

# KIC 009535881

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009535881-01	OBS	4228.01	0.960871	131.777768	128.8	2.012	26.1	25.5	1.60	7381	2.12	14723.30
009535881-02	OBS	No	0.960867	132.258068	148.0	2.049	33.6	29.7	1.60	7381	2.27	14723.38

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009535881-01	OBS	FP	0.00	1	0	1	0	LPP_DV—MOD_NONUNIQ_ALT—CENT_RESOLVED_OFFSET
009535881-02	OBS	FP	0.00	1	0	1	0	MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_RESOLVED_OFFSET

**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 009535881-01

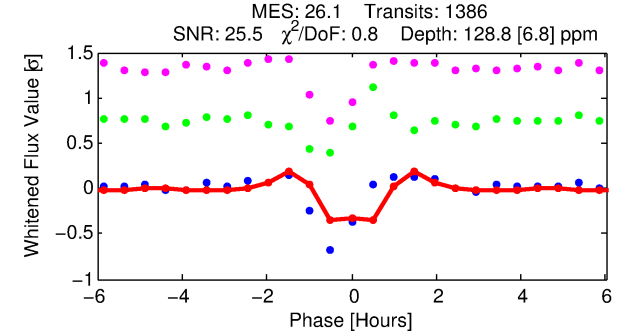
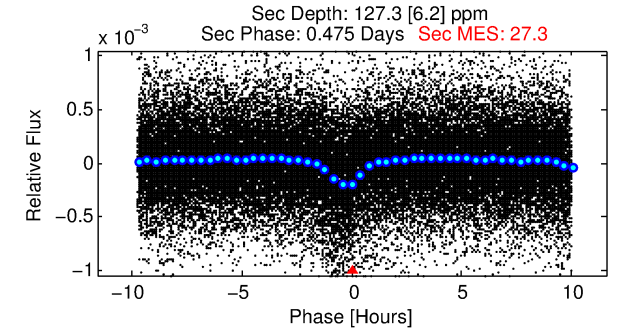
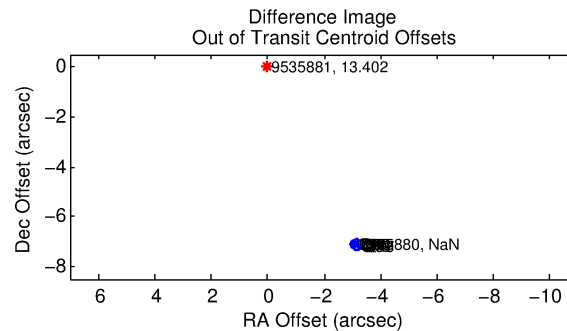
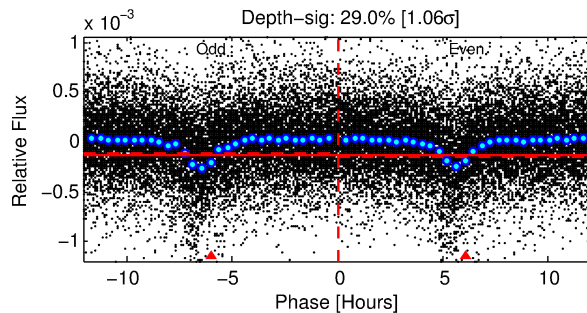
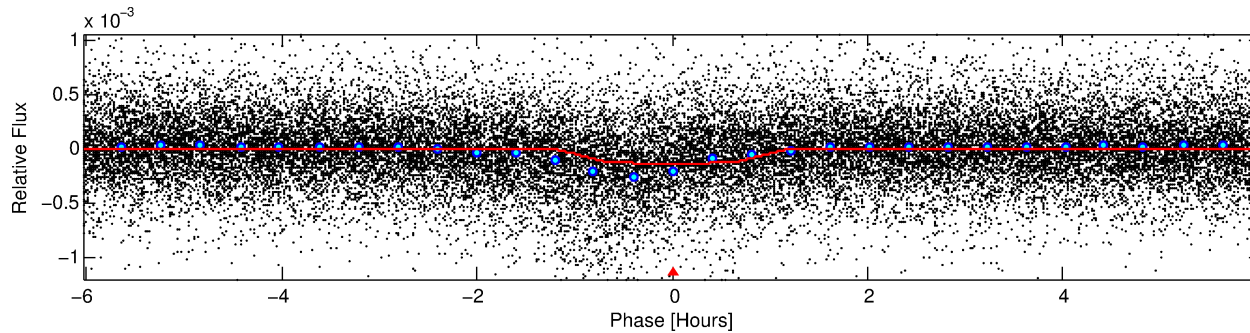
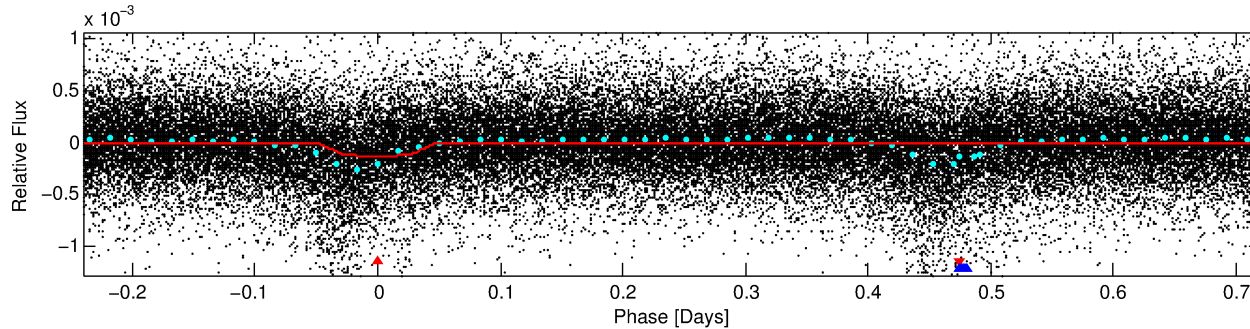
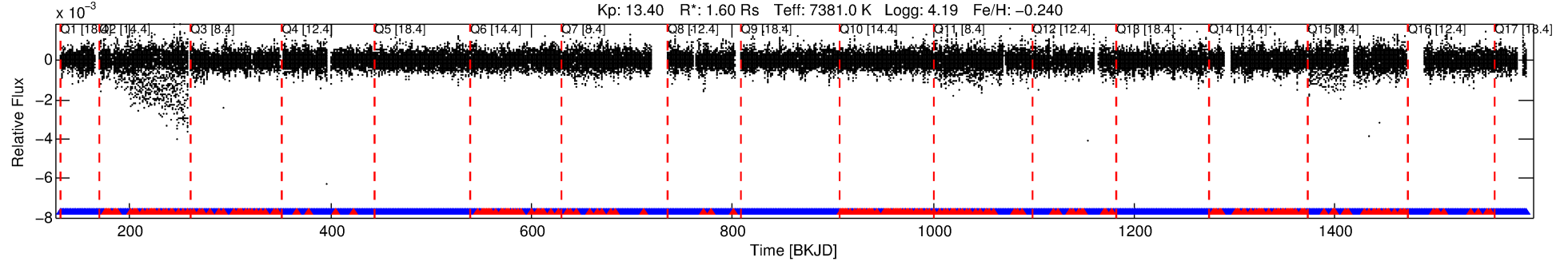
No Significant Match Found

# DV One-Page Summary

KIC: 9535881 Candidate: 1 of 2 Period: 0.961 d

KOI: K04228.01 Corr: 0.765

Kp: 13.40 R\*: 1.60 Rs Teff: 7381.0 K Logg: 4.19 Fe/H: -0.240



## DV Fit Results:

Period = 0.96087 [0.00000] d  
Epoch = 131.7778 [0.0006] BKJD  
Rp/R\* = 0.0122 [0.0013]  
a/R\* = 1.89 [0.85]  
b = 0.91 [0.12]  
Seff = 14723.30 [5748.59]  
Teq = 2809 [274] K  
Rp = 2.12 [0.69] Re  
a = 0.0215 [0.0054] AU  
Ag = 7.20 [2.97] [2.09σ]  
Teffp = 7113 [484] K [7.73σ]

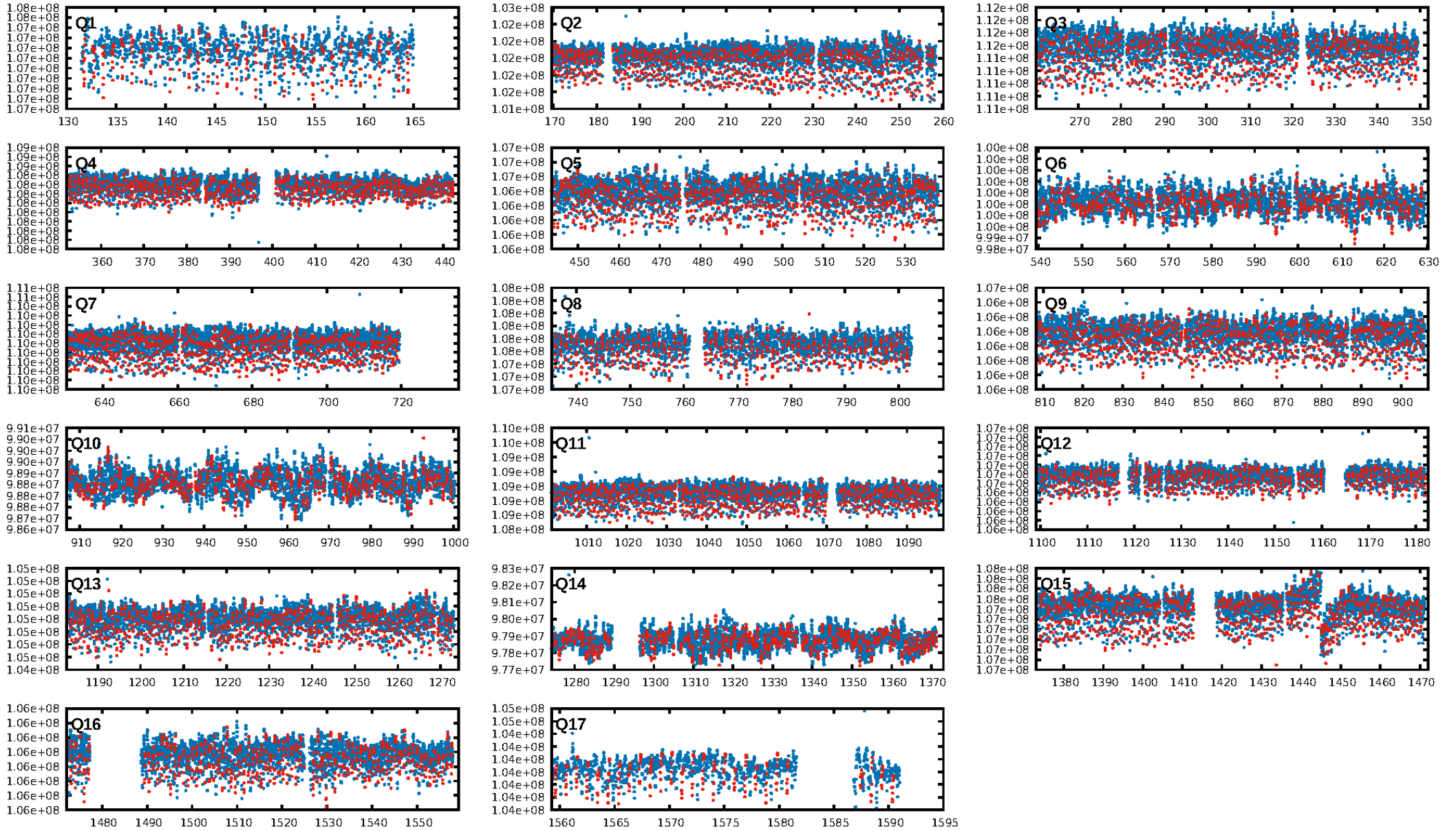
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 2.22e-156  
RollingBand-fgt: 0.83 [1093/1324]  
GhostDiagnostic-chr: N/A  
Centroid-sig: N/A  
Centroid-so: N/A  
OotOffset-rm: 7.788 arcsec [113.33σ]  
KicOffset-rm: 7.801 arcsec [115.16σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 1.00 [17/17]

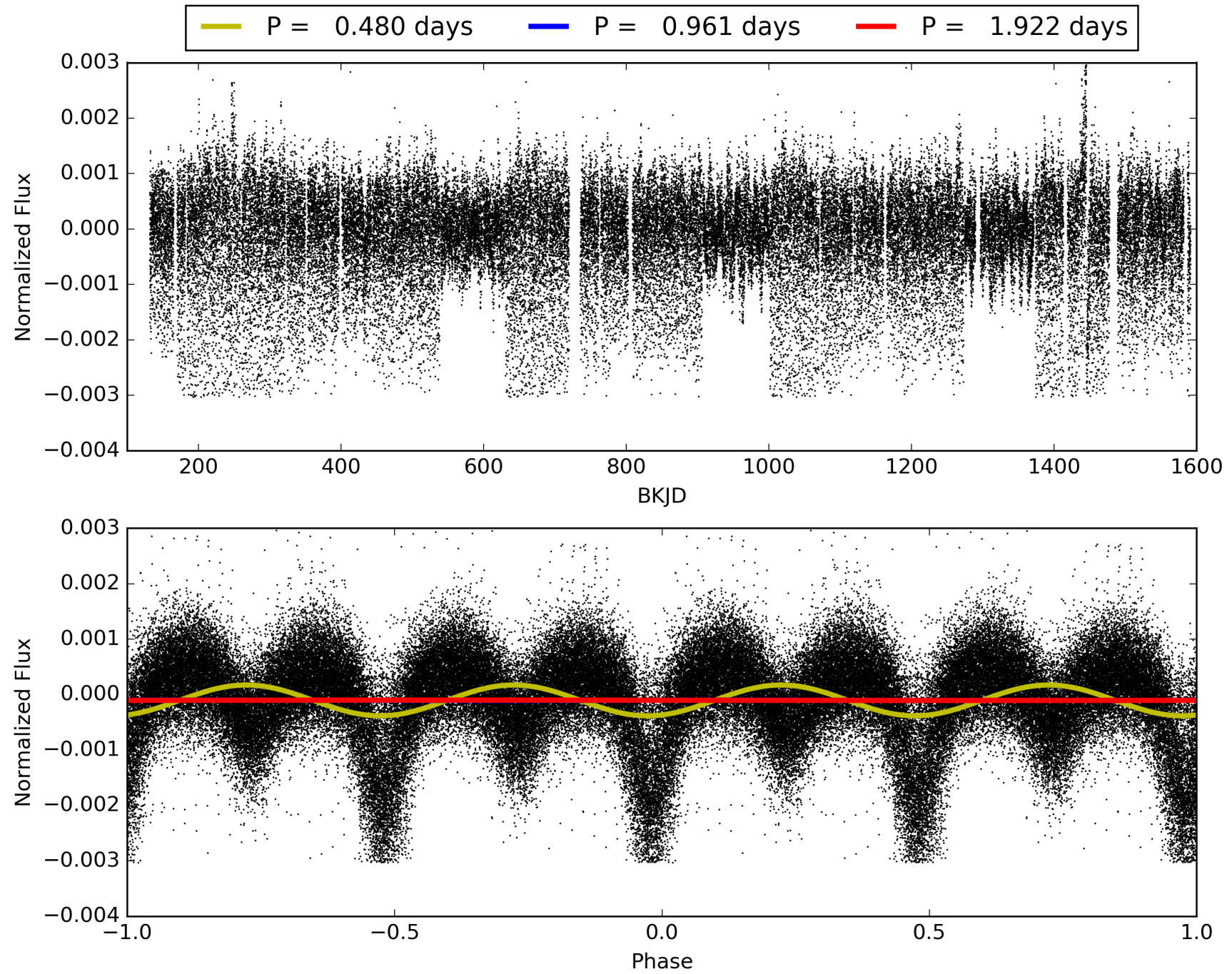
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 03-Feb-2016 05:22:10 Z

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

# TCE 009535881-01, PDC Light Curves

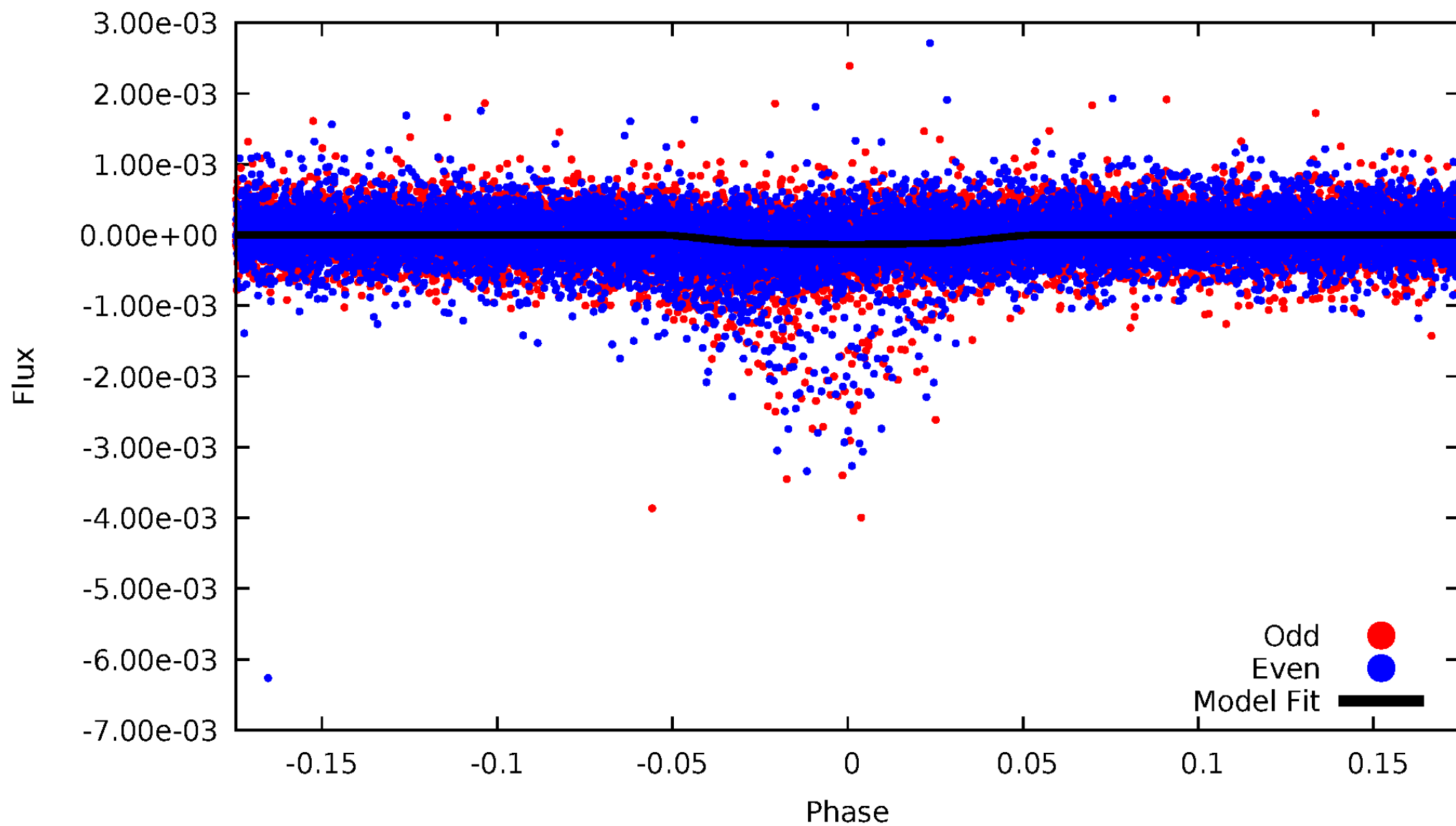


TCE 009535881-01



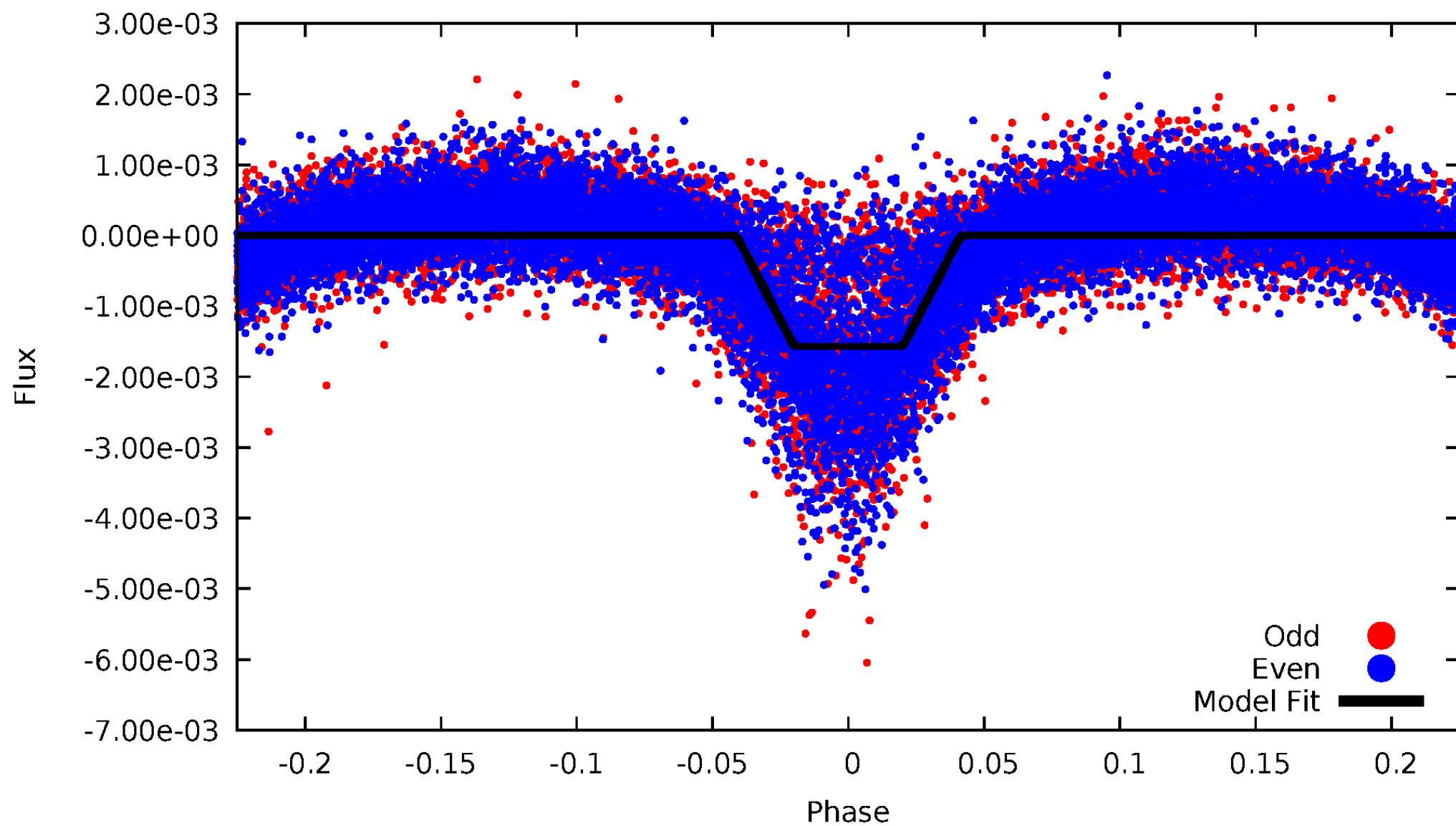
# DV Odd/Even

TCE 009535881-01

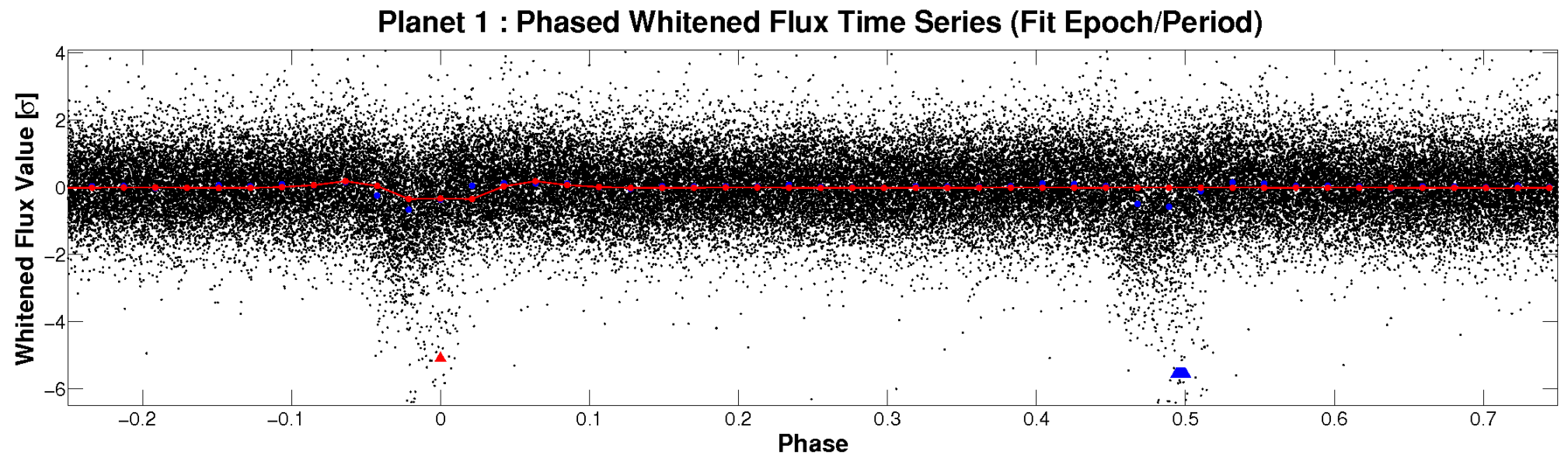
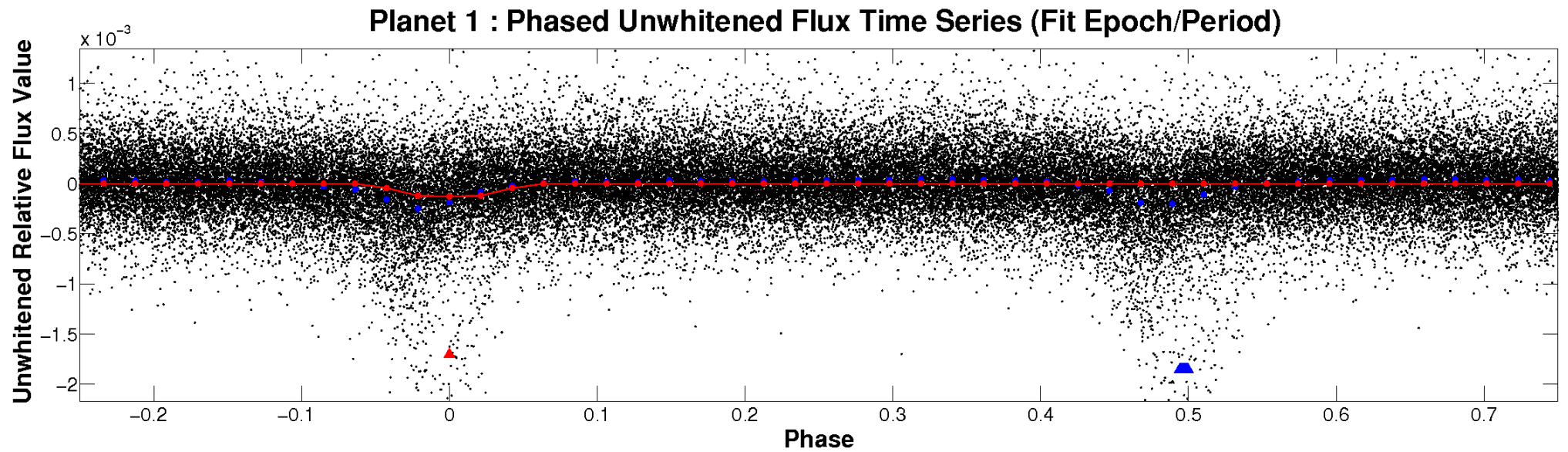


# ALT Odd/Even

TCE 009535881-01

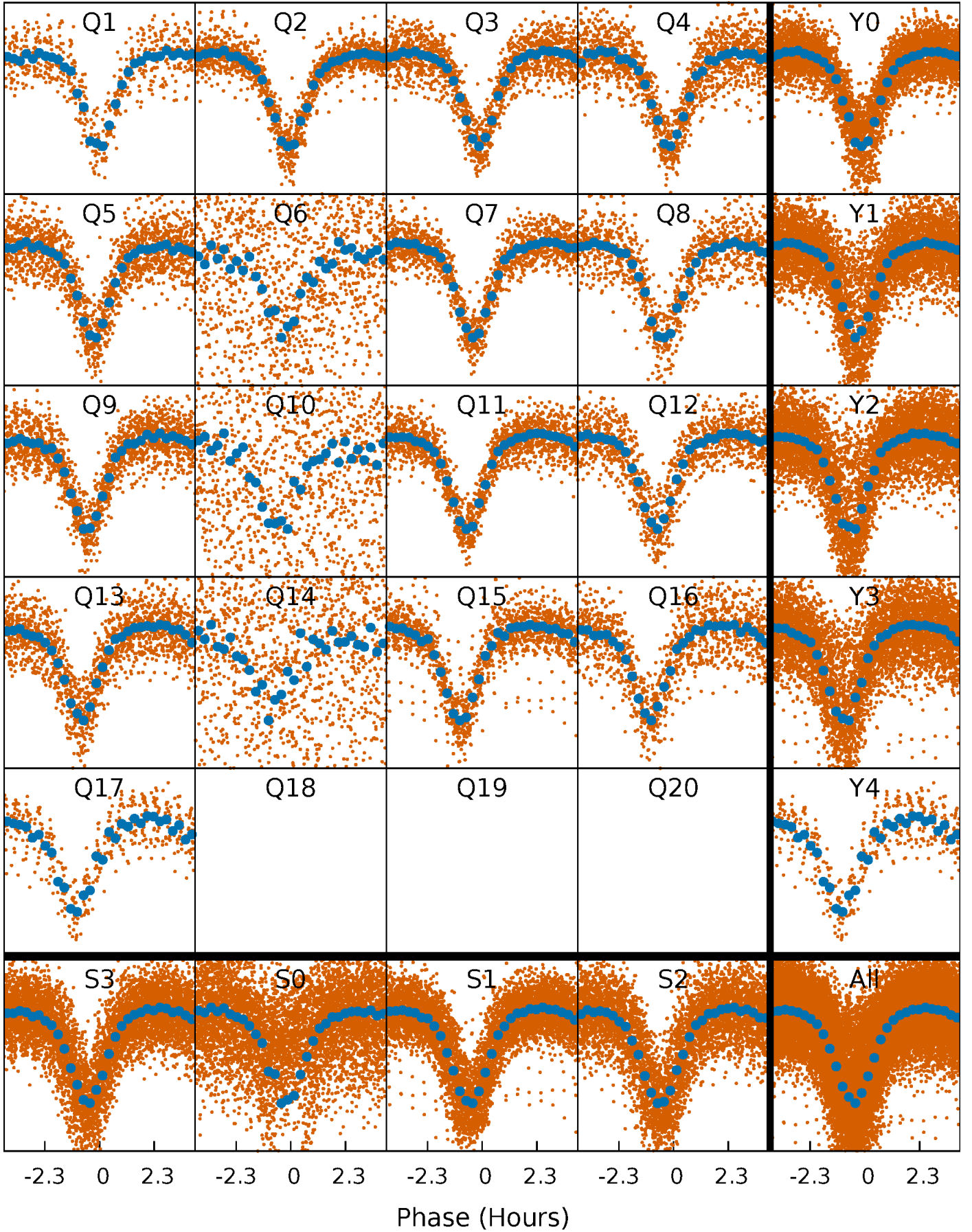


# Non-Whitened Vs. Whitened Light Curve



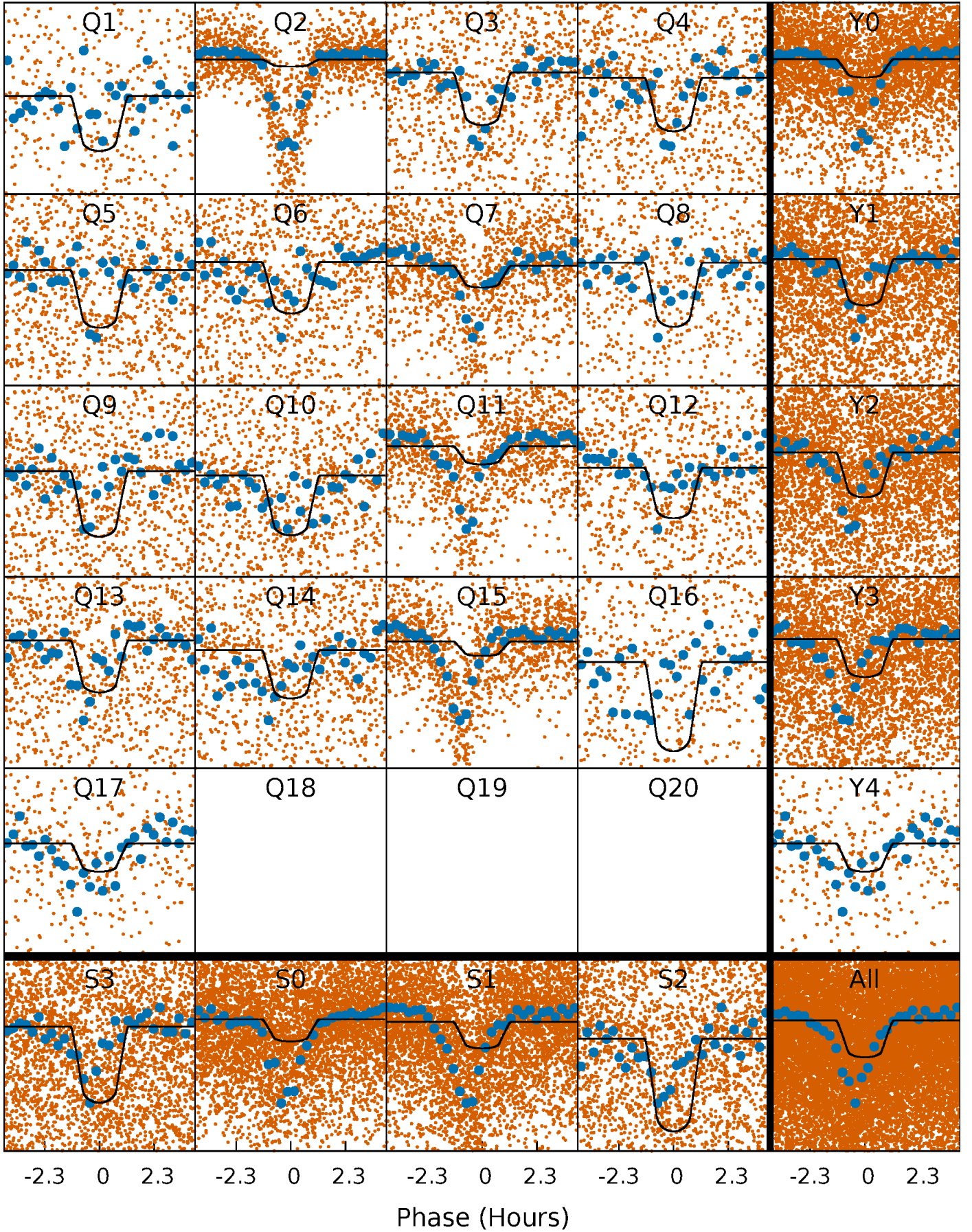
# PDC Quarter-Phased Transit Curves

TCE 009535881-01   P= 0.960871 Days    $T_0=131.777768$  (BKJD)



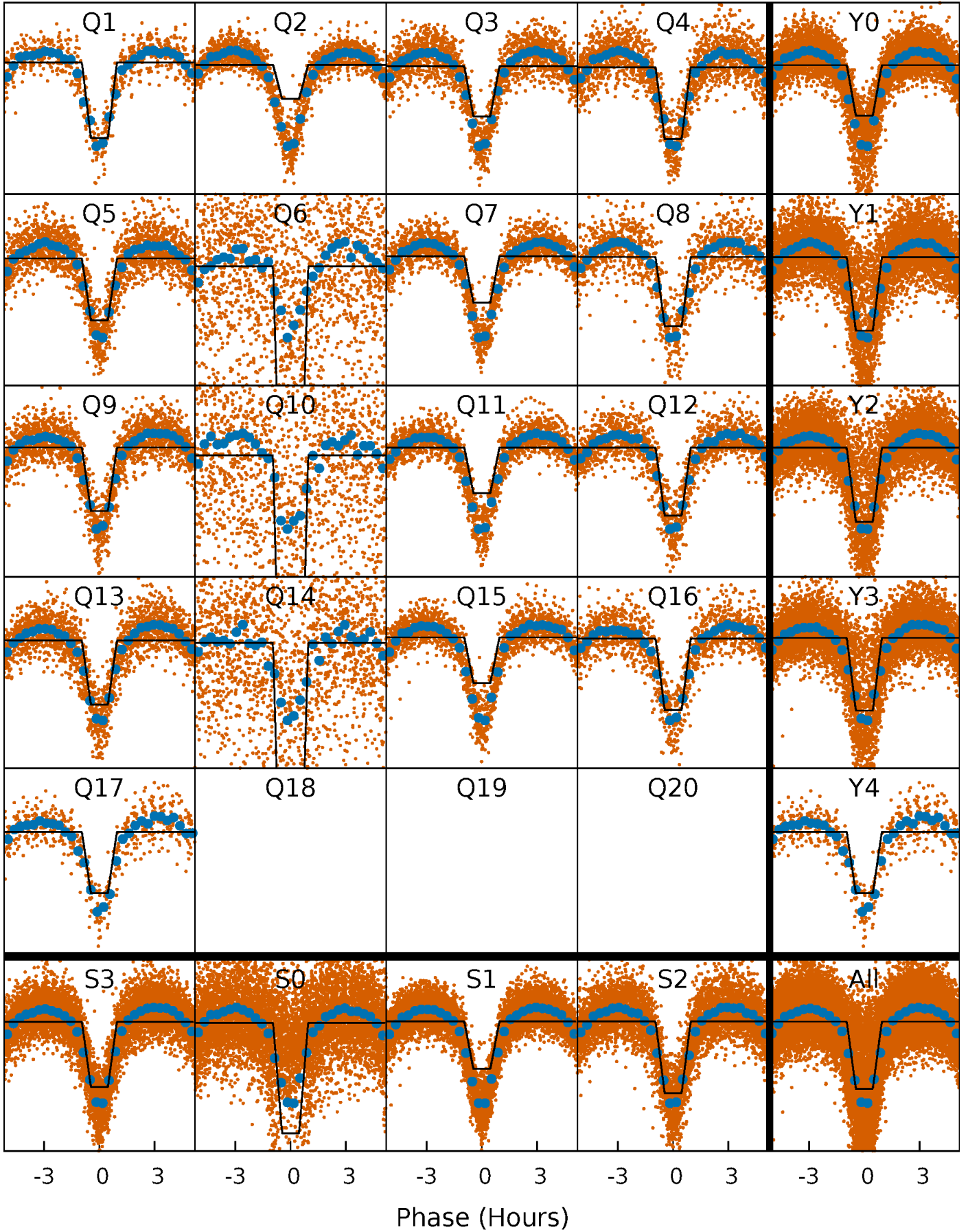
# DV Quarter-Phased Transit Curves

TCE 009535881-01   P= 0.960871 Days    $T_0=131.777768$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

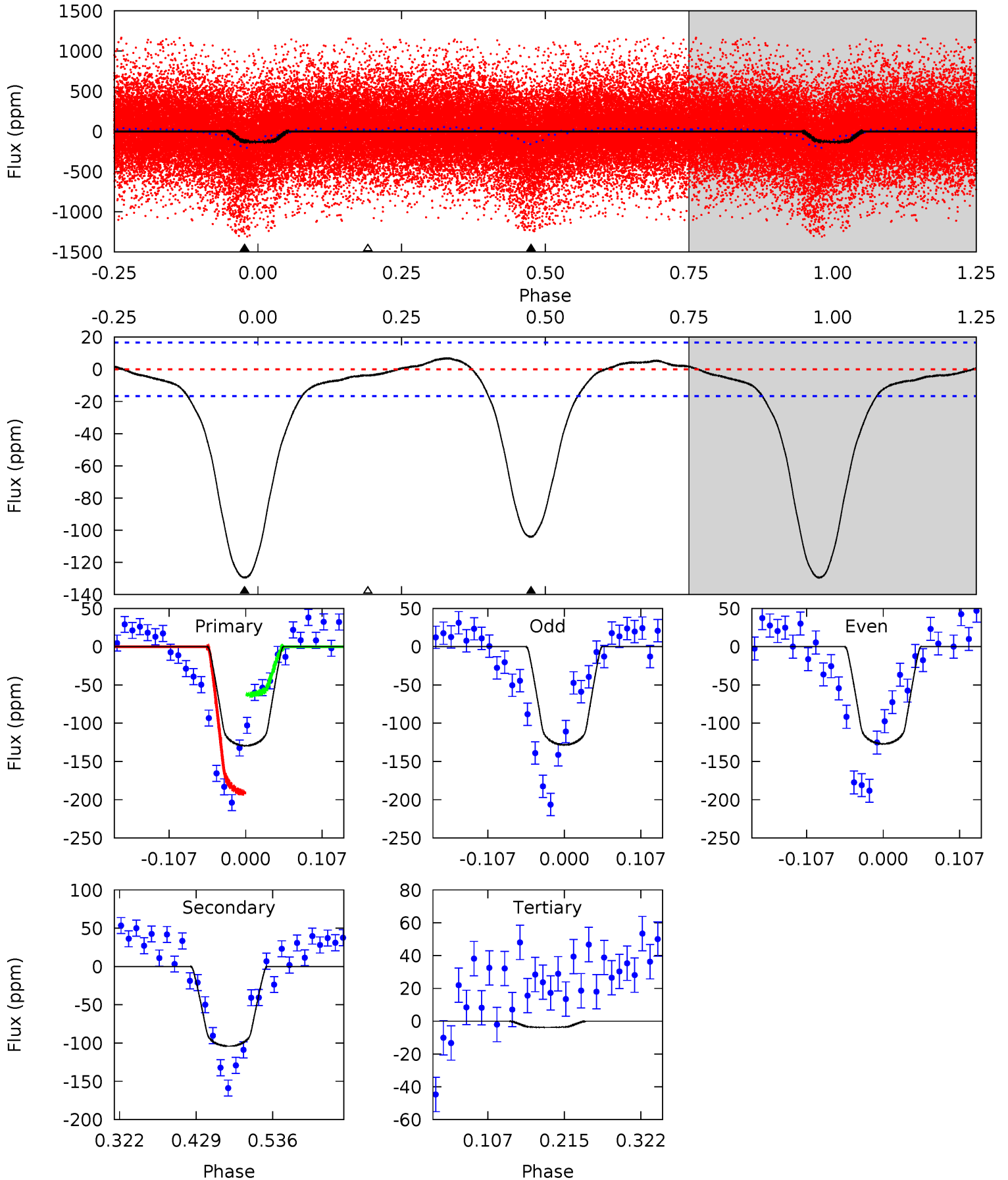
TCE 009535881-01 P= 0.960842 Days  $T_0=131.778353$  (BKJD)



# DV Model-Shift Uniqueness Test

009535881-01, P = 0.960871 Days, E = 130.816897 Days

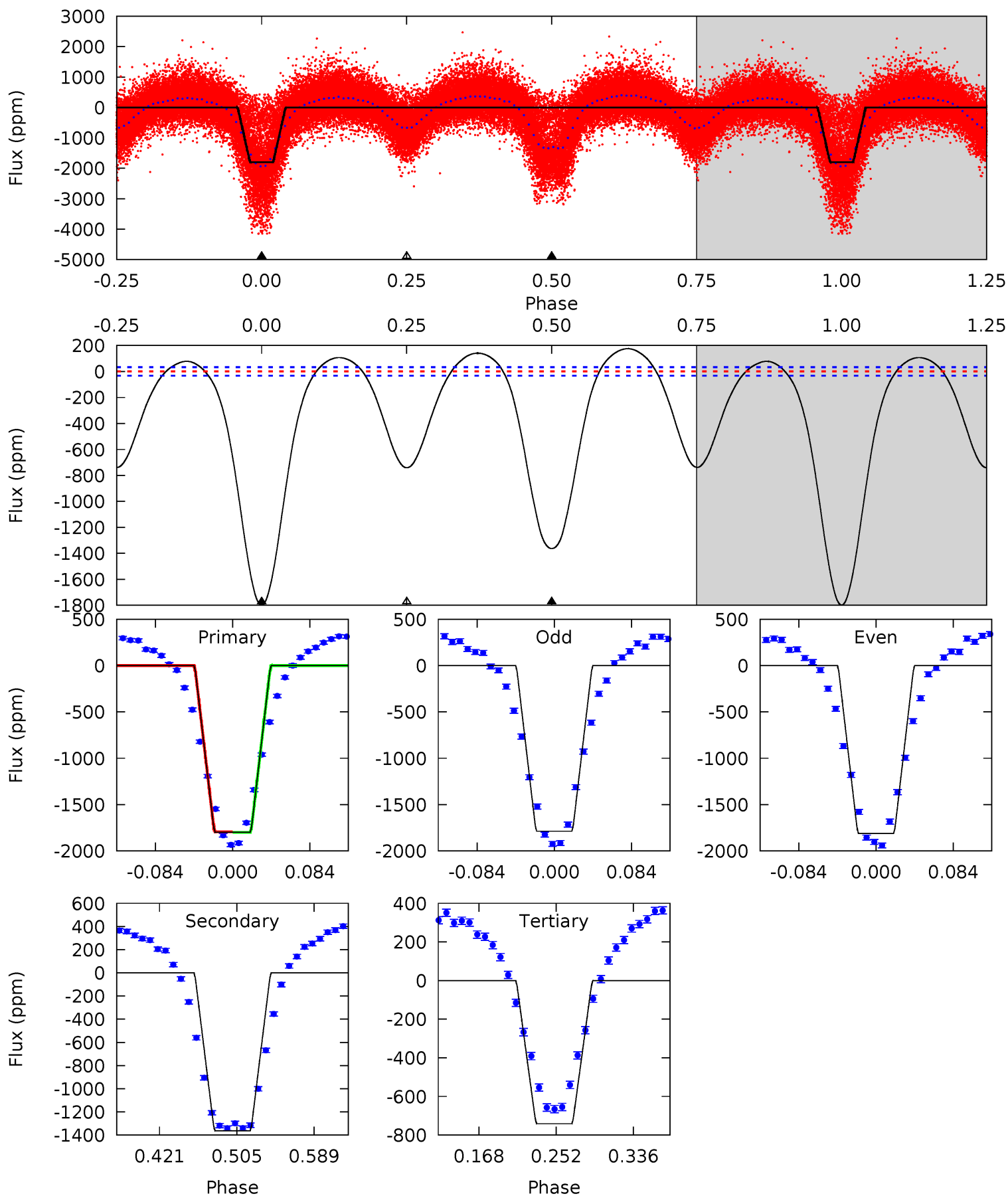
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
35.4	28.5	1.04	0	4.55	1.61	1.38	34.3	35.4	27.4	28.5	0.18	1.49	0.05	17.6



# Alt Model-Shift Uniqueness Test

009535881-01, P = 0.960842 Days, E = 130.817511 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
249.4	189.0	102.8	0	4.60	1.73	40.5	146.6	249.4	86.2	189.0	1.70	0.97	0.09	0.54



### Stellar Parameters For KIC 009535881

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7381^{+232}_{-310}$	$4.186^{+0.124}_{-0.186}$	$-0.240^{+0.250}_{-0.350}$	$1.597^{+0.495}_{-0.330}$	$1.429^{+0.216}_{-0.216}$	$0.494^{+0.300}_{-0.250}$
	+3%/-4%	+3%/-4%	+104%/-146%	+31%/-21%	+15%/-15%	+61%/-51%
Source	KIC0	KIC0	KIC0	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 009535881-01 / KOI 4228.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-104 \pm 4$	$2.13^{+0.43}_{-0.32}$	$3941^{+309}_{-261}$	$6573^{+503}_{-401}$	$5.770^{+2.084}_{-1.690}$
Alt.	$-1363 \pm 7$	$7.07^{+1.03}_{-0.80}$	$3959^{+283}_{-247}$	$7006^{+251}_{-321}$	$6.965^{+1.628}_{-1.603}$

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

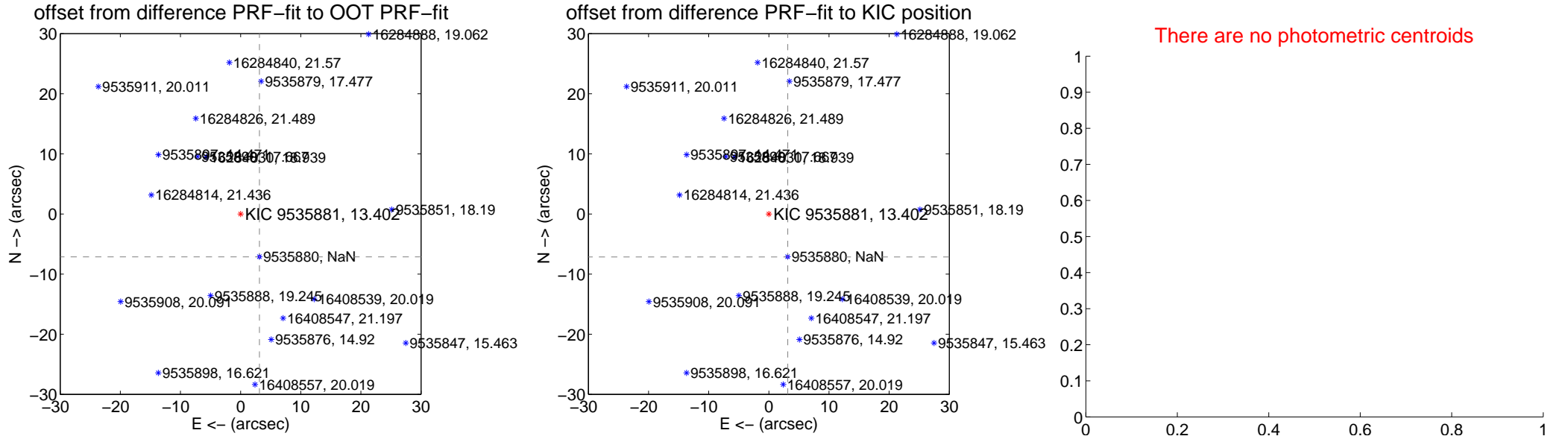
## DV Centroid Data

Supplemental centroid analysis for 009535881-01. Kepler magnitude: 13.40. Transit SNR 25.51

There are 17 quarters with good PRF difference image offsets

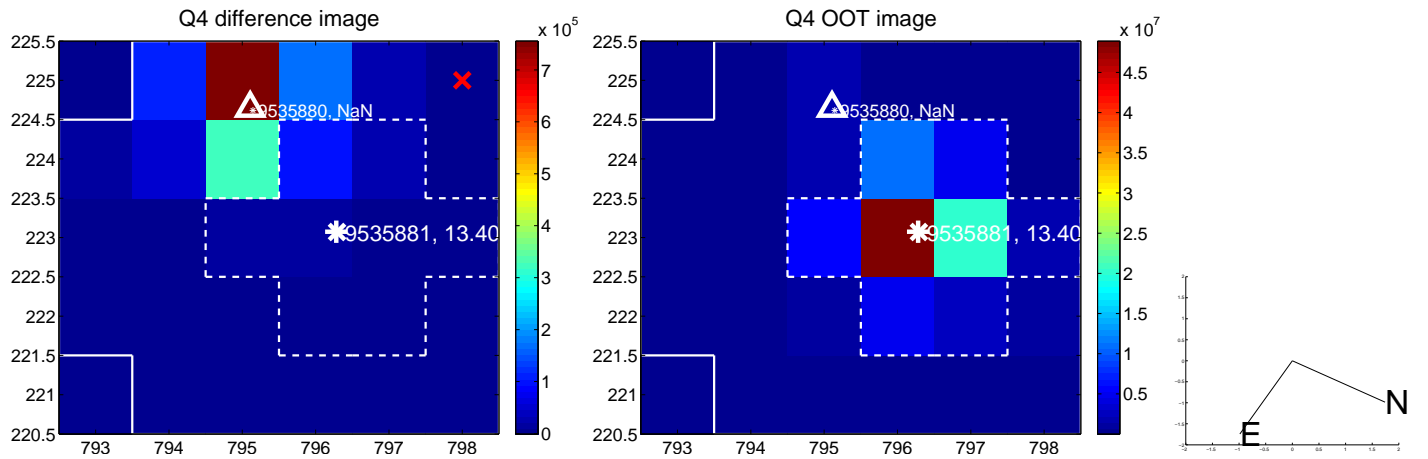
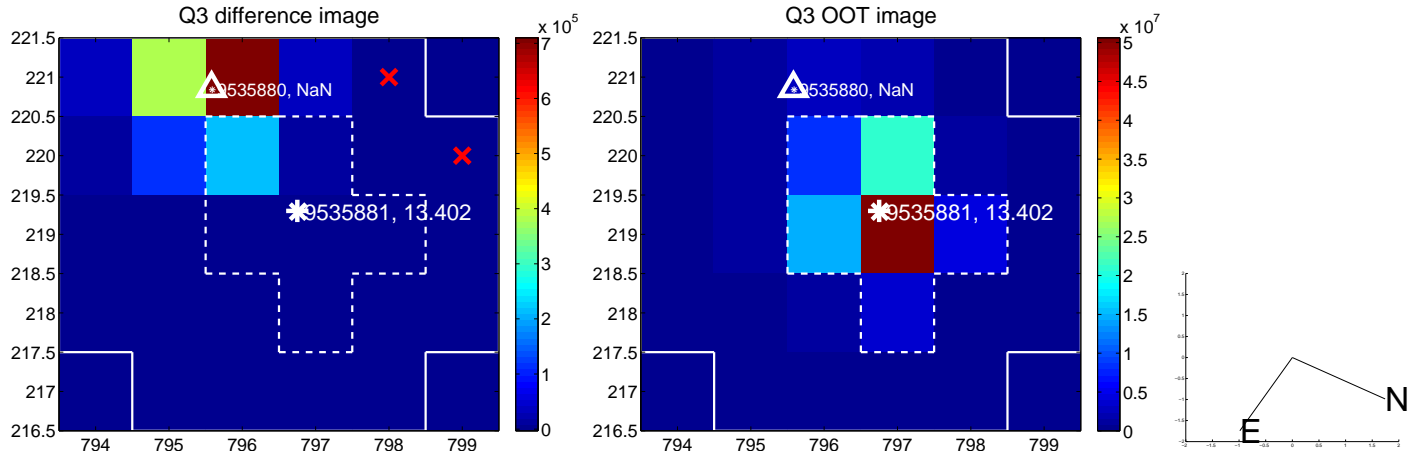
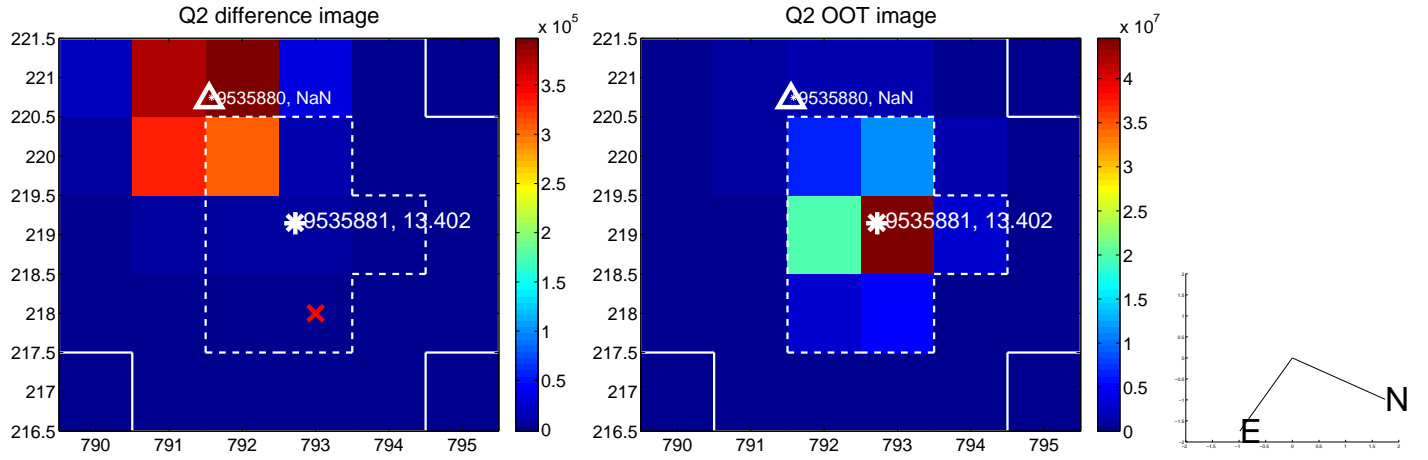
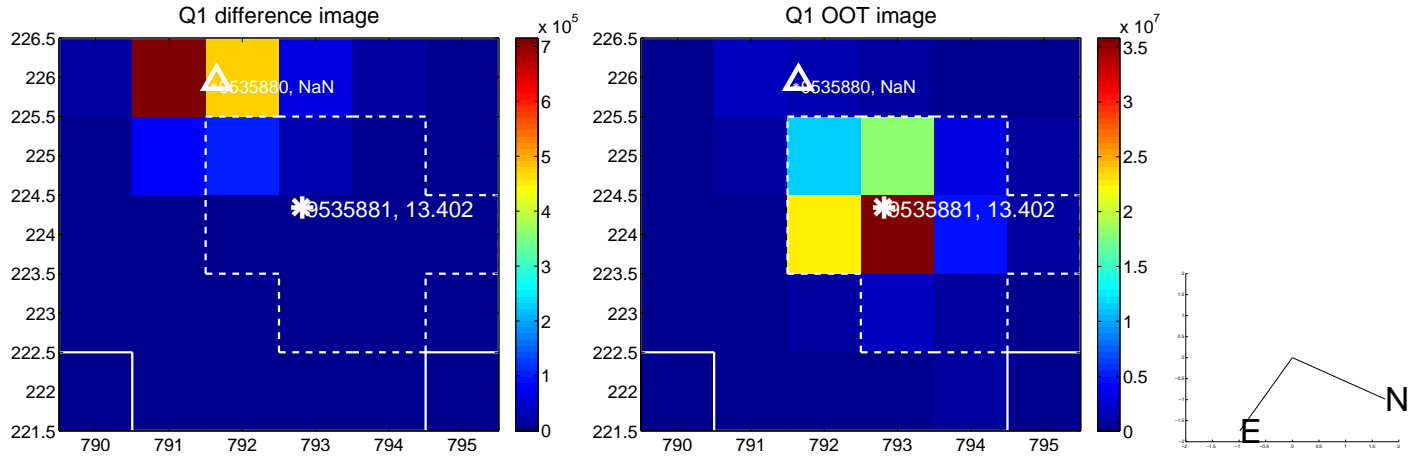
The direct PRF centroid is offset from the target star catalog position by about 0.03 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b>7.788 <math>\pm</math> 0.069</b>	<b>113.33</b>	-3.136 $\pm$ 0.069	-7.128 $\pm$ 0.067
PRF-fit source offset from KIC position	<b>7.801 <math>\pm</math> 0.068</b>	<b>115.16</b>	-3.138 $\pm$ 0.070	-7.142 $\pm$ 0.067
photometric centroid source offset	—	—	—	—

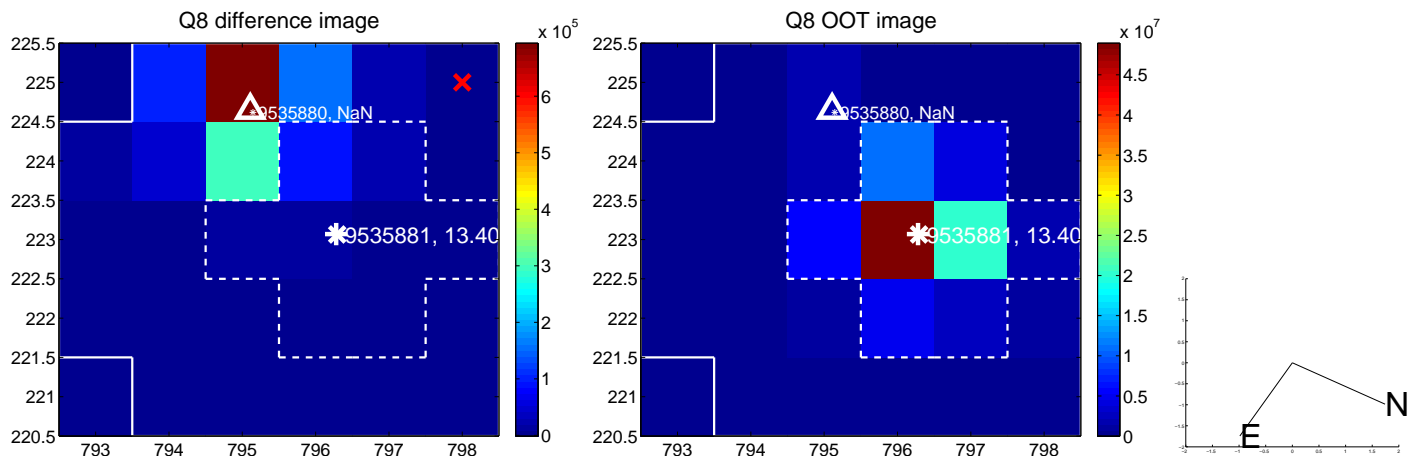
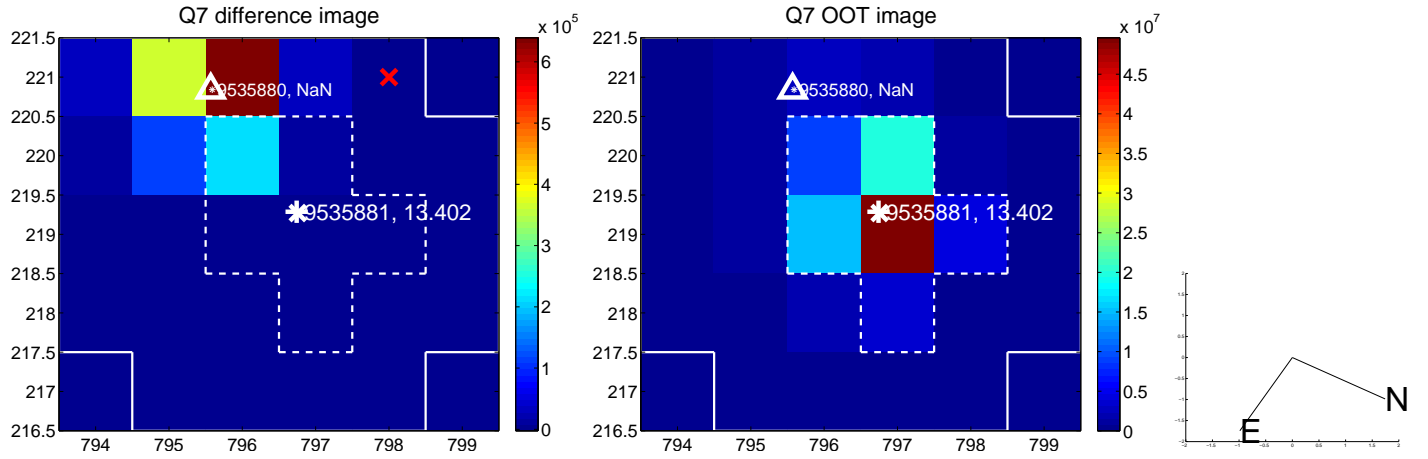
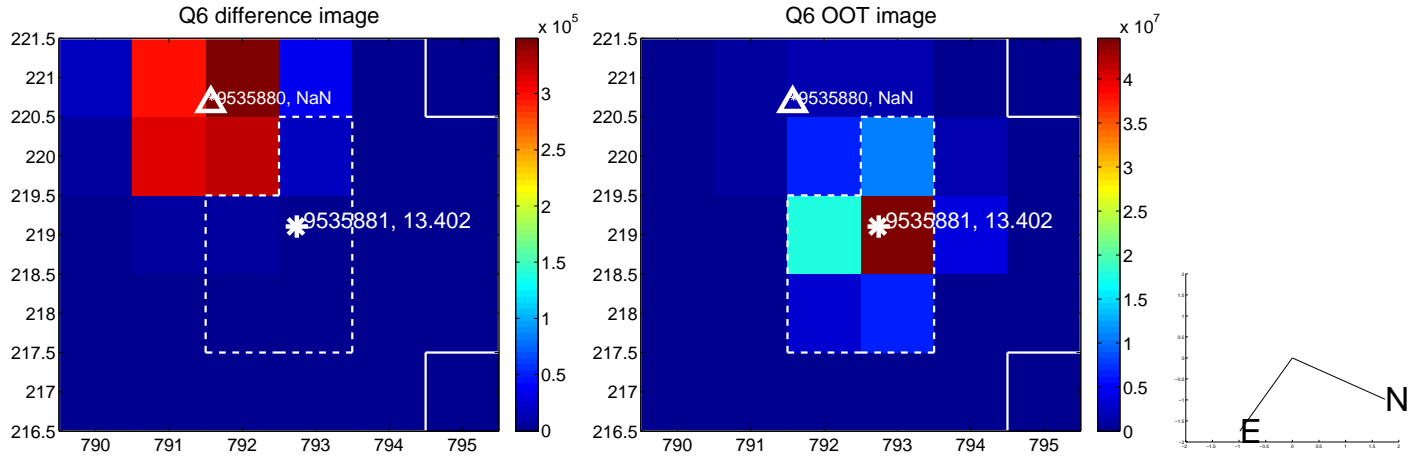
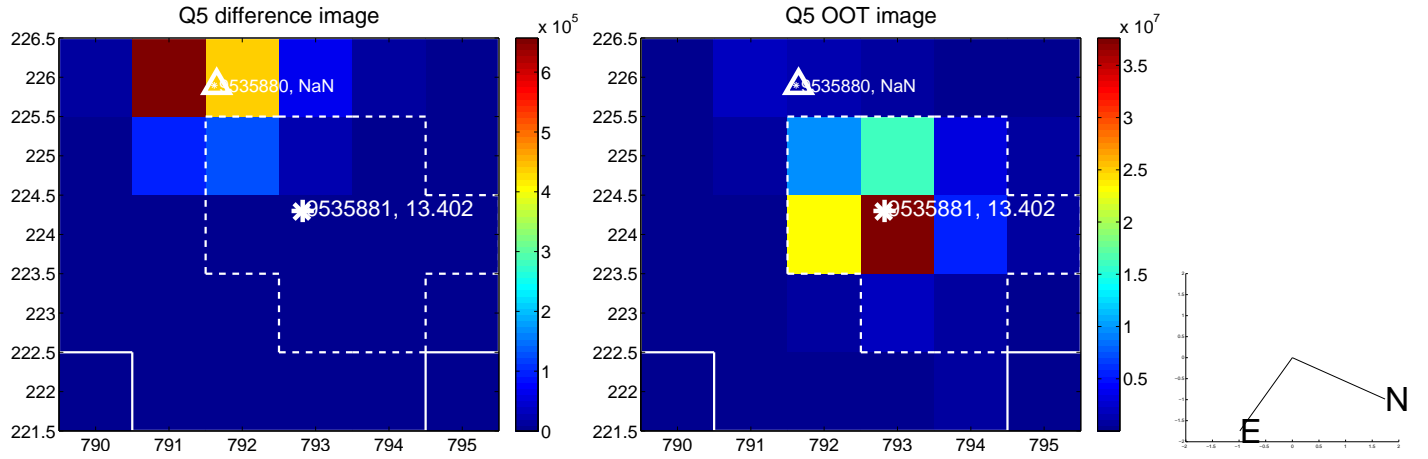


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

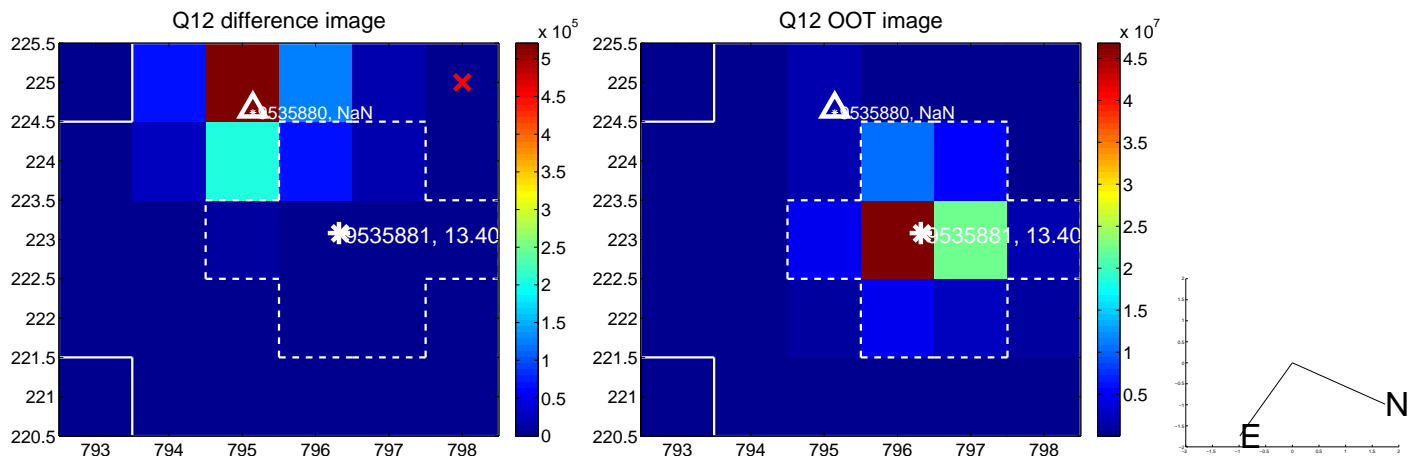
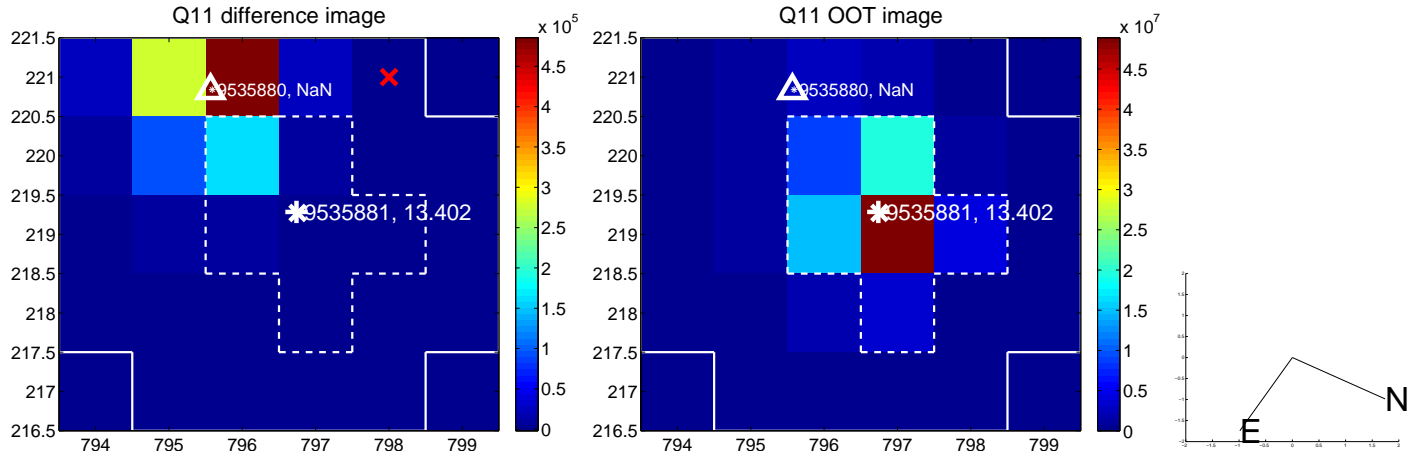
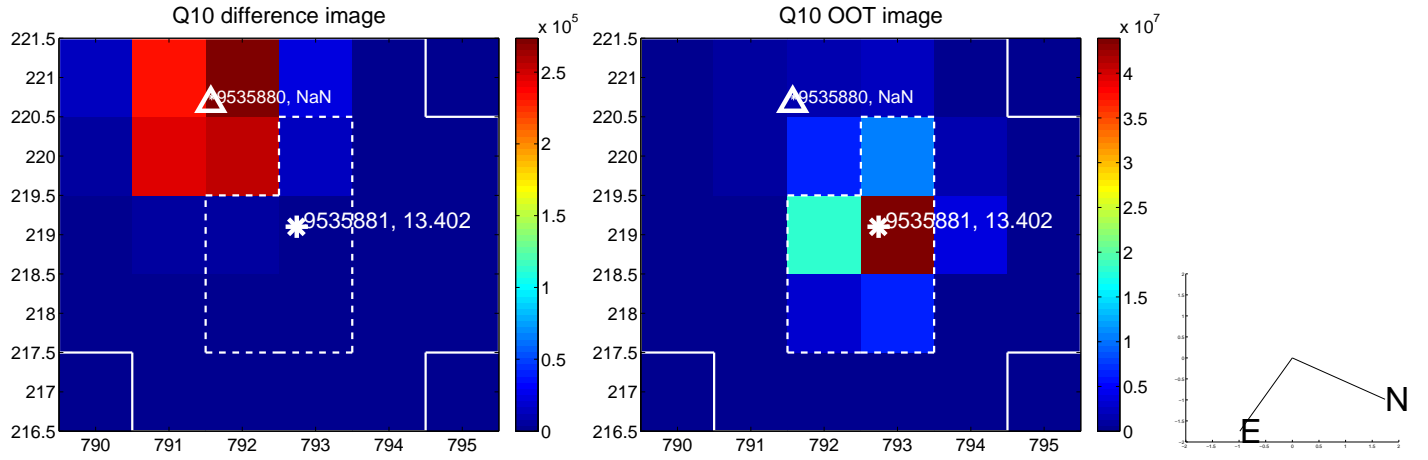
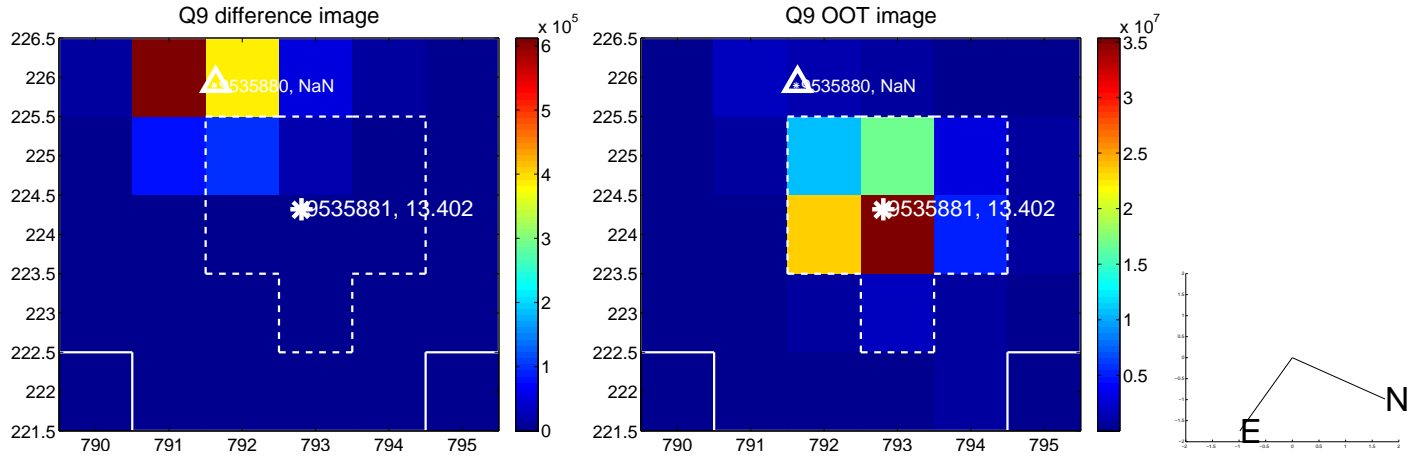
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



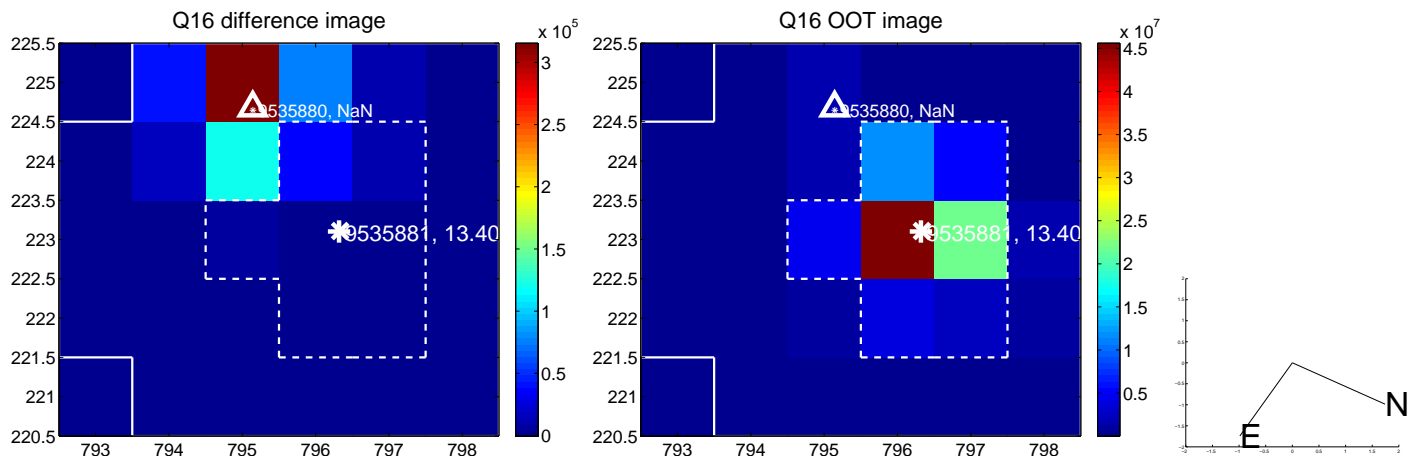
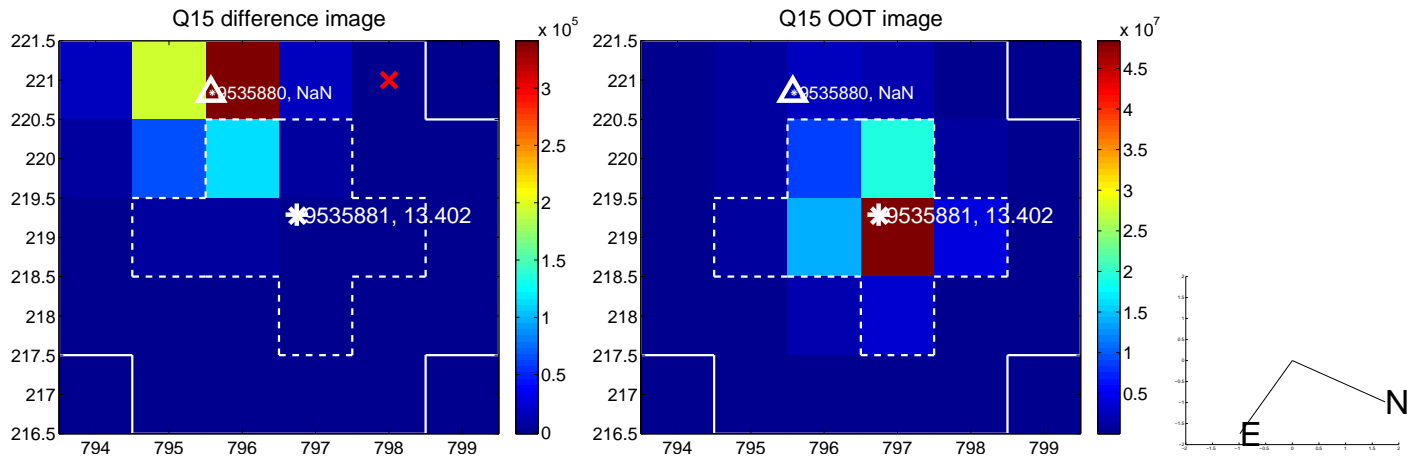
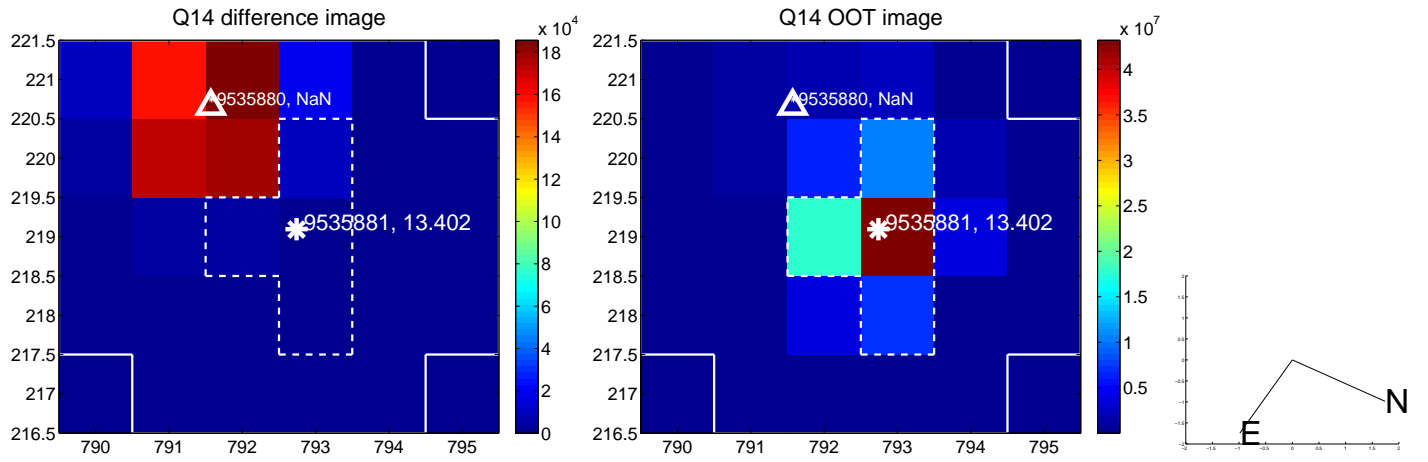
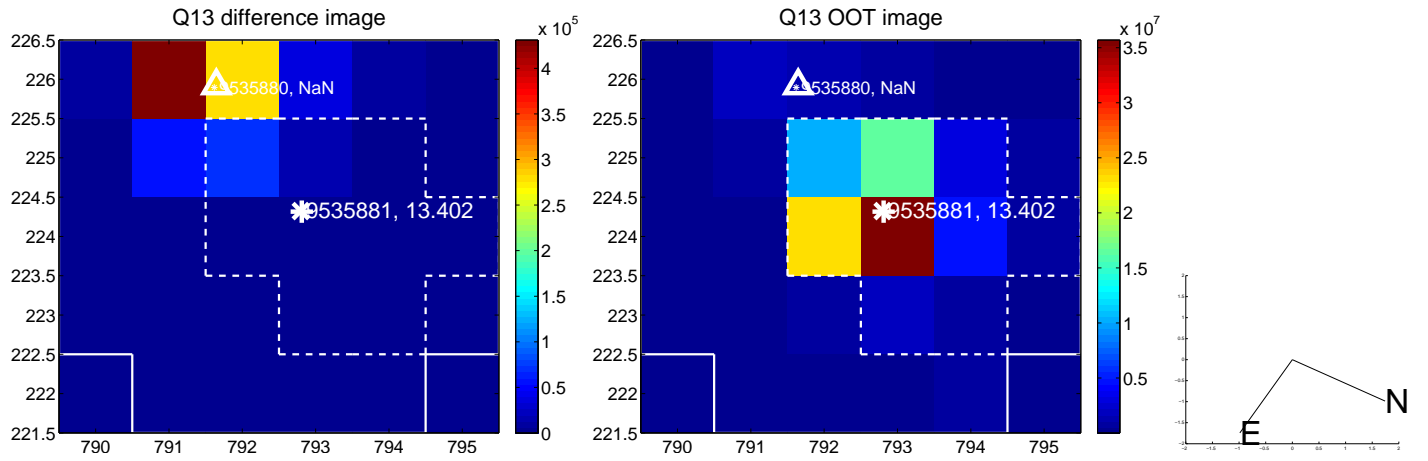
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



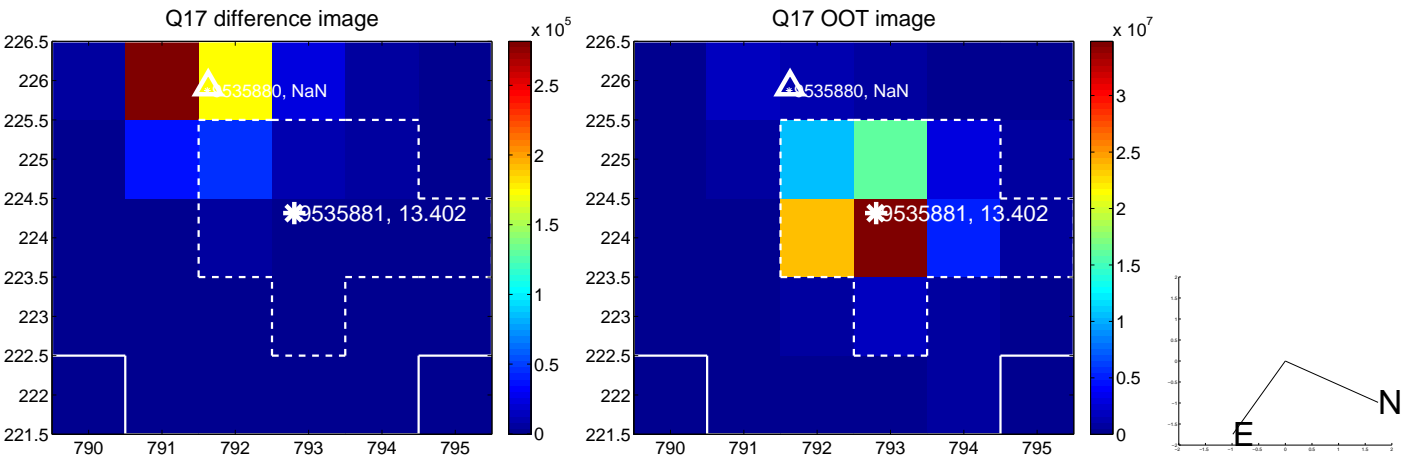
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

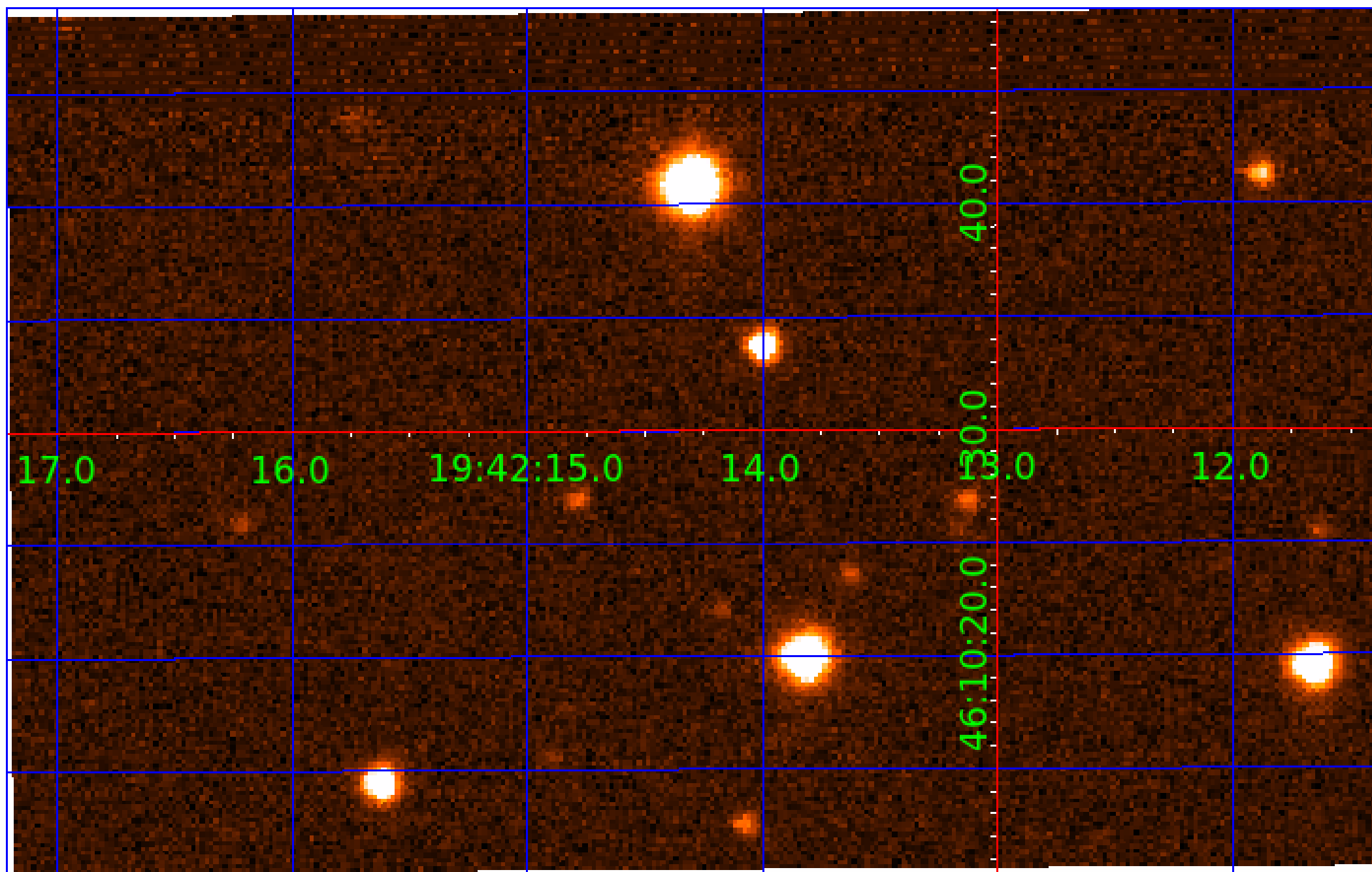


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



folded centroid time series figure for this object.

UKIRT Image



# KIC 009535881

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009535881-01	OBS	4228.01	0.960871	131.777768	128.8	2.012	26.1	25.5	1.60	7381	2.12	14723.30
009535881-02	OBS	No	0.960867	132.258068	148.0	2.049	33.6	29.7	1.60	7381	2.27	14723.38

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009535881-01	OBS	FP	0.00	1	0	1	0	LPP_DV—MOD_NONUNIQ_ALT—CENT_RESOLVED_OFFSET
009535881-02	OBS	FP	0.00	1	0	1	0	MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_RESOLVED_OFFSET

**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.

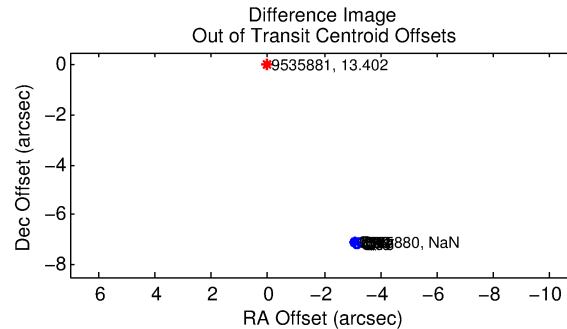
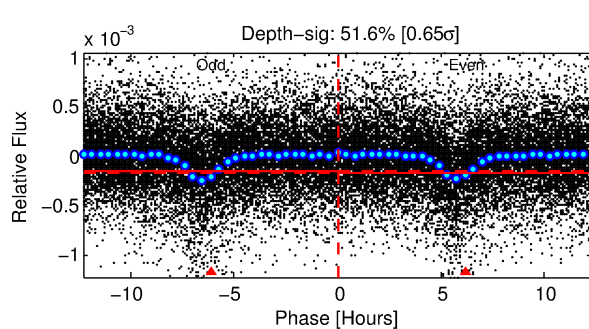
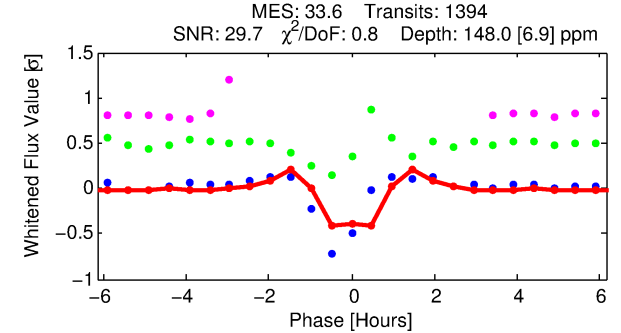
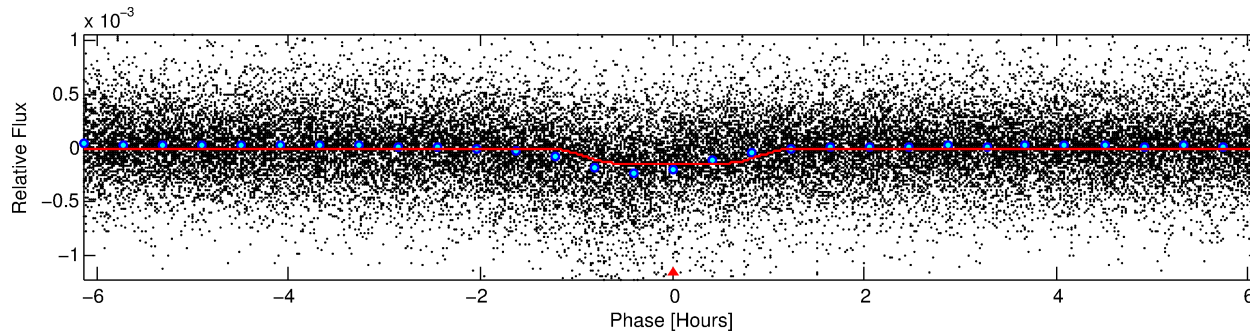
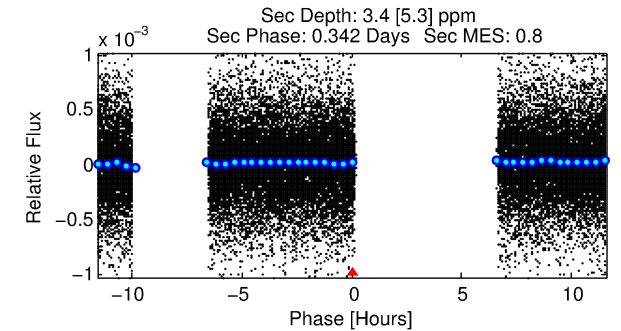
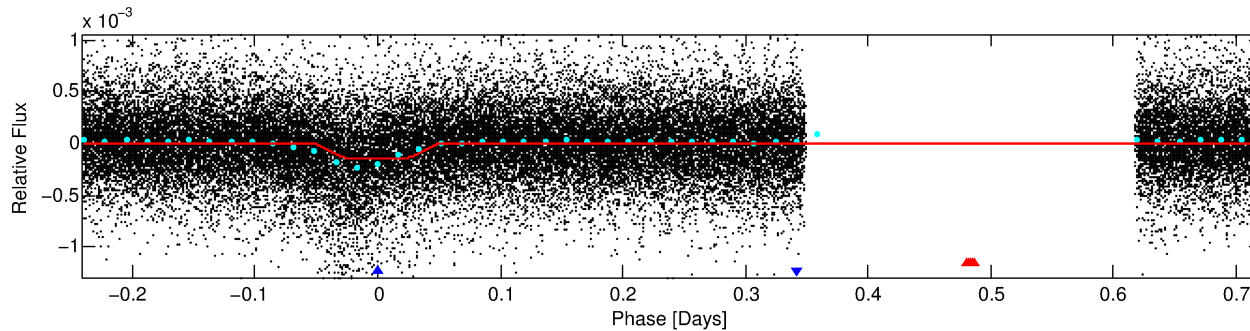
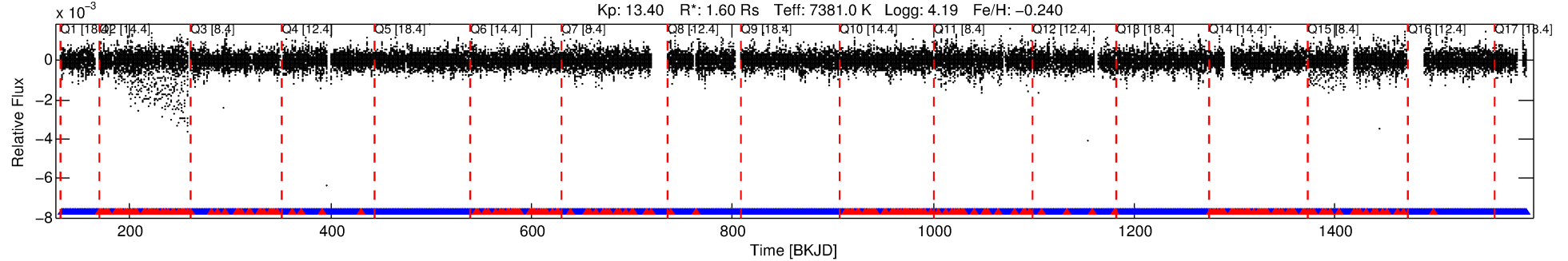
## Ephemeris Match Information For 009535881-02

No Significant Match Found

# DV One-Page Summary

KIC: 9535881 Candidate: 2 of 2 Period: 0.961 d  
KOI: K04228 Corr: No Ephemeris Match

Kp: 13.40 R\*: 1.60 Rs Teff: 7381.0 K Logg: 4.19 Fe/H: -0.240



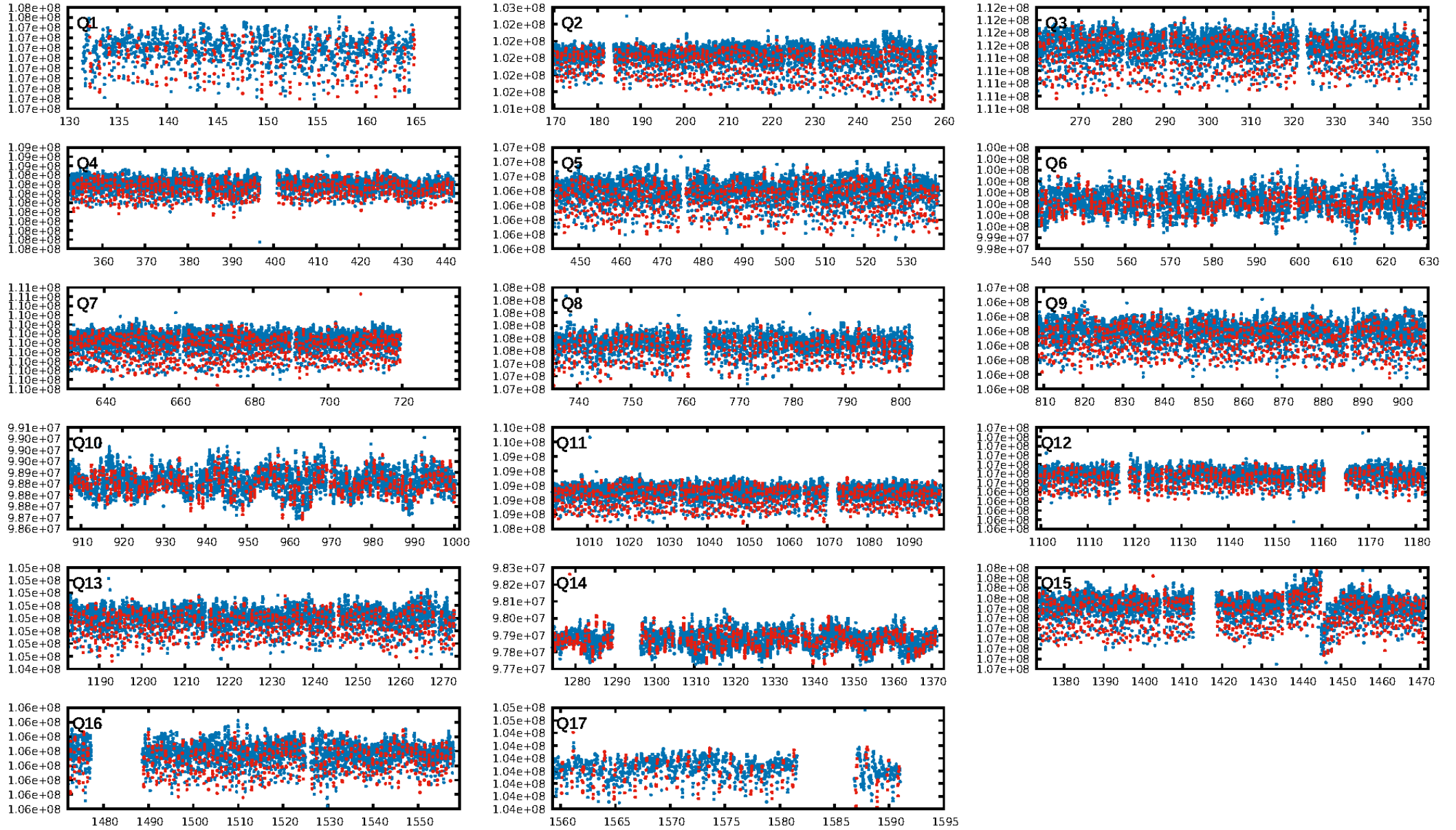
## DV Fit Results:

Period = 0.96087 [0.00000] d  
Epoch = 132.2581 [0.0005] BKJD  
Rp/R\* = 0.0130 [0.0012]  
a/R\* = 1.87 [0.73]  
b = 0.91 [0.11]  
Seff = 14723.38 [5748.62]  
Teq = 2809 [274] K  
Rp = 2.27 [0.73] Re  
a = 0.0215 [0.0054] AU  
Ag = 0.17 [0.27] [-3.08σ]  
Teffp = 2776 [1103] K [-0.03σ]

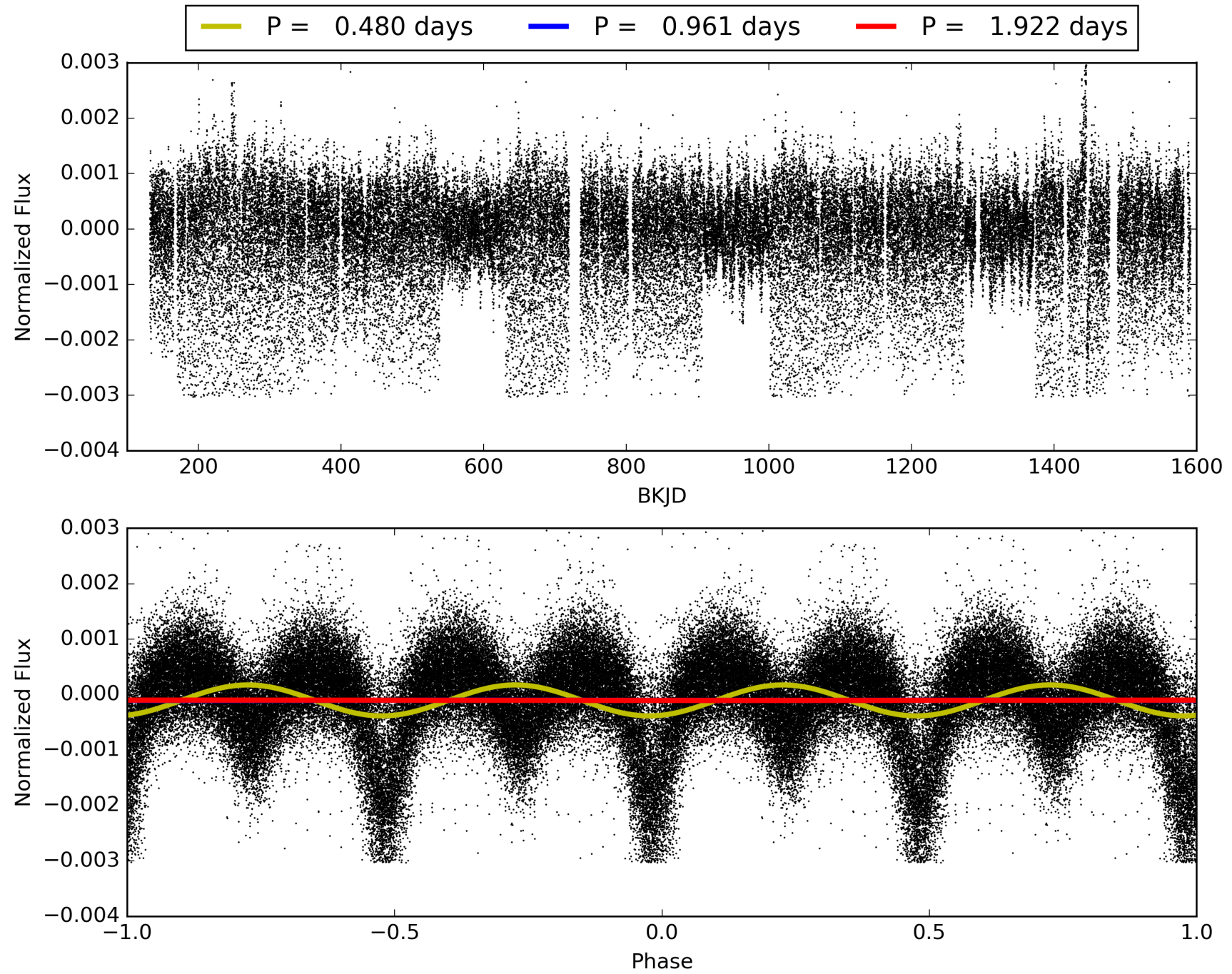
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 3.54e-257  
RollingBand-fgt: 0.82 [1096/1331]  
GhostDiagnostic-chr: N/A  
Centroid-sig: N/A  
Centroid-so: N/A  
OotOffset-rm: 7.790 arcsec [114.01σ]  
KicOffset-rm: 7.806 arcsec [115.34σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 1.00 [17/17]

# TCE 009535881-02, PDC Light Curves

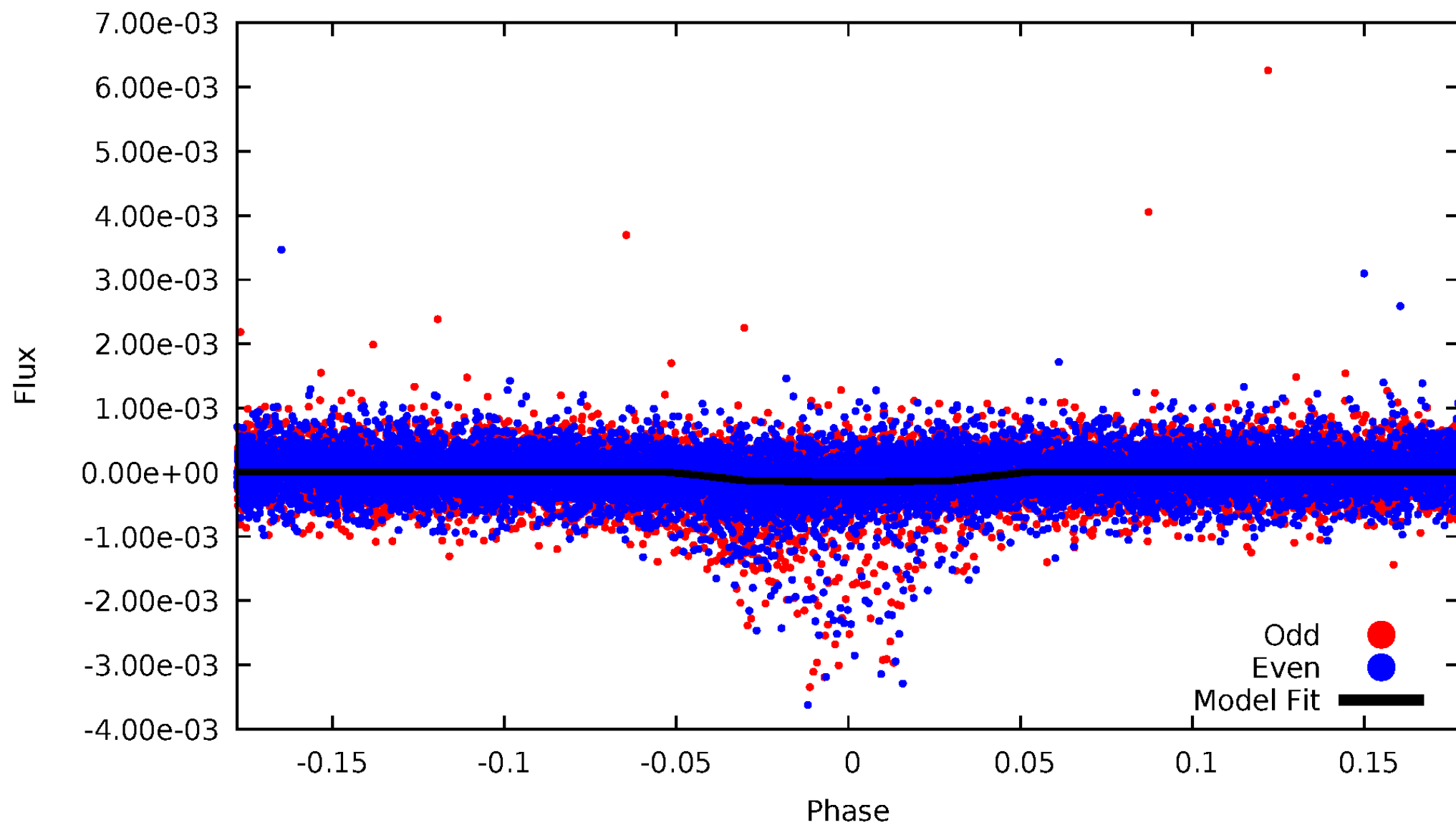


TCE 009535881-02



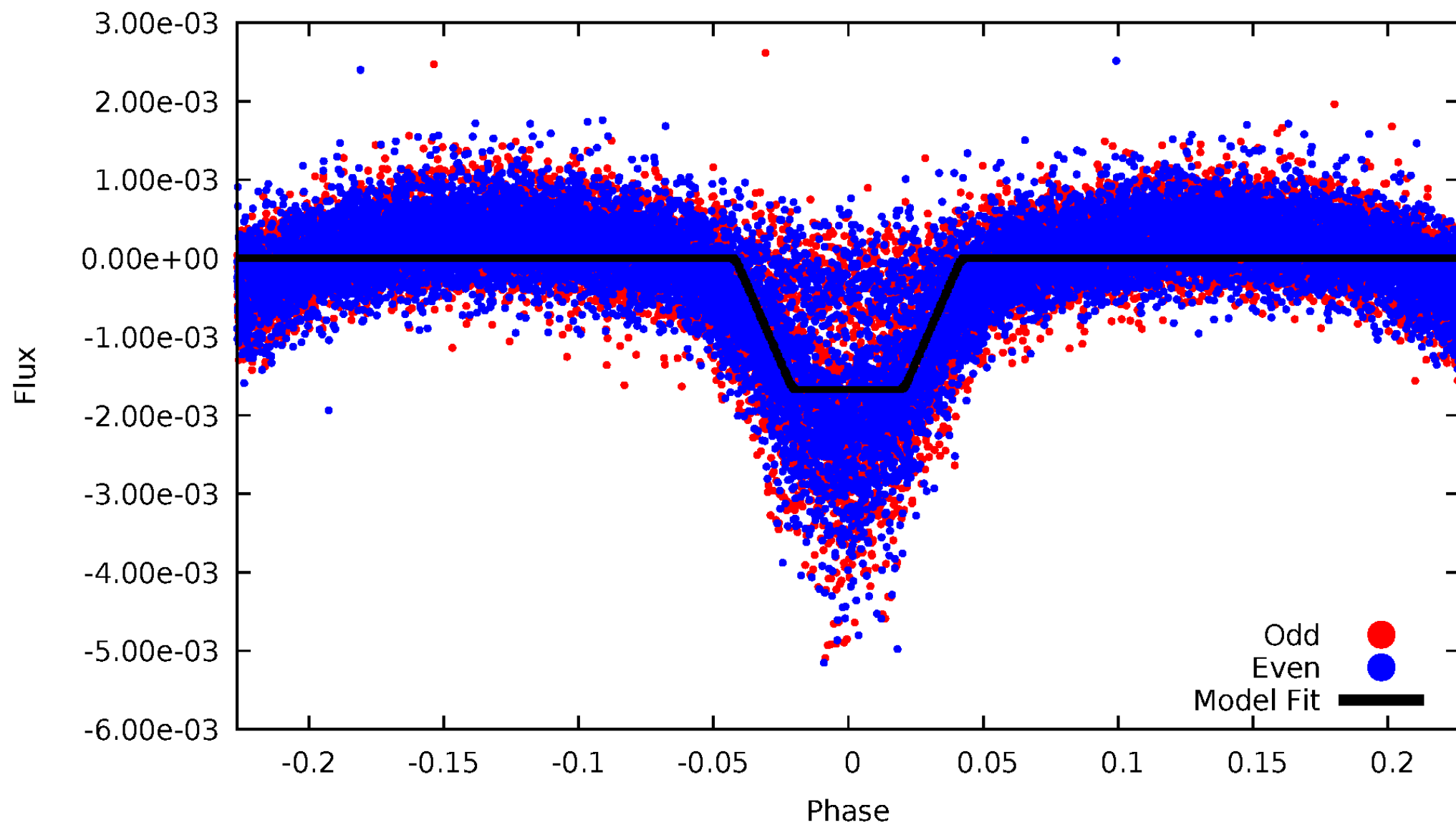
# DV Odd/Even

TCE 009535881-02



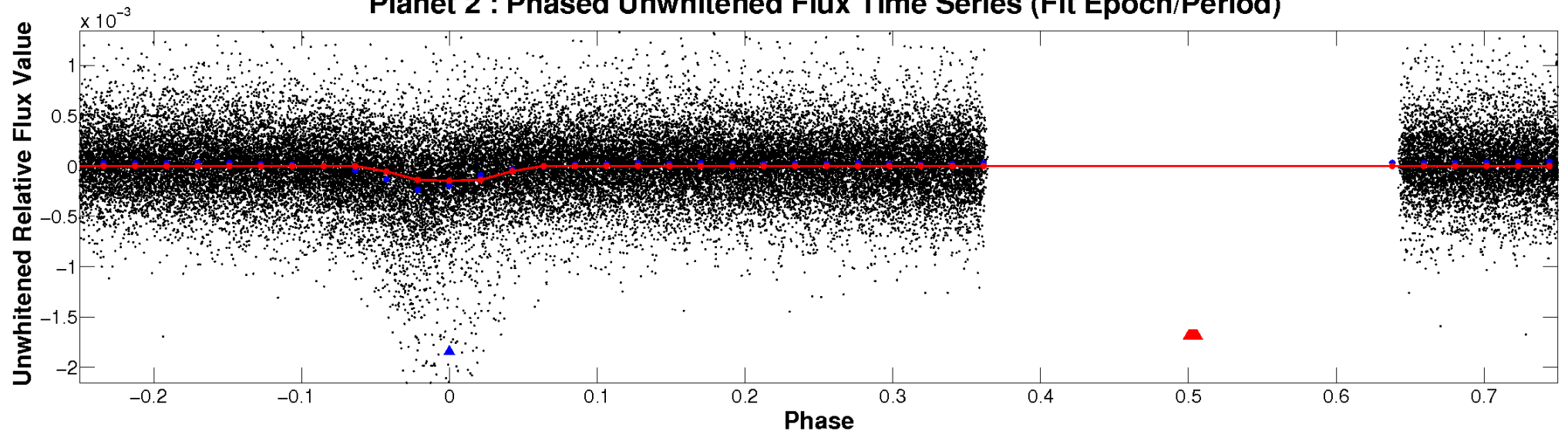
# ALT Odd/Even

TCE 009535881-02

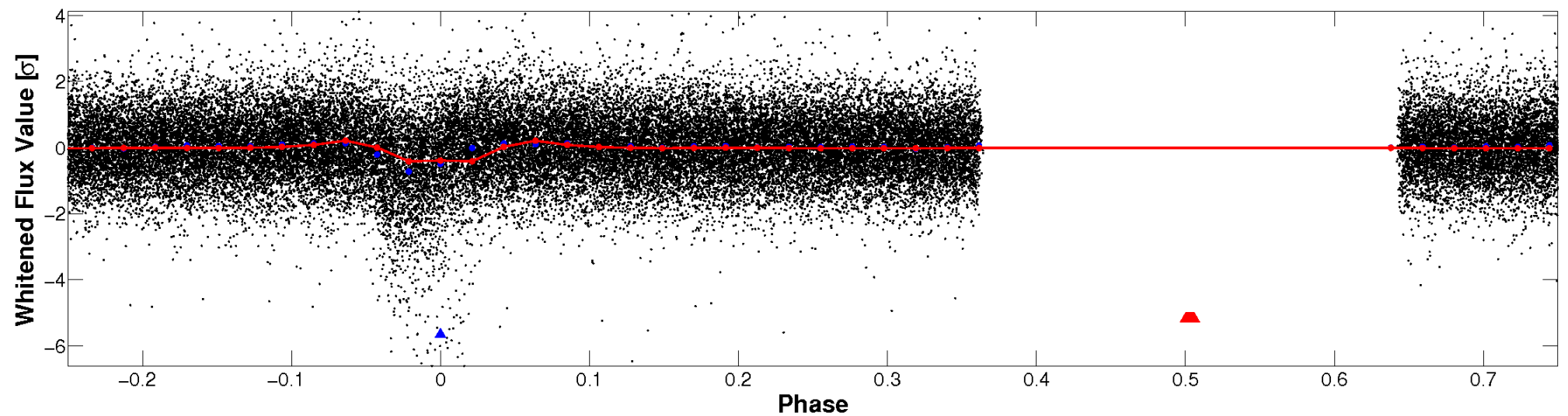


# Non-Whitened Vs. Whitened Light Curve

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

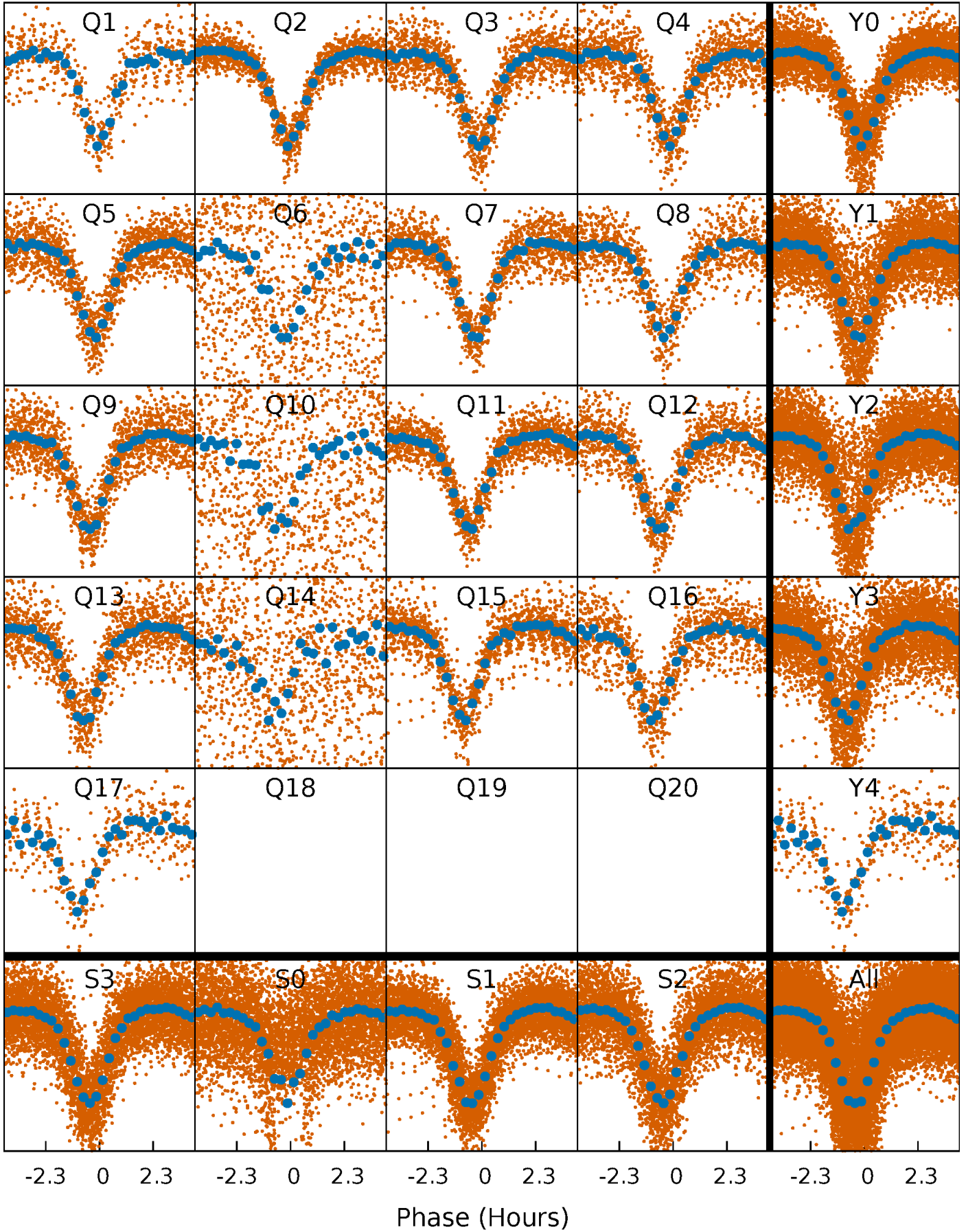


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



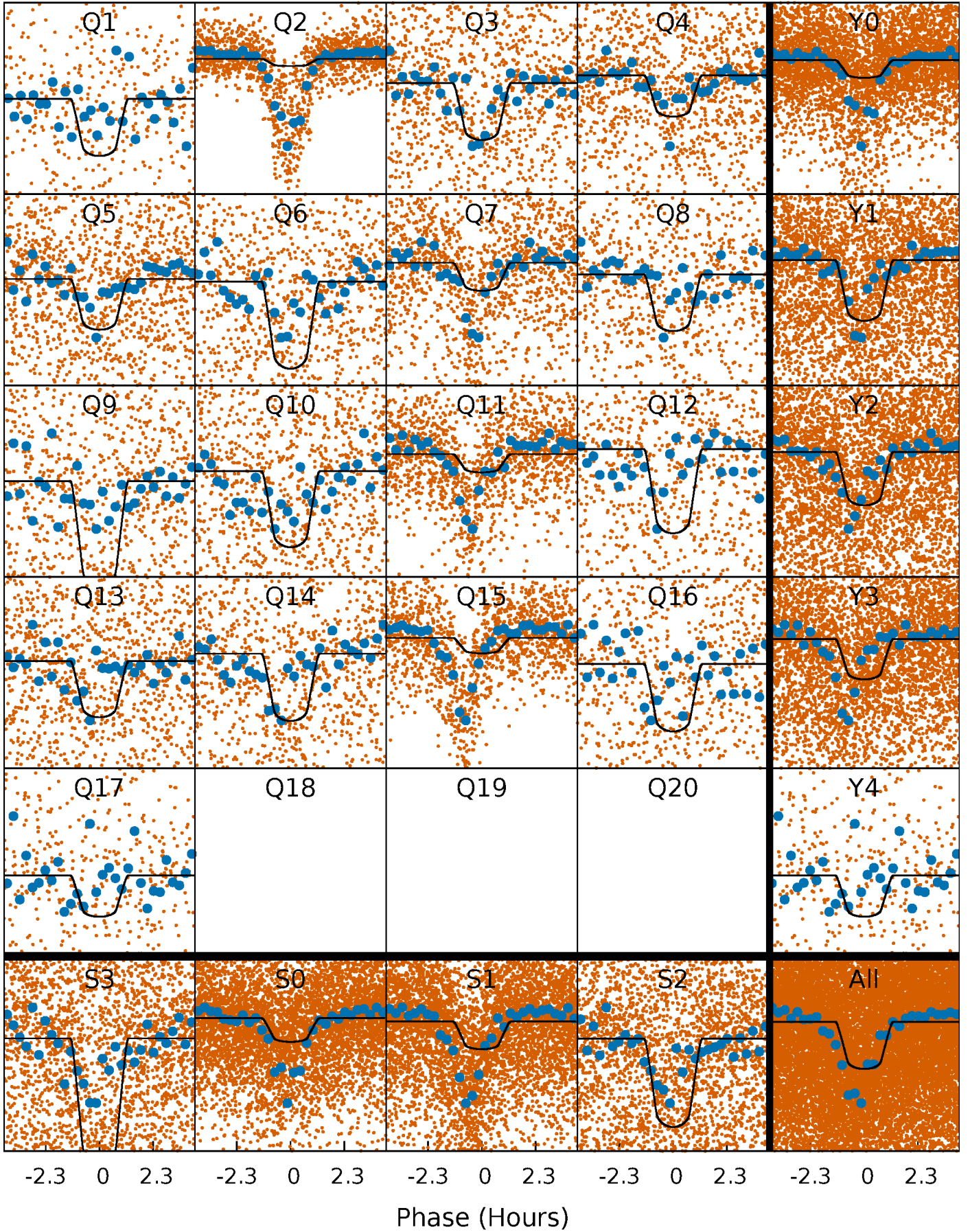
# PDC Quarter-Phased Transit Curves

TCE 009535881-02   P= 0.960867 Days    $T_0=132.258068$  (BKJD)



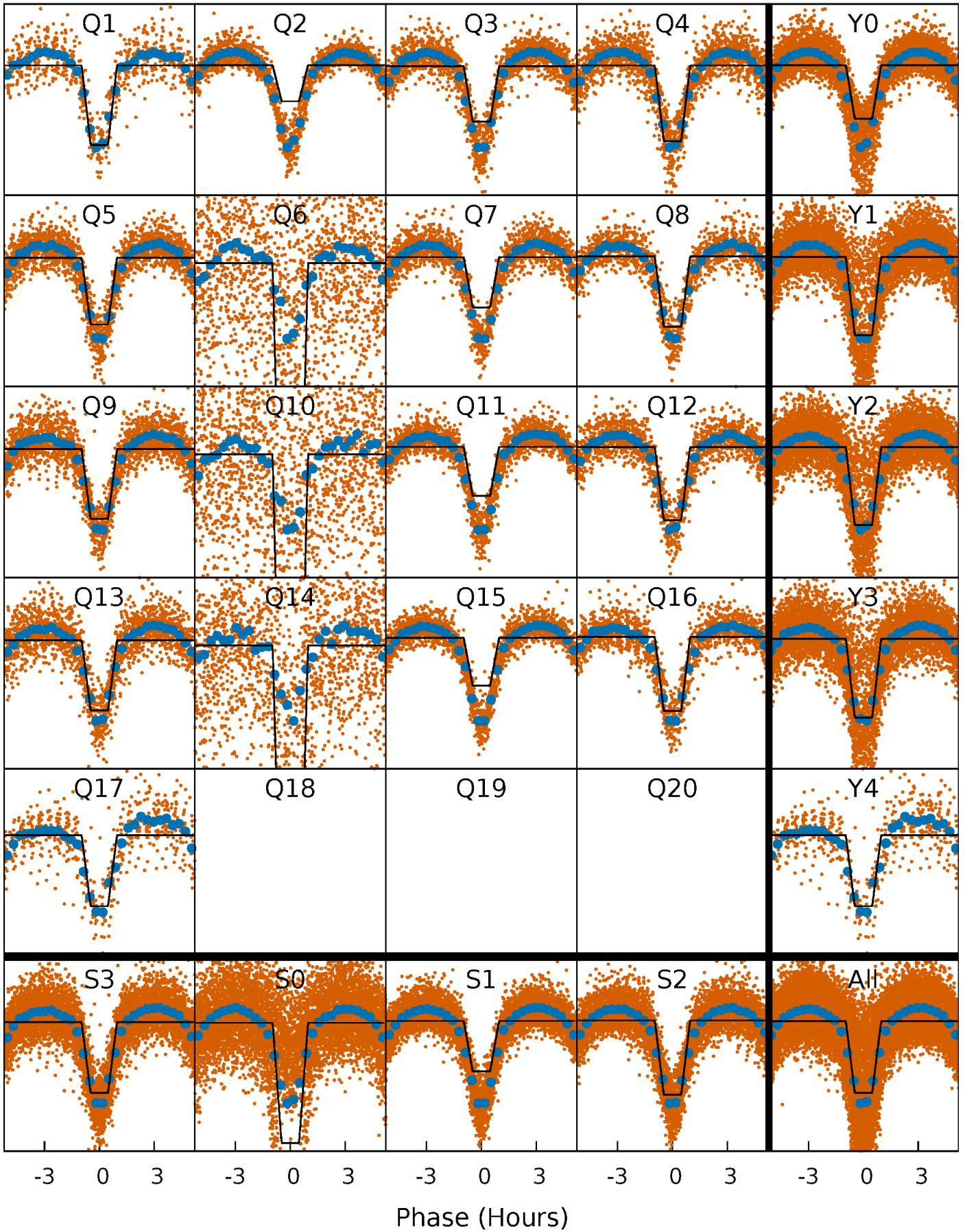
# DV Quarter-Phased Transit Curves

TCE 009535881-02     $P = 0.960867$  Days     $T_0 = 132.258068$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

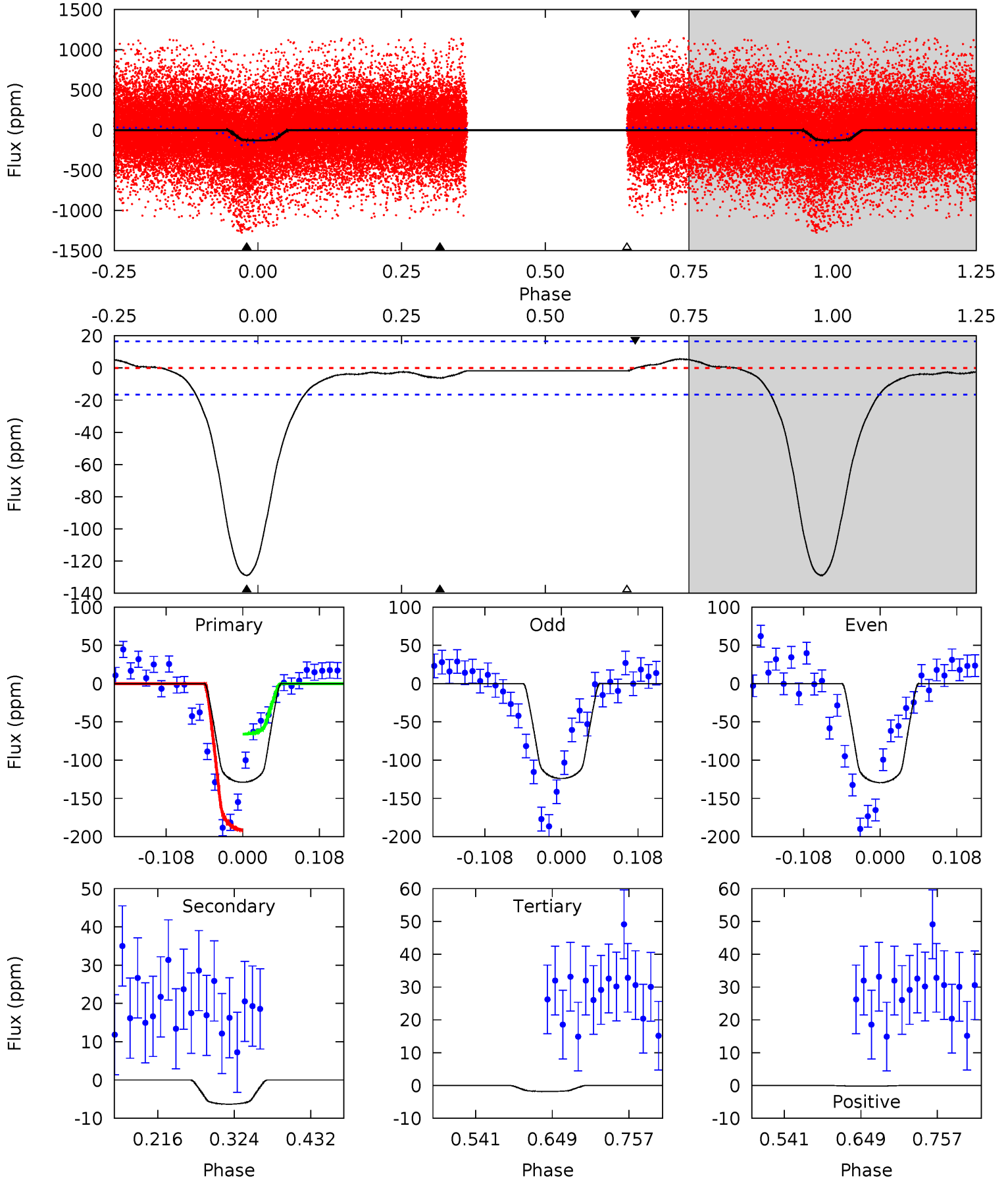
TCE 009535881-02   P= 0.960842 Days    $T_0=132.258792$  (BKJD)



# DV Model-Shift Uniqueness Test

009535881-02, P = 0.960867 Days, E = 131.297201 Days

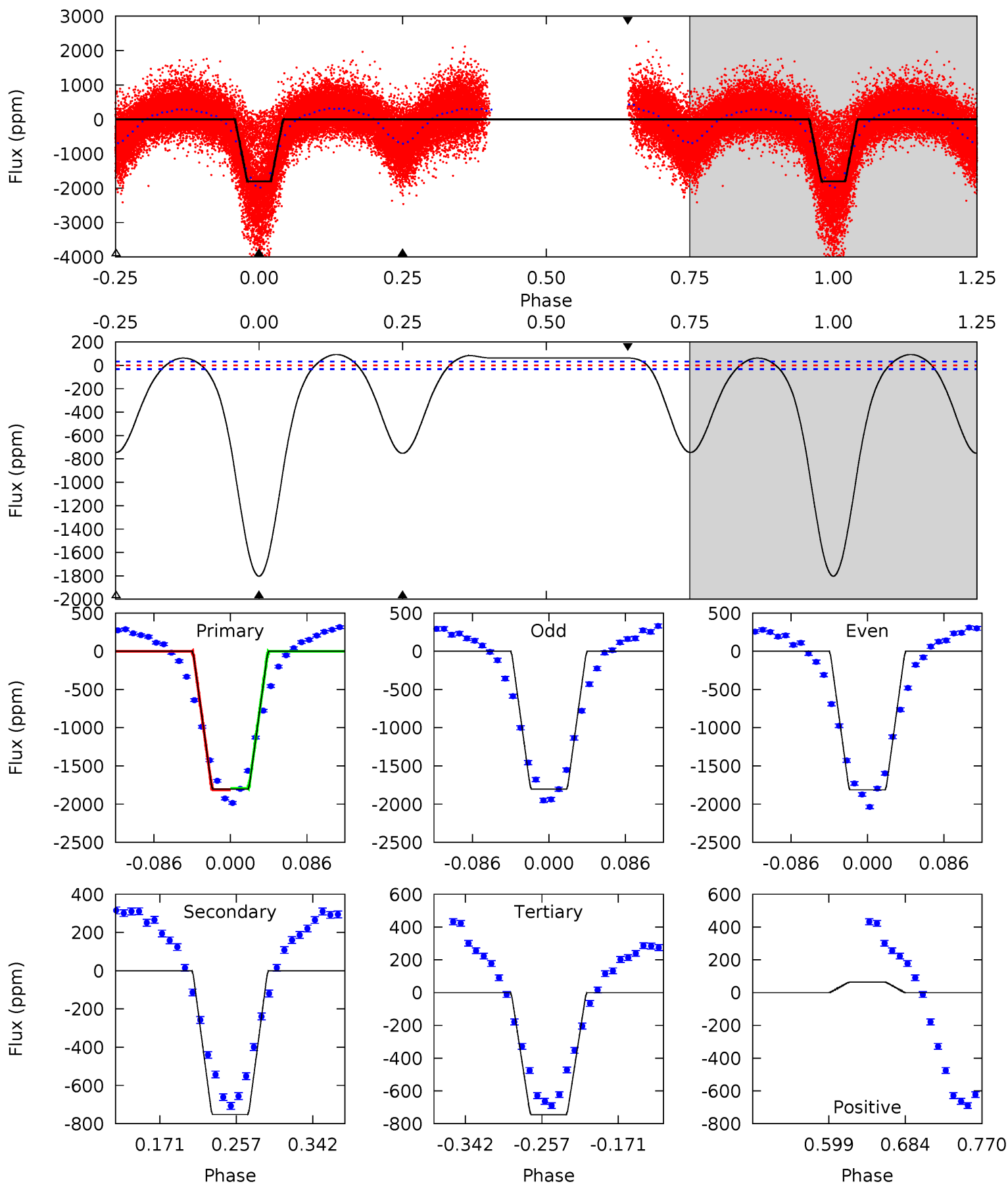
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
35.4	1.73	0.50	-0.04	4.55	1.61	1.17	34.9	35.4	1.23	1.77	0.74	1.42	0.04	17.3



# Alt Model-Shift Uniqueness Test

009535881-02, P = 0.960842 Days, E = 131.297950 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
253.7	105.8	104.8	8.99	4.60	1.72	38.1	149.0	244.8	1.07	96.8	0.68	0.96	0.05	1.20



### Stellar Parameters For KIC 009535881

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7381^{+232}_{-310}$	$4.186^{+0.124}_{-0.186}$	$-0.240^{+0.250}_{-0.350}$	$1.597^{+0.495}_{-0.330}$	$1.429^{+0.216}_{-0.216}$	$0.494^{+0.300}_{-0.250}$
	+3%/-4%	+3%/-4%	+104%/-146%	+31%/-21%	+15%/-15%	+61%/-51%
Source	KIC0	KIC0	KIC0	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 009535881-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-6 \pm 4$	$2.32^{+0.42}_{-0.35}$	$3967^{+289}_{-255}$	$-2371^{+5746}_{-1042}$	$0.286^{+0.231}_{-0.170}$
Alt.	$-752 \pm 7$	$7.23^{+1.20}_{-0.83}$	$3963^{+311}_{-274}$	$5840^{+175}_{-222}$	$3.606^{+0.913}_{-0.864}$

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

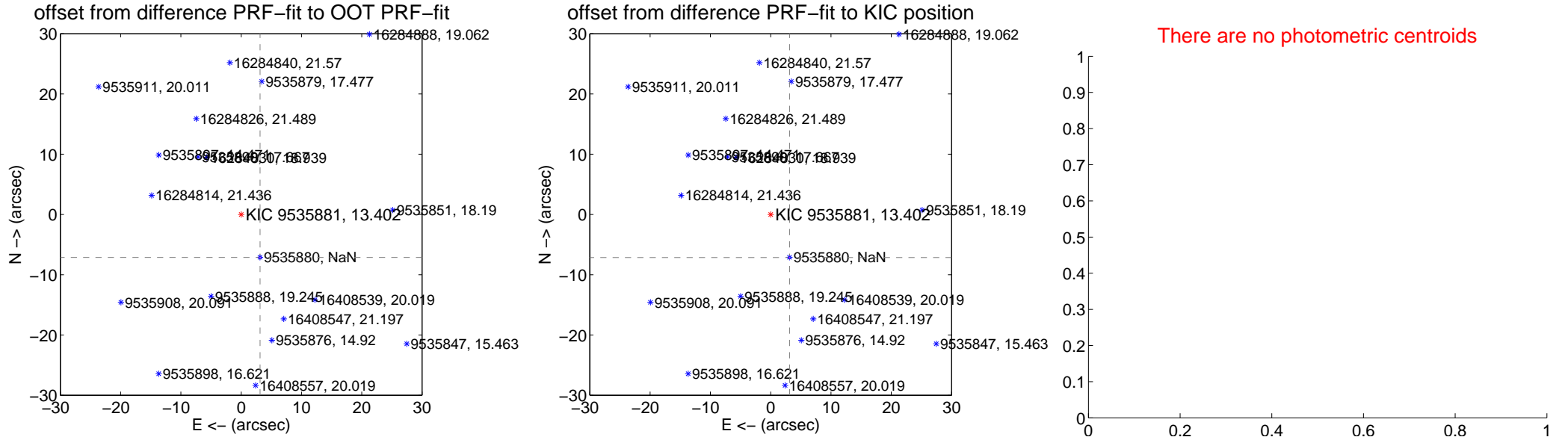
## DV Centroid Data

Supplemental centroid analysis for 009535881-02. Kepler magnitude: 13.40. Transit SNR 29.72

There are 17 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.03 arcsec

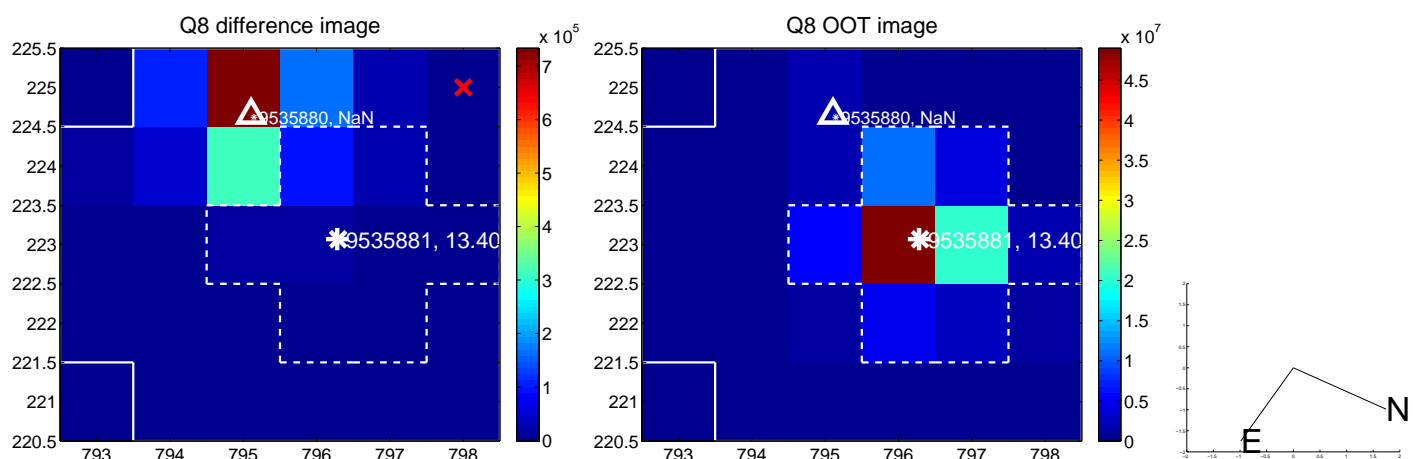
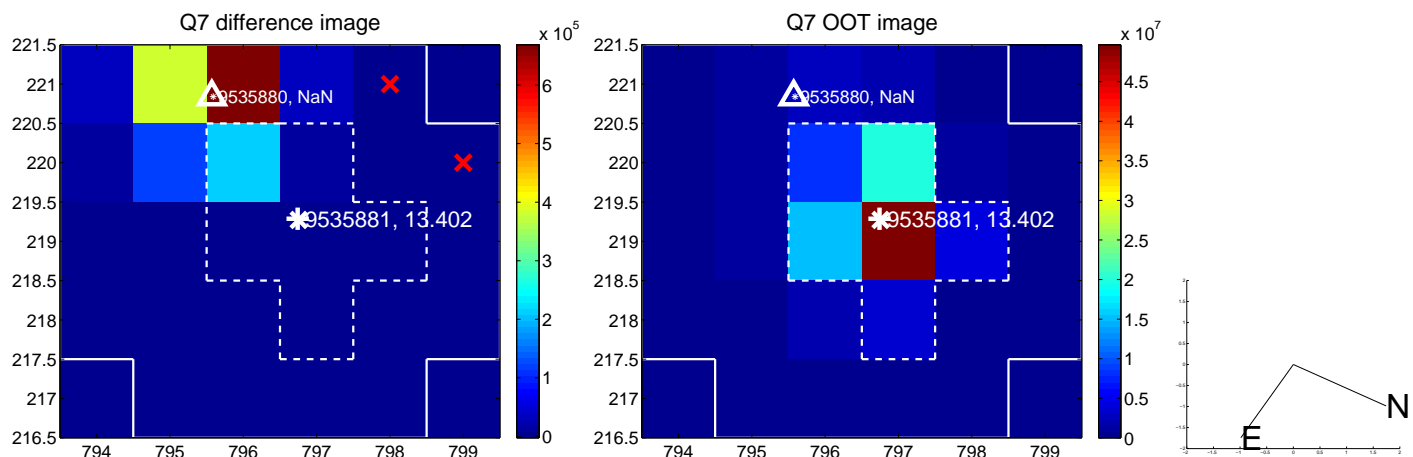
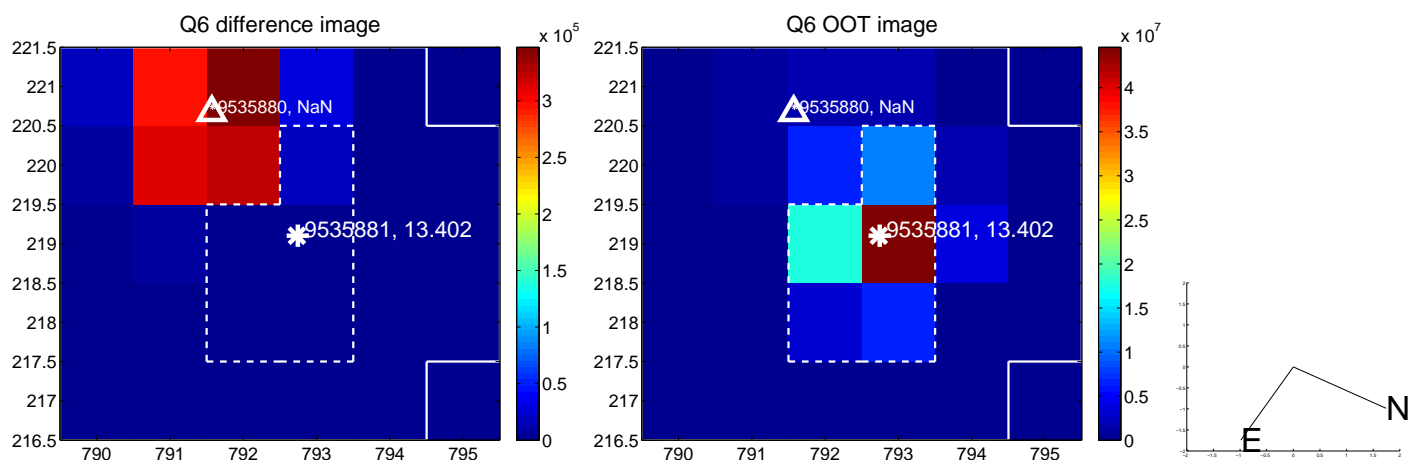
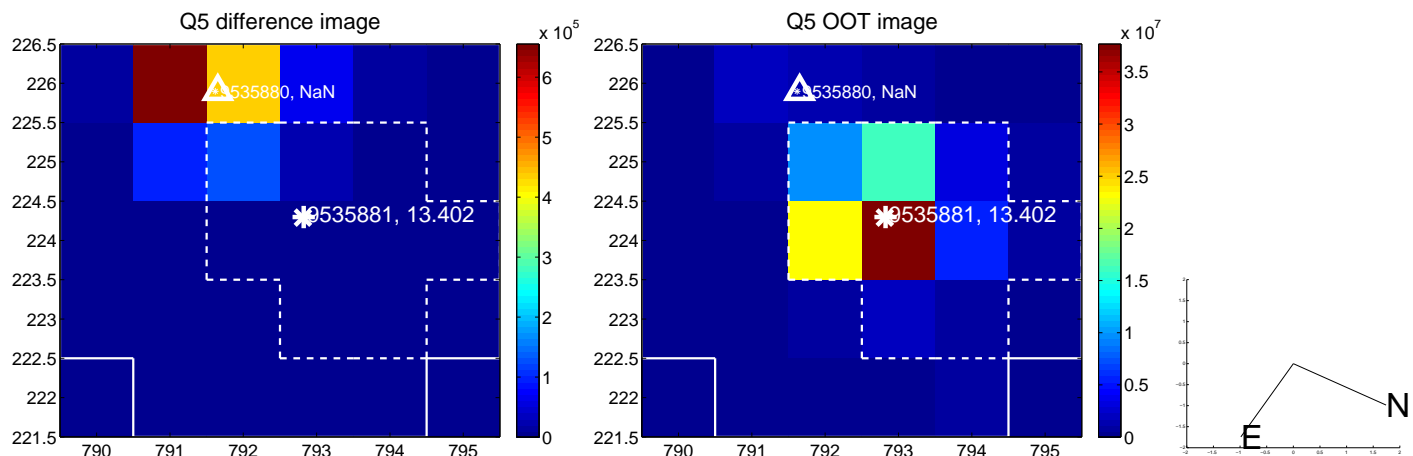
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b>7.790 <math>\pm</math> 0.068</b>	<b>114.01</b>	-3.138 $\pm$ 0.069	-7.130 $\pm$ 0.067
PRF-fit source offset from KIC position	<b>7.806 <math>\pm</math> 0.068</b>	<b>115.34</b>	-3.142 $\pm$ 0.069	-7.146 $\pm$ 0.067
photometric centroid source offset	—	—	—	—



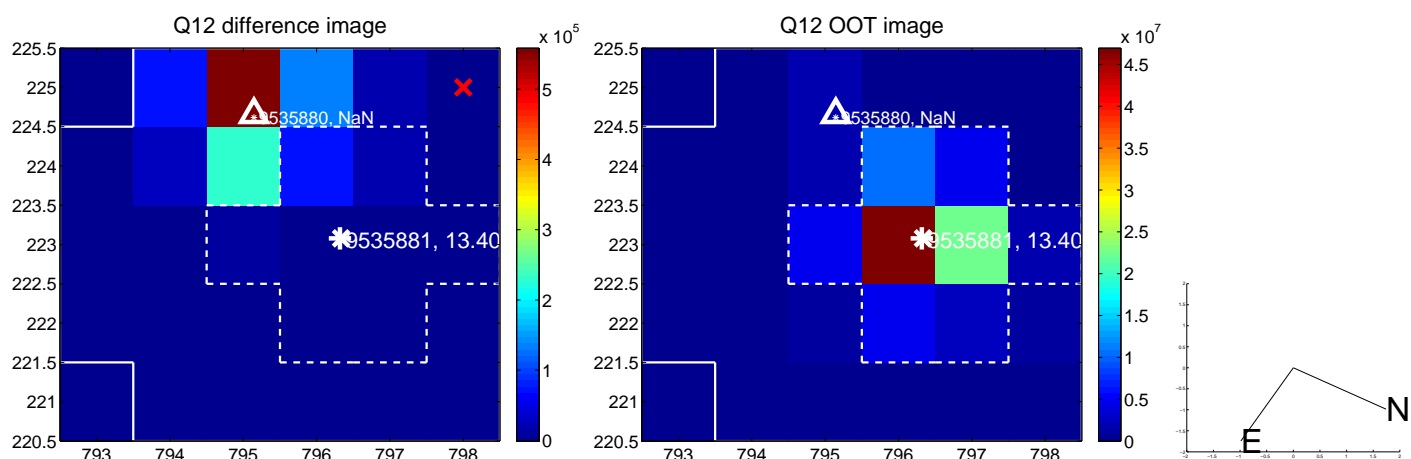
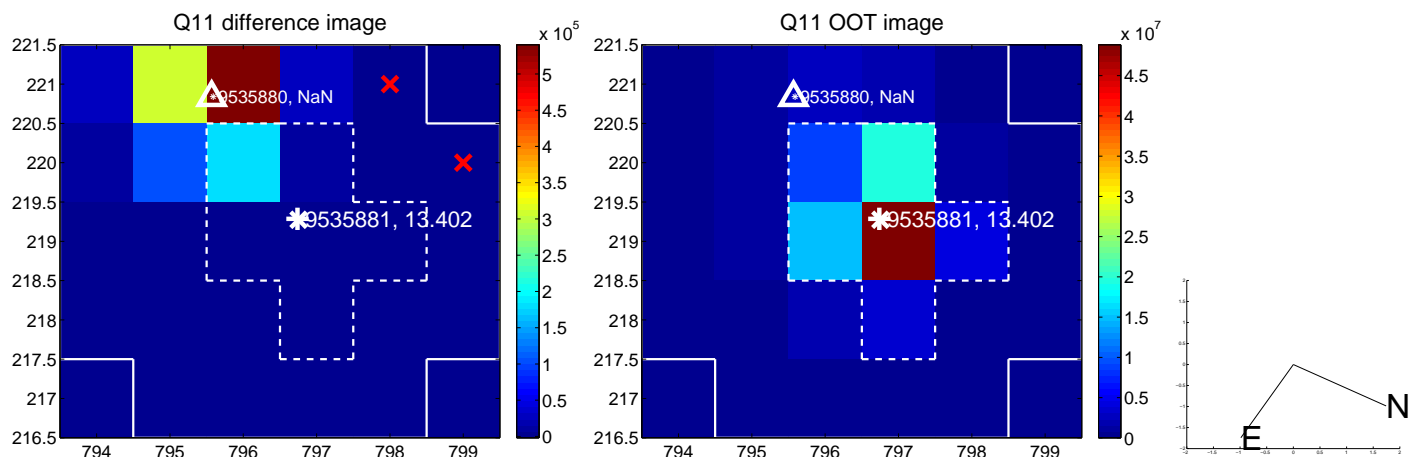
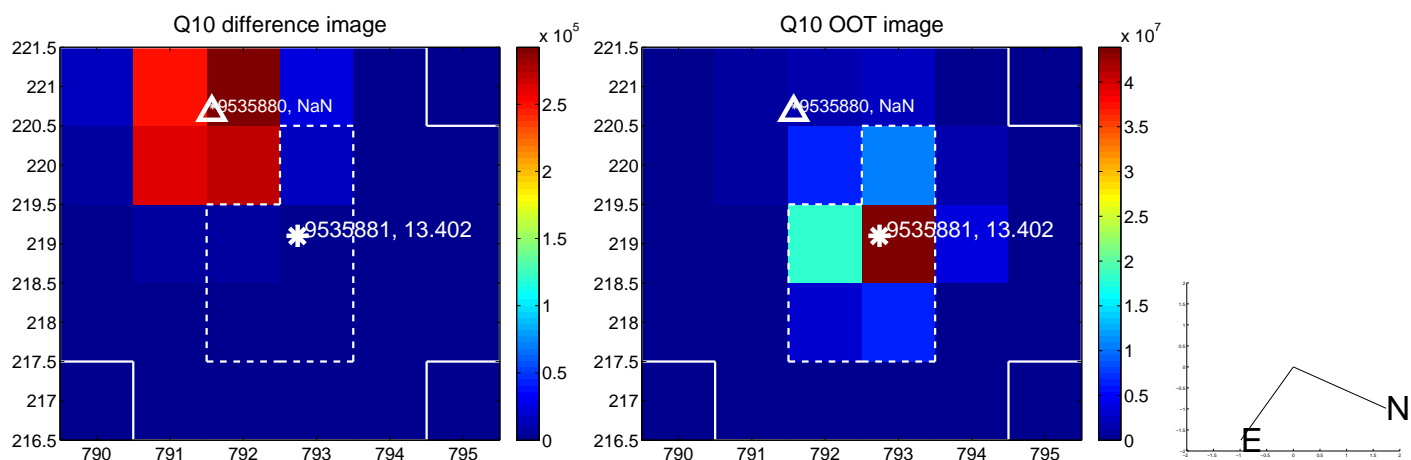
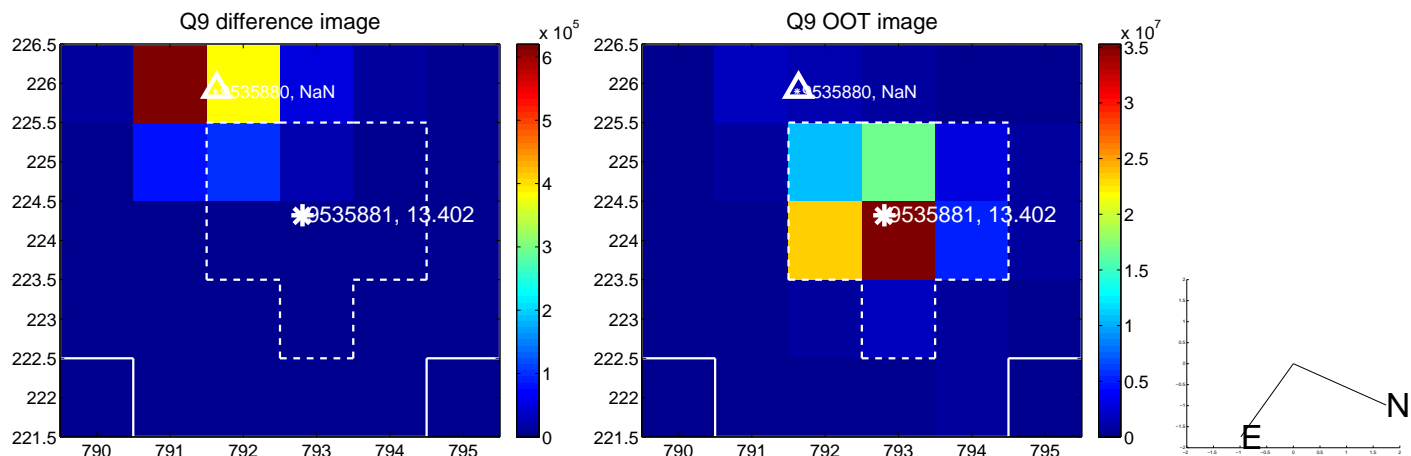
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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



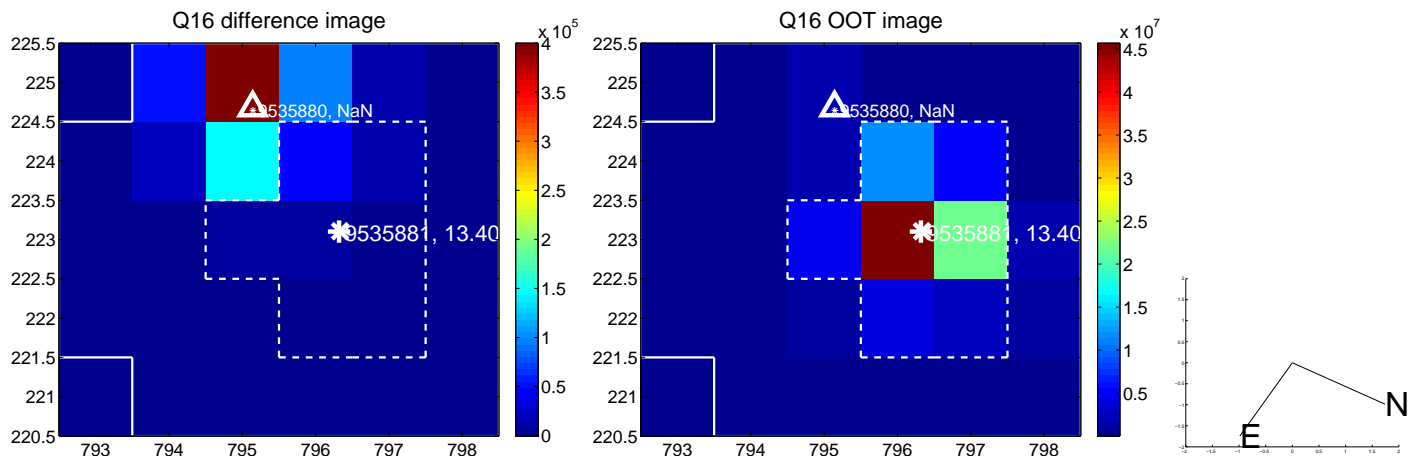
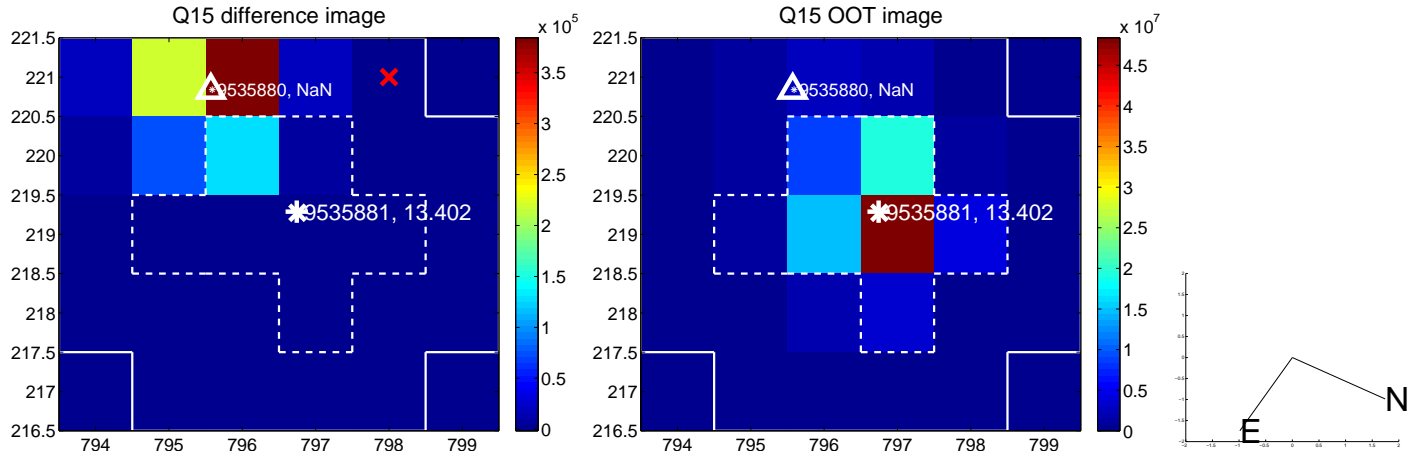
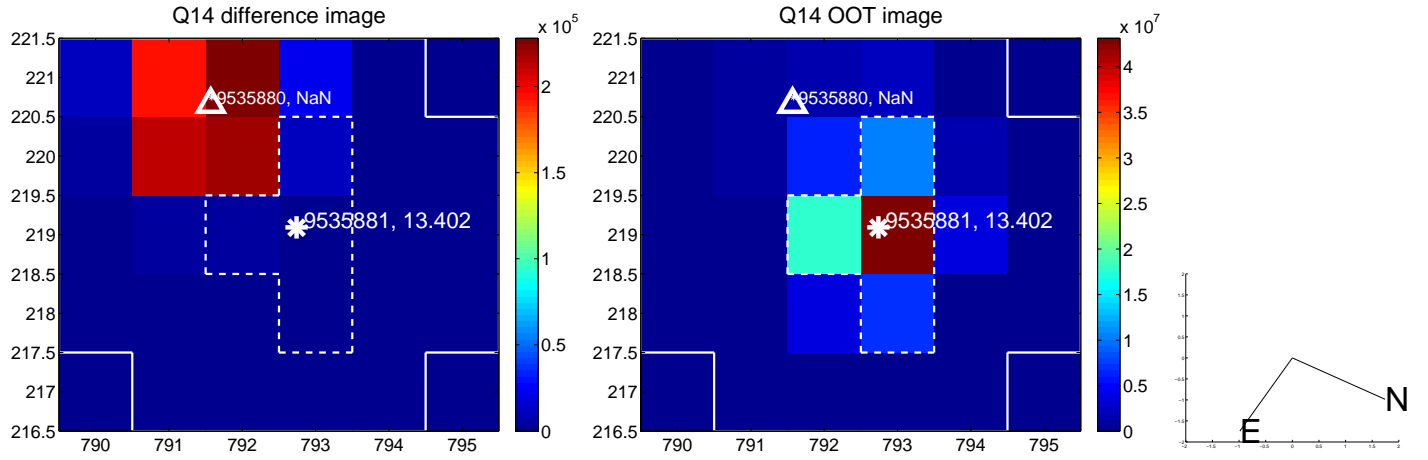
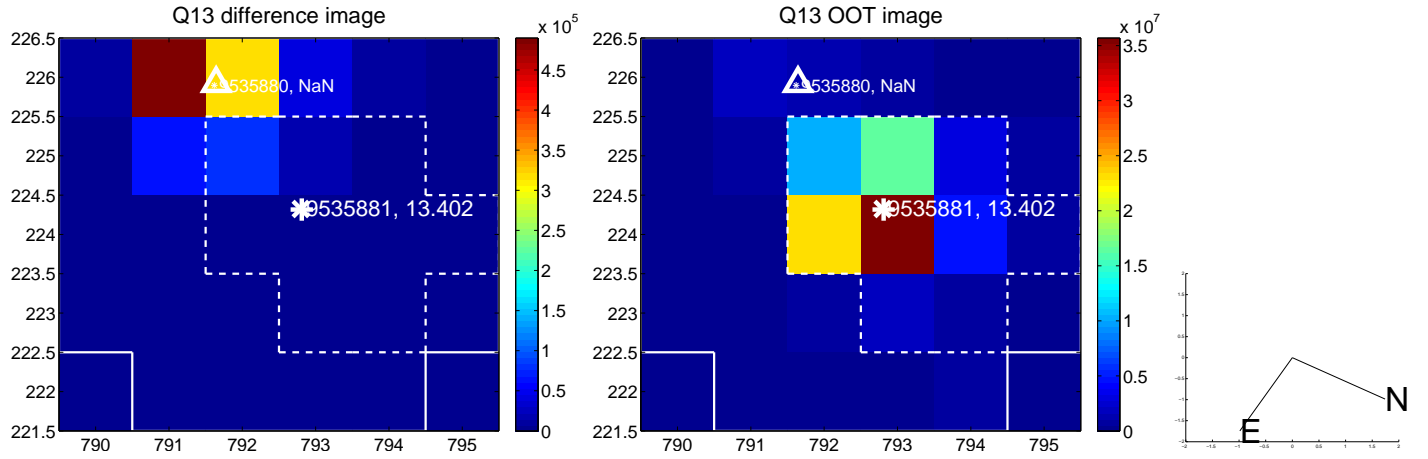
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



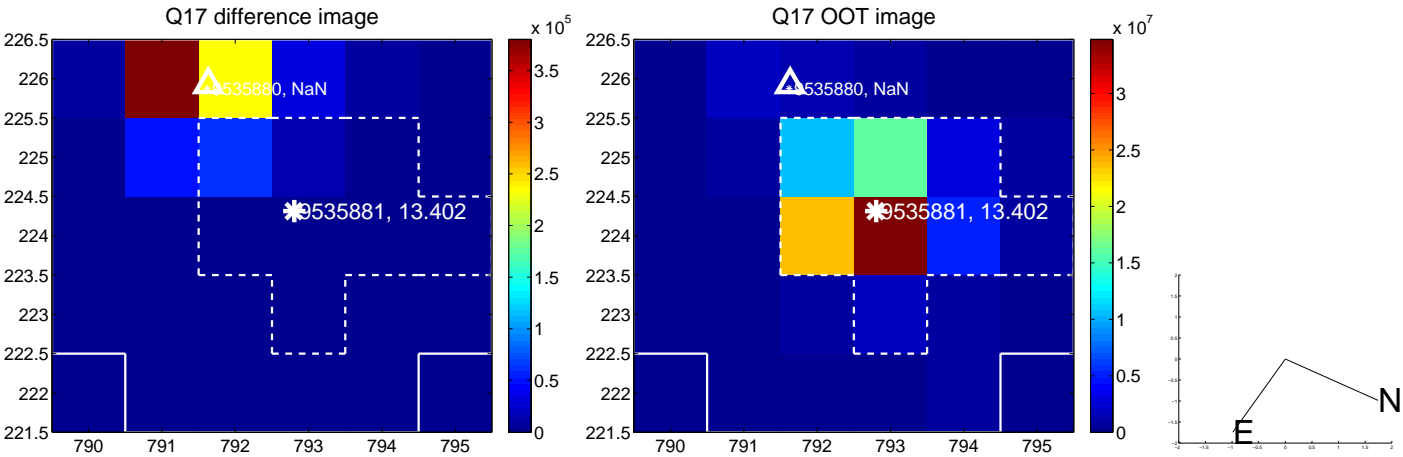
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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.



folded centroid time series figure for this object.

UKIRT Image

