

# KIC 011656928

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
011656928-01	OBS	No	11.750574	138.279623	56.7	28.727	10.1	10.6	3.15	6915	2.67	1431.53
011656928-02	OBS	No	2.350835	131.939402	25.0	22.829	7.5	8.7	3.15	6915	1.83	12234.41

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
011656928-01	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV
011656928-02	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT

**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 011656928-01

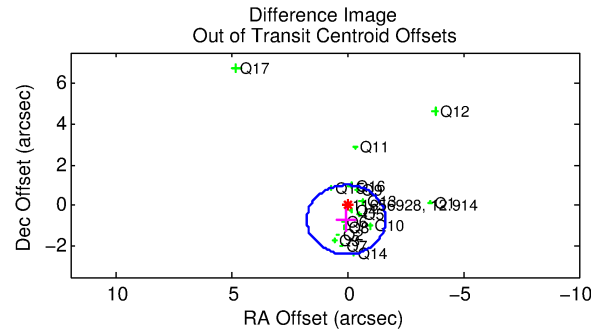
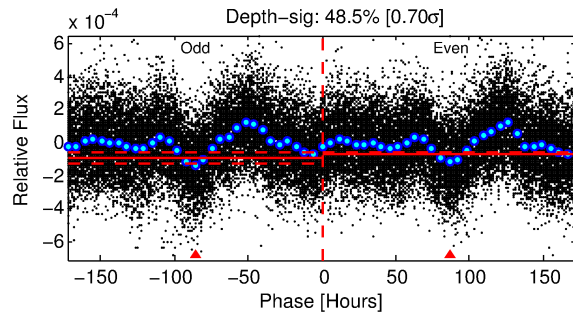
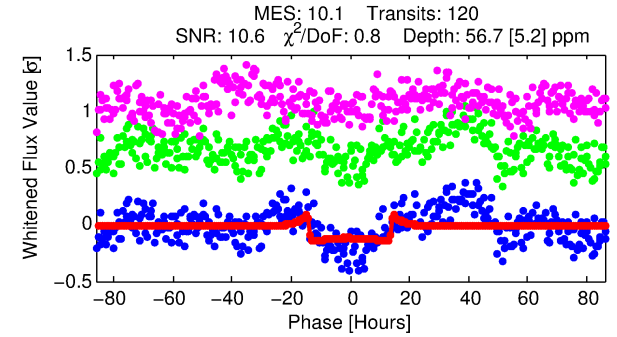
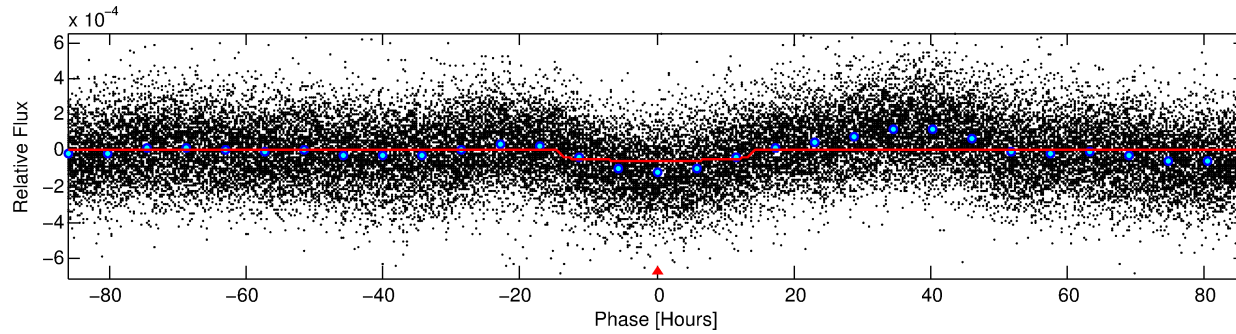
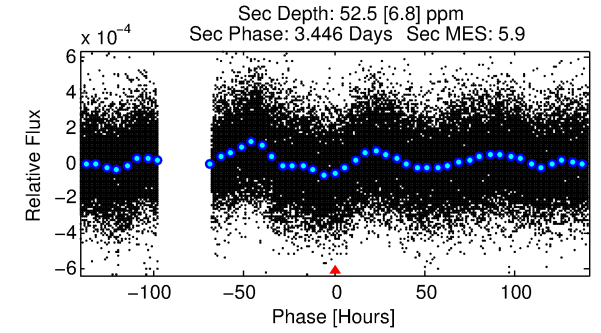
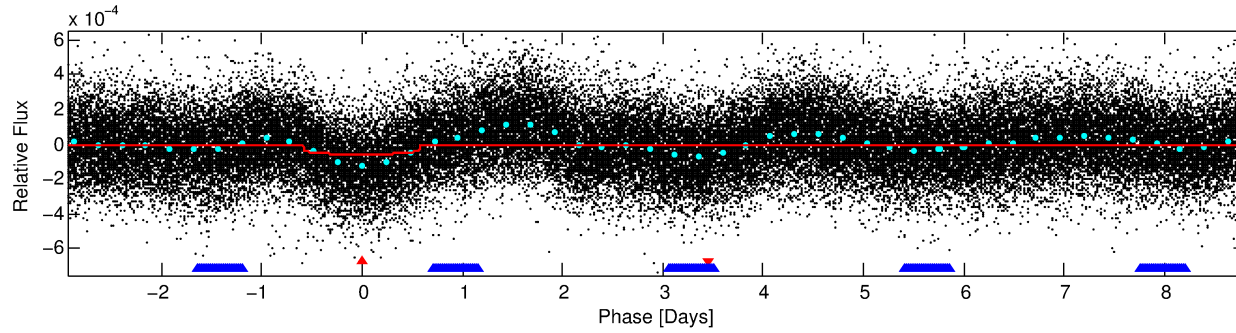
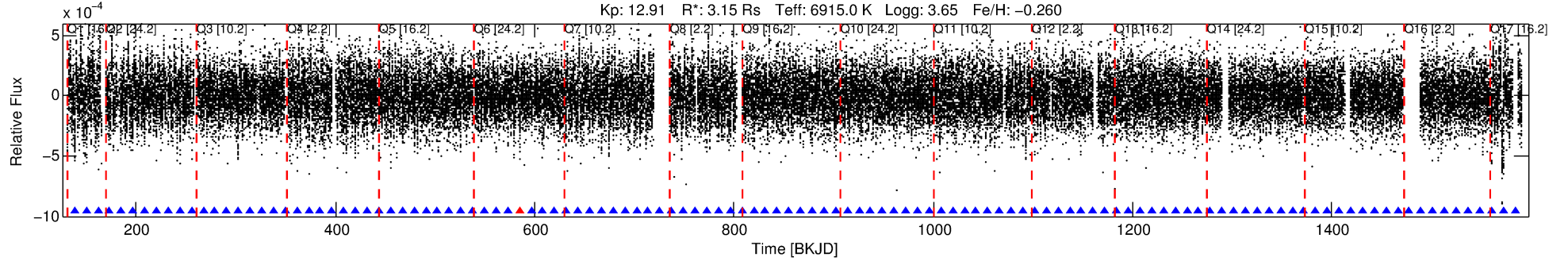
No Significant Match Found

# DV One-Page Summary

KIC: 11656928 Candidate: 1 of 2 Period: 11.751 d

KOI: K06242 Corr: No Ephemeris Match

Kp: 12.91 R\*: 3.15 Rs Teff: 6915.0 K Logg: 3.65 Fe/H: -0.260



## DV Fit Results:

Period = 11.75057 [0.00021] d  
Epoch = 138.2796 [0.0139] BKJD  
Rp/R\* = 0.0078 [0.0005]  
a/R\* = 1.94 [0.40]  
b = 0.84 [0.10]  
Seff = 1431.53 [785.00]  
Teq = 1568 [215] K  
Rp = 2.67 [0.96] Re  
a = 0.1193 [0.0400] AU  
Ag = 57.65 [32.59] [1.74σ]  
Teffp = 6682 [379] K [11.73σ]

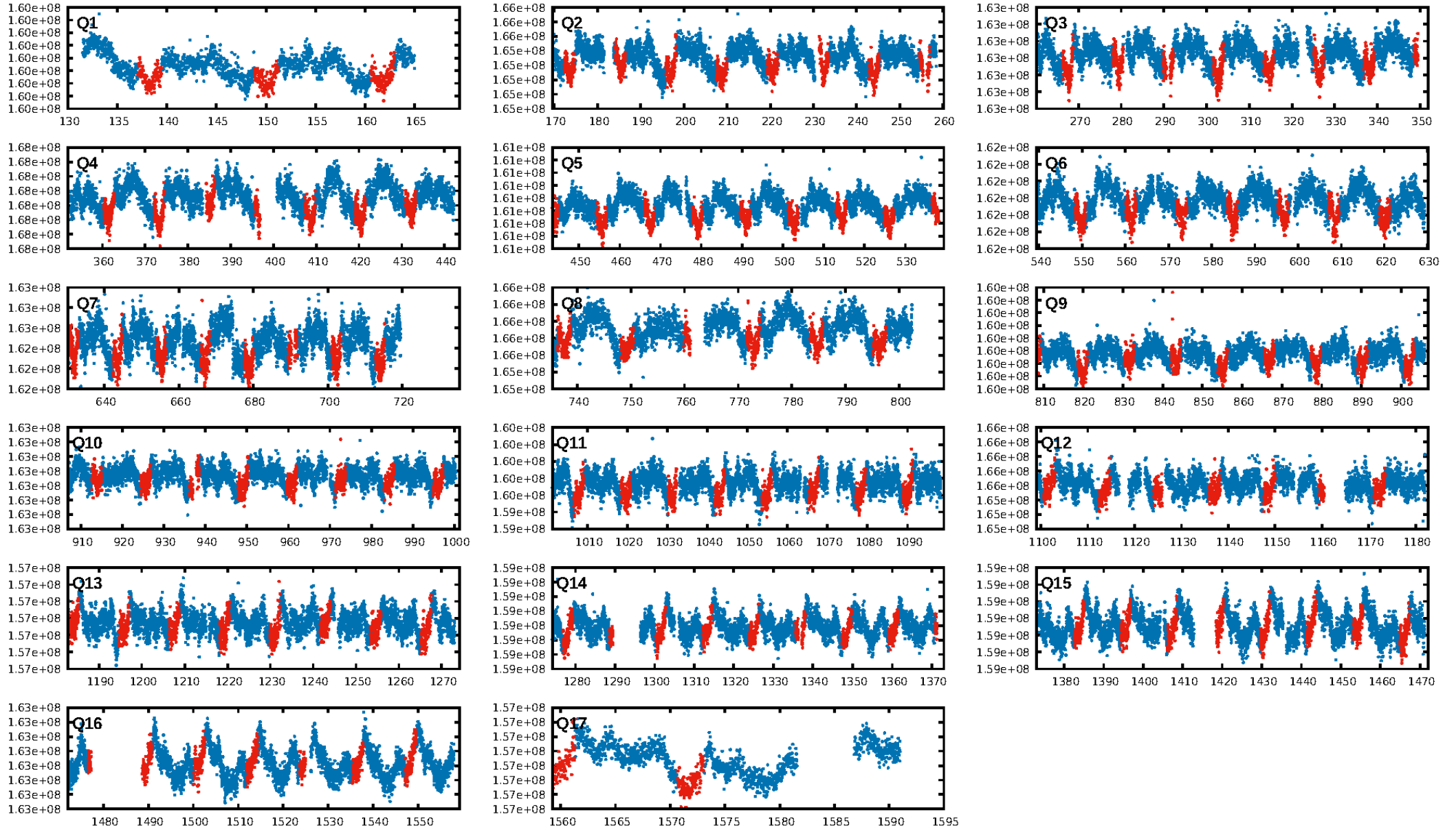
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [6.15σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 100.0%  
ModelChiSquareGoF-sig: 100.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 0.99 [114/115]  
GhostDiagnostic-chr: 2.064  
Centroid-sig: 11.4%  
Centroid-so: 0.390 arcsec [0.98σ]  
OotOffset-rm: 0.698 arcsec [1.23σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-rm: 0.859 arcsec [1.56σ]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.88 [15/17]  
DiffImageOverlap-fno: 0.00 [0/17]

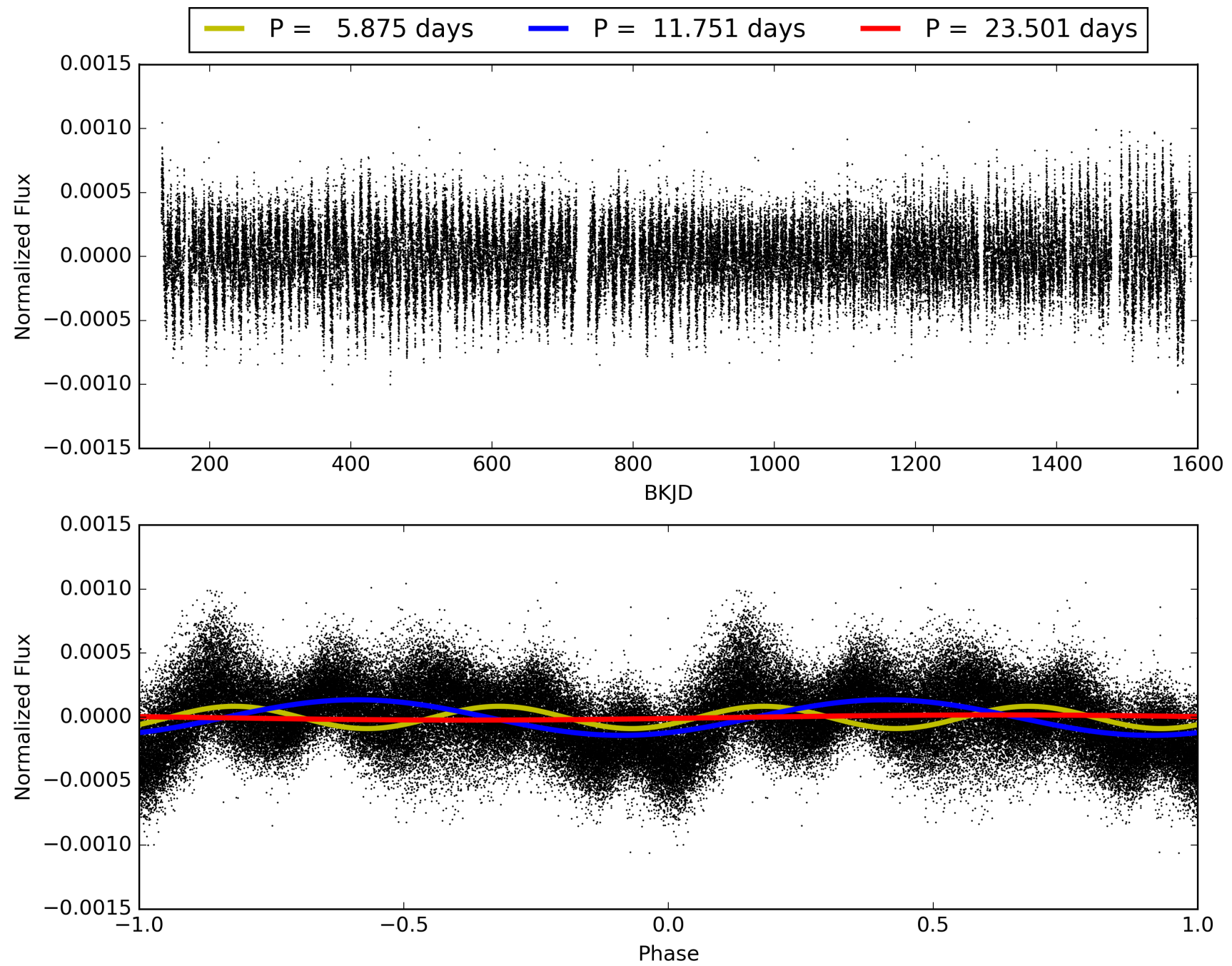
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 05:21:15 Z

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

# TCE 011656928-01, PDC Light Curves

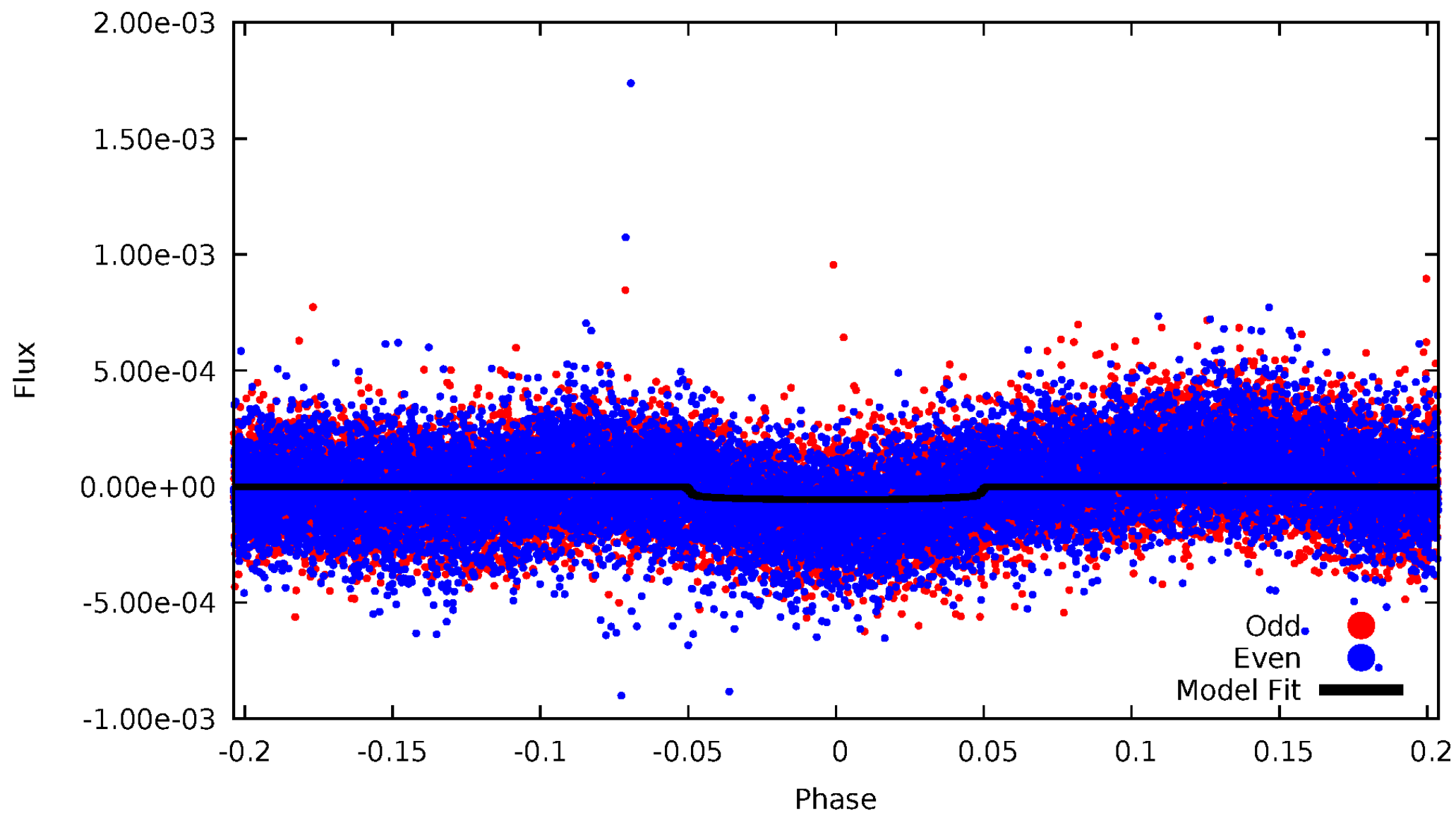


TCE 011656928-01



# DV Odd/Even

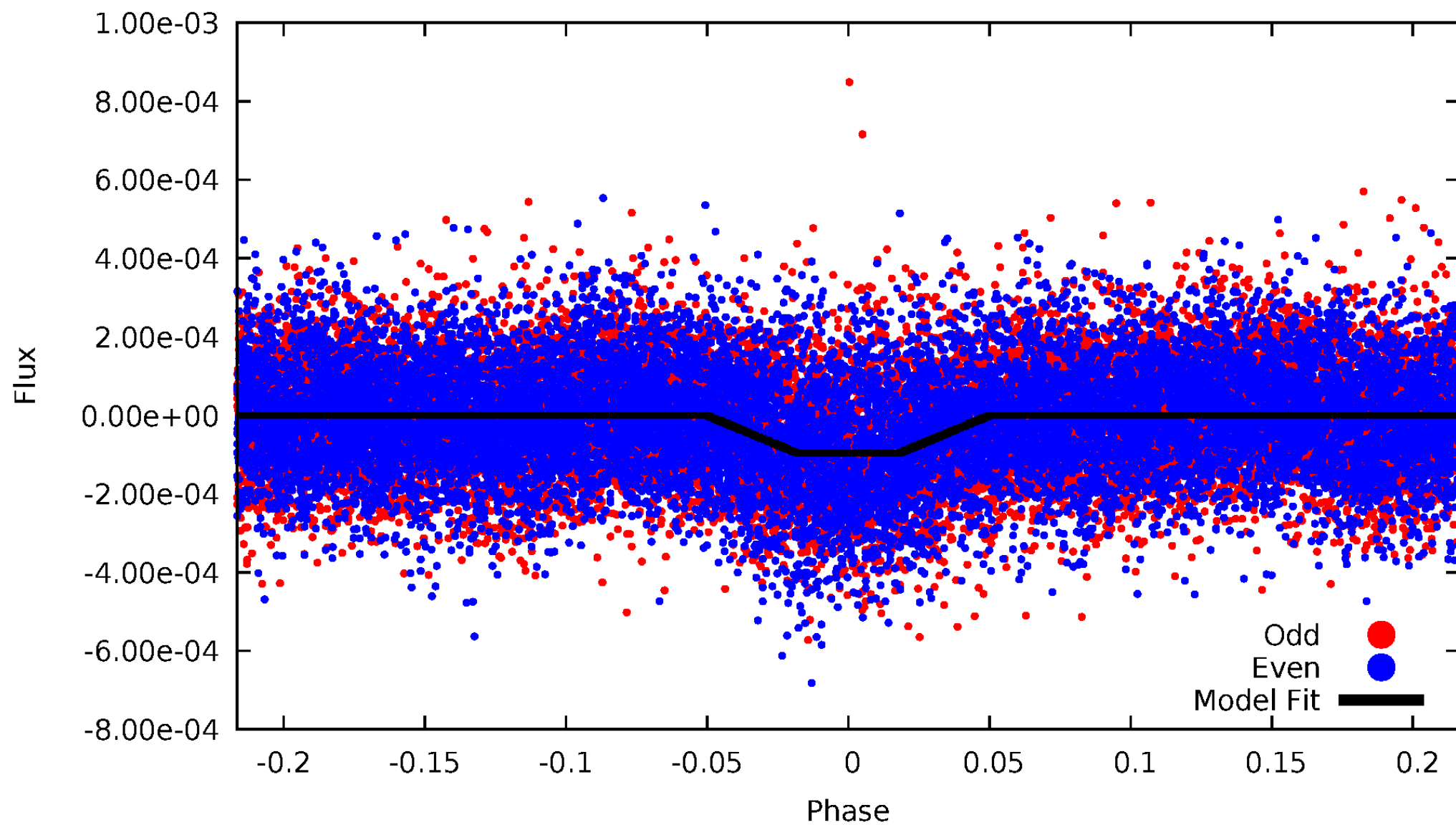
TCE 011656928-01



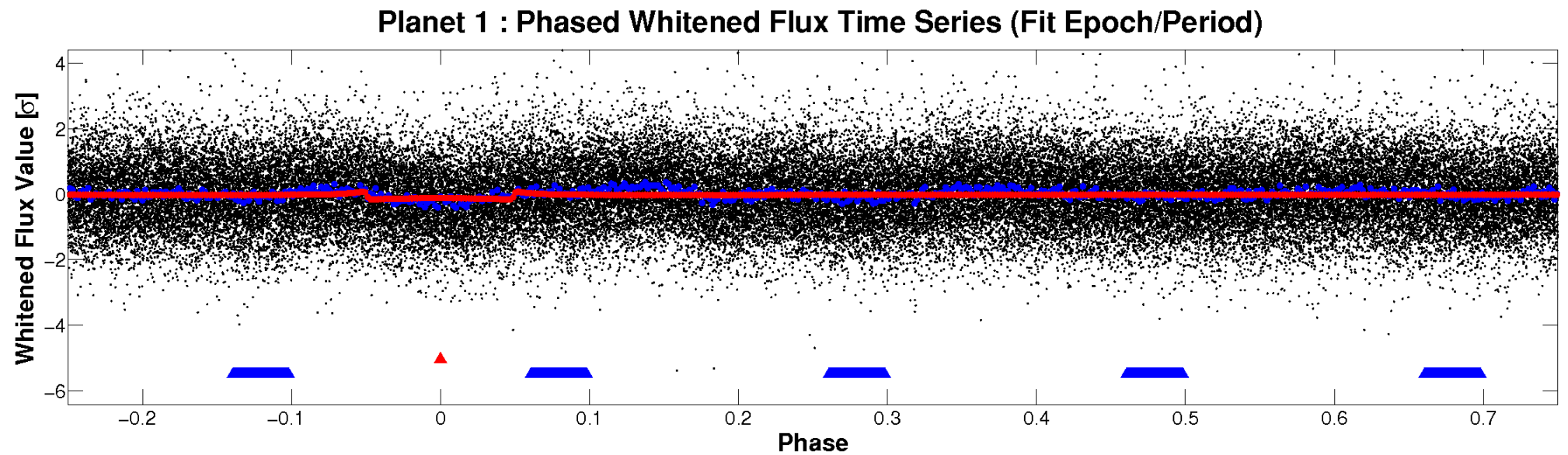
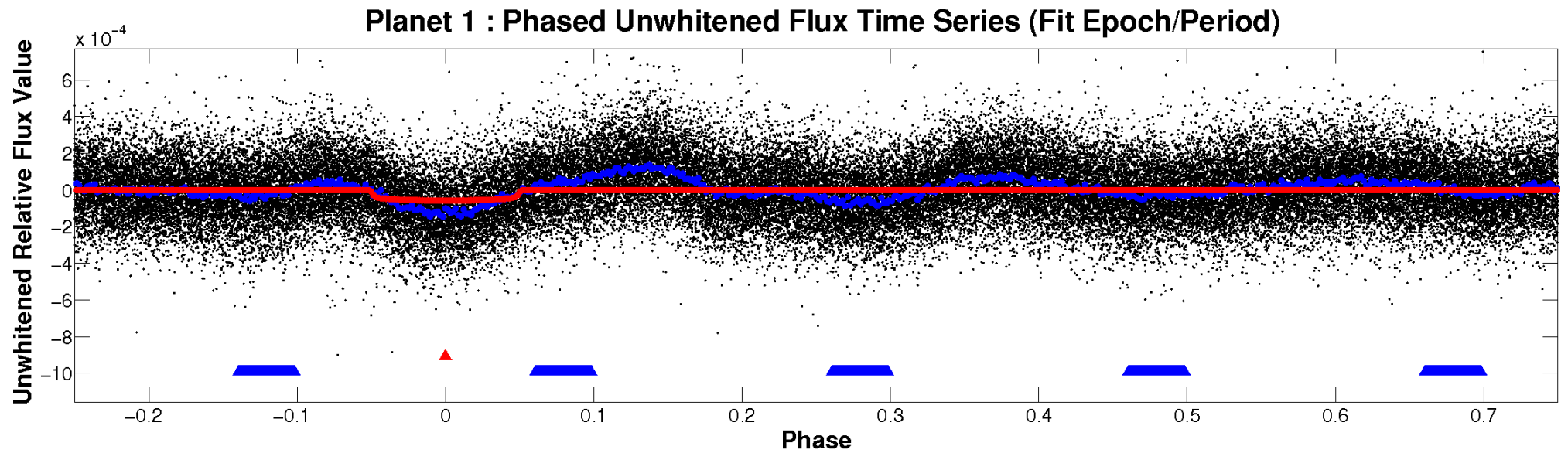


# ALT Odd/Even

TCE 011656928-01

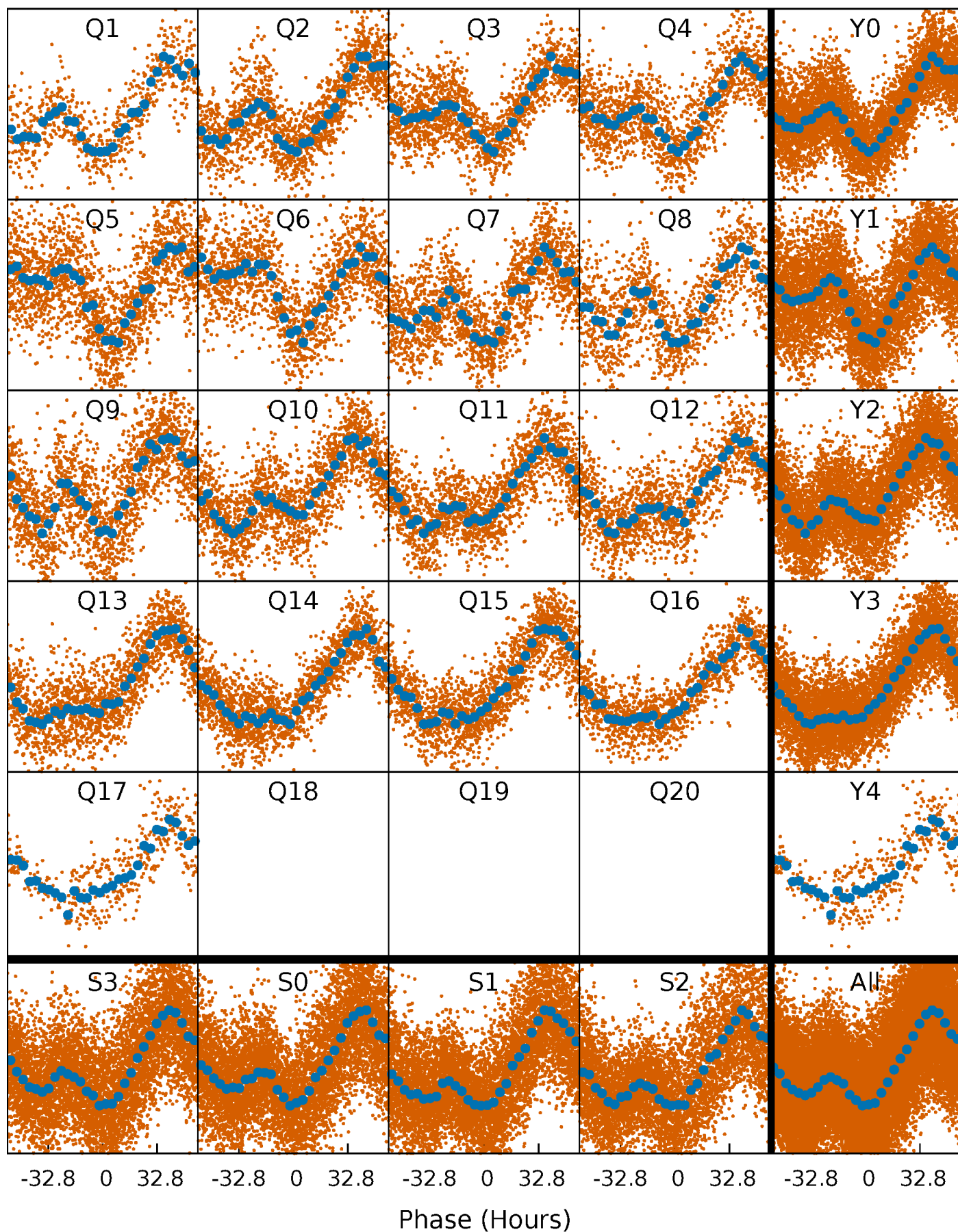


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

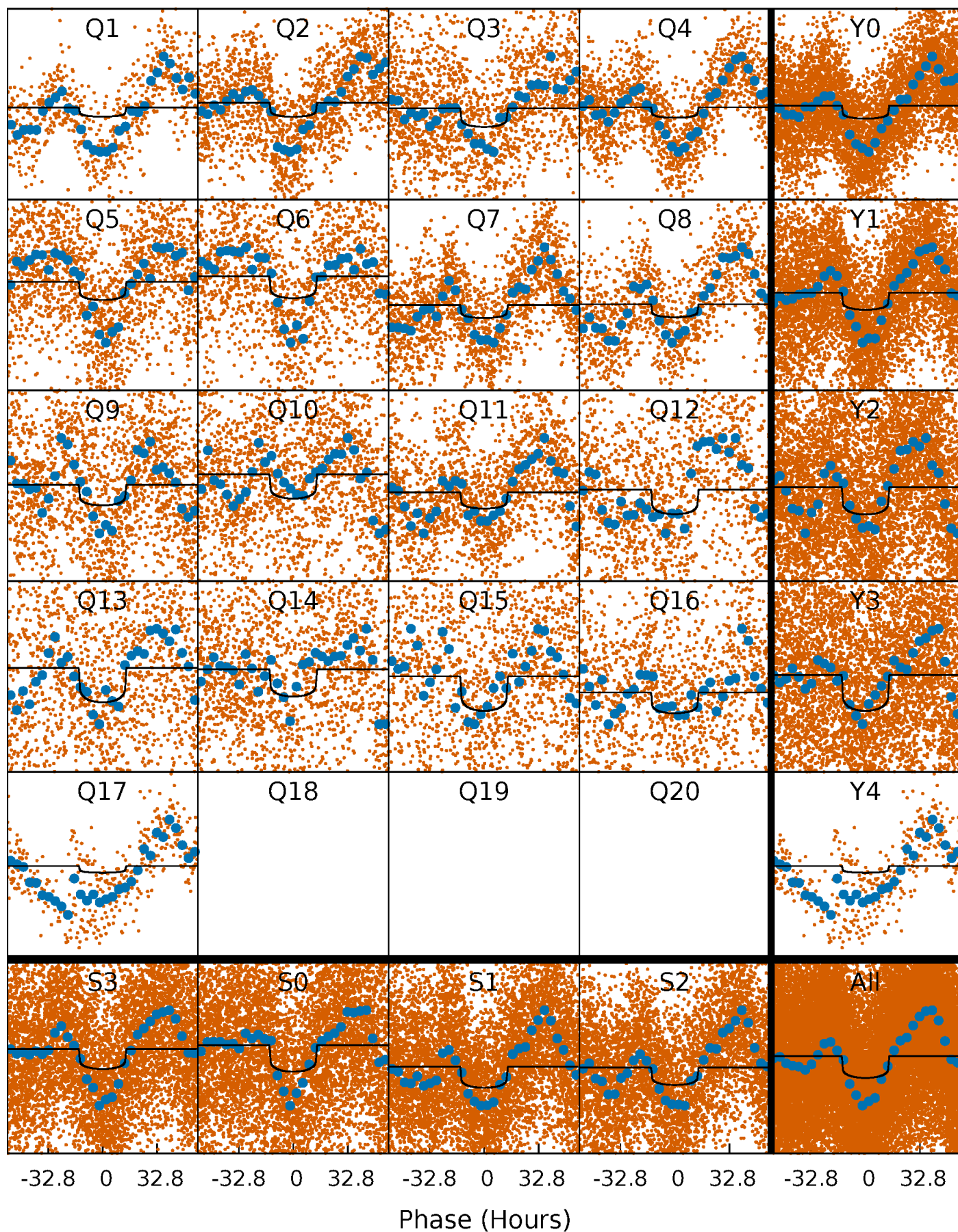
TCE 011656928-01 P= 11.750574 Days  $T_0=138.279623$  (BKJD)





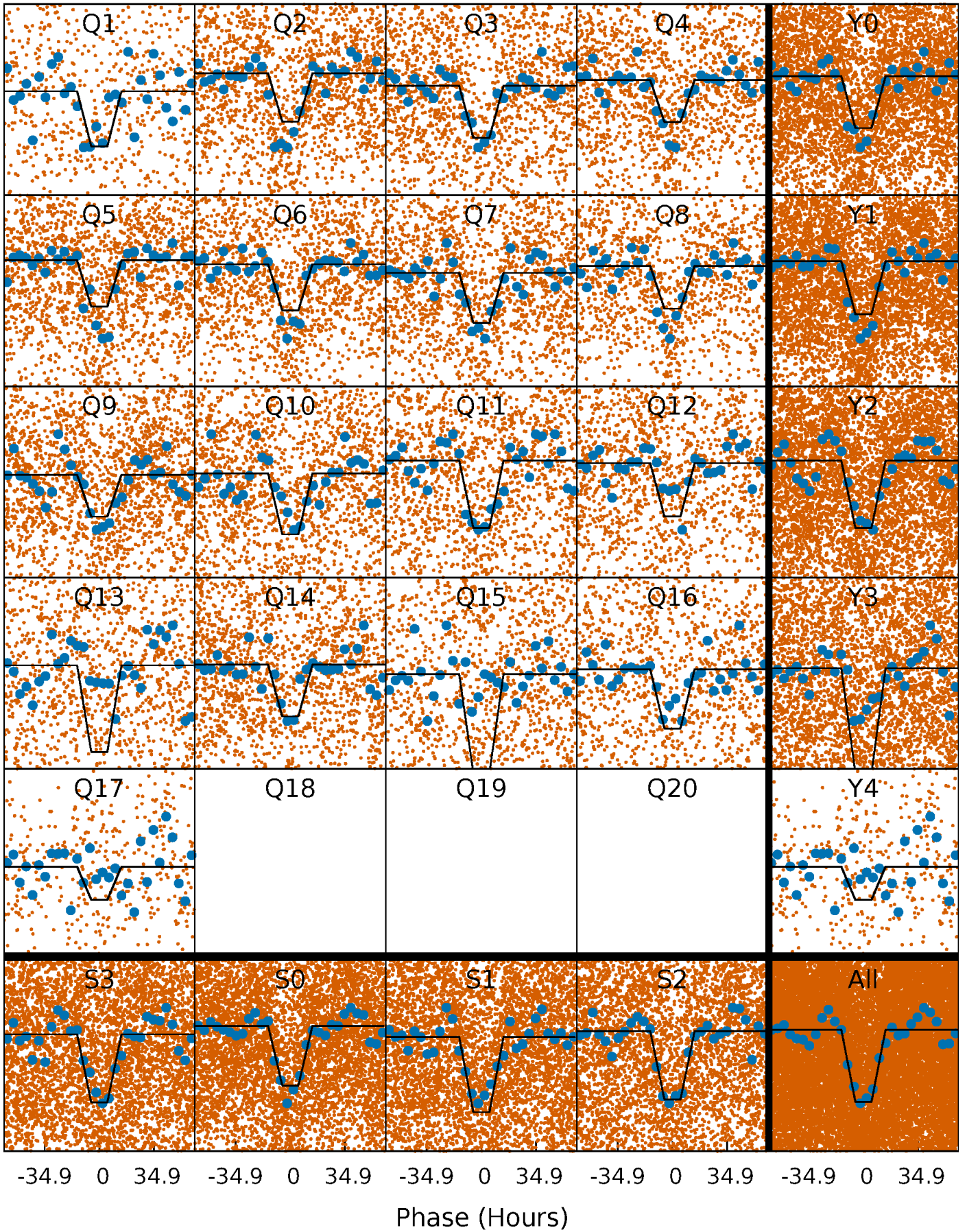
# DV Quarter-Phased Transit Curves

TCE 011656928-01 P= 11.750574 Days  $T_0=138.279623$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 011656928-01 P= 11.749526 Days  $T_0=138.339884$  (BKJD)

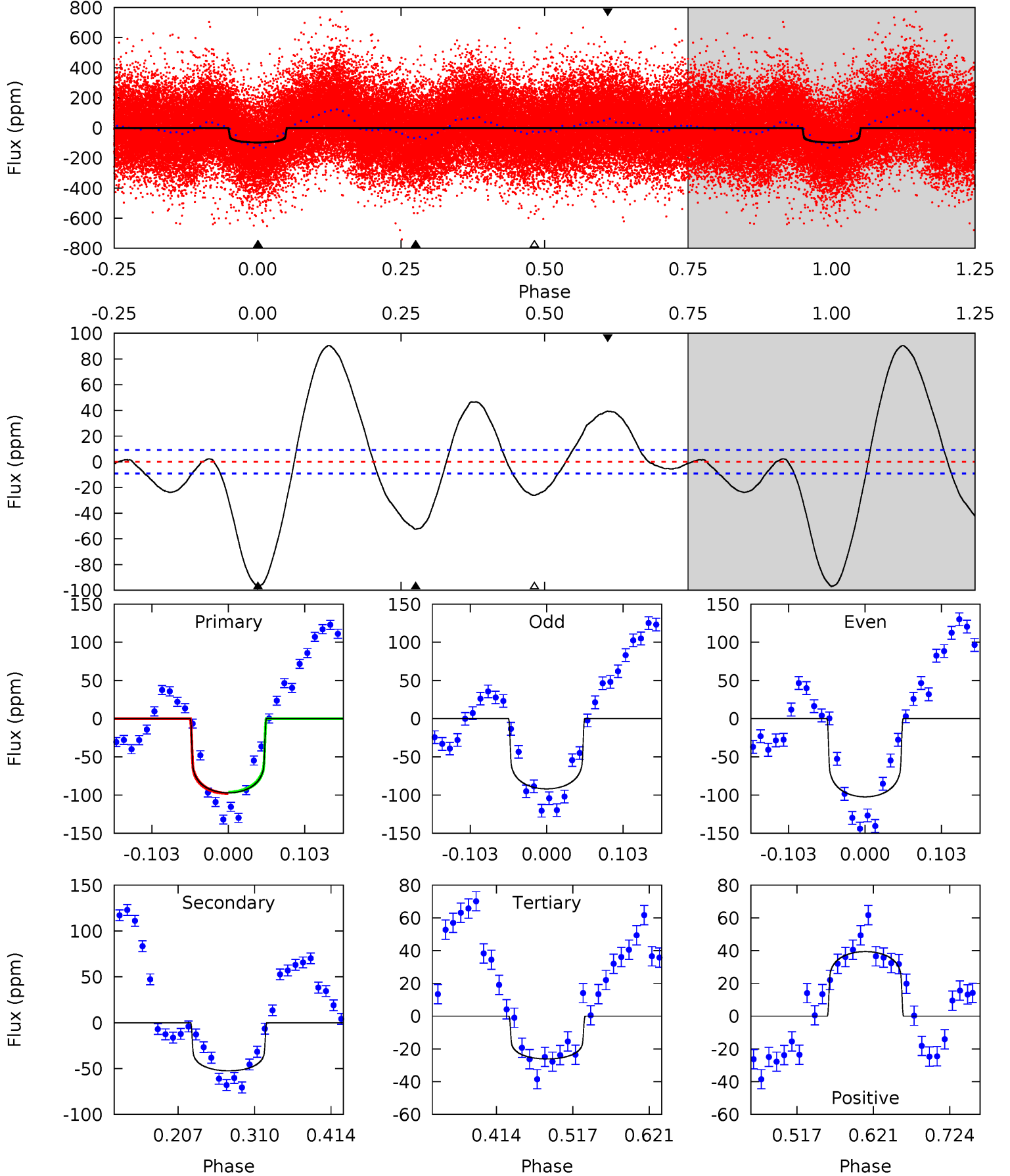




# DV Model-Shift Uniqueness Test

011656928-01, P = 11.750574 Days, E = 126.529049 Days

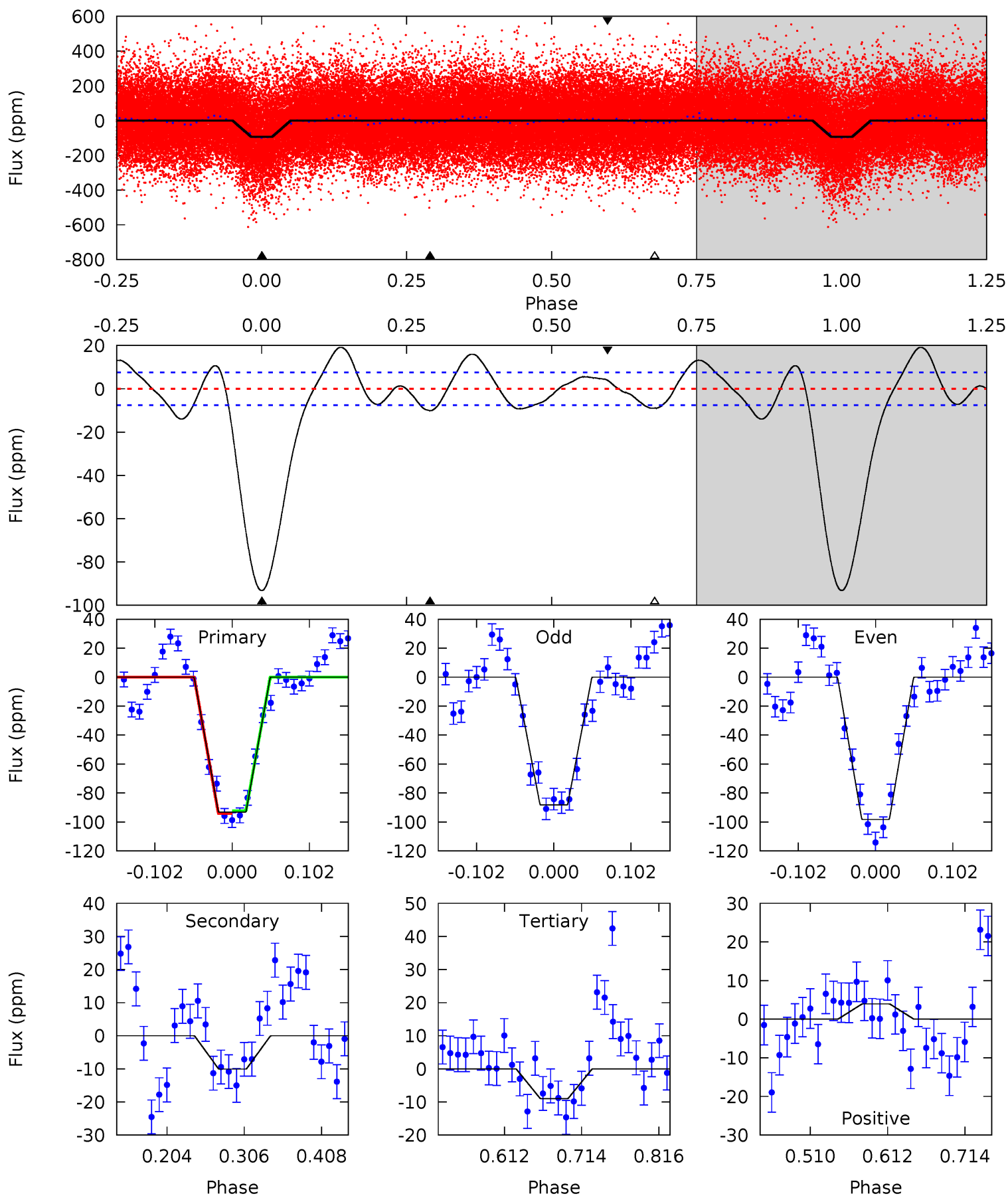
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
48.1	26.0	13.0	19.5	4.56	1.63	15.4	35.2	28.6	13.1	6.50	2.60	1.07	0.48	0.40



# Alt Model-Shift Uniqueness Test

011656928-01, P = 11.749526 Days, E = 126.590358 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
56.0	6.06	5.42	2.37	4.56	1.64	4.79	50.6	53.7	0.64	3.68	3.01	1.07	0.17	0.56



### Stellar Parameters For KIC 011656928

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6915^{+187}_{-221}$	$3.655^{+0.312}_{-0.078}$	$-0.260^{+0.300}_{-0.250}$	$3.153^{+0.396}_{-1.109}$	$1.638^{+0.231}_{-0.308}$	$0.074^{+0.174}_{-0.018}$
	+3%/-3%	+9%/-2%	+115%/-96%	+13%/-35%	+14%/-19%	+236%/-24%
Source	PHO1	FLK73	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 011656928-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-53 \pm 2$	$2.58^{+0.34}_{-0.47}$	$2152^{+118}_{-186}$	$6665^{+333}_{-319}$	$63^{+27}_{-13}$
Alt.	$-10 \pm 2$	$3.29^{+0.41}_{-0.64}$	$2139^{+119}_{-180}$	$4143^{+162}_{-184}$	$7.551^{+3.481}_{-1.920}$

$T_{\text{max}}$  = 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

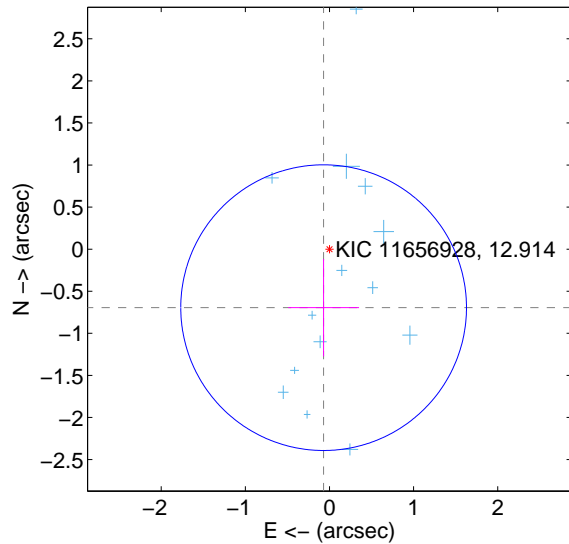
Supplemental centroid analysis for 011656928-01. Kepler magnitude: 12.91. Transit SNR 10.59

There are 15 quarters with good PRF difference image offsets

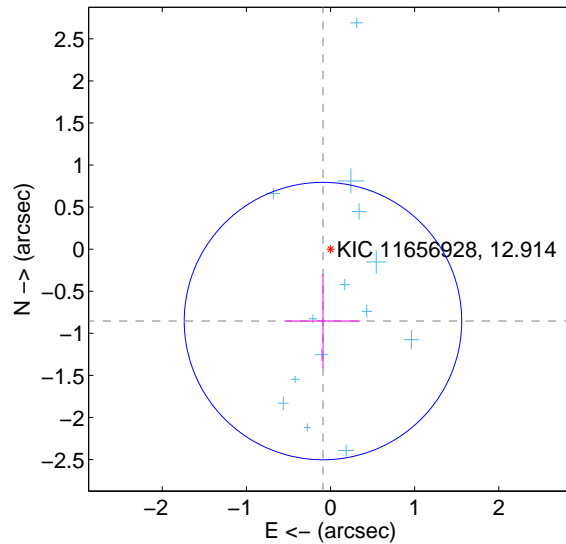
The direct PRF centroid is offset from the target star catalog position by about 0.32 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.698 \pm 0.566$	1.23	$0.069 \pm 0.421$	$-0.695 \pm 0.578$
PRF-fit source offset from KIC position	$0.859 \pm 0.550$	1.56	$0.090 \pm 0.442$	$-0.854 \pm 0.560$
photometric centroid source offset	$0.39 \pm 0.40$	0.98	$-0.38 \pm 0.39$	$0.07 \pm 0.54$

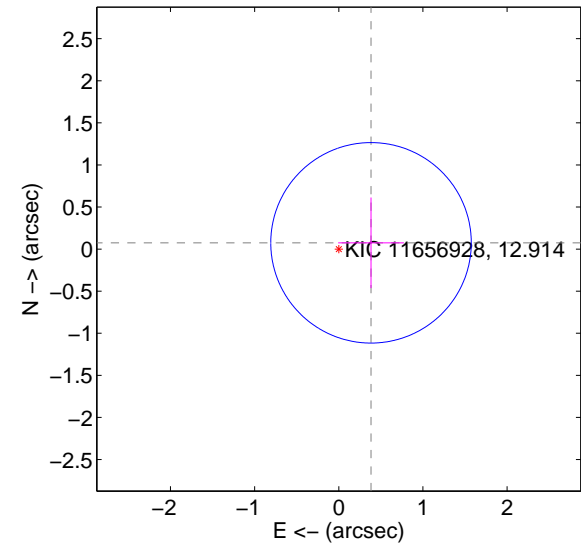
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

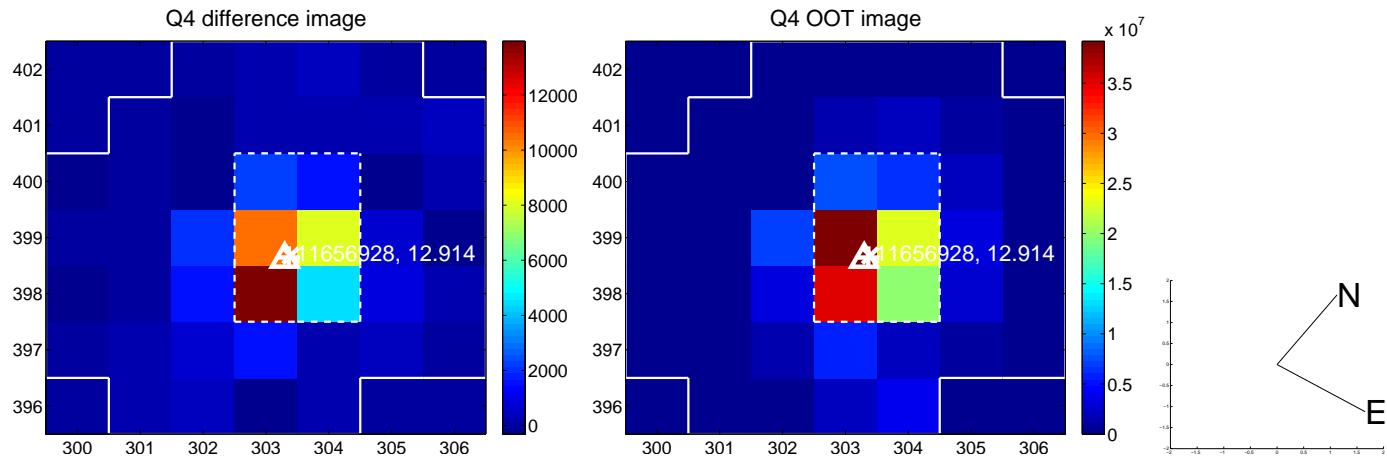
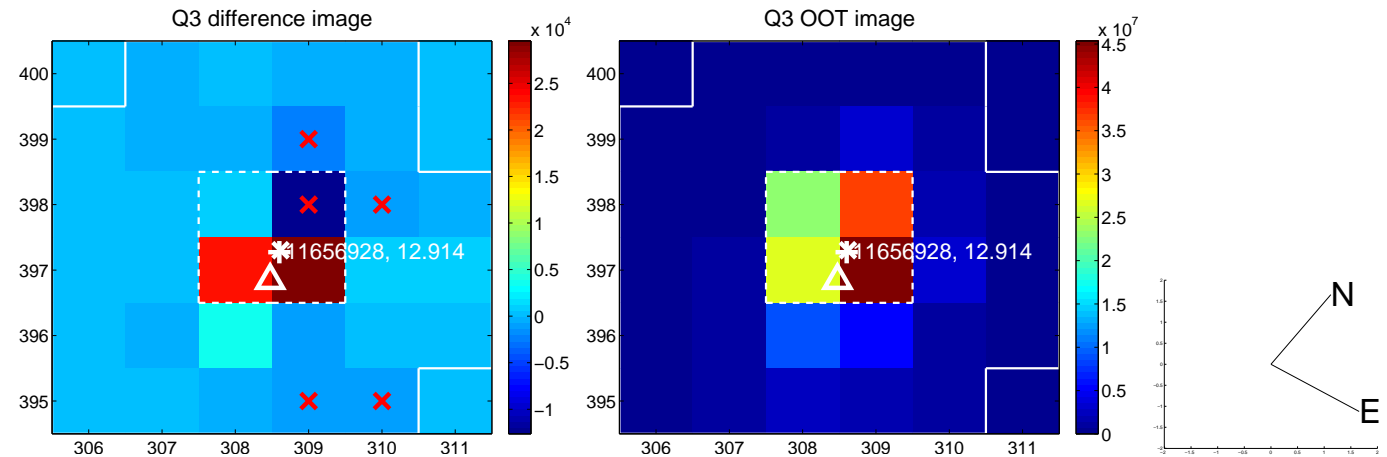
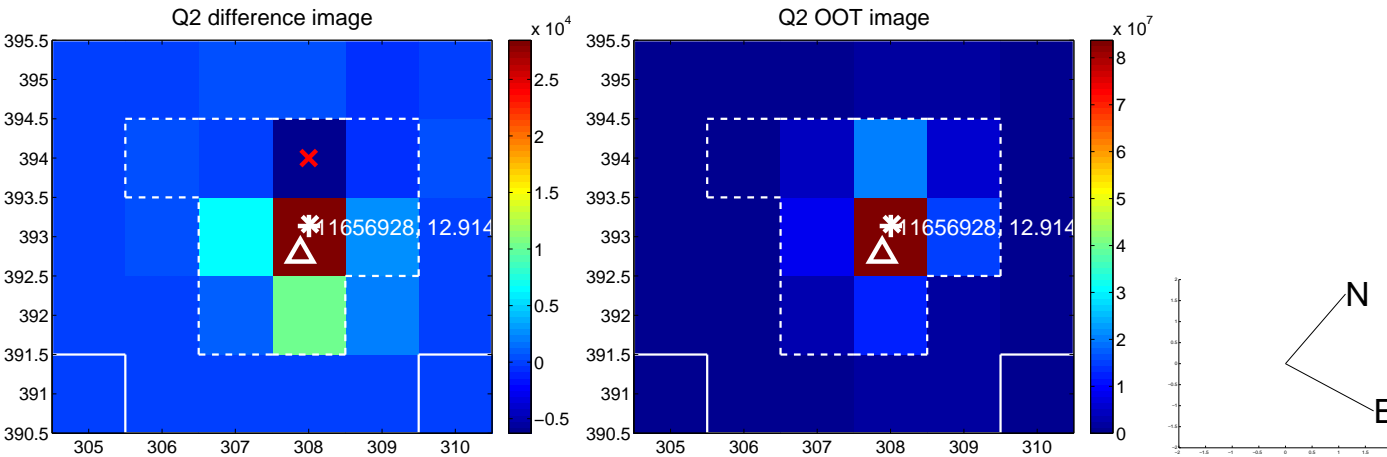
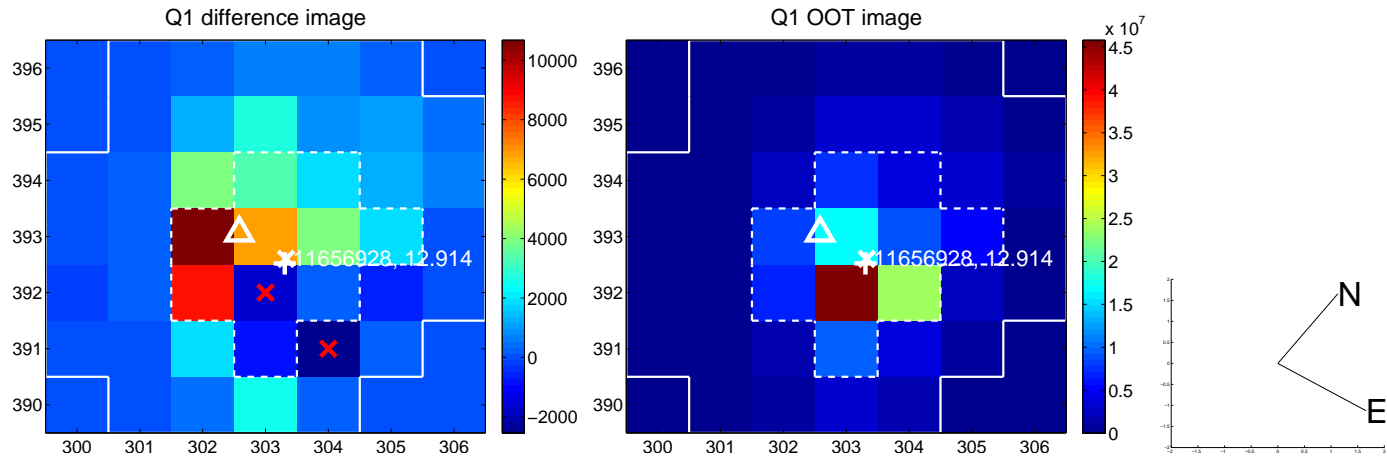


offset from photometric centroids

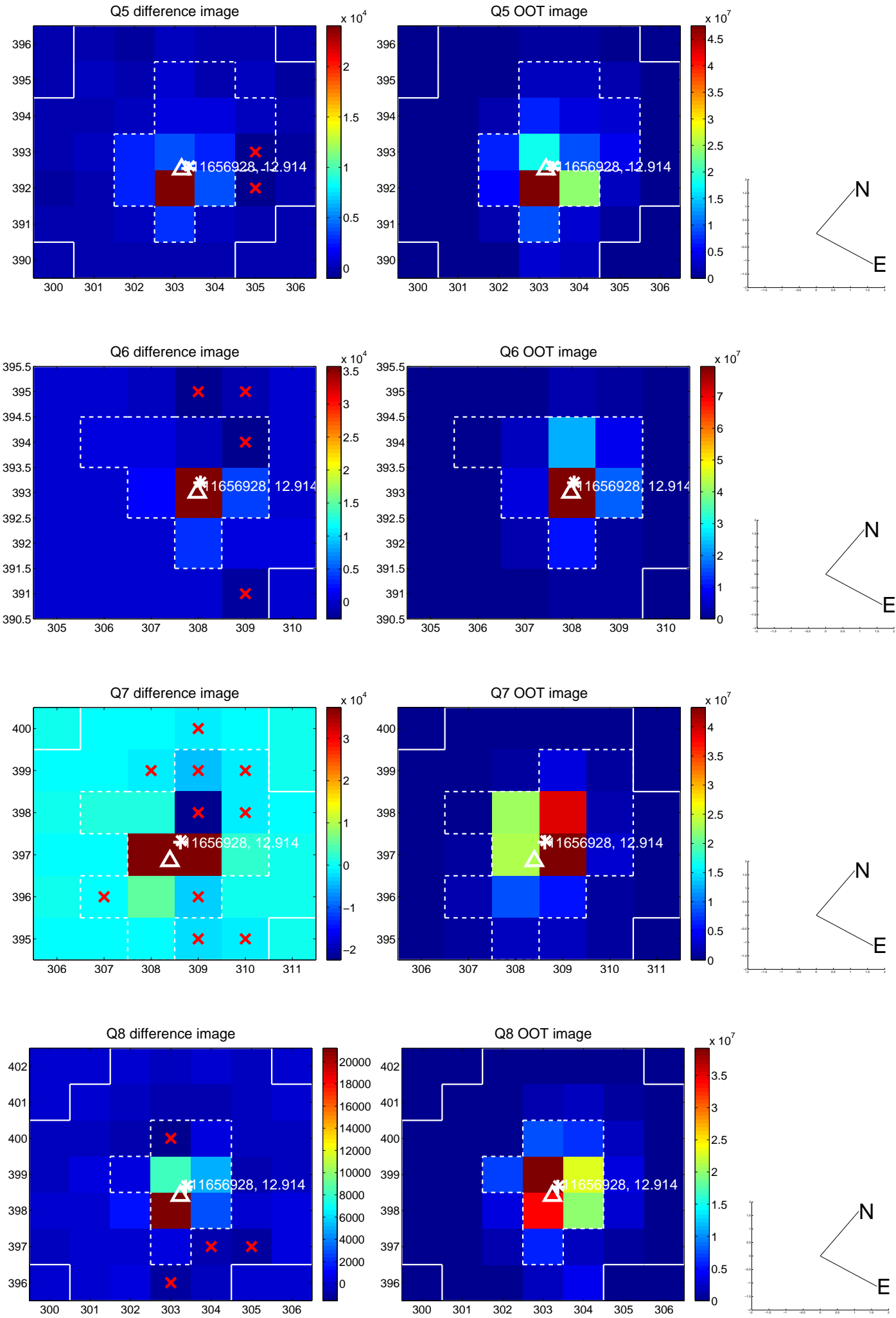


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

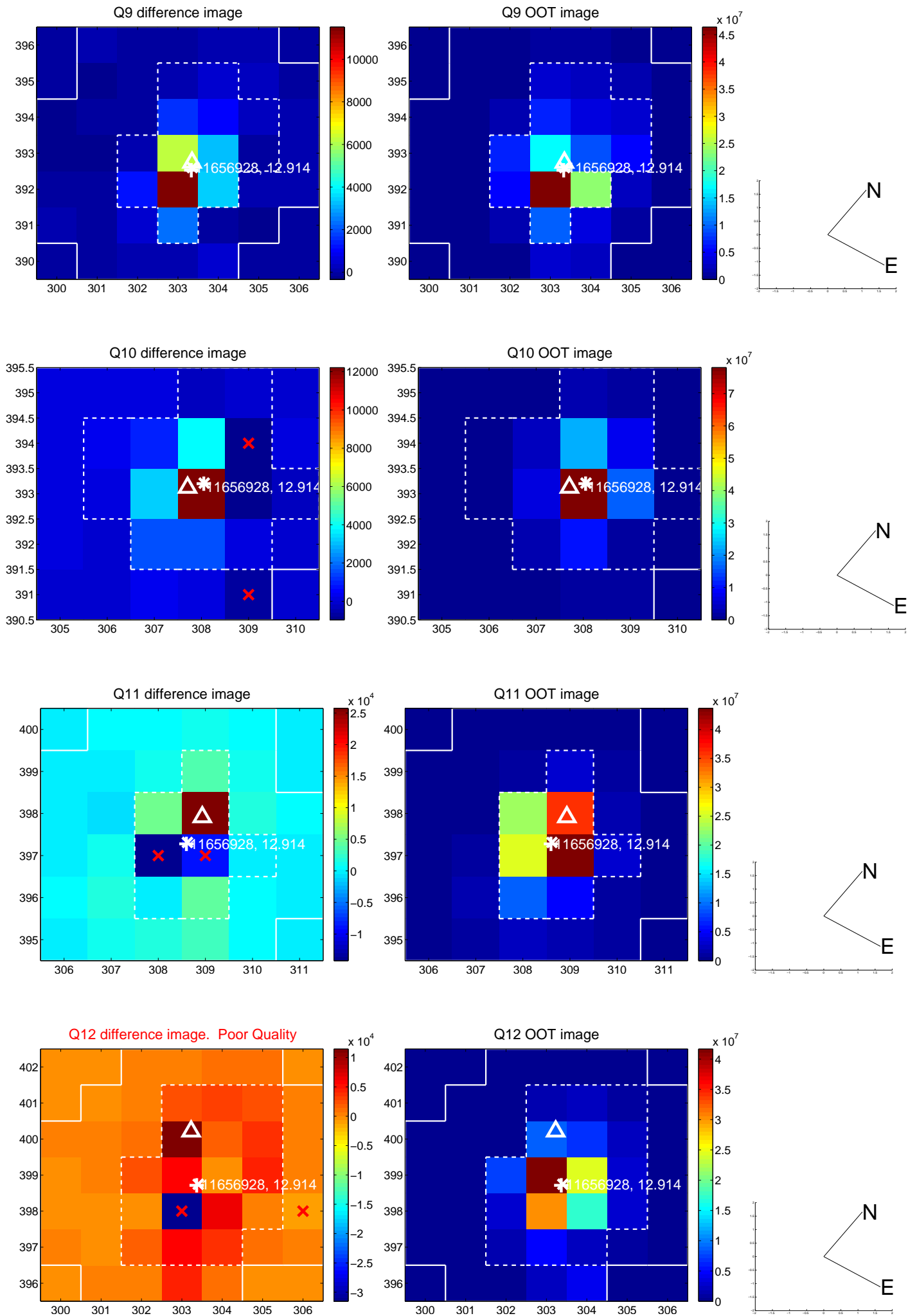
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



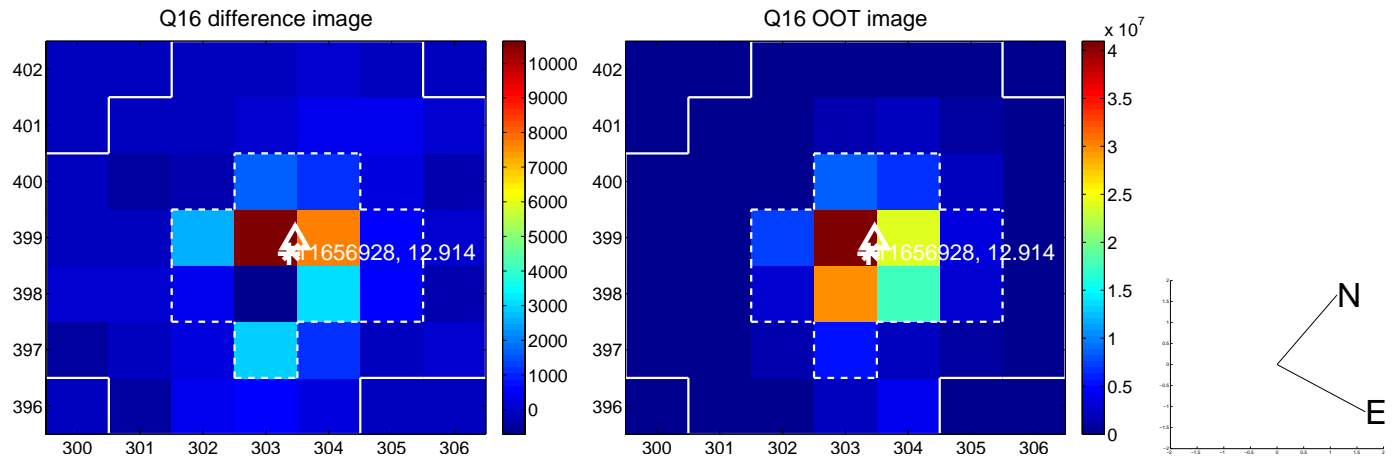
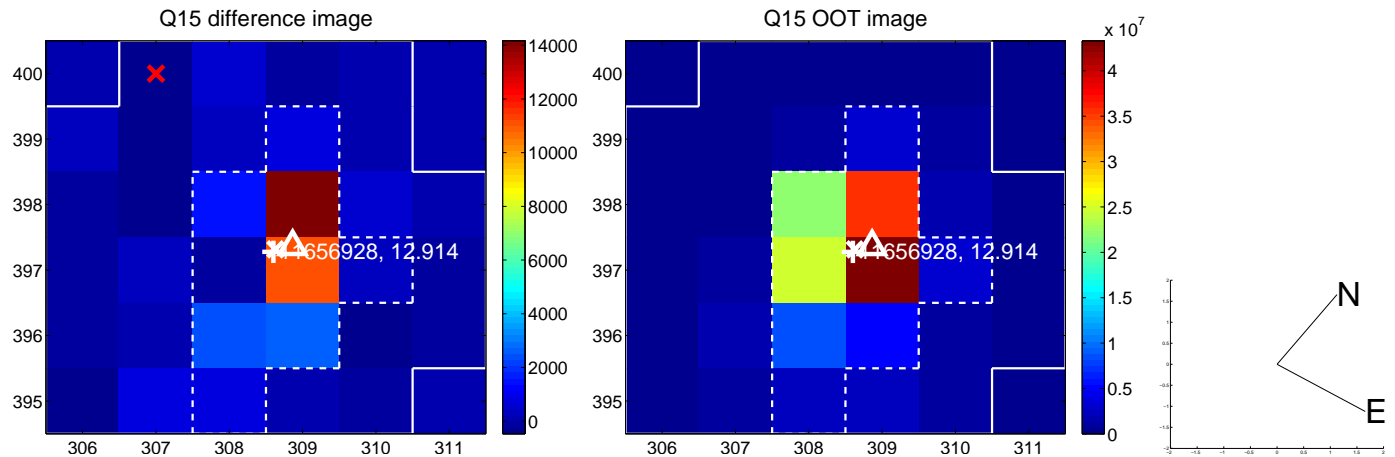
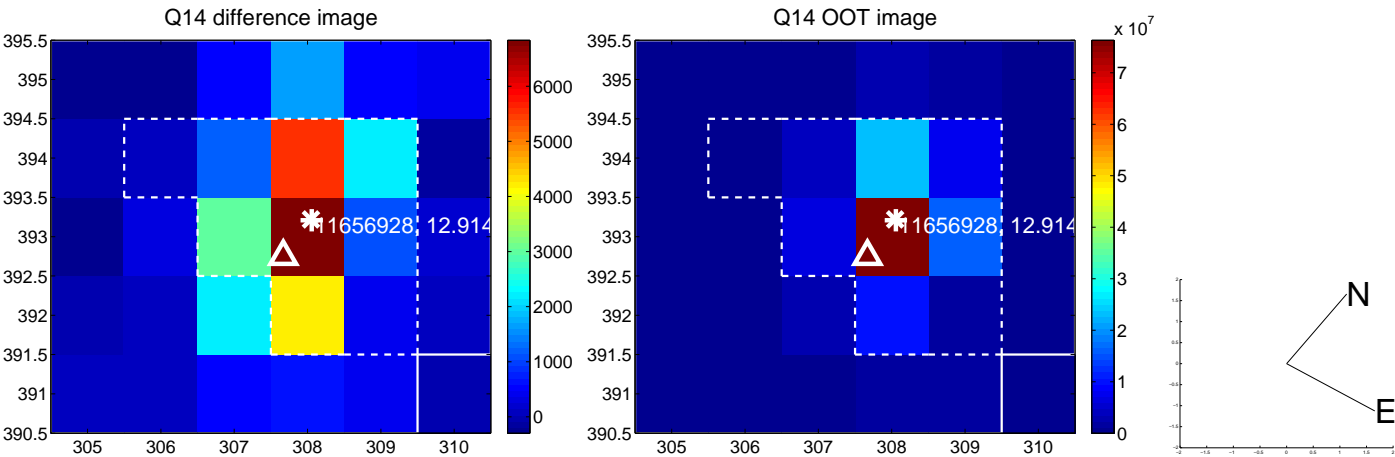
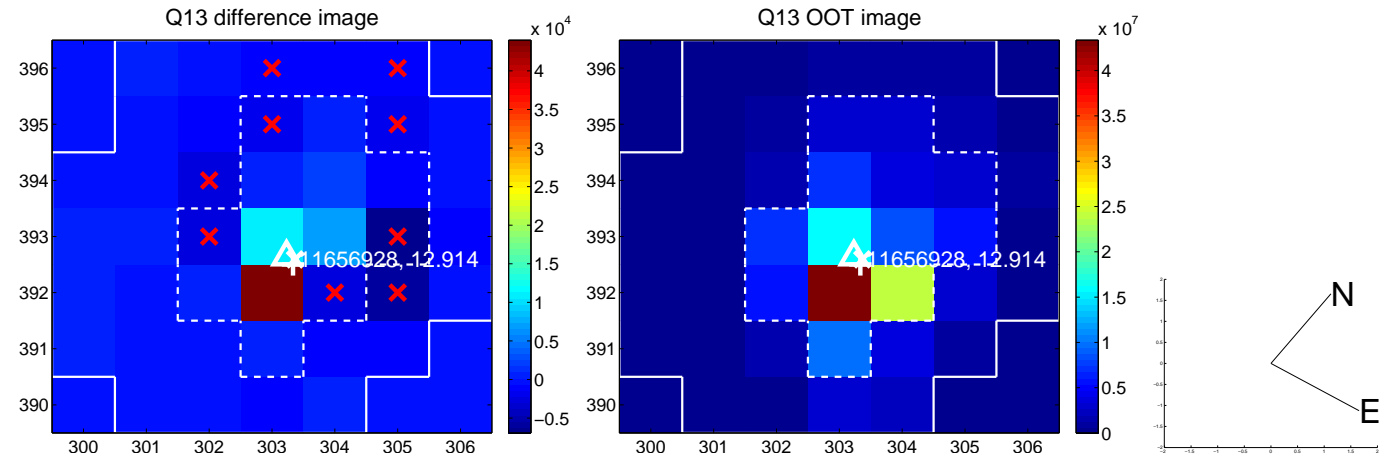
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

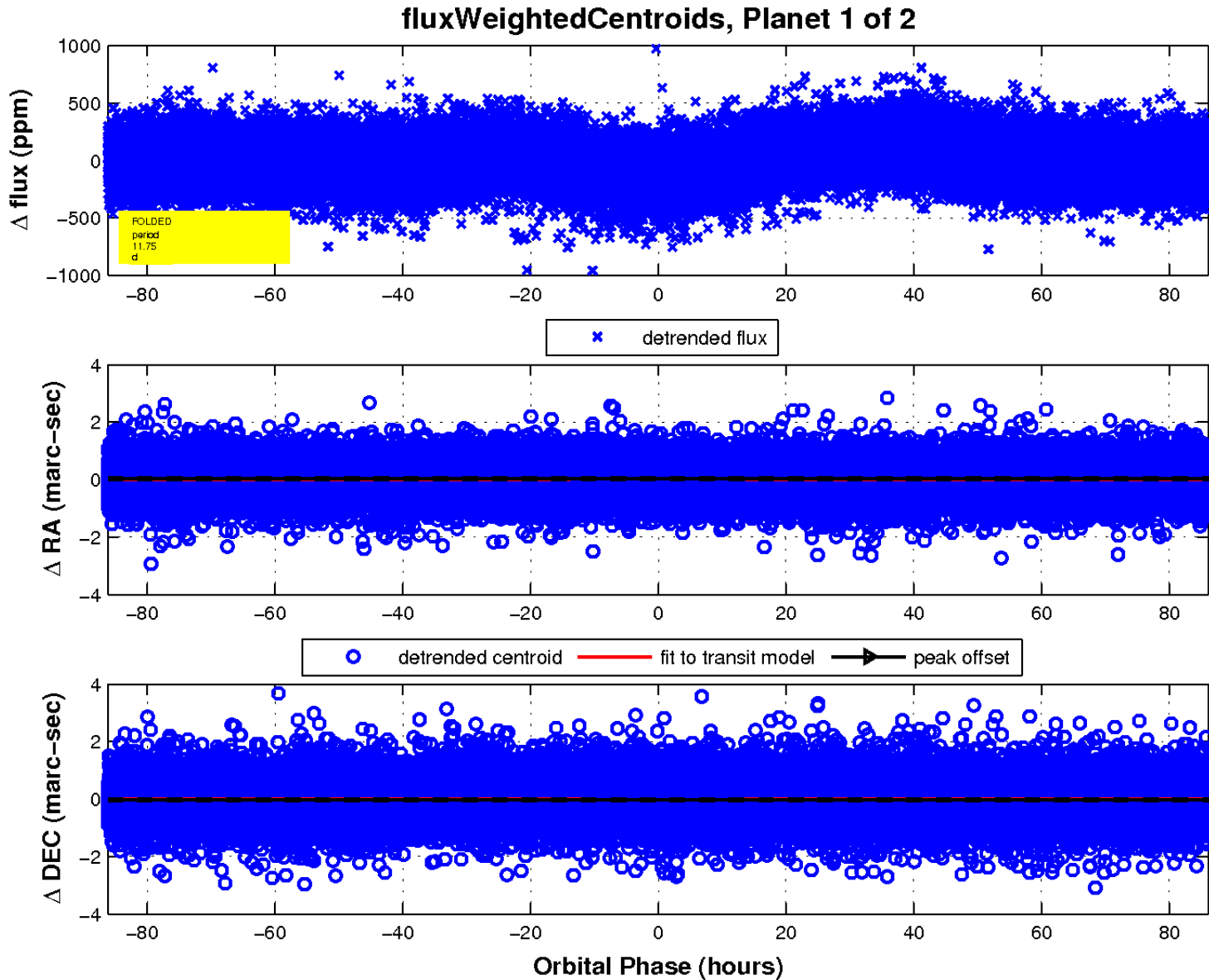
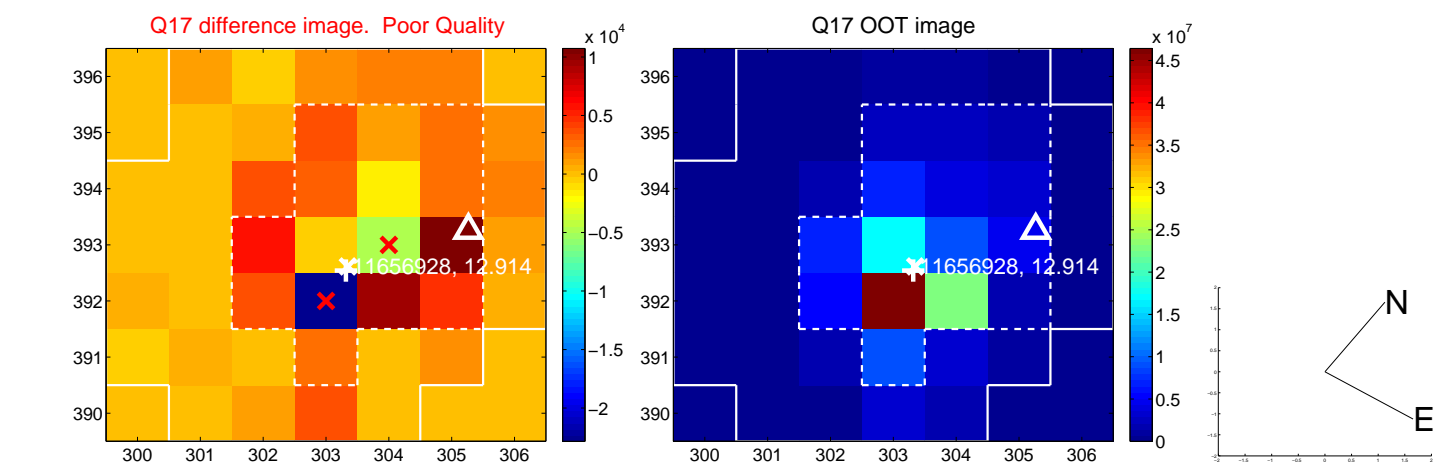


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



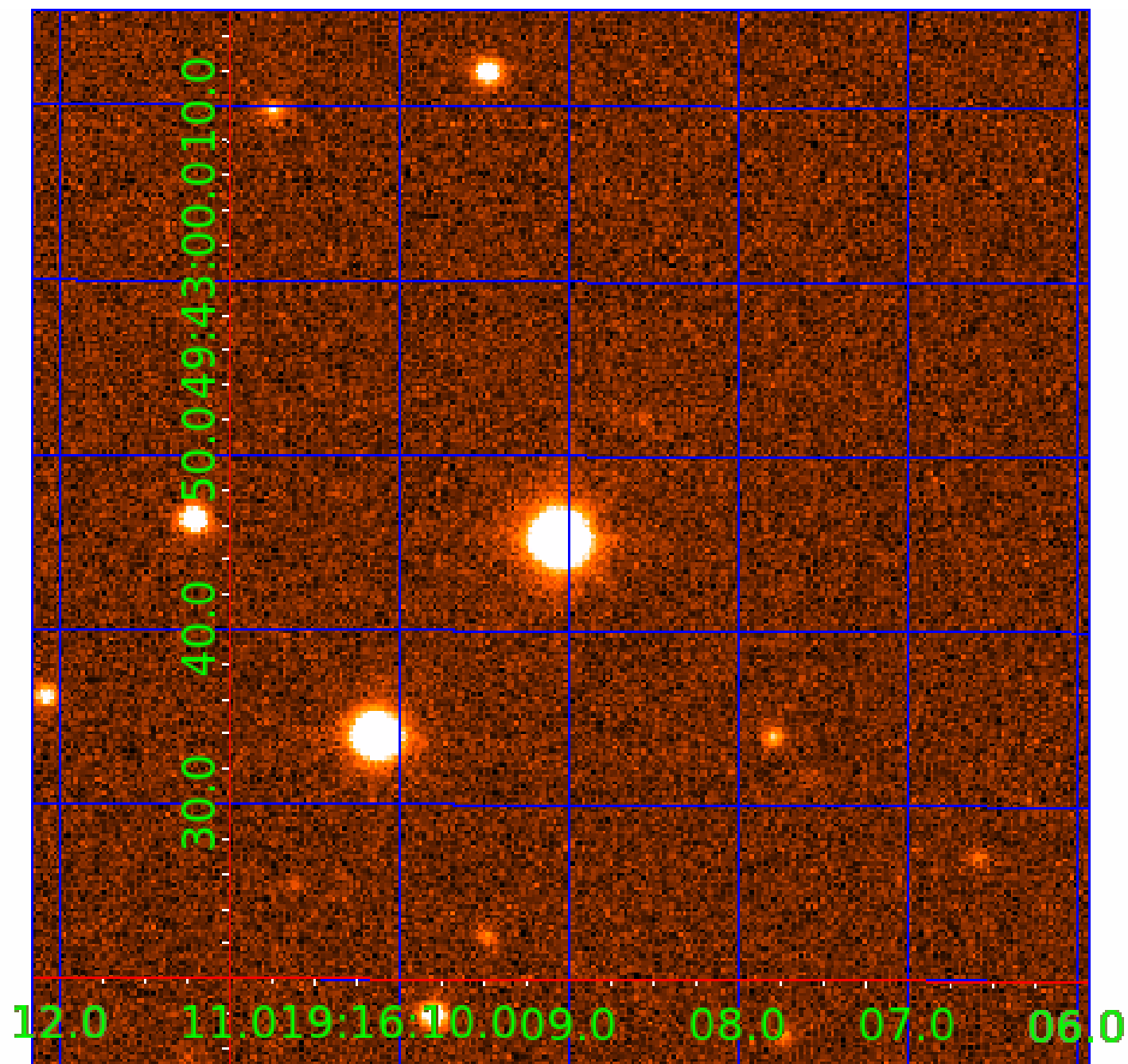


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 011656928

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
011656928-01	OBS	No	11.750574	138.279623	56.7	28.727	10.1	10.6	3.15	6915	2.67	1431.53
011656928-02	OBS	No	2.350835	131.939402	25.0	22.829	7.5	8.7	3.15	6915	1.83	12234.41

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
011656928-01	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV
011656928-02	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT

**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.

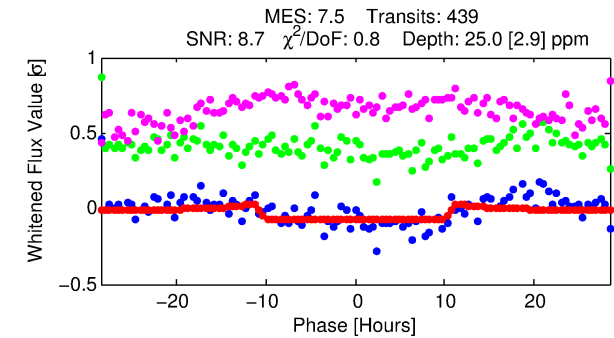
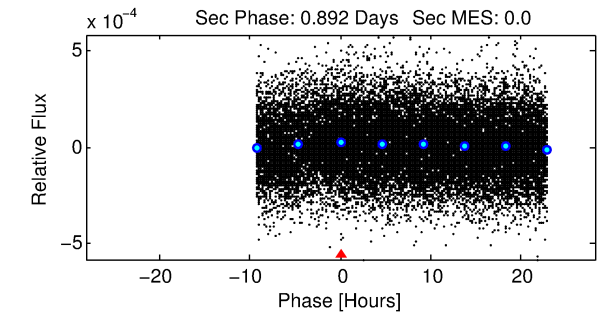
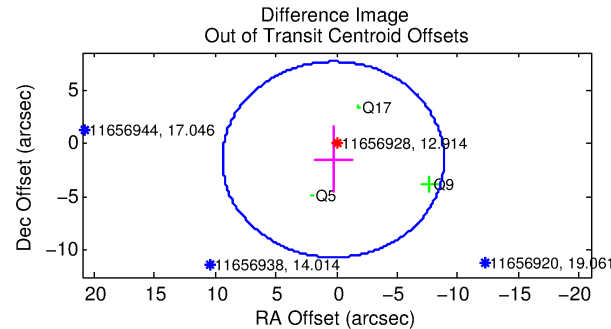
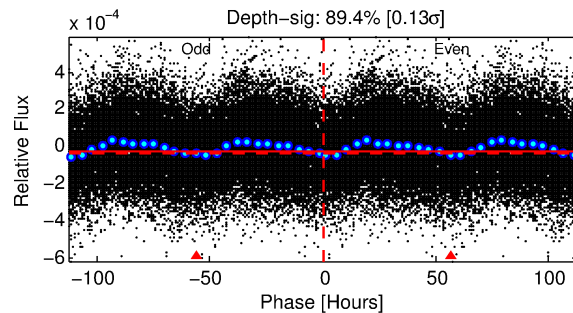
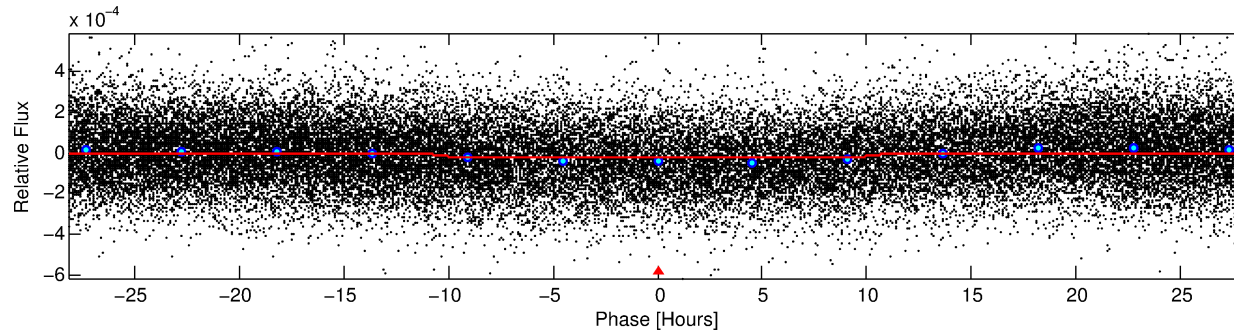
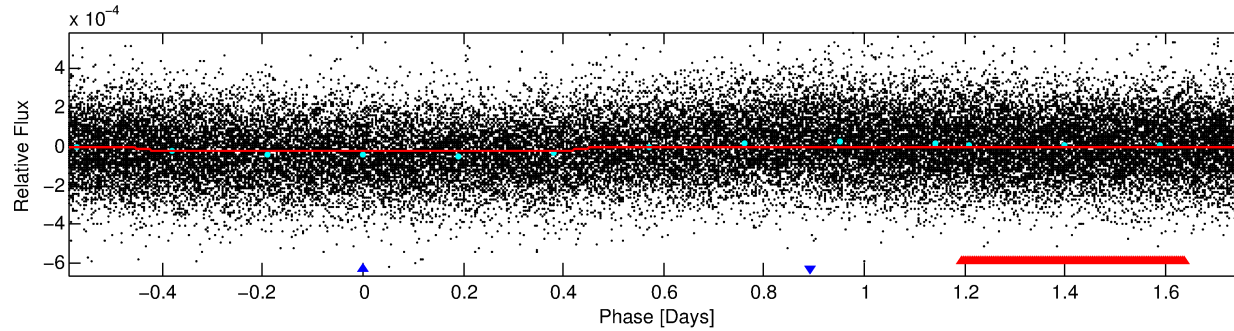
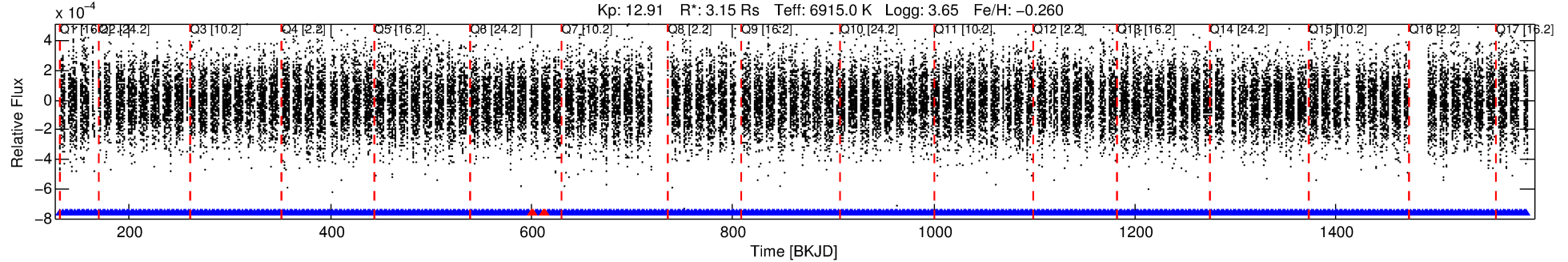
## Ephemeris Match Information For 011656928-02

No Significant Match Found

# DV One-Page Summary

KIC: 11656928 Candidate: 2 of 2 Period: 2.351 d  
KOI: K06242 Corr: No Ephemeris Match

Kp: 12.91 R\*: 3.15 Rs Teff: 6915.0 K Logg: 3.65 Fe/H: -0.260



## DV Fit Results:

Period = 2.35083 [0.00006] d  
Epoch = 131.9394 [0.0156] BKJD  
Rp/R\* = 0.0053 [0.0005]  
a/R\* = 1.01 [0.02]  
b = 0.90 [0.11]  
Seff = 12234.41 [6708.96]  
Teq = 2682 [368] K  
Rp = 1.83 [0.67] Re  
a = 0.0408 [0.0137] AU  
Ag = N/A  
Teffp = N/A

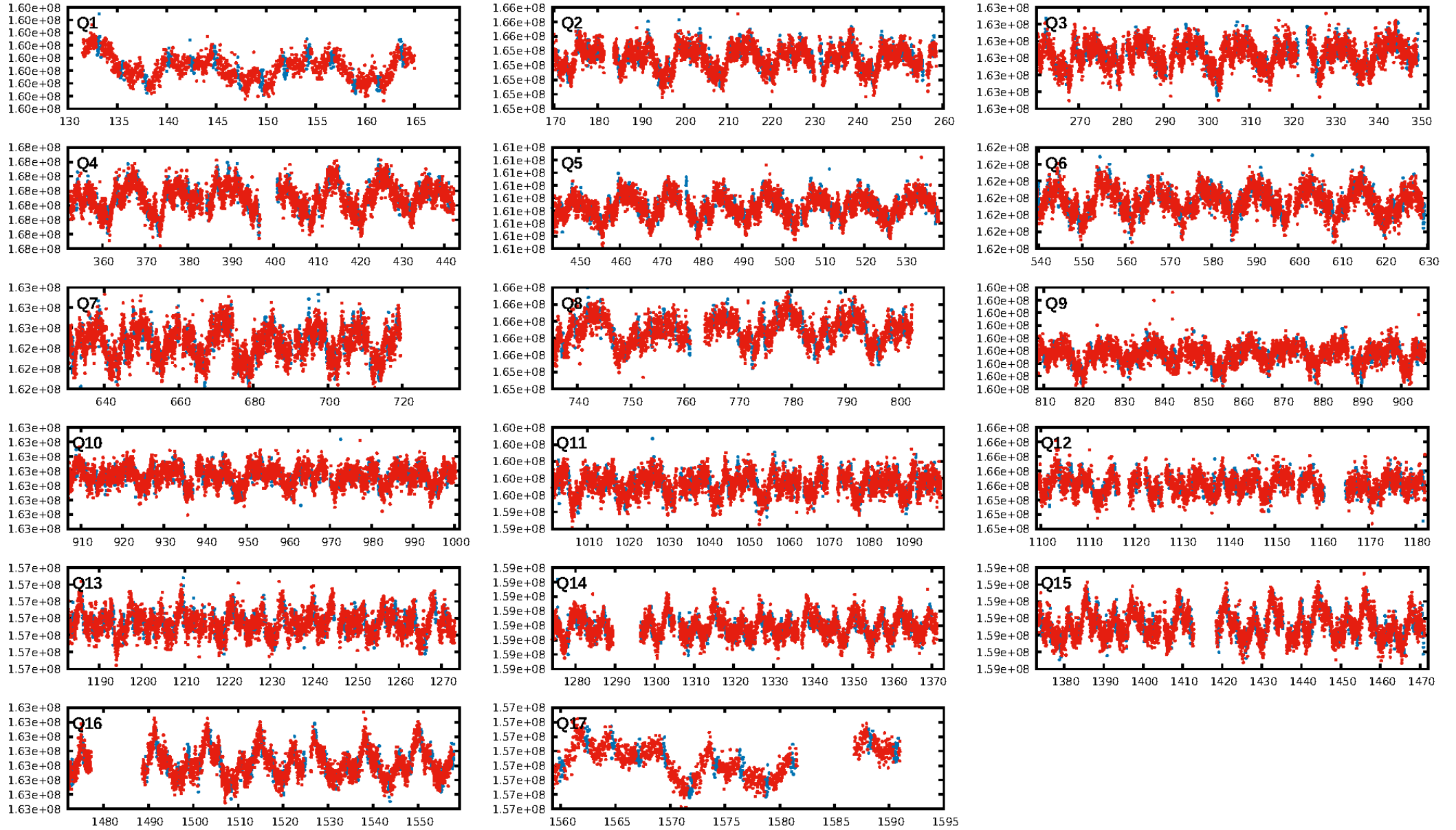
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [6.15σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 0.99 [415/419]  
GhostDiagnostic-chr: 2.024  
Centroid-sig: 0.9%  
Centroid-so: 0.623 arcsec [1.39σ]  
OotOffset-rm: 1.543 arcsec [0.51σ]  
KicOffset-rm: 1.843 arcsec [0.61σ]  
OotOffset-st: 0/0/0/3 [3]  
KicOffset-st: 0/0/0/3 [3]  
DiffImageQuality-fgm: 0.33 [1/3]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 05:21:30 Z

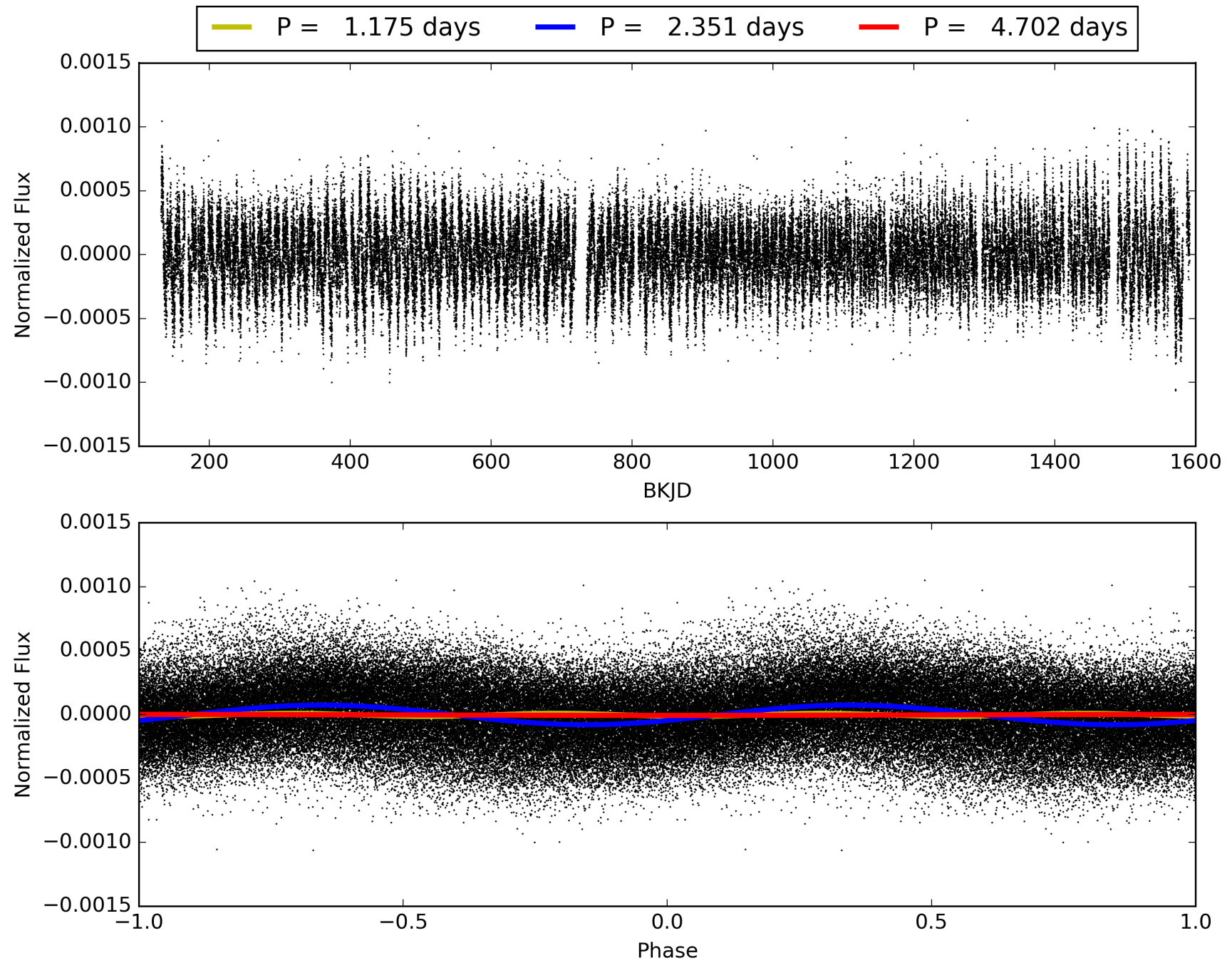
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 011656928-02, PDC Light Curves



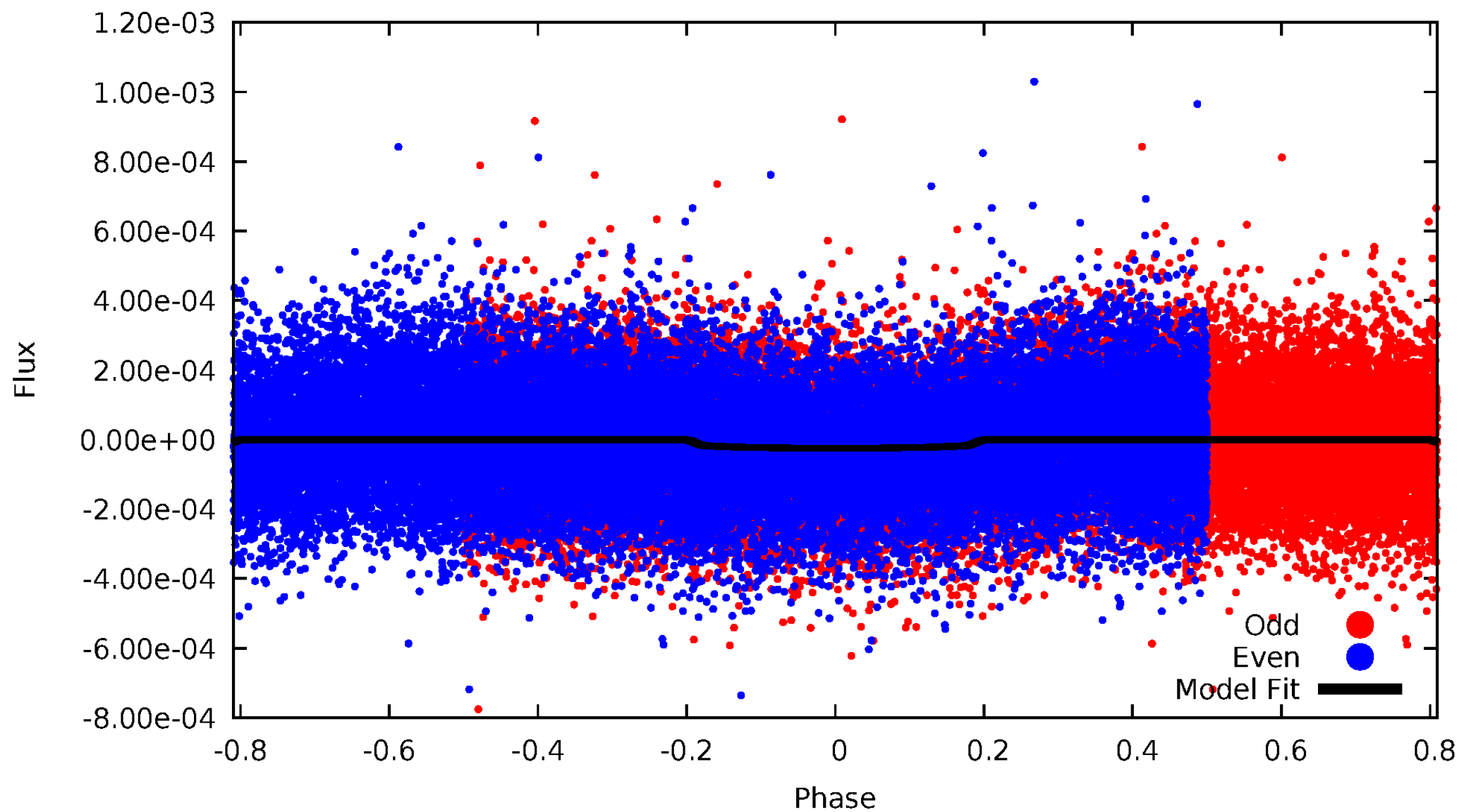


TCE 011656928-02



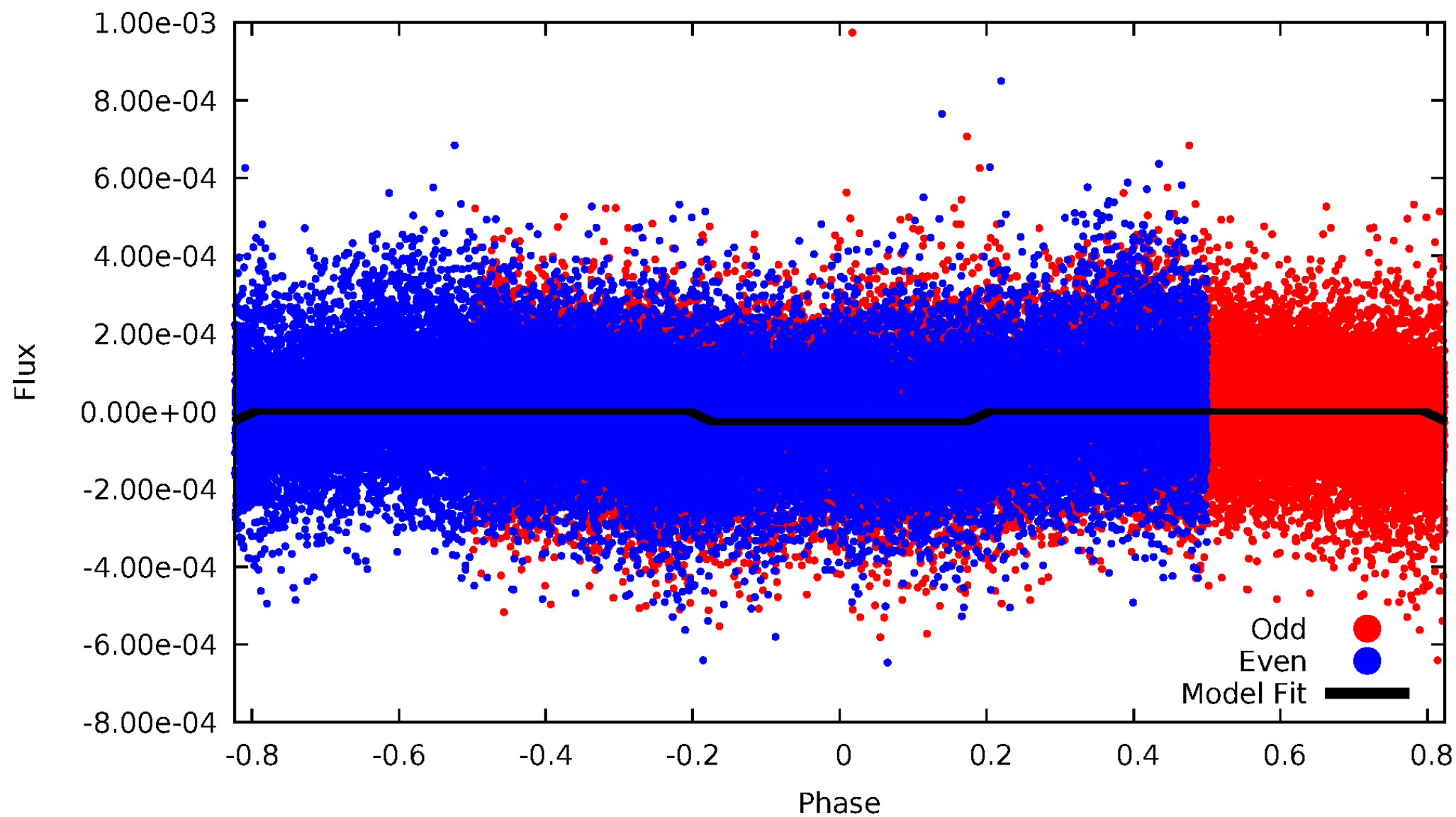
# DV Odd/Even

TCE 011656928-02



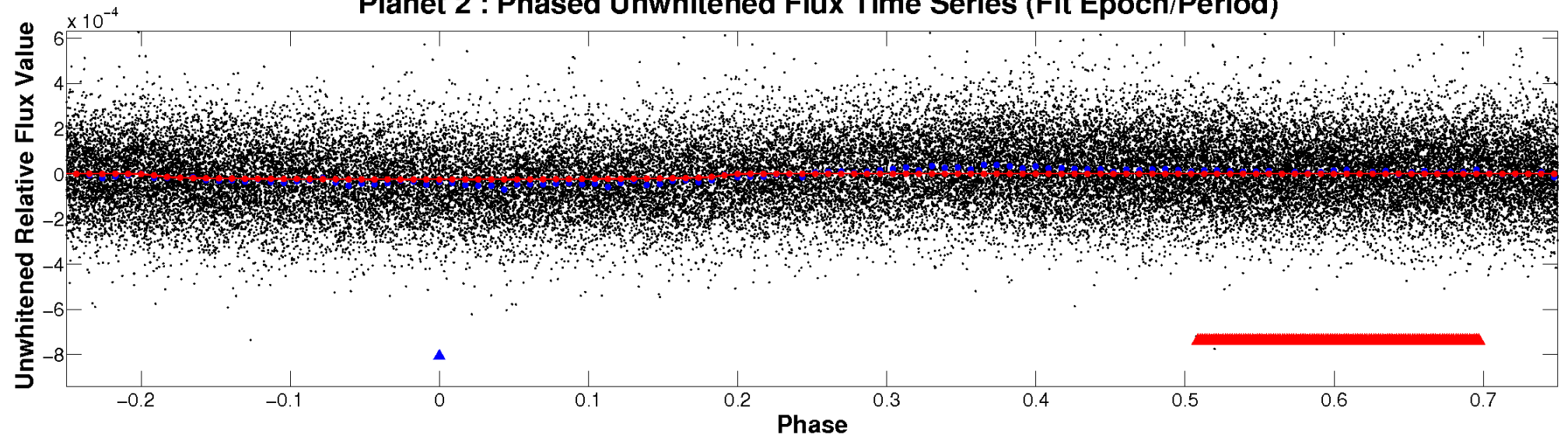
# ALT Odd/Even

TCE 011656928-02

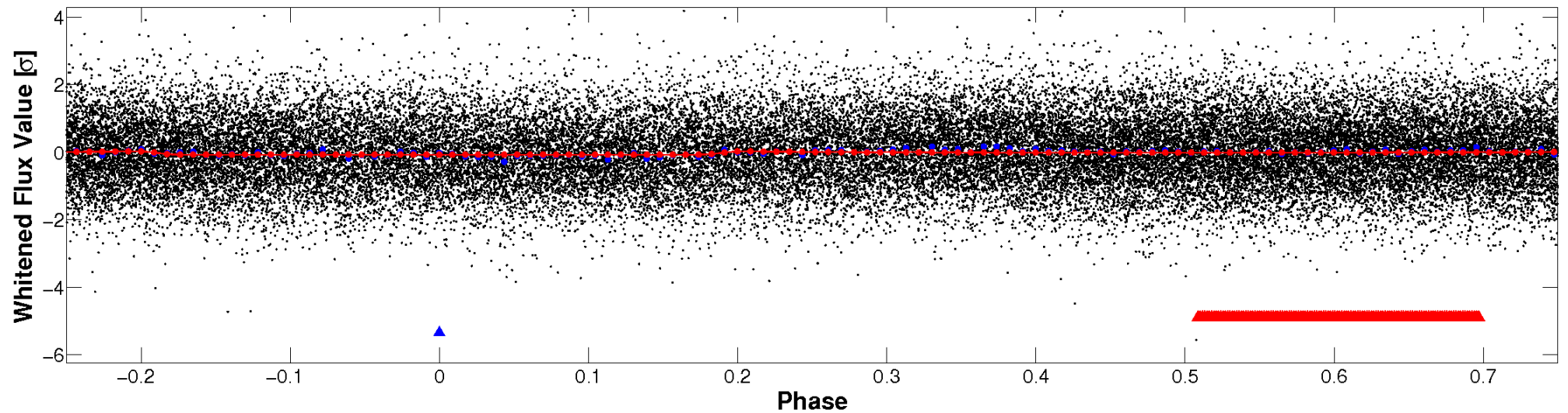


# Non-Whitened Vs. Whitened Light Curve

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



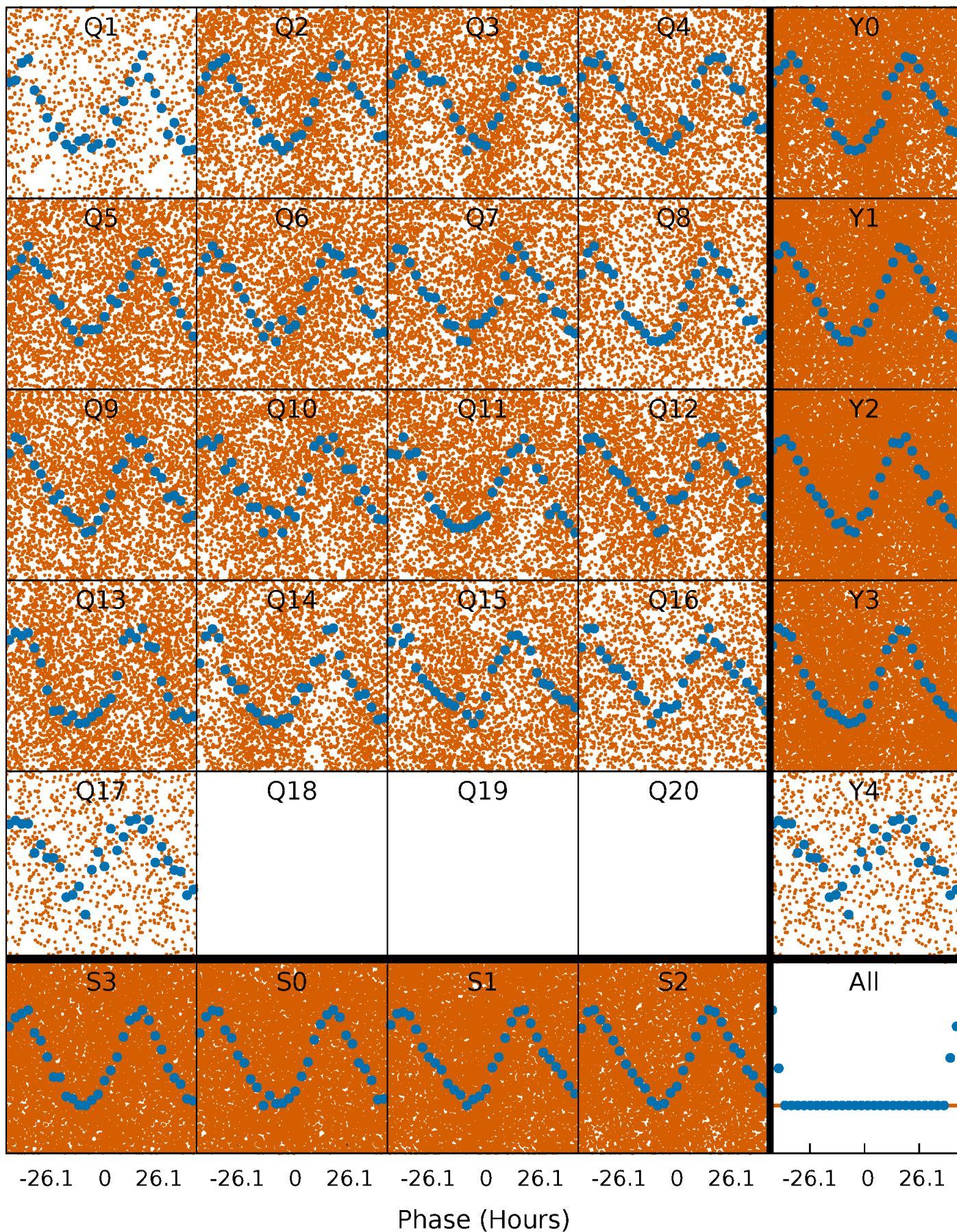
## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)





# PDC Quarter-Phased Transit Curves

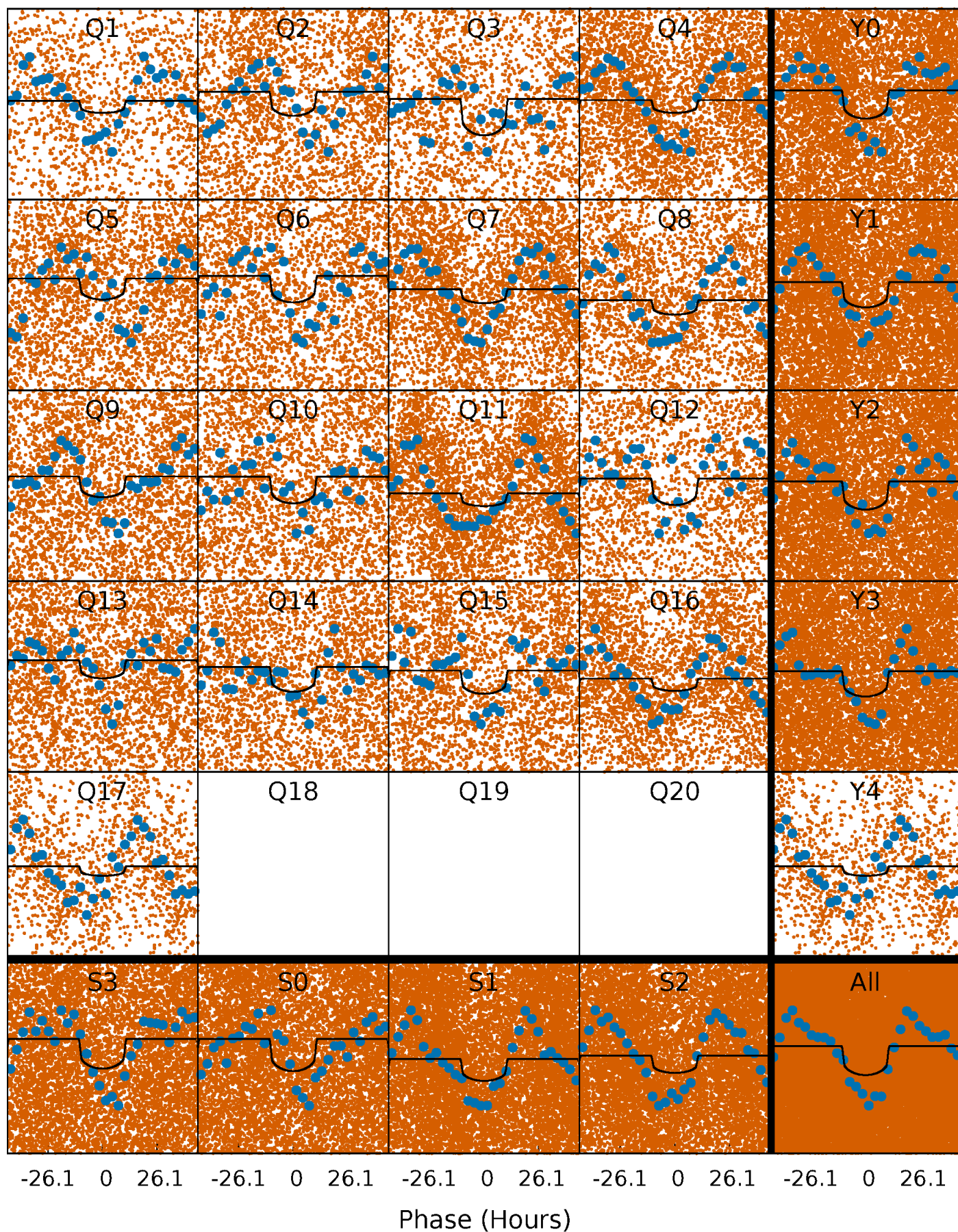
TCE 011656928-02 P= 2.350835 Days  $T_0=131.939402$  (BKJD)





# DV Quarter-Phased Transit Curves

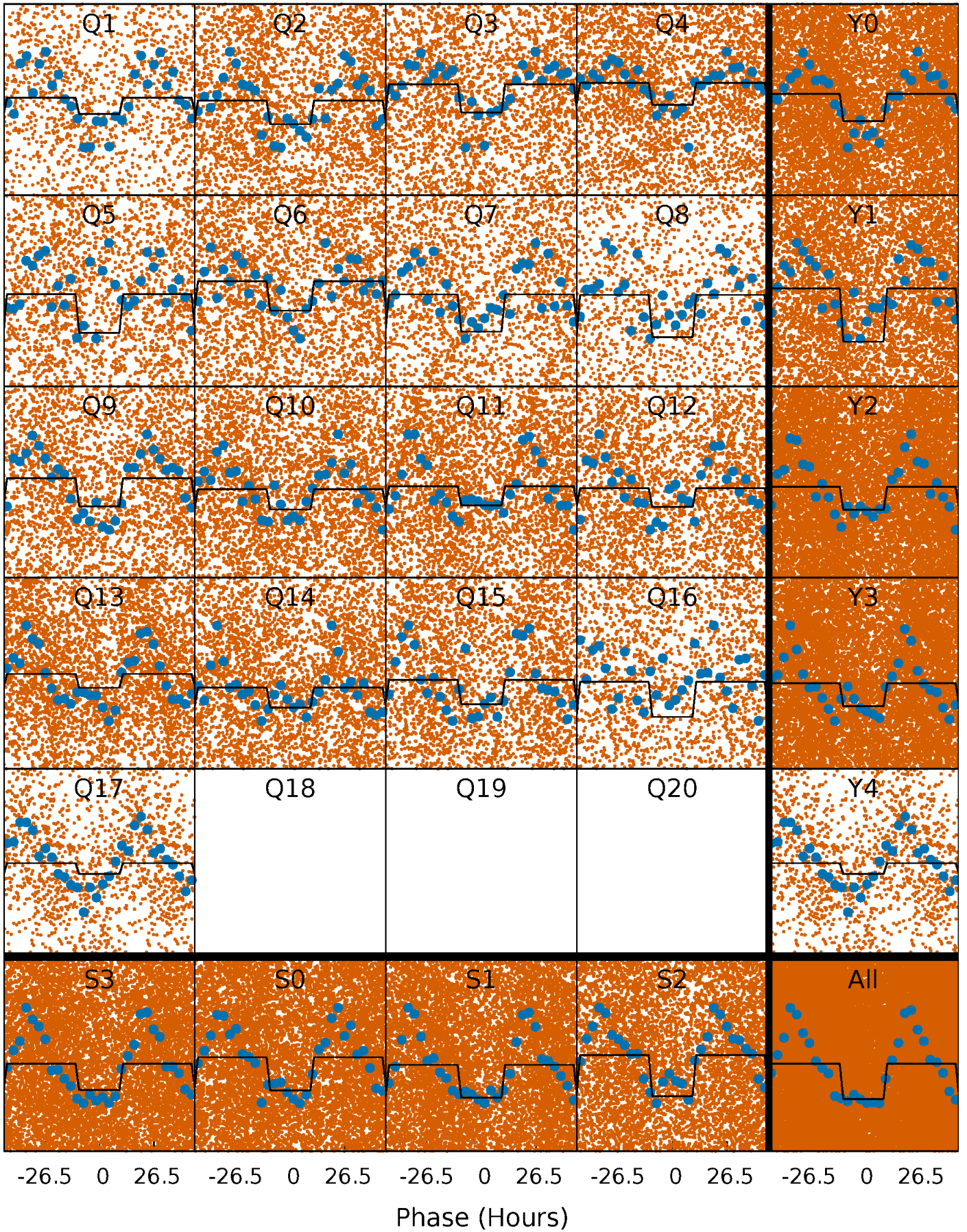
TCE 011656928-02 P= 2.350835 Days  $T_0=131.939402$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

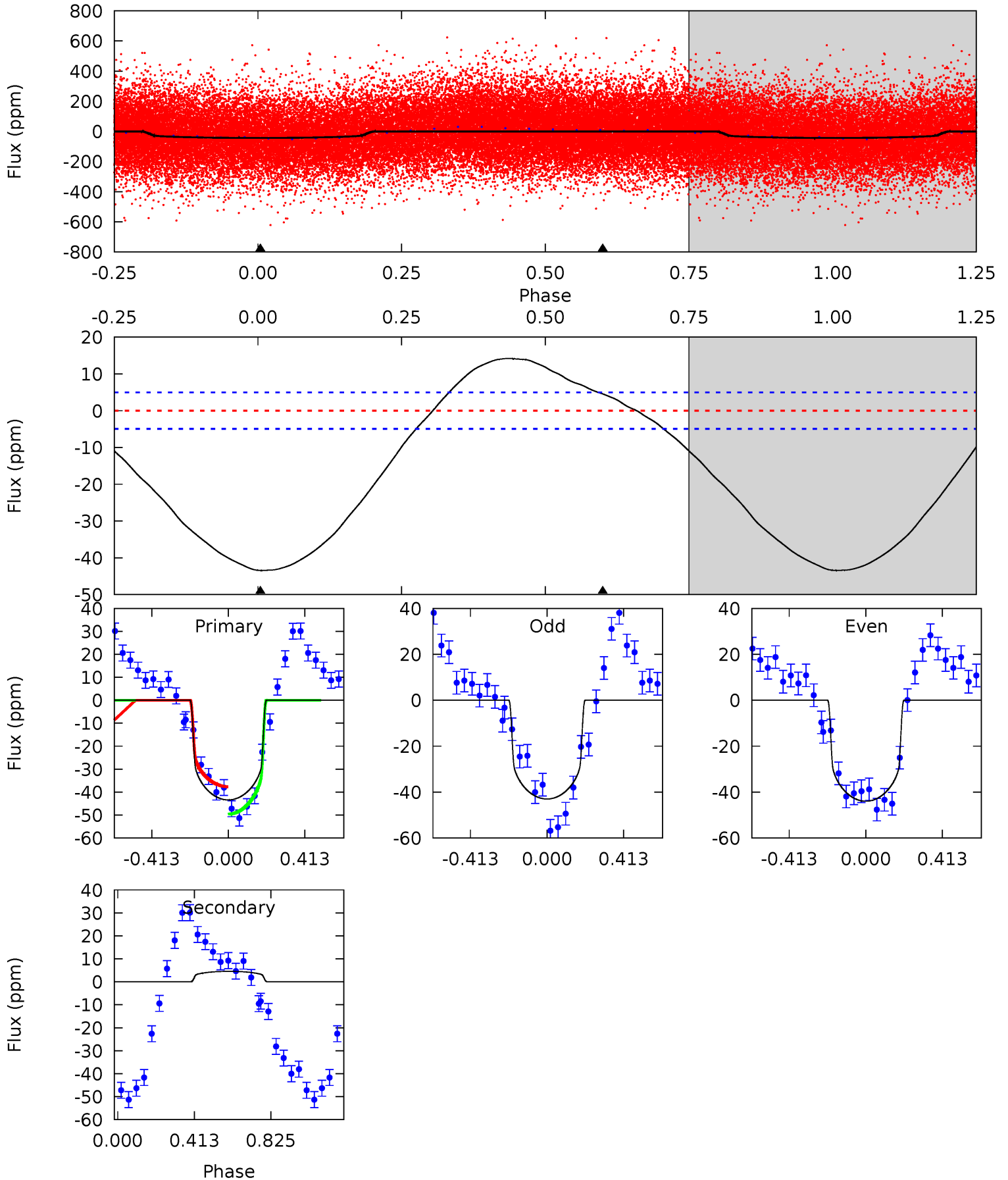
TCE 011656928-02 P= 2.350740 Days  $T_0=131.935866$  (BKJD)



# DV Model-Shift Uniqueness Test

011656928-02, P = 2.350835 Days, E = 129.588567 Days

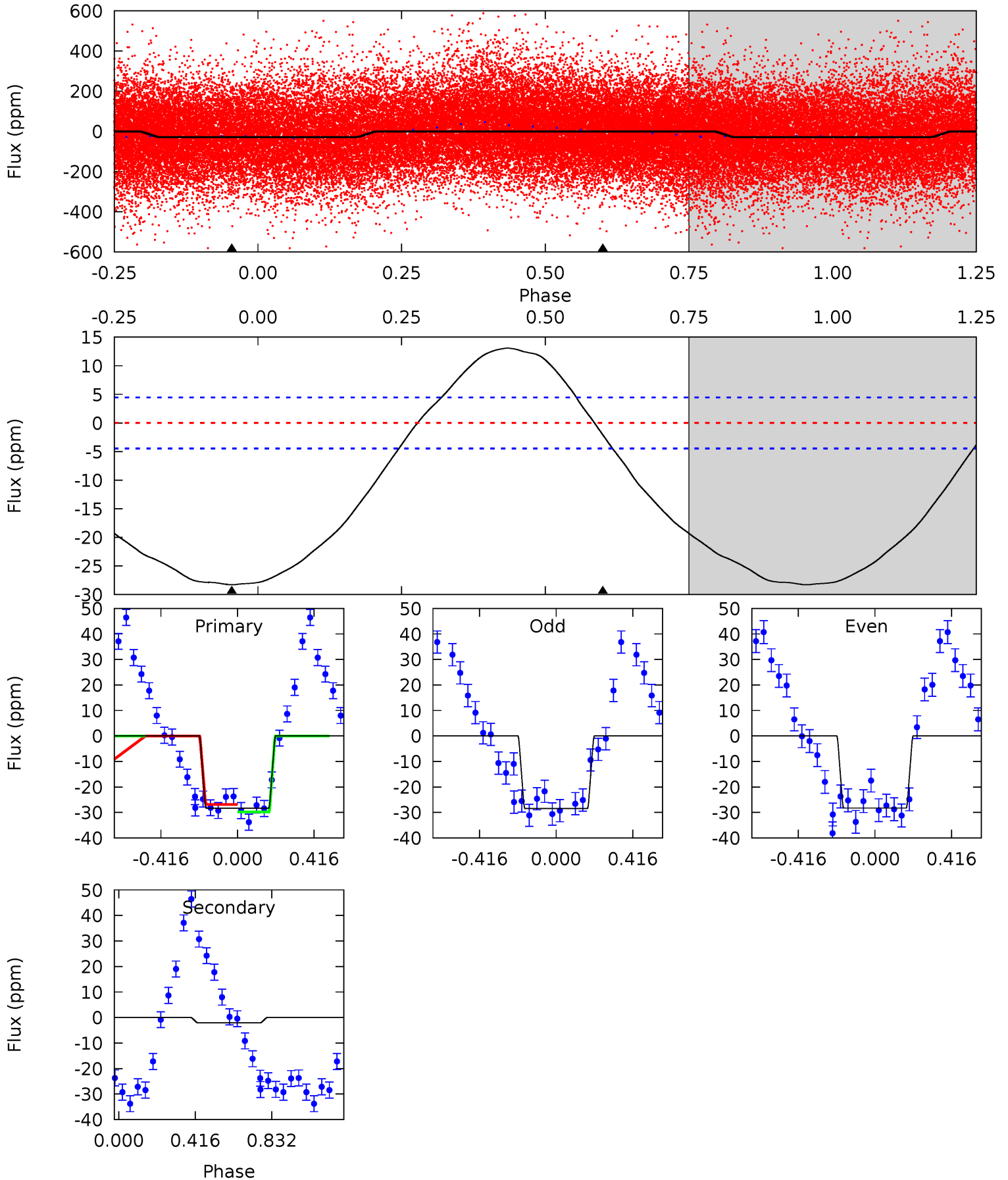
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
37.2	-3.91	0	0	4.26	0.82	4.90	37.2	37.2	-3.91	-3.91	0.42	1.09	0.25	5.22



# Alt Model-Shift Uniqueness Test

011656928-02, P = 2.350740 Days, E = 129.585126 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
27.0	1.97	0	0	4.26	0.81	4.00	27.0	27.0	1.97	1.97	0.06	1.88	0.32	1.41



### Stellar Parameters For KIC 011656928

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6915^{+187}_{-221}$	$3.655^{+0.312}_{-0.078}$	$-0.260^{+0.300}_{-0.250}$	$3.153^{+0.396}_{-1.109}$	$1.638^{+0.231}_{-0.308}$	$0.074^{+0.174}_{-0.018}$
	+3%/-3%	+9%/-2%	+115%/-96%	+13%/-35%	+14%/-19%	+236%/-24%
Source	PHO1	FLK73	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 011656928-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$5 \pm 1$	$1.76^{+0.30}_{-0.35}$	$3664^{+198}_{-336}$	$-4706^{+281}_{-289}$	$-1.383^{+0.461}_{-0.850}$
Alt.	$-2 \pm 1$	$1.72^{+0.28}_{-0.34}$	$3650^{+222}_{-308}$	$3562^{+459}_{-5685}$	$0.659^{+0.486}_{-0.366}$

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



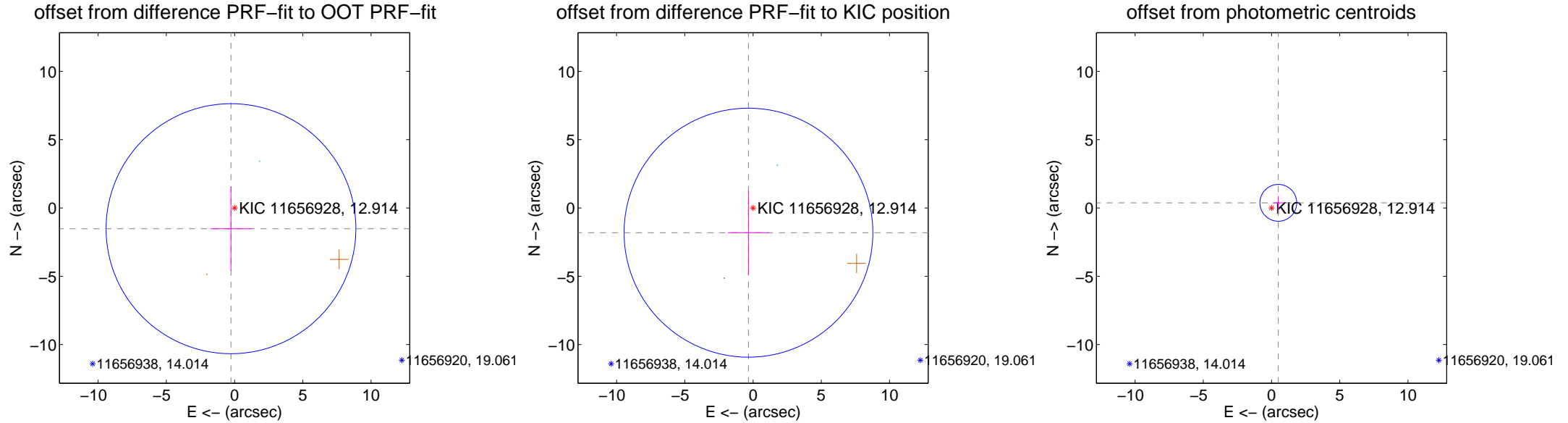
## DV Centroid Data

Supplemental centroid analysis for 011656928-02. Kepler magnitude: 12.91. Transit SNR 8.68

There are 1 quarters with good PRF difference image offsets

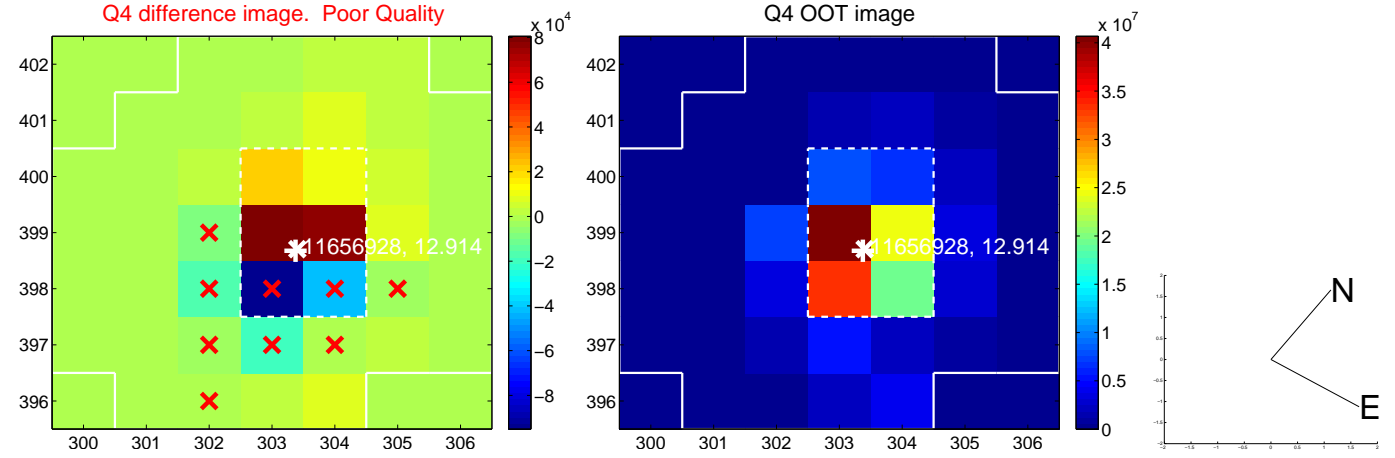
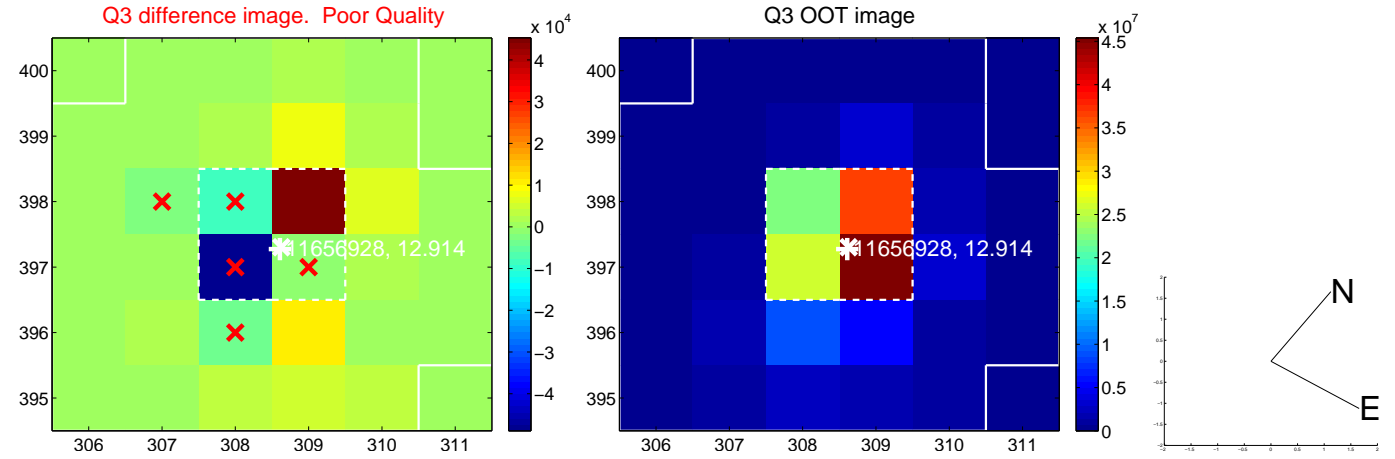
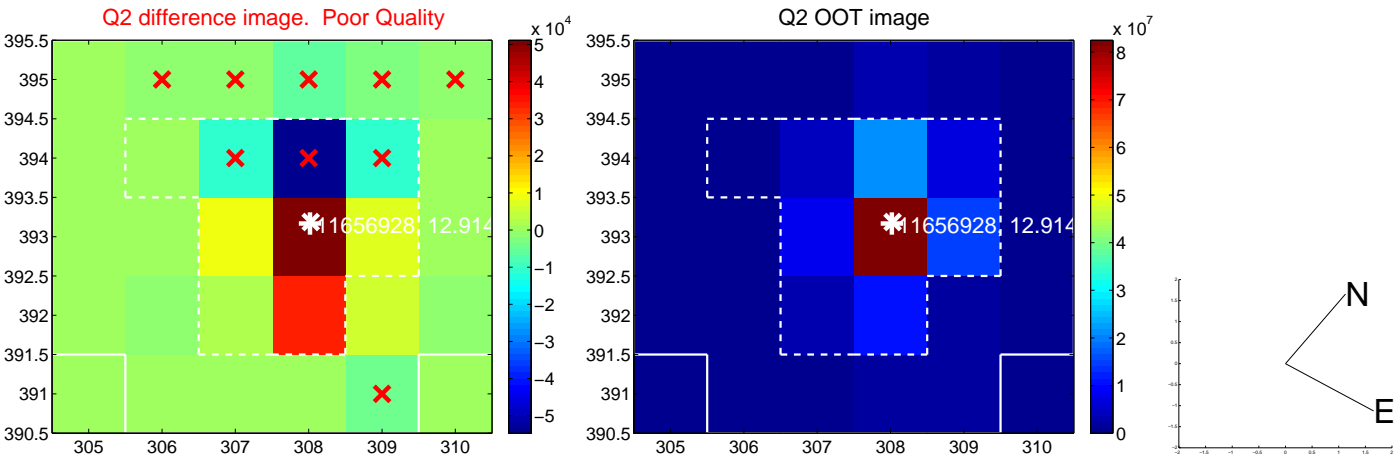
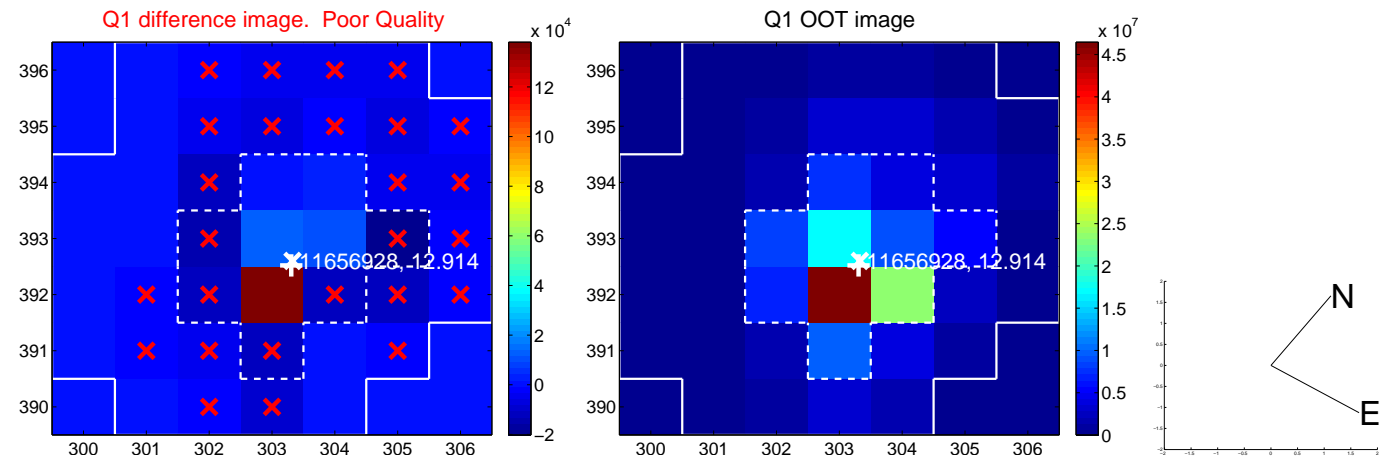
The direct PRF centroid is offset from the target star catalog position by about 0.31 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.543 \pm 3.051$	0.51	$0.263 \pm 1.498$	$-1.520 \pm 3.086$
PRF-fit source offset from KIC position	$1.843 \pm 3.039$	0.61	$0.336 \pm 1.507$	$-1.812 \pm 3.078$
photometric centroid source offset	$0.62 \pm 0.45$	1.39	$-0.50 \pm 0.41$	$0.37 \pm 0.51$

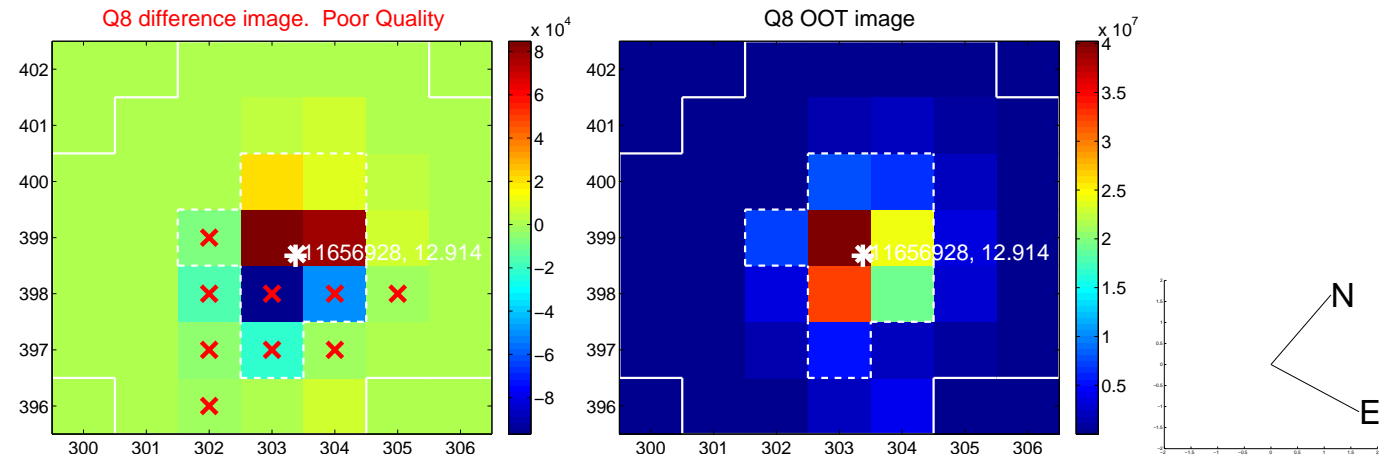
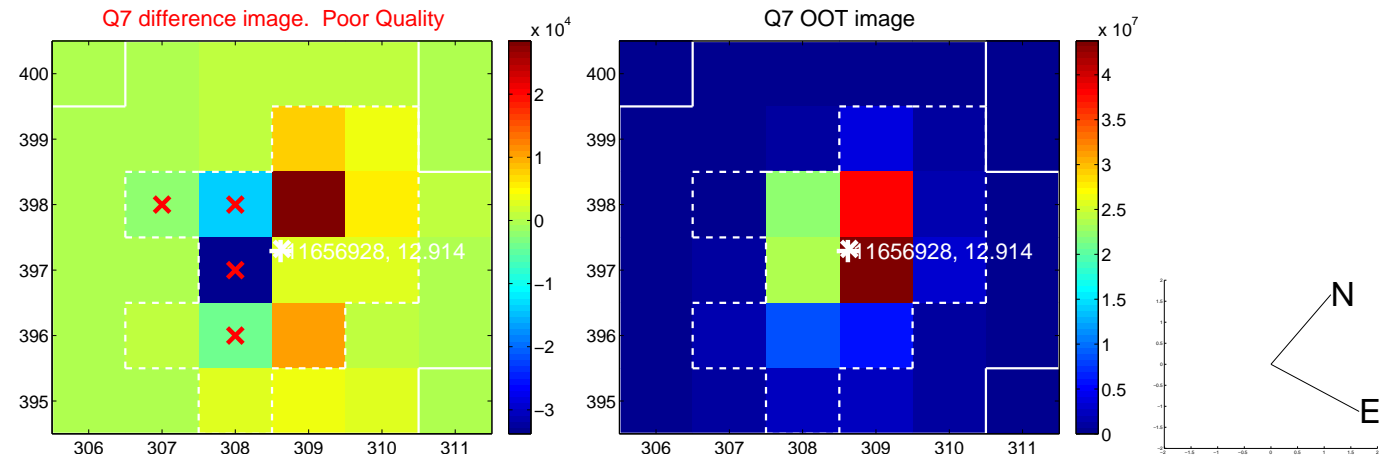
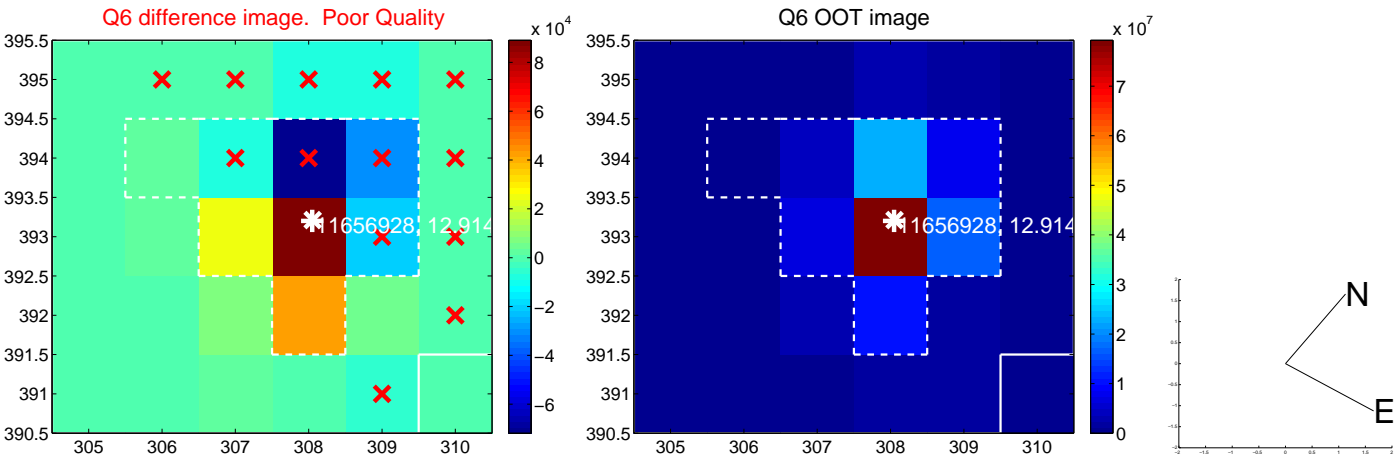
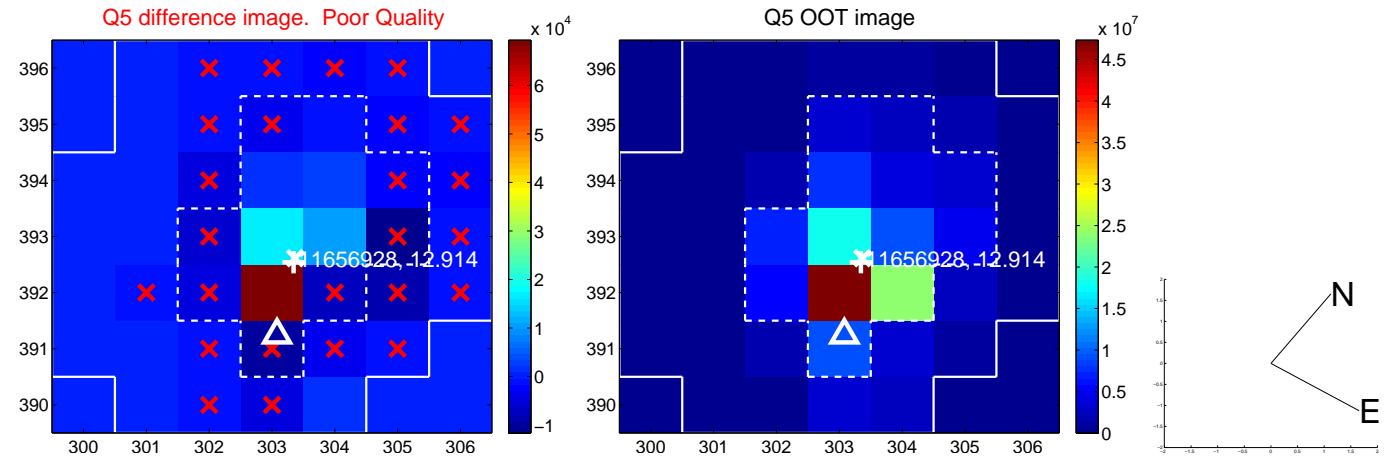


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

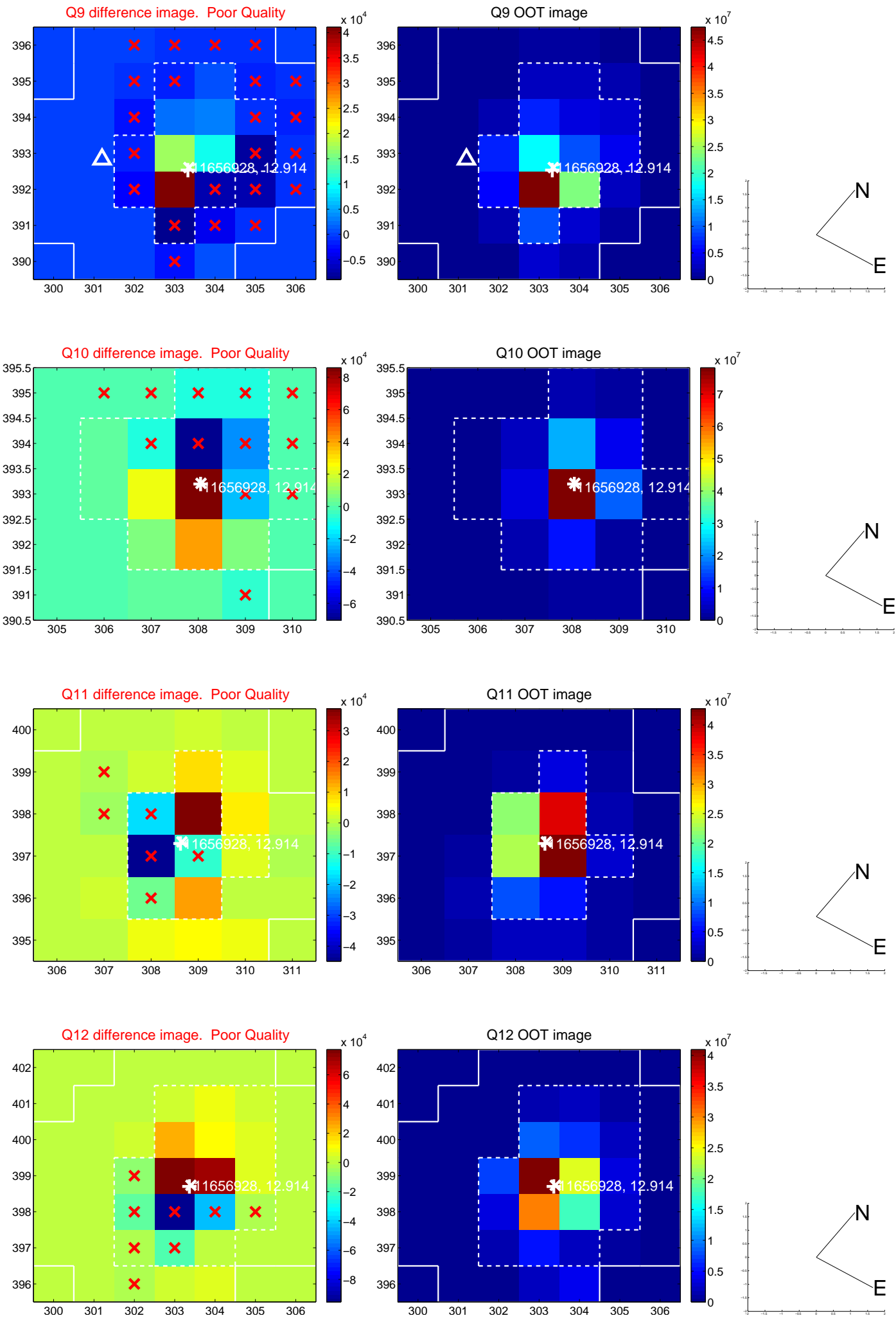
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



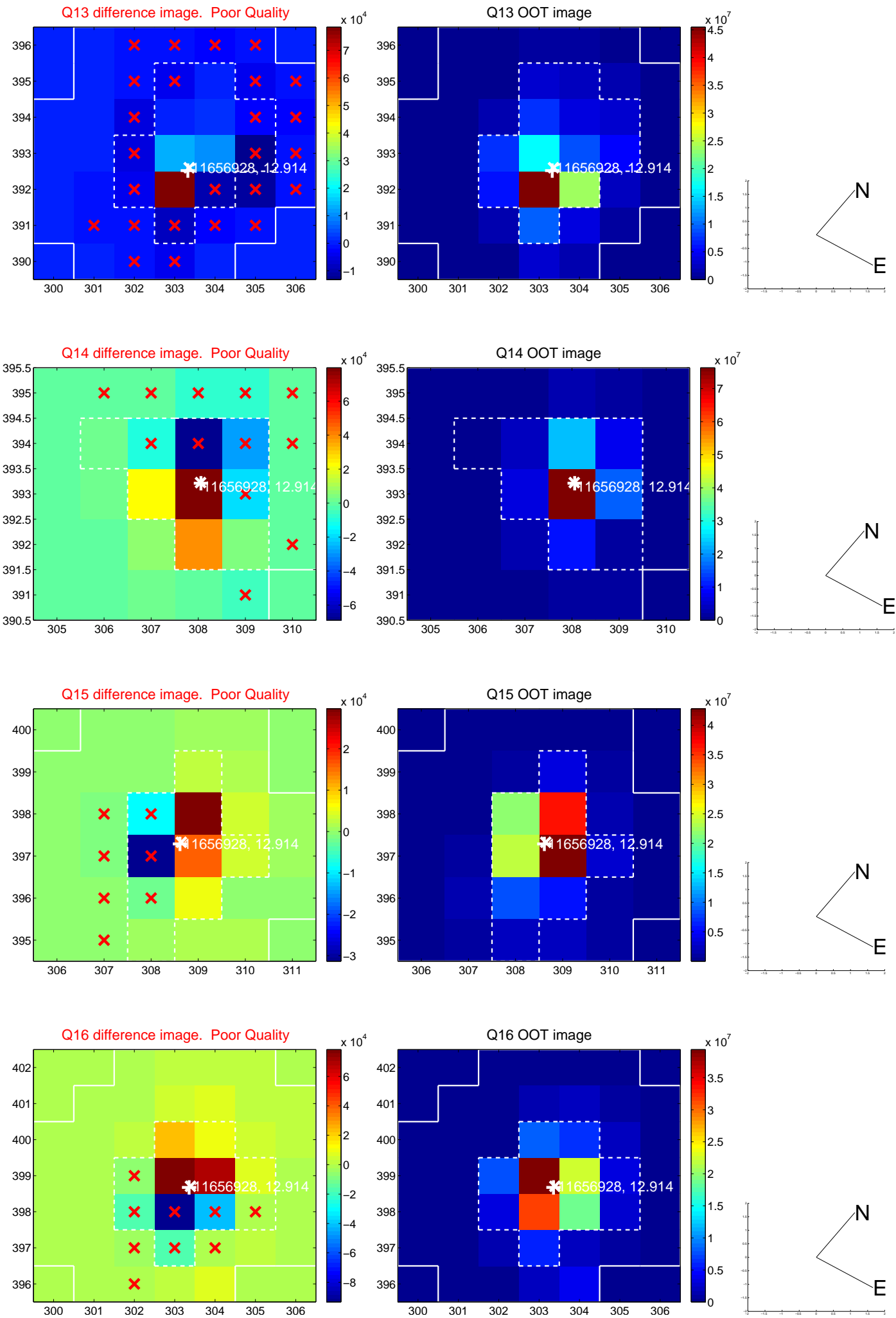
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

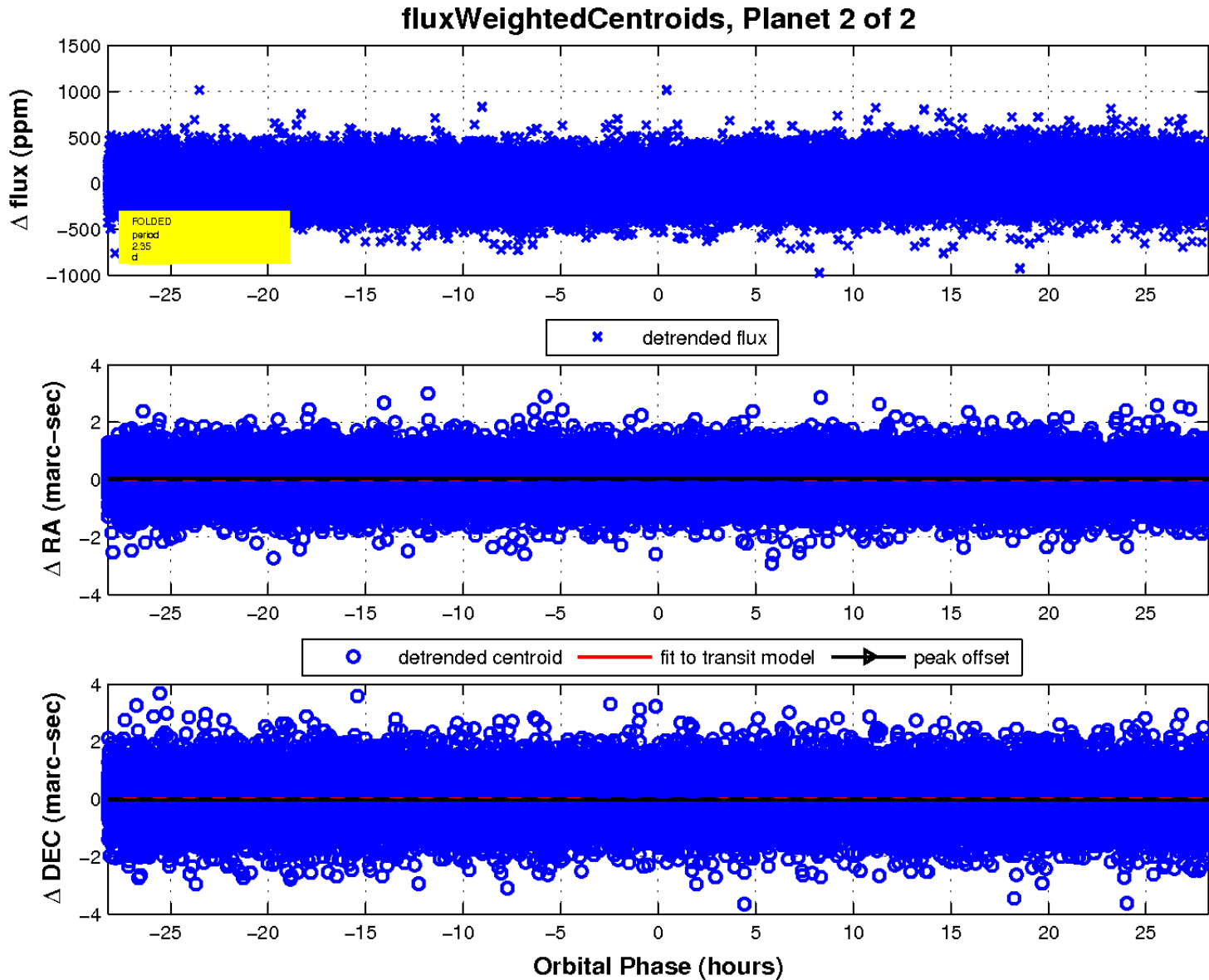
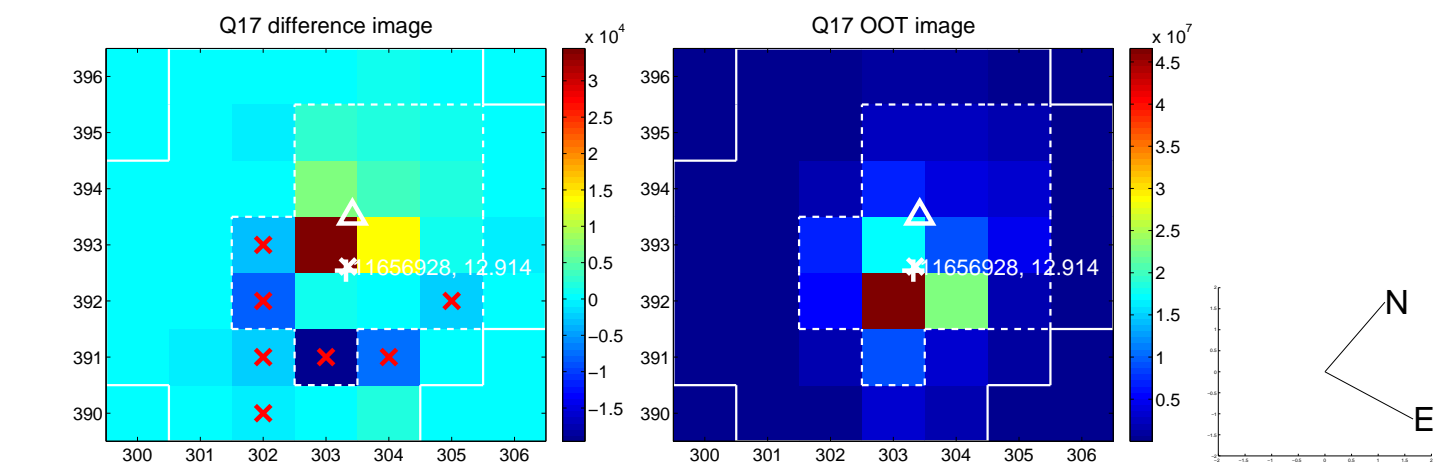


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





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



UKIRT Image

Declination

