

# KIC 010330495

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010330495-01	OBS	7310.01	18.060075	138.611204	59290.9	11.570	3216.9	2311.8	0.85	5330	20.74	34.47
010330495-02	OBS	No	9.030026	138.155686	8523.2	10.113	488.7	448.6	0.85	5330	8.33	86.87

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010330495-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—MOD_ODDEVEN_DV—HAS_SEC_TCE
010330495-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE

**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.

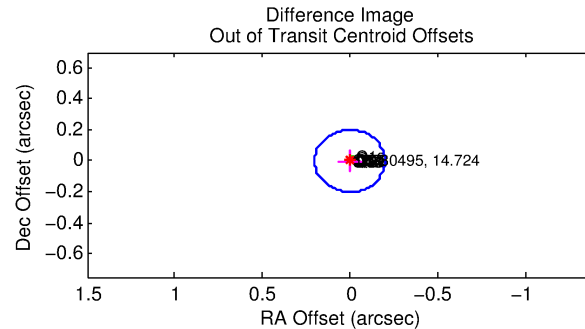
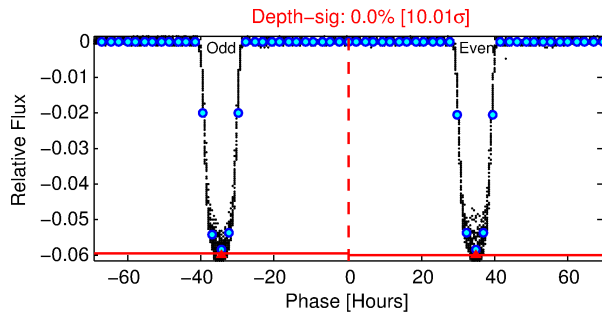
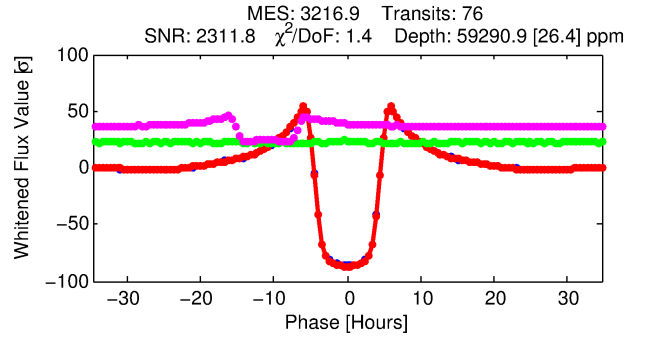
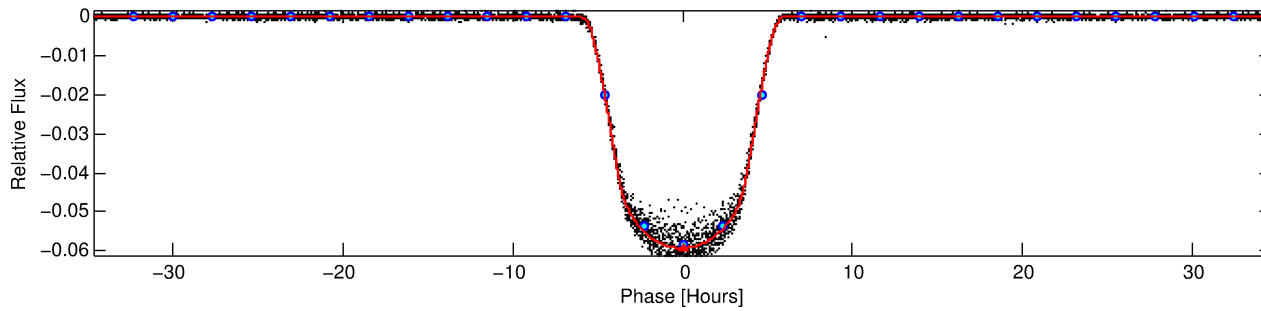
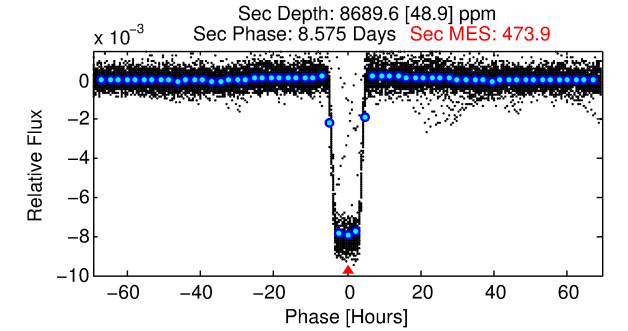
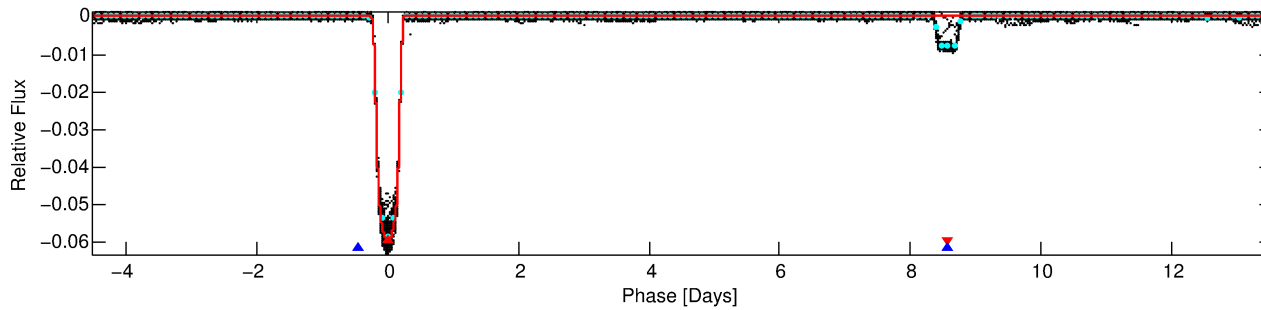
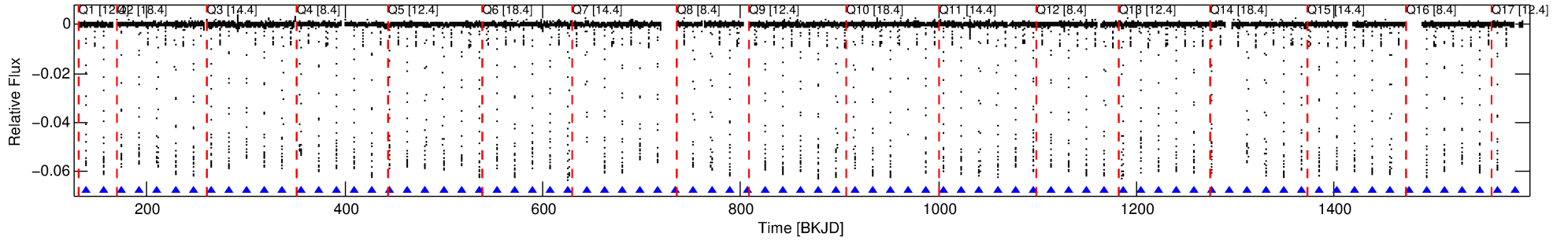
## Ephemeris Match Information For 010330495-01

No Significant Match Found

# DV One-Page Summary

KIC: 10330495 Candidate: 1 of 2 Period: 18.060 d  
KOI: K07310.01 Corr: 1.000

Kp: 14.72 R\*: 0.85 Rs Teff: 5330.0 K Logg: 4.46 Fe/H: -0.180



## DV Fit Results:

Period = 18.06007 [0.00000] d  
Epoch = 138.6112 [0.0001] BKJD  
Rp/R\* = 0.2223 [0.0001]  
a/R\* = 14.09 [0.01]  
b = 0.32 [0.00]  
Seff = 34.47 [9.18]  
Teq = 618 [41] K  
Rp = 20.74 [3.66] Re  
a = 0.1238 [0.0191] AU  
Ag = 170.46 [39.51] [4.29σ]  
Teffp = 3452 [113] K [23.49σ]

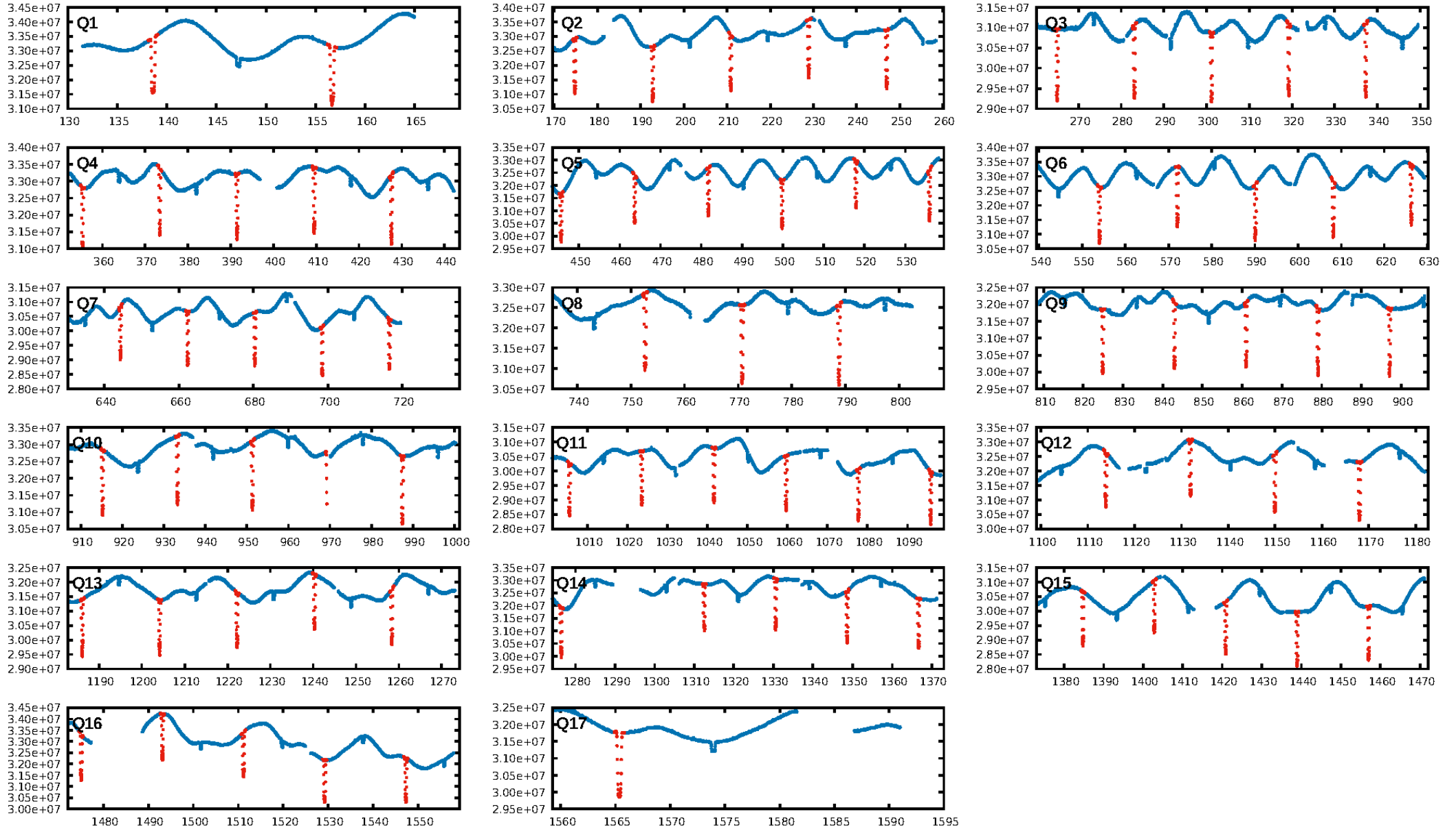
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [14.10σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 0.2%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [73/73]  
GhostDiagnostic-chr: 1.658  
Centroid-sig: 0.0%  
Centroid-so: 0.068 arcsec [31.99σ]  
OotOffset-rm: 0.003 arcsec [0.05σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-rm: 0.145 arcsec [2.08σ]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 0.00 [0/17]

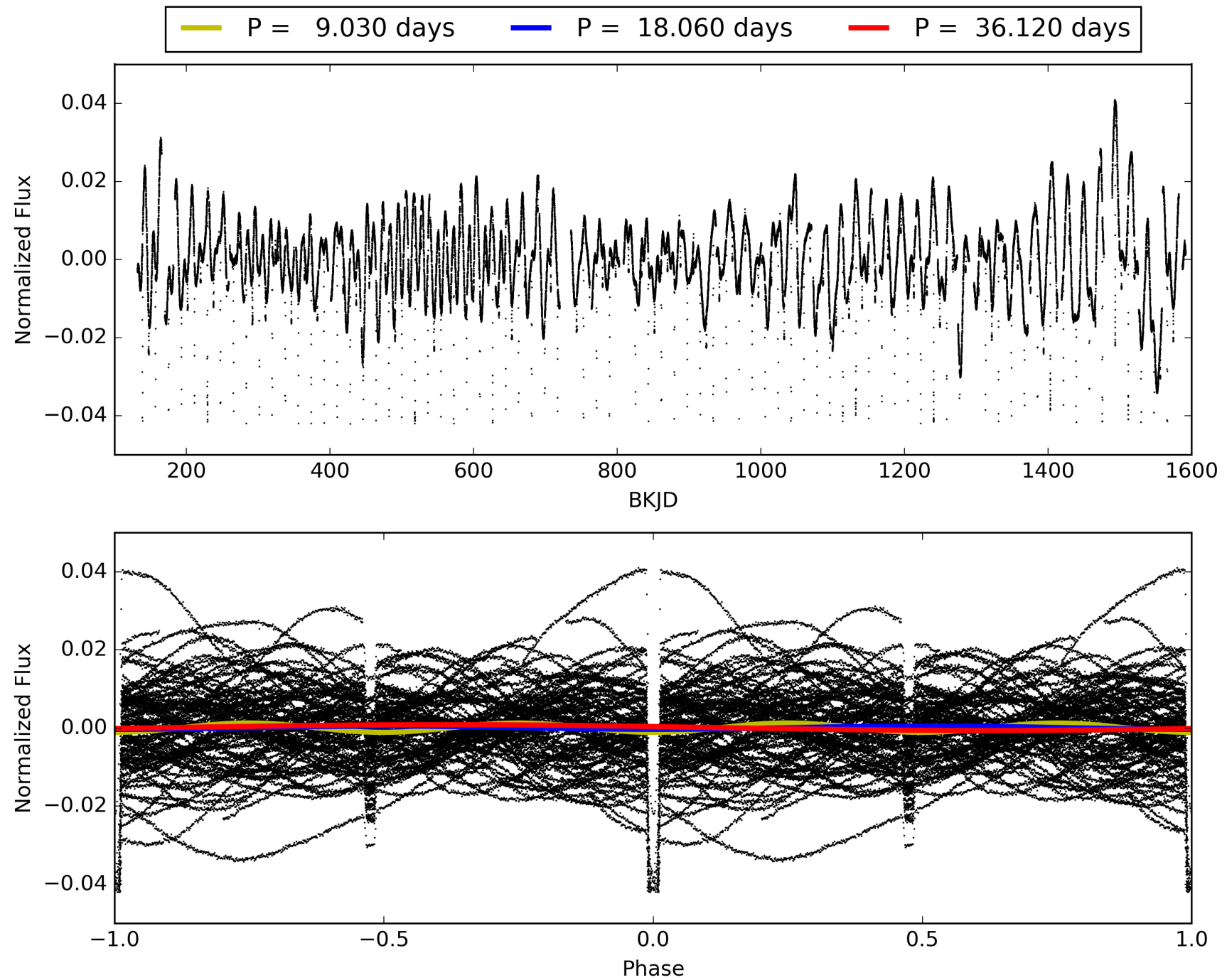
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 17:26:23 Z

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

# TCE 010330495-01, PDC Light Curves

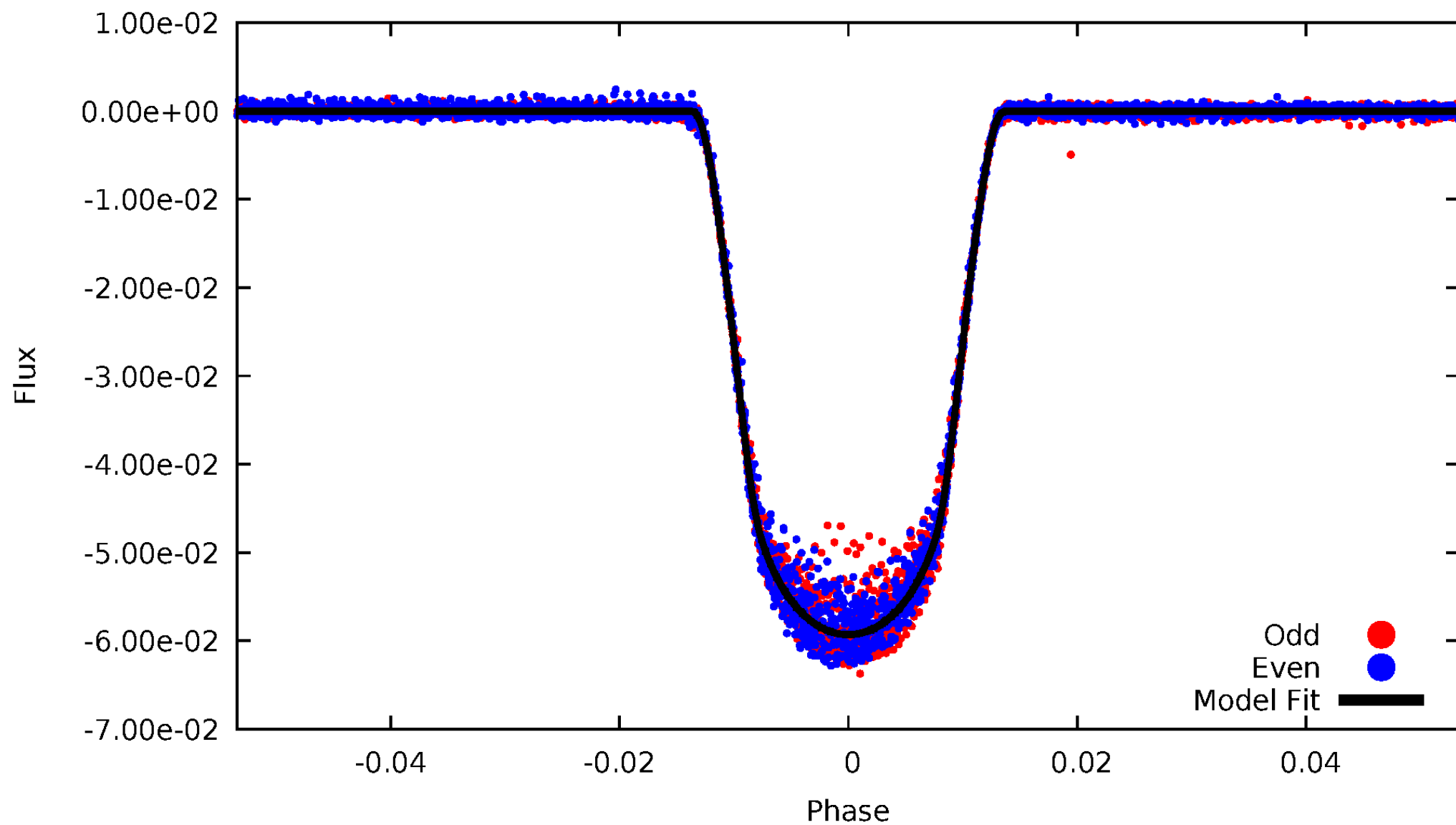


TCE 010330495-01



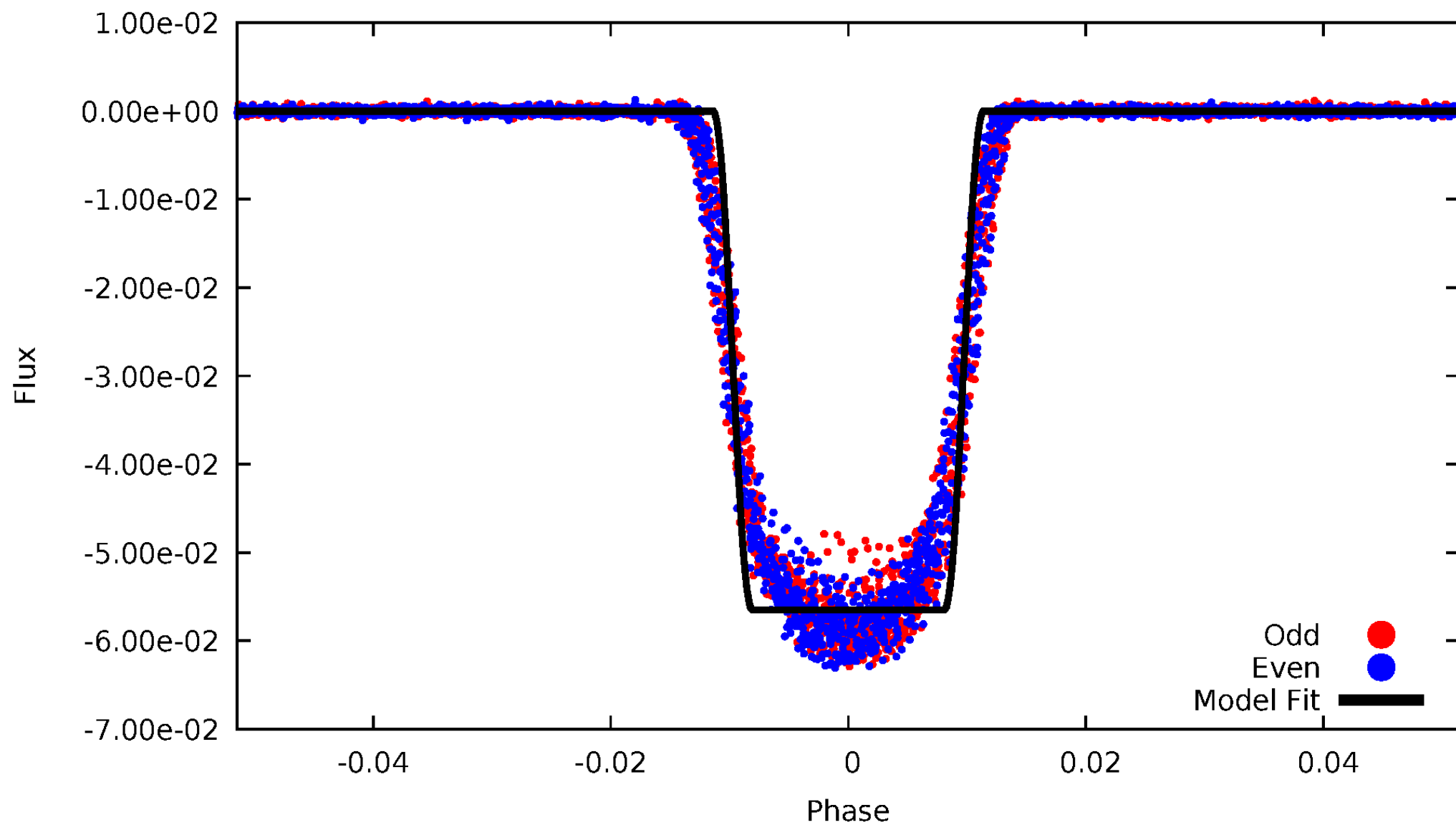
# DV Odd/Even

TCE 010330495-01



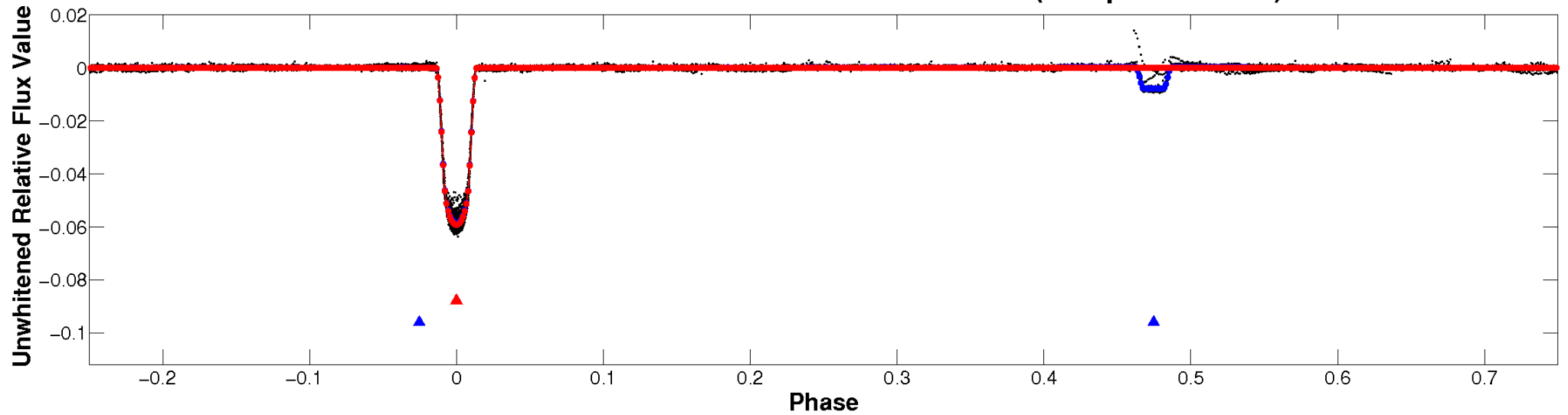
# ALT Odd/Even

TCE 010330495-01

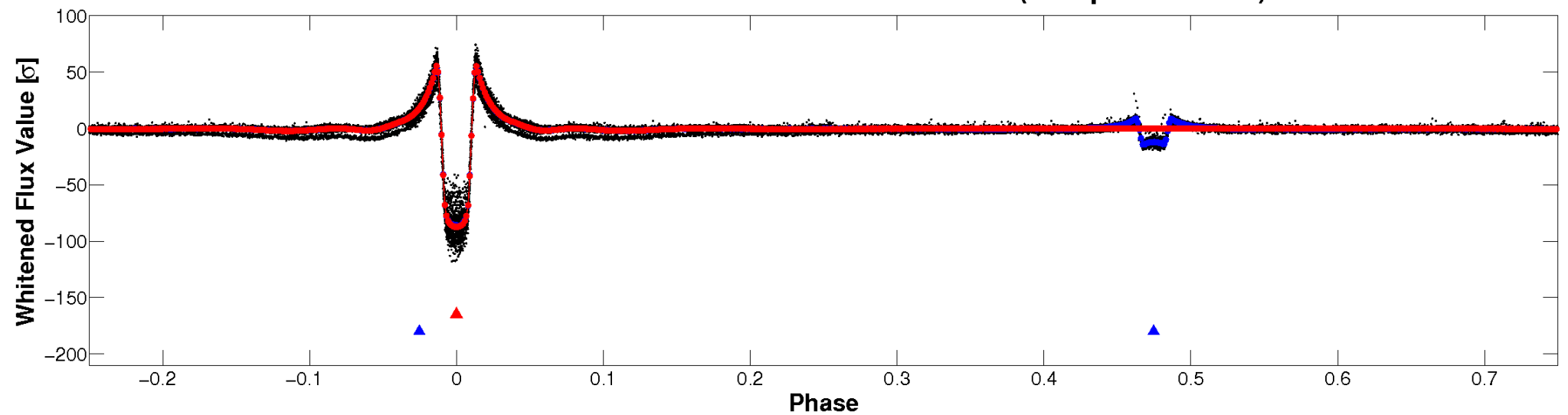


# Non-Whitened Vs. Whitened Light Curve

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

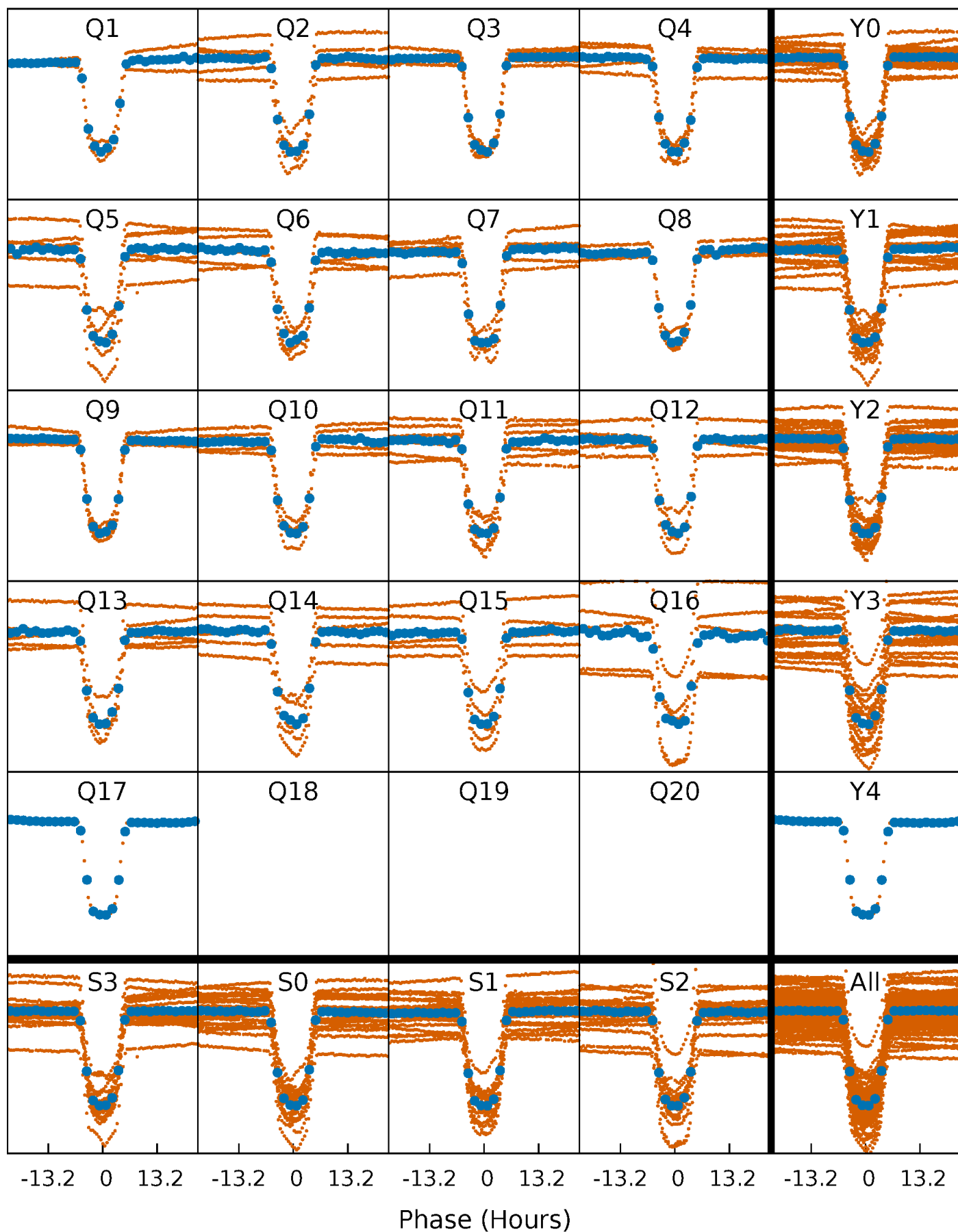


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

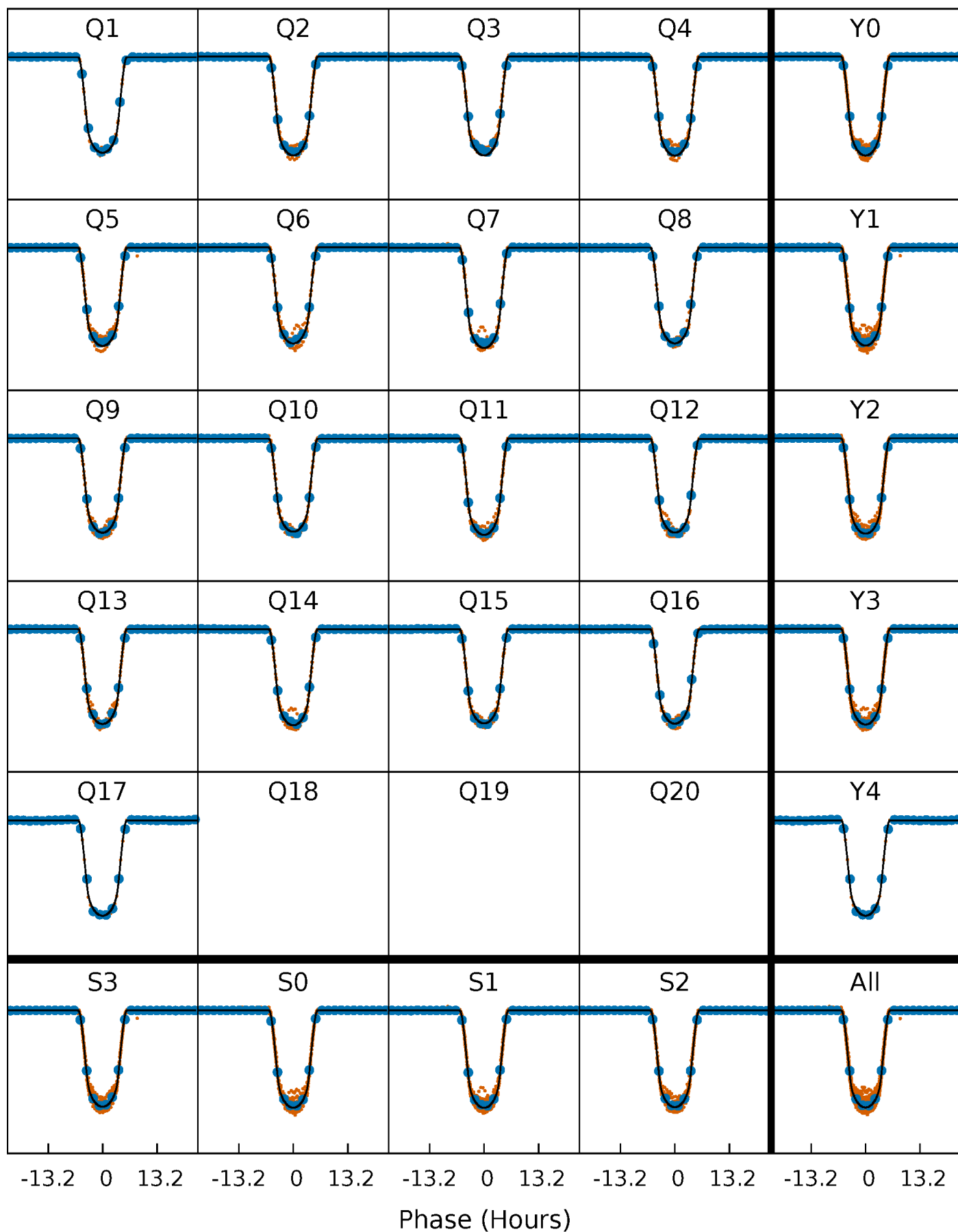
TCE 010330495-01 P= 18.060075 Days  $T_0=138.611204$  (BKJD)





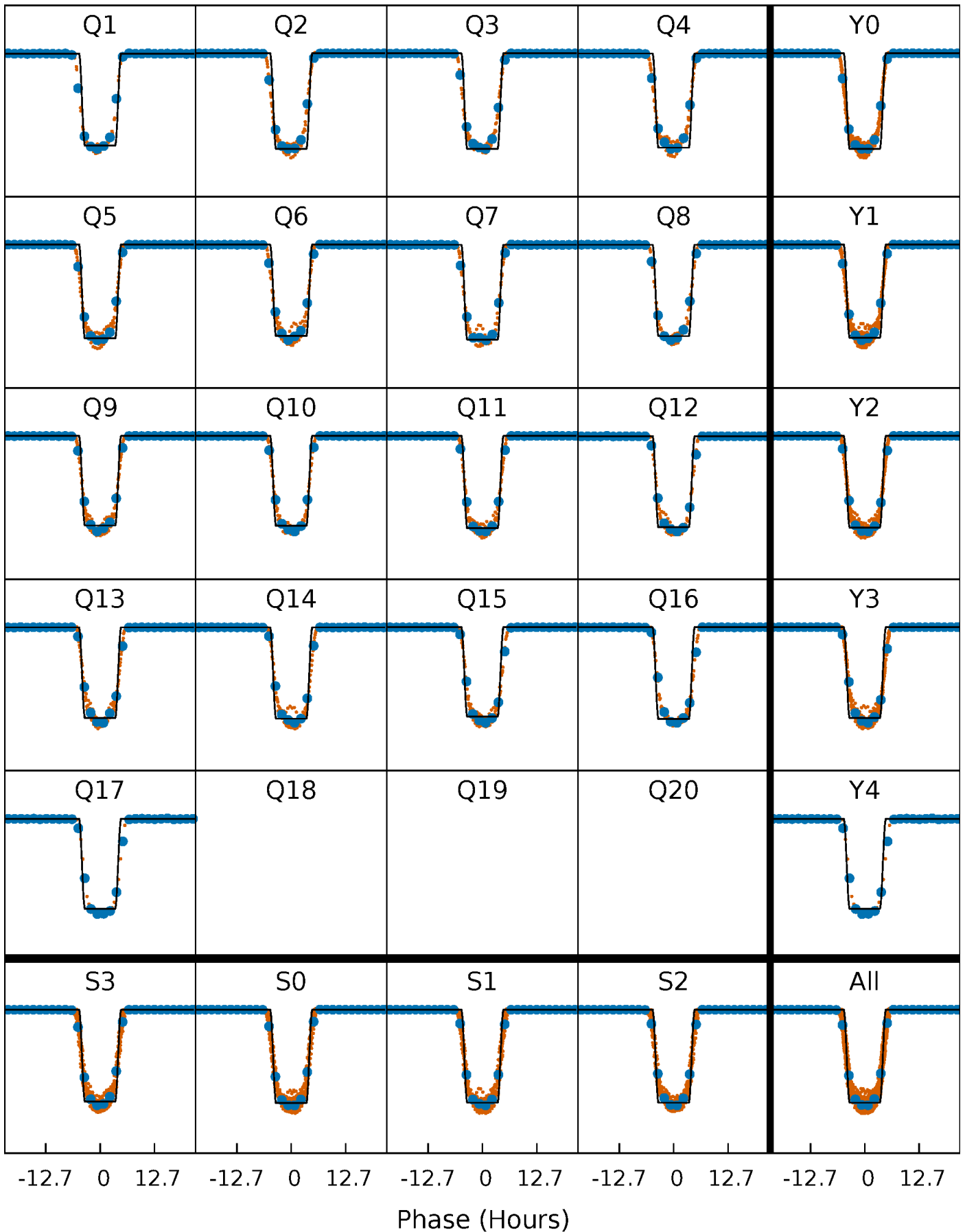
# DV Quarter-Phased Transit Curves

TCE 010330495-01 P= 18.060075 Days  $T_0=138.611204$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

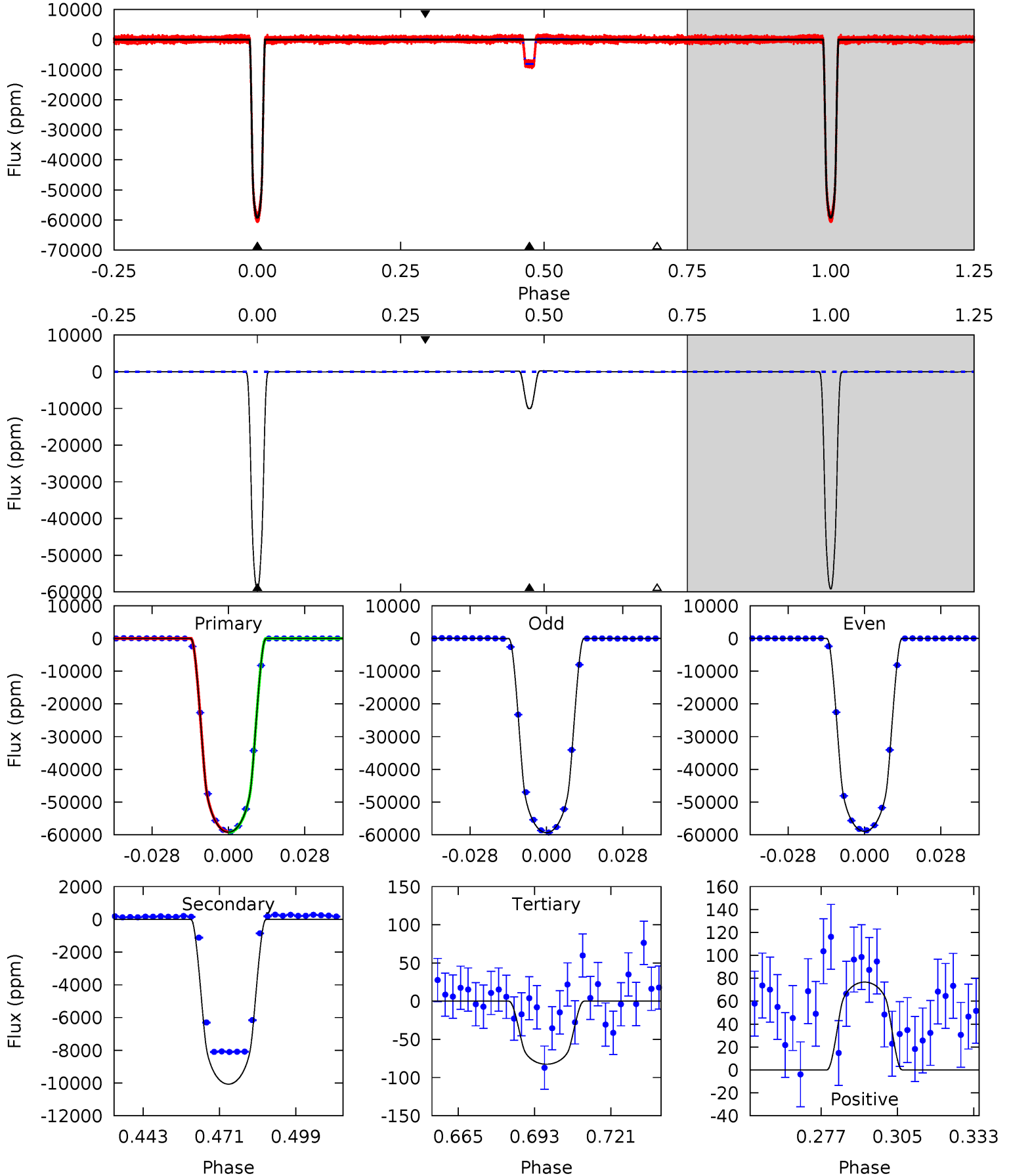
TCE 010330495-01   P= 18.059635 Days    $T_0=138.629155$  (BKJD)



# DV Model-Shift Uniqueness Test

010330495-01, P = 18.060075 Days, E = 120.551129 Days

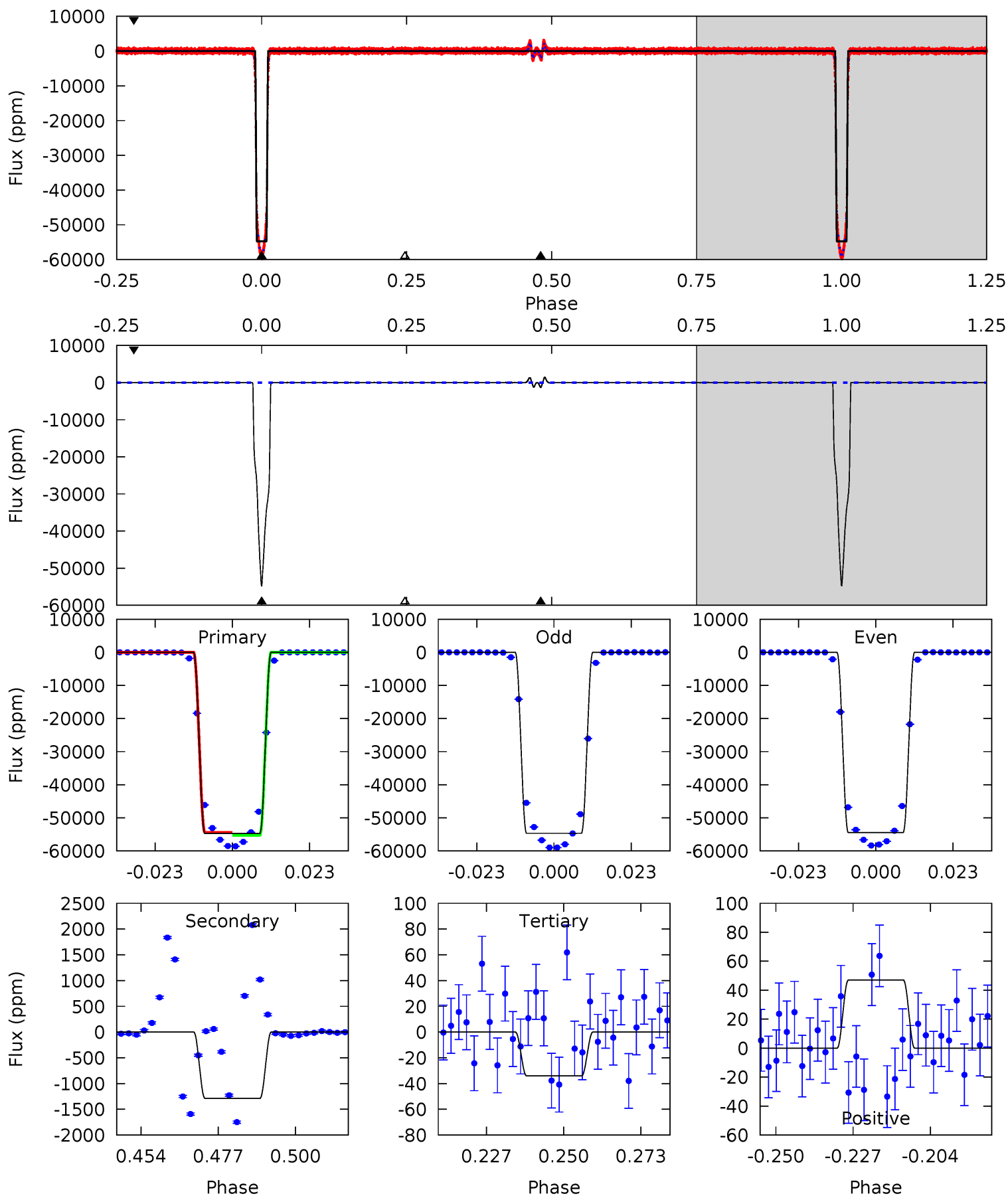
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5465	929.4	7.62	7.07	4.83	2.20	5.39	5457	5458	921.8	922.4	17.6	1.00	0.00	0



# Alt Model-Shift Uniqueness Test

010330495-01, P = 18.059635 Days, E = 120.569520 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
4055	95.4	2.52	3.48	4.87	2.28	1.19	4053	4052	92.9	91.9	8.20	0.99	0.03	0



### Stellar Parameters For KIC 010330495

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5330^{+175}_{-159}$	$4.464^{+0.117}_{-0.130}$	$-0.180^{+0.300}_{-0.300}$	$0.855^{+0.151}_{-0.113}$	$0.776^{+0.113}_{-0.061}$	$1.749^{+0.834}_{-0.661}$
	+3%/-3%	+3%/-3%	+167%/-167%	+18%/-13%	+15%/-8%	+48%/-38%
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 010330495-01 / KOI 7310.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-10071 \pm 11$	$21.04^{+2.29}_{-1.83}$	$868^{+52}_{-45}$	$3911^{+103}_{-93}$	$196^{+38}_{-34}$
Alt.	$-1288 \pm 14$	$22.26^{+2.61}_{-1.73}$	$866^{+50}_{-44}$	$2796^{+54}_{-51}$	$22^{+4}_{-4}$

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

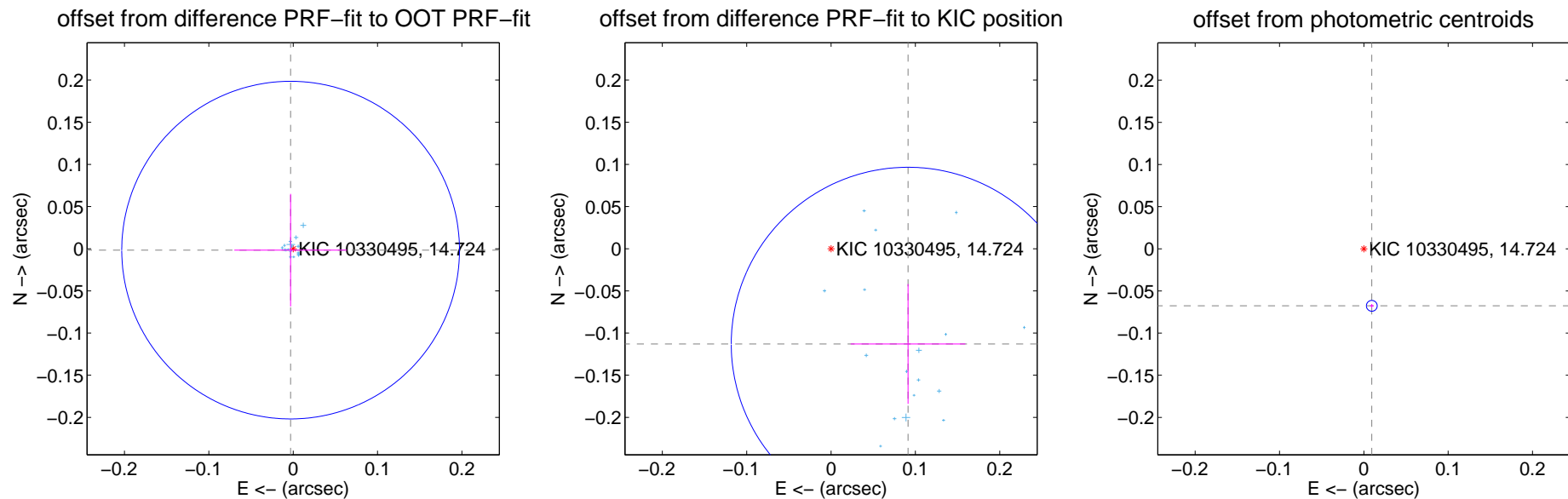
## DV Centroid Data

Supplemental centroid analysis for 010330495-01. Kepler magnitude: 14.72. Transit SNR 2311.76

There are 17 quarters with good PRF difference image offsets

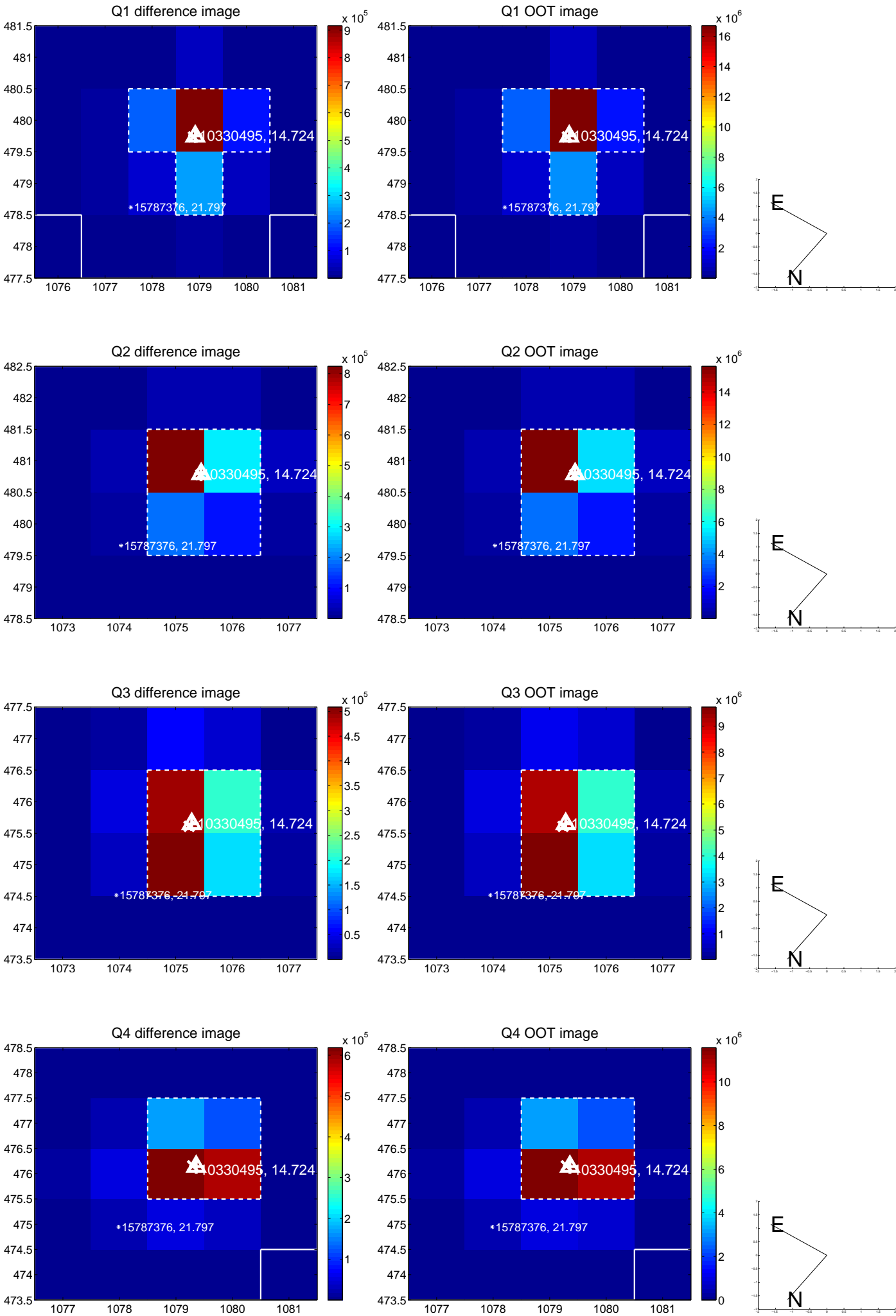
The direct PRF centroid is offset from the target star catalog position by about 0.22 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.003 \pm 0.067$	0.05	$0.003 \pm 0.067$	$-0.002 \pm 0.067$
PRF-fit source offset from KIC position	$0.145 \pm 0.070$	2.08	$-0.091 \pm 0.068$	$-0.113 \pm 0.071$
photometric centroid source offset	$0.07 \pm 0.00$	31.99	$-0.01 \pm 0.00$	$-0.07 \pm 0.00$

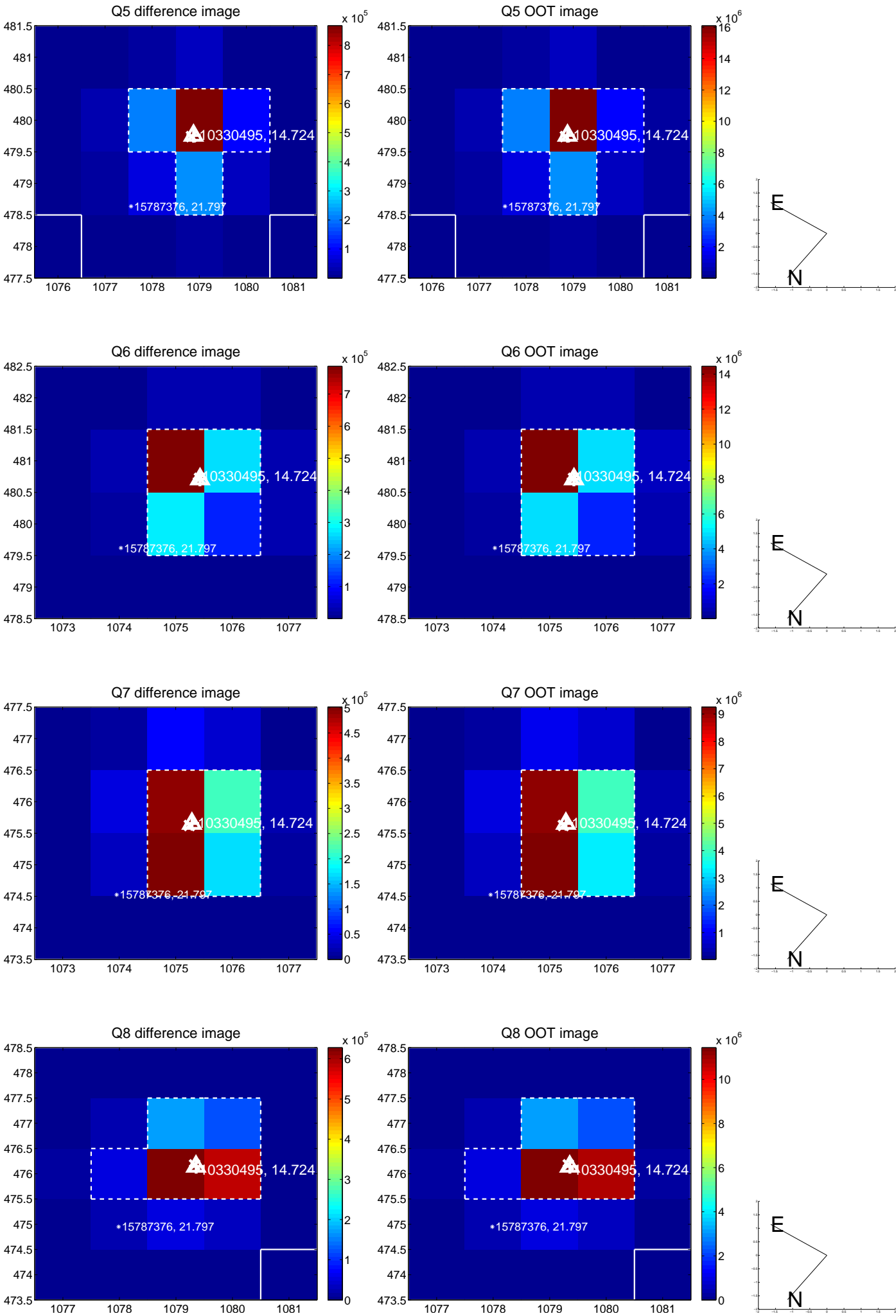


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

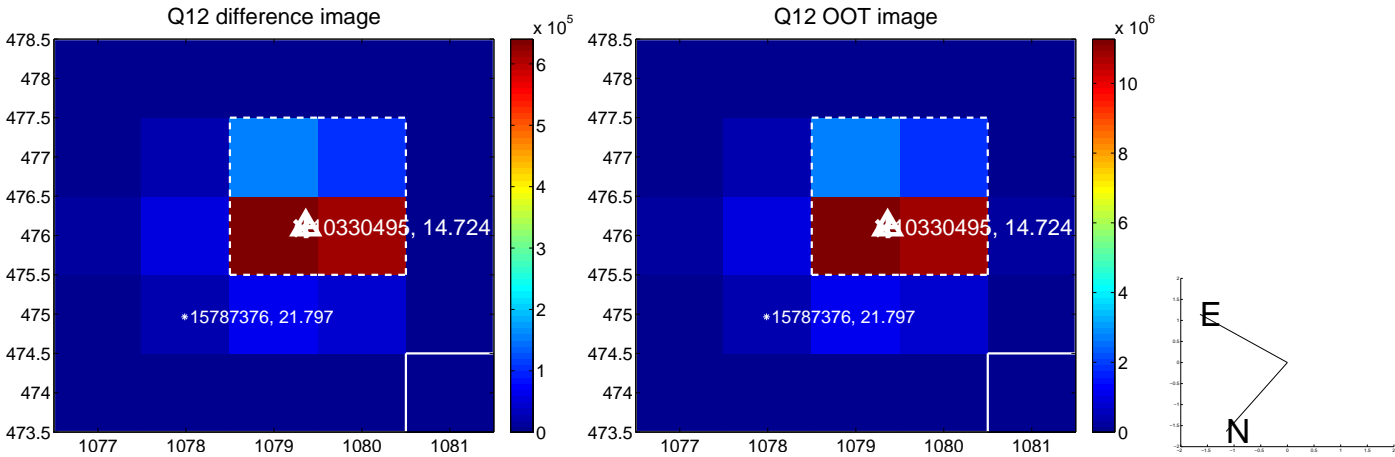
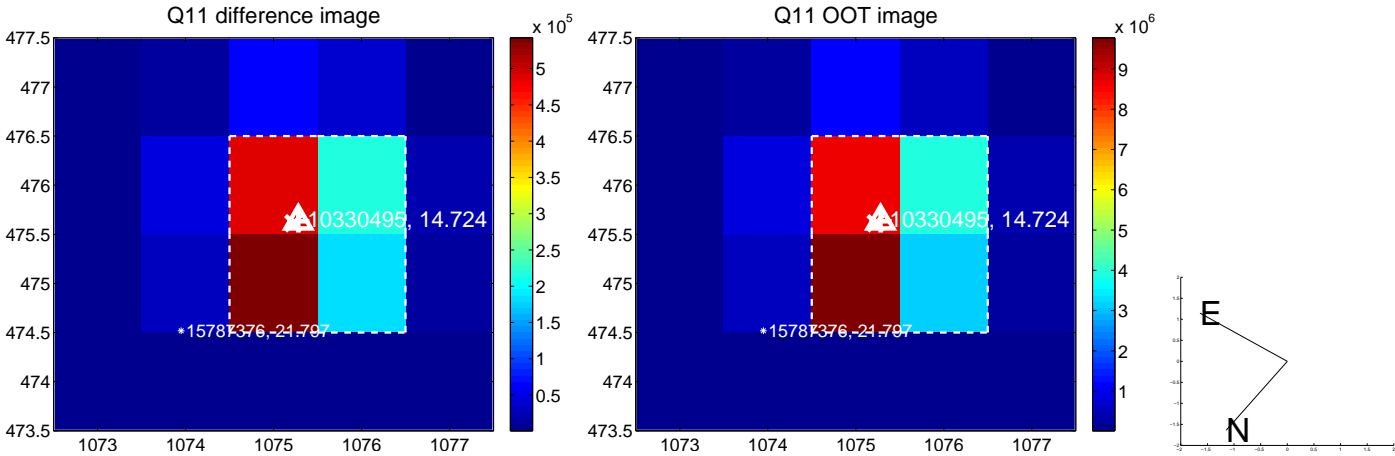
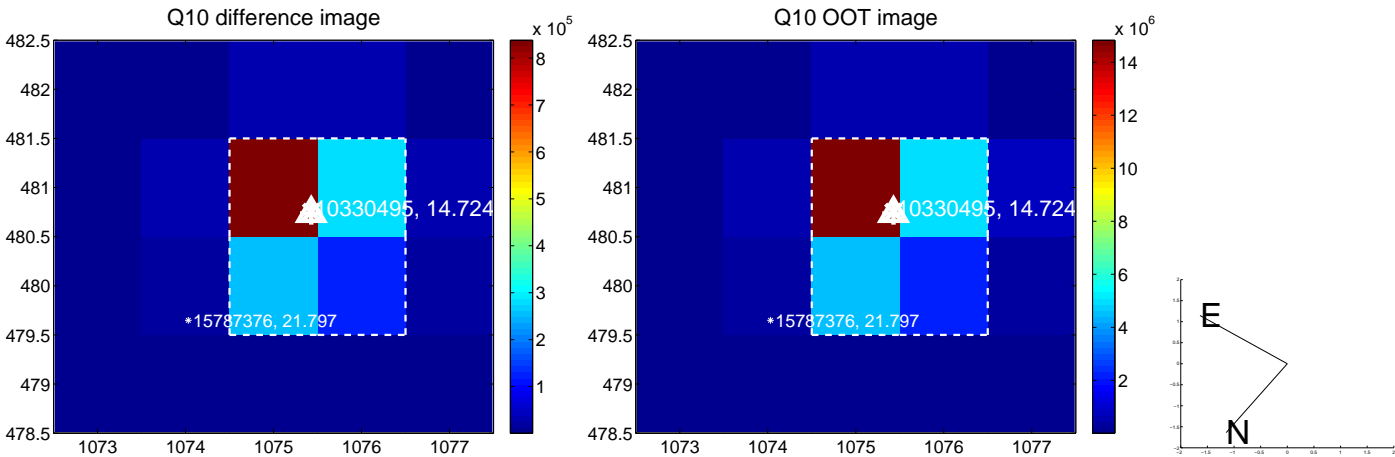
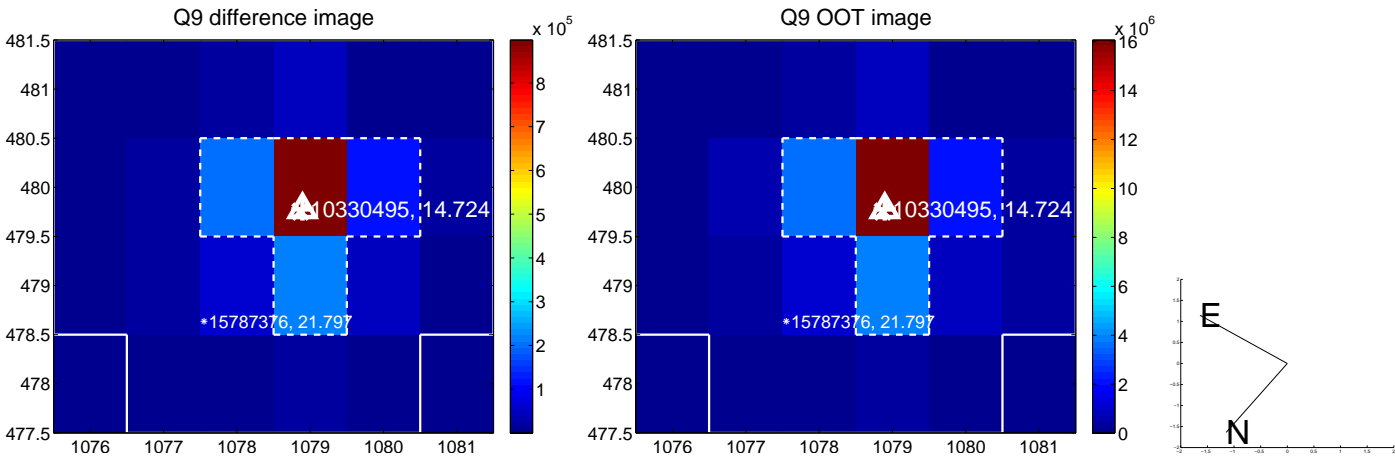


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

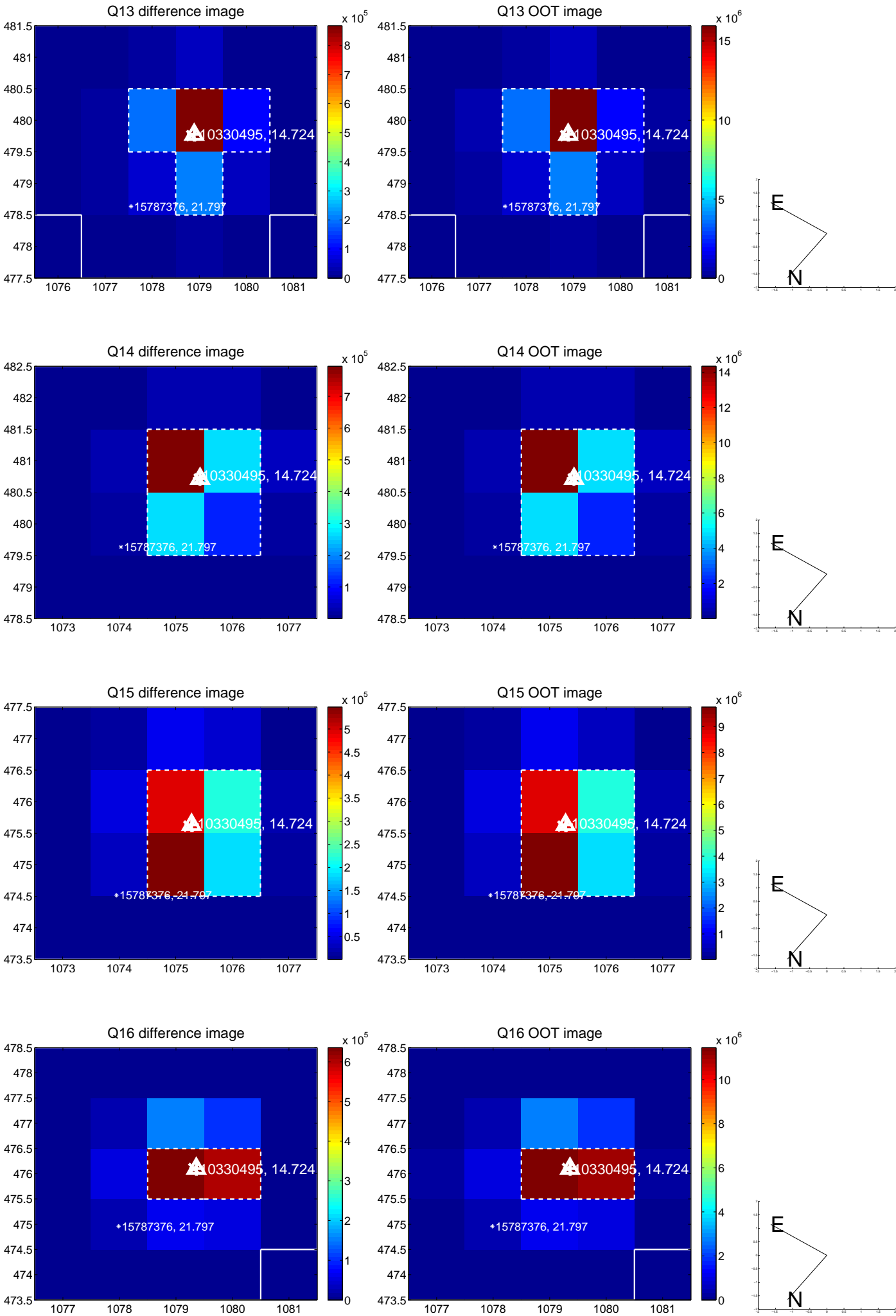




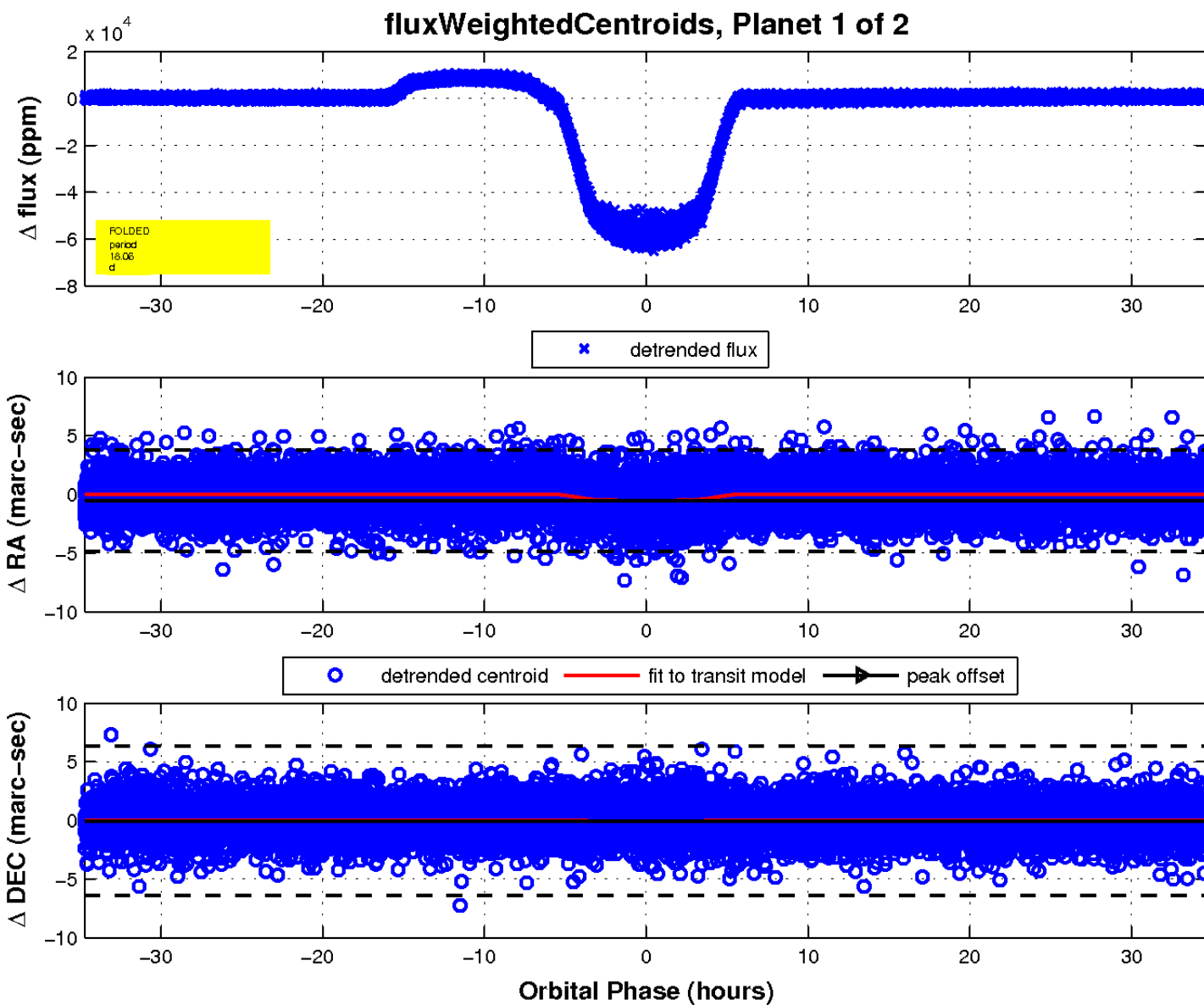
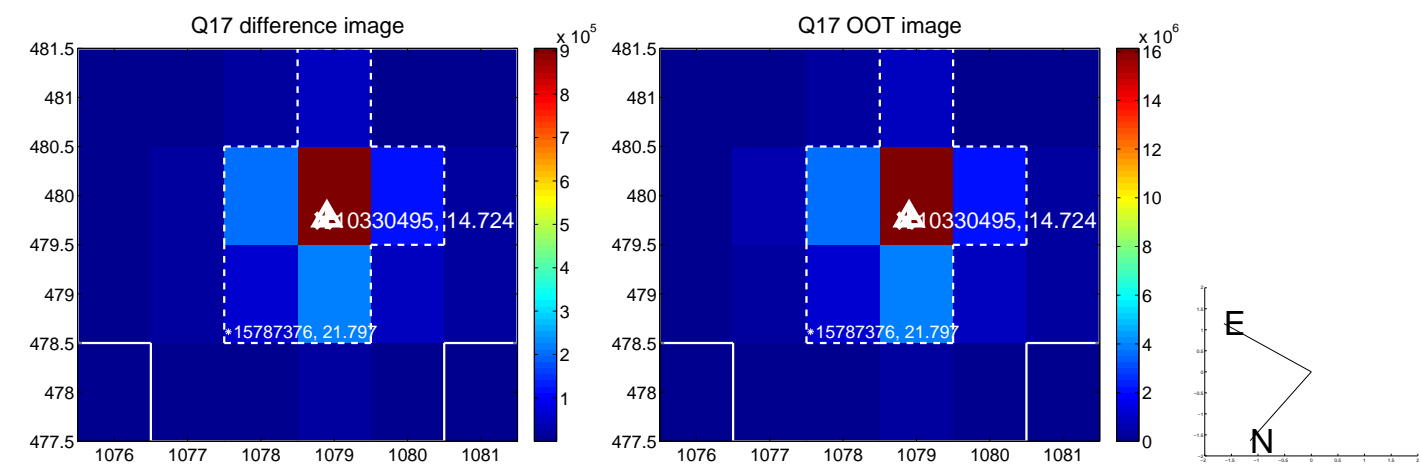
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

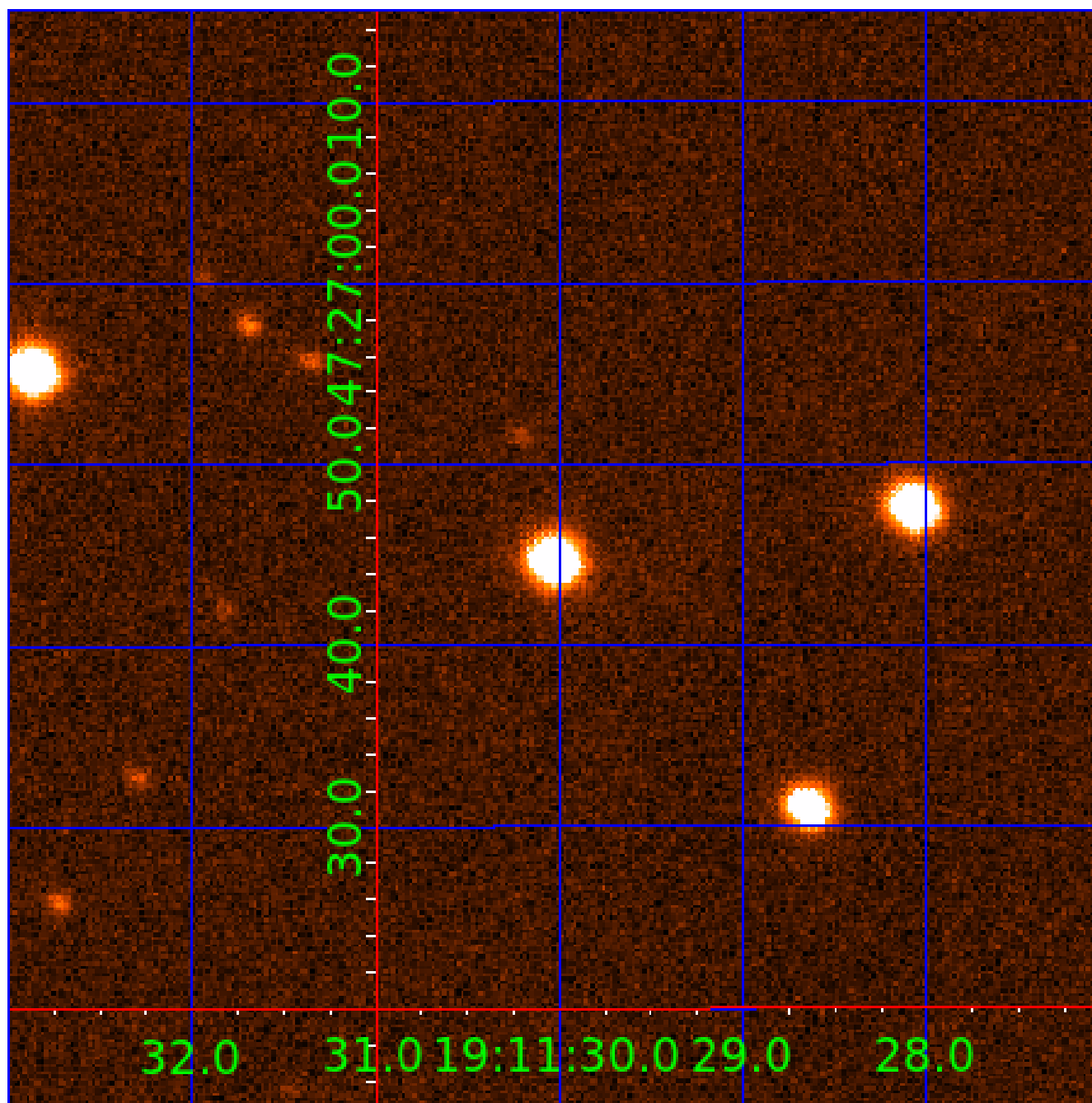


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 010330495

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010330495-01	OBS	7310.01	18.060075	138.611204	59290.9	11.570	3216.9	2311.8	0.85	5330	20.74	34.47
010330495-02	OBS	No	9.030026	138.155686	8523.2	10.113	488.7	448.6	0.85	5330	8.33	86.87

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010330495-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—MOD_ODDEVEN_DV—HAS_SEC_TCE
010330495-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE

**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 010330495-02

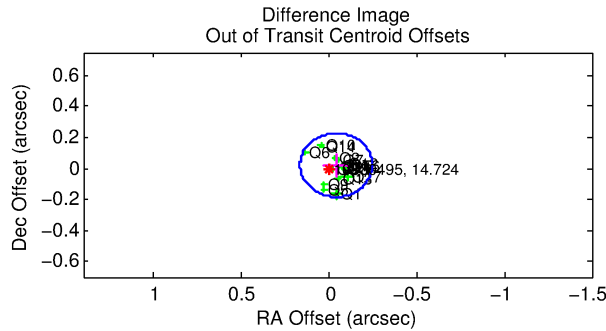
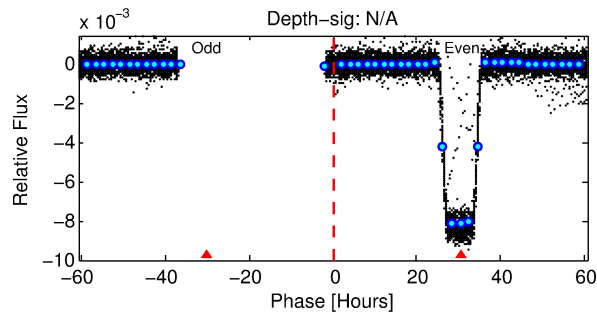
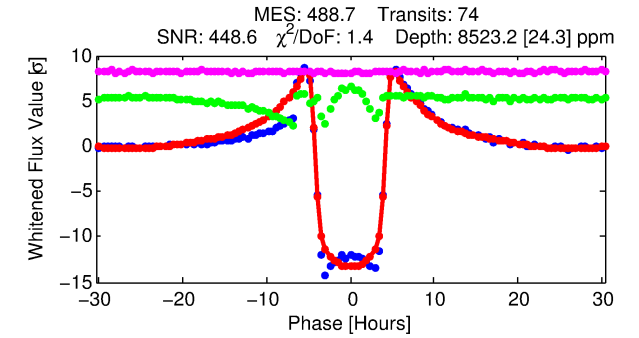
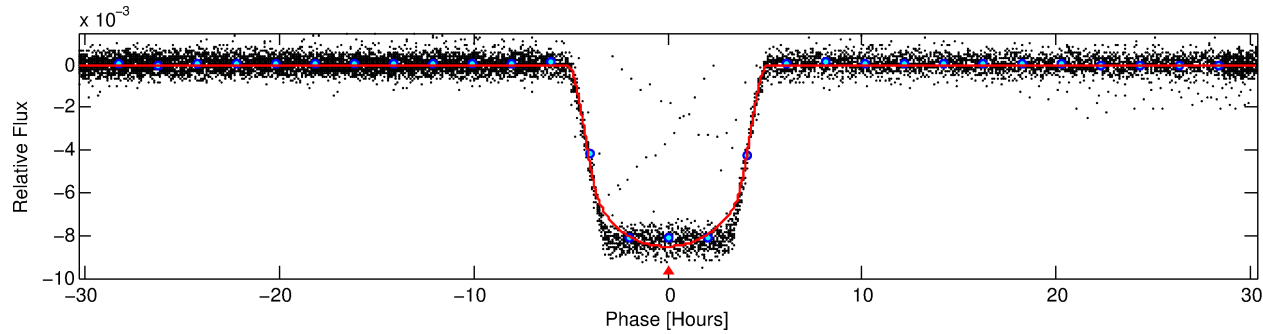
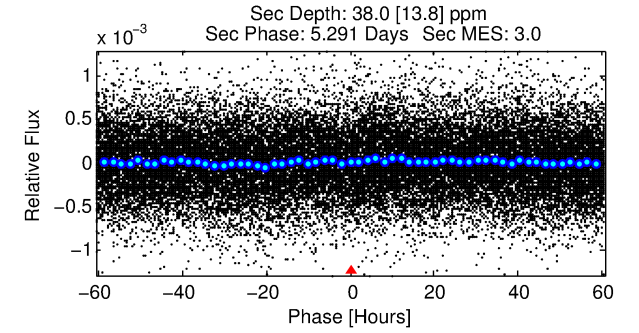
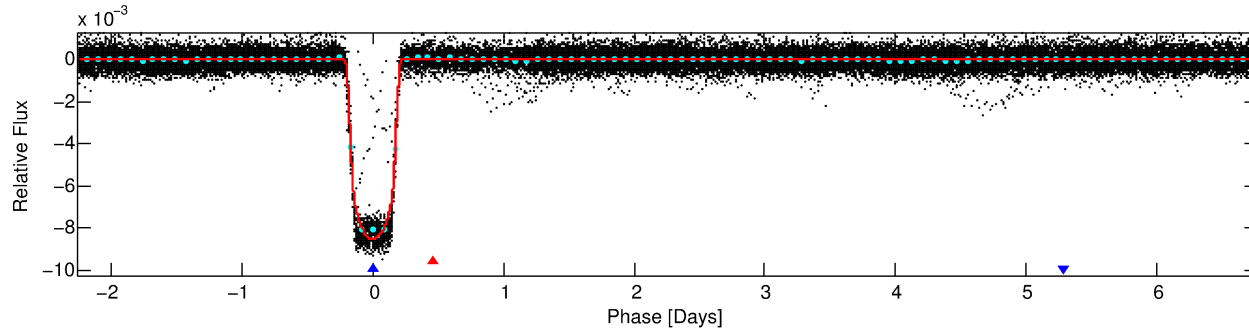
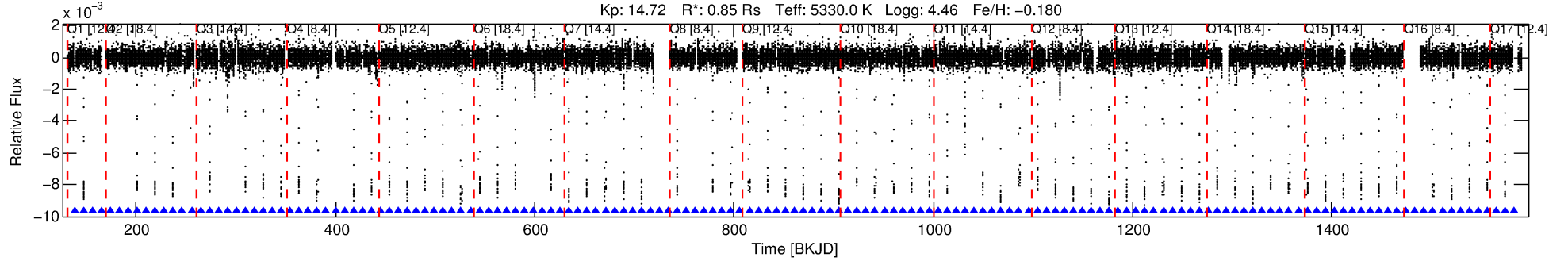
No Significant Match Found

# DV One-Page Summary

KIC: 10330495 Candidate: 2 of 2 Period: 9.030 d

KOI: K07310 Corr: No Ephemeris Match

Kp: 14.72 R\*: 0.85 Rs Teff: 5330.0 K Logg: 4.46 Fe/H: -0.180



## DV Fit Results:

Period = 9.03003 [0.00000] d  
Epoch = 138.1557 [0.0004] BKJD  
Rp/R\* = 0.0893 [0.0003]  
a/R\* = 5.95 [0.05]  
b = 0.66 [0.01]  
Seff = 86.87 [23.14]  
Teff = 778 [52] K  
Rp = 8.33 [1.47] Re  
a = 0.0780 [0.0120] AU  
Ag = 1.83 [0.79] [1.05σ]  
Teffp = 1400 [135] K [4.29σ]

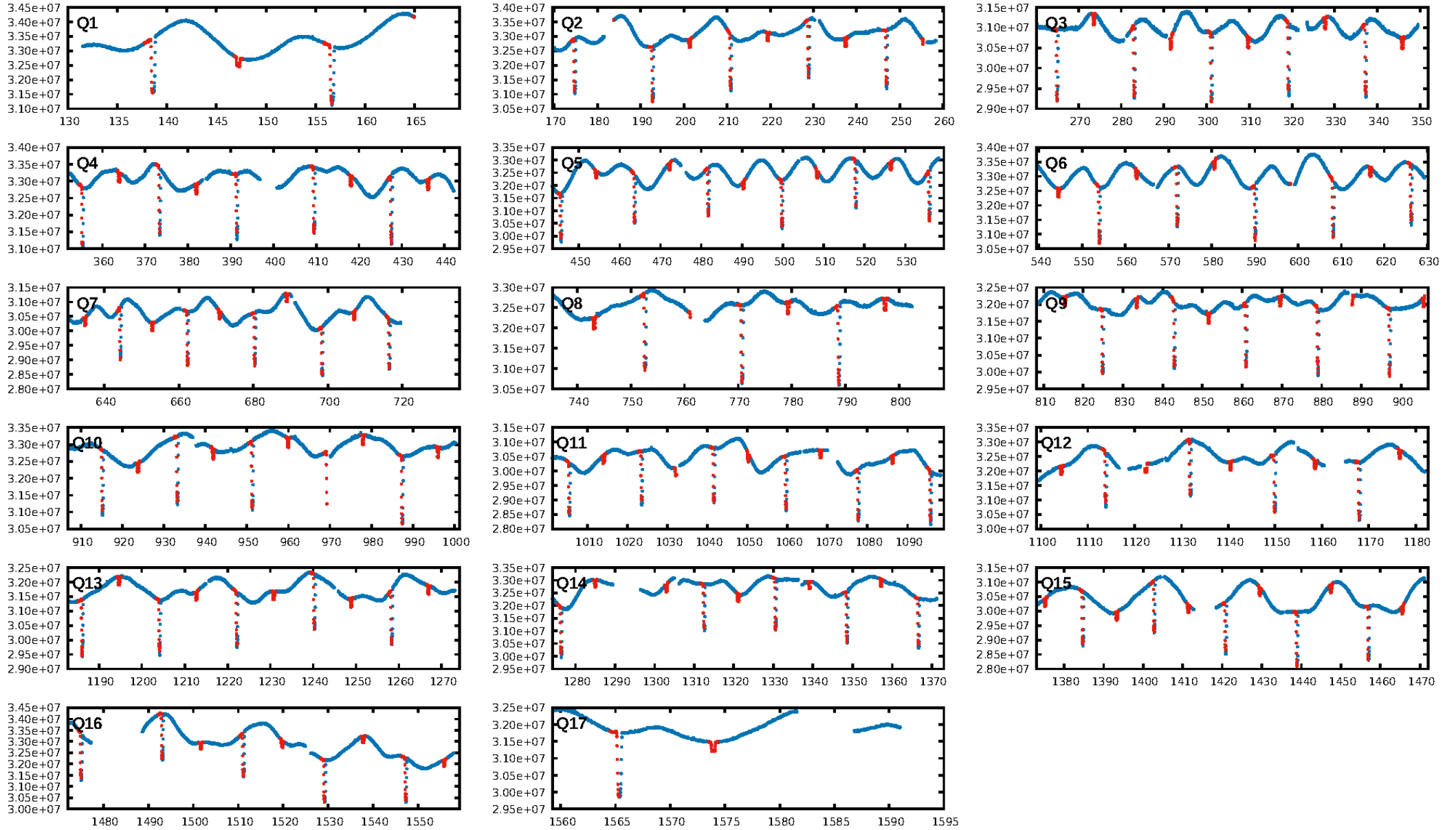
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [14.10σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 0.0%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [72/72]  
GhostDiagnostic-chr: 0.4123  
Centroid-sig: 0.0%  
Centroid-so: 0.046 arcsec [4.30σ]  
OotOffset-rm: 0.047 arcsec [0.68σ]  
KicOffset-rm: 0.169 arcsec [2.24σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 1.00 [17/17]

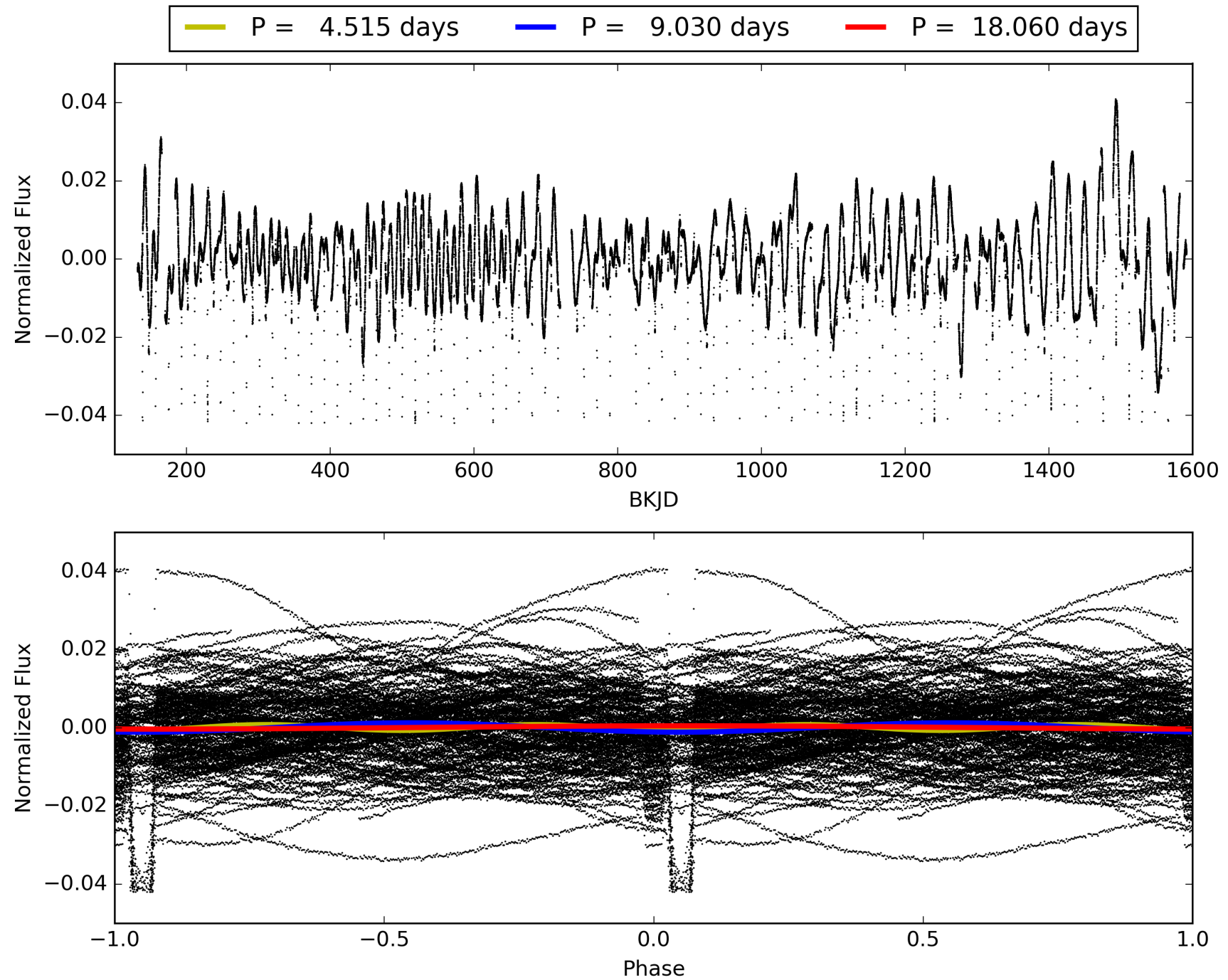
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 17:26:29 Z

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

# TCE 010330495-02, PDC Light Curves



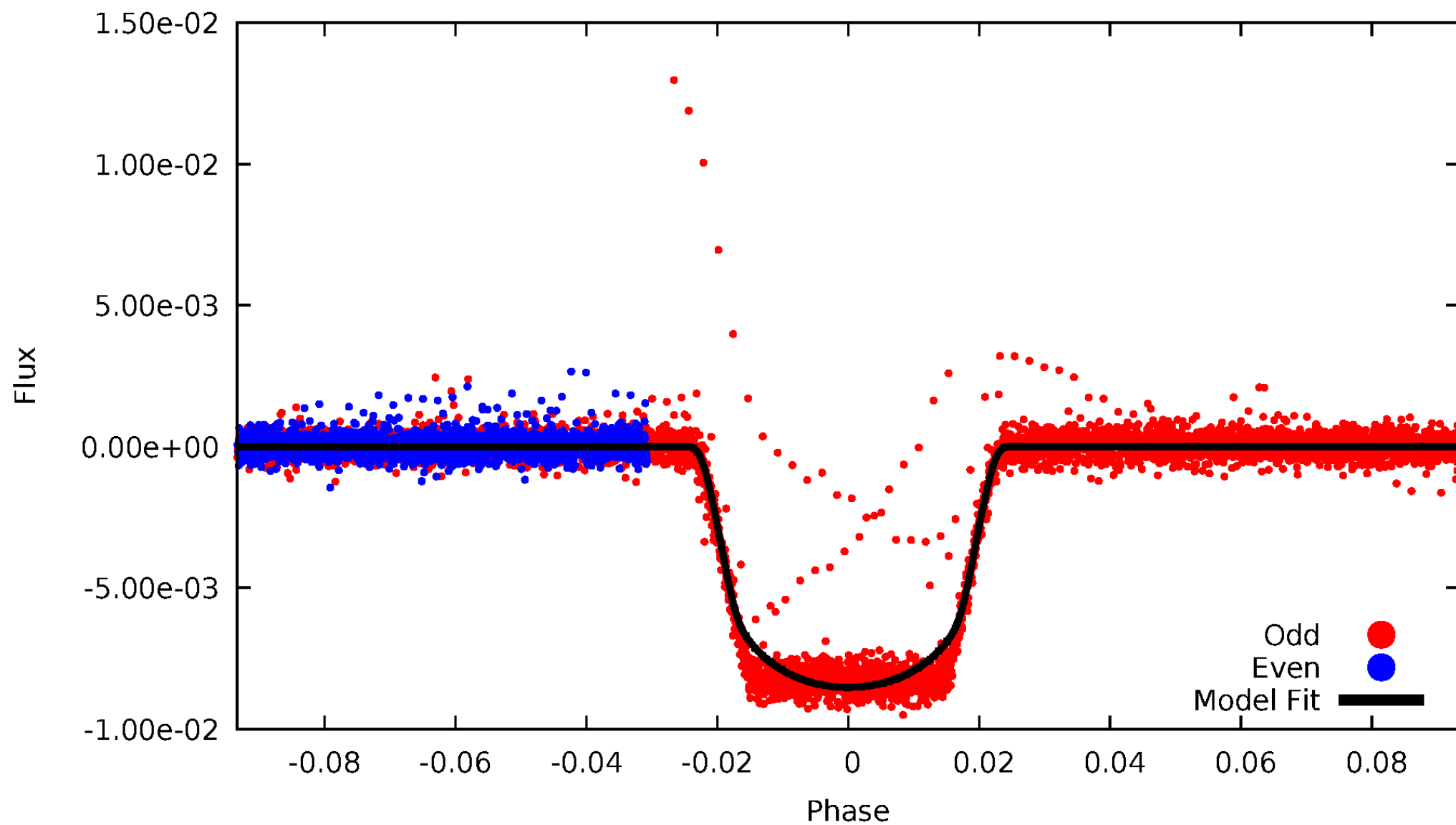
TCE 010330495-02





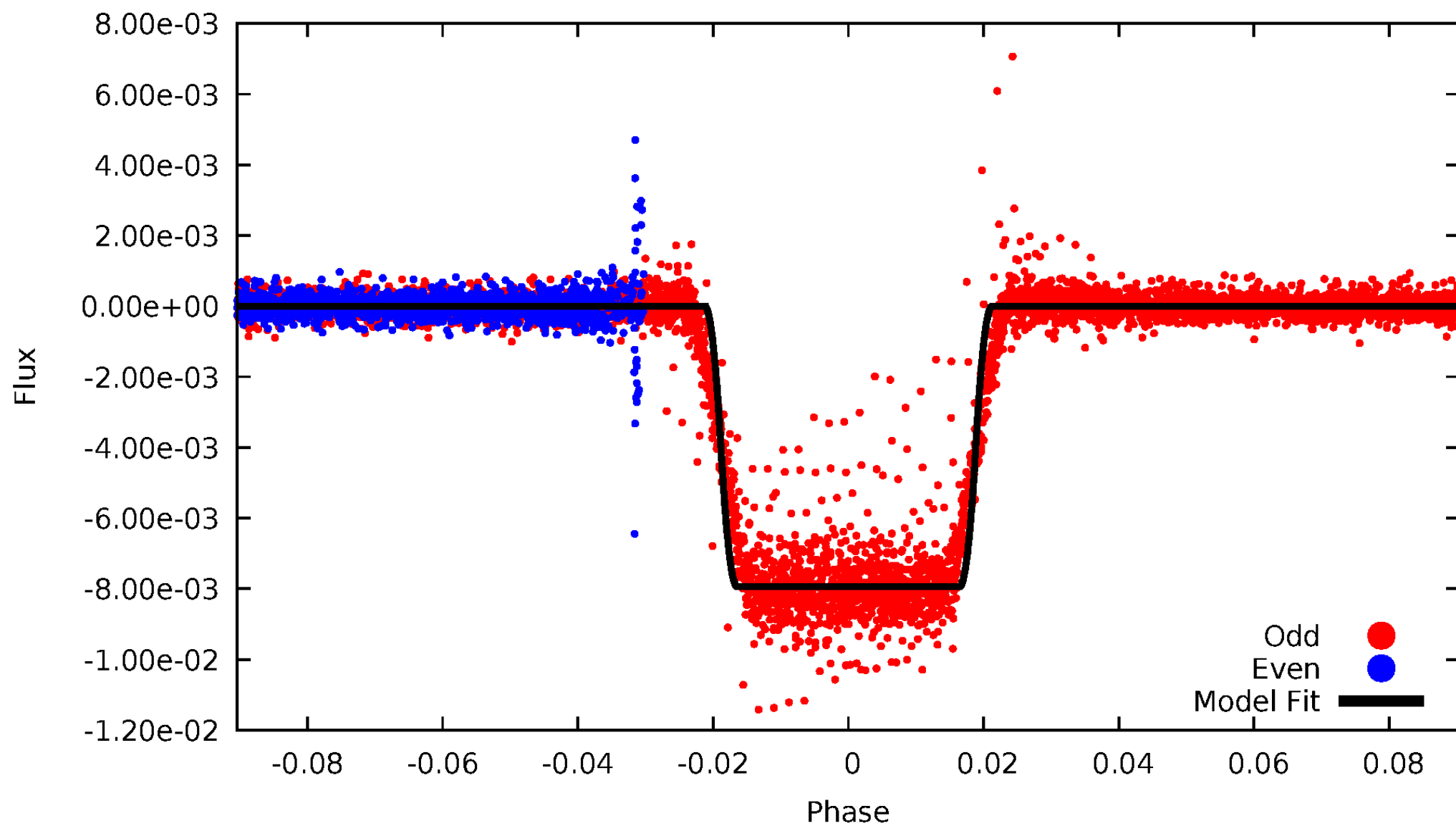
# DV Odd/Even

TCE 010330495-02



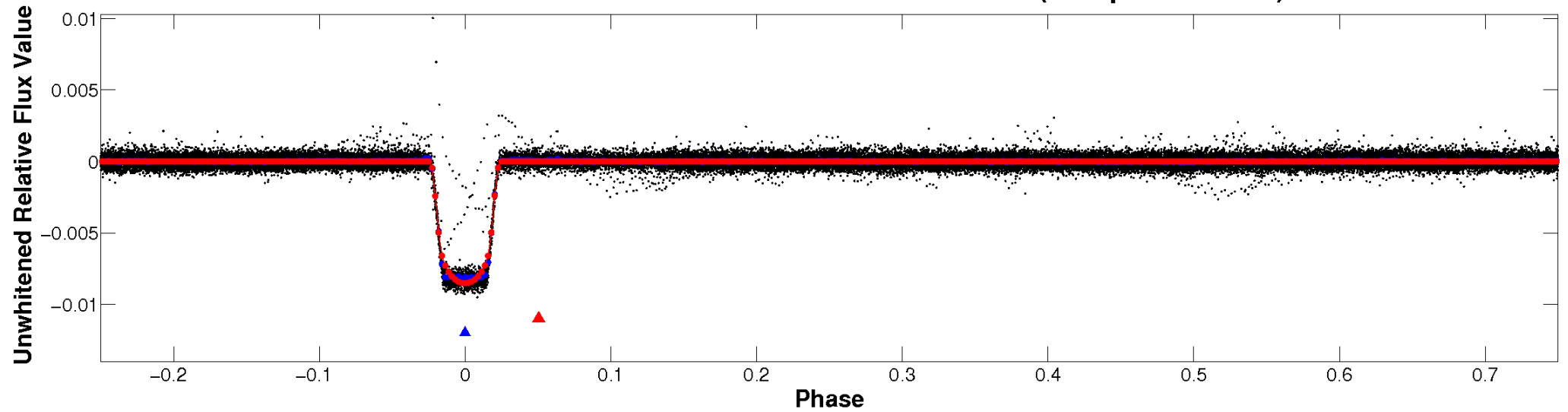
# ALT Odd/Even

TCE 010330495-02

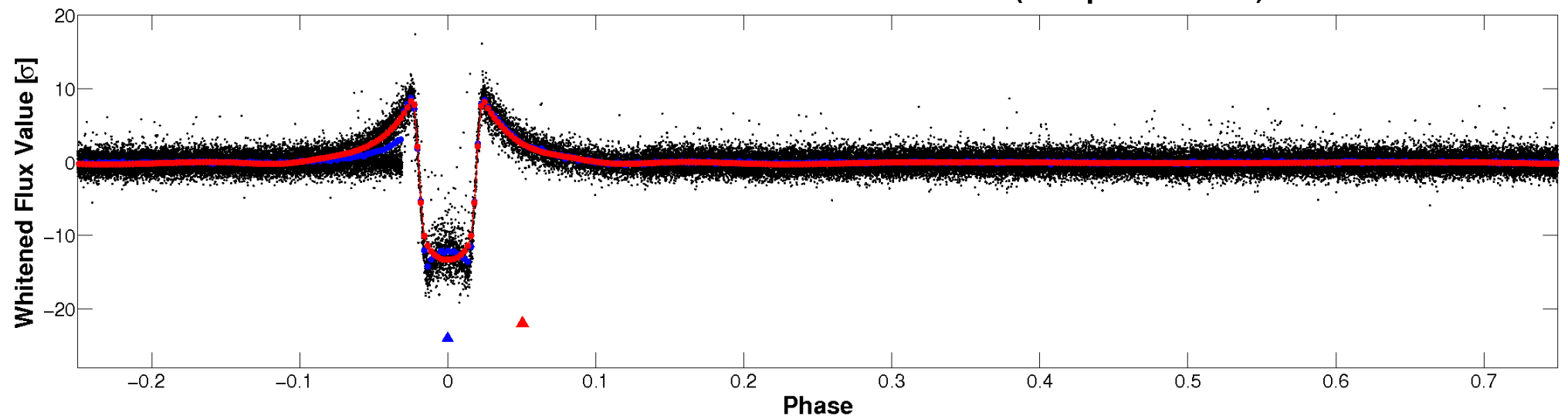


# Non-Whitened Vs. Whitened Light Curve

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

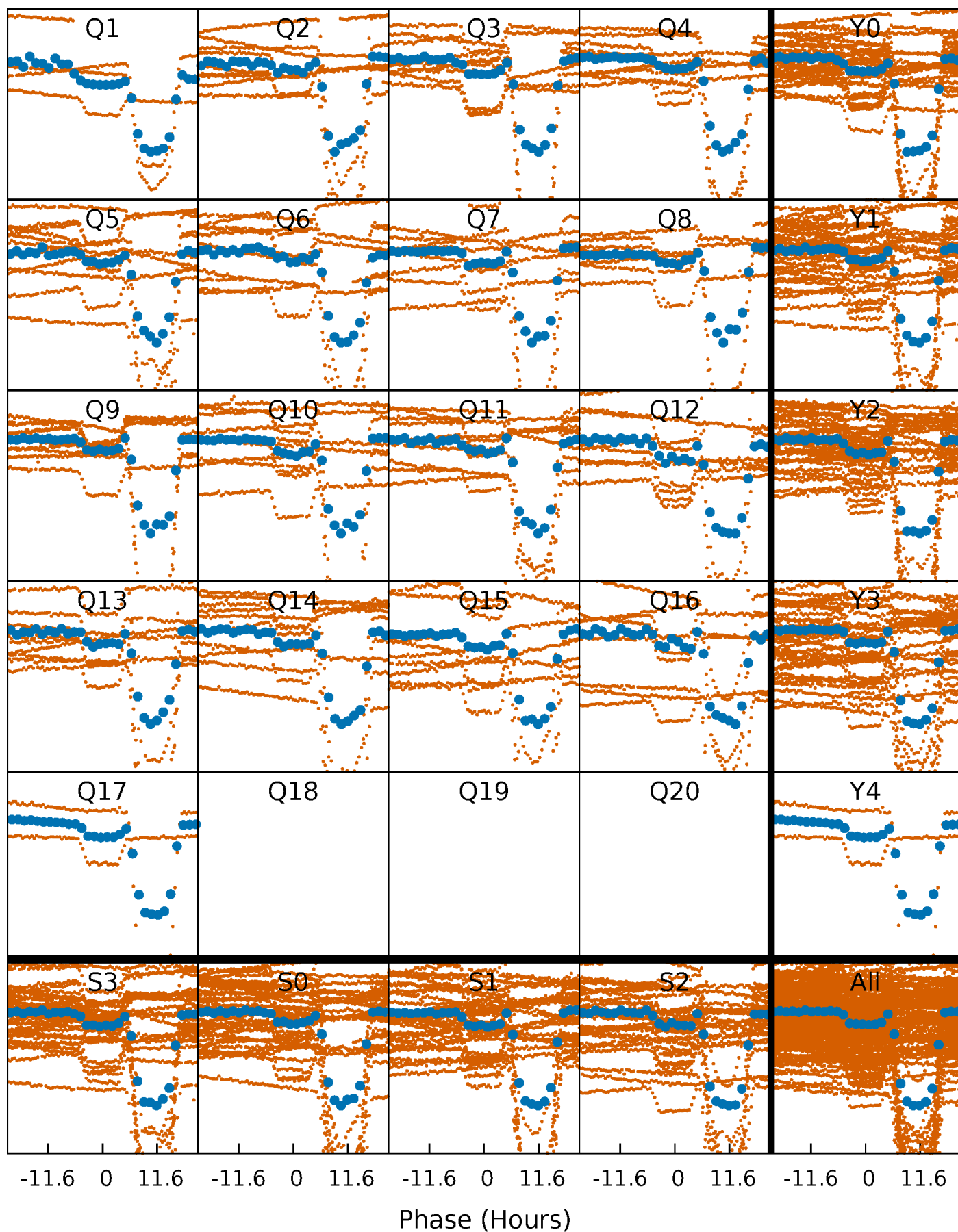


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



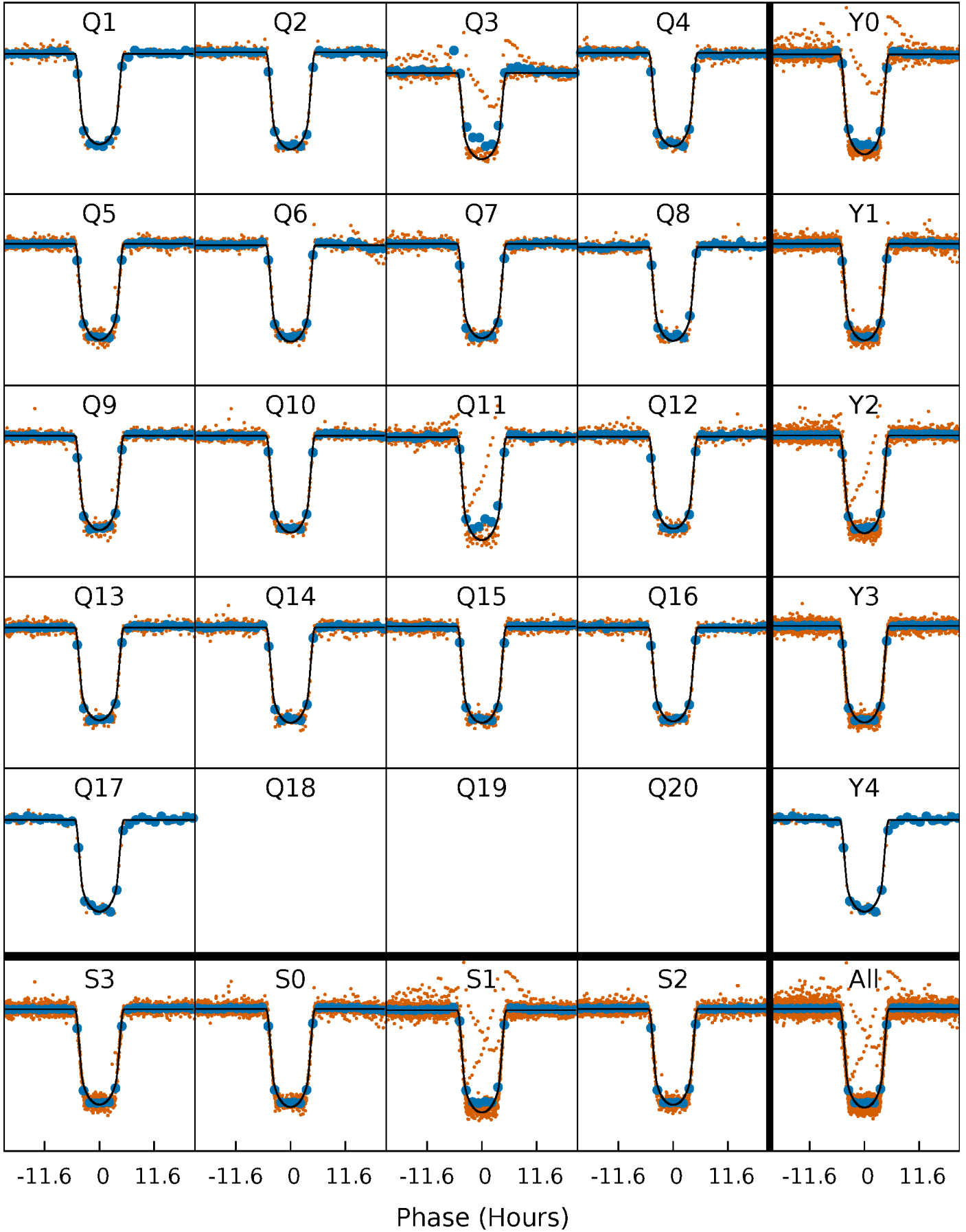
# PDC Quarter-Phased Transit Curves

TCE 010330495-02 P= 9.030026 Days  $T_0=138.155686$  (BKJD)



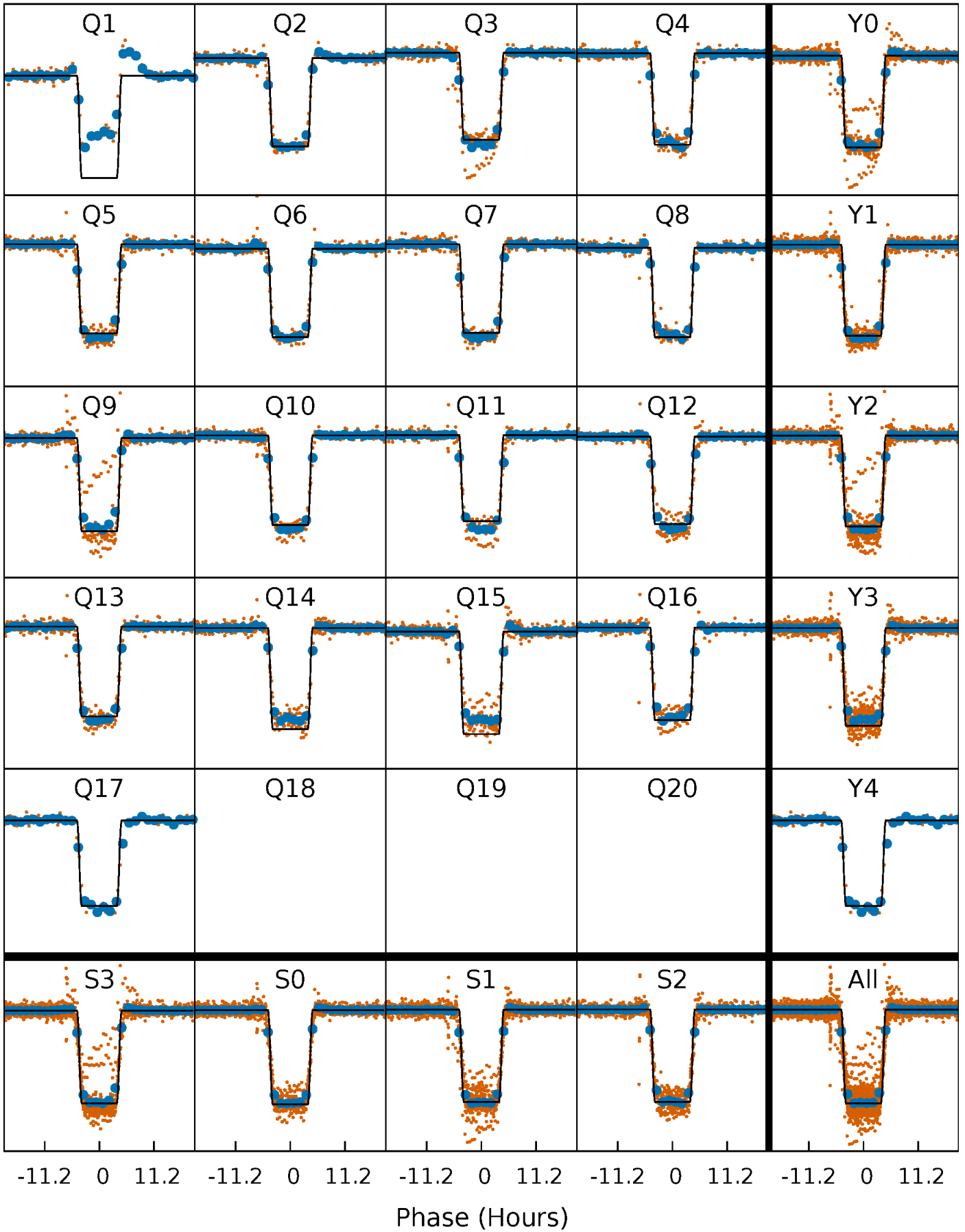
# DV Quarter-Phased Transit Curves

TCE 010330495-02   P= 9.030026 Days    $T_0=138.155686$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

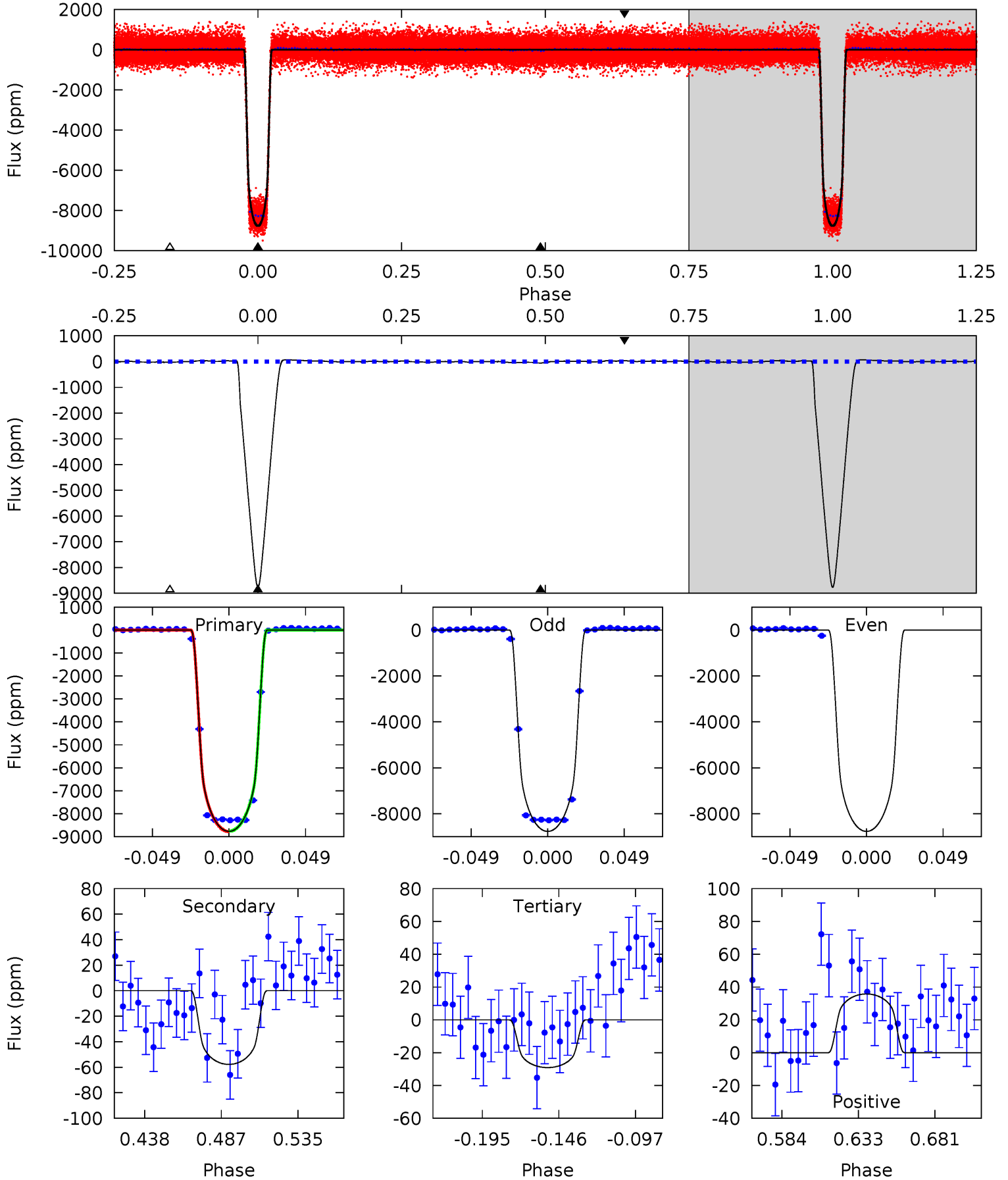
TCE 010330495-02     $P = 9.029981$  Days     $T_0 = 138.158461$  (BKJD)



# DV Model-Shift Uniqueness Test

010330495-02, P = 9.030026 Days, E = 129.125660 Days

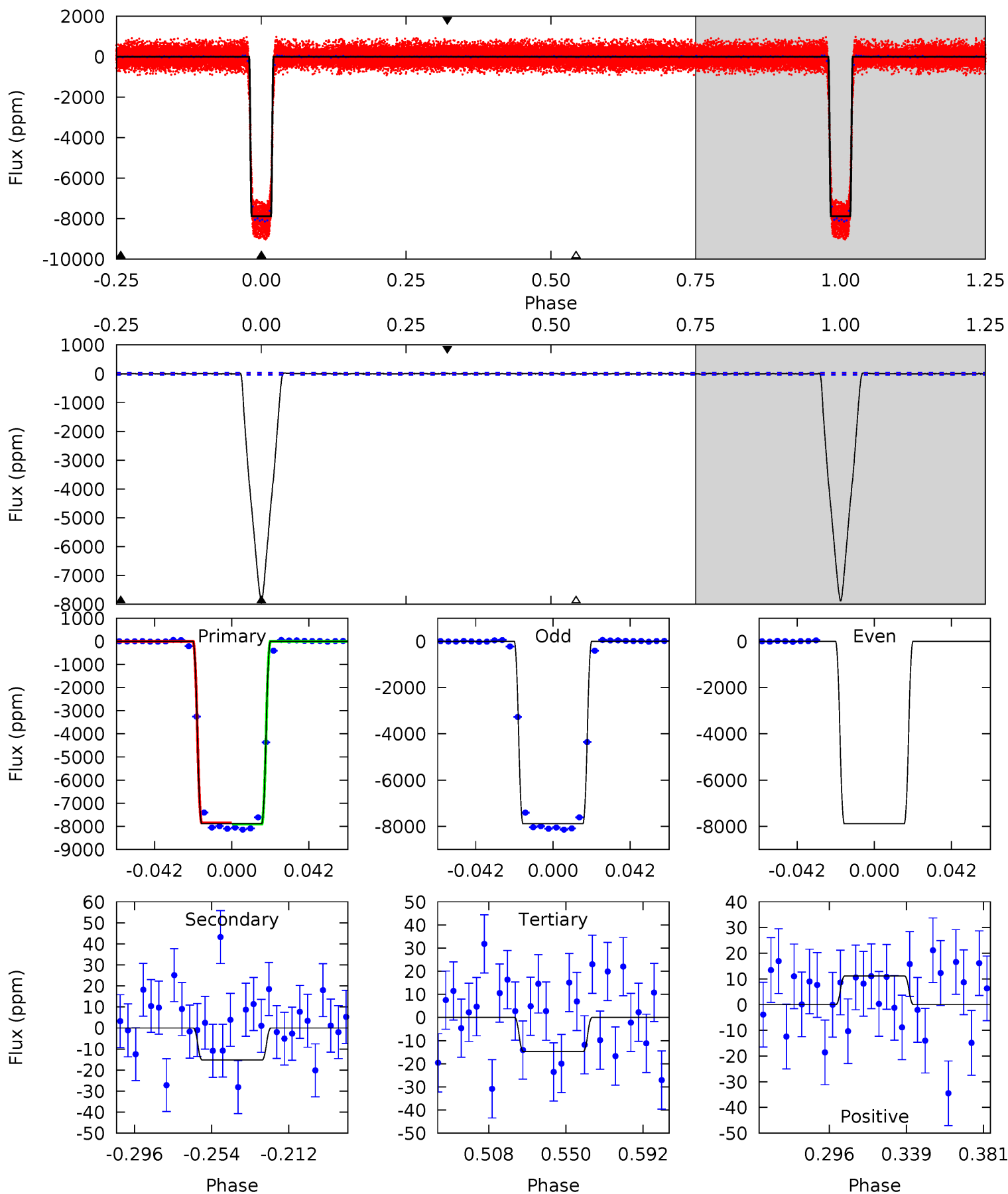
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
997.8	6.57	3.31	4.07	4.71	1.97	1.97	994.5	993.7	3.26	2.50	0	0.98	0.01	0.95



# Alt Model-Shift Uniqueness Test

010330495-02, P = 9.029981 Days, E = 129.128480 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
1079	2.09	2.01	1.52	4.74	2.03	0.58	1077	1078	0.07	0.57	0	0.99	0.00	3.66





### Stellar Parameters For KIC 010330495

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5330^{+175}_{-159}$	$4.464^{+0.117}_{-0.130}$	$-0.180^{+0.300}_{-0.300}$	$0.855^{+0.151}_{-0.113}$	$0.776^{+0.113}_{-0.061}$	$1.749^{+0.834}_{-0.661}$
	+3%/-3%	+3%/-3%	+167%/-167%	+18%/-13%	+15%/-8%	+48%/-38%
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 010330495-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-58 \pm 9$	$8.40^{+0.88}_{-0.71}$	$1090^{+64}_{-54}$	$2386^{+62}_{-66}$	$2.726^{+0.643}_{-0.583}$
Alt.	$-15 \pm 7$	$8.29^{+0.96}_{-0.62}$	$1088^{+63}_{-53}$	$1959^{+146}_{-295}$	$0.711^{+0.386}_{-0.352}$

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

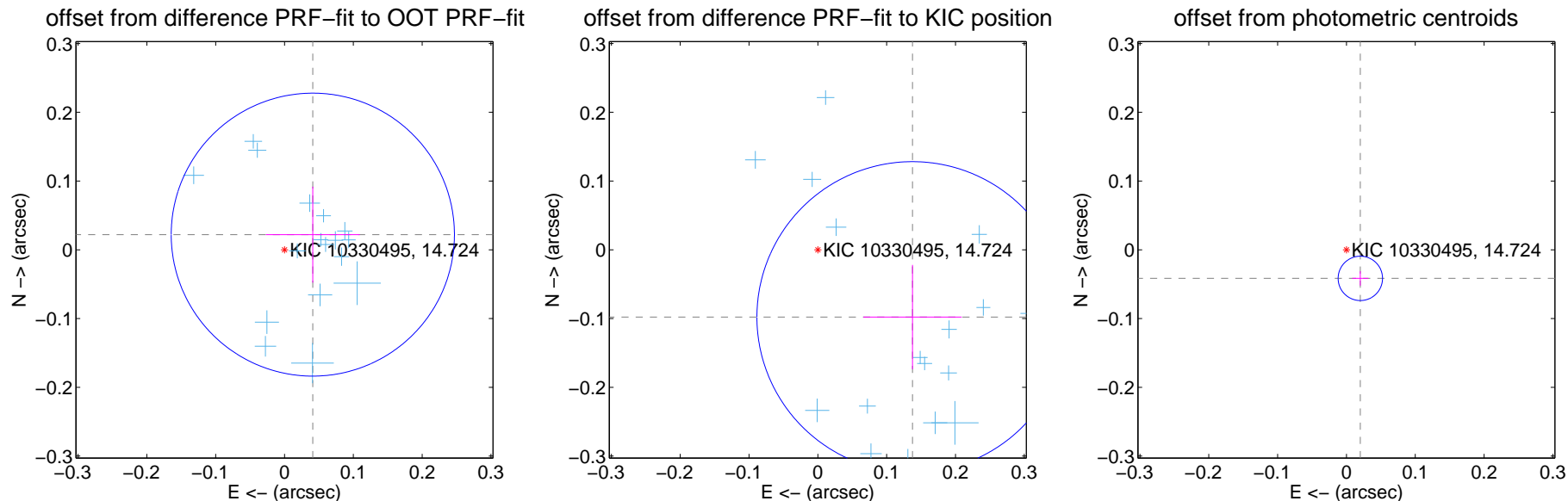
## DV Centroid Data

Supplemental centroid analysis for 010330495-02. Kepler magnitude: 14.72. Transit SNR 448.65

There are 17 quarters with good PRF difference image offsets

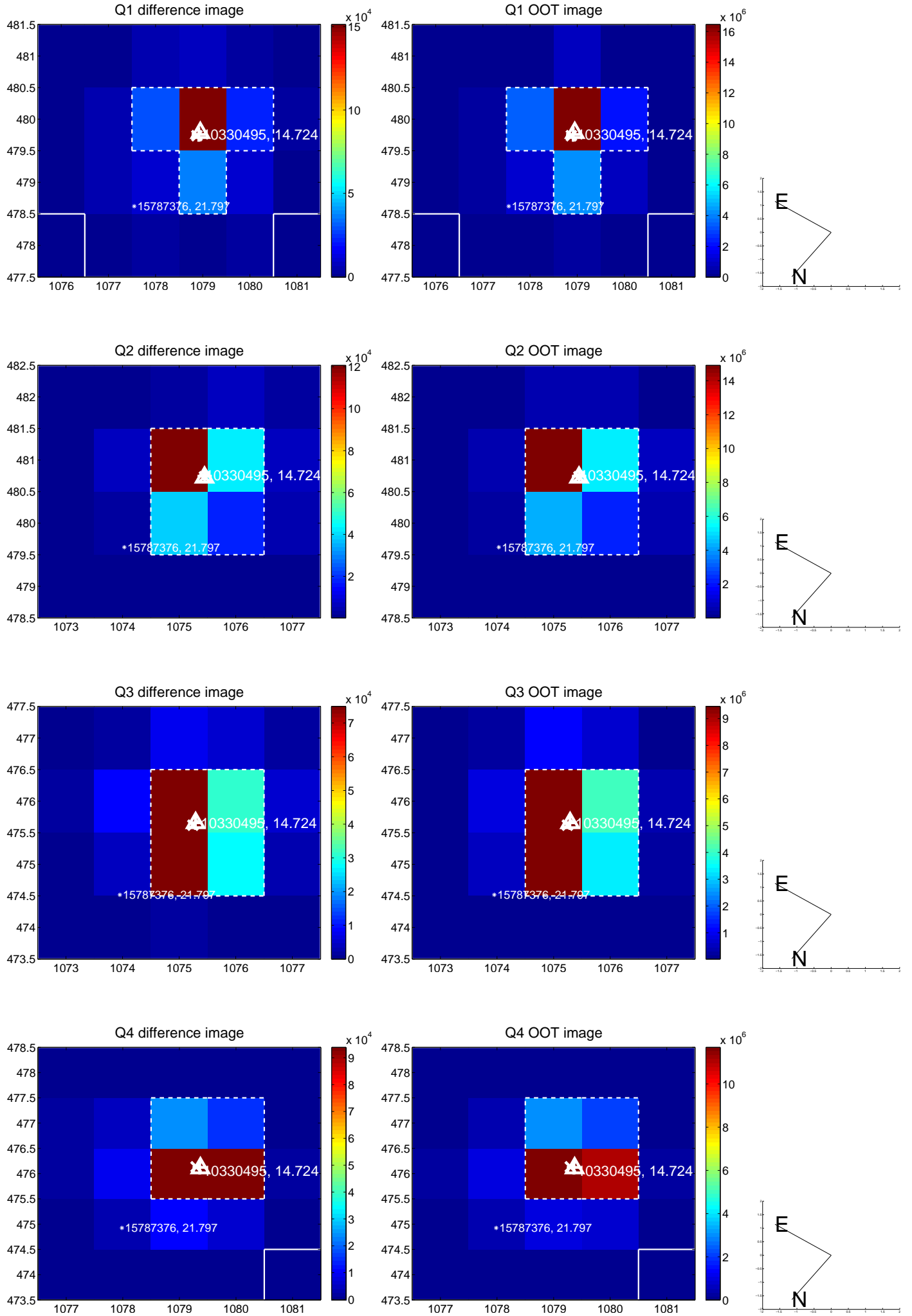
The direct PRF centroid is offset from the target star catalog position by about 0.22 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.047 \pm 0.069$	0.68	$-0.041 \pm 0.068$	$0.022 \pm 0.070$
PRF-fit source offset from KIC position	$0.169 \pm 0.075$	2.24	$-0.138 \pm 0.072$	$-0.098 \pm 0.076$
photometric centroid source offset	$0.05 \pm 0.01$	4.30	$-0.02 \pm 0.01$	$-0.04 \pm 0.01$

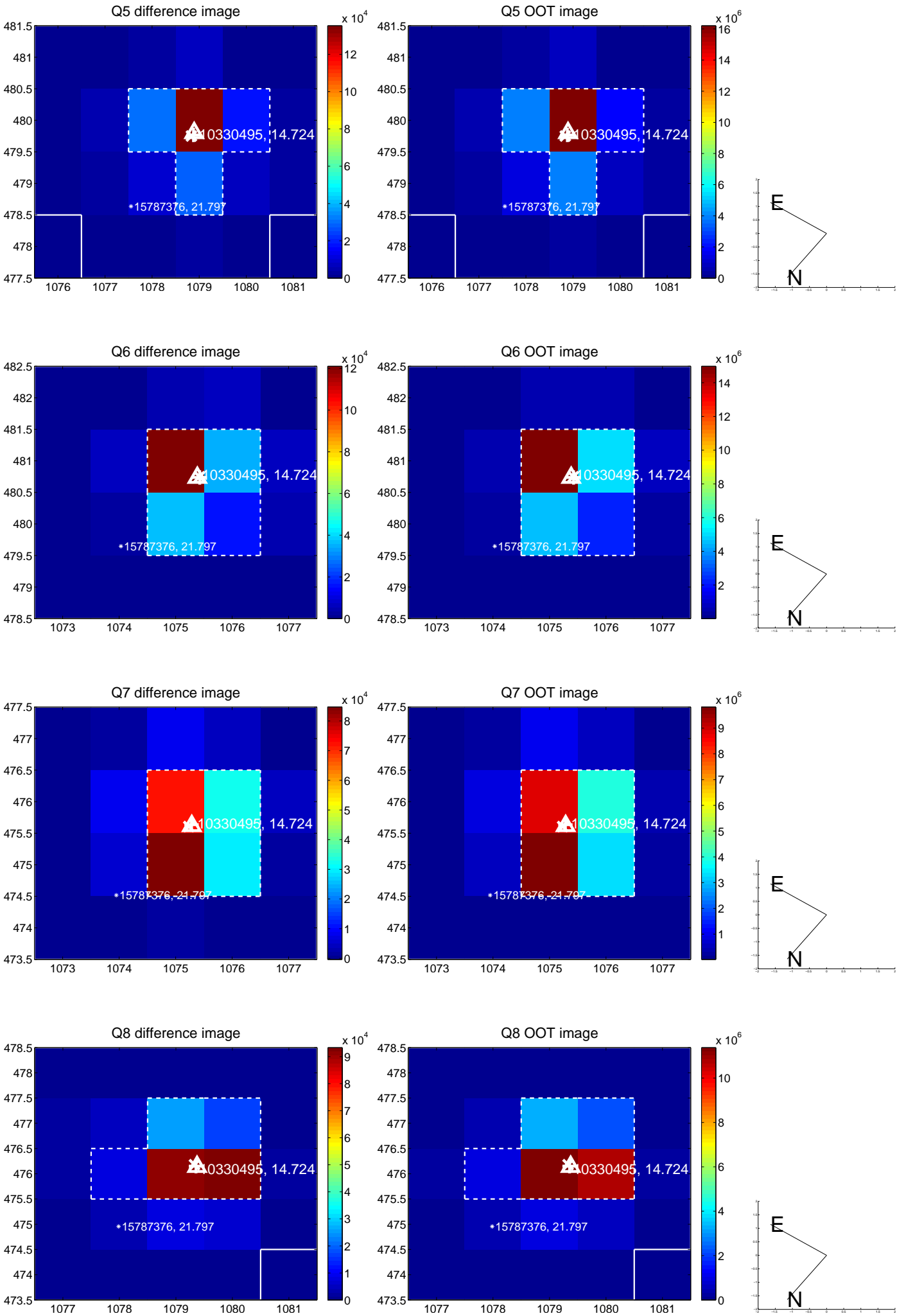


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

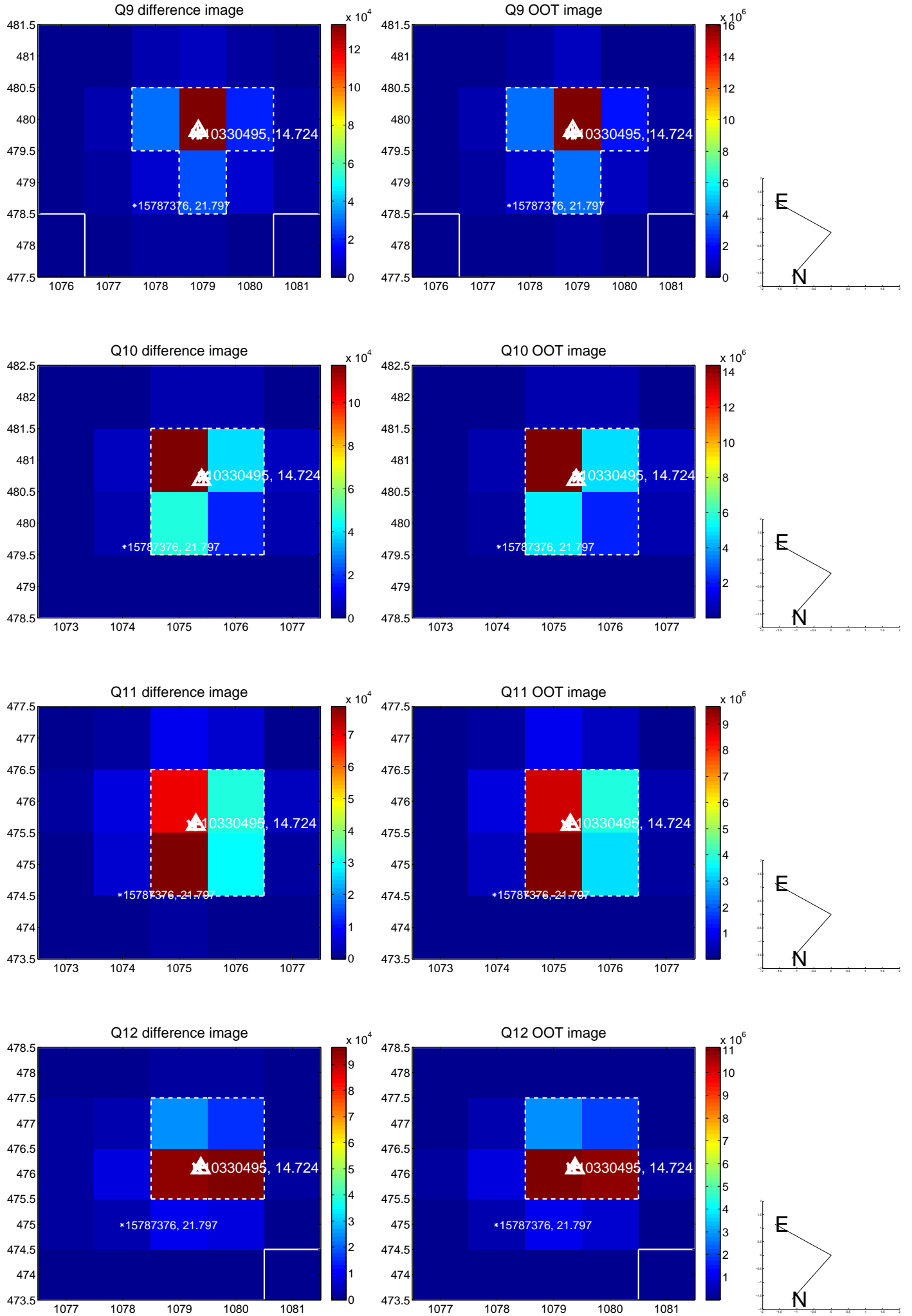
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



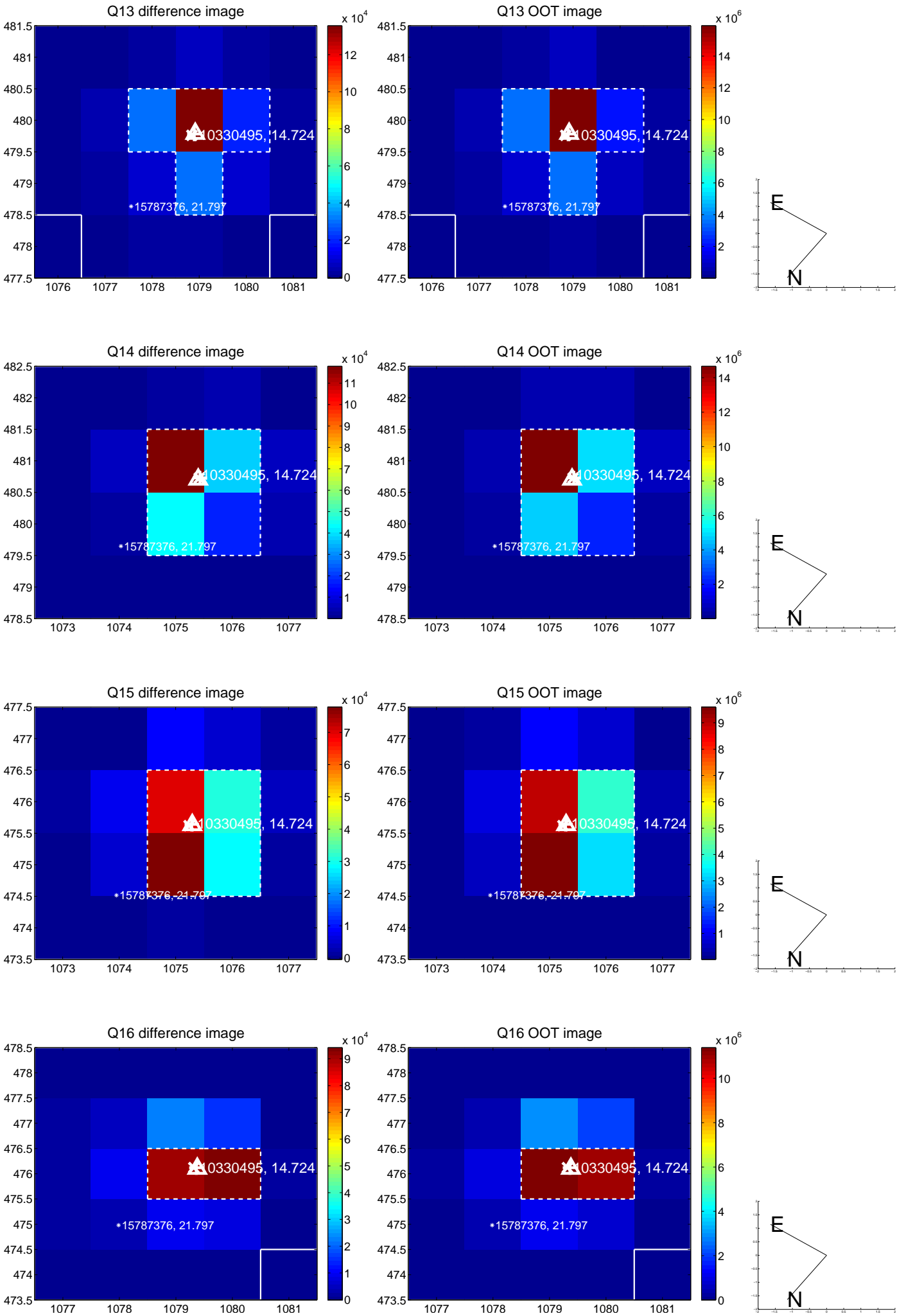
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



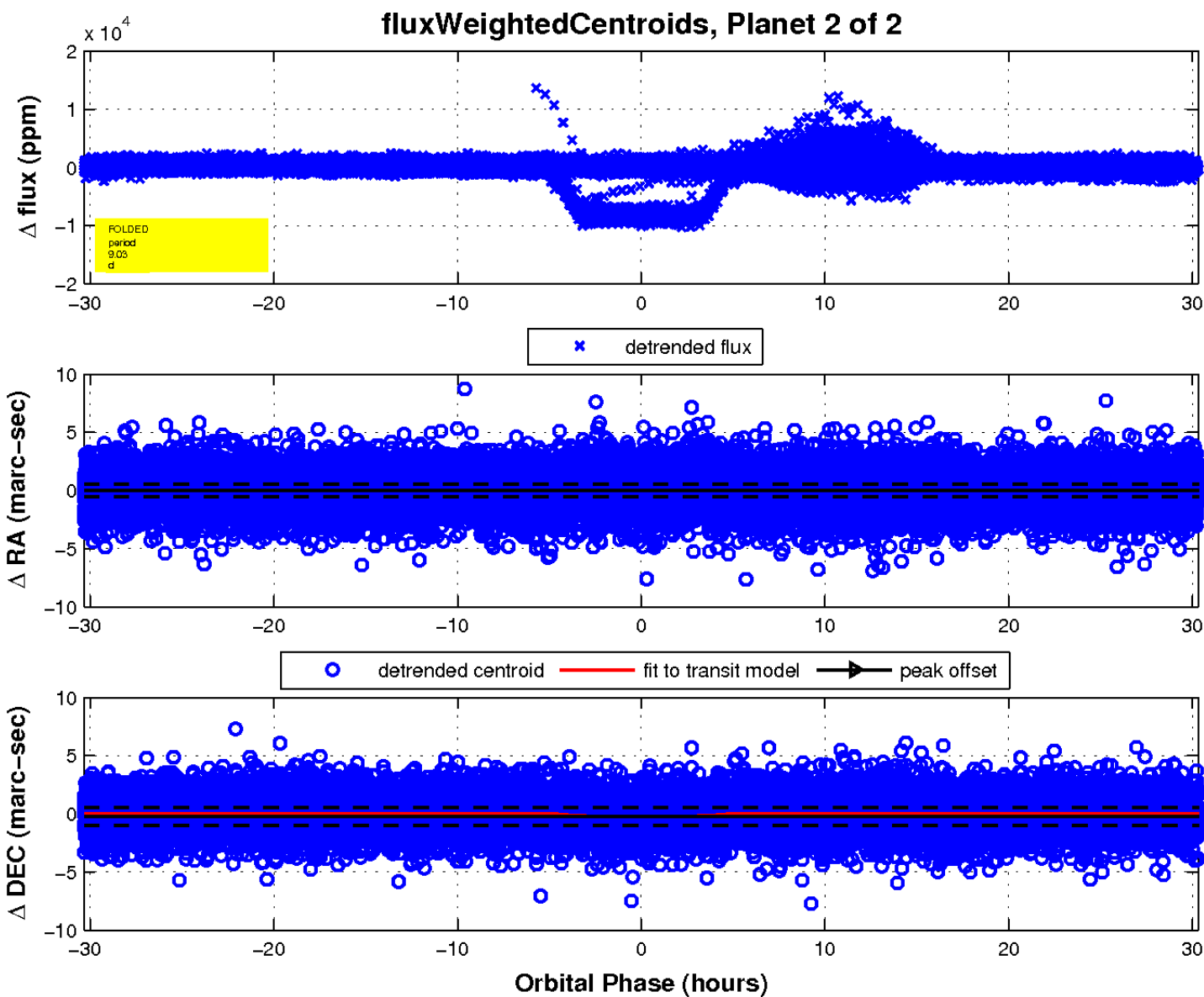
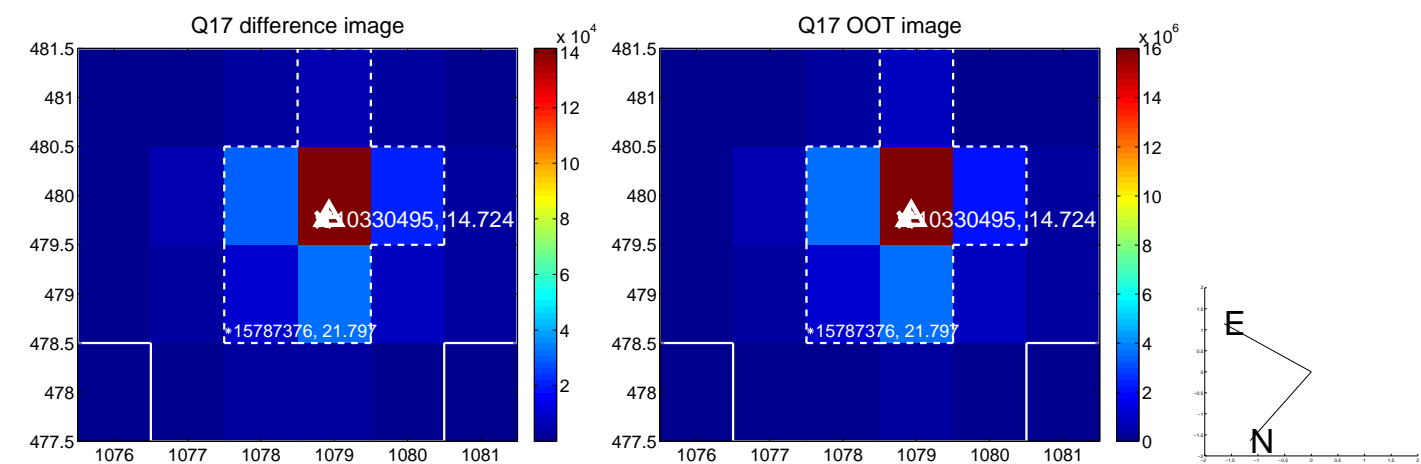
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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UKIRT Image

Declination

