

# KIC 004853523

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004853523-01	OBS	No	172.366487	237.174328	1342.6	3.062	11.4	6.4	0.61	4622	2.24	0.59
004853523-02	OBS	No	180.140087	151.629363	1592.4	3.719	11.5	7.1	0.61	4622	2.69	0.56

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004853523-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT— INCONSISTENT_TRANS—CENT_FEW_DIFFS
004853523-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—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.

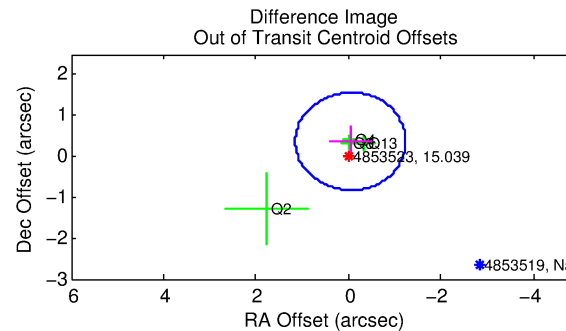
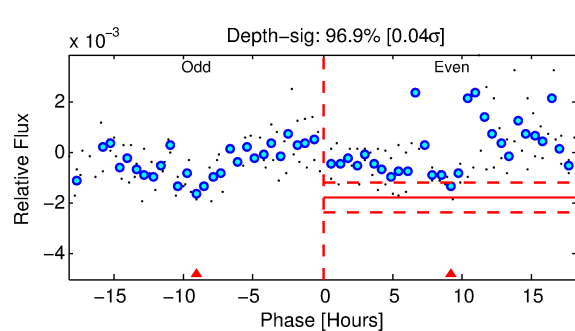
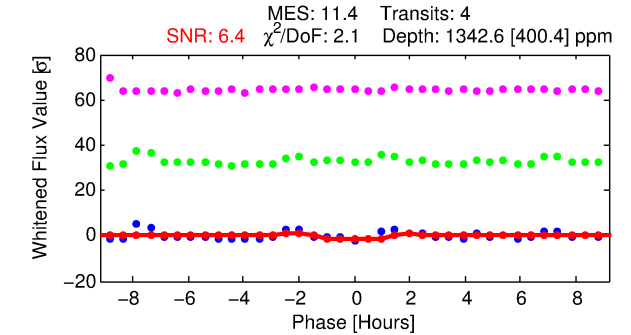
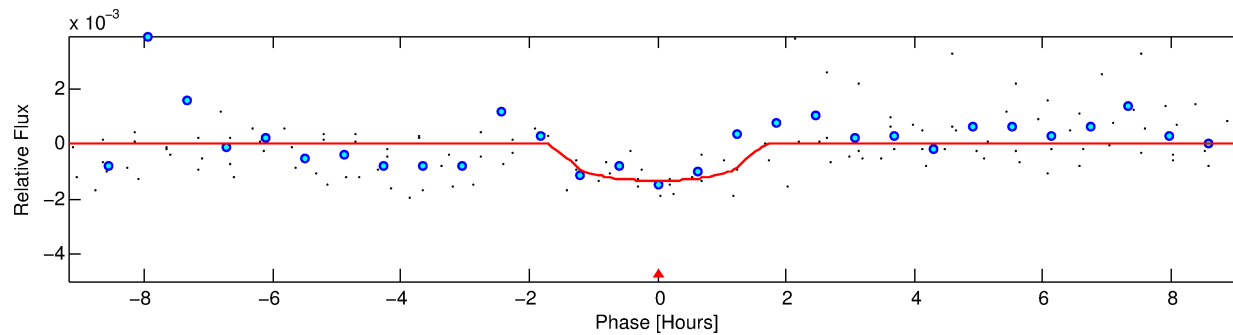
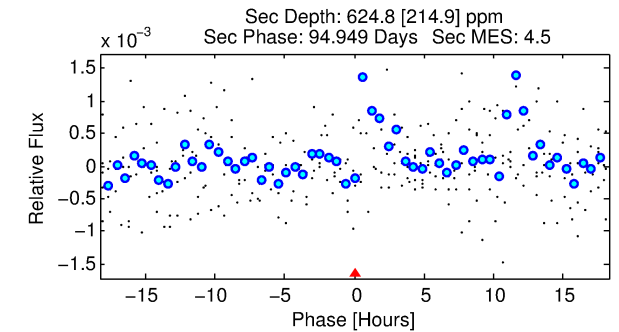
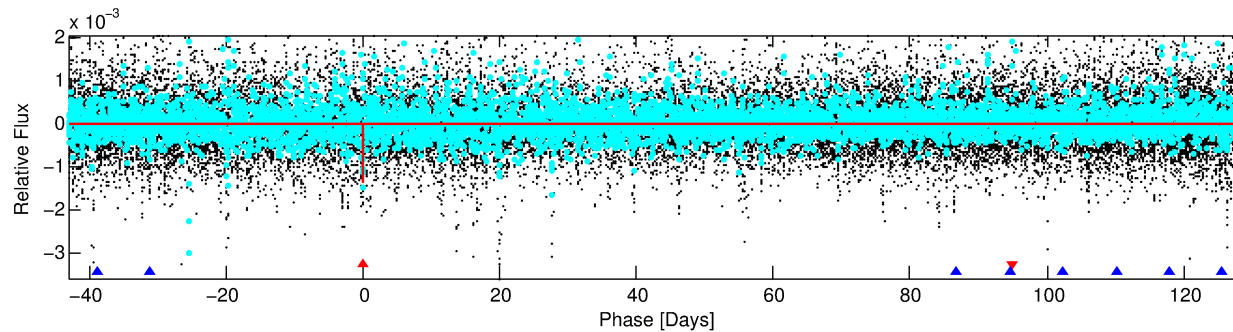
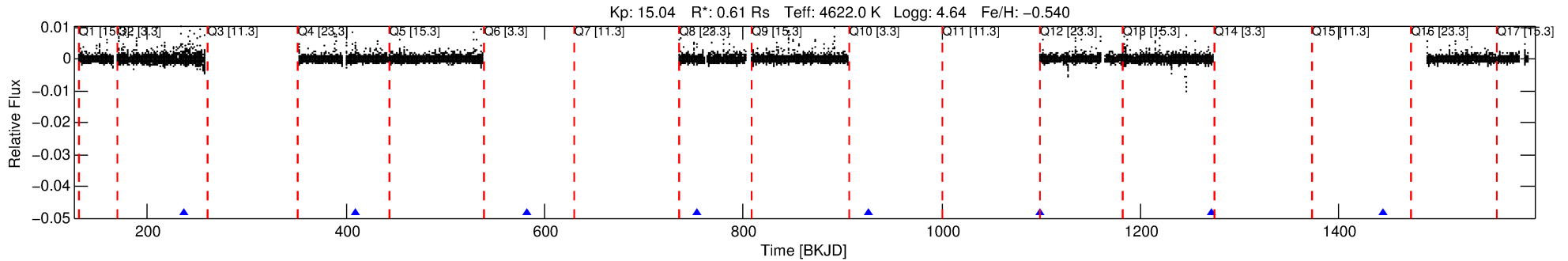
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004853523-01

No Significant Match Found

# DV One-Page Summary

KIC: 4853523 Candidate: 1 of 2 Period: 172.366 d



## DV Fit Results:

Period = 172.36649 [0.00377] d  
Epoch = 237.1743 [0.0122] BKJD  
Rp/R\* = 0.0334 [0.1996]  
a/R\* = 403.78 [7703.43]  
b = 0.43 [36.84]  
Seff = 0.59 [0.09]  
Teq = 223 [9] K  
Rp = 2.24 [13.40] Re  
a = 0.5120 [0.0367] AU  
Ag = 17949.58 [214742.90] [0.08σ]  
Teffp = 3999 [11962] K [0.32σ]

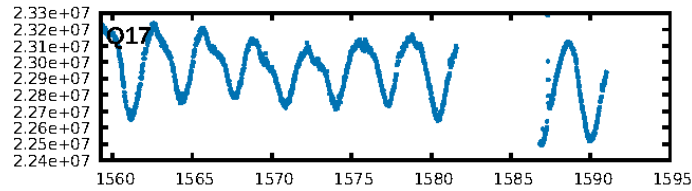
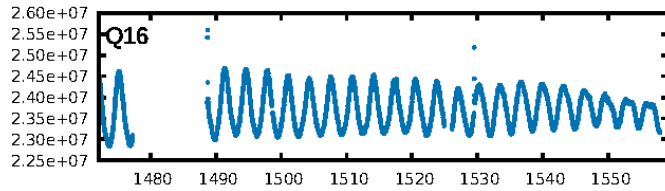
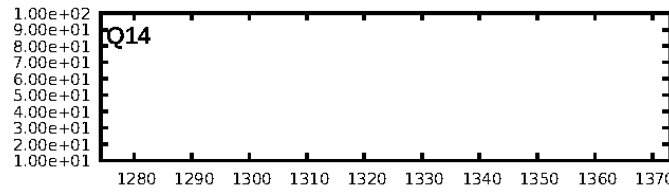
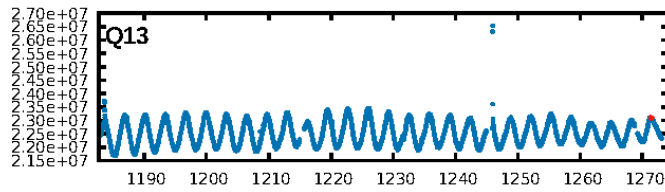
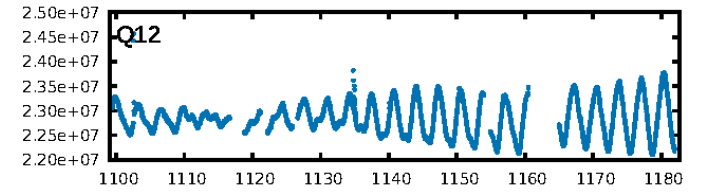
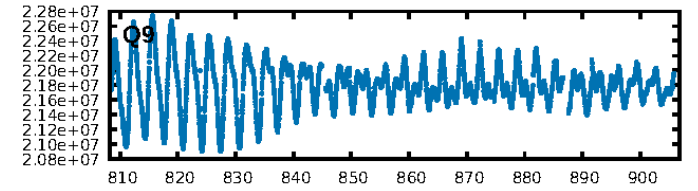
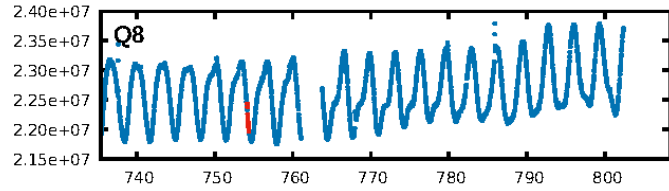
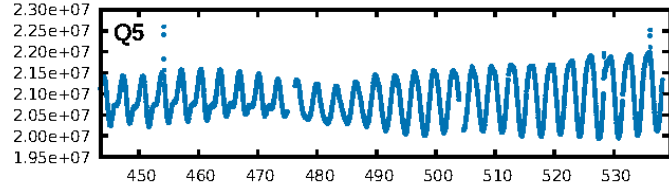
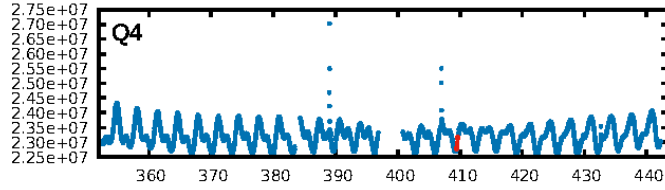
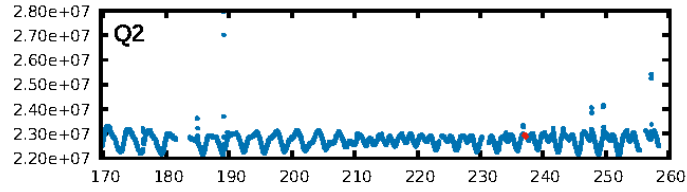
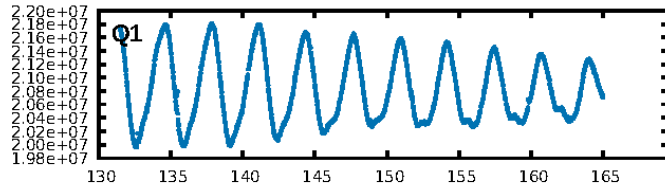
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [38.72σ]  
ModelChiSquare2-sig: 2.0%  
ModelChiSquareGof-sig: 58.4%  
Bootstrap-pfa: 8.00e-13  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: -0.9681  
Centroid-sig: 68.9%  
Centroid-so: 0.958 arcsec [0.76σ]  
OotOffset-rm: 0.372 arcsec [0.93σ]  
KicOffset-rm: 0.228 arcsec [0.42σ]  
OotOffset-st: 1/0/2/1 [4]  
KicOffset-st: 1/0/2/1 [4]  
DiffImageQuality-fgm: 0.50 [2/4]  
DiffImageOverlap-fno: 1.00 [4/4]

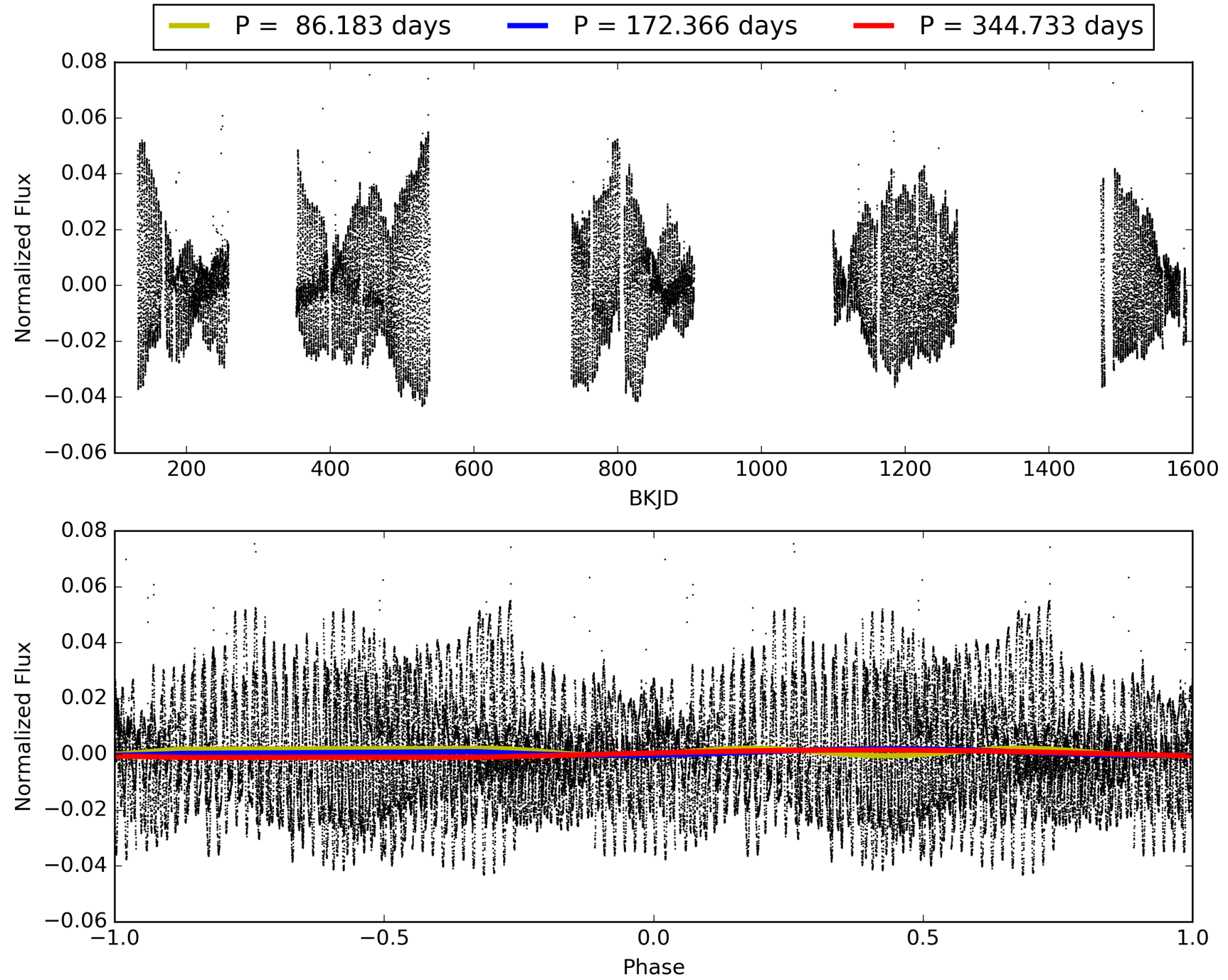
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 01:14:54 Z

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

# TCE 004853523-01, PDC Light Curves

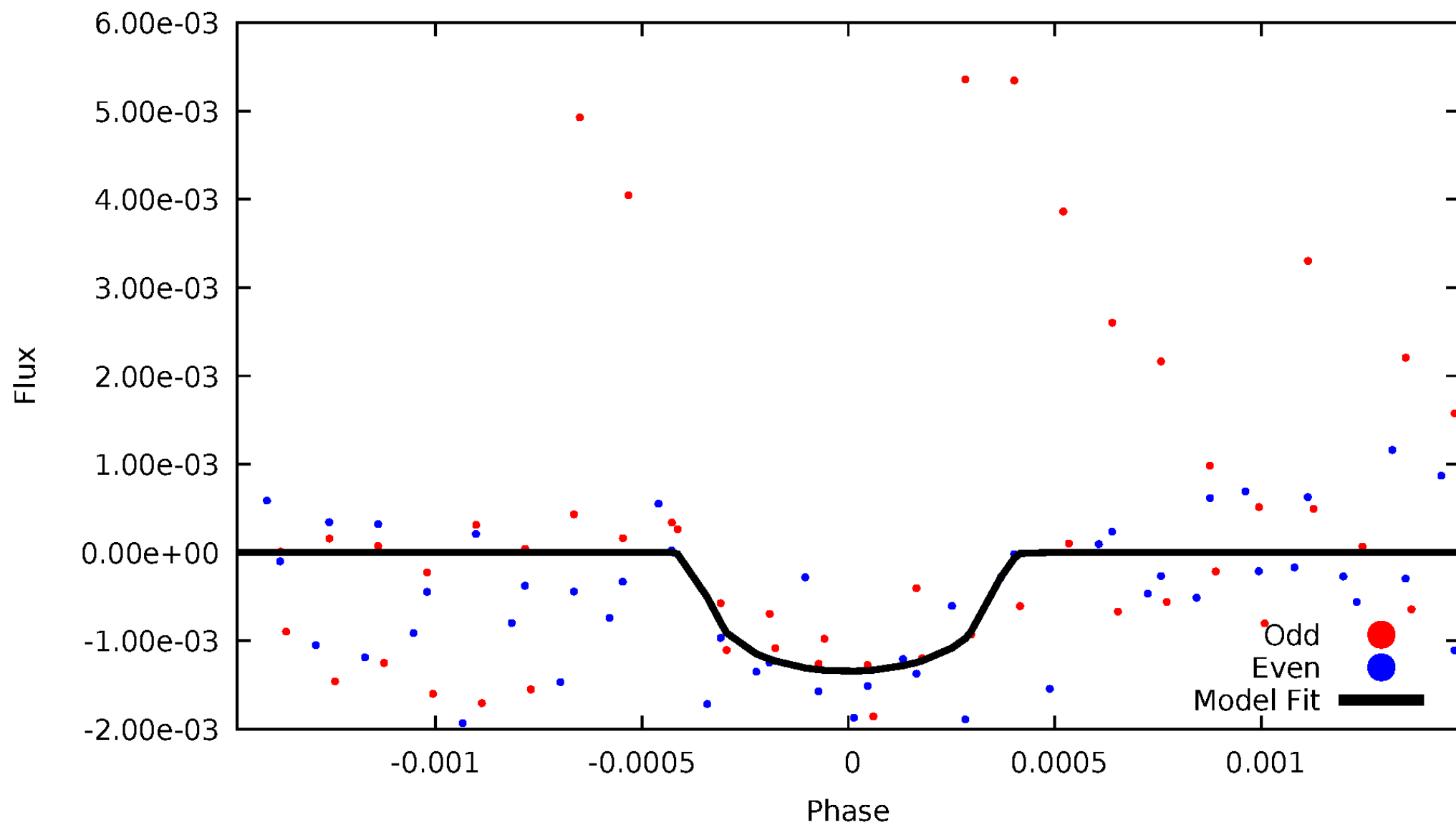


TCE 004853523-01



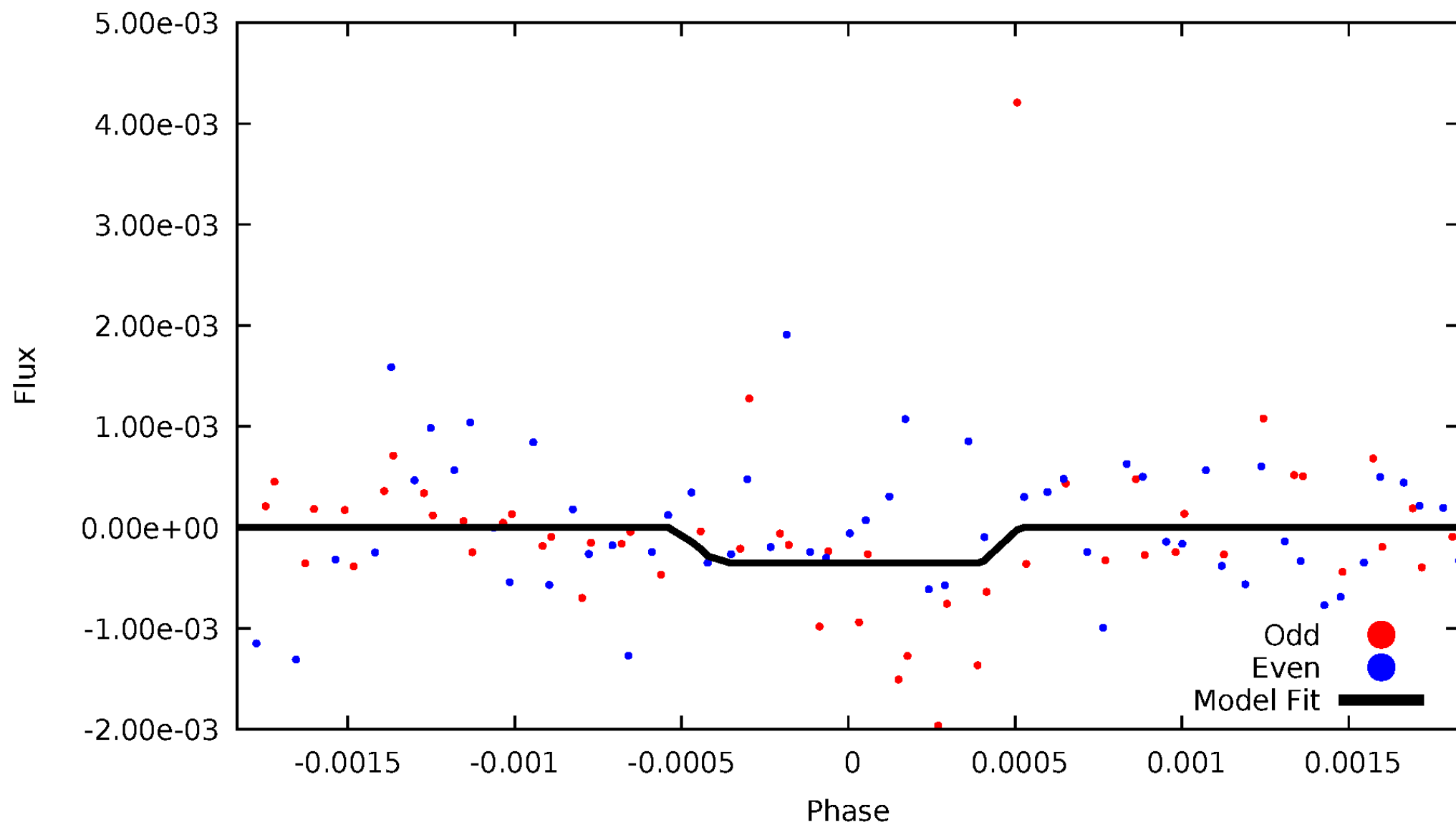
# DV Odd/Even

TCE 004853523-01



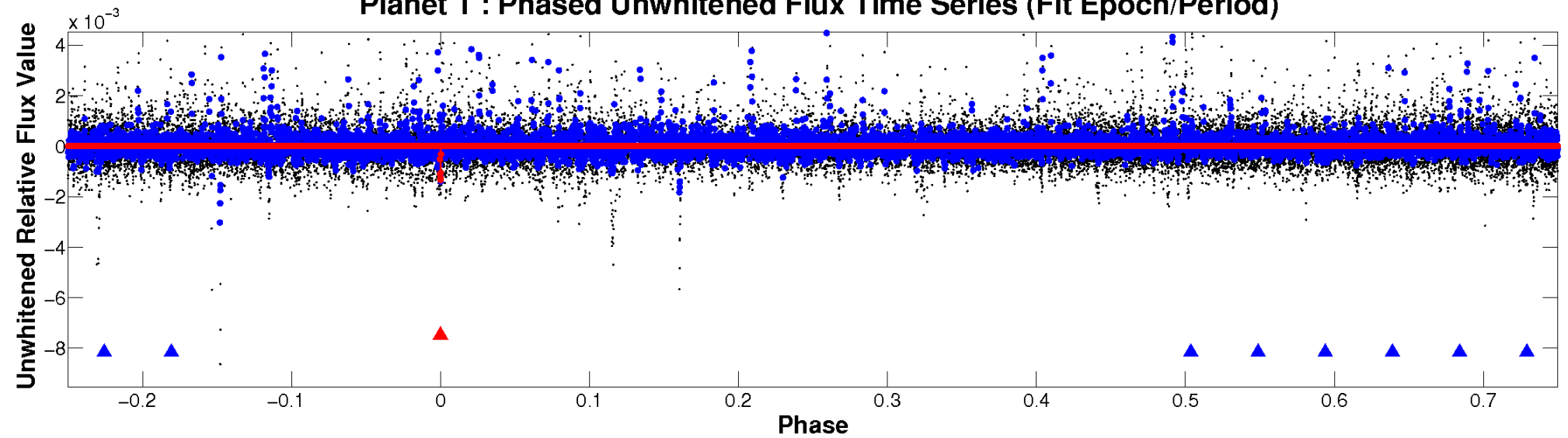
# ALT Odd/Even

TCE 004853523-01

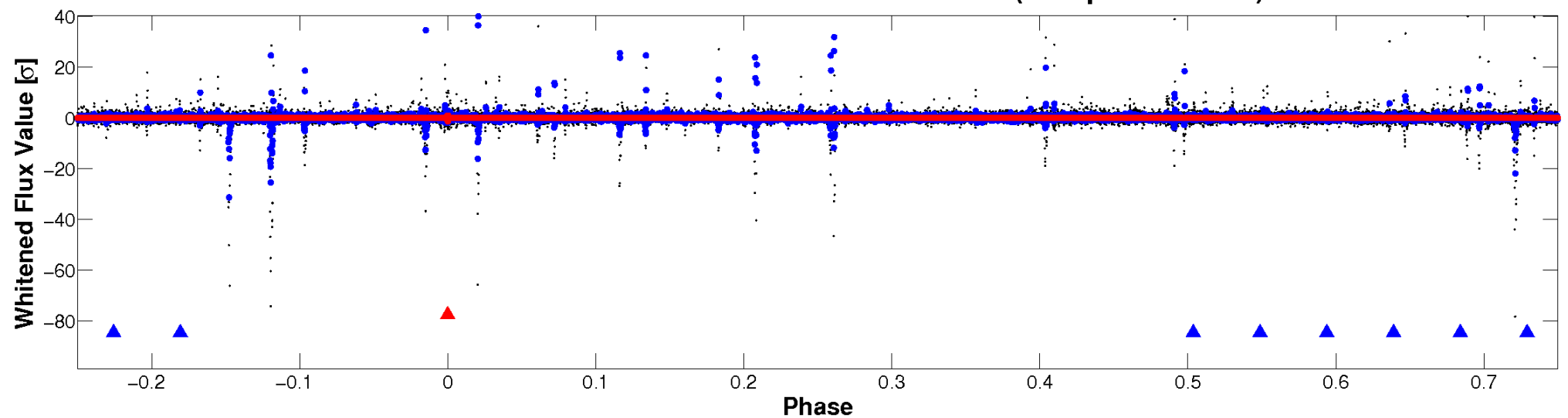


# Non-Whitened Vs. Whitened Light Curve

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

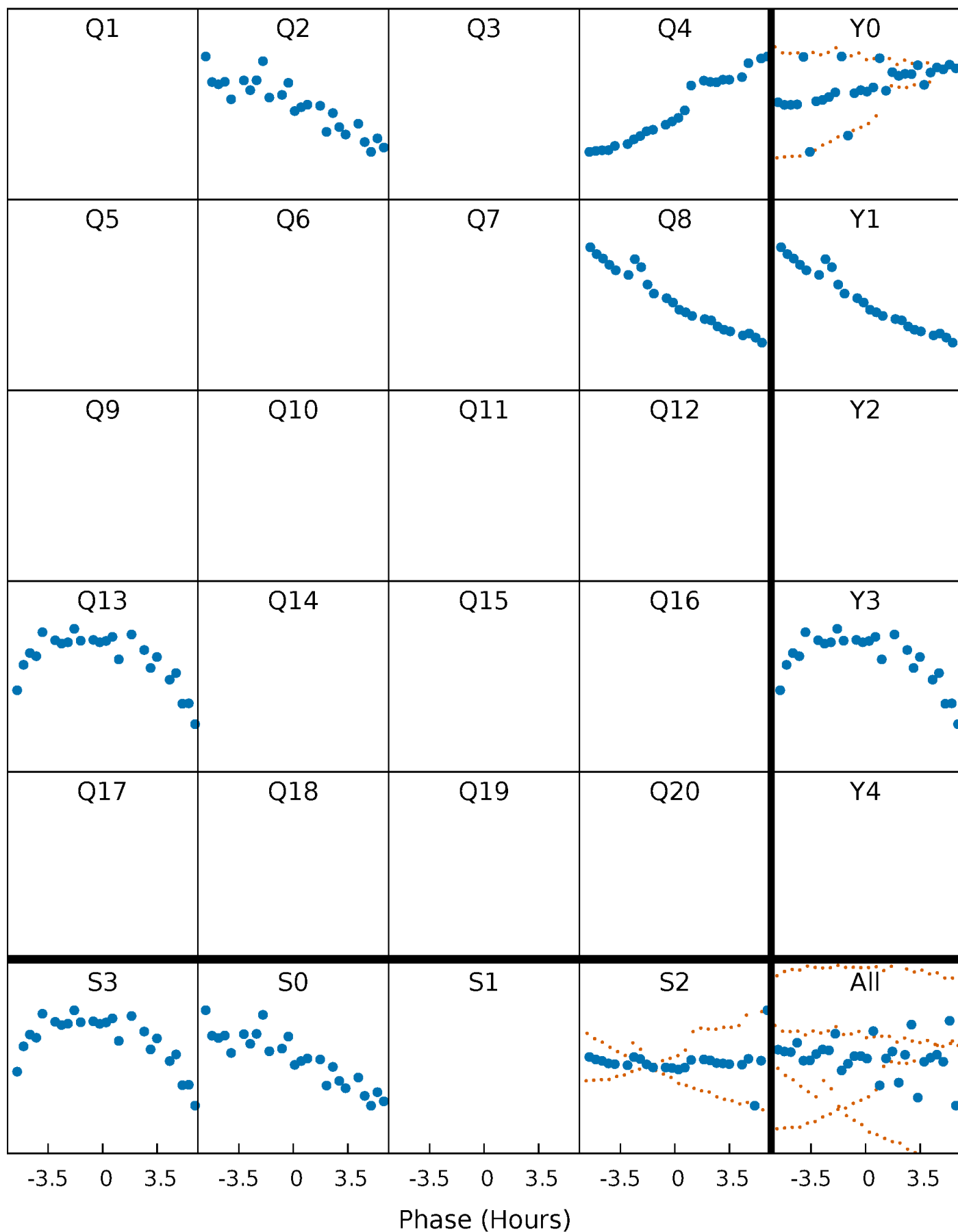


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

TCE 004853523-01 P=172.366487 Days  $T_0=237.174328$  (BKJD)





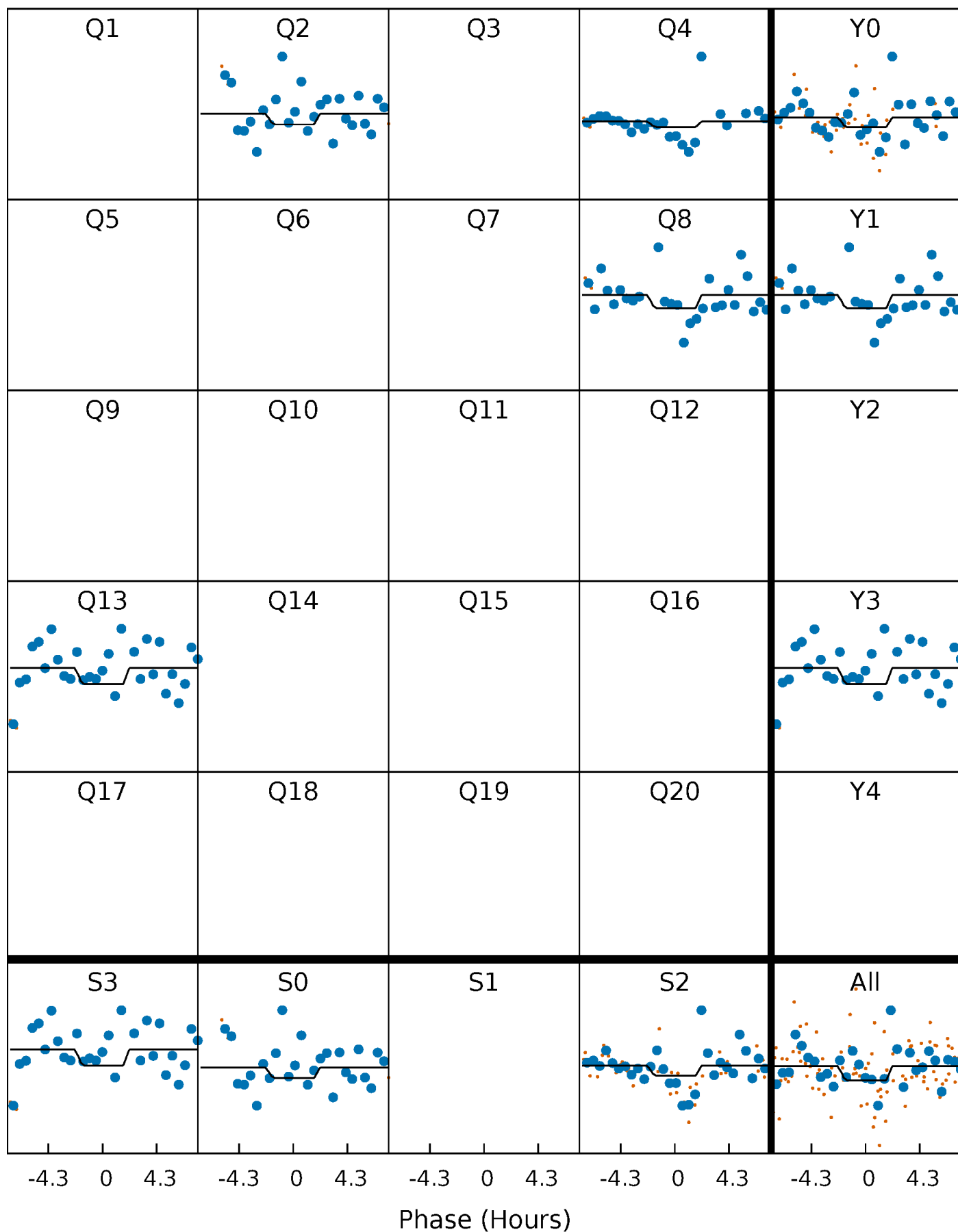
# DV Quarter-Phased Transit Curves

TCE 004853523-01 P=172.366487 Days  $T_0=237.174328$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

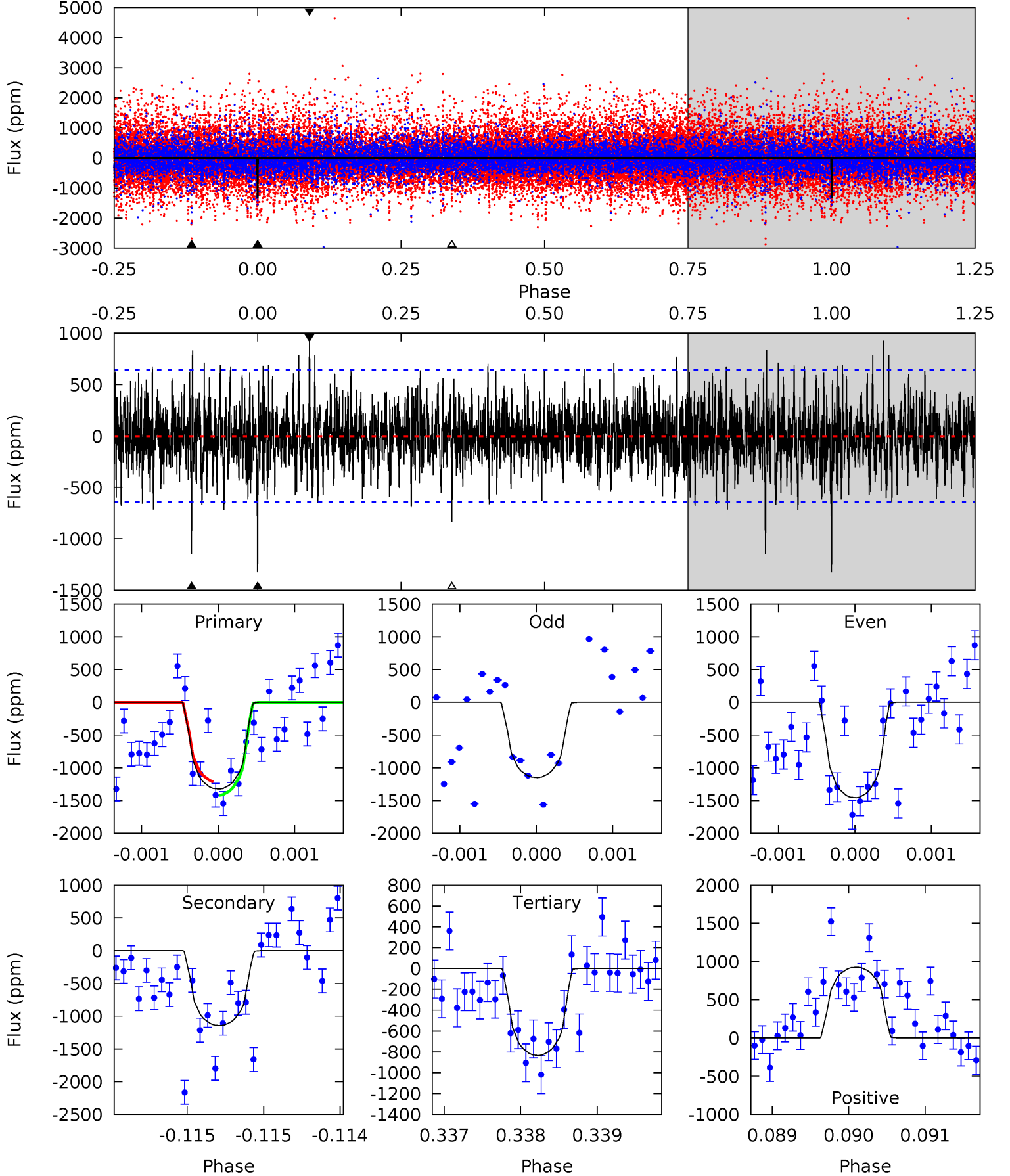
TCE 004853523-01 P=172.375608 Days  $T_0=237.126839$  (BKJD)



# DV Model-Shift Uniqueness Test

004853523-01,  $P = 172.366487$  Days,  $E = 64.807841$  Days

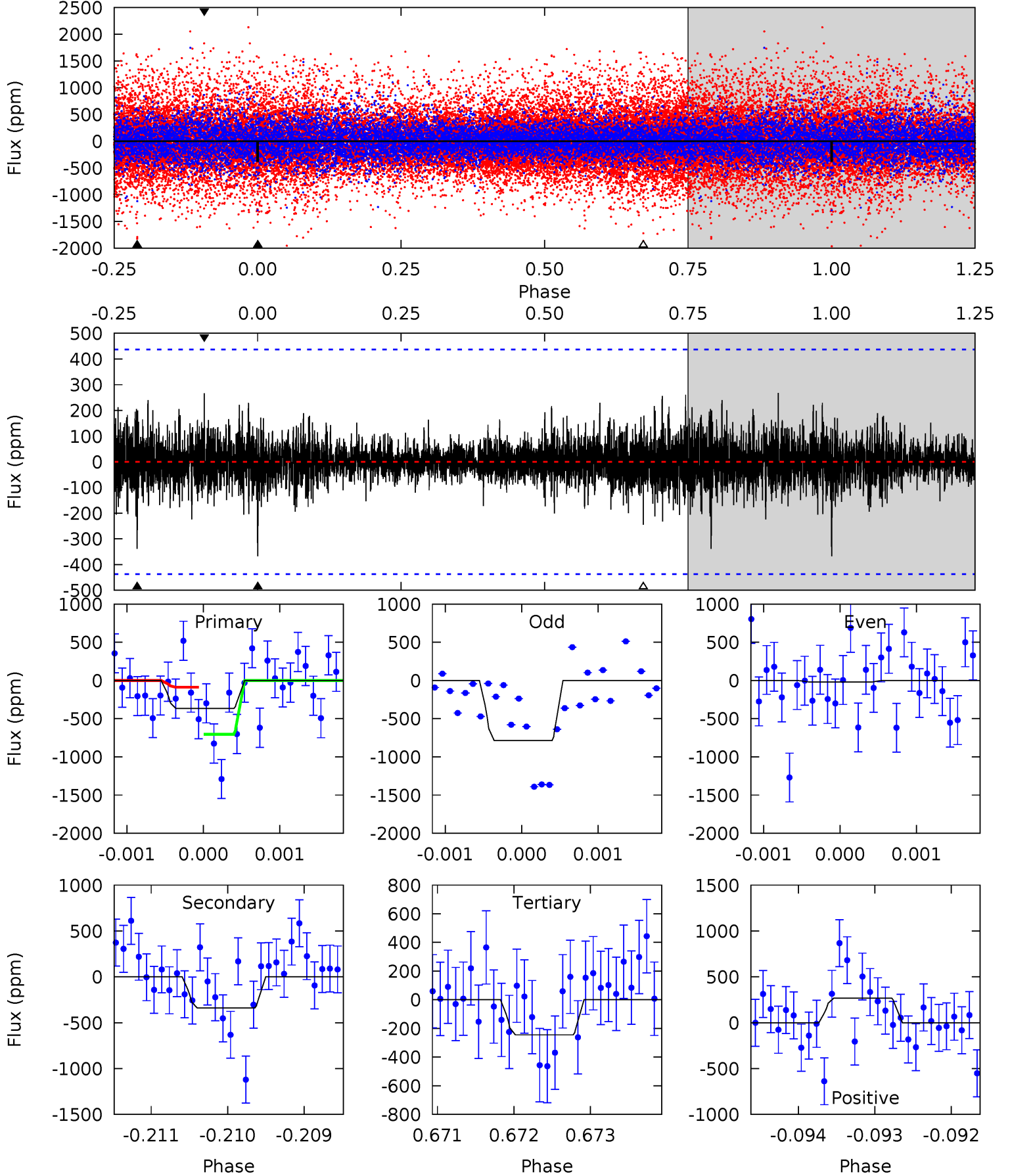
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.3	9.75	7.12	7.90	5.47	3.32	1.89	4.18	3.40	2.64	1.85	0.73	0.80	0.41	0.89



# Alt Model-Shift Uniqueness Test

004853523-01,  $P = 172.375608$  Days,  $E = 64.751231$  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
4.58	4.23	3.05	3.33	5.46	3.30	0.74	1.53	1.25	1.17	0.90	4.71	1.51	0.42	3.80



### Stellar Parameters For KIC 004853523

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4622^{+138}_{-138}$	$4.640^{+0.054}_{-0.027}$	$-0.540^{+0.300}_{-0.300}$	$0.615^{+0.049}_{-0.054}$	$0.601^{+0.072}_{-0.039}$	$3.640^{+0.909}_{-0.466}$
	+3%/-3%	+1%/-1%	+56%/-56%	+8%/-9%	+12%/-6%	+25%/-13%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 004853523-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-1144 \pm 117$	$10.19^{+9.35}_{-7.10}$	$311^{+11}_{-11}$	$2858^{+1192}_{-456}$	$1635^{+15220}_{-1206}$
Alt.	$-339 \pm 80$	$8.66^{+9.64}_{-6.03}$	$310^{+11}_{-11}$	$2500^{+997}_{-386}$	$610^{+6126}_{-464}$

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

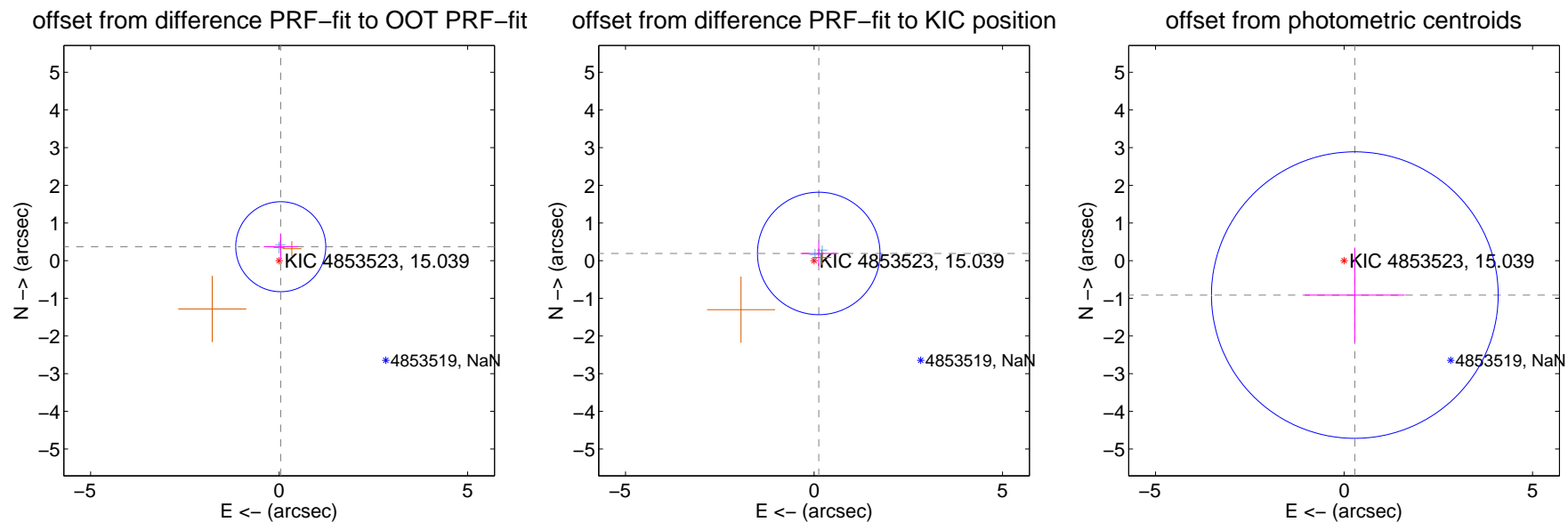
## DV Centroid Data

Supplemental centroid analysis for 004853523-01. Kepler magnitude: 15.04. Transit SNR 6.37

There are 2 quarters with good PRF difference image offsets

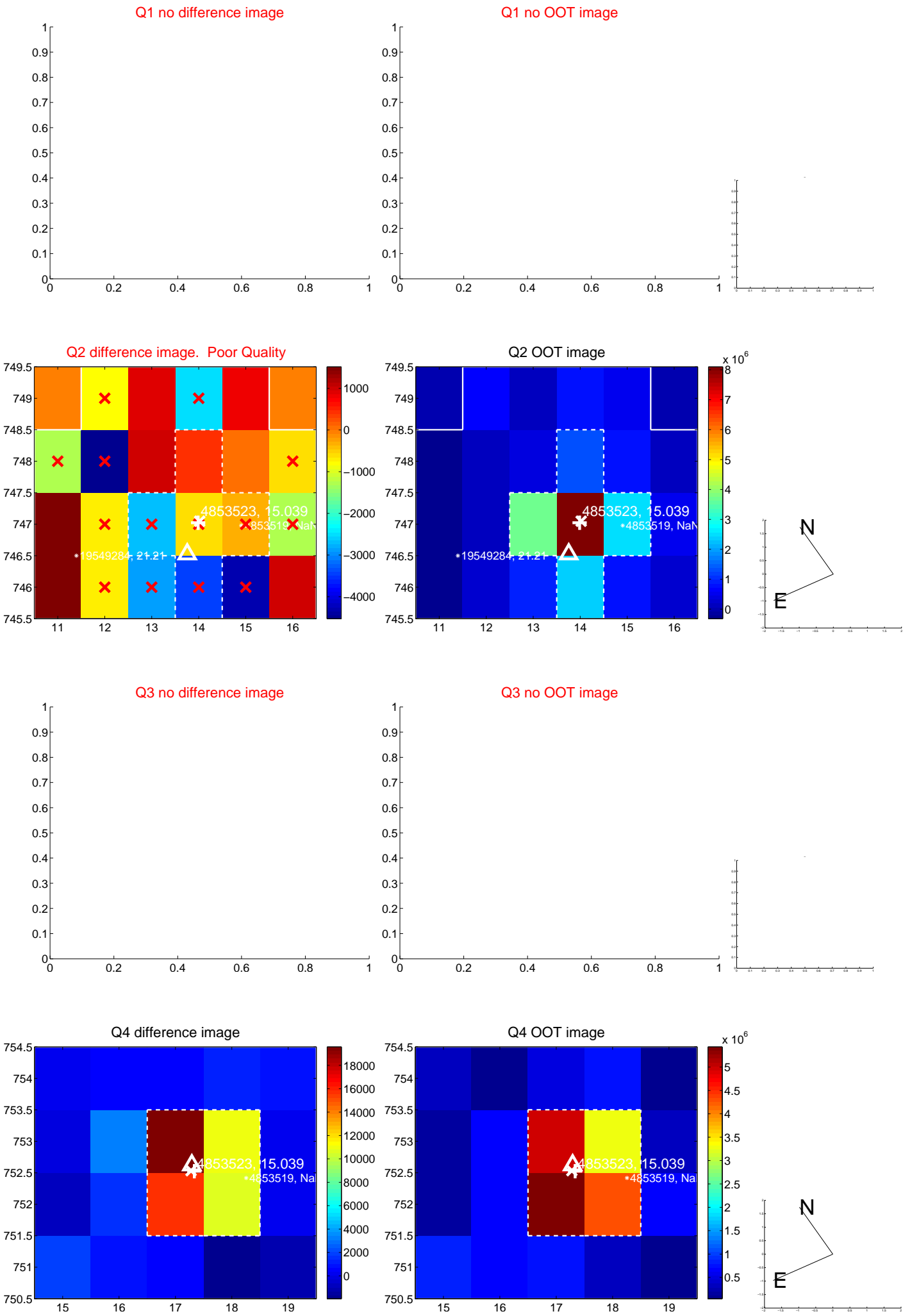
The direct PRF centroid is offset from the target star catalog position by about 0.27 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.372 \pm 0.398$	0.93	$-0.043 \pm 0.447$	$0.370 \pm 0.351$
PRF-fit source offset from KIC position	$0.228 \pm 0.542$	0.42	$-0.124 \pm 0.483$	$0.191 \pm 0.337$
photometric centroid source offset	$0.96 \pm 1.27$	0.76	$-0.29 \pm 1.32$	$-0.91 \pm 1.26$

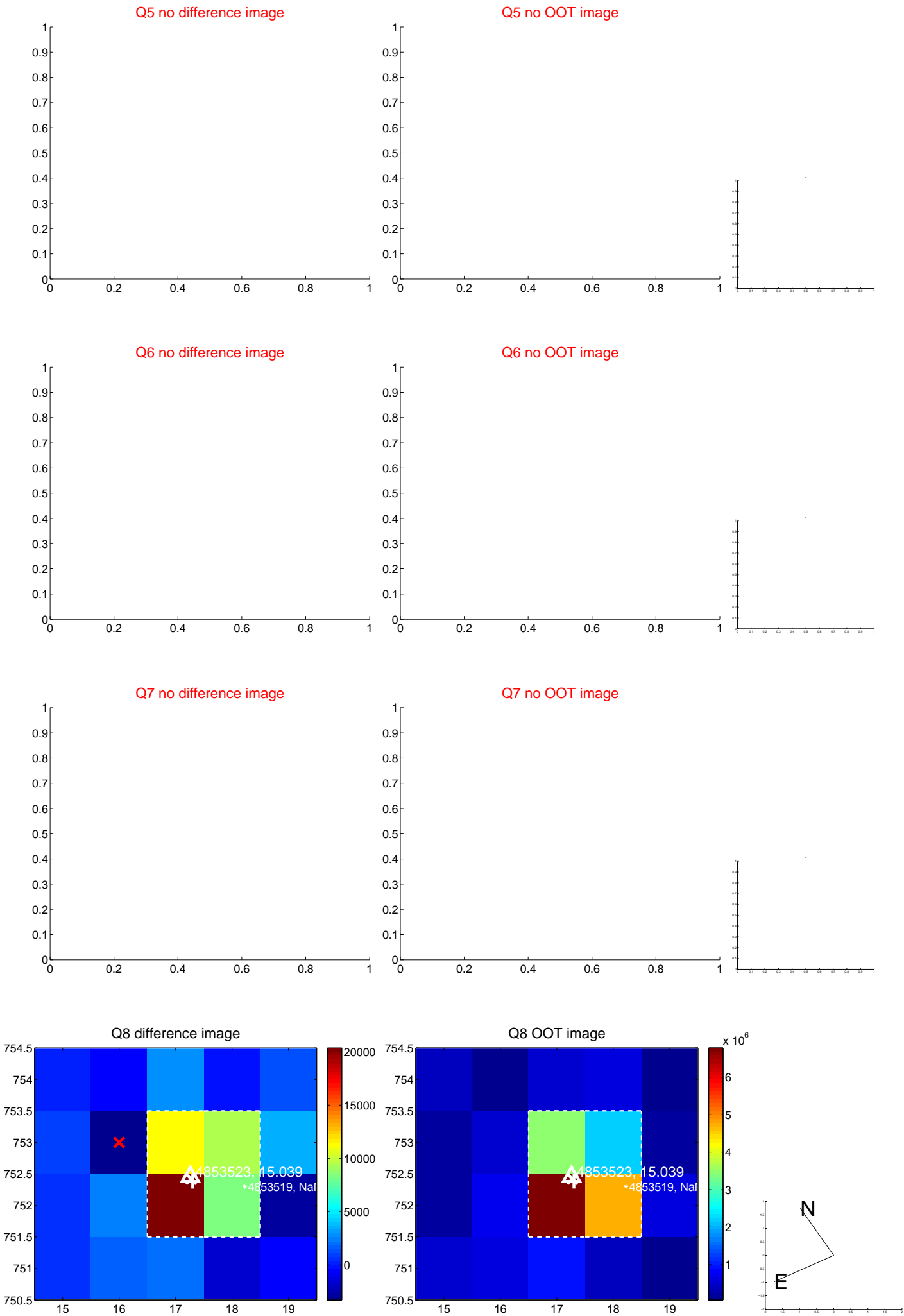


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

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



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

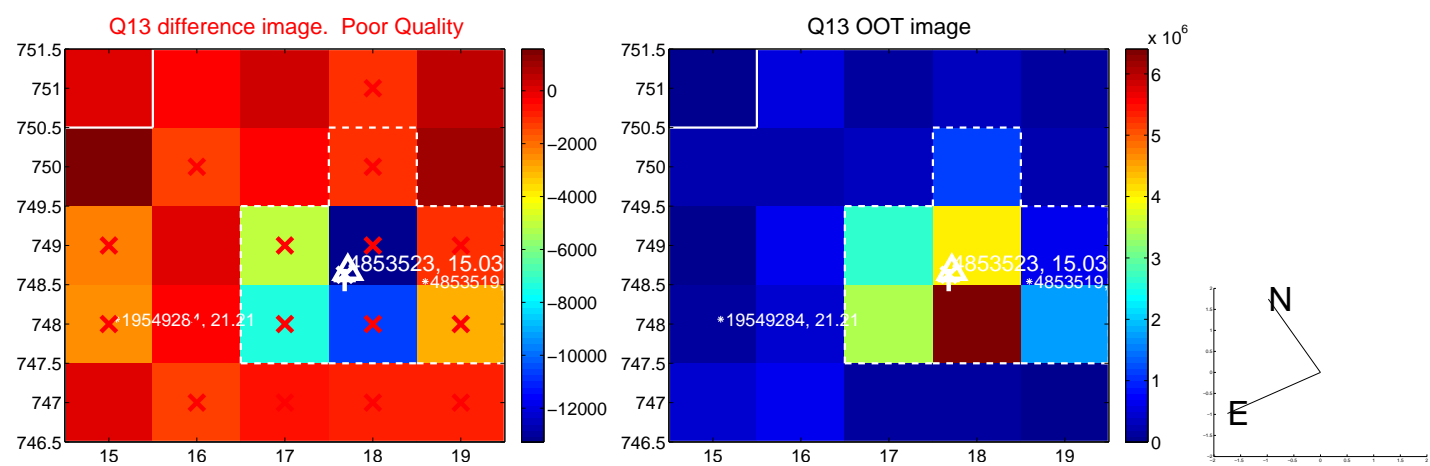




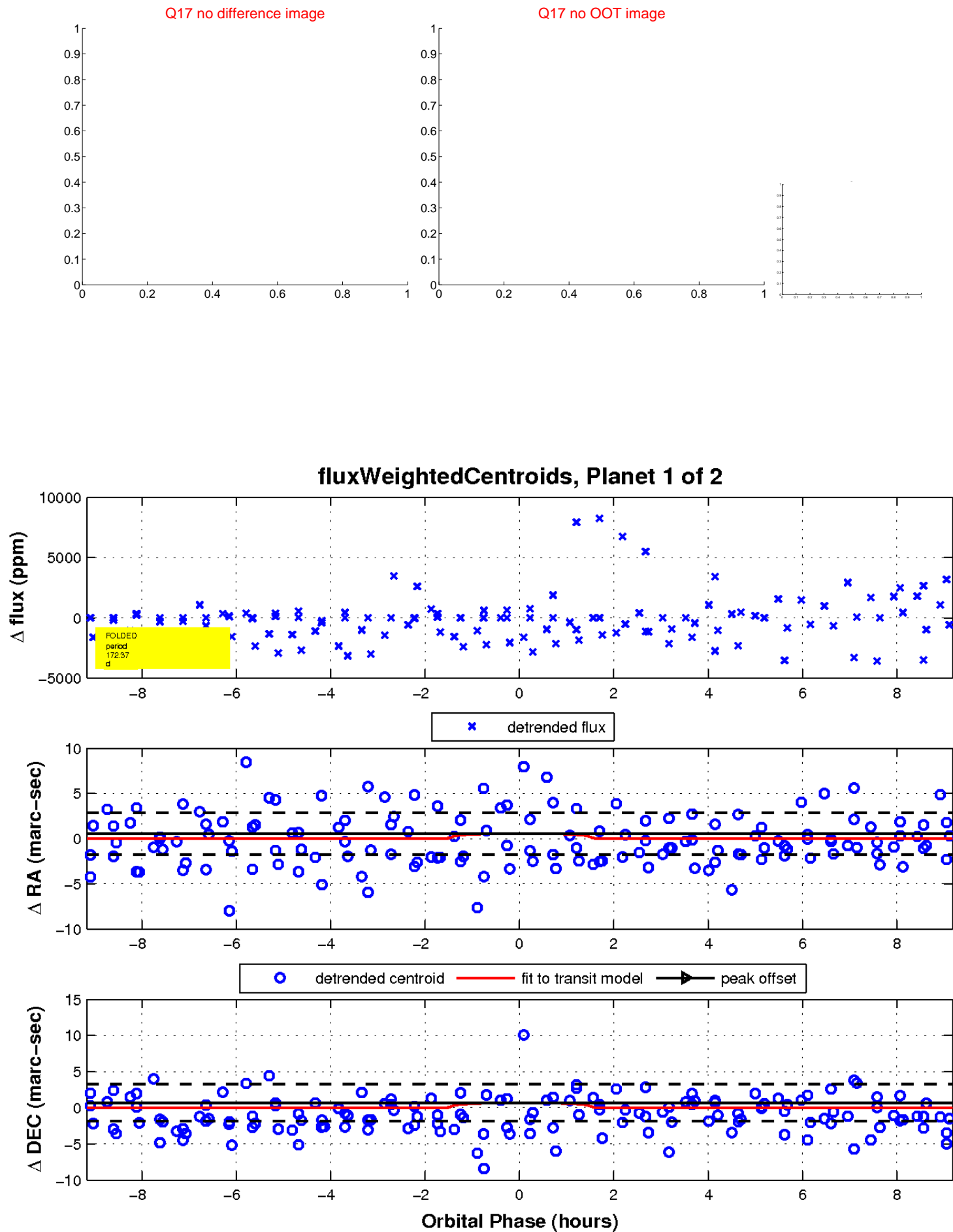
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

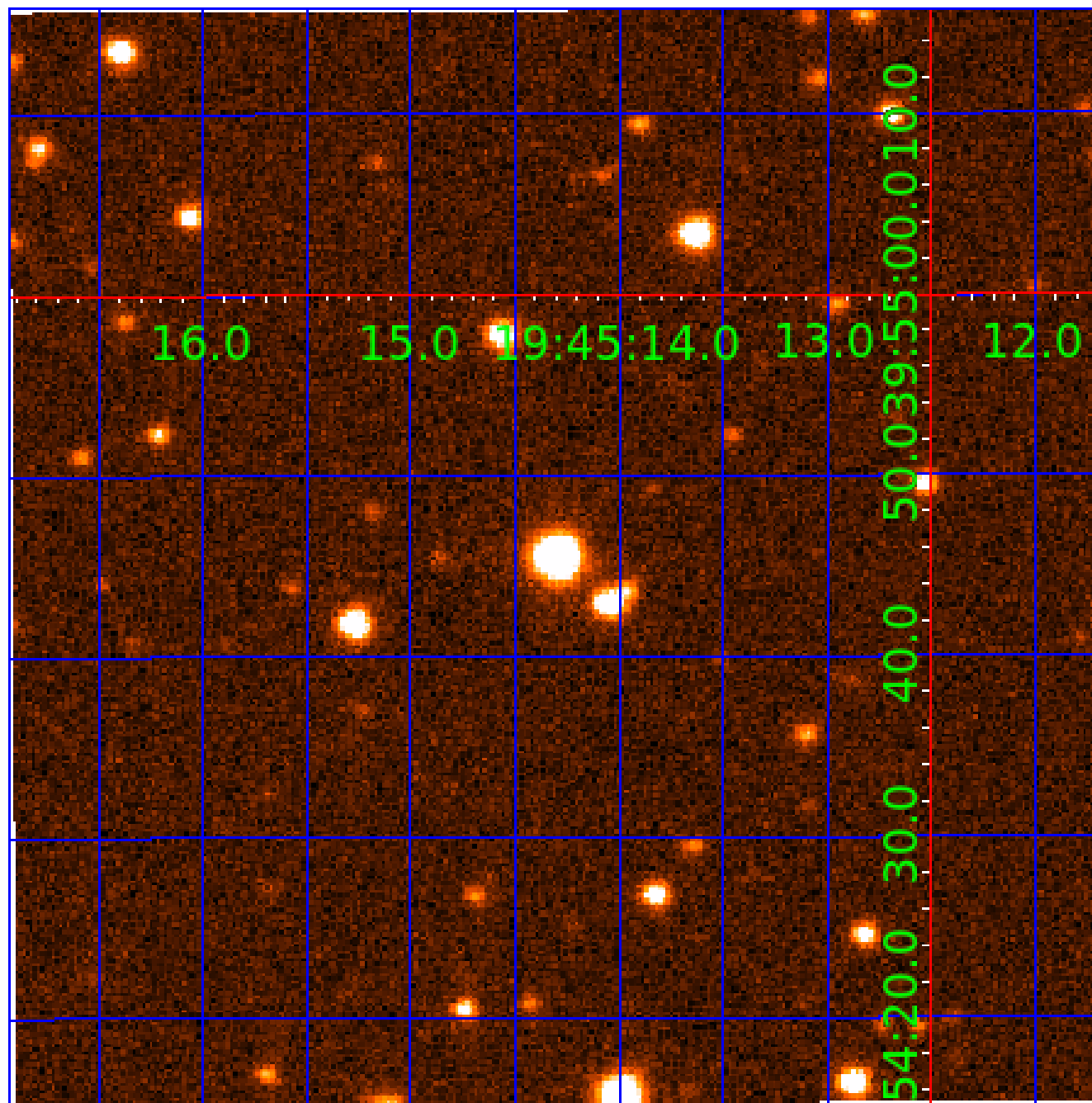


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 004853523

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004853523-01	OBS	No	172.366487	237.174328	1342.6	3.062	11.4	6.4	0.61	4622	2.24	0.59
004853523-02	OBS	No	180.140087	151.629363	1592.4	3.719	11.5	7.1	0.61	4622	2.69	0.56

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004853523-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004853523-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—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.

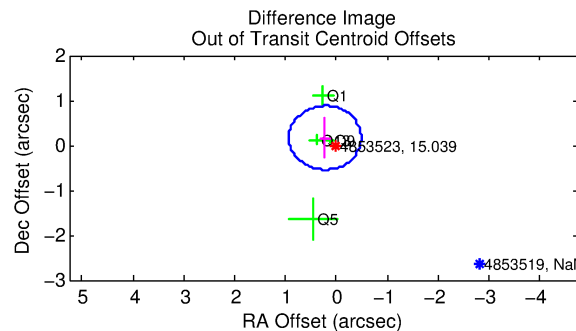
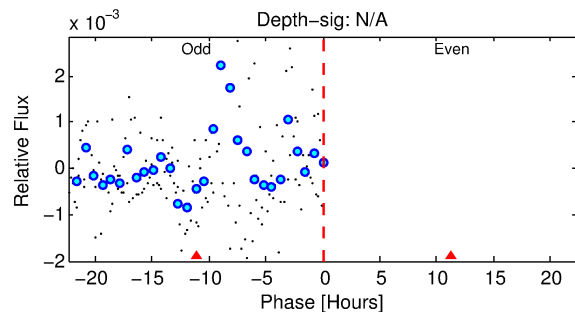
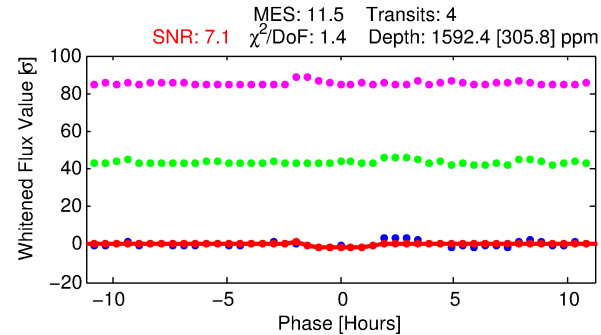
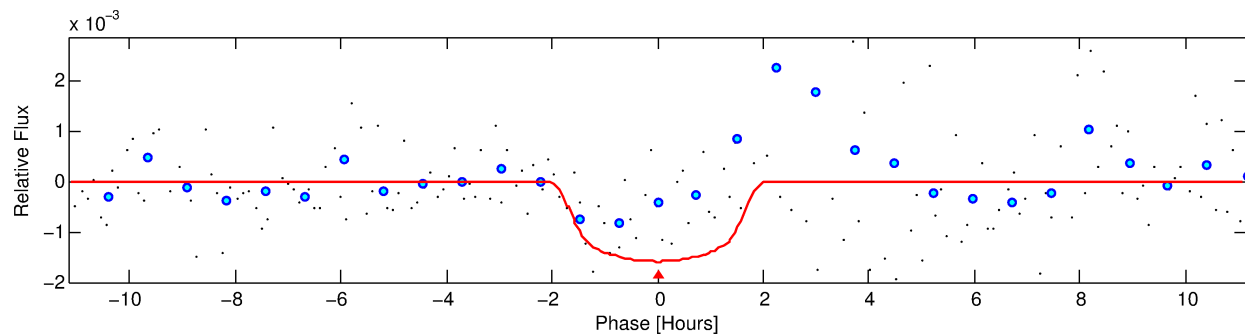
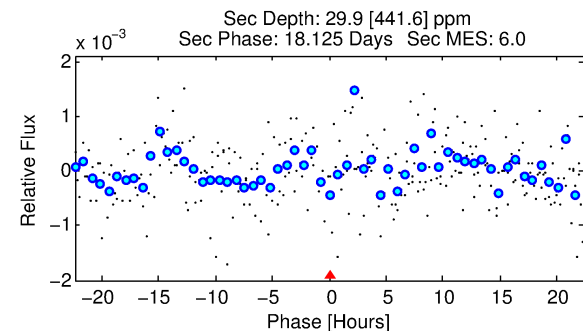
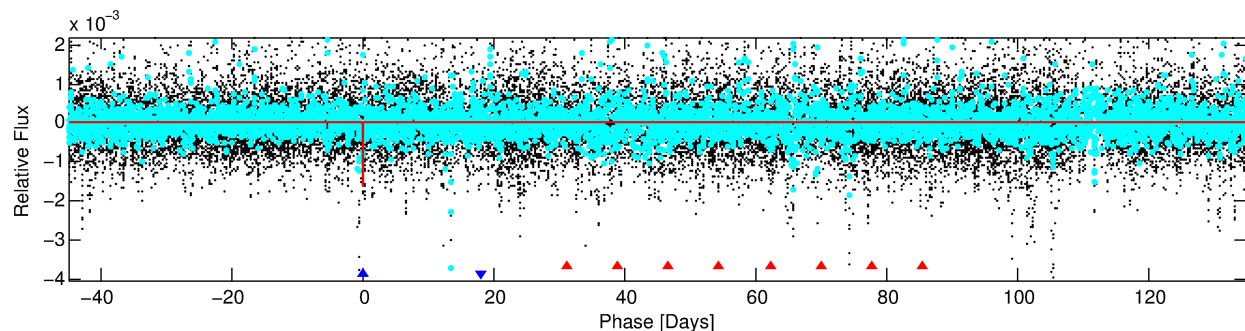
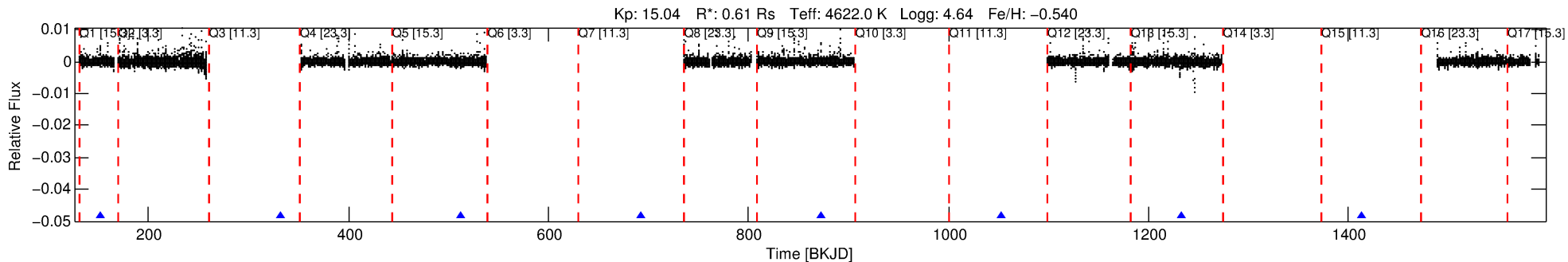
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004853523-02

No Significant Match Found

# DV One-Page Summary

KIC: 4853523 Candidate: 2 of 2 Period: 180.140 d



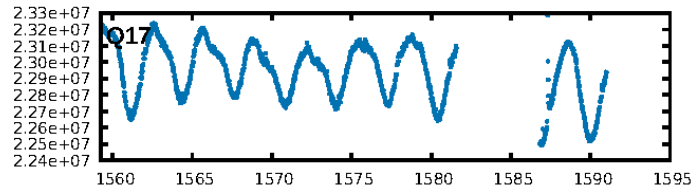
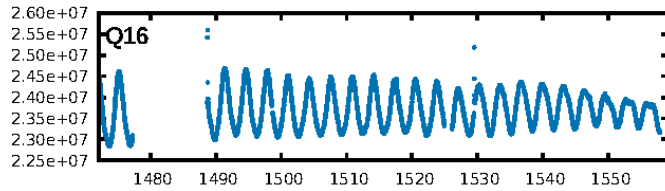
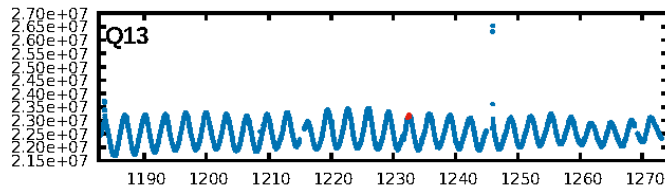
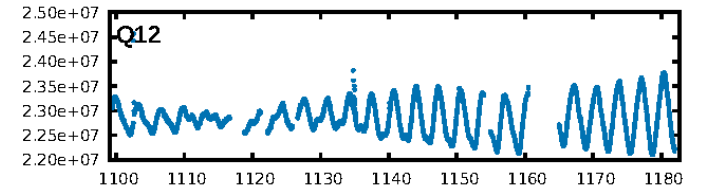
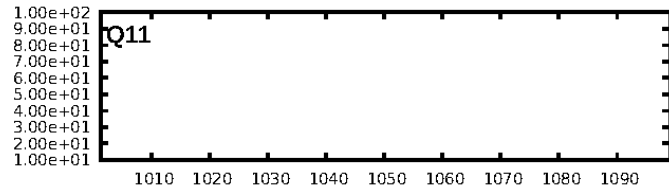
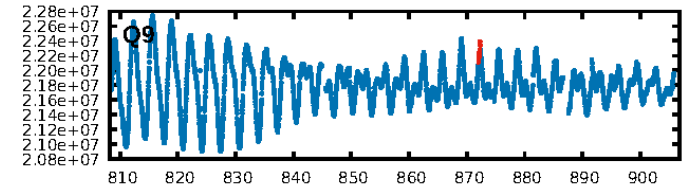
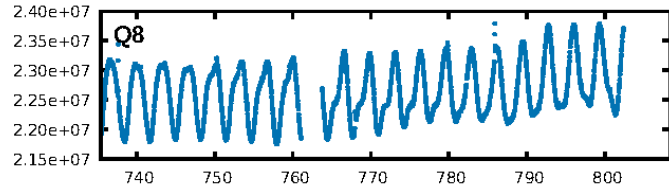
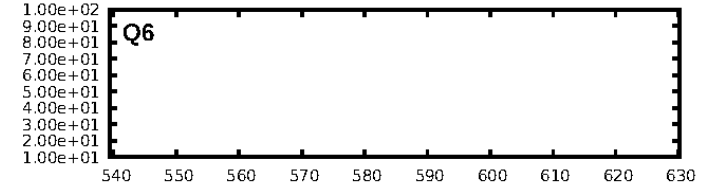
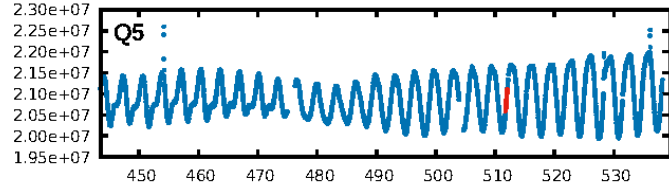
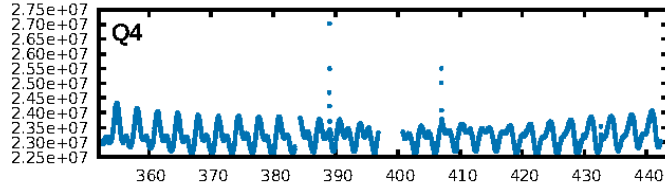
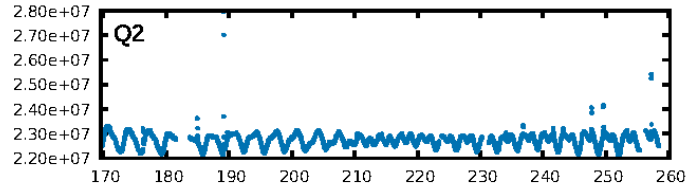
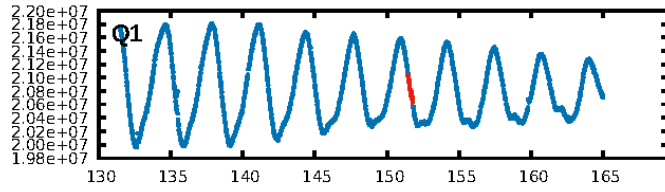
## DV Fit Results:

Period = 180.14009 [0.00224] d  
Epoch = 151.6294 [0.0082] BKJD  
Rp/R\* = 0.0401 [0.0272]  
a/R\* = 263.16 [570.96]  
b = 0.76 [1.24]  
Seff = 0.56 [0.09]  
Teq = 220 [9] K  
Rp = 2.69 [1.84] Re  
a = 0.5273 [0.0378] AU  
Ag = 631.22 [9362.63] [0.07σ]  
Teffp = 1707 [6329] K [0.23σ]

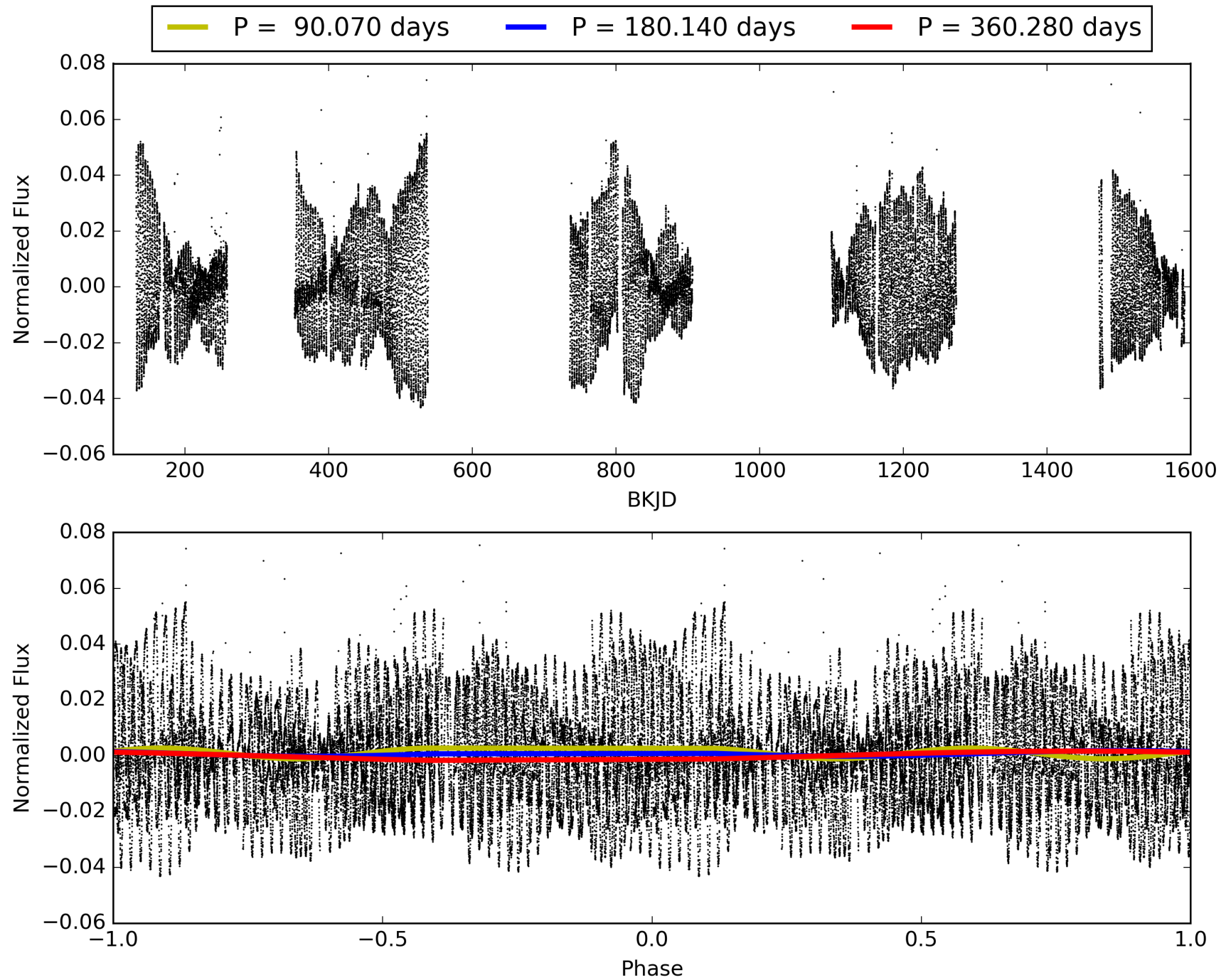
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [38.72σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 1.4%  
ModelChiSquareGof-sig: 94.4%  
Bootstrap-pfa: 8.31e-13  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -3.595  
Centroid-sig: 16.9%  
Centroid-so: 1.497 arcsec [1.35σ]  
OotOffset-rm: 0.277 arcsec [1.17σ]  
KicOffset-rm: 0.339 arcsec [2.18σ]  
OotOffset-st: 0/0/0/4 [4]  
KicOffset-st: 0/0/0/4 [4]  
DiffImageQuality-fgm: 0.50 [2/4]  
DiffImageOverlap-fno: 1.00 [4/4]

# TCE 004853523-02, PDC Light Curves



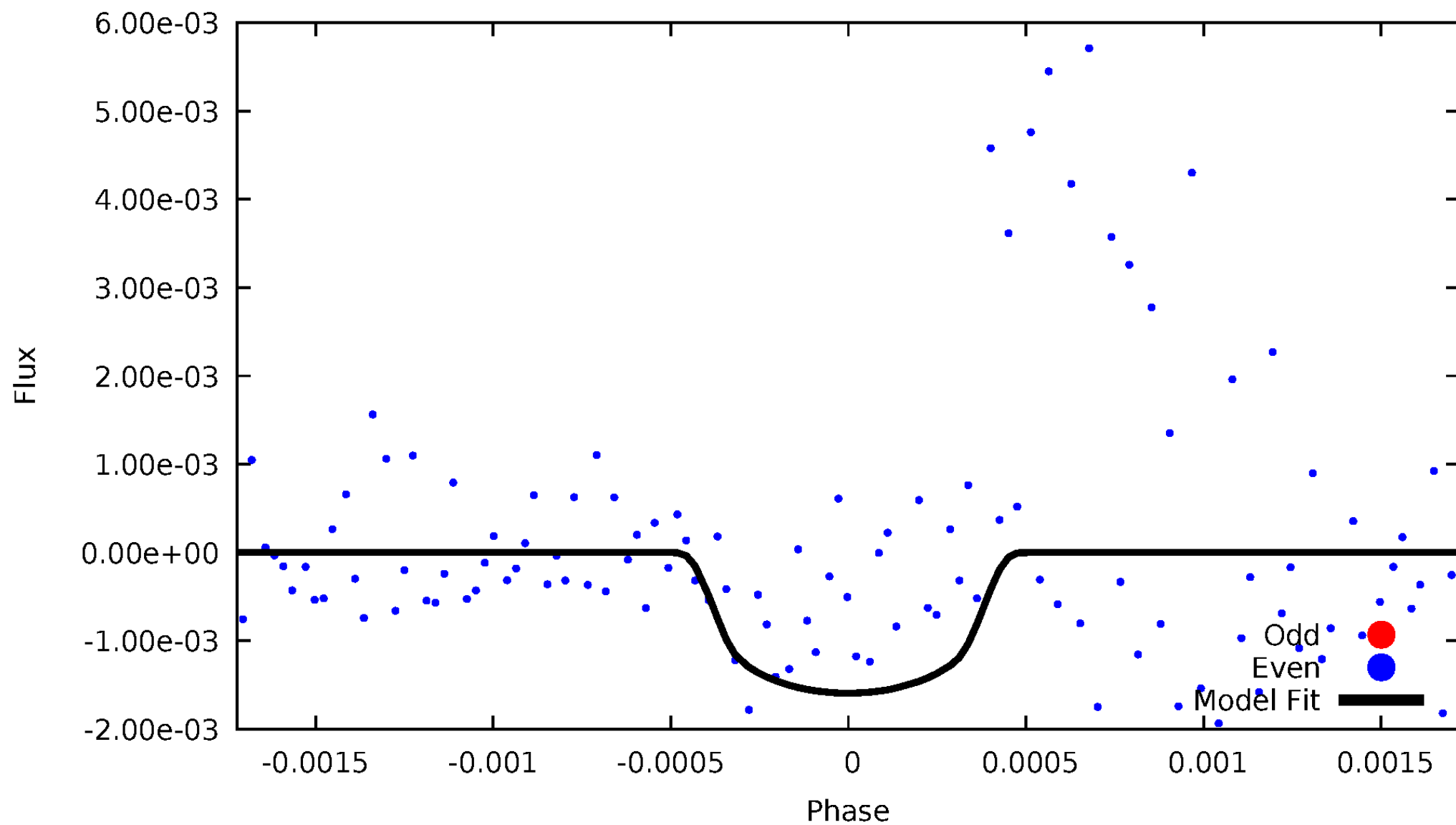
TCE 004853523-02





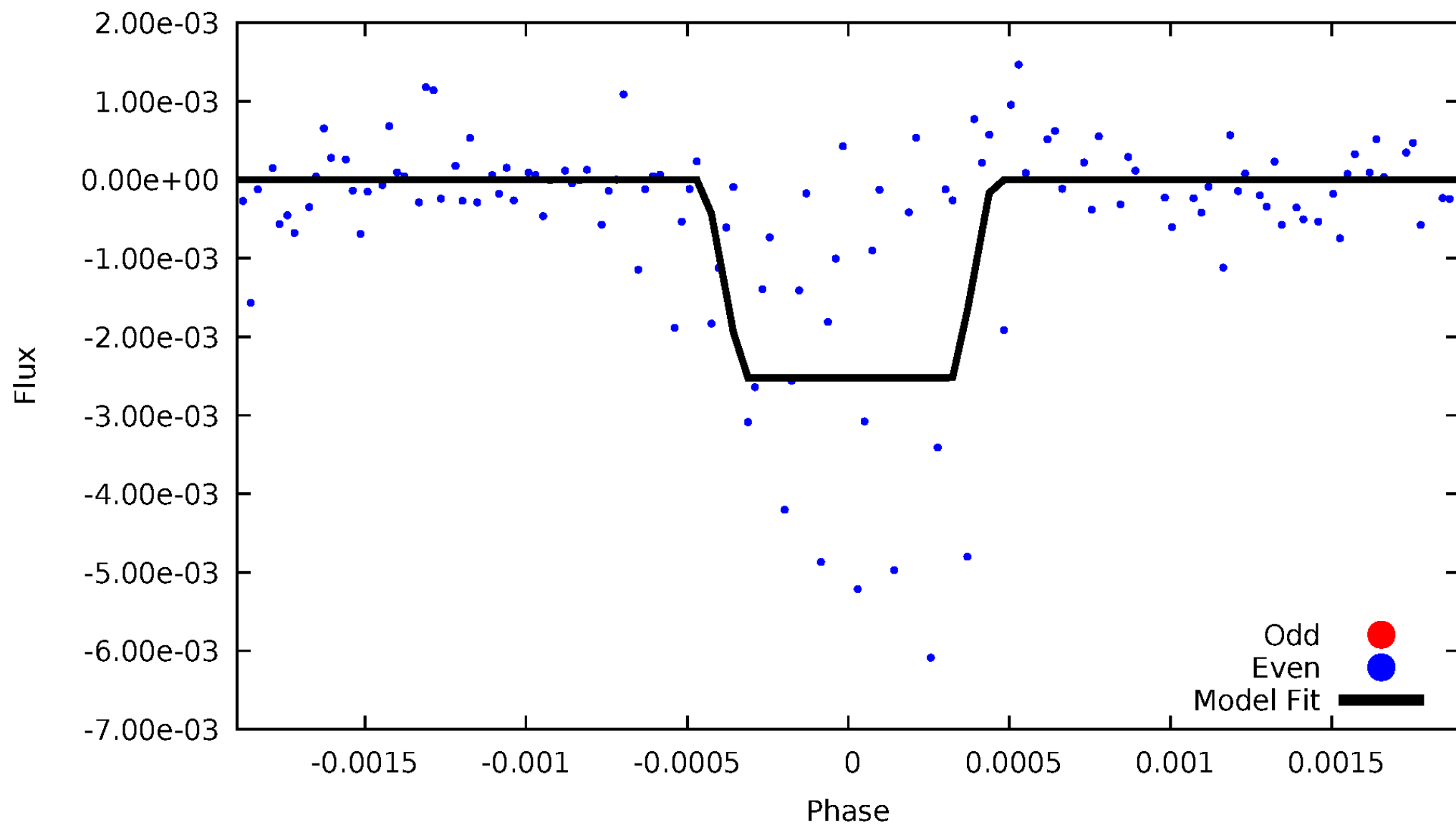
# DV Odd/Even

TCE 004853523-02



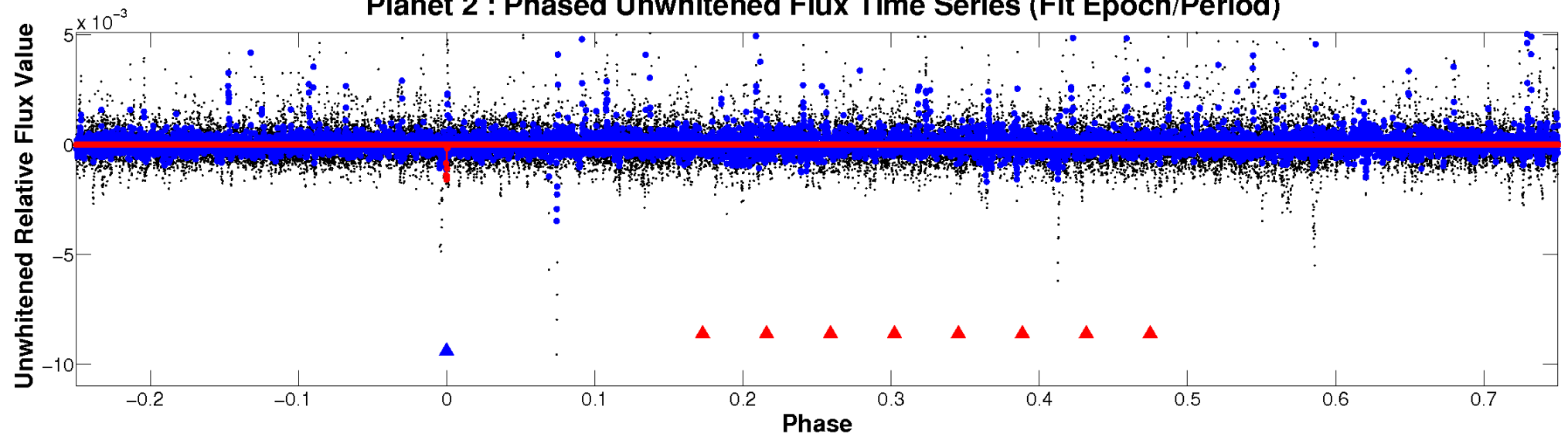
# ALT Odd/Even

TCE 004853523-02

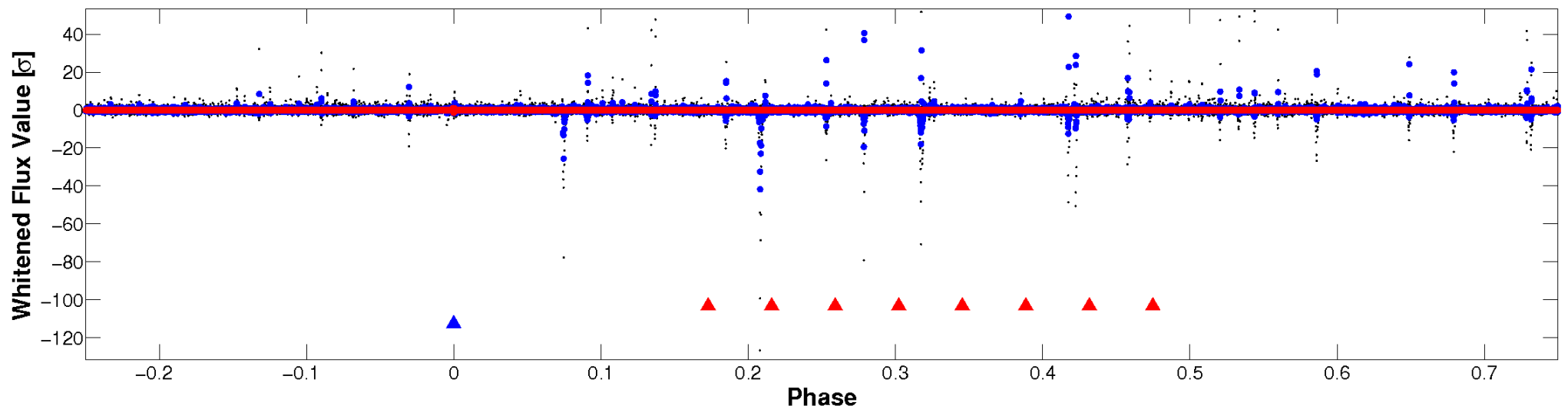


# Non-Whitened Vs. Whitened Light Curve

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

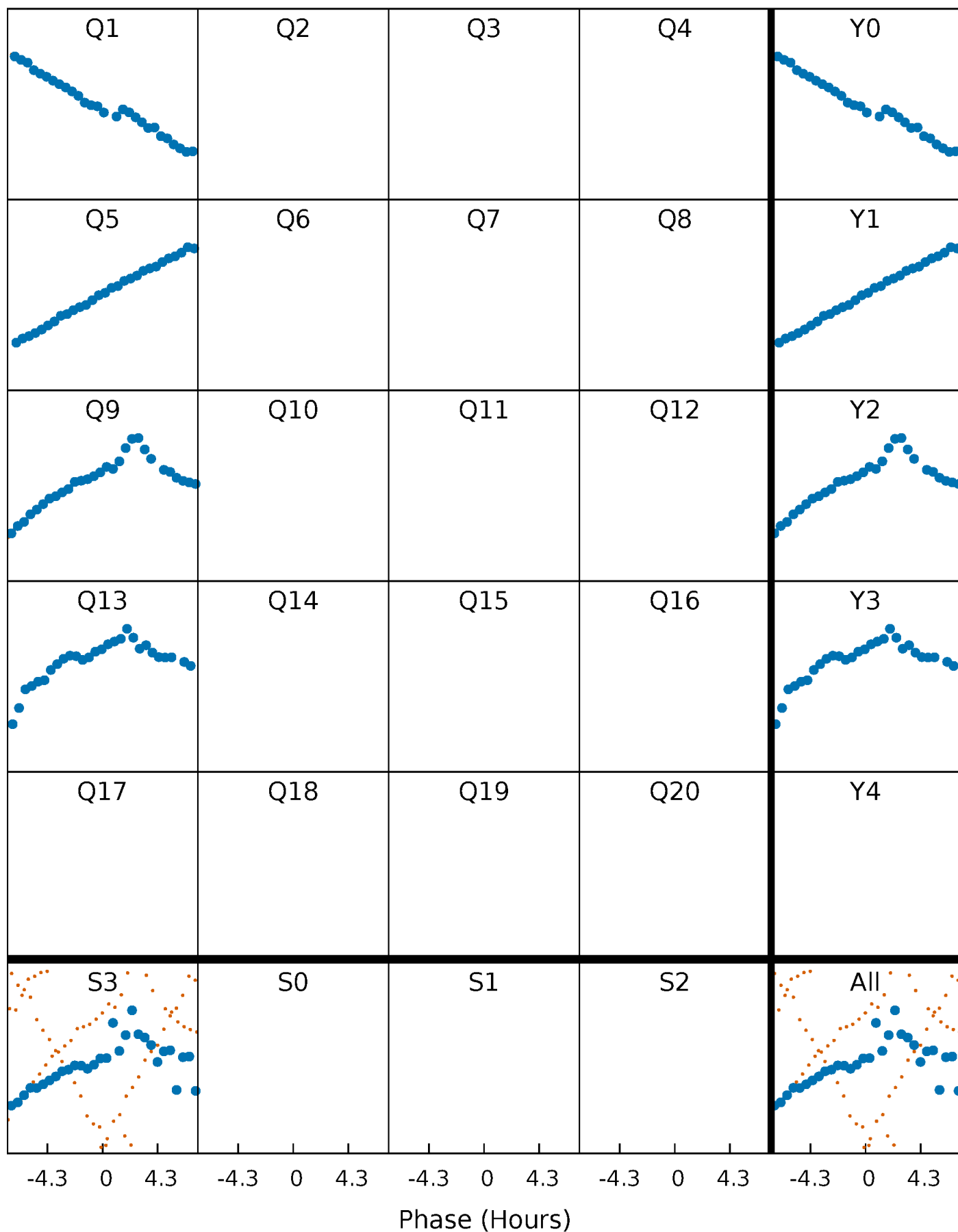


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



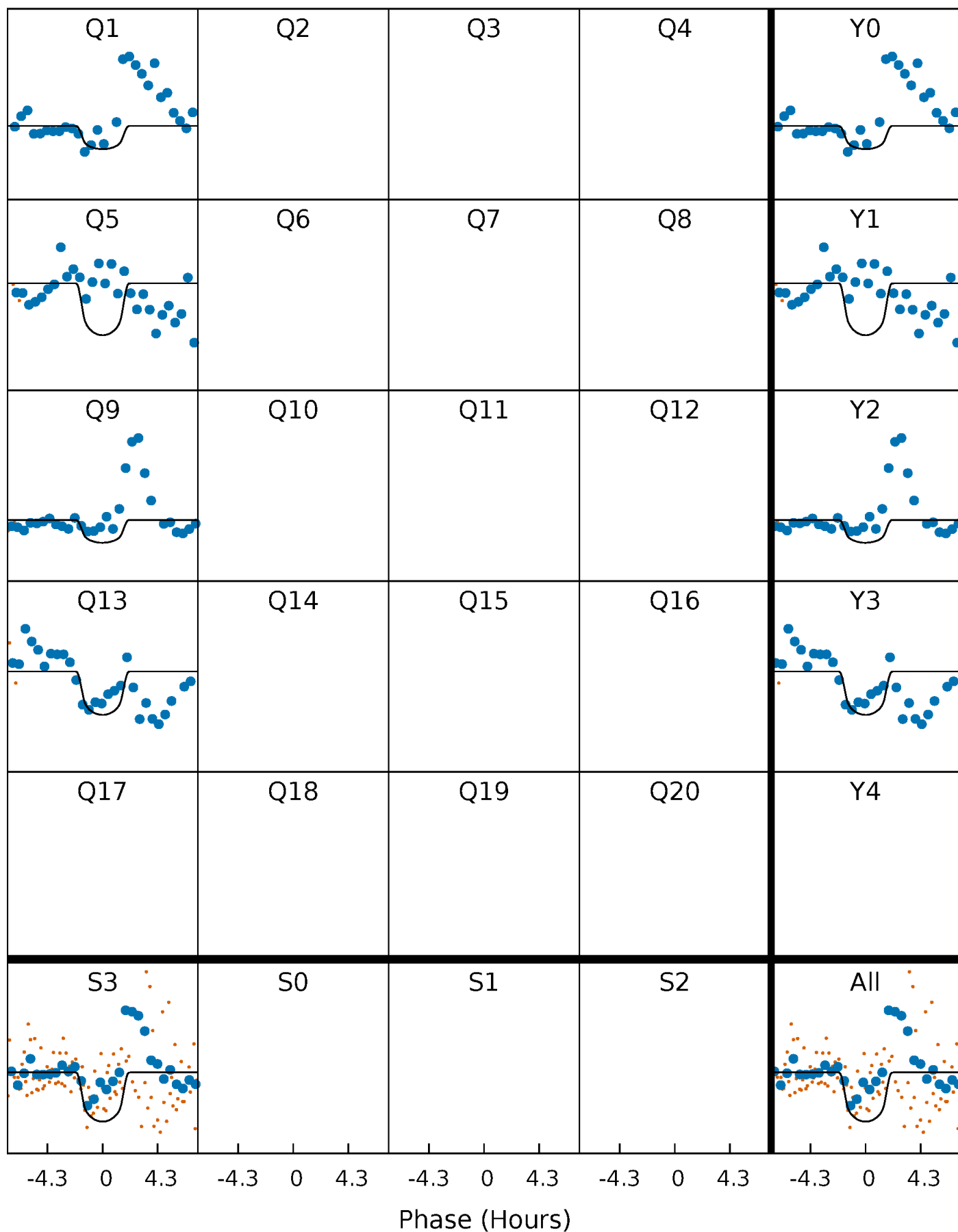
# PDC Quarter-Phased Transit Curves

TCE 004853523-02 P=180.140087 Days  $T_0=151.629363$  (BKJD)



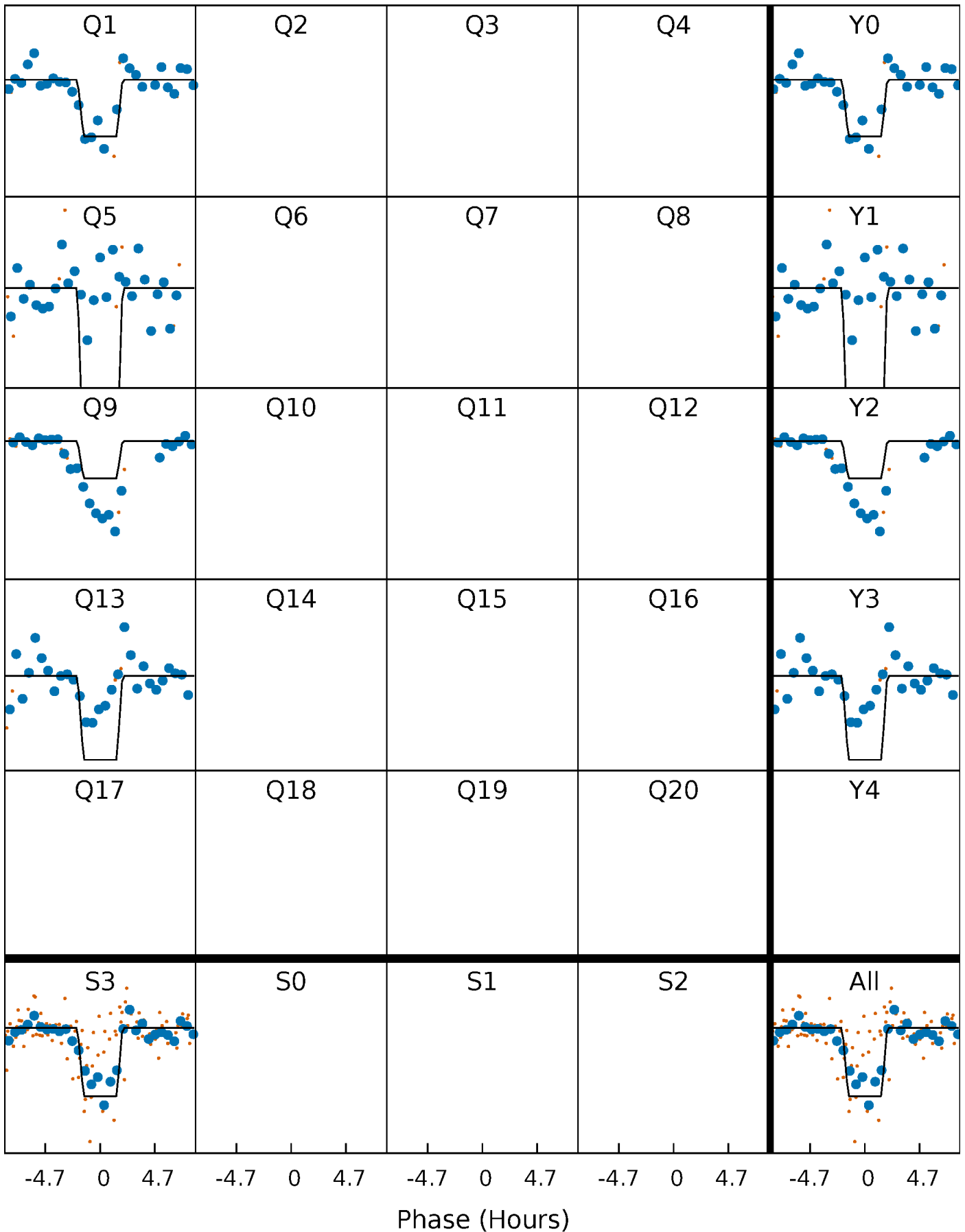
# DV Quarter-Phased Transit Curves

TCE 004853523-02     $P=180.140087$  Days     $T_0=151.629363$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

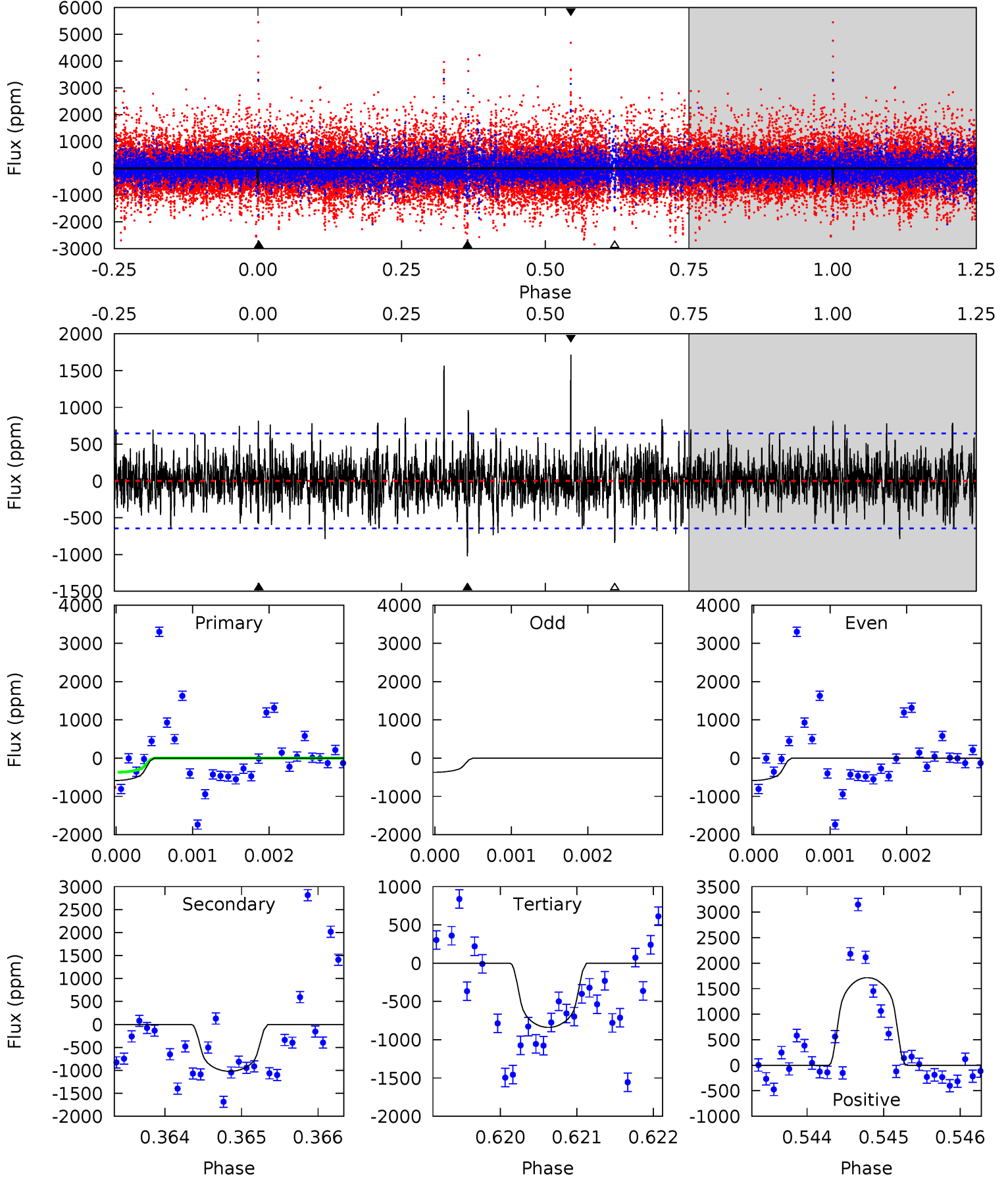
TCE 004853523-02 P=180.138214 Days  $T_0=151.631135$  (BKJD)



# DV Model-Shift Uniqueness Test

004853523-02, P = 180.140087 Days, E = 151.629363 Days

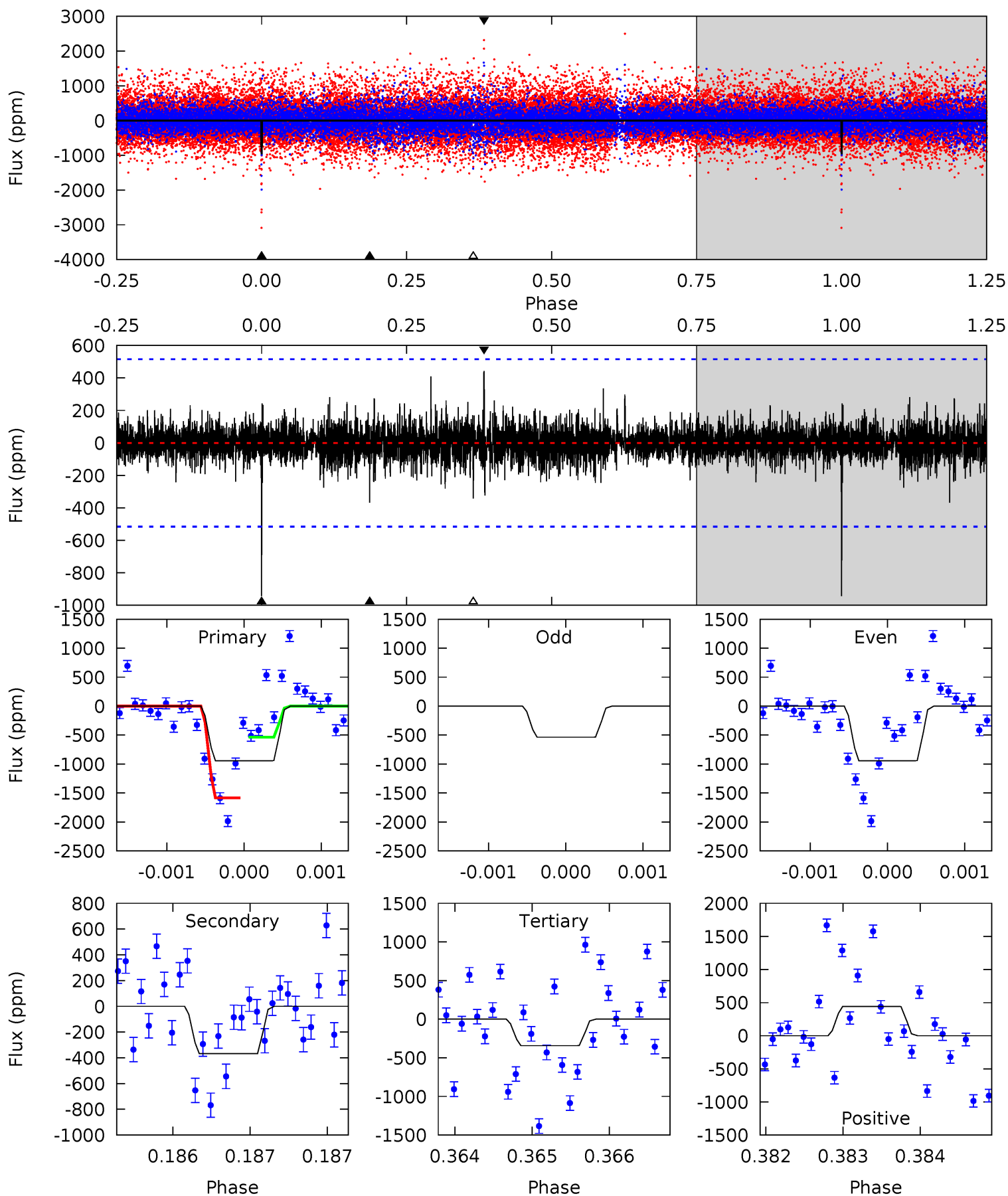
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
4.93	8.63	7.09	14.5	5.46	3.30	1.95	-2.16	-9.58	1.54	-5.88	0.96	1.00	0.63	1.65



# Alt Model-Shift Uniqueness Test

004853523-02, P = 180.138214 Days, E = 151.631135 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
10.0	3.91	3.64	4.70	5.48	3.34	0.78	6.38	5.32	0.27	-0.79	2.30	1.24	0.32	0





### Stellar Parameters For KIC 004853523

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4622^{+138}_{-138}$	$4.640^{+0.054}_{-0.027}$	$-0.540^{+0.300}_{-0.300}$	$0.615^{+0.049}_{-0.054}$	$0.601^{+0.072}_{-0.039}$	$3.640^{+0.909}_{-0.466}$
	+3%/-3%	+1%/-1%	+56%/-56%	+8%/-9%	+12%/-6%	+25%/-13%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 004853523-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-1021 \pm 118$	$2.78^{+1.89}_{-1.61}$	$307^{+10}_{-10}$	$4173^{+1915}_{-666}$	$20433^{+91836}_{-12961}$
Alt.	$-368 \pm 94$	$3.50^{+1.61}_{-1.82}$	$307^{+11}_{-11}$	$3278^{+880}_{-403}$	$4684^{+15246}_{-2762}$

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

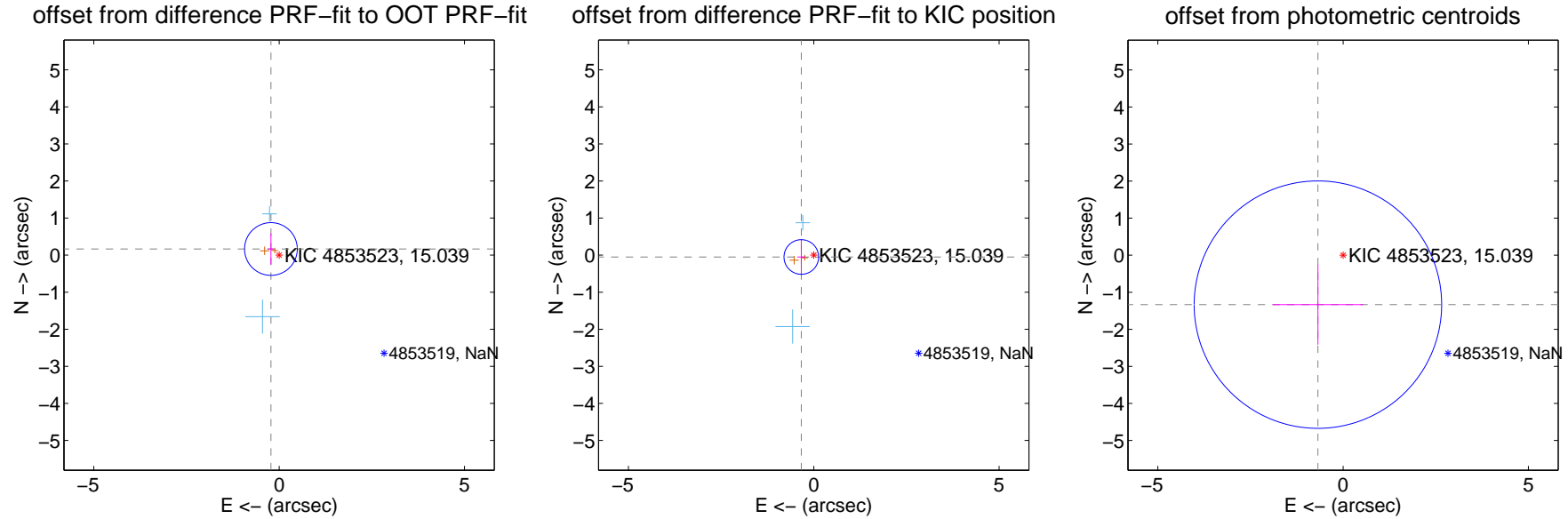
## DV Centroid Data

Supplemental centroid analysis for 004853523-02. Kepler magnitude: 15.04. Transit SNR 7.09

There are 2 quarters with good PRF difference image offsets

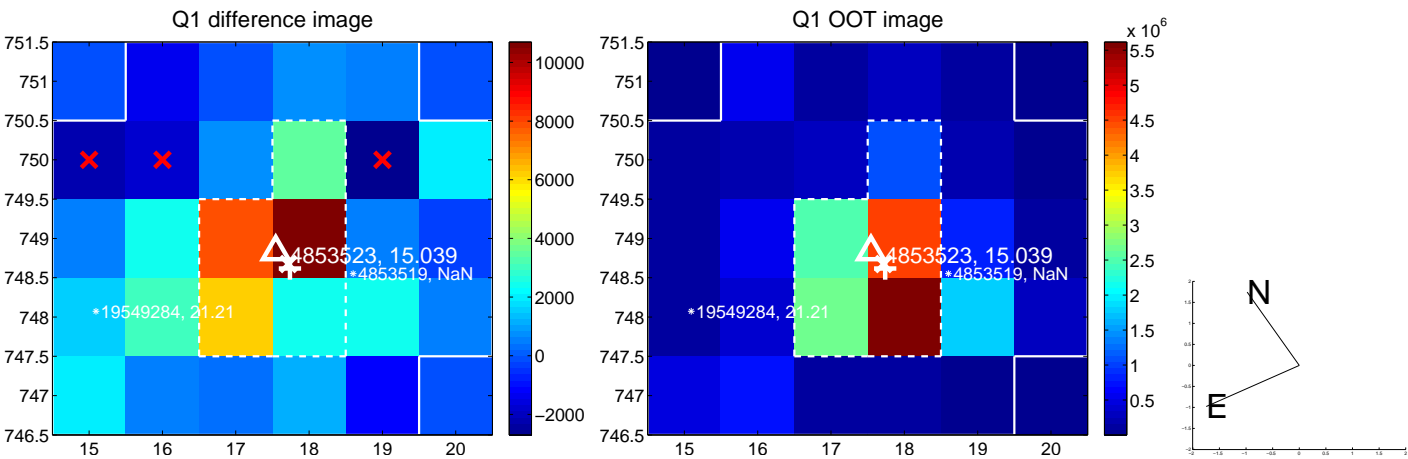
The direct PRF centroid is offset from the target star catalog position by about 0.29 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.277 \pm 0.237$	1.17	$0.222 \pm 0.086$	$0.166 \pm 0.421$
PRF-fit source offset from KIC position	$0.339 \pm 0.156$	2.18	$0.336 \pm 0.106$	$-0.050 \pm 0.479$
photometric centroid source offset	$1.50 \pm 1.11$	1.35	$0.68 \pm 1.22$	$-1.33 \pm 1.08$

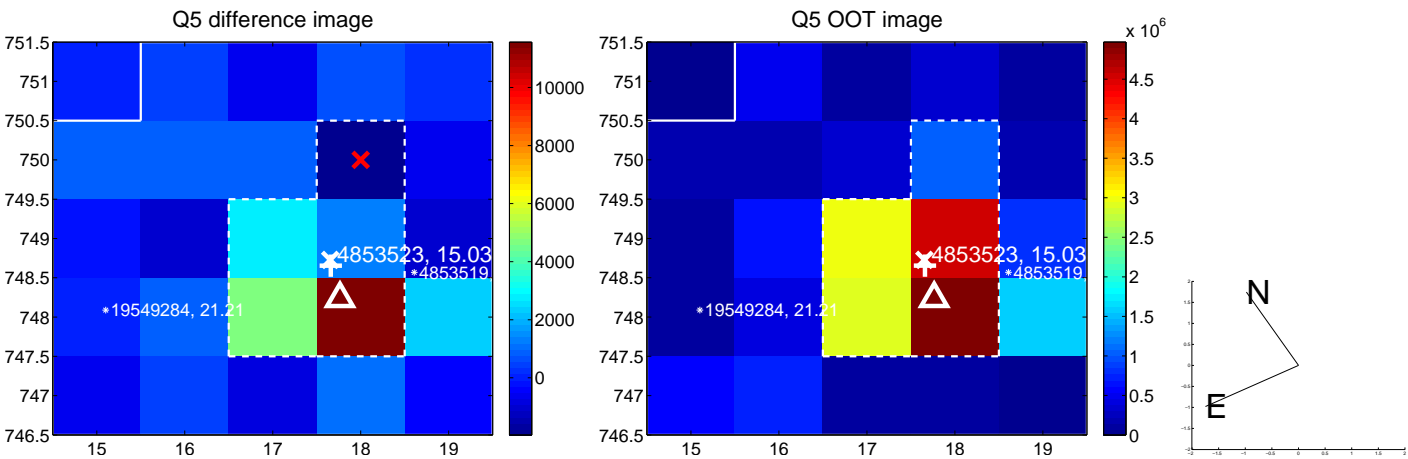


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

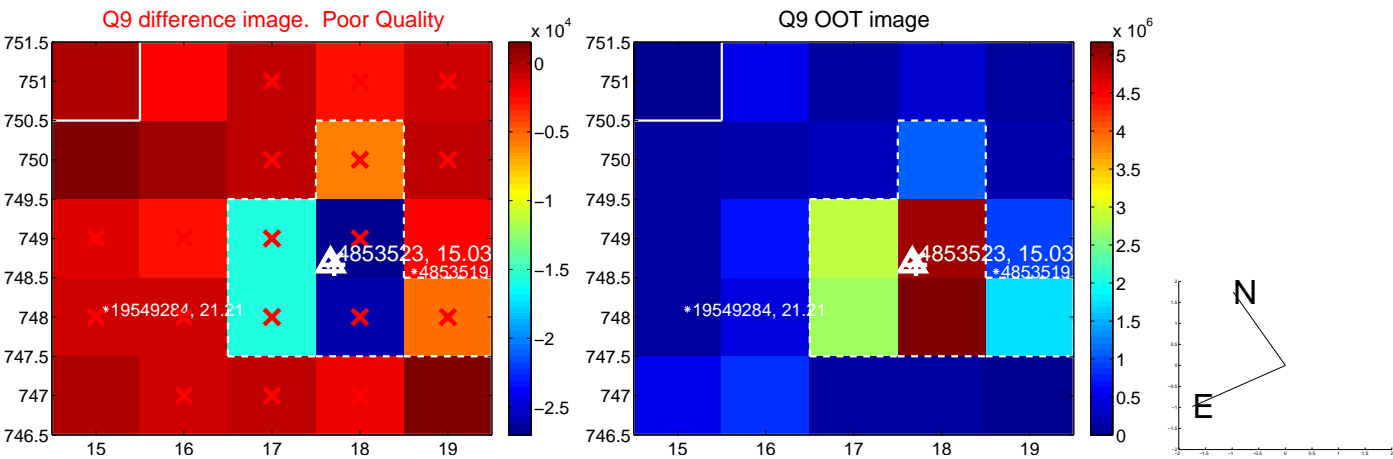
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



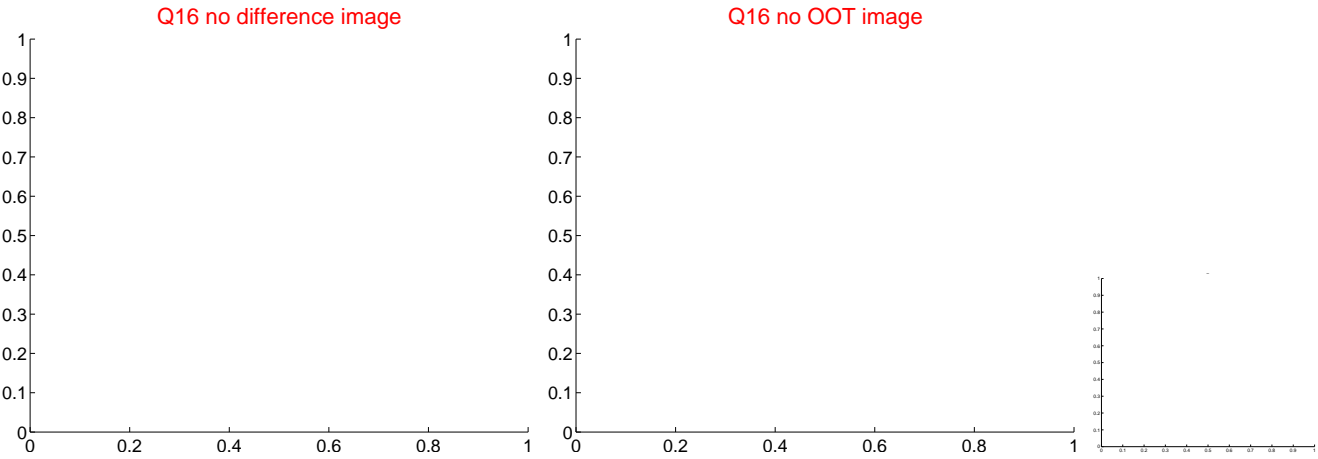
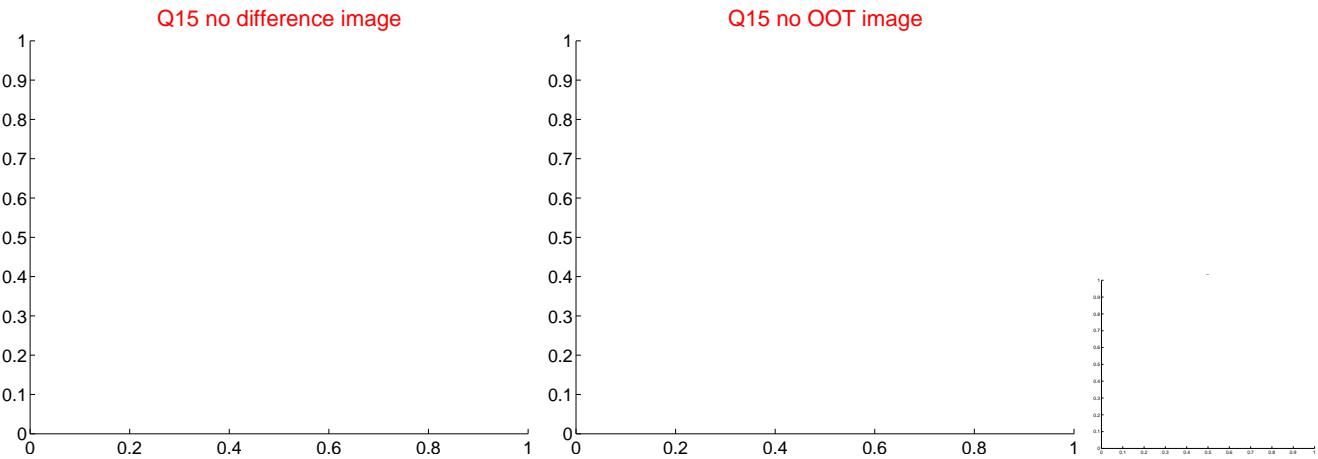
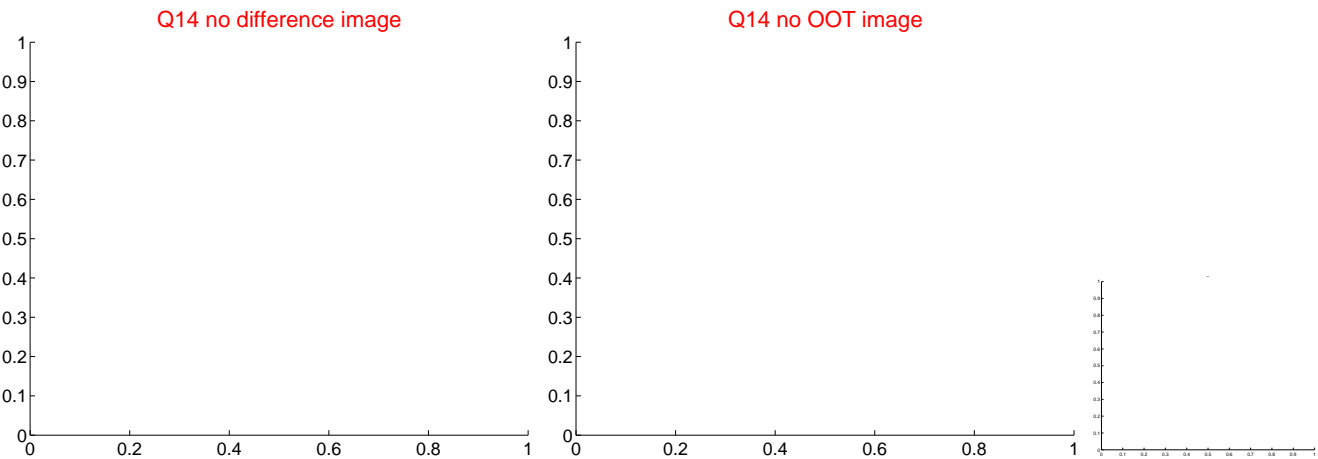
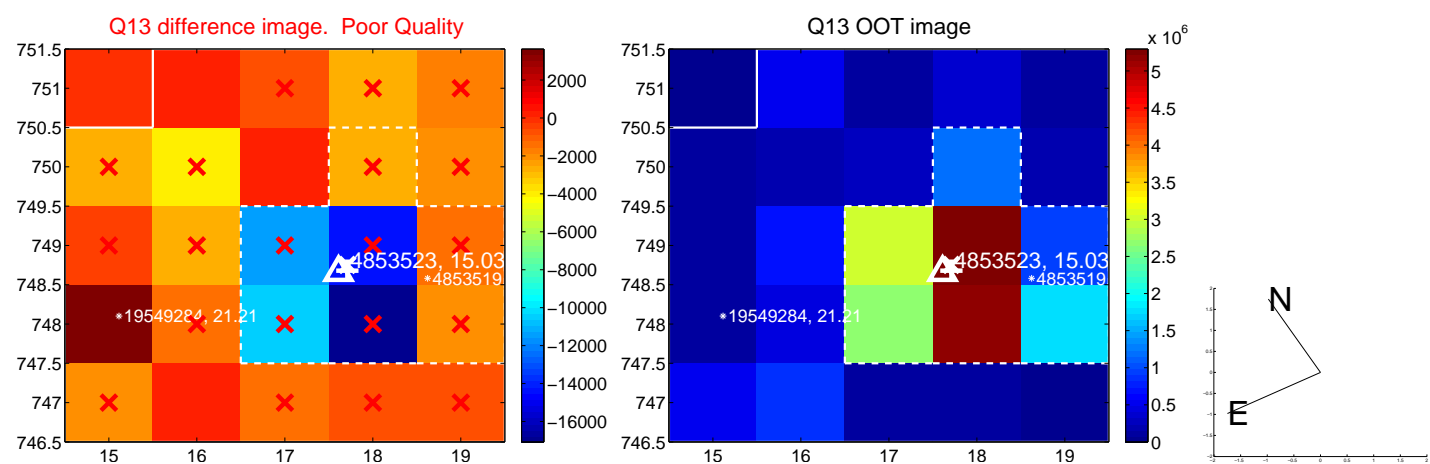
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.



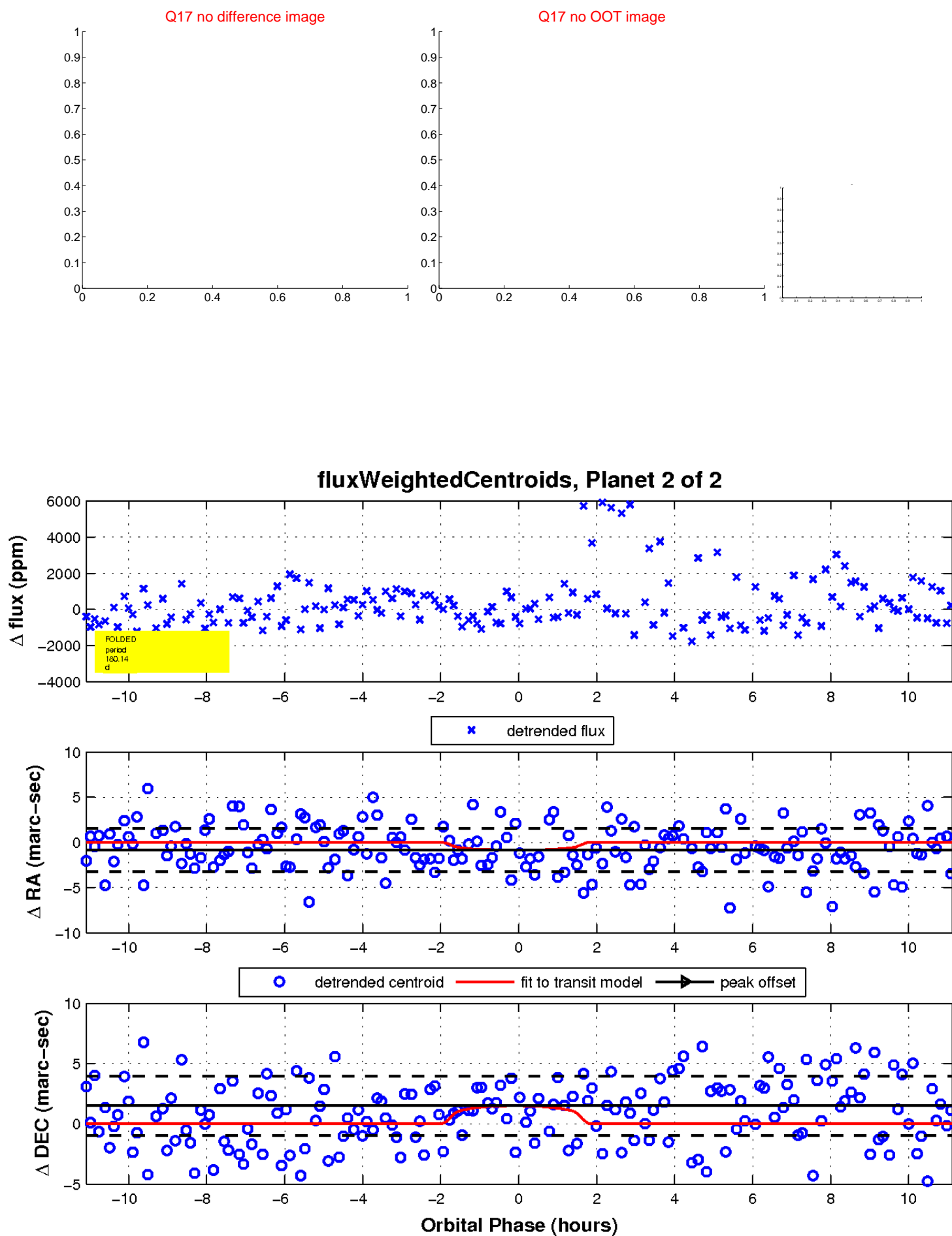
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

