

# KIC 010935310

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010935310-01	OBS	6083.01	4.128795	132.579706	154696.5	2.784	13815.1	9525.9	1.08	5949	63.84	566.66
010935310-02	OBS	No	4.128793	134.639729	8459.0	2.829	839.5	819.7	1.08	5949	17.98	566.66

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010935310-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—DEEP_V_SHAPED—HAS_SEC_TCE
010935310-02	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.

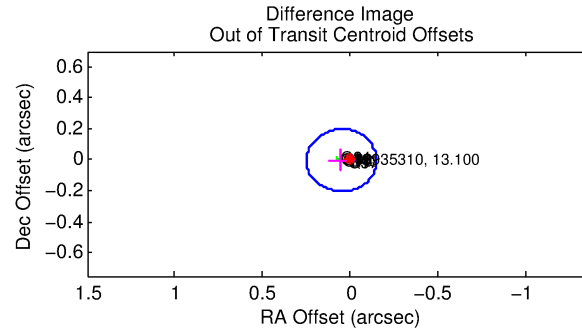
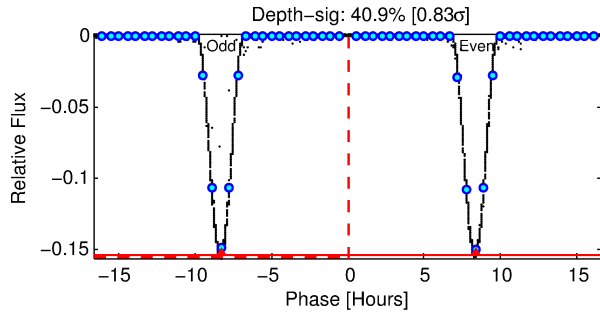
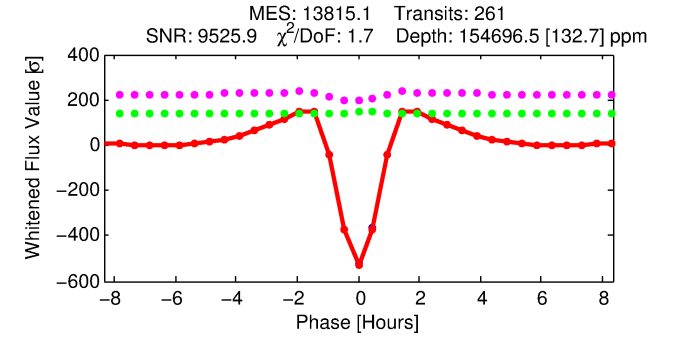
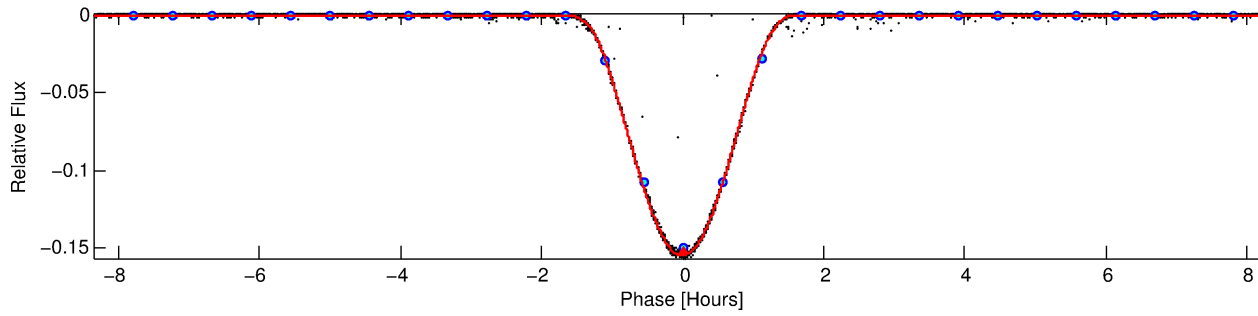
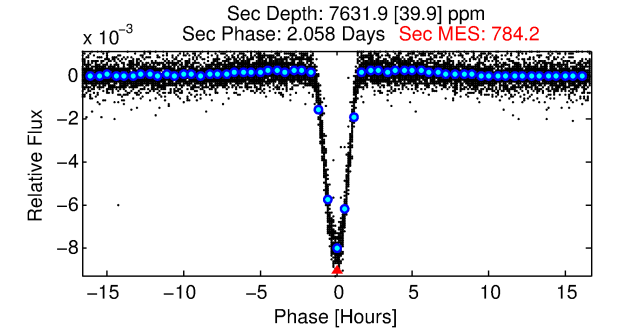
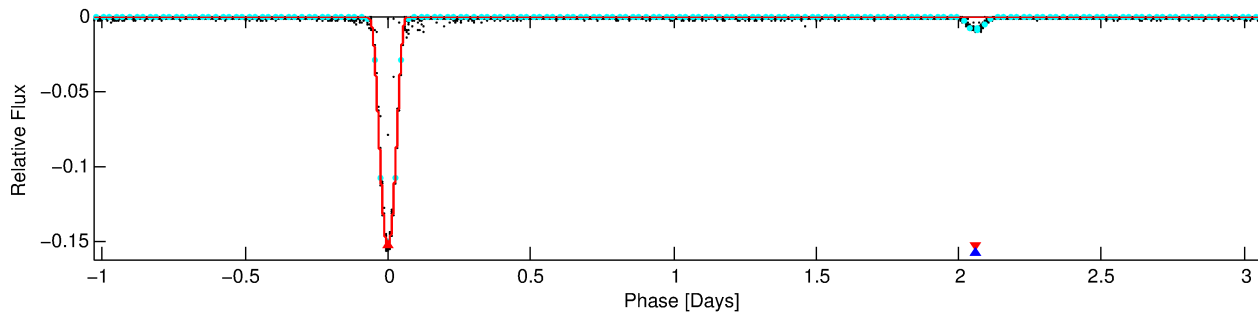
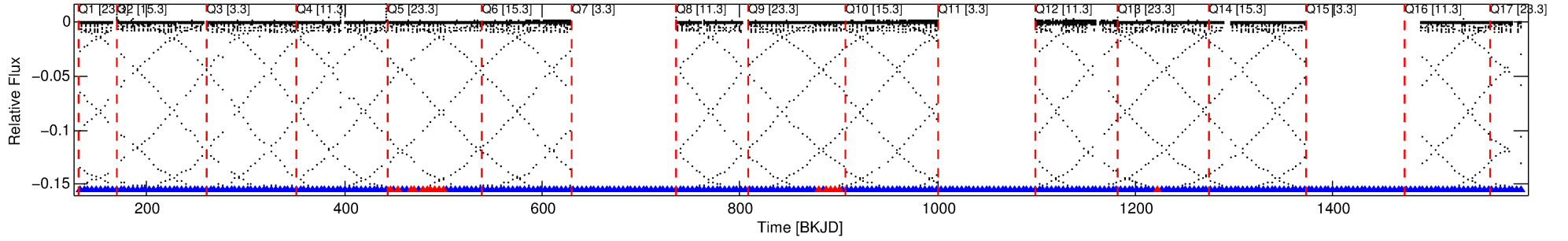
## Ephemeris Match Information For 010935310-01

No Significant Match Found

# DV One-Page Summary

KIC: 10935310 Candidate: 1 of 2 Period: 4.129 d  
KOI: K06083.01 Corr: 0.998

Kp: 13.10 R\*: 1.08 Rs Teff: 5949.0 K Logg: 4.31 Fe/H: -0.400



## DV Fit Results:

Period = 4.12880 [0.00000] d  
Epoch = 132.5797 [0.0000] BKJD  
Rp/R\* = 0.5402 [0.0328]  
a/R\* = 14.22 [0.09]  
b = 0.90 [0.05]  
Seff = 566.66 [217.12]  
Teq = 1244 [119] K  
Rp = 63.84 [17.64] Re  
a = 0.0482 [0.0116] AU  
Ag = 2.39 [0.93] [1.50σ]  
Teffp = 2392 [97] K [7.47σ]

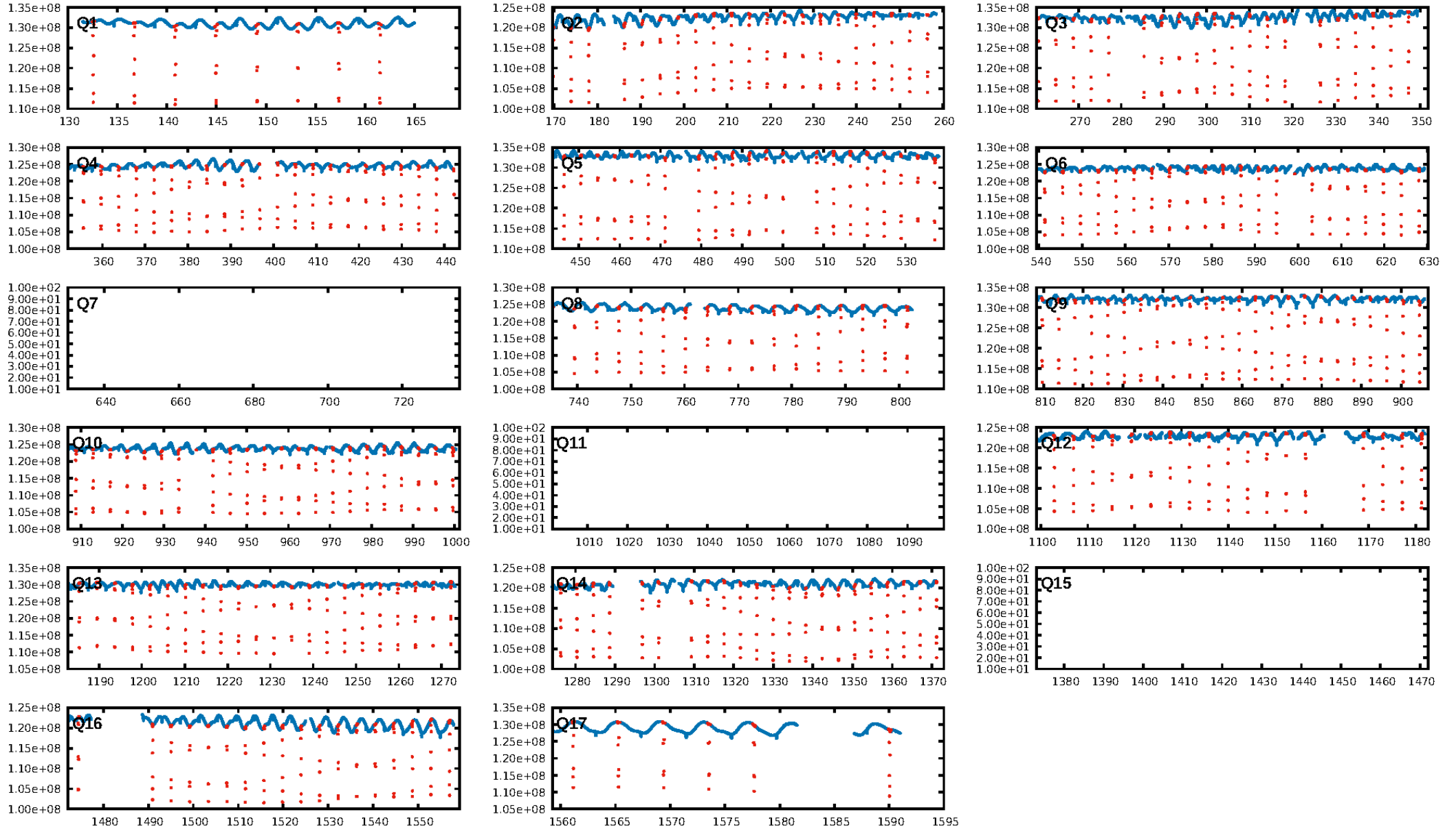
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 0.94 [231/247]  
GhostDiagnostic-chr: 2.81  
Centroid-sig: 0.0%  
Centroid-so: 0.048 arcsec [82.20σ]  
OotOffset-rm: 0.051 arcsec [0.76σ]  
OotOffset-st: 4/1/4/5 [14]  
KicOffset-rm: 0.115 arcsec [1.64σ]  
KicOffset-st: 4/1/4/5 [14]  
DiffImageQuality-fgm: 1.00 [14/14]  
DiffImageOverlap-fno: 1.00 [14/14]

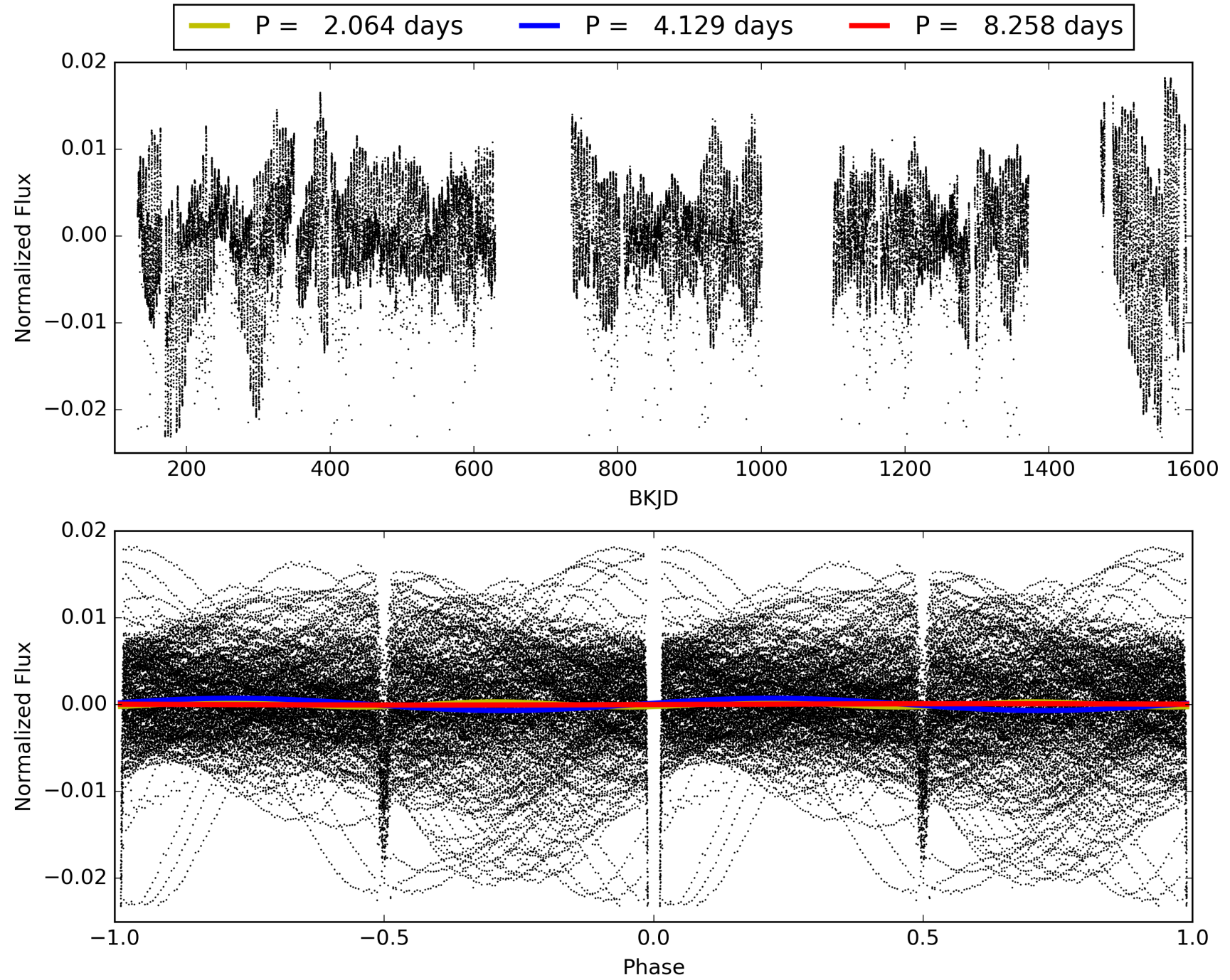
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 11:06:26 Z

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

# TCE 010935310-01, PDC Light Curves

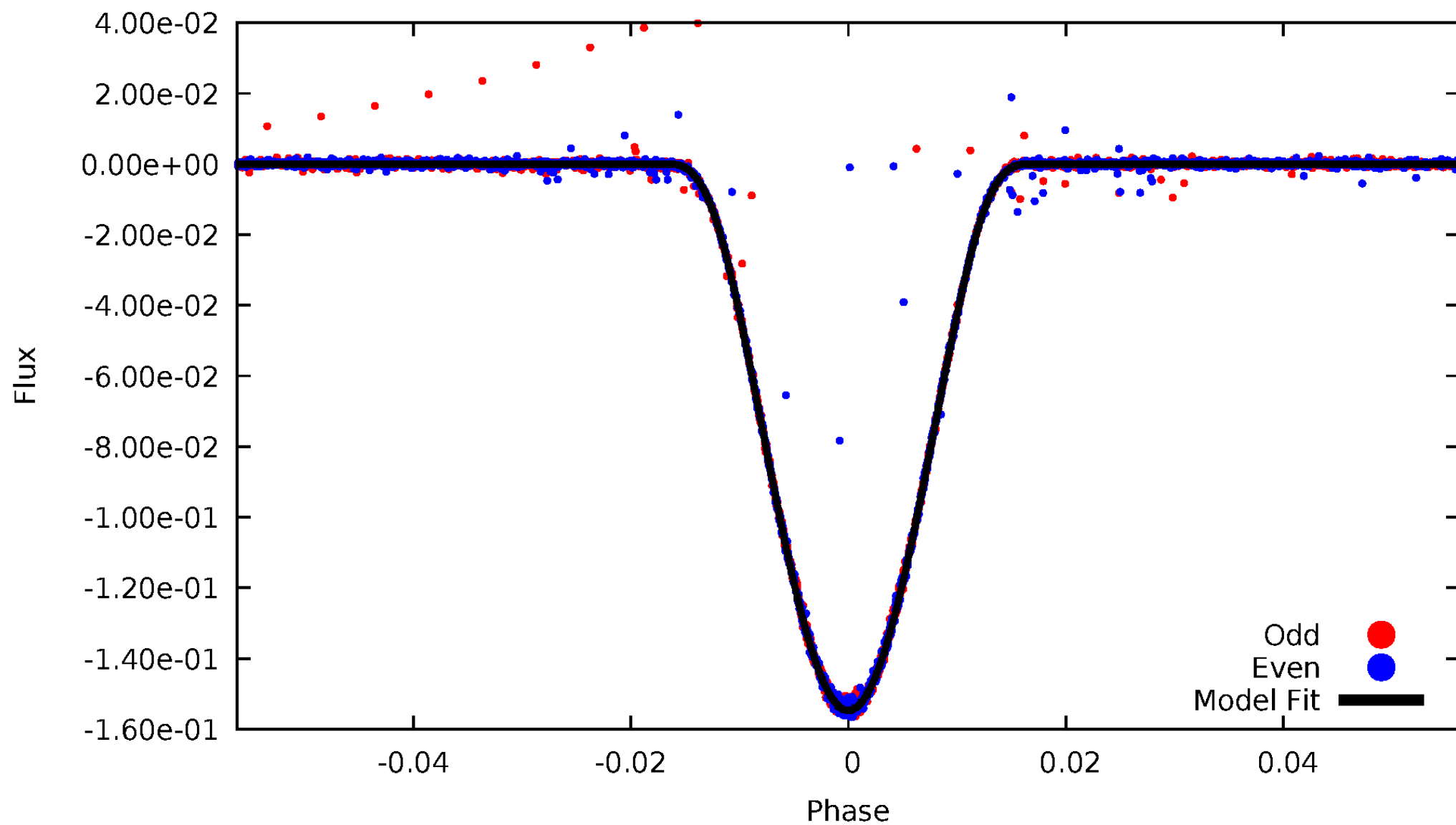


# TCE 010935310-01



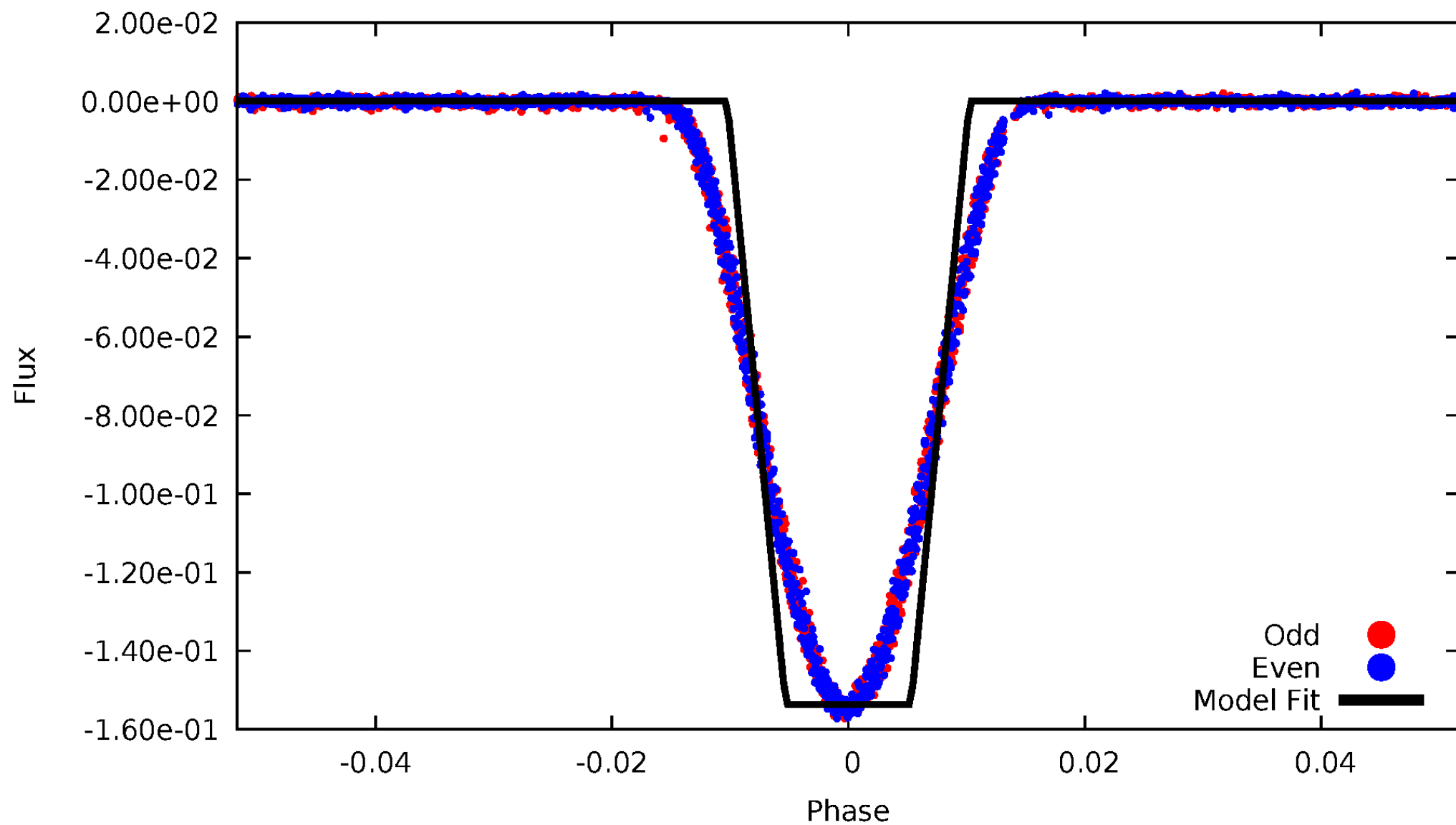
# DV Odd/Even

TCE 010935310-01



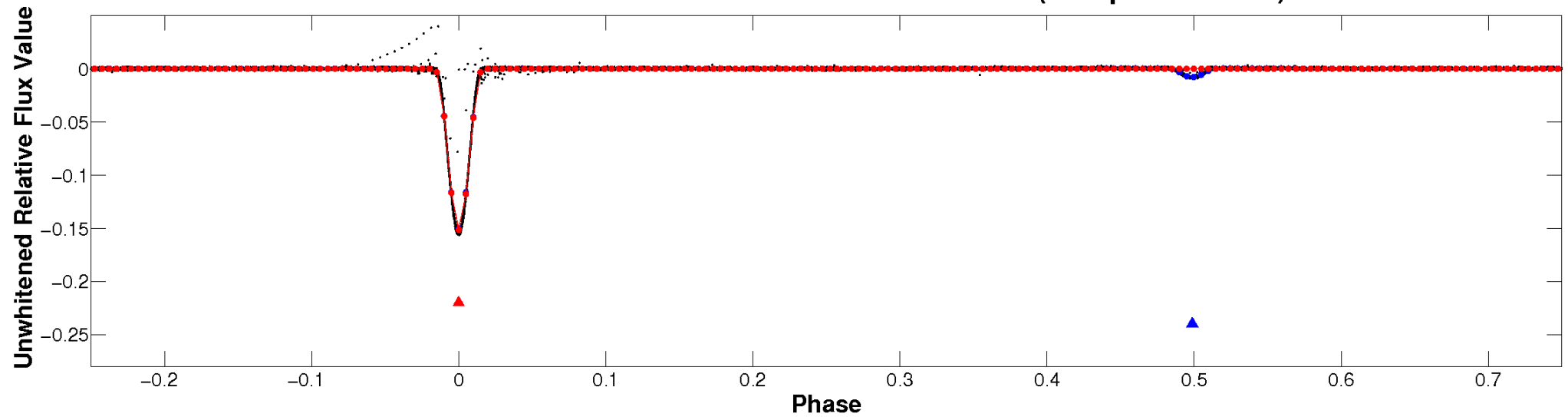
# ALT Odd/Even

TCE 010935310-01

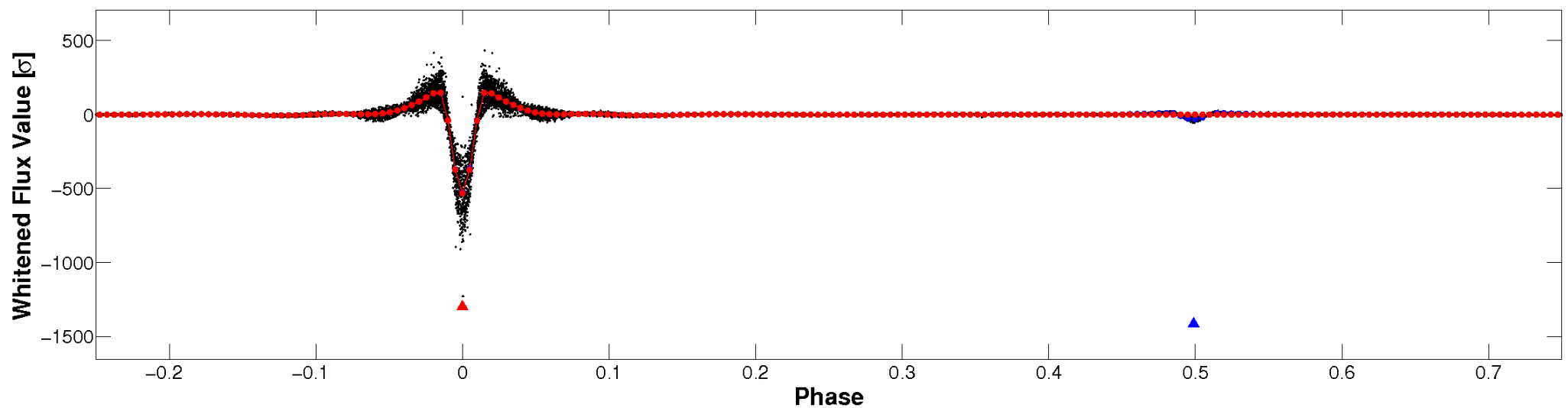


# Non-Whitened Vs. Whitened Light Curve

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

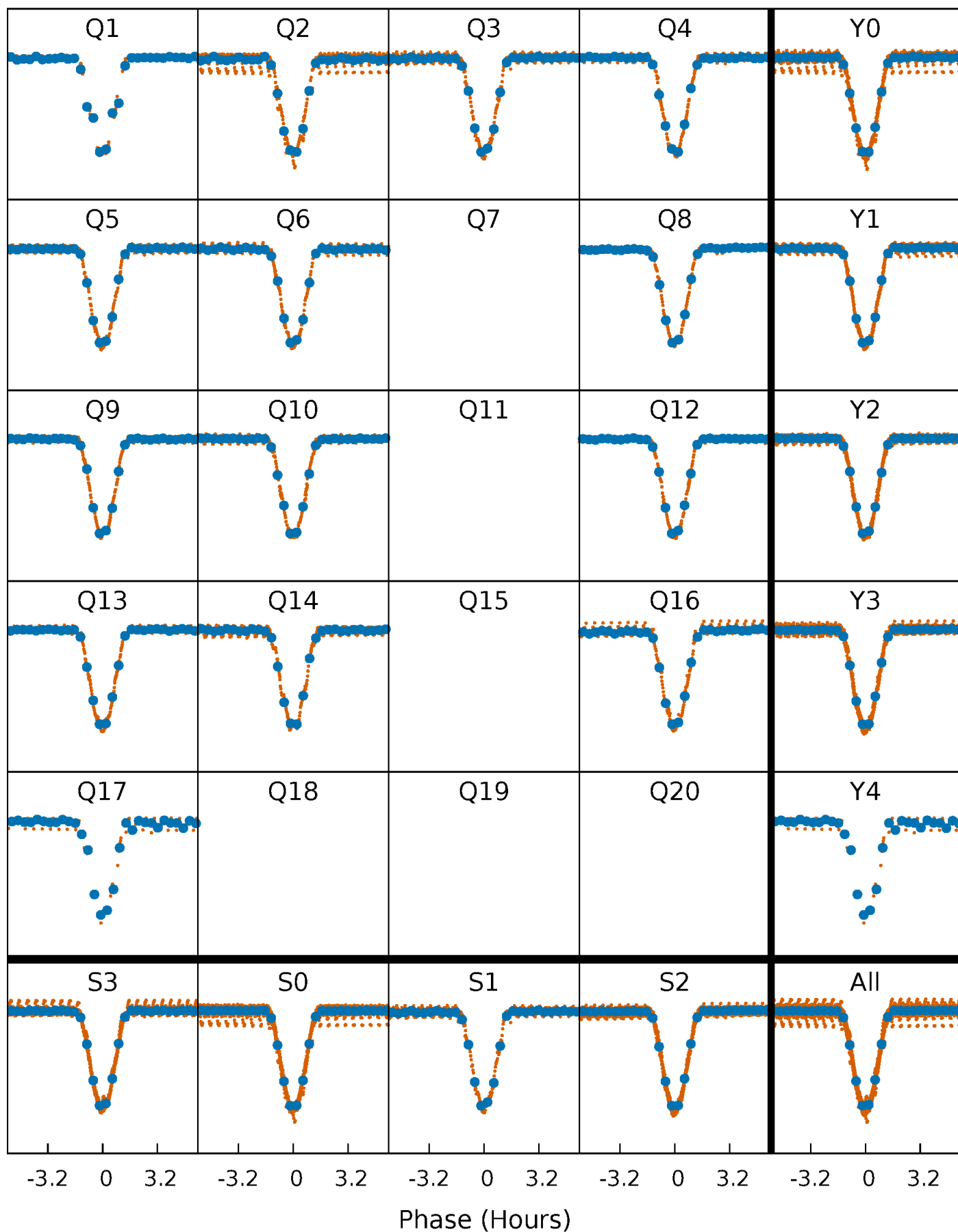


## Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

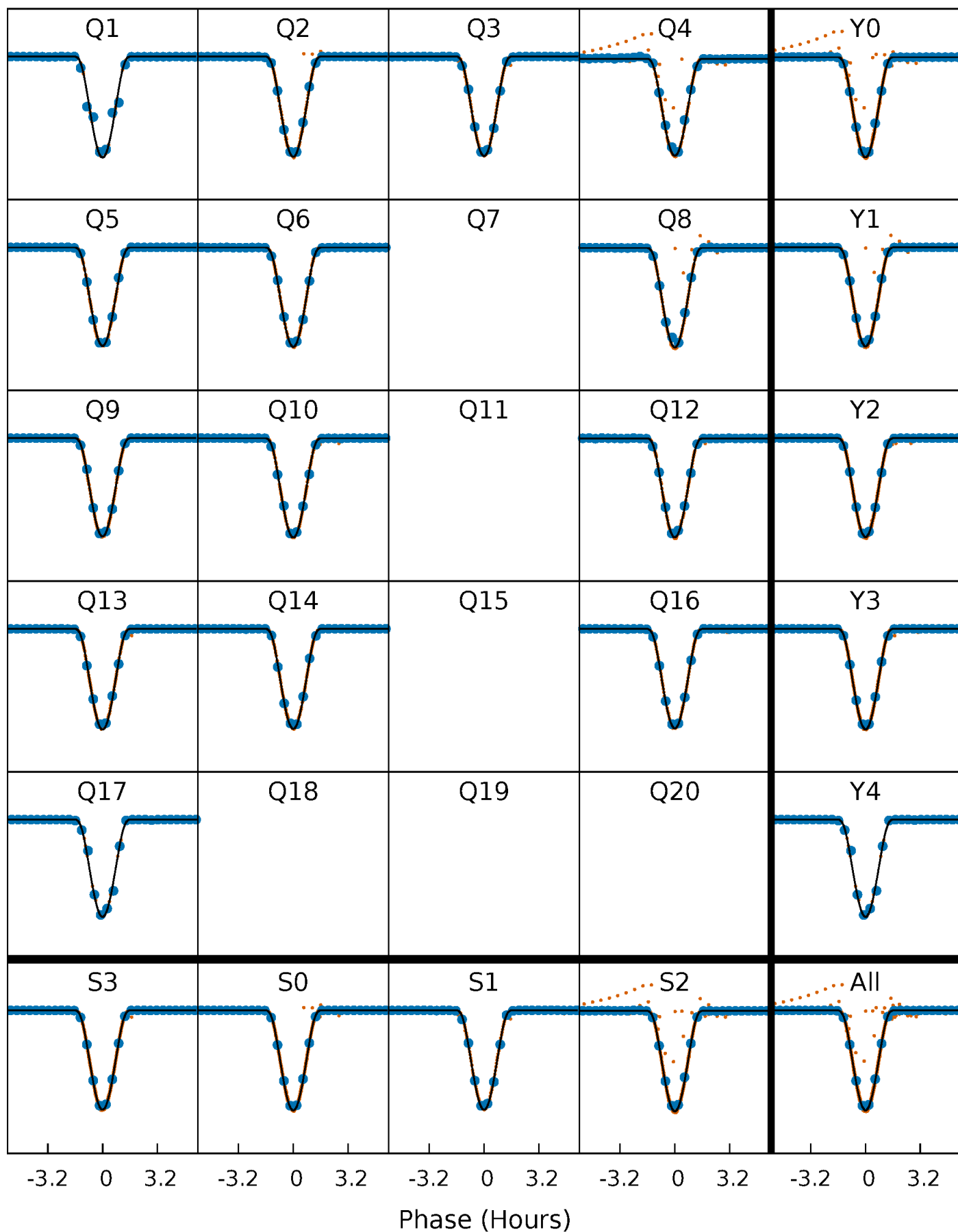
TCE 010935310-01 P= 4.128795 Days  $T_0=132.579706$  (BKJD)





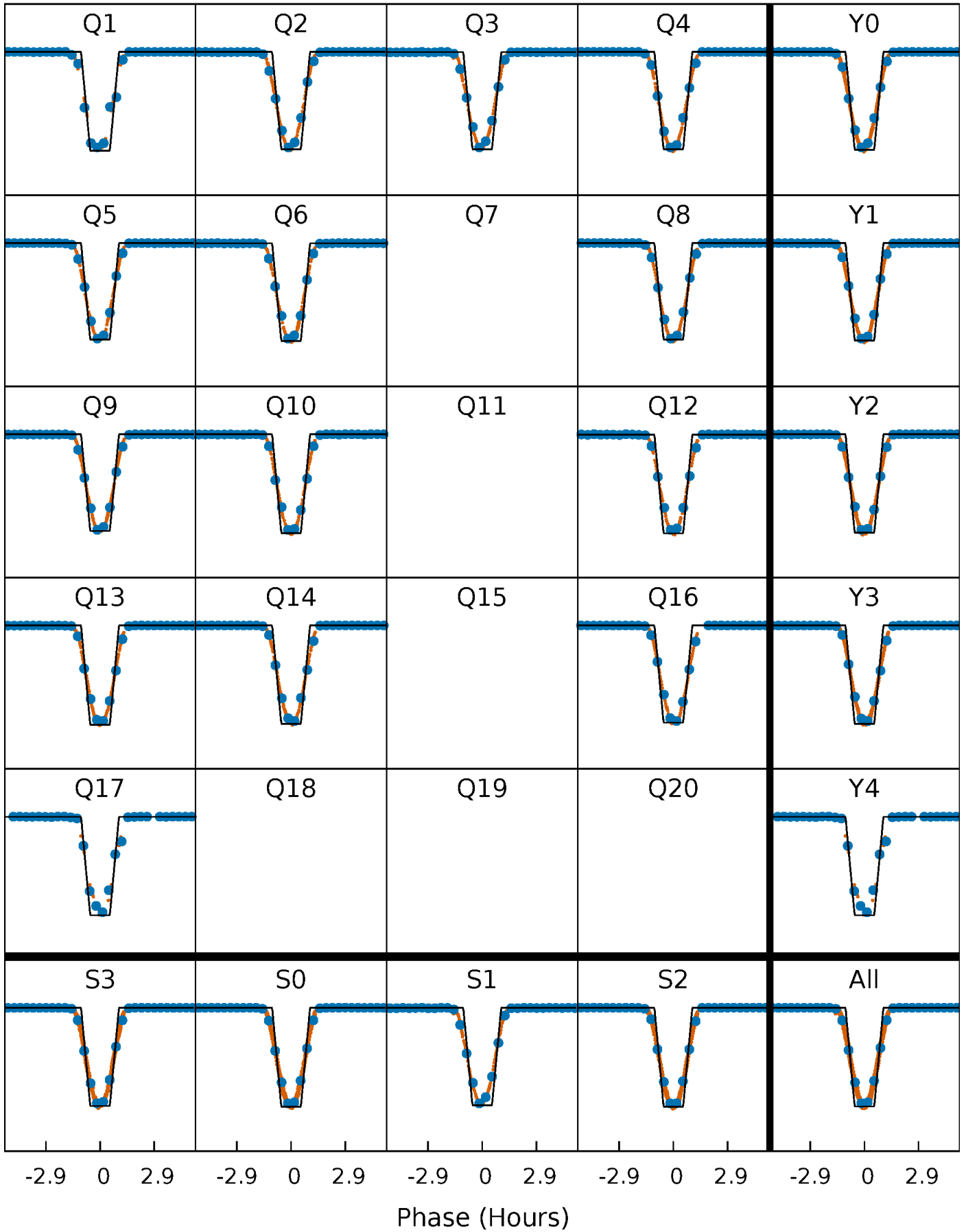
# DV Quarter-Phased Transit Curves

TCE 010935310-01 P= 4.128795 Days  $T_0=132.579706$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

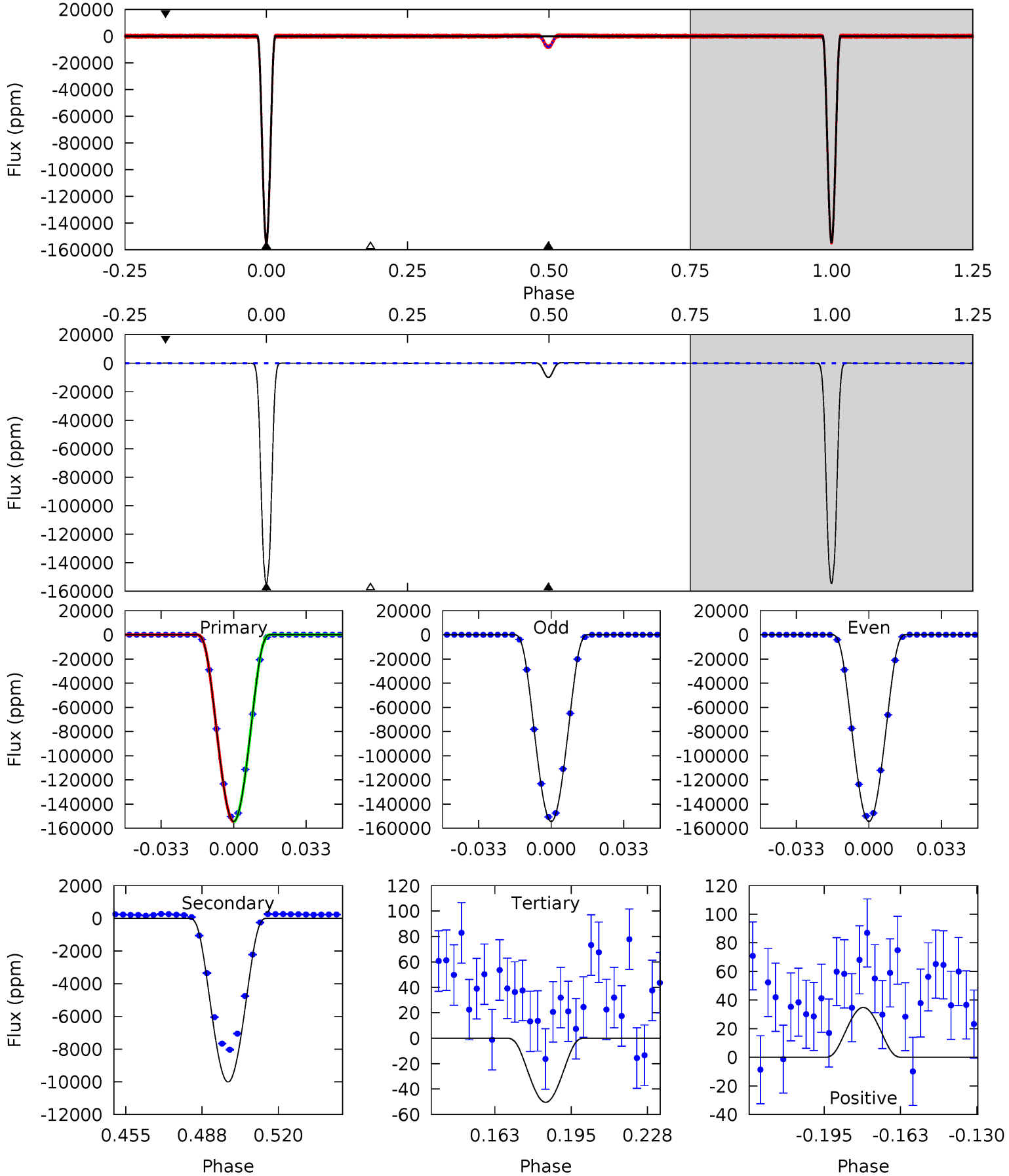
TCE 010935310-01 P= 4.128782 Days  $T_0=132.582393$  (BKJD)



# DV Model-Shift Uniqueness Test

010935310-01, P = 4.128795 Days, E = 128.450911 Days

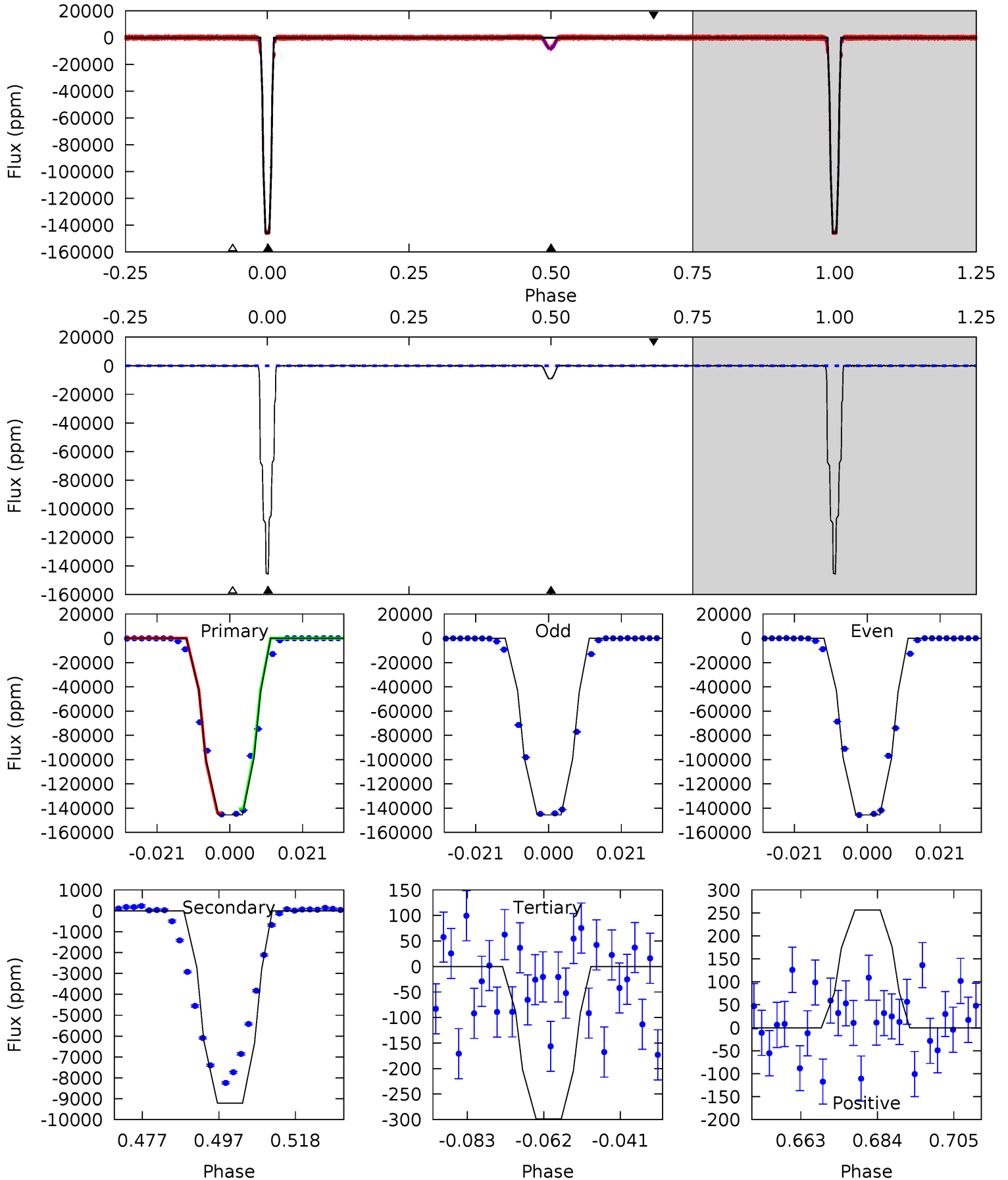
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
16646	1079	5.44	3.76	4.80	2.14	7.57	16640	16642	1074	1075	3.02	0.99	0.00	1.98



# Alt Model-Shift Uniqueness Test

010935310-01, P = 4.128782 Days, E = 128.453611 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
2957	187.1	6.07	5.21	4.88	2.31	1.88	2951	2951	181.0	181.9	0.43	0.99	0.00	0



### Stellar Parameters For KIC 010935310

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5949^{+160}_{-160}$	$4.311^{+0.209}_{-0.190}$	$-0.400^{+0.300}_{-0.300}$	$1.083^{+0.292}_{-0.239}$	$0.876^{+0.120}_{-0.076}$	$0.971^{+0.916}_{-0.464}$
	+3%/-3%	+5%/-4%	+75%/-75%	+27%/-22%	+14%/-9%	+94%/-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 010935310-01 / KOI 6083.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-10012 \pm 9$	$64.10^{+11.20}_{-8.64}$	$1737^{+134}_{-120}$	$3117^{+90}_{-73}$	$3.159^{+1.113}_{-0.823}$
Alt.	$-9213 \pm 49$	$46.73^{+8.08}_{-7.22}$	$1739^{+125}_{-130}$	$3419^{+111}_{-108}$	$5.546^{+2.079}_{-1.542}$

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

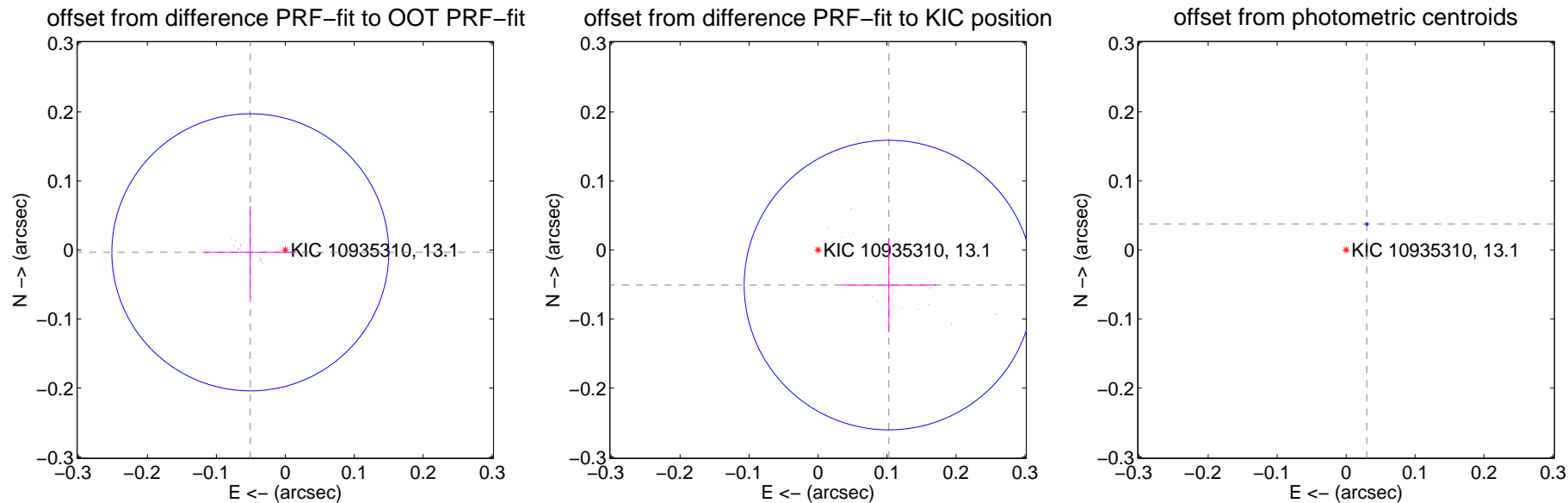
## DV Centroid Data

Supplemental centroid analysis for 010935310-01. Kepler magnitude: 13.10. Transit SNR 9525.93

There are 14 quarters with good PRF difference image offsets

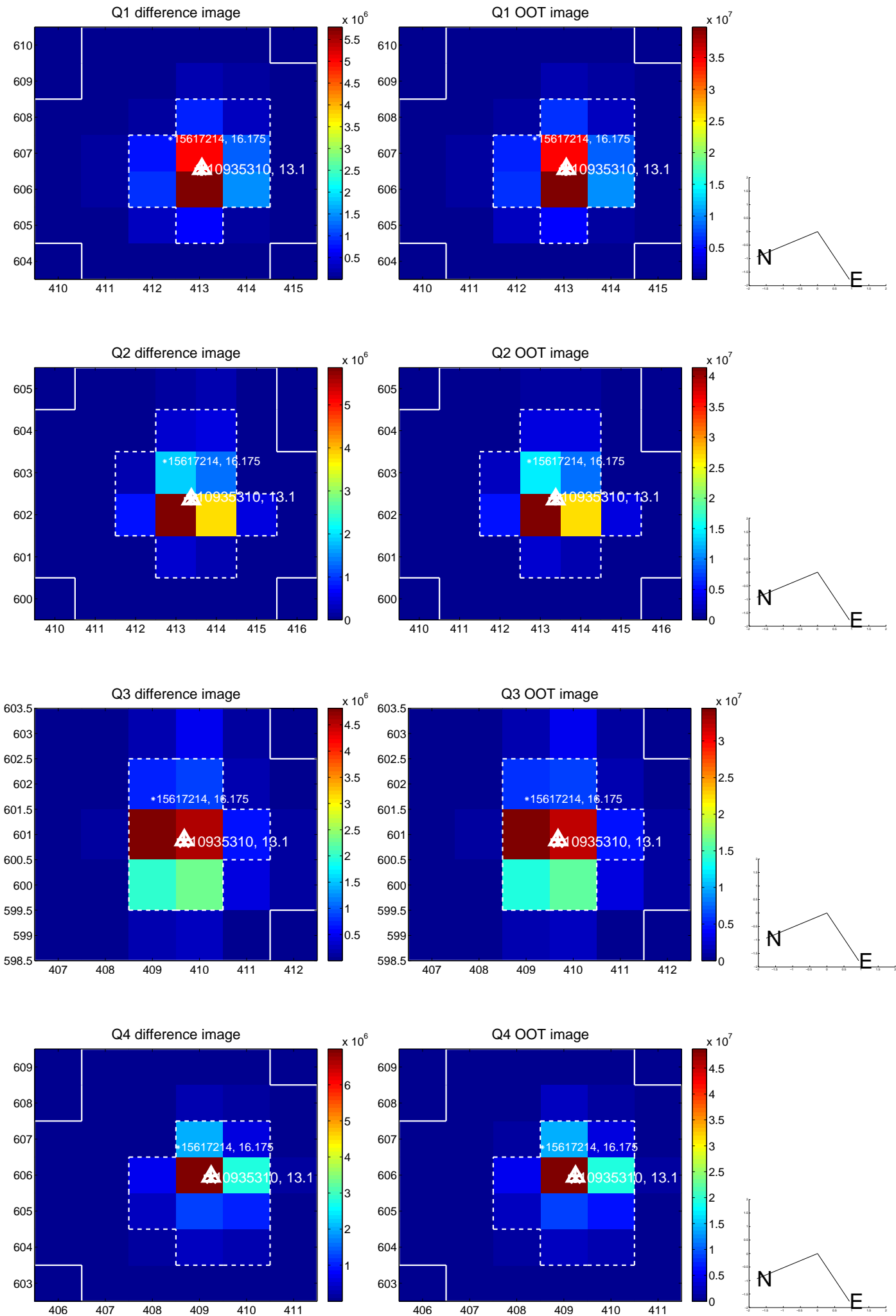
The direct PRF centroid is offset from the target star catalog position by about 0.16 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.051 \pm 0.067$	0.76	$0.051 \pm 0.067$	$-0.003 \pm 0.067$
PRF-fit source offset from KIC position	$0.115 \pm 0.070$	1.64	$-0.103 \pm 0.069$	$-0.051 \pm 0.068$
photometric centroid source offset	$0.05 \pm 0.00$	82.20	$-0.03 \pm 0.00$	$0.04 \pm 0.00$

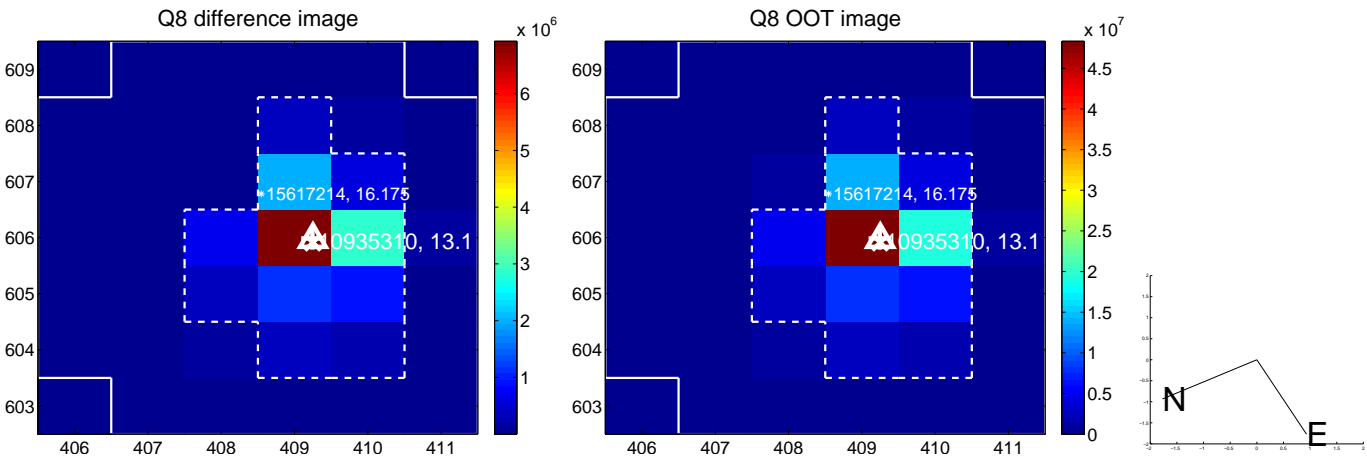
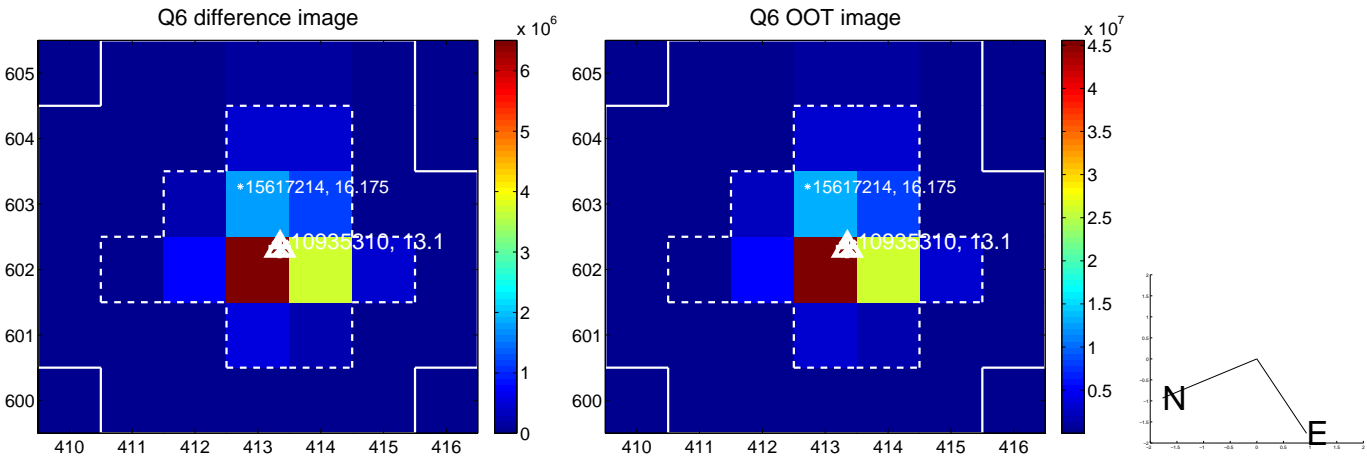
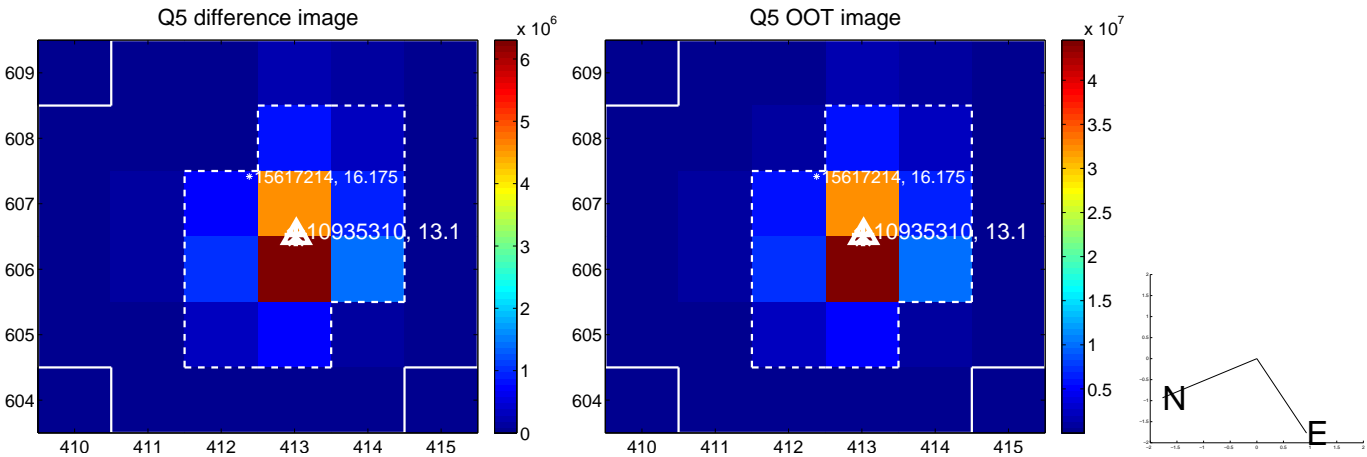


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

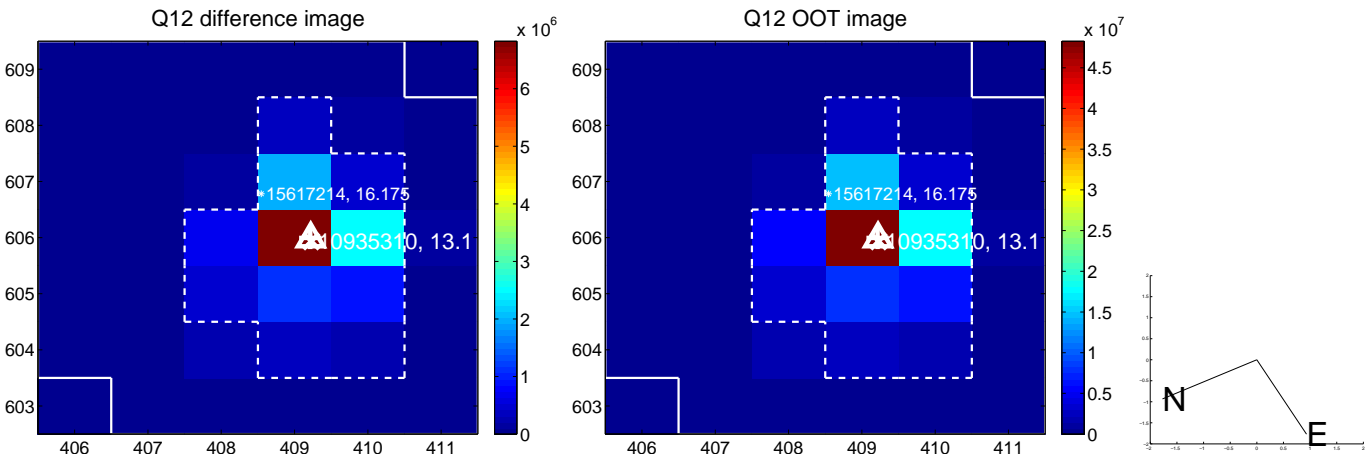
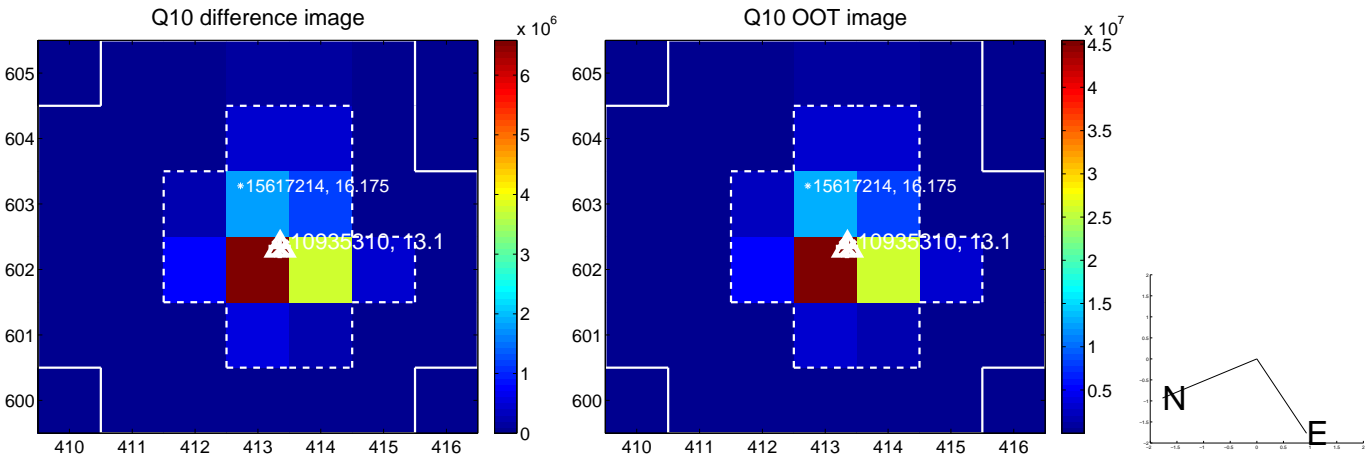
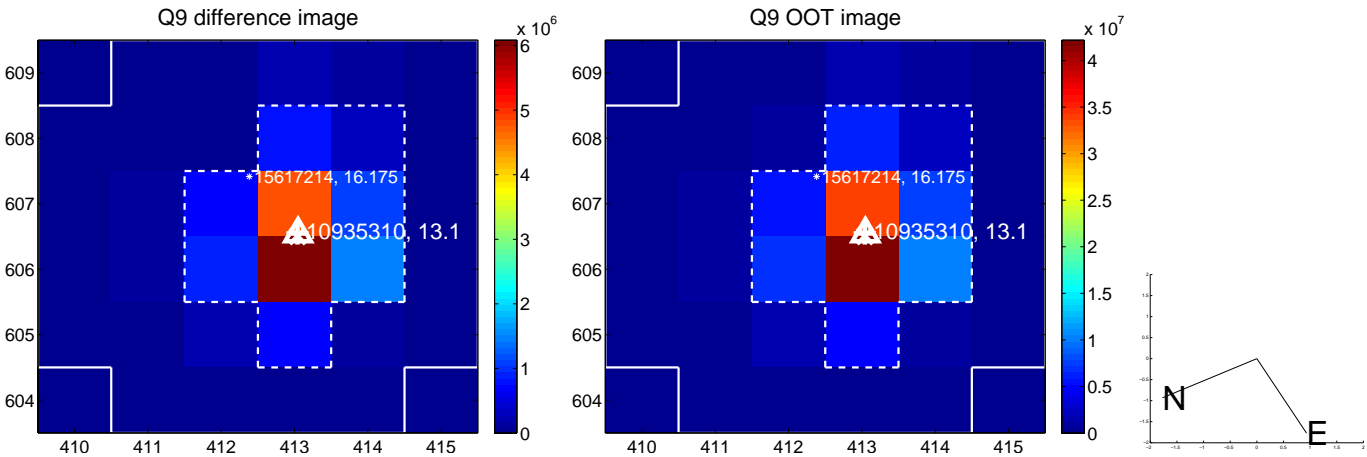


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

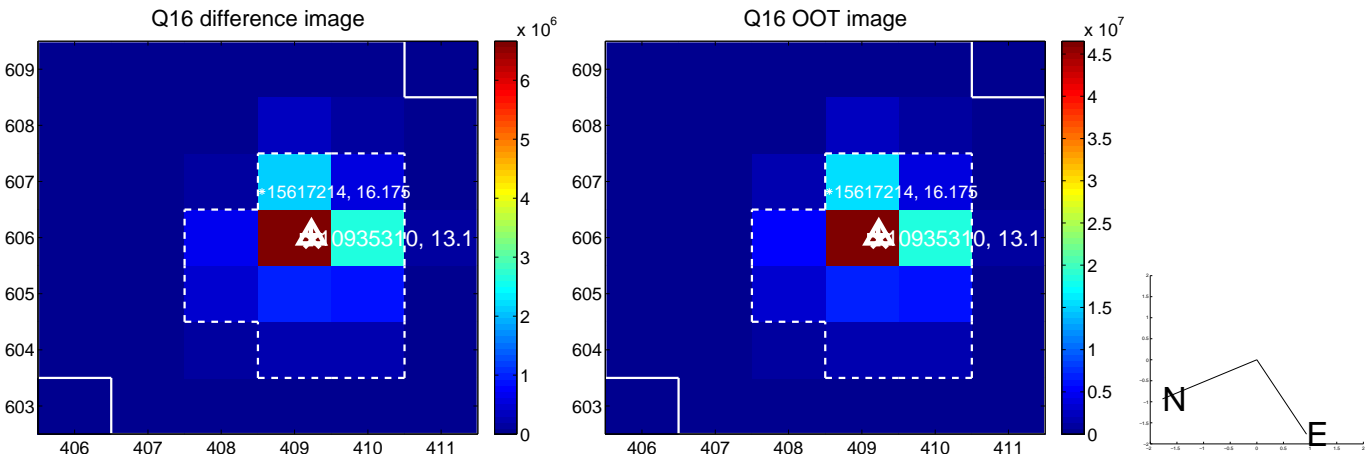
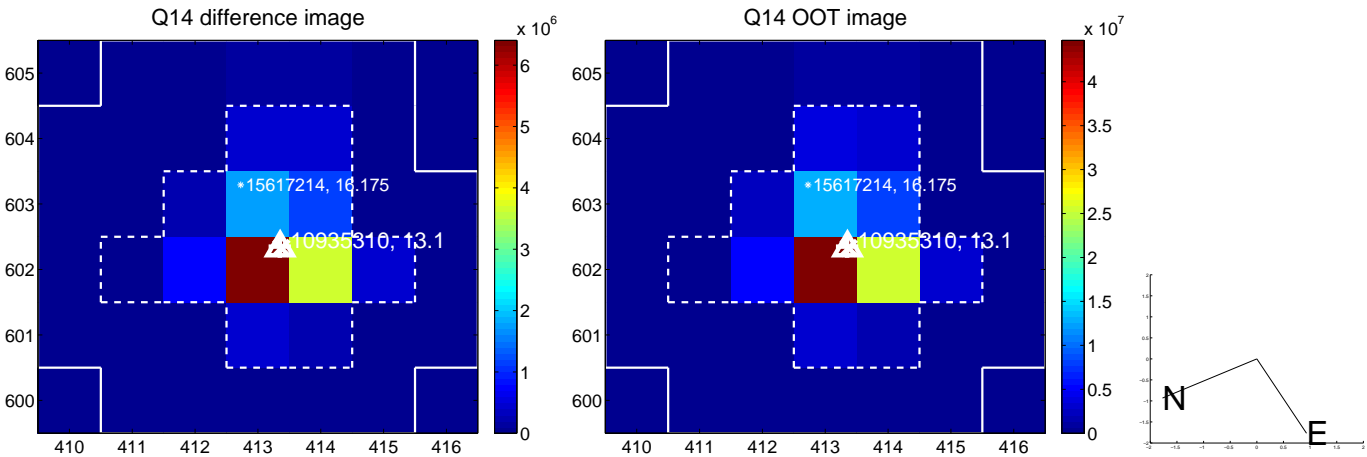
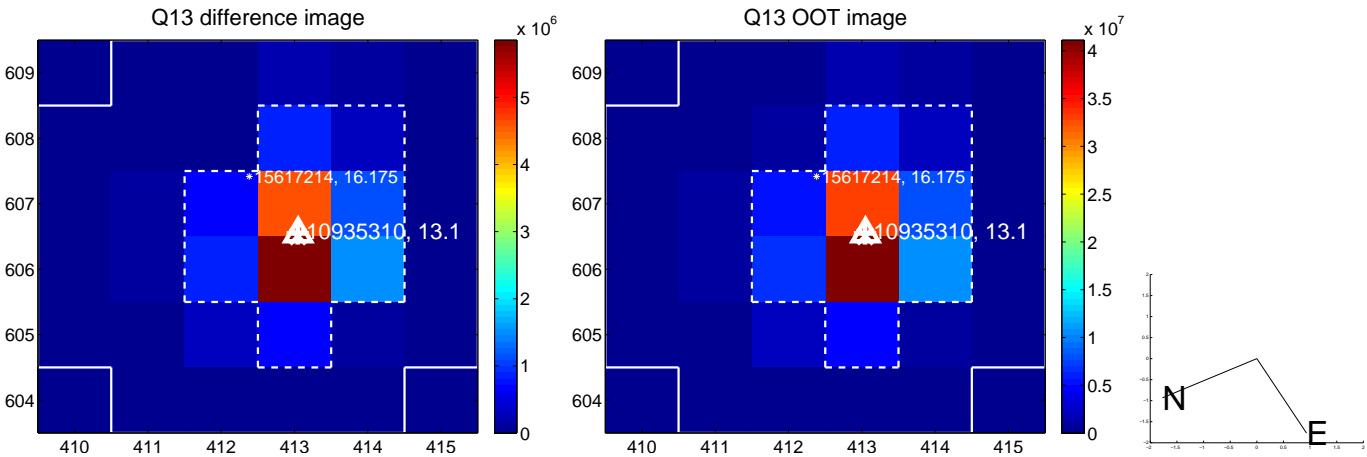




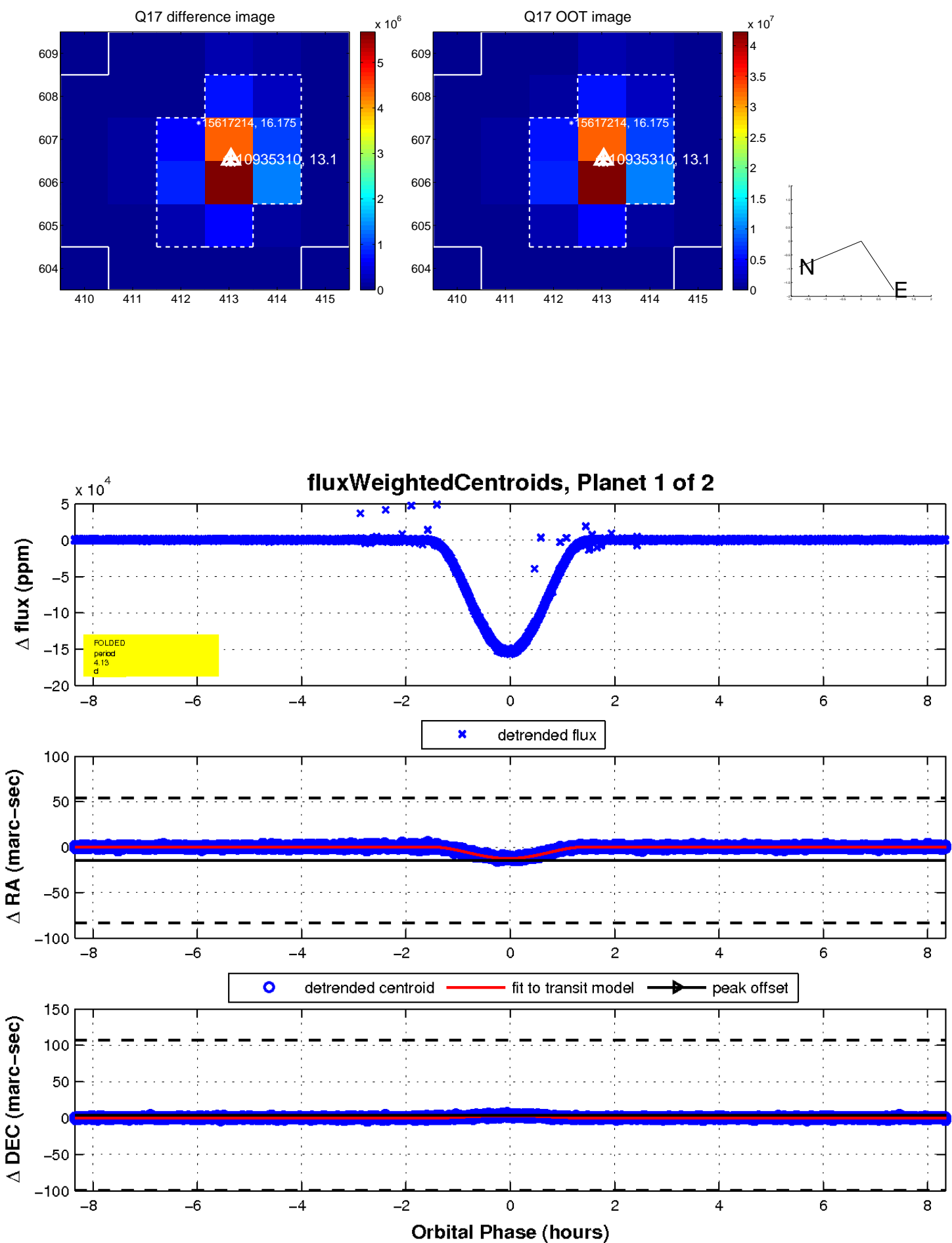
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

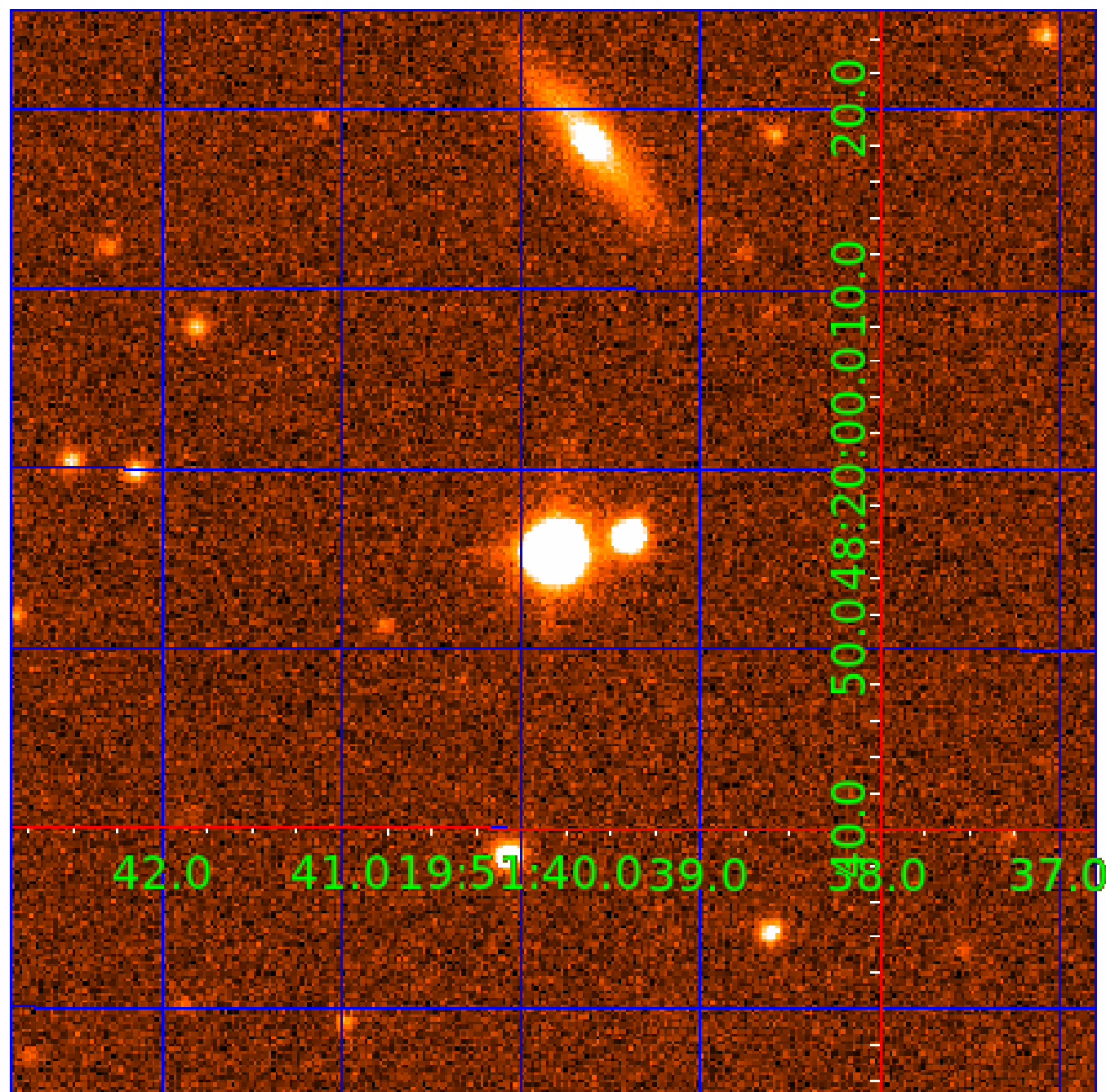


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 010935310

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010935310-01	OBS	6083.01	4.128795	132.579706	154696.5	2.784	13815.1	9525.9	1.08	5949	63.84	566.66
010935310-02	OBS	No	4.128793	134.639729	8459.0	2.829	839.5	819.7	1.08	5949	17.98	566.66

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010935310-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—DEEP_V_SHAPED—HAS_SEC_TCE
010935310-02	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.

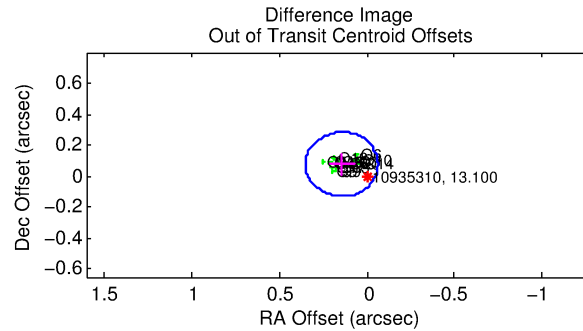
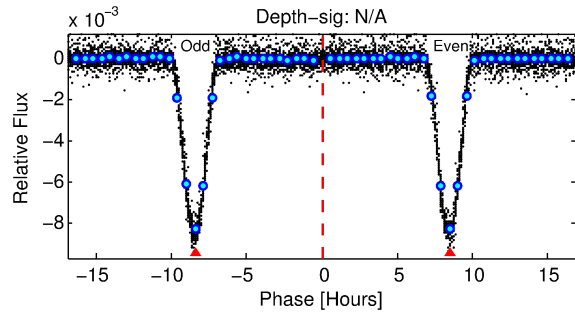
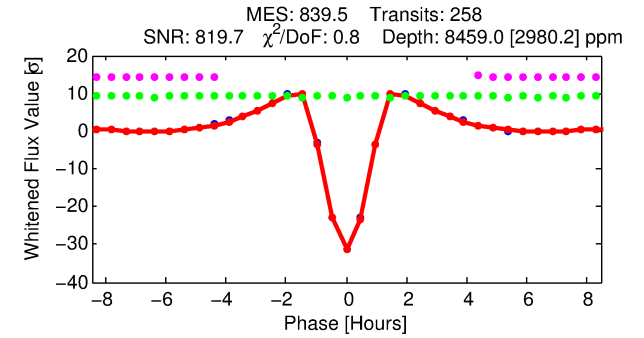
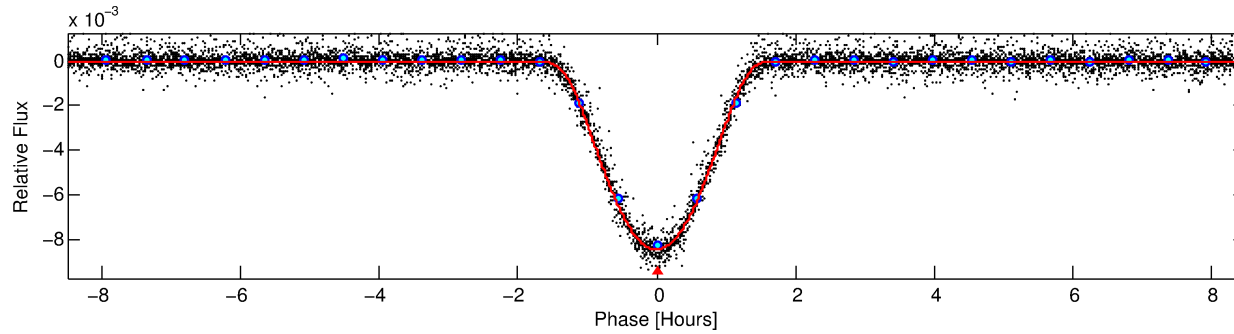
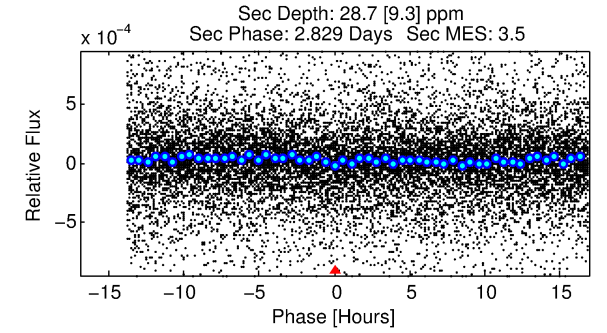
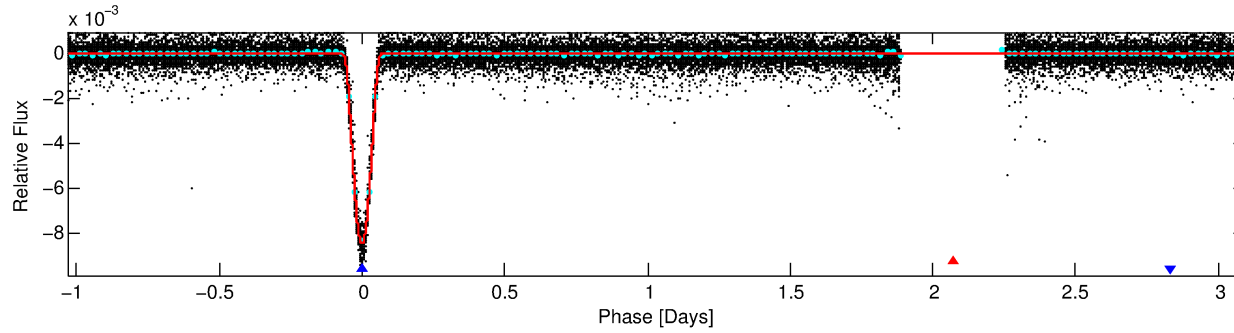
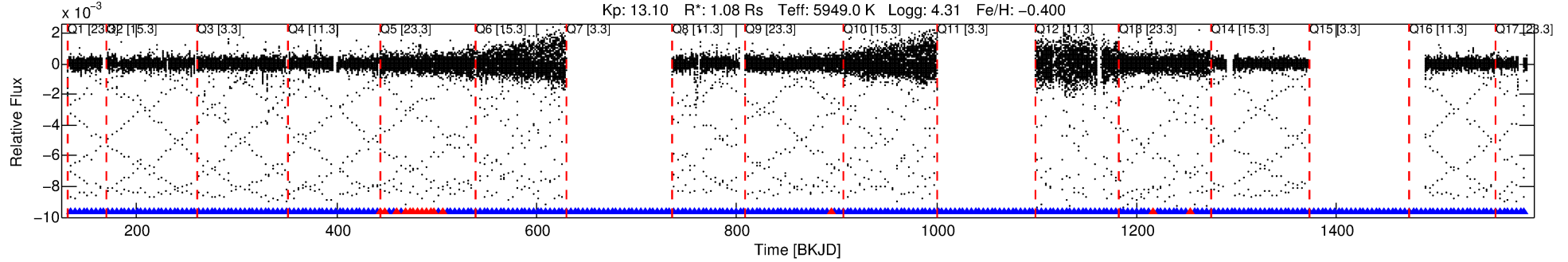
## Ephemeris Match Information For 010935310-02

No Significant Match Found

# DV One-Page Summary

KIC: 10935310 Candidate: 2 of 2 Period: 4.129 d  
KOI: K06083 Corr: No Ephemeris Match

Kp: 13.10 R\*: 1.08 Rs Teff: 5949.0 K Logg: 4.31 Fe/H: -0.400



## DV Fit Results:

Period = 4.12879 [0.00000] d  
Epoch = 134.6397 [0.0000] BKJD  
Rp/R\* = 0.1521 [0.0087]  
a/R\* = 6.46 [0.06]  
b = 1.00 [0.02]  
Seff = 566.66 [217.12]  
Teff = 1244 [119] K  
Rp = 17.98 [4.96] Re  
a = 0.0482 [0.0116] AU  
Ag = 0.11 [0.06] [-15.50σ]  
Teffp = 1117 [100] K [-0.82σ]

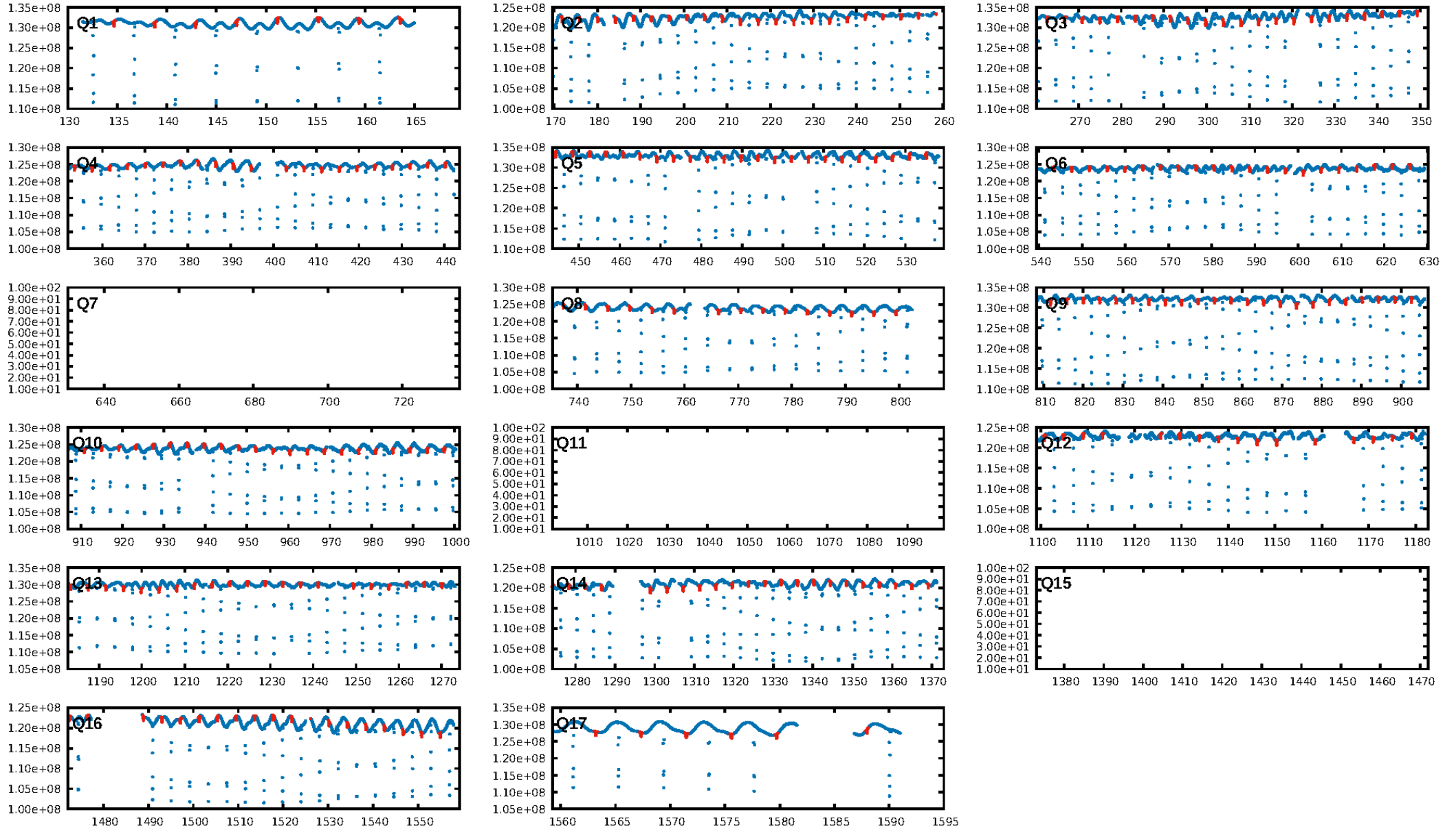
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 0.94 [229/244]  
GhostDiagnostic-chr: 2.673  
Centroid-sig: 0.0%  
Centroid-so: 0.170 arcsec [18.46σ]  
OotOffset-rm: 0.163 arcsec [2.36σ]  
KicOffset-rm: 0.030 arcsec [0.43σ]  
OotOffset-st: 4/1/4/5 [14]  
KicOffset-st: 4/1/4/5 [14]  
DiffImageQuality-fgm: 1.00 [14/14]  
DiffImageOverlap-fno: 1.00 [14/14]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 11:06:31 Z

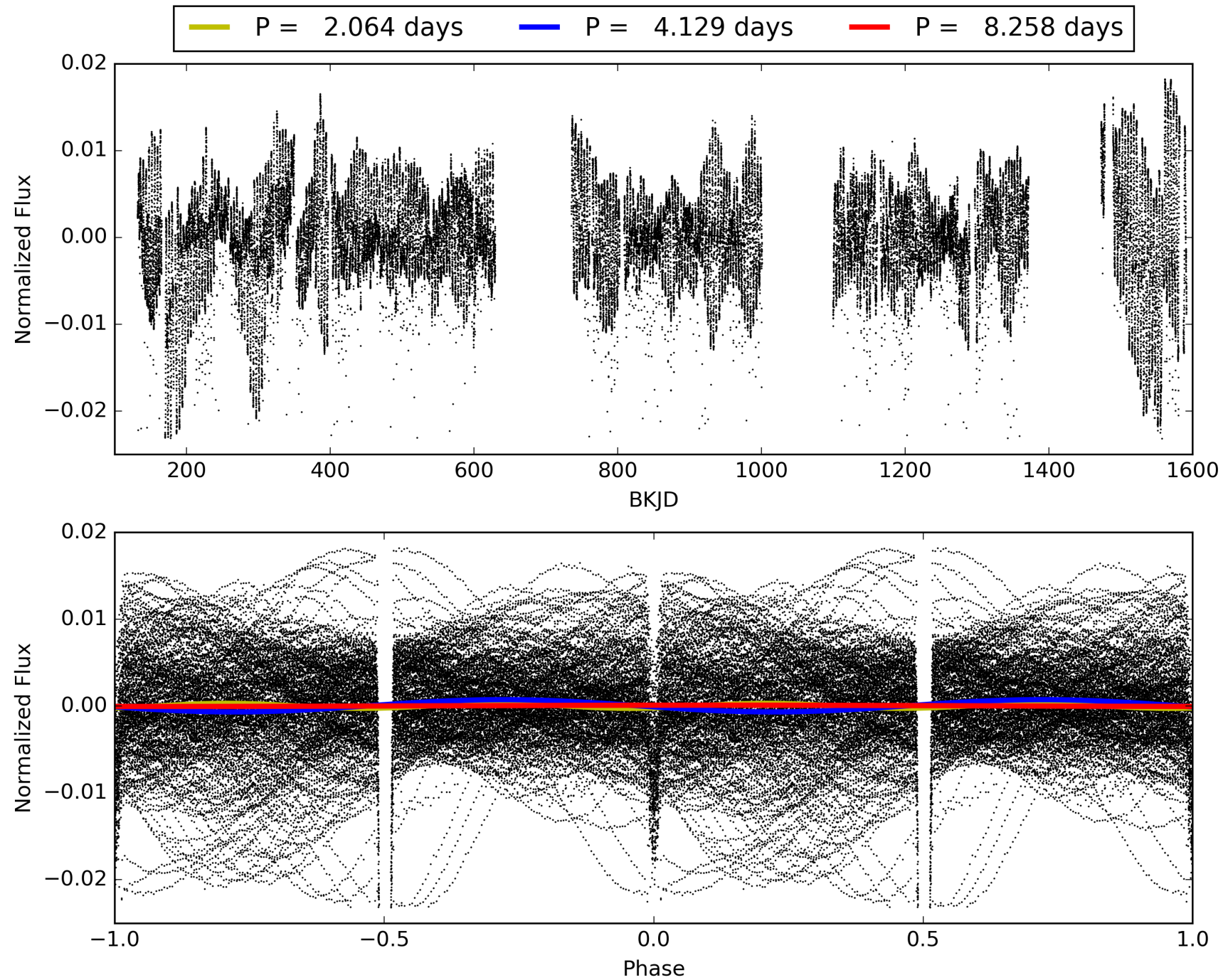
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 010935310-02, PDC Light Curves





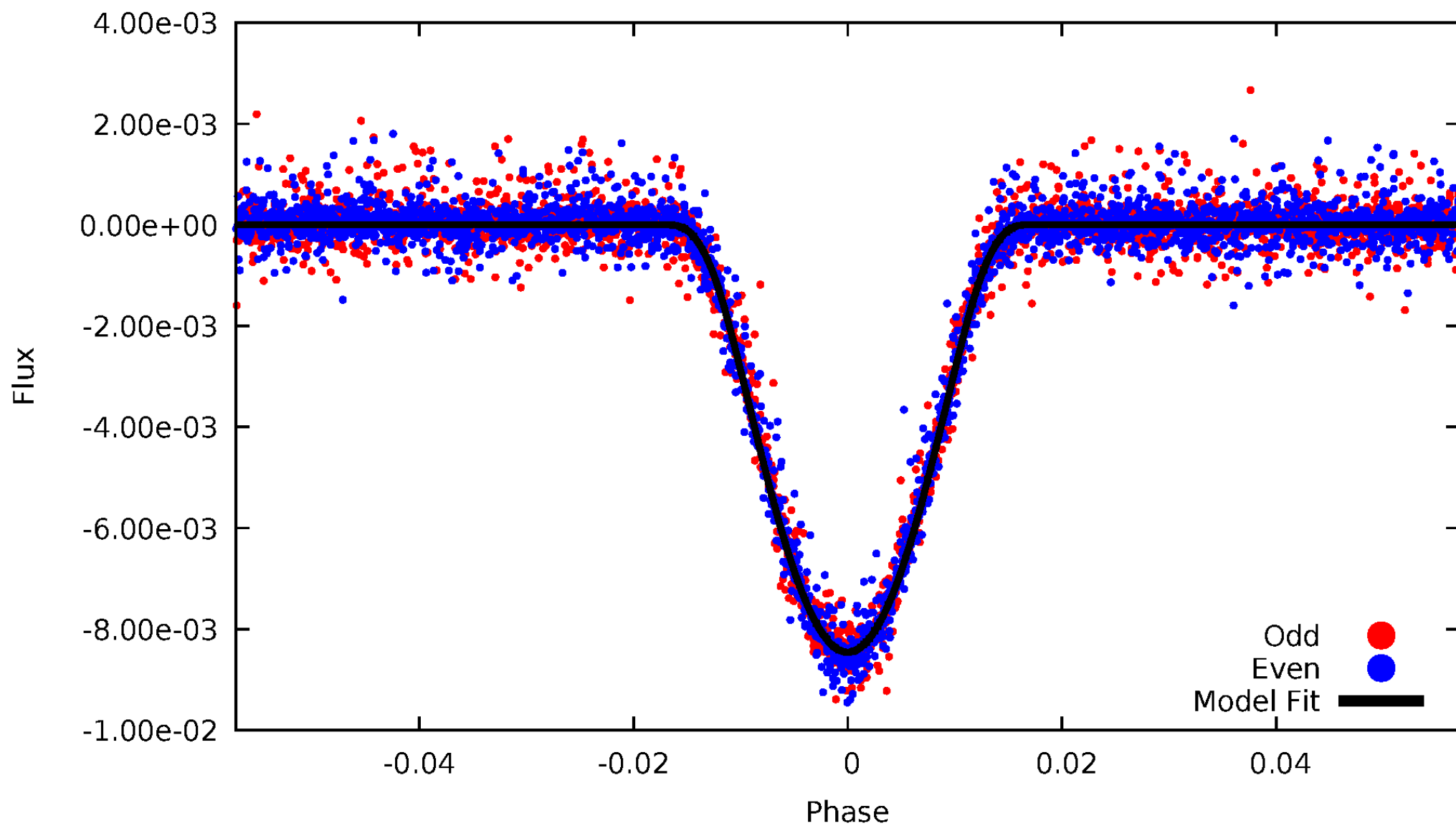
TCE 010935310-02





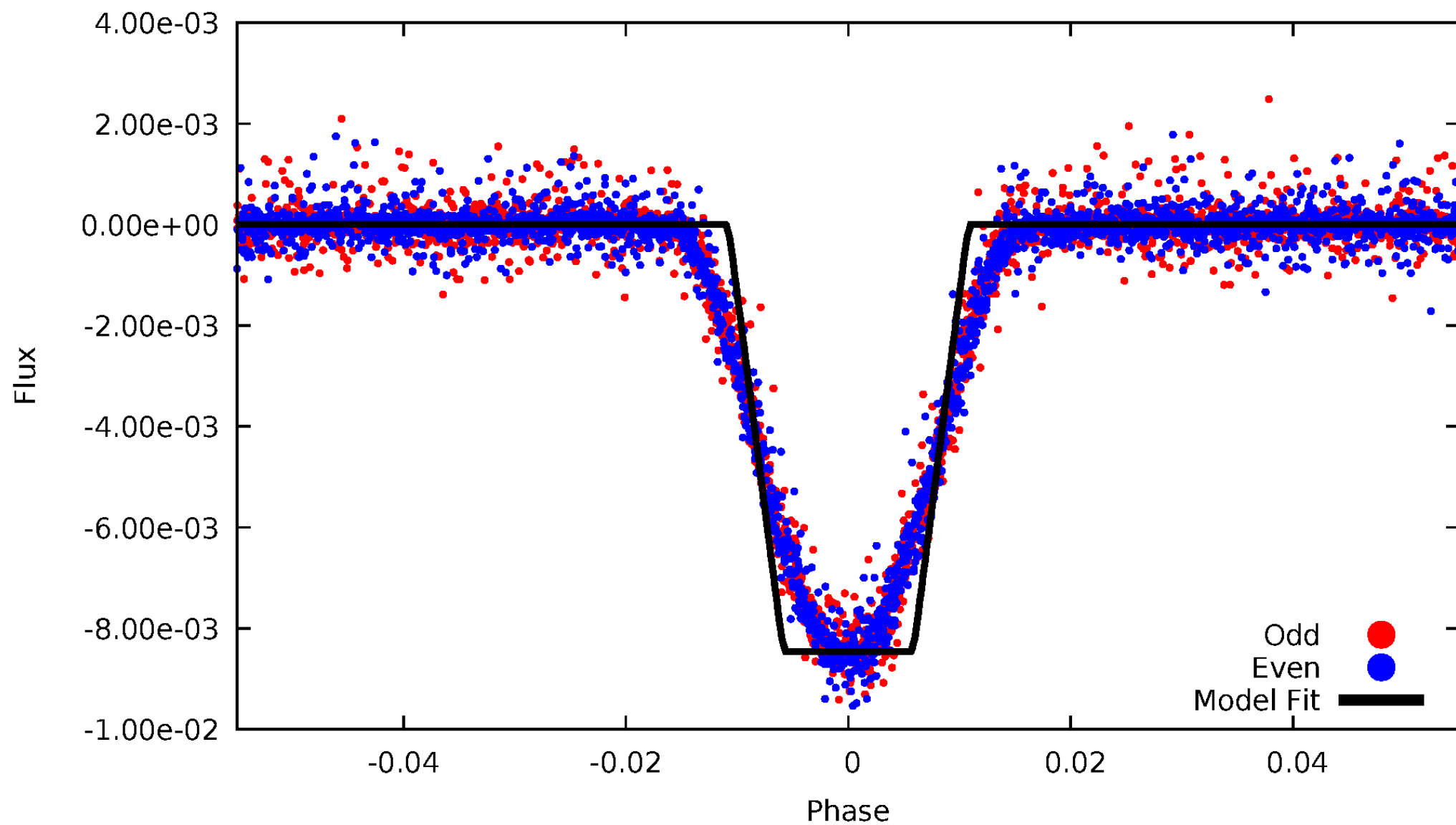
# DV Odd/Even

TCE 010935310-02



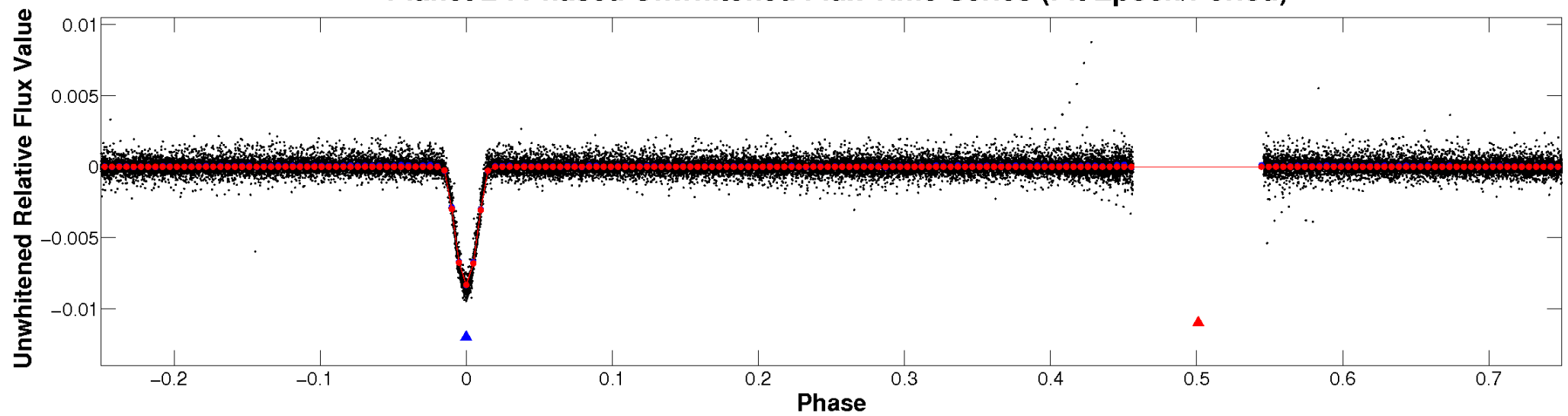
# ALT Odd/Even

TCE 010935310-02

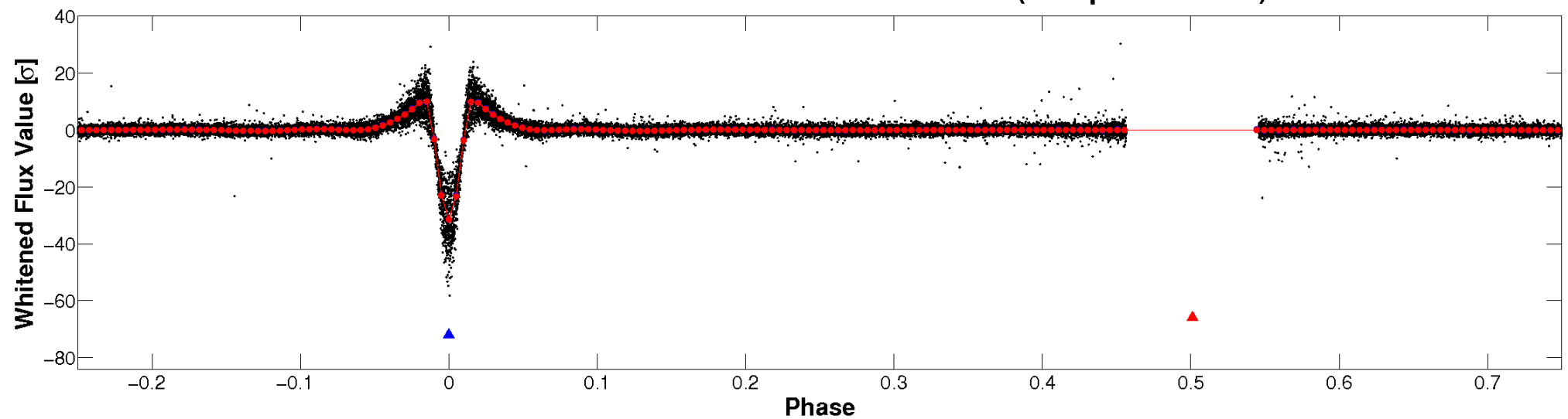


# Non-Whitened Vs. Whitened Light Curve

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

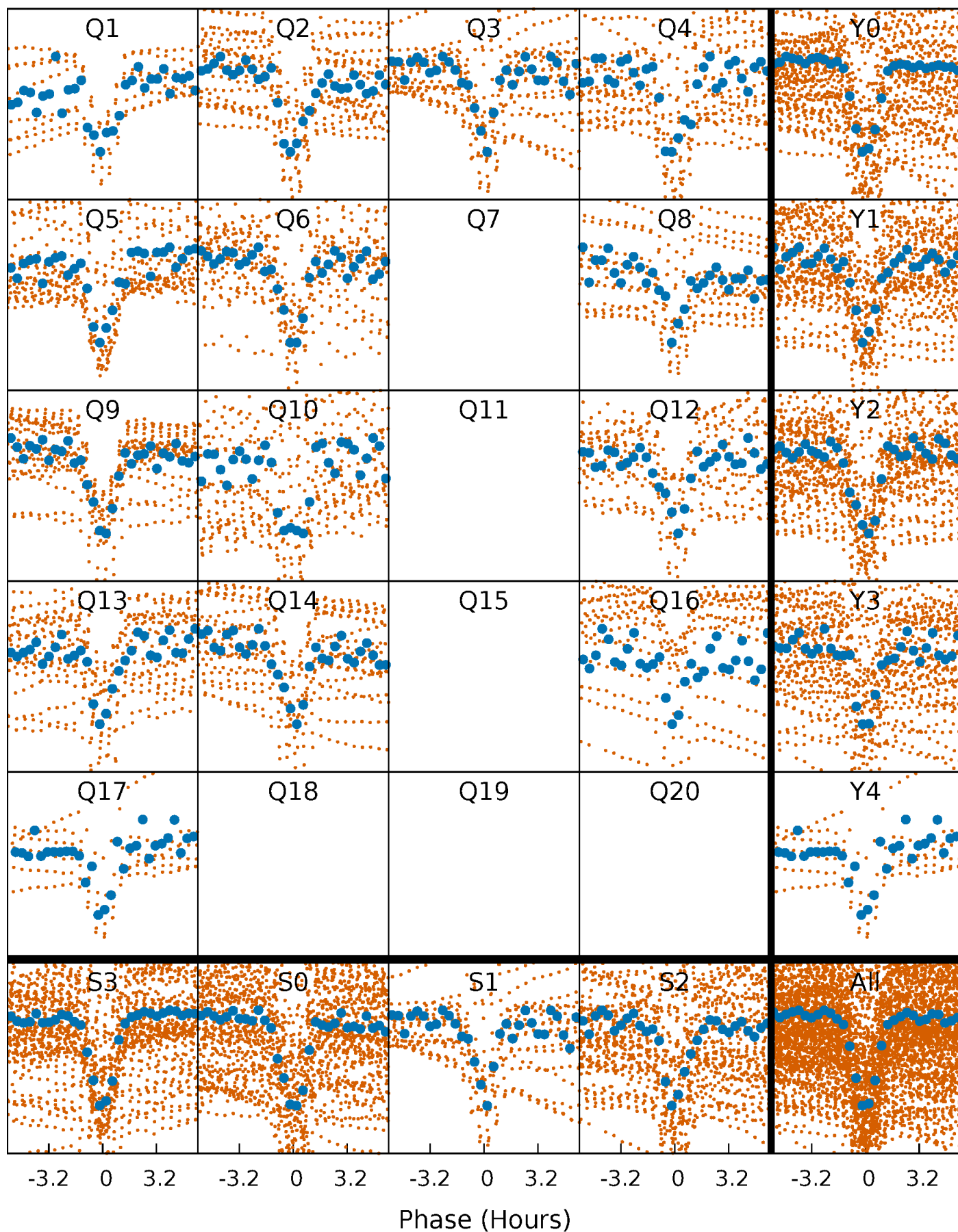


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



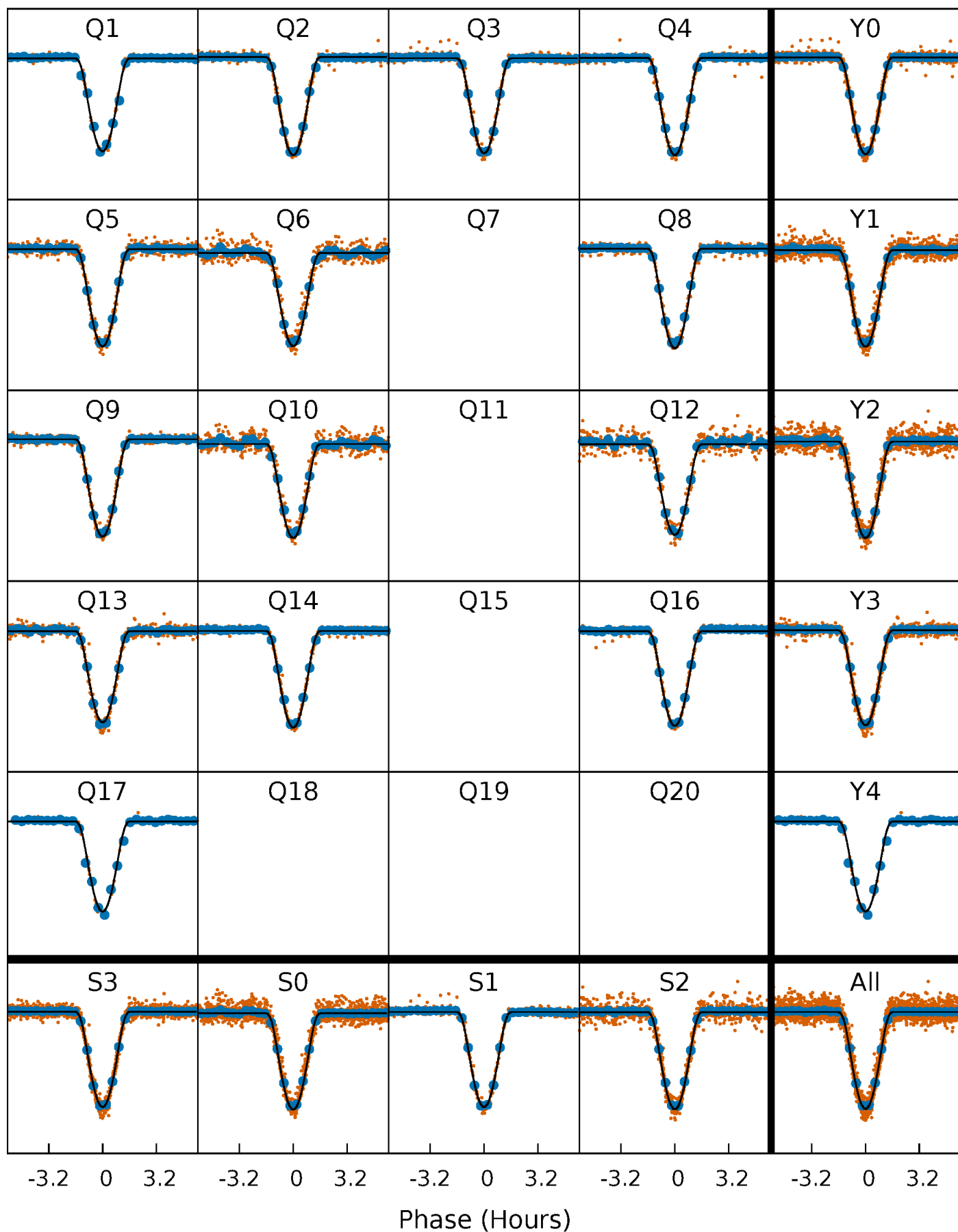
# PDC Quarter-Phased Transit Curves

TCE 010935310-02 P= 4.128793 Days  $T_0=134.639729$  (BKJD)



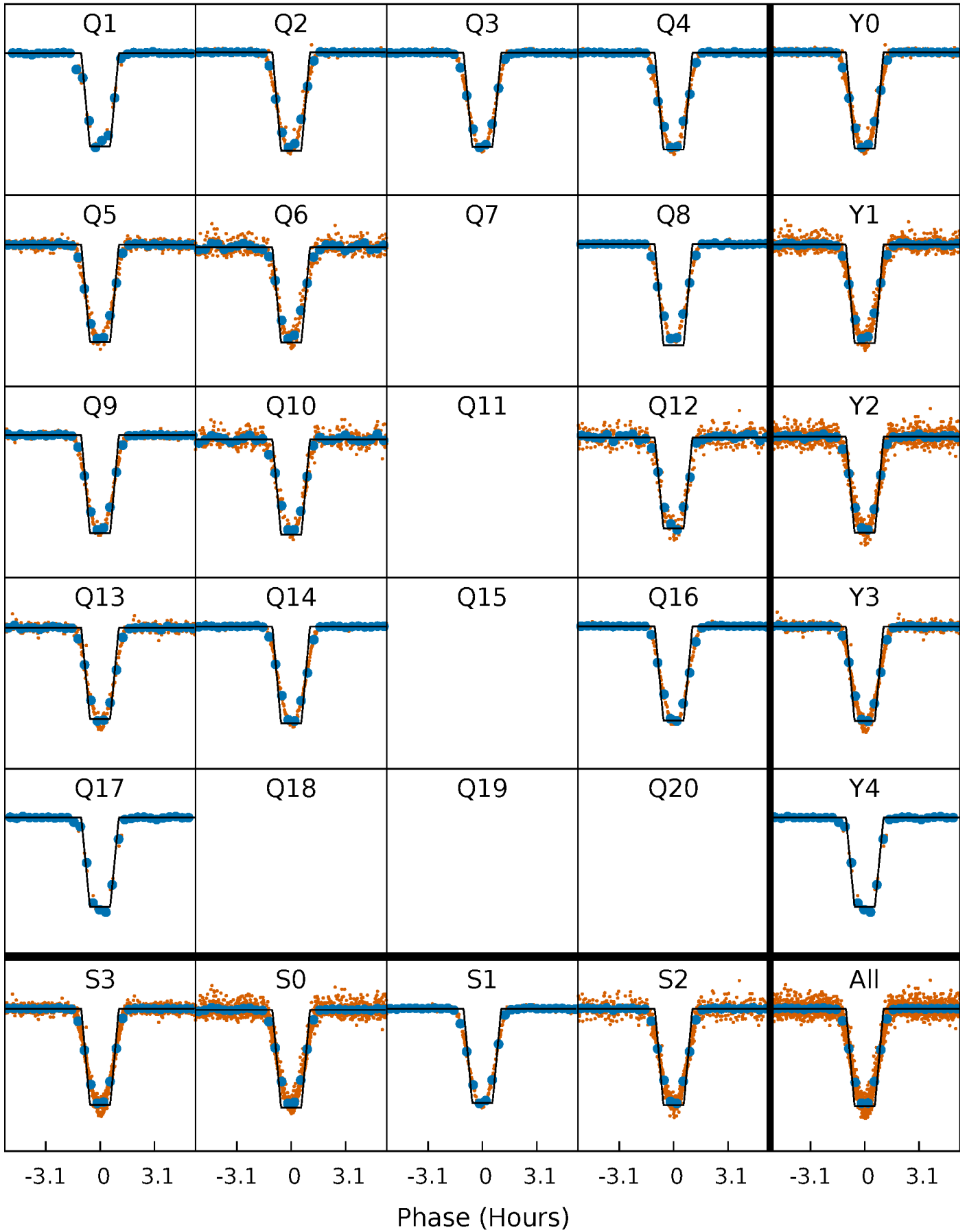
# DV Quarter-Phased Transit Curves

TCE 010935310-02   P= 4.128793 Days    $T_0=134.639729$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

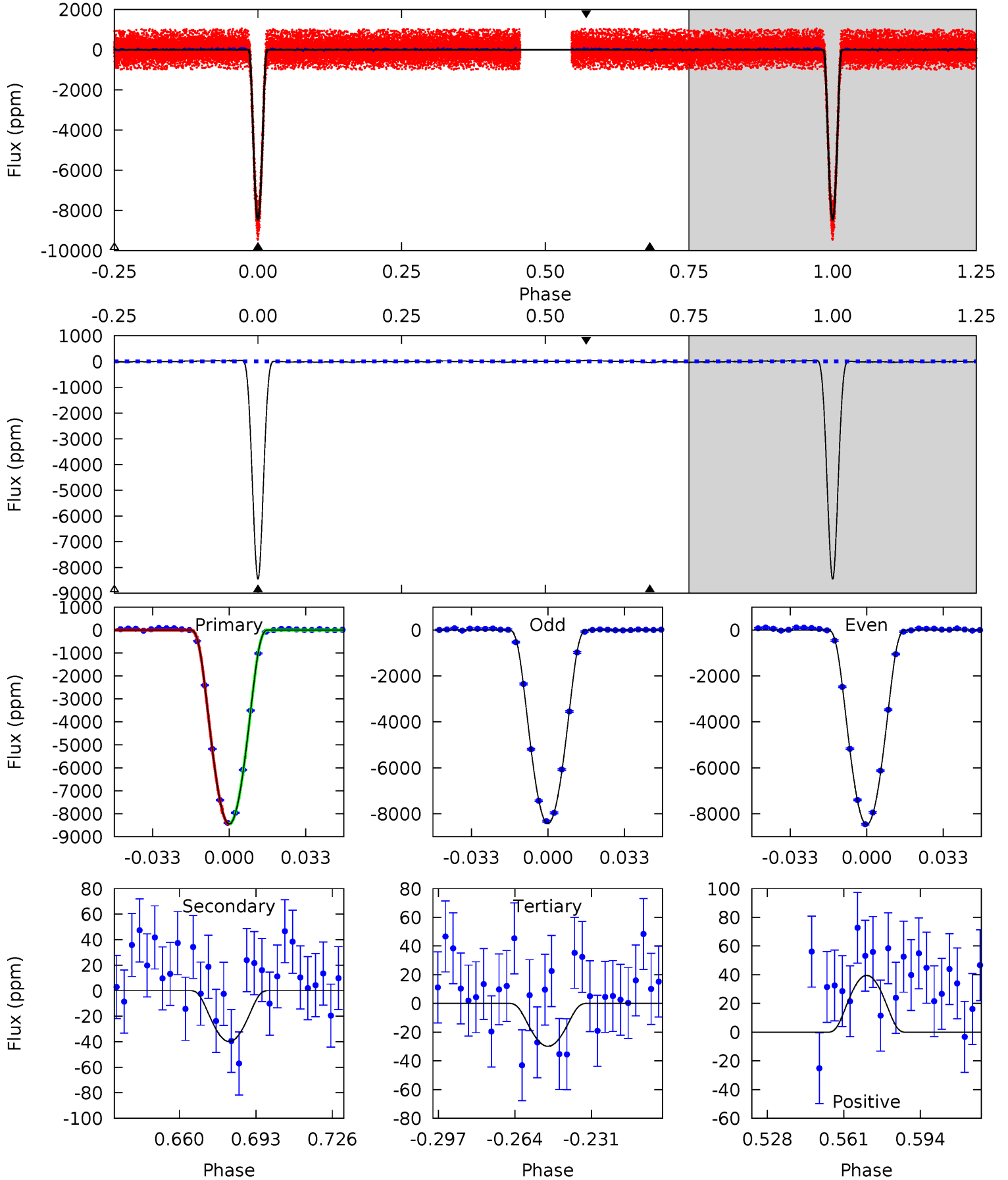
TCE 010935310-02     $P = 4.128782$  Days     $T_0 = 134.641515$  (BKJD)



# DV Model-Shift Uniqueness Test

010935310-02, P = 4.128793 Days, E = 130.510936 Days

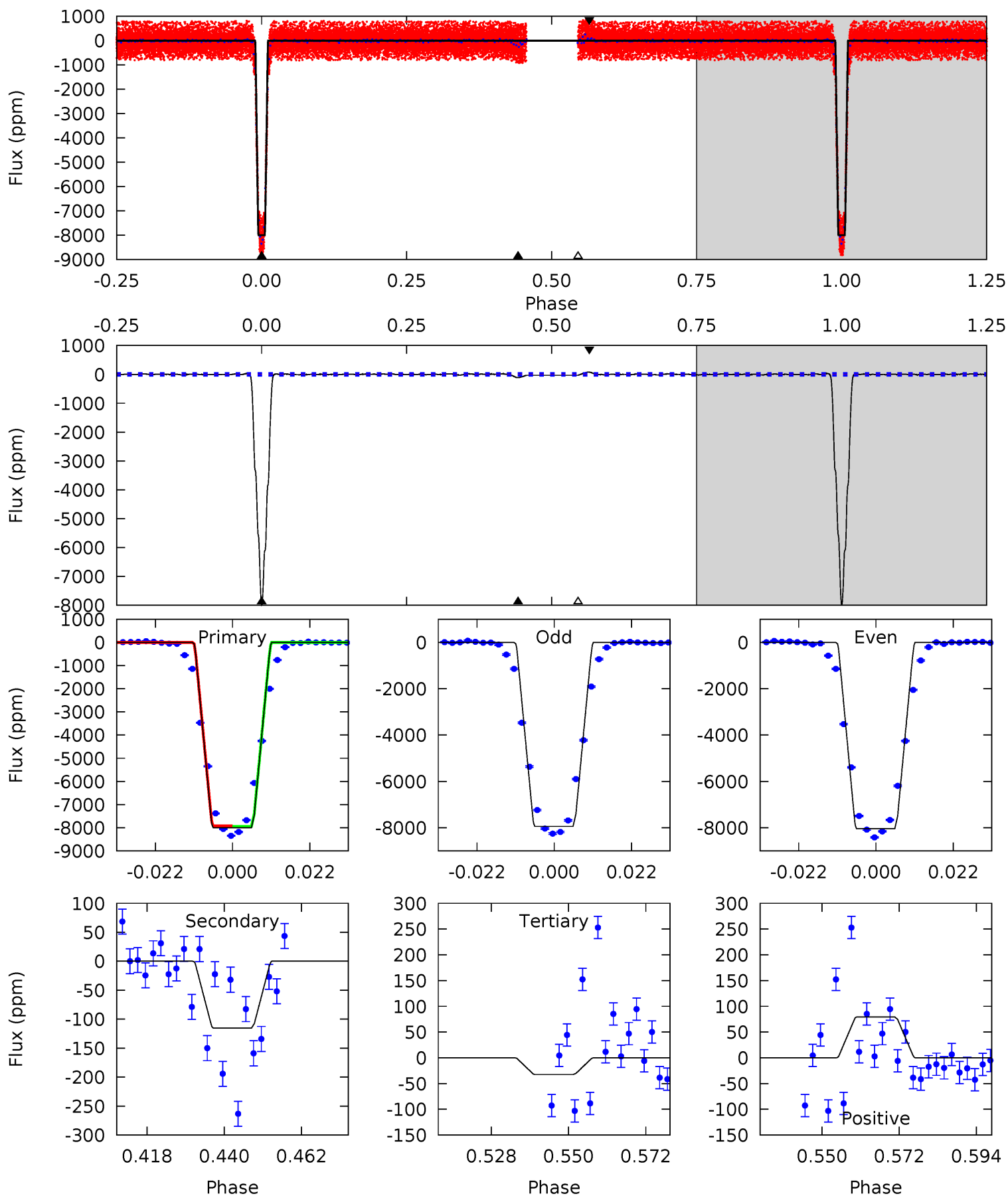
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
1113	5.25	3.93	5.21	4.79	2.13	2.13	1109	1108	1.32	0.04	2.78	1.00	0.01	1.06



# Alt Model-Shift Uniqueness Test

010935310-02, P = 4.128782 Days, E = 130.512733 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
886.6	12.8	3.60	8.81	4.87	2.29	1.33	883.0	877.8	9.19	3.98	5.58	1.00	0.01	1.94





### Stellar Parameters For KIC 010935310

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5949^{+160}_{-160}$	$4.311^{+0.209}_{-0.190}$	$-0.400^{+0.300}_{-0.300}$	$1.083^{+0.292}_{-0.239}$	$0.876^{+0.120}_{-0.076}$	$0.971^{+0.916}_{-0.464}$
	+3%/-3%	+5%/-4%	+75%/-75%	+27%/-22%	+14%/-9%	+94%/-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 010935310-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-40 \pm 8$	$17.91^{+2.78}_{-2.39}$	$1727^{+133}_{-116}$	$-2143^{+176}_{-128}$	$0.159^{+0.064}_{-0.048}$
Alt.	$-115 \pm 9$	$10.89^{+2.19}_{-1.83}$	$1737^{+147}_{-125}$	$2687^{+109}_{-107}$	$1.258^{+0.579}_{-0.371}$

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

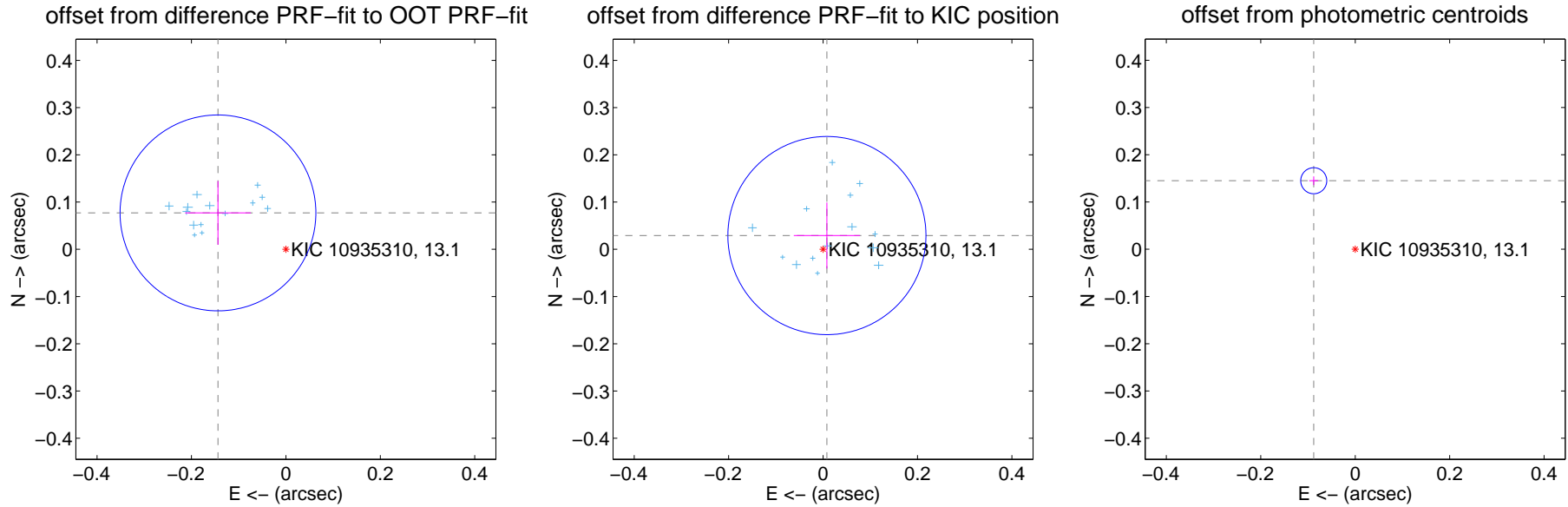
## DV Centroid Data

Supplemental centroid analysis for 010935310-02. Kepler magnitude: 13.10. Transit SNR 819.68

There are 14 quarters with good PRF difference image offsets

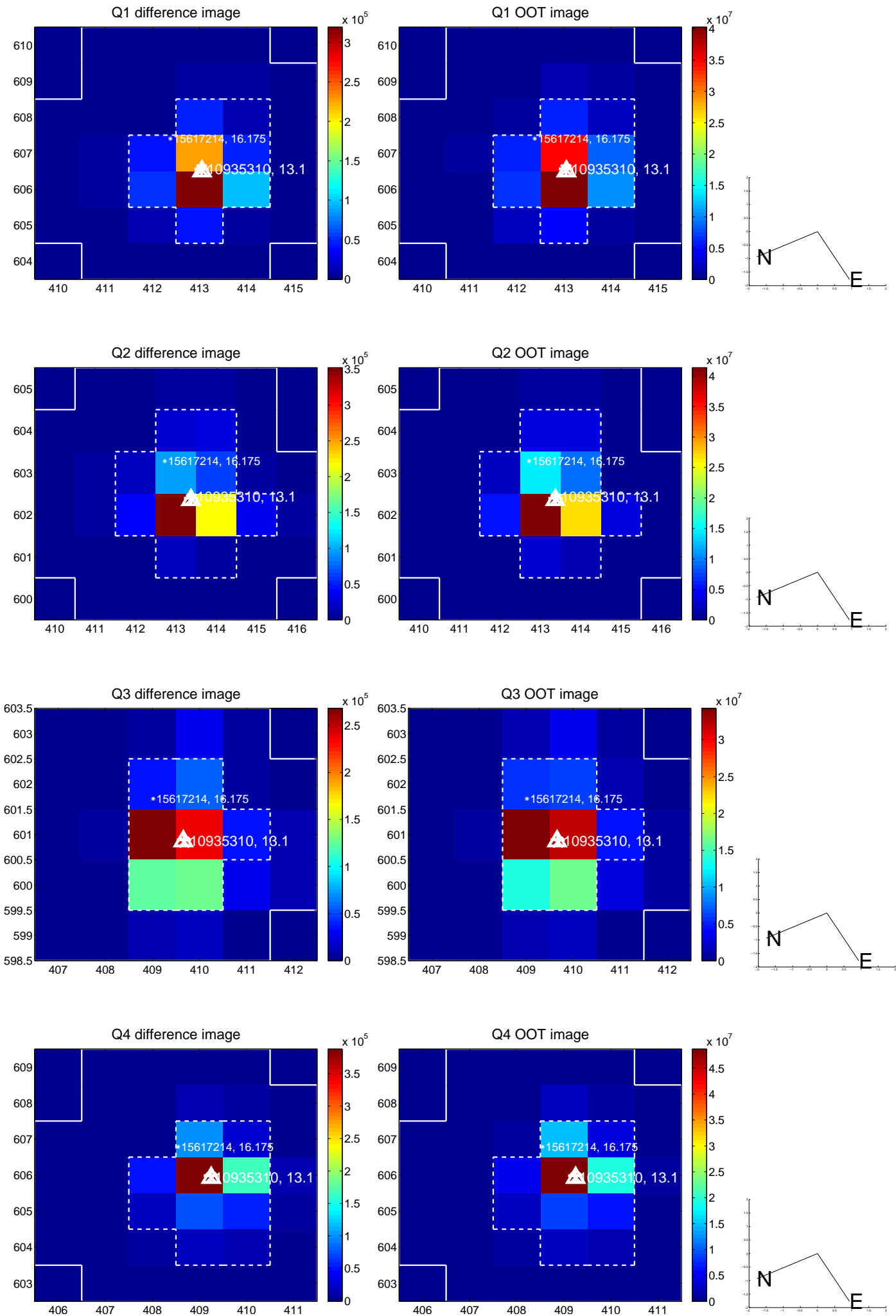
The direct PRF centroid is offset from the target star catalog position by about 0.16 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.163 \pm 0.069$	2.36	$0.144 \pm 0.070$	$0.077 \pm 0.067$
PRF-fit source offset from KIC position	$0.030 \pm 0.070$	0.43	$-0.008 \pm 0.070$	$0.029 \pm 0.070$
photometric centroid source offset	$0.17 \pm 0.01$	18.46	$0.09 \pm 0.01$	$0.15 \pm 0.01$

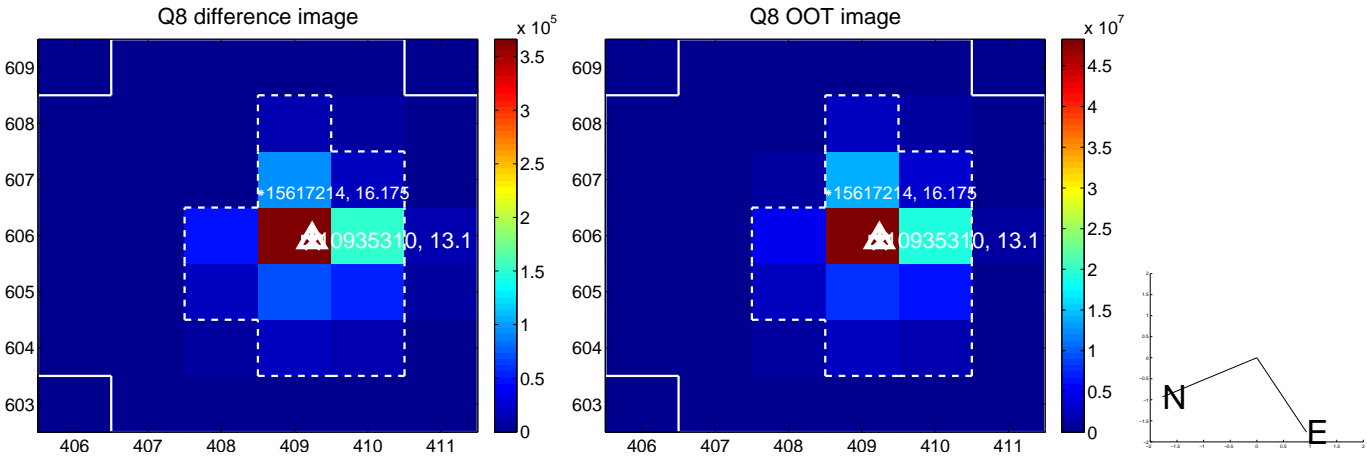
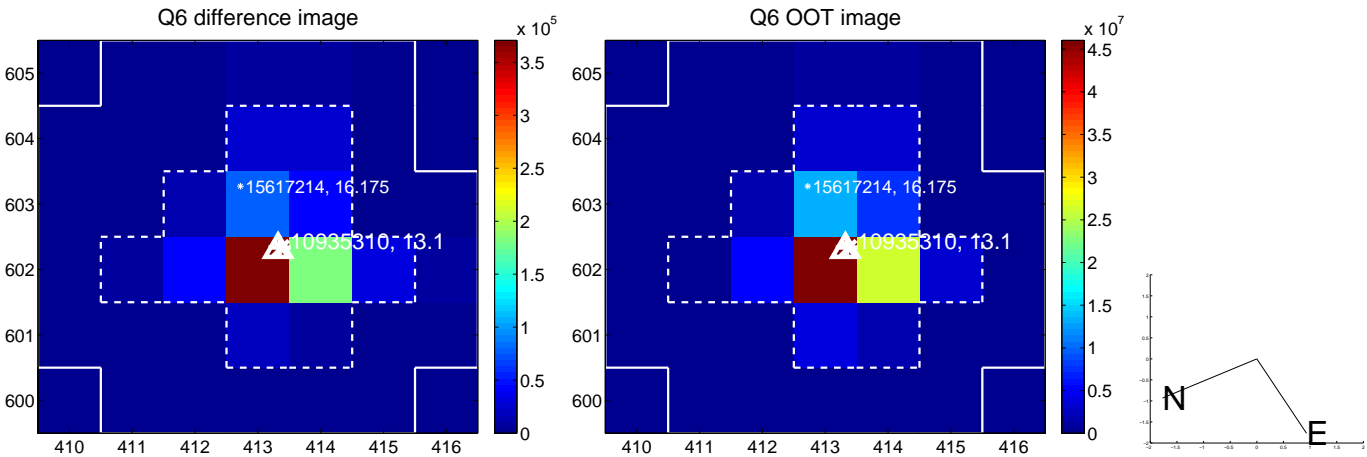
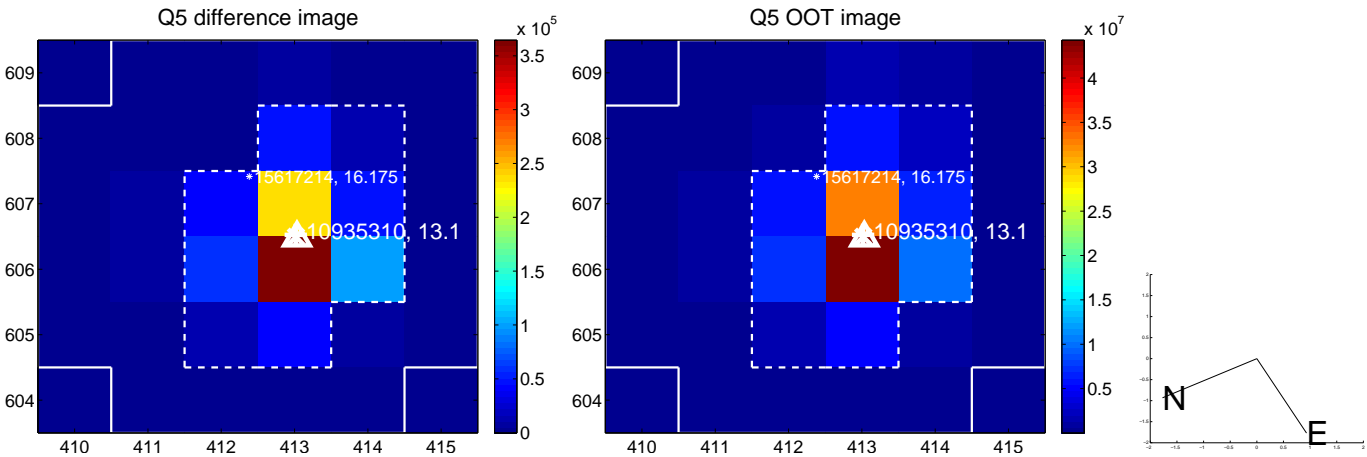


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

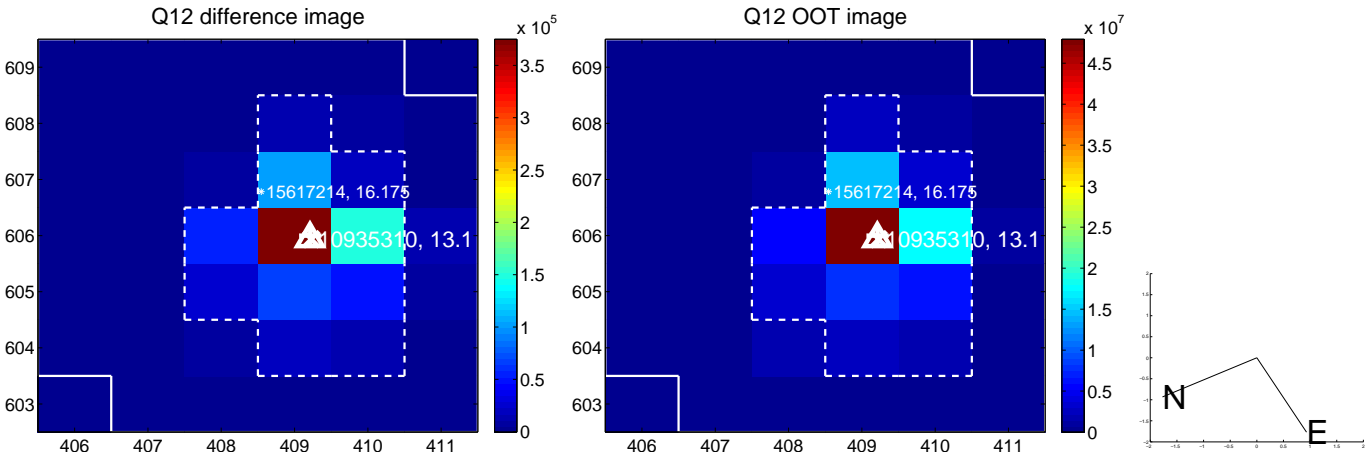
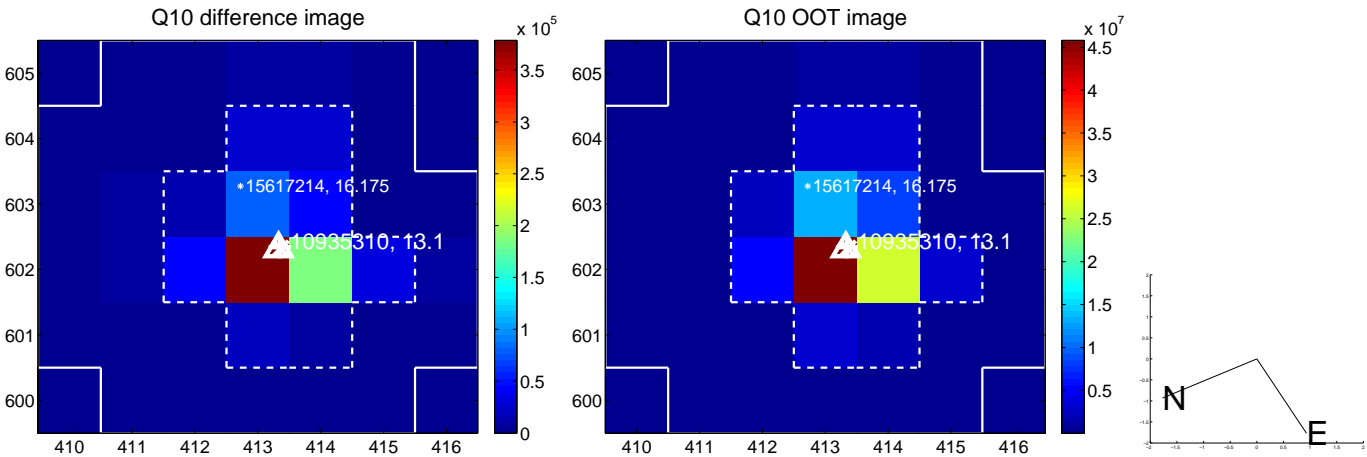
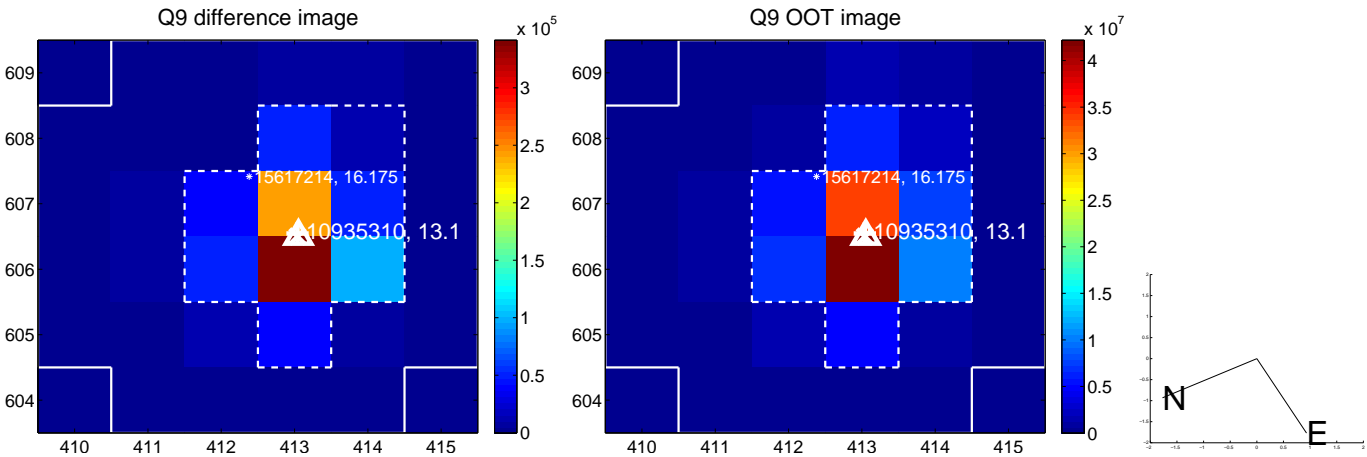
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



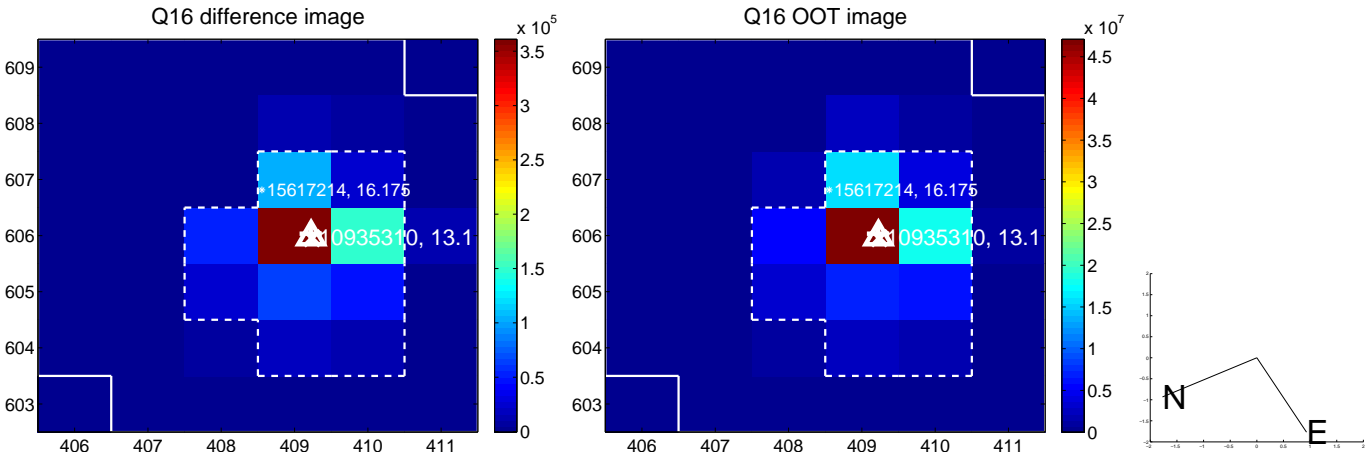
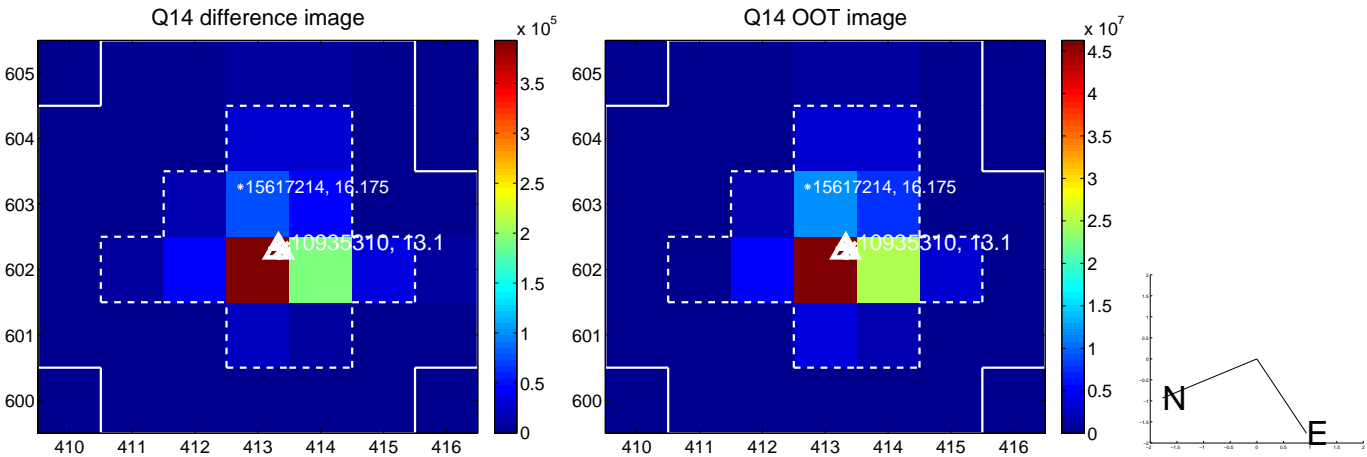
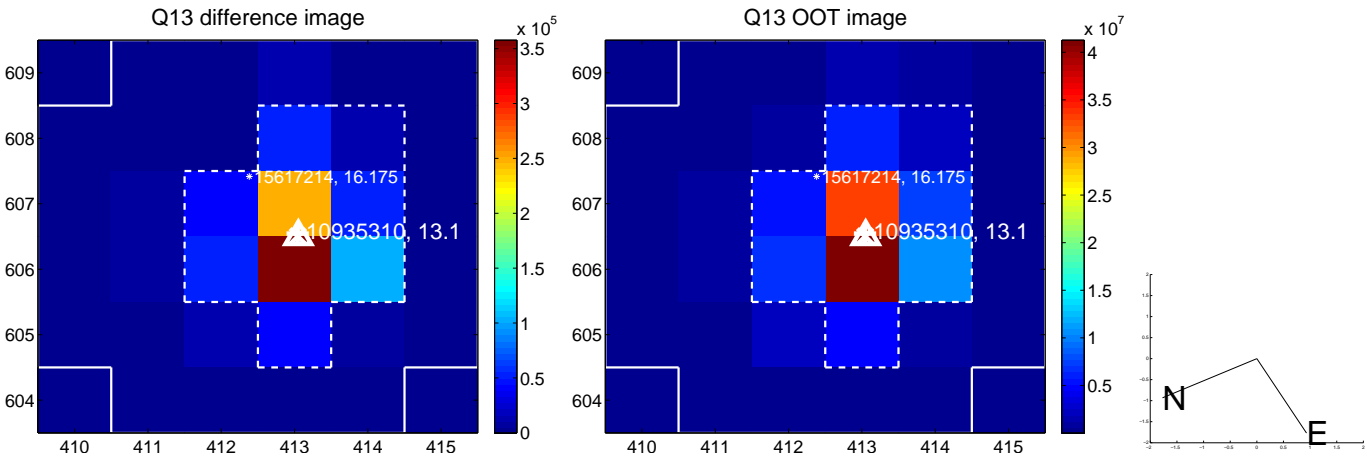
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



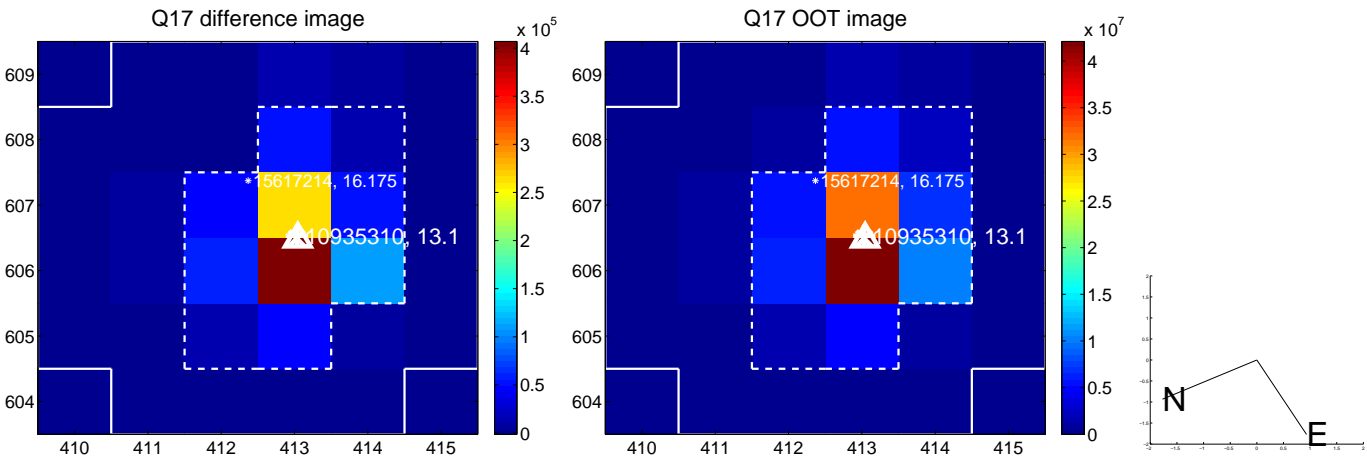
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



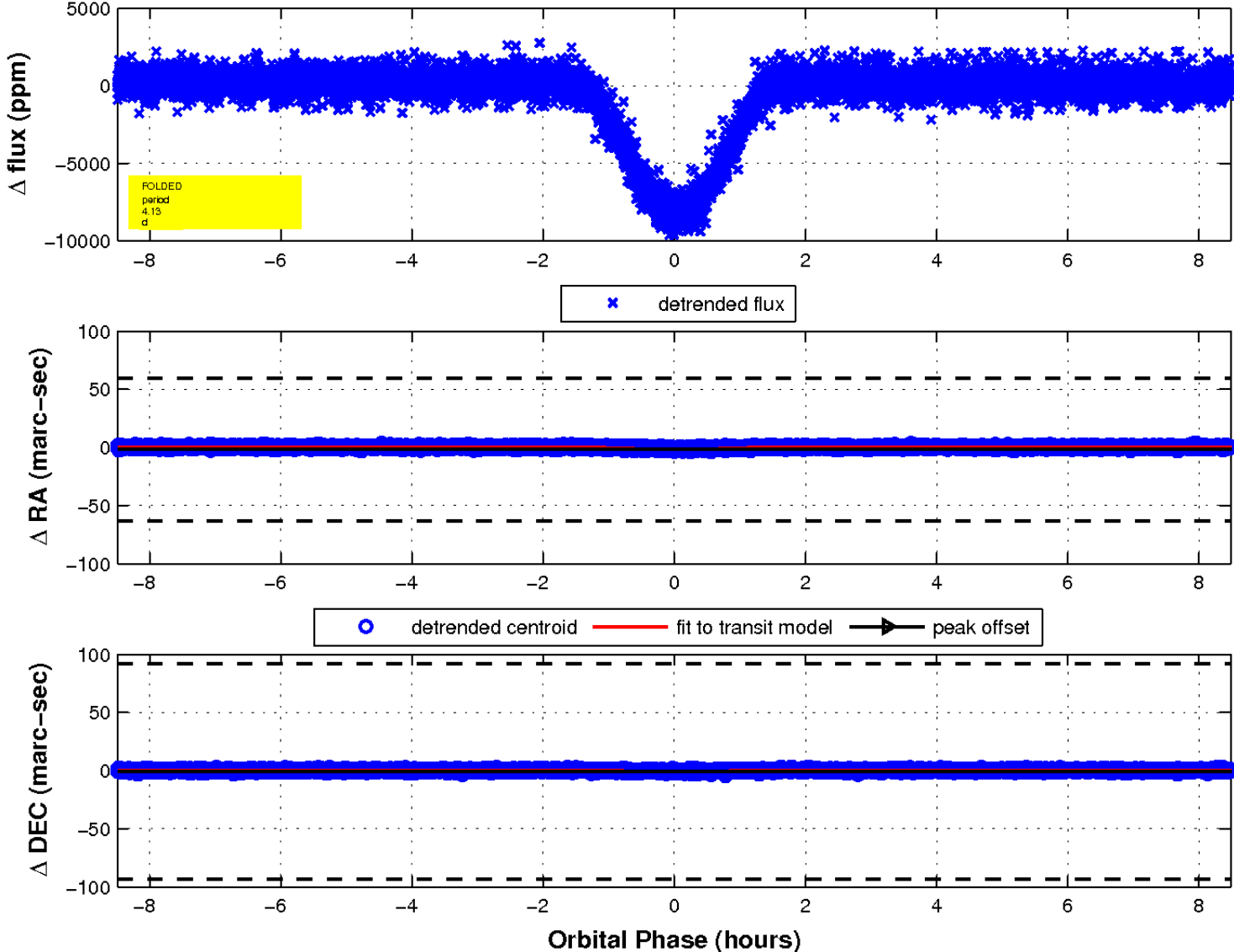
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

Declination

