

# KIC 009655393

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009655393-01	OBS	No	0.855187	132.264319	78.7	3.346	10.3	11.3	1.83	7800	1.89	25388.26
009655393-02	OBS	No	0.978285	132.442675	120.0	2.988	7.8	10.3	1.83	7800	2.33	21220.75

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009655393-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT
009655393-02	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—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.

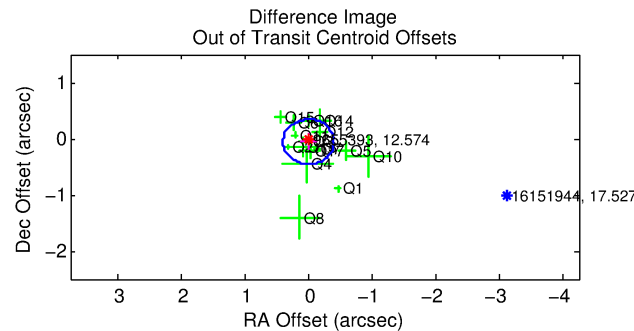
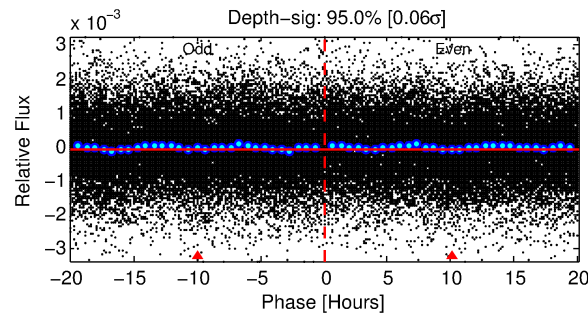
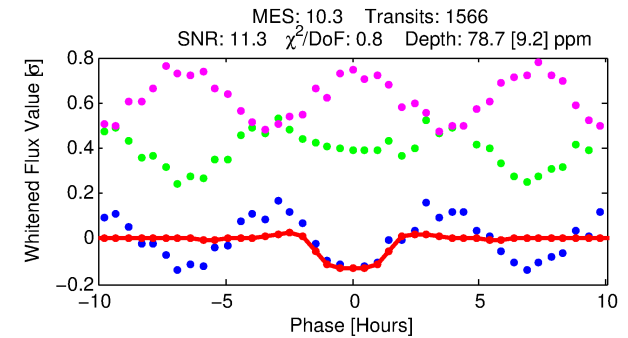
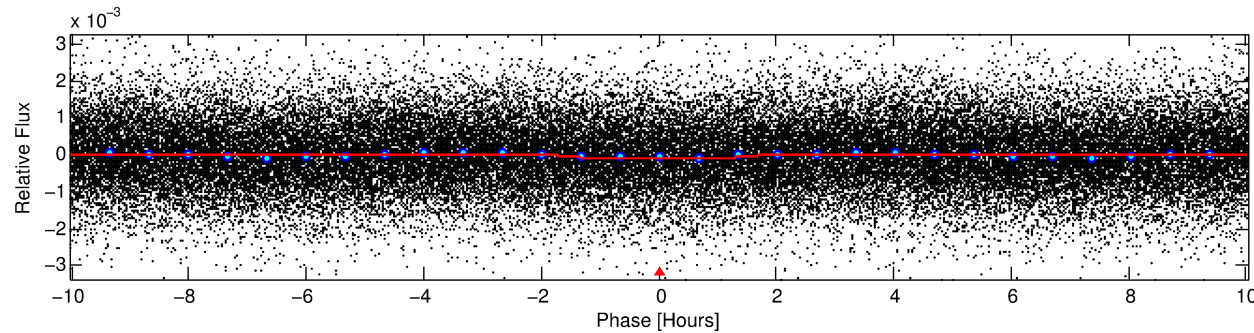
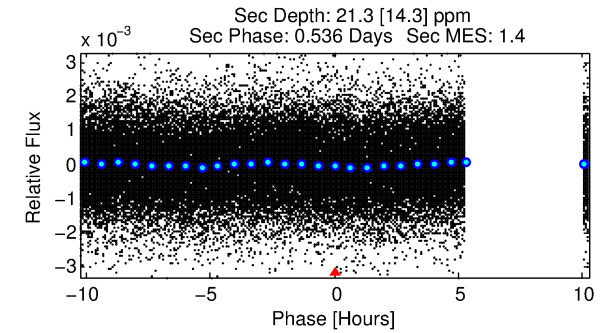
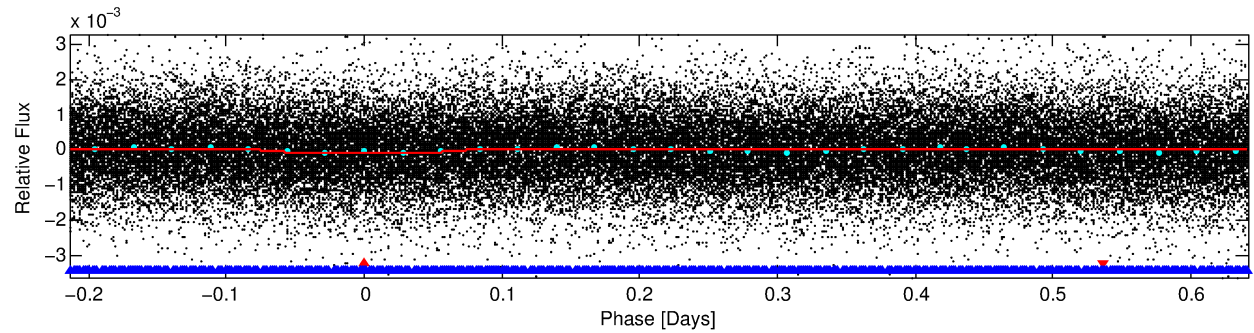
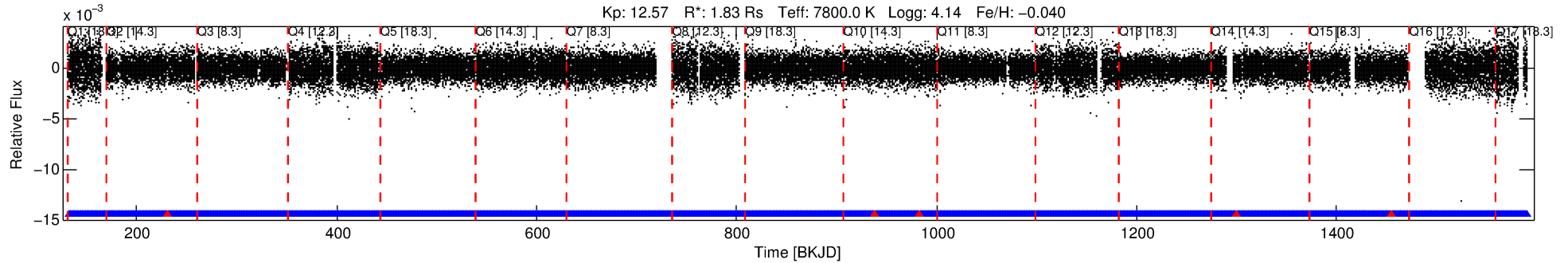
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009655393-01

No Significant Match Found

# DV One-Page Summary

KIC: 9655393 Candidate: 1 of 2 Period: 0.855 d



## DV Fit Results:

Period = 0.85519 [0.00001] d  
Epoch = 132.2643 [0.0037] BKJD  
Rp/R\* = 0.0094 [0.0051]  
a/R\* = 1.29 [1.82]  
b = 0.90 [0.73]  
Seff = 25388.26 [9473.79]  
Teq = 3219 [300] K  
Rp = 1.89 [1.14] Re  
a = 0.0209 [0.0049] AU  
Ag = 1.44 [1.89] [0.23σ]  
Teffp = 5455 [1742] K [1.27σ]

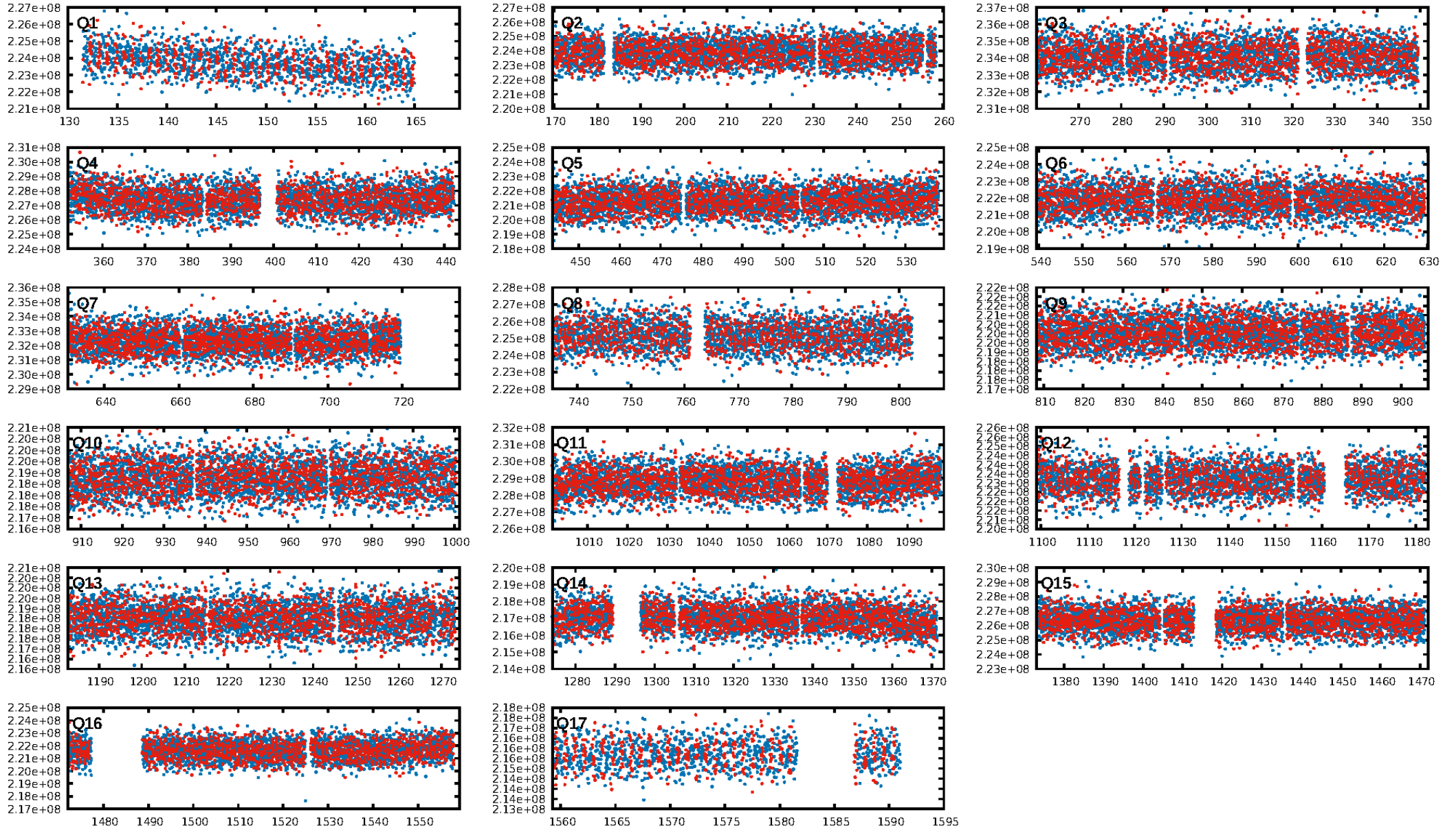
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 49.0% [0.66σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 4.20e-29  
RollingBand-fgt: 1.00 [1491/1496]  
GhostDiagnostic-chr: 1.762  
Centroid-sig: 2.2%  
Centroid-so: 0.539 arcsec [3.11σ]  
OotOffset-rm: 0.057 arcsec [0.43σ]  
KicOffset-rm: 0.203 arcsec [1.87σ]  
OotOffset-st: 4/4/4/4 [16]  
KicOffset-st: 4/4/4/4 [16]  
DiffImageQuality-fgm: 0.75 [12/16]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:21:29 Z

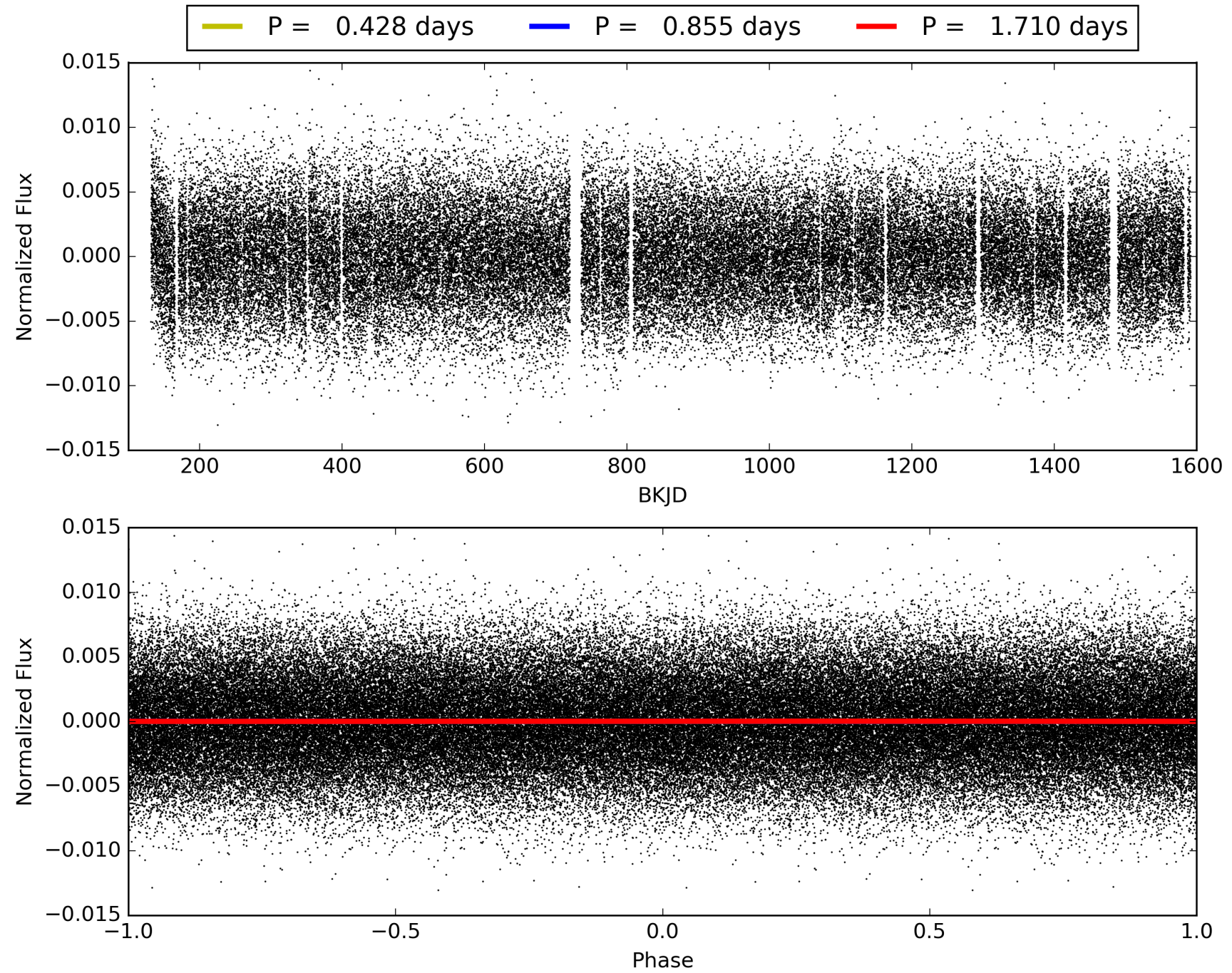
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 009655393-01, PDC Light Curves



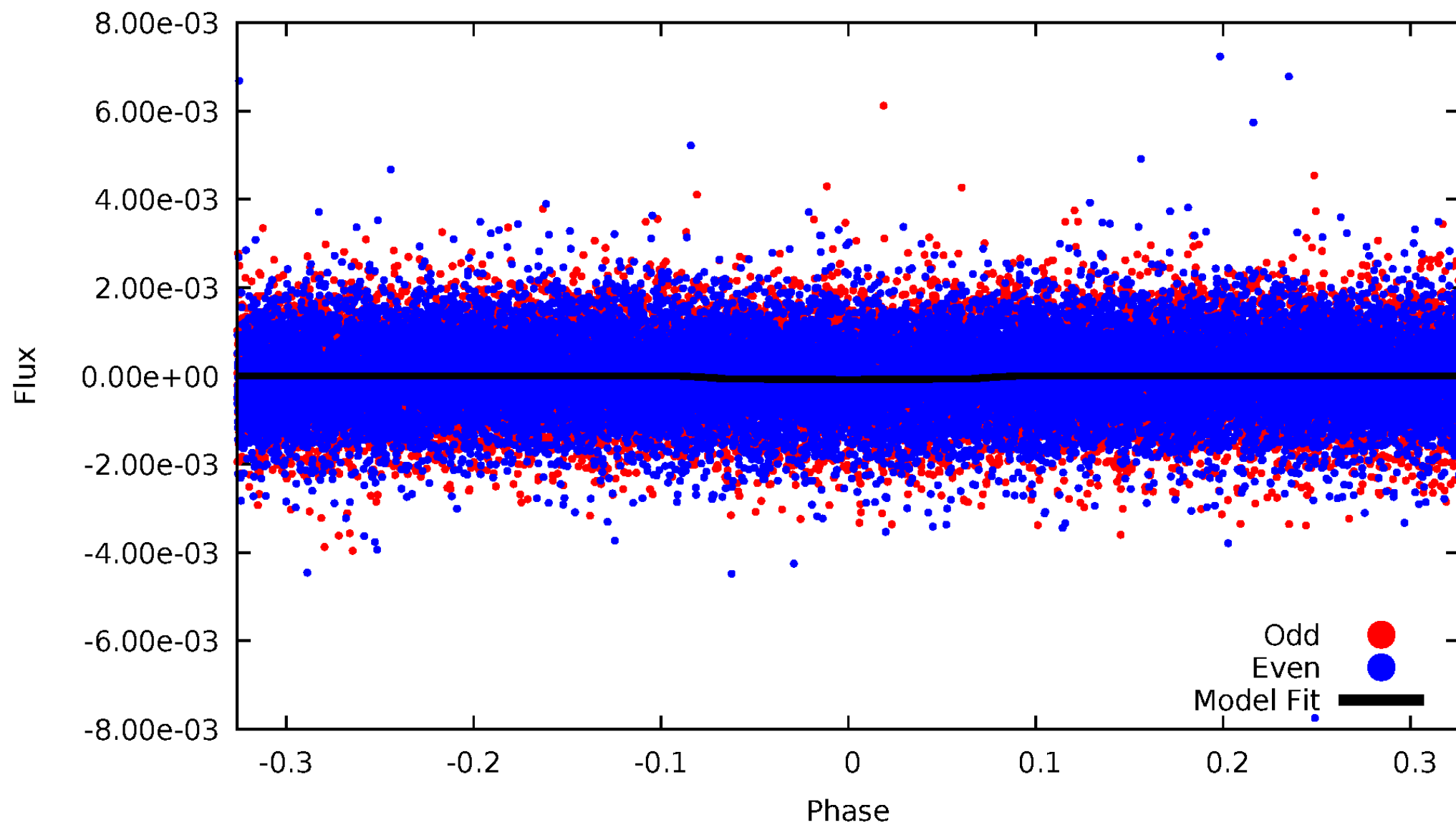


TCE 009655393-01



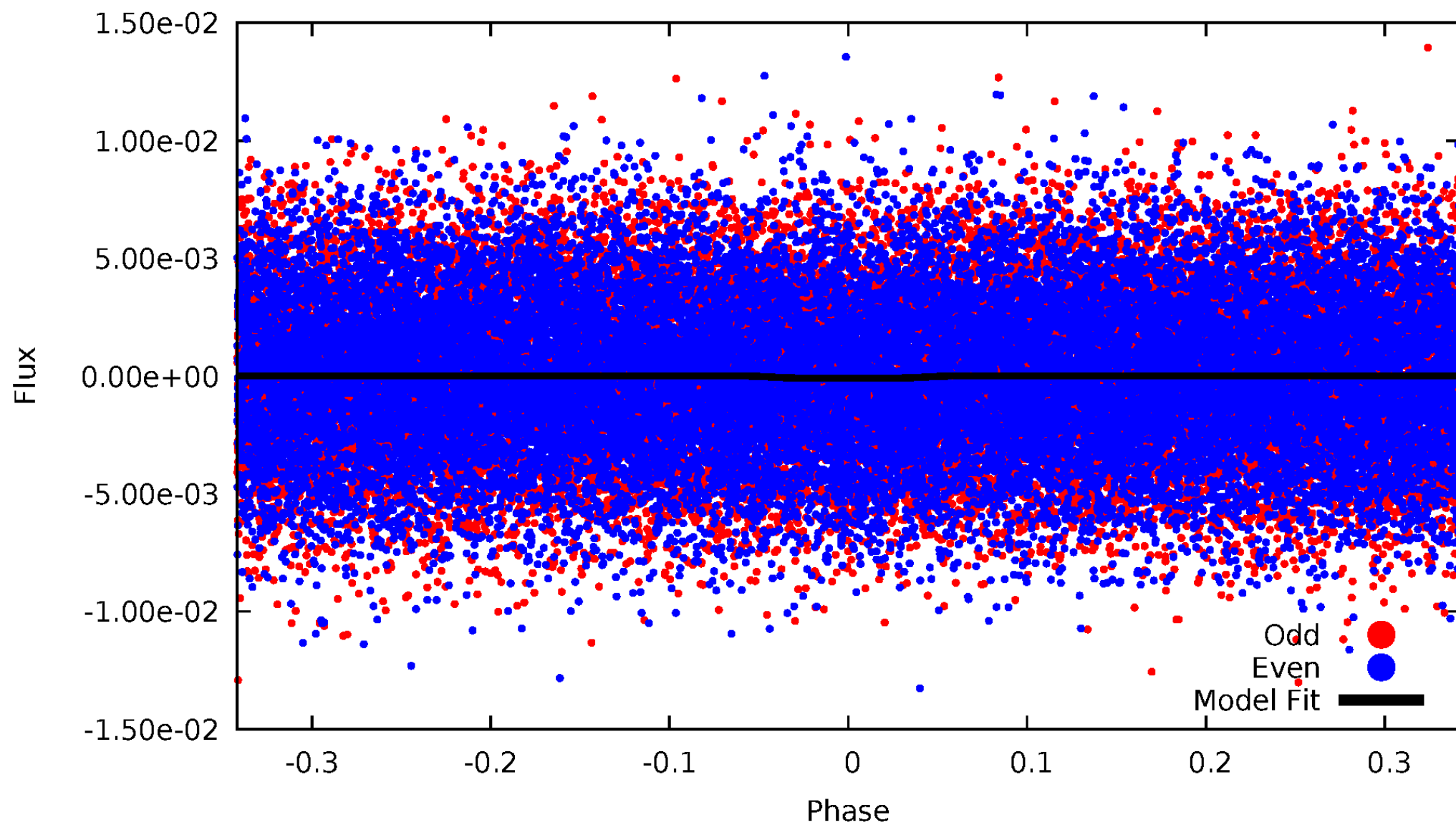
# DV Odd/Even

TCE 009655393-01



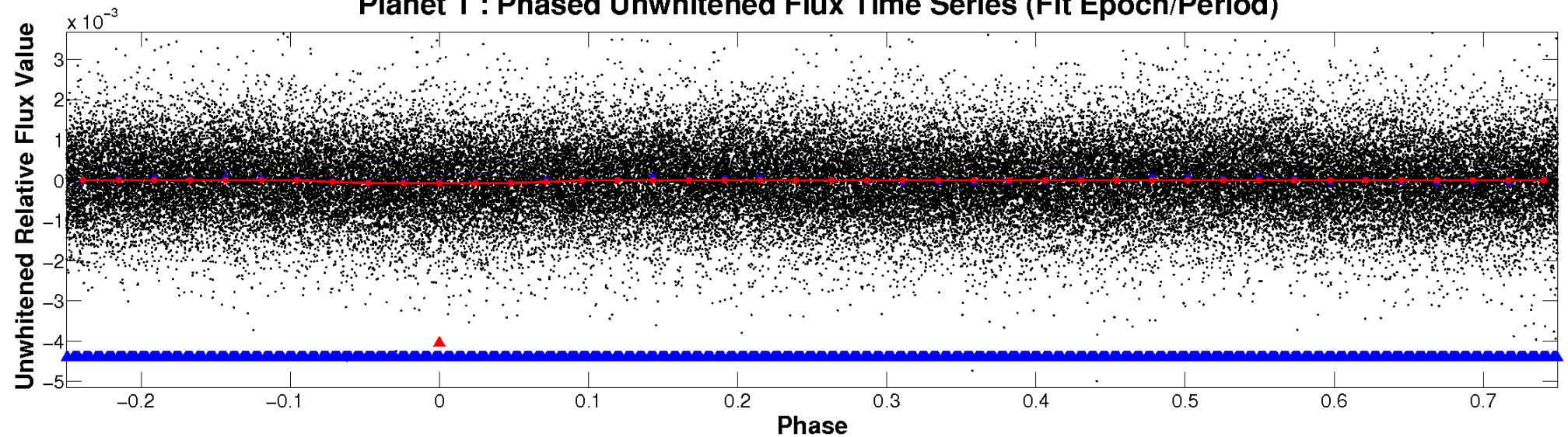
# ALT Odd/Even

TCE 009655393-01

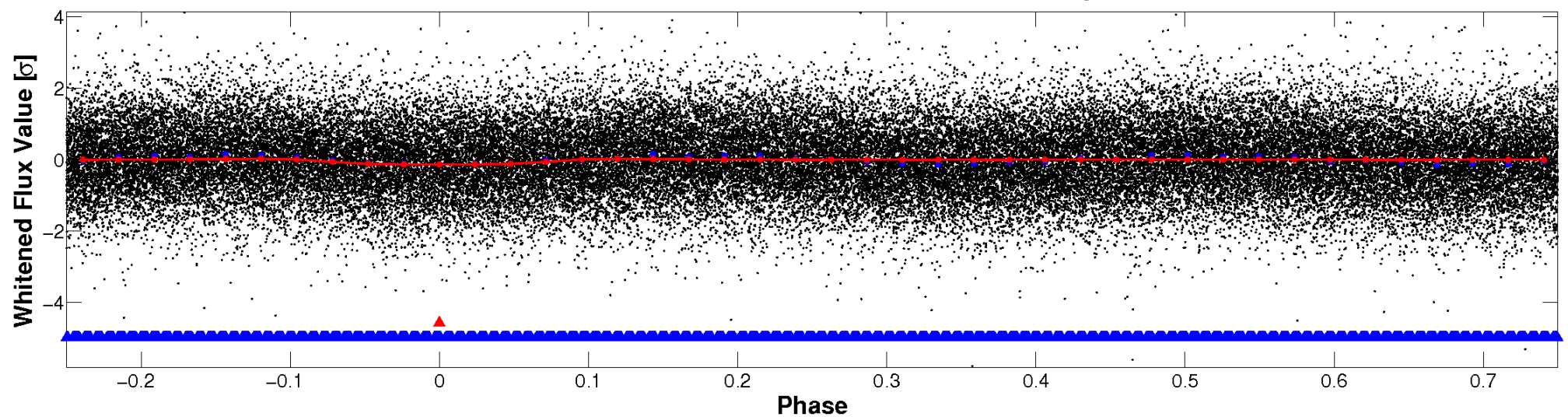


# Non-Whitened Vs. Whitened Light Curve

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



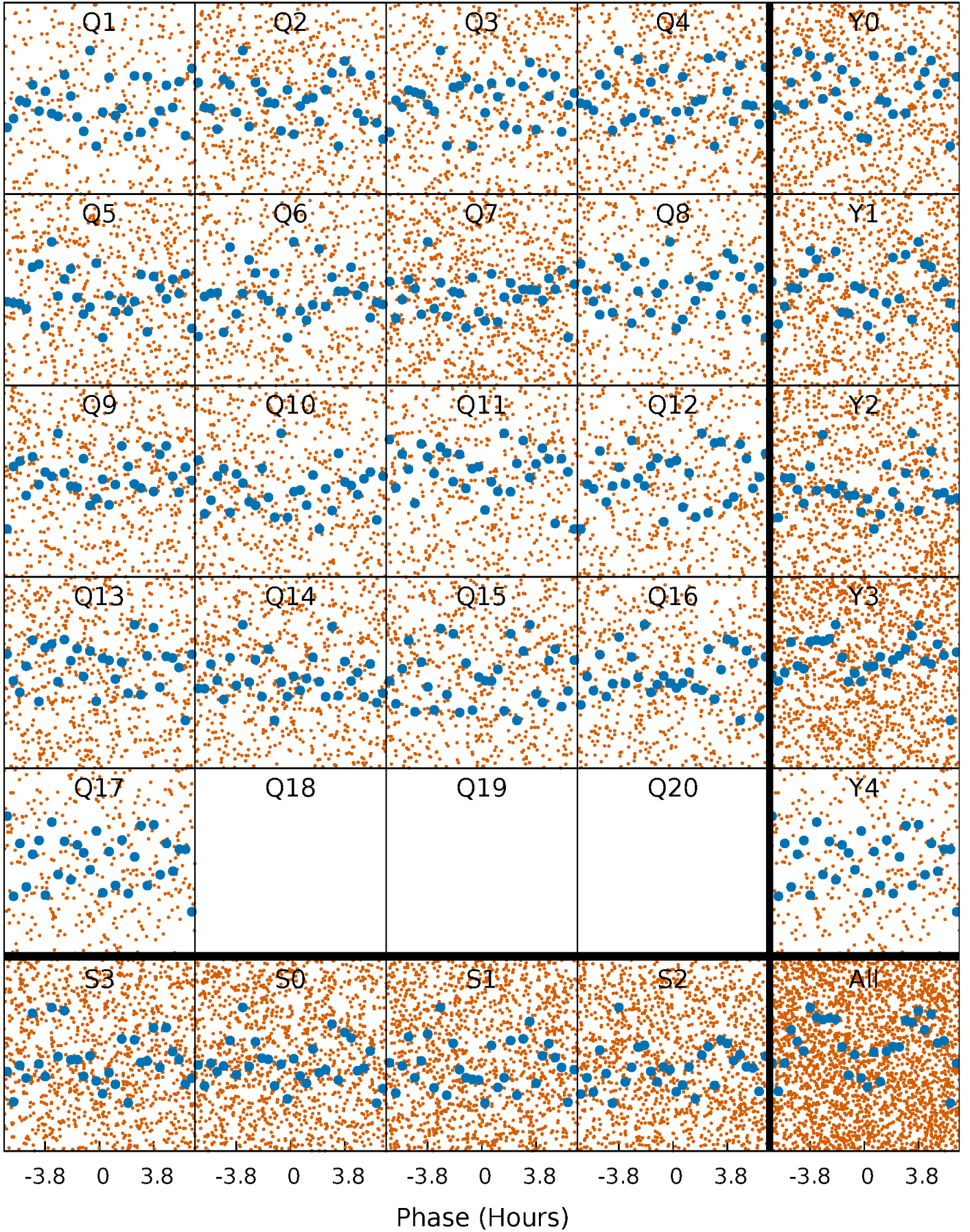
**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**





# PDC Quarter-Phased Transit Curves

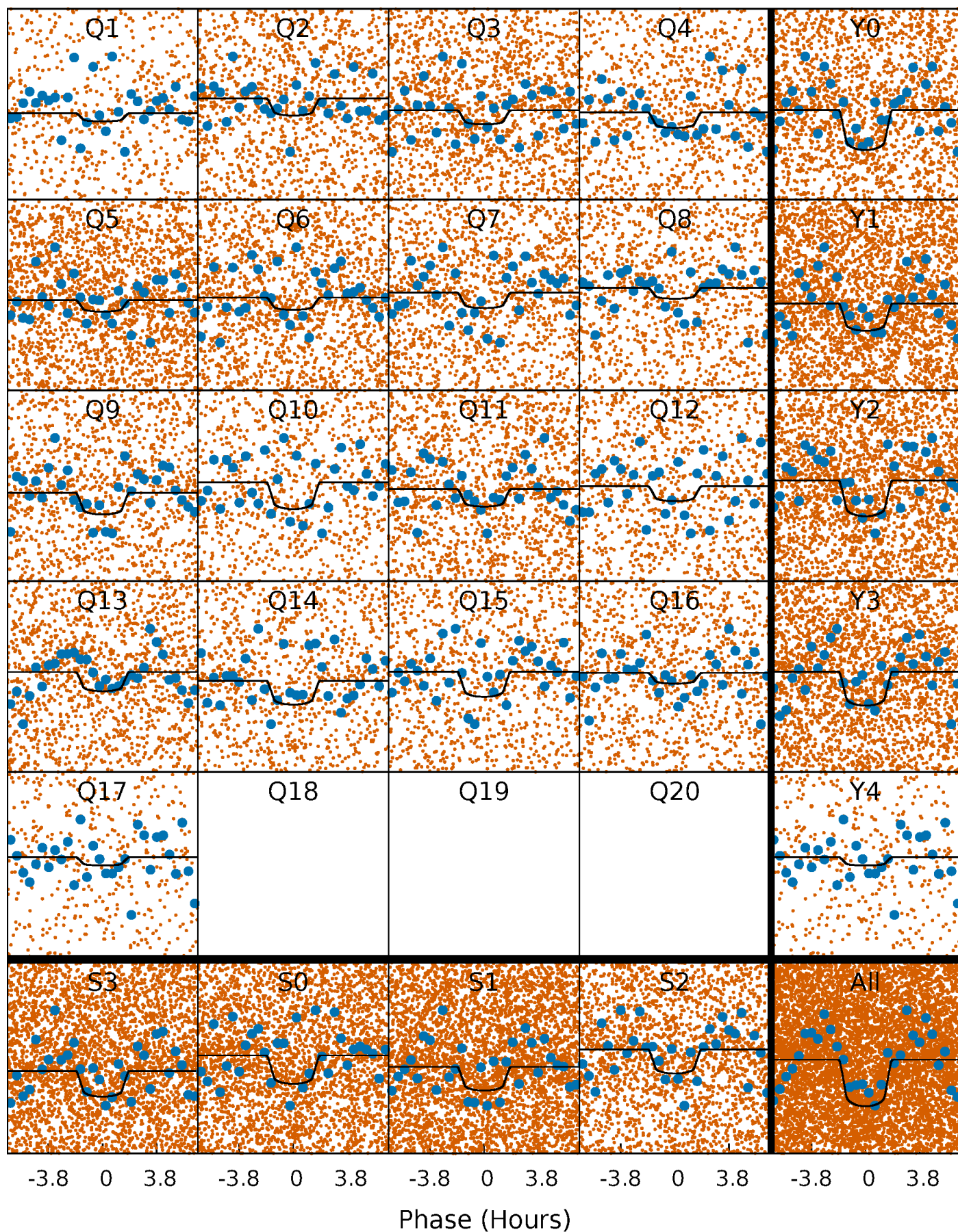
TCE 009655393-01 P= 0.855187 Days  $T_0=132.264319$  (BKJD)





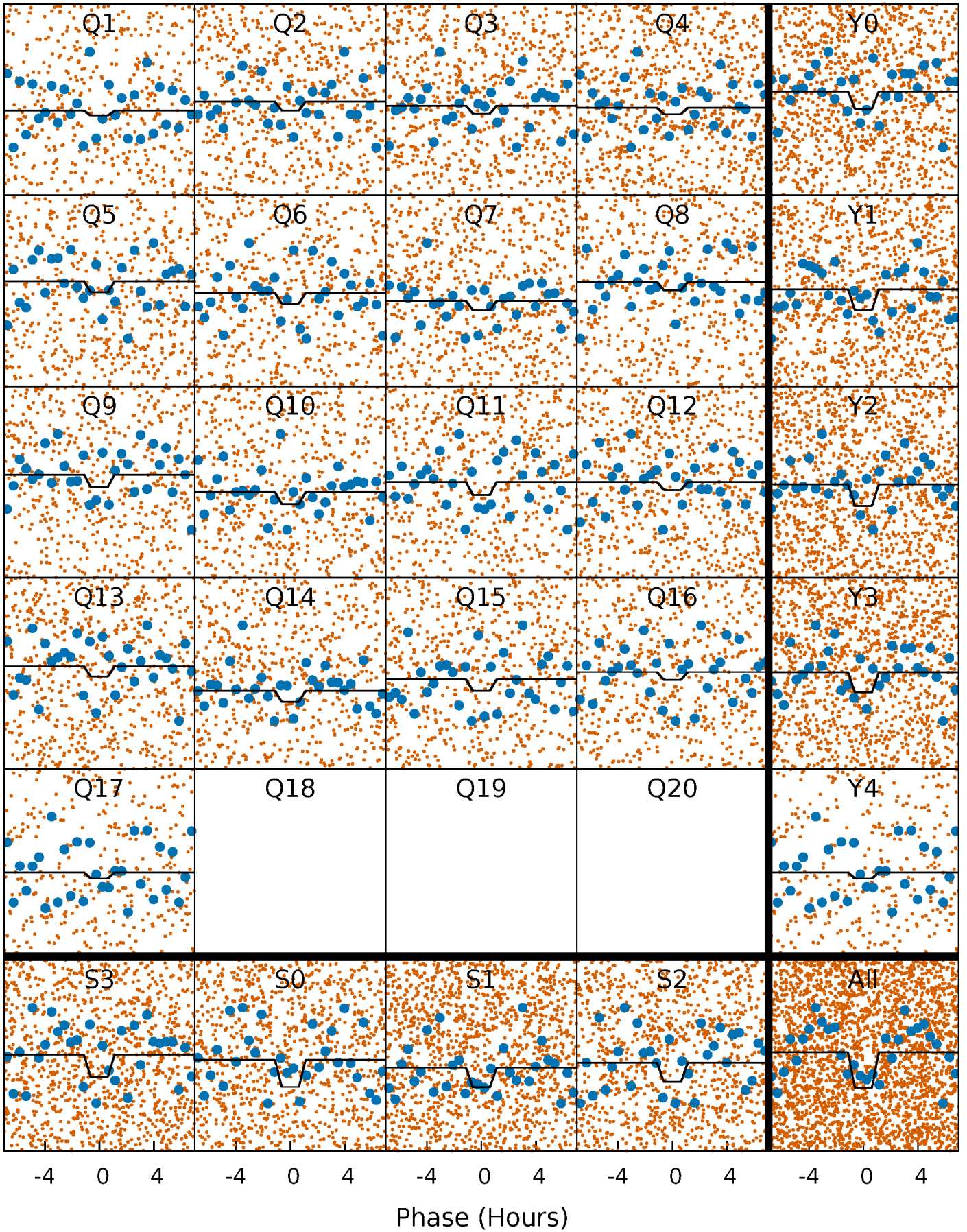
# DV Quarter-Phased Transit Curves

TCE 009655393-01   P= 0.855187 Days    $T_0=132.264319$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

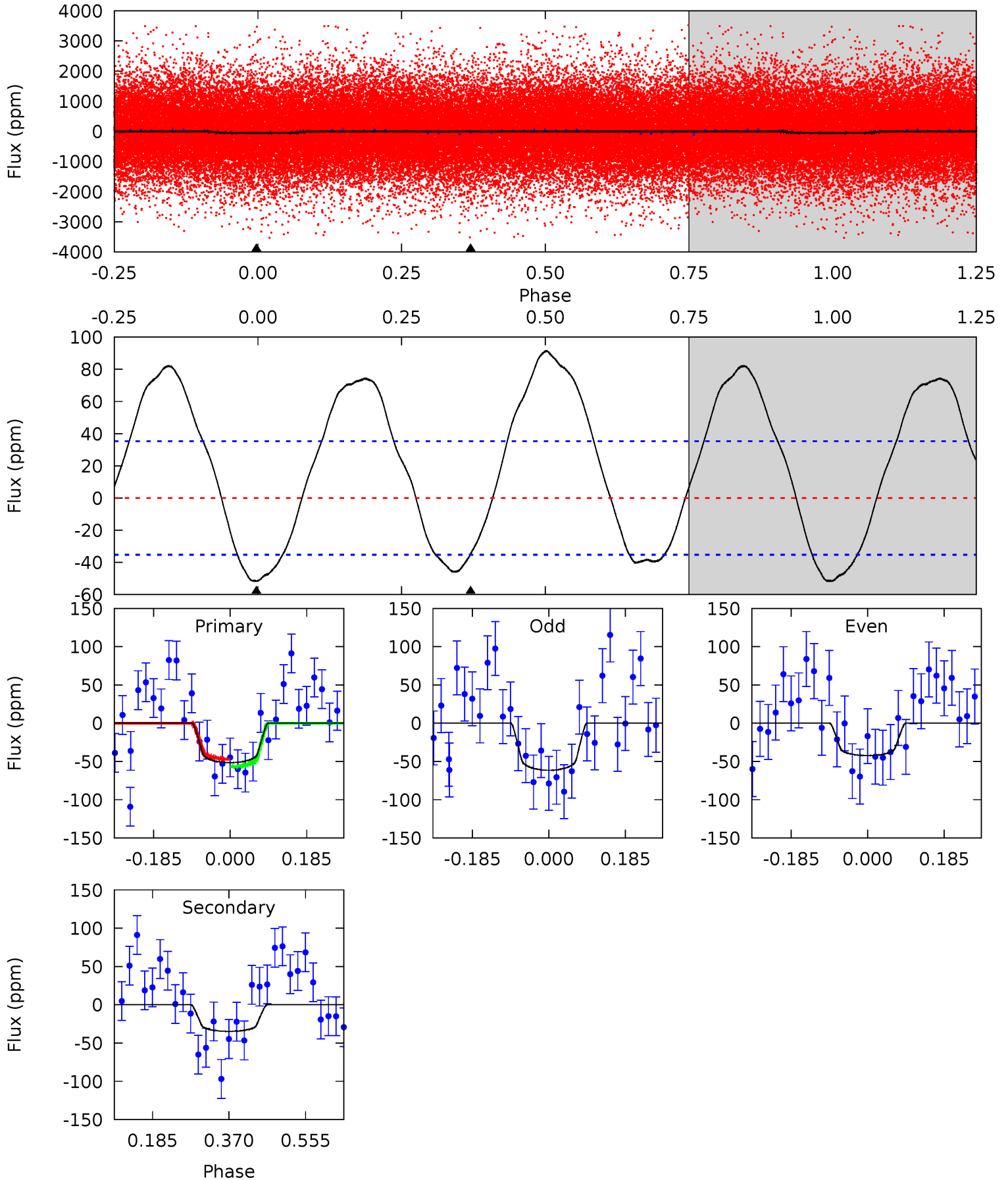
TCE 009655393-01 P= 0.855193 Days  $T_0=132.263827$  (BKJD)



# DV Model-Shift Uniqueness Test

009655393-01, P = 0.855187 Days, E = 131.409132 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
6.47	4.37	0	0	4.43	1.33	4.70	6.47	6.47	4.37	4.37	1.22	1.07	0.64	0.61

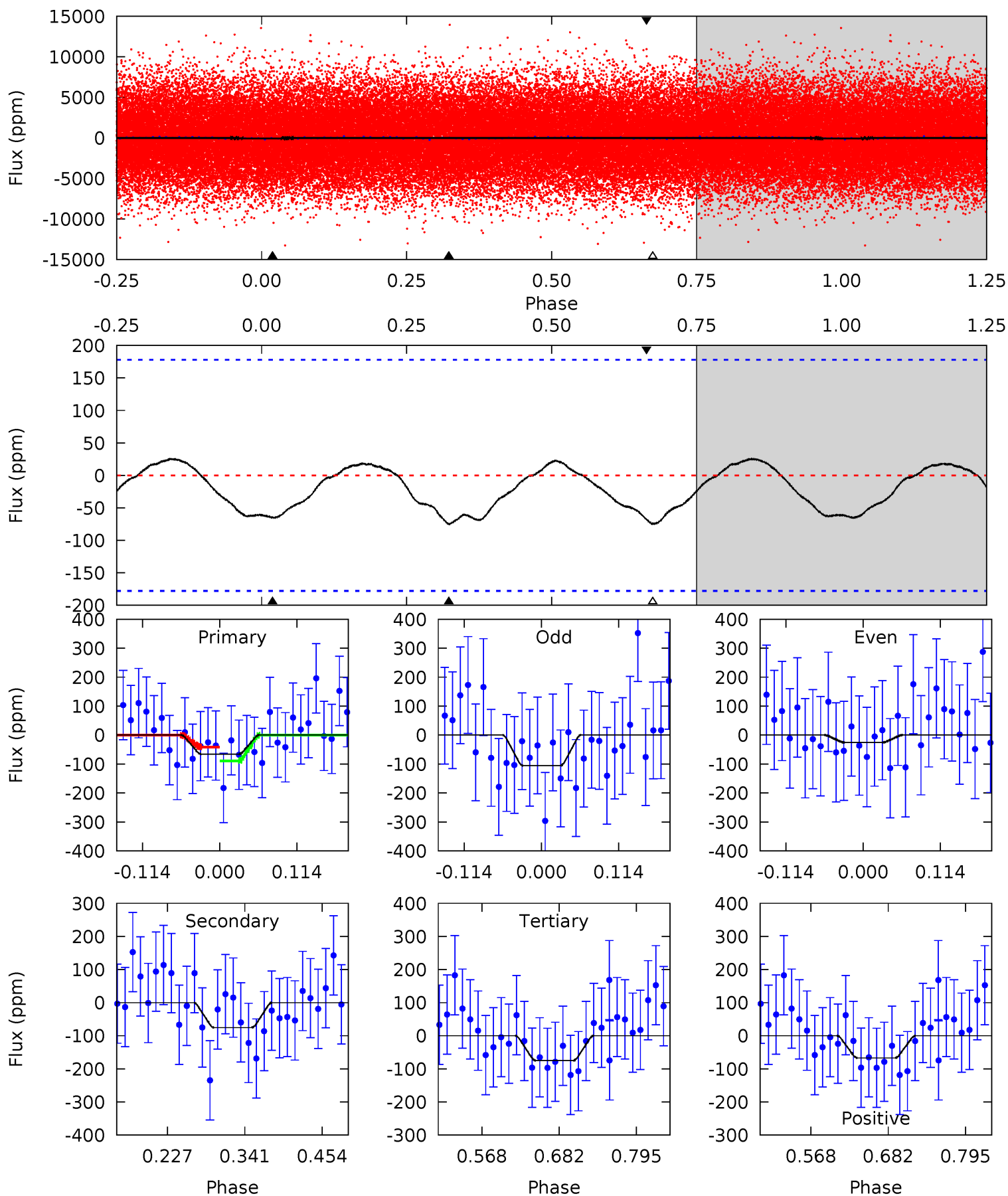




# Alt Model-Shift Uniqueness Test

009655393-01, P = 0.855193 Days, E = 131.408634 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
1.67	1.92	1.91	-1.72	4.54	1.58	0.75	-0.24	3.39	0.01	3.64	1.01	1.05	0.25	0.61





### Stellar Parameters For KIC 009655393

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7800^{+214}_{-322}$	$4.136^{+0.120}_{-0.180}$	$-0.040^{+0.150}_{-0.400}$	$1.833^{+0.519}_{-0.346}$	$1.676^{+0.204}_{-0.271}$	$0.383^{+0.228}_{-0.195}$
	+3%/-4%	+3%/-4%	+375%/-1000%	+28%/-19%	+12%/-16%	+60%/-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 009655393-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-35 \pm 8$	$2.02^{+1.06}_{-1.02}$	$4539^{+318}_{-311}$	$5599^{+2747}_{-1110}$	$2.008^{+5.909}_{-1.144}$
Alt.	$-75 \pm 39$	$1.93^{+1.01}_{-0.89}$	$4522^{+302}_{-262}$	$7089^{+4145}_{-1926}$	$4.530^{+12.993}_{-3.120}$

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

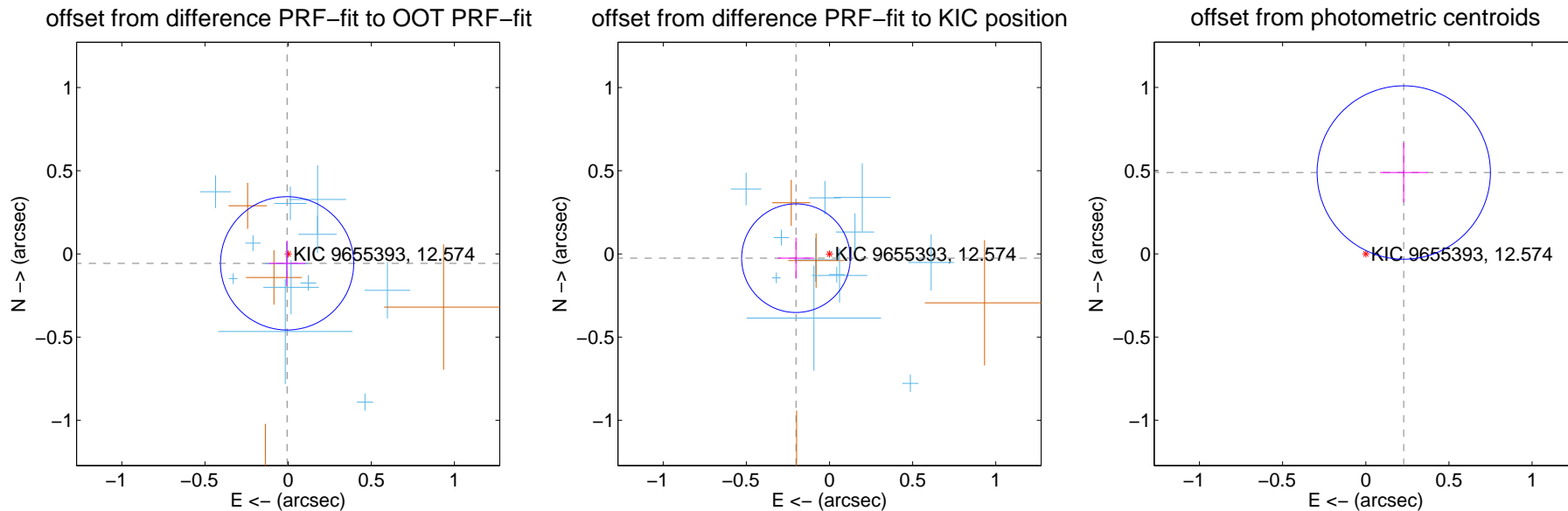
## DV Centroid Data

Supplemental centroid analysis for 009655393-01. Kepler magnitude: 12.57. Transit SNR 11.35

There are 12 quarters with good PRF difference image offsets

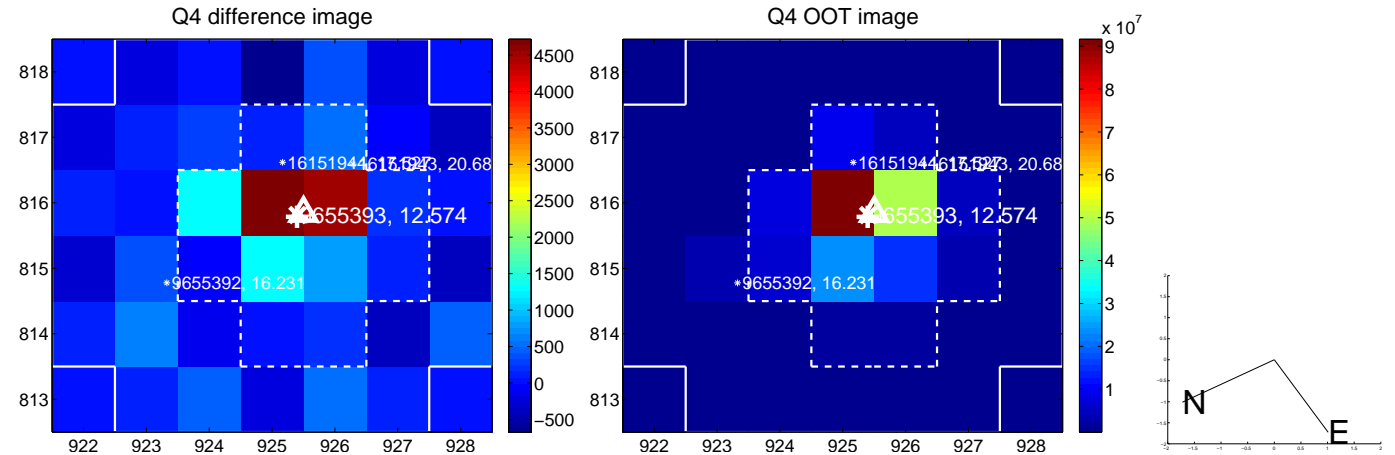
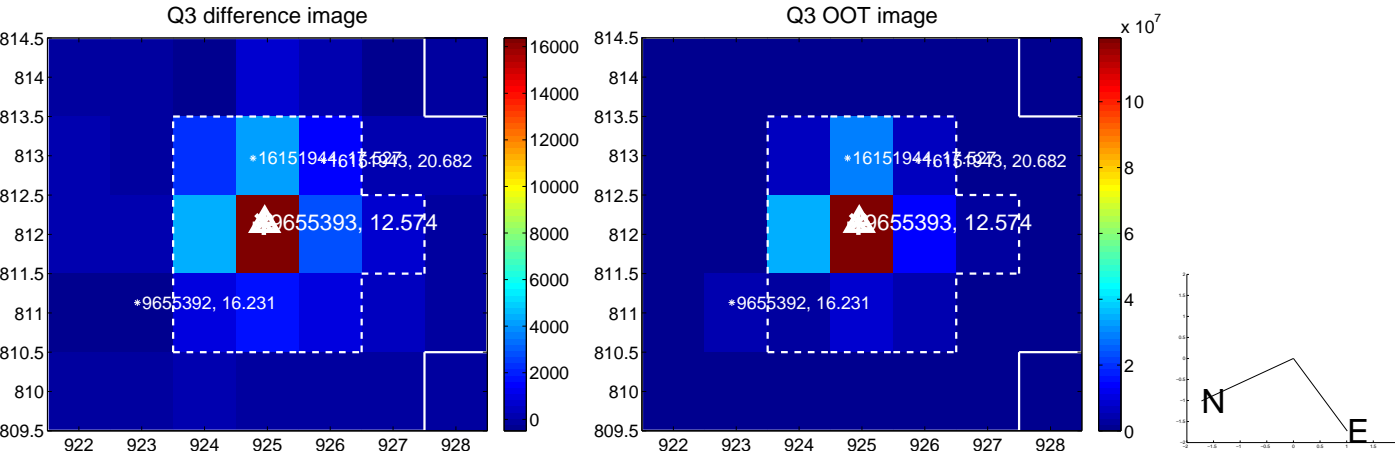
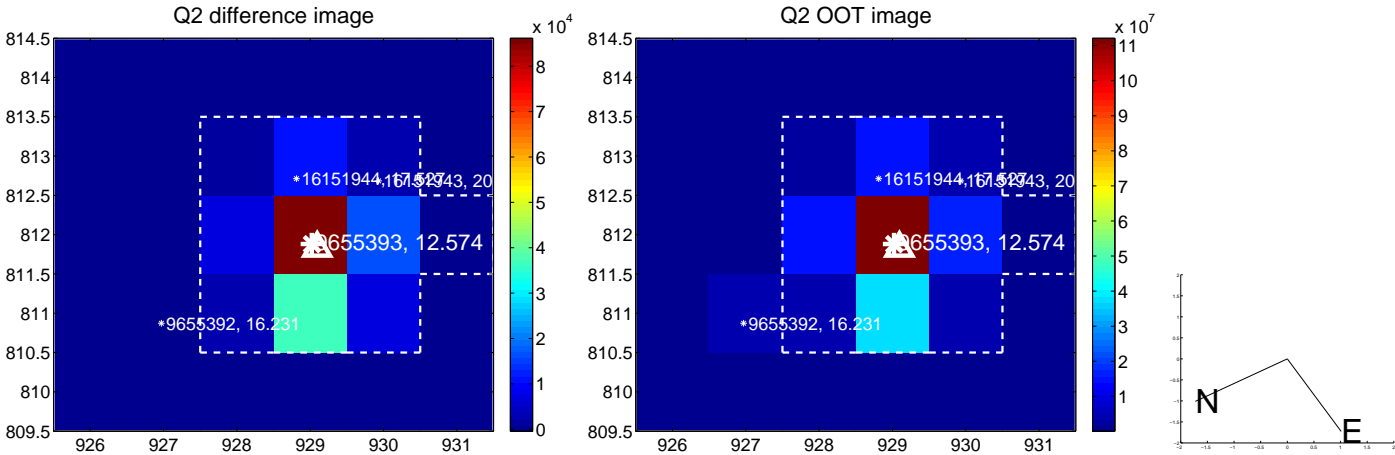
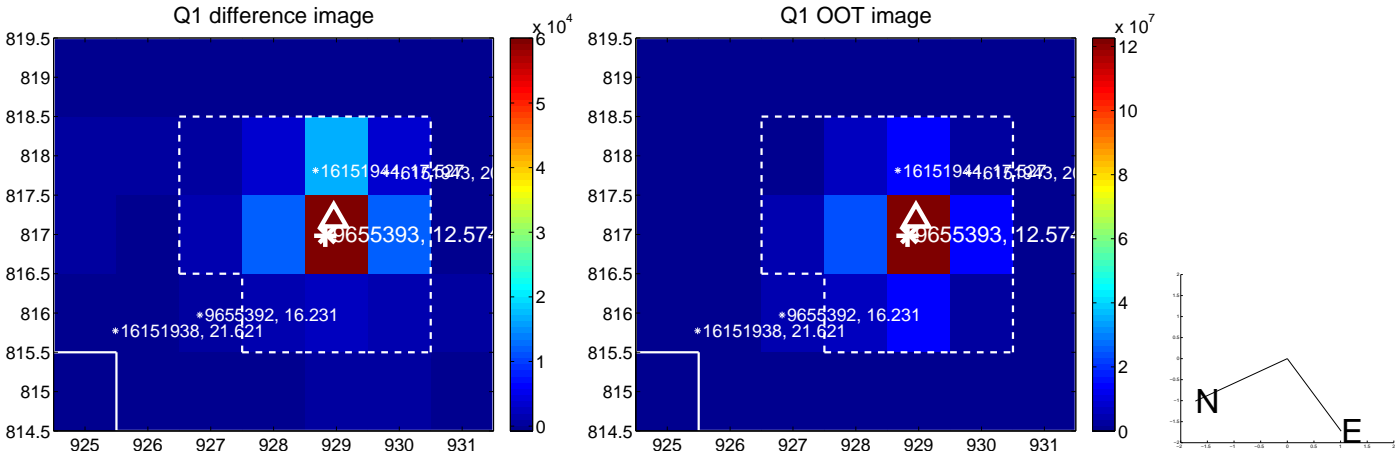
The direct PRF centroid is offset from the target star catalog position by about 0.08 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.057 \pm 0.134$	0.43	$0.006 \pm 0.109$	$-0.057 \pm 0.136$
PRF-fit source offset from KIC position	$0.203 \pm 0.109$	1.87	$0.202 \pm 0.110$	$-0.026 \pm 0.123$
photometric centroid source offset	$0.54 \pm 0.17$	3.11	$-0.23 \pm 0.14$	$0.49 \pm 0.18$

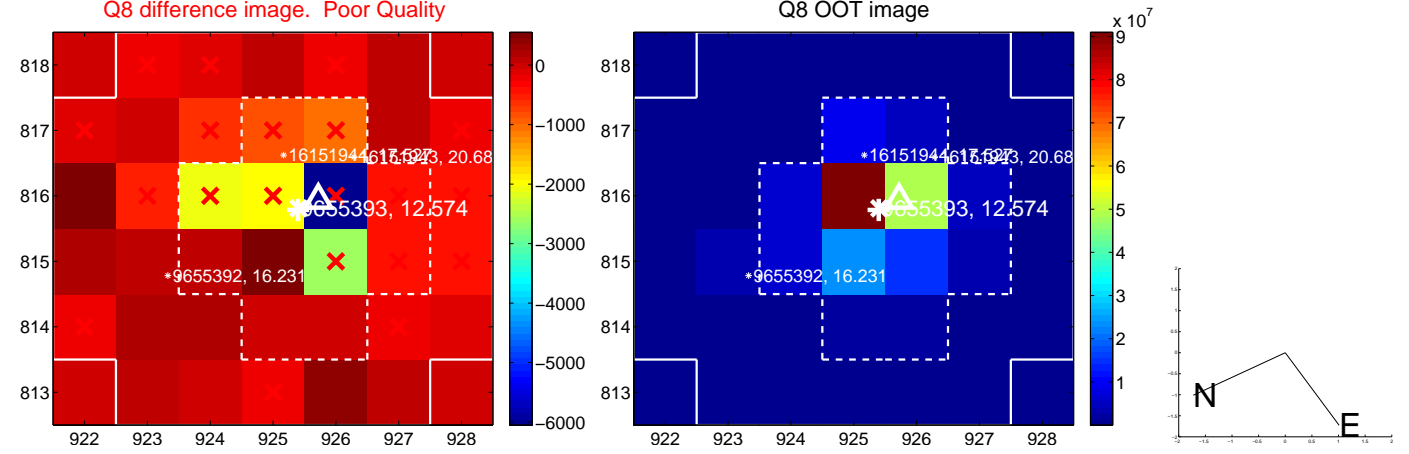
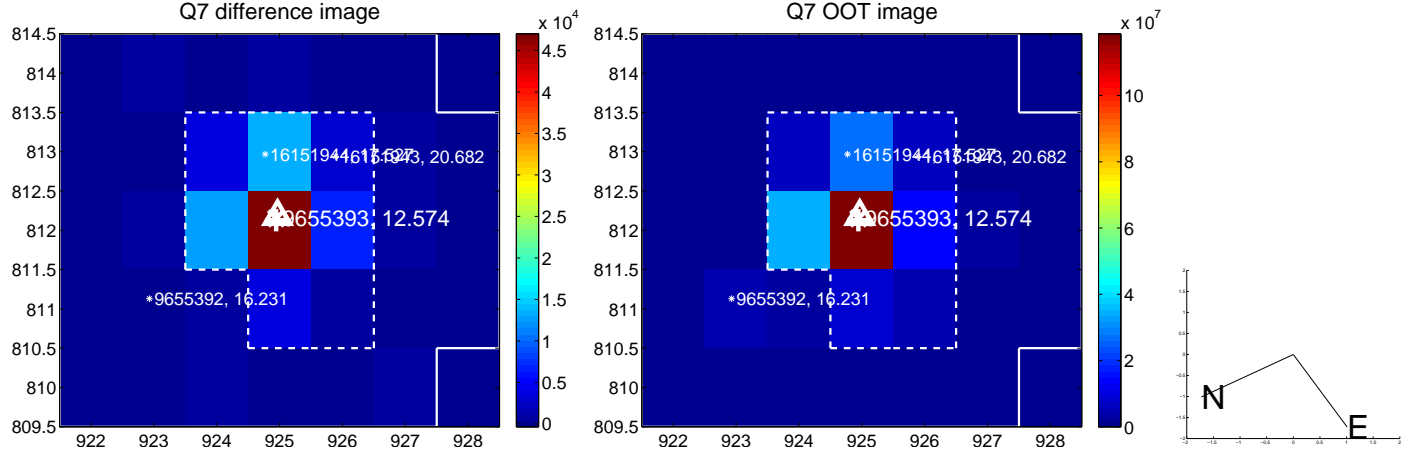
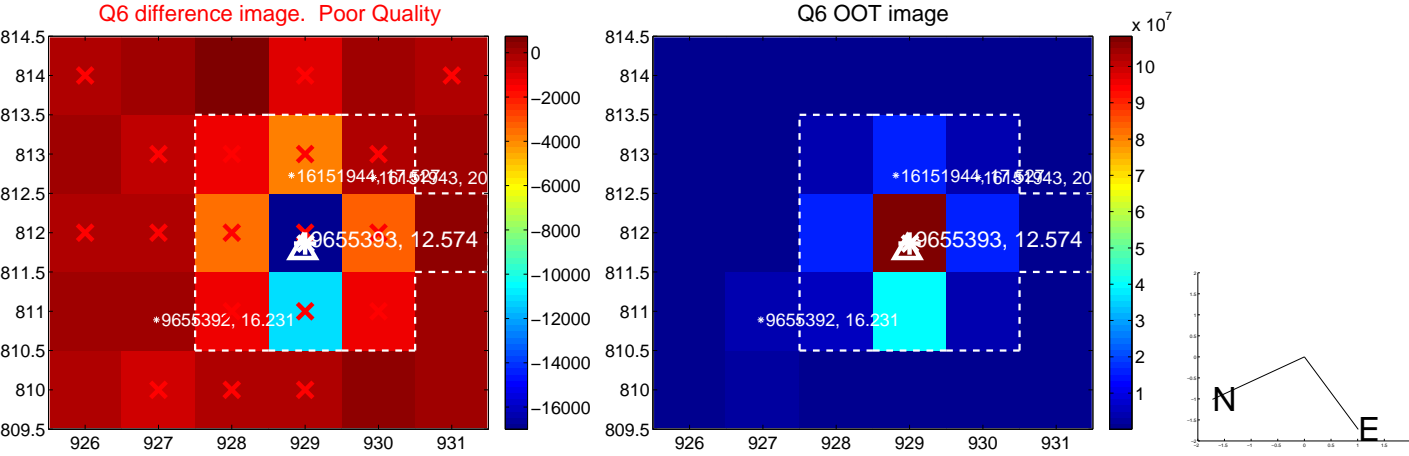
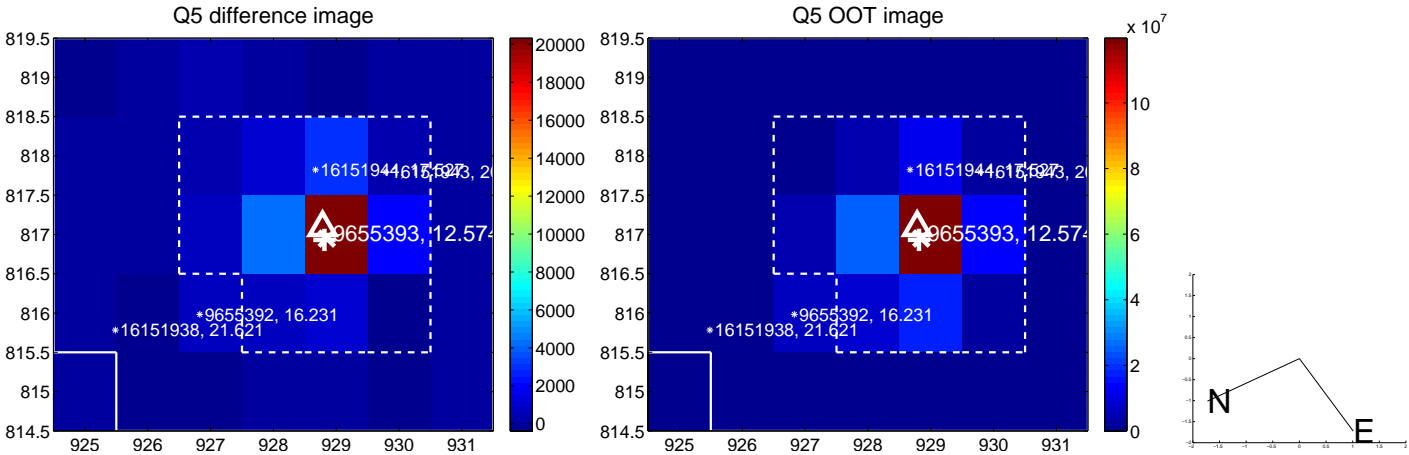


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

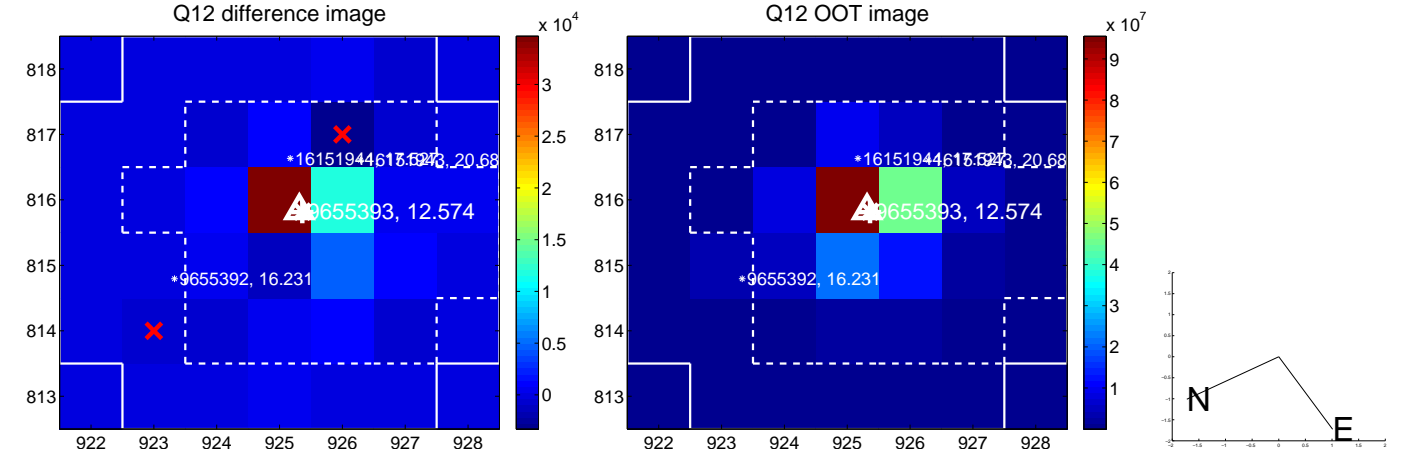
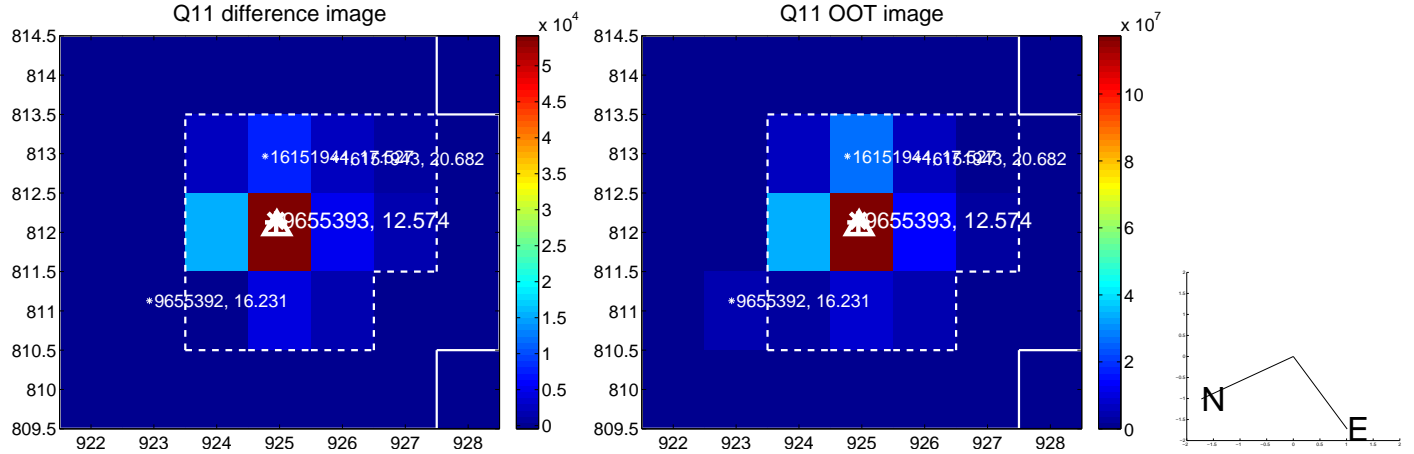
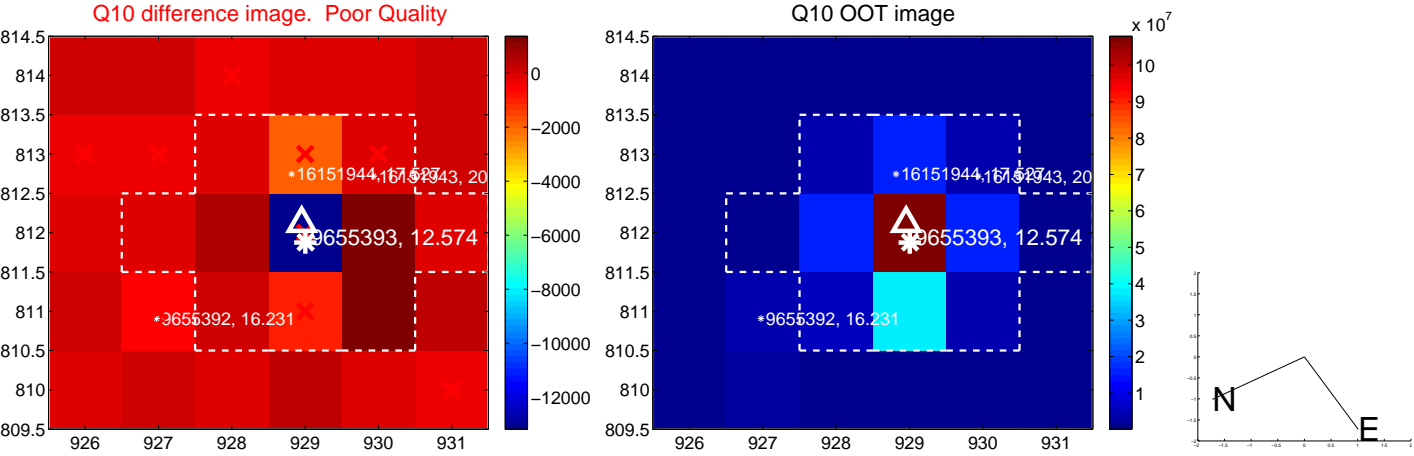
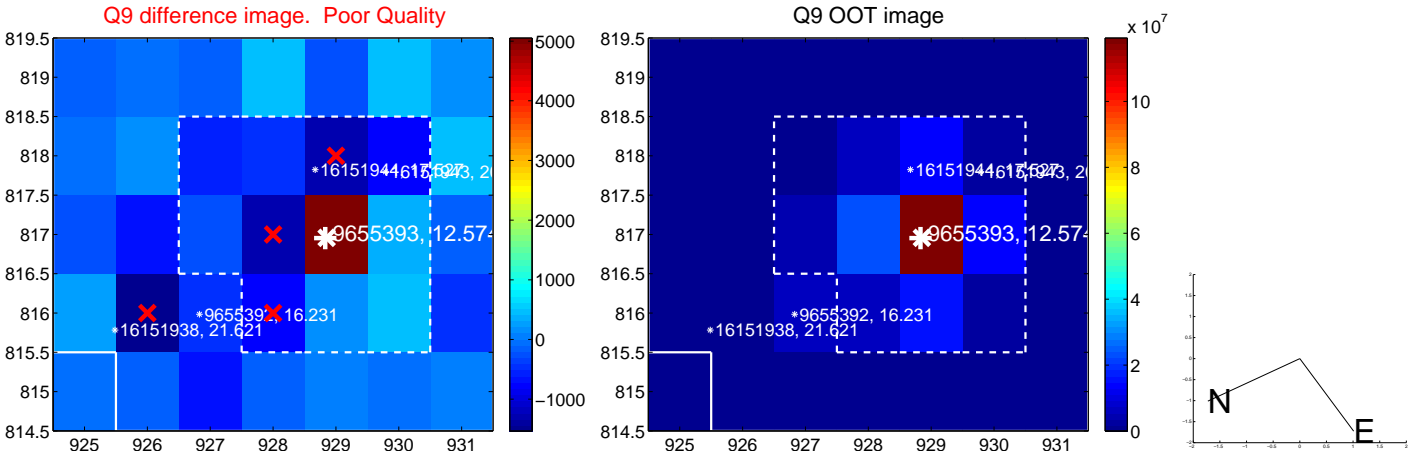


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

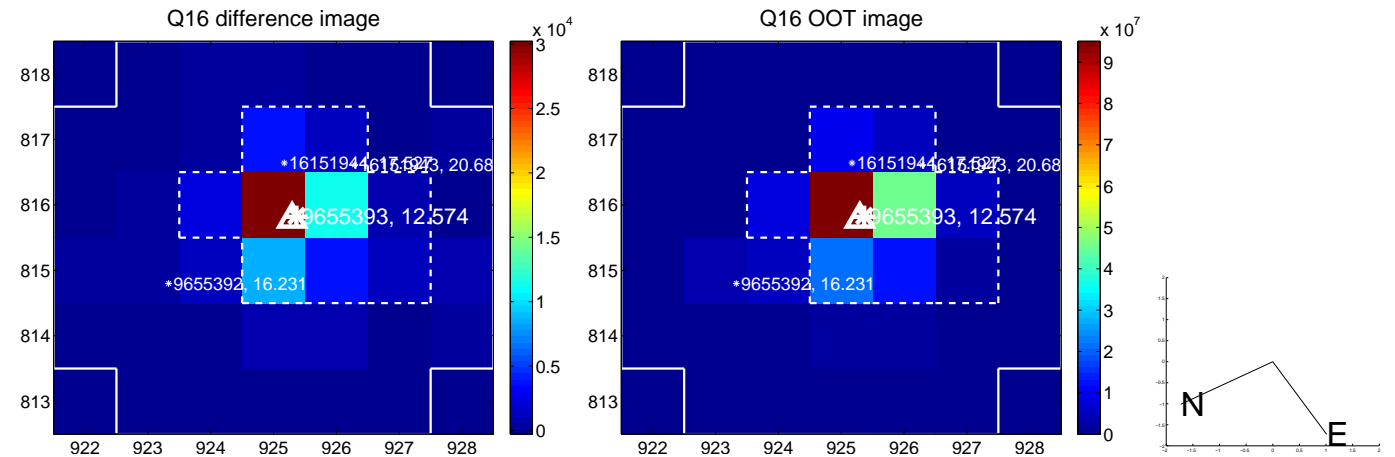
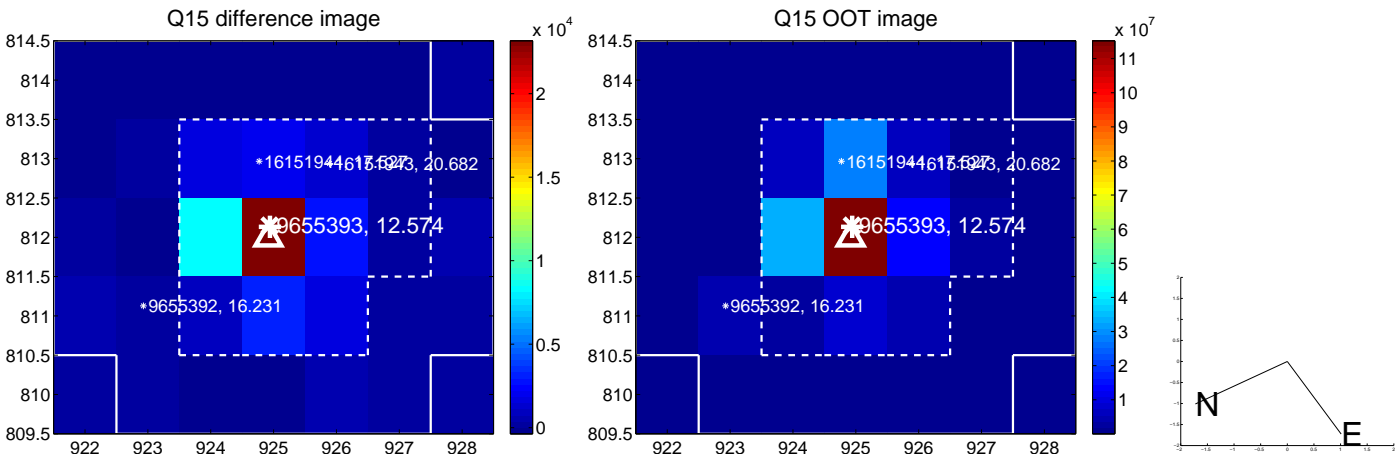
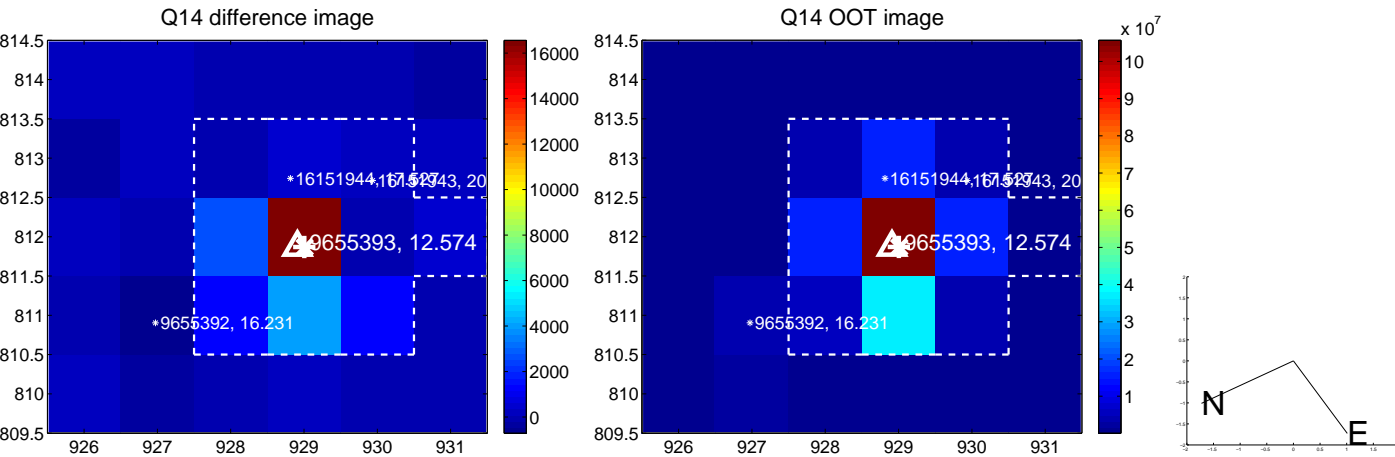
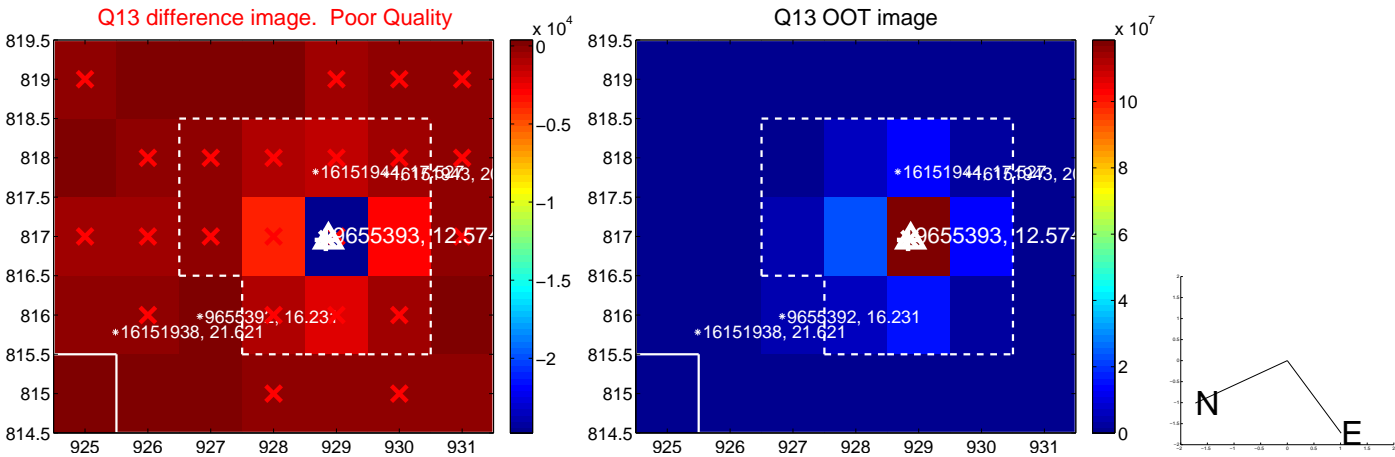




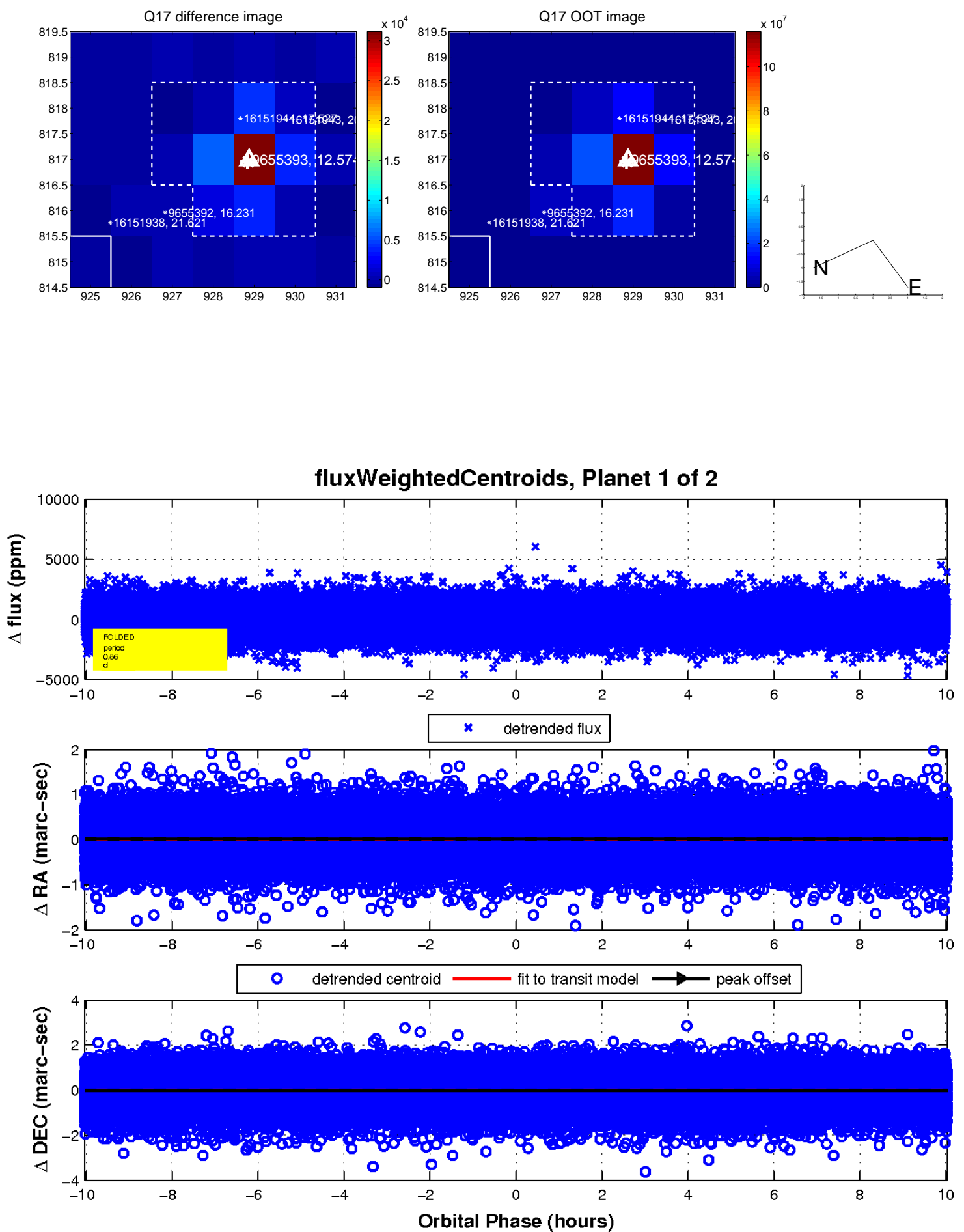
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

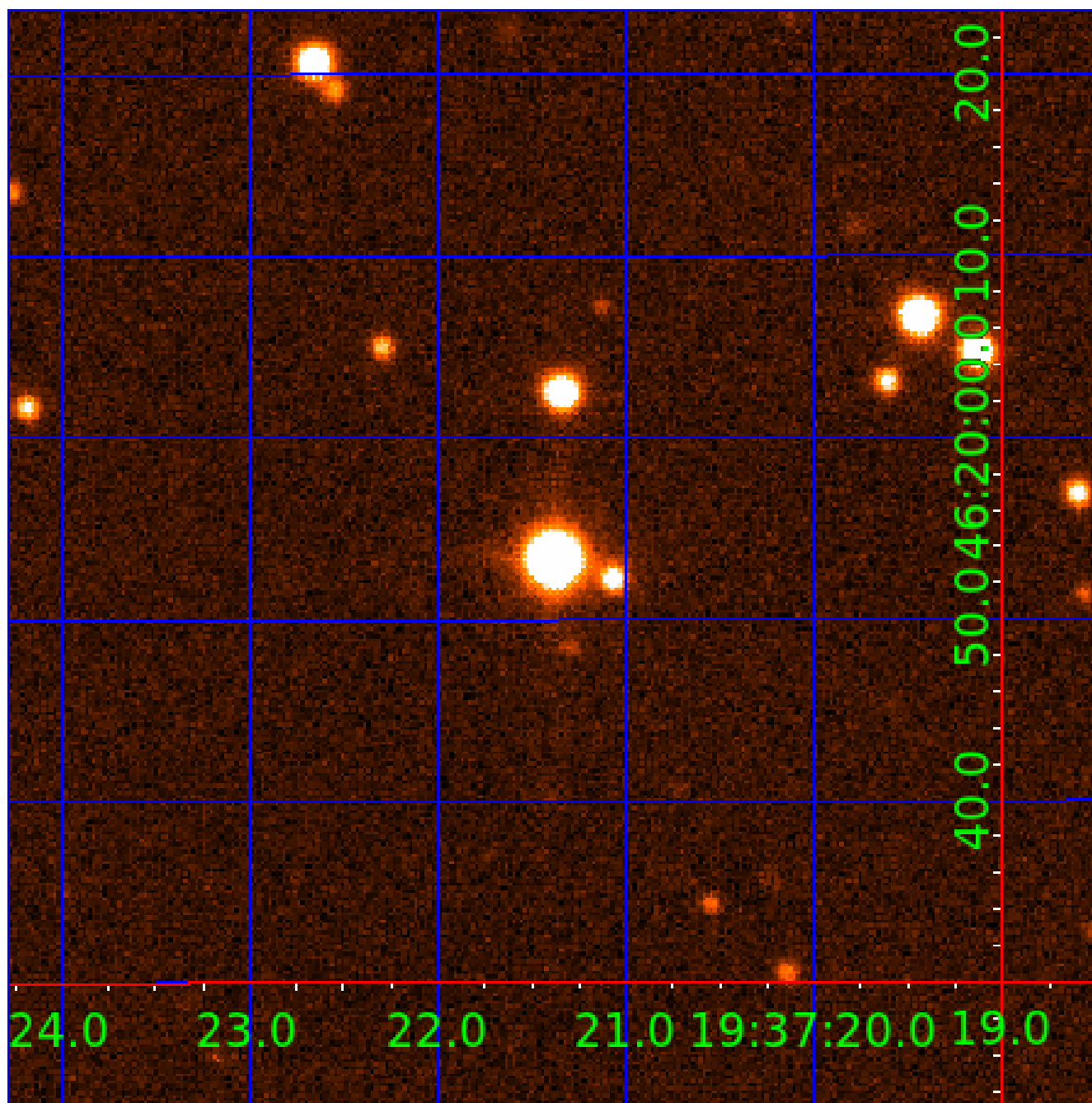


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 009655393

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009655393-01	OBS	No	0.855187	132.264319	78.7	3.346	10.3	11.3	1.83	7800	1.89	25388.26
009655393-02	OBS	No	0.978285	132.442675	120.0	2.988	7.8	10.3	1.83	7800	2.33	21220.75

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009655393-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT
009655393-02	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—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.

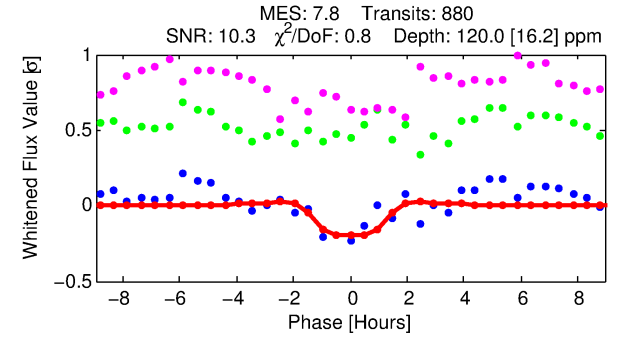
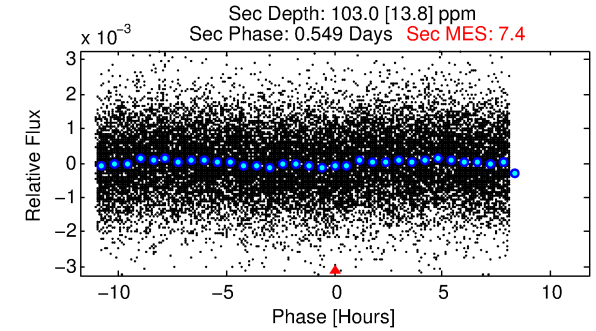
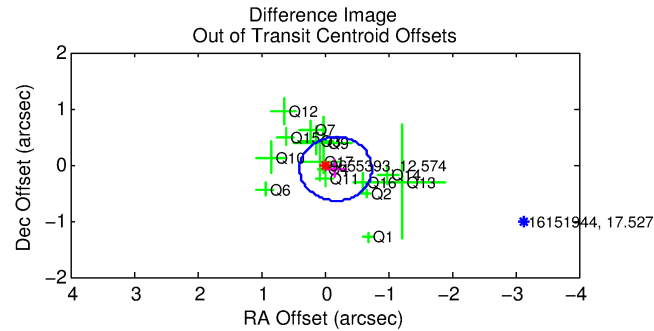
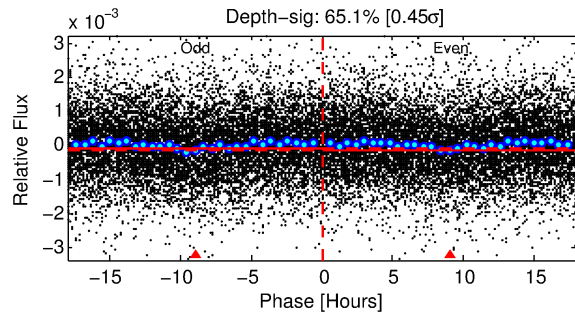
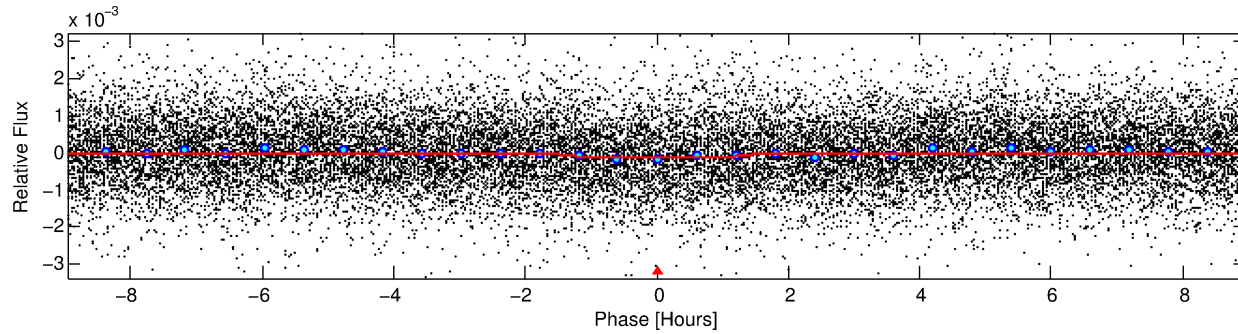
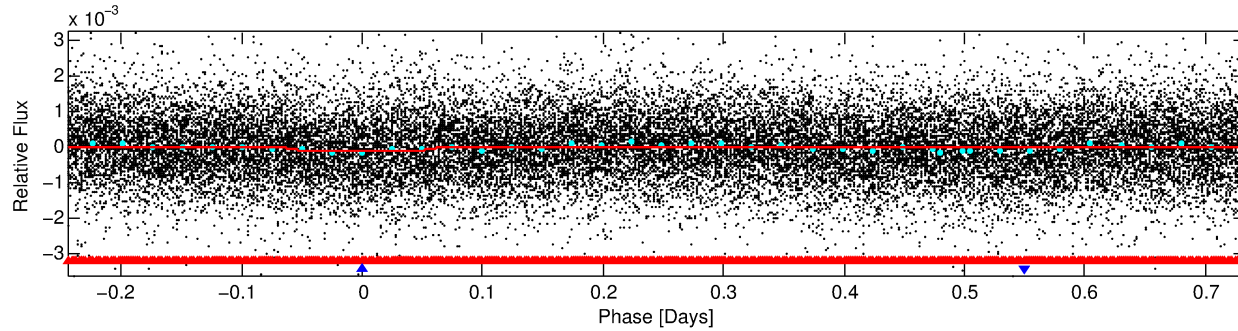
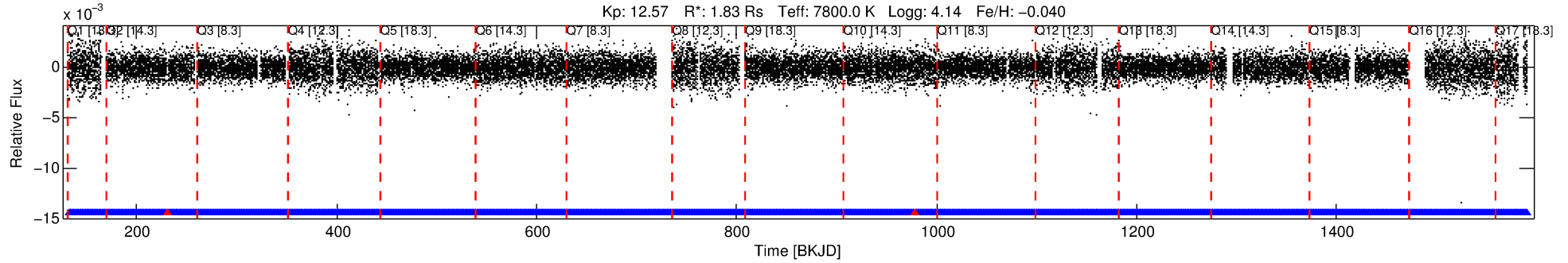
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009655393-02

No Significant Match Found

# DV One-Page Summary

KIC: 9655393 Candidate: 2 of 2 Period: 0.978 d



## DV Fit Results:

Period = 0.97828 [0.00001] d  
Epoch = 132.4427 [0.0040] BKJD  
Rp/R\* = 0.0116 [0.0066]  
a/R\* = 1.48 [3.00]  
b = 0.90 [0.77]  
Seff = 21220.75 [7918.66]  
Teq = 3078 [287] K  
Rp = 2.33 [1.48] Re  
a = 0.0229 [0.0054] AU  
Ag = 5.49 [6.55] [0.69 $\sigma$ ]  
Teffp = 7284 [2106] K [1.98 $\sigma$ ]

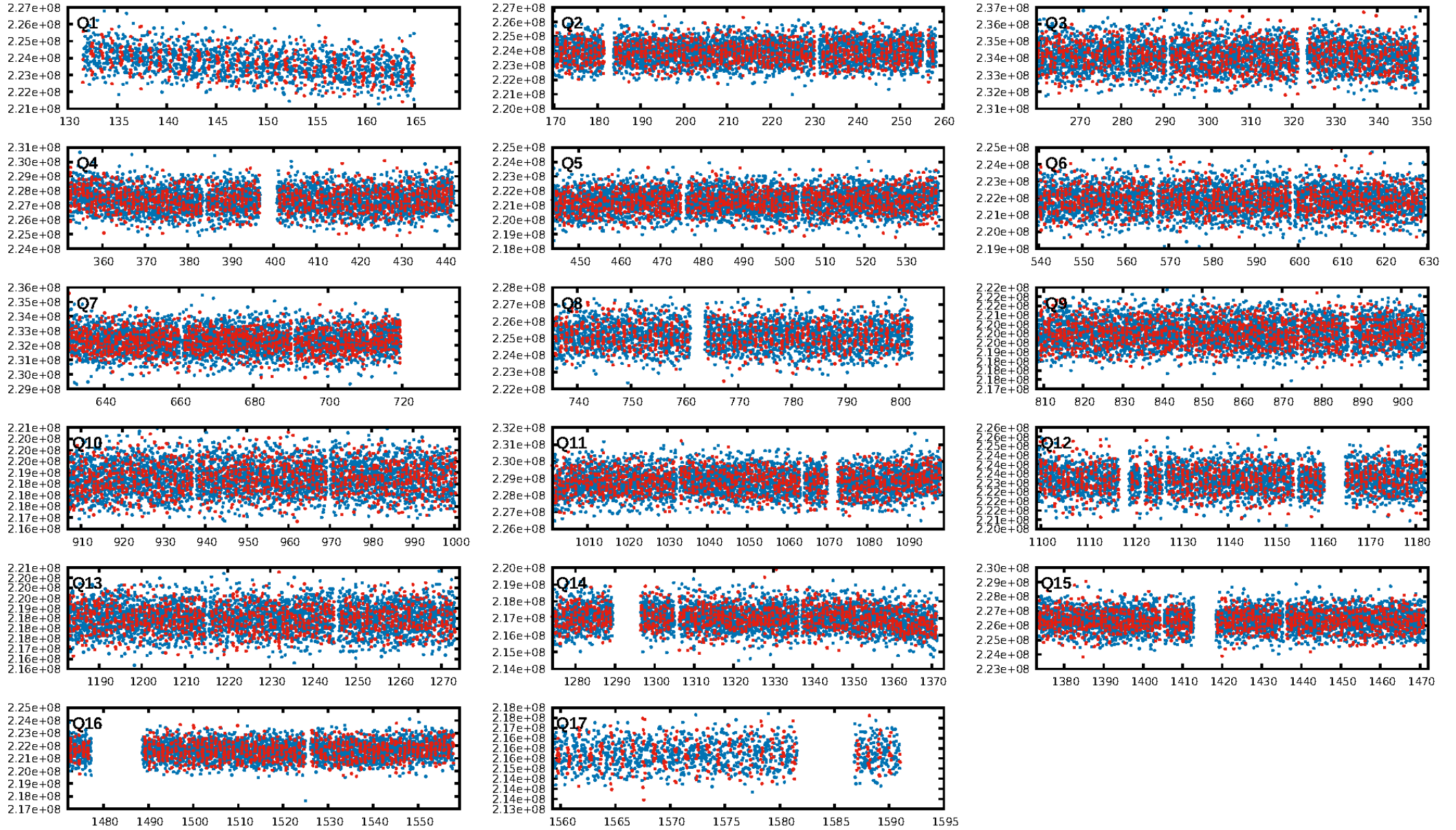
## DV Diagnostic Results:

ShortPeriod-sig: 49.0% [0.66 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 1.78e-20  
RollingBand-fgt: 1.00 [832/834]  
GhostDiagnostic-chr: 0.7761  
Centroid-sig: 1.8%  
Centroid-so: 0.150 arcsec [1.22 $\sigma$ ]  
OotOffset-rm: 0.189 arcsec [1.00 $\sigma$ ]  
KicOffset-rm: 0.138 arcsec [0.71 $\sigma$ ]  
OotOffset-st: 4/4/3/4 [15]  
KicOffset-st: 4/4/3/4 [15]  
DiffImageQuality-fgm: 0.33 [5/15]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:21:41 Z

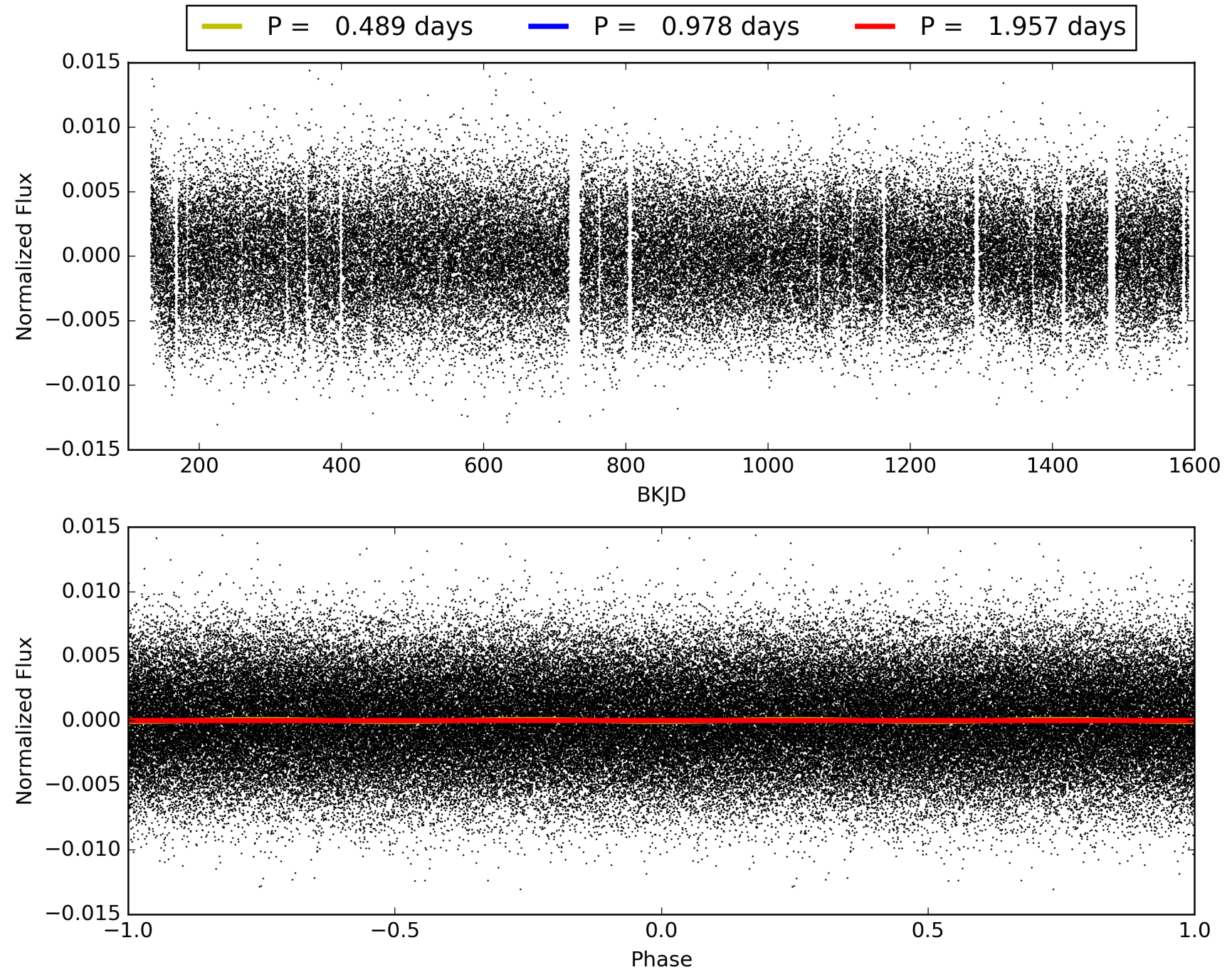
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 009655393-02, PDC Light Curves





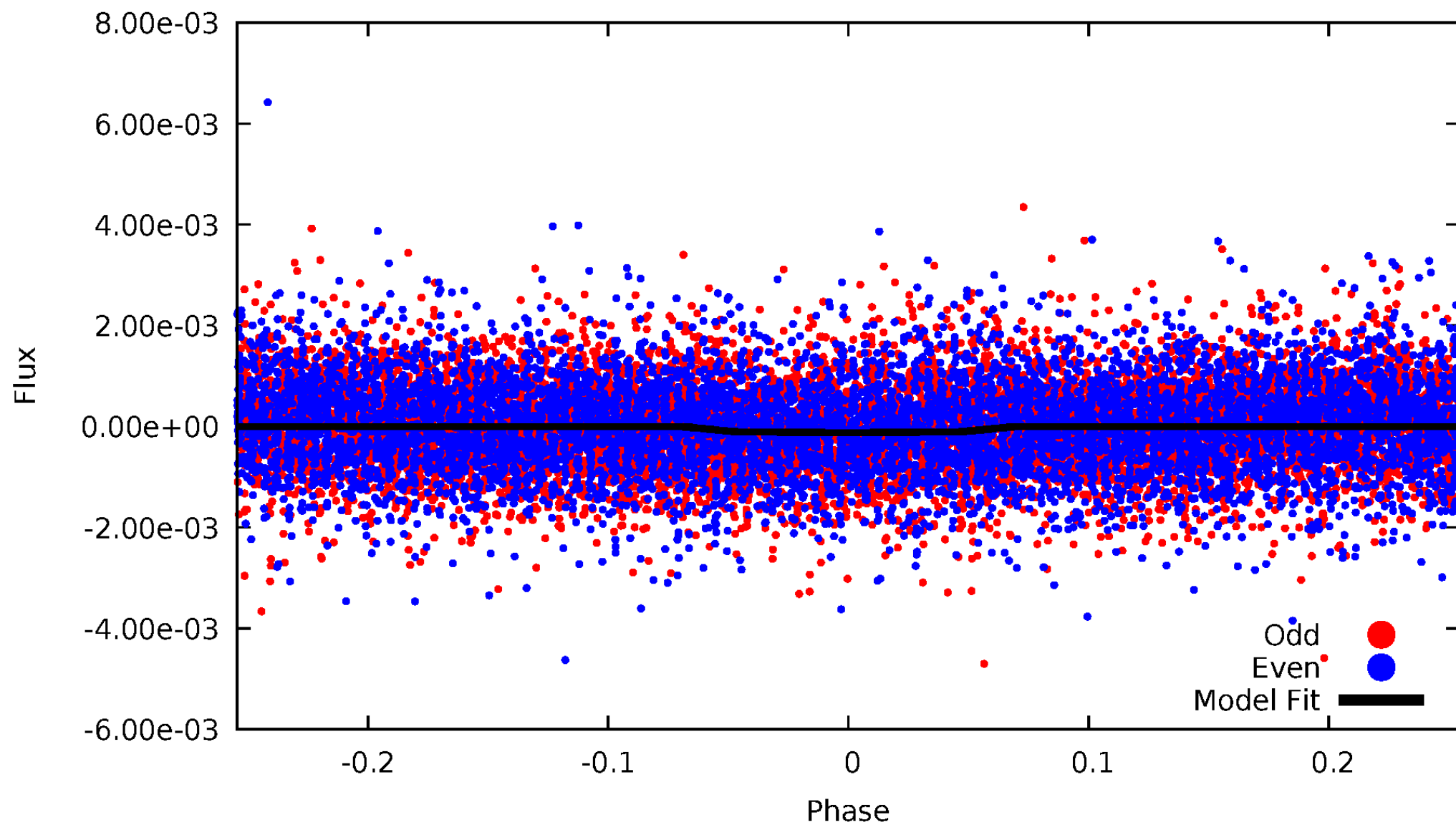
# TCE 009655393-02





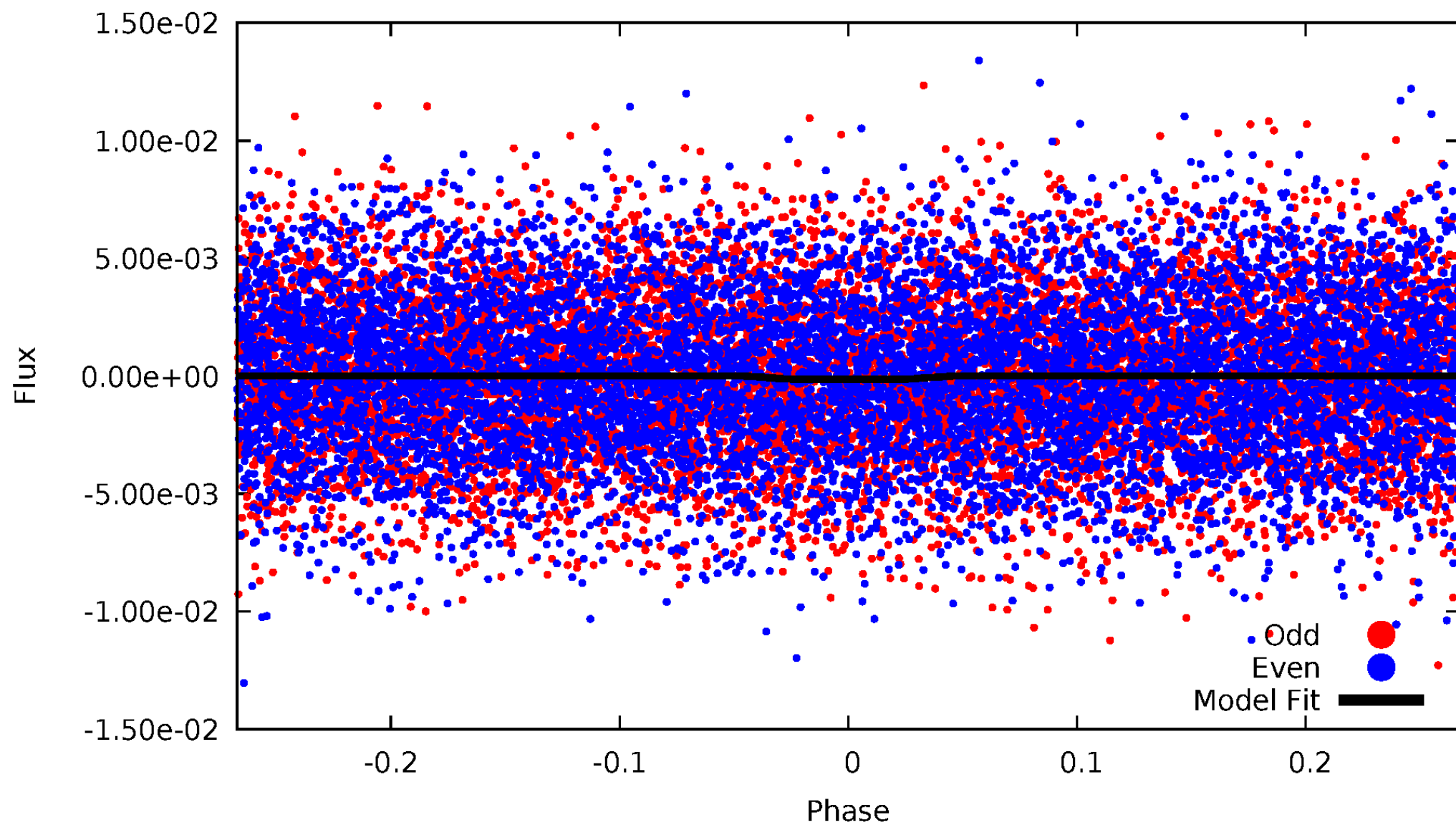
# DV Odd/Even

TCE 009655393-02



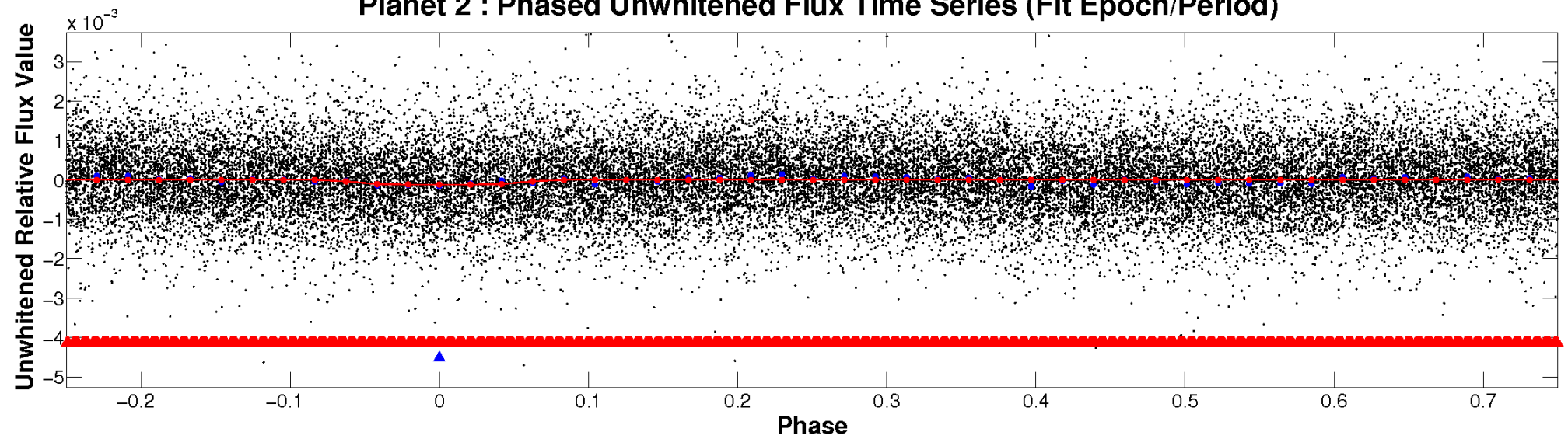
# ALT Odd/Even

TCE 009655393-02

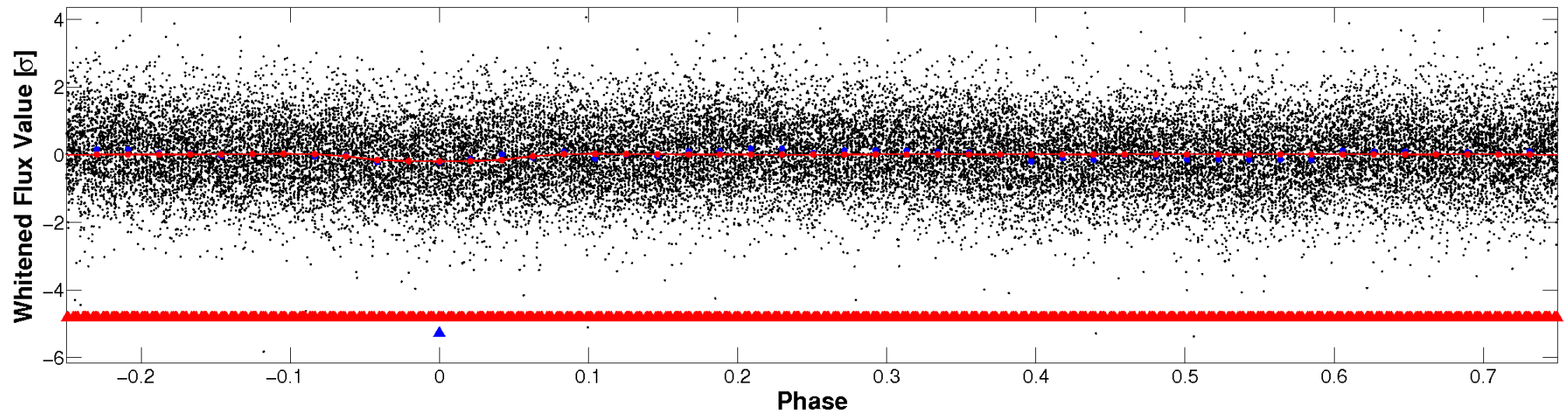


# Non-Whitened Vs. Whitened Light Curve

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

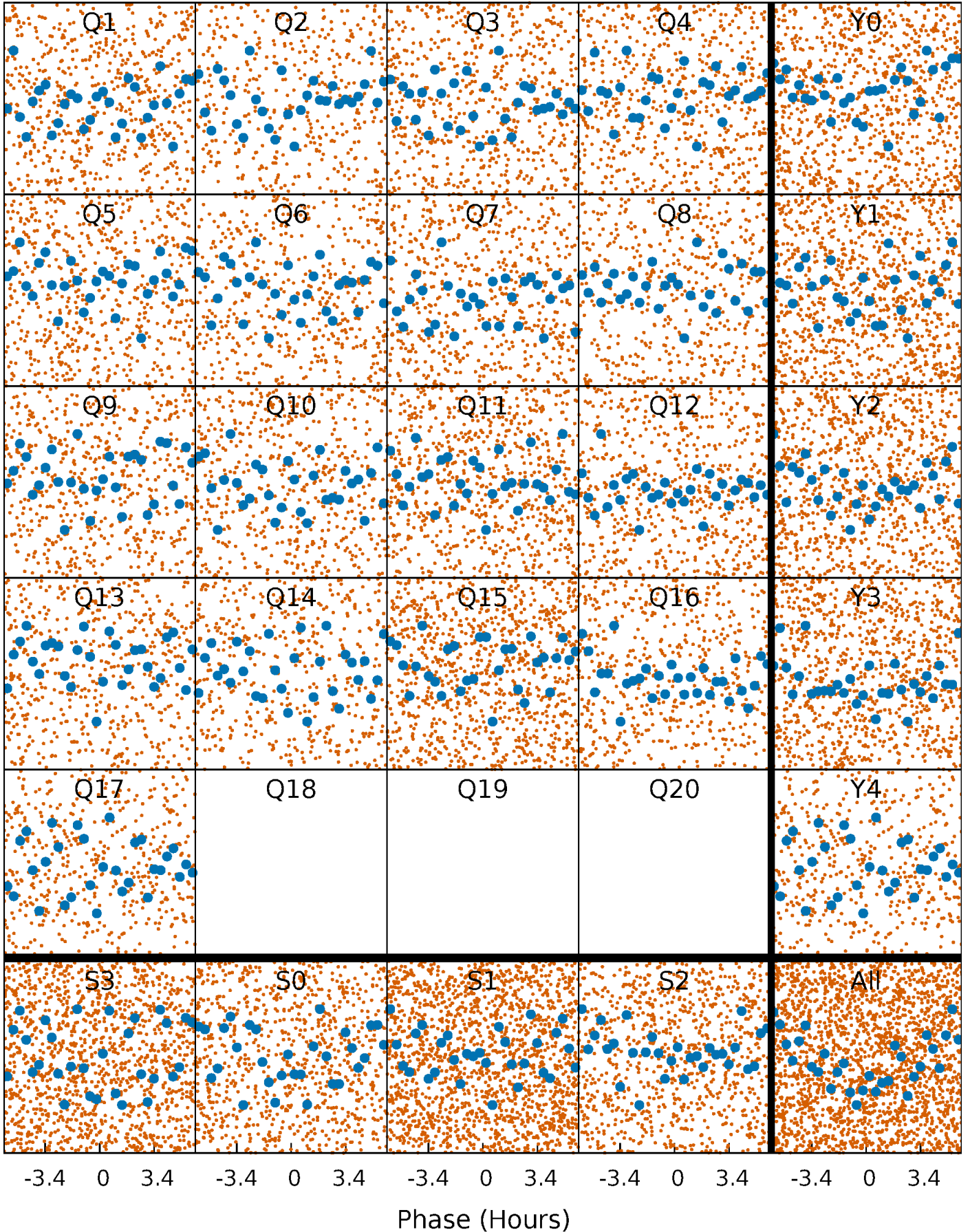


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

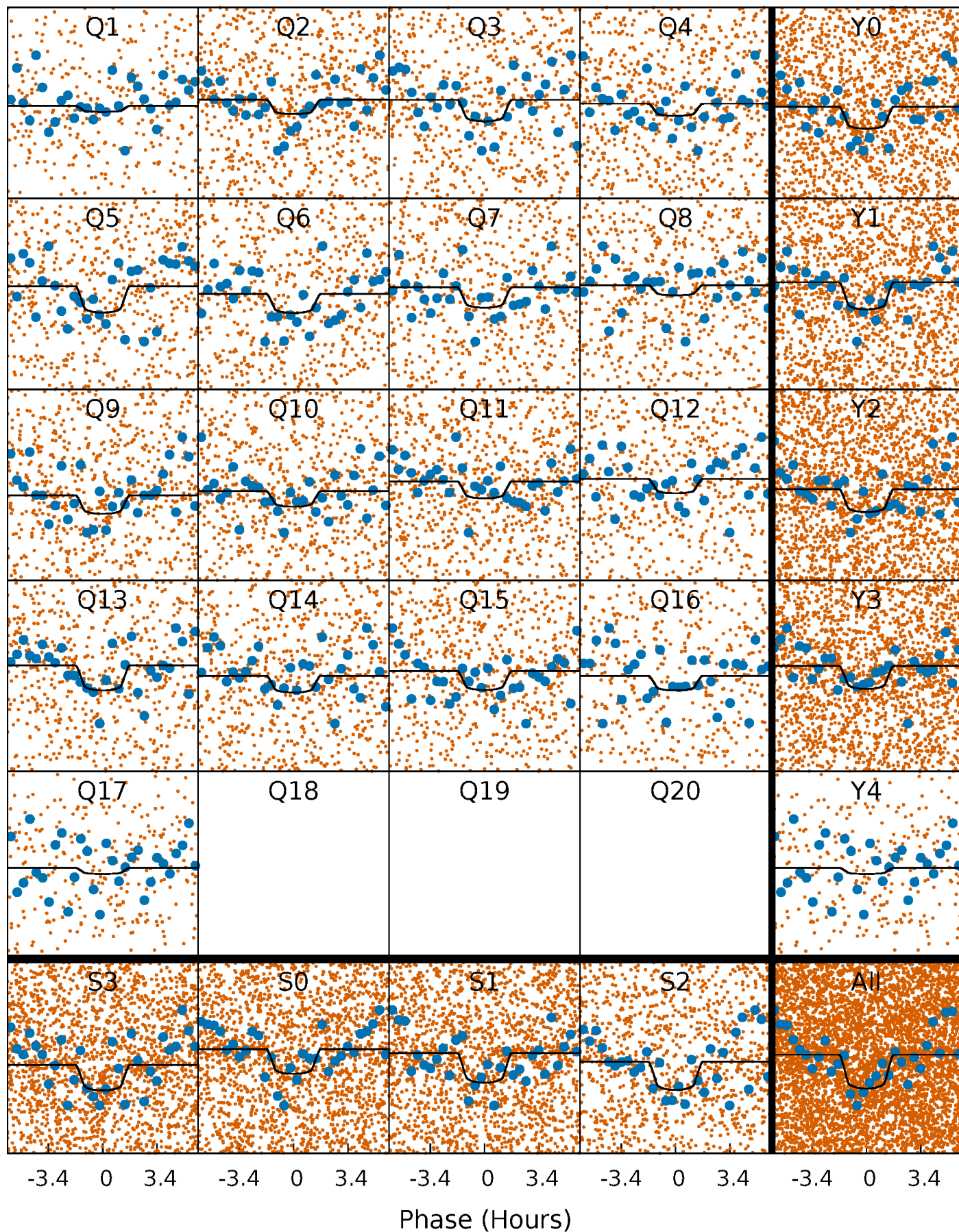
TCE 009655393-02   P= 0.978285 Days    $T_0=132.442675$  (BKJD)





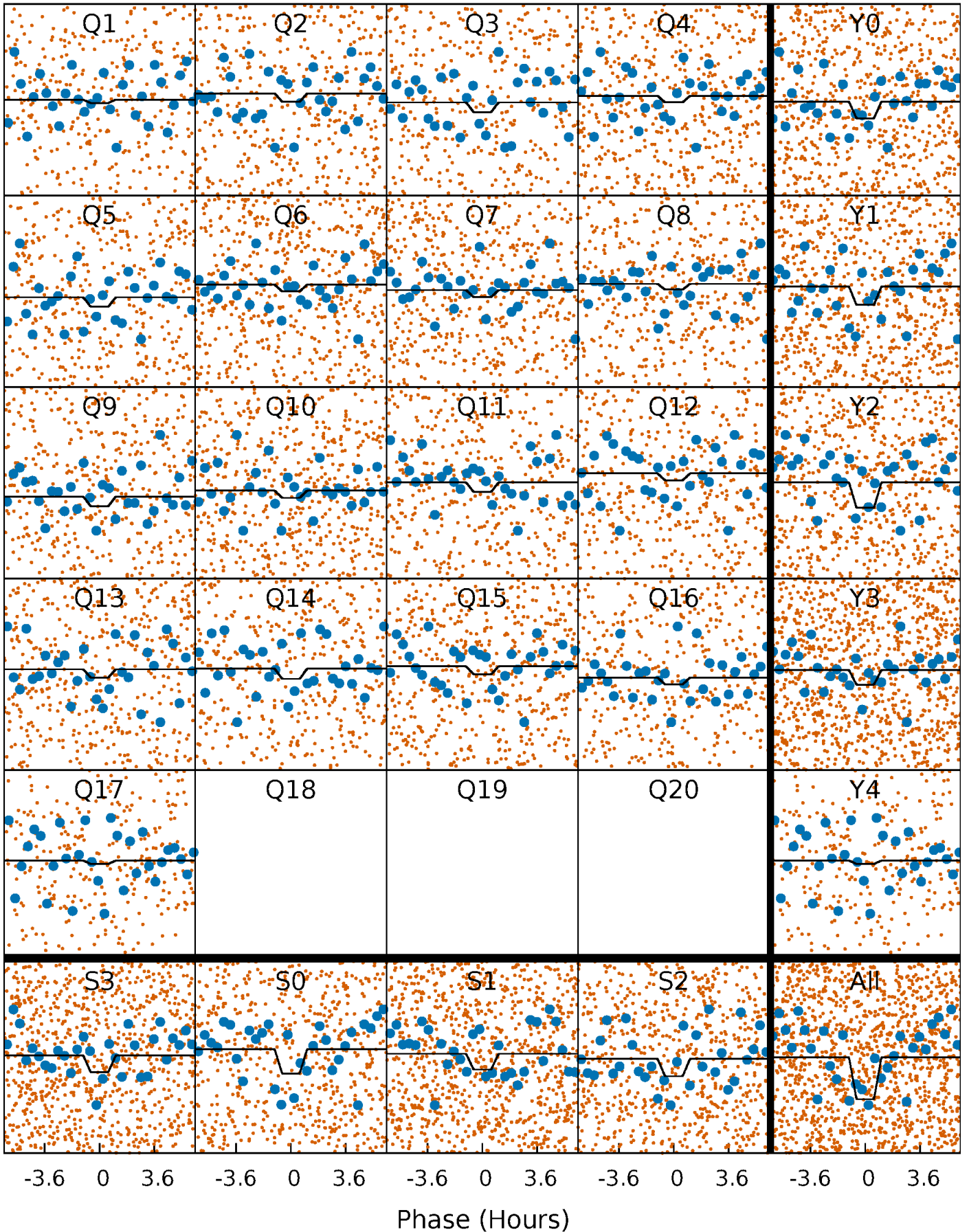
# DV Quarter-Phased Transit Curves

TCE 009655393-02     $P = 0.978285$  Days     $T_0 = 132.442675$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 009655393-02 P= 0.978275 Days  $T_0=132.442988$  (BKJD)

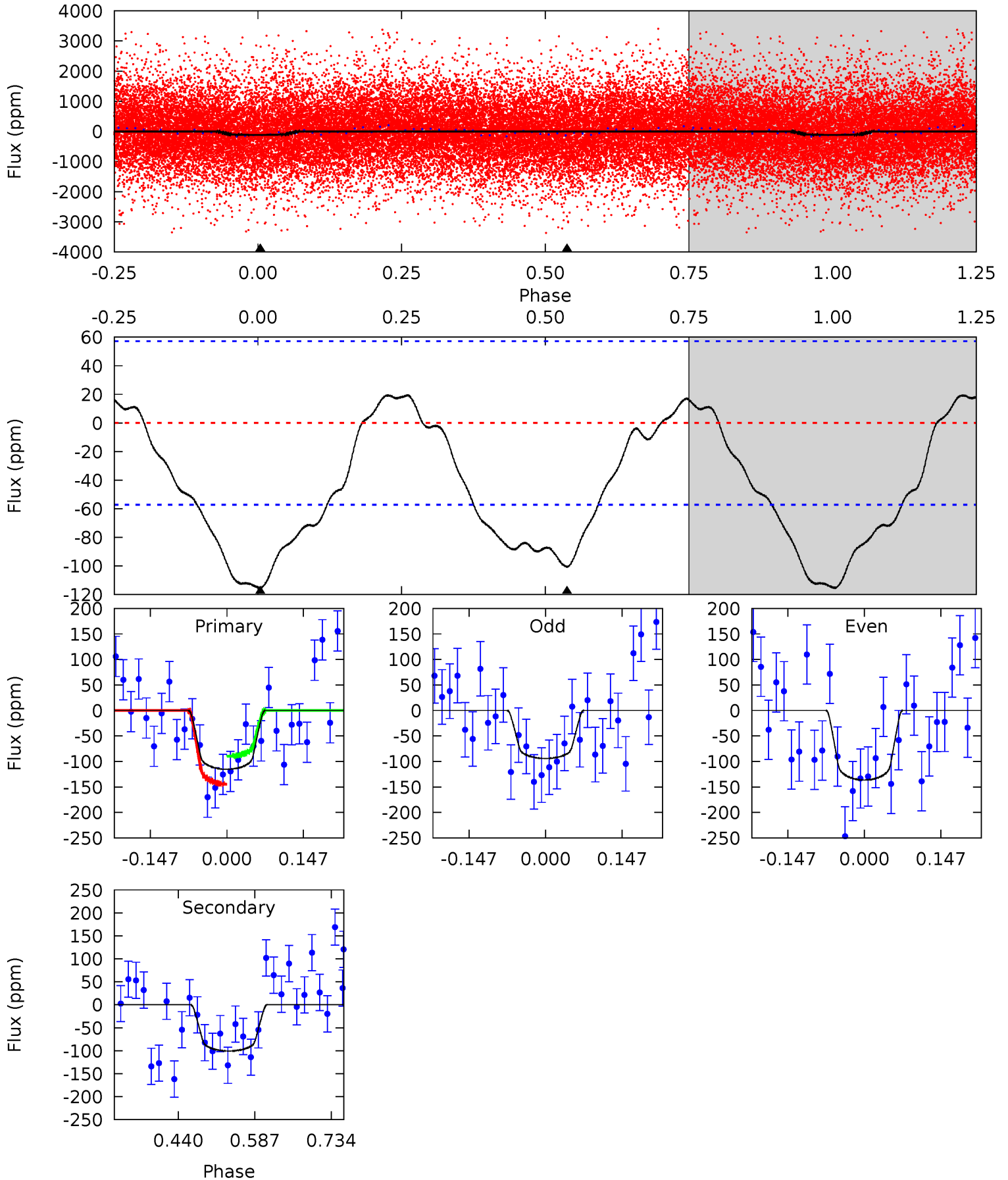




# DV Model-Shift Uniqueness Test

009655393-02, P = 0.978285 Days, E = 131.464390 Days

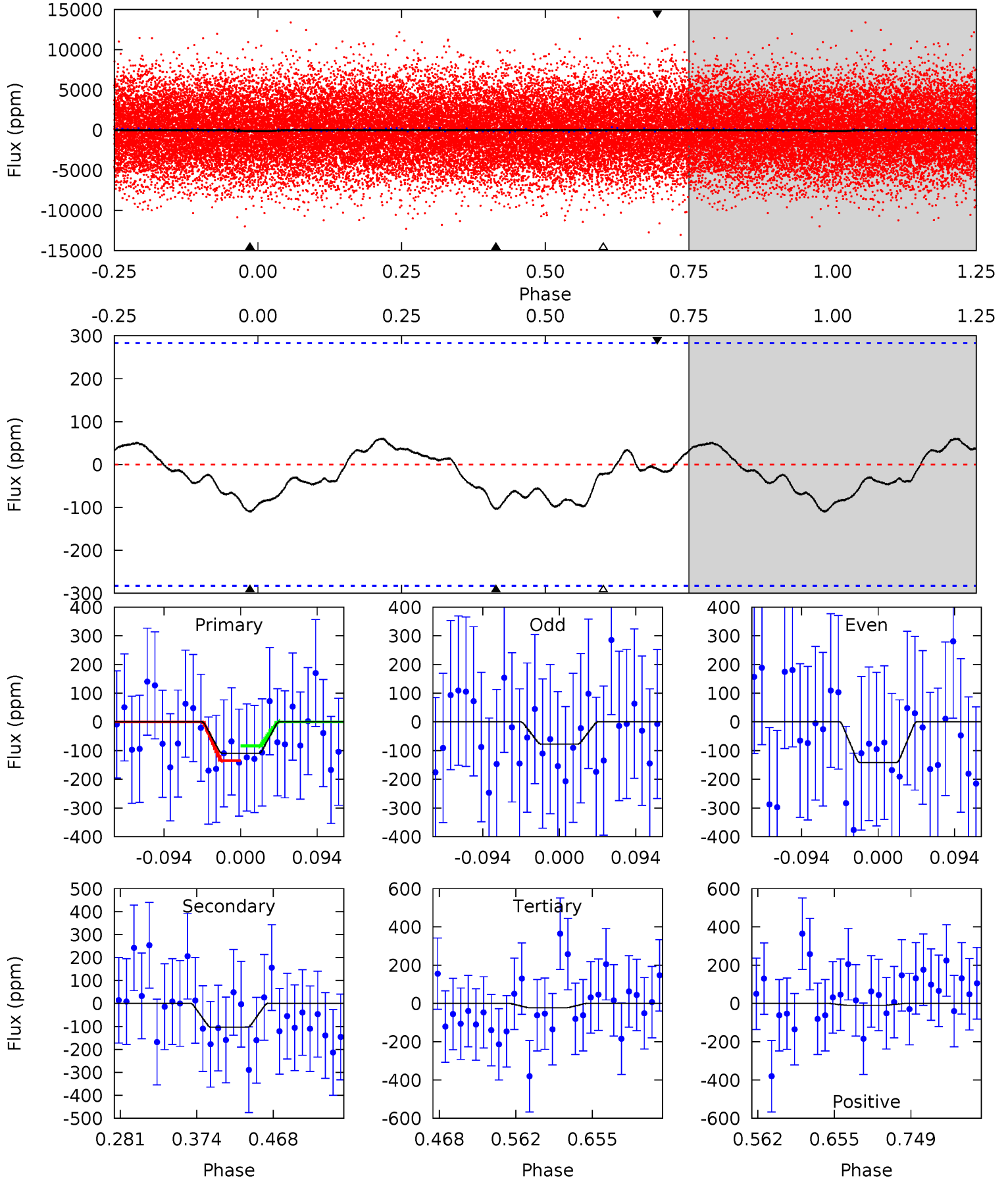
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.05	7.89	0	0	4.48	1.45	1.74	9.05	9.05	7.89	7.89	1.66	1.03	0.14	2.13



# Alt Model-Shift Uniqueness Test

009655393-02, P = 0.978275 Days, E = 131.464713 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
1.77	1.67	0.36	-0.16	4.58	1.68	0.68	1.41	1.92	1.31	1.83	0.52	0.77	0.35	0.41



### Stellar Parameters For KIC 009655393

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7800^{+214}_{-322}$	$4.136^{+0.120}_{-0.180}$	$-0.040^{+0.150}_{-0.400}$	$1.833^{+0.519}_{-0.346}$	$1.676^{+0.204}_{-0.271}$	$0.383^{+0.228}_{-0.195}$
	+3%/-4%	+3%/-4%	+375%/-1000%	+28%/-19%	+12%/-16%	+60%/-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 009655393-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	-101±13	$2.36^{+1.40}_{-1.12}$	$4317^{+333}_{-262}$	$7003^{+3592}_{-1580}$	$5.125^{+13.999}_{-3.169}$
Alt.	-103±62	$2.44^{+1.45}_{-1.13}$	$4304^{+306}_{-247}$	$6741^{+3777}_{-1923}$	$4.524^{+13.009}_{-3.249}$

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

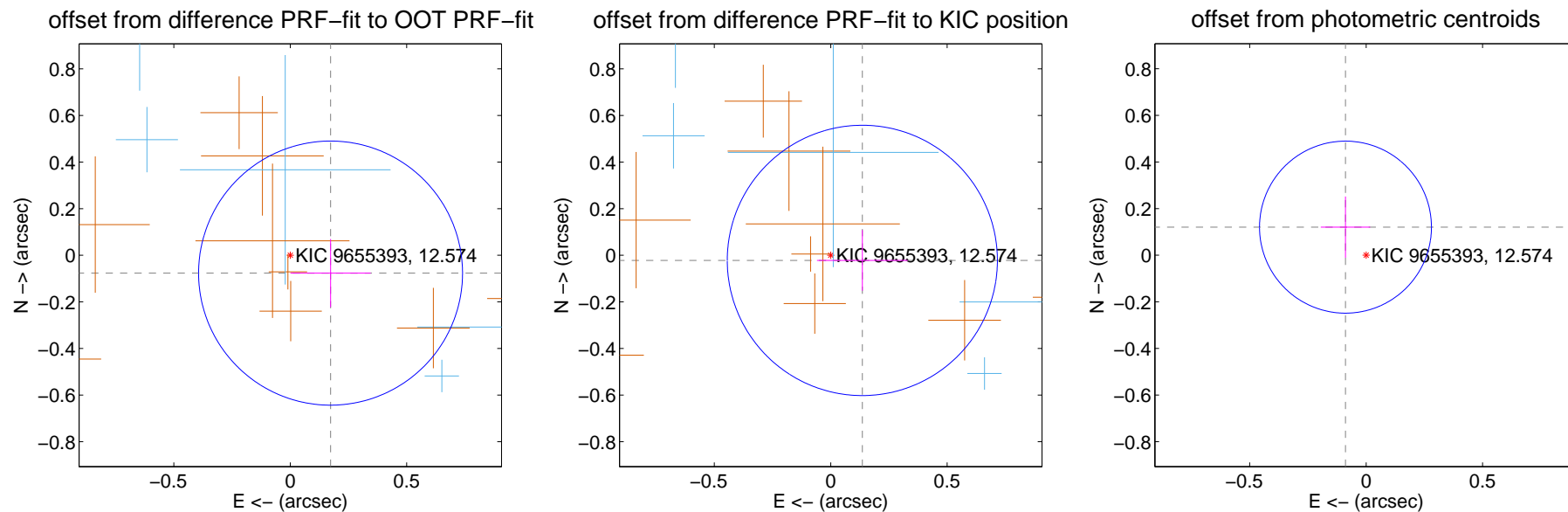
## DV Centroid Data

Supplemental centroid analysis for 009655393-02. Kepler magnitude: 12.57. Transit SNR 10.32

There are 5 quarters with good PRF difference image offsets

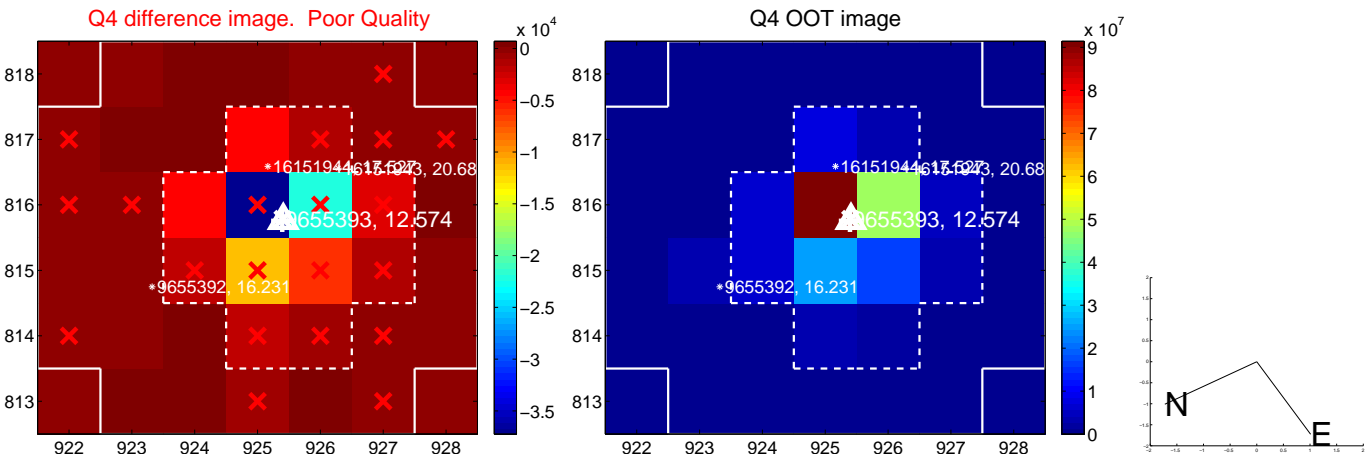
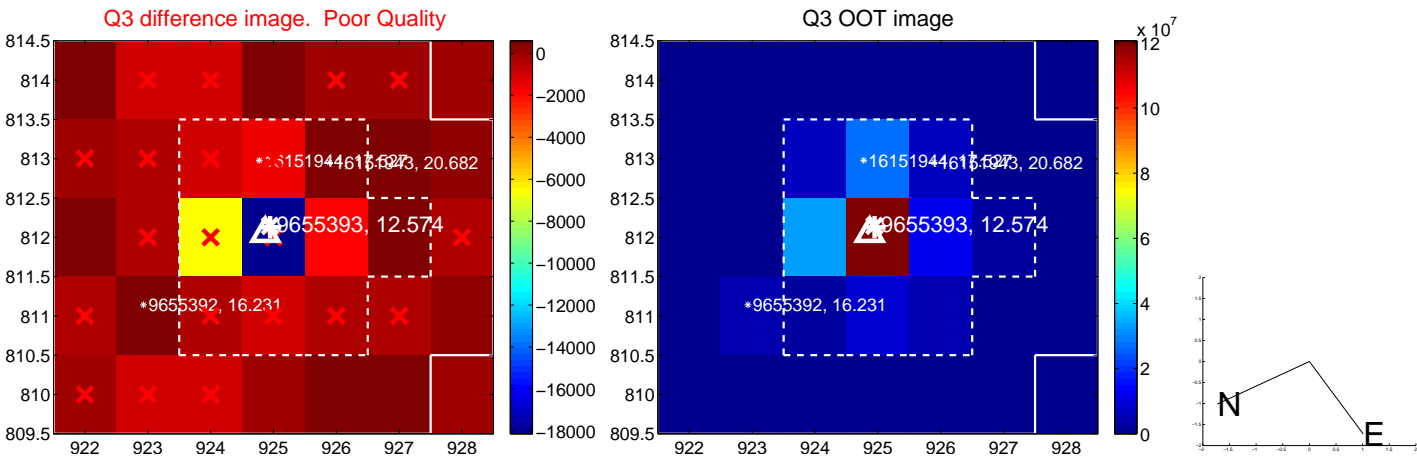
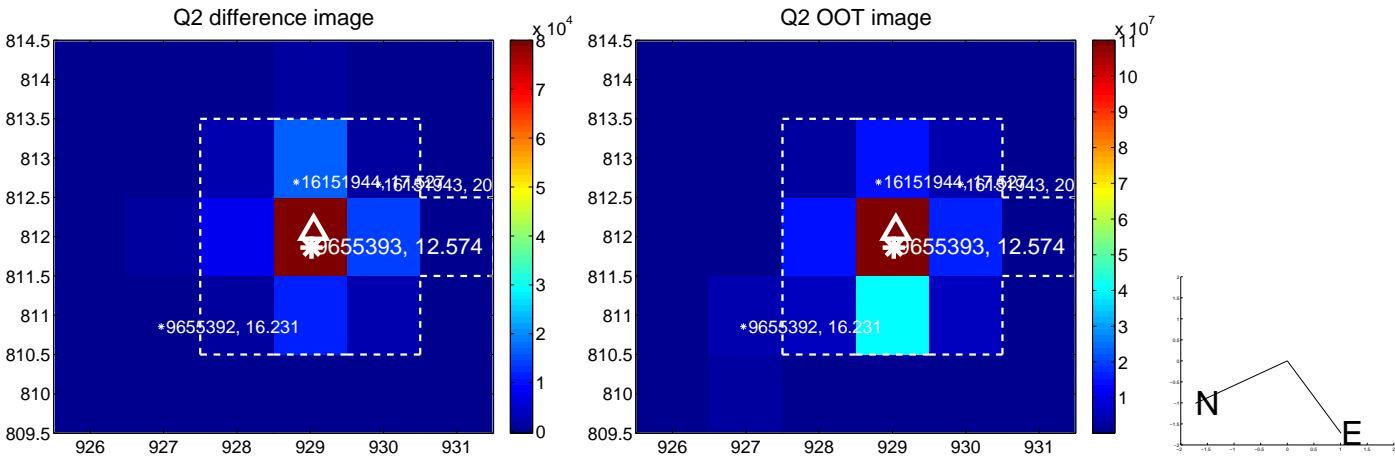
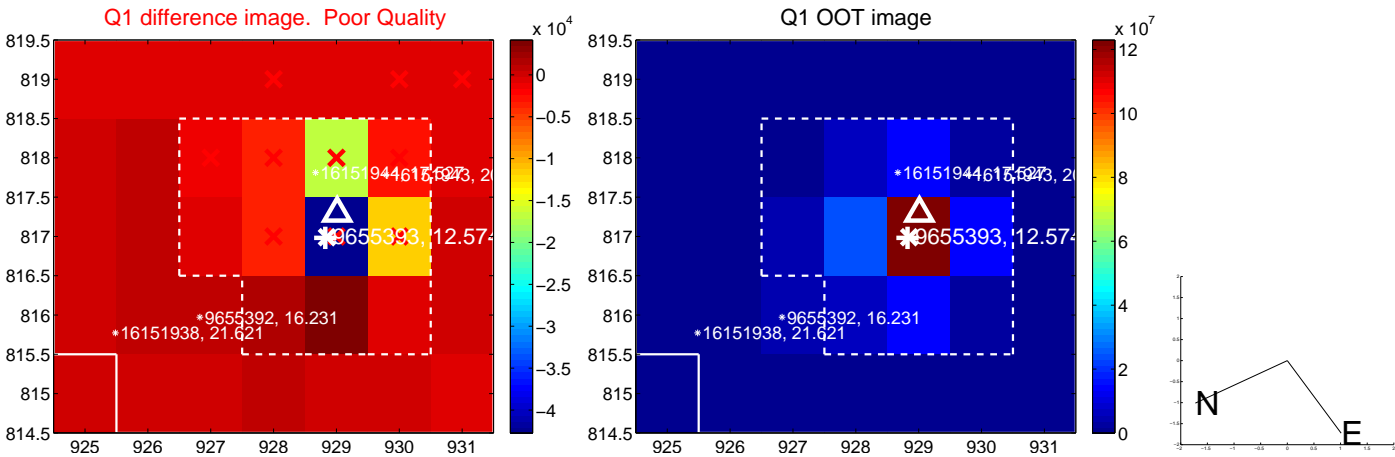
The direct PRF centroid is offset from the target star catalog position by about 0.08 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.189 \pm 0.189$	1.00	$-0.173 \pm 0.172$	$-0.077 \pm 0.146$
PRF-fit source offset from KIC position	$0.138 \pm 0.193$	0.71	$-0.136 \pm 0.195$	$-0.022 \pm 0.130$
photometric centroid source offset	$0.15 \pm 0.12$	1.22	$0.09 \pm 0.11$	$0.12 \pm 0.13$

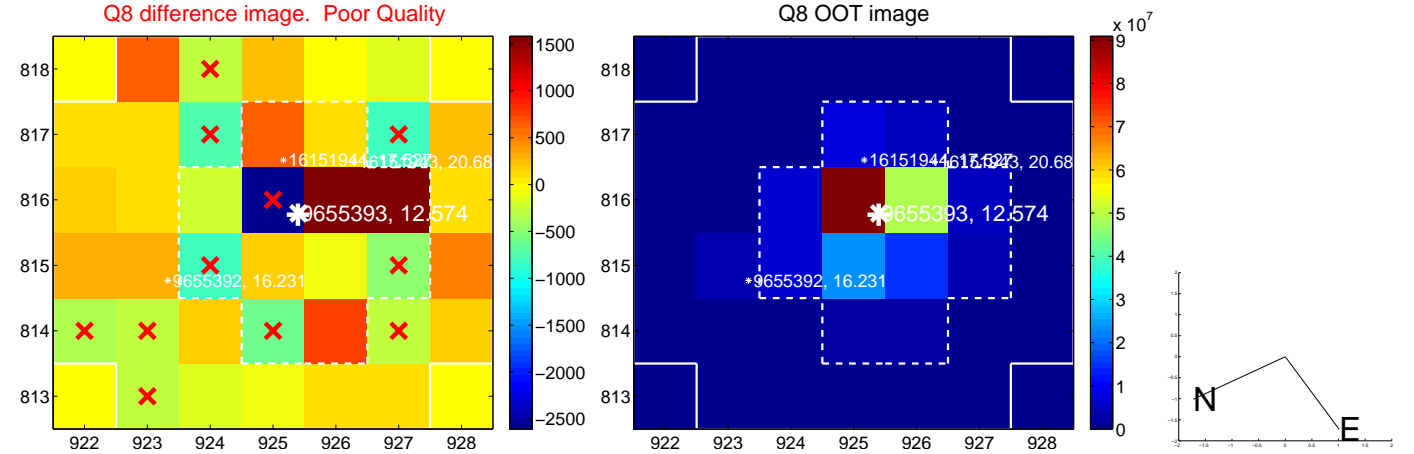
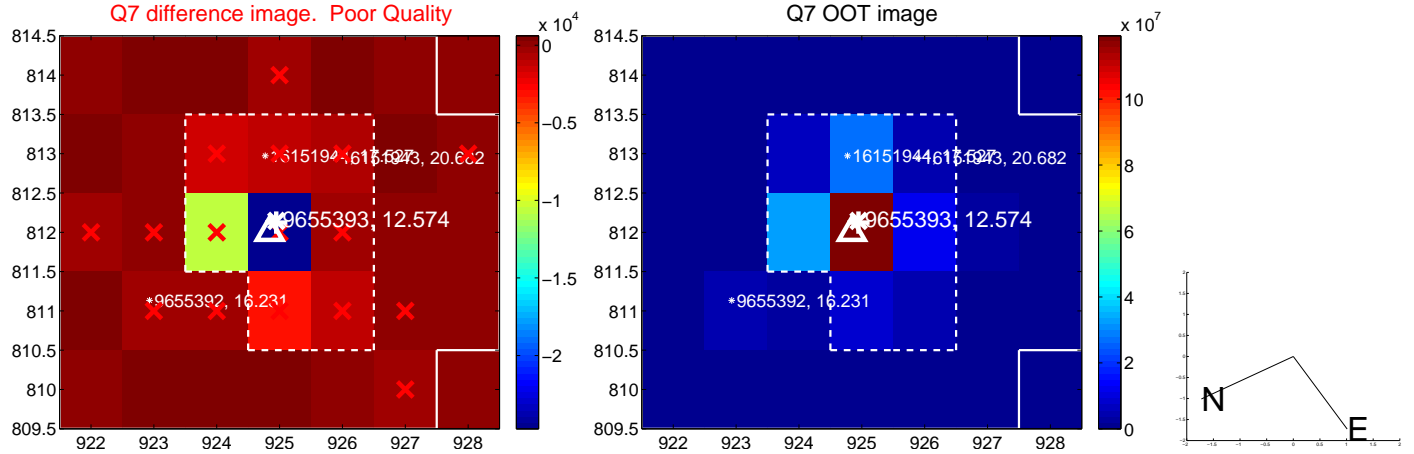
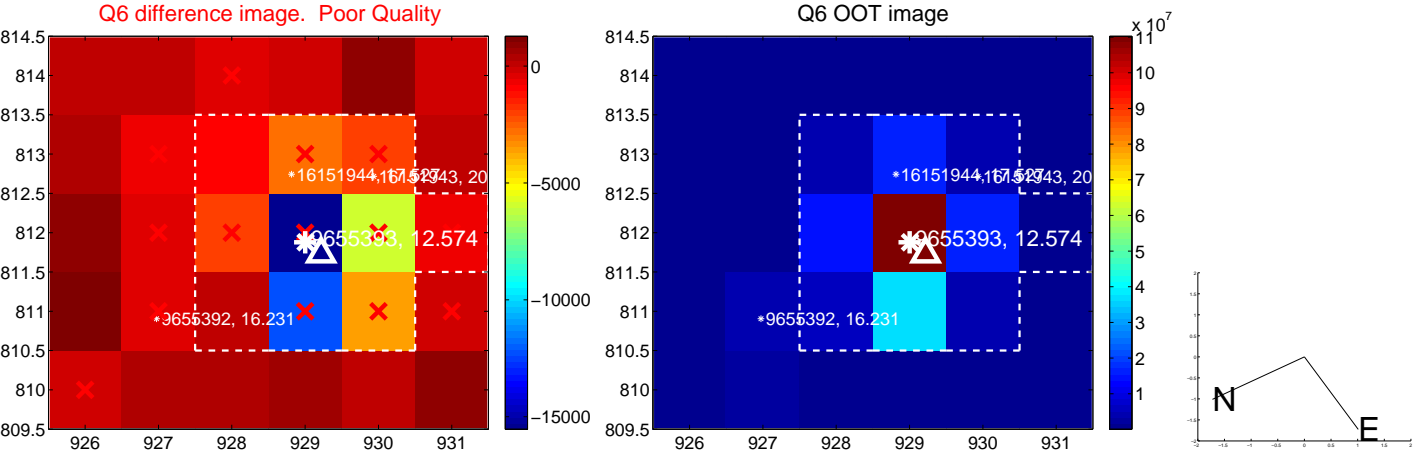
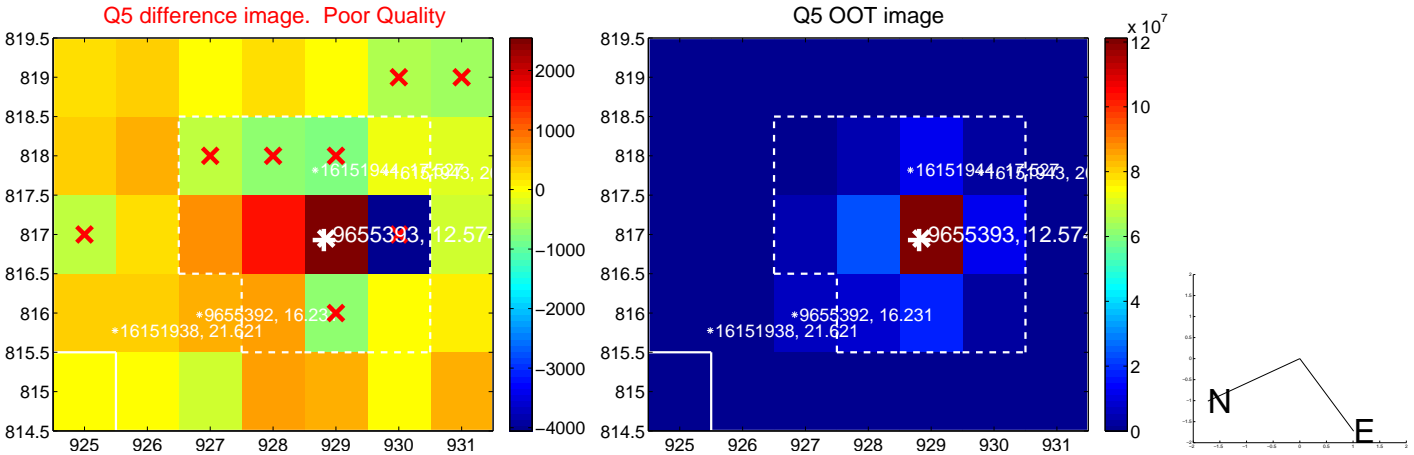


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

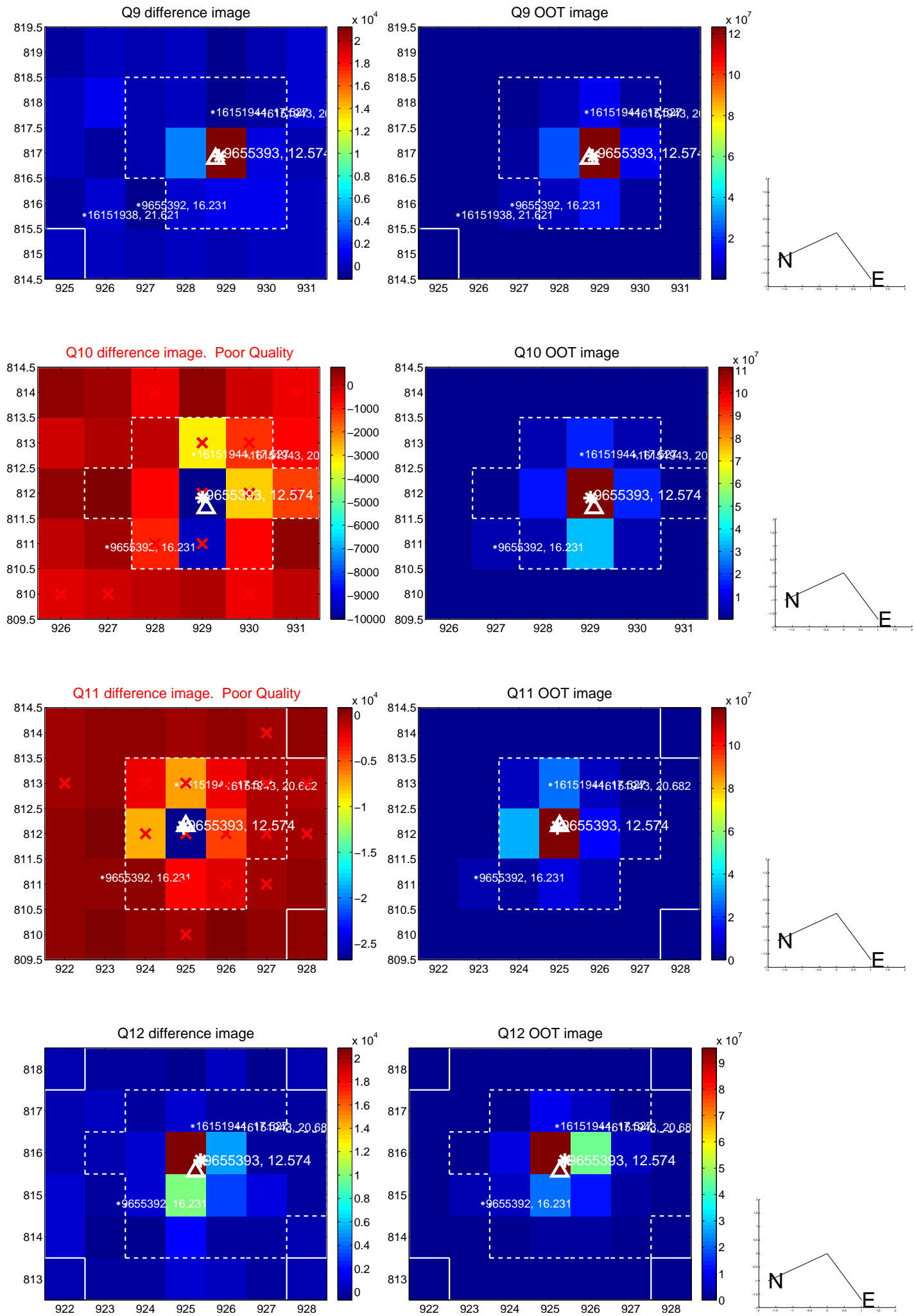


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

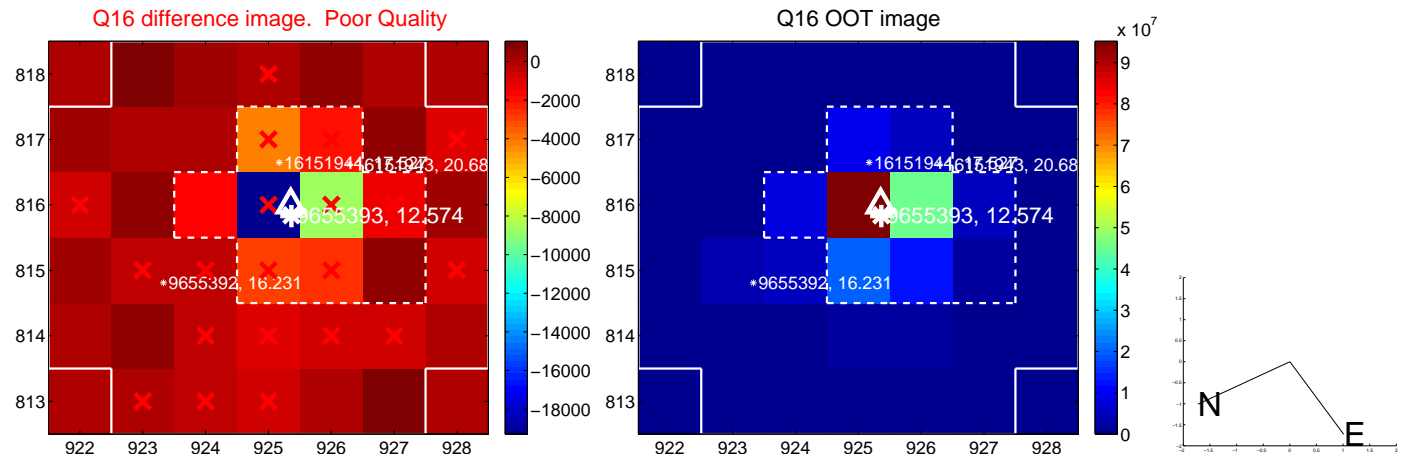
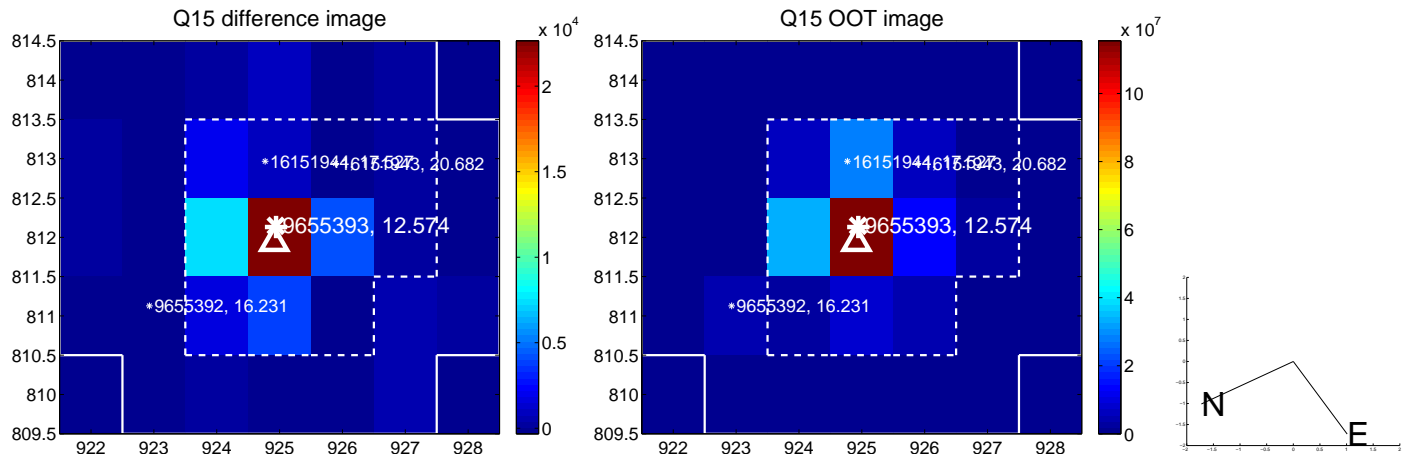
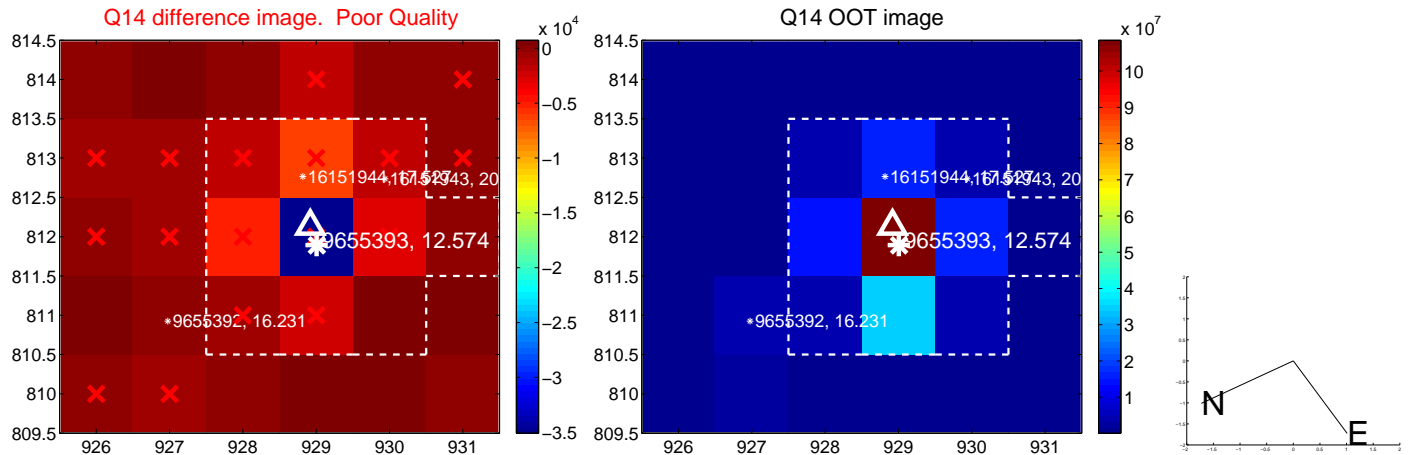
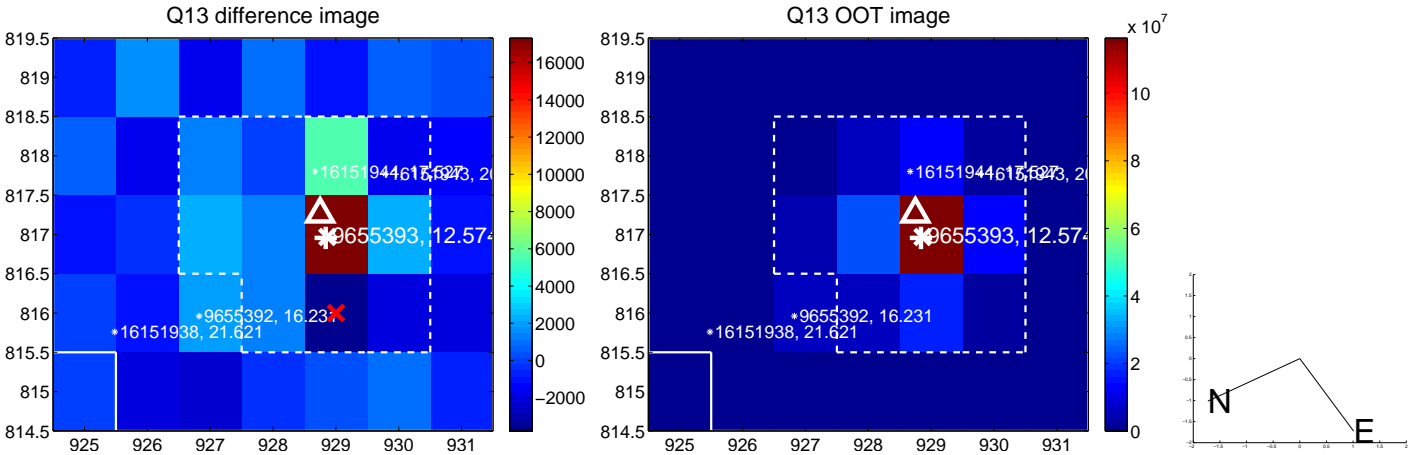




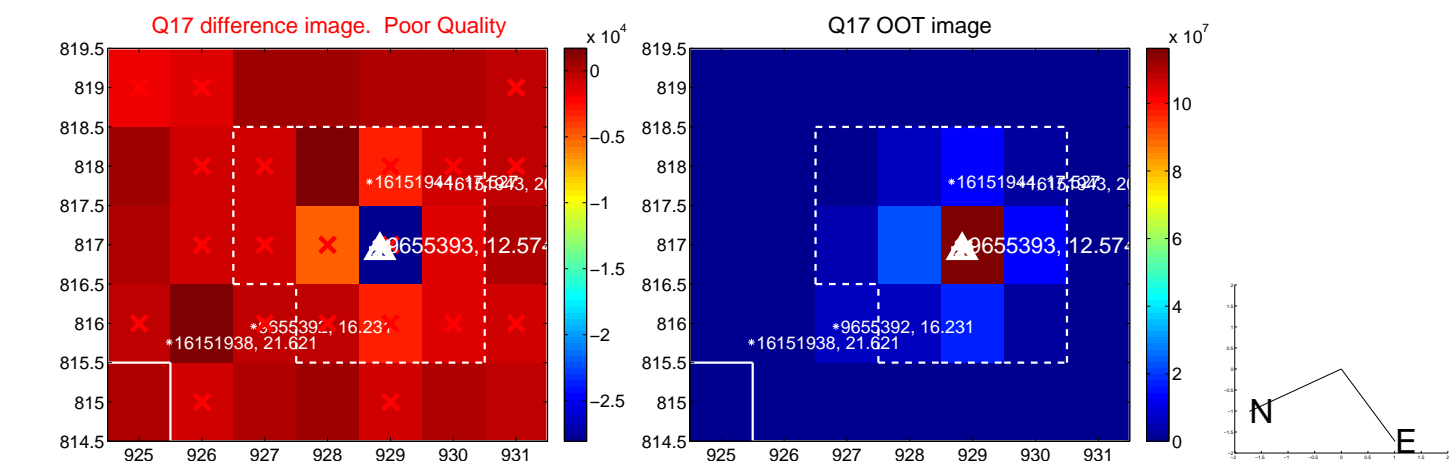
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



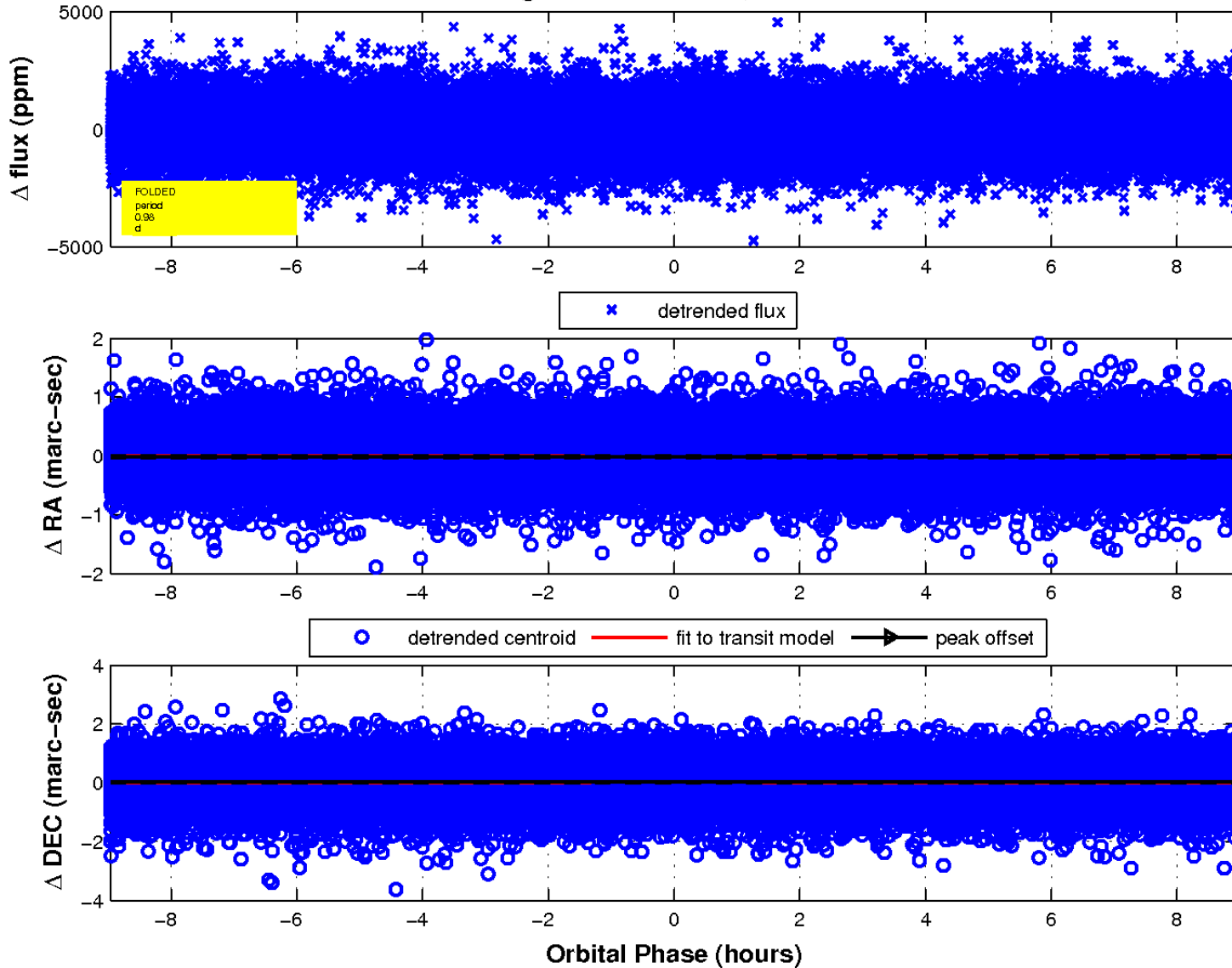
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

Declination

