

# KIC 002436635

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
002436635-01	OBS	No	1.169545	132.106283	327.3	3.191	9.9	10.6	0.69	4624	1.52	530.26
002436635-02	OBS	No	309.537210	426.080774	3345.9	10.473	9.3	5.1	0.69	4624	4.63	0.31

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
002436635-01	OBS	FP	0.00	1	0	1	0	SWEET_NTL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—CENT_FEW_DIFFS—HALO_GHOST
002436635-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS

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

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

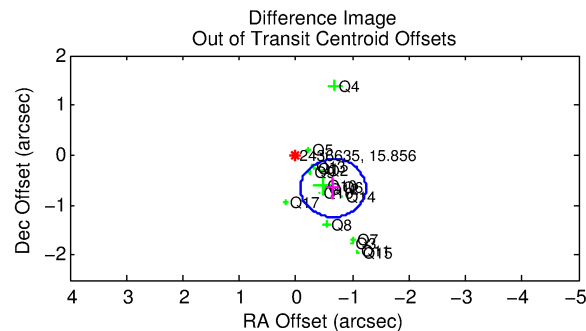
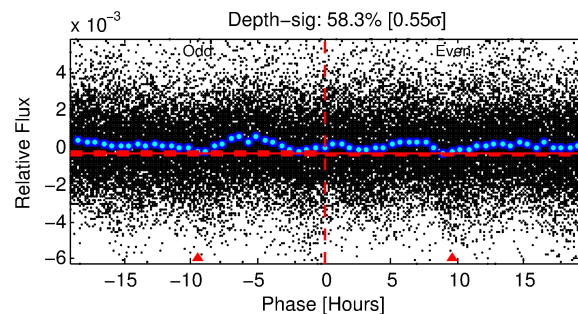
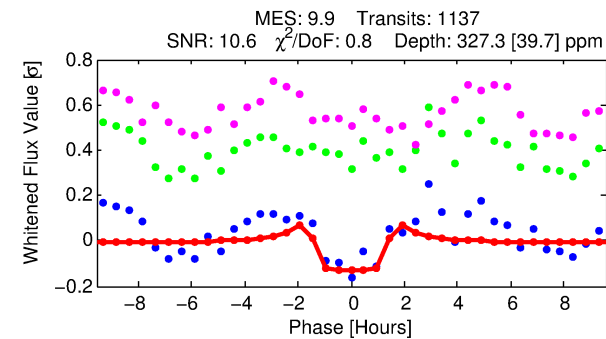
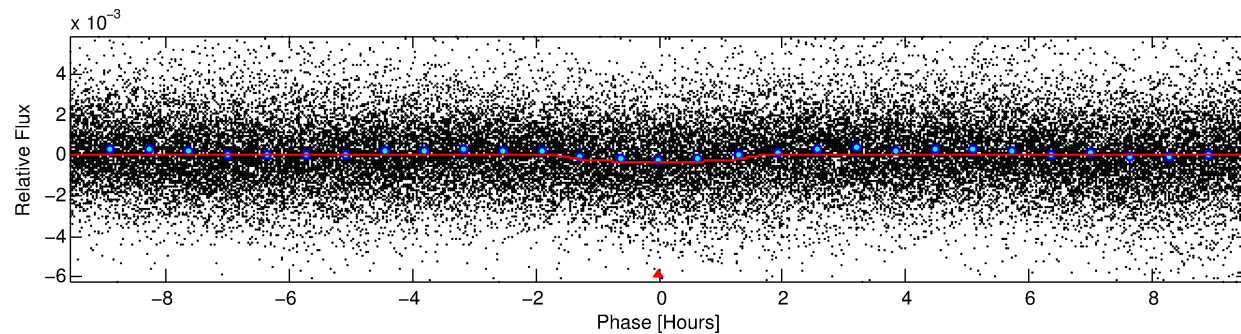
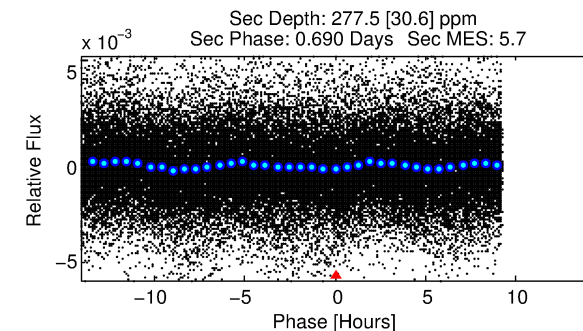
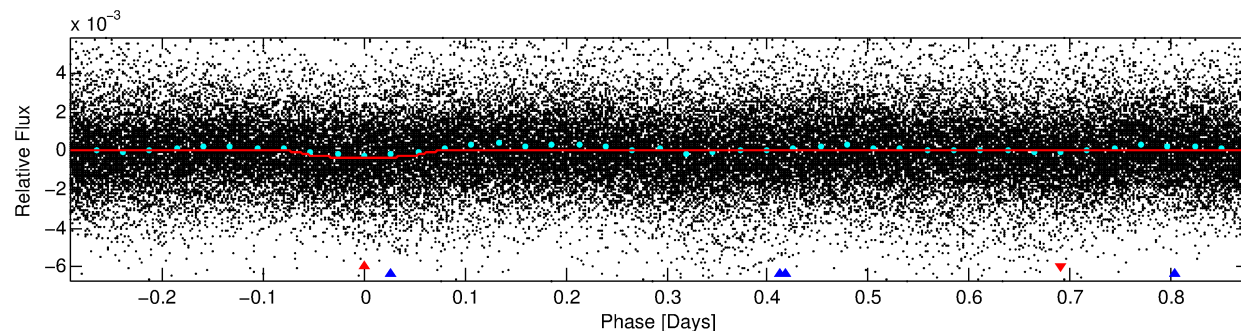
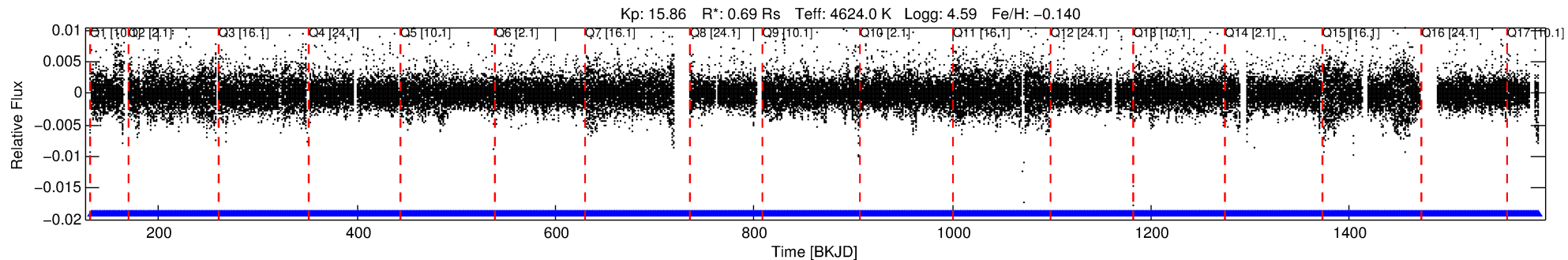
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 002436635-01

No Significant Match Found

# DV One-Page Summary

KIC: 2436635 Candidate: 1 of 2 Period: 1.170 d



## DV Fit Results:

Period = 1.16955 [0.00001] d  
Epoch = 132.1063 [0.0022] BKJD  
Rp/R\* = 0.0203 [0.0056]  
a/R\* = 1.66 [1.03]  
b = 0.90 [0.22]  
Seff = 530.26 [88.50]  
Teq = 1224 [51] K  
Rp = 1.52 [0.44] Re  
a = 0.0191 [0.0014] AU  
Ag = 24.05 [13.67] [1.69σ]  
Teffp = 4190 [601] K [4.92σ]

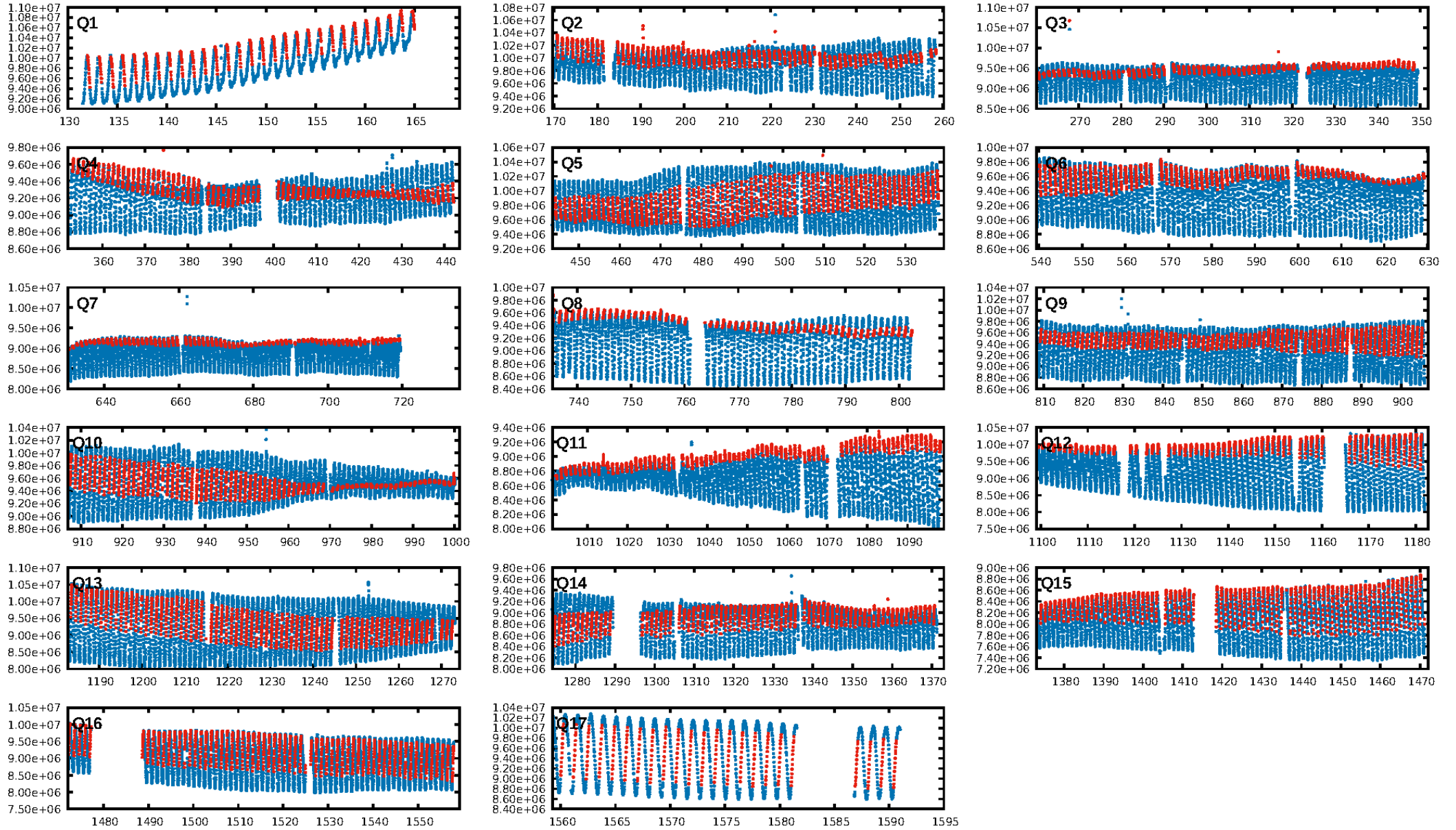
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [676.00σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 1.71e-18  
RollingBand-fgt: 1.00 [1085/1085]  
**GhostDiagnostic-chr: 0.1391**  
Centroid-sig: 0.0%  
Centroid-so: 2.233 arcsec [3.29σ]  
OotOffset-rm: 0.930 arcsec [4.82σ]  
KicOffset-rm: 0.114 arcsec [1.01σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.12 [2/17]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 09:18:05 Z

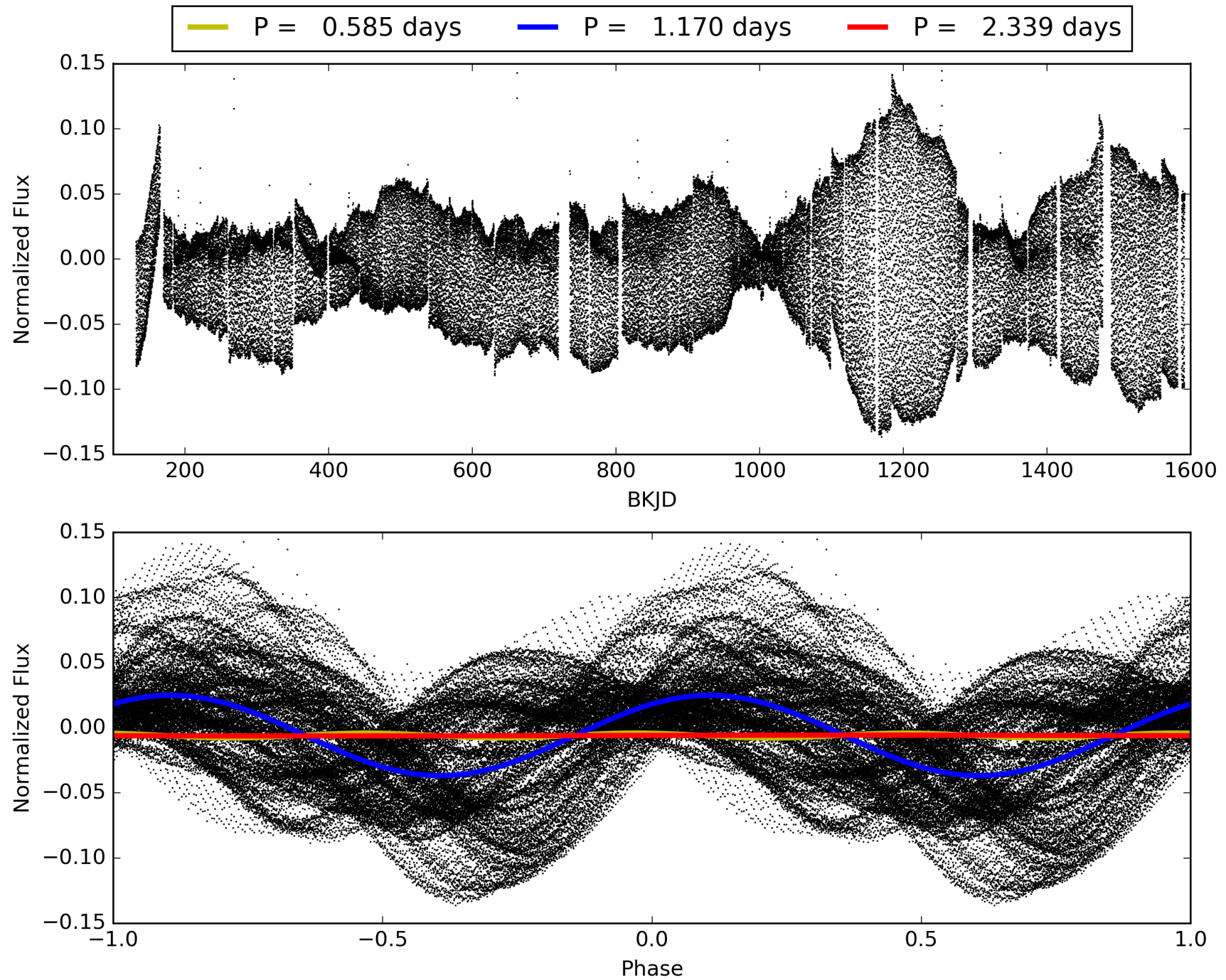
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 002436635-01, PDC Light Curves



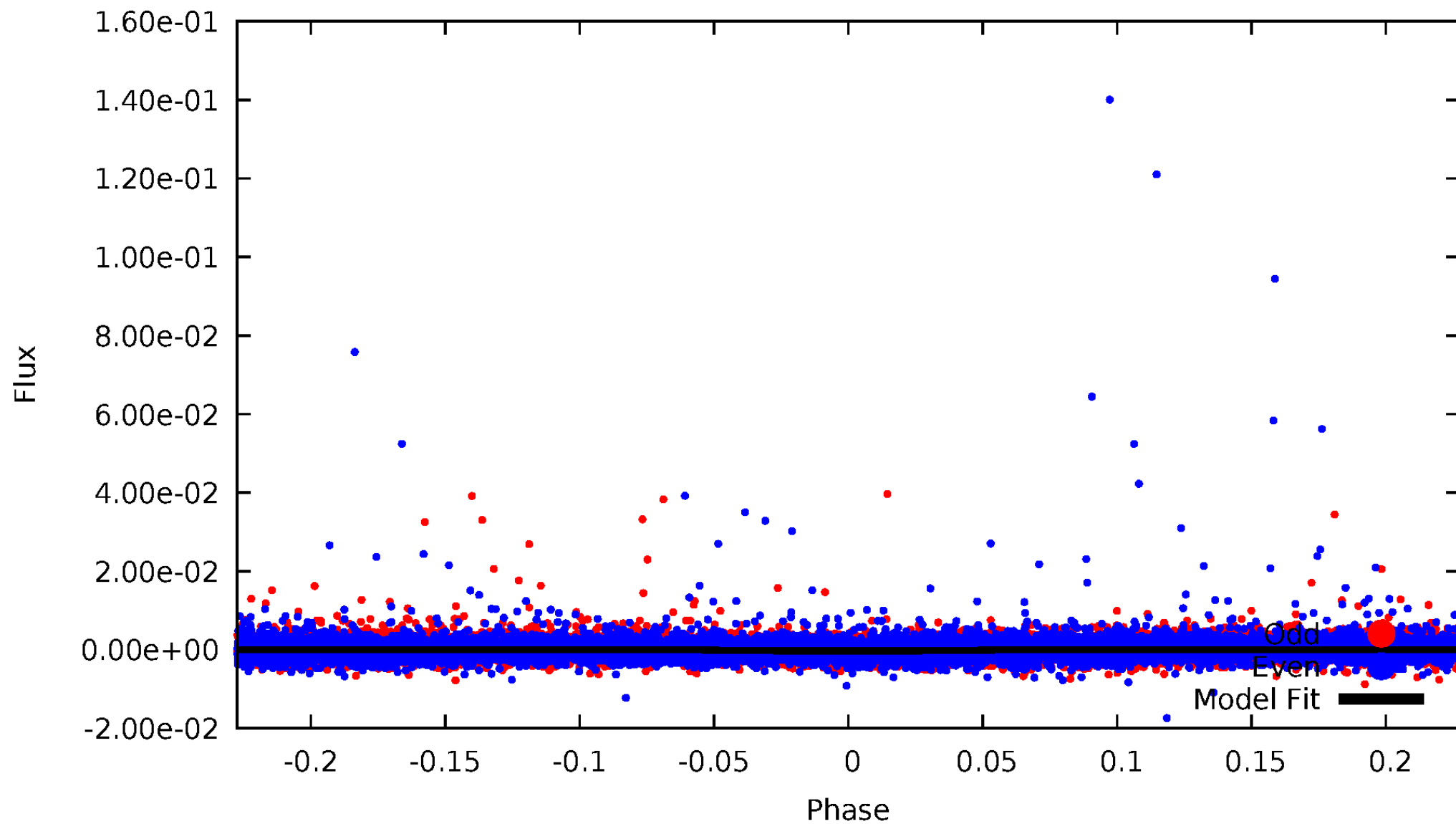


TCE 002436635-01



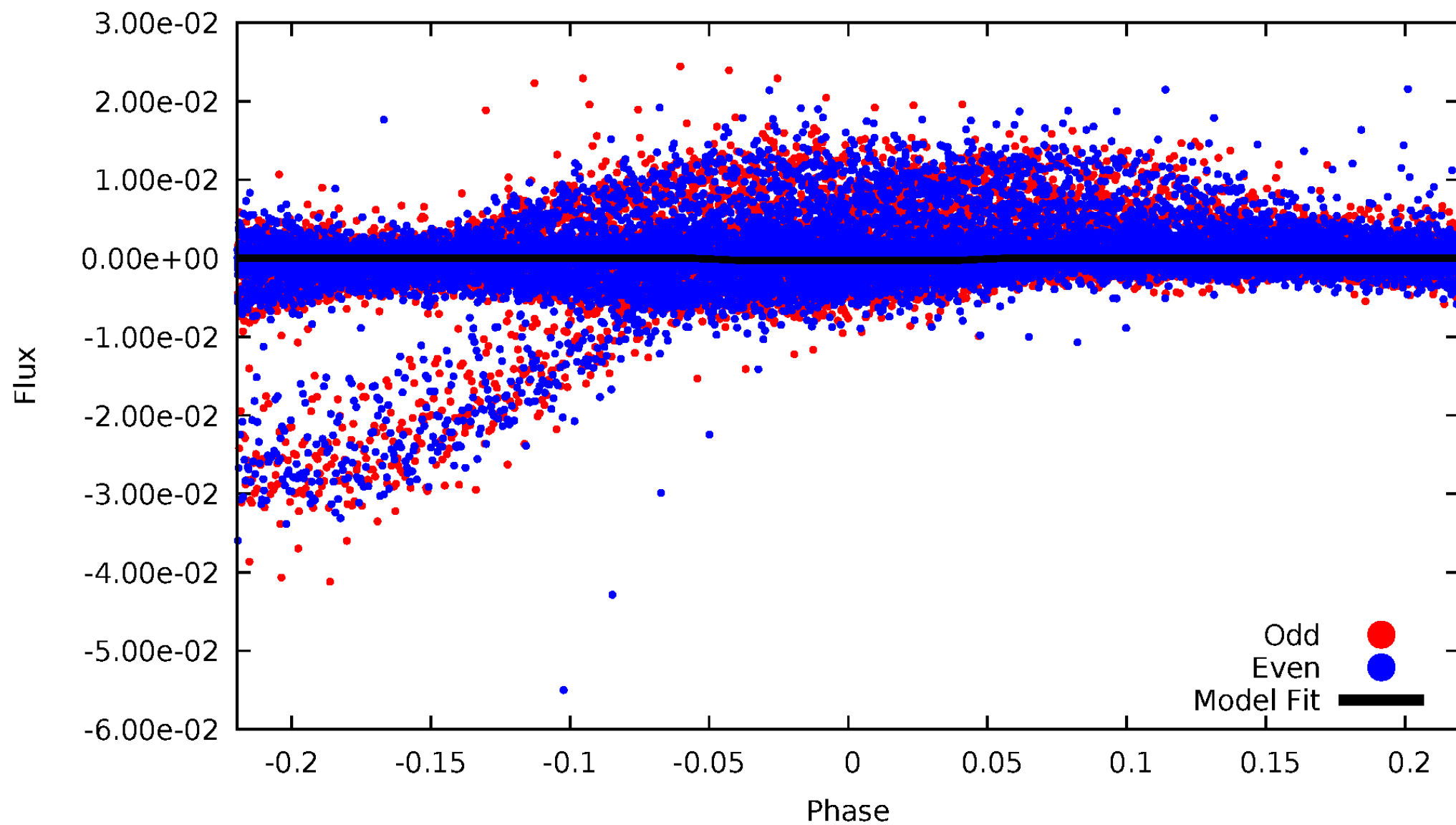
# DV Odd/Even

TCE 002436635-01

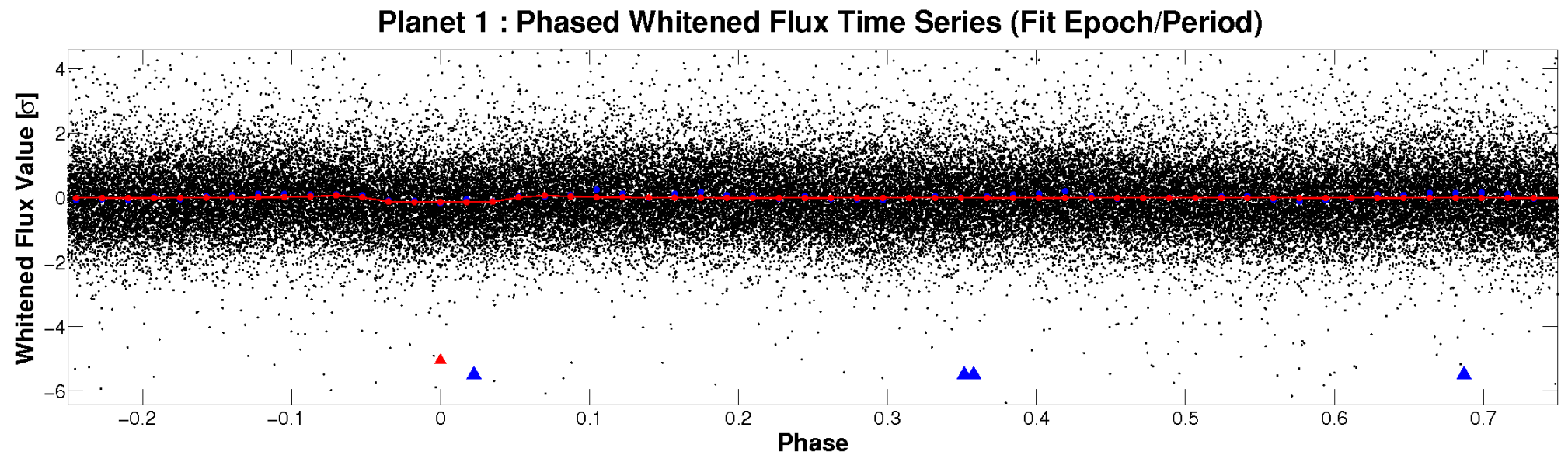
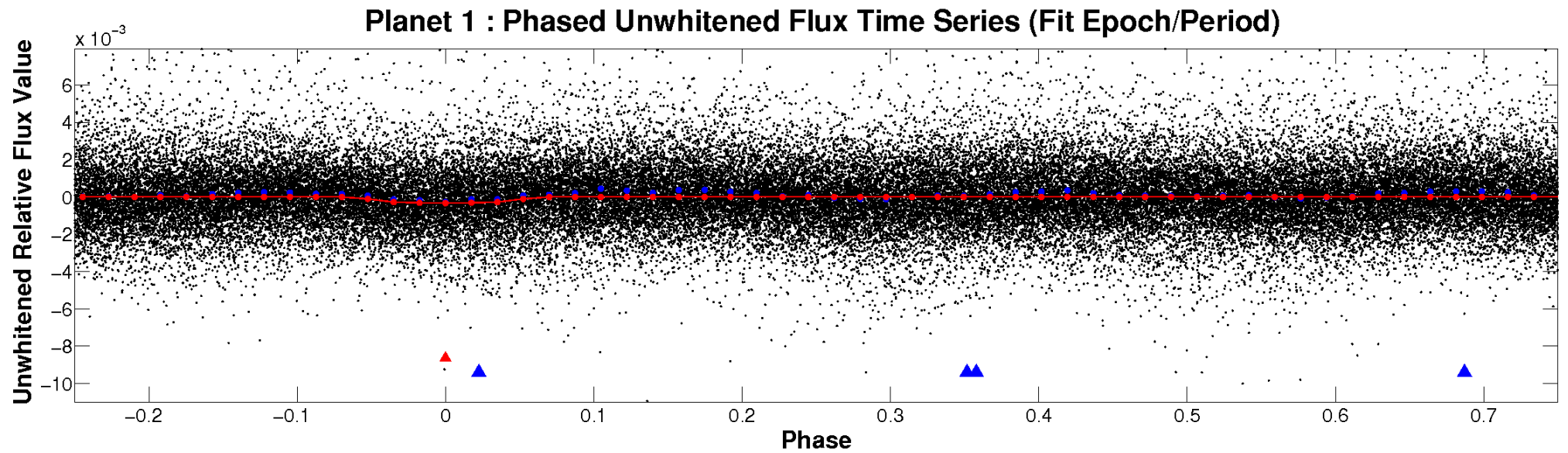


# ALT Odd/Even

TCE 002436635-01



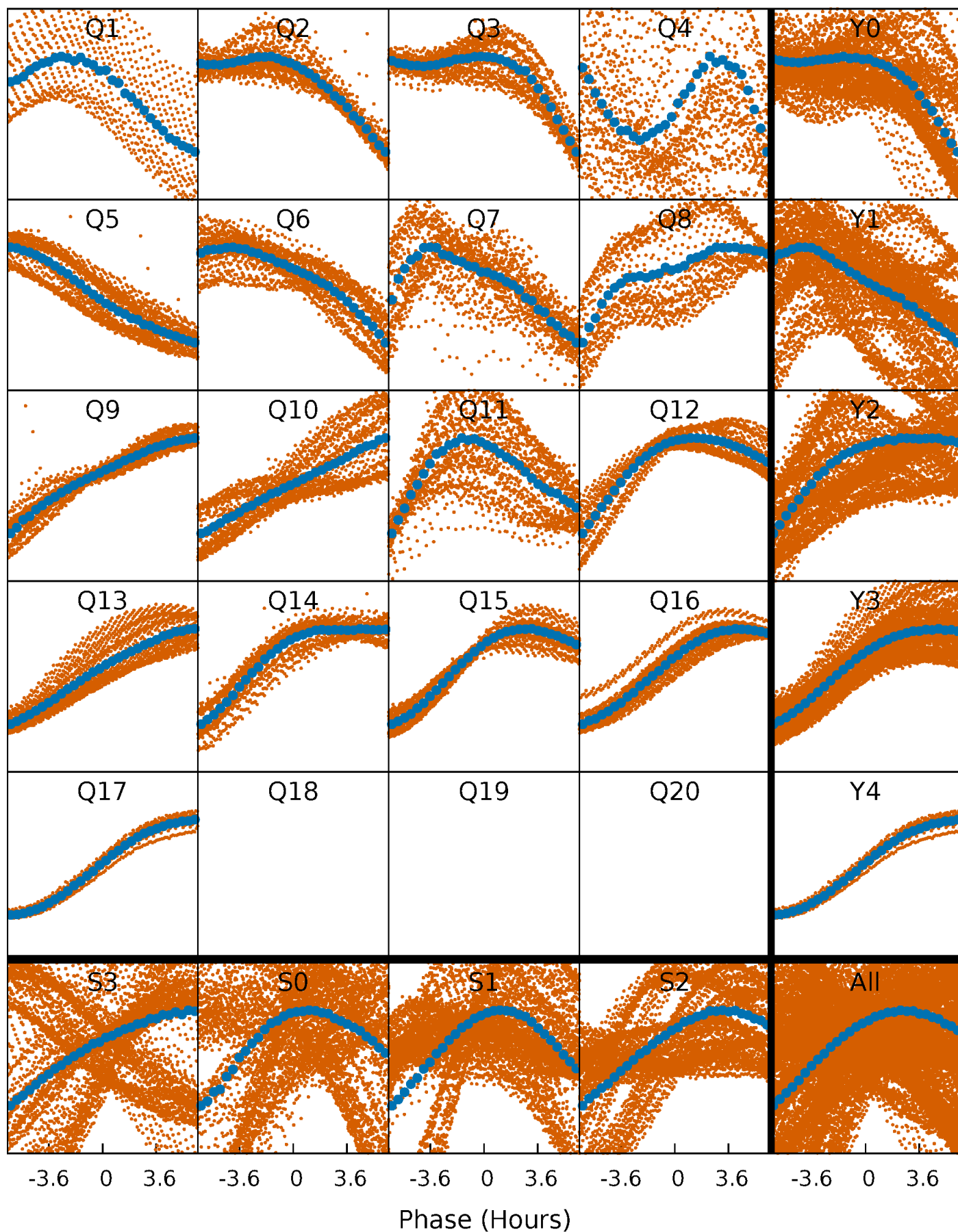
# Non-Whitened Vs. Whitened Light Curve





# PDC Quarter-Phased Transit Curves

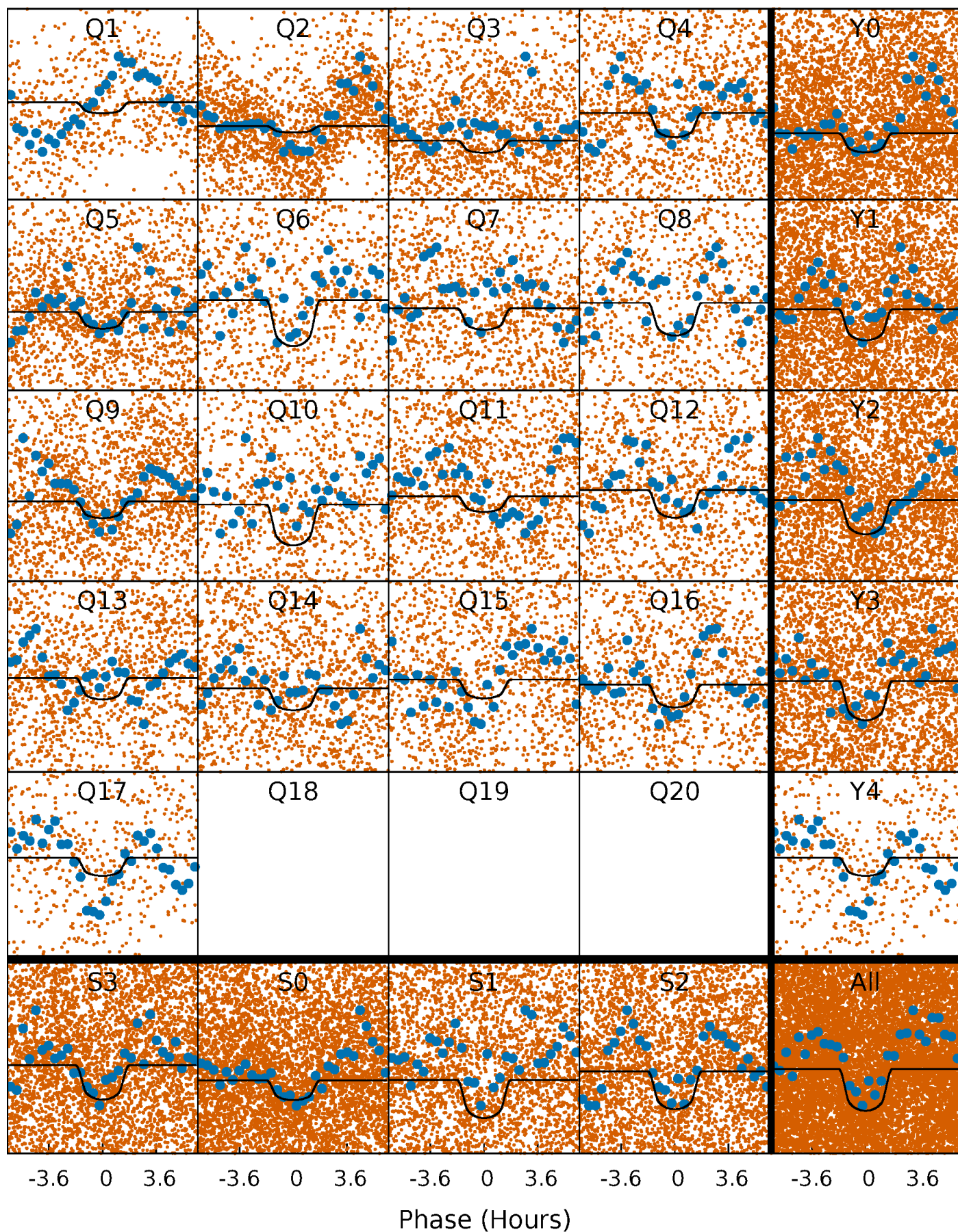
TCE 002436635-01   P= 1.169545 Days    $T_0=132.106283$  (BKJD)





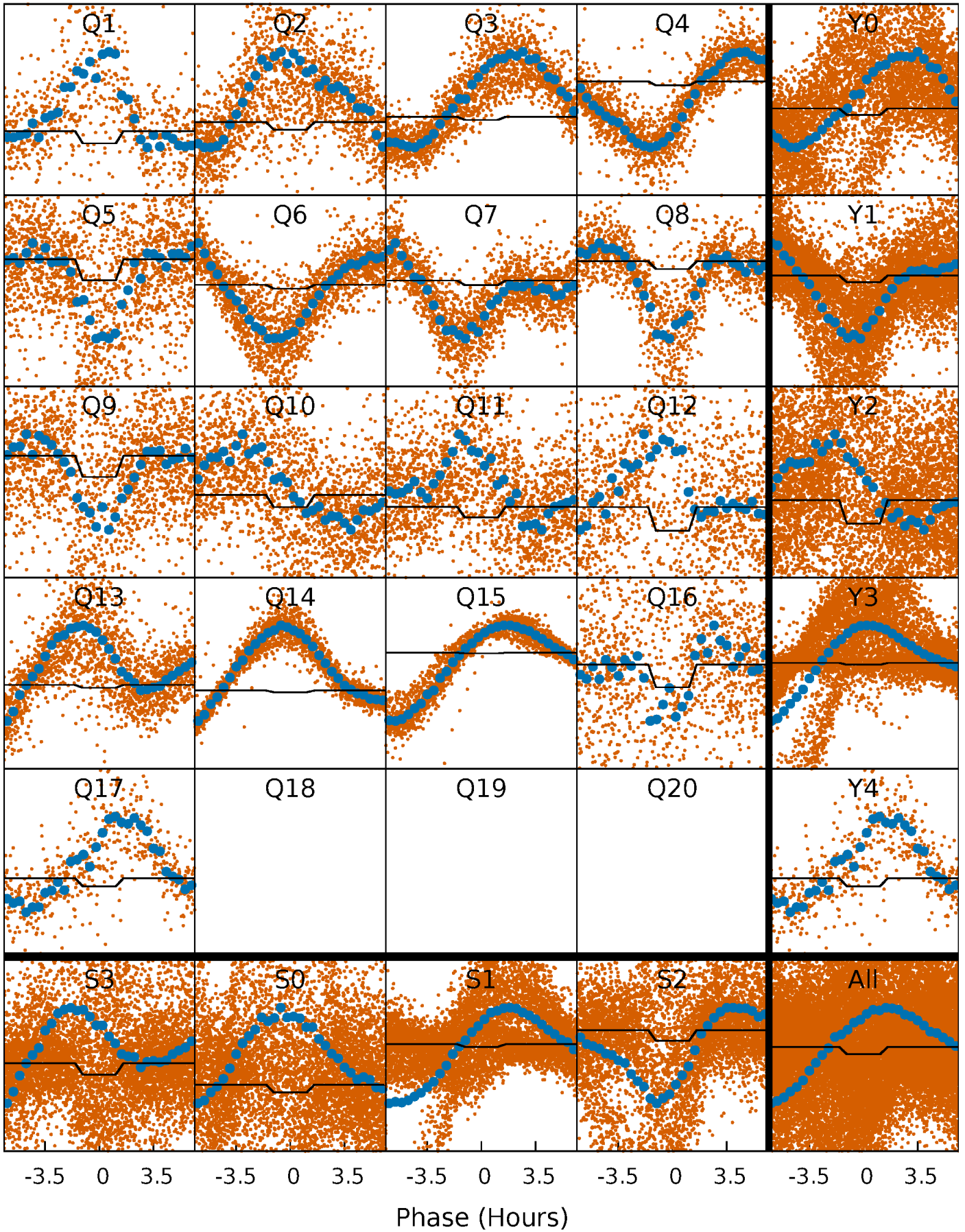
# DV Quarter-Phased Transit Curves

TCE 002436635-01 P= 1.169545 Days  $T_0=132.106283$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 002436635-01 P= 1.169537 Days  $T_0=132.110369$  (BKJD)

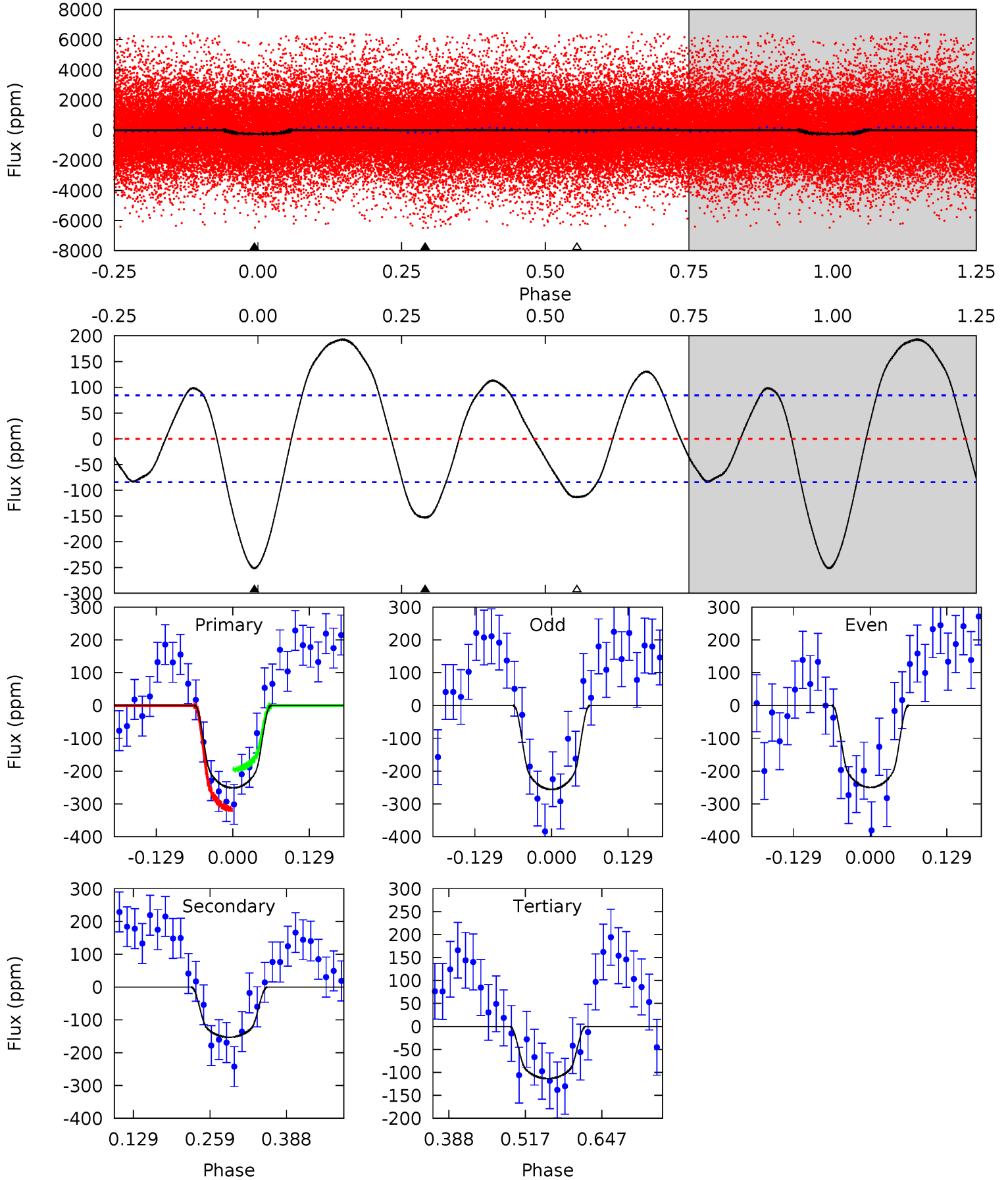




# DV Model-Shift Uniqueness Test

002436635-01, P = 1.169545 Days, E = 130.936738 Days

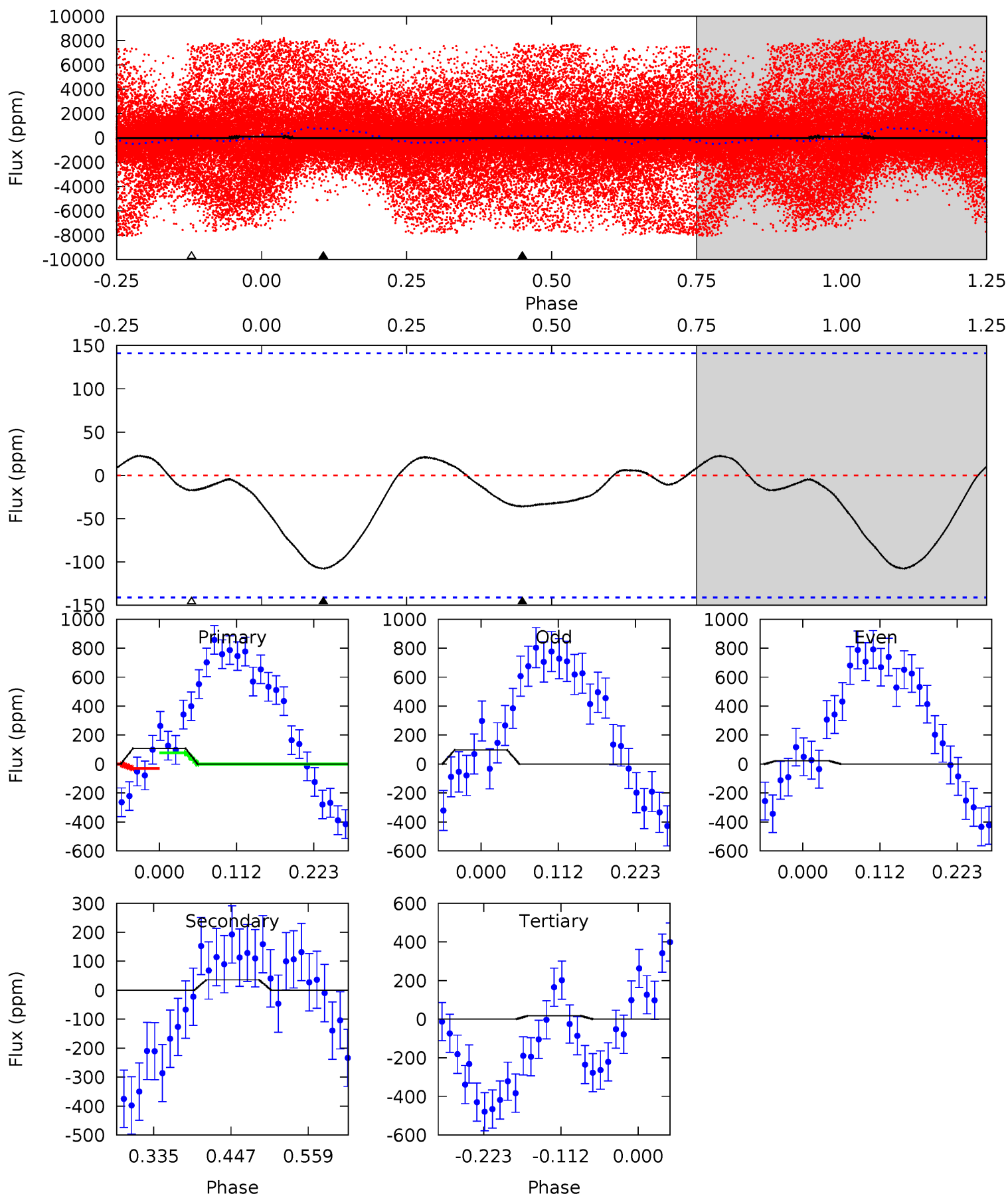
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
13.5	8.19	6.08	0	4.51	1.52	4.79	7.38	13.5	2.11	8.19	0.16	0.78	0.43	3.28



# Alt Model-Shift Uniqueness Test

002436635-01, P = 1.169537 Days, E = 130.940832 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
3.46	1.15	0.56	0	4.54	1.59	0.43	2.91	3.46	0.60	1.15	1.23	4.85	0.17	0.75





### Stellar Parameters For KIC 002436635

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (g \cdot \text{cm}^{-3})$
	$4624^{+151}_{-151}$	$4.595^{+0.056}_{-0.028}$	$-0.140^{+0.300}_{-0.300}$	$0.686^{+0.054}_{-0.060}$	$0.677^{+0.075}_{-0.054}$	$2.954^{+0.668}_{-0.360}$
	+3%/-3%	+1%/-1%	+214%/-214%	+8%/-9%	+11%/-8%	+23%/-12%
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 002436635-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-153 \pm 19$	$1.52^{+0.42}_{-0.42}$	$1698^{+63}_{-64}$	$3823^{+514}_{-308}$	$13^{+12}_{-5}$
Alt.	$-36 \pm 31$	$1.26^{+0.45}_{-0.41}$	$1703^{+59}_{-60}$	$3144^{+652}_{-931}$	$4.197^{+7.795}_{-3.680}$

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

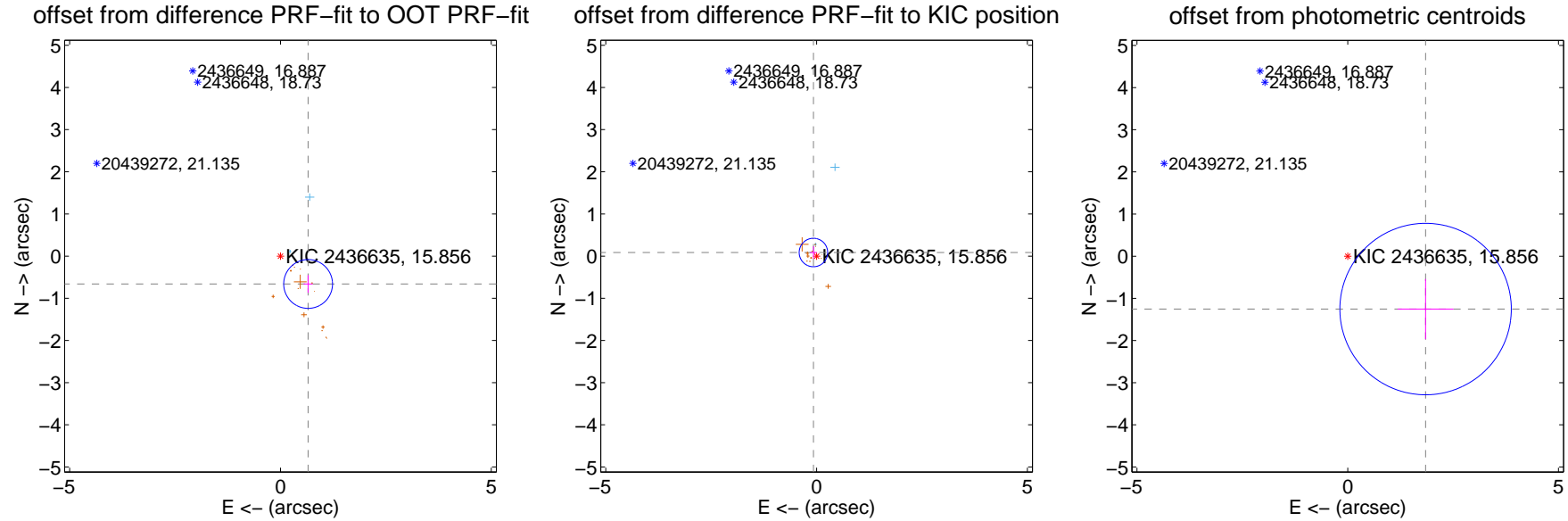
## DV Centroid Data

Supplemental centroid analysis for 002436635-01. Kepler magnitude: 15.86. Transit SNR 10.59

There are 2 quarters with good PRF difference image offsets

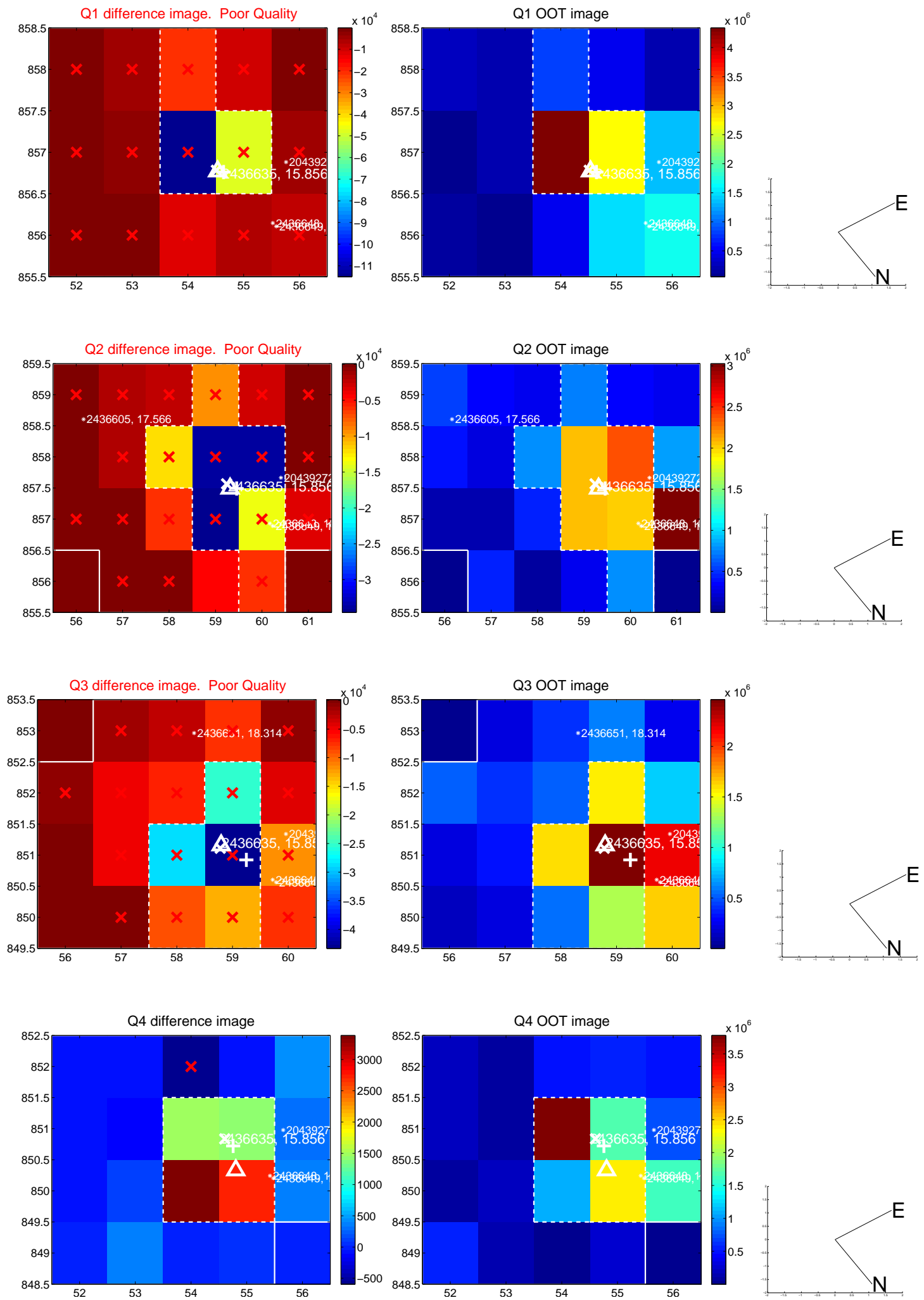
The direct PRF centroid is offset from the target star catalog position by about 0.96 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.930 \pm 0.193$	4.82	$-0.656 \pm 0.108$	$-0.660 \pm 0.208$
PRF-fit source offset from KIC position	$0.114 \pm 0.113$	1.01	$0.075 \pm 0.082$	$0.086 \pm 0.147$
photometric centroid source offset	$2.23 \pm 0.68$	3.29	$-1.85 \pm 0.66$	$-1.25 \pm 0.71$

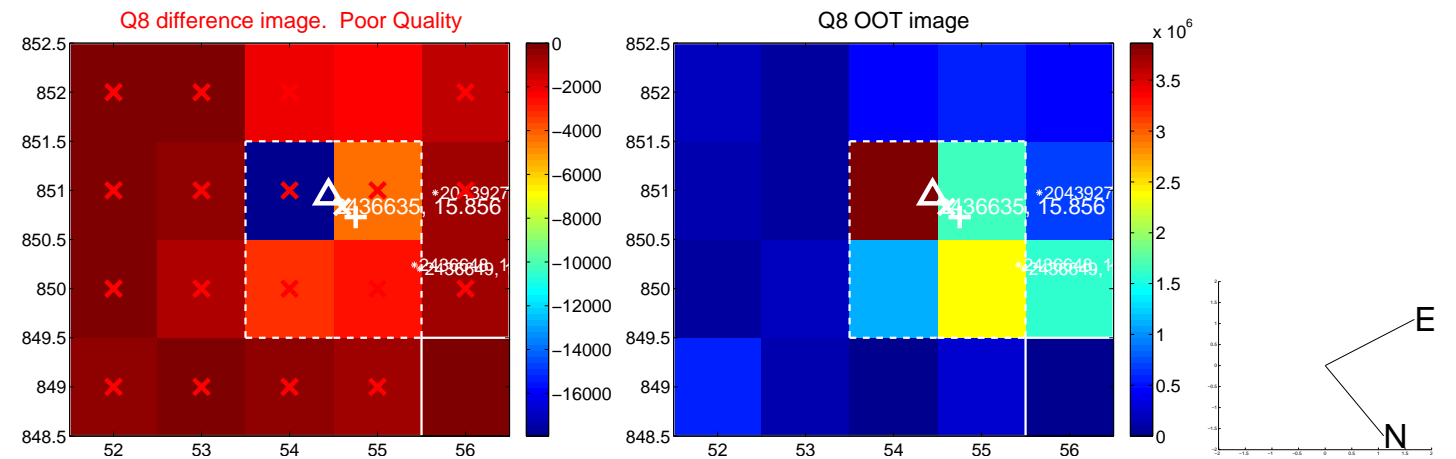
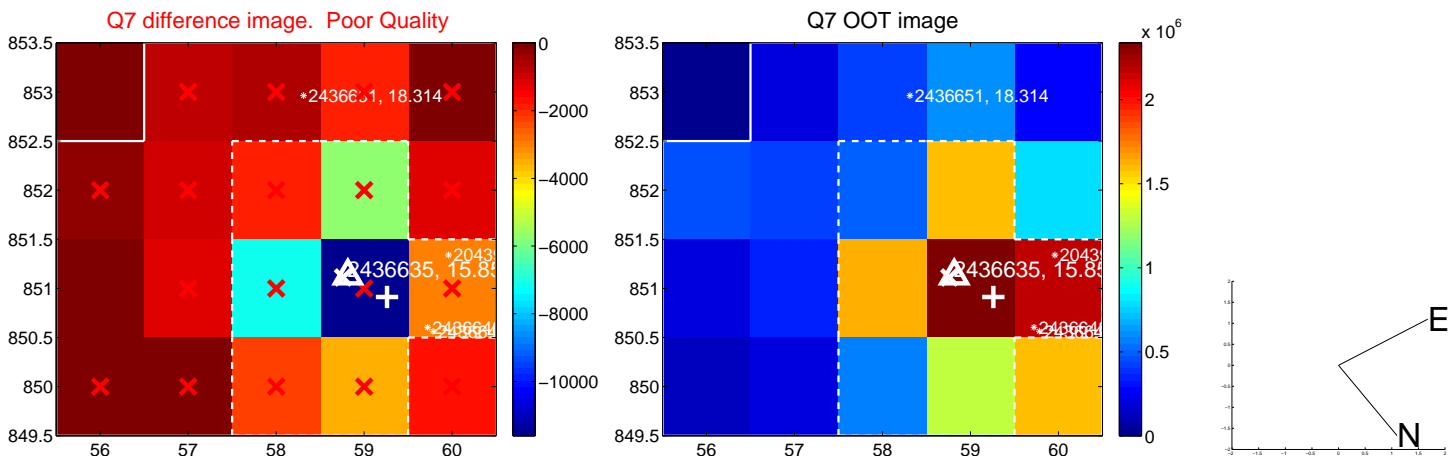
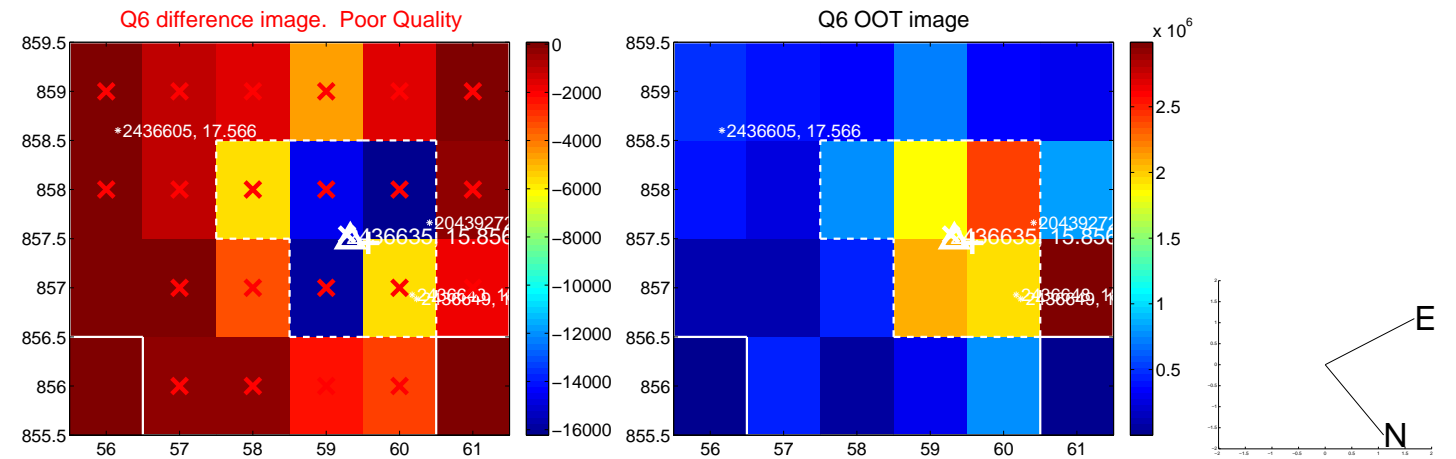
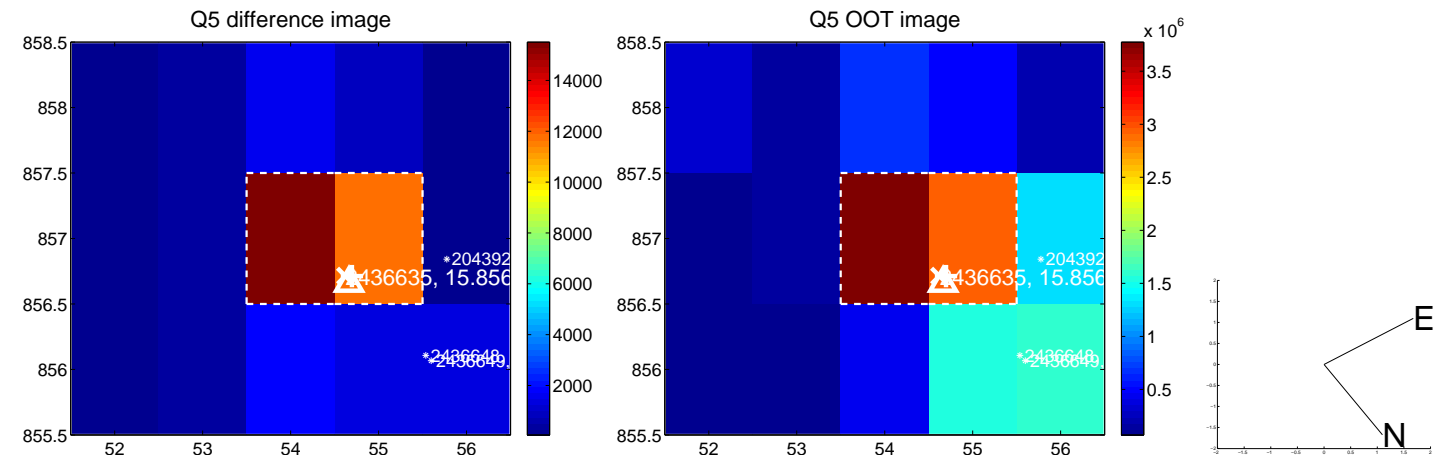


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

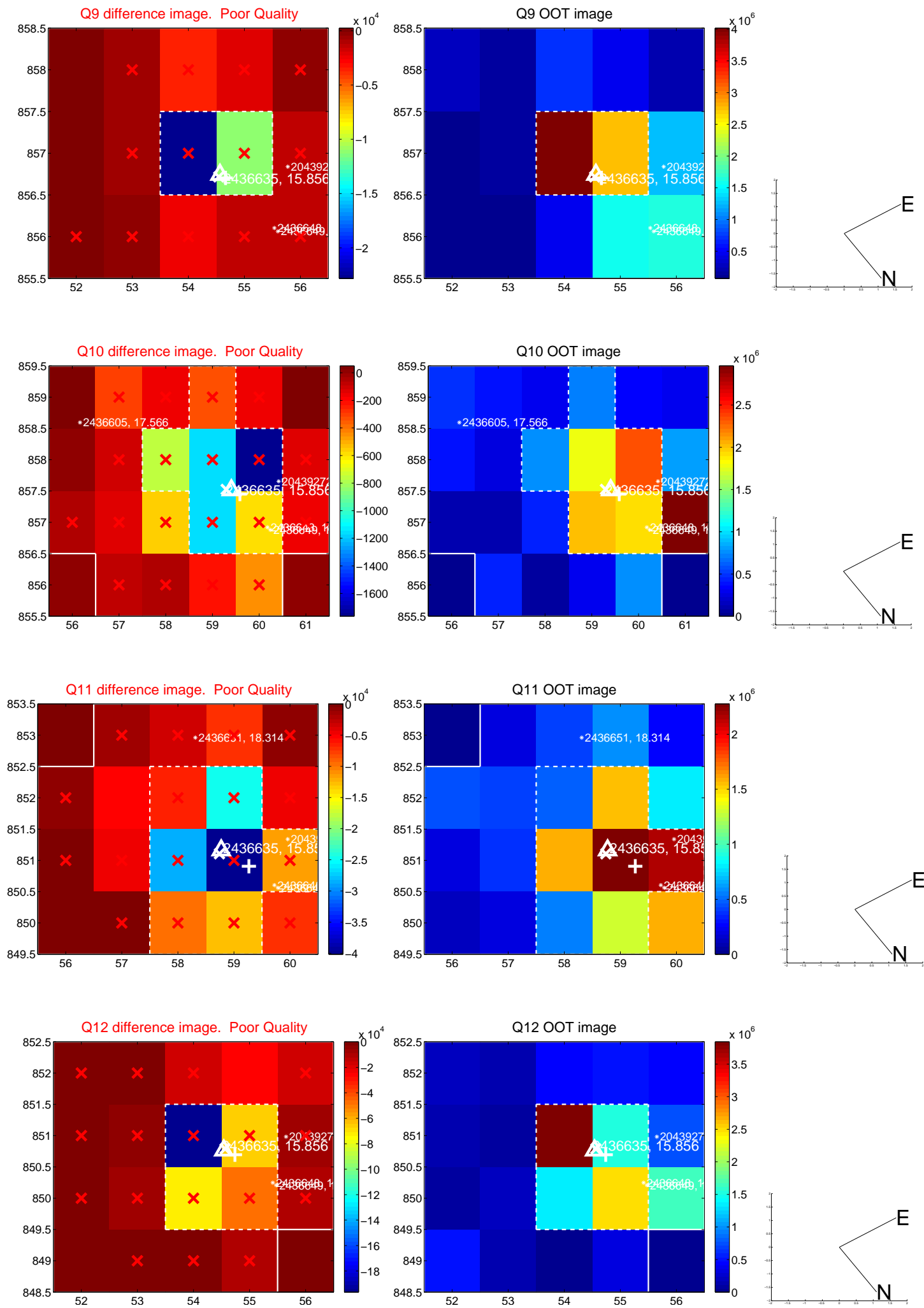


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

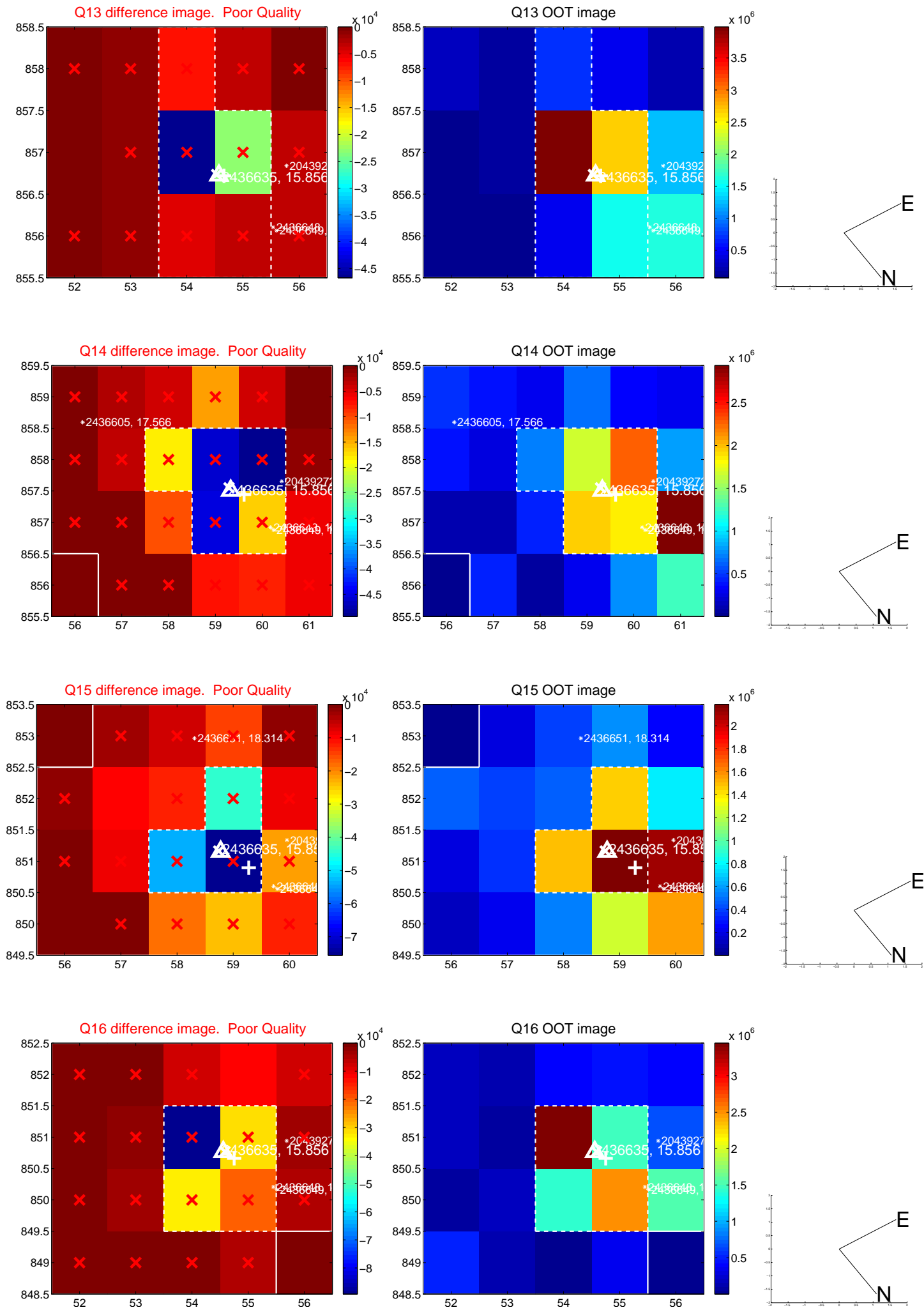




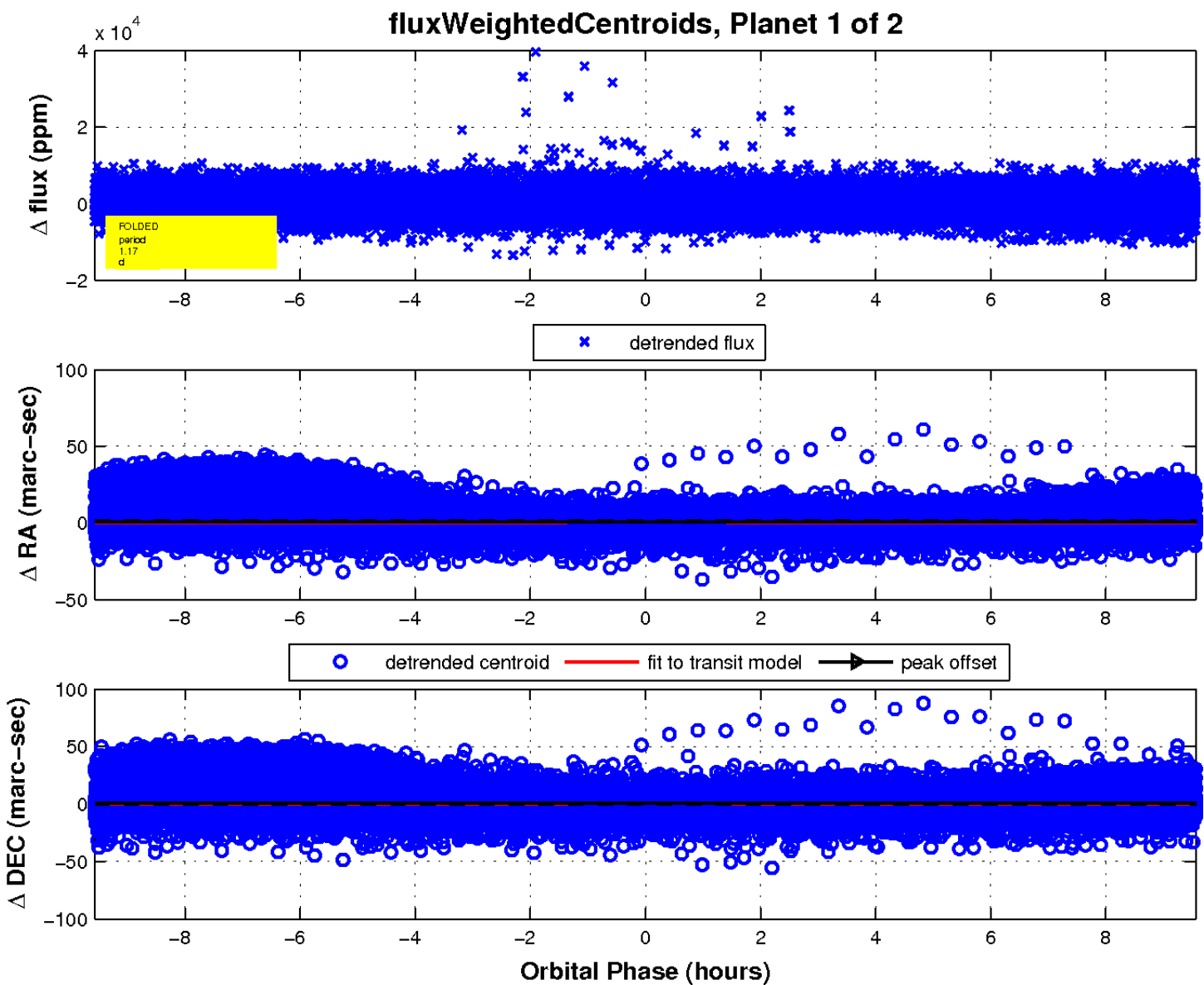
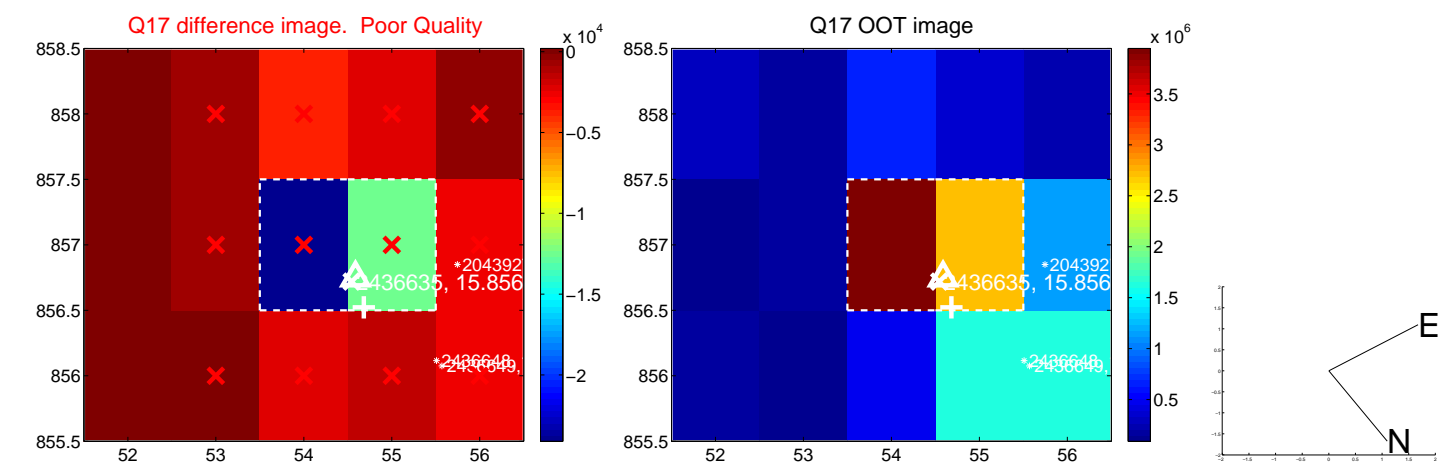
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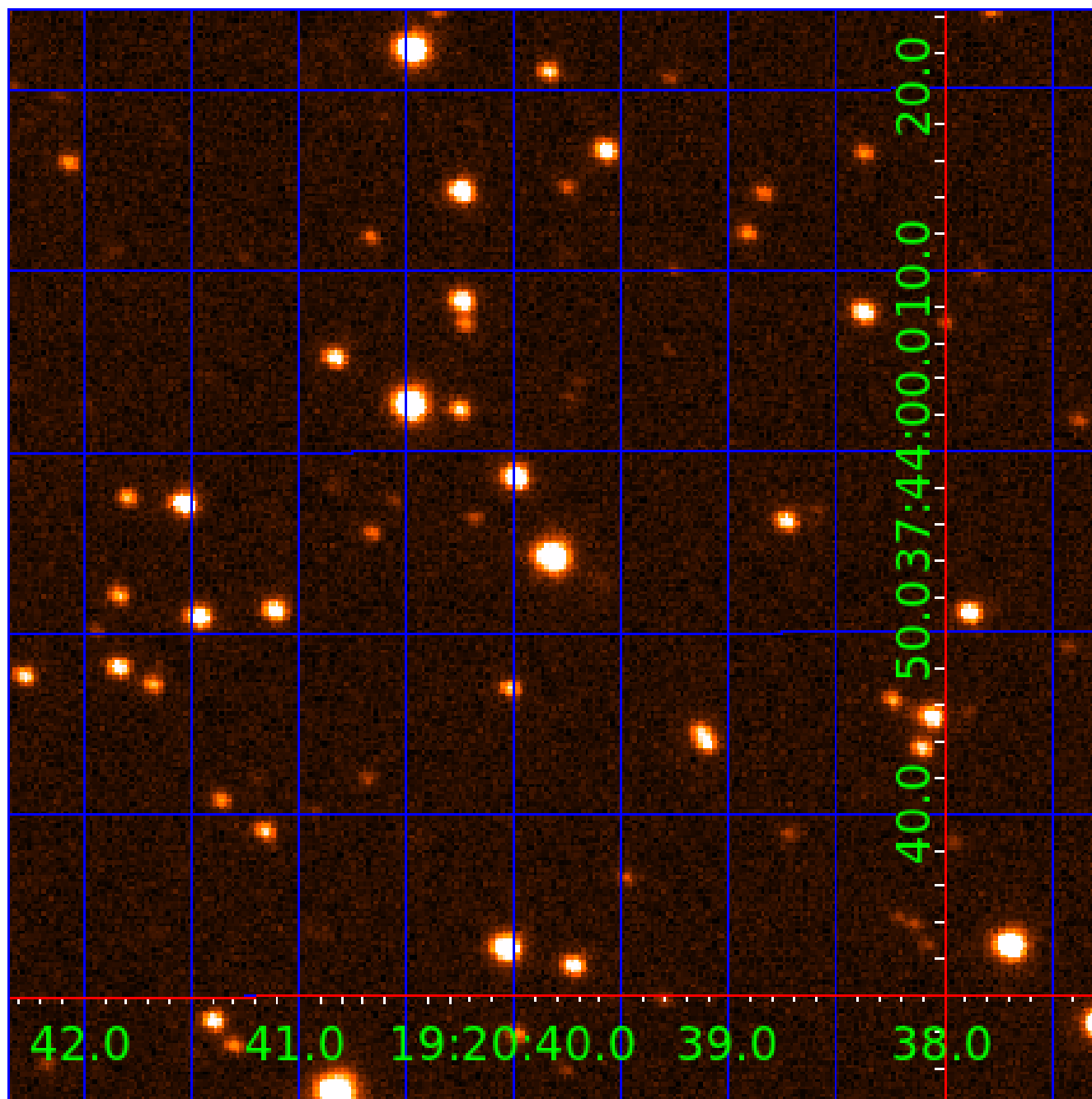


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 002436635

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
002436635-01	OBS	No	1.169545	132.106283	327.3	3.191	9.9	10.6	0.69	4624	1.52	530.26
002436635-02	OBS	No	309.537210	426.080774	3345.9	10.473	9.3	5.1	0.69	4624	4.63	0.31

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
002436635-01	OBS	FP	0.00	1	0	1	0	SWEET_NTL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—CENT_FEW_DIFFS—HALO_GHOST
002436635-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS

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

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

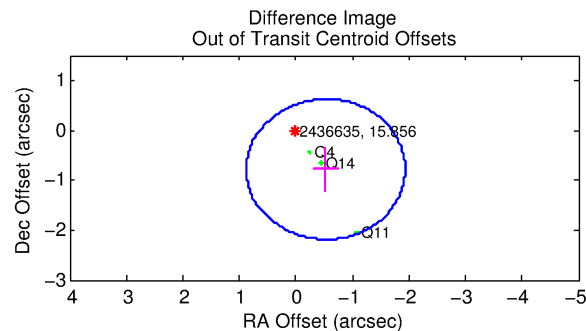
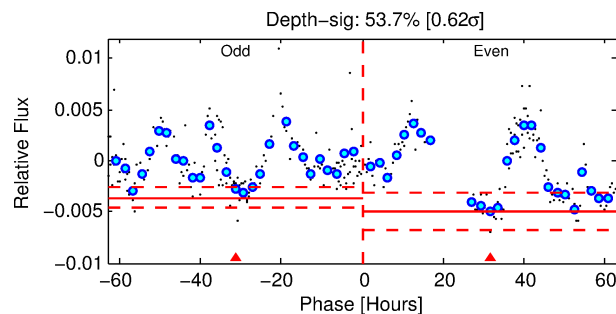
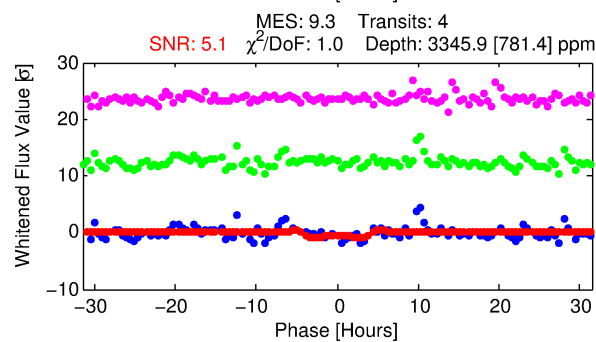
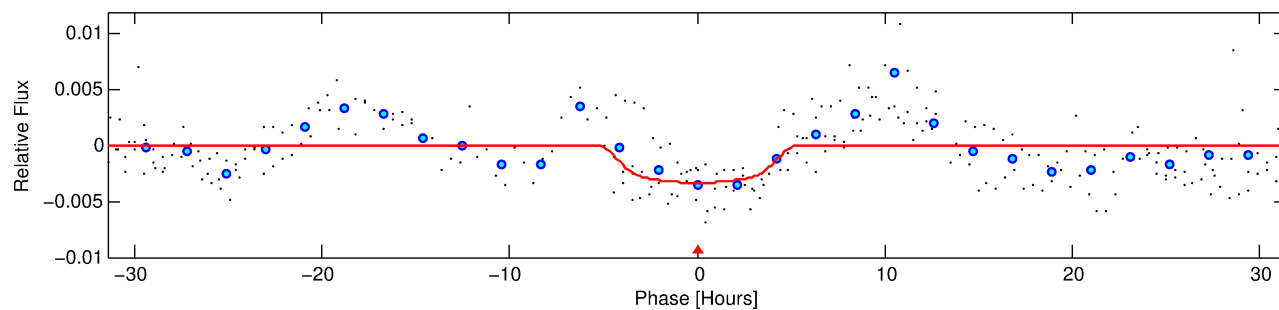
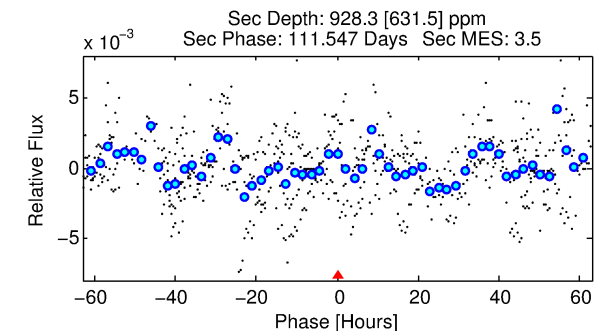
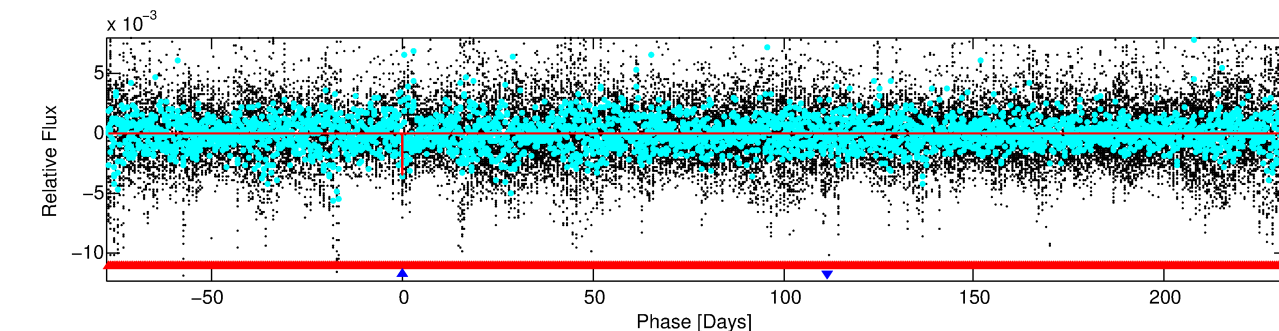
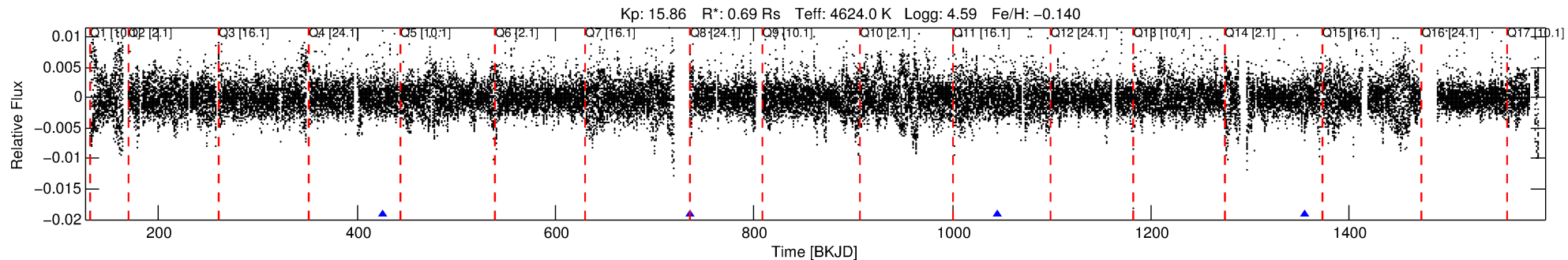
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 002436635-02

No Significant Match Found

# DV One-Page Summary

KIC: 2436635 Candidate: 2 of 2 Period: 309.537 d



## DV Fit Results:

Period = 309.53721 [0.01070] d  
Epoch = 426.0808 [0.0206] BKJD  
Rp/R\* = 0.0618 [0.0103]  
a/R\* = 144.88 [47.86]  
b = 0.85 [0.12]  
Seff = 0.31 [0.05]  
Teq = 191 [8] K  
Rp = 4.63 [0.87] Re  
a = 0.7859 [0.0569] AU  
Ag = 14737.09 [11266.19] [1.31σ]  
Teff = 3247 [624] K [4.90σ]

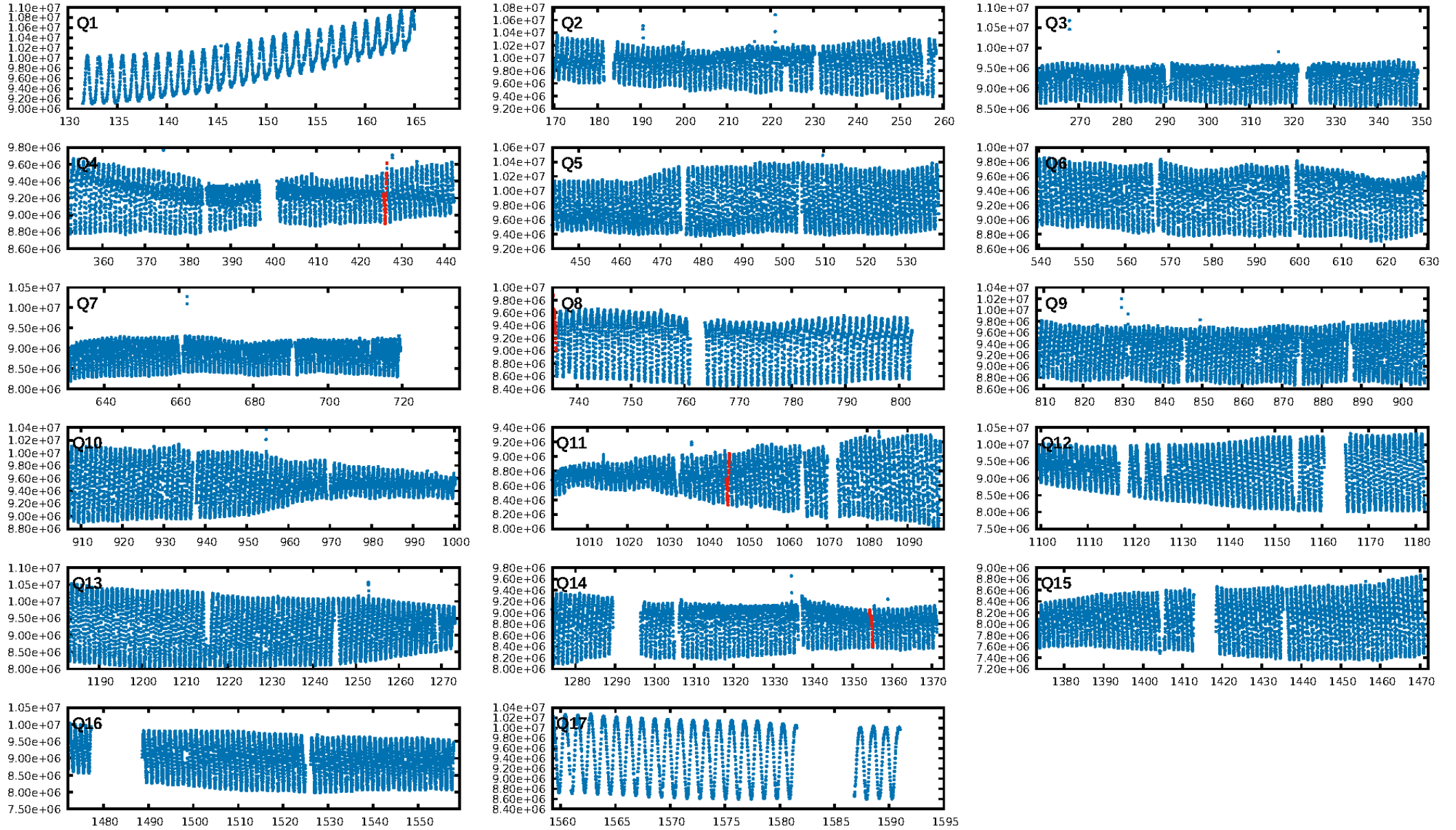
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [676.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 54.4%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 1.63e-12**  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: 1.407  
Centroid-sig: 45.0%  
Centroid-so: 1.311 arcsec [1.25σ]  
OotOffset-rm: 0.943 arcsec [2.01σ]  
KicOffset-rm: 0.098 arcsec [0.73σ]  
OotOffset-st: 1/1/1/0 [3]  
KicOffset-st: 1/1/1/0 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 0.00 [0/3]

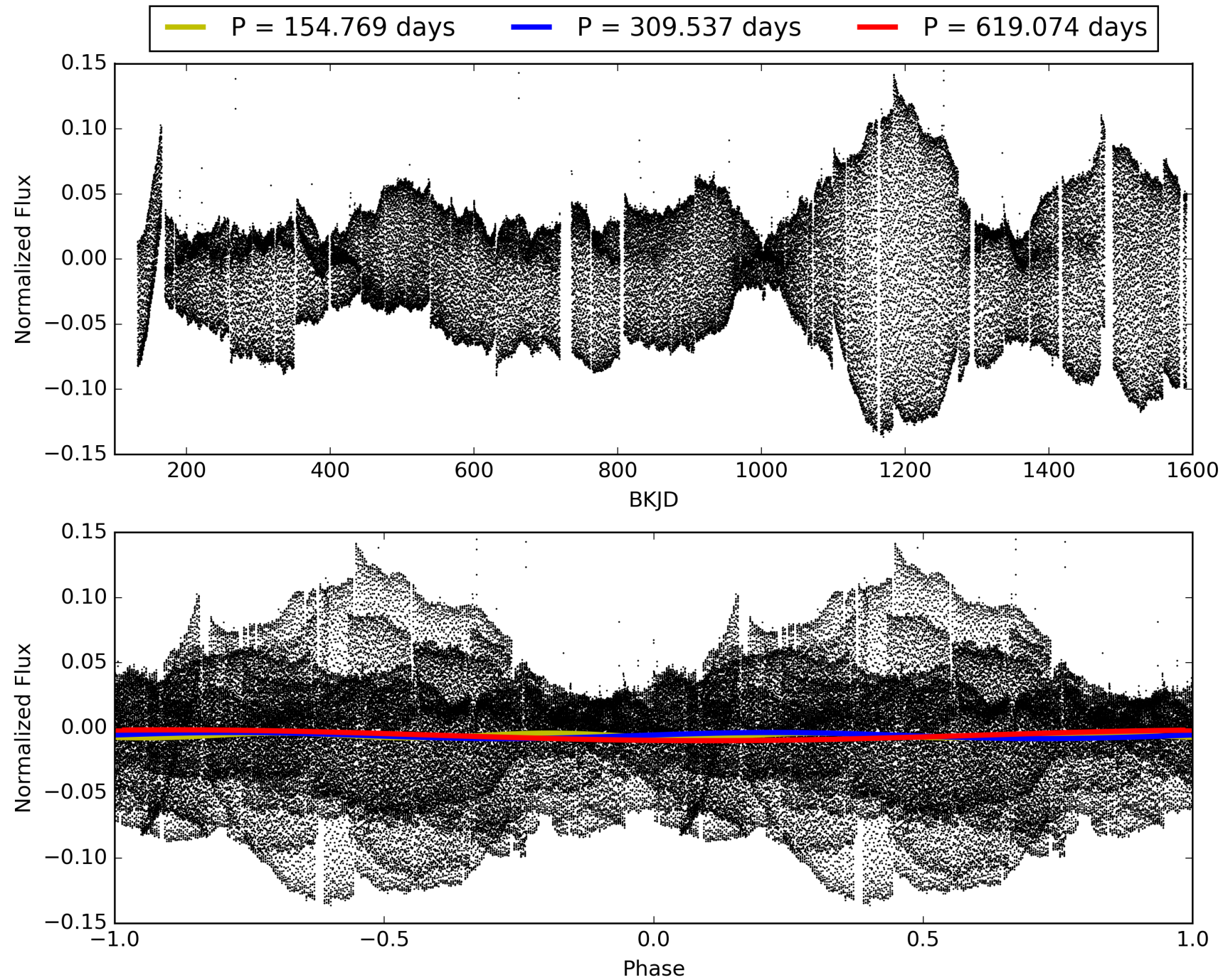
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 09:18:16 Z

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

# TCE 002436635-02, PDC Light Curves



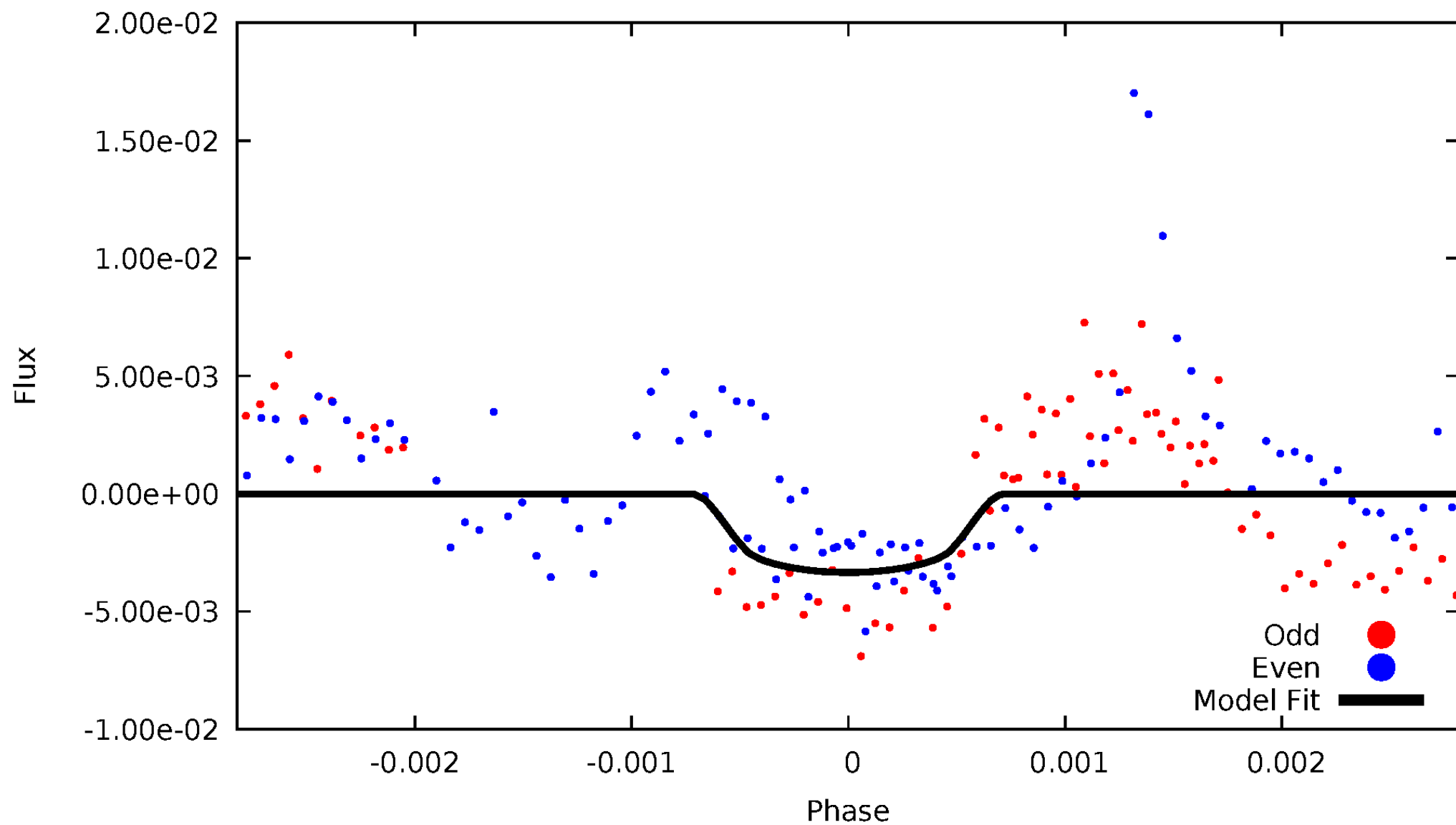
TCE 002436635-02





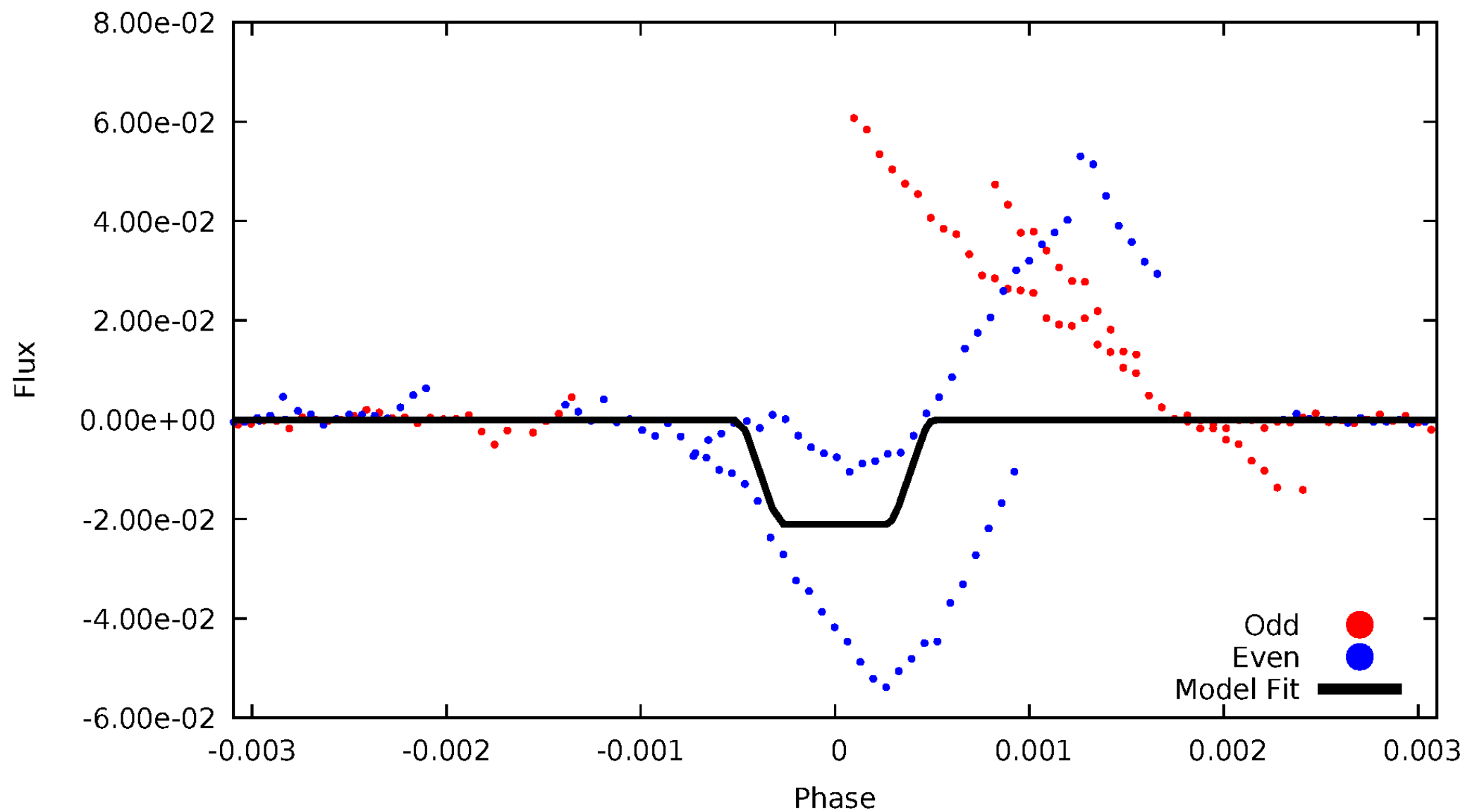
# DV Odd/Even

TCE 002436635-02



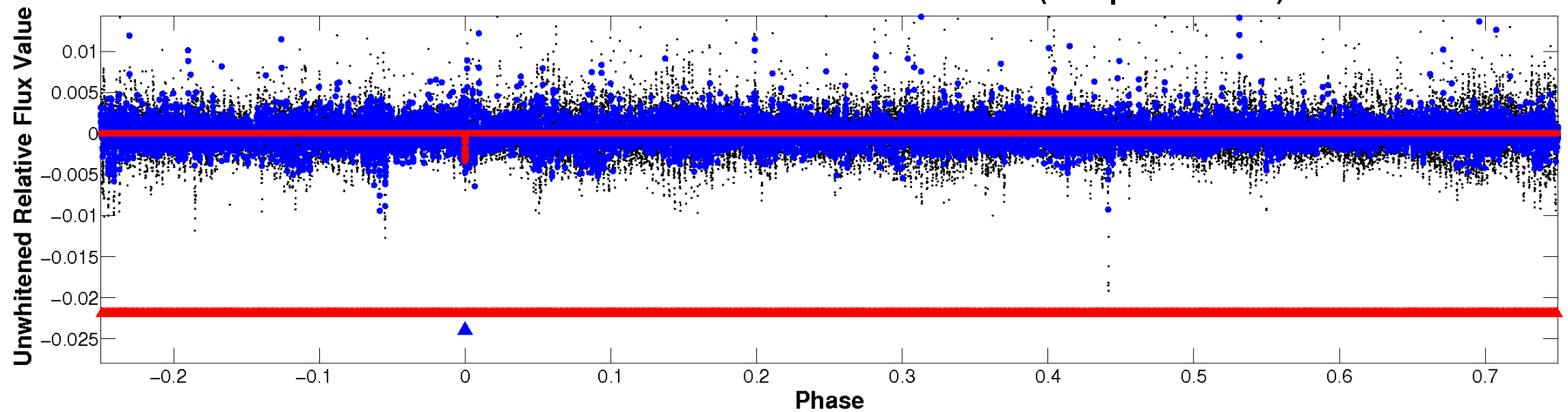
# ALT Odd/Even

TCE 002436635-02

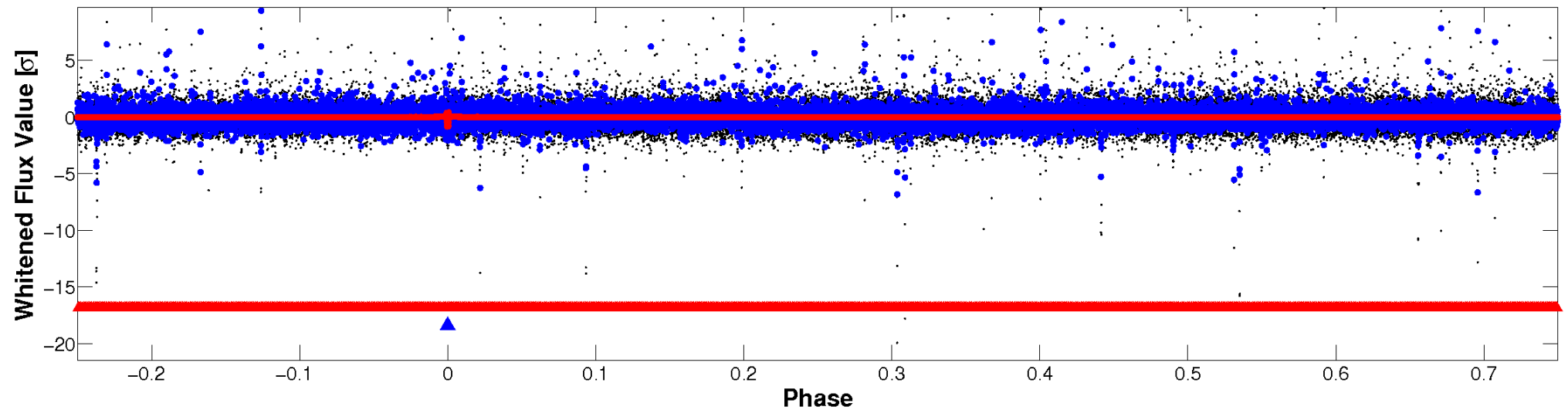


# Non-Whitened Vs. Whitened Light Curve

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

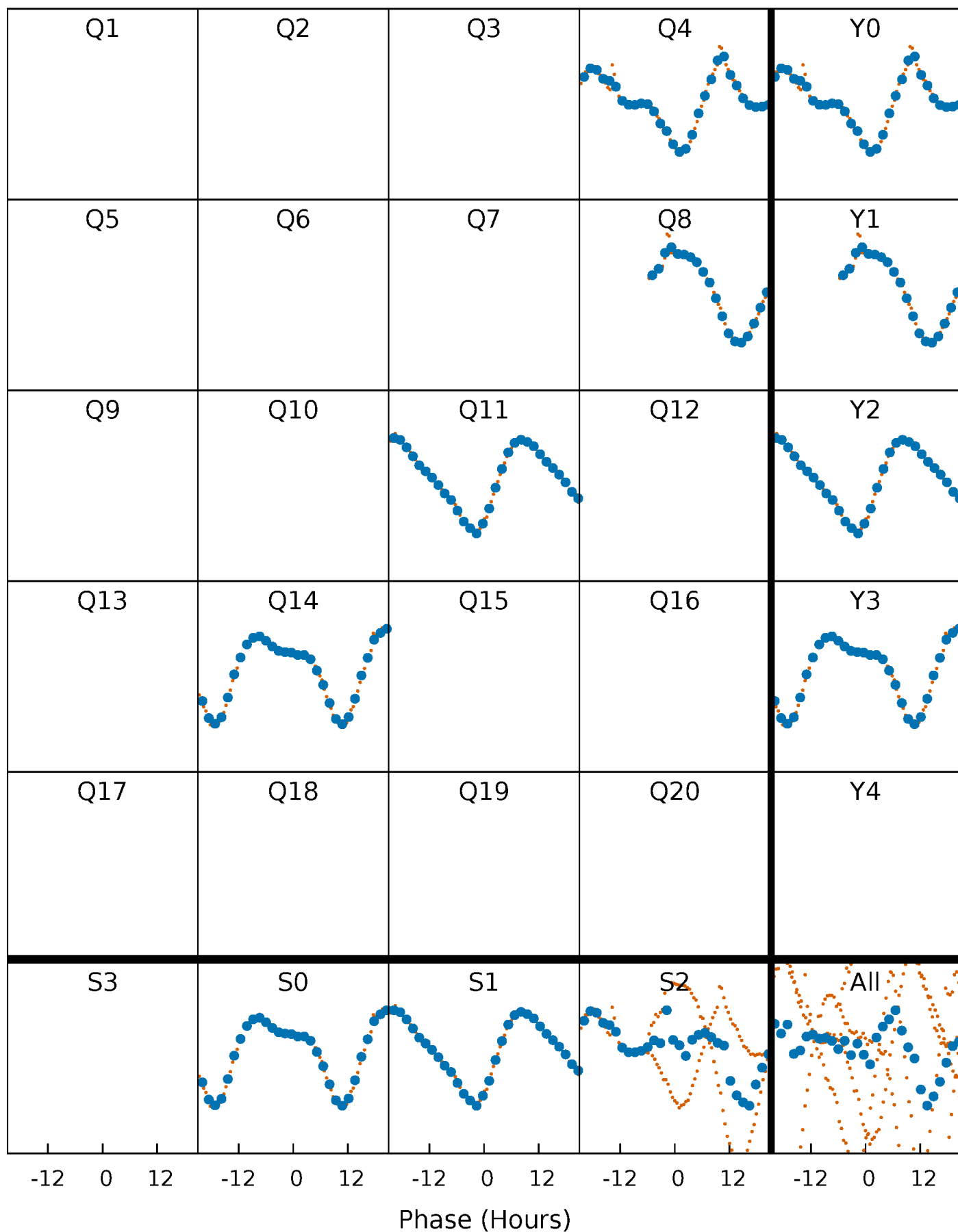


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



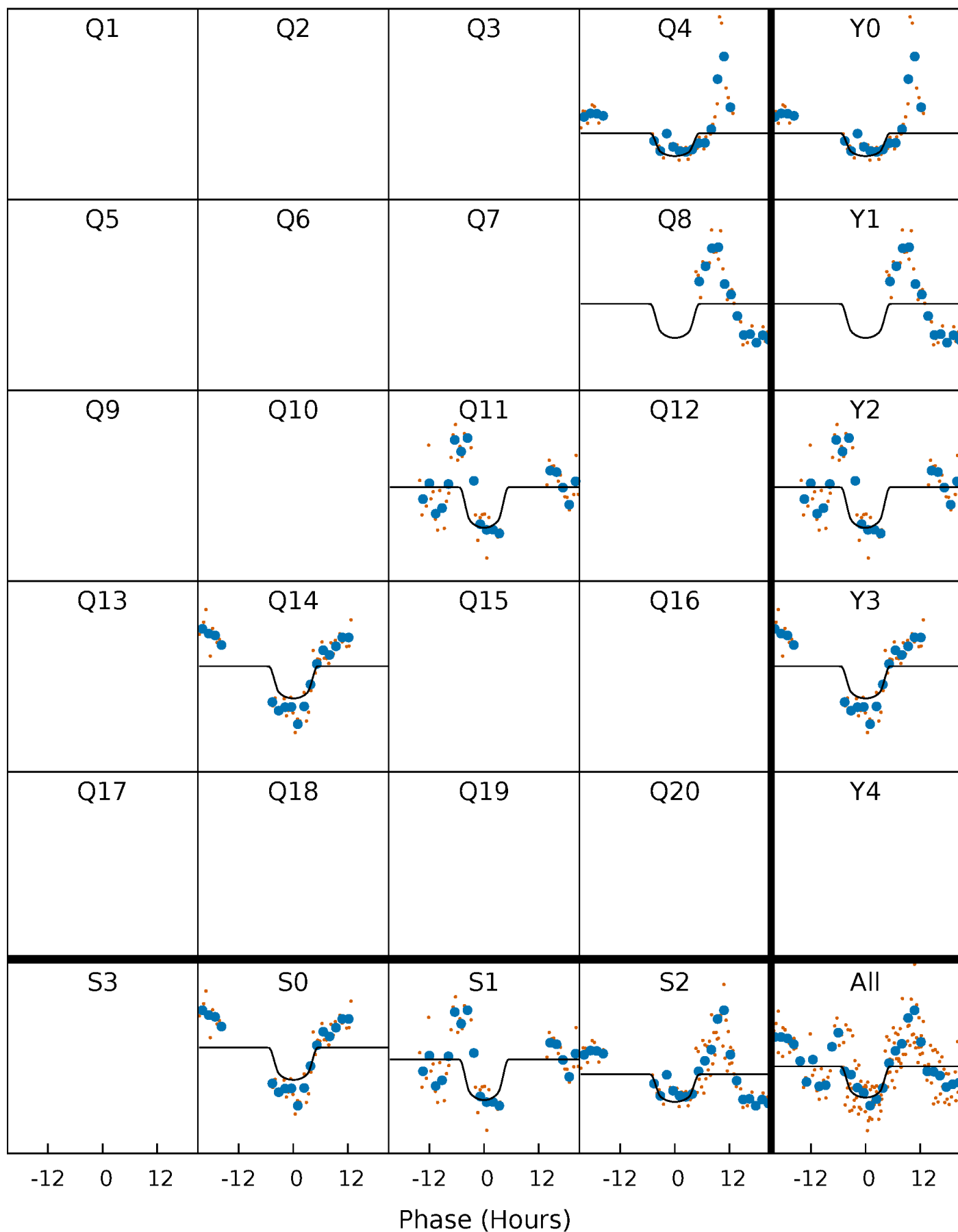
# PDC Quarter-Phased Transit Curves

TCE 002436635-02 P=309.537210 Days  $T_0=426.080774$  (BKJD)



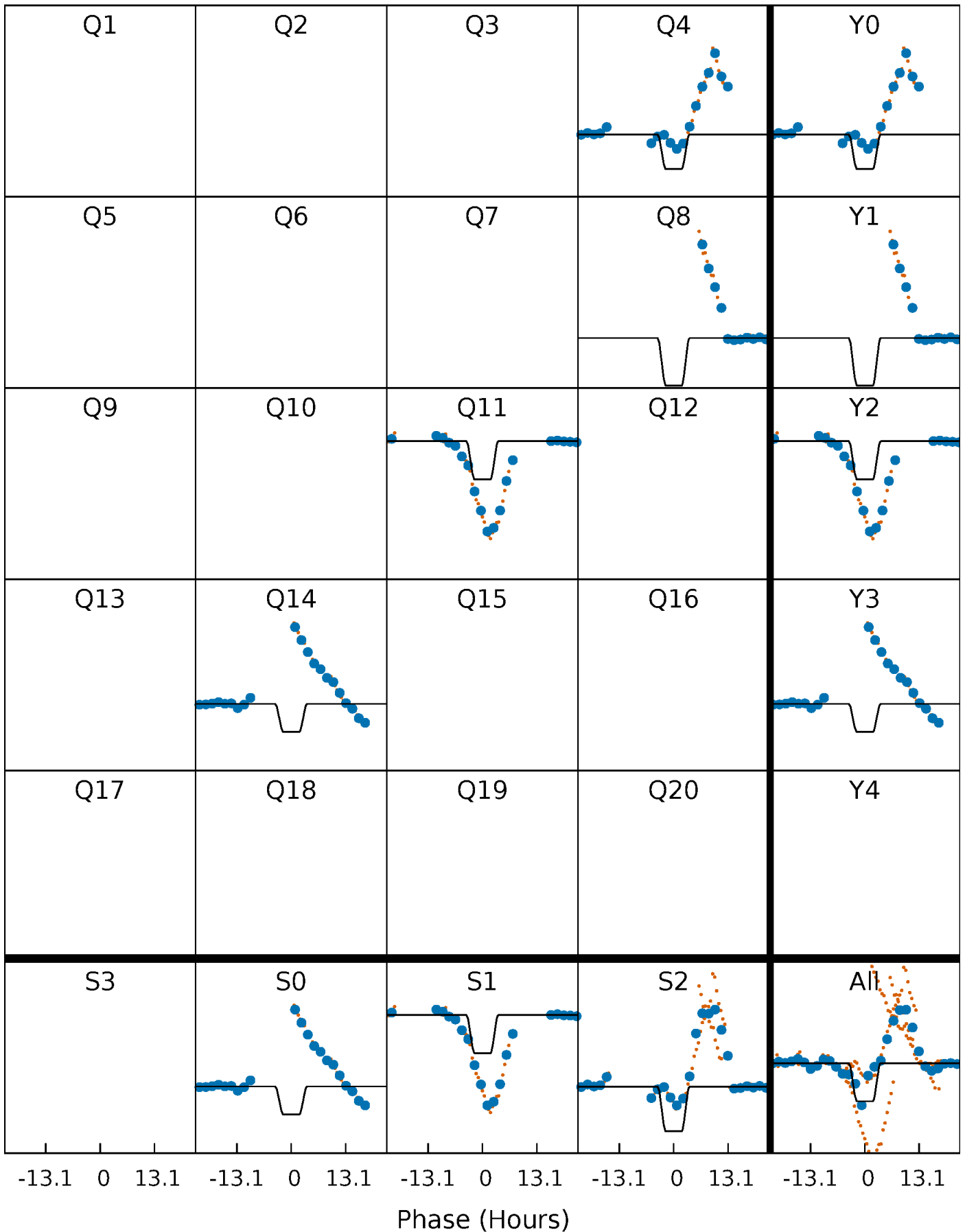
# DV Quarter-Phased Transit Curves

TCE 002436635-02     $P=309.537210$  Days     $T_0=426.080774$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 002436635-02 P=309.459455 Days  $T_0=426.097999$  (BKJD)

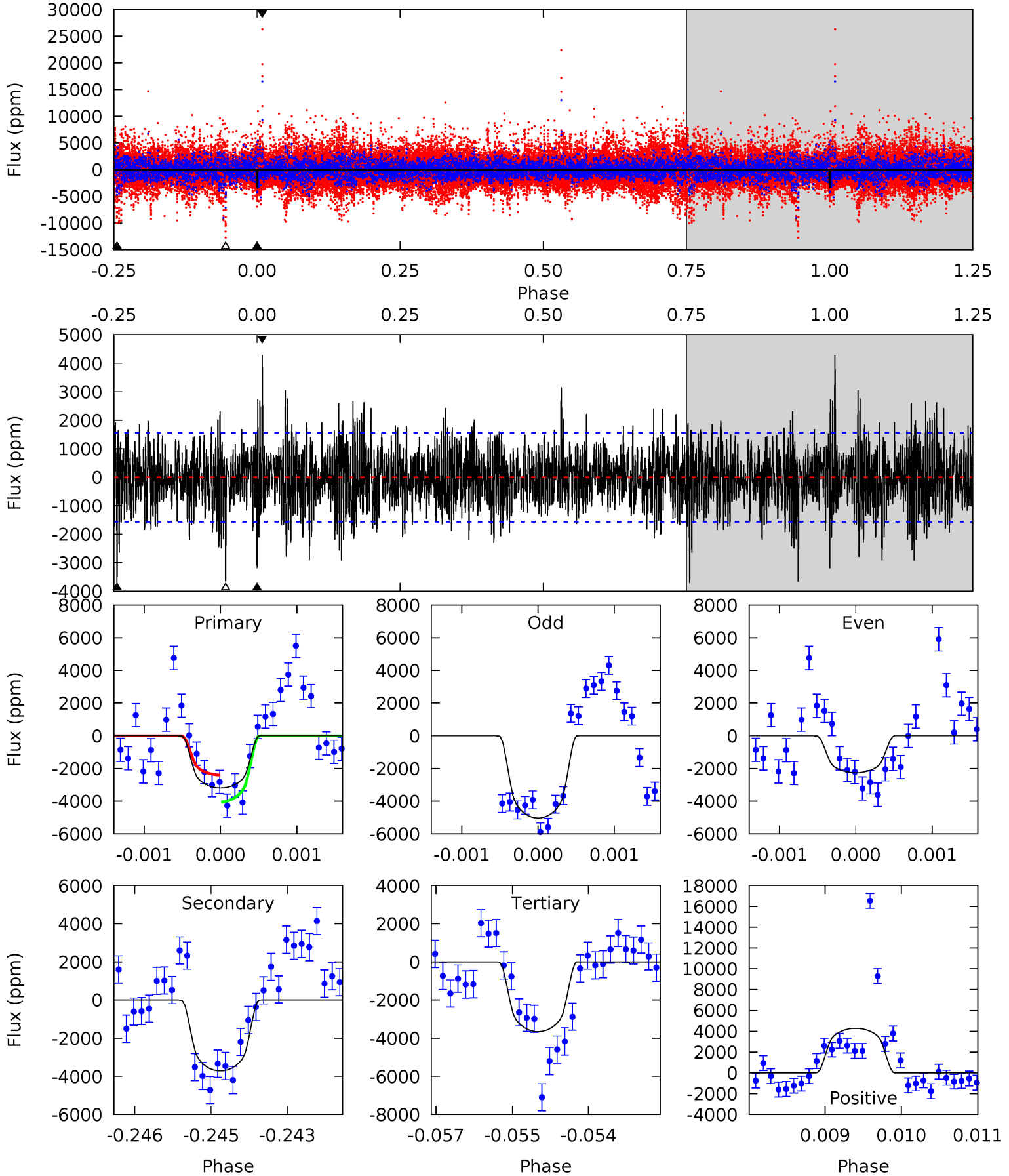




# DV Model-Shift Uniqueness Test

002436635-02, P = 309.537210 Days, E = 116.543564 Days

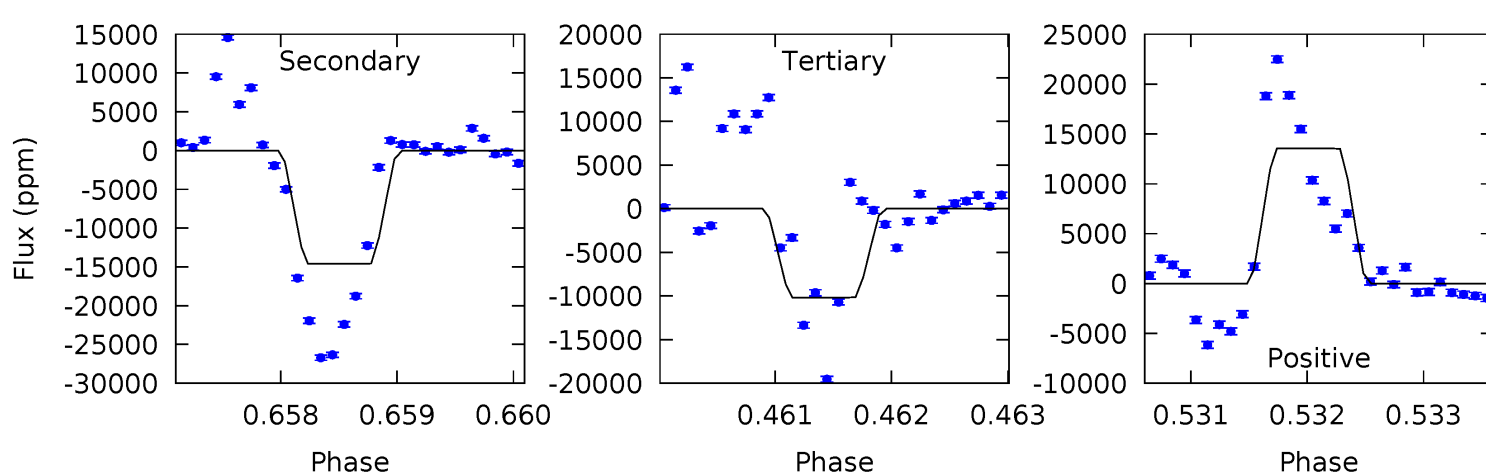
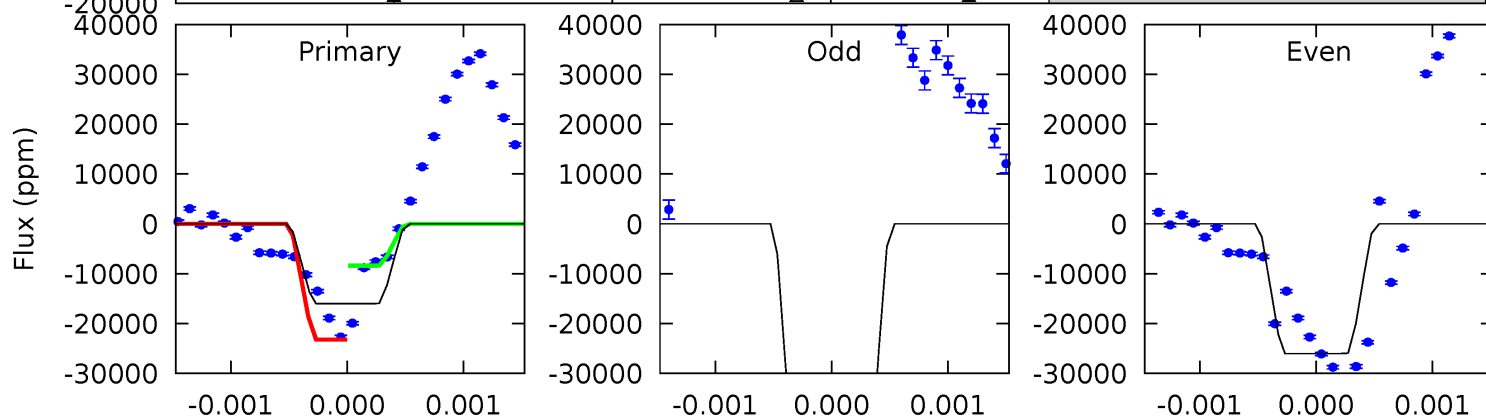
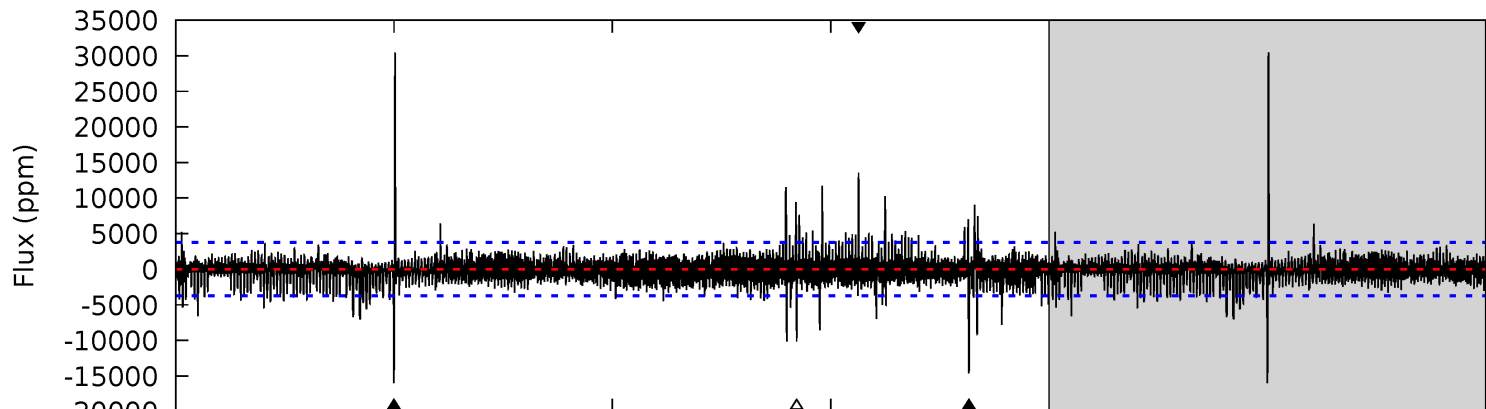
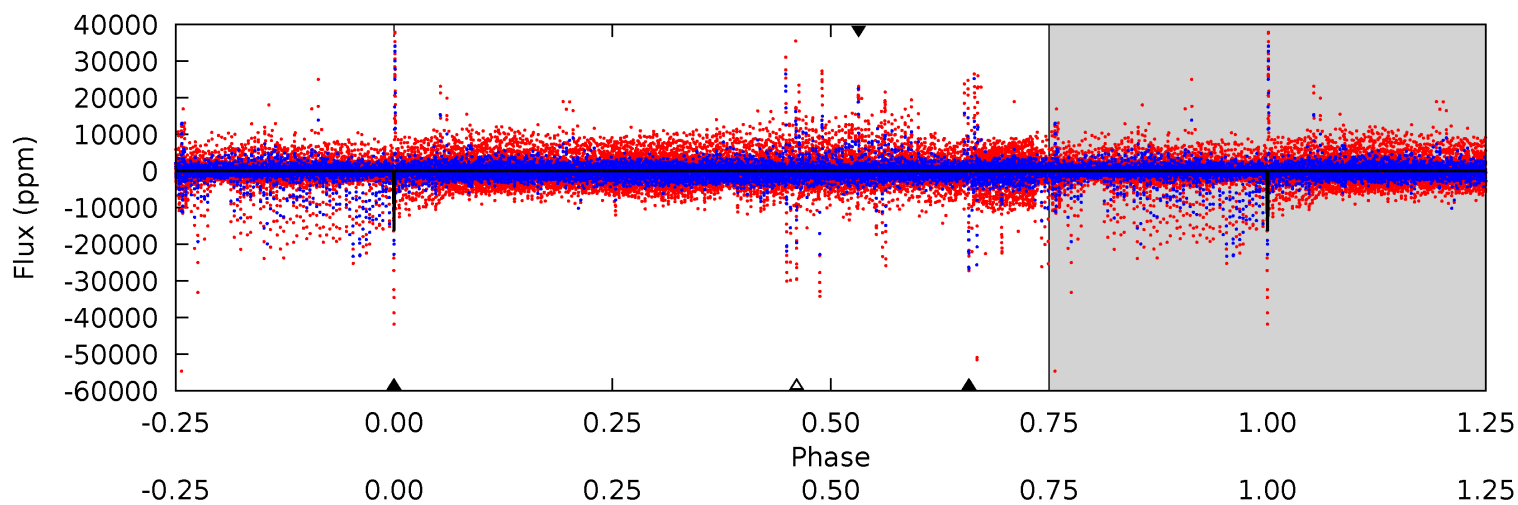
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.0	12.8	12.6	14.8	5.39	3.19	2.98	-1.60	-3.77	0.21	-1.96	4.33	-1.13	0.54	2.86



# Alt Model-Shift Uniqueness Test

002436635-02, P = 309.459455 Days, E = 116.638544 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
23.3	21.3	14.8	19.7	5.45	3.29	2.40	8.49	3.59	6.45	1.56	12.3	-0.58	0.66	10.3



### Stellar Parameters For KIC 002436635

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (g \cdot \text{cm}^{-3})$
	$4624^{+151}_{-151}$	$4.595^{+0.056}_{-0.028}$	$-0.140^{+0.300}_{-0.300}$	$0.686^{+0.054}_{-0.060}$	$0.677^{+0.075}_{-0.054}$	$2.954^{+0.668}_{-0.360}$
	+3%/-3%	+1%/-1%	+214%/-214%	+8%/-9%	+11%/-8%	+23%/-12%
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 002436635-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-3718 \pm 290$	$4.59^{+0.79}_{-0.80}$	$264^{+10}_{-10}$	$4593^{+441}_{-310}$	$60934^{+27795}_{-17674}$
Alt.	$-14618 \pm 687$	$10.75^{+0.93}_{-0.83}$	$264^{+10}_{-9}$	$4324^{+185}_{-185}$	$43949^{+7646}_{-6405}$

$T_{max}$  = 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

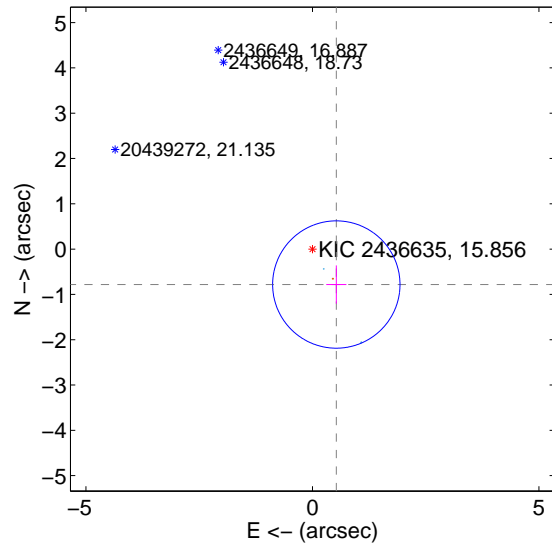
Supplemental centroid analysis for 002436635-02. Kepler magnitude: 15.86. Transit SNR 5.13

There are 2 quarters with good PRF difference image offsets

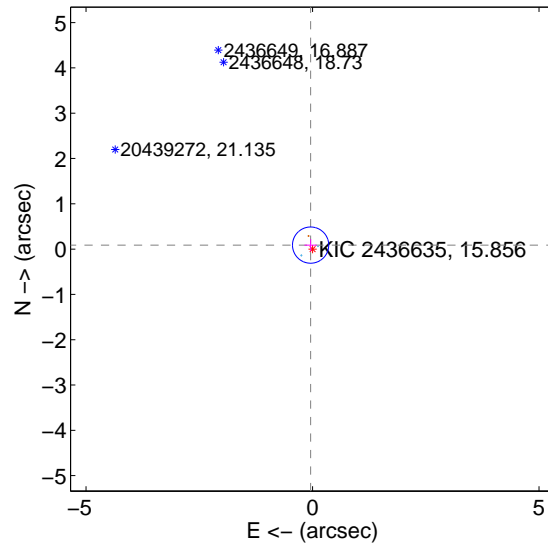
The direct PRF centroid is offset from the target star catalog position by about 1.09 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.943 \pm 0.469$	2.01	$-0.527 \pm 0.223$	$-0.782 \pm 0.422$
PRF-fit source offset from KIC position	$0.098 \pm 0.133$	0.73	$0.042 \pm 0.136$	$0.088 \pm 0.133$
photometric centroid source offset	$1.31 \pm 1.05$	1.25	$0.53 \pm 0.82$	$1.20 \pm 1.09$

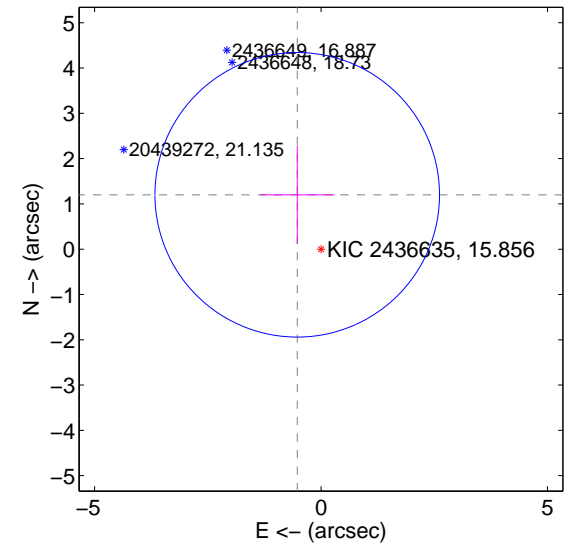
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

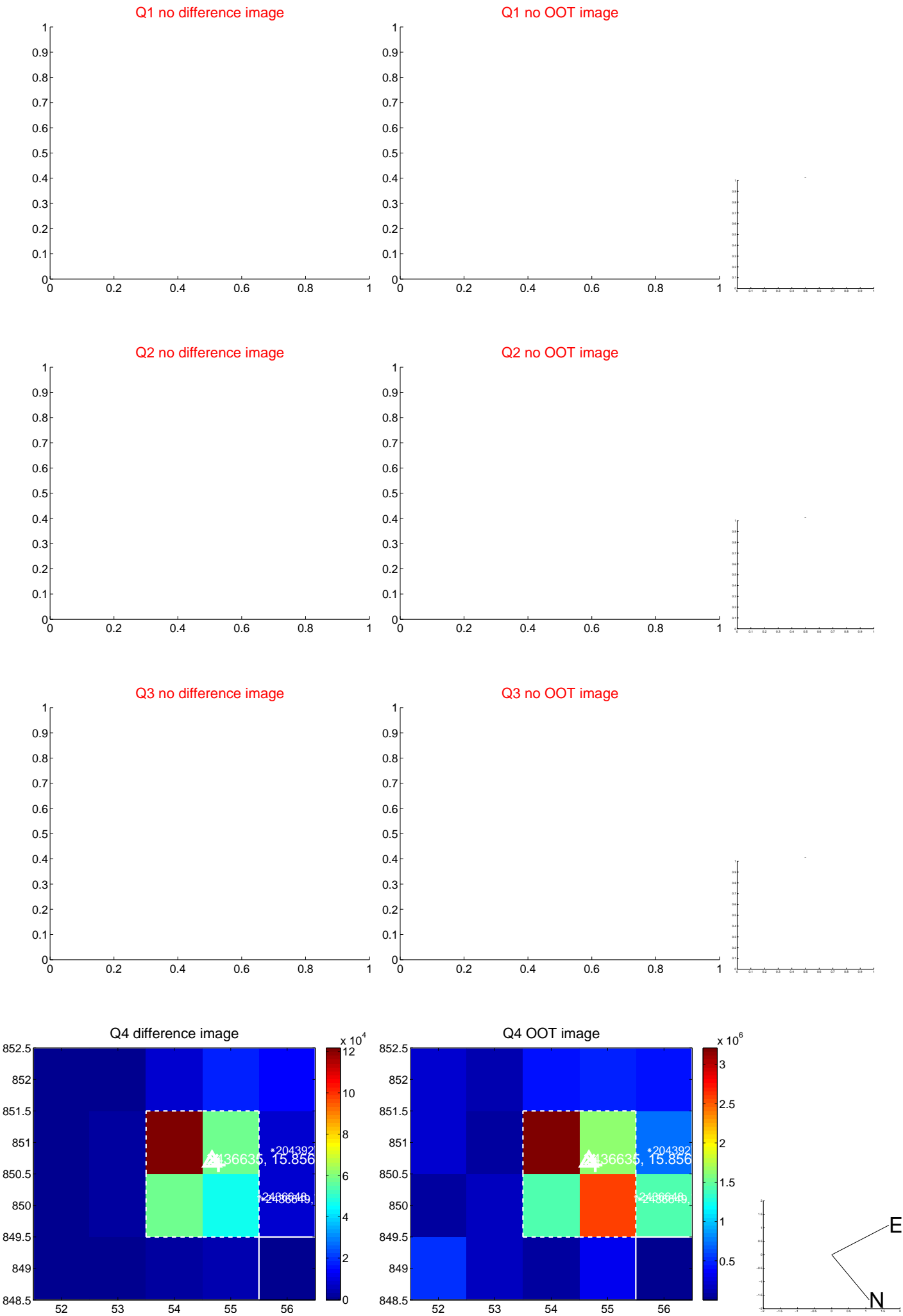


offset from photometric centroids

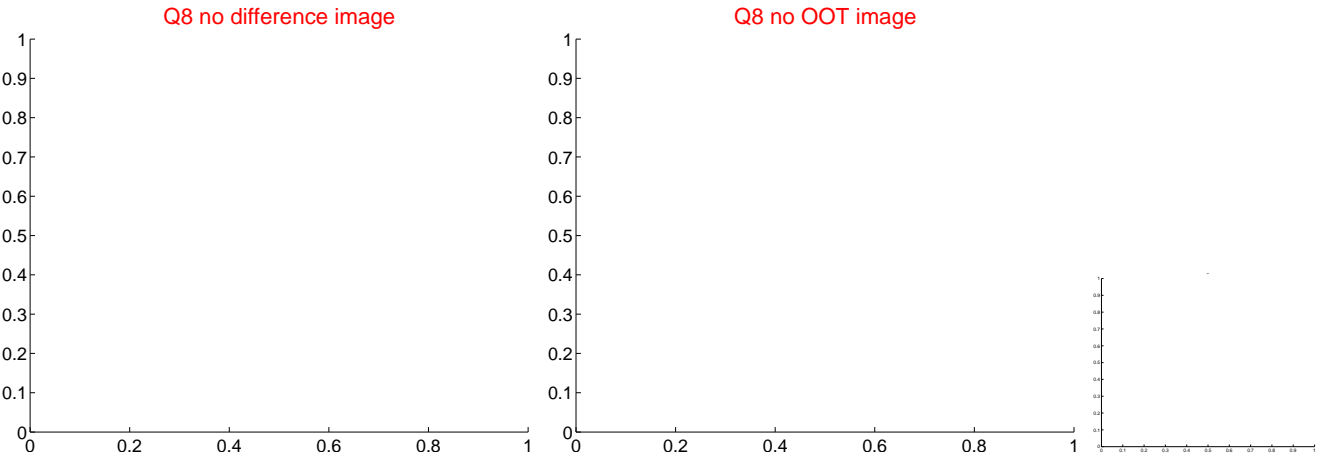
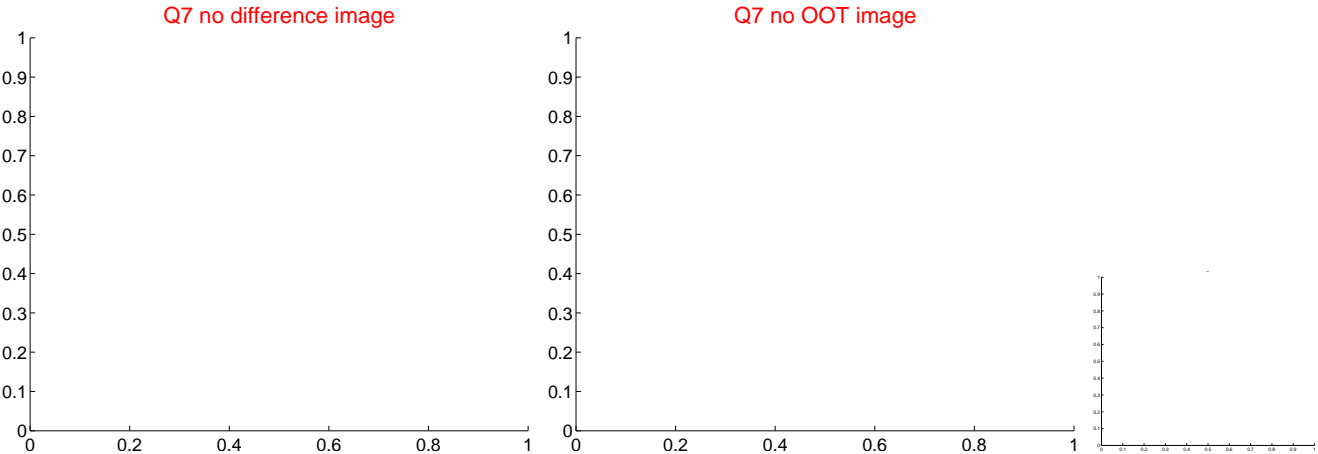
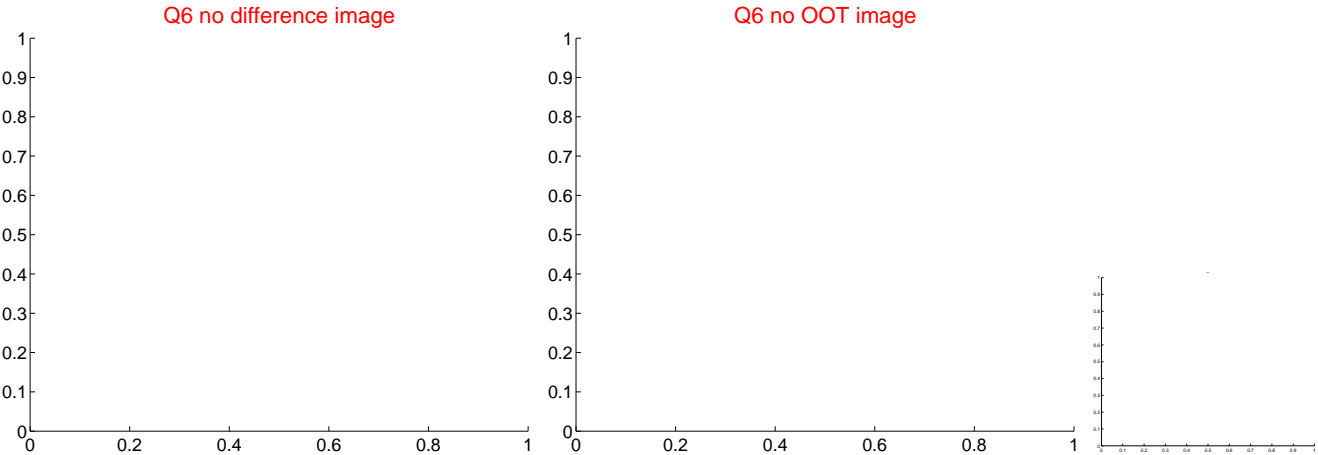
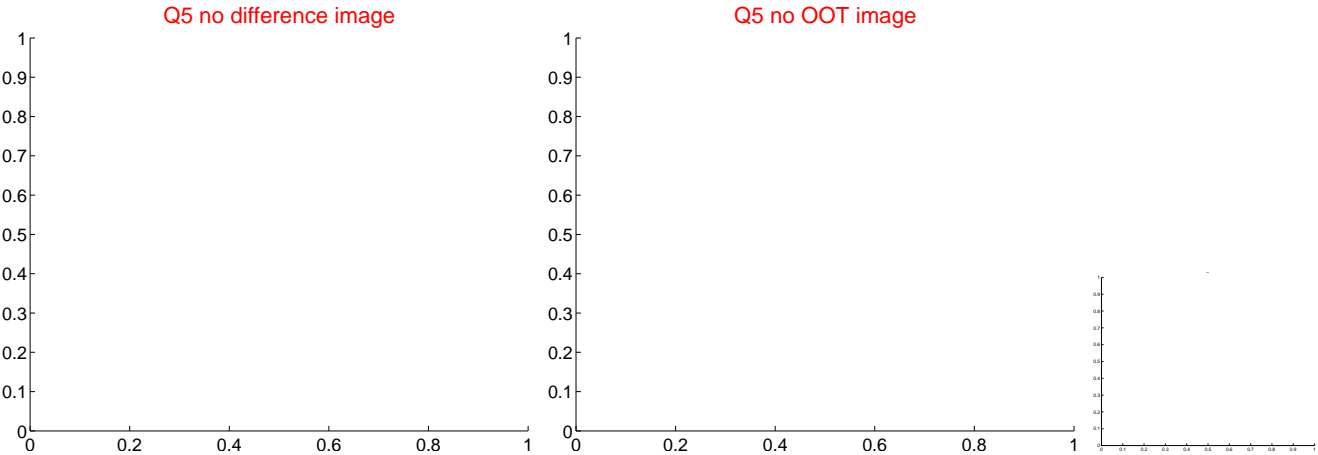


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

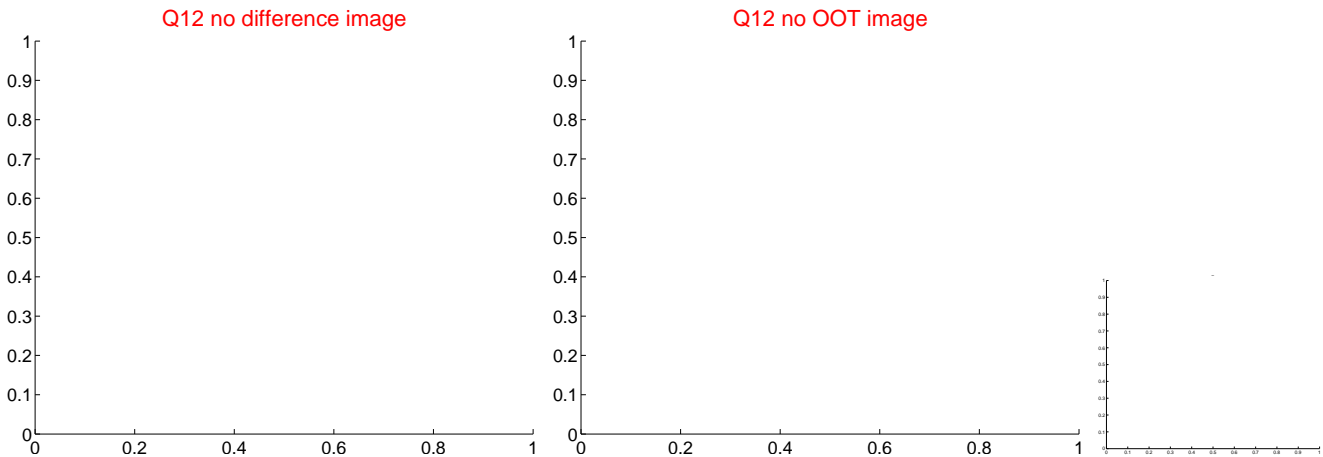
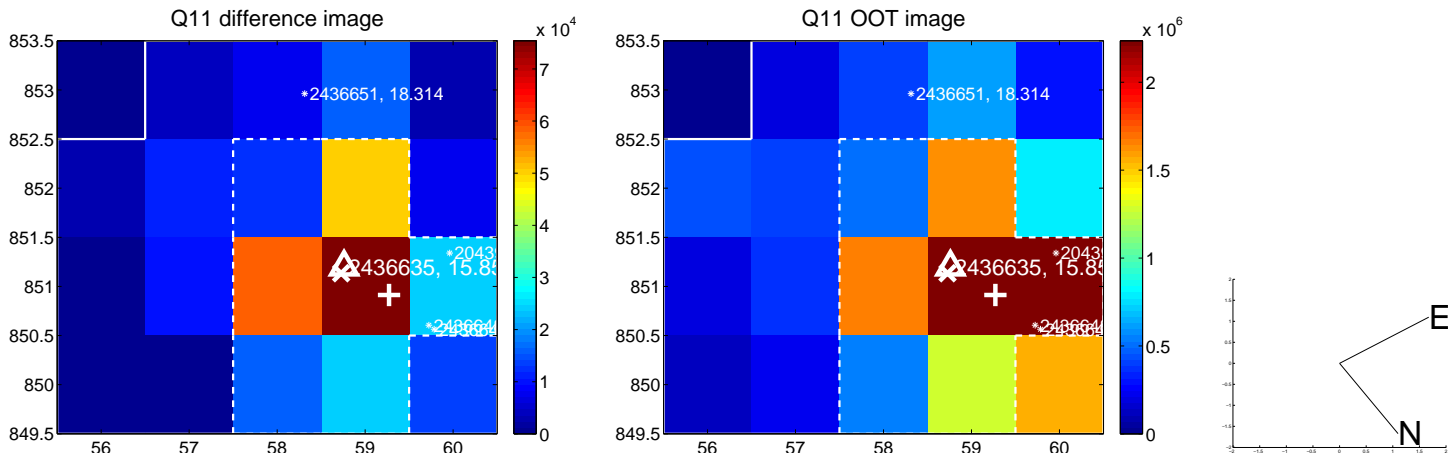
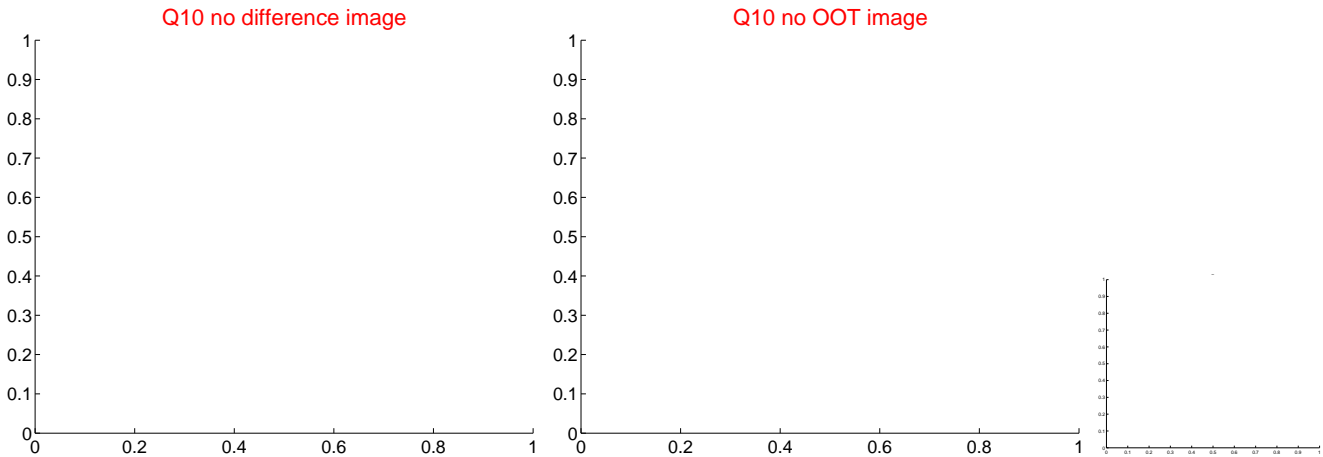
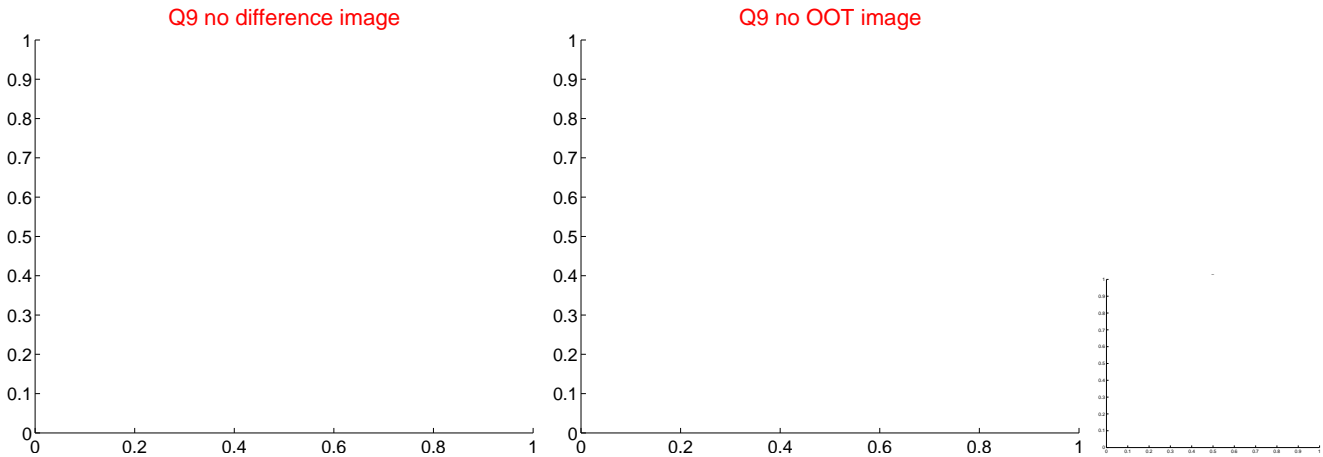


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

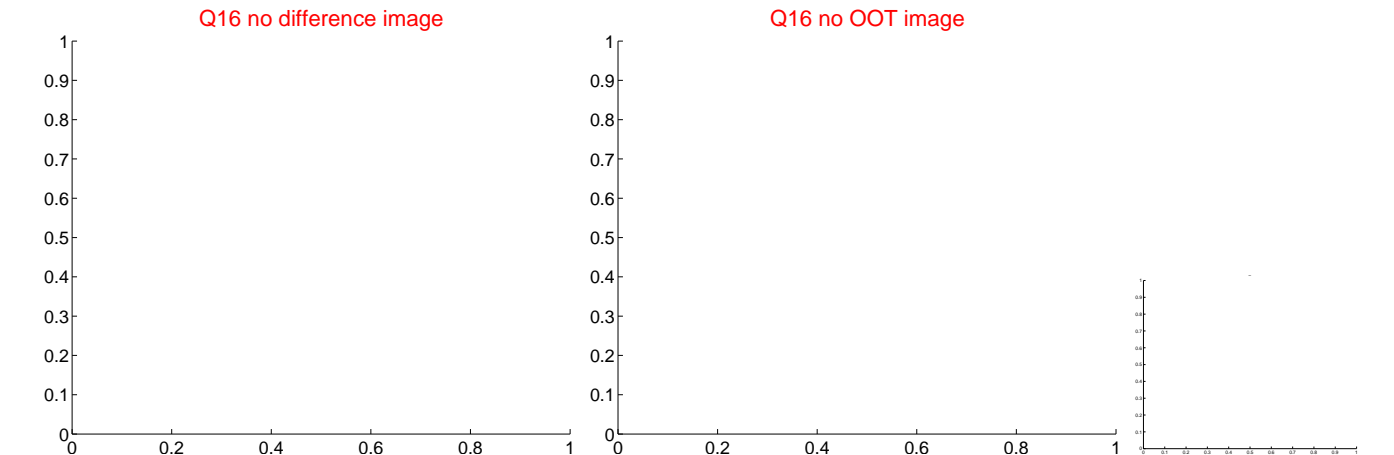
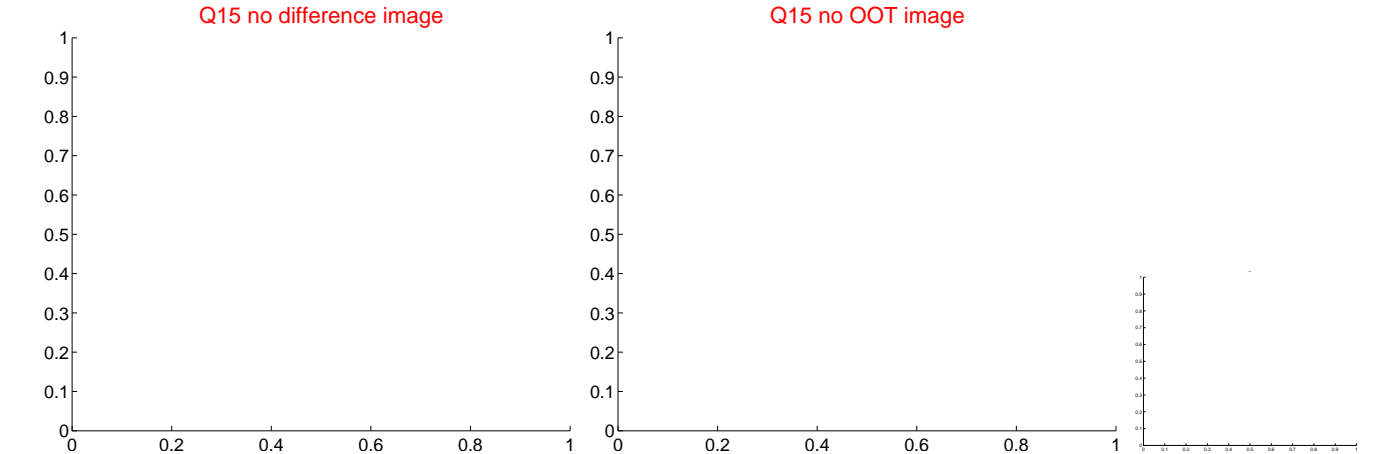
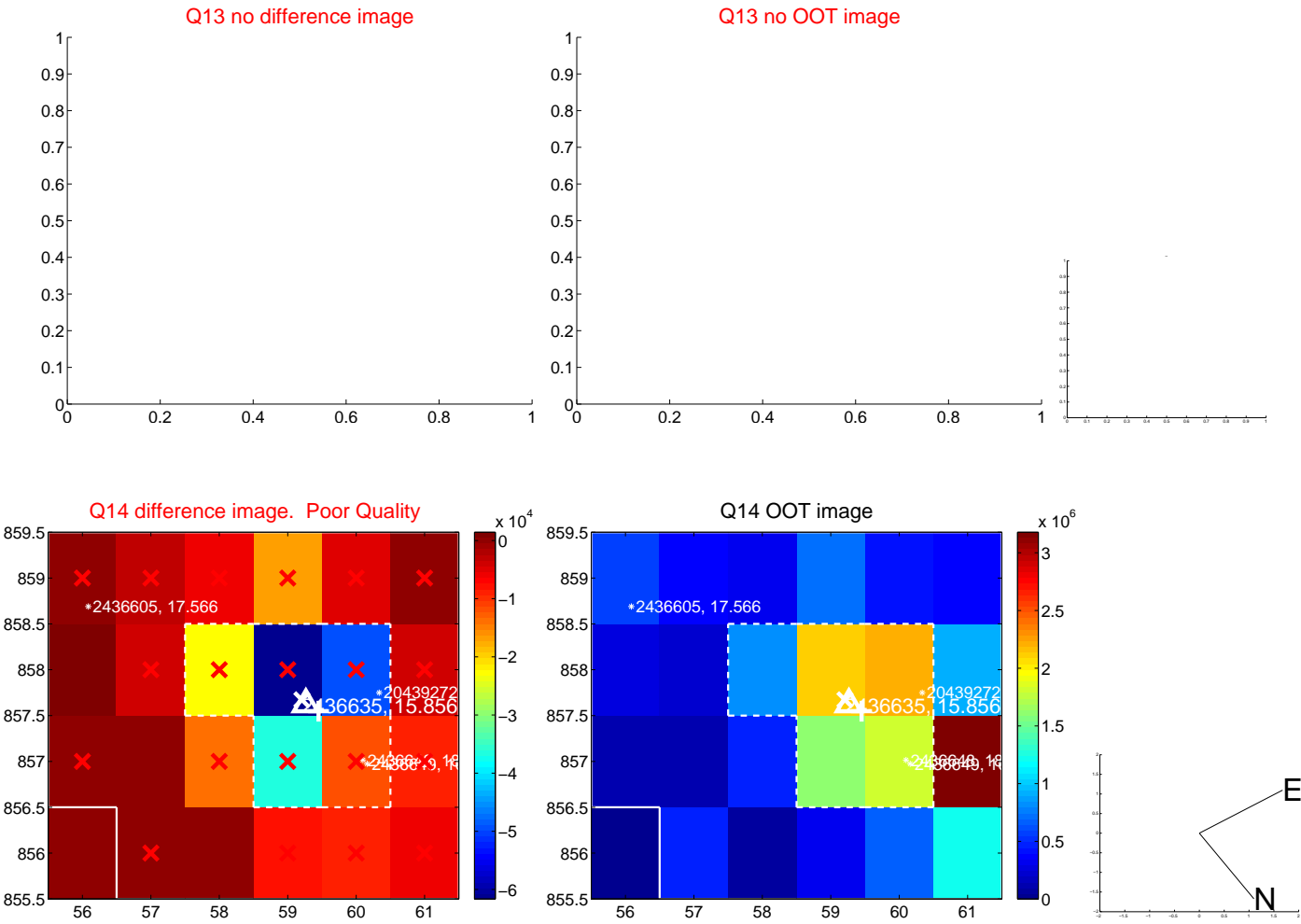




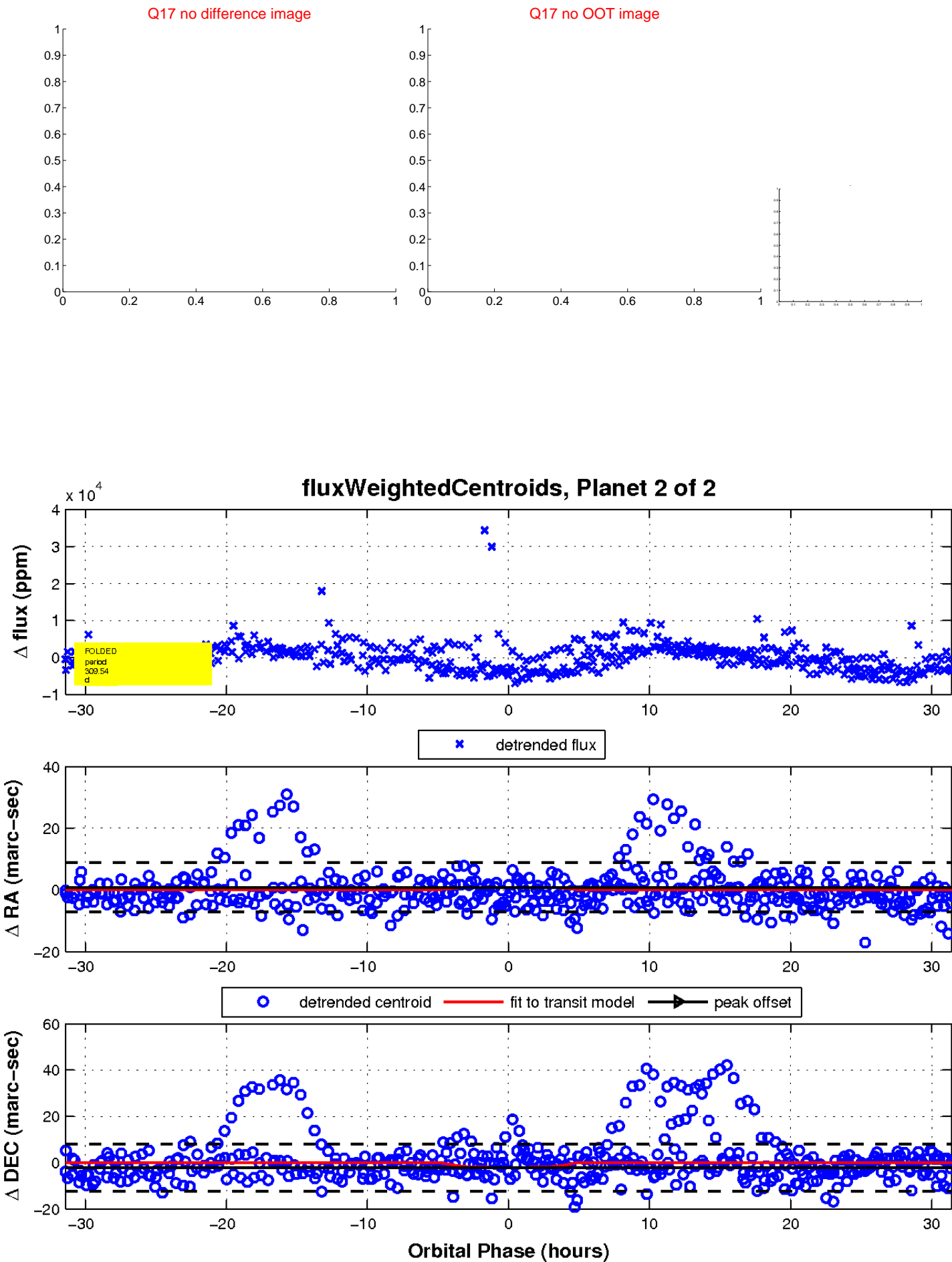
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



white ×: 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

