

# KIC 002988145

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
002988145-01	OBS	No	1.233538	132.386239	148.3	5.874	14.0	12.5	1.49	6992	2.09	7530.64
002988145-02	OBS	No	0.822351	131.979468	302.7	1.180	11.8	13.7	1.49	6992	3.02	12930.82
002988145-03	OBS	No	0.616760	131.634832	447.5	1.145	9.6	14.0	1.49	6992	3.68	18976.40

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
002988145-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT
002988145-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT
002988145-03	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_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.

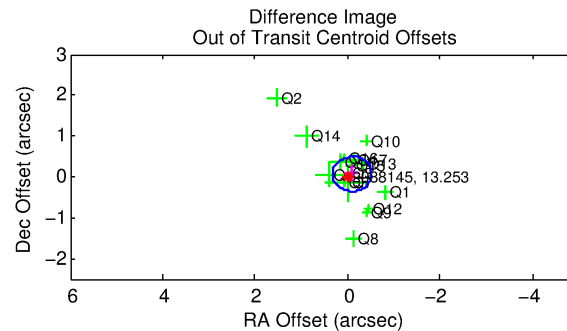
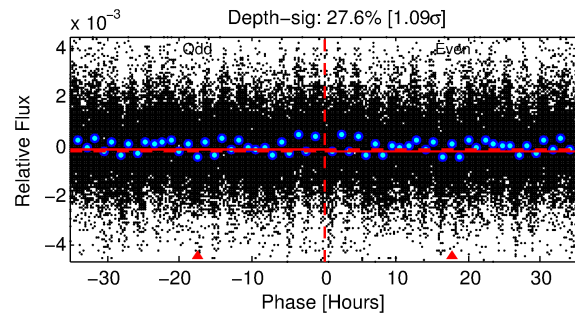
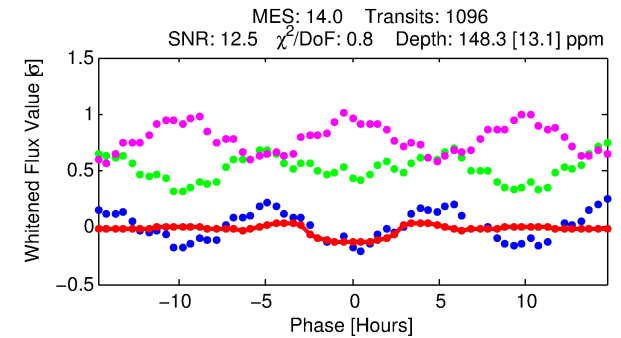
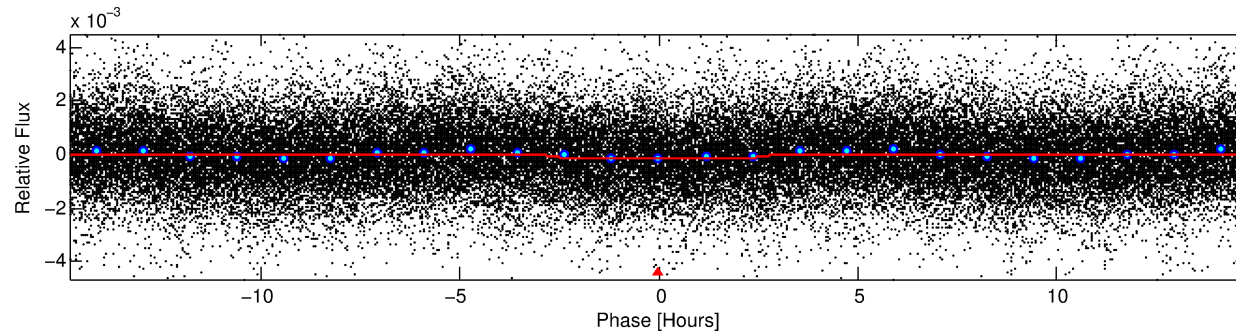
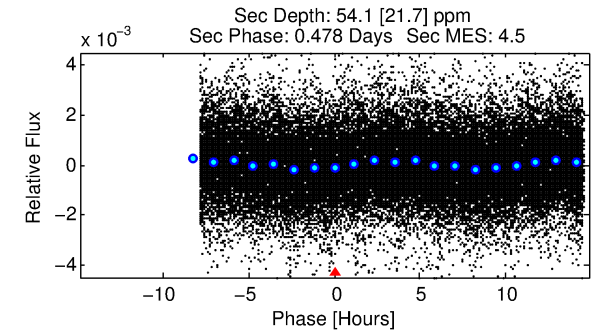
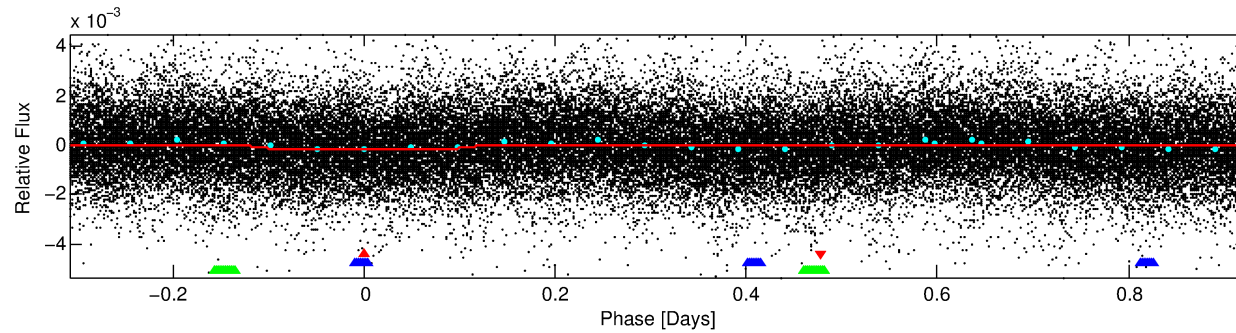
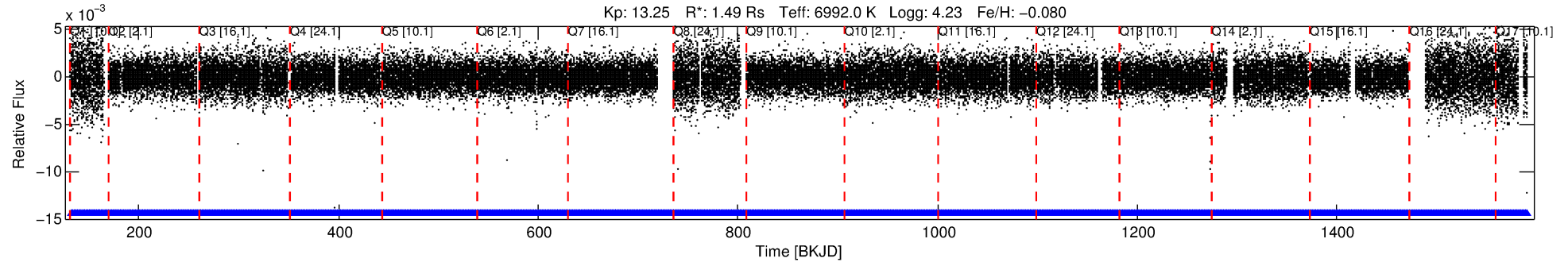
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 002988145-01

No Significant Match Found

# DV One-Page Summary

KIC: 2988145 Candidate: 1 of 3 Period: 1.234 d



## DV Fit Results:

Period = 1.23354 [0.00001] d  
Epoch = 132.3862 [0.0043] BKJD  
Rp/R\* = 0.0129 [0.0027]  
a/R\* = 1.21 [0.49]  
b = 0.89 [0.29]  
Seff = 7530.64 [3108.01]  
Teq = 2375 [245] K  
Rp = 2.09 [0.84] Re  
a = 0.0251 [0.0069] AU  
Ag = 4.28 [2.99] [1.10σ]  
Teffp = 5282 [796] K [3.49σ]

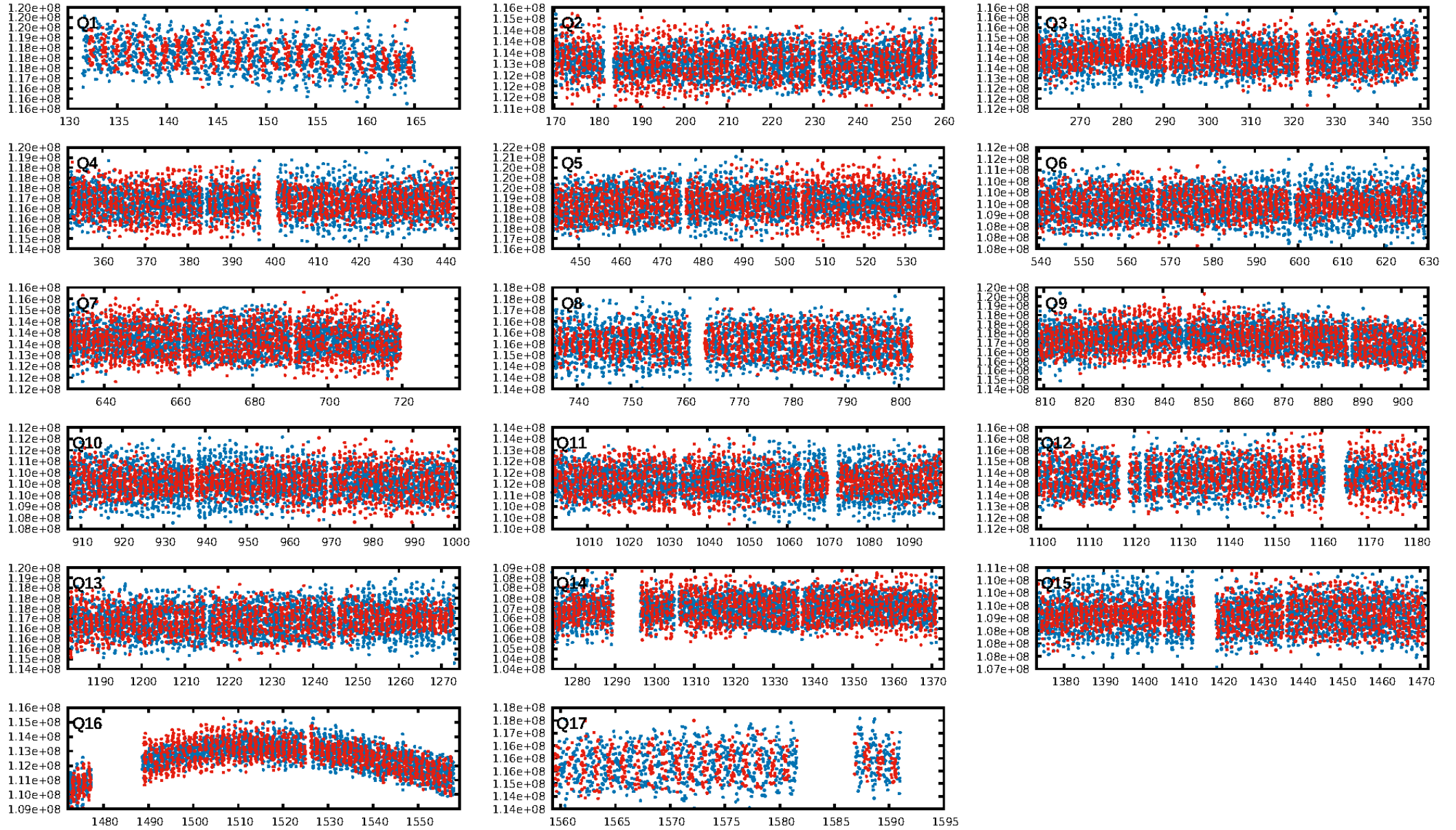
## DV Diagnostic Results:

ShortPeriod-sig: 90.0% [1.65σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [1047/1047]  
GhostDiagnostic-chr: 1.679  
Centroid-sig: 0.1%  
Centroid-so: 0.239 arcsec [1.58σ]  
OotOffset-rm: 0.114 arcsec [0.81σ]  
KicOffset-rm: 0.139 arcsec [0.79σ]  
OotOffset-st: 3/4/4/5 [16]  
KicOffset-st: 3/4/4/5 [16]  
DiffImageQuality-fgm: 0.69 [11/16]  
DiffImageOverlap-fno: 0.00 [0/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 03-Feb-2016 09:14:56 Z

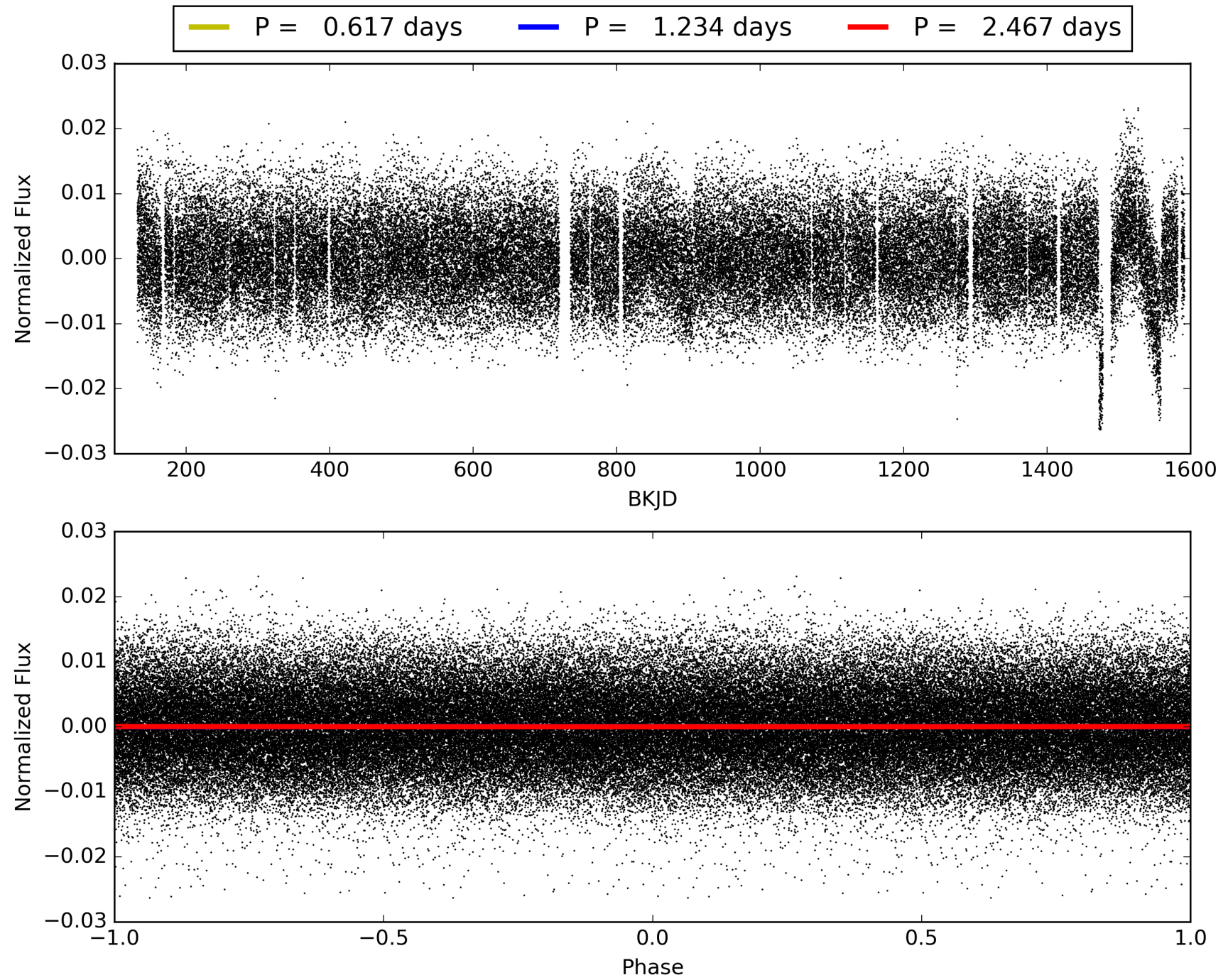
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 002988145-01, PDC Light Curves





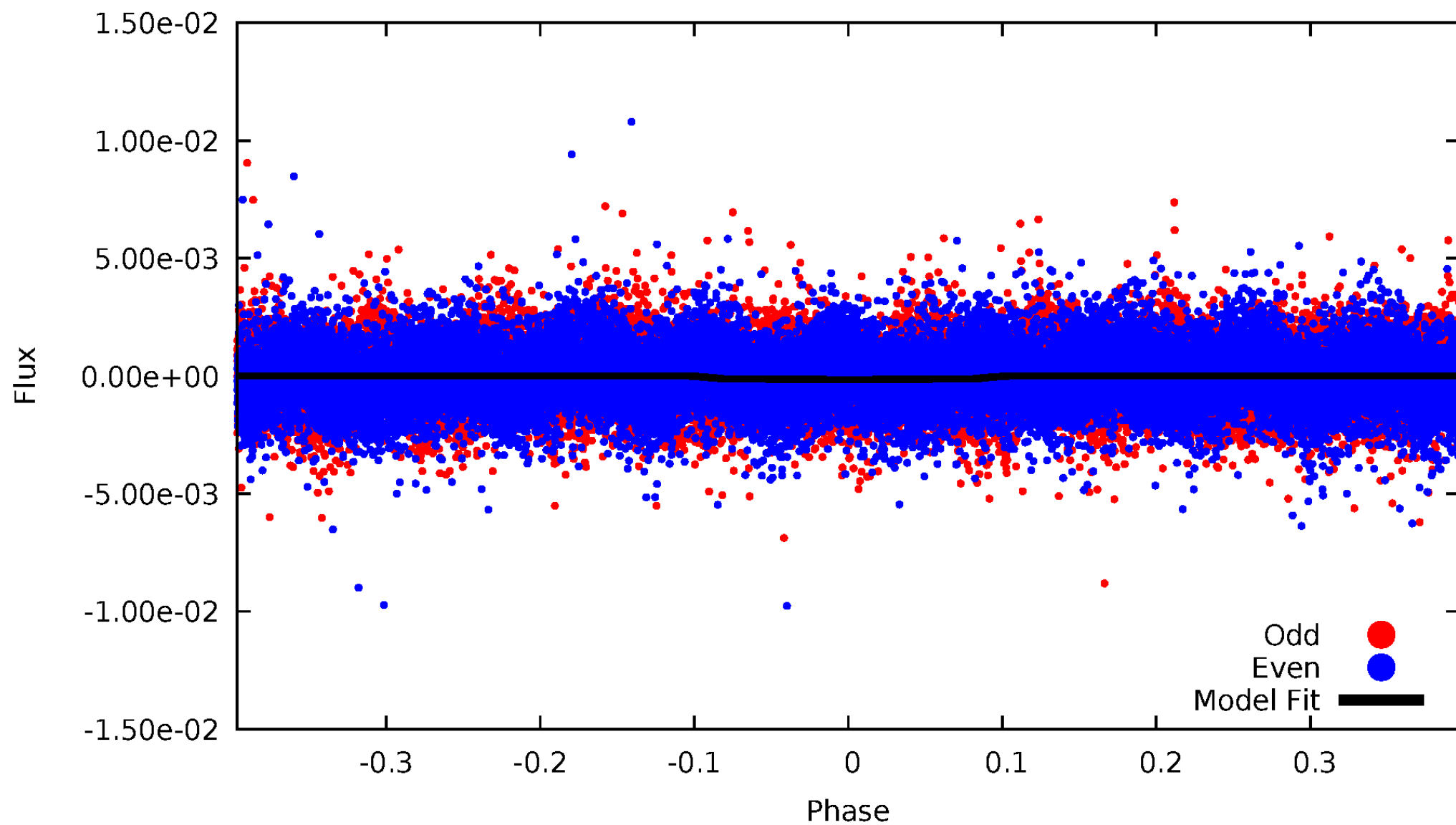
TCE 002988145-01





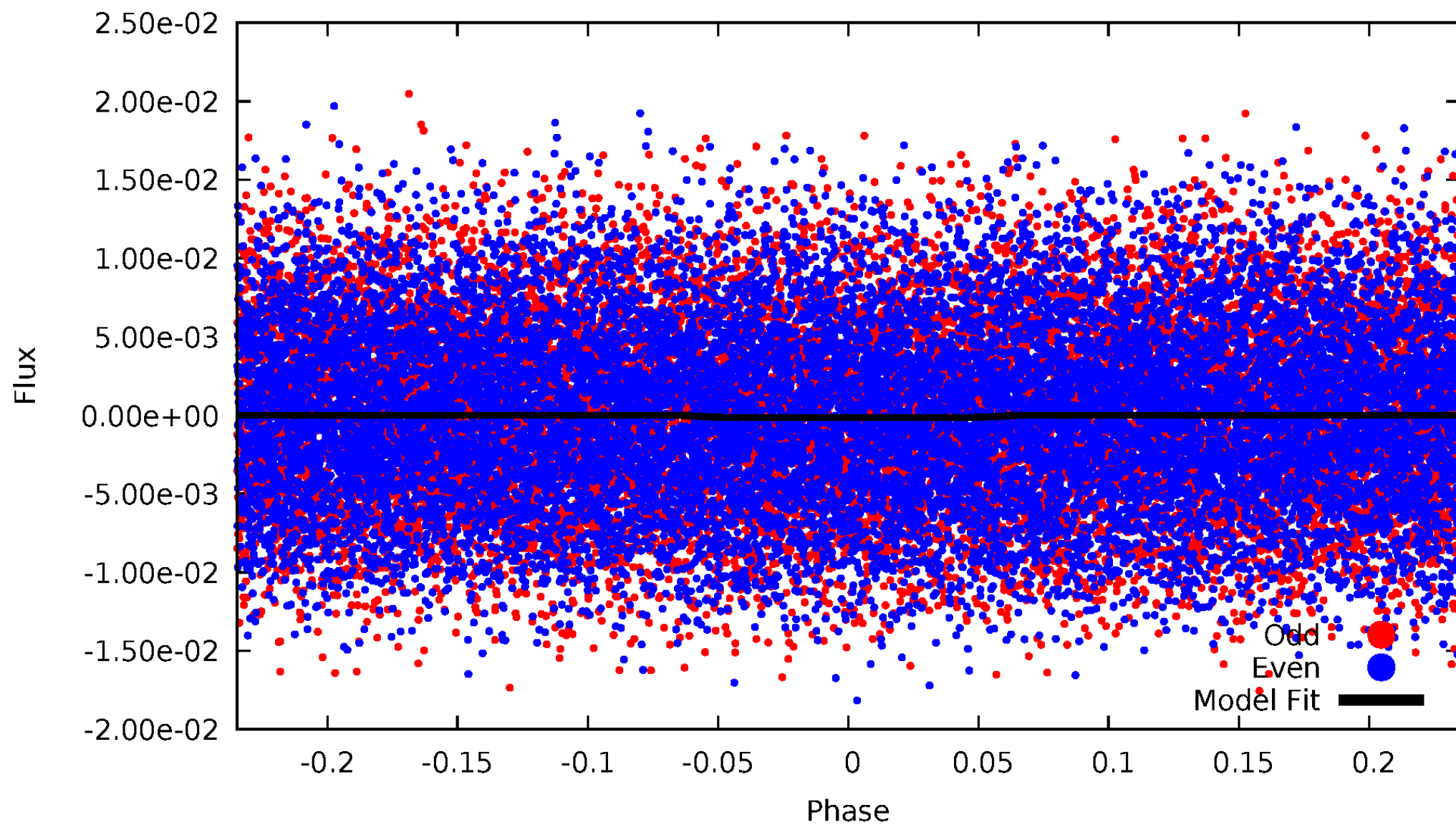
# DV Odd/Even

TCE 002988145-01

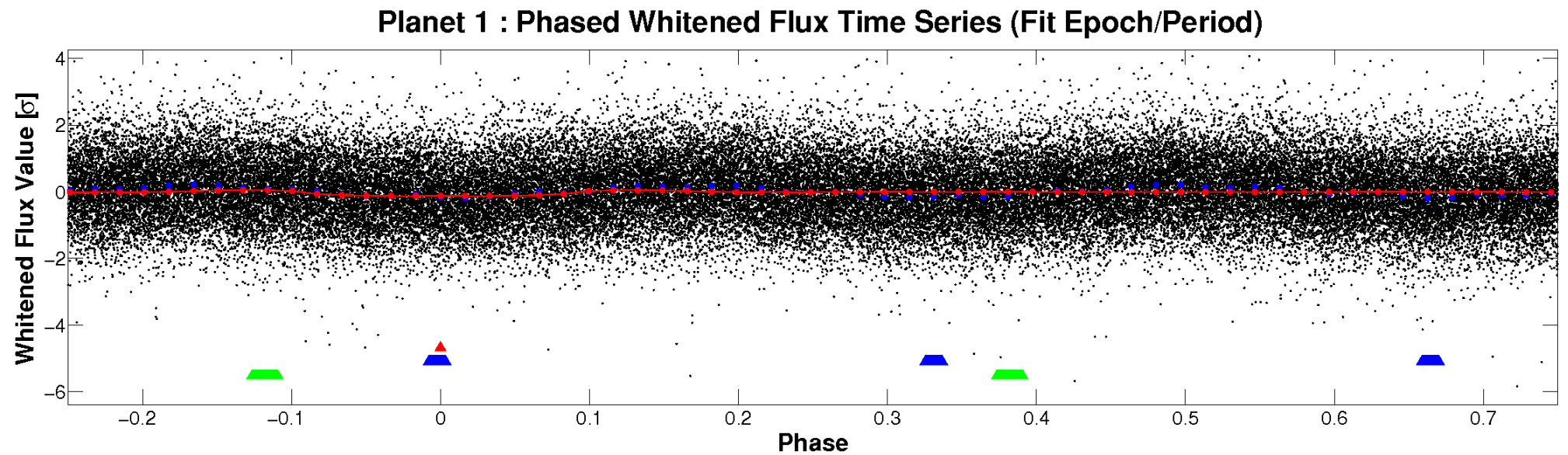
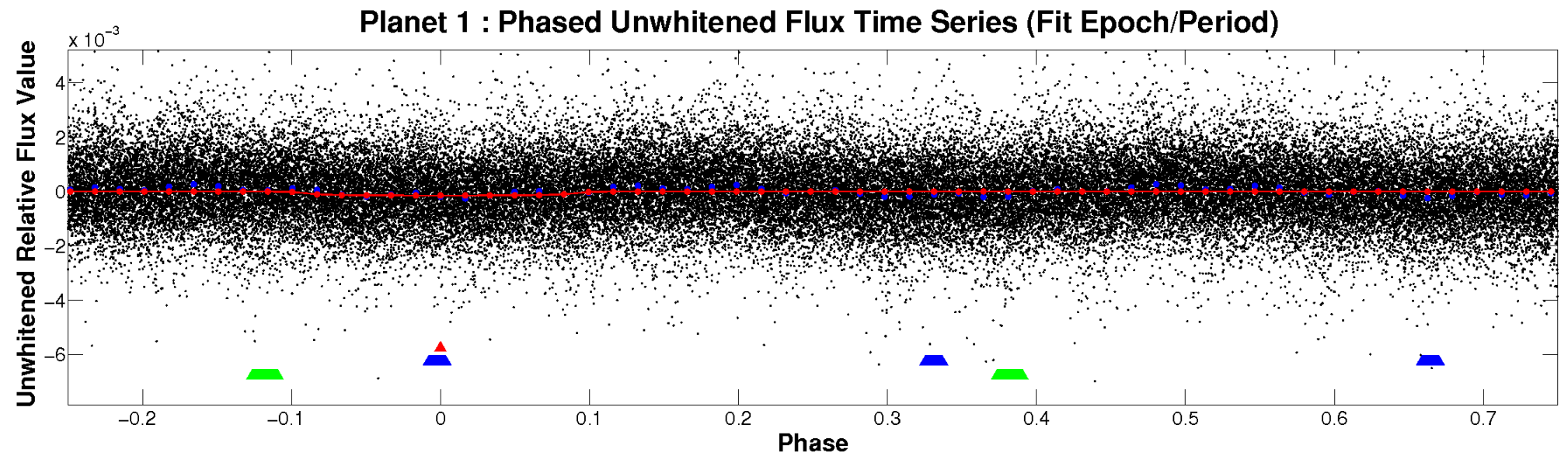


# ALT Odd/Even

TCE 002988145-01



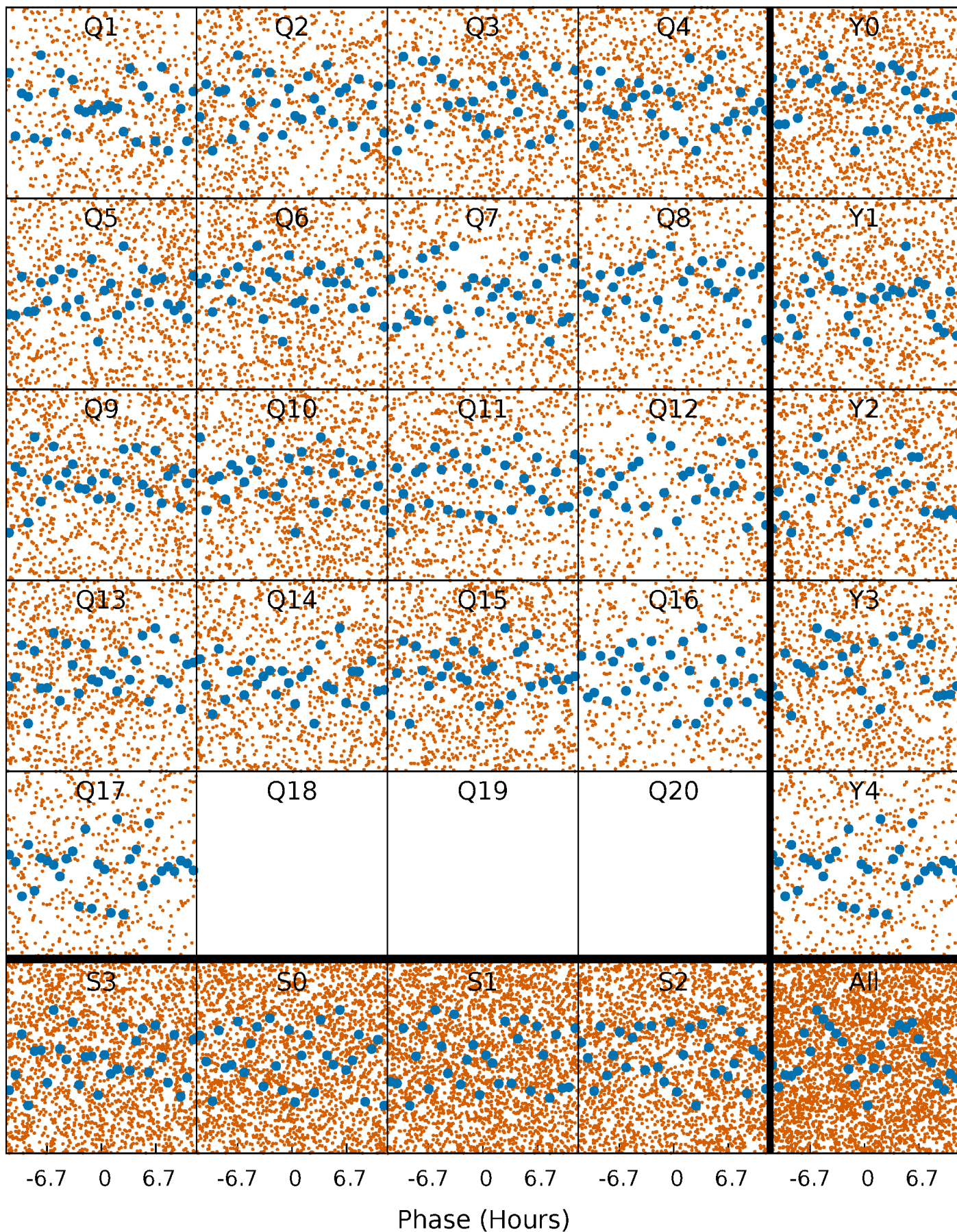
# Non-Whitened Vs. Whitened Light Curve





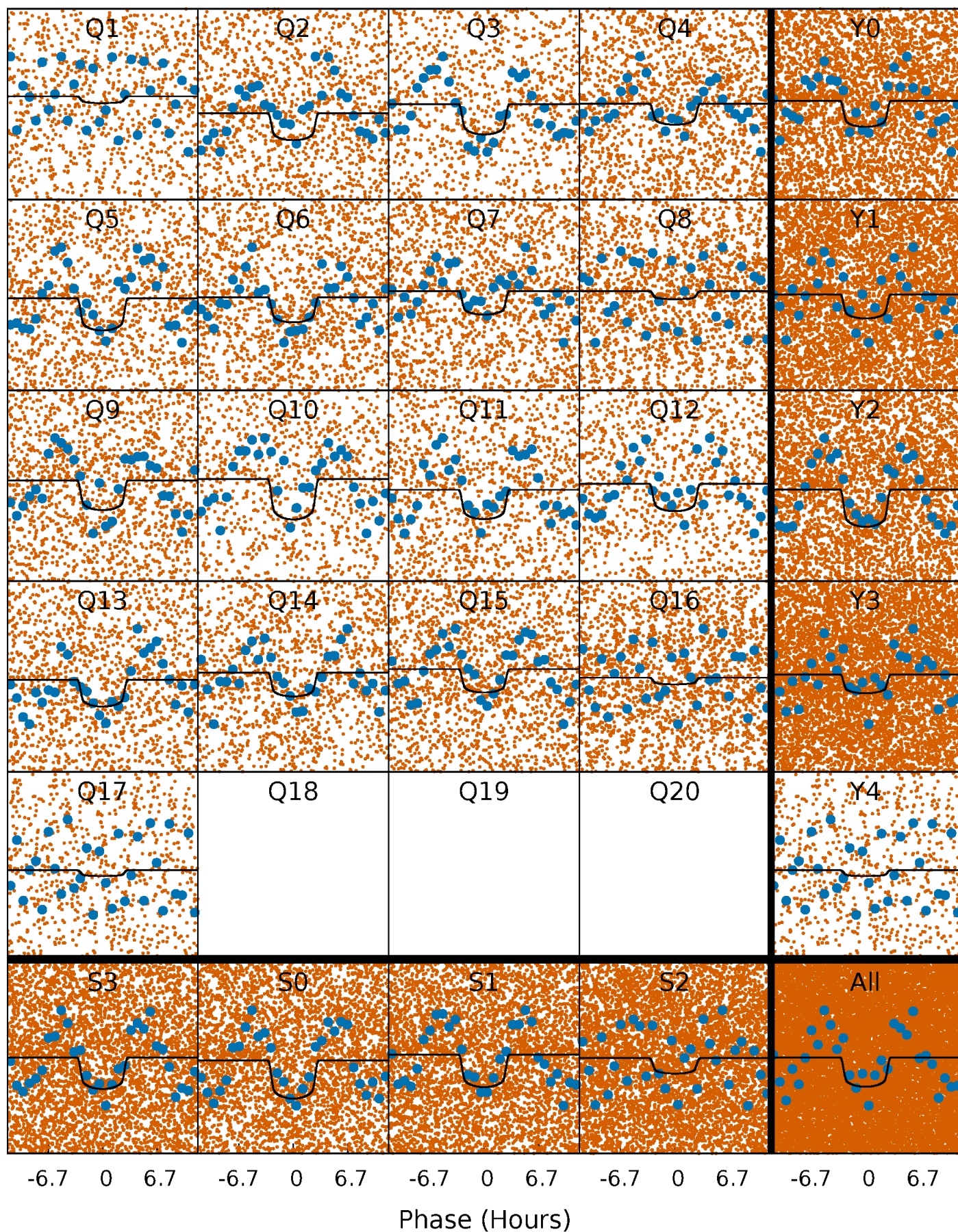
# PDC Quarter-Phased Transit Curves

TCE 002988145-01 P= 1.233538 Days  $T_0=132.386239$  (BKJD)



# DV Quarter-Phased Transit Curves

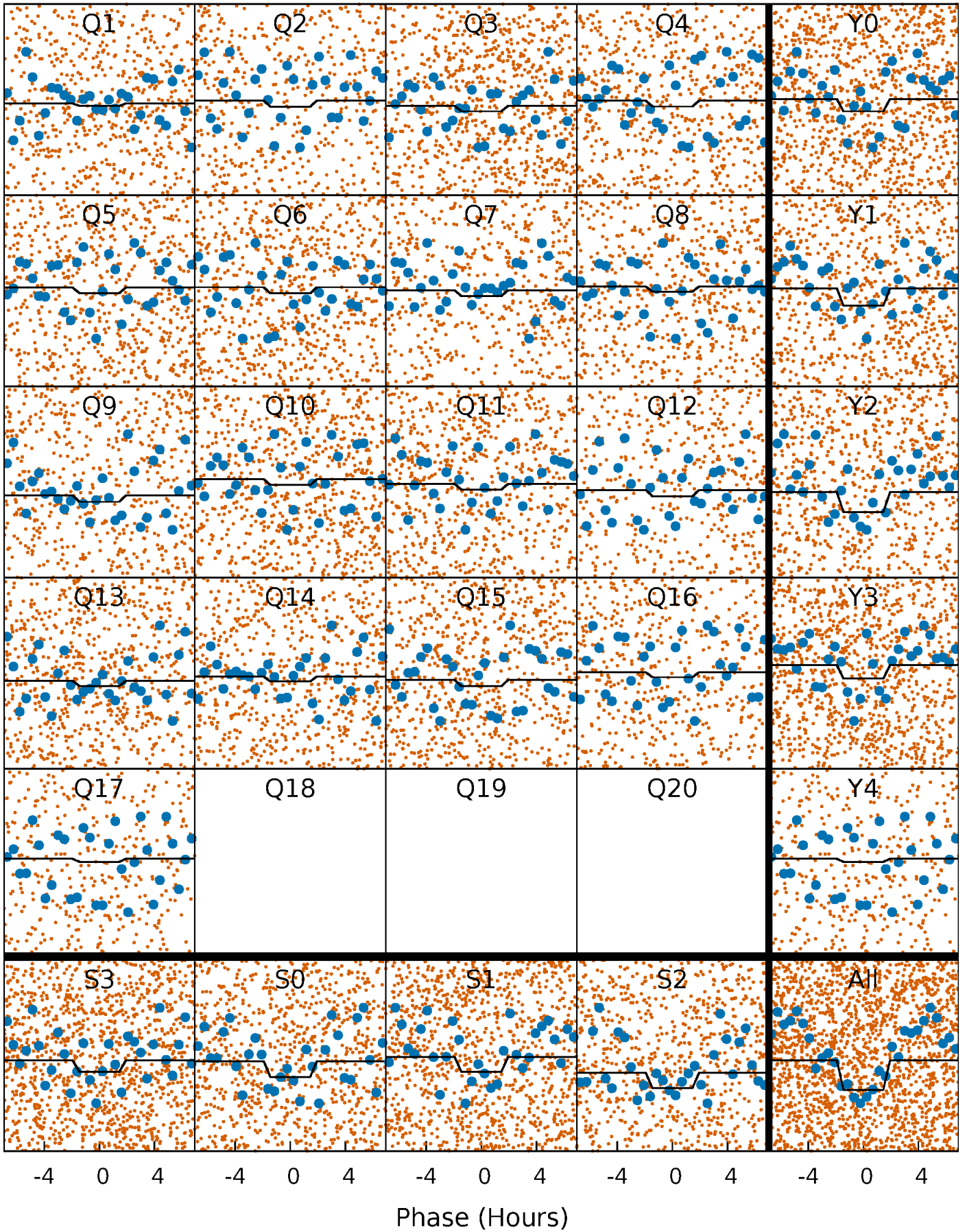
TCE 002988145-01 P= 1.233538 Days  $T_0=132.386239$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

TCE 002988145-01 P= 1.233578 Days  $T_0=132.377894$  (BKJD)

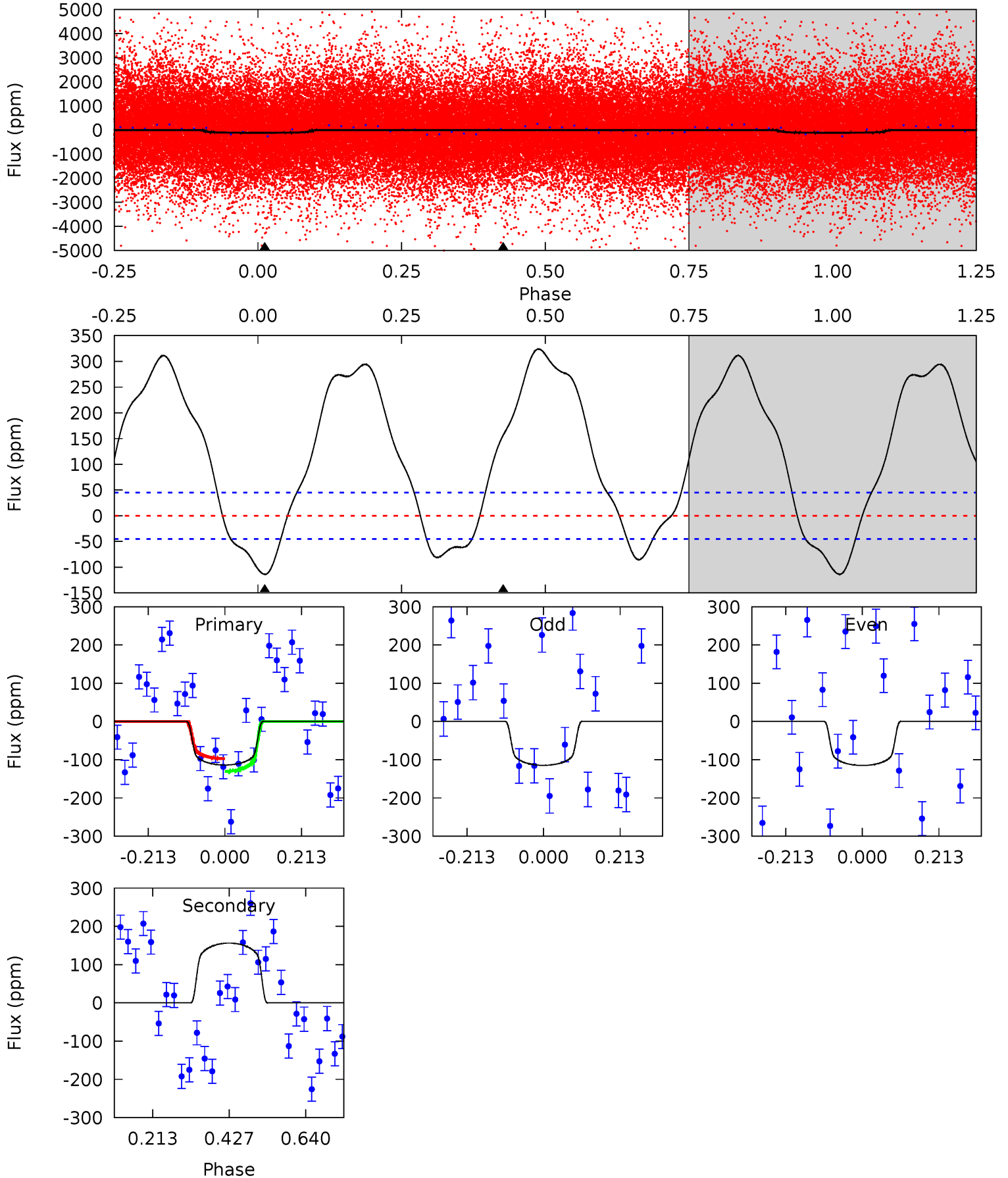




# DV Model-Shift Uniqueness Test

002988145-01, P = 1.233538 Days, E = 131.152701 Days

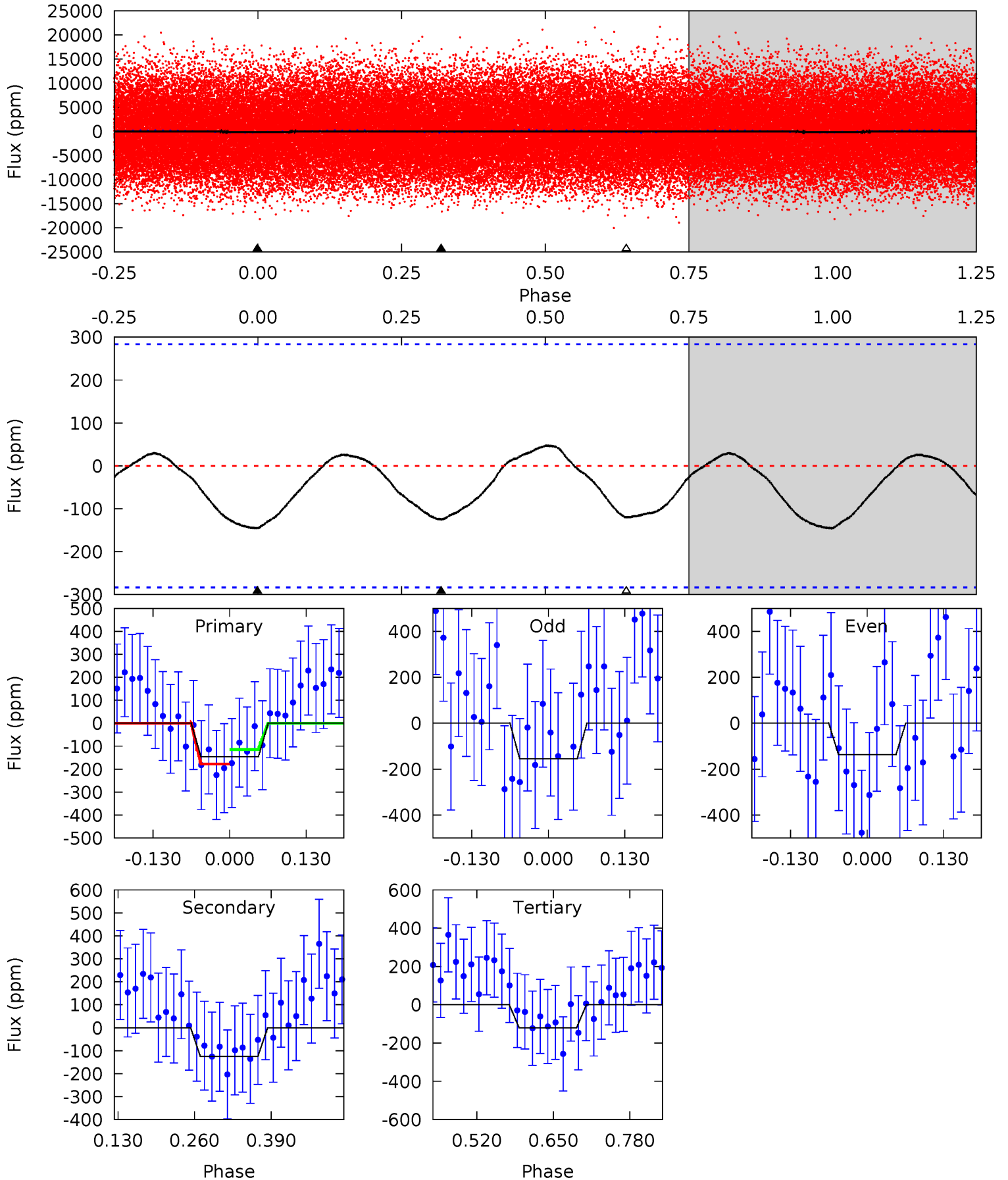
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.1	-15.3	0	0	4.40	1.24	10.8	11.1	11.1	-15.3	-15.3	0.01	0.86	0.74	1.65



# Alt Model-Shift Uniqueness Test

002988145-01, P = 1.233578 Days, E = 131.144316 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
2.32	1.99	1.91	0	4.51	1.51	0.87	0.41	2.32	0.08	1.99	0.15	0.64	0.25	0.49



### Stellar Parameters For KIC 002988145

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6992^{+194}_{-267}$	$4.234^{+0.093}_{-0.201}$	$-0.080^{+0.250}_{-0.350}$	$1.488^{+0.508}_{-0.234}$	$1.392^{+0.222}_{-0.202}$	$0.595^{+0.298}_{-0.316}$
	+3%/-4%	+2%/-5%	+312%/-438%	+34%/-16%	+16%/-15%	+50%/-53%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 002988145-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$156 \pm 10$	$2.18^{+0.54}_{-0.48}$	$3348^{+237}_{-196}$	$-6863^{+667}_{-994}$	$-11.347^{+4.065}_{-7.435}$
Alt.	$-125 \pm 63$	$1.96^{+0.56}_{-0.47}$	$3353^{+238}_{-192}$	$6601^{+1476}_{-1240}$	$10^{+11}_{-6}$

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



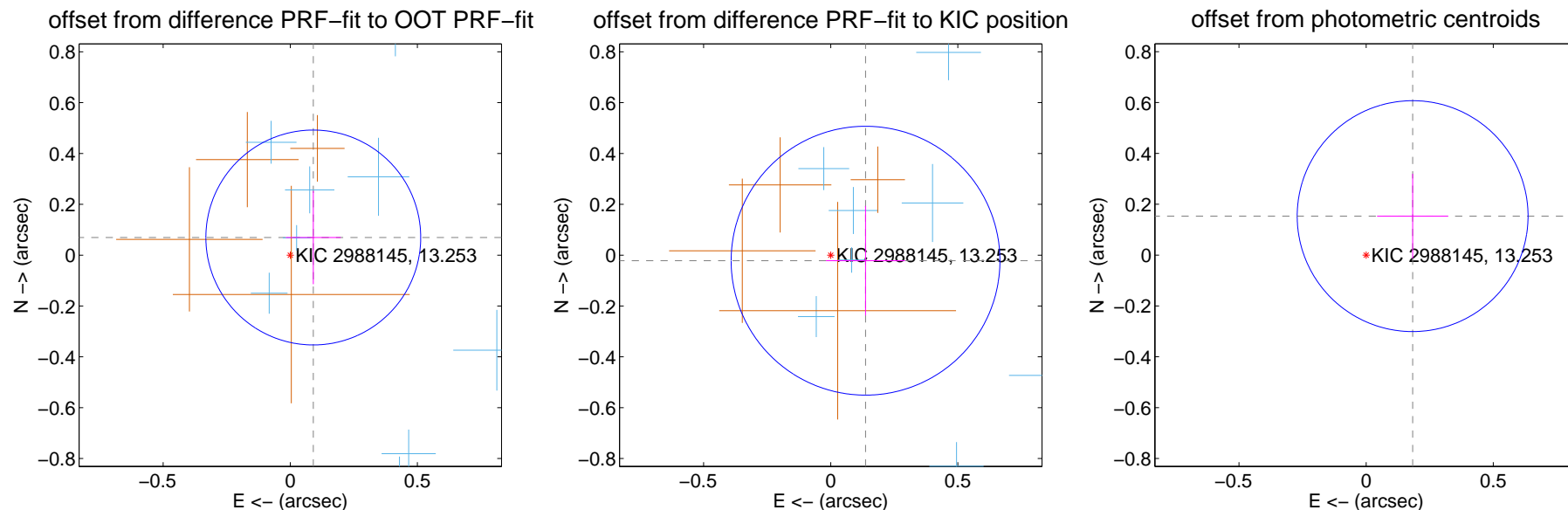
## DV Centroid Data

Supplemental centroid analysis for 002988145-01. Kepler magnitude: 13.25. Transit SNR 12.52

There are 11 quarters with good PRF difference image offsets

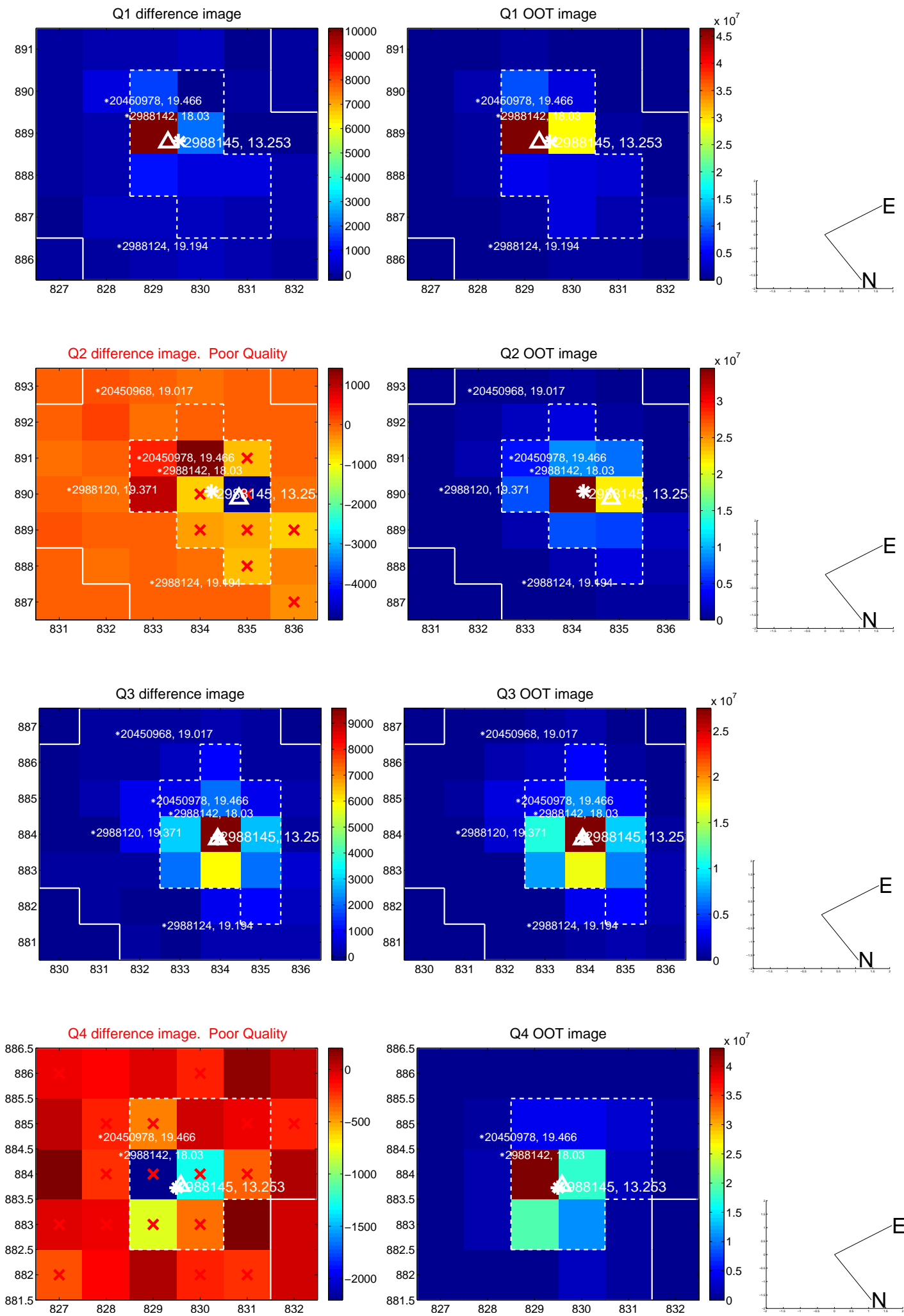
The direct PRF centroid is offset from the target star catalog position by about 0.15 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.114 \pm 0.141$	0.81	$-0.091 \pm 0.108$	$0.069 \pm 0.184$
PRF-fit source offset from KIC position	$0.139 \pm 0.176$	0.79	$-0.137 \pm 0.156$	$-0.022 \pm 0.215$
photometric centroid source offset	$0.24 \pm 0.15$	1.58	$-0.18 \pm 0.14$	$0.15 \pm 0.17$

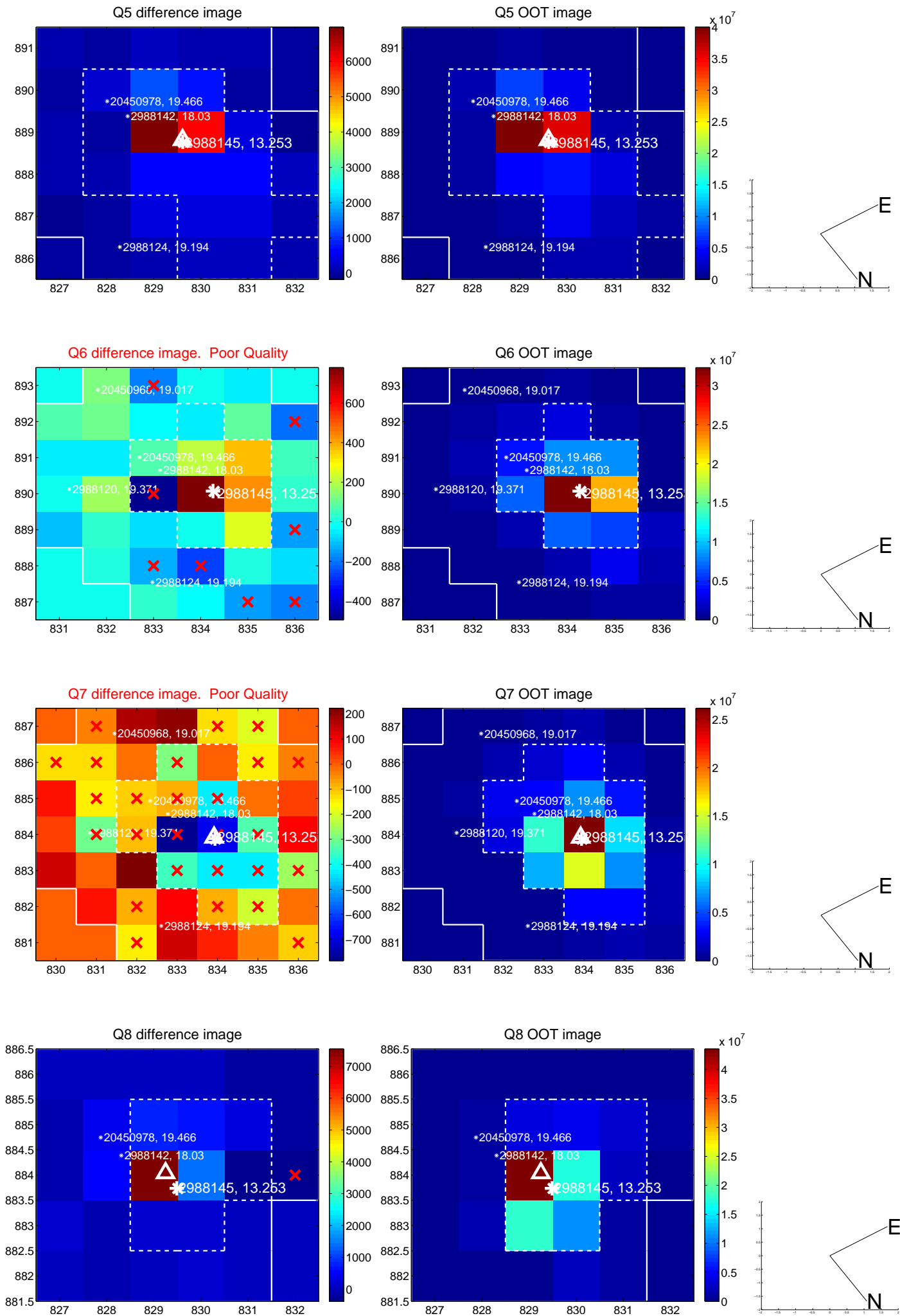


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

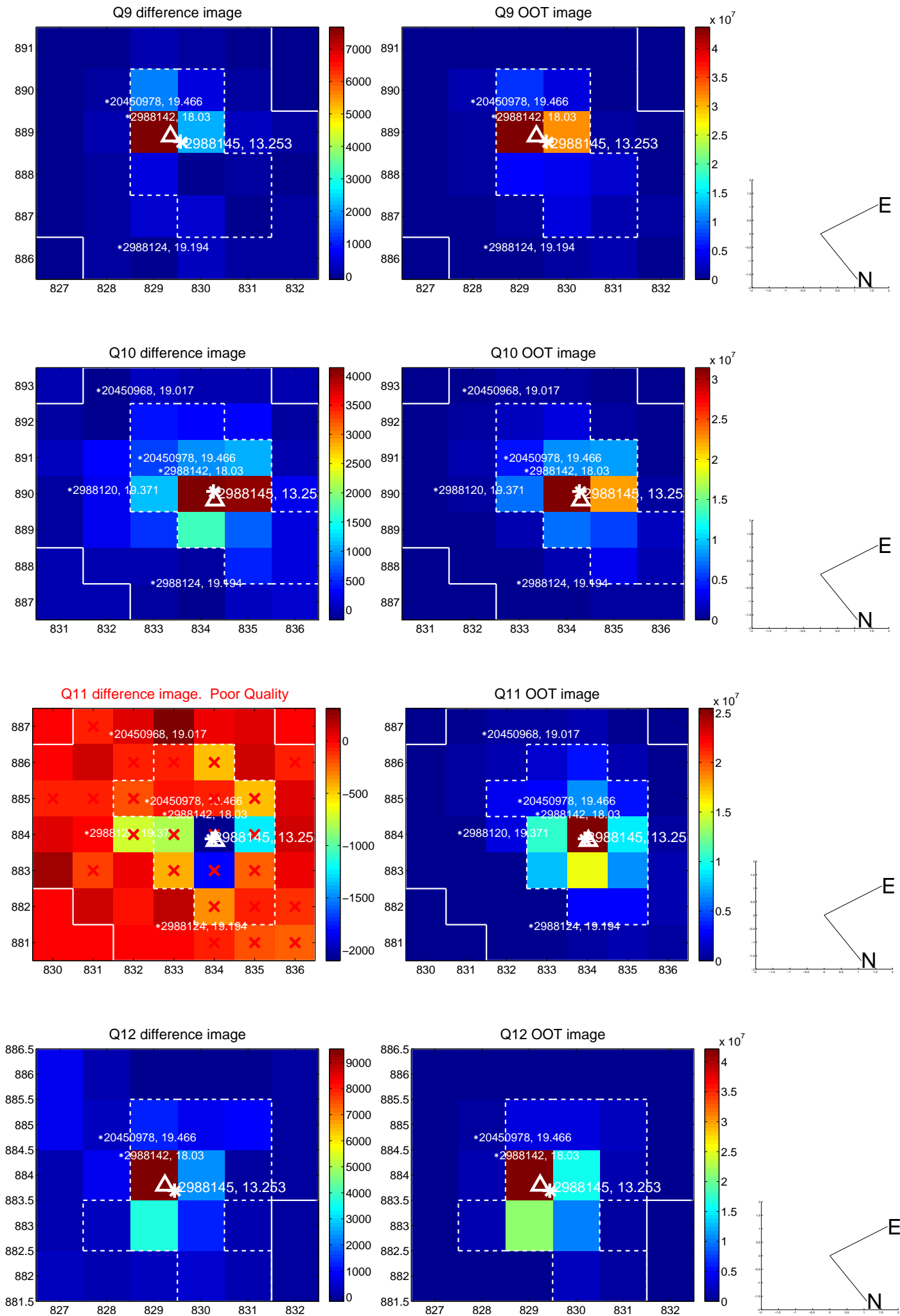


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

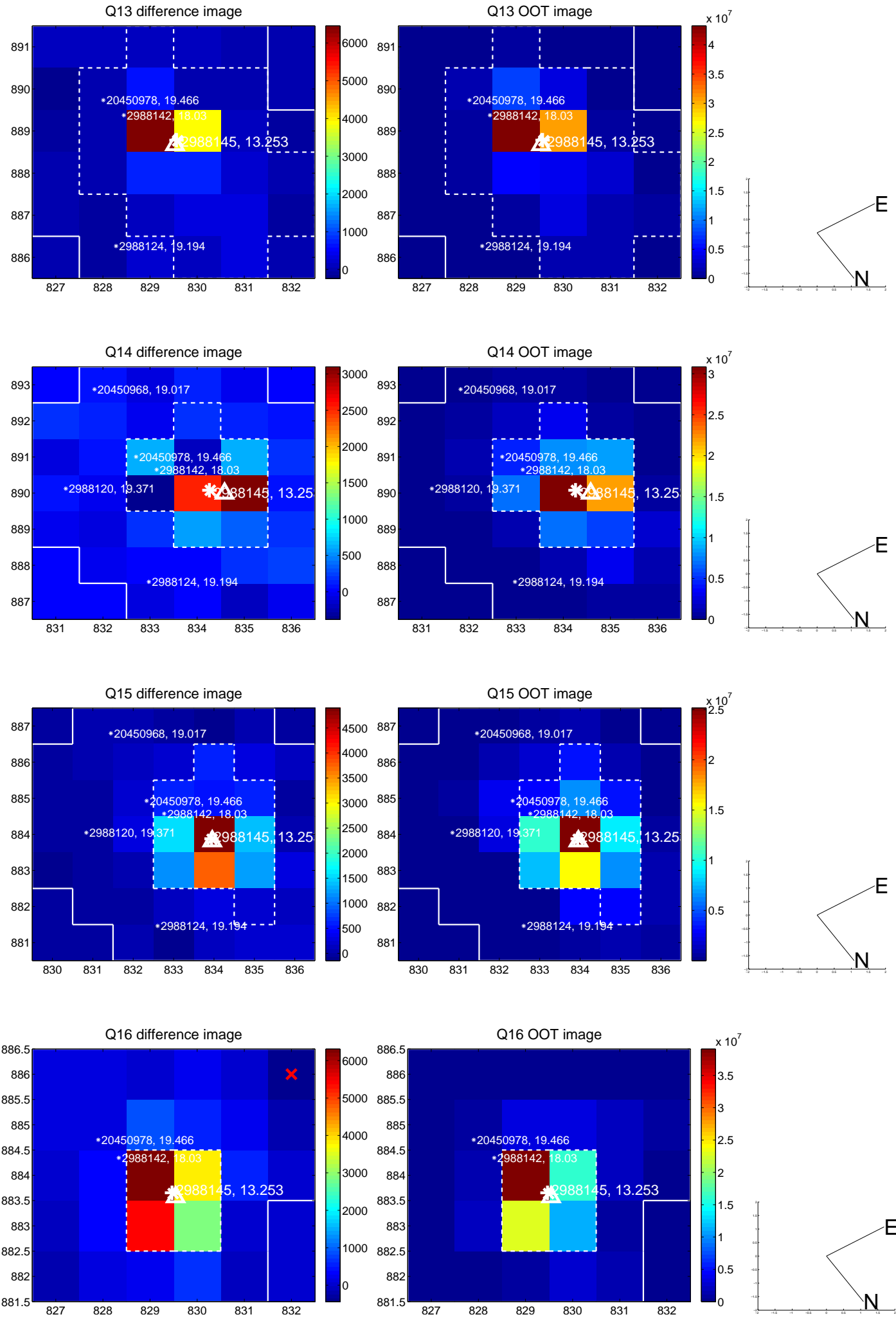




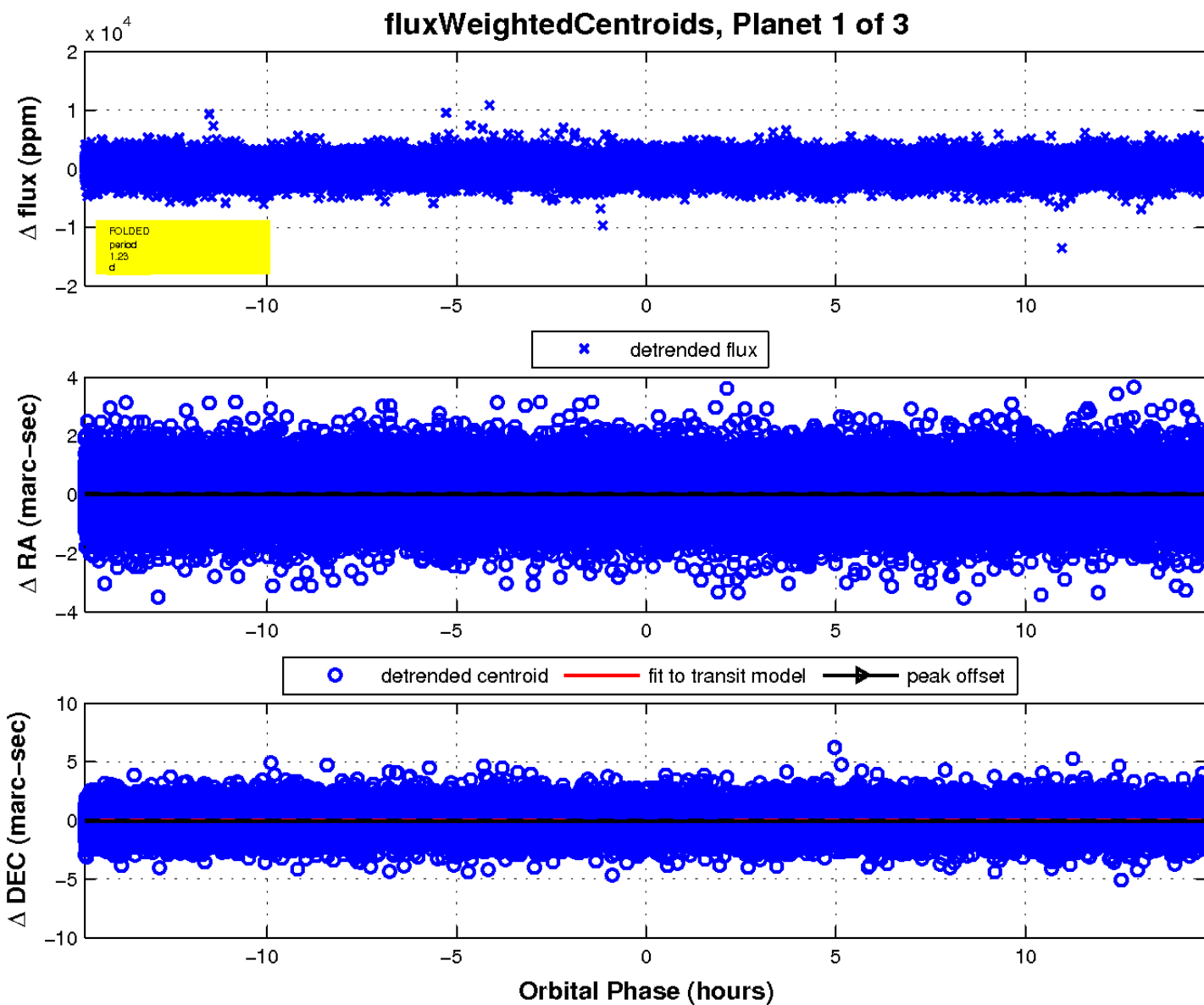
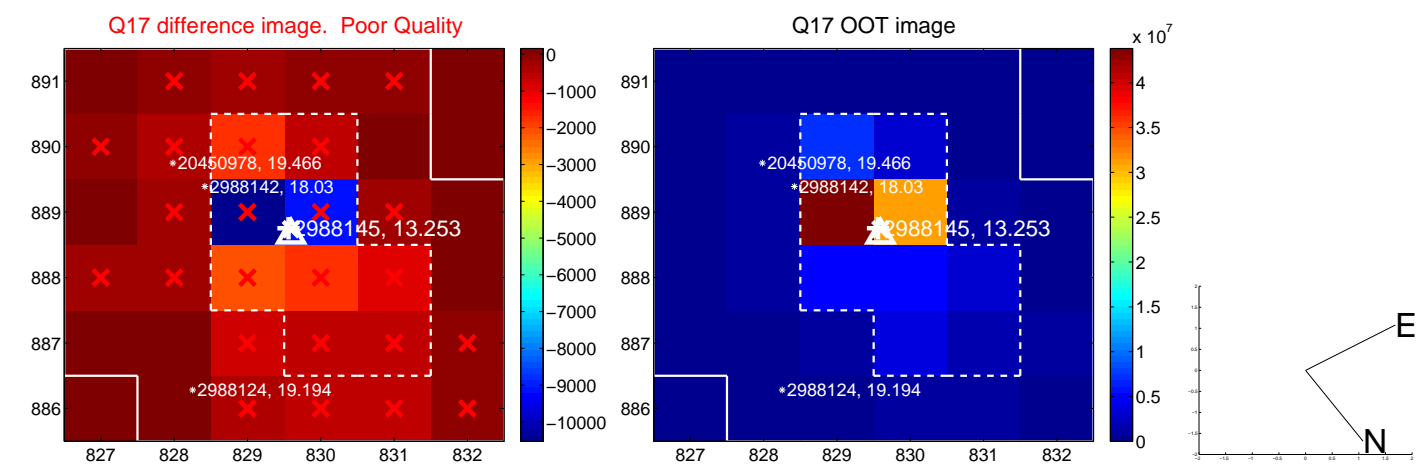
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

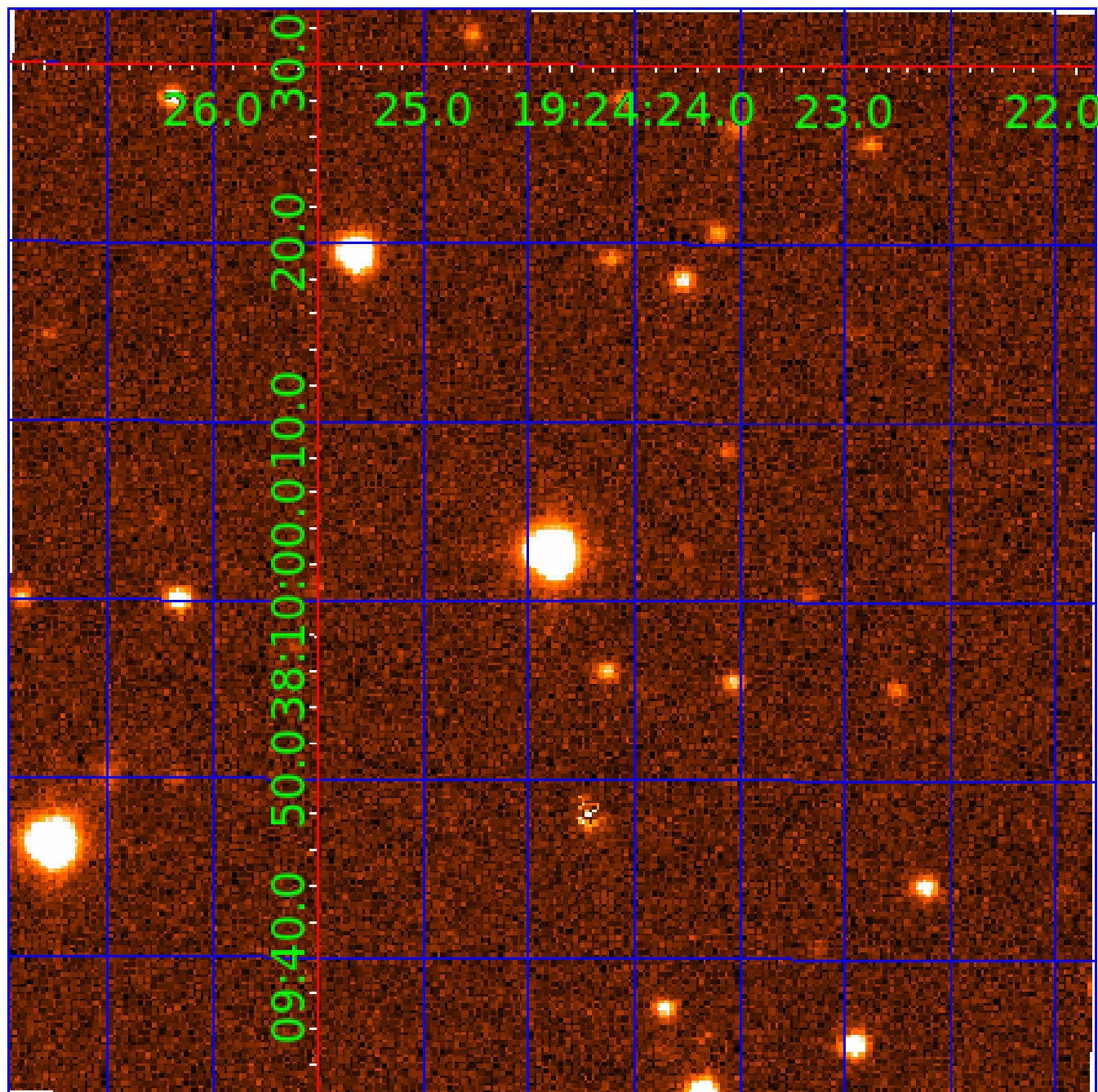


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 002988145

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
002988145-01	OBS	No	1.233538	132.386239	148.3	5.874	14.0	12.5	1.49	6992	2.09	7530.64
002988145-02	OBS	No	0.822351	131.979468	302.7	1.180	11.8	13.7	1.49	6992	3.02	12930.82
002988145-03	OBS	No	0.616760	131.634832	447.5	1.145	9.6	14.0	1.49	6992	3.68	18976.40

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
002988145-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT
002988145-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT
002988145-03	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_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.

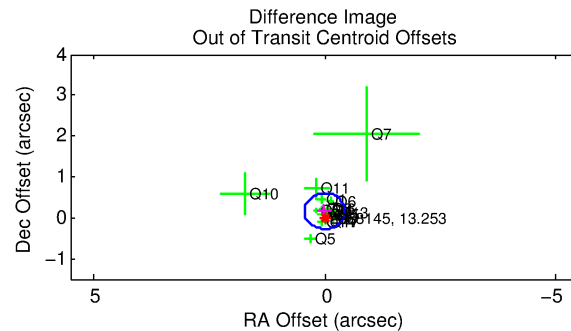
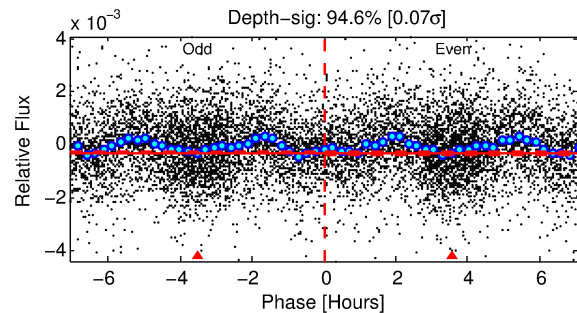
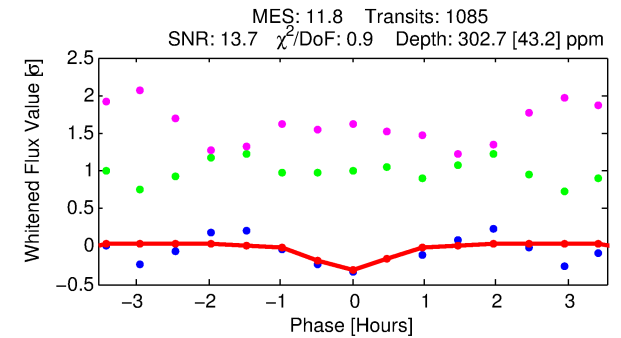
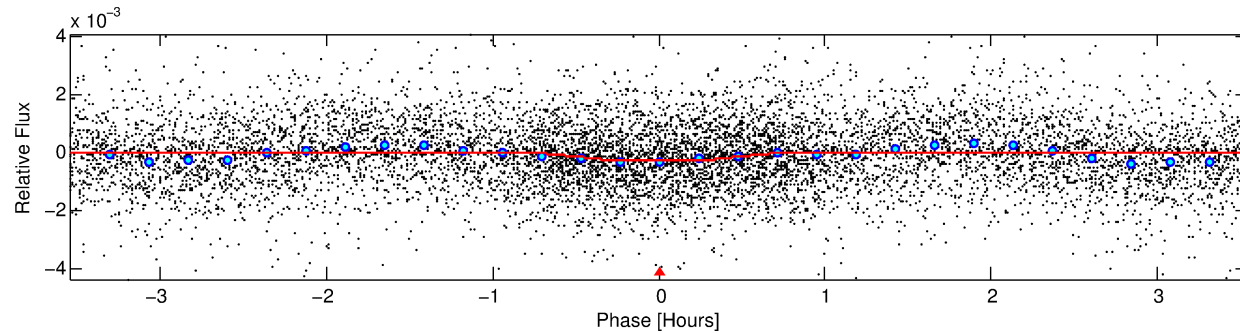
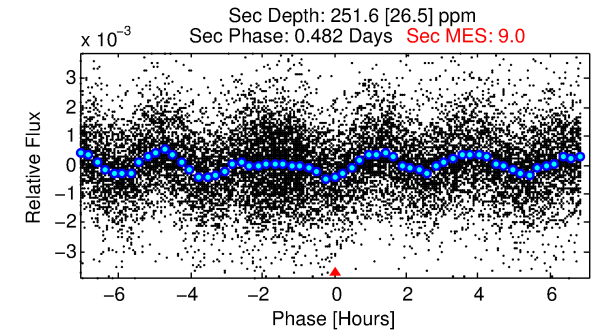
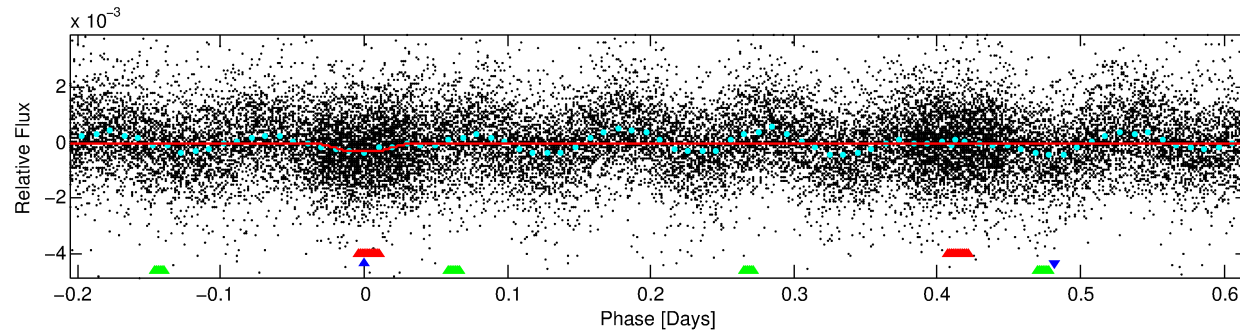
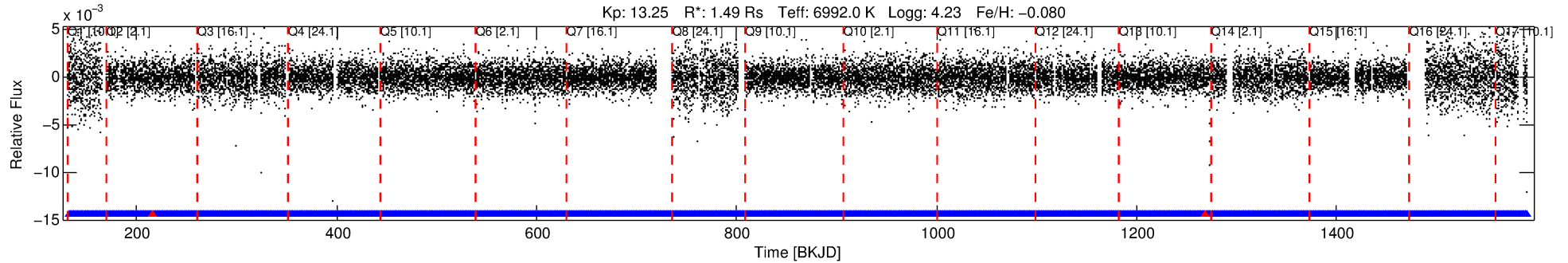
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 002988145-02

No Significant Match Found

# DV One-Page Summary

KIC: 2988145 Candidate: 2 of 3 Period: 0.822 d



## DV Fit Results:

Period = 0.82235 [0.00001] d  
Epoch = 131.9795 [0.0016] BKJD  
Rp/R\* = 0.0186 [0.0100]  
a/R\* = 2.71 [7.55]  
b = 0.90 [0.69]  
Seff = 12930.82 [5336.74]  
Teq = 2719 [281] K  
Rp = 3.02 [1.92] Re  
a = 0.0191 [0.0053] AU  
Ag = 5.55 [6.35] [0.72σ]  
Teffp = 6452 [1757] K [2.10σ]

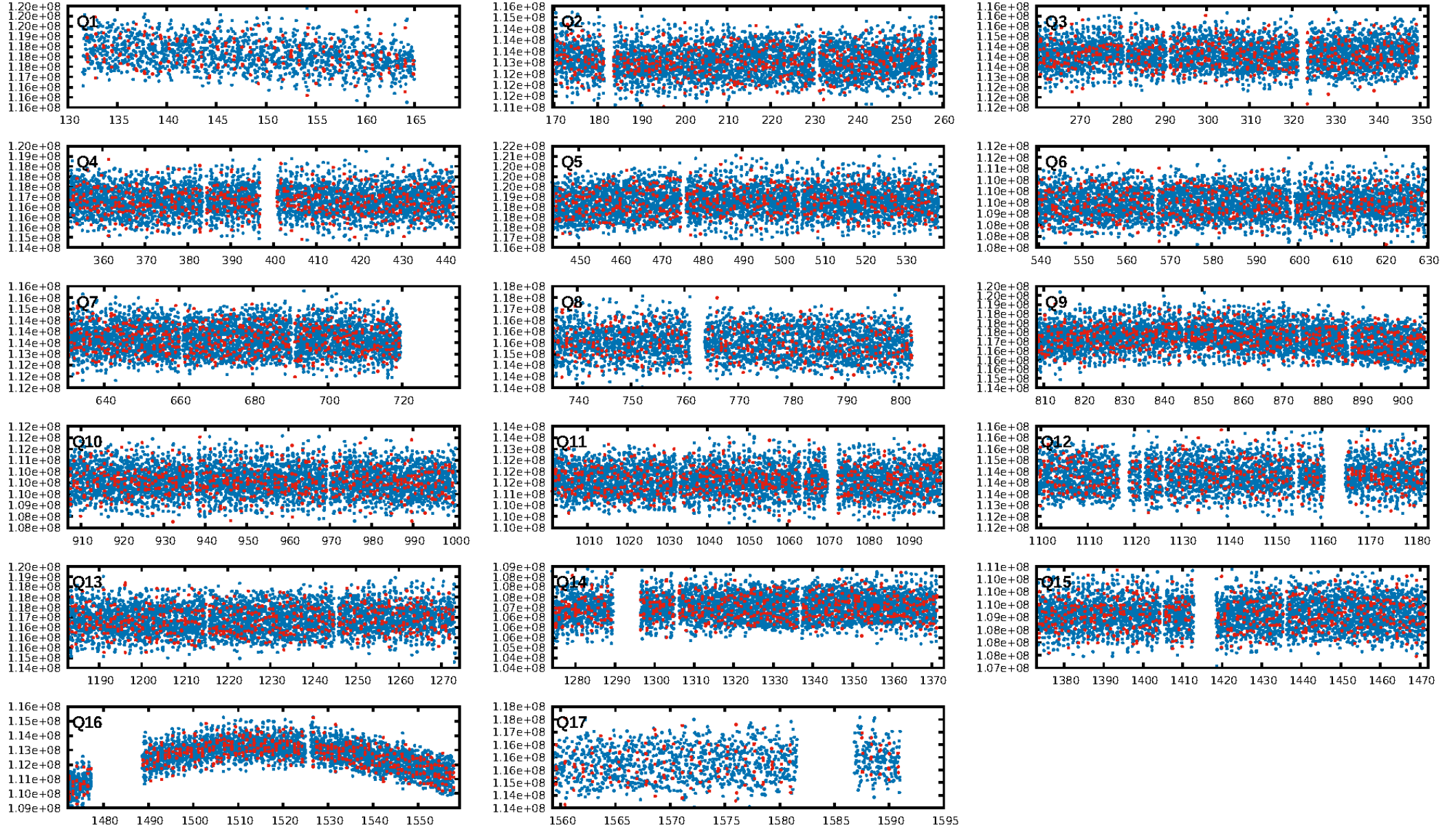
## DV Diagnostic Results:

ShortPeriod-sig: 99.7% [3.00σ]  
LongPeriod-sig: 90.0% [1.65σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [1033/1035]  
GhostDiagnostic-chr: 0.4751  
Centroid-sig: 18.0%  
Centroid-so: 0.323 arcsec [2.18σ]  
OotOffset-rm: 0.166 arcsec [1.14σ]  
OotOffset-st: 4/4/3/5 [16]  
KicOffset-rm: 0.097 arcsec [0.58σ]  
KicOffset-st: 4/4/3/5 [16]  
DiffImageQuality-fgm: 0.56 [9/16]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 03-Feb-2016 09:15:07 Z

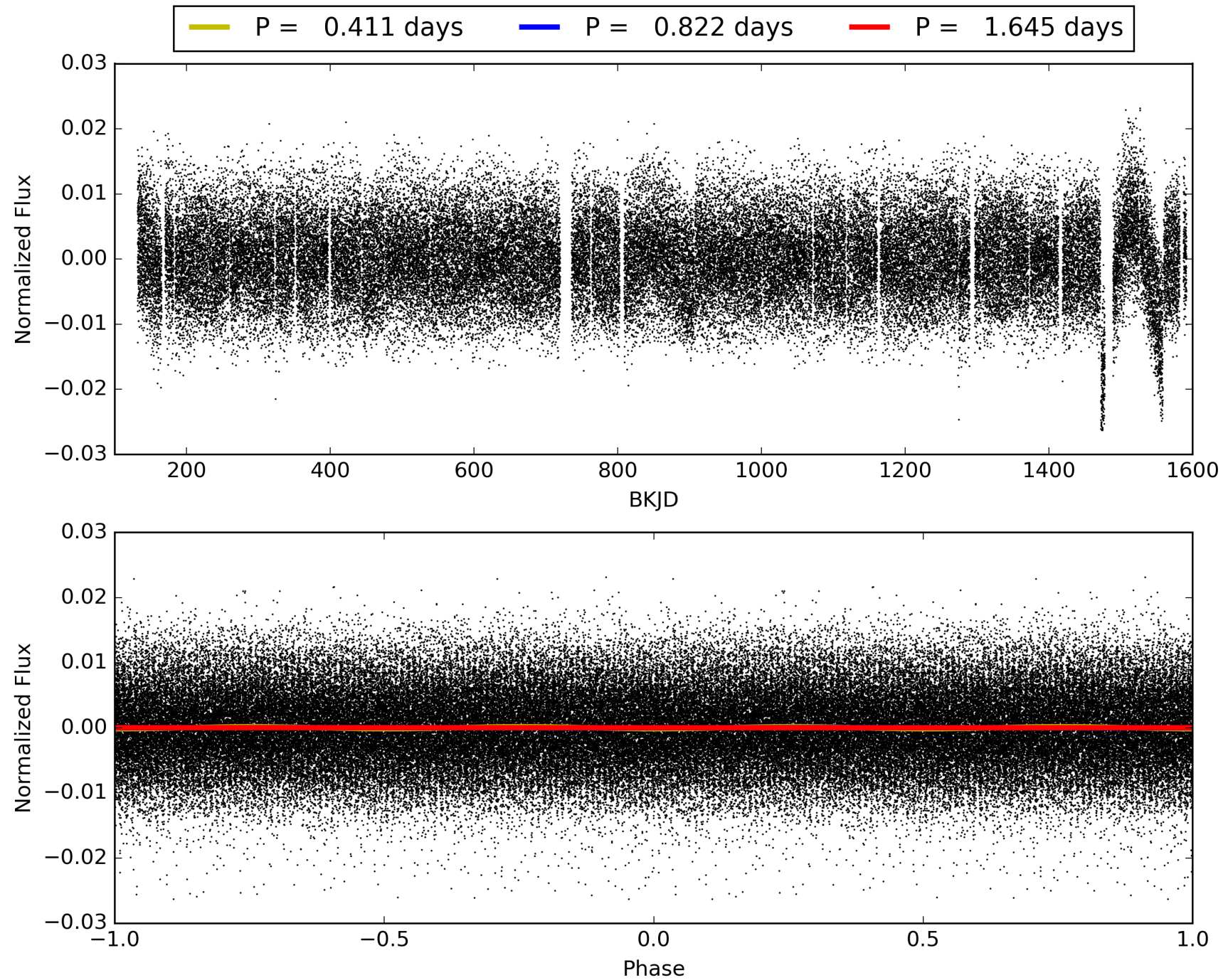
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 002988145-02, PDC Light Curves





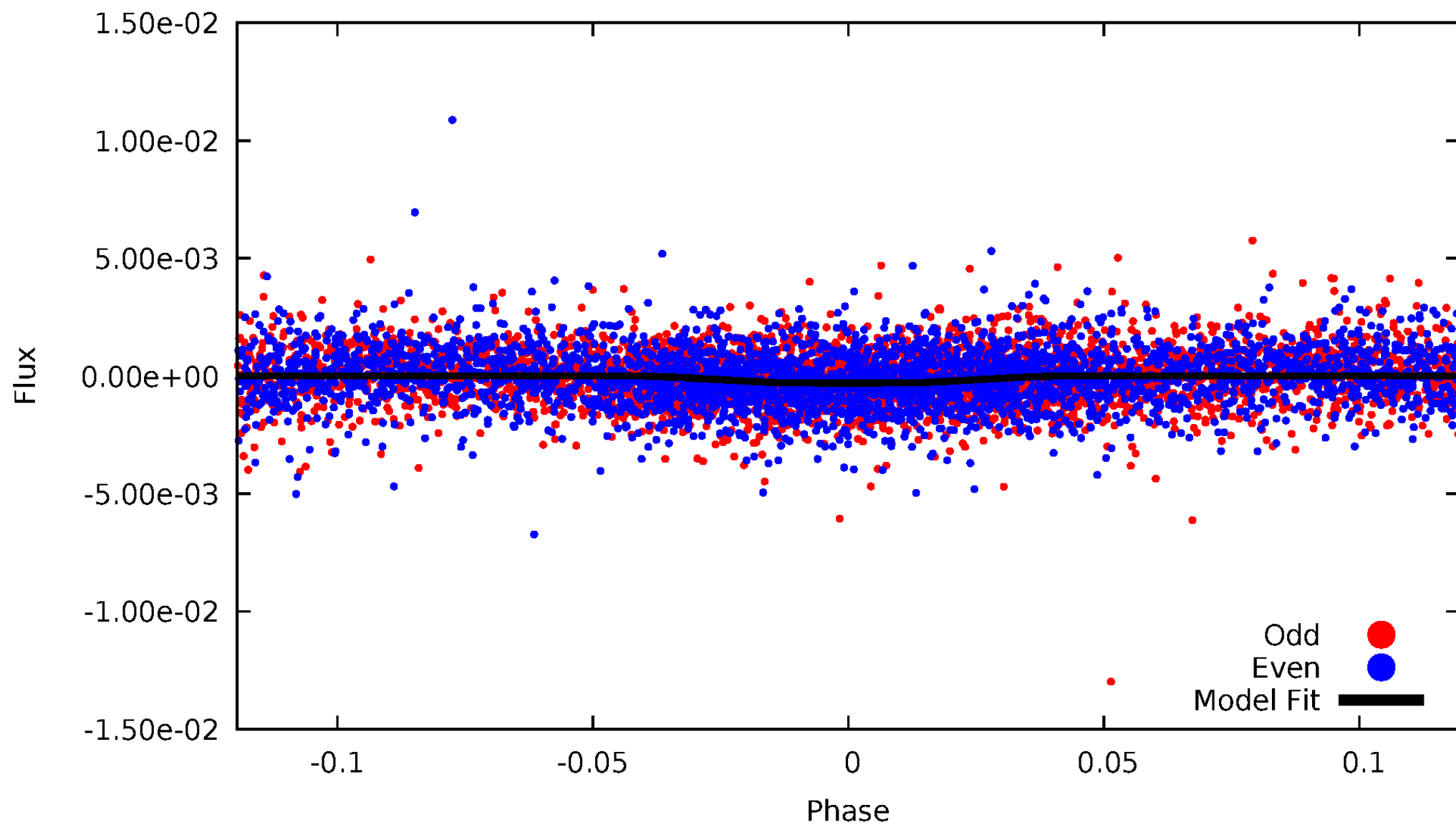
TCE 002988145-02





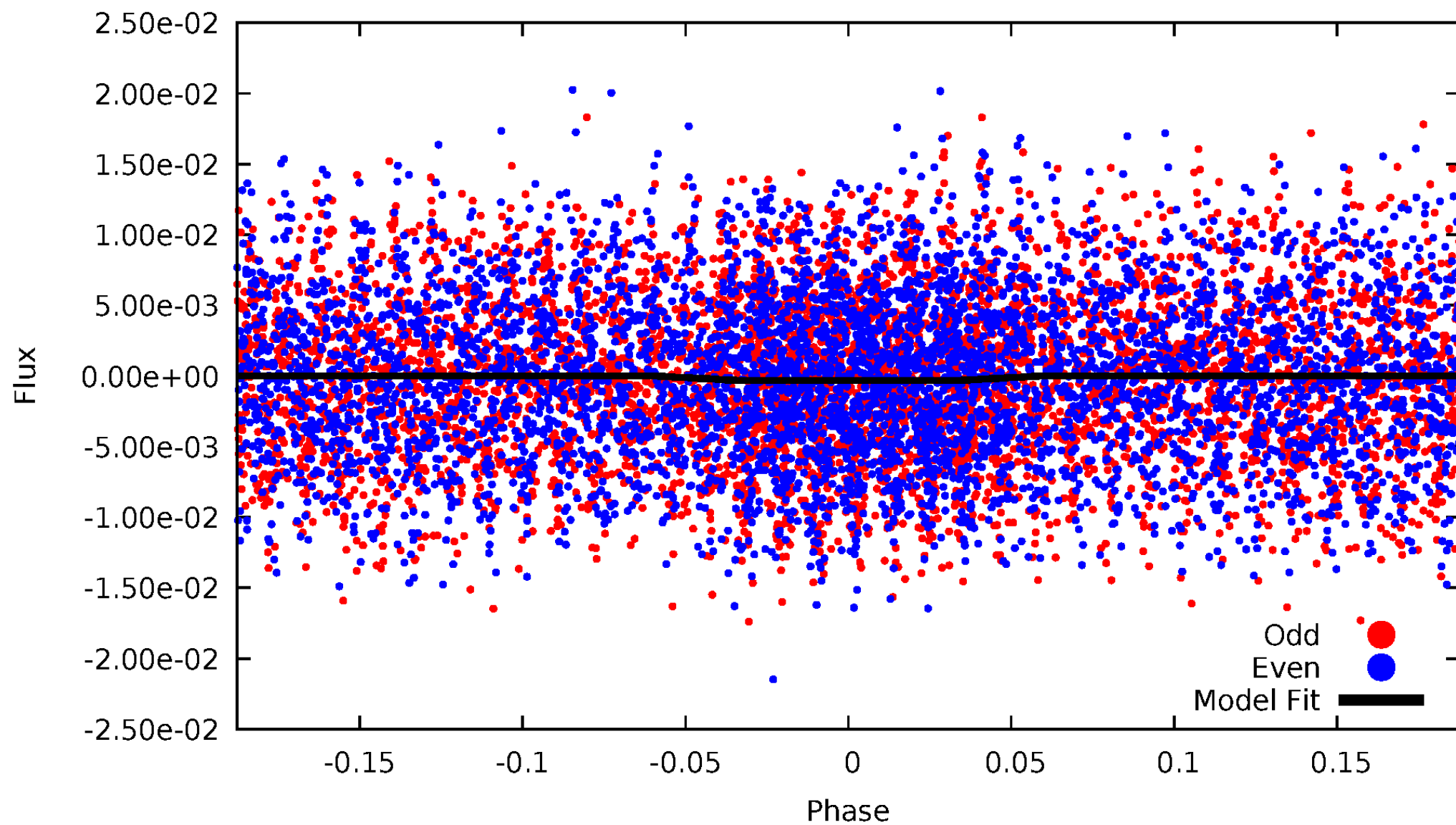
# DV Odd/Even

TCE 002988145-02



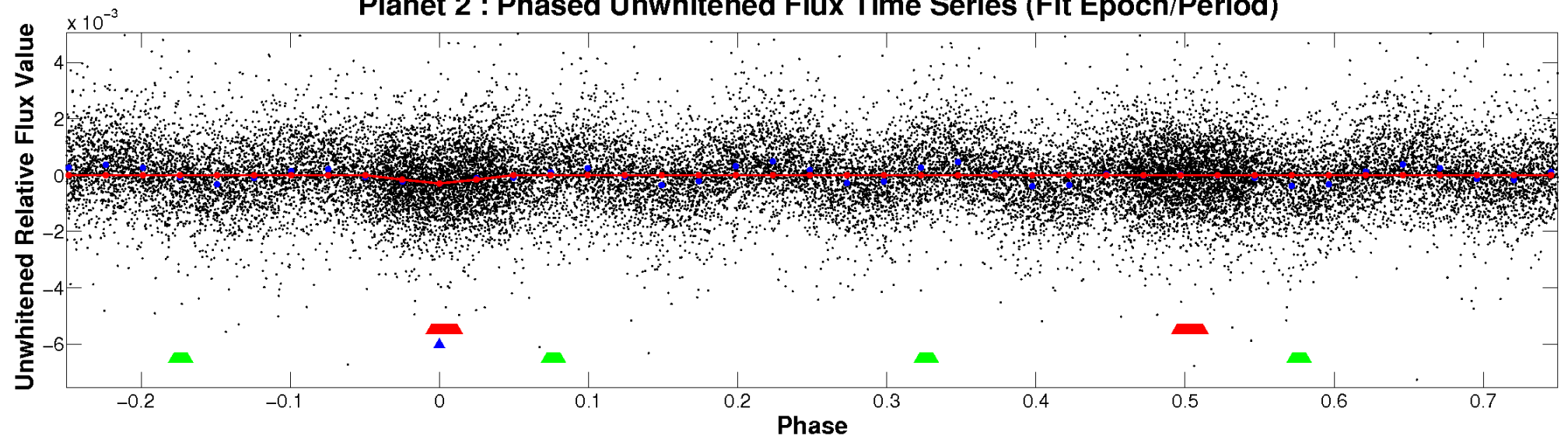
# ALT Odd/Even

TCE 002988145-02

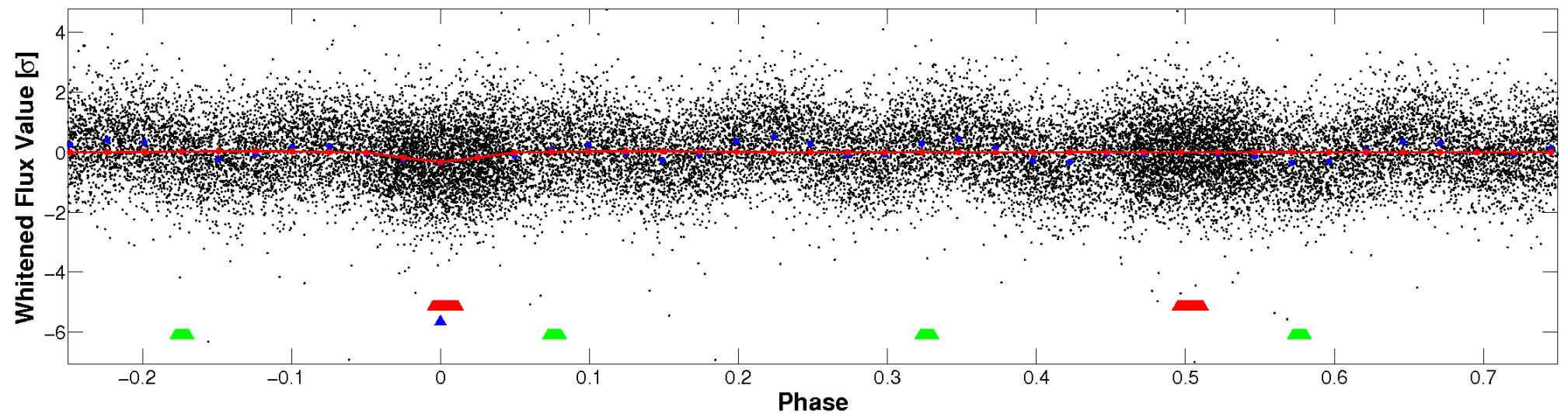


# Non-Whitened Vs. Whitened Light Curve

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

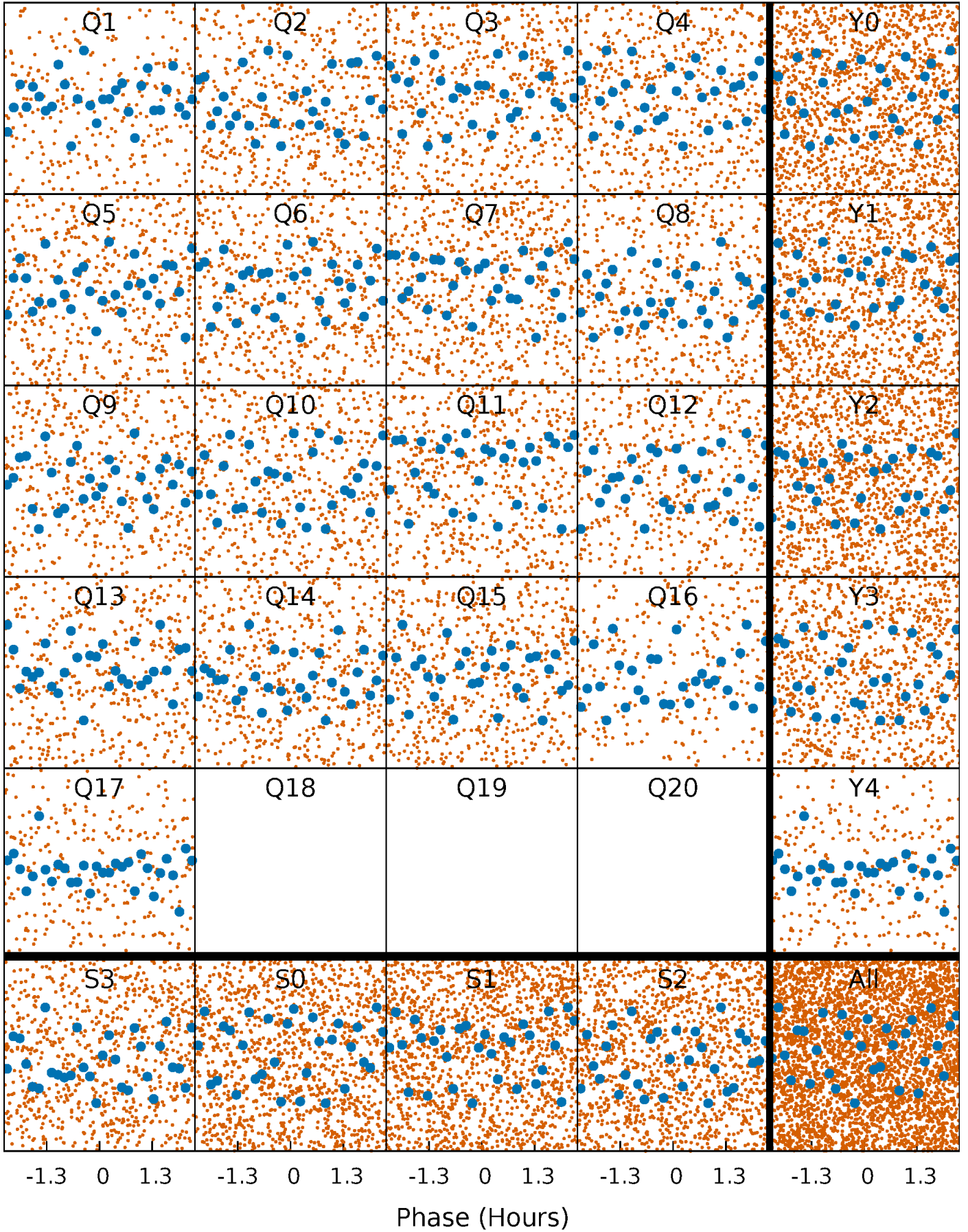


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

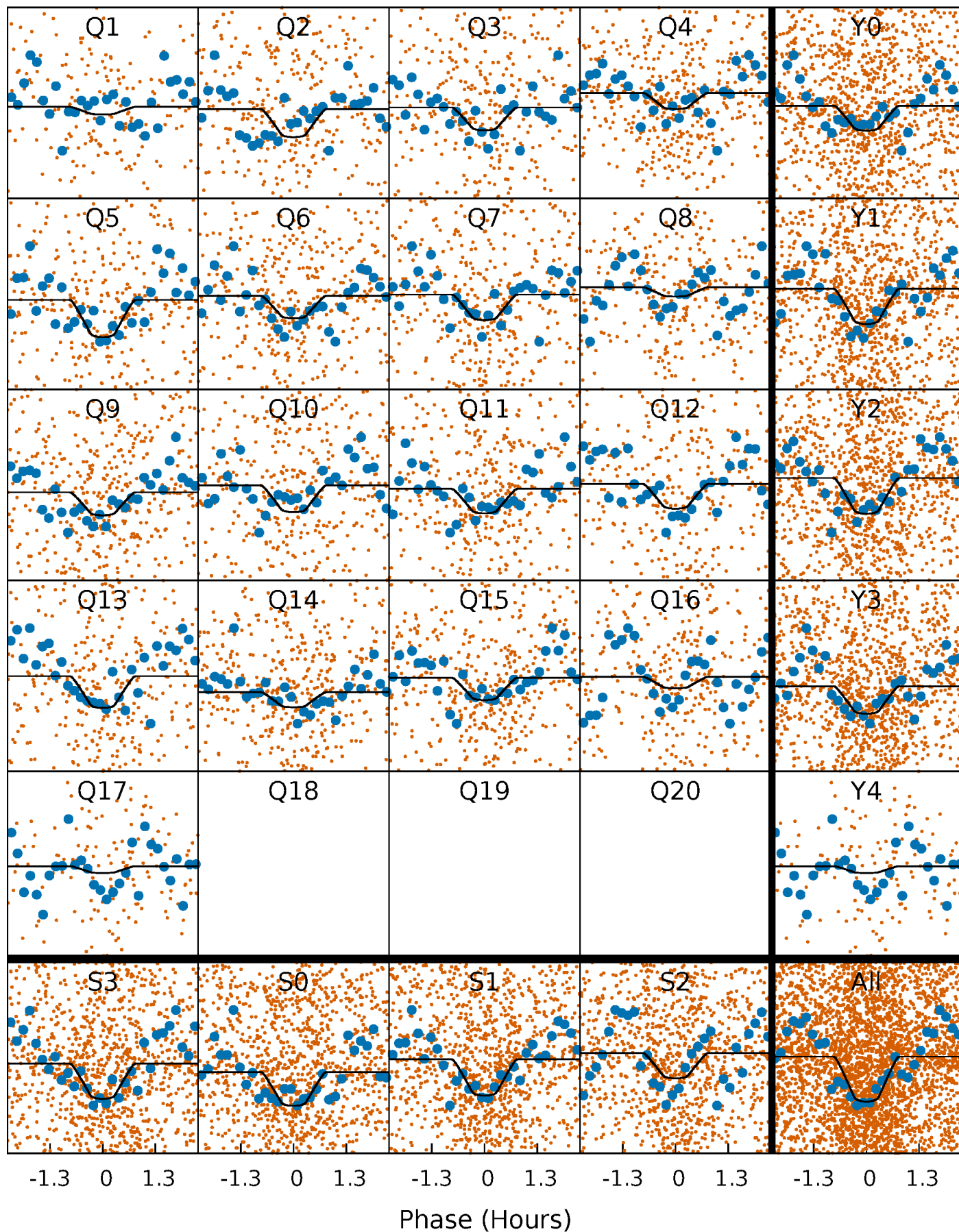
TCE 002988145-02   P= 0.822351 Days    $T_0=131.979468$  (BKJD)





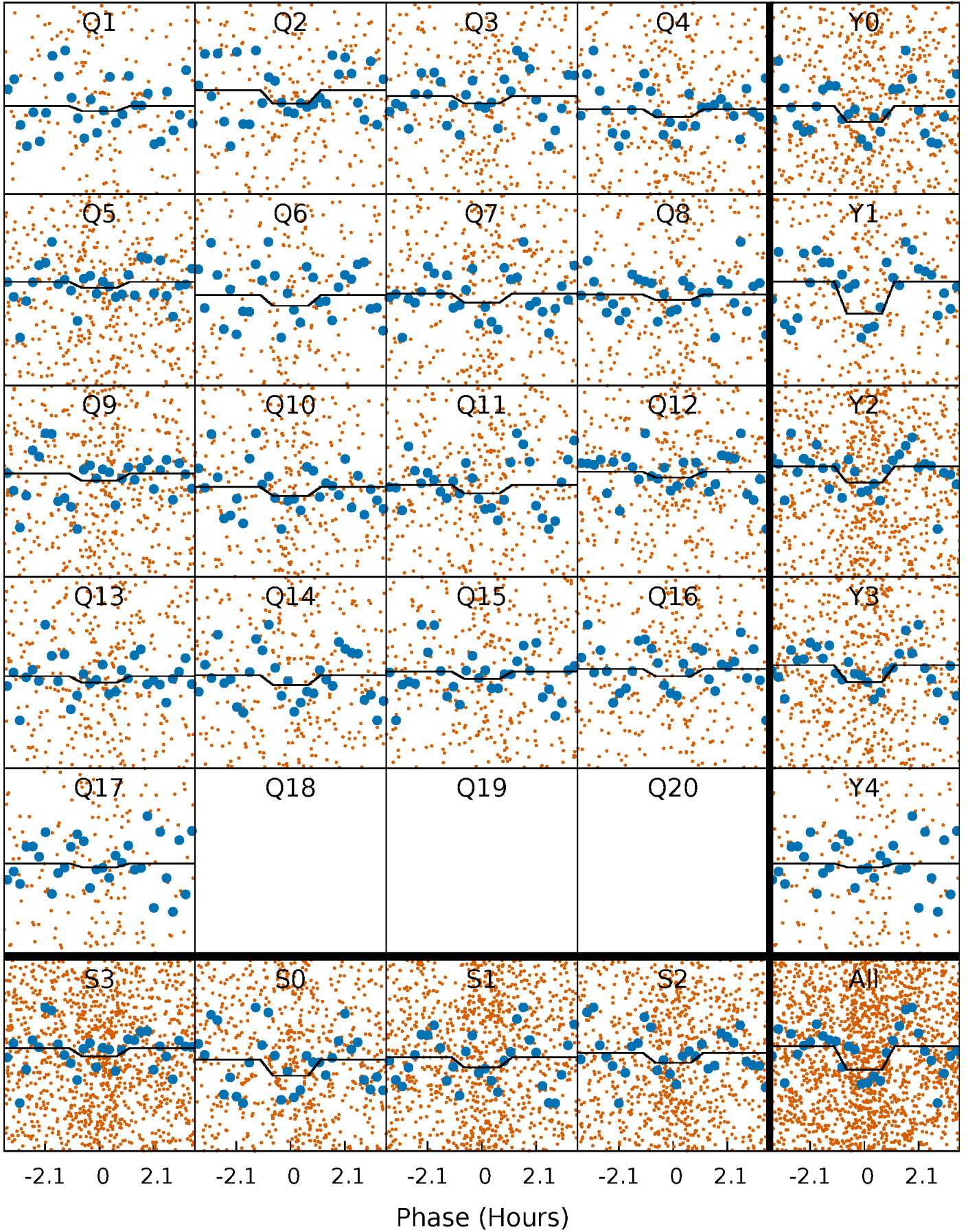
# DV Quarter-Phased Transit Curves

TCE 002988145-02     $P = 0.822351$  Days     $T_0 = 131.979468$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

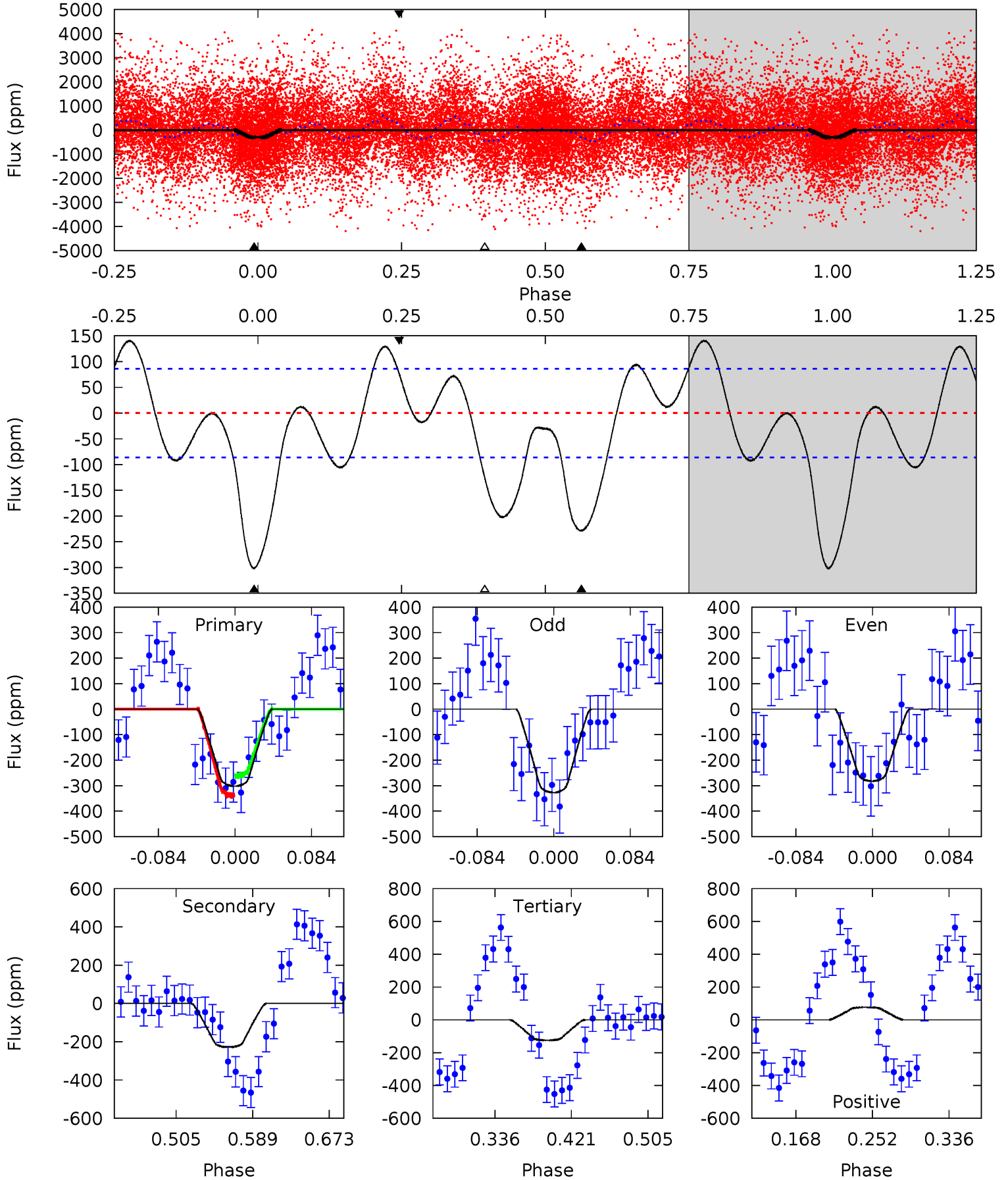
TCE 002988145-02   P= 0.822348 Days    $T_0=131.979385$  (BKJD)



# DV Model-Shift Uniqueness Test

002988145-02, P = 0.822351 Days, E = 131.157117 Days

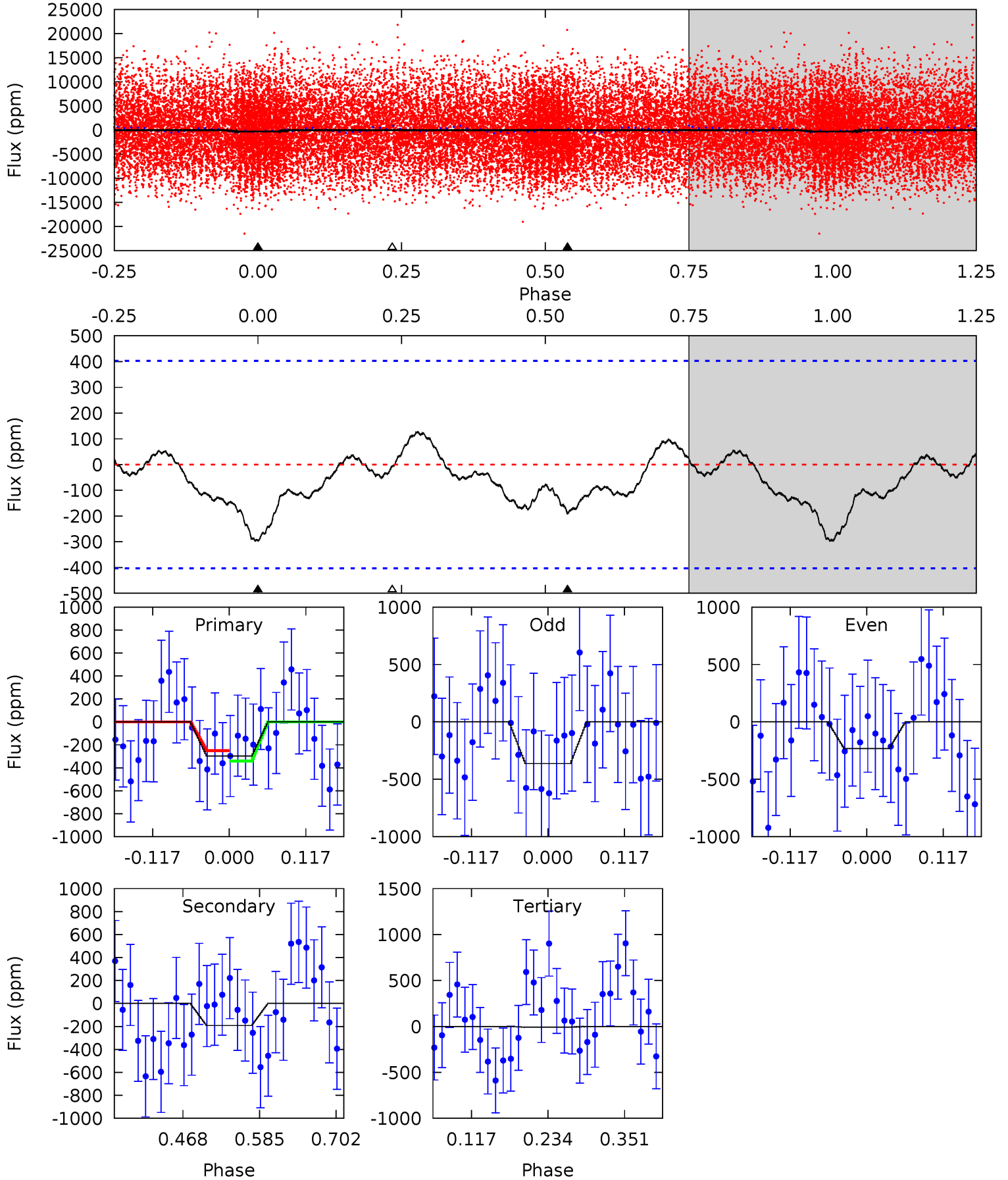
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
16.1	12.2	6.66	4.11	4.60	1.73	4.69	9.47	12.0	5.55	8.10	1.21	0.98	0.32	2.11



# Alt Model-Shift Uniqueness Test

002988145-02, P = 0.822348 Days, E = 131.157037 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
3.34	2.16	0.09	0	4.53	1.57	0.59	3.25	3.34	2.07	2.16	0.74	0.81	0.30	0.51





### Stellar Parameters For KIC 002988145

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6992^{+194}_{-267}$	$4.234^{+0.093}_{-0.201}$	$-0.080^{+0.250}_{-0.350}$	$1.488^{+0.508}_{-0.234}$	$1.392^{+0.222}_{-0.202}$	$0.595^{+0.298}_{-0.316}$
	+3%/-4%	+2%/-5%	+312%/-438%	+34%/-16%	+16%/-15%	+50%/-53%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 002988145-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-229 \pm 19$	$3.24^{+1.85}_{-1.54}$	$3862^{+299}_{-250}$	$5952^{+3007}_{-1068}$	$4.294^{+12.108}_{-2.492}$
Alt.	$-192 \pm 89$	$3.04^{+1.88}_{-1.54}$	$3833^{+291}_{-217}$	$5763^{+3027}_{-1363}$	$3.759^{+12.779}_{-2.545}$

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

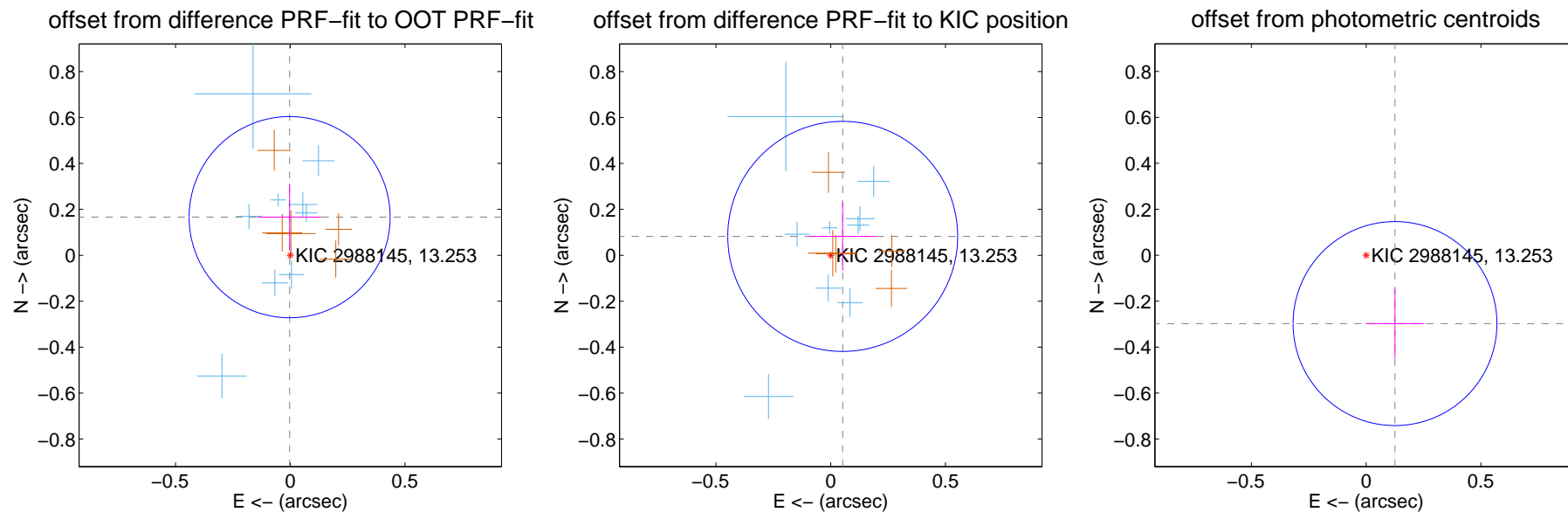
## DV Centroid Data

Supplemental centroid analysis for 002988145-02. Kepler magnitude: 13.25. Transit SNR 13.68

There are 9 quarters with good PRF difference image offsets

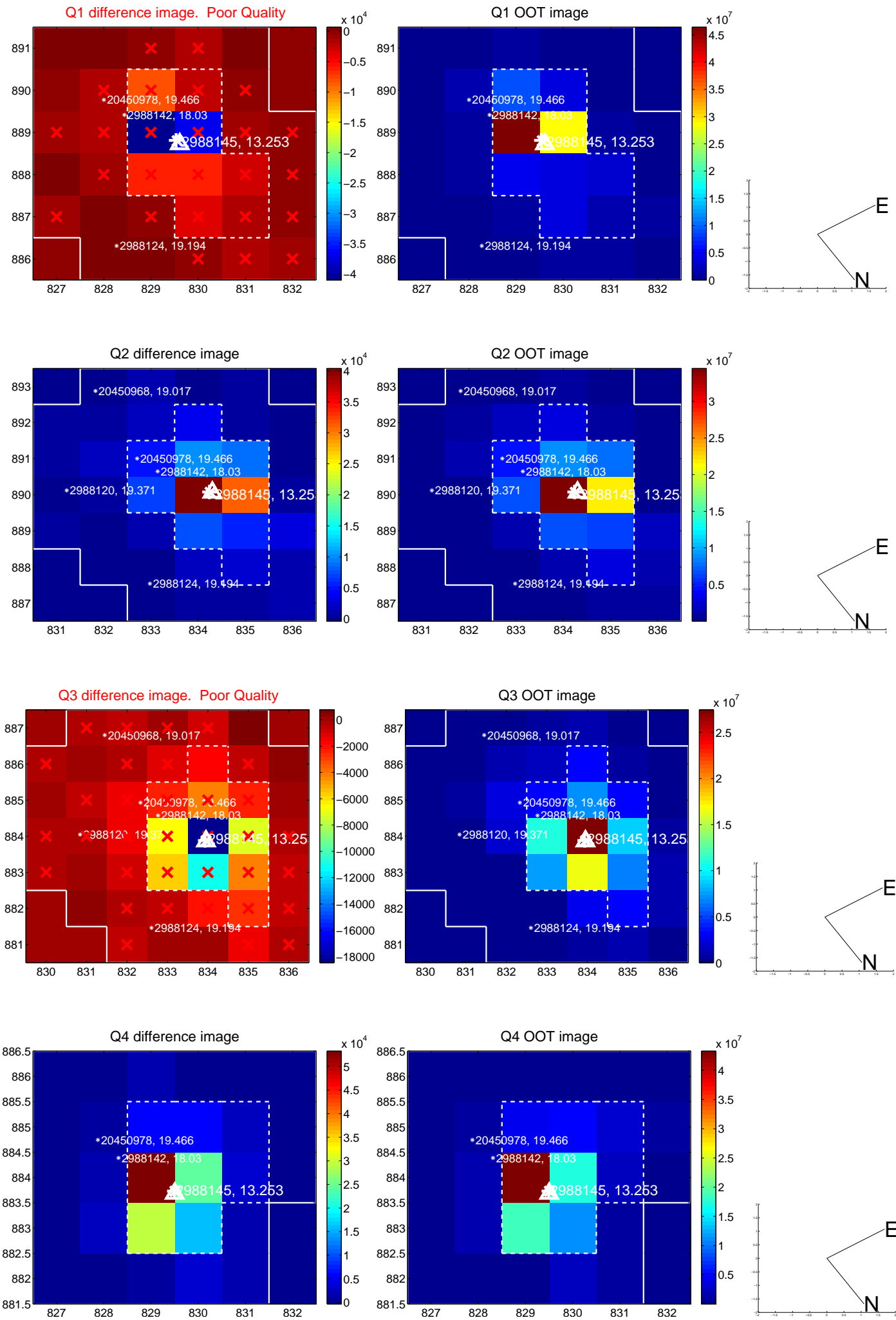
The direct PRF centroid is offset from the target star catalog position by about 0.15 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.166 \pm 0.146$	1.14	$0.003 \pm 0.138$	$0.166 \pm 0.147$
PRF-fit source offset from KIC position	$0.097 \pm 0.167$	0.58	$-0.052 \pm 0.148$	$0.082 \pm 0.150$
photometric centroid source offset	$0.32 \pm 0.15$	2.18	$-0.13 \pm 0.13$	$-0.30 \pm 0.15$

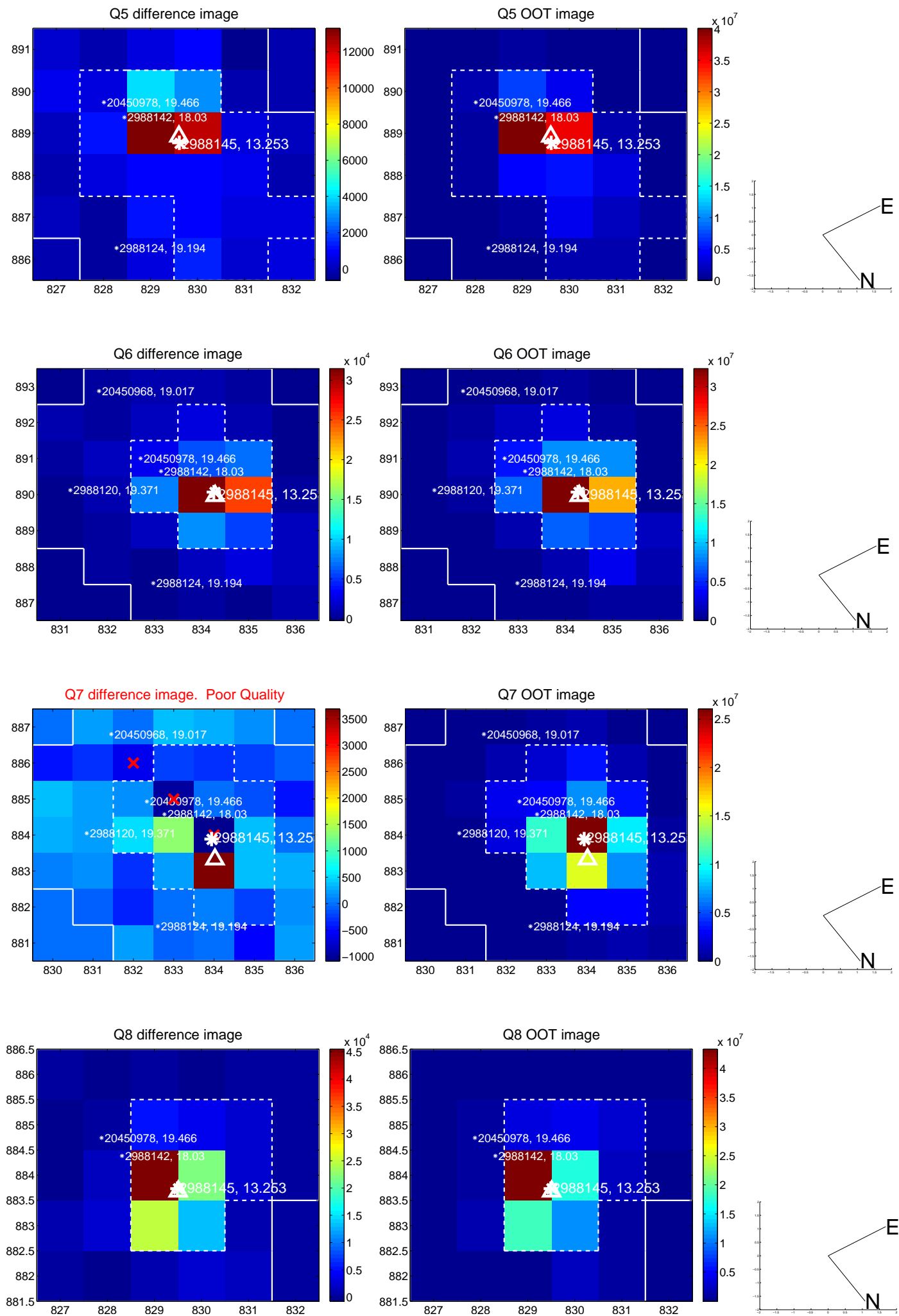


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

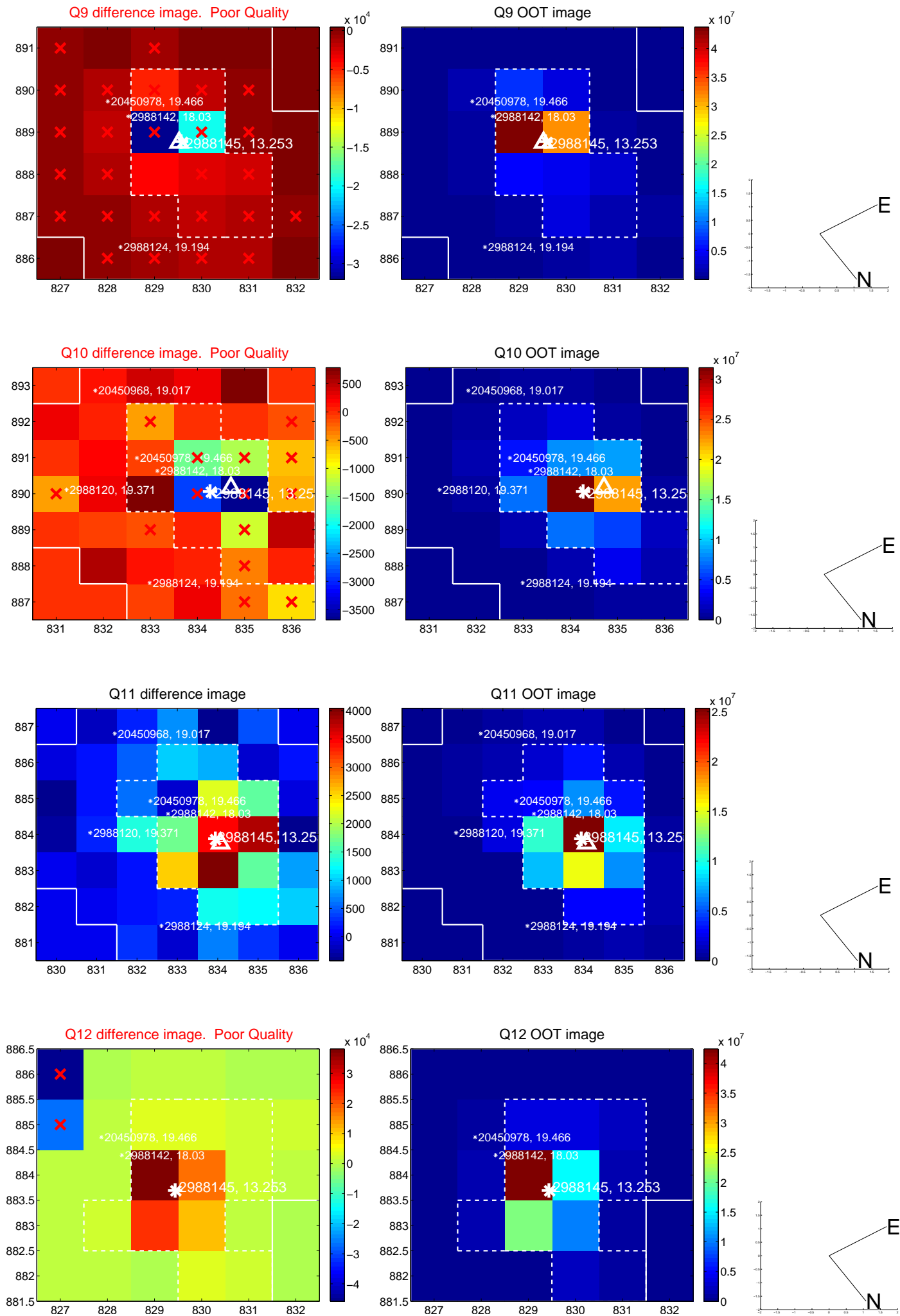
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

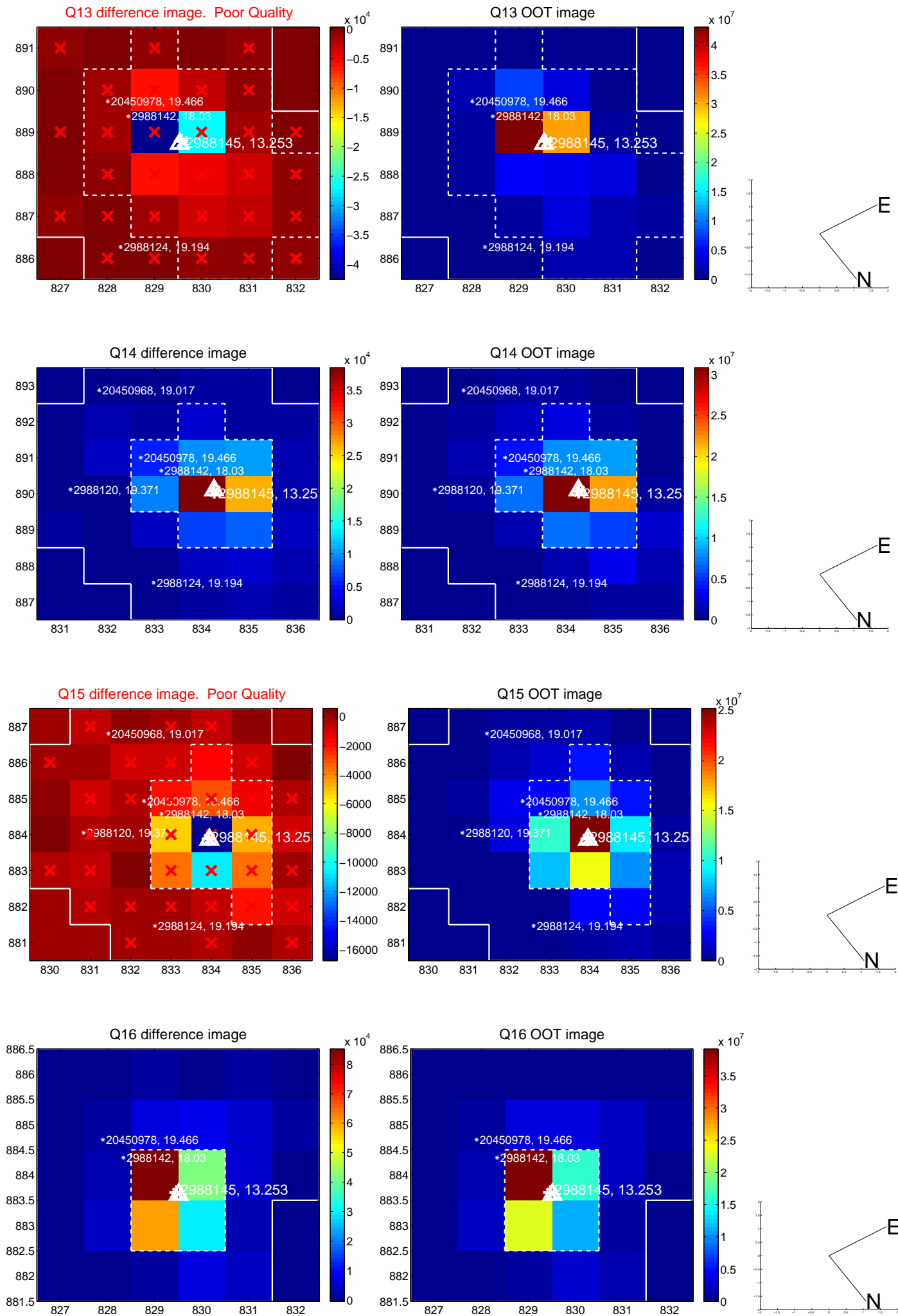


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

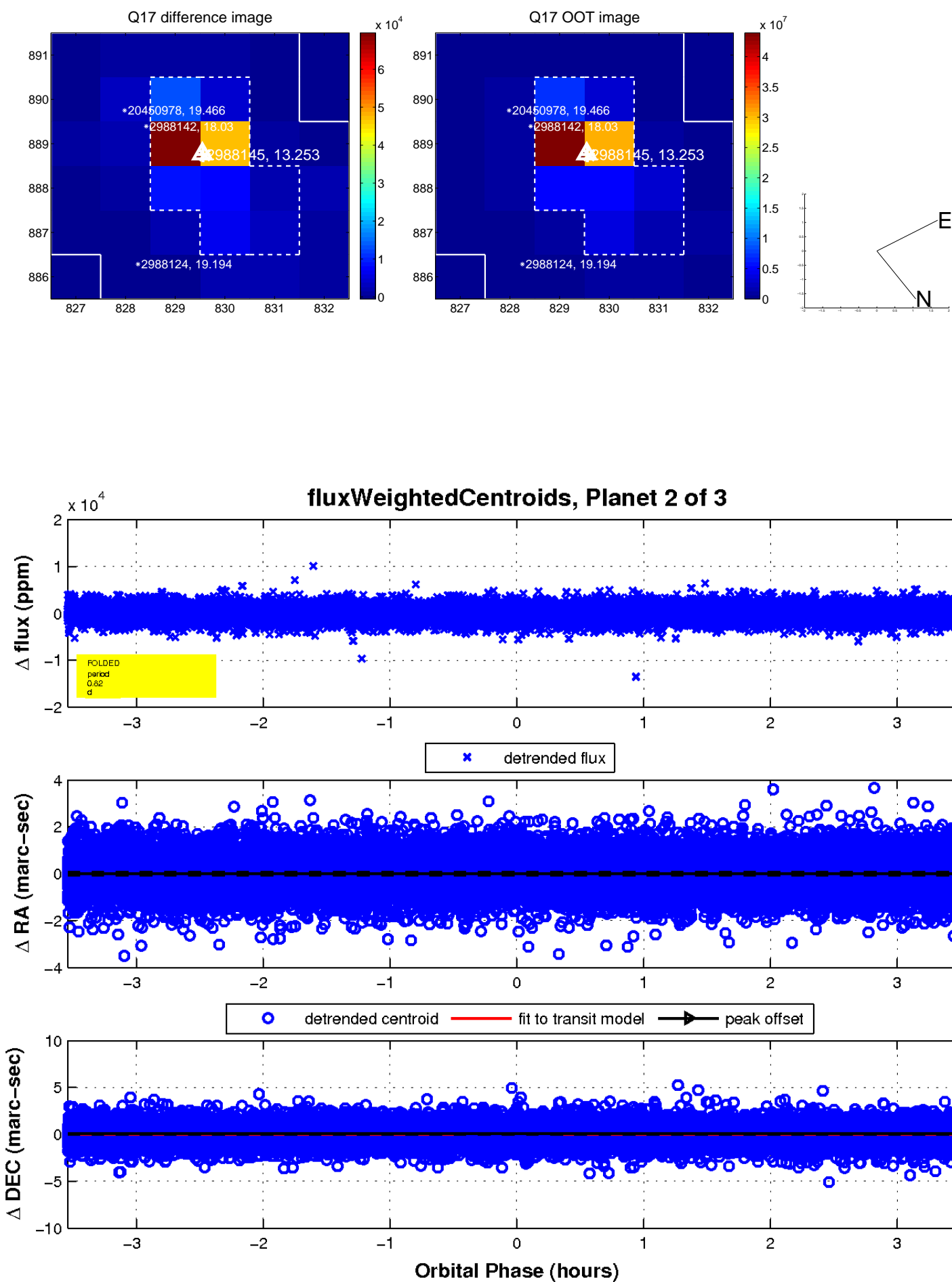




white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

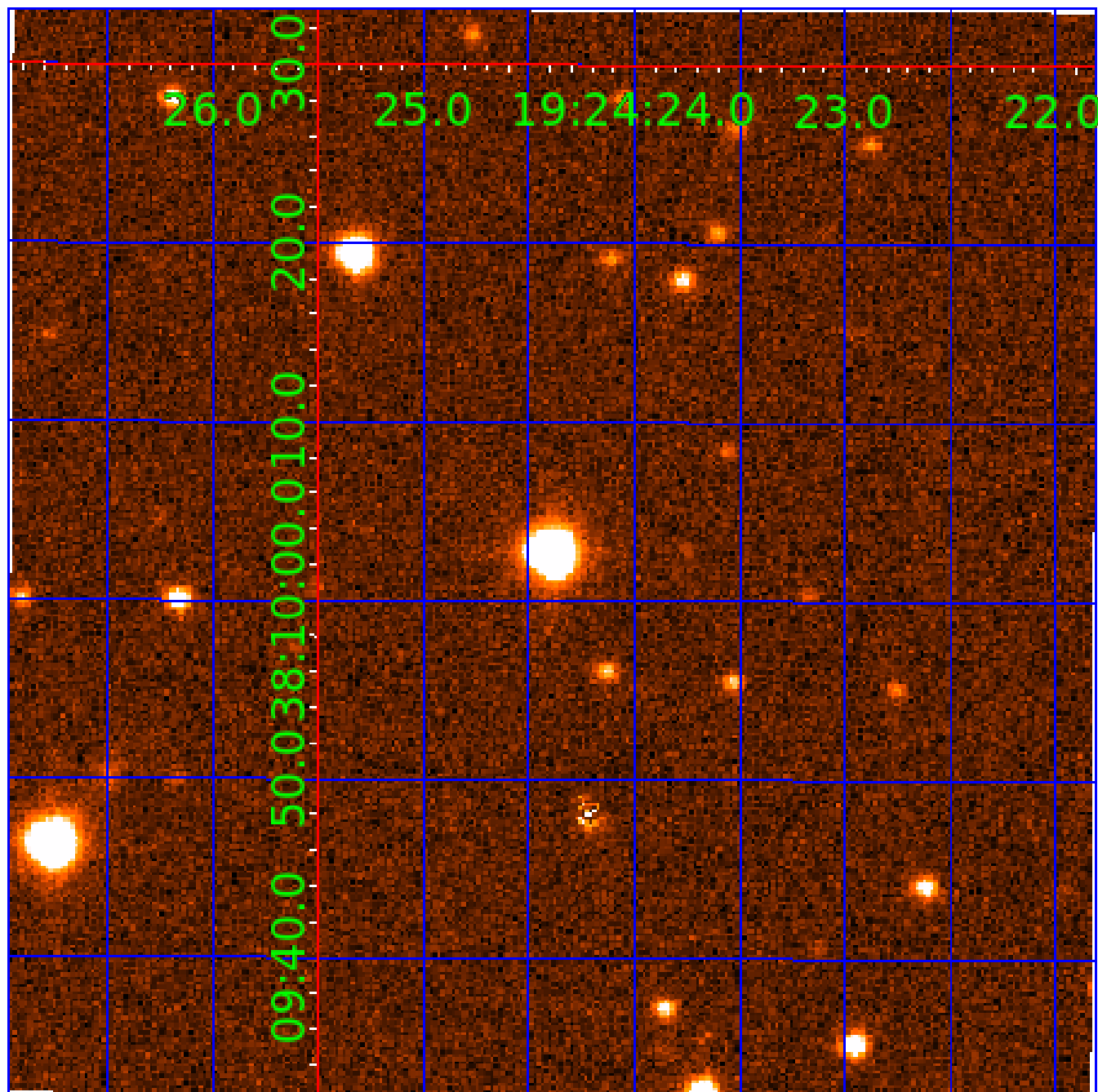


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 002988145

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
002988145-01	OBS	No	1.233538	132.386239	148.3	5.874	14.0	12.5	1.49	6992	2.09	7530.64
002988145-02	OBS	No	0.822351	131.979468	302.7	1.180	11.8	13.7	1.49	6992	3.02	12930.82
002988145-03	OBS	No	0.616760	131.634832	447.5	1.145	9.6	14.0	1.49	6992	3.68	18976.40

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
002988145-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT
002988145-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT
002988145-03	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_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.

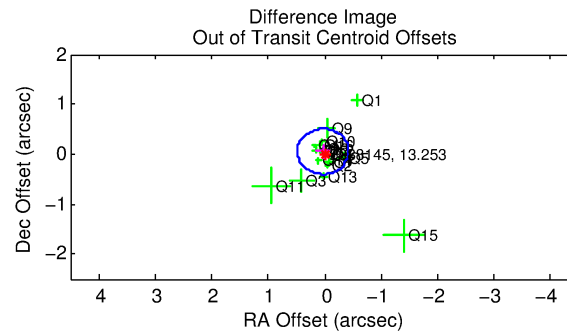
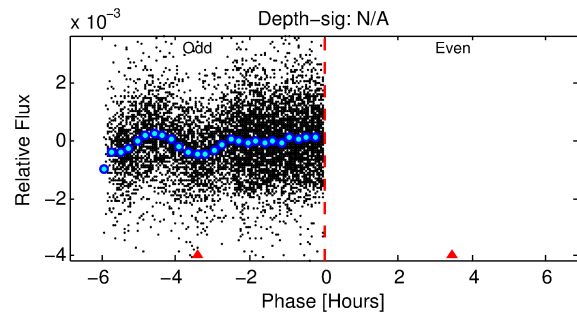
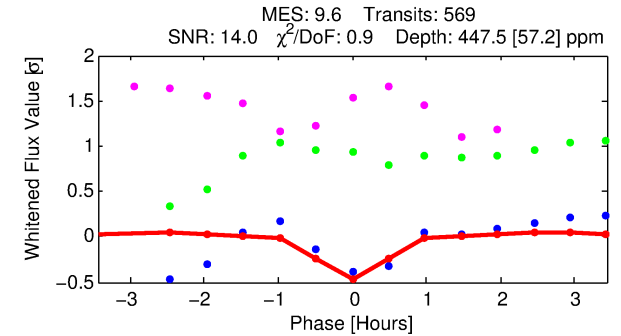
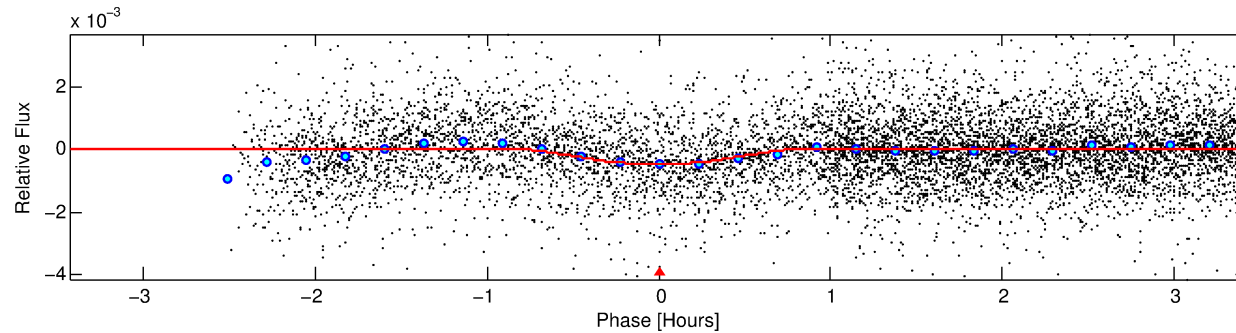
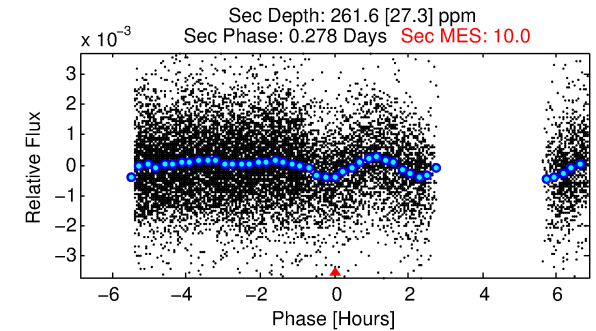
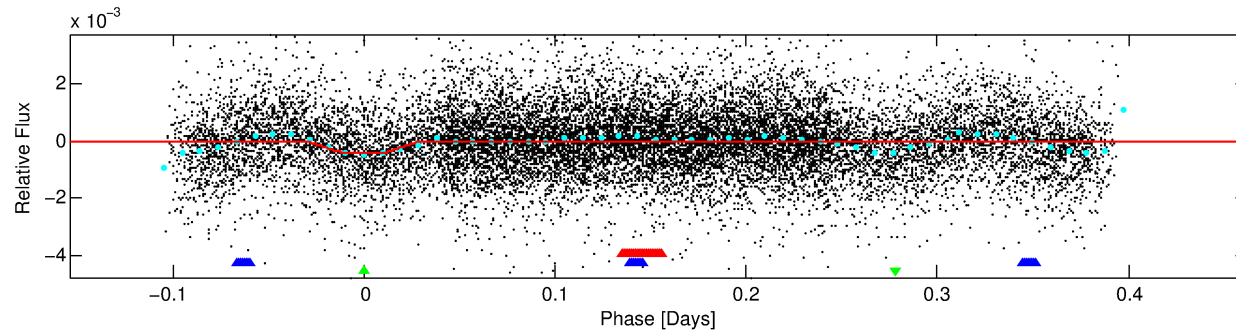
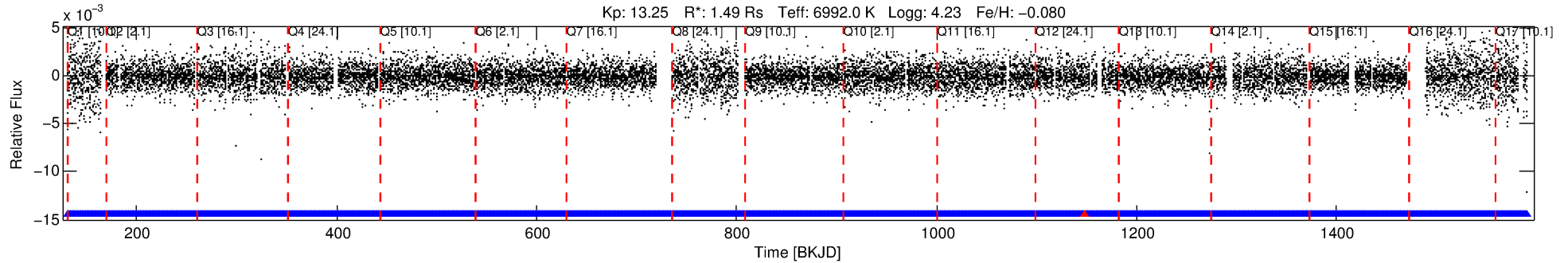
## Ephemeris Match Information For 002988145-03

No Significant Match Found



# DV One-Page Summary

KIC: 2988145 Candidate: 3 of 3 Period: 0.617 d



## DV Fit Results:

Period = 0.61676 [0.00001] d  
Epoch = 131.6348 [0.0015] BKJD  
Rp/R\* = 0.0227 [0.0105]  
a/R\* = 2.21 [4.79]  
b = 0.90 [0.58]  
Seff = 18976.40 [7831.84]  
Teq = 2993 [309] K  
Rp = 3.68 [2.12] Re  
a = 0.0158 [0.0043] AU  
Ag = 2.65 [2.67] [0.62σ]  
Teffp = 5905 [1395] K [2.04σ]

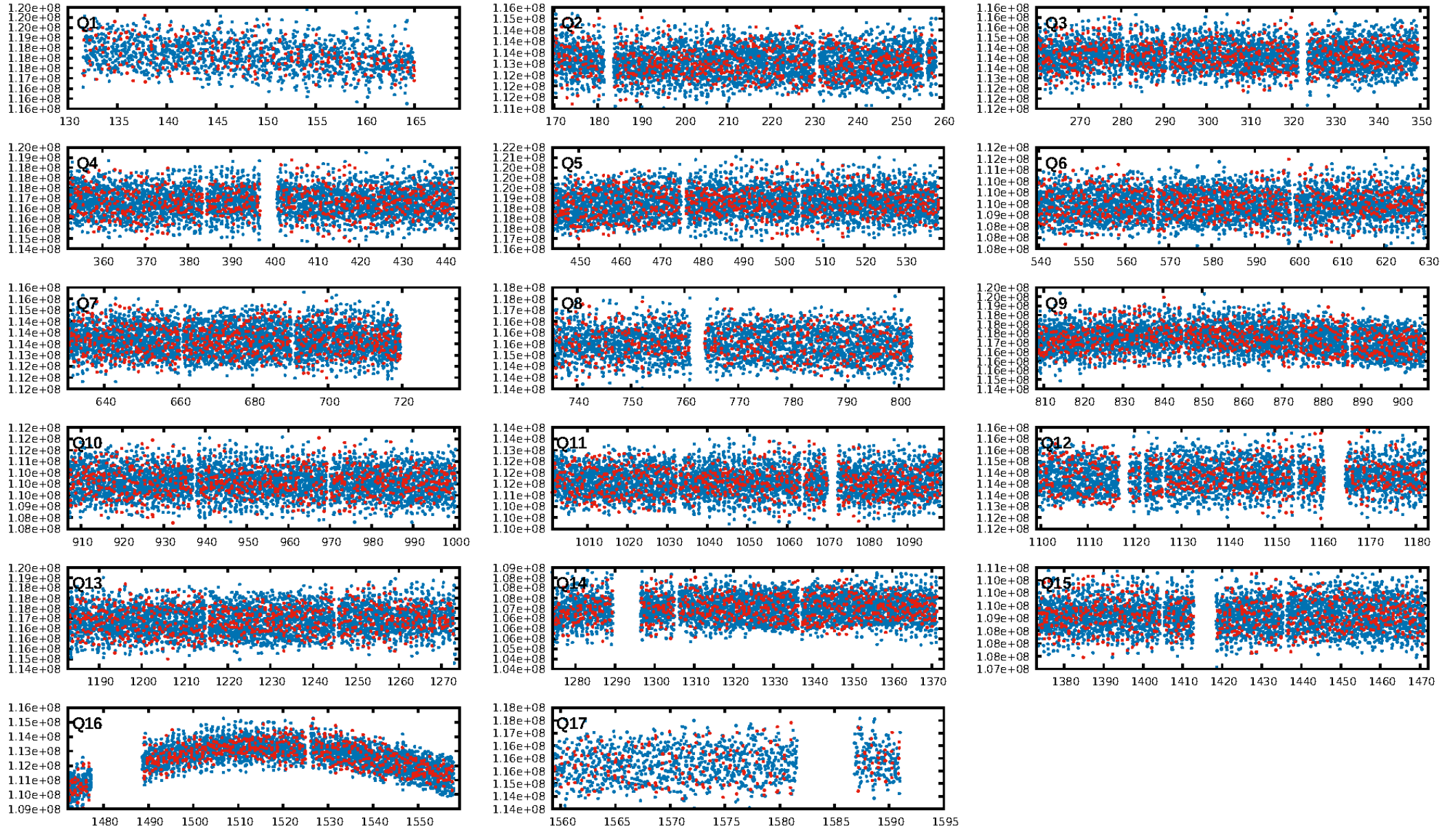
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 99.7% [3.00σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [540/541]  
GhostDiagnostic-chr: 2.048  
Centroid-sig: 35.1%  
Centroid-so: 0.160 arcsec [1.81σ]  
OotOffset-rm: 0.062 arcsec [0.41σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-rm: 0.024 arcsec [0.16σ]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.71 [12/17]  
DiffImageOverlap-fno: 1.00 [17/17]

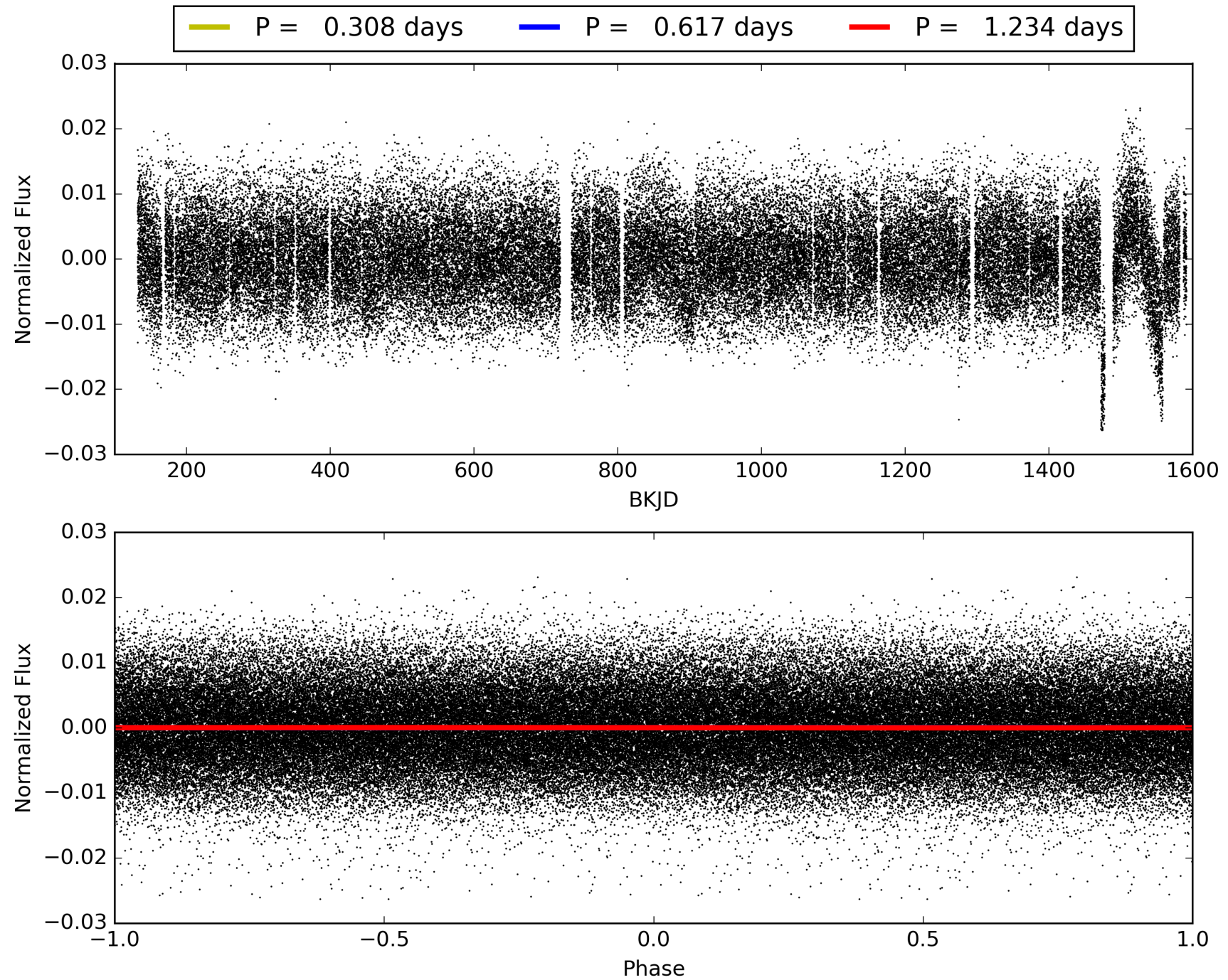
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 03-Feb-2016 09:15:14 Z

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

# TCE 002988145-03, PDC Light Curves



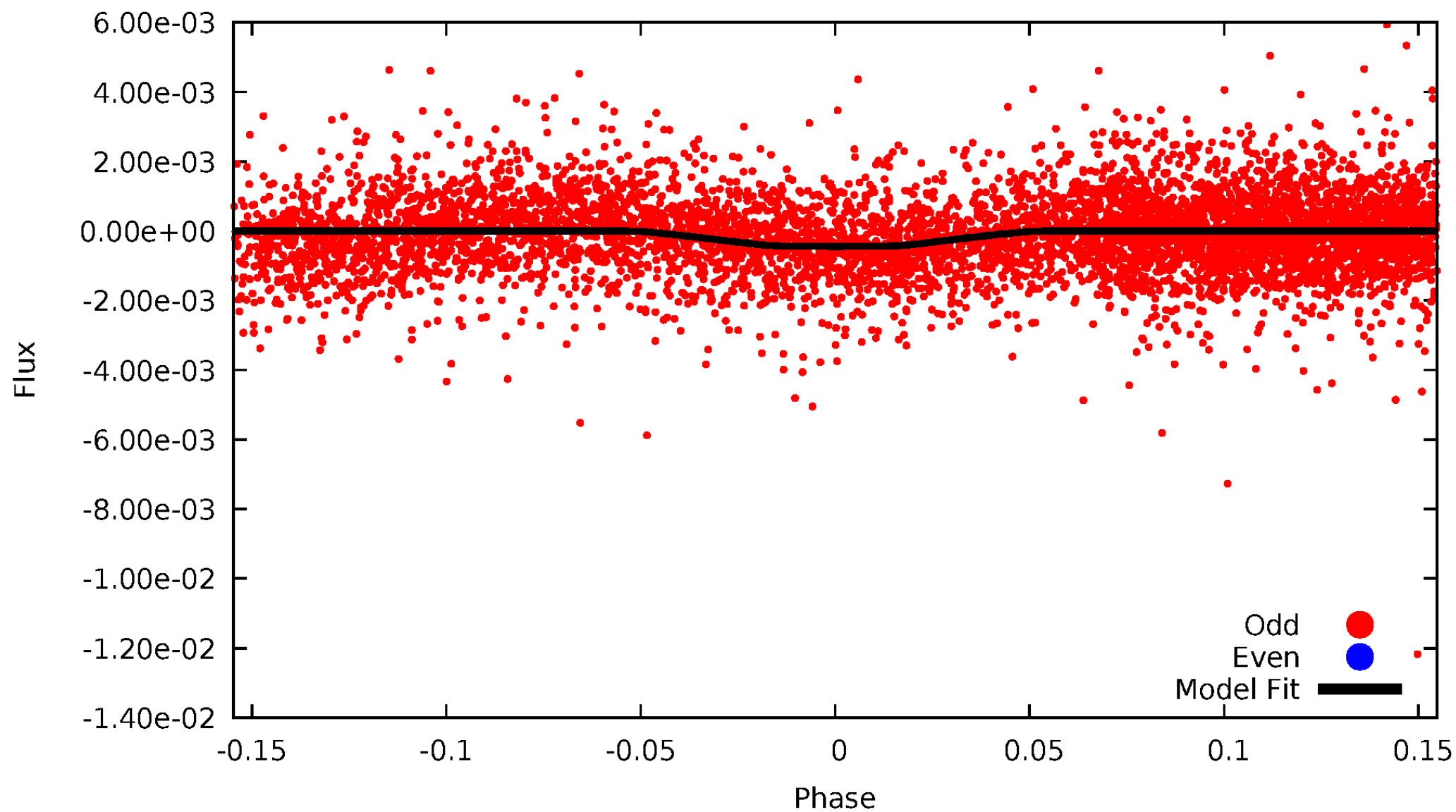
TCE 002988145-03





# DV Odd/Even

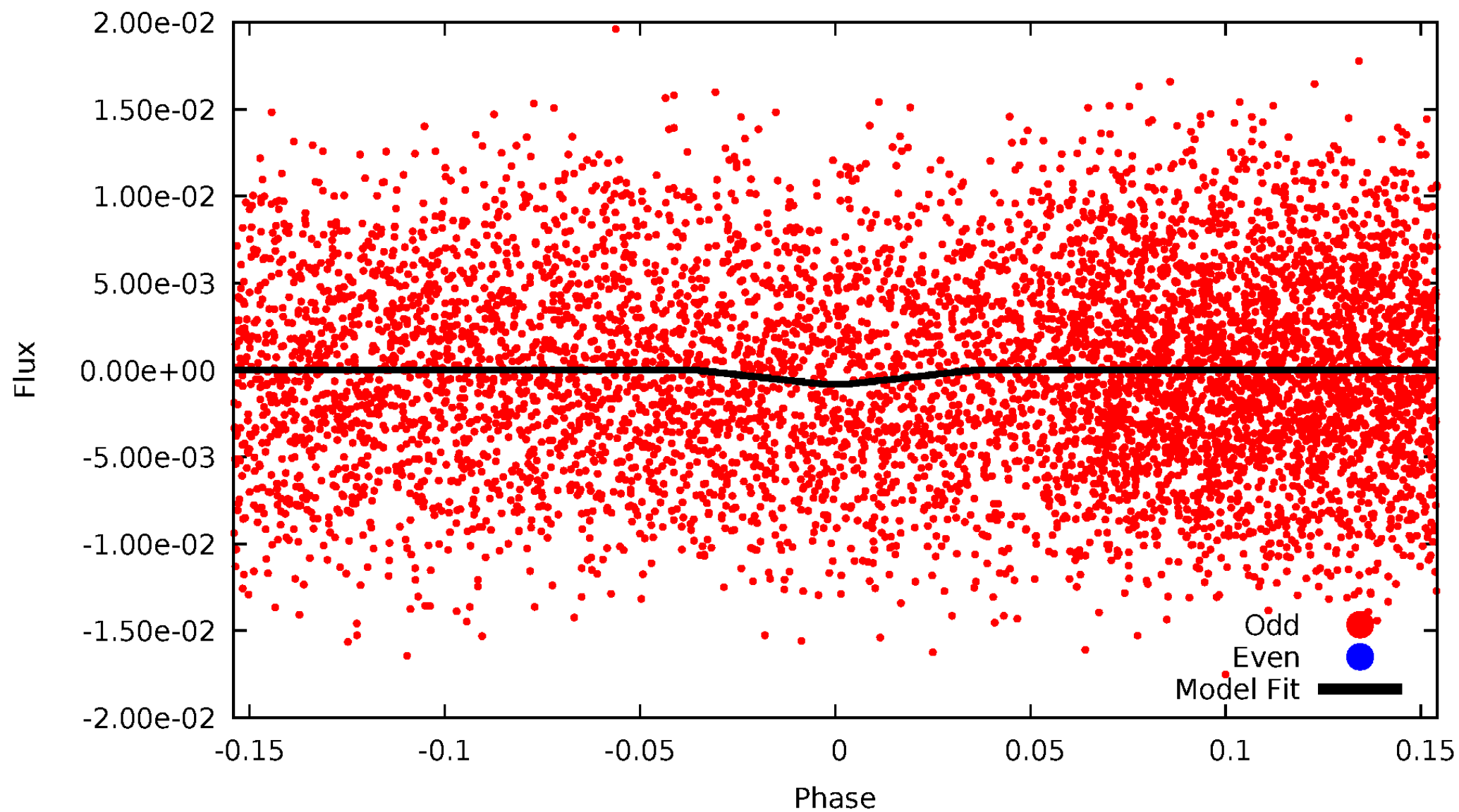
TCE 002988145-03





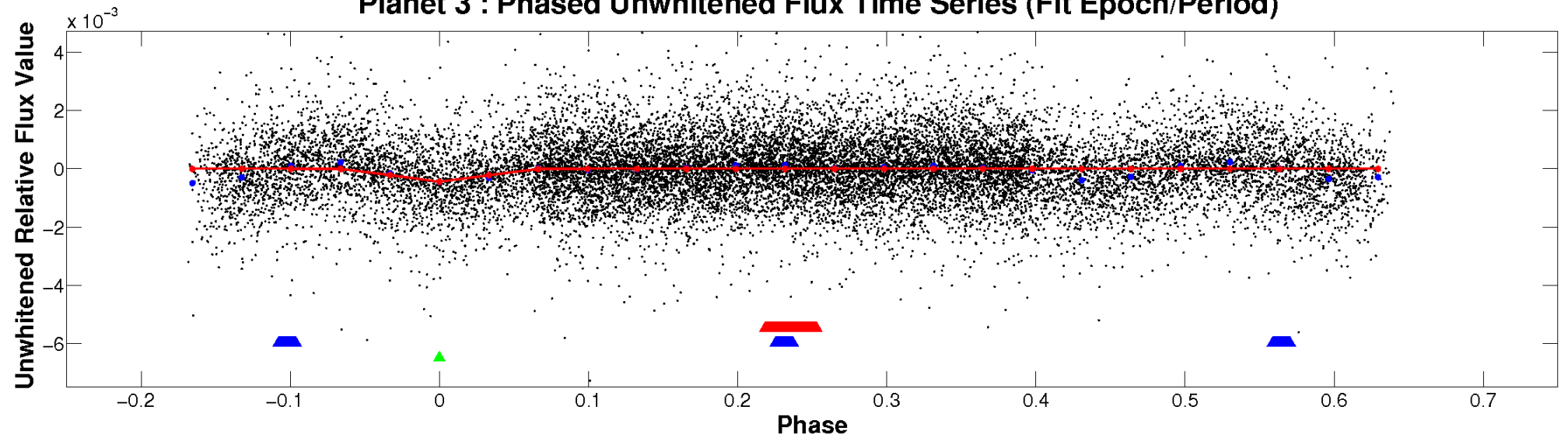
# ALT Odd/Even

TCE 002988145-03

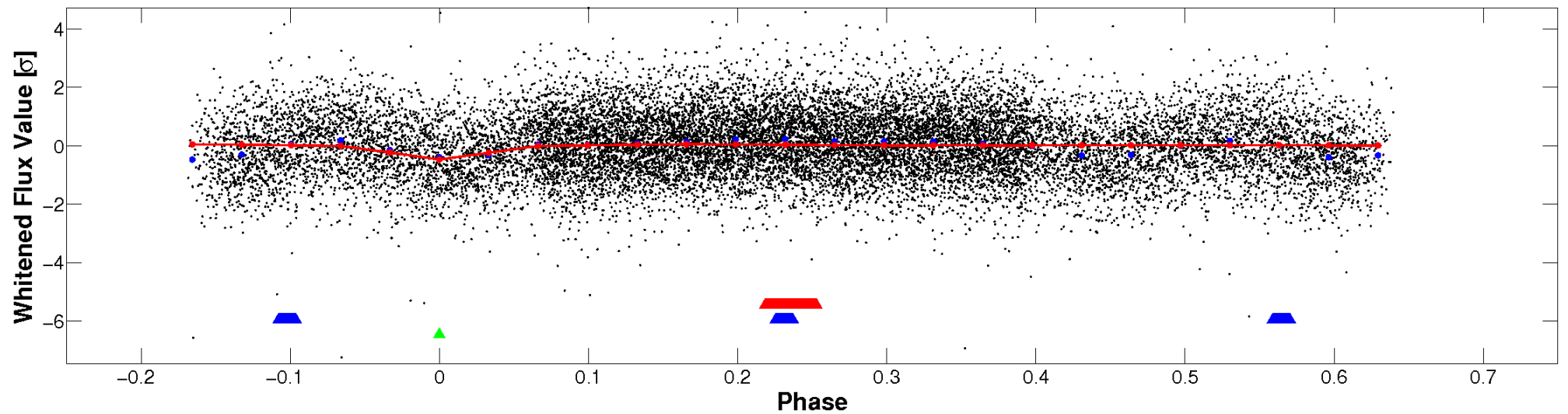


# Non-Whitened Vs. Whitened Light Curve

**Planet 3 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)**

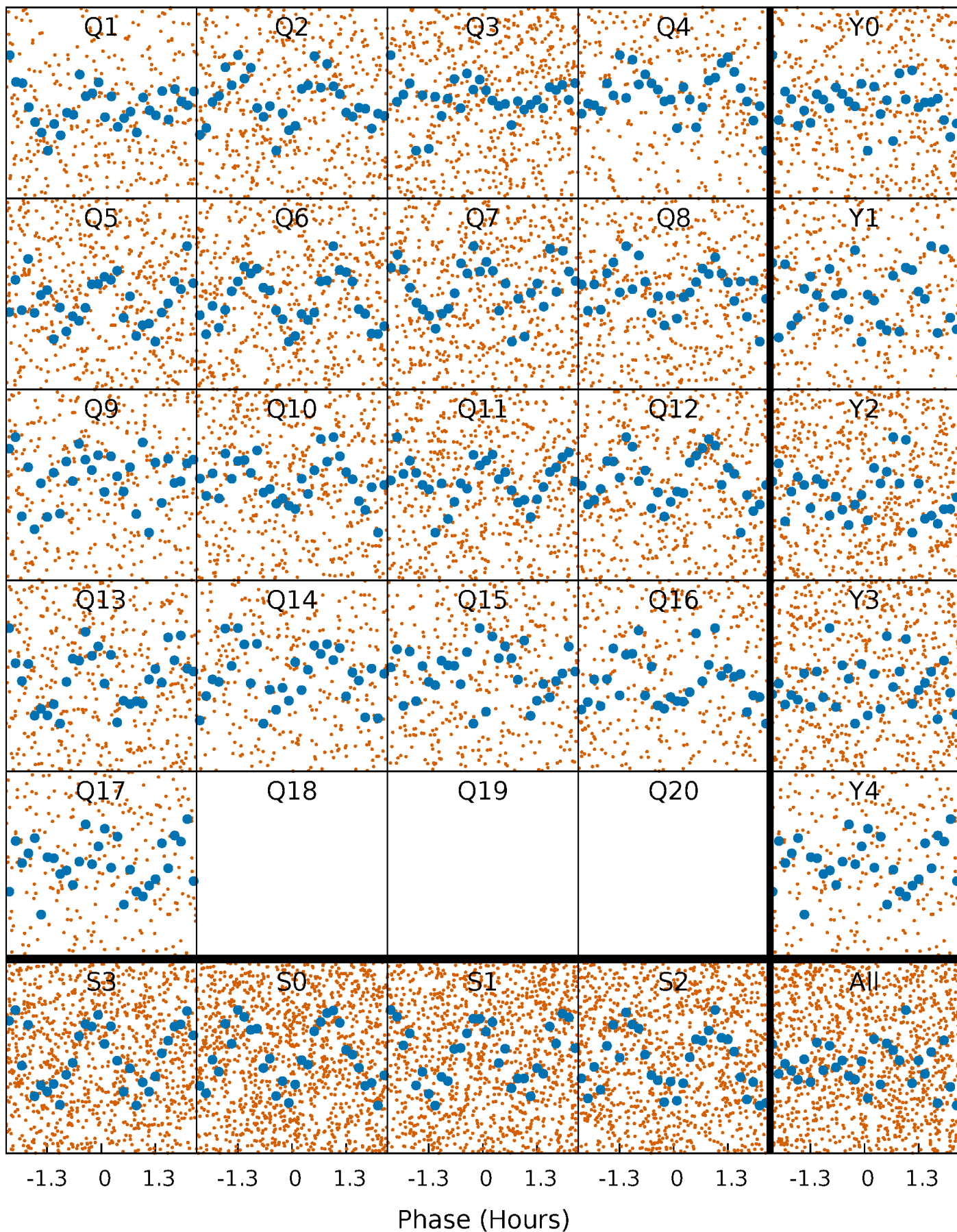


**Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



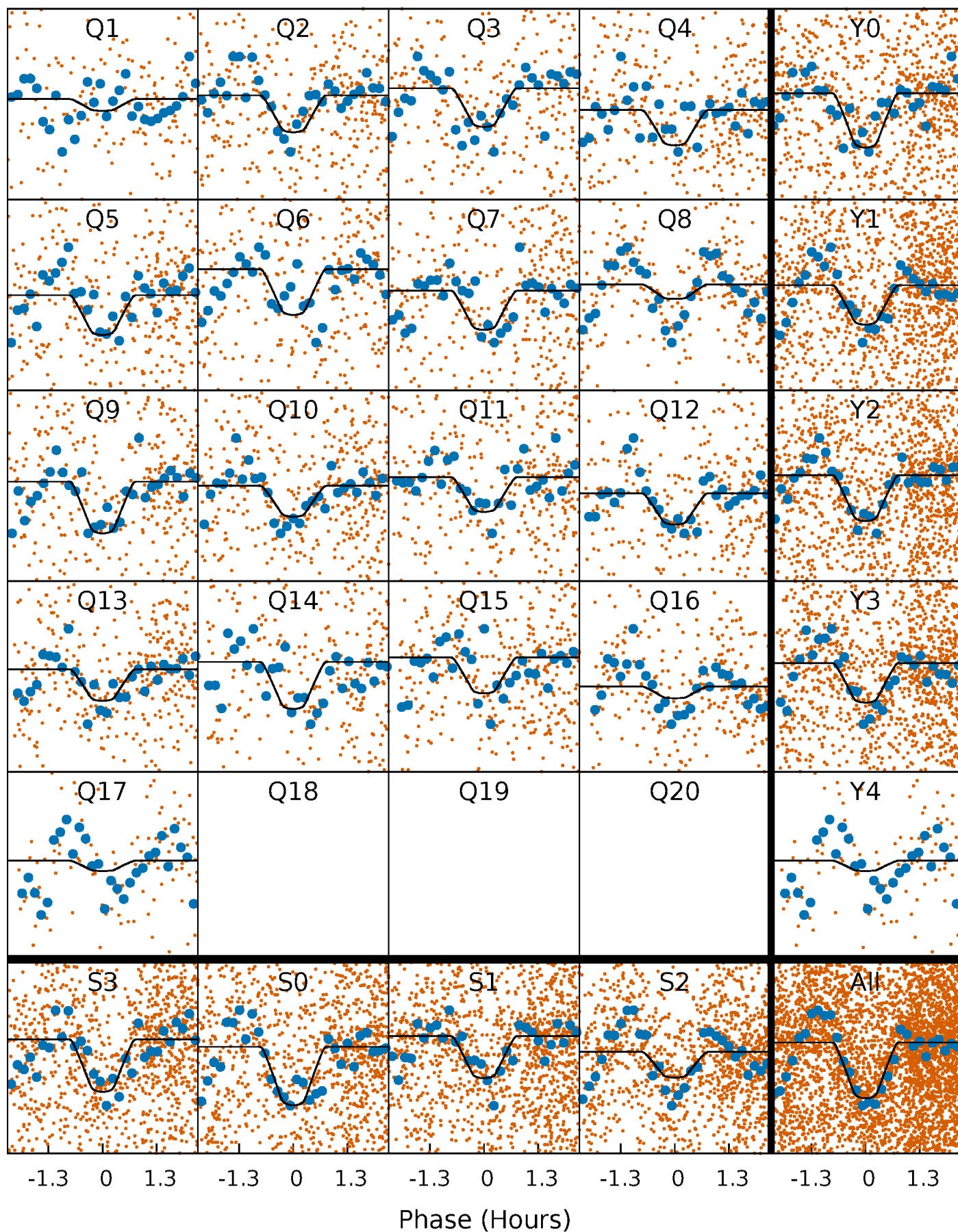
# PDC Quarter-Phased Transit Curves

TCE 002988145-03 P= 0.616760 Days  $T_0=131.634832$  (BKJD)



# DV Quarter-Phased Transit Curves

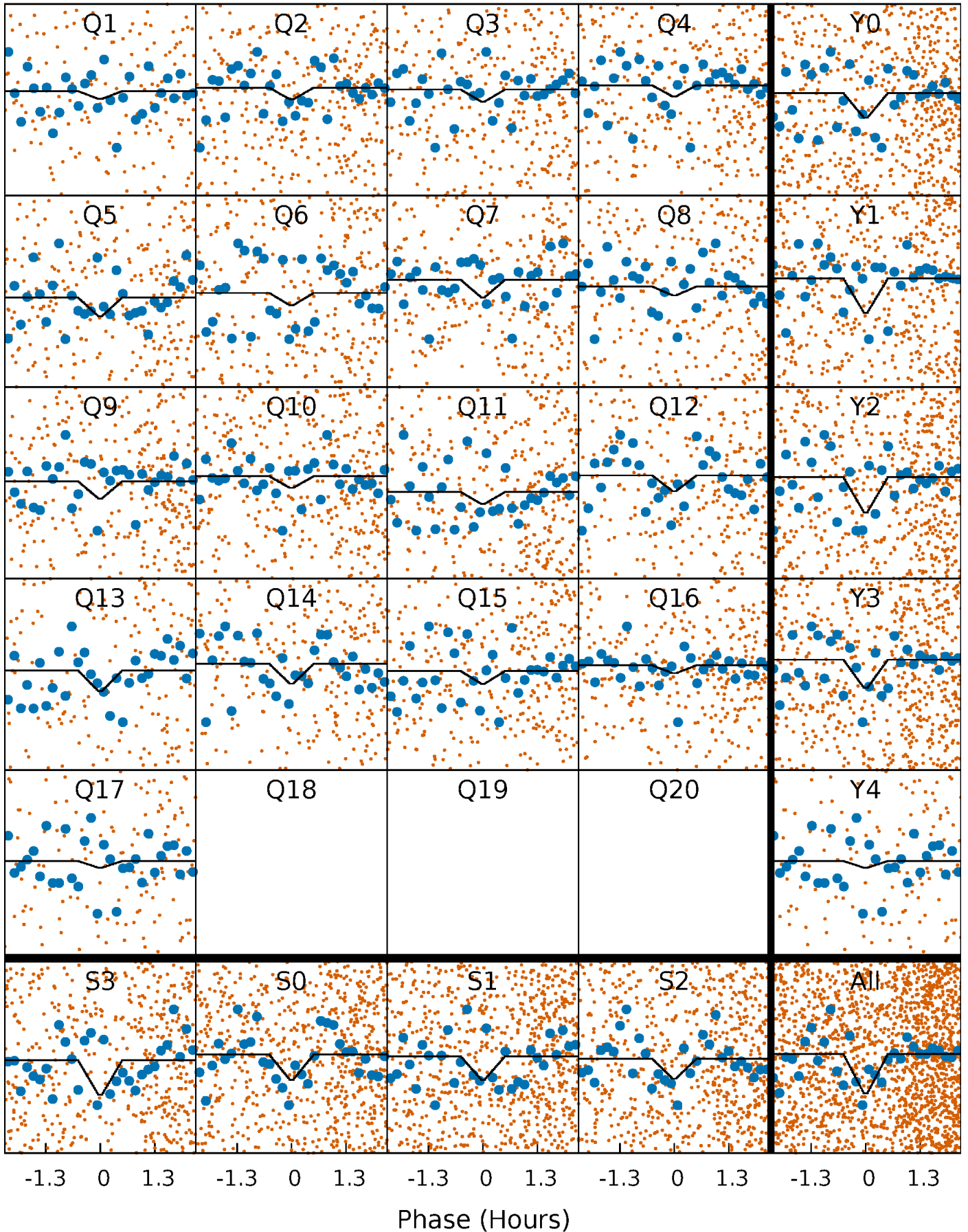
TCE 002988145-03 P= 0.616760 Days  $T_0=131.634832$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

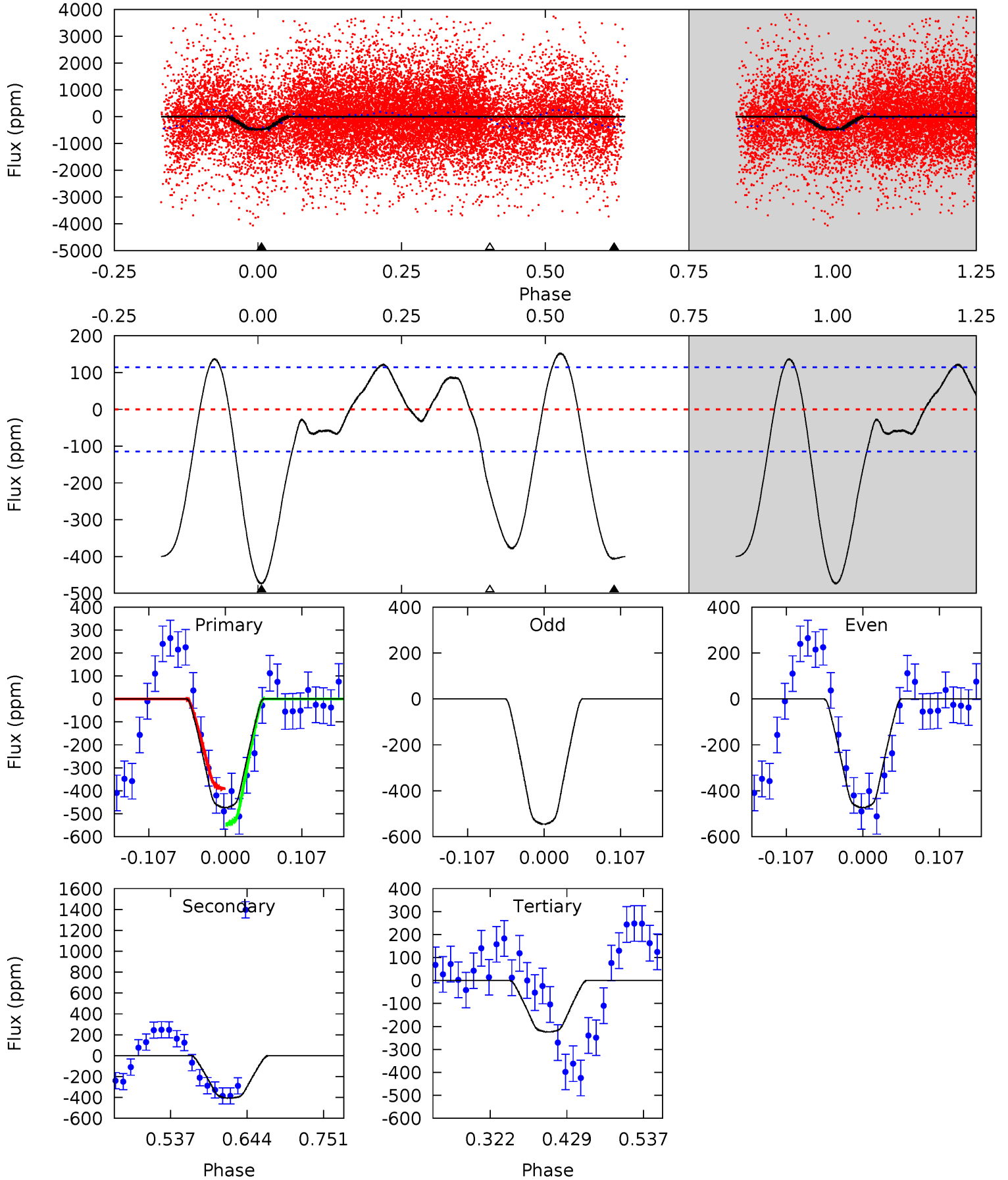
TCE 002988145-03 P= 0.616768 Days  $T_0=131.629030$  (BKJD)



# DV Model-Shift Uniqueness Test

002988145-03, P = 0.616760 Days, E = 131.018072 Days

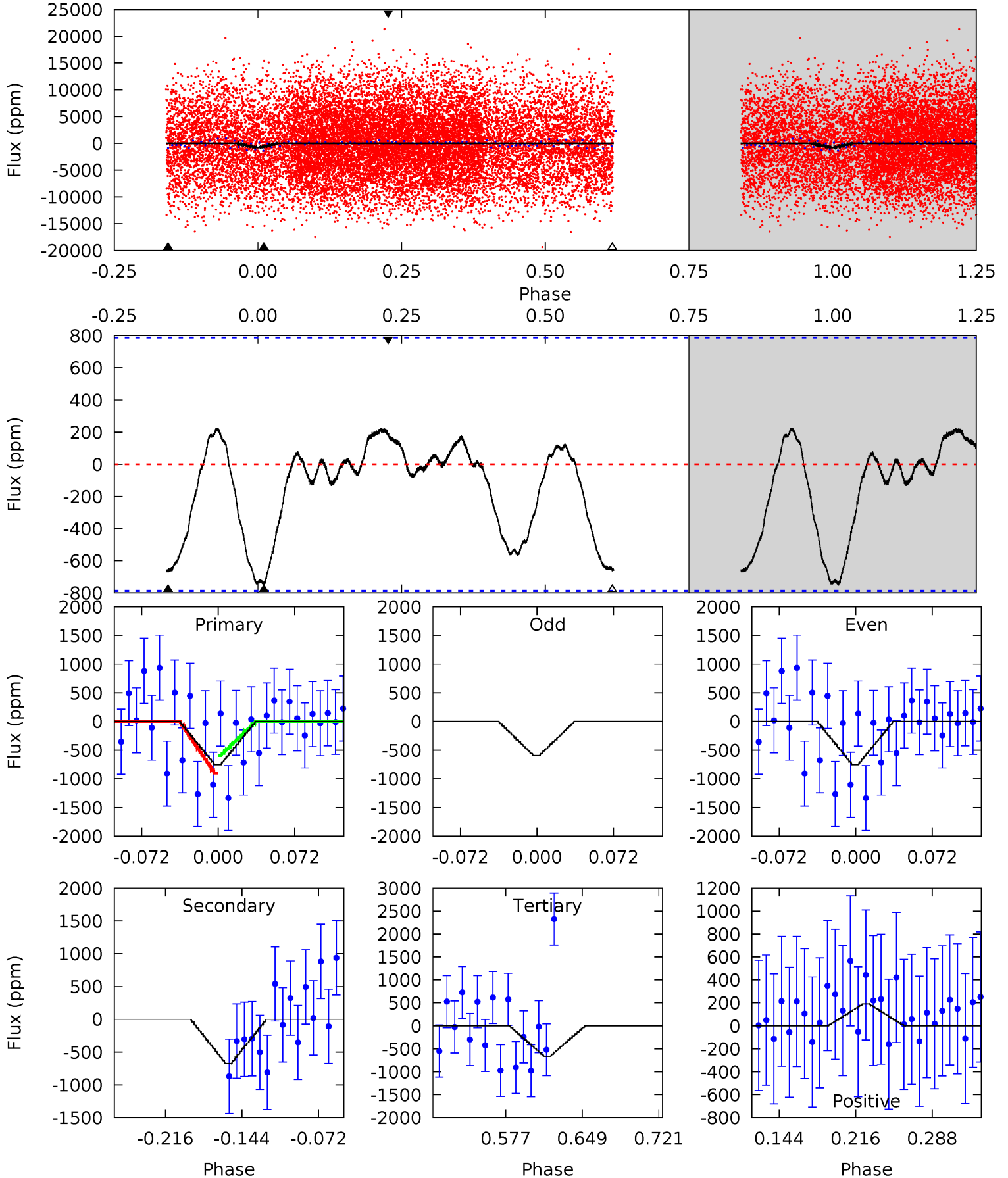
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
18.8	16.1	8.89	0	4.55	1.61	5.34	9.91	18.8	7.24	16.1	1.64	1.05	0.24	3.16



# Alt Model-Shift Uniqueness Test

002988145-03, P = 0.616768 Days, E = 131.012262 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
4.43	3.95	3.91	1.13	4.63	1.80	1.21	0.53	3.31	0.04	2.82	0.54	1.29	0.23	0.91



### Stellar Parameters For KIC 002988145

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6992^{+194}_{-267}$	$4.234^{+0.093}_{-0.201}$	$-0.080^{+0.250}_{-0.350}$	$1.488^{+0.508}_{-0.234}$	$1.392^{+0.222}_{-0.202}$	$0.595^{+0.298}_{-0.316}$
	+3%/-4%	+2%/-5%	+312%/-438%	+34%/-16%	+16%/-15%	+50%/-53%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 002988145-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-406 \pm 25$	$3.88^{+2.06}_{-1.70}$	$4234^{+348}_{-240}$	$6336^{+2609}_{-1212}$	$3.585^{+8.120}_{-1.997}$
Alt.	$-672 \pm 170$	$4.85^{+1.85}_{-1.87}$	$4215^{+331}_{-238}$	$6370^{+2293}_{-1085}$	$3.755^{+6.709}_{-1.916}$

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

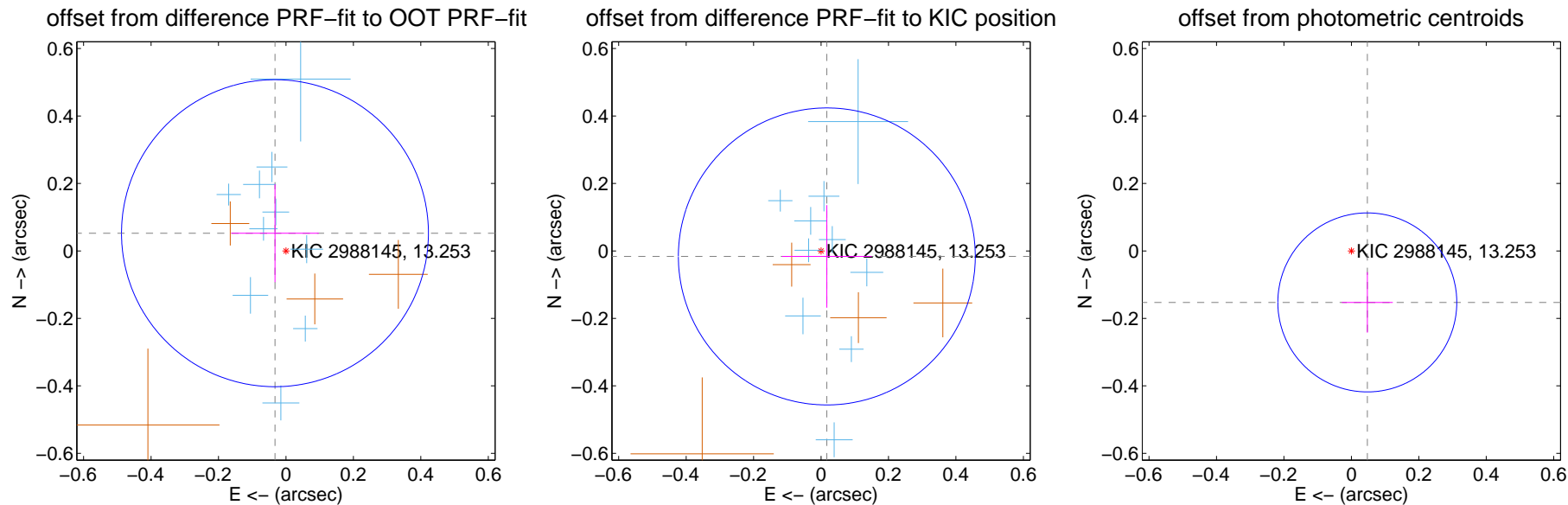
## DV Centroid Data

Supplemental centroid analysis for 002988145-03. Kepler magnitude: 13.25. Transit SNR 14.01

There are 12 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.14 arcsec

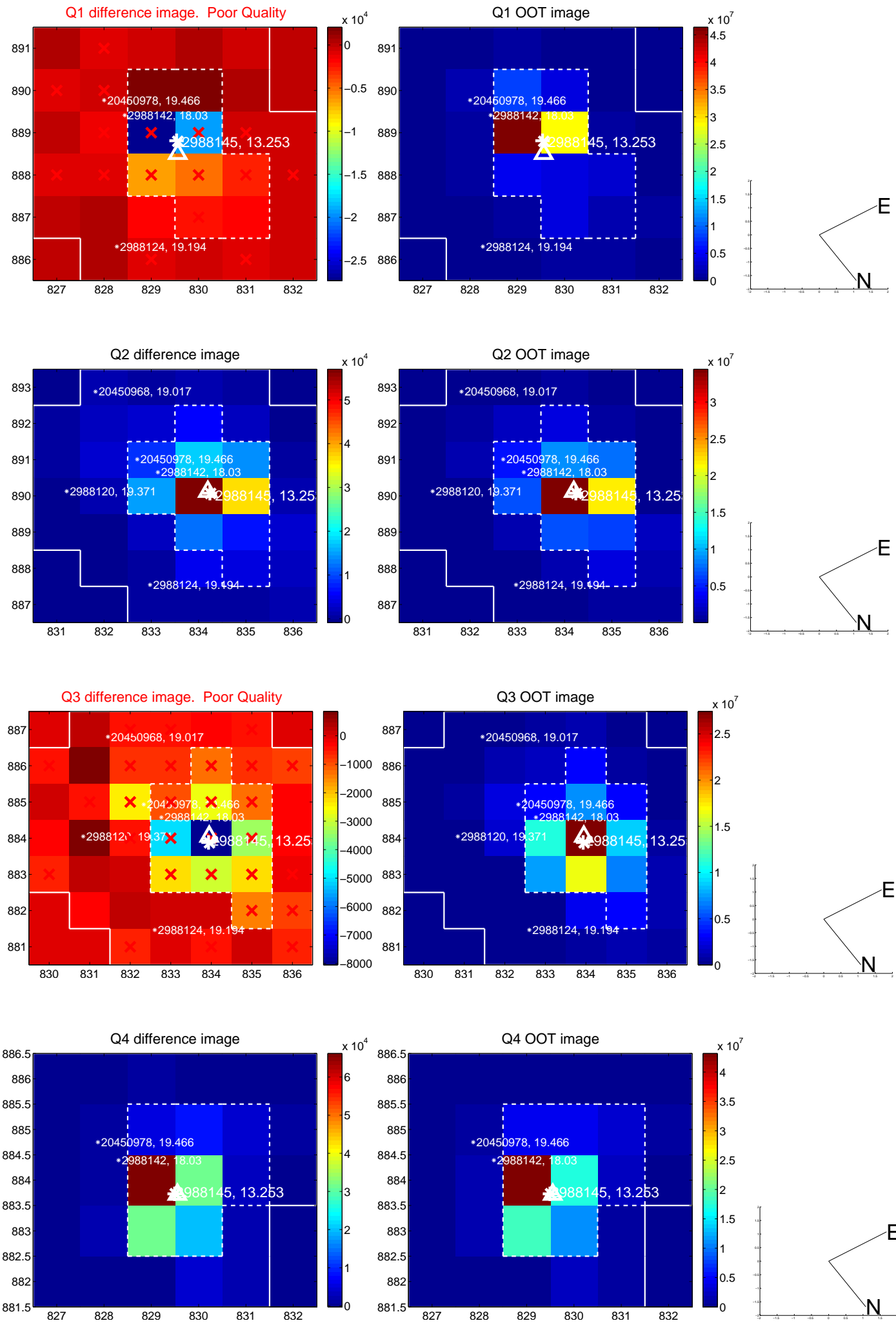
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.062 \pm 0.152$	0.41	$0.033 \pm 0.130$	$0.053 \pm 0.145$
PRF-fit source offset from KIC position	$0.024 \pm 0.147$	0.16	$-0.017 \pm 0.133$	$-0.016 \pm 0.152$
photometric centroid source offset	$0.16 \pm 0.09$	1.81	$-0.05 \pm 0.08$	$-0.15 \pm 0.09$



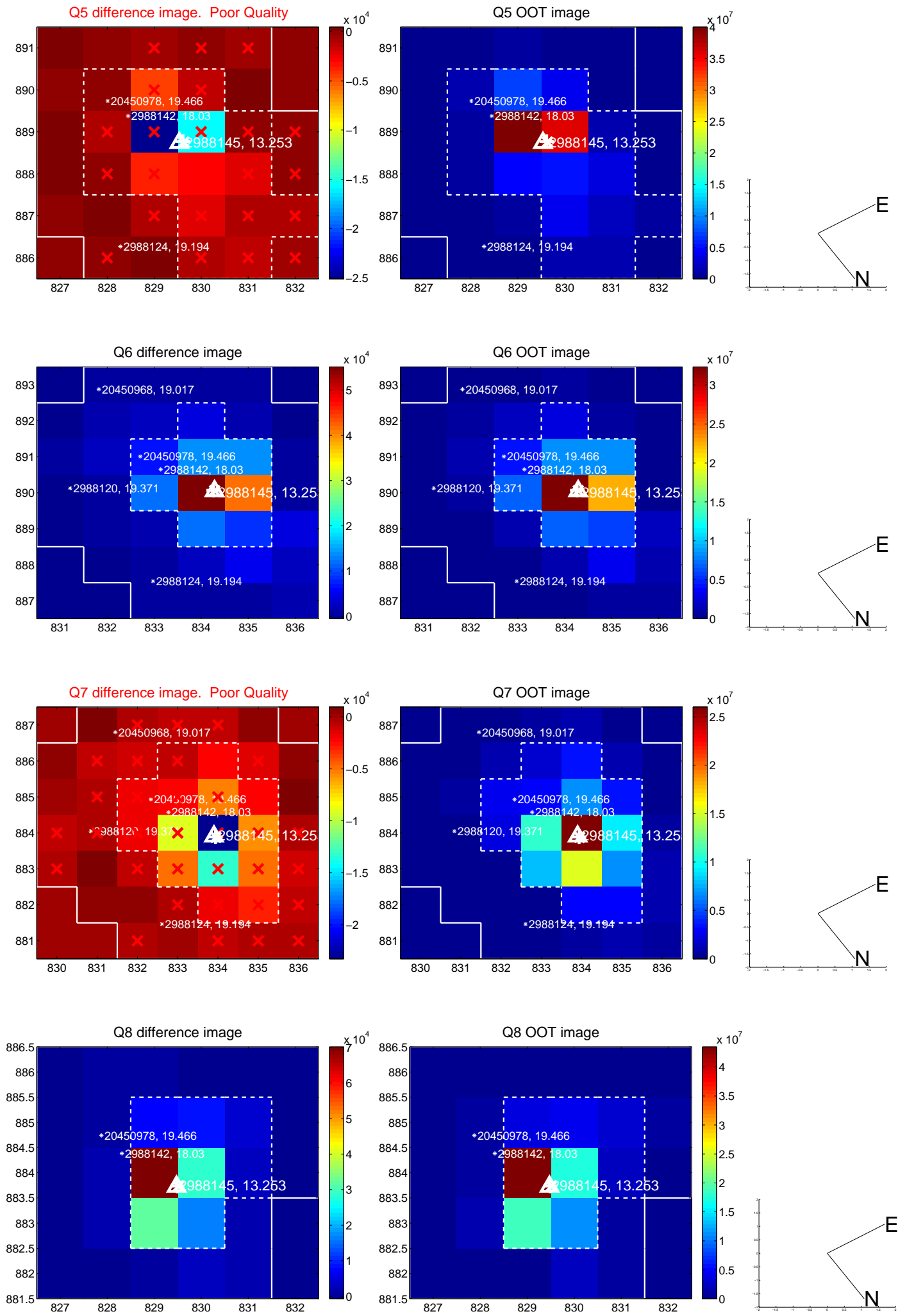
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



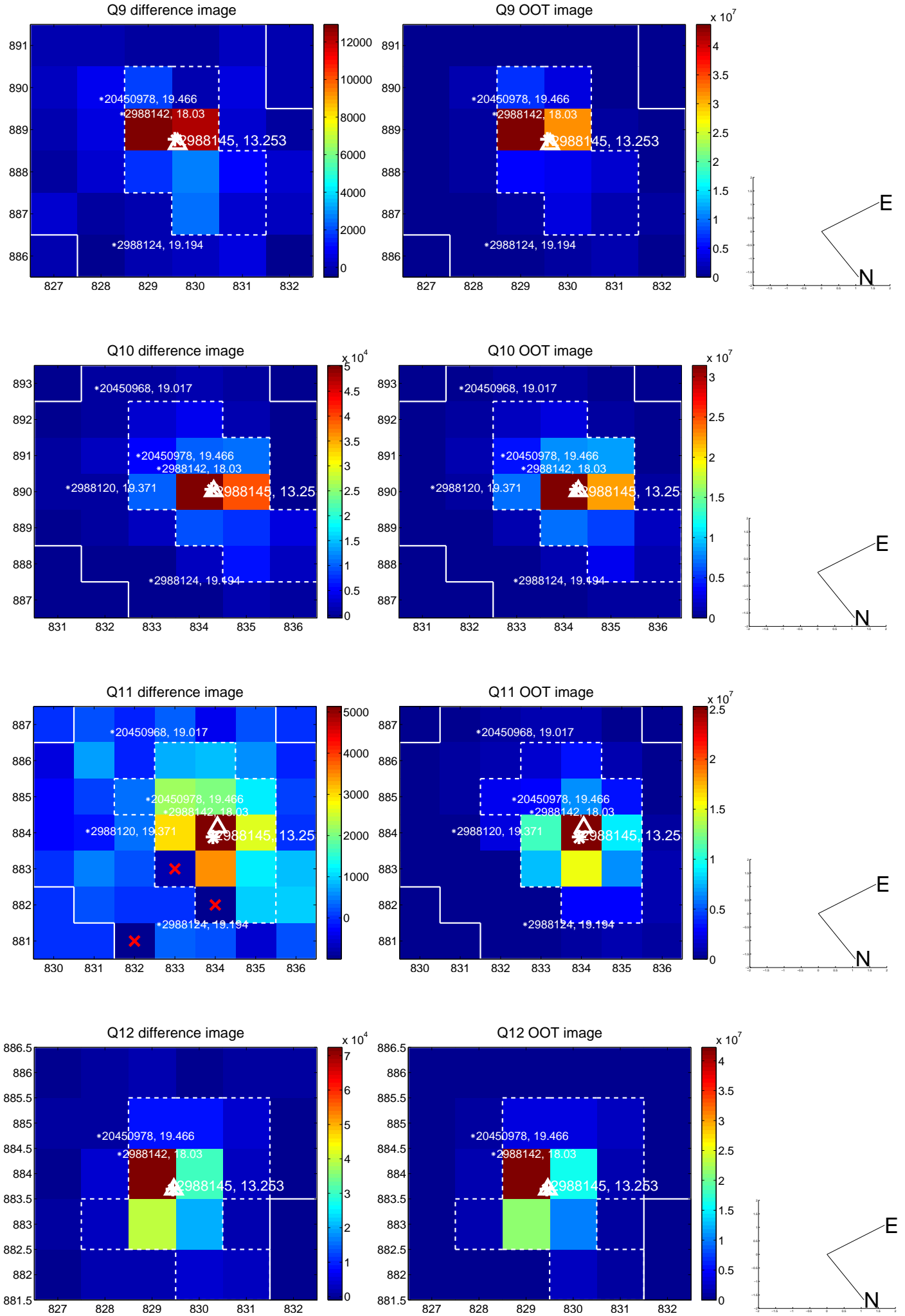
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



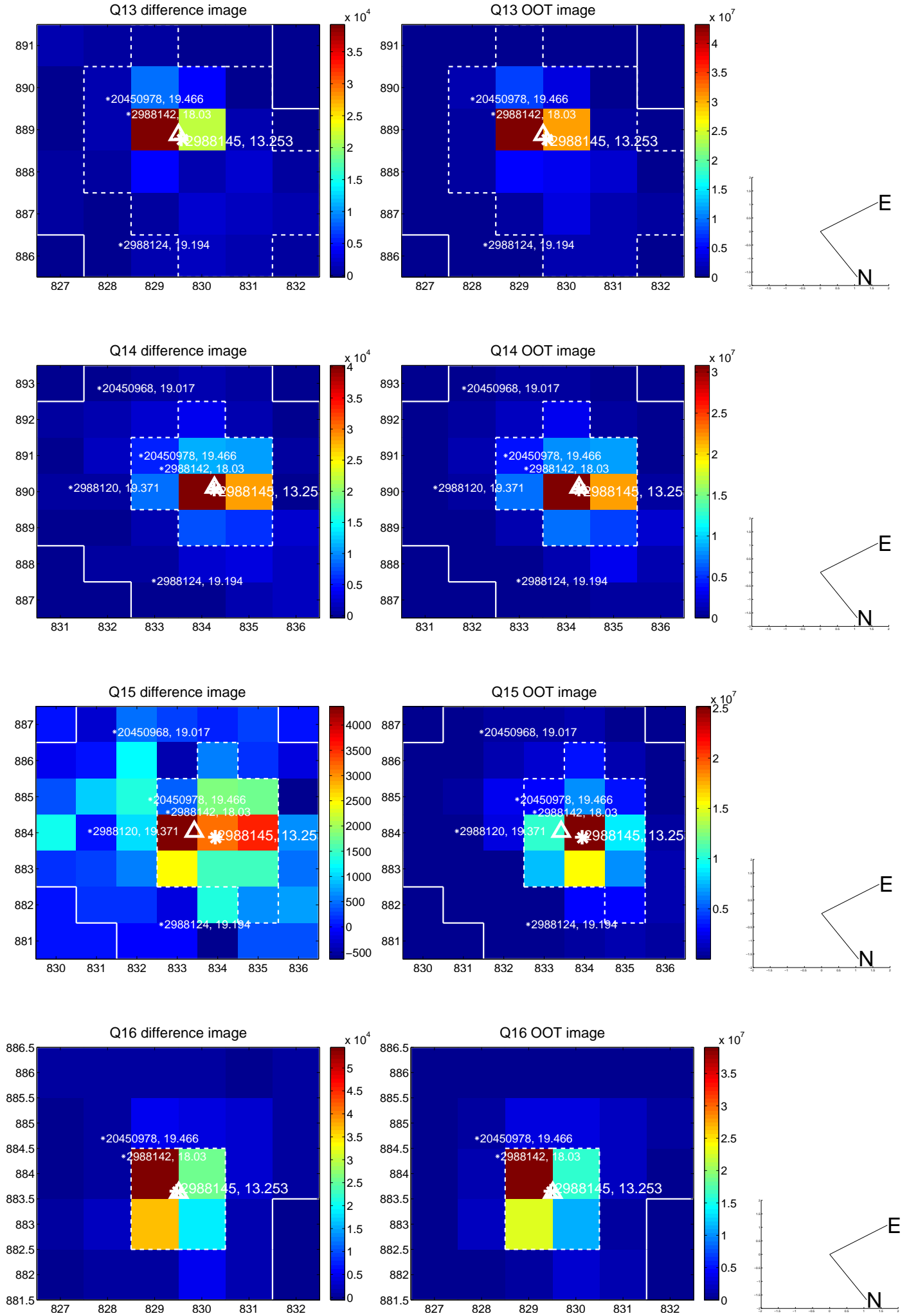
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



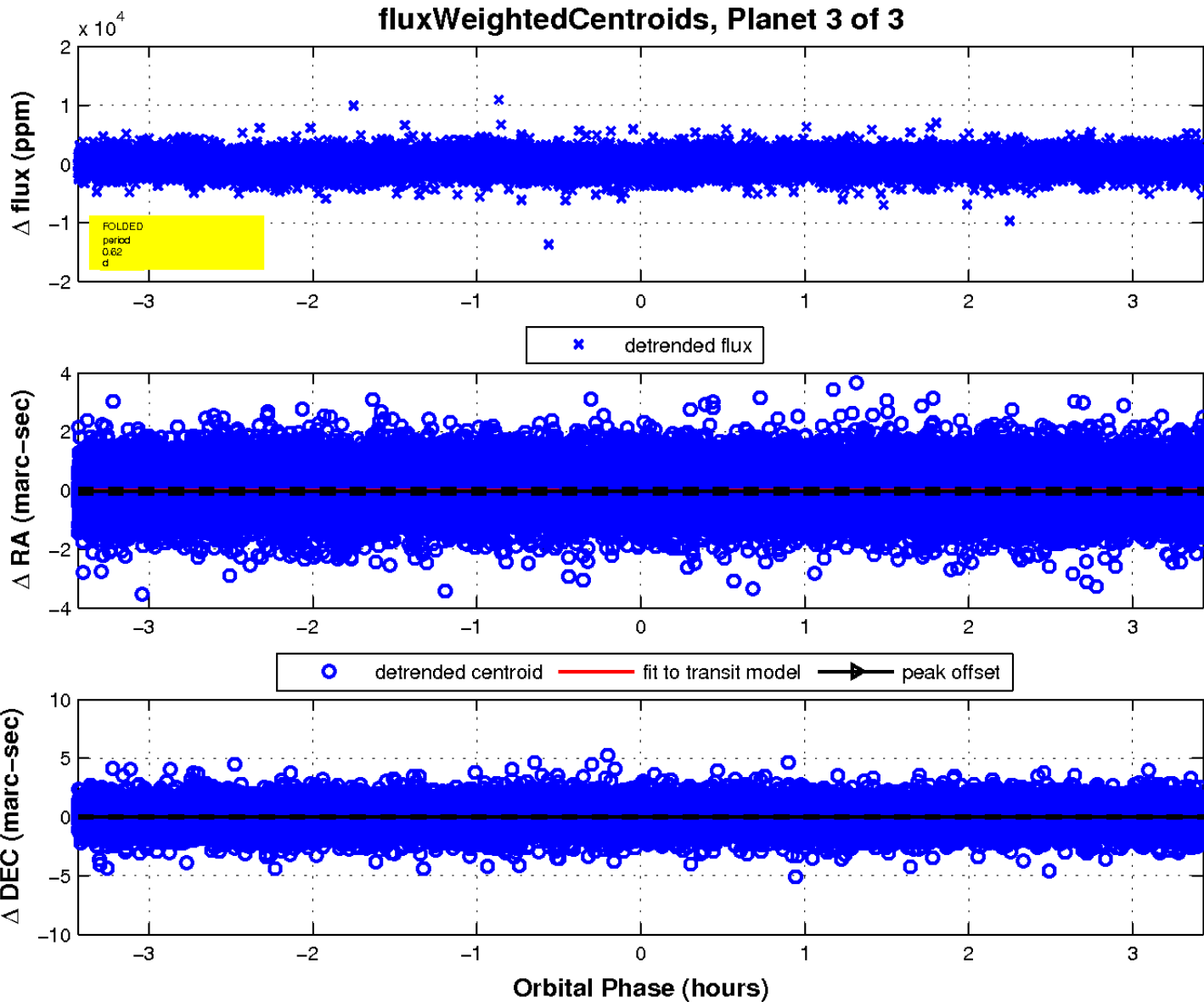
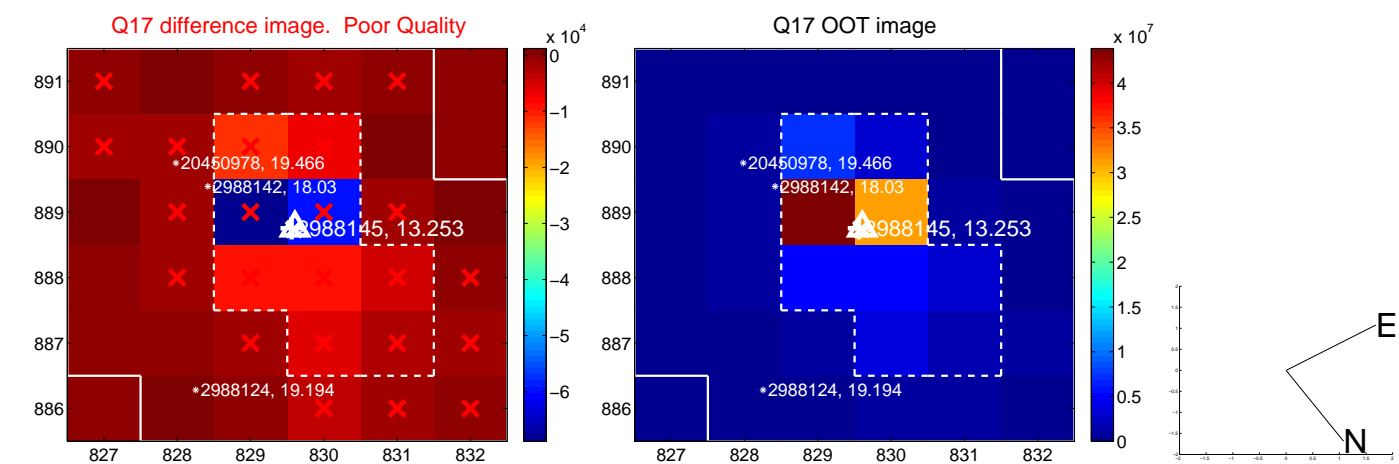
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

