

# KIC 004252226

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004252226-01	OBS	6396.01	21.858966	151.262730	116997.8	6.324	5625.4	4570.0	2.06	5923	104.25	173.03
004252226-02	OBS	No	21.858950	134.000142	44319.8	6.136	2255.1	2098.7	2.06	5923	68.71	173.03

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004252226-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—DEEP_V_SHAPED—HAS_SEC_TCE
004252226-02	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.

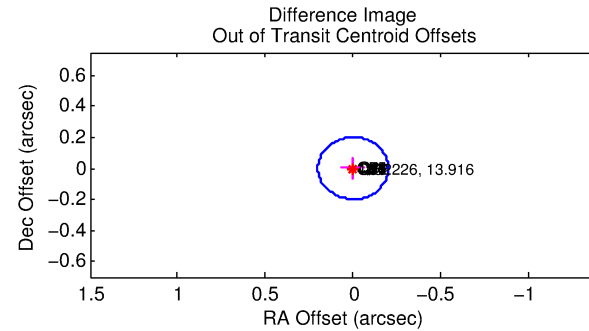
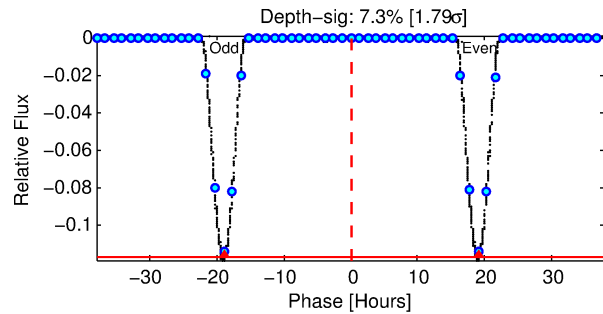
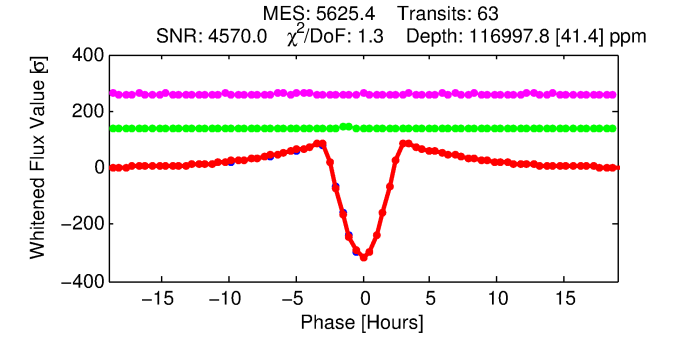
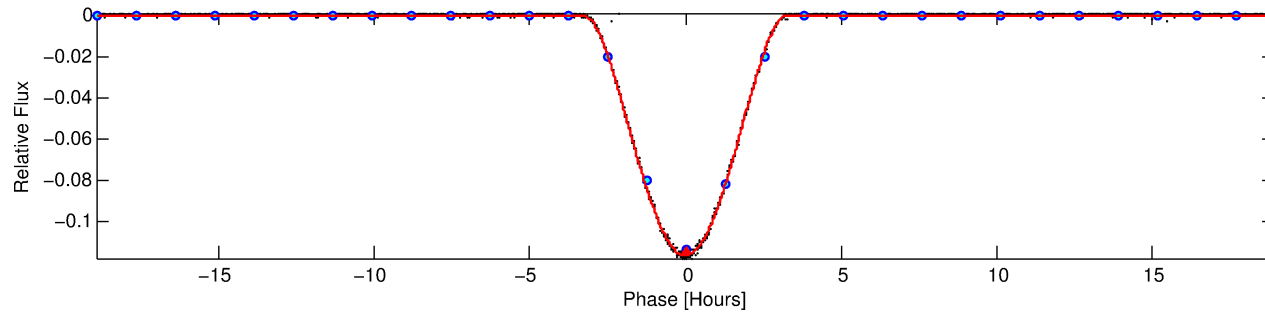
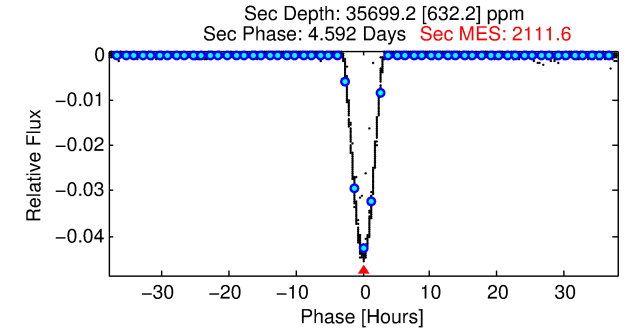
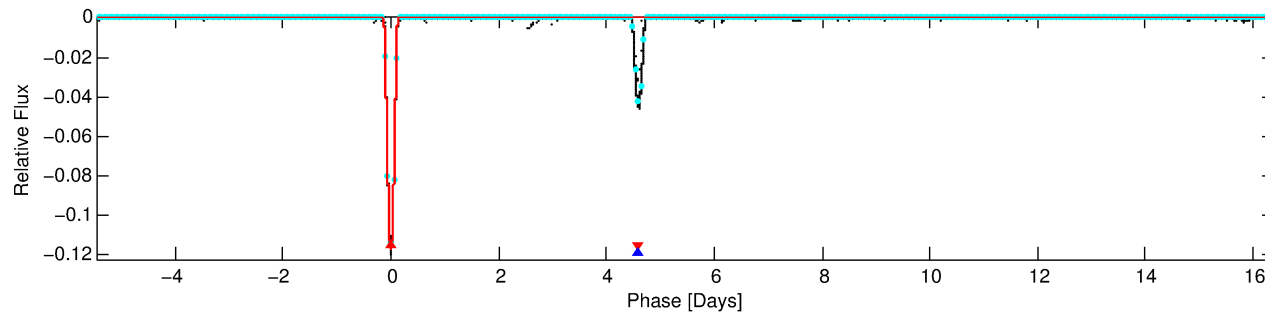
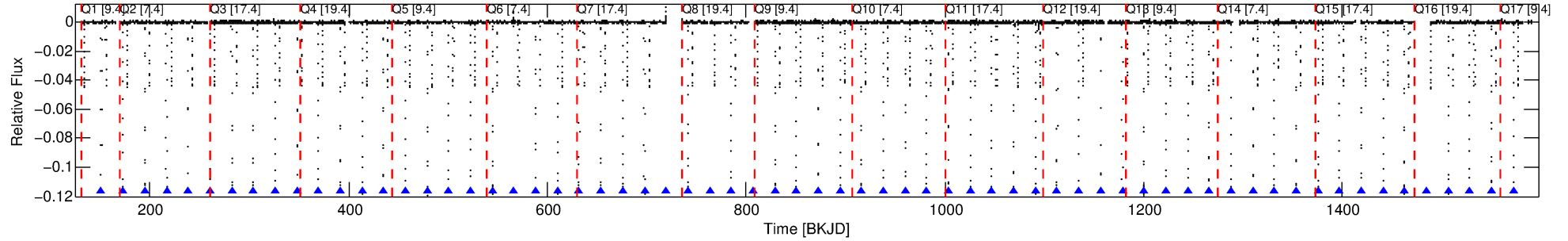
## Ephemeris Match Information For 004252226-01

No Significant Match Found

# DV One-Page Summary

KIC: 4252226 Candidate: 1 of 2 Period: 21.859 d  
KOI: K06396.01 Corr: 1.000

Kp: 13.92 R\*: 2.06 Rs Teff: 5923.0 K Logg: 3.90 Fe/H: 0.080



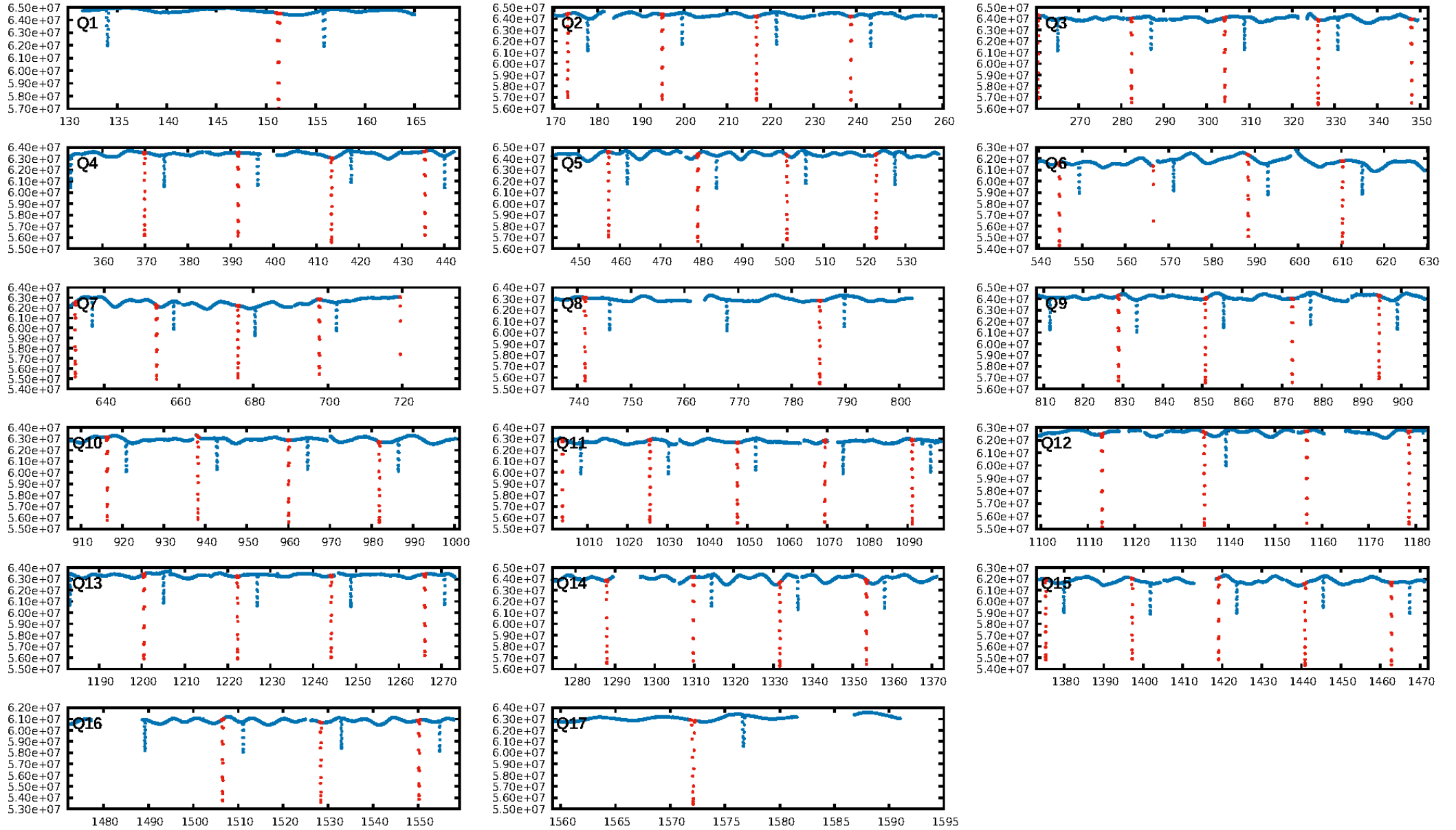
## DV Fit Results:

Period = 21.85897 [0.00000] d  
Epoch = 151.2627 [0.0000] BKJD  
Rp/R\* = 0.4638 [0.0136]  
a/R\* = 30.37 [0.05]  
b = 0.91 [0.02]  
Seff = 173.03 [134.28]  
Teq = 925 [179] K  
Rp = 104.25 [48.23] Re  
a = 0.1644 [0.0766] AU  
Ag = 48.87 [37.49] [1.28σ]  
Teffp = 3781 [138] K [12.62σ]

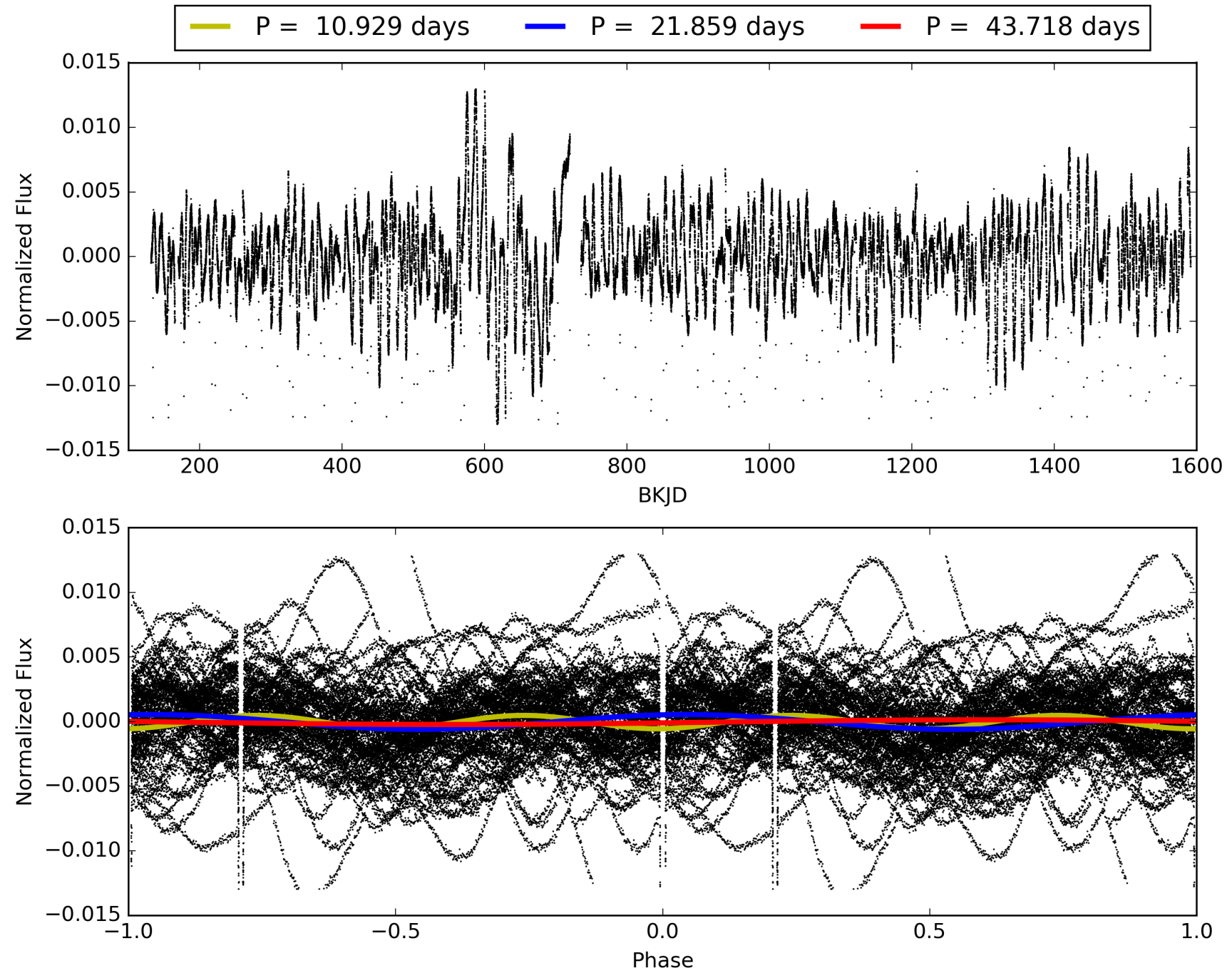
## DV Diagnostic Results:

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 [61/61]  
GhostDiagnostic-chr: 2.561  
Centroid-sig: 0.0%  
Centroid-so: 0.172 arcsec [142.58σ]  
OotOffset-rm: 0.002 arcsec [0.03σ]  
KicOffset-rm: 0.150 arcsec [2.07σ]  
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]

# TCE 004252226-01, PDC Light Curves

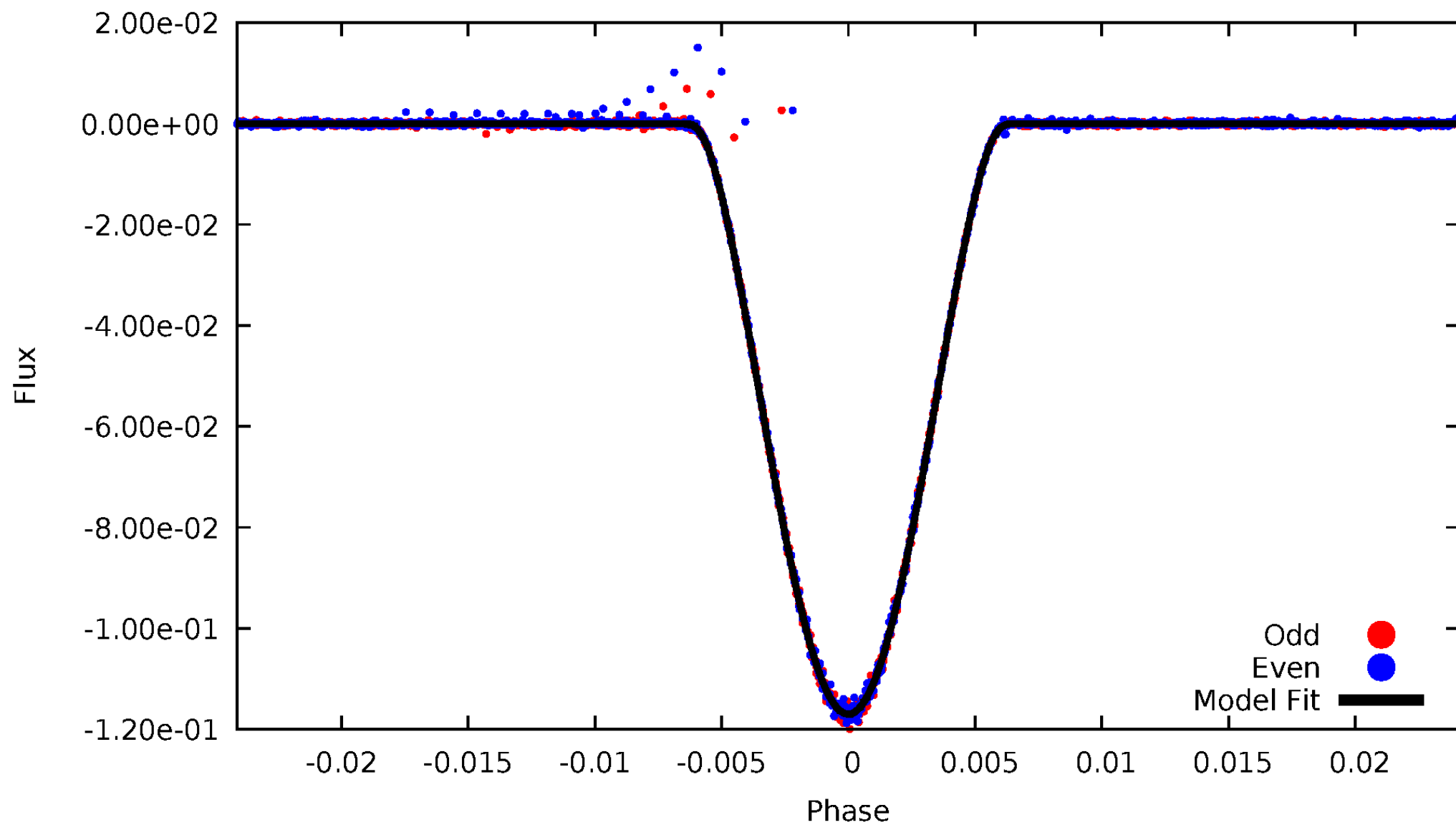


TCE 004252226-01



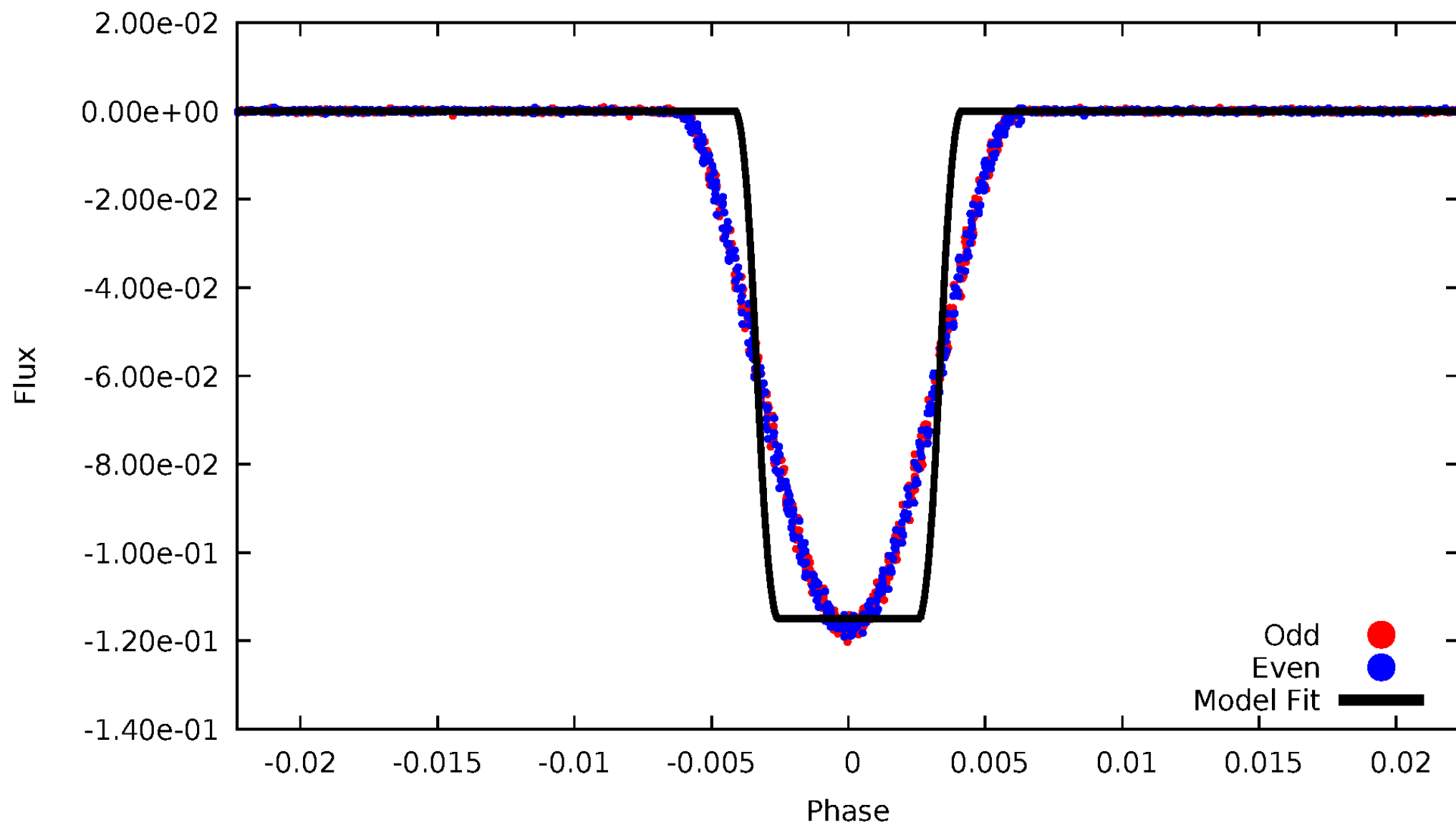
# DV Odd/Even

TCE 004252226-01



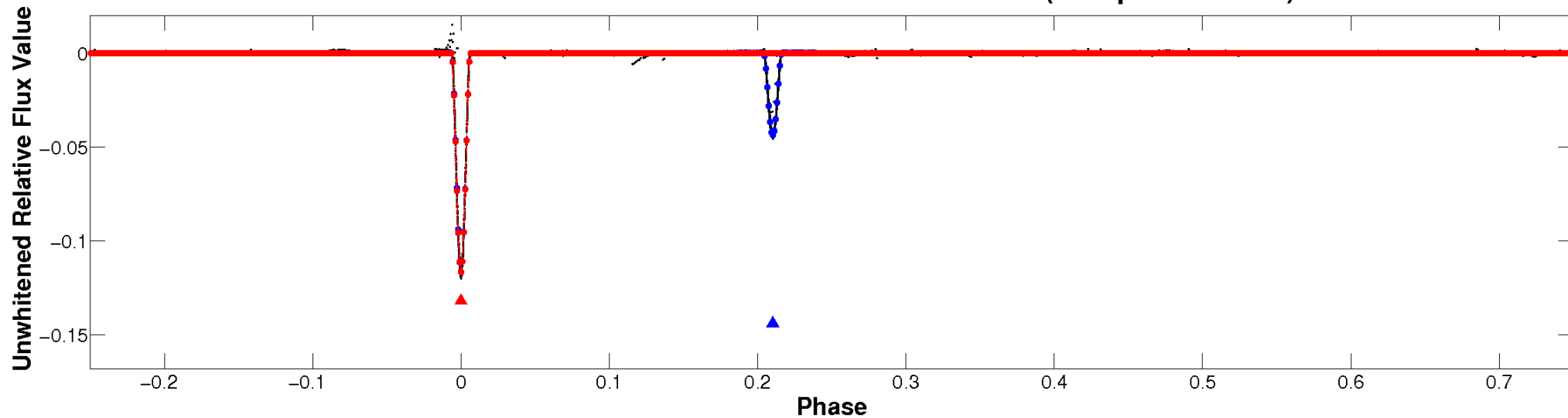
# ALT Odd/Even

TCE 004252226-01

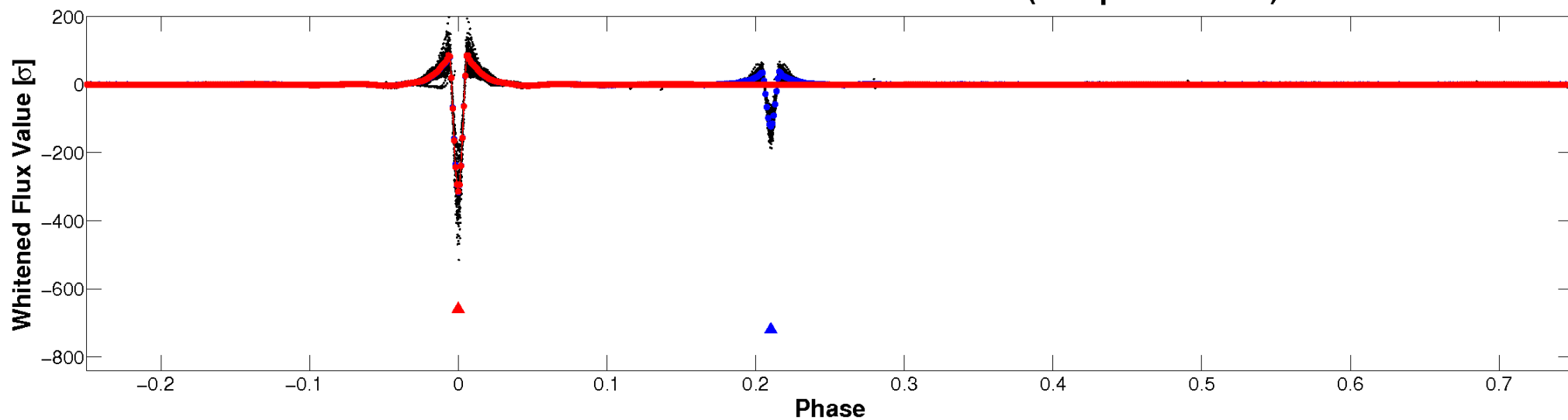


# Non-Whitened Vs. Whitened Light Curve

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

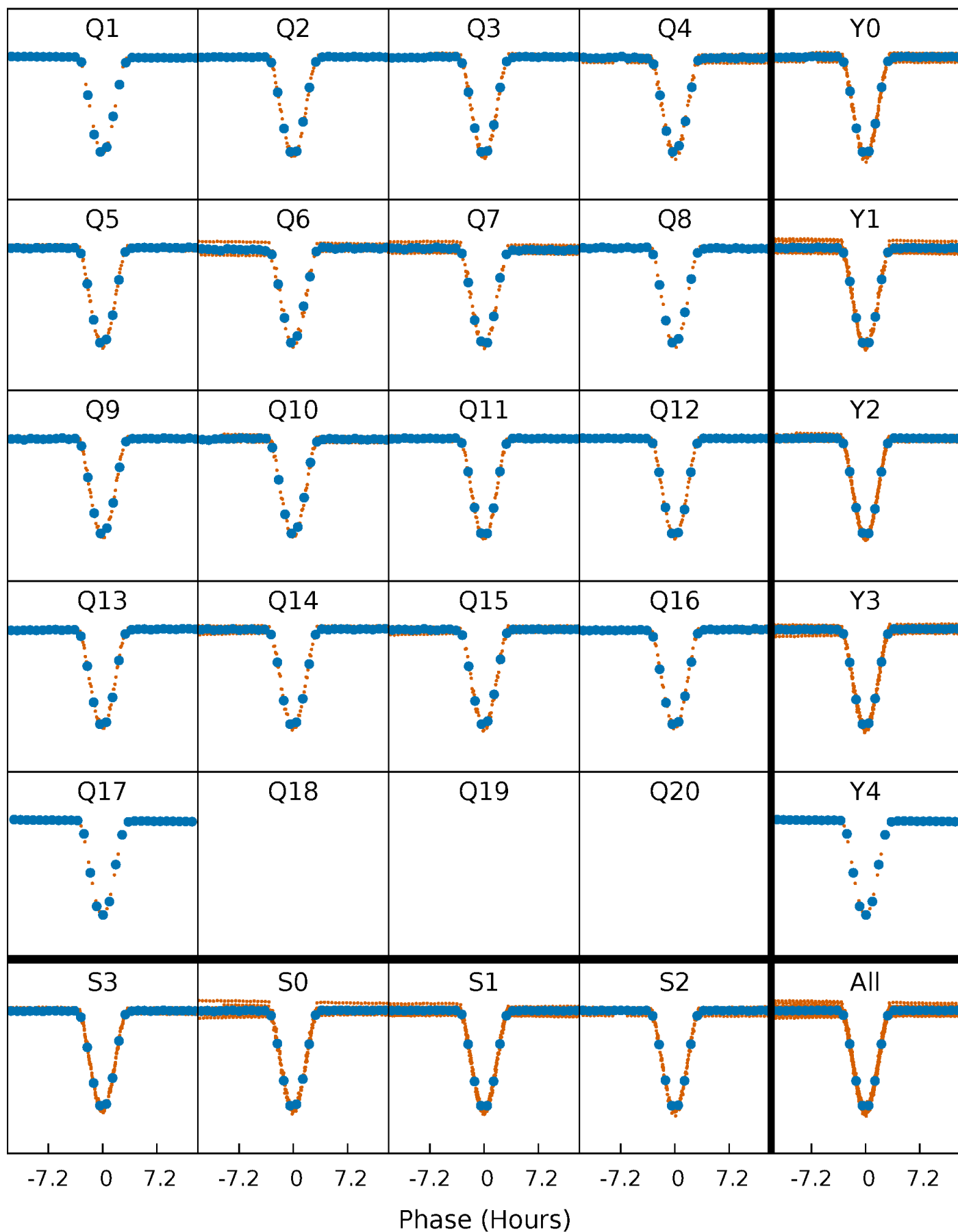


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

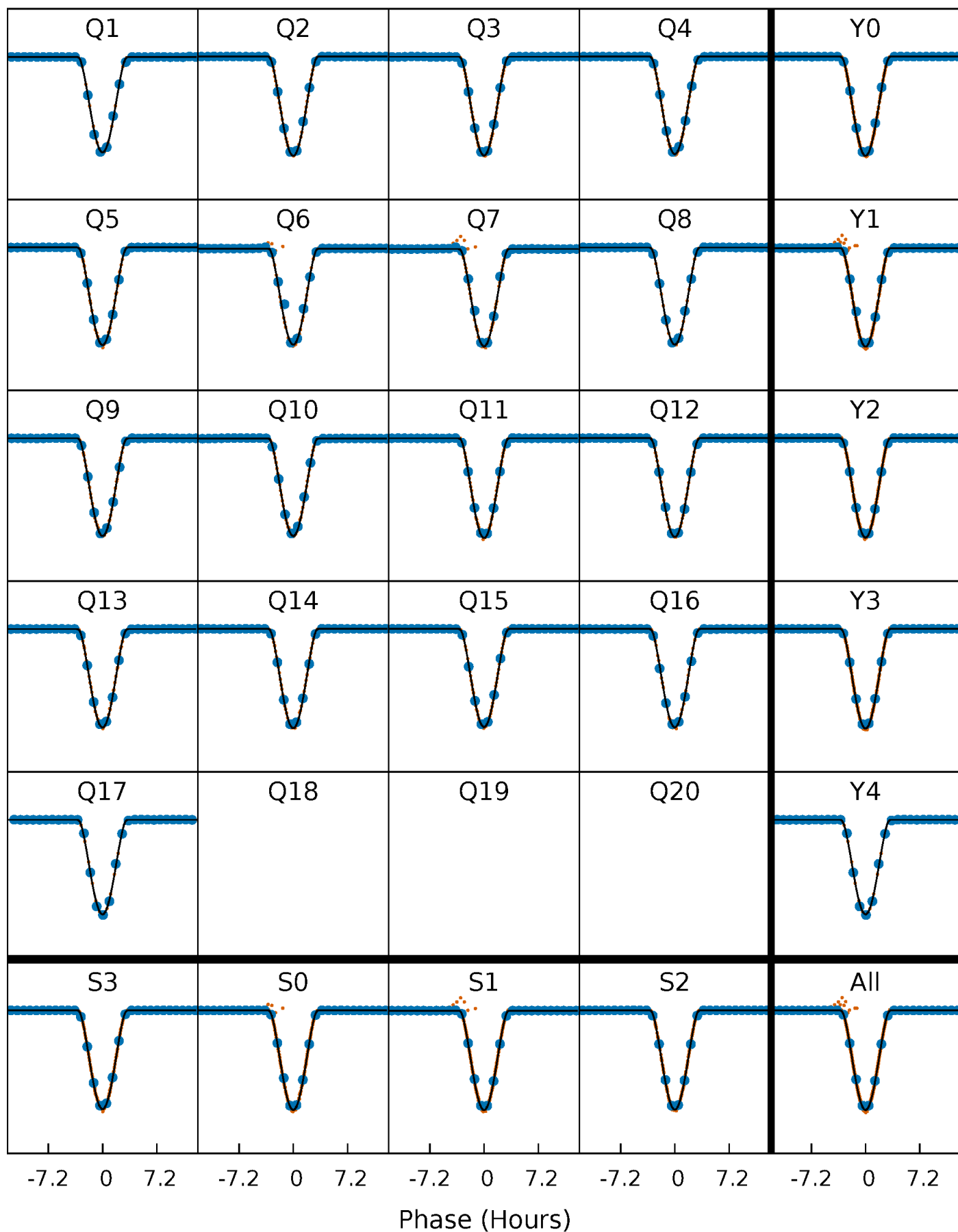
TCE 004252226-01 P= 21.858966 Days  $T_0=151.262730$  (BKJD)





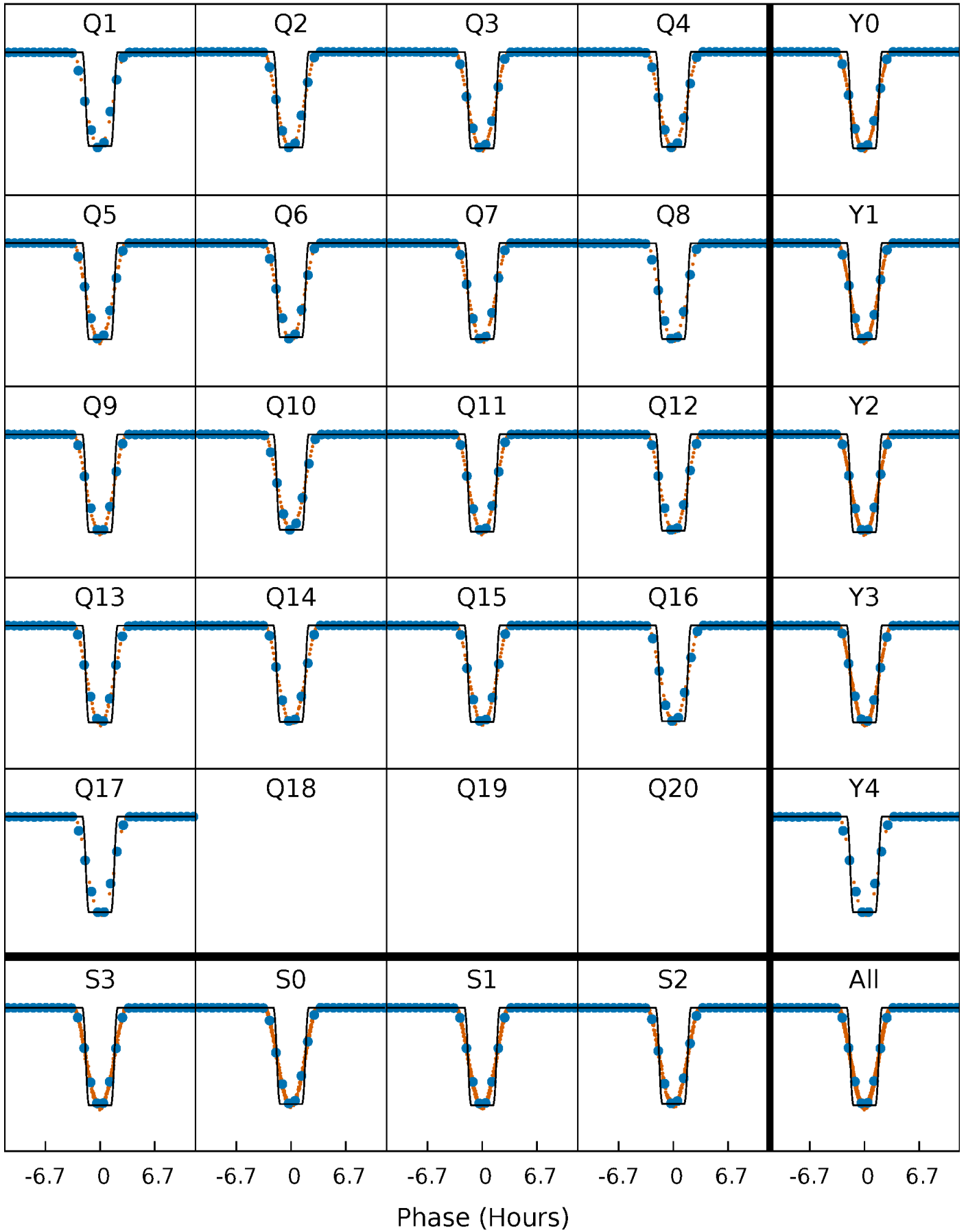
# DV Quarter-Phased Transit Curves

TCE 004252226-01 P= 21.858966 Days  $T_0=151.262730$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

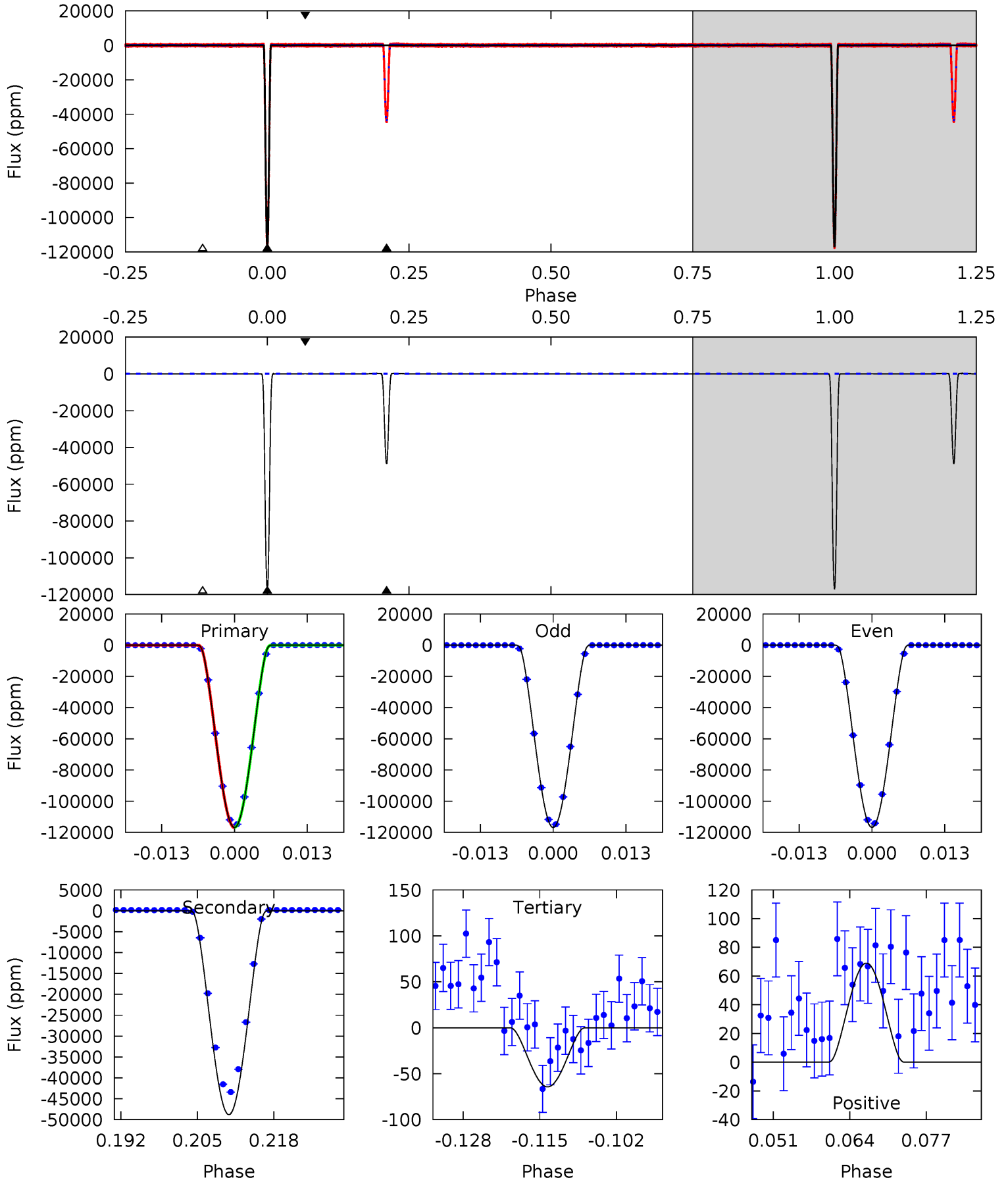
TCE 004252226-01 P= 21.858847 Days  $T_0=151.266524$  (BKJD)



# DV Model-Shift Uniqueness Test

004252226-01, P = 21.858966 Days, E = 129.403764 Days

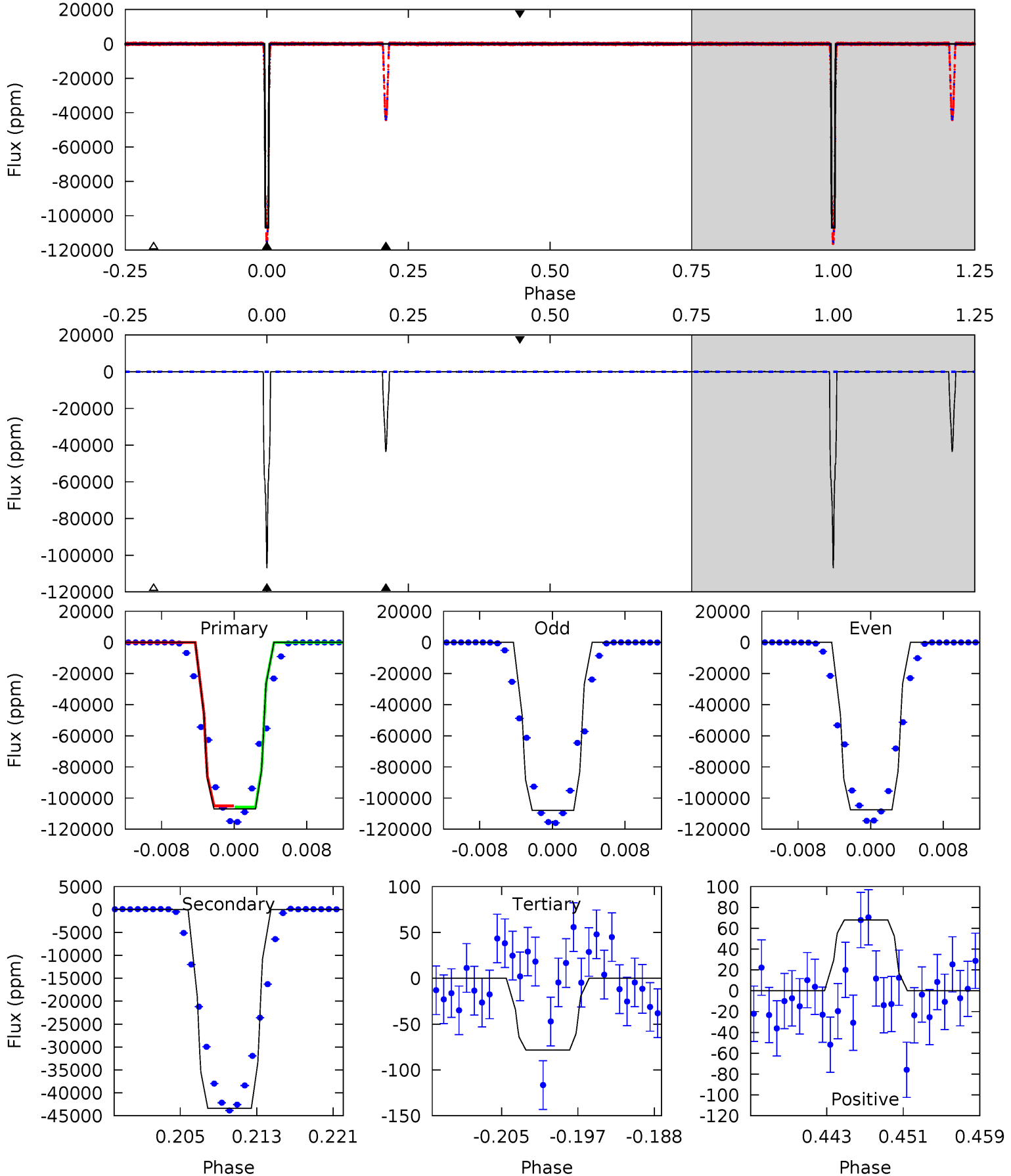
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12824	5358	7.06	7.58	4.98	2.49	5.16	12817	12817	5351	5350	3.25	0.97	0.00	0.56



# Alt Model-Shift Uniqueness Test

004252226-01, P = 21.858847 Days, E = 129.407677 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
5879	2383	4.31	3.73	5.06	2.64	1.18	5874	5875	2378	2379	13.0	1.00	0.00	0



### Stellar Parameters For KIC 004252226

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5923^{+178}_{-196}$	$3.904^{+0.456}_{-0.114}$	$0.080^{+0.250}_{-0.300}$	$2.060^{+0.407}_{-0.951}$	$1.242^{+0.178}_{-0.266}$	$0.200^{+0.854}_{-0.067}$
	+3%/-3%	+12%/-3%	+312%/-375%	+20%/-46%	+14%/-21%	+427%/-34%
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 004252226-01 / KOI 6396.01

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-48820 \pm 9$	$99.70^{+15.72}_{-25.99}$	$1257^{+91}_{-160}$	$4356^{+116}_{-121}$	$78^{+51}_{-18}$
Alt.	$-43343 \pm 18$	$72.76^{+11.83}_{-18.31}$	$1262^{+91}_{-155}$	$4813^{+149}_{-160}$	$129^{+81}_{-32}$

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

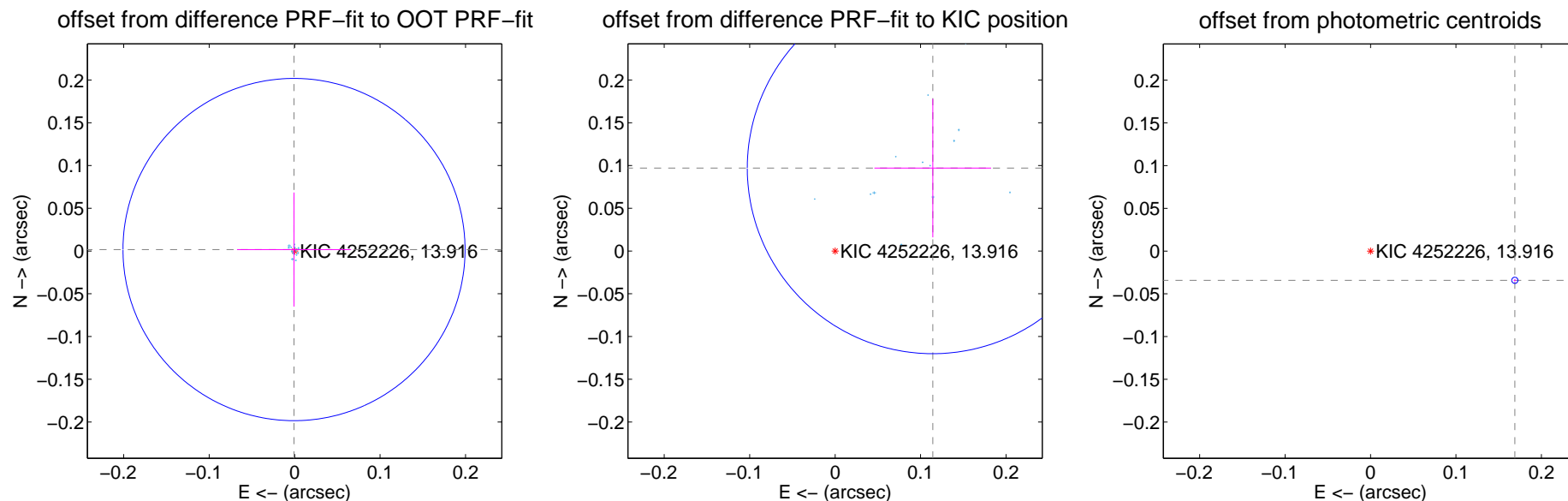
## DV Centroid Data

Supplemental centroid analysis for 004252226-01. Kepler magnitude: 13.92. Transit SNR 4569.96

There are 17 quarters with good PRF difference image offsets

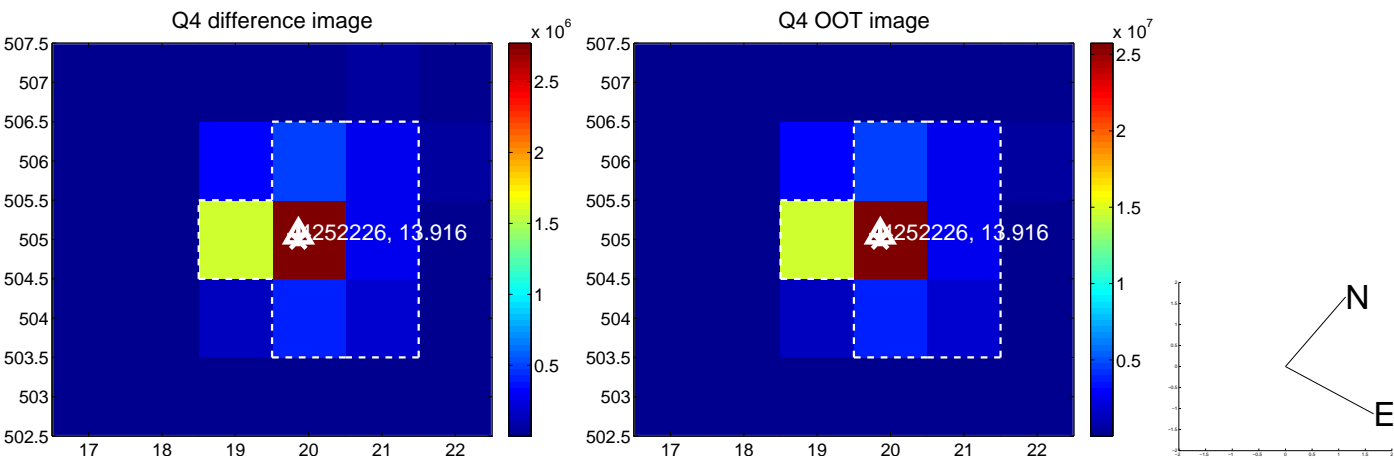
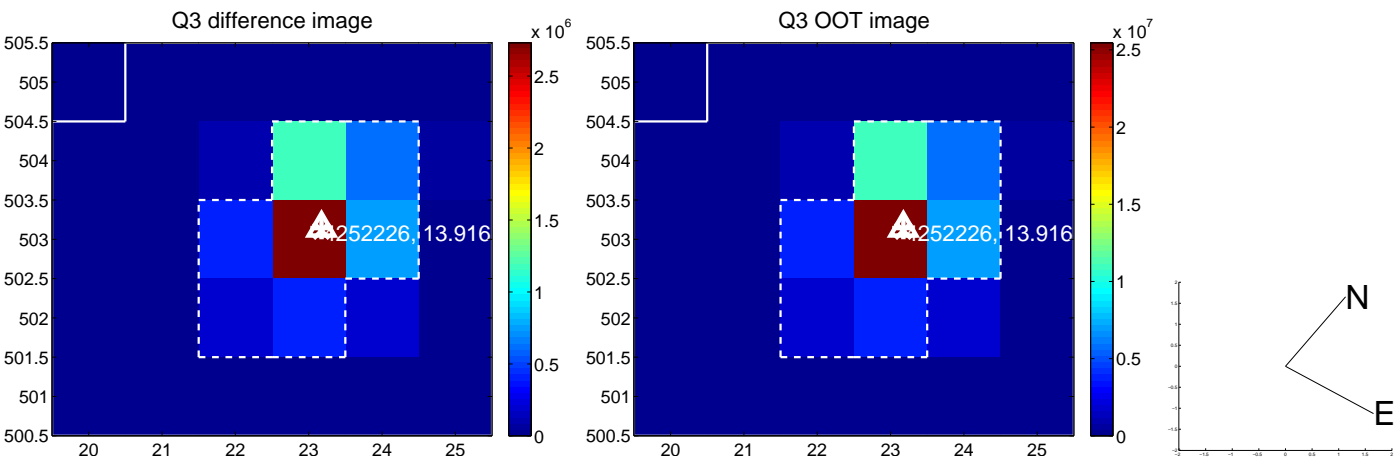
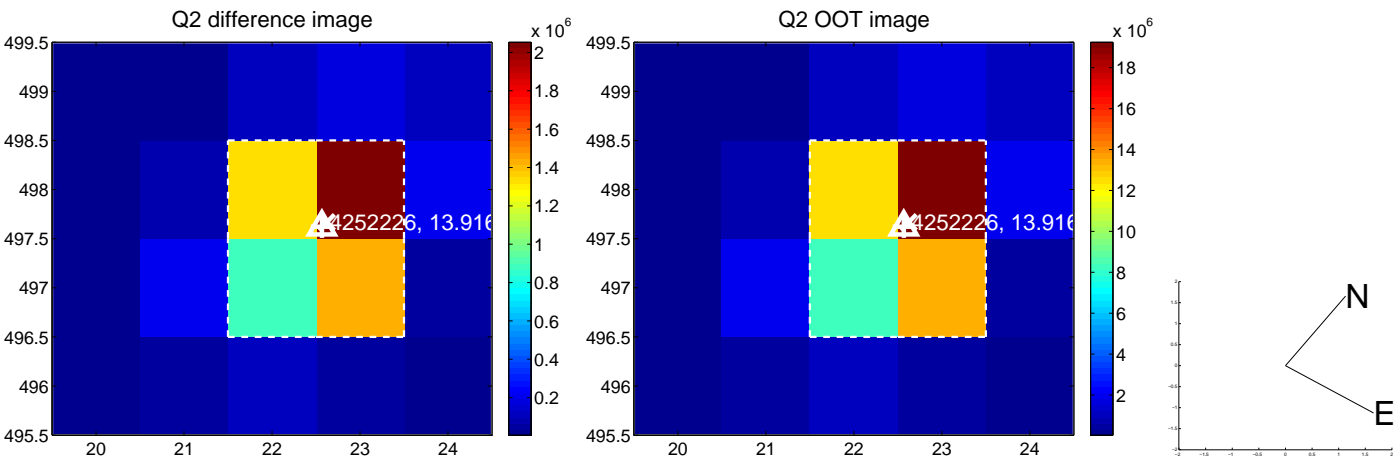
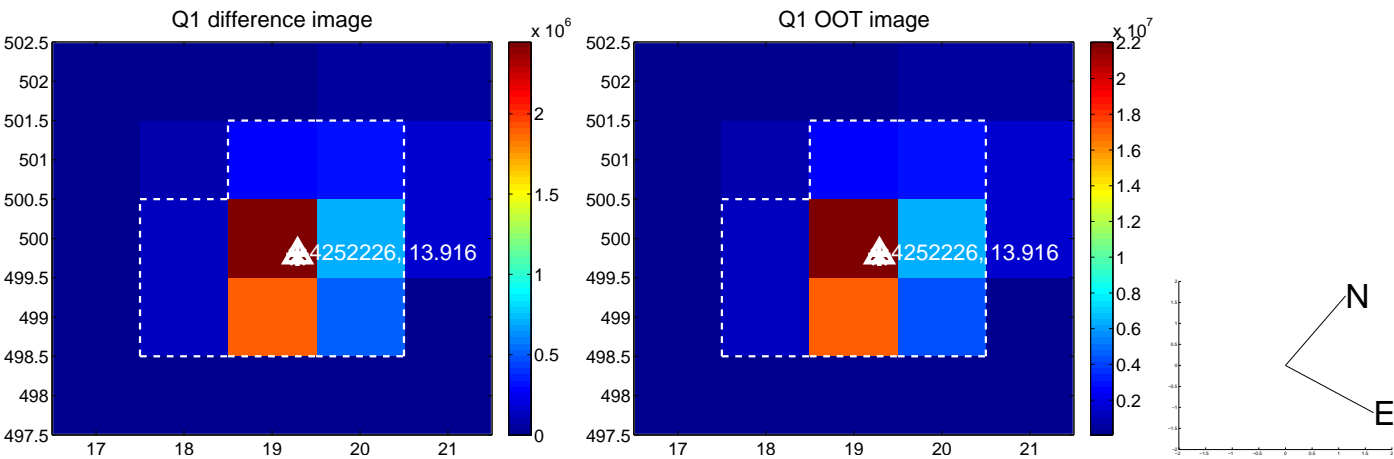
The direct PRF centroid is offset from the target star catalog position by about 0.14 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.002 \pm 0.067$	0.03	$0.001 \pm 0.067$	$0.002 \pm 0.067$
PRF-fit source offset from KIC position	$0.150 \pm 0.072$	2.07	$-0.114 \pm 0.068$	$0.097 \pm 0.081$
photometric centroid source offset	$0.17 \pm 0.00$	142.58	$-0.17 \pm 0.00$	$-0.03 \pm 0.00$

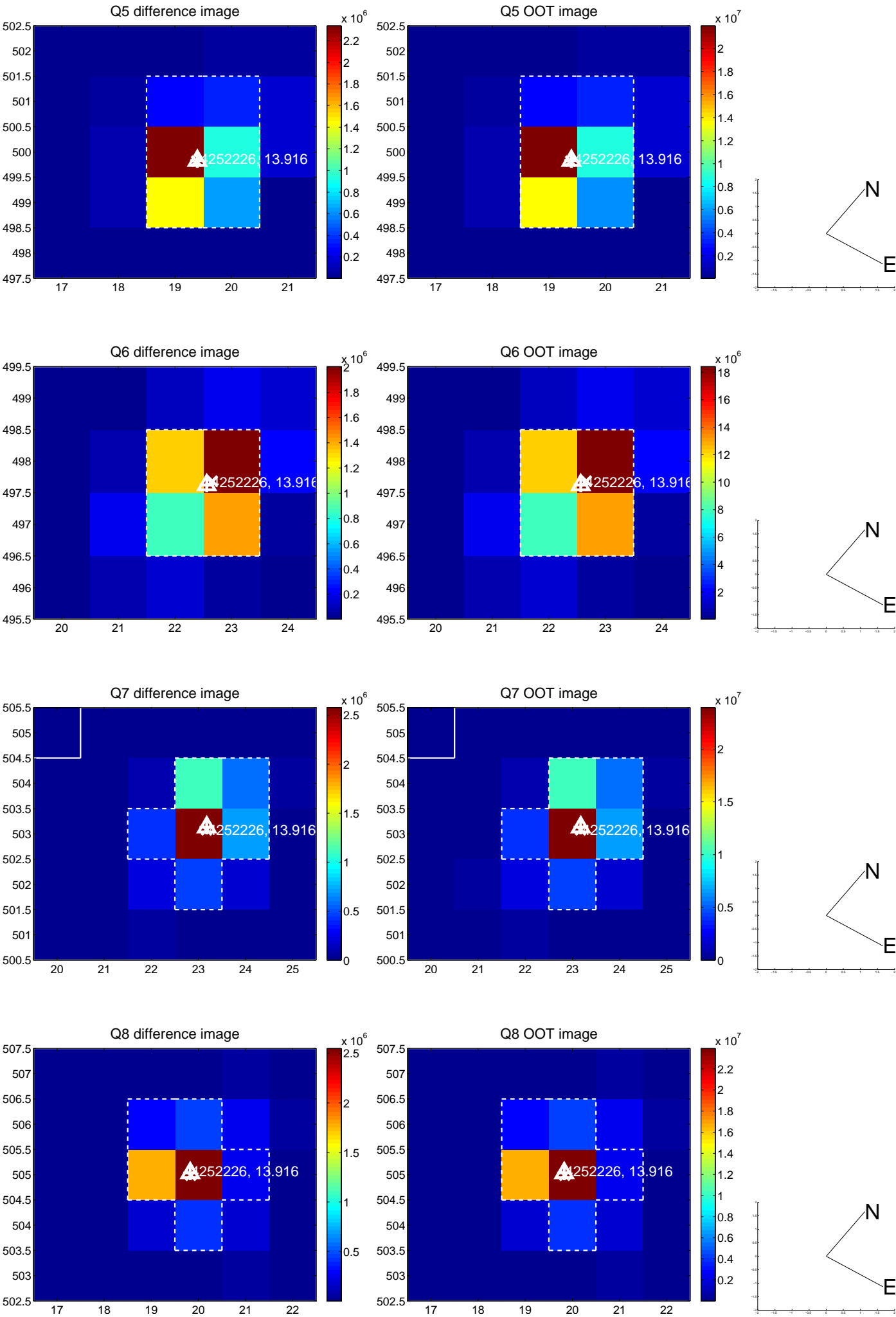


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

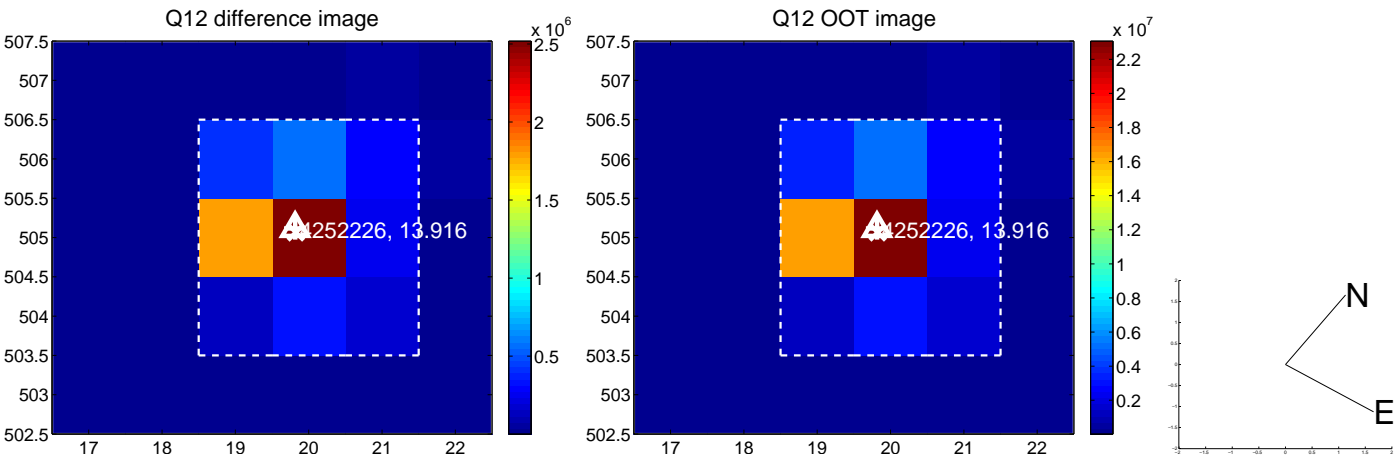
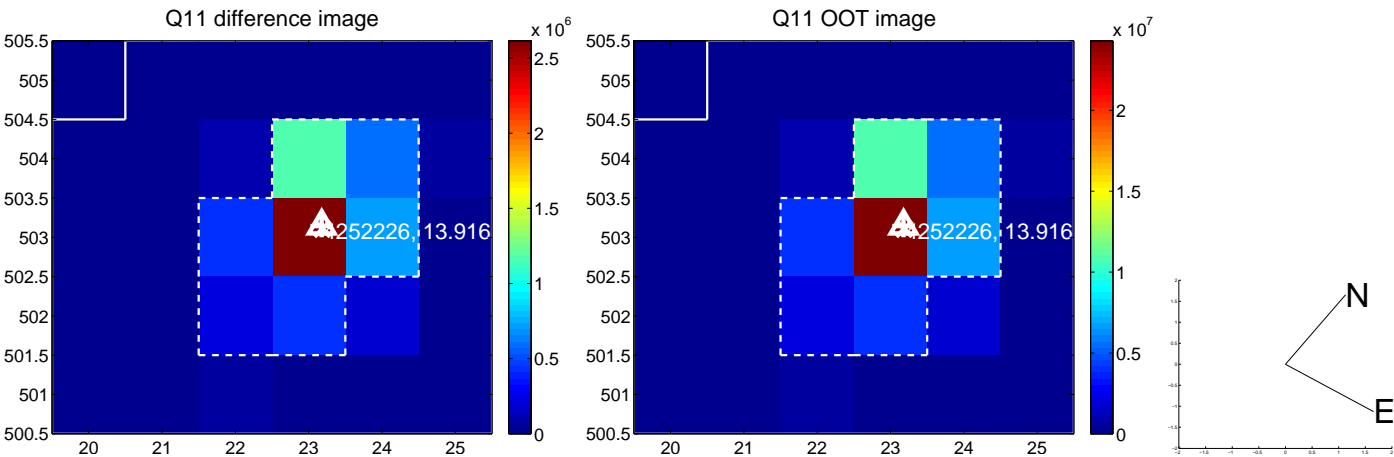
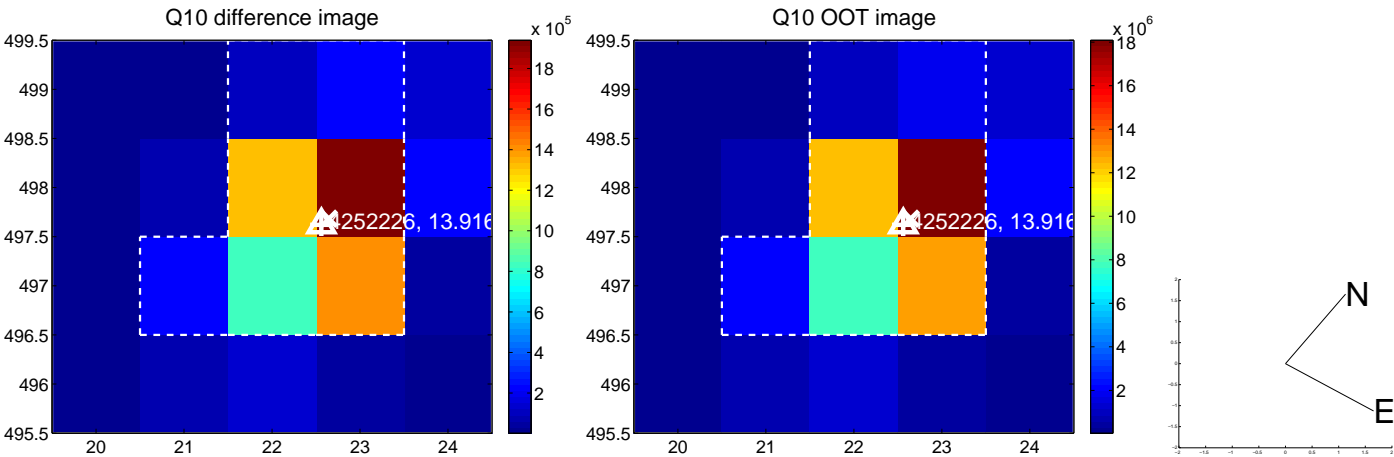
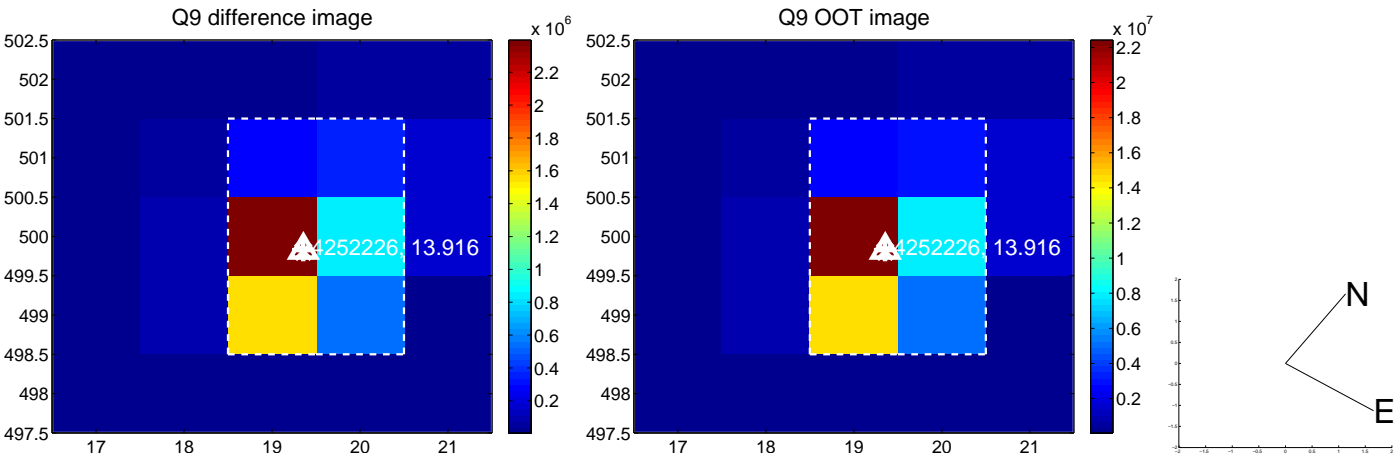


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

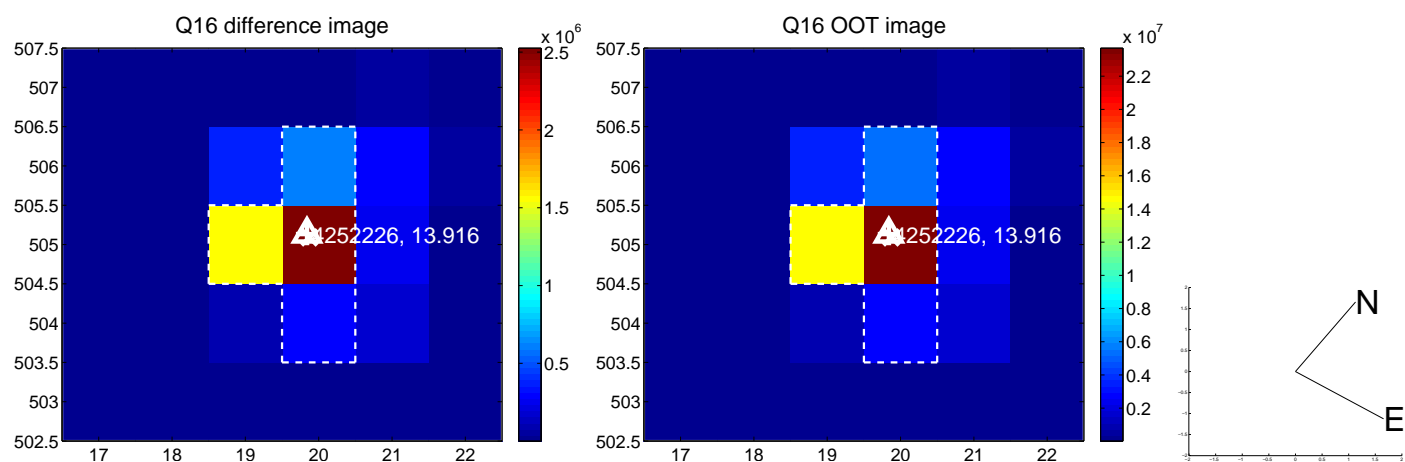
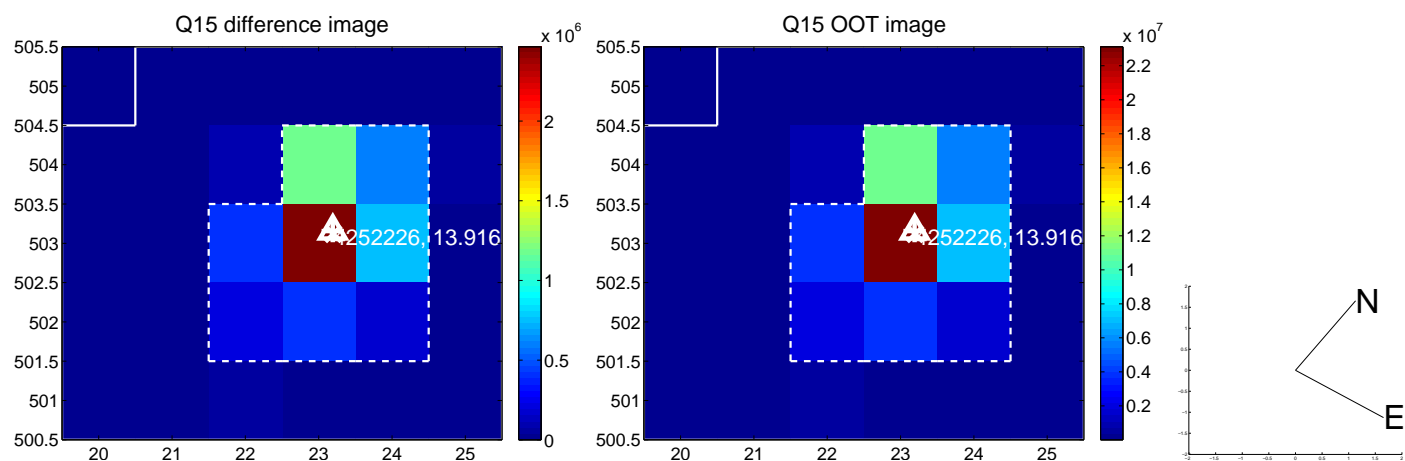
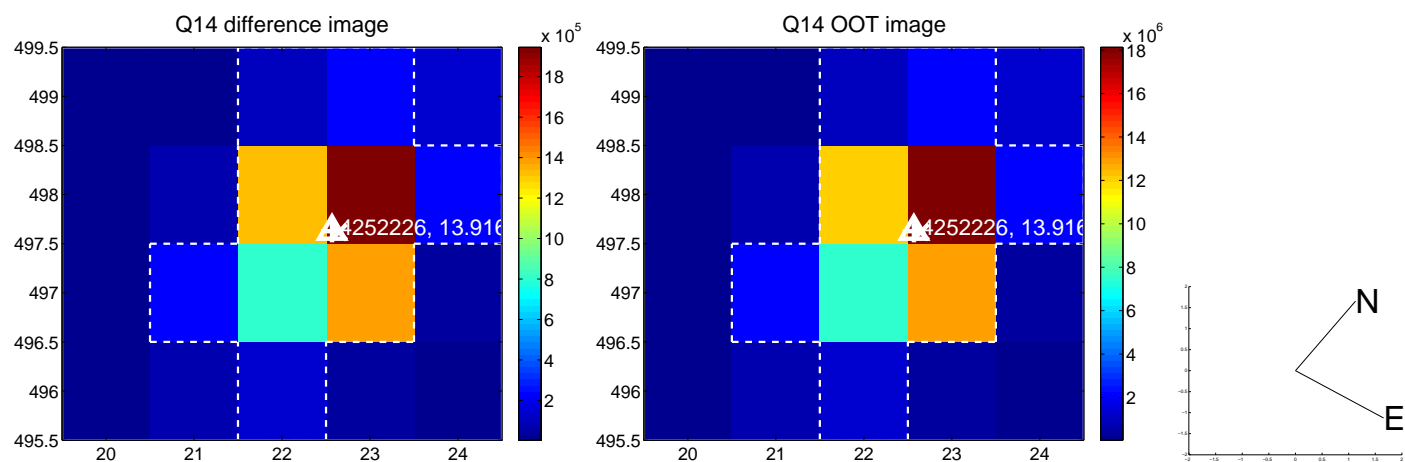
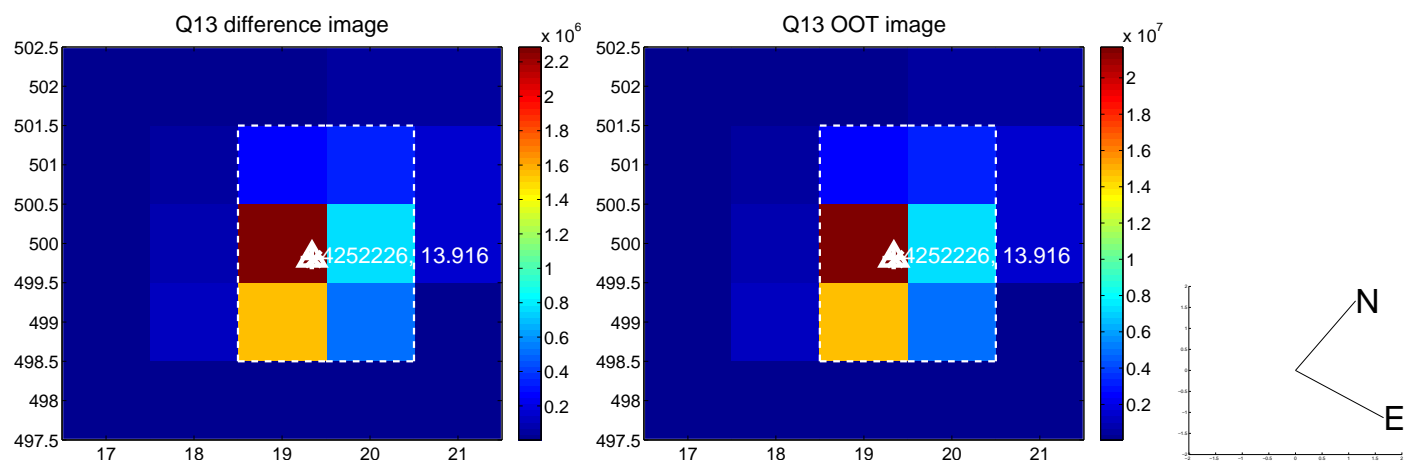




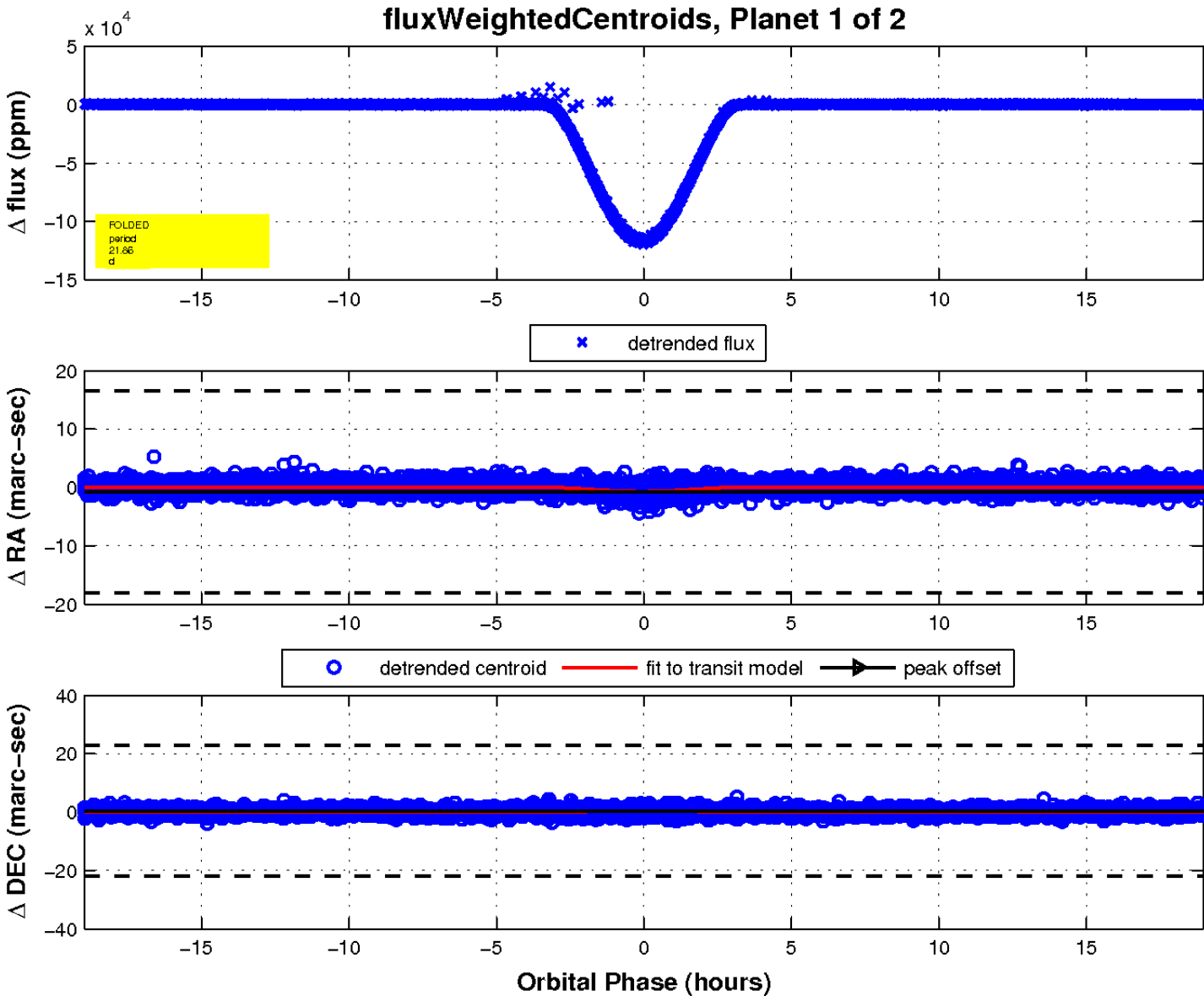
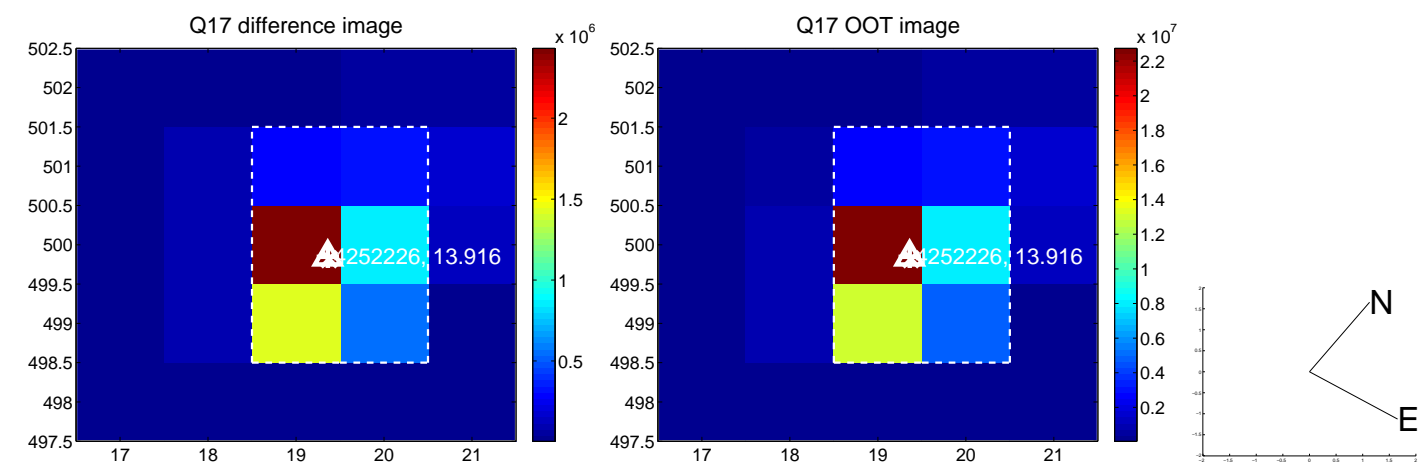
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



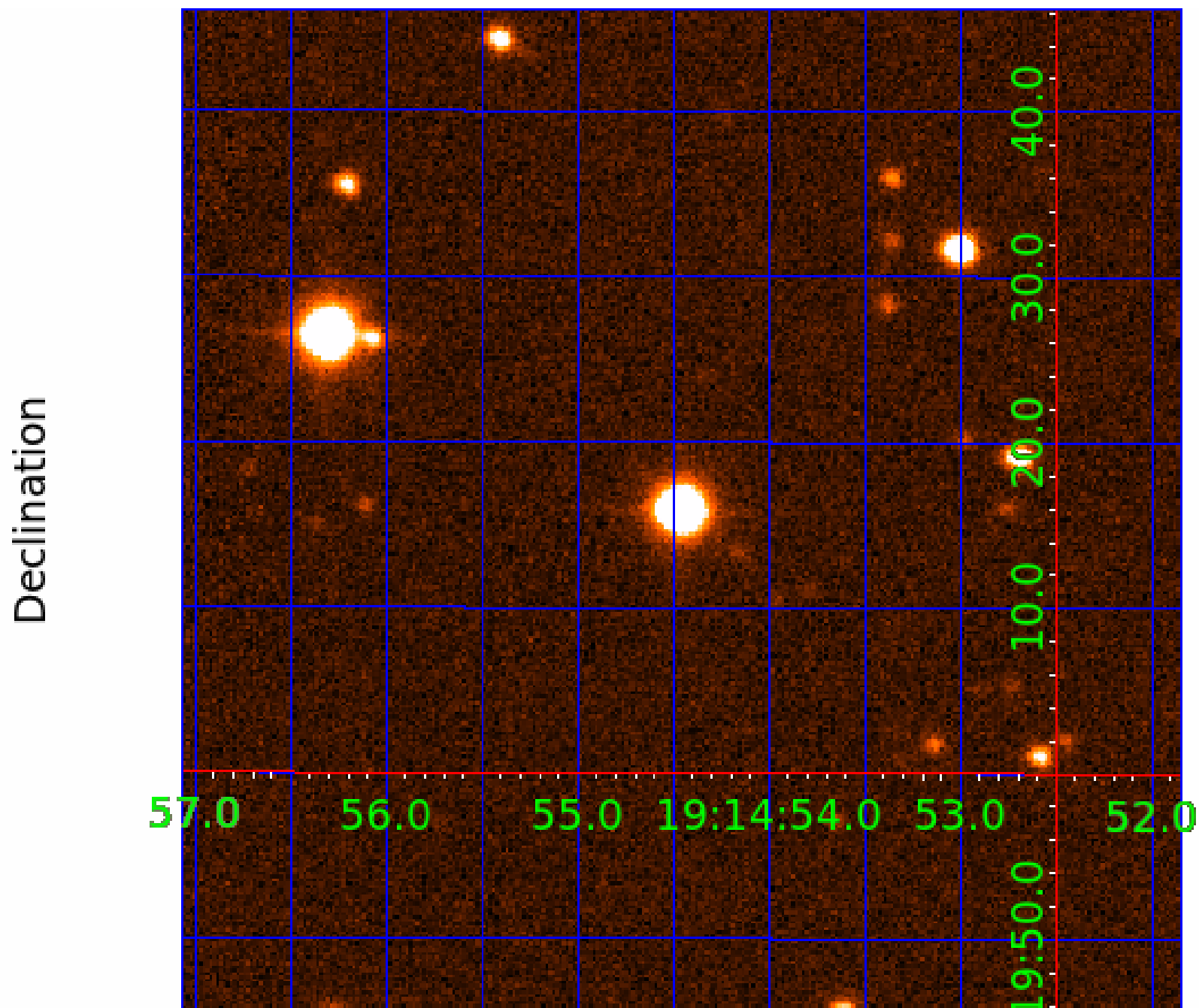
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image



# KIC 004252226

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004252226-01	OBS	6396.01	21.858966	151.262730	116997.8	6.324	5625.4	4570.0	2.06	5923	104.25	173.03
004252226-02	OBS	No	21.858950	134.000142	44319.8	6.136	2255.1	2098.7	2.06	5923	68.71	173.03

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004252226-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—DEEP_V_SHAPED—HAS_SEC_TCE
004252226-02	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.

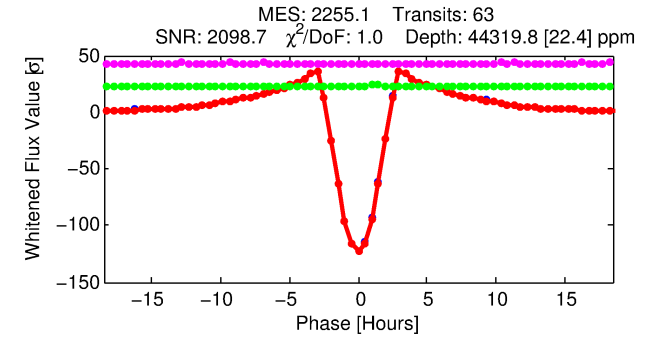
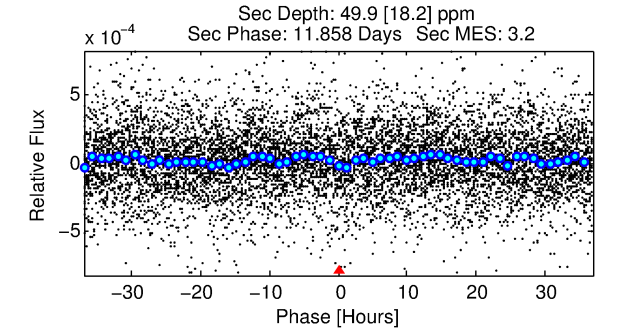
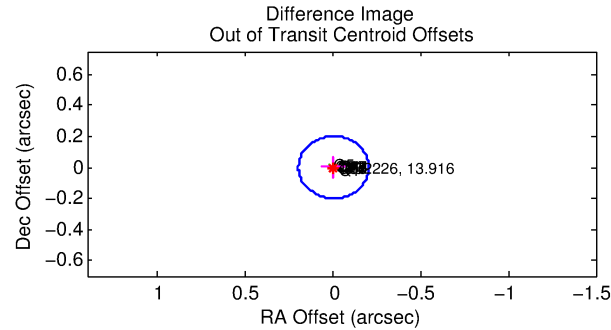
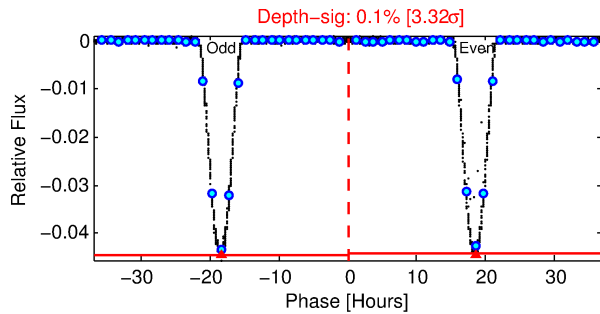
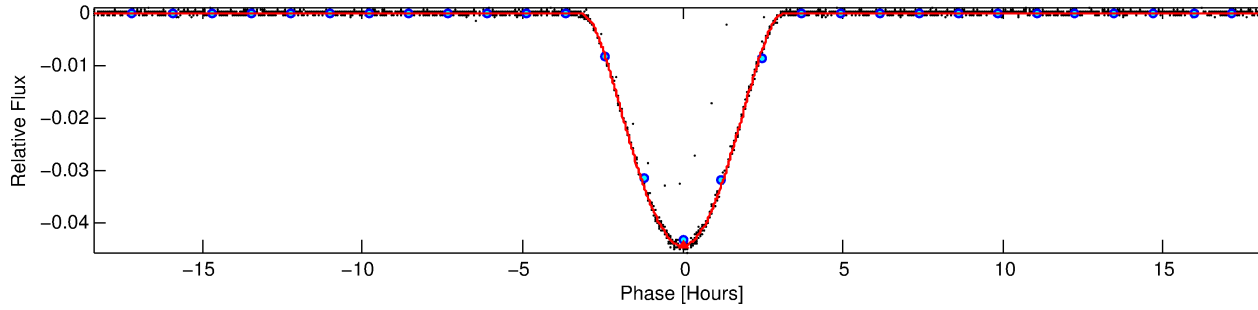
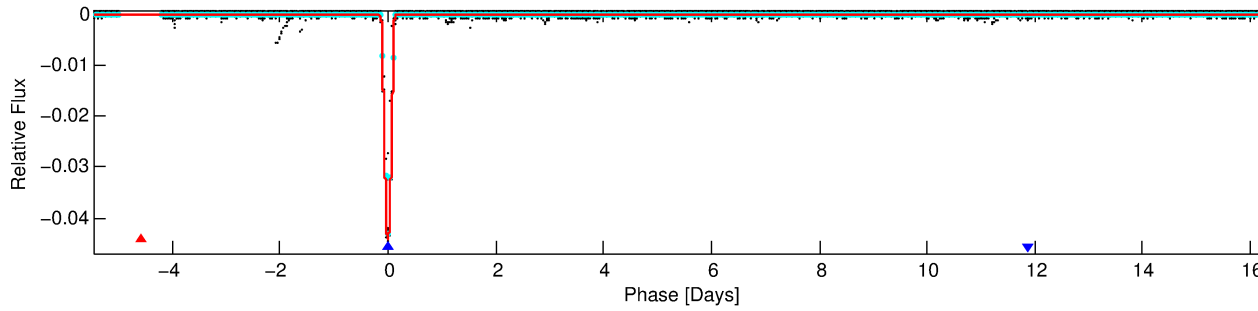
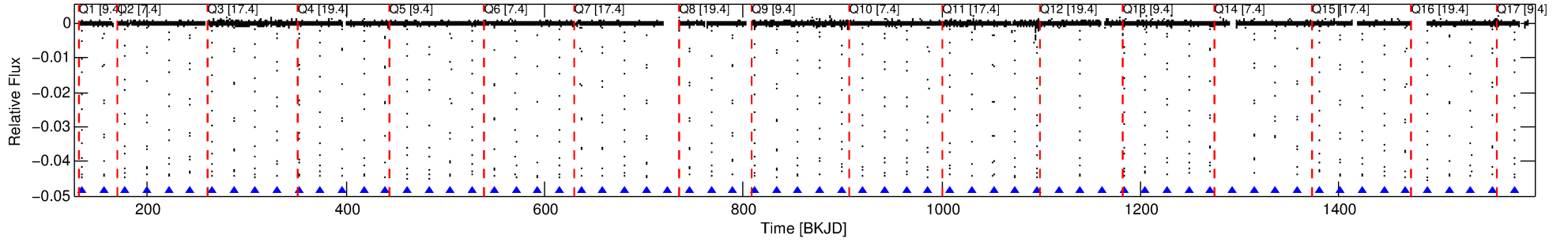
## Ephemeris Match Information For 004252226-02

No Significant Match Found

# DV One-Page Summary

KIC: 4252226 Candidate: 2 of 2 Period: 21.859 d  
KOI: K06396 Corr: No Ephemeris Match

Kp: 13.92 R\*: 2.06 Rs Teff: 5923.0 K Logg: 3.90 Fe/H: 0.080



## DV Fit Results:

Period = 21.85895 [0.00000] d  
Epoch = 134.0001 [0.0001] BKJD  
Rp/R\* = 0.3057 [0.0060]  
a/R\* = 24.05 [0.03]  
b = 0.96 [0.01]  
Seff = 173.03 [134.28]  
Teq = 925 [179] K  
Rp = 68.71 [31.75] Re  
a = 0.1644 [0.0766] AU  
Ag = 0.16 [0.13] [-6.32σ]  
Teffp = 900 [88] K [-0.12σ]

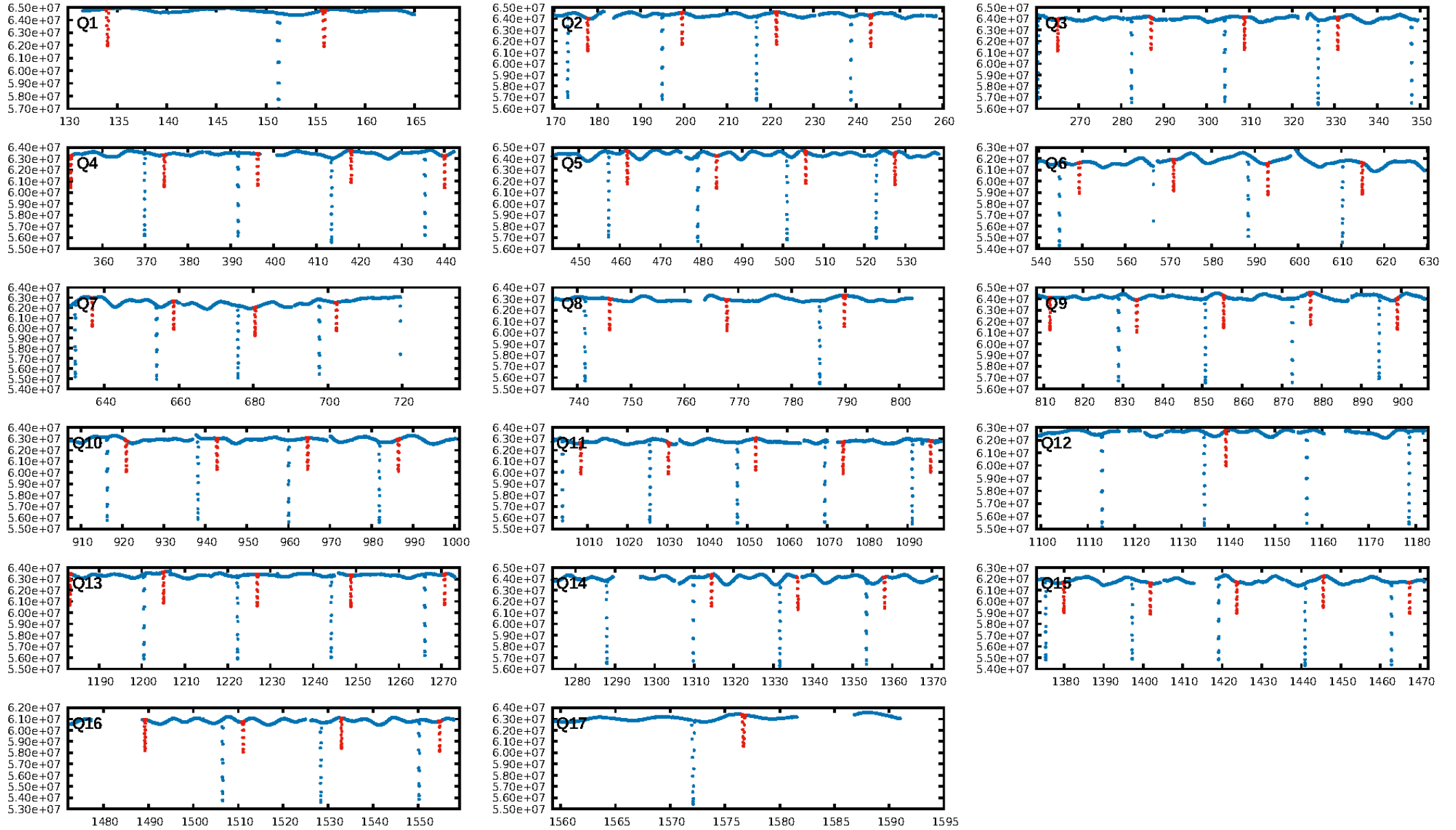
## DV Diagnostic Results:

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 [60/60]  
GhostDiagnostic-chr: 2.963  
Centroid-sig: 0.0%  
Centroid-so: 0.176 arcsec [57.40σ]  
OotOffset-rm: 0.004 arcsec [0.06σ]  
KicOffset-rm: 0.146 arcsec [2.02σ]  
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]

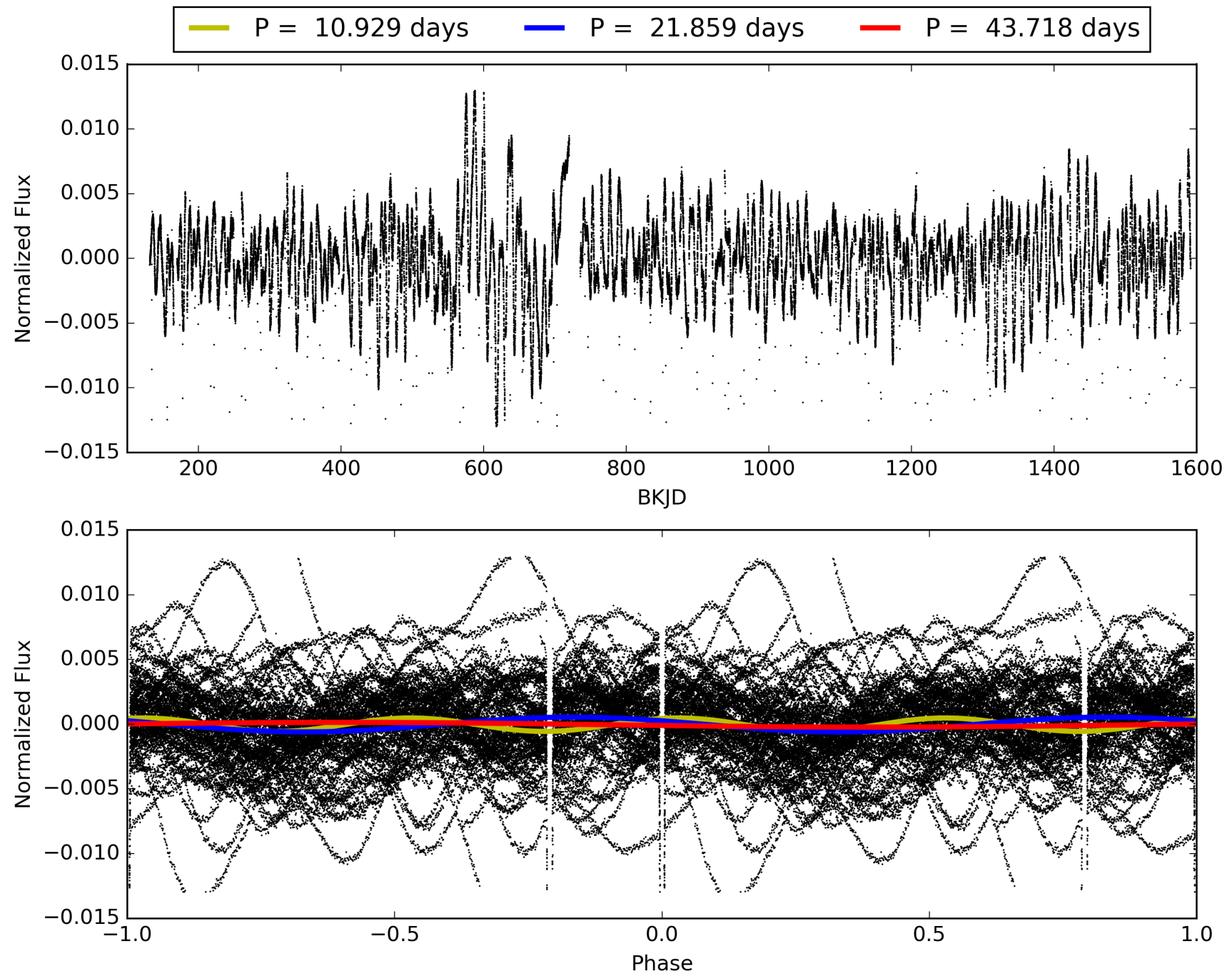
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 09:35:38 Z

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

# TCE 004252226-02, PDC Light Curves



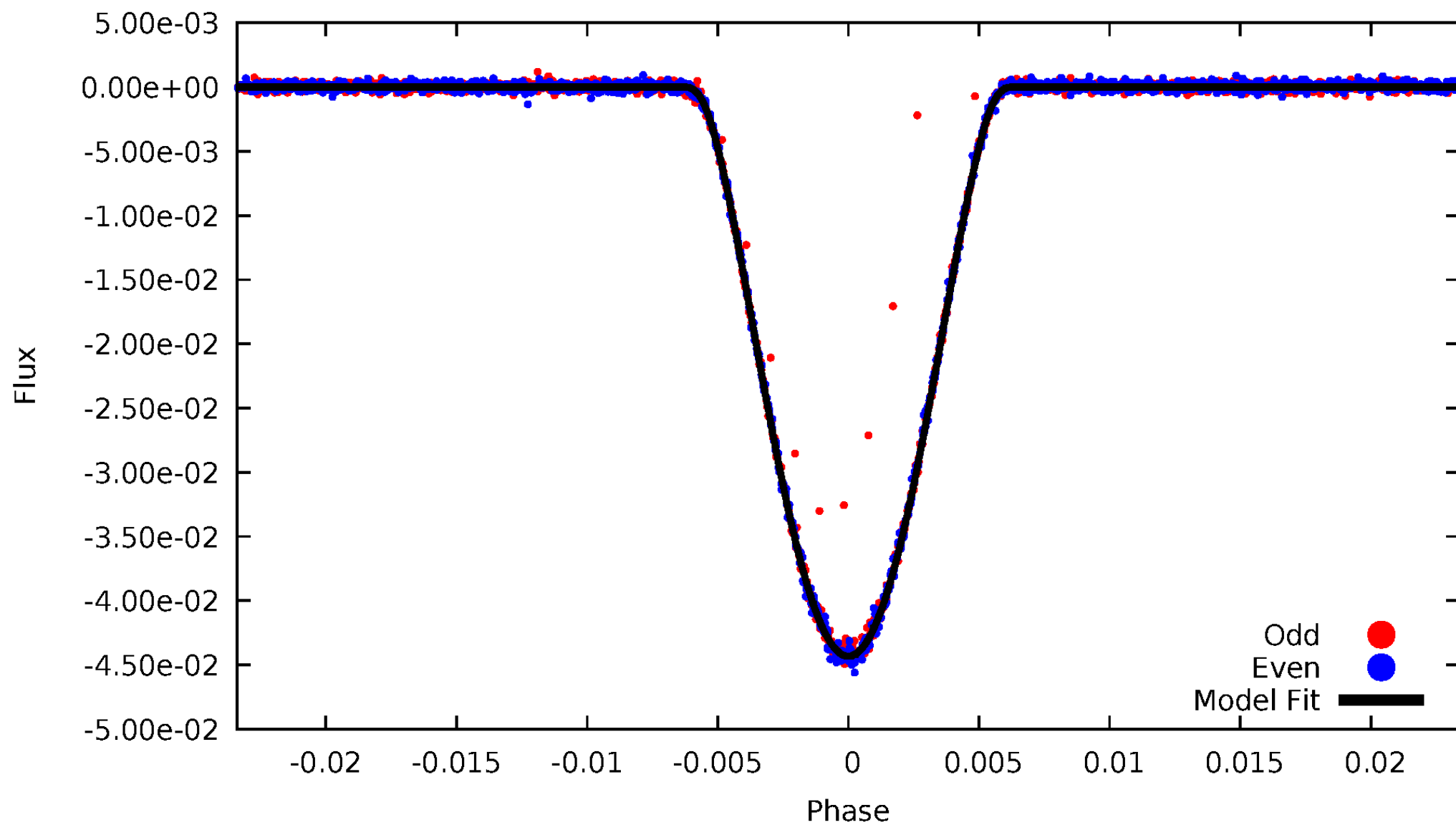
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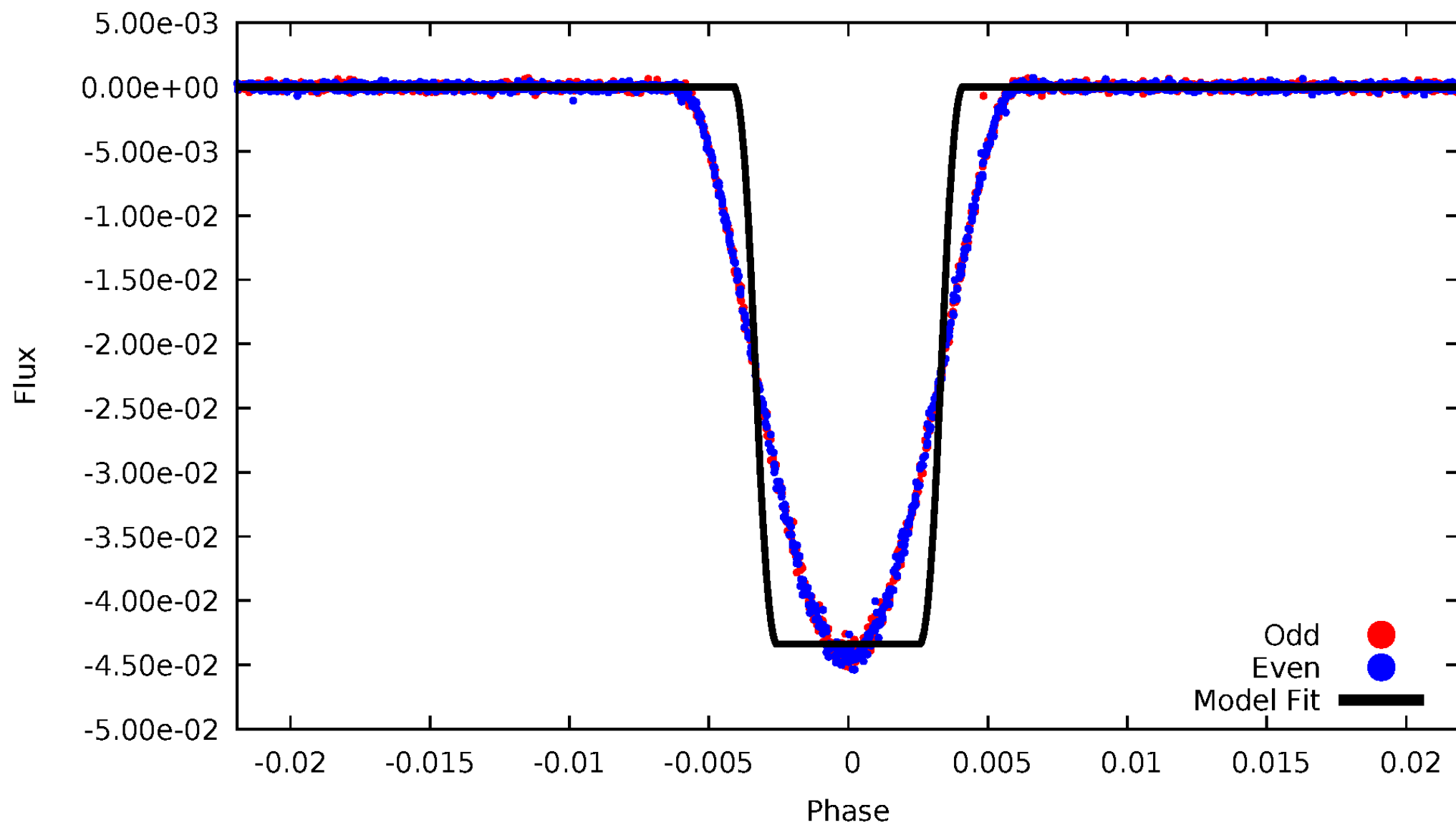
# DV Odd/Even

TCE 004252226-02



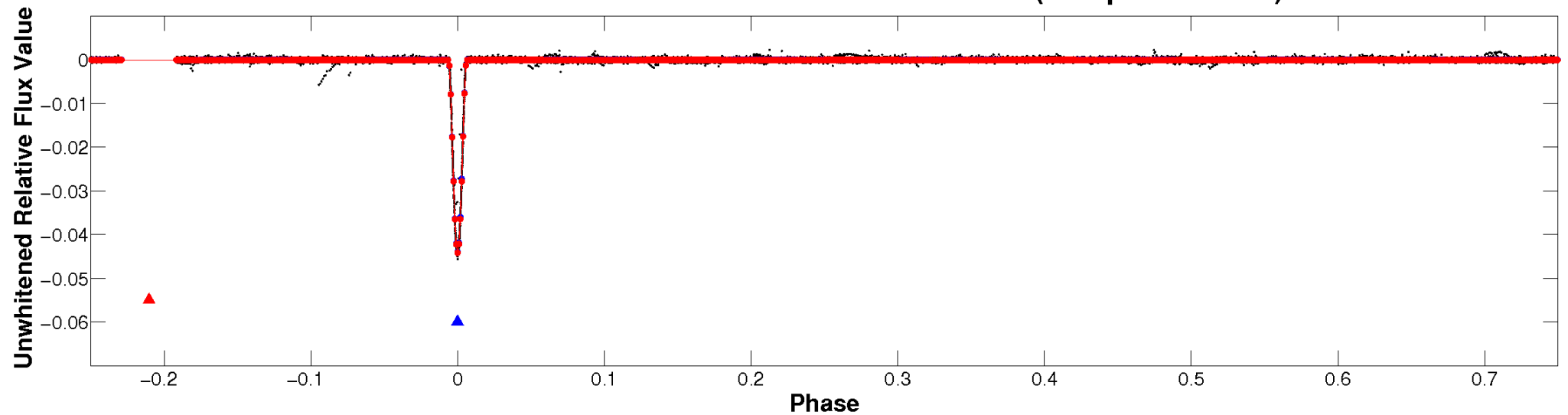
# ALT Odd/Even

TCE 004252226-02

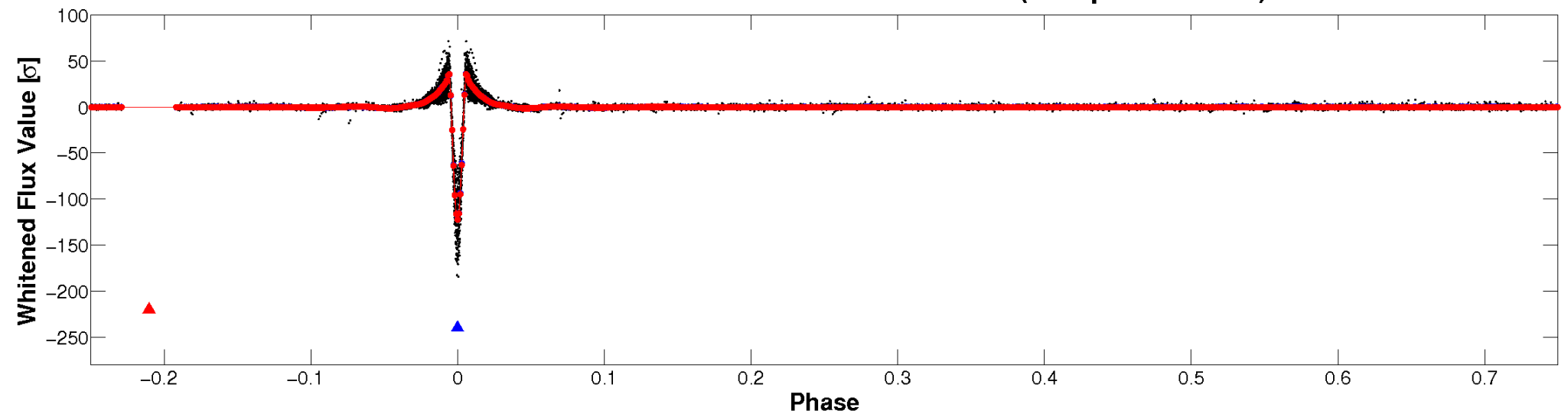


# Non-Whitened Vs. Whitened Light Curve

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

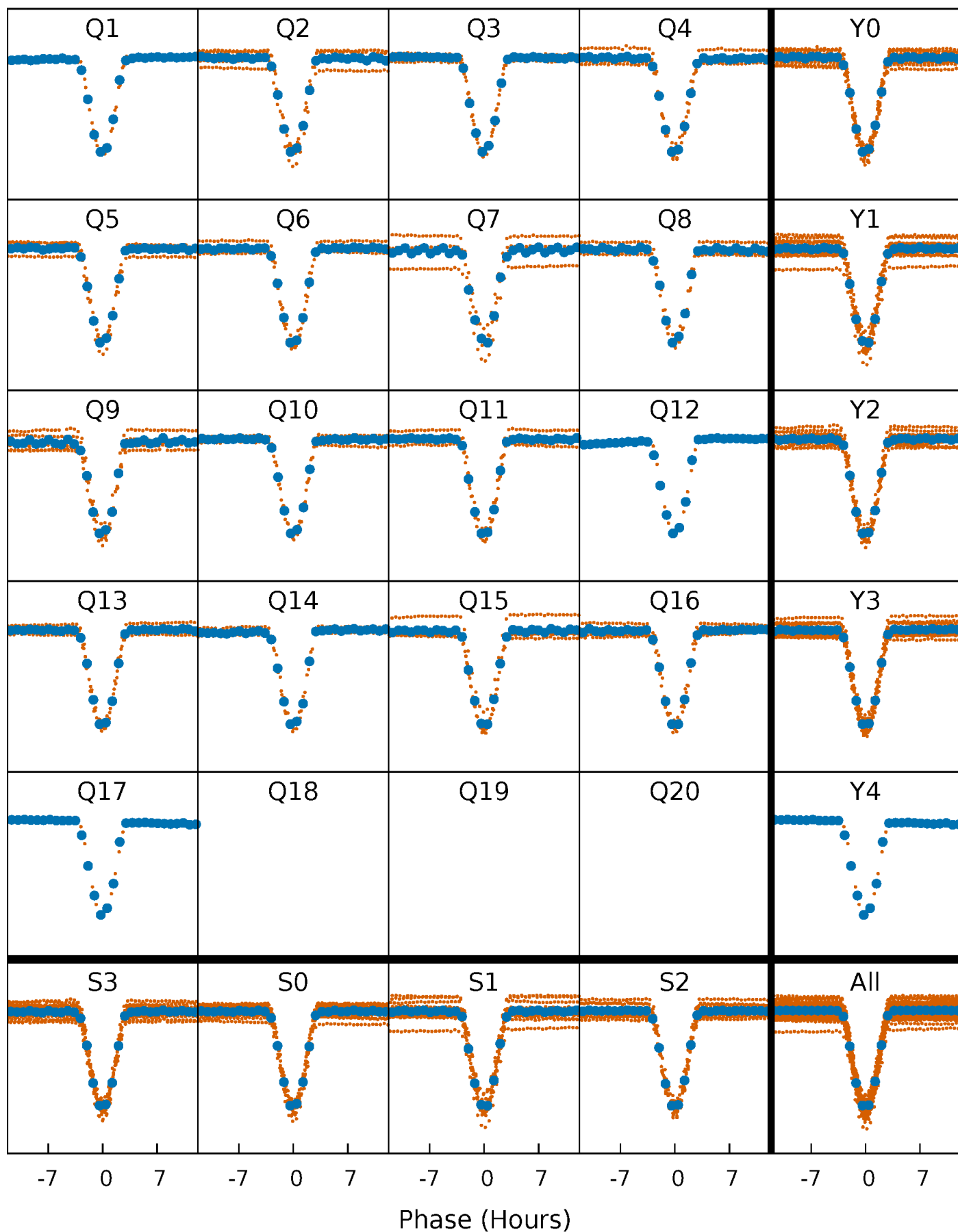


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



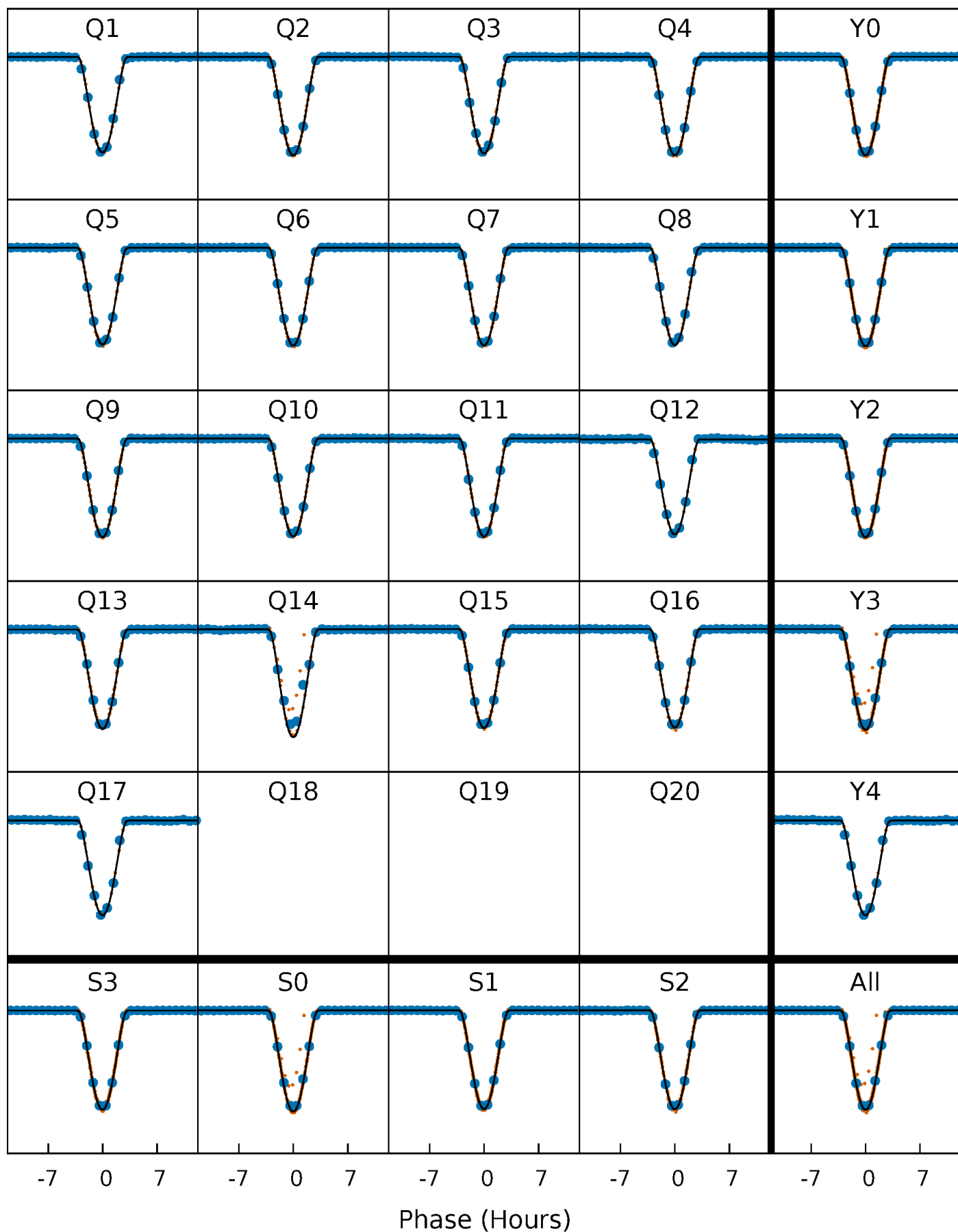
# PDC Quarter-Phased Transit Curves

TCE 004252226-02 P= 21.858950 Days  $T_0=134.000142$  (BKJD)



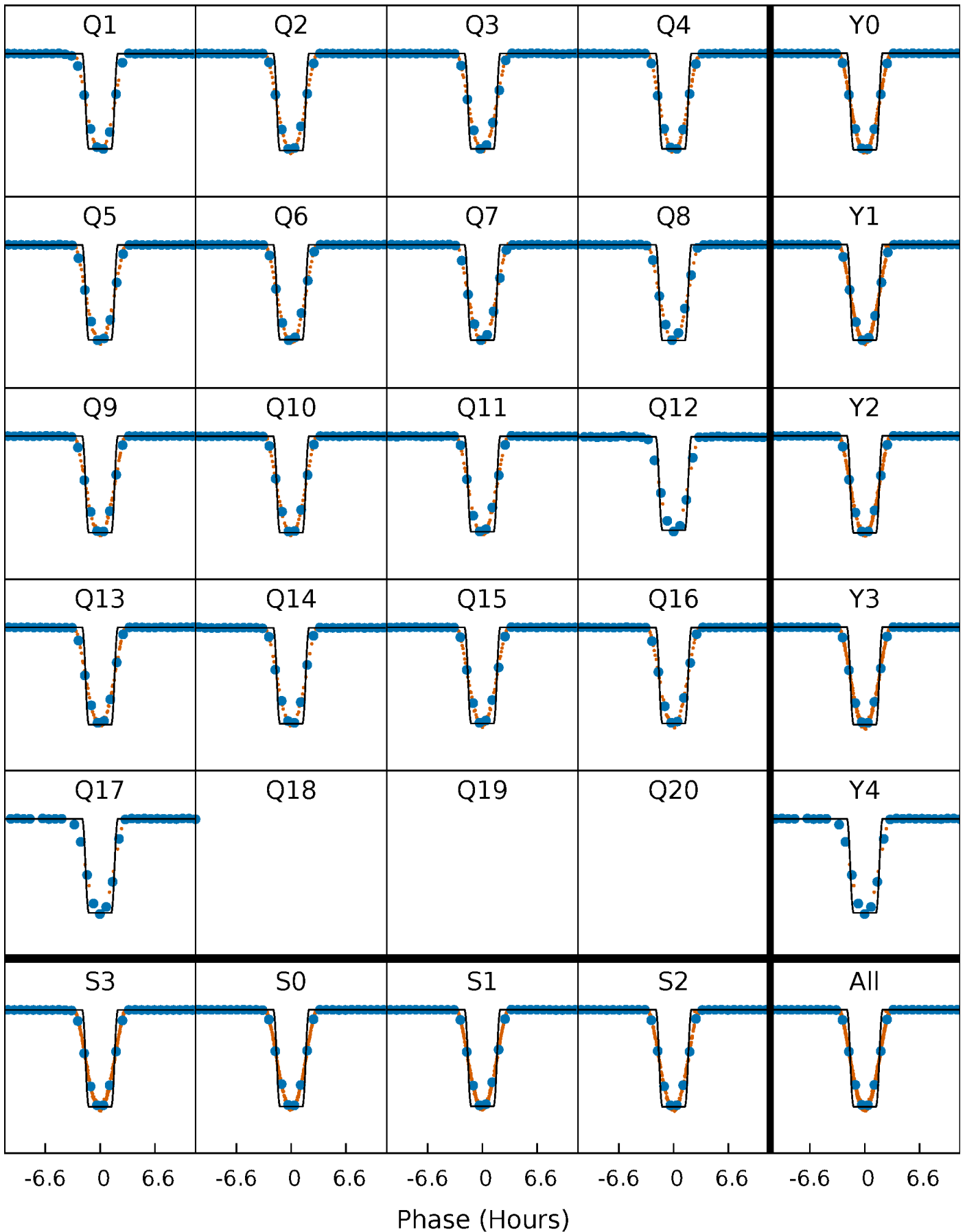
# DV Quarter-Phased Transit Curves

TCE 004252226-02 P= 21.858950 Days  $T_0=134.000142$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

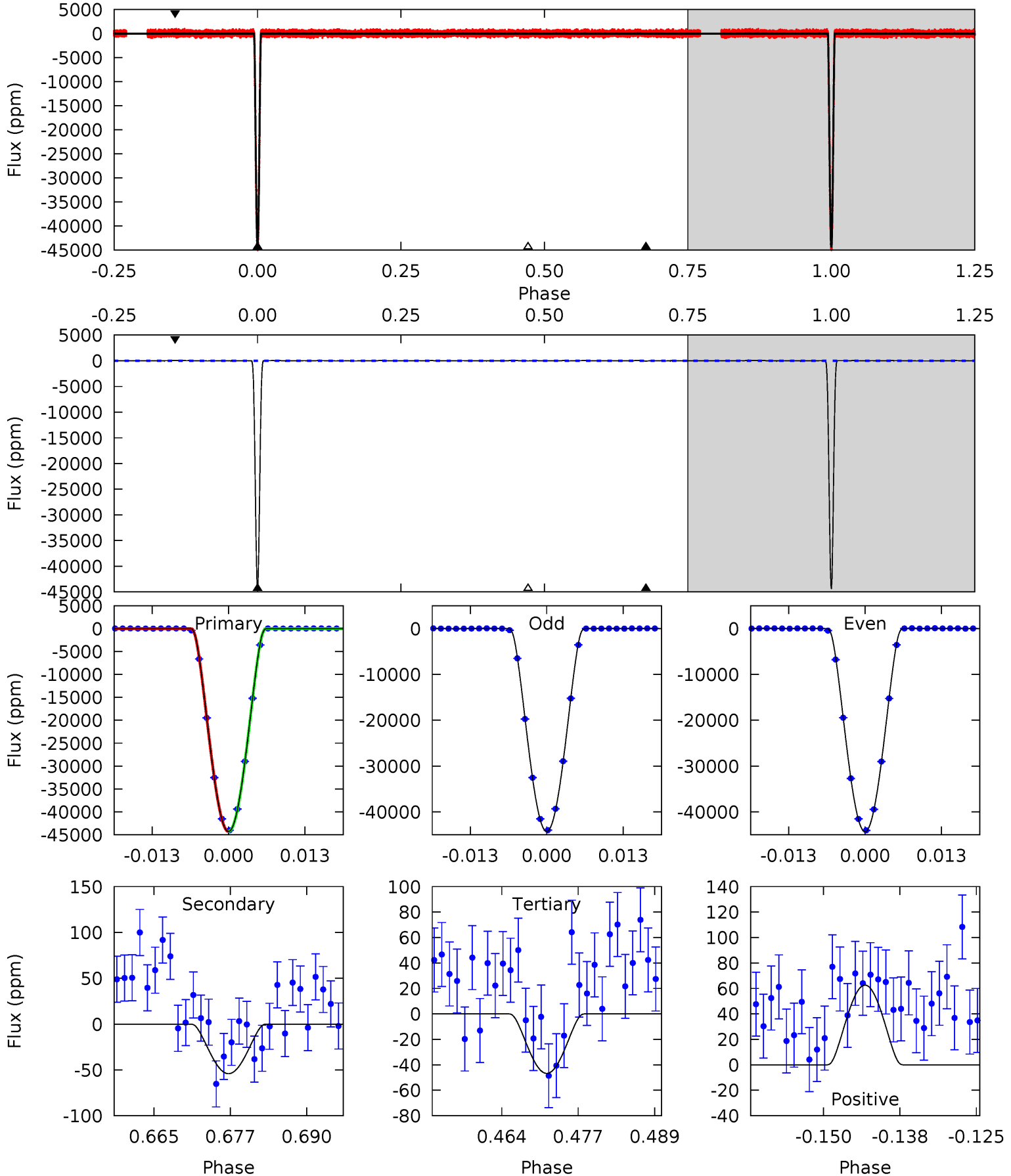
TCE 004252226-02   P= 21.858966 Days    $T_0=133.999529$  (BKJD)



# DV Model-Shift Uniqueness Test

004252226-02, P = 21.858950 Days, E = 112.141192 Days

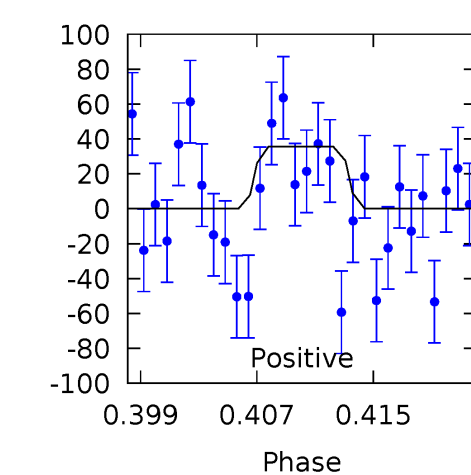
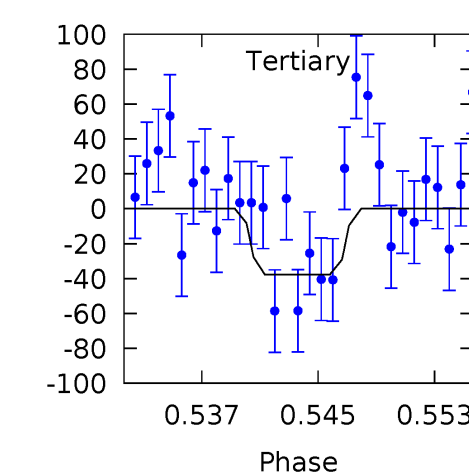
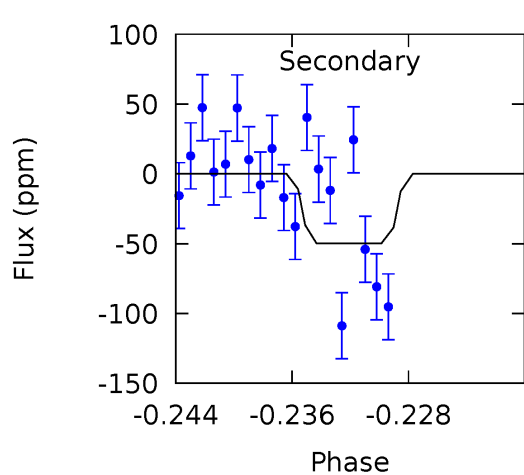
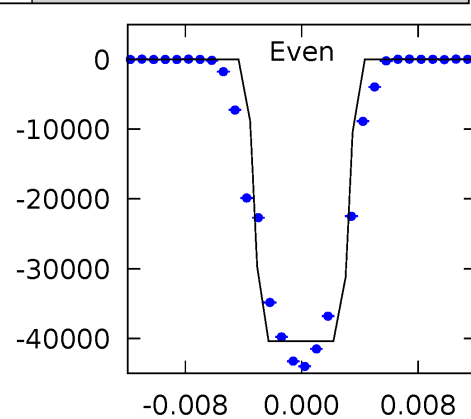
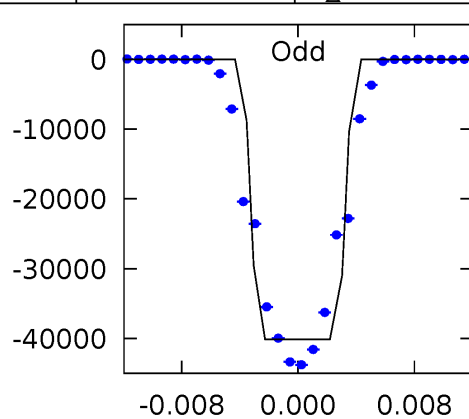
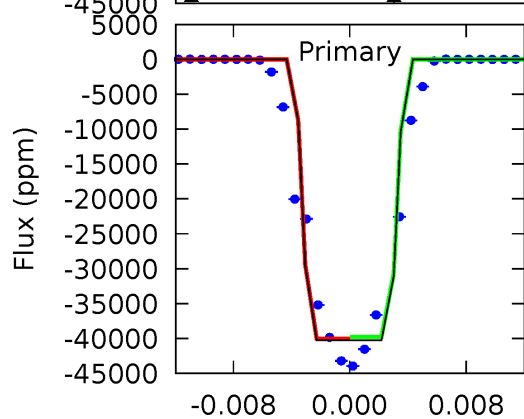
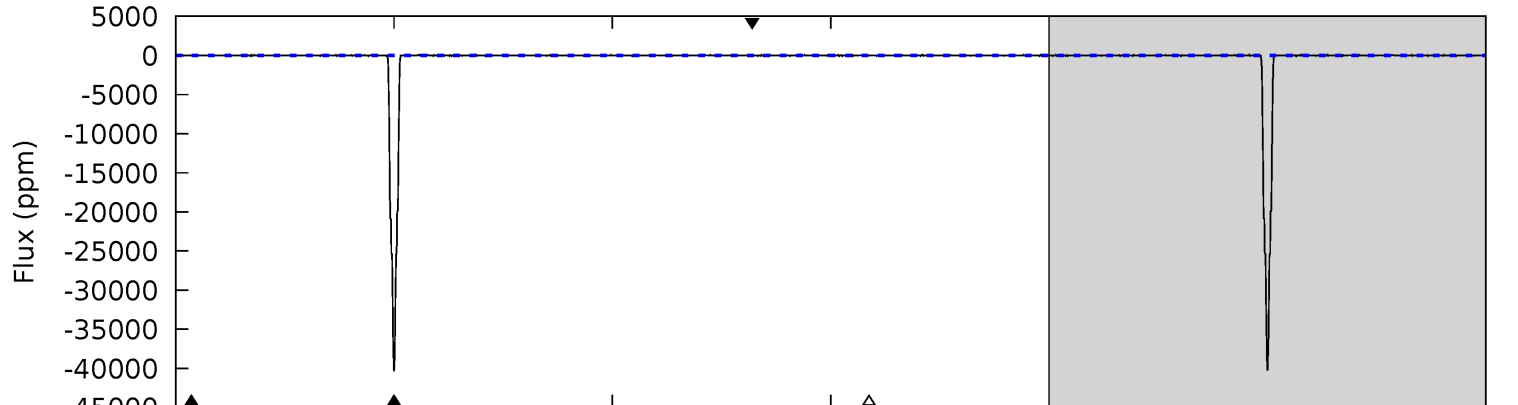
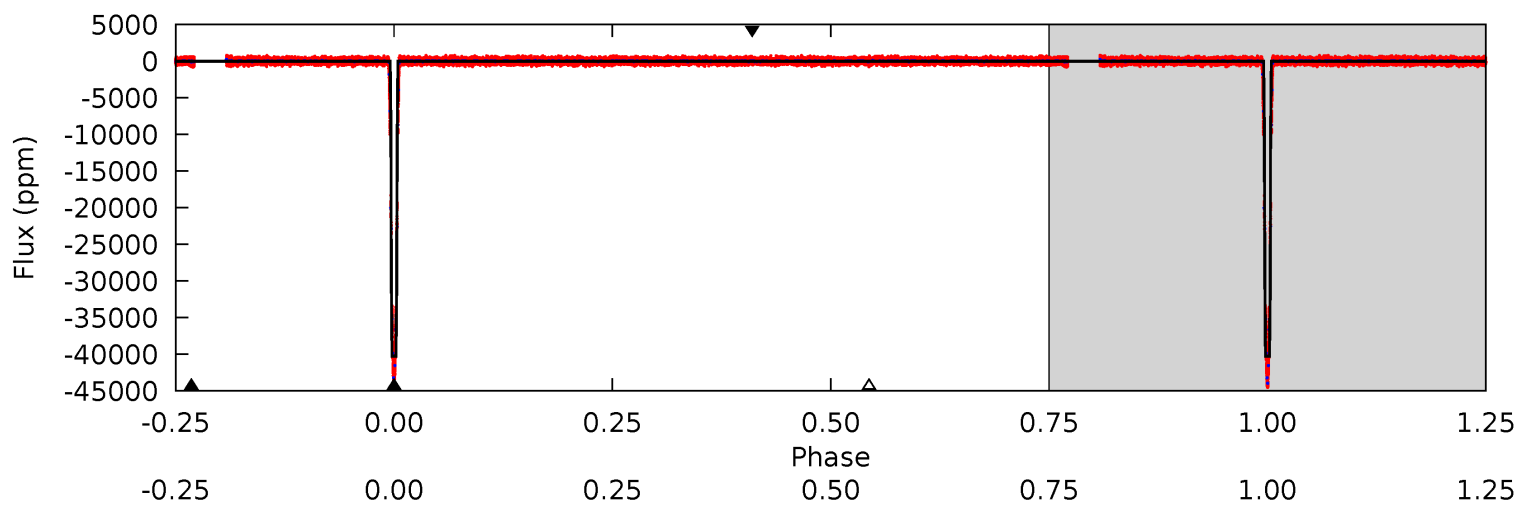
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5384	6.58	5.68	7.61	4.98	2.50	2.62	5378	5376	0.90	-1.04	2.62	0.99	0.00	0.89



# Alt Model-Shift Uniqueness Test

004252226-02, P = 21.858966 Days, E = 112.140563 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
3756	4.65	3.53	3.32	5.07	2.65	1.09	3753	3753	1.12	1.33	12.4	1.00	0.00	9.88





### Stellar Parameters For KIC 004252226

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5923^{+178}_{-196}$	$3.904^{+0.456}_{-0.114}$	$0.080^{+0.250}_{-0.300}$	$2.060^{+0.407}_{-0.951}$	$1.242^{+0.178}_{-0.266}$	$0.200^{+0.854}_{-0.067}$
	+3%/-3%	+12%/-3%	+312%/-375%	+20%/-46%	+14%/-21%	+427%/-34%
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 004252226-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-54 \pm 8$	$66.34^{+9.25}_{-16.26}$	$1259^{+92}_{-153}$	$-1844^{+3266}_{-115}$	$0.188^{+0.122}_{-0.051}$
Alt.	$-50 \pm 11$	$45.45^{+6.11}_{-11.07}$	$1257^{+100}_{-153}$	$1776^{+178}_{-3487}$	$0.377^{+0.223}_{-0.120}$

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

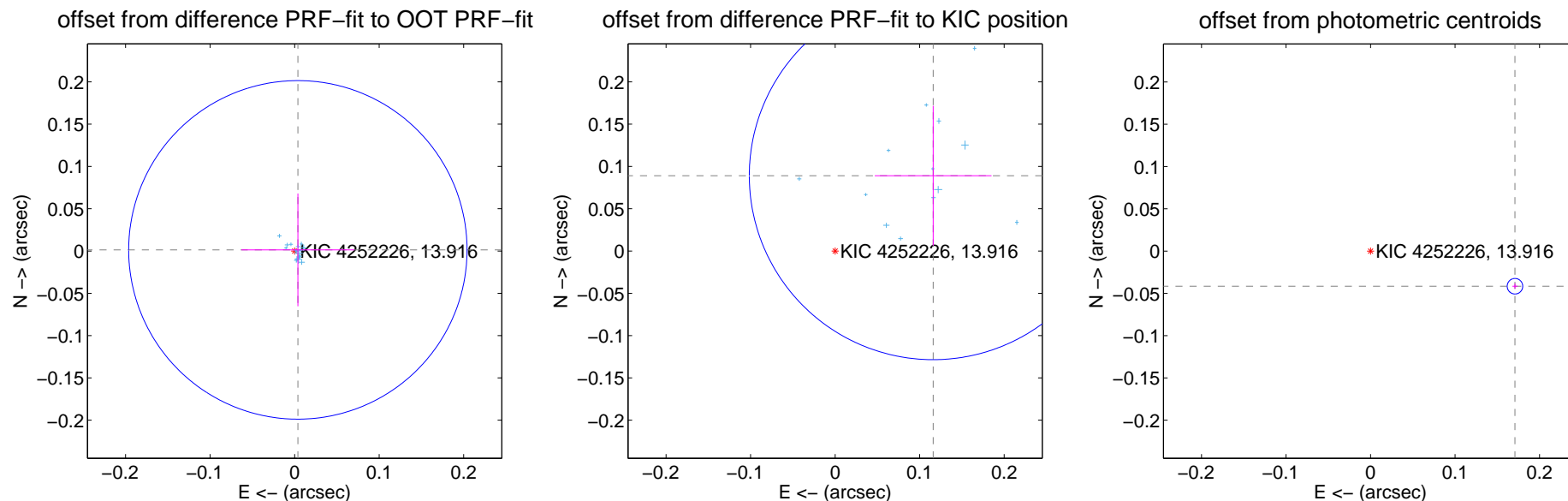
## DV Centroid Data

Supplemental centroid analysis for 004252226-02. Kepler magnitude: 13.92. Transit SNR 2098.69

There are 17 quarters with good PRF difference image offsets

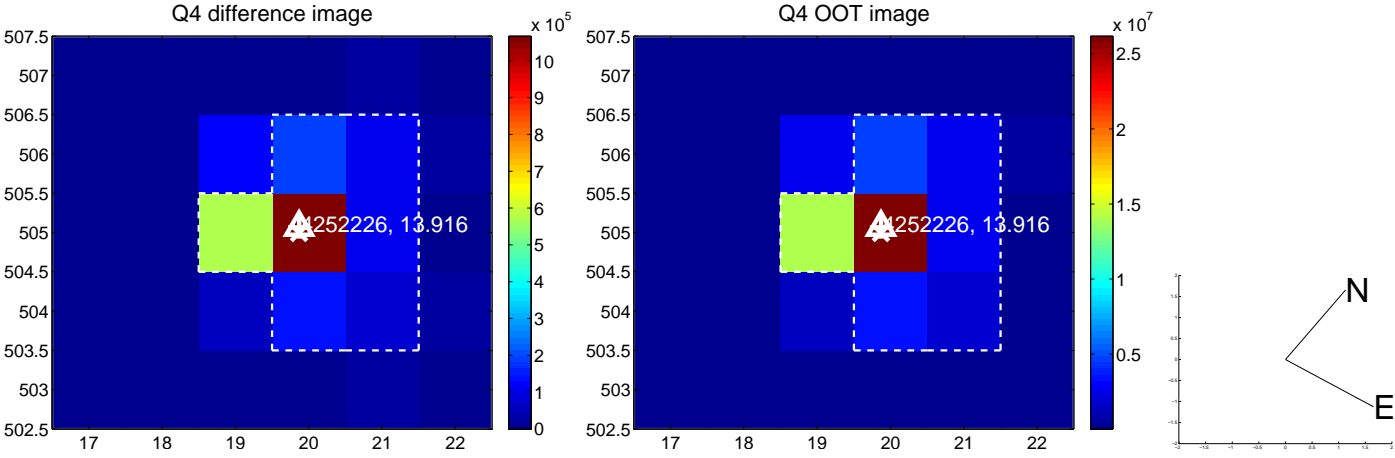
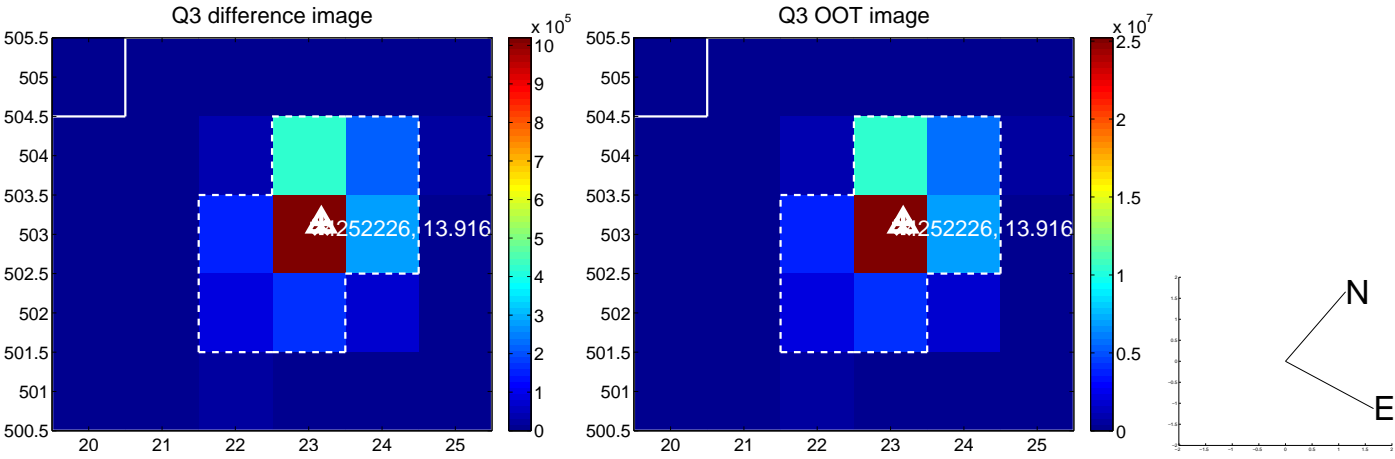
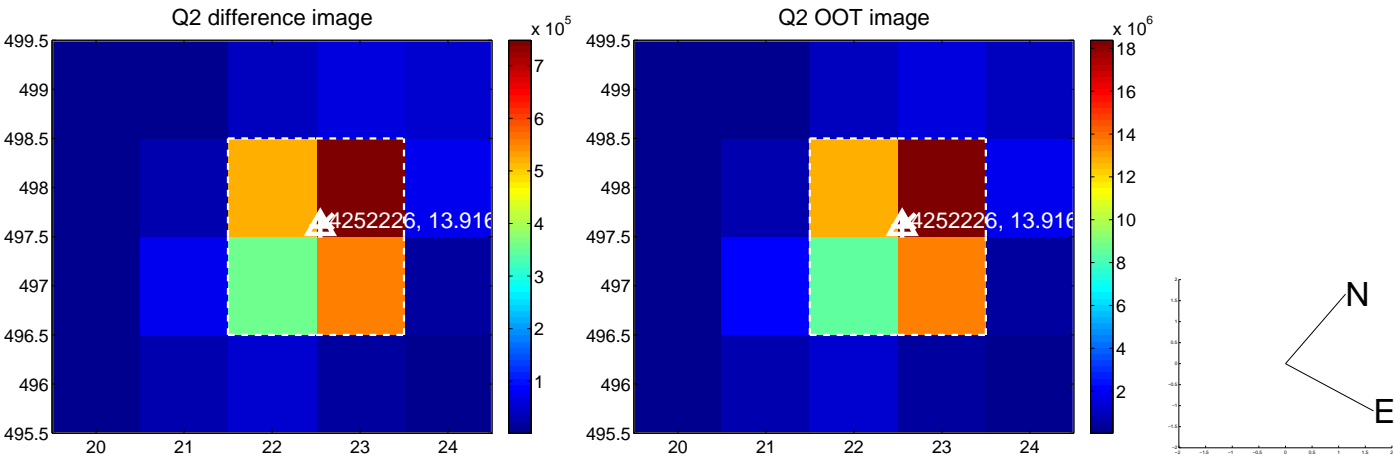
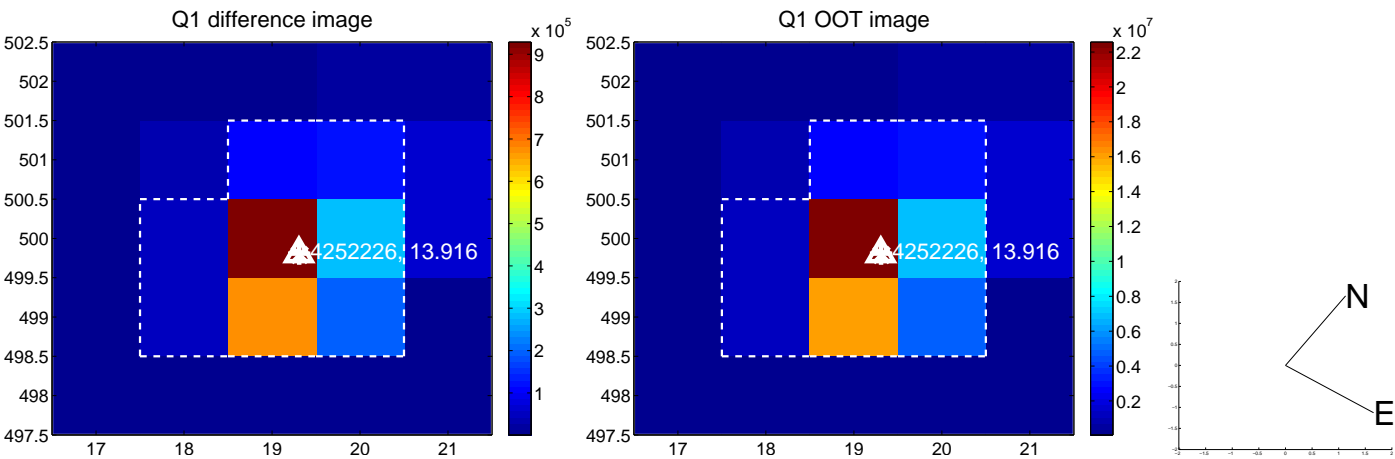
The direct PRF centroid is offset from the target star catalog position by about 0.14 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.004 \pm 0.067$	0.06	$-0.004 \pm 0.067$	$0.001 \pm 0.067$
PRF-fit source offset from KIC position	$0.146 \pm 0.073$	2.02	$-0.116 \pm 0.069$	$0.089 \pm 0.083$
photometric centroid source offset	$0.18 \pm 0.00$	57.40	$-0.17 \pm 0.00$	$-0.04 \pm 0.00$

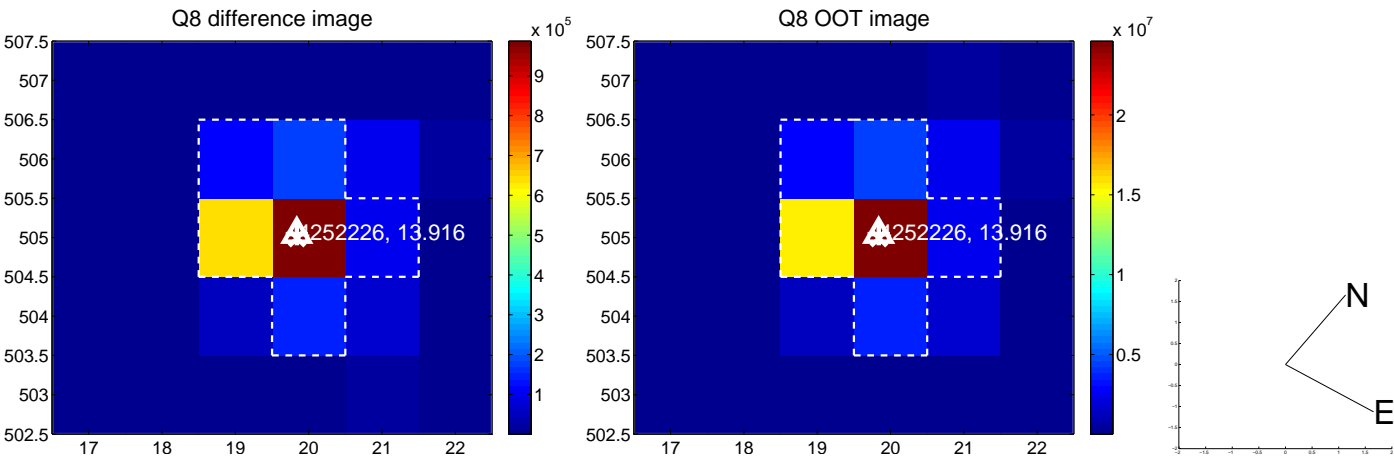
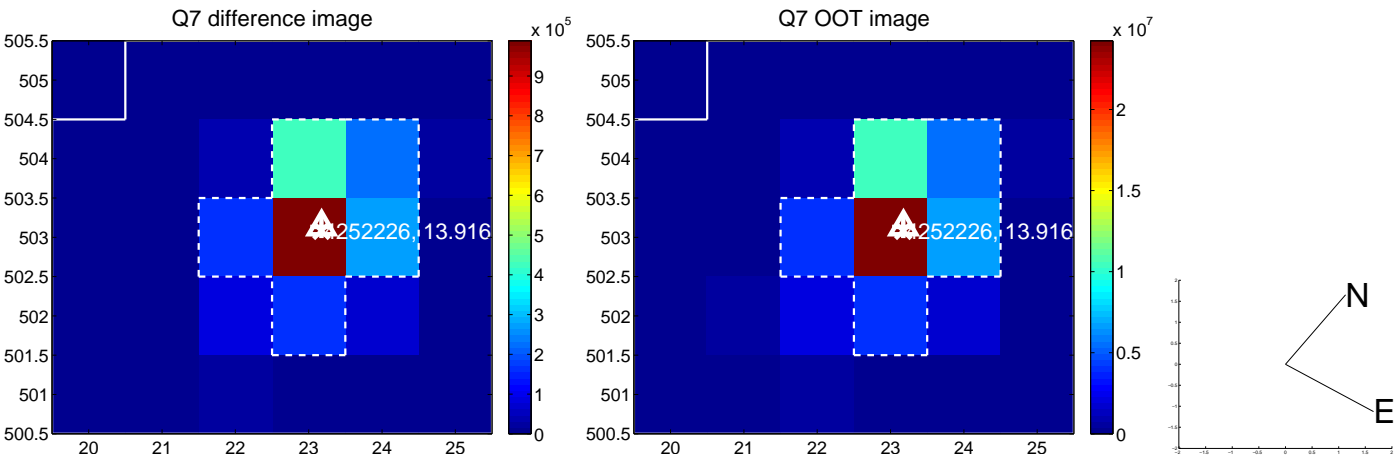
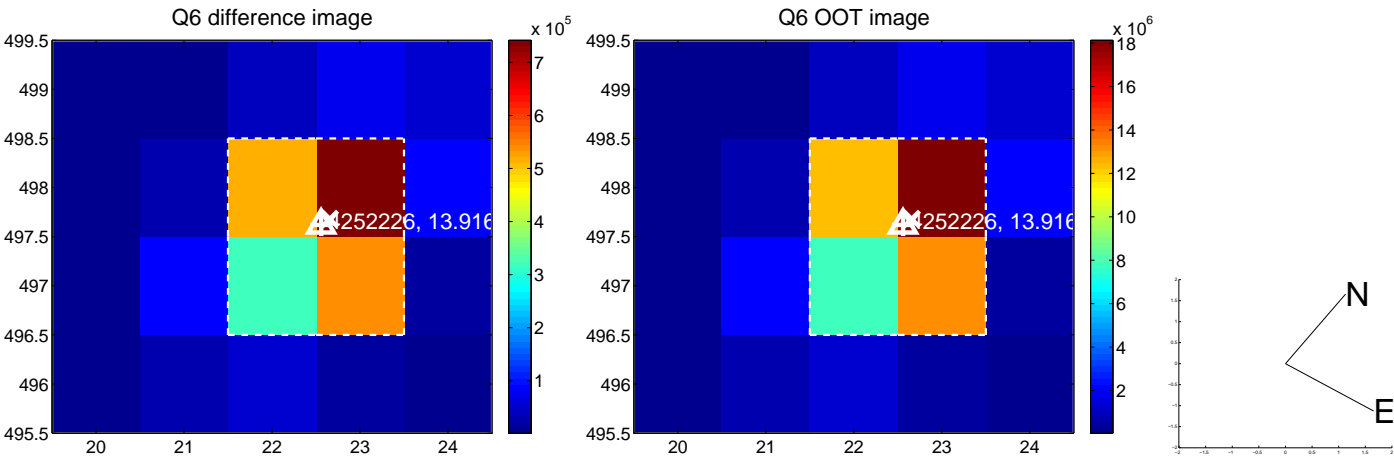
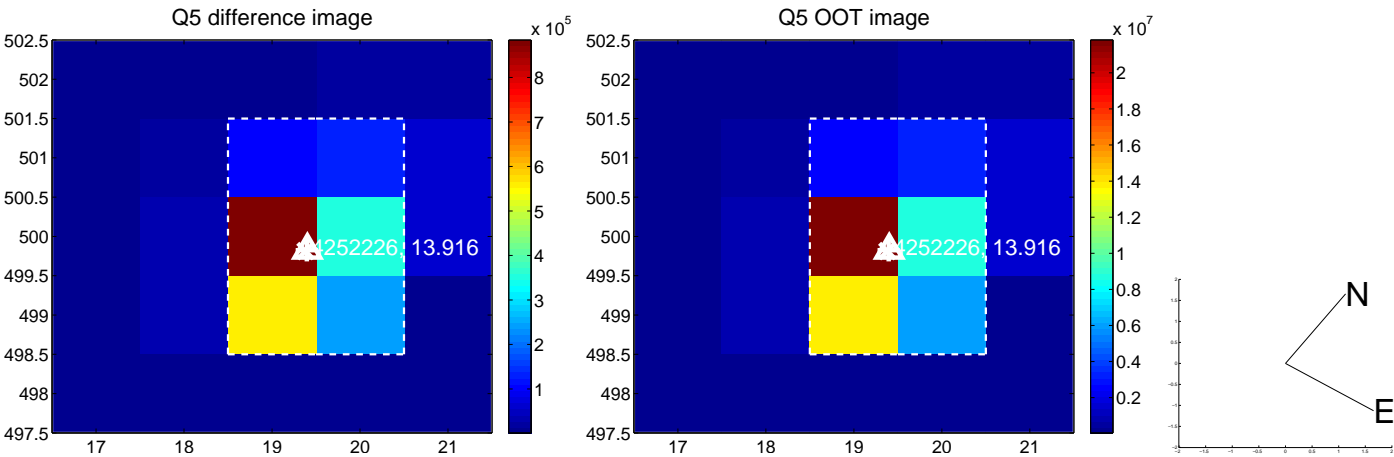


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

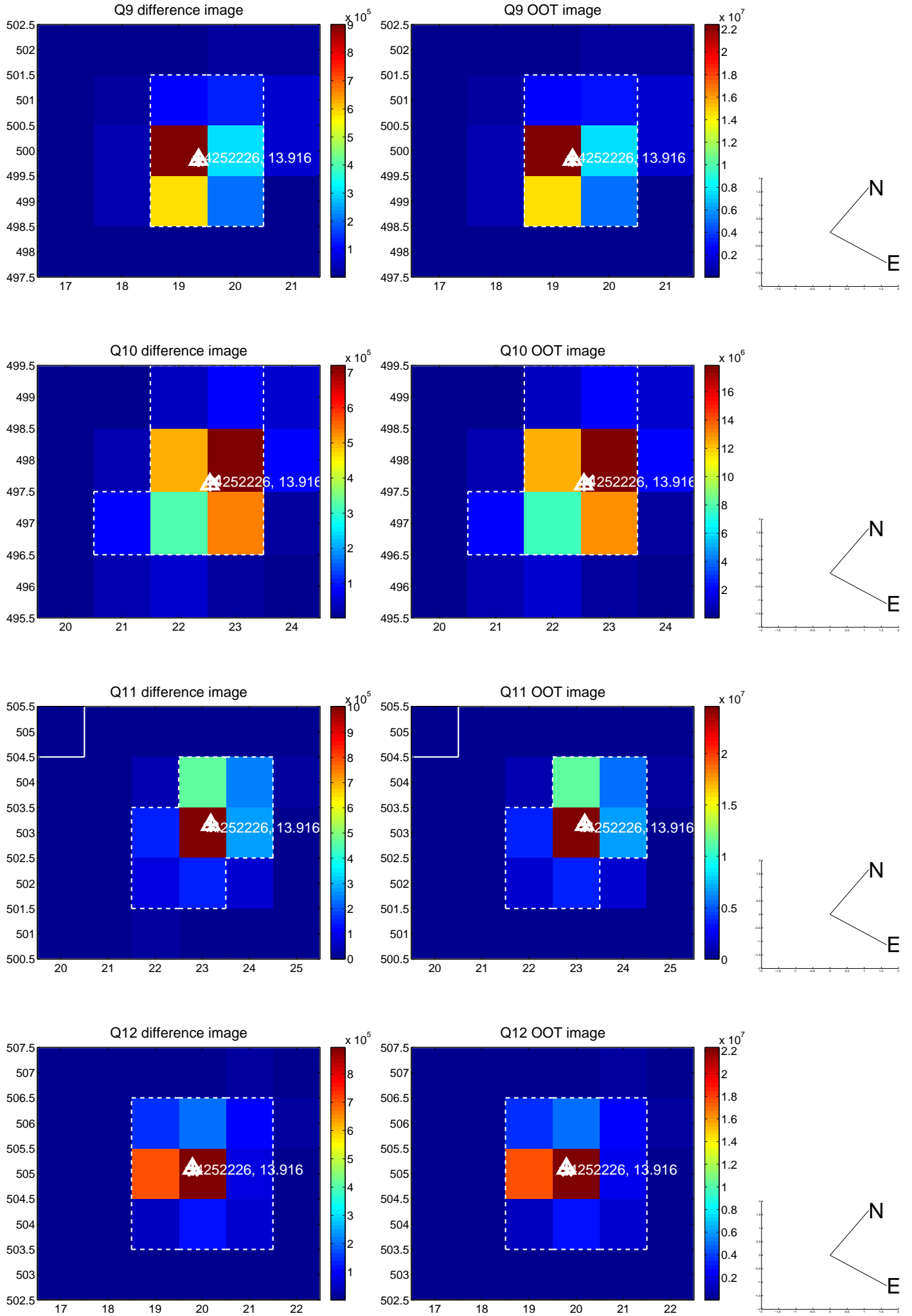
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



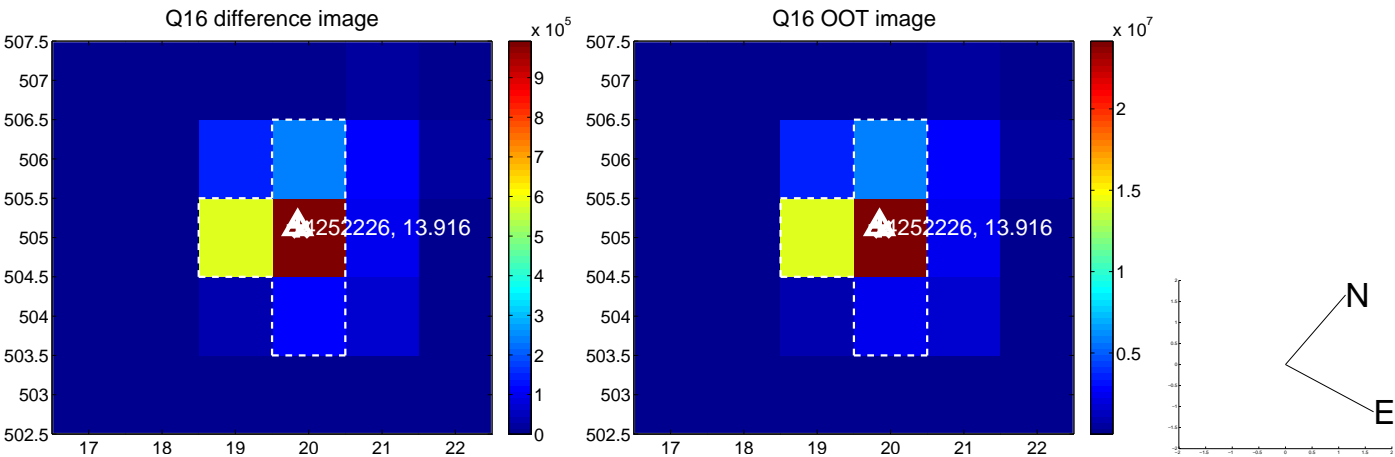
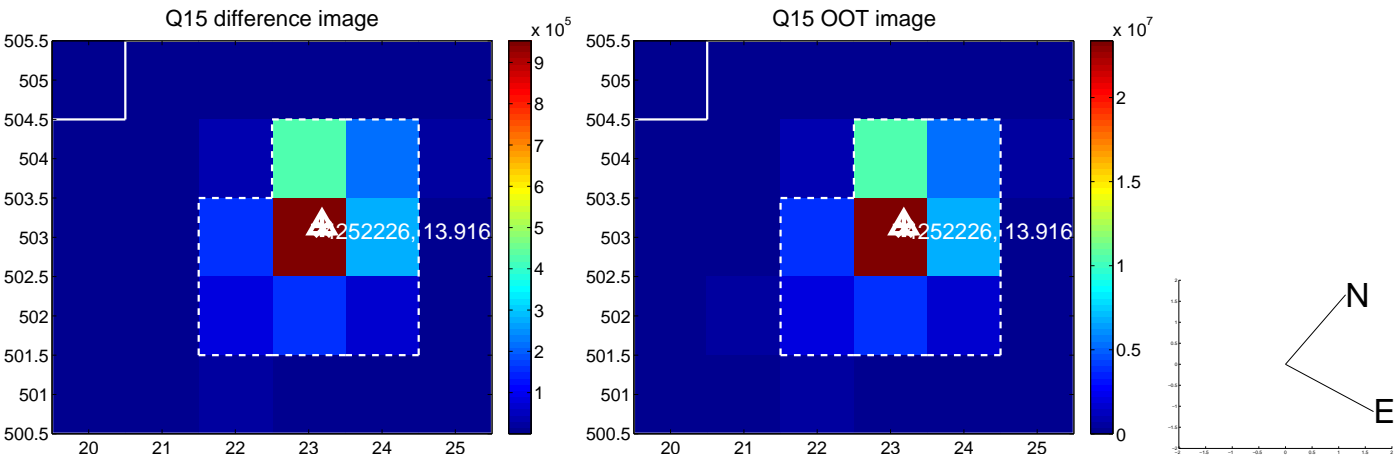
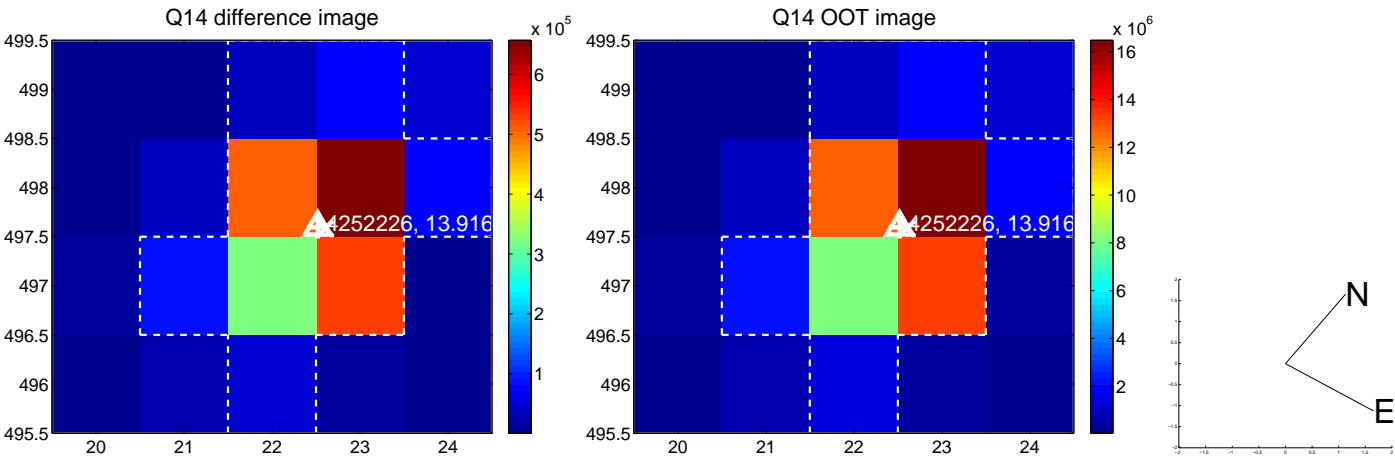
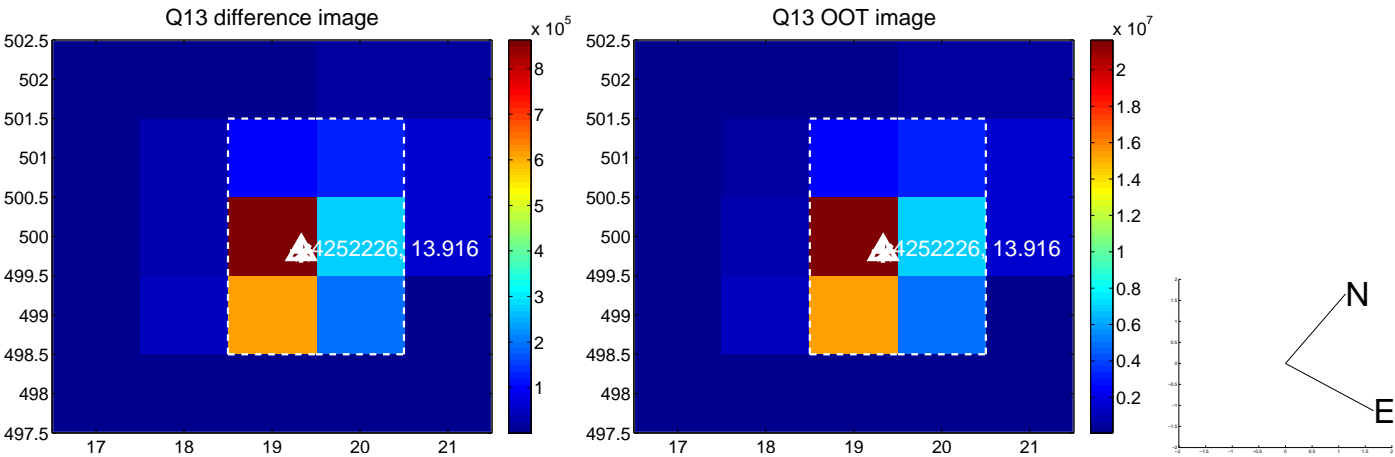
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



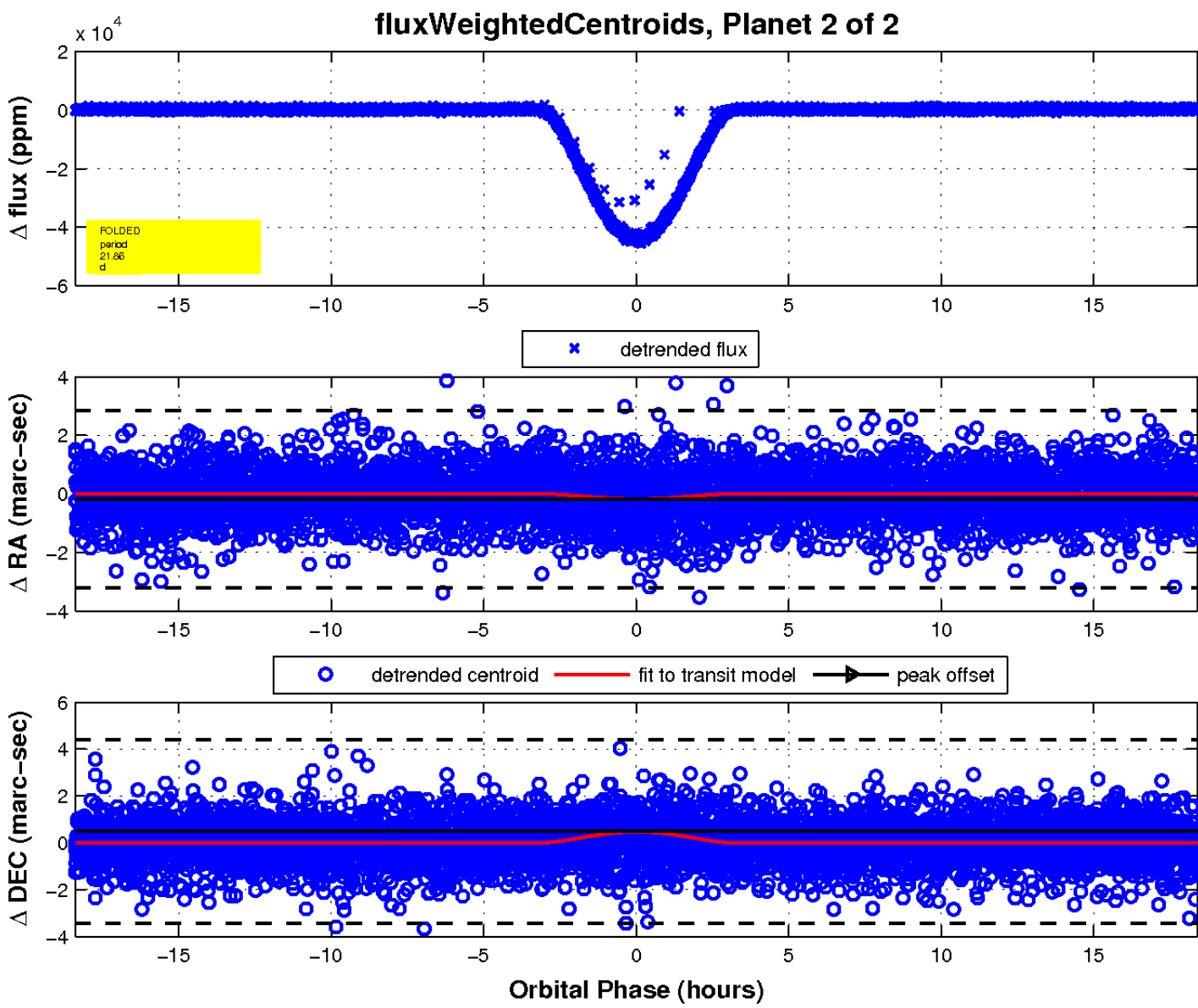
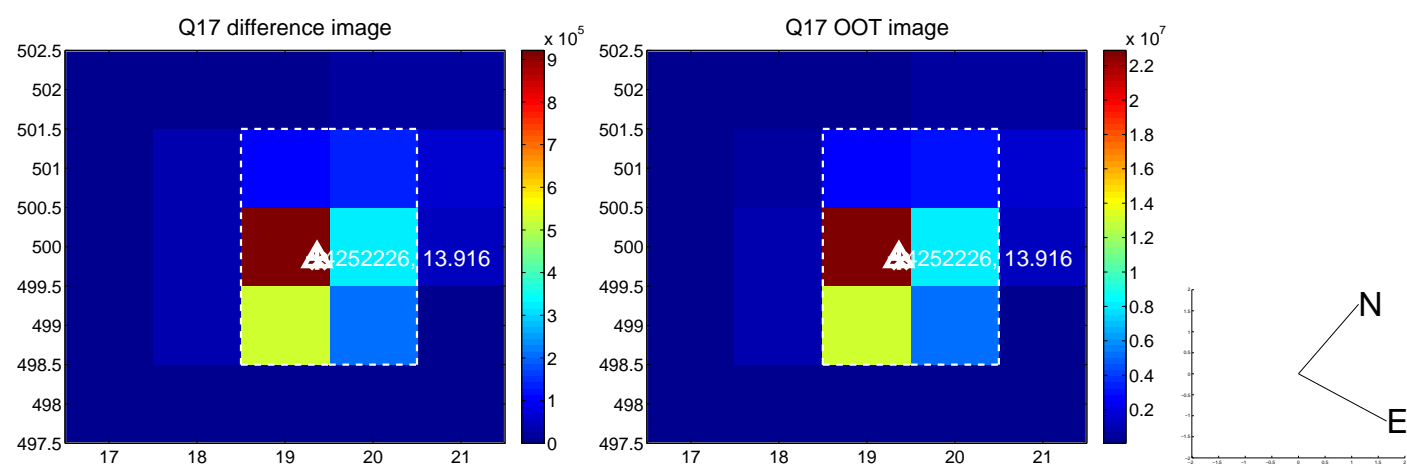
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

