

# KIC 006716670

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006716670-01	OBS	No	0.553203	131.625074	26.0	1.006	14.5	3.4	2.39	7904	1.42	75515.23
006716670-02	OBS	No	0.553132	131.922005	19.5	4.298	14.1	3.2	2.39	7904	1.23	75528.20

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006716670-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_FEW_DIFFS
006716670-02	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—LPP_ALT—SAME_NTL_PERIOD

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

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

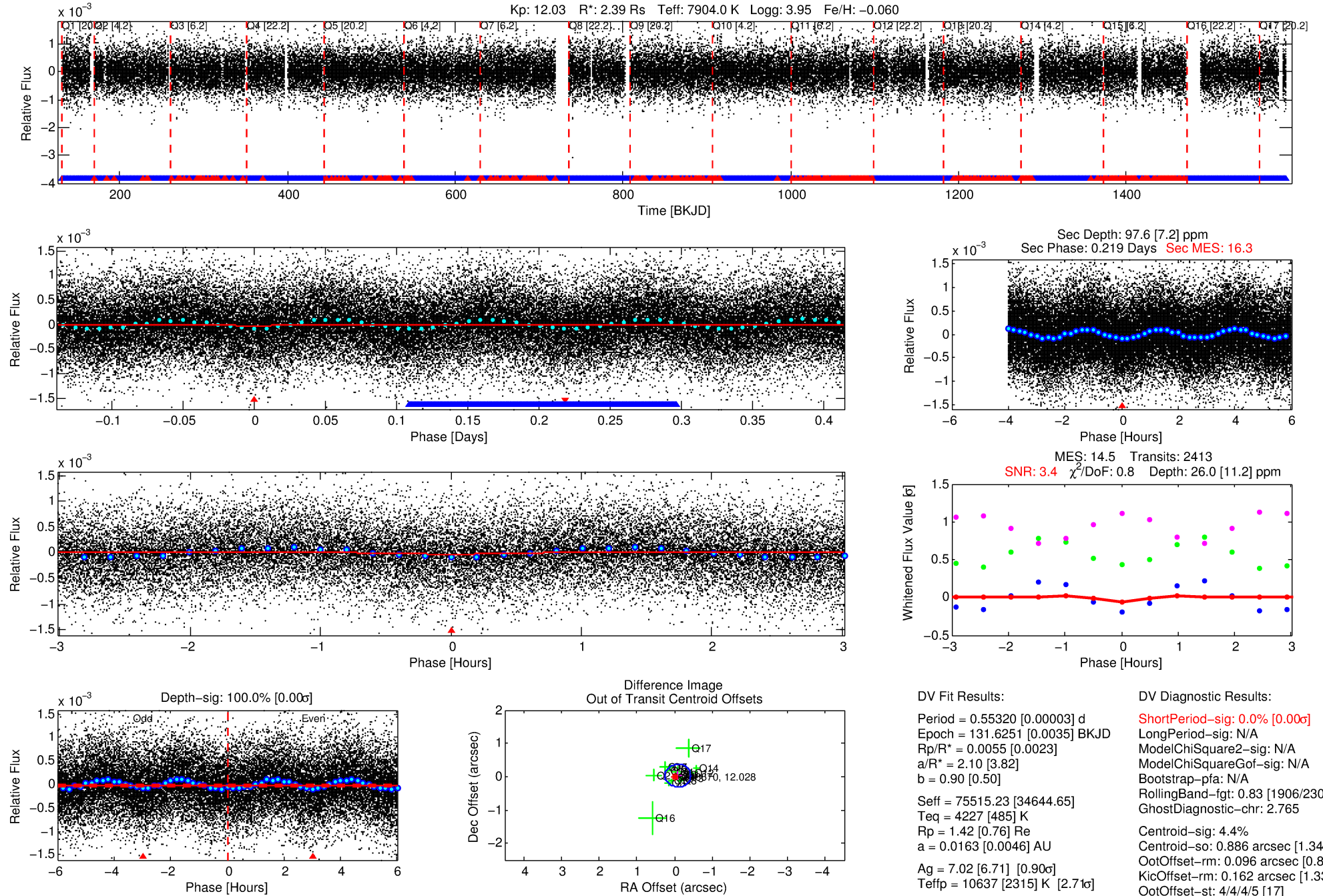
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 006716670-01

No Significant Match Found

# DV One-Page Summary

KIC: 6716670 Candidate: 1 of 2 Period: 0.553 d



## DV Fit Results:

Period = 0.55320 [0.00003] d  
Epoch = 131.6251 [0.0035] BKJD  
Rp/R\* = 0.0055 [0.0023]  
a/R\* = 2.10 [3.82]  
b = 0.90 [0.50]  
Seff = 75515.23 [34644.65]  
Teff = 4227 [485] K  
Rp = 1.42 [0.76] Re  
a = 0.0163 [0.0046] AU  
Ag = 7.02 [6.71] [0.90 $\sigma$ ]  
Teffp = 10637 [2315] K [2.71 $\sigma$ ]

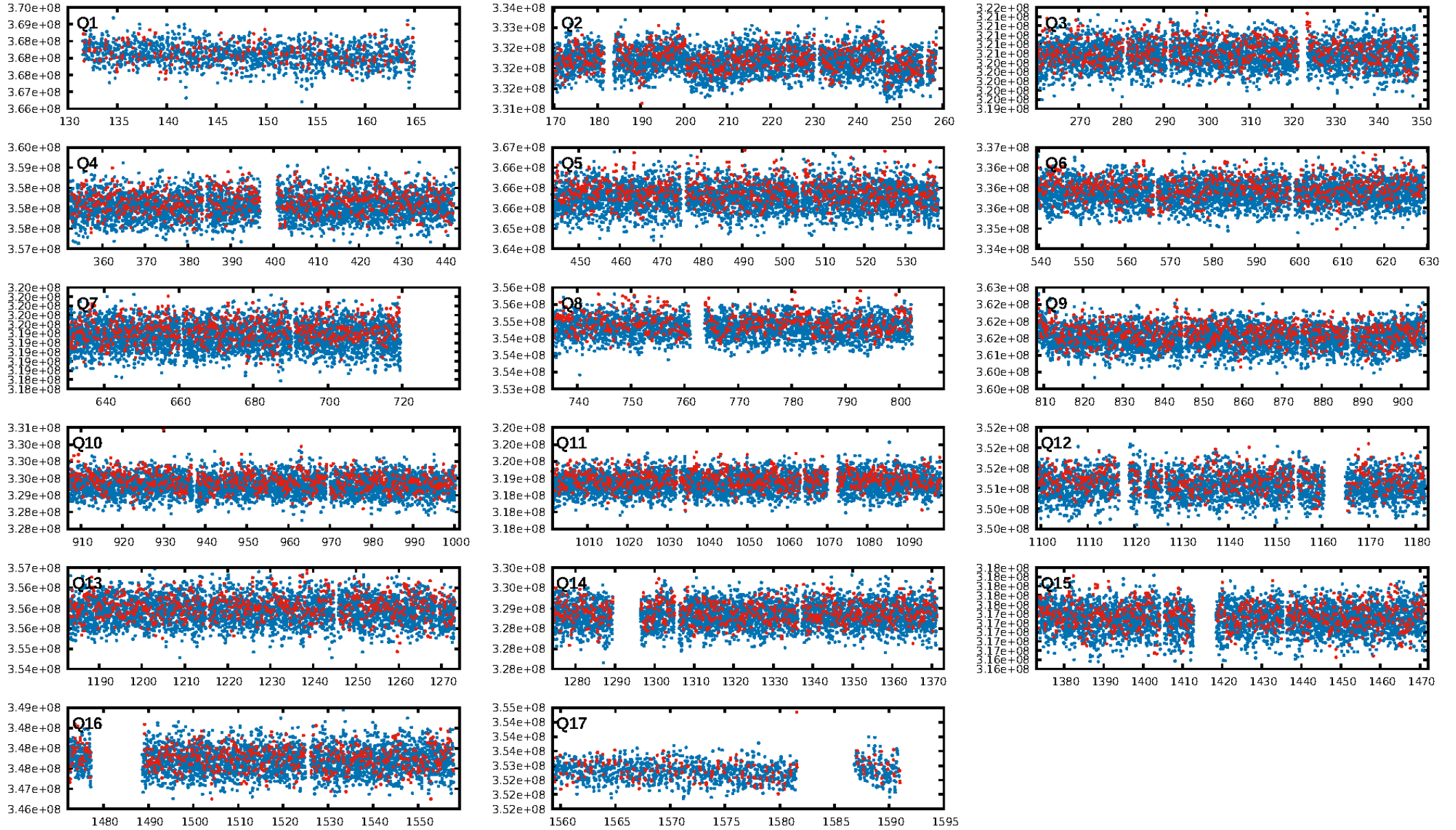
## DV Diagnostic Results:

**ShortPeriod-sig: 0.0% [0.00 $\sigma$ ]**  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 0.83 [1906/2303]  
GhostDiagnostic-chr: 2.765  
Centroid-sig: 4.4%  
Centroid-so: 0.886 arcsec [1.34 $\sigma$ ]  
OotOffset-rm: 0.096 arcsec [0.84 $\sigma$ ]  
KicOffset-rm: 0.162 arcsec [1.33 $\sigma$ ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.06 [1/17]  
DiffImageOverlap-fno: 0.00 [0/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 11:57:59 Z

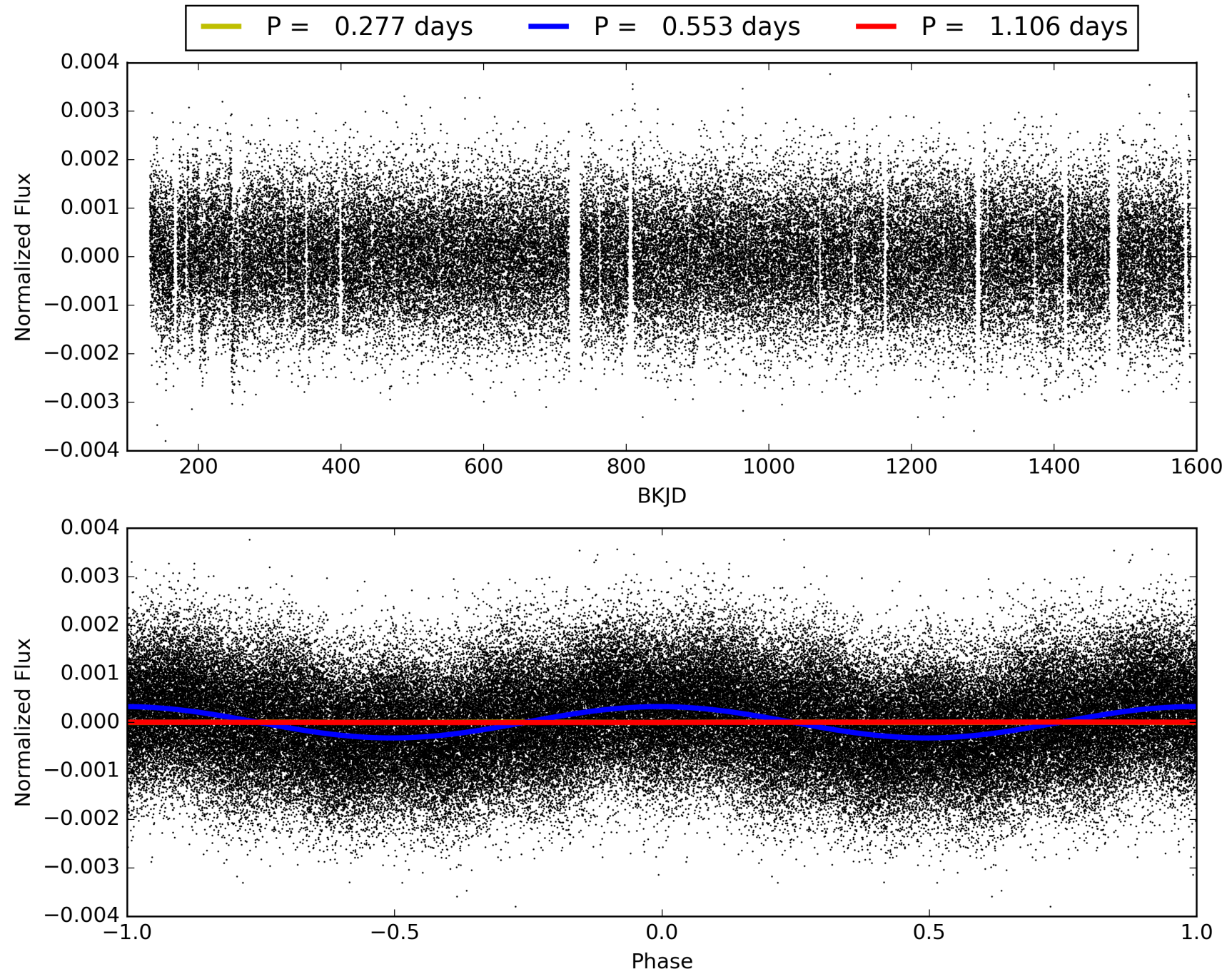
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 006716670-01, PDC Light Curves



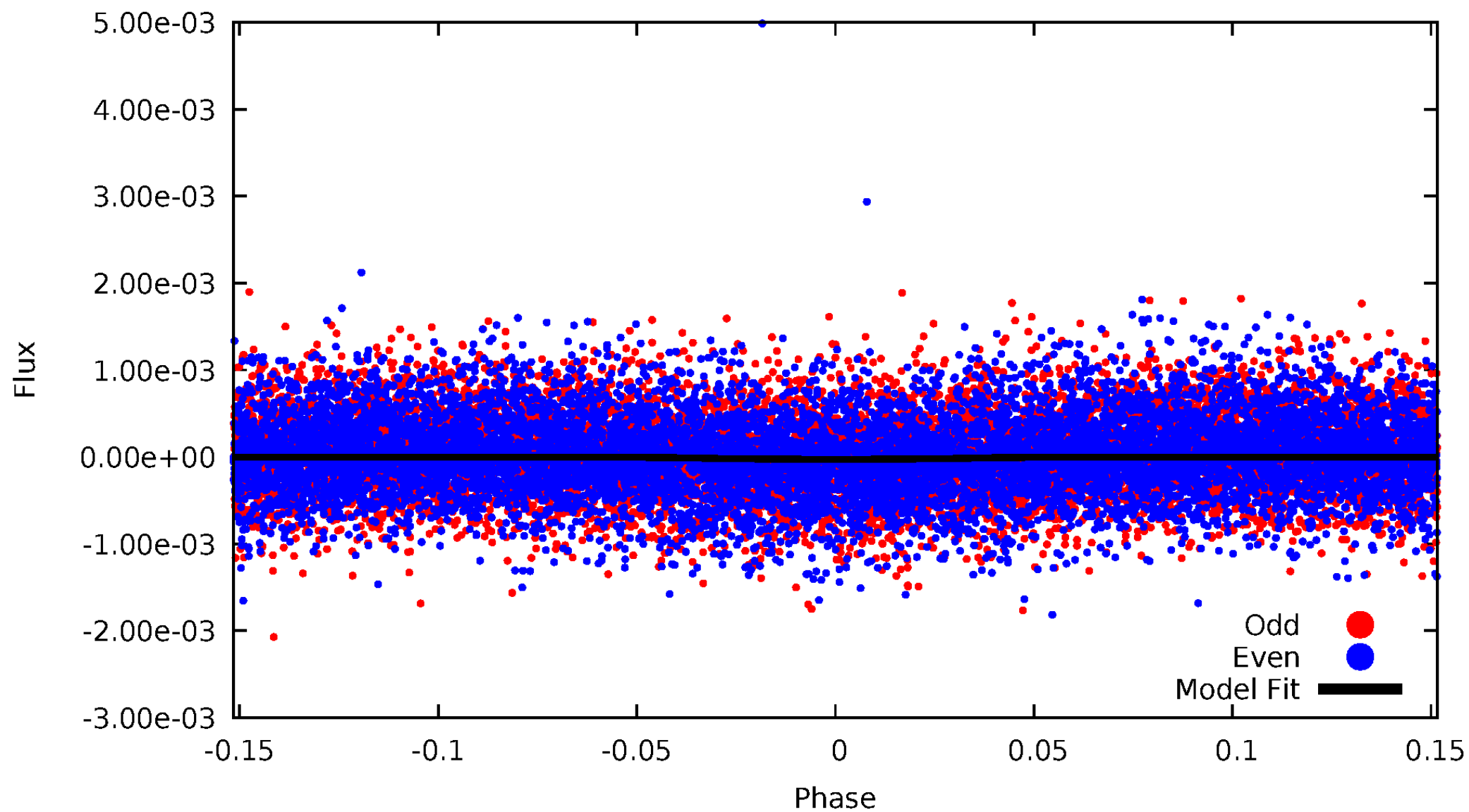


TCE 006716670-01



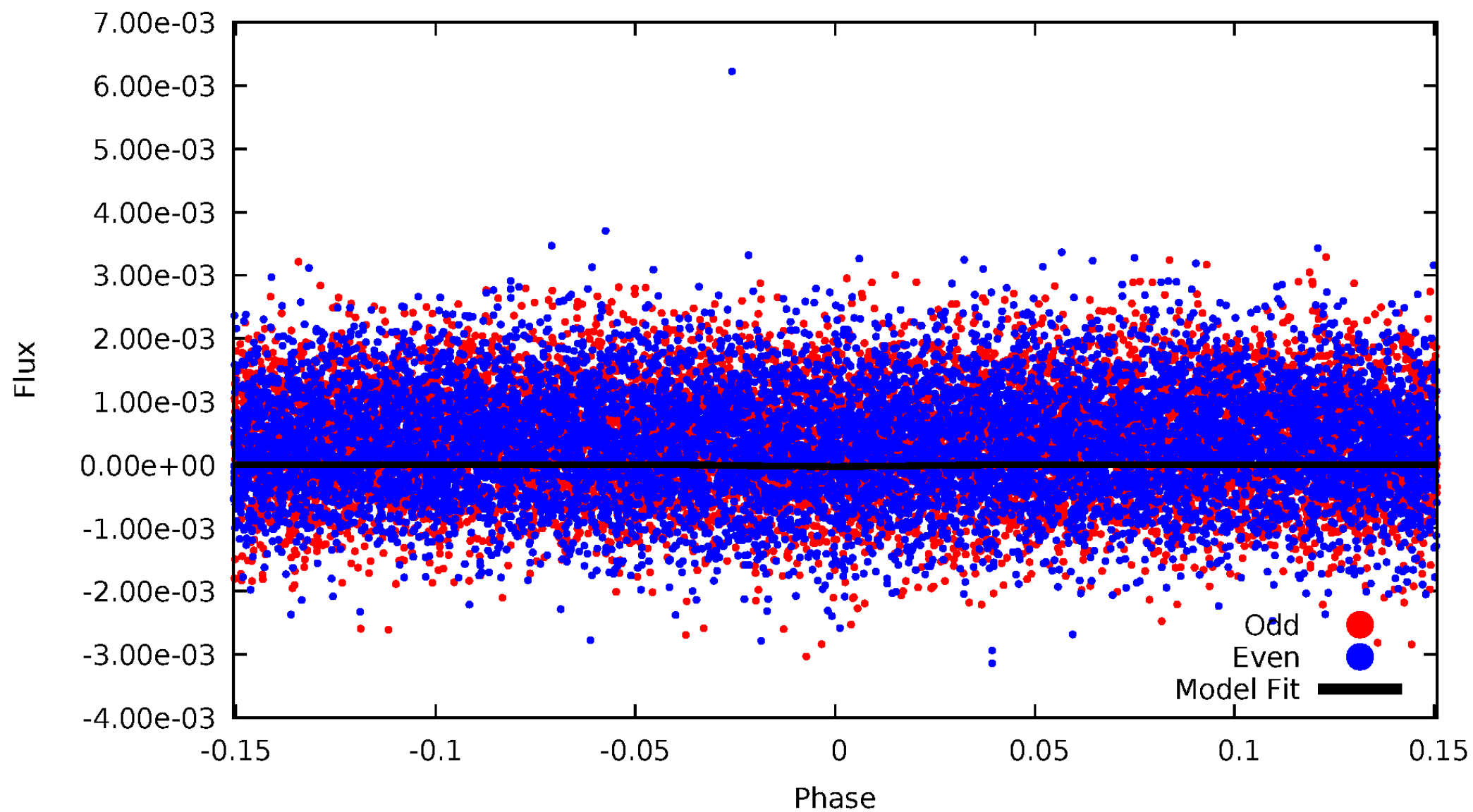
# DV Odd/Even

TCE 006716670-01



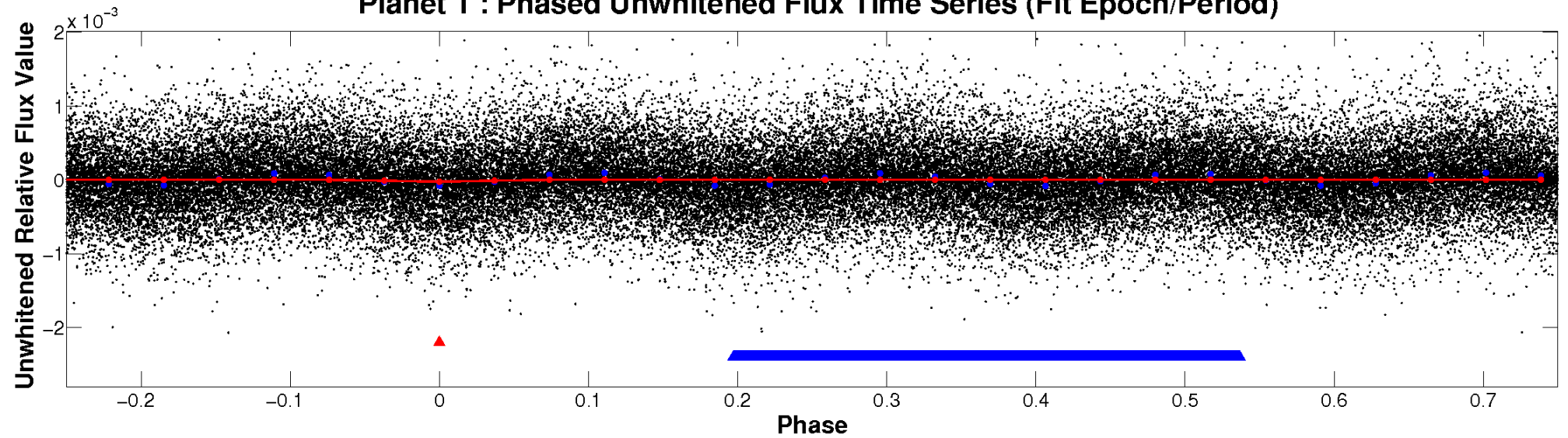
# ALT Odd/Even

TCE 006716670-01

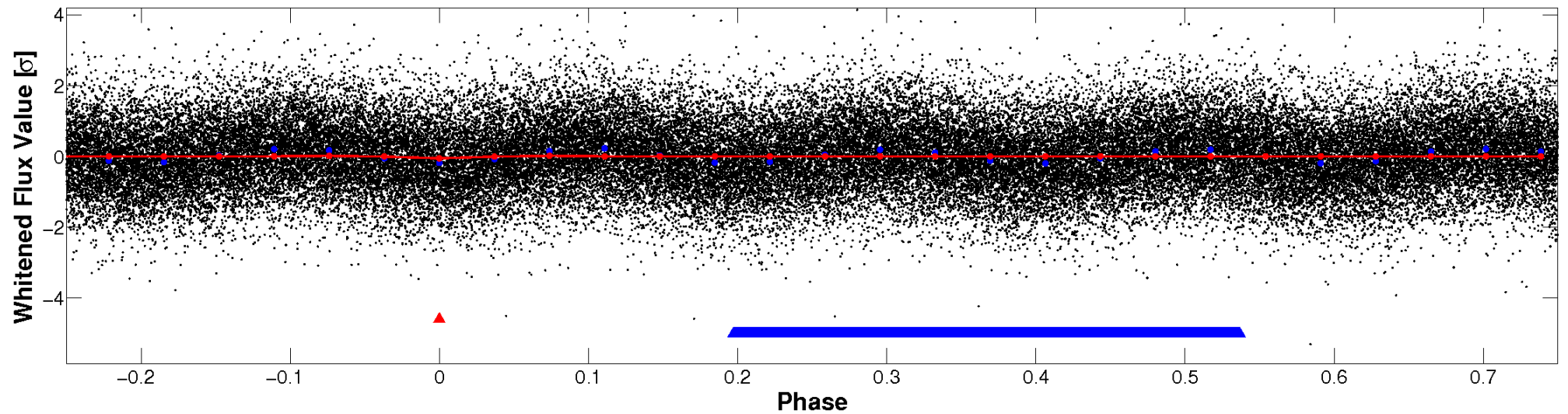


# Non-Whitened Vs. Whitened Light Curve

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



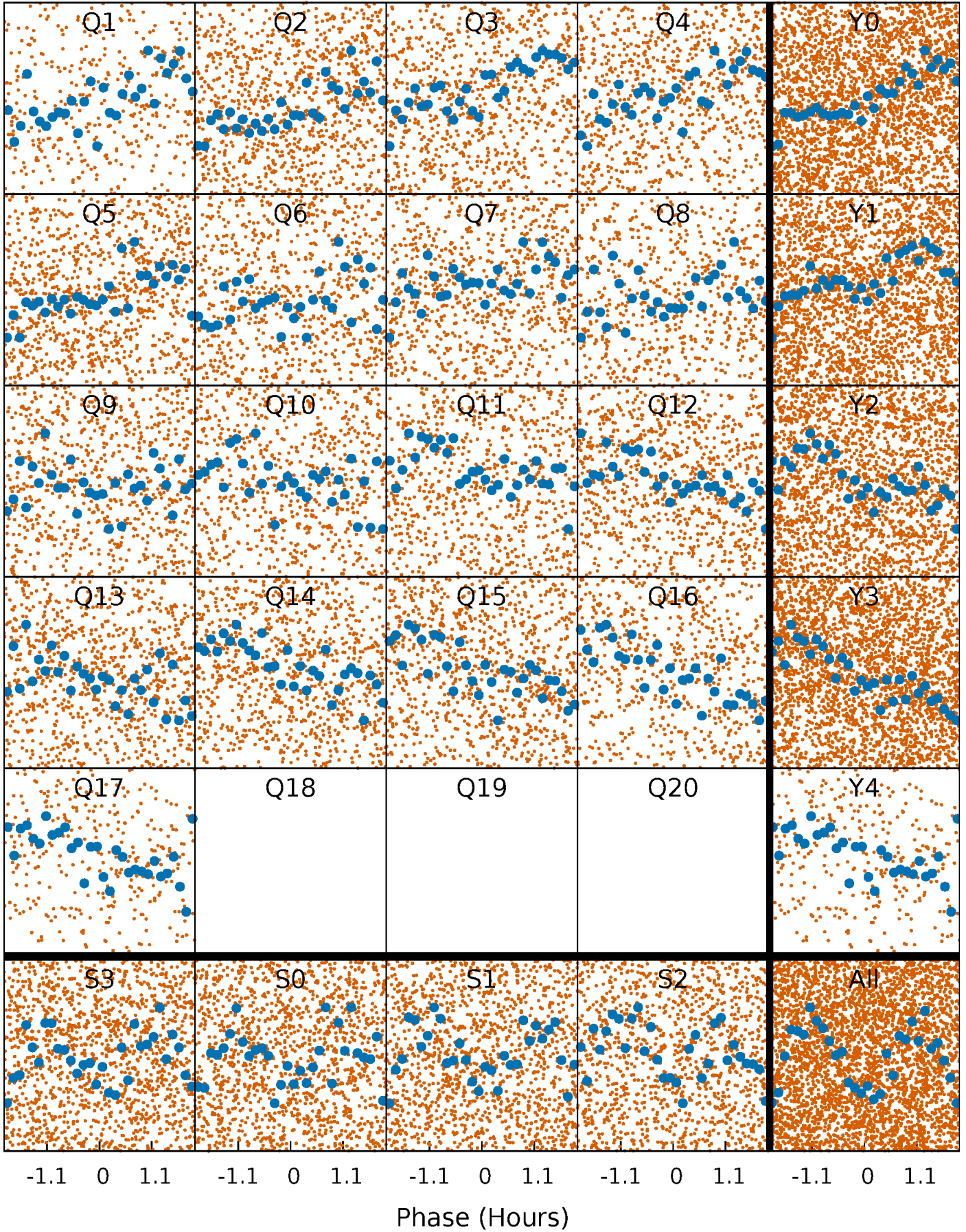
**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**





# PDC Quarter-Phased Transit Curves

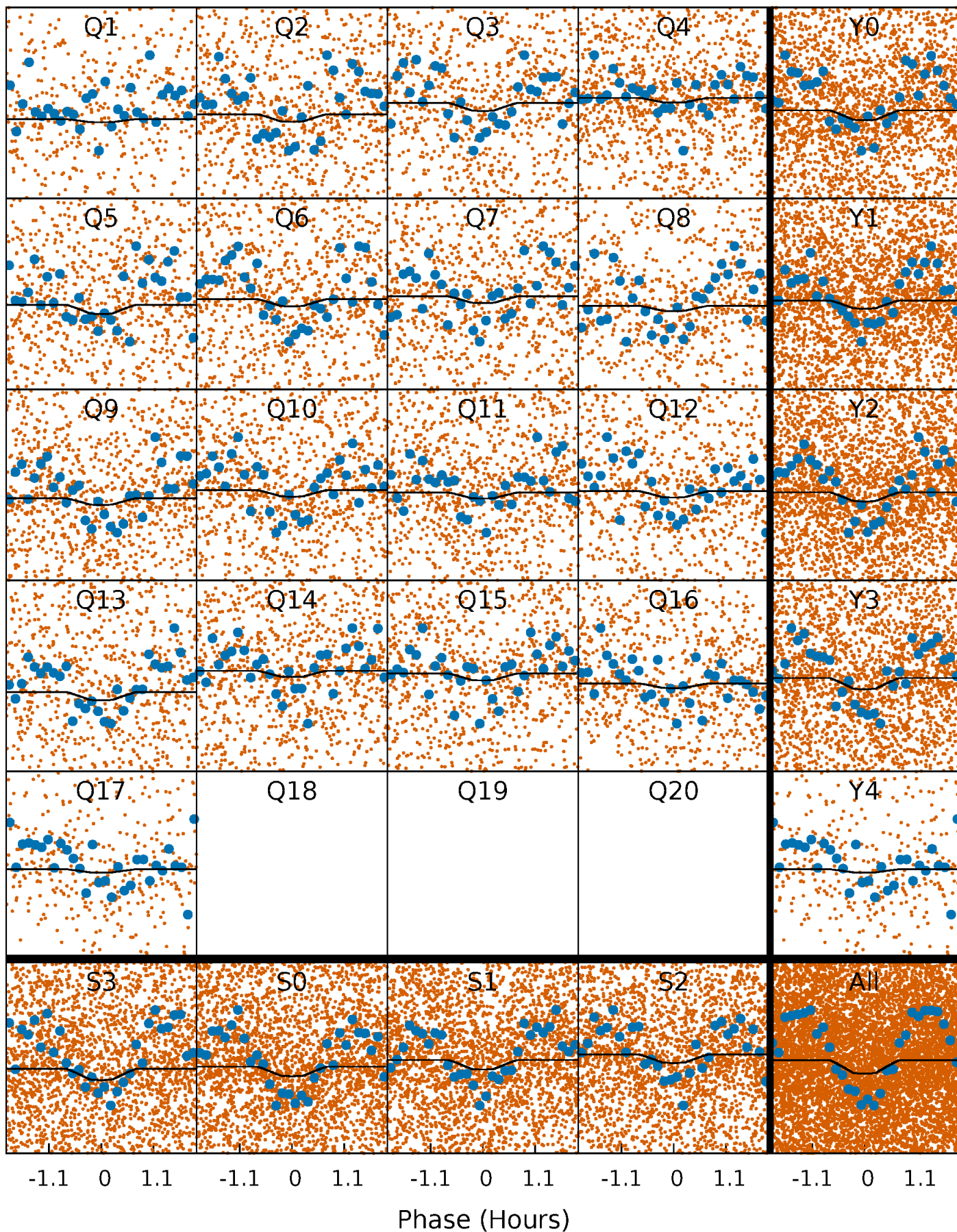
TCE 006716670-01 P= 0.553203 Days  $T_0=131.625074$  (BKJD)





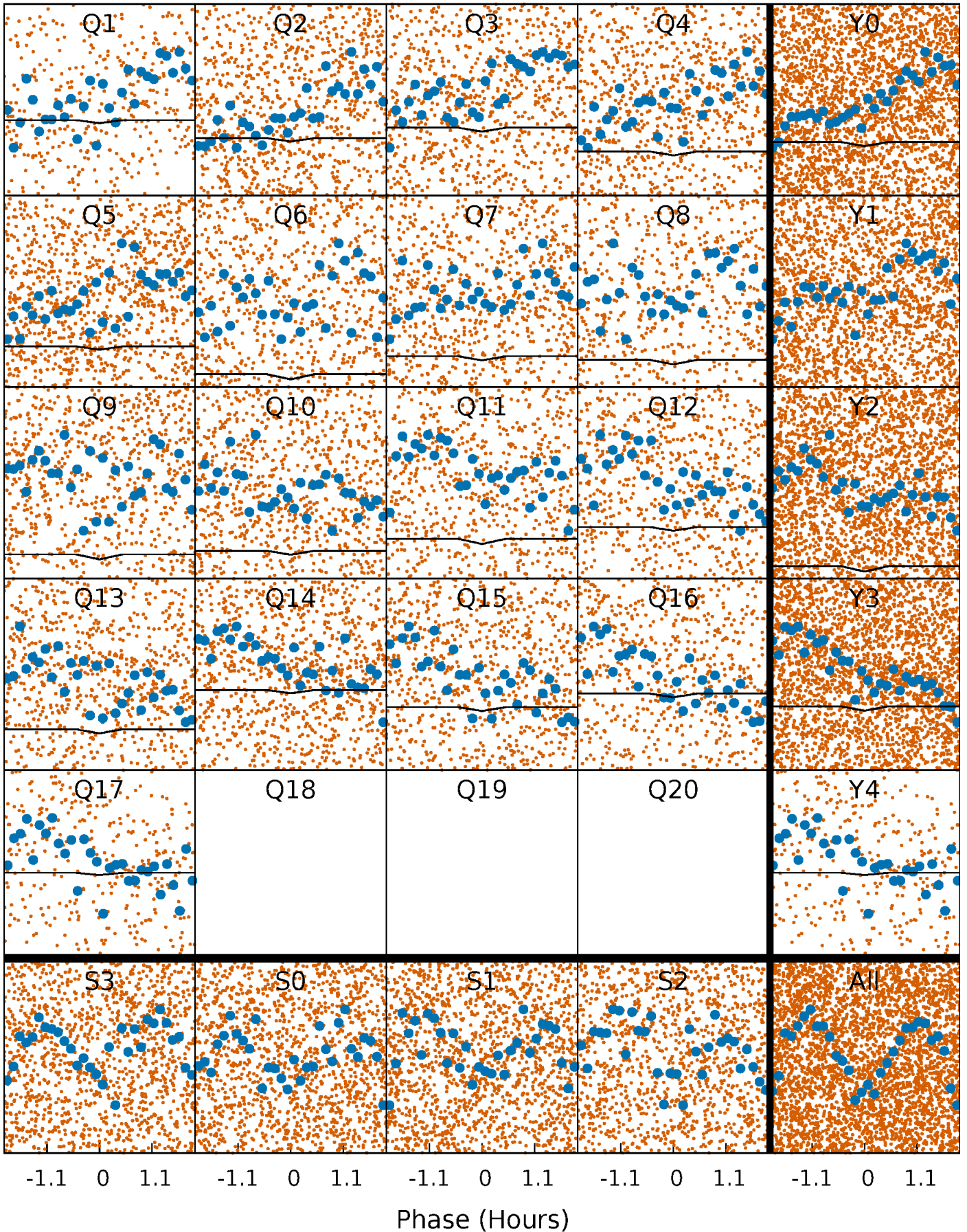
# DV Quarter-Phased Transit Curves

TCE 006716670-01 P= 0.553203 Days  $T_0=131.625074$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

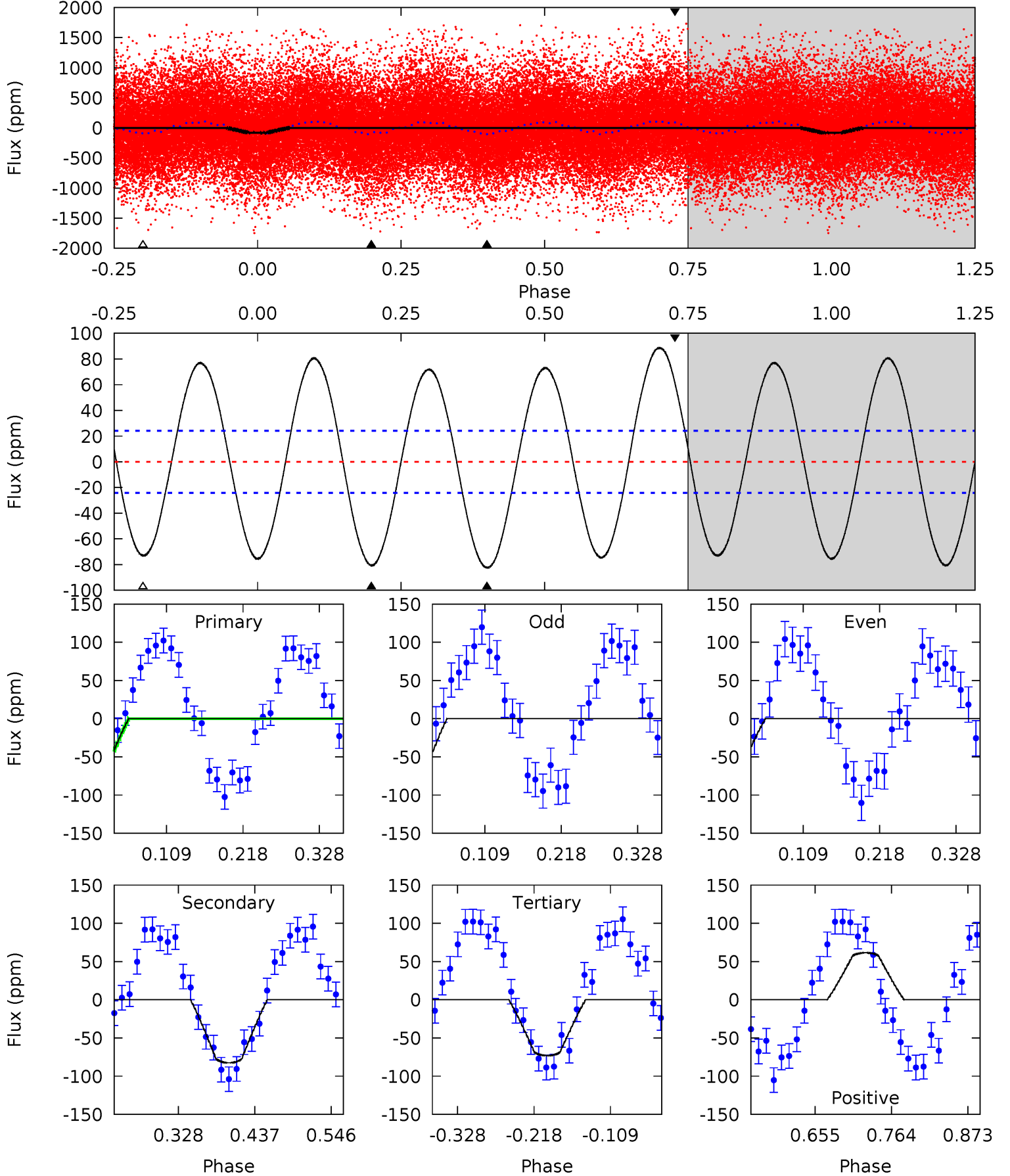
TCE 006716670-01 P= 0.553205 Days  $T_0=131.625102$  (BKJD)



# DV Model-Shift Uniqueness Test

006716670-01, P = 0.553203 Days, E = 131.071871 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
15.2	15.5	13.8	11.6	4.55	1.60	10.2	1.44	3.62	1.79	3.97	1.25	1.08	0.52	0.58

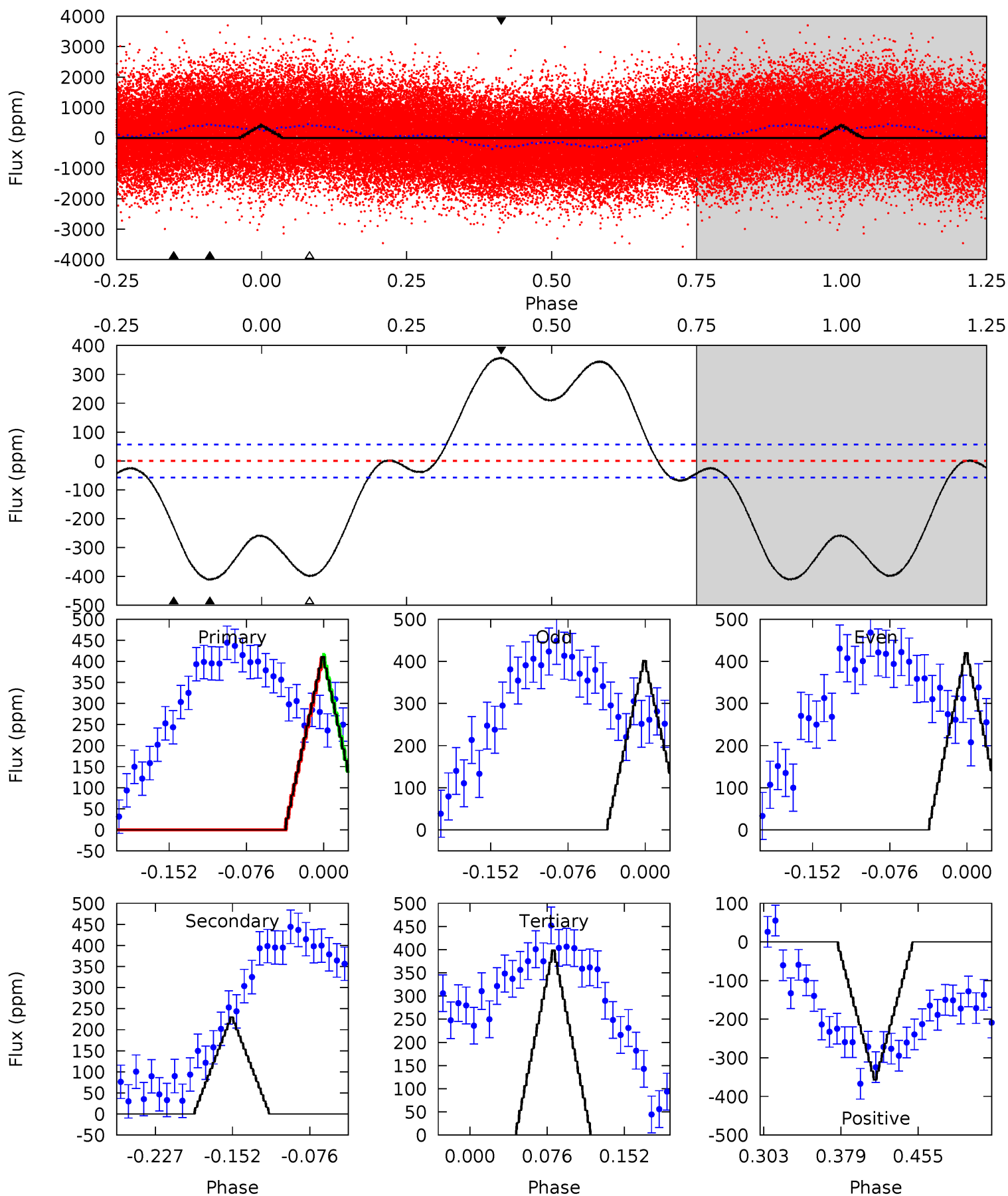




# Alt Model-Shift Uniqueness Test

006716670-01, P = 0.553205 Days, E = 131.071897 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
33.3	18.7	32.3	29.0	4.62	1.78	18.9	0.99	4.34	-13.7	-10.3	0.74	1.05	0.47	0.13





### Stellar Parameters For KIC 006716670

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$7904^{+219}_{-329}$	$3.954^{+0.241}_{-0.130}$	$-0.060^{+0.200}_{-0.350}$	$2.390^{+0.473}_{-0.768}$	$1.872^{+0.120}_{-0.385}$	$0.193^{+0.284}_{-0.075}$
	+3%/-4%	+6%/-3%	+333%/-583%	+20%/-32%	+6%/-21%	+147%/-39%
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 006716670-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-83 \pm 5$	$1.34^{+0.62}_{-0.63}$	$5850^{+362}_{-491}$	$11247^{+8255}_{-2801}$	$6.623^{+16.554}_{-3.578}$
Alt.	$-230 \pm 12$	$1.38^{+0.55}_{-0.61}$	$5829^{+380}_{-500}$	$17332^{+17221}_{-4703}$	$17^{+36}_{-8}$

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

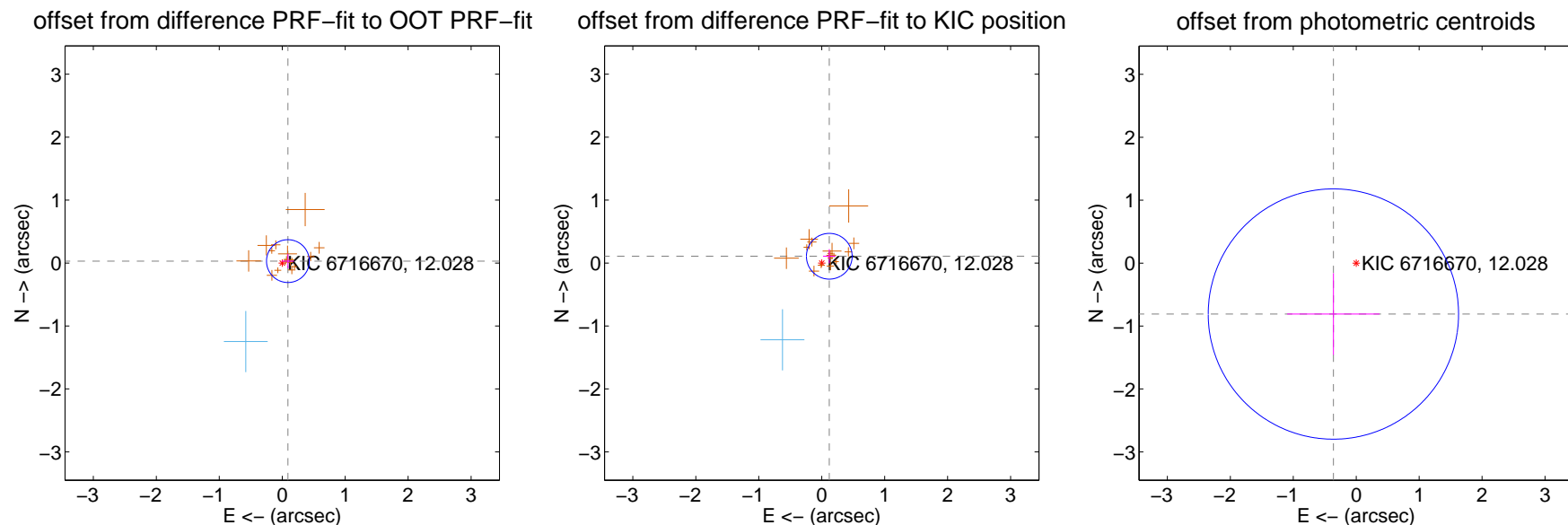
## DV Centroid Data

Supplemental centroid analysis for 006716670-01. Kepler magnitude: 12.03. Transit SNR 3.39

There are 1 quarters with good PRF difference image offsets

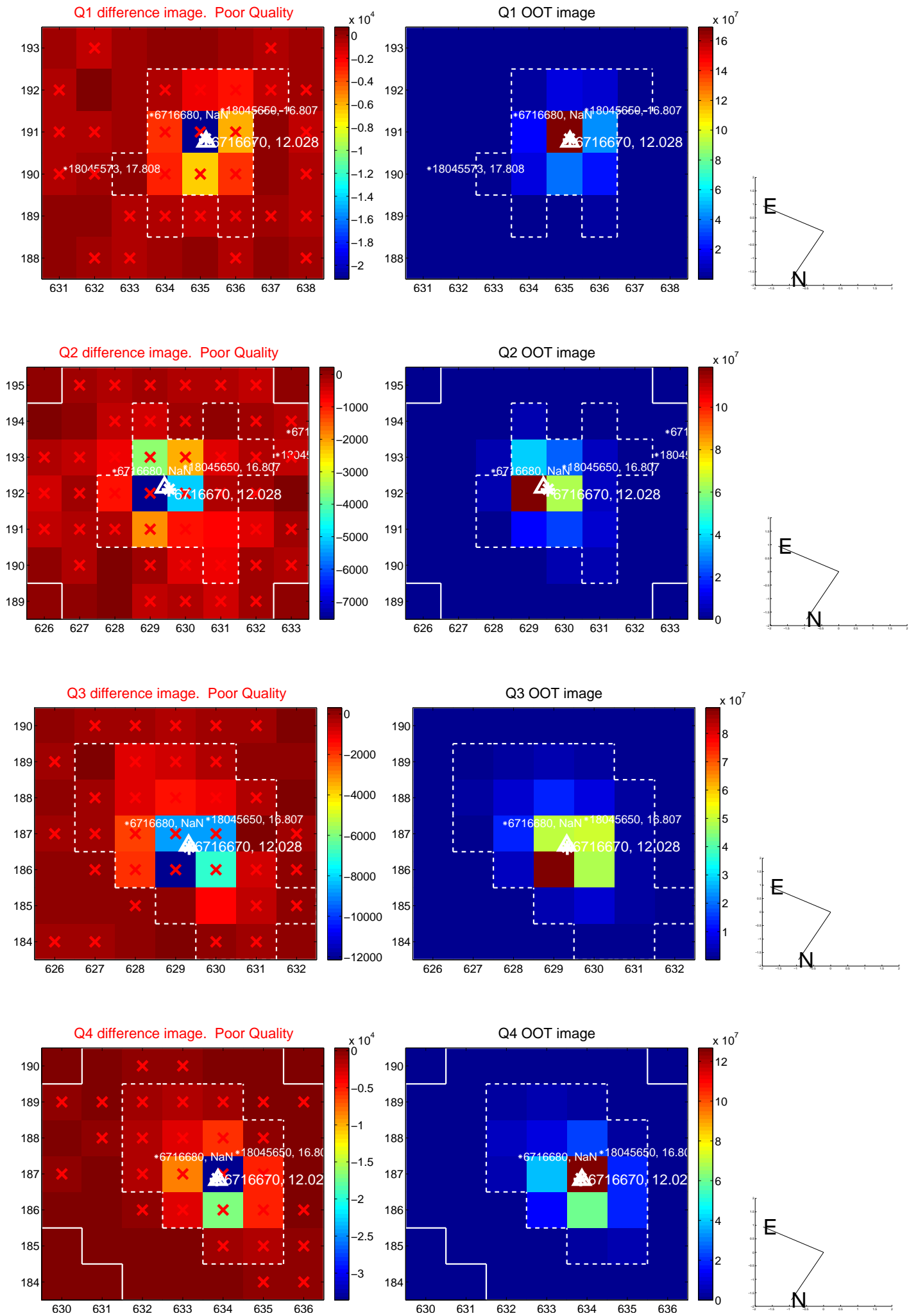
The direct PRF centroid is offset from the target star catalog position by about 0.08 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.096 \pm 0.113$	0.84	$-0.090 \pm 0.100$	$0.031 \pm 0.117$
PRF-fit source offset from KIC position	$0.162 \pm 0.121$	1.33	$-0.120 \pm 0.100$	$0.108 \pm 0.113$
photometric centroid source offset	$0.89 \pm 0.66$	1.34	$0.36 \pm 0.73$	$-0.81 \pm 0.65$

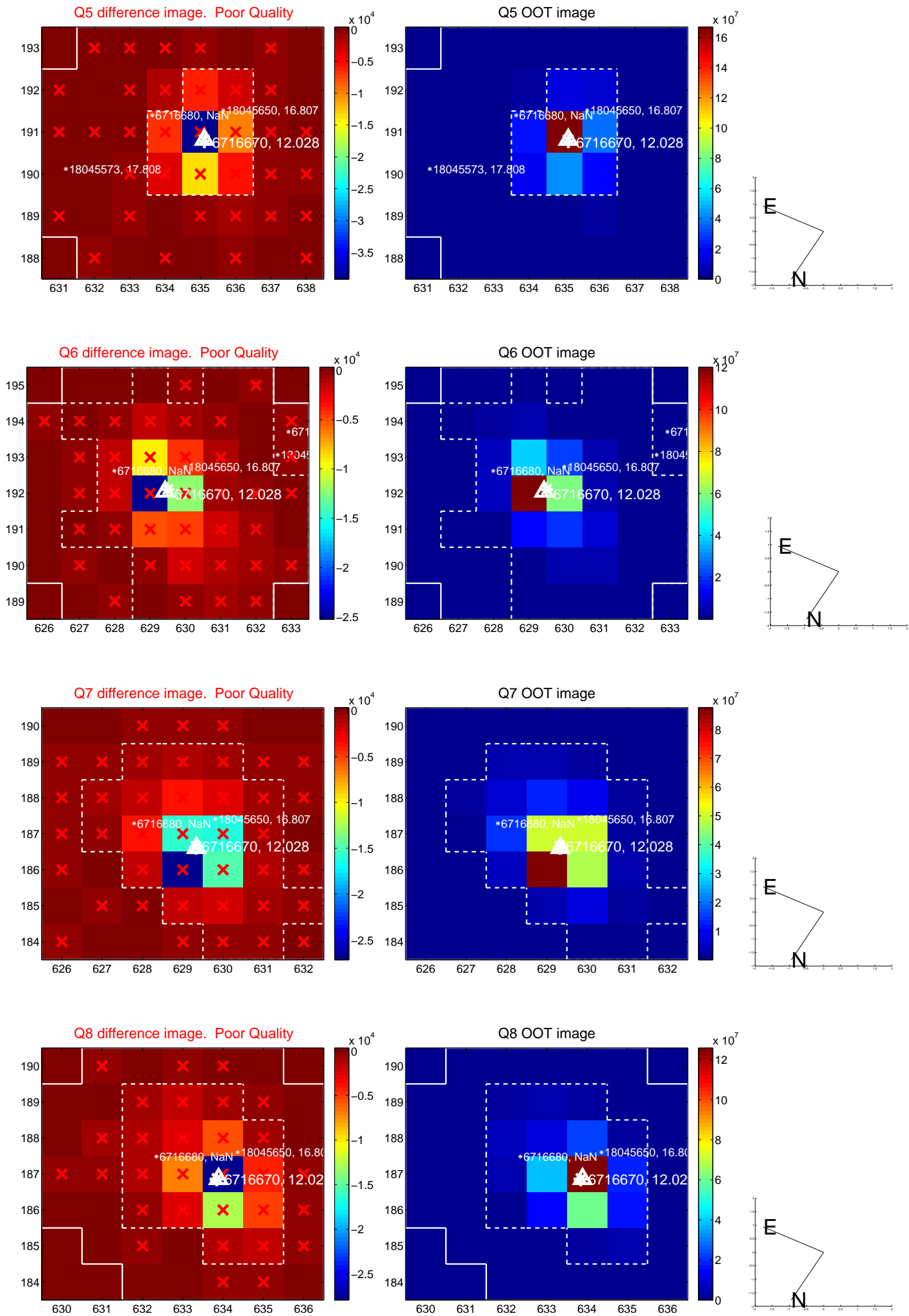


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

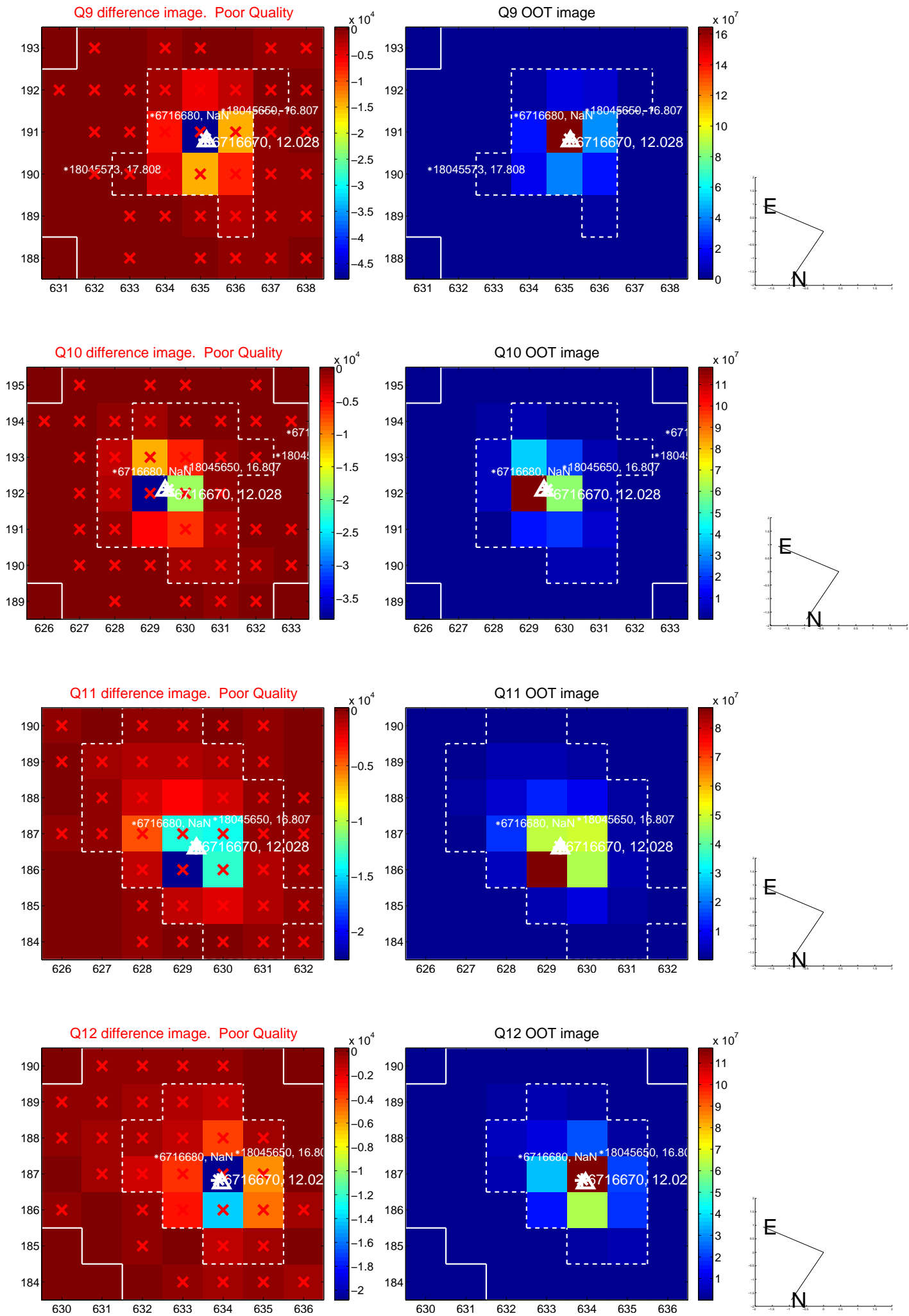


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

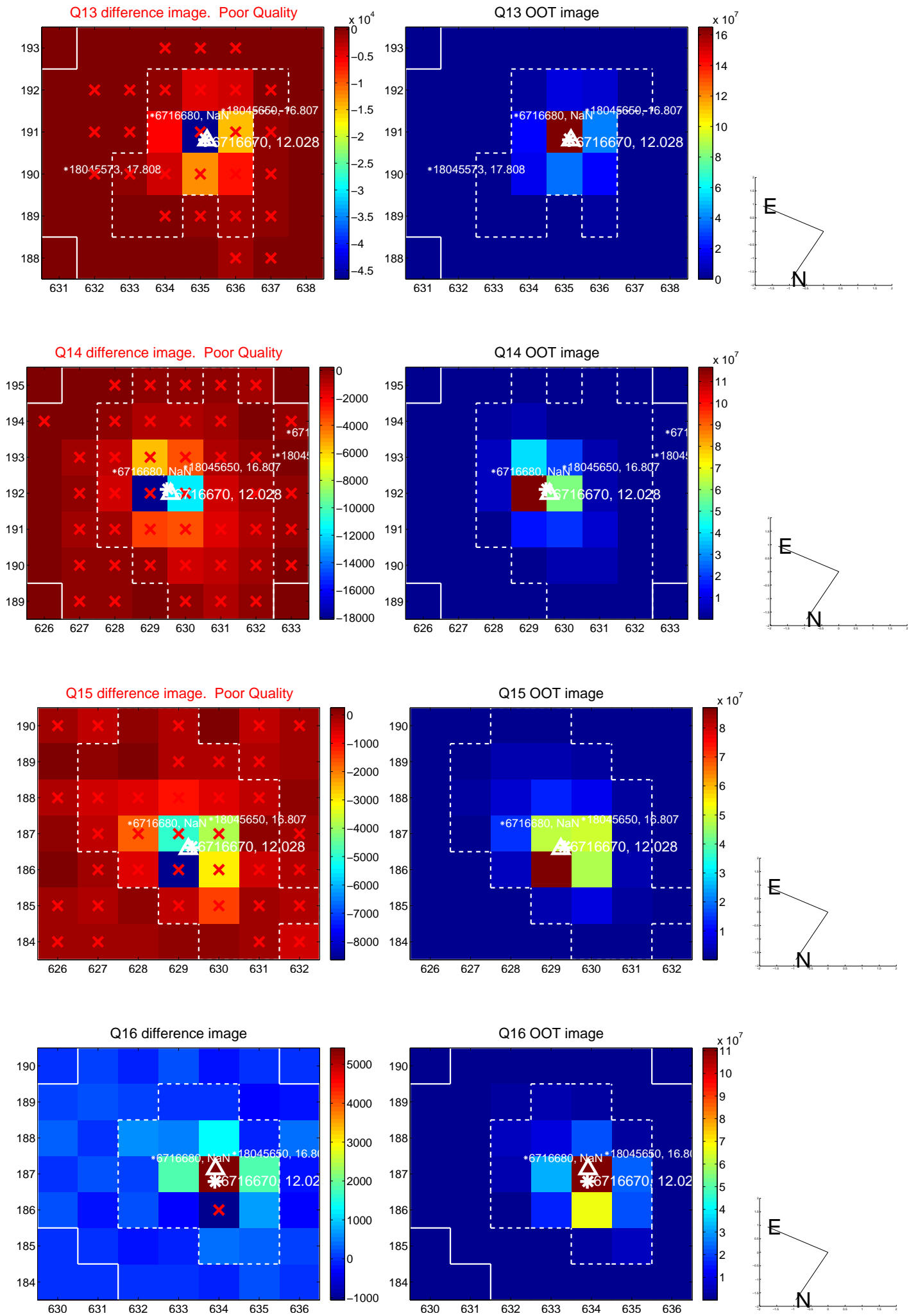




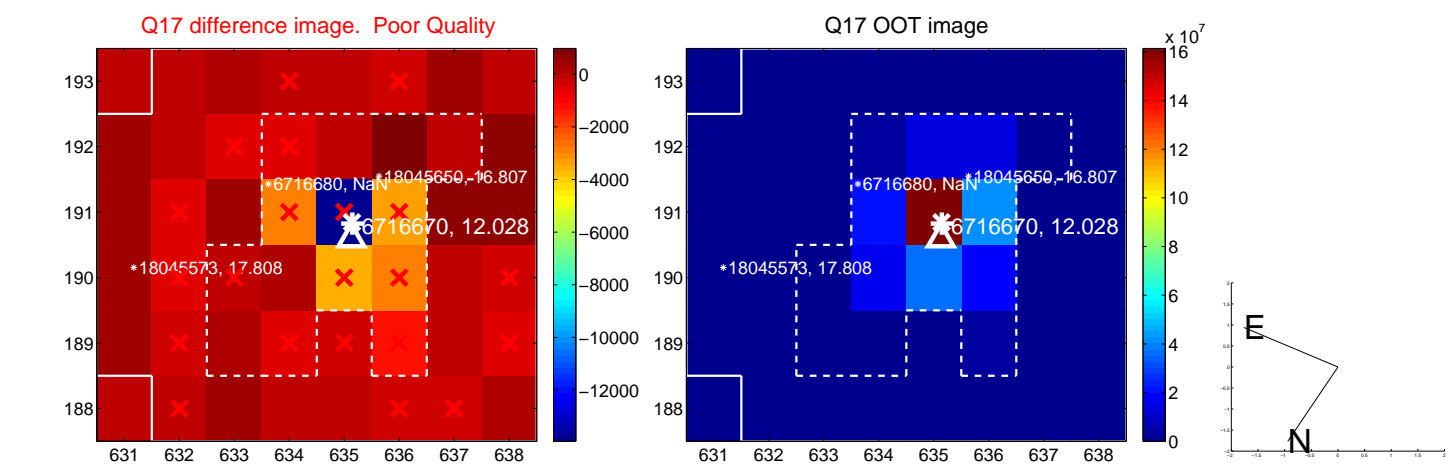
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



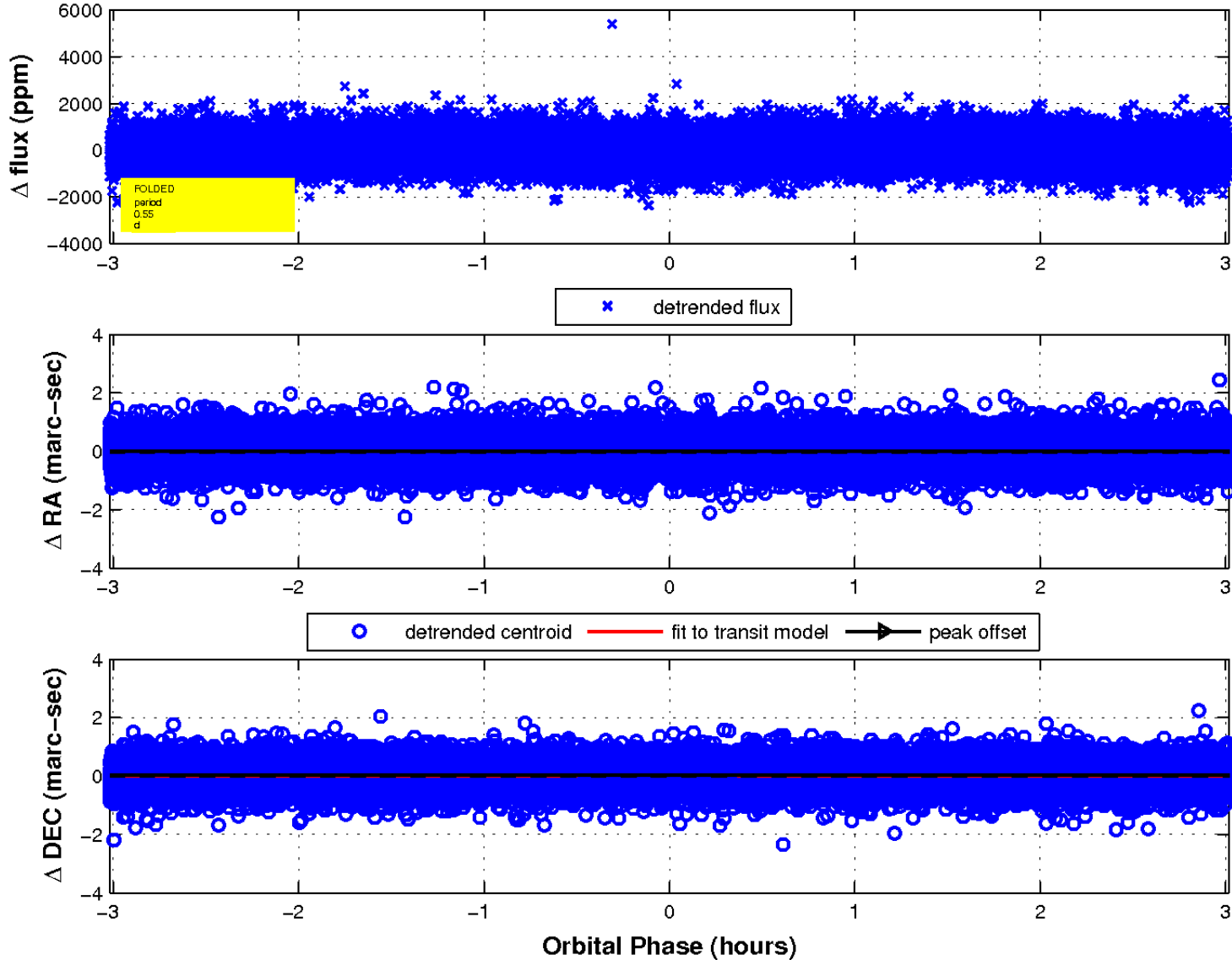
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



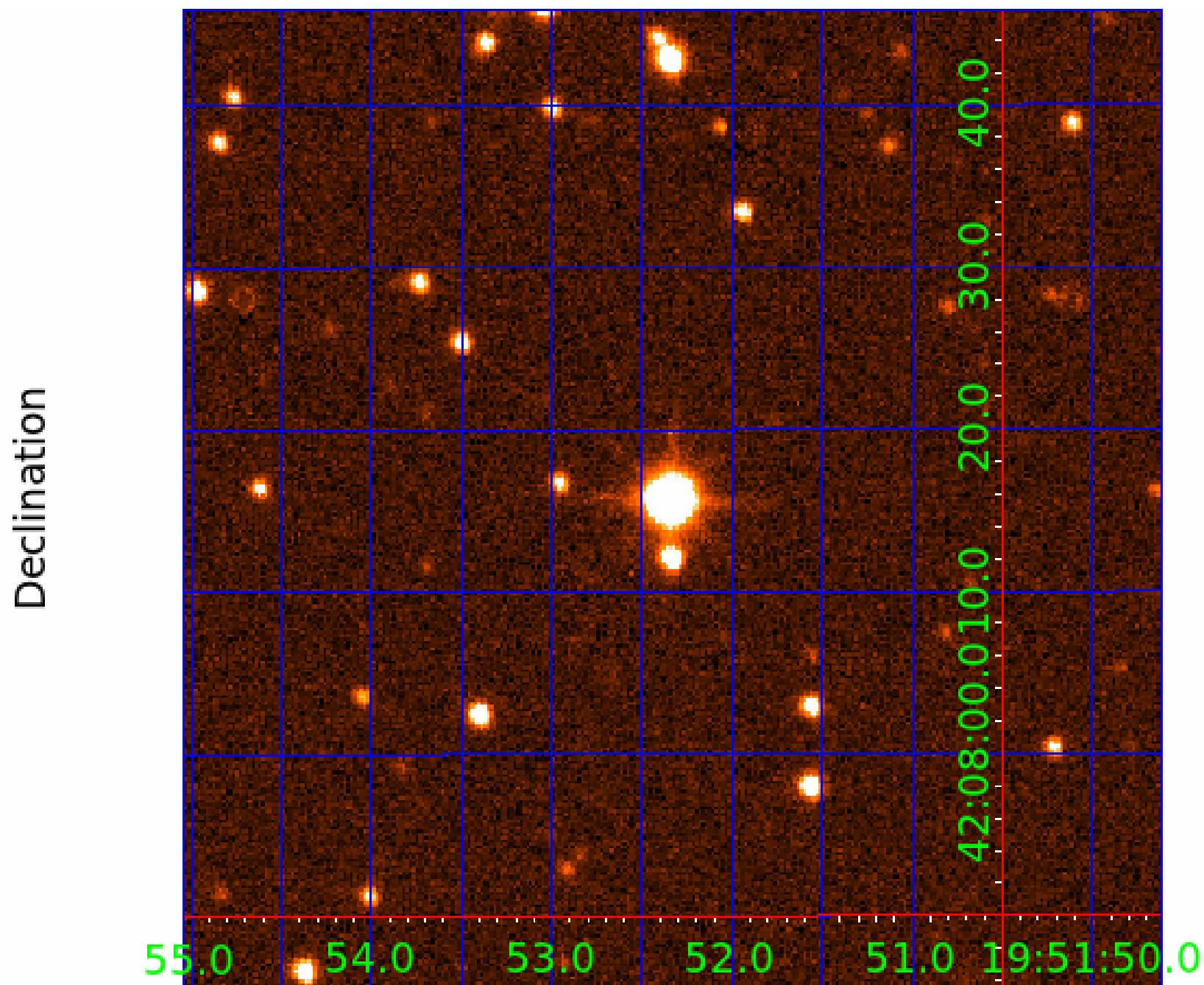
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



fluxWeightedCentroids, Planet 1 of 2



UKIRT Image





# KIC 006716670

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006716670-01	OBS	No	0.553203	131.625074	26.0	1.006	14.5	3.4	2.39	7904	1.42	75515.23
006716670-02	OBS	No	0.553132	131.922005	19.5	4.298	14.1	3.2	2.39	7904	1.23	75528.20

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006716670-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_FEW_DIFFS
006716670-02	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—LPP_ALT—SAME_NTL_PERIOD

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

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

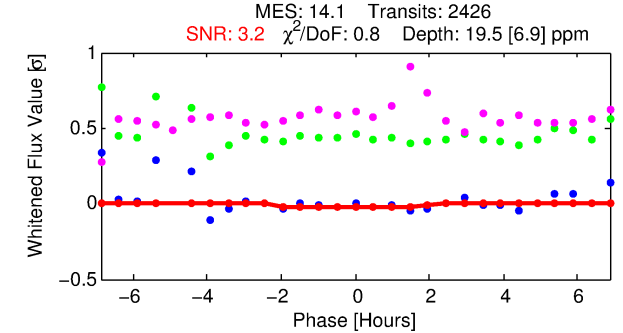
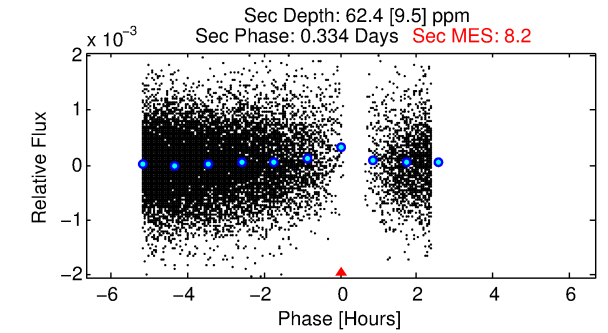
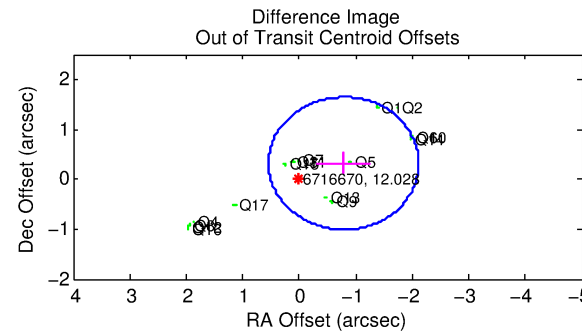
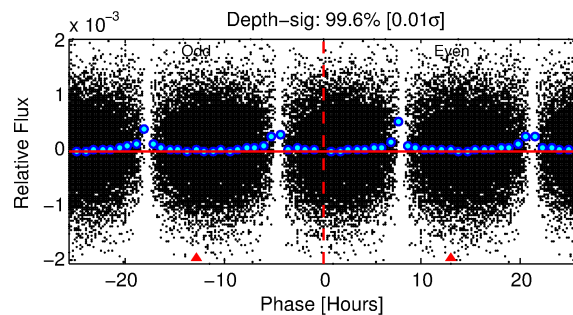
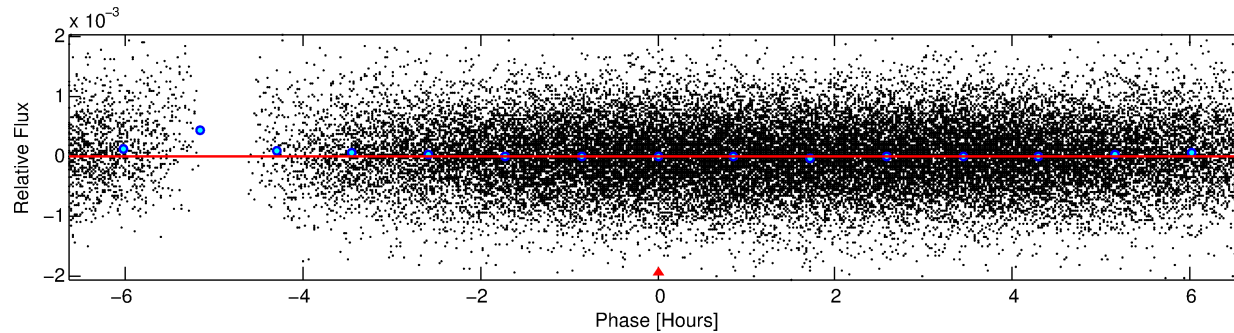
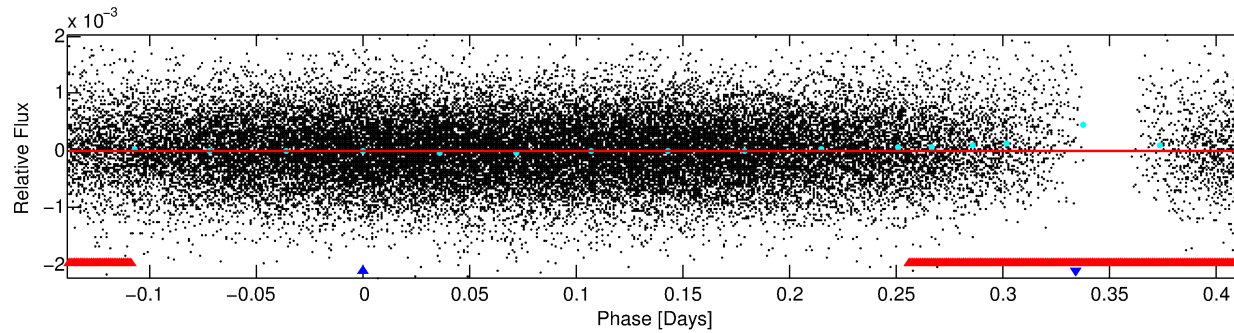
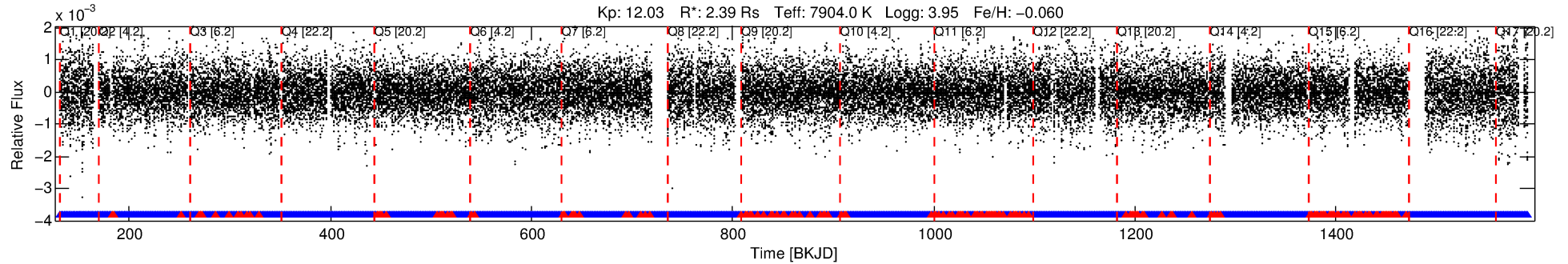
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 006716670-02

No Significant Match Found

# DV One-Page Summary

KIC: 6716670 Candidate: 2 of 2 Period: 0.553 d



## DV Fit Results:

Period = 0.55313 [0.00003] d  
Epoch = 131.9220 [0.0084] BKJD  
Rp/R\* = 0.0047 [0.0053]  
a/R\* = 1.04 [0.60]  
b = 0.90 [1.58]  
Seff = 75528.20 [34650.60]  
Teq = 4227 [485] K  
Rp = 1.22 [1.44] Re  
a = 0.0163 [0.0046] AU  
Ag = 6.05 [13.98] [0.36σ]  
Teffp = 10252 [5831] K [1.03σ]

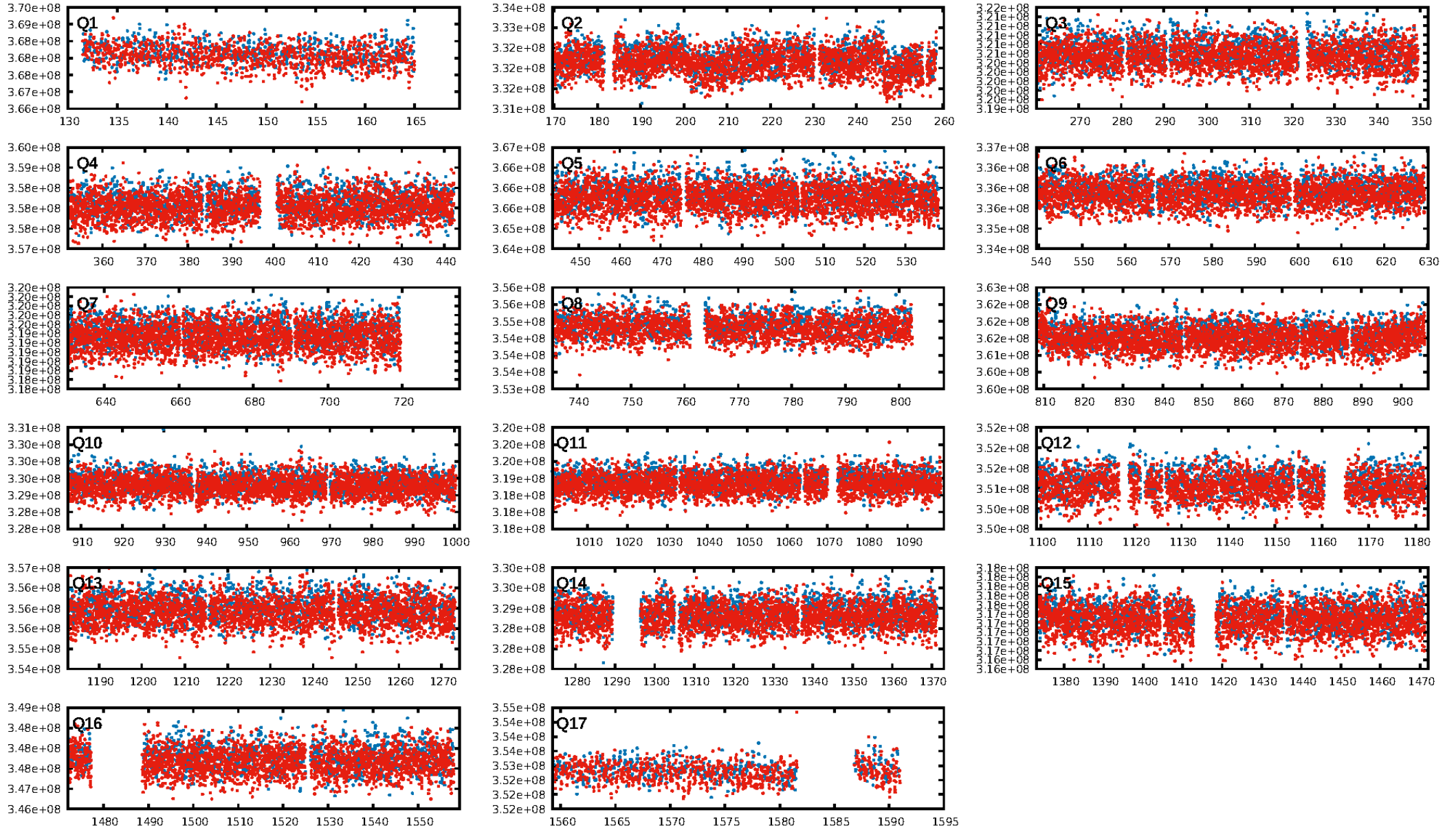
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 0.92 [2134/2319]  
GhostDiagnostic-chr: 0.4903  
Centroid-sig: 0.0%  
Centroid-so: 1.781 arcsec [3.97σ]  
OotOffset-rm: 0.845 arcsec [1.91σ]  
KicOffset-rm: 0.897 arcsec [2.12σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 0.00 [0/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 11:58:13 Z

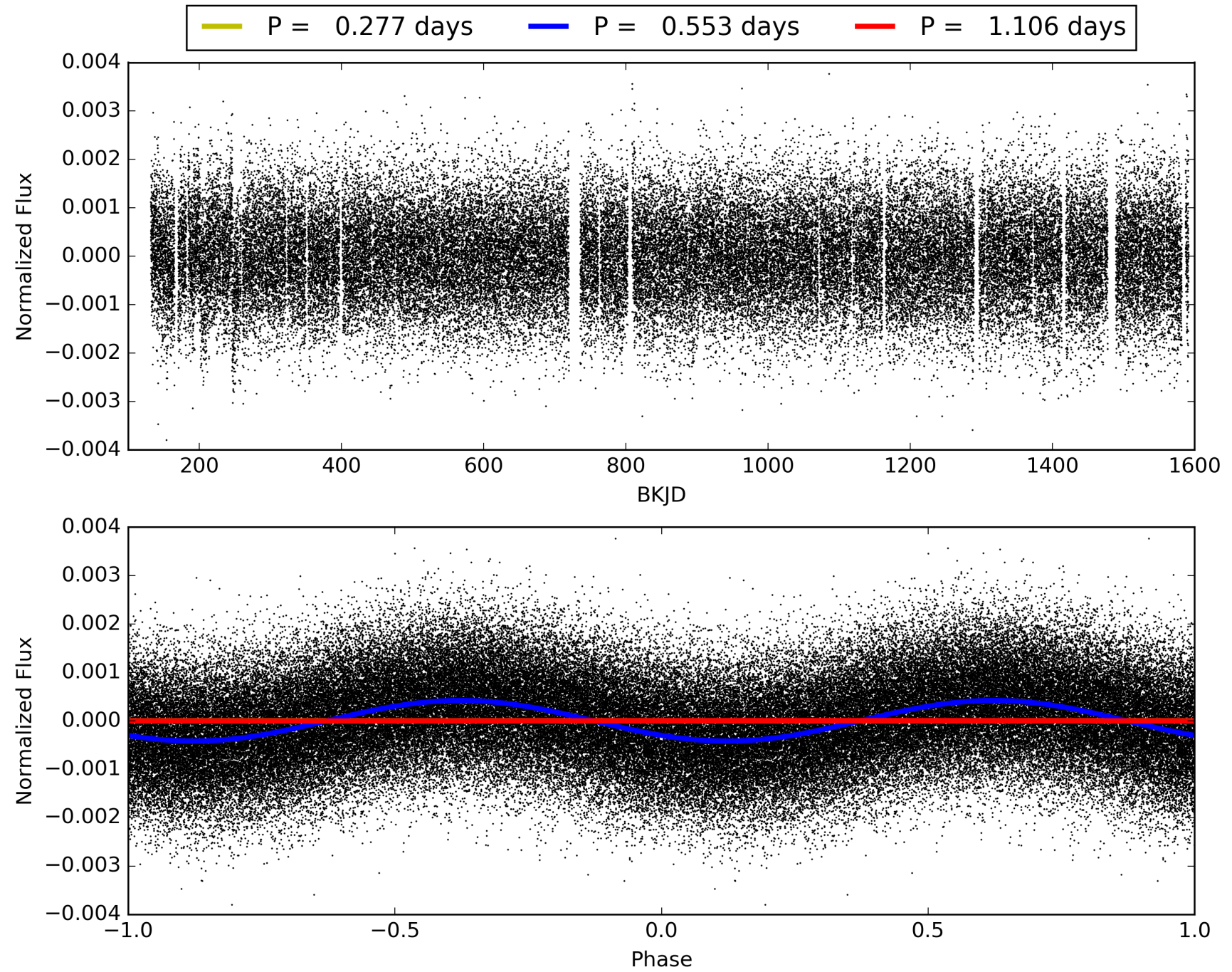
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 006716670-02, PDC Light Curves



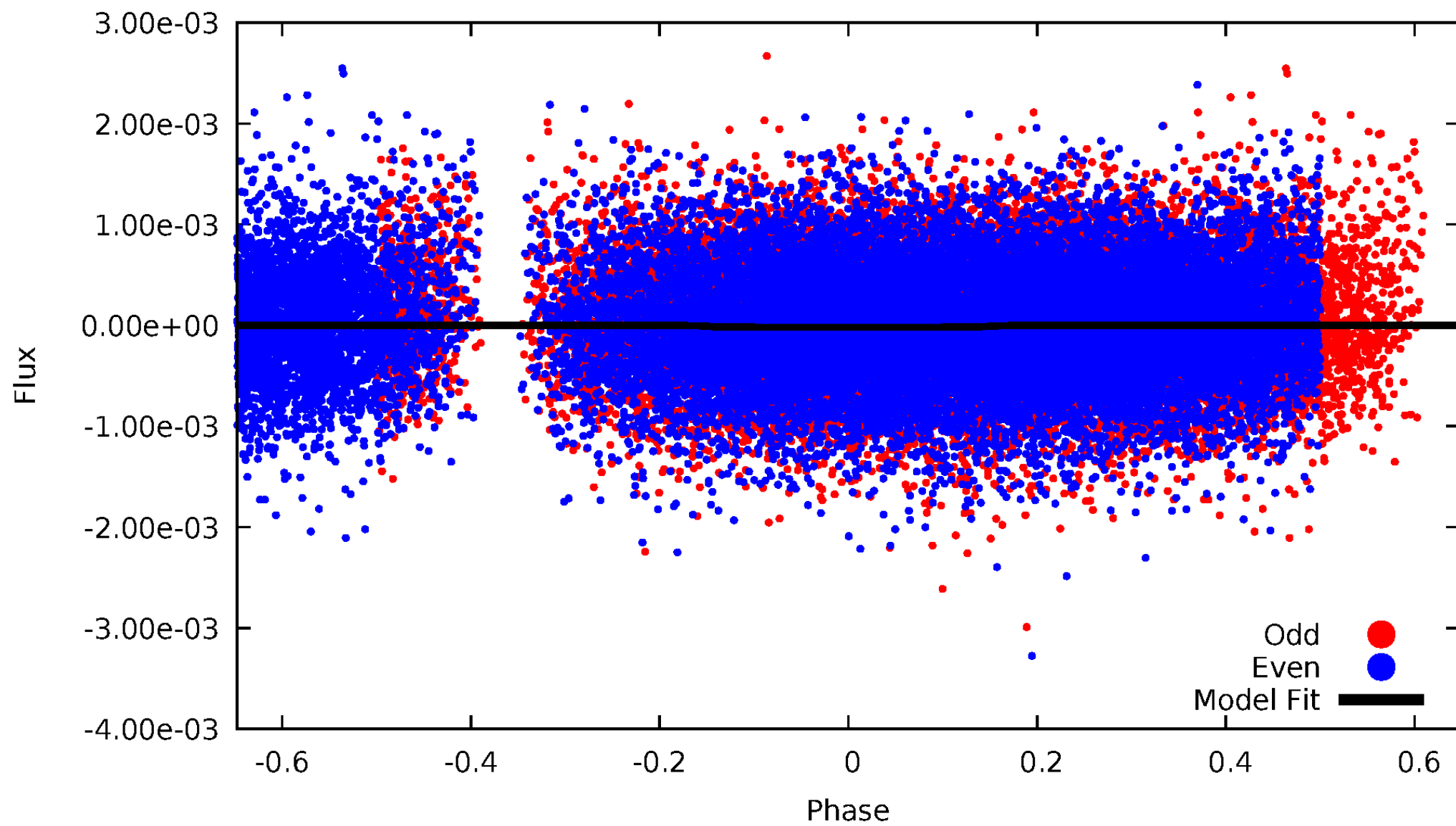


# TCE 006716670-02



DV Odd/Even

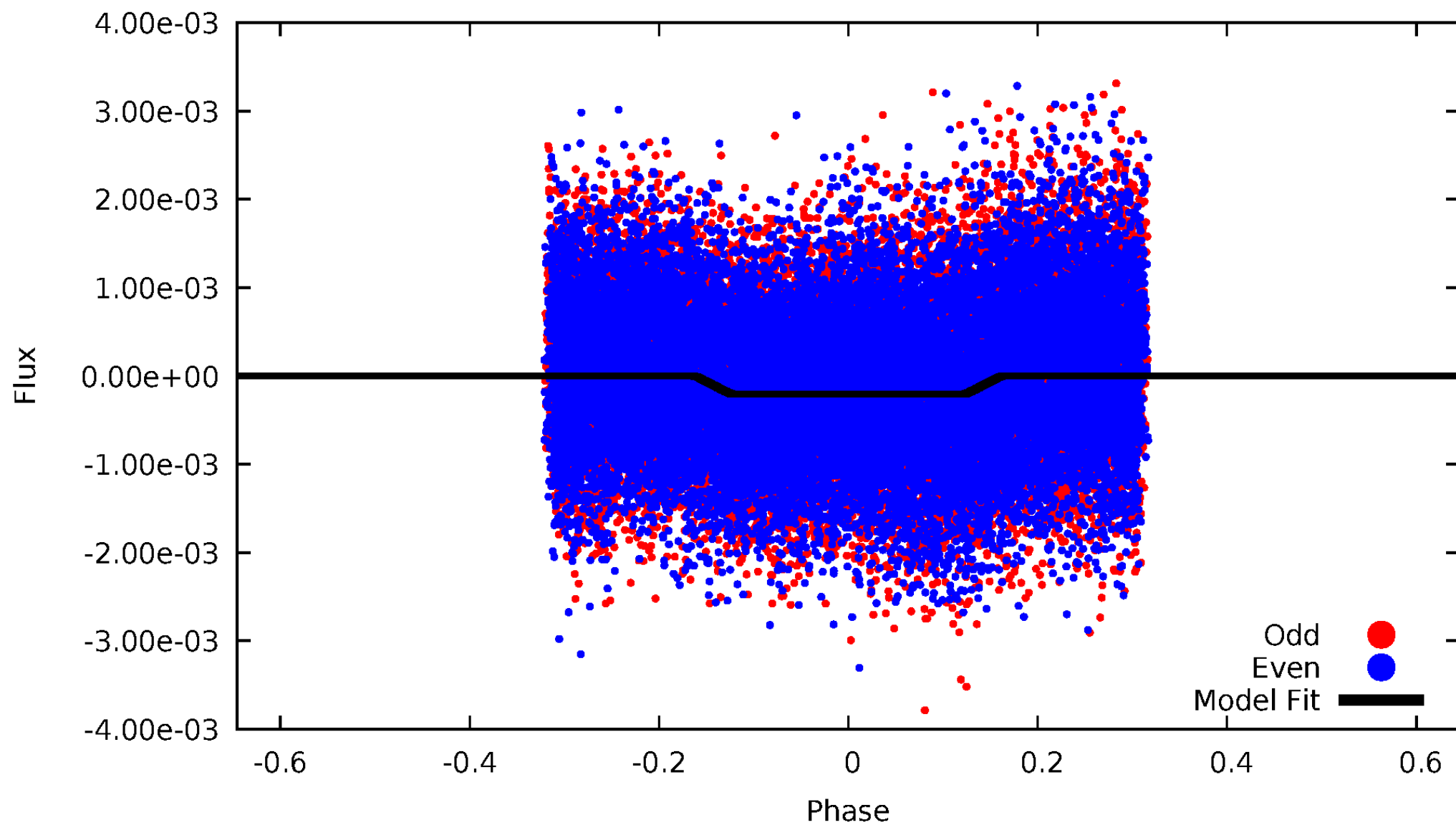
TCE 006716670-02





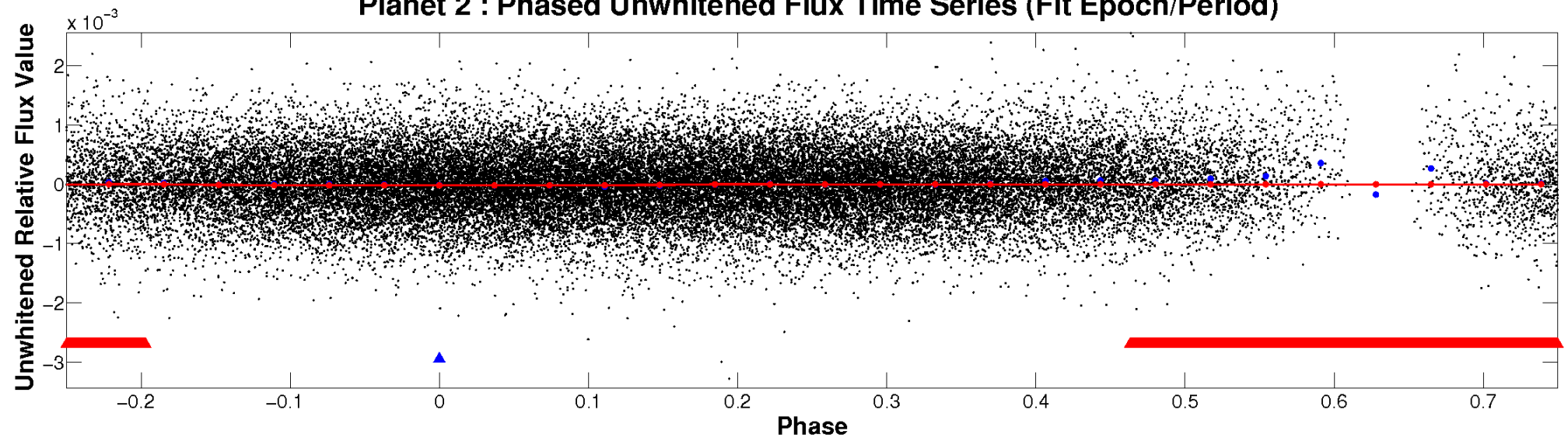
# ALT Odd/Even

TCE 006716670-02

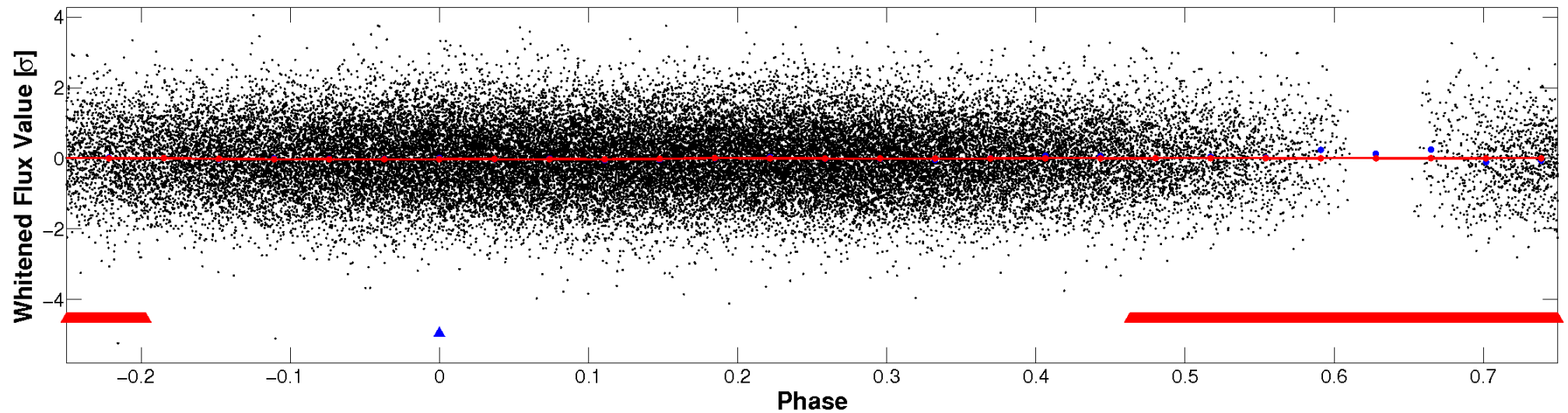


# Non-Whitened Vs. Whitened Light Curve

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

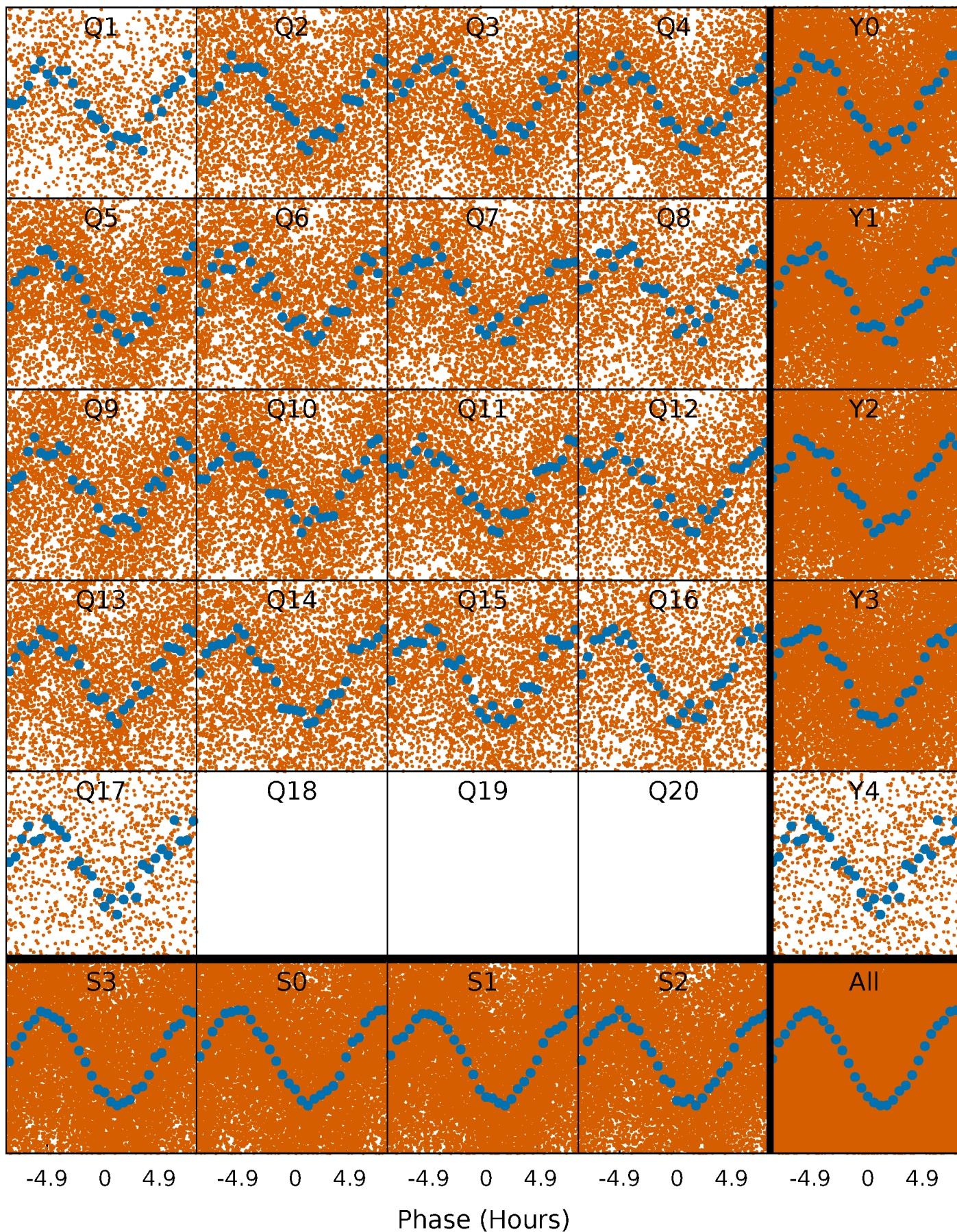


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

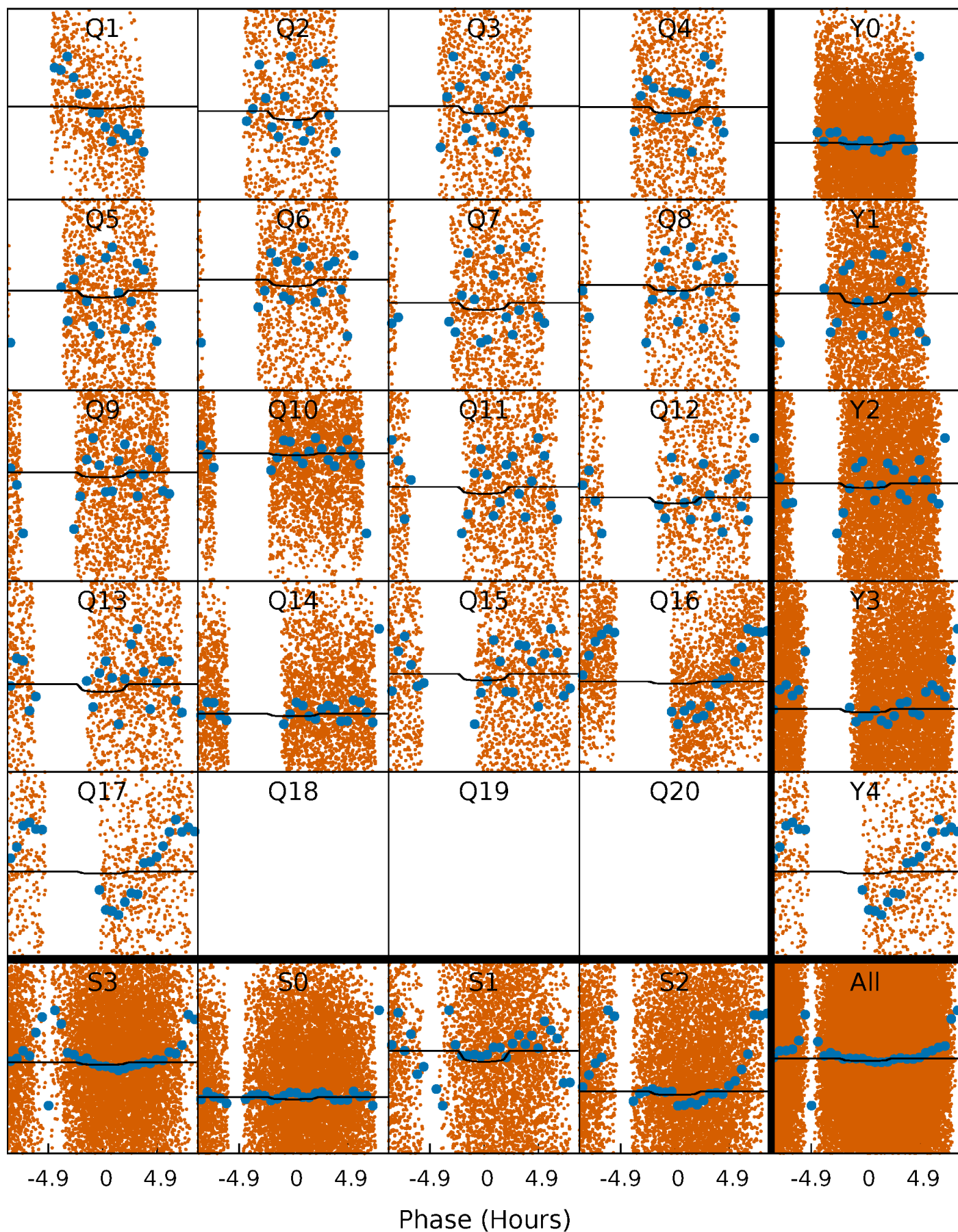
TCE 006716670-02 P= 0.553132 Days  $T_0=131.922005$  (BKJD)





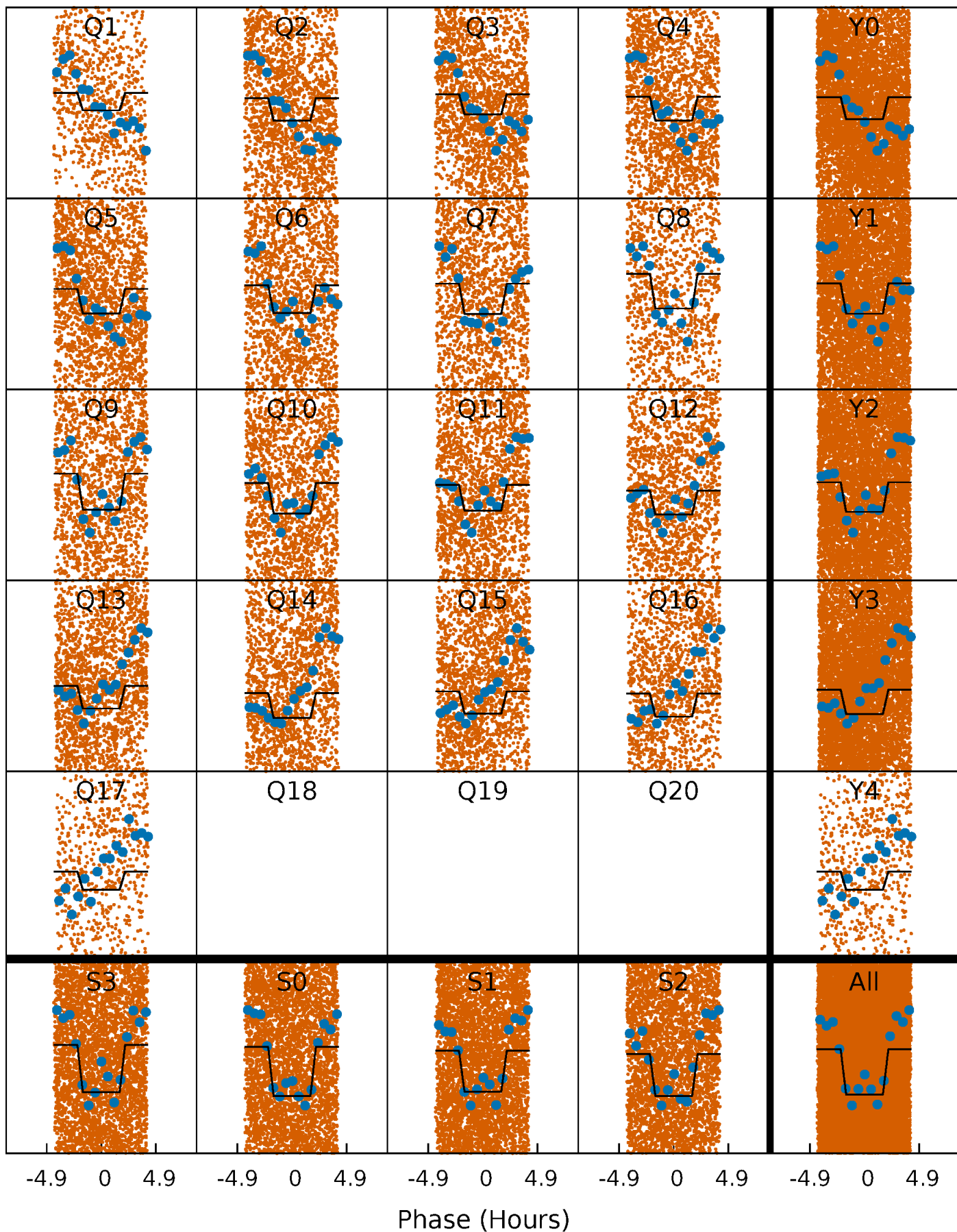
# DV Quarter-Phased Transit Curves

TCE 006716670-02   P= 0.553132 Days    $T_0=131.922005$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 006716670-02     $P = 0.553200$  Days     $T_0 = 131.906941$  (BKJD)

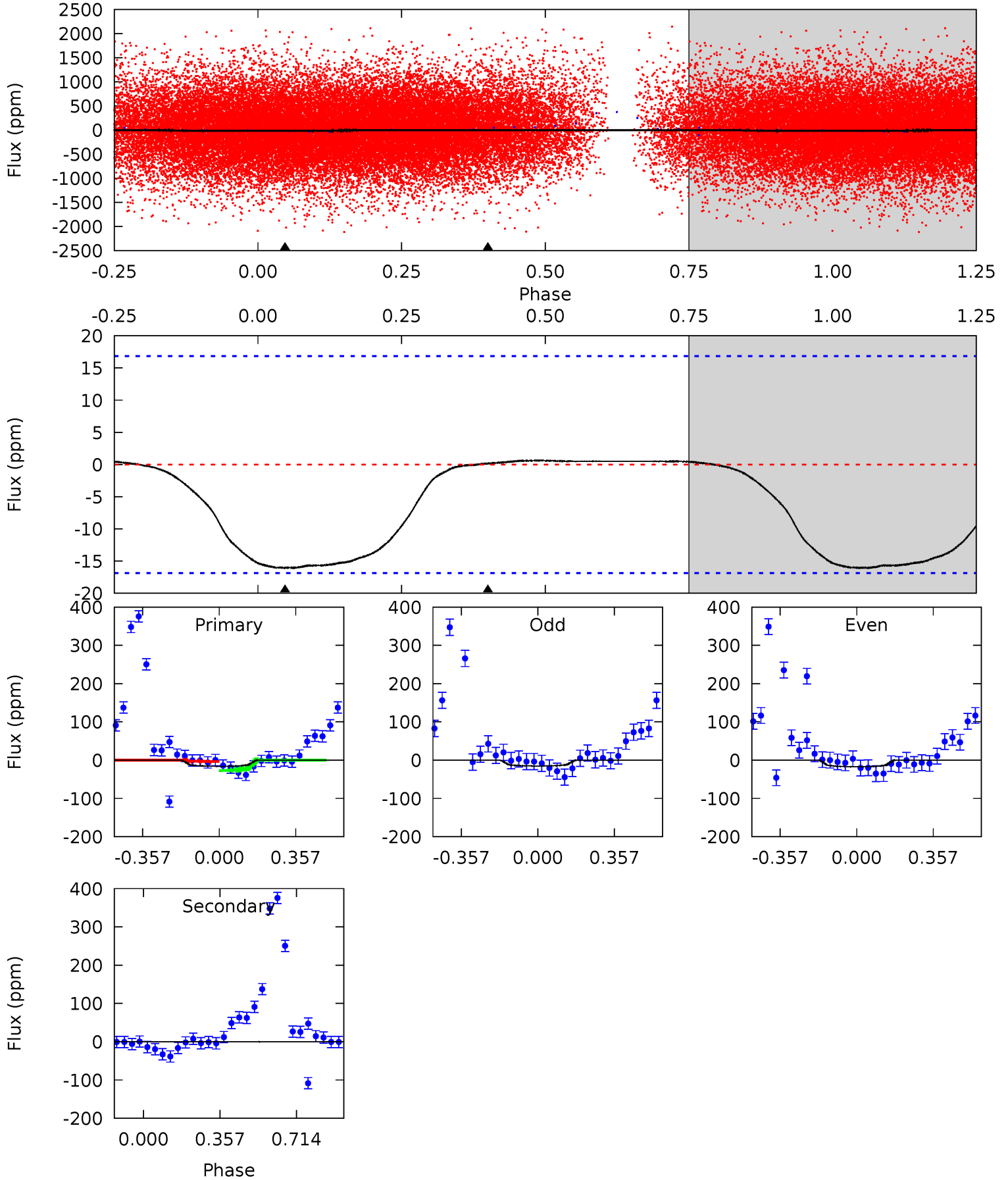




# DV Model-Shift Uniqueness Test

006716670-02, P = 0.553132 Days, E = 131.368873 Days

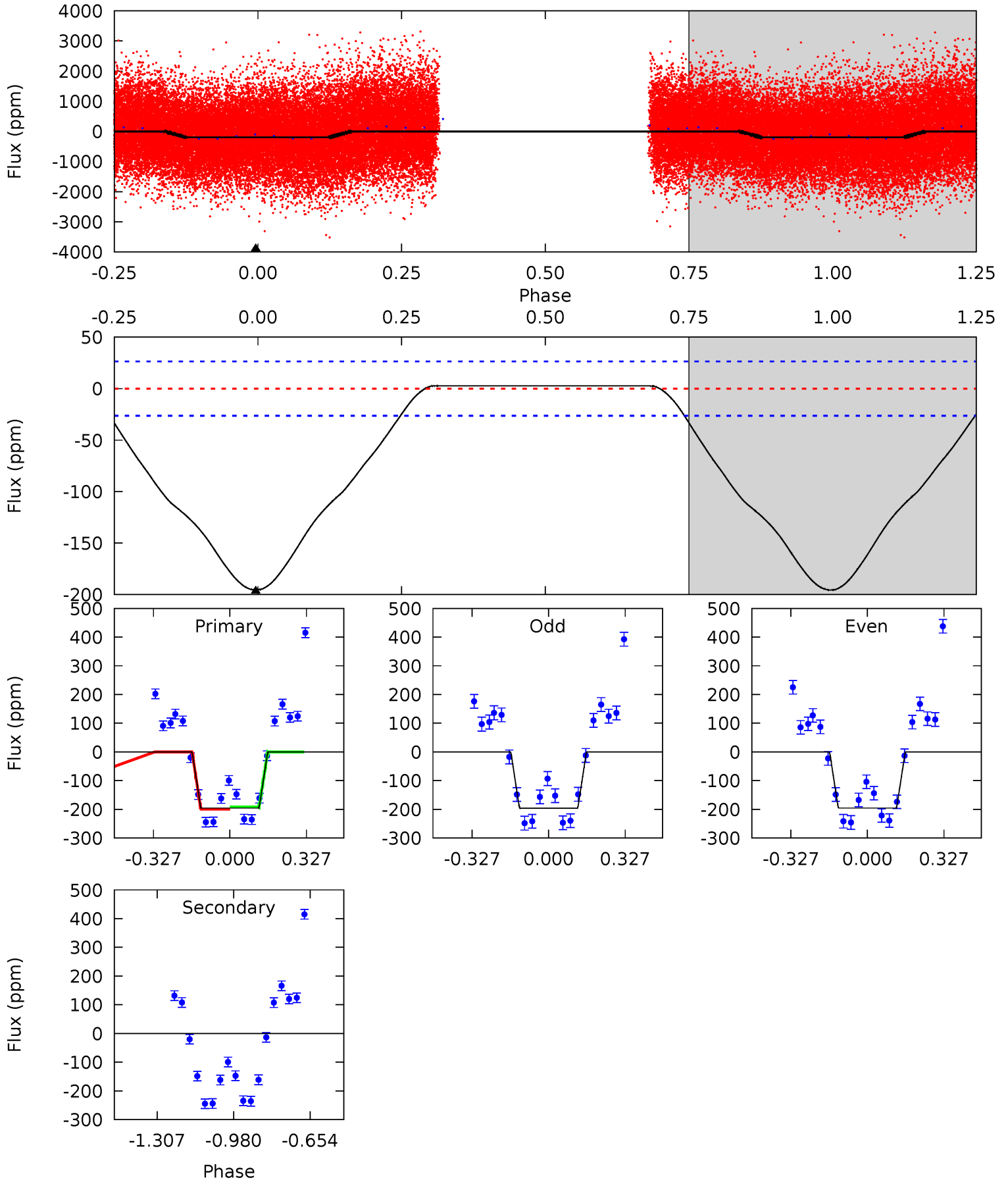
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
4.09	-0.04	0	0	4.29	0.92	0.17	4.09	4.09	-0.04	-0.04	0.25	0.85	0.04	3.03



# Alt Model-Shift Uniqueness Test

006716670-02, P = 0.553200 Days, E = 131.353741 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
32.0	0	0	0	4.31	0.98	0.50	32.0	32.0	0	0	0.06	0.96	0.01	0.57



### Stellar Parameters For KIC 006716670

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$7904^{+219}_{-329}$	$3.954^{+0.241}_{-0.130}$	$-0.060^{+0.200}_{-0.350}$	$2.390^{+0.473}_{-0.768}$	$1.872^{+0.120}_{-0.385}$	$0.193^{+0.284}_{-0.075}$
	+3%/-4%	+6%/-3%	+333%/-583%	+20%/-32%	+6%/-21%	+147%/-39%
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 006716670-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$0 \pm 4$	$1.46^{+1.27}_{-0.99}$	$5832^{+404}_{-473}$	$-4783^{+8624}_{-982}$	$-0.001^{+0.409}_{-0.416}$
Alt.	$0 \pm 6$	$3.56^{+1.57}_{-1.37}$	$5874^{+386}_{-483}$	$-4833^{+484}_{-375}$	$-0.002^{+0.077}_{-0.078}$

$T_{max}$  = 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

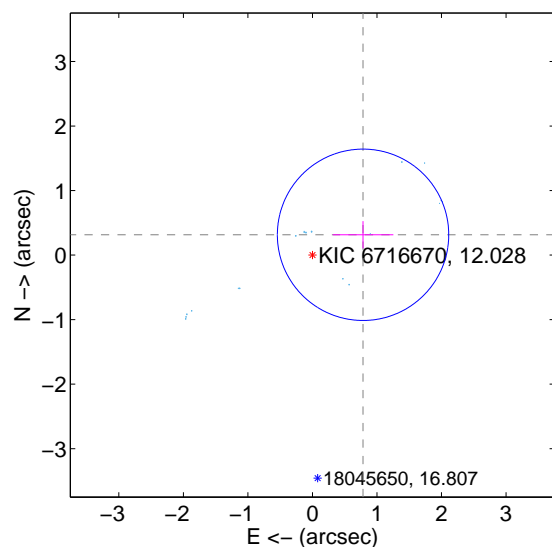
Supplemental centroid analysis for 006716670-02. Kepler magnitude: 12.03. Transit SNR 3.22

There are 17 quarters with good PRF difference image offsets

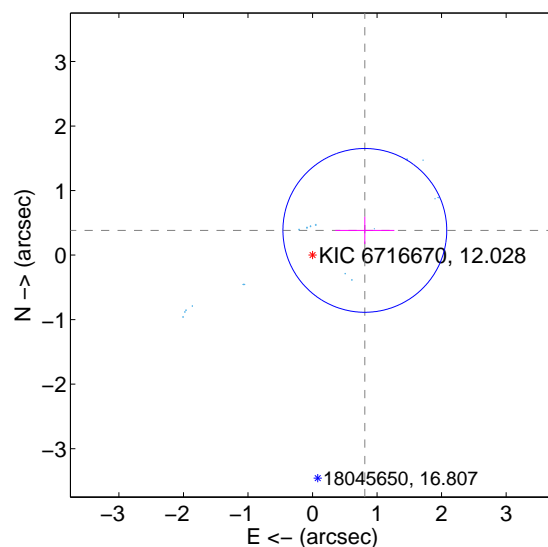
The direct PRF centroid is offset from the target star catalog position by about 0.09 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.845 \pm 0.443$	1.91	$-0.784 \pm 0.469$	$0.315 \pm 0.211$
PRF-fit source offset from KIC position	$0.897 \pm 0.423$	2.12	$-0.811 \pm 0.457$	$0.383 \pm 0.211$
photometric centroid source offset	$1.78 \pm 0.45$	<b>3.97</b>	$-0.66 \pm 0.50$	$1.65 \pm 0.44$

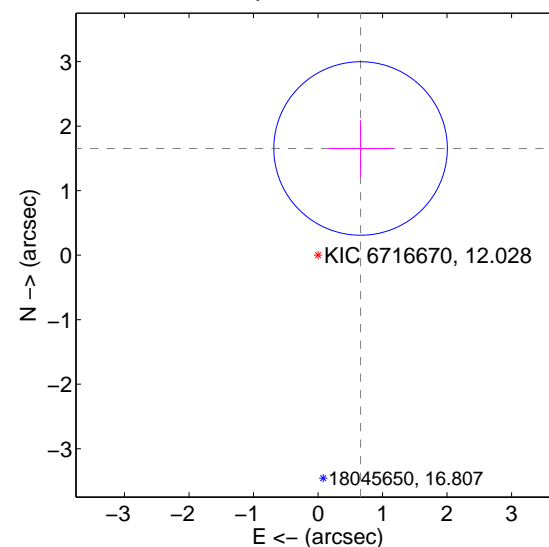
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

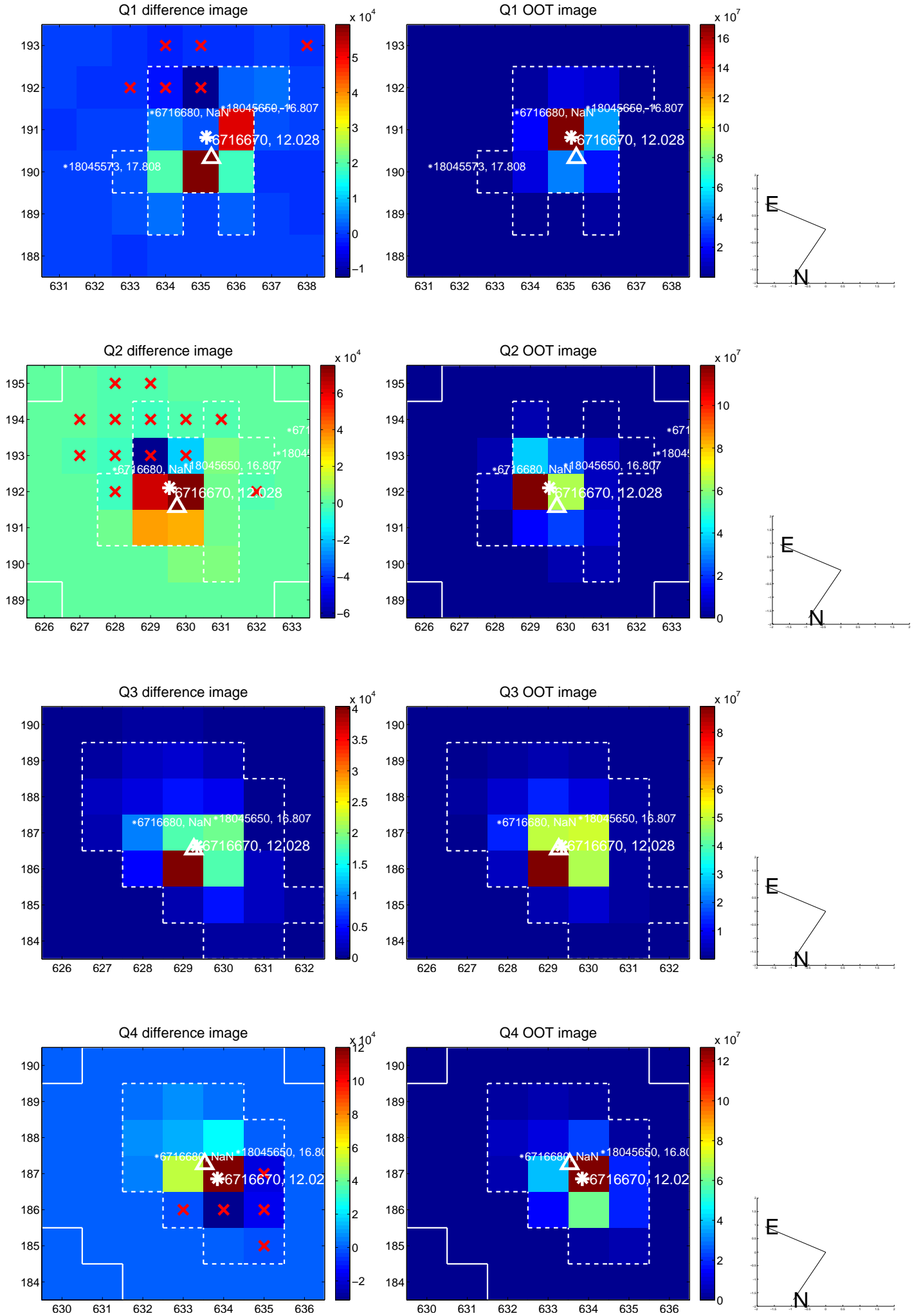


offset from photometric centroids



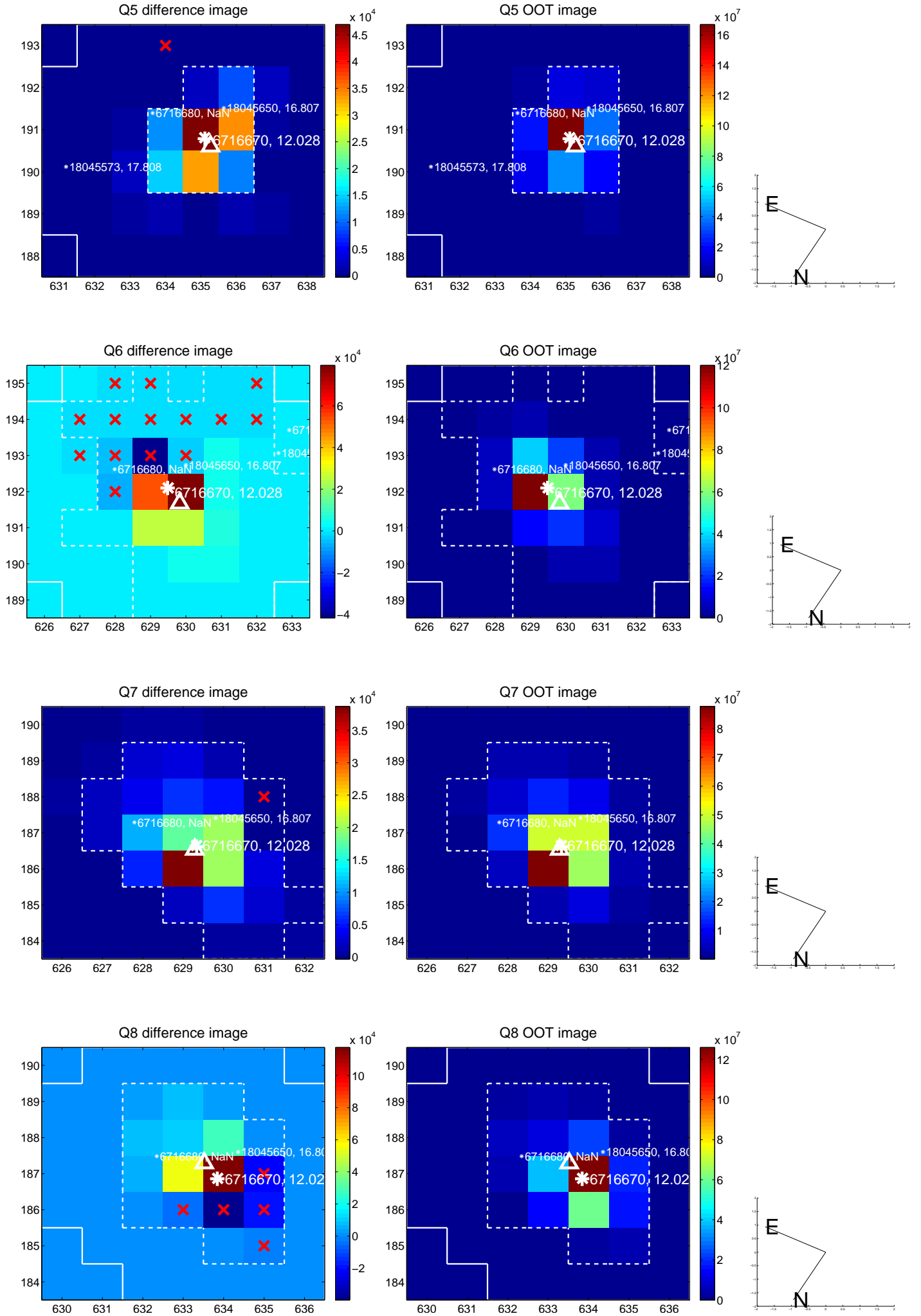
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

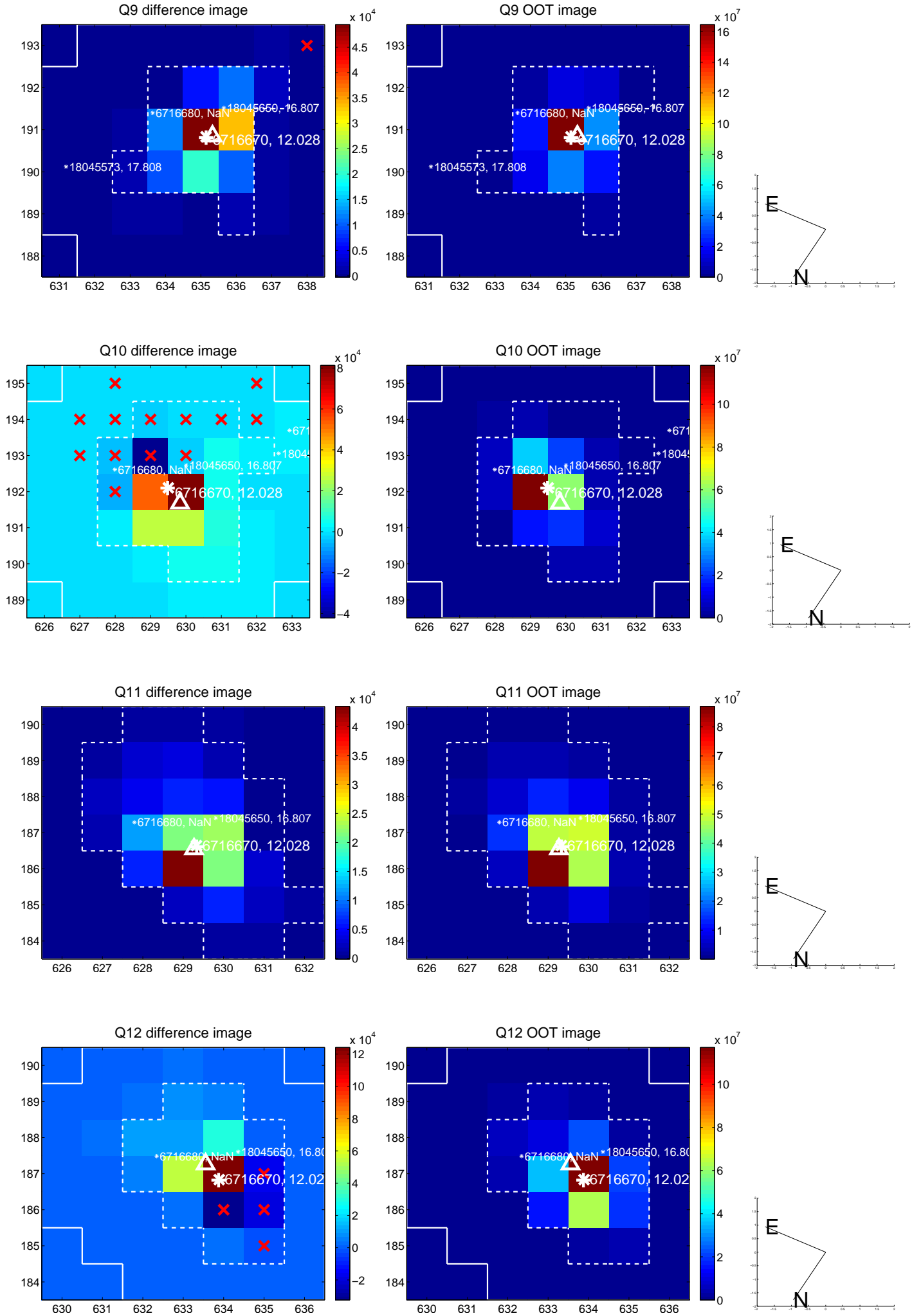




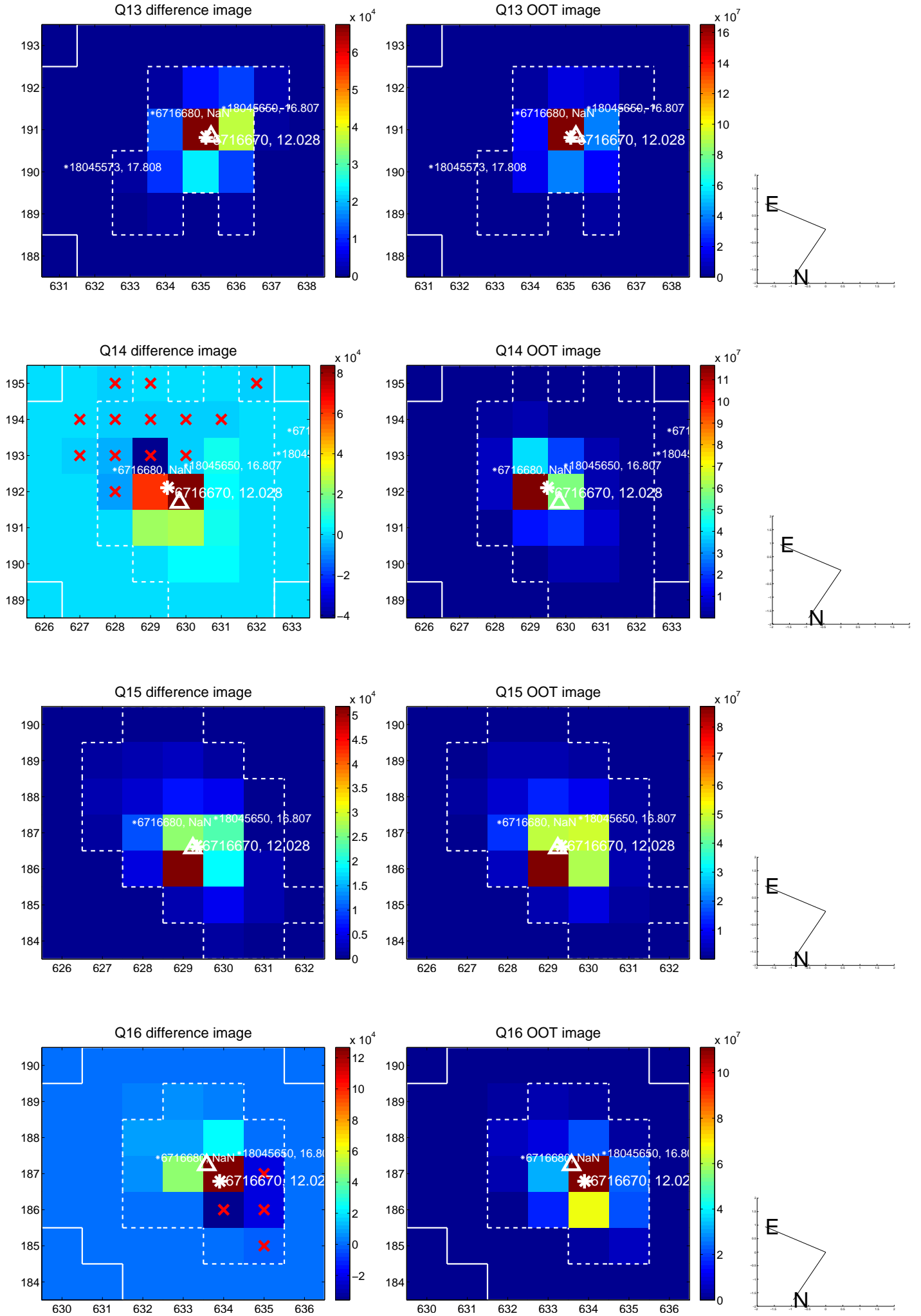
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



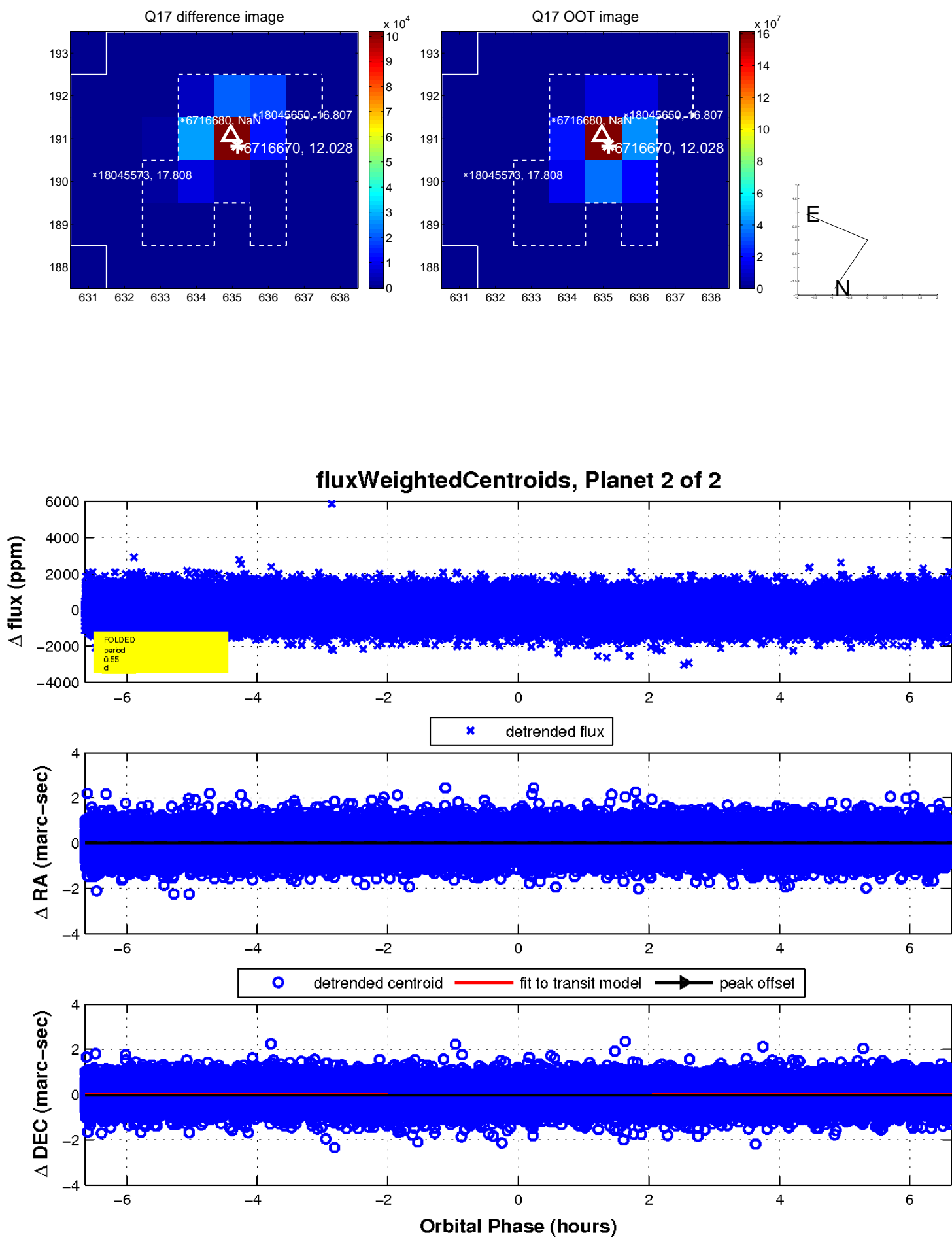
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

