

# KIC 004661634

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004661634-01	OBS	6432.01	73.894164	159.900505	213610.0	9.490	3758.2	3215.6	0.84	5442	39.15	5.62
004661634-02	OBS	No	73.894393	142.939744	22233.3	12.334	446.2	418.7	0.84	5442	13.90	5.62

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004661634-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE
004661634-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE

**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.

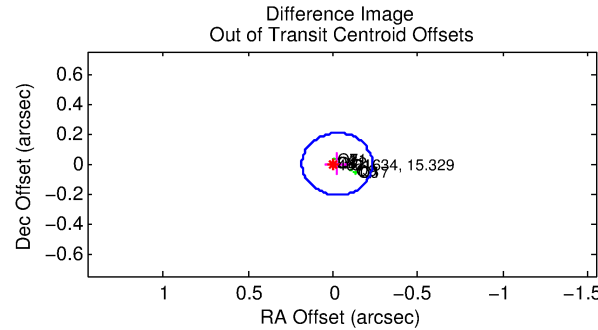
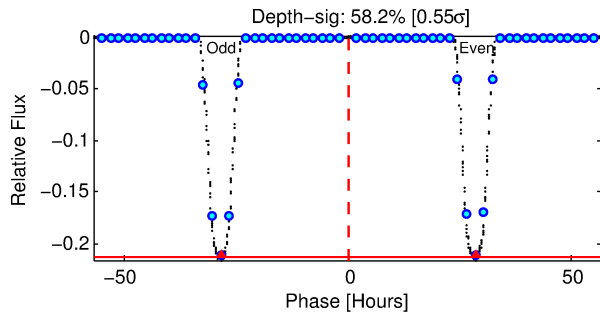
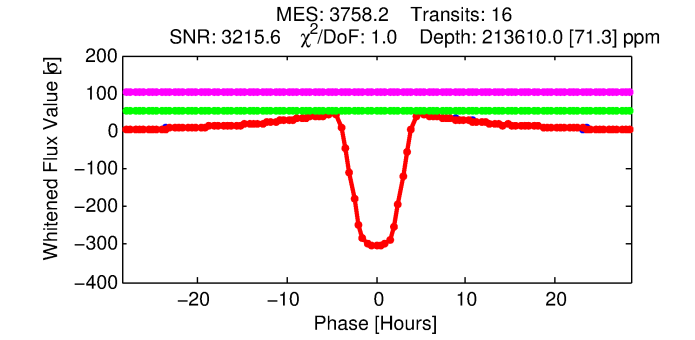
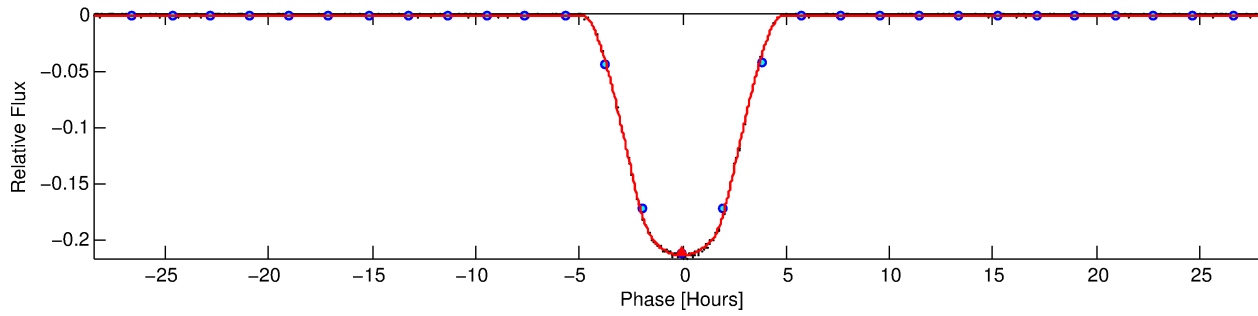
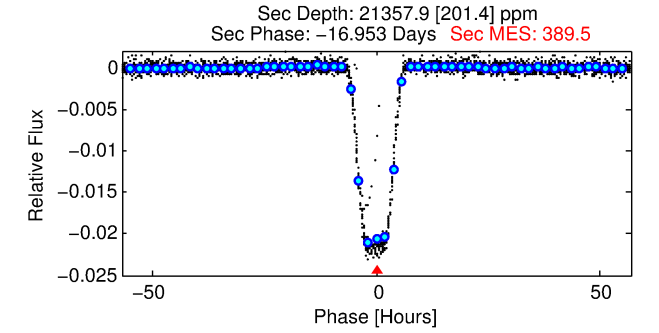
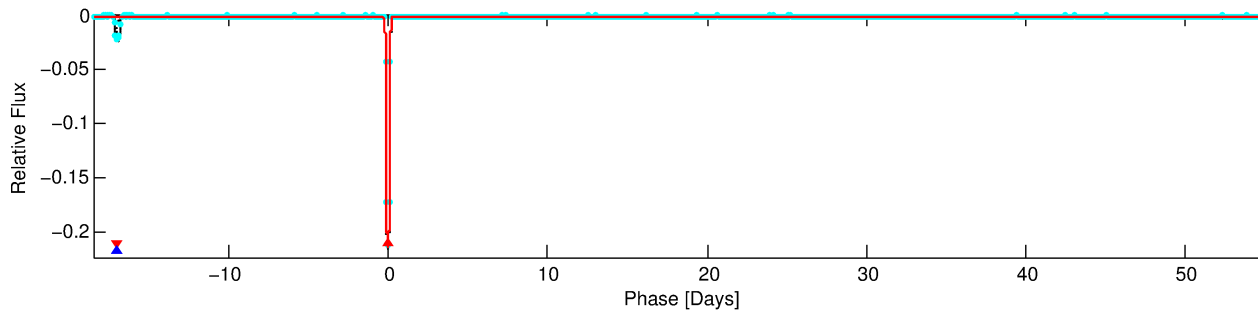
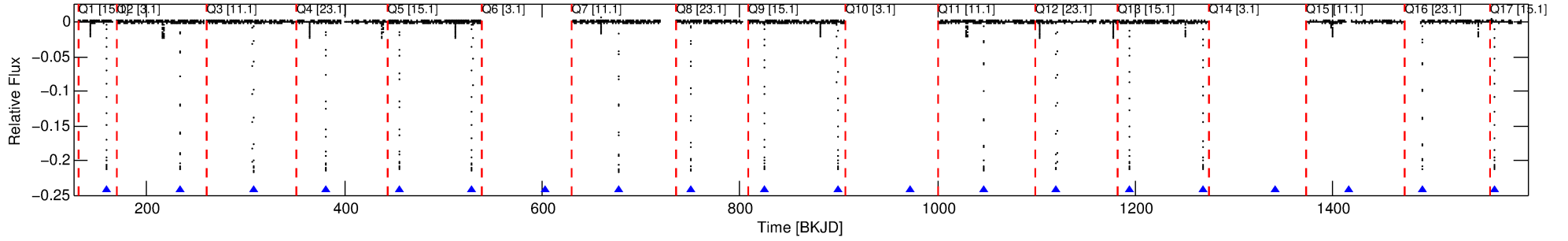
## Ephemeris Match Information For 004661634-01

No Significant Match Found

# DV One-Page Summary

KIC: 4661634 Candidate: 1 of 2 Period: 73.894 d  
KOI: K06432.01 Corr: 1.000

Kp: 15.33 R\*: 0.84 Rs Teff: 5442.0 K Logg: 4.47 Fe/H: -0.340



## DV Fit Results:

Period = 73.89416 [0.00000] d  
Epoch = 159.9005 [0.0000] BKJD  
Rp/R\* = 0.4265 [0.0001]  
a/R\* = 83.32 [0.04]  
b = 0.27 [0.00]  
Seff = 5.62 [1.55]  
Teq = 393 [27] K  
Rp = 39.15 [7.17] Re  
a = 0.3145 [0.0507] AU  
Ag = 758.48 [184.58] [4.10σ]  
Teffp = 3185 [104] K [25.88σ]

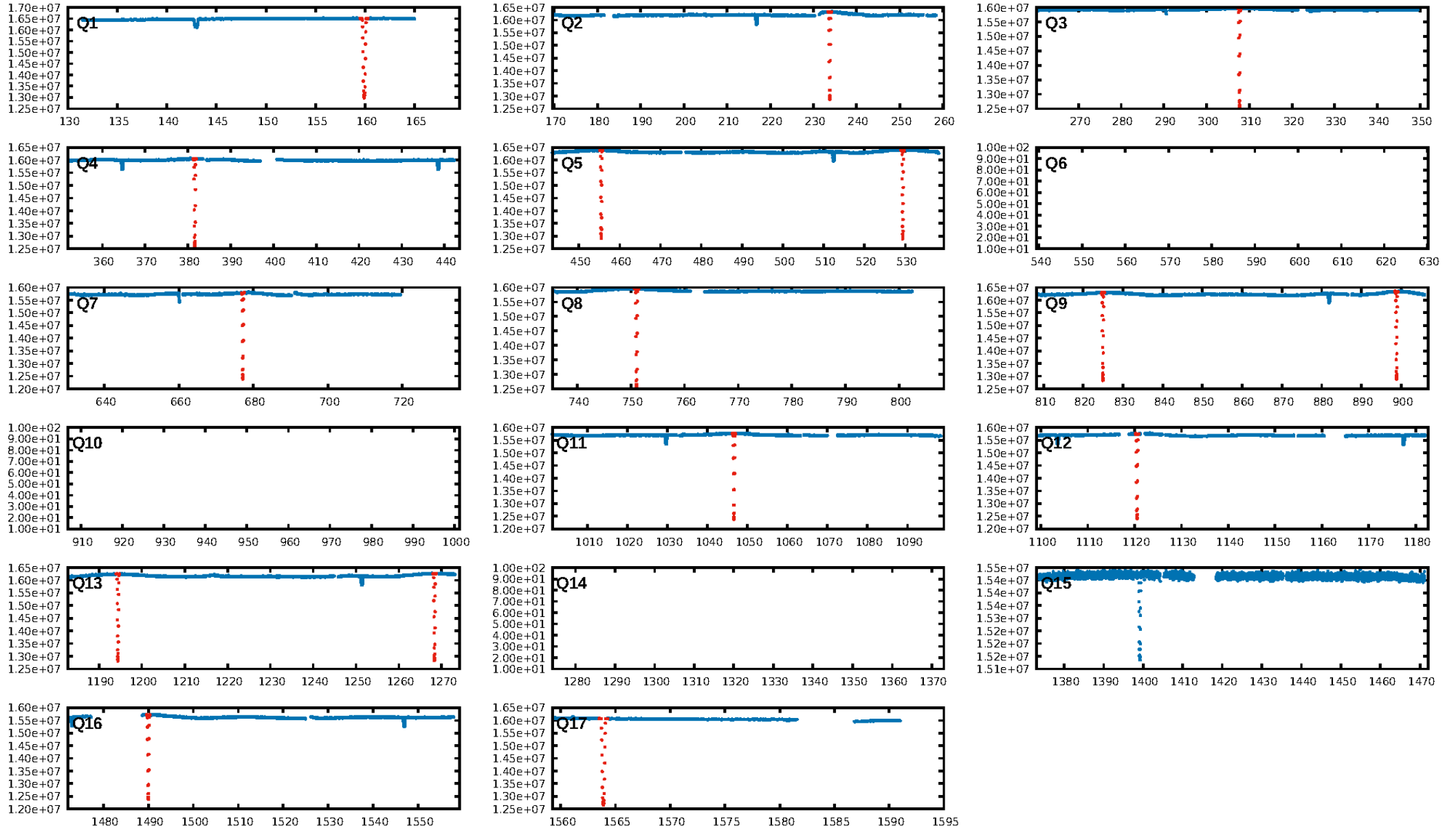
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 22.3%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [14/14]  
GhostDiagnostic-chr: 5.833  
Centroid-sig: 0.0%  
Centroid-so: 0.117 arcsec [37.26σ]  
OotOffset-rm: 0.024 arcsec [0.34σ]  
KicOffset-rm: 0.131 arcsec [1.89σ]  
OotOffset-st: 1/3/3/4 [11]  
KicOffset-st: 1/3/3/4 [11]  
DiffImageQuality-fgm: 1.00 [11/11]  
DiffImageOverlap-fno: 1.00 [11/11]

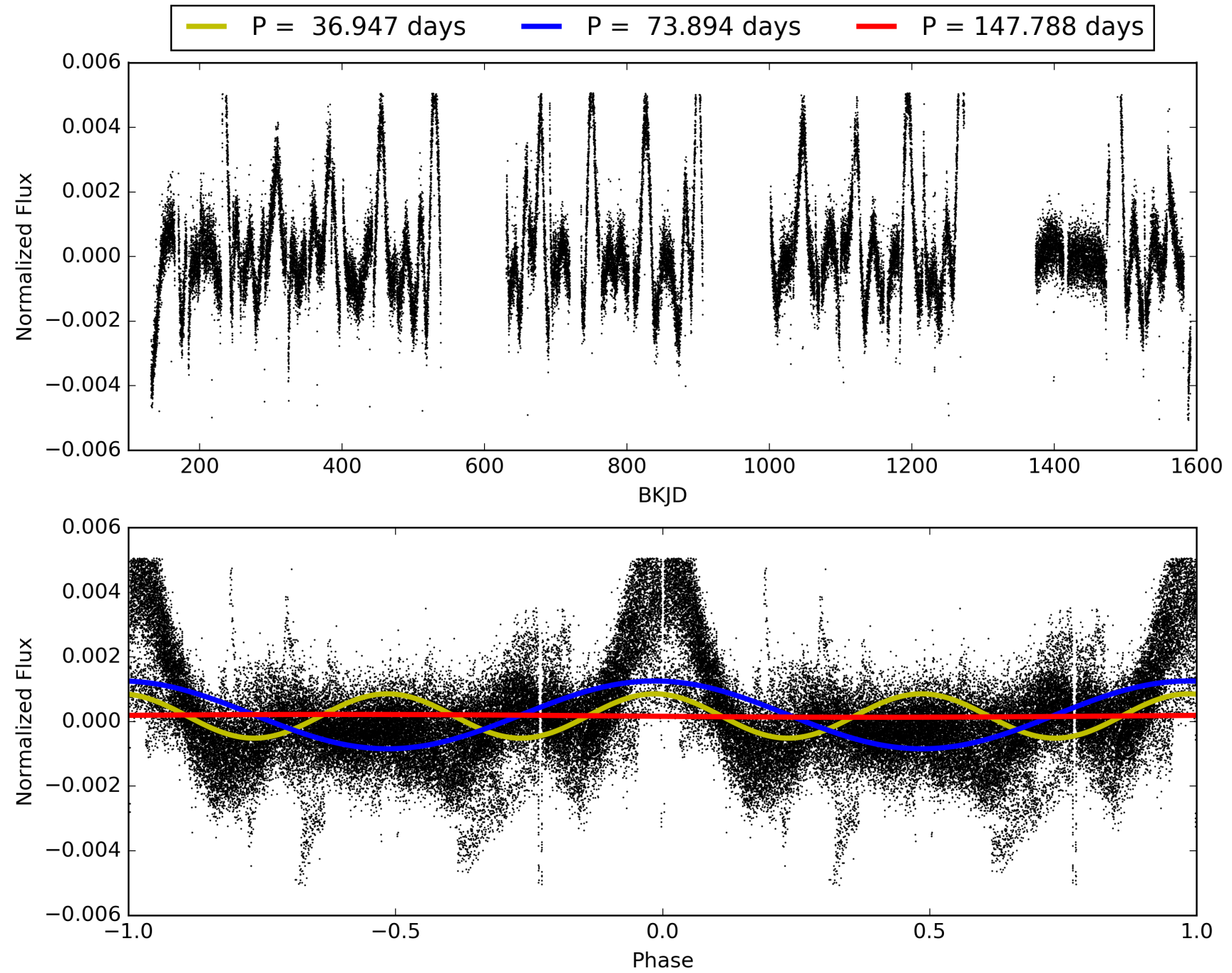
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 08:59:47 Z

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

# TCE 004661634-01, PDC Light Curves

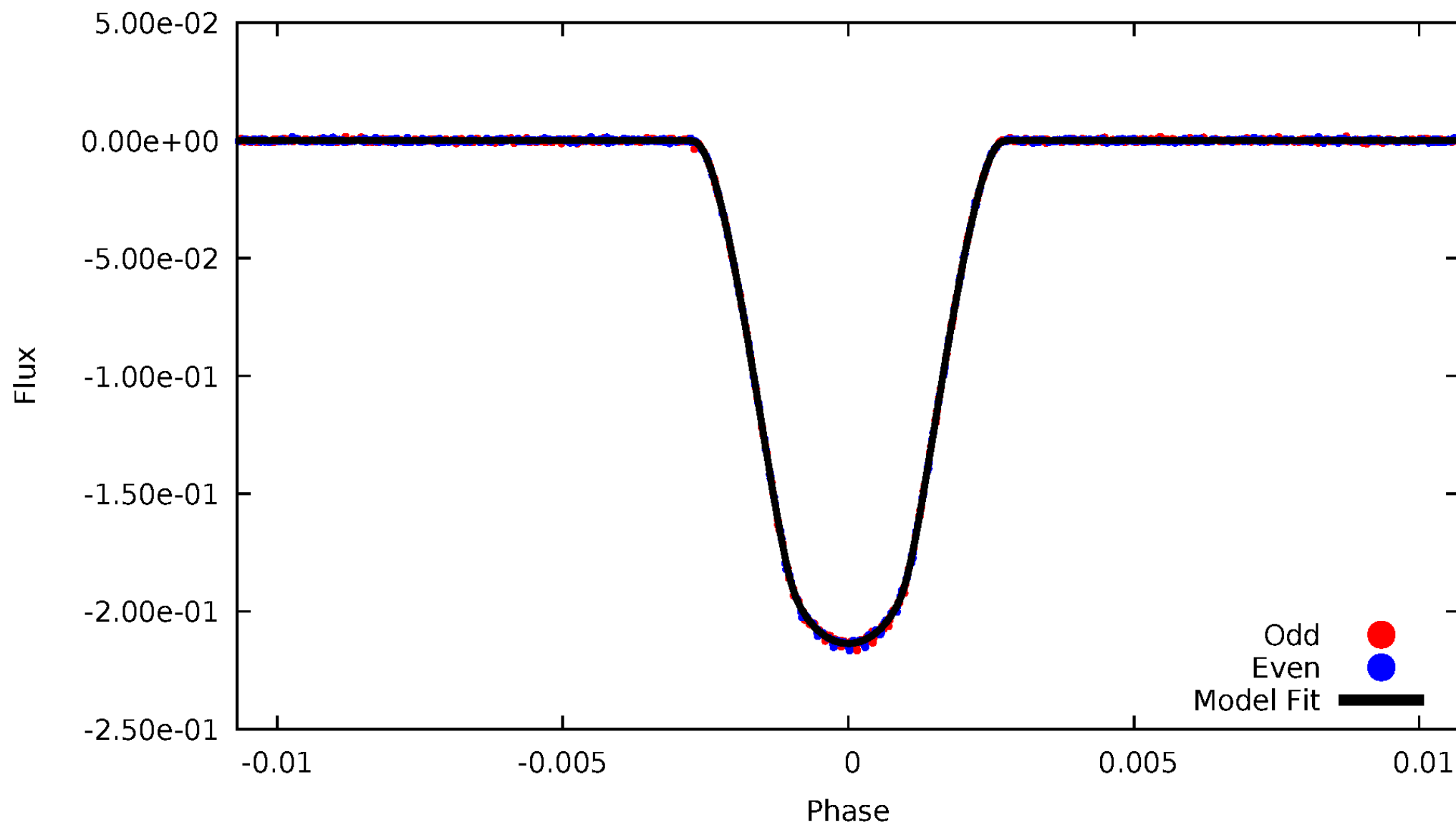


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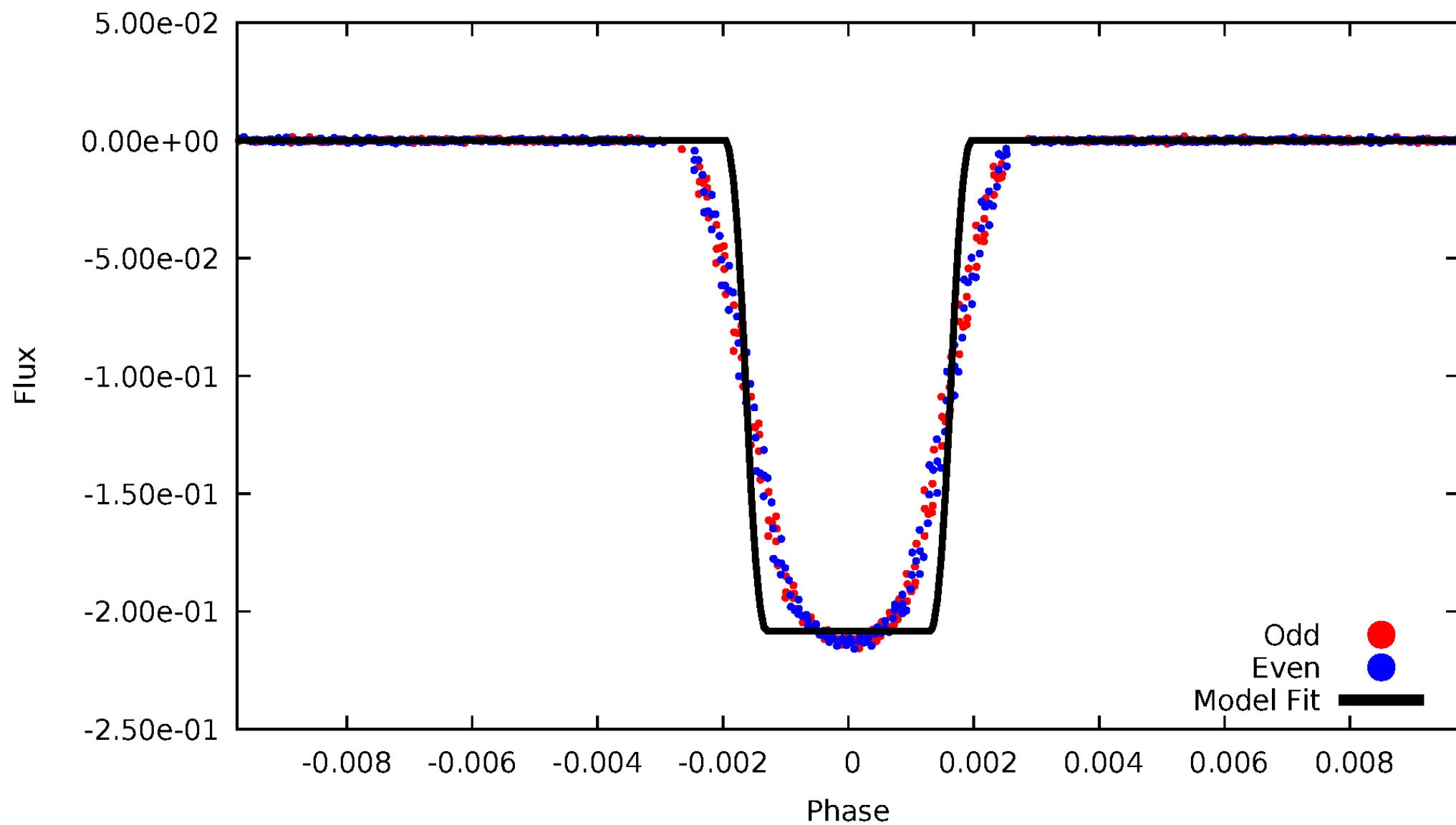
# DV Odd/Even

TCE 004661634-01



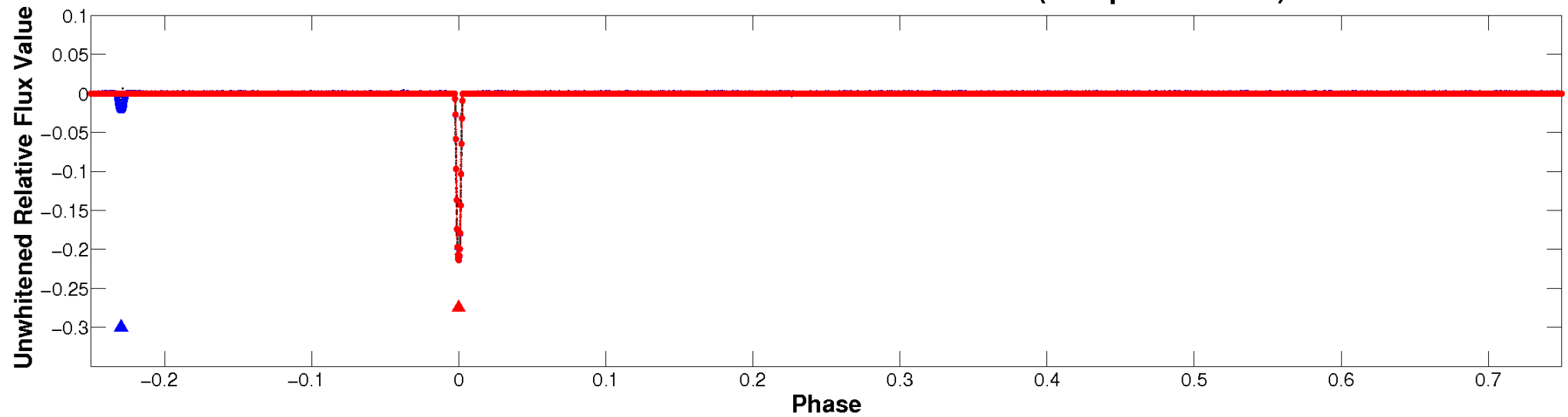
# ALT Odd/Even

TCE 004661634-01

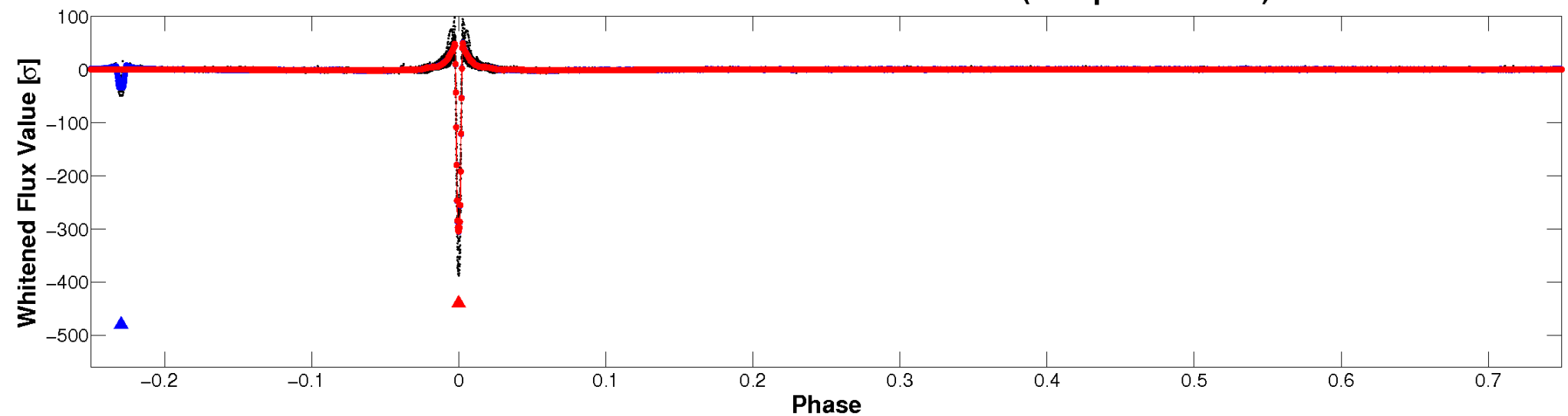


# Non-Whitened Vs. Whitened Light Curve

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

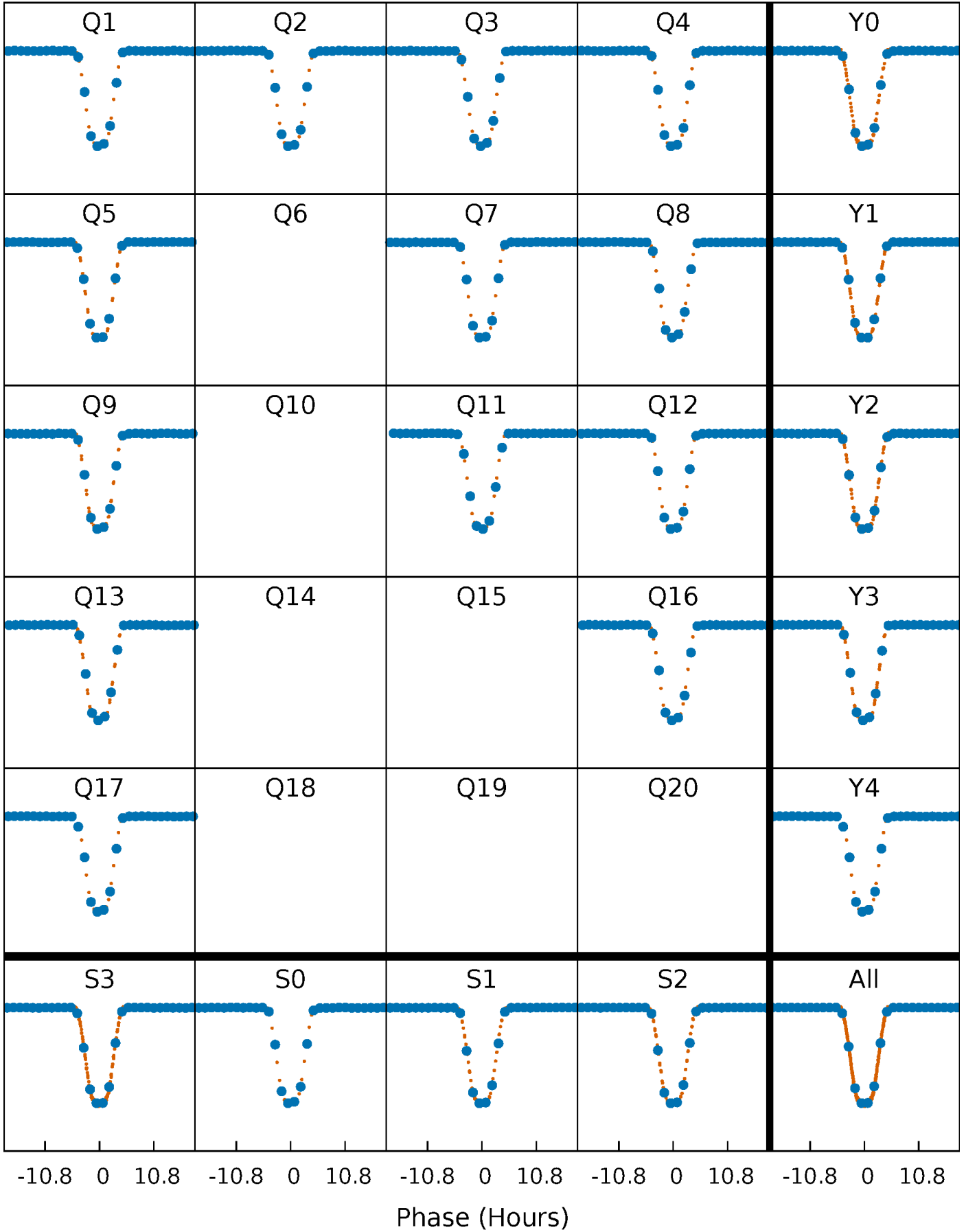


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

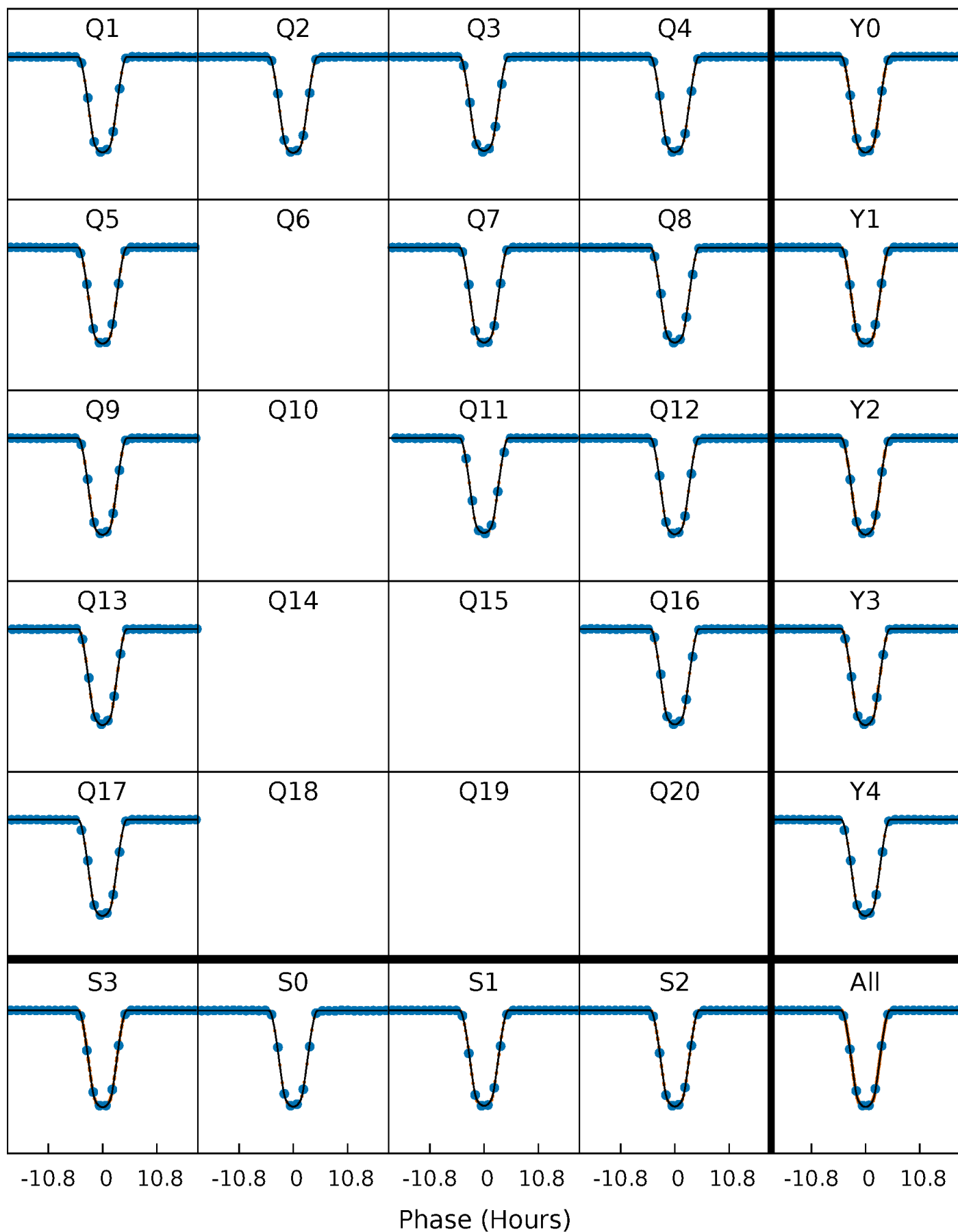
TCE 004661634-01 P= 73.894164 Days  $T_0=159.900505$  (BKJD)





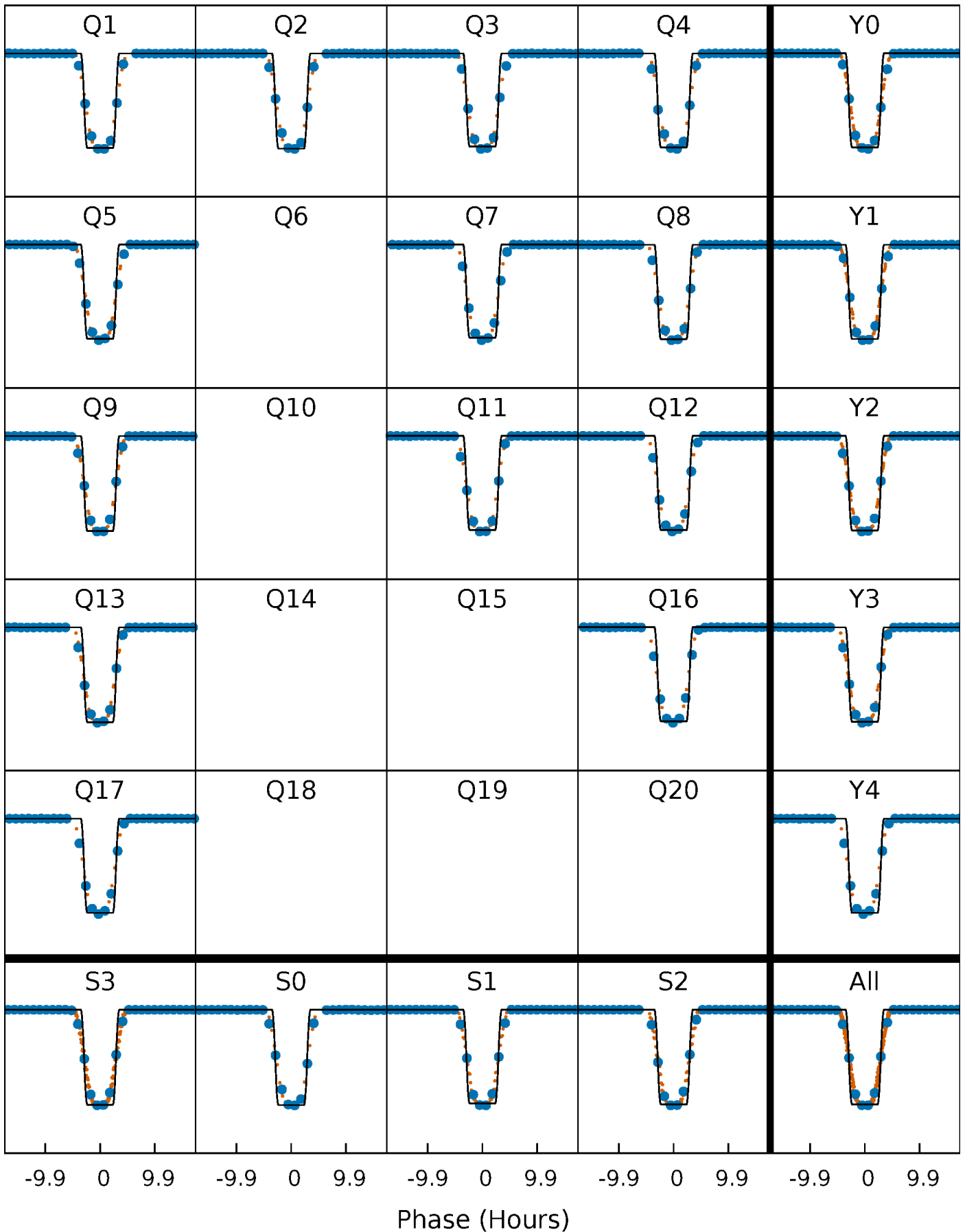
# DV Quarter-Phased Transit Curves

TCE 004661634-01 P= 73.894164 Days  $T_0=159.900505$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

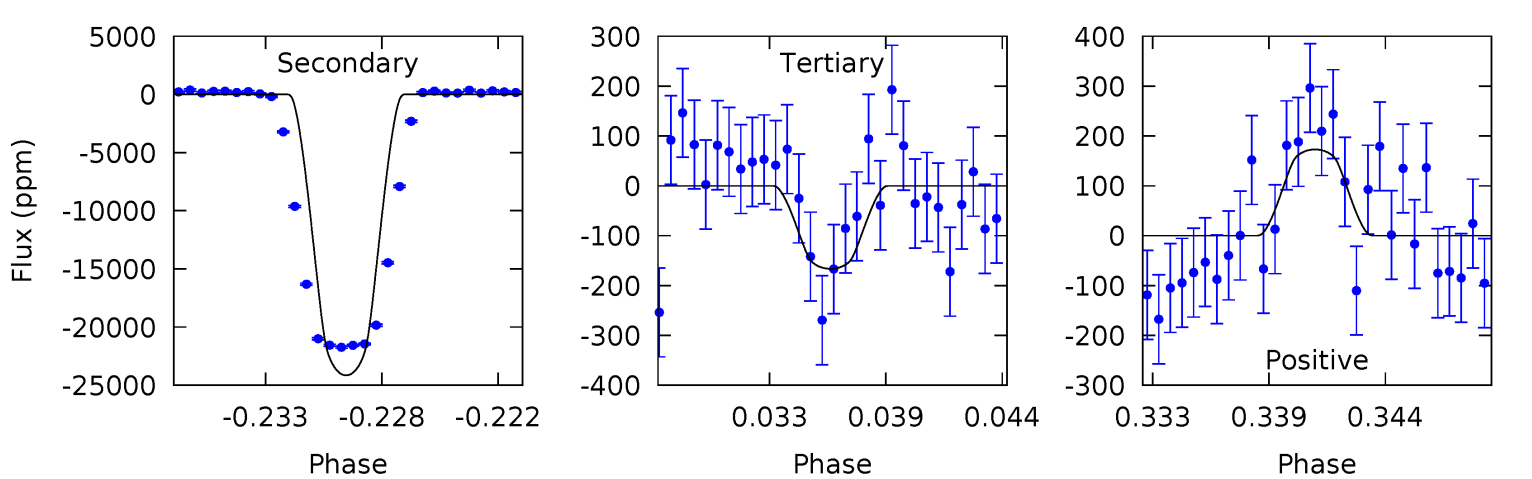
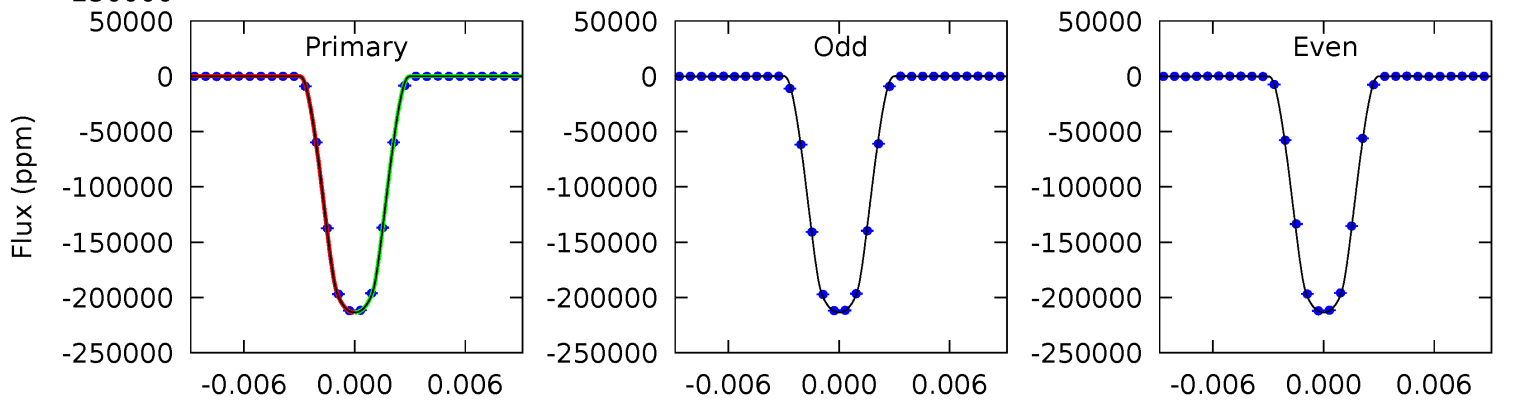
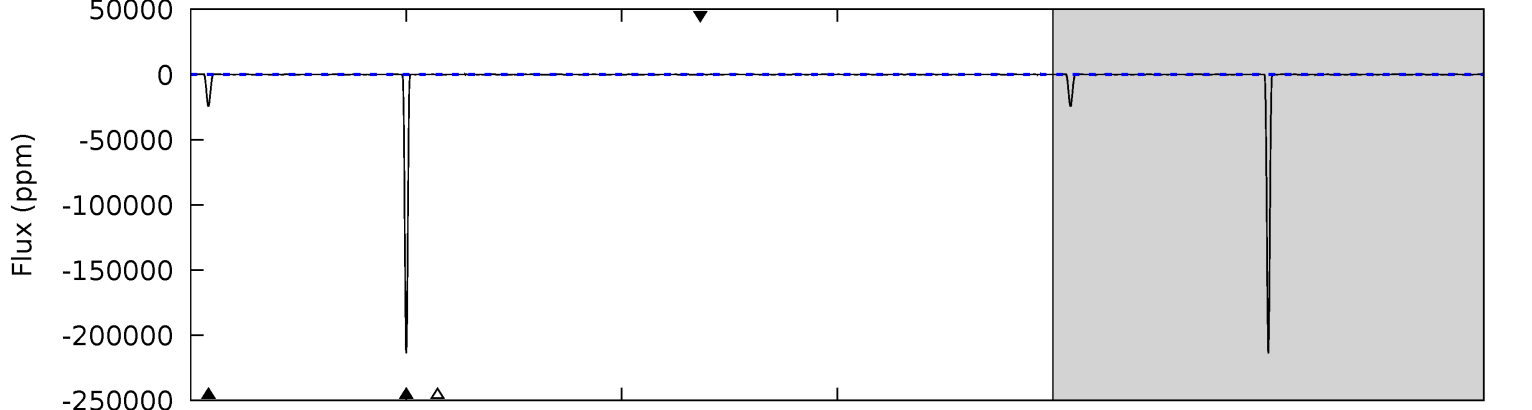
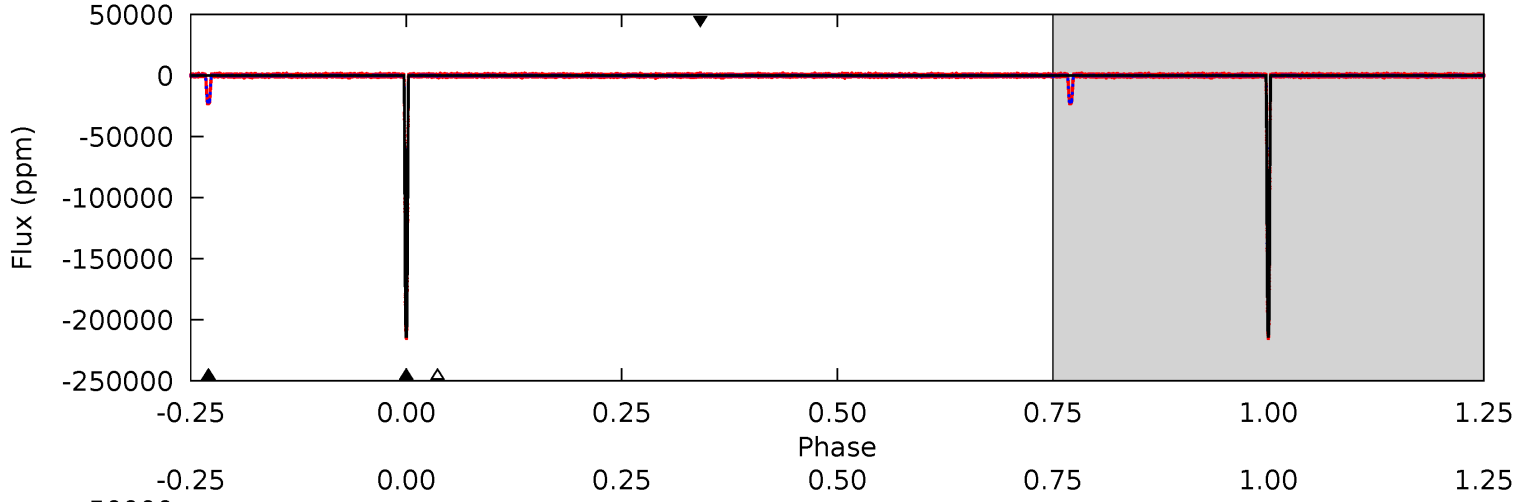
TCE 004661634-01 P= 73.894958 Days  $T_0=159.893248$  (BKJD)



# DV Model-Shift Uniqueness Test

004661634-01, P = 73.894164 Days, E = 86.006341 Days

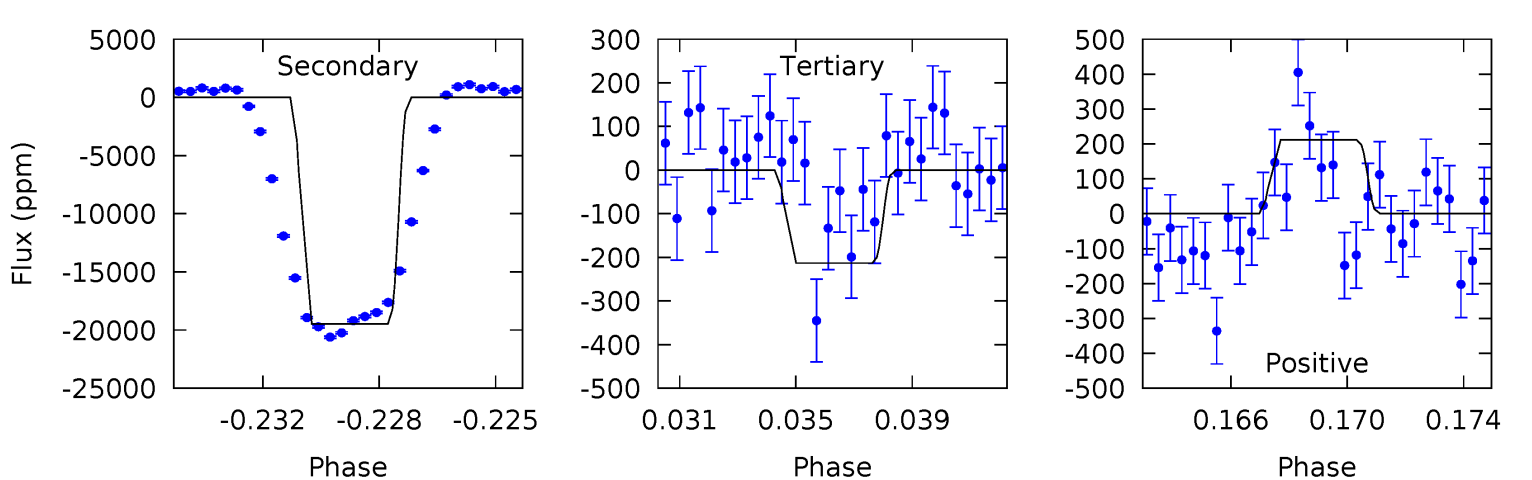
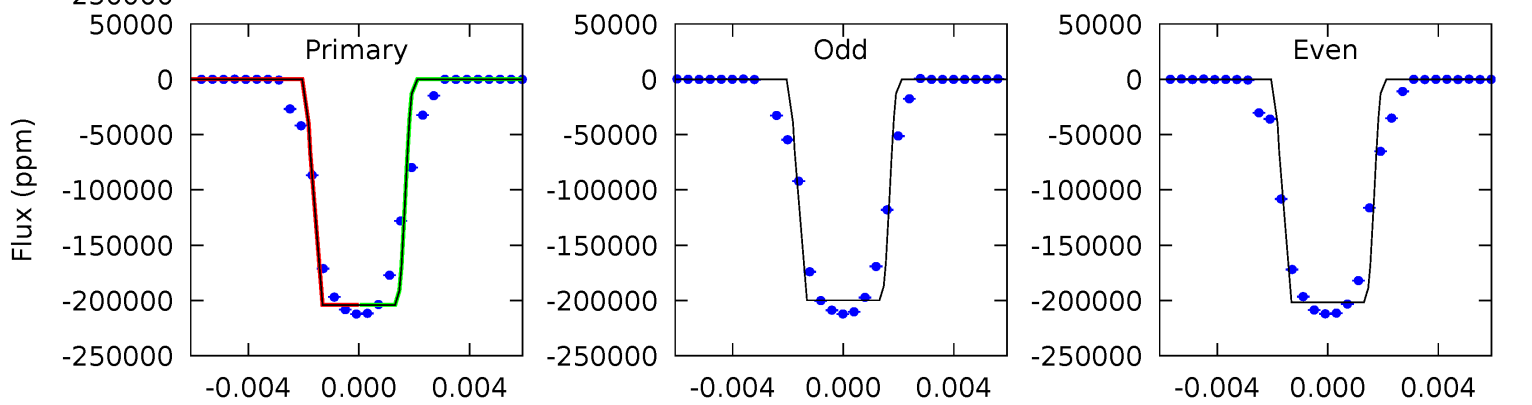
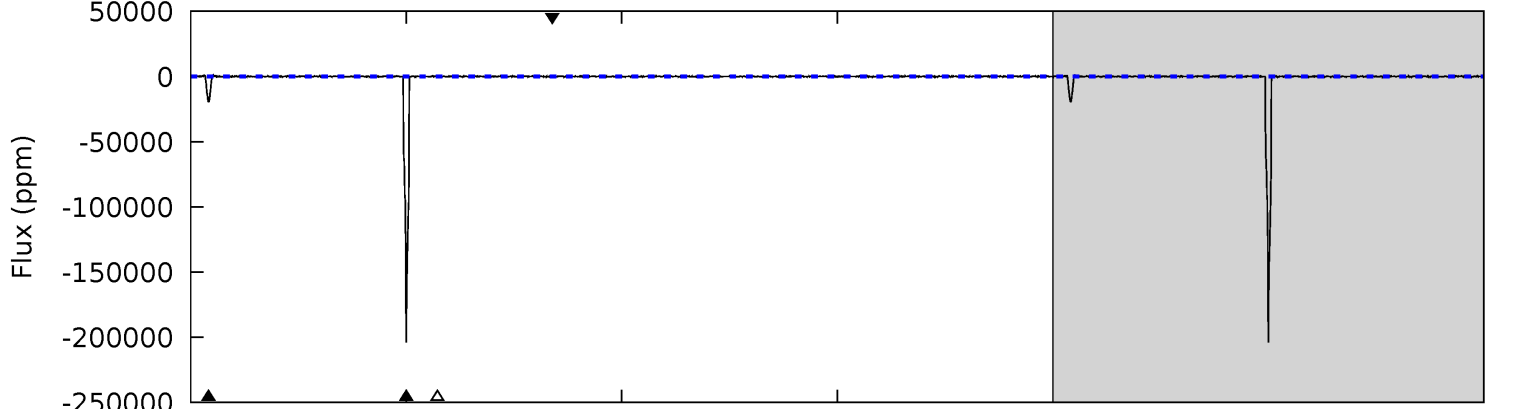
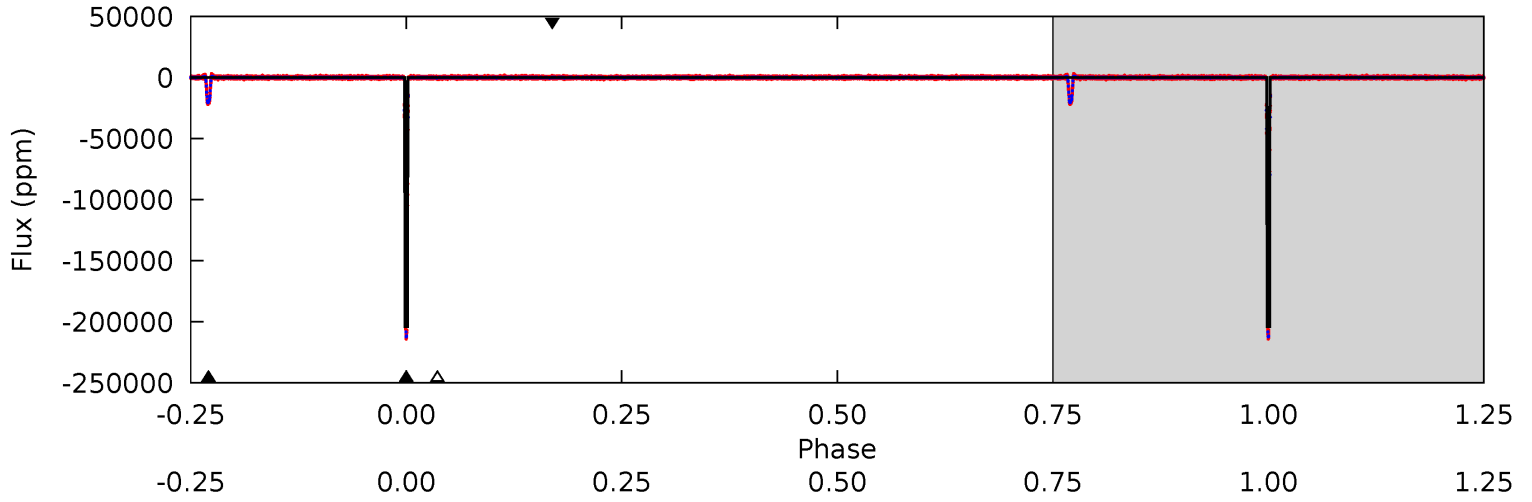
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7637	863.3	5.95	6.18	5.14	2.77	2.13	7631	7630	857.3	857.1	0.97	1.00	0.00	0.02



# Alt Model-Shift Uniqueness Test

004661634-01, P = 73.894958 Days, E = 85.998290 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
4179	398.6	4.37	4.33	5.21	2.89	1.36	4174	4174	394.2	394.3	18.7	1.00	0.00	0.88



### Stellar Parameters For KIC 004661634

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5442^{+178}_{-162}$	$4.469^{+0.113}_{-0.137}$	$-0.340^{+0.350}_{-0.300}$	$0.841^{+0.154}_{-0.115}$	$0.759^{+0.122}_{-0.052}$	$1.800^{+0.913}_{-0.663}$
	+3%/-3%	+3%/-3%	+103%/-88%	+18%/-14%	+16%/-7%	+51%/-37%
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 004661634-01 / KOI 6432.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-24151 \pm 28$	$39.78^{+4.48}_{-3.49}$	$551^{+32}_{-27}$	$3697^{+93}_{-78}$	$871^{+152}_{-162}$
Alt.	$-19456 \pm 49$	$42.43^{+4.96}_{-3.66}$	$552^{+33}_{-31}$	$3498^{+81}_{-77}$	$609^{+113}_{-108}$

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

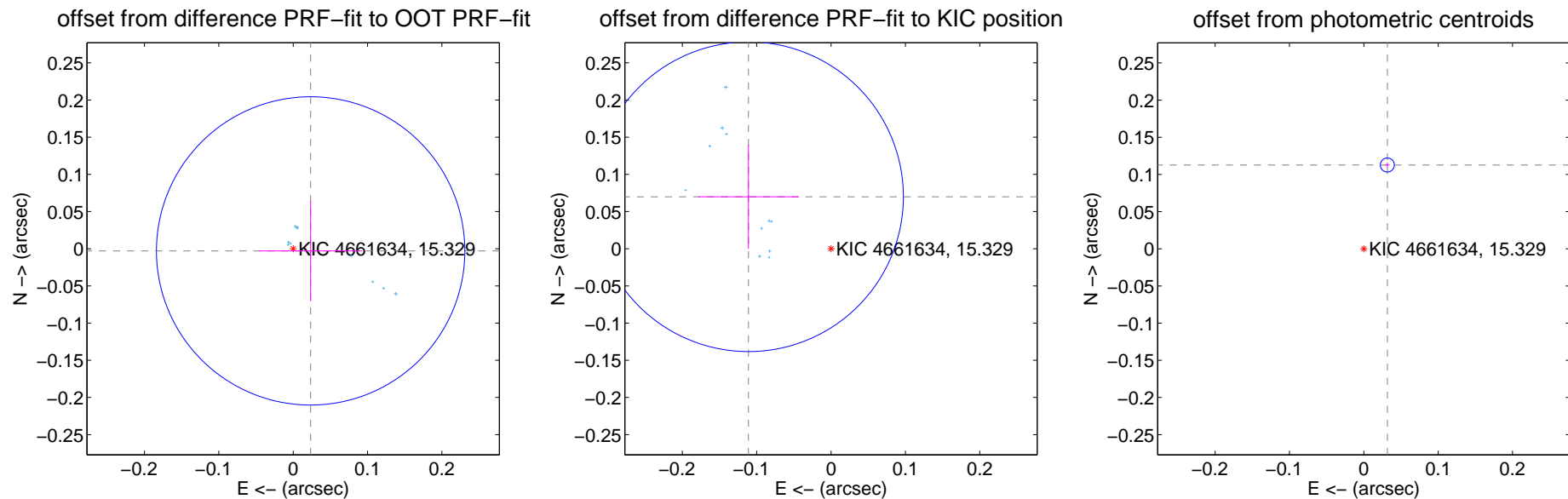
## DV Centroid Data

Supplemental centroid analysis for 004661634-01. Kepler magnitude: 15.33. Transit SNR 3215.63

There are 11 quarters with good PRF difference image offsets

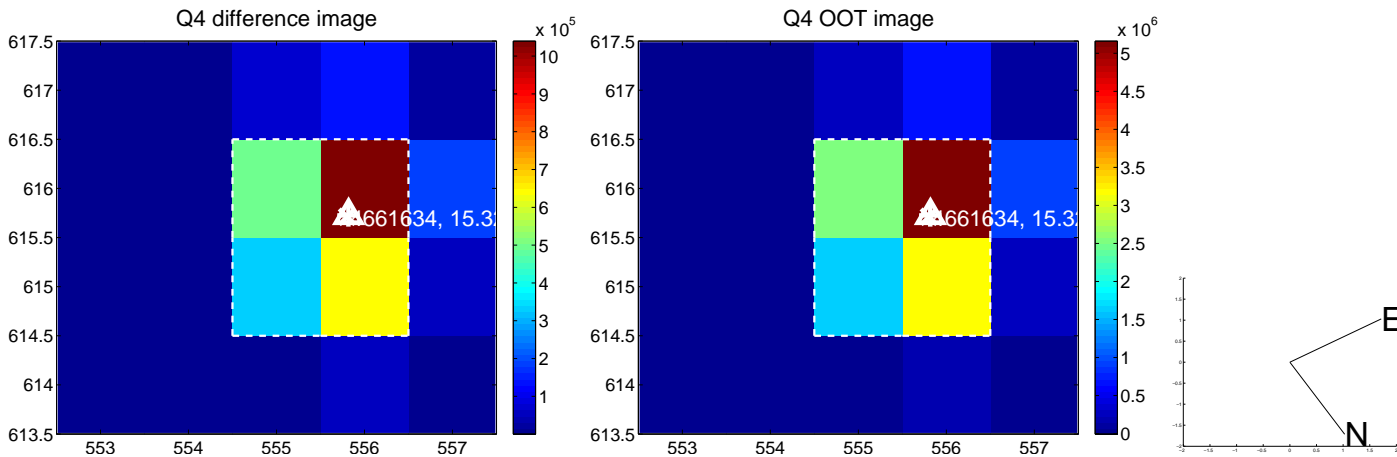
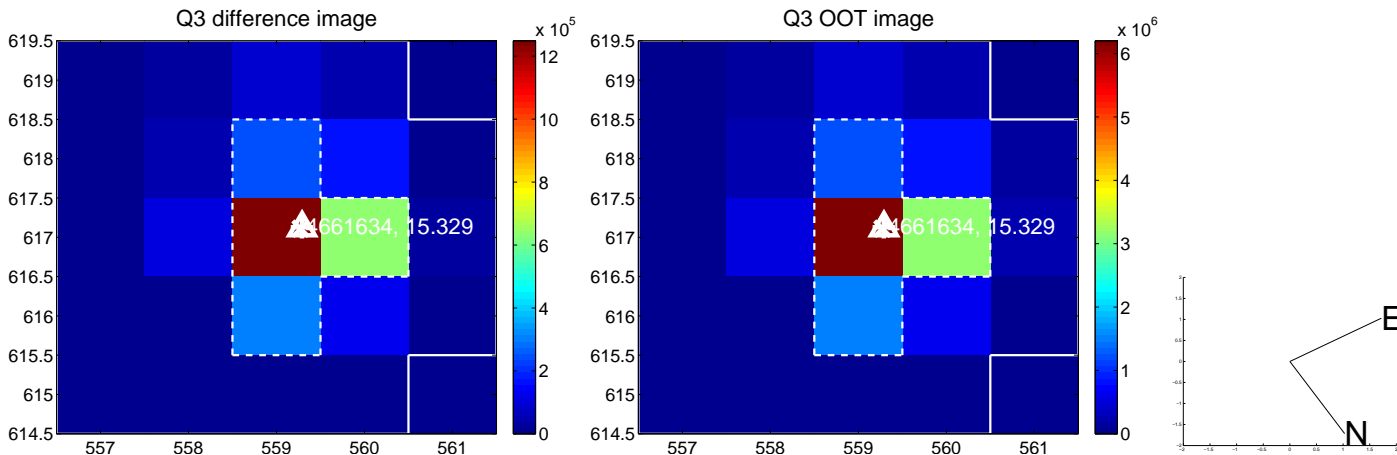
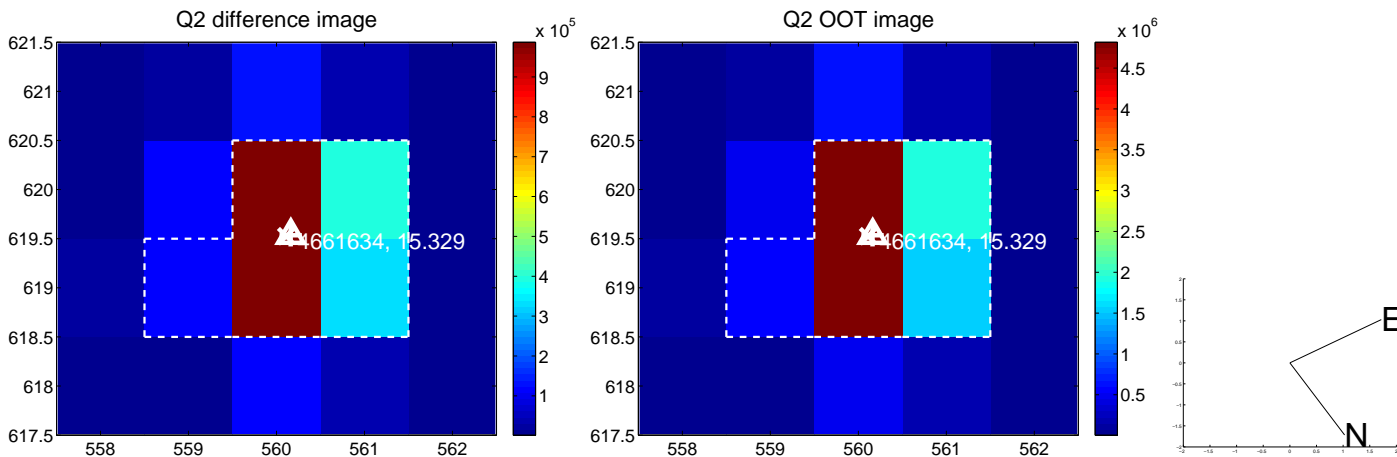
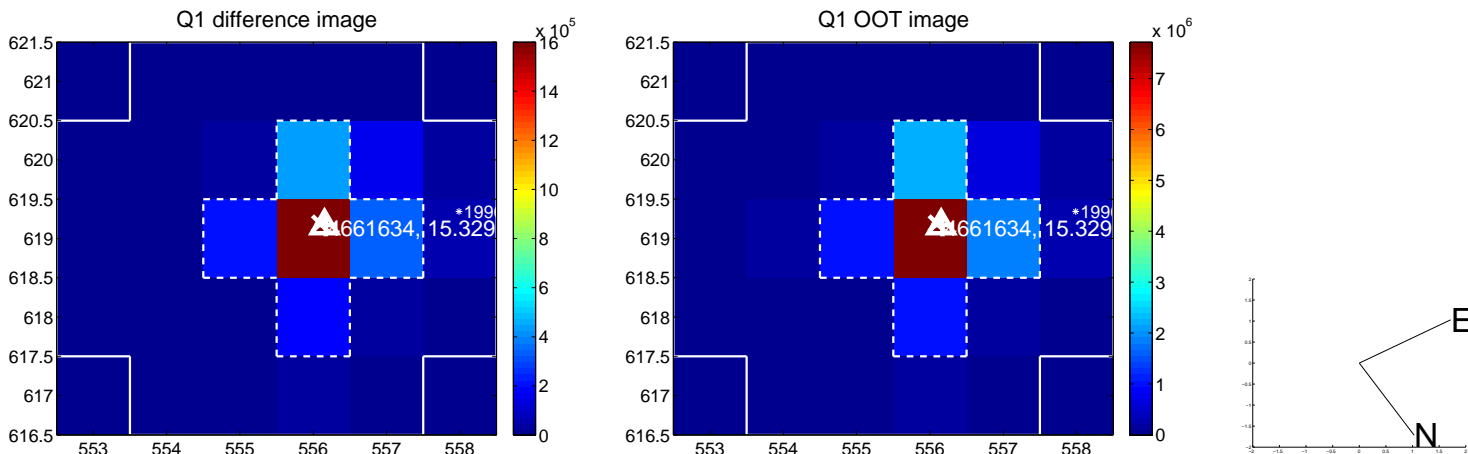
The direct PRF centroid is offset from the target star catalog position by about 0.36 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.024 \pm 0.069$	0.34	$-0.023 \pm 0.069$	$-0.003 \pm 0.067$
PRF-fit source offset from KIC position	$0.131 \pm 0.069$	1.89	$0.111 \pm 0.068$	$0.070 \pm 0.070$
photometric centroid source offset	$0.12 \pm 0.00$	37.26	$-0.03 \pm 0.00$	$0.11 \pm 0.00$

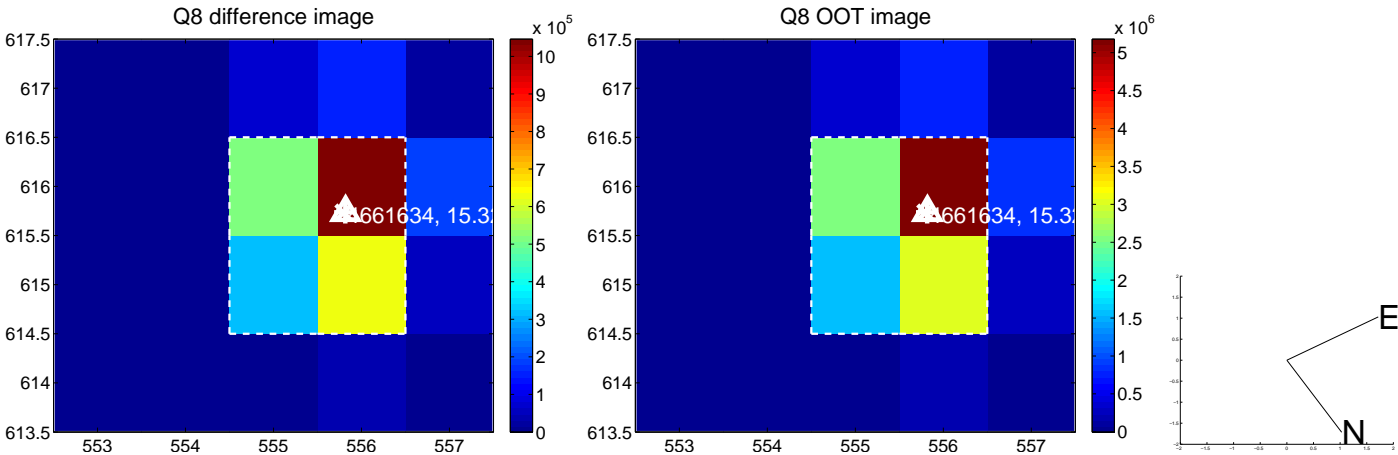
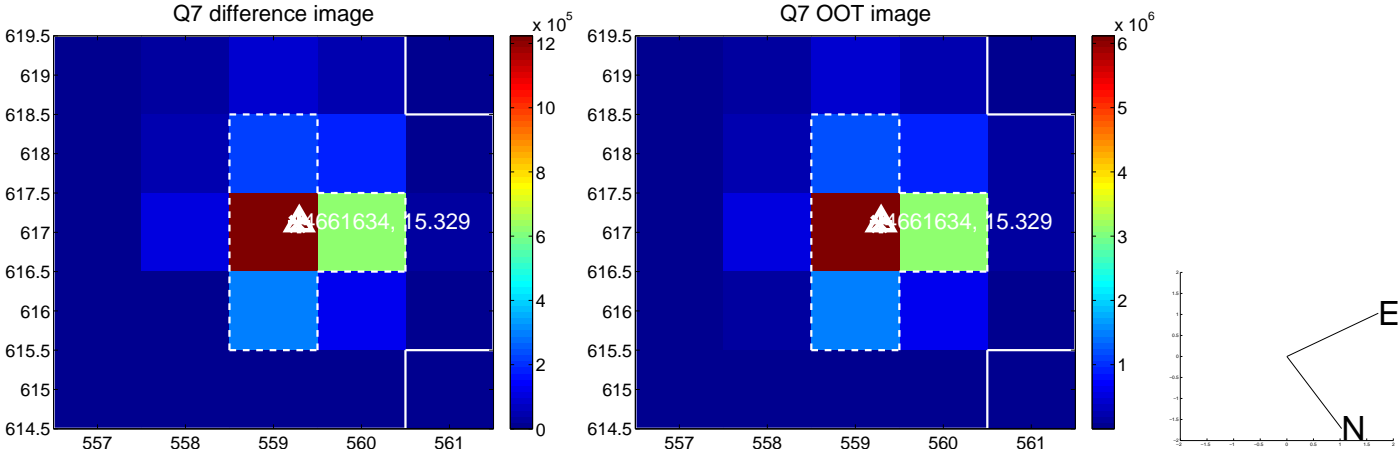
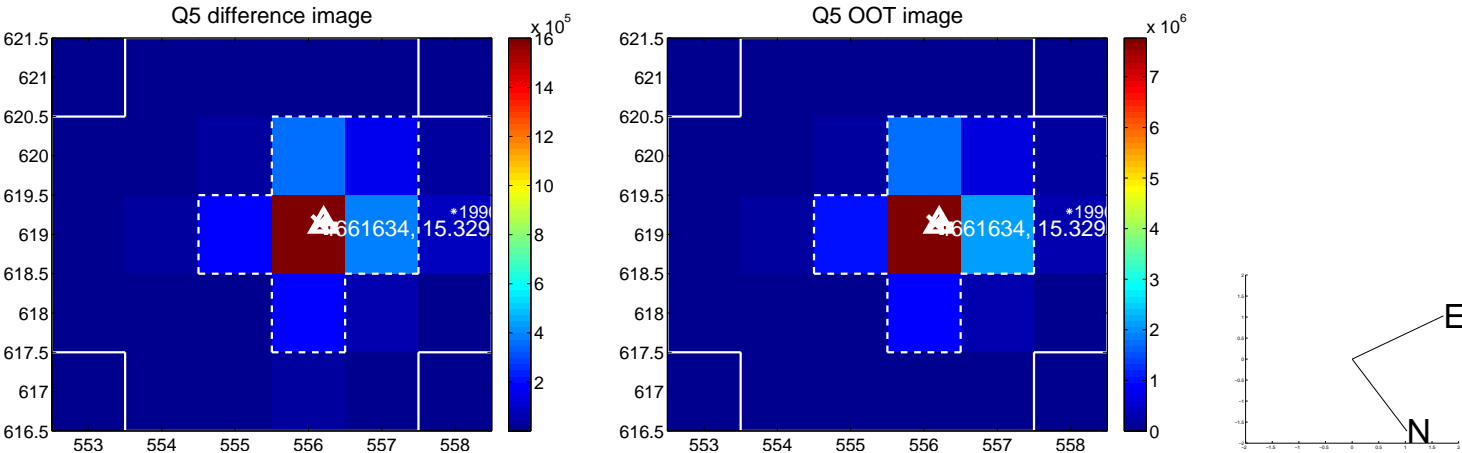


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

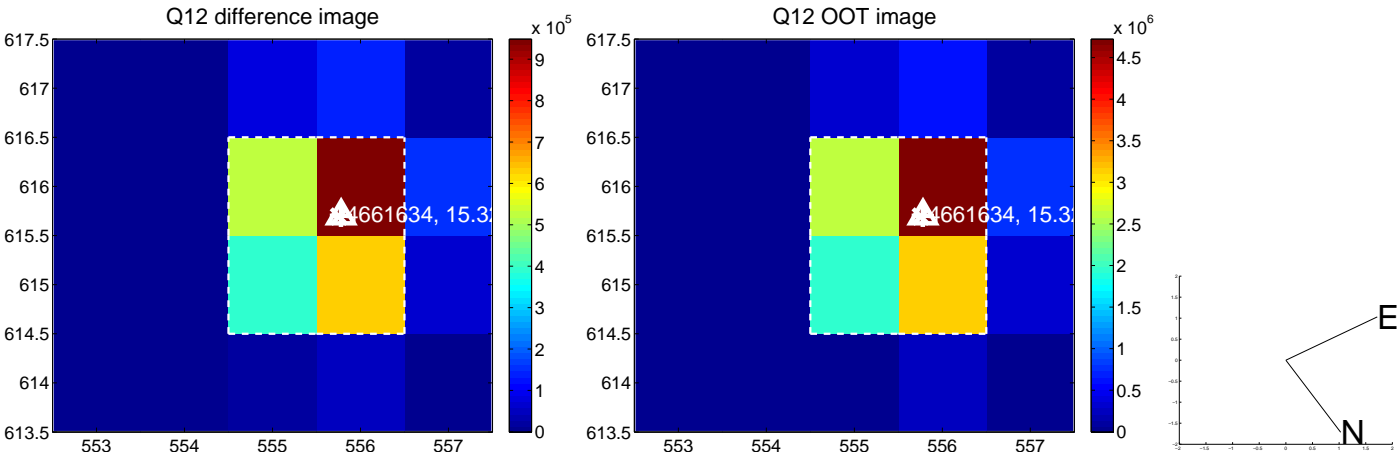
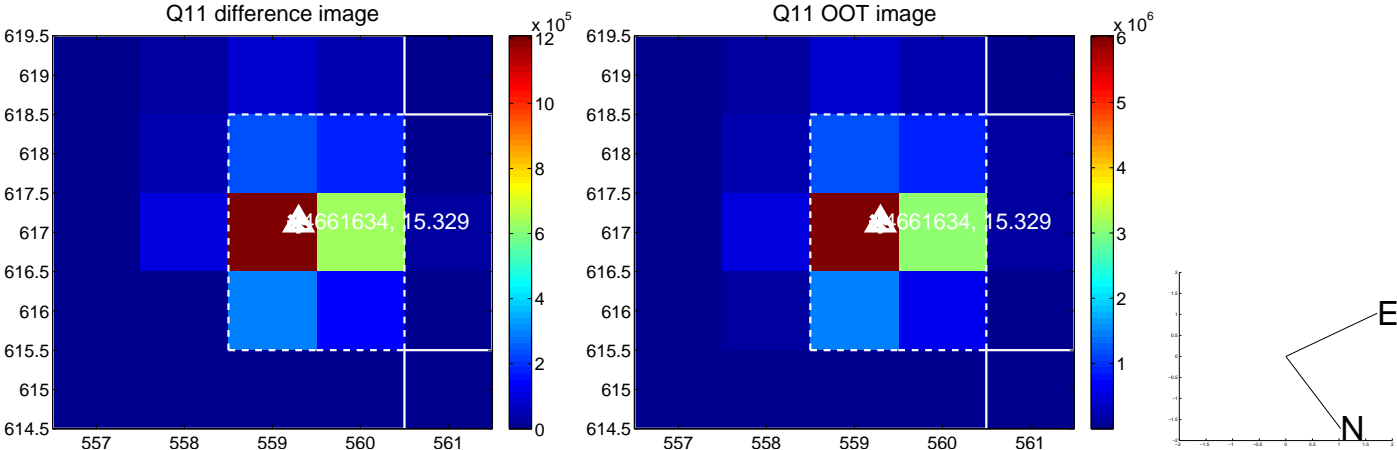
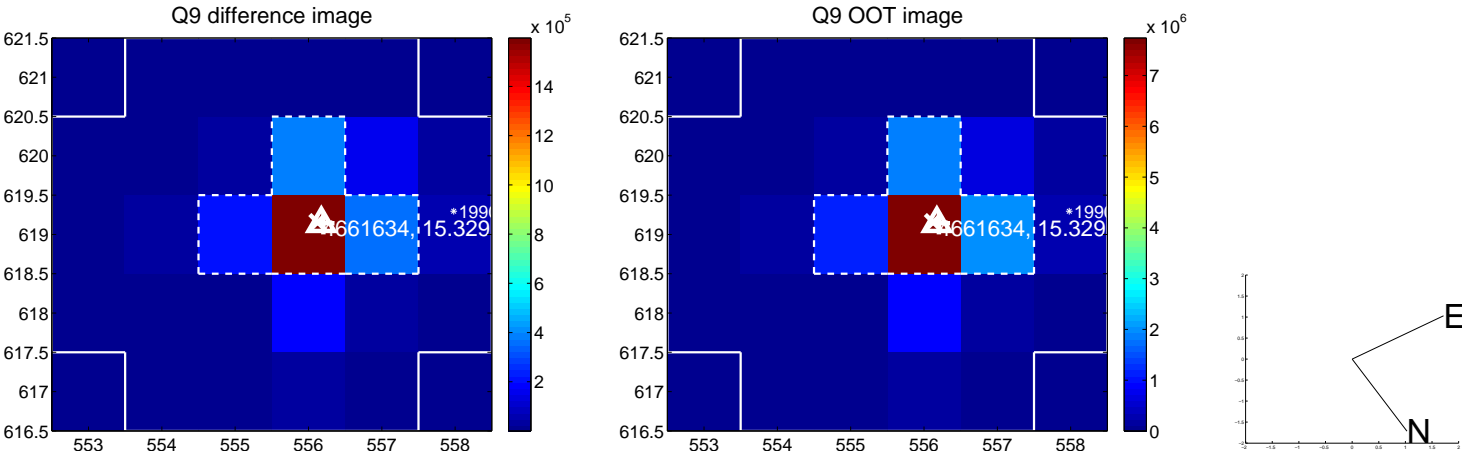


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





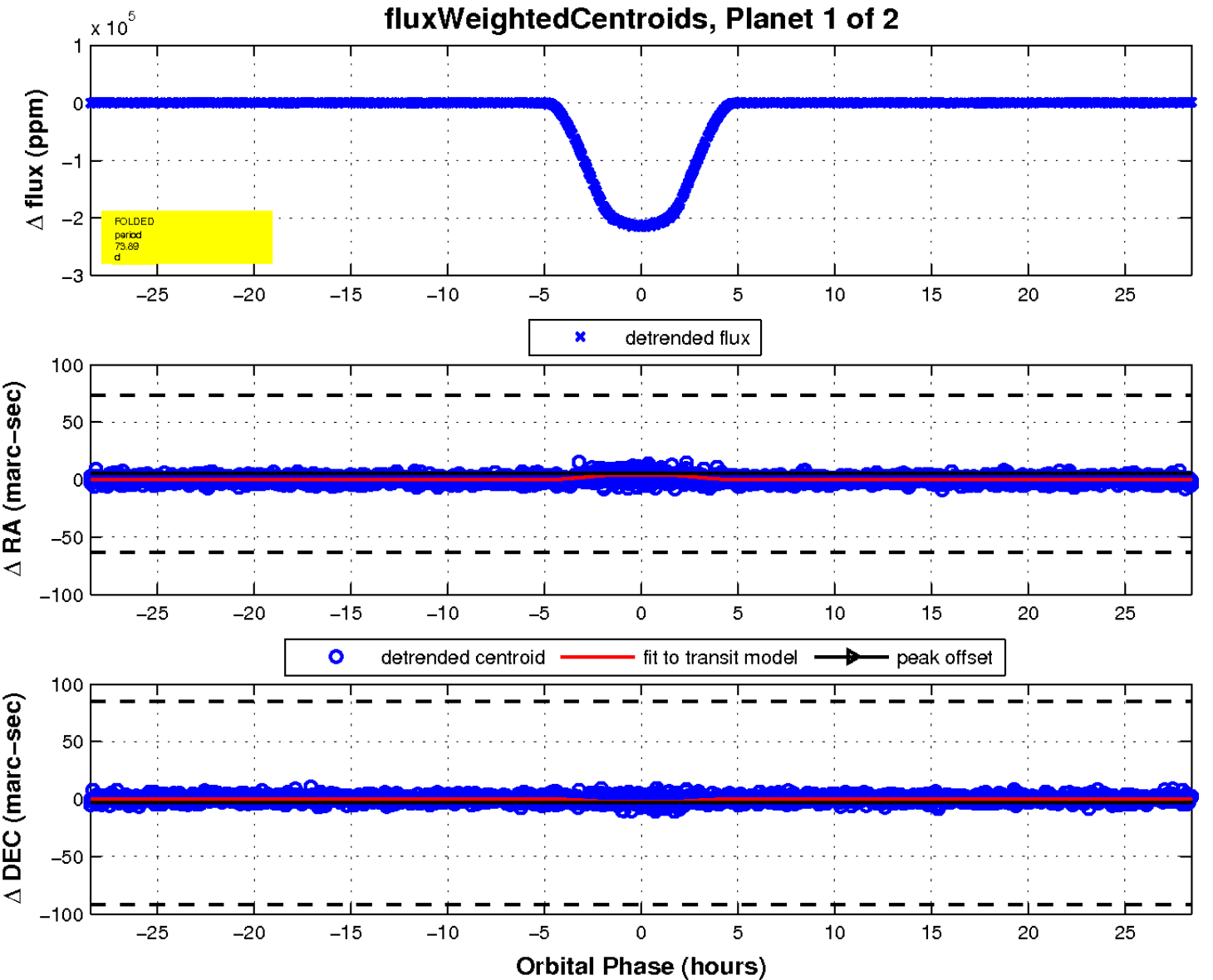
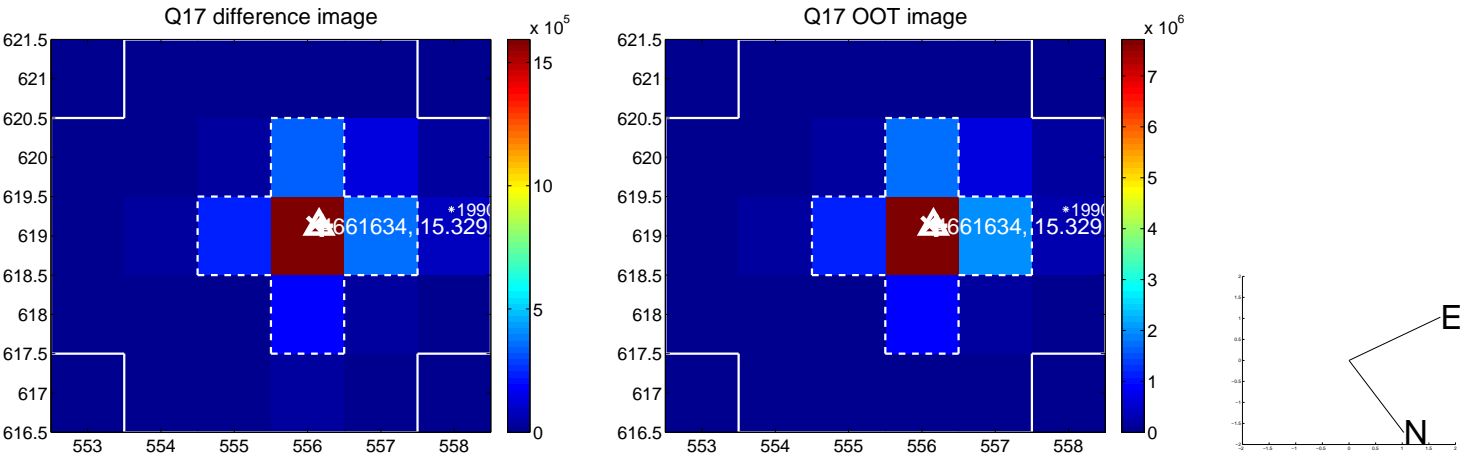
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

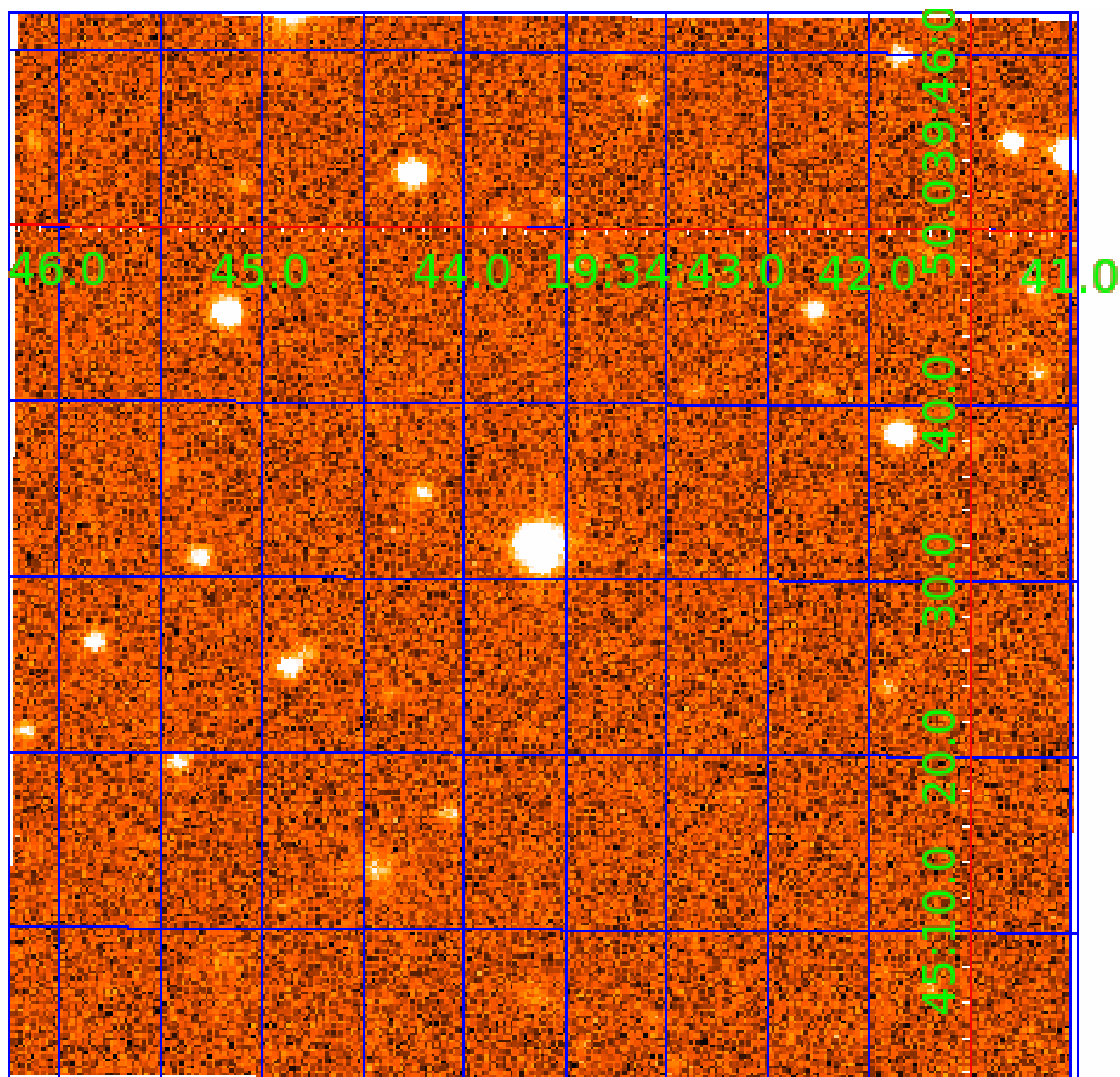


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 004661634

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004661634-01	OBS	6432.01	73.894164	159.900505	213610.0	9.490	3758.2	3215.6	0.84	5442	39.15	5.62
004661634-02	OBS	No	73.894393	142.939744	22233.3	12.334	446.2	418.7	0.84	5442	13.90	5.62

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004661634-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE
004661634-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE

**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.

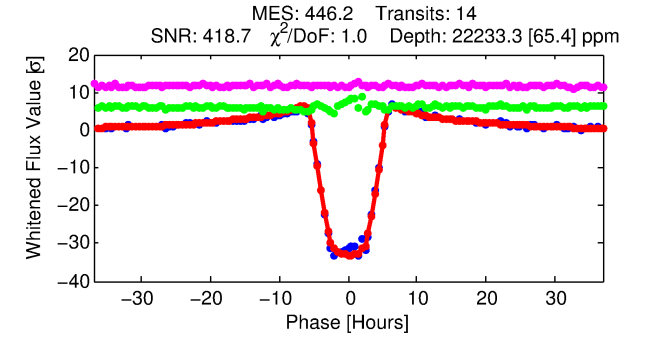
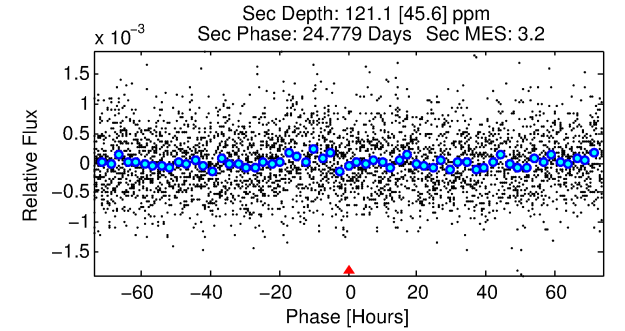
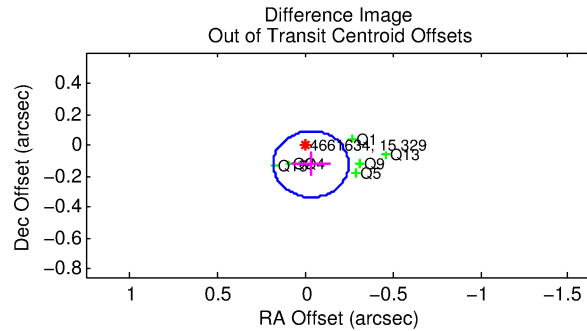
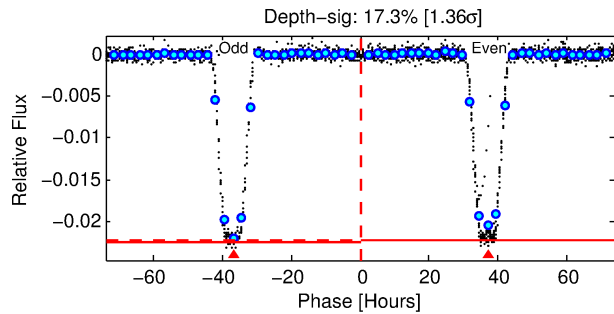
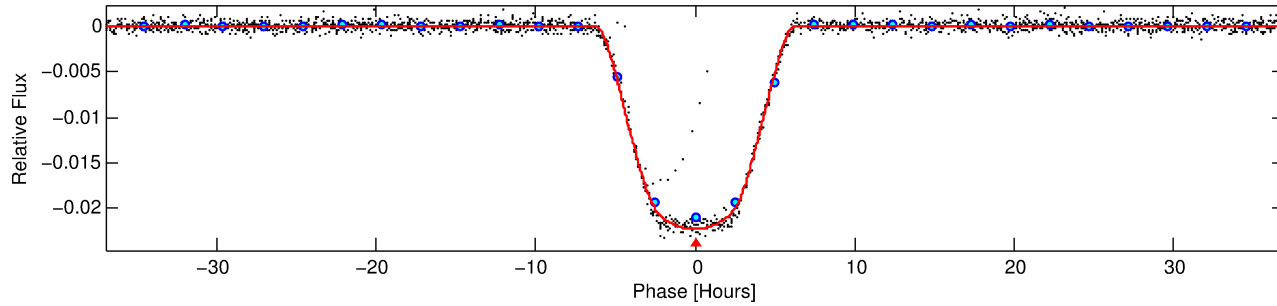
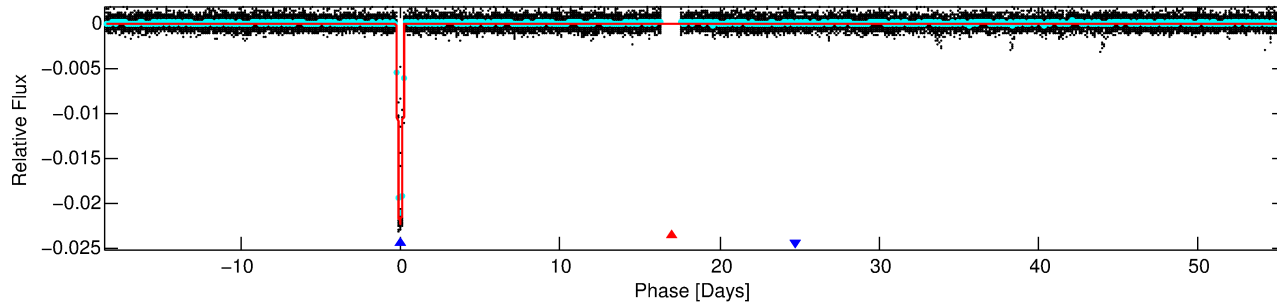
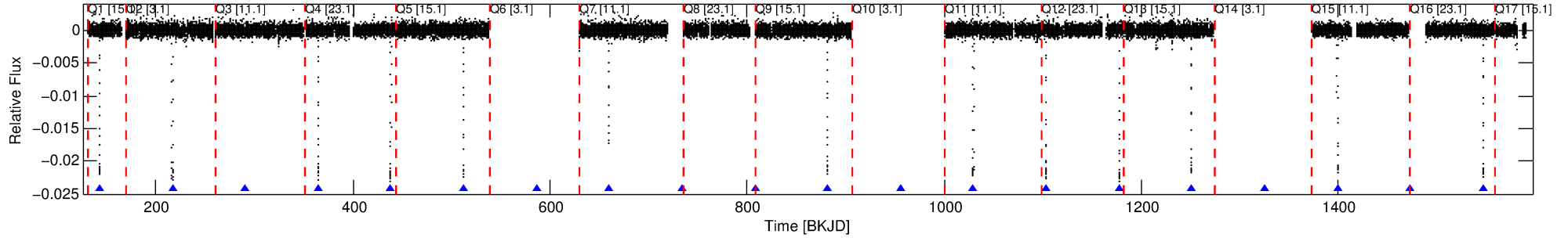
## Ephemeris Match Information For 004661634-02

No Significant Match Found

# DV One-Page Summary

KIC: 4661634 Candidate: 2 of 2 Period: 73.894 d  
KOI: K06432 Corr: No Ephemeris Match

Kp: 15.33 R\*: 0.84 Rs Teff: 5442.0 K Logg: 4.47 Fe/H: -0.340



## DV Fit Results:

Period = 73.89439 [0.00005] d  
Epoch = 142.9397 [0.0006] BKJD  
Rp/R\* = 0.1515 [0.0004]  
a/R\* = 38.81 [0.20]  
b = 0.78 [0.00]  
Seff = 5.62 [1.55]  
Teq = 393 [27] K  
Rp = 13.90 [2.55] Re  
a = 0.3145 [0.0507] AU  
Ag = 34.11 [15.28] [2.17σ]  
Teffp = 1467 [146] K [7.23σ]

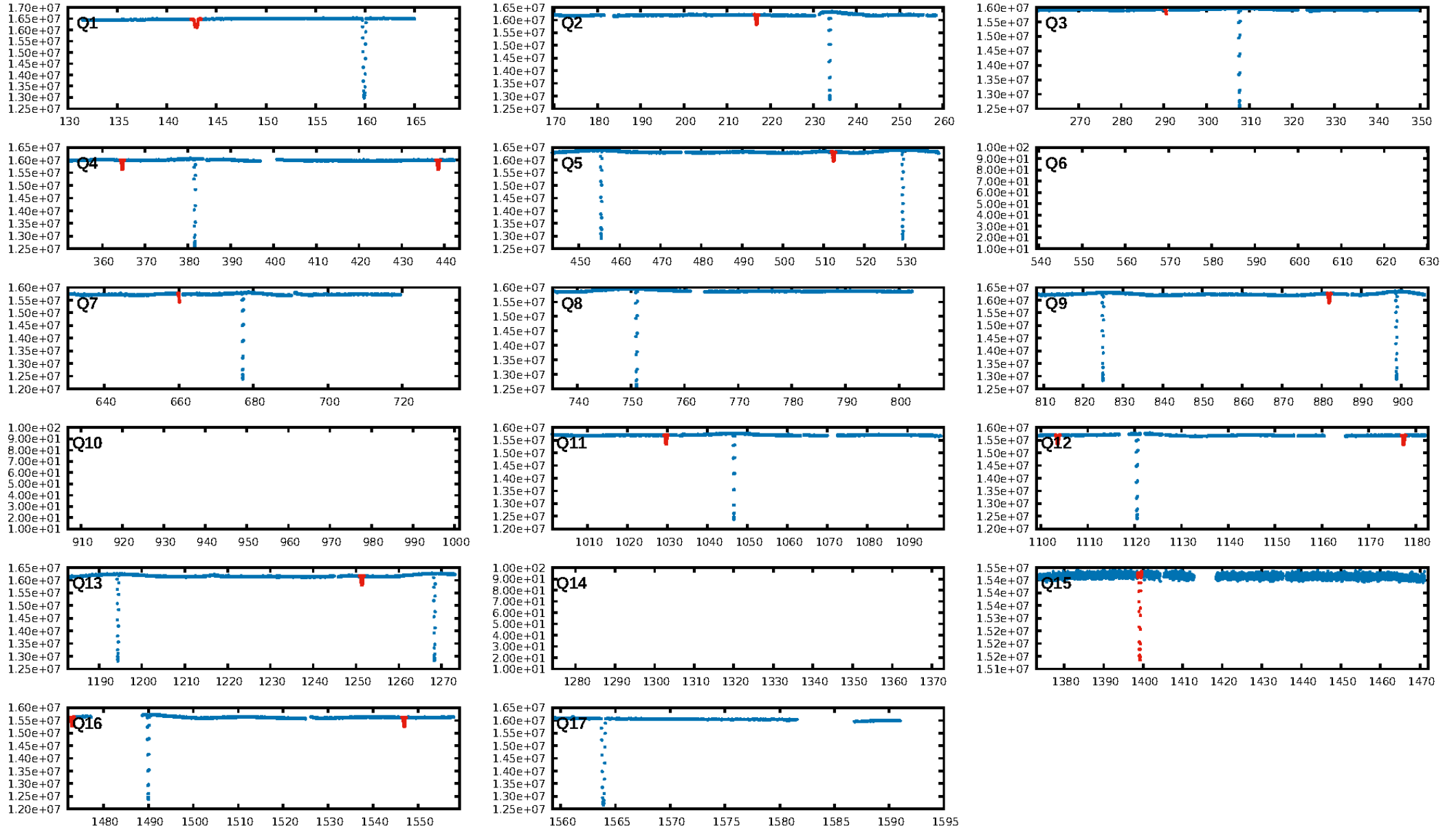
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 99.9%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [13/13]  
GhostDiagnostic-chr: 6.563  
Centroid-sig: 0.0%  
Centroid-so: 0.045 arcsec [1.67σ]  
OotOffset-rm: 0.126 arcsec [1.77σ]  
KicOffset-rm: 0.118 arcsec [1.20σ]  
OotOffset-st: 1/1/1/4 [7]  
KicOffset-st: 1/1/1/4 [7]  
DiffImageQuality-fgm: 1.00 [7/7]  
DiffImageOverlap-fno: 1.00 [7/7]

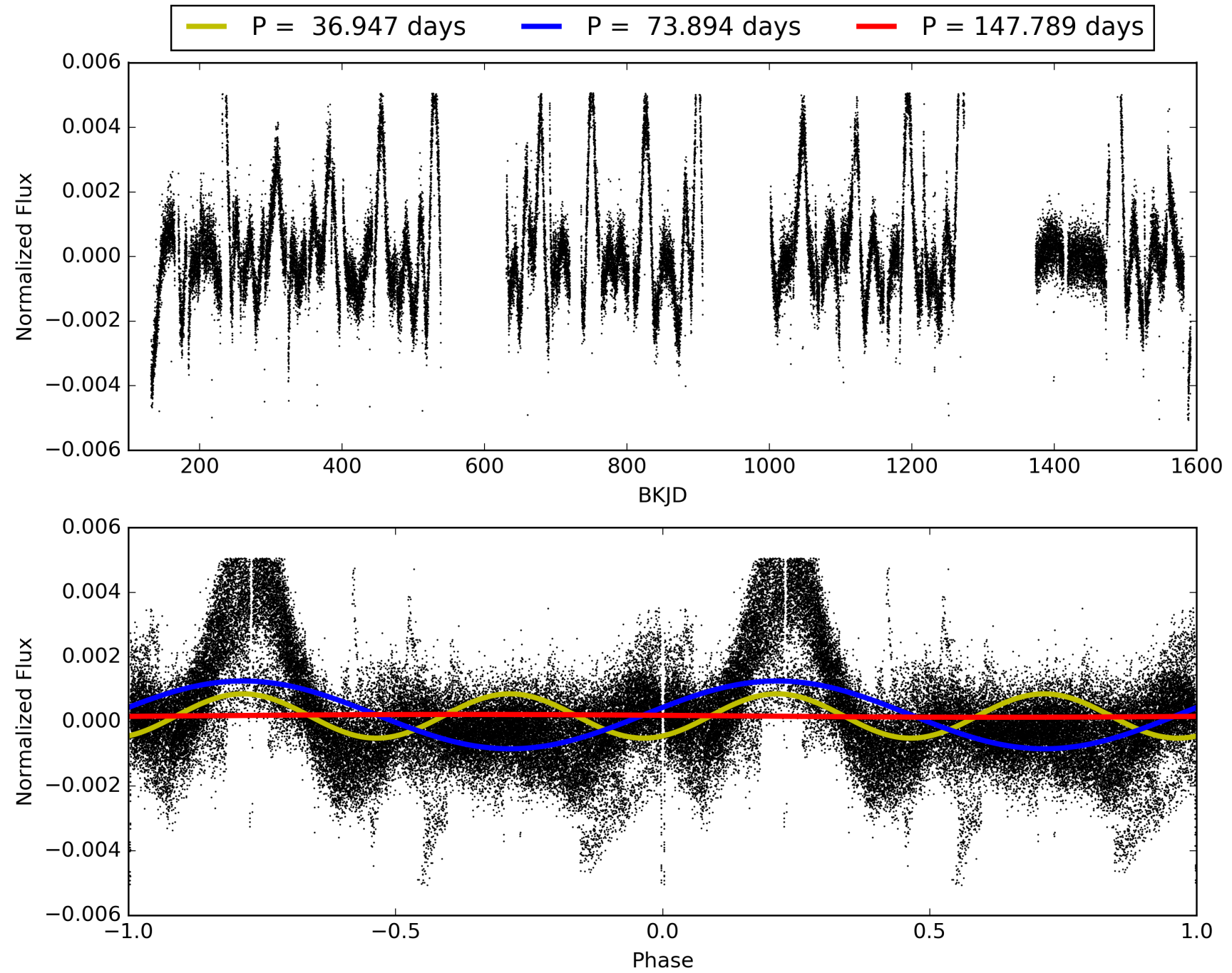
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 08:59:51 Z

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

# TCE 004661634-02, PDC Light Curves



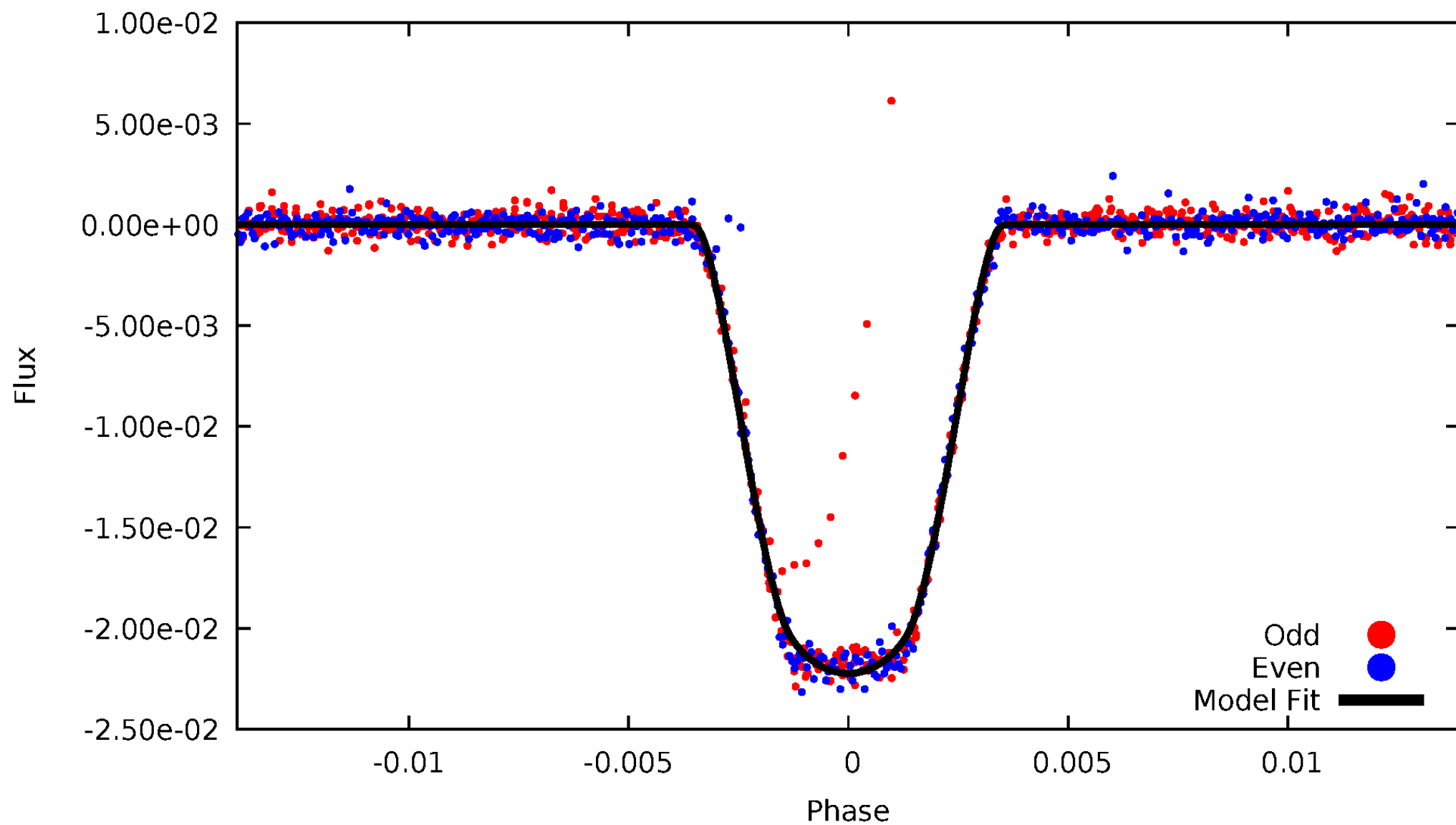
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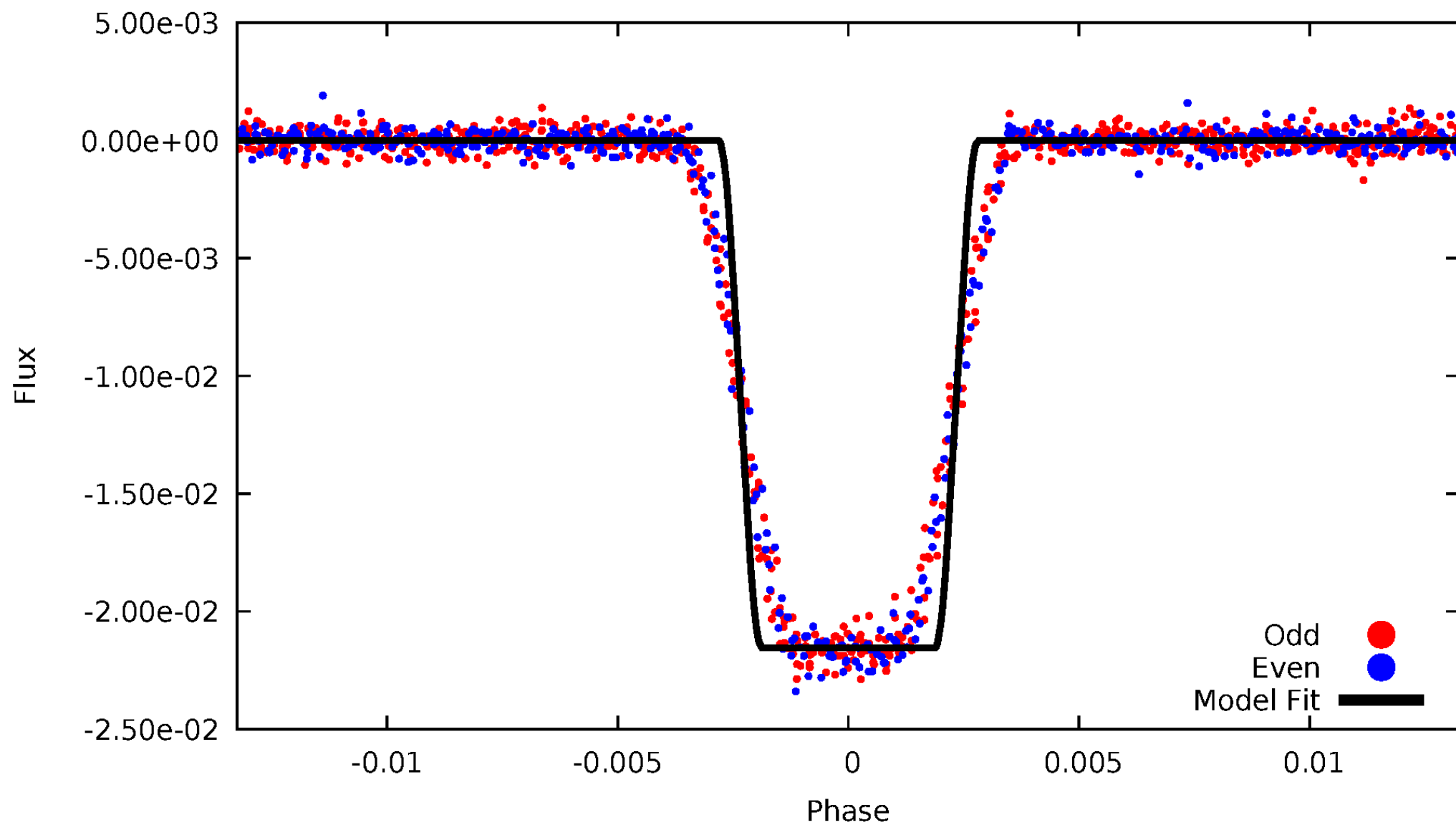
# DV Odd/Even

TCE 004661634-02



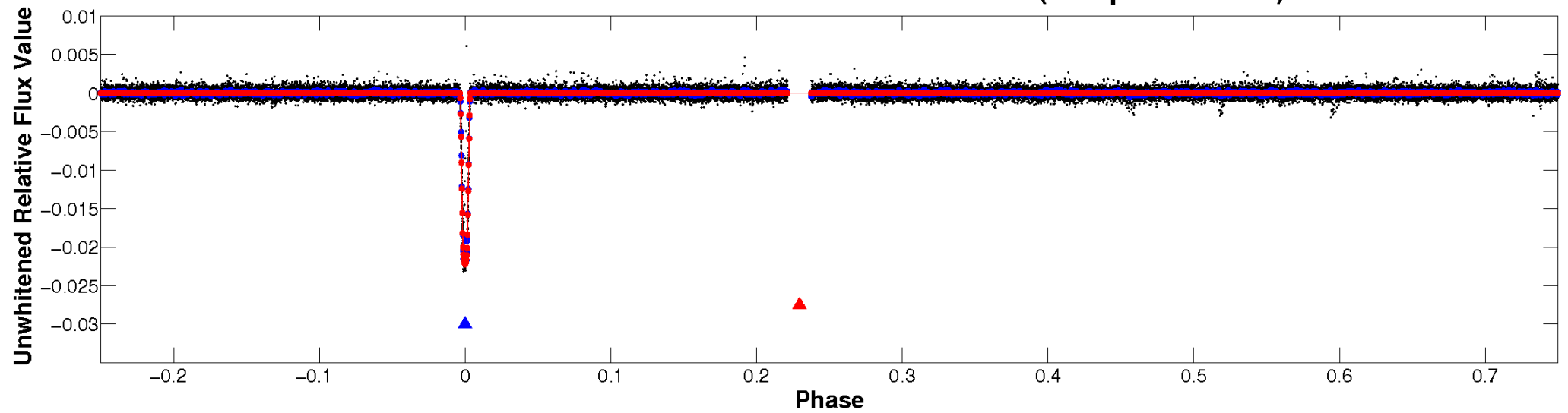
# ALT Odd/Even

TCE 004661634-02

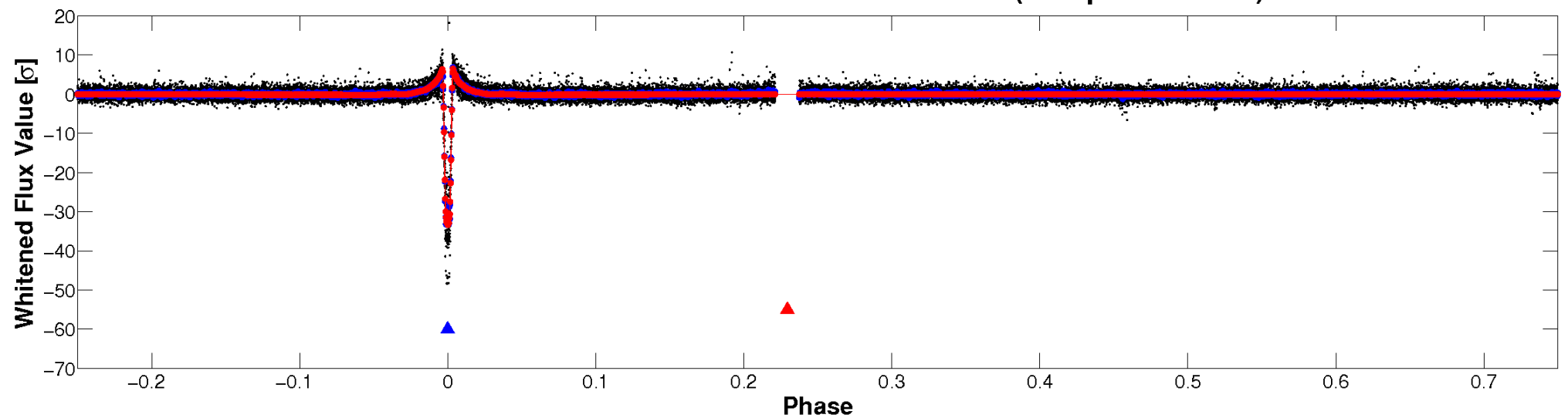


# Non-Whitened Vs. Whitened Light Curve

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

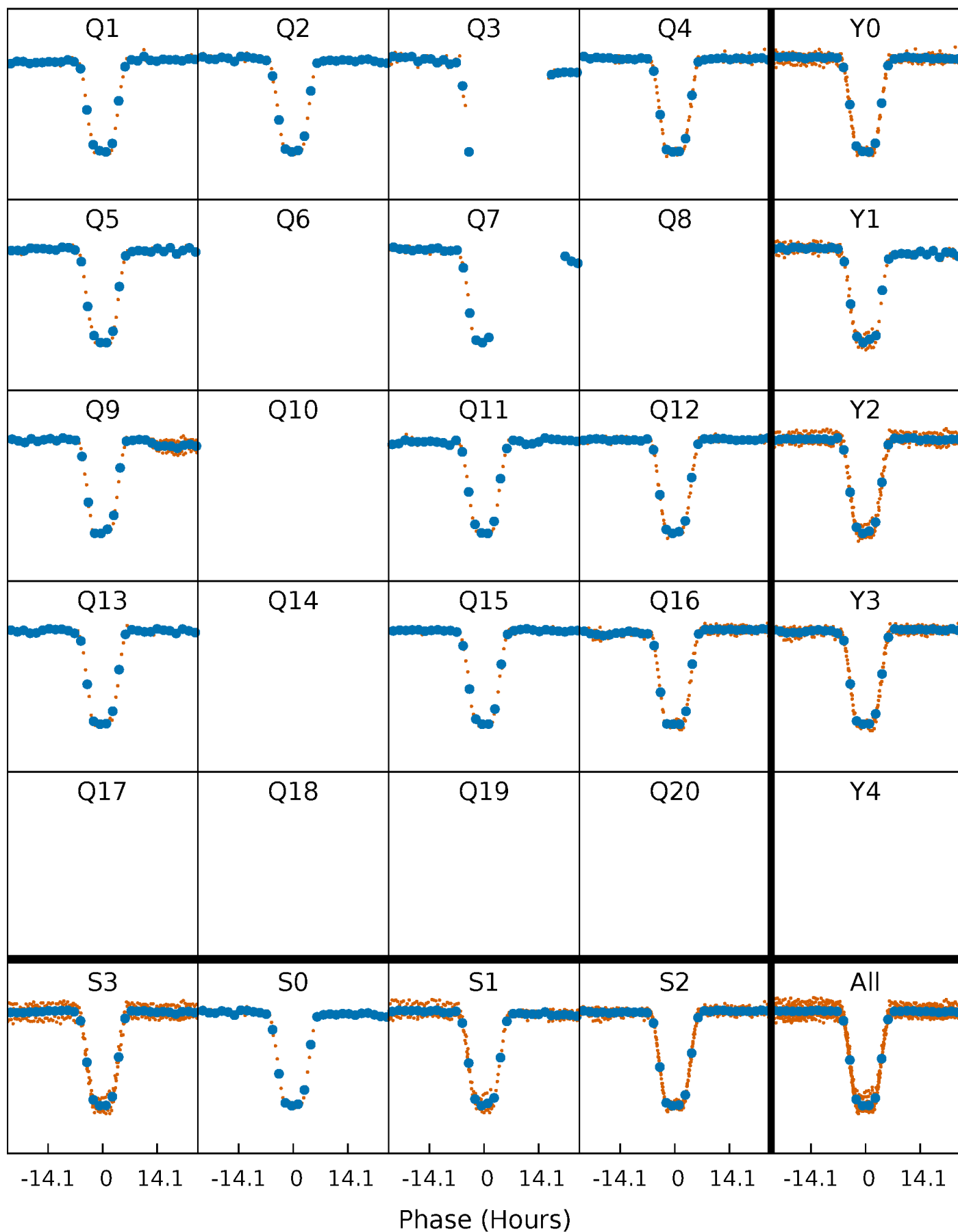


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



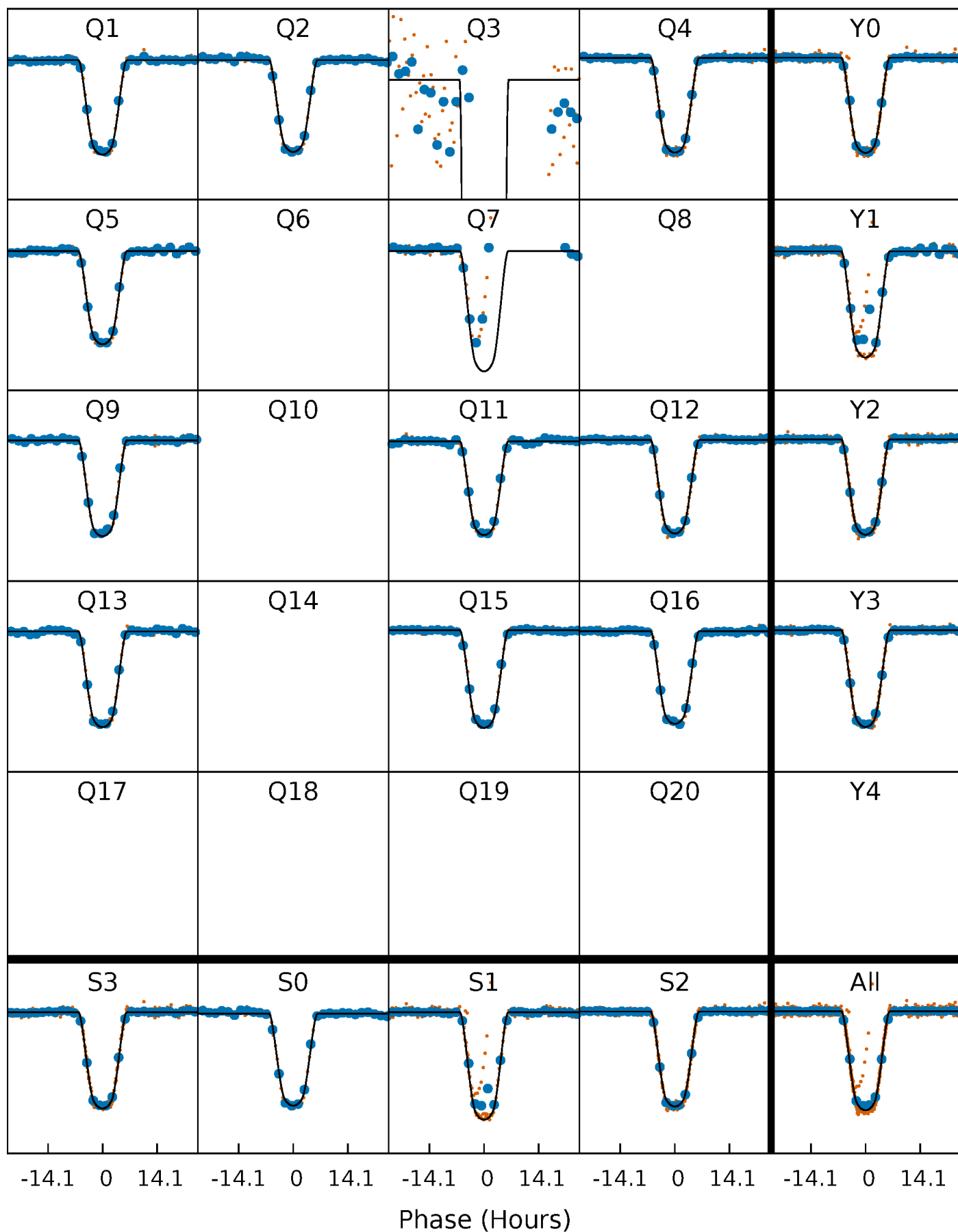
# PDC Quarter-Phased Transit Curves

TCE 004661634-02 P= 73.894393 Days  $T_0=142.939744$  (BKJD)



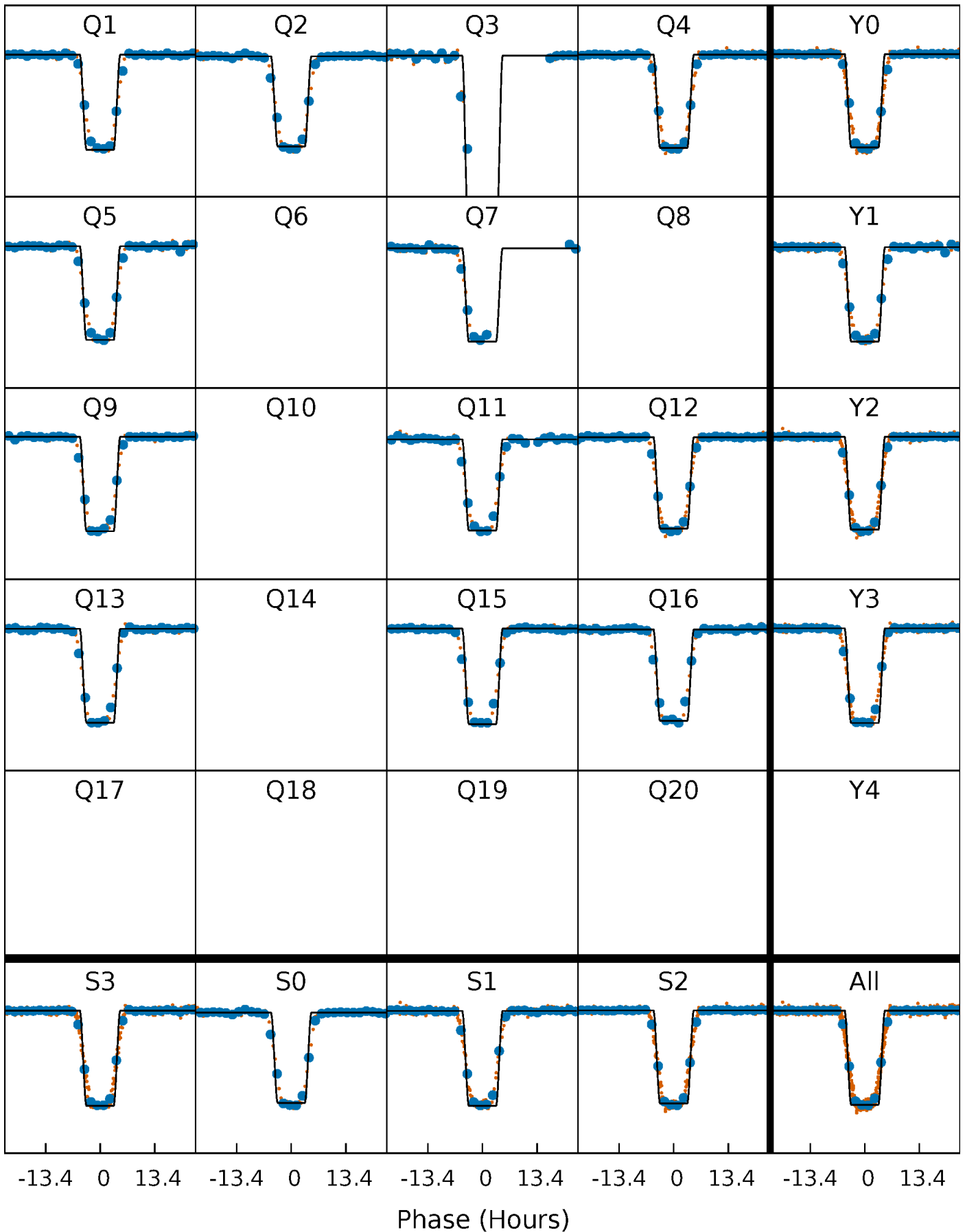
# DV Quarter-Phased Transit Curves

TCE 004661634-02   P= 73.894393 Days    $T_0=142.939744$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

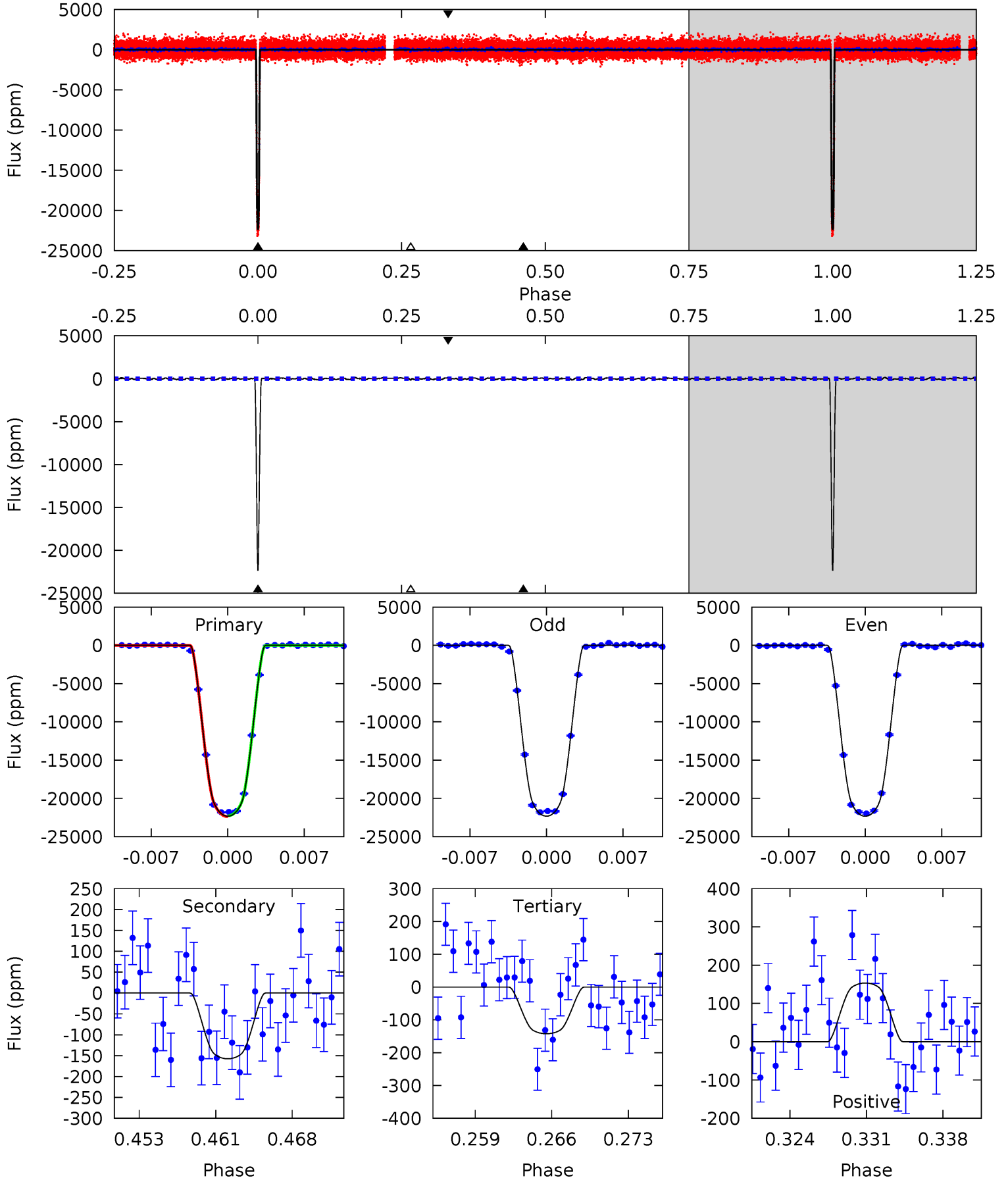
TCE 004661634-02 P= 73.895501 Days  $T_0=142.930111$  (BKJD)



# DV Model-Shift Uniqueness Test

004661634-02, P = 73.894393 Days, E = 69.045351 Days

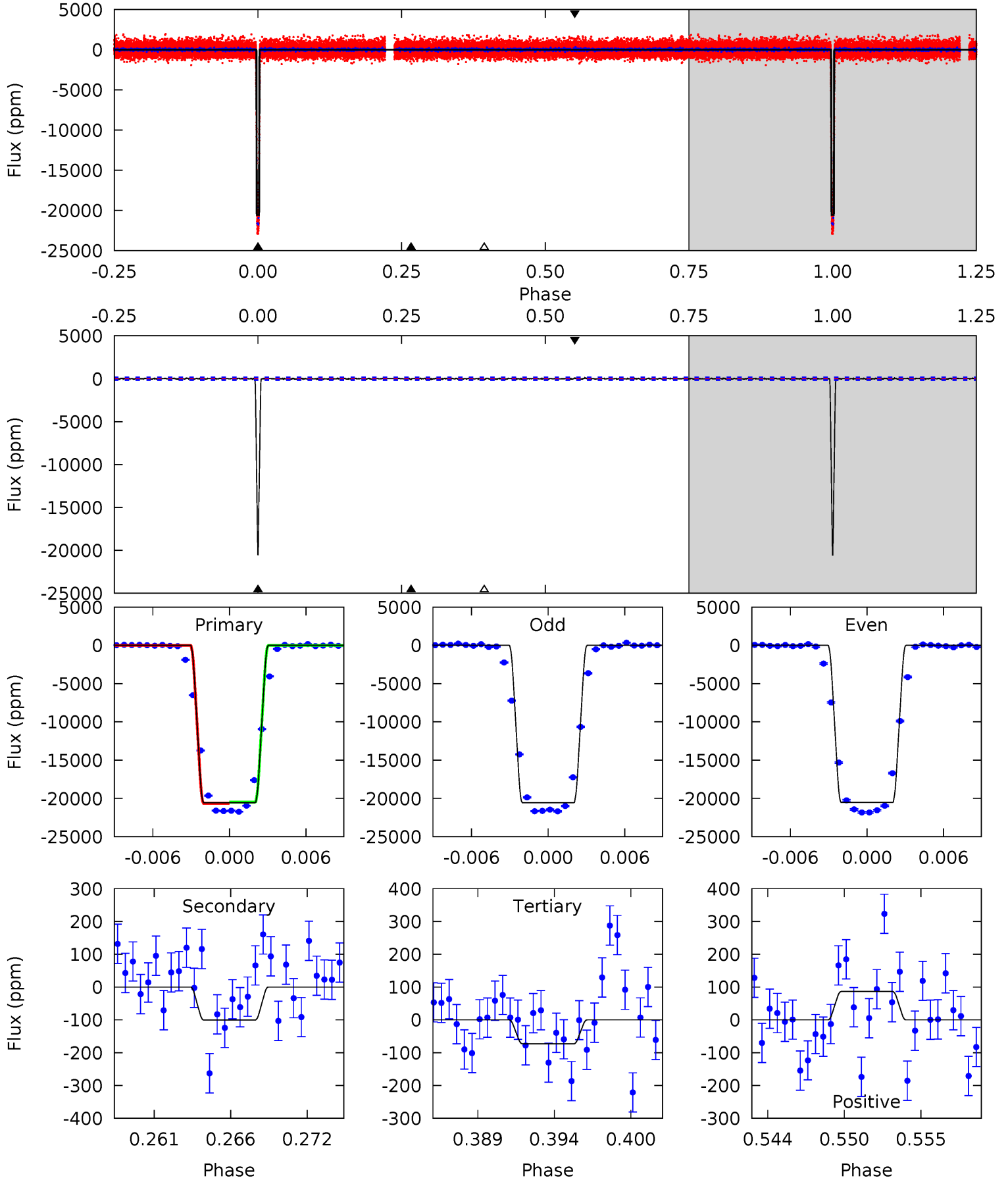
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
817.0	5.76	5.21	5.61	5.09	2.69	1.95	811.8	811.4	0.55	0.15	0.24	0.90	0.01	1.95



# Alt Model-Shift Uniqueness Test

004661634-02, P = 73.895501 Days, E = 69.034610 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
701.6	3.43	2.49	2.95	5.14	2.77	0.81	699.1	698.7	0.94	0.48	0.52	1.01	0.00	2.89





### Stellar Parameters For KIC 004661634

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5442^{+178}_{-162}$	$4.469^{+0.113}_{-0.137}$	$-0.340^{+0.350}_{-0.300}$	$0.841^{+0.154}_{-0.115}$	$0.759^{+0.122}_{-0.052}$	$1.800^{+0.913}_{-0.663}$
	+3%/-3%	+3%/-3%	+103%/-88%	+18%/-14%	+16%/-7%	+51%/-37%
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 004661634-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-157 \pm 27$	$14.01^{+1.75}_{-1.08}$	$549^{+34}_{-27}$	$2431^{+68}_{-68}$	$43^{+11}_{-10}$
Alt.	$-101 \pm 29$	$13.68^{+1.58}_{-1.16}$	$553^{+30}_{-31}$	$2323^{+85}_{-96}$	$29^{+11}_{-9}$

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

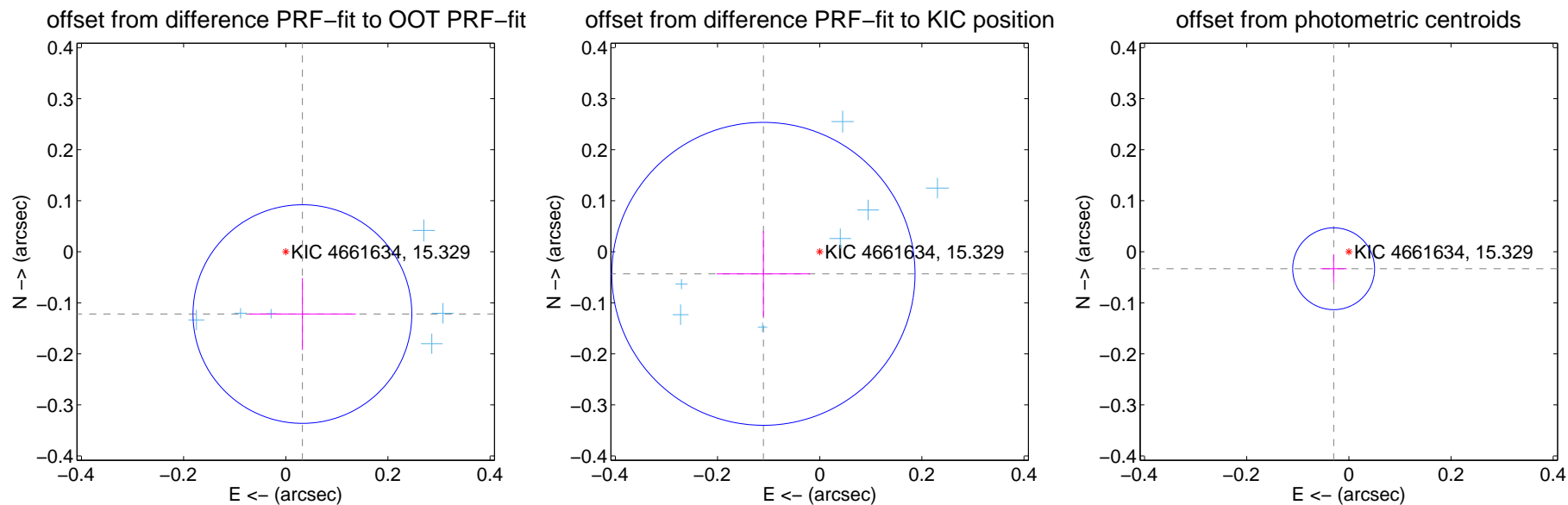
## DV Centroid Data

Supplemental centroid analysis for 004661634-02. Kepler magnitude: 15.33. Transit SNR 418.68

There are 7 quarters with good PRF difference image offsets

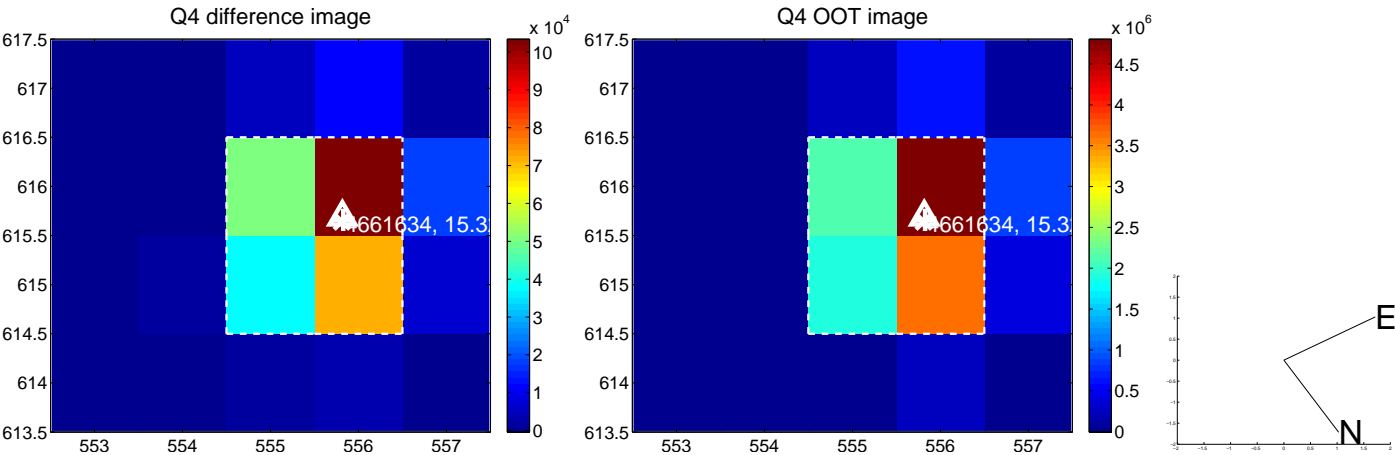
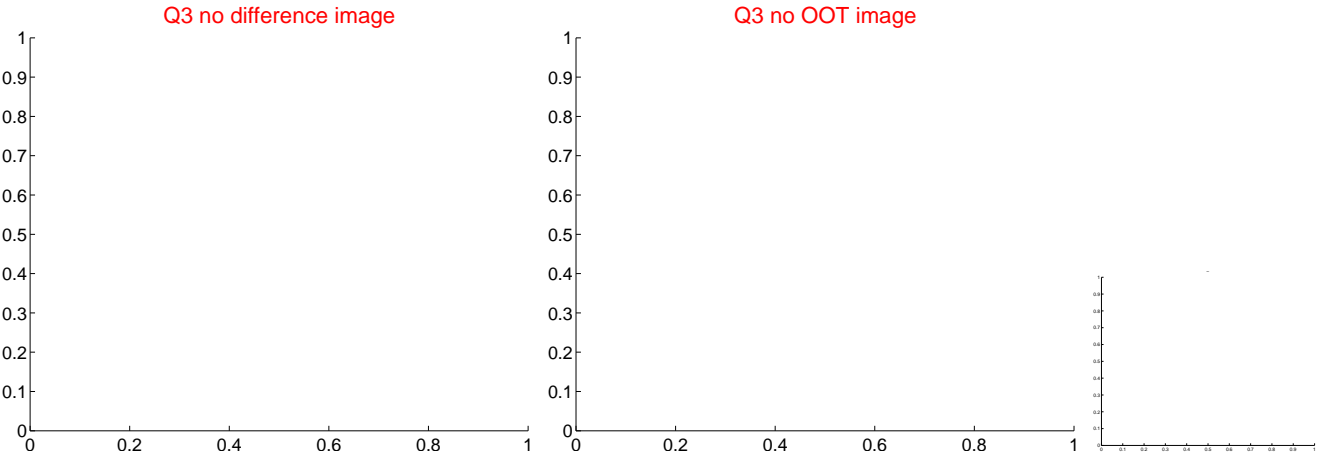
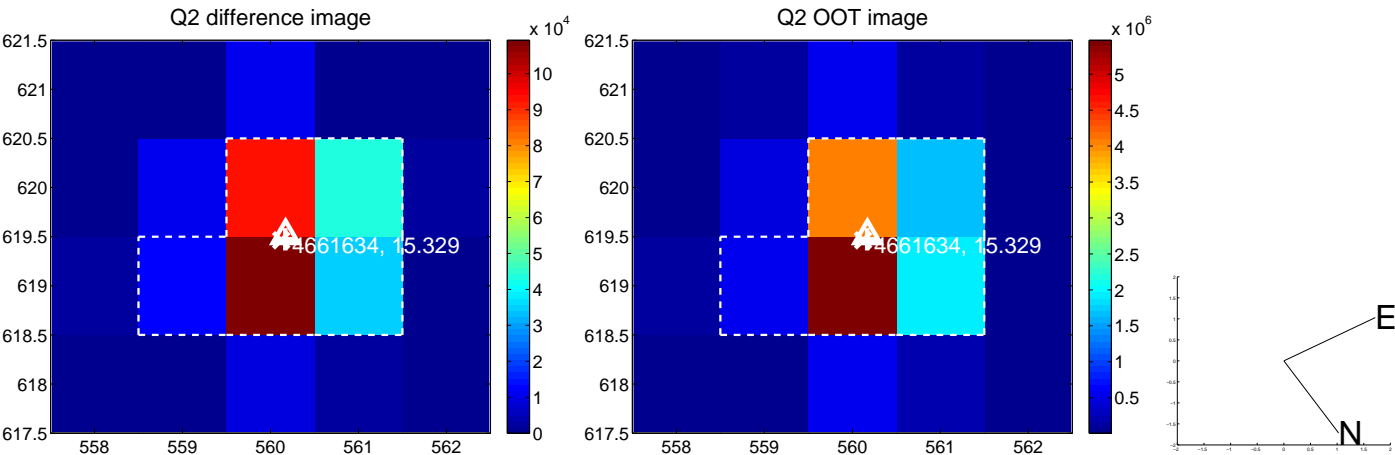
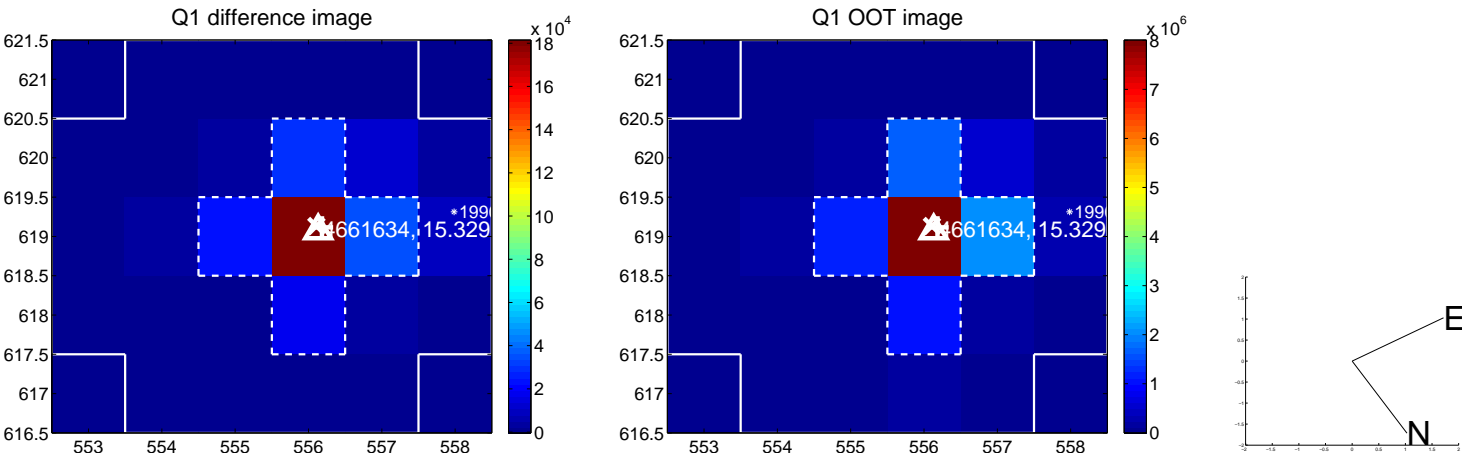
The direct PRF centroid is offset from the target star catalog position by about 0.10 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.126 \pm 0.071$	1.77	$-0.033 \pm 0.105$	$-0.122 \pm 0.070$
PRF-fit source offset from KIC position	$0.118 \pm 0.099$	1.20	$0.110 \pm 0.091$	$-0.043 \pm 0.084$
photometric centroid source offset	$0.04 \pm 0.03$	1.67	$0.03 \pm 0.03$	$-0.03 \pm 0.03$

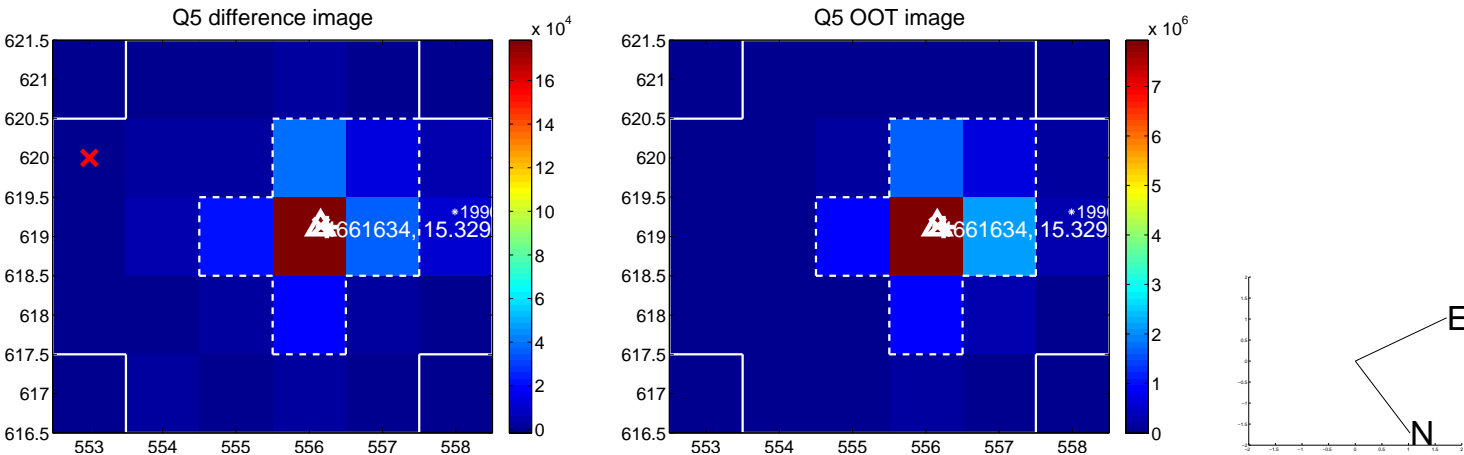


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

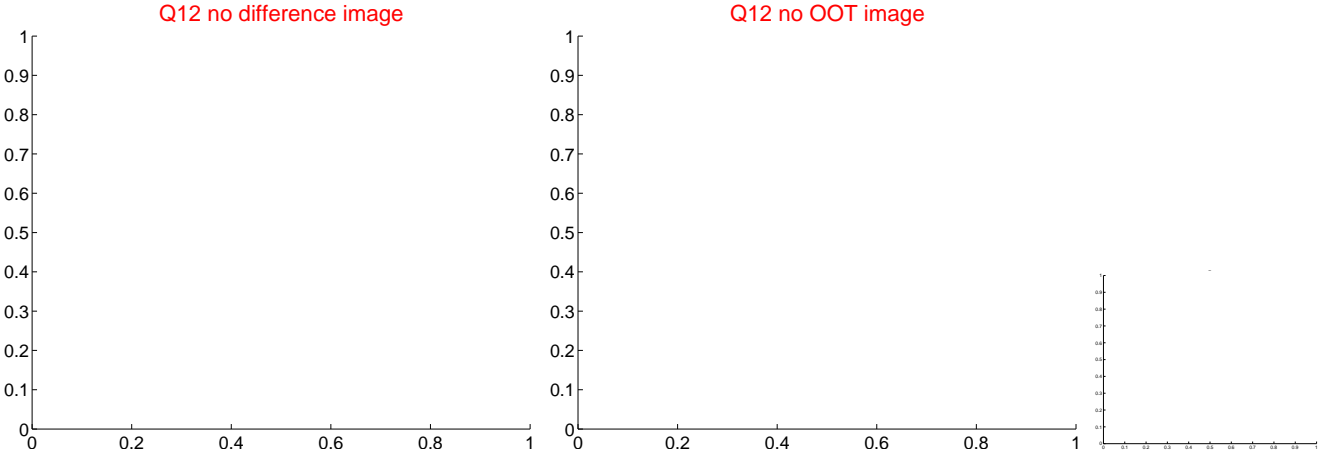
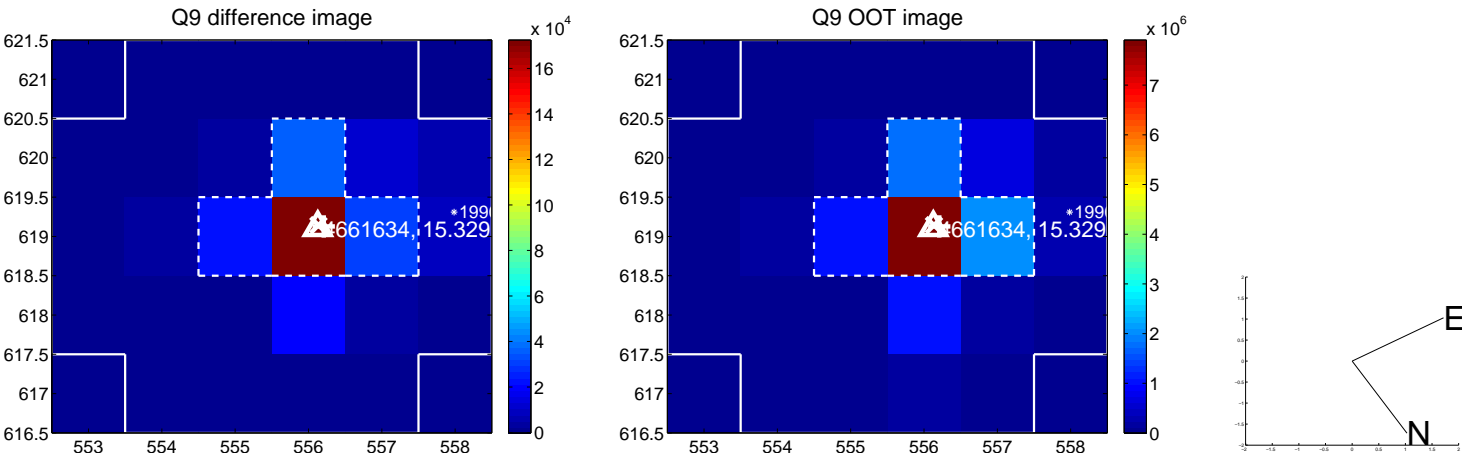
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



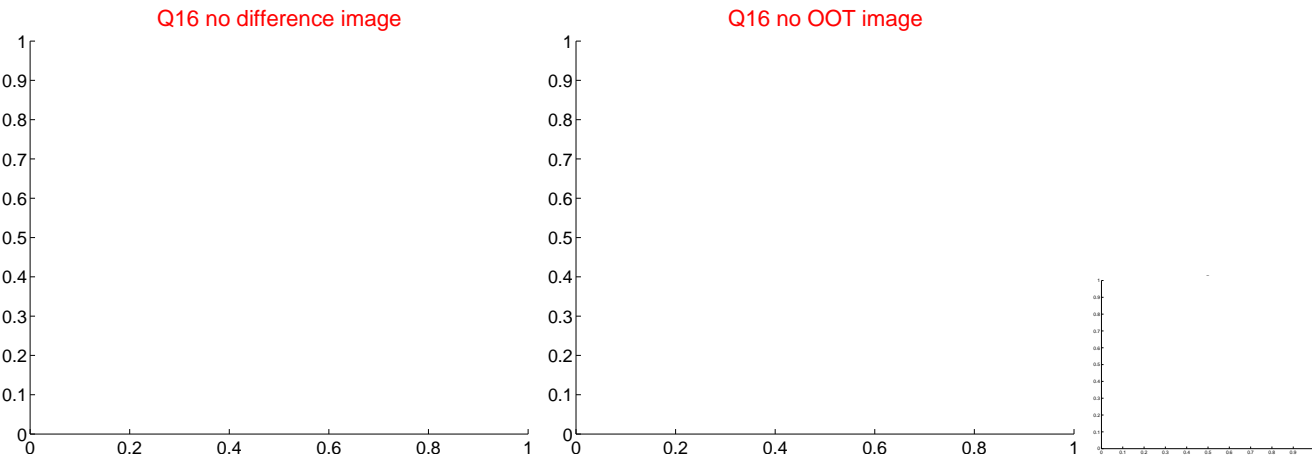
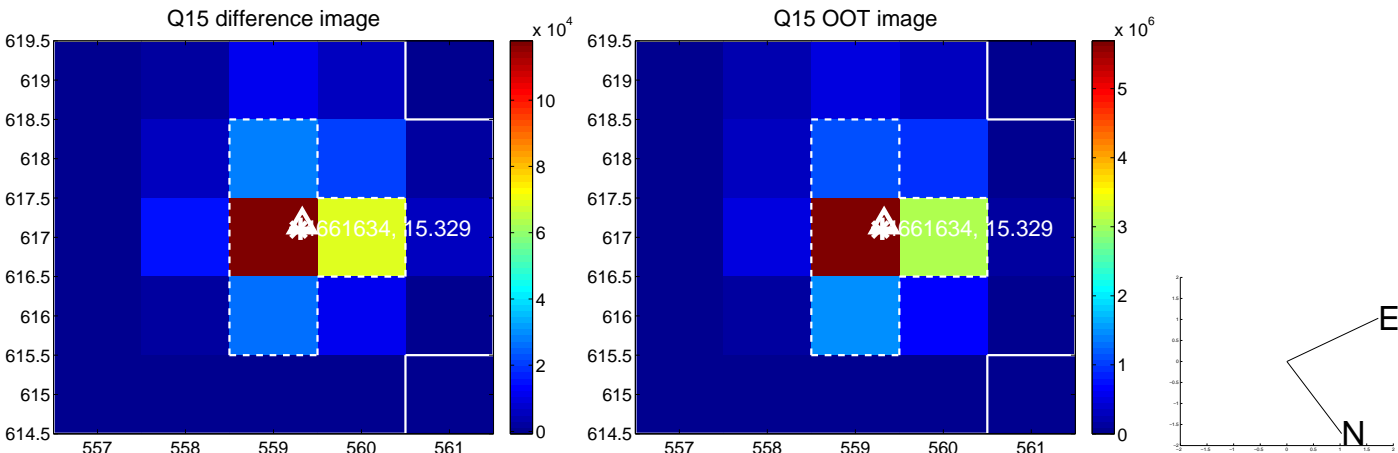
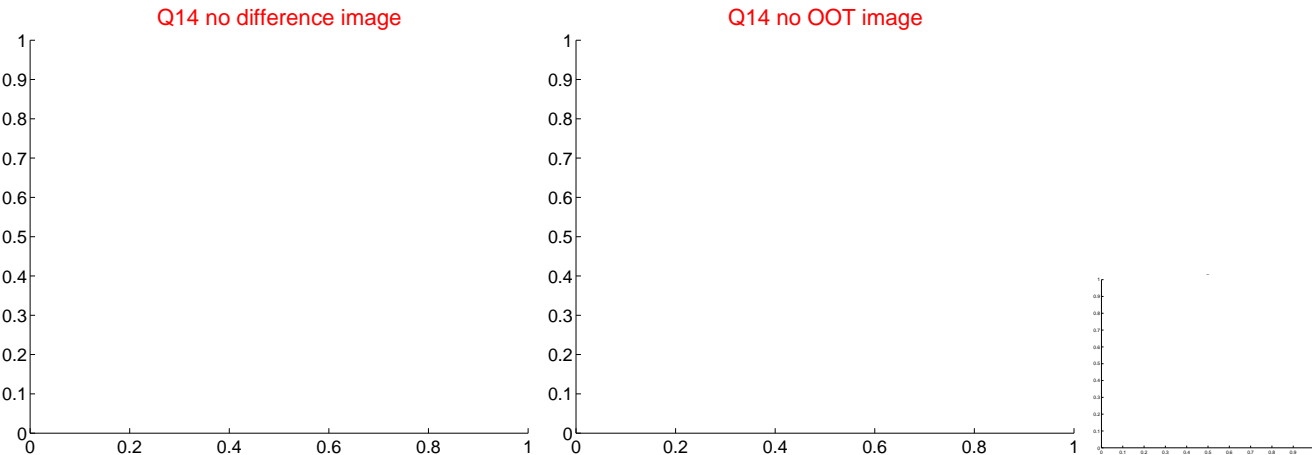
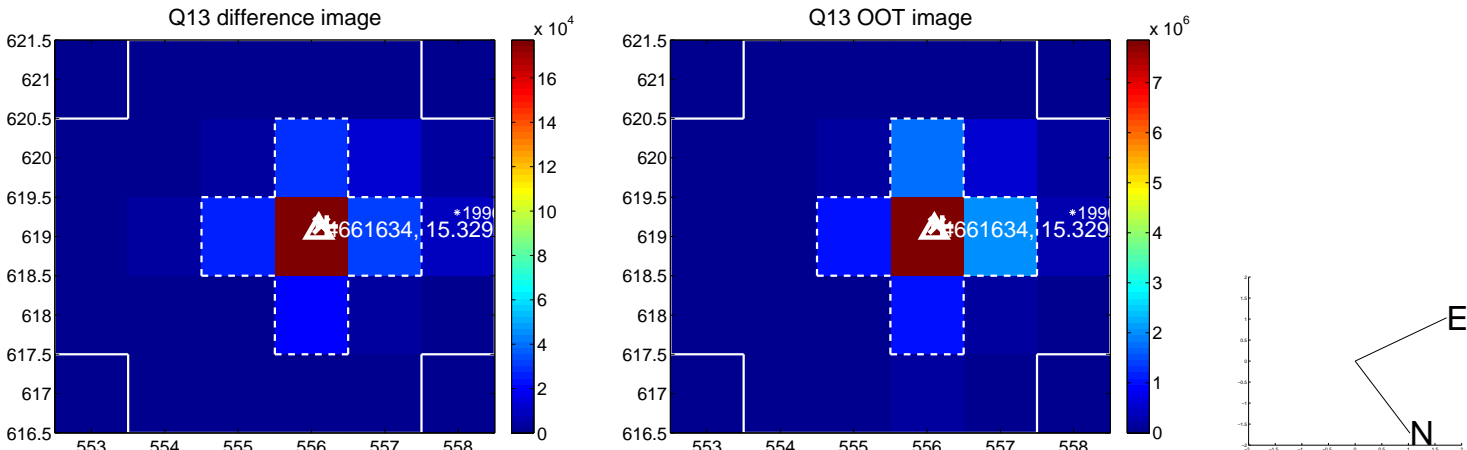
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



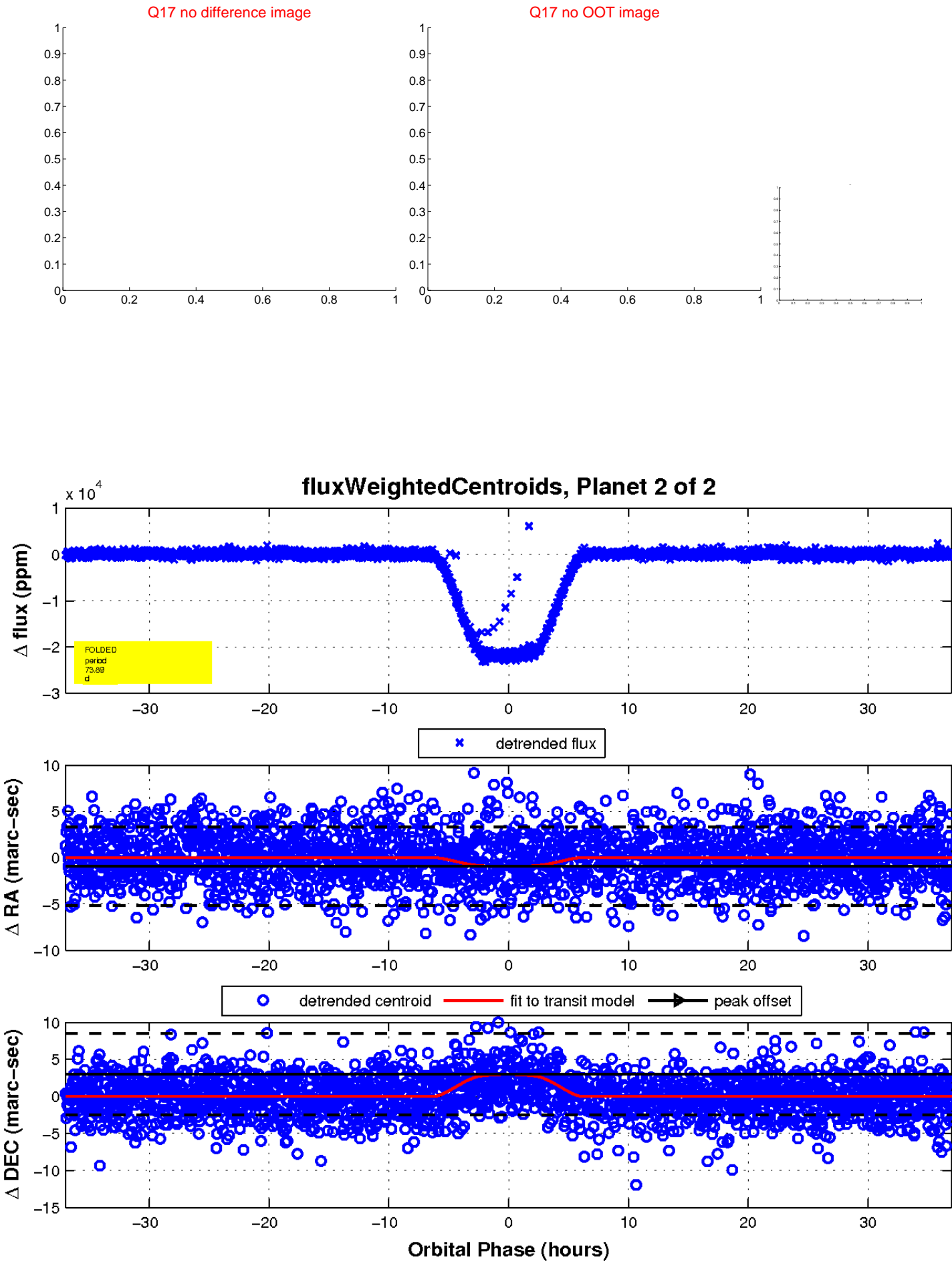
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UKIRT Image

Declination

