

# KIC 007447200

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007447200-01	OBS	0676.01	7.972520	131.721489	3194.5	3.111	336.3	294.6	0.53	3912	3.38	14.48
007447200-02	OBS	0676.02	2.453235	131.640462	1723.6	1.841	278.0	267.0	0.53	3912	2.57	69.71

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007447200-01	OBS	PC	0.38	0	0	0	0	NO_COMMENT
007447200-02	OBS	PC	1.00	0	0	0	0	NO_COMMENT

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

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

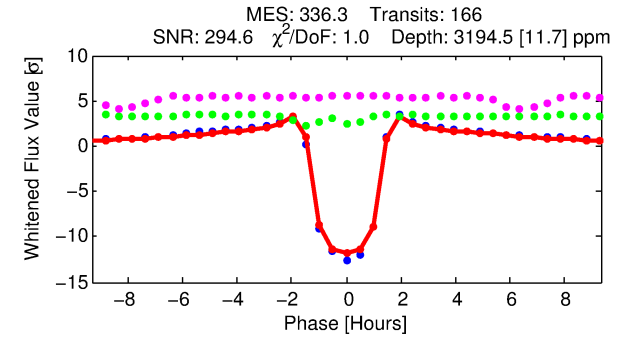
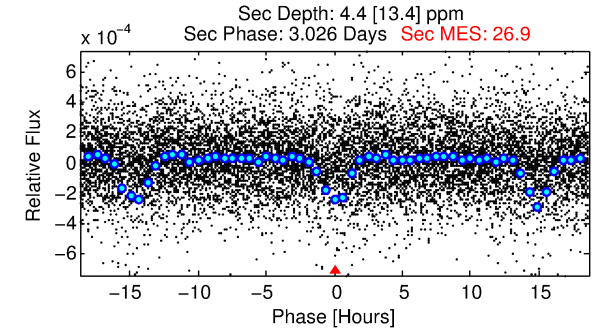
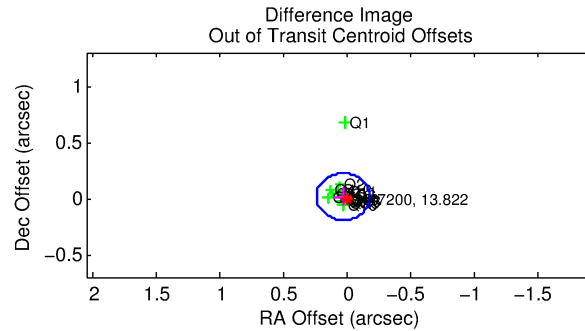
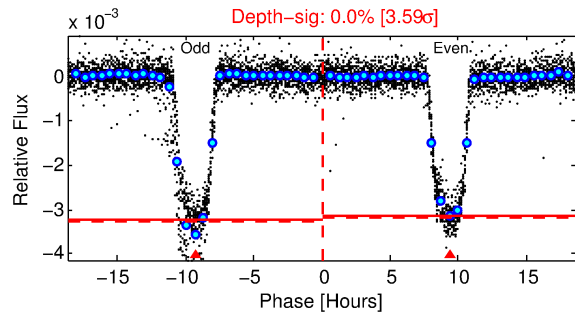
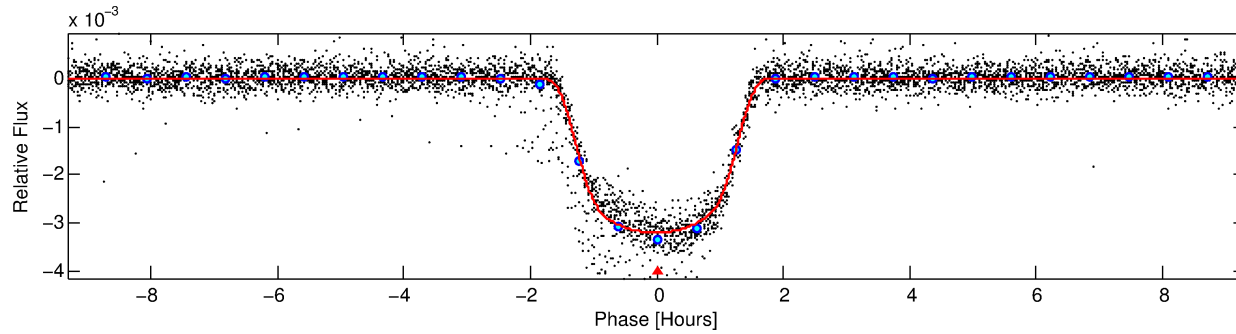
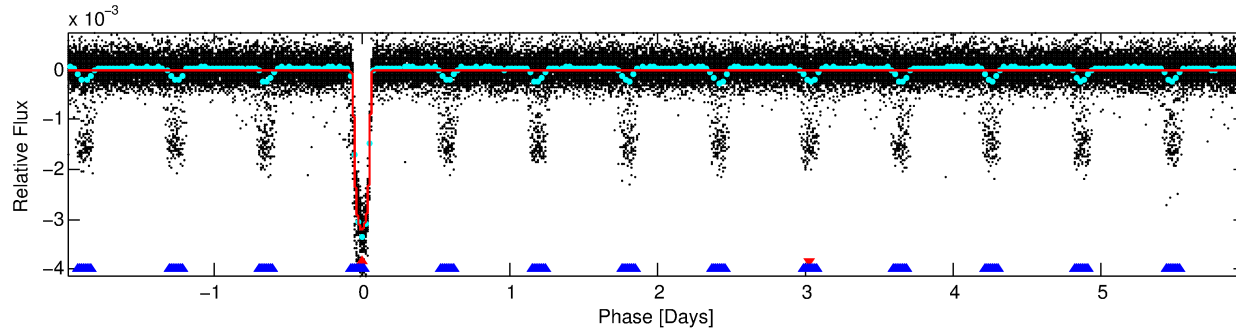
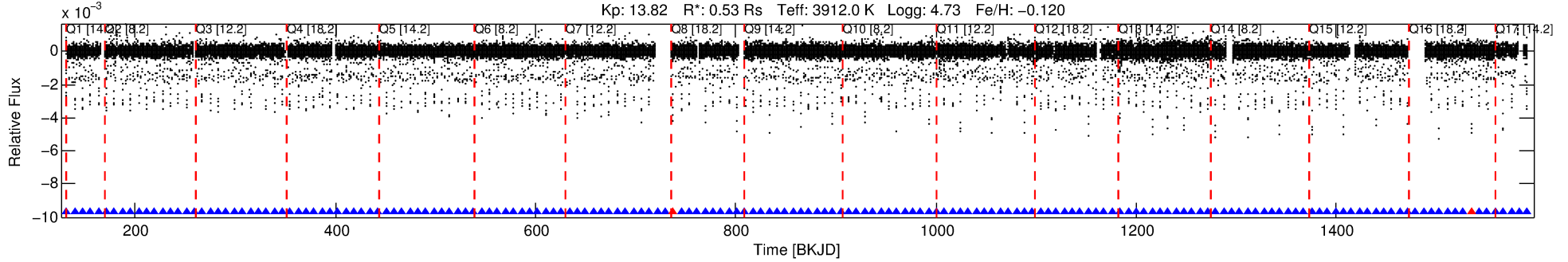
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 007447200-01

No Significant Match Found

# DV One-Page Summary

KIC: 7447200 Candidate: 1 of 2 Period: 7.973 d  
KOI: K00676.01 Name: Kepler-210c Corr: 0.978



## DV Fit Results:

Period = 7.97252 [0.00000] d  
Epoch = 131.7215 [0.0002] BKJD  
Rp/R\* = 0.0581 [0.0004]  
a/R\* = 13.18 [0.33]  
b = 0.82 [0.01]  
Seff = 14.48 [1.60]  
Teq = 497 [14] K  
Rp = 3.38 [0.22] Re  
a = 0.0642 [0.0032] AU  
Ag = 0.87 [2.66] [-0.05 $\sigma$ ]  
Teffp = 742 [570] K [0.43 $\sigma$ ]

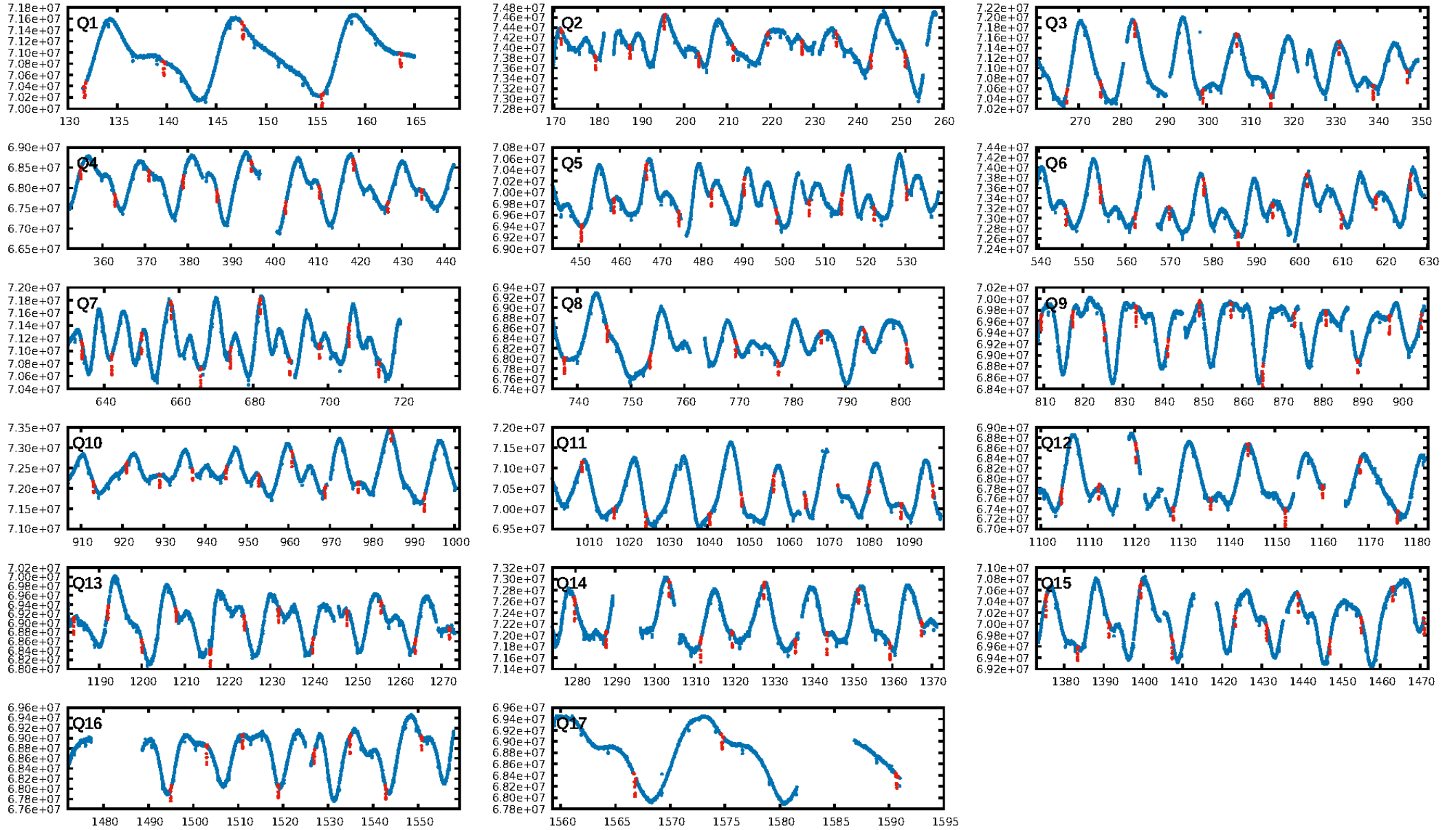
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [36.65 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 14.6%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 0.99 [156/158]  
GhostDiagnostic-chr: 2.41  
Centroid-sig: 1.2%  
Centroid-so: 0.341 arcsec [12.87 $\sigma$ ]  
OotOffset-rm: 0.035 arcsec [0.51 $\sigma$ ]  
KicOffset-rm: 0.277 arcsec [3.66 $\sigma$ ]  
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]

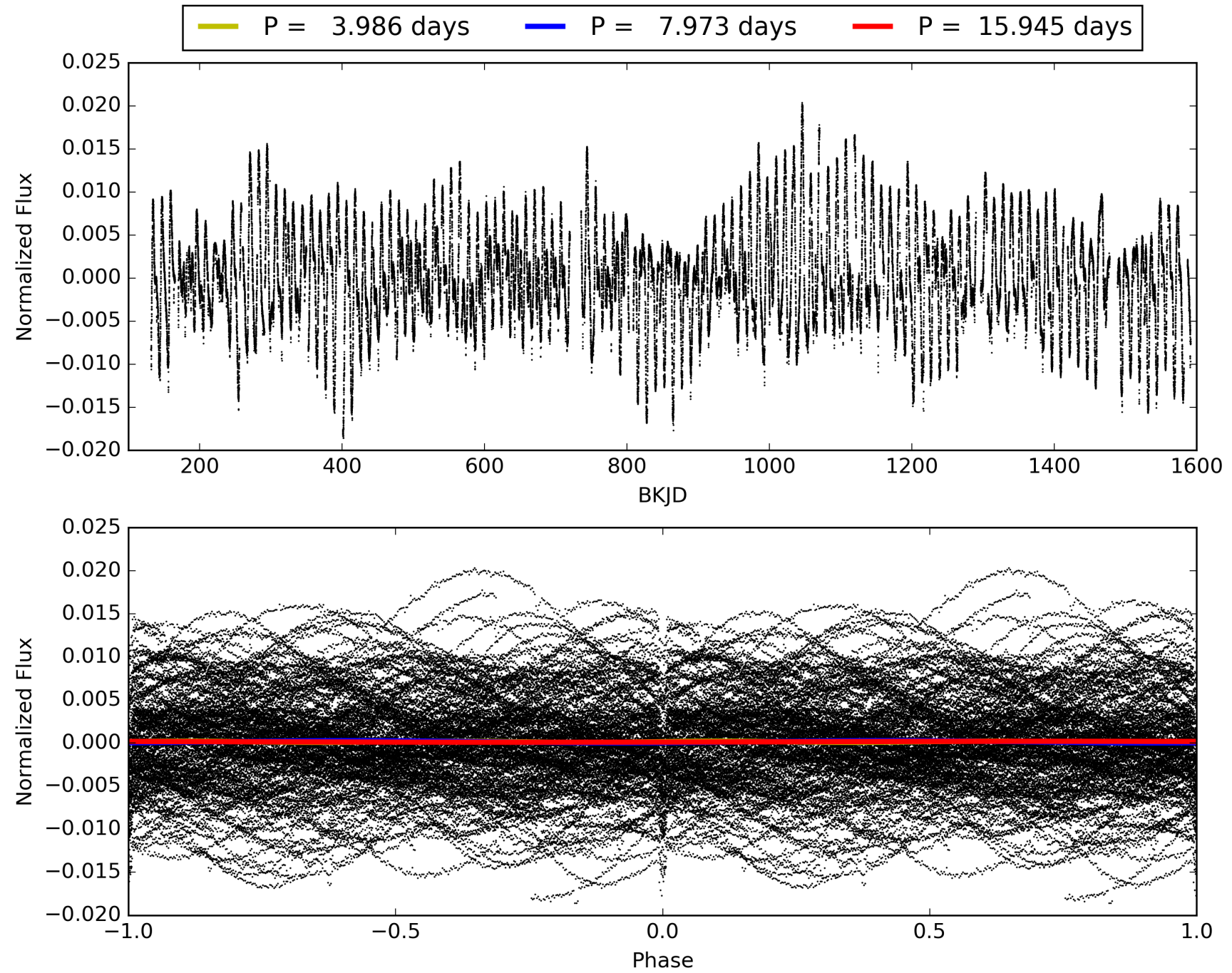
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 07:48:18 Z

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

# TCE 007447200-01, PDC Light Curves

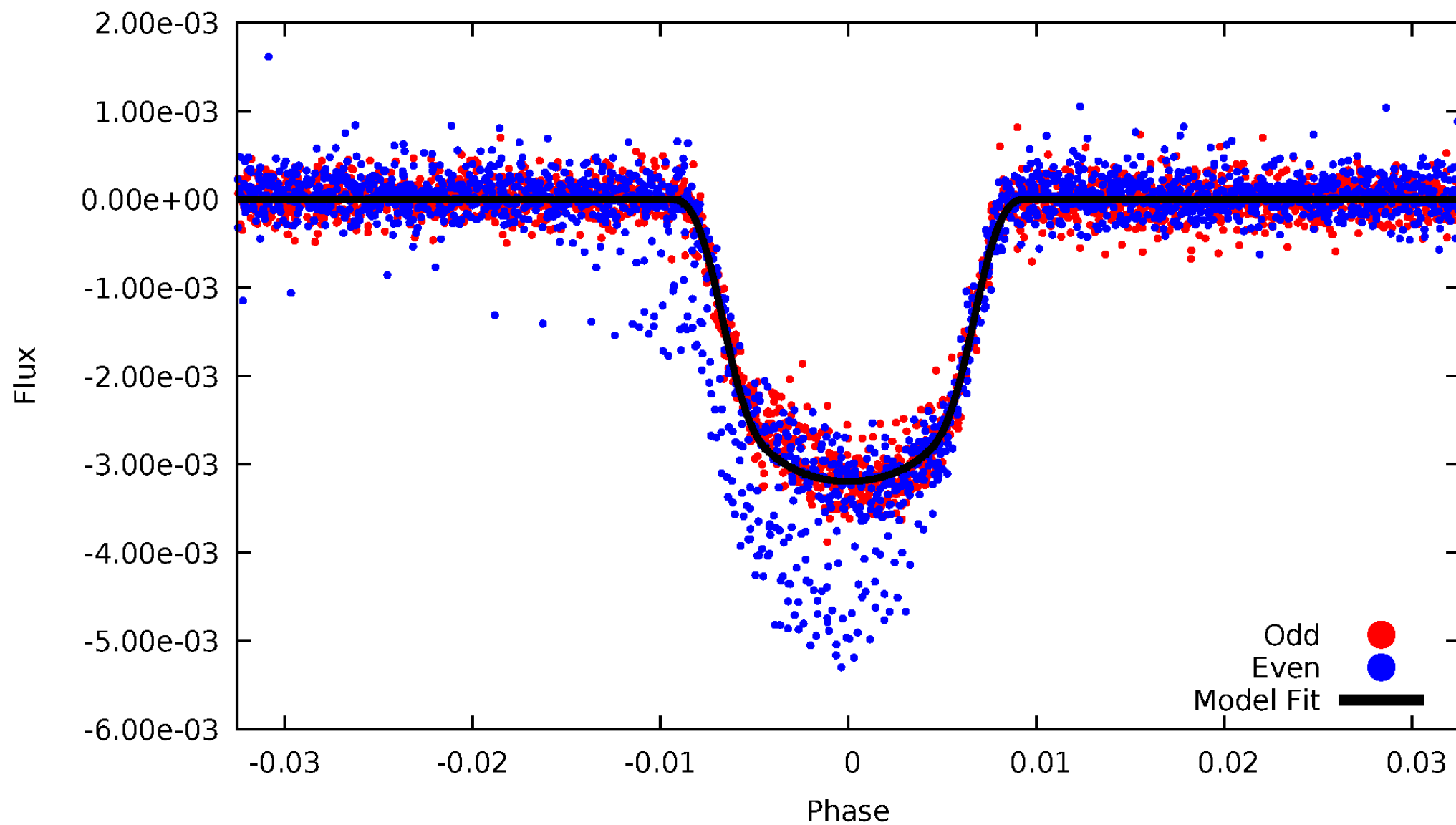


TCE 007447200-01



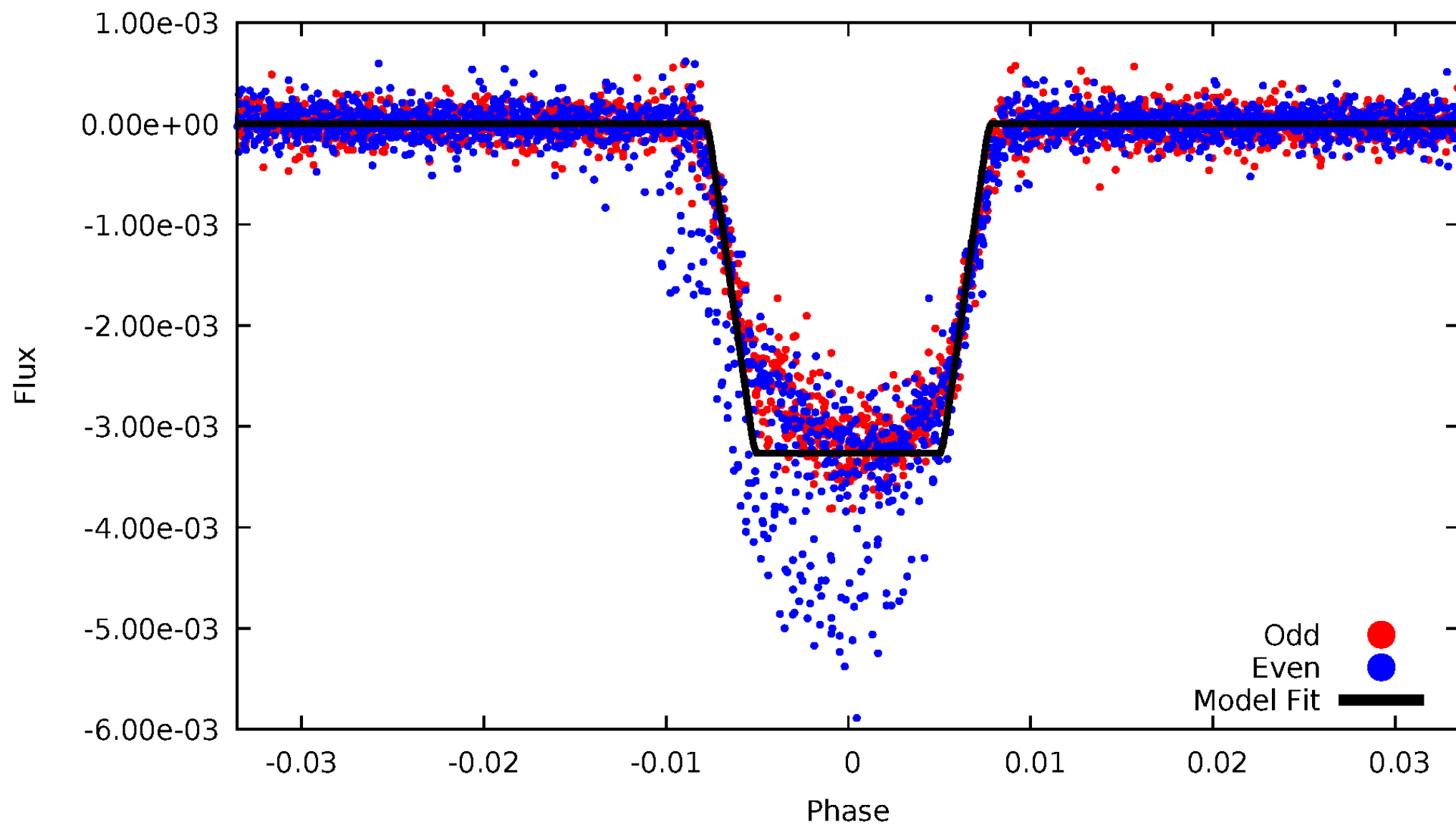
# DV Odd/Even

TCE 007447200-01



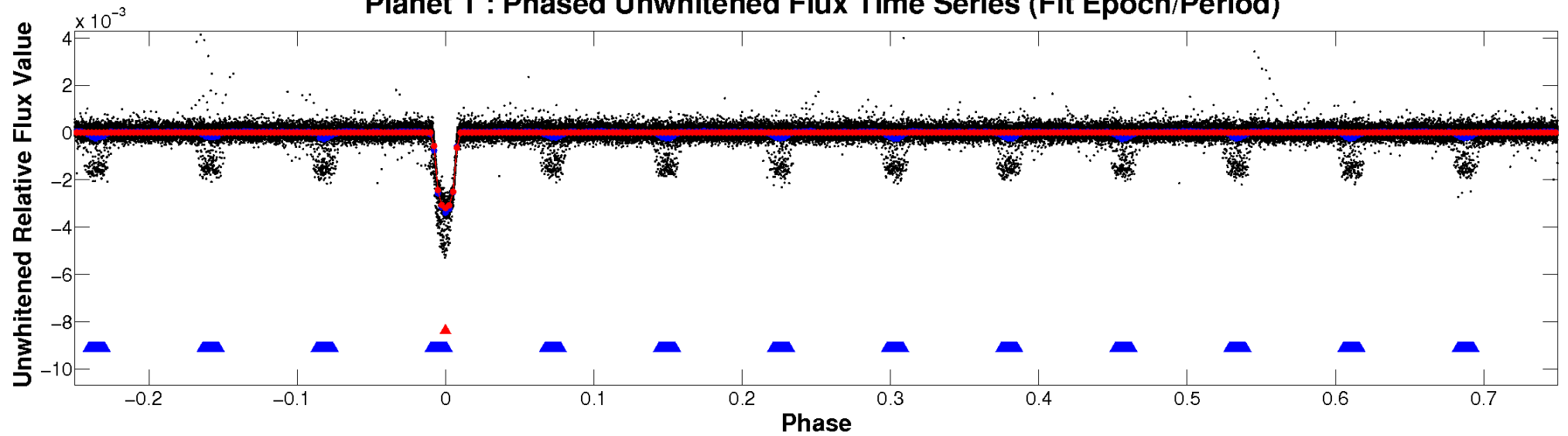
# ALT Odd/Even

TCE 007447200-01

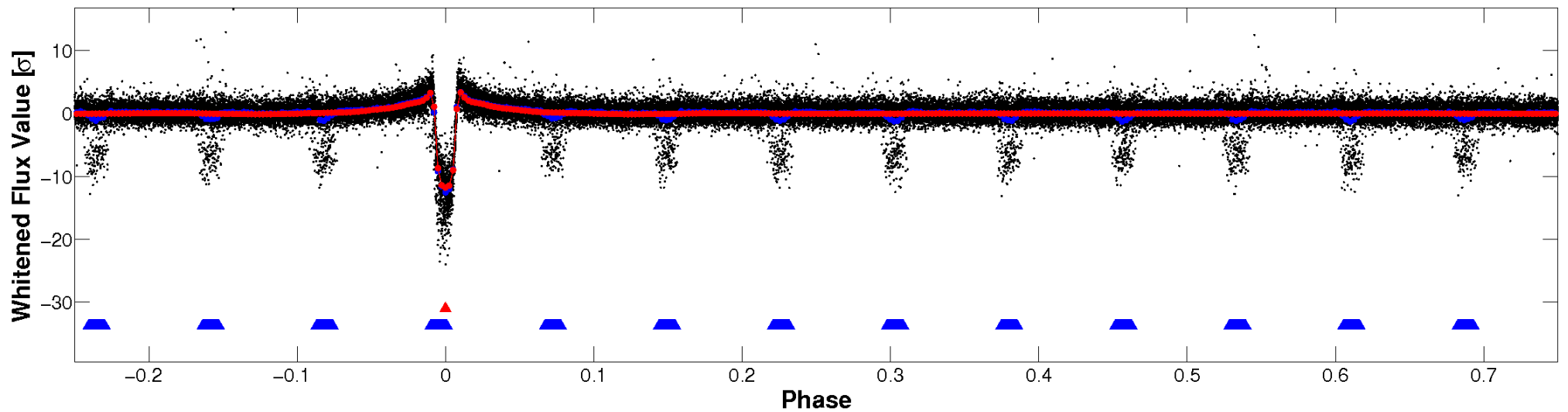


# Non-Whitened Vs. Whitened Light Curve

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



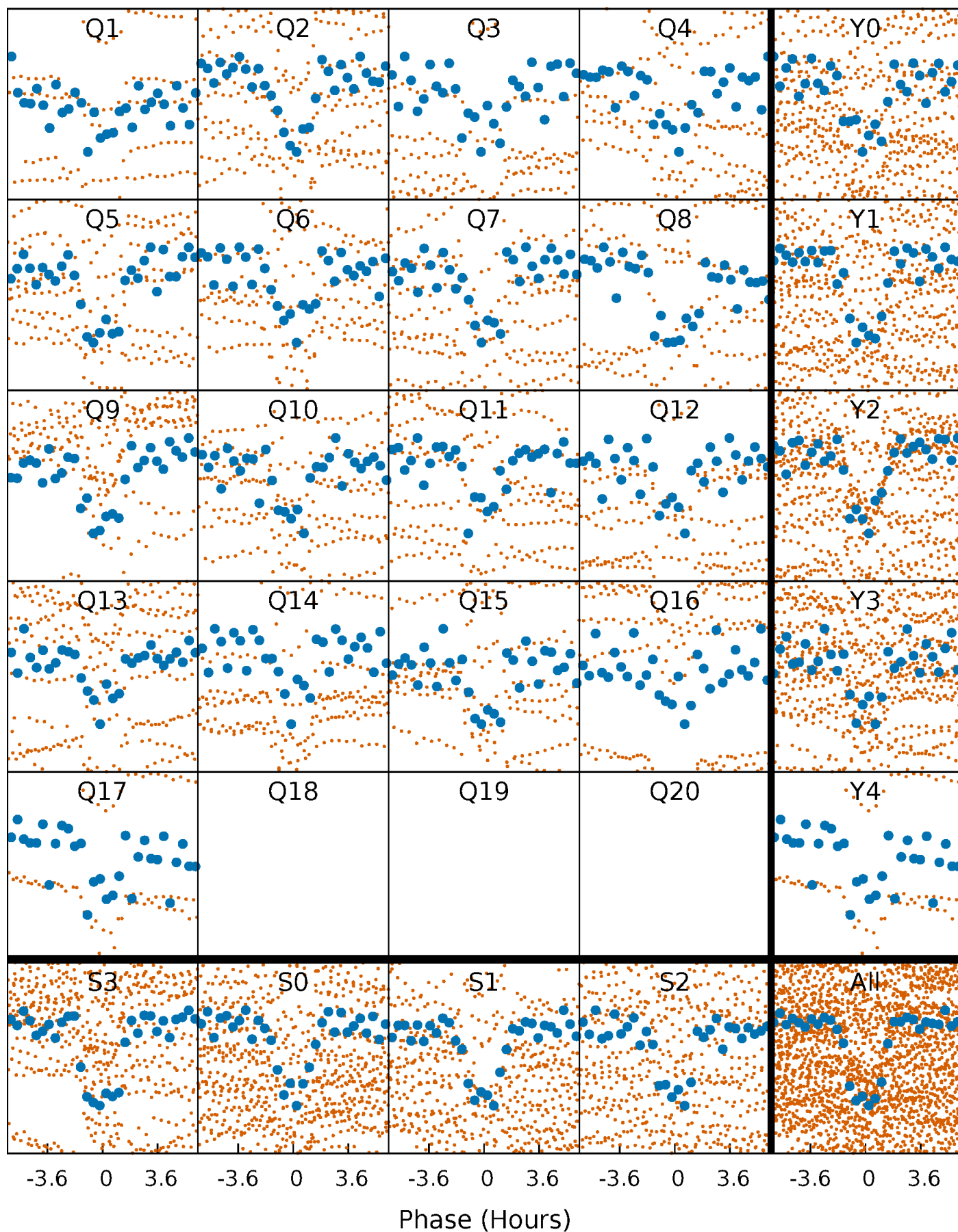
Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)





# PDC Quarter-Phased Transit Curves

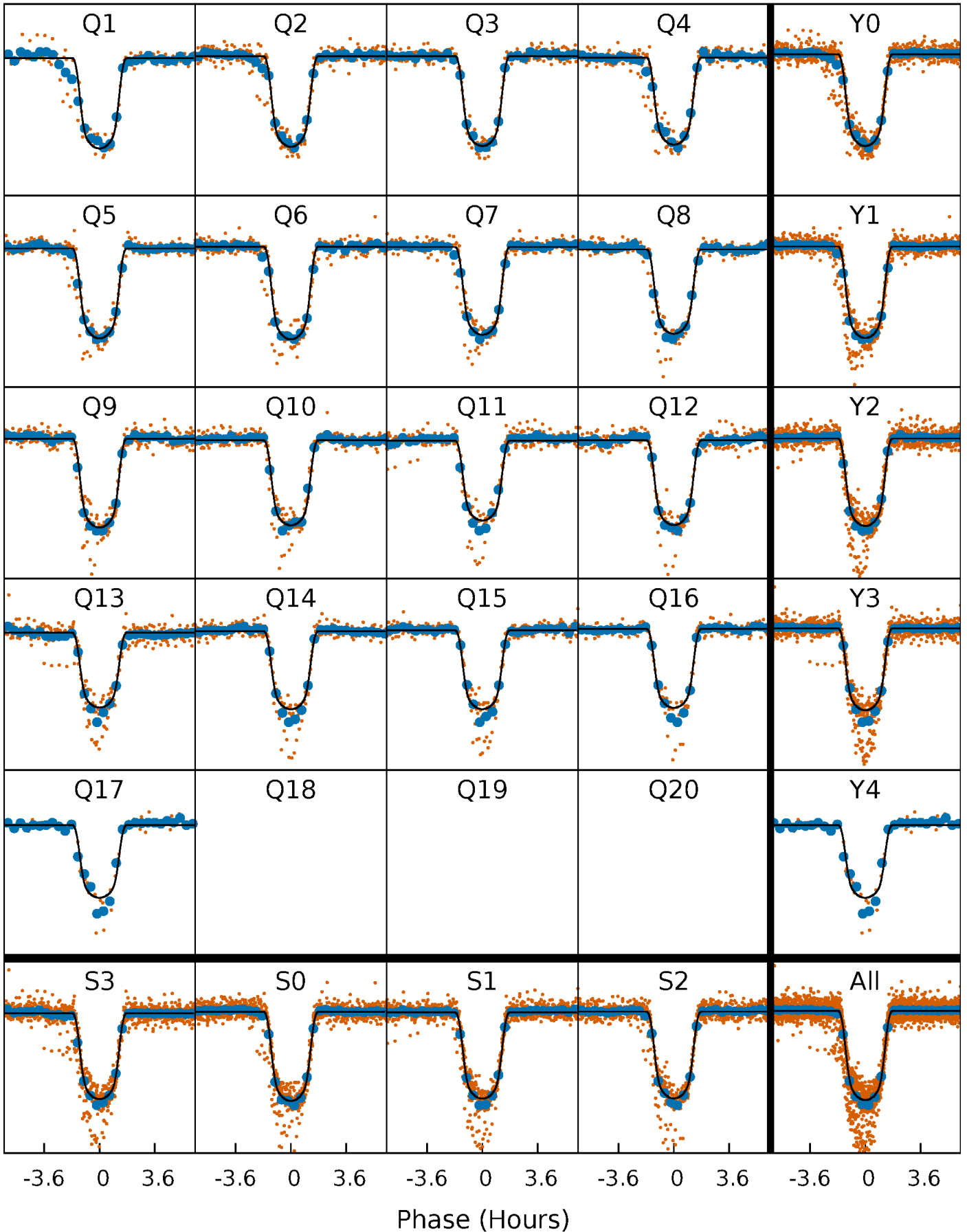
TCE 007447200-01 P= 7.972520 Days  $T_0=131.721489$  (BKJD)





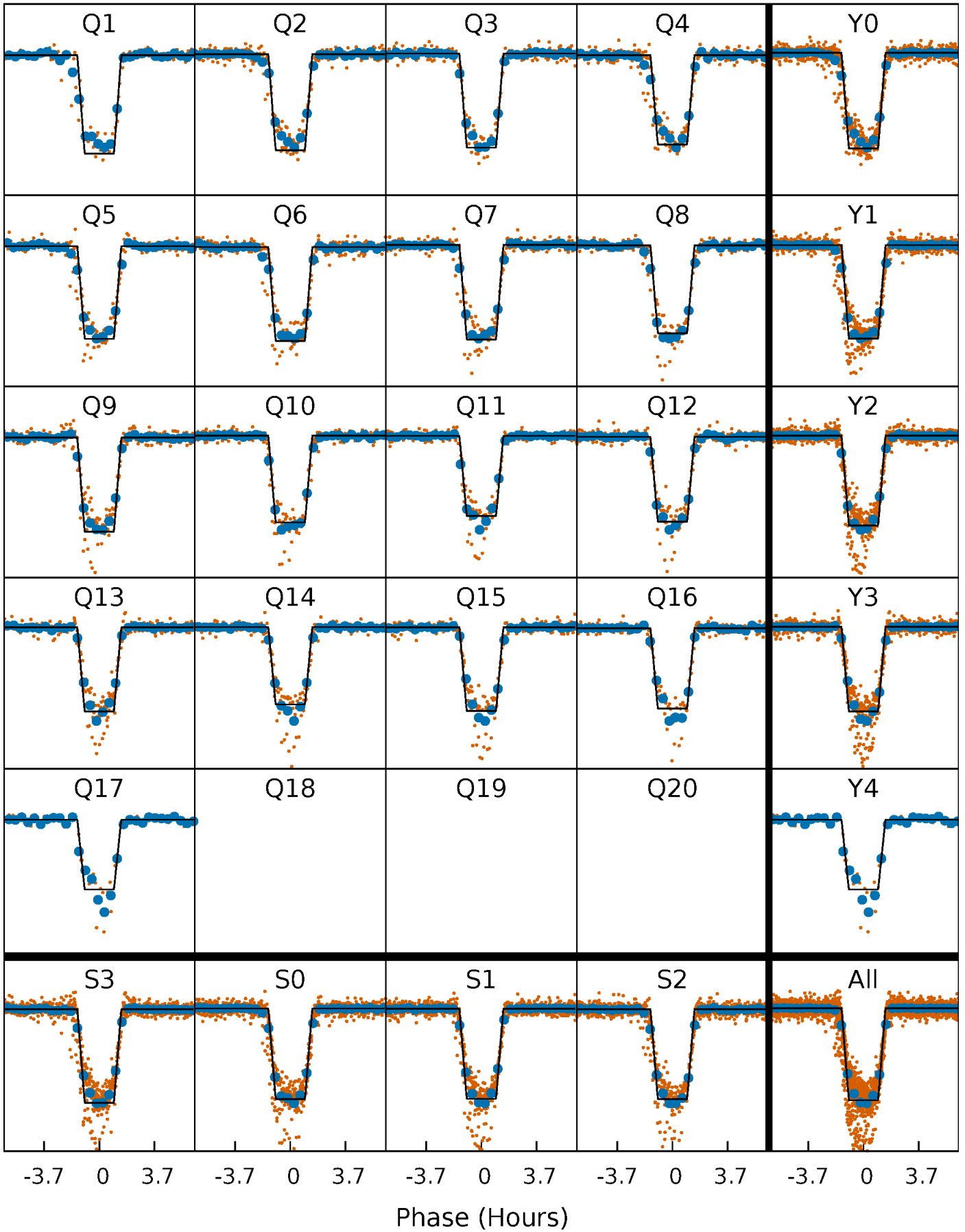
# DV Quarter-Phased Transit Curves

TCE 007447200-01 P= 7.972520 Days  $T_0=131.721489$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

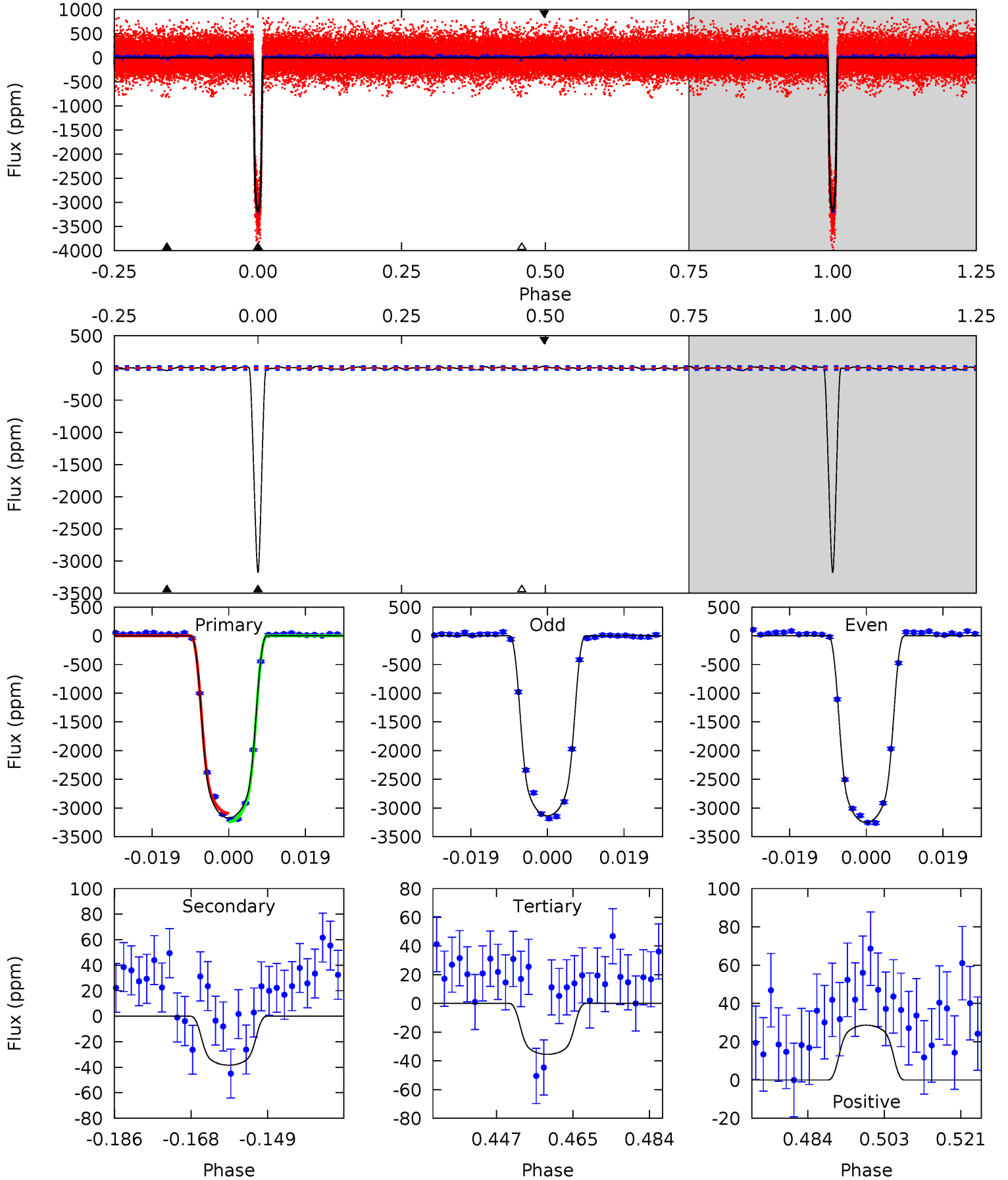
TCE 007447200-01   P= 7.972516 Days    $T_0=131.720708$  (BKJD)



# DV Model-Shift Uniqueness Test

007447200-01, P = 7.972520 Days, E = 123.748969 Days

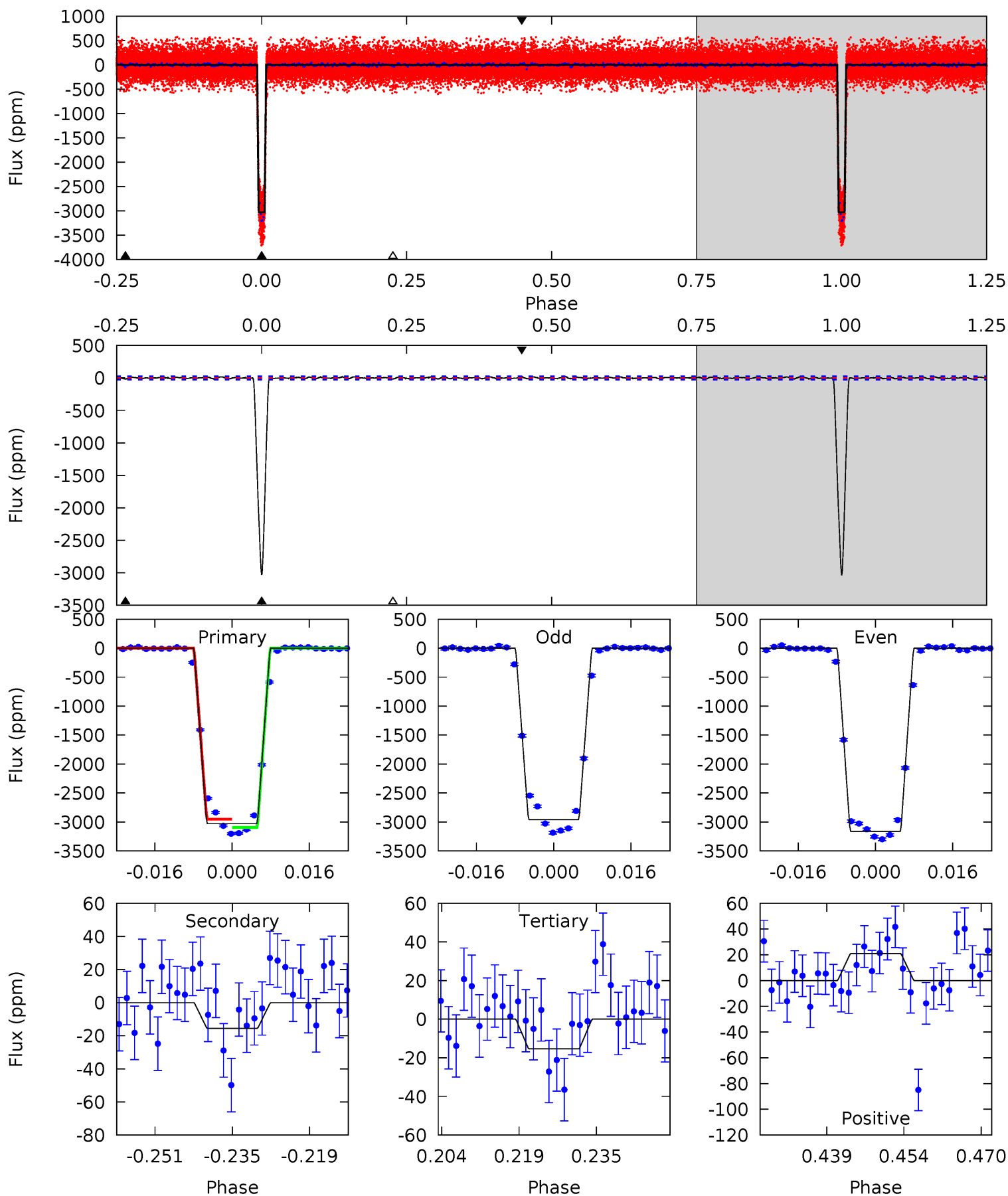
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
521.7	6.31	5.83	4.71	4.91	2.35	1.91	515.9	517.0	0.48	1.60	9.80	1.04	0.01	12.3



# Alt Model-Shift Uniqueness Test

007447200-01, P = 7.972516 Days, E = 123.748192 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
588.3	3.02	2.99	4.07	4.94	2.42	1.29	585.3	584.2	0.03	-1.04	19.7	1.03	0.01	13.9



### Stellar Parameters For KIC 007447200

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3912^{+78}_{-86}$	$4.728^{+0.030}_{-0.033}$	$-0.120^{+0.150}_{-0.150}$	$0.533^{+0.032}_{-0.035}$	$0.556^{+0.032}_{-0.039}$	$5.155^{+0.760}_{-0.662}$
	+2%/-2%	+1%/-1%	+125%/-125%	+6%/-7%	+6%/-7%	+15%/-13%
Source	SPE5	SPE5	SPE5	DSEP		

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

### Secondary Eclipse Parameters for KIC 007447200-01 / KOI 0676.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-38 \pm 6$	$3.40^{+0.11}_{-0.12}$	$695^{+19}_{-17}$	$2125^{+48}_{-47}$	$7.622^{+1.355}_{-1.258}$
Alt.	$-16 \pm 5$	$3.35^{+0.11}_{-0.13}$	$696^{+17}_{-18}$	$1926^{+72}_{-85}$	$3.102^{+1.095}_{-1.015}$

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

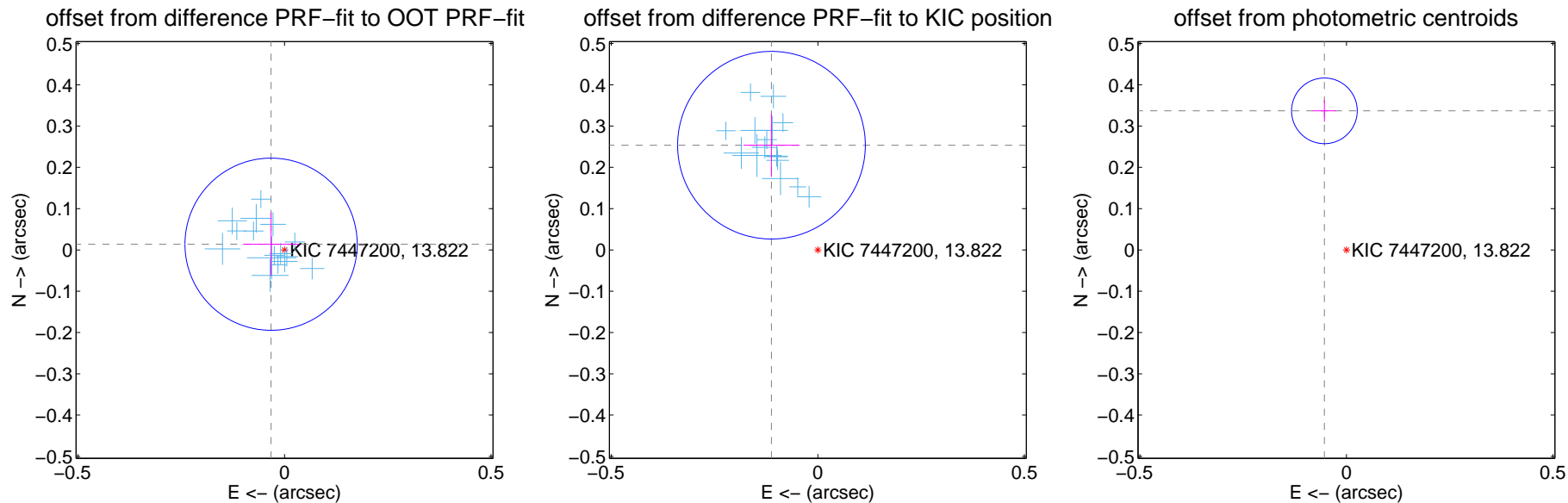
## DV Centroid Data

Supplemental centroid analysis for 007447200-01. Kepler magnitude: 13.82. Transit SNR 294.55

There are 17 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.27 arcsec

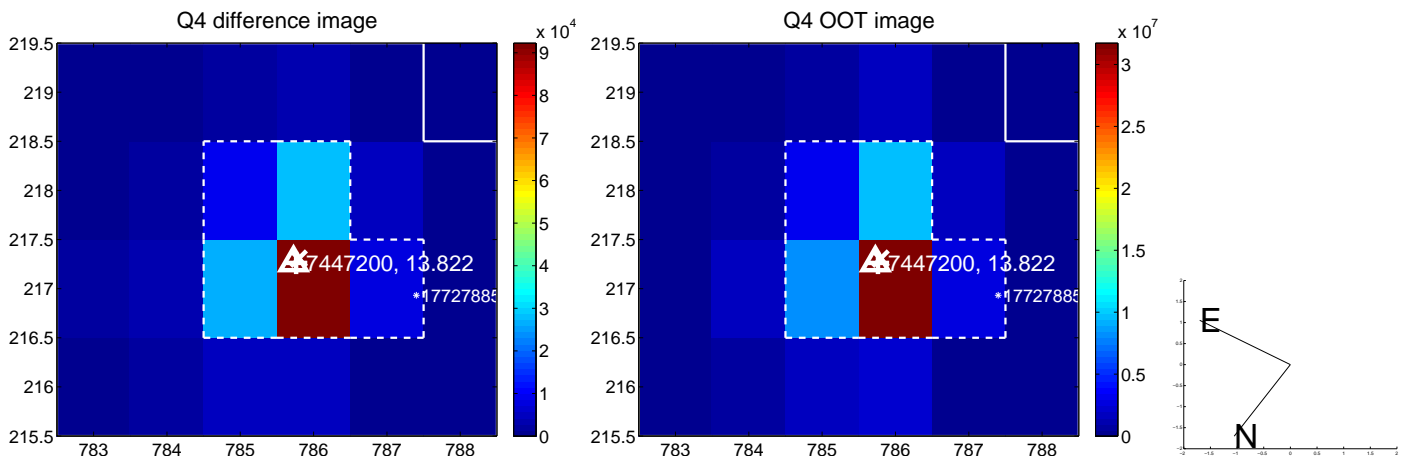
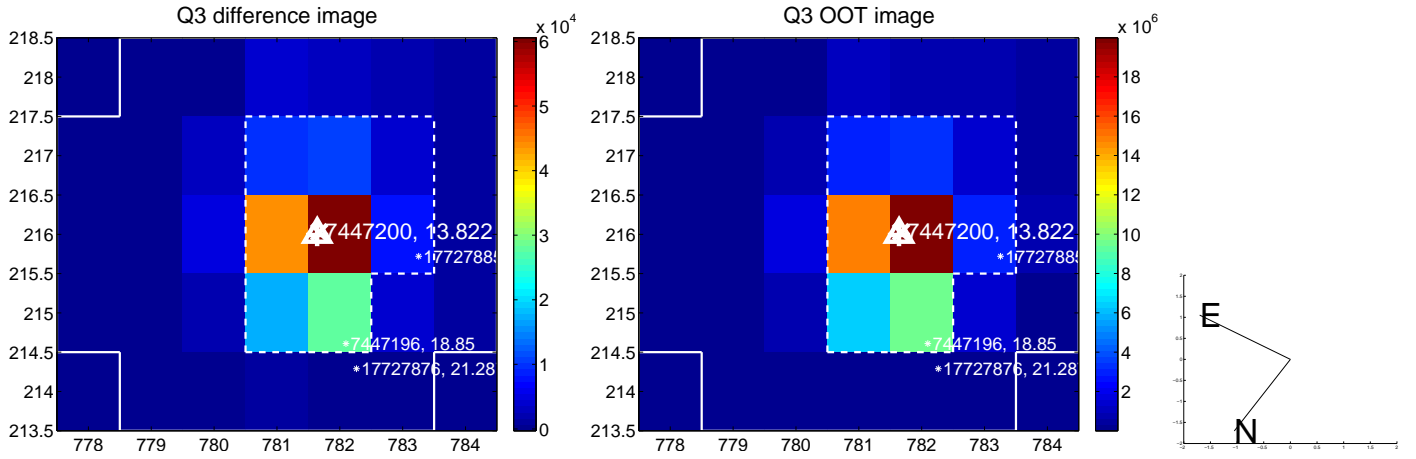
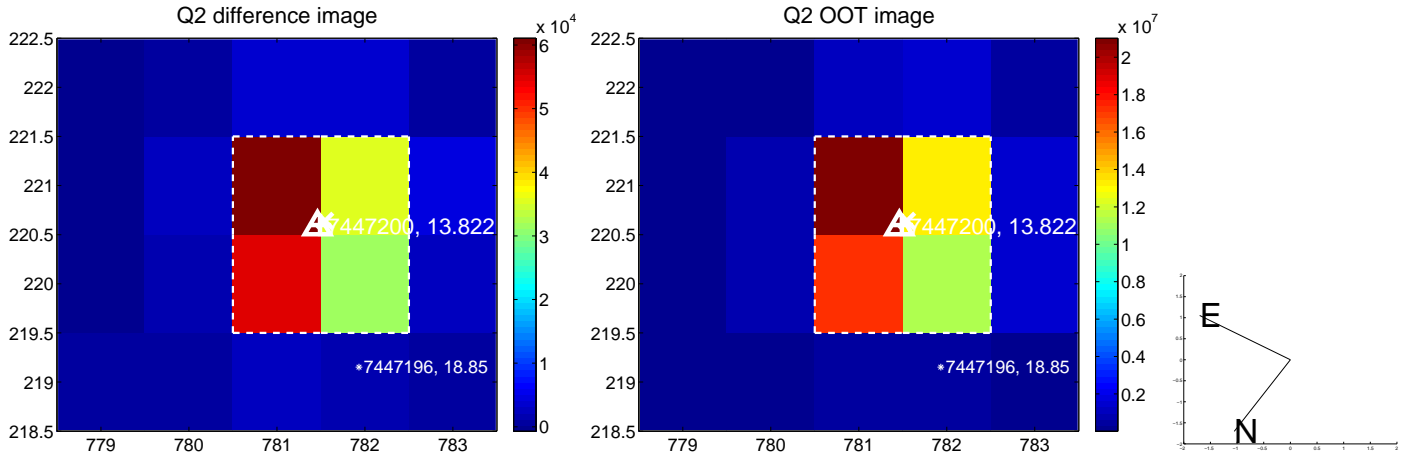
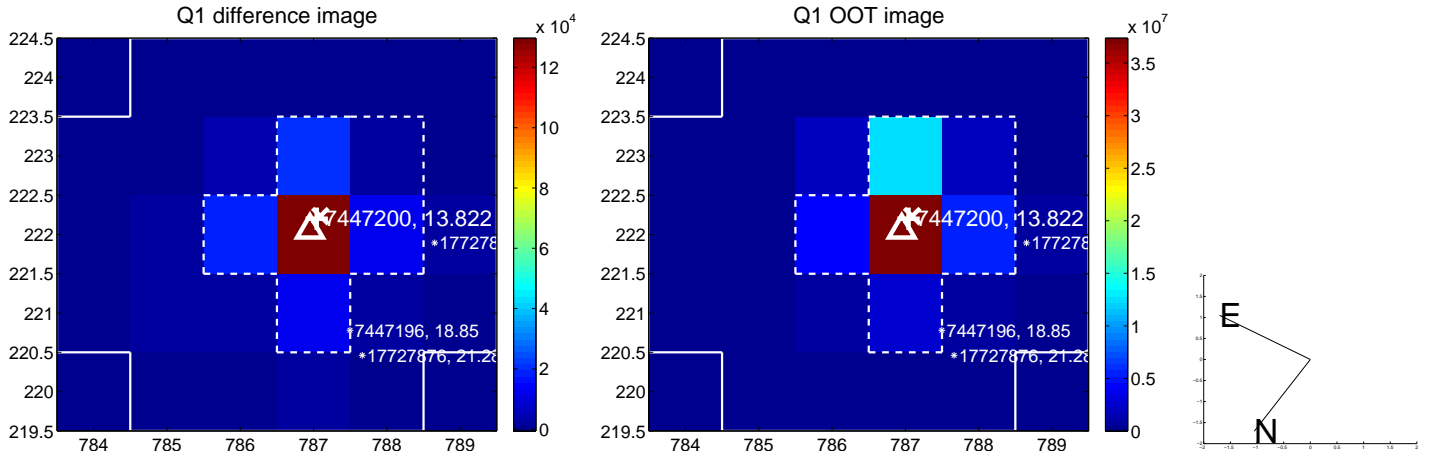
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.035 \pm 0.069$	0.51	$0.033 \pm 0.068$	$0.014 \pm 0.077$
PRF-fit source offset from KIC position	$0.277 \pm 0.076$	3.66	$0.112 \pm 0.068$	$0.254 \pm 0.077$
photometric centroid source offset	$0.34 \pm 0.03$	12.87	$0.05 \pm 0.03$	$0.34 \pm 0.03$



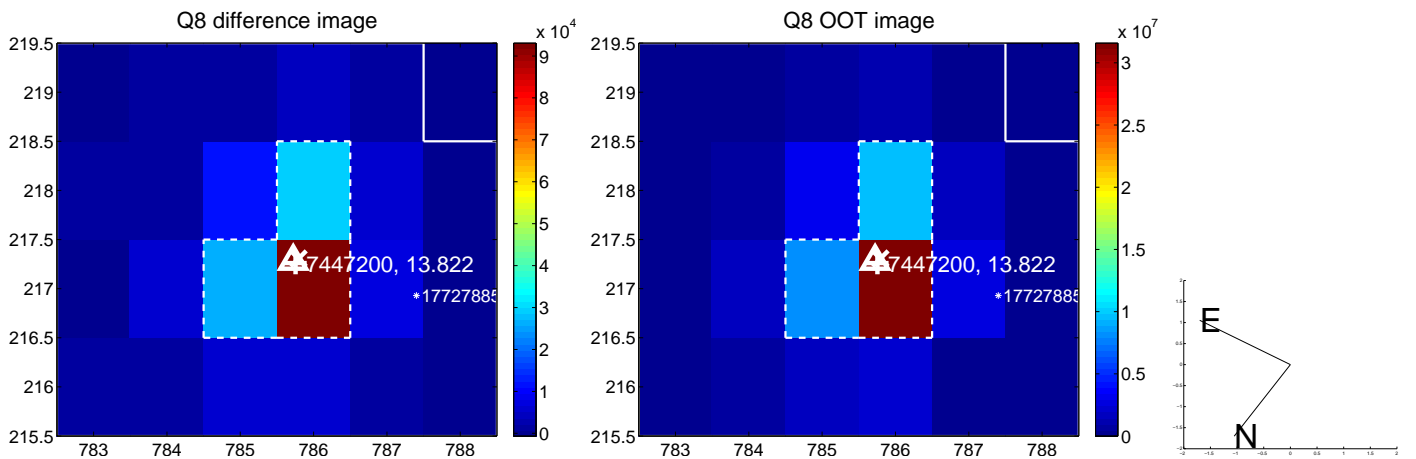
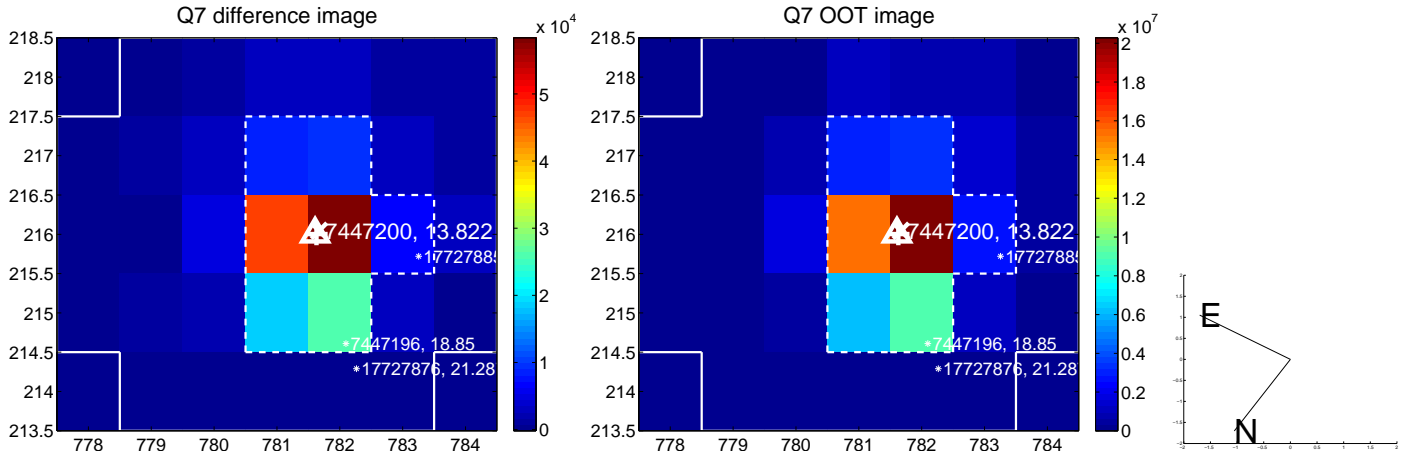
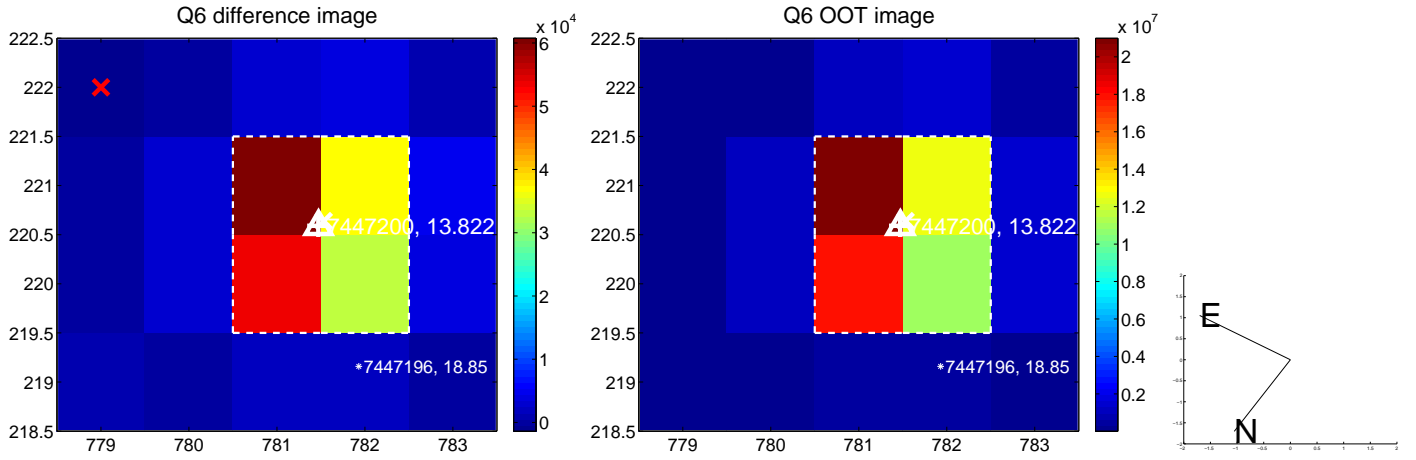
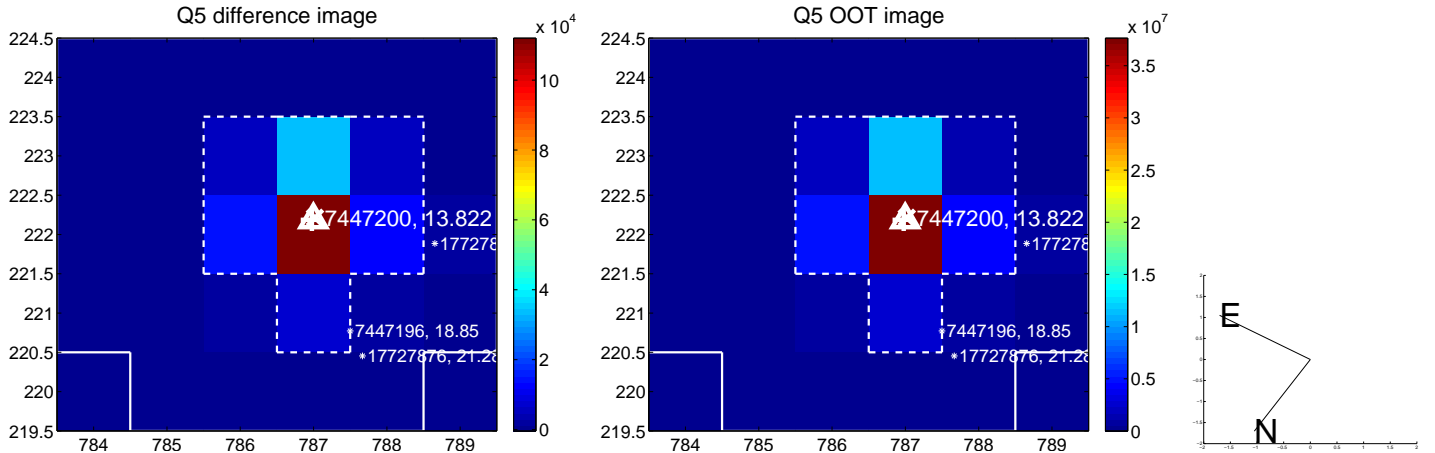
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



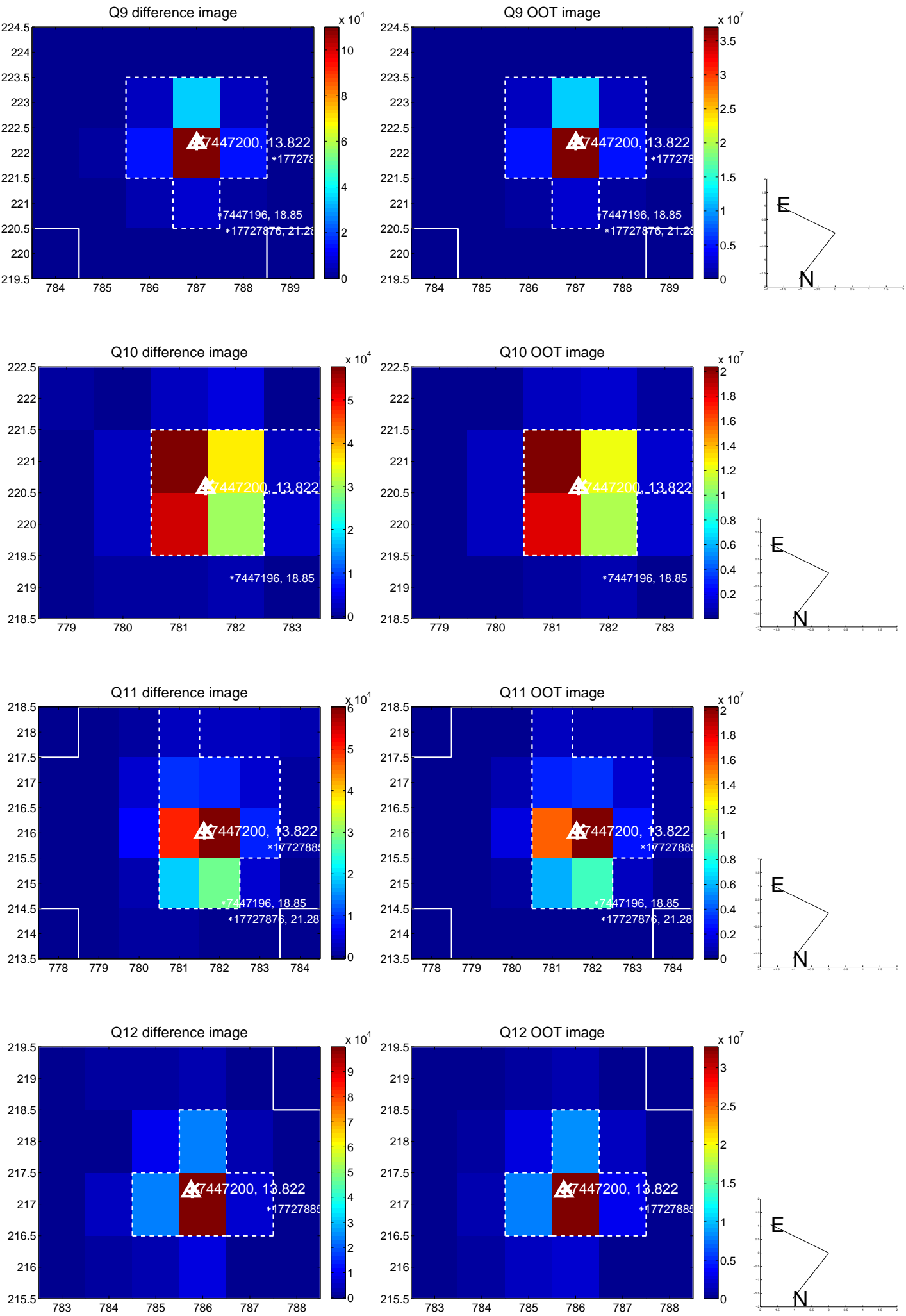
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



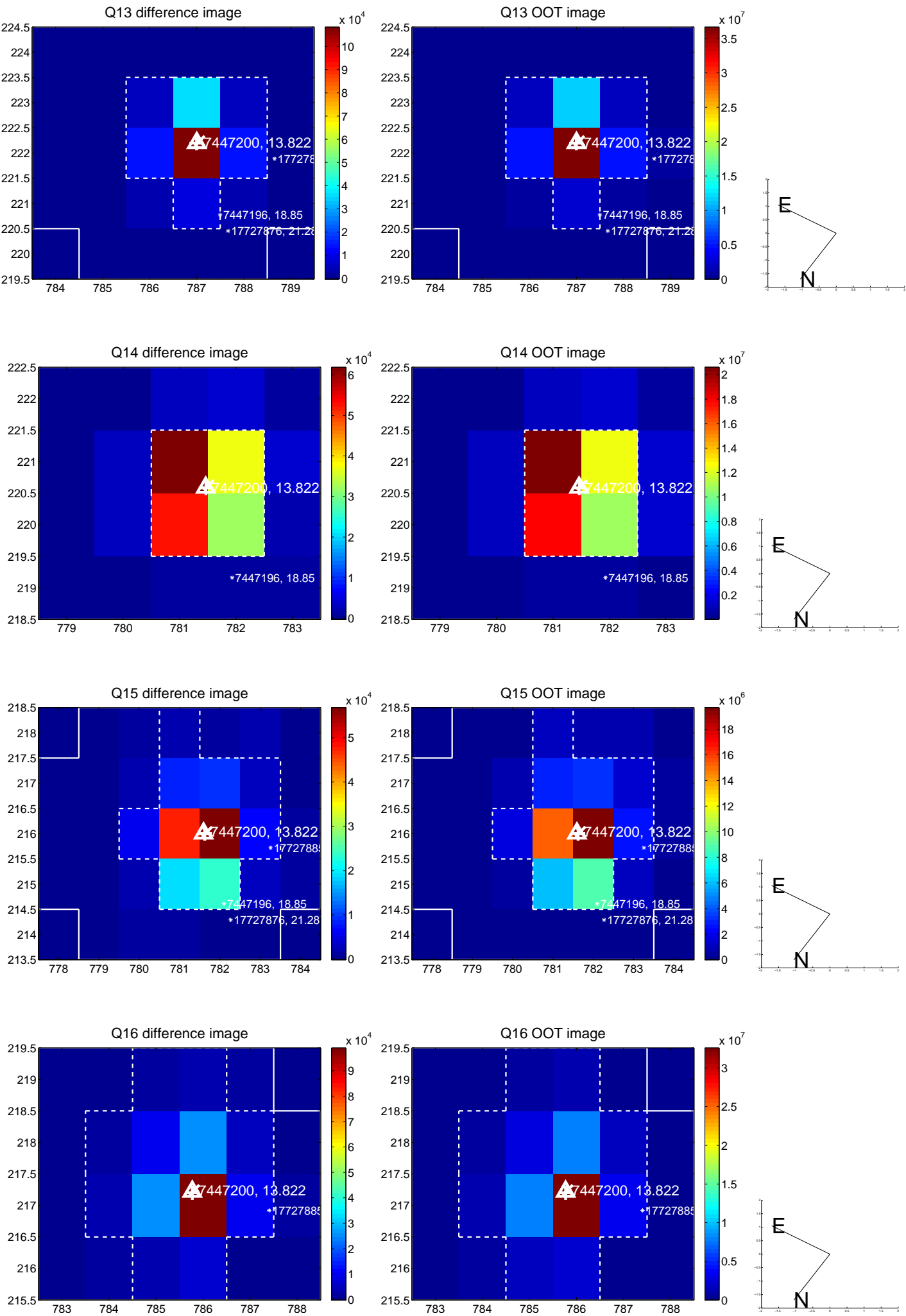
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



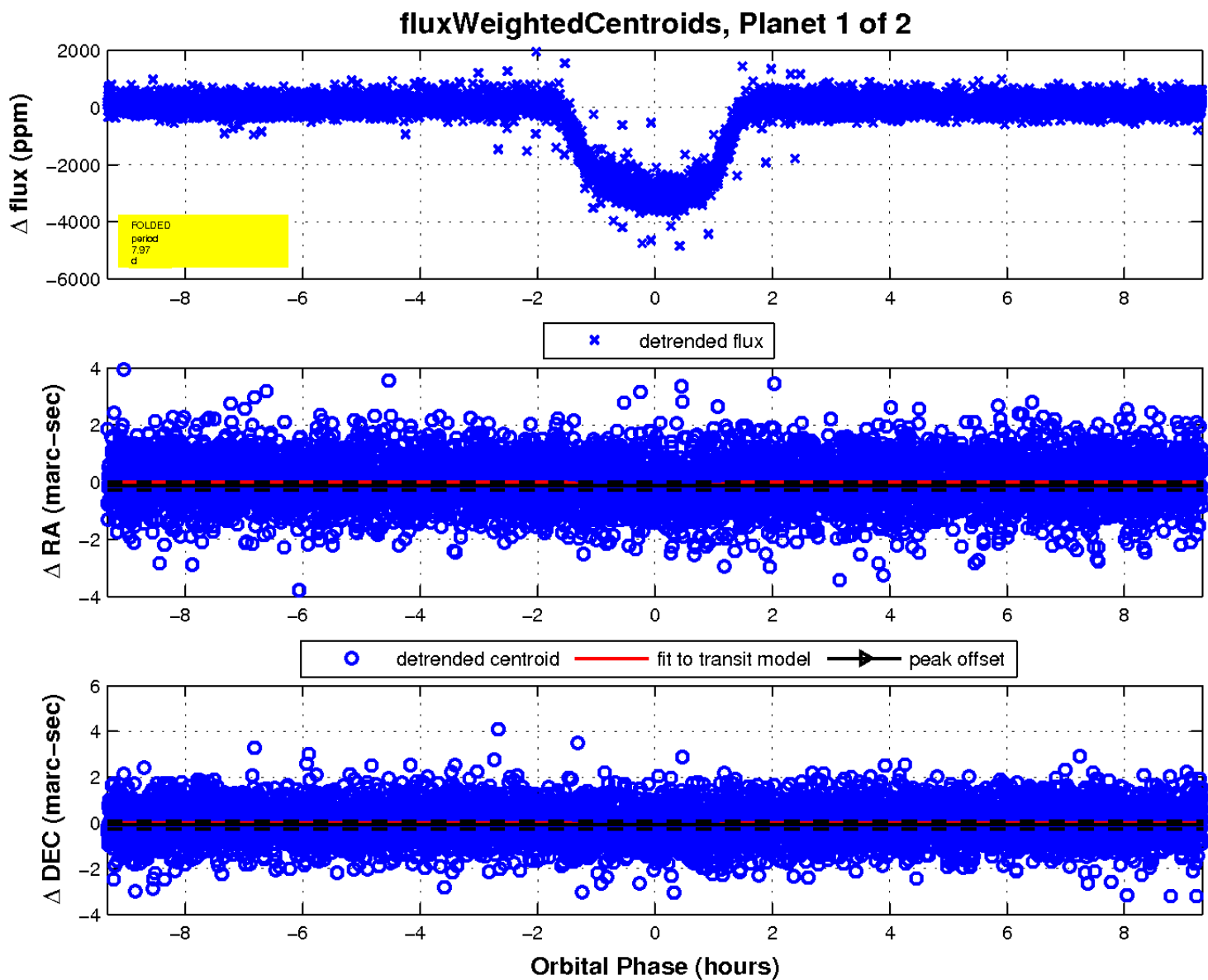
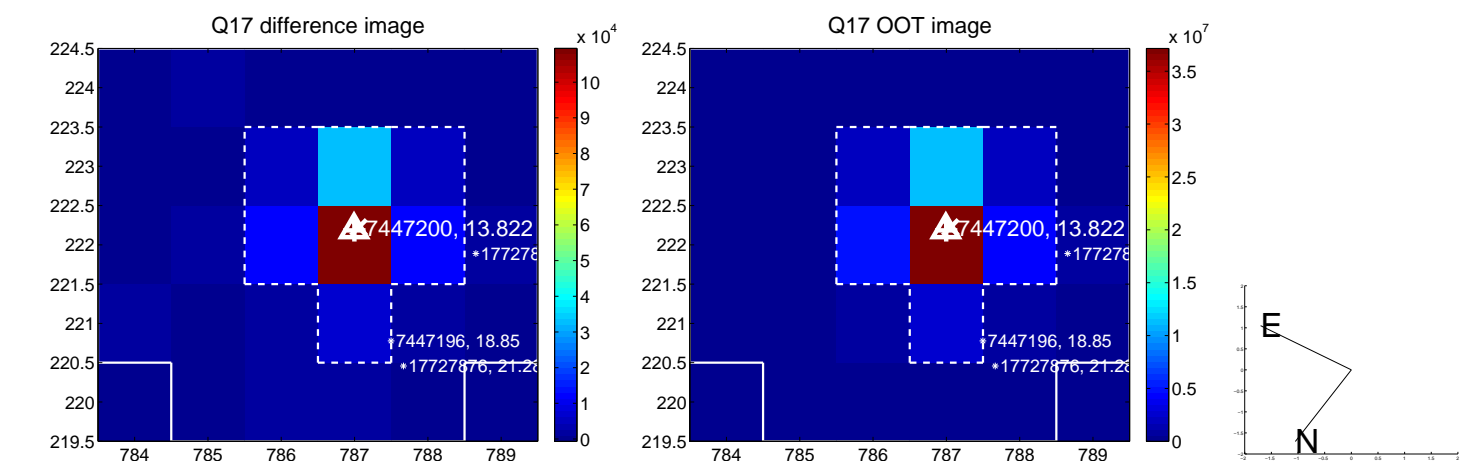
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

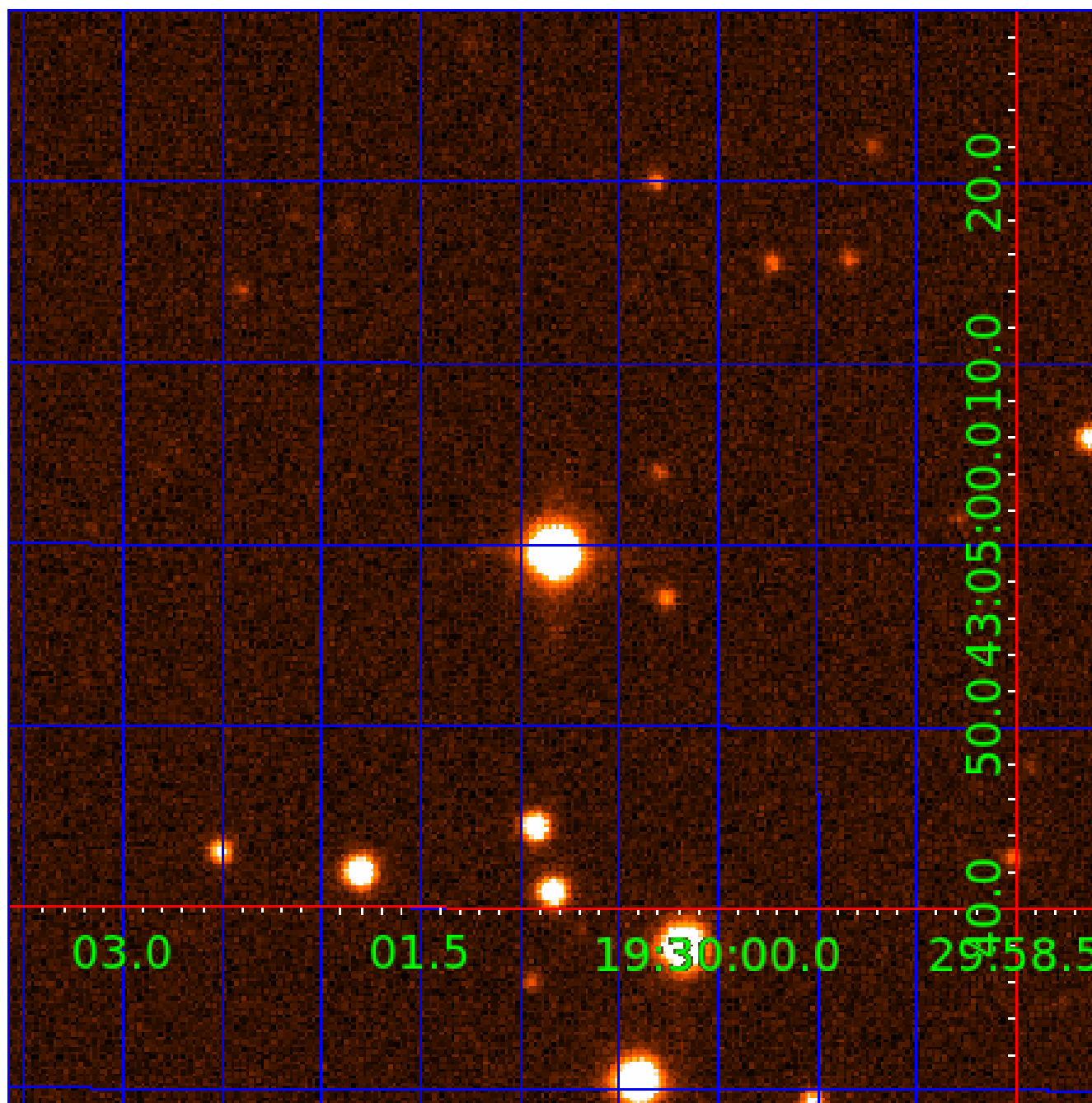


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 007447200

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007447200-01	OBS	0676.01	7.972520	131.721489	3194.5	3.111	336.3	294.6	0.53	3912	3.38	14.48
007447200-02	OBS	0676.02	2.453235	131.640462	1723.6	1.841	278.0	267.0	0.53	3912	2.57	69.71

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007447200-01	OBS	PC	0.38	0	0	0	0	NO_COMMENT
007447200-02	OBS	PC	1.00	0	0	0	0	NO_COMMENT

**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.

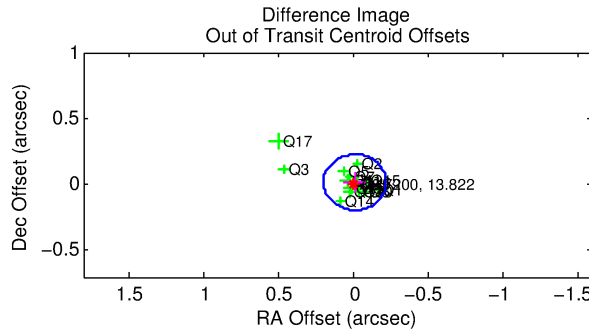
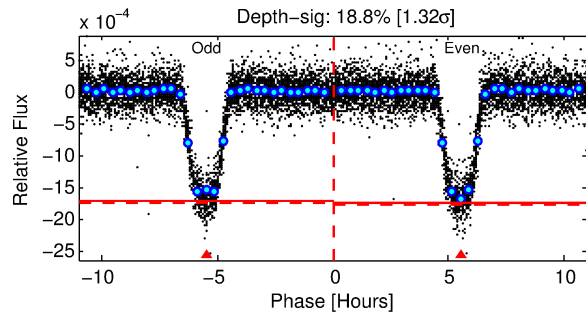
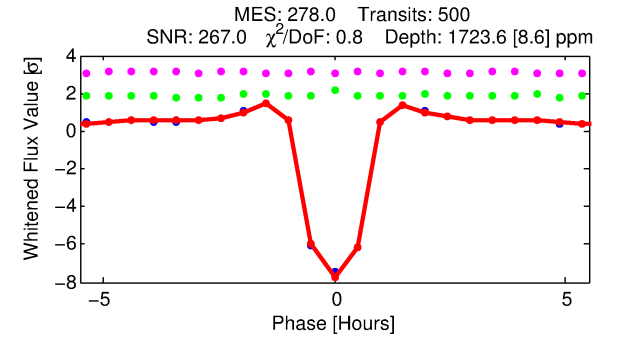
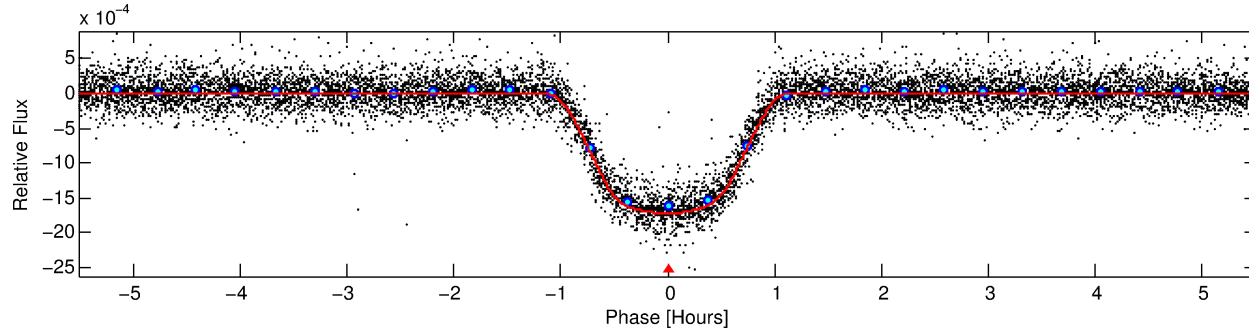
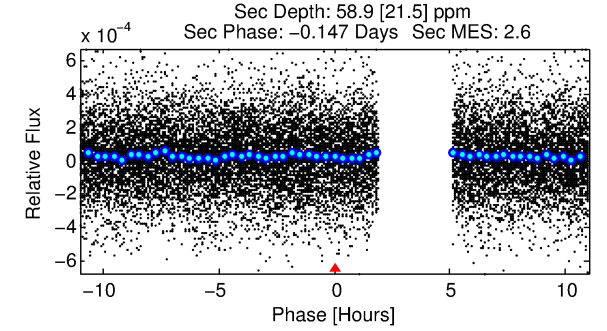
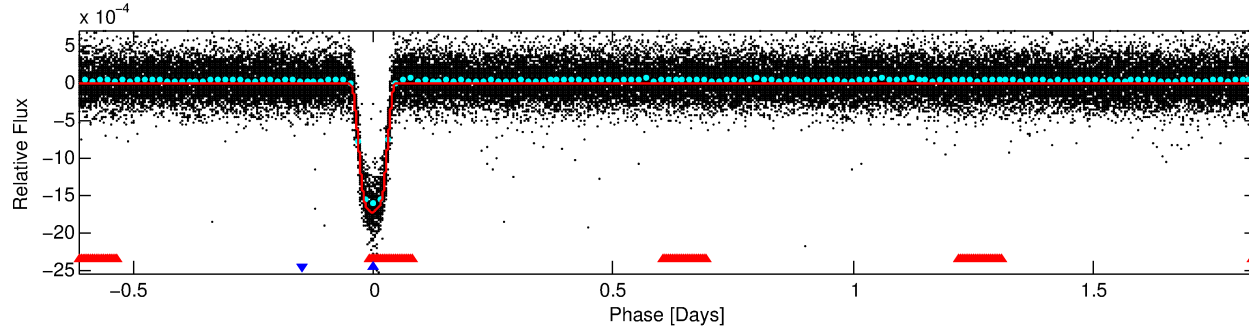
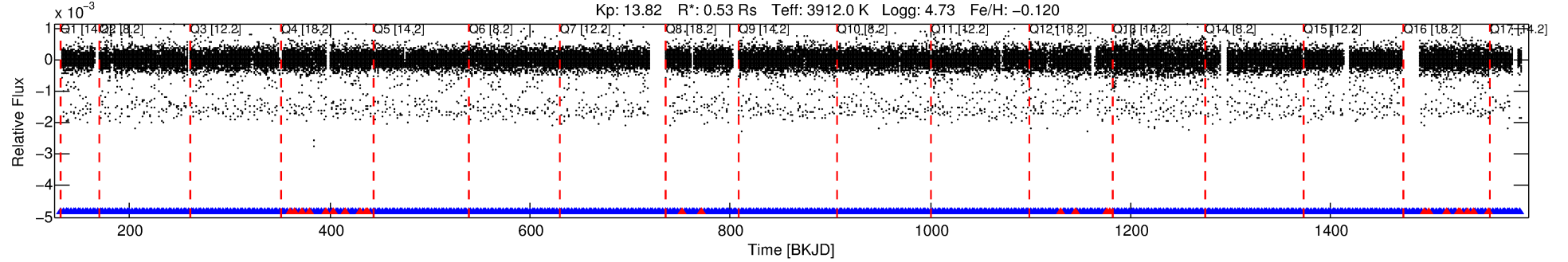
## Ephemeris Match Information For 007447200-02

No Significant Match Found

# DV One-Page Summary

KIC: 7447200 Candidate: 2 of 2 Period: 2.453 d  
KOI: K00676.02 Name: Kepler-210b Corr: 0.946

Kp: 13.82 R\*: 0.53 Rs Teff: 3912.0 K Logg: 4.73 Fe/H: -0.120



## DV Fit Results:

Period = 2.45324 [0.00000] d  
Epoch = 131.6405 [0.0001] BKJD  
Rp/R\* = 0.0442 [0.0005]  
a/R\* = 5.99 [0.27]  
b = 0.87 [0.01]  
Seff = 69.71 [7.70]  
Teq = 737 [20] K  
Rp = 2.57 [0.17] Re  
a = 0.0292 [0.0015] AU  
Ag = 4.19 [1.56] [2.04σ]  
Teffp = 1630 [154] K [5.76σ]

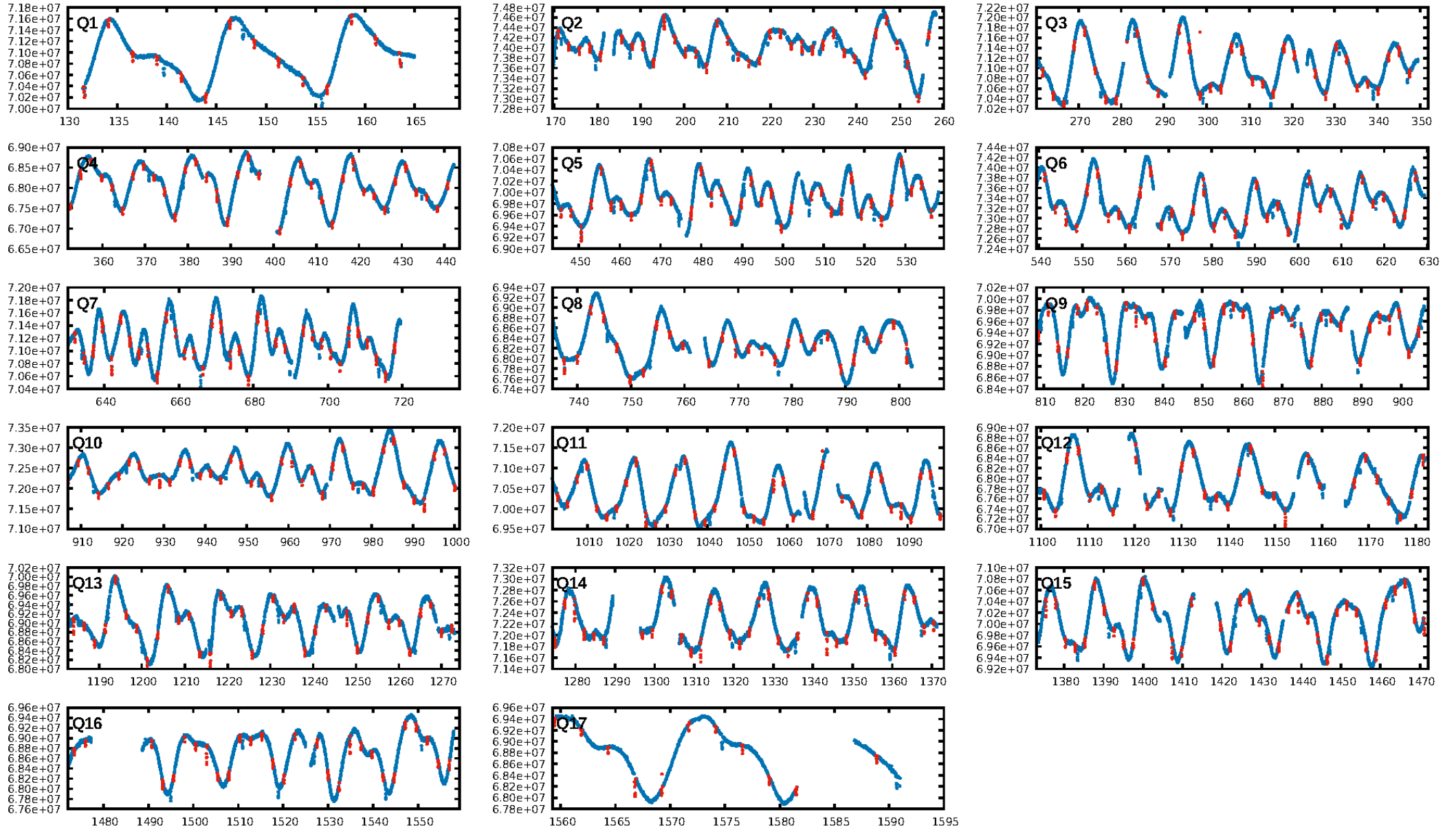
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [36.65σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 0.95 [454/478]  
GhostDiagnostic-chr: 2.679  
Centroid-sig: 0.2%  
Centroid-so: 0.371 arcsec [10.56σ]  
OotOffset-rm: 0.021 arcsec [0.30σ]  
KicOffset-rm: 0.264 arcsec [3.55σ]  
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]

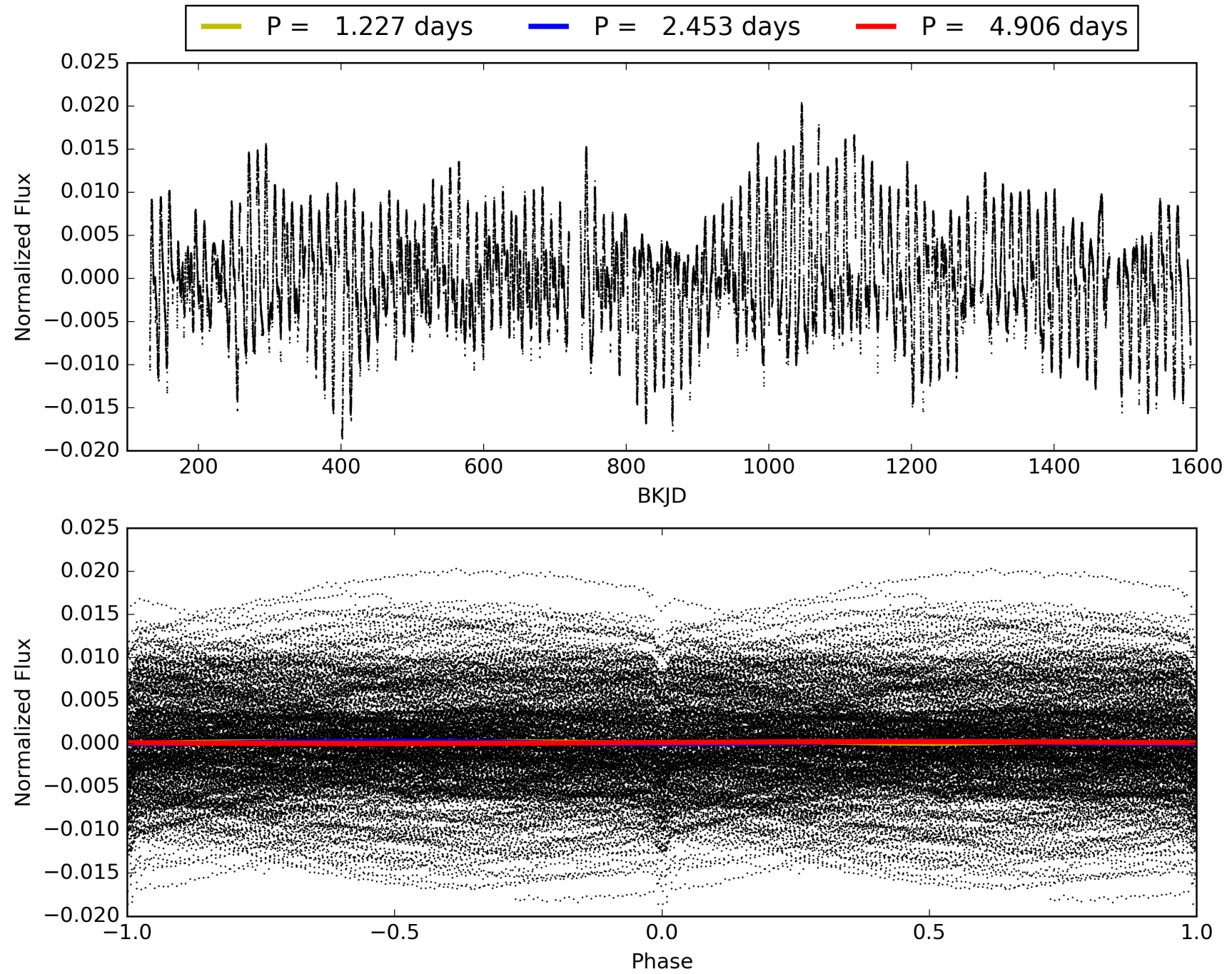
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 07:48:25 Z

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

# TCE 007447200-02, PDC Light Curves

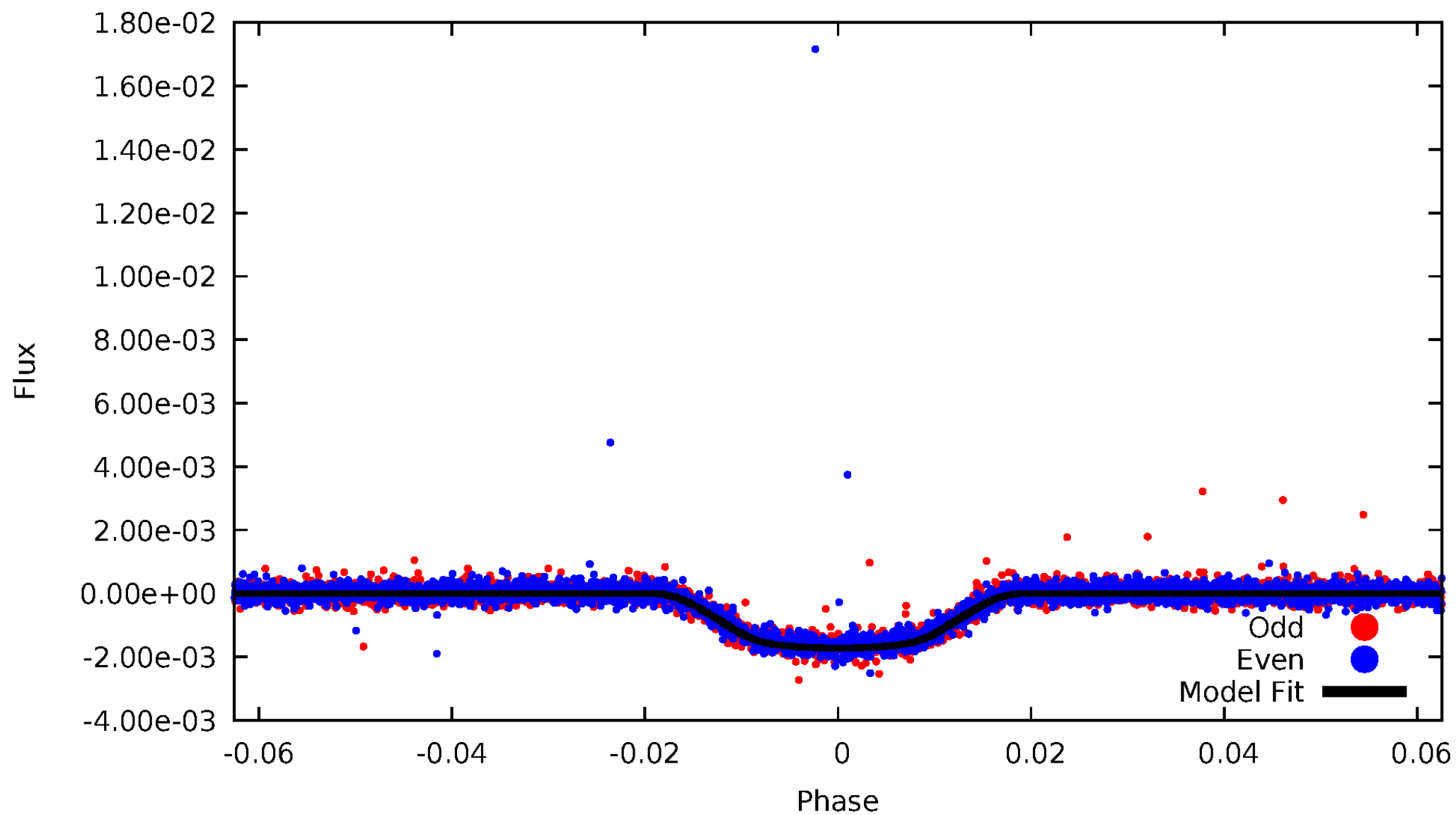


TCE 007447200-02



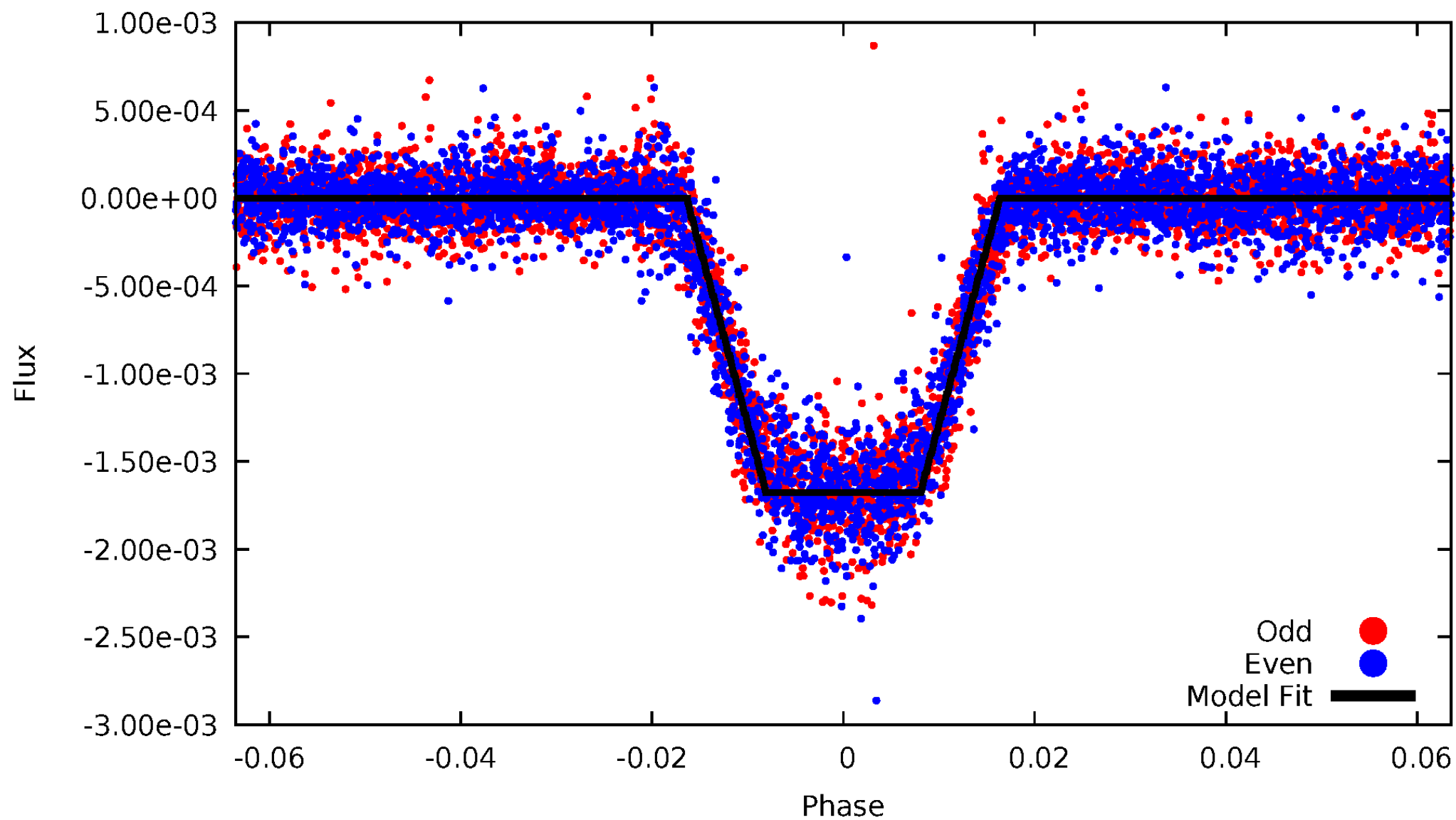
# DV Odd/Even

TCE 007447200-02



# ALT Odd/Even

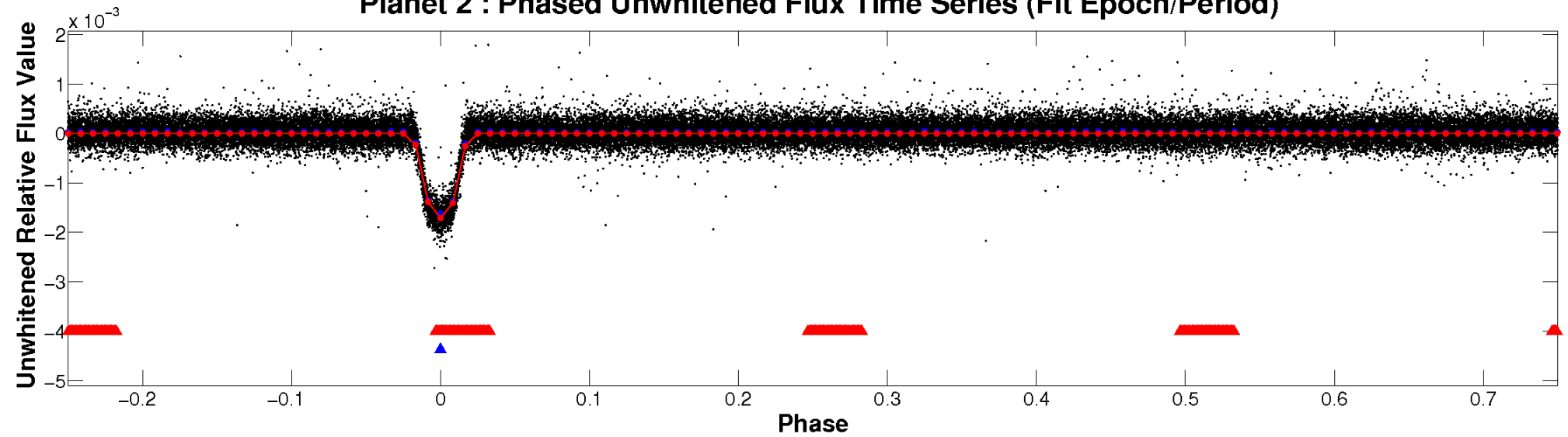
TCE 007447200-02



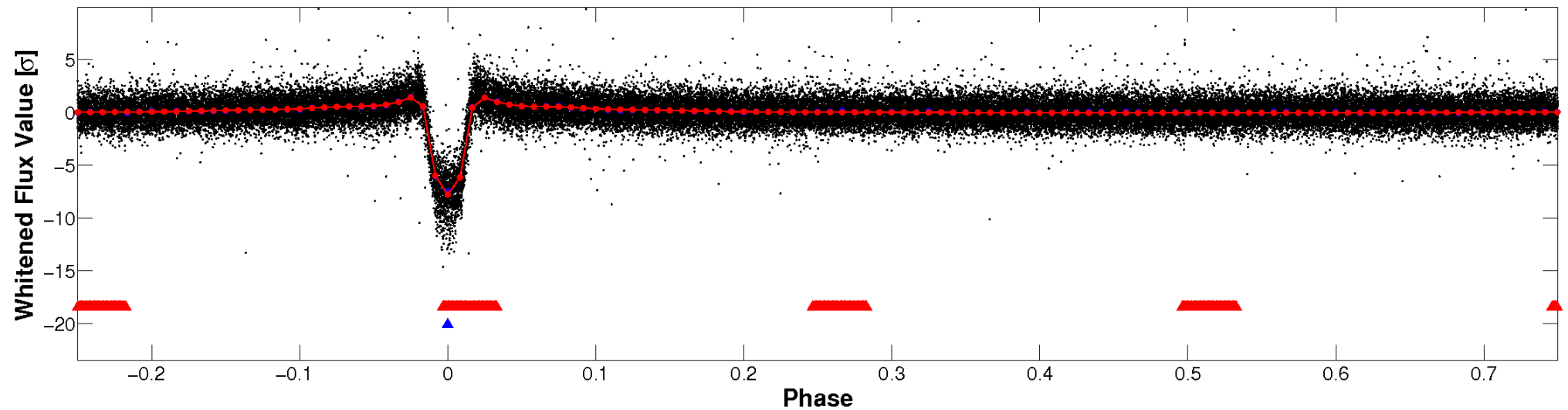


# Non-Whitened Vs. Whitened Light Curve

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

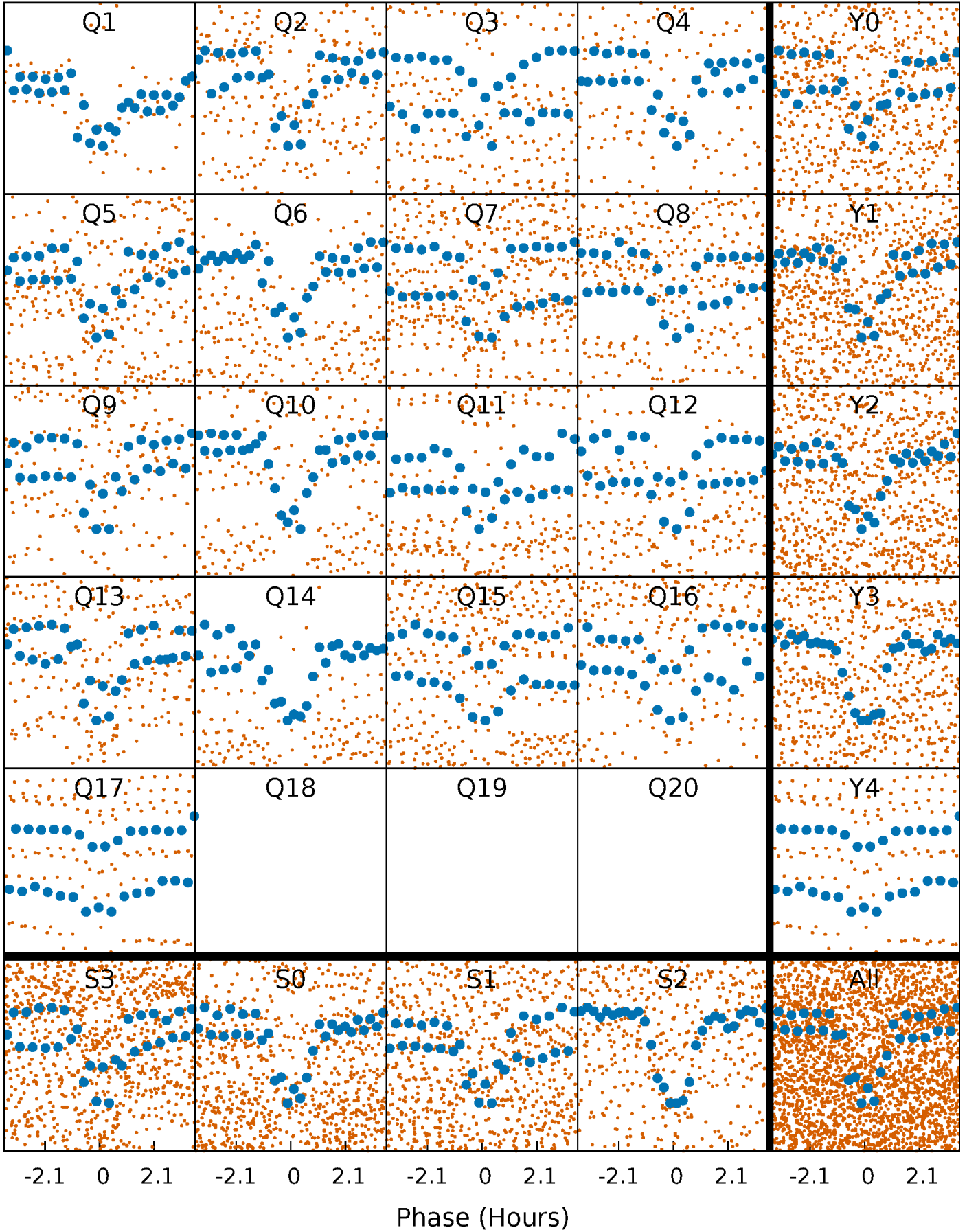


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



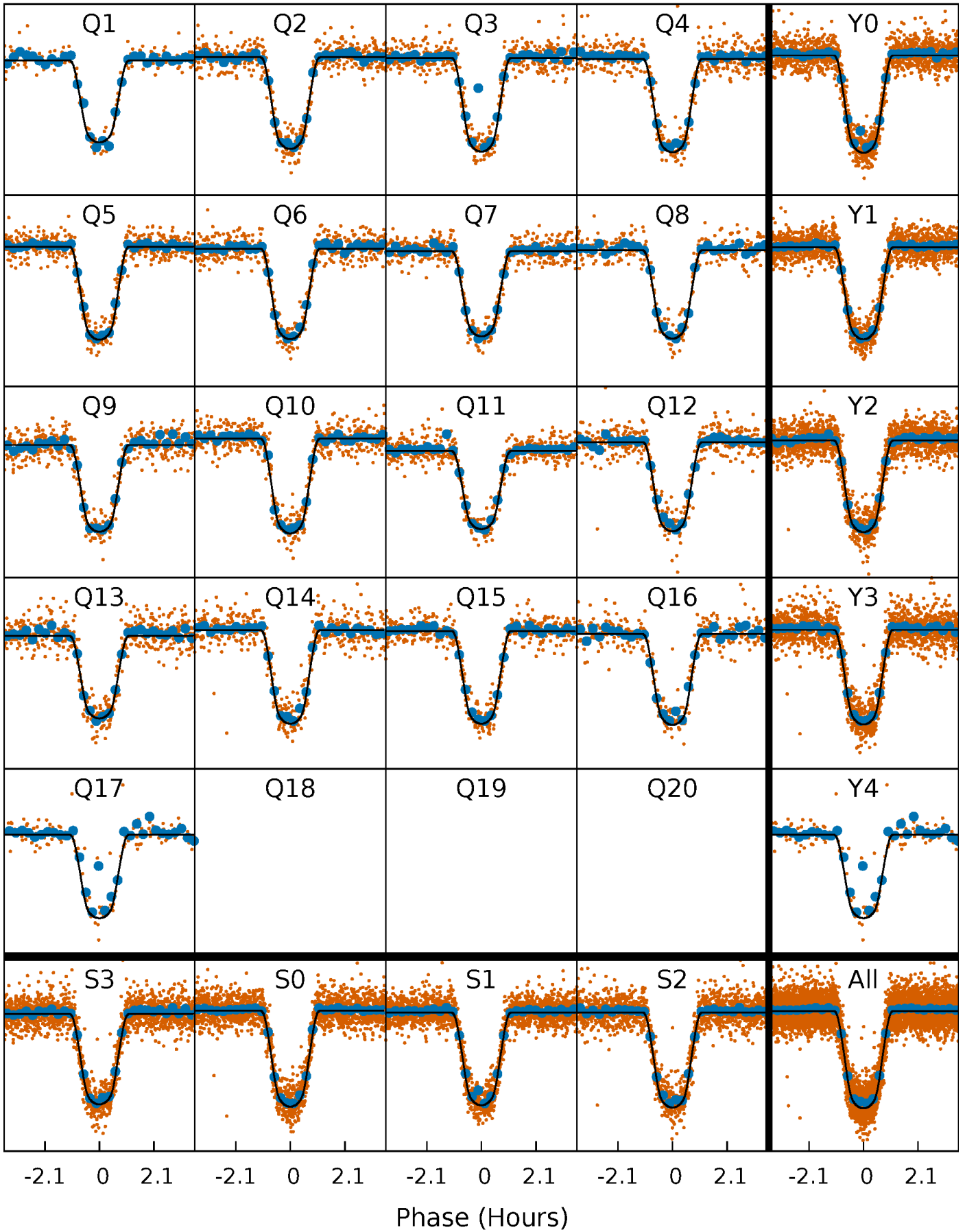
# PDC Quarter-Phased Transit Curves

TCE 007447200-02     $P = 2.453235$  Days     $T_0 = 131.640463$  (BKJD)



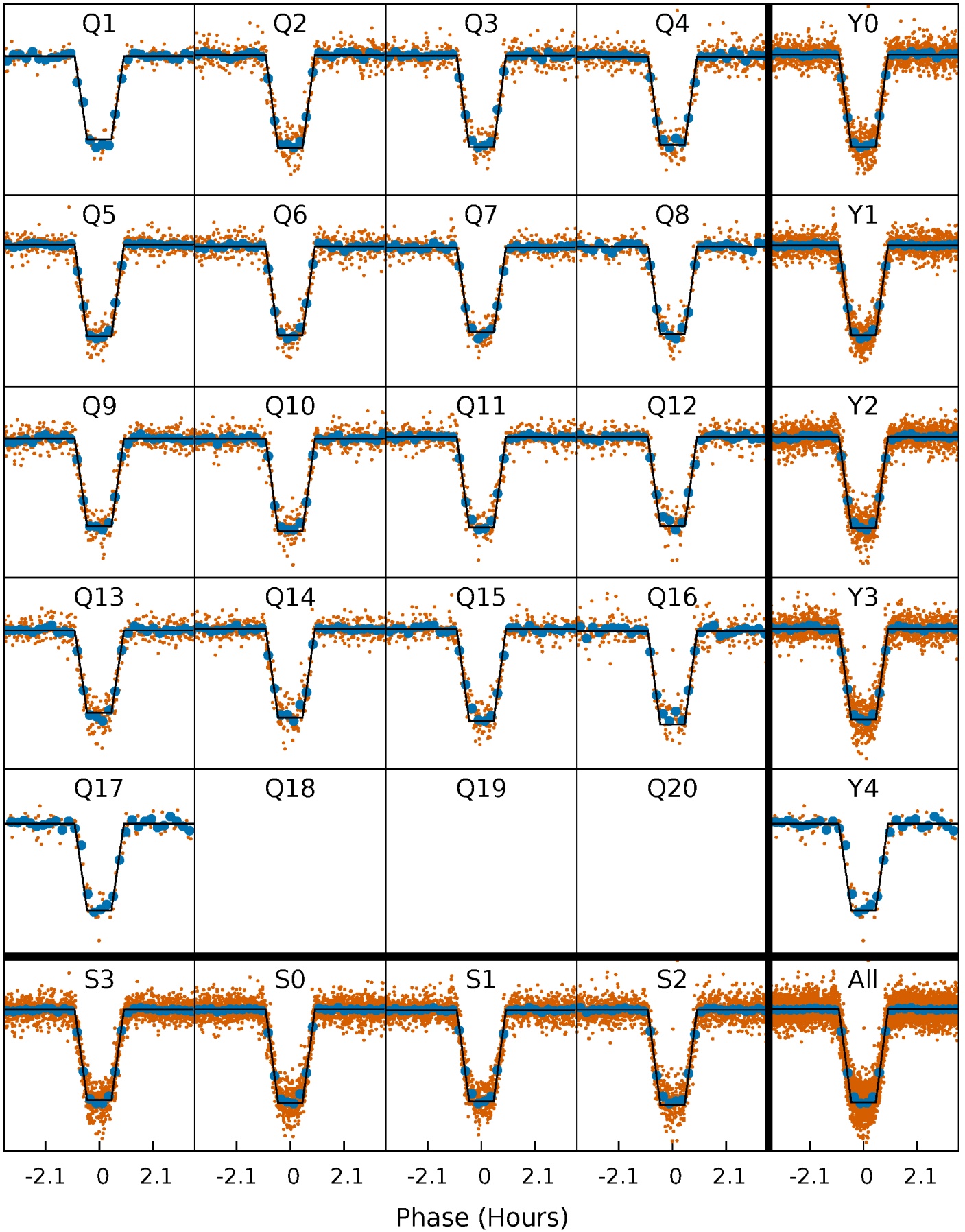
# DV Quarter-Phased Transit Curves

TCE 007447200-02     $P = 2.453235$  Days     $T_0 = 131.640463$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

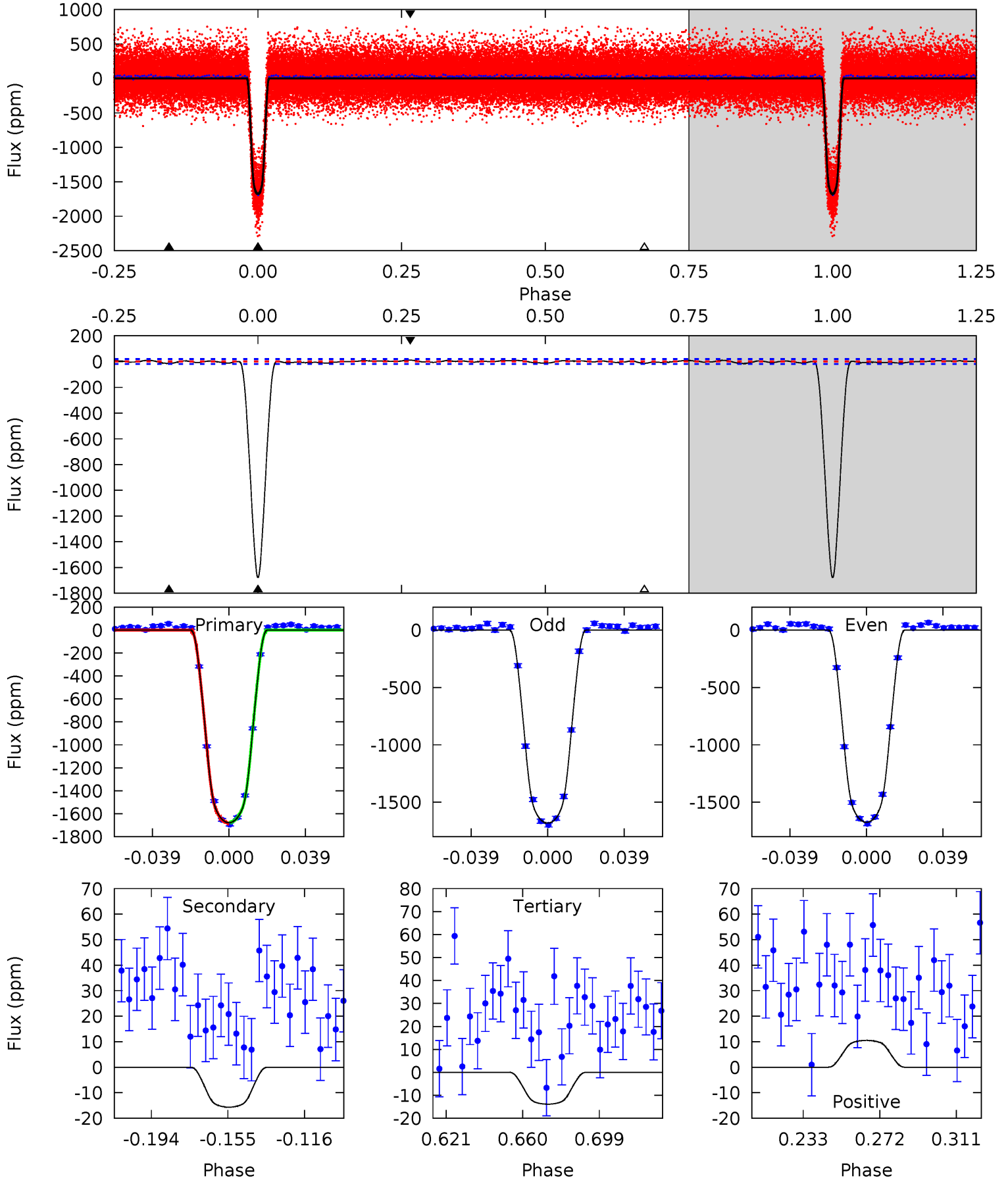
TCE 007447200-02     $P = 2.453233$  Days     $T_0 = 131.640895$  (BKJD)



# DV Model-Shift Uniqueness Test

007447200-02, P = 2.453235 Days, E = 129.187228 Days

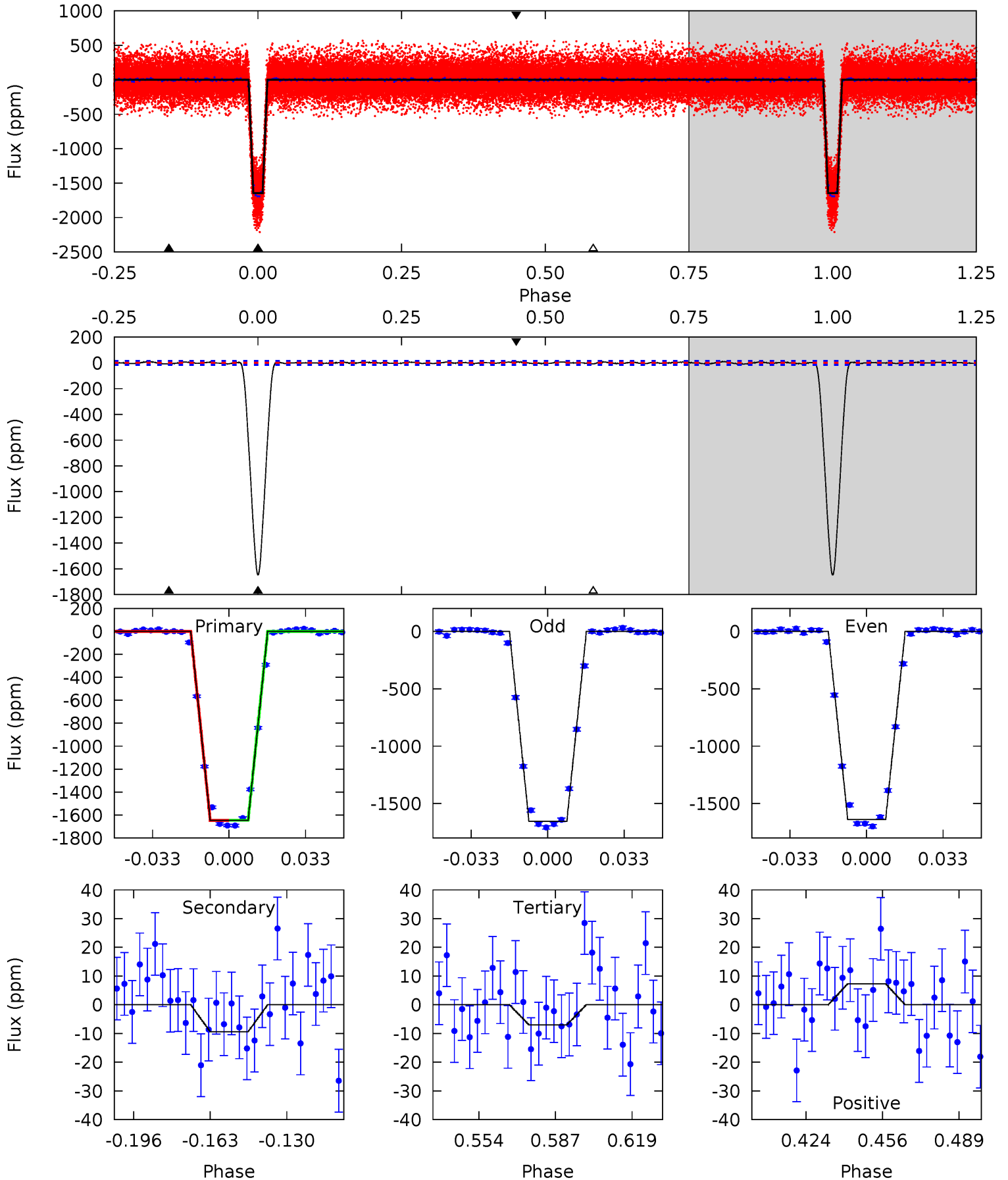
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
426.8	3.98	3.52	2.67	4.76	2.07	1.44	423.3	424.2	0.46	1.31	0.92	0.99	0.01	0.83



# Alt Model-Shift Uniqueness Test

007447200-02, P = 2.453233 Days, E = 131.640895 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
491.8	2.80	2.08	2.18	4.79	2.14	1.01	489.7	489.6	0.72	0.62	2.39	1.01	0.01	0.07



### Stellar Parameters For KIC 007447200

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3912^{+78}_{-86}$	$4.728^{+0.030}_{-0.033}$	$-0.120^{+0.150}_{-0.150}$	$0.533^{+0.032}_{-0.035}$	$0.556^{+0.032}_{-0.039}$	$5.155^{+0.760}_{-0.662}$
	+2%/-2%	+1%/-1%	+125%/-125%	+6%/-7%	+6%/-7%	+15%/-13%
Source	SPE5	SPE5	SPE5	DSEP		

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

### Secondary Eclipse Parameters for KIC 007447200-02 / KOI 0676.02

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-16 \pm 4$	$2.58^{+0.09}_{-0.10}$	$1031^{+24}_{-26}$	$1984^{+74}_{-86}$	$1.091^{+0.299}_{-0.281}$
Alt.	$-9 \pm 3$	$2.39^{+0.08}_{-0.10}$	$1029^{+26}_{-24}$	$1884^{+92}_{-170}$	$0.766^{+0.286}_{-0.289}$

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

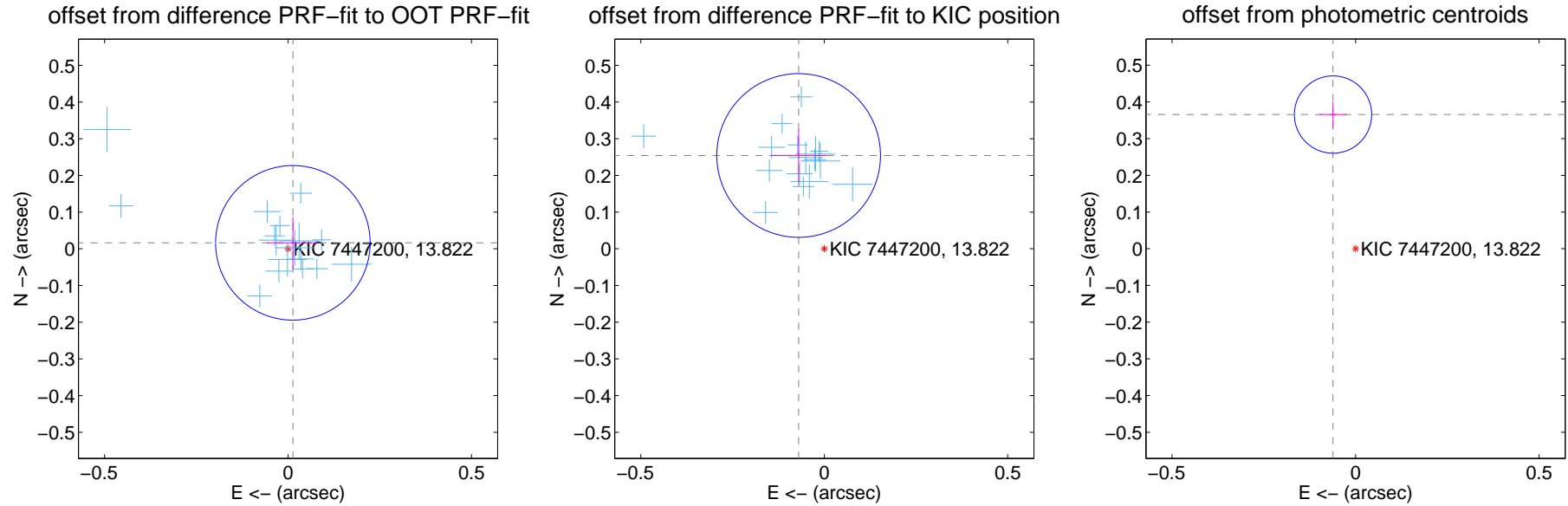
## DV Centroid Data

Supplemental centroid analysis for 007447200-02. Kepler magnitude: 13.82. Transit SNR 267.03

There are 17 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.27 arcsec

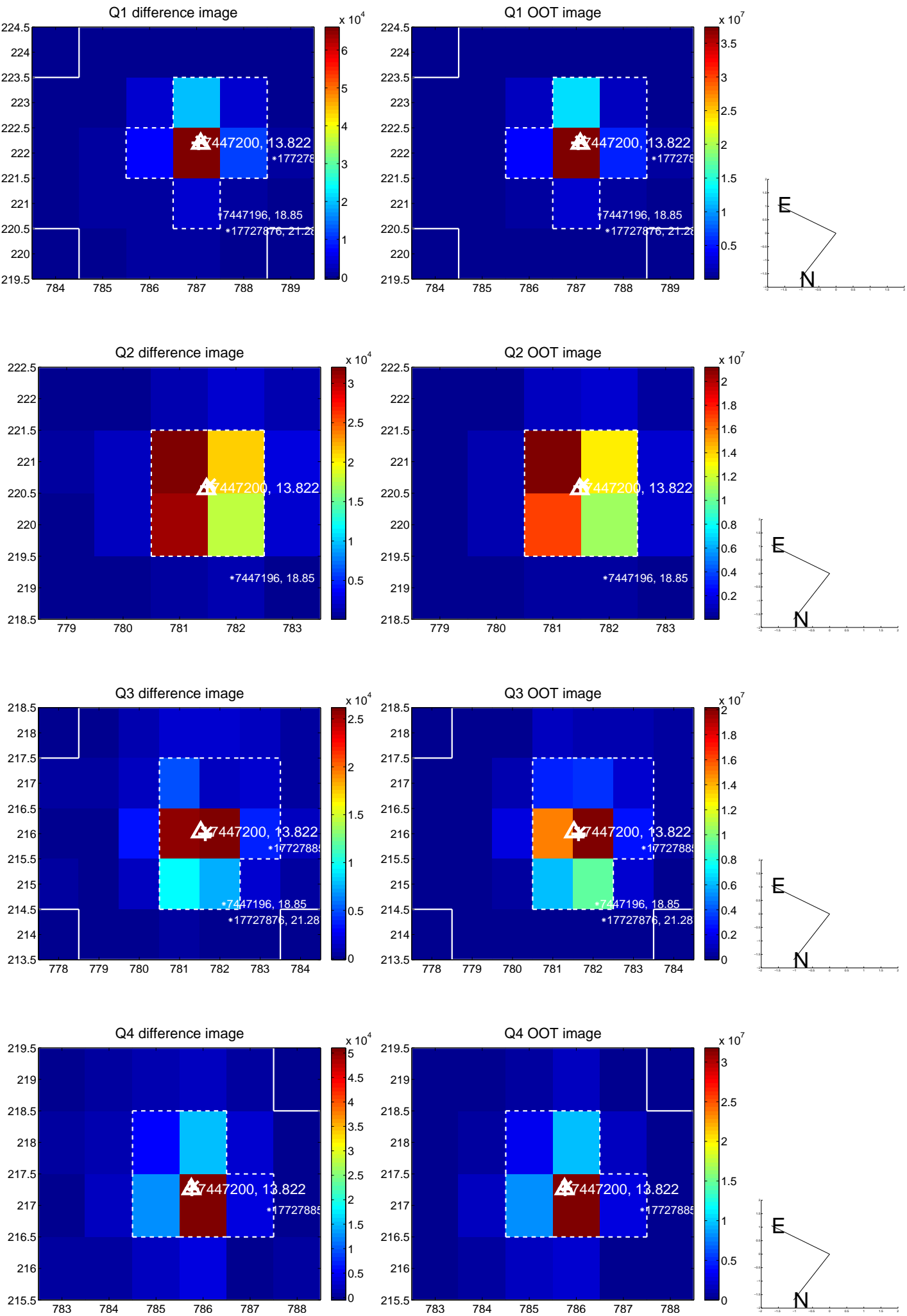
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.021 \pm 0.070$	0.30	$-0.013 \pm 0.070$	$0.016 \pm 0.071$
PRF-fit source offset from KIC position	$0.264 \pm 0.074$	3.55	$0.070 \pm 0.077$	$0.254 \pm 0.072$
photometric centroid source offset	$0.37 \pm 0.04$	10.56	$0.06 \pm 0.04$	$0.37 \pm 0.04$



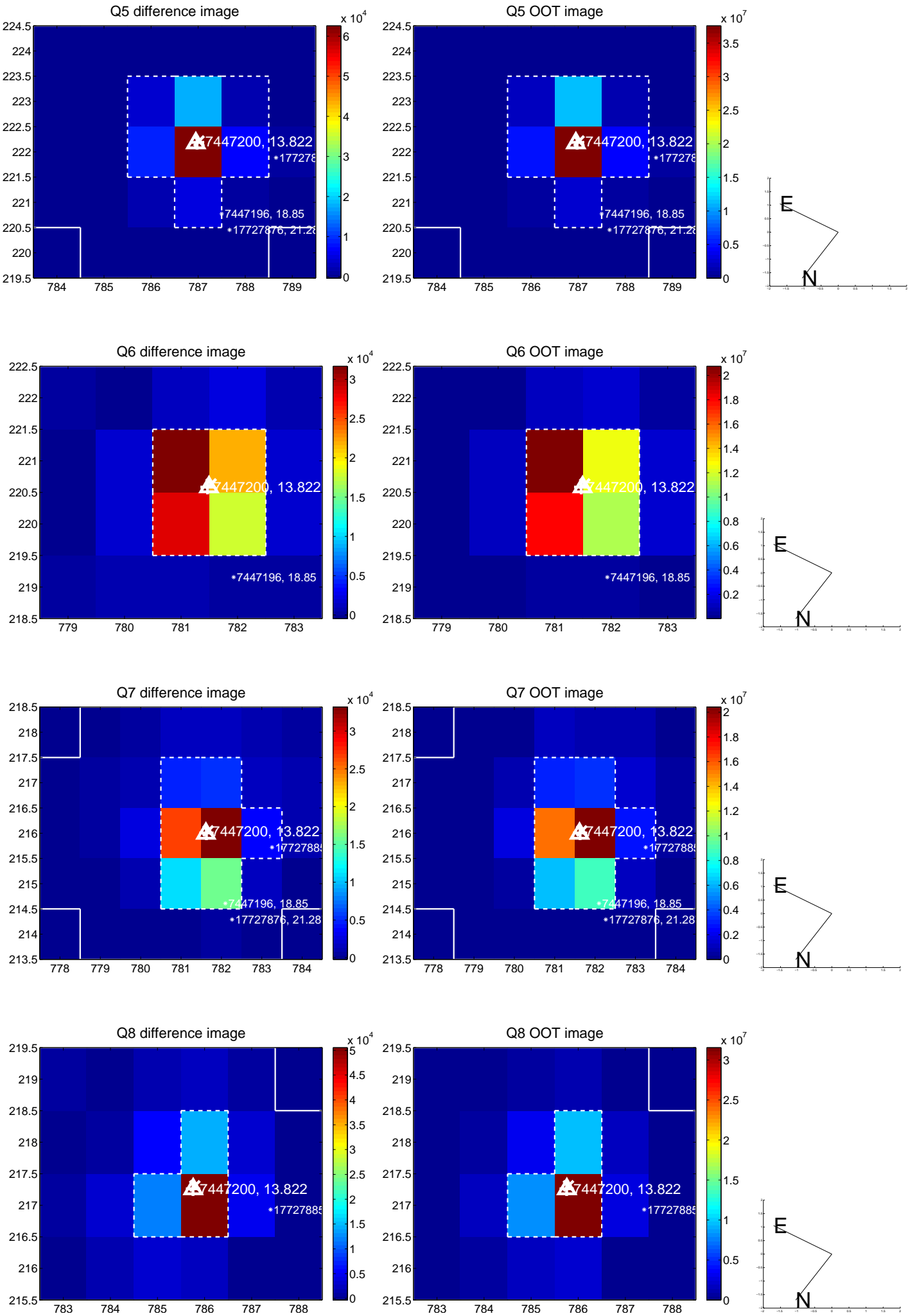
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



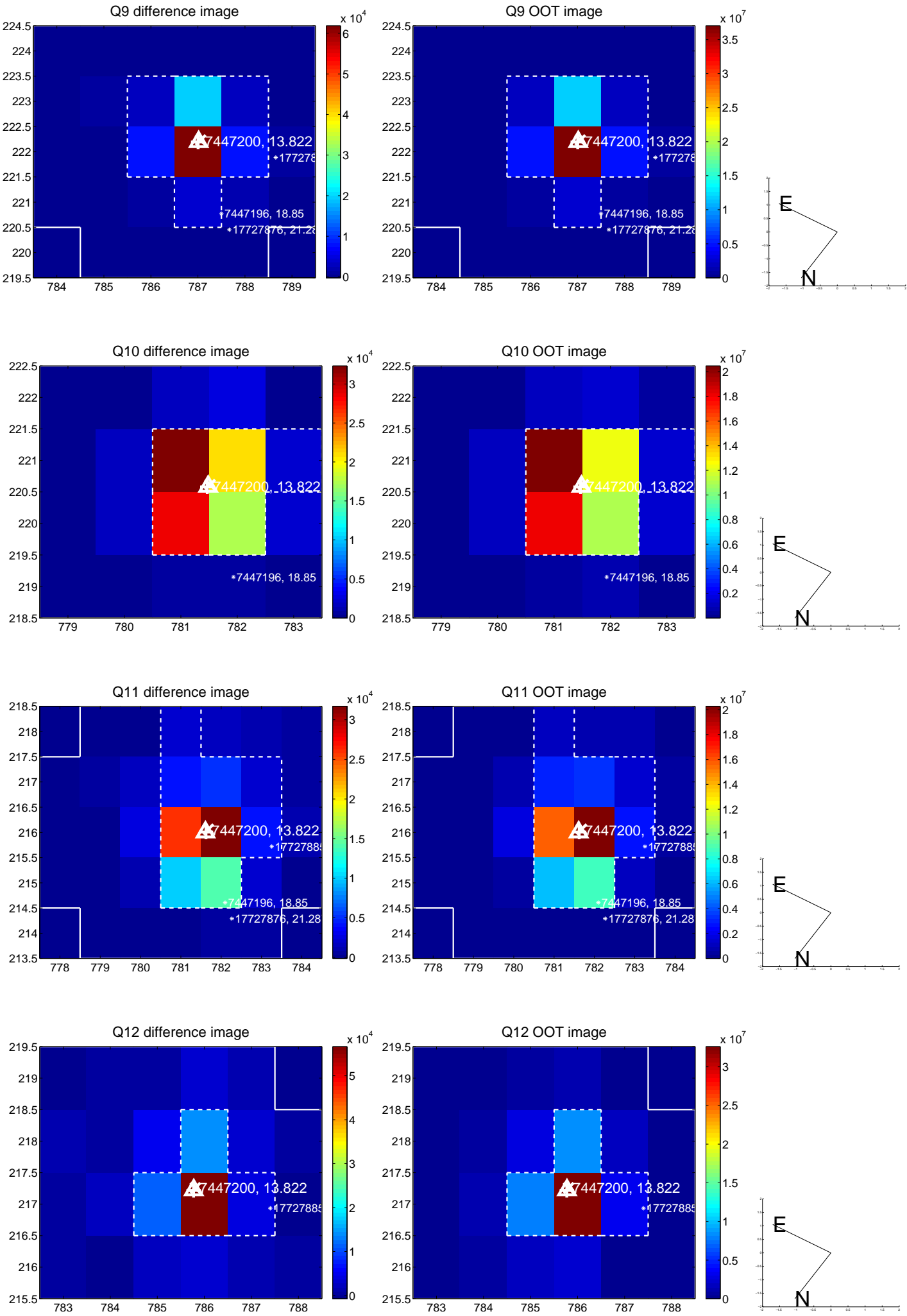
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



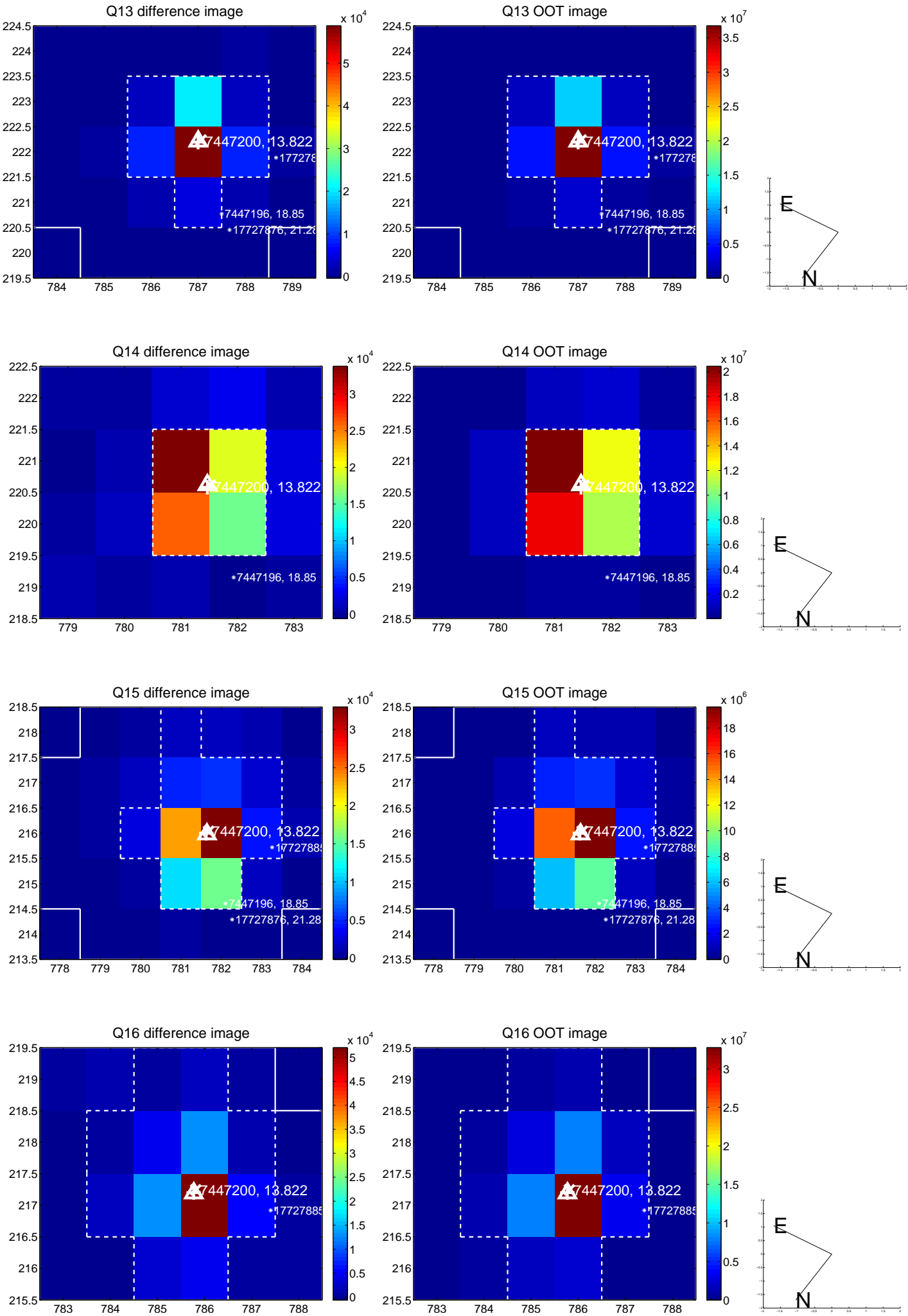
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



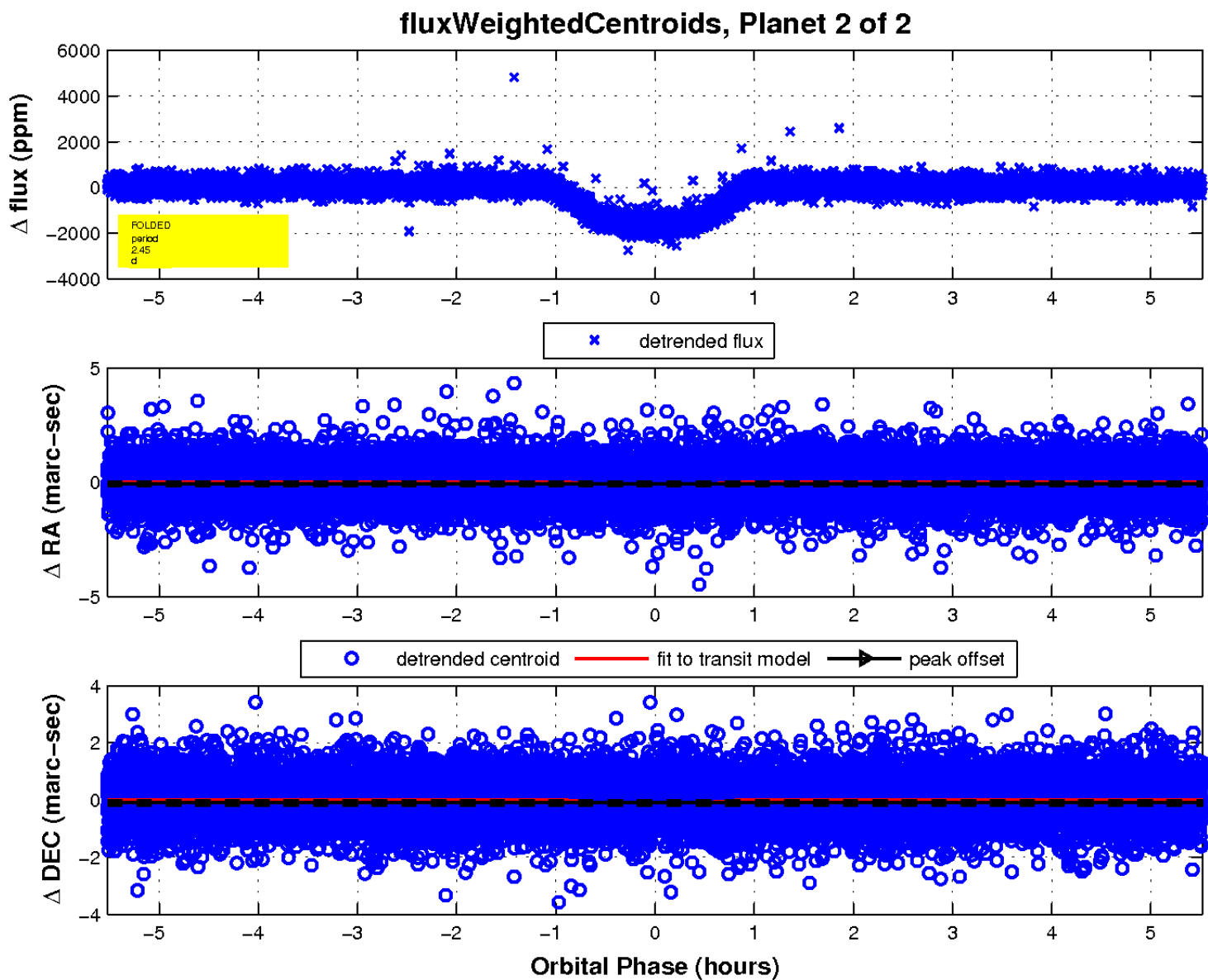
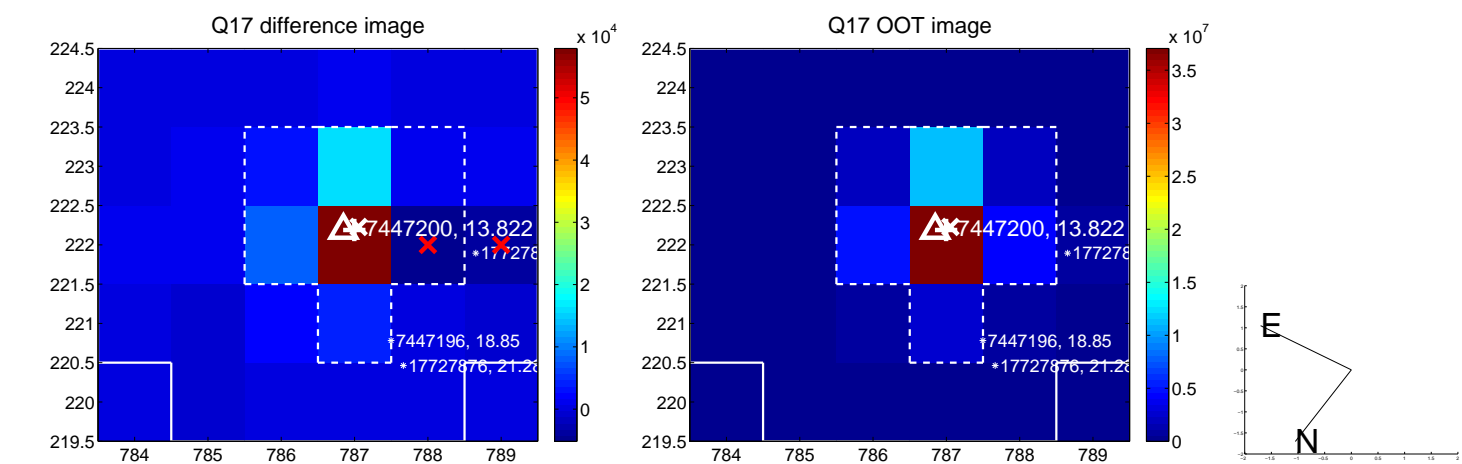
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

