

# KIC 005164458

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005164458-01	OBS	No	337.090889	410.153486	59.9	21.005	11.5	11.9	1.97	7886	1.70	10.14
005164458-02	OBS	No	368.456066	439.159818	74.5	13.366	10.6	9.0	1.97	7886	2.06	9.00

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005164458-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—MOD_POS_DV—INCONSISTENT_TRANS—CENT_SATURATED
005164458-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_SATURATED

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

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

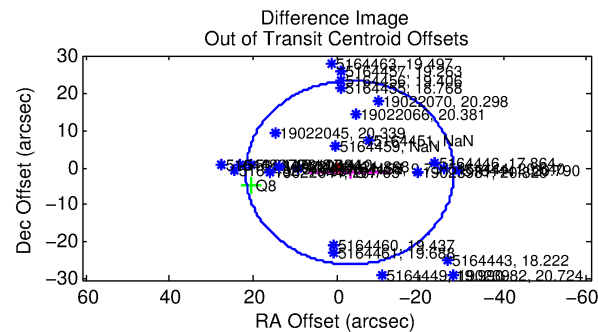
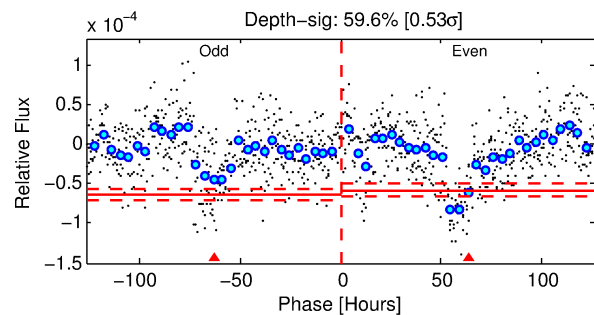
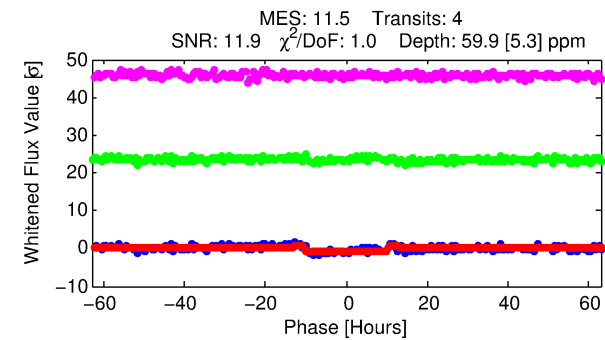
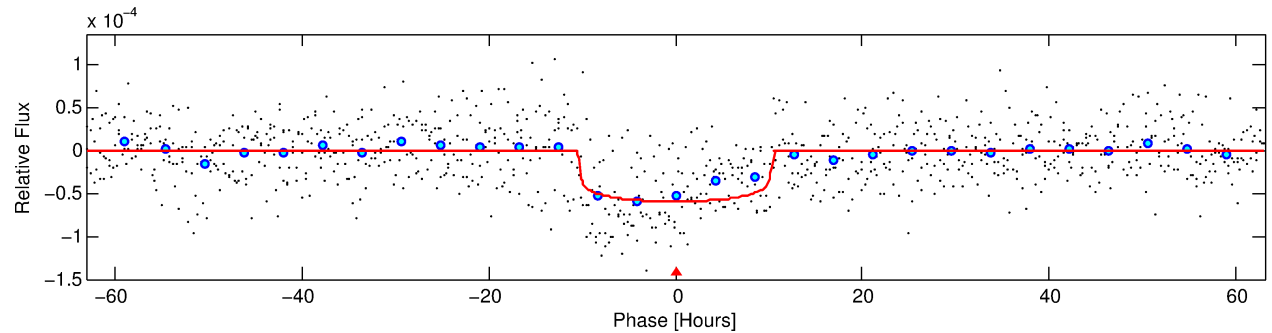
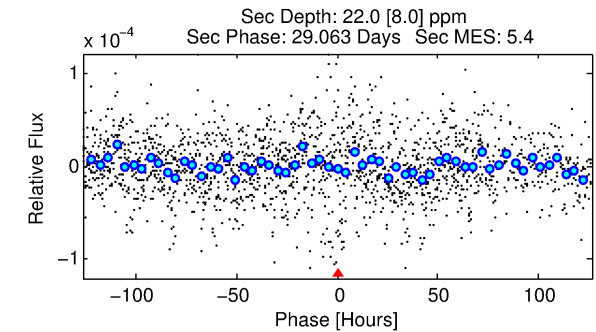
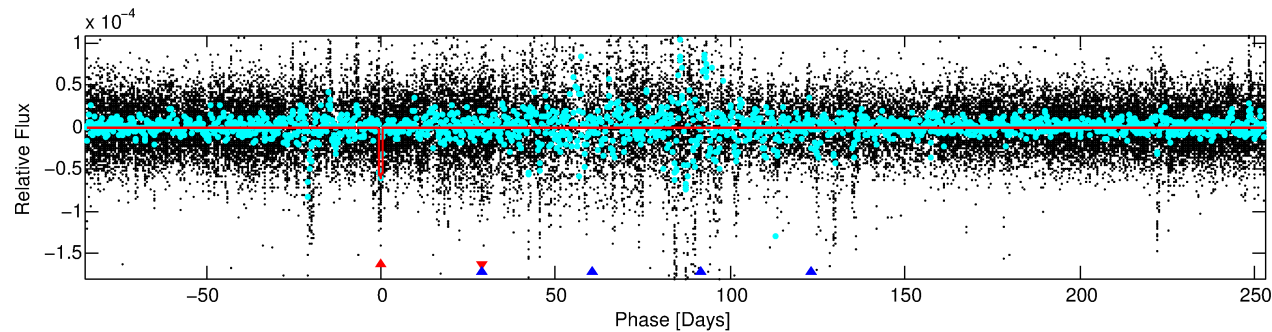
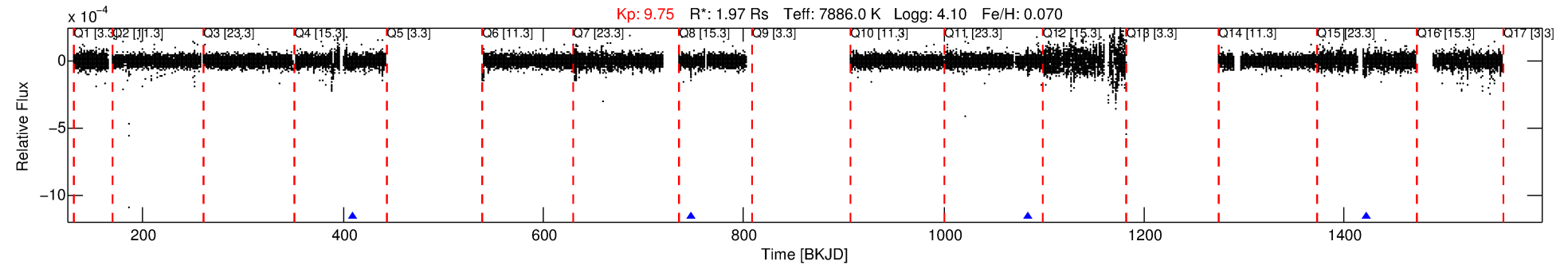
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 005164458-01

No Significant Match Found

# DV One-Page Summary

KIC: 5164458 Candidate: 1 of 2 Period: 337.091 d



## DV Fit Results:

Period = 337.09089 [0.00600] d  
Epoch = 410.1535 [0.0118] BKJD  
Rp/R\* = 0.0079 [0.0006]  
a/R\* = 70.85 [27.66]  
b = 0.83 [0.15]  
Seff = 10.14 [3.50]  
Teff = 455 [39] K  
Rp = 1.70 [0.44] Re  
a = 1.1529 [0.2362] AU  
Ag = 5582.82 [2768.42] [2.02σ]  
Teffp = 6081 [663] K [8.47σ]

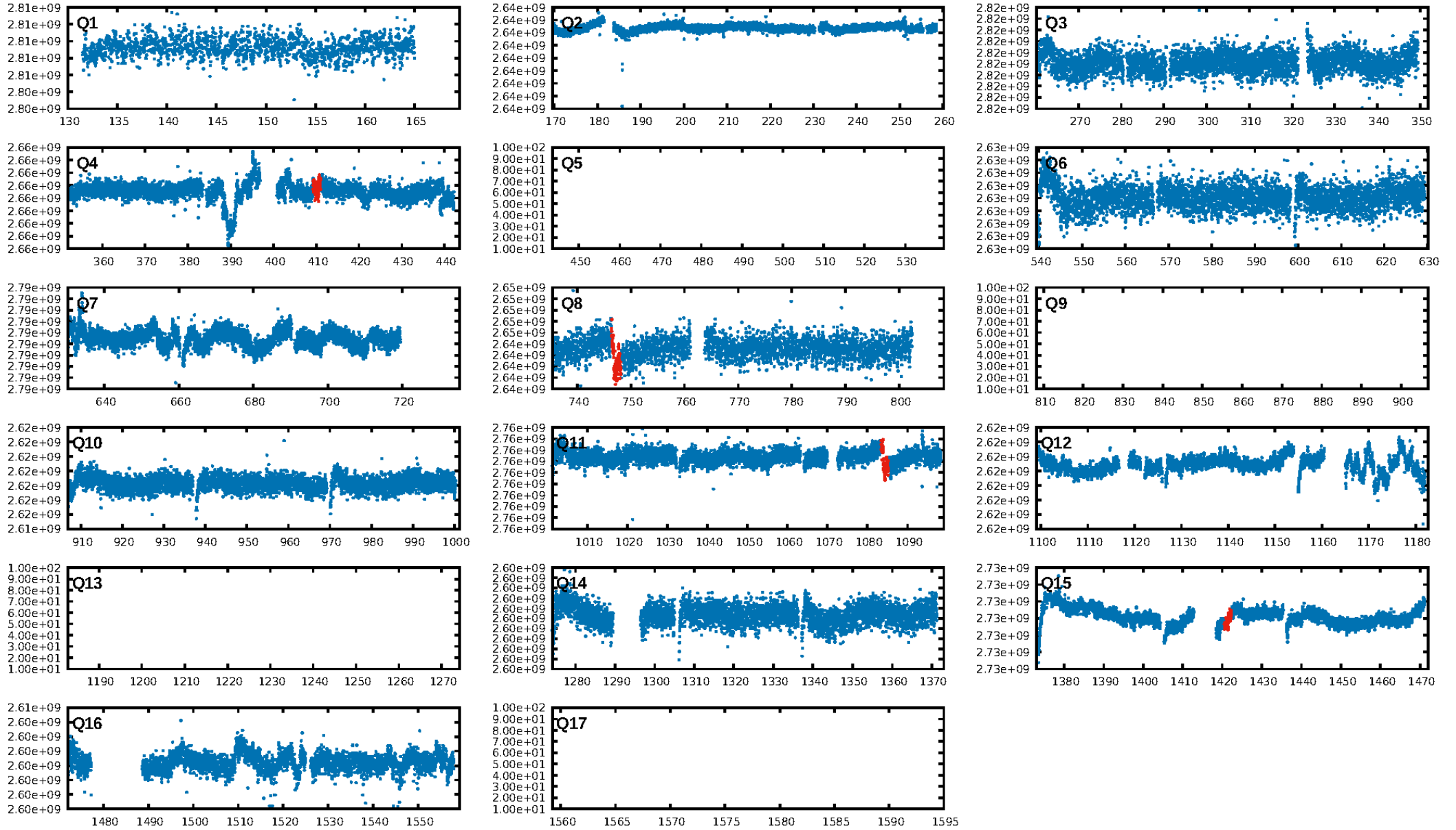
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [30.24σ]  
ModelChiSquare2-sig: 0.5%  
ModelChiSquareGof-sig: 97.7%  
Bootstrap-pfa: 3.67e-13  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: N/A  
Centroid-sig: 11.0%  
Centroid-so: 2.910 arcsec [1.11σ]  
OotOffset-rm: 3.499 arcsec [0.42σ]  
KicOffset-rm: 5.018 arcsec [0.92σ]  
OotOffset-st: 0/0/2/0 [2]  
KicOffset-st: 0/0/2/0 [2]  
DiffImageQuality-fgm: 0.00 [0/2]  
DiffImageOverlap-fno: 1.00 [3/3]

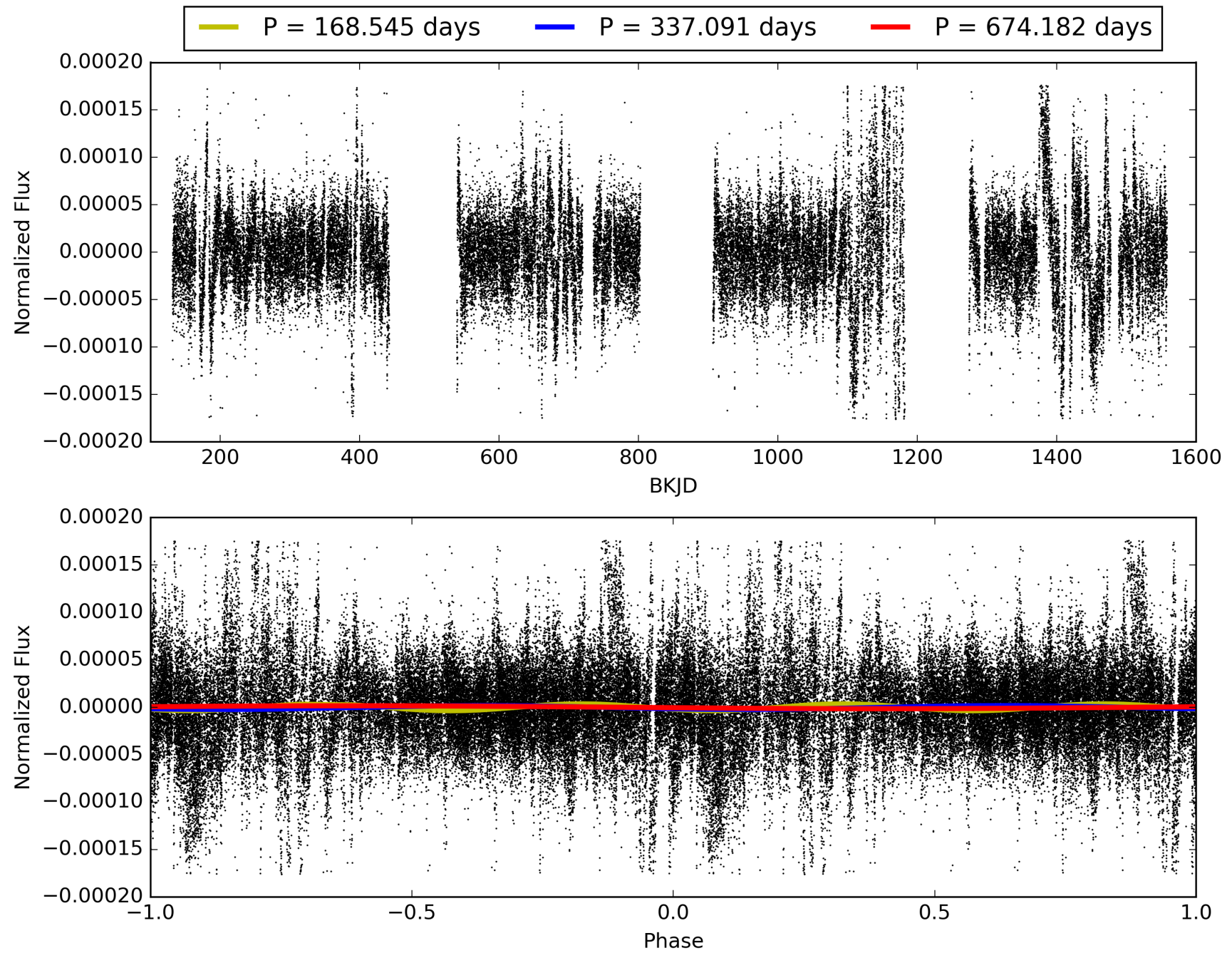
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 05:21:35 Z

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

# TCE 005164458-01, PDC Light Curves

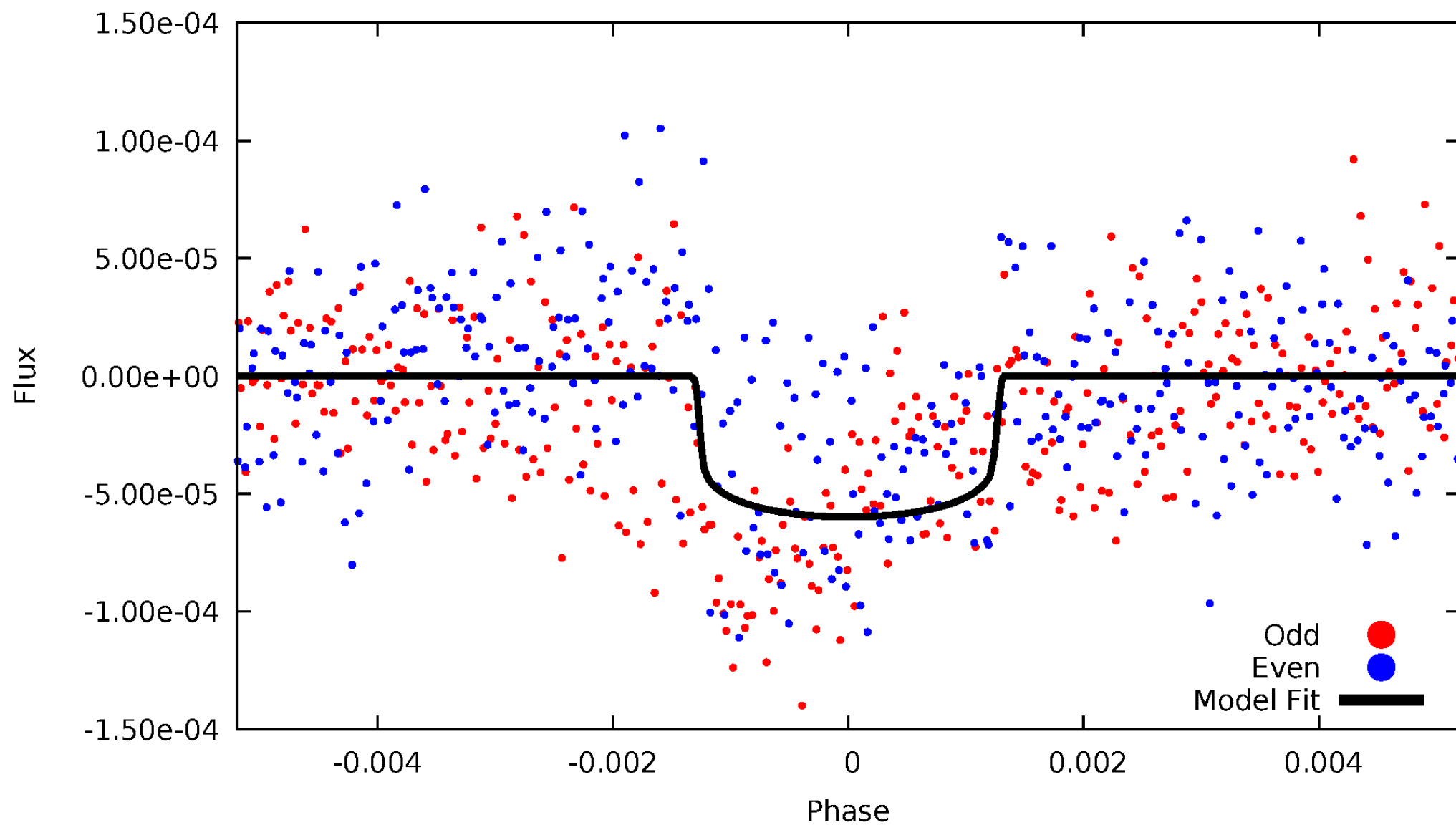


TCE 005164458-01



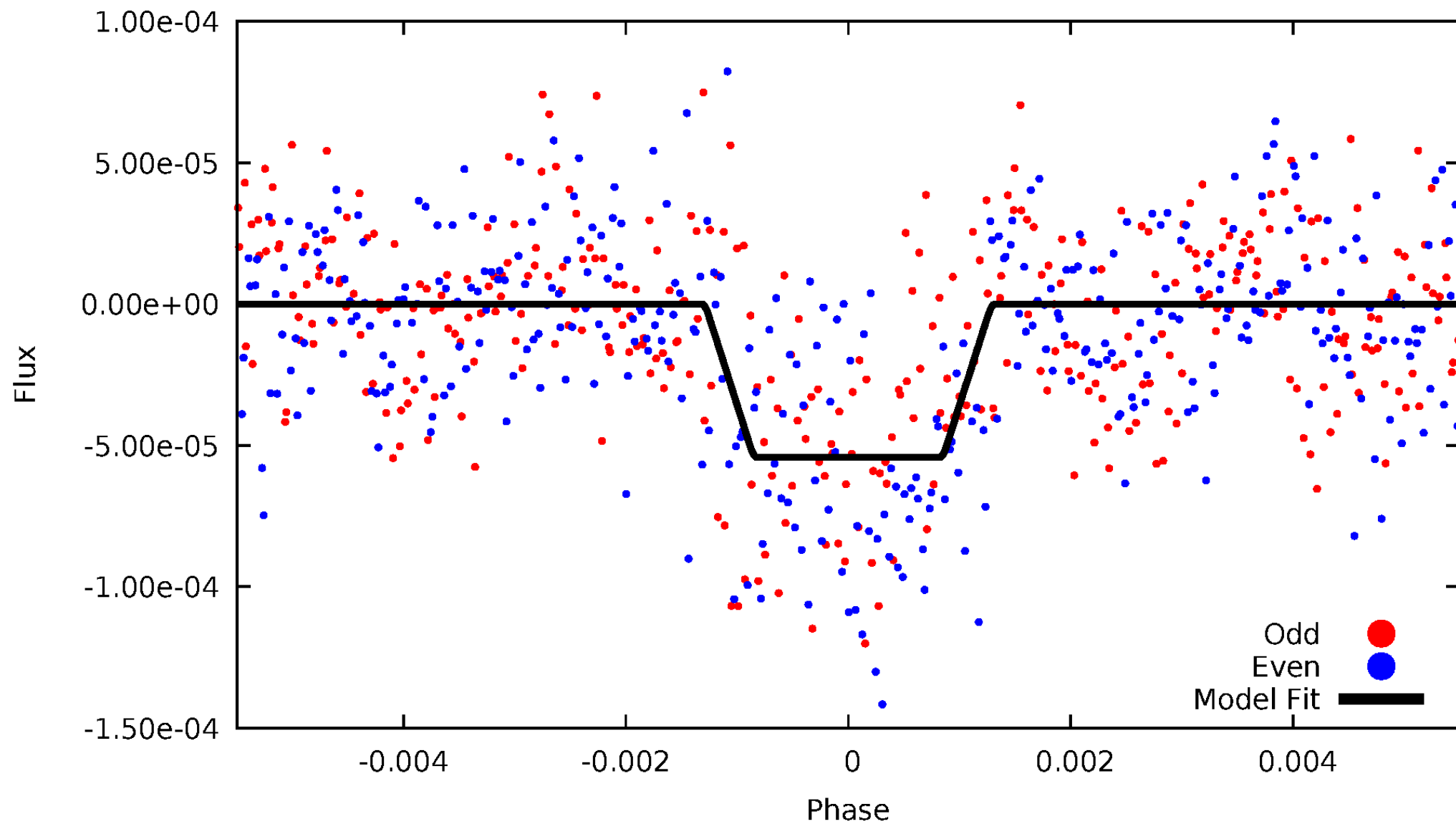
# DV Odd/Even

TCE 005164458-01

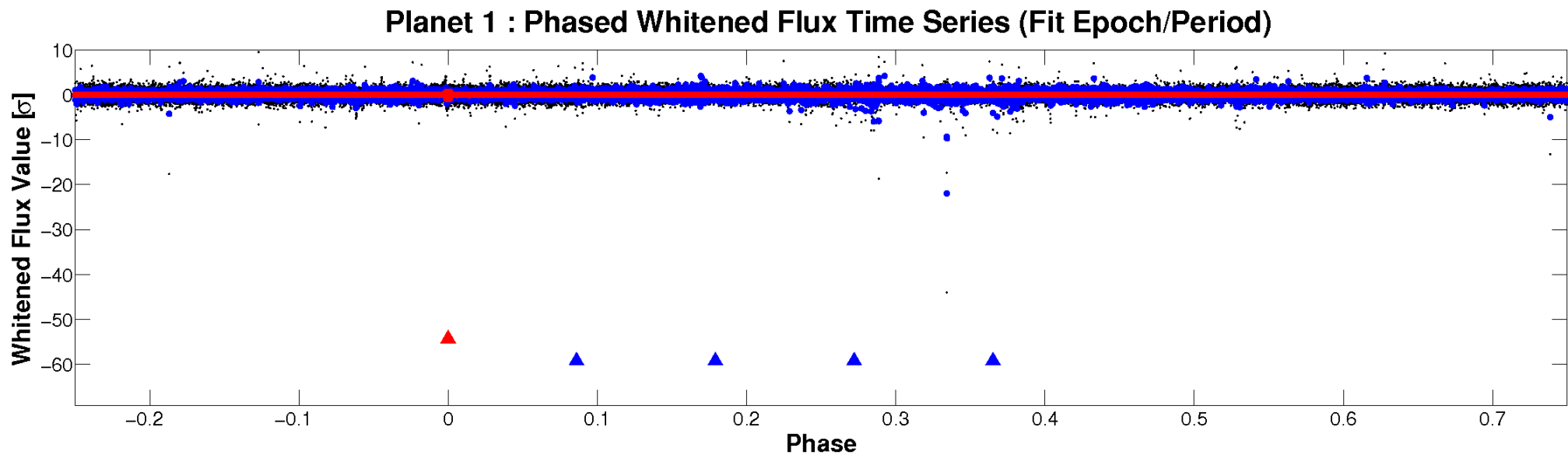
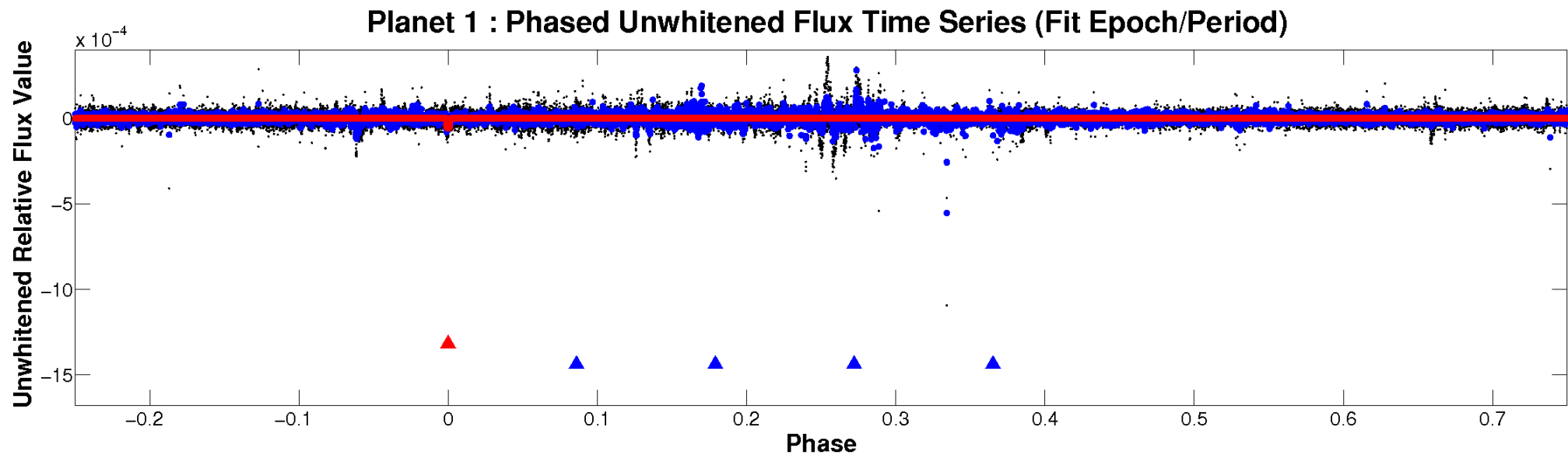


# ALT Odd/Even

TCE 005164458-01

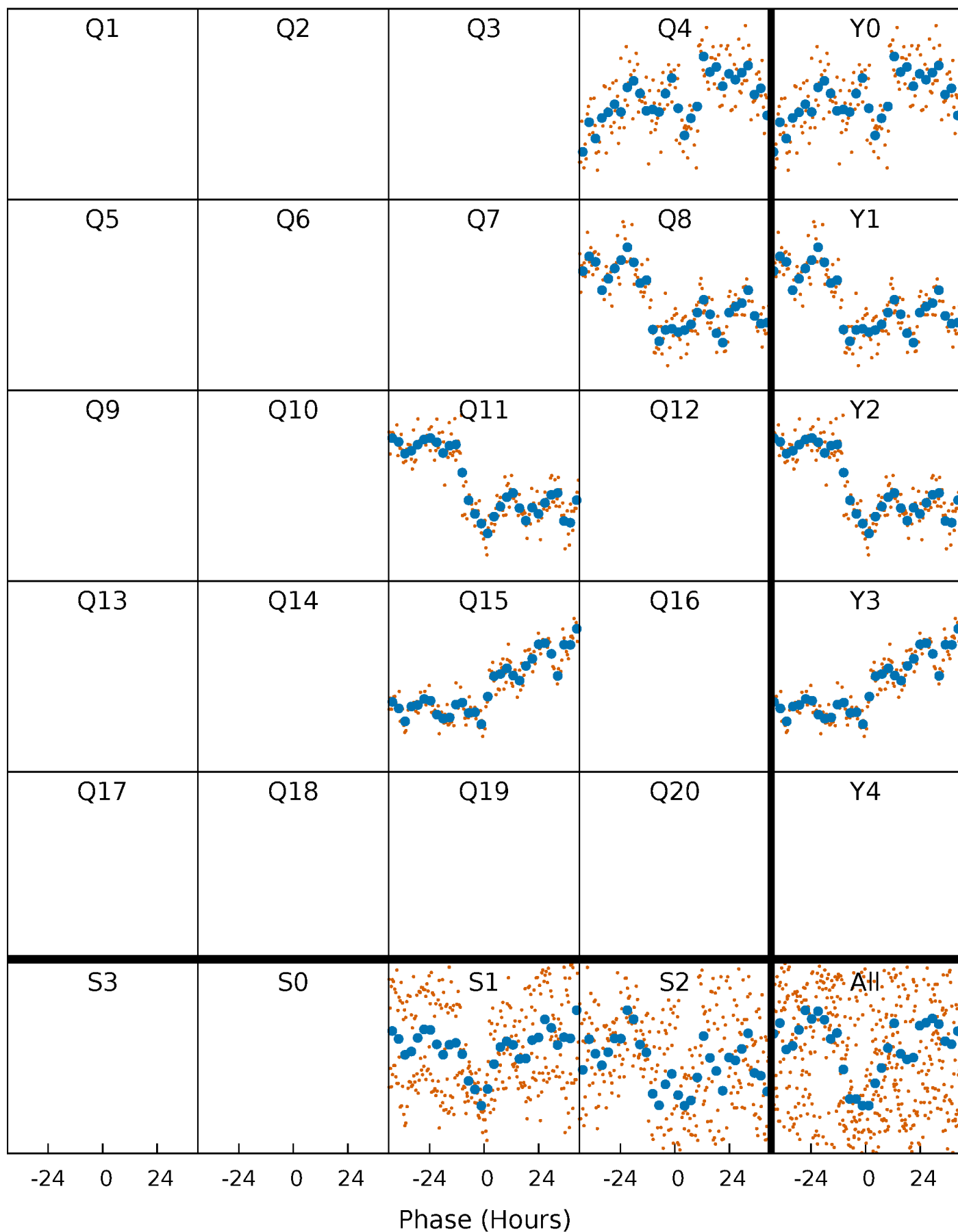


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

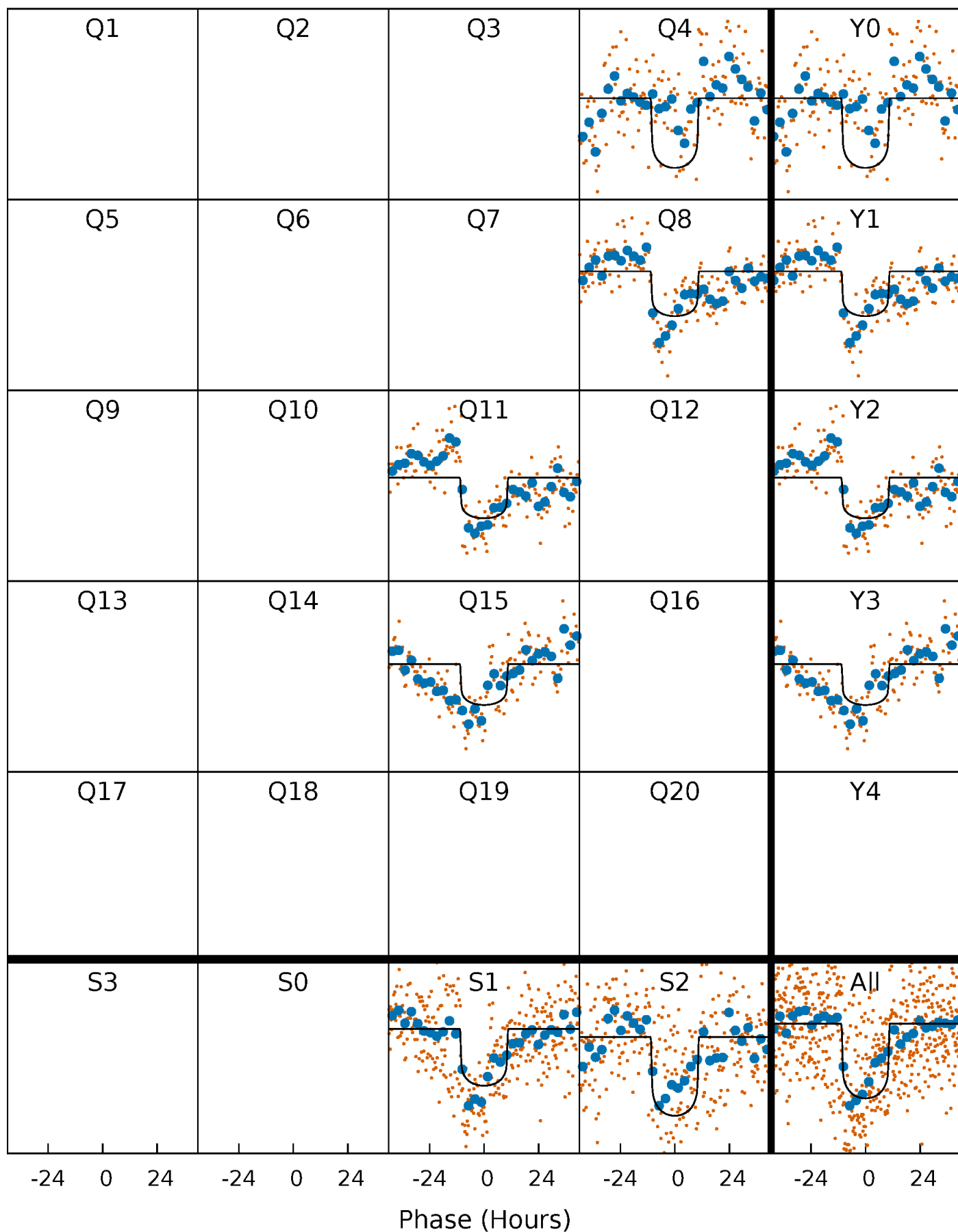
TCE 005164458-01 P=337.090889 Days  $T_0=410.153486$  (BKJD)





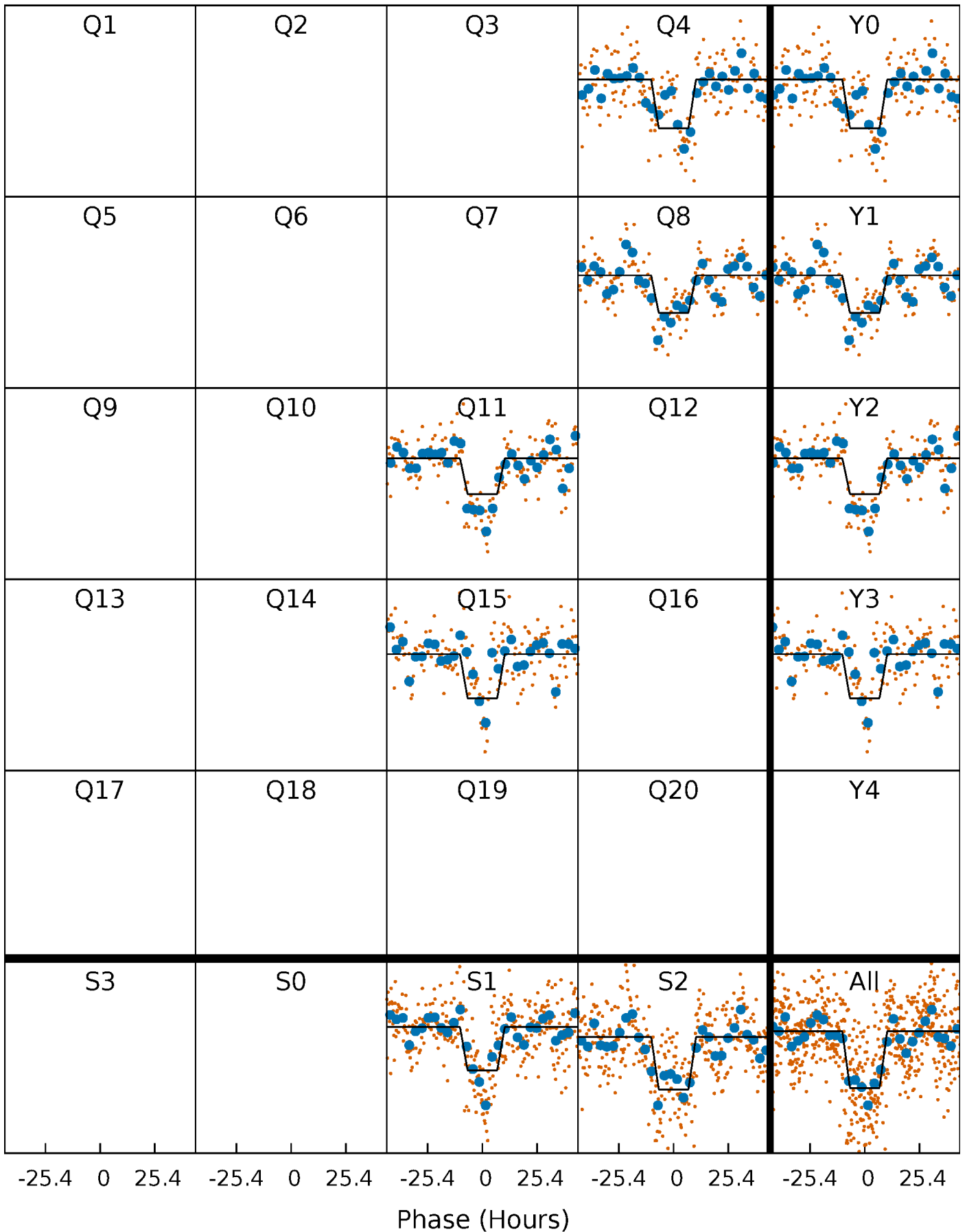
# DV Quarter-Phased Transit Curves

TCE 005164458-01 P=337.090889 Days  $T_0=410.153486$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

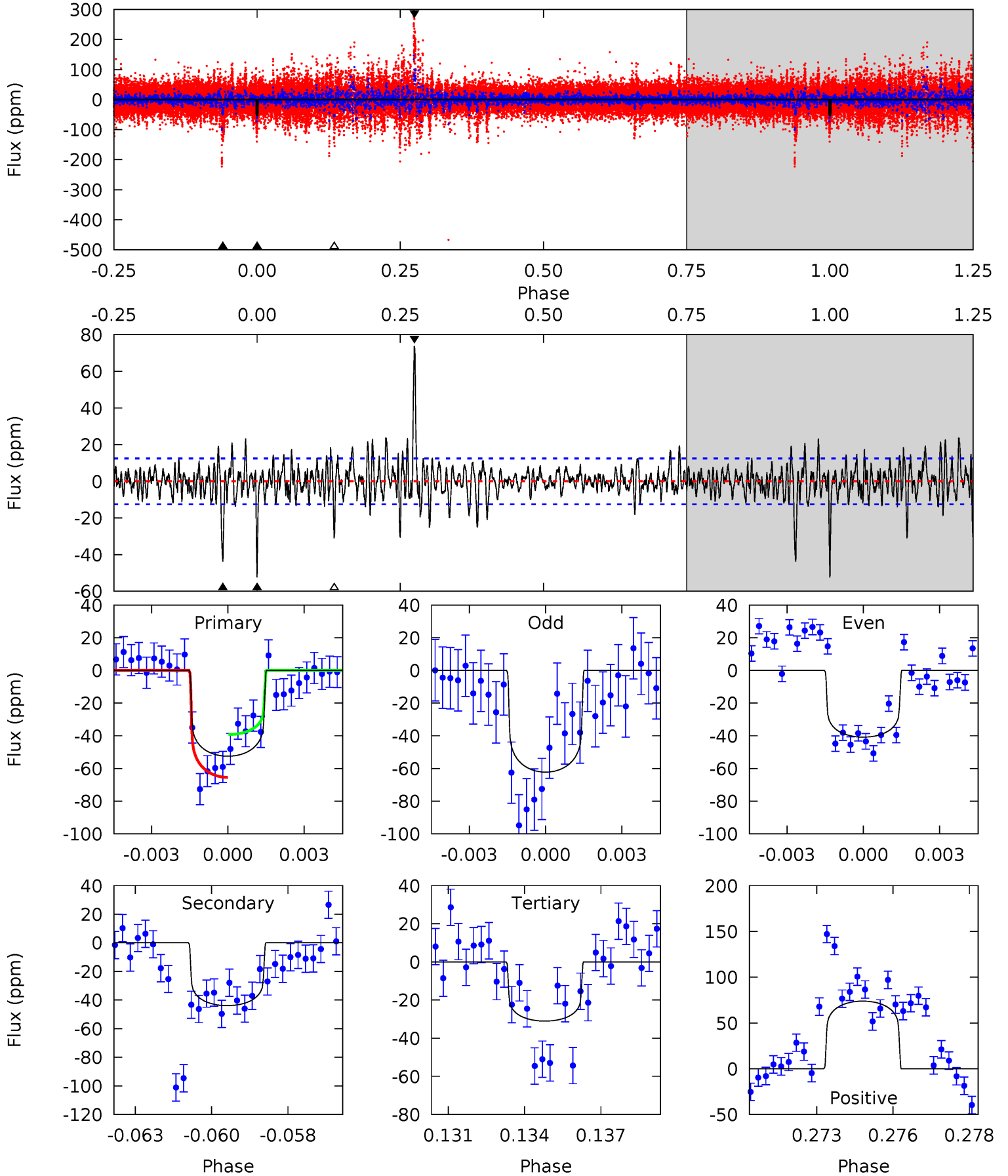
TCE 005164458-01 P=337.065195 Days  $T_0=410.155904$  (BKJD)



# DV Model-Shift Uniqueness Test

005164458-01, P = 337.090889 Days, E = 73.062597 Days

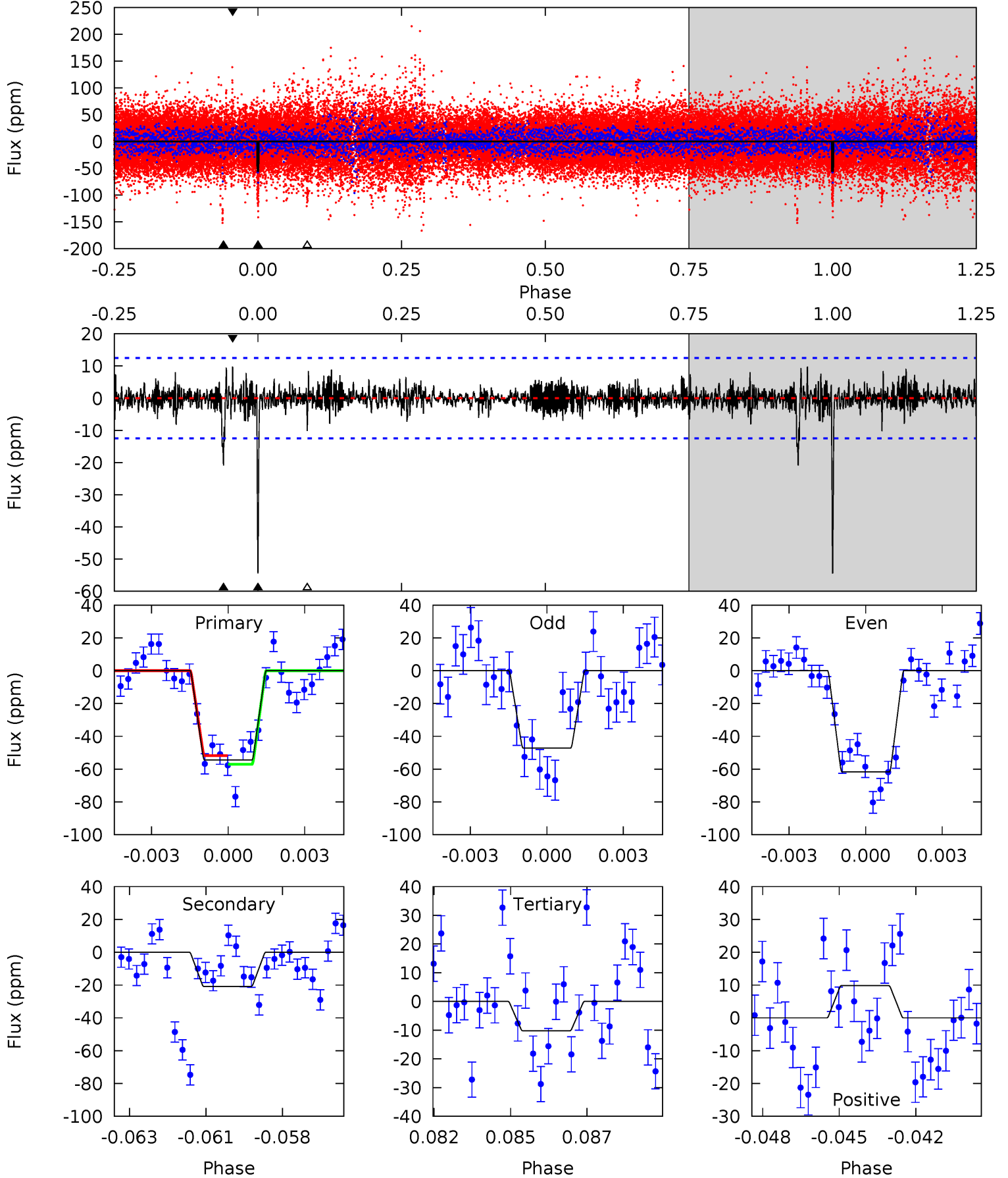
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
22.1	18.5	13.1	31.1	5.28	3.01	3.13	9.04	-9.01	5.42	-12.6	4.20	0.84	0.58	5.37



# Alt Model-Shift Uniqueness Test

005164458-01,  $P = 337.065195$  Days,  $E = 73.090709$  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
23.0	8.81	4.31	4.15	5.28	3.01	0.94	18.7	18.8	4.51	4.67	3.01	1.02	0.15	1.12



### Stellar Parameters For KIC 005164458

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7886^{+216}_{-351}$	$4.103^{+0.131}_{-0.160}$	$0.070^{+0.250}_{-0.450}$	$1.972^{+0.485}_{-0.397}$	$1.796^{+0.160}_{-0.321}$	$0.330^{+0.216}_{-0.153}$
	+3%/-4%	+3%/-4%	+357%/-643%	+25%/-20%	+9%/-18%	+65%/-46%
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 005164458-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-44 \pm 2$	$1.68^{+0.28}_{-0.23}$	$634^{+45}_{-38}$	$7086^{+447}_{-384}$	$11151^{+3377}_{-2963}$
Alt.	$-21 \pm 2$	$1.57^{+0.24}_{-0.20}$	$636^{+41}_{-43}$	$6014^{+378}_{-328}$	$5892^{+2092}_{-1431}$

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

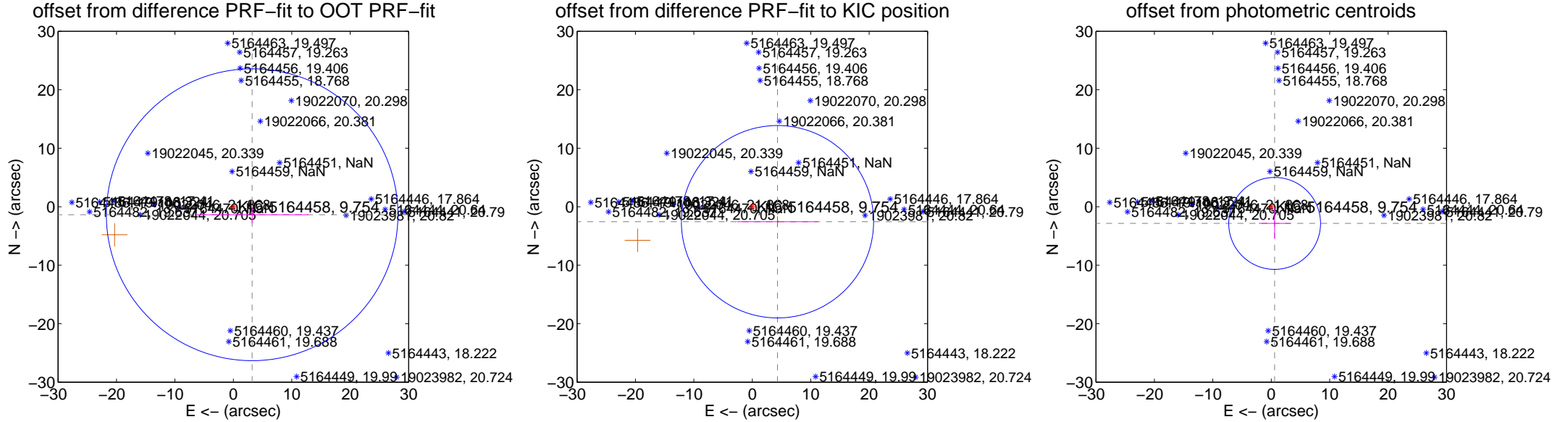
## DV Centroid Data

Supplemental centroid analysis for 005164458-01. **Kepler magnitude: 9.75.** Transit SNR 11.94

**There are 0 quarters with good PRF difference image offsets**

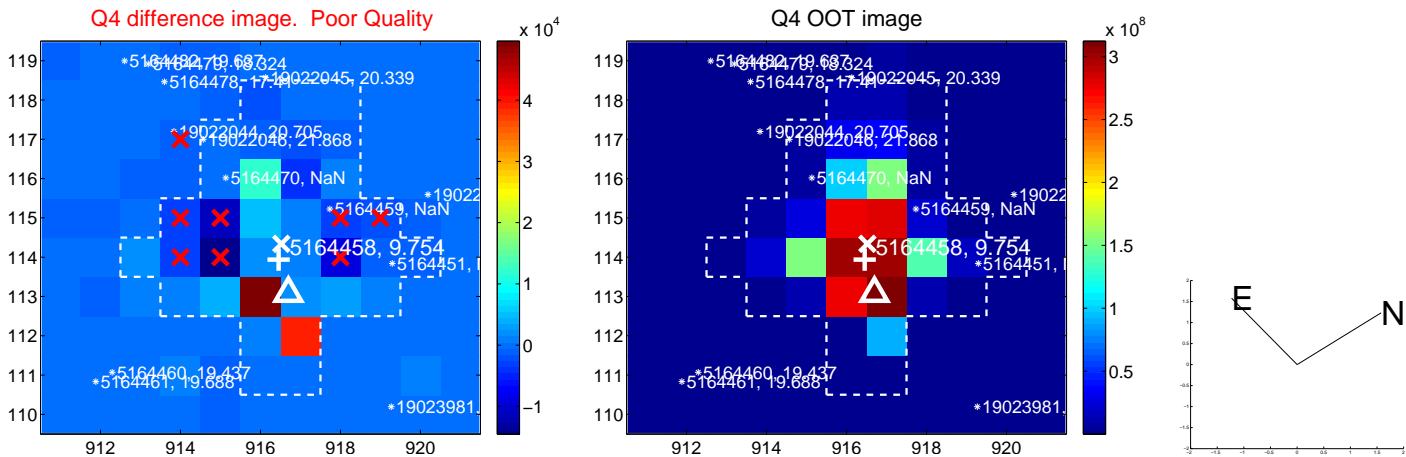
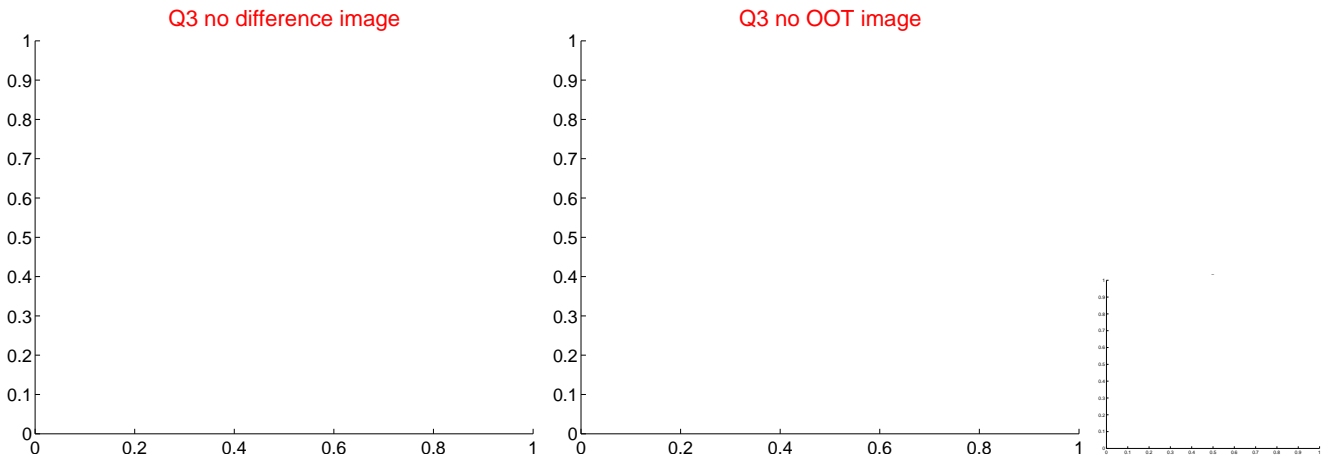
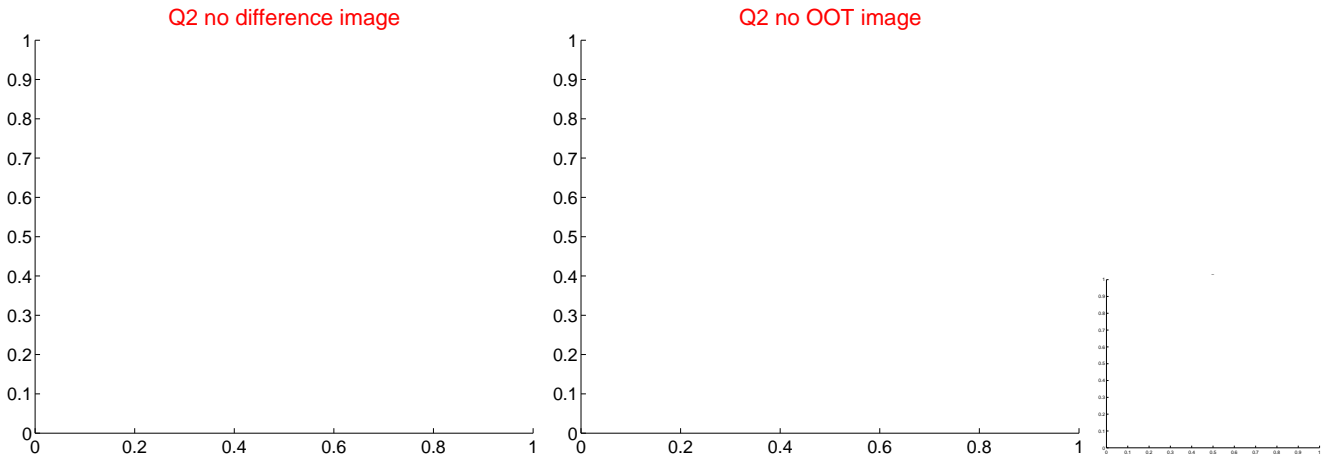
The direct PRF centroid is offset from the target star catalog position by about 1.17 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$3.499 \pm 8.317$	0.42	$-3.219 \pm 9.643$	$-1.371 \pm 1.417$
PRF-fit source offset from KIC position	$5.018 \pm 5.482$	0.92	$-4.312 \pm 6.932$	$-2.567 \pm 0.930$
photometric centroid source offset	$2.91 \pm 2.62$	1.11	$-0.58 \pm 2.68$	$-2.85 \pm 2.62$

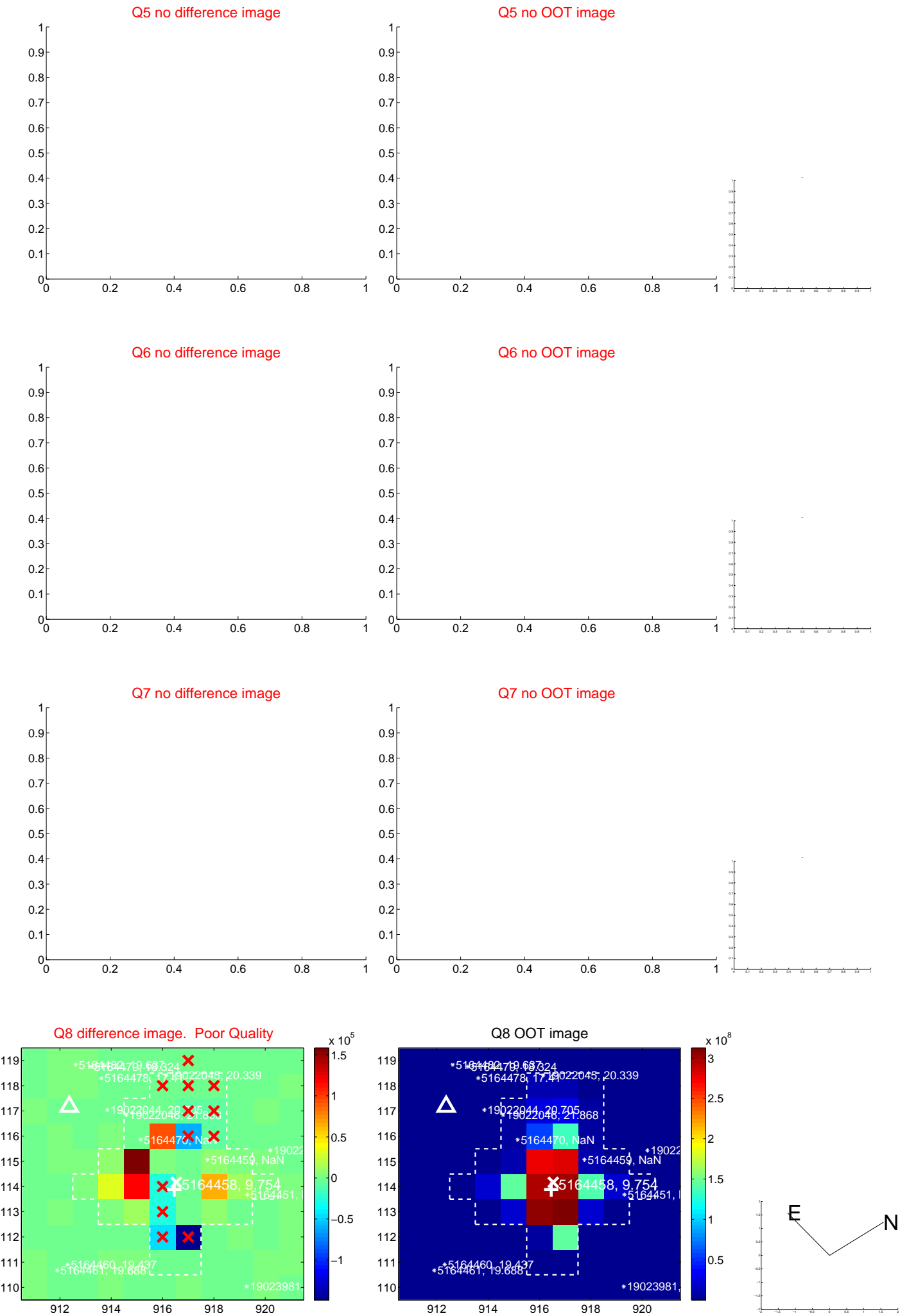


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

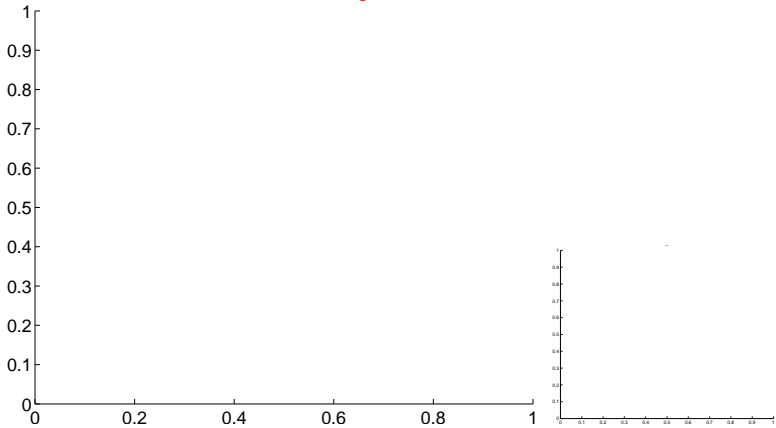


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

Q13 no difference image



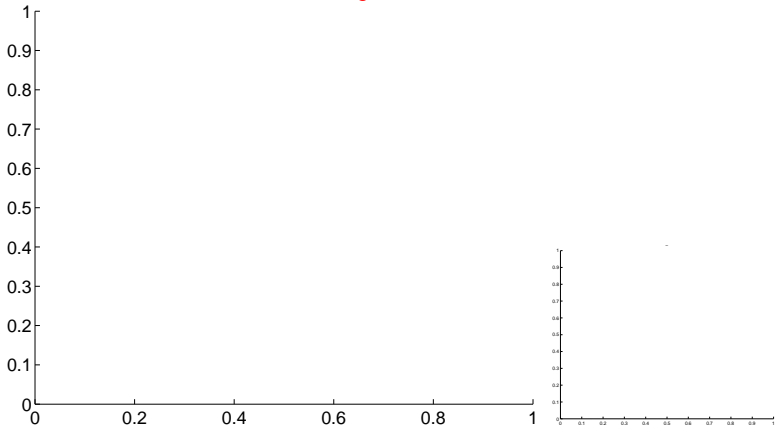
Q13 no OOT image



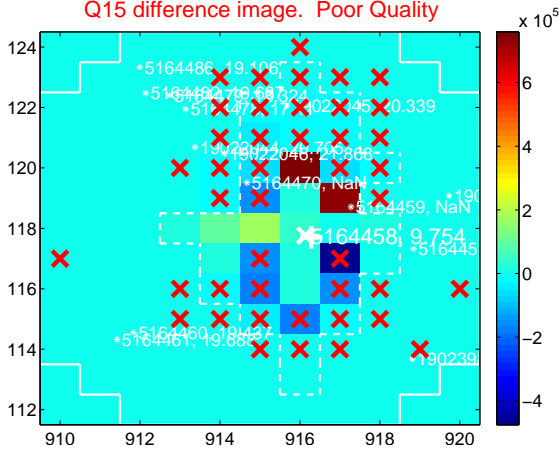
Q14 no difference image



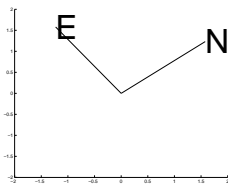
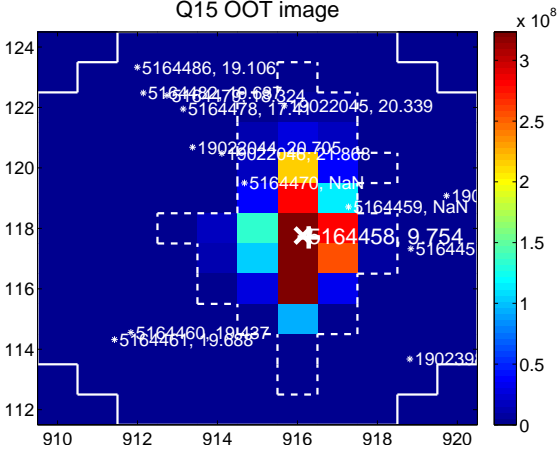
Q14 no OOT image



Q15 difference image. Poor Quality



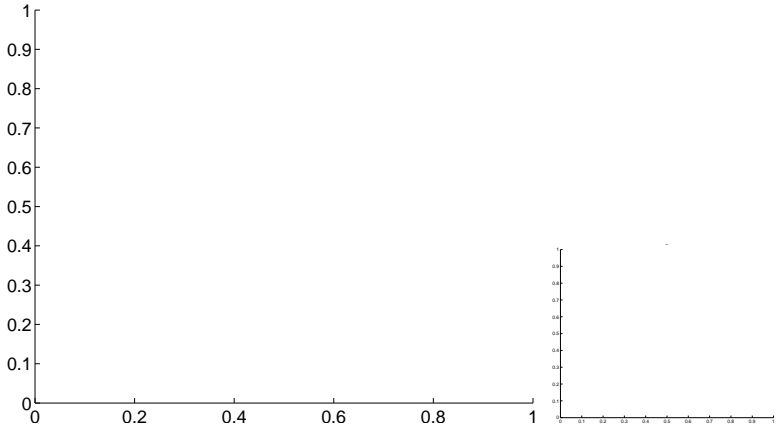
Q15 OOT image



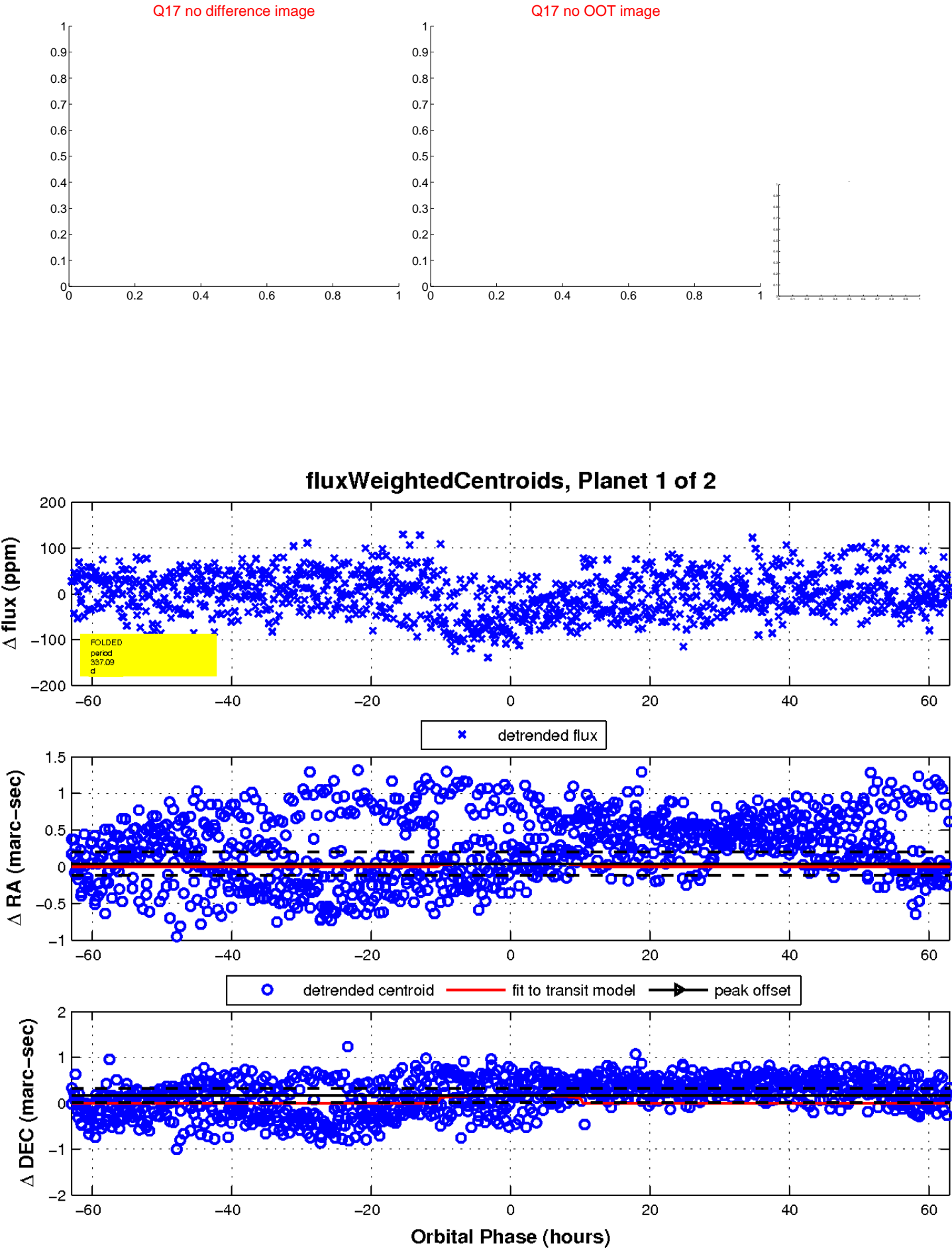
Q16 no difference image



Q16 no OOT image

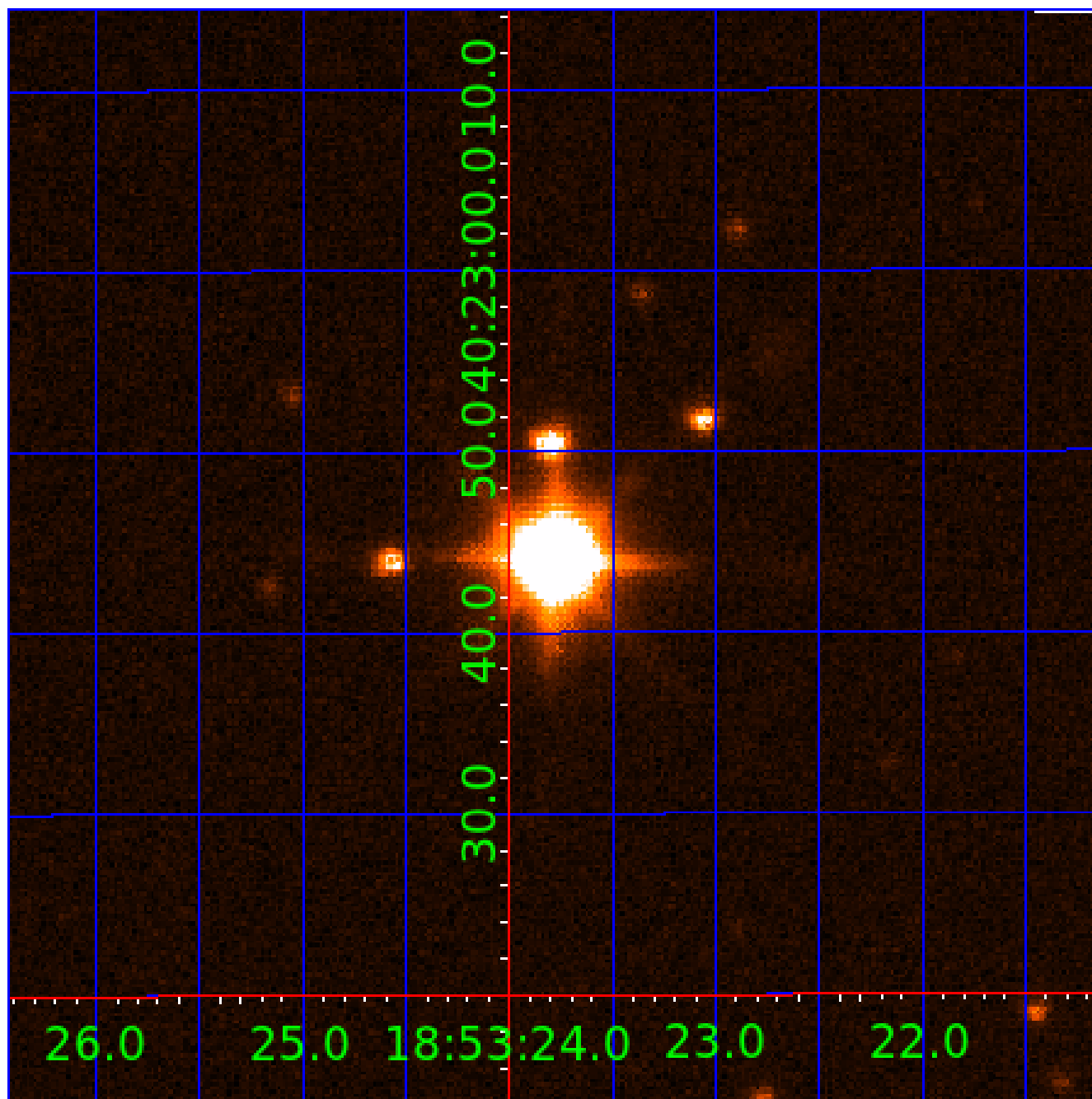


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 005164458

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005164458-01	OBS	No	337.090889	410.153486	59.9	21.005	11.5	11.9	1.97	7886	1.70	10.14
005164458-02	OBS	No	368.456066	439.159818	74.5	13.366	10.6	9.0	1.97	7886	2.06	9.00

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005164458-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—MOD_POS_DV—INCONSISTENT_TRANS—CENT_SATURATED
005164458-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_SATURATED

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

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

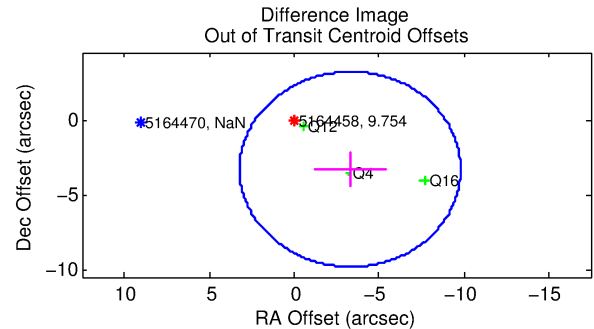
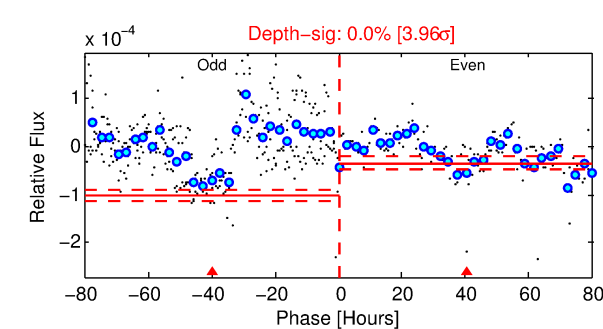
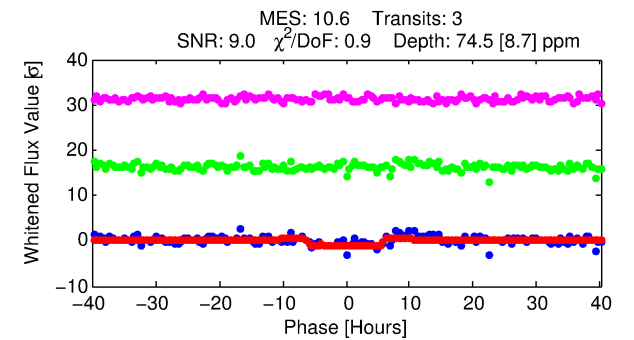
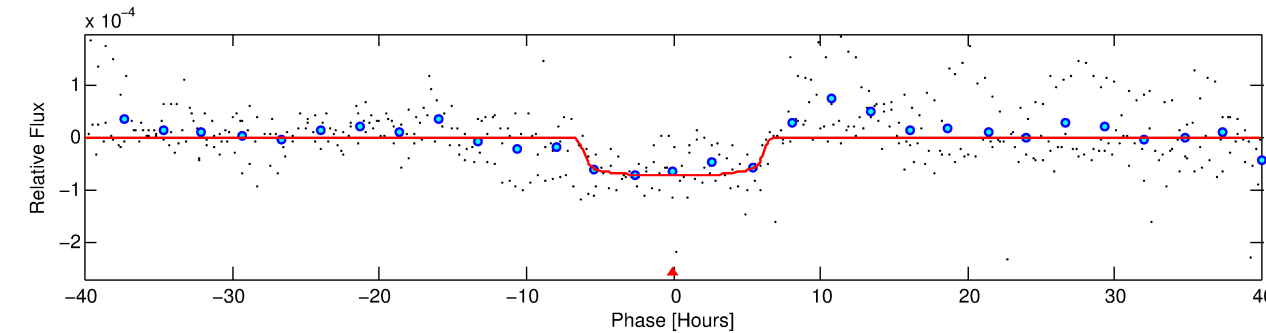
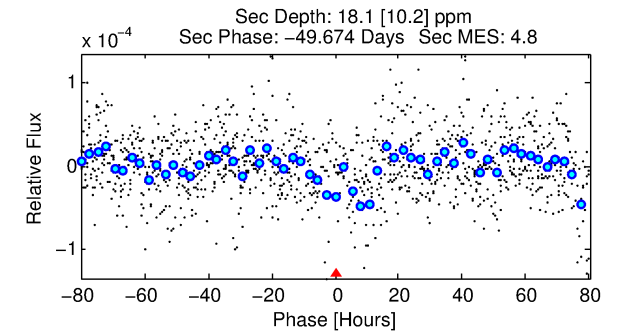
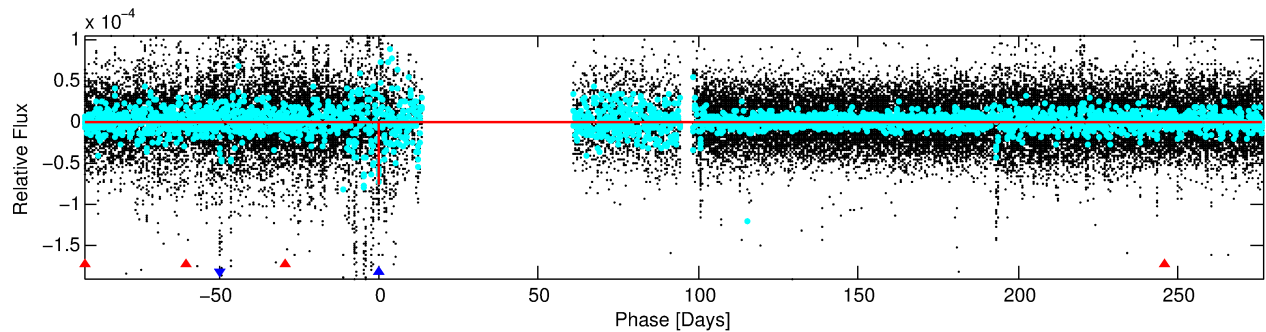
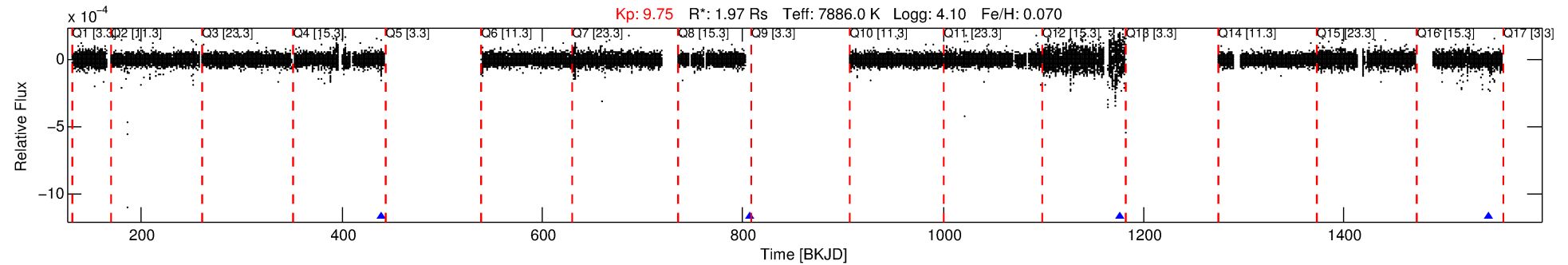
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 005164458-02

No Significant Match Found

# DV One-Page Summary

KIC: 5164458 Candidate: 2 of 2 Period: 368.456 d



## DV Fit Results:

Period = 368.45607 [0.00520] d  
Epoch = 439.1598 [0.0103] BKJD  
Rp/R\* = 0.0096 [0.0007]  
a/R\* = 75.45 [21.36]  
b = 0.94 [0.03]  
Seff = 9.00 [3.10]  
Teq = 442 [38] K  
Rp = 2.06 [0.53] Re  
a = 1.2234 [0.2506] AU  
Ag = 3524.50 [2310.34] [1.53σ]  
Teffp = 5262 [805] K [5.98σ]

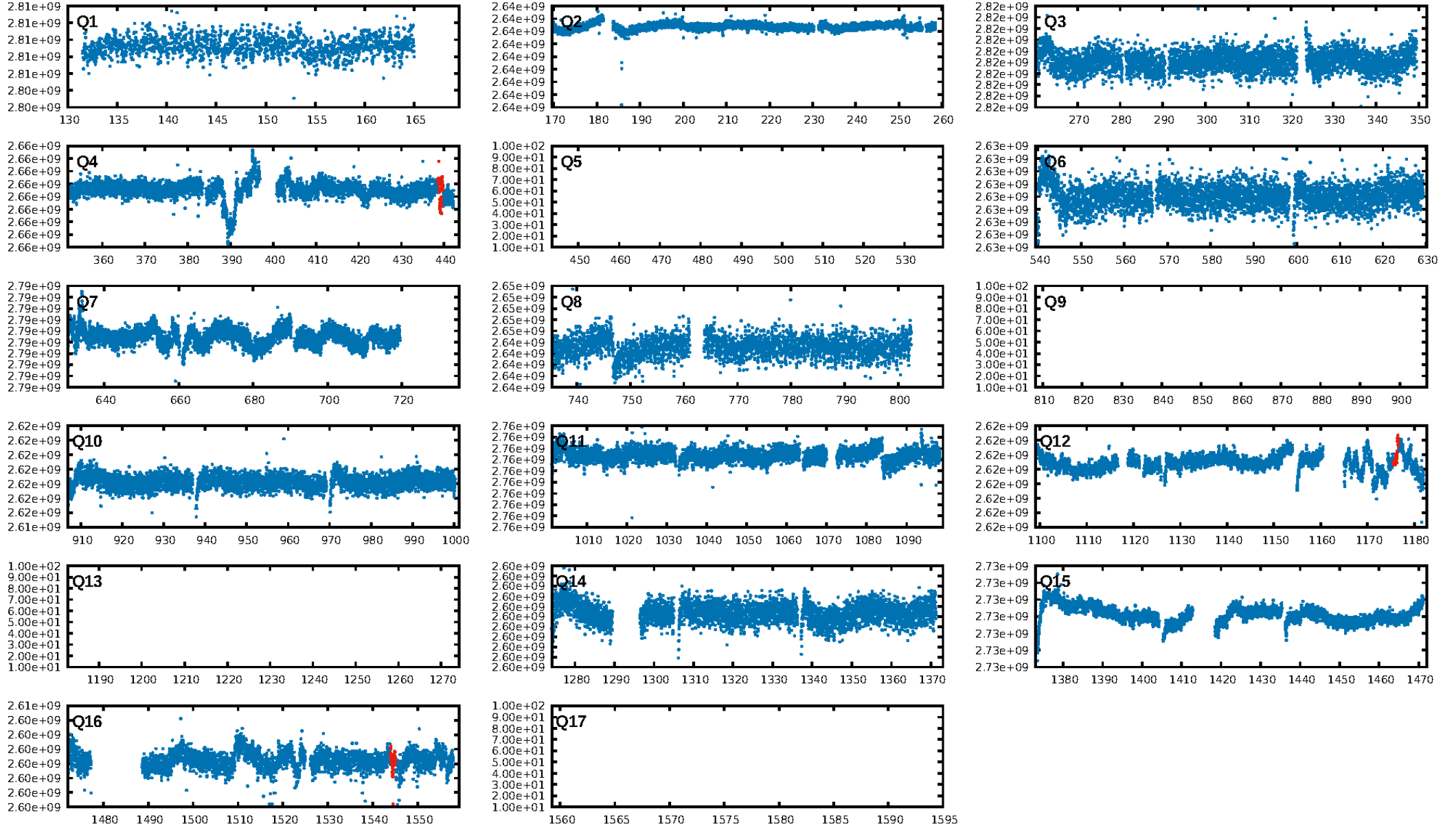
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [30.24σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.3%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 2.29e-13  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: N/A  
Centroid-sig: 16.6%  
Centroid-so: 3.385 arcsec [1.09σ]  
OotOffset-rm: 4.683 arcsec [2.16σ]  
KicOffset-rm: 3.811 arcsec [1.32σ]  
OotOffset-st: 0/0/3/0 [3]  
KicOffset-st: 0/0/3/0 [3]  
DiffImageQuality-fgm: 0.00 [0/3]  
DiffImageOverlap-fno: 1.00 [3/3]

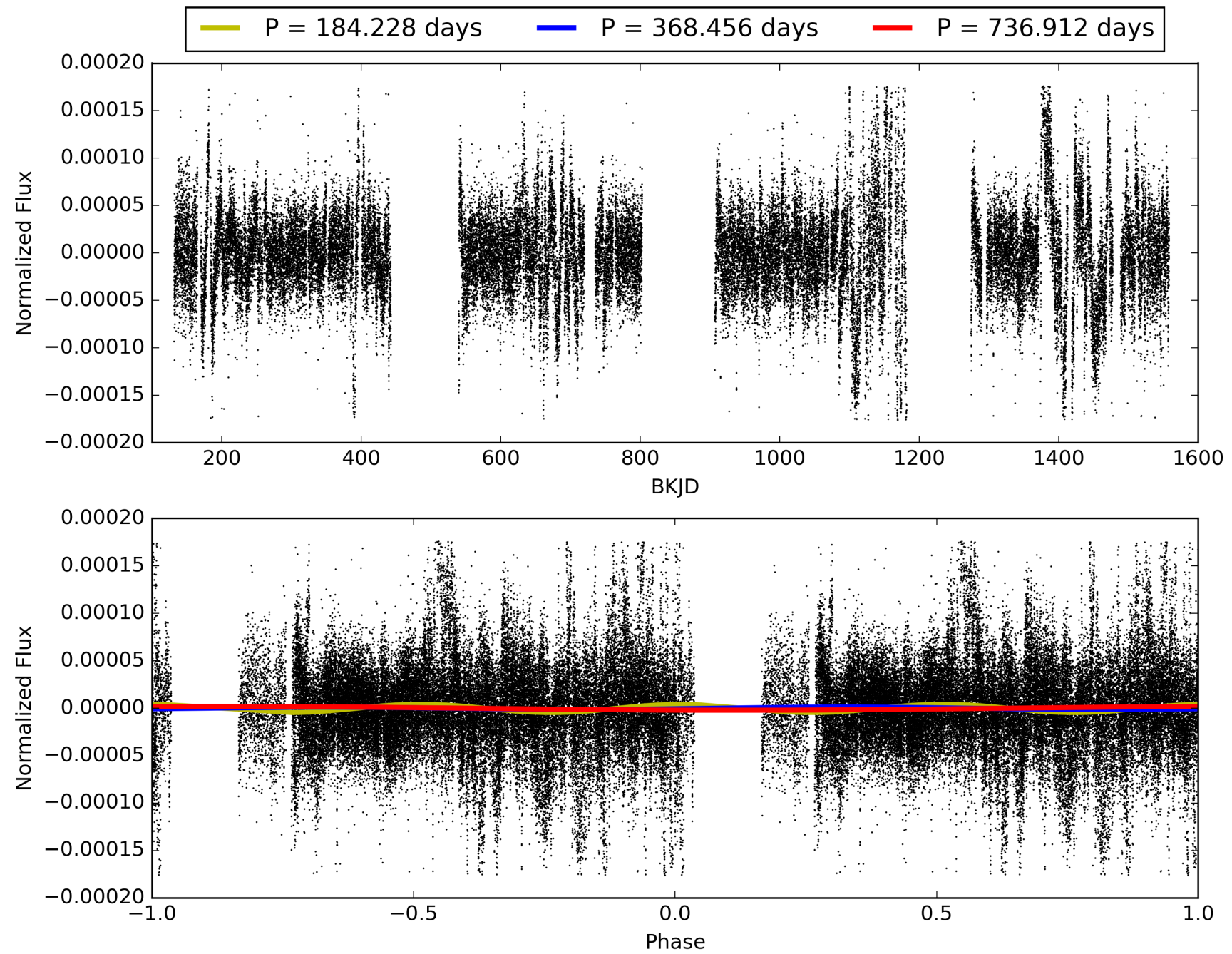
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 05:21:43 Z

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

# TCE 005164458-02, PDC Light Curves



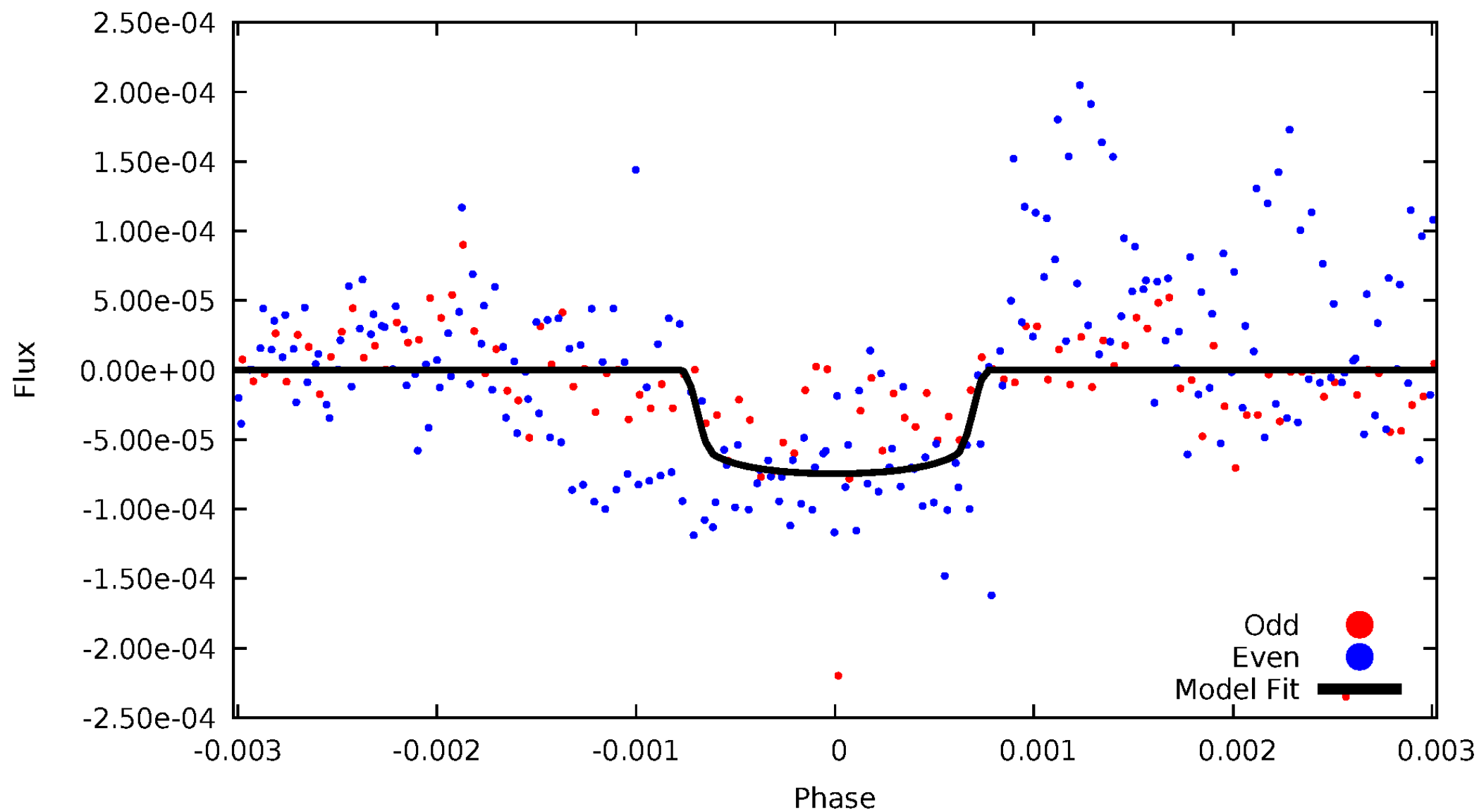
TCE 005164458-02





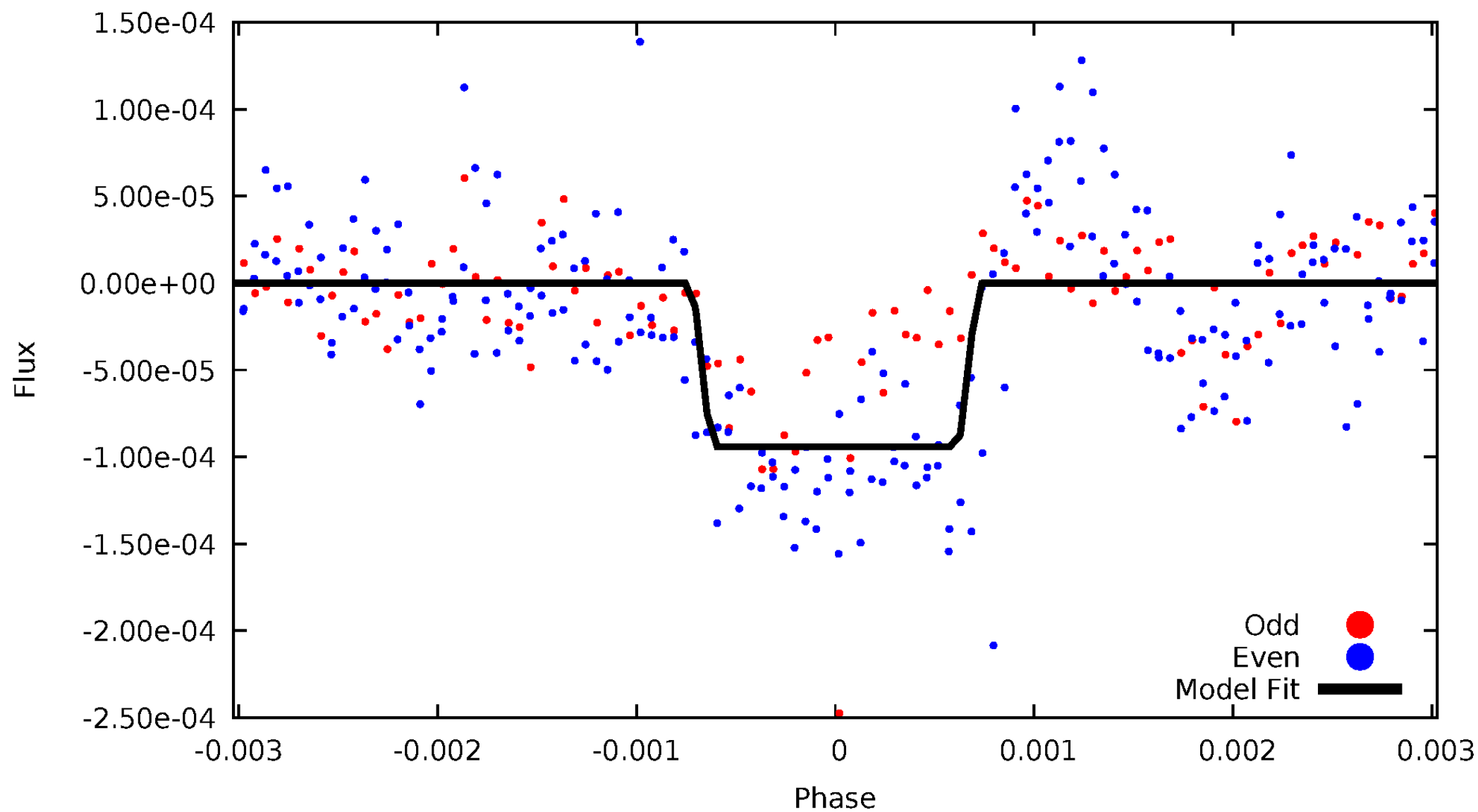
# DV Odd/Even

TCE 005164458-02



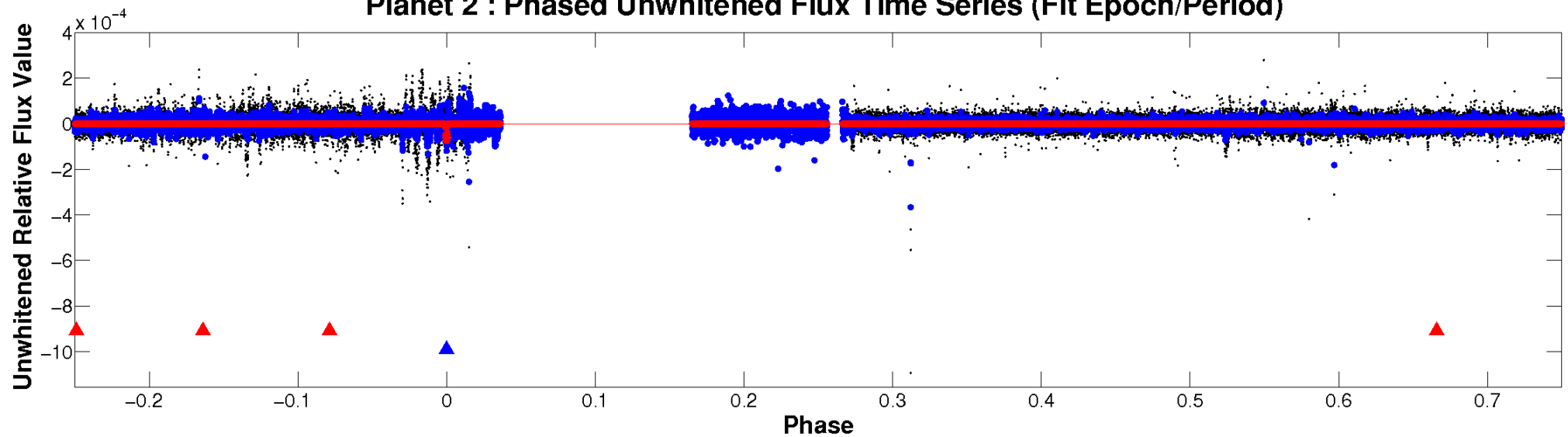
# ALT Odd/Even

TCE 005164458-02

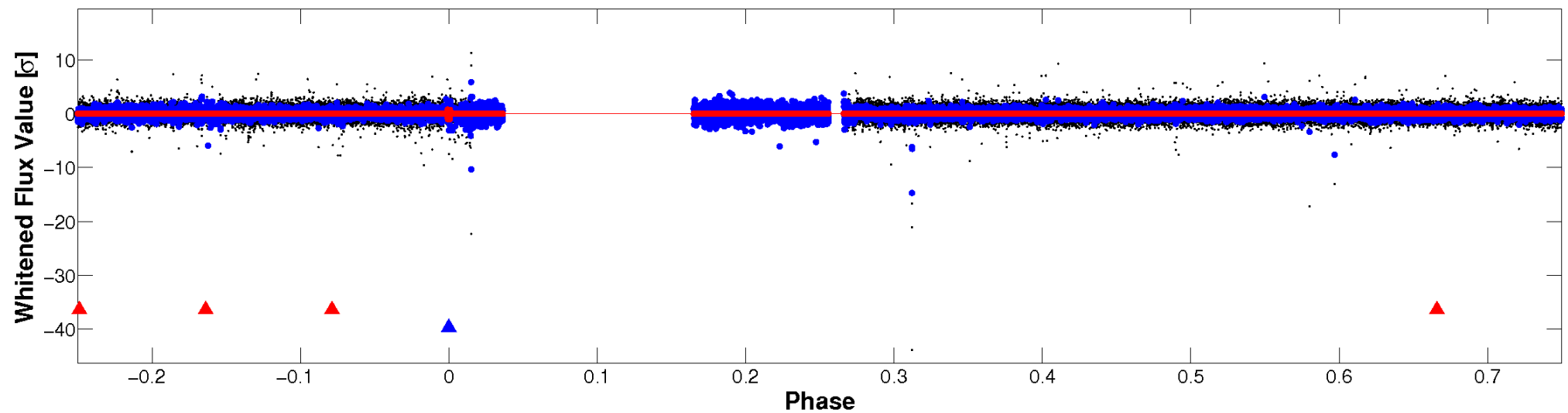


# Non-Whitened Vs. Whitened Light Curve

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

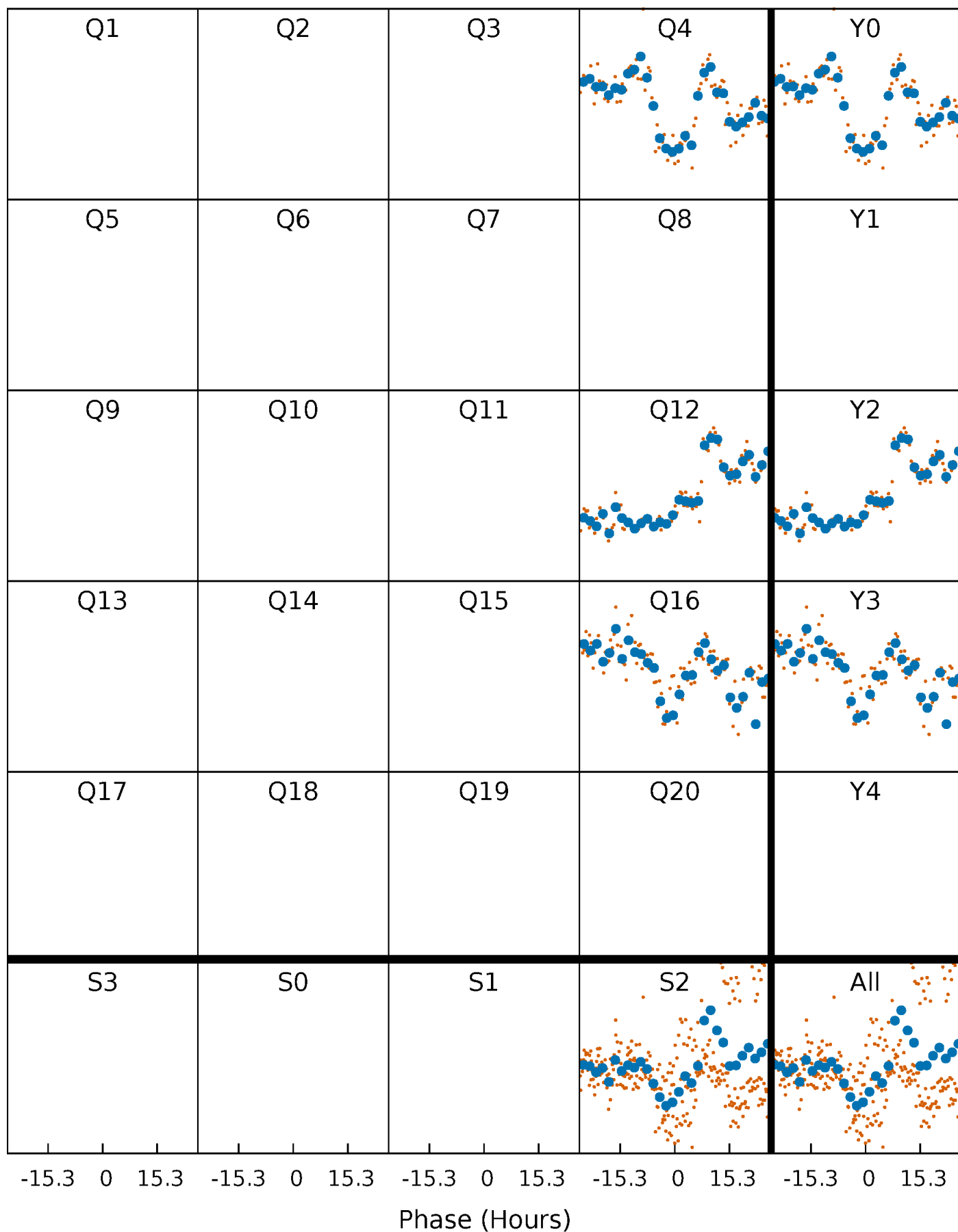


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



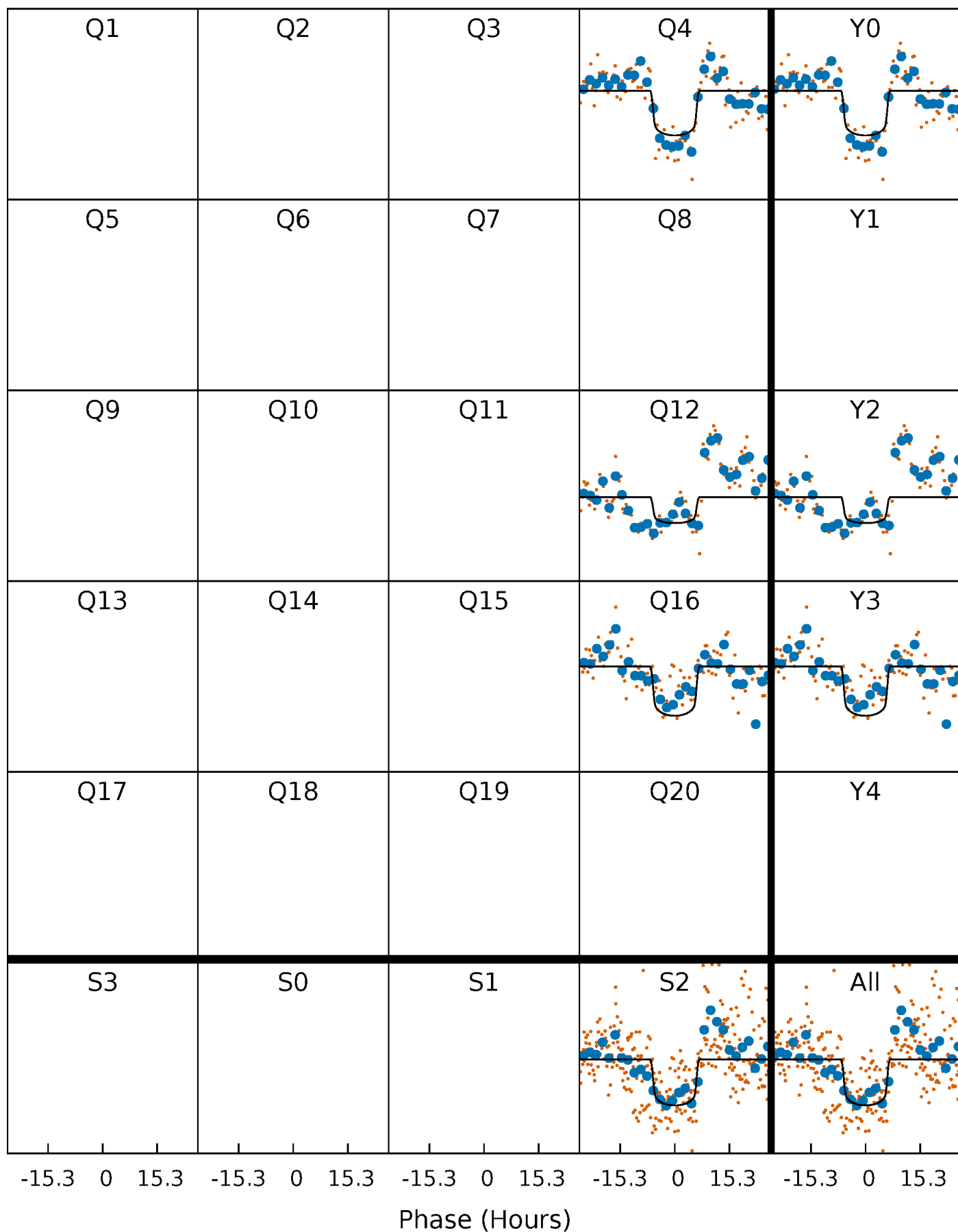
# PDC Quarter-Phased Transit Curves

TCE 005164458-02 P=368.456066 Days  $T_0=439.159818$  (BKJD)



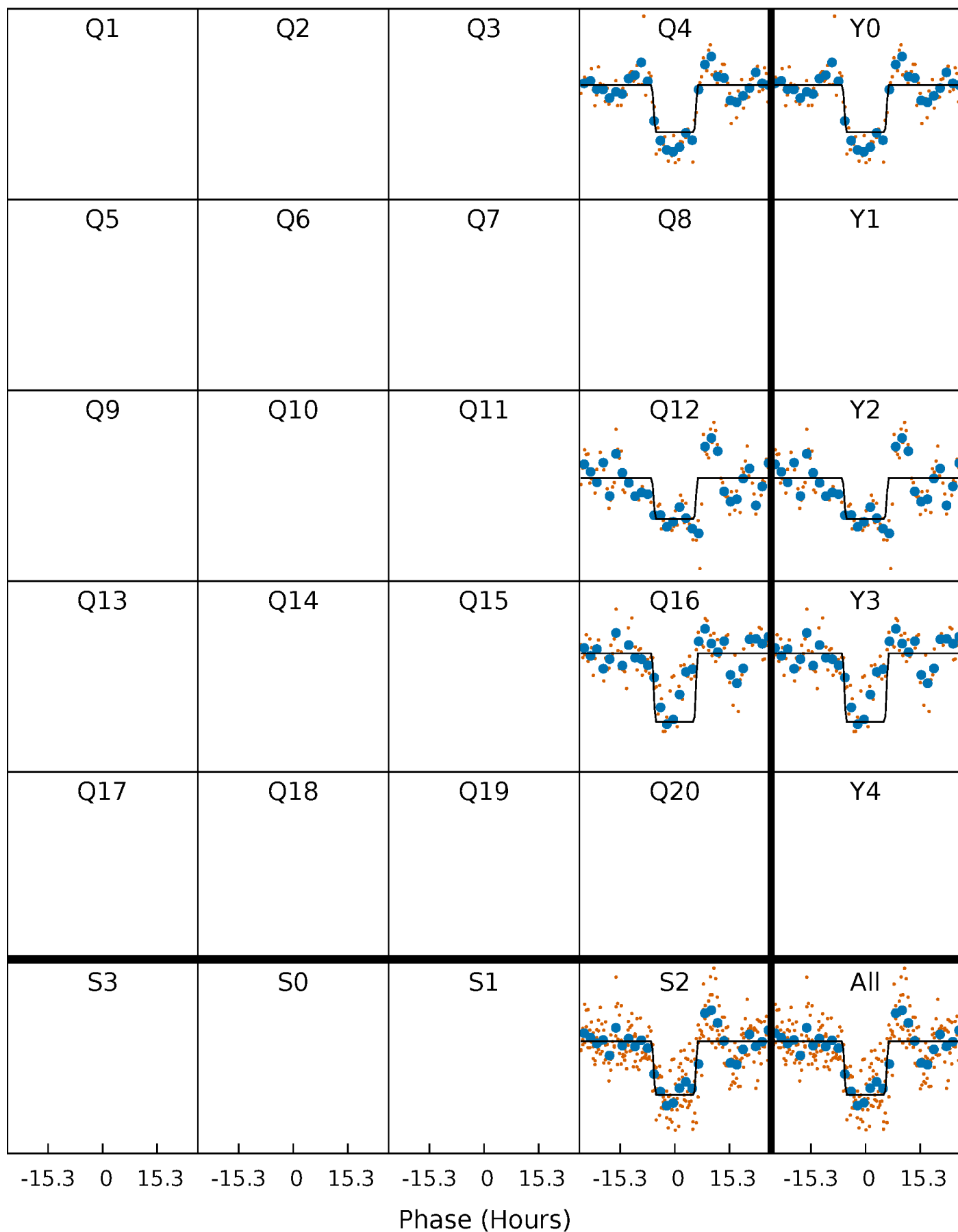
# DV Quarter-Phased Transit Curves

TCE 005164458-02 P=368.456066 Days  $T_0=439.159818$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

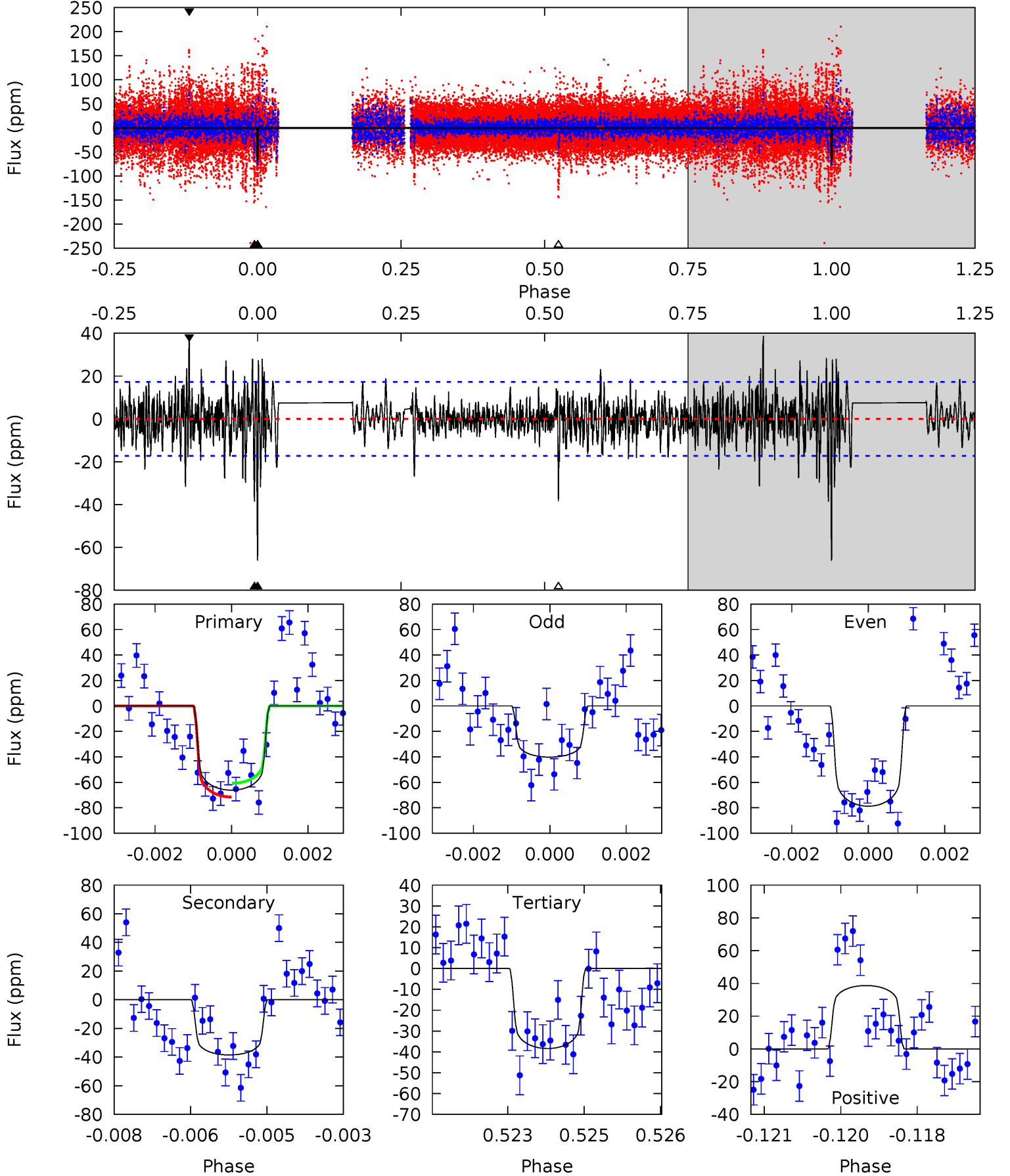
TCE 005164458-02     $P=368.457954$  Days     $T_0=439.152529$  (BKJD)



# DV Model-Shift Uniqueness Test

005164458-02, P = 368.456066 Days, E = 70.703752 Days

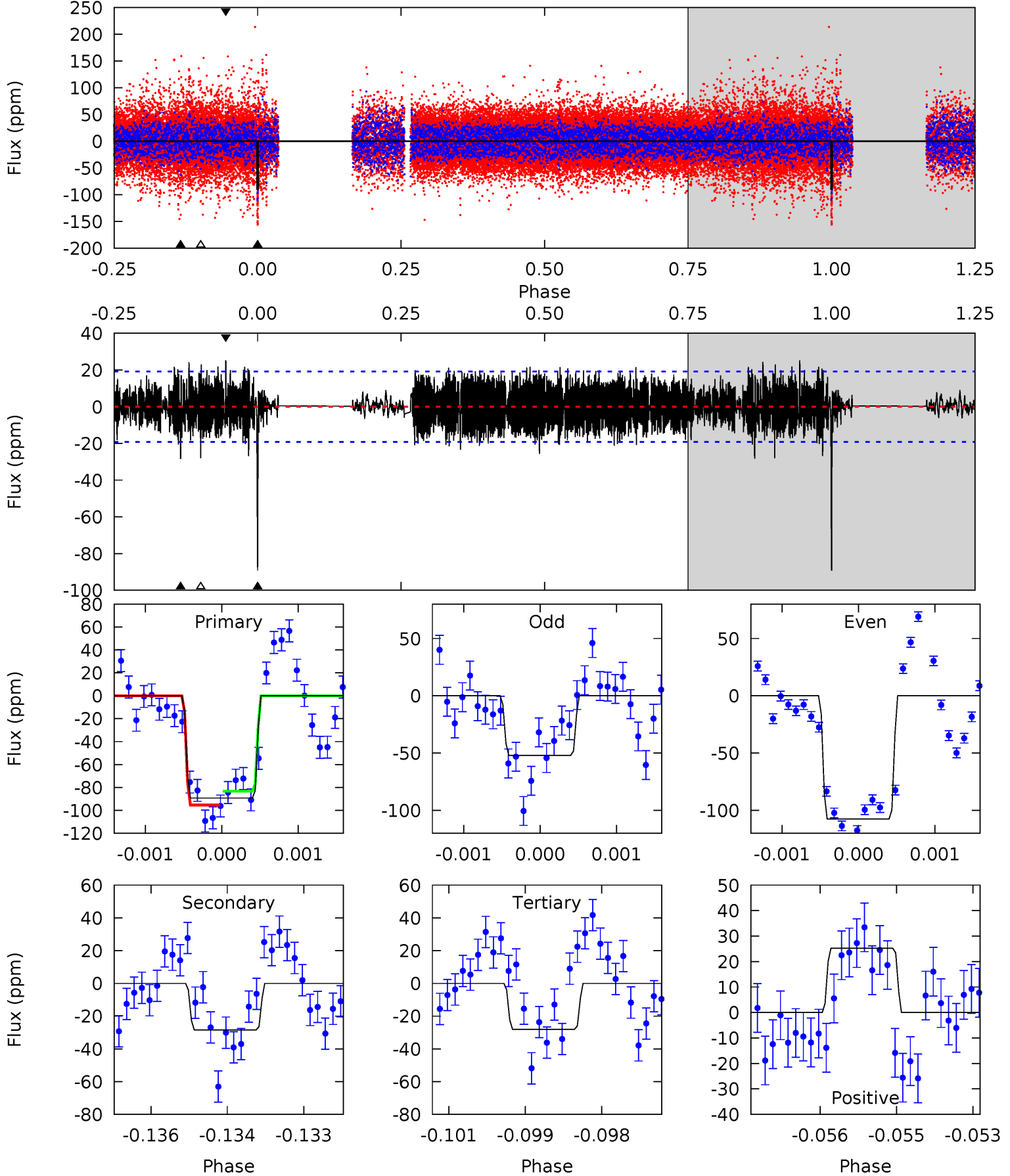
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
20.6	12.0	12.0	12.0	5.37	3.16	2.23	8.64	8.55	0.04	-0.05	5.53	1.08	0.37	1.70



# Alt Model-Shift Uniqueness Test

005164458-02,  $P = 368.457954$  Days,  $E = 70.694575$  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
25.0	7.96	7.87	7.07	5.39	3.19	2.64	17.2	18.0	0.10	0.90	7.42	0.95	0.22	1.70





### Stellar Parameters For KIC 005164458

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7886^{+216}_{-351}$	$4.103^{+0.131}_{-0.160}$	$0.070^{+0.250}_{-0.450}$	$1.972^{+0.485}_{-0.397}$	$1.796^{+0.160}_{-0.321}$	$0.330^{+0.216}_{-0.153}$
	+3%/-4%	+3%/-4%	+357%/-643%	+25%/-20%	+9%/-18%	+65%/-46%
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 005164458-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-39 \pm 3$	$2.08^{+0.33}_{-0.27}$	$619^{+42}_{-39}$	$6186^{+308}_{-355}$	$7170^{+2189}_{-1680}$
Alt.	$-28 \pm 4$	$2.08^{+0.34}_{-0.27}$	$616^{+42}_{-36}$	$5696^{+301}_{-308}$	$5247^{+1771}_{-1432}$

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

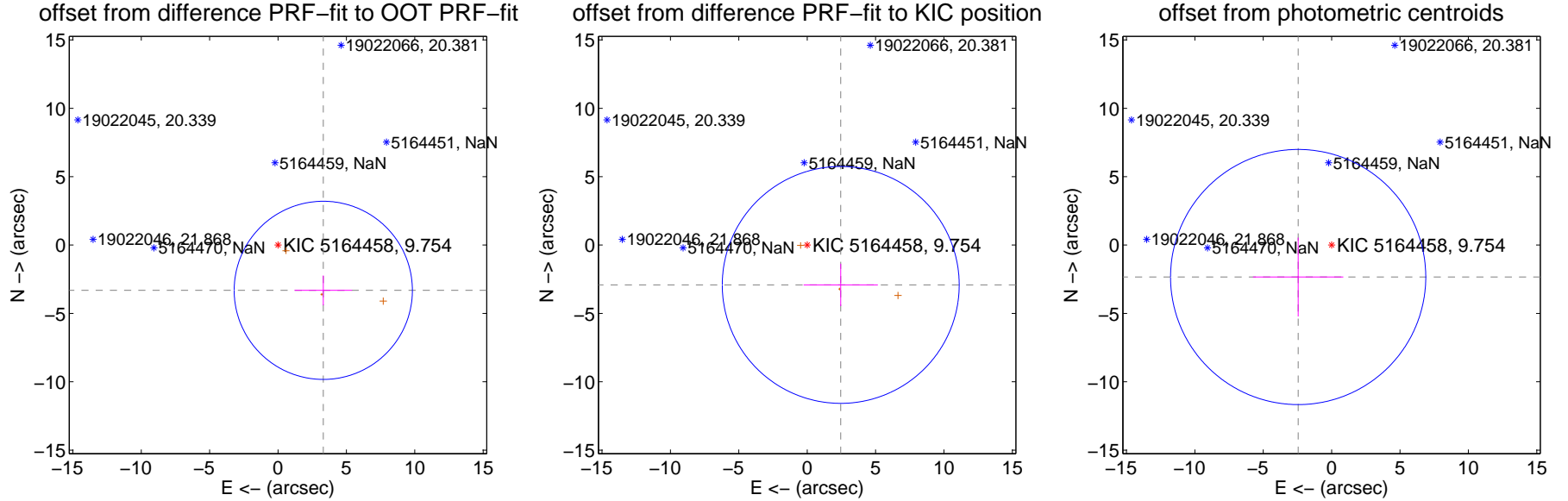
## DV Centroid Data

Supplemental centroid analysis for 005164458-02. **Kepler magnitude: 9.75.** Transit SNR 9.00

**There are 0 quarters with good PRF difference image offsets**

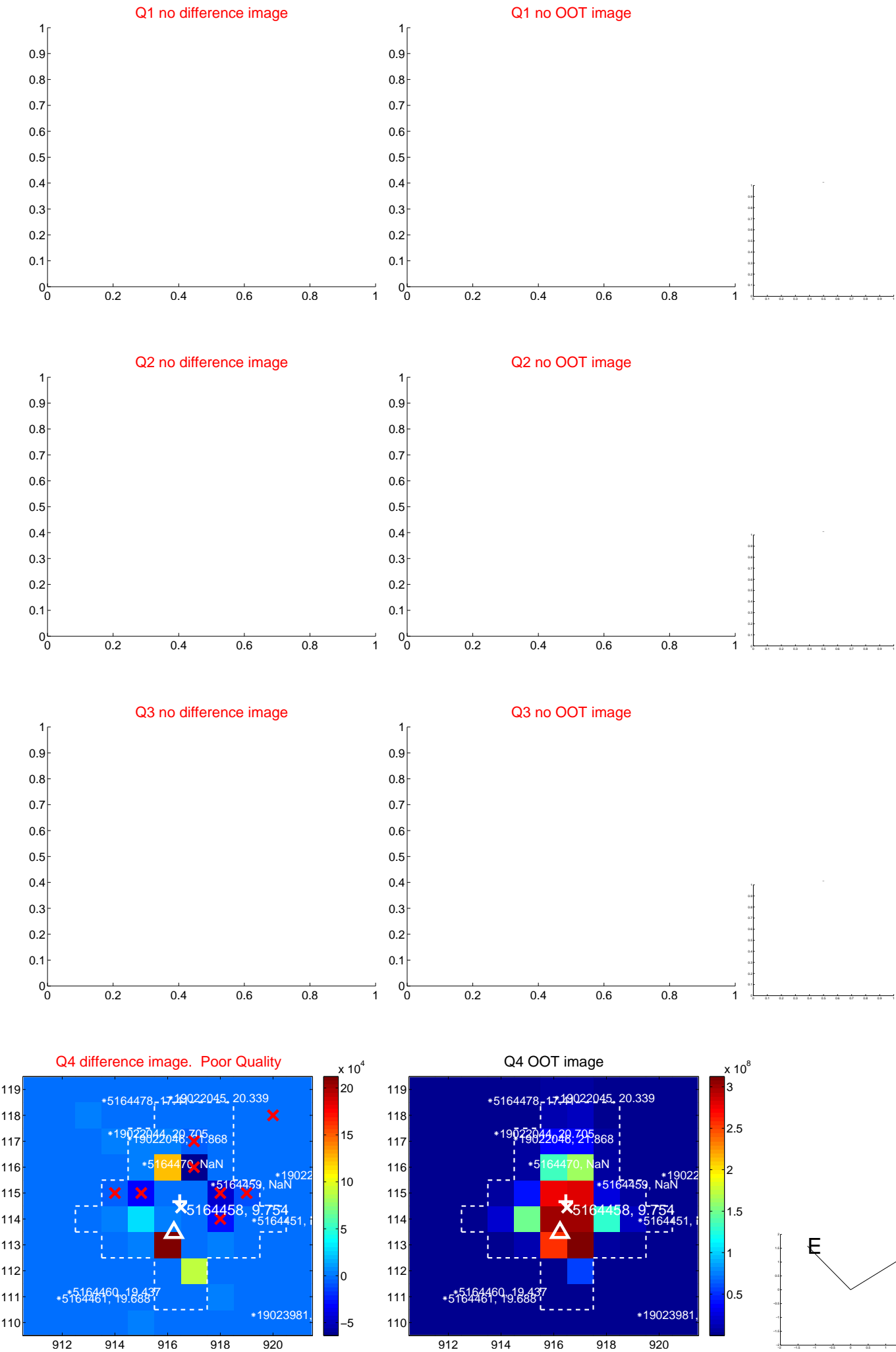
The direct PRF centroid is offset from the target star catalog position by about 1.13 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$4.683 \pm 2.172$	2.16	$-3.310 \pm 2.103$	$-3.313 \pm 1.086$
PRF-fit source offset from KIC position	$3.811 \pm 2.887$	1.32	$-2.453 \pm 2.716$	$-2.916 \pm 1.546$
photometric centroid source offset	$3.38 \pm 3.11$	1.09	$2.45 \pm 3.30$	$-2.34 \pm 2.89$



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

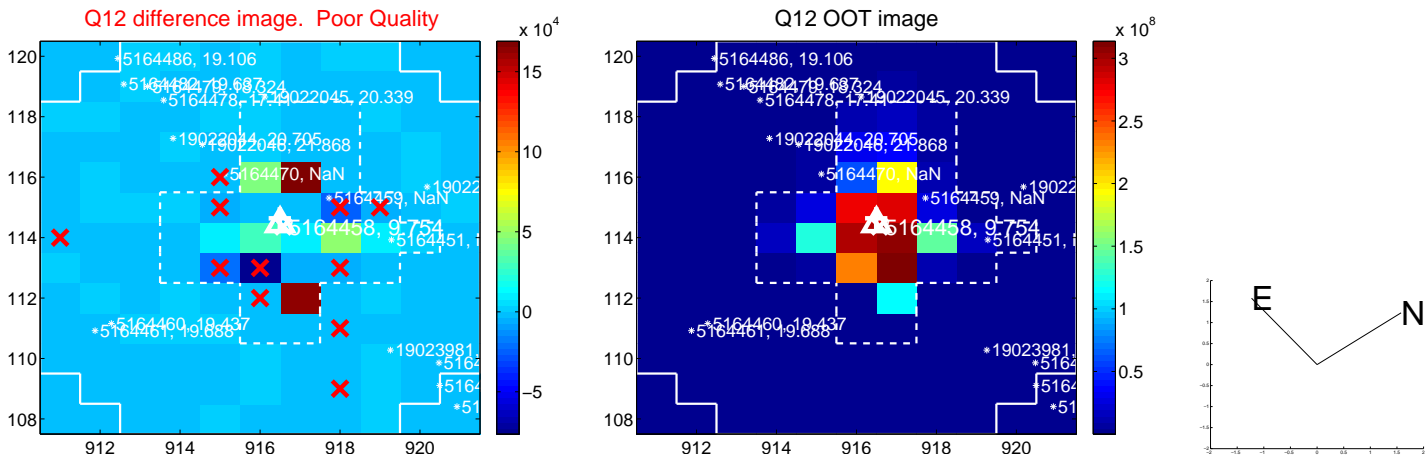
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



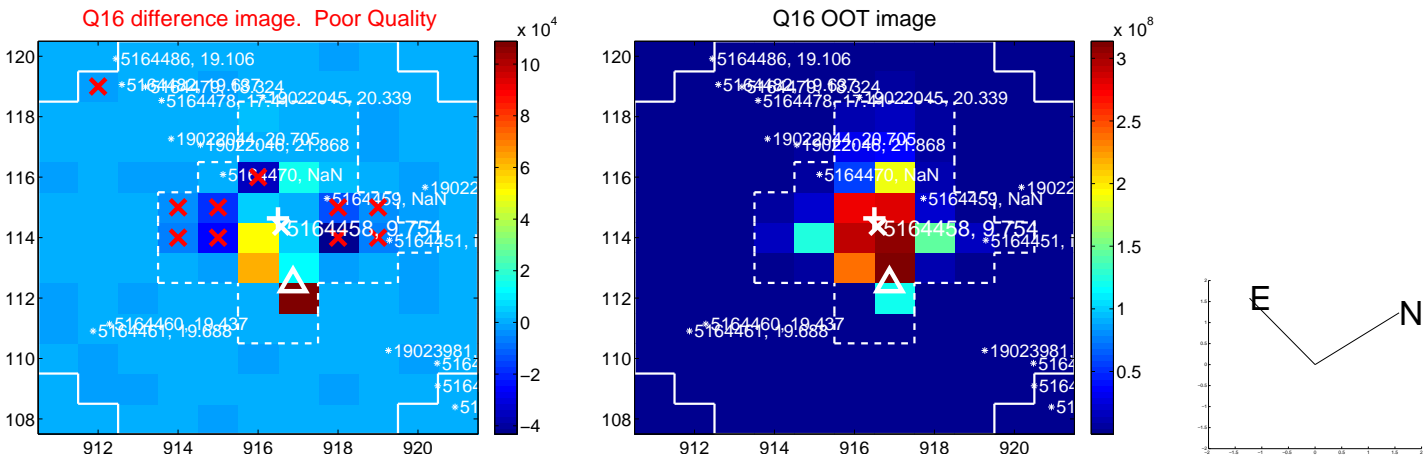
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



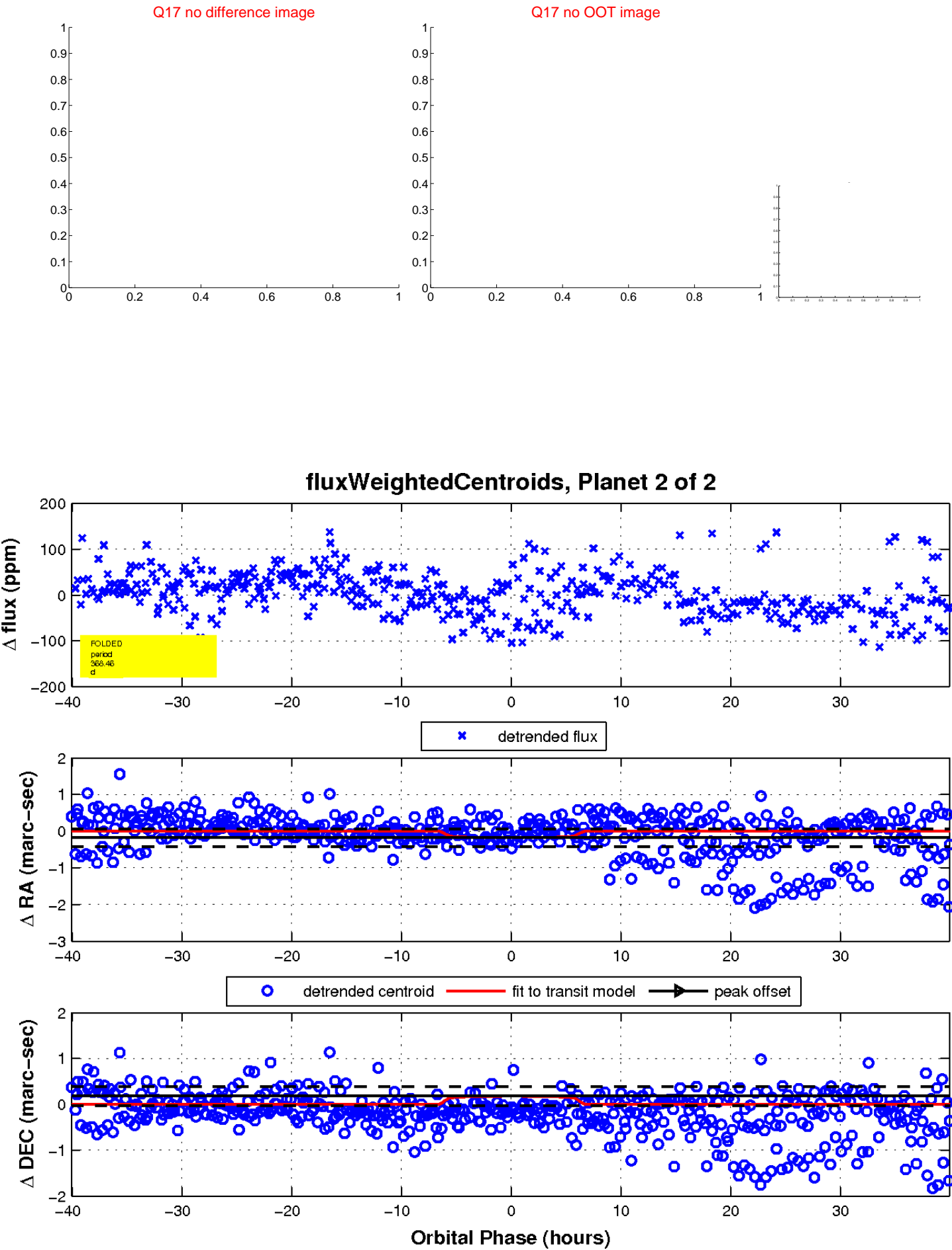
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



white ×: 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

