

# KIC 006231451

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006231451-01	OBS	No	0.751993	131.625032	98.2	1.659	10.5	10.9	2.47	7684	2.84	47322.92
006231451-02	OBS	No	3.296244	132.589660	120.4	8.316	9.0	8.0	2.47	7684	3.13	6596.76
006231451-03	OBS	No	346.059088	140.988715	1053.2	8.096	7.9	7.4	2.47	7684	9.18	13.32

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006231451-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT
006231451-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
006231451-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—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.

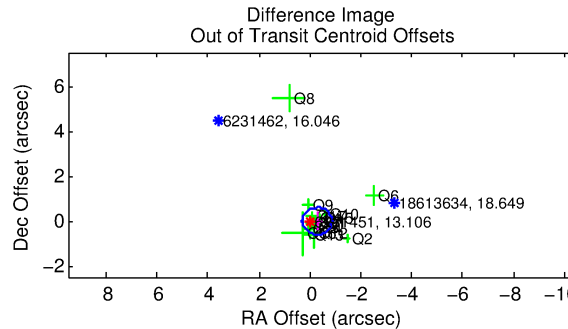
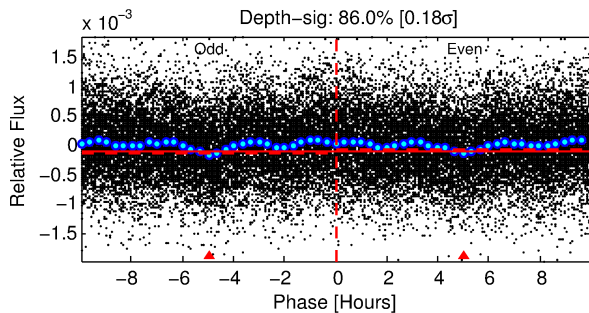
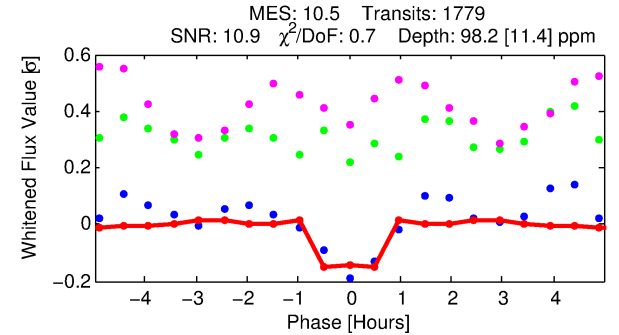
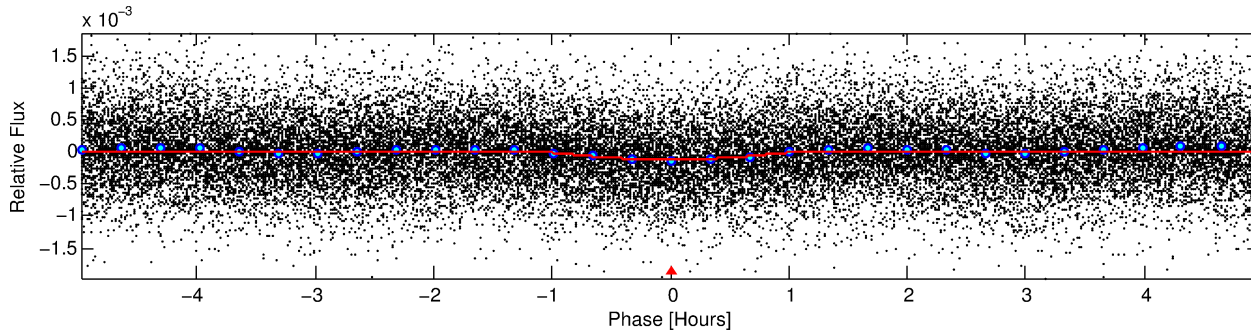
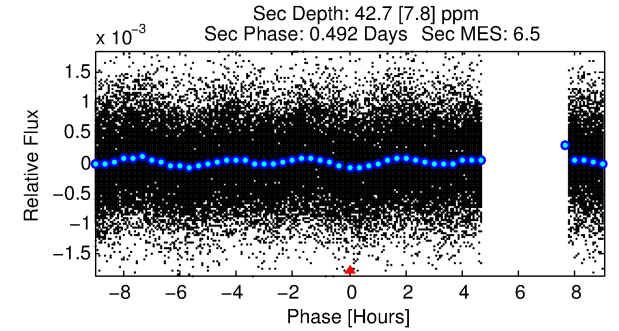
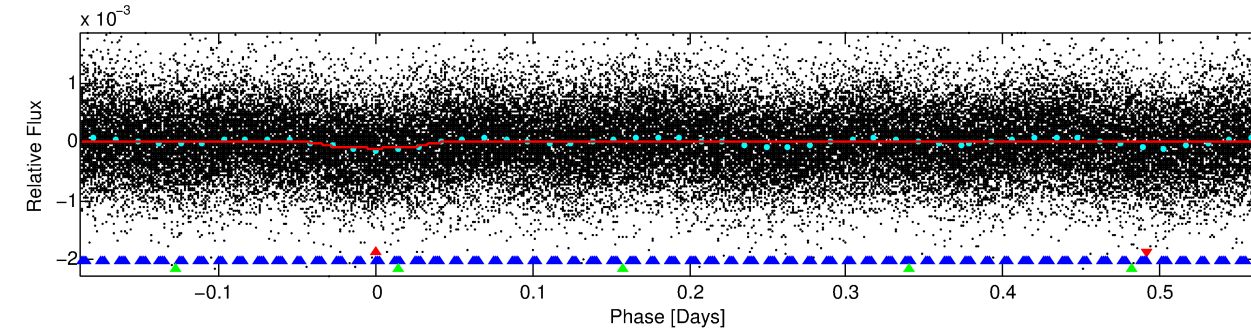
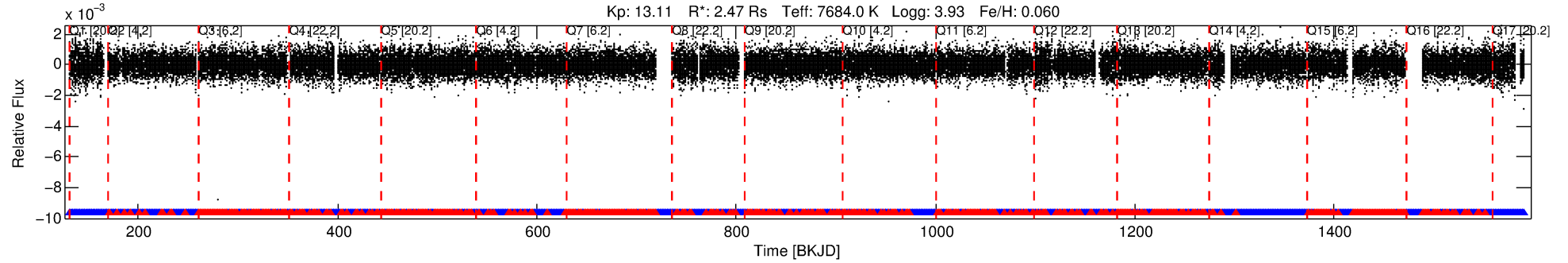
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 006231451-01

No Significant Match Found

# DV One-Page Summary

KIC: 6231451 Candidate: 1 of 3 Period: 0.752 d



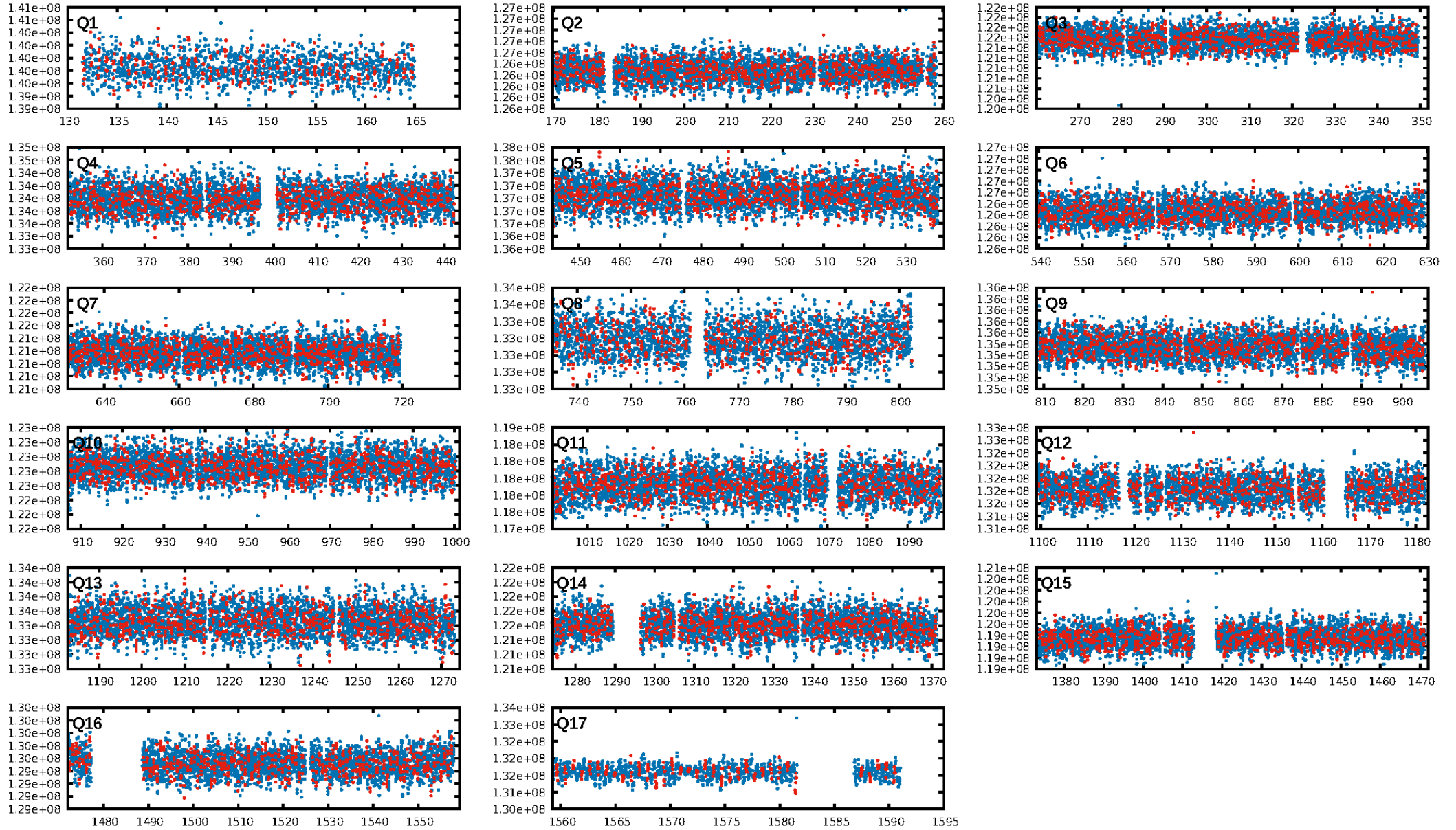
## DV Fit Results:

Period = 0.75199 [0.00001] d  
Epoch = 131.6250 [0.0014] BKJD  
Rp/R\* = 0.0106 [0.0025]  
a/R\* = 1.84 [1.93]  
b = 0.90 [0.31]  
Seff = 47322.92 [22188.37]  
Teq = 3761 [441] K  
Rp = 2.84 [1.11] Re  
a = 0.0200 [0.0056] AU  
Ag = 1.17 [0.78] [0.22 $\sigma$ ]  
Teffp = 6045 [816] K [2.46 $\sigma$ ]

## DV Diagnostic Results:

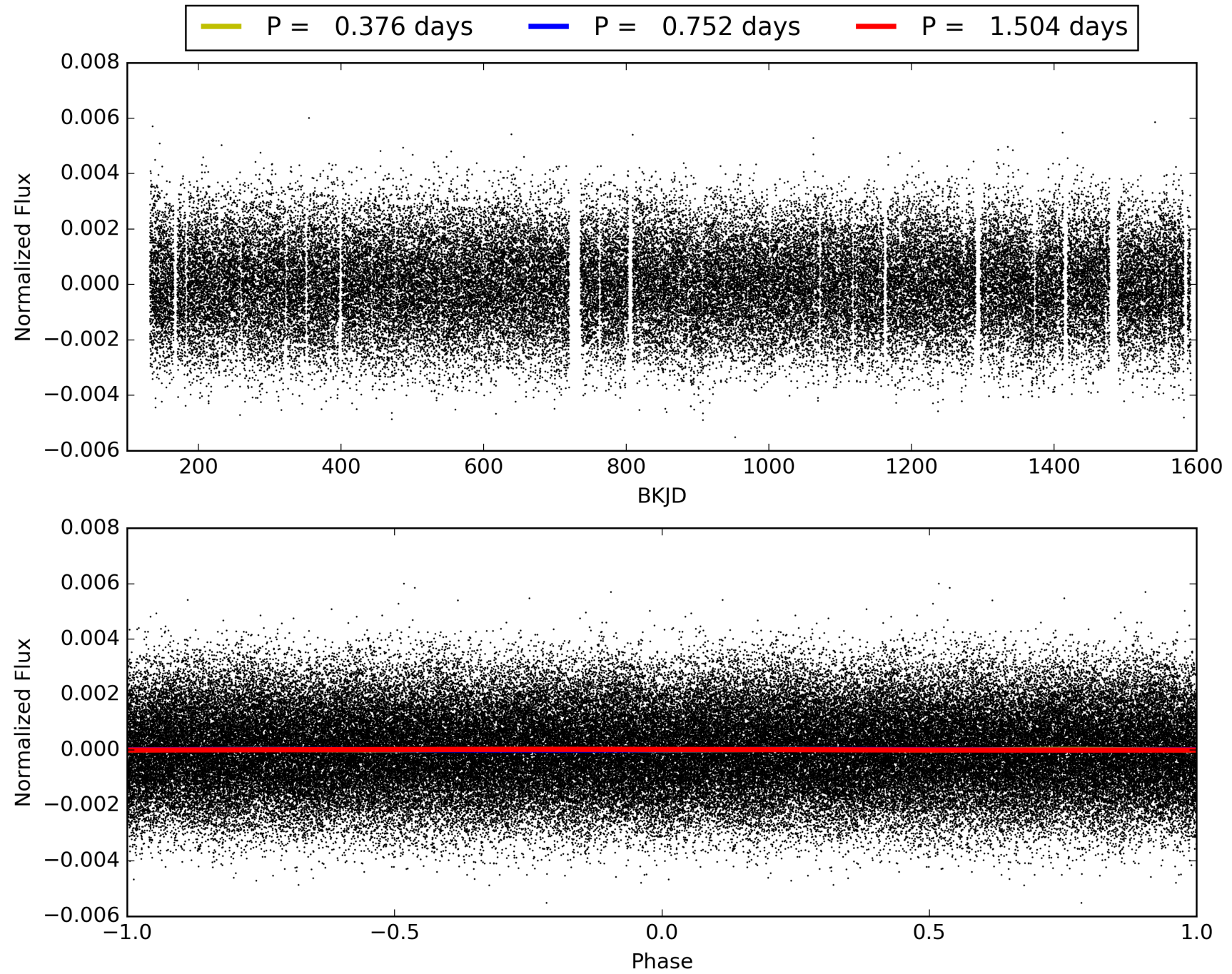
ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [7.20 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 1.36e-23  
RollingBand-fgt: 0.64 [1091/1699]  
GhostDiagnostic-chr: 5.223  
Centroid-sig: 55.1%  
Centroid-so: 0.099 arcsec [0.29 $\sigma$ ]  
OotOffset-rm: 0.286 arcsec [1.44 $\sigma$ ]  
KicOffset-rm: 0.252 arcsec [1.59 $\sigma$ ]  
OotOffset-st: 4/4/4/4 [16]  
KicOffset-st: 4/4/4/4 [16]  
DiffImageQuality-fgm: 0.69 [11/16]  
DiffImageOverlap-fno: 1.00 [17/17]

# TCE 006231451-01, PDC Light Curves





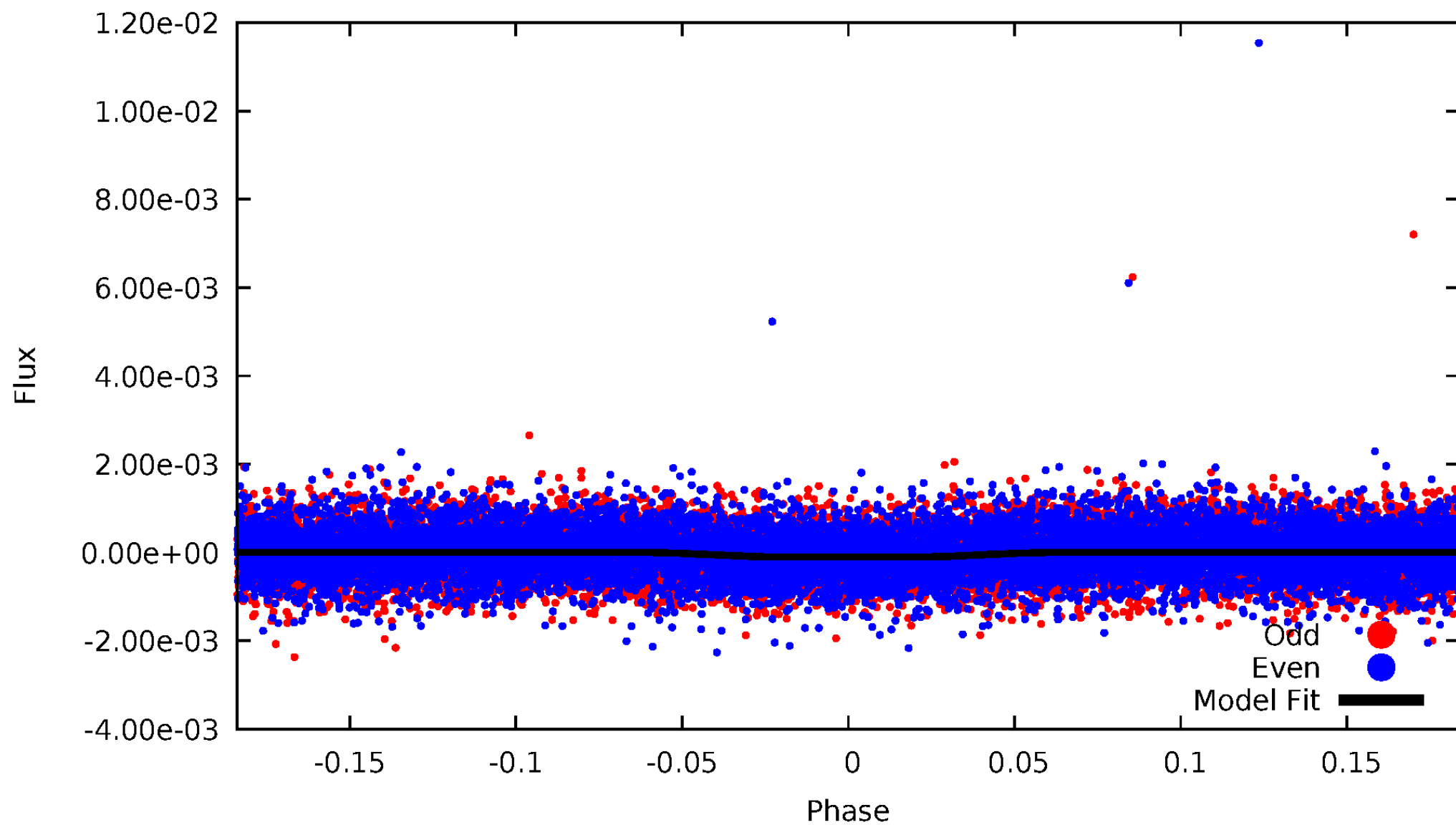
TCE 006231451-01





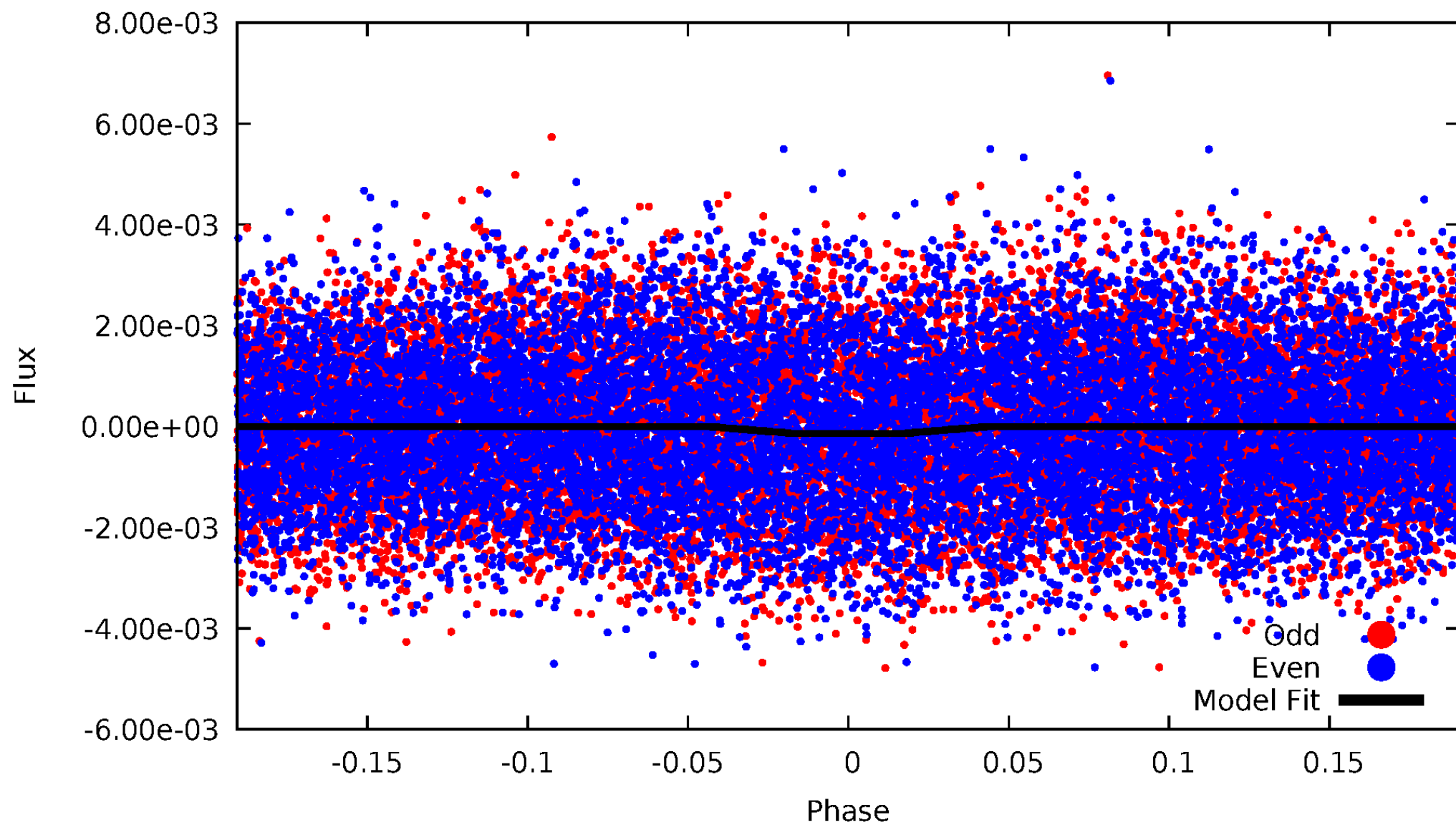
# DV Odd/Even

TCE 006231451-01



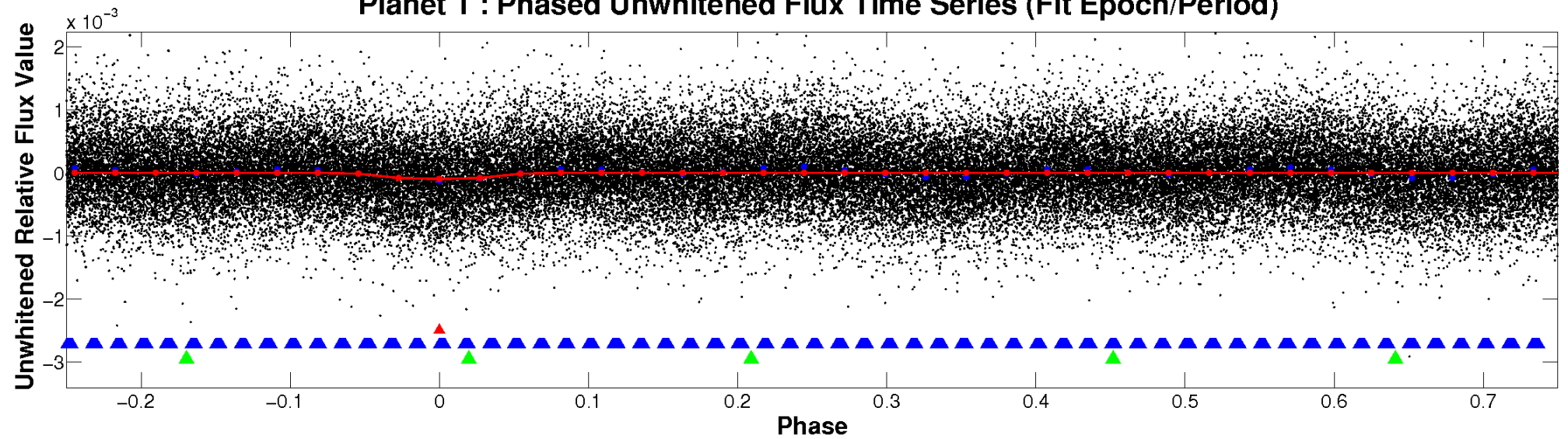
# ALT Odd/Even

TCE 006231451-01

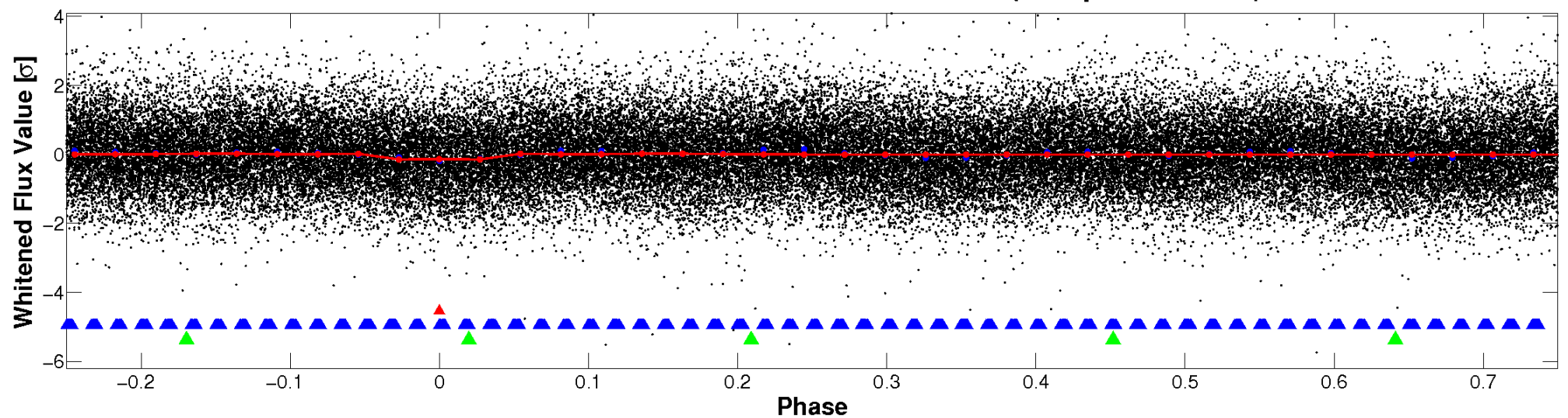


# Non-Whitened Vs. Whitened Light Curve

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



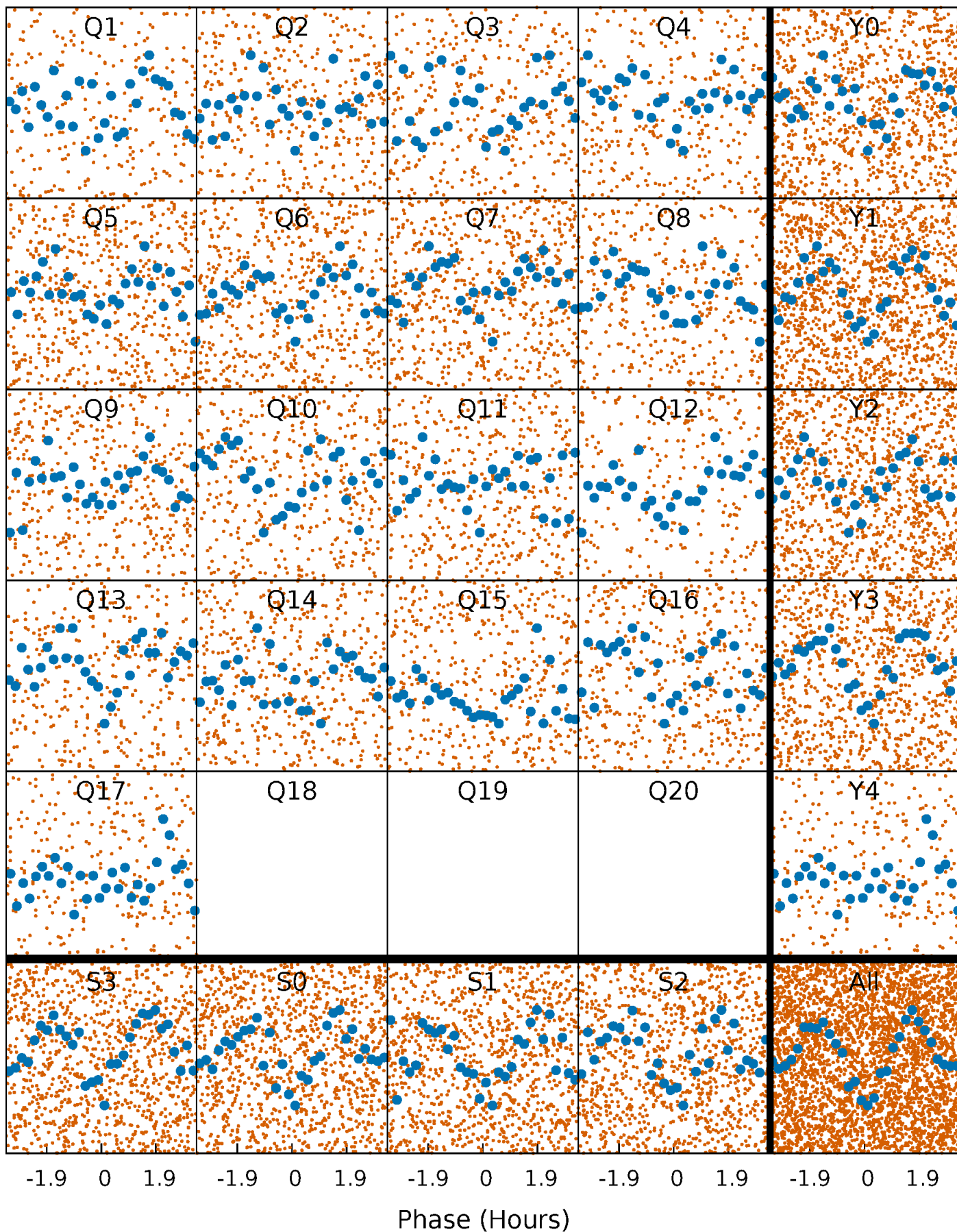
**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**





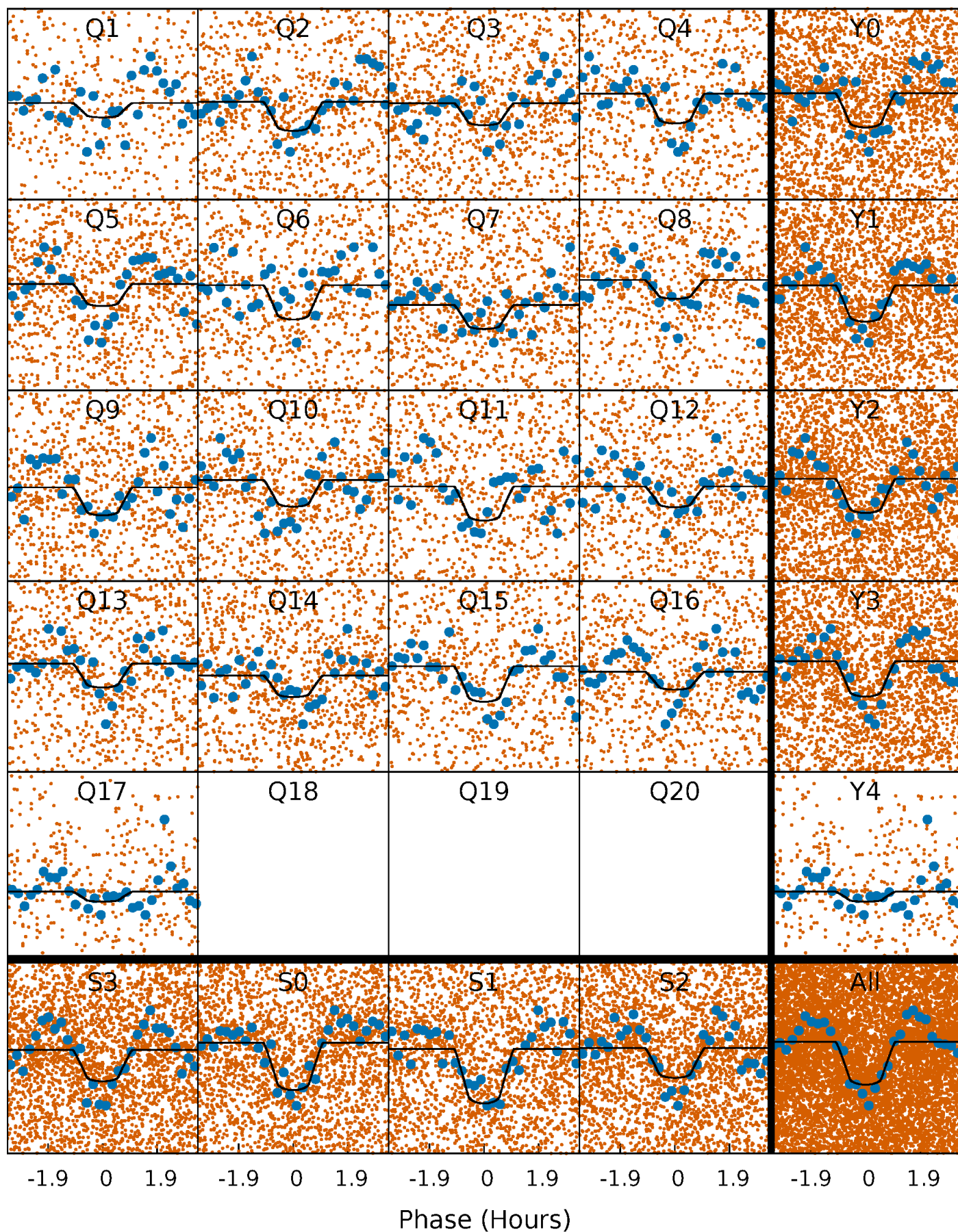
# PDC Quarter-Phased Transit Curves

TCE 006231451-01 P= 0.751993 Days  $T_0=131.625033$  (BKJD)



# DV Quarter-Phased Transit Curves

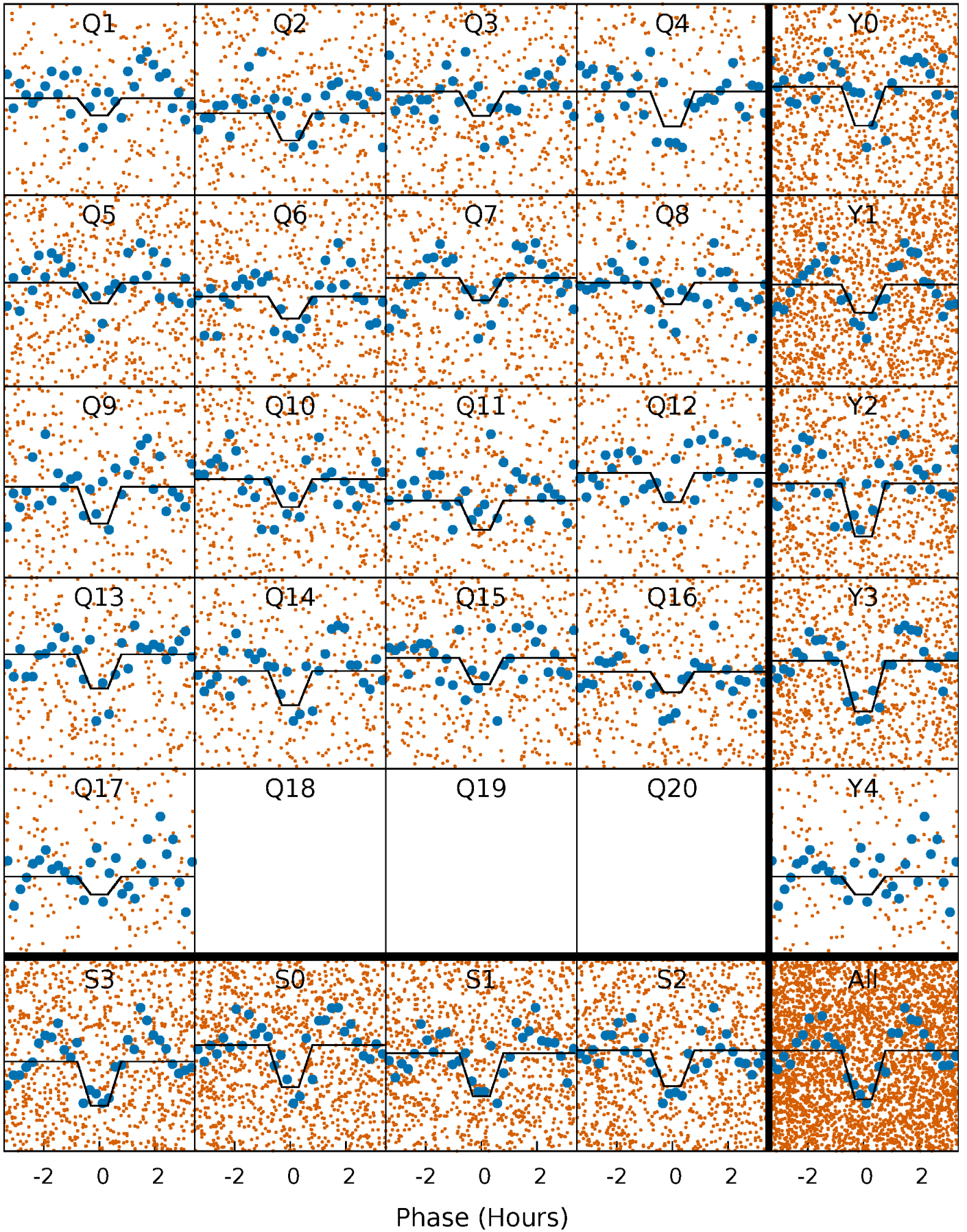
TCE 006231451-01 P= 0.751993 Days  $T_0=131.625033$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

TCE 006231451-01 P= 0.751998 Days  $T_0=131.622339$  (BKJD)

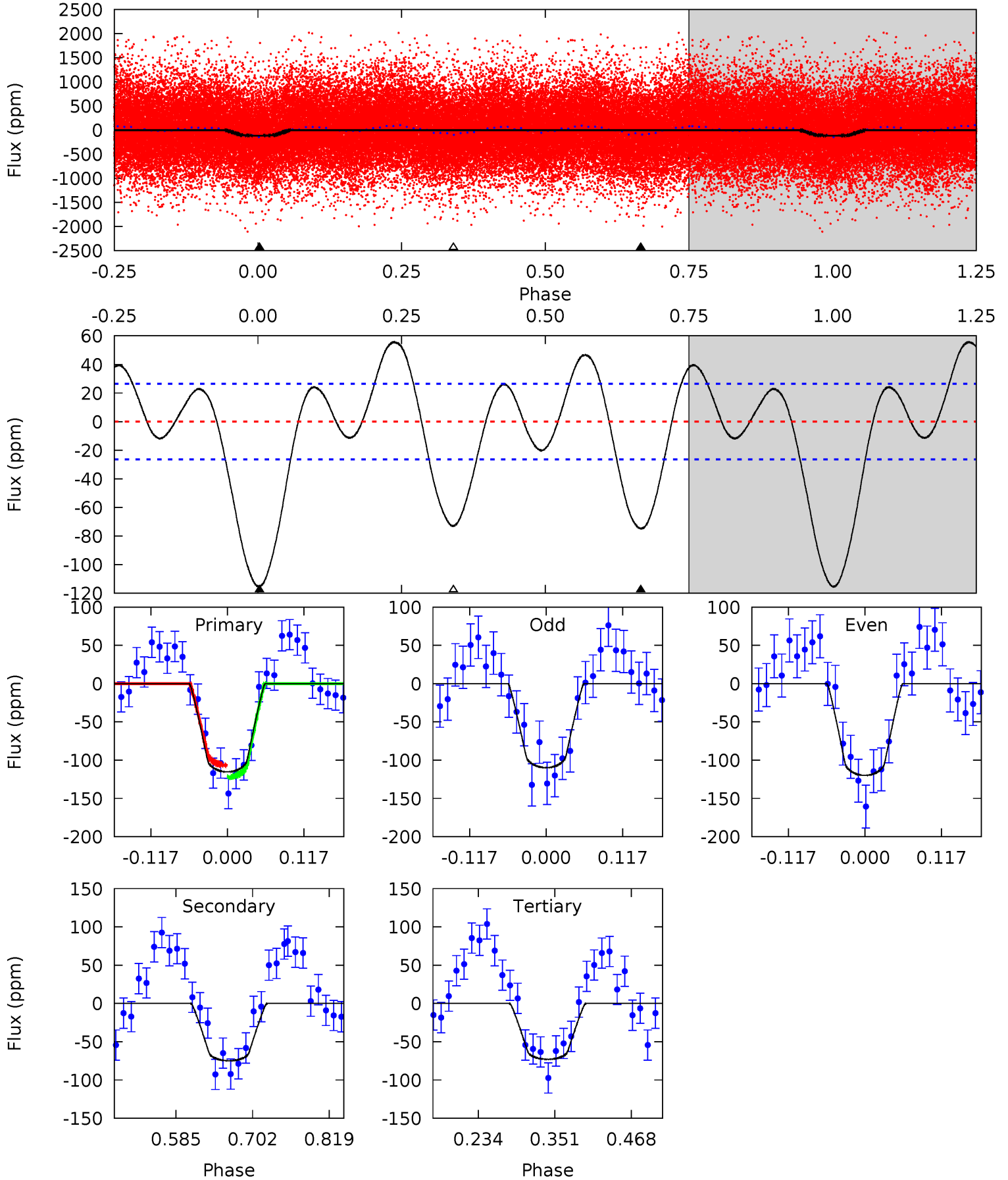




# DV Model-Shift Uniqueness Test

006231451-01, P = 0.751993 Days, E = 130.873040 Days

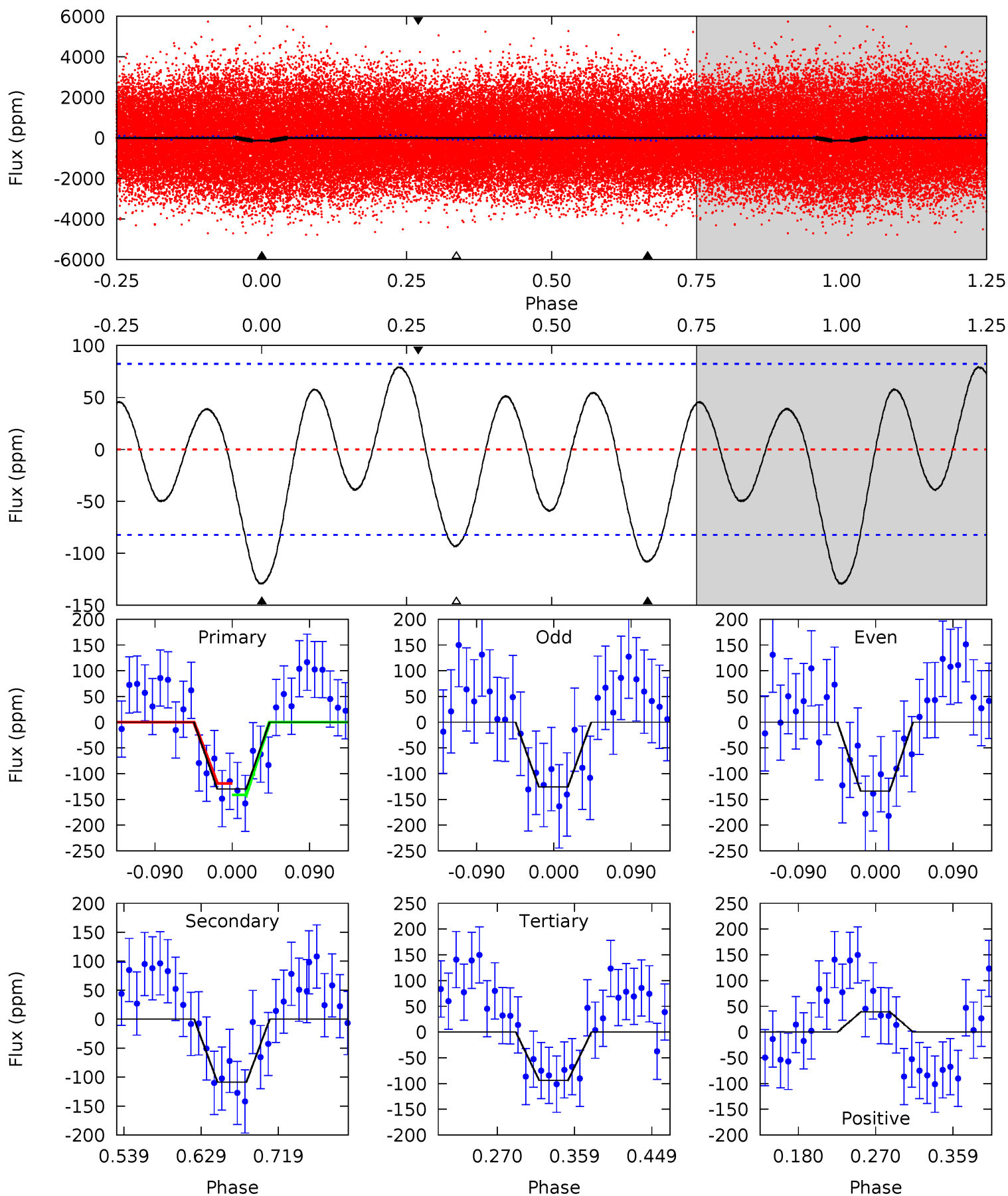
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
19.8	12.8	12.5	0	4.53	1.57	5.26	7.27	19.8	0.32	12.8	0.86	1.00	0.33	1.30



# Alt Model-Shift Uniqueness Test

006231451-01, P = 0.751998 Days, E = 130.870341 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
7.24	6.06	5.23	2.19	4.59	1.70	2.51	2.01	5.05	0.83	3.87	0.22	1.16	0.38	0.62



### Stellar Parameters For KIC 006231451

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7684^{+214}_{-349}$	$3.932^{+0.247}_{-0.133}$	$0.060^{+0.150}_{-0.400}$	$2.467^{+0.448}_{-0.768}$	$1.897^{+0.103}_{-0.439}$	$0.178^{+0.305}_{-0.061}$
	+3%/-5%	+6%/-3%	+250%/-667%	+18%/-31%	+5%/-23%	+171%/-34%
Source	KIC0	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 006231451-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-75 \pm 6$	$2.77^{+0.79}_{-0.81}$	$5187^{+350}_{-416}$	$6514^{+1205}_{-846}$	$2.100^{+1.925}_{-0.828}$
Alt.	$-109 \pm 18$	$3.04^{+0.83}_{-0.72}$	$5183^{+348}_{-428}$	$6853^{+1143}_{-936}$	$2.559^{+1.772}_{-1.063}$

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



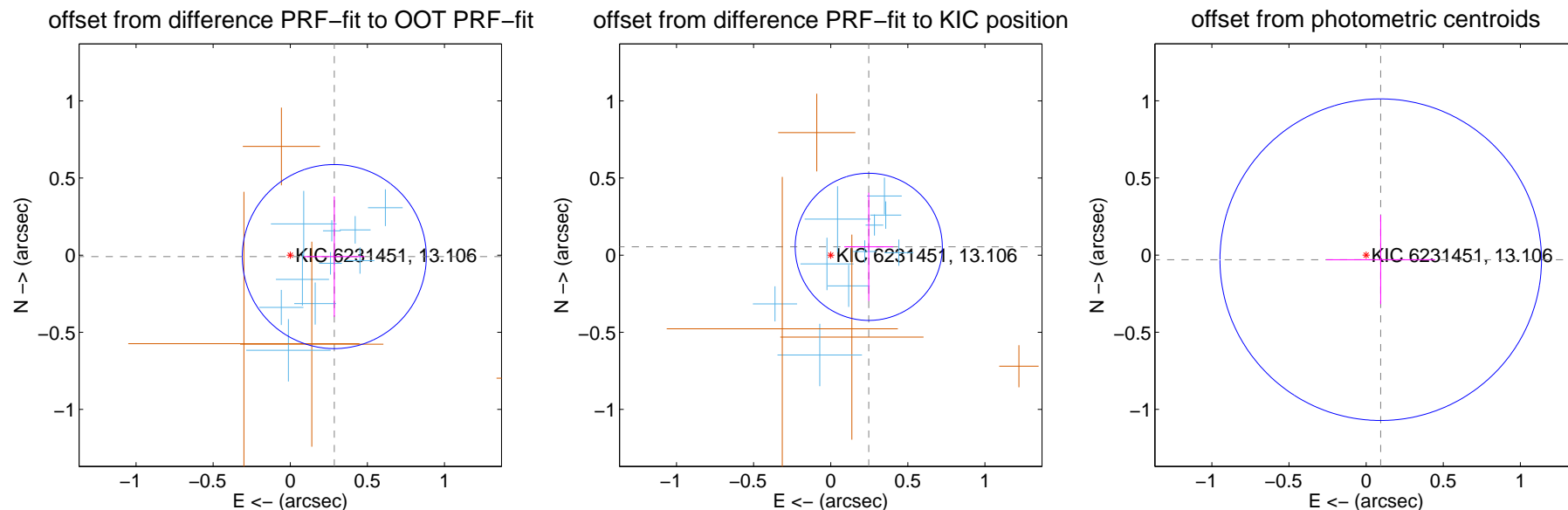
## DV Centroid Data

Supplemental centroid analysis for 006231451-01. Kepler magnitude: 13.11. Transit SNR 10.92

There are 11 quarters with good PRF difference image offsets

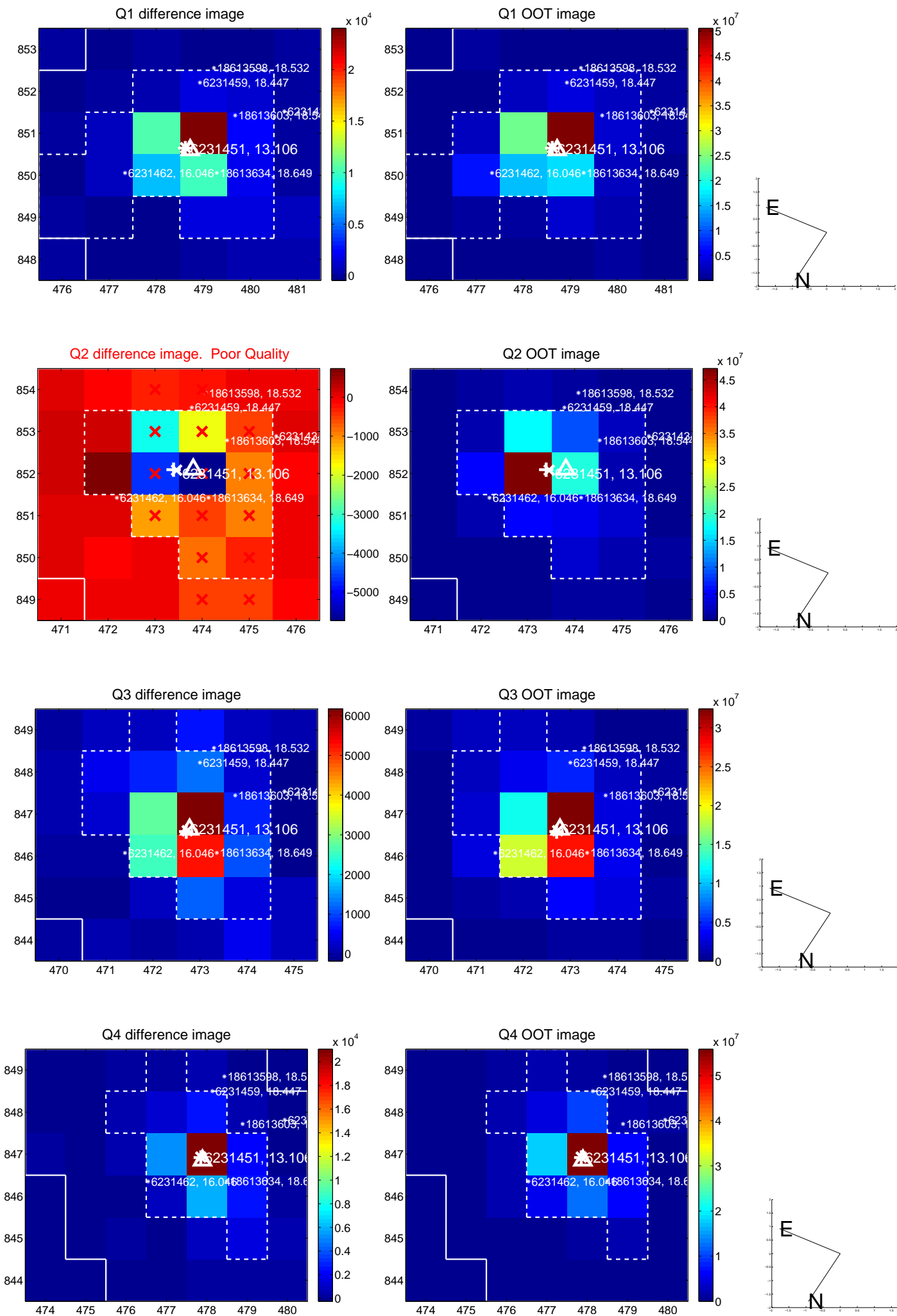
The direct PRF centroid is offset from the target star catalog position by about 0.05 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.286 \pm 0.199$	1.44	$-0.286 \pm 0.196$	$-0.009 \pm 0.390$
PRF-fit source offset from KIC position	$0.252 \pm 0.159$	1.59	$-0.247 \pm 0.159$	$0.054 \pm 0.351$
photometric centroid source offset	$0.10 \pm 0.35$	0.29	$-0.09 \pm 0.35$	$-0.03 \pm 0.29$

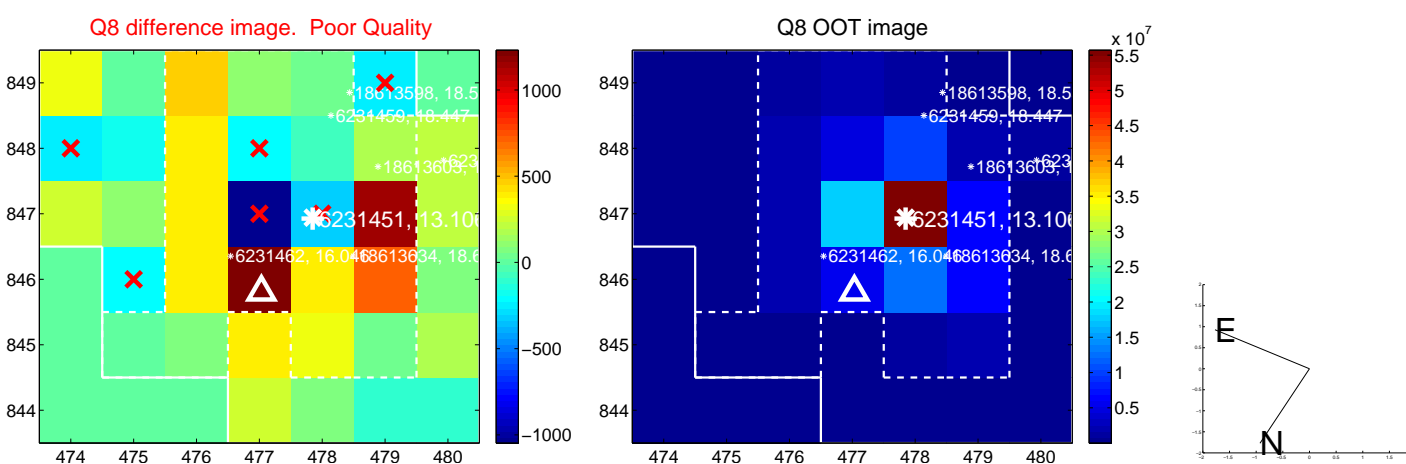
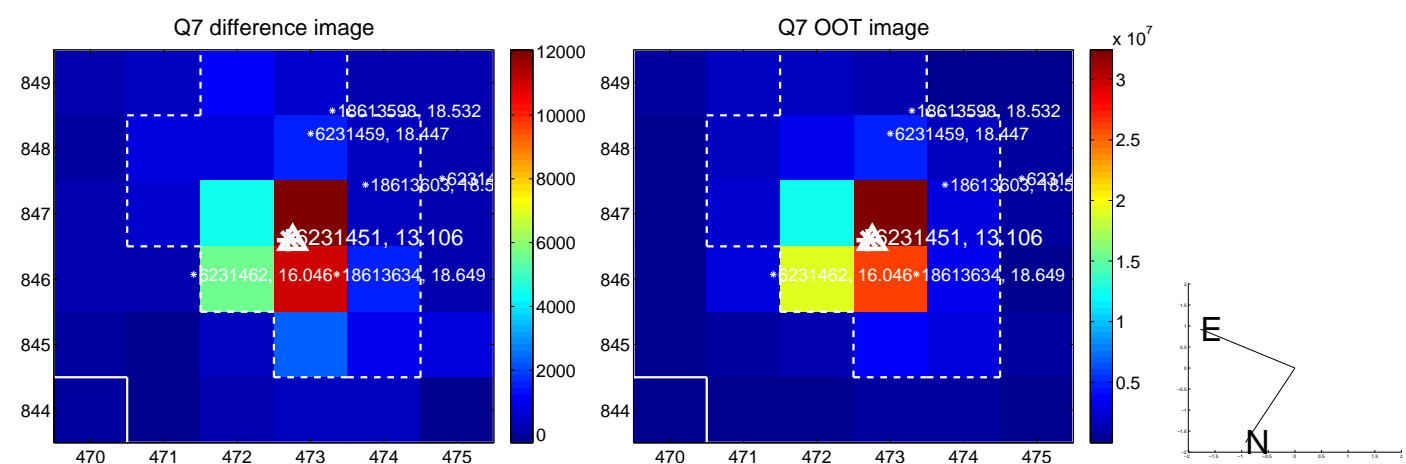
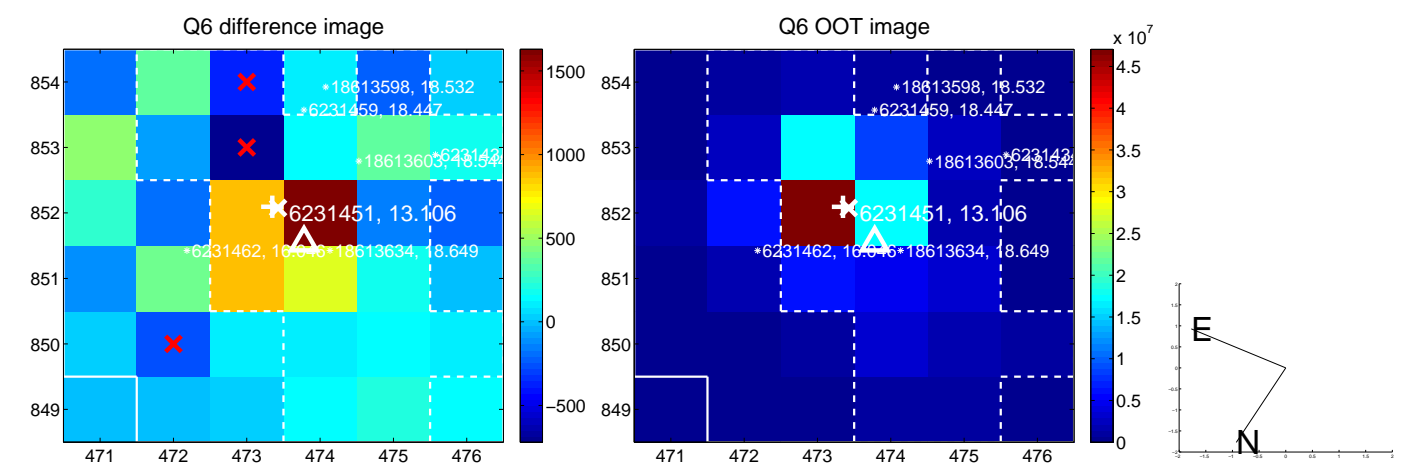
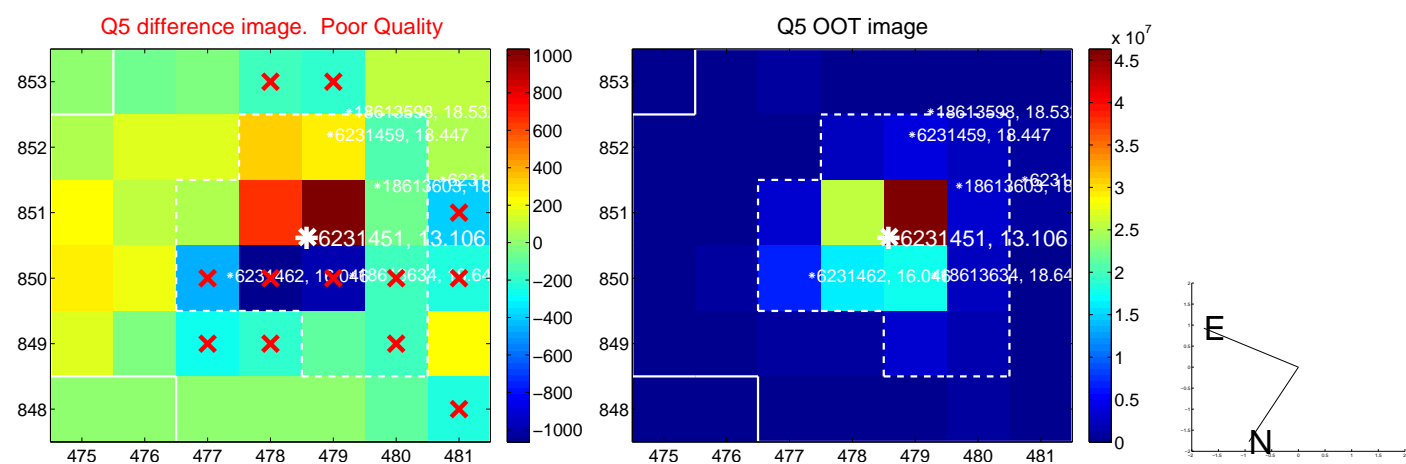


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

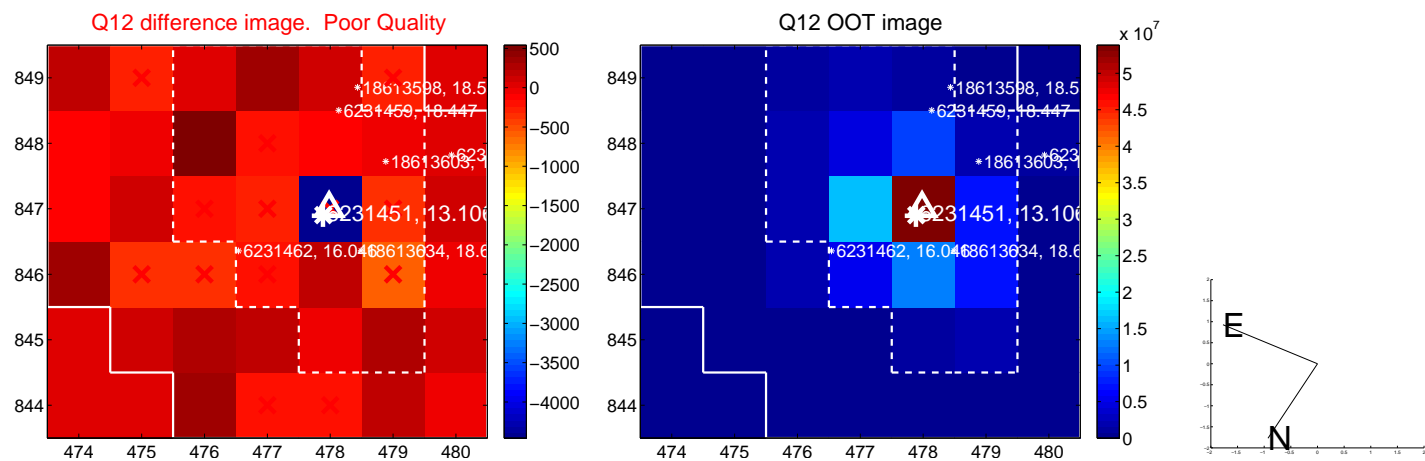
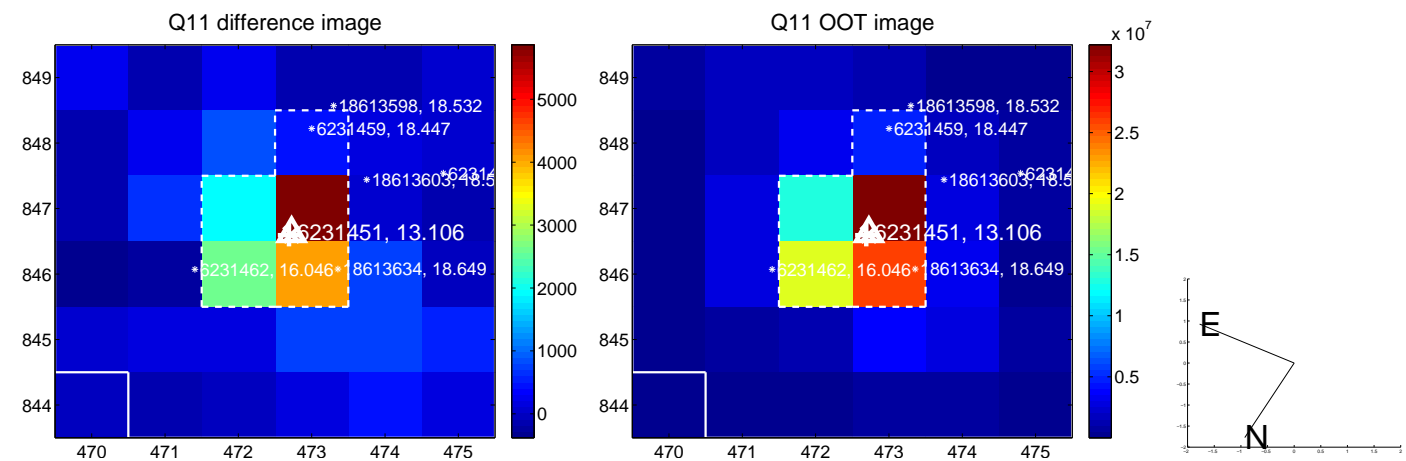
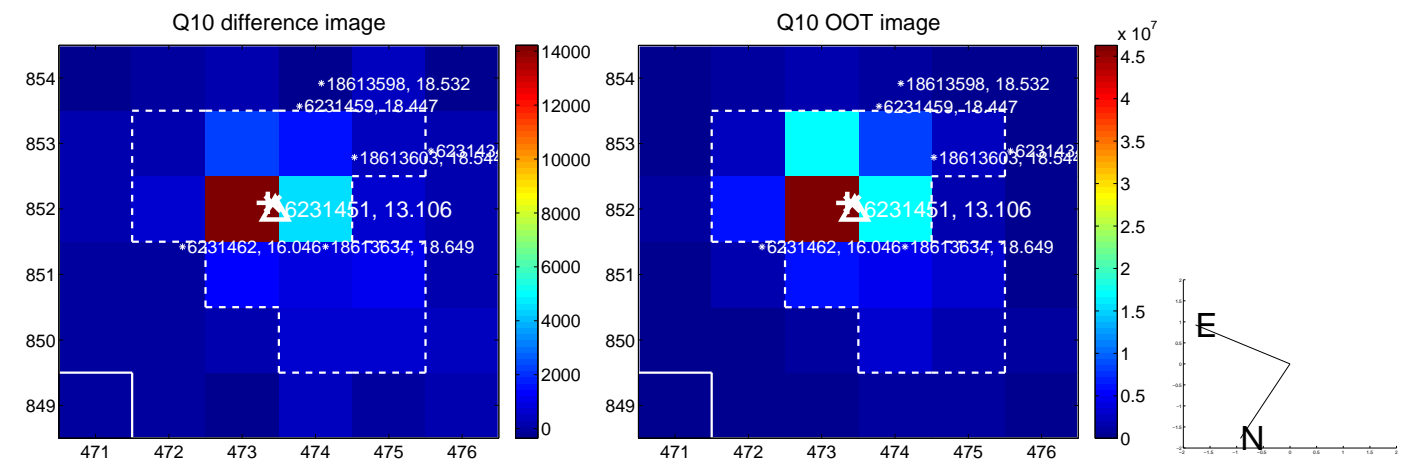
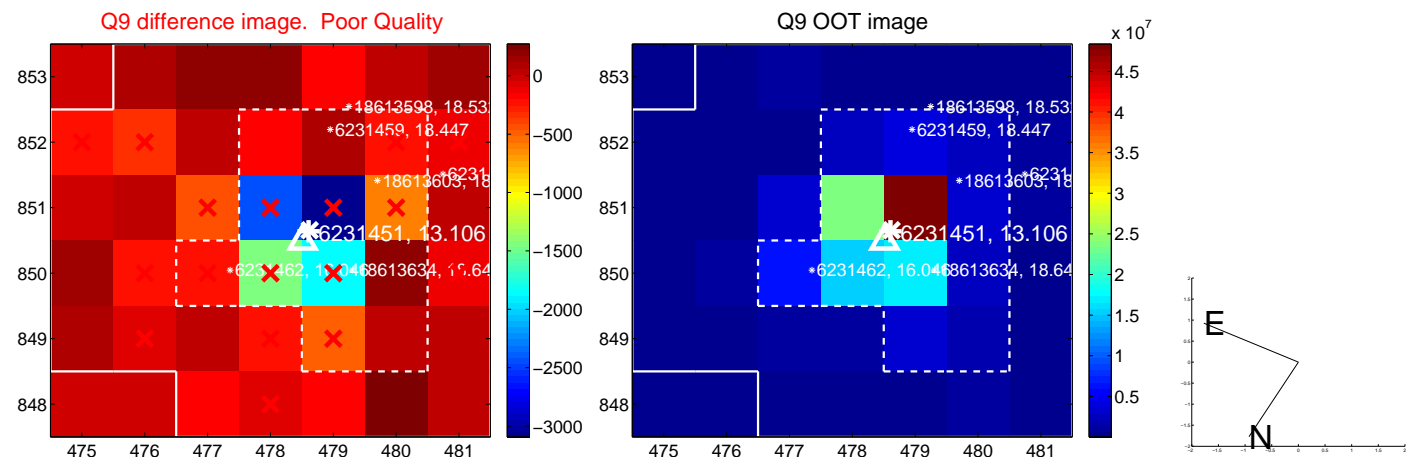


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

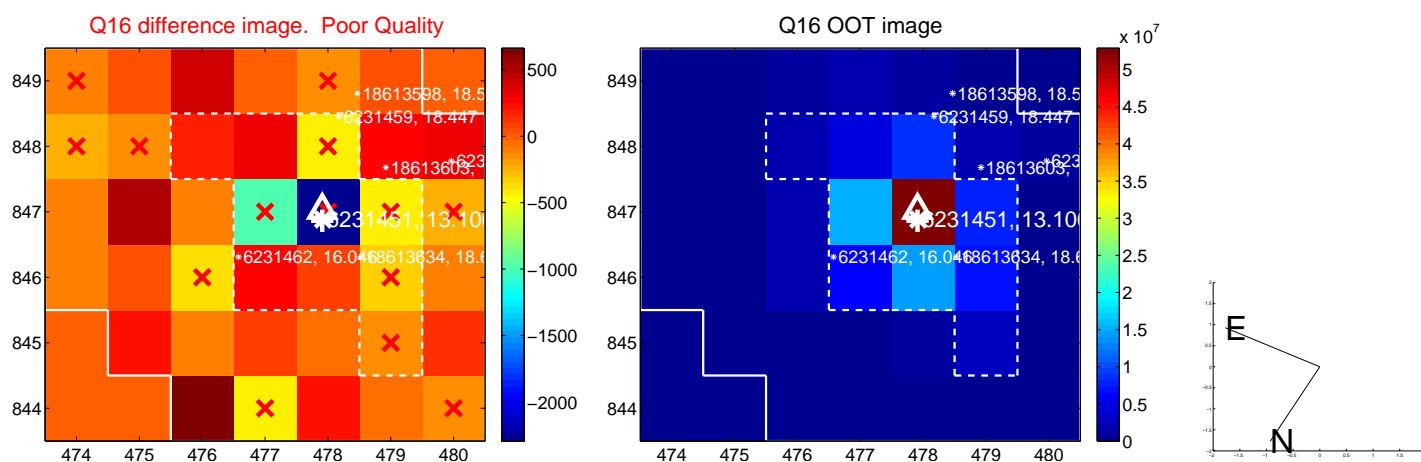
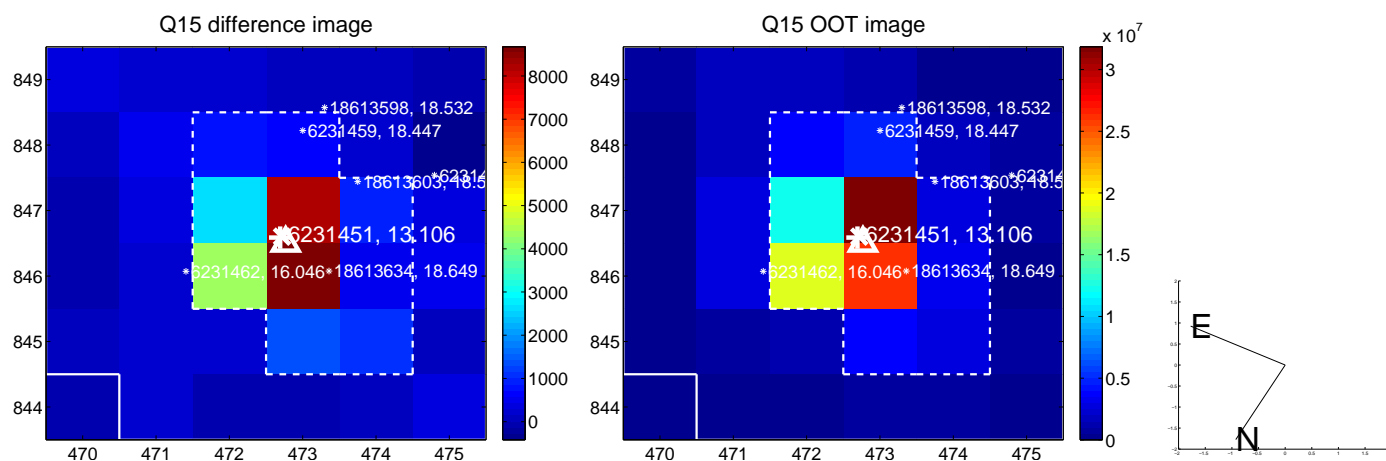
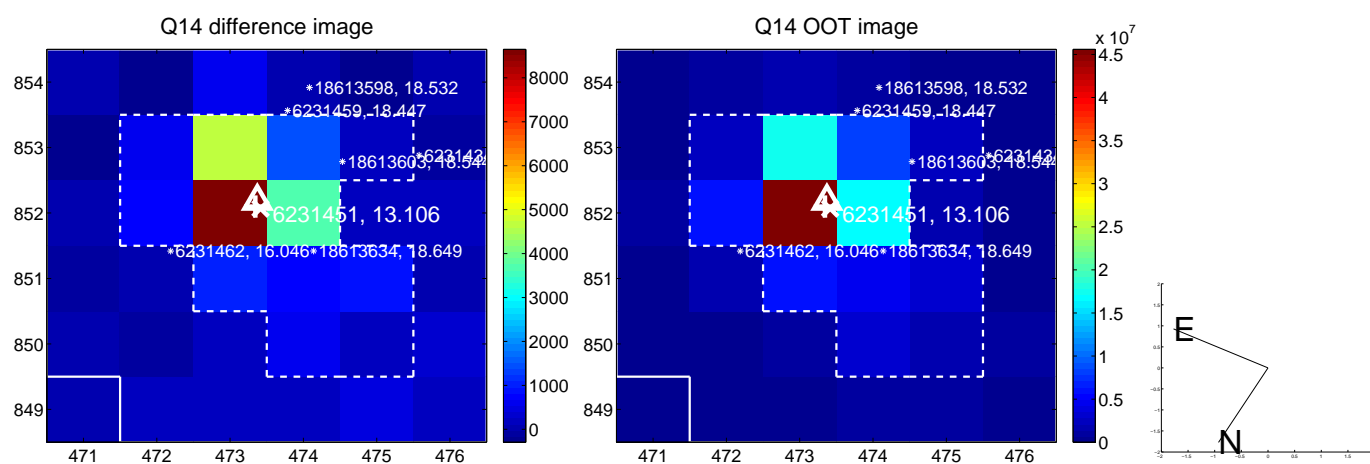
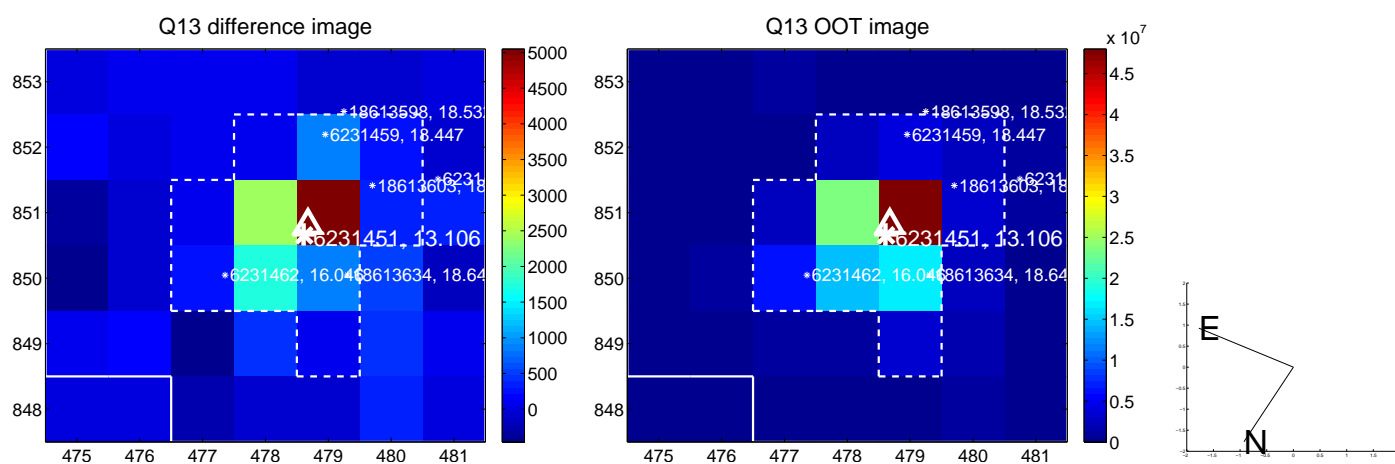




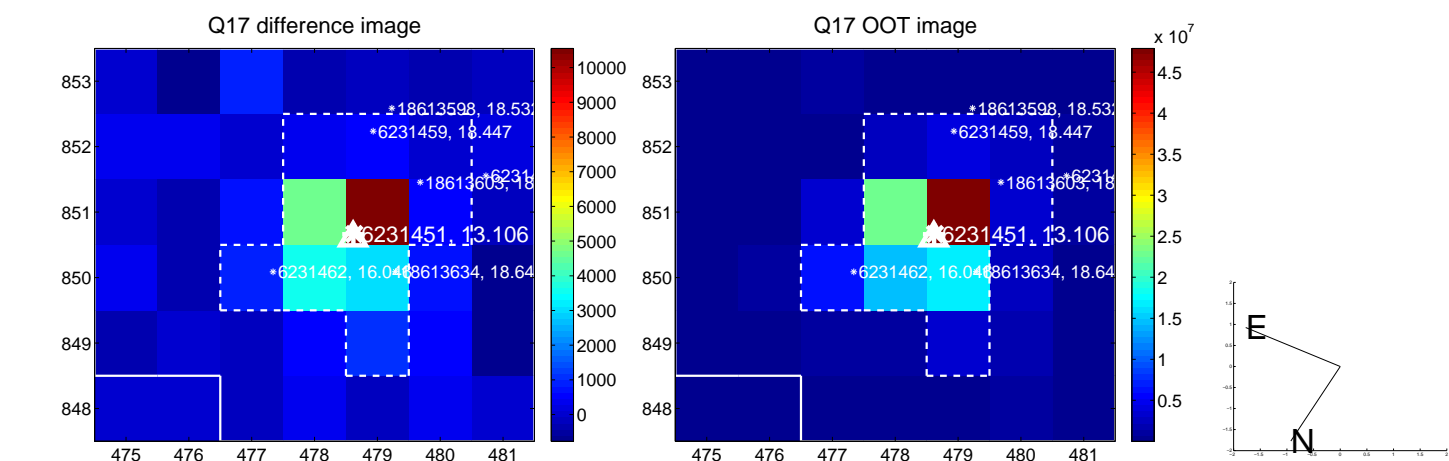
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



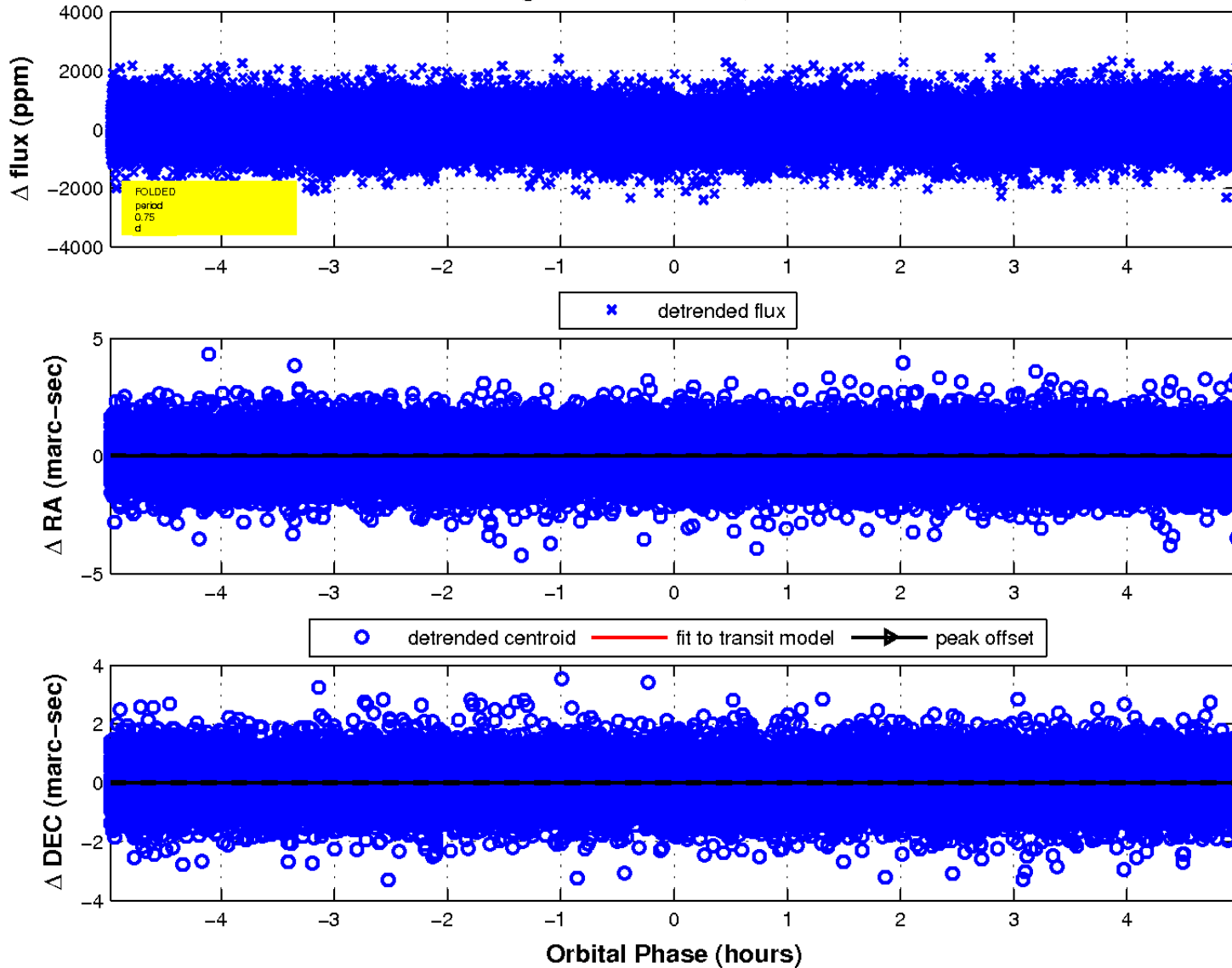
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

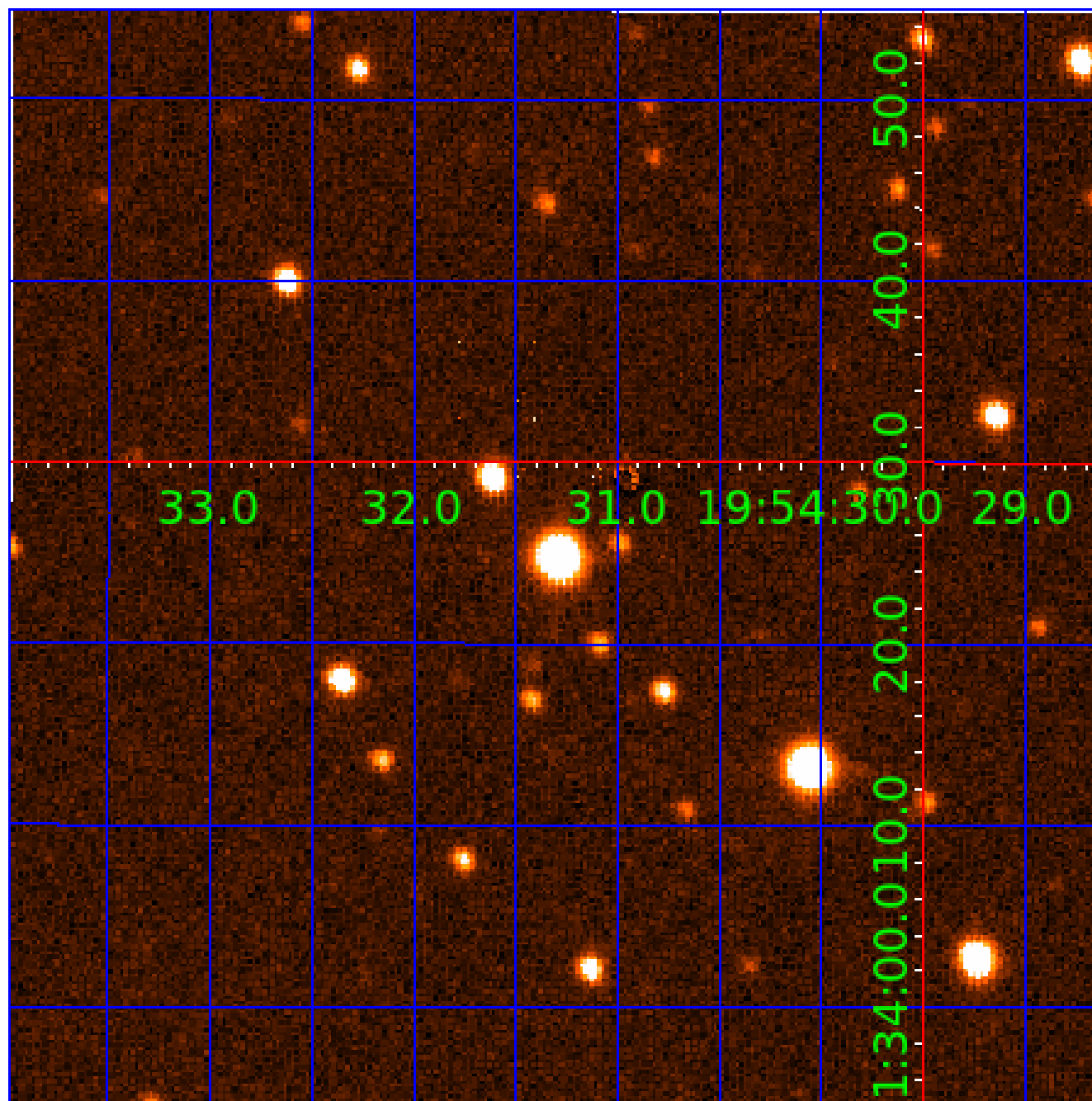


fluxWeightedCentroids, Planet 1 of 3



UKIRT Image

Declination



# KIC 006231451

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006231451-01	OBS	No	0.751993	131.625032	98.2	1.659	10.5	10.9	2.47	7684	2.84	47322.92
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## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006231451-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT
006231451-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
006231451-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—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.

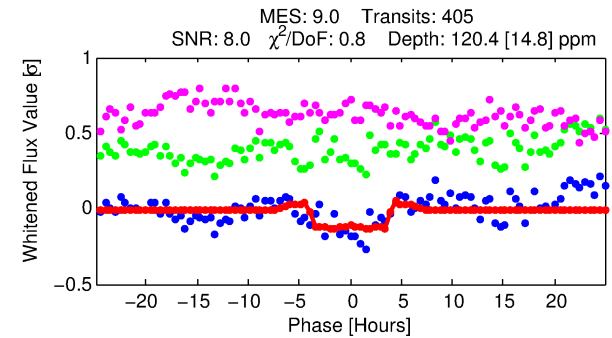
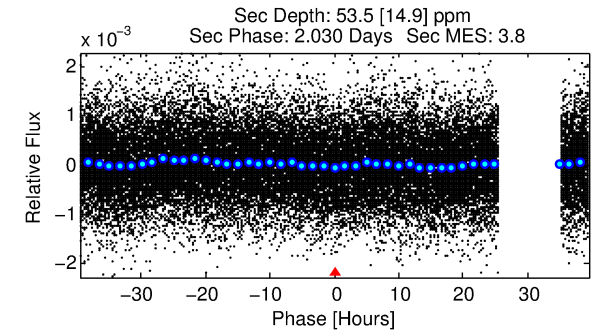
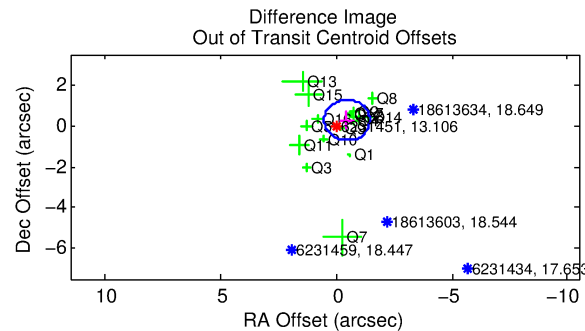
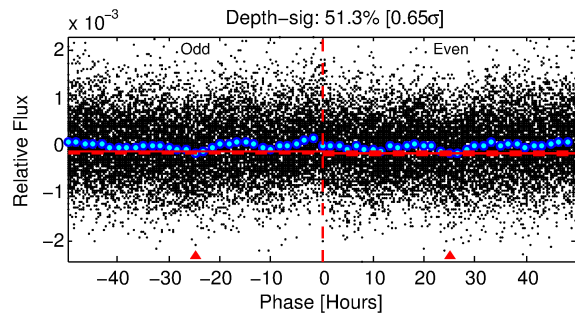
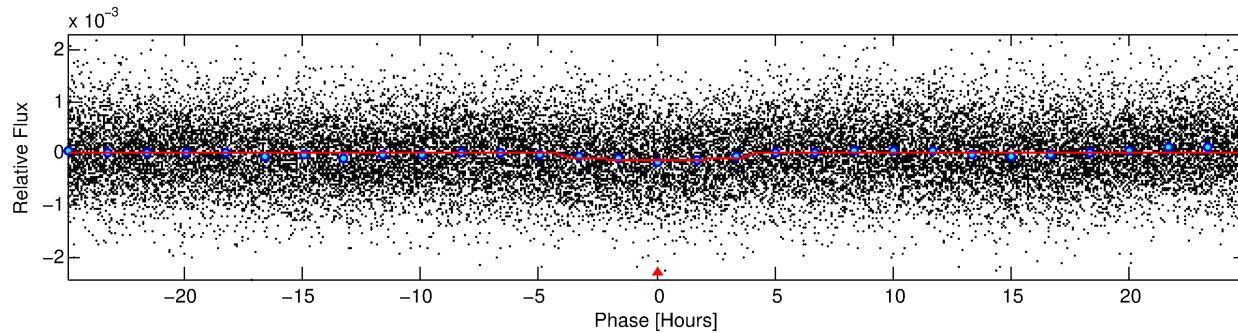
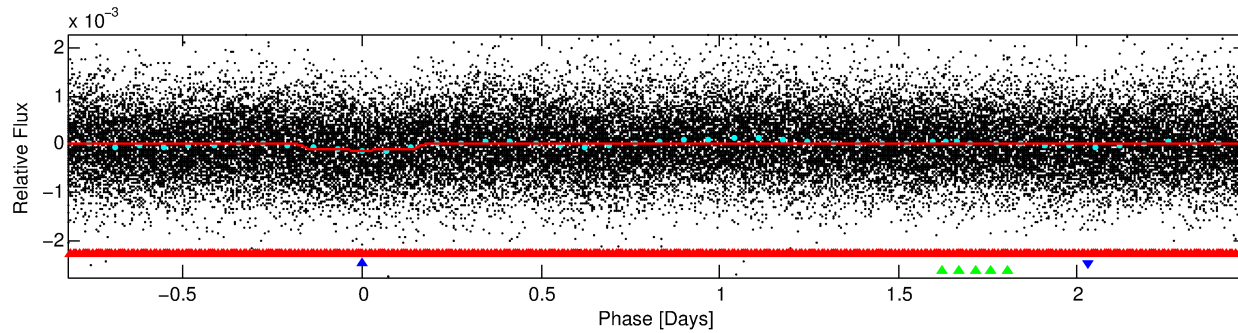
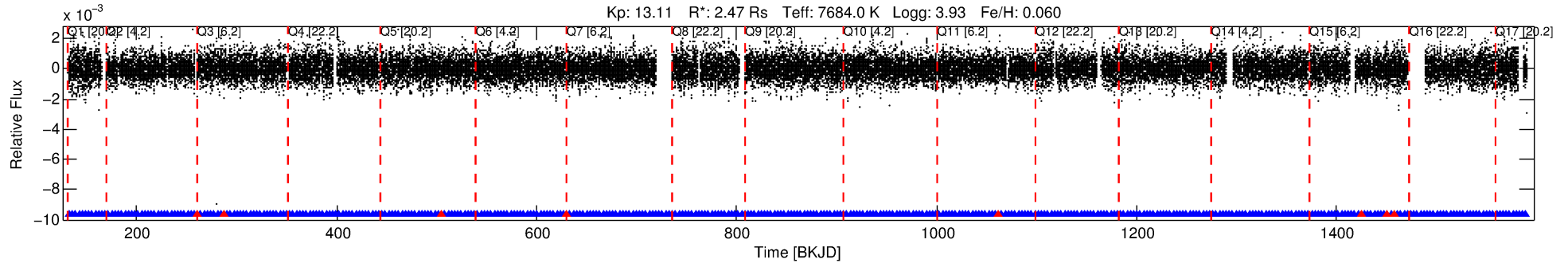
## Ephemeris Match Information For 006231451-02

No Significant Match Found



# DV One-Page Summary

KIC: 6231451 Candidate: 2 of 3 Period: 3.296 d



## DV Fit Results:

Period = 3.29624 [0.00003] d  
Epoch = 132.5897 [0.0055] BKJD  
Rp/R\* = 0.0116 [0.0014]  
a/R\* = 1.69 [0.68]  
b = 0.90 [0.13]  
Seff = 6596.76 [3093.03]  
Teq = 2298 [269] K  
Rp = 3.13 [1.04] Re  
a = 0.0537 [0.0151] AU  
Ag = 8.65 [4.89] [1.57 $\sigma$ ]  
Teffp = 6093 [619] K [5.62 $\sigma$ ]

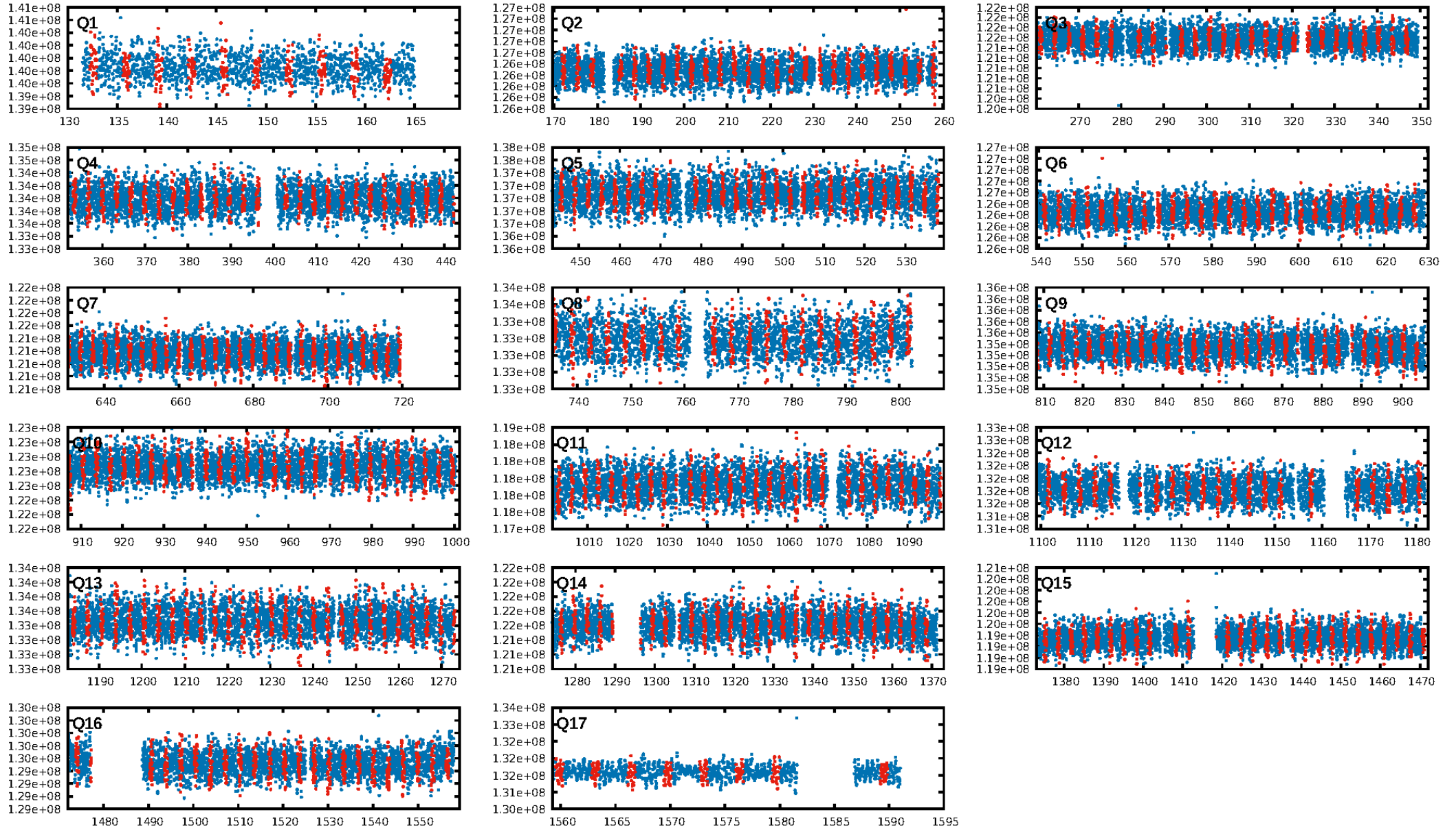
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [7.20 $\sigma$ ]  
LongPeriod-sig: 100.0% [708.78 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 5.31e-14  
RollingBand-fgt: 0.98 [379/387]  
GhostDiagnostic-chr: 3.792  
Centroid-sig: 69.0%  
Centroid-so: 0.131 arcsec [0.48 $\sigma$ ]  
OotOffset-rm: 0.541 arcsec [1.64 $\sigma$ ]  
KicOffset-rm: 0.531 arcsec [1.60 $\sigma$ ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
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DiffImageOverlap-fno: 0.00 [0/17]

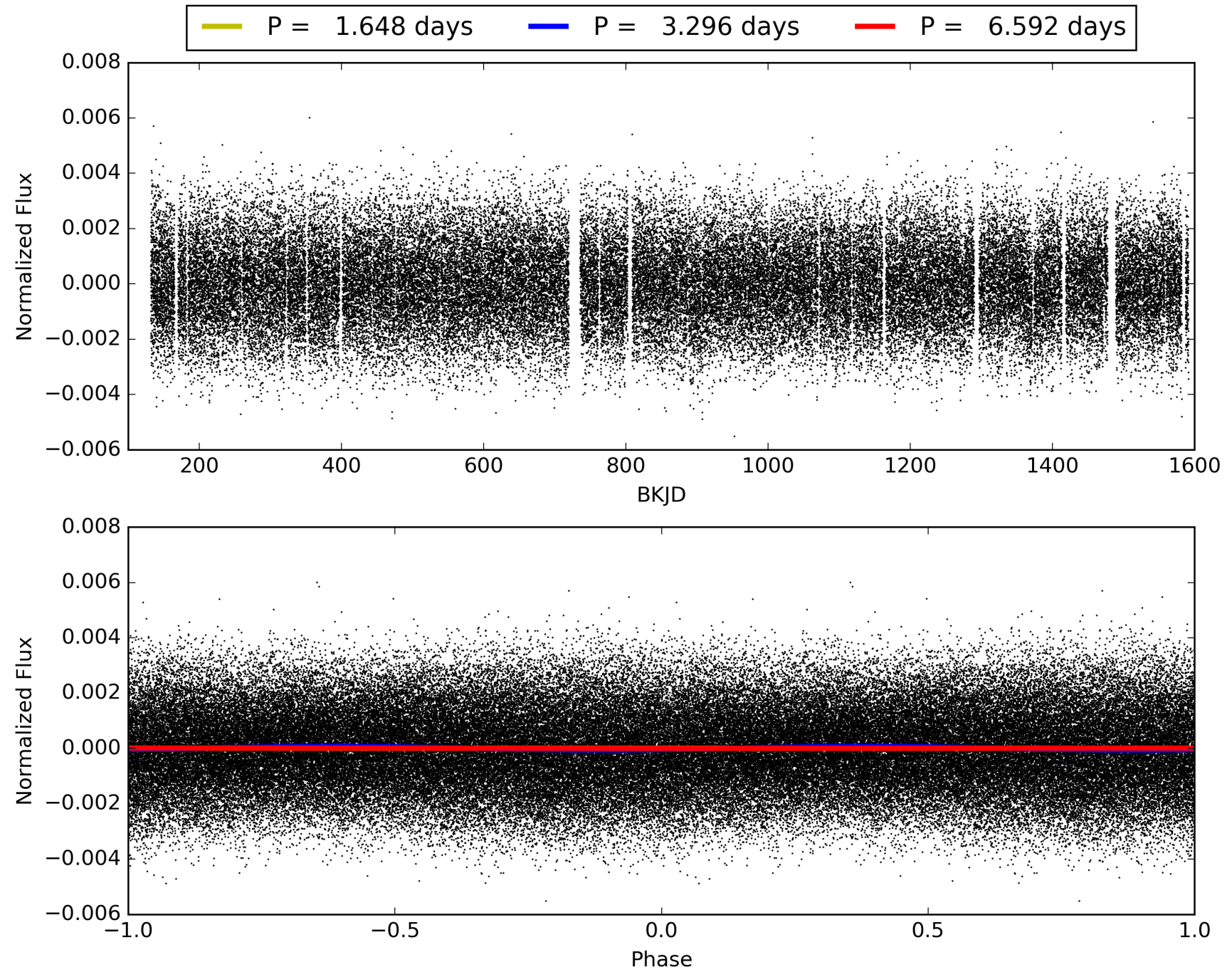
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 16:57:00 Z

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

# TCE 006231451-02, PDC Light Curves



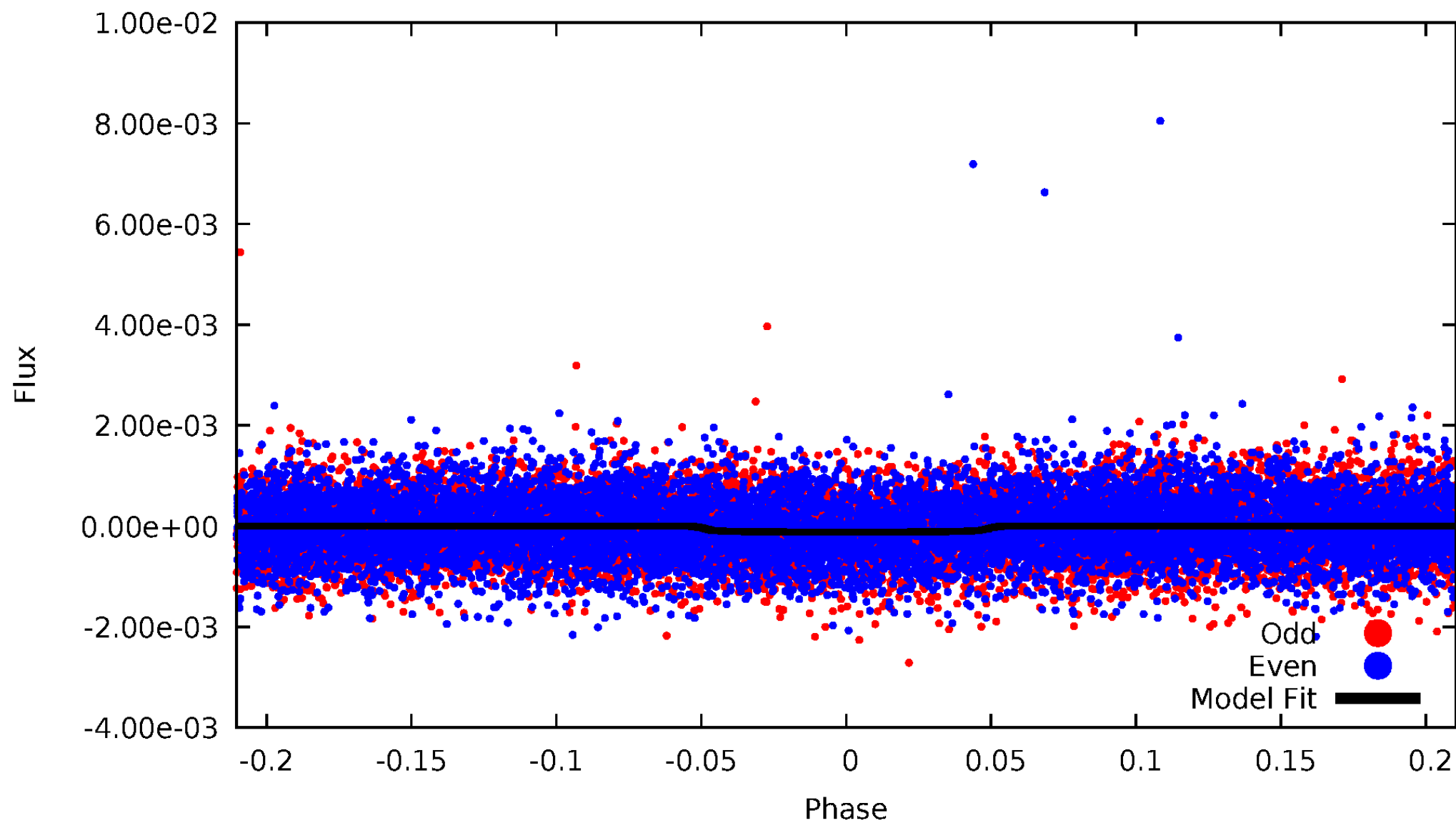
# TCE 006231451-02





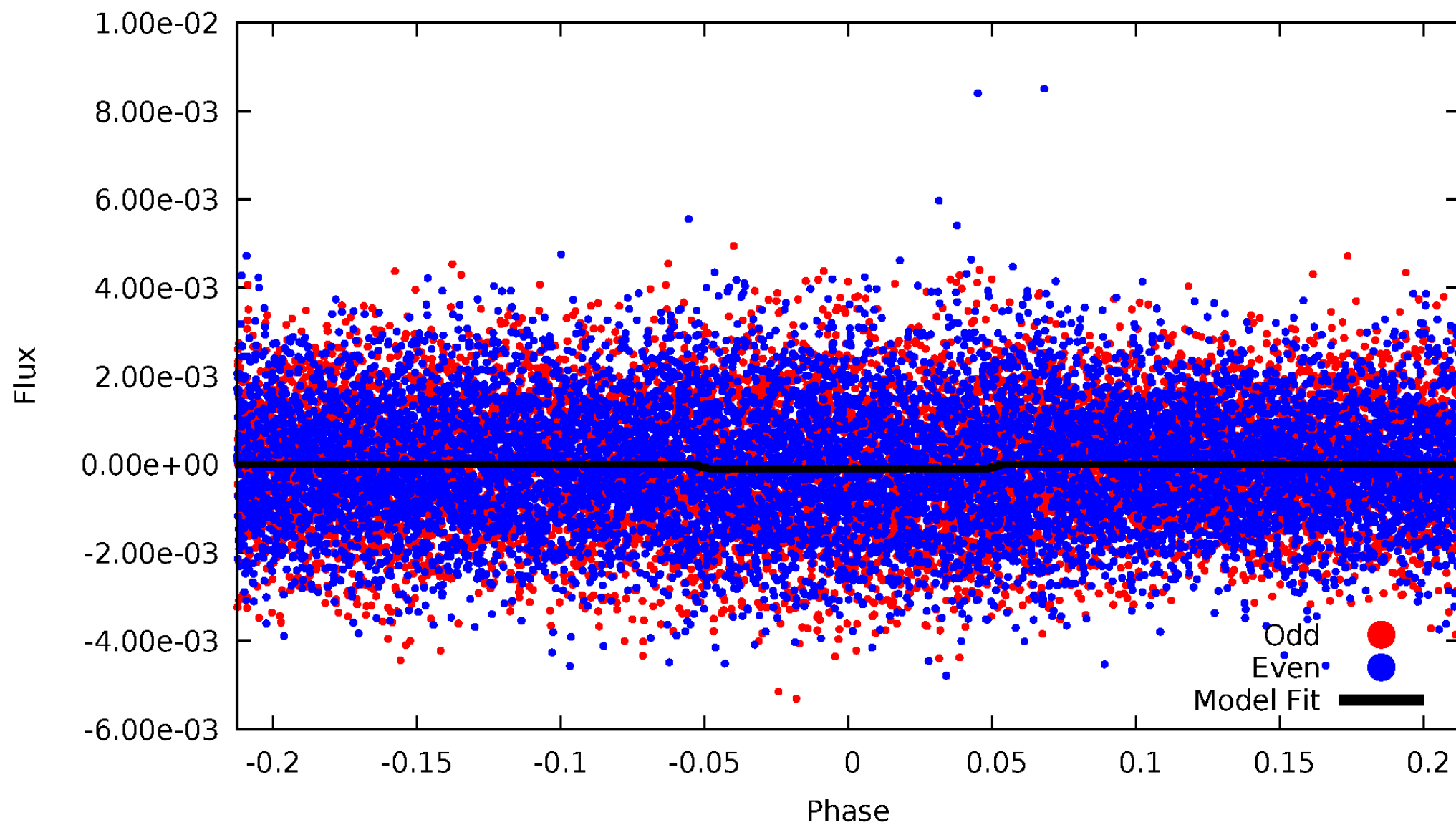
# DV Odd/Even

TCE 006231451-02



# ALT Odd/Even

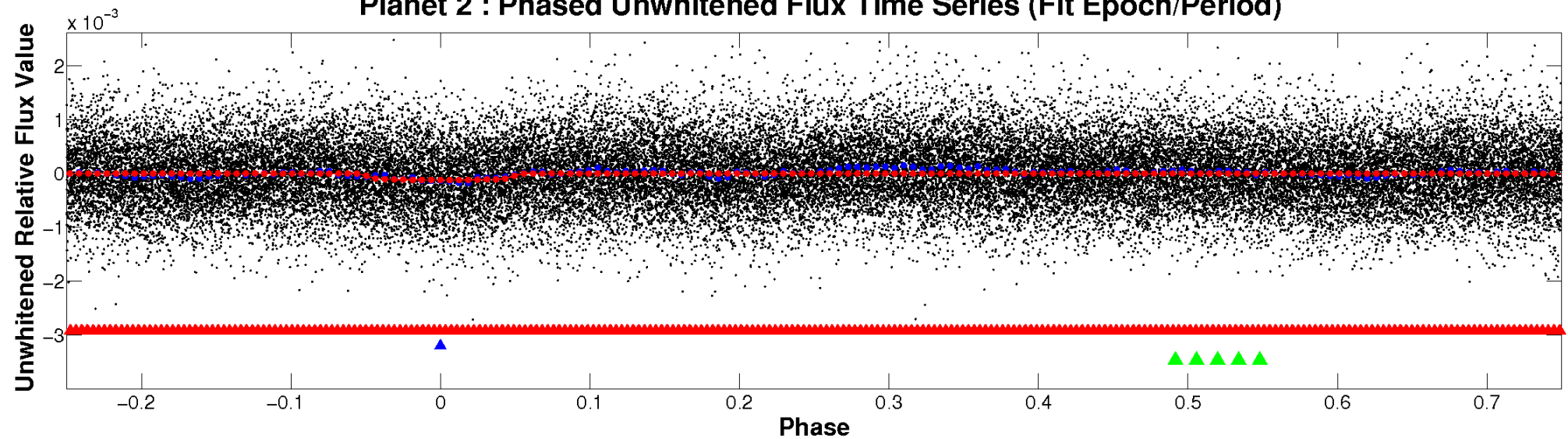
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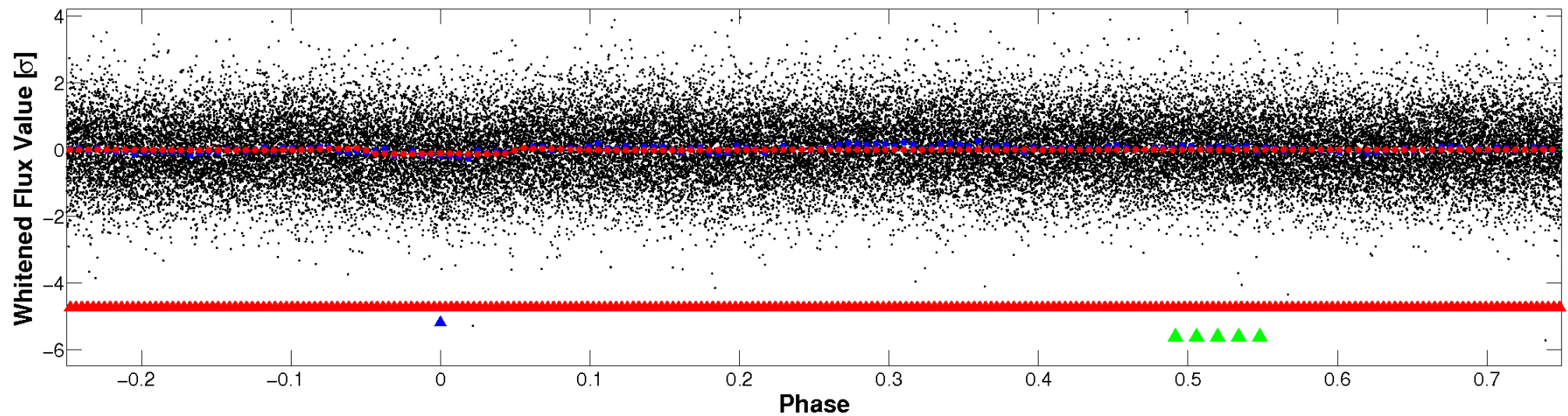


# Non-Whitened Vs. Whitened Light Curve

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

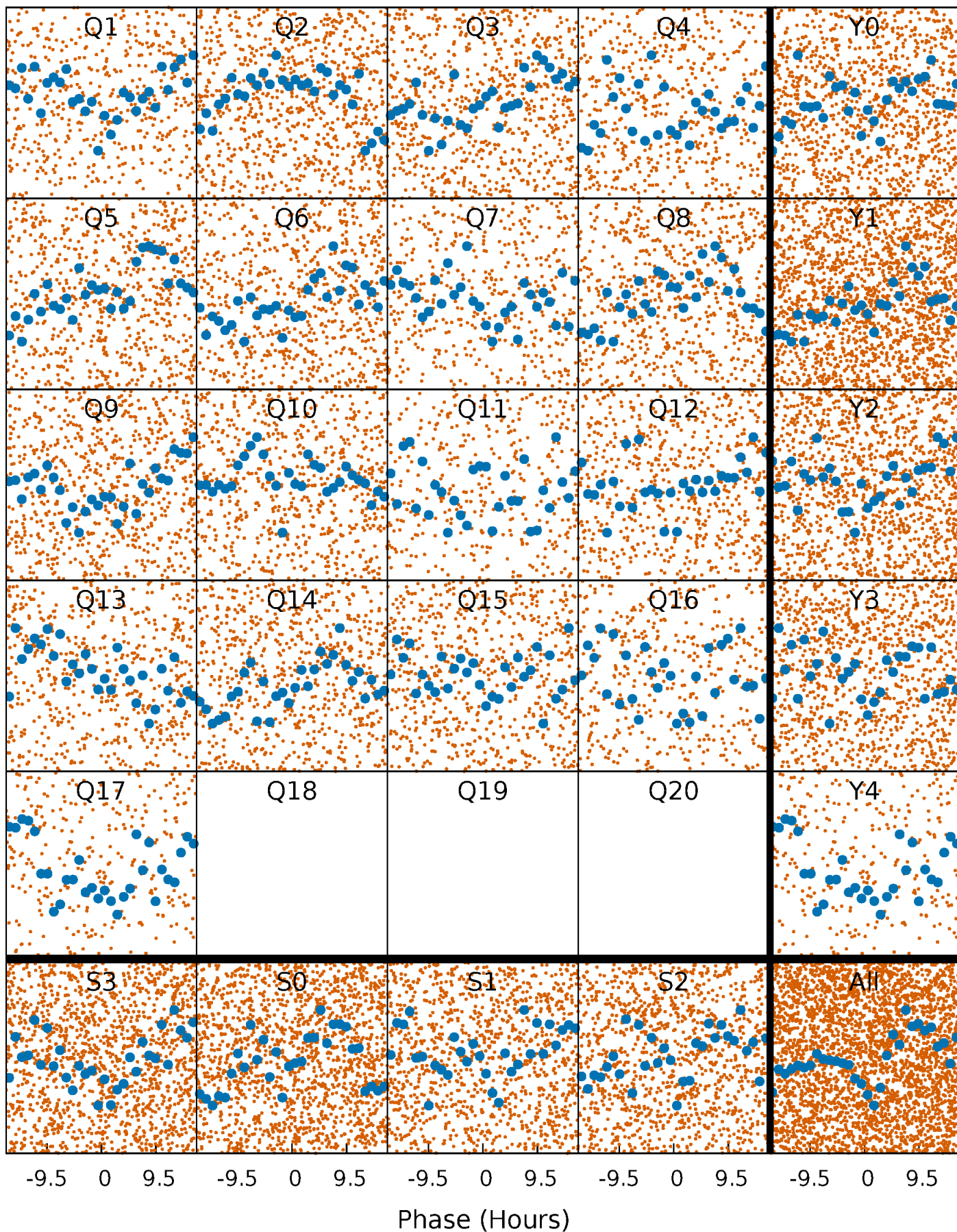


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

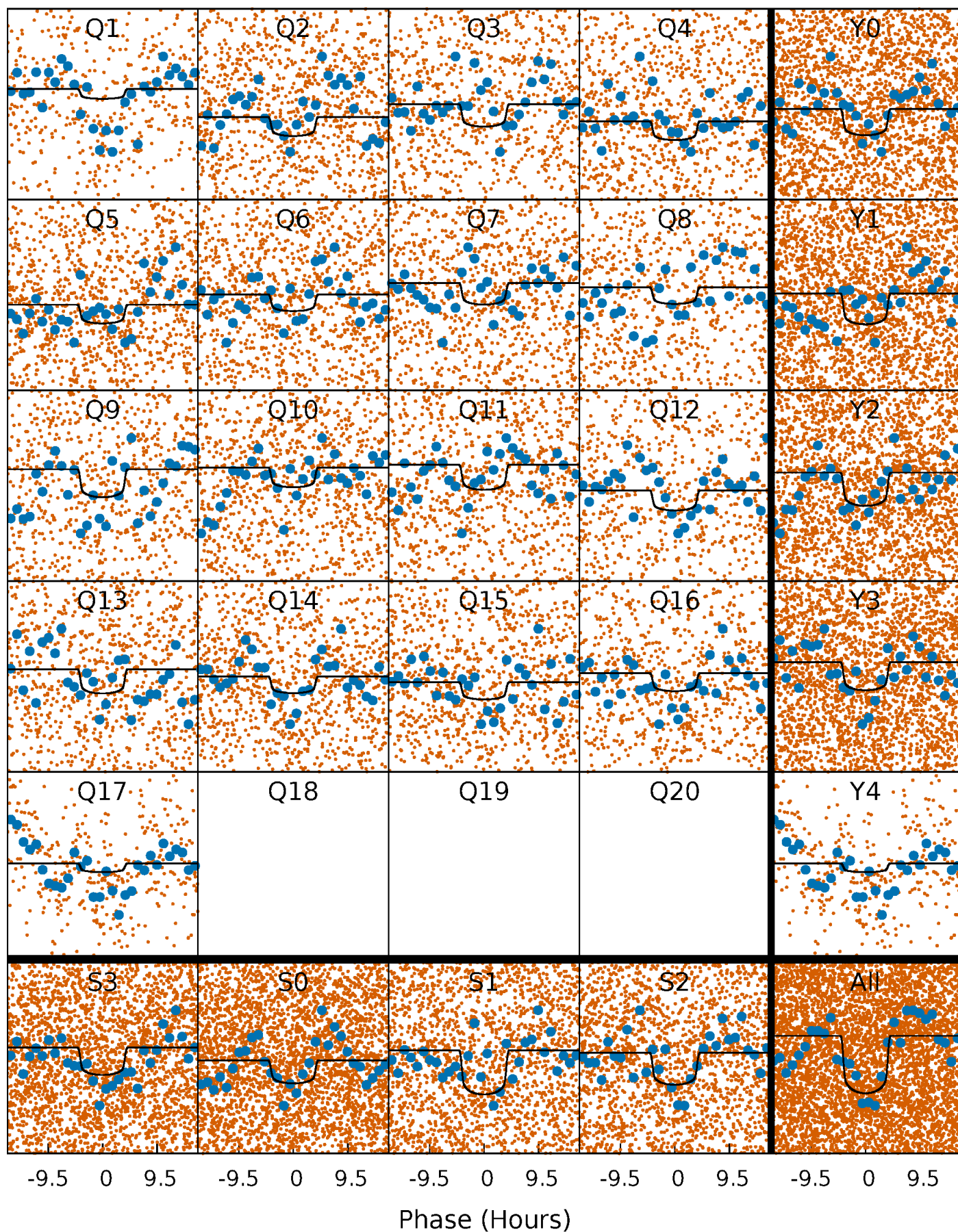
TCE 006231451-02   P= 3.296244 Days    $T_0=132.589660$  (BKJD)





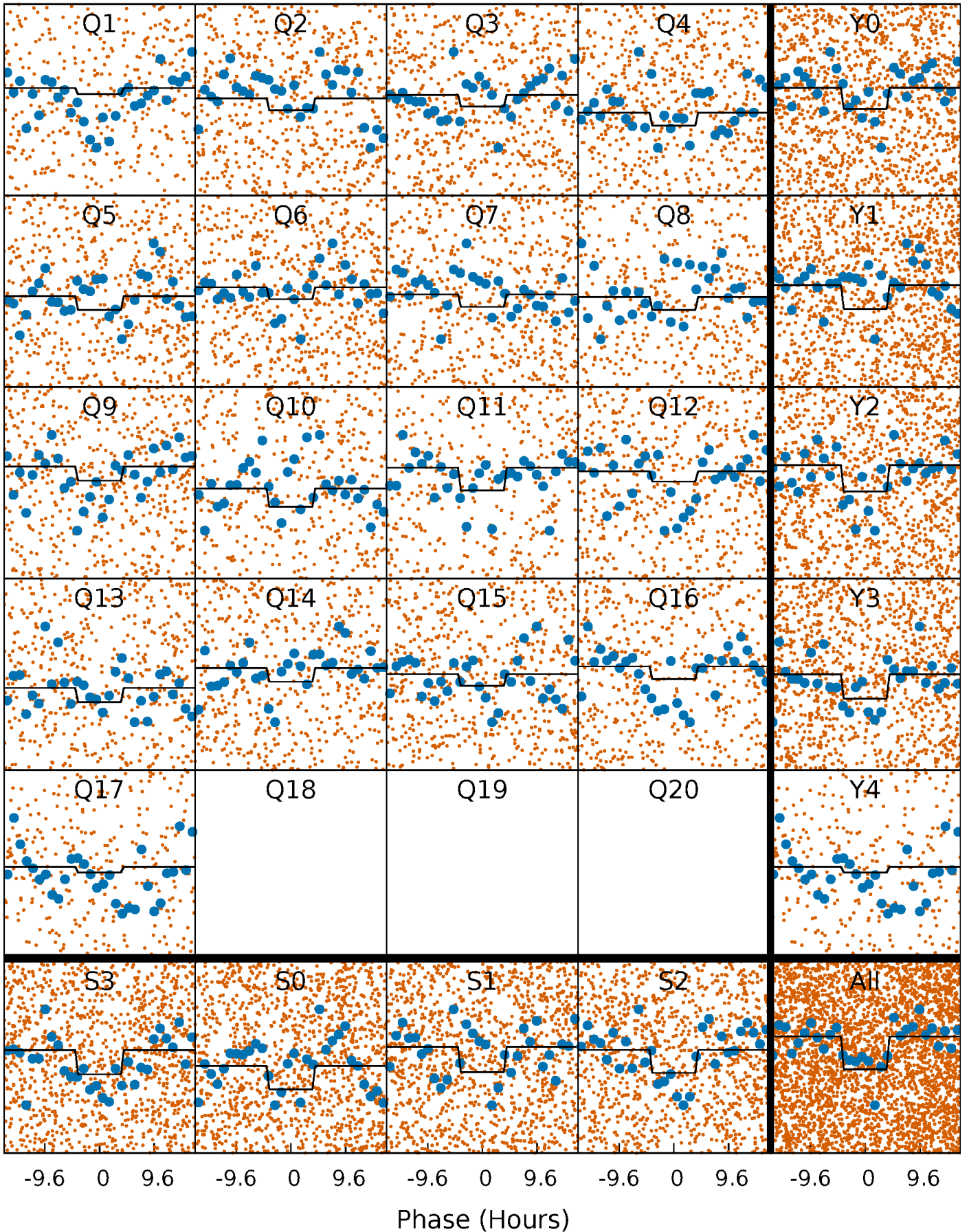
# DV Quarter-Phased Transit Curves

TCE 006231451-02   P= 3.296244 Days    $T_0=132.589660$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

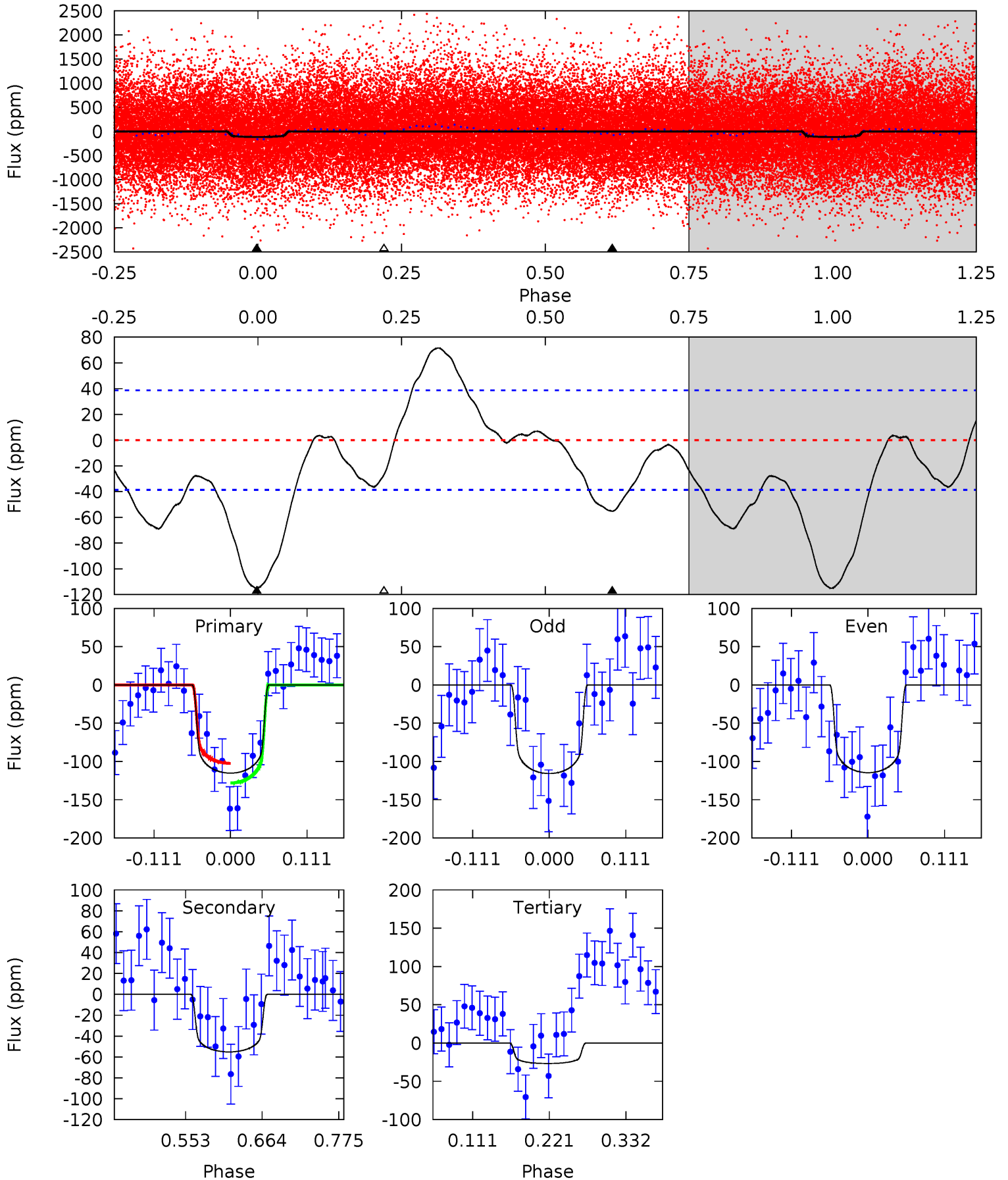
TCE 006231451-02 P= 3.296186 Days  $T_0=132.592778$  (BKJD)



# DV Model-Shift Uniqueness Test

006231451-02, P = 3.296244 Days, E = 129.293416 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
13.5	6.48	3.15	0	4.54	1.60	4.47	10.4	13.5	3.34	6.48	0.07	0.90	0.38	1.50

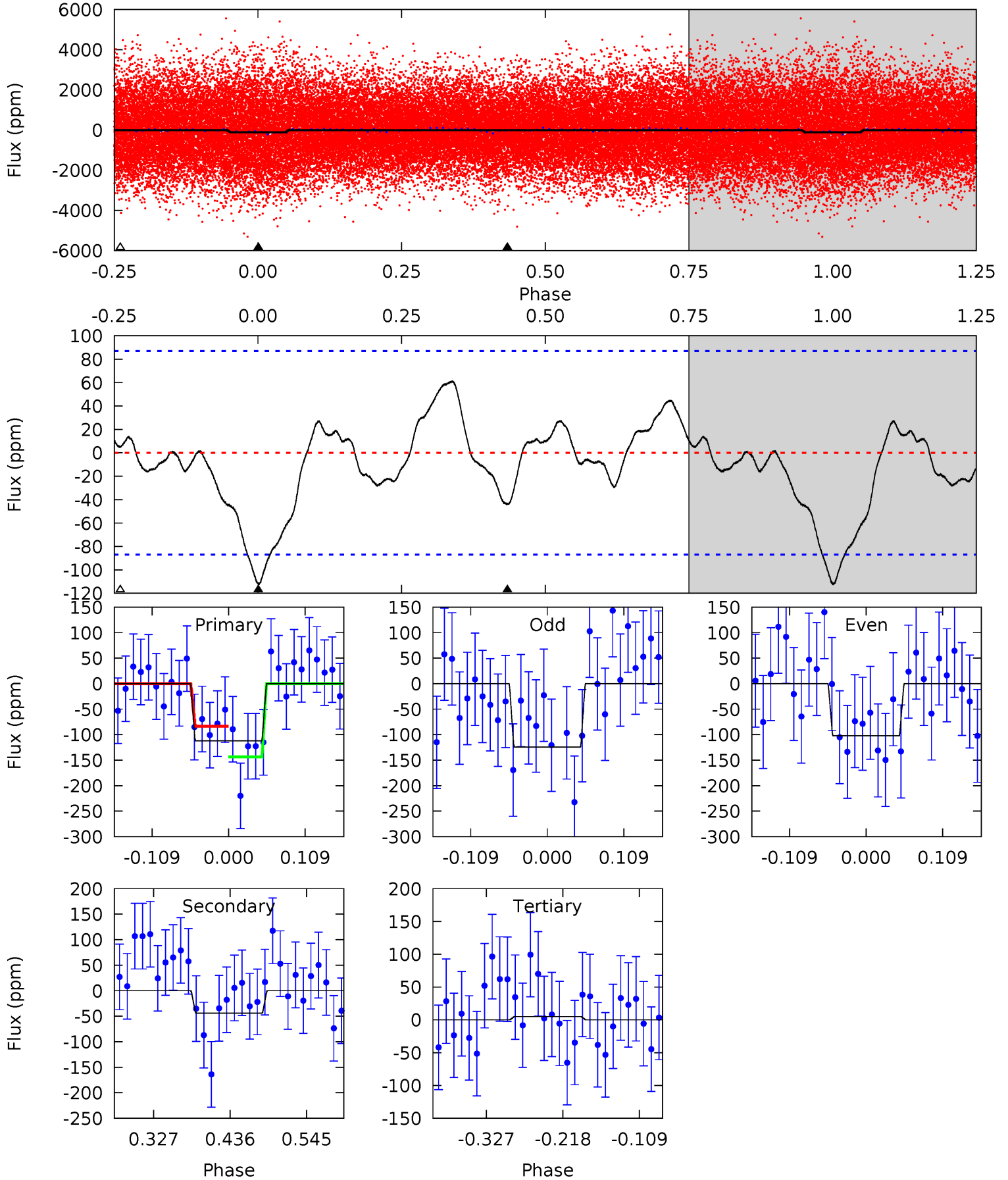




# Alt Model-Shift Uniqueness Test

006231451-02, P = 3.296186 Days, E = 129.296592 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
5.87	2.30	-0.26	0	4.55	1.60	1.10	6.13	5.87	2.56	2.30	0.58	1.46	0.35	1.59



### Stellar Parameters For KIC 006231451

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7684^{+214}_{-349}$	$3.932^{+0.247}_{-0.133}$	$0.060^{+0.150}_{-0.400}$	$2.467^{+0.448}_{-0.768}$	$1.897^{+0.103}_{-0.439}$	$0.178^{+0.305}_{-0.061}$
	+3%/-5%	+6%/-3%	+250%/-667%	+18%/-31%	+5%/-23%	+171%/-34%
Source	KIC0	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 006231451-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-55 \pm 9$	$3.00^{+0.56}_{-0.61}$	$3157^{+231}_{-270}$	$5962^{+493}_{-462}$	$9.664^{+4.675}_{-3.174}$
Alt.	$-44 \pm 19$	$2.72^{+0.54}_{-0.53}$	$3174^{+208}_{-260}$	$5903^{+731}_{-796}$	$8.821^{+6.708}_{-3.977}$

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

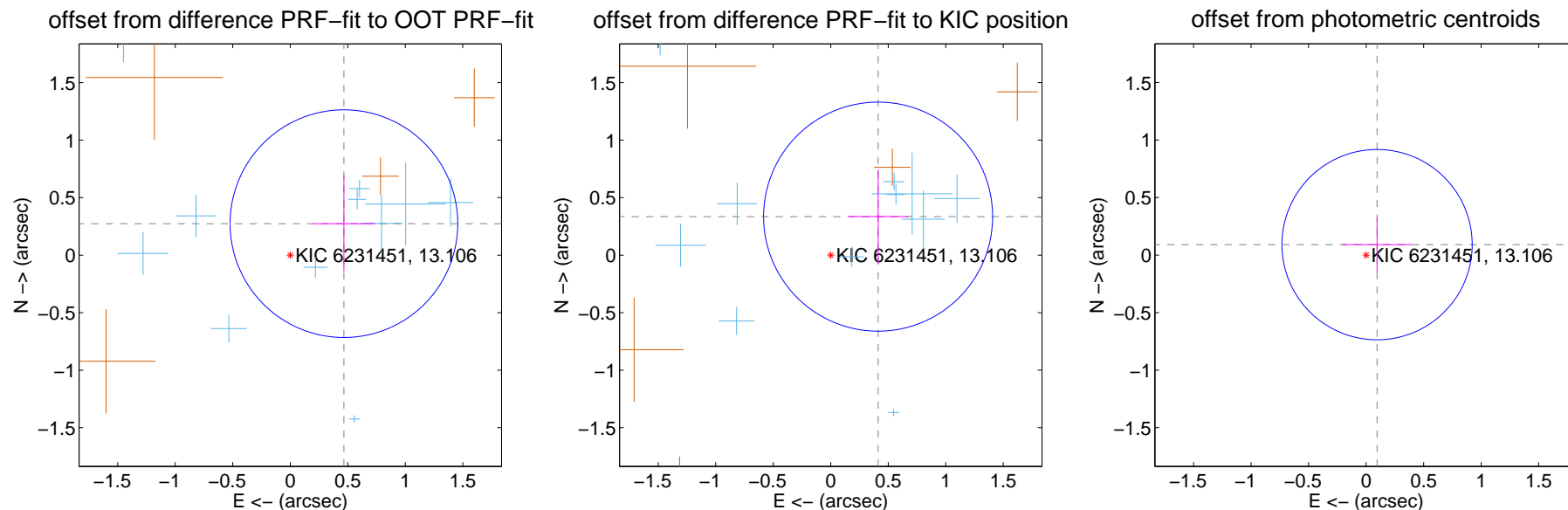
## DV Centroid Data

Supplemental centroid analysis for 006231451-02. Kepler magnitude: 13.11. Transit SNR 8.01

There are 11 quarters with good PRF difference image offsets

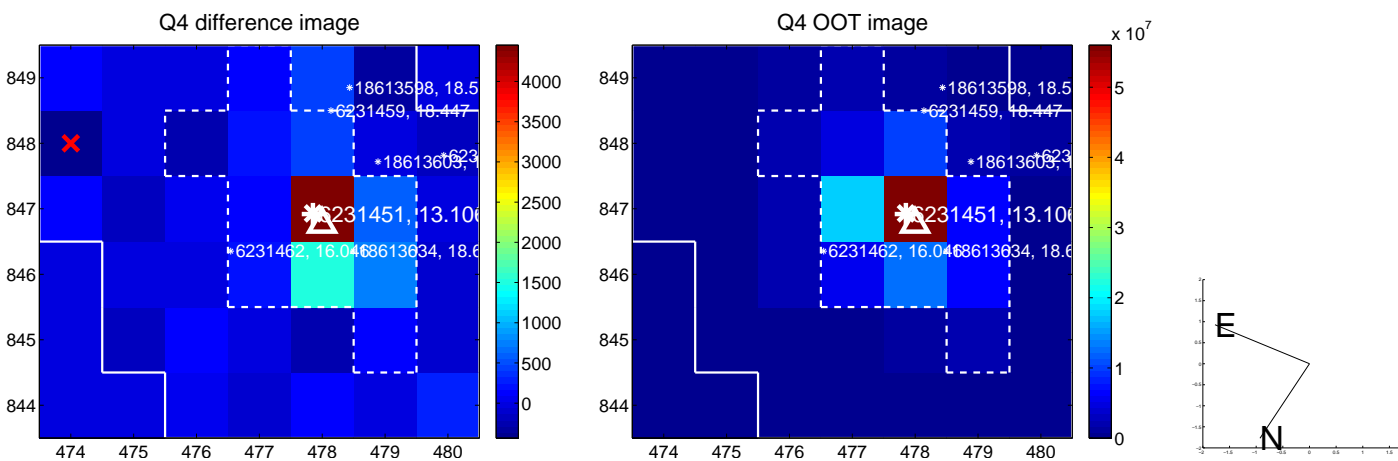
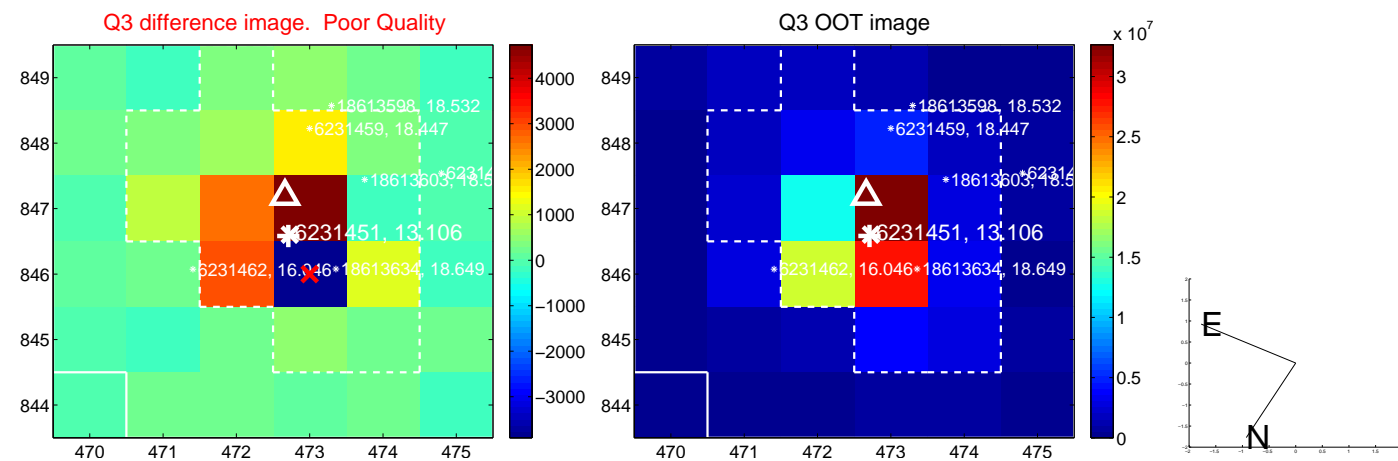
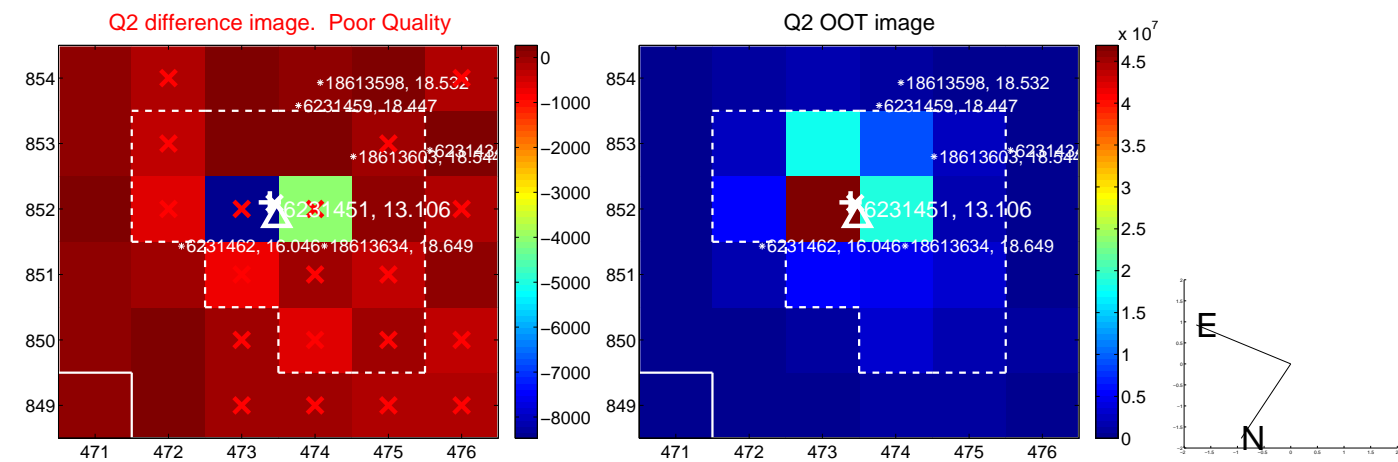
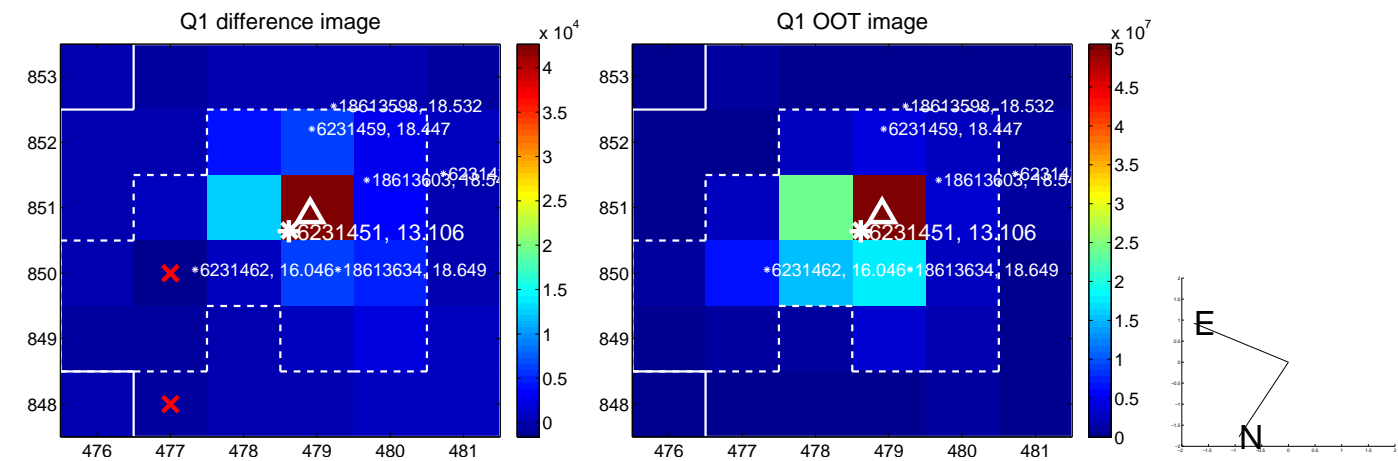
The direct PRF centroid is offset from the target star catalog position by about 0.08 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.541 \pm 0.330$	1.64	$-0.467 \pm 0.271$	$0.274 \pm 0.417$
PRF-fit source offset from KIC position	$0.531 \pm 0.332$	1.60	$-0.412 \pm 0.260$	$0.335 \pm 0.410$
photometric centroid source offset	$0.13 \pm 0.28$	0.48	$-0.10 \pm 0.30$	$0.09 \pm 0.24$

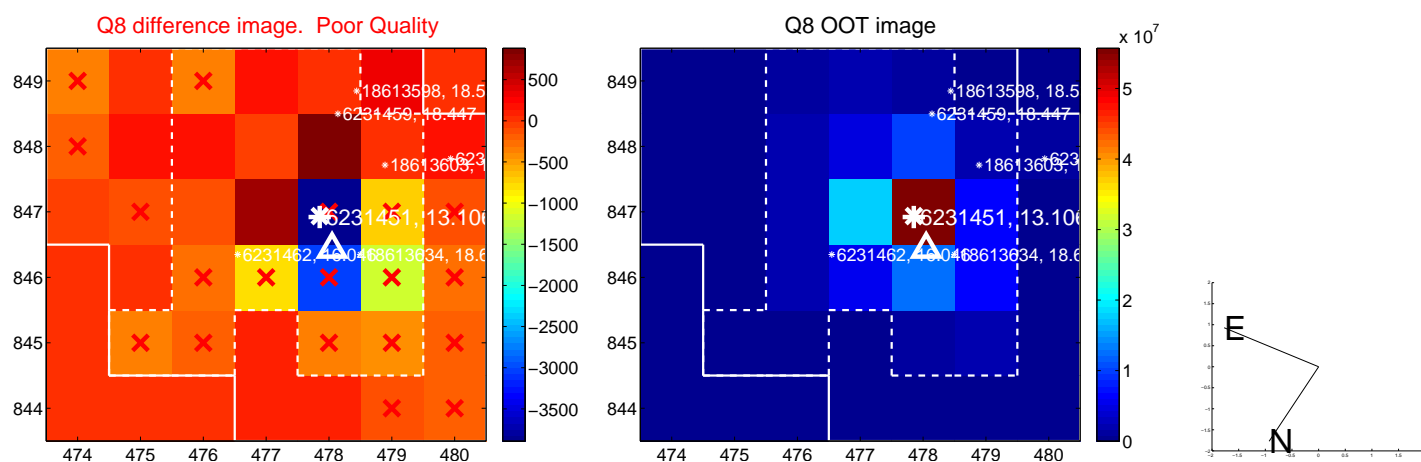
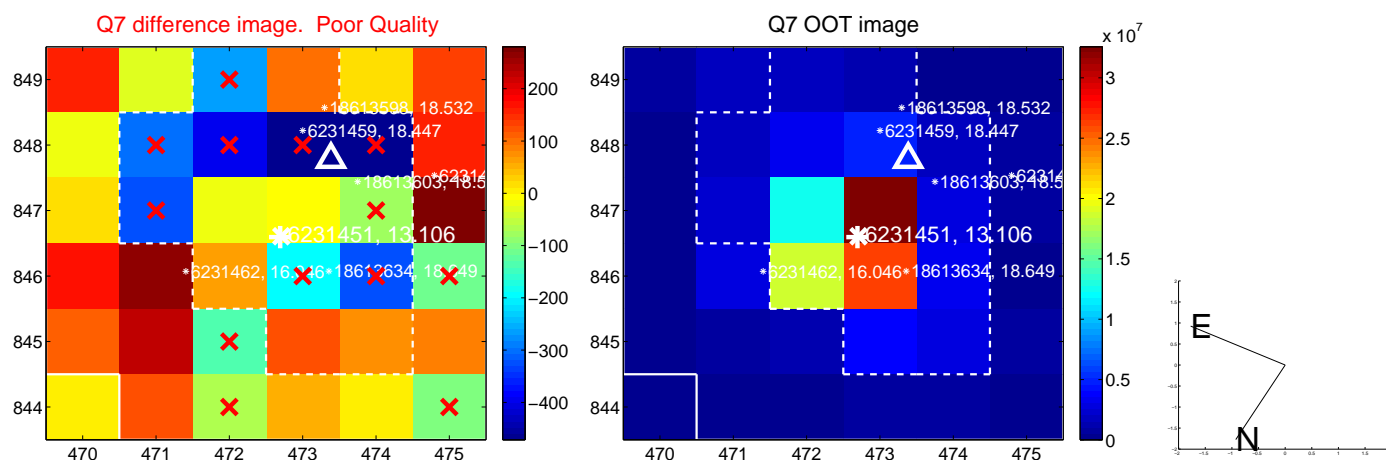
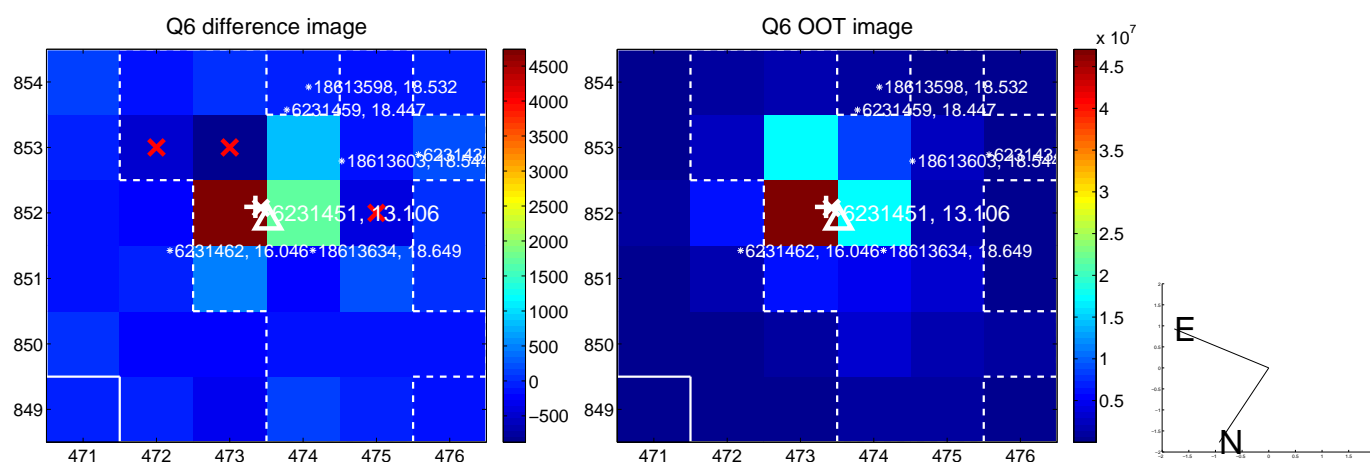
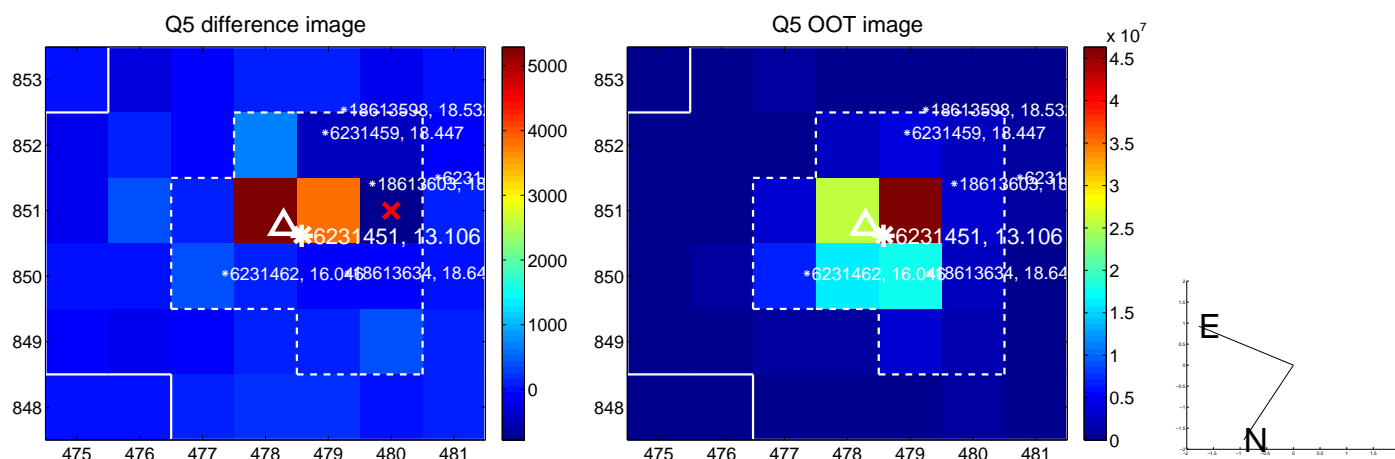


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

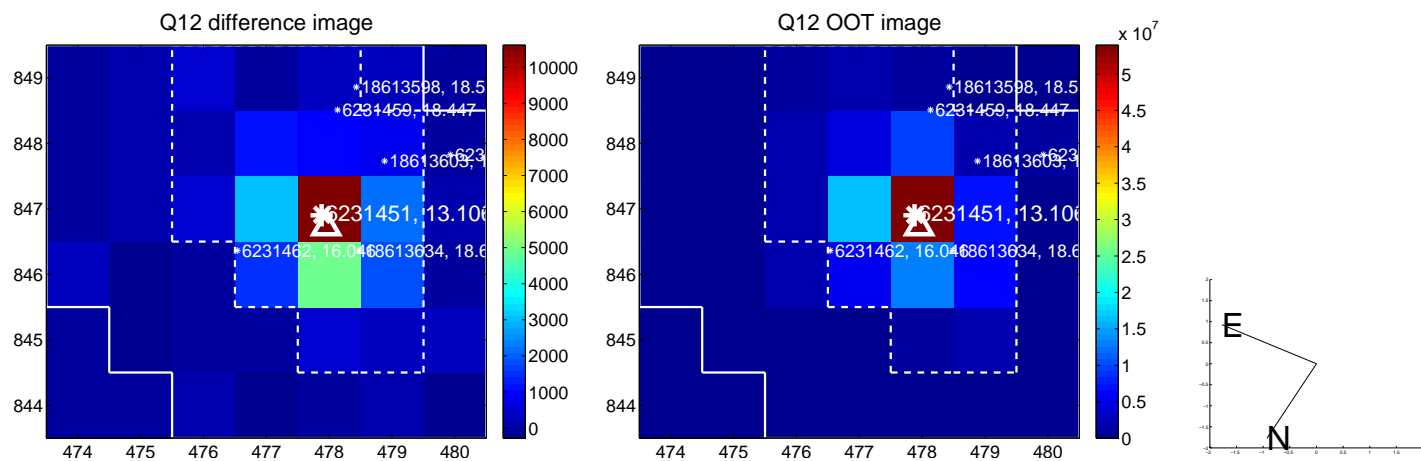
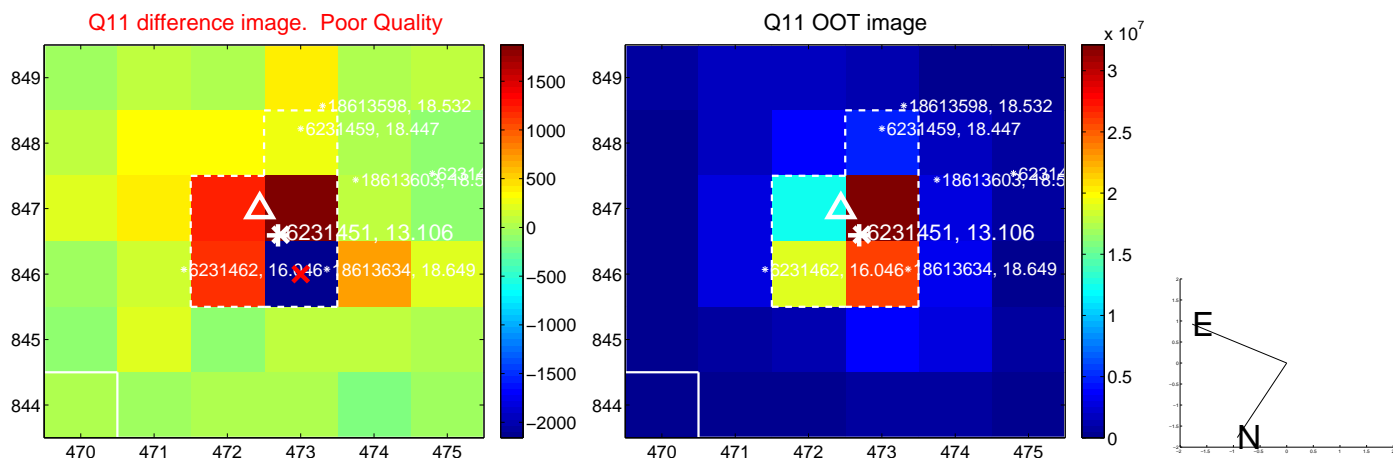
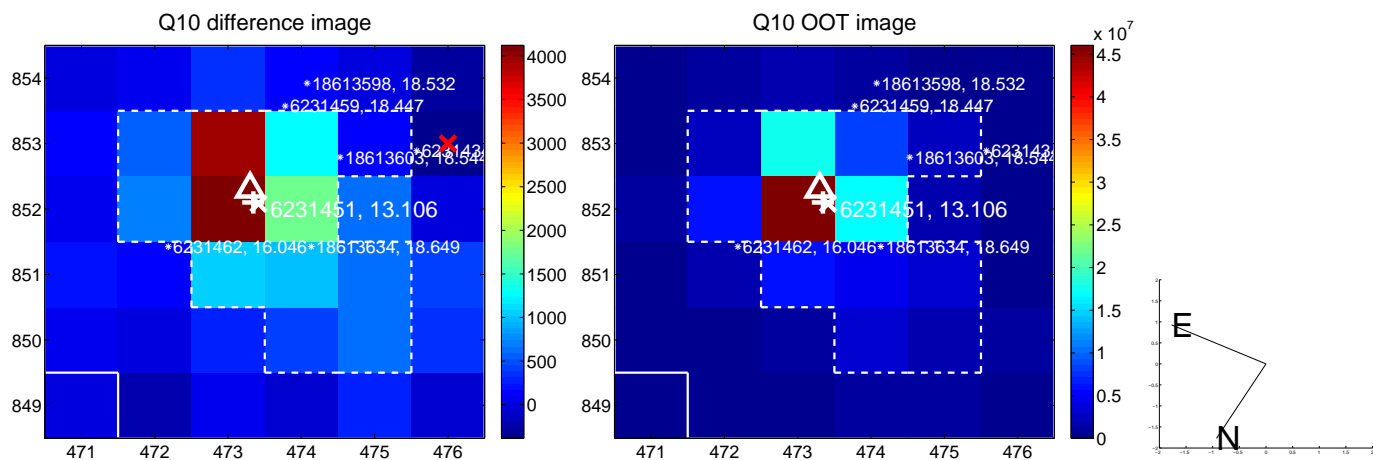
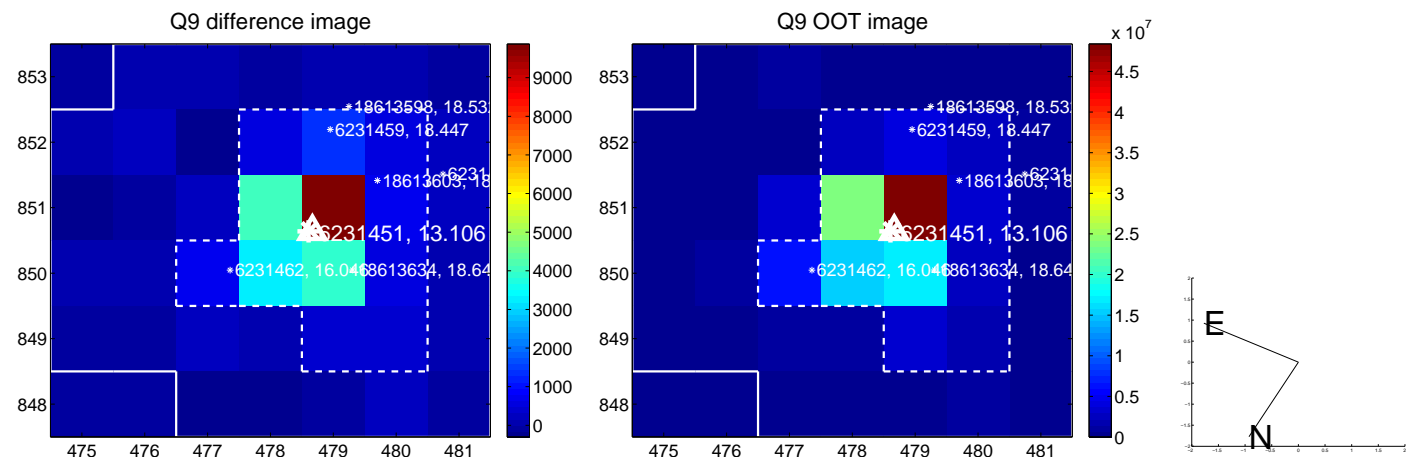


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

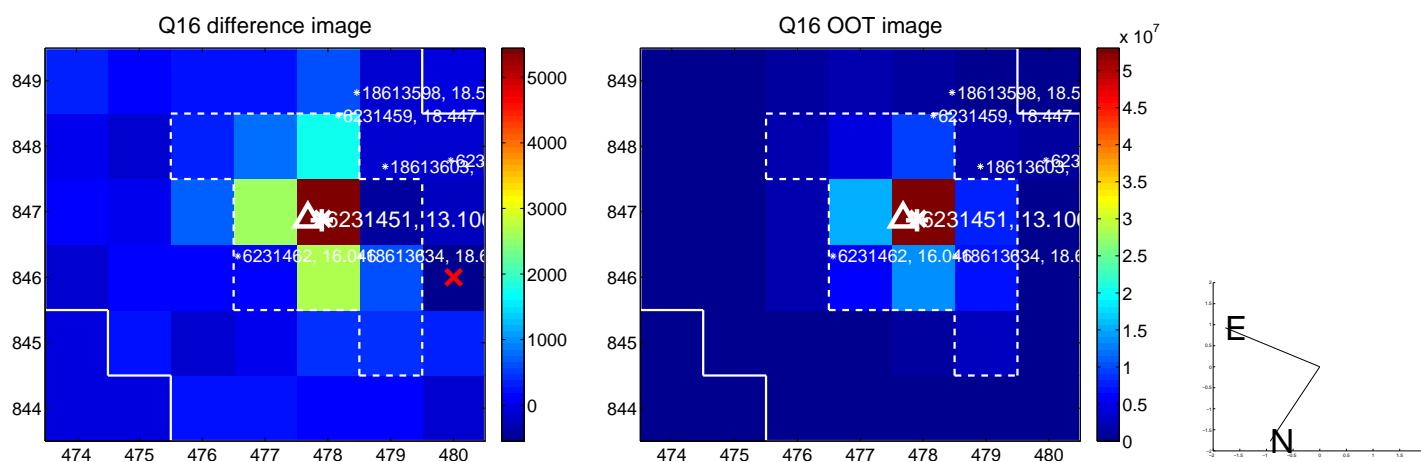
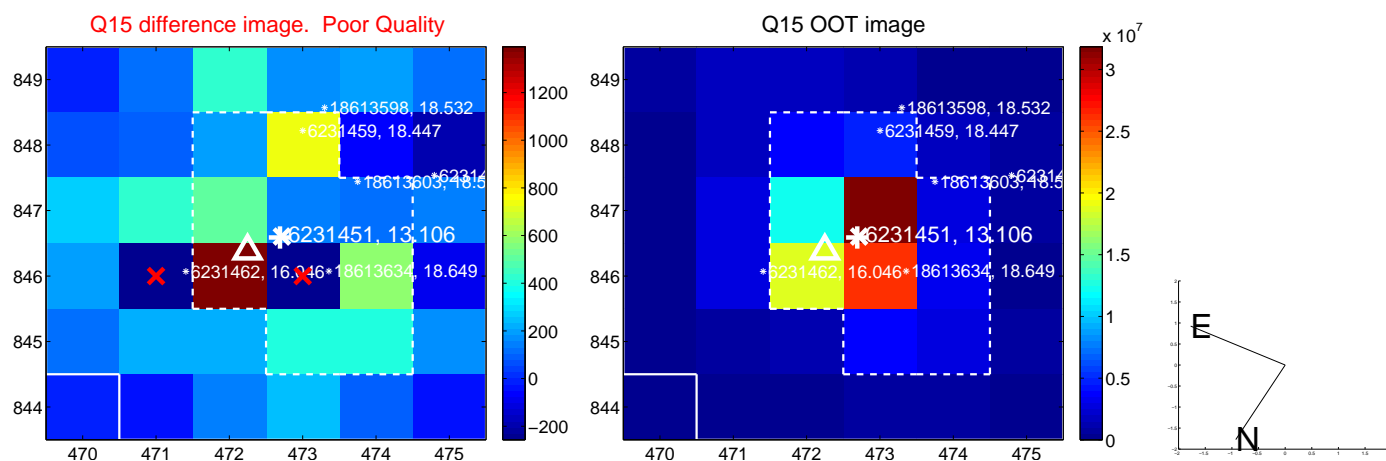
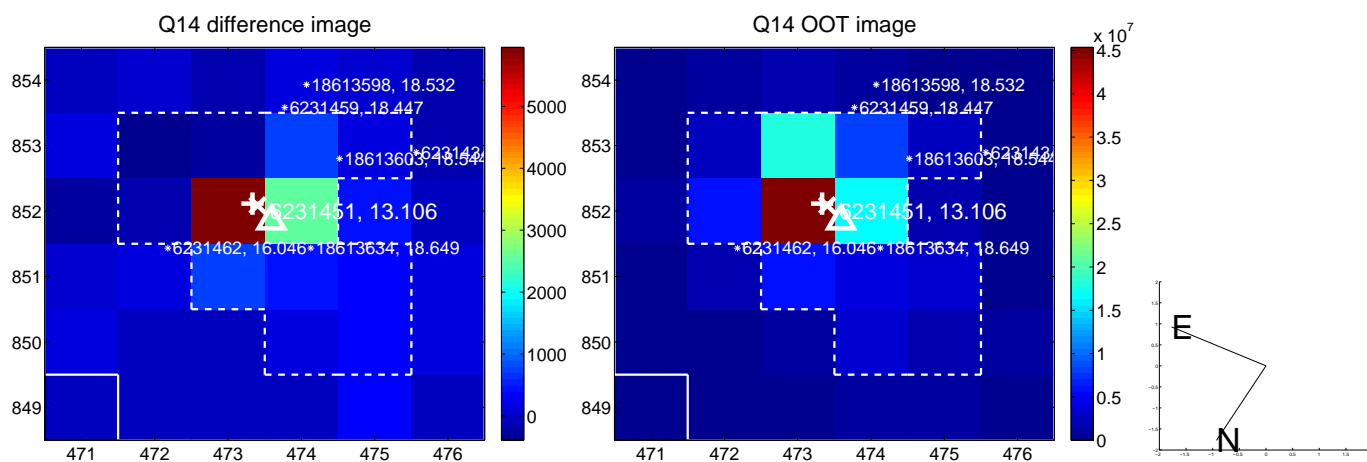
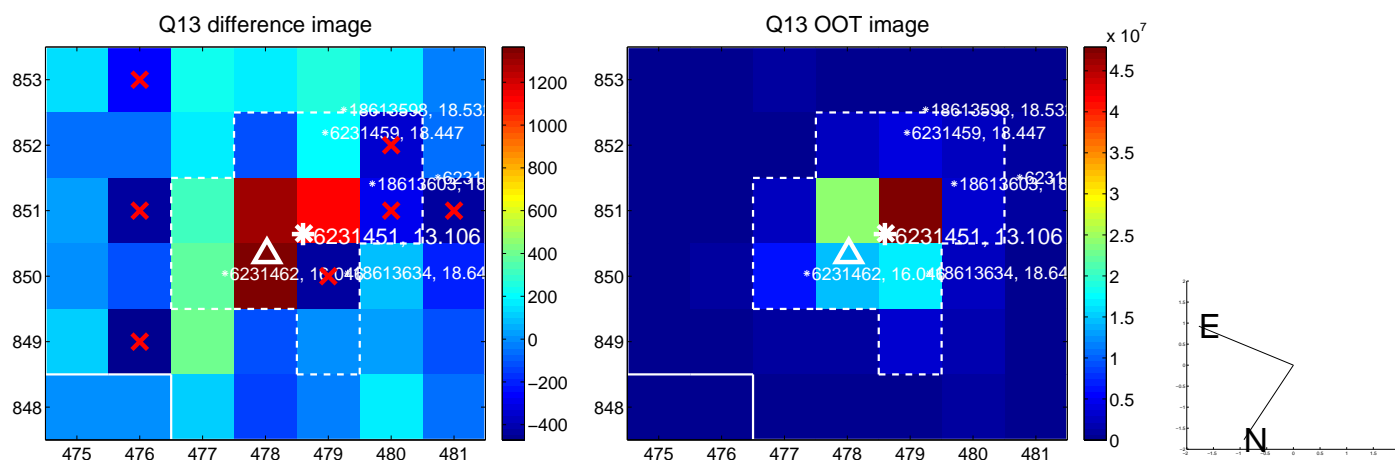




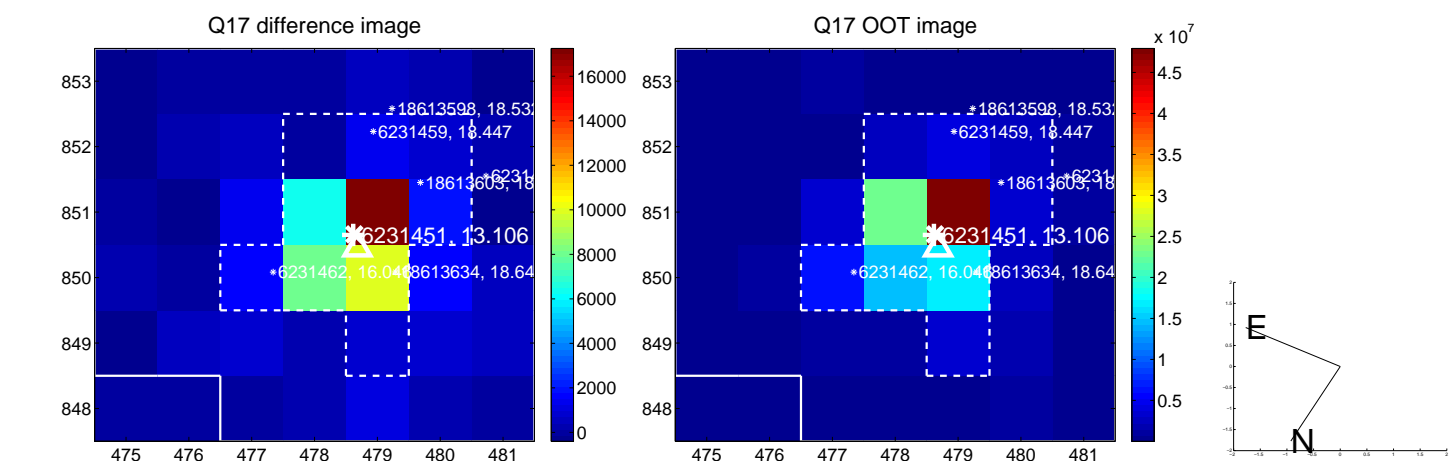
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



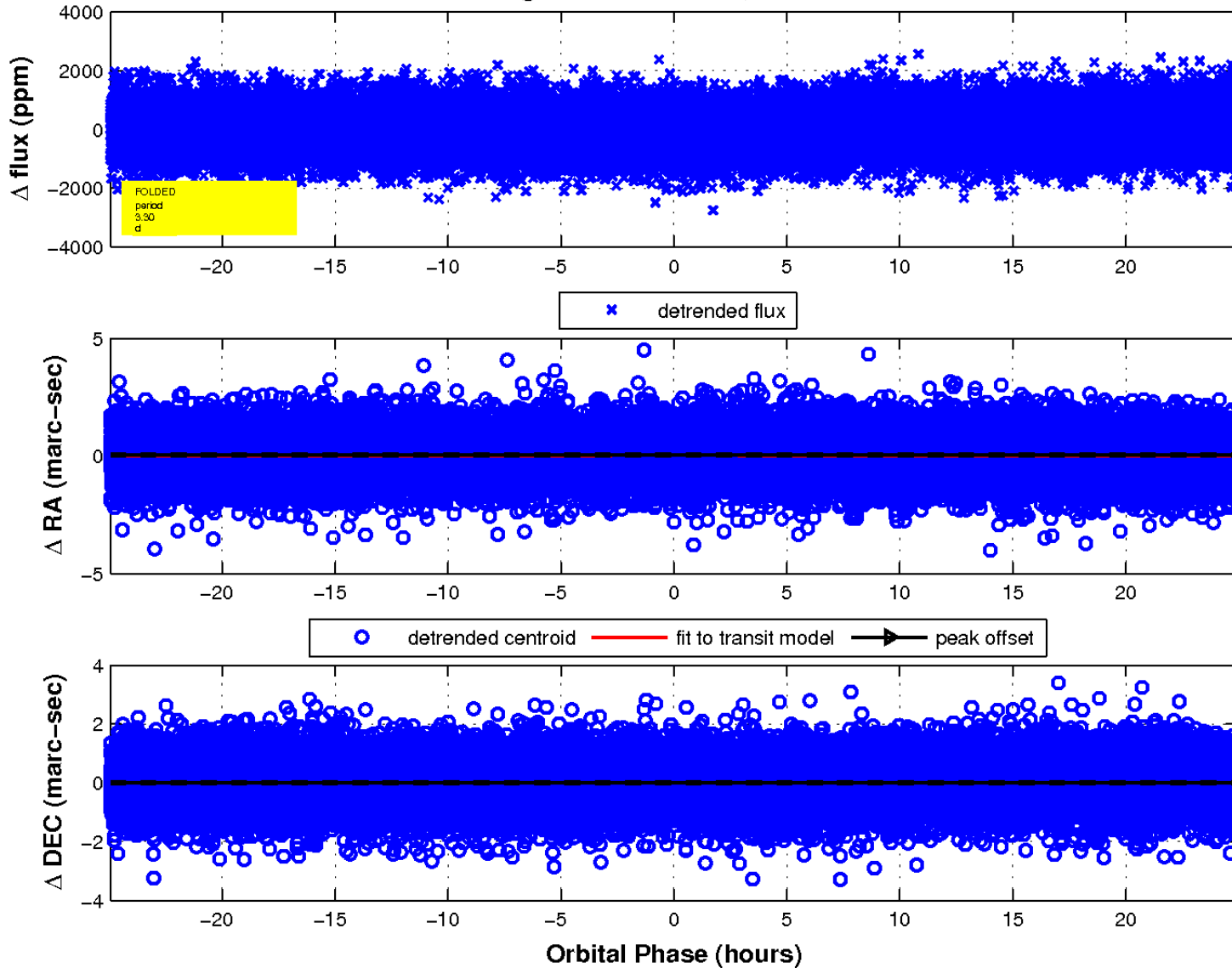
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

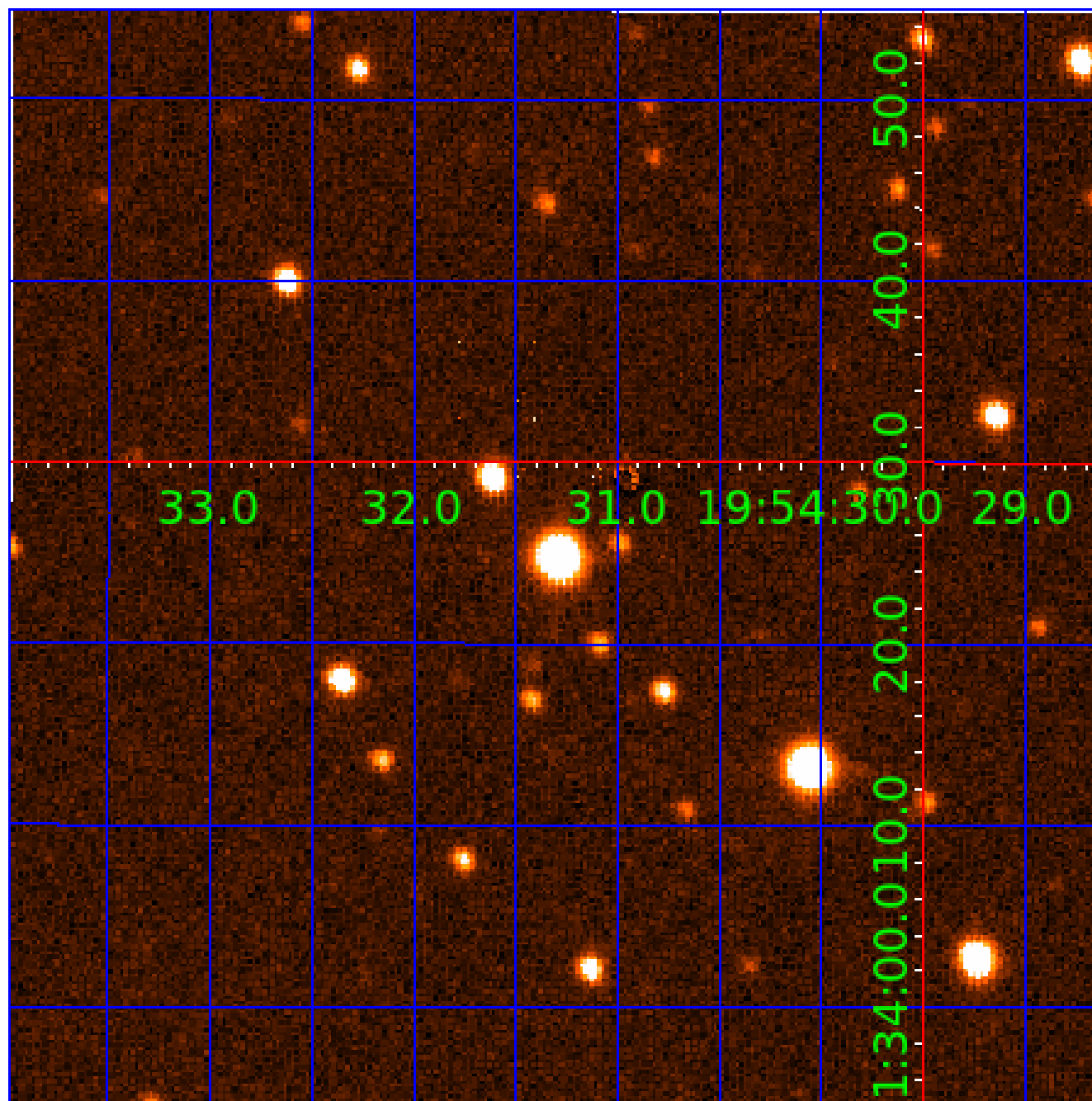


fluxWeightedCentroids, Planet 2 of 3



UKIRT Image

Declination



# KIC 006231451

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006231451-01	OBS	No	0.751993	131.625032	98.2	1.659	10.5	10.9	2.47	7684	2.84	47322.92
006231451-02	OBS	No	3.296244	132.589660	120.4	8.316	9.0	8.0	2.47	7684	3.13	6596.76
006231451-03	OBS	No	346.059088	140.988715	1053.2	8.096	7.9	7.4	2.47	7684	9.18	13.32

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006231451-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT
006231451-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
006231451-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—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.

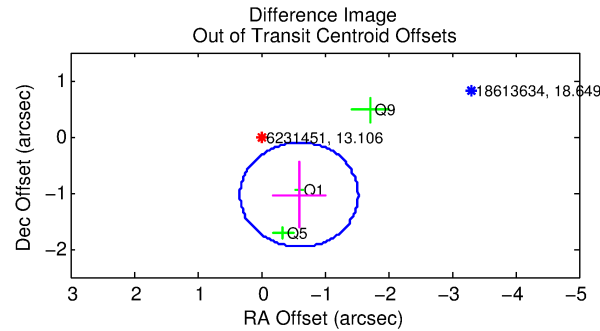
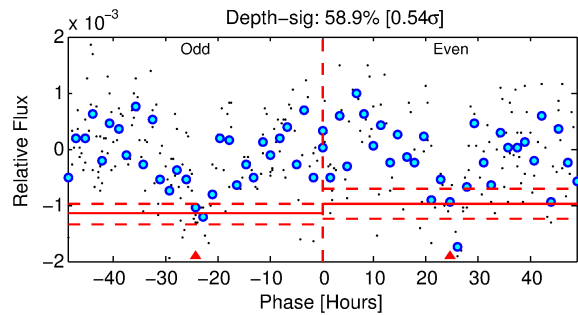
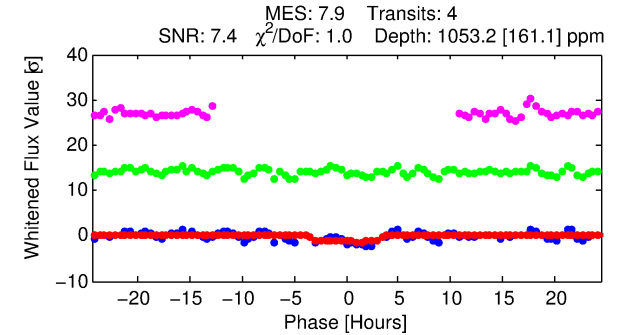
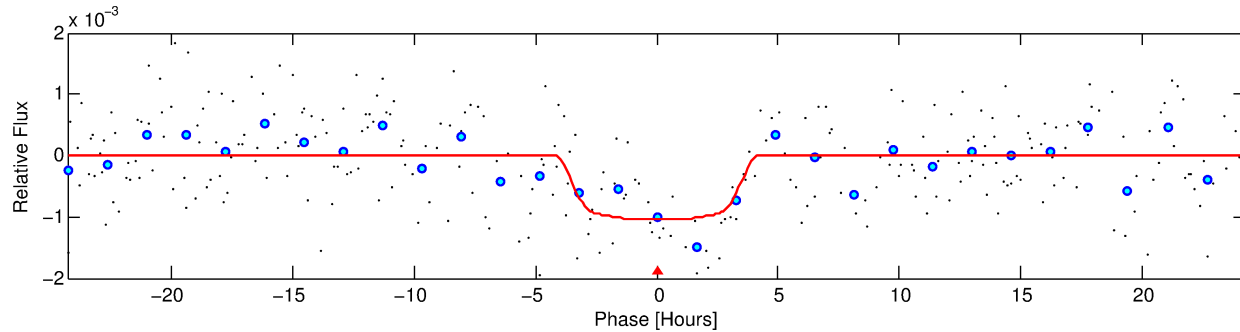
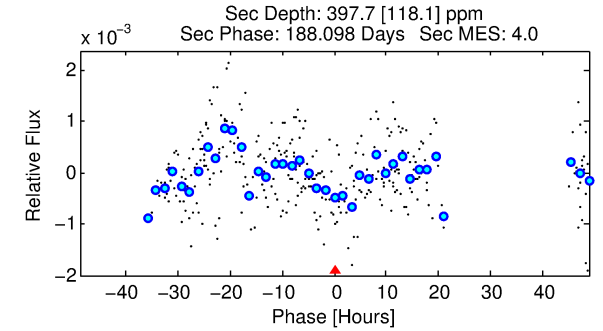
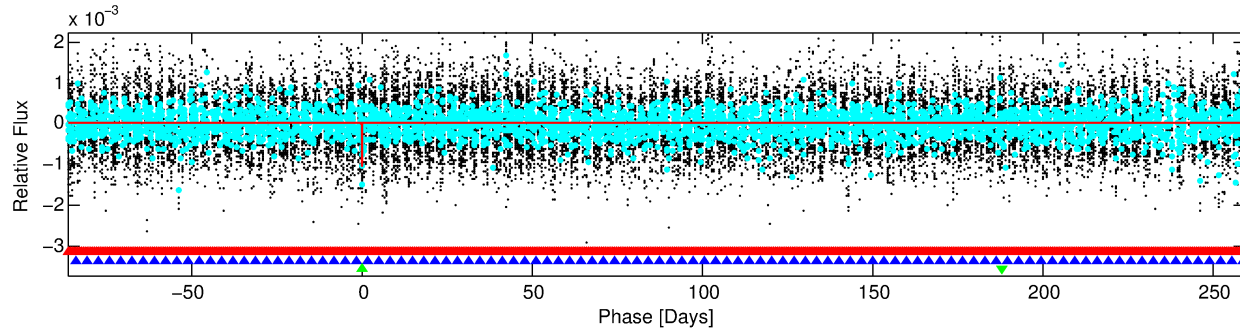
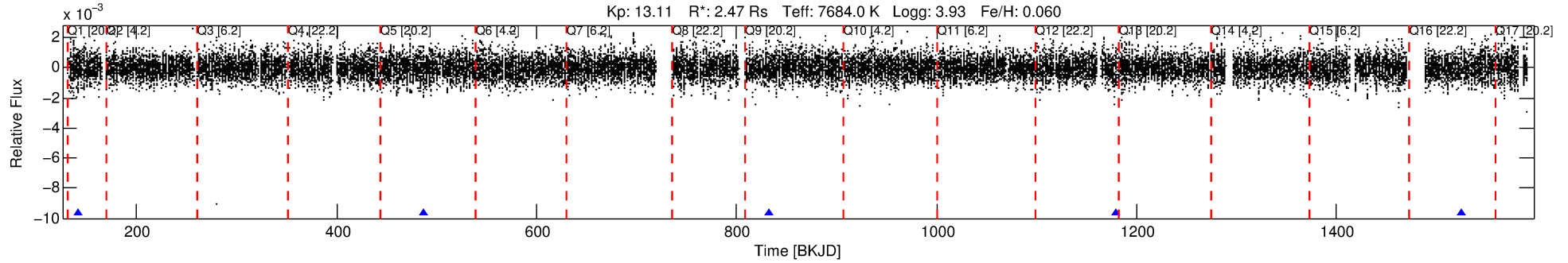
## Ephemeris Match Information For 006231451-03

No Significant Match Found



# DV One-Page Summary

KIC: 6231451 Candidate: 3 of 3 Period: 346.059 d



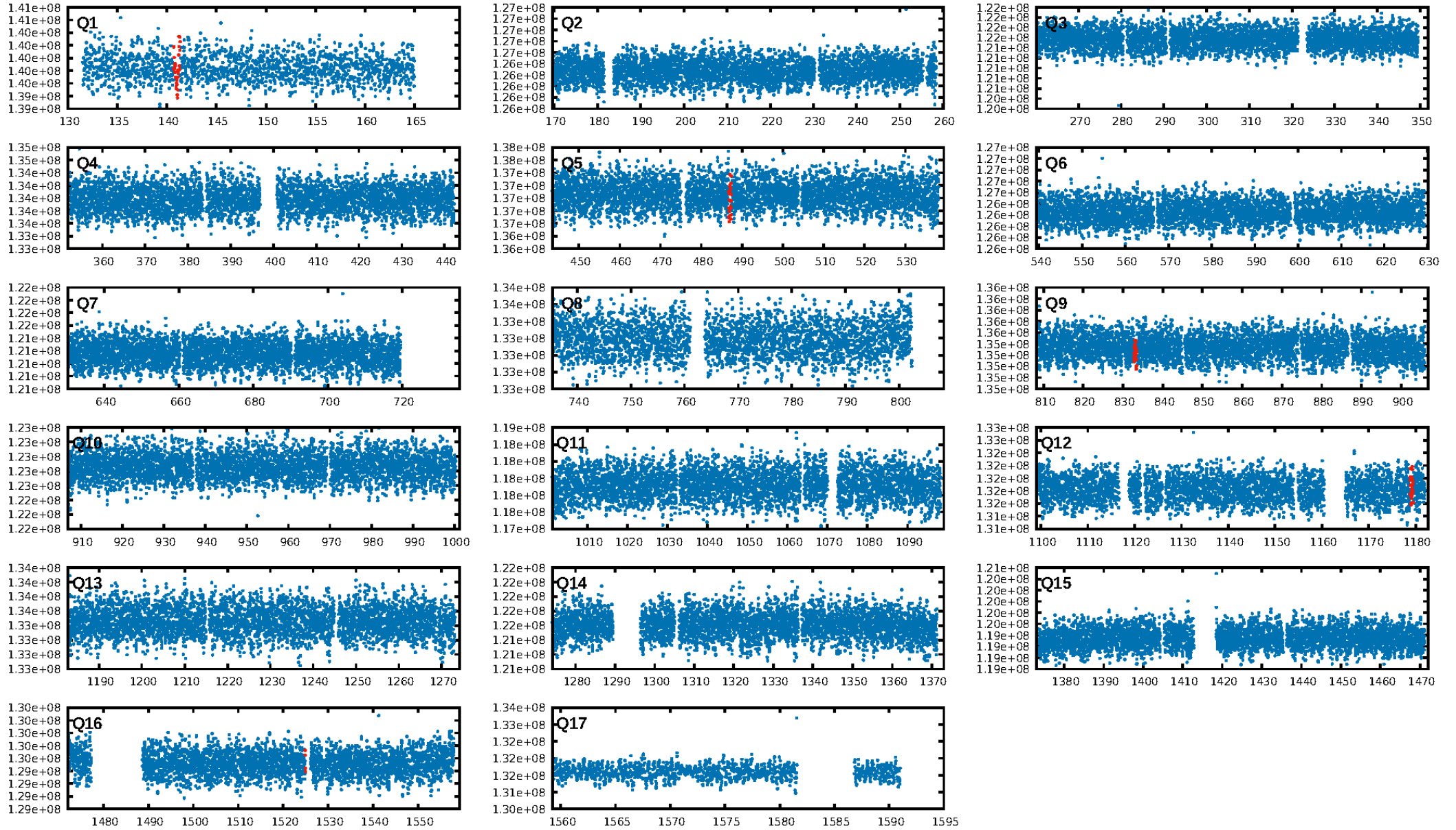
## DV Fit Results:

Period = 346.05909 [0.00732] d  
Epoch = 140.9887 [0.0131] BKJD  
Rp/R\* = 0.0341 [0.0036]  
a/R\* = 175.59 [67.27]  
b = 0.88 [0.10]  
Seff = 13.32 [6.25]  
Teq = 487 [57] K  
Rp = 9.18 [3.01] Re  
a = 1.1947 [0.3358] AU  
Ag = 3705.07 [2091.95] [1.77 $\sigma$ ]  
Teffp = 5876 [597] K [8.99 $\sigma$ ]

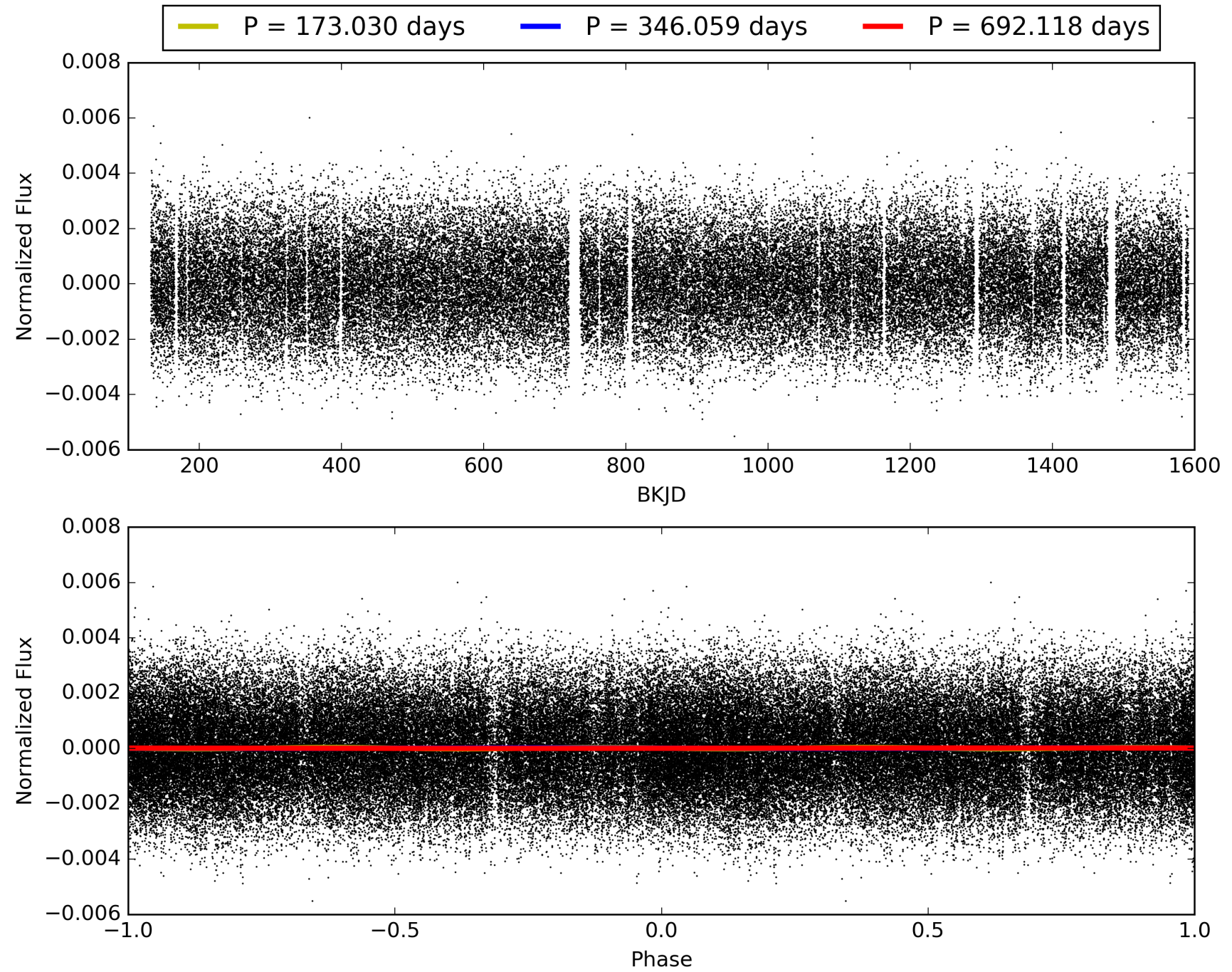
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [708.78 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 64.2%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 2.70e-12**  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -0.3608  
Centroid-sig: 28.9%  
Centroid-so: 0.179 arcsec [0.50 $\sigma$ ]  
**OotOffset-rm: 1.198 arcsec [3.86 $\sigma$ ]**  
**KicOffset-rm: 1.141 arcsec [3.69 $\sigma$ ]**  
OotOffset-st: 0/0/0/3 [3]  
KicOffset-st: 0/0/0/3 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 0.00 [0/3]

# TCE 006231451-03, PDC Light Curves

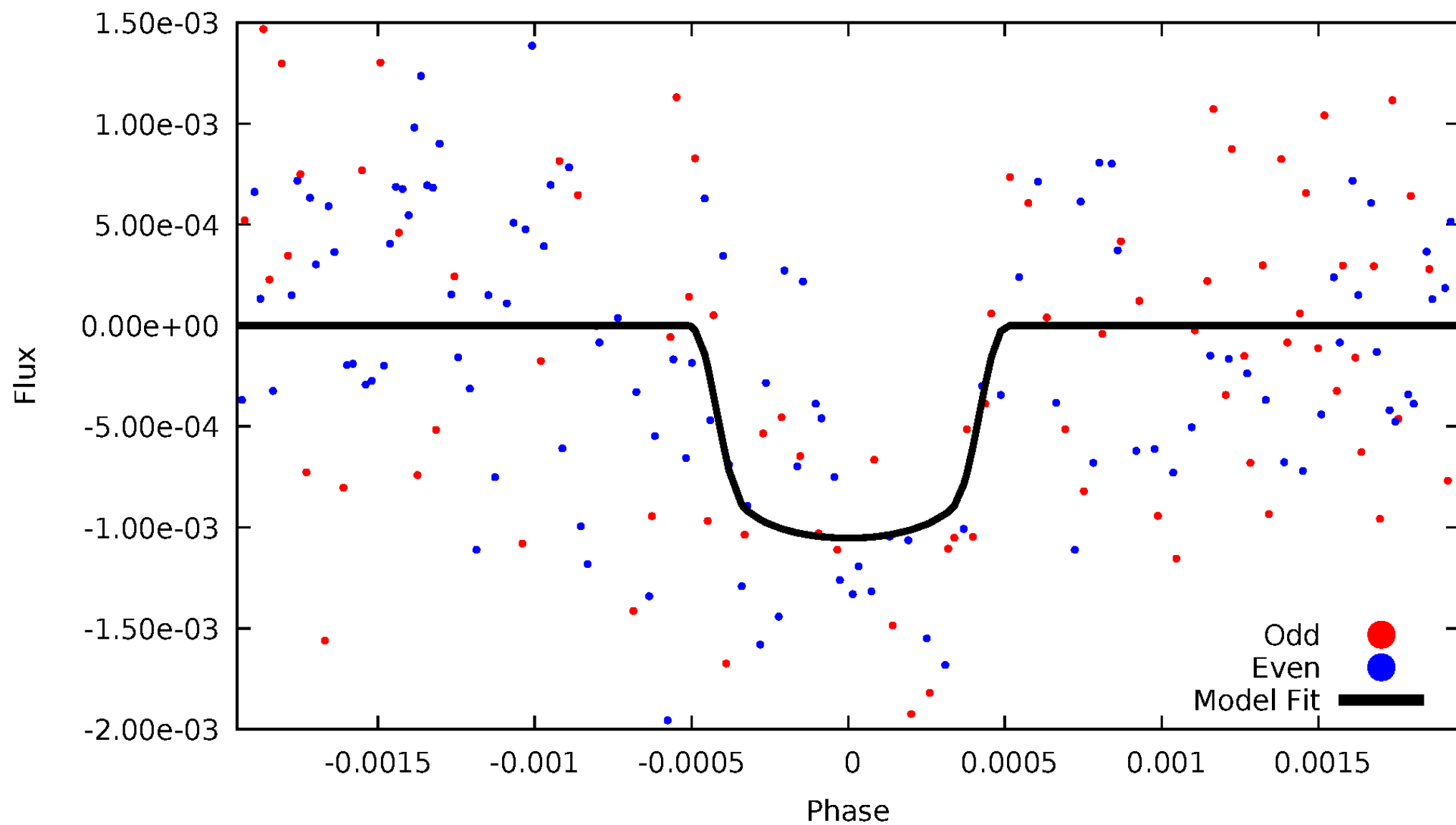


# TCE 006231451-03



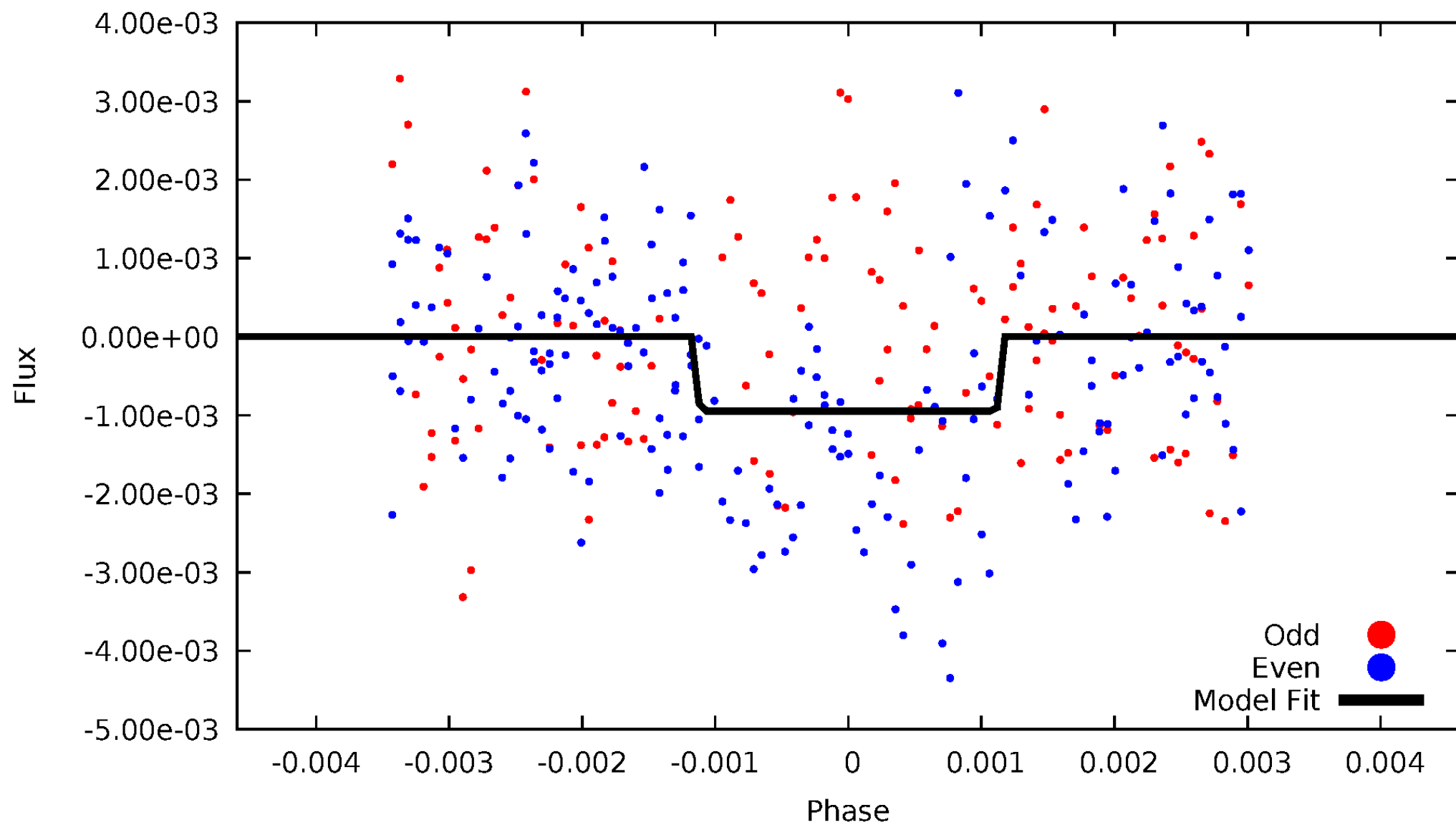
# DV Odd/Even

TCE 006231451-03



# ALT Odd/Even

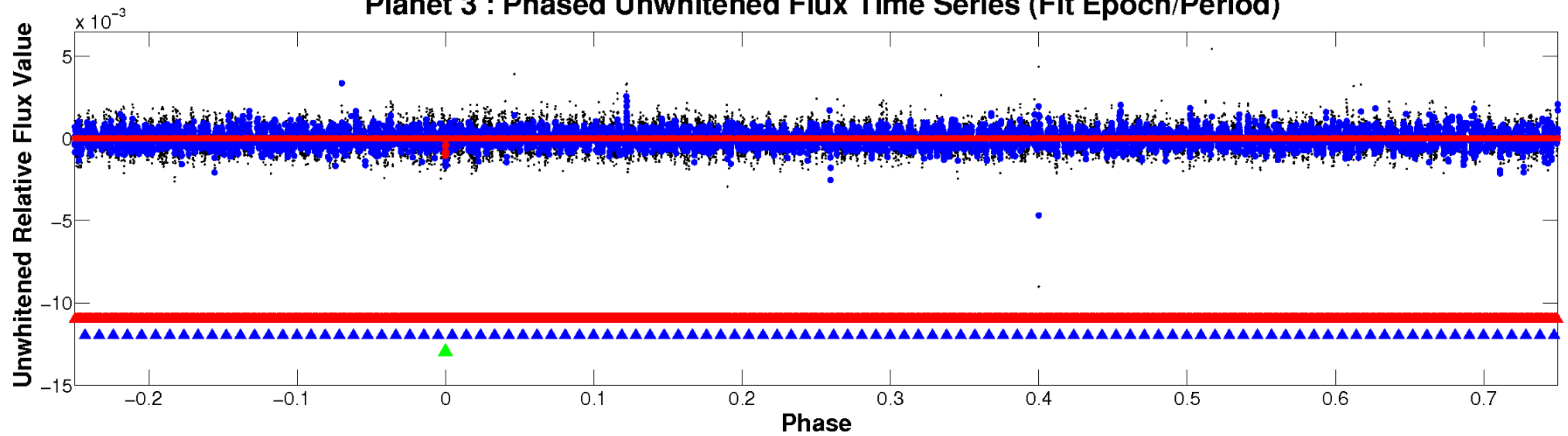
TCE 006231451-03



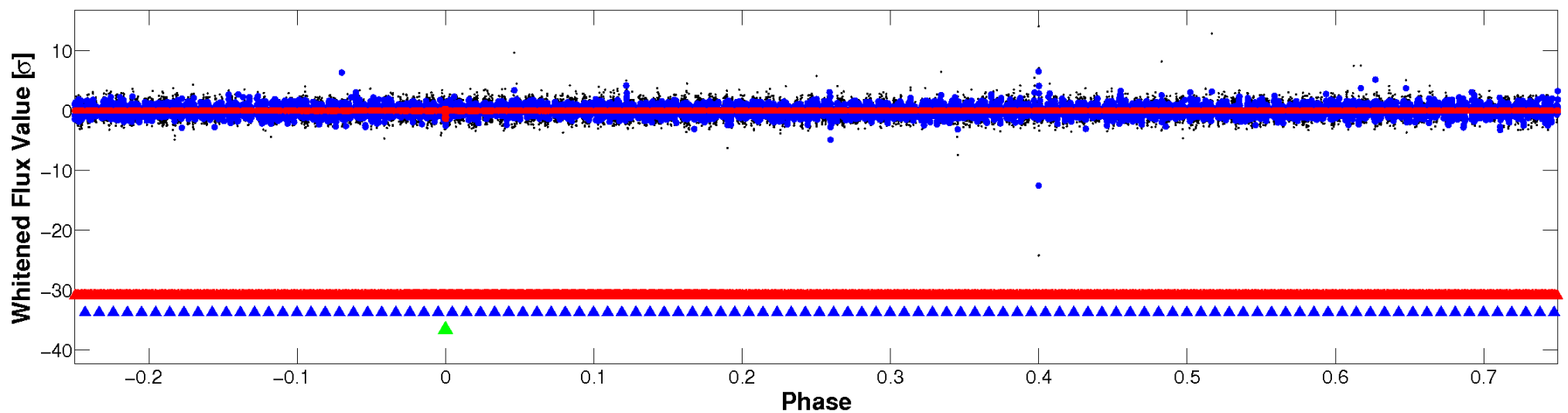


# Non-Whitened Vs. Whitened Light Curve

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

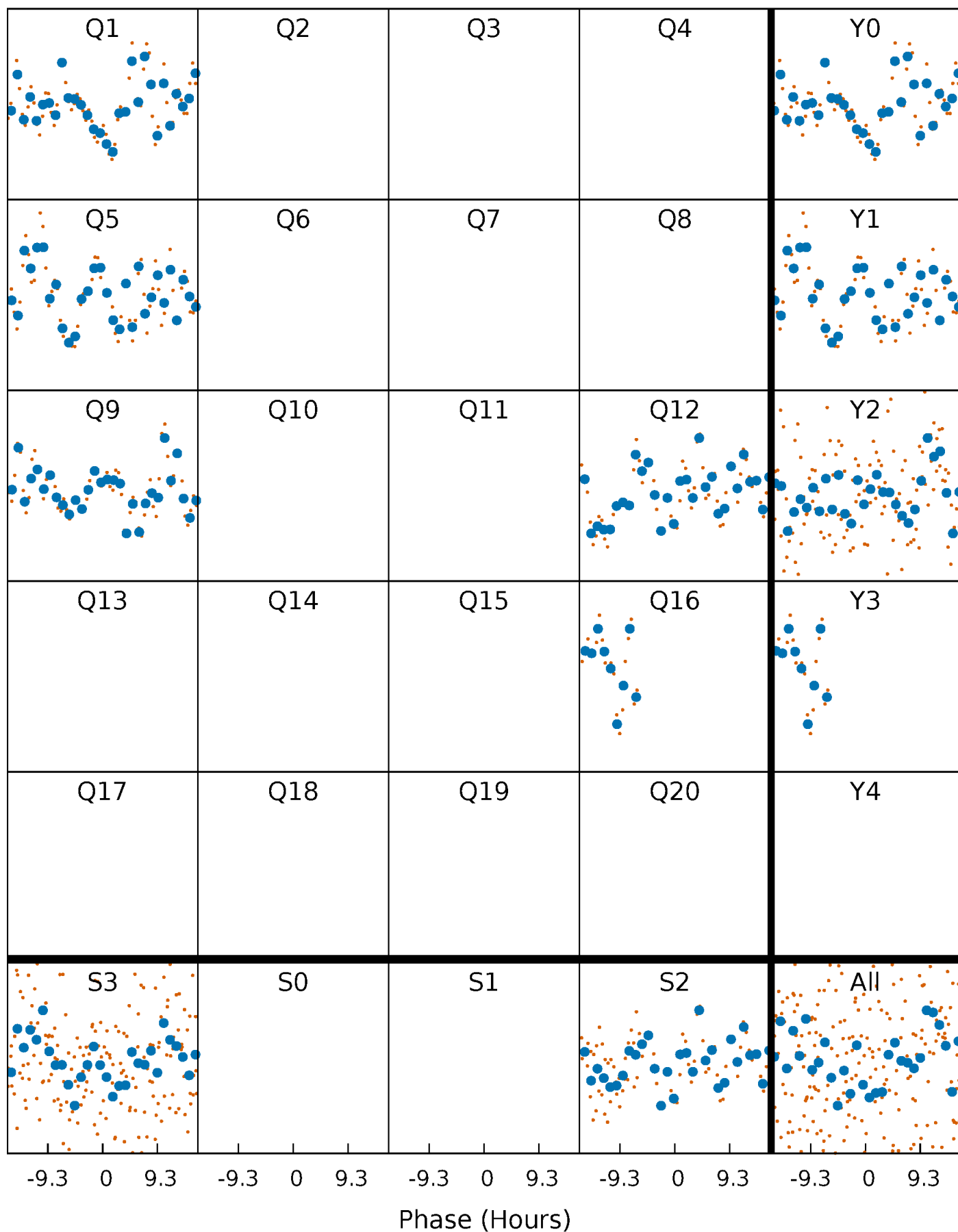


Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



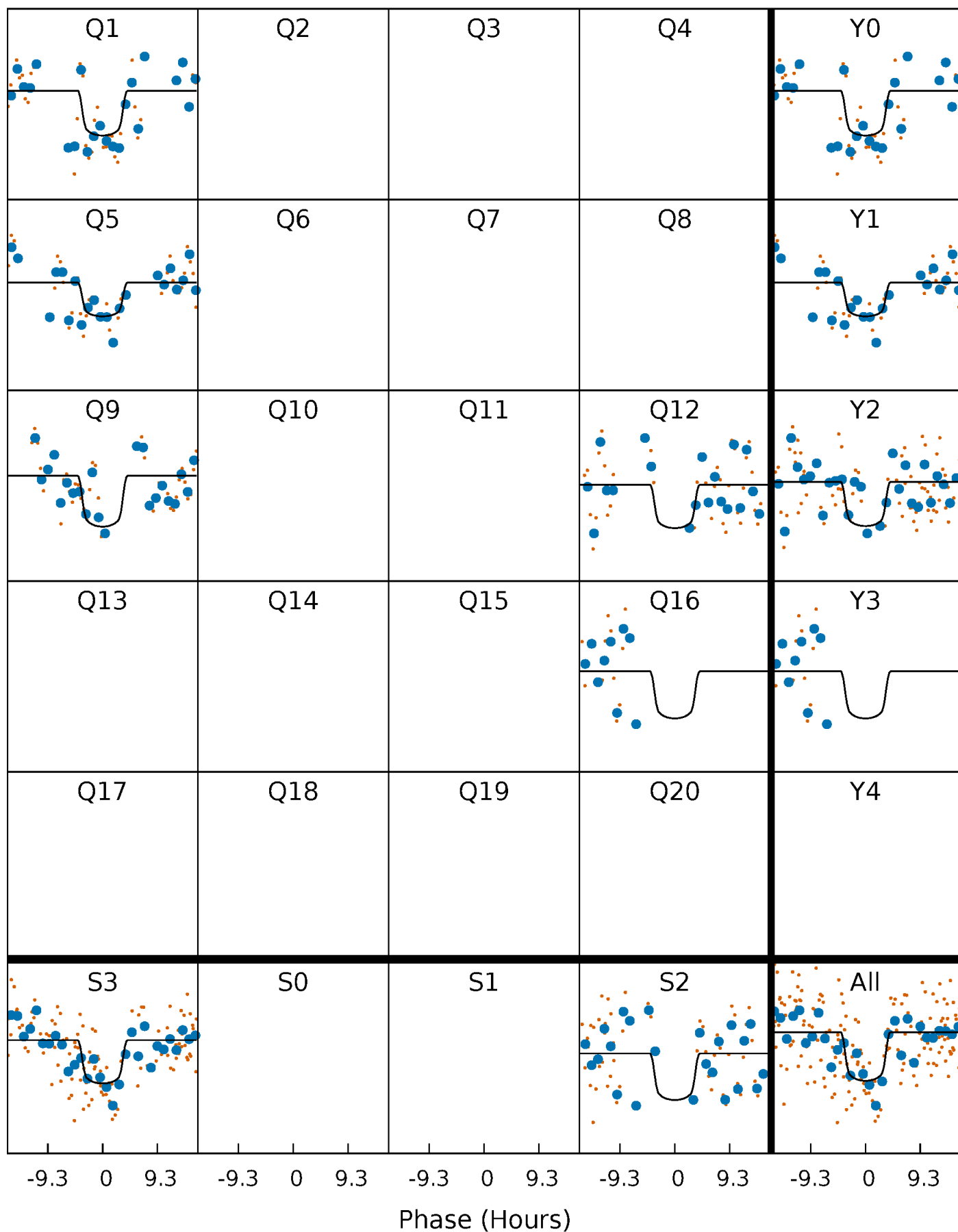
# PDC Quarter-Phased Transit Curves

TCE 006231451-03     $P=346.059088$  Days     $T_0=140.988715$  (BKJD)



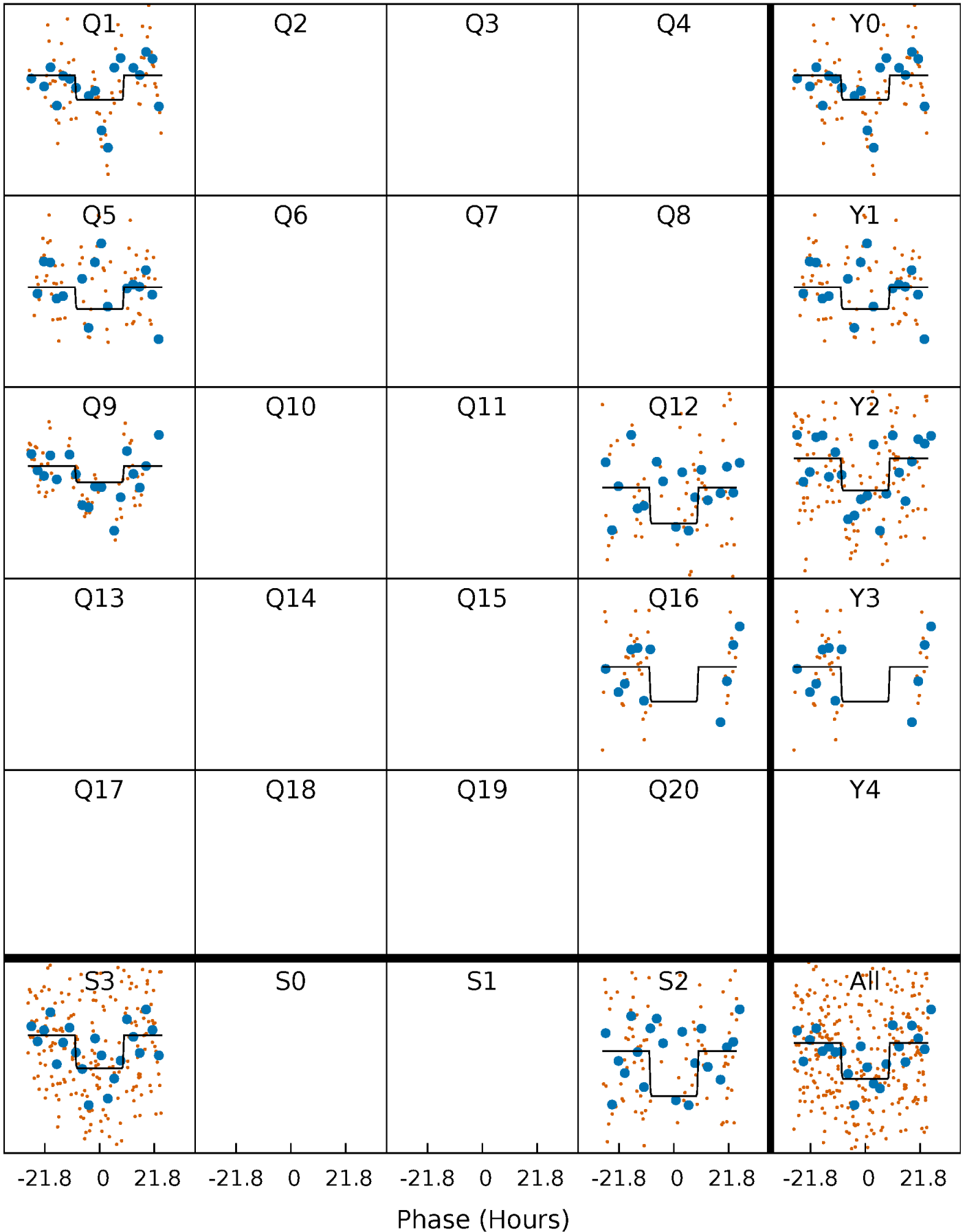
# DV Quarter-Phased Transit Curves

TCE 006231451-03     $P=346.059088$  Days     $T_0=140.988715$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

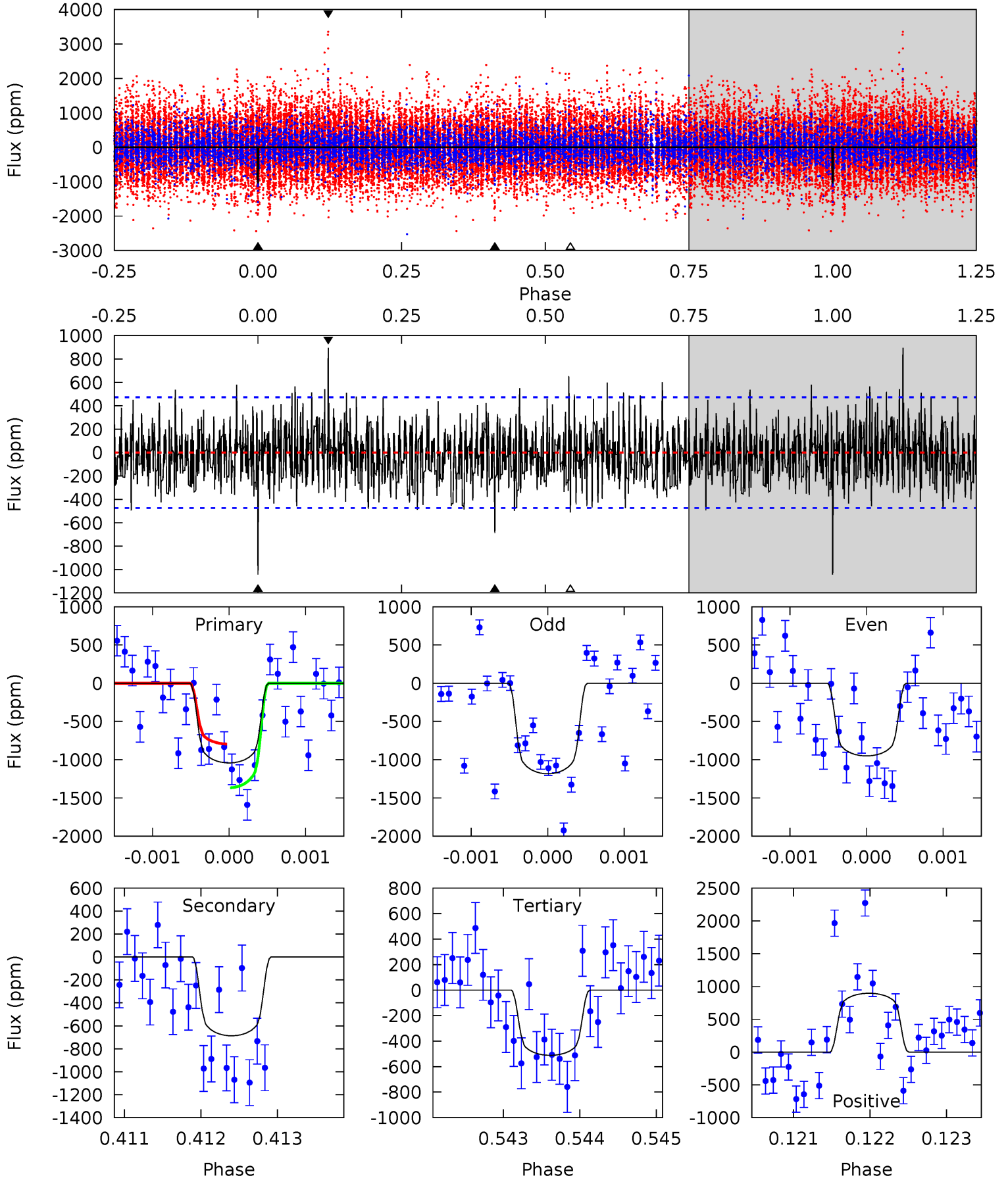
TCE 006231451-03     $P=346.103639$  Days     $T_0=140.911765$  (BKJD)



# DV Model-Shift Uniqueness Test

006231451-03, P = 346.059088 Days, E = 140.988715 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
12.0	7.90	5.88	10.3	5.45	3.29	2.08	6.11	1.67	2.02	-2.41	1.33	0.88	0.46	3.24

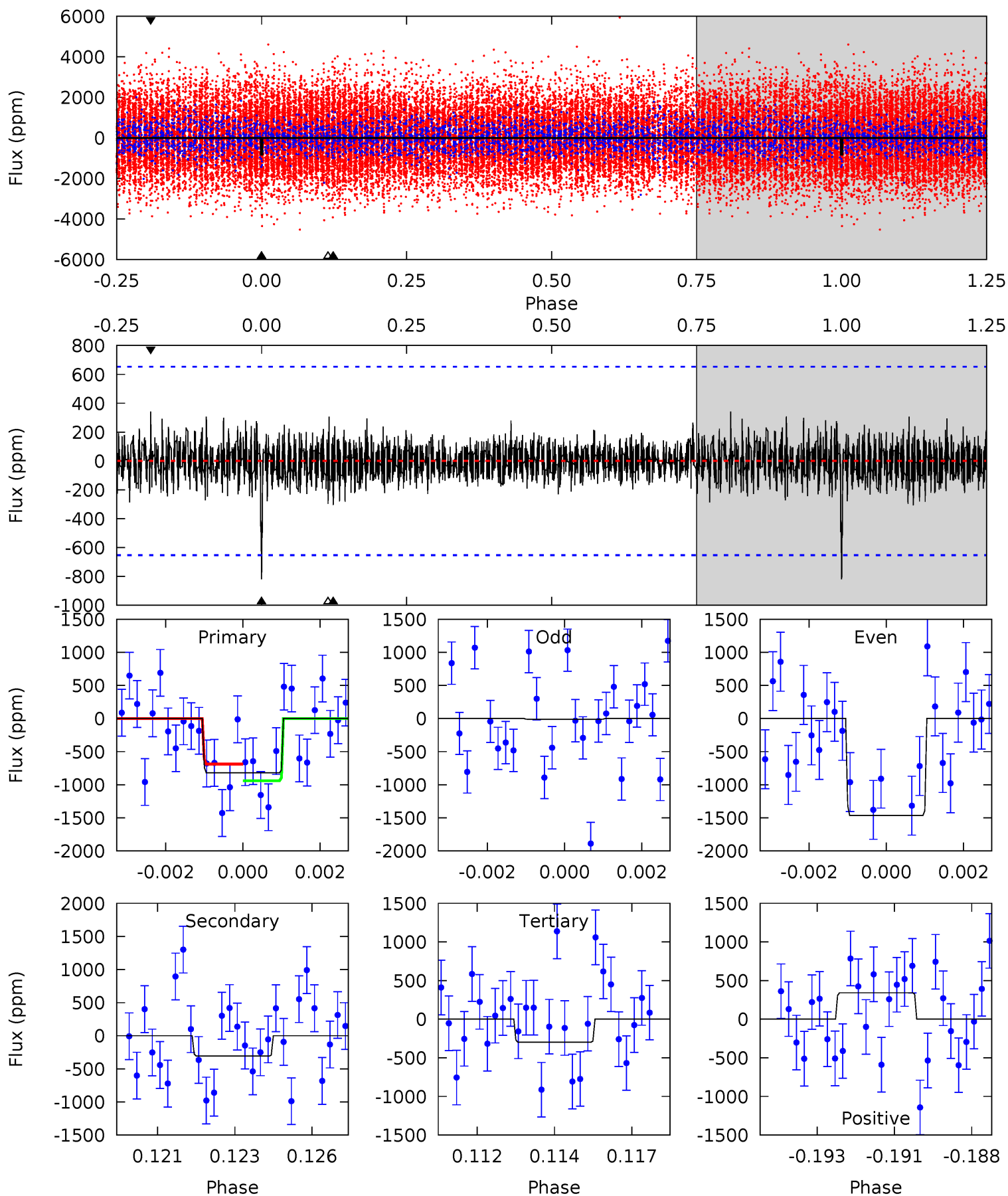




# Alt Model-Shift Uniqueness Test

006231451-03, P = 346.103639 Days, E = 140.911765 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
6.67	2.49	2.42	2.77	5.31	3.06	0.68	4.24	3.89	0.07	-0.28	5.91	1.17	0.29	1.02



### Stellar Parameters For KIC 006231451

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7684^{+214}_{-349}$	$3.932^{+0.247}_{-0.133}$	$0.060^{+0.150}_{-0.400}$	$2.467^{+0.448}_{-0.768}$	$1.897^{+0.103}_{-0.439}$	$0.178^{+0.305}_{-0.061}$
	+3%/-5%	+6%/-3%	+250%/-667%	+18%/-31%	+5%/-23%	+171%/-34%
Source	KIC0	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 006231451-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-687 \pm 87$	$8.87^{+1.52}_{-1.57}$	$670^{+47}_{-53}$	$6592^{+510}_{-467}$	$6687^{+3260}_{-1983}$
Alt.	$-307 \pm 123$	$7.99^{+1.56}_{-1.59}$	$672^{+45}_{-56}$	$5641^{+633}_{-676}$	$3528^{+2784}_{-1600}$

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

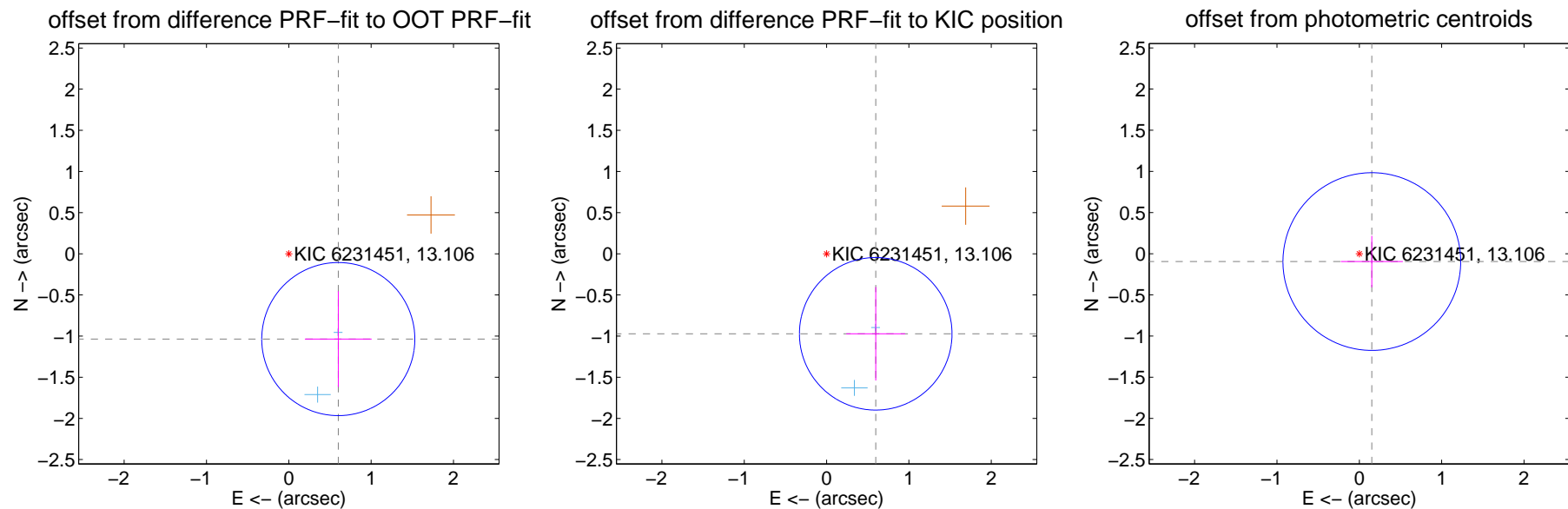
## DV Centroid Data

Supplemental centroid analysis for 006231451-03. Kepler magnitude: 13.11. Transit SNR 7.39

There are 2 quarters with good PRF difference image offsets

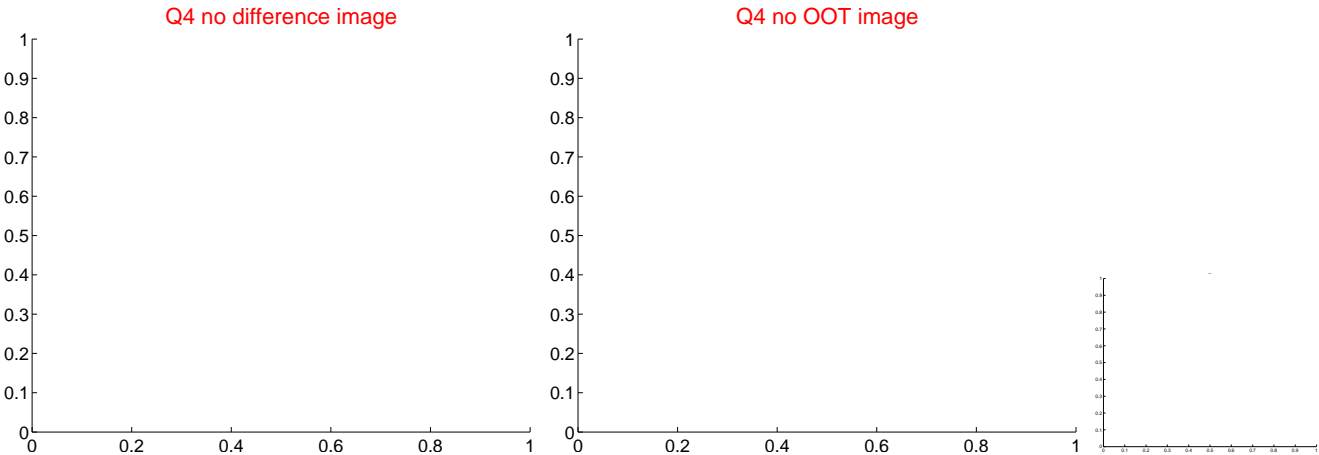
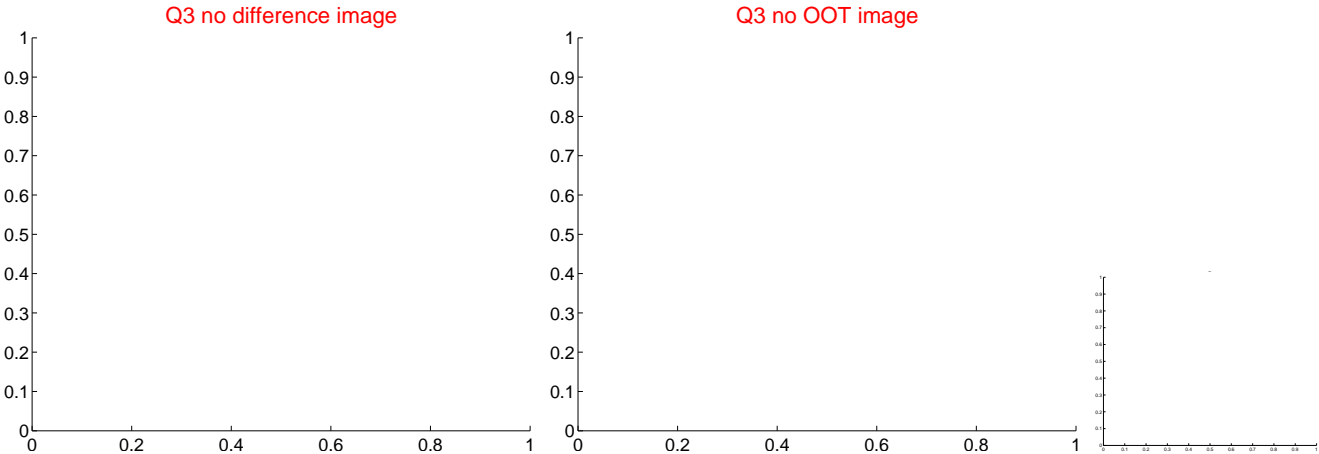
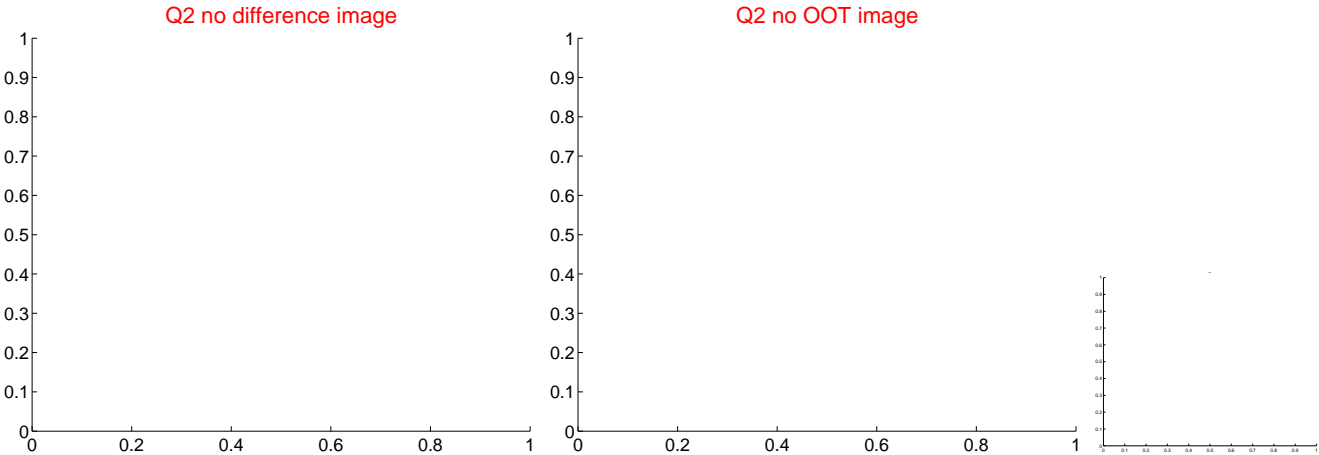
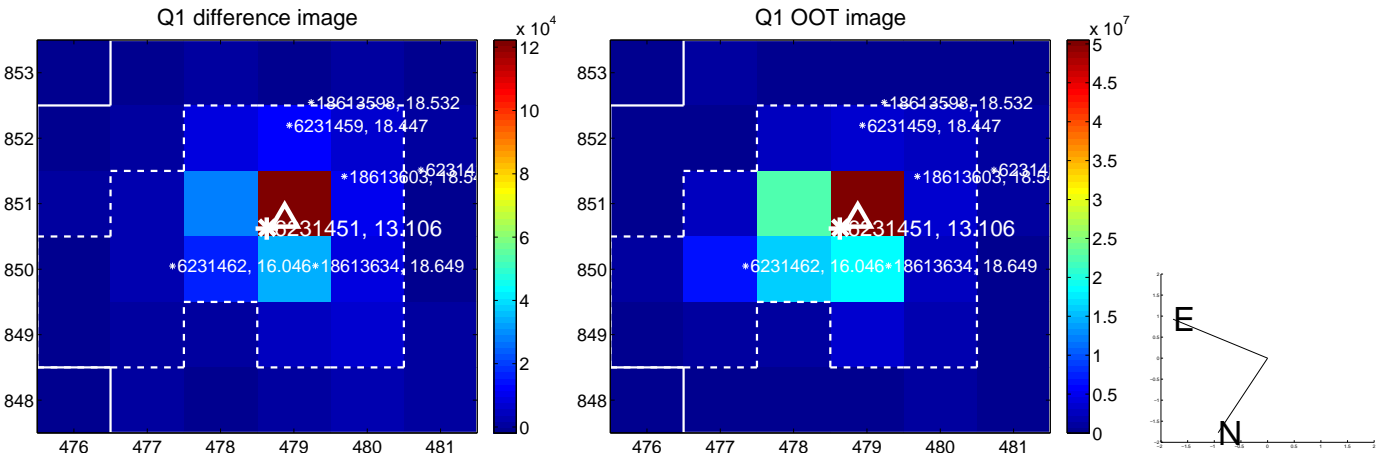
The direct PRF centroid is offset from the target star catalog position by about 0.11 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.198 \pm 0.310$	3.86	$-0.601 \pm 0.405$	$-1.036 \pm 0.581$
PRF-fit source offset from KIC position	$1.141 \pm 0.309$	3.69	$-0.597 \pm 0.357$	$-0.972 \pm 0.568$
photometric centroid source offset	$0.18 \pm 0.36$	0.50	$-0.15 \pm 0.38$	$-0.10 \pm 0.31$

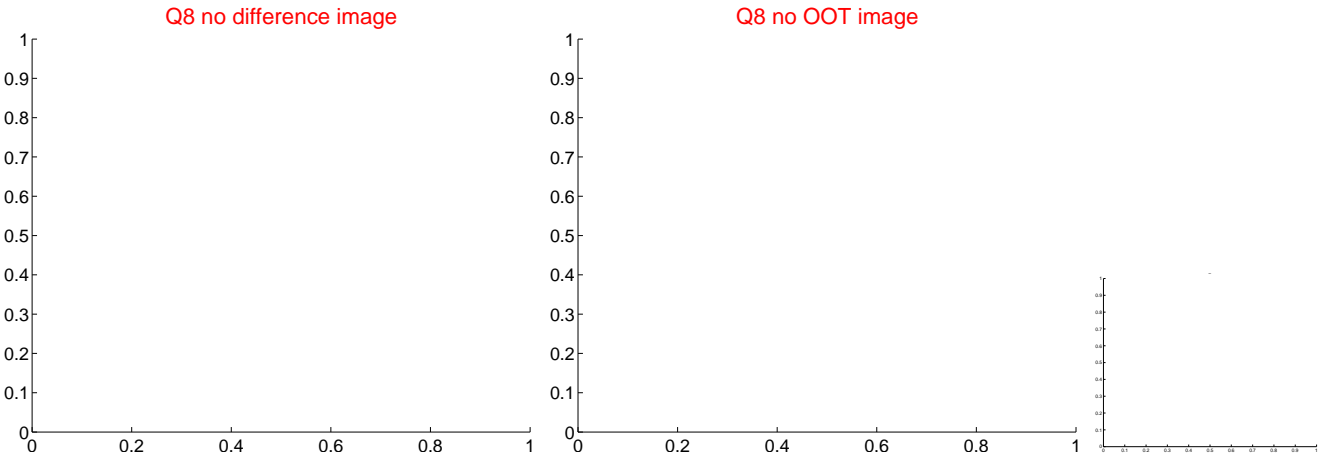
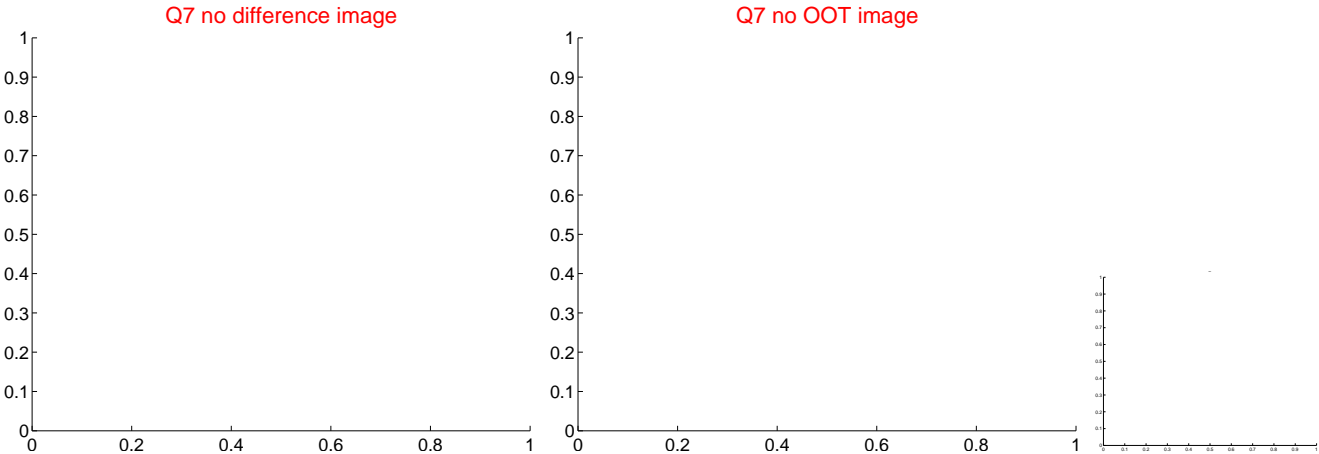
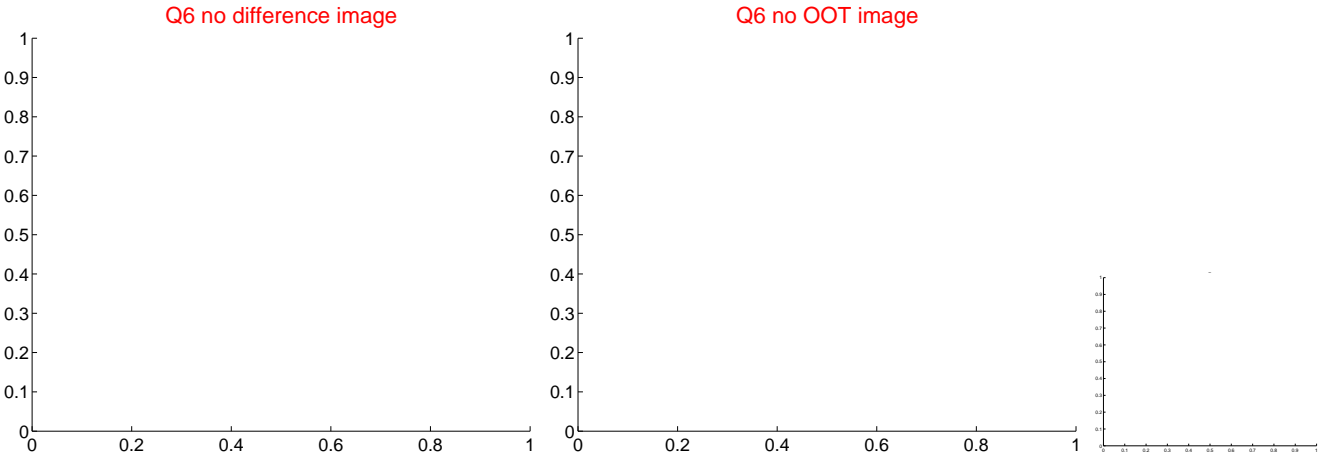
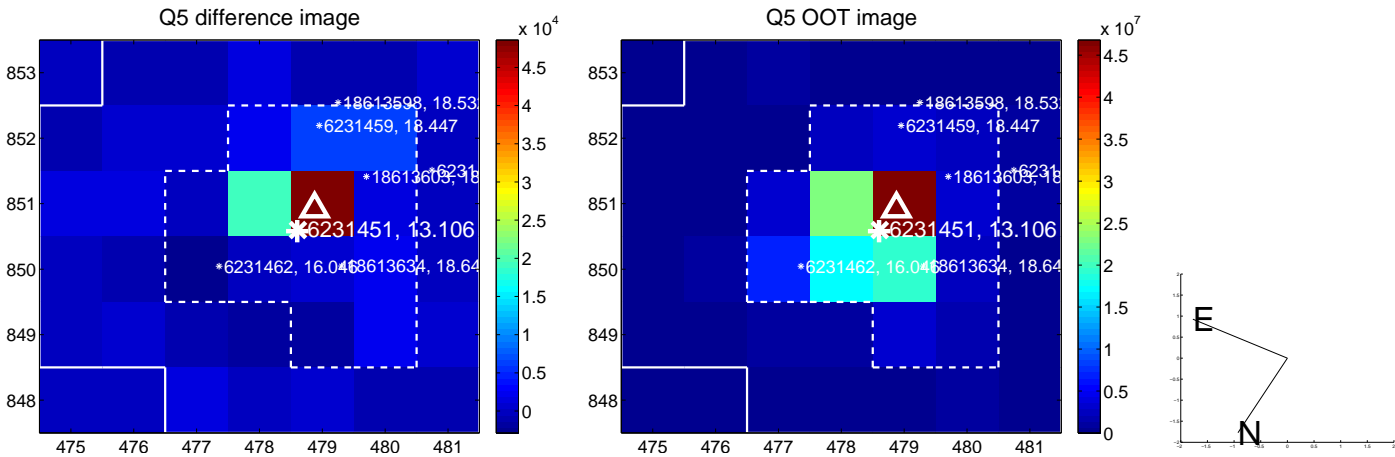


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

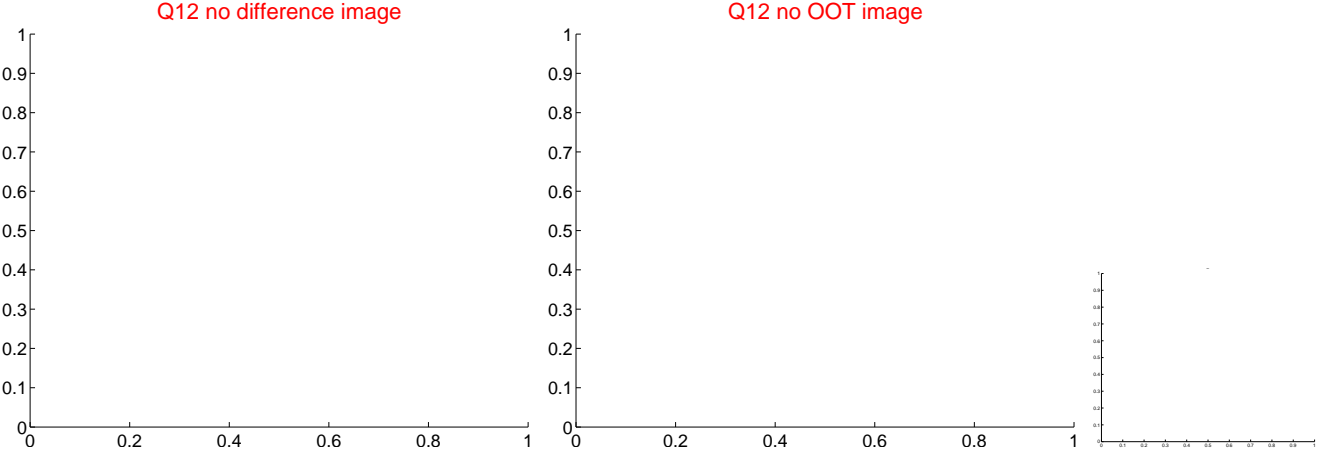
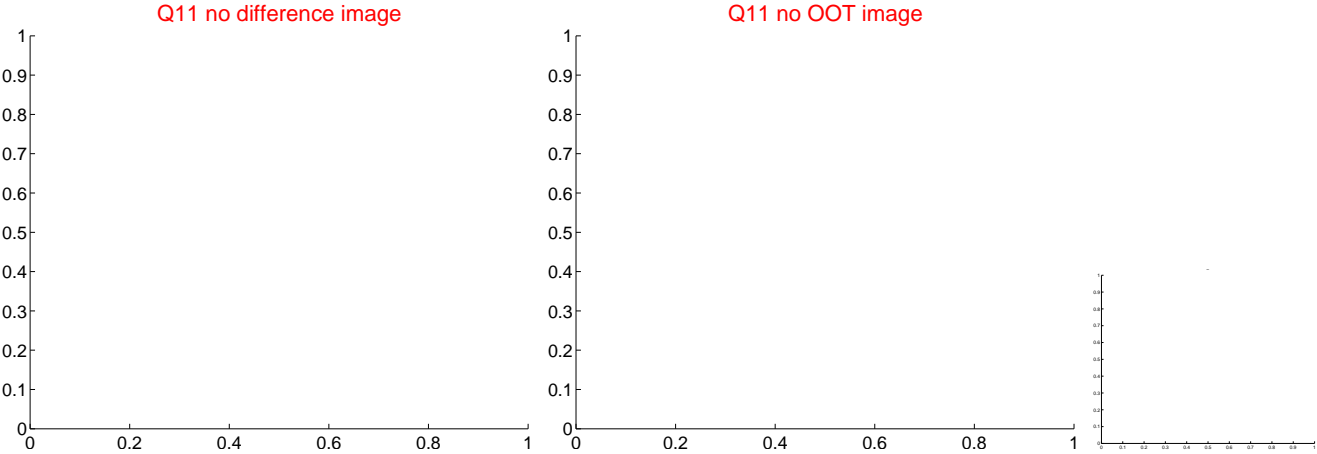
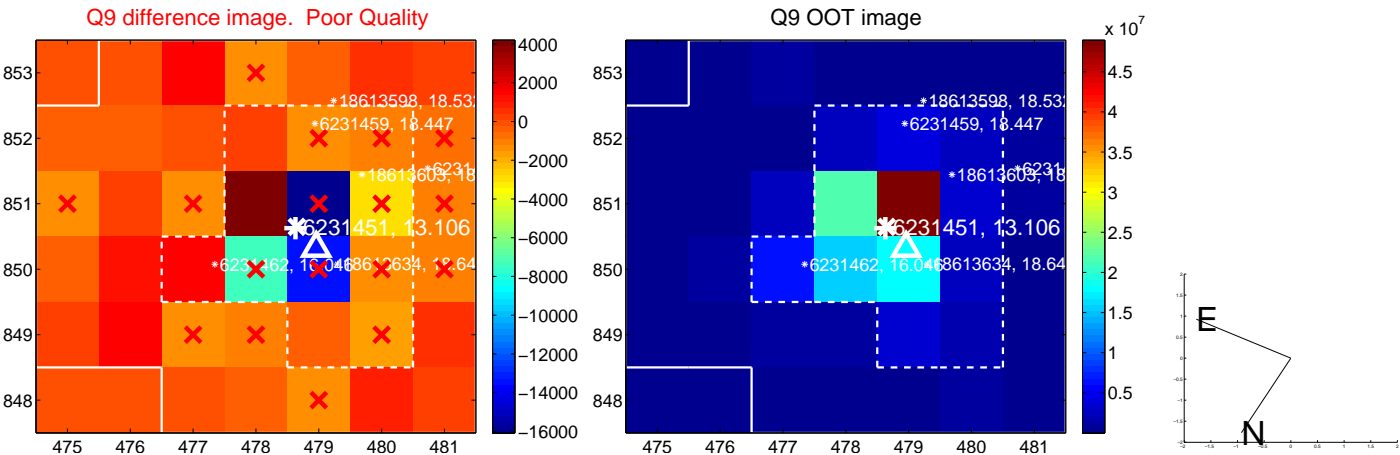


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





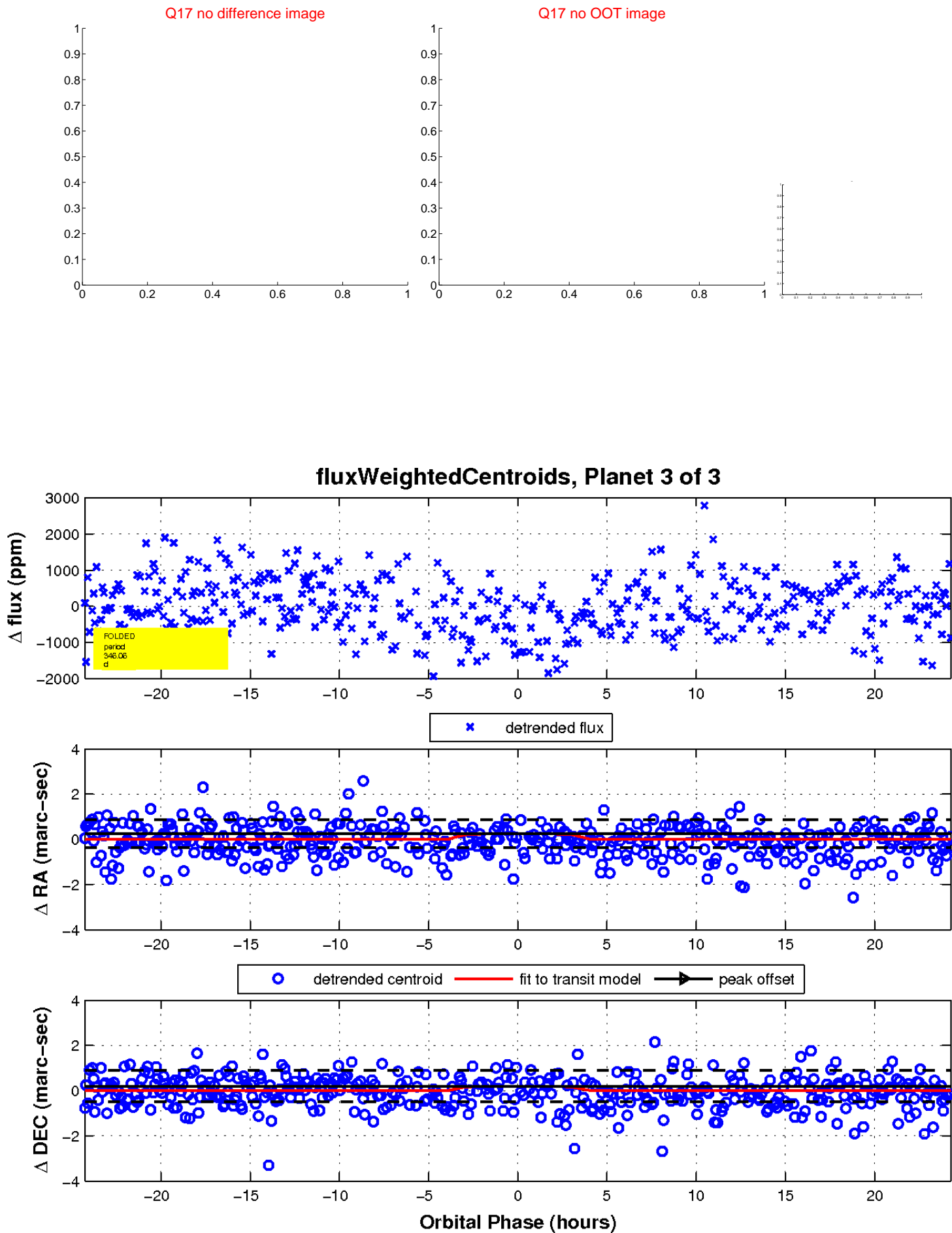
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

