

# KIC 009772075

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009772075-01	OBS	No	0.768918	132.185957	6.9	4.882	11.8	3.8	2.57	7256	0.69	41000.94
009772075-02	OBS	No	73.413840	176.350967	219.1	3.278	8.9	6.7	2.57	7256	4.21	93.96
009772075-03	OBS	No	14.488138	133.697772	159.0	5.389	9.3	11.2	2.57	7256	6.19	817.74
009772075-04	OBS	No	40.121595	132.617429	183.0	2.371	8.6	8.9	2.57	7256	4.03	210.28
009772075-05	OBS	No	31.416621	138.366729	184.4	2.007	8.1	8.4	2.57	7256	3.99	291.35
009772075-06	OBS	No	10.115804	133.549542	95.7	2.371	7.9	8.6	2.57	7256	2.92	1320.18

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009772075-01	OBS	FP	0.00	1	0	0	0	LPP_DV
009772075-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009772075-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009772075-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009772075-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009772075-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_ZUMA—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

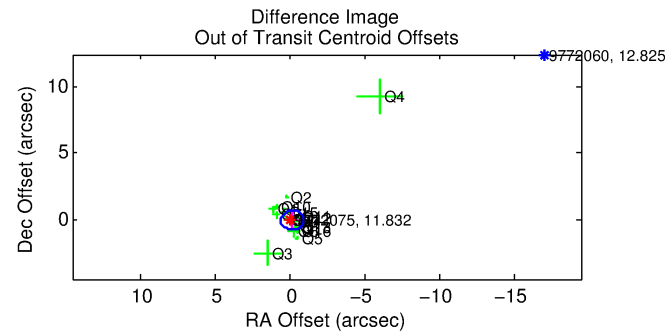
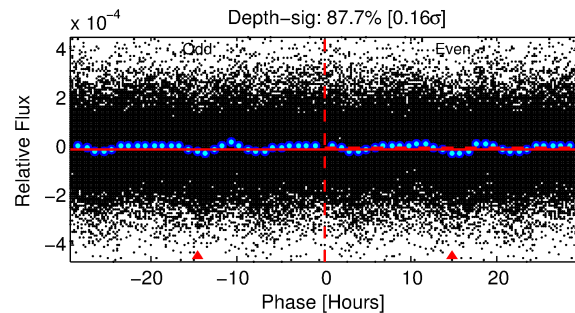
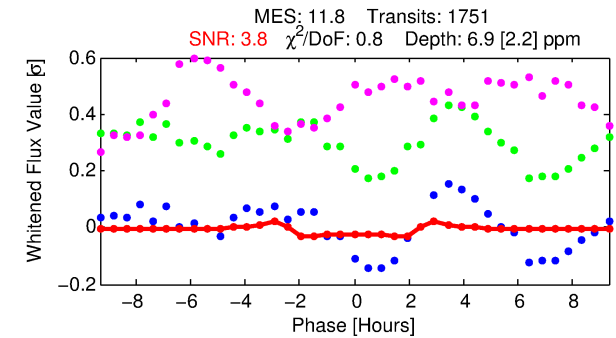
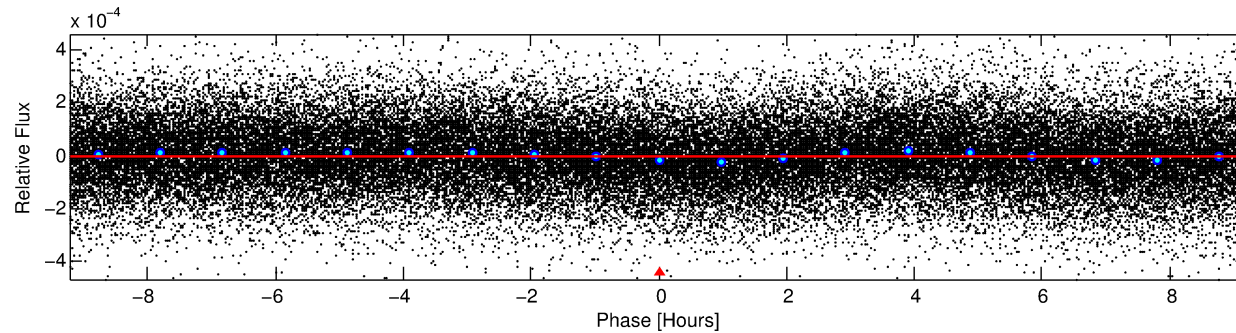
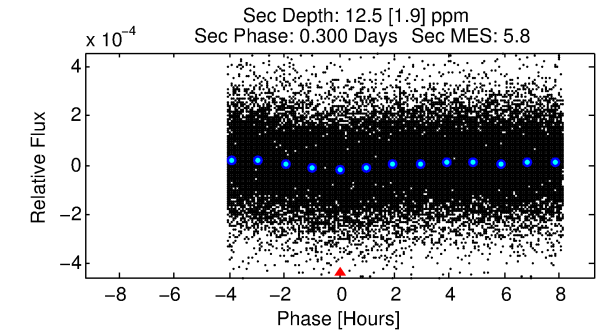
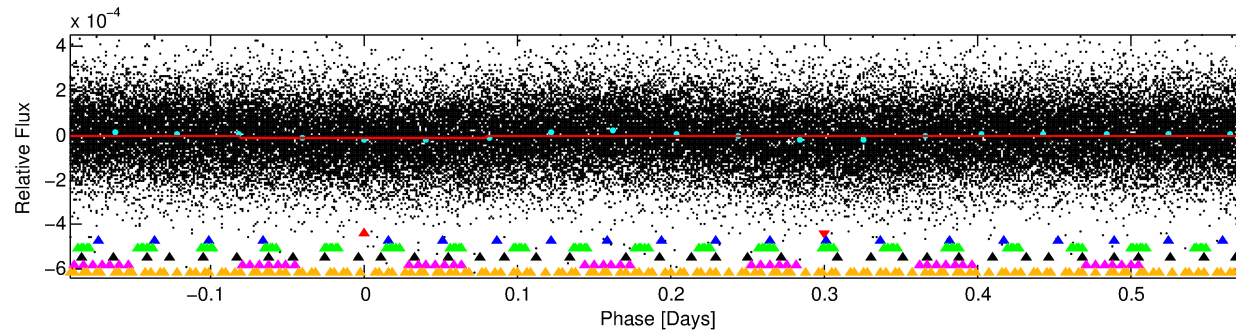
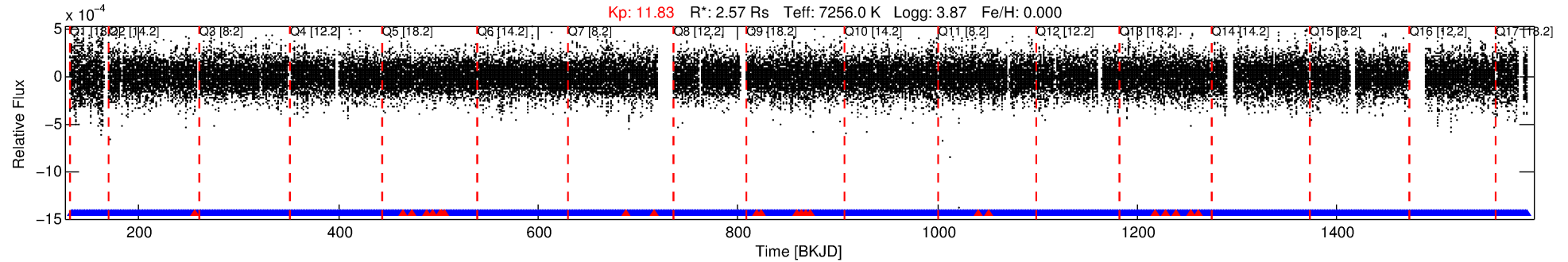
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009772075-01

No Significant Match Found

# DV One-Page Summary

KIC: 9772075 Candidate: 1 of 6 Period: 0.769 d



## DV Fit Results:

Period = 0.76892 [0.00003] d  
Epoch = 132.1860 [0.0061] BKJD  
Rp/R\* = 0.0025 [0.0013]  
a/R\* = 1.31 [1.73]  
b = 0.40 [6.72]  
Seff = 41000.94 [22963.19]  
Teq = 3628 [508] K  
Rp = 0.69 [0.46] Re  
a = 0.0200 [0.0069] AU  
Ag = 5.73 [7.00] [0.68σ]  
Teffp = 8681 [2409] K [2.05σ]

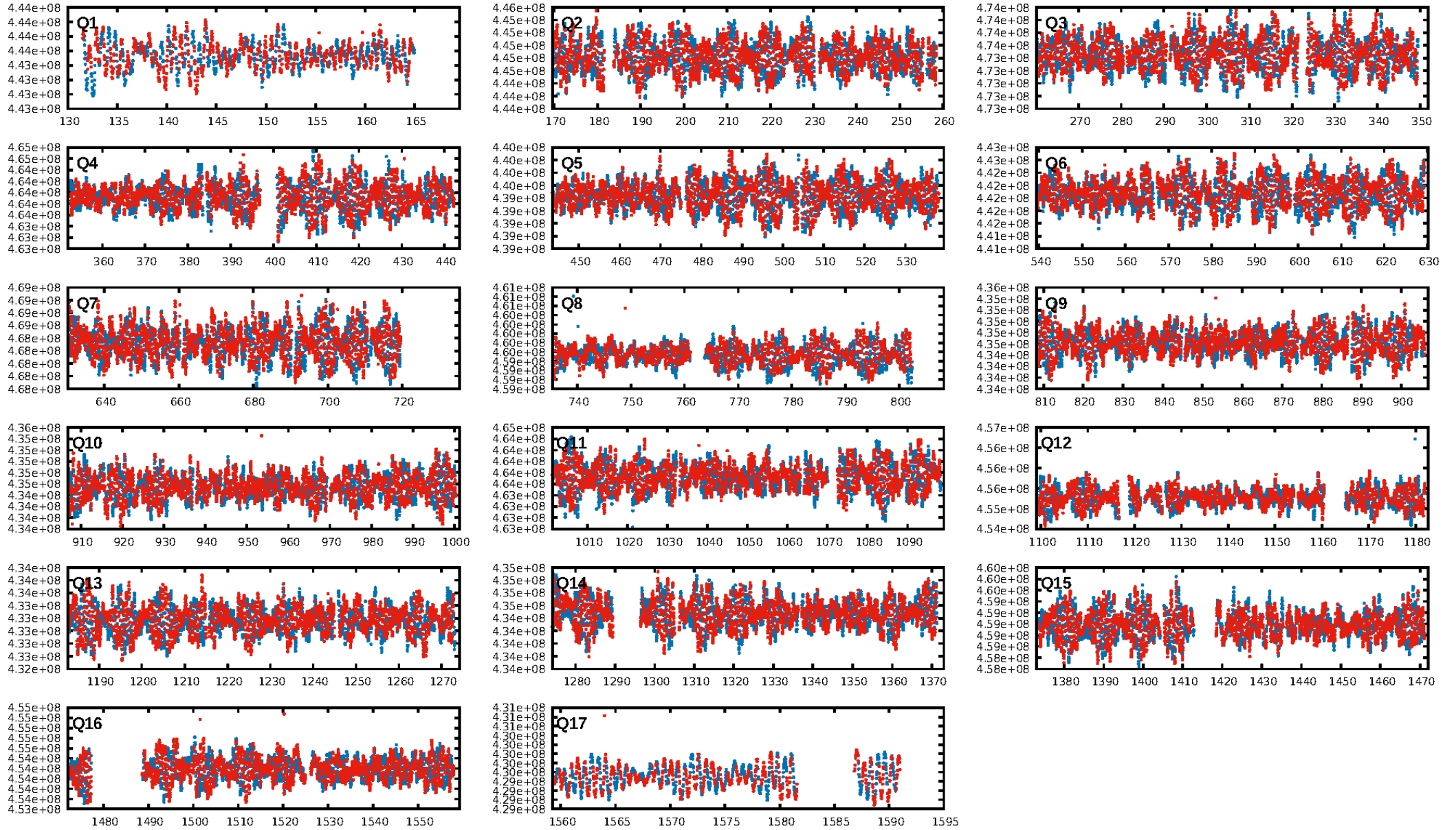
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [41.33σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 1.85e-20  
RollingBand-fgt: 0.99 [1648/1671]  
GhostDiagnostic-chr: 1.154  
Centroid-sig: 5.8%  
Centroid-so: 1.649 arcsec [1.67σ]  
OotOffset-rm: 0.185 arcsec [0.74σ]  
KicOffset-rm: 0.369 arcsec [1.38σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.65 [11/17]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 18:52:55 Z

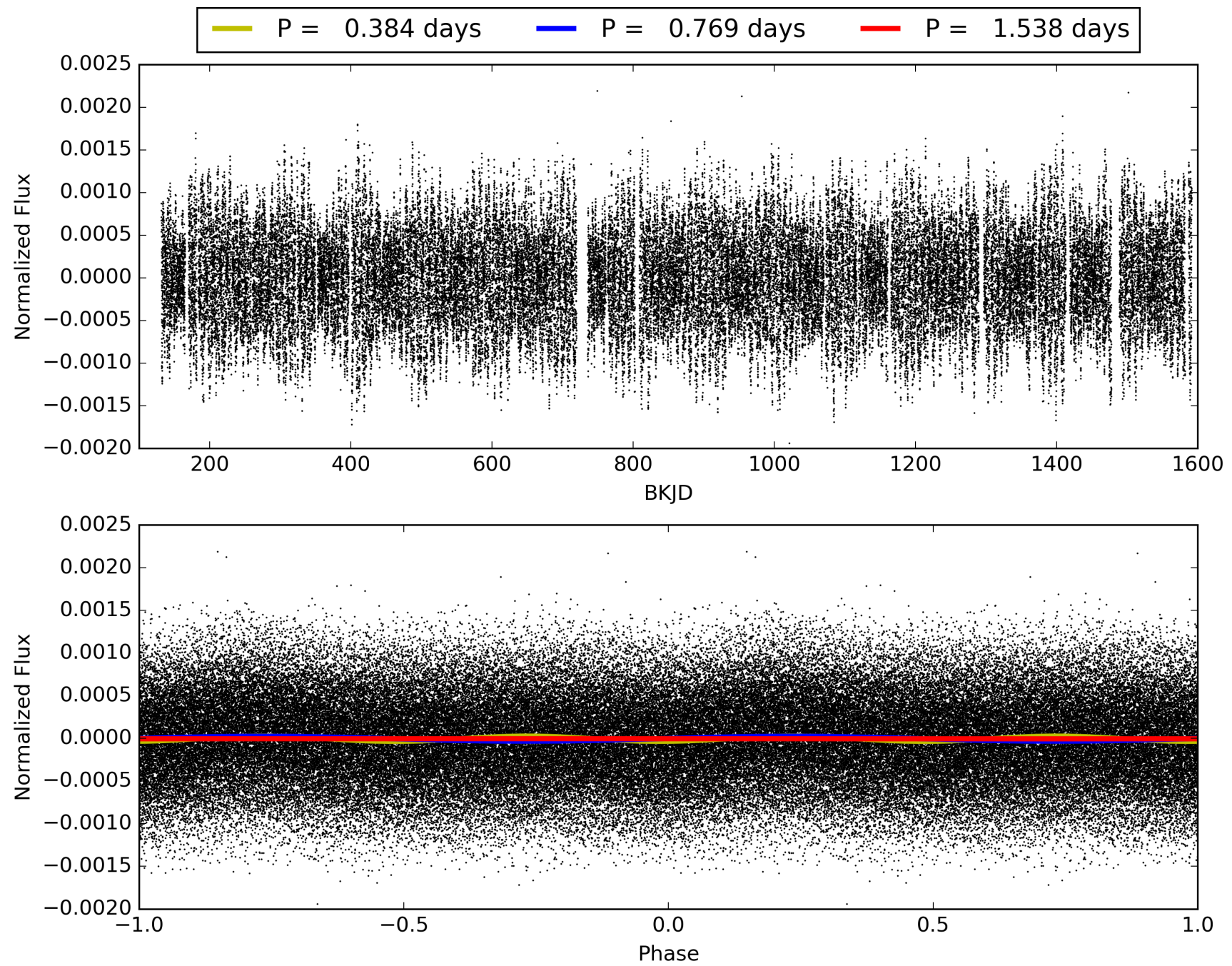
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 009772075-01, PDC Light Curves





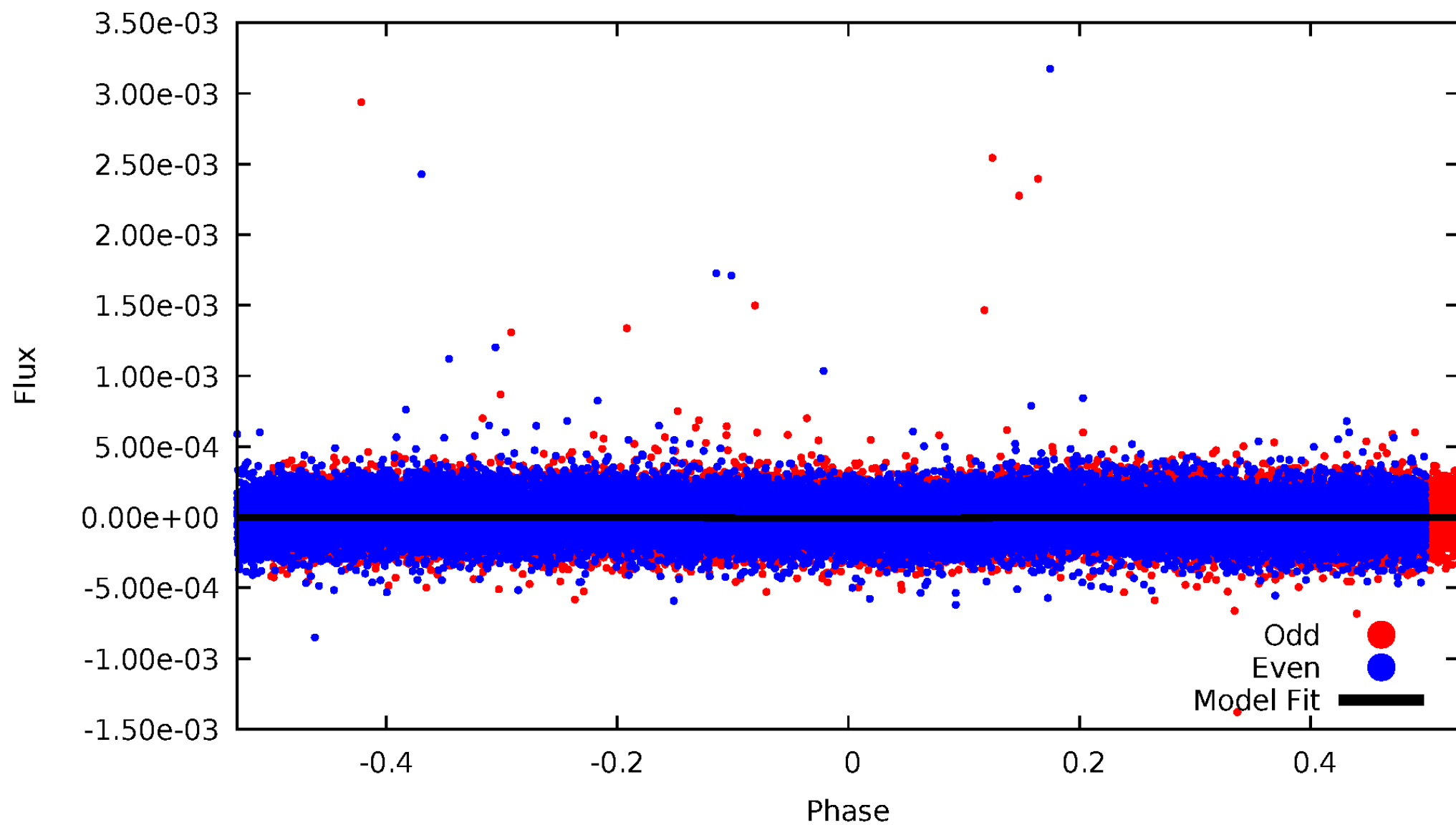
TCE 009772075-01





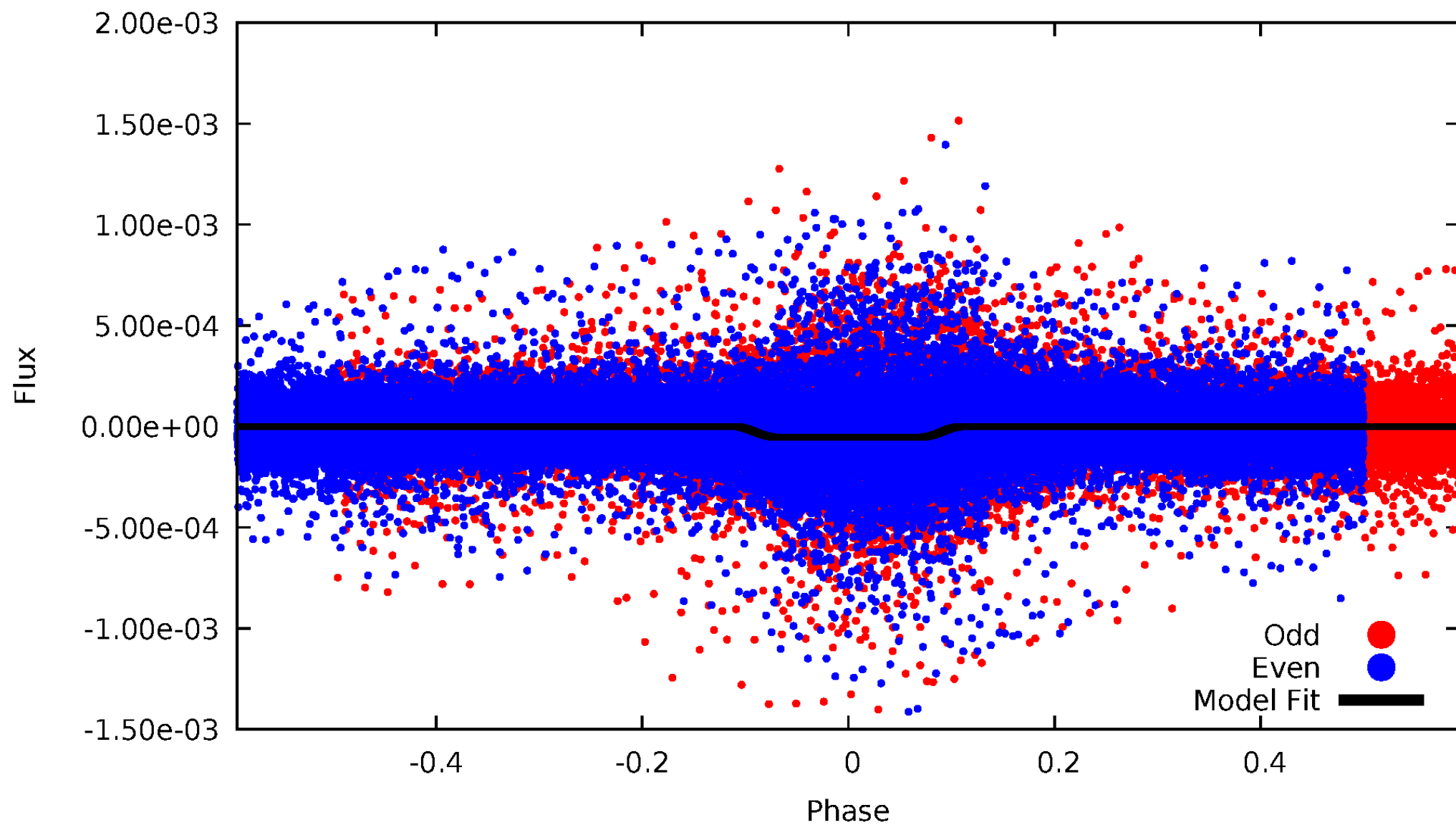
# DV Odd/Even

TCE 009772075-01

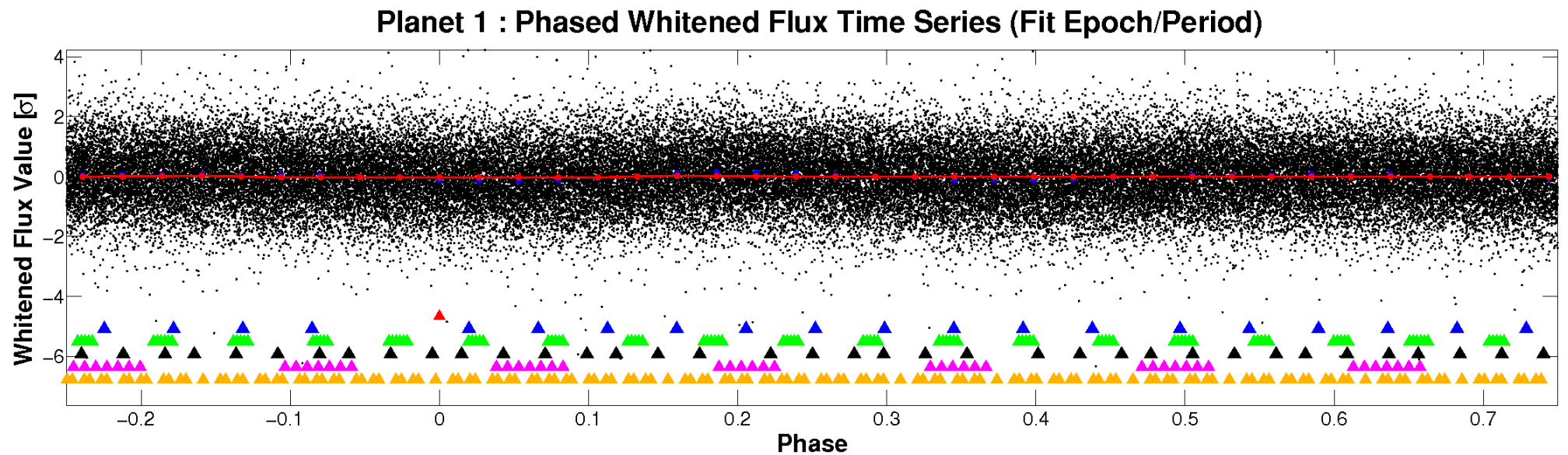
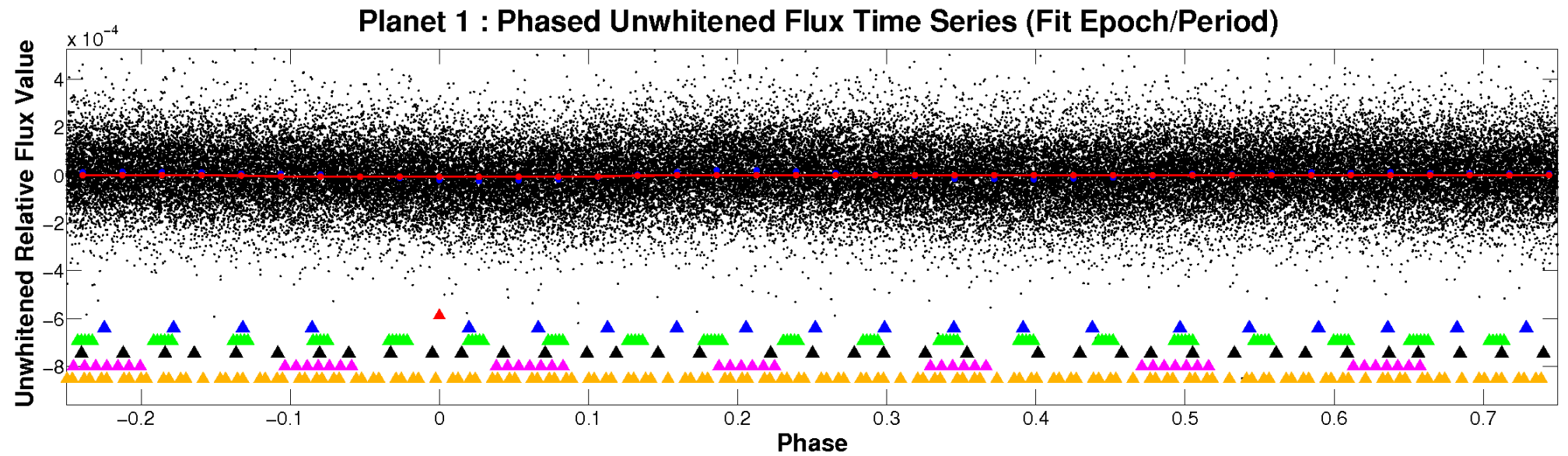


# ALT Odd/Even

TCE 009772075-01



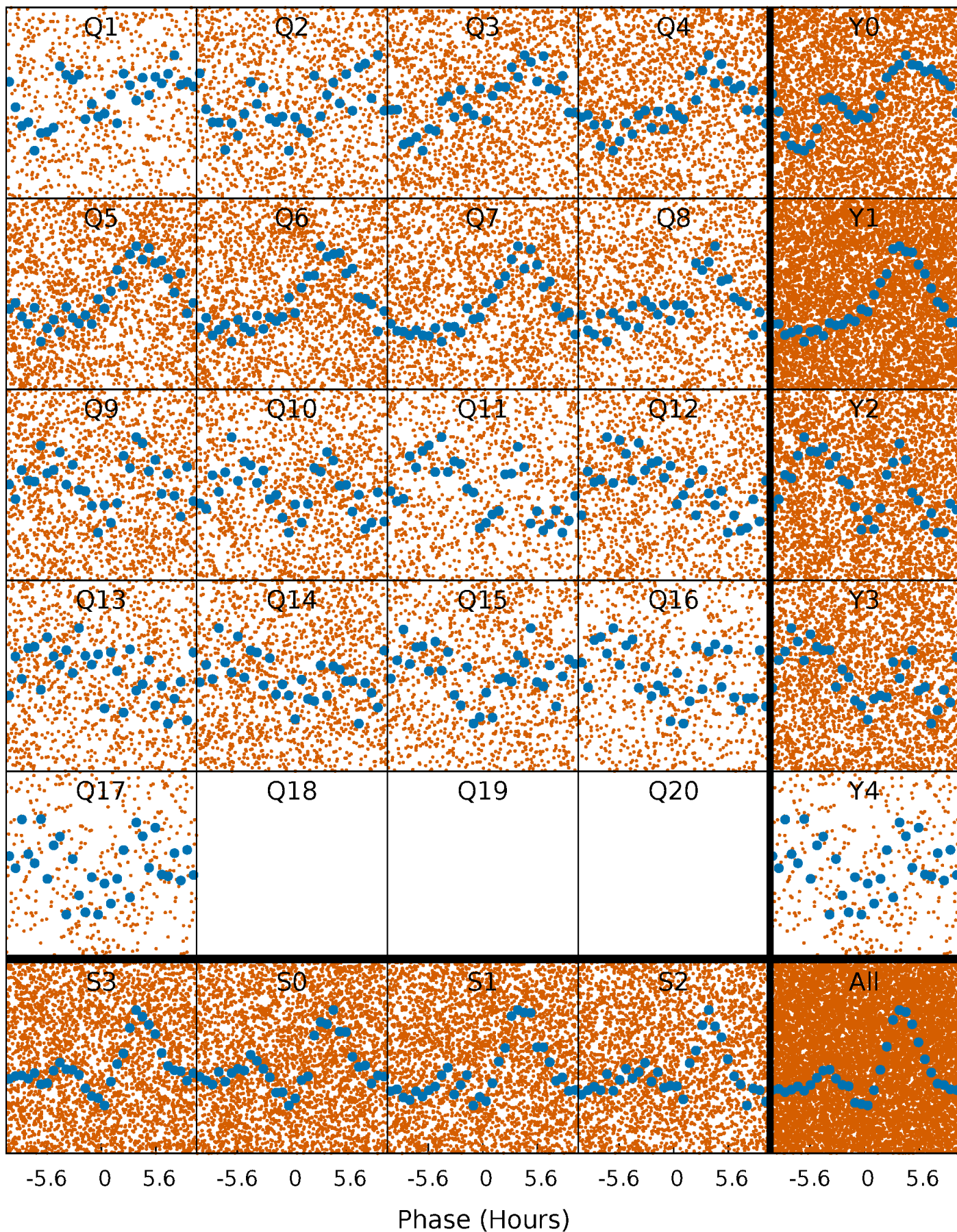
# Non-Whitened Vs. Whitened Light Curve





# PDC Quarter-Phased Transit Curves

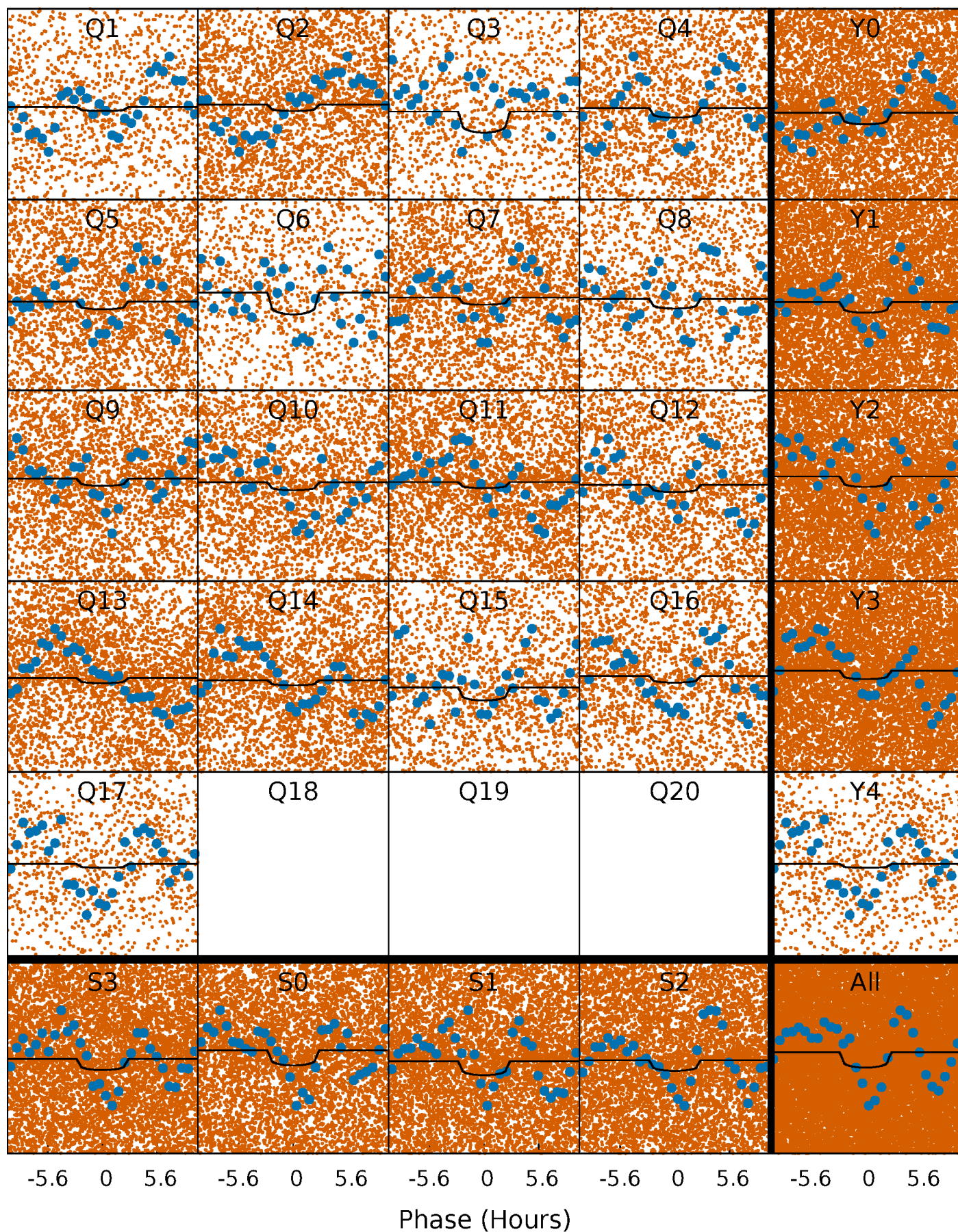
TCE 009772075-01 P= 0.768918 Days  $T_0=132.185957$  (BKJD)





# DV Quarter-Phased Transit Curves

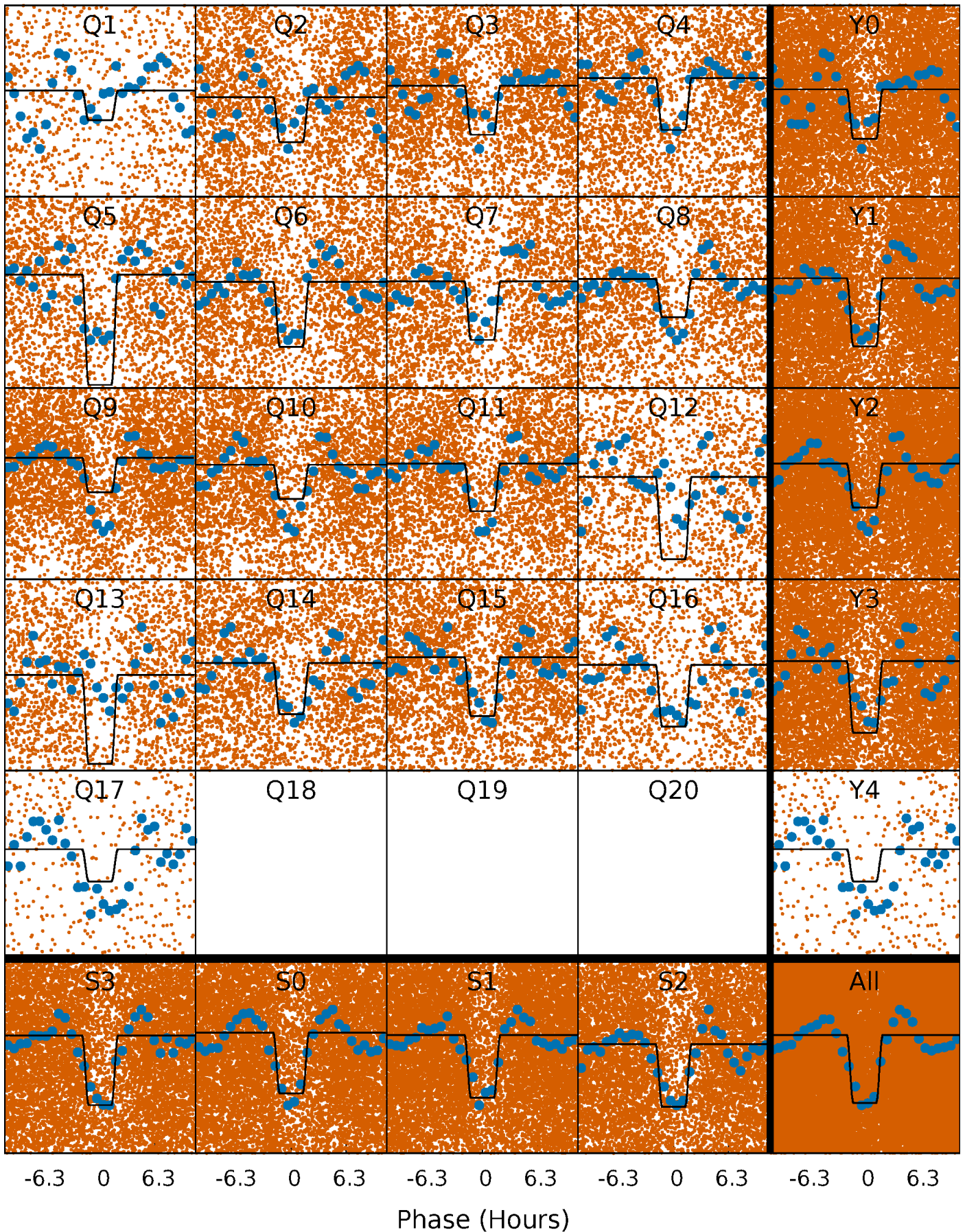
TCE 009772075-01 P= 0.768918 Days  $T_0=132.185957$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

TCE 009772075-01 P= 0.768885 Days  $T_0=132.223752$  (BKJD)

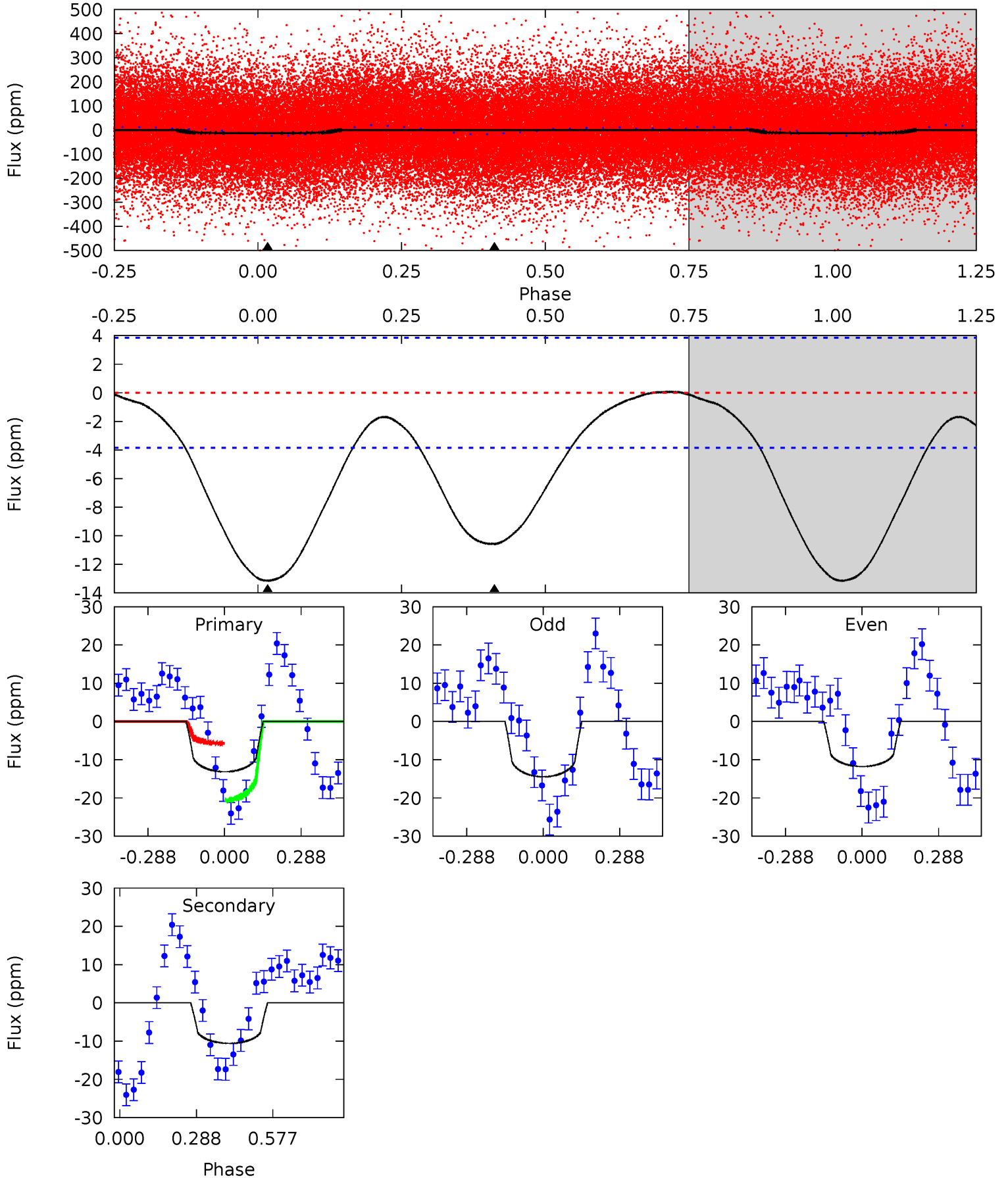




# DV Model-Shift Uniqueness Test

009772075-01, P = 0.768918 Days, E = 131.417039 Days

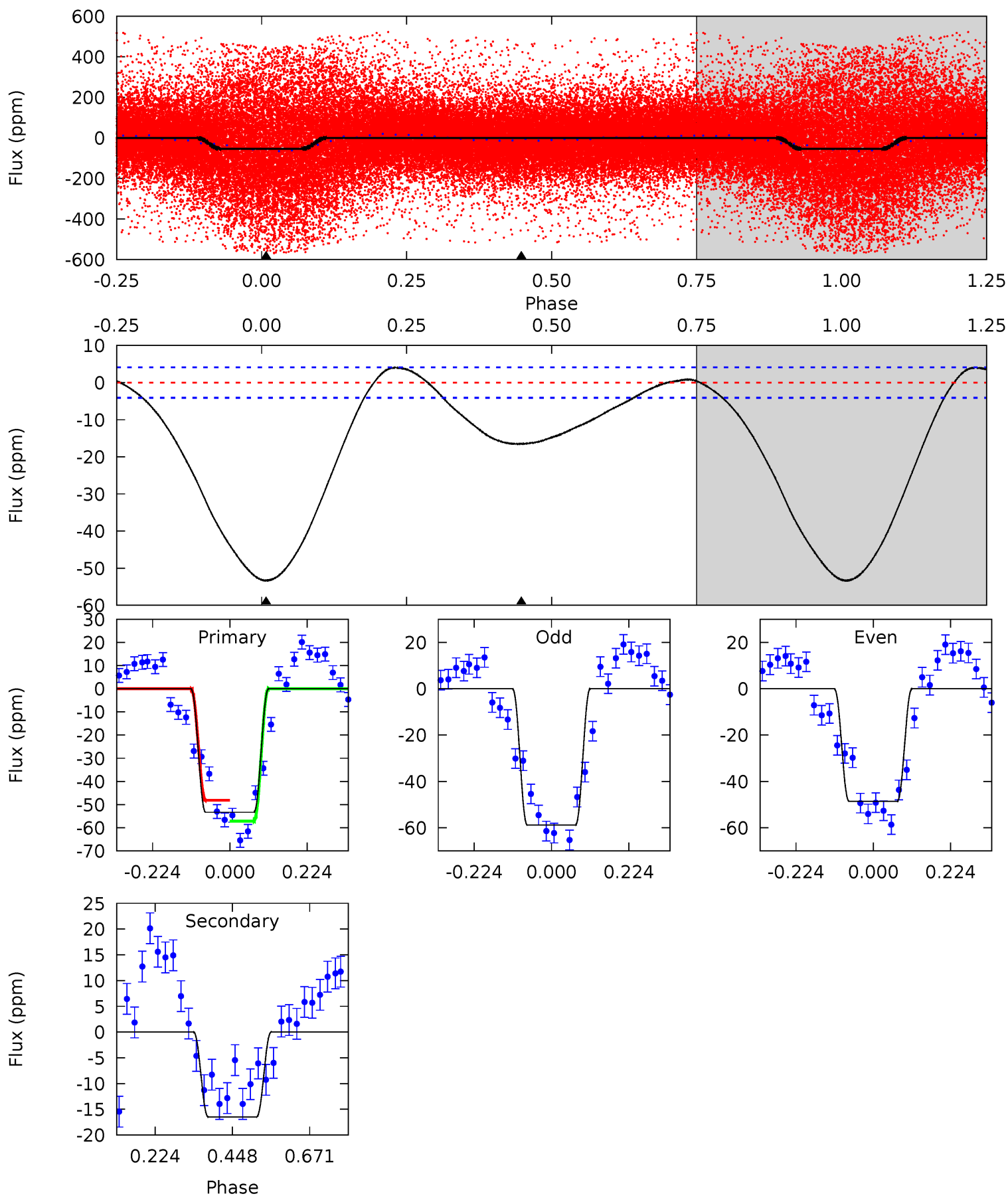
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
14.8	11.9	0	0	4.34	1.06	0.12	14.8	14.8	11.9	11.9	1.52	1.10	0.01	8.36



# Alt Model-Shift Uniqueness Test

009772075-01, P = 0.768885 Days, E = 131.454867 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
57.1	17.7	0	0	4.39	1.22	0.99	57.1	57.1	17.7	17.7	5.53	0.98	0.07	4.70



### Stellar Parameters For KIC 009772075

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7256^{+201}_{-302}$	$3.874^{+0.308}_{-0.132}$	$0.000^{+0.200}_{-0.350}$	$2.567^{+0.518}_{-0.962}$	$1.796^{+0.177}_{-0.412}$	$0.150^{+0.334}_{-0.060}$
	+3%/-4%	+8%/-3%	+inf%/-inf%	+20%/-37%	+10%/-23%	+223%/-40%
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 009772075-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-11 \pm 1$	$0.66^{+0.42}_{-0.34}$	$4948^{+404}_{-450}$	$8360^{+6429}_{-2133}$	$5.329^{+17.793}_{-3.342}$
Alt.	$-17 \pm 1$	$1.96^{+0.50}_{-0.52}$	$5002^{+374}_{-477}$	$4964^{+672}_{-648}$	$0.926^{+0.764}_{-0.335}$

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



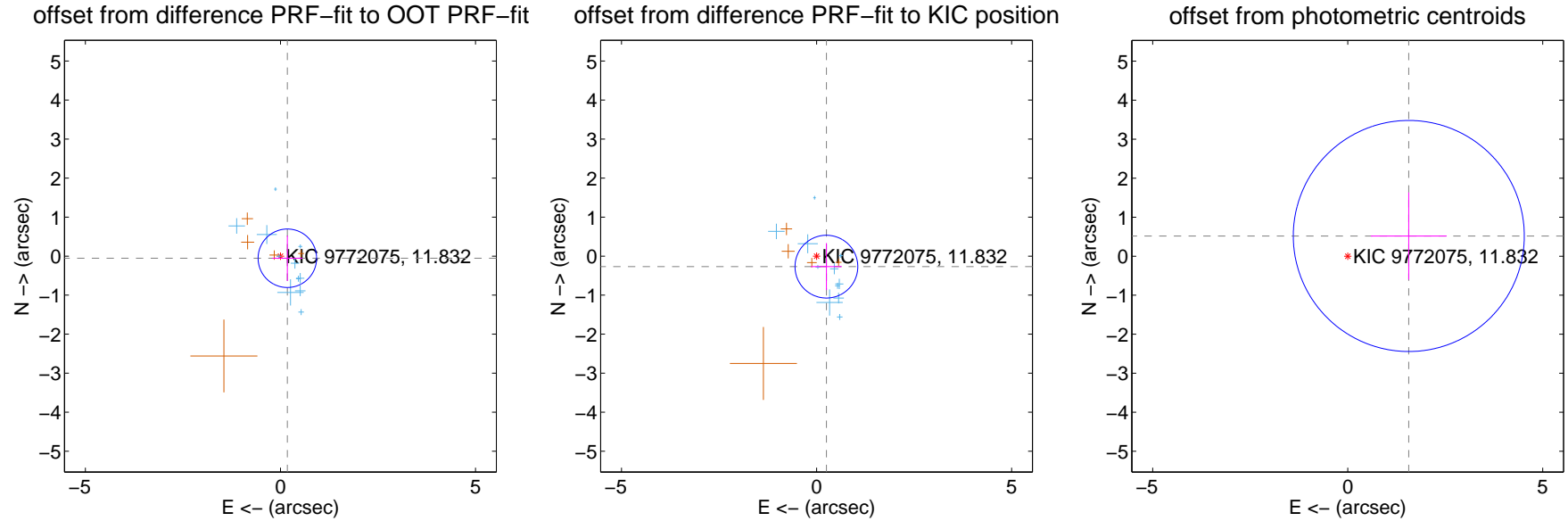
## DV Centroid Data

Supplemental centroid analysis for 009772075-01. **Kepler magnitude: 11.83.** Transit SNR 3.78

There are 11 quarters with good PRF difference image offsets

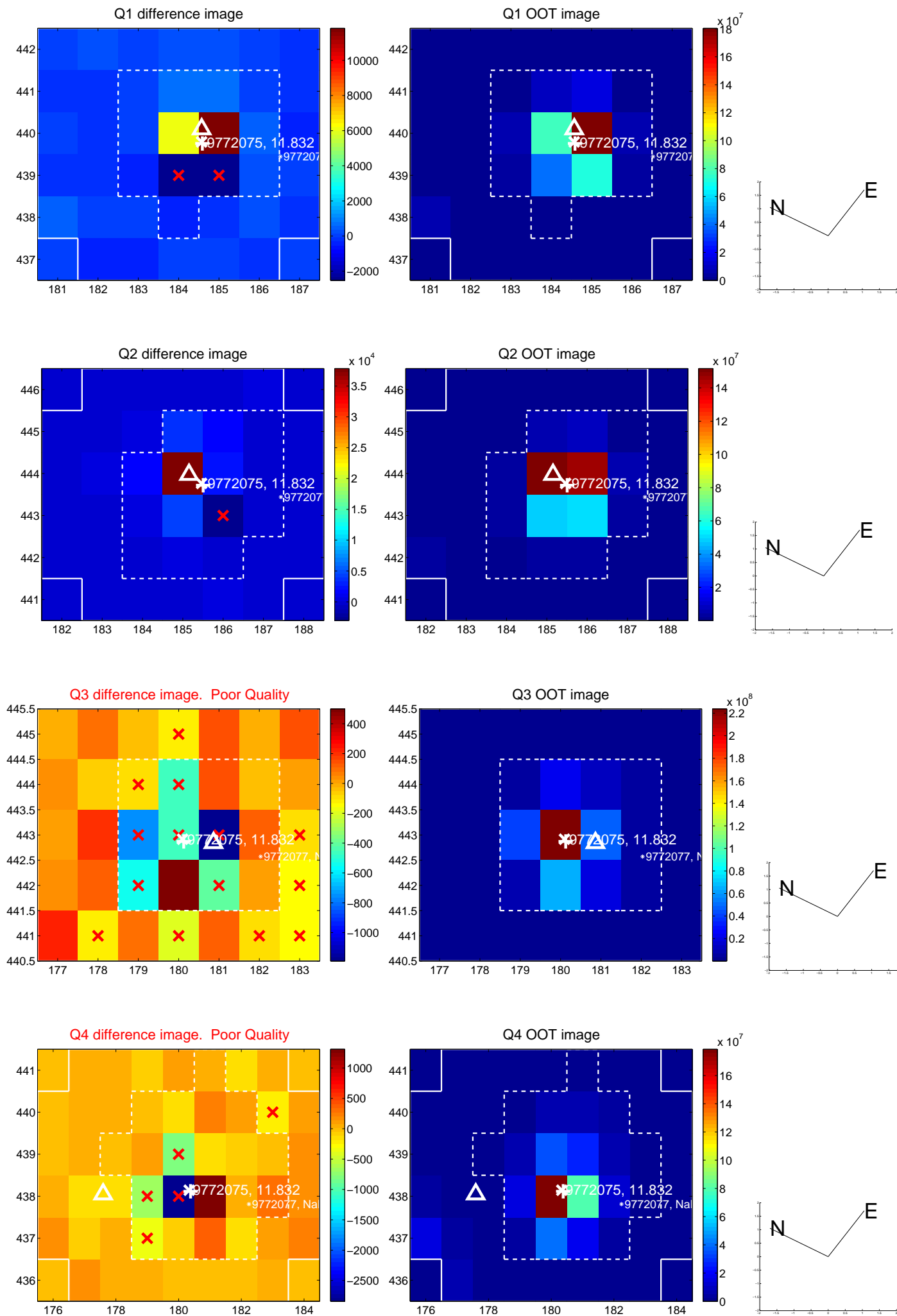
The direct PRF centroid is offset from the target star catalog position by about 0.20 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.185 \pm 0.250$	0.74	$-0.177 \pm 0.388$	$-0.055 \pm 0.583$
PRF-fit source offset from KIC position	$0.369 \pm 0.268$	1.38	$-0.252 \pm 0.393$	$-0.270 \pm 0.602$
photometric centroid source offset	$1.65 \pm 0.99$	1.67	$-1.57 \pm 0.97$	$0.52 \pm 1.12$

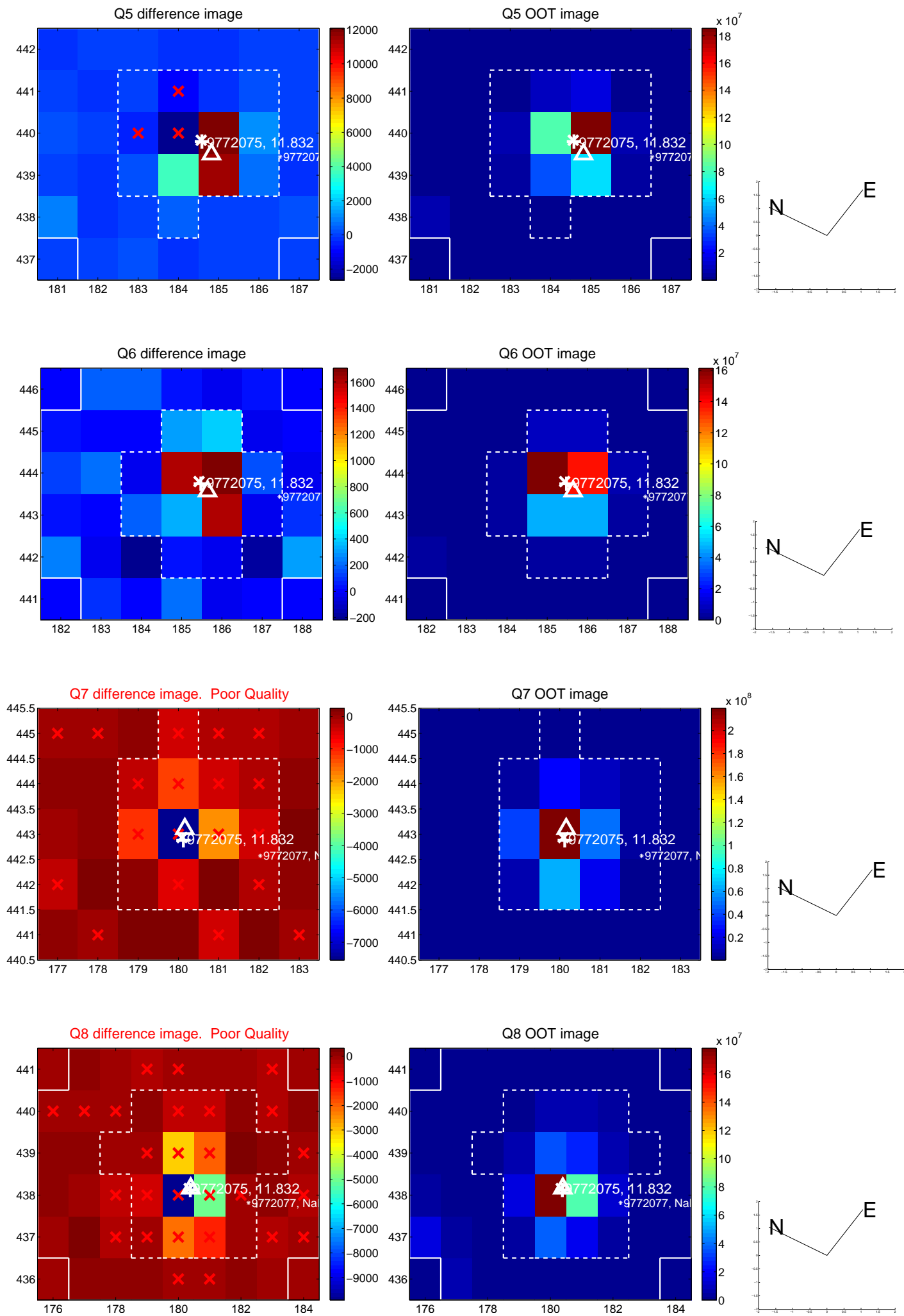


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

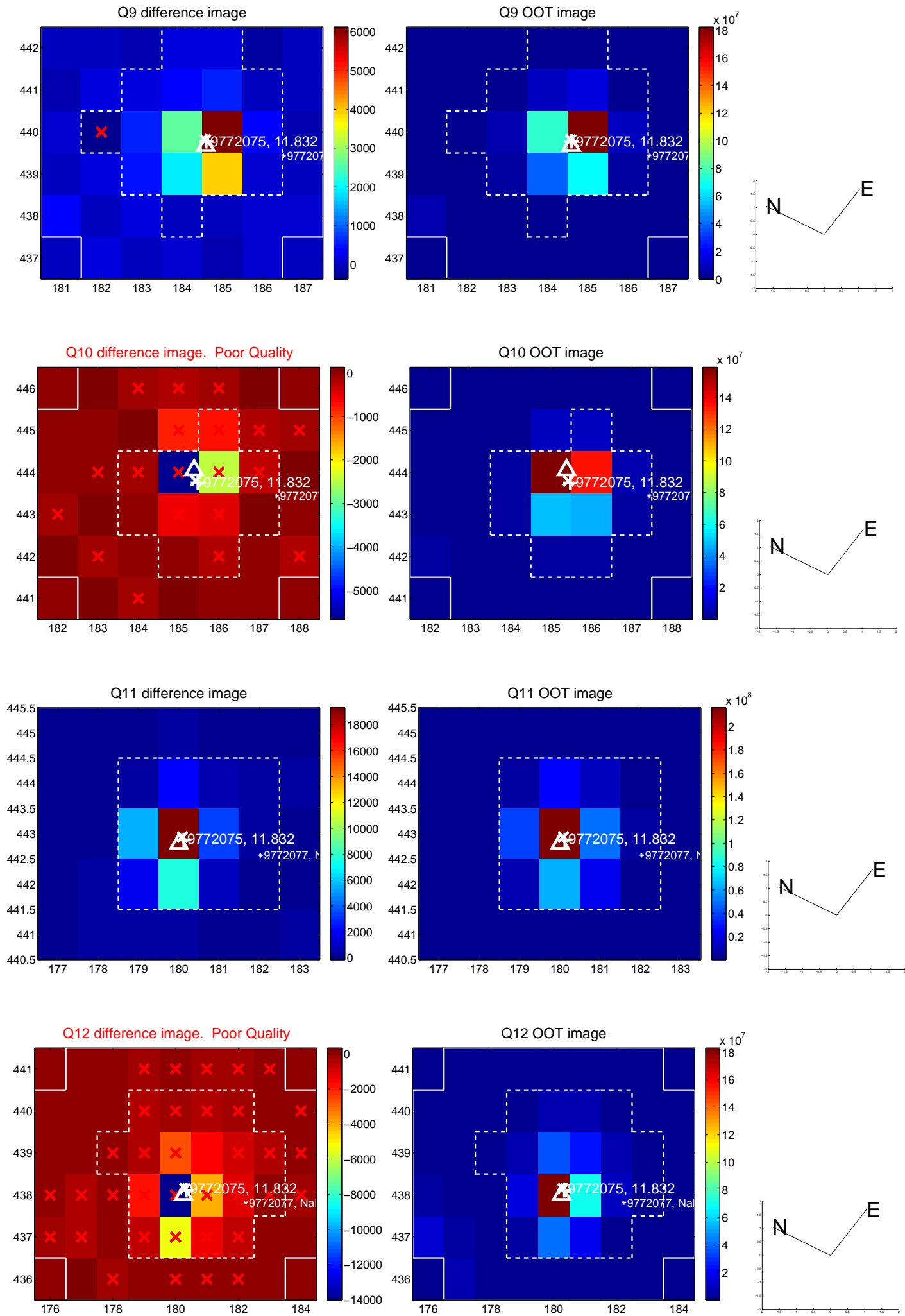


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

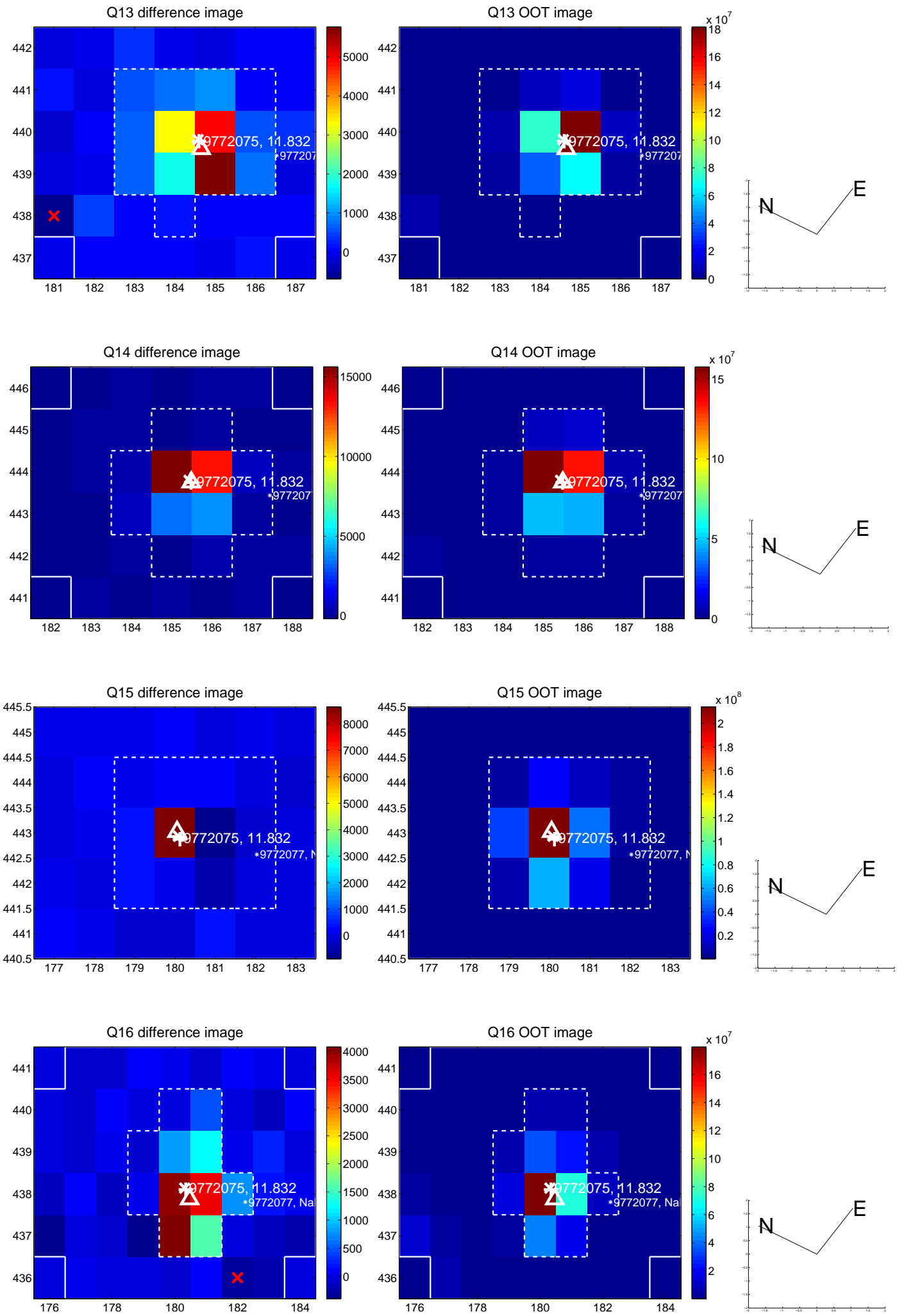




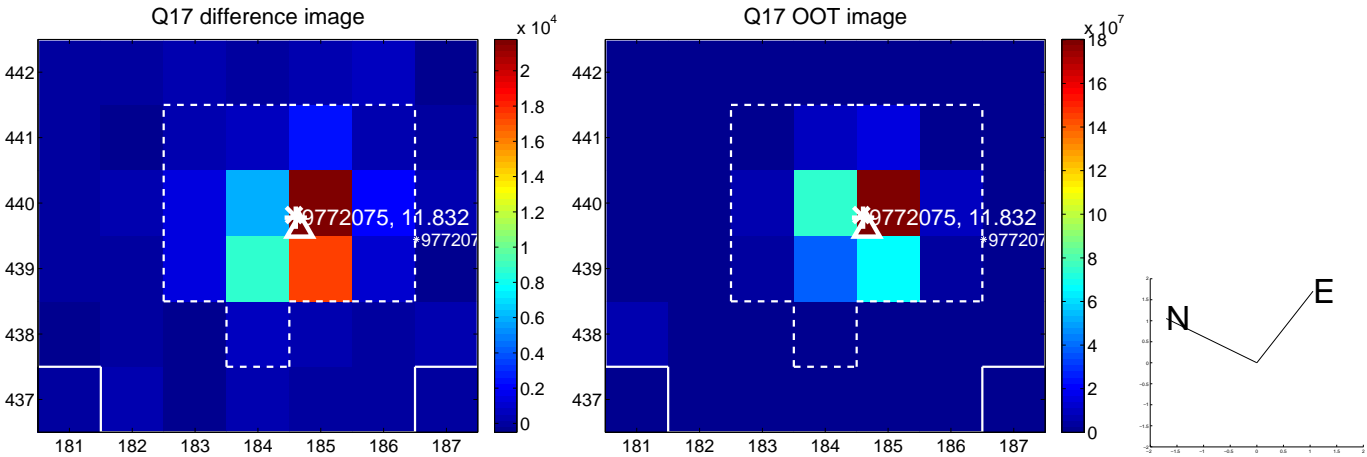
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



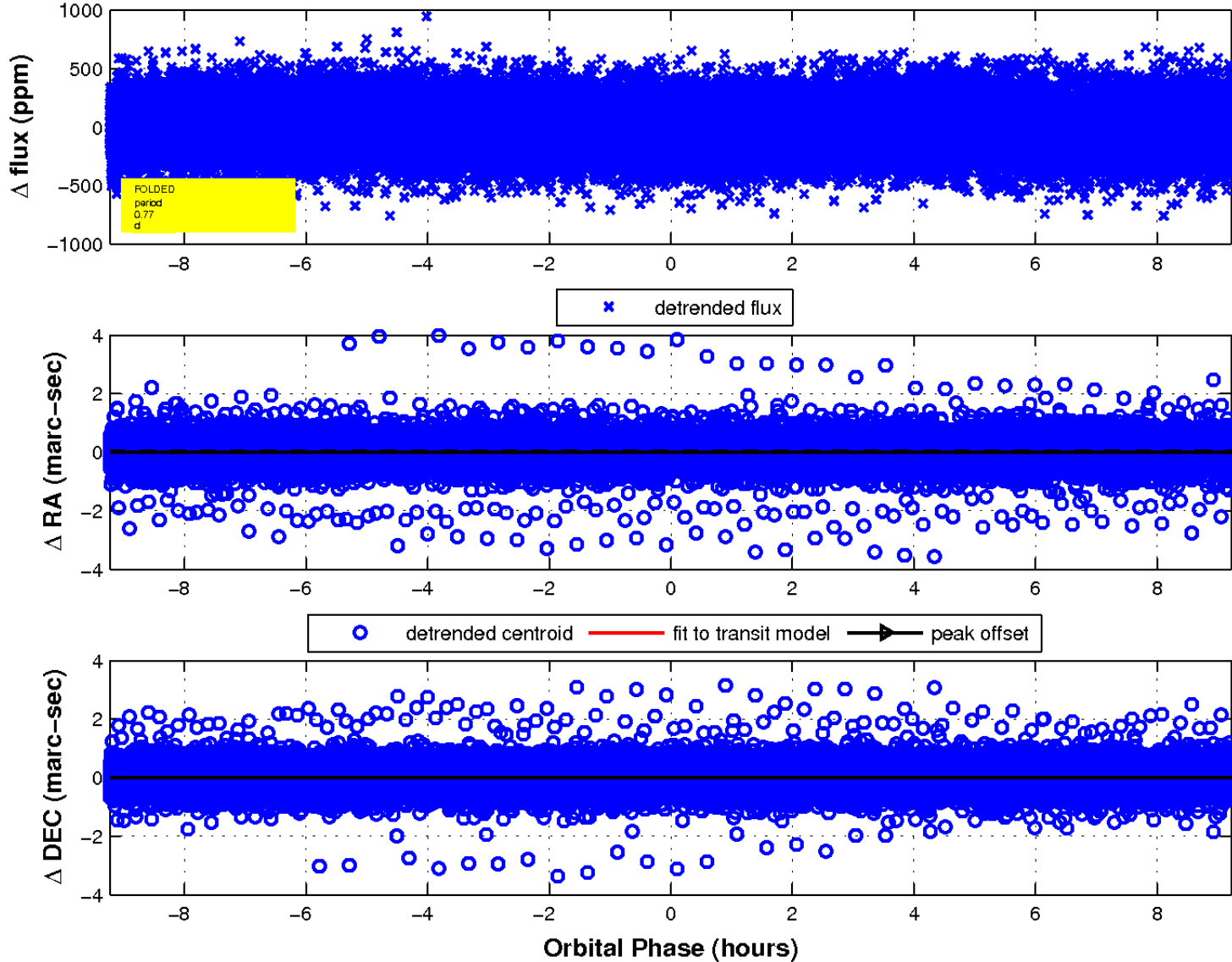
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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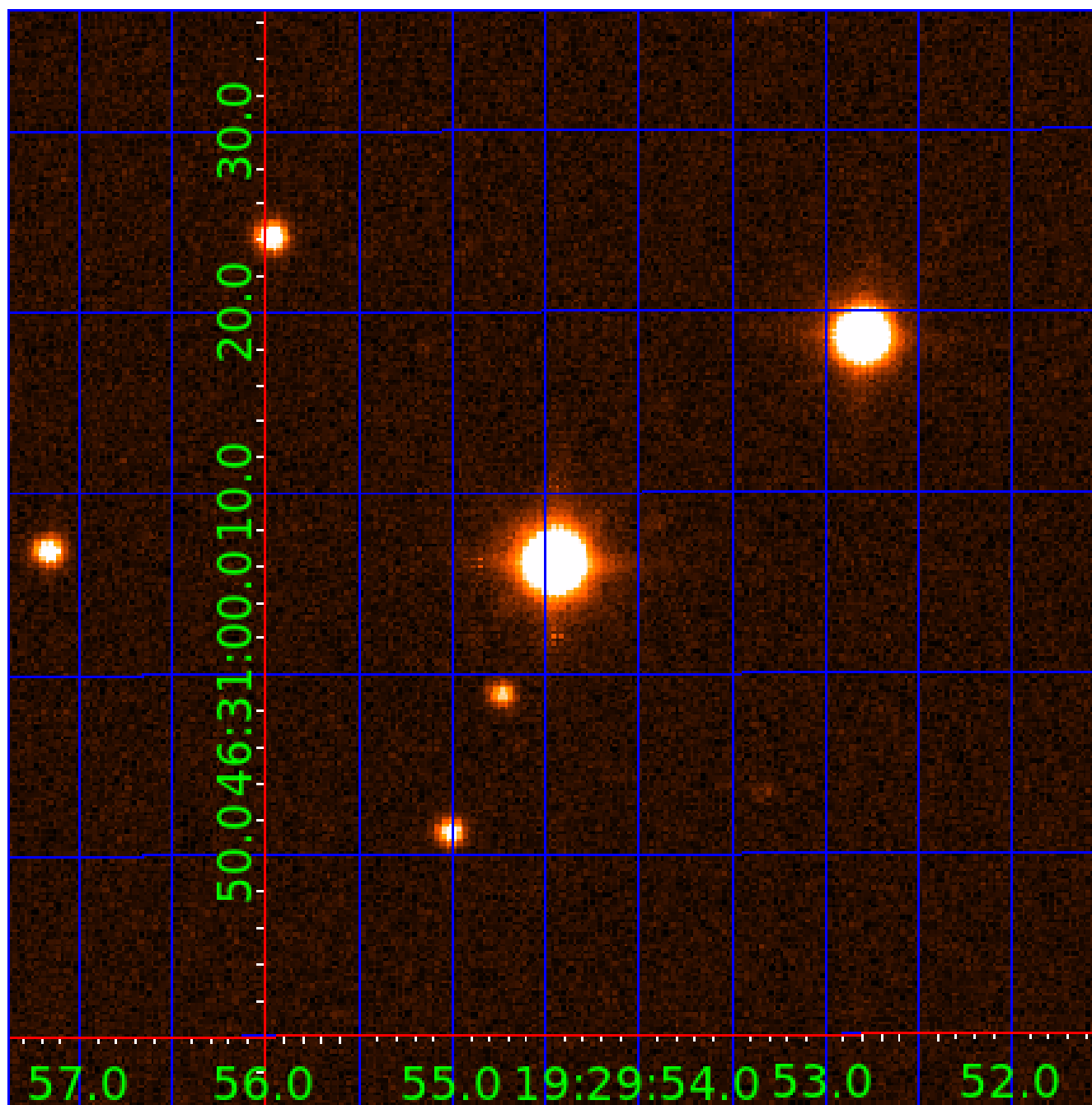


fluxWeightedCentroids, Planet 1 of 6



UKIRT Image

Declination



# KIC 009772075

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009772075-01	OBS	No	0.768918	132.185957	6.9	4.882	11.8	3.8	2.57	7256	0.69	41000.94
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## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009772075-01	OBS	FP	0.00	1	0	0	0	LPP_DV
009772075-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009772075-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009772075-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009772075-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009772075-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_ZUMA—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

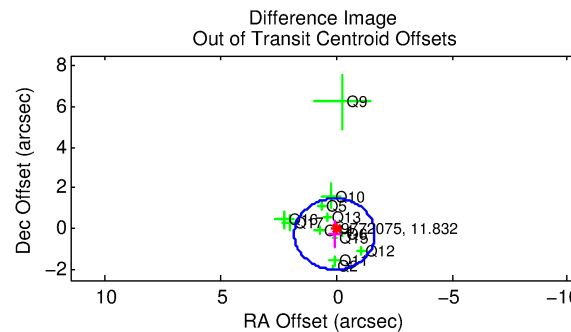
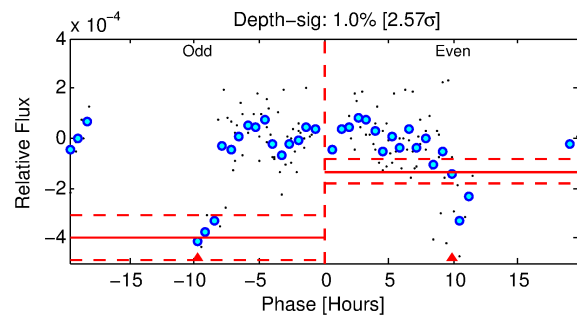
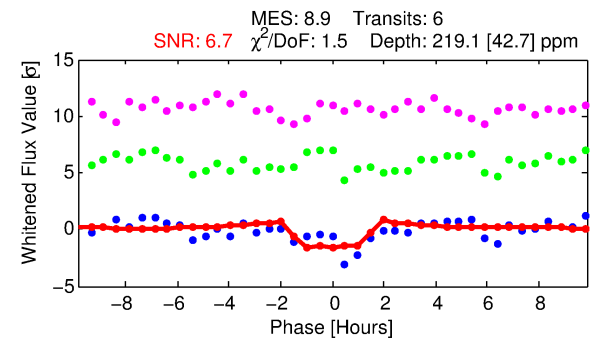
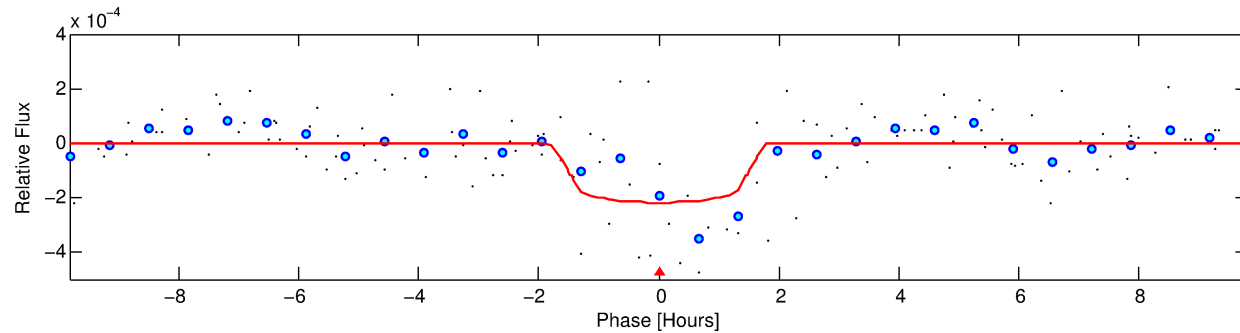
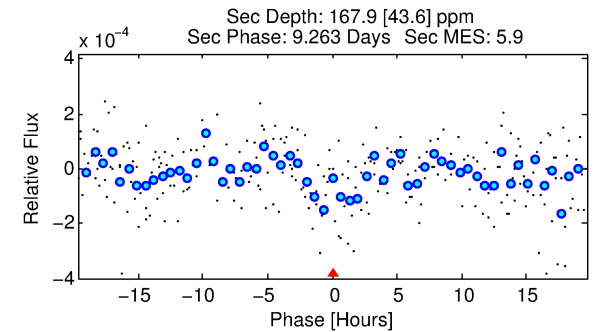
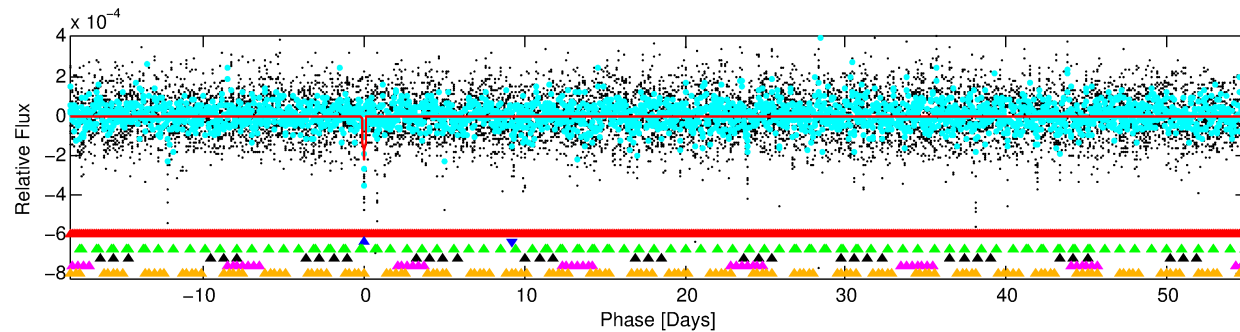
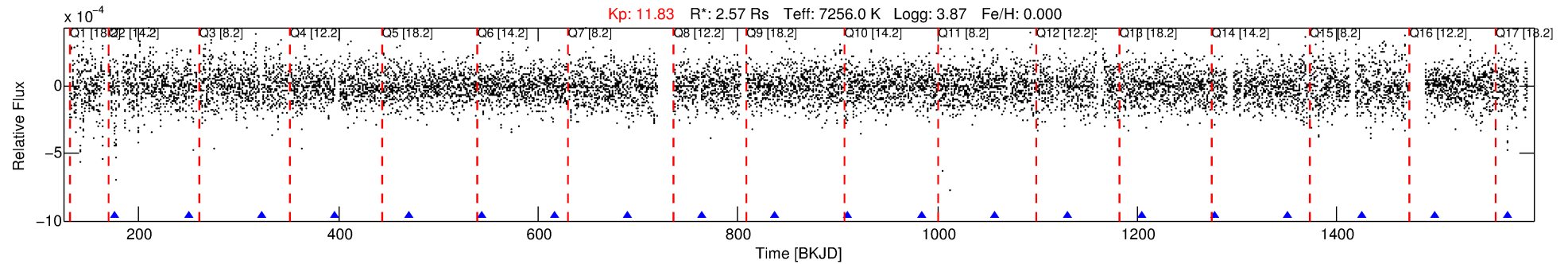
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009772075-02

No Significant Match Found

# DV One-Page Summary

KIC: 9772075 Candidate: 2 of 6 Period: 73.414 d



## DV Fit Results:

Period = 73.41384 [0.00090] d  
Epoch = 176.3510 [0.0113] BKJD  
Rp/R\* = 0.0150 [0.0077]  
a/R\* = 103.40 [314.74]  
b = 0.82 [1.26]  
Seff = 93.96 [52.62]  
Teq = 794 [111] K  
Rp = 4.21 [2.67] Re  
a = 0.4173 [0.1435] AU  
Ag = 905.97 [1072.67] [0.84σ]  
Teffp = 6734 [1800] K [3.29σ]

## DV Diagnostic Results:

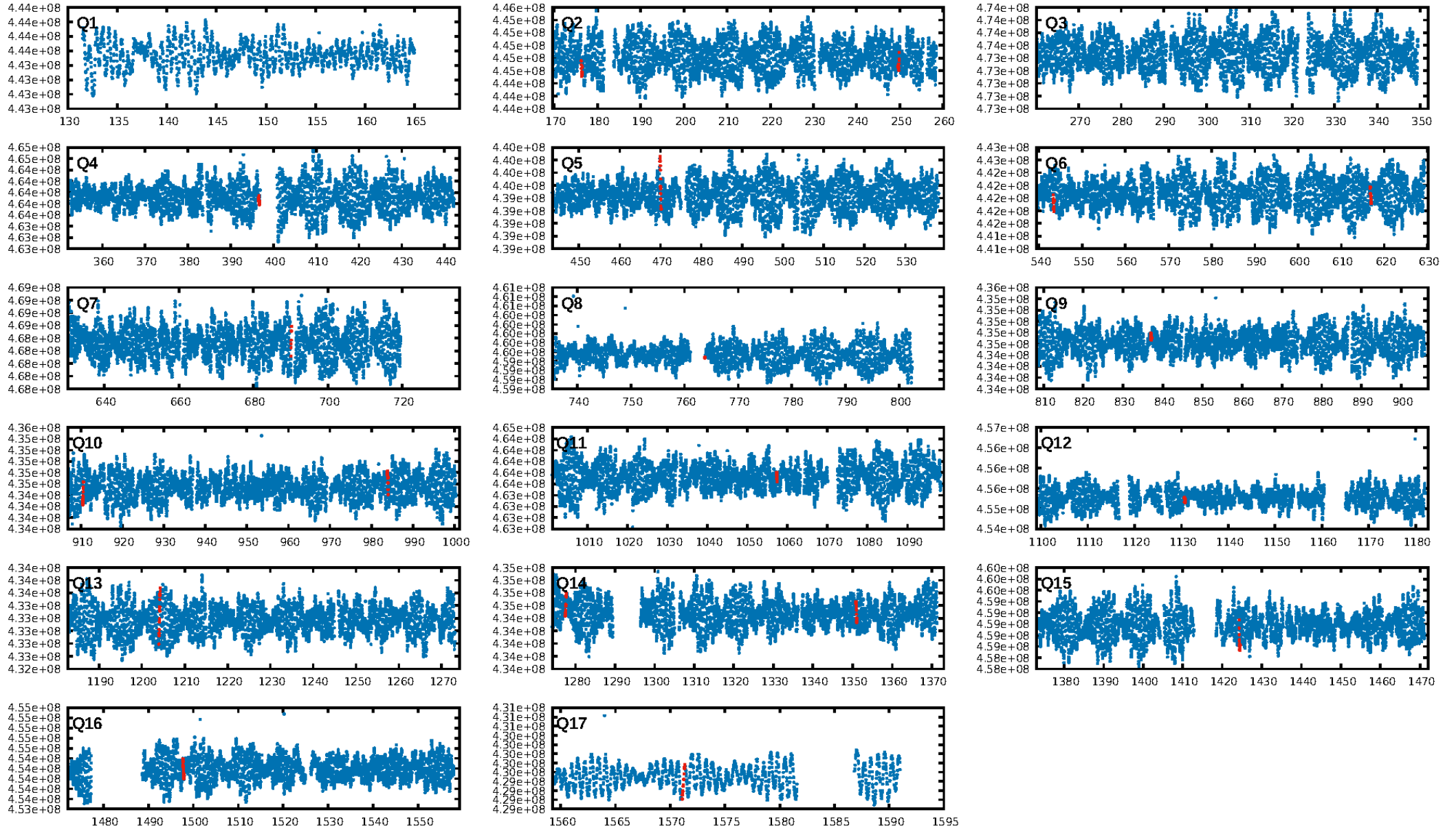
ShortPeriod-sig: 100.0% [197.48σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGoF-sig: 97.6%  
Bootstrap-pfa: 9.16e-11  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: -0.4829  
Centroid-sig: 93.2%  
Centroid-so: 0.124 arcsec [0.32σ]  
OotOffset-rm: 0.265 arcsec [0.45σ]  
KicOffset-rm: 0.482 arcsec [0.95σ]  
OotOffset-st: 4/2/2/4 [12]  
KicOffset-st: 4/2/2/4 [12]  
DiffImageQuality-fgm: 0.42 [5/12]  
DiffImageOverlap-fno: 0.00 [0/12]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 18:53:06 Z

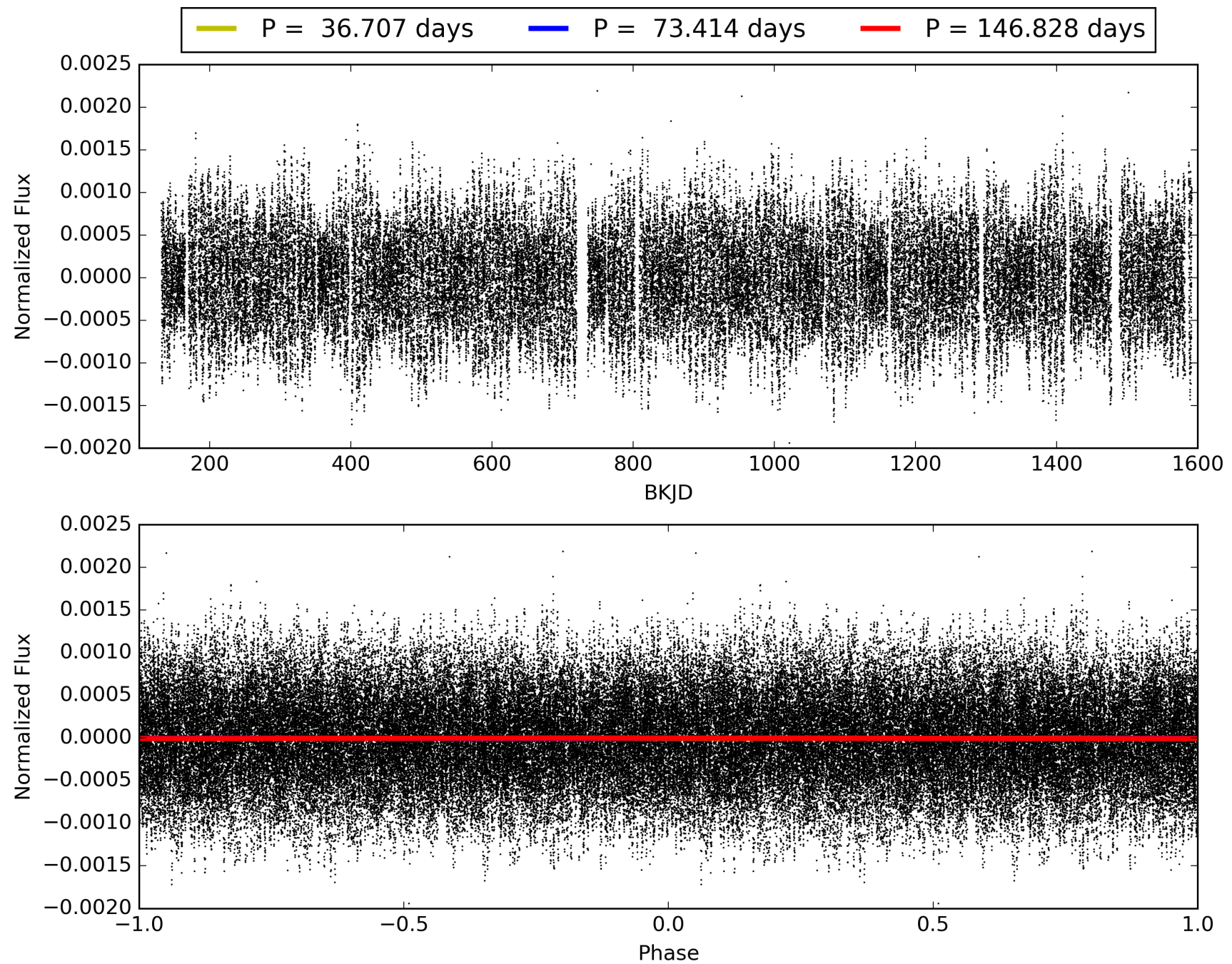
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 009772075-02, PDC Light Curves

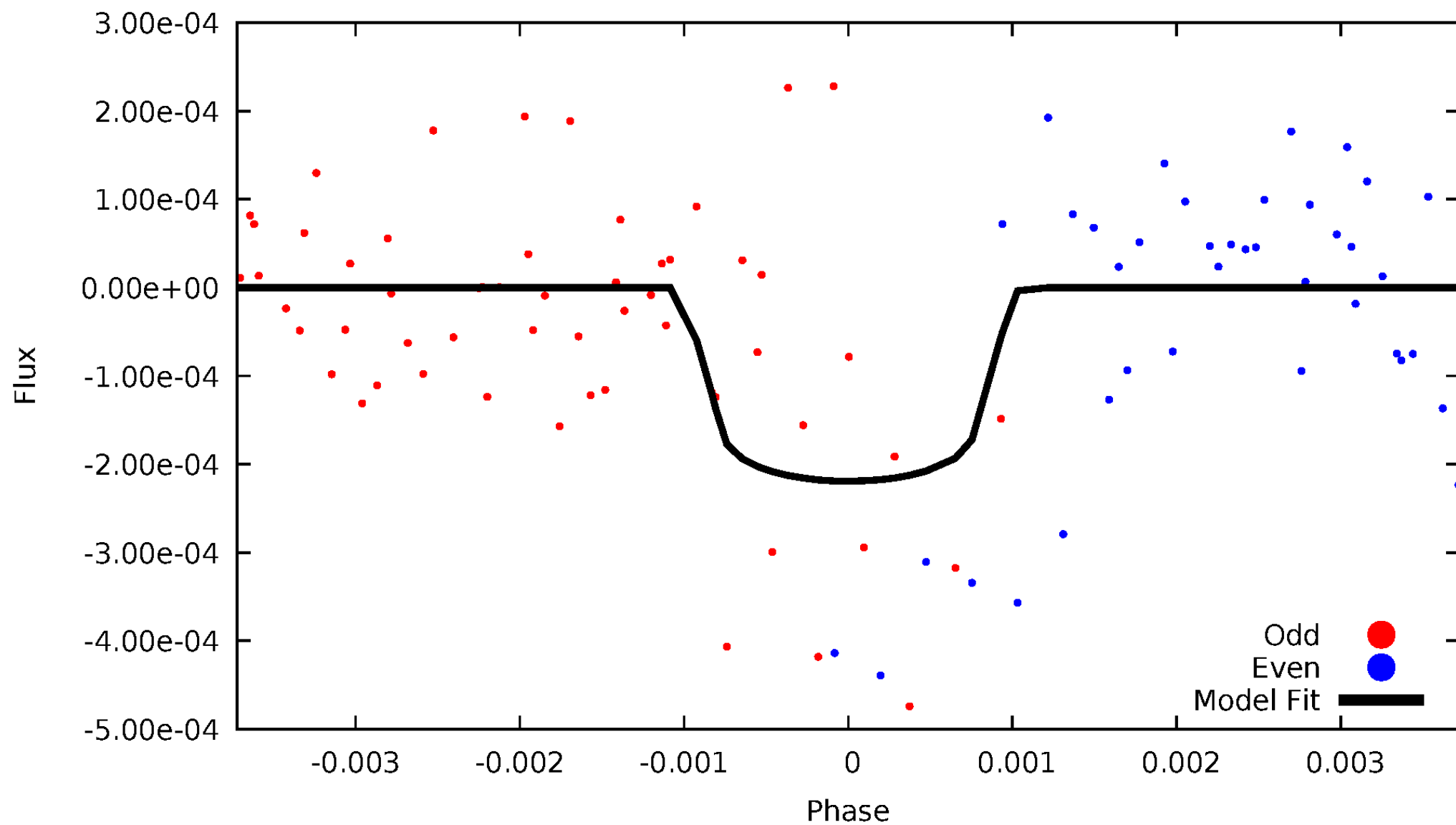


TCE 009772075-02



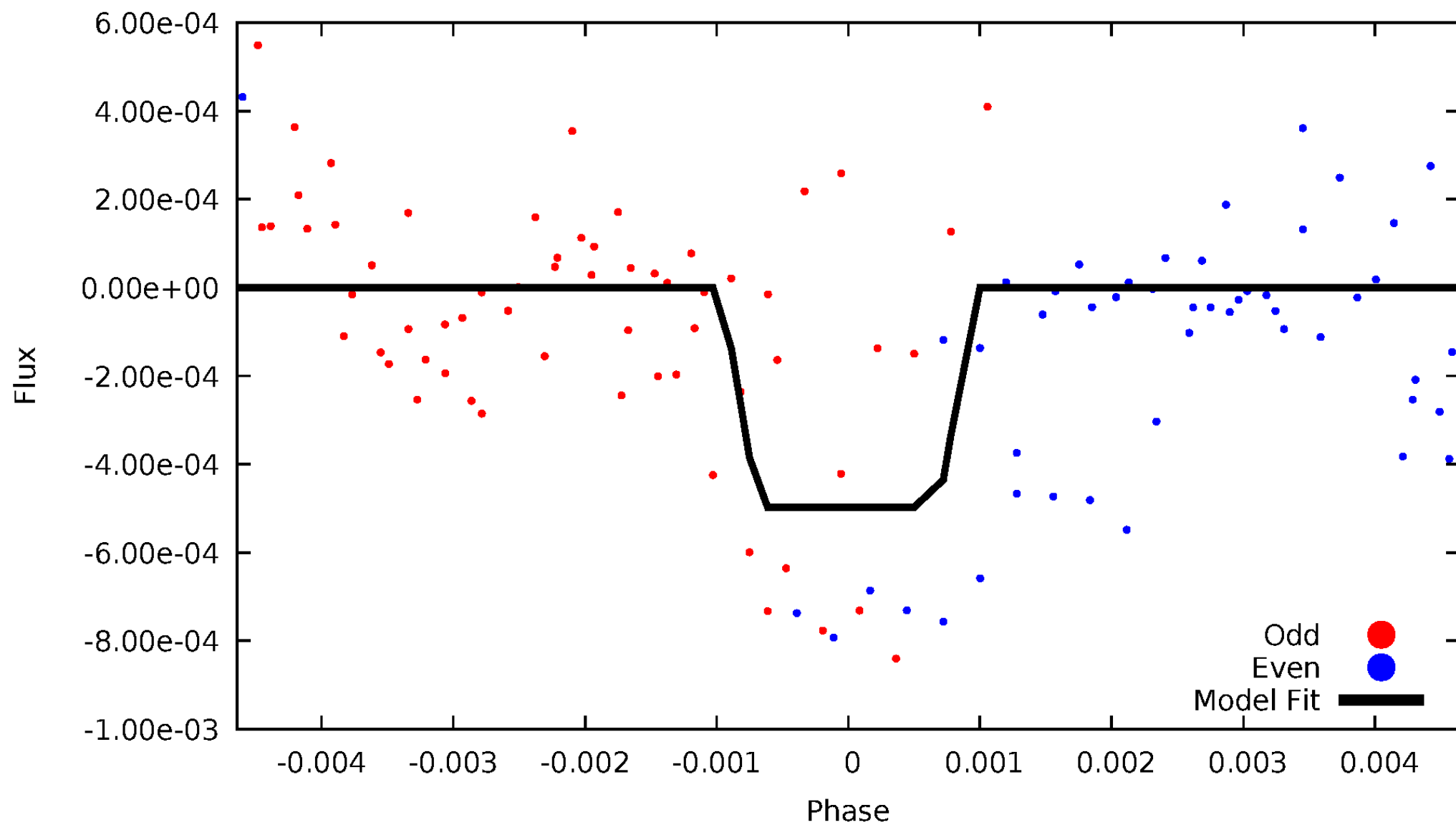
# DV Odd/Even

TCE 009772075-02



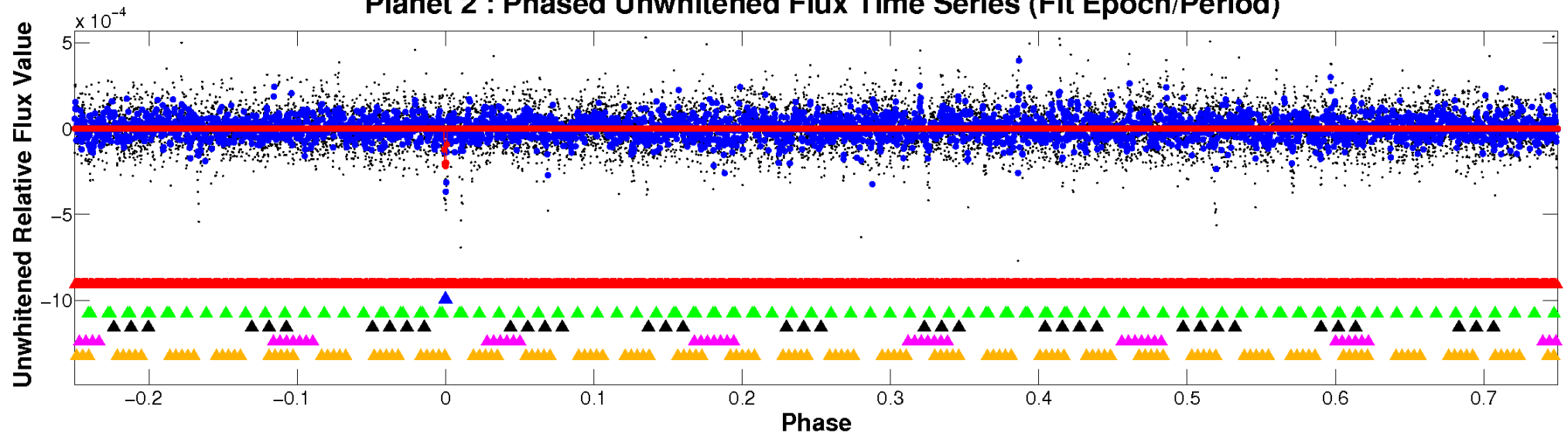
# ALT Odd/Even

TCE 009772075-02

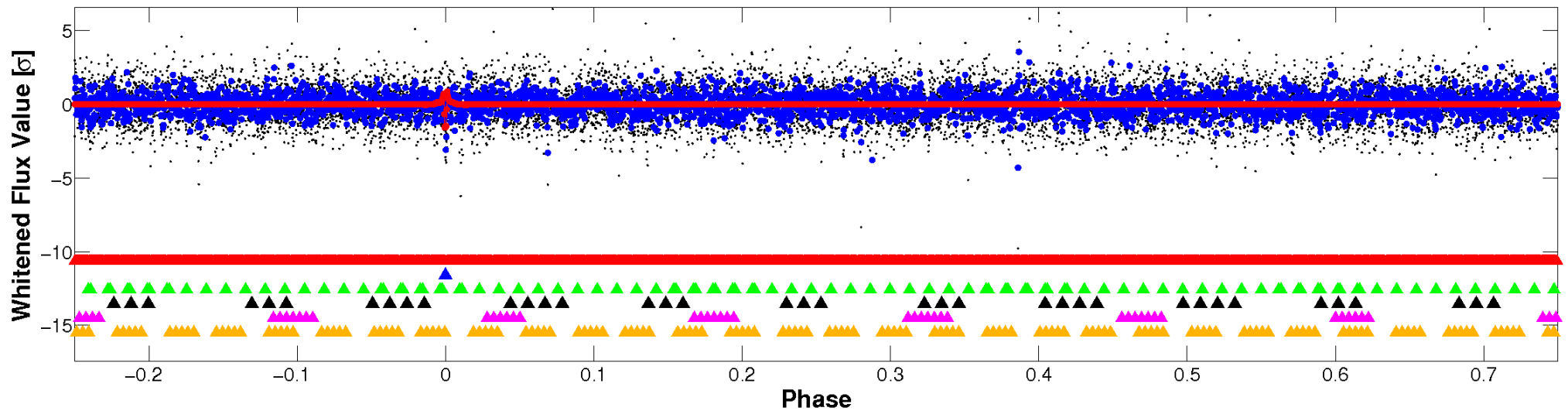


# Non-Whitened Vs. Whitened Light Curve

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

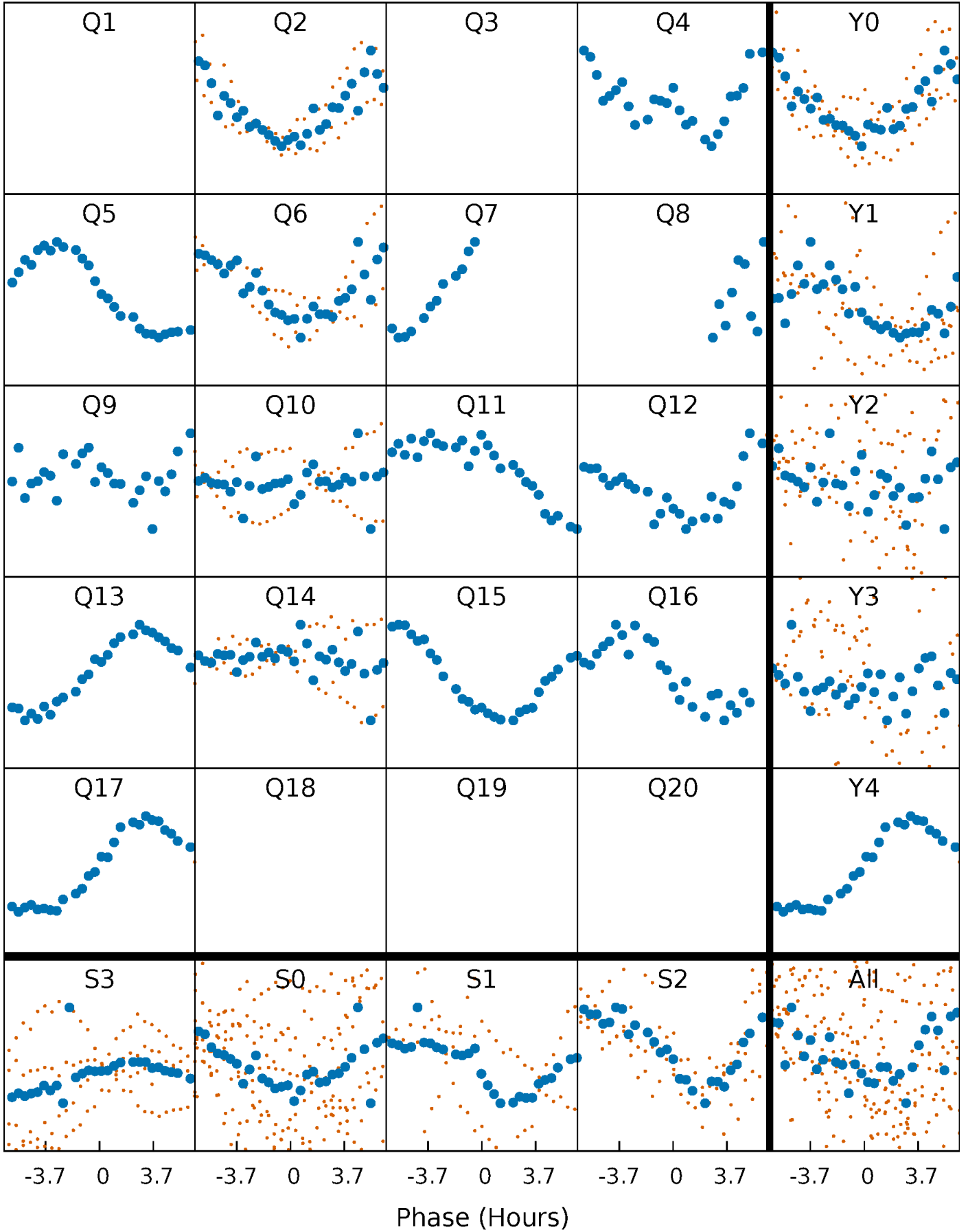


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

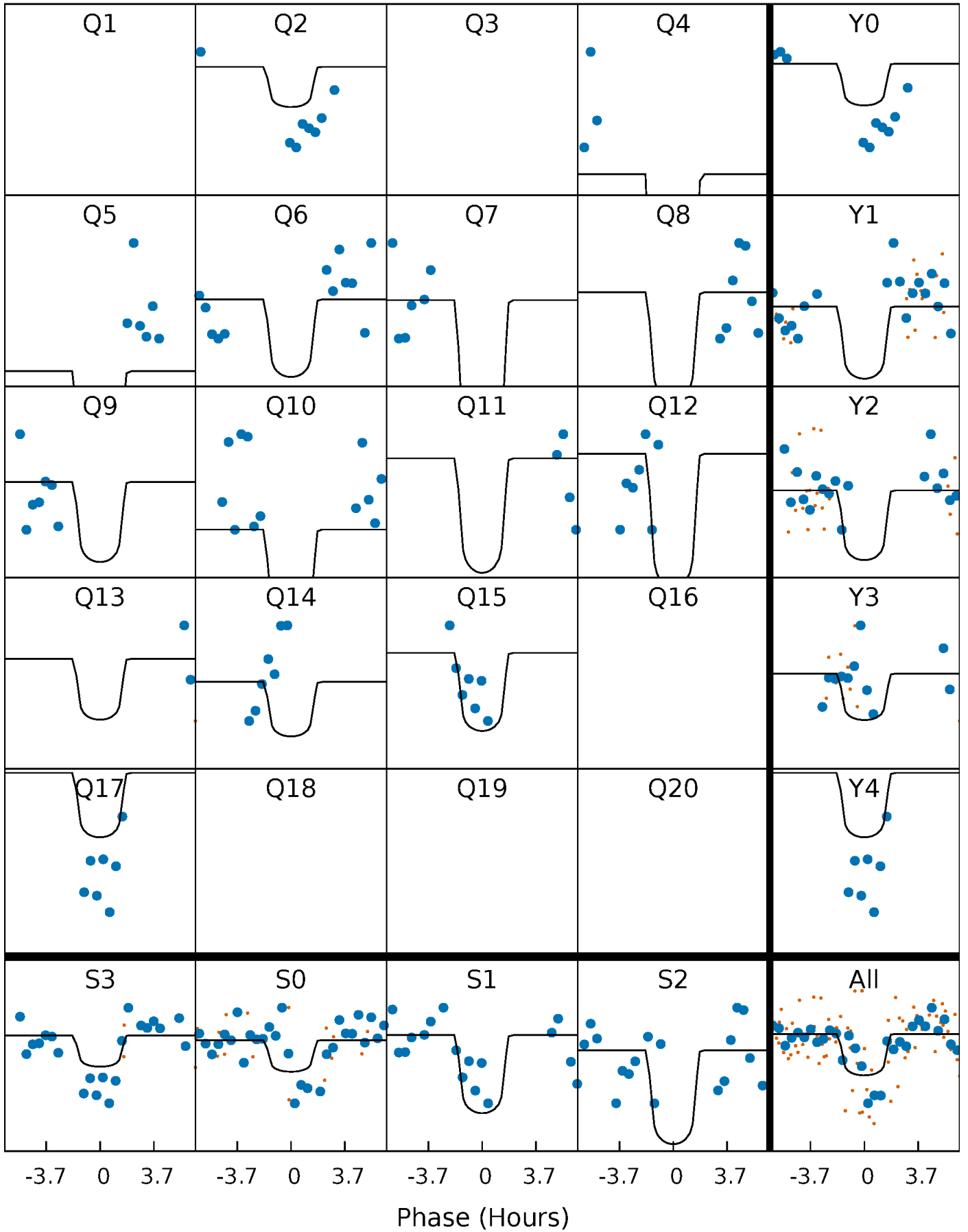
TCE 009772075-02   P= 73.413840 Days    $T_0=176.350967$  (BKJD)





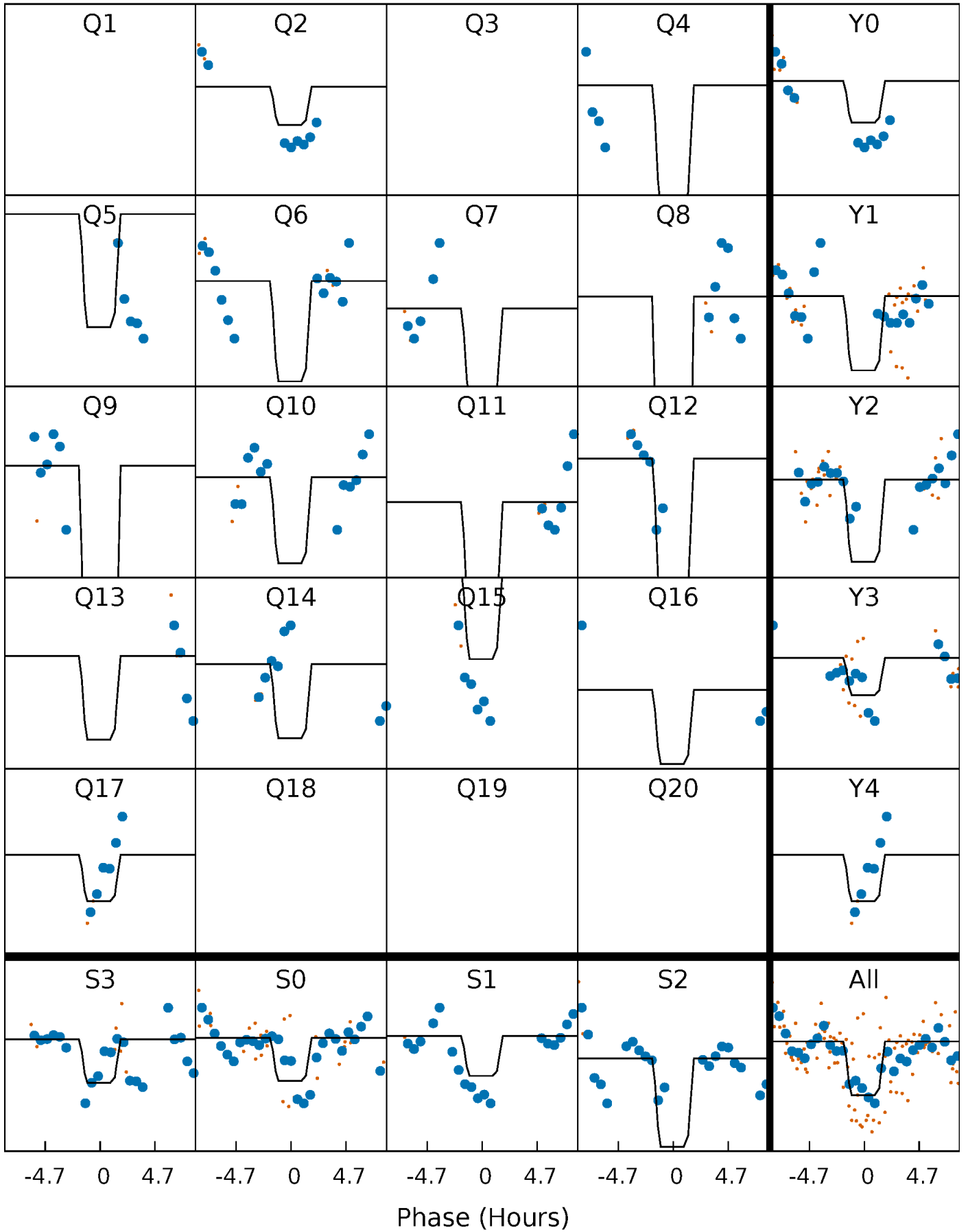
# DV Quarter-Phased Transit Curves

TCE 009772075-02   P= 73.413840 Days    $T_0=176.350967$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

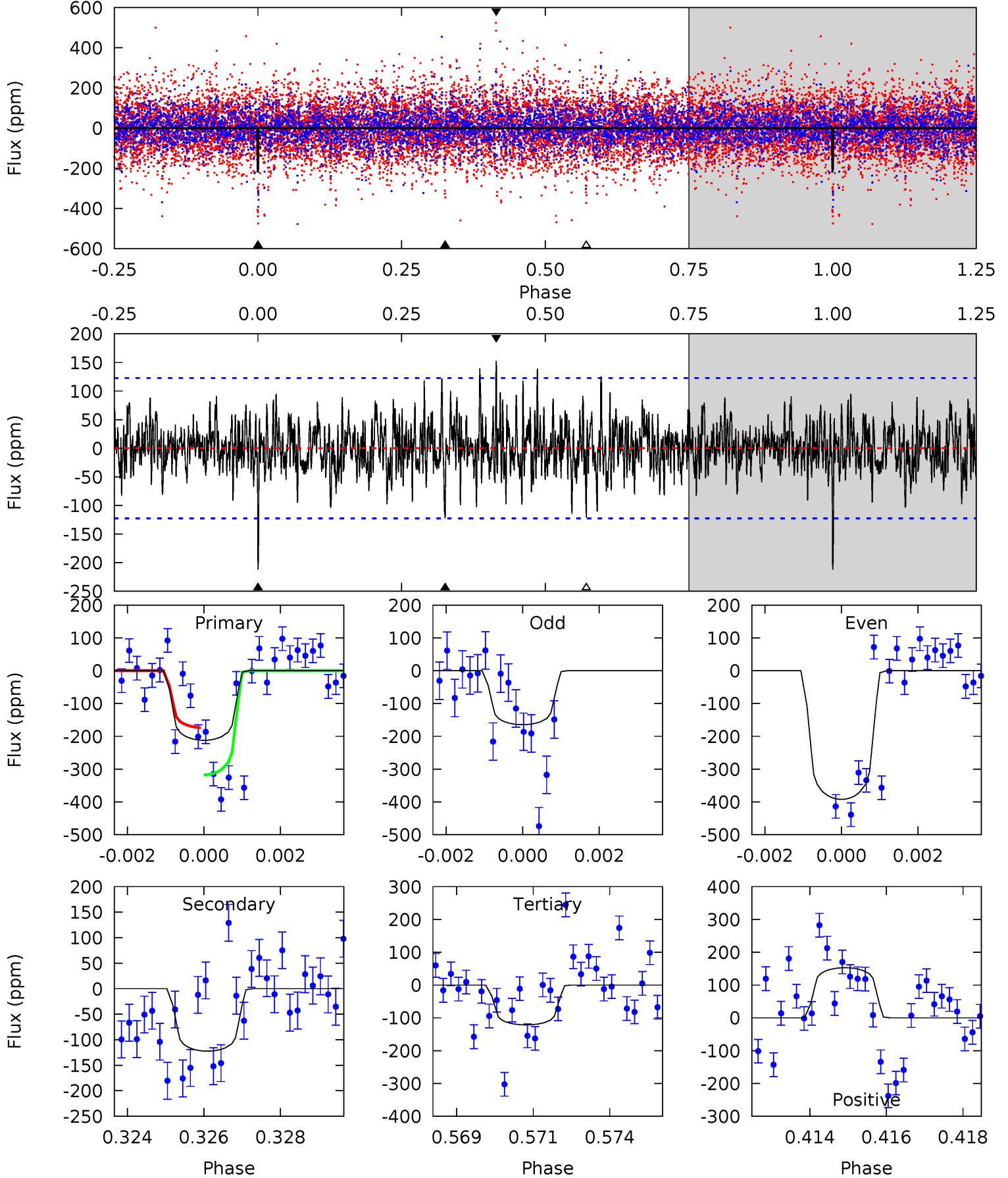
TCE 009772075-02 P= 73.412158 Days  $T_0=176.373589$  (BKJD)



# DV Model-Shift Uniqueness Test

009772075-02, P = 73.413840 Days, E = 102.937127 Days

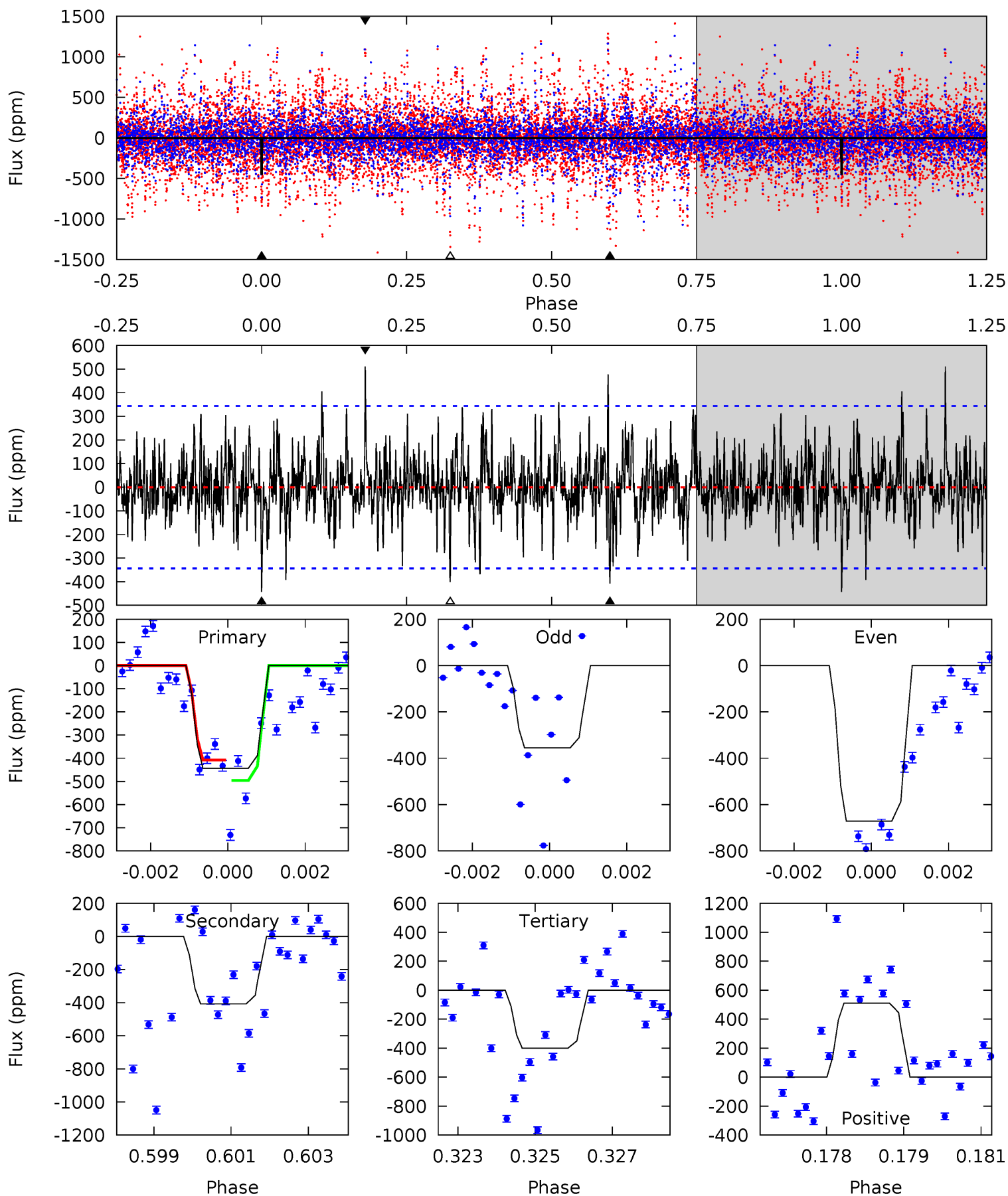
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.21	5.31	5.26	6.63	5.32	3.08	1.56	3.94	2.58	0.05	-1.32	4.63	1.19	0.42	3.06



# Alt Model-Shift Uniqueness Test

009772075-02, P = 73.412158 Days, E = 102.961431 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
6.88	6.33	6.22	7.93	5.34	3.11	1.71	0.66	-1.05	0.11	-1.60	2.32	1.13	0.54	0.68



### Stellar Parameters For KIC 009772075

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7256^{+201}_{-302}$	$3.874^{+0.308}_{-0.132}$	$0.000^{+0.200}_{-0.350}$	$2.567^{+0.518}_{-0.962}$	$1.796^{+0.177}_{-0.412}$	$0.150^{+0.334}_{-0.060}$
	+3%/-4%	+8%/-3%	+inf%/-inf%	+20%/-37%	+10%/-23%	+223%/-40%
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 009772075-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-122 \pm 23$	$4.05^{+2.33}_{-2.03}$	$1097^{+77}_{-113}$	$6029^{+2883}_{-1030}$	$682^{+2299}_{-397}$
Alt.	$-408 \pm 64$	$5.80^{+2.66}_{-2.13}$	$1092^{+78}_{-107}$	$6789^{+2103}_{-973}$	$1104^{+1670}_{-563}$

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

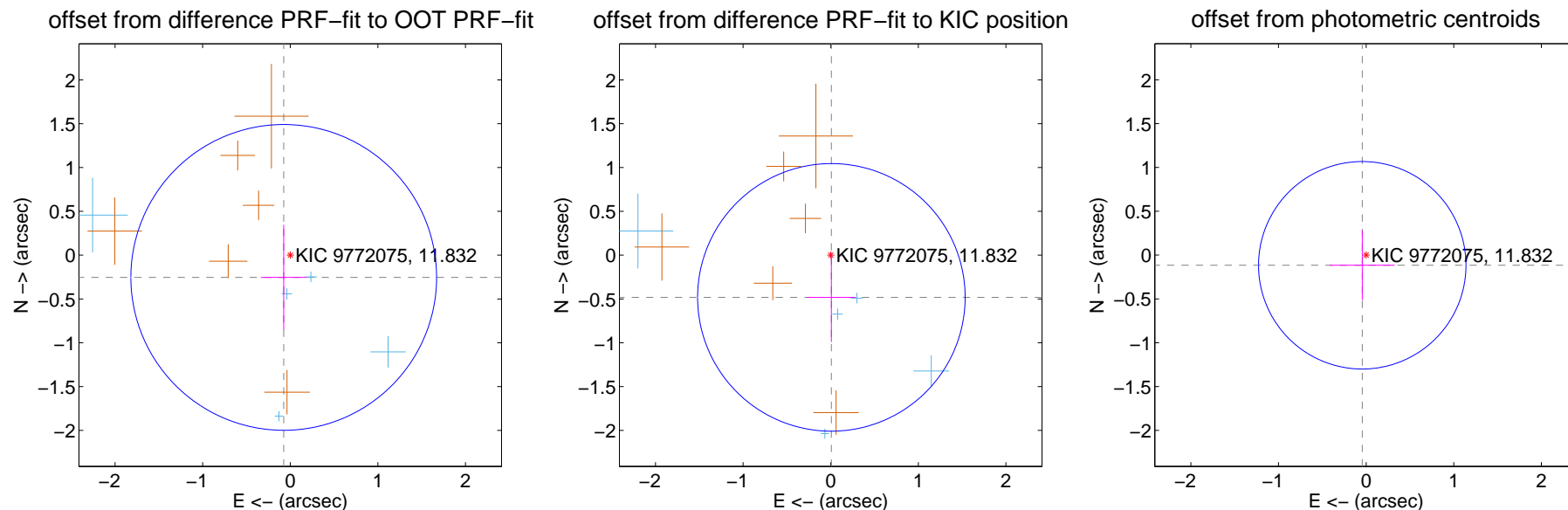
## DV Centroid Data

Supplemental centroid analysis for 009772075-02. **Kepler magnitude: 11.83.** Transit SNR 6.69

There are 5 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.20 arcsec

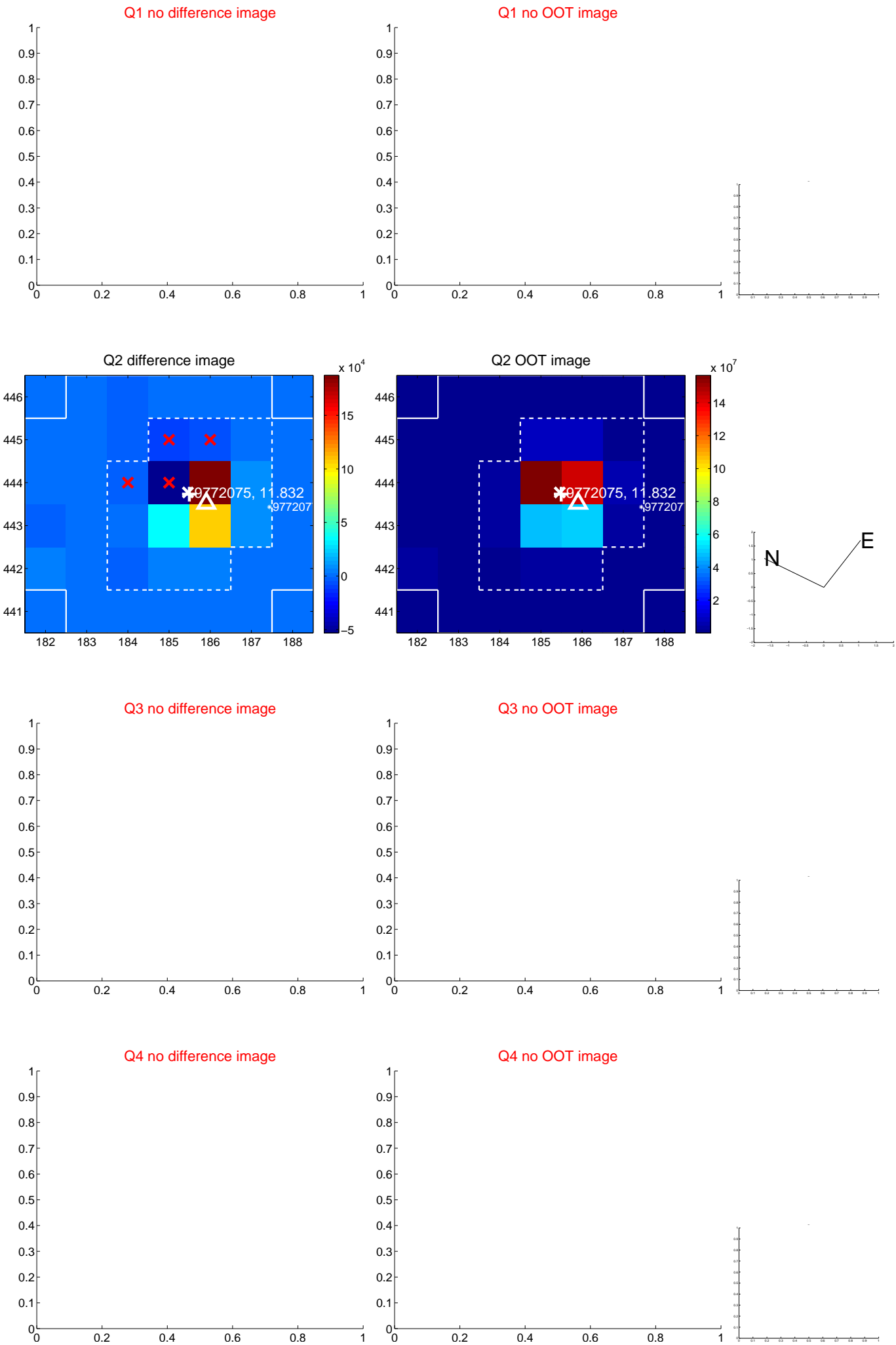
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.265 \pm 0.582$	0.45	$0.074 \pm 0.260$	$-0.254 \pm 0.599$
PRF-fit source offset from KIC position	$0.482 \pm 0.509$	0.95	$-0.007 \pm 0.279$	$-0.482 \pm 0.509$
photometric centroid source offset	$0.12 \pm 0.39$	0.32	$0.04 \pm 0.37$	$-0.12 \pm 0.40$



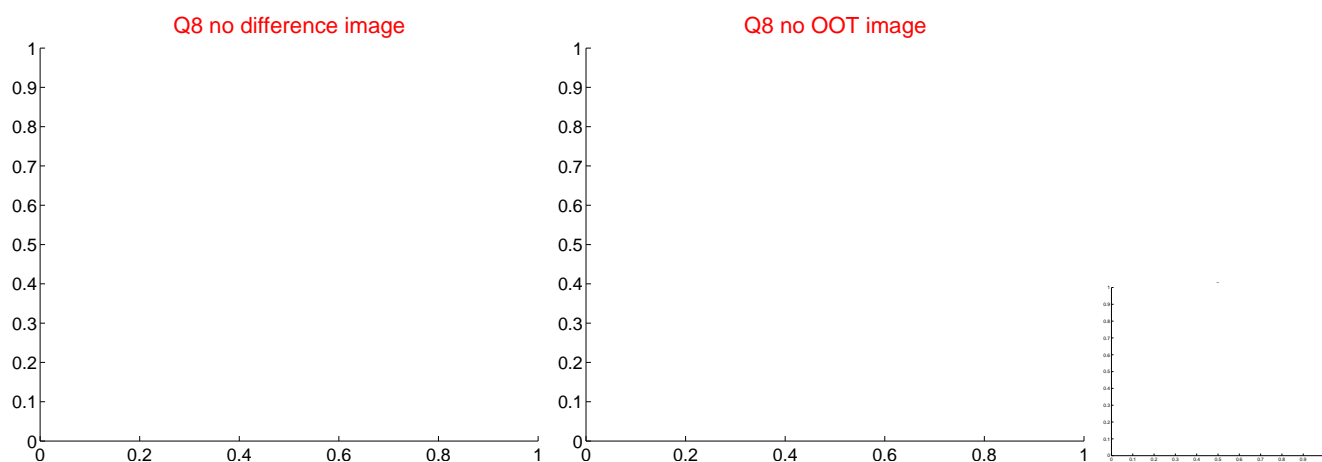
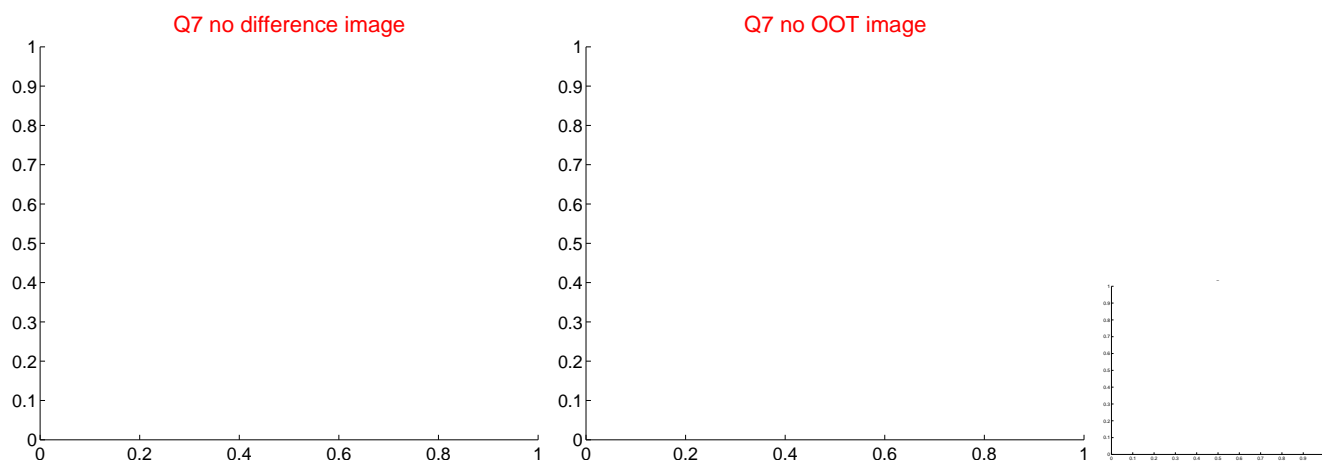
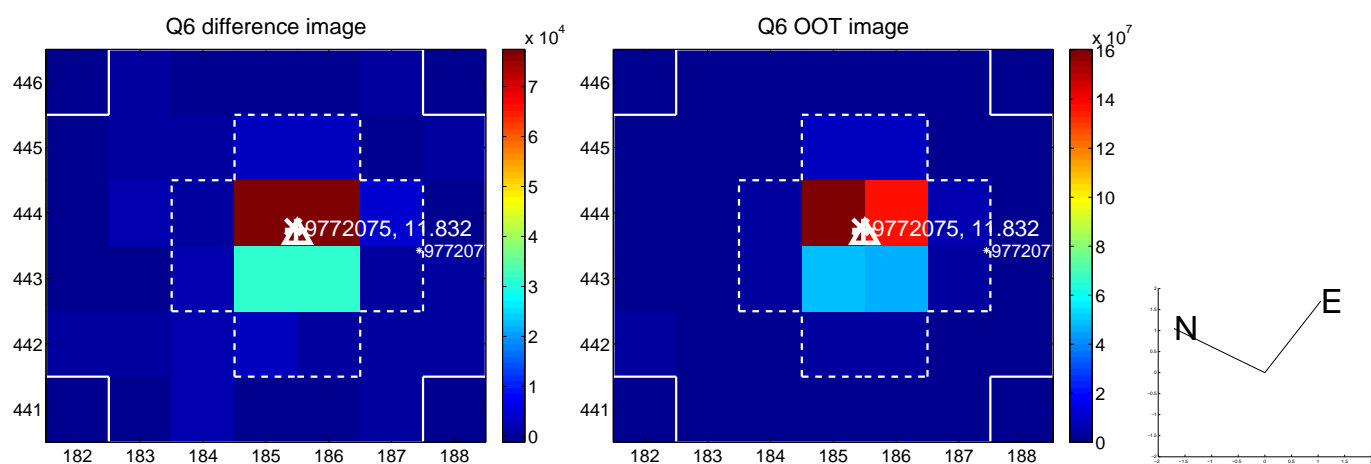
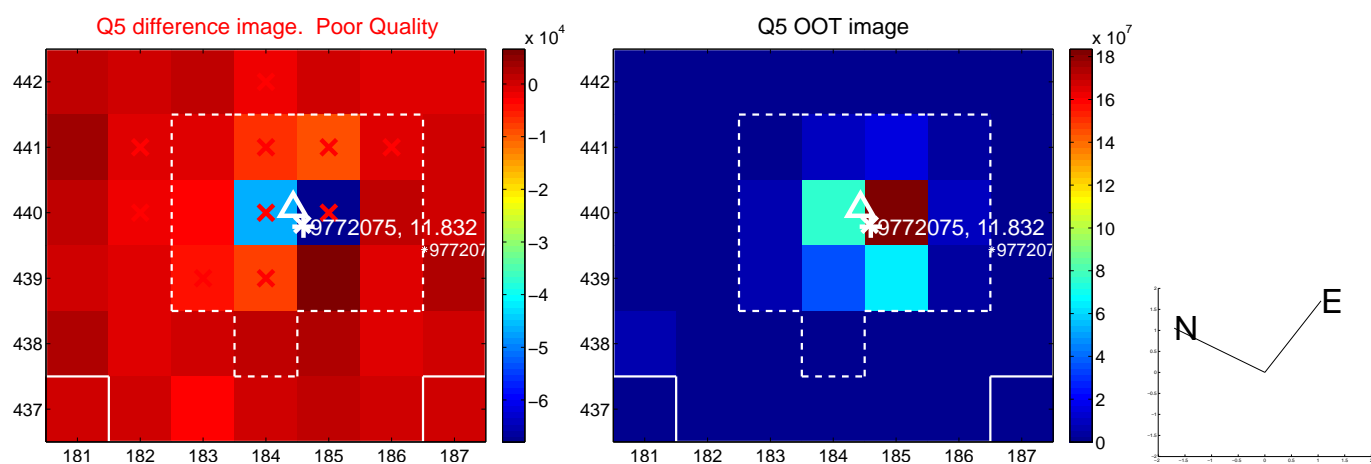
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



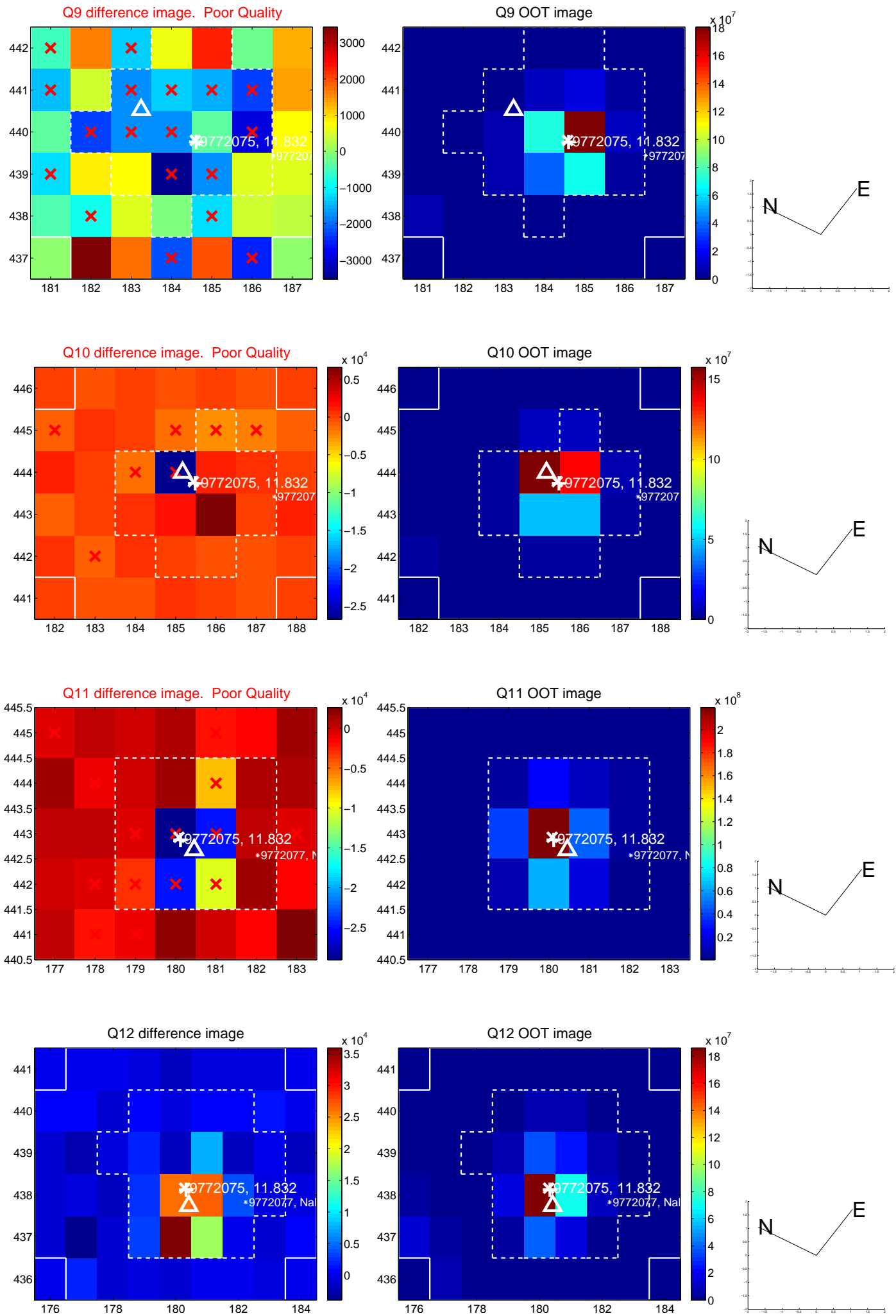
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



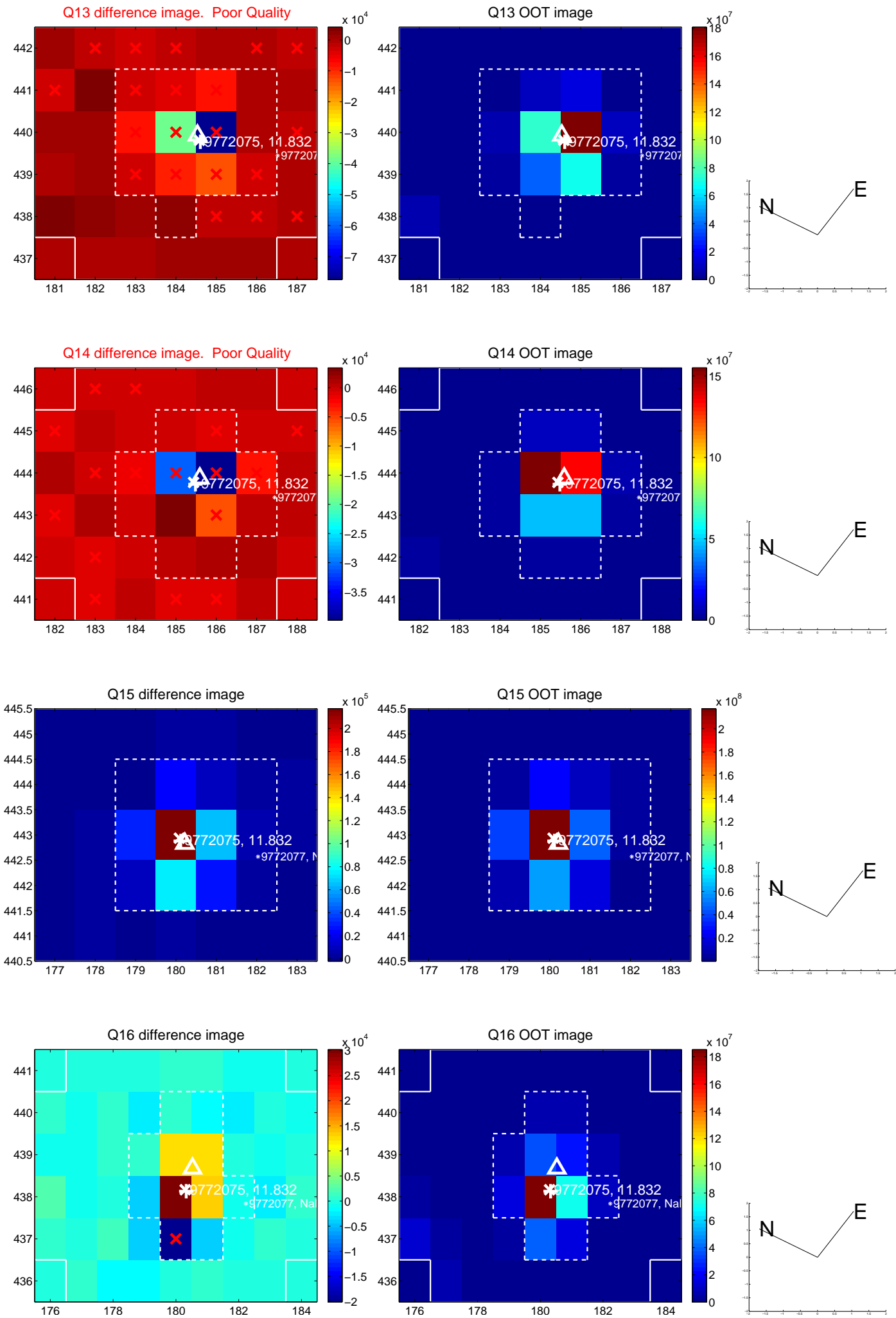
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

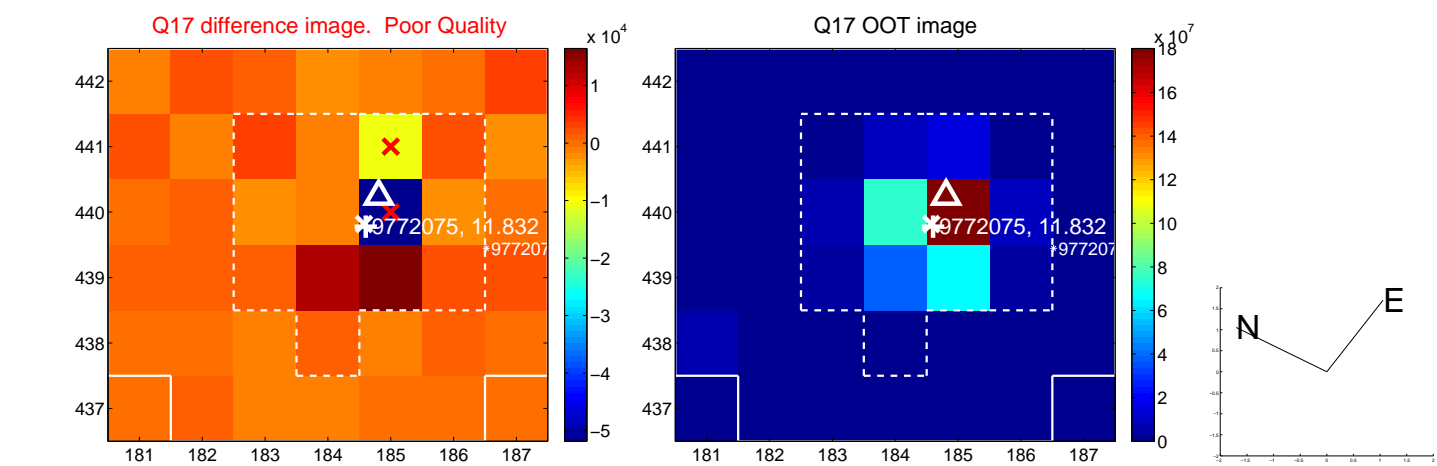


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

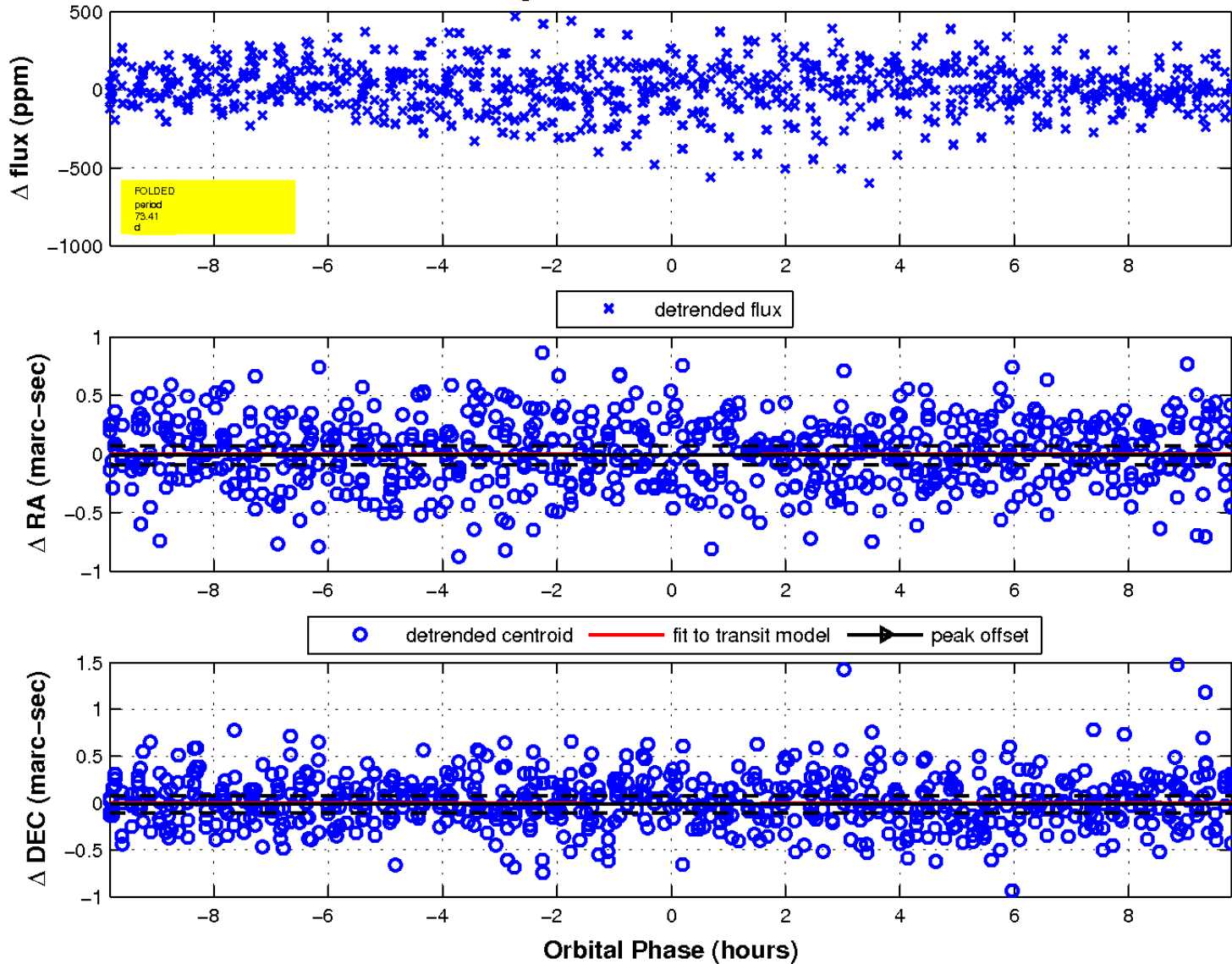




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\Delta$ : difference centroid. red  $\times$ : large negative pixel value.

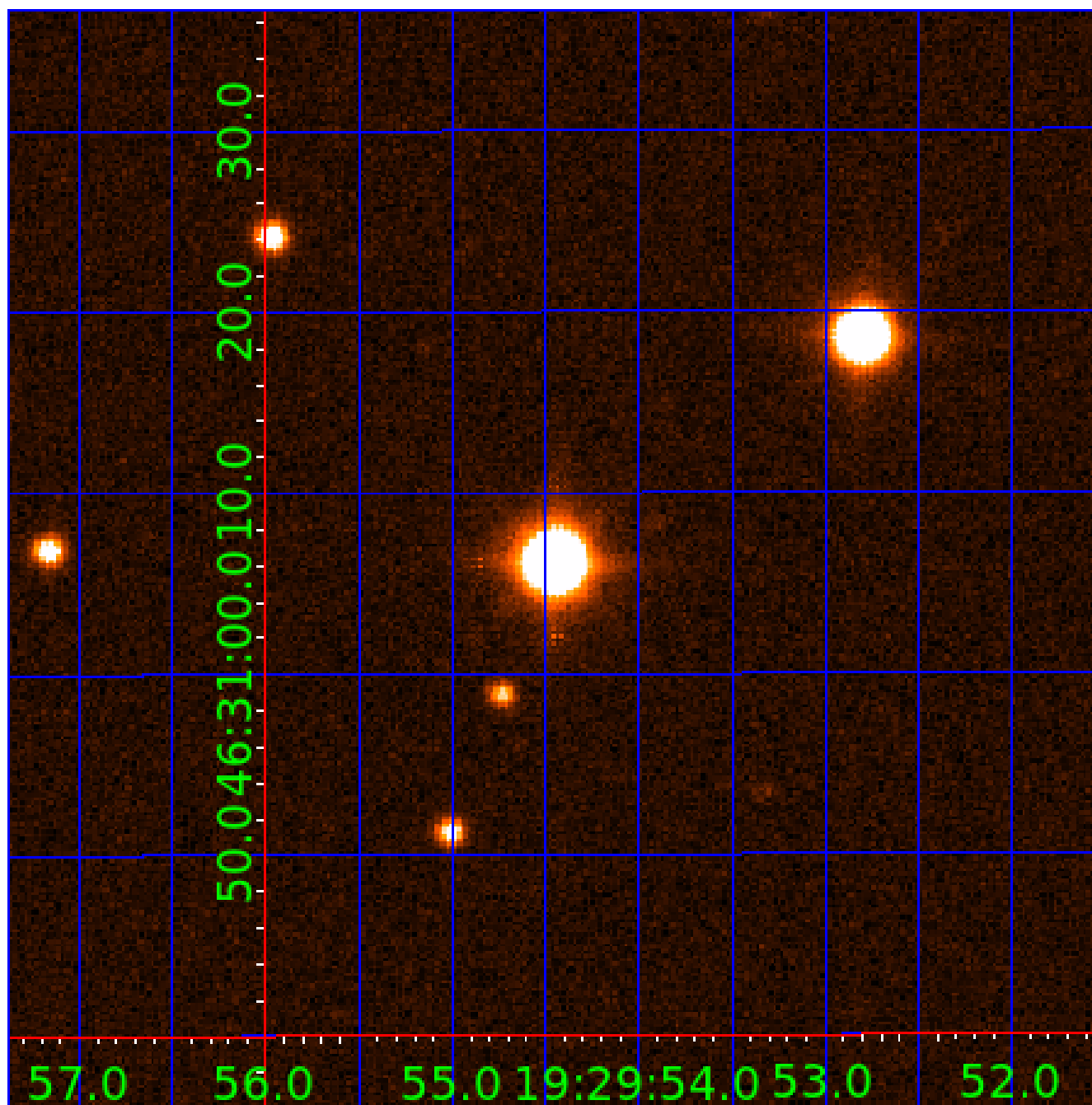


fluxWeightedCentroids, Planet 2 of 6



UKIRT Image

Declination



# KIC 009772075

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009772075-01	OBS	No	0.768918	132.185957	6.9	4.882	11.8	3.8	2.57	7256	0.69	41000.94
009772075-02	OBS	No	73.413840	176.350967	219.1	3.278	8.9	6.7	2.57	7256	4.21	93.96
009772075-03	OBS	No	14.488138	133.697772	159.0	5.389	9.3	11.2	2.57	7256	6.19	817.74
009772075-04	OBS	No	40.121595	132.617429	183.0	2.371	8.6	8.9	2.57	7256	4.03	210.28
009772075-05	OBS	No	31.416621	138.366729	184.4	2.007	8.1	8.4	2.57	7256	3.99	291.35
009772075-06	OBS	No	10.115804	133.549542	95.7	2.371	7.9	8.6	2.57	7256	2.92	1320.18

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009772075-01	OBS	FP	0.00	1	0	0	0	LPP_DV
009772075-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009772075-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009772075-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009772075-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009772075-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_ZUMA—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

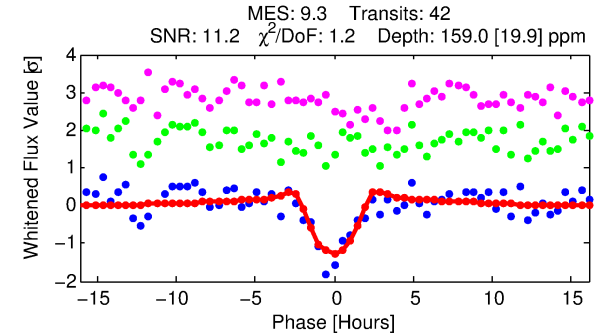
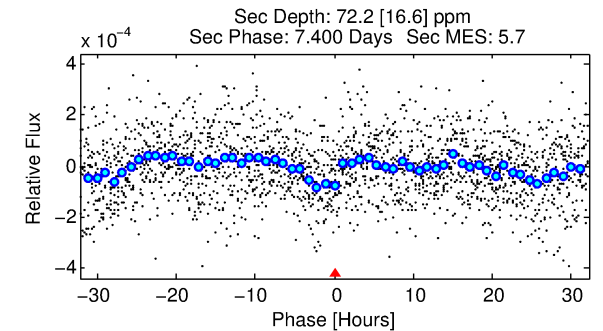
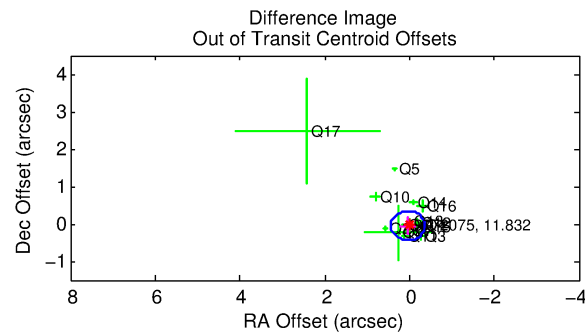
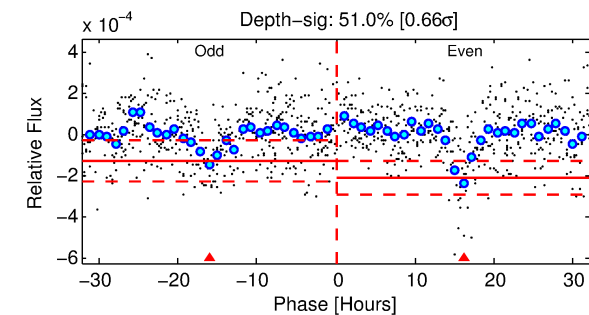
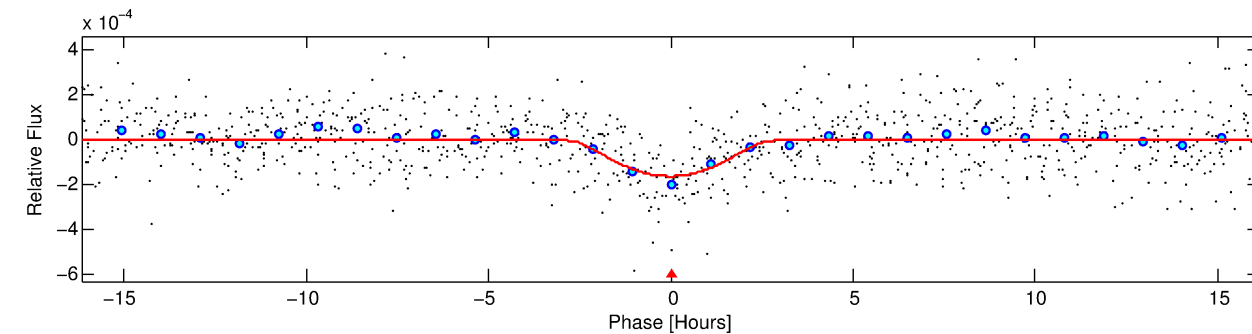
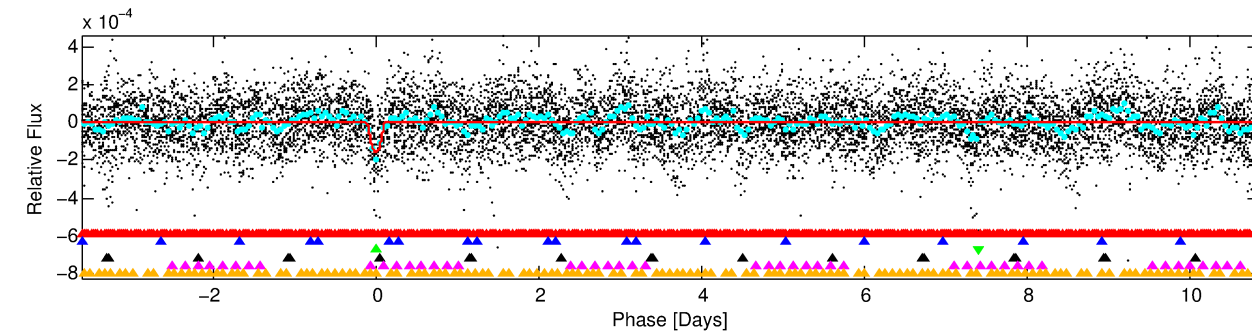
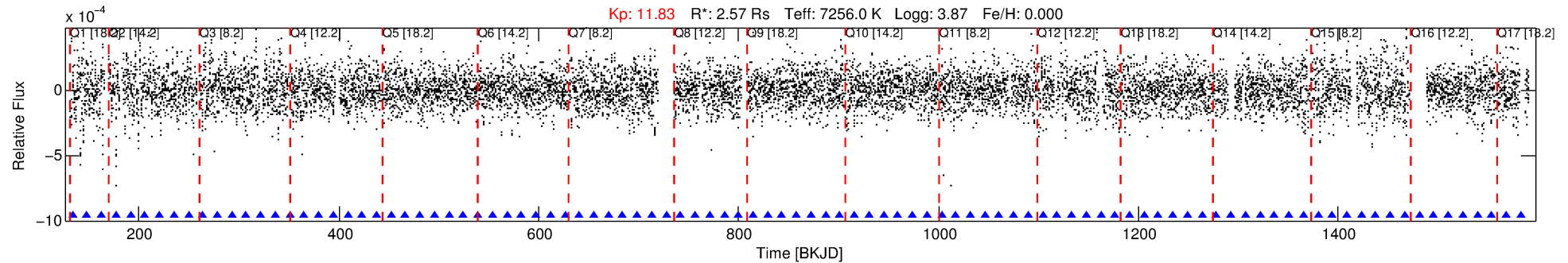
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009772075-03

No Significant Match Found

# DV One-Page Summary

KIC: 9772075 Candidate: 3 of 6 Period: 14.488 d



## DV Fit Results:

Period = 14.48814 [0.00019] d  
Epoch = 133.6978 [0.0109] BKJD  
Rp/R\* = 0.0221 [0.0479]  
a/R\* = 4.52 [2.61]  
b = 1.00 [0.07]  
Seff = 817.74 [457.99]  
Teq = 1364 [191] K  
Rp = 6.19 [13.61] Re  
a = 0.1415 [0.0487] AU  
Ag = 20.75 [90.75] [0.22 $\sigma$ ]  
Teffp = 4500 [4886] K [0.64 $\sigma$ ]

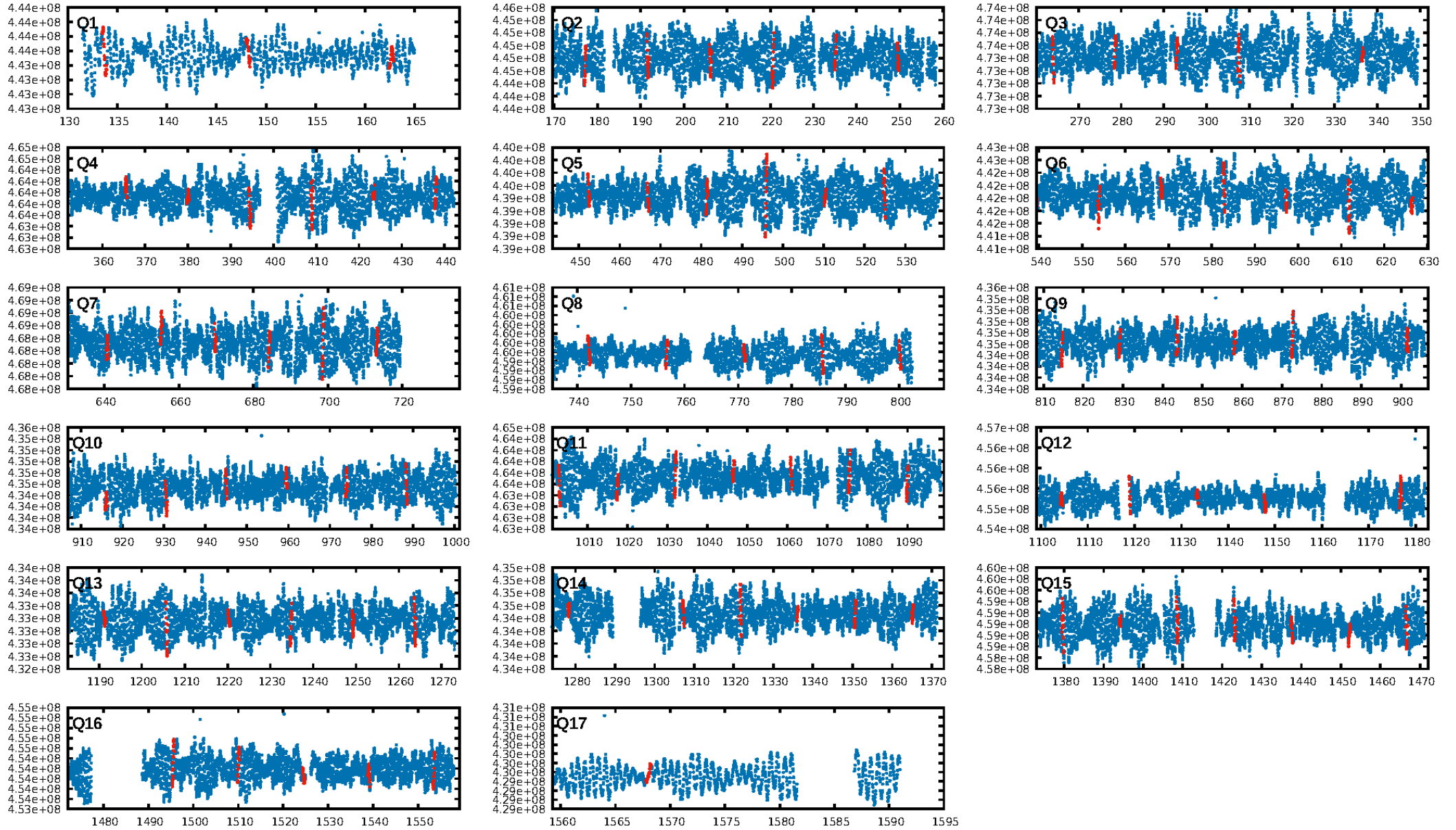
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [17.82 $\sigma$ ]  
LongPeriod-sig: 100.0% [70.65 $\sigma$ ]  
ModelChiSquare2-sig: 5.0%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 1.74e-11**  
RollingBand-fgt: 1.00 [40/40]  
GhostDiagnostic-chr: 1.664  
Centroid-sig: 6.1%  
Centroid-so: 0.334 arcsec [1.41 $\sigma$ ]  
OotOffset-rm: 0.064 arcsec [0.49 $\sigma$ ]  
OotOffset-st: 4/4/4/3 [15]  
KicOffset-rm: 0.291 arcsec [1.16 $\sigma$ ]  
KicOffset-st: 4/4/4/3 [15]  
DiffImageQuality-fgm: 0.47 [7/15]  
DiffImageOverlap-fno: 0.00 [0/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 18:53:10 Z

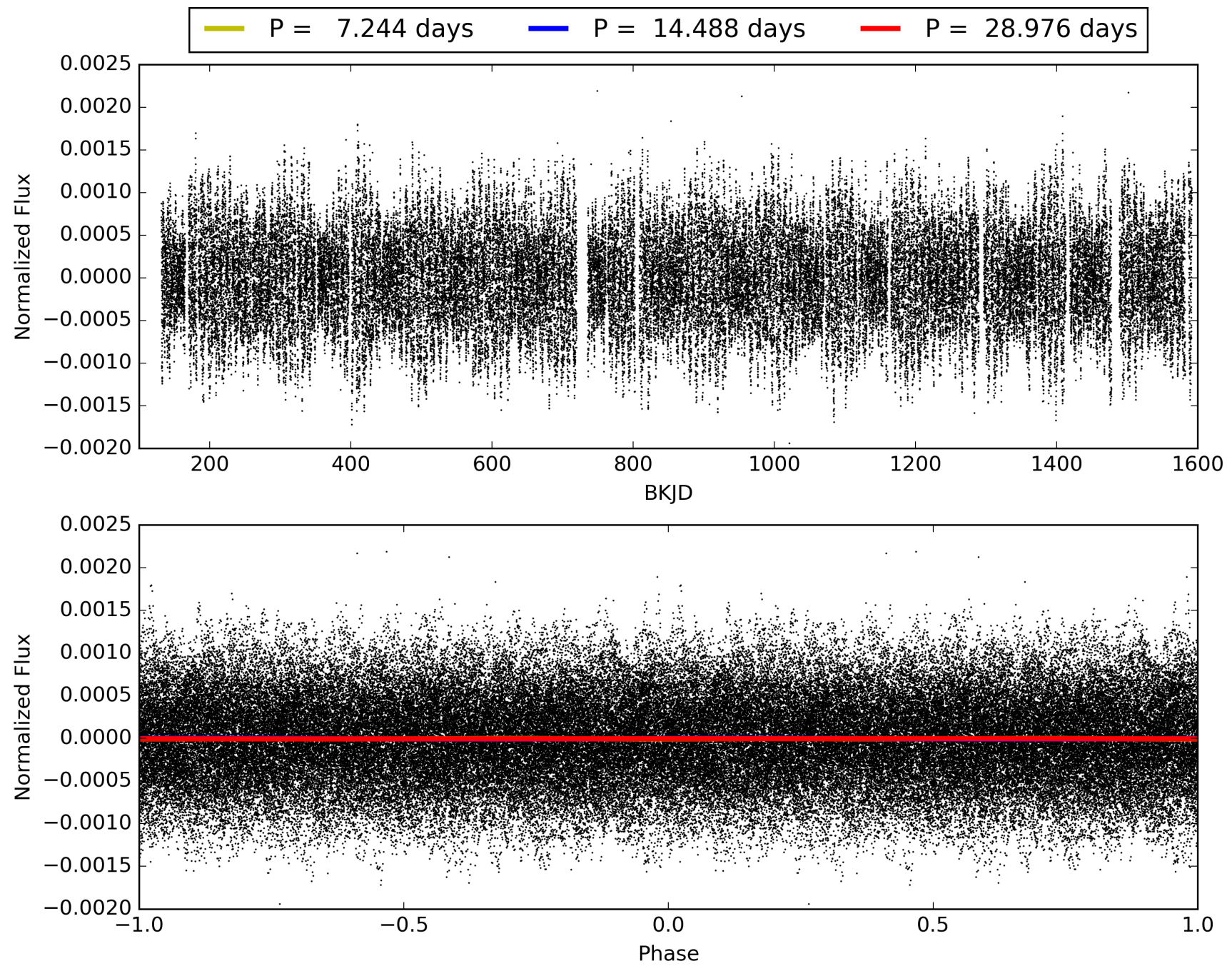
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 009772075-03, PDC Light Curves





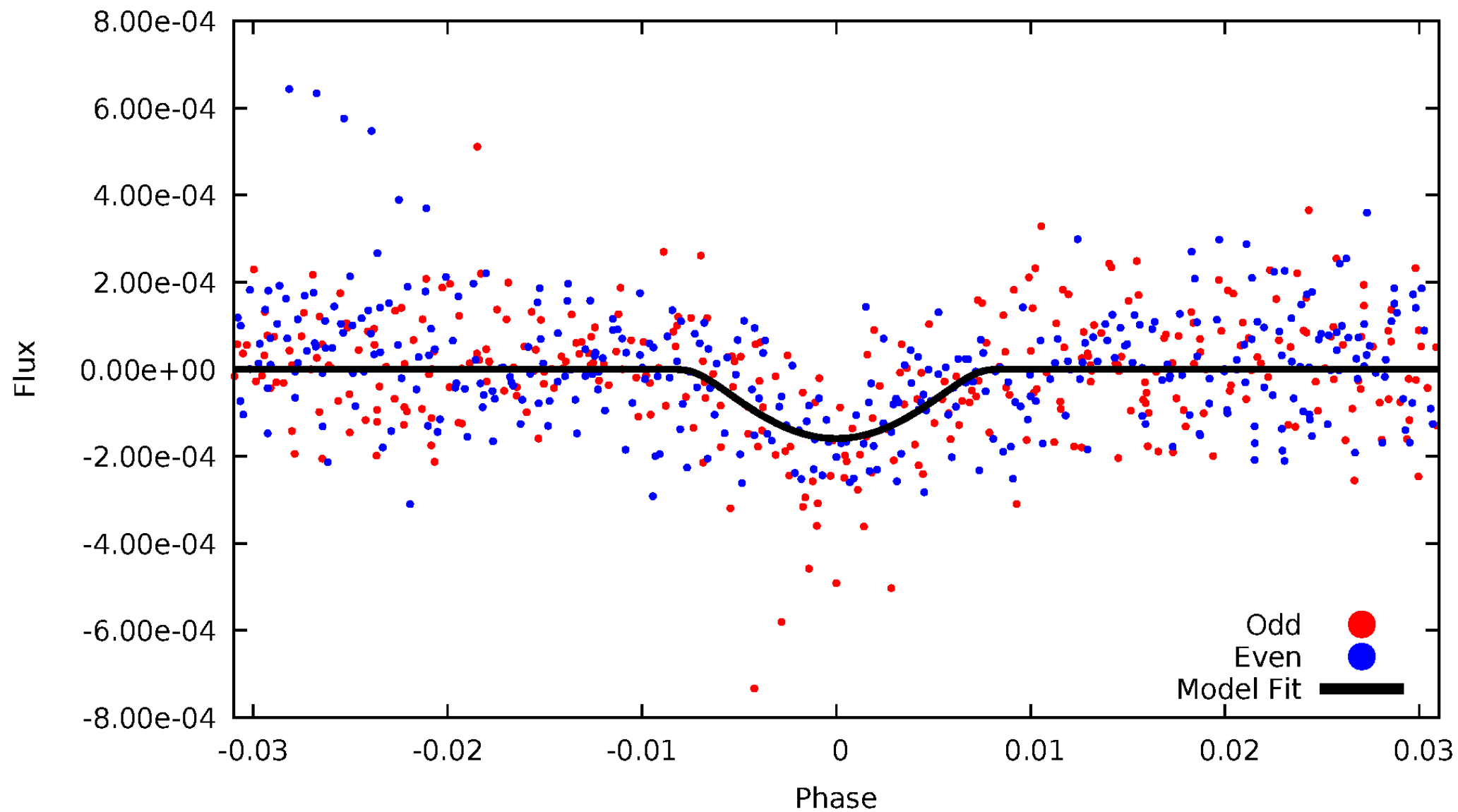
TCE 009772075-03





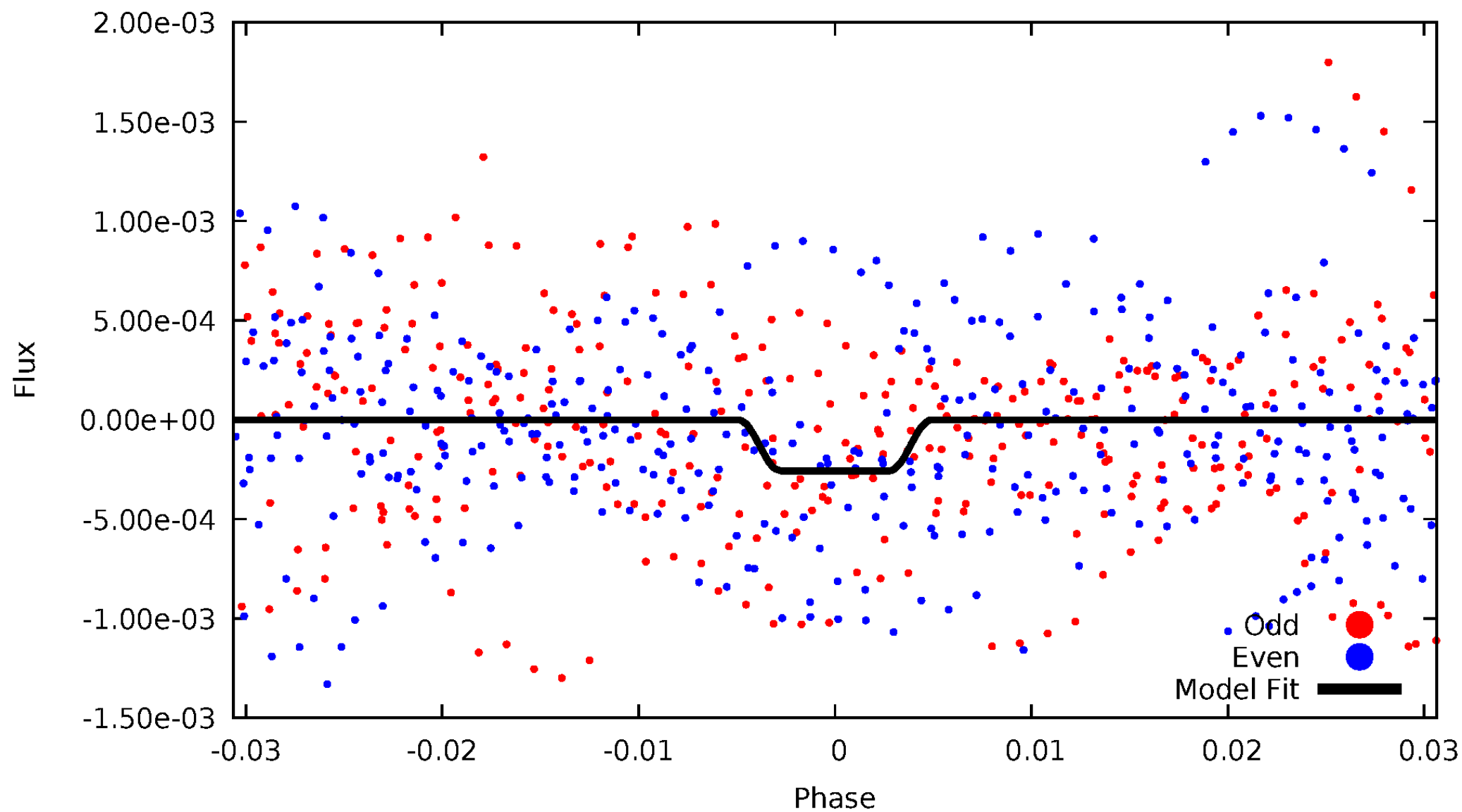
# DV Odd/Even

TCE 009772075-03



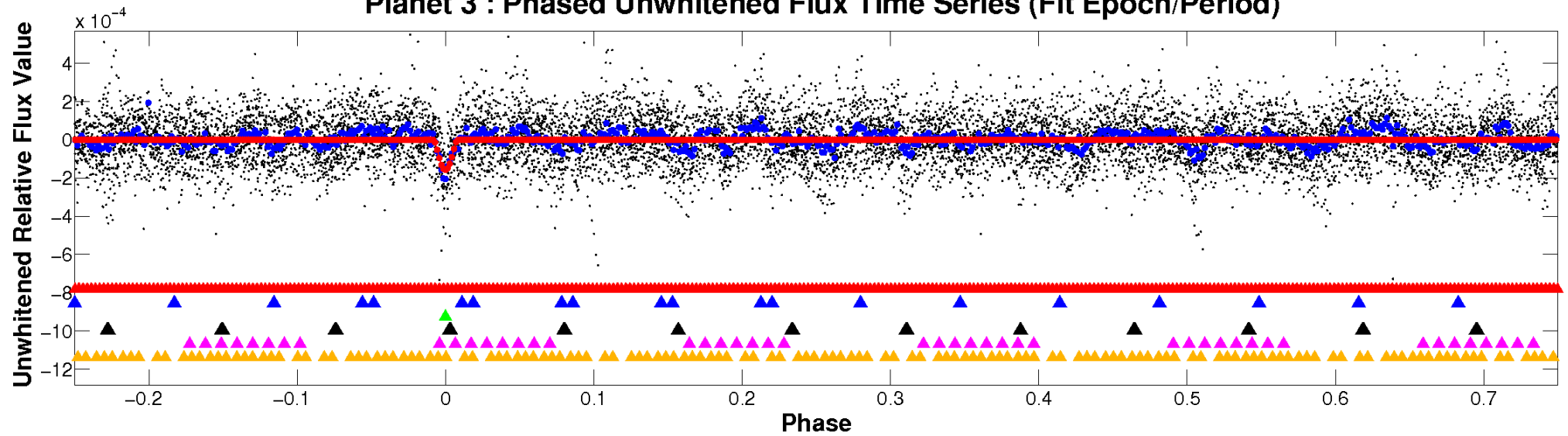
# ALT Odd/Even

TCE 009772075-03

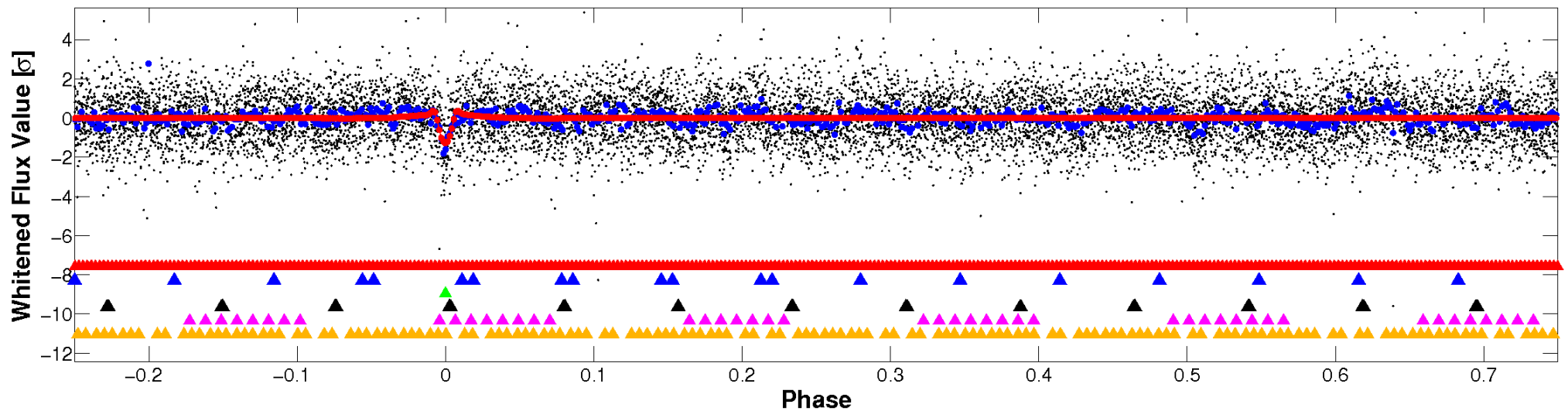


# Non-Whitened Vs. Whitened Light Curve

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

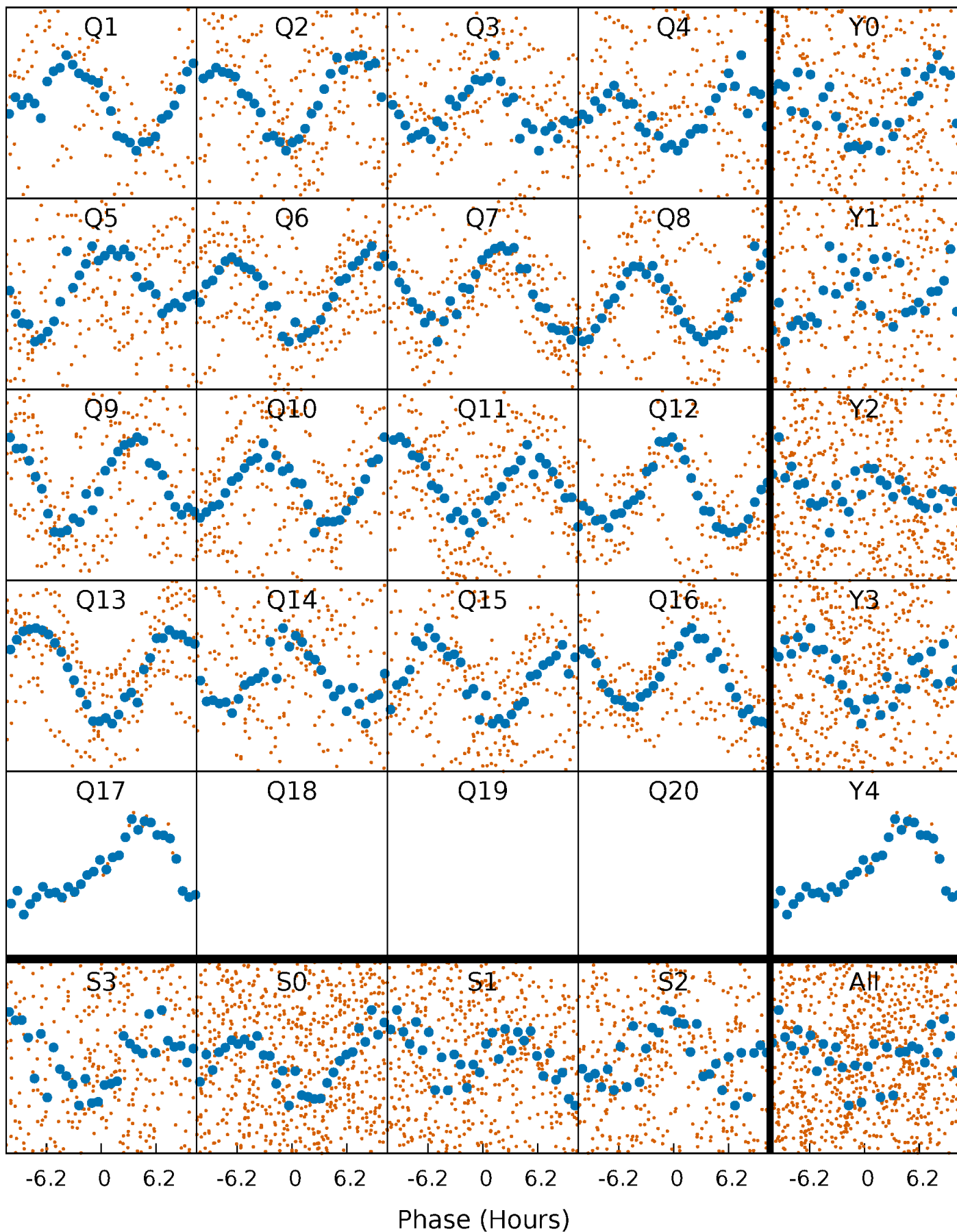


## Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



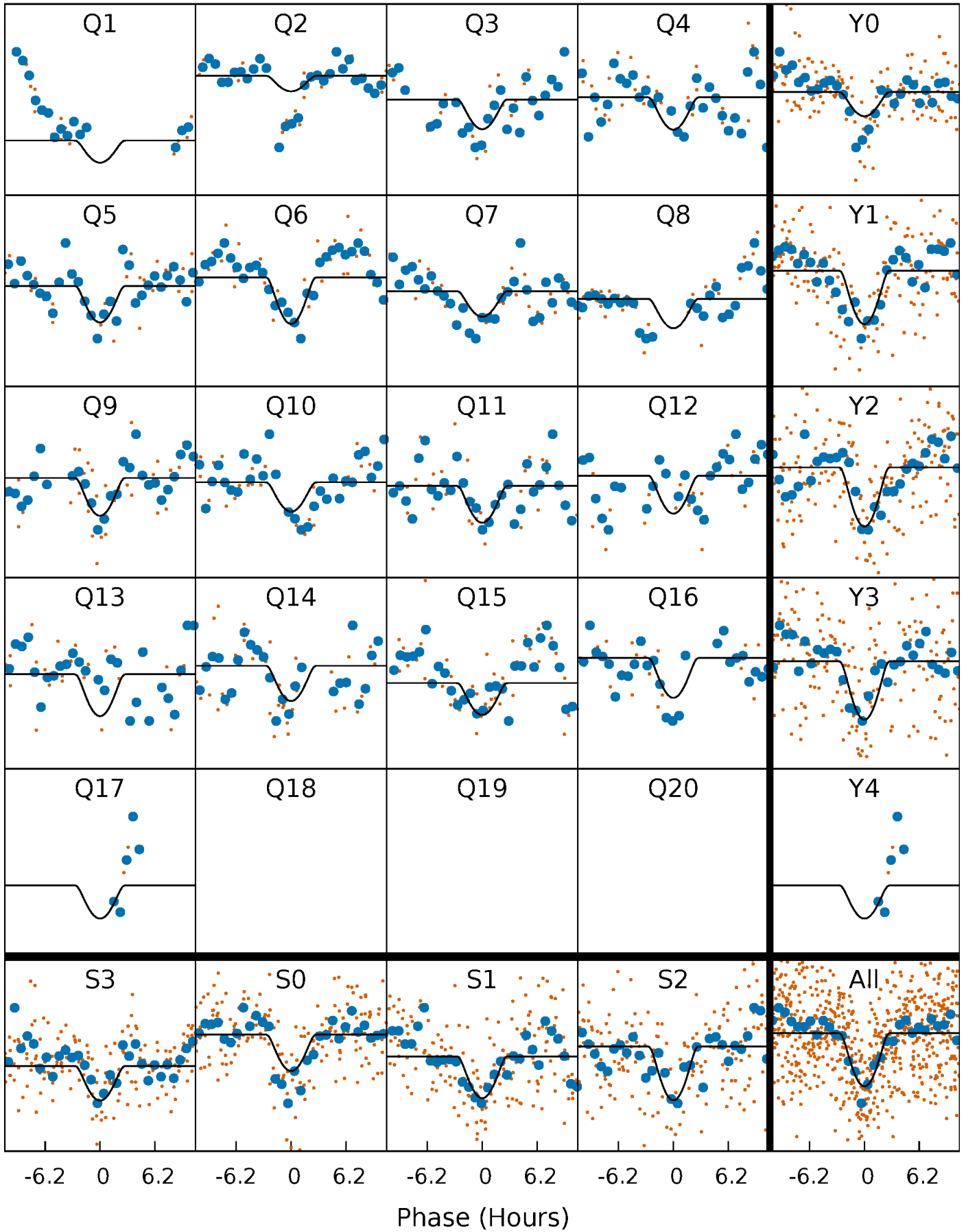
# PDC Quarter-Phased Transit Curves

TCE 009772075-03 P= 14.488138 Days  $T_0=133.697772$  (BKJD)



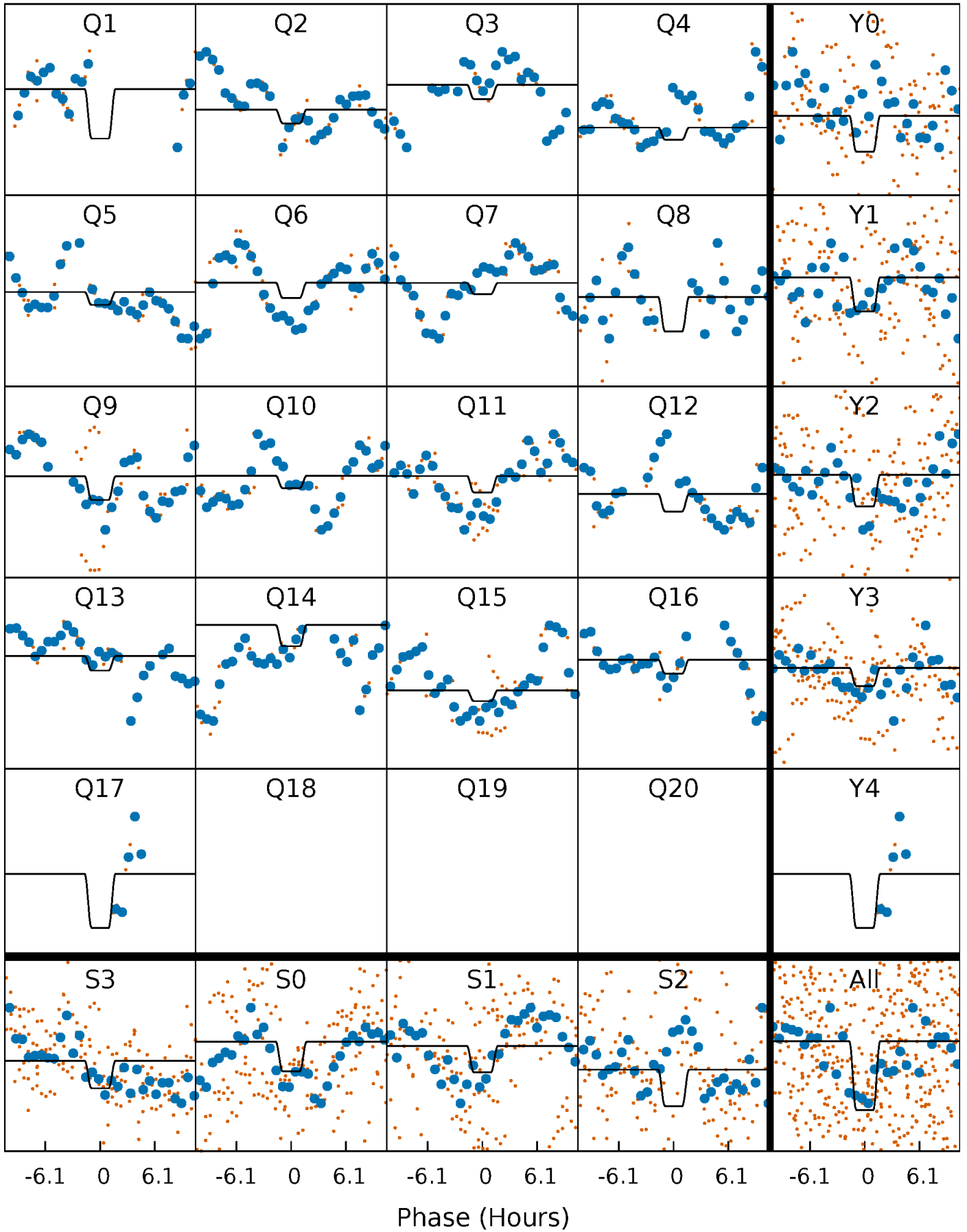
# DV Quarter-Phased Transit Curves

TCE 009772075-03   P= 14.488138 Days    $T_0=133.697772$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 009772075-03 P= 14.488187 Days  $T_0=133.685208$  (BKJD)

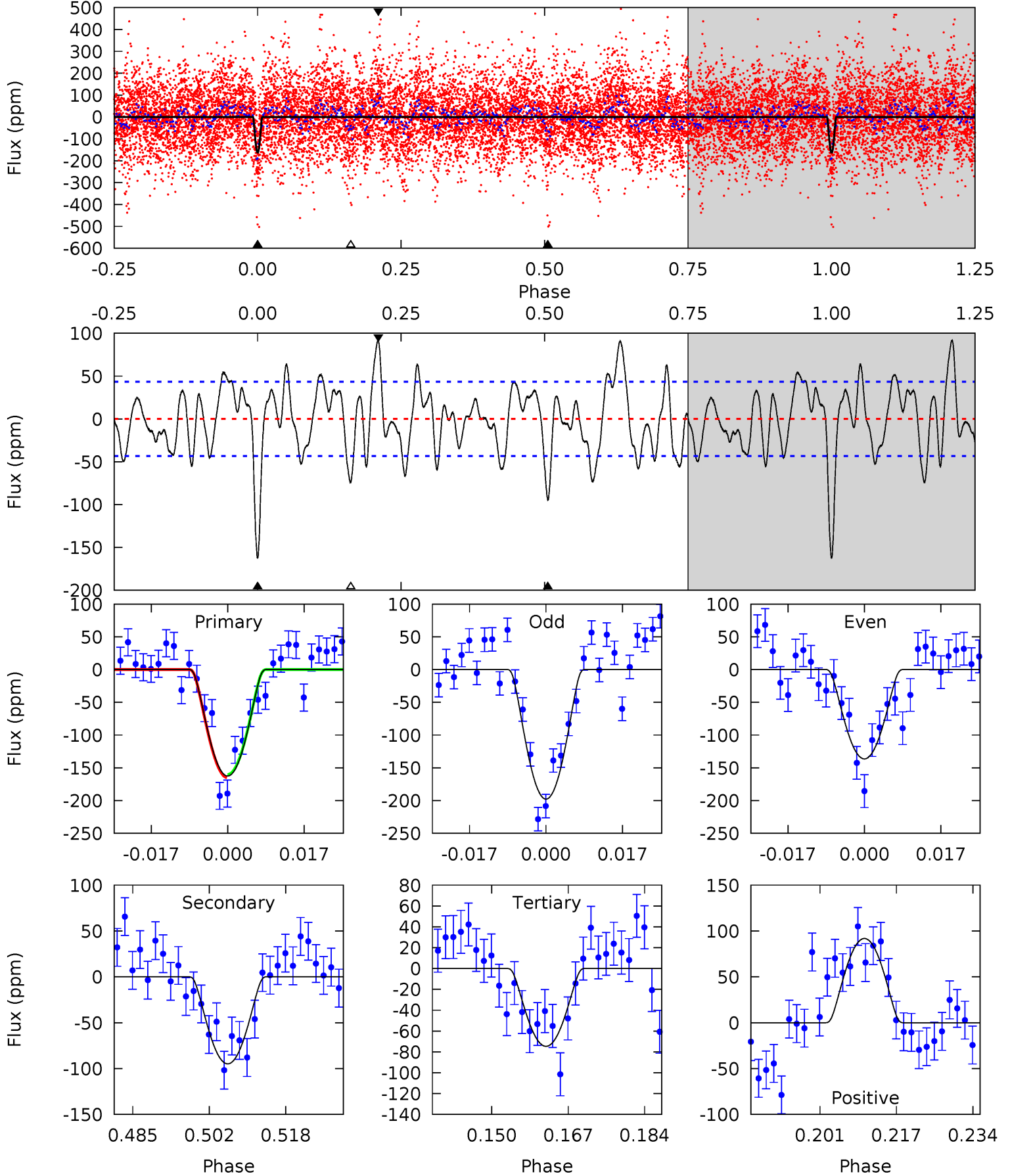




# DV Model-Shift Uniqueness Test

009772075-03, P = 14.488138 Days, E = 119.209634 Days

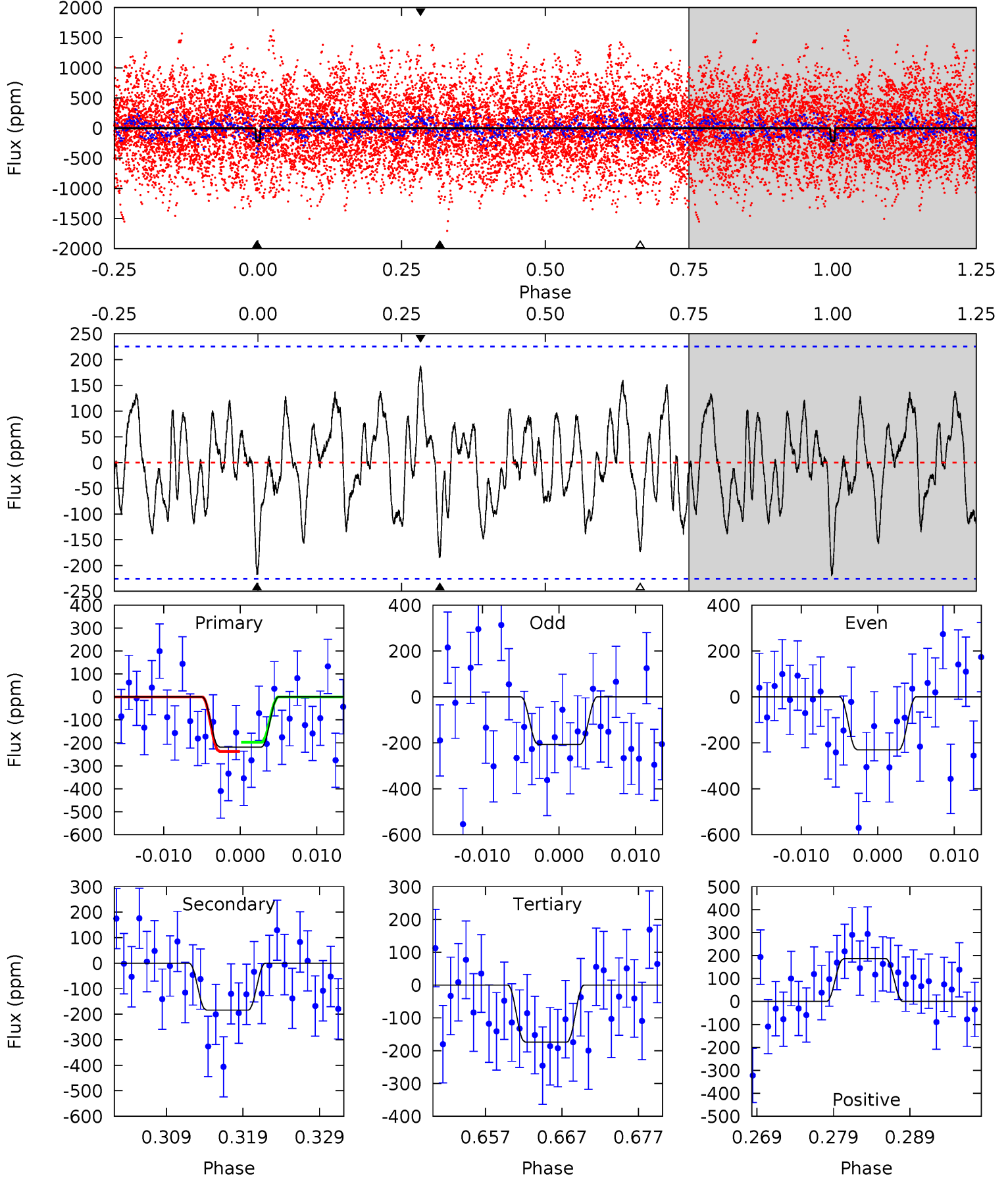
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
18.5	10.8	8.48	10.4	4.93	2.39	3.83	9.97	8.03	2.29	0.35	3.52	0.98	0.36	0.27



# Alt Model-Shift Uniqueness Test

009772075-03, P = 14.488187 Days, E = 119.197021 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
4.87	4.11	3.88	4.16	5.03	2.58	1.59	0.99	0.71	0.22	-0.06	0.26	0.67	0.46	0.45



### Stellar Parameters For KIC 009772075

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$7256^{+201}_{-302}$	$3.874^{+0.308}_{-0.132}$	$0.000^{+0.200}_{-0.350}$	$2.567^{+0.518}_{-0.962}$	$1.796^{+0.177}_{-0.412}$	$0.150^{+0.334}_{-0.060}$
	+3%/-4%	+8%/-3%	+inf%/-inf%	+20%/-37%	+10%/-23%	+223%/-40%
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 009772075-03 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-95 \pm 9$	$10.77^{+11.68}_{-7.06}$	$1873^{+141}_{-186}$	$3811^{+2167}_{-813}$	$8.770^{+63.134}_{-6.717}$
Alt.	$-184 \pm 45$	$10.13^{+10.38}_{-6.96}$	$1873^{+129}_{-177}$	$4347^{+3464}_{-924}$	$18^{+188}_{-13}$

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

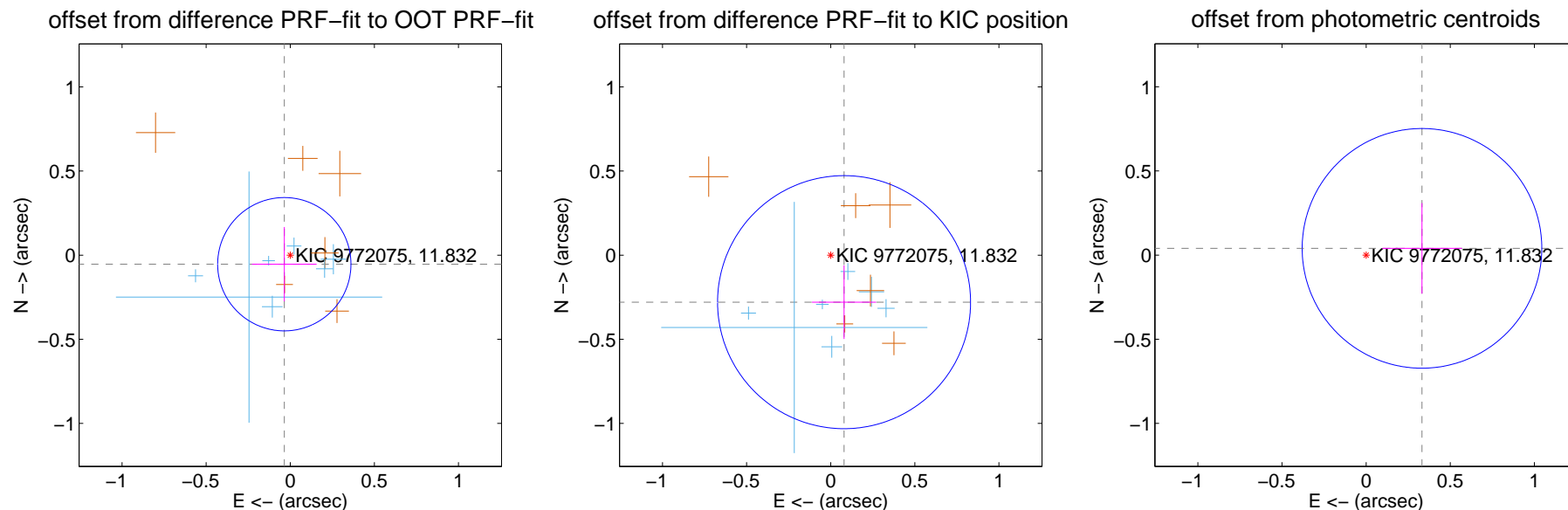
## DV Centroid Data

Supplemental centroid analysis for 009772075-03. **Kepler magnitude: 11.83.** Transit SNR 11.18

There are 7 quarters with good PRF difference image offsets

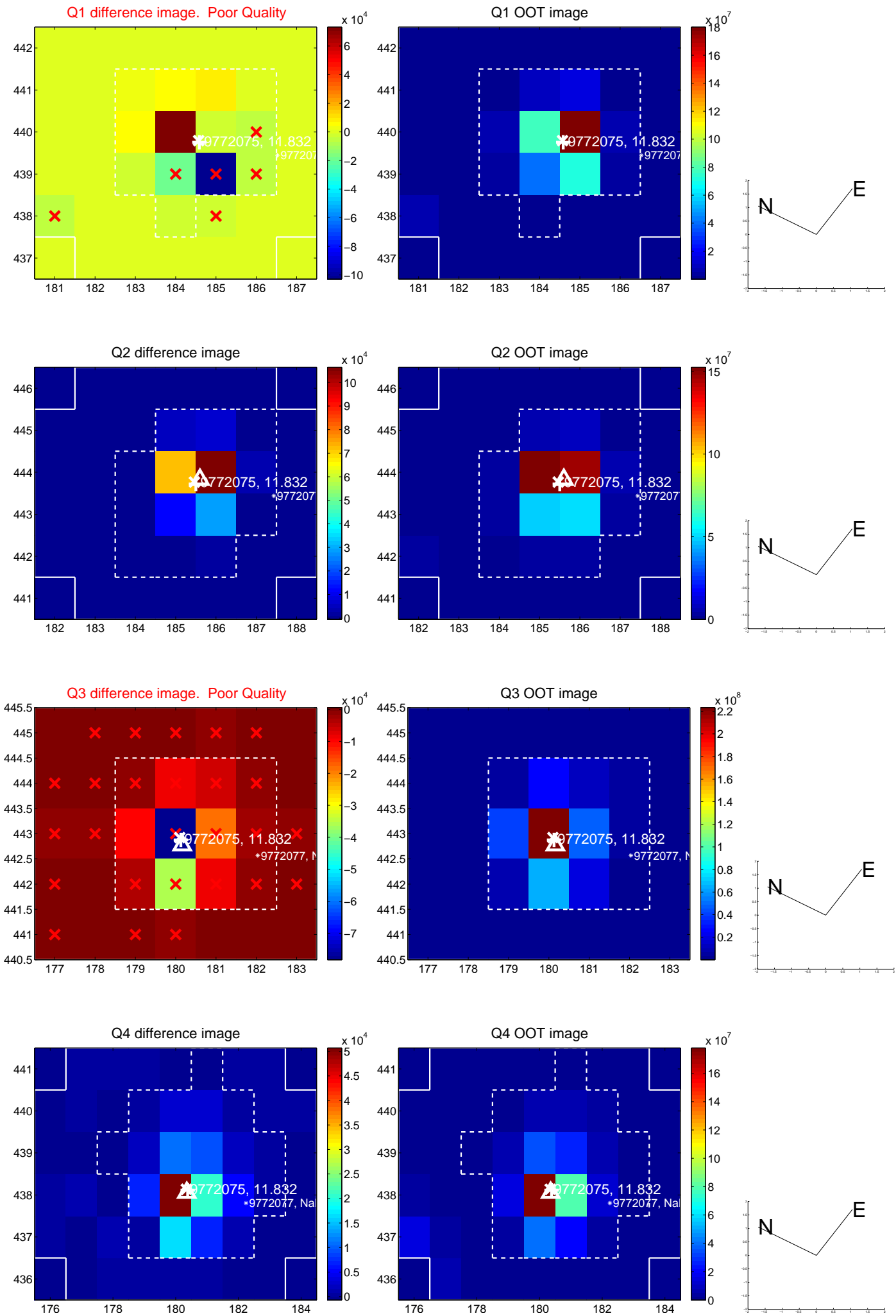
The direct PRF centroid is offset from the target star catalog position by about 0.20 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.064 \pm 0.132$	0.49	$0.035 \pm 0.192$	$-0.054 \pm 0.221$
PRF-fit source offset from KIC position	$0.291 \pm 0.251$	1.16	$-0.079 \pm 0.191$	$-0.280 \pm 0.219$
photometric centroid source offset	$0.33 \pm 0.24$	1.41	$-0.33 \pm 0.24$	$0.04 \pm 0.27$

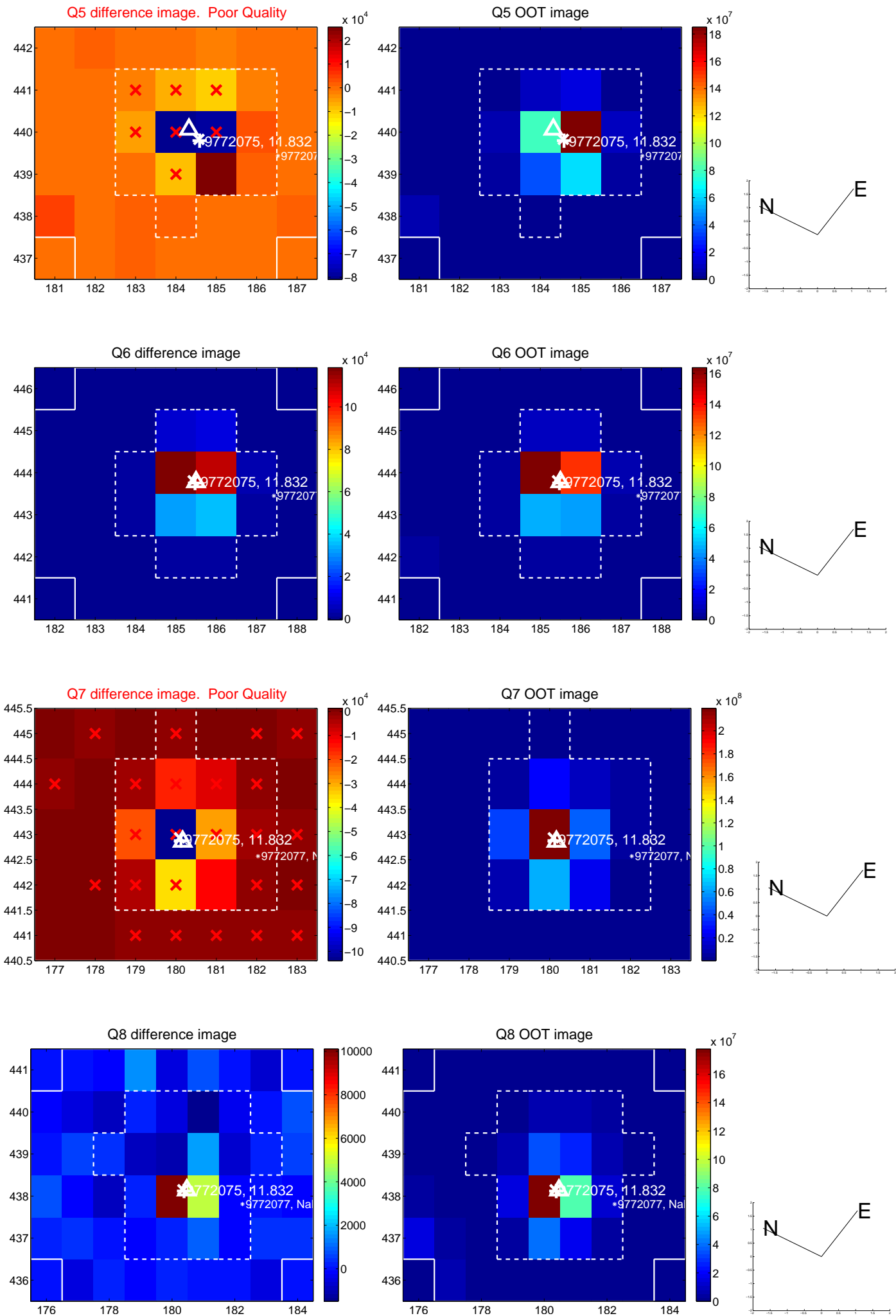


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

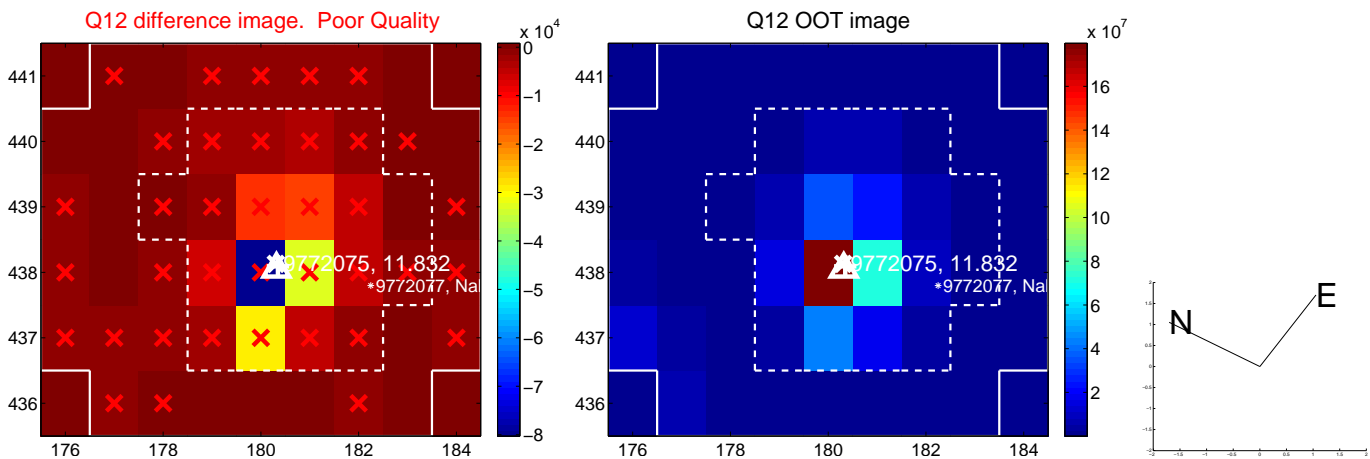
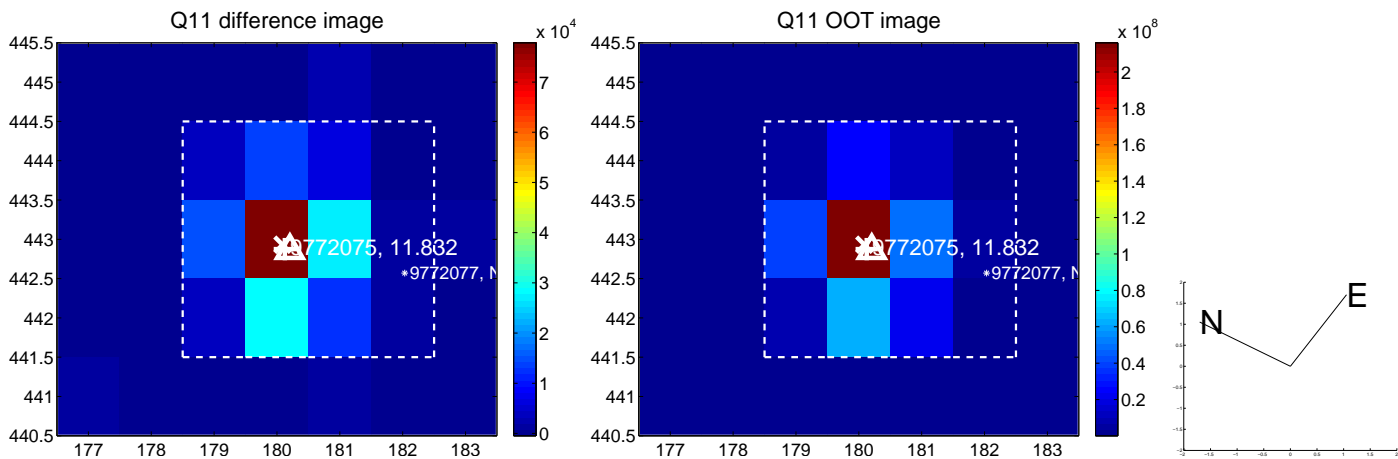
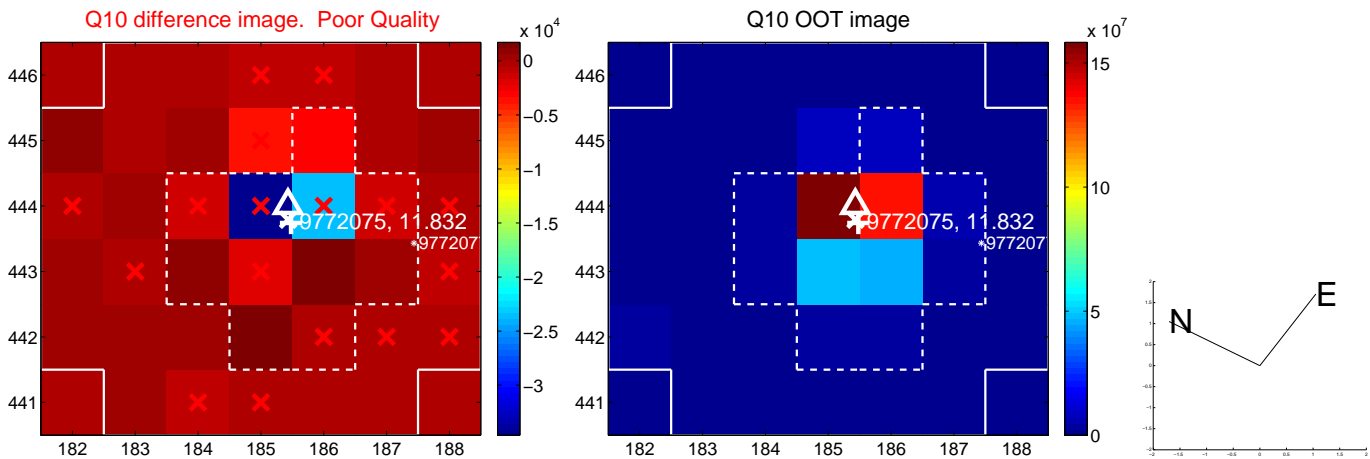
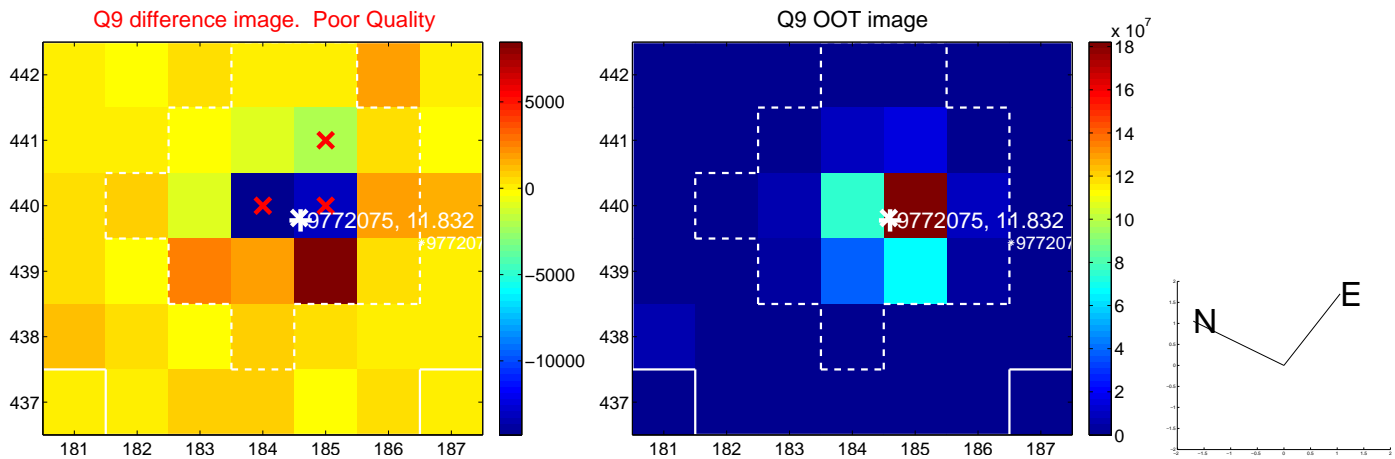


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

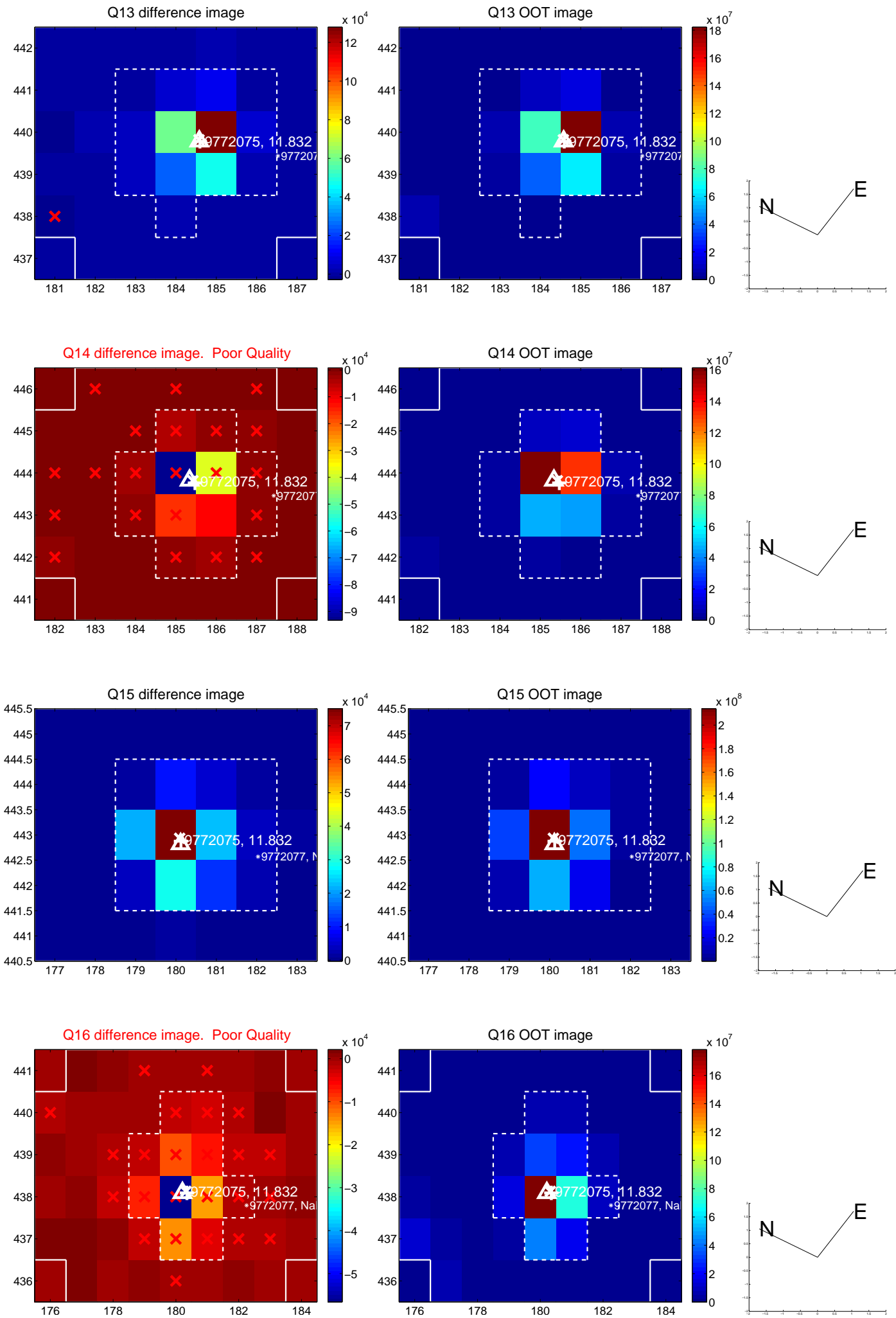




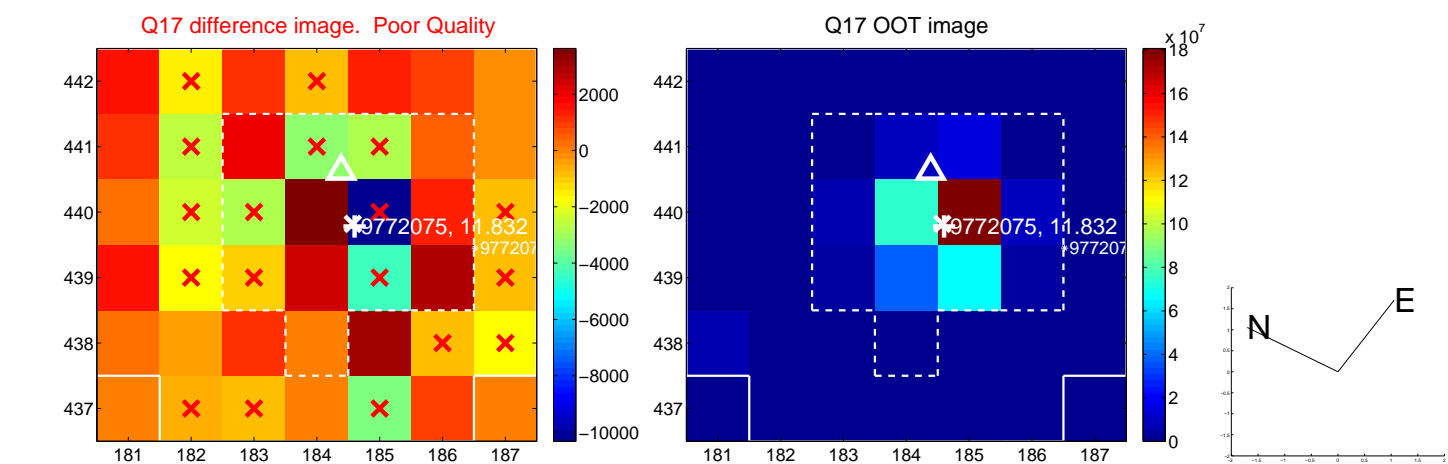
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



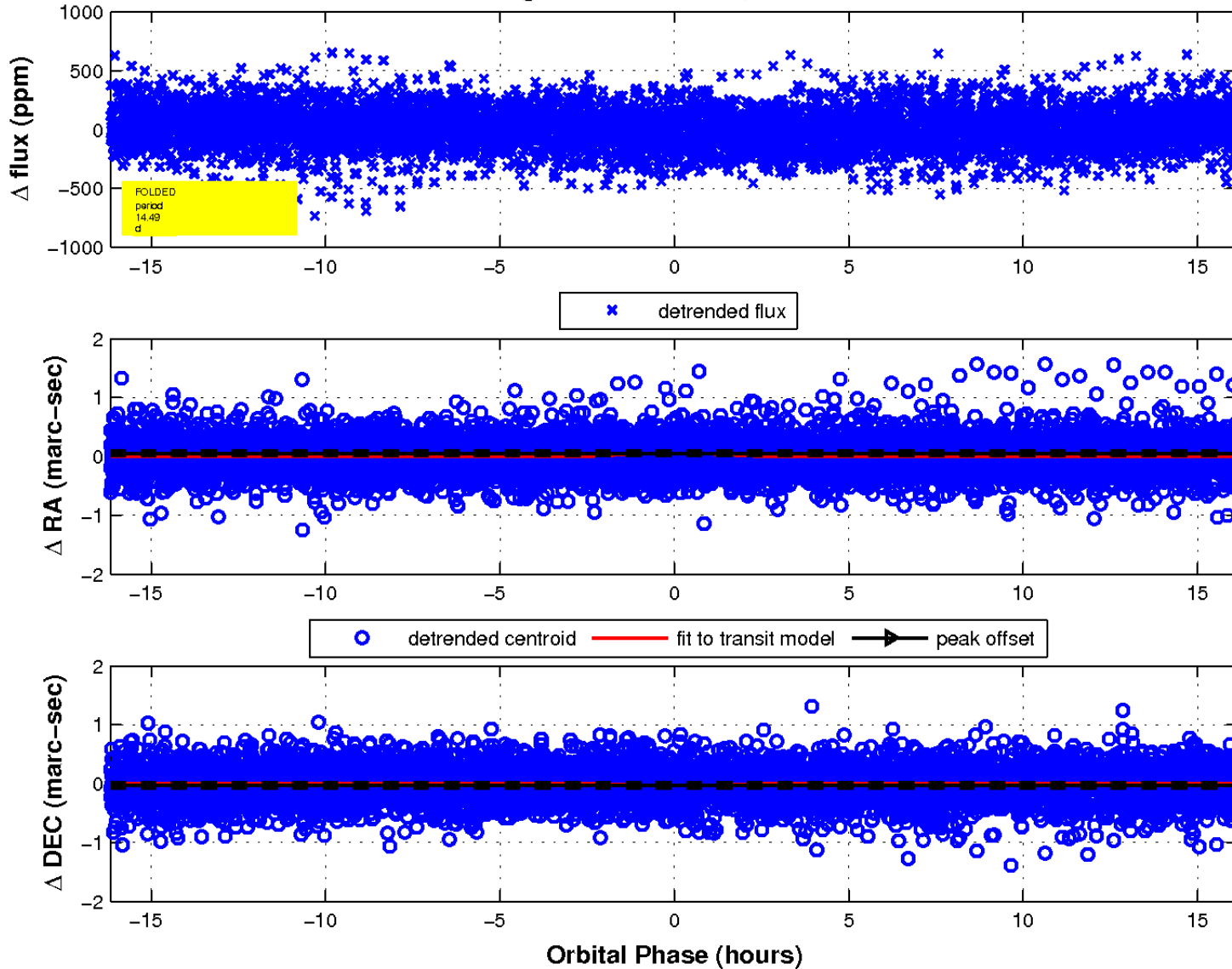
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

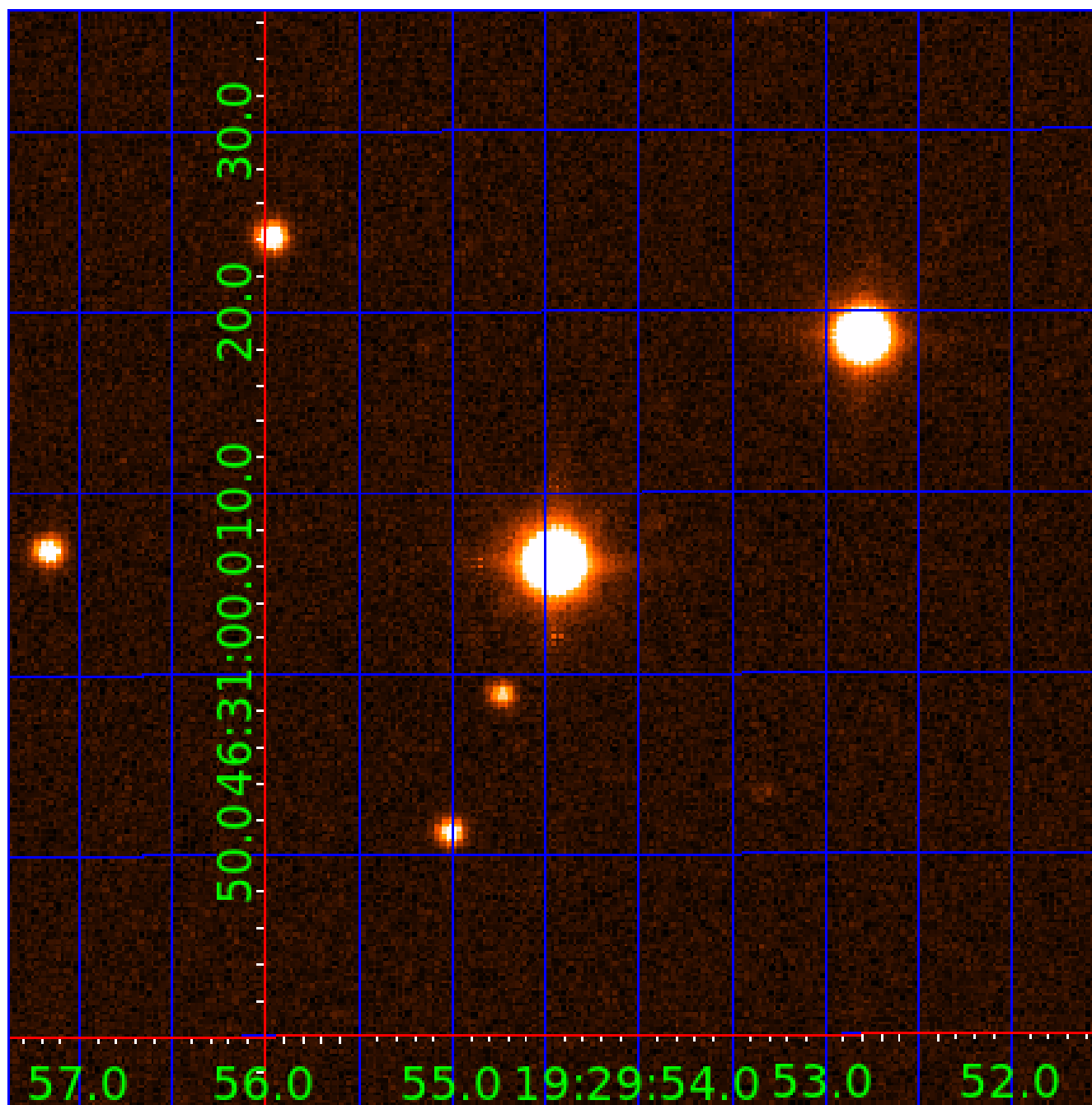


fluxWeightedCentroids, Planet 3 of 6



UKIRT Image

Declination



# KIC 009772075

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009772075-01	OBS	No	0.768918	132.185957	6.9	4.882	11.8	3.8	2.57	7256	0.69	41000.94
009772075-02	OBS	No	73.413840	176.350967	219.1	3.278	8.9	6.7	2.57	7256	4.21	93.96
009772075-03	OBS	No	14.488138	133.697772	159.0	5.389	9.3	11.2	2.57	7256	6.19	817.74
009772075-04	OBS	No	40.121595	132.617429	183.0	2.371	8.6	8.9	2.57	7256	4.03	210.28
009772075-05	OBS	No	31.416621	138.366729	184.4	2.007	8.1	8.4	2.57	7256	3.99	291.35
009772075-06	OBS	No	10.115804	133.549542	95.7	2.371	7.9	8.6	2.57	7256	2.92	1320.18

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009772075-01	OBS	FP	0.00	1	0	0	0	LPP_DV
009772075-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009772075-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009772075-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009772075-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009772075-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_ZUMA—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

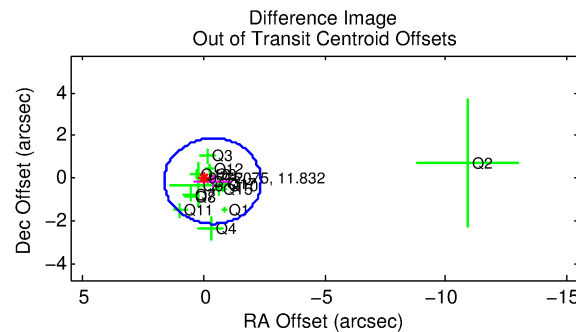
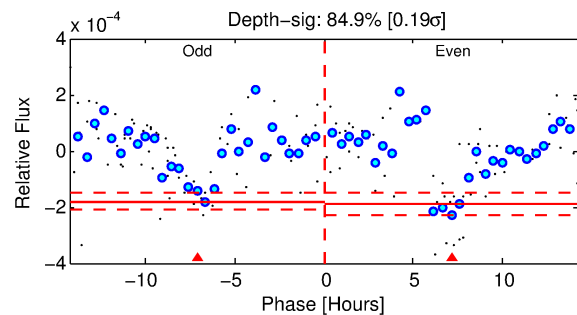
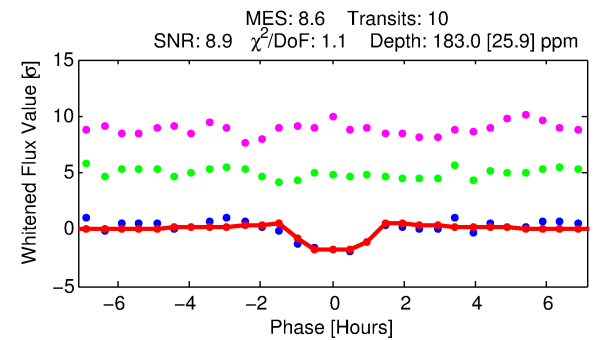
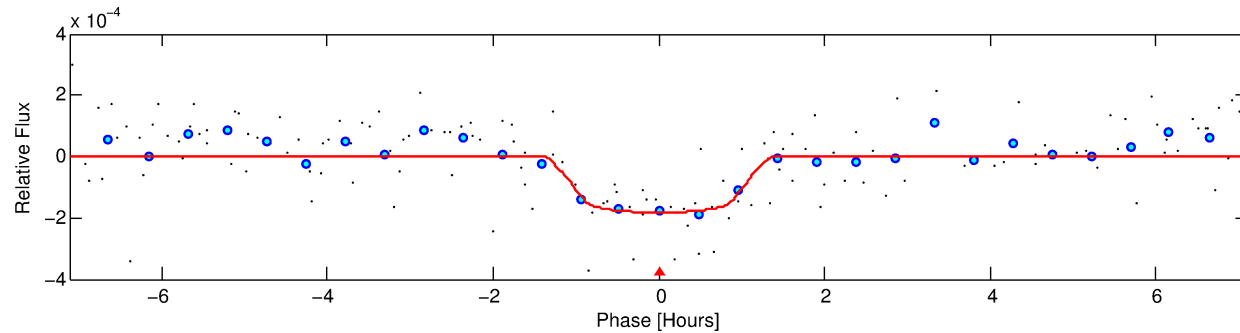
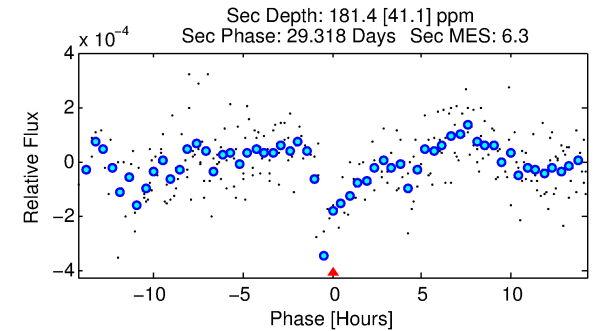
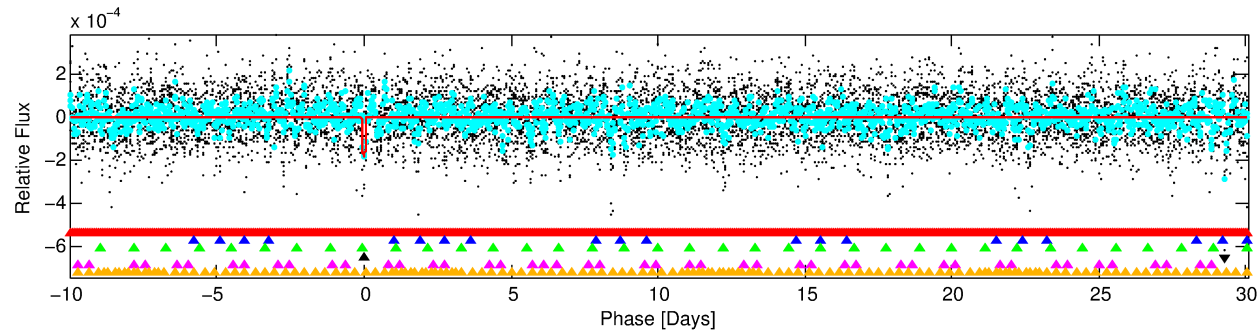
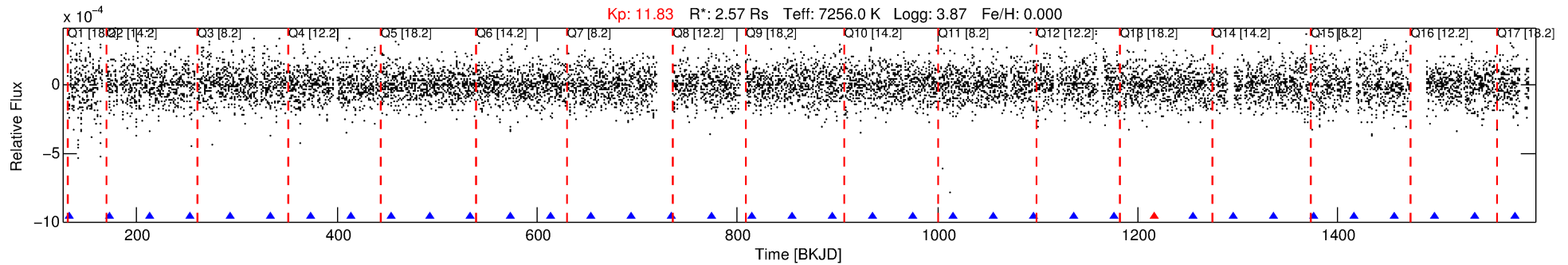
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 009772075-04

No Significant Match Found

# DV One-Page Summary

KIC: 9772075 Candidate: 4 of 6 Period: 40.122 d



## DV Fit Results:

Period = 40.12159 [0.00028] d  
Epoch = 132.6174 [0.0064] BKJD  
Rp/R\* = 0.0144 [0.0087]  
a/R\* = 60.61 [231.66]  
b = 0.90 [0.82]  
Seff = 210.28 [117.77]  
Teq = 971 [136] K  
Rp = 4.03 [2.87] Re  
a = 0.2790 [0.0960] AU  
Ag = 479.04 [644.47] [0.74σ]  
Teffp = 7024 [2187] K [2.76σ]

## DV Diagnostic Results:

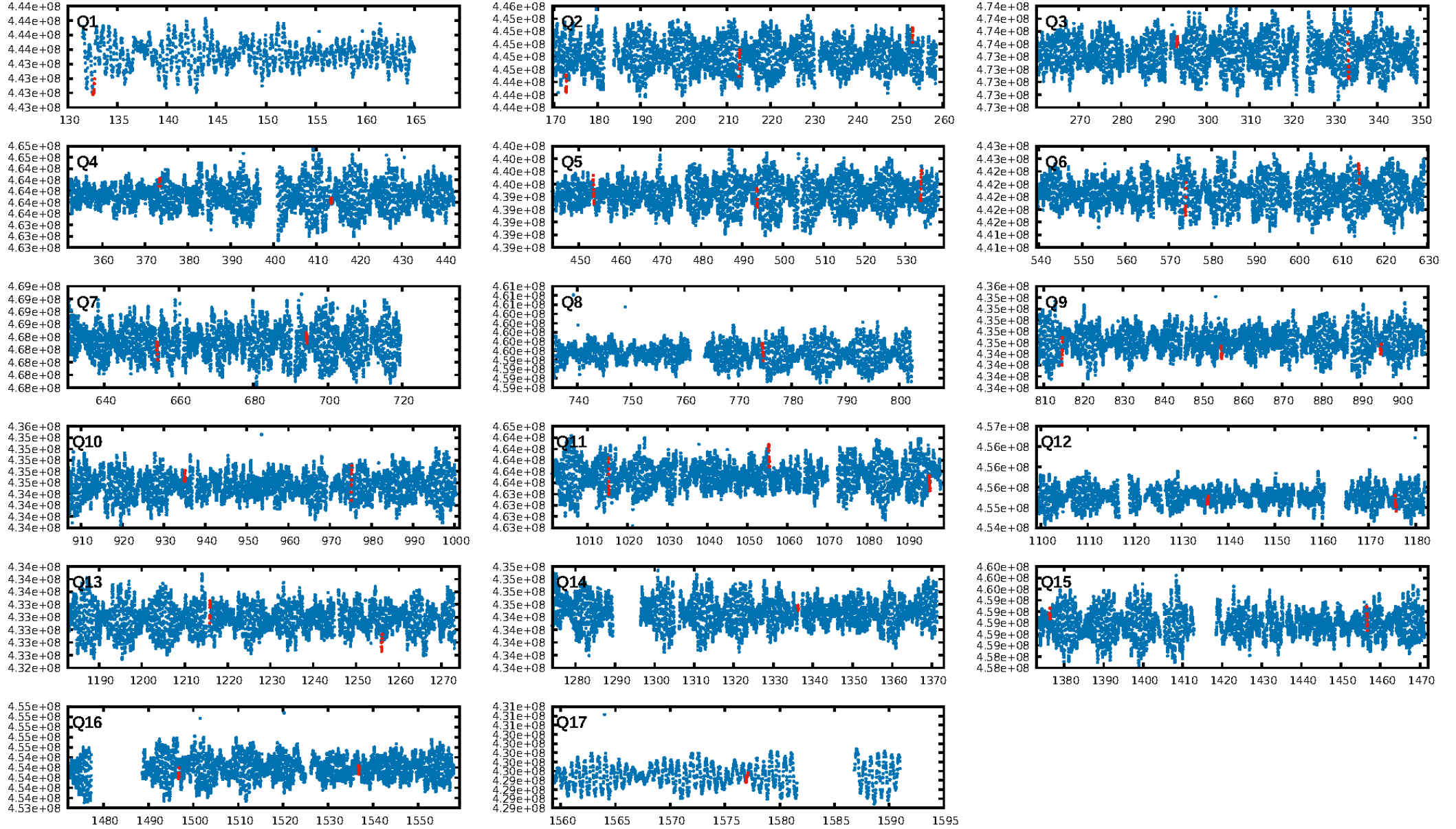
ShortPeriod-sig: 100.0% [67.25σ]  
LongPeriod-sig: 100.0% [197.48σ]  
ModelChiSquare2-sig: 25.4%  
ModelChiSquareGoF-sig: 100.0%  
**Bootstrap-pfa: 1.02e-09**  
RollingBand-fgt: 0.89 [8/9]  
GhostDiagnostic-chr: 1.936  
Centroid-sig: 61.1%  
Centroid-so: 0.344 arcsec [0.89σ]  
OotOffset-rm: 0.400 arcsec [0.60σ]  
KicOffset-rm: 0.573 arcsec [1.04σ]  
OotOffset-st: 3/4/4/4 [15]  
KicOffset-st: 3/4/4/4 [15]  
DiffImageQuality-fgm: 0.60 [9/15]  
DiffImageOverlap-fno: 0.00 [0/16]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 18:53:14 Z

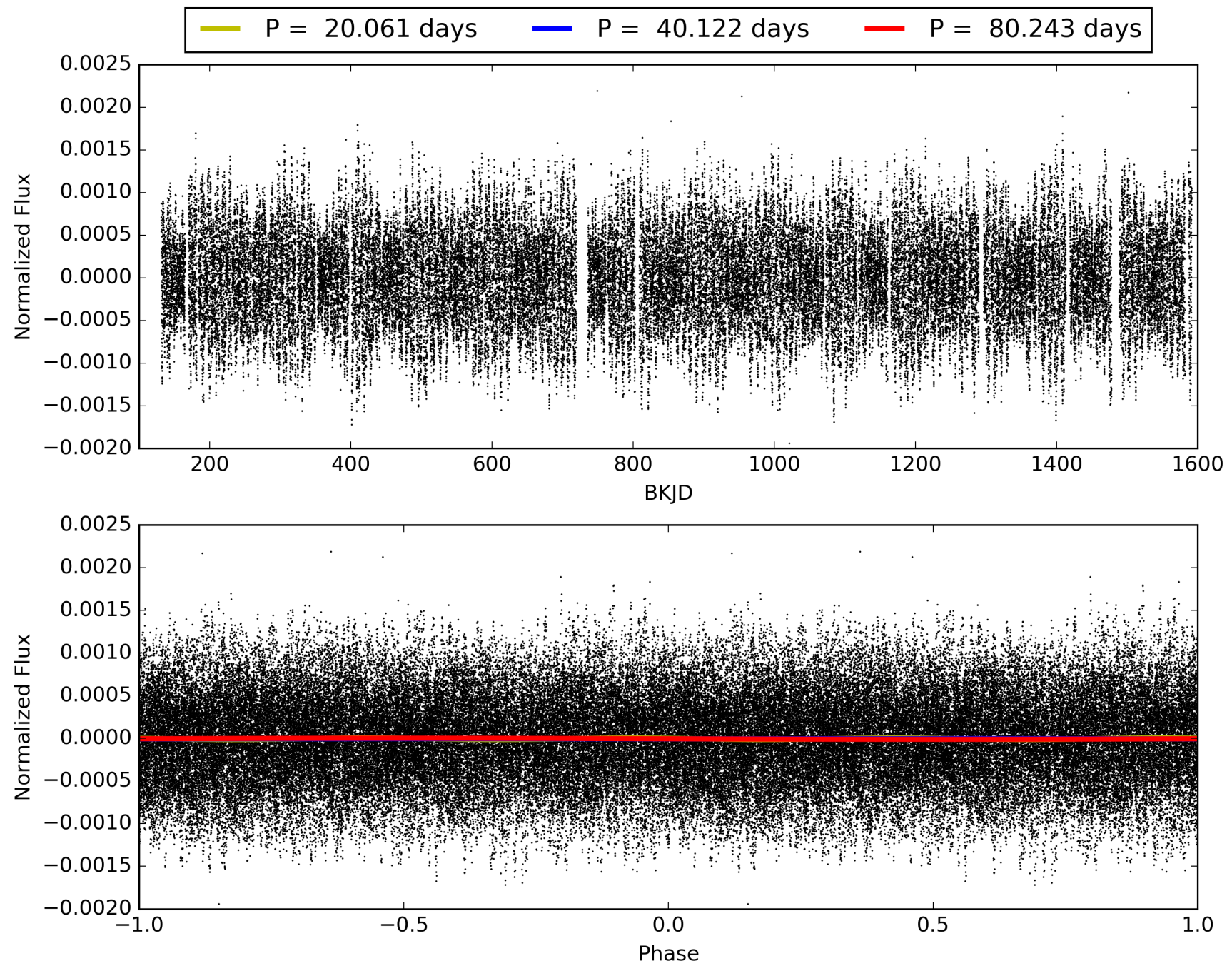
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 009772075-04, PDC Light Curves

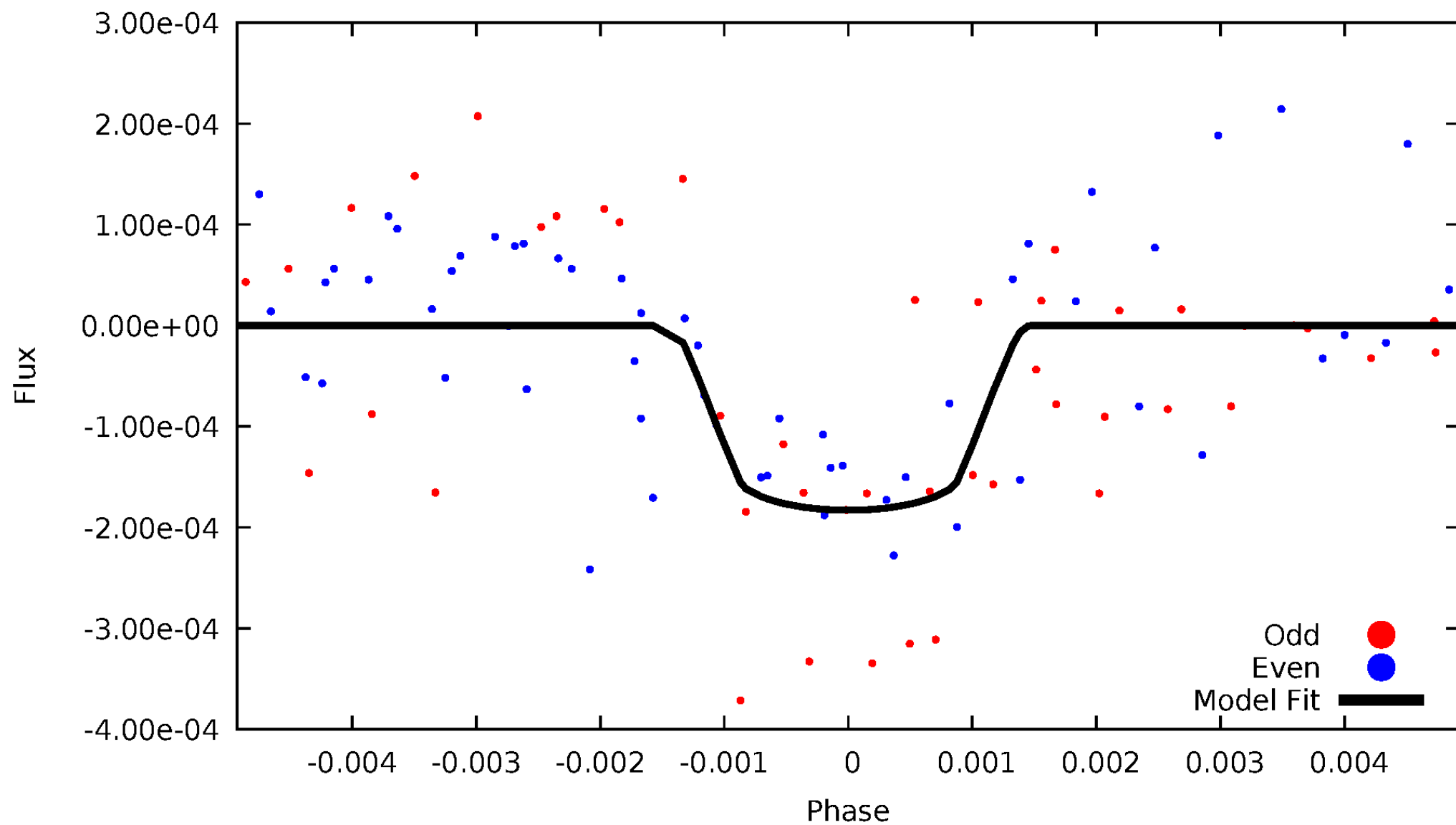


TCE 009772075-04



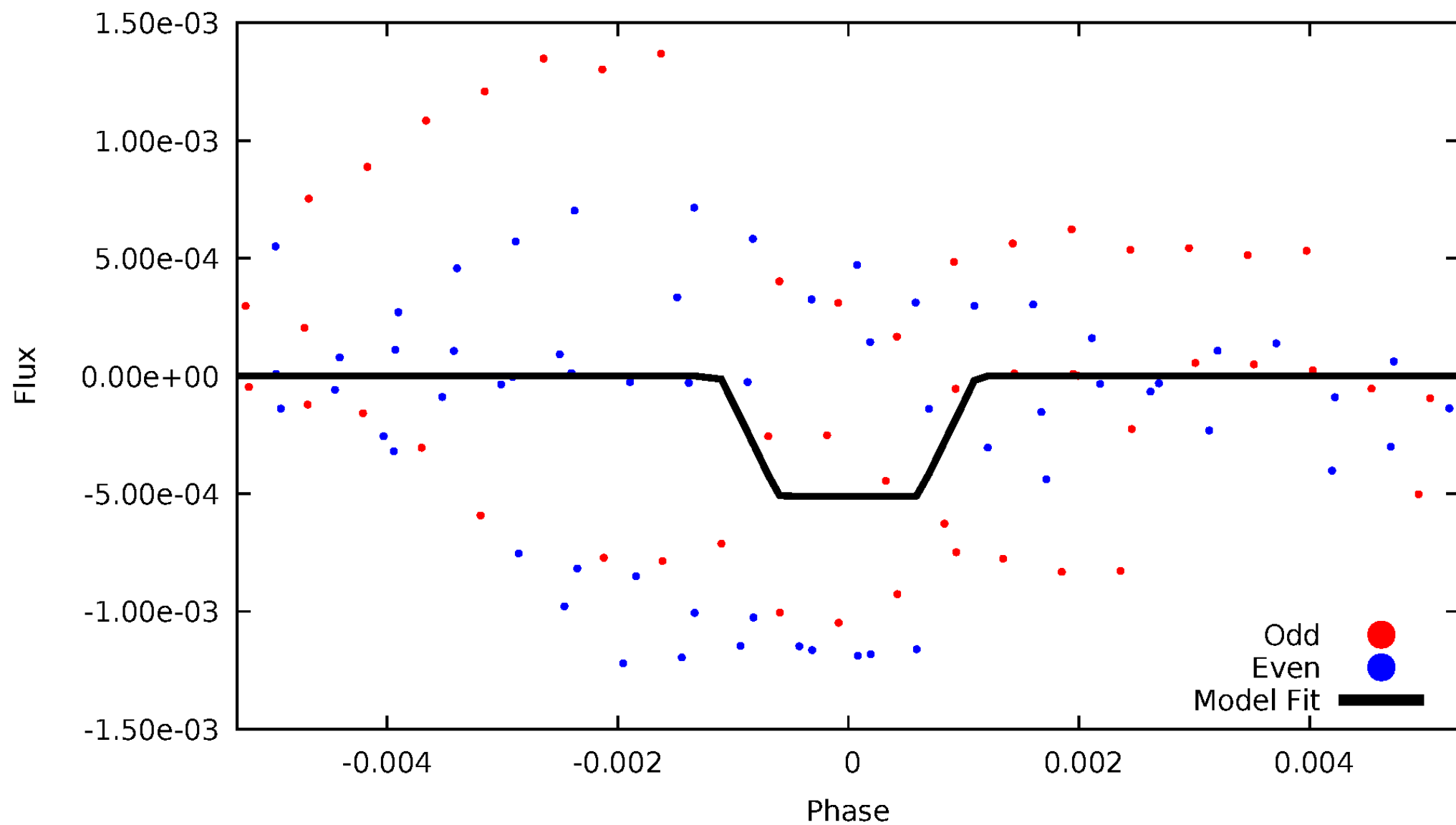
# DV Odd/Even

TCE 009772075-04



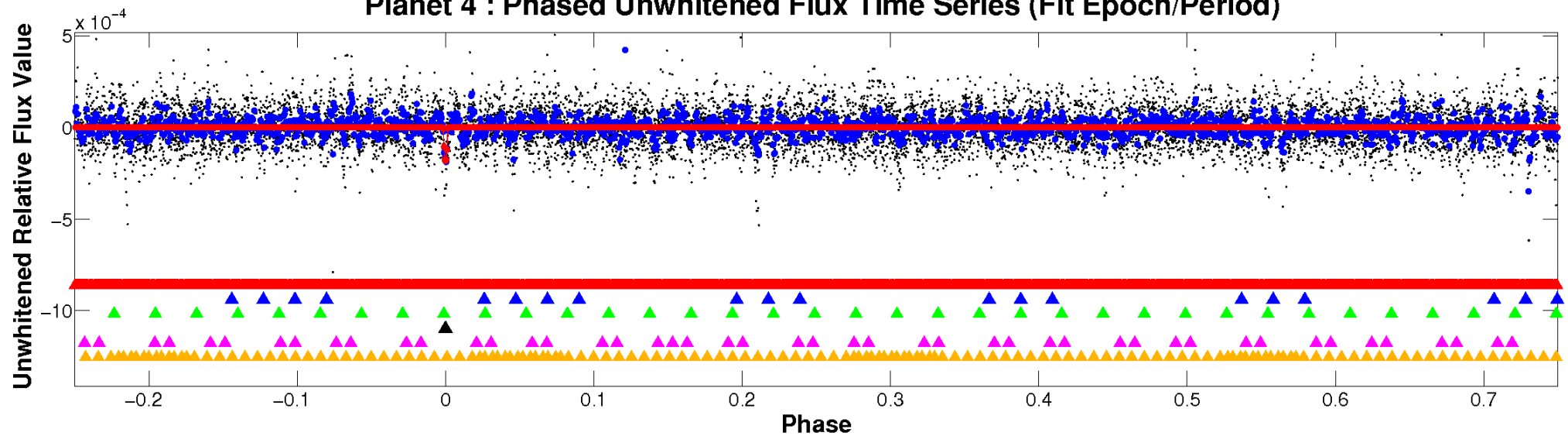
# ALT Odd/Even

TCE 009772075-04

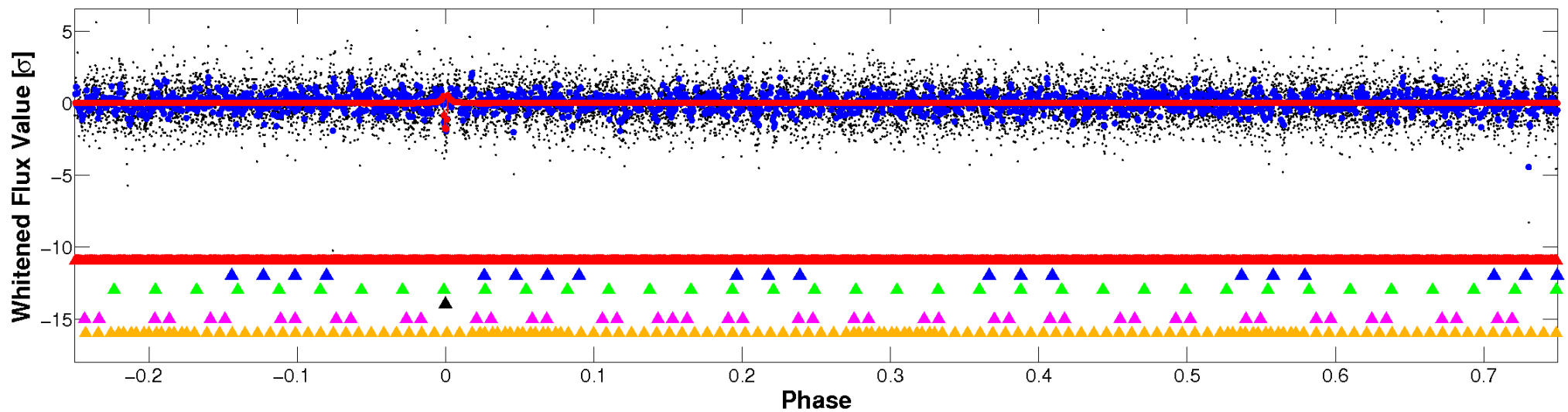


# Non-Whitened Vs. Whitened Light Curve

## Planet 4 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

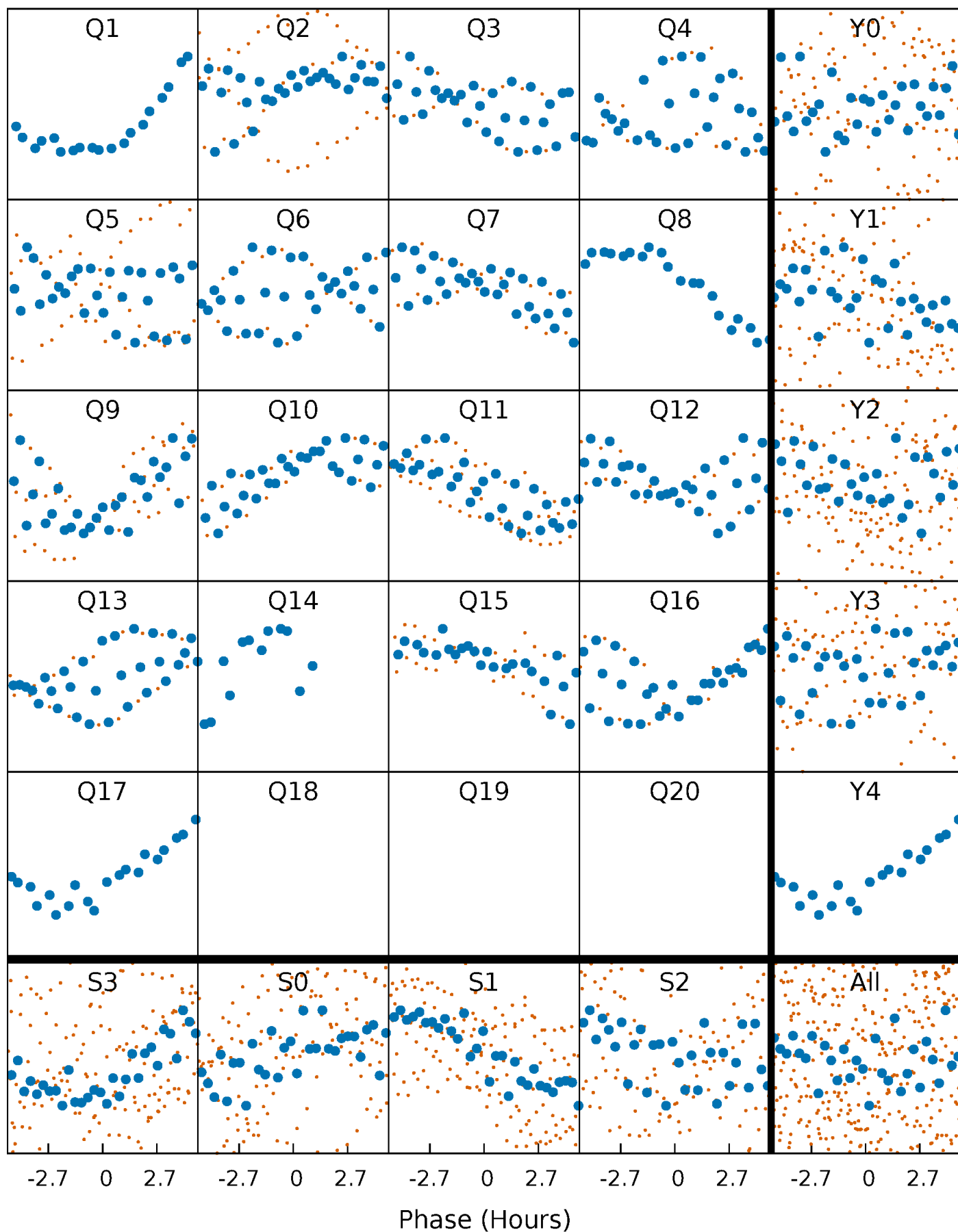


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



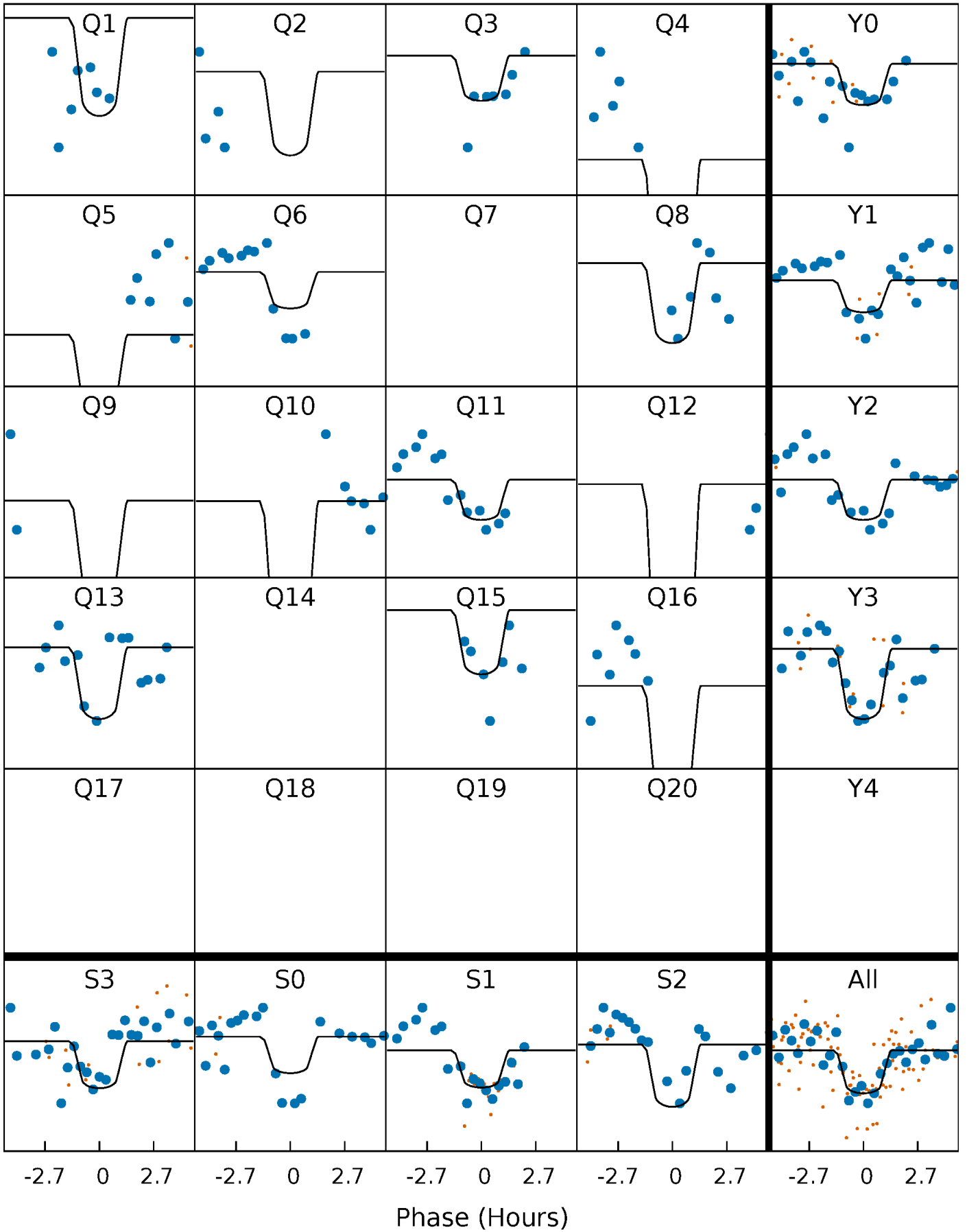
# PDC Quarter-Phased Transit Curves

TCE 009772075-04   P= 40.121595 Days    $T_0=132.617429$  (BKJD)



# DV Quarter-Phased Transit Curves

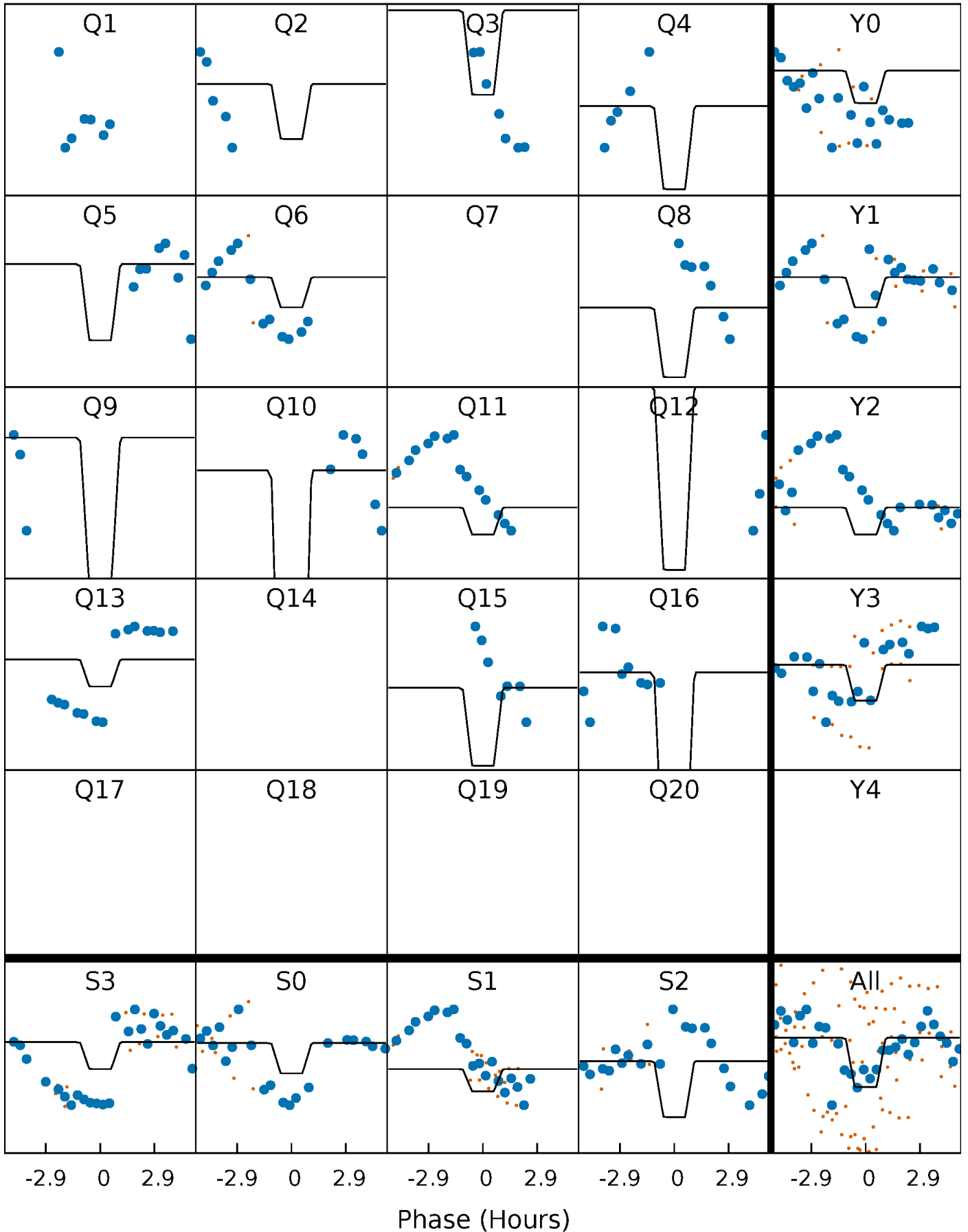
TCE 009772075-04     $P = 40.121595$  Days     $T_0 = 132.617429$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

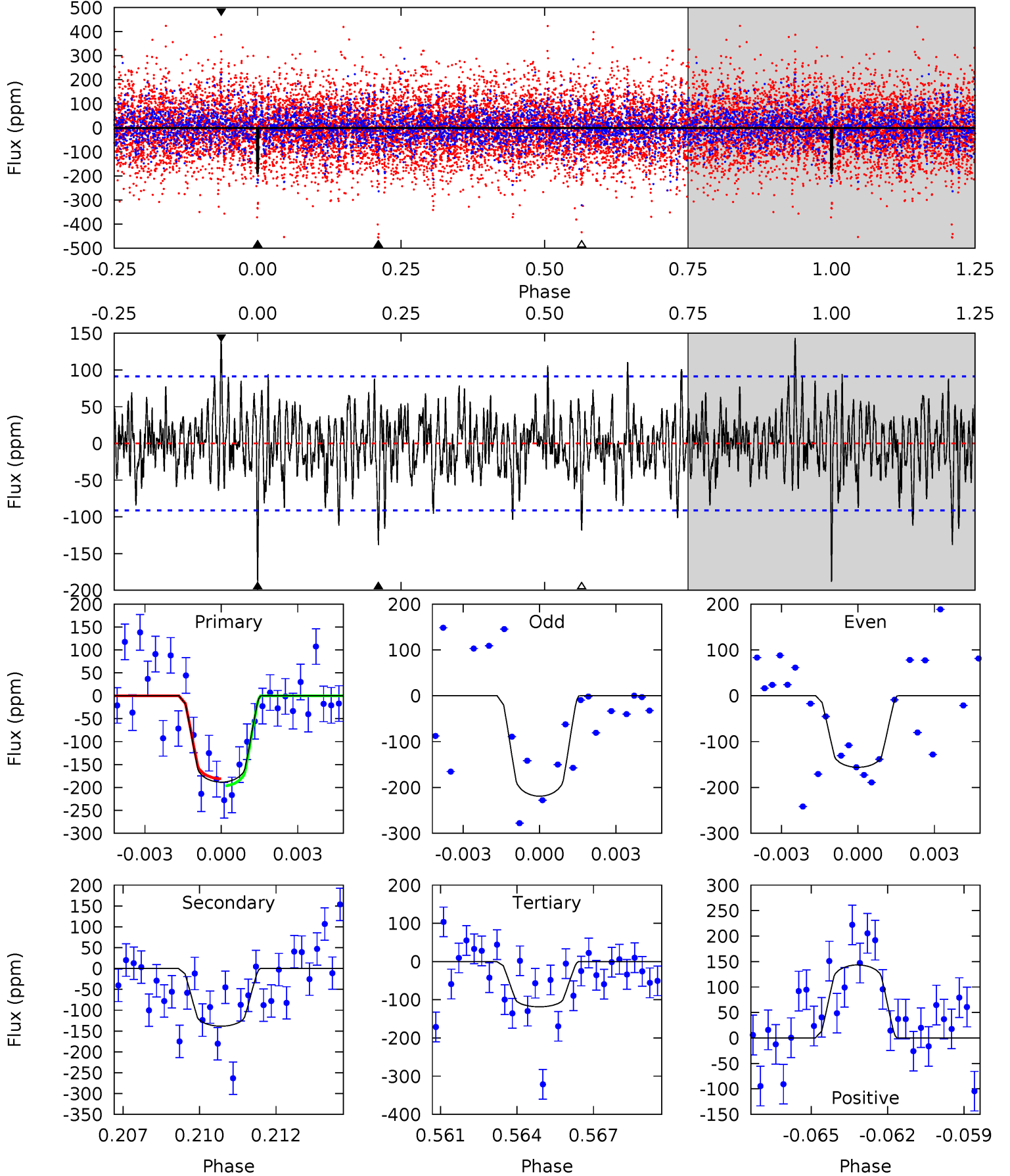
TCE 009772075-04 P= 40.121222 Days  $T_0=132.612236$  (BKJD)



# DV Model-Shift Uniqueness Test

009772075-04, P = 40.121595 Days, E = 92.495834 Days

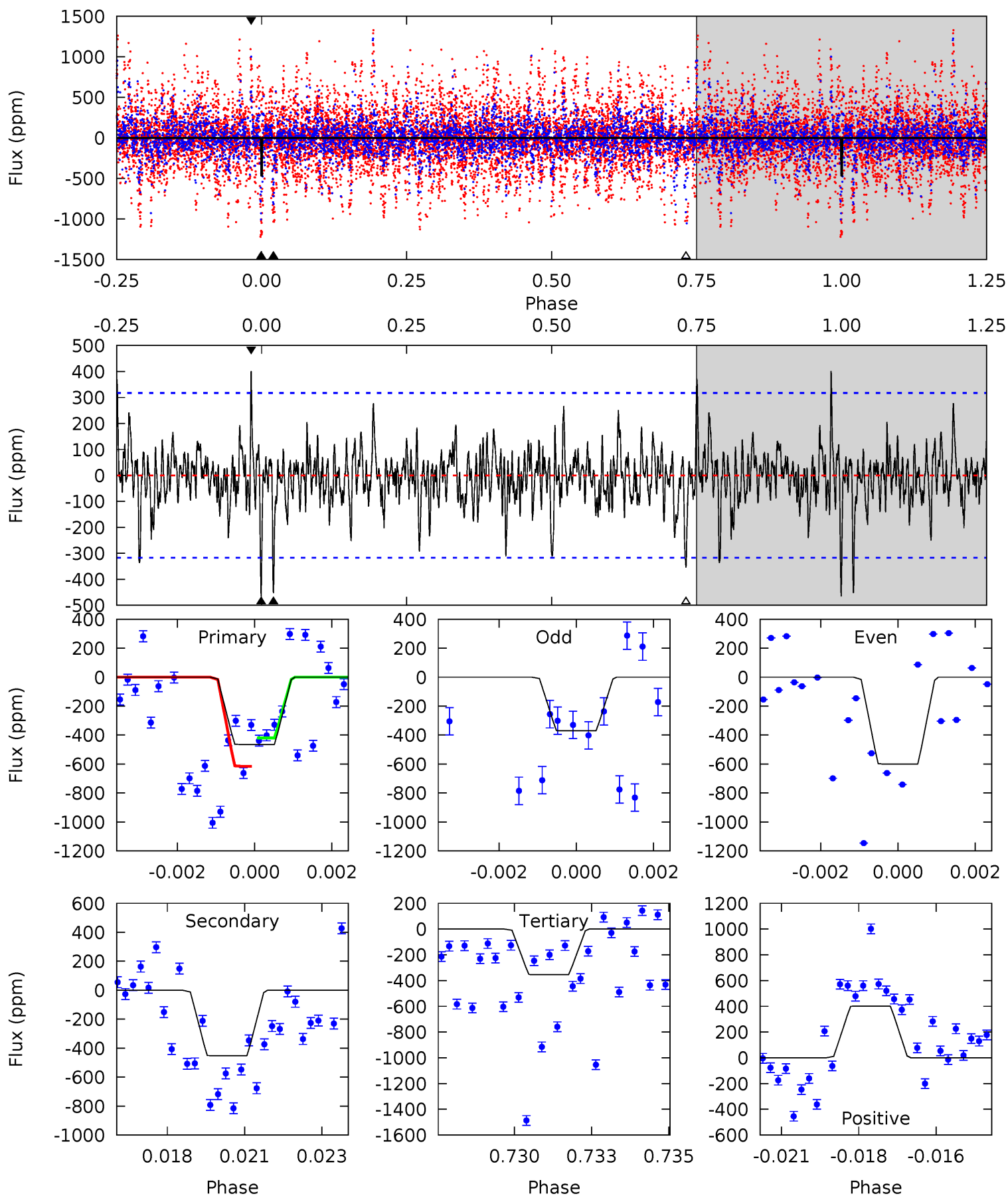
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.9	7.98	6.84	8.27	5.26	2.99	1.98	4.03	2.60	1.14	-0.29	1.81	0.92	0.43	0.45



# Alt Model-Shift Uniqueness Test

009772075-04, P = 40.121222 Days, E = 92.491014 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
7.78	7.57	5.93	6.72	5.30	3.05	1.47	1.85	1.06	1.64	0.85	1.80	1.04	0.46	1.61



### Stellar Parameters For KIC 009772075

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7256^{+201}_{-302}$	$3.874^{+0.308}_{-0.132}$	$0.000^{+0.200}_{-0.350}$	$2.567^{+0.518}_{-0.962}$	$1.796^{+0.177}_{-0.412}$	$0.150^{+0.334}_{-0.060}$
	+3%/-4%	+8%/-3%	+inf%/-inf%	+20%/-37%	+10%/-23%	+223%/-40%
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 009772075-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-138 \pm 17$	$3.98^{+2.43}_{-2.22}$	$1336^{+86}_{-126}$	$6307^{+3876}_{-1217}$	$365^{+1488}_{-225}$
Alt.	$-453 \pm 60$	$6.08^{+2.77}_{-2.41}$	$1336^{+100}_{-119}$	$6907^{+2329}_{-1067}$	$519^{+904}_{-274}$

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

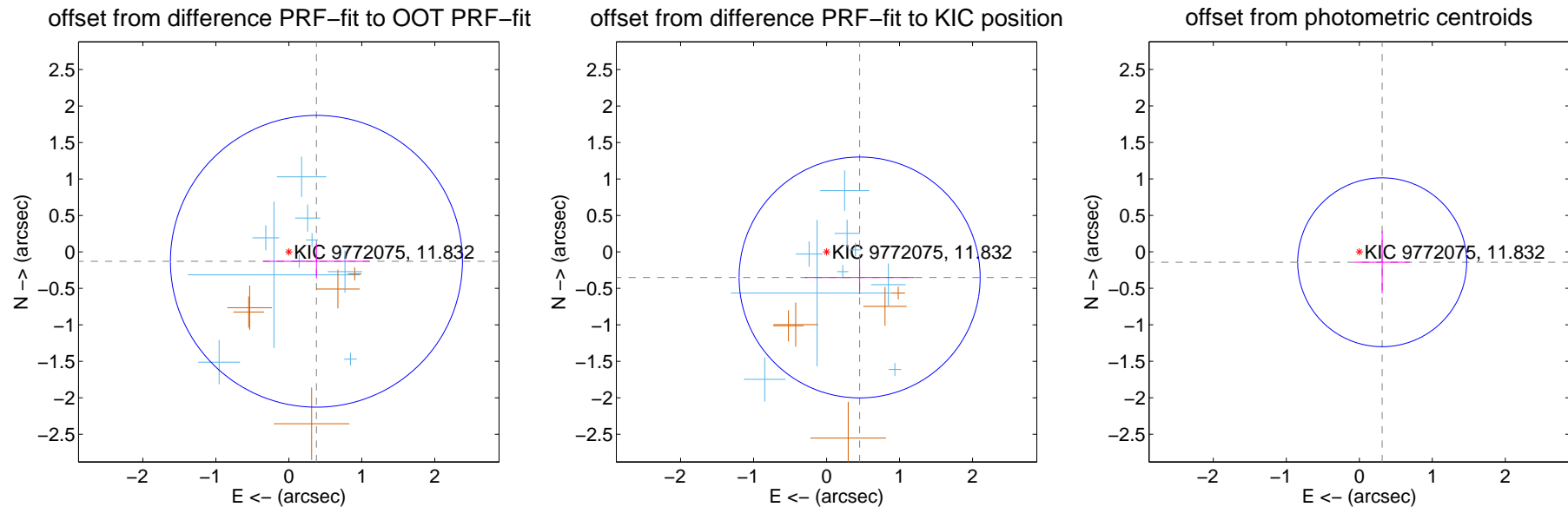
## DV Centroid Data

Supplemental centroid analysis for 009772075-04. **Kepler magnitude: 11.83.** Transit SNR 8.92

There are 9 quarters with good PRF difference image offsets

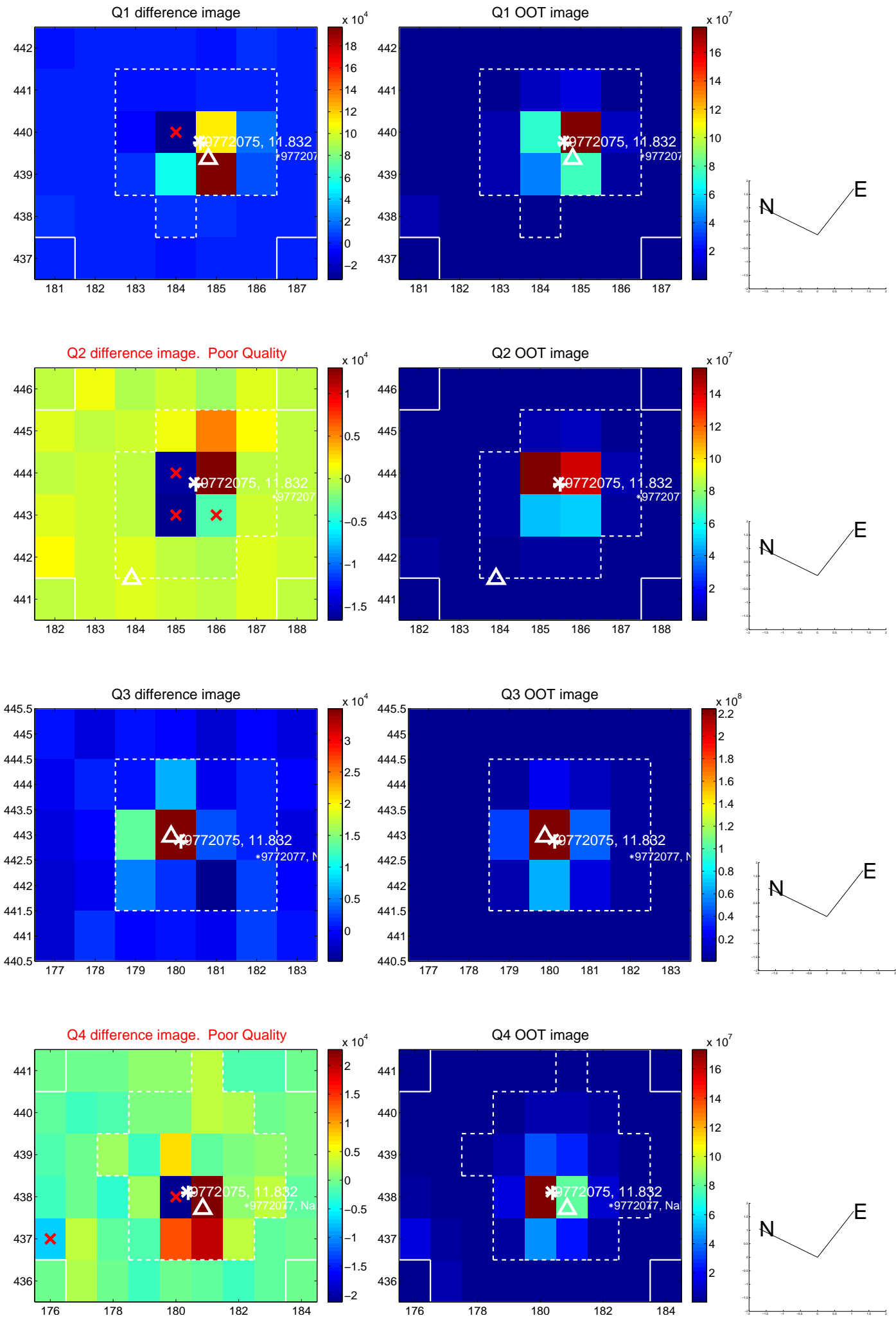
The direct PRF centroid is offset from the target star catalog position by about 0.20 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.400 \pm 0.667$	0.60	$-0.378 \pm 0.731$	$-0.128 \pm 0.237$
PRF-fit source offset from KIC position	$0.573 \pm 0.550$	1.04	$-0.453 \pm 0.754$	$-0.350 \pm 0.228$
photometric centroid source offset	$0.34 \pm 0.39$	0.89	$-0.31 \pm 0.38$	$-0.14 \pm 0.43$

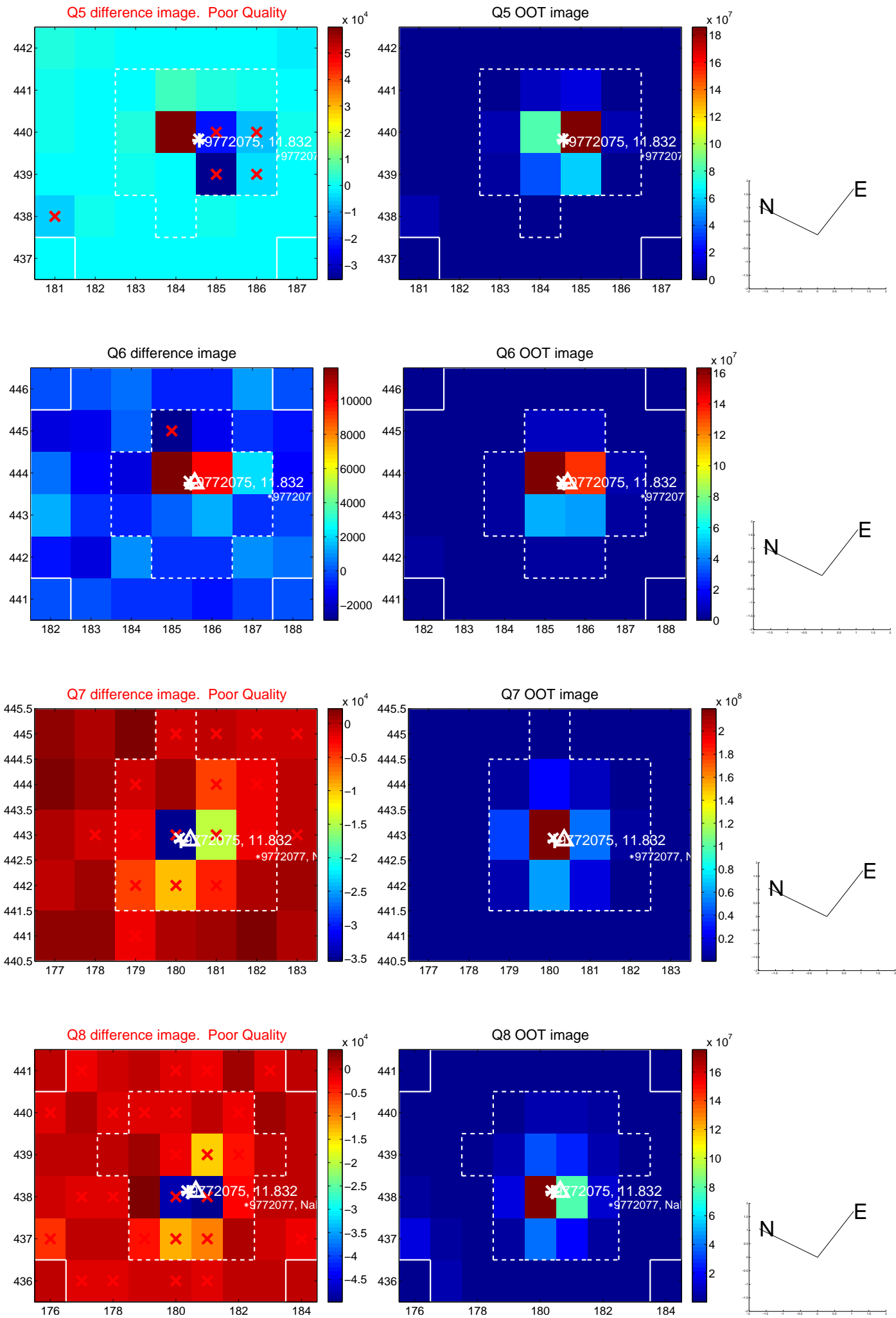


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

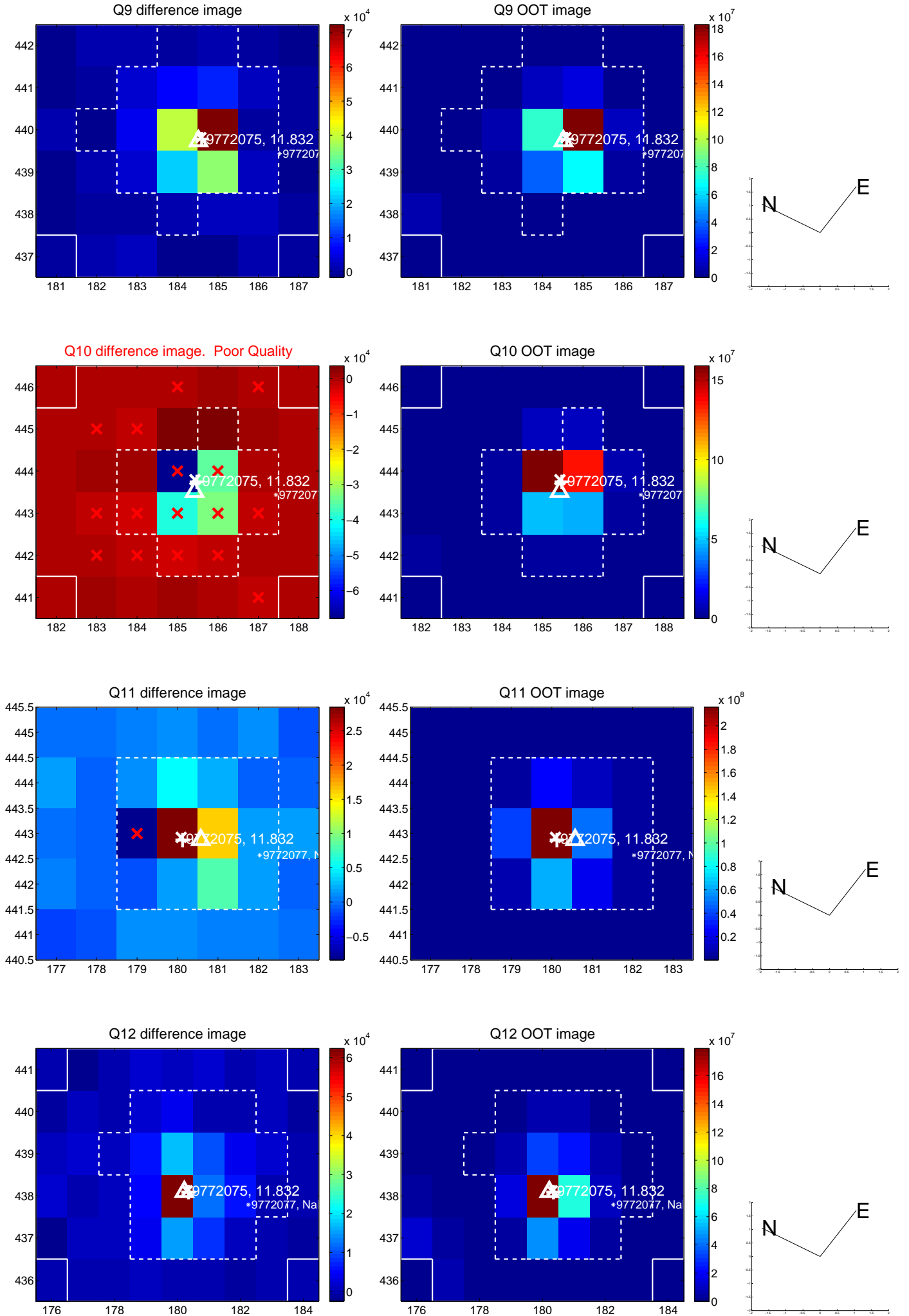


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

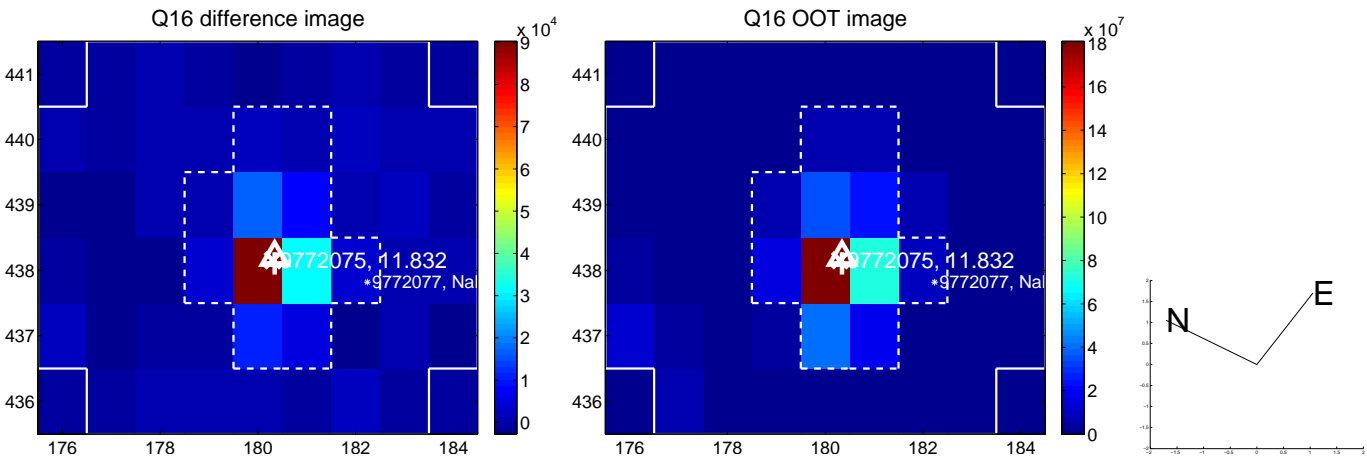
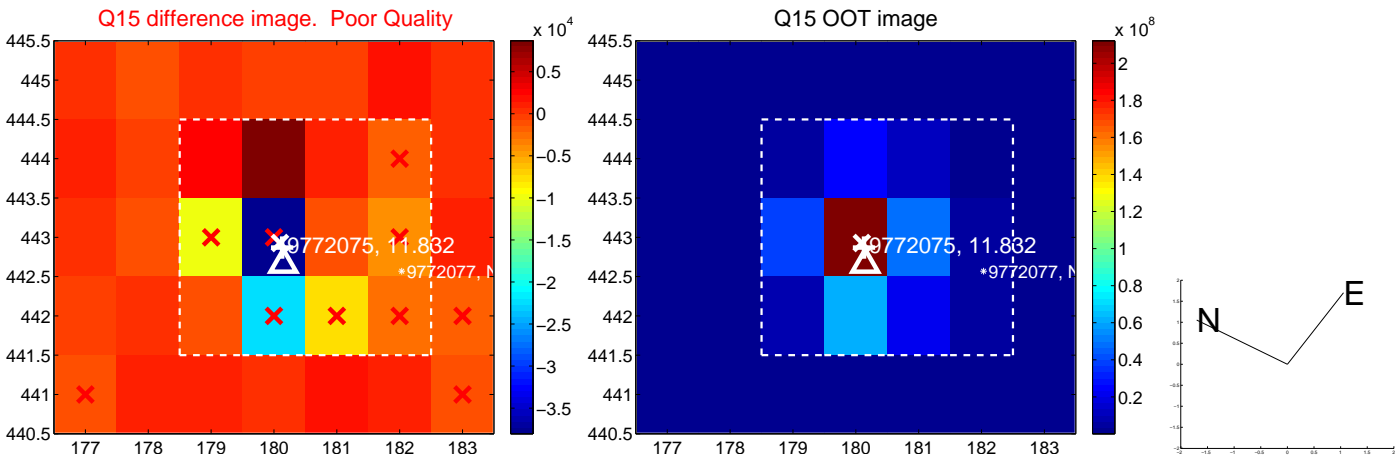
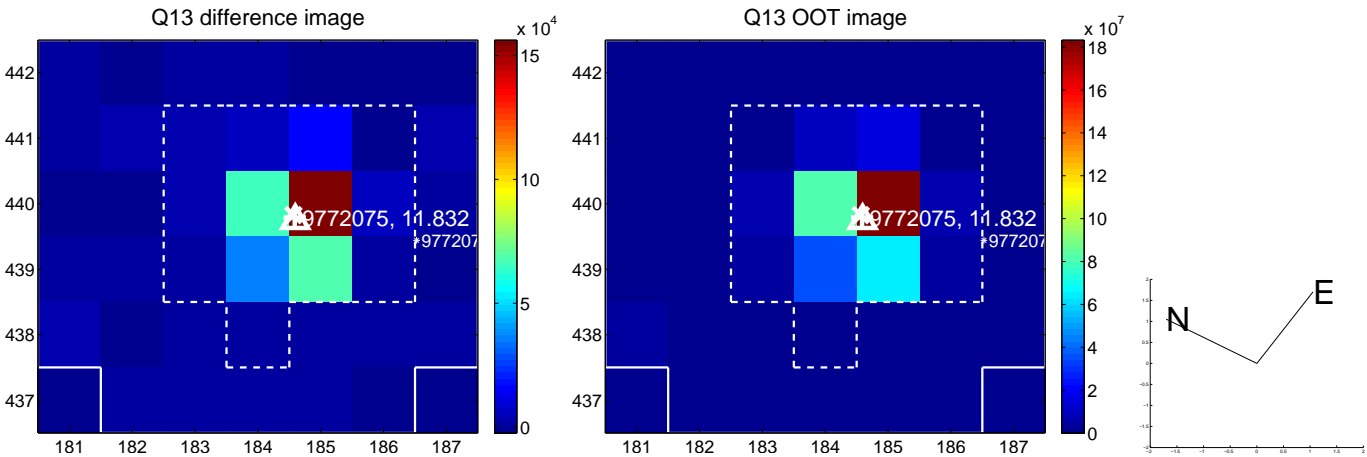




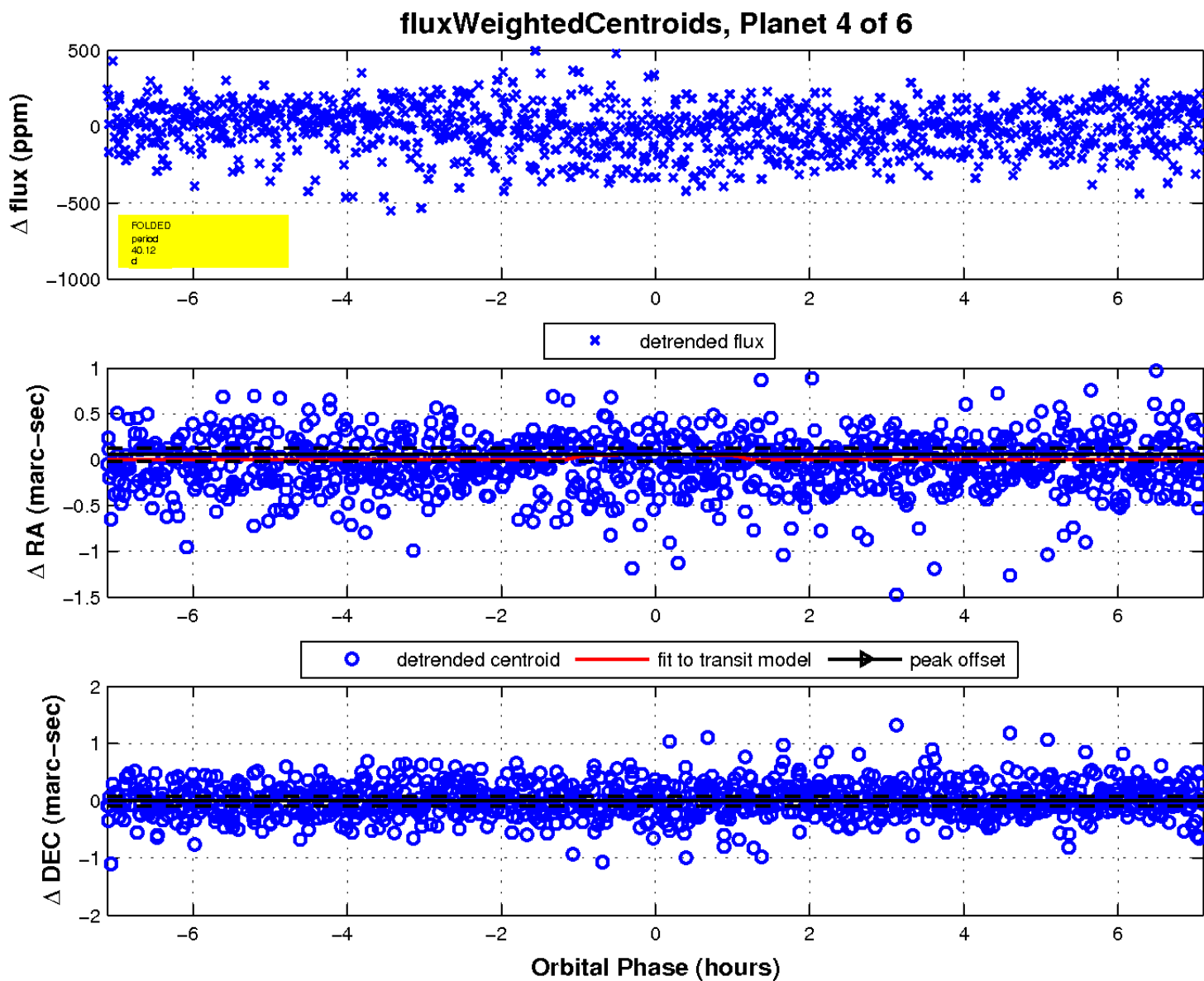
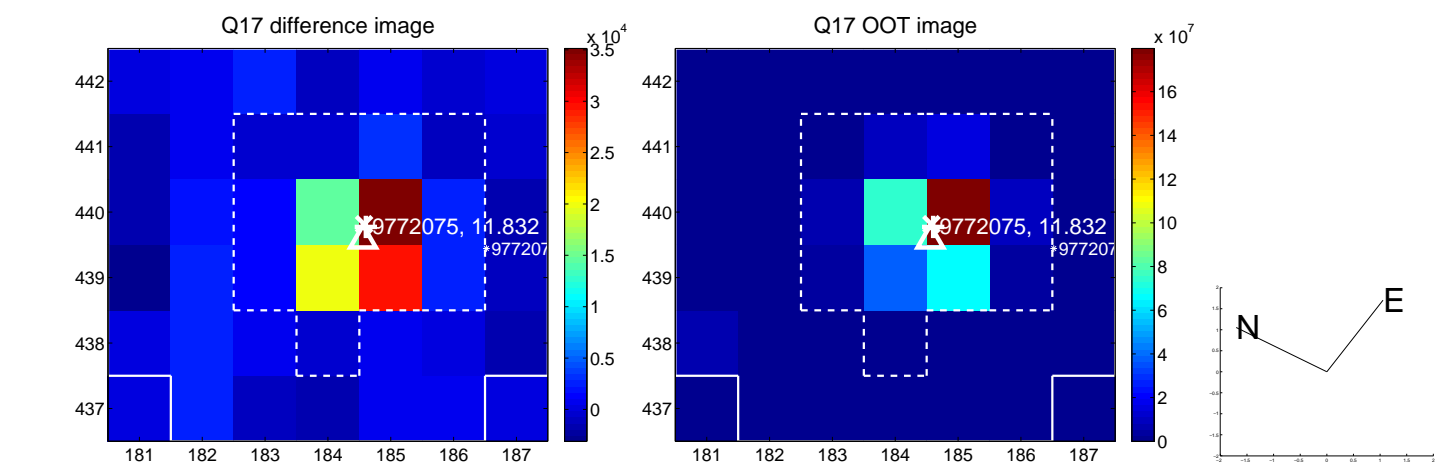
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

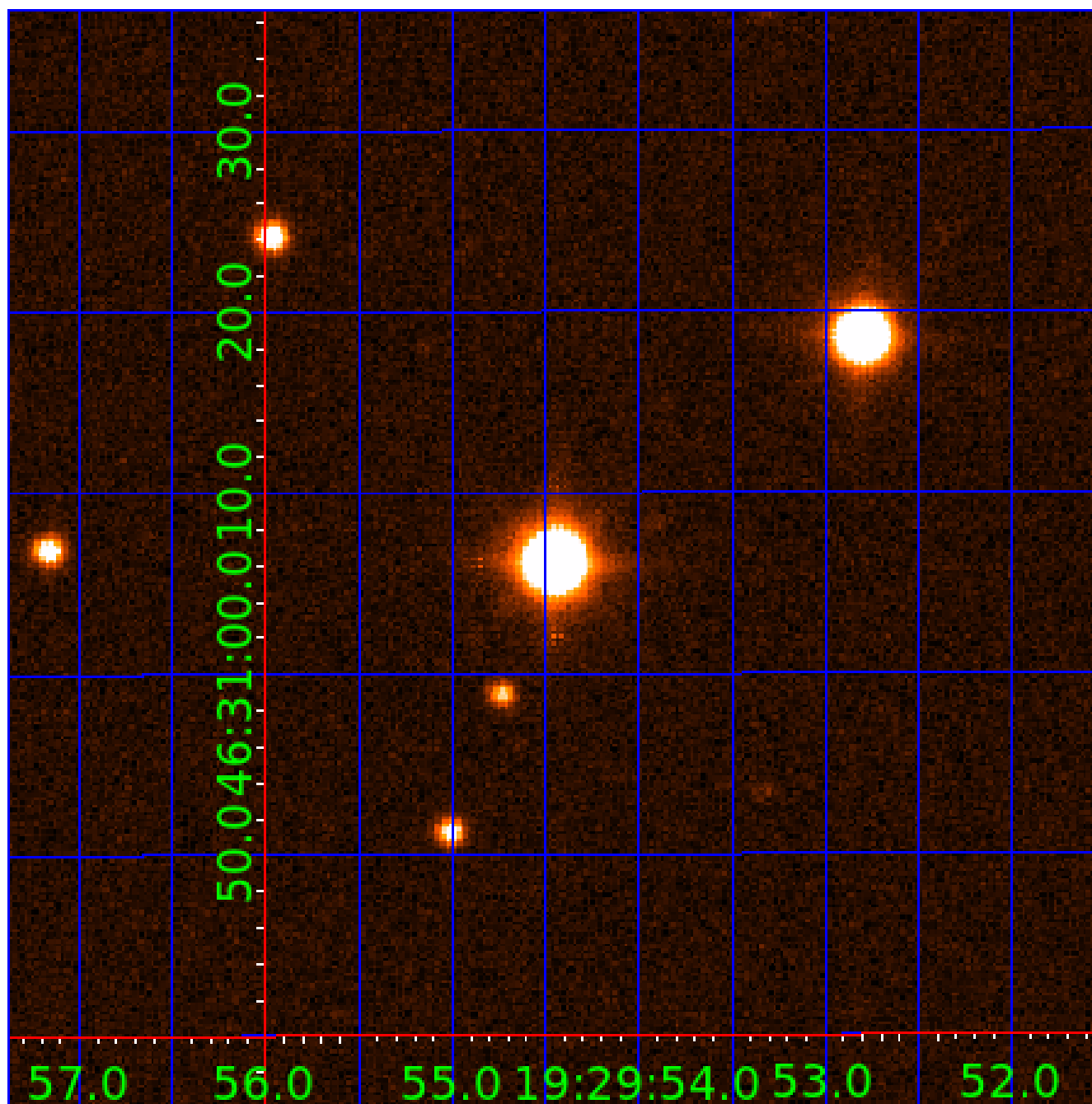


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 009772075

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009772075-01	OBS	No	0.768918	132.185957	6.9	4.882	11.8	3.8	2.57	7256	0.69	41000.94
009772075-02	OBS	No	73.413840	176.350967	219.1	3.278	8.9	6.7	2.57	7256	4.21	93.96
009772075-03	OBS	No	14.488138	133.697772	159.0	5.389	9.3	11.2	2.57	7256	6.19	817.74
009772075-04	OBS	No	40.121595	132.617429	183.0	2.371	8.6	8.9	2.57	7256	4.03	210.28
009772075-05	OBS	No	31.416621	138.366729	184.4	2.007	8.1	8.4	2.57	7256	3.99	291.35
009772075-06	OBS	No	10.115804	133.549542	95.7	2.371	7.9	8.6	2.57	7256	2.92	1320.18

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009772075-01	OBS	FP	0.00	1	0	0	0	LPP_DV
009772075-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009772075-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009772075-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009772075-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009772075-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_ZUMA—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

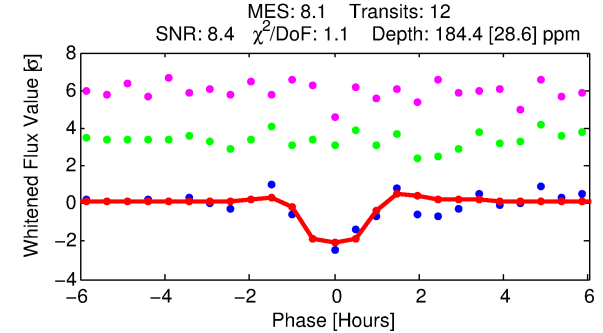
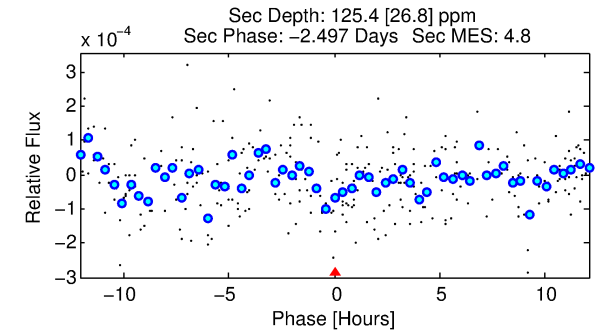
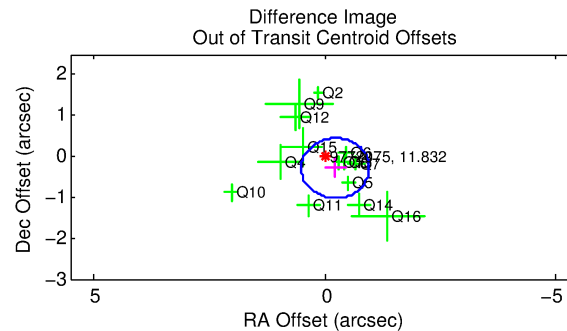
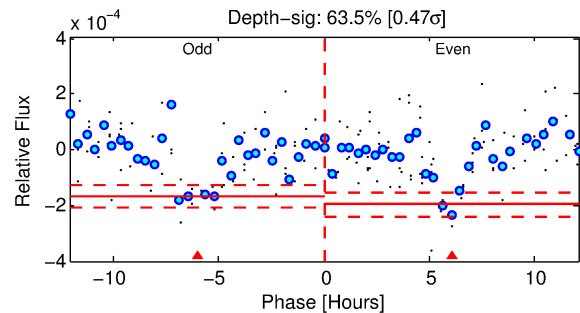
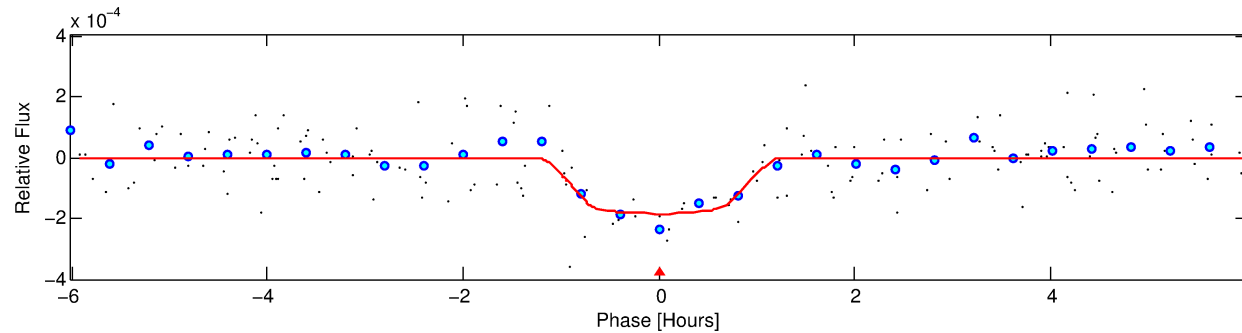
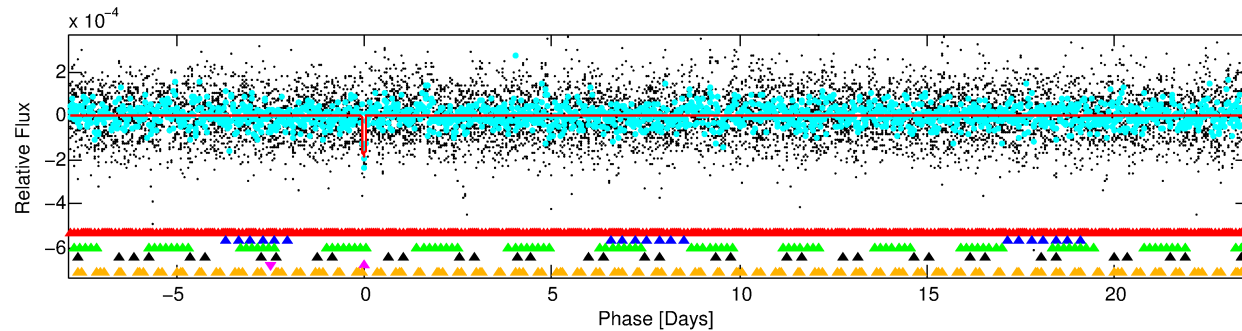
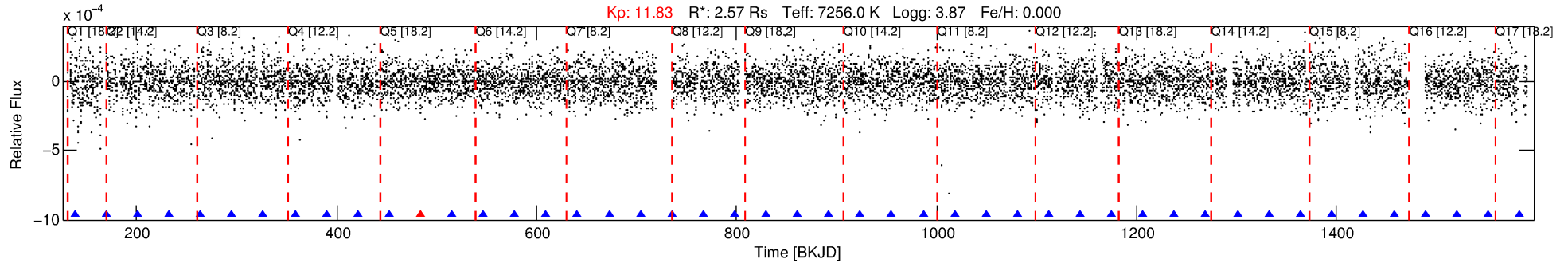
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009772075-05

No Significant Match Found

# DV One-Page Summary

KIC: 9772075 Candidate: 5 of 6 Period: 31.417 d



## DV Fit Results:

Period = 31.41662 [0.00027] d  
Epoch = 138.3667 [0.0071] BKJD  
Rp/R\* = 0.0143 [0.0085]  
a/R\* = 60.15 [223.46]  
b = 0.88 [0.95]  
Seff = 291.35 [163.18]  
Teq = 1053 [148] K  
Rp = 3.99 [2.81] Re  
a = 0.2370 [0.0815] AU  
Ag = 242.84 [321.40] [0.75 $\sigma$ ]  
Teffp = 6430 [1964] K [2.73 $\sigma$ ]

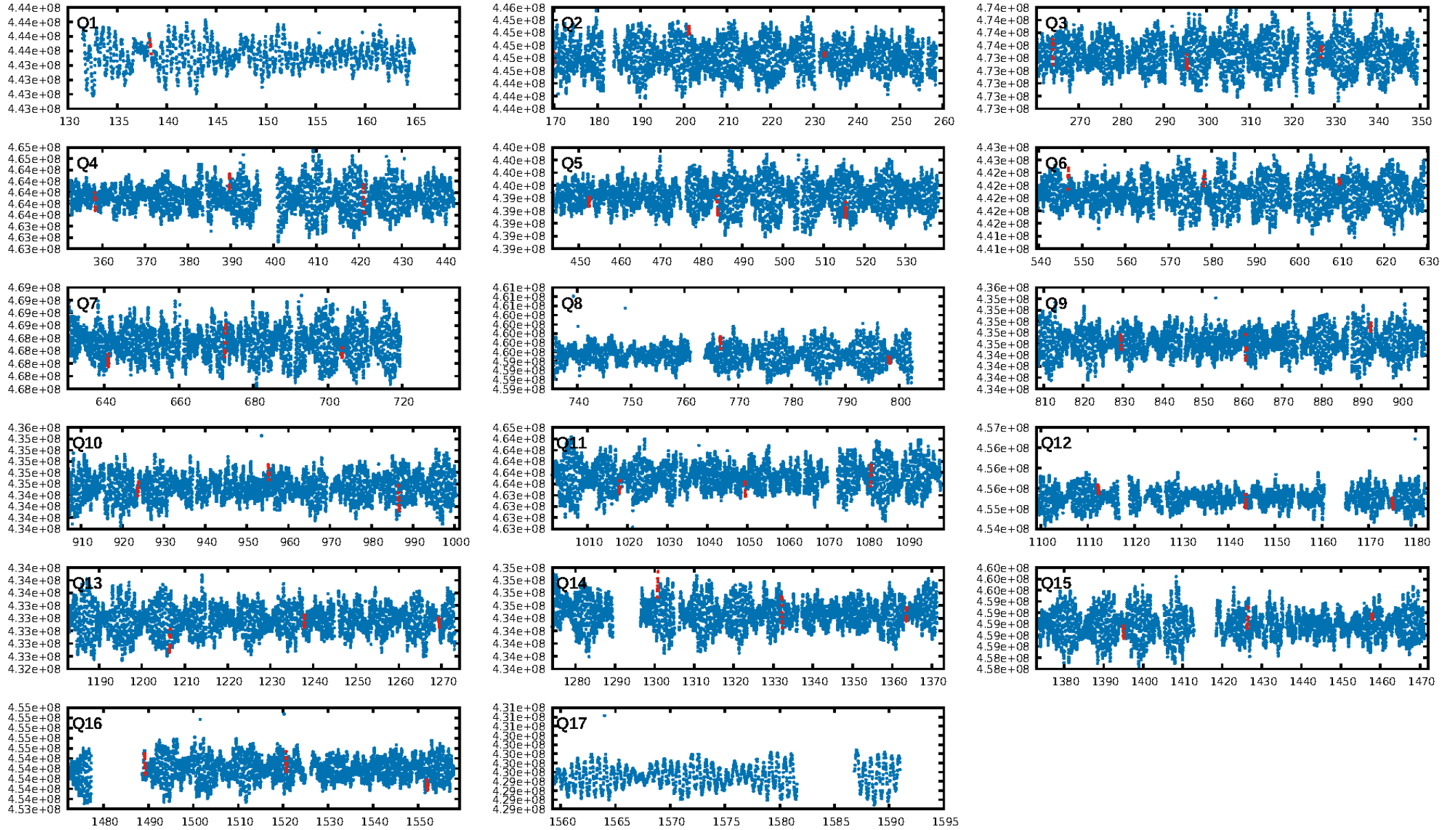
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [70.65 $\sigma$ ]  
LongPeriod-sig: 100.0% [67.25 $\sigma$ ]  
ModelChiSquare2-sig: 87.2%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 4.85e-10**  
RollingBand-fgt: 0.92 [11/12]  
**GhostDiagnostic-chr: 5.708**  
Centroid-sig: 3.6%  
Centroid-so: 0.413 arcsec [1.16 $\sigma$ ]  
OotOffset-rm: 0.365 arcsec [1.49 $\sigma$ ]  
OotOffset-st: 4/3/4/3 [14]  
KicOffset-rm: 0.587 arcsec [2.16 $\sigma$ ]  
KicOffset-st: 4/3/4/3 [14]  
DiffImageQuality-fgm: 0.57 [8/14]  
DiffImageOverlap-fno: 0.31 [5/16]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 18:53:18 Z

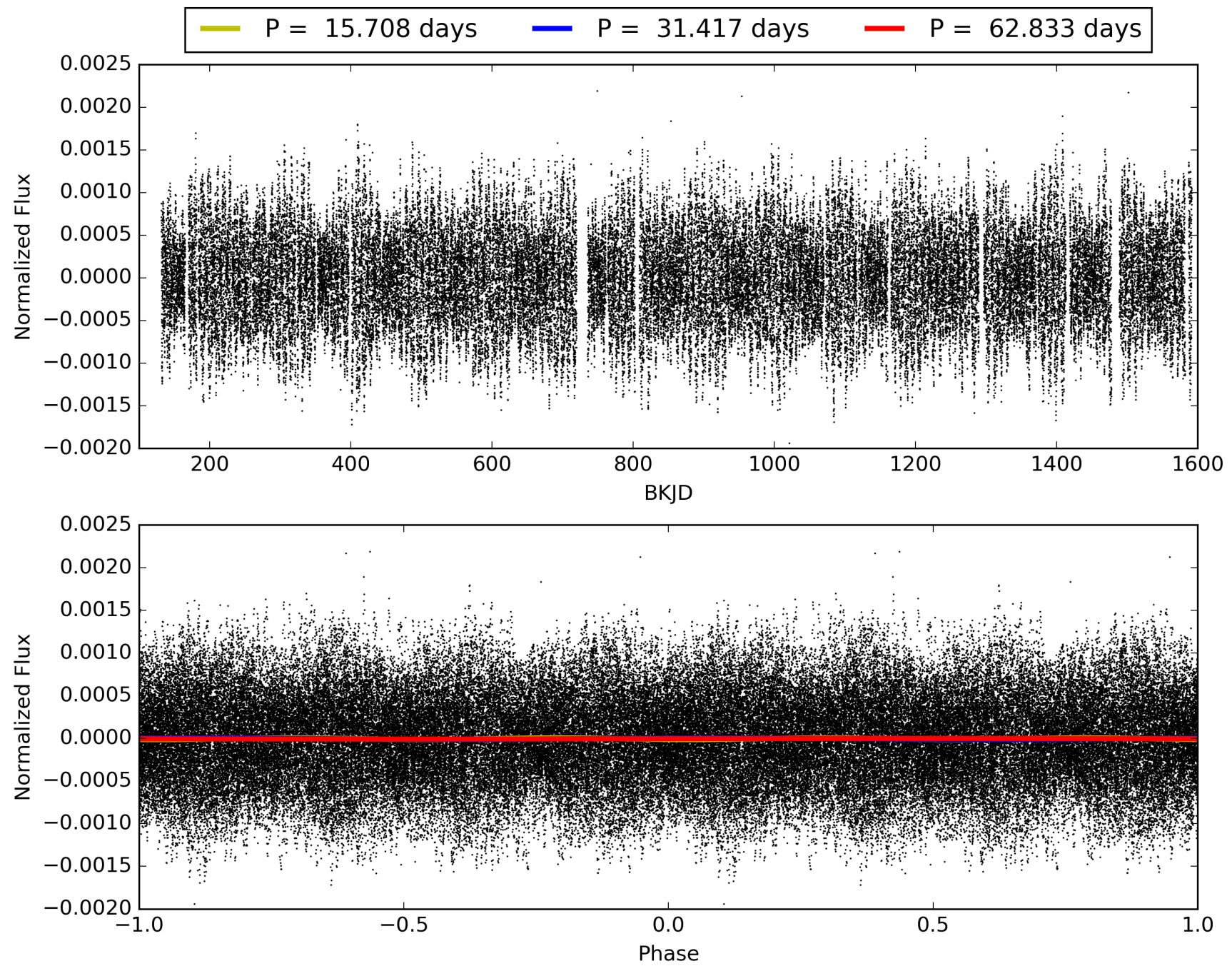
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 009772075-05, PDC Light Curves



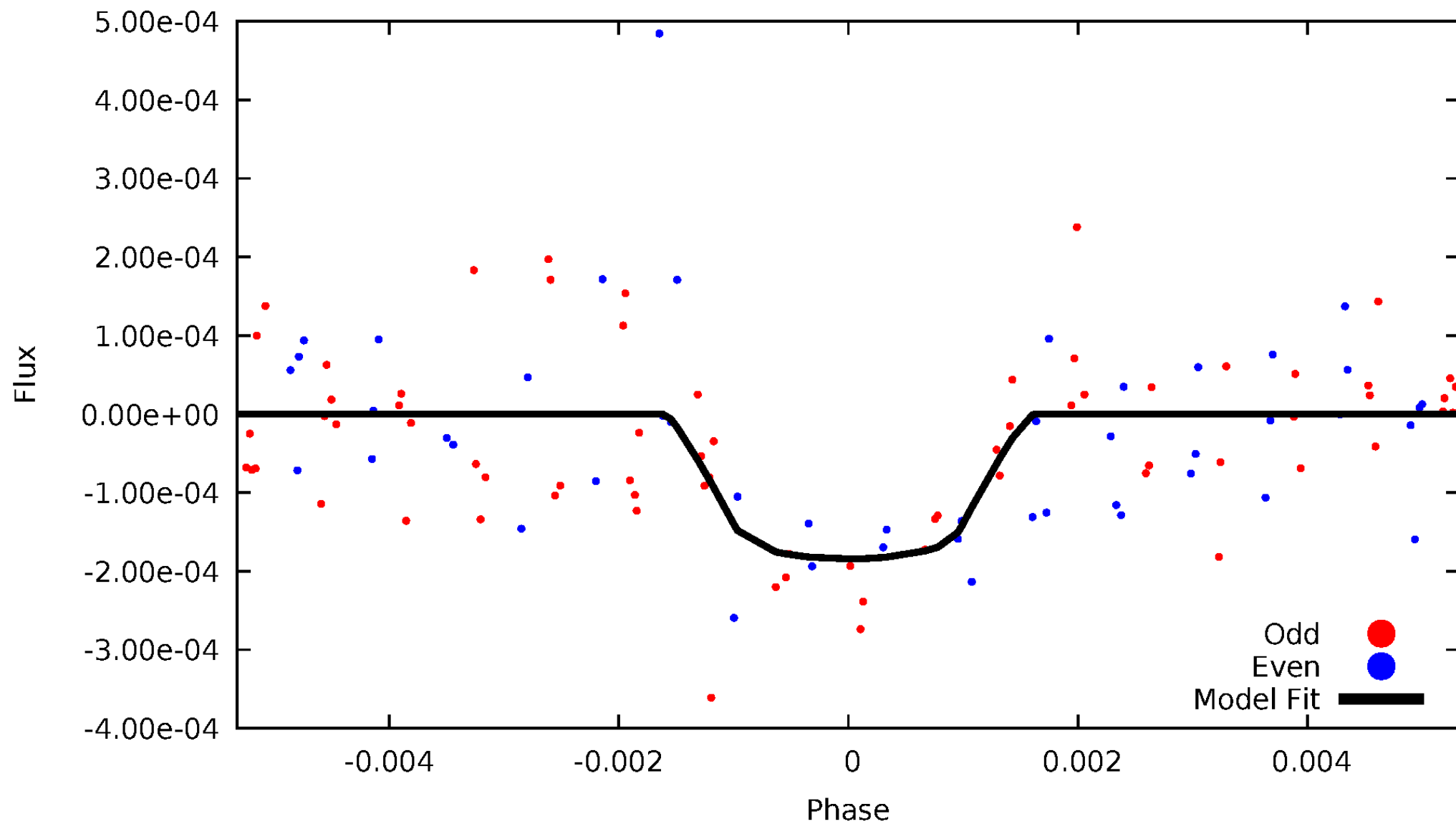


TCE 009772075-05



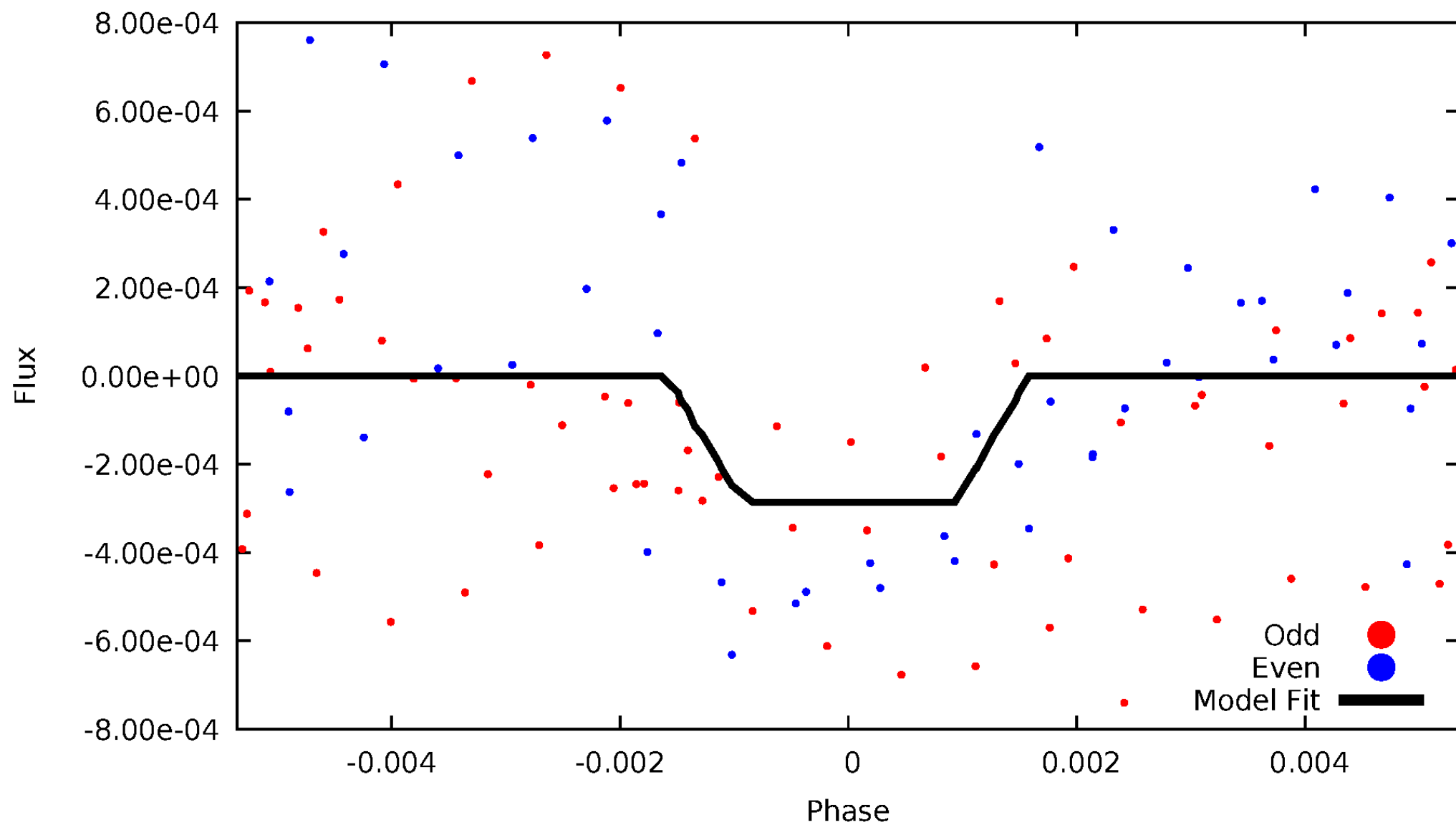
# DV Odd/Even

TCE 009772075-05



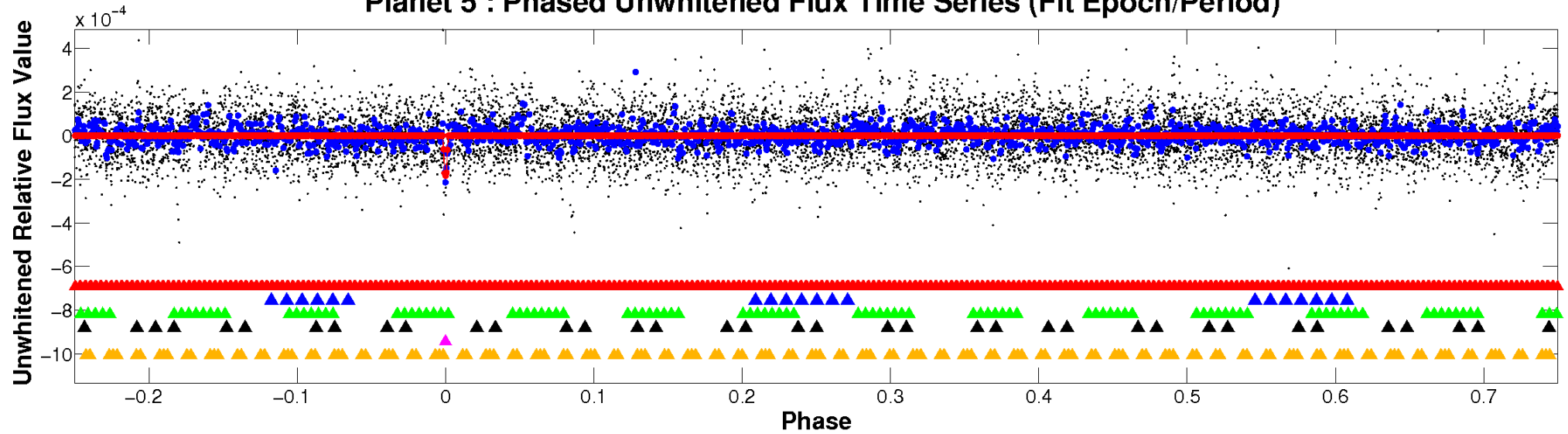
# ALT Odd/Even

TCE 009772075-05

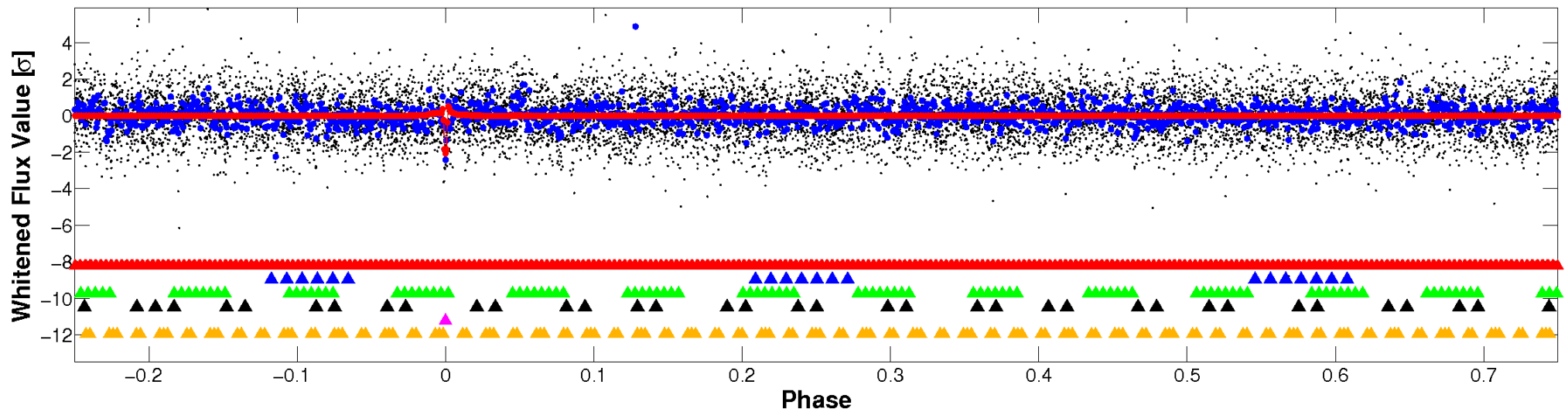


# Non-Whitened Vs. Whitened Light Curve

## Planet 5 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

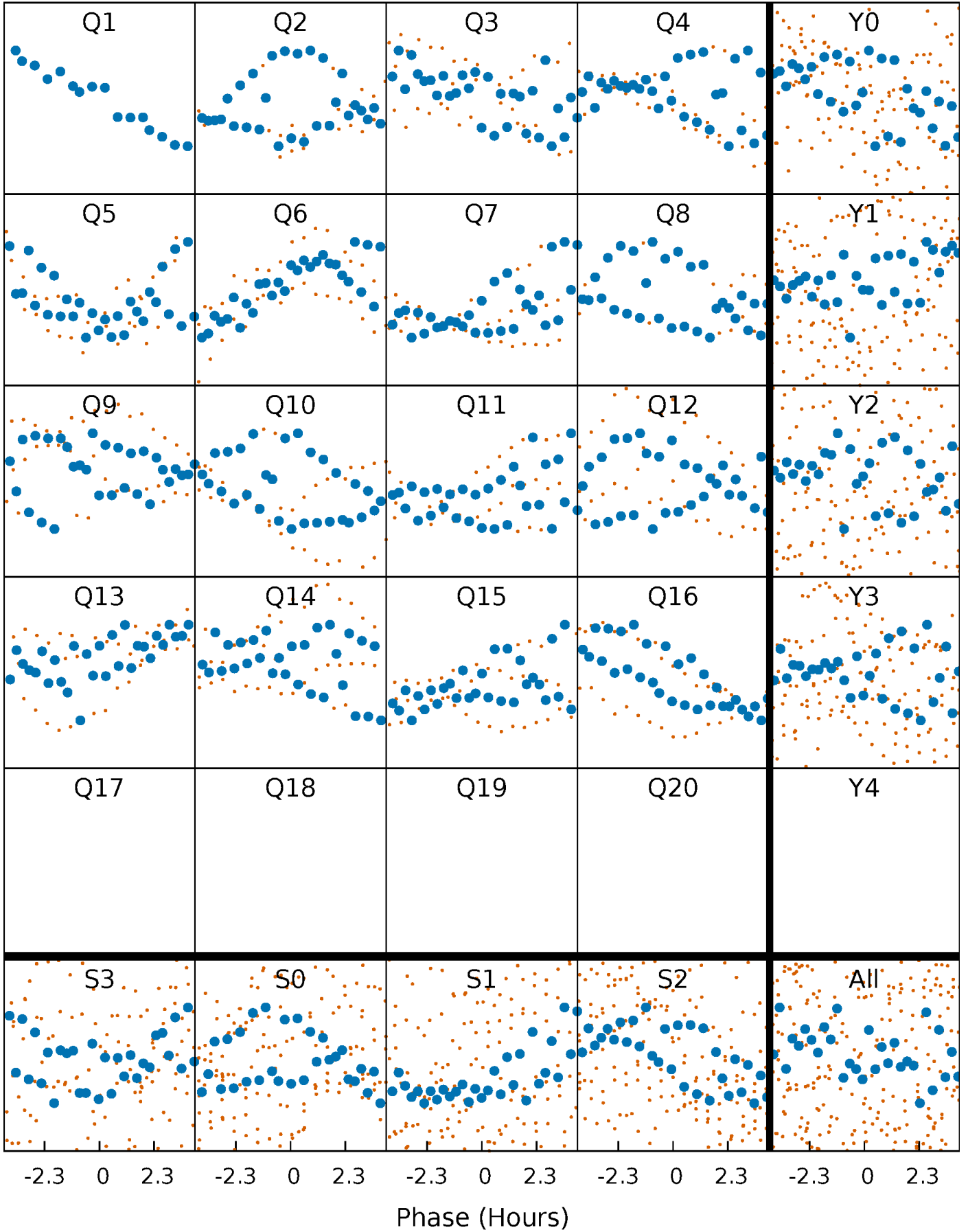


## Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)



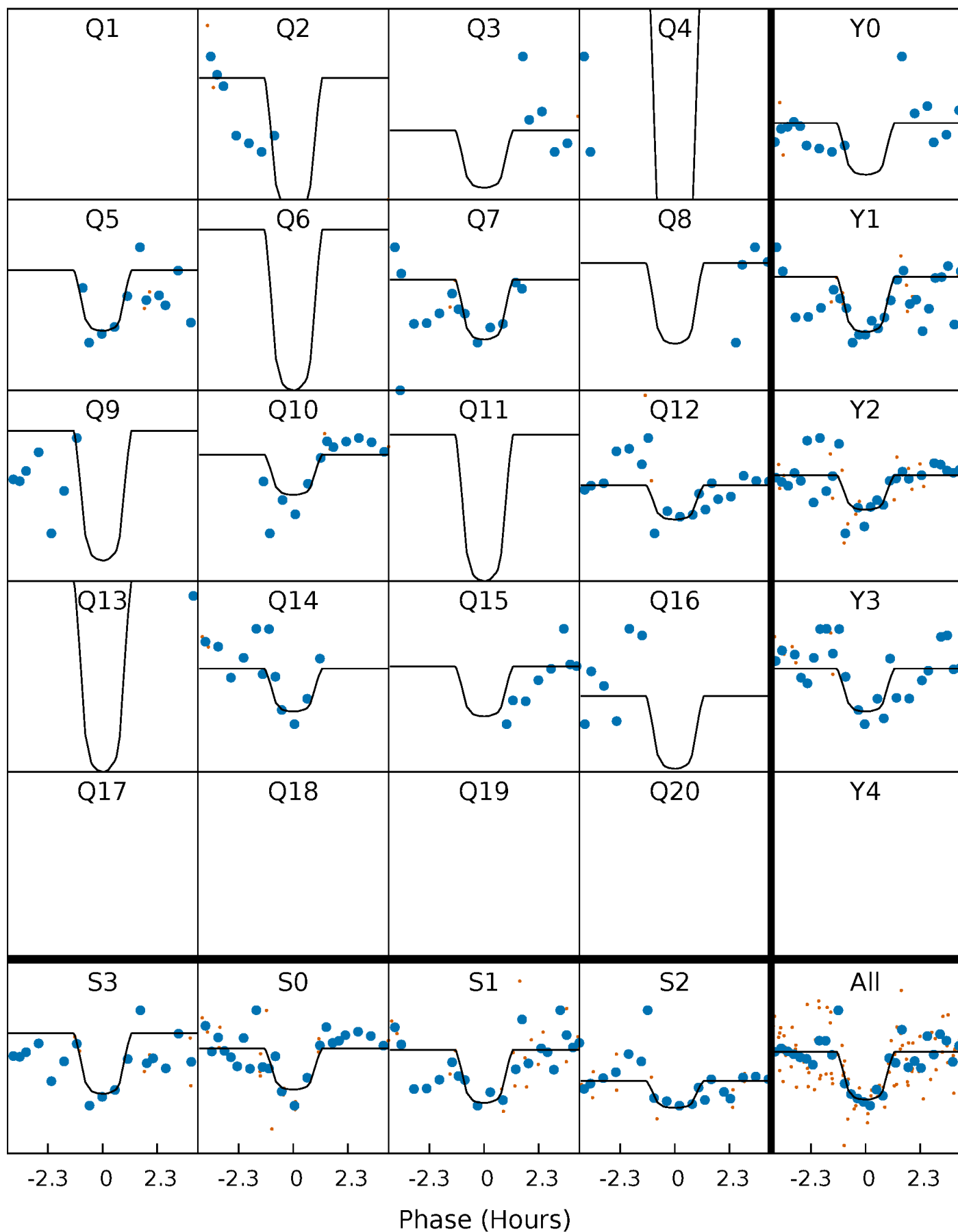
# PDC Quarter-Phased Transit Curves

TCE 009772075-05   P= 31.416621 Days    $T_0=138.366729$  (BKJD)



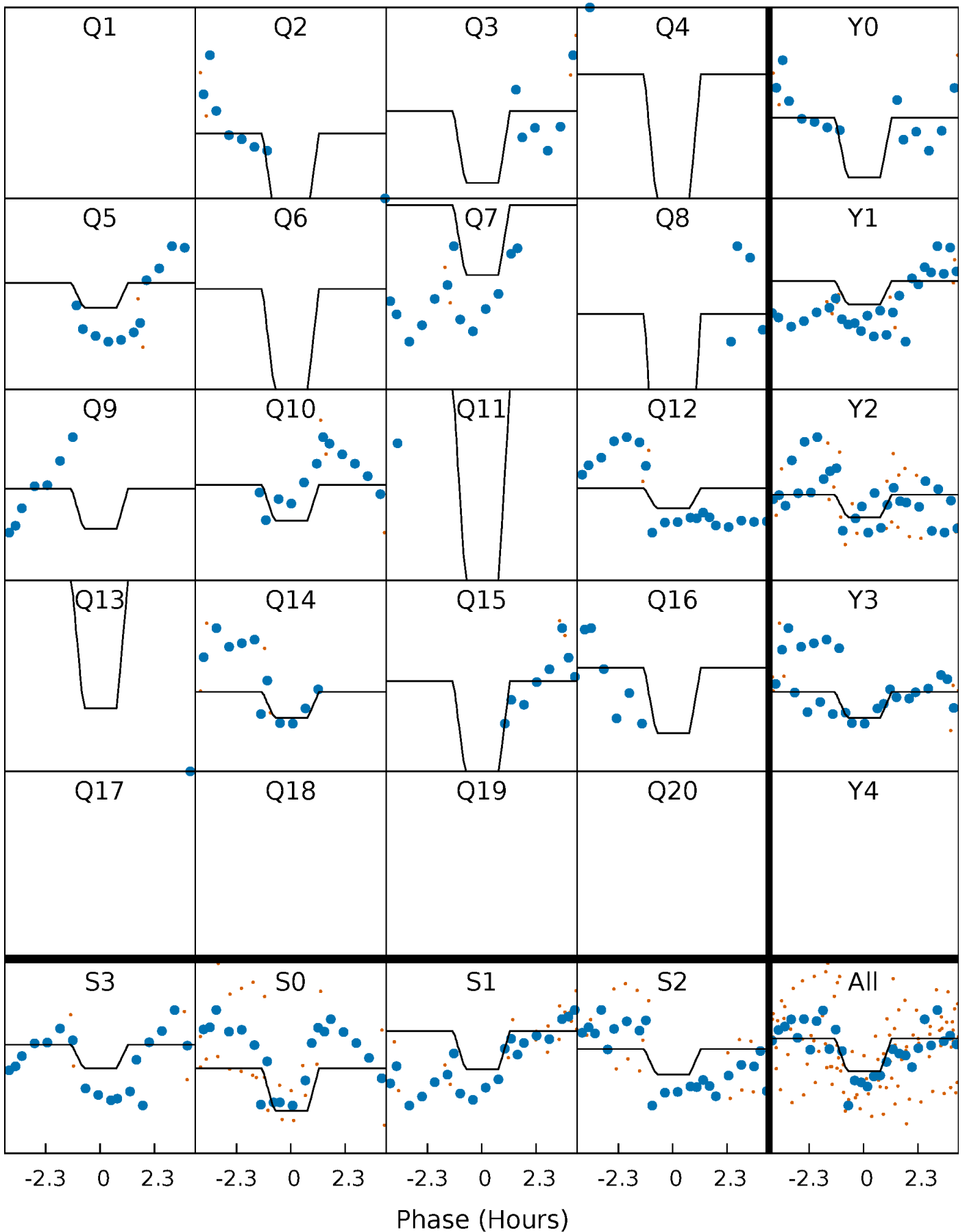
# DV Quarter-Phased Transit Curves

TCE 009772075-05   P= 31.416621 Days    $T_0=138.366729$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 009772075-05   P= 31.416351 Days    $T_0=138.376140$  (BKJD)

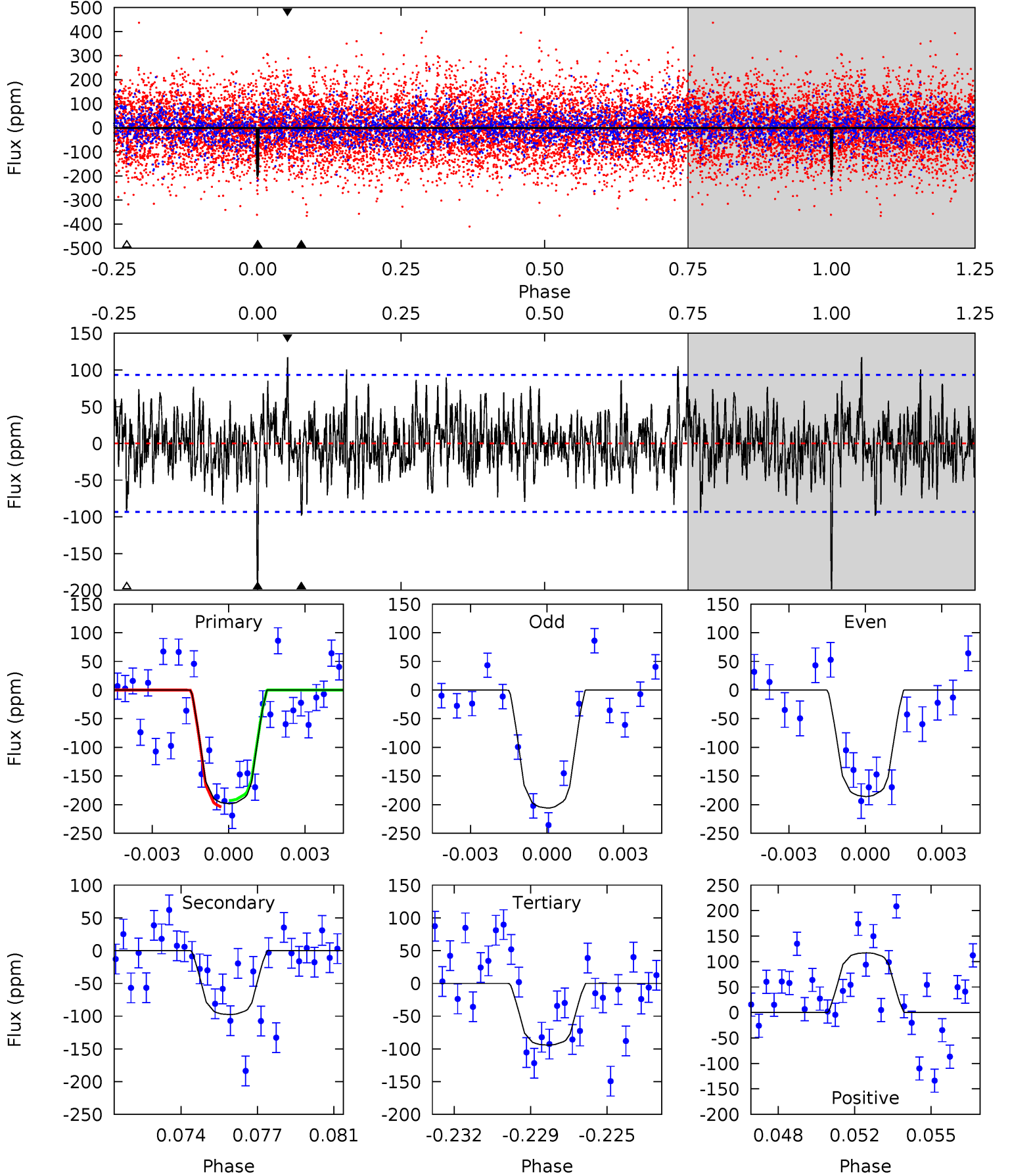




# DV Model-Shift Uniqueness Test

009772075-05, P = 31.416621 Days, E = 106.950108 Days

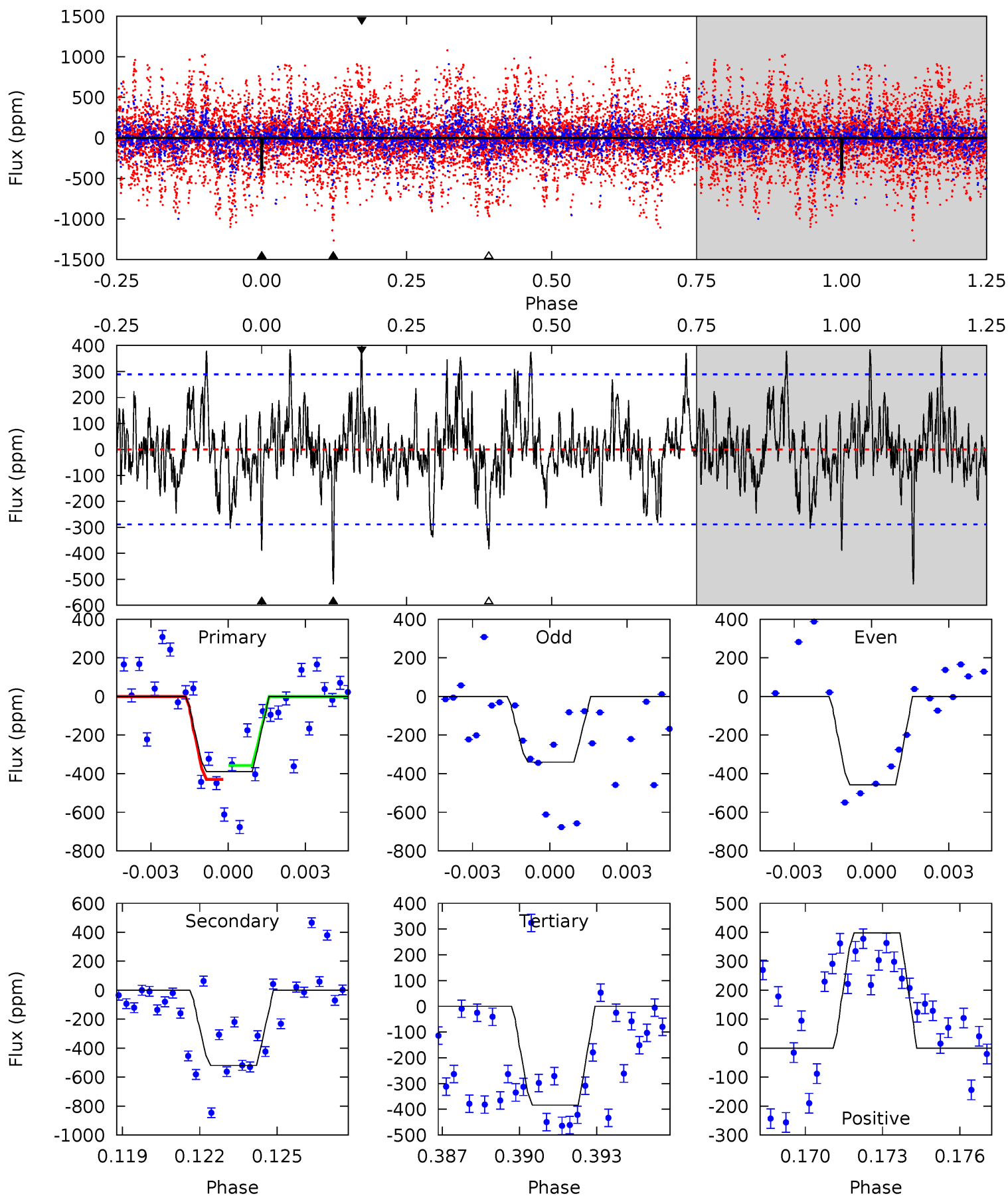
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.2	5.49	5.30	6.59	5.24	2.95	1.69	5.86	4.57	0.19	-1.10	0.54	1.00	0.37	0.32



# Alt Model-Shift Uniqueness Test

009772075-05, P = 31.416351 Days, E = 106.959789 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
7.08	9.45	6.98	7.24	5.25	2.97	2.05	0.10	-0.16	2.47	2.21	1.02	0.86	0.43	0.67



### Stellar Parameters For KIC 009772075

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7256^{+201}_{-302}$	$3.874^{+0.308}_{-0.132}$	$0.000^{+0.200}_{-0.350}$	$2.567^{+0.518}_{-0.962}$	$1.796^{+0.177}_{-0.412}$	$0.150^{+0.334}_{-0.060}$
	+3%/-4%	+8%/-3%	+inf%/-inf%	+20%/-37%	+10%/-23%	+223%/-40%
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 009772075-05 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-98 \pm 18$	$3.82^{+2.56}_{-1.96}$	$1452^{+101}_{-132}$	$5948^{+2992}_{-1265}$	$202^{+615}_{-129}$
Alt.	$-519 \pm 55$	$4.48^{+2.72}_{-2.31}$	$1446^{+110}_{-139}$	$8486^{+6652}_{-1785}$	$801^{+2488}_{-505}$

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

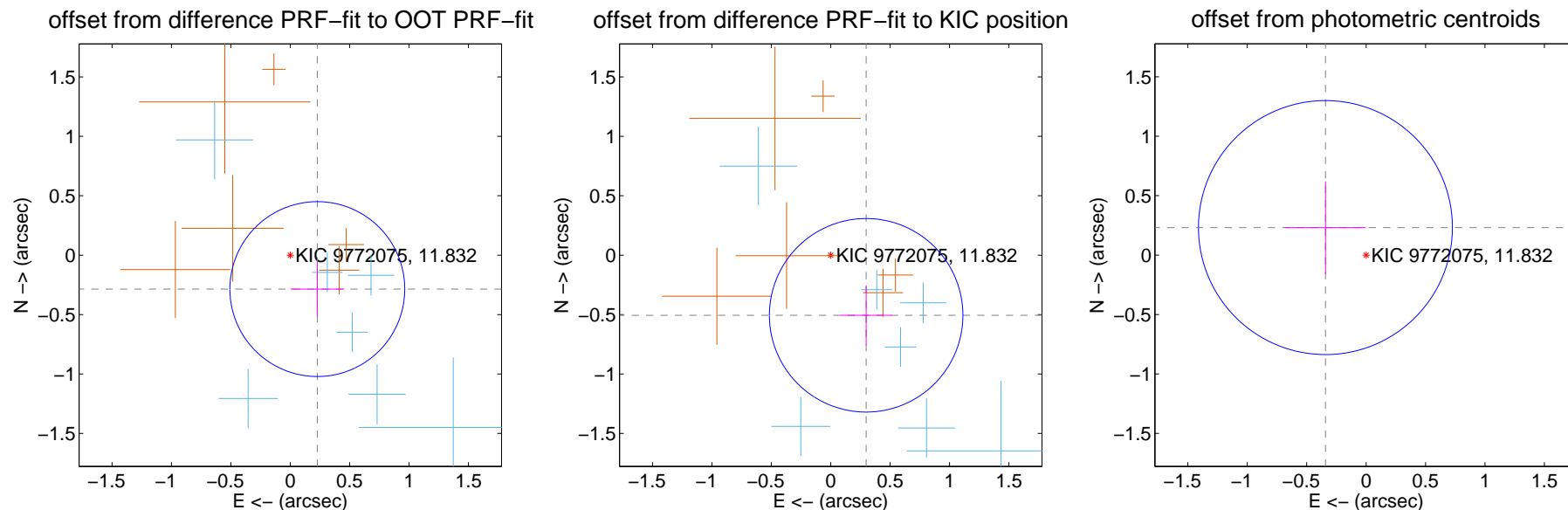
## DV Centroid Data

Supplemental centroid analysis for 009772075-05. **Kepler magnitude: 11.83.** Transit SNR 8.36

There are 8 quarters with good PRF difference image offsets

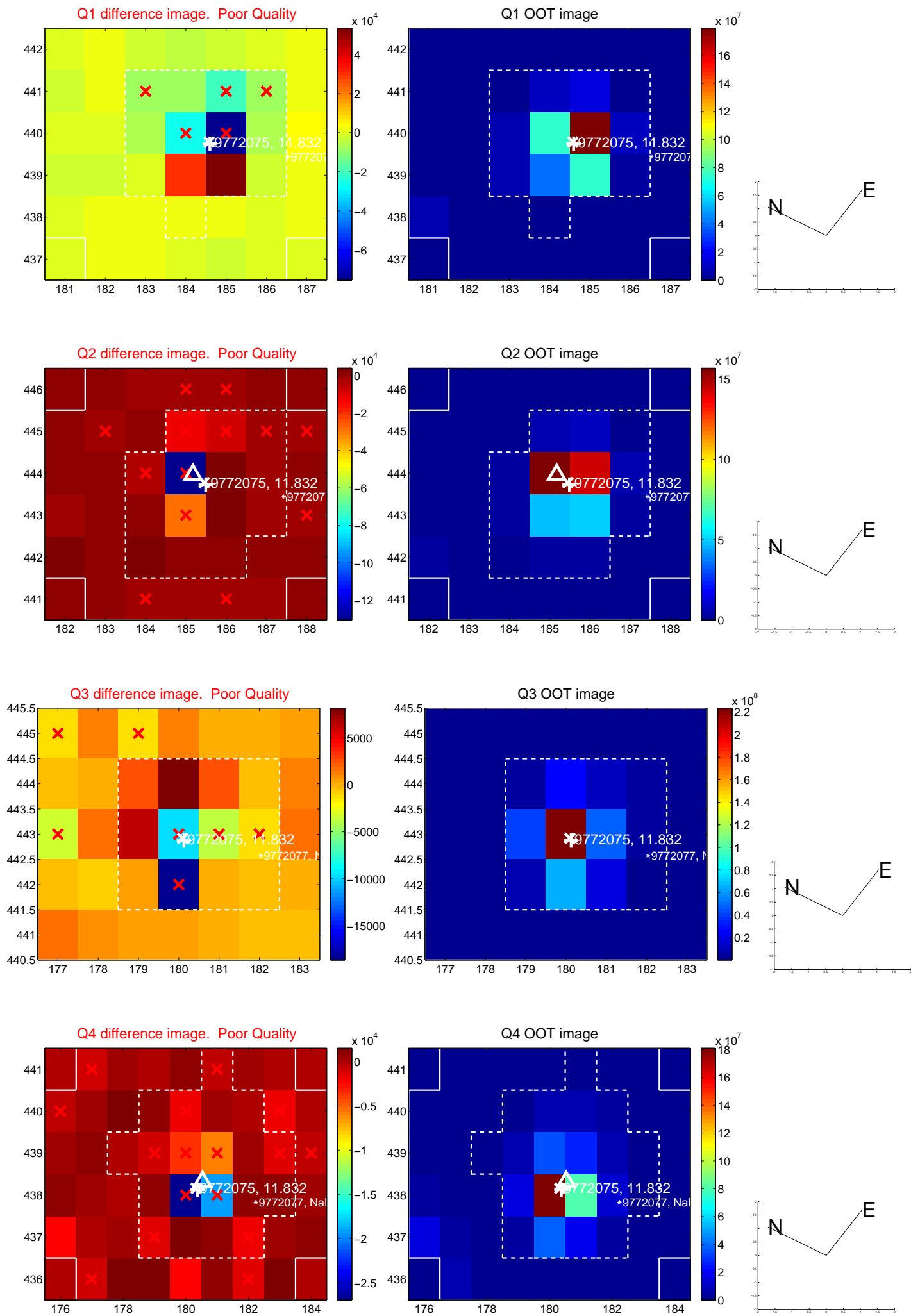
The direct PRF centroid is offset from the target star catalog position by about 0.21 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.365 \pm 0.245$	1.49	$-0.228 \pm 0.225$	$-0.285 \pm 0.228$
PRF-fit source offset from KIC position	$0.587 \pm 0.271$	2.16	$-0.298 \pm 0.217$	$-0.506 \pm 0.252$
photometric centroid source offset	$0.41 \pm 0.36$	1.16	$0.34 \pm 0.34$	$0.23 \pm 0.39$

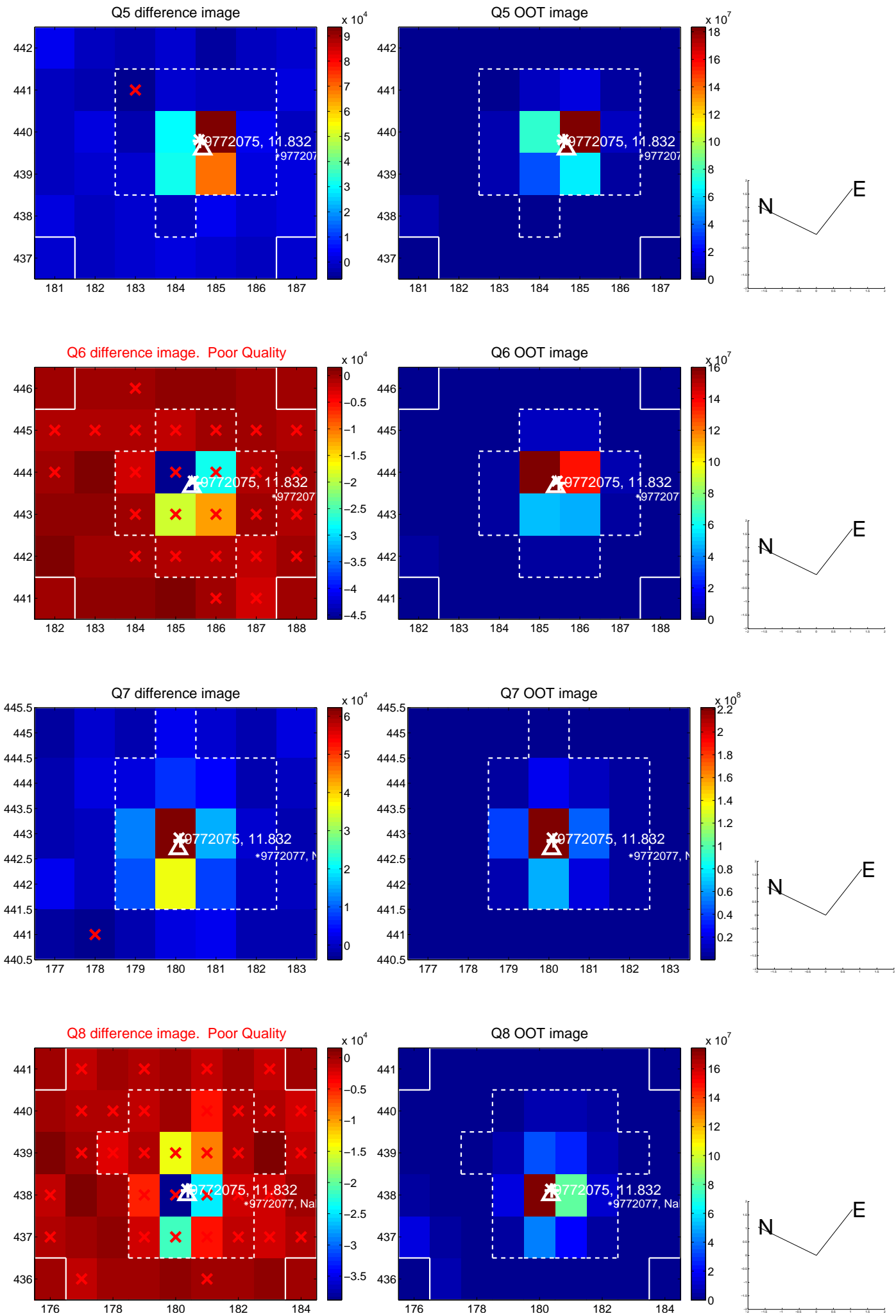


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

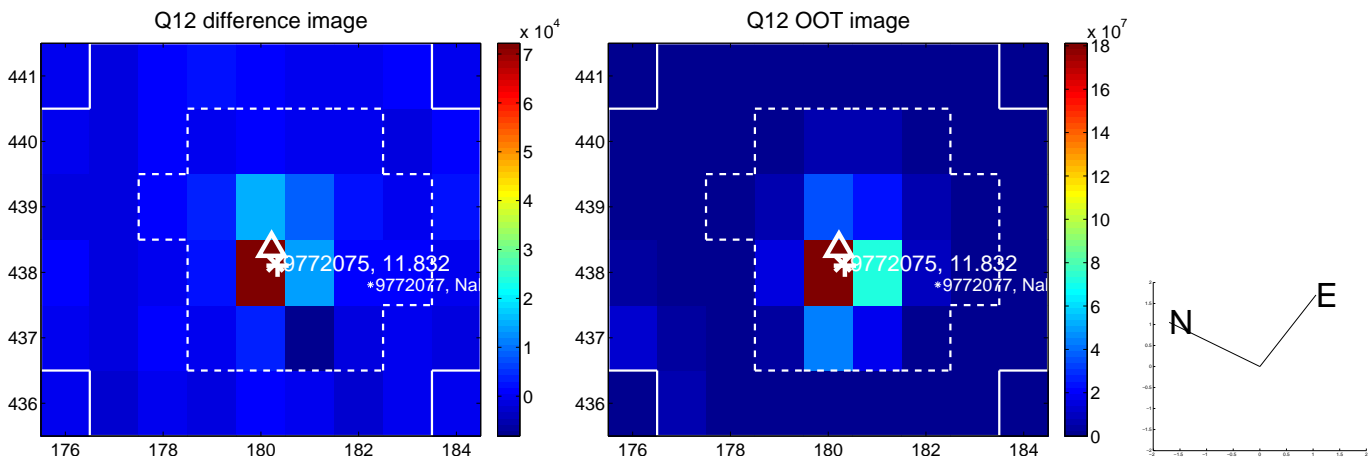
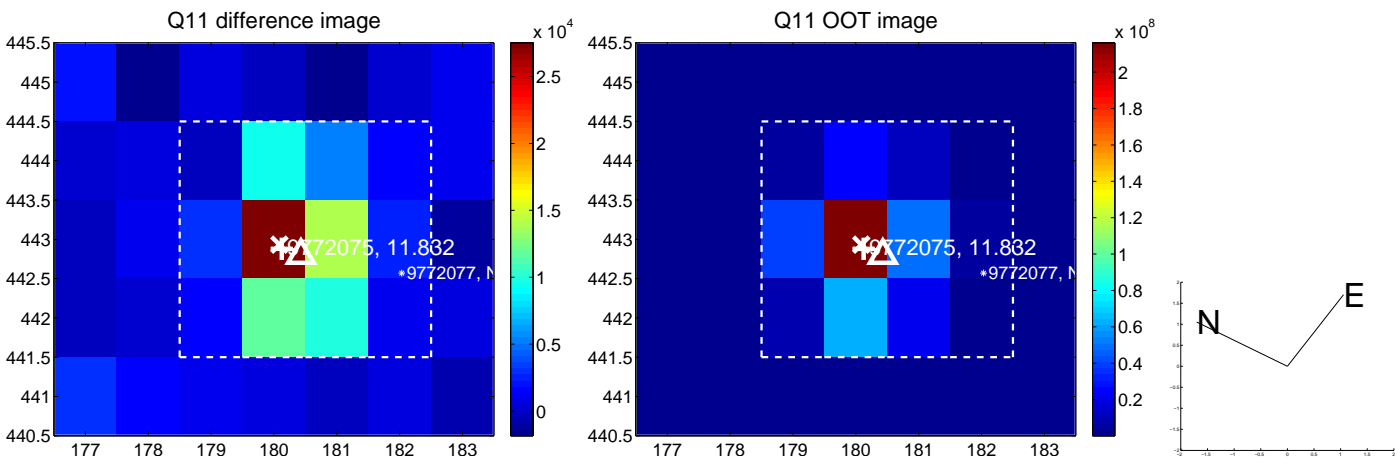
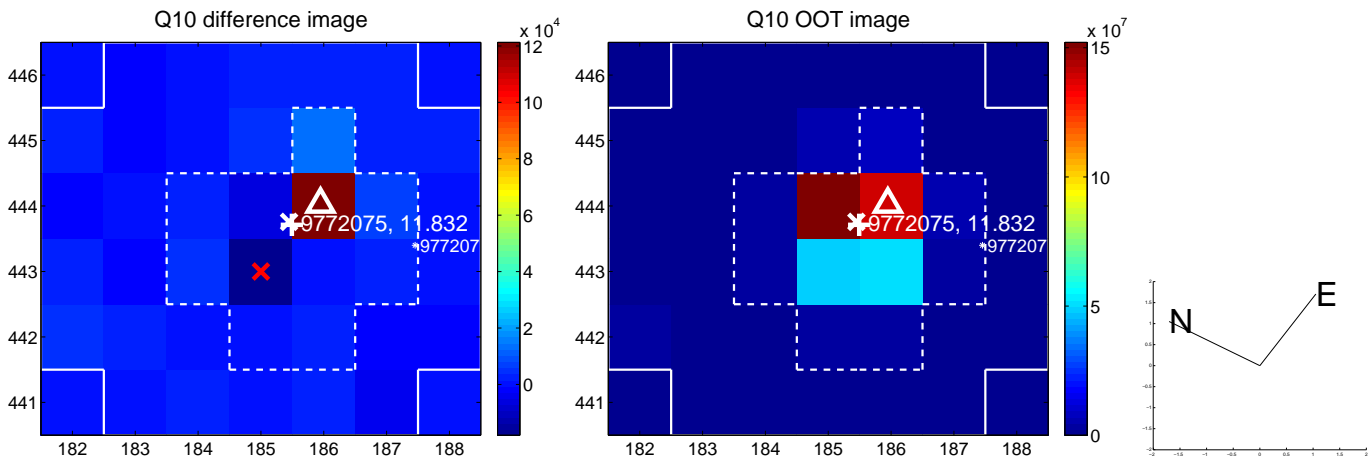
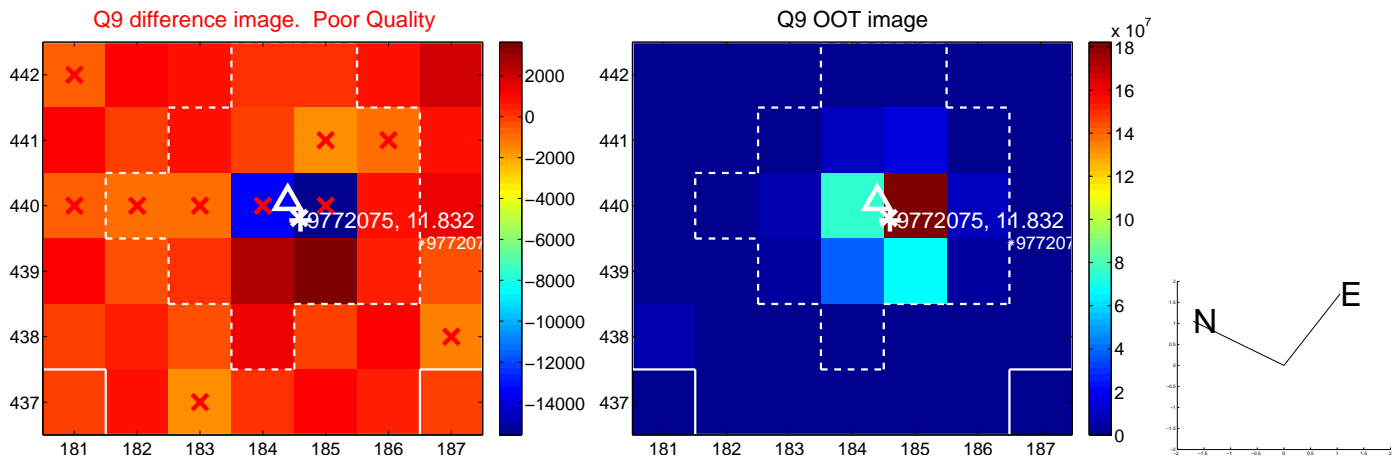
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

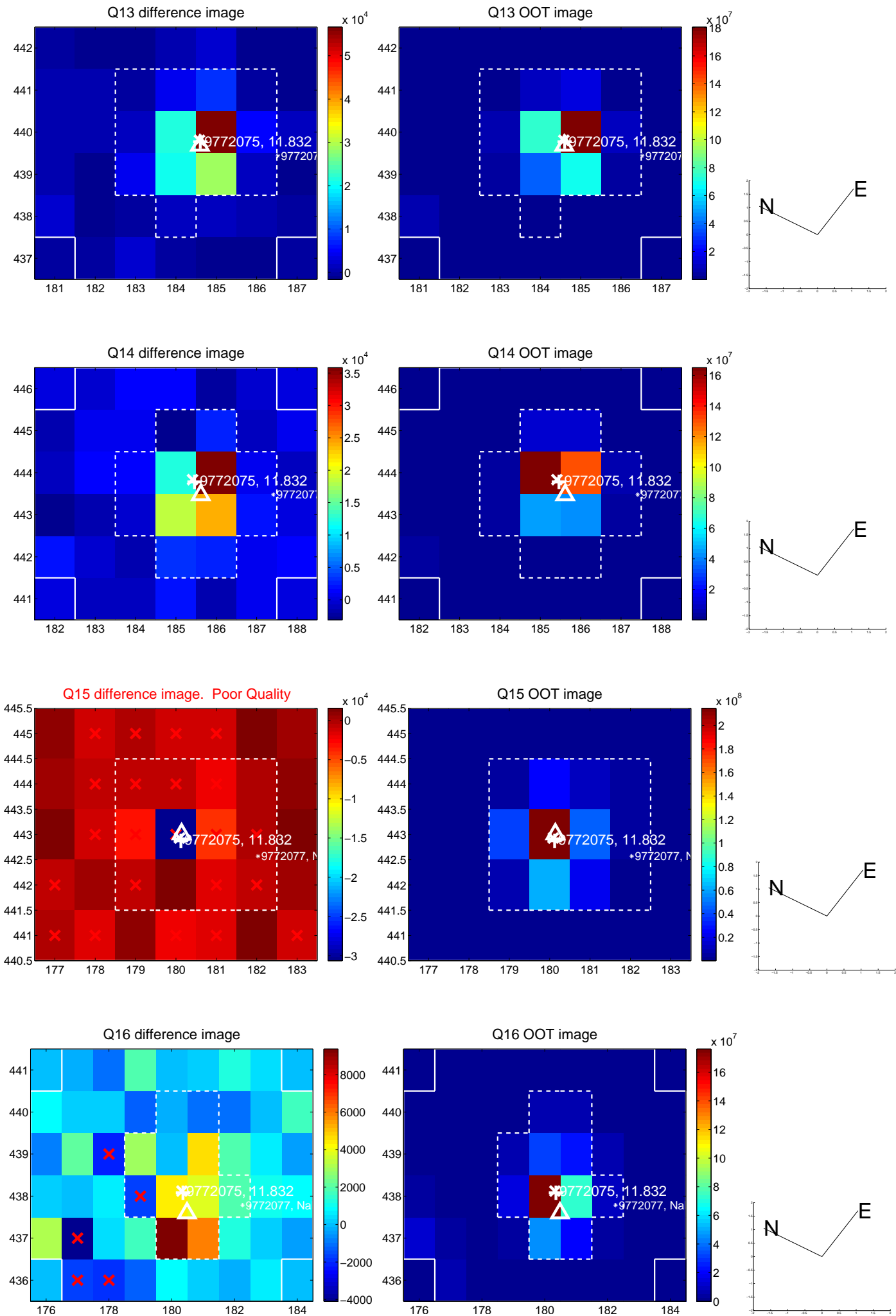


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

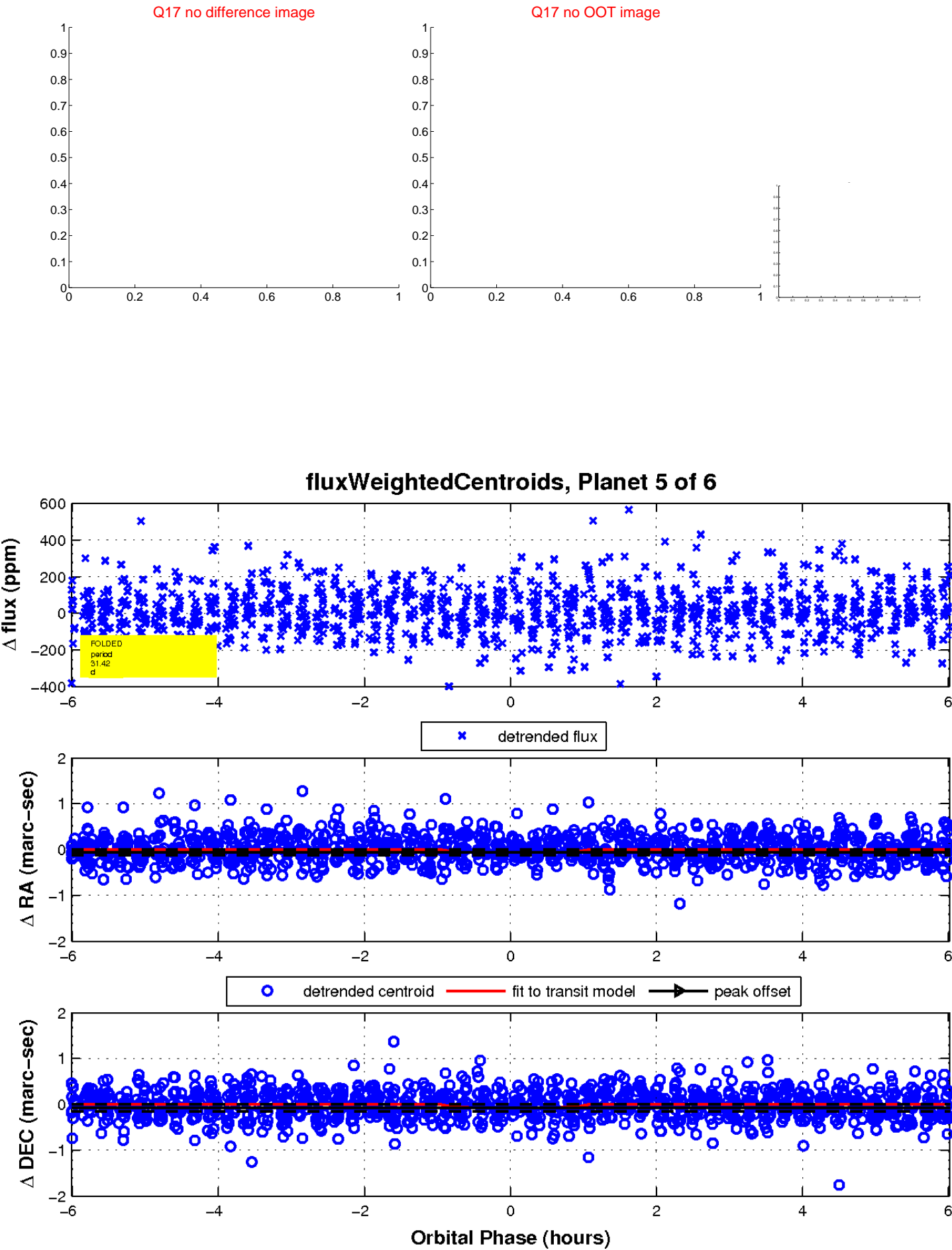




white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

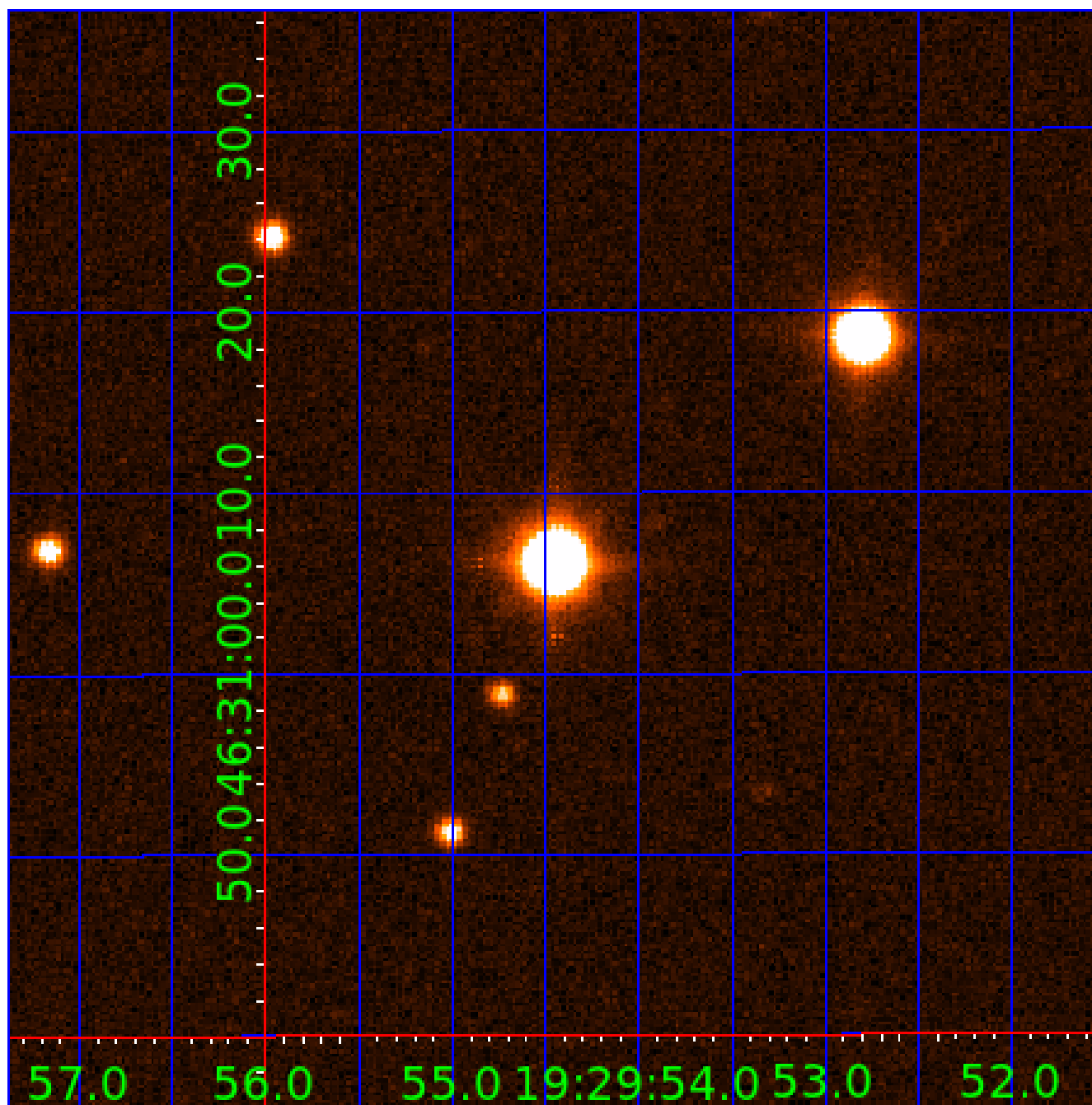


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 009772075

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009772075-01	OBS	No	0.768918	132.185957	6.9	4.882	11.8	3.8	2.57	7256	0.69	41000.94
009772075-02	OBS	No	73.413840	176.350967	219.1	3.278	8.9	6.7	2.57	7256	4.21	93.96
009772075-03	OBS	No	14.488138	133.697772	159.0	5.389	9.3	11.2	2.57	7256	6.19	817.74
009772075-04	OBS	No	40.121595	132.617429	183.0	2.371	8.6	8.9	2.57	7256	4.03	210.28
009772075-05	OBS	No	31.416621	138.366729	184.4	2.007	8.1	8.4	2.57	7256	3.99	291.35
009772075-06	OBS	No	10.115804	133.549542	95.7	2.371	7.9	8.6	2.57	7256	2.92	1320.18

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009772075-01	OBS	FP	0.00	1	0	0	0	LPP_DV
009772075-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009772075-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009772075-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009772075-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009772075-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_ZUMA—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

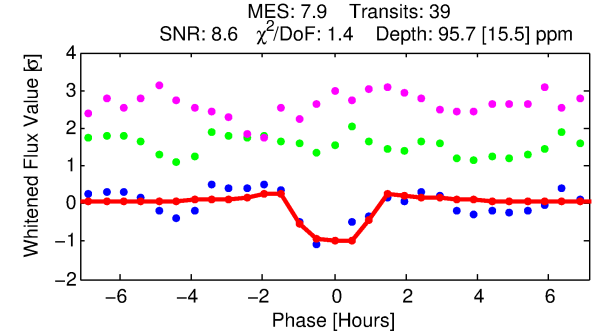
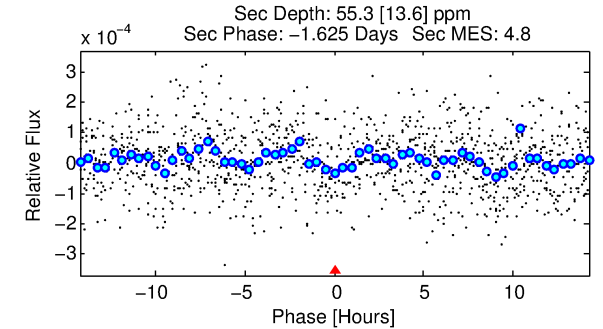
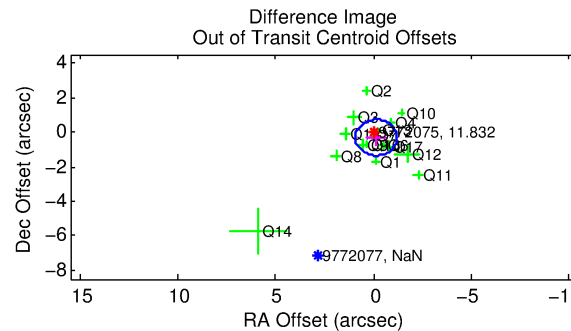
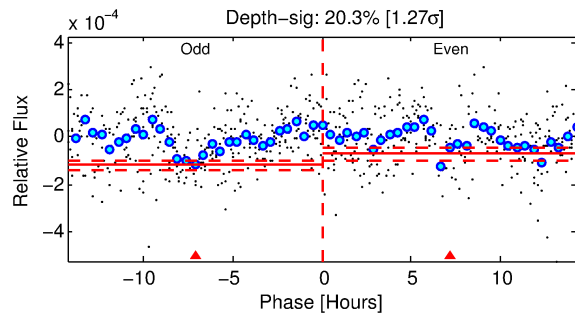
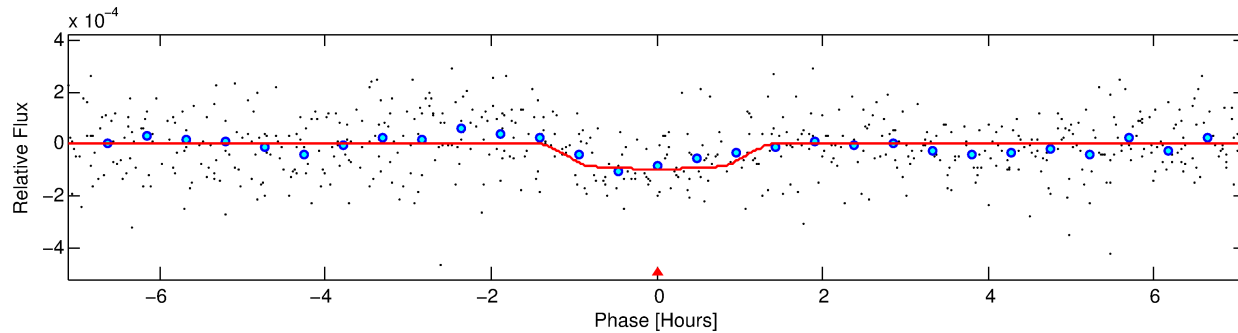
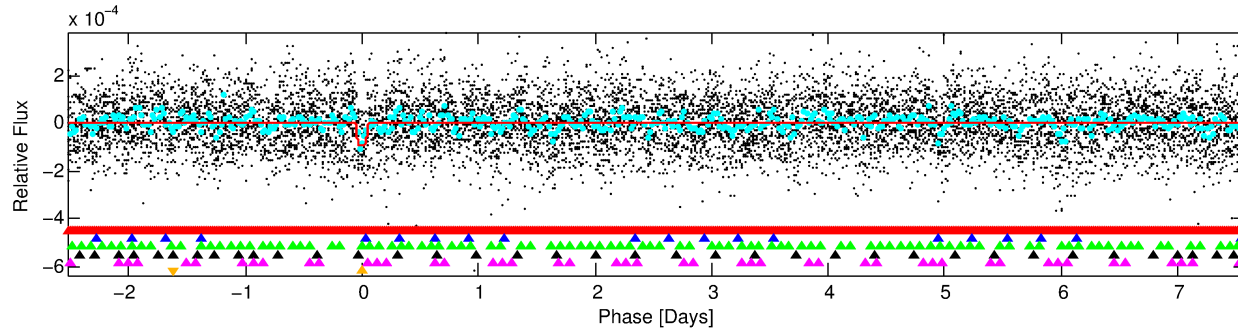
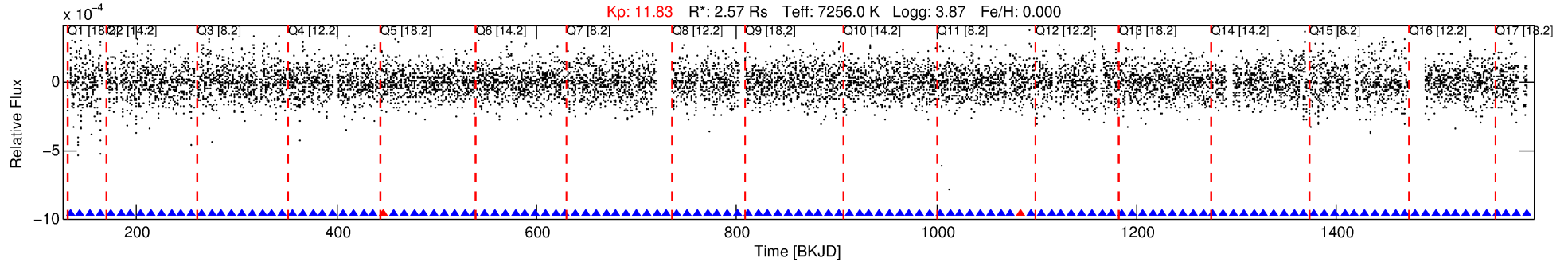
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009772075-06

No Significant Match Found

# DV One-Page Summary

KIC: 9772075 Candidate: 6 of 6 Period: 10.116 d



## DV Fit Results:

Period = 10.11580 [0.00009] d  
Epoch = 133.5495 [0.0067] BKJD  
Rp/R\* = 0.0104 [0.0058]  
a/R\* = 14.71 [51.27]  
b = 0.90 [0.71]  
Seff = 1320.18 [739.39]  
Teff = 1537 [215] K  
Rp = 2.92 [1.96] Re  
a = 0.1113 [0.0383] AU  
Ag = 44.16 [55.46] [0.78 $\sigma$ ]  
Teffp = 6126 [1759] K [2.59 $\sigma$ ]

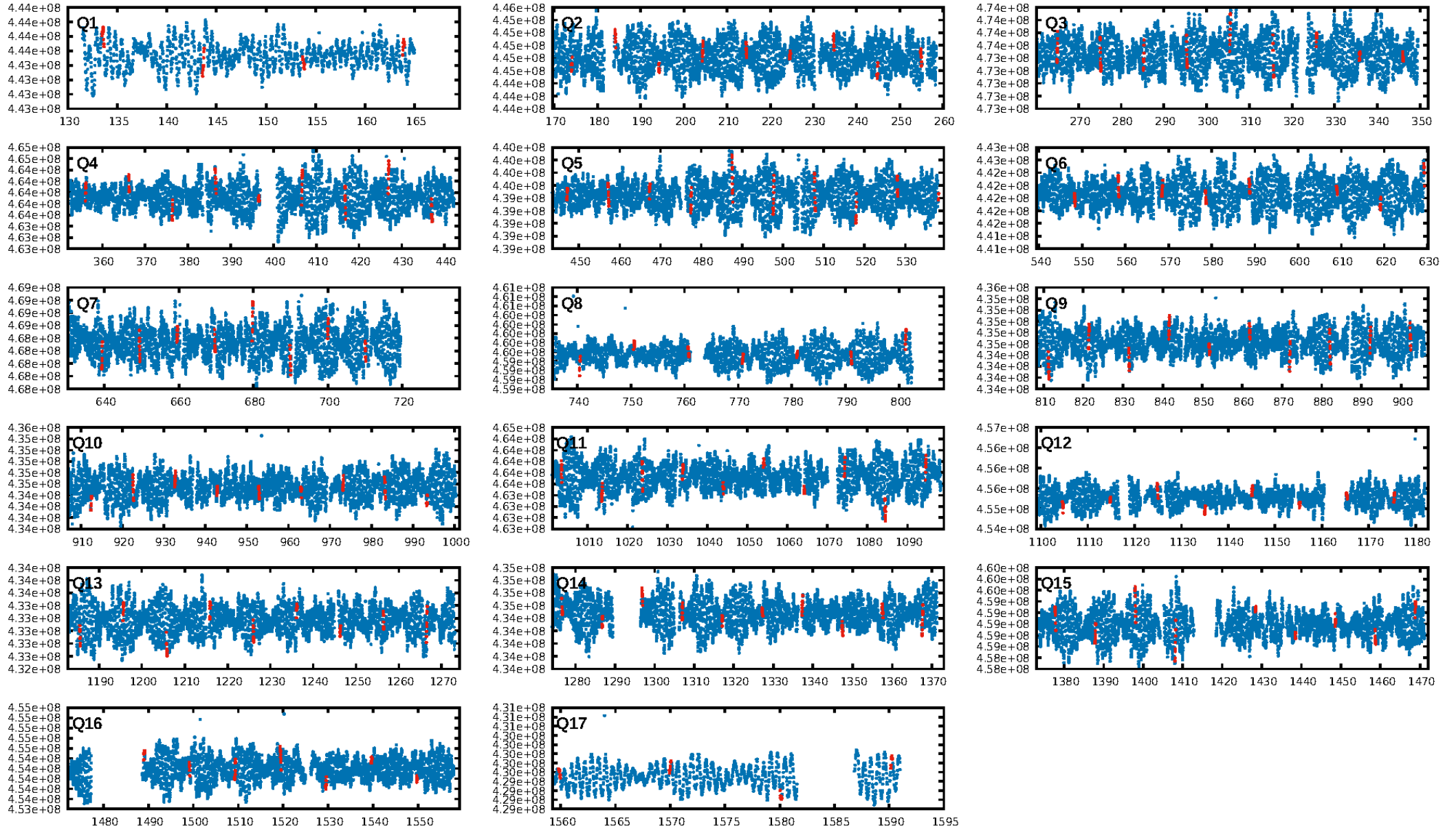
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [41.33 $\sigma$ ]  
LongPeriod-sig: 100.0% [17.82 $\sigma$ ]  
ModelChiSquare2-sig: 10.1%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 9.45e-09**  
RollingBand-fgt: 0.95 [37/39]  
**GhostDiagnostic-chr: -16.01**  
Centroid-sig: 12.0%  
Centroid-so: 0.367 arcsec [1.02 $\sigma$ ]  
OotOffset-rm: 0.341 arcsec [0.98 $\sigma$ ]  
KicOffset-rm: 0.553 arcsec [1.57 $\sigma$ ]  
OotOffset-st: 4/4/4/4 [16]  
KicOffset-st: 4/4/4/4 [16]  
DiffImageQuality-fgm: 0.38 [6/16]  
DiffImageOverlap-fno: 0.06 [1/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 18:53:21 Z

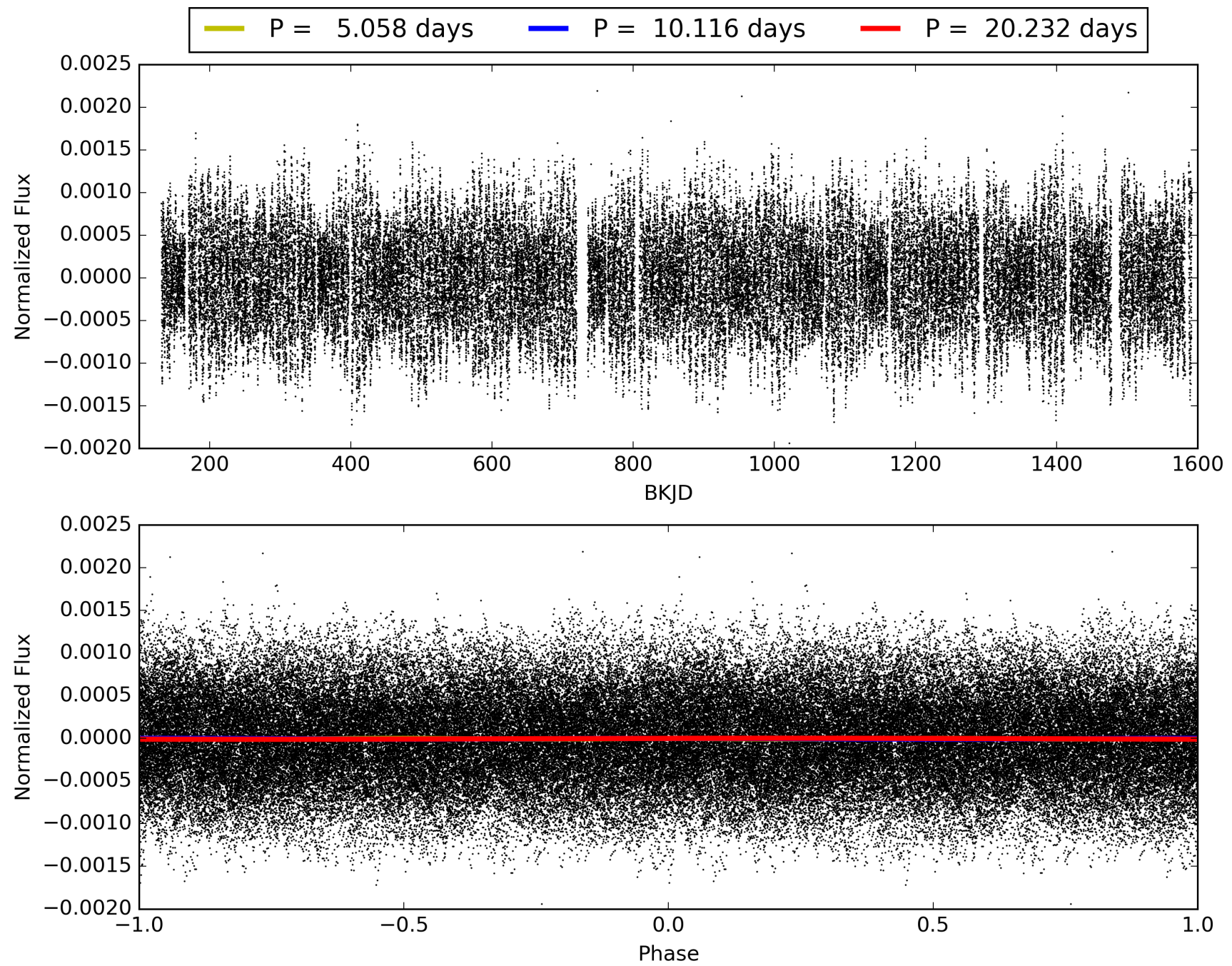
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 009772075-06, PDC Light Curves





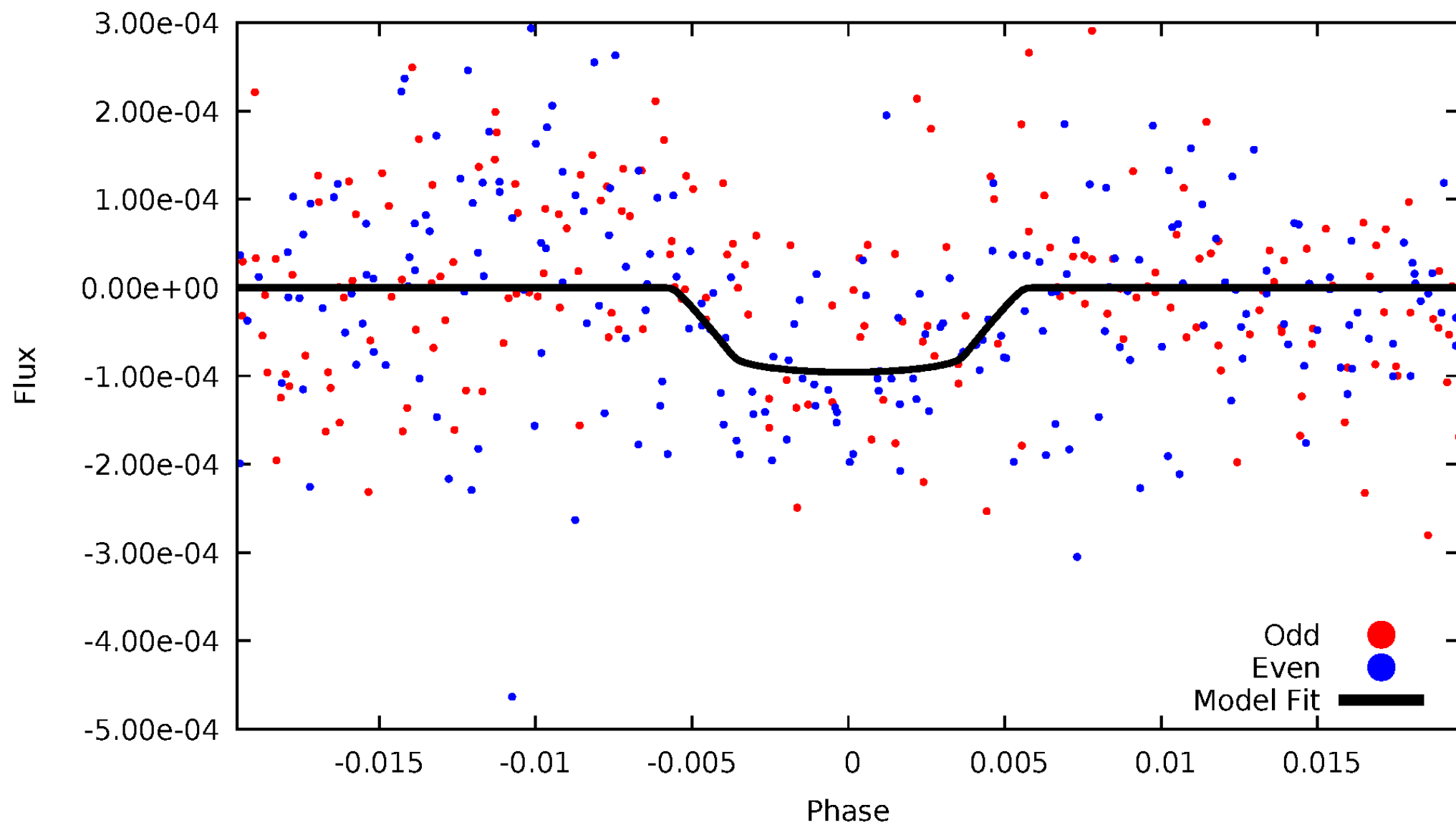
TCE 009772075-06





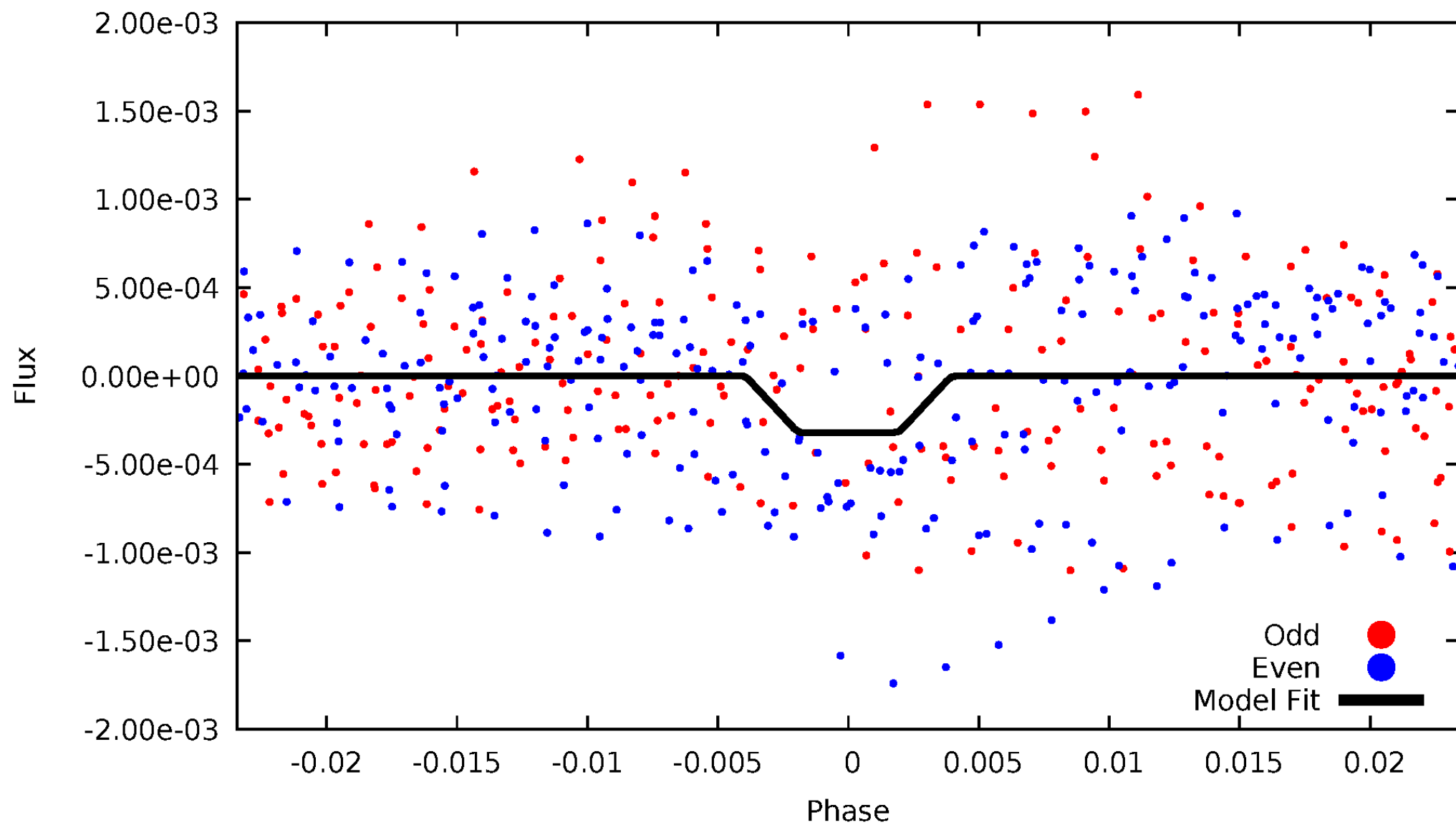
# DV Odd/Even

TCE 009772075-06



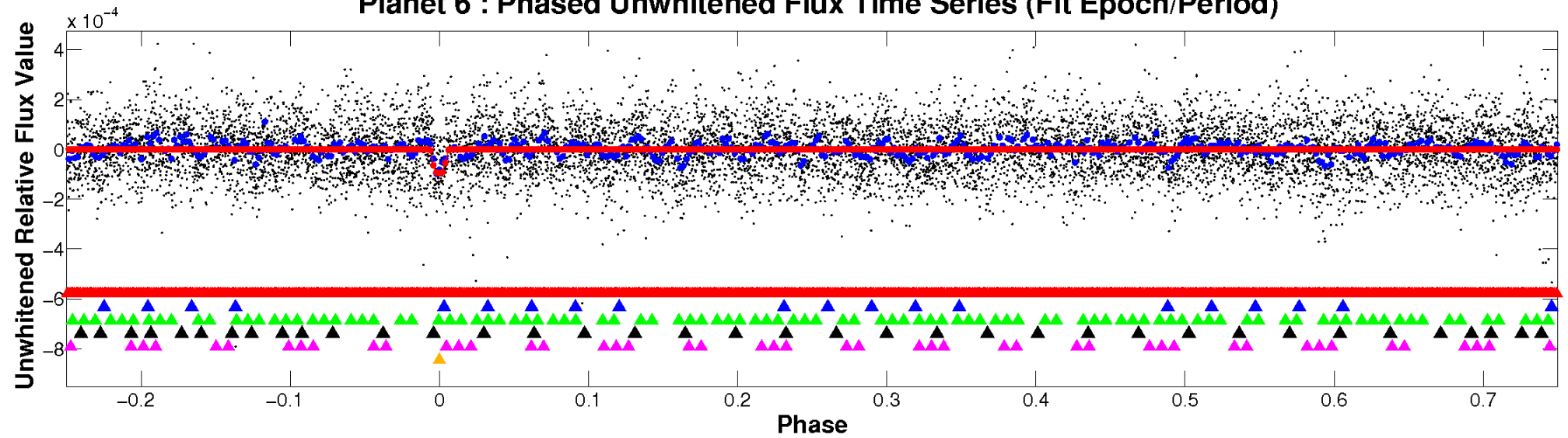
# ALT Odd/Even

TCE 009772075-06

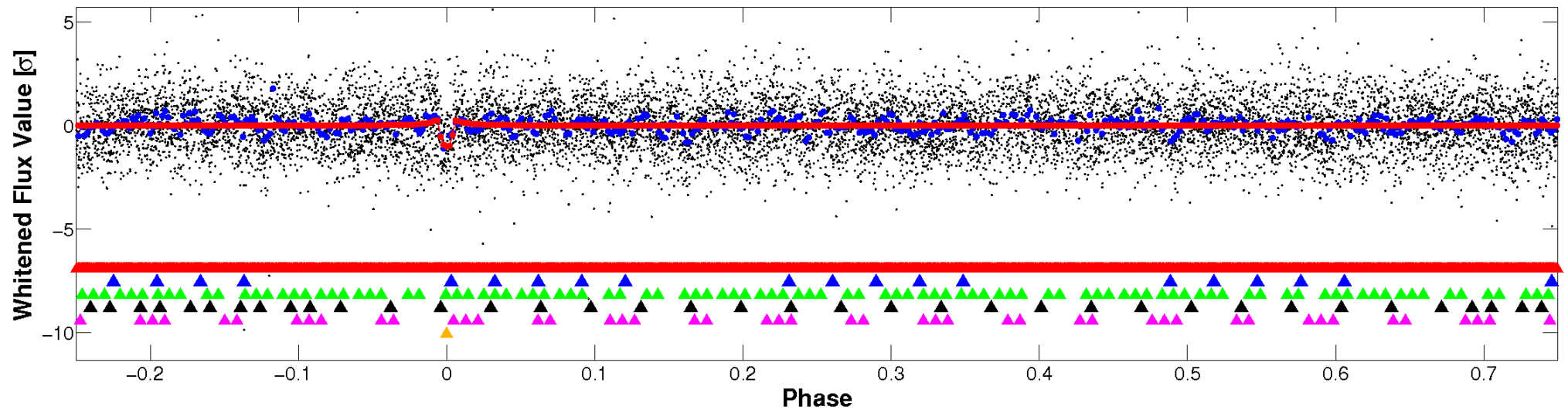


# Non-Whitened Vs. Whitened Light Curve

## Planet 6 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

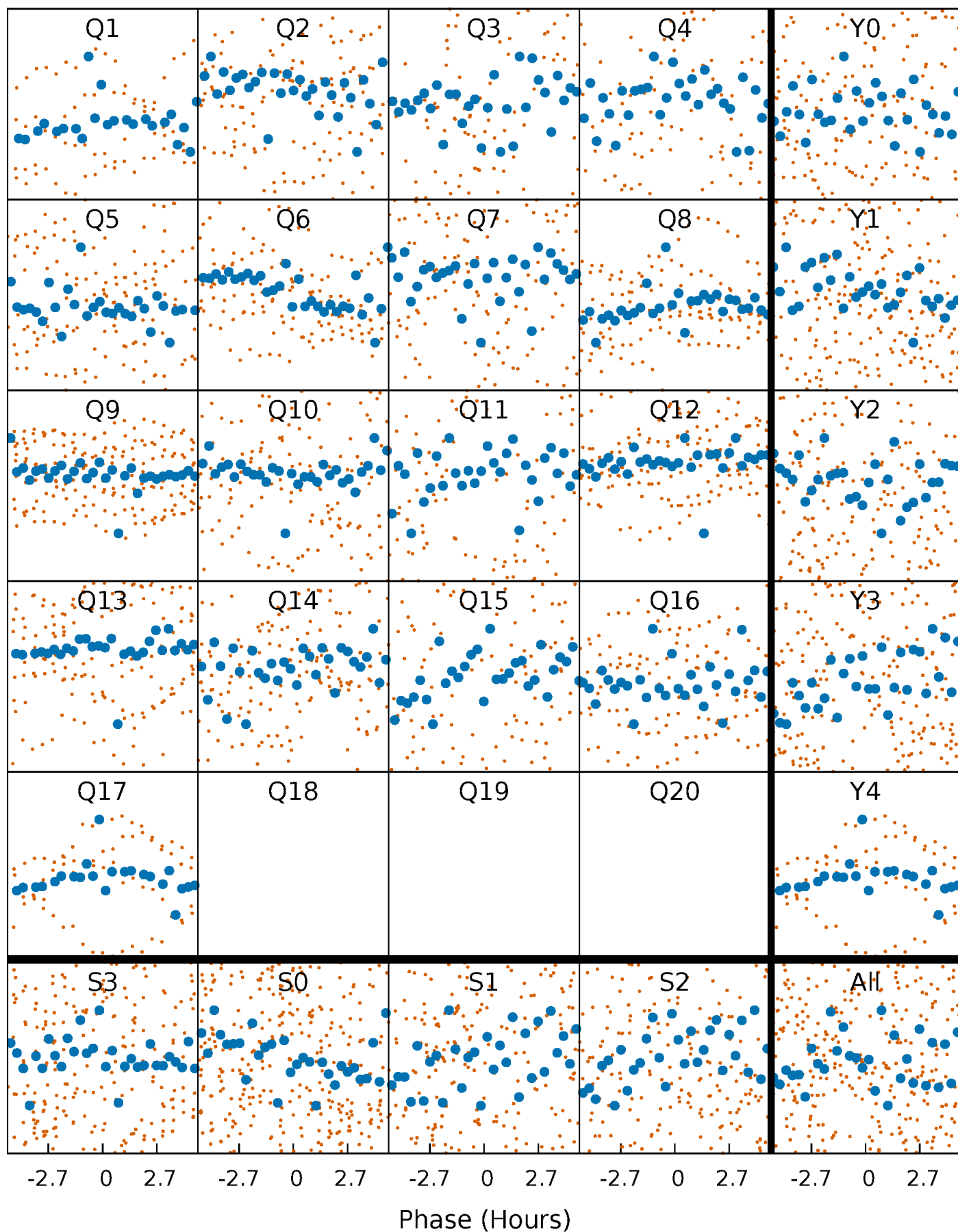


## Planet 6 : Phased Whitened Flux Time Series (Fit Epoch/Period)



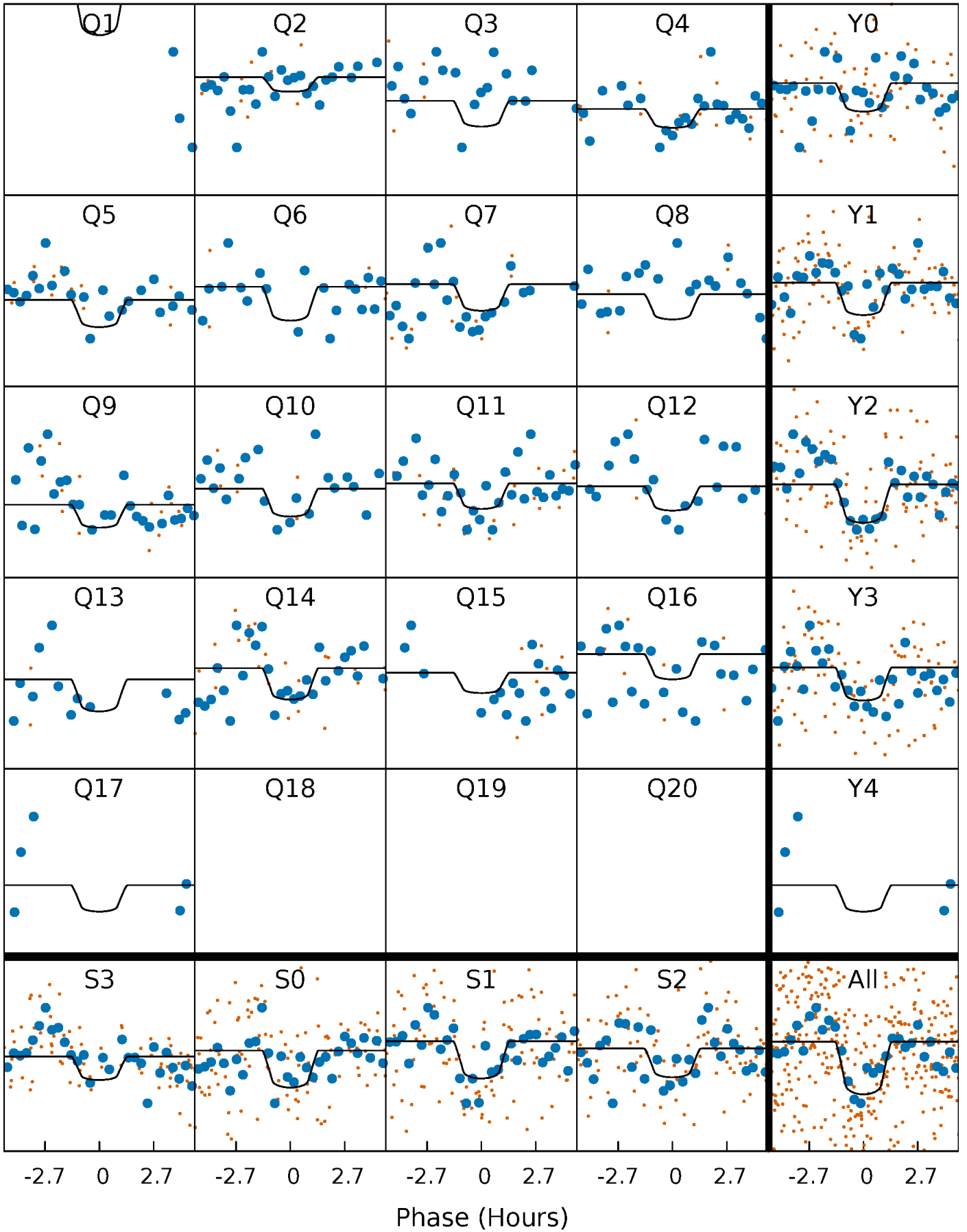
# PDC Quarter-Phased Transit Curves

TCE 009772075-06 P= 10.115804 Days  $T_0=133.549542$  (BKJD)



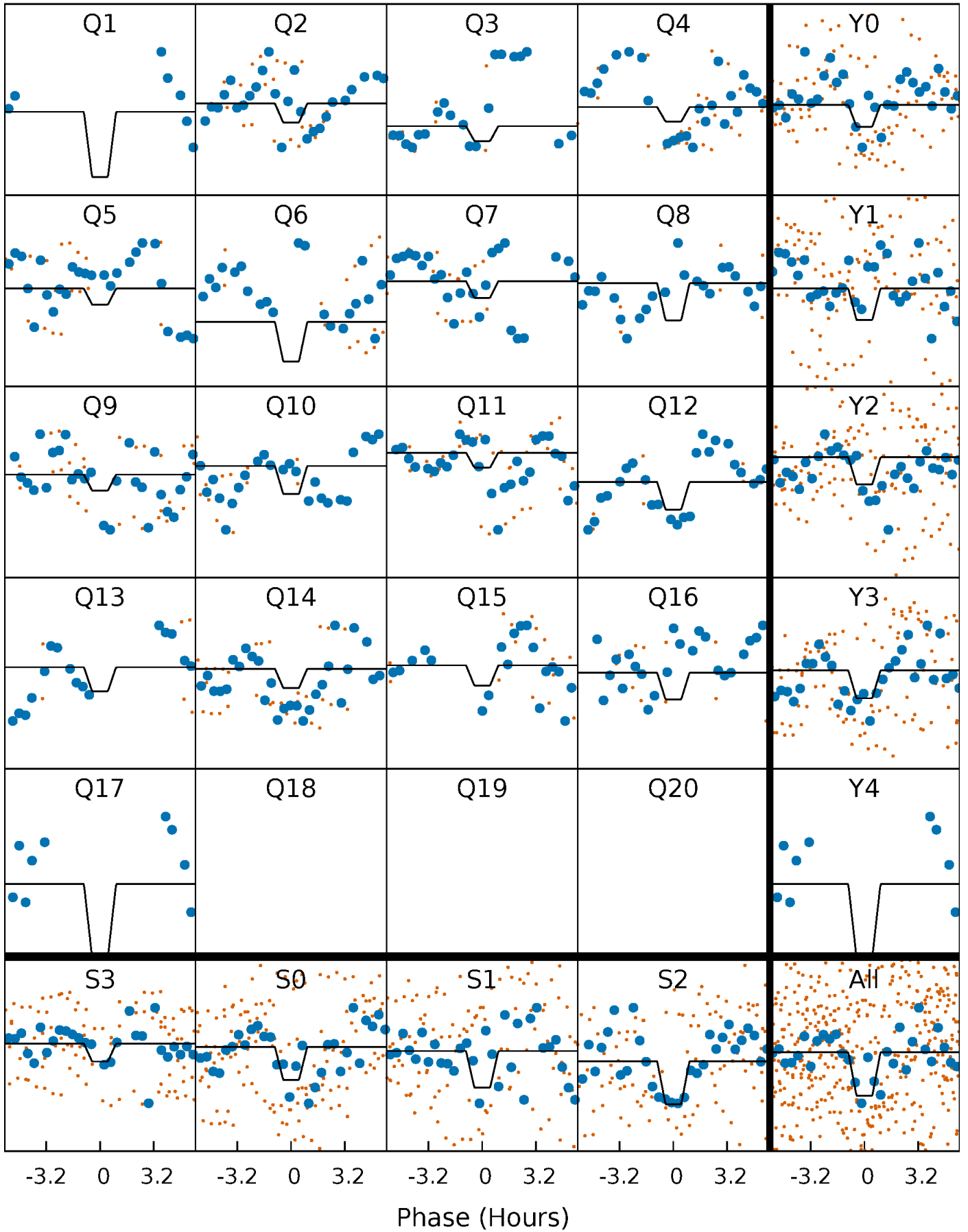
# DV Quarter-Phased Transit Curves

TCE 009772075-06 P= 10.115804 Days  $T_0=133.549542$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

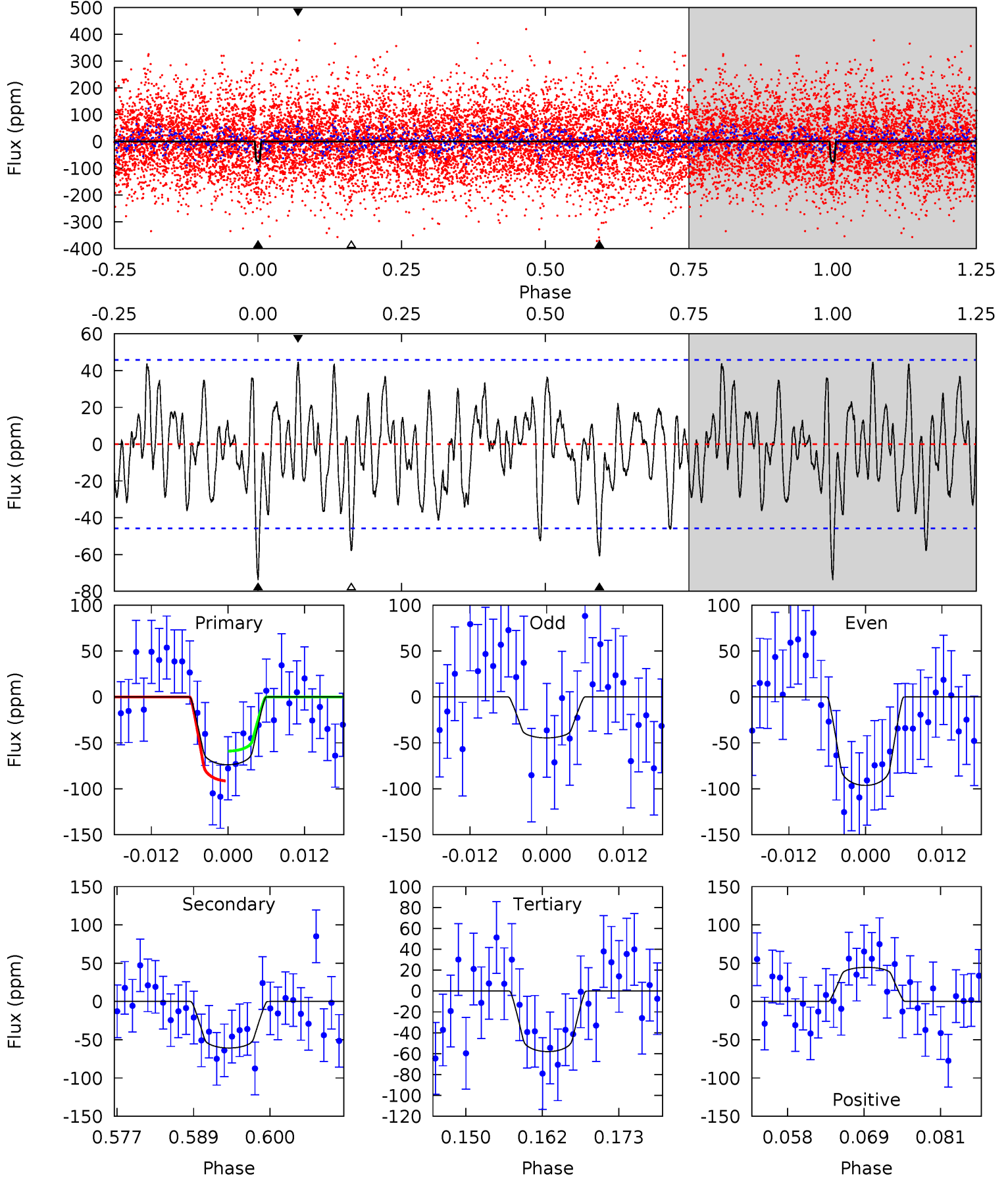
TCE 009772075-06 P= 10.115846 Days  $T_0=133.544918$  (BKJD)



# DV Model-Shift Uniqueness Test

009772075-06, P = 10.115804 Days, E = 123.433738 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
8.05	6.63	6.33	4.86	5.00	2.53	2.02	1.72	3.19	0.30	1.77	2.81	0.95	0.38	1.77

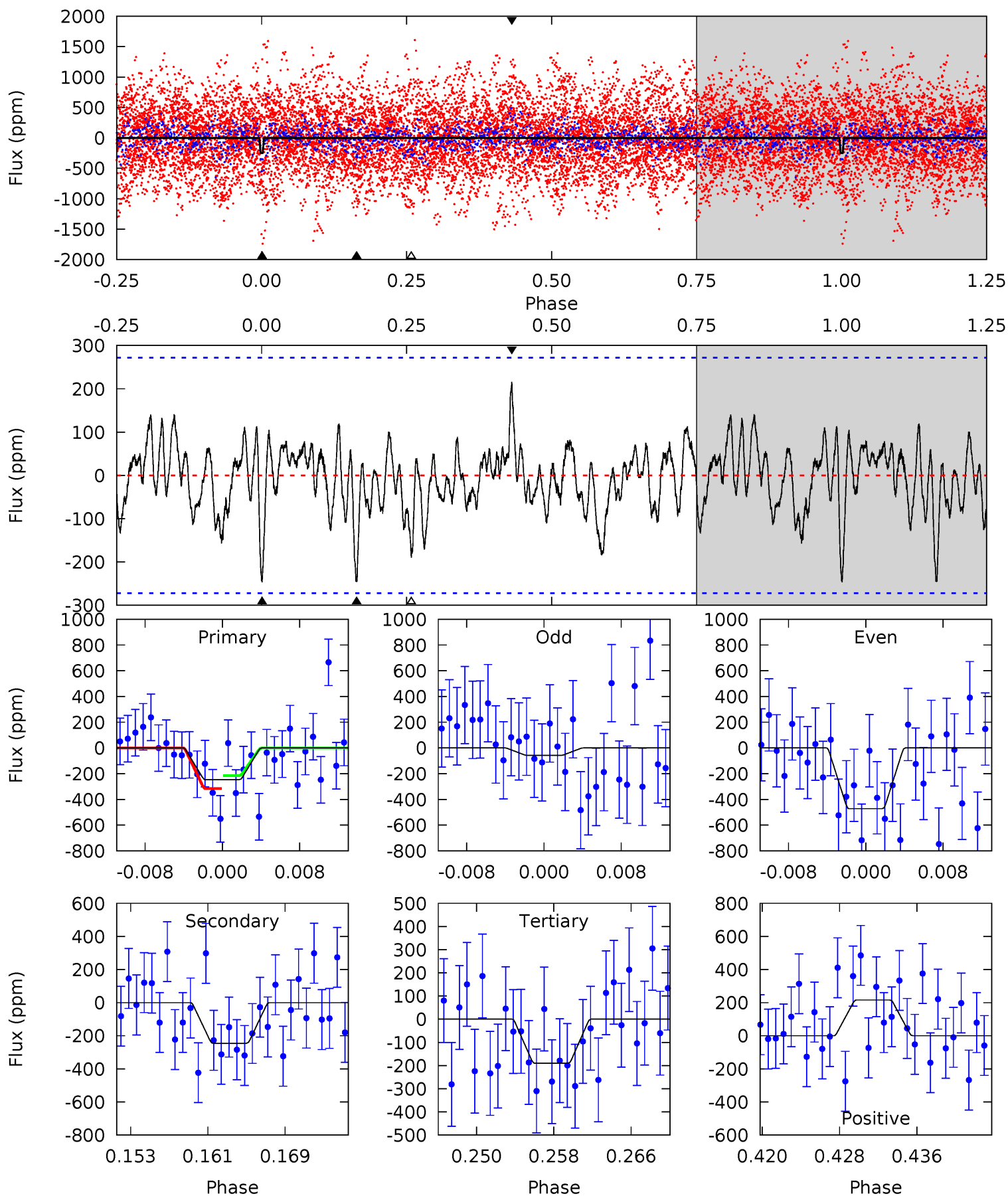




# Alt Model-Shift Uniqueness Test

009772075-06, P = 10.115846 Days, E = 123.429072 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
4.60	4.58	3.53	4.03	5.07	2.65	1.19	1.07	0.57	1.04	0.55	3.87	0.56	0.47	0.93



### Stellar Parameters For KIC 009772075

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$7256^{+201}_{-302}$	$3.874^{+0.308}_{-0.132}$	$0.000^{+0.200}_{-0.350}$	$2.567^{+0.518}_{-0.962}$	$1.796^{+0.177}_{-0.412}$	$0.150^{+0.334}_{-0.060}$
	+3%/-4%	+8%/-3%	+inf%/-inf%	+20%/-37%	+10%/-23%	+223%/-40%
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 009772075-06 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-61 \pm 9$	$2.70^{+1.74}_{-1.30}$	$2102^{+155}_{-196}$	$6093^{+2906}_{-1176}$	$54^{+150}_{-34}$
Alt.	$-246 \pm 54$	$4.69^{+1.81}_{-1.65}$	$2106^{+154}_{-195}$	$6688^{+1729}_{-969}$	$74^{+98}_{-36}$

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

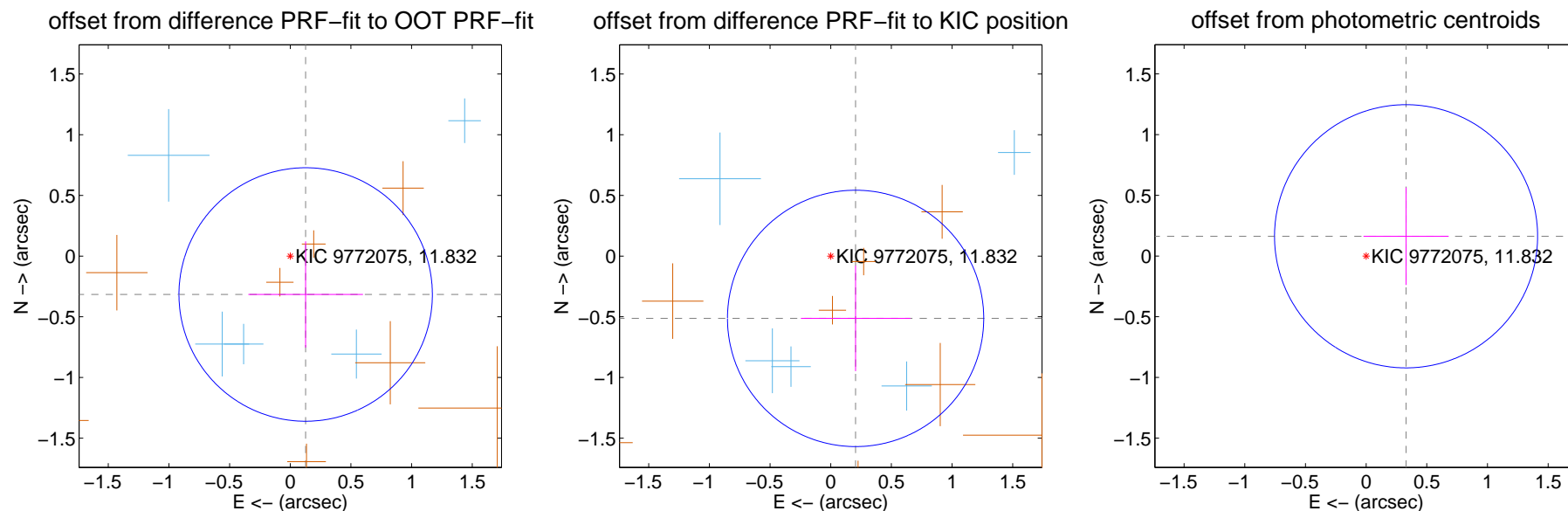
## DV Centroid Data

Supplemental centroid analysis for 009772075-06. **Kepler magnitude: 11.83.** Transit SNR 8.58

There are 6 quarters with good PRF difference image offsets

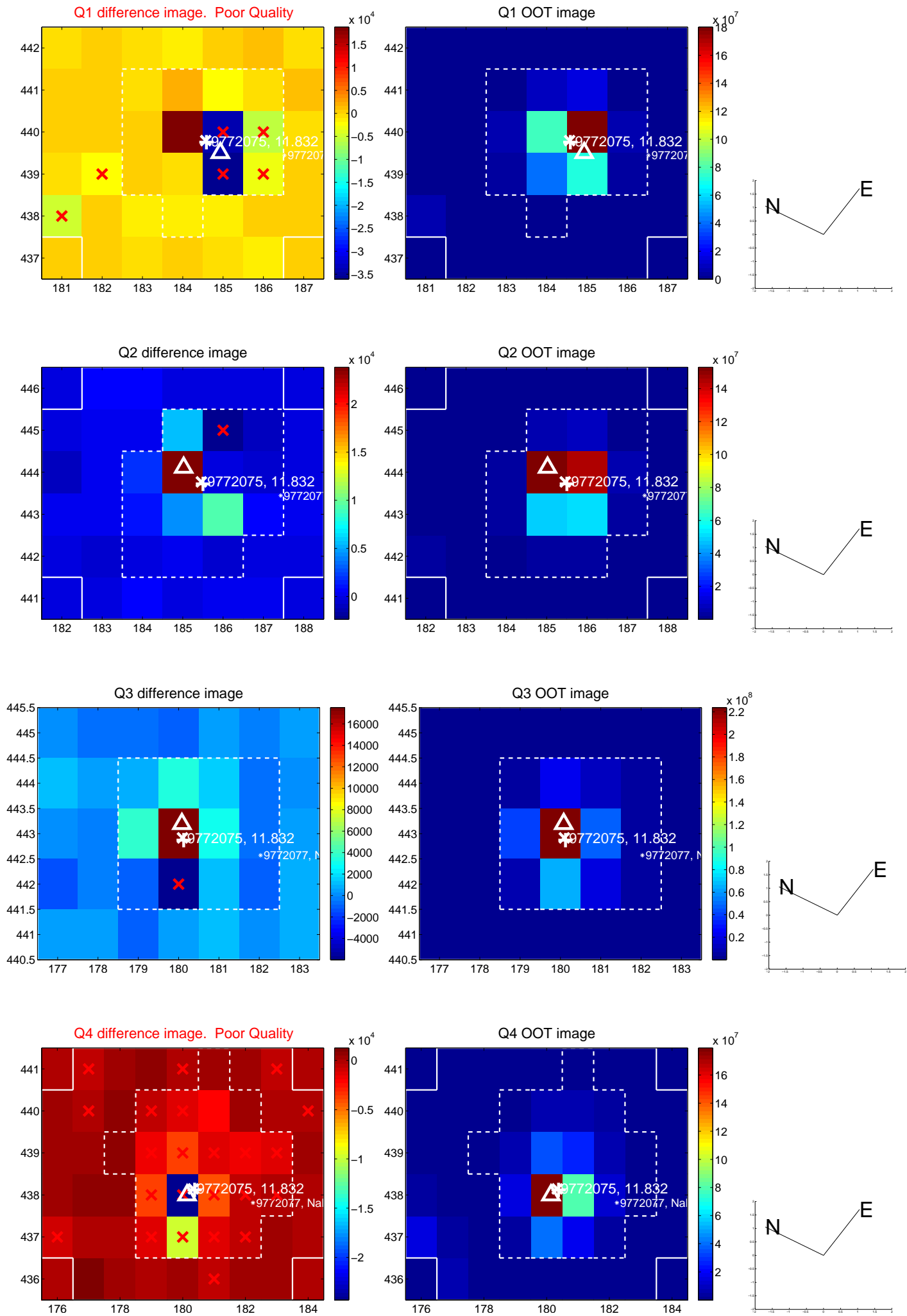
The direct PRF centroid is offset from the target star catalog position by about 0.20 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.341 \pm 0.348$	0.98	$-0.127 \pm 0.472$	$-0.316 \pm 0.437$
PRF-fit source offset from KIC position	$0.553 \pm 0.352$	1.57	$-0.205 \pm 0.451$	$-0.513 \pm 0.435$
photometric centroid source offset	$0.37 \pm 0.36$	1.02	$-0.33 \pm 0.35$	$0.16 \pm 0.40$

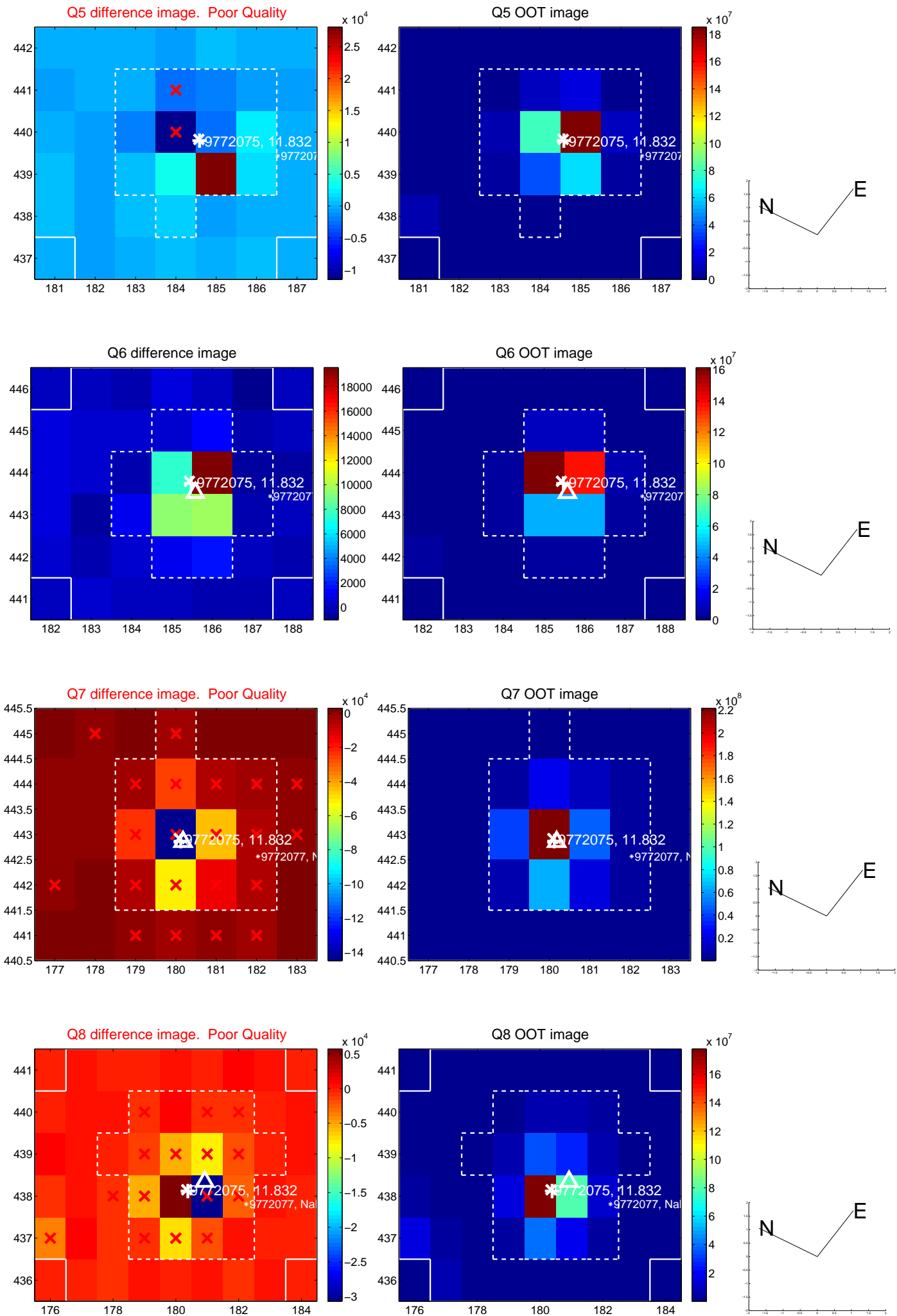


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

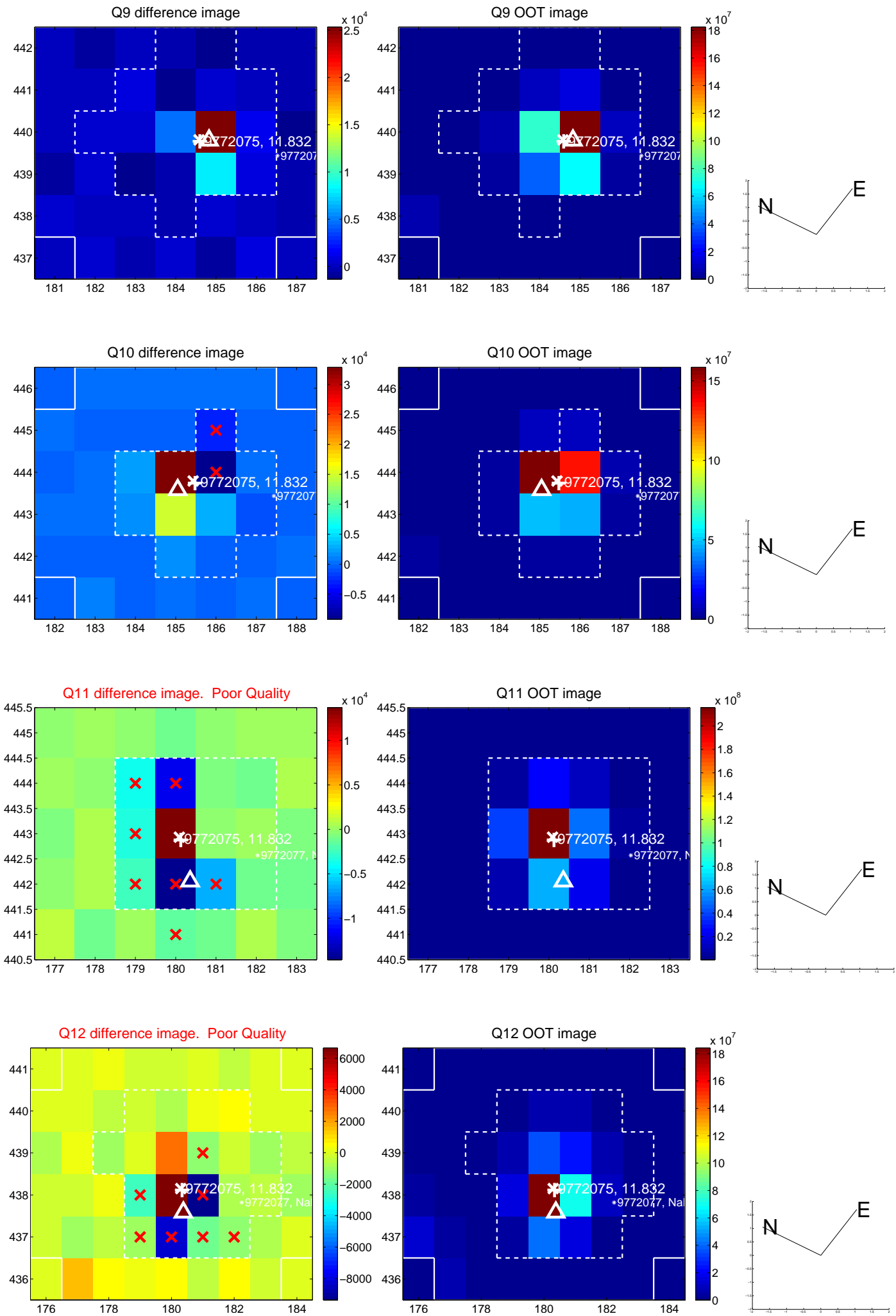
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



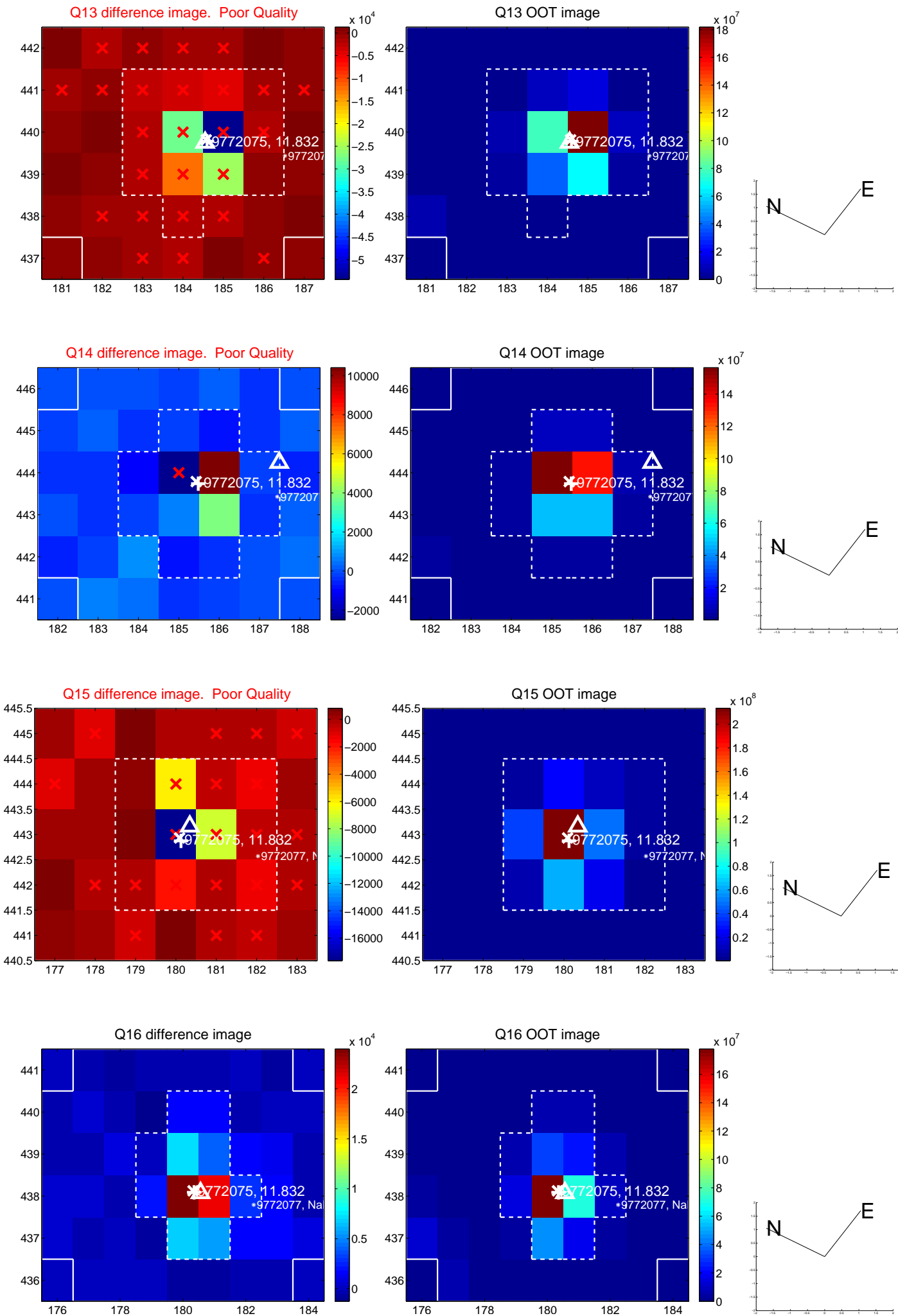
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

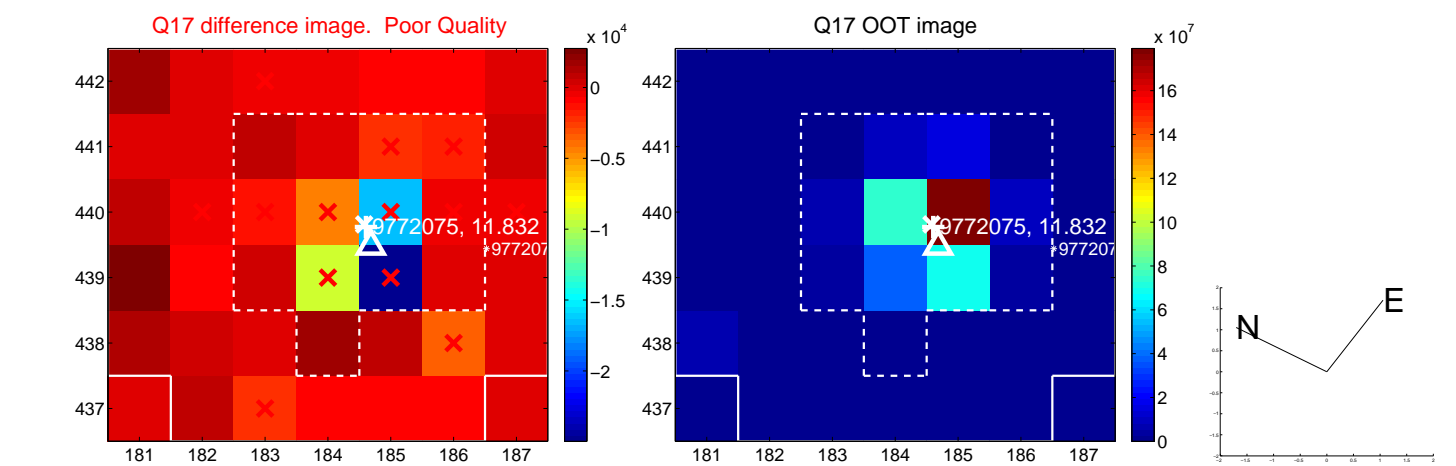


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

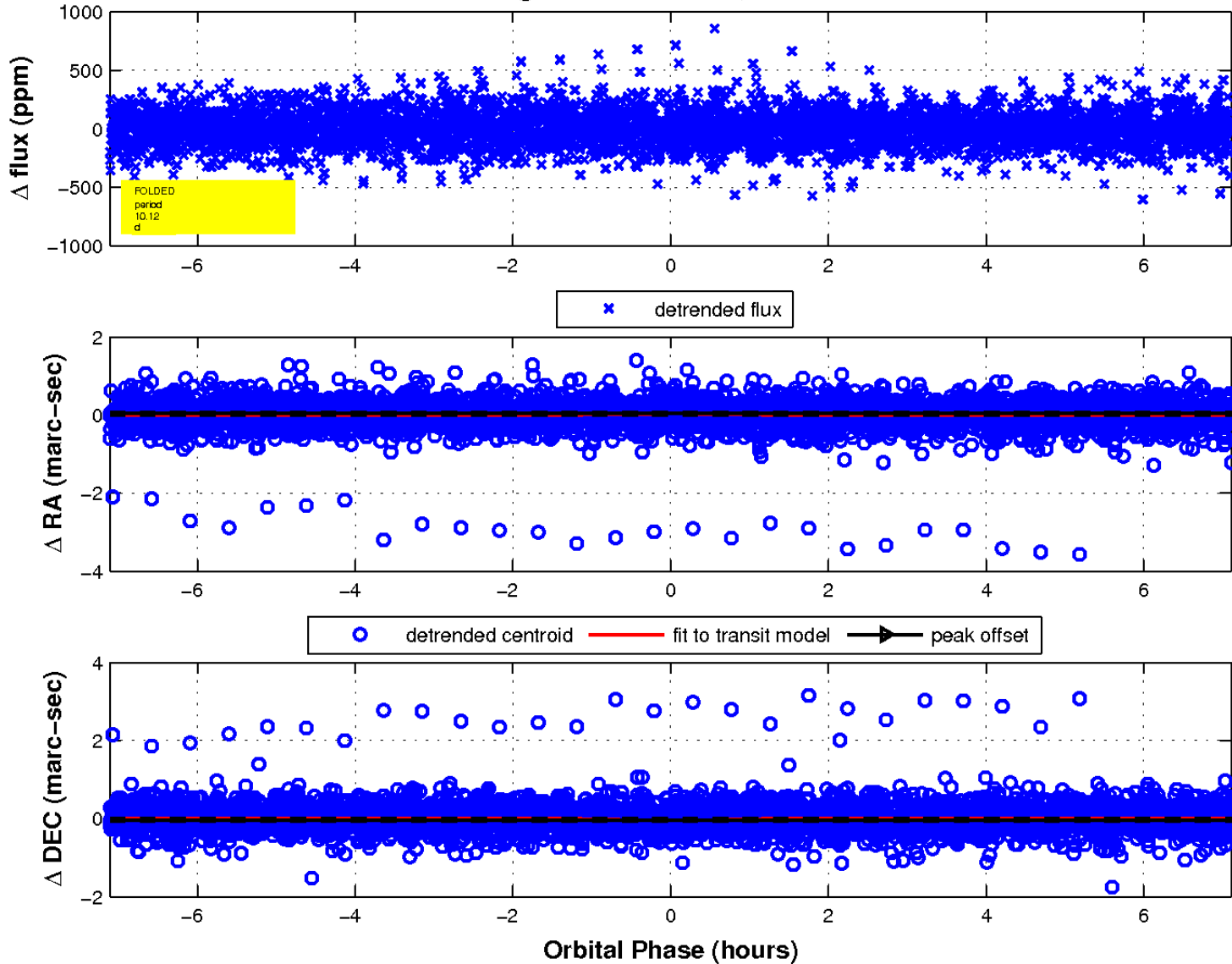




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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UKIRT Image

Declination

