

# KIC 012302391

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
012302391-01	OBS	7519.01	25.321700	139.687477	107941.5	4.712	2824.9	1238.7	1.03	6109	54.27	43.49
012302391-02	OBS	No	25.321864	150.716600	77844.1	8.952	2636.7	1382.1	1.03	6109	47.45	43.49

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
012302391-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—MOD_ODDEVEN_DV—DEEP_V_SHAPED—HAS_SEC_TCE
012302391-02	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.

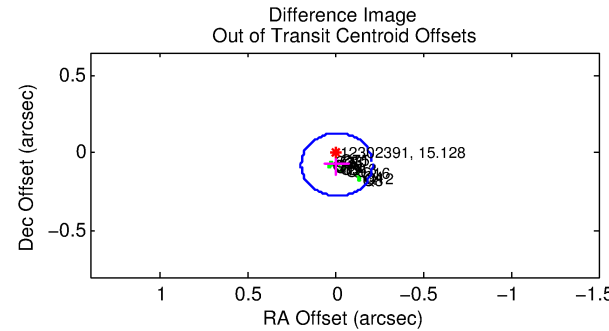
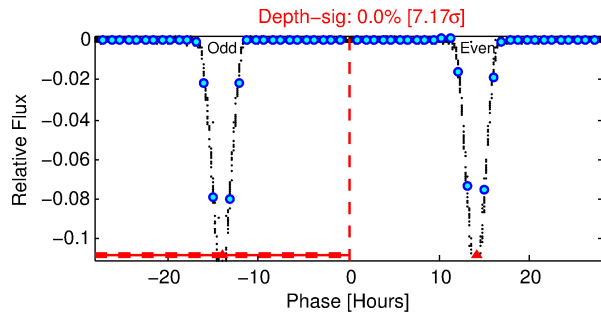
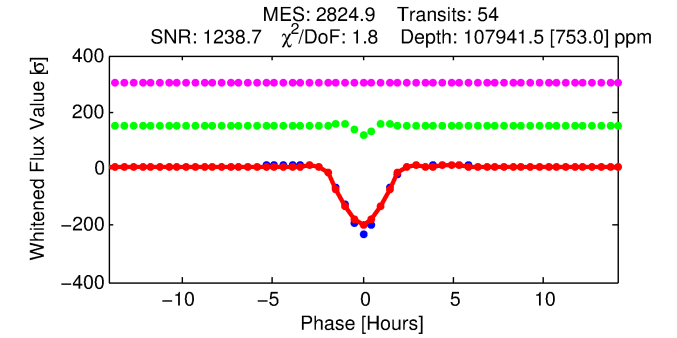
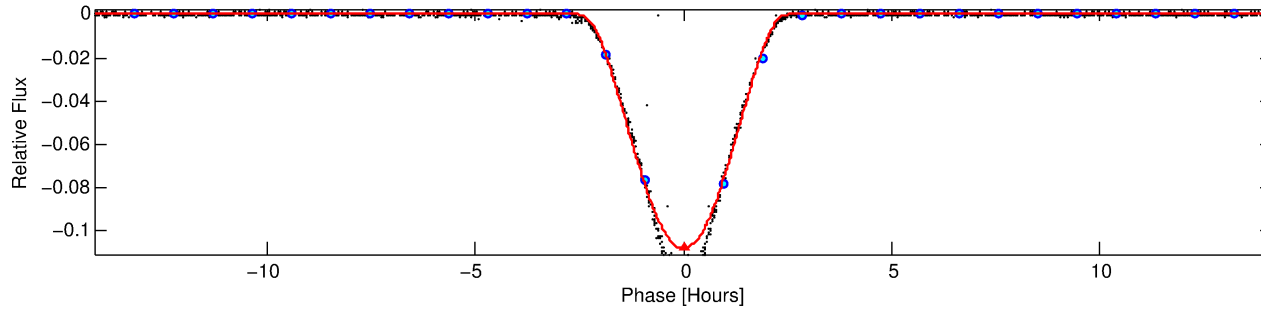
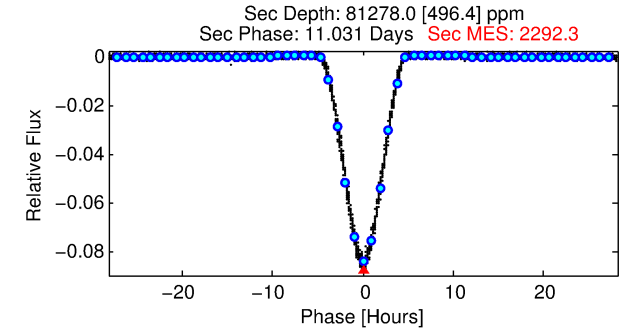
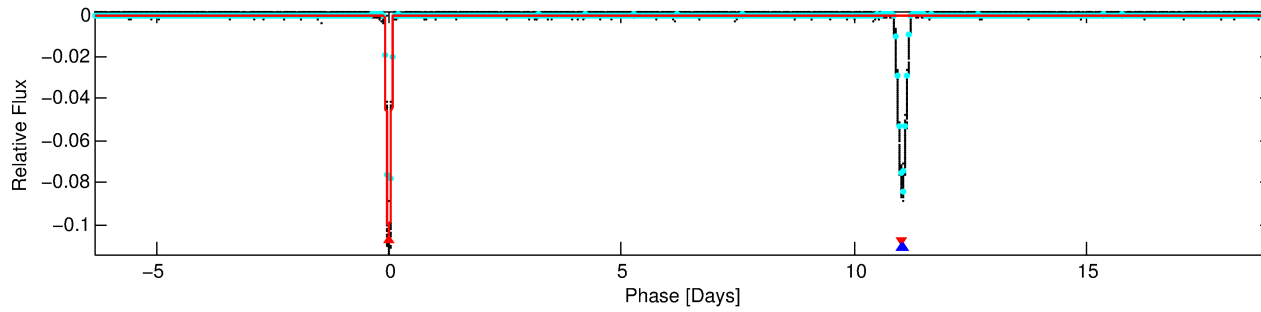
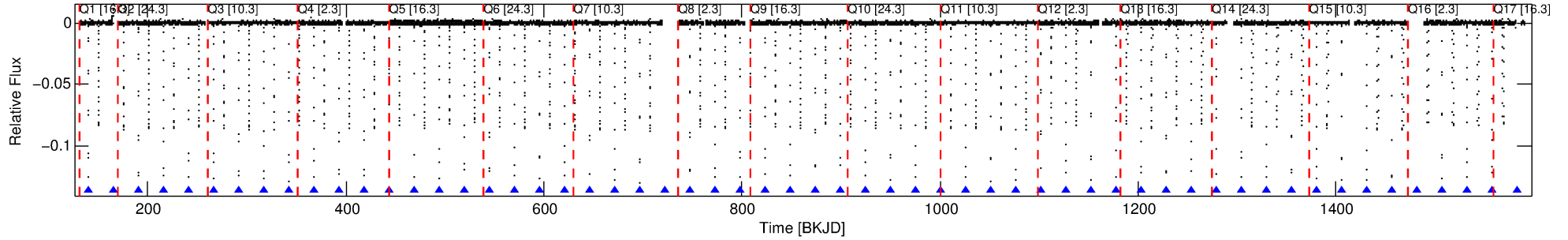
## Ephemeris Match Information For 012302391-01

No Significant Match Found

# DV One-Page Summary

KIC: 12302391 Candidate: 1 of 2 Period: 25.322 d  
KOI: K07519.01 Corr: 0.973

Kp: 15.13 R\*: 1.03 Rs Teff: 6109.0 K Logg: 4.46 Fe/H: 0.000



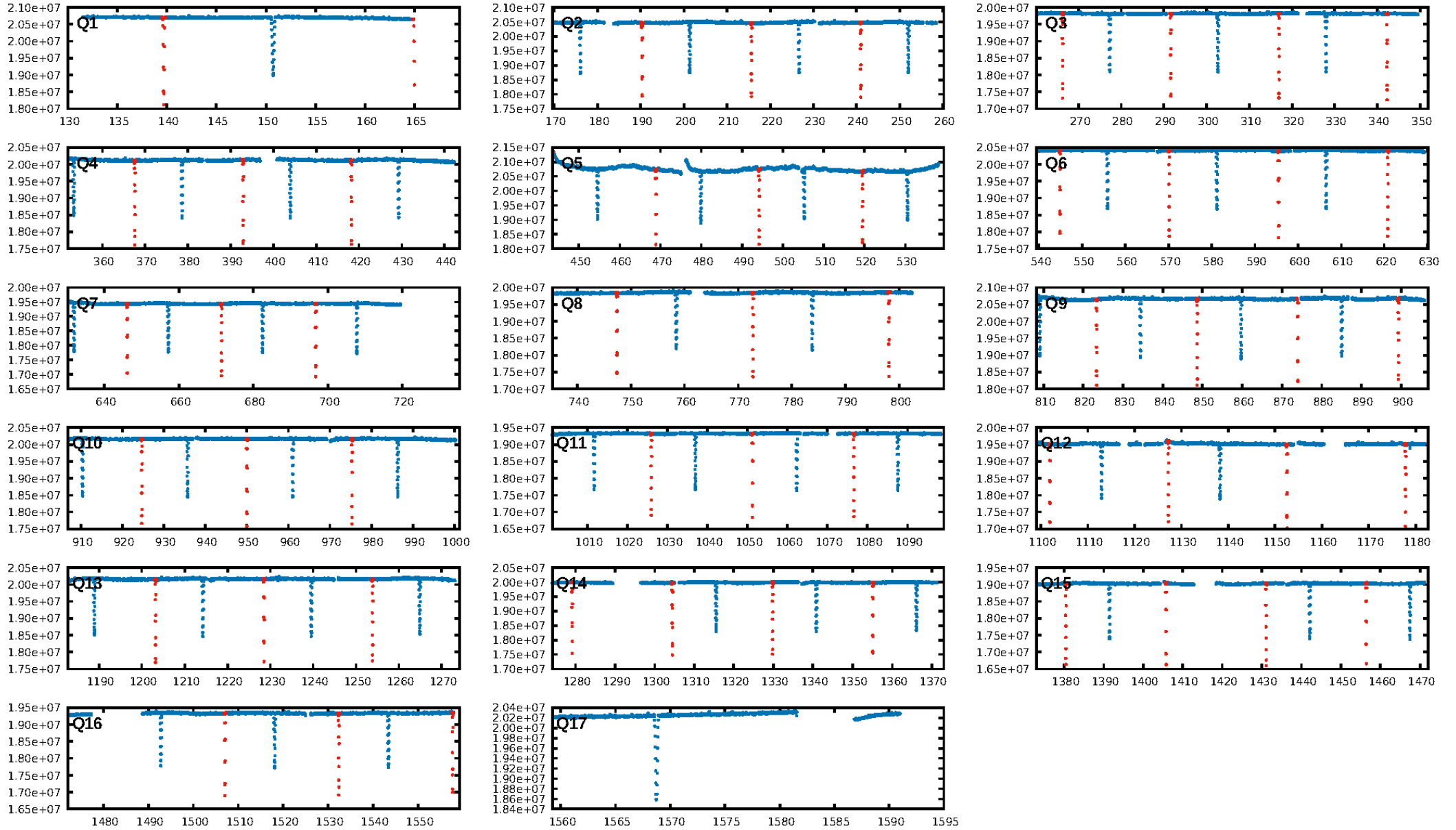
## DV Fit Results:

Period = 25.32170 [0.00000] d  
Epoch = 139.6875 [0.0001] BKJD  
Rp/R\* = 0.4833 [0.1843]  
a/R\* = 46.36 [1.24]  
b = 0.96 [0.25]  
Seff = 43.49 [18.28]  
Teq = 655 [69] K  
Rp = 54.27 [27.42] Re  
a = 0.1743 [0.0477] AU  
Ag = 461.31 [395.34] [1.16σ]  
Teffp = 4692 [913] K [4.41σ]

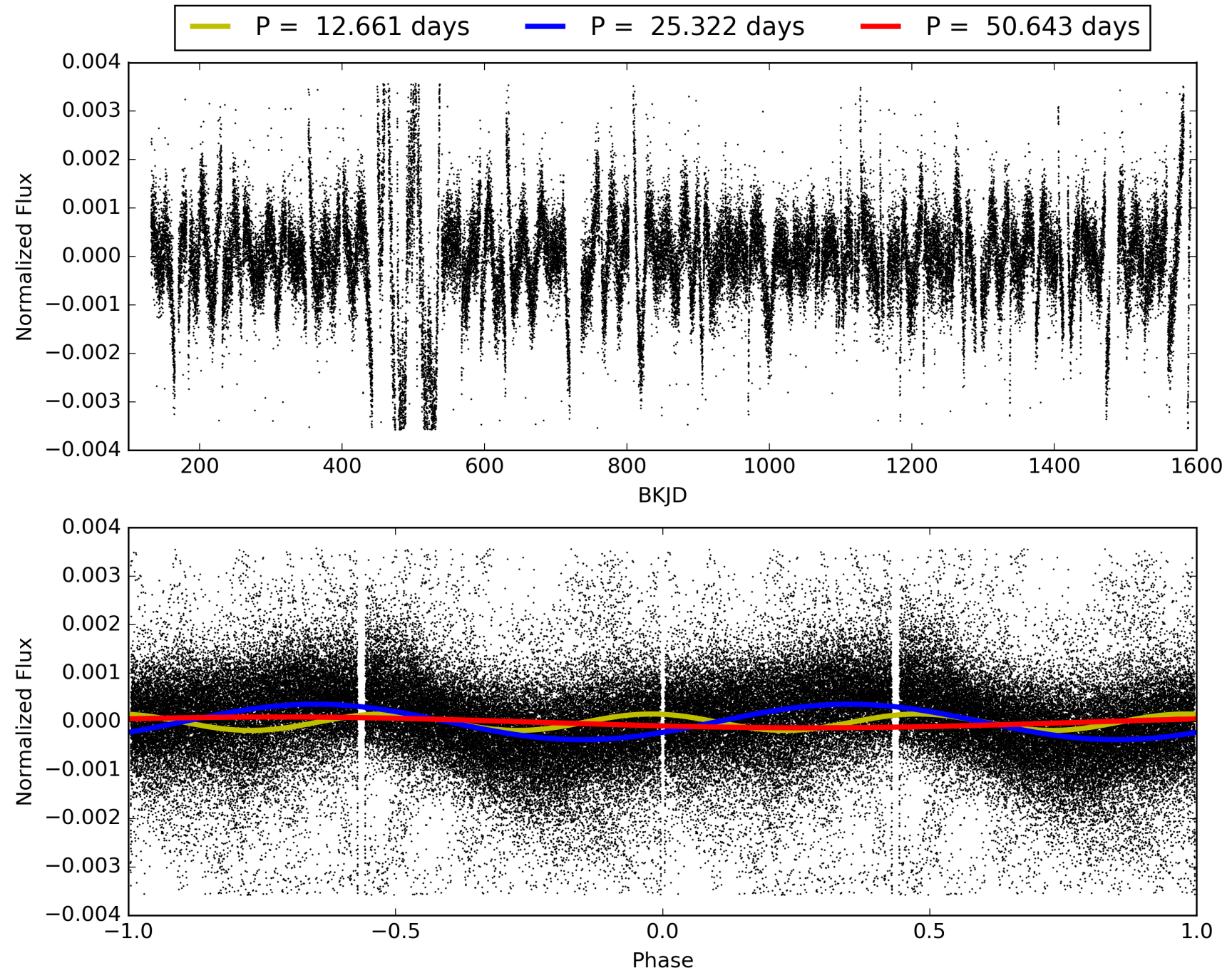
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 0.0%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [52/52]  
GhostDiagnostic-chr: 2.616  
Centroid-sig: 0.0%  
Centroid-so: 0.502 arcsec [111.38σ]  
OotOffset-rm: 0.075 arcsec [1.11σ]  
KicOffset-rm: 0.129 arcsec [1.89σ]  
OotOffset-st: 4/4/4/4 [16]  
KicOffset-st: 4/4/4/4 [16]  
DiffImageQuality-fgm: 1.00 [16/16]  
DiffImageOverlap-fno: 1.00 [16/16]

# TCE 012302391-01, PDC Light Curves

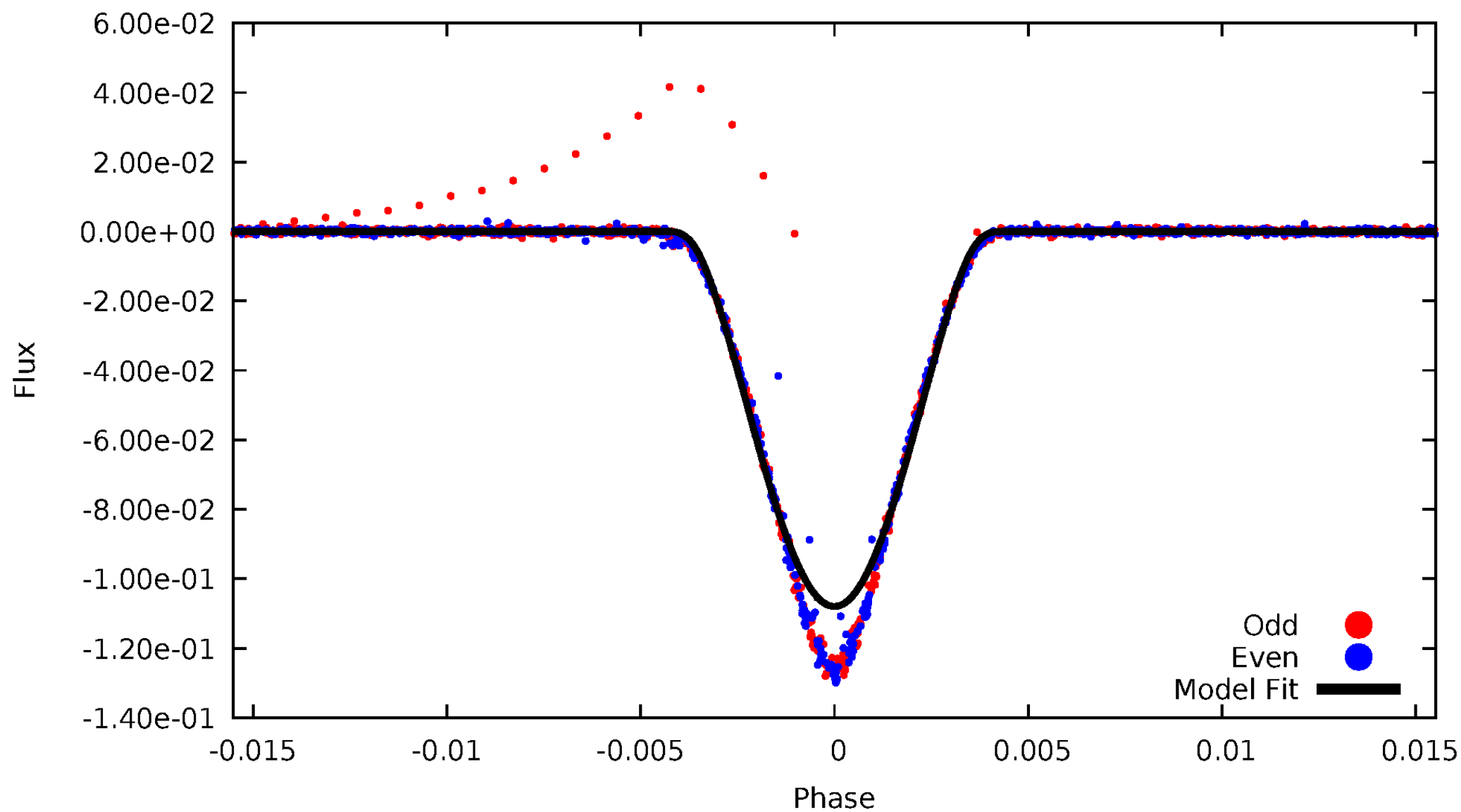


TCE 012302391-01



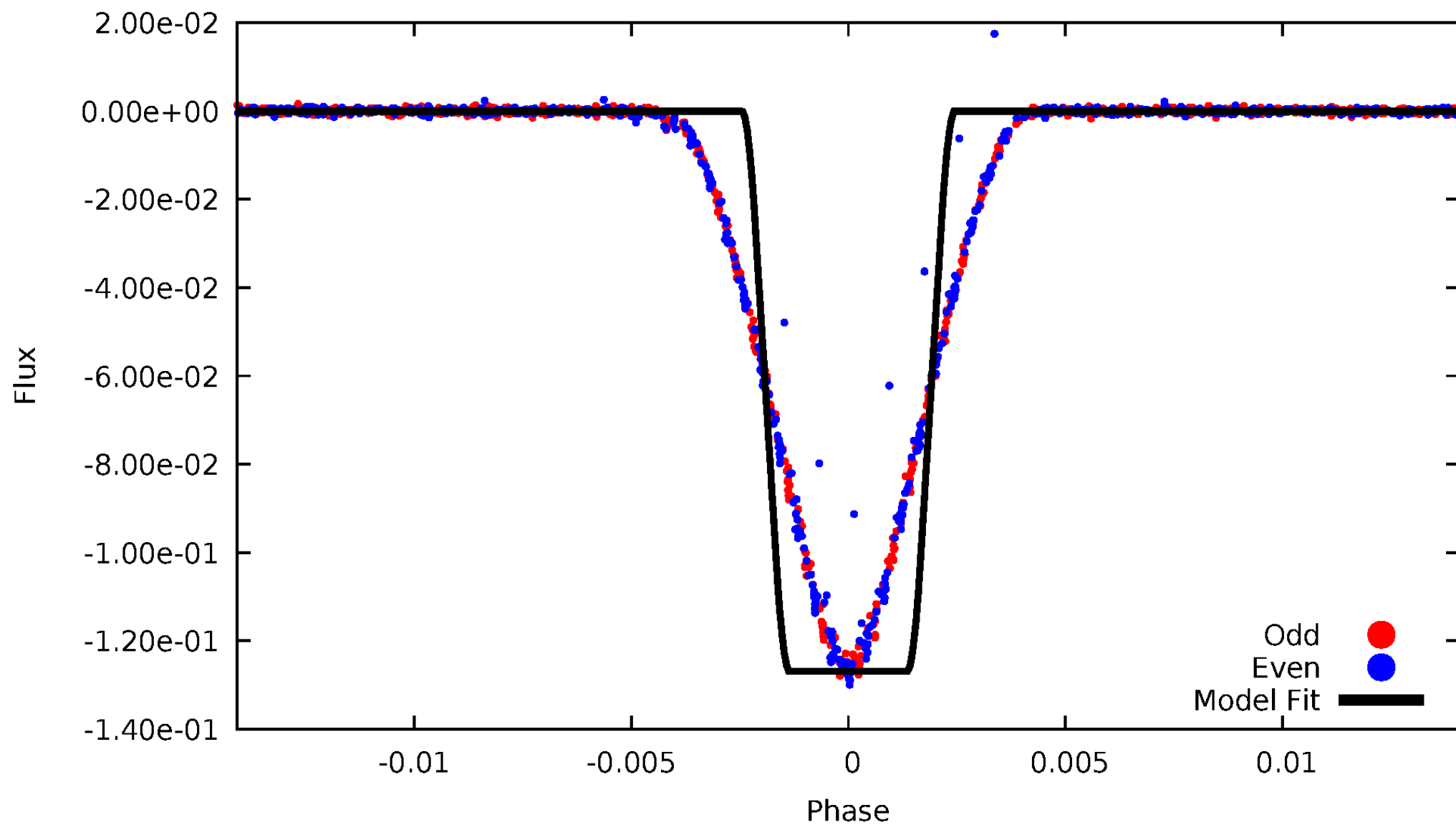
# DV Odd/Even

TCE 012302391-01



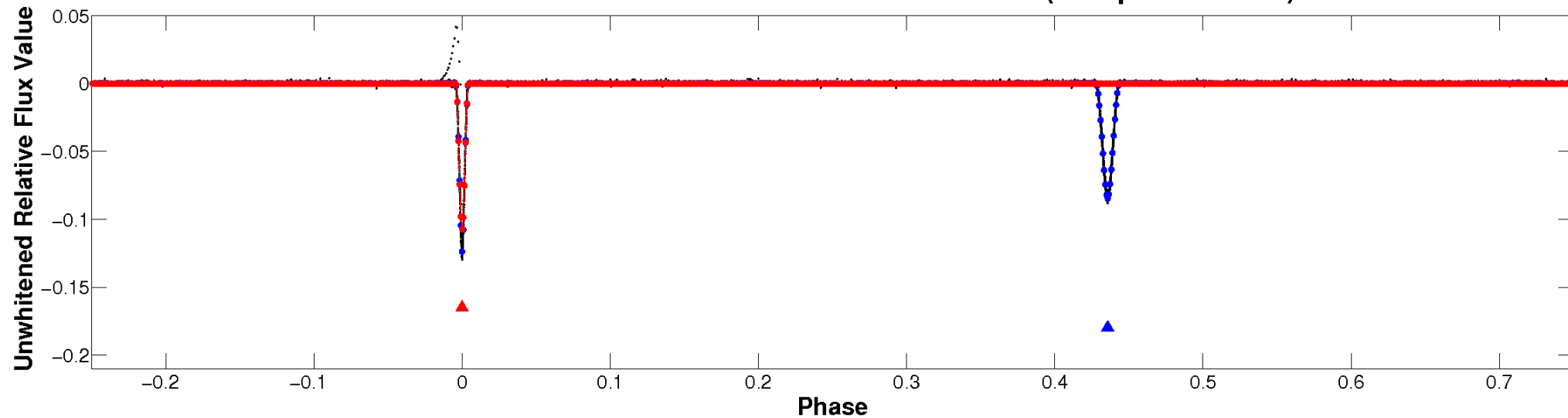
# ALT Odd/Even

TCE 012302391-01

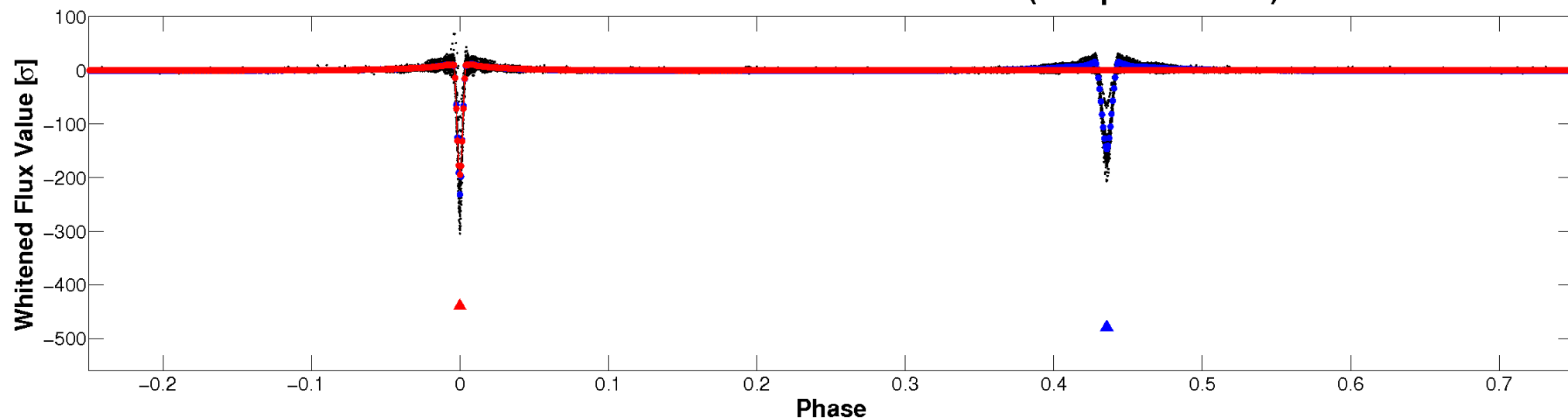


# Non-Whitened Vs. Whitened Light Curve

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

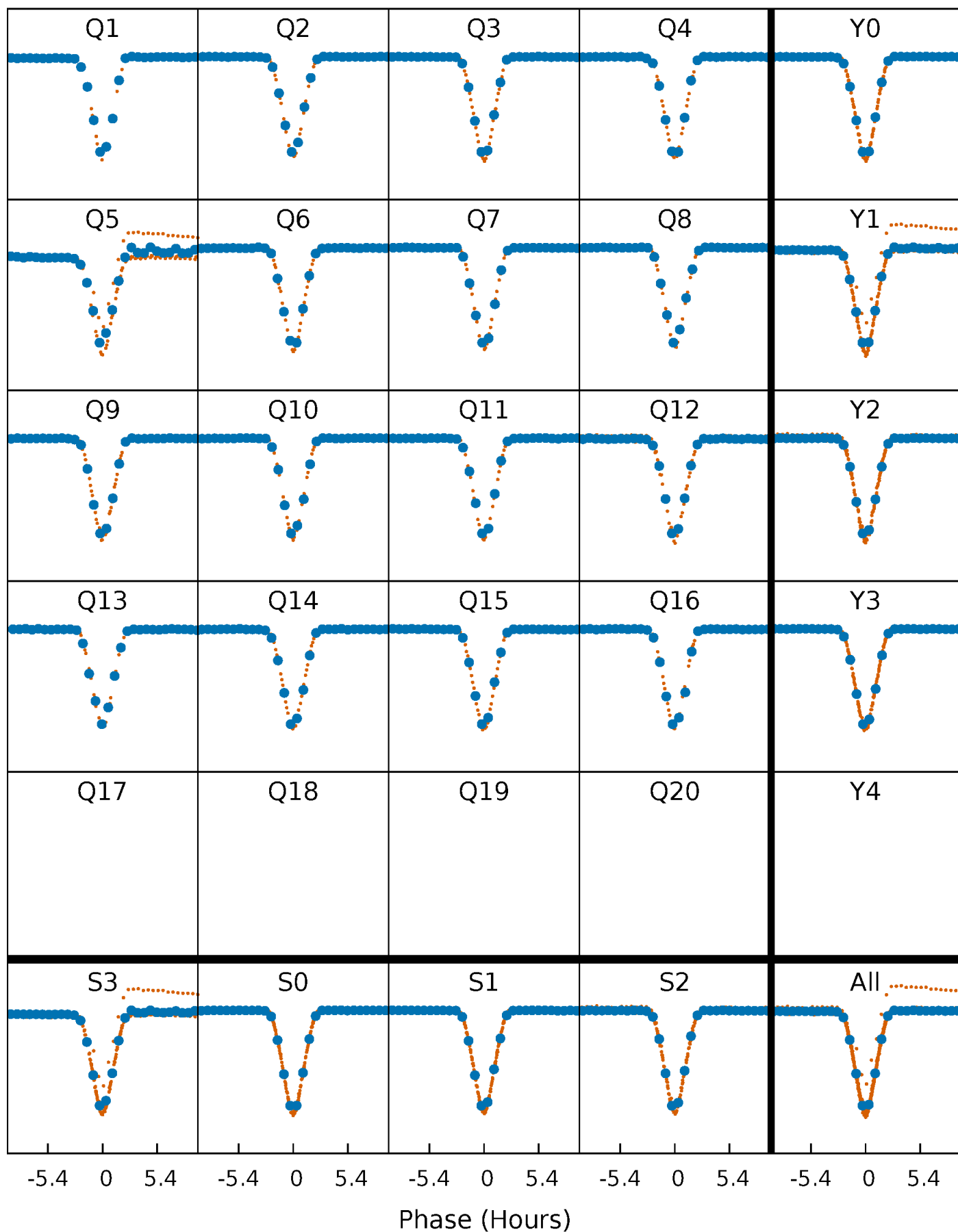


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

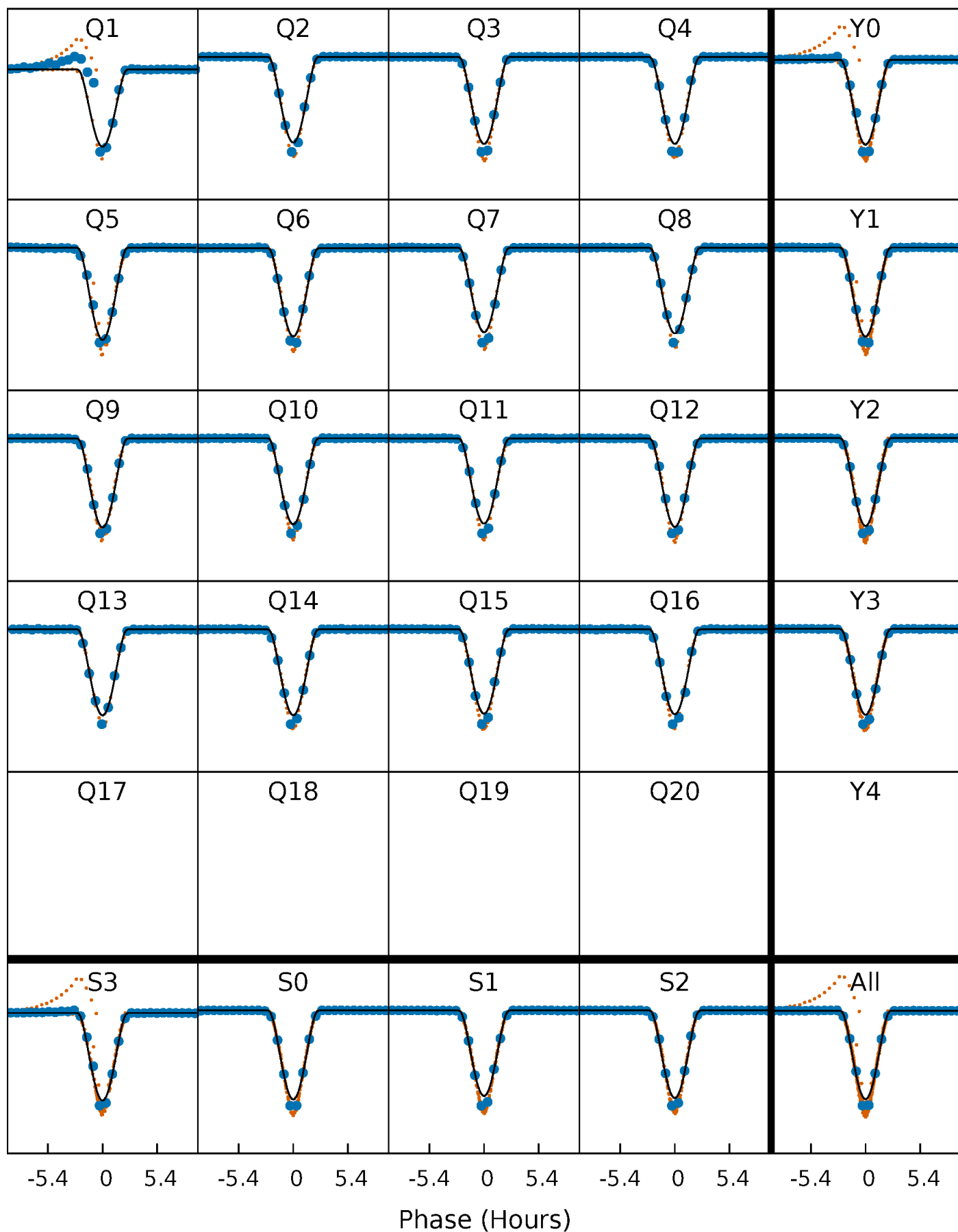
TCE 012302391-01   P= 25.321700 Days    $T_0=139.687477$  (BKJD)





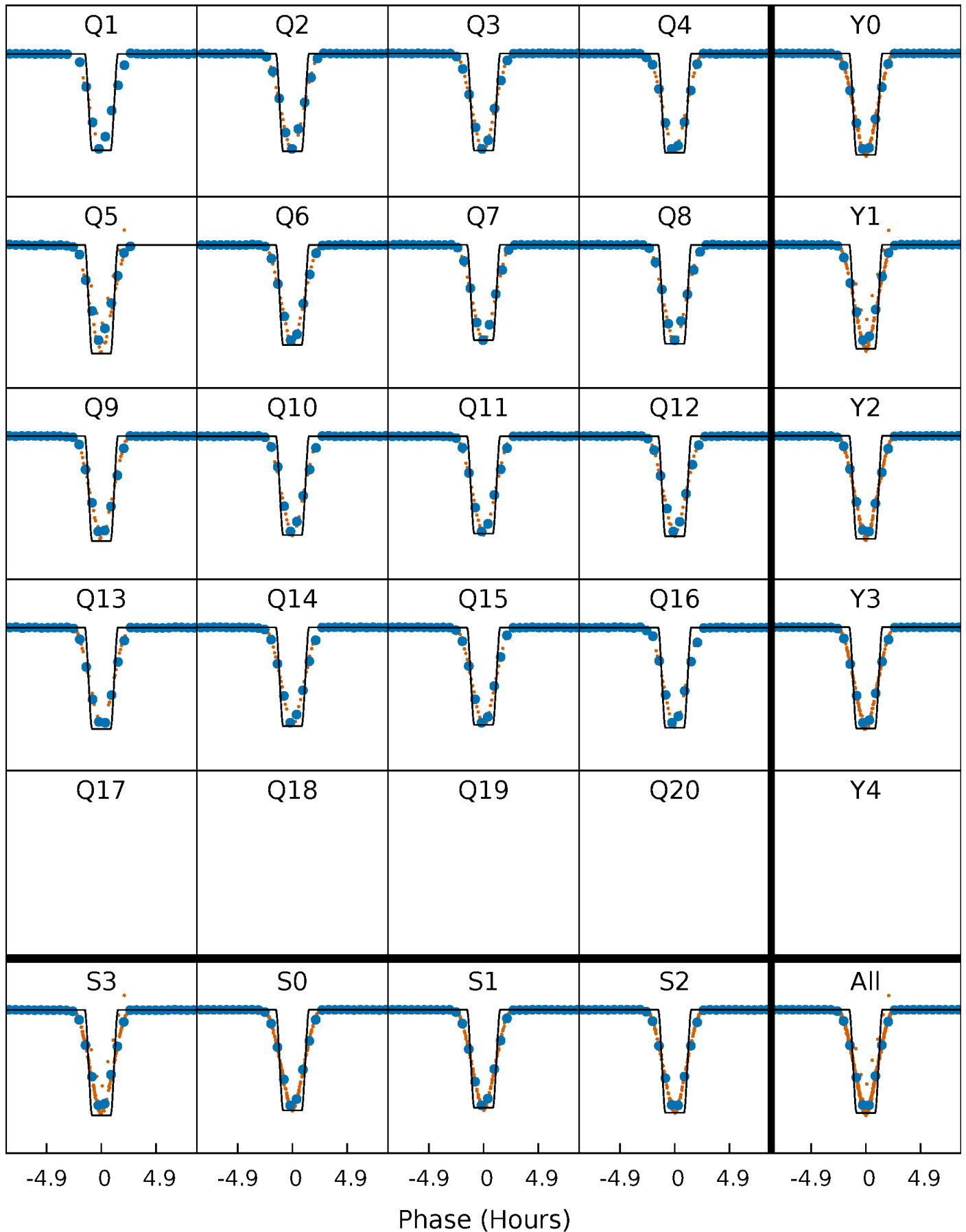
# DV Quarter-Phased Transit Curves

TCE 012302391-01 P= 25.321700 Days  $T_0=139.687477$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

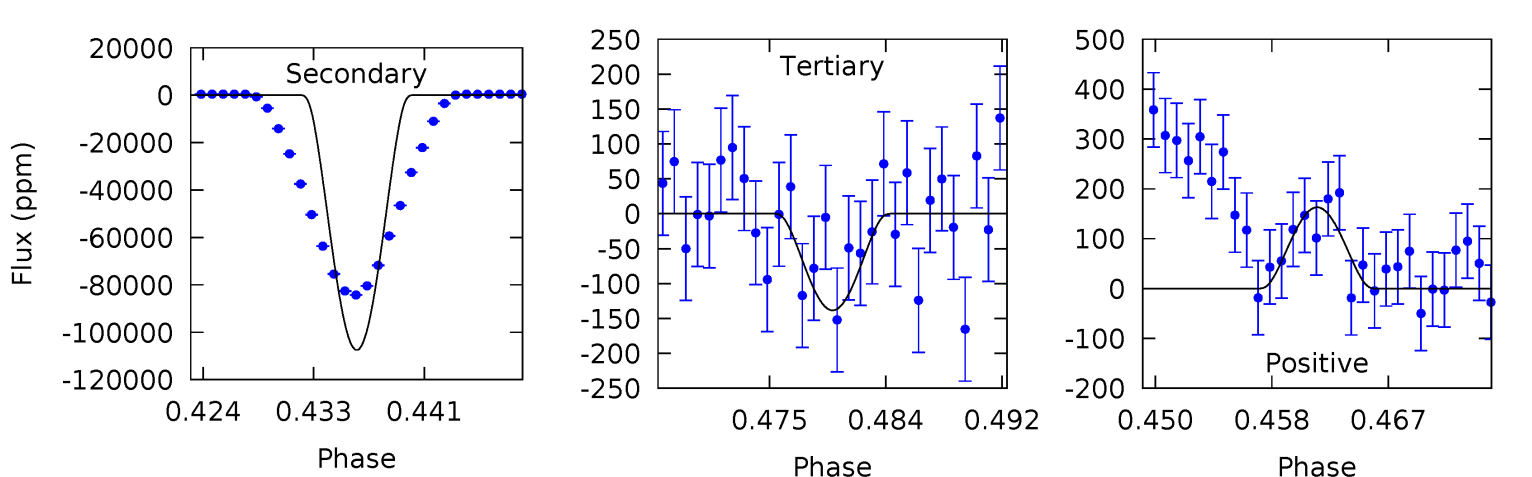
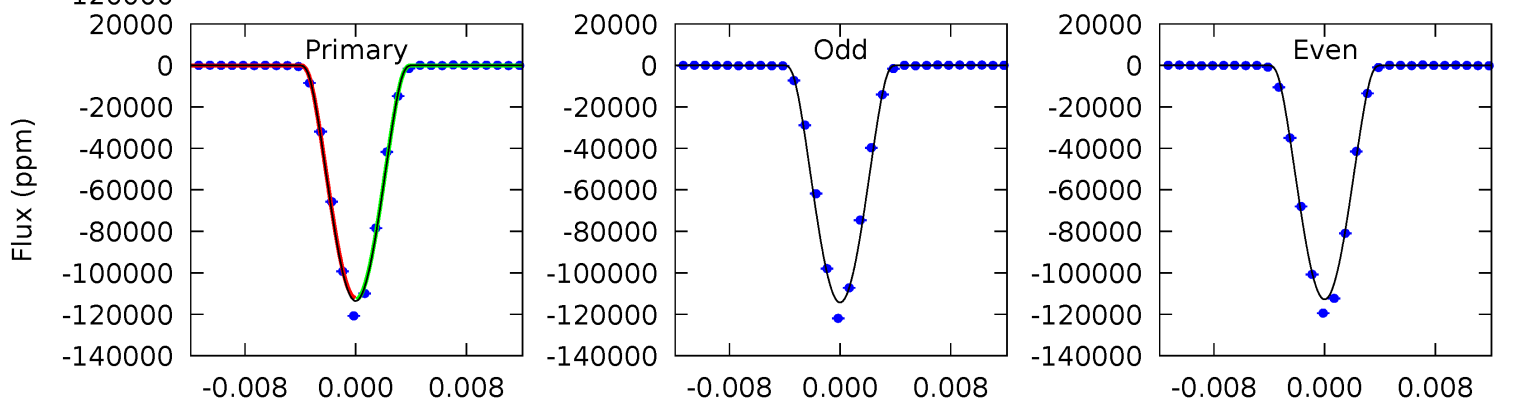
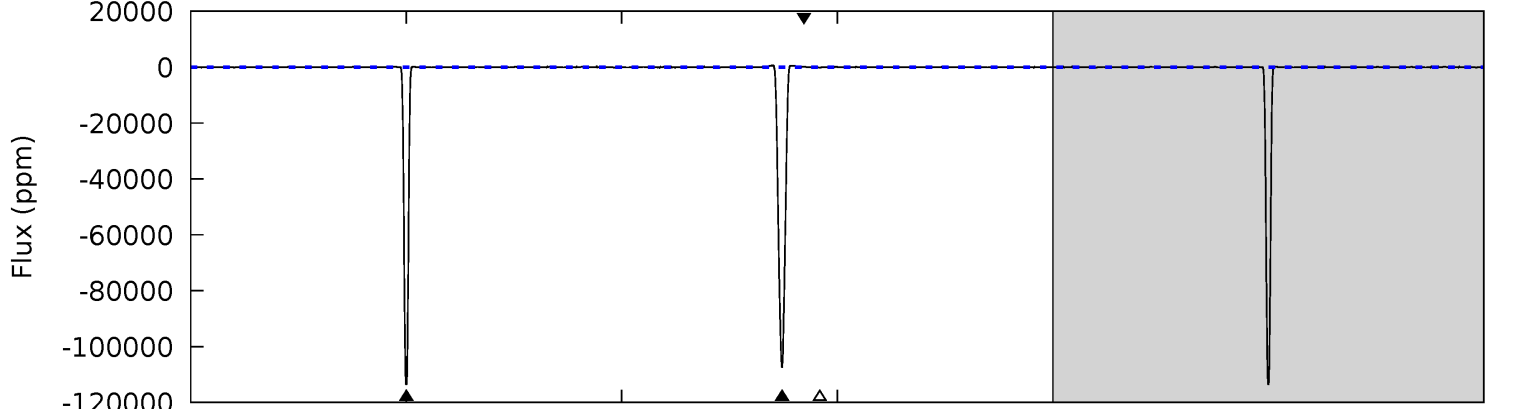
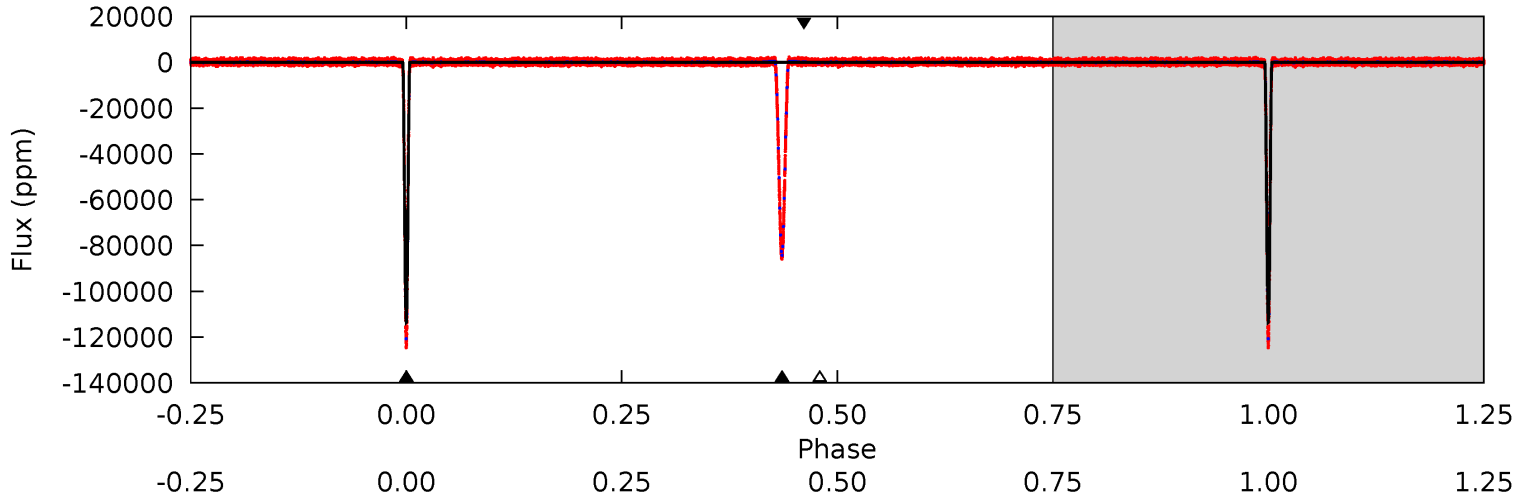
TCE 012302391-01   P= 25.321663 Days    $T_0=139.688534$  (BKJD)



# DV Model-Shift Uniqueness Test

012302391-01, P = 25.321700 Days, E = 114.365777 Days

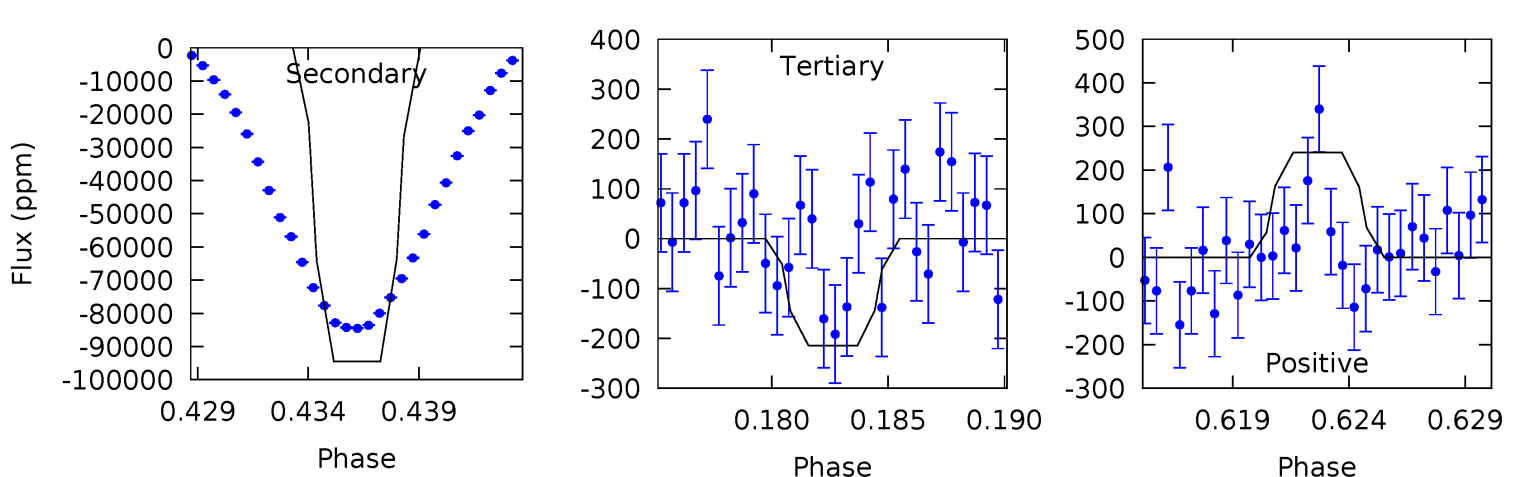
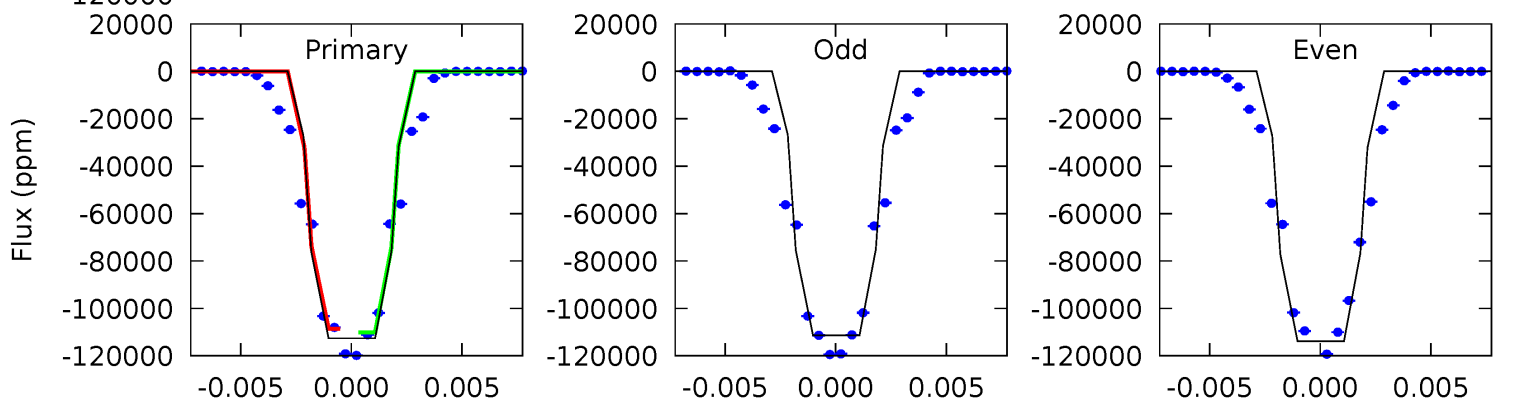
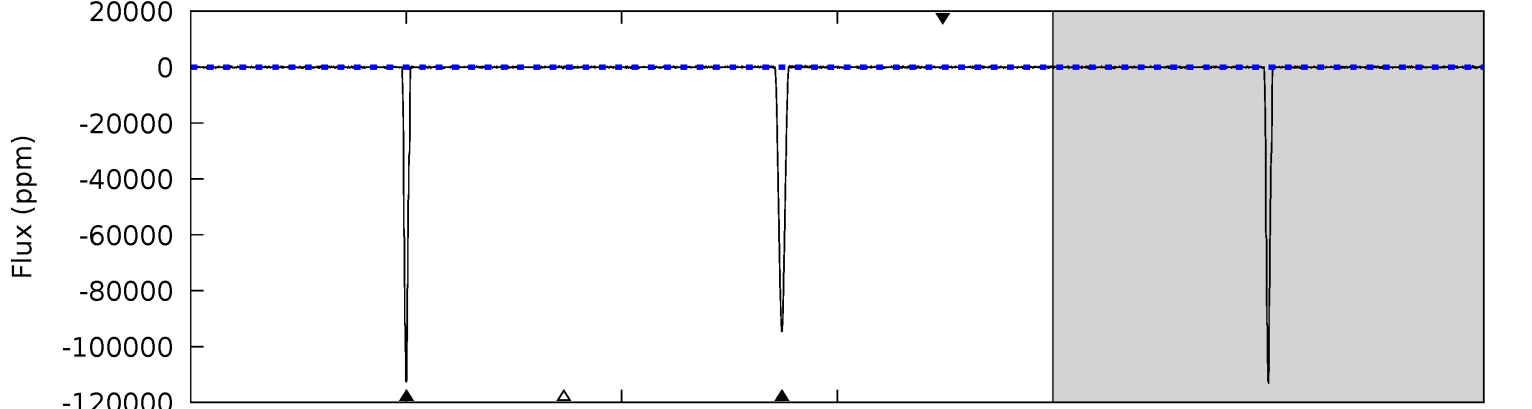
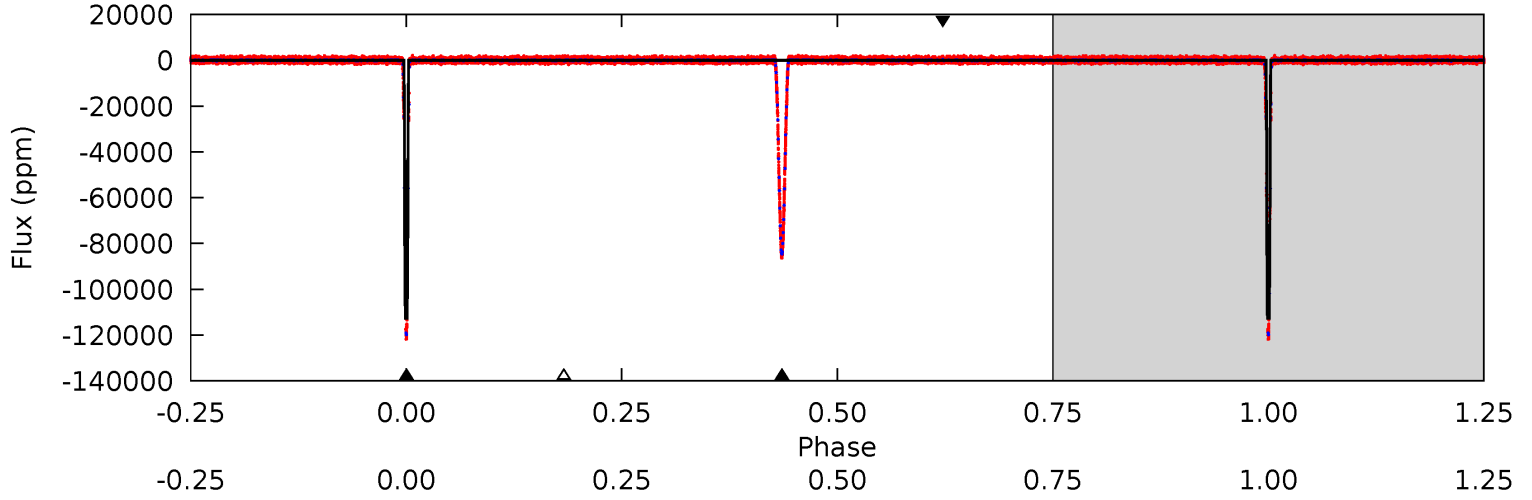
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
4662	4413	5.68	6.69	5.06	2.63	3.44	4657	4656	4408	4407	29.9	0.98	0.01	0



# Alt Model-Shift Uniqueness Test

012302391-01, P = 25.321663 Days, E = 114.366871 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
1245	1045	2.37	2.65	5.16	2.82	10.3	1243	1243	1043	1043	14.1	0.99	0.00	0



### Stellar Parameters For KIC 012302391

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6109^{+193}_{-236}$	$4.455^{+0.056}_{-0.210}$	$0.000^{+0.250}_{-0.300}$	$1.029^{+0.341}_{-0.114}$	$1.099^{+0.151}_{-0.151}$	$1.421^{+0.415}_{-0.759}$
	+3%/-4%	+1%/-5%	+inf%/-inf%	+33%/-11%	+14%/-14%	+29%/-53%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 012302391-01 / KOI 7519.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-107426 \pm 24$	$57.07^{+23.81}_{-21.73}$	$936^{+78}_{-52}$	$5238^{+1325}_{-696}$	$605^{+975}_{-299}$
Alt.	$-94560 \pm 90$	$41.84^{+23.23}_{-20.35}$	$934^{+65}_{-49}$	$5819^{+2458}_{-1033}$	$990^{+2745}_{-593}$

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

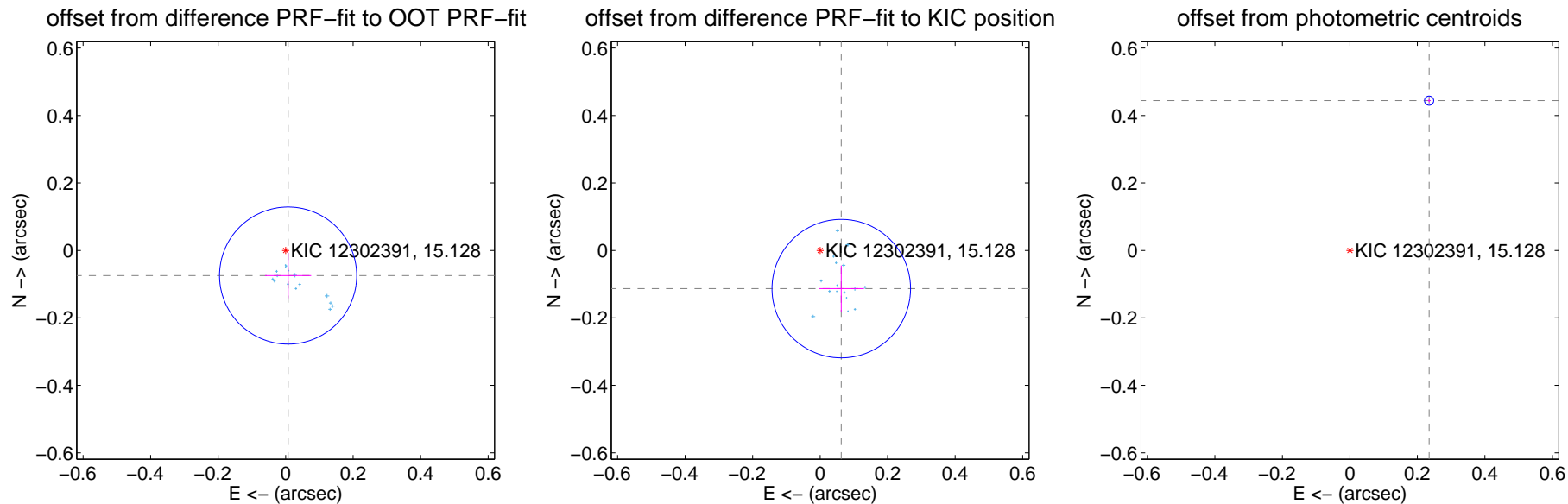
## DV Centroid Data

Supplemental centroid analysis for 012302391-01. Kepler magnitude: 15.13. Transit SNR 1238.73

There are 16 quarters with good PRF difference image offsets

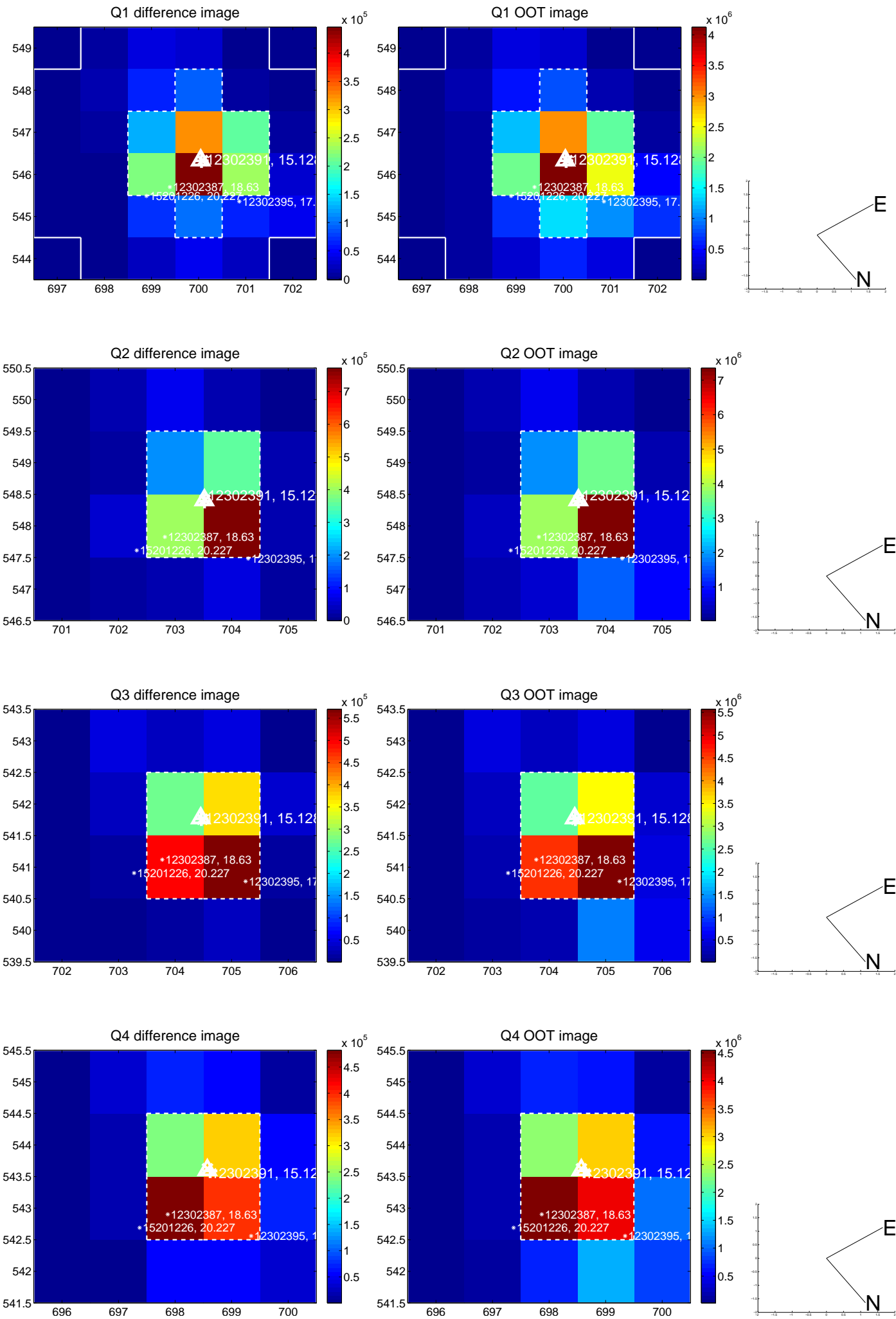
The direct PRF centroid is offset from the target star catalog position by about 0.16 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.075 \pm 0.068$	1.11	$-0.007 \pm 0.068$	$-0.075 \pm 0.068$
PRF-fit source offset from KIC position	$0.129 \pm 0.068$	1.89	$-0.063 \pm 0.067$	$-0.113 \pm 0.069$
photometric centroid source offset	$0.50 \pm 0.00$	111.38	$-0.23 \pm 0.00$	$0.44 \pm 0.00$

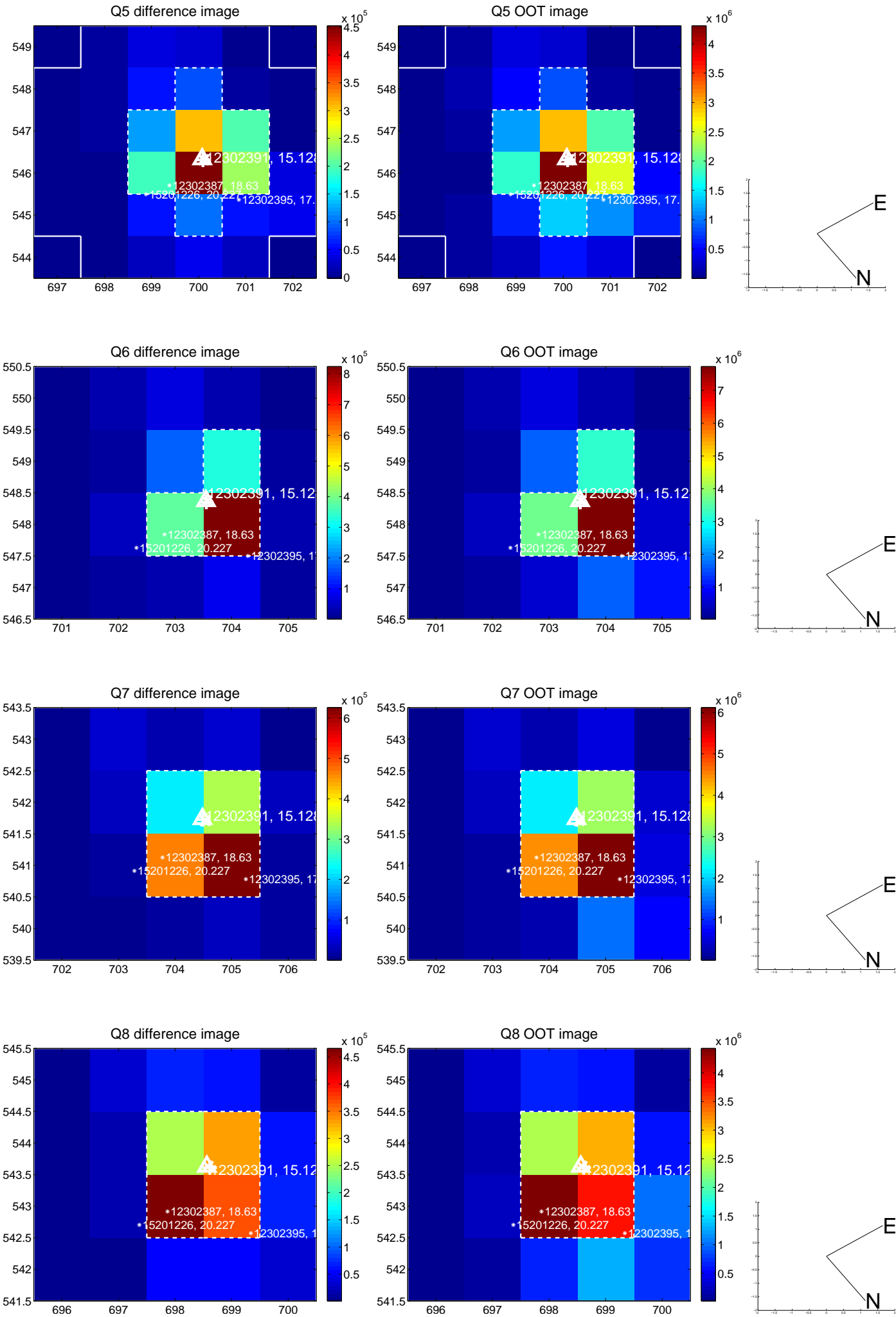


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

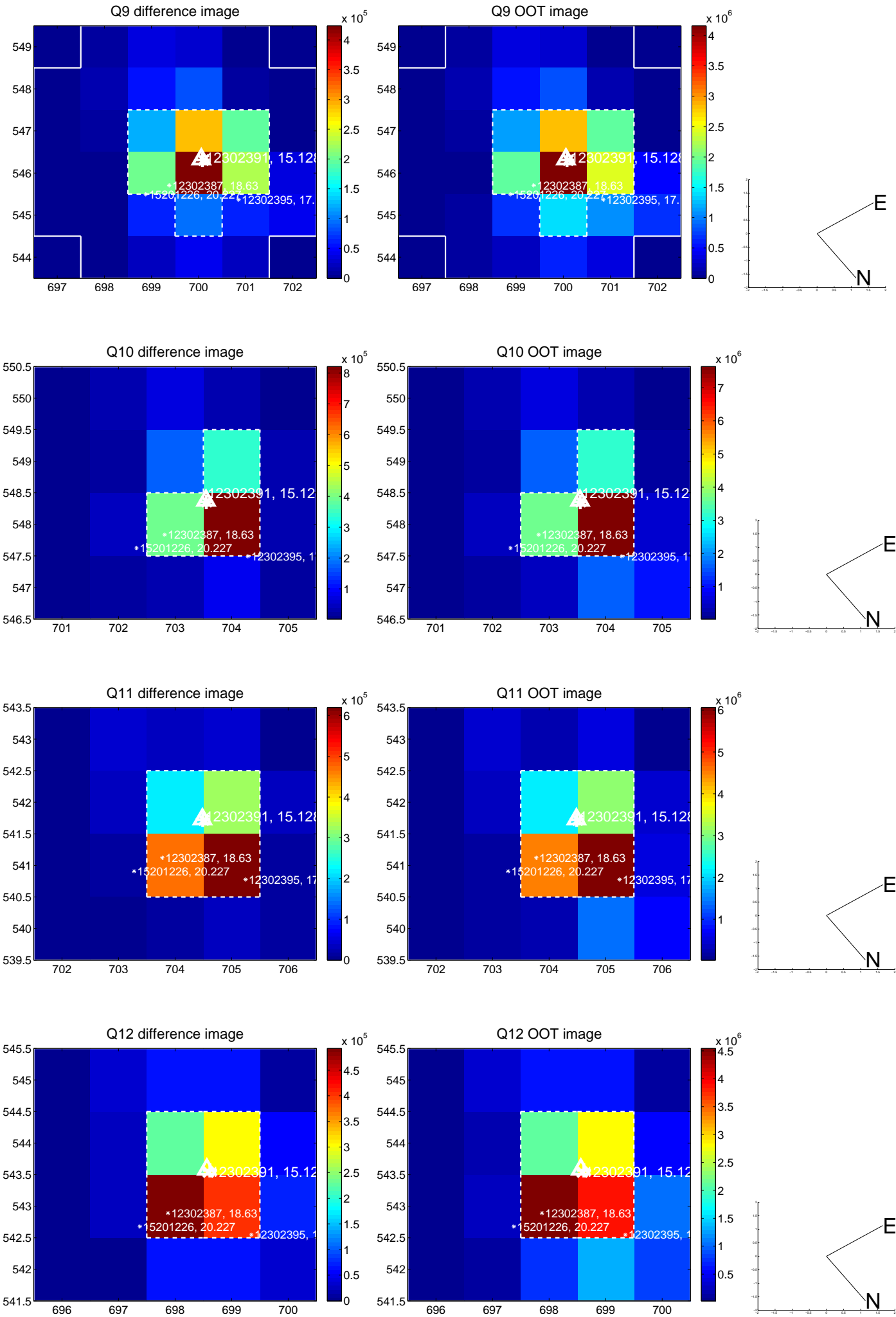


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

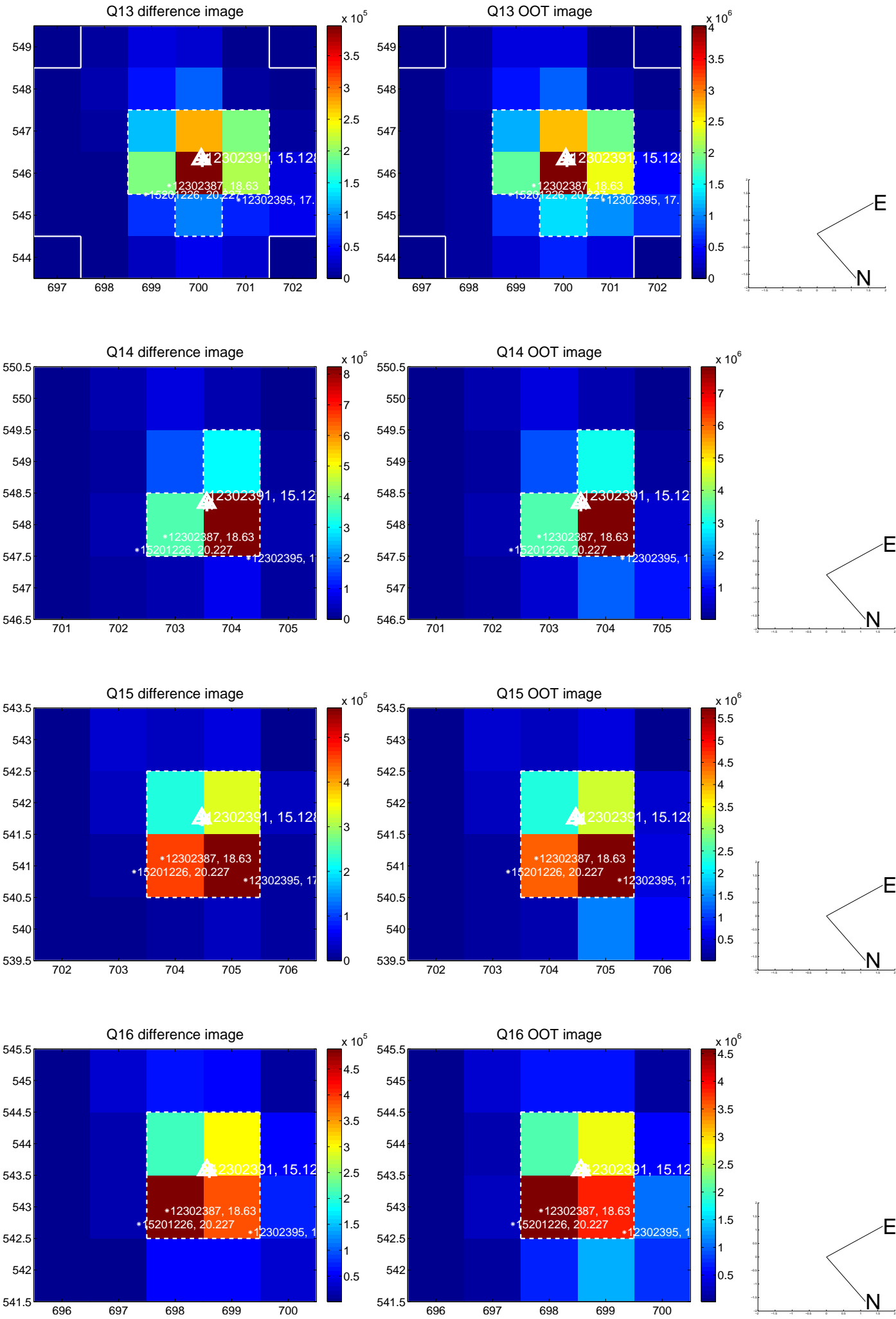




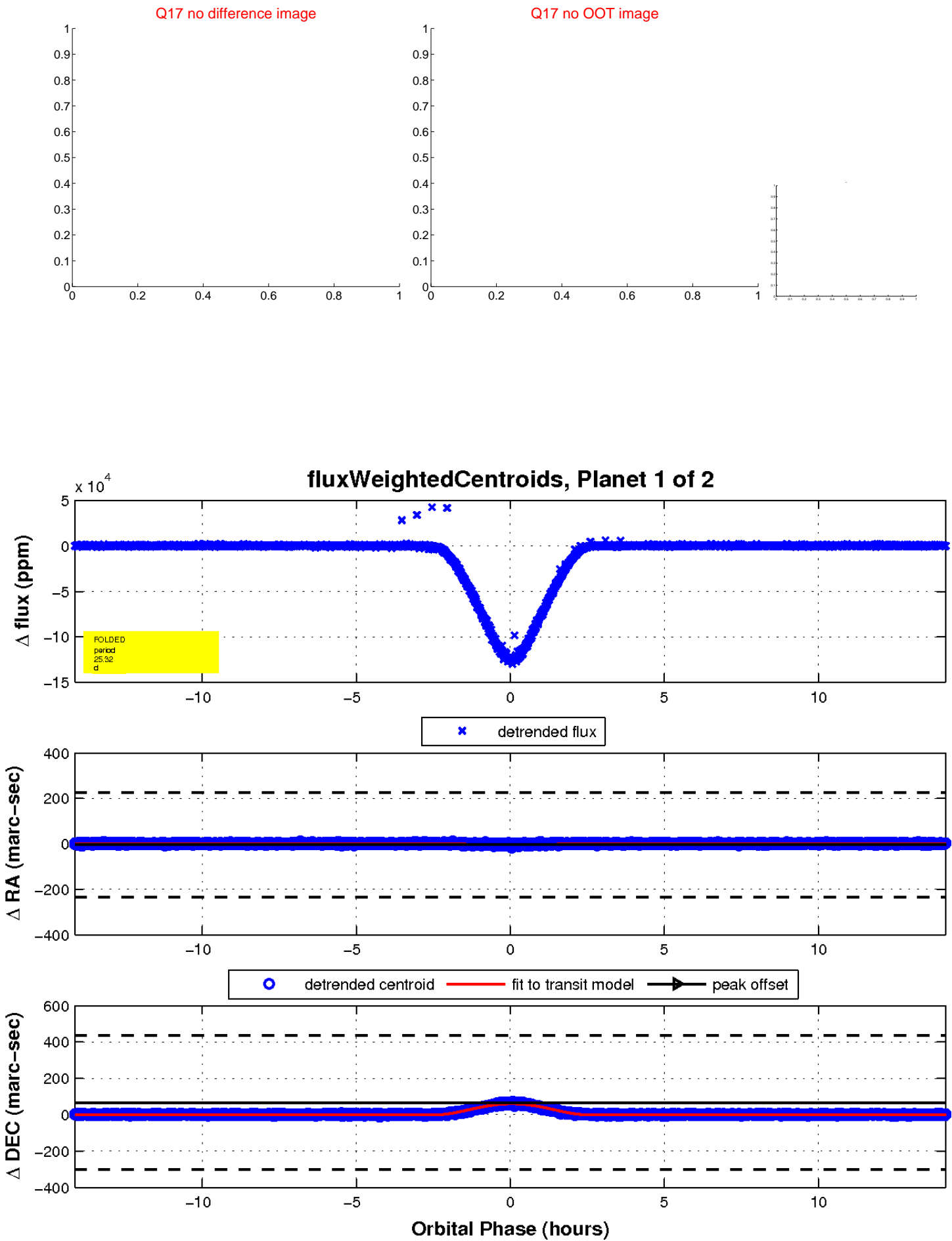
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

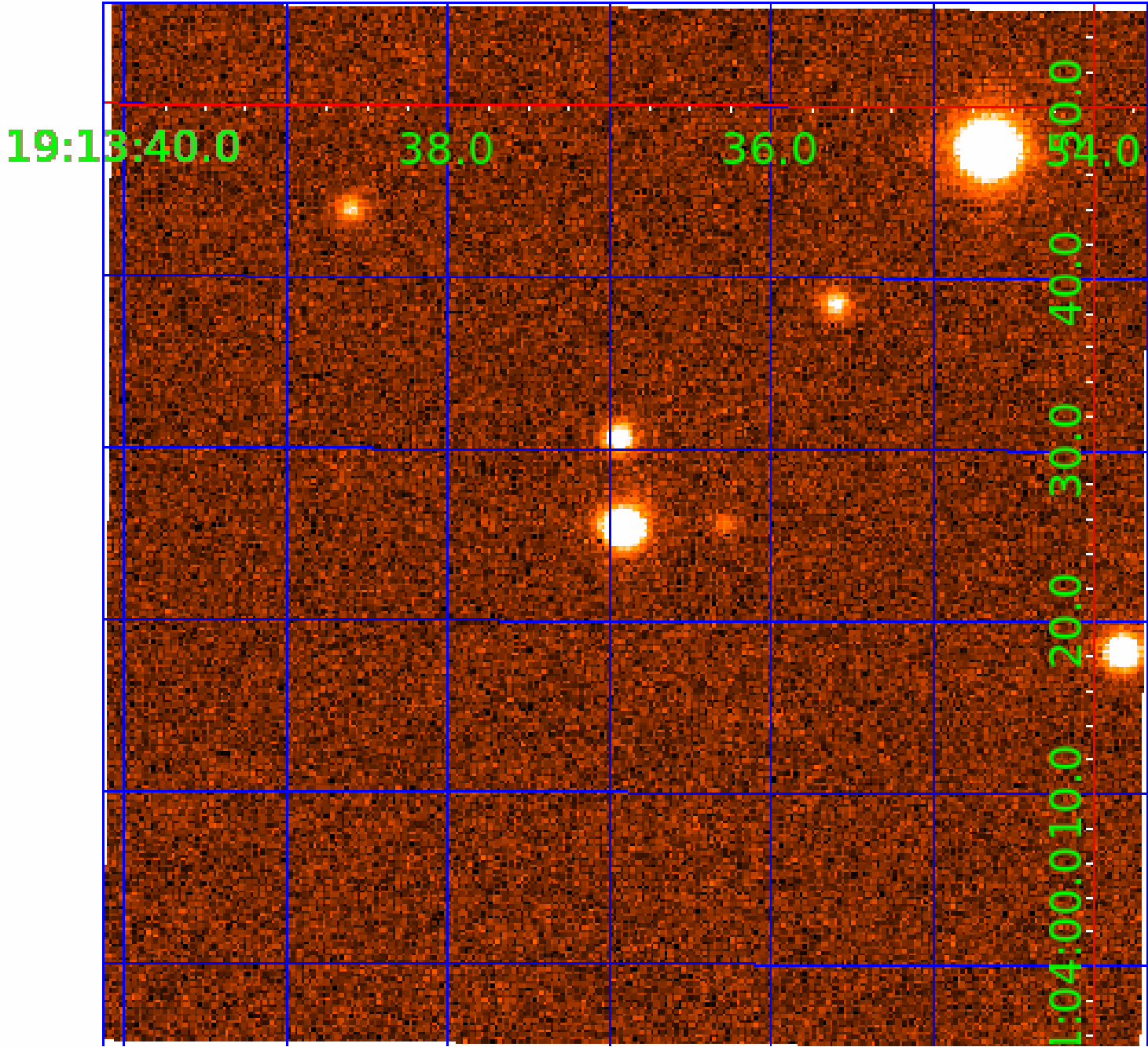


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 012302391

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
012302391-01	OBS	7519.01	25.321700	139.687477	107941.5	4.712	2824.9	1238.7	1.03	6109	54.27	43.49
012302391-02	OBS	No	25.321864	150.716600	77844.1	8.952	2636.7	1382.1	1.03	6109	47.45	43.49

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
012302391-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—MOD_ODDEVEN_DV—DEEP_V_SHAPED—HAS_SEC_TCE
012302391-02	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 012302391-02

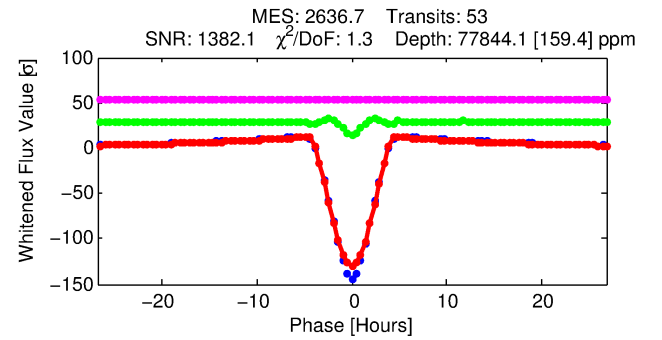
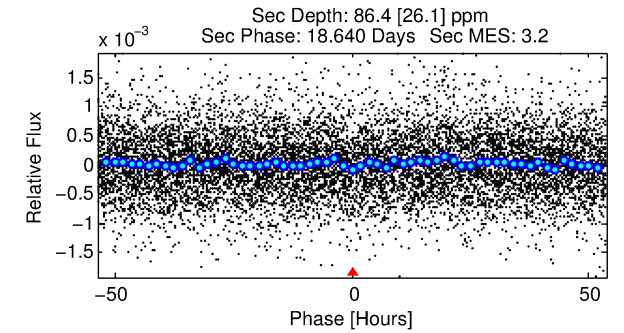
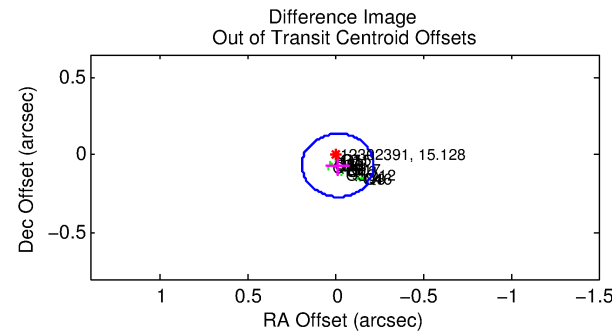
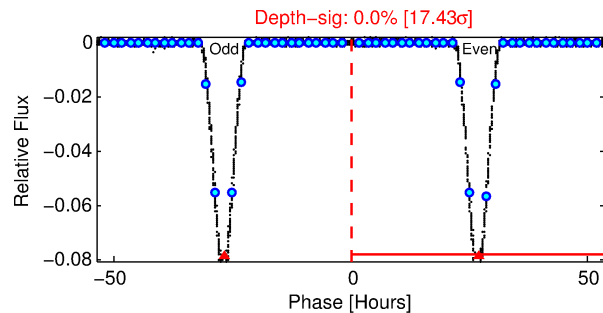
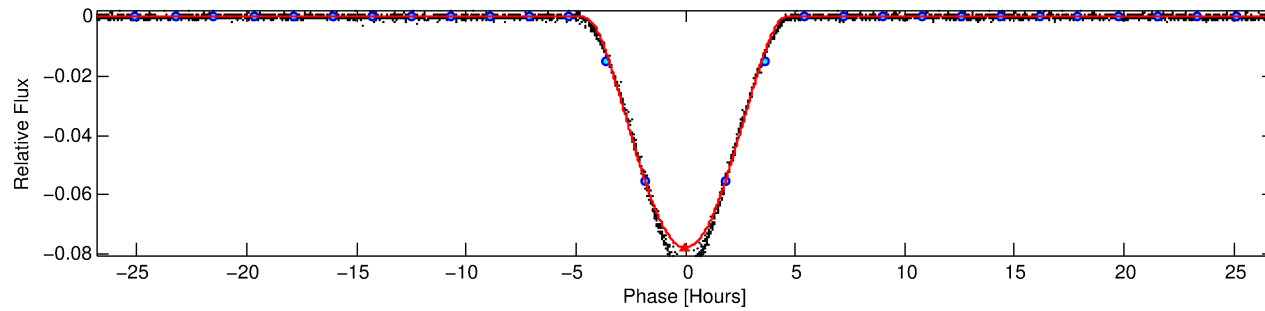
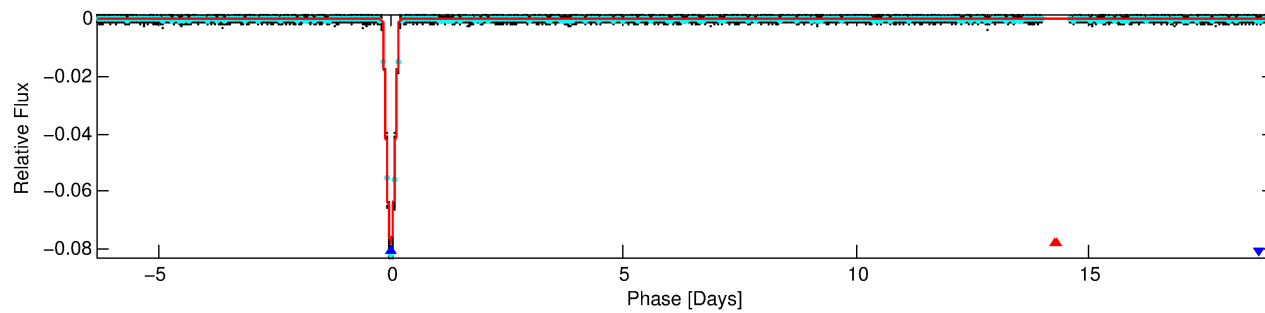
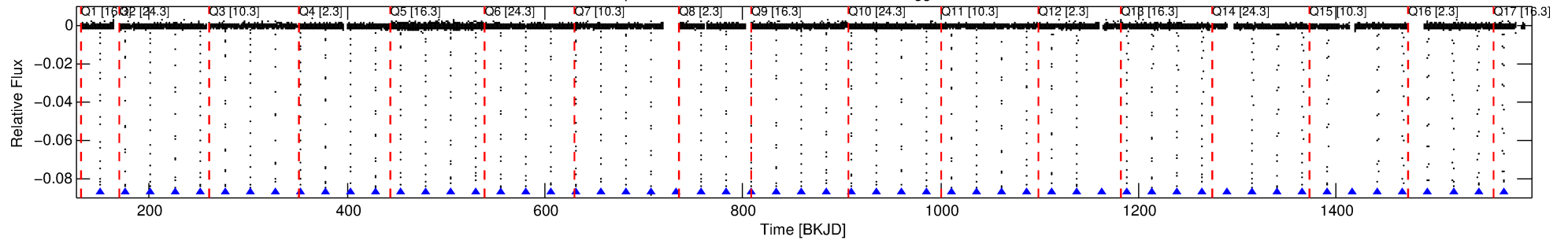
No Significant Match Found

# DV One-Page Summary

KIC: 12302391 Candidate: 2 of 2 Period: 25.322 d

KOI: K07519 Corr: No Ephemeris Match

Kp: 15.13 R\*: 1.03 Rs Teff: 6109.0 K Logg: 4.46 Fe/H: 0.000



## DV Fit Results:

Period = 25.32186 [0.00000] d  
Epoch = 150.7166 [0.0001] BKJD  
Rp/R\* = 0.4226 [0.0395]  
a/R\* = 22.24 [0.07]  
b = 0.98 [0.05]  
Seff = 43.49 [18.28]  
Teff = 655 [69] K  
Rp = 47.45 [16.34] Re  
a = 0.1743 [0.0477] AU  
Ag = 0.64 [0.34] [-1.06σ]  
Teffp = 906 [88] K [2.25σ]

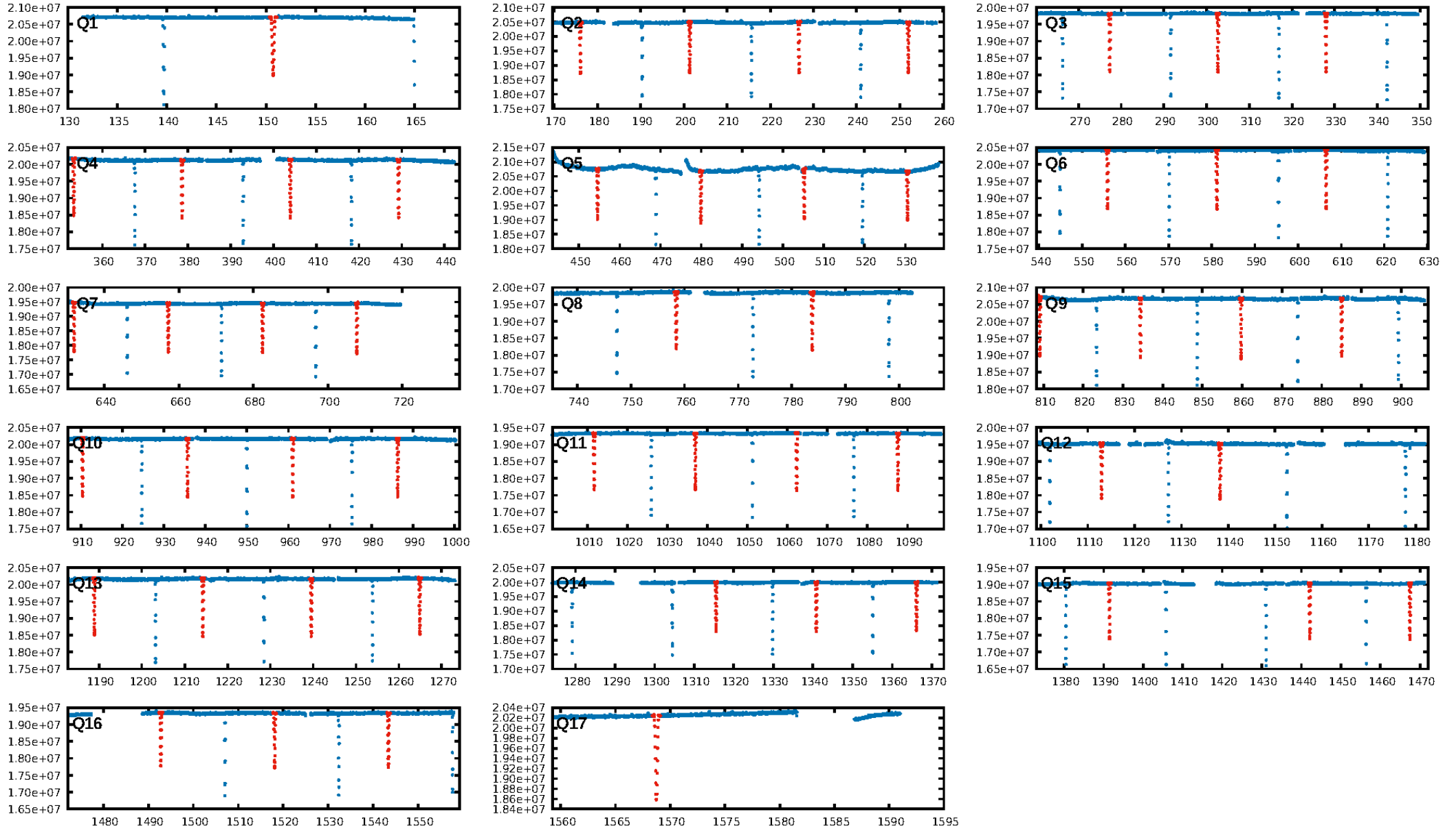
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 0.0%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [51/51]  
GhostDiagnostic-chr: 3.089  
Centroid-sig: 0.0%  
Centroid-so: 0.560 arcsec [120.59σ]  
OotOffset-rm: 0.068 arcsec [1.00σ]  
KicOffset-rm: 0.126 arcsec [1.83σ]  
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]

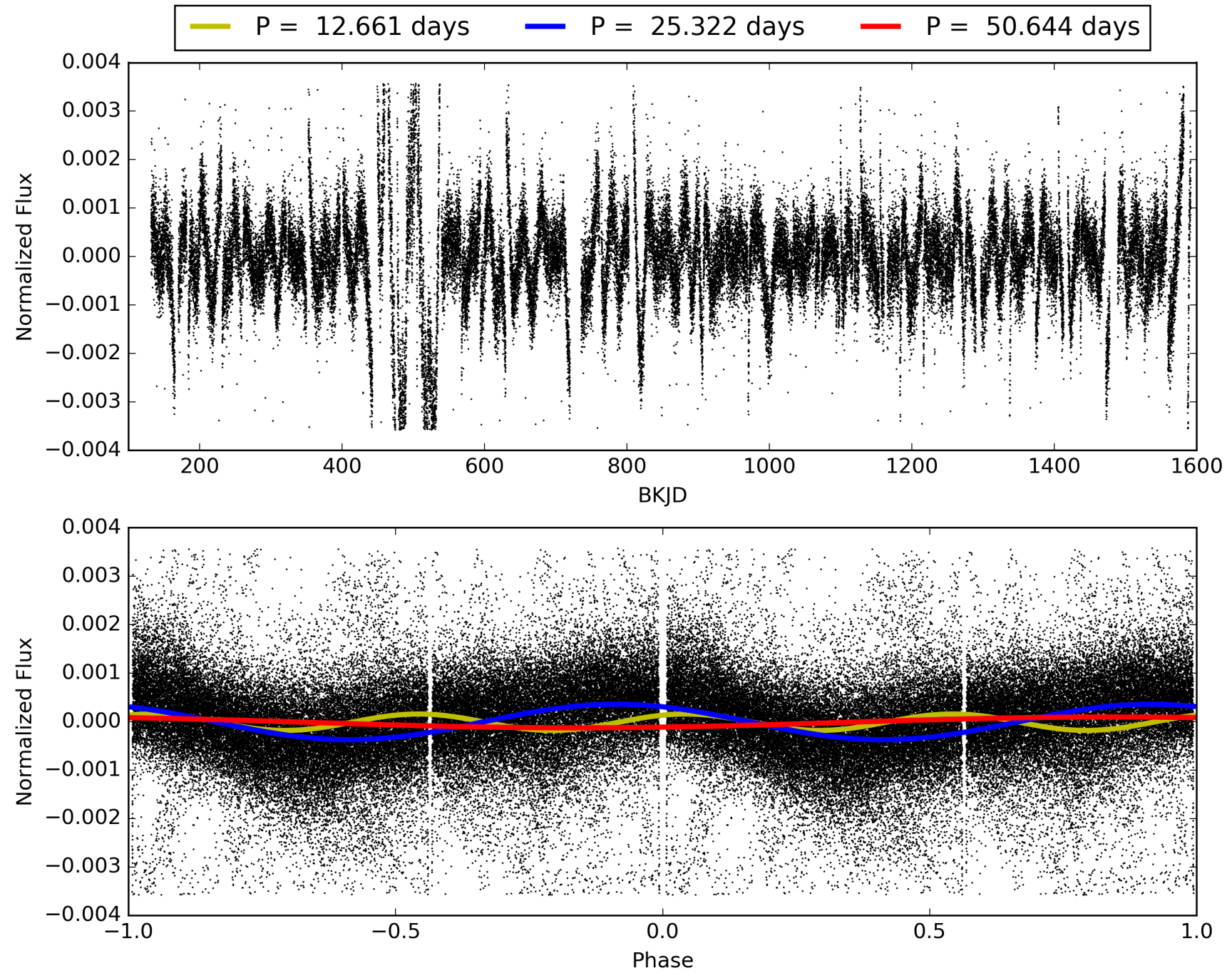
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 17:20:03 Z

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

# TCE 012302391-02, PDC Light Curves



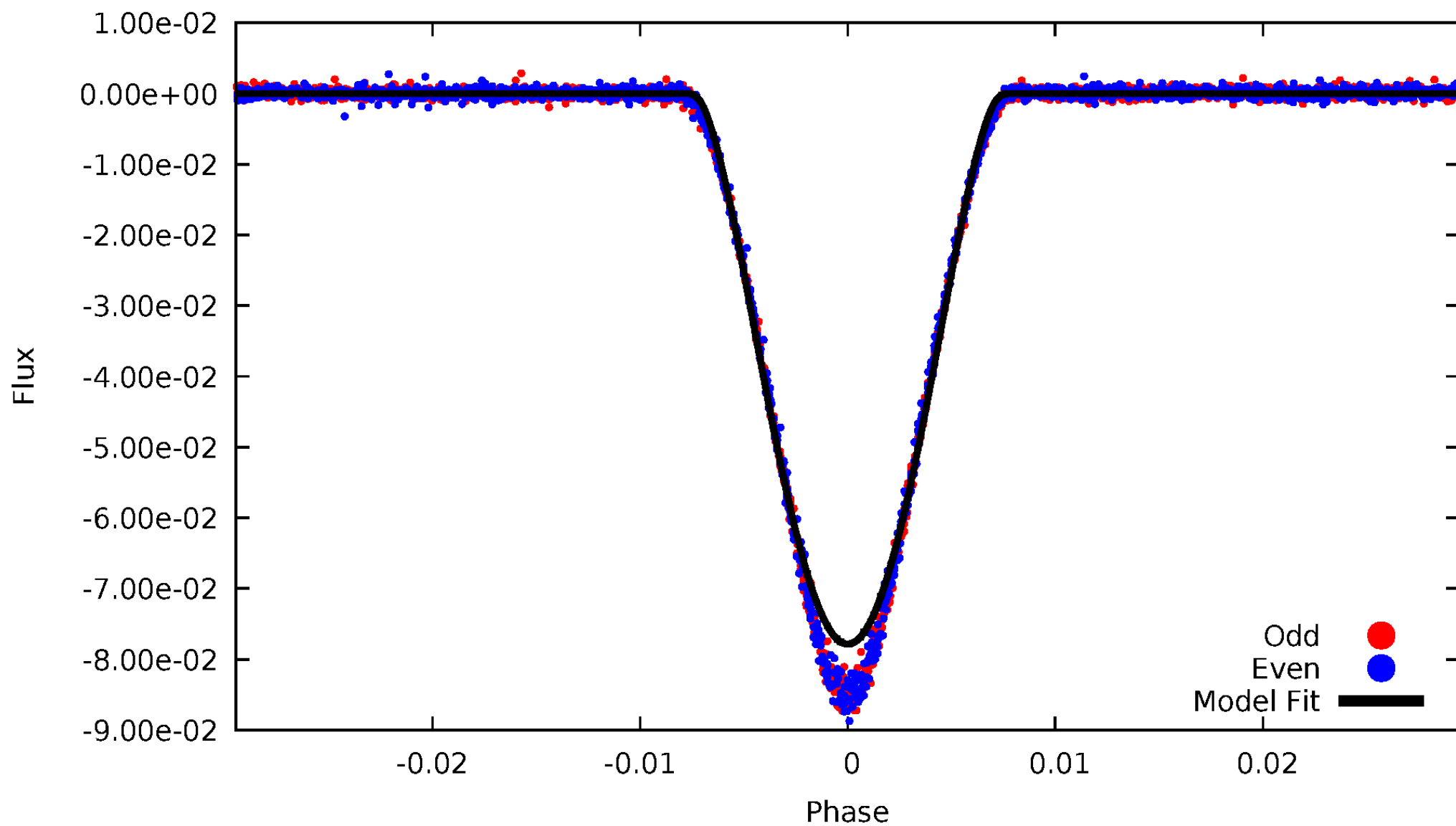
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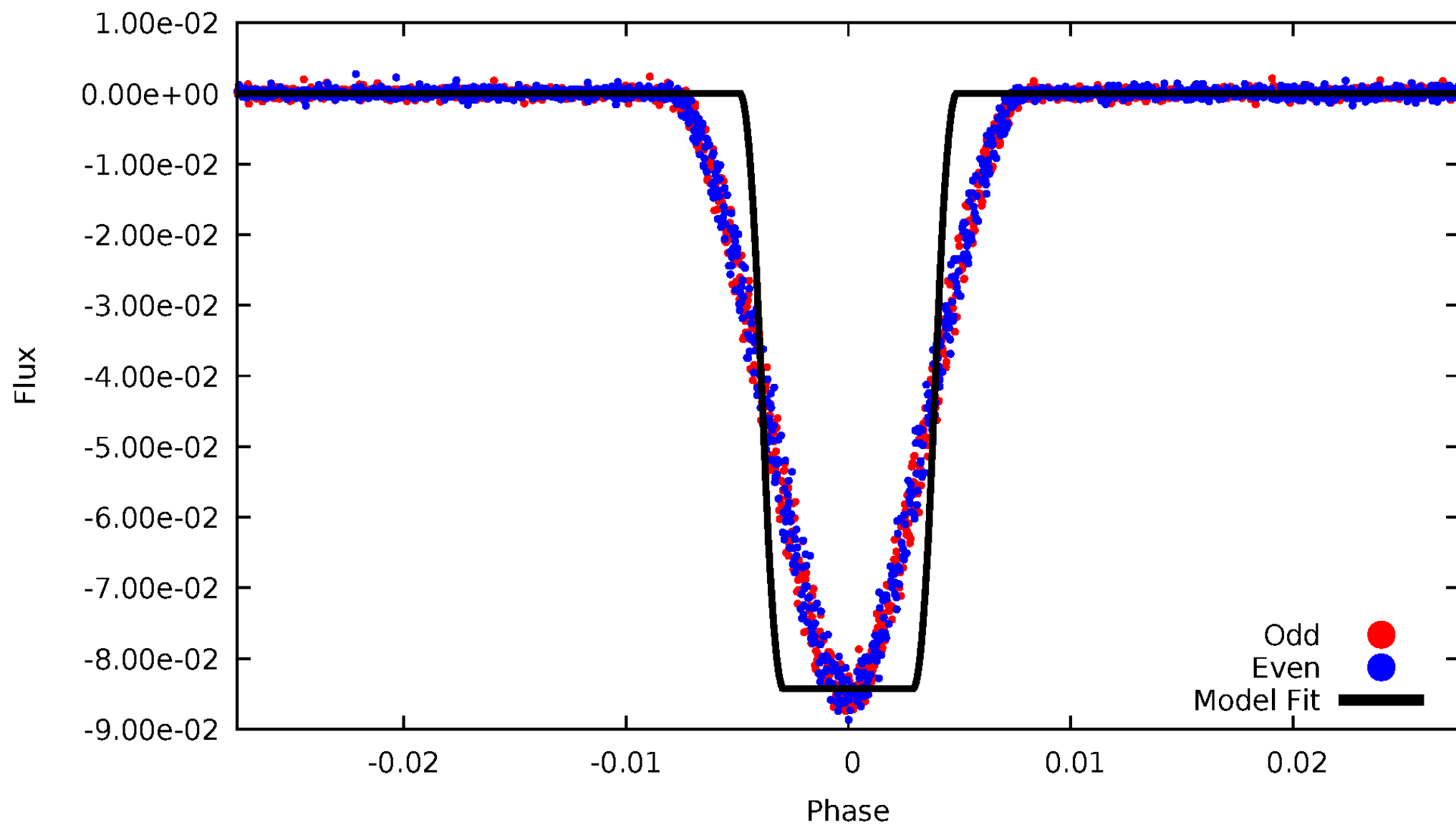
# DV Odd/Even

TCE 012302391-02



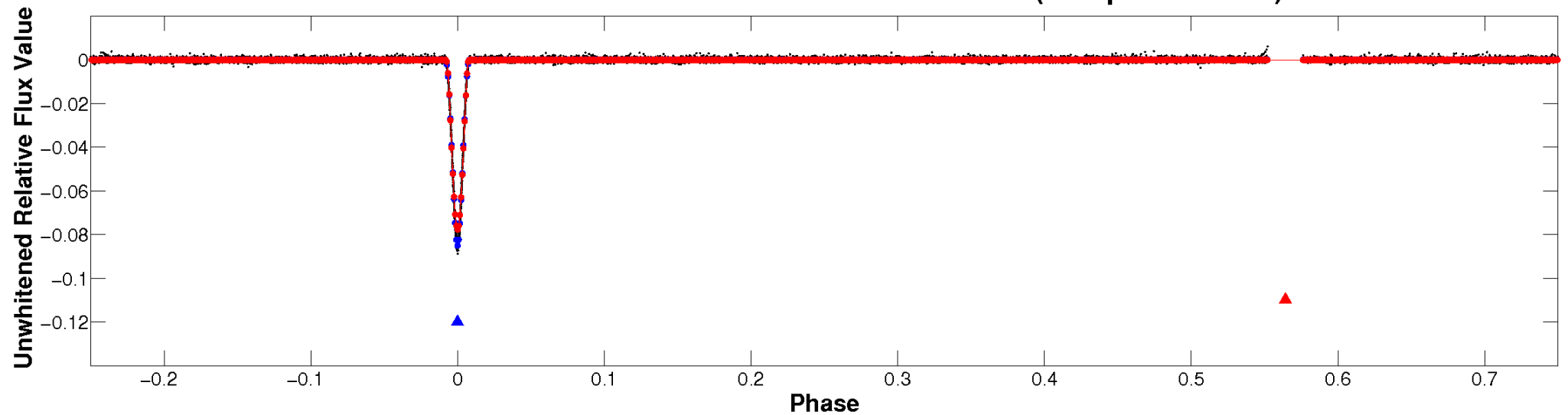
# ALT Odd/Even

TCE 012302391-02

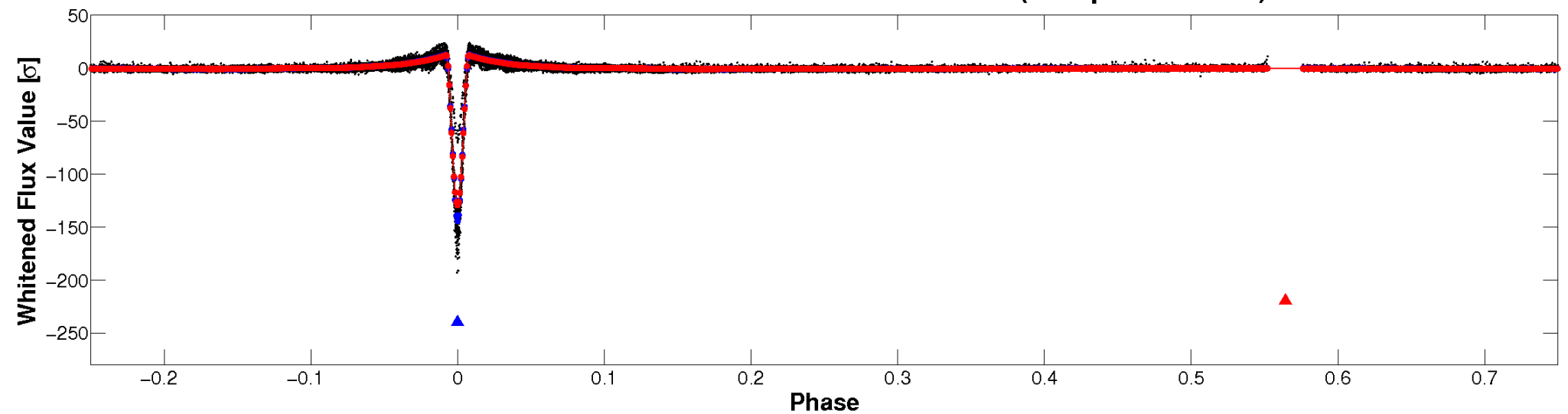


# Non-Whitened Vs. Whitened Light Curve

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

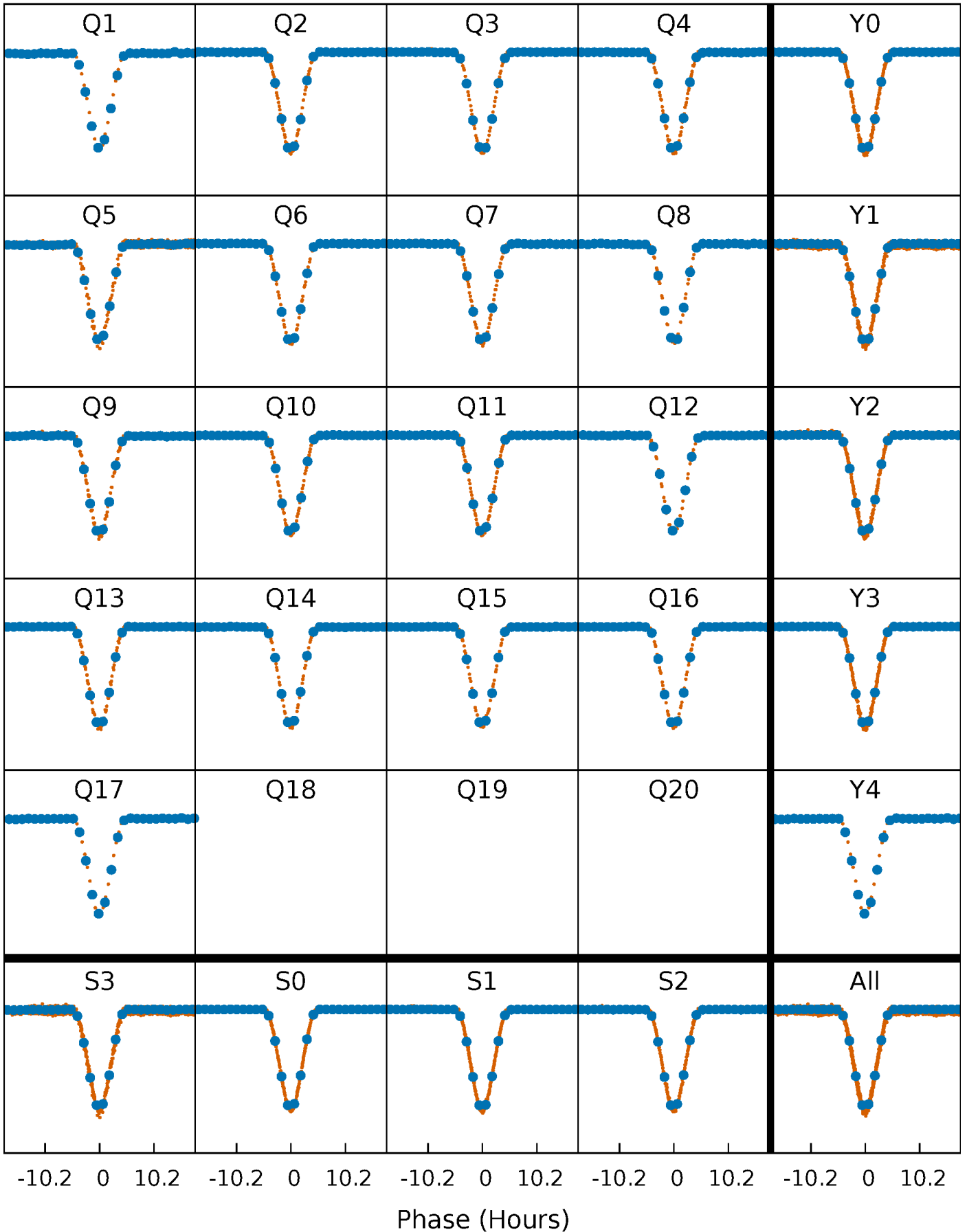


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



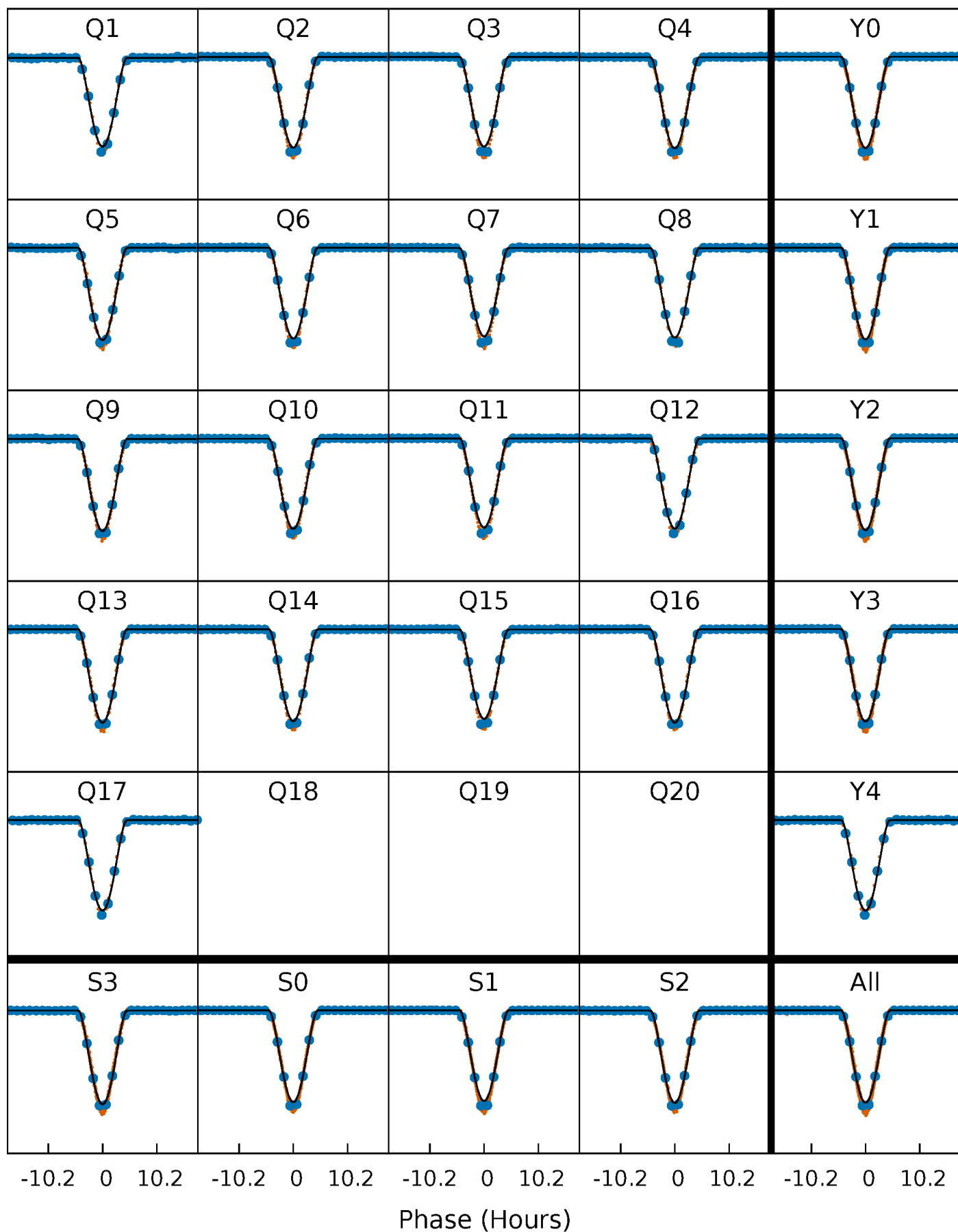
# PDC Quarter-Phased Transit Curves

TCE 012302391-02   P= 25.321864 Days    $T_0=150.716600$  (BKJD)



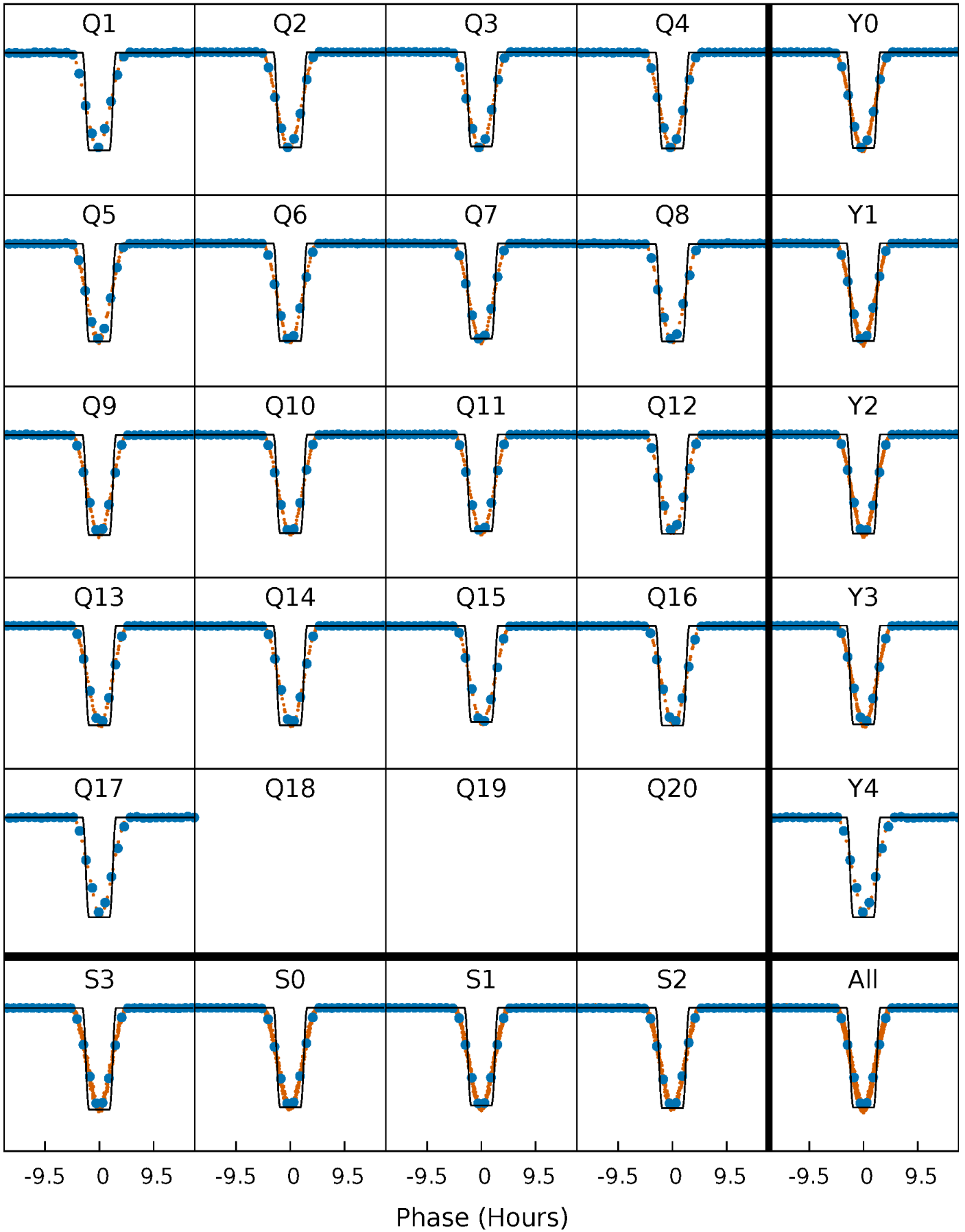
# DV Quarter-Phased Transit Curves

TCE 012302391-02   P= 25.321864 Days    $T_0=150.716600$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

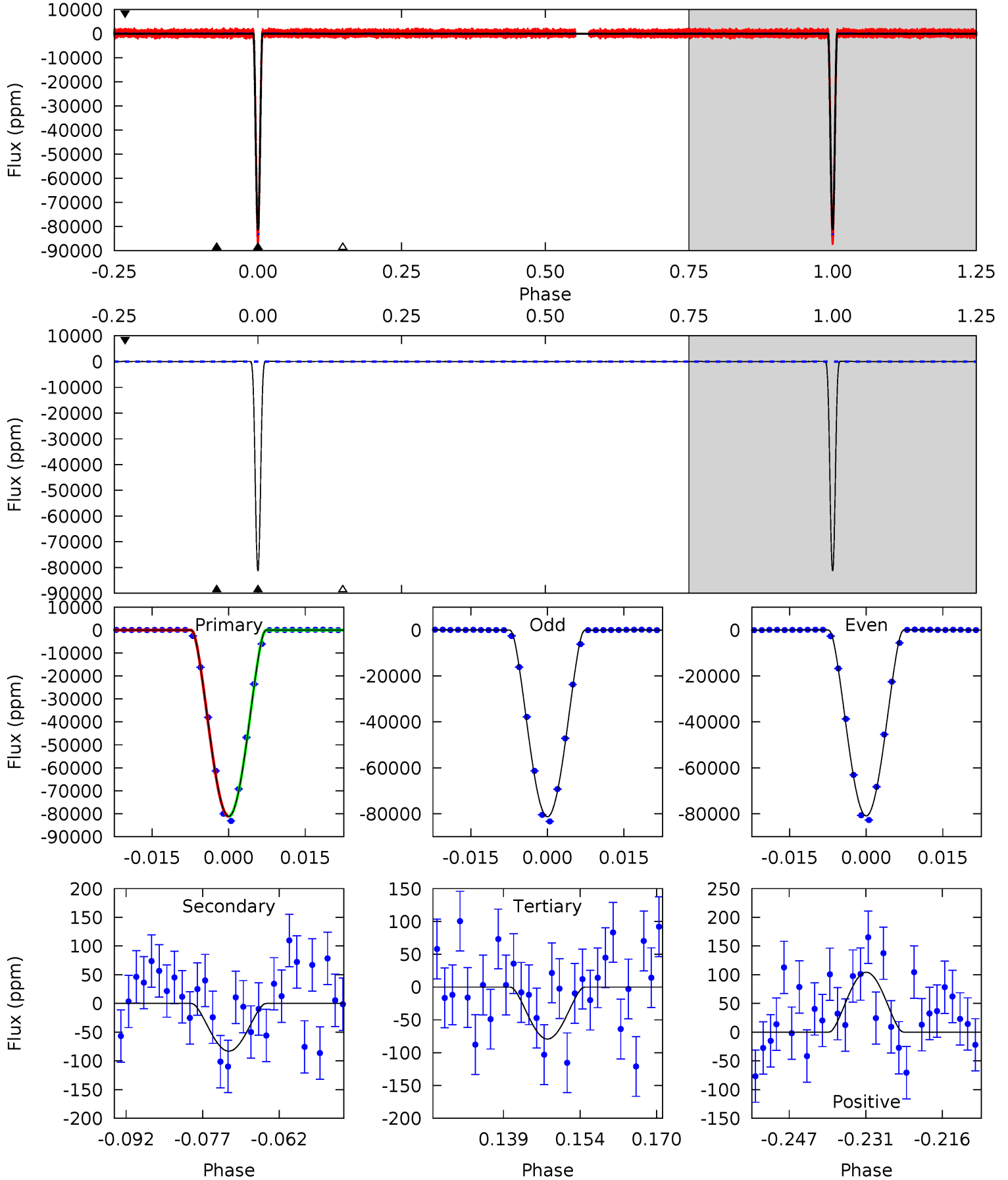
TCE 012302391-02   P= 25.321520 Days    $T_0=150.725918$  (BKJD)



# DV Model-Shift Uniqueness Test

012302391-02, P = 25.321864 Days, E = 125.394736 Days

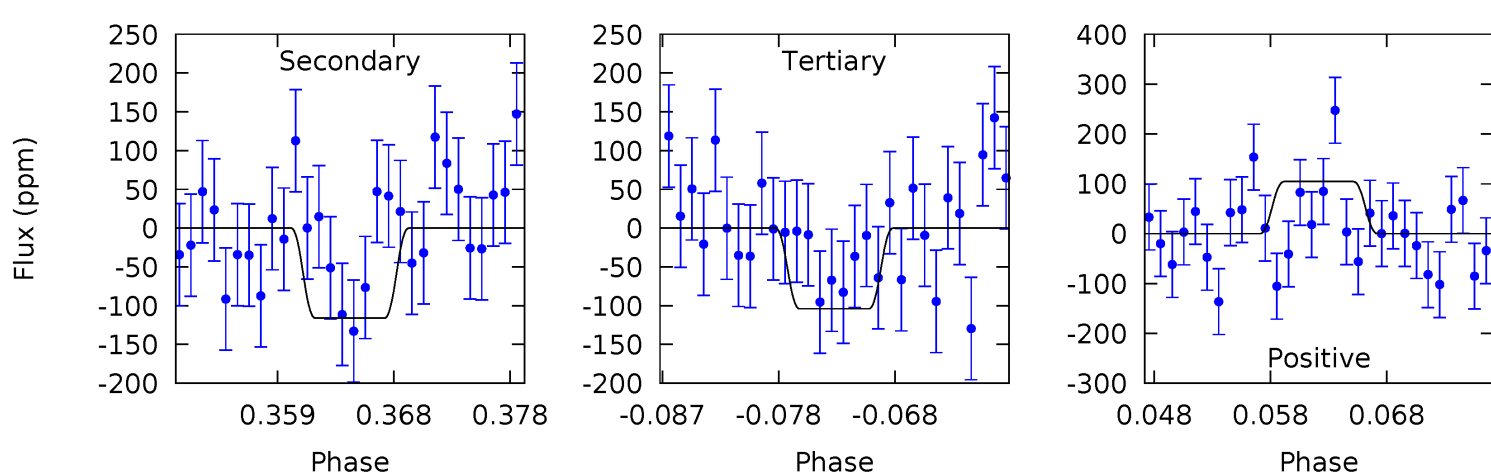
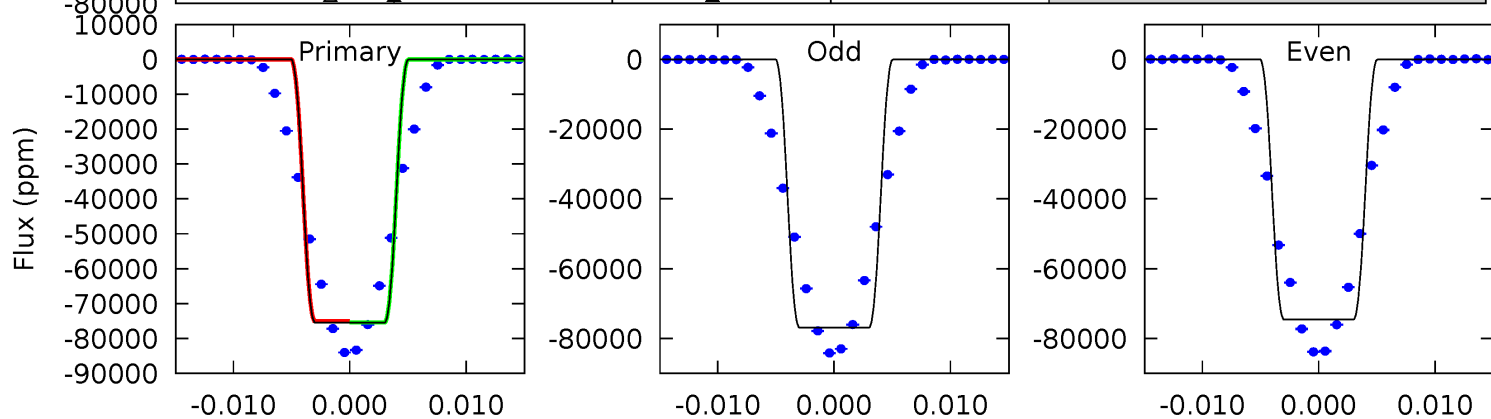
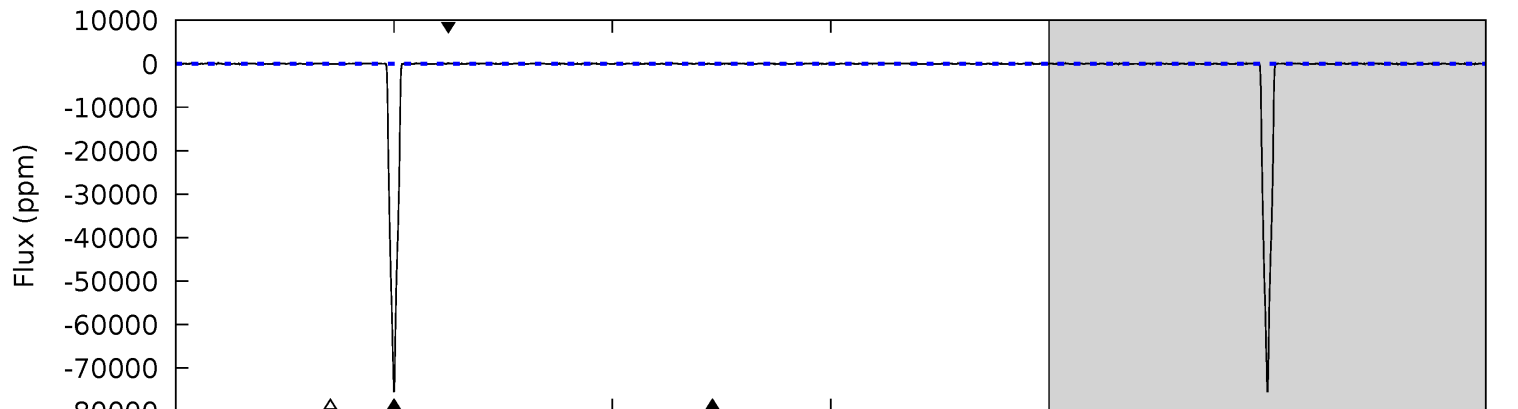
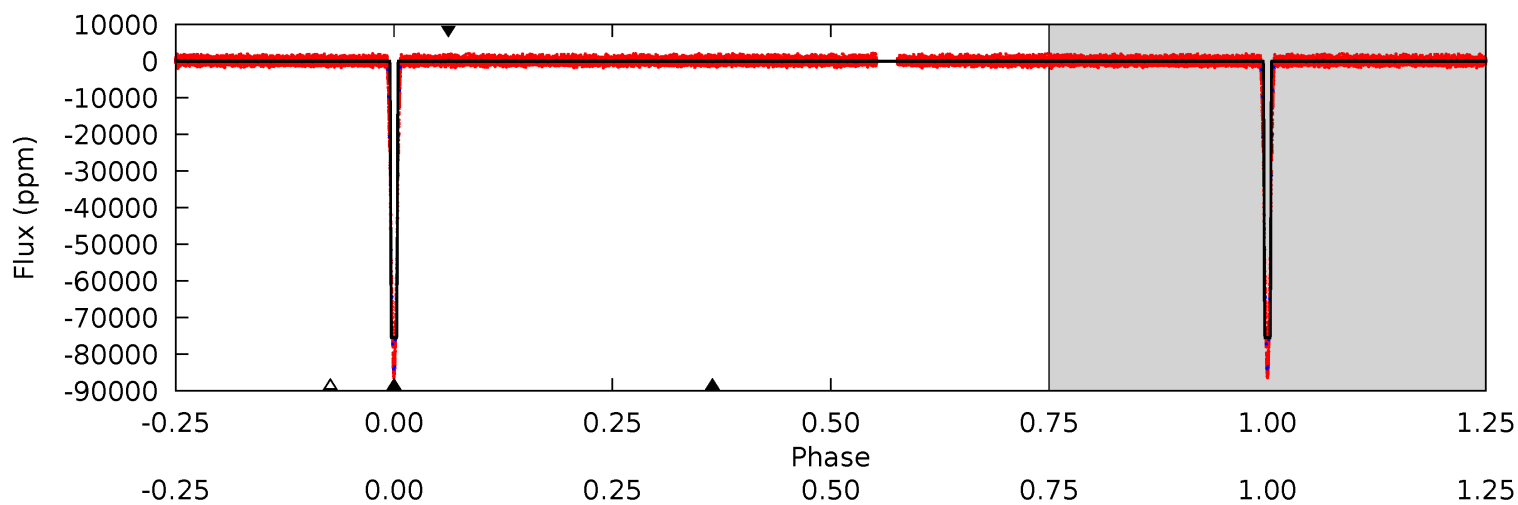
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
4810	4.92	4.69	6.18	4.94	2.42	2.06	4806	4804	0.23	-1.26	11.1	1.00	0.00	0



# Alt Model-Shift Uniqueness Test

012302391-02, P = 25.321520 Days, E = 125.404398 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
2494	3.83	3.44	3.45	5.03	2.59	1.14	2490	2490	0.39	0.38	38.1	1.00	0.00	5.28





### Stellar Parameters For KIC 012302391

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6109^{+193}_{-236}$	$4.455^{+0.056}_{-0.210}$	$0.000^{+0.250}_{-0.300}$	$1.029^{+0.341}_{-0.114}$	$1.099^{+0.151}_{-0.151}$	$1.421^{+0.415}_{-0.759}$
	+3%/-4%	+1%/-5%	+inf%/-inf%	+33%/-11%	+14%/-14%	+29%/-53%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 012302391-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-83 \pm 17$	$48.94^{+8.60}_{-6.77}$	$932^{+73}_{-49}$	$1778^{+100}_{-161}$	$0.563^{+0.216}_{-0.187}$
Alt.	$-116 \pm 30$	$33.69^{+6.52}_{-5.51}$	$934^{+68}_{-49}$	$2095^{+105}_{-109}$	$1.624^{+0.808}_{-0.580}$

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

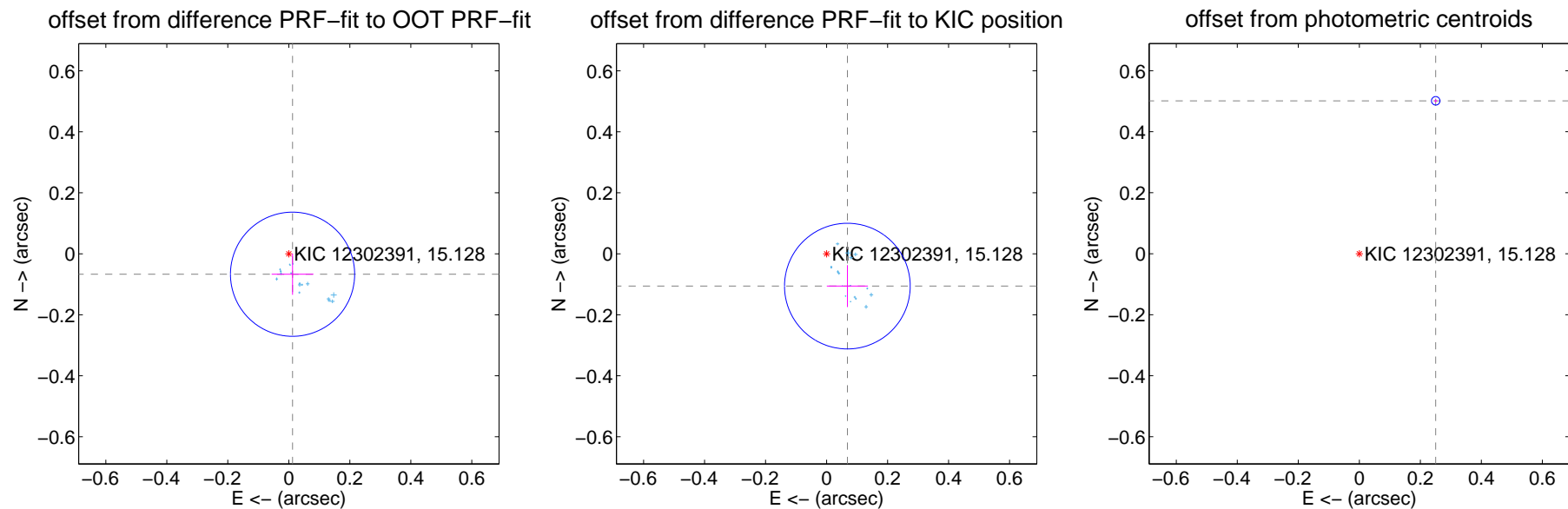
## DV Centroid Data

Supplemental centroid analysis for 012302391-02. Kepler magnitude: 15.13. Transit SNR 1382.07

There are 17 quarters with good PRF difference image offsets

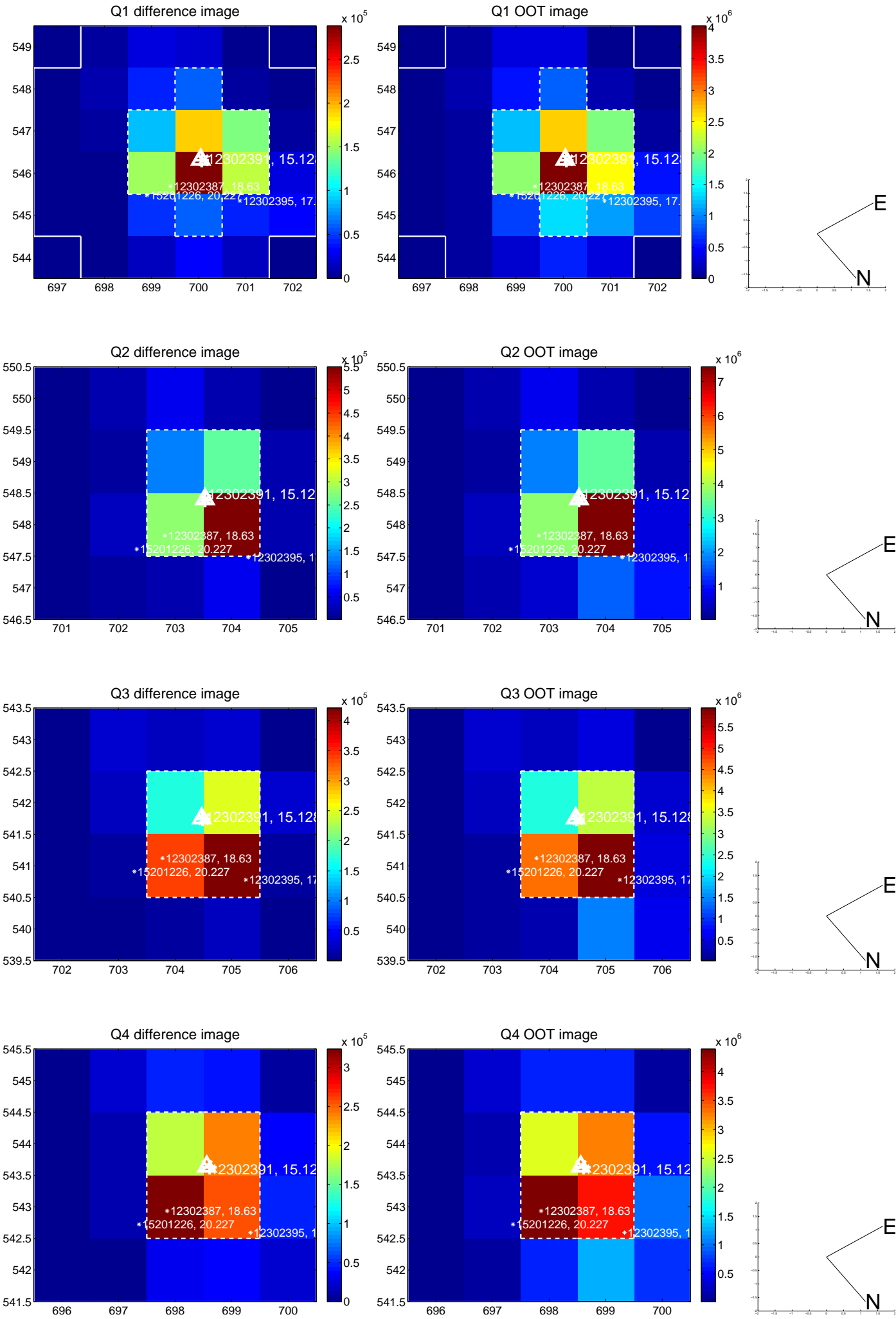
The direct PRF centroid is offset from the target star catalog position by about 0.09 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.068 \pm 0.068$	1.00	$-0.012 \pm 0.068$	$-0.067 \pm 0.067$
PRF-fit source offset from KIC position	$0.126 \pm 0.069$	1.83	$-0.068 \pm 0.067$	$-0.106 \pm 0.069$
photometric centroid source offset	$0.56 \pm 0.00$	120.59	$-0.25 \pm 0.00$	$0.50 \pm 0.00$

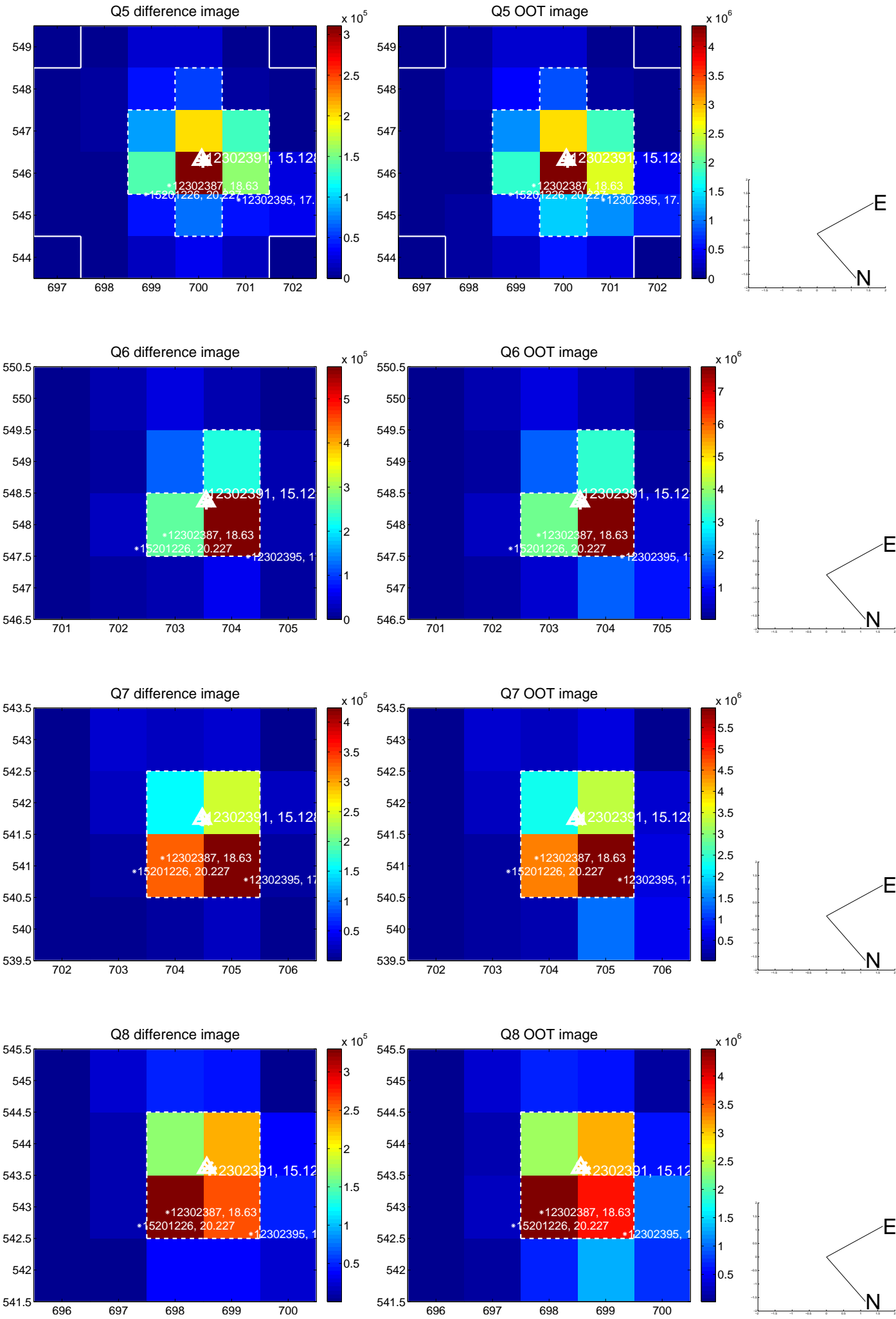


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

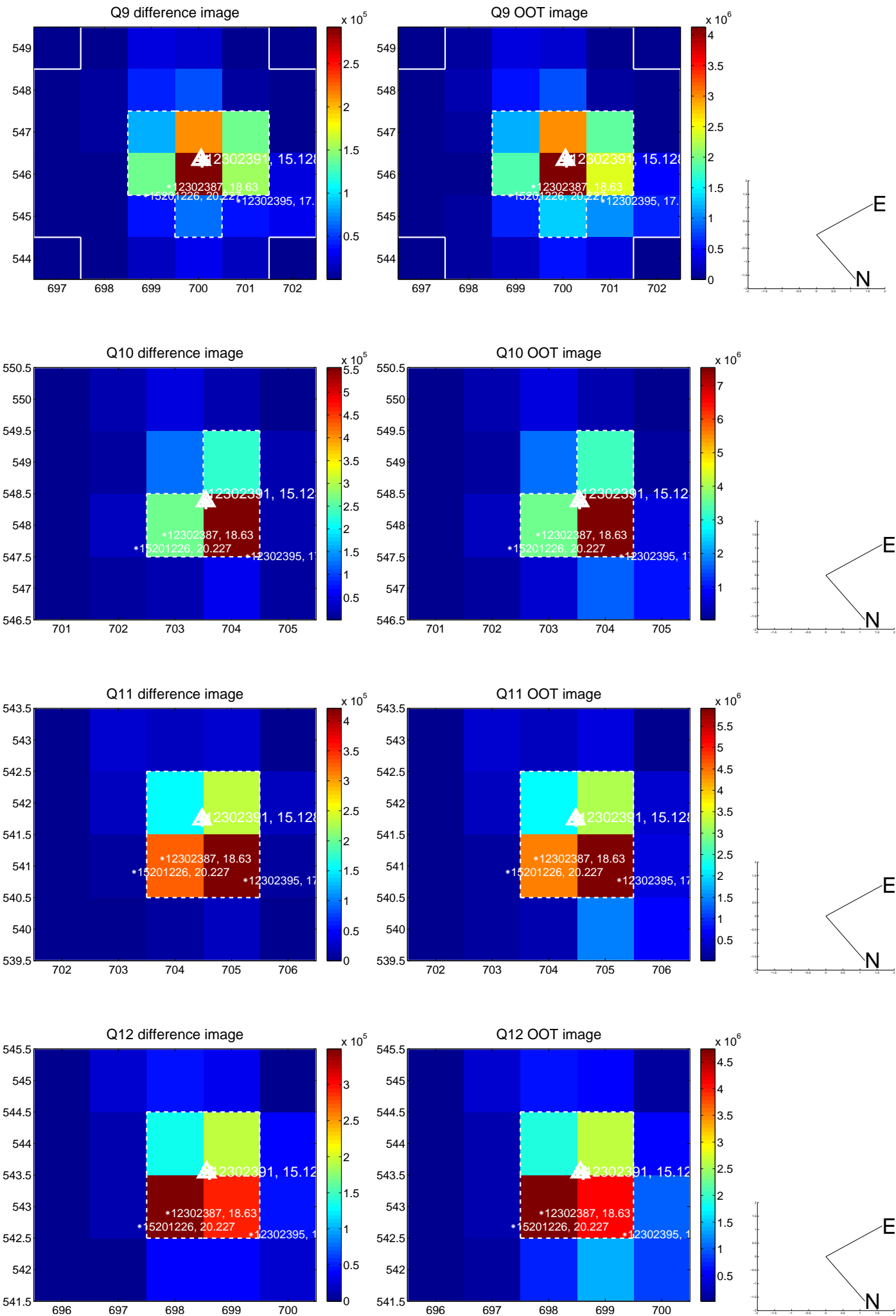
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



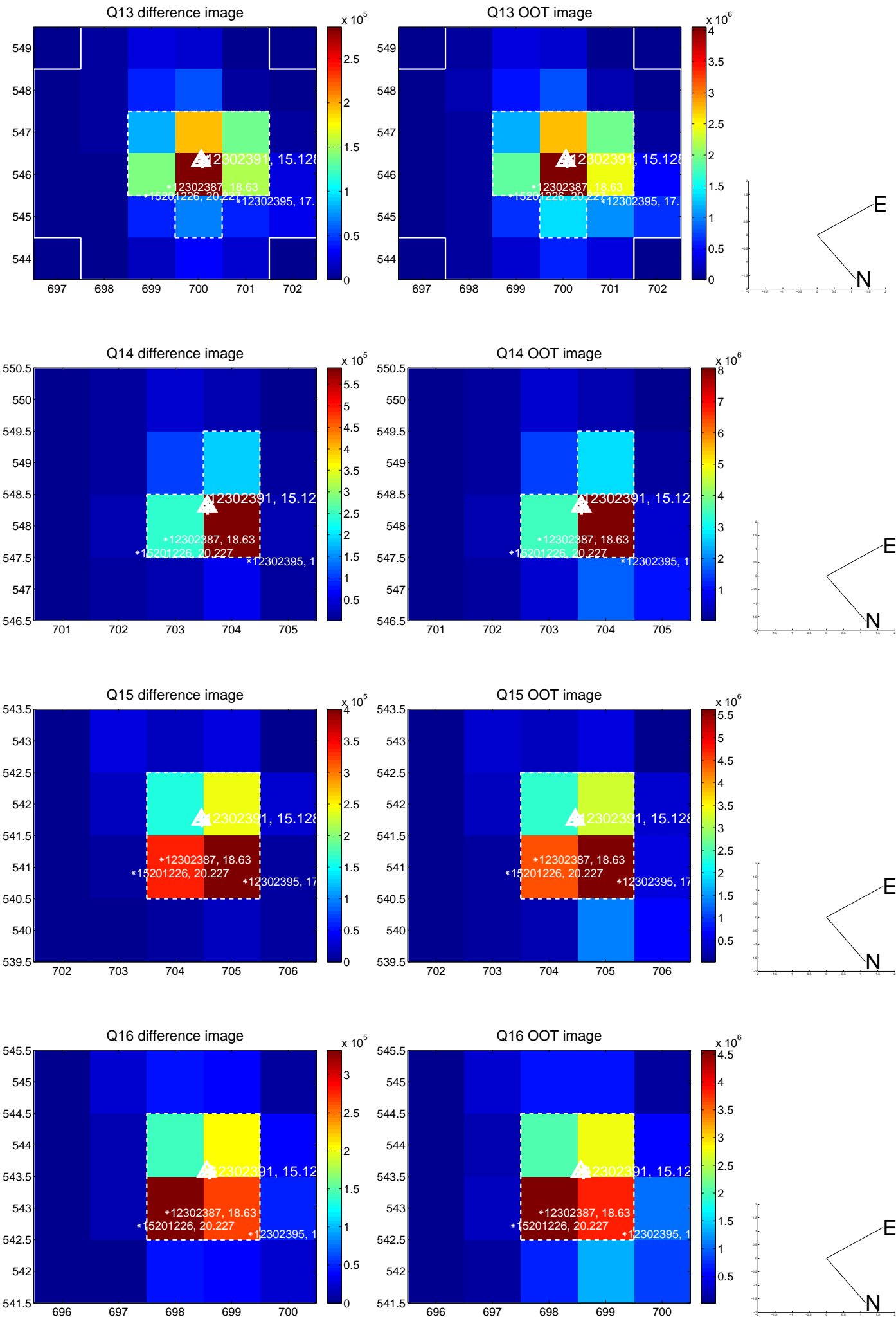
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



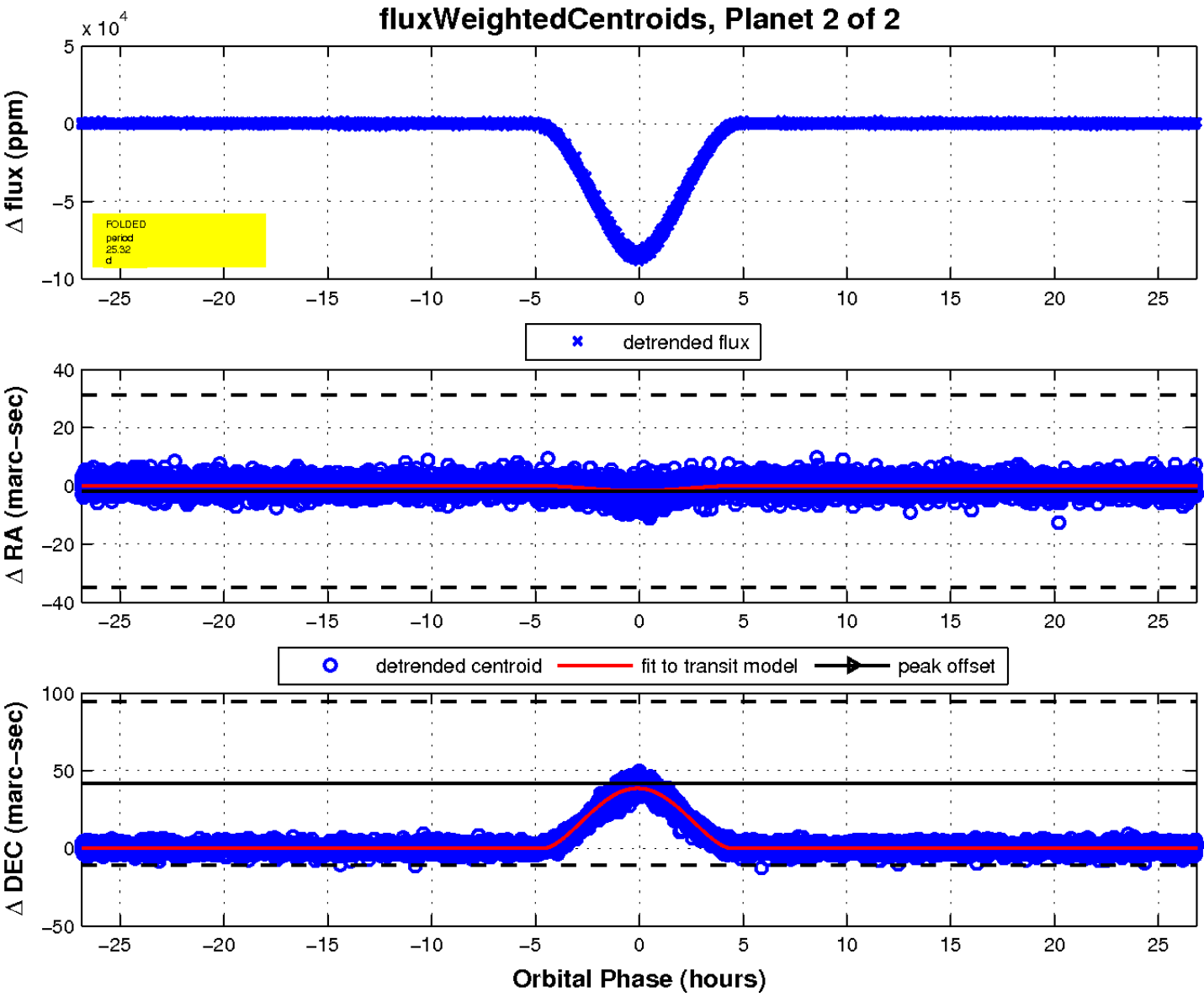
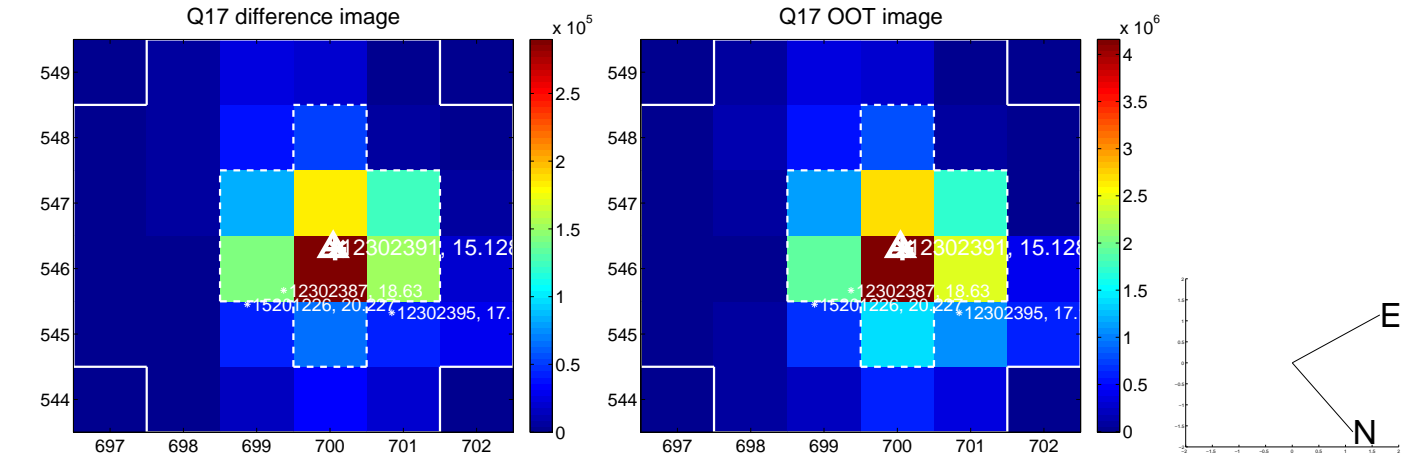
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

