

# KIC 005437849

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005437849-01	OBS	No	447.200149	367.962151	1303.5	6.274	16.4	5.9	2.72	5380	19.27	3.68
005437849-02	OBS	No	381.217284	422.743280	1518.9	7.906	10.5	6.4	2.72	5380	14.32	4.56

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005437849-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_ZUMA—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
005437849-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—ALL_TRANS_CHASES—MOD_NONUNIQ_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.

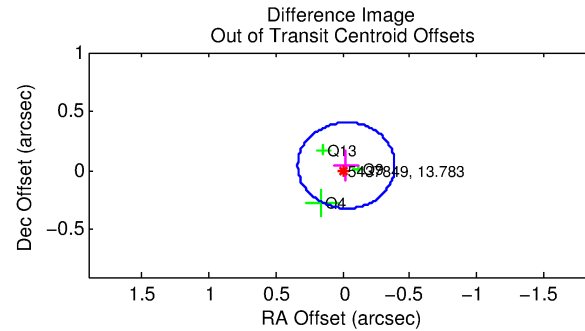
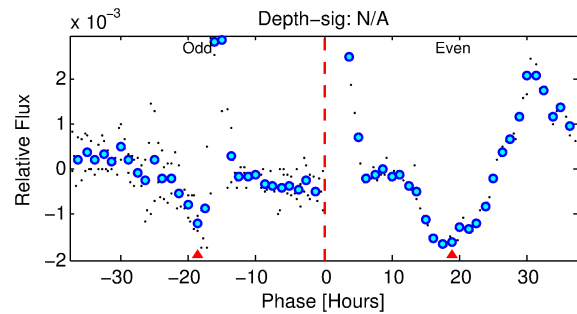
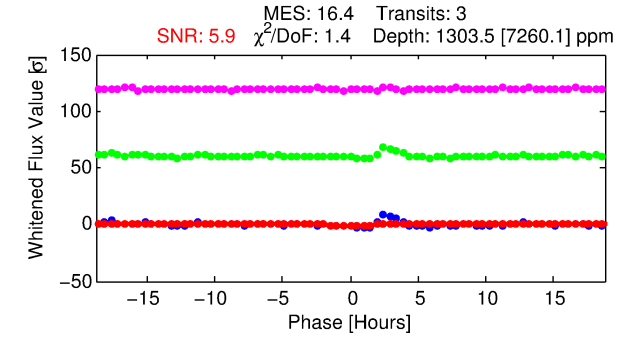
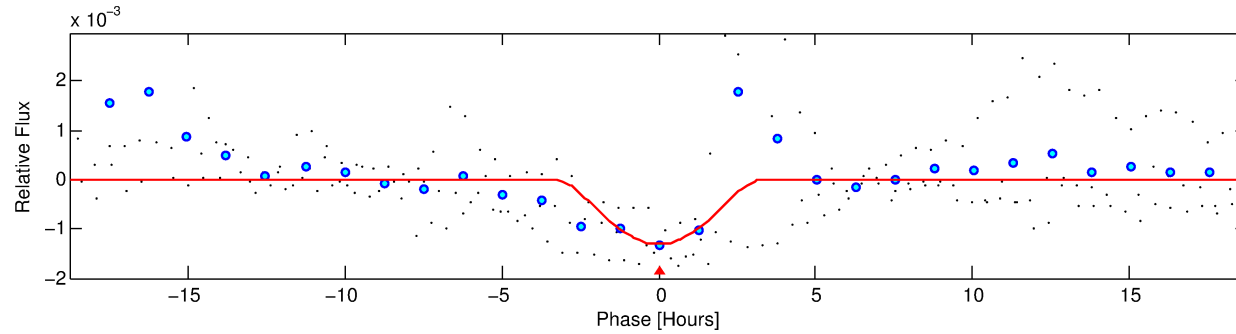
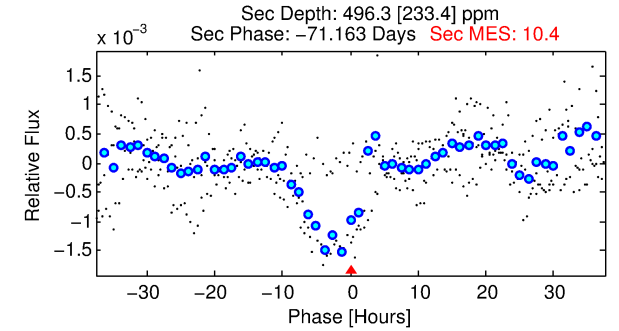
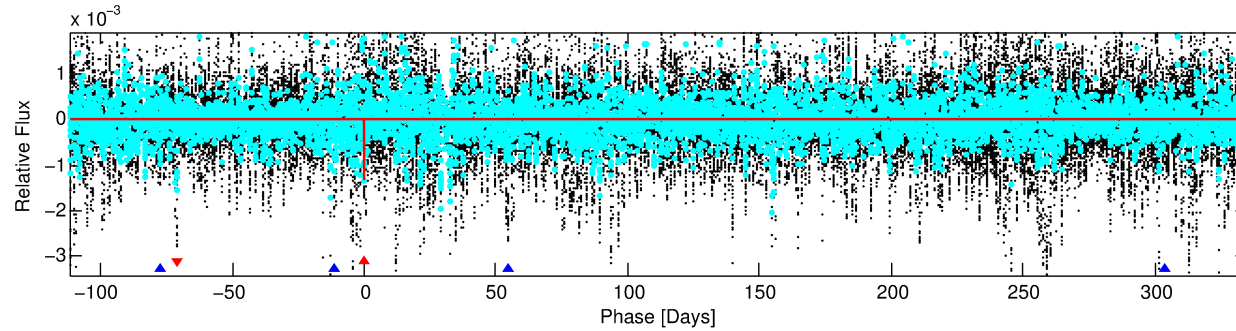
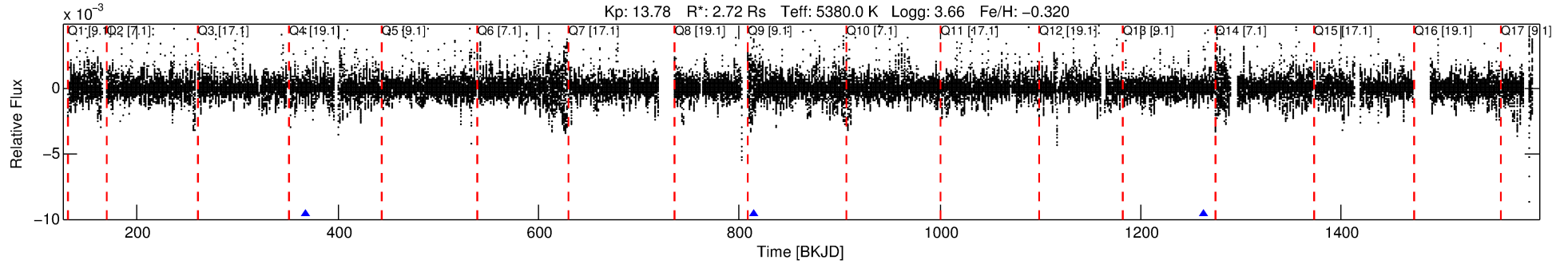
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 005437849-01

No Significant Match Found

# DV One-Page Summary

KIC: 5437849 Candidate: 1 of 2 Period: 447.200 d



## DV Fit Results:

Period = 447.20015 [0.01102] d  
Epoch = 367.9622 [0.0150] BKJD  
Rp/R\* = 0.0648 [0.2138]  
a/R\* = 199.26 [147.12]  
b = 1.00 [0.54]  
Seff = 3.68 [1.04]  
Teq = 353 [25] K  
Rp = 19.27 [63.71] Re  
a = 1.2298 [0.2340] AU  
Ag = 1111.80 [7357.65] [0.15] $\sigma$   
Teffp = 3154 [5213] K [0.54] $\sigma$

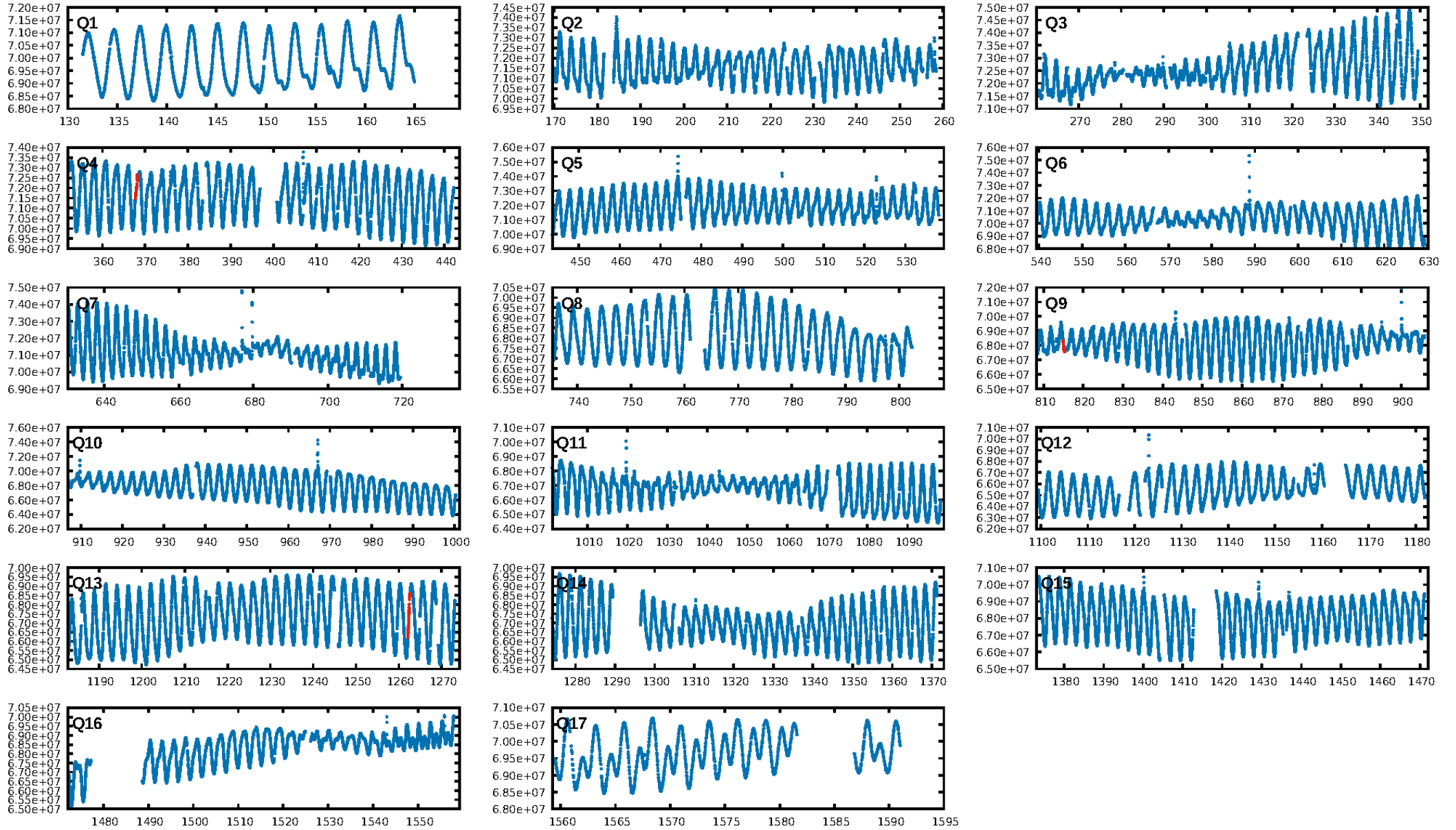
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [156.90] $\sigma$   
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 1.1%  
ModelChiSquareGof-sig: 98.6%  
Bootstrap-pfa: 4.55e-13  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 1.218  
Centroid-sig: N/A  
Centroid-so: 0.642 arcsec [0.97] $\sigma$   
OotOffset-rm: 0.051 arcsec [0.43] $\sigma$   
OotOffset-st: 0/0/1/2 [3]  
KicOffset-rm: 0.079 arcsec [0.91] $\sigma$   
KicOffset-st: 0/0/1/2 [3]  
DiffImageQuality-fgm: 0.33 [1/3]  
DiffImageOverlap-fno: 1.00 [3/3]

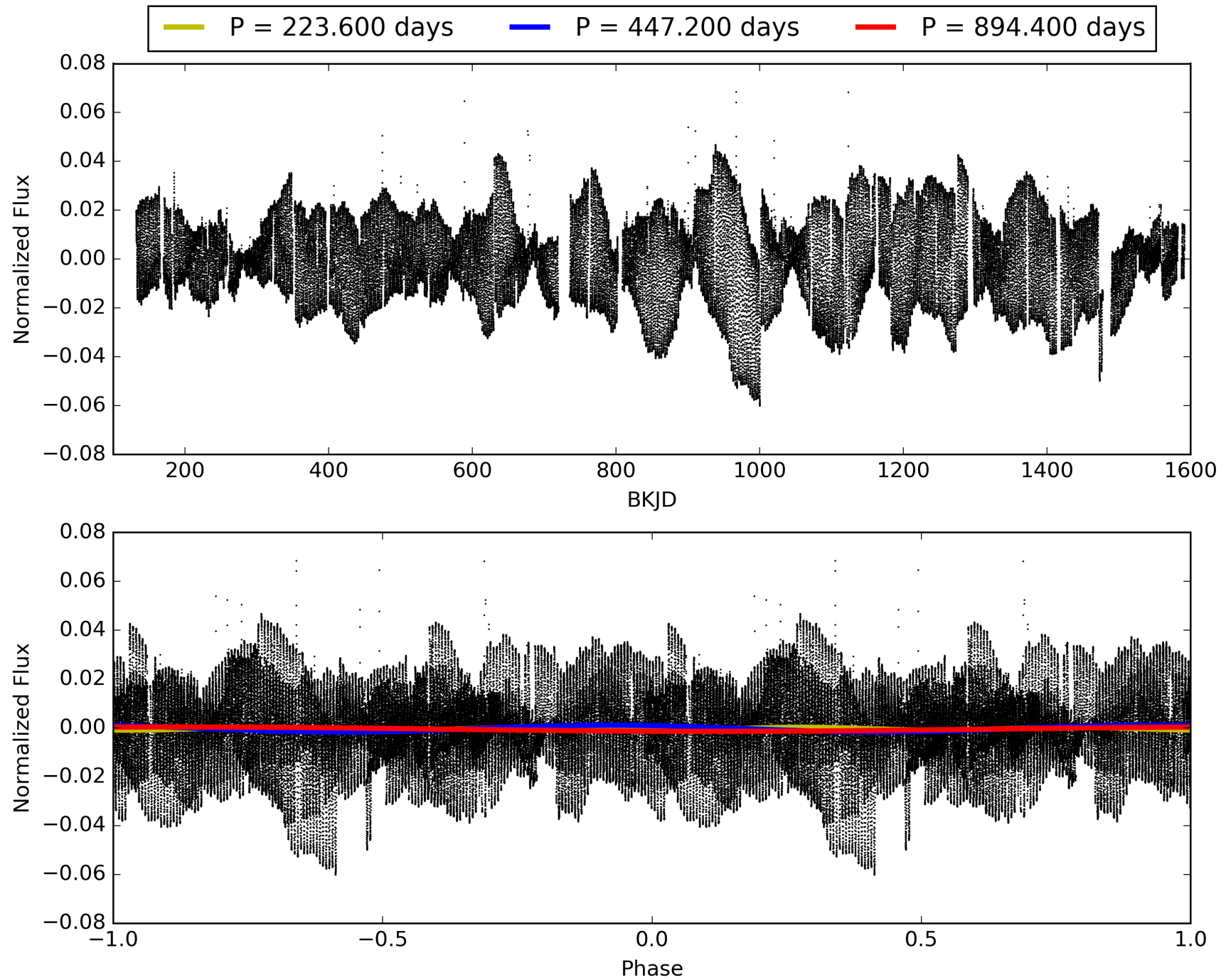
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 18:59:40 Z

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

# TCE 005437849-01, PDC Light Curves

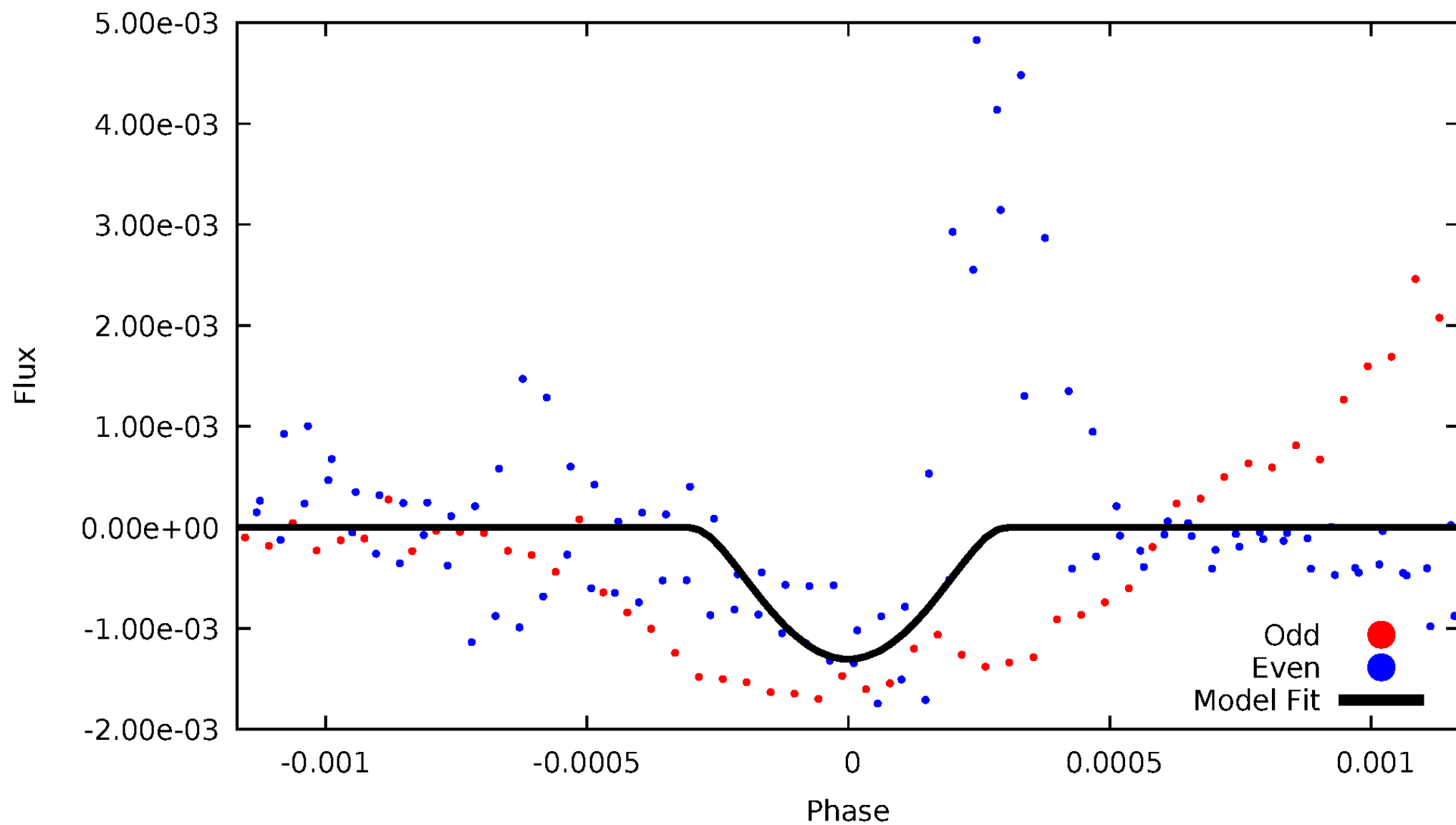


TCE 005437849-01



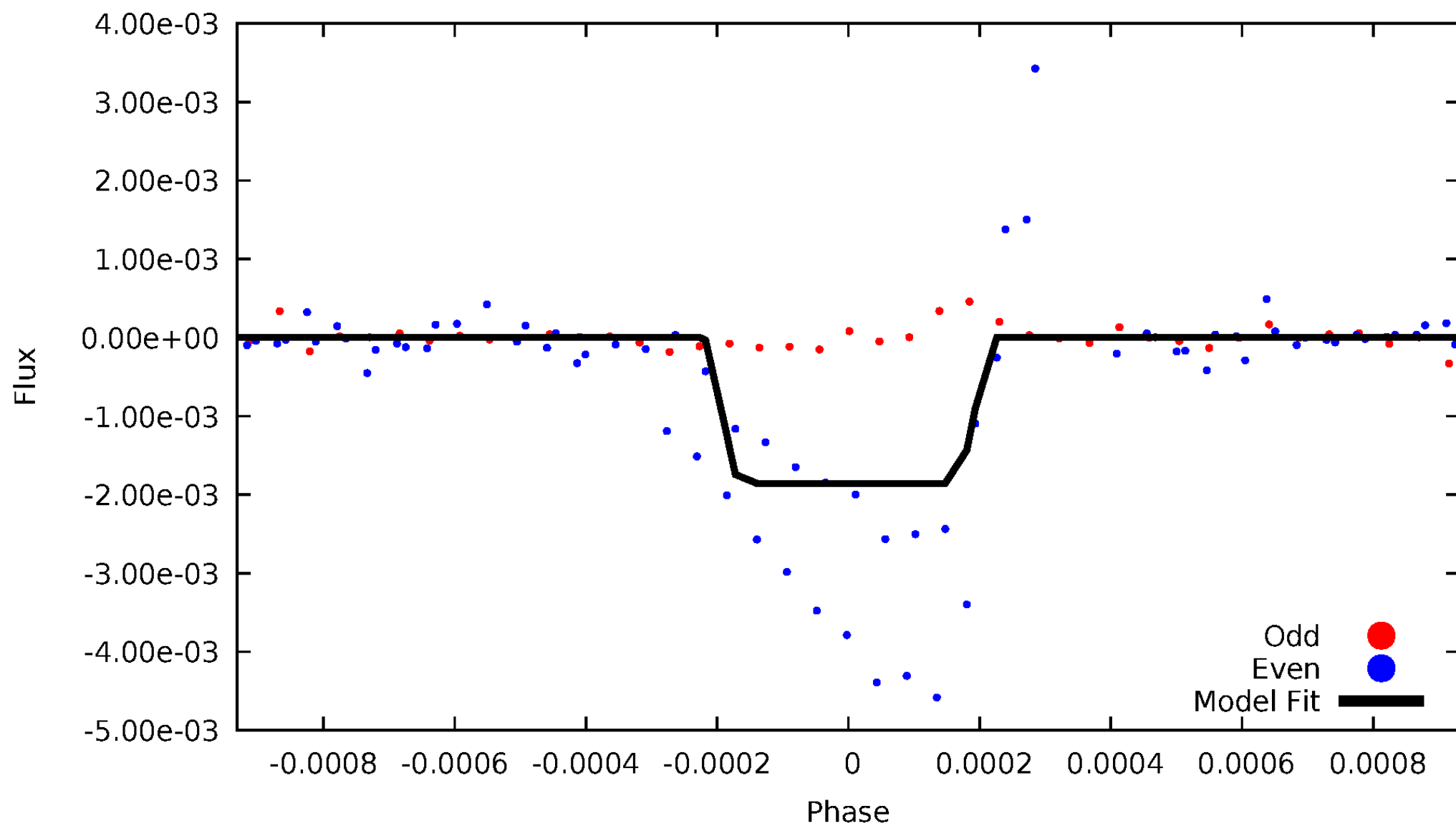
# DV Odd/Even

TCE 005437849-01



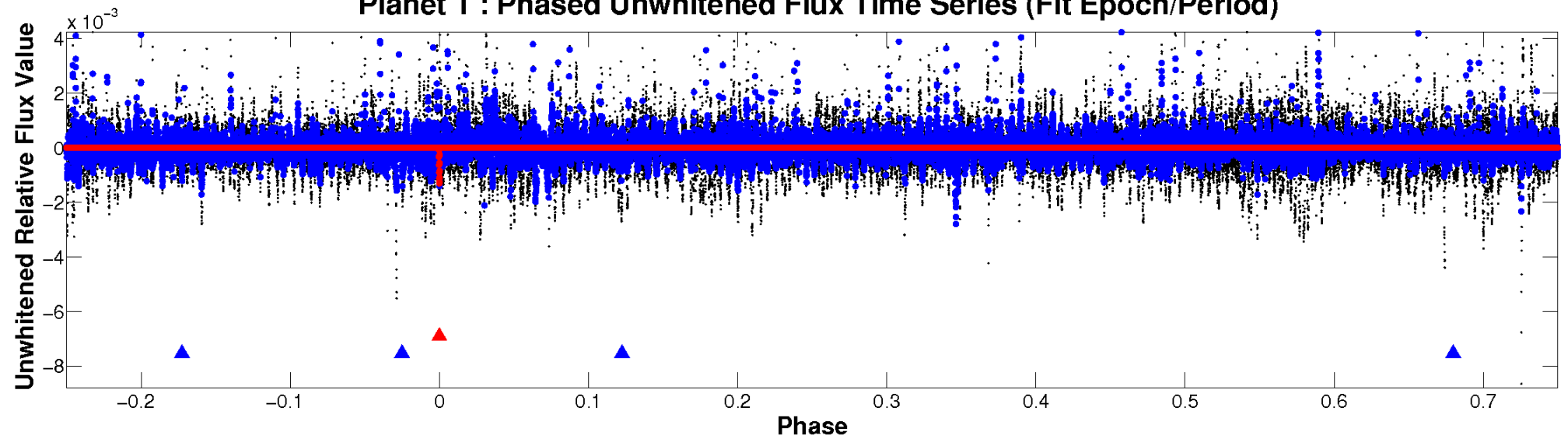
# ALT Odd/Even

TCE 005437849-01

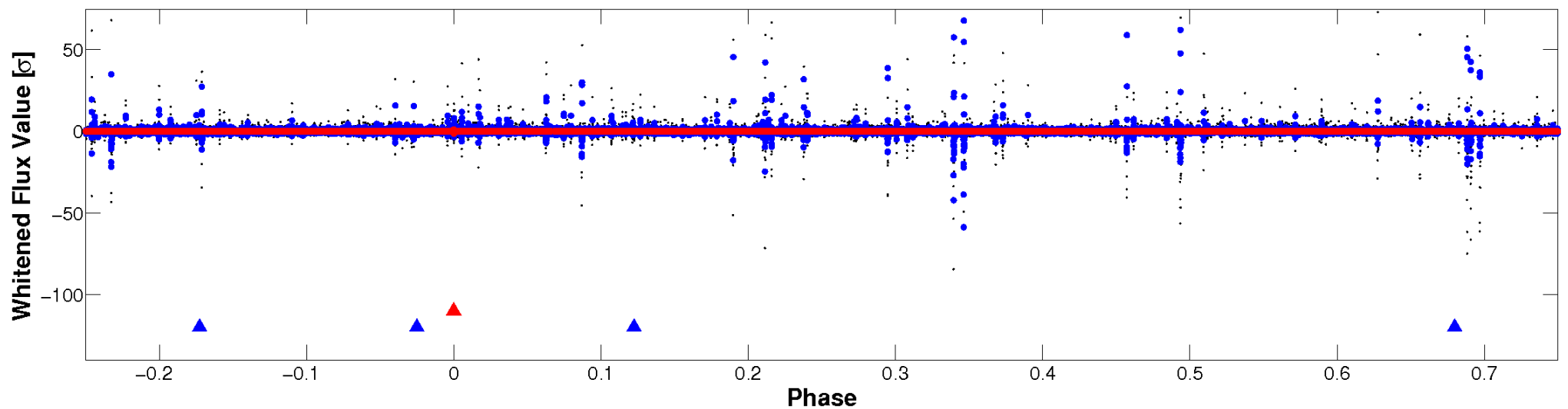


# Non-Whitened Vs. Whitened Light Curve

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

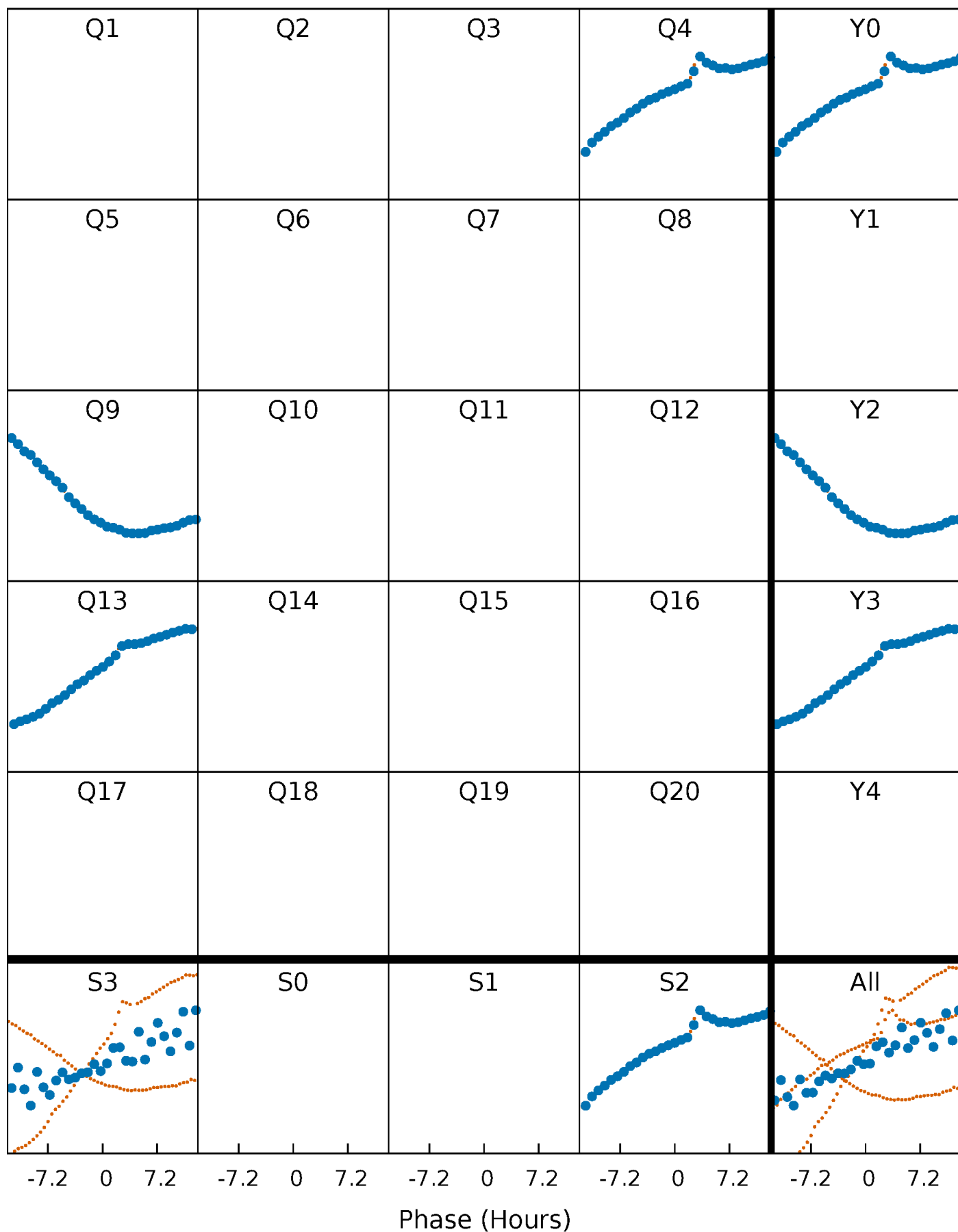


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

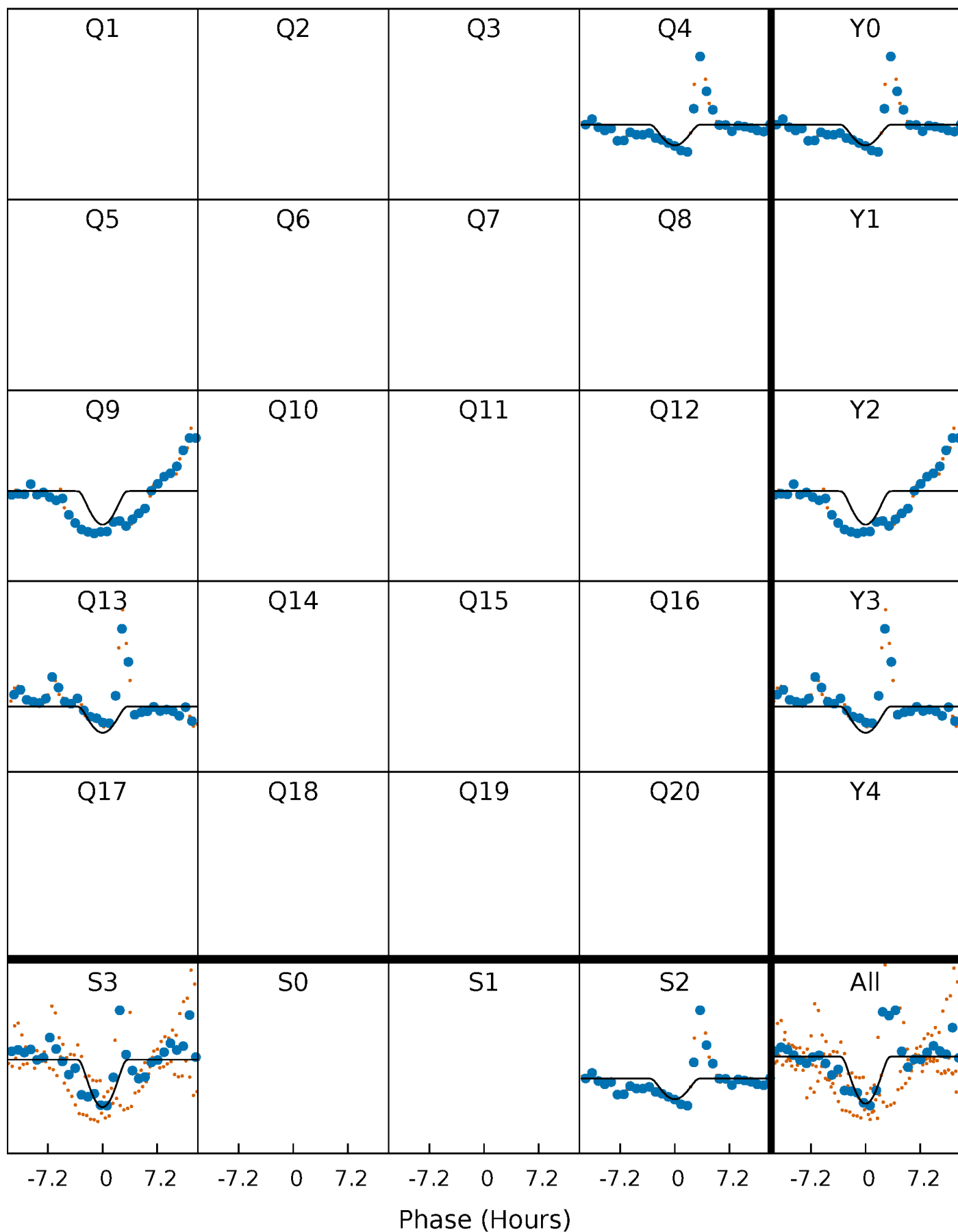
TCE 005437849-01 P=447.200149 Days  $T_0=367.962151$  (BKJD)





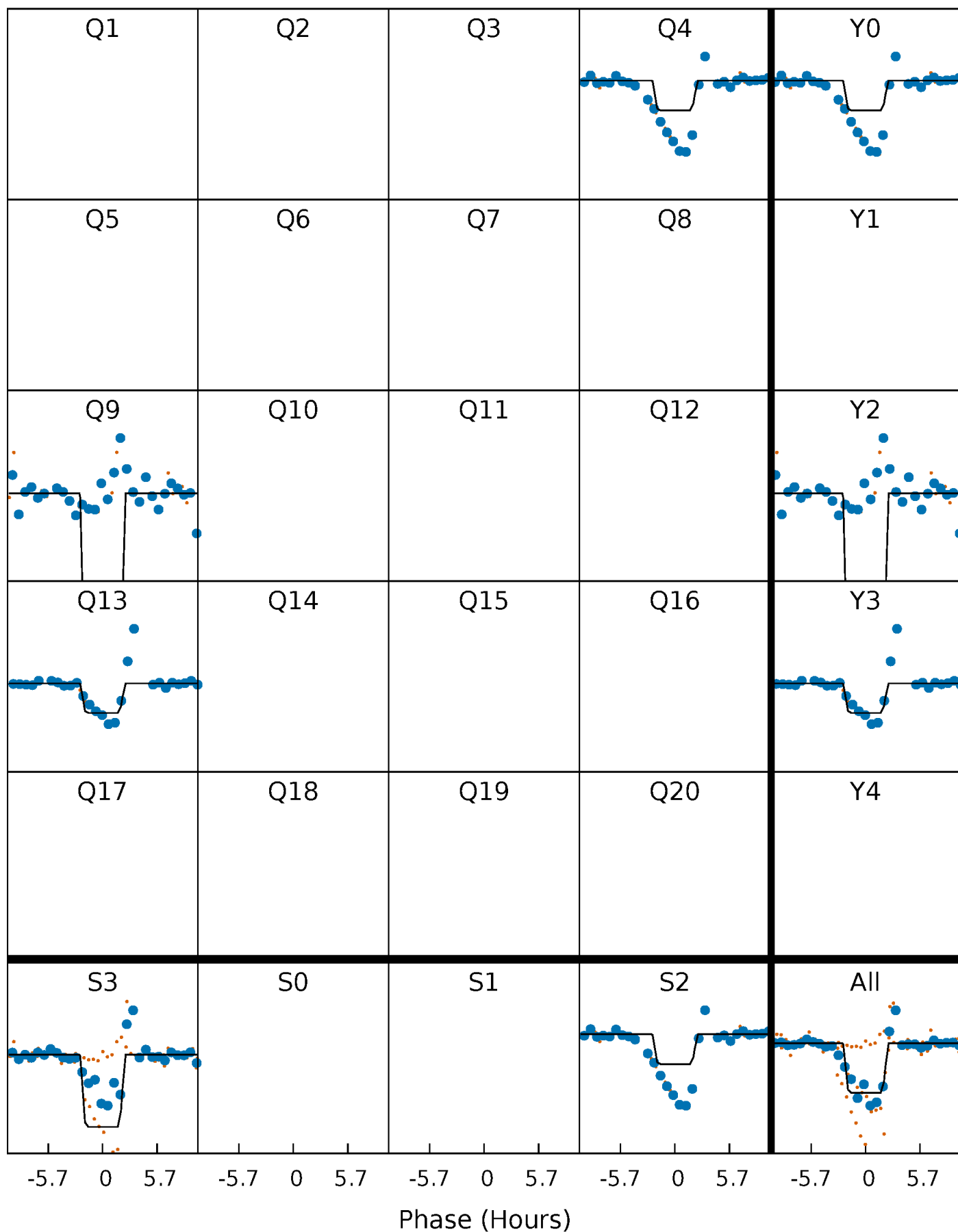
# DV Quarter-Phased Transit Curves

TCE 005437849-01 P=447.200149 Days  $T_0=367.962151$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

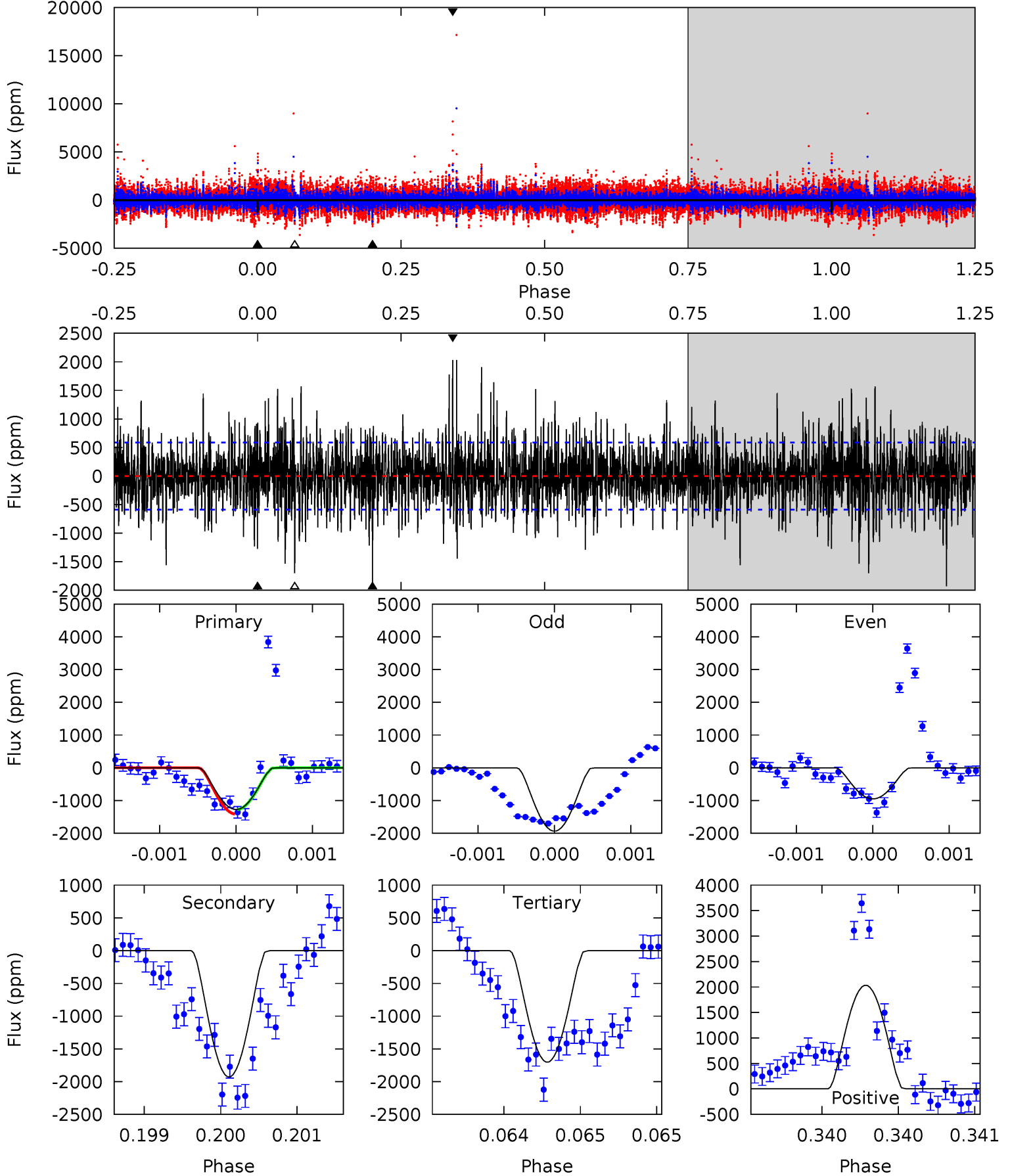
TCE 005437849-01 P=447.188461 Days  $T_0=367.967846$  (BKJD)



# DV Model-Shift Uniqueness Test

005437849-01, P = 447.200149 Days, E = 367.962151 Days

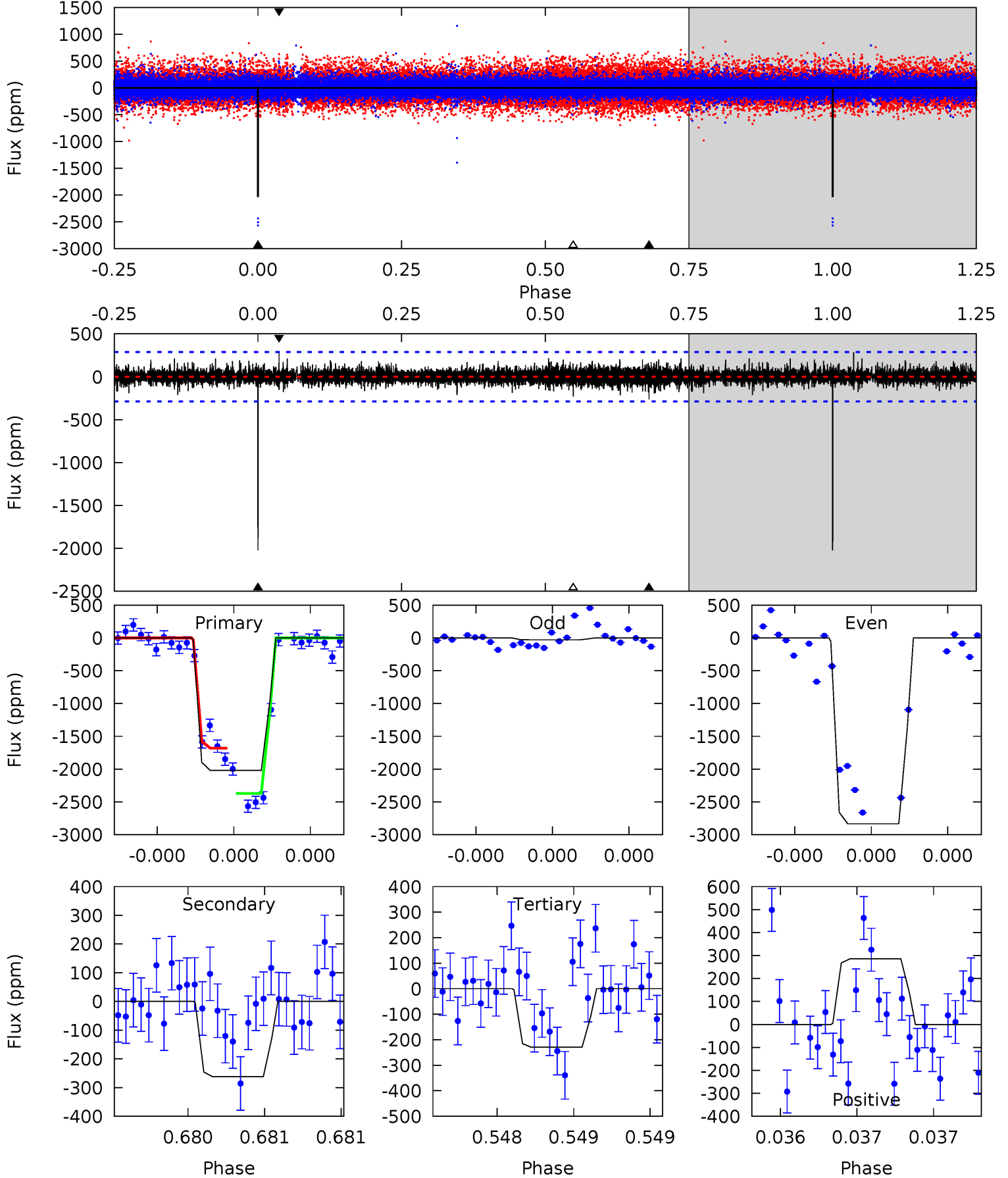
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.0	18.1	16.0	19.1	5.54	3.42	3.70	-4.04	-7.16	2.13	-0.99	2.88	0.84	0.51	0.63



# Alt Model-Shift Uniqueness Test

005437849-01, P = 447.188461 Days, E = 367.967846 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
39.5	5.11	4.47	5.57	5.61	3.53	0.86	35.0	33.9	0.64	-0.46	38.7	0.96	0.12	0



### Stellar Parameters For KIC 005437849

	$T_{\text{eff}} (K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5380^{+72}_{-88}$	$3.661^{+0.150}_{-0.100}$	$-0.320^{+0.150}_{-0.150}$	$2.724^{+0.450}_{-0.619}$	$1.240^{+0.135}_{-0.250}$	$0.086^{+0.067}_{-0.027}$
	+1%/-2%	+4%/-3%	+47%/-47%	+17%/-23%	+11%/-20%	+78%/-32%
Source	SPE68	SPE68	SPE68	DSEP		

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

### Secondary Eclipse Parameters for KIC 005437849-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-1926 \pm 106$	$52.01^{+46.72}_{-37.42}$	$493^{+21}_{-25}$	$3247^{+1883}_{-538}$	$580^{+7206}_{-421}$
Alt.	$-262 \pm 51$	$46.63^{+48.15}_{-32.20}$	$491^{+21}_{-25}$	$2515^{+971}_{-365}$	$94^{+852}_{-70}$

$T_{max}$  = 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

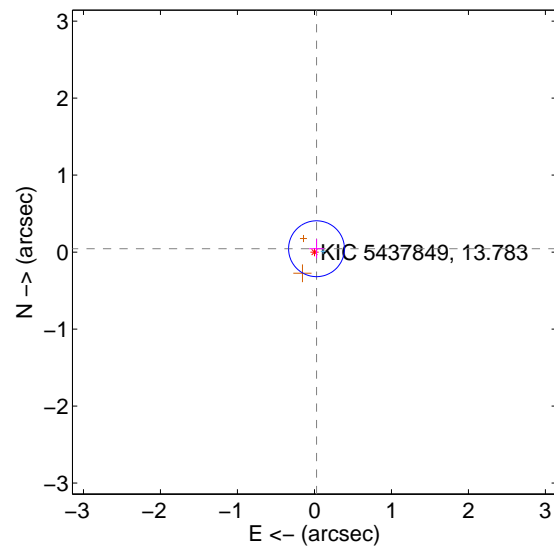
Supplemental centroid analysis for 005437849-01. Kepler magnitude: 13.78. Transit SNR 5.93

There are 1 quarters with good PRF difference image offsets

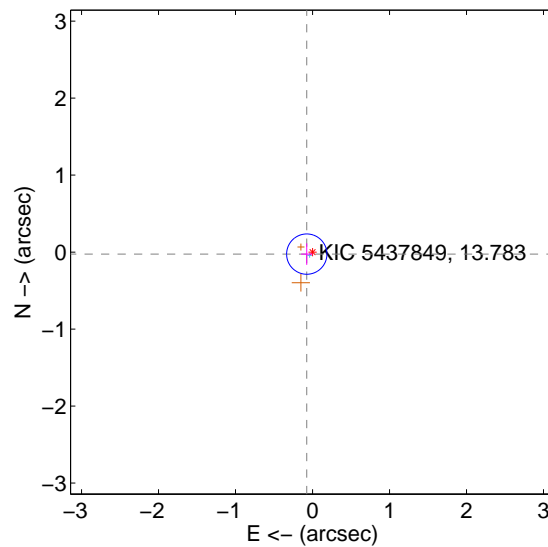
The direct PRF centroid is offset from the target star catalog position by about 0.11 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.051 \pm 0.121$	0.43	$-0.027 \pm 0.095$	$0.044 \pm 0.125$
PRF-fit source offset from KIC position	$0.079 \pm 0.087$	0.91	$0.075 \pm 0.074$	$-0.026 \pm 0.140$
photometric centroid source offset	$0.64 \pm 0.66$	0.97	$0.26 \pm 1.15$	$0.59 \pm 0.51$

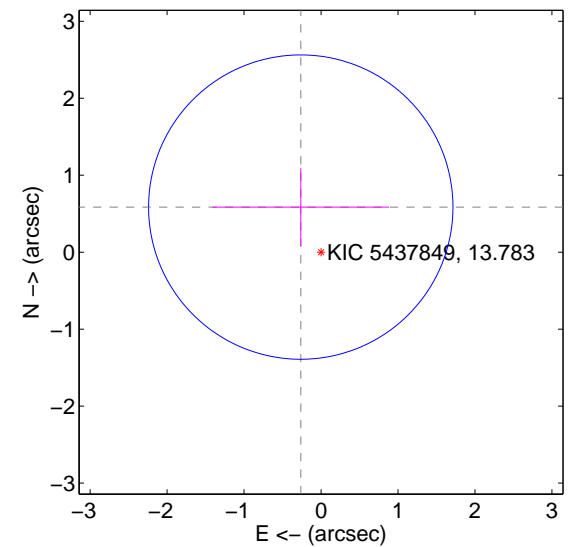
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

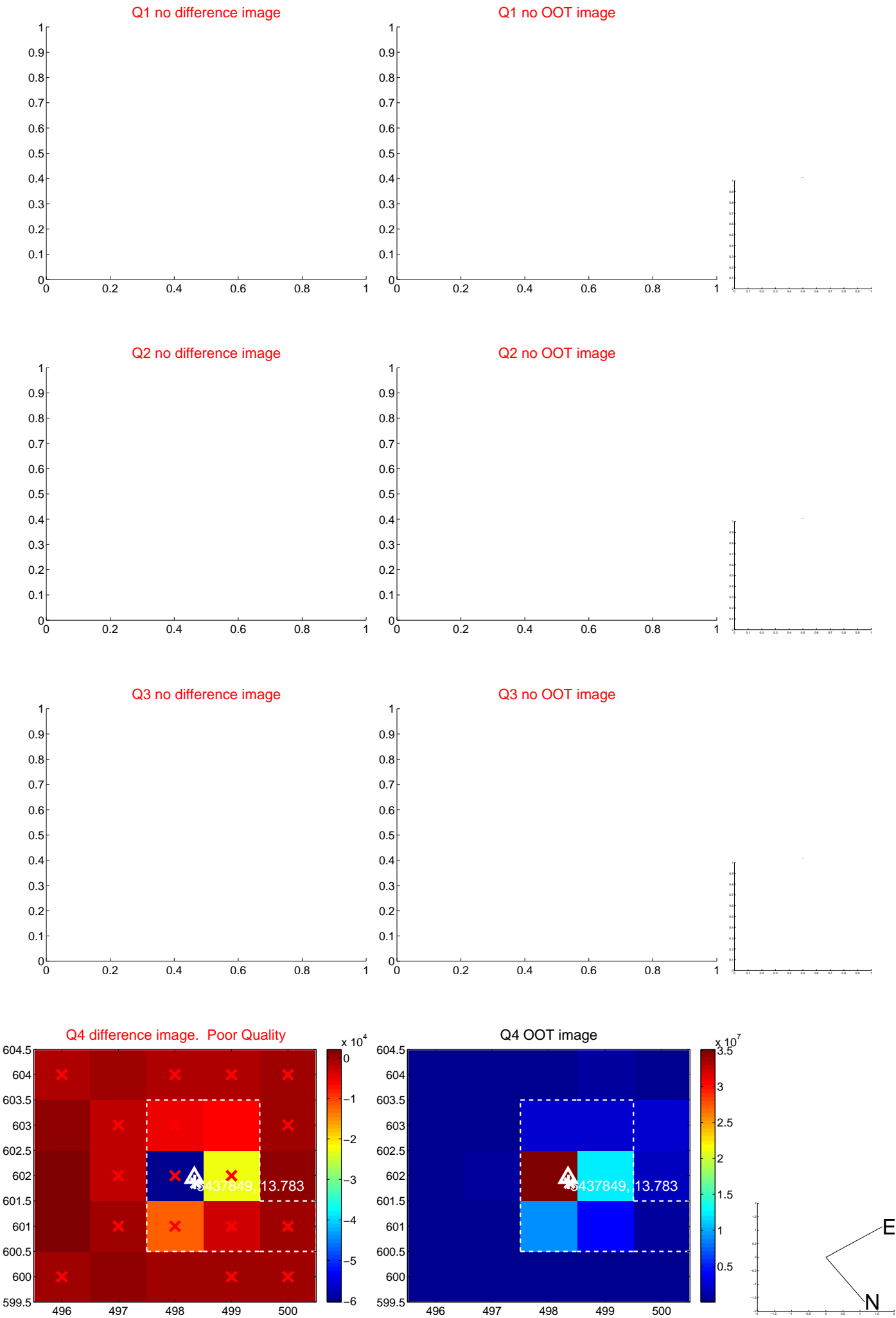


offset from photometric centroids



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

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

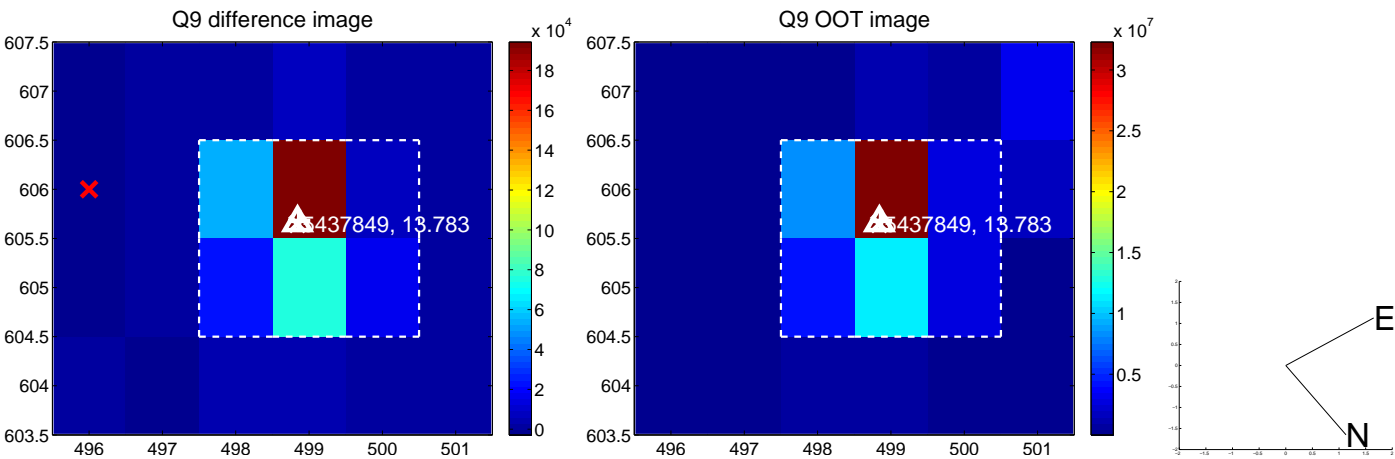


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

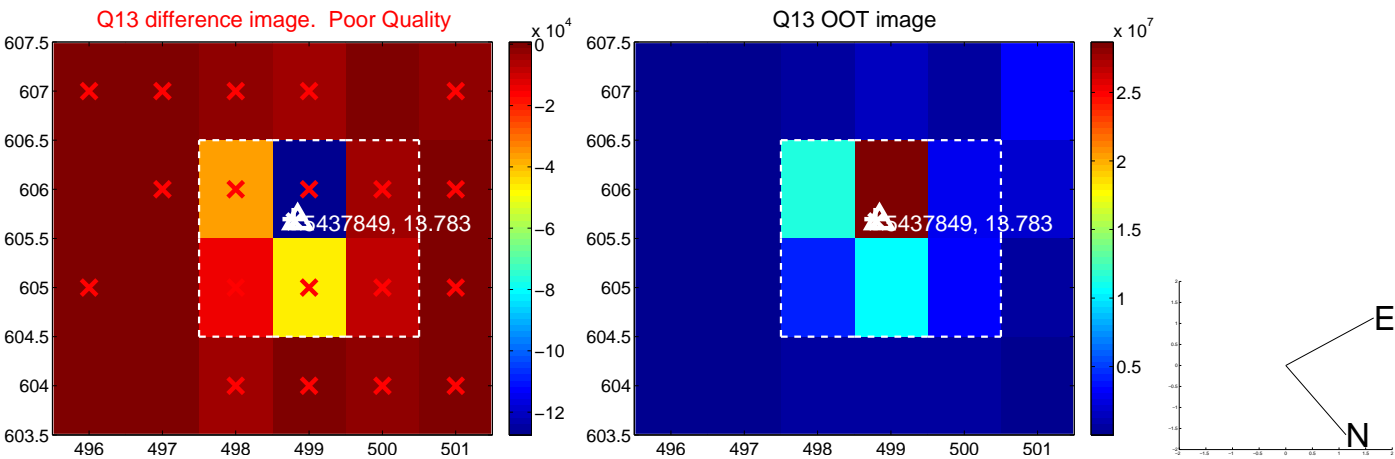




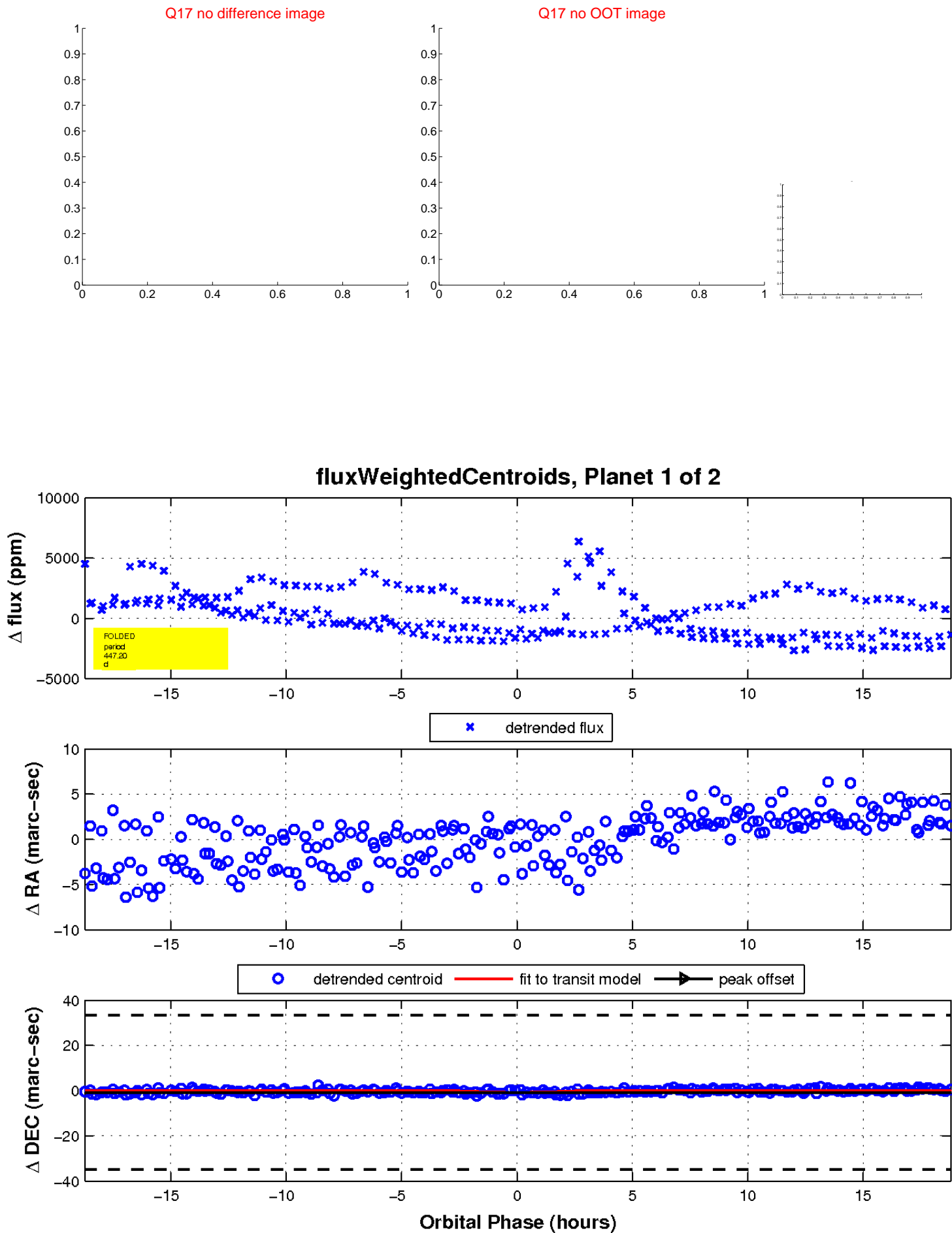
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

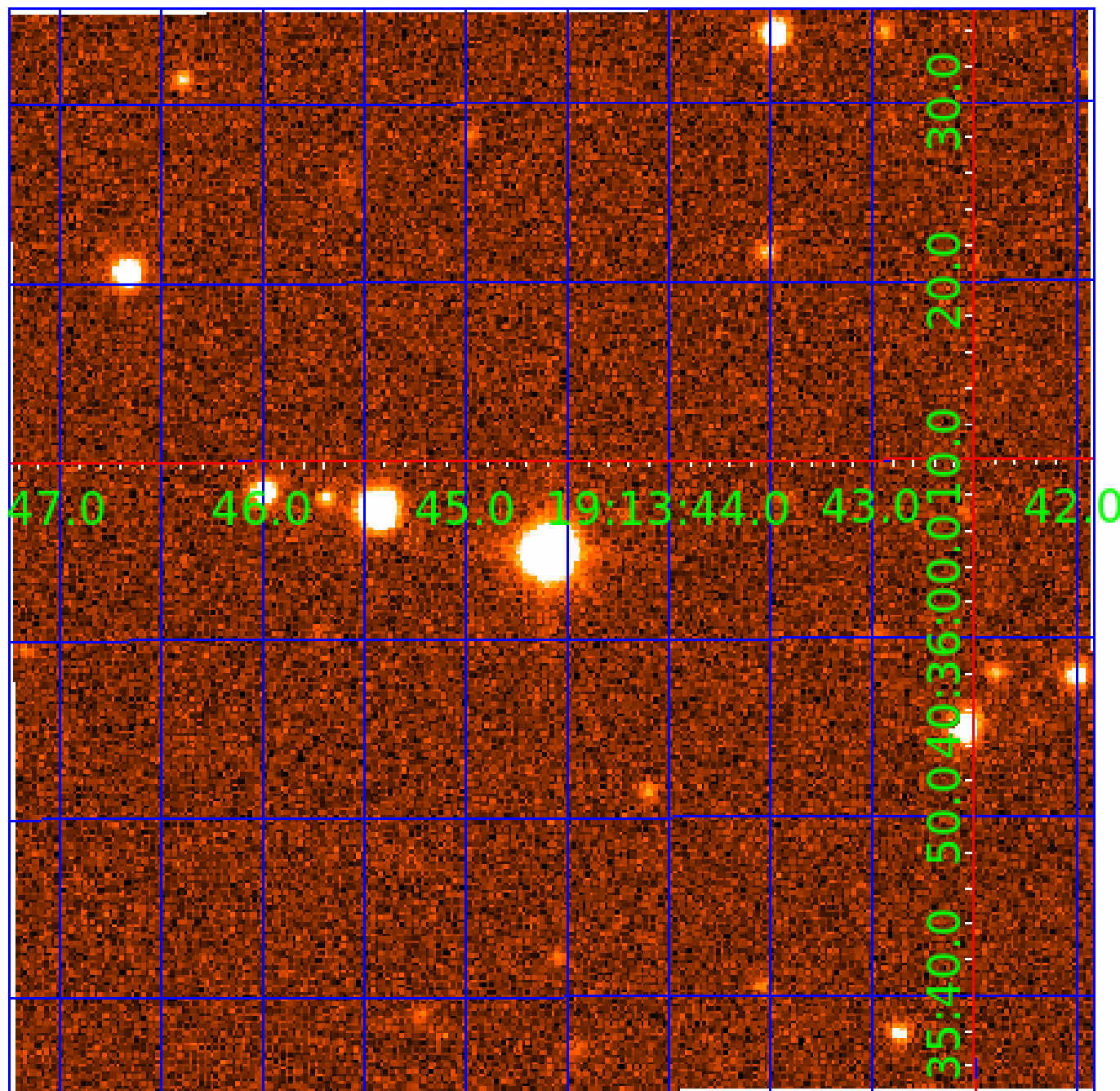


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 005437849

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005437849-01	OBS	No	447.200149	367.962151	1303.5	6.274	16.4	5.9	2.72	5380	19.27	3.68
005437849-02	OBS	No	381.217284	422.743280	1518.9	7.906	10.5	6.4	2.72	5380	14.32	4.56

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005437849-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_ZUMA—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
005437849-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—ALL_TRANS_CHASES—MOD_NONUNIQ_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.

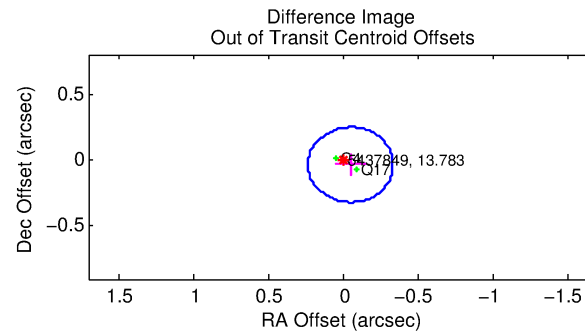
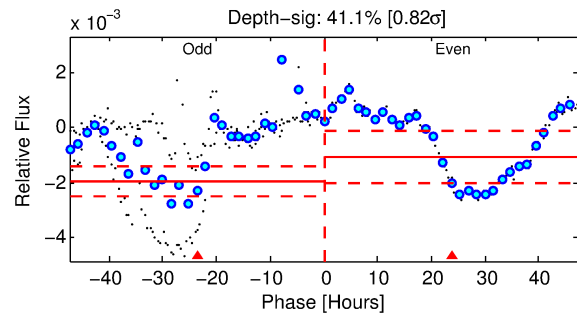
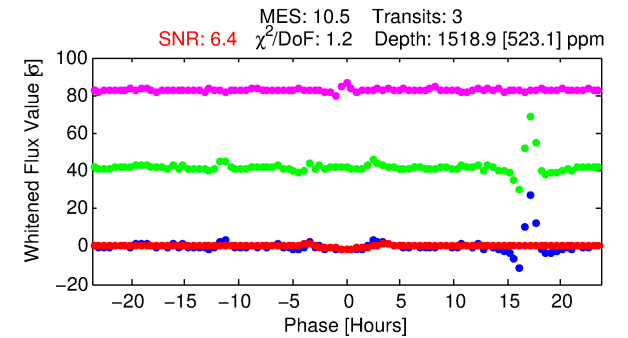
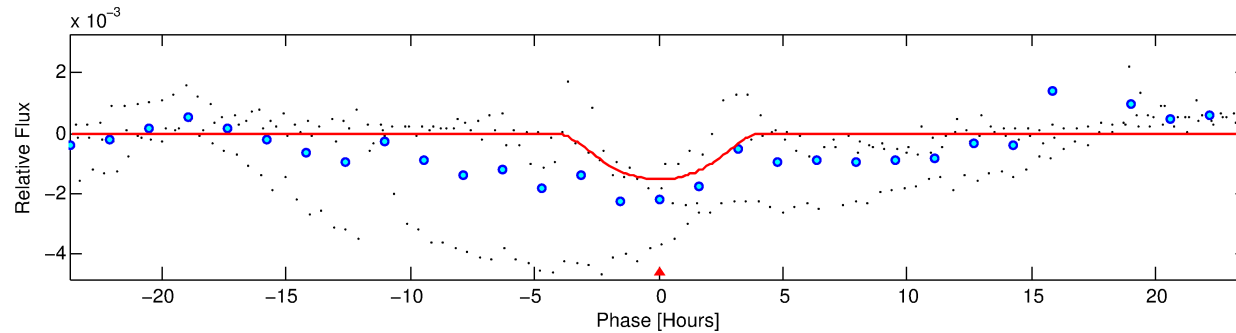
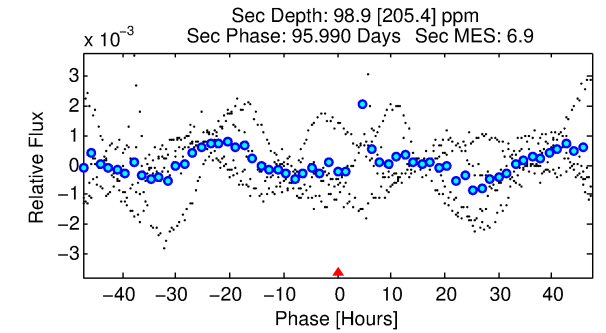
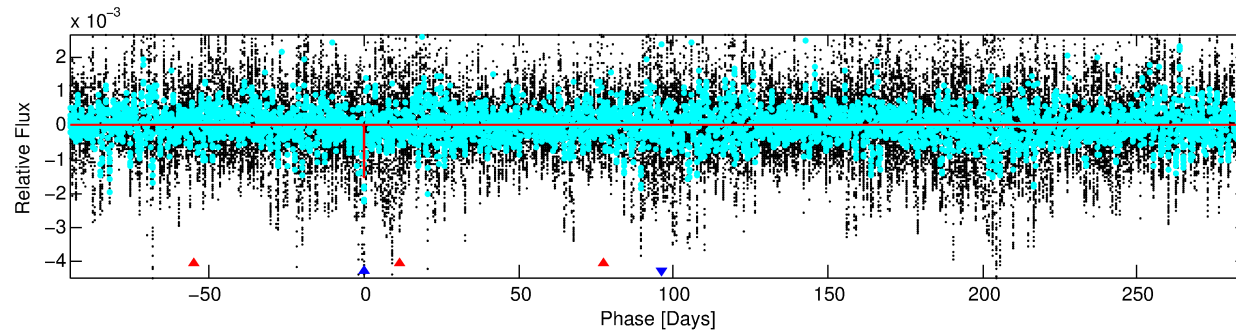
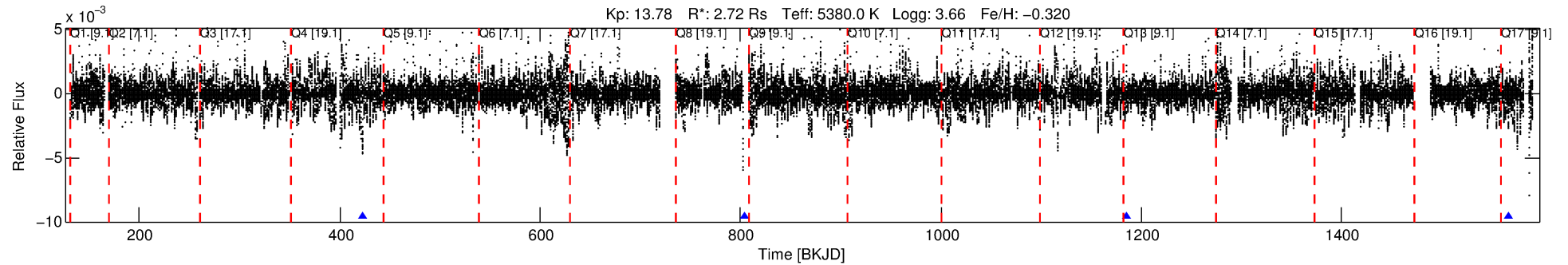
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 005437849-02

No Significant Match Found

# DV One-Page Summary

KIC: 5437849 Candidate: 2 of 2 Period: 381.217 d



## DV Fit Results:

Period = 381.21728 [0.00978] d  
Epoch = 422.7433 [0.0199] BKJD  
Rp/R\* = 0.0482 [0.0178]  
a/R\* = 154.96 [33.90]  
b = 0.96 [0.04]  
Seff = 4.56 [1.29]  
Teff = 373 [26] K  
Rp = 14.32 [6.21] Re  
a = 1.1056 [0.2104] AU  
Ag = 324.26 [720.20] [0.45 sigma]  
Teffp = 2444 [1347] K [1.54 sigma]

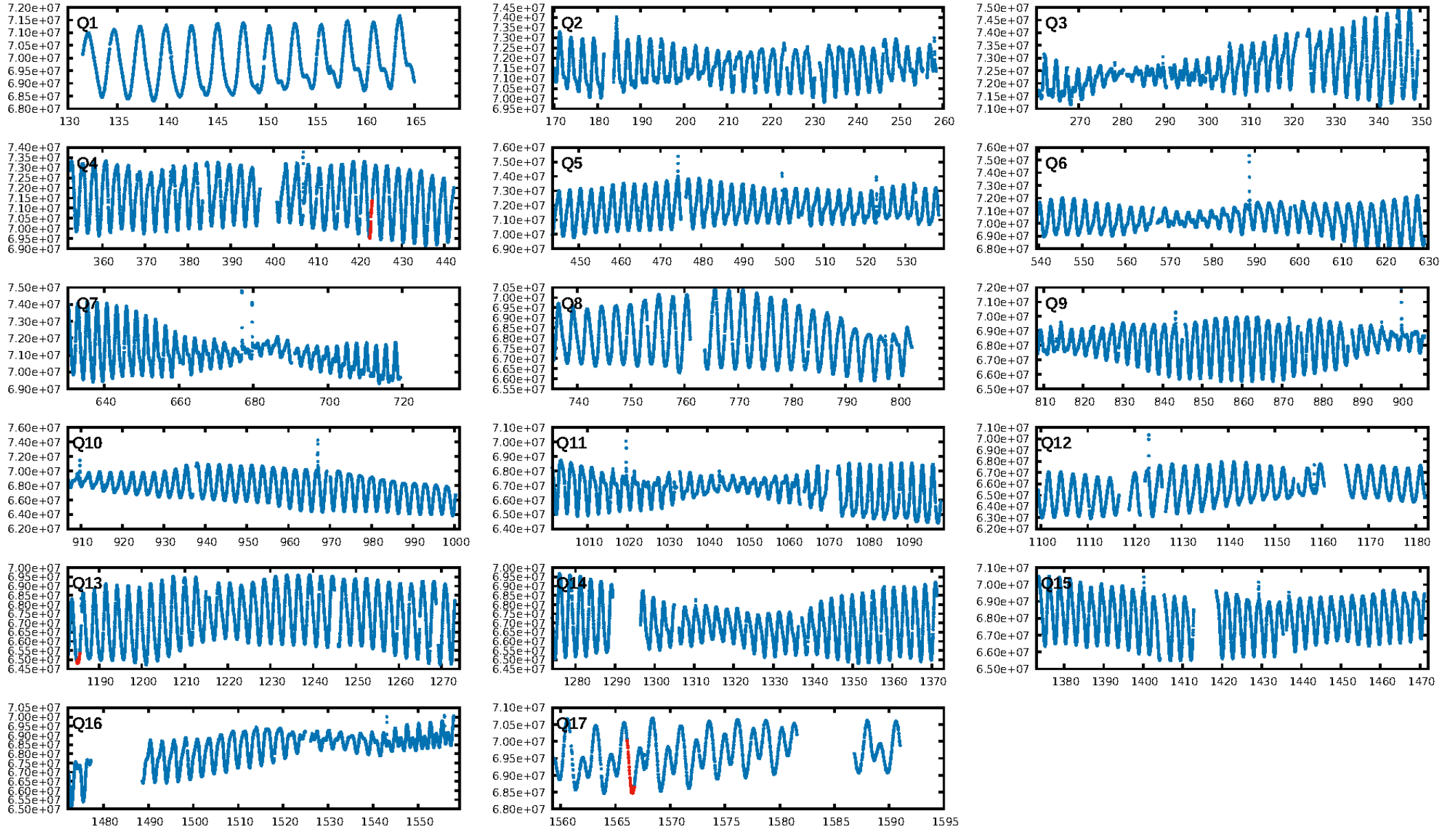
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [156.90 sigma]  
ModelChiSquare2-sig: 23.5%  
ModelChiSquareGof-sig: 99.0%  
**Bootstrap-pfa: 5.92e-08**  
RollingBand-fgt: 1.00 [2/2]  
**GhostDiagnostic-chr: 0.2776**  
Centroid-sig: N/A  
Centroid-so: 0.880 arcsec [0.99 sigma]  
OotOffset-rm: 0.064 arcsec [0.67 sigma]  
OotOffset-st: 0/0/1/1 [2]  
KicOffset-rm: 0.116 arcsec [1.63 sigma]  
KicOffset-st: 0/0/1/1 [2]  
DiffImageQuality-fgm: 1.00 [2/2]  
DiffImageOverlap-fno: 1.00 [2/2]

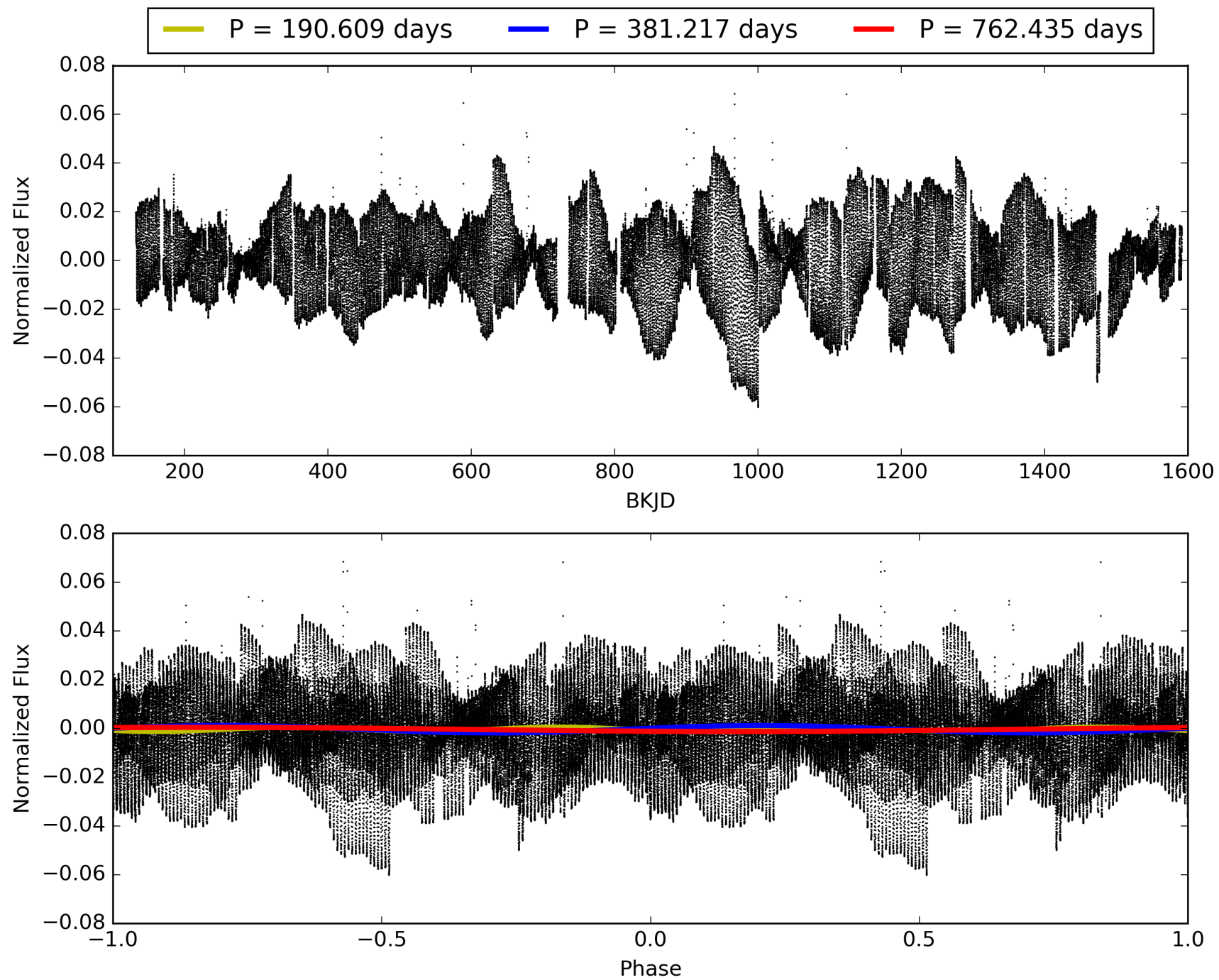
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 18:59:51 Z

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

# TCE 005437849-02, PDC Light Curves



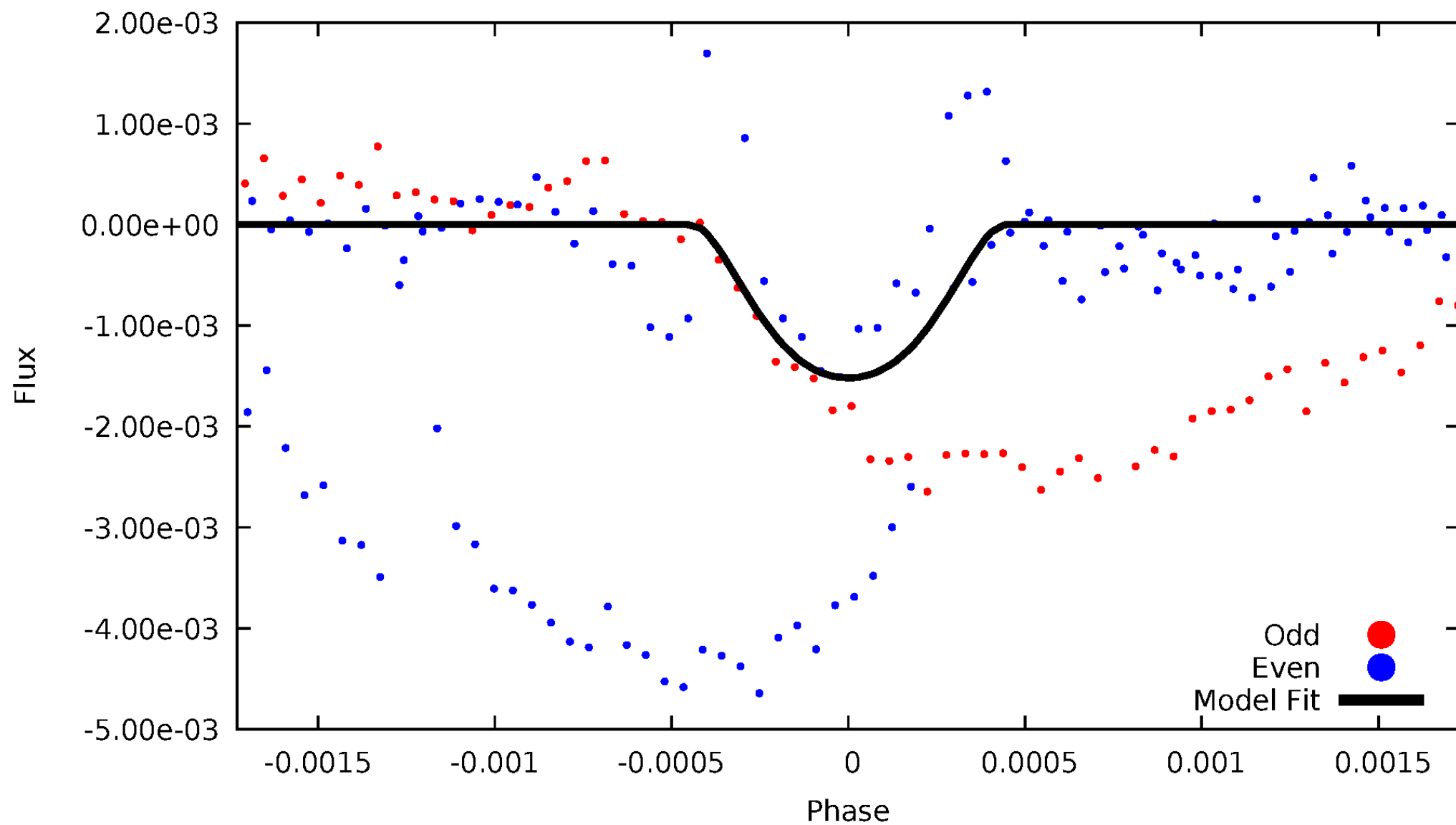
TCE 005437849-02





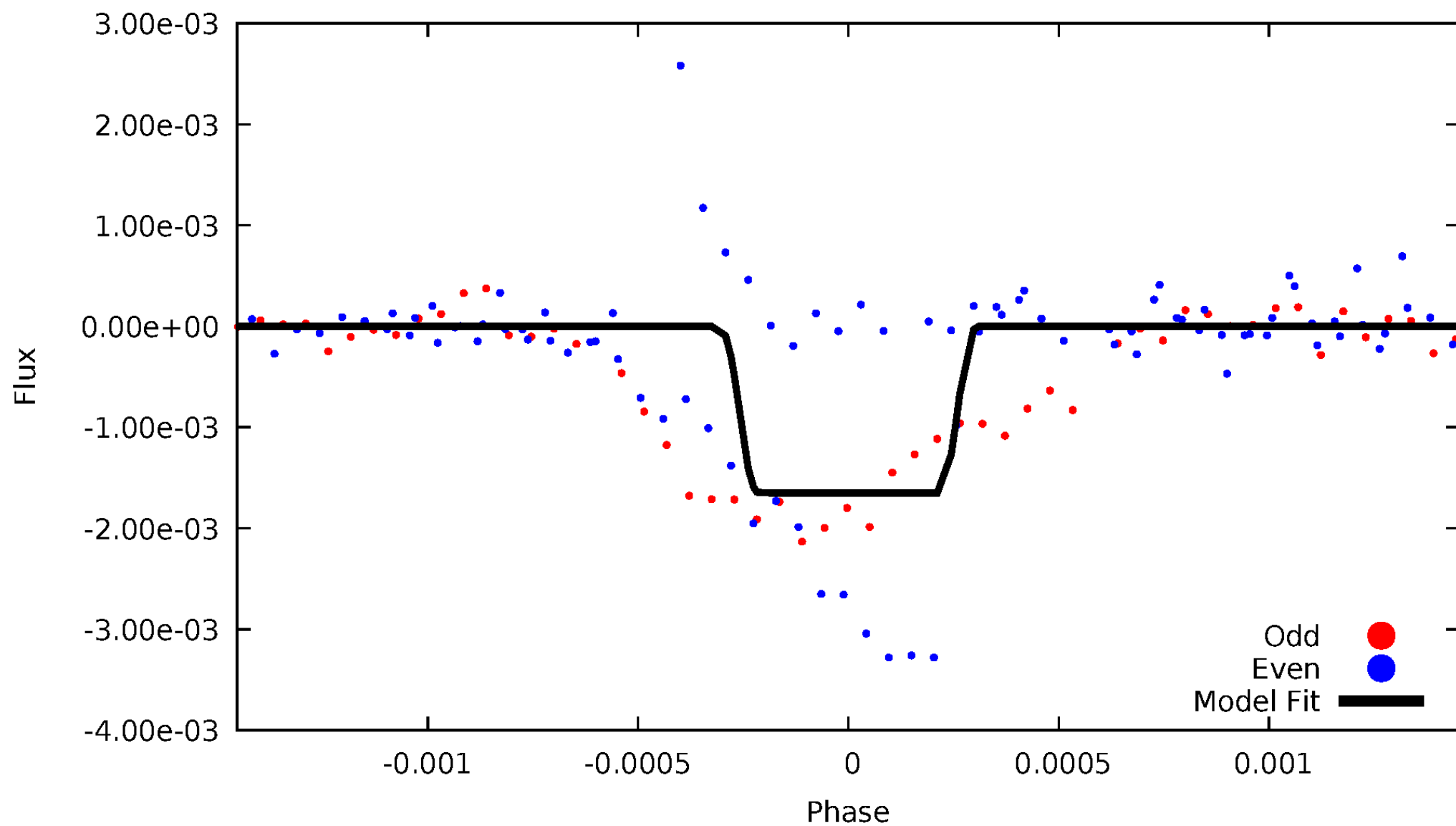
# DV Odd/Even

TCE 005437849-02



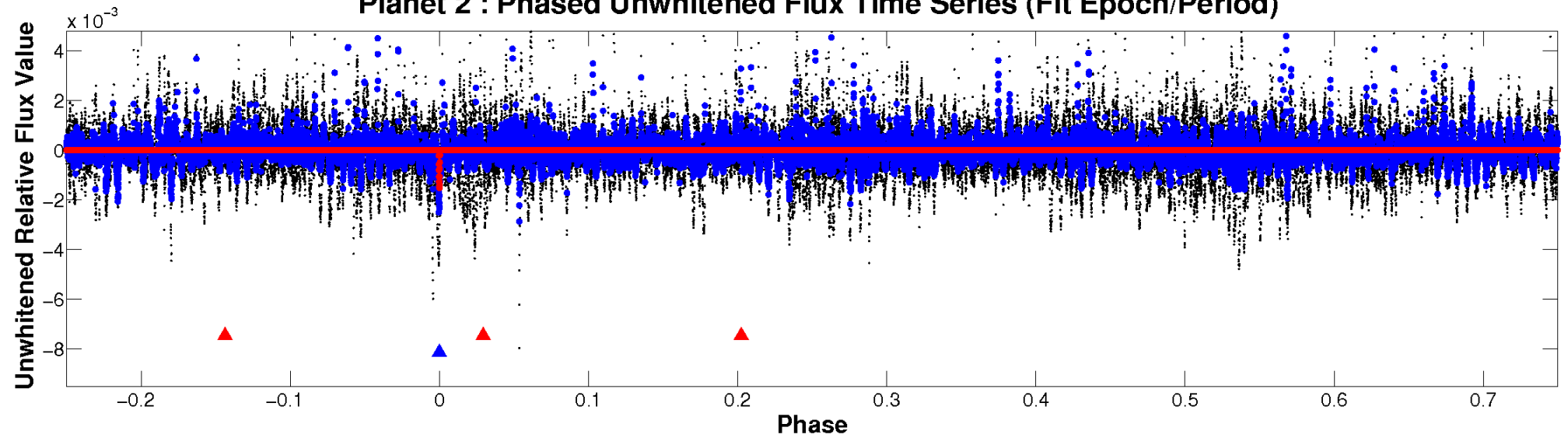
# ALT Odd/Even

TCE 005437849-02

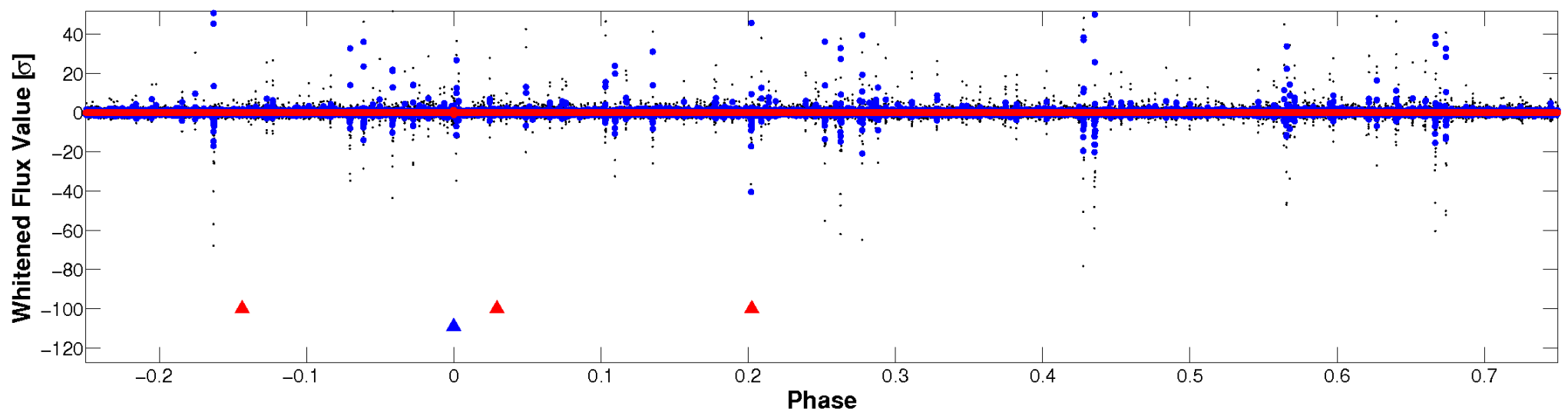


# Non-Whitened Vs. Whitened Light Curve

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

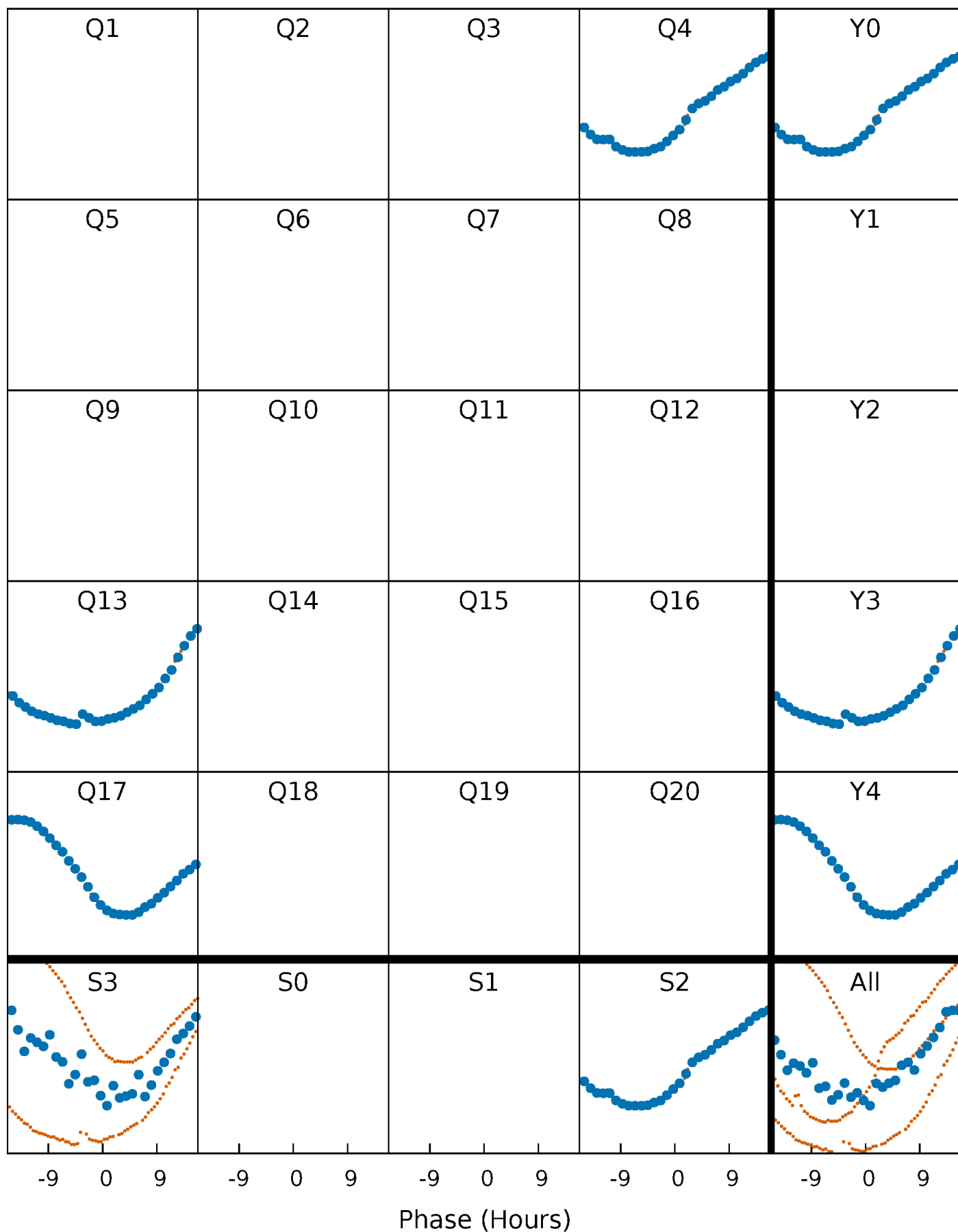


**Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



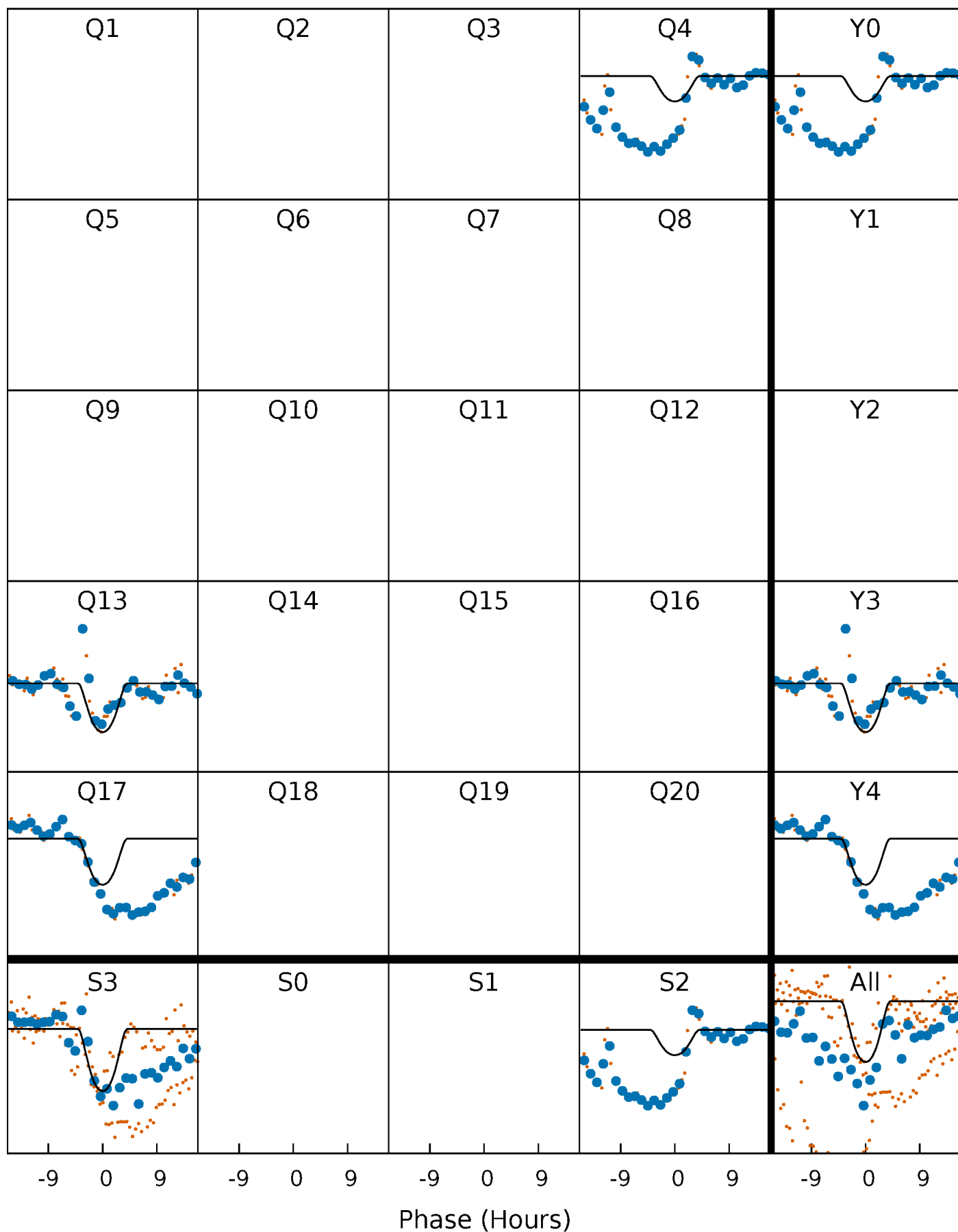
# PDC Quarter-Phased Transit Curves

TCE 005437849-02     $P=381.217284$  Days     $T_0=422.743280$  (BKJD)



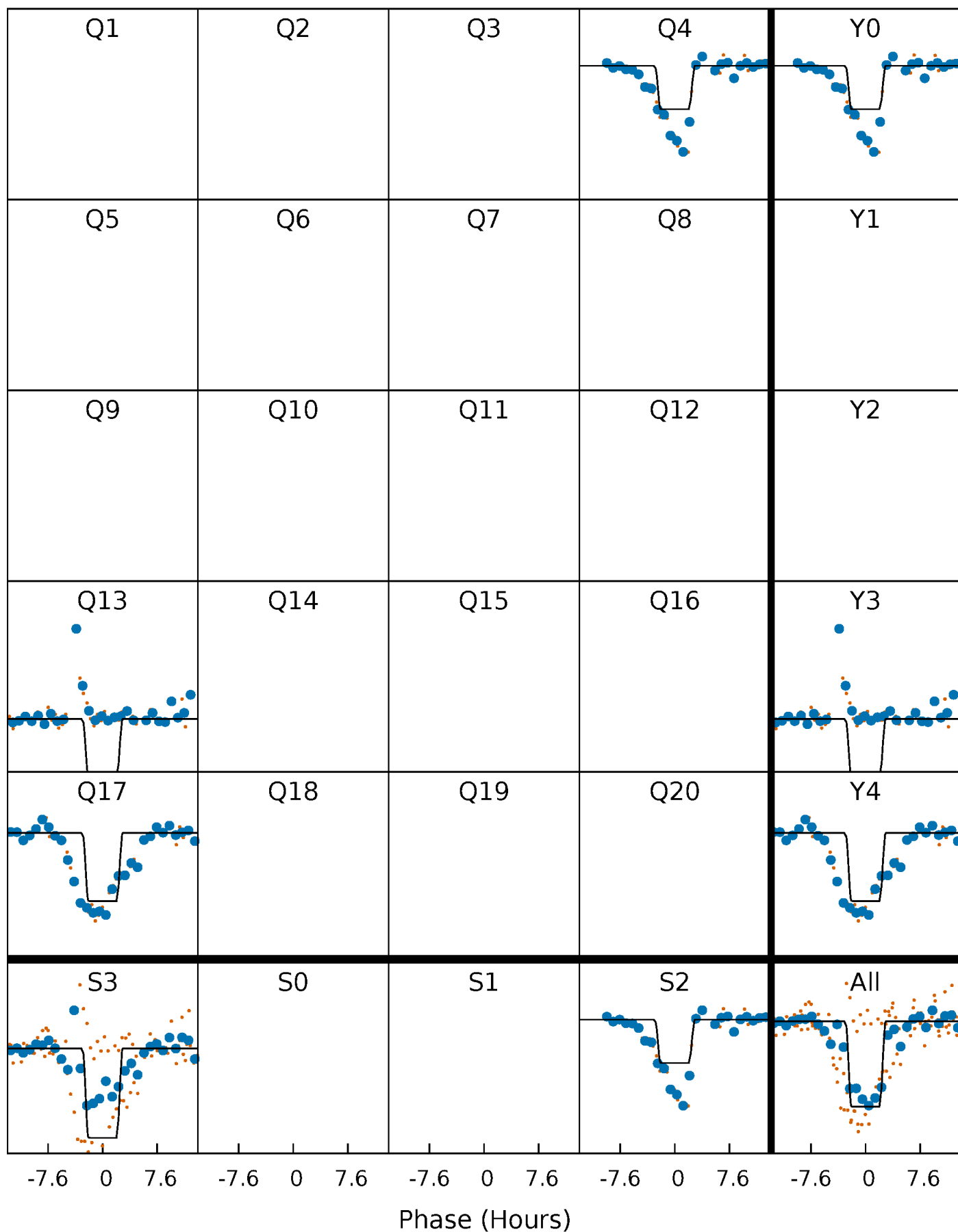
# DV Quarter-Phased Transit Curves

TCE 005437849-02 P=381.217284 Days  $T_0=422.743280$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

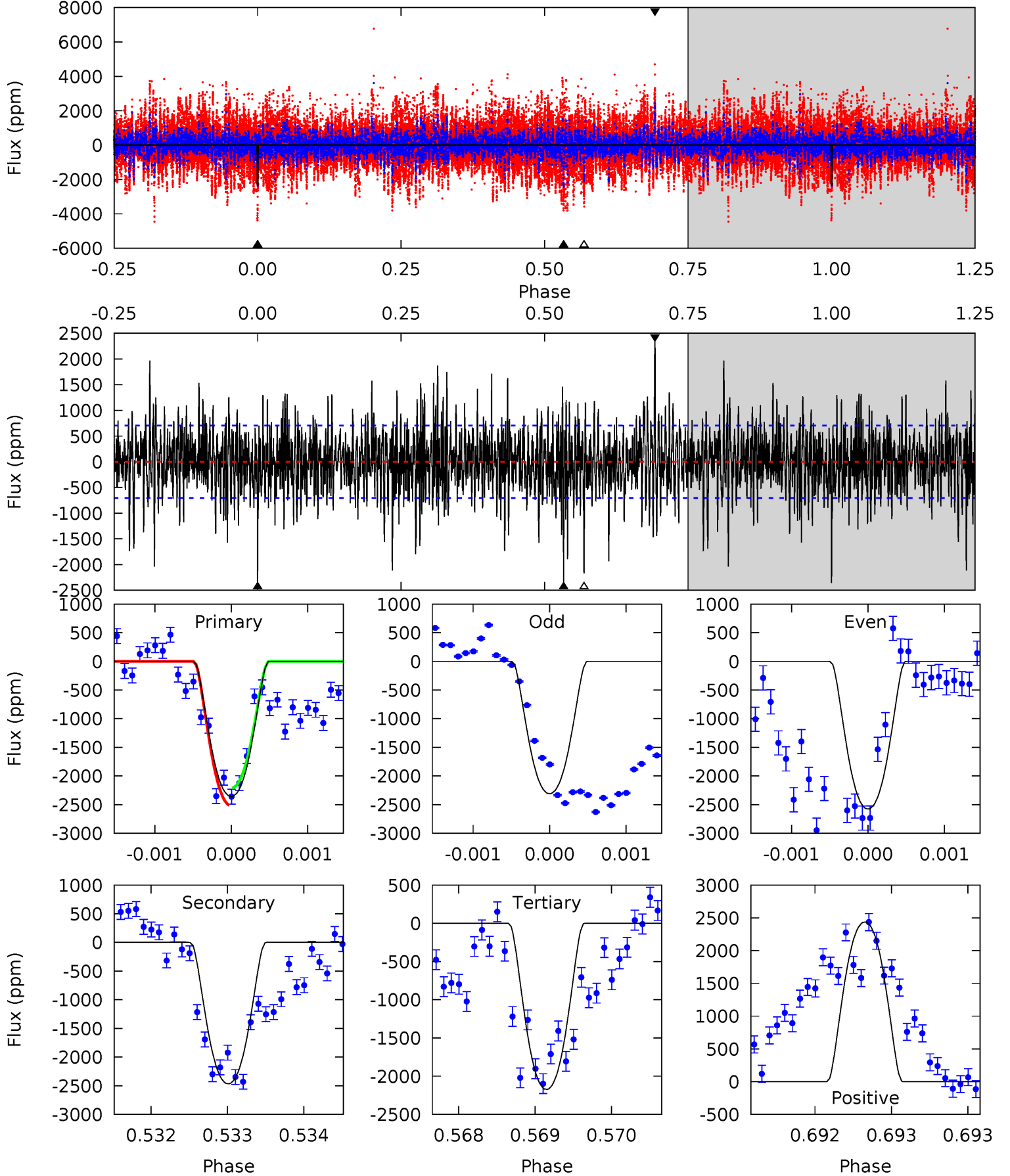
TCE 005437849-02 P=381.242551 Days  $T_0=422.733330$  (BKJD)



# DV Model-Shift Uniqueness Test

005437849-02, P = 381.217284 Days, E = 41.525996 Days

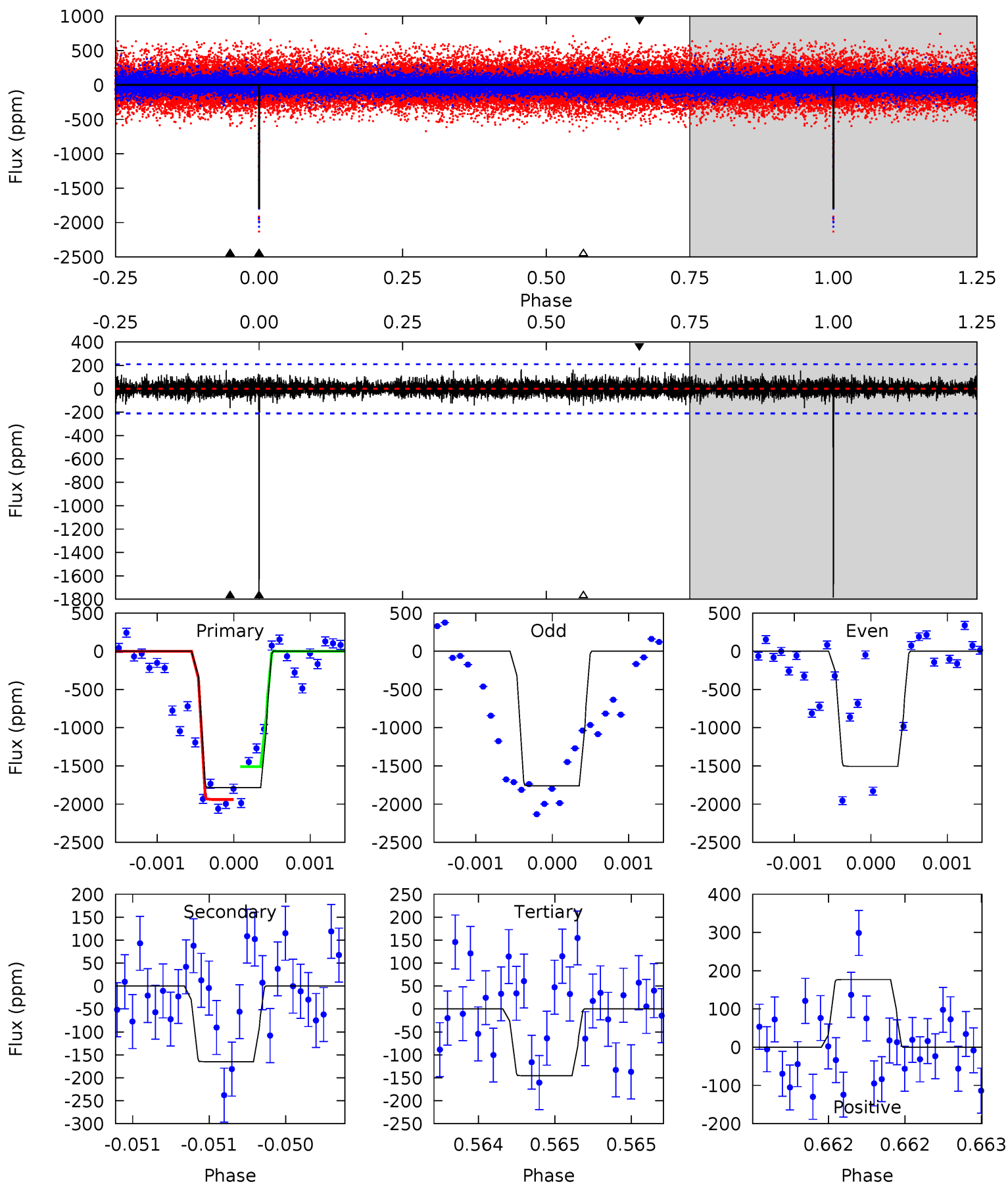
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
18.3	19.1	16.8	18.9	5.47	3.32	4.10	1.43	-0.62	2.27	0.22	0.90	1.05	0.50	1.17



# Alt Model-Shift Uniqueness Test

005437849-02, P = 381.242551 Days, E = 41.490779 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
47.1	4.35	3.84	4.67	5.54	3.43	0.86	43.2	42.4	0.51	-0.32	4.17	0.82	0.09	5.67





### Stellar Parameters For KIC 005437849

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5380^{+72}_{-88}$	$3.661^{+0.150}_{-0.100}$	$-0.320^{+0.150}_{-0.150}$	$2.724^{+0.450}_{-0.619}$	$1.240^{+0.135}_{-0.250}$	$0.086^{+0.067}_{-0.027}$
	+1%/-2%	+4%/-3%	+47%/-47%	+17%/-23%	+11%/-20%	+78%/-32%
Source	SPE68	SPE68	SPE68	DSEP		

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

### Secondary Eclipse Parameters for KIC 005437849-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-2466 \pm 129$	$13.71^{+5.68}_{-4.93}$	$517^{+23}_{-29}$	$5457^{+1379}_{-678}$	$8555^{+12245}_{-4093}$
Alt.	$-165 \pm 38$	$11.88^{+5.84}_{-5.21}$	$518^{+23}_{-26}$	$3452^{+750}_{-374}$	$773^{+1558}_{-441}$

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

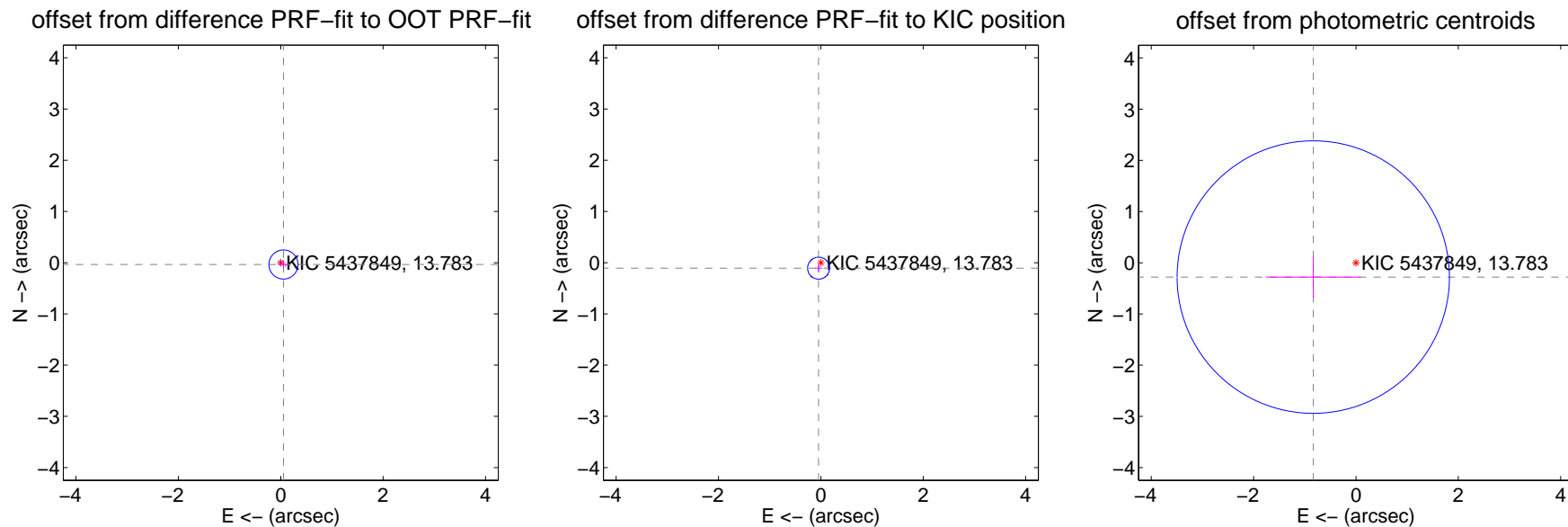
## DV Centroid Data

Supplemental centroid analysis for 005437849-02. Kepler magnitude: 13.78. Transit SNR 6.36

There are 2 quarters with good PRF difference image offsets

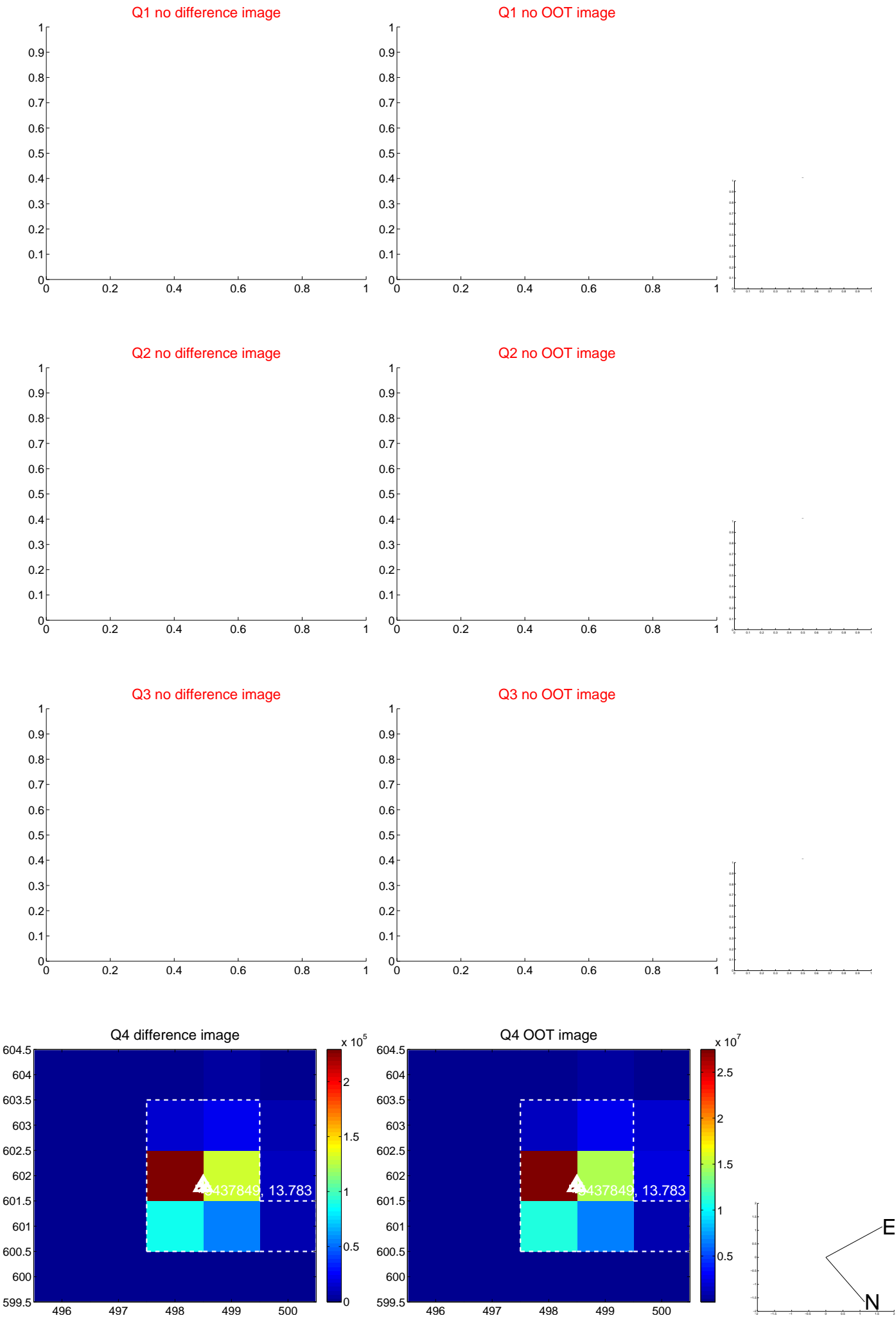
The direct PRF centroid is offset from the target star catalog position by about 0.16 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.064 \pm 0.095$	0.67	$-0.053 \pm 0.100$	$-0.036 \pm 0.081$
PRF-fit source offset from KIC position	$0.116 \pm 0.071$	1.63	$0.045 \pm 0.067$	$-0.107 \pm 0.072$
photometric centroid source offset	$0.88 \pm 0.89$	0.99	$0.83 \pm 0.93$	$-0.28 \pm 0.41$



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



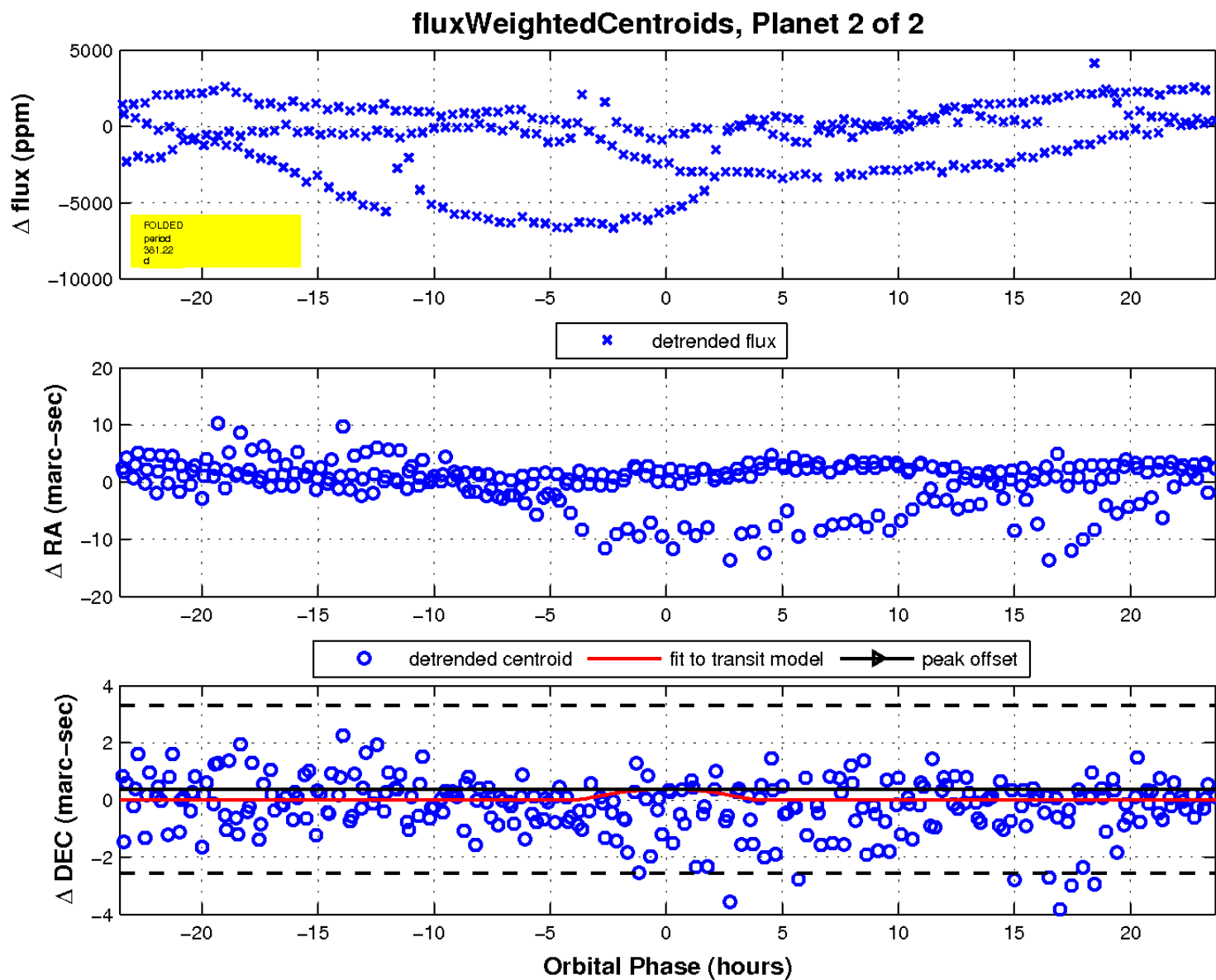
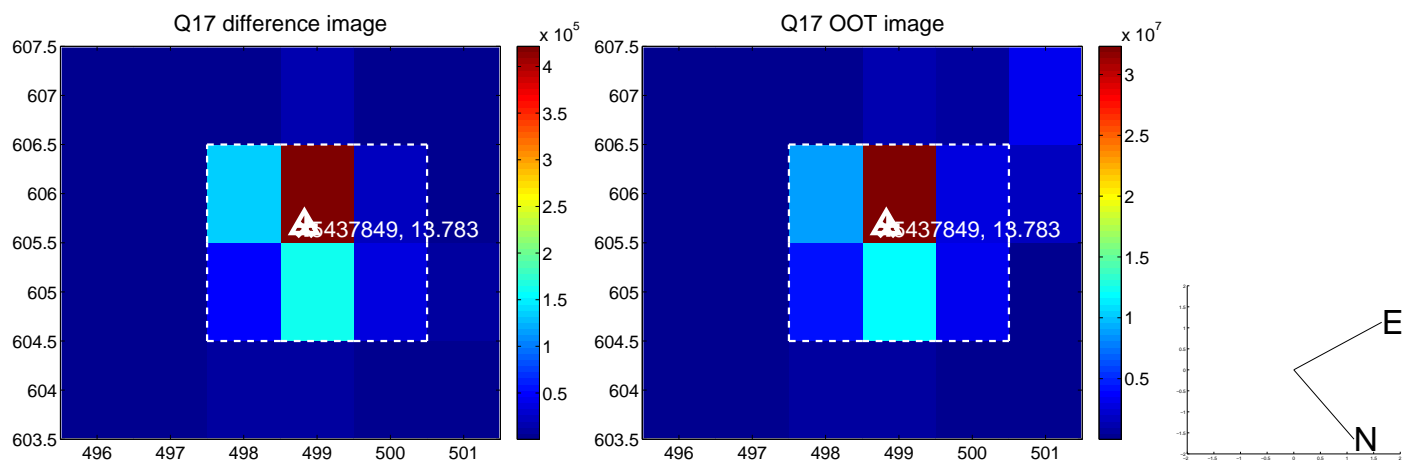
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

