

# KIC 012307574

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
012307574-01	OBS	No	0.604353	131.968949	25.7	2.109	19.1	5.6	1.35	6499	0.77	14238.00
012307574-02	OBS	No	141.503022	259.392793	430.8	15.384	7.7	6.7	1.35	6499	2.89	9.87

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
012307574-01	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_ALT—CENT_KIC_POS
012307574-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_KIC_POS

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

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

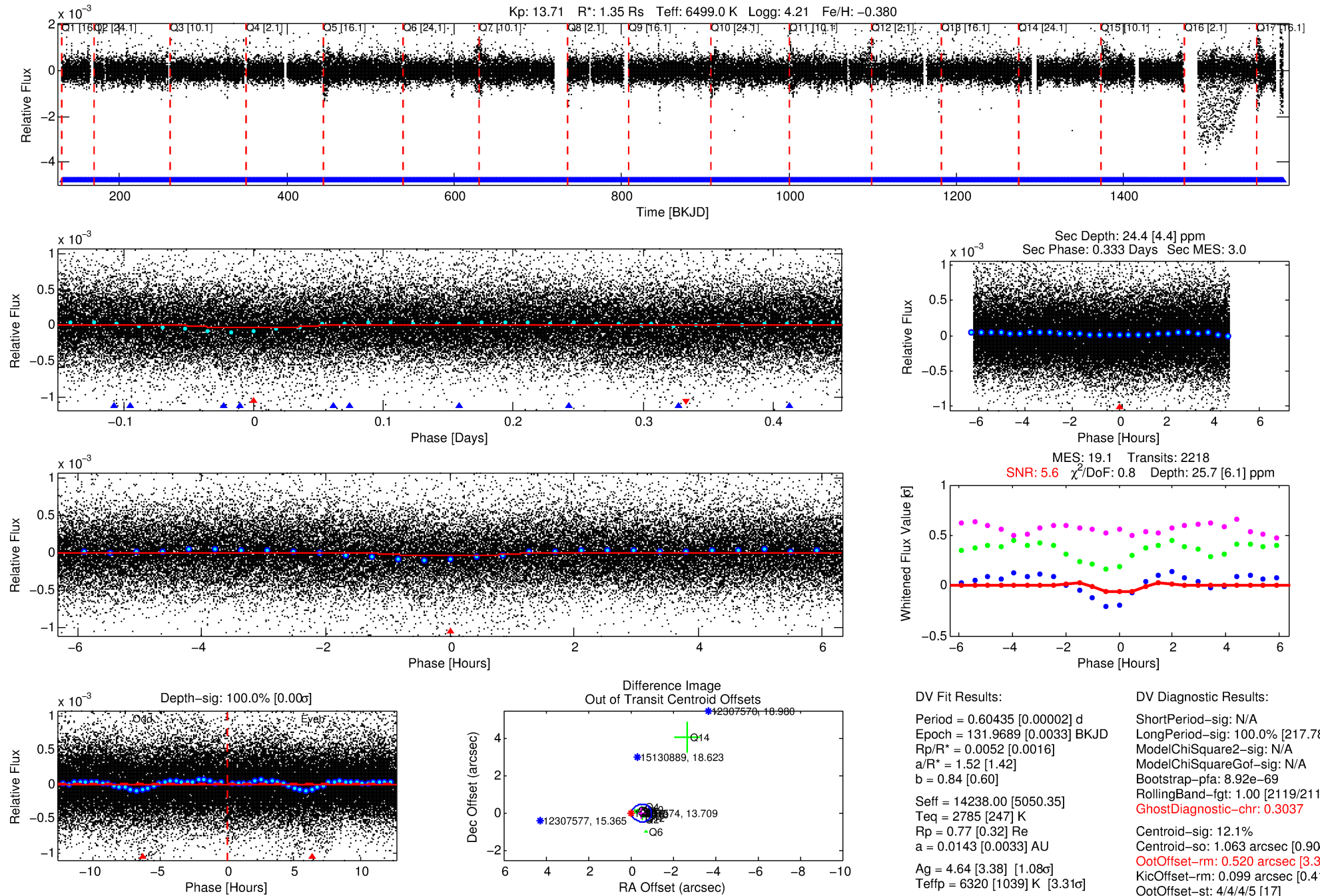
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 012307574-01

No Significant Match Found

# DV One-Page Summary

KIC: 12307574 Candidate: 1 of 2 Period: 0.604 d



## DV Fit Results:

Period = 0.60435 [0.00002] d  
Epoch = 131.9689 [0.0033] BKJD  
Rp/R\* = 0.0052 [0.0016]  
a/R\* = 1.52 [1.42]  
b = 0.84 [0.60]  
Seff = 14238.00 [5050.35]  
Teff = 2785 [247] K  
Rp = 0.77 [0.32] Re  
a = 0.0143 [0.0033] AU  
Ag = 4.64 [3.38] [1.08σ]  
Teffp = 6320 [1039] K [3.31σ]

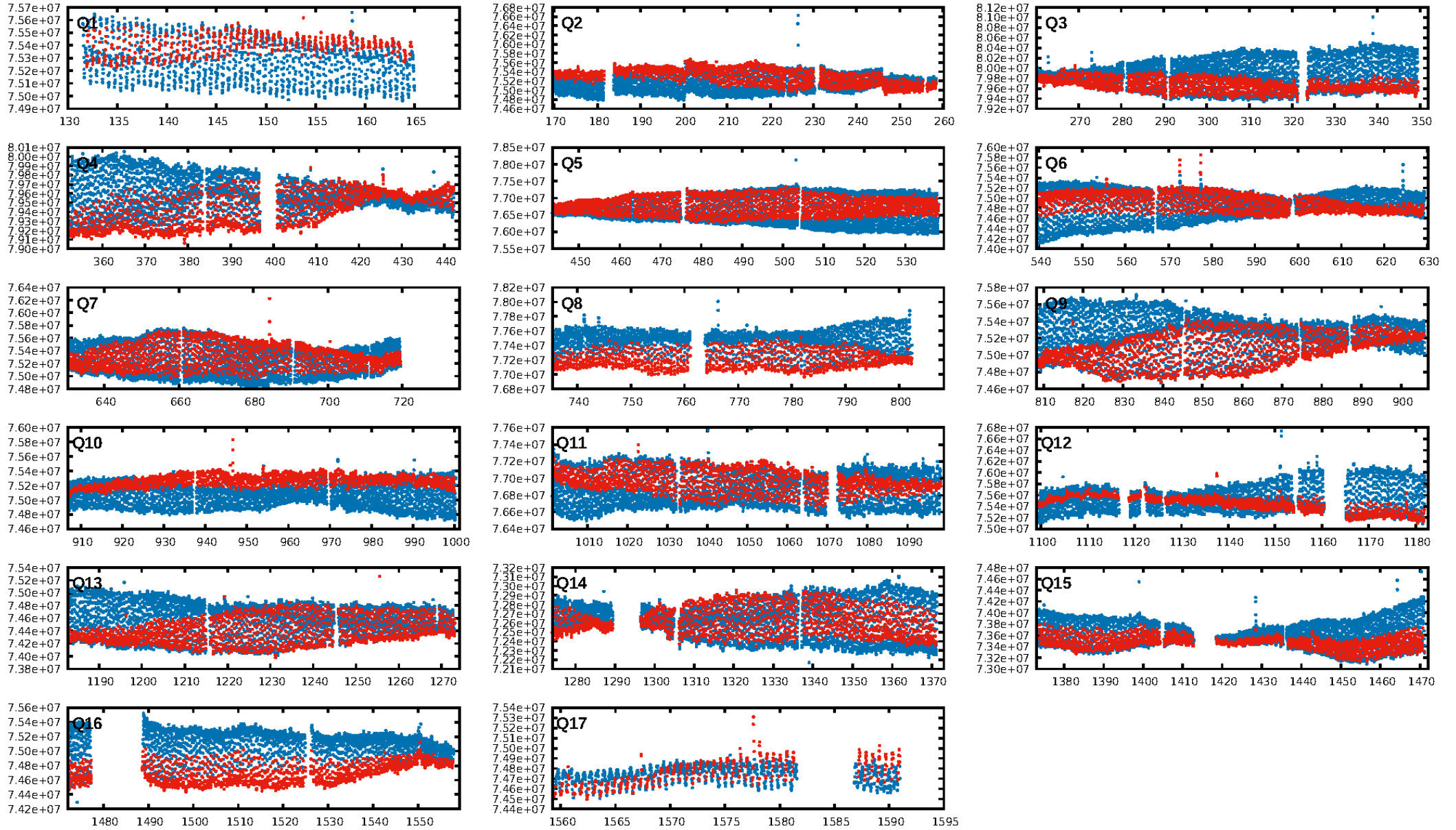
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [217.78σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 8.92e-69  
RollingBand-fgt: 1.00 [2119/2119]  
GhostDiagnostic-chr: 0.3037  
Centroid-sig: 12.1%  
Centroid-so: 1.063 arcsec [0.90σ]  
OotOffset-rm: 0.520 arcsec [3.32σ]  
KicOffset-rm: 0.099 arcsec [0.41σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.47 [8/17]  
DiffImageOverlap-fno: 1.00 [17/17]

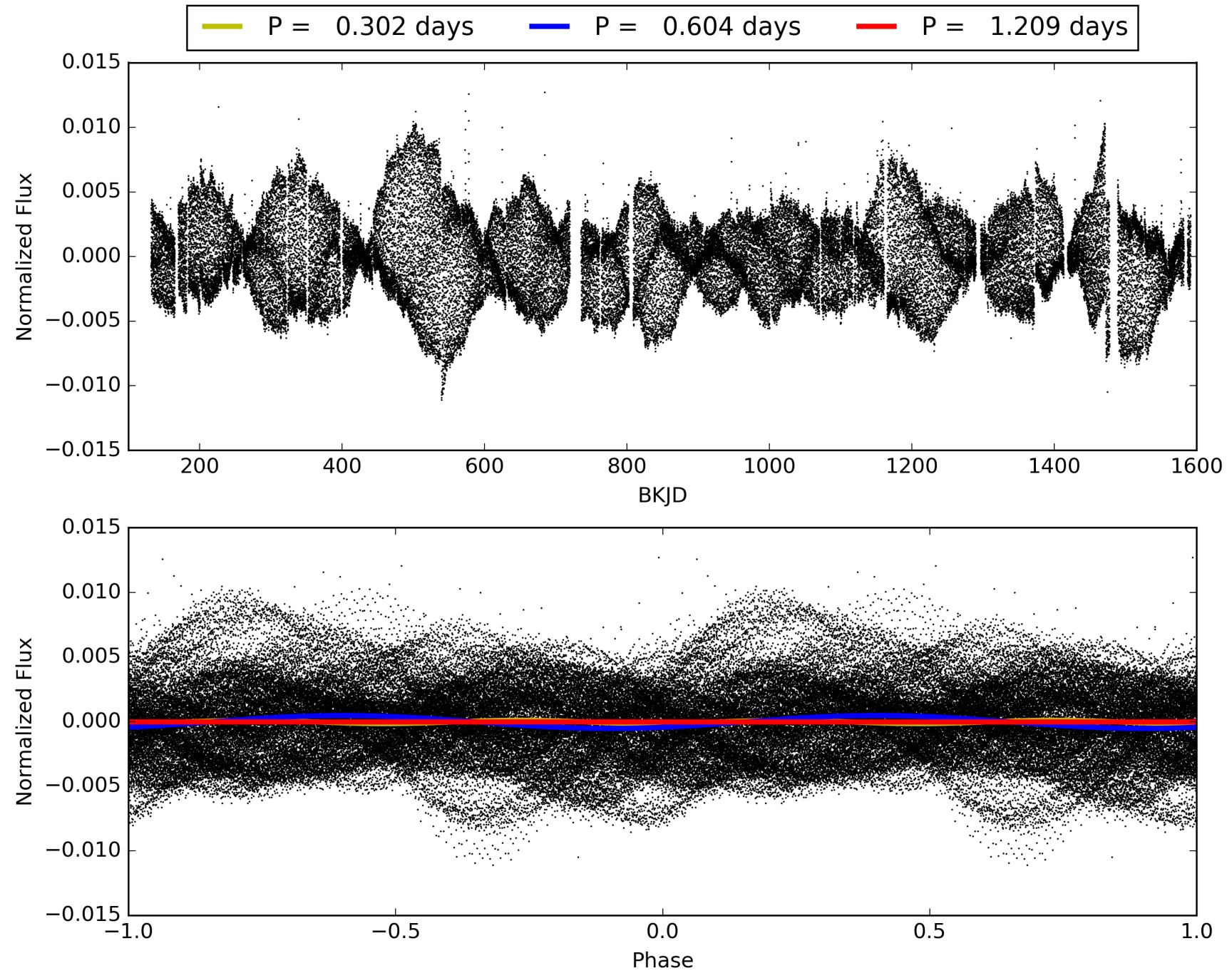
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 06:27:06 Z

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

# TCE 012307574-01, PDC Light Curves

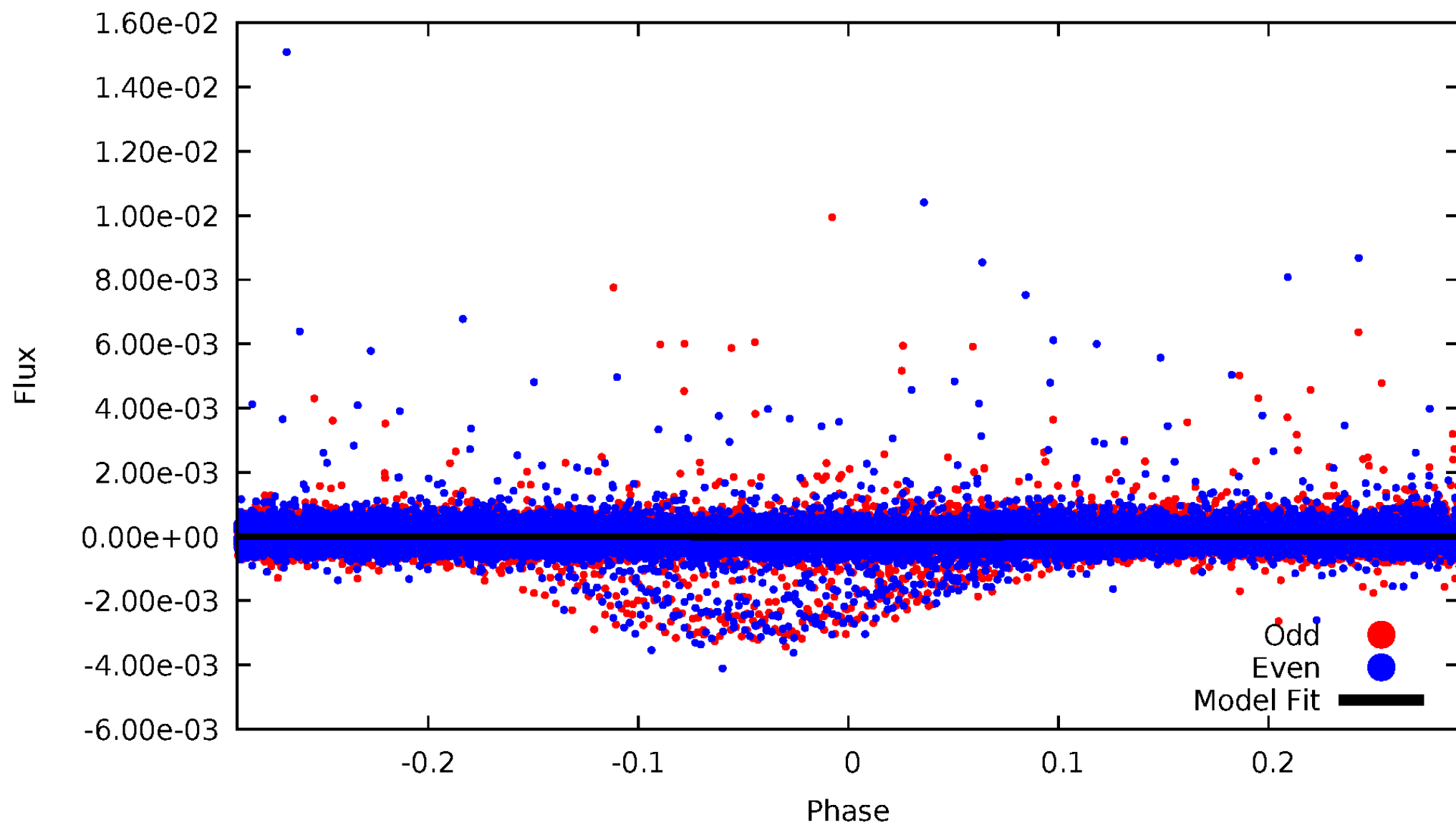


TCE 012307574-01



# DV Odd/Even

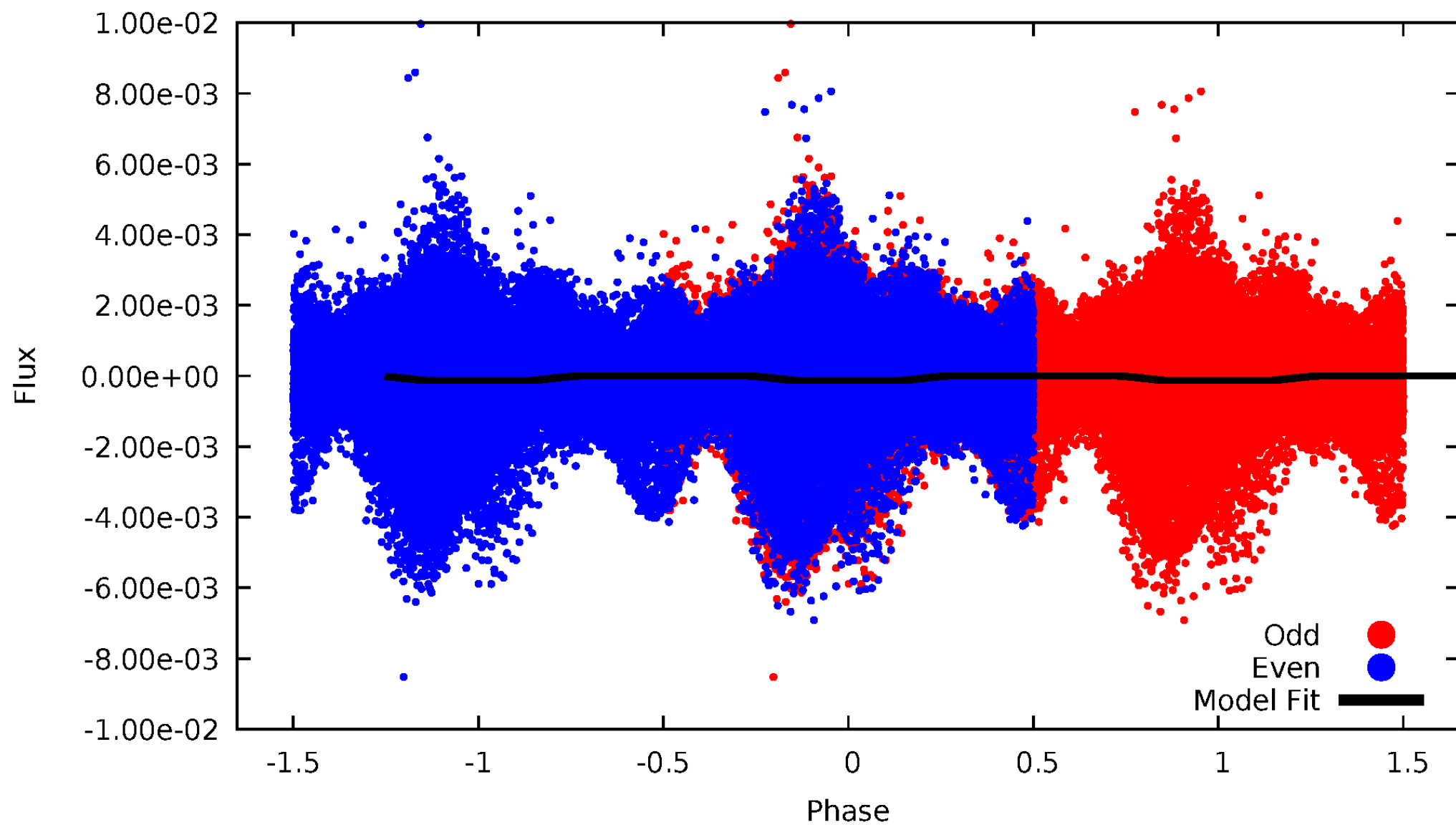
TCE 012307574-01





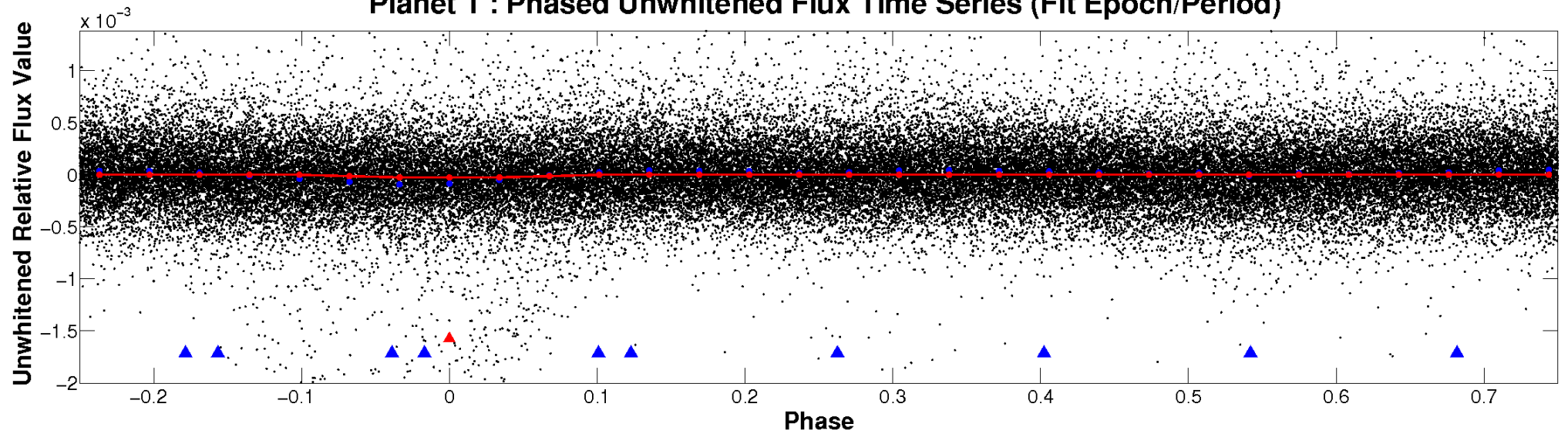
# ALT Odd/Even

TCE 012307574-01

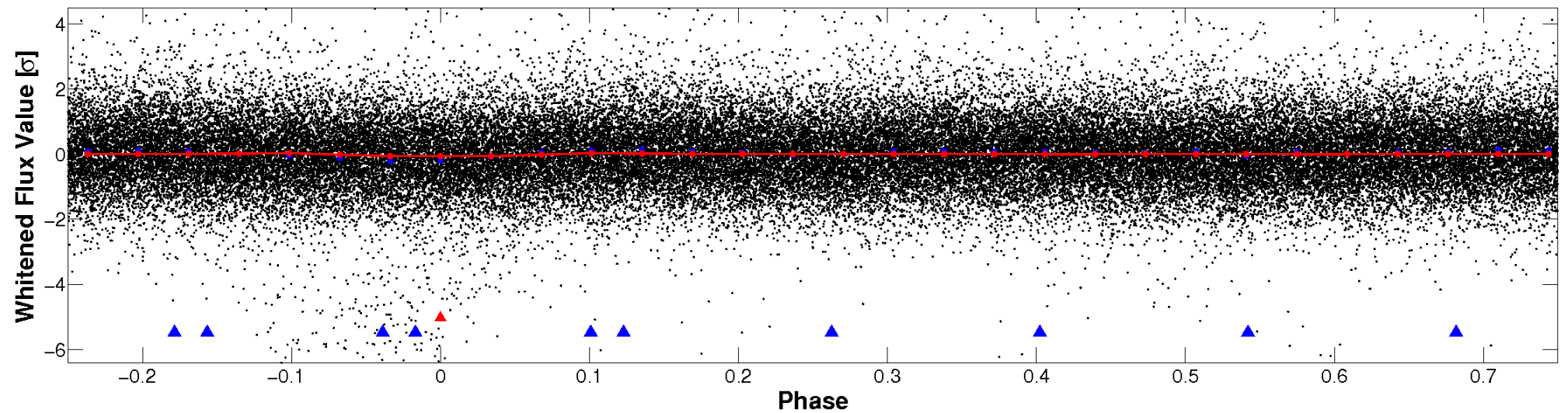


# Non-Whitened Vs. Whitened Light Curve

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

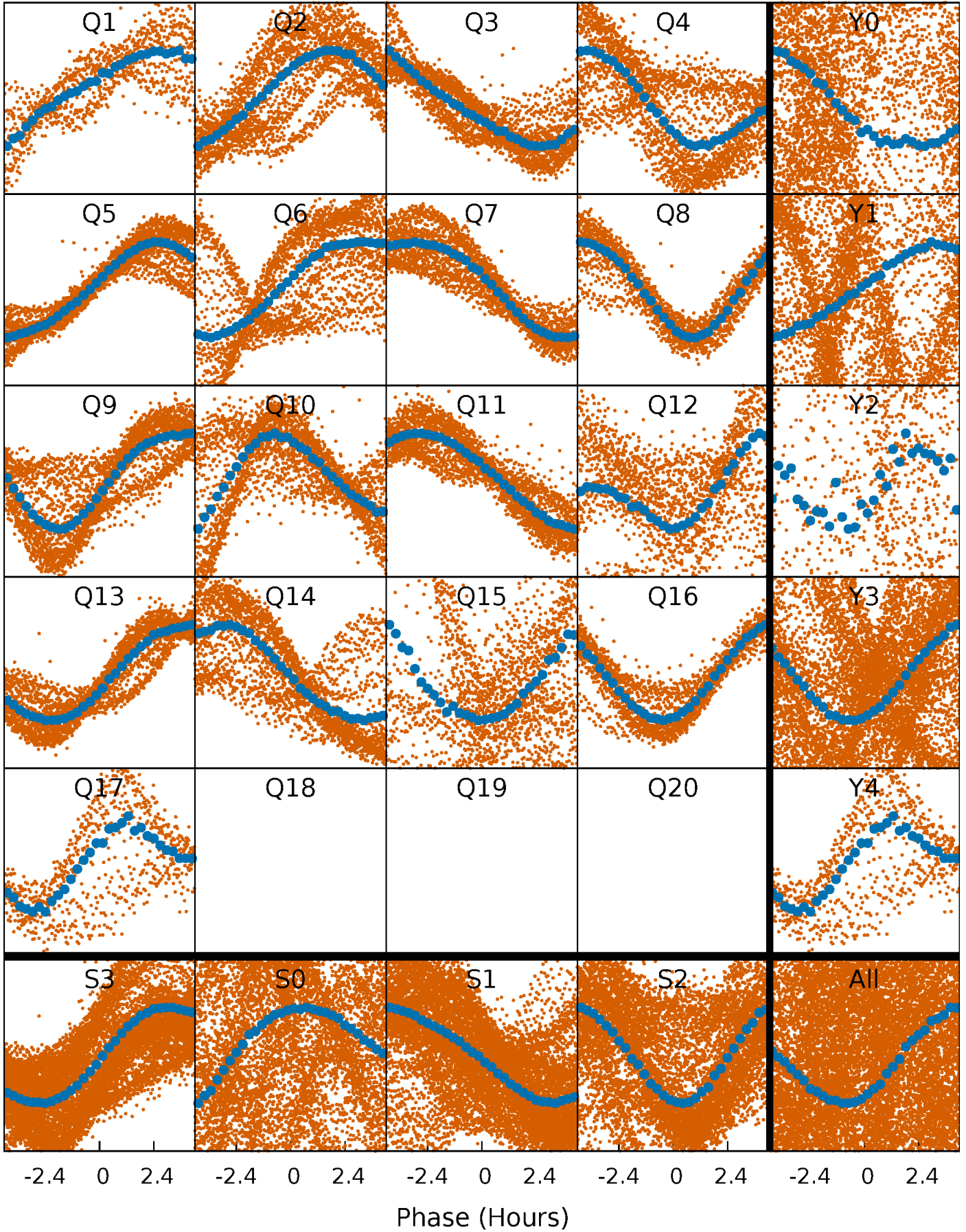


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

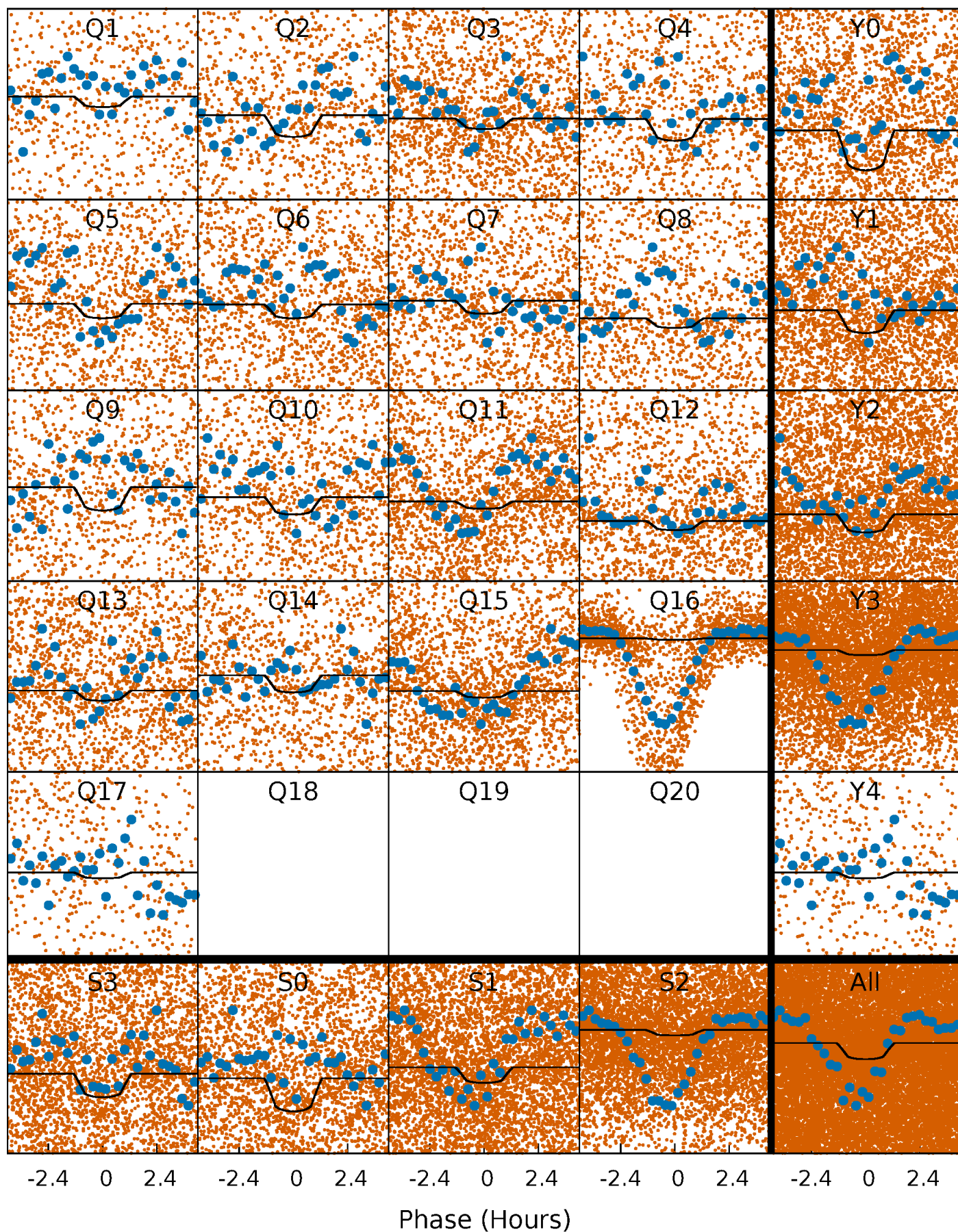
TCE 012307574-01   P= 0.604353 Days    $T_0=131.968949$  (BKJD)





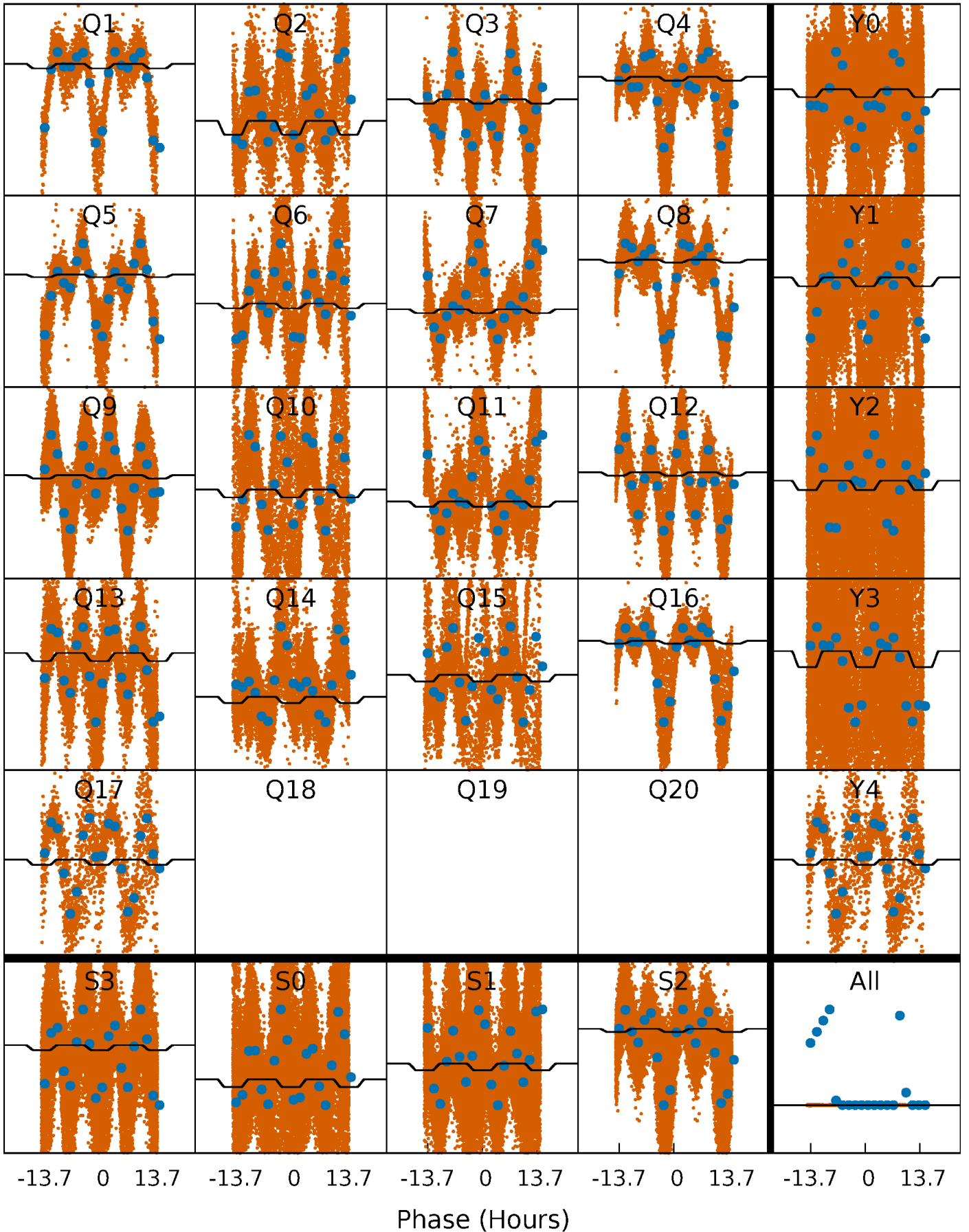
# DV Quarter-Phased Transit Curves

TCE 012307574-01 P= 0.604353 Days  $T_0=131.968949$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

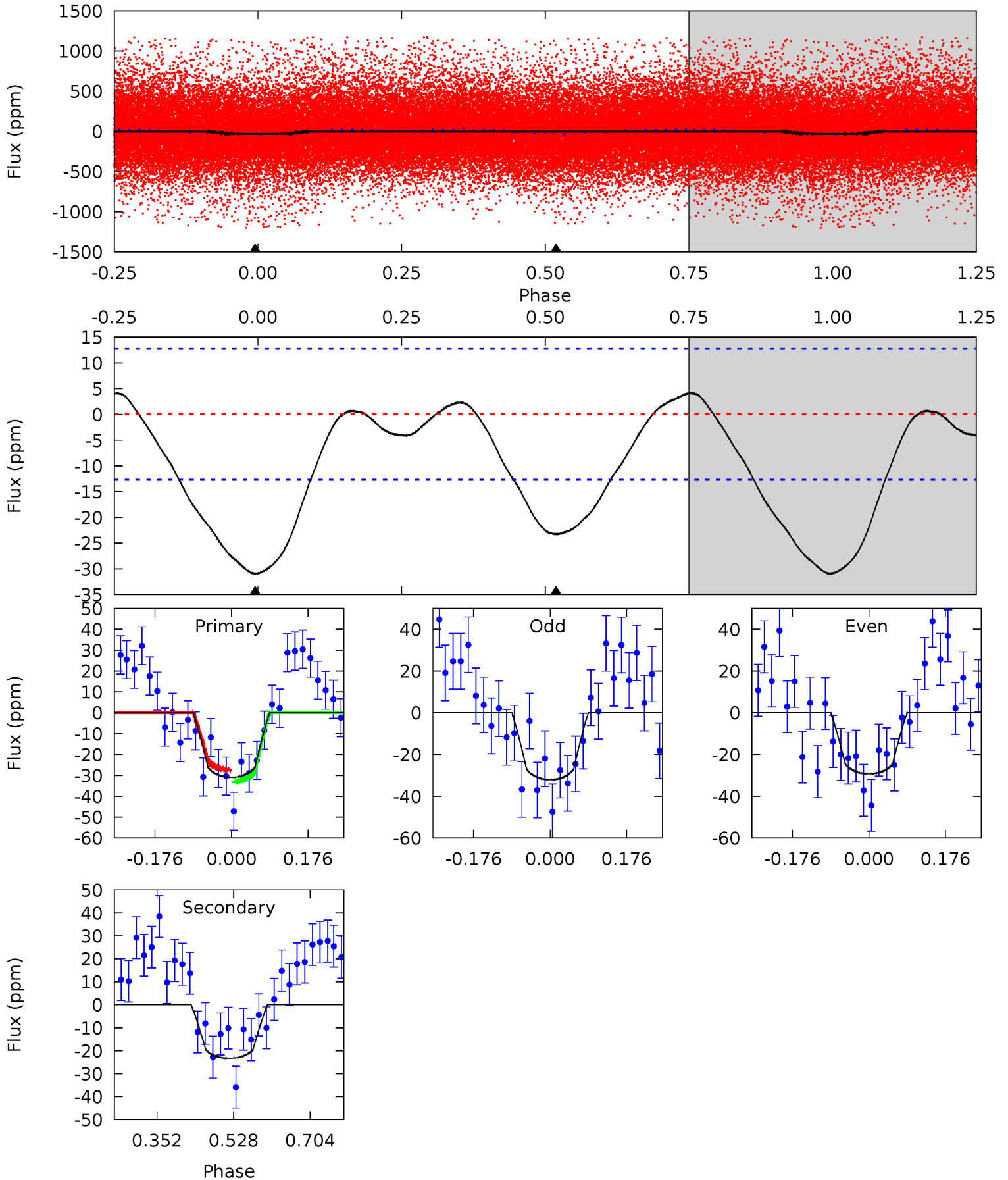
TCE 012307574-01   P= 0.605300 Days    $T_0=131.690234$  (BKJD)



# DV Model-Shift Uniqueness Test

012307574-01, P = 0.604353 Days, E = 131.364596 Days

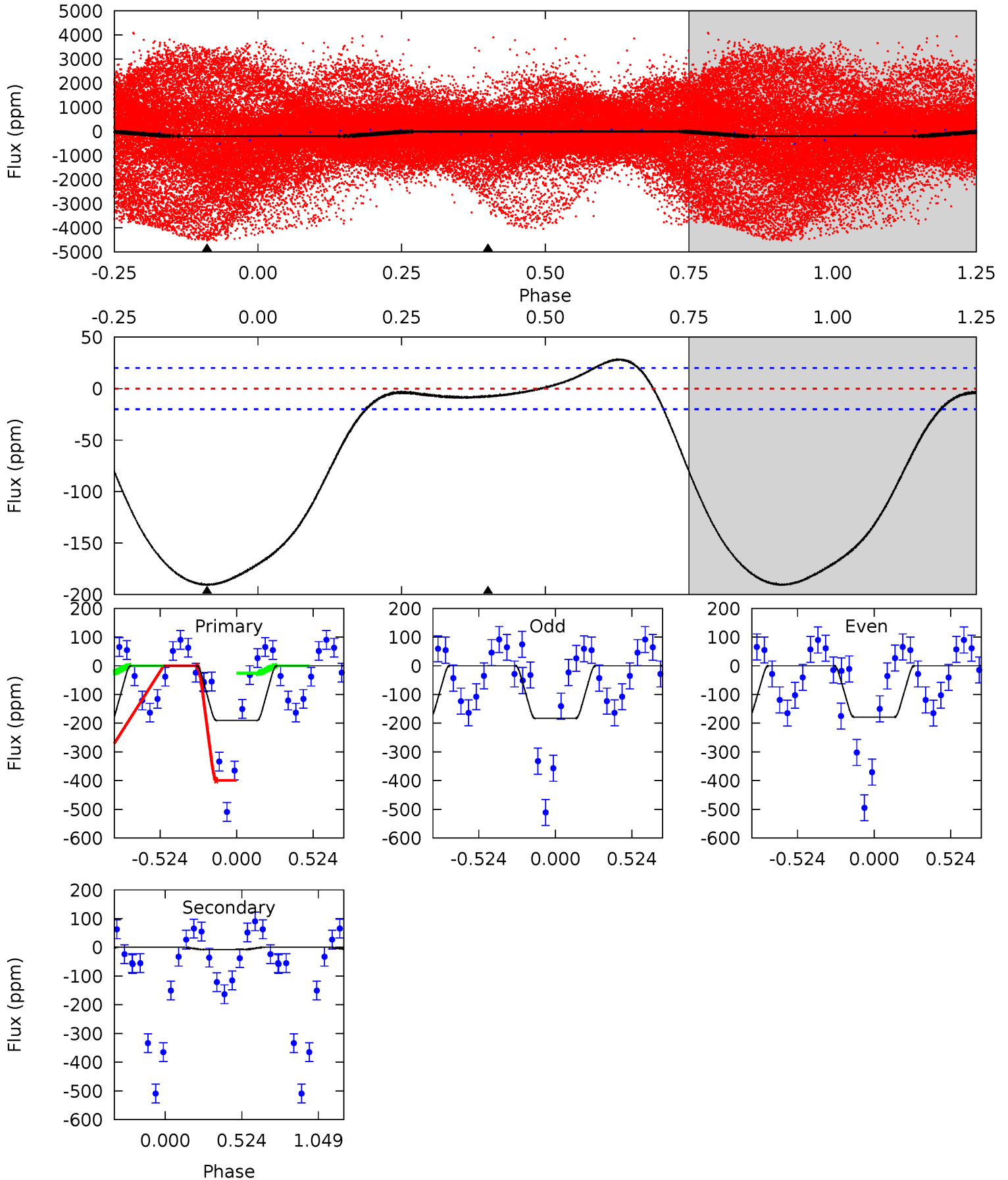
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.8	8.15	0	0	4.44	1.35	0.94	10.8	10.8	8.15	8.15	0.49	2.16	0.12	1.00



# Alt Model-Shift Uniqueness Test

012307574-01, P = 0.605300 Days, E = 131.084934 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
40.0	1.63	0	0	4.20	0.64	5.78	40.0	40.0	1.63	1.63	0.45	1.44	0.13	23.0





### Stellar Parameters For KIC 012307574

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6499^{+146}_{-194}$	$4.206^{+0.180}_{-0.180}$	$-0.380^{+0.250}_{-0.300}$	$1.350^{+0.380}_{-0.311}$	$1.066^{+0.175}_{-0.117}$	$0.610^{+0.649}_{-0.291}$
	+2%/-3%	+4%/-4%	+66%/-79%	+28%/-23%	+16%/-11%	+106%/-48%
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 012307574-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-23 \pm 3$	$0.76^{+0.25}_{-0.24}$	$3891^{+282}_{-254}$	$6241^{+1389}_{-914}$	$4.667^{+5.209}_{-2.193}$
Alt.	$-8 \pm 5$	$1.62^{+0.40}_{-0.30}$	$3891^{+290}_{-252}$	$2072^{+1507}_{-5507}$	$0.304^{+0.305}_{-0.199}$

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

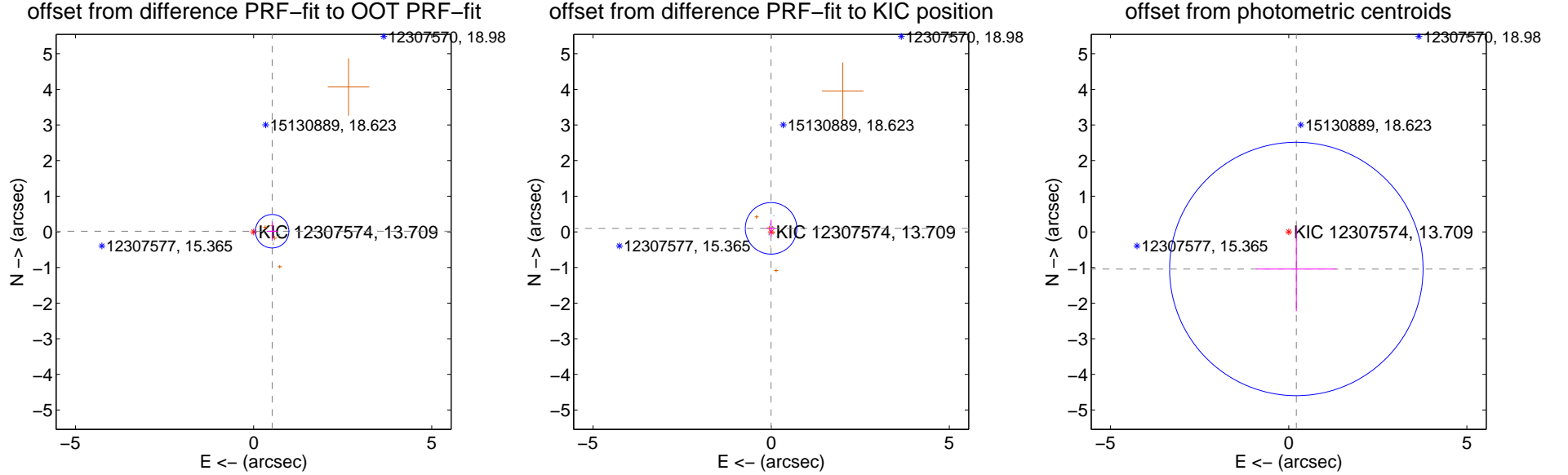
## DV Centroid Data

Supplemental centroid analysis for 012307574-01. Kepler magnitude: 13.71. Transit SNR 5.57

There are 8 quarters with good PRF difference image offsets

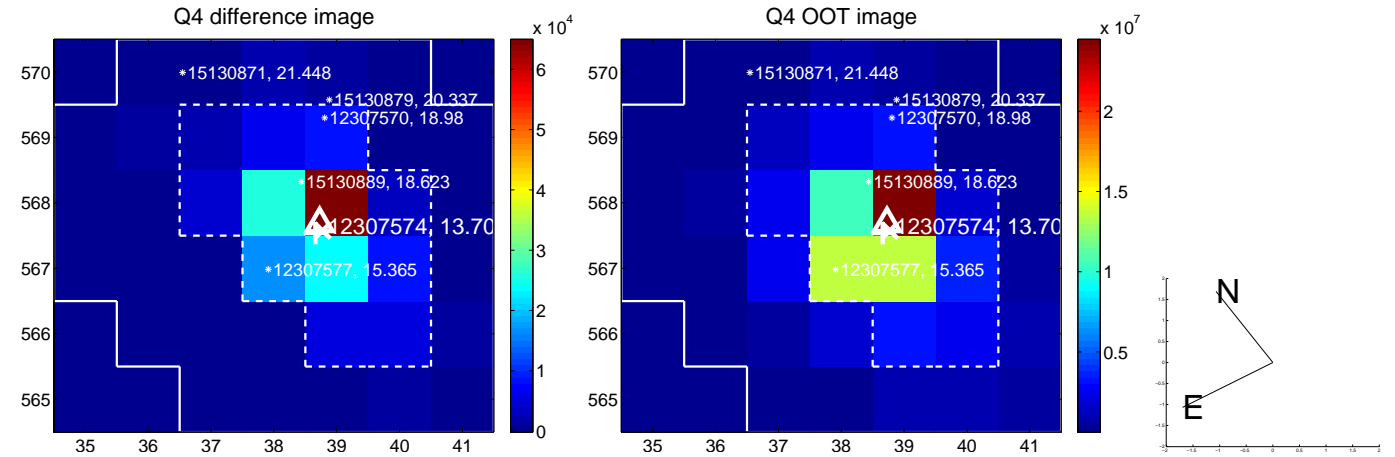
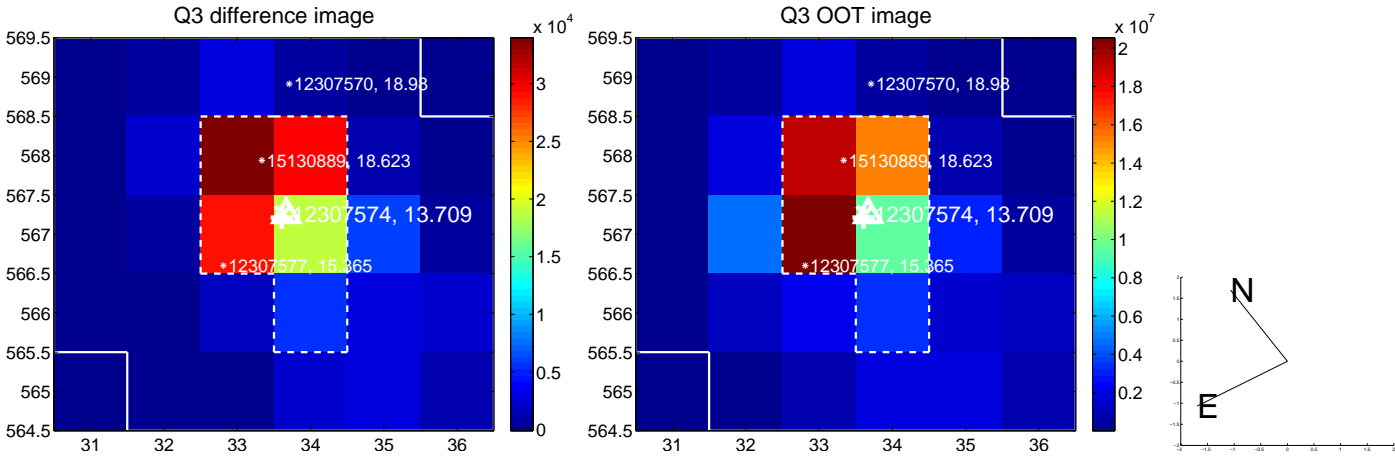
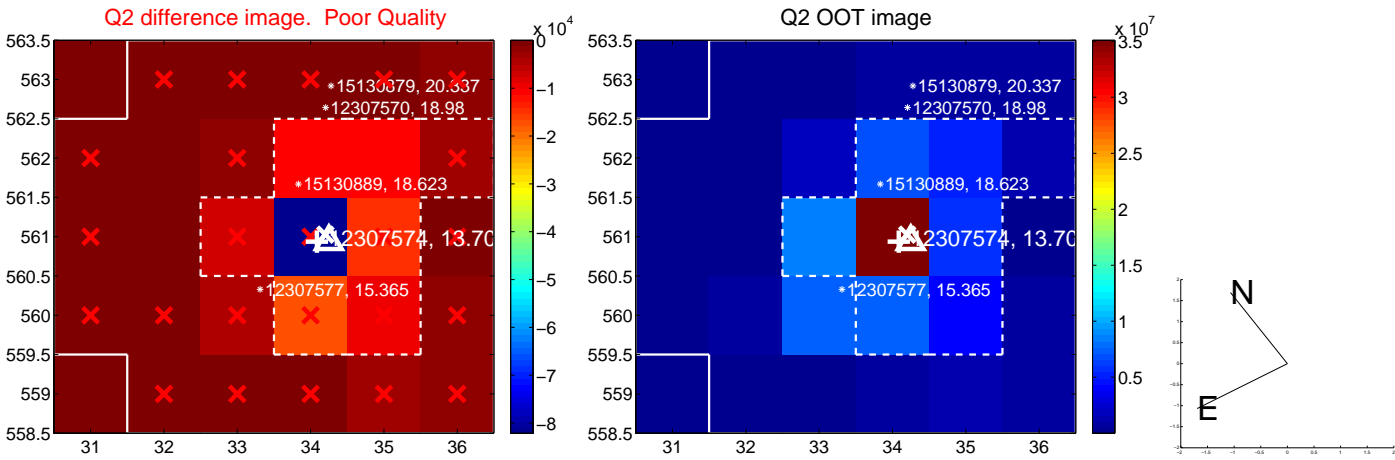
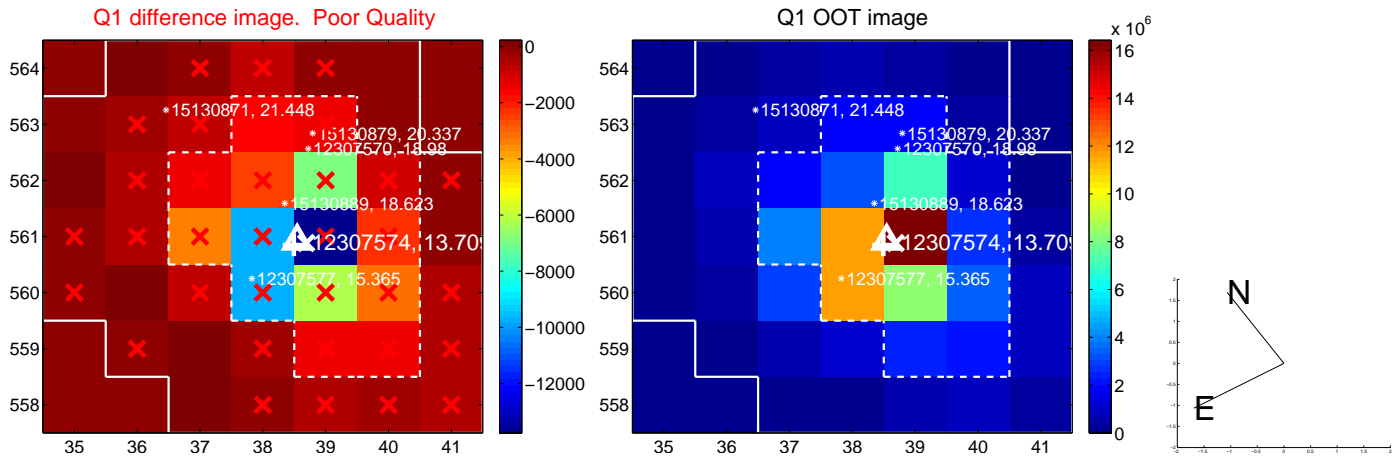
The direct PRF centroid is offset from the target star catalog position by about 0.70 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b>0.520 <math>\pm</math> 0.157</b>	<b>3.32</b>	-0.520 $\pm$ 0.150	0.018 $\pm$ 0.261
PRF-fit source offset from KIC position	0.099 $\pm$ 0.241	0.41	0.003 $\pm$ 0.129	0.098 $\pm$ 0.244
photometric centroid source offset	1.06 $\pm$ 1.19	0.90	-0.21 $\pm$ 1.13	-1.04 $\pm$ 1.19

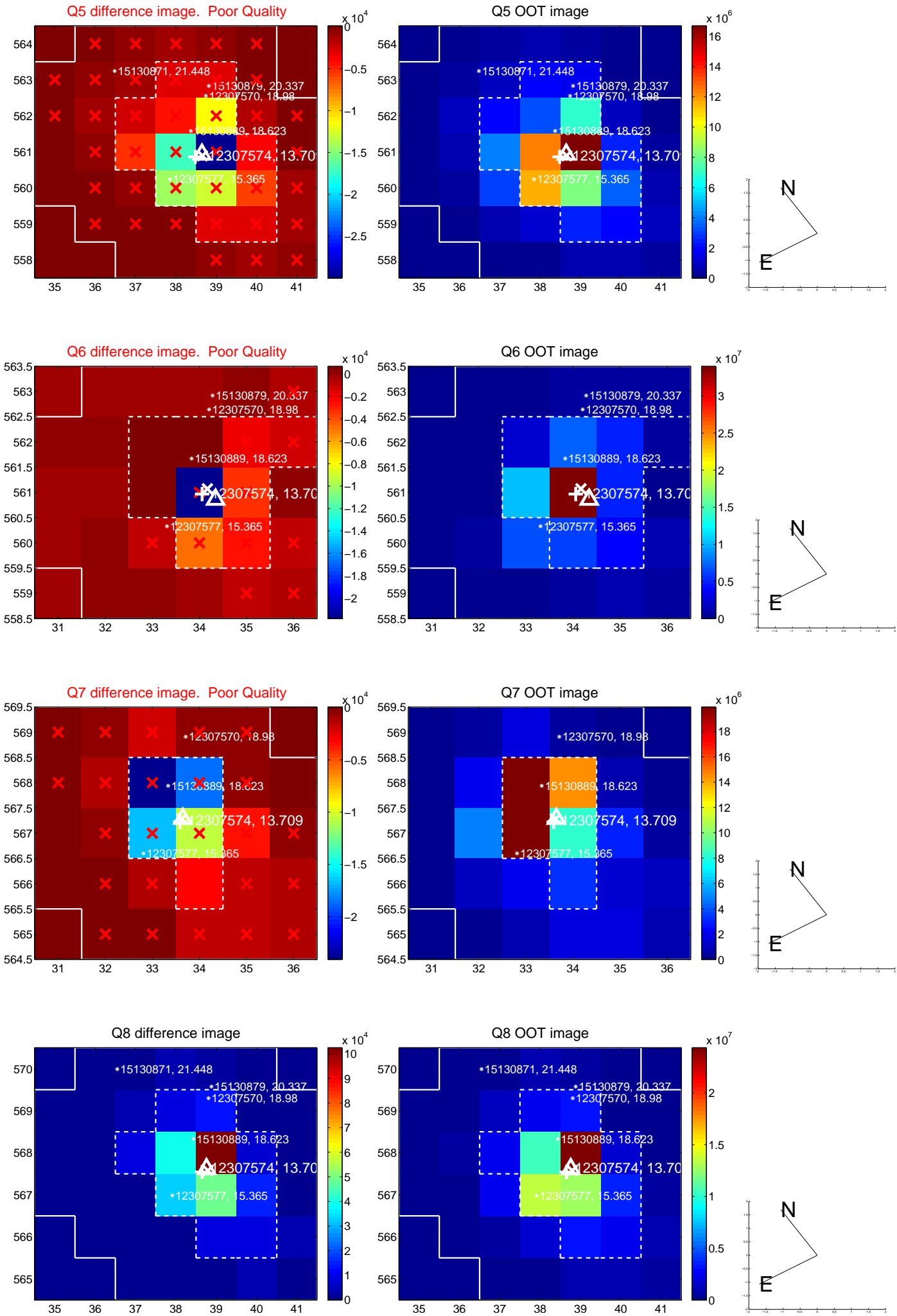


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

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

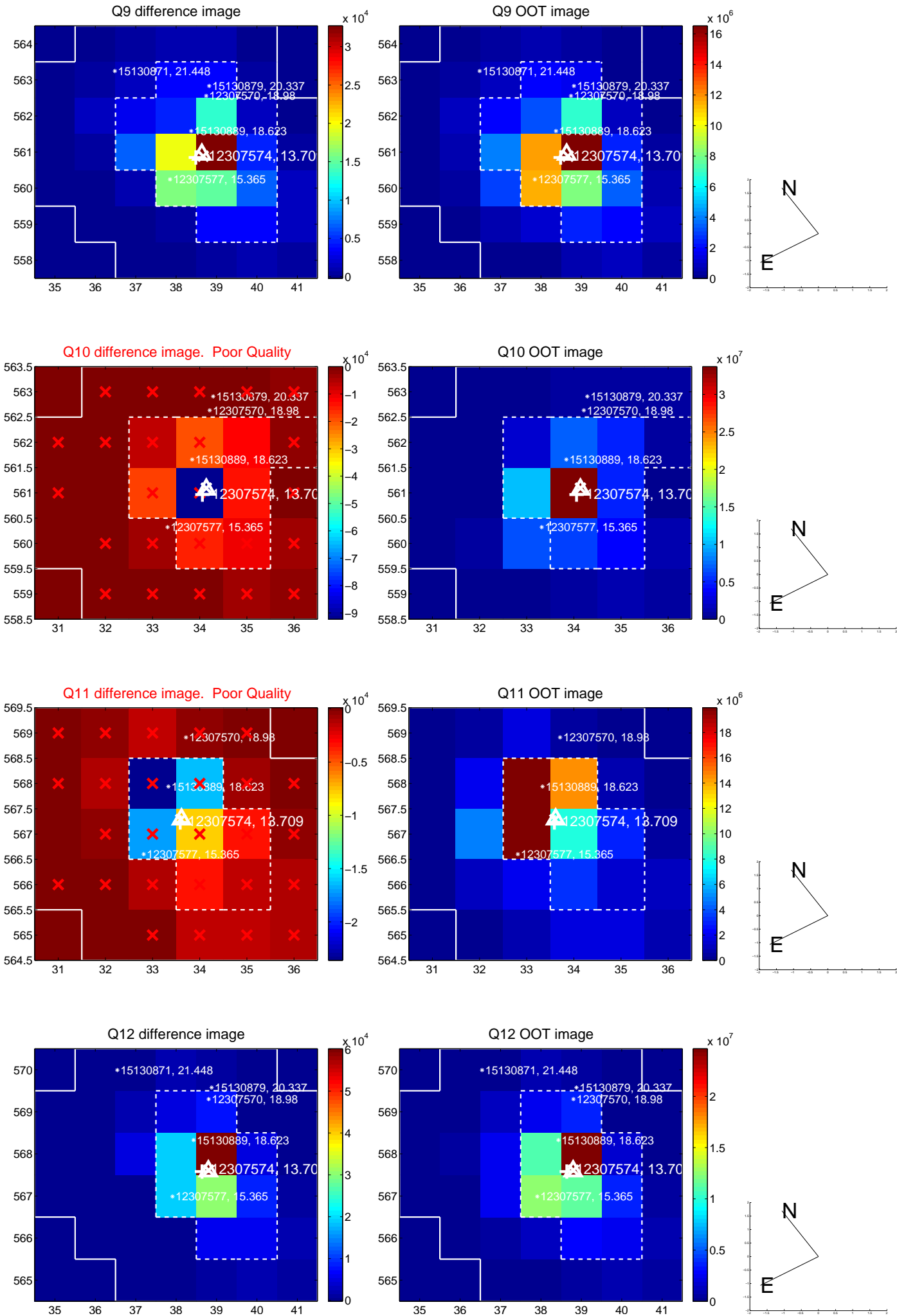


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

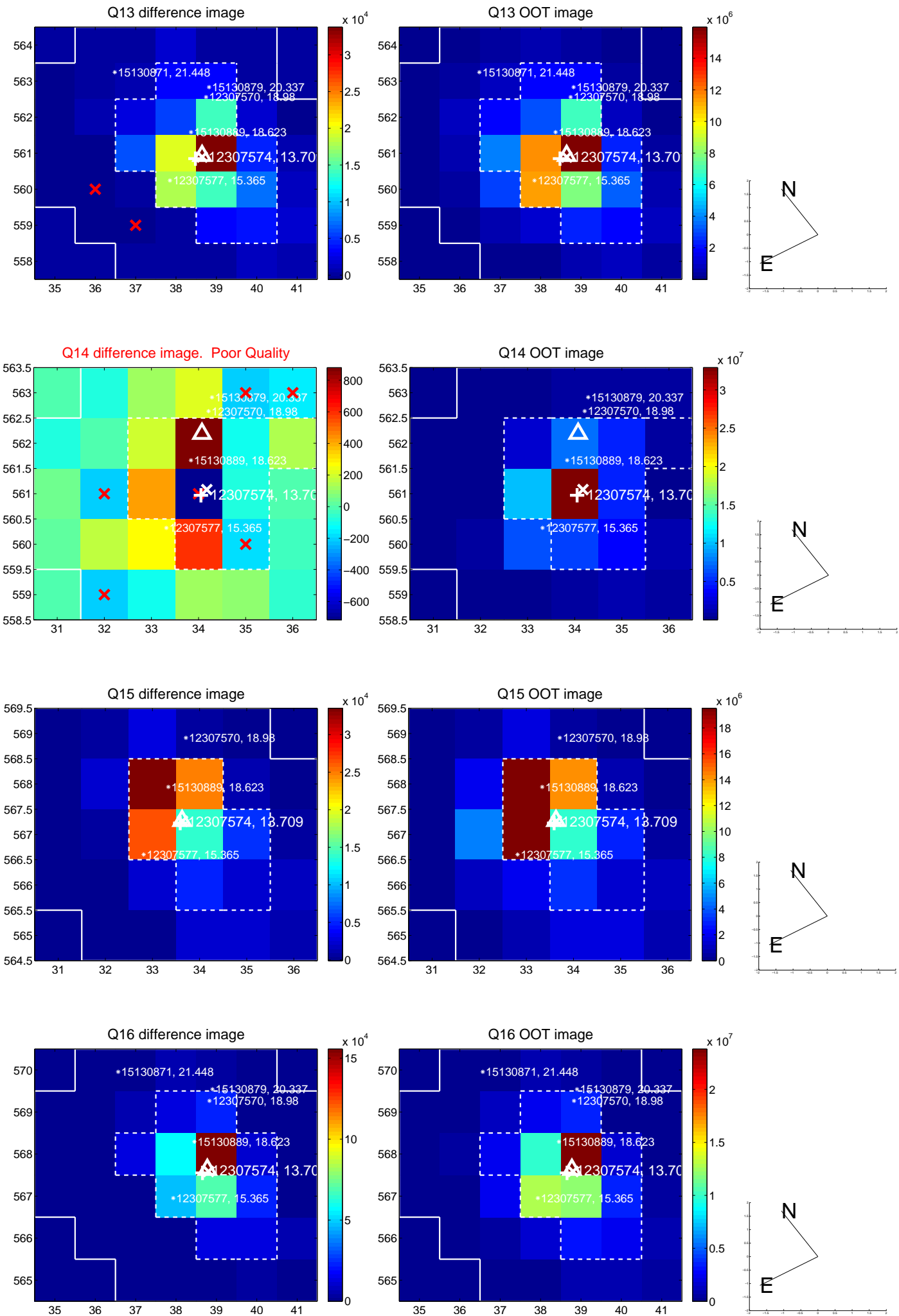




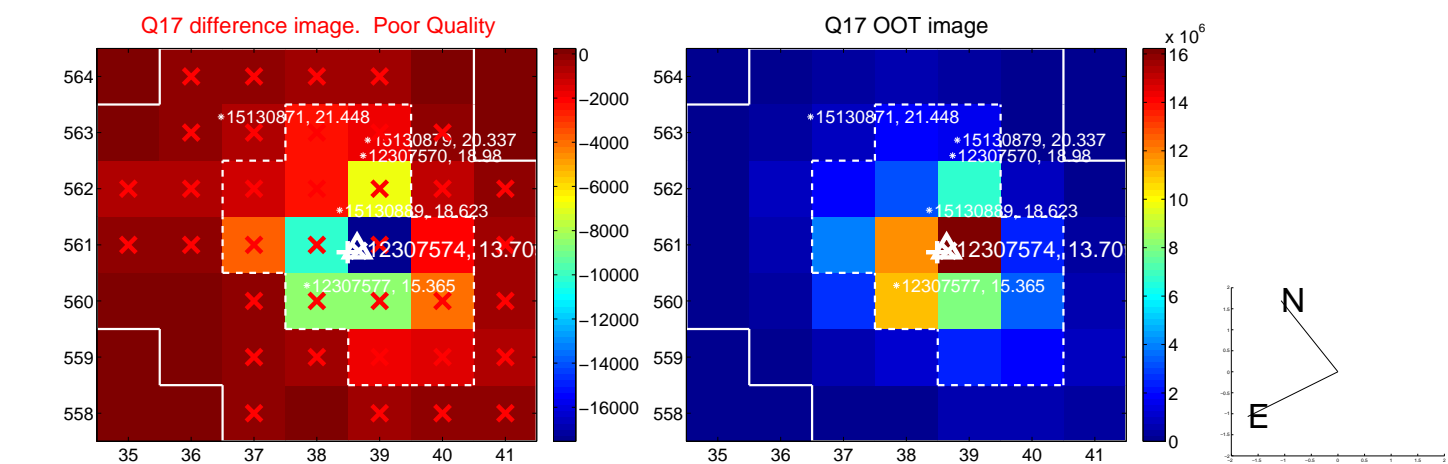
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



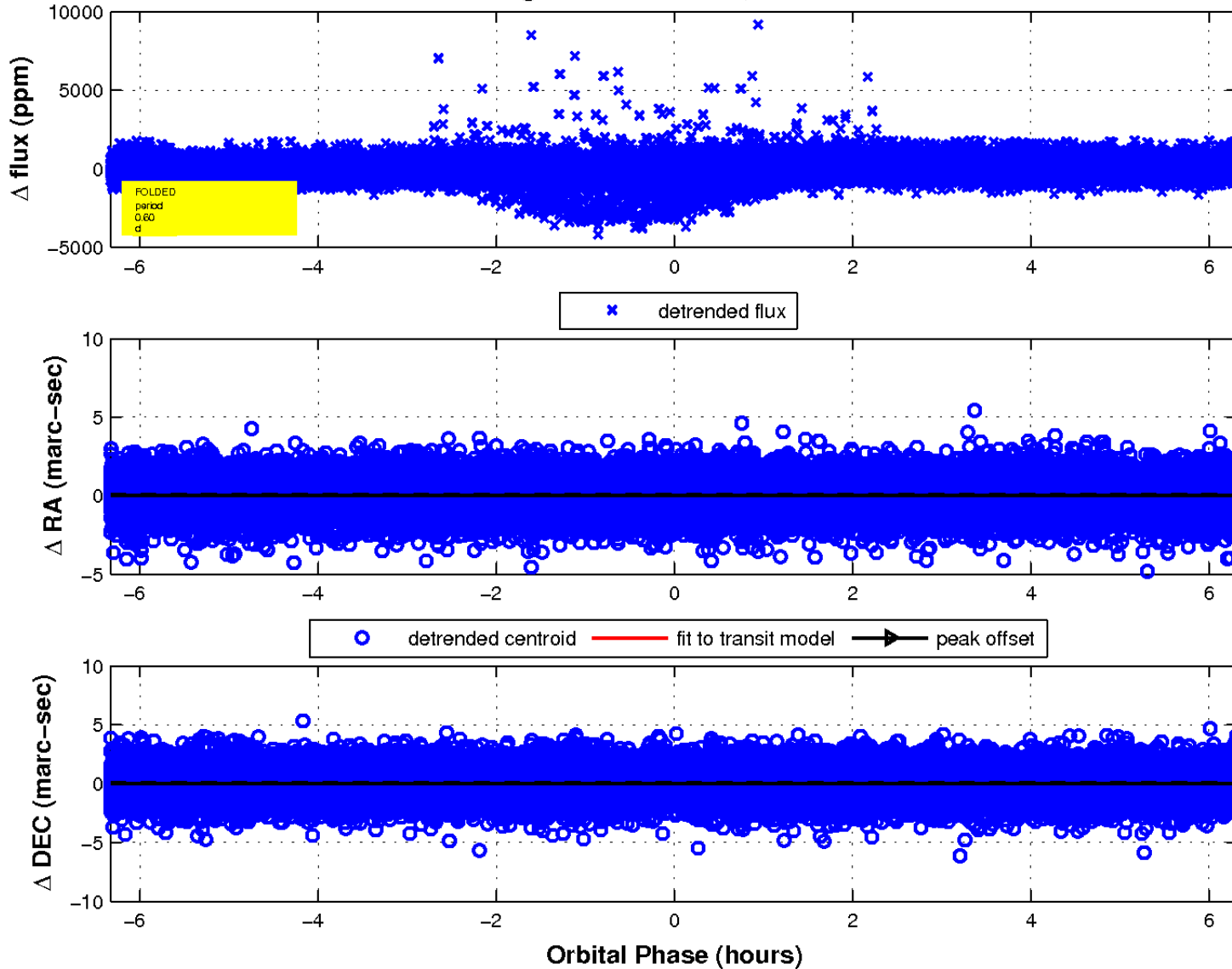
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

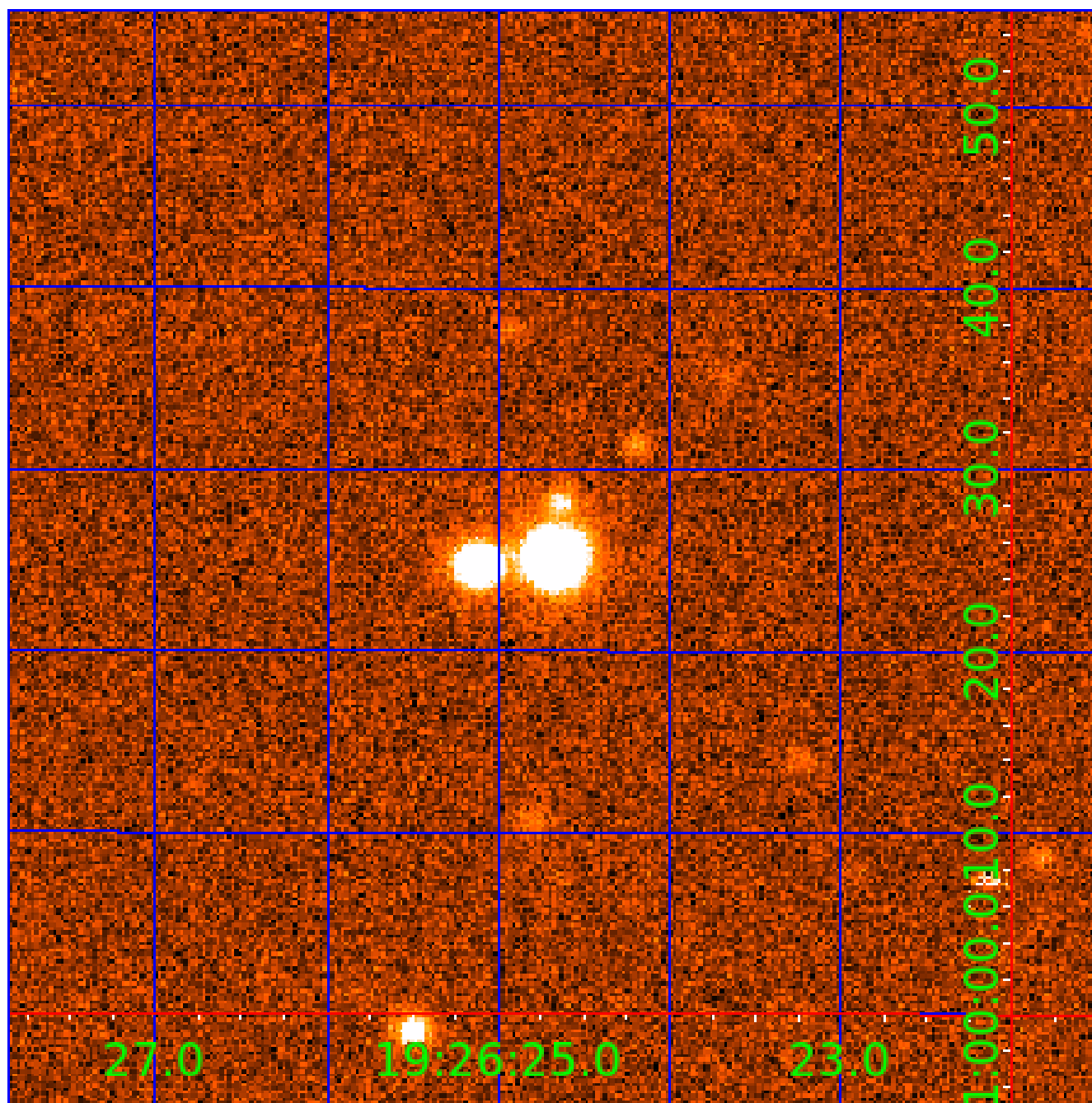


fluxWeightedCentroids, Planet 1 of 2



UKIRT Image

Declination





# KIC 012307574

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
012307574-01	OBS	No	0.604353	131.968949	25.7	2.109	19.1	5.6	1.35	6499	0.77	14238.00
012307574-02	OBS	No	141.503022	259.392793	430.8	15.384	7.7	6.7	1.35	6499	2.89	9.87

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
012307574-01	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_ALT—CENT_KIC_POS
012307574-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_KIC_POS

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

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

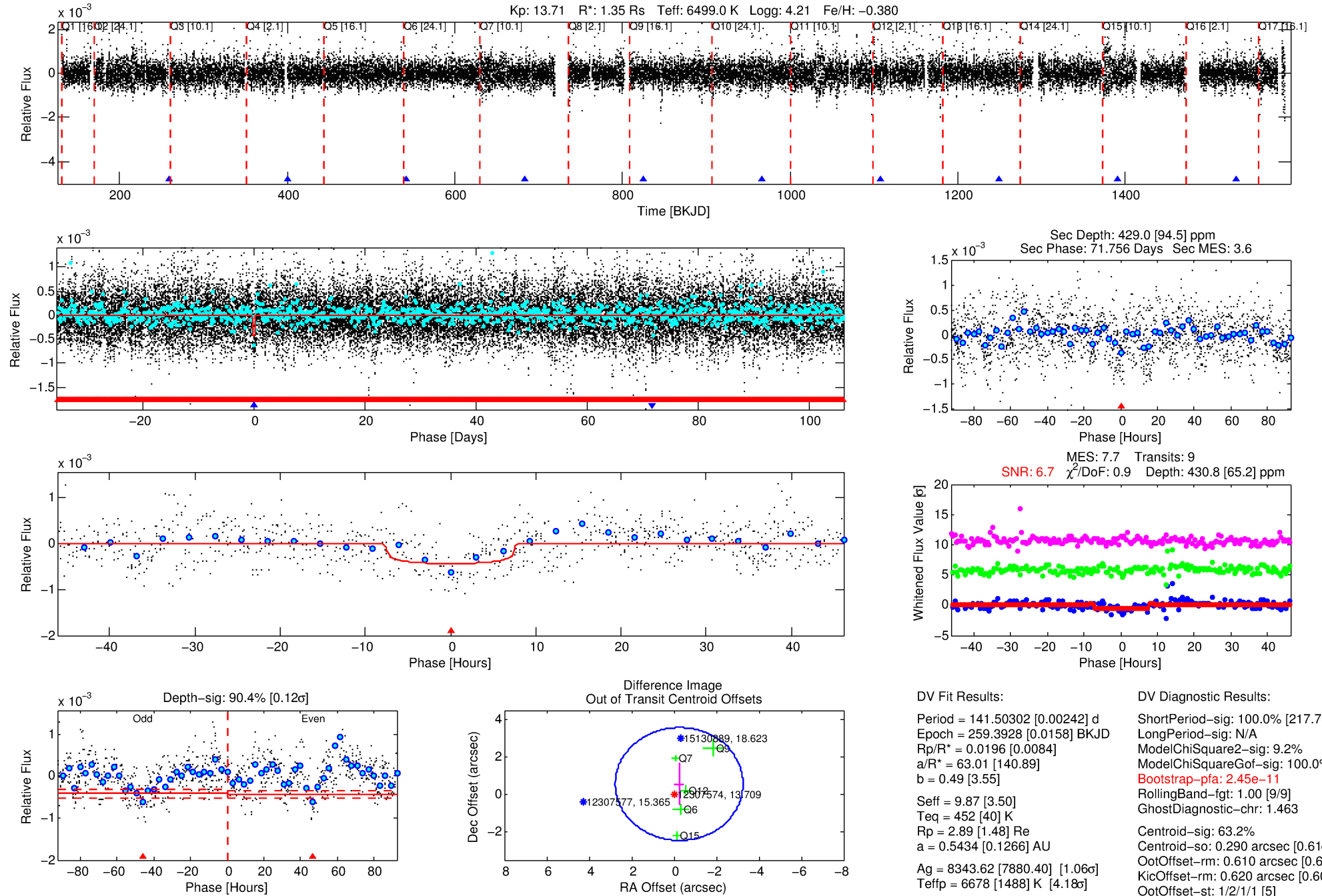
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 012307574-02

No Significant Match Found

# DV One-Page Summary

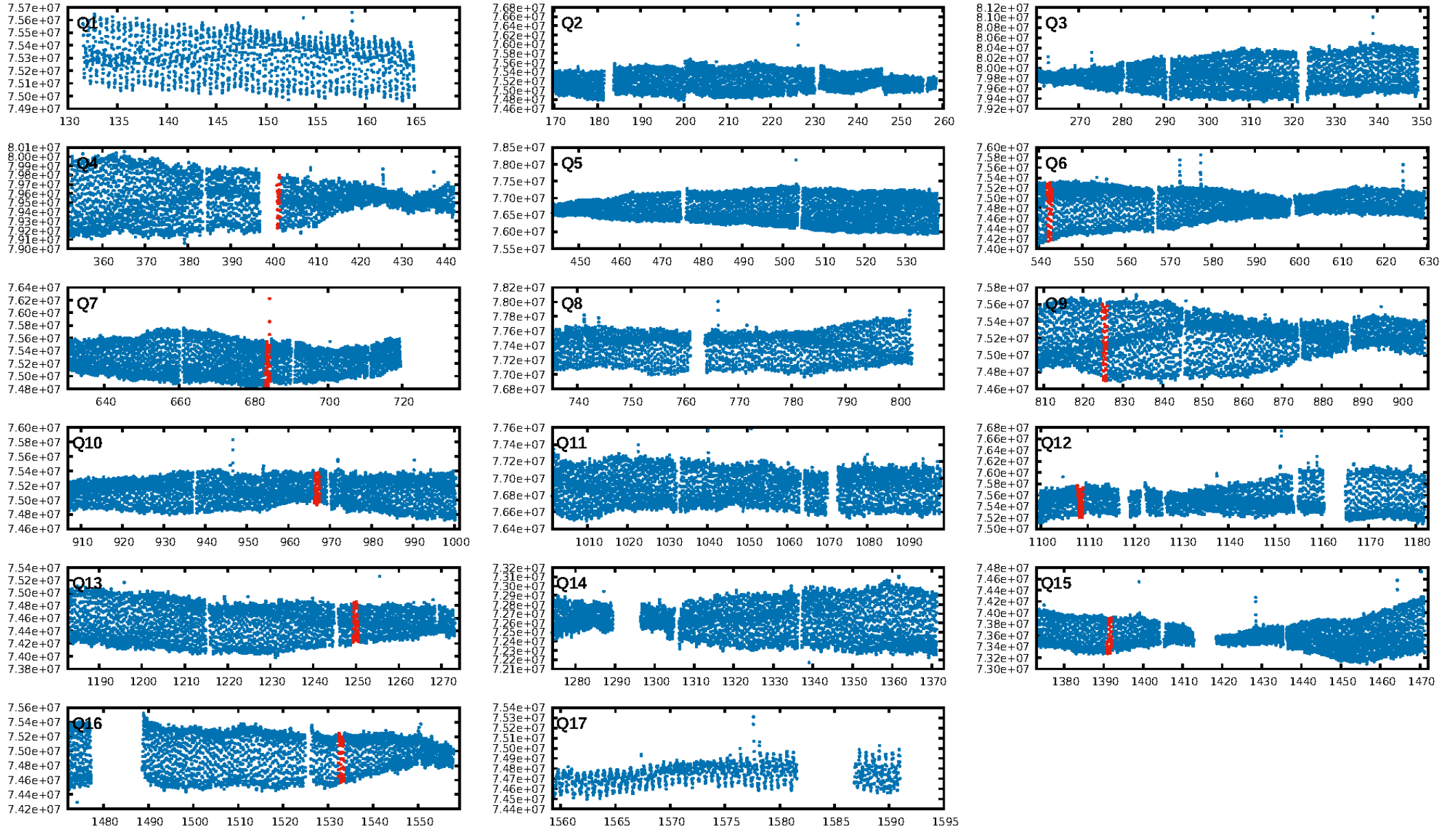
KIC: 12307574 Candidate: 2 of 2 Period: 141.503 d



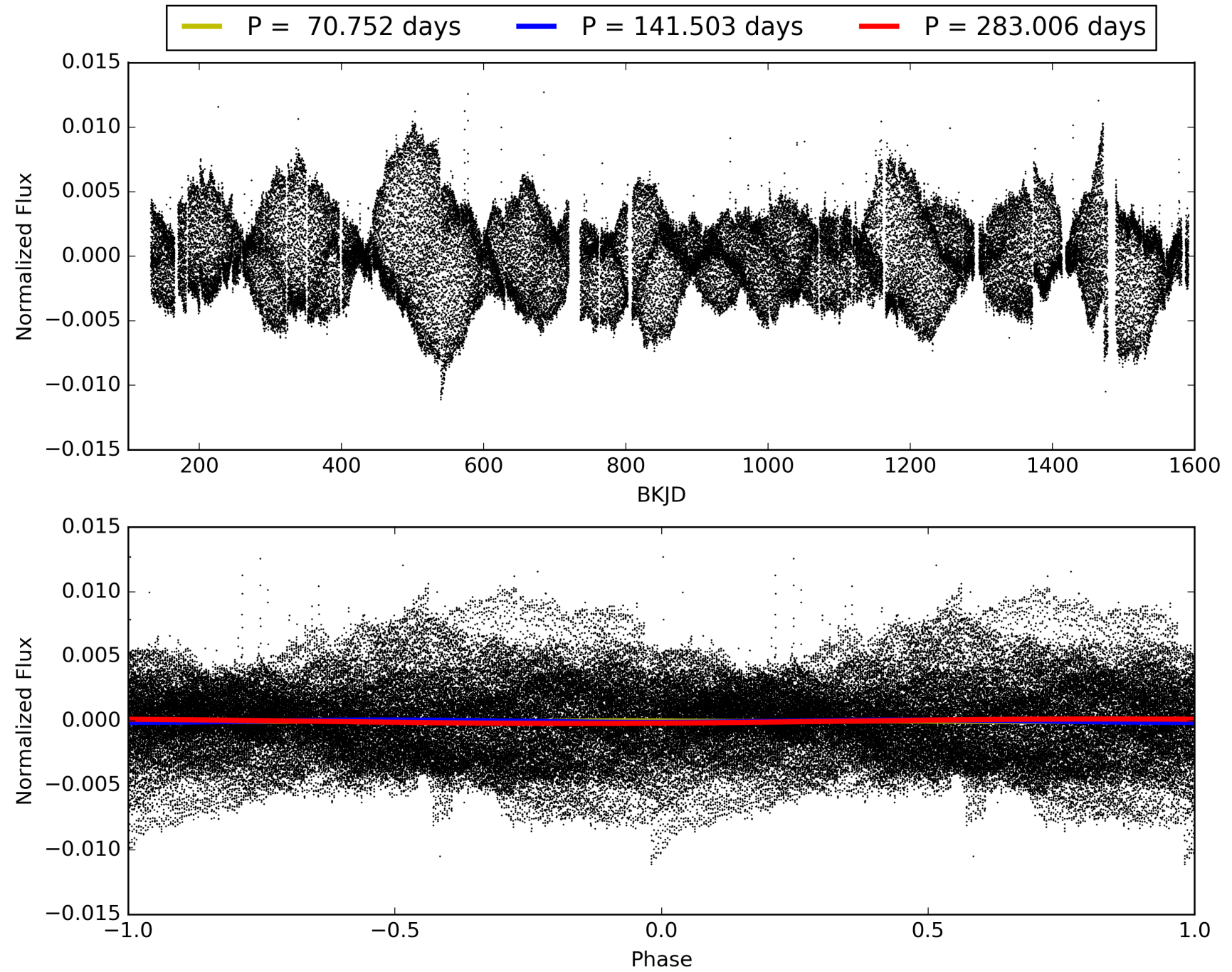
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 06:27:16 Z

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

# TCE 012307574-02, PDC Light Curves



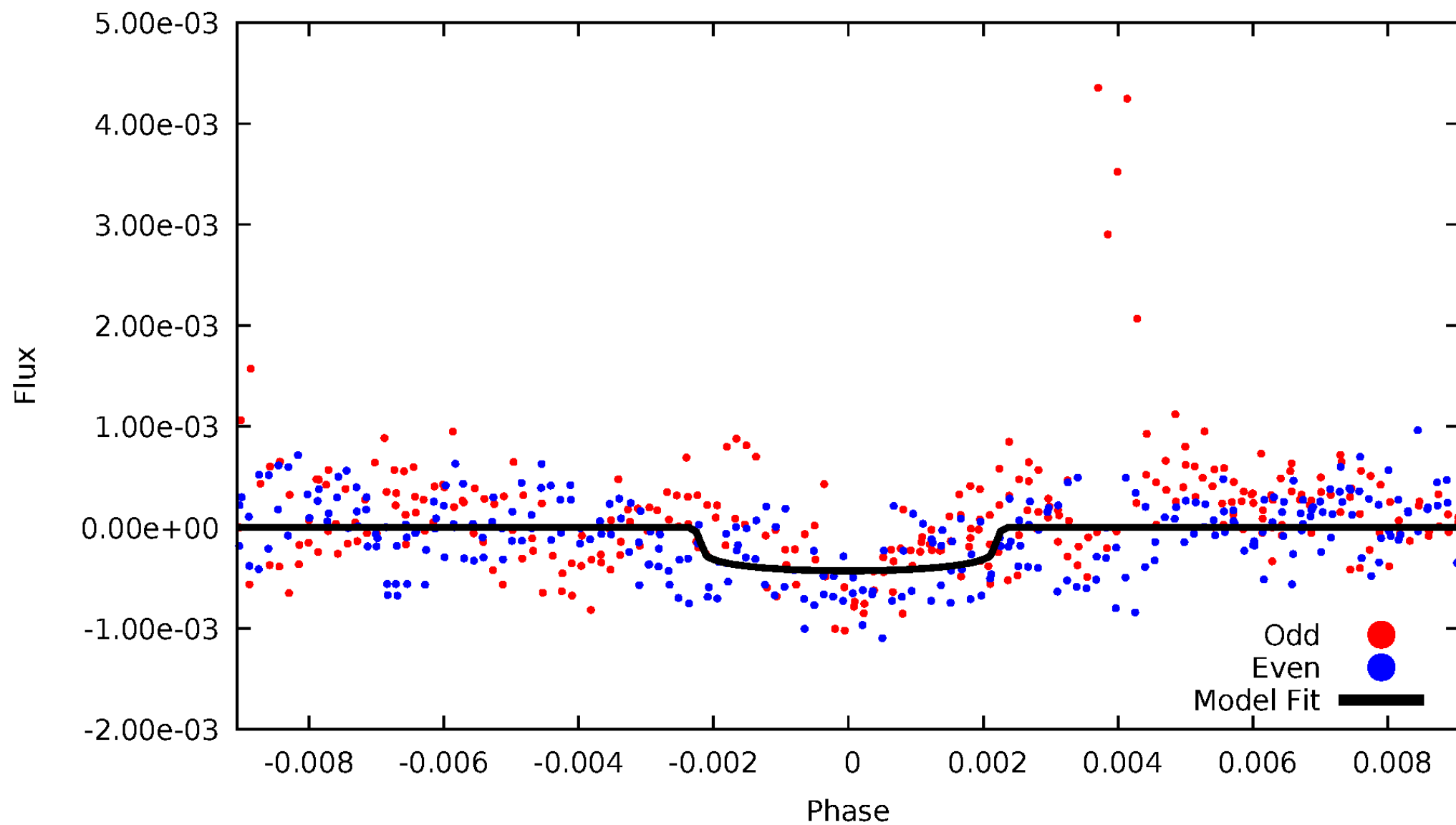
# TCE 012307574-02





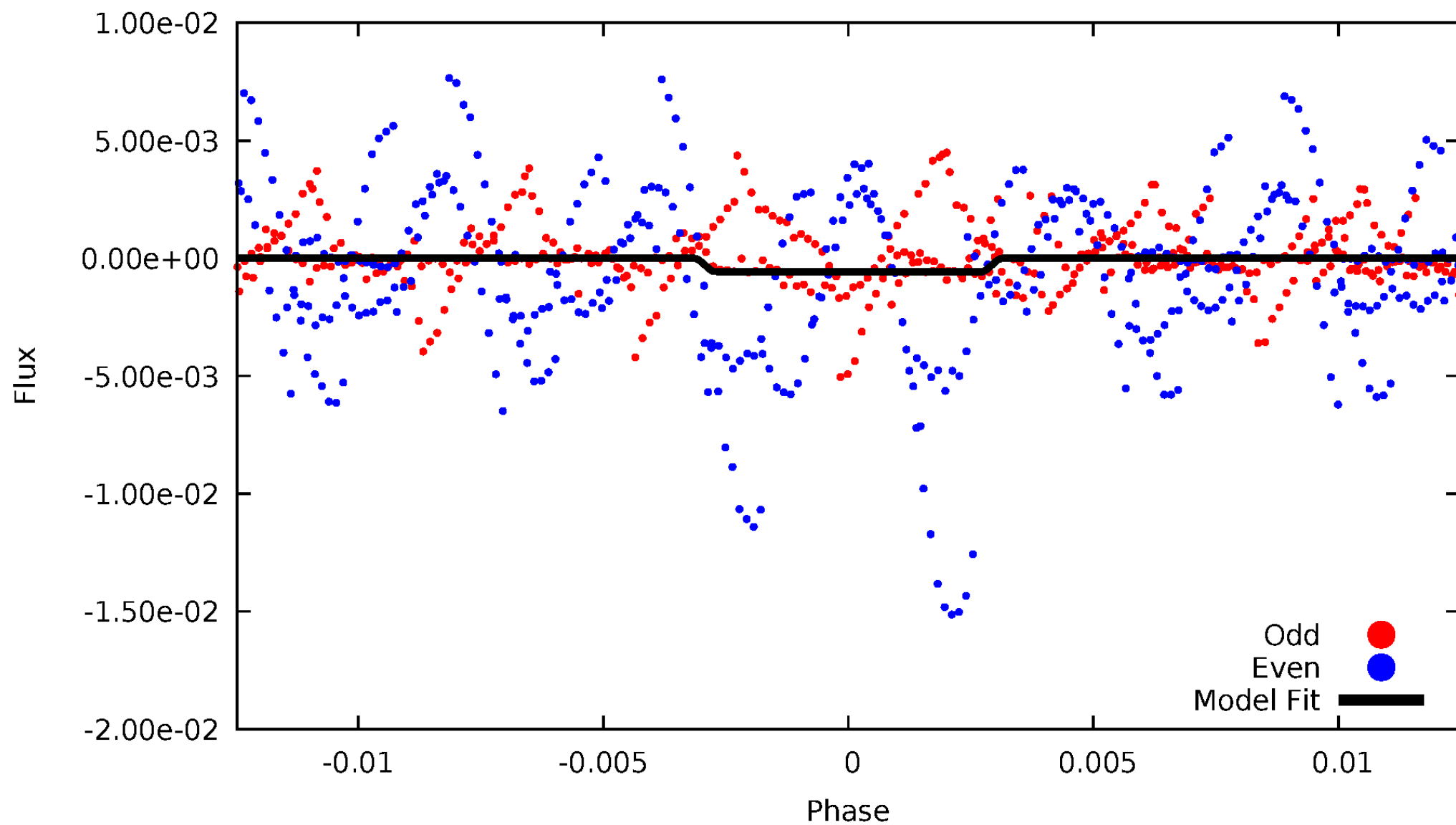
# DV Odd/Even

TCE 012307574-02



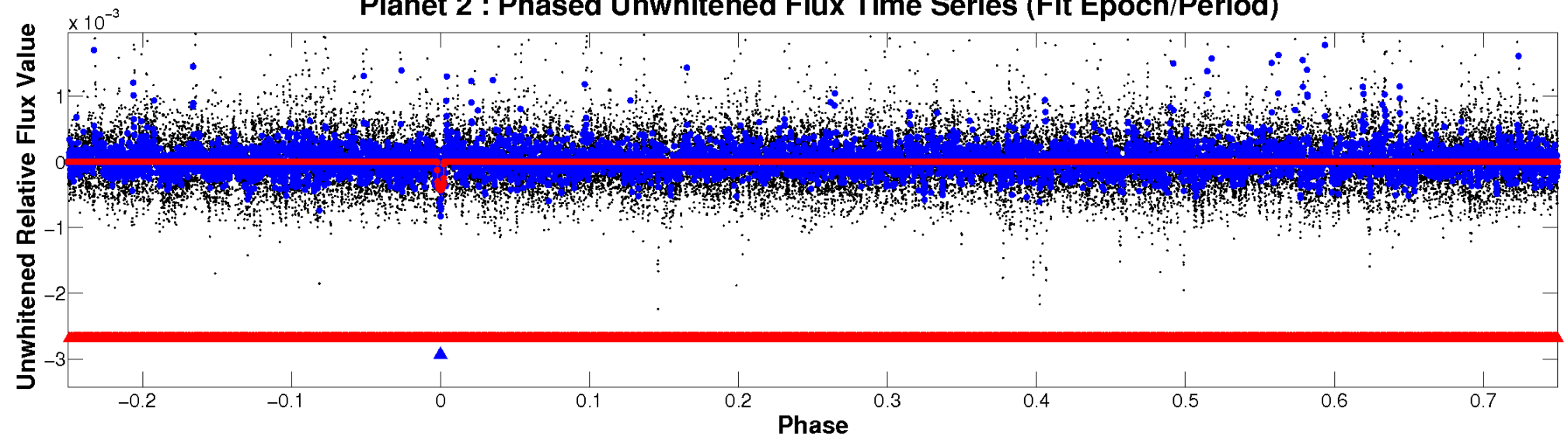
# ALT Odd/Even

TCE 012307574-02

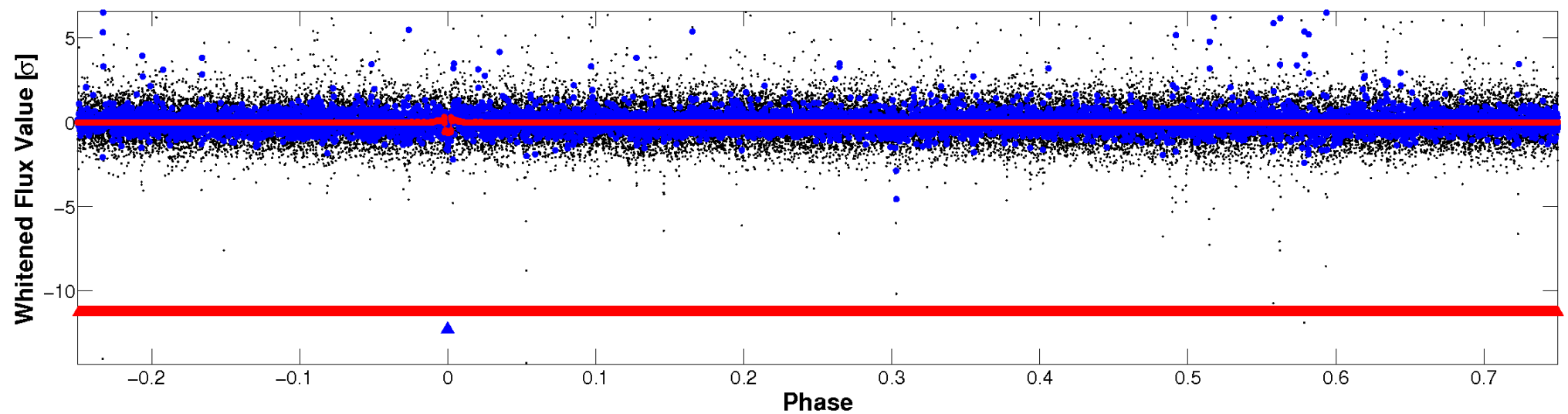


# Non-Whitened Vs. Whitened Light Curve

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

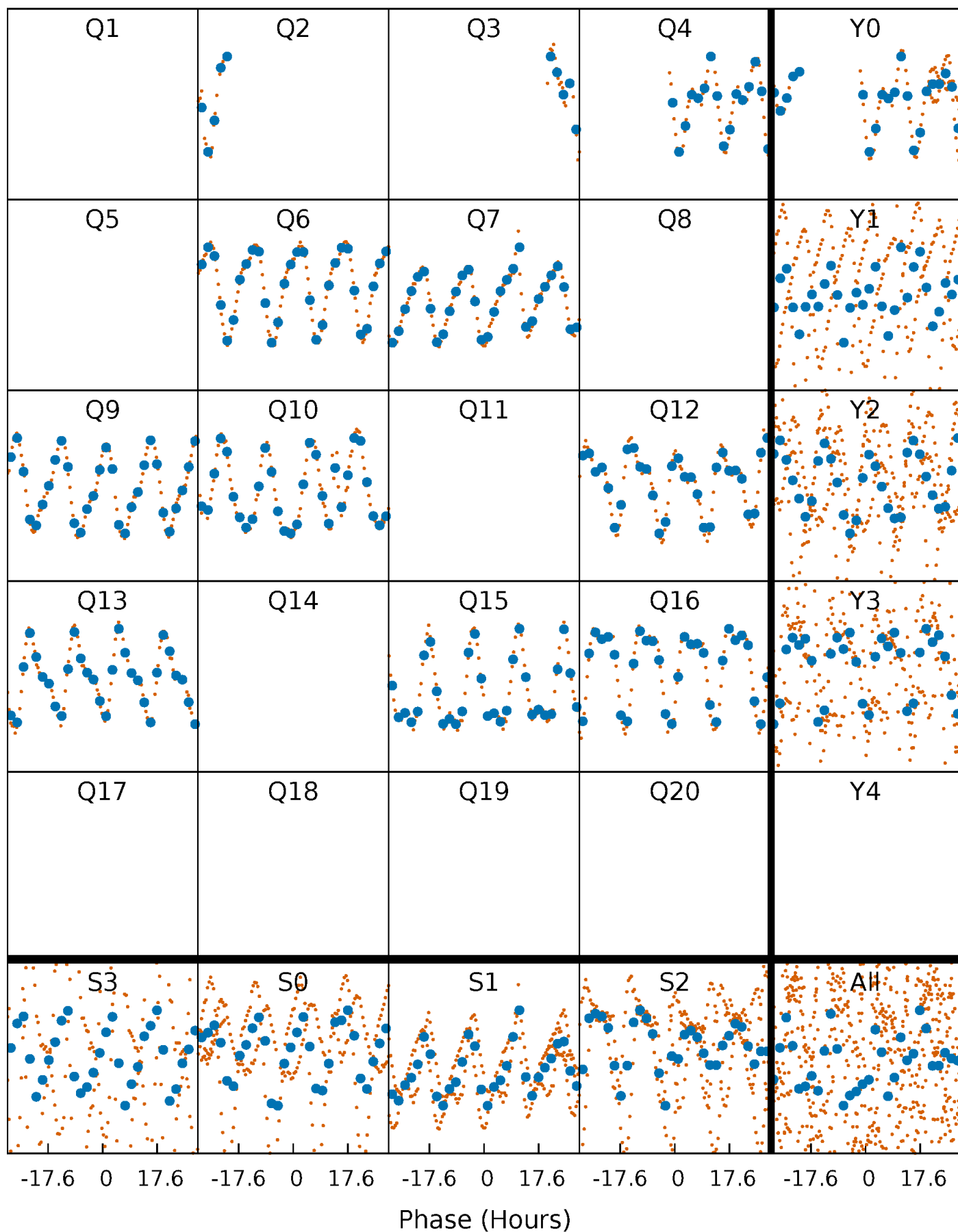


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



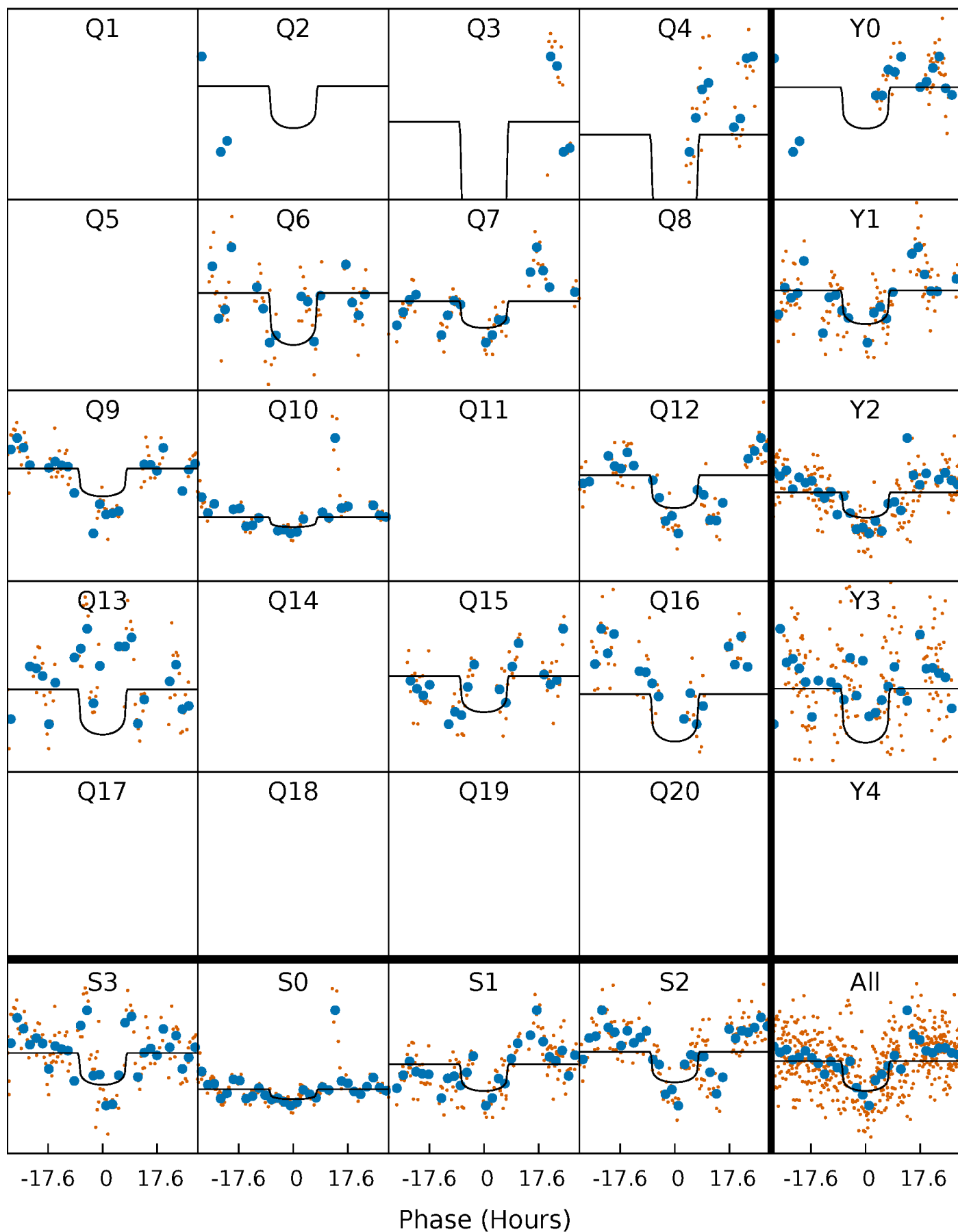
# PDC Quarter-Phased Transit Curves

TCE 012307574-02 P=141.503021 Days  $T_0=259.392793$  (BKJD)



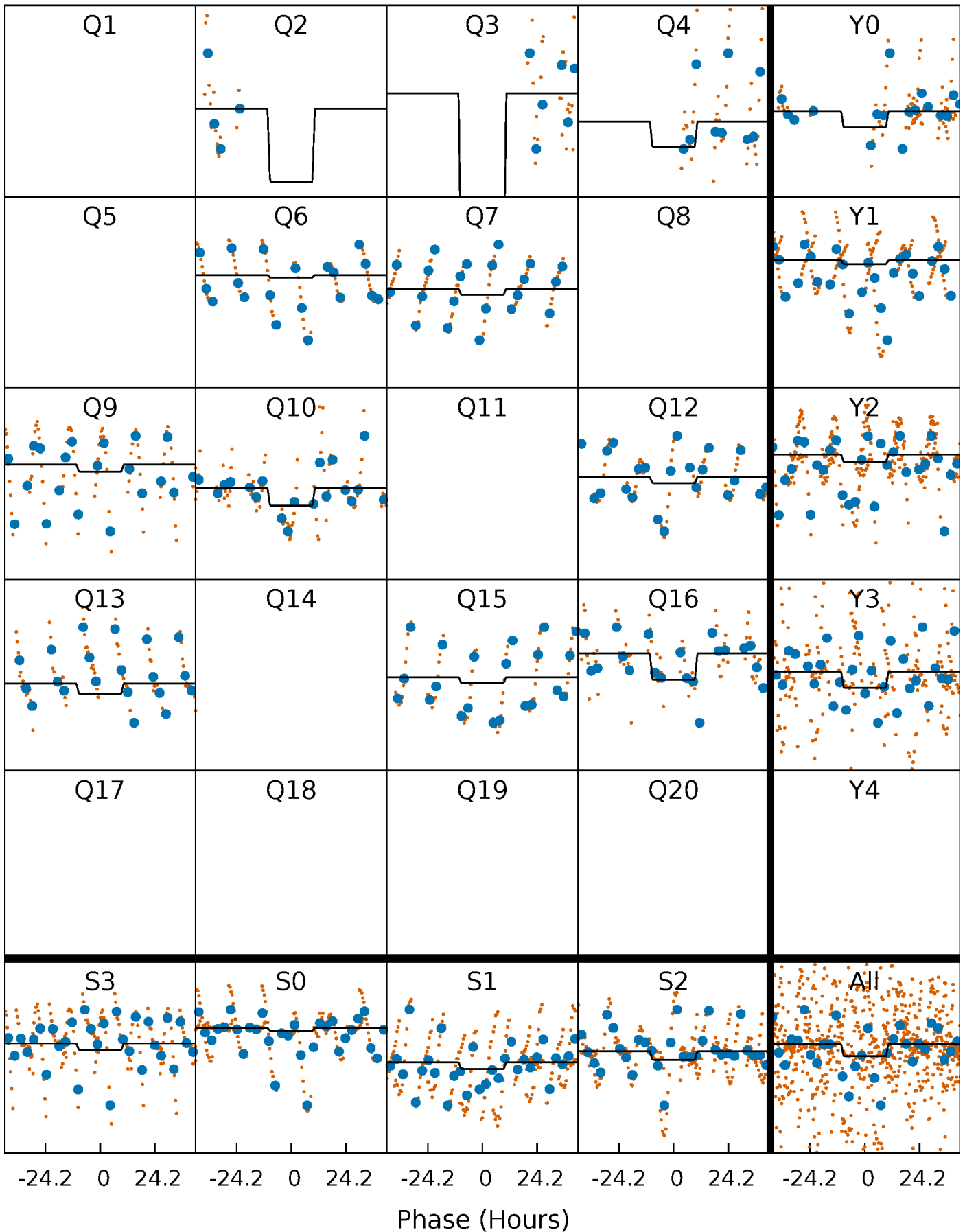
# DV Quarter-Phased Transit Curves

TCE 012307574-02 P=141.503021 Days  $T_0=259.392793$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 012307574-02 P=141.495592 Days  $T_0=259.428829$  (BKJD)

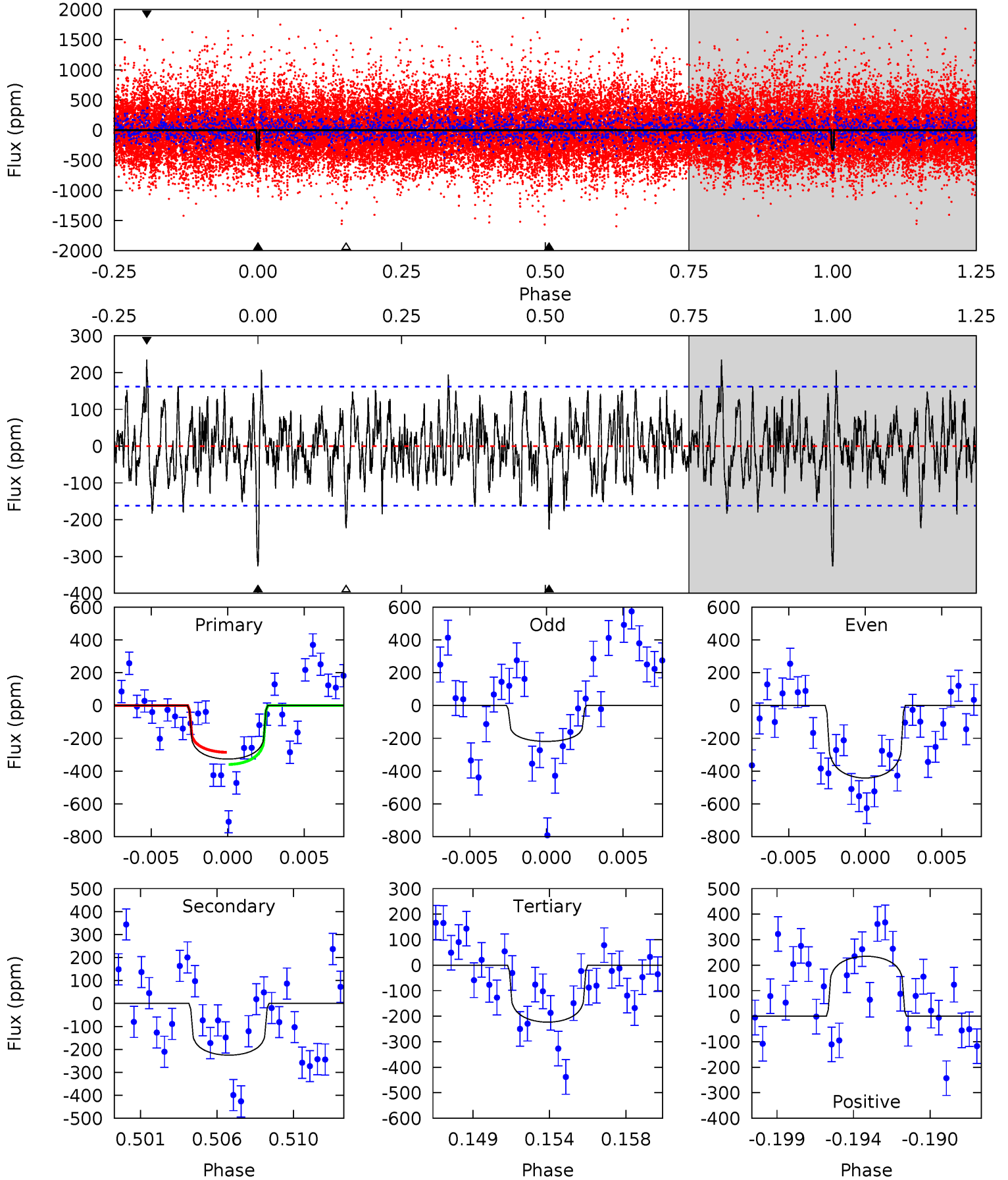




# DV Model-Shift Uniqueness Test

012307574-02, P = 141.503021 Days, E = 117.889772 Days

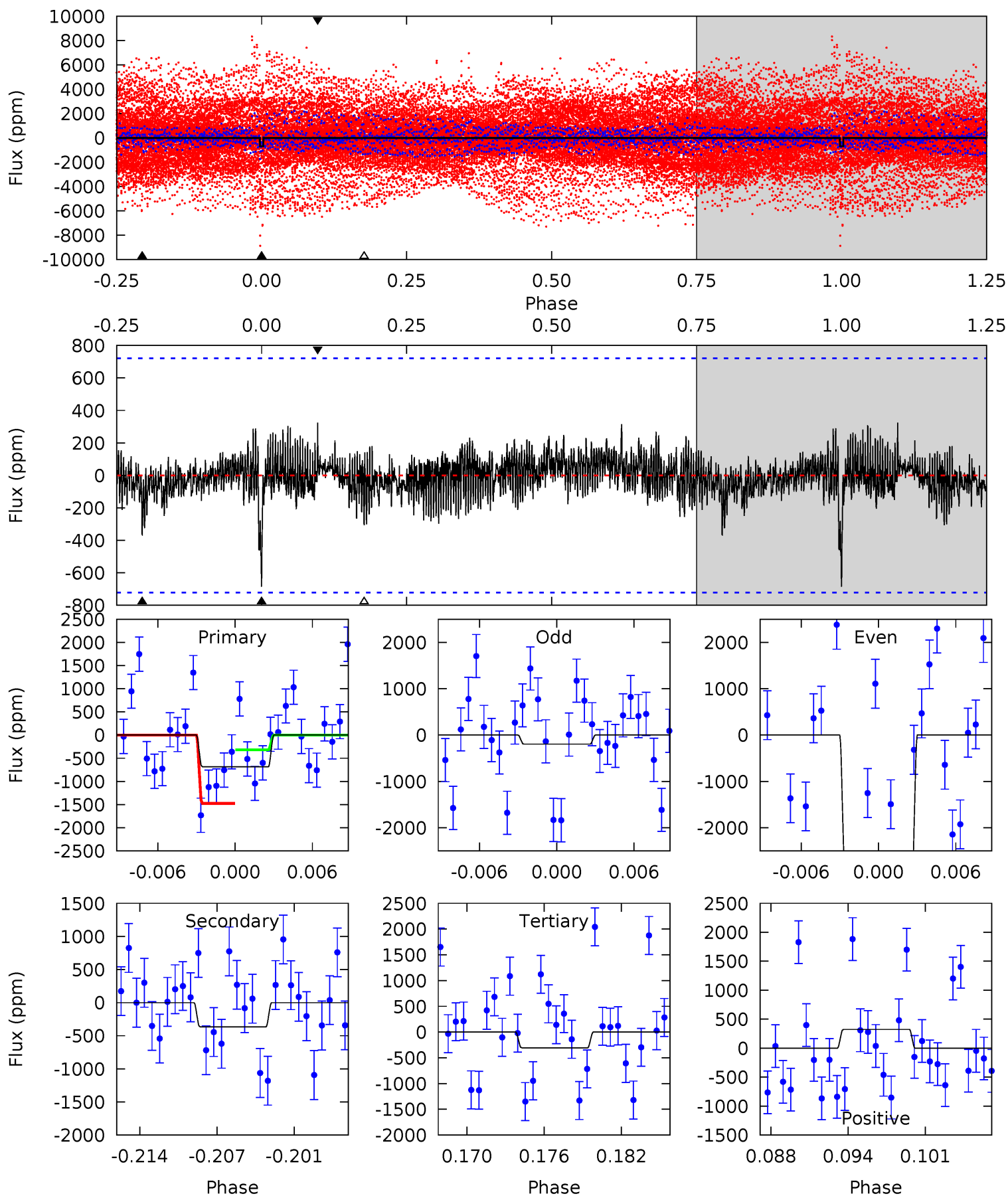
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.5	7.20	7.14	7.51	5.18	2.84	2.17	3.31	2.94	0.06	-0.31	3.48	1.19	0.42	1.18



# Alt Model-Shift Uniqueness Test

012307574-02,  $P = 141.495592$  Days,  $E = 117.933237$  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
4.85	2.59	2.17	2.29	5.11	2.73	0.66	2.68	2.56	0.41	0.29	10.9	1.73	0.32	4.09



### Stellar Parameters For KIC 012307574

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6499^{+146}_{-194}$	$4.206^{+0.180}_{-0.180}$	$-0.380^{+0.250}_{-0.300}$	$1.350^{+0.380}_{-0.311}$	$1.066^{+0.175}_{-0.117}$	$0.610^{+0.649}_{-0.291}$
	+2%/-3%	+4%/-4%	+66%/-79%	+28%/-23%	+16%/-11%	+106%/-48%
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 012307574-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-225 \pm 31$	$2.81^{+1.44}_{-1.20}$	$632^{+44}_{-45}$	$5707^{+2141}_{-877}$	$4510^{+9488}_{-2473}$
Alt.	$-365 \pm 141$	$3.52^{+1.44}_{-1.22}$	$627^{+51}_{-38}$	$5729^{+1582}_{-907}$	$4663^{+7092}_{-2652}$

$T_{max}$  = 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

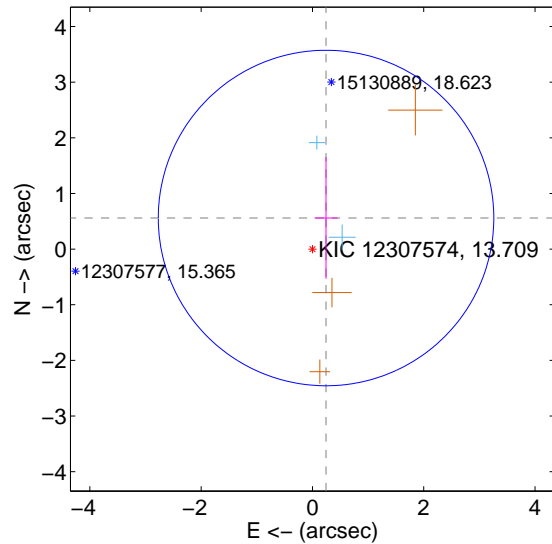
Supplemental centroid analysis for 012307574-02. Kepler magnitude: 13.71. Transit SNR 6.65

There are 2 quarters with good PRF difference image offsets

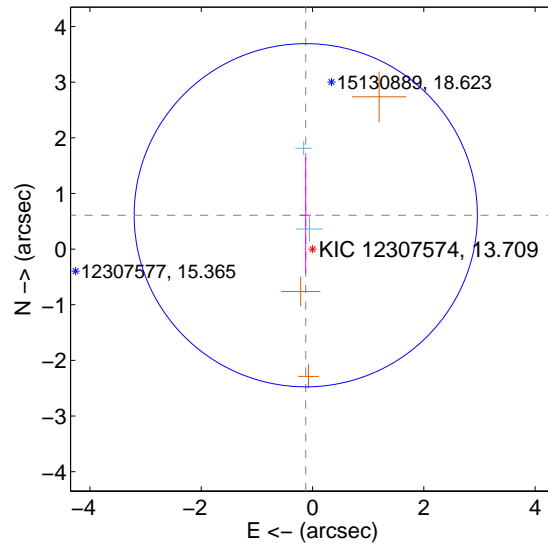
The direct PRF centroid is offset from the target star catalog position by about 0.22 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.610 \pm 1.005$	0.61	$-0.244 \pm 0.205$	$0.558 \pm 1.093$
PRF-fit source offset from KIC position	$0.620 \pm 1.028$	0.60	$0.122 \pm 0.093$	$0.608 \pm 1.048$
photometric centroid source offset	$0.29 \pm 0.47$	0.61	$0.28 \pm 0.47$	$0.06 \pm 0.49$

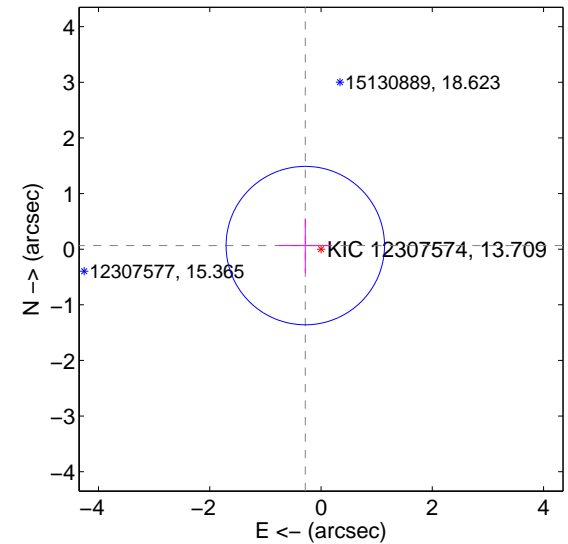
offset from difference PRF-fit to OOT PRF-fit



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.

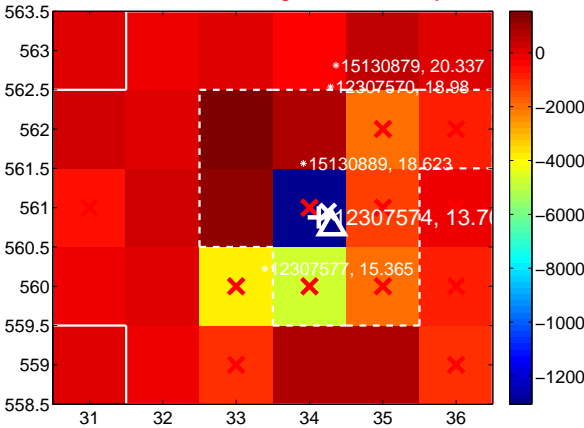
Q5 no difference image



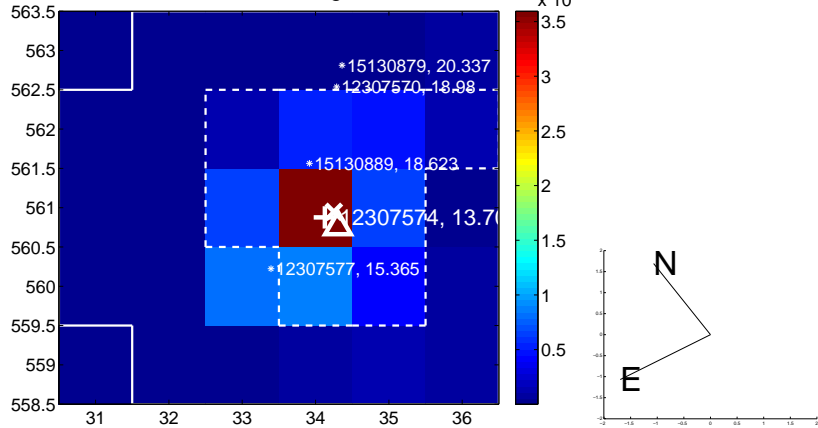
Q5 no OOT image



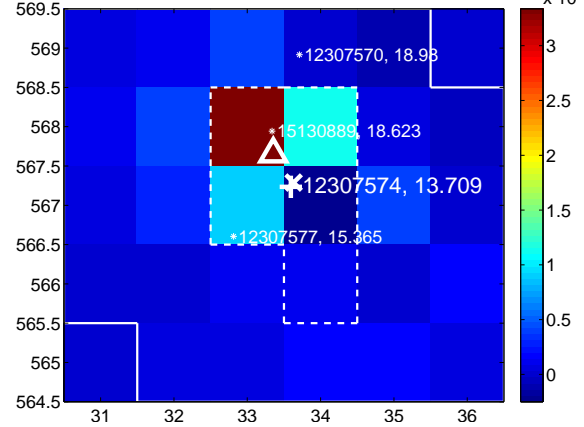
Q6 difference image. Poor Quality



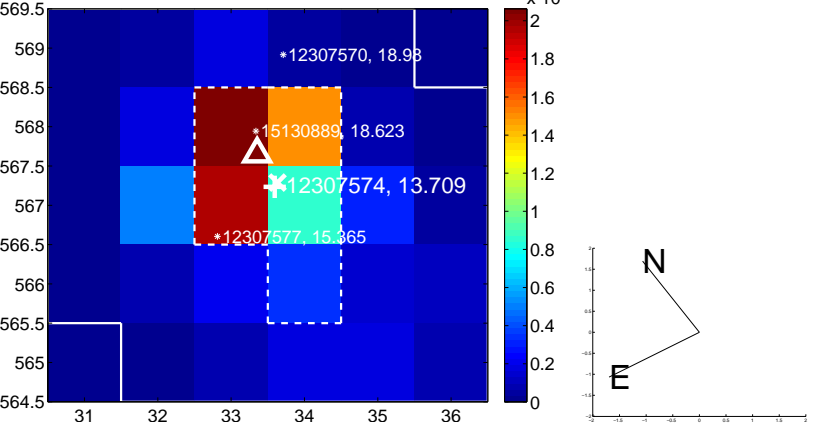
Q6 OOT image



Q7 difference image



Q7 OOT image



Q8 no difference image

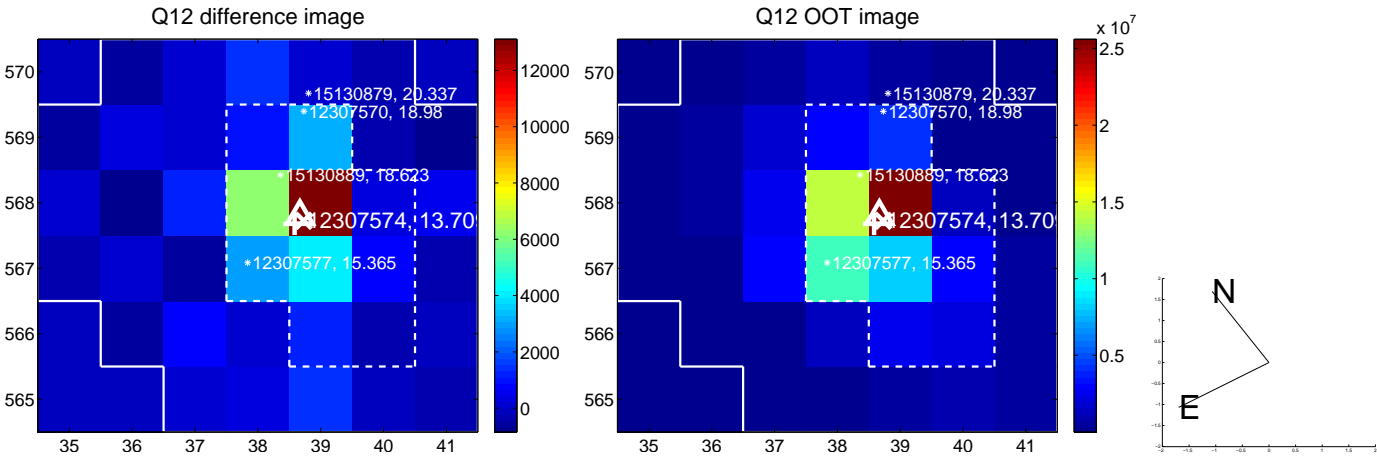
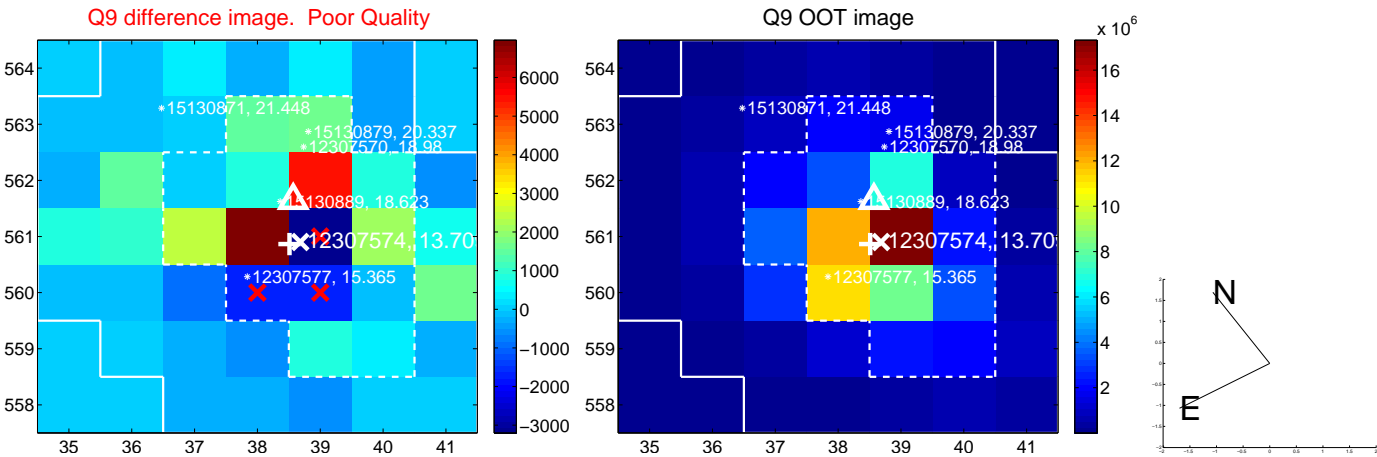


Q8 no OOT image

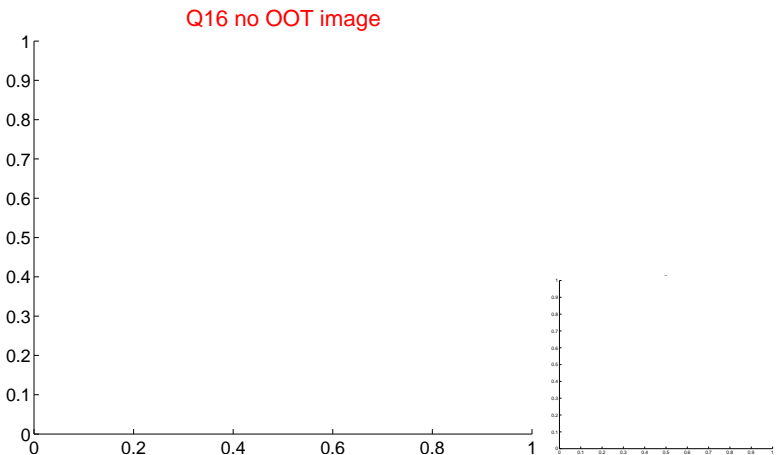
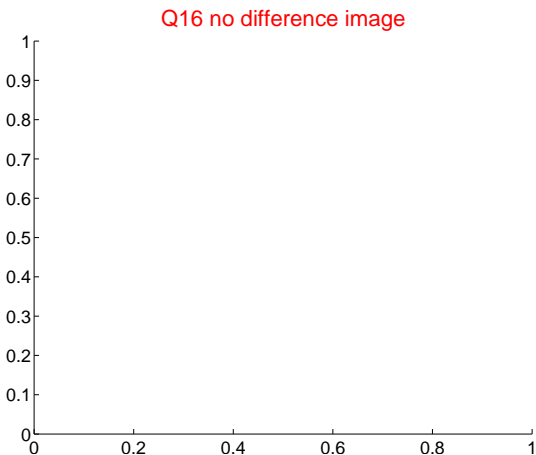
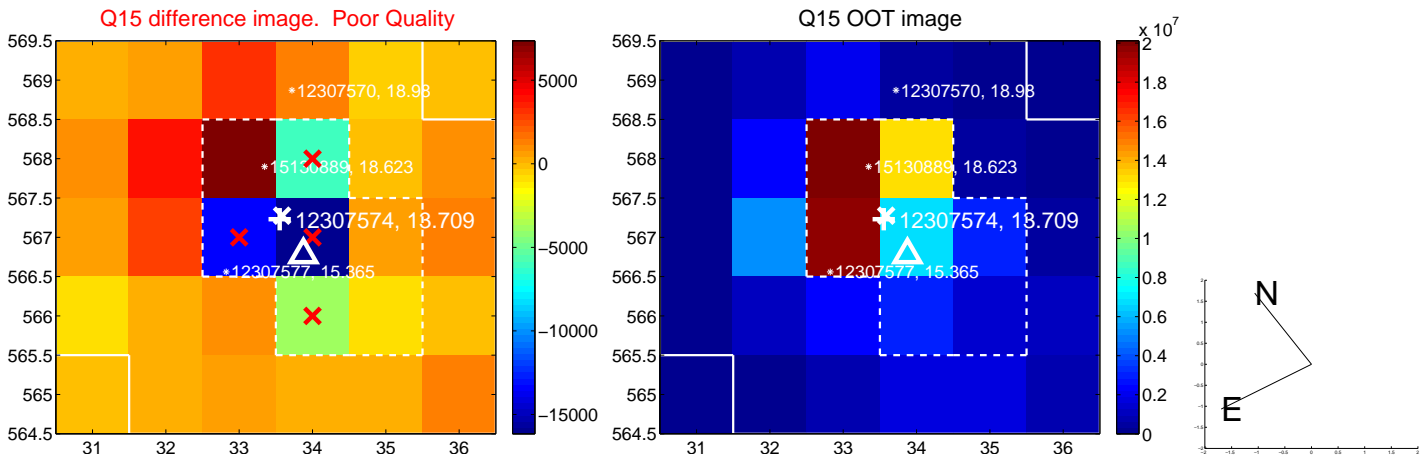
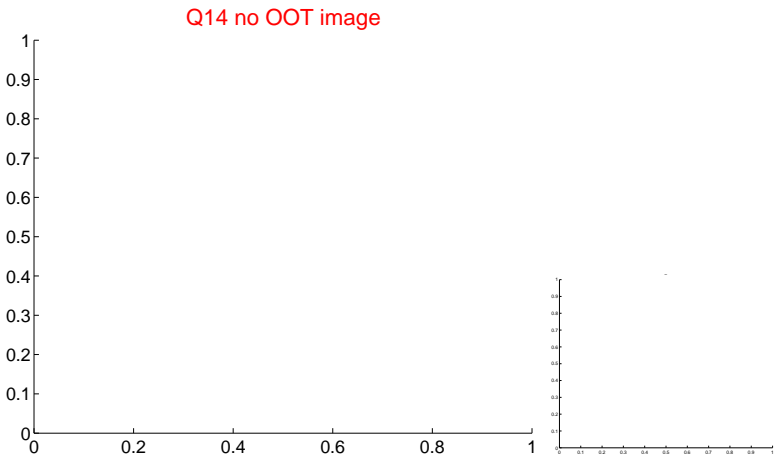
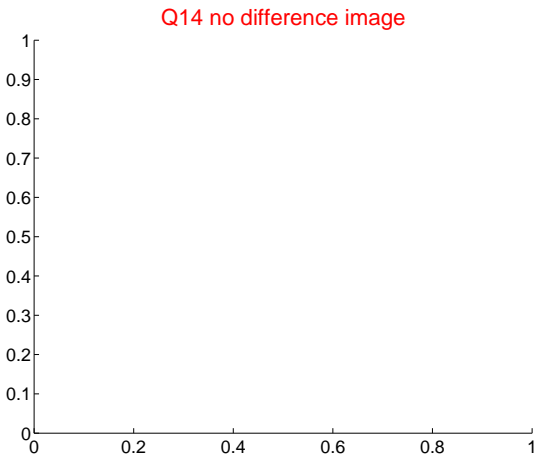
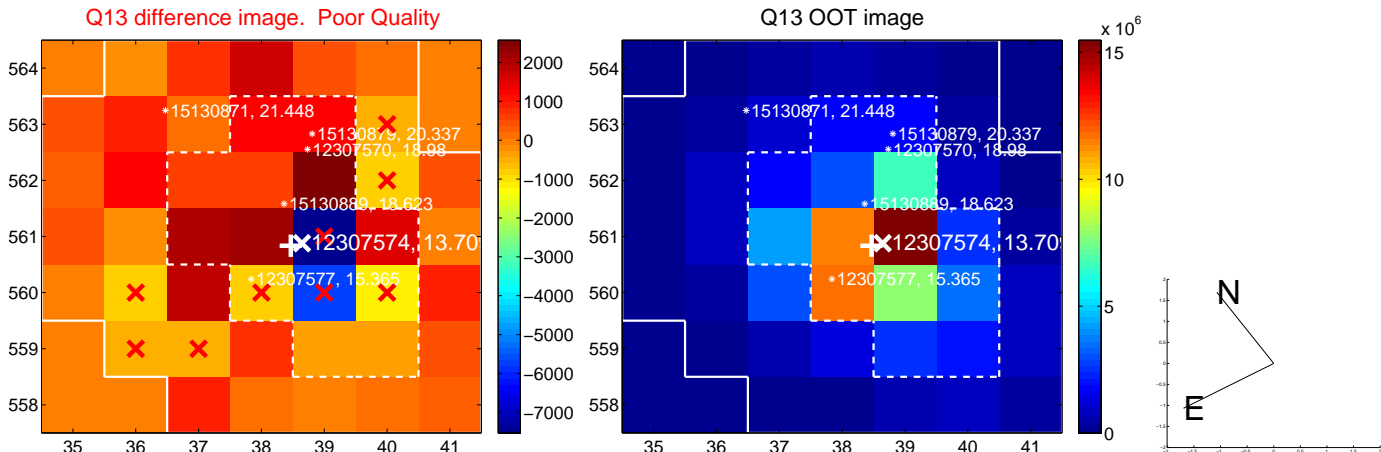




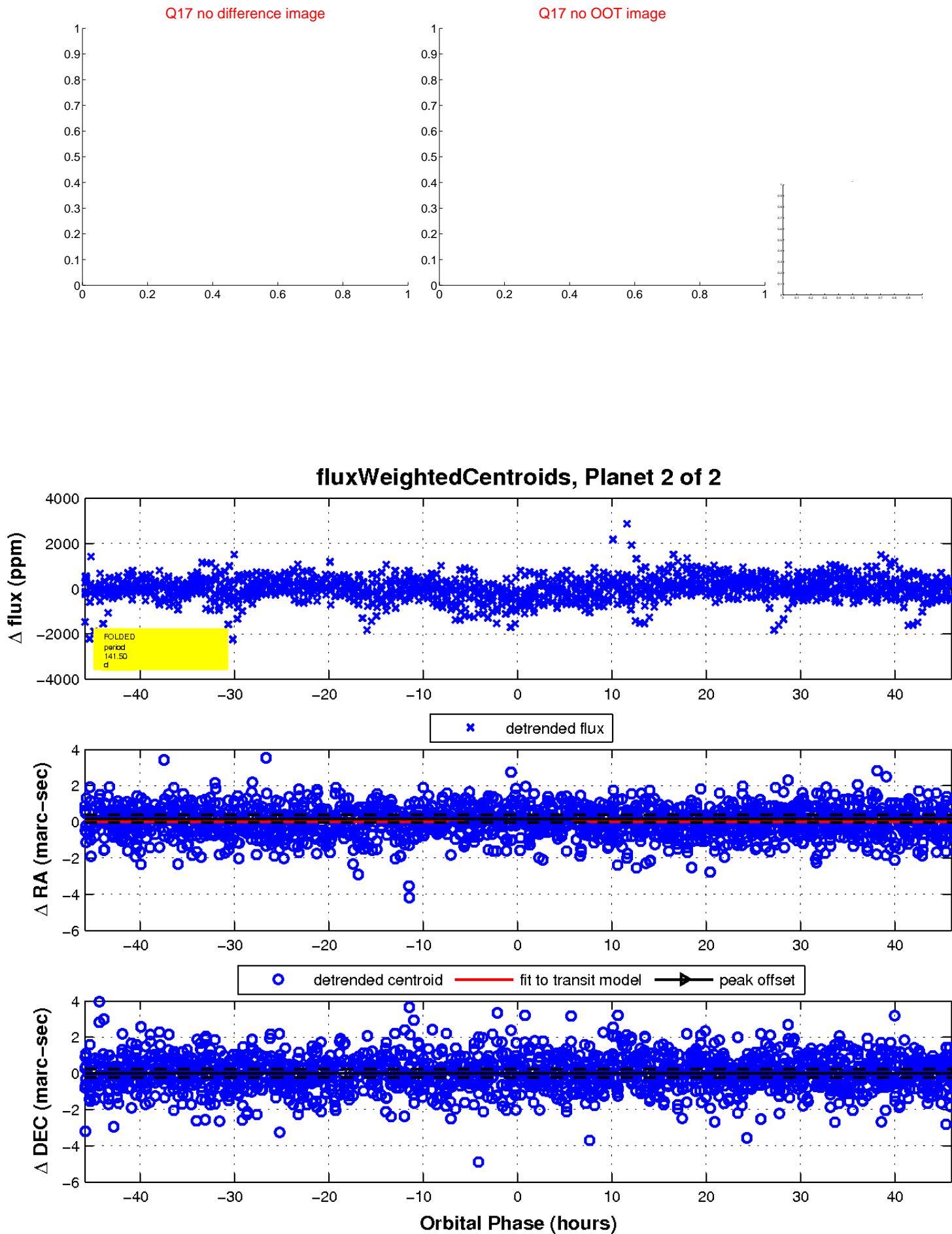
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

