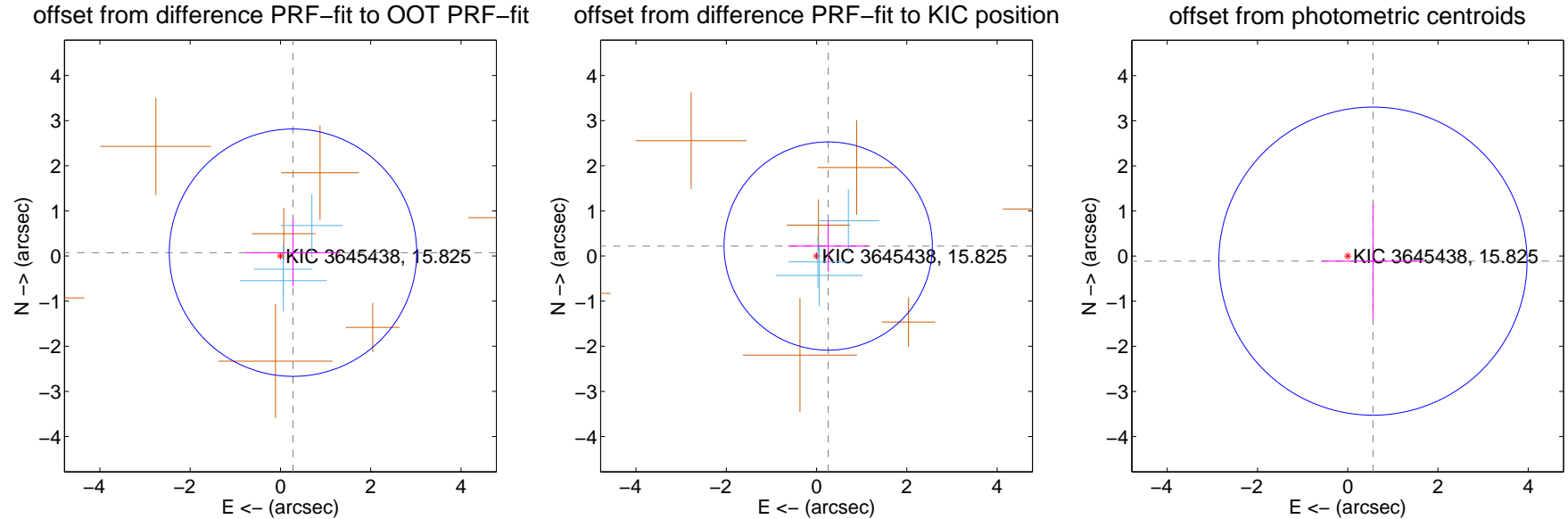
## DV Centroid Data

Supplemental centroid analysis for 003645438-02. Kepler magnitude: 15.82. Transit SNR 13.13

There are 3 quarters with good PRF difference image offsets

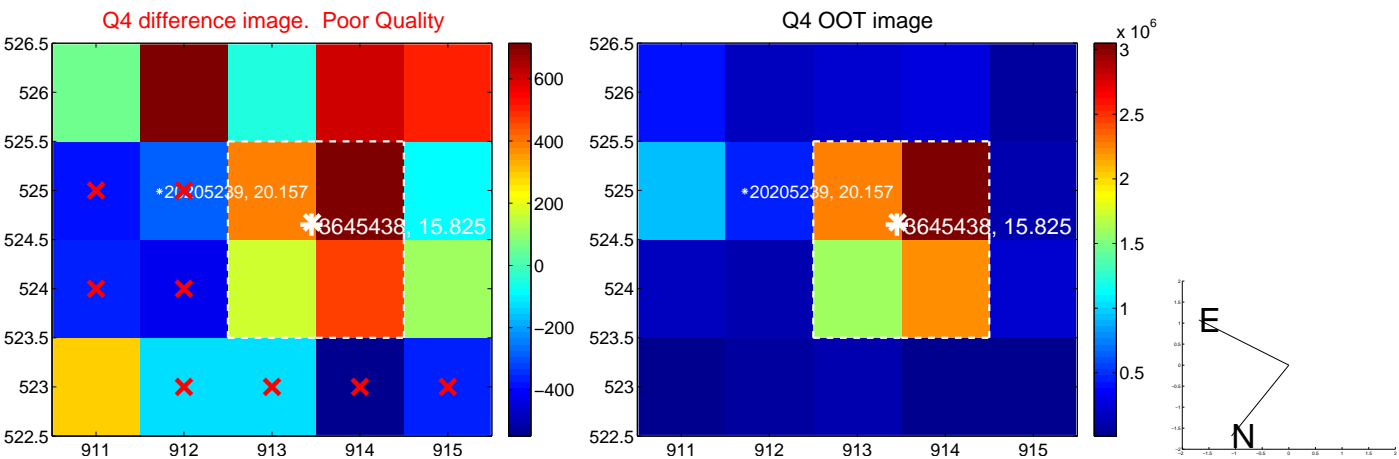
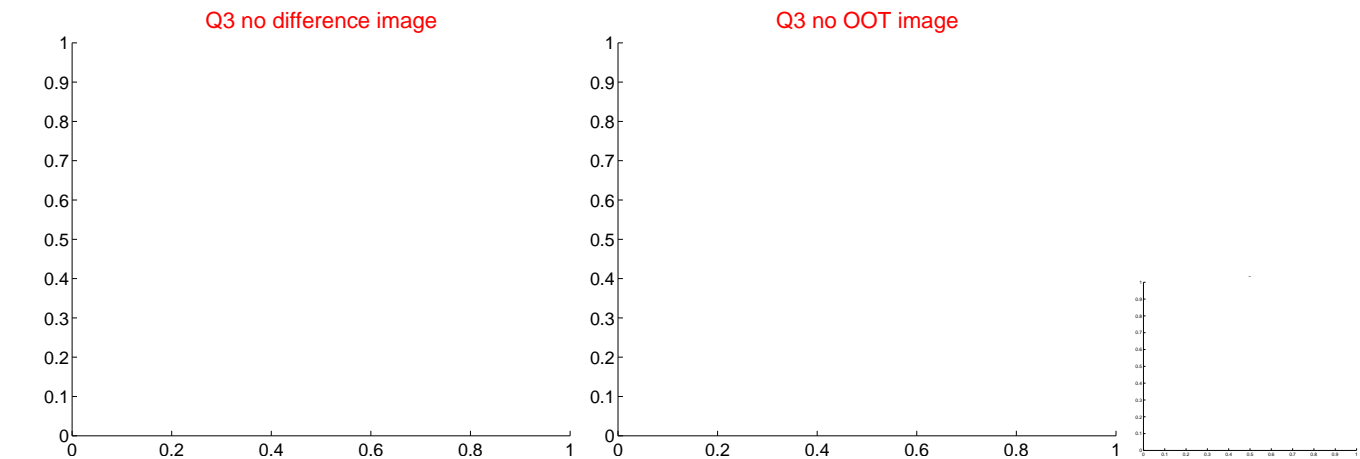
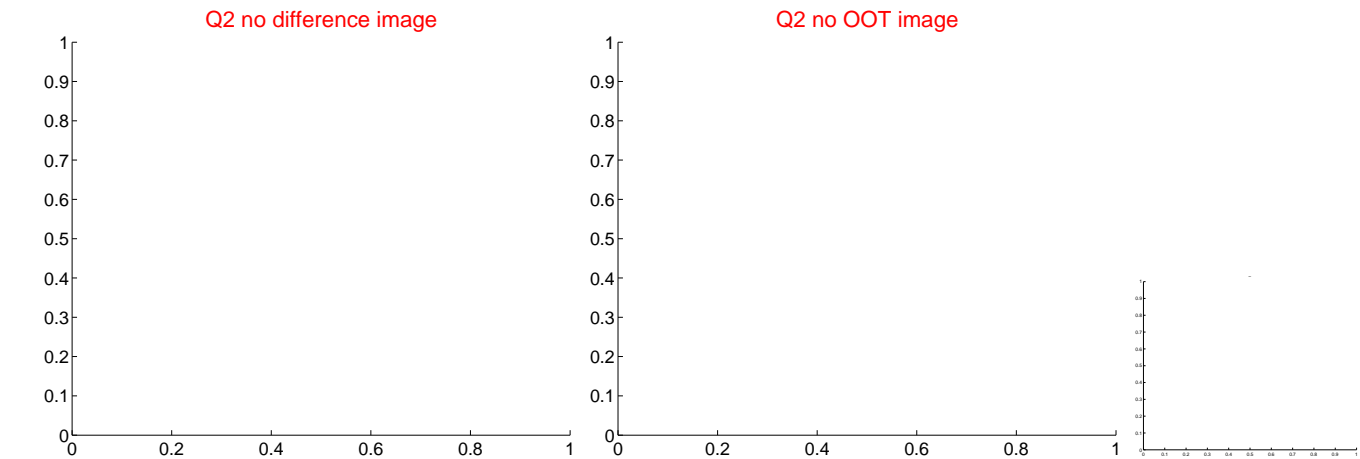
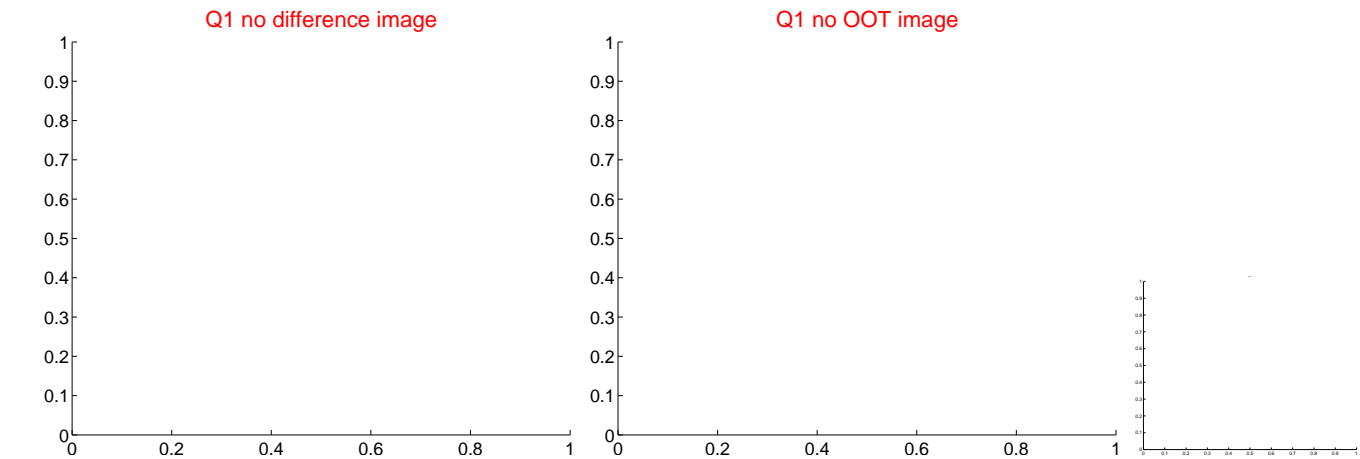
The direct PRF centroid is offset from the target star catalog position by about 0.27 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.288 \pm 0.913$	0.32	$-0.278 \pm 1.058$	$0.074 \pm 0.750$
PRF-fit source offset from KIC position	$0.339 \pm 0.769$	0.44	$-0.257 \pm 0.890$	$0.221 \pm 0.566$
photometric centroid source offset	$0.57 \pm 1.14$	0.50	$-0.56 \pm 1.13$	$-0.11 \pm 1.27$

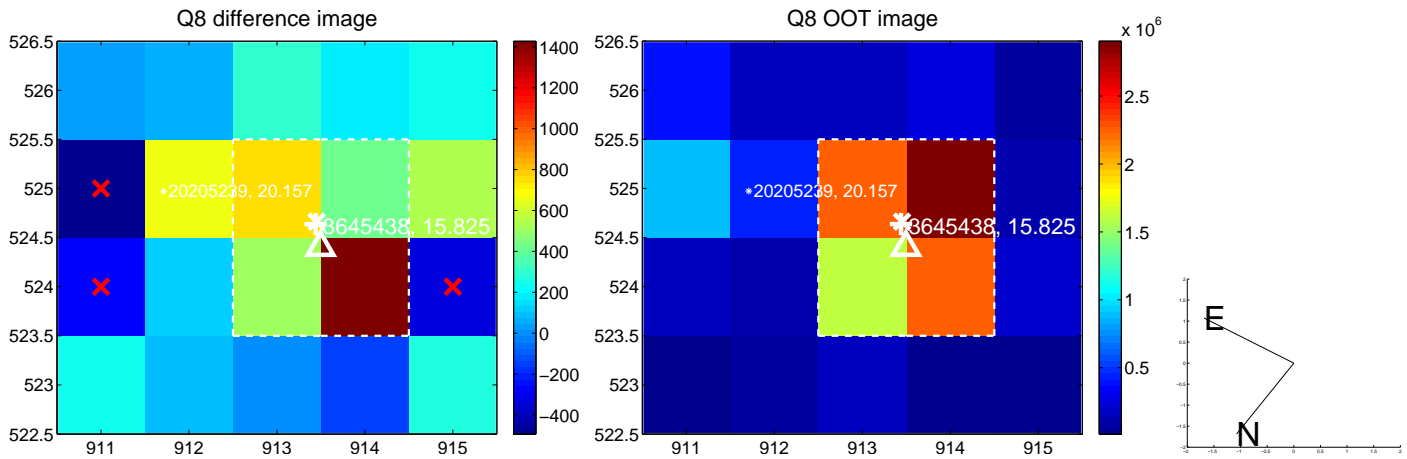
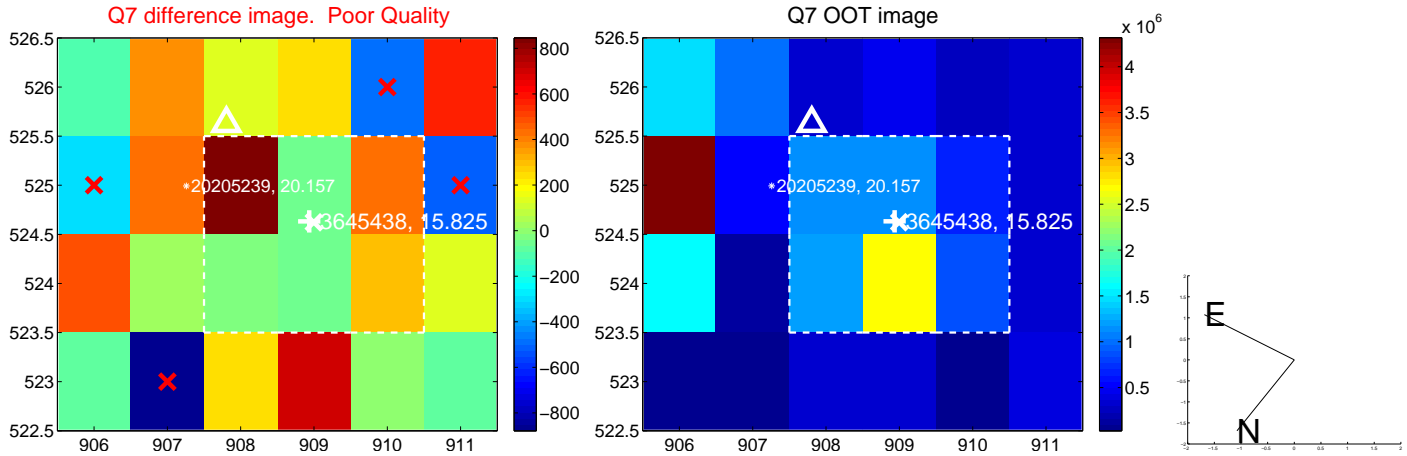
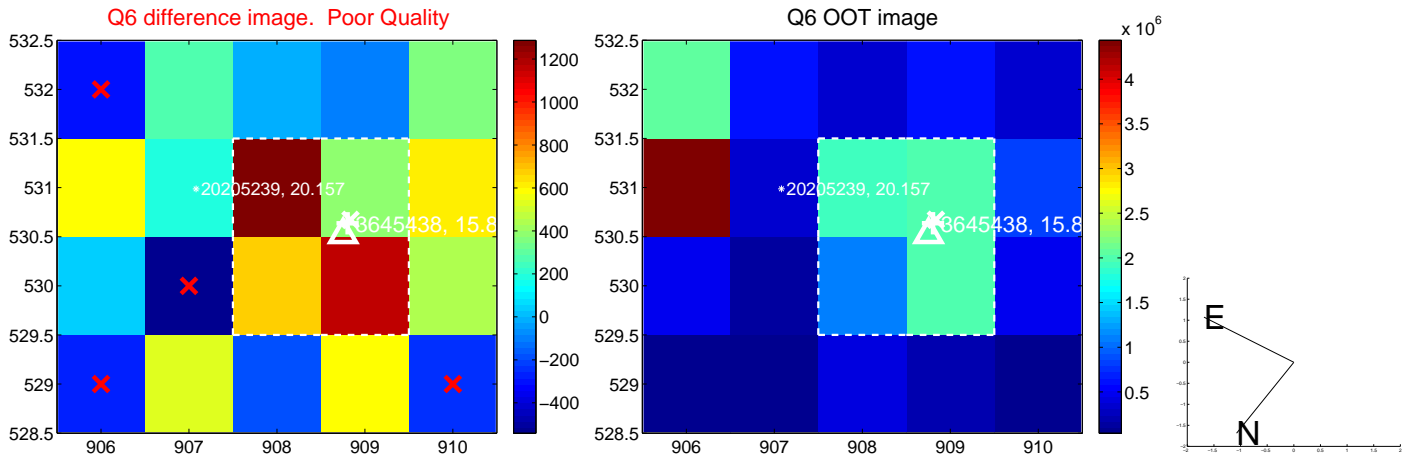
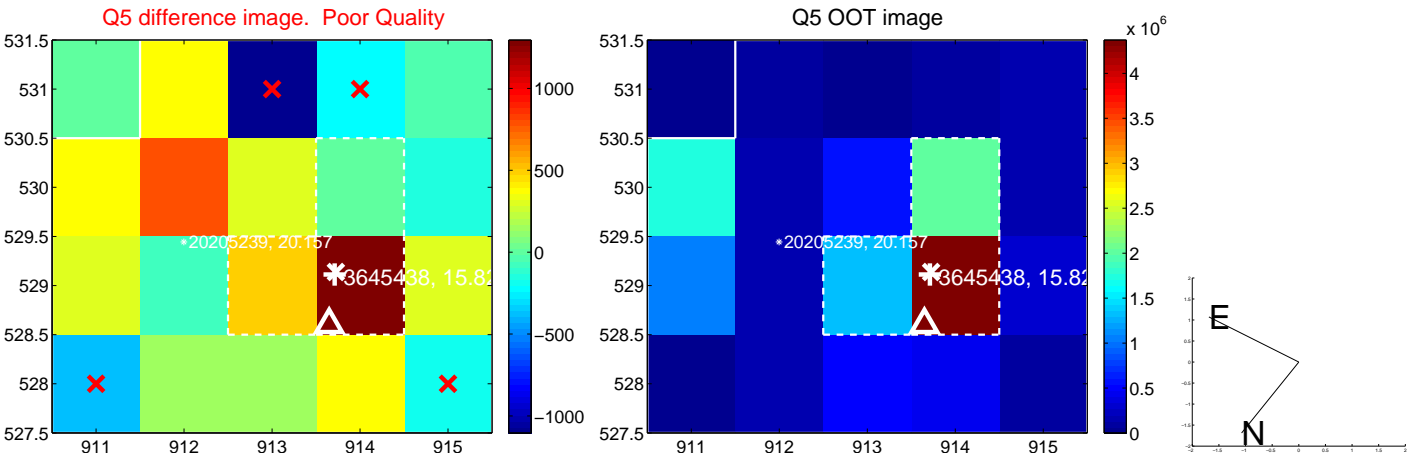


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

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

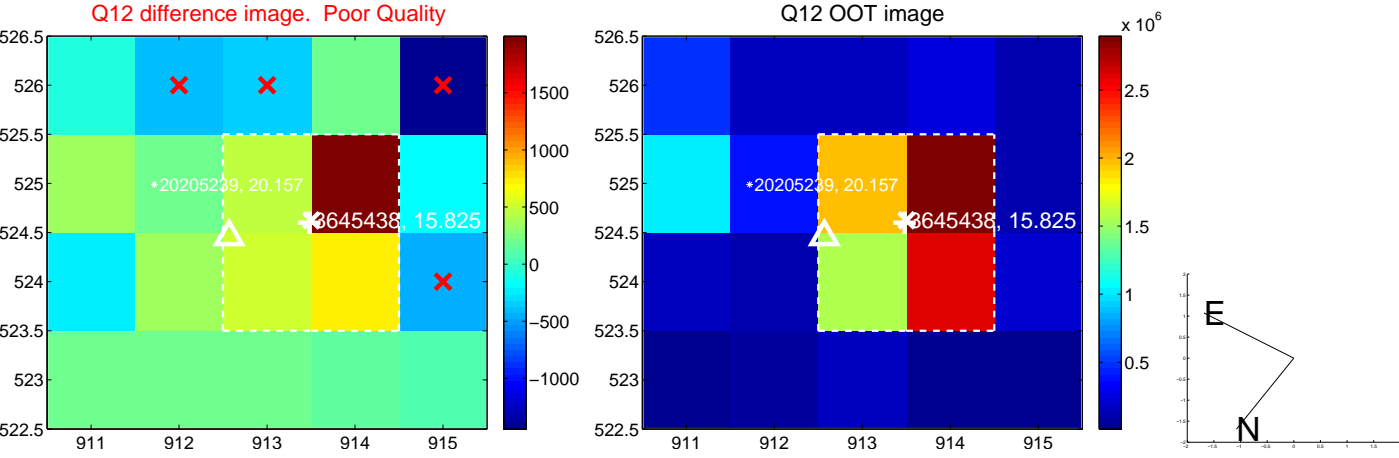
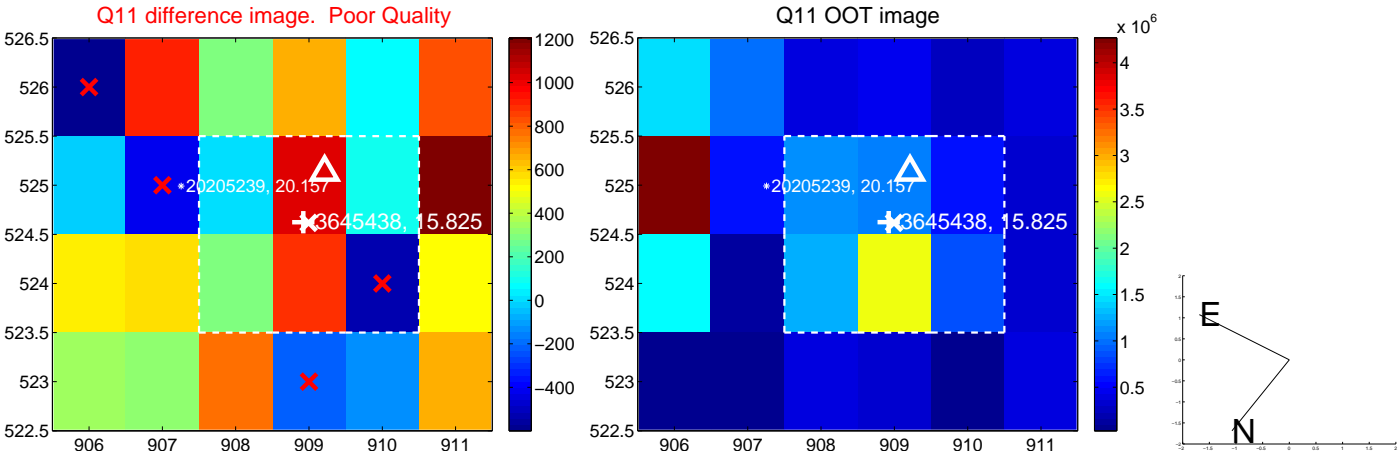
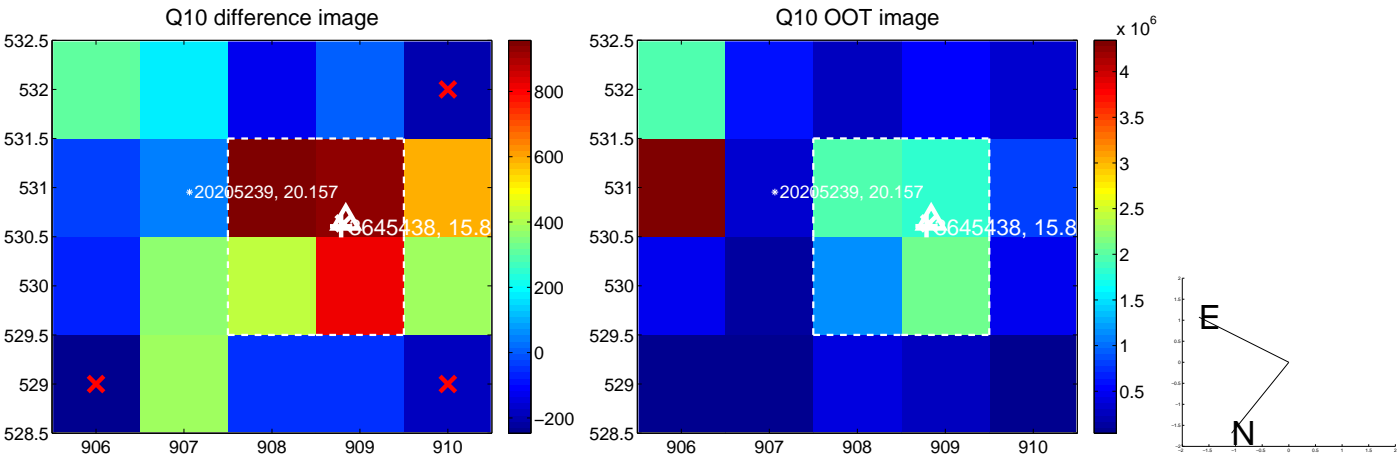
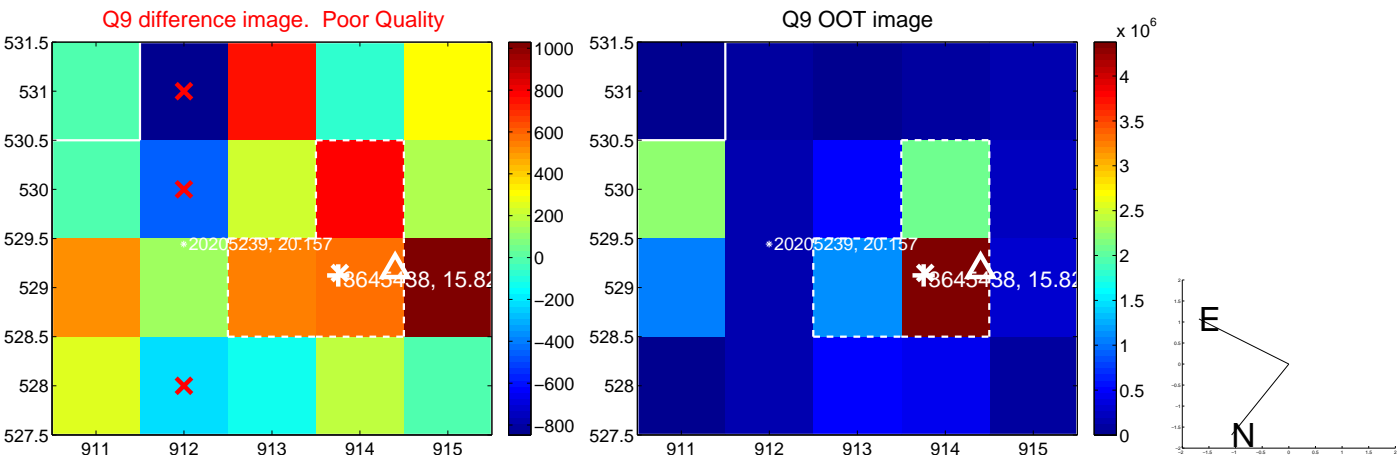


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

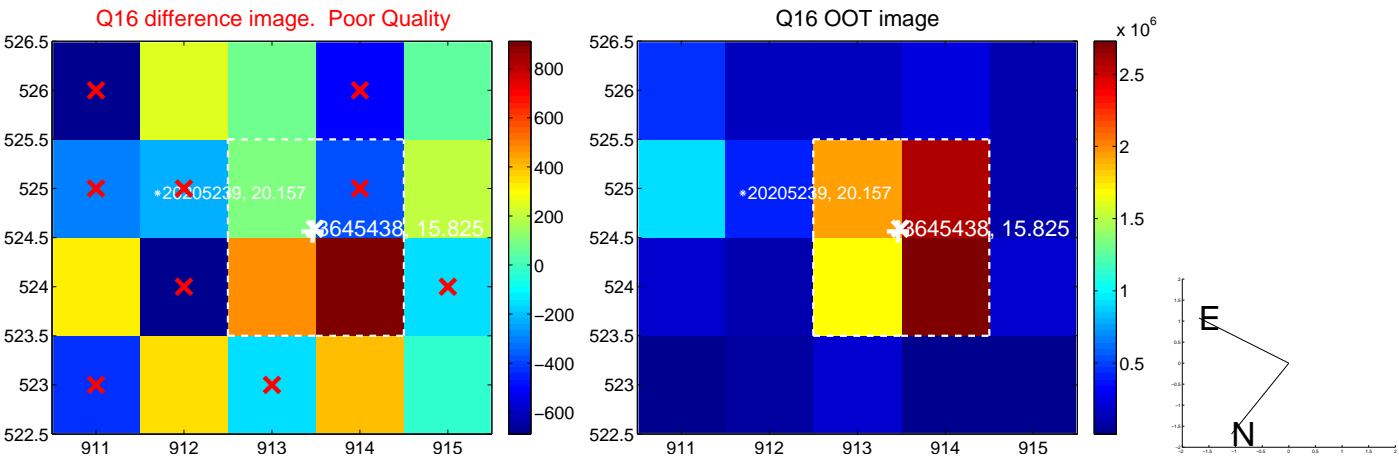
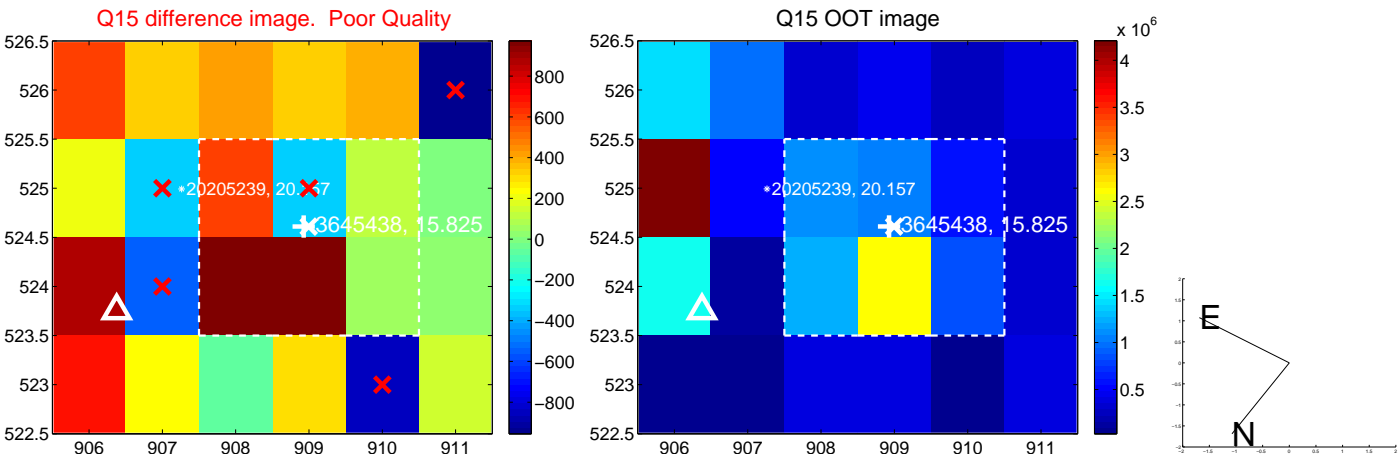
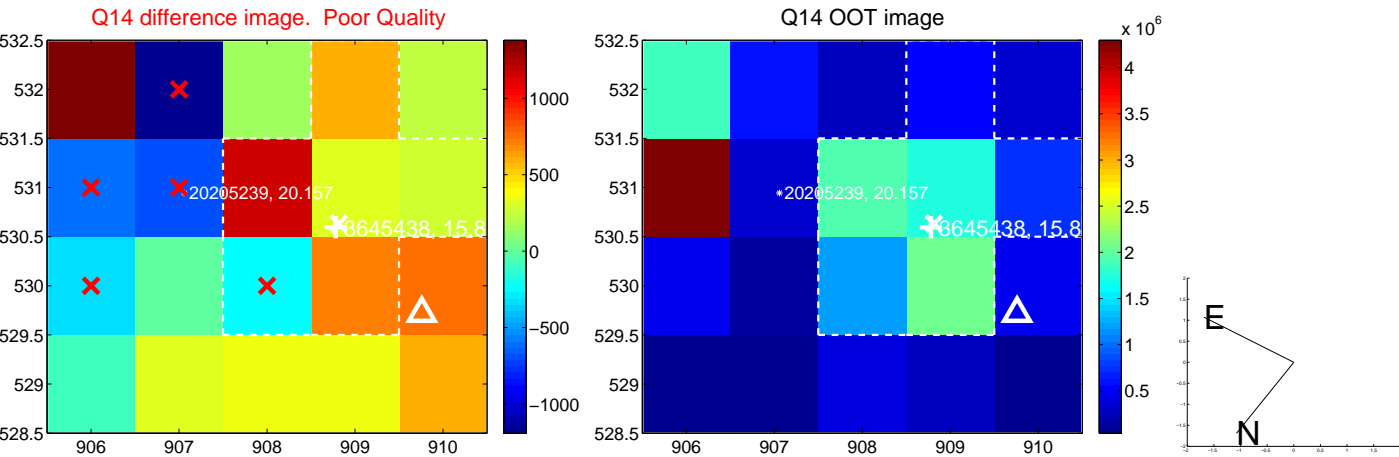
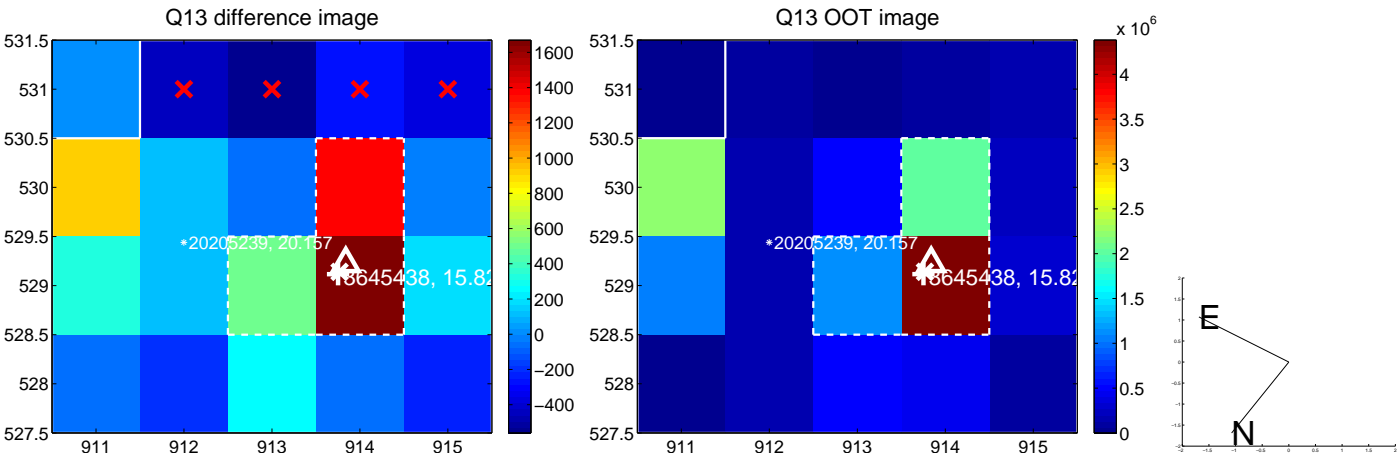




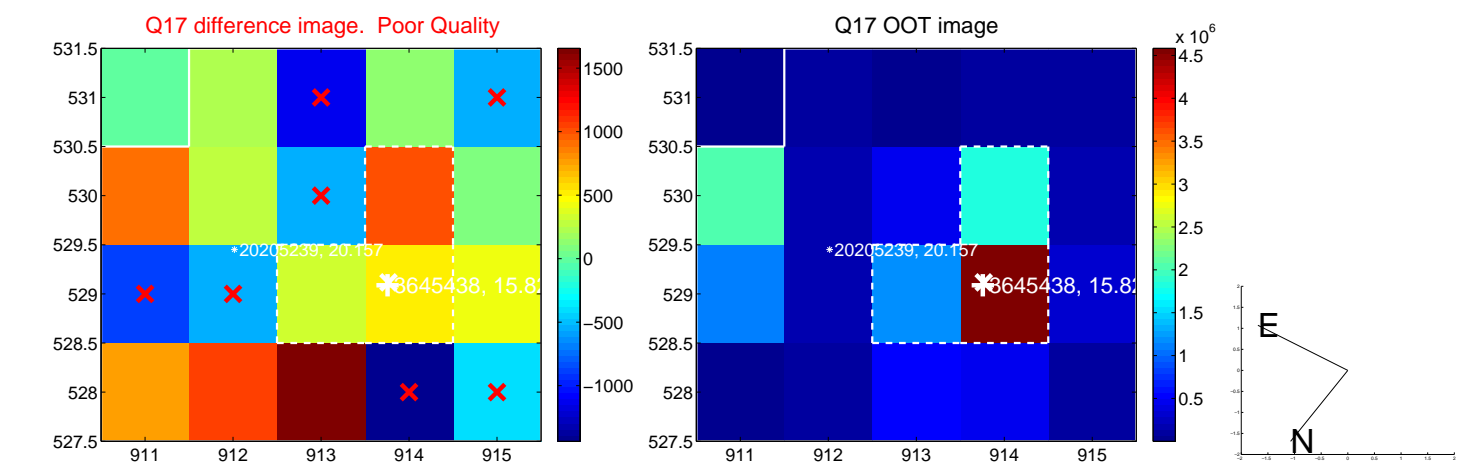
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



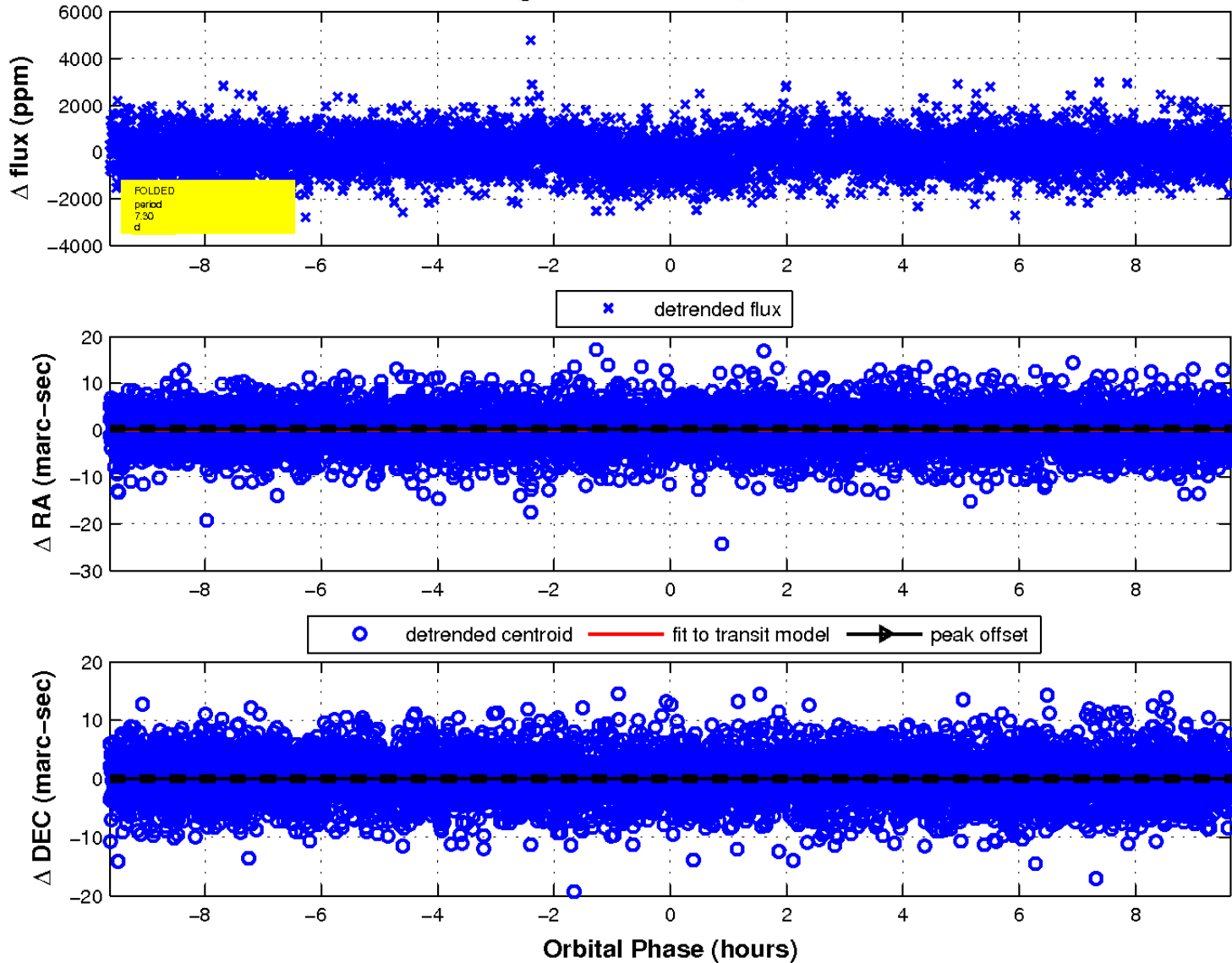
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

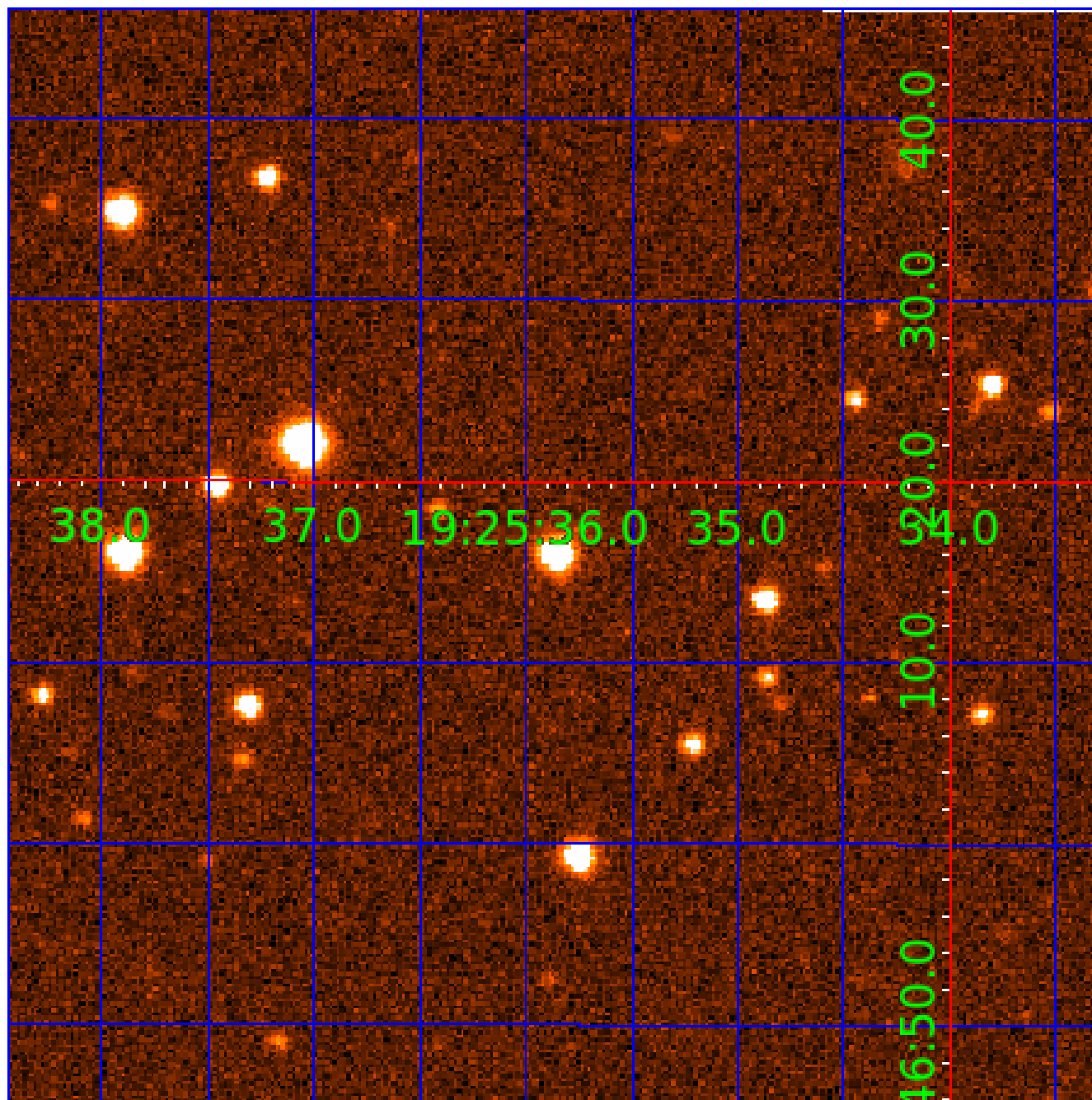


fluxWeightedCentroids, Planet 2 of 3



UKIRT Image

Declination



# KIC 003645438

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
003645438-01	OBS	4385.02	386.371506	452.871398	1367.6	11.213	13.0	13.0	0.83	5119	3.20	0.45
003645438-02	OBS	4385.01	7.298049	137.866515	366.1	3.213	12.2	13.1	0.83	5119	1.93	90.25
003645438-03	OBS	4385.03	17.369336	136.633845	350.9	3.661	8.2	8.3	0.83	5119	1.83	28.40

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003645438-01	OBS	PC	0.91	0	0	0	0	CENT_FEW_DIFFS
003645438-02	OBS	PC	1.00	0	0	0	0	CENT_FEW_DIFFS
003645438-03	OBS	PC	0.95	0	0	0	0	CENT_FEW_DIFFS

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

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

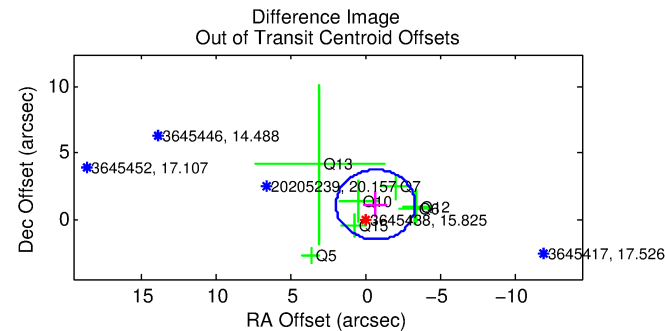
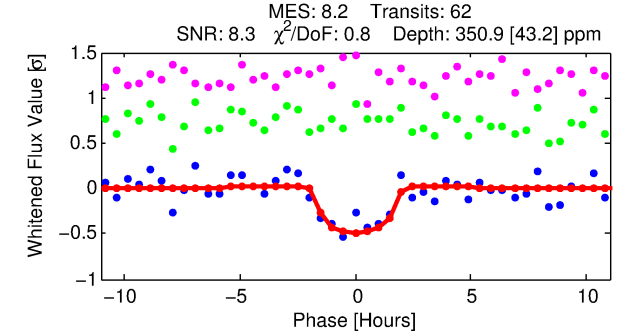
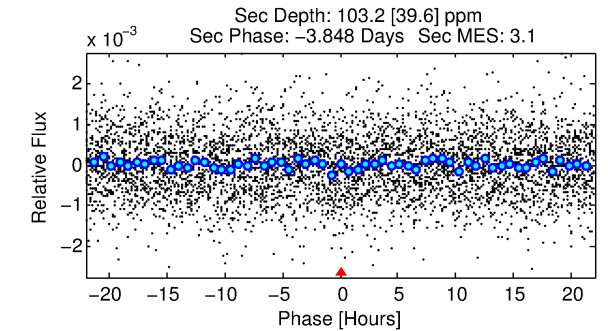
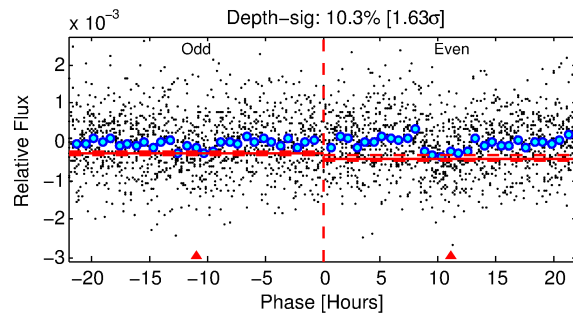
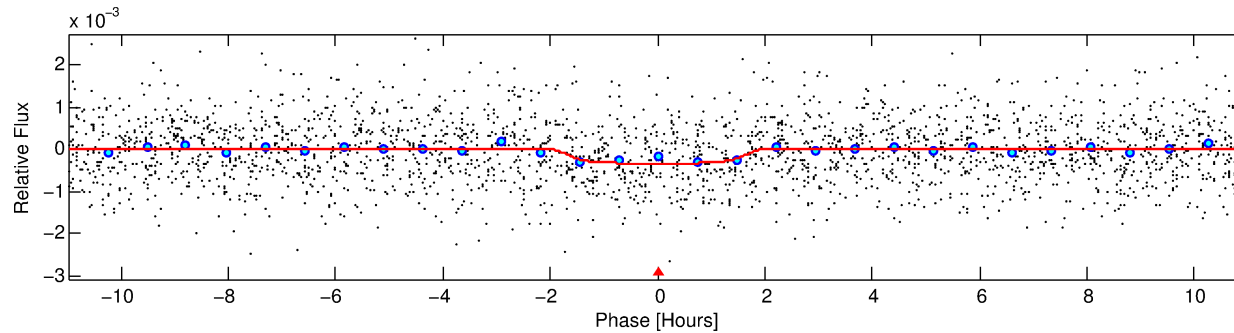
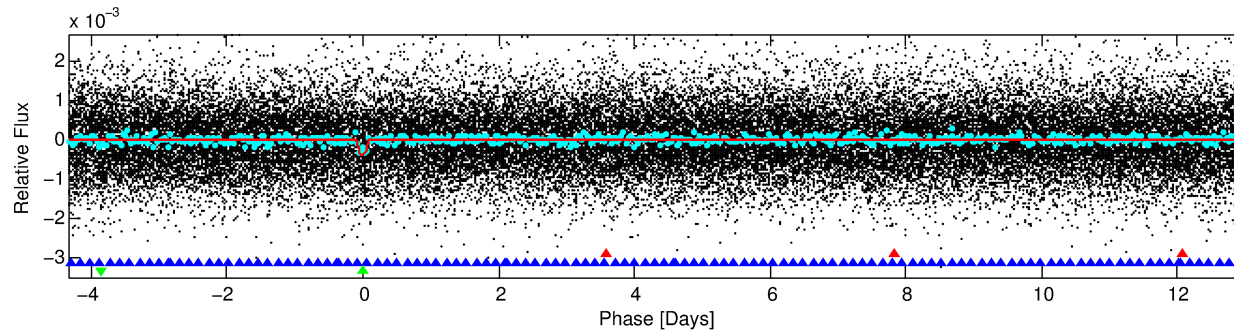
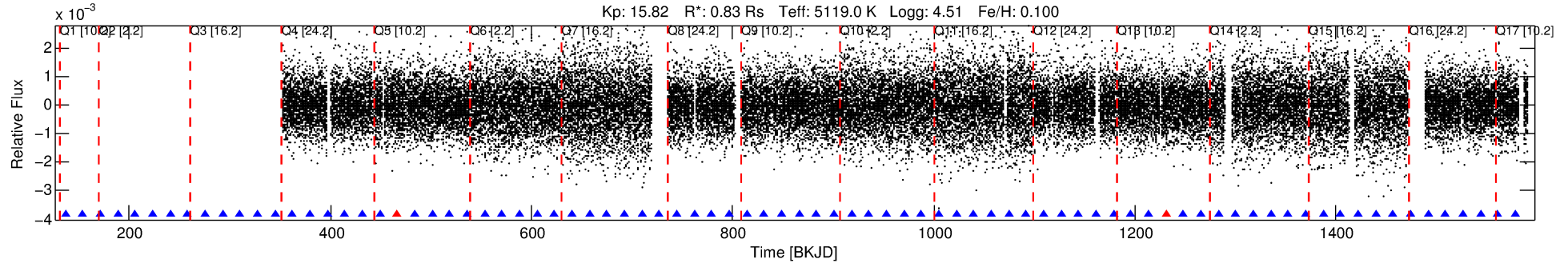
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 003645438-03

No Significant Match Found

# DV One-Page Summary

KIC: 3645438 Candidate: 3 of 3 Period: 17.369 d  
KOI: K04385.03 Corr: 0.962



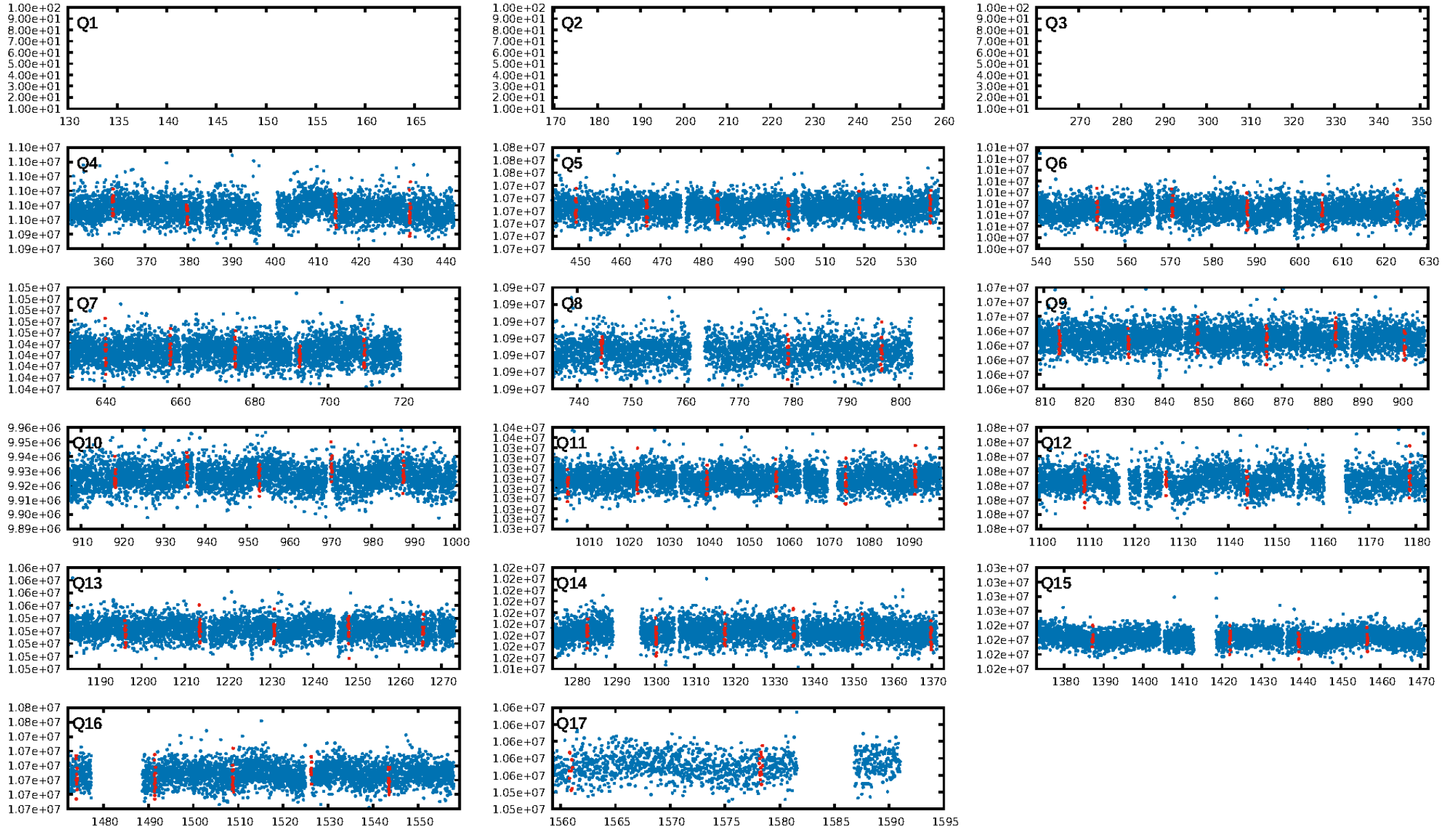
## DV Fit Results:

Period = 17.36934 [0.00025] d  
Epoch = 136.6338 [0.0122] BKJD  
Rp/R\* = 0.0201 [0.0184]  
a/R\* = 19.63 [69.39]  
b = 0.86 [1.06]  
Seff = 28.40 [3.40]  
Teq = 589 [18] K  
Rp = 1.83 [1.68] Re  
a = 0.1227 [0.0076] AU  
Ag = 254.88 [475.88] [0.53 $\sigma$ ]  
Teffp = 3637 [1696] K [1.80 $\sigma$ ]

## DV Diagnostic Results:

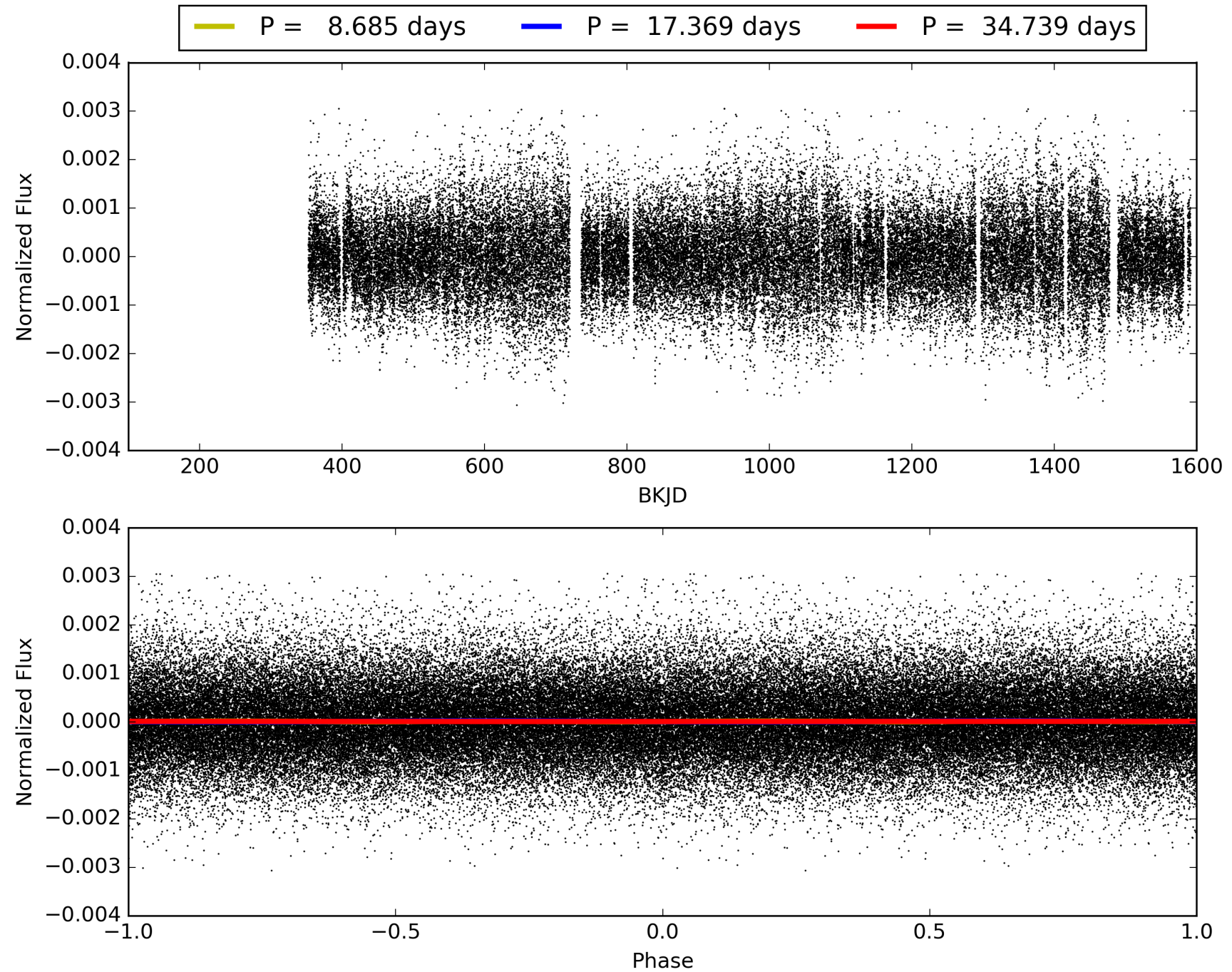
ShortPeriod-sig: 100.0% [49.62 $\sigma$ ]  
LongPeriod-sig: 100.0% [750.78 $\sigma$ ]  
ModelChiSquare2-sig: 94.6%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 1.37e-16  
RollingBand-fgt: 0.97 [59/61]  
GhostDiagnostic-chr: 5.771  
Centroid-sig: 2.6%  
Centroid-so: 3.469 arcsec [1.98 $\sigma$ ]  
OotOffset-rm: 1.324 arcsec [1.50 $\sigma$ ]  
KicOffset-rm: 1.409 arcsec [1.55 $\sigma$ ]  
OotOffset-st: 2/2/1/2 [7]  
KicOffset-st: 2/2/1/2 [7]  
DiffImageQuality-fgm: 0.00 [0/7]  
DiffImageOverlap-fno: 1.00 [14/14]

# TCE 003645438-03, PDC Light Curves





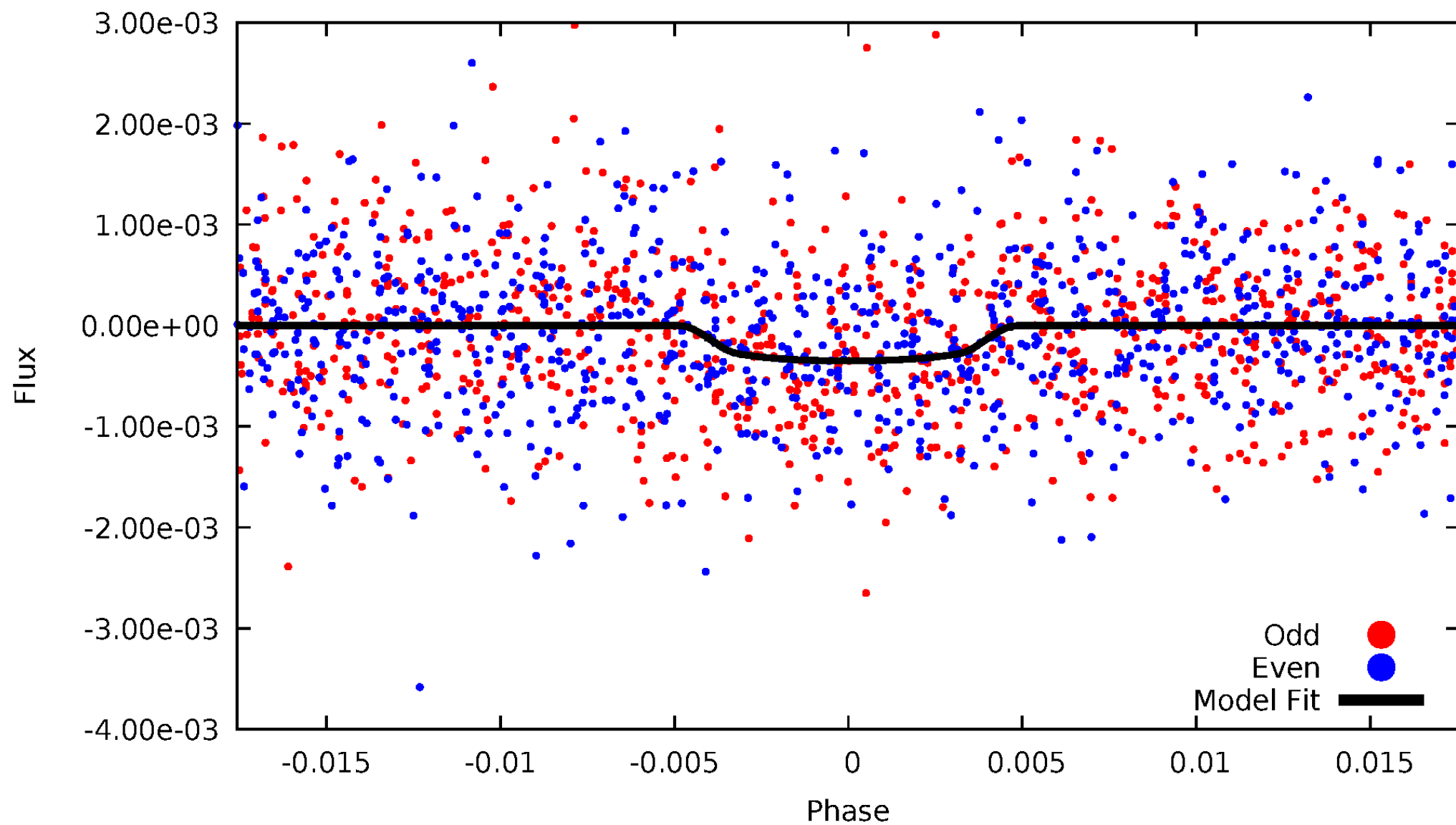
TCE 003645438-03





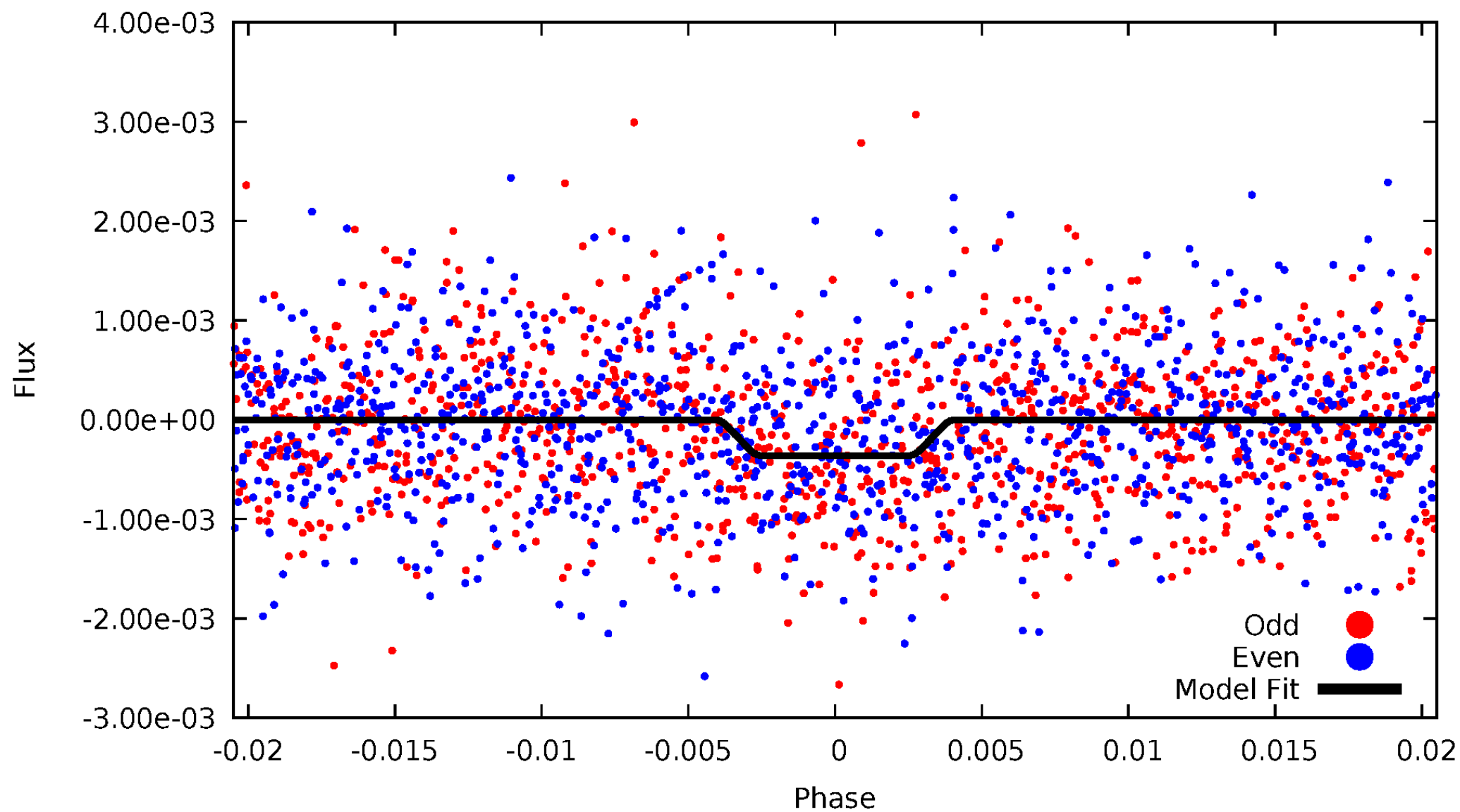
# DV Odd/Even

TCE 003645438-03



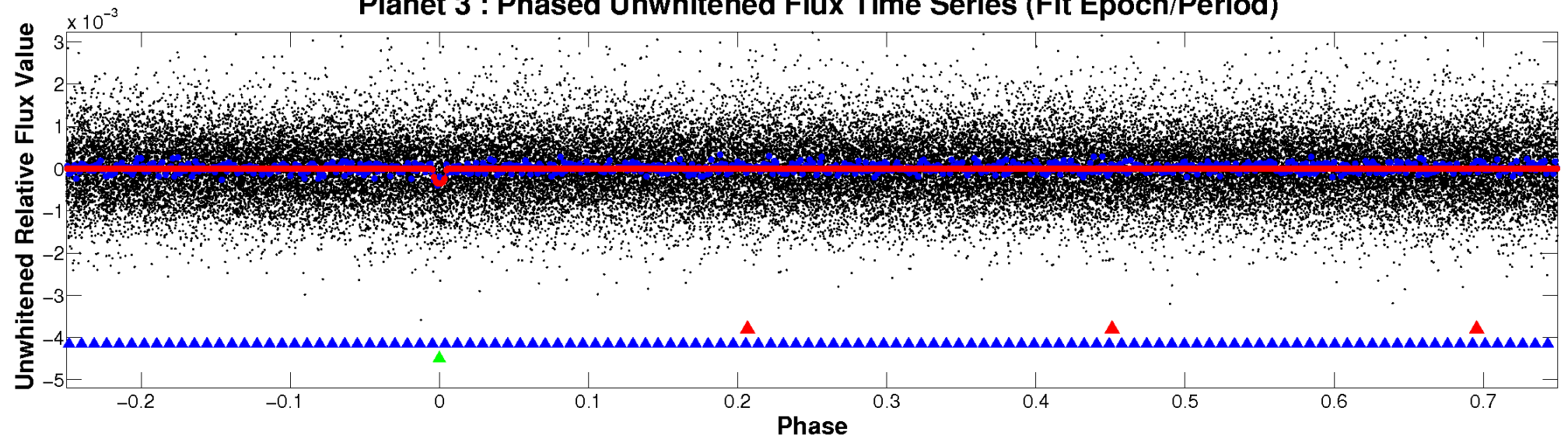
# ALT Odd/Even

TCE 003645438-03

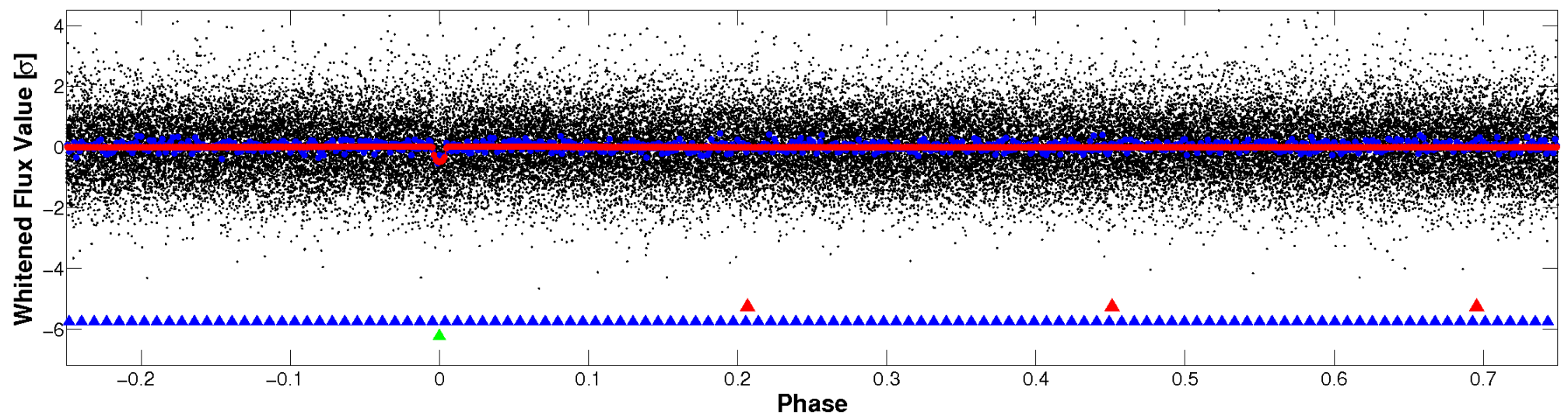


# Non-Whitened Vs. Whitened Light Curve

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

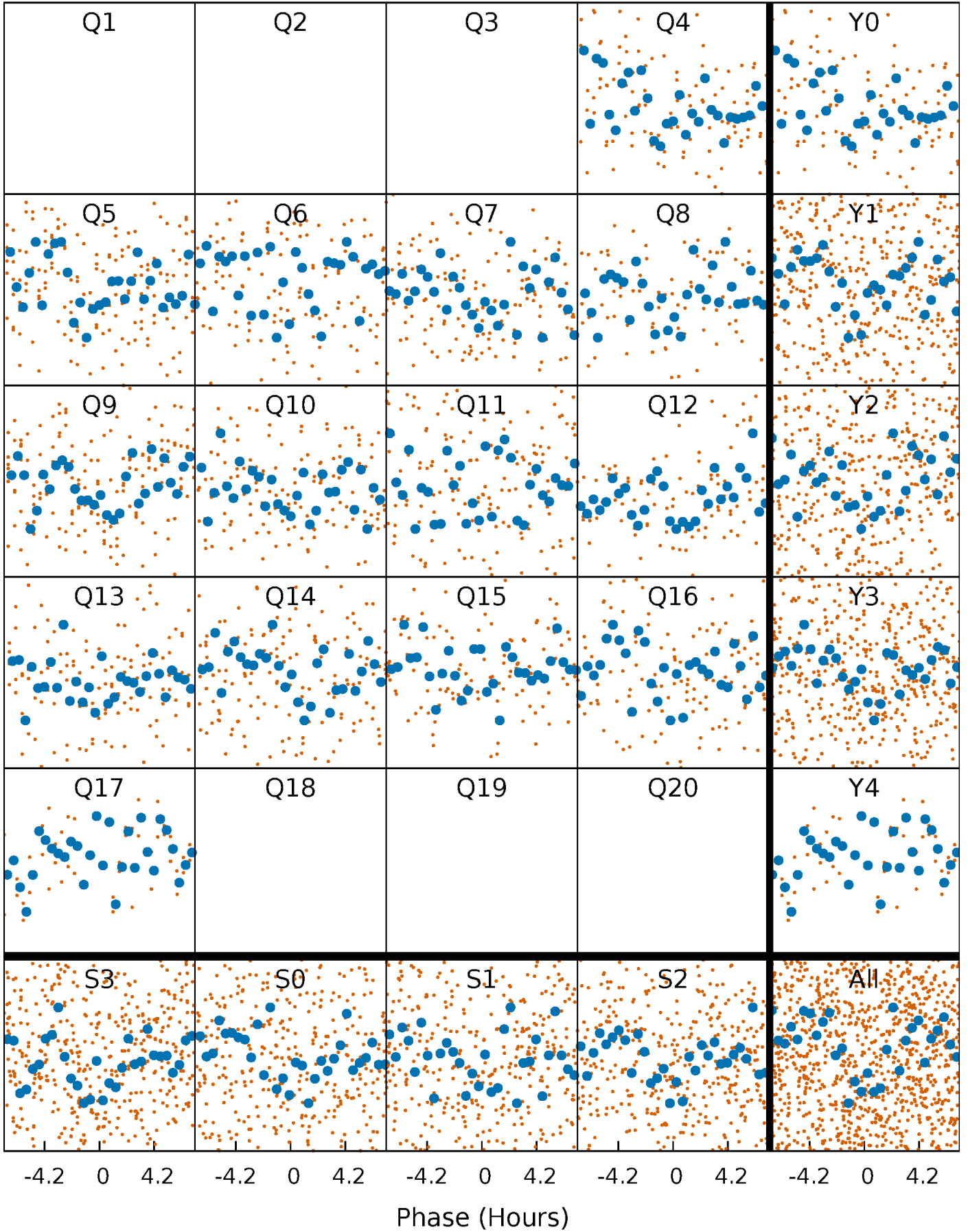


**Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



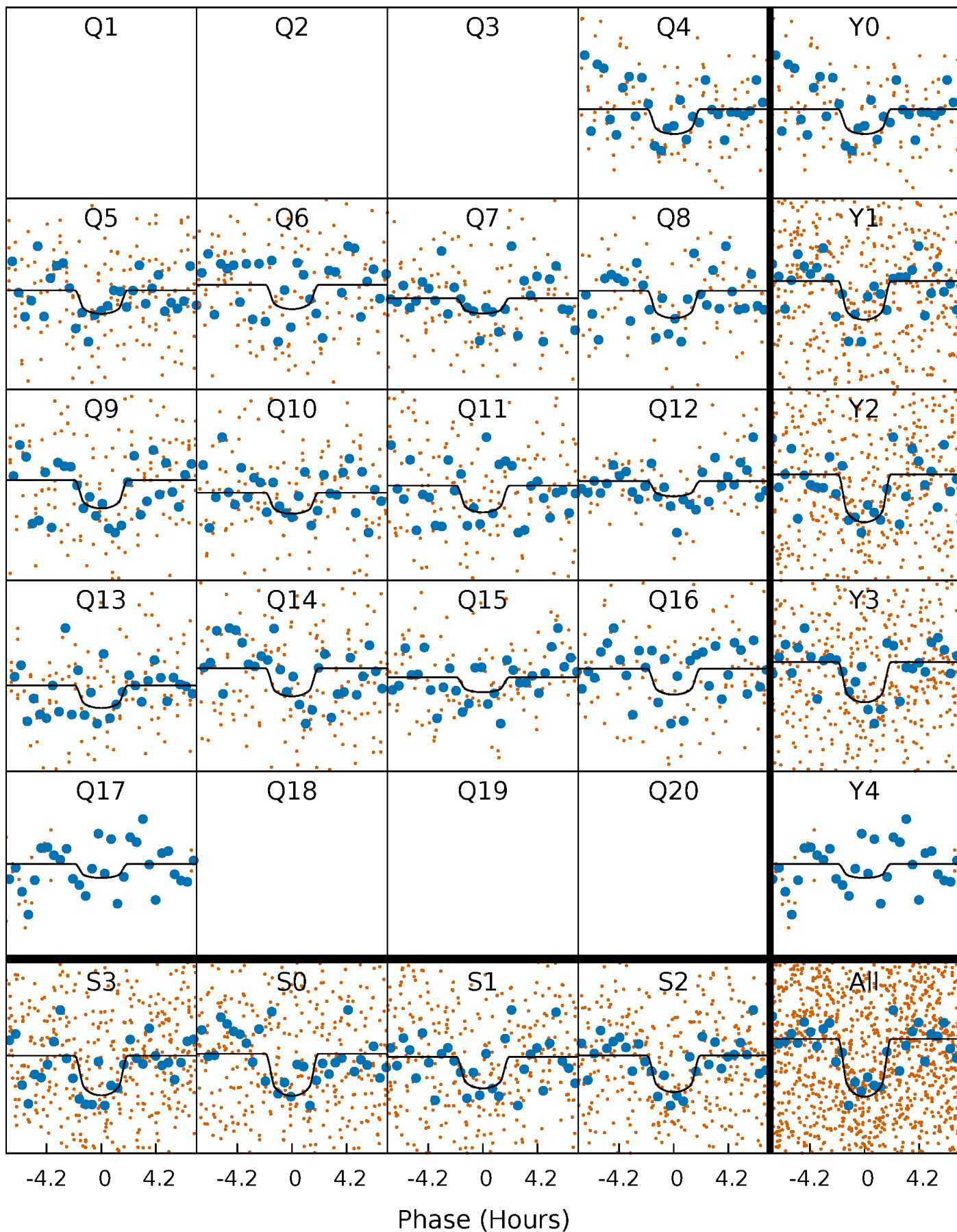
# PDC Quarter-Phased Transit Curves

TCE 003645438-03 P= 17.369336 Days  $T_0=136.633845$  (BKJD)



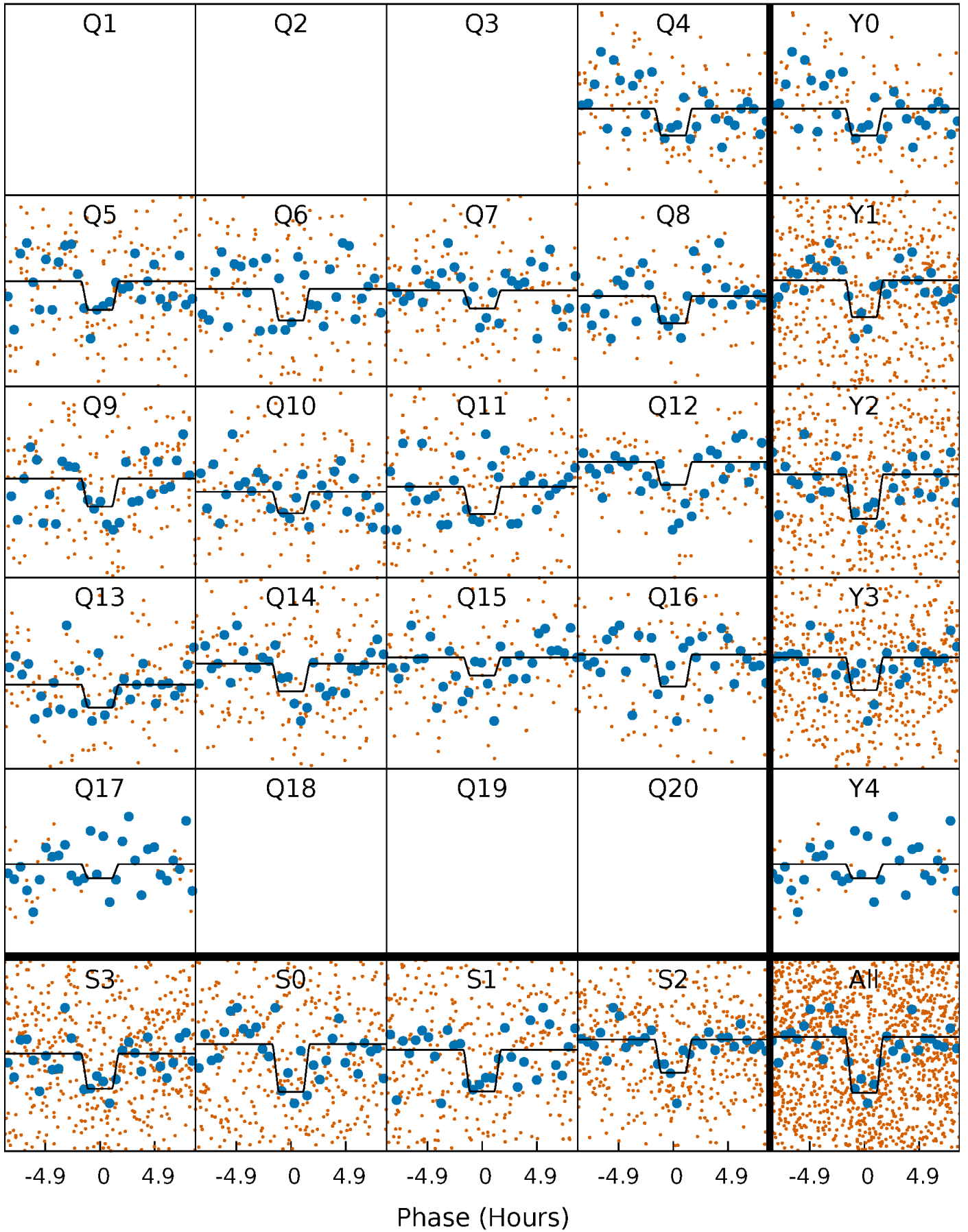
# DV Quarter-Phased Transit Curves

TCE 003645438-03 P= 17.369336 Days  $T_0=136.633845$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 003645438-03 P= 17.369861 Days  $T_0=136.600915$  (BKJD)

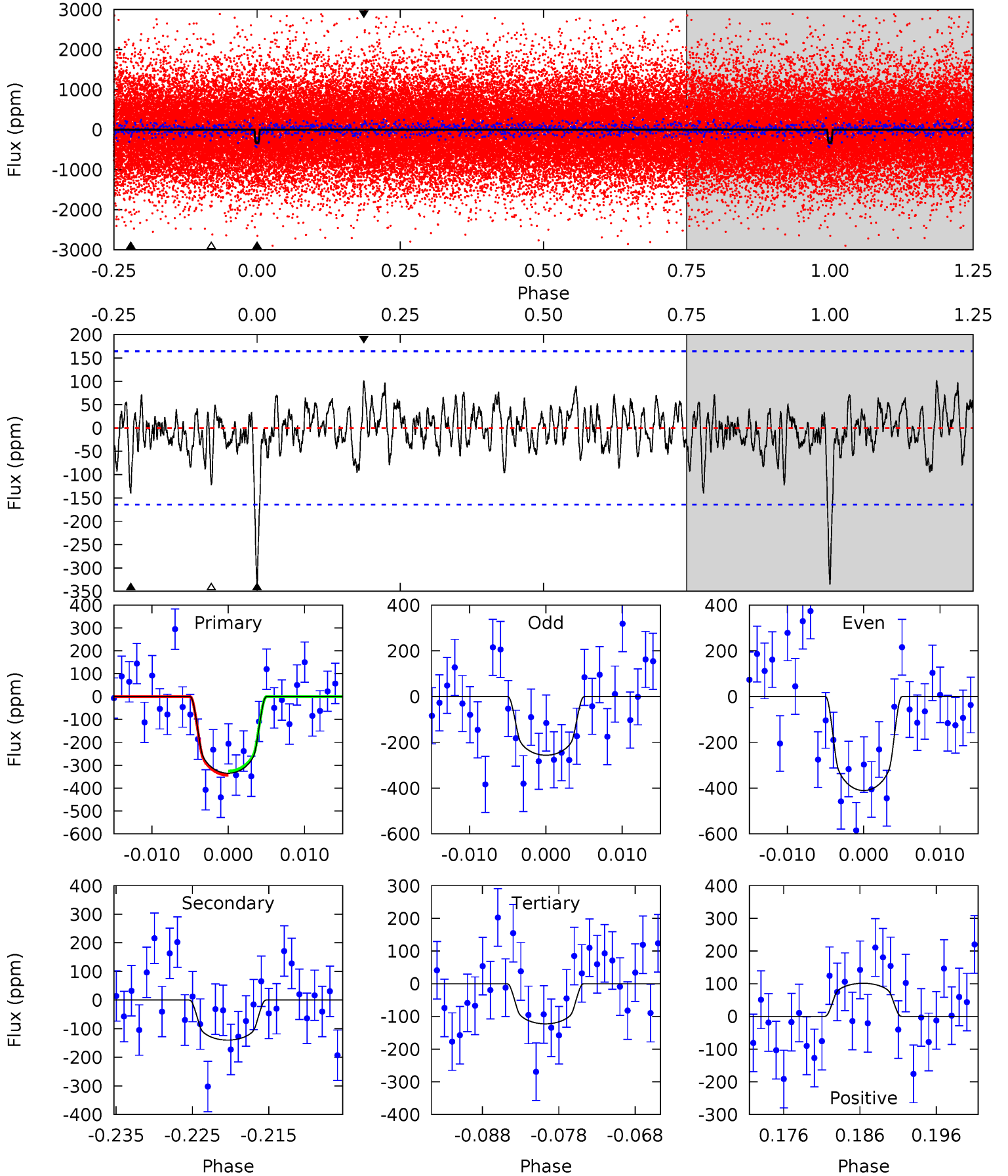




# DV Model-Shift Uniqueness Test

003645438-03, P = 17.369336 Days, E = 136.633845 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.3	4.29	3.76	3.10	5.03	2.58	1.11	6.50	7.16	0.53	1.19	2.37	0.94	0.23	0.27

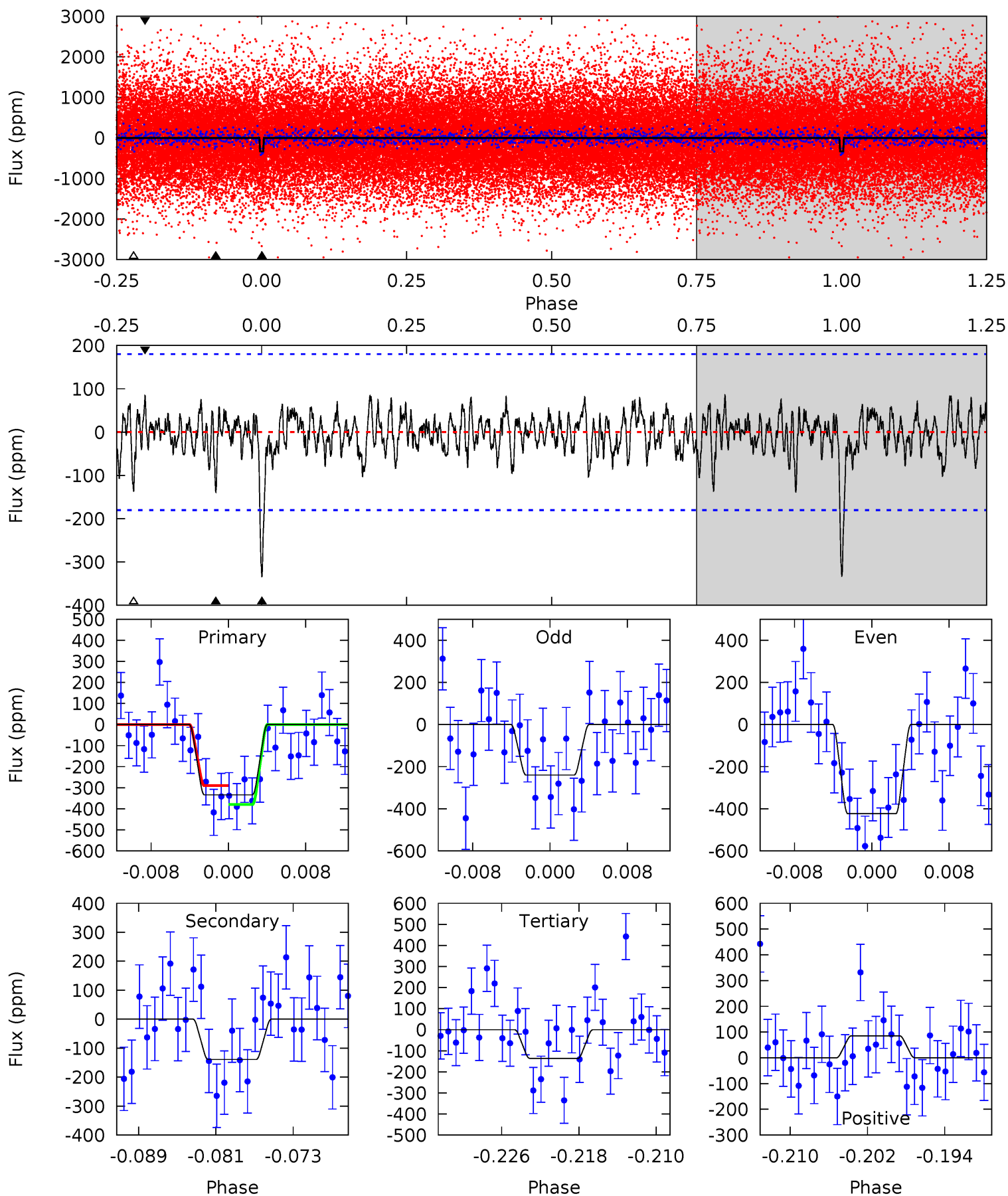




# Alt Model-Shift Uniqueness Test

003645438-03, P = 17.369861 Days, E = 136.600915 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
9.38	3.91	3.83	2.41	5.07	2.65	1.02	5.55	6.98	0.08	1.51	2.59	1.05	0.20	1.26



### Stellar Parameters For KIC 003645438

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5119^{+82}_{-82}$	$4.508^{+0.060}_{-0.040}$	$0.100^{+0.150}_{-0.150}$	$0.834^{+0.047}_{-0.052}$	$0.818^{+0.053}_{-0.035}$	$1.983^{+0.457}_{-0.256}$
	+2%/-2%	+1%/-1%	+150%/-150%	+6%/-6%	+6%/-4%	+23%/-13%
Source	SPE90	SPE90	SPE90	DSEP		

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

### Secondary Eclipse Parameters for KIC 003645438-03 / KOI 4385.03

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-140 \pm 33$	$2.11^{+1.62}_{-1.24}$	$821^{+18}_{-18}$	$3900^{+1732}_{-636}$	$251^{+1170}_{-169}$
Alt.	$-139 \pm 36$	$2.05^{+1.54}_{-1.31}$	$821^{+21}_{-19}$	$3952^{+2014}_{-648}$	$272^{+1778}_{-183}$

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

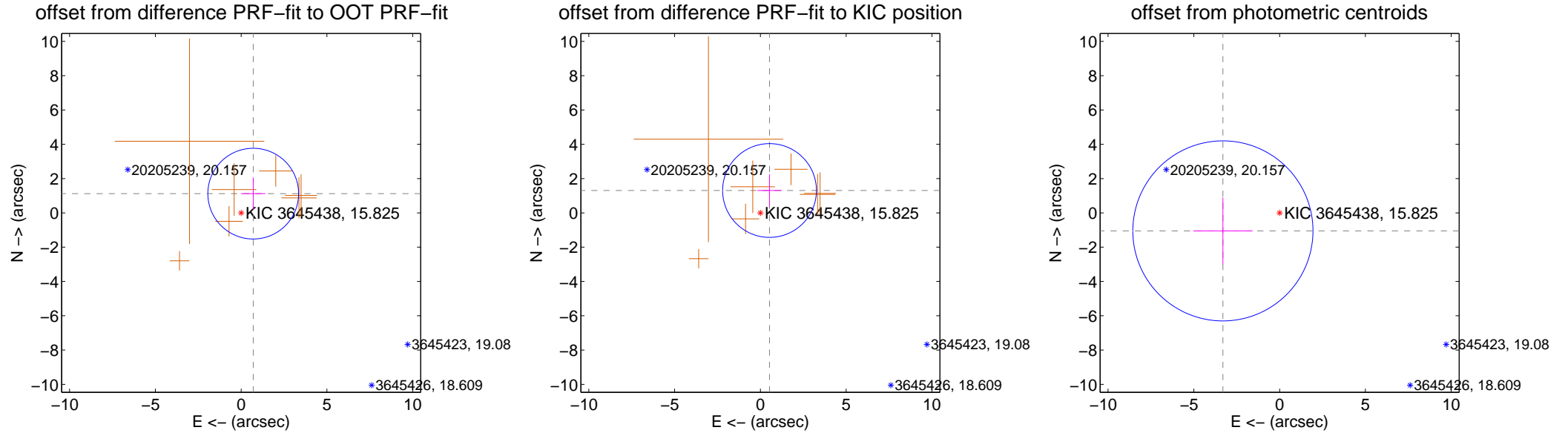
## DV Centroid Data

Supplemental centroid analysis for 003645438-03. Kepler magnitude: 15.82. Transit SNR 8.35

There are 0 quarters with good PRF difference image offsets

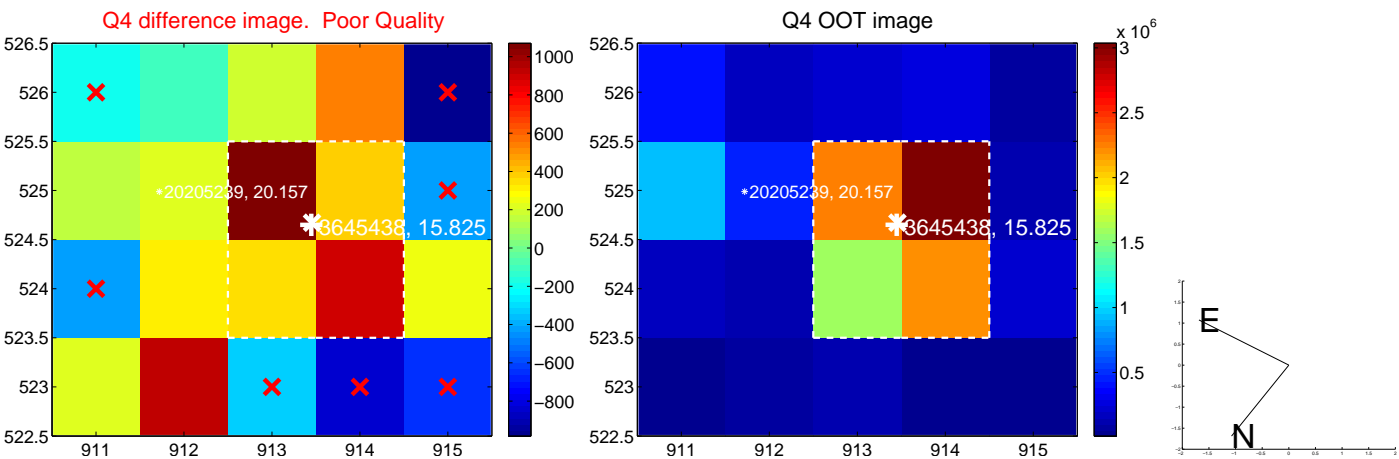
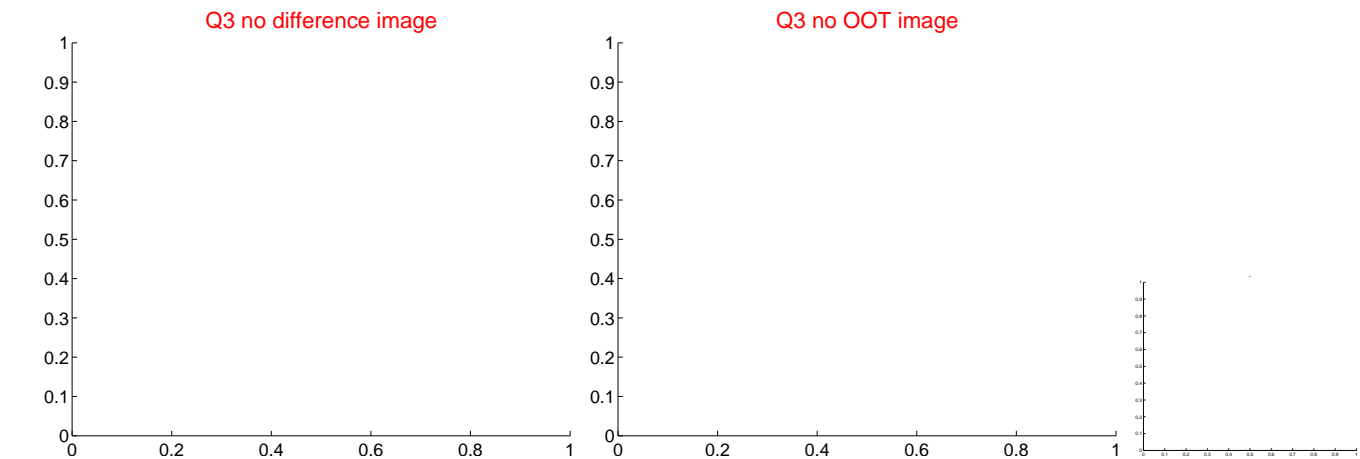
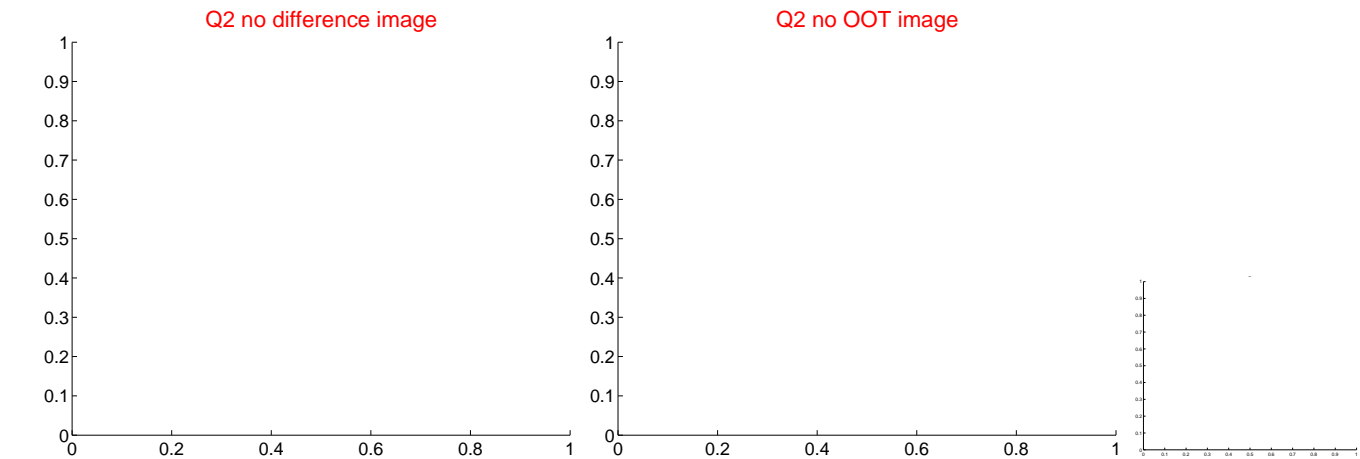
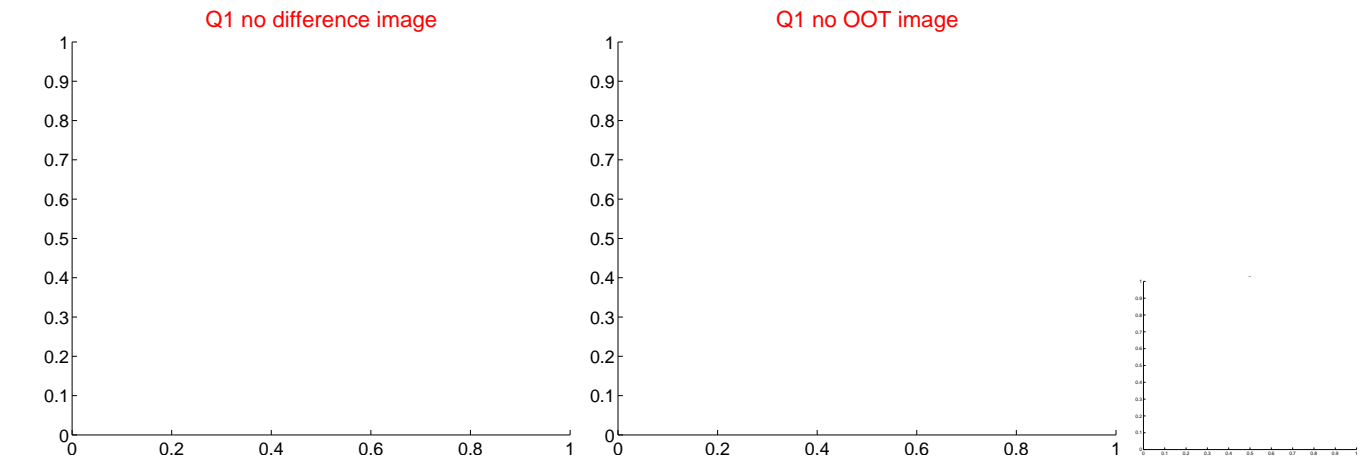
The direct PRF centroid is offset from the target star catalog position by about 0.21 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.324 \pm 0.882$	1.50	$-0.704 \pm 0.710$	$1.121 \pm 0.941$
PRF-fit source offset from KIC position	$1.409 \pm 0.911$	1.55	$-0.533 \pm 0.710$	$1.304 \pm 0.941$
photometric centroid source offset	$3.47 \pm 1.75$	1.98	$3.31 \pm 1.73$	$-1.05 \pm 1.95$

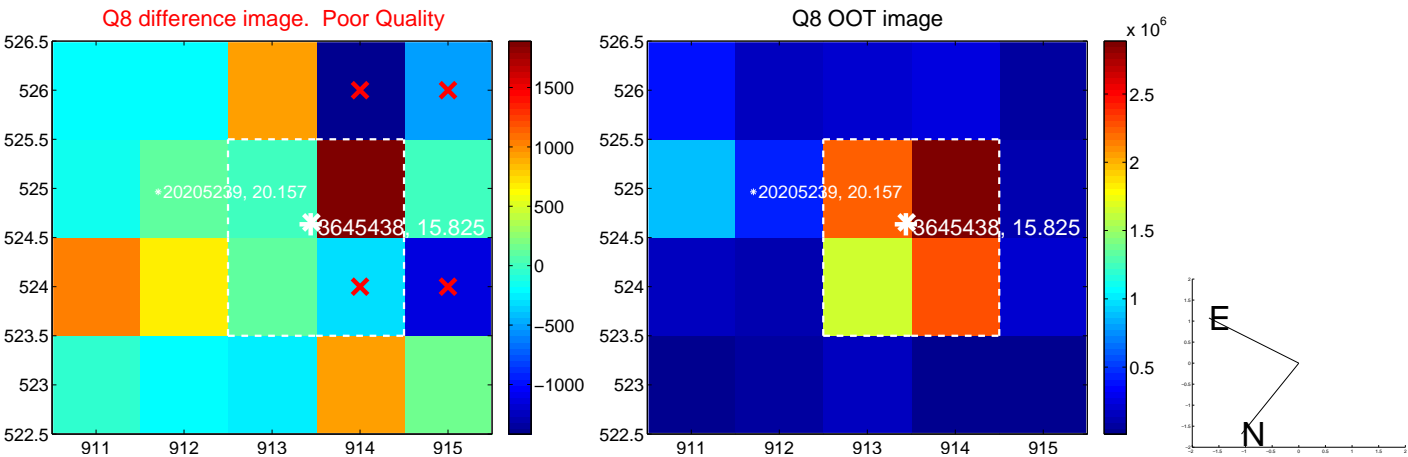
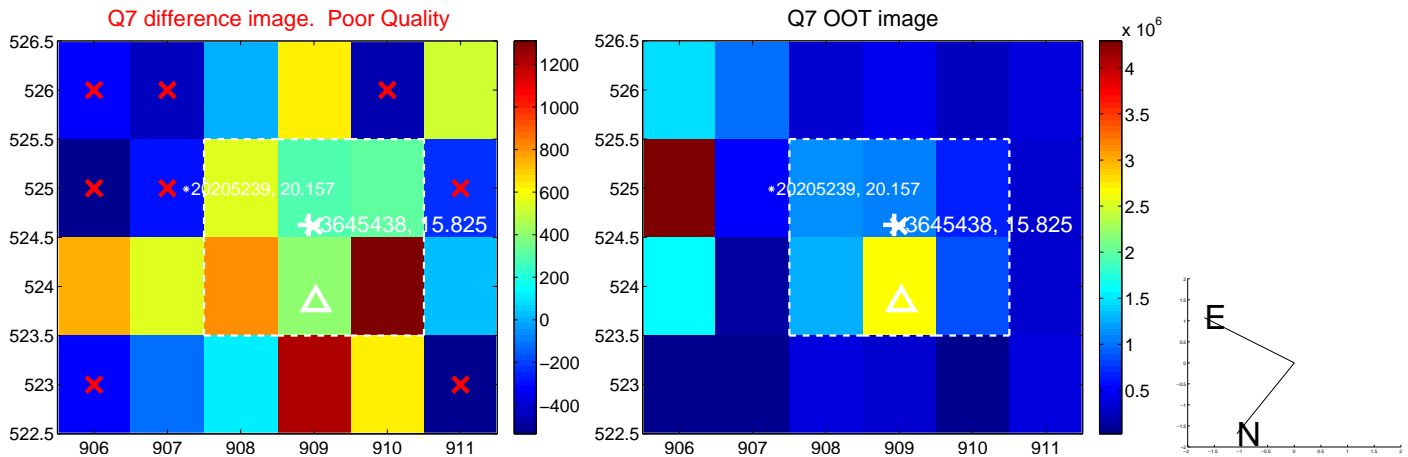
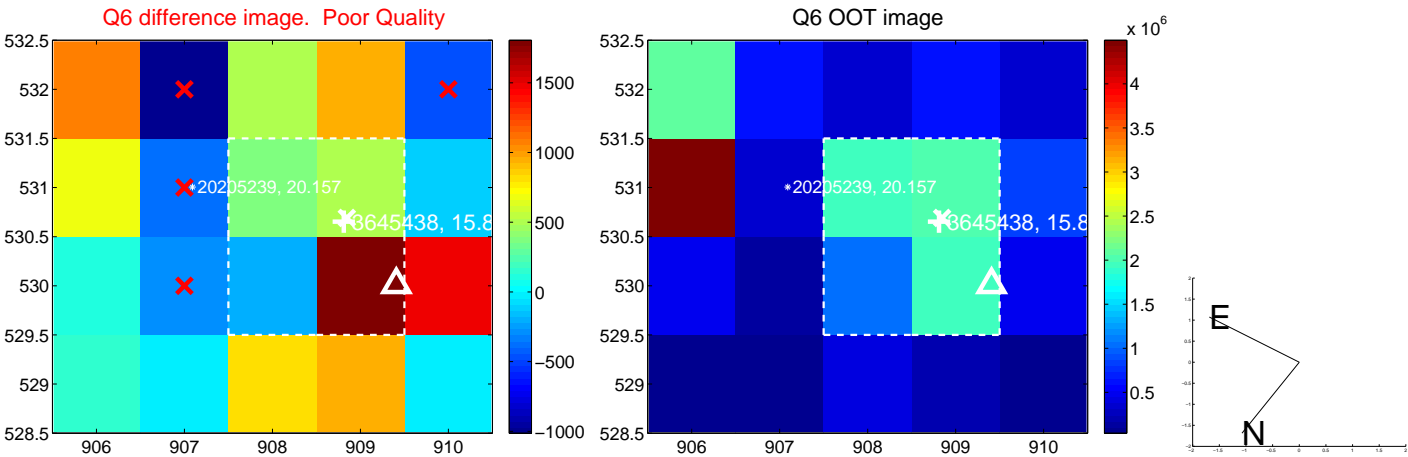
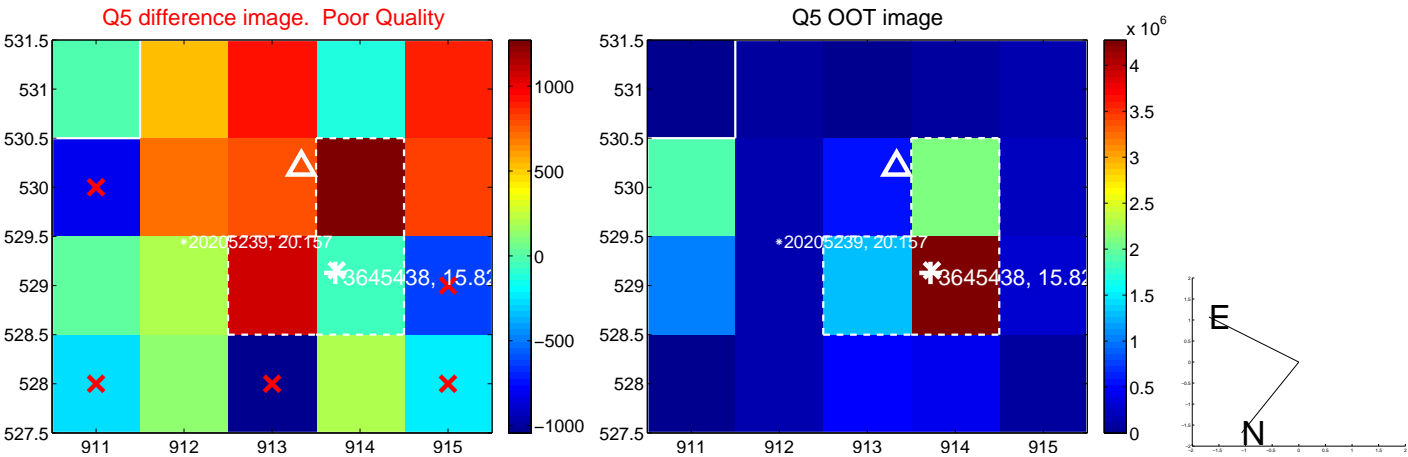


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

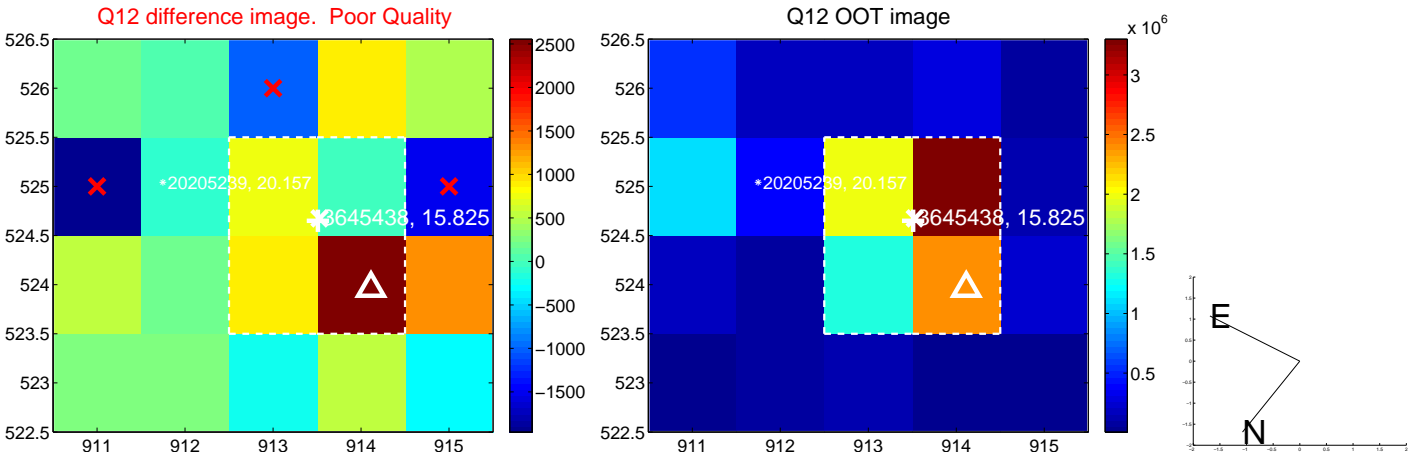
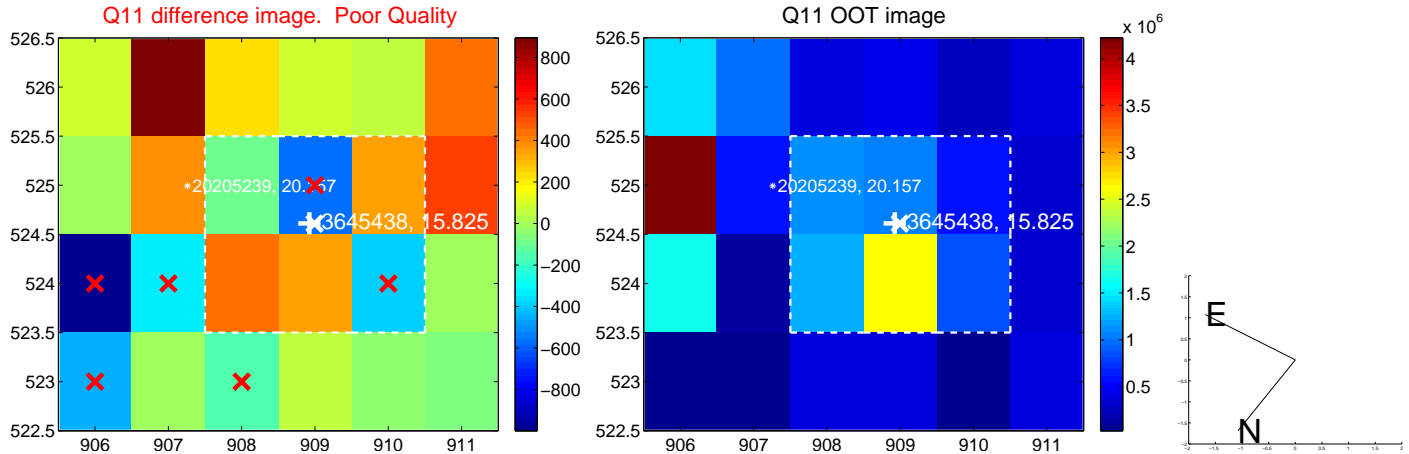
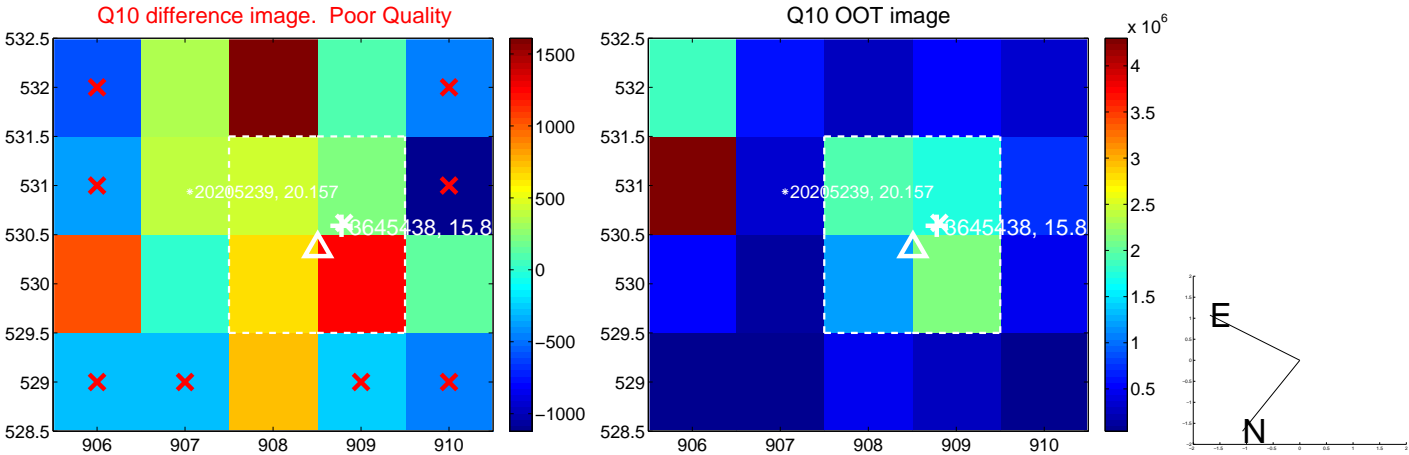
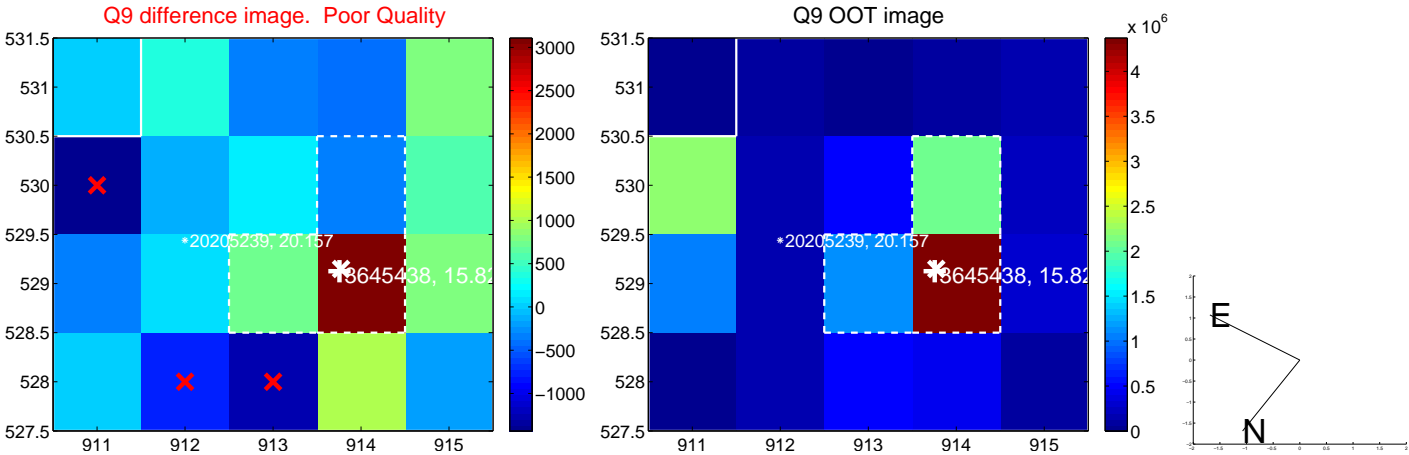
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



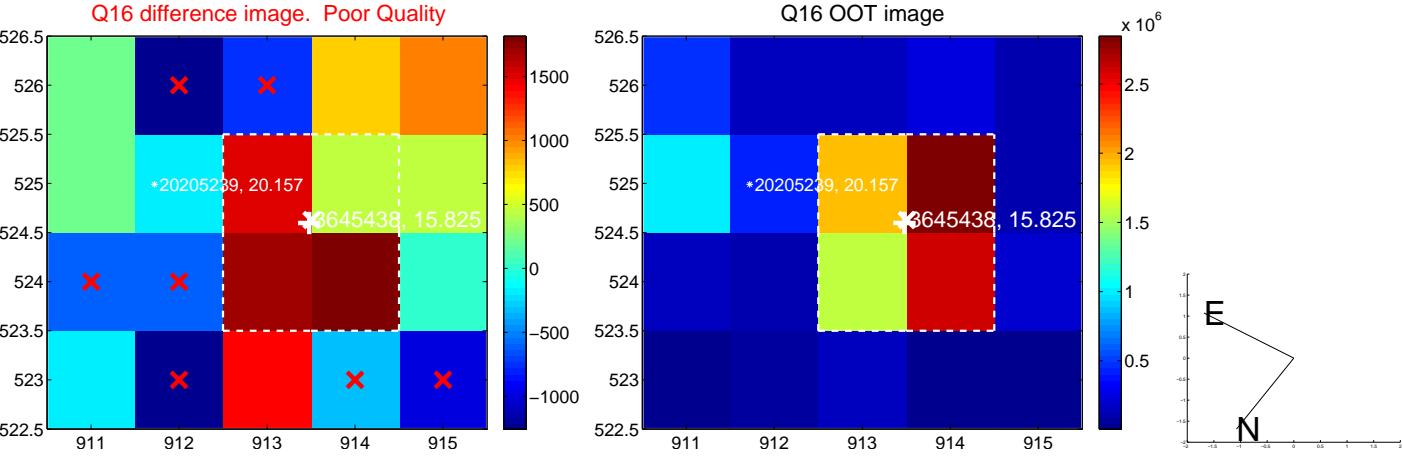
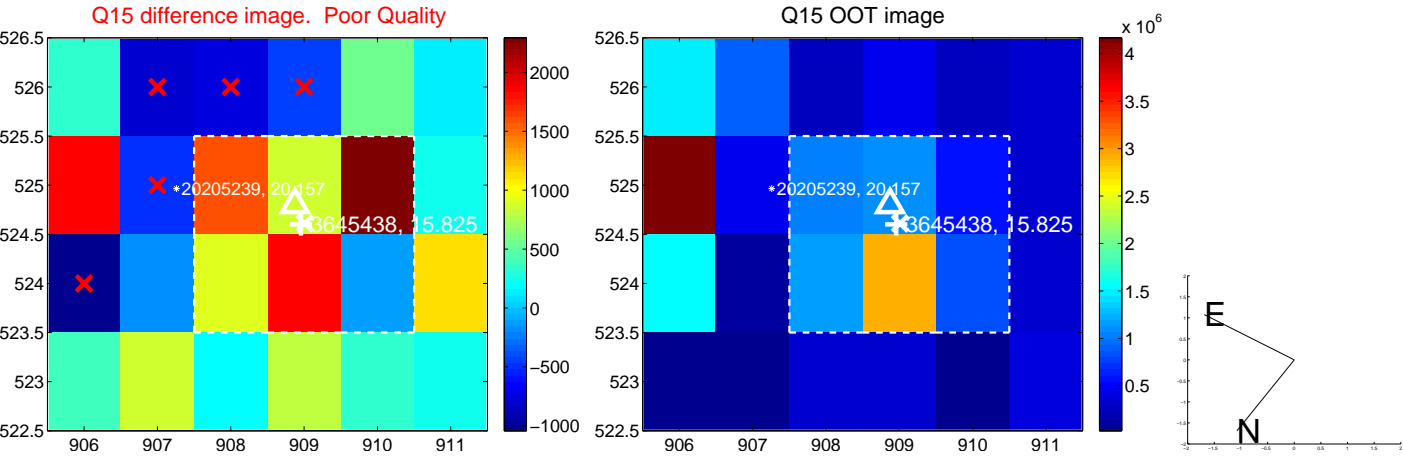
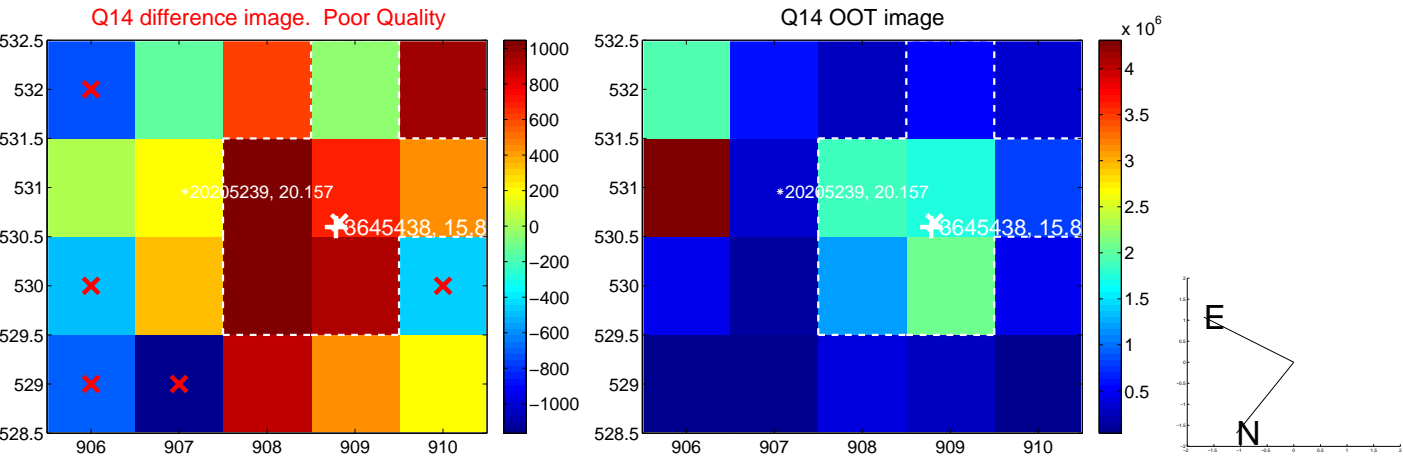
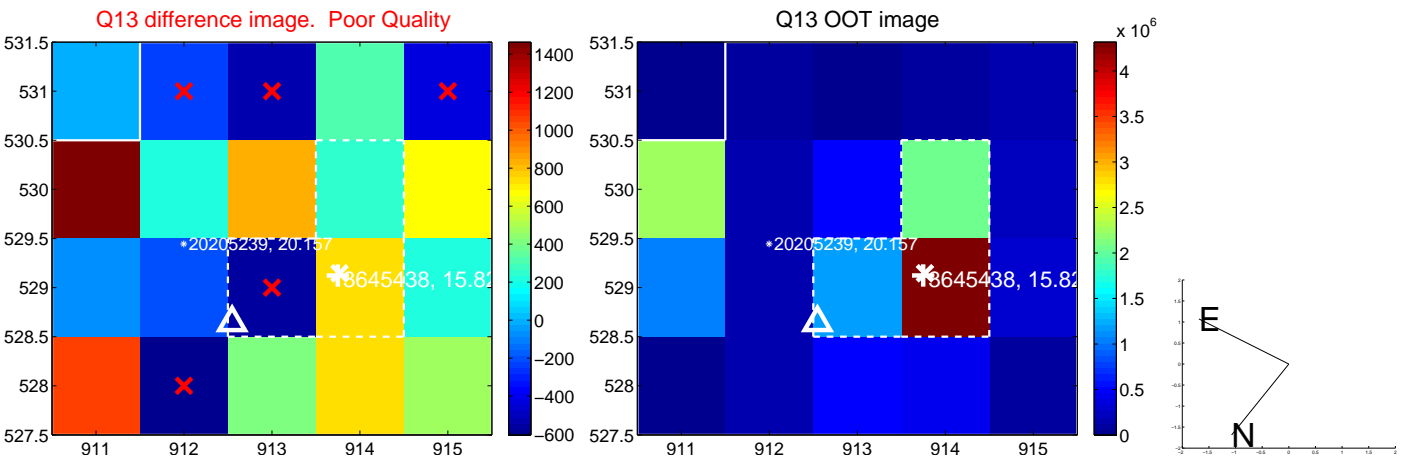
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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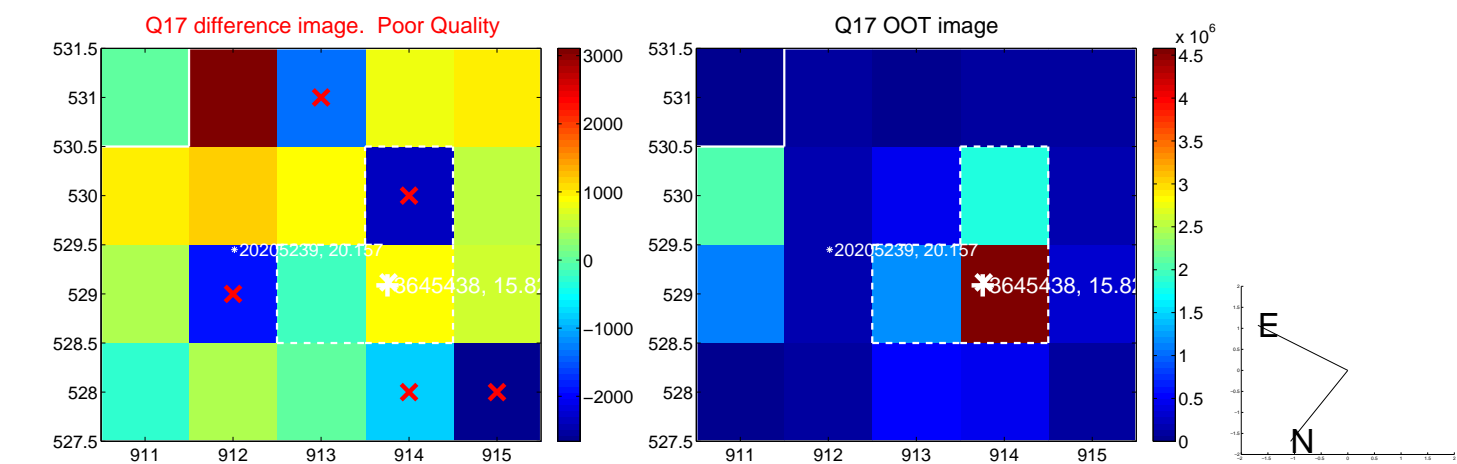


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

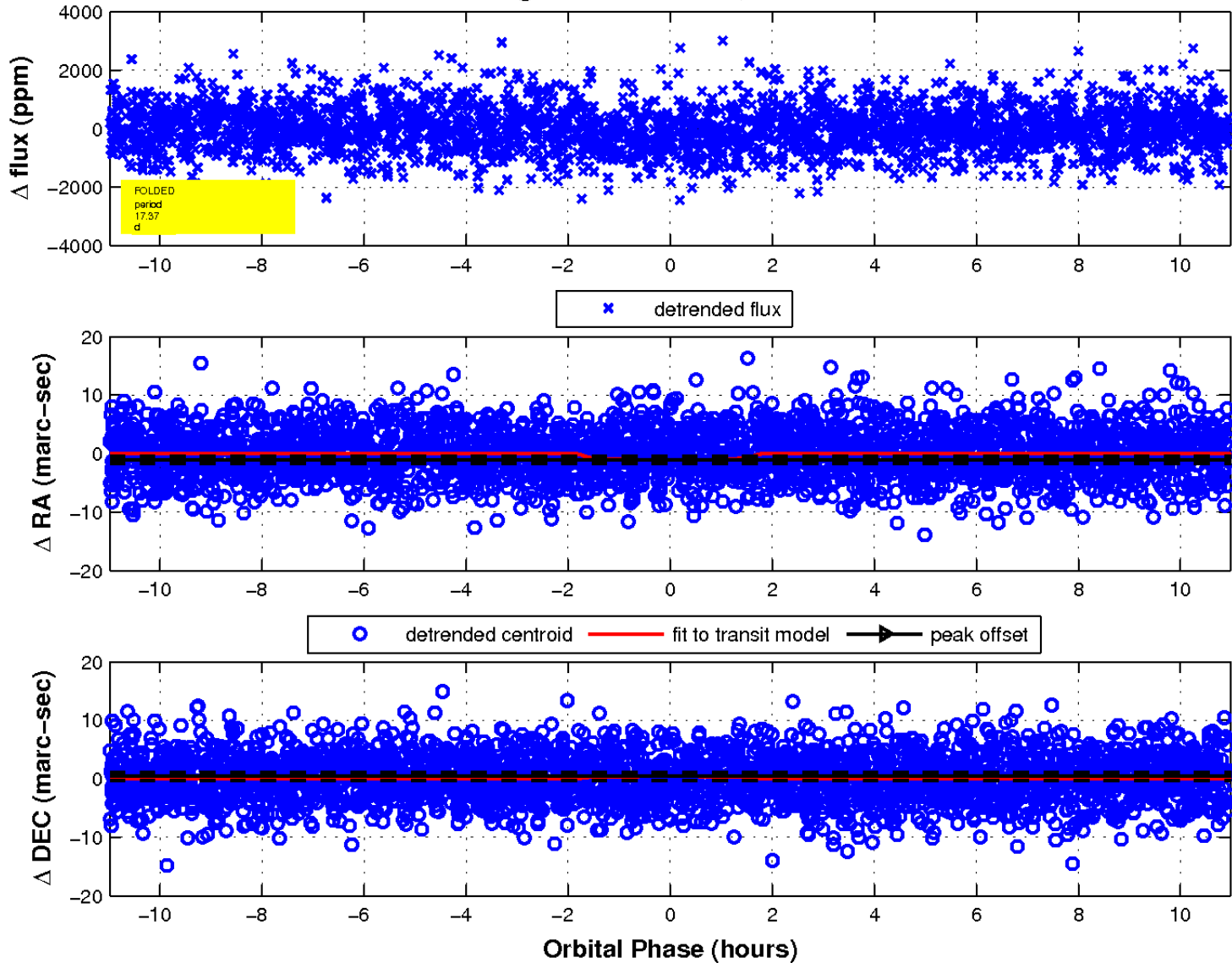




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



fluxWeightedCentroids, Planet 3 of 3



UKIRT Image

Declination

