

# KIC 009529856

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009529856-01	OBS	7185.01	37.482218	155.840419	28704.8	4.802	1860.0	1351.4	2.42	6422	70.45	156.71
009529856-02	OBS	No	37.482205	163.975509	7475.4	5.024	485.7	466.5	2.42	6422	37.18	156.71

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009529856-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—MOD_ODDEVEN_DV—MOD_ODDEVEN_ALT—DEEP_V_SHAPED—HAS_SEC_TCE
009529856-02	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.

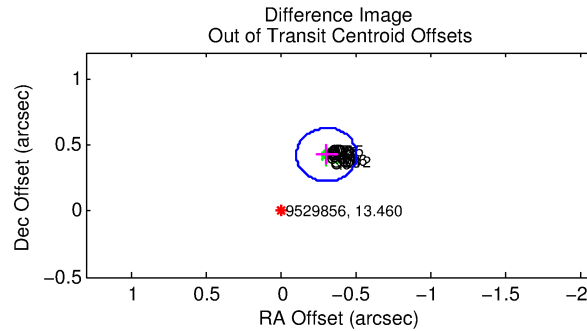
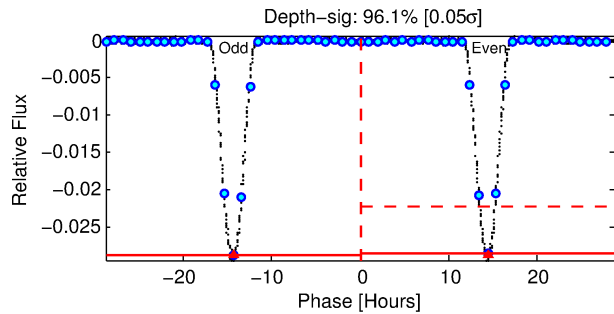
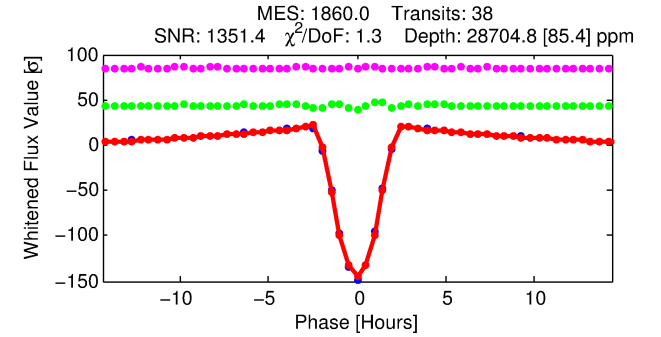
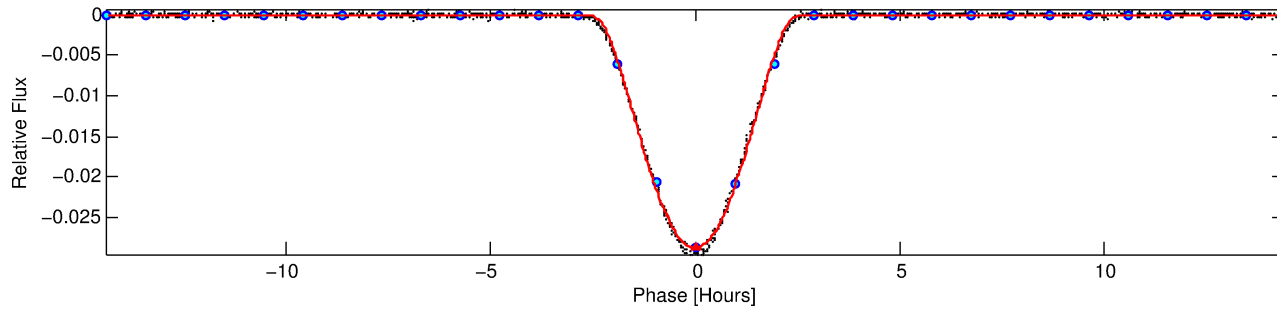
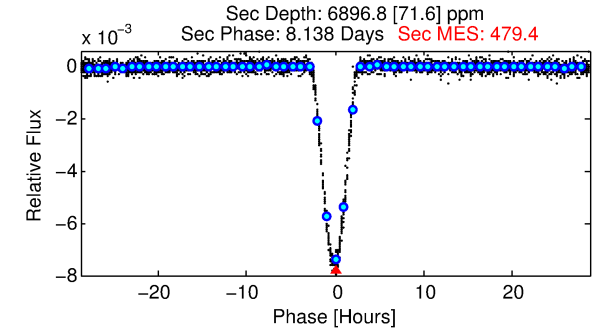
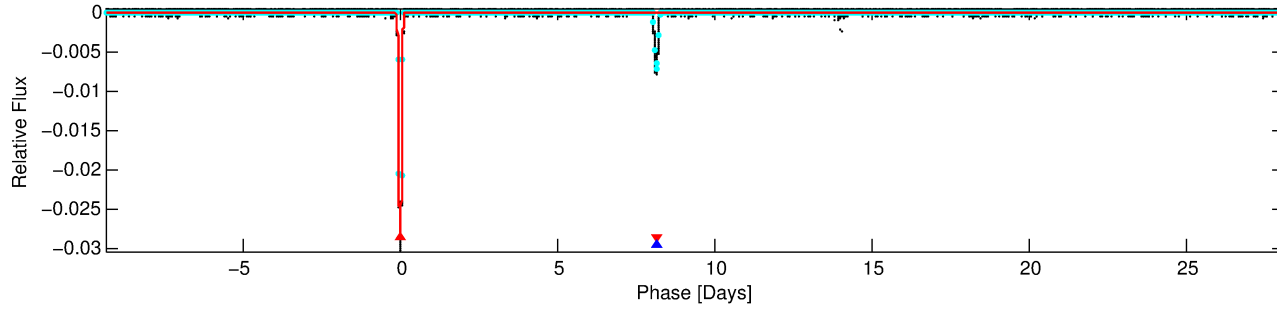
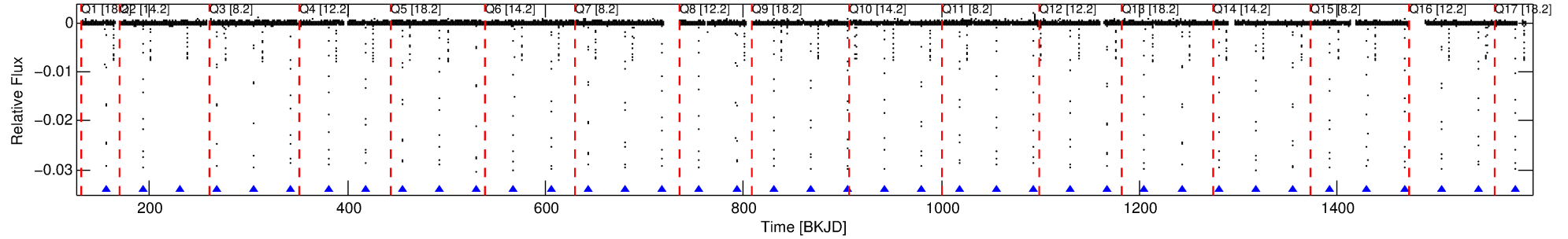
## Ephemeris Match Information For 009529856-01

No Significant Match Found

# DV One-Page Summary

KIC: 9529856 Candidate: 1 of 2 Period: 37.482 d  
KOI: K07185.01 Corr: 1.000

Kp: 13.46 R\*: 2.42 Rs Teff: 6422.0 K Logg: 3.78 Fe/H: -0.400



## DV Fit Results:

Period = 37.48222 [0.00000] d  
Epoch = 155.8404 [0.0001] BKJD  
Rp/R\* = 0.2673 [0.0119]  
a/R\* = 46.47 [0.16]  
b = 1.00 [0.02]  
Seff = 156.71 [88.39]  
Teq = 902 [127] K  
Rp = 70.45 [26.53] Re  
a = 0.2382 [0.0833] AU  
Ag = 43.36 [24.20] [1.75σ]  
Teff = 3579 [135] K [14.43σ]

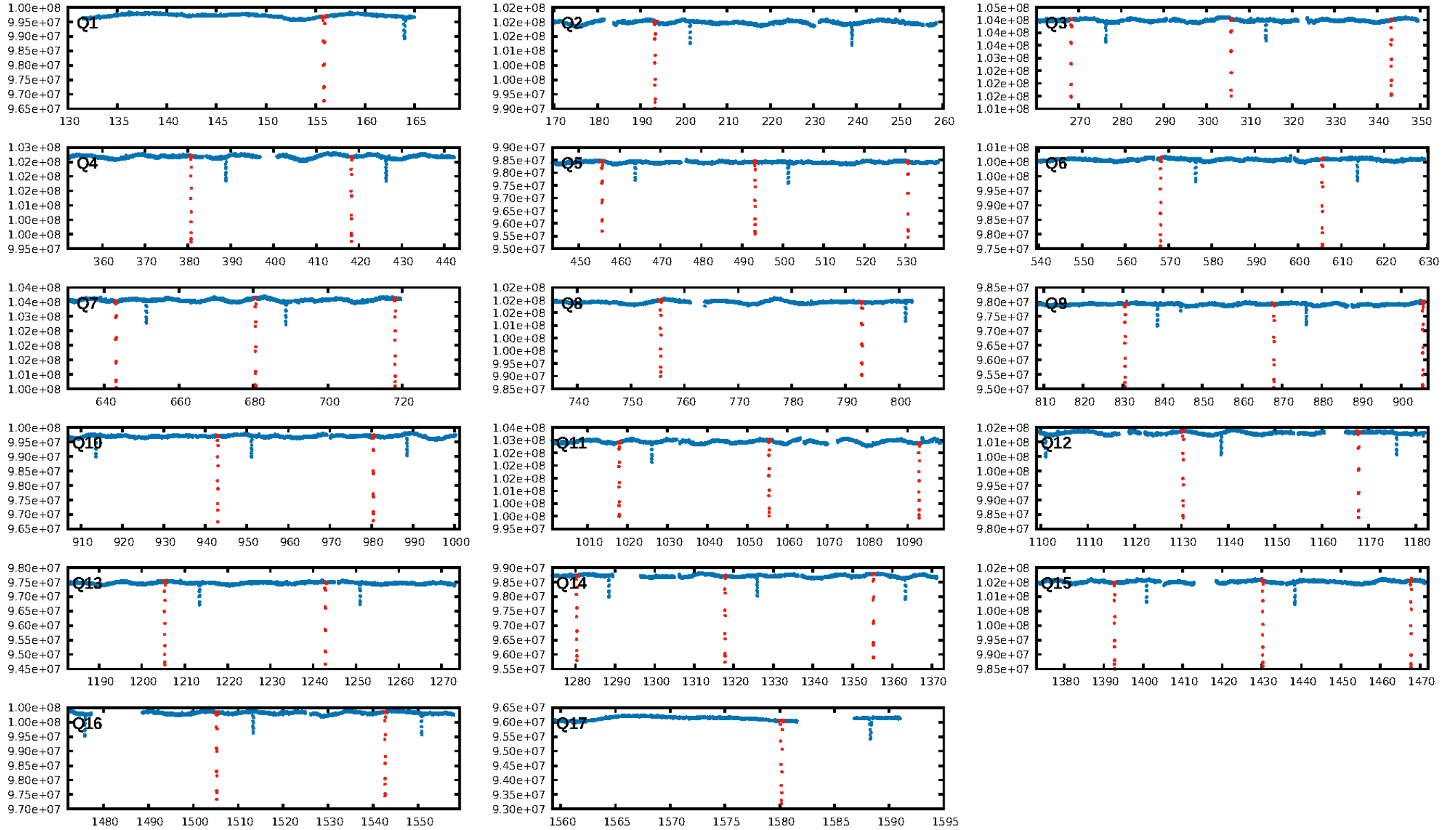
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 0.1%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [36/36]  
GhostDiagnostic-chr: 4.821  
Centroid-sig: 0.0%  
Centroid-so: 0.462 arcsec [78.65σ]  
OotOffset-rm: 0.525 arcsec [7.81σ]  
KicOffset-rm: 0.418 arcsec [6.19σ]  
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]

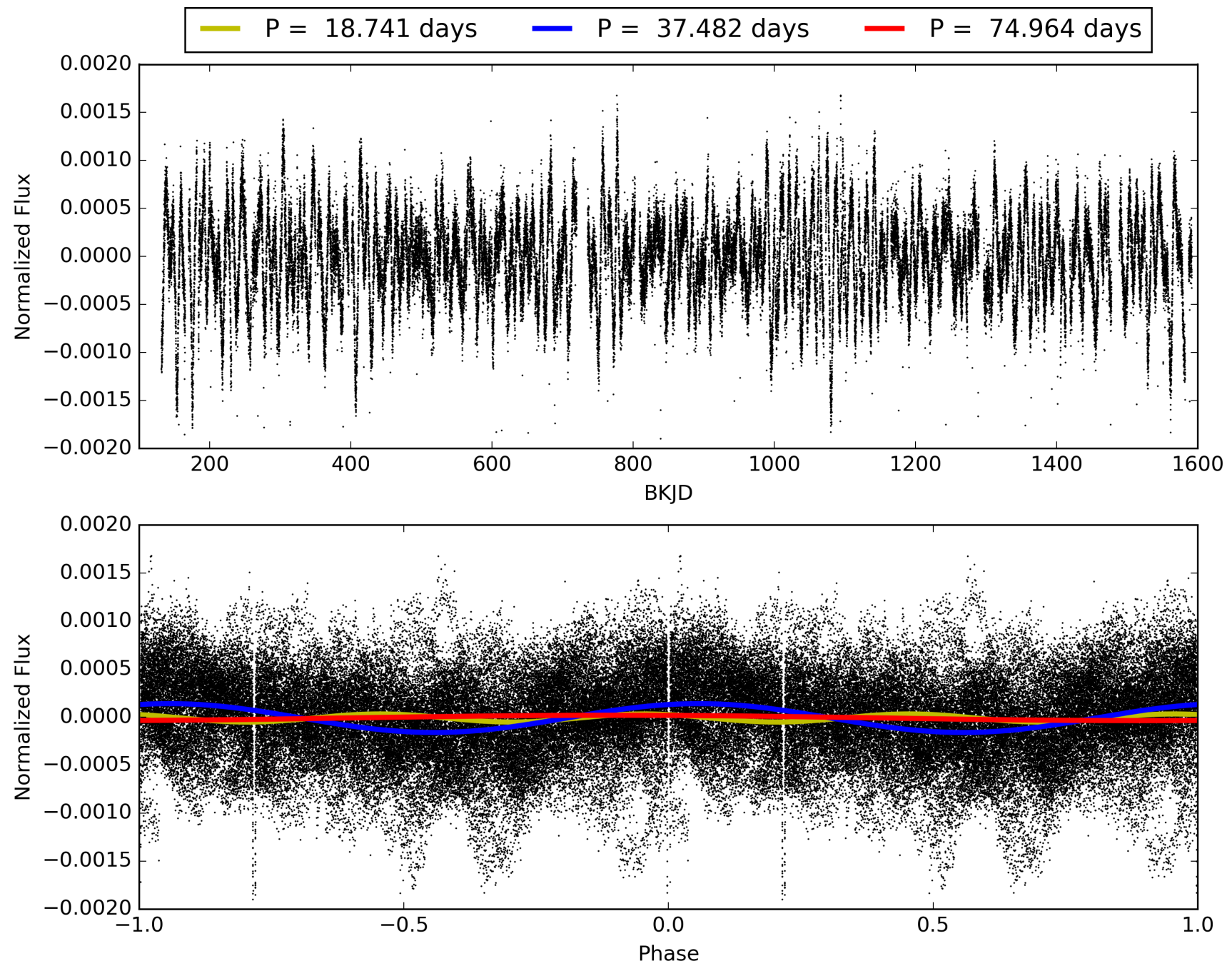
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 19:45:59 Z

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

# TCE 009529856-01, PDC Light Curves

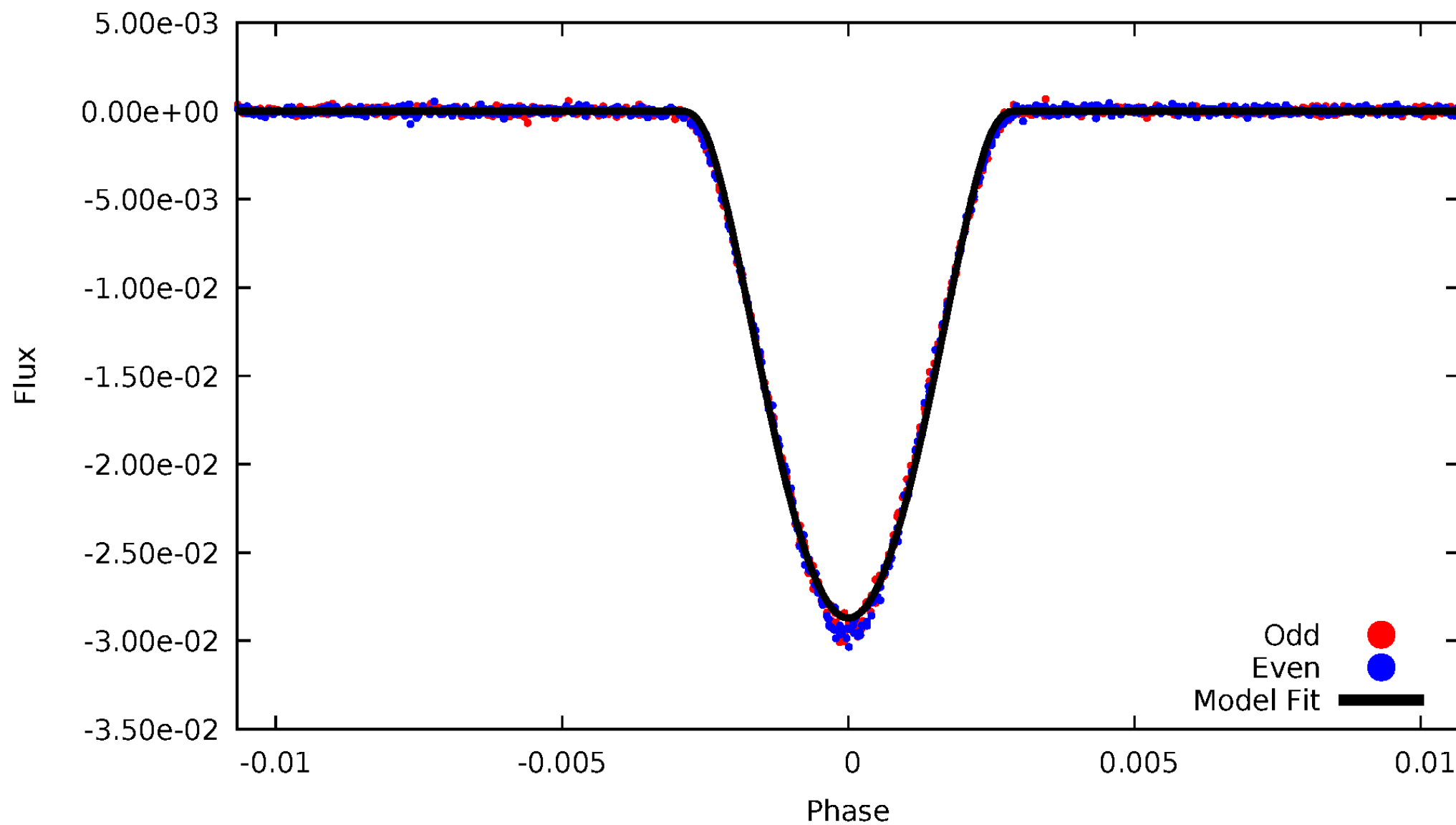


TCE 009529856-01



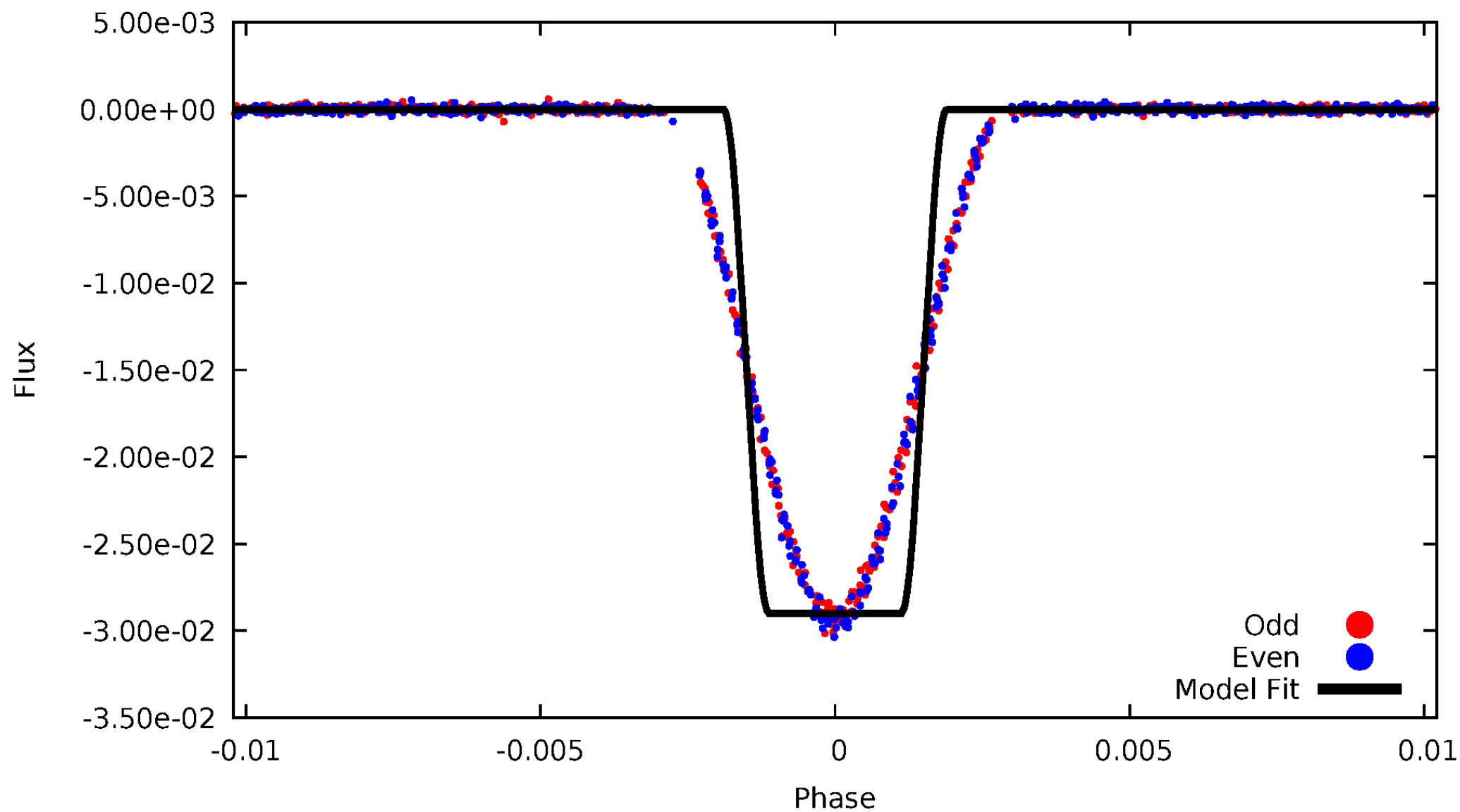
# DV Odd/Even

TCE 009529856-01



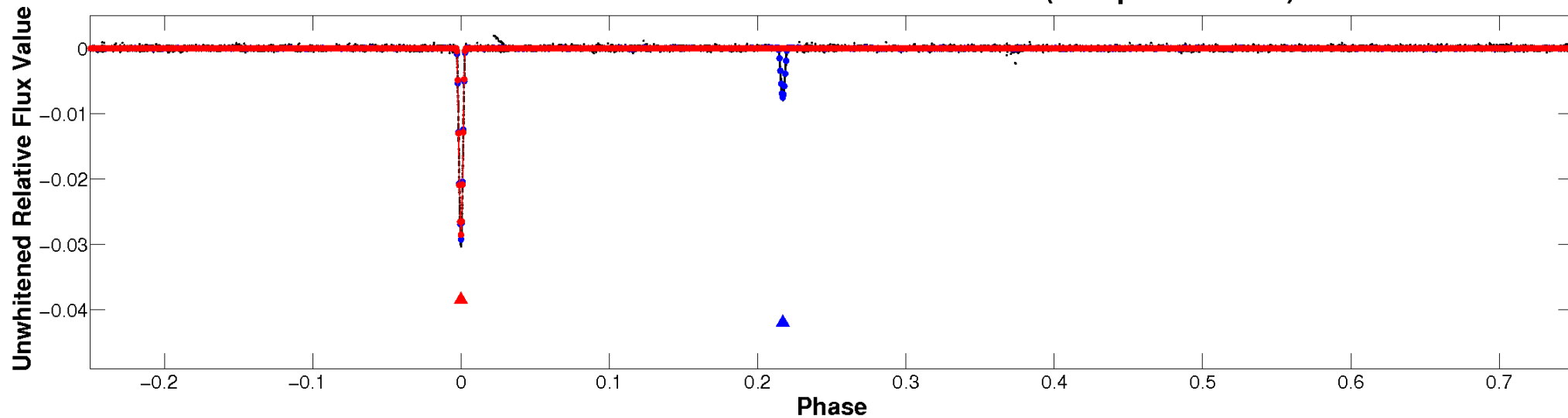
# ALT Odd/Even

TCE 009529856-01

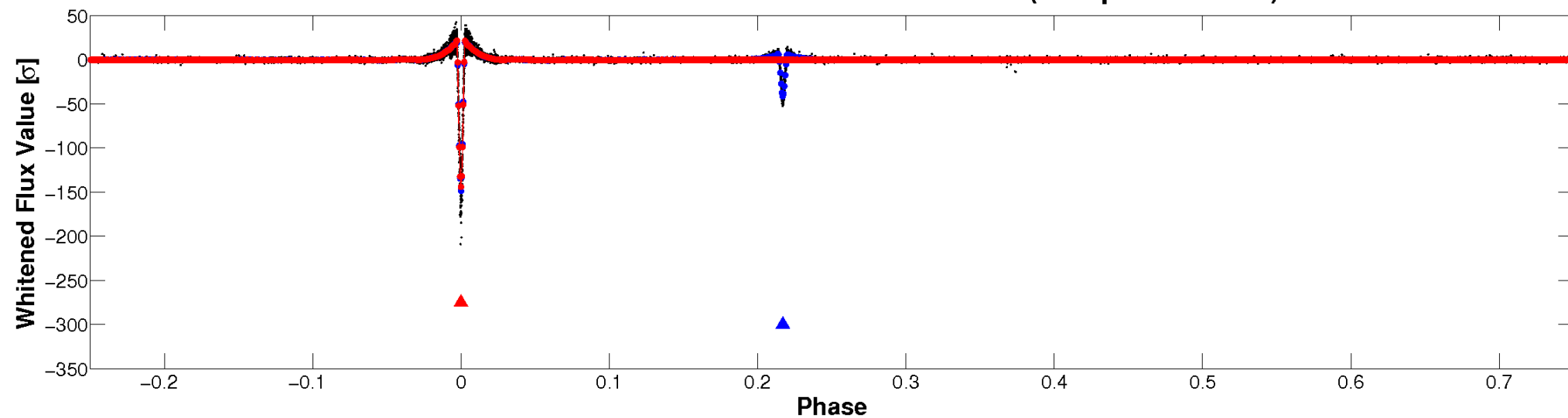


# Non-Whitened Vs. Whitened Light Curve

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

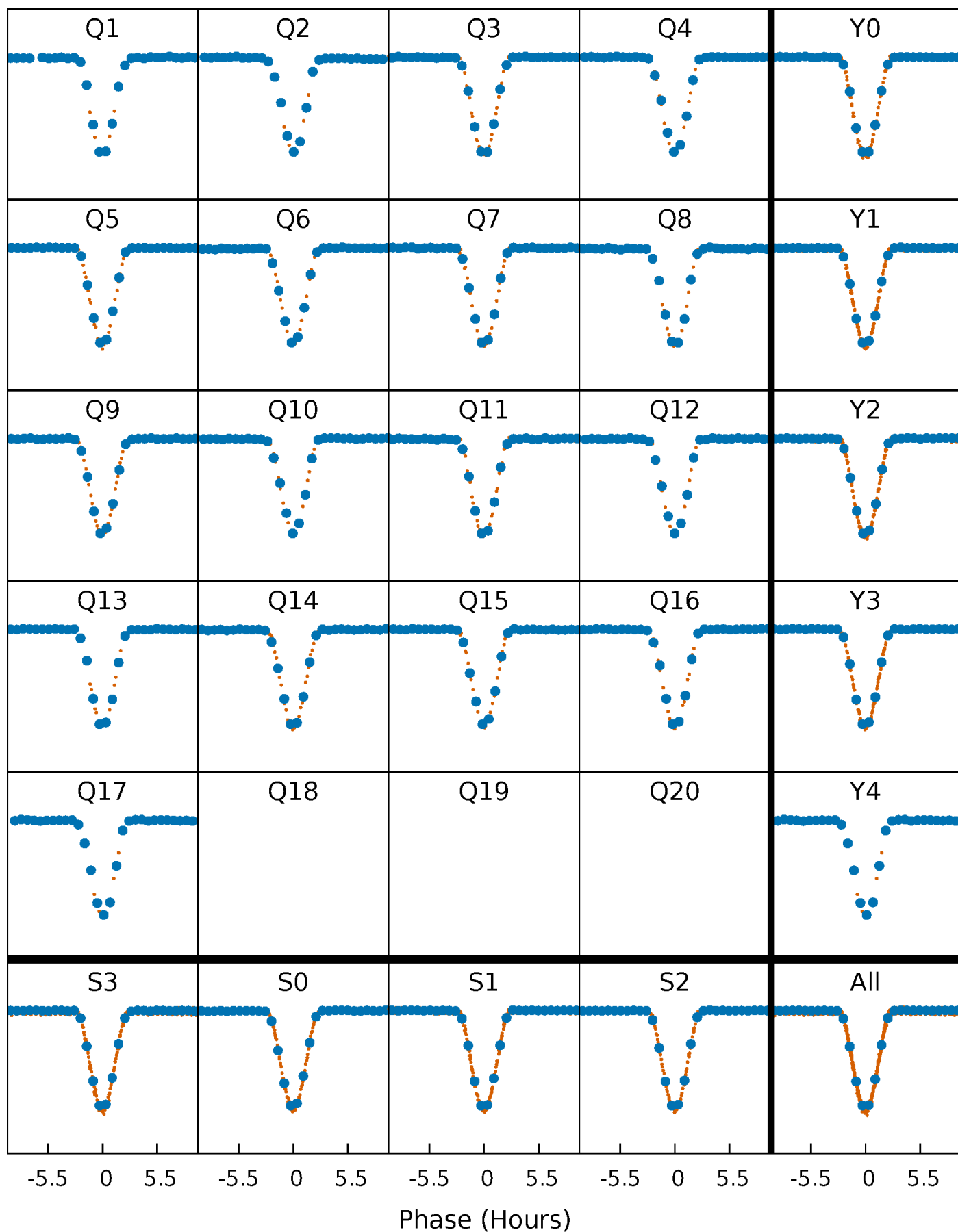


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

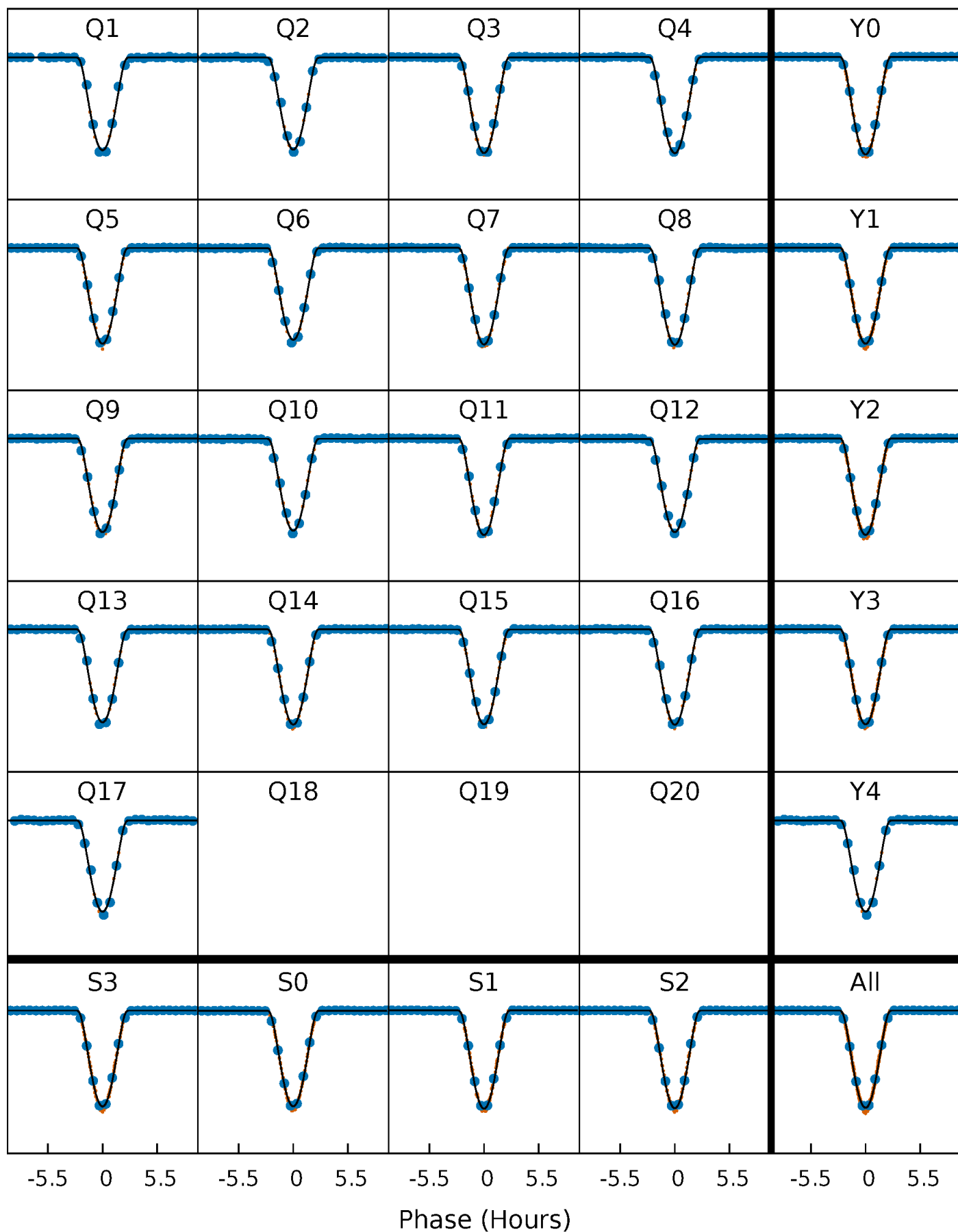
TCE 009529856-01 P= 37.482218 Days  $T_0=155.840419$  (BKJD)





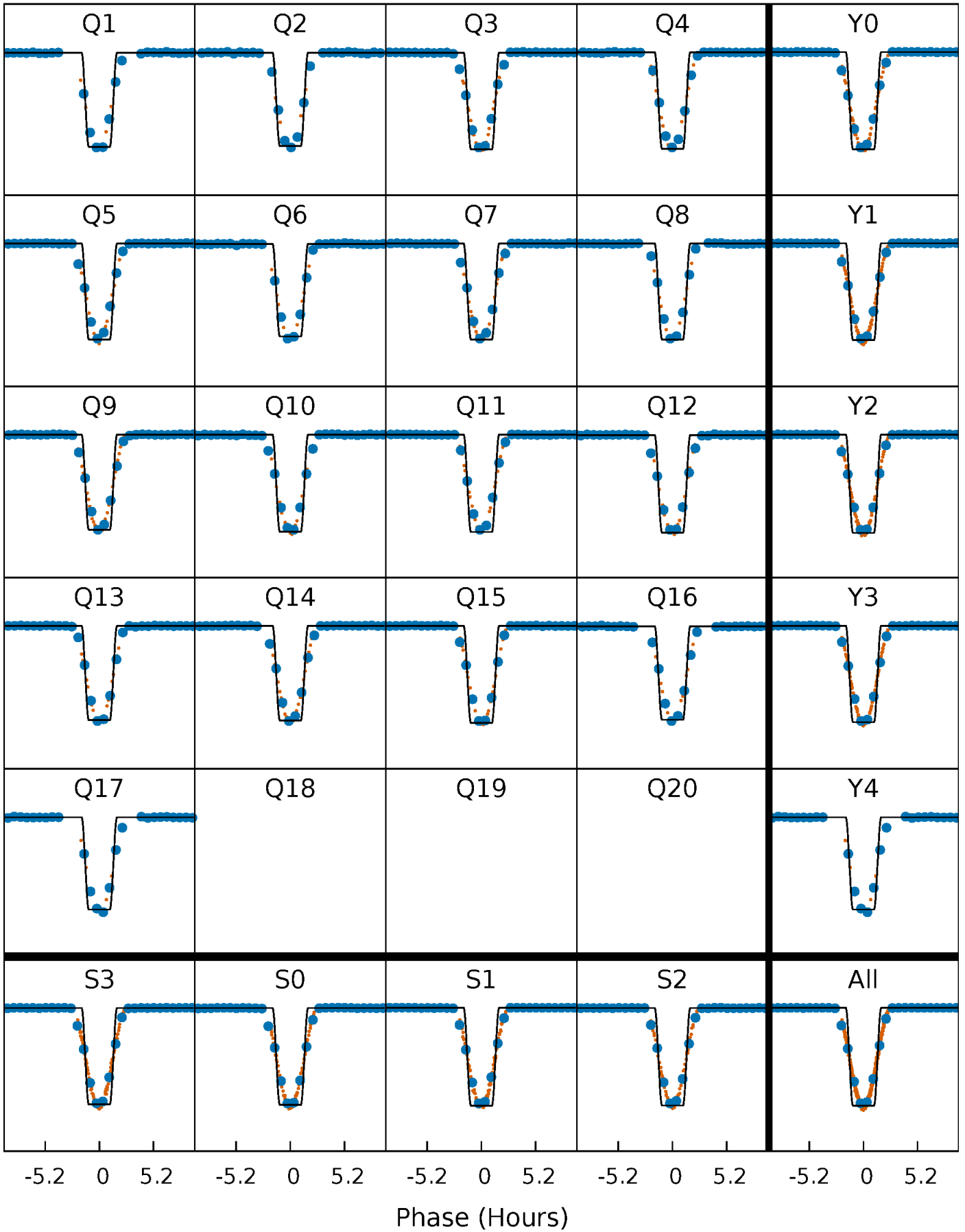
# DV Quarter-Phased Transit Curves

TCE 009529856-01 P= 37.482218 Days  $T_0=155.840419$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

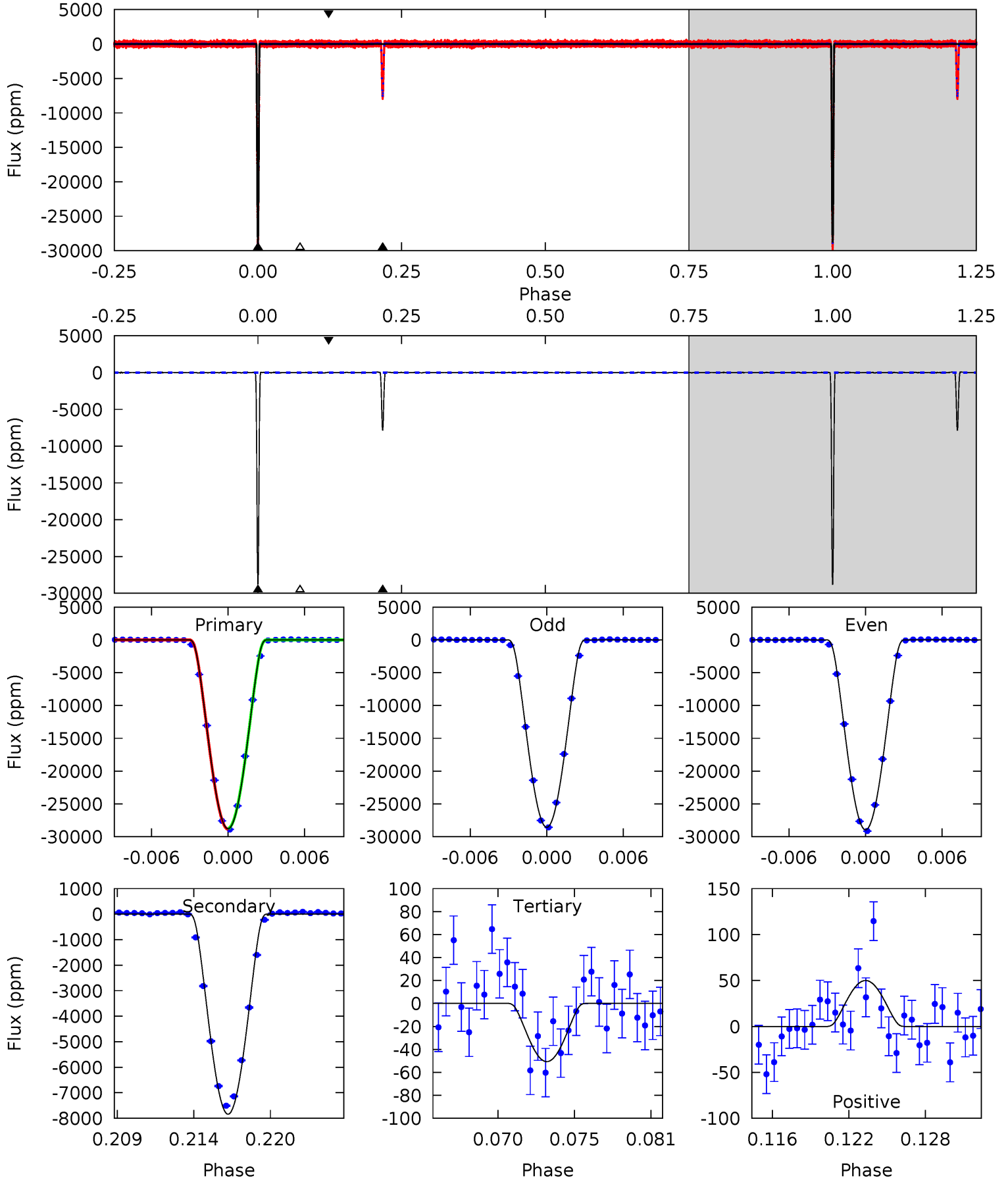
TCE 009529856-01 P= 37.482108 Days  $T_0=155.842458$  (BKJD)



# DV Model-Shift Uniqueness Test

009529856-01, P = 37.482218 Days, E = 118.358201 Days

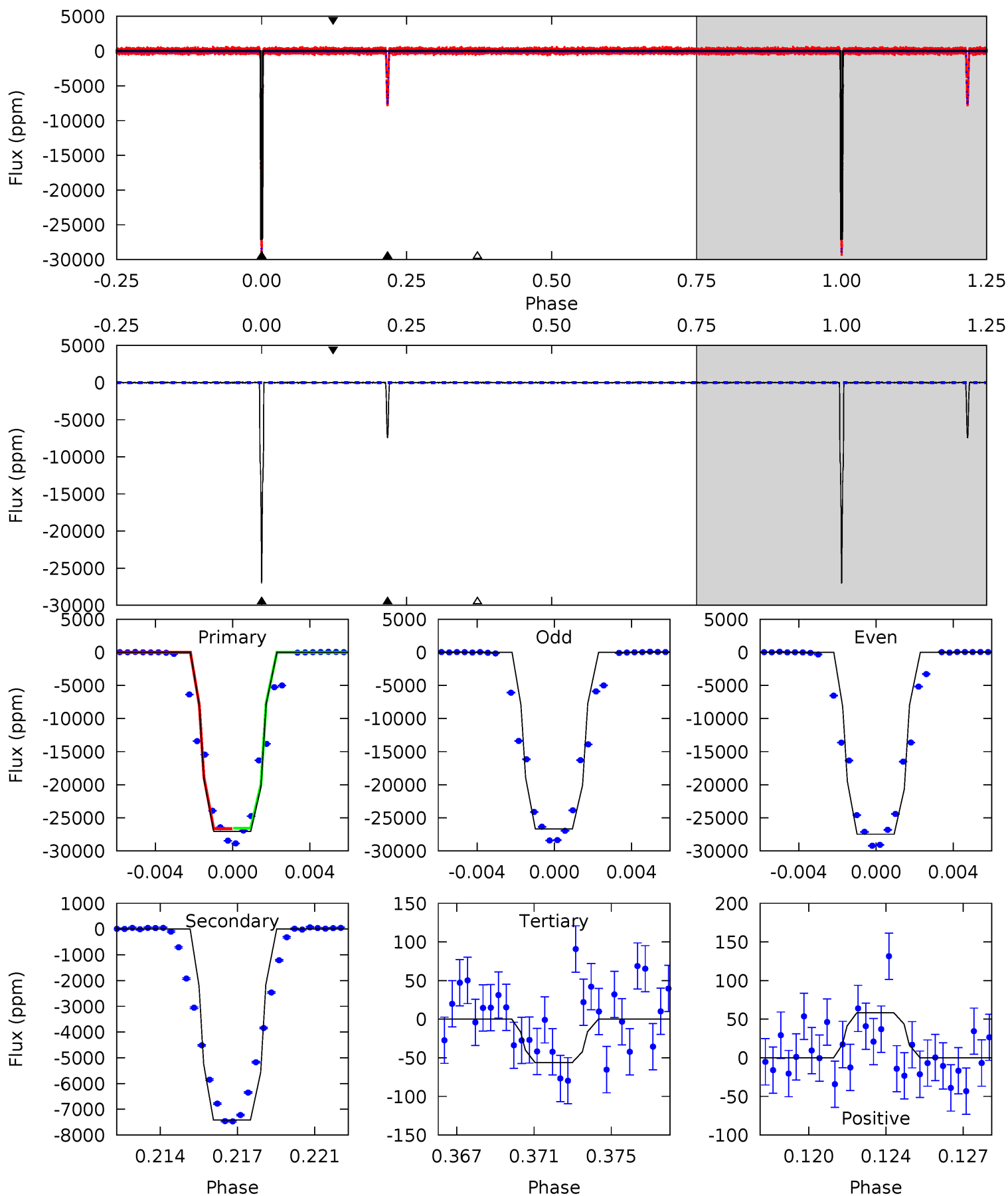
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
3684	1003	6.48	6.40	5.13	2.76	2.23	3678	3678	996.8	996.9	24.0	1.00	0.00	3.20



# Alt Model-Shift Uniqueness Test

009529856-01, P = 37.482108 Days, E = 118.360350 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
1993	546.1	4.15	4.29	5.21	2.90	1.32	1989	1989	542.0	541.8	28.9	1.00	0.00	0



### Stellar Parameters For KIC 009529856

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$\rho_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6422^{+195}_{-176}$	$3.780^{+0.320}_{-0.080}$	$-0.400^{+0.350}_{-0.300}$	$2.415^{+0.387}_{-0.903}$	$1.284^{+0.222}_{-0.247}$	$0.128^{+0.273}_{-0.041}$
	+3%/-3%	+8%/-2%	+87%/-75%	+16%/-37%	+17%/-19%	+213%/-32%
Source	PHO1	FLK73	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 009529856-01 / KOI 7185.01

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-7840 \pm 8$	$69.25^{+8.74}_{-13.61}$	$1238^{+71}_{-108}$	$4016^{+102}_{-104}$	$53^{+25}_{-11}$
Alt.	$-7410 \pm 14$	$43.76^{+6.16}_{-8.97}$	$1236^{+66}_{-106}$	$4710^{+186}_{-167}$	$125^{+59}_{-27}$

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

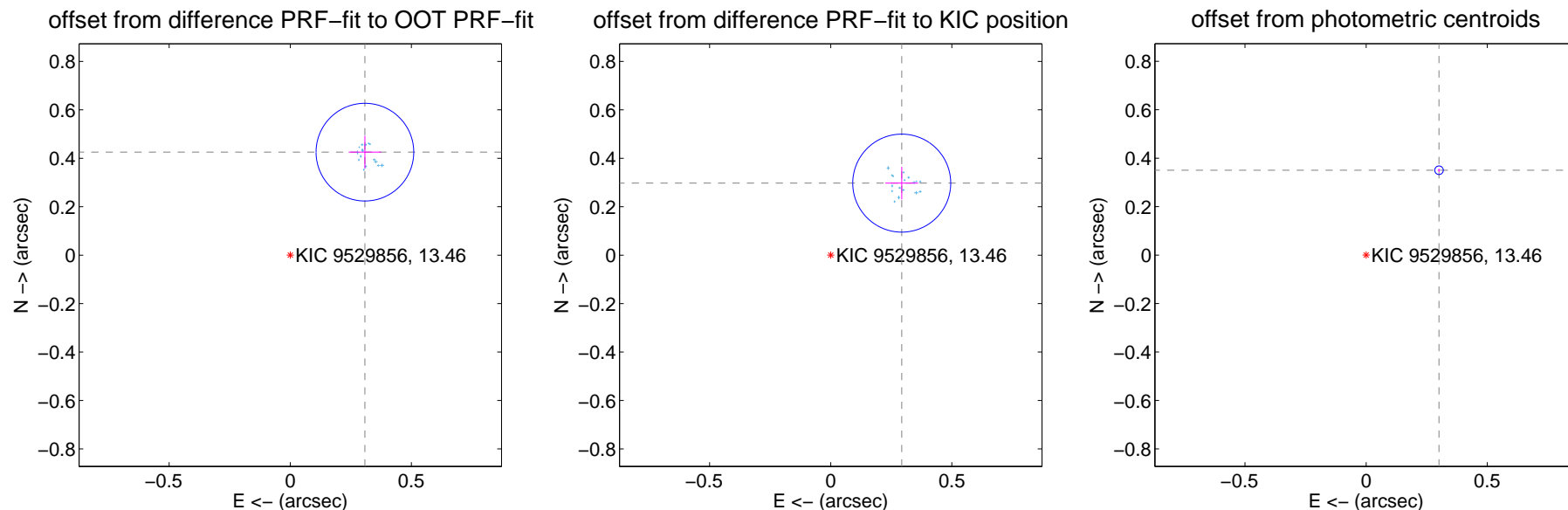
## DV Centroid Data

Supplemental centroid analysis for 009529856-01. Kepler magnitude: 13.46. Transit SNR 1351.44

There are 17 quarters with good PRF difference image offsets

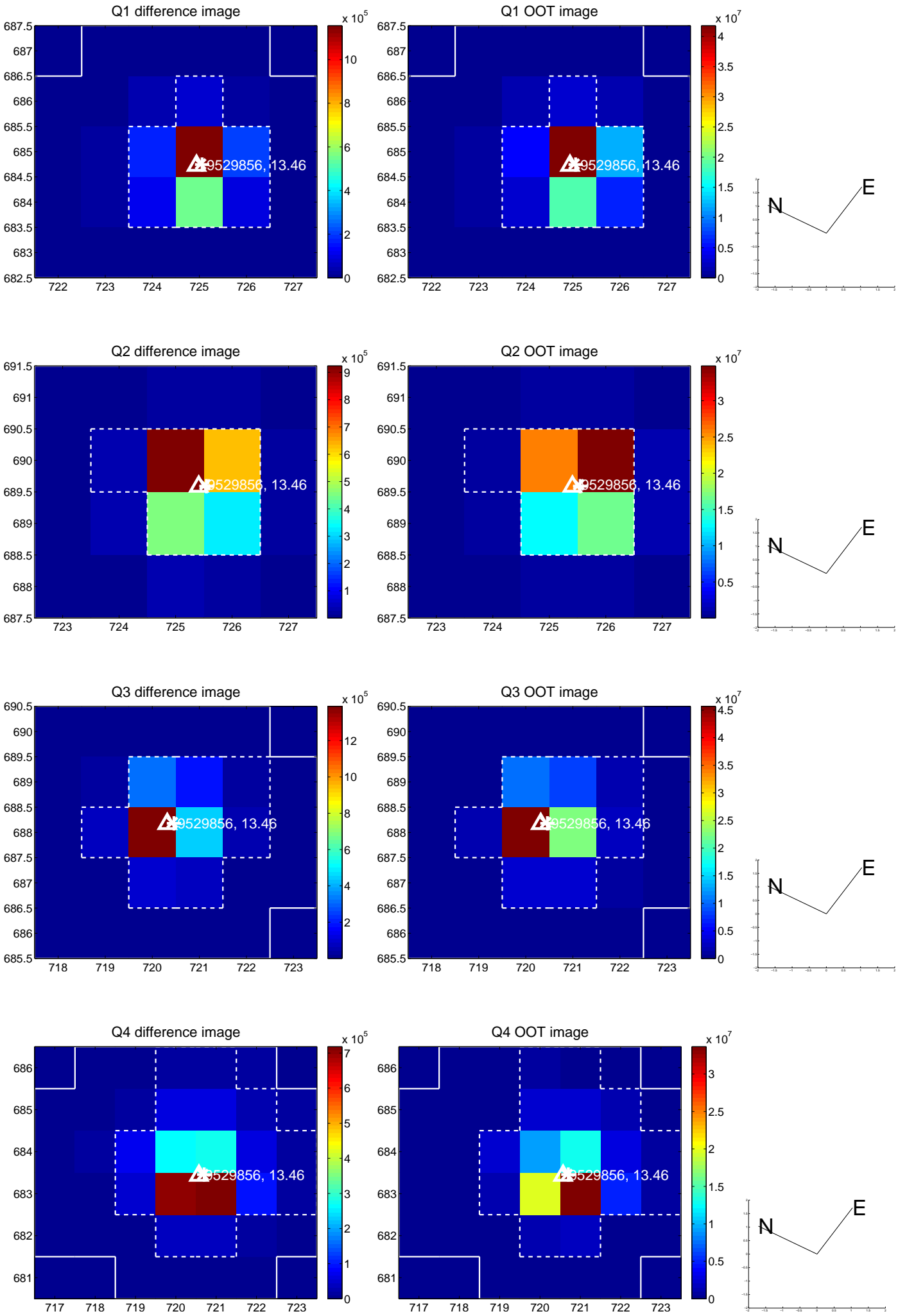
The direct PRF centroid is offset from the target star catalog position by about 0.08 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.525 \pm 0.067$	7.81	$-0.308 \pm 0.067$	$0.425 \pm 0.067$
PRF-fit source offset from KIC position	$0.418 \pm 0.067$	6.19	$-0.293 \pm 0.068$	$0.297 \pm 0.067$
photometric centroid source offset	$0.46 \pm 0.01$	78.65	$-0.30 \pm 0.01$	$0.35 \pm 0.01$

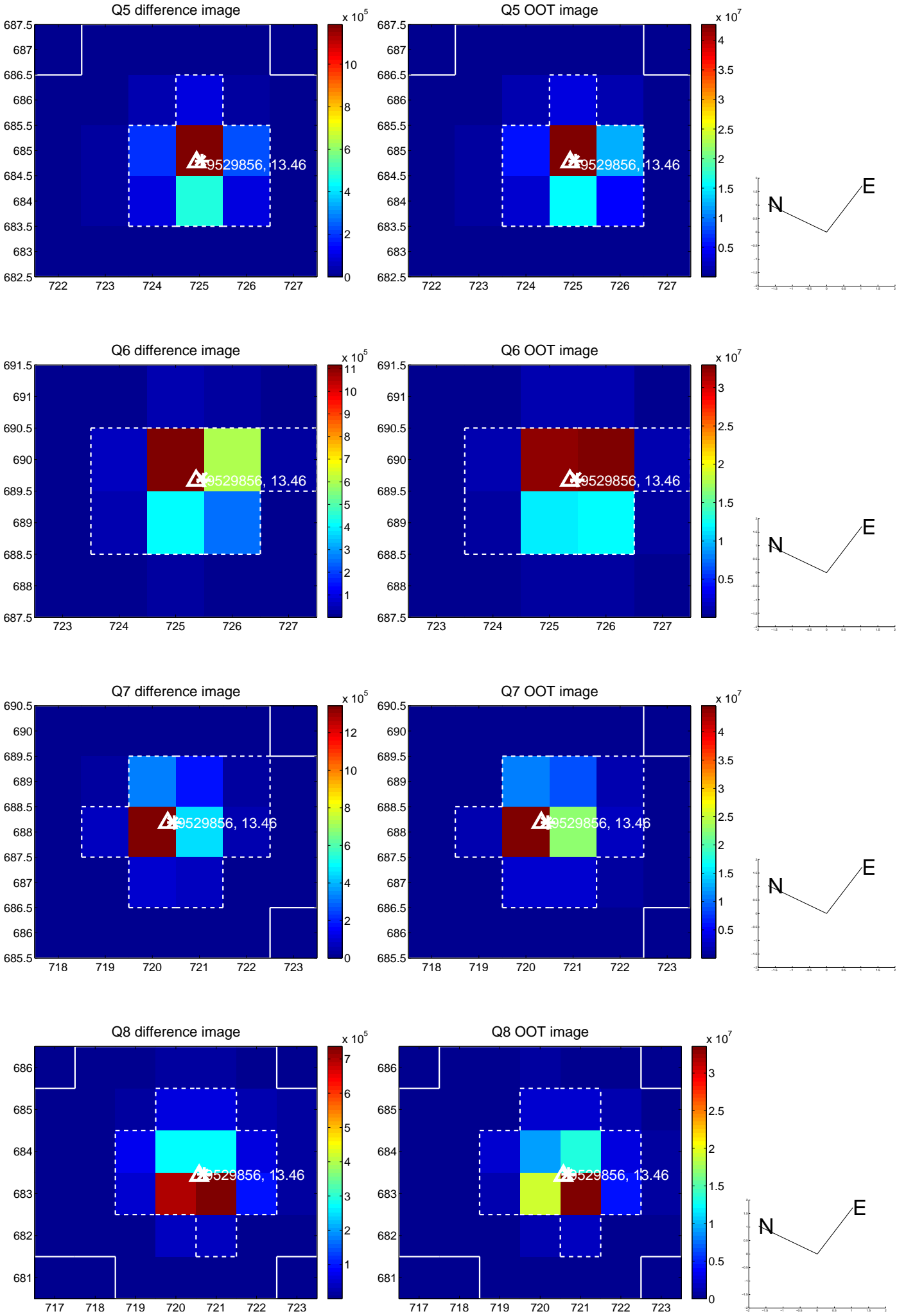


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

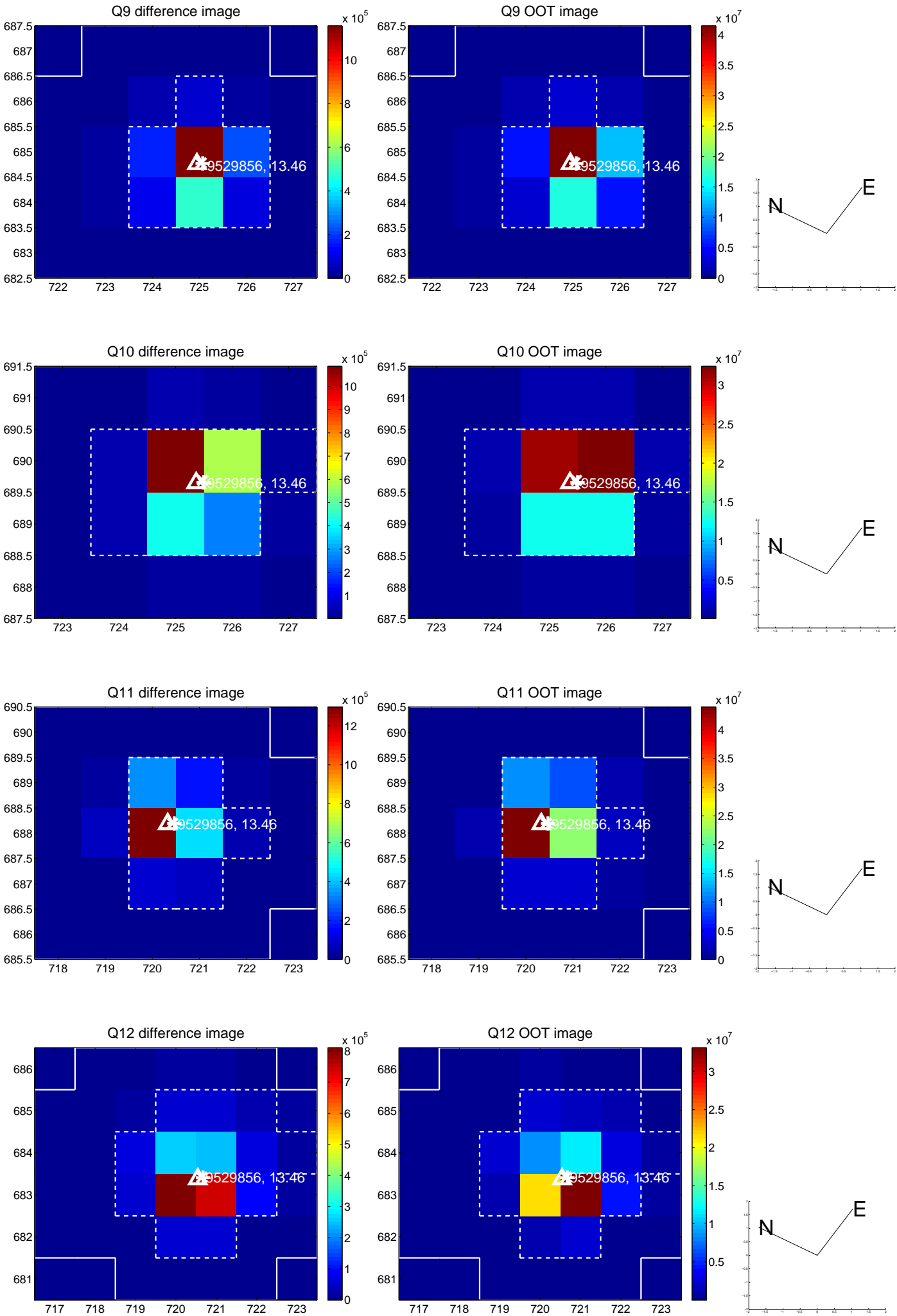


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

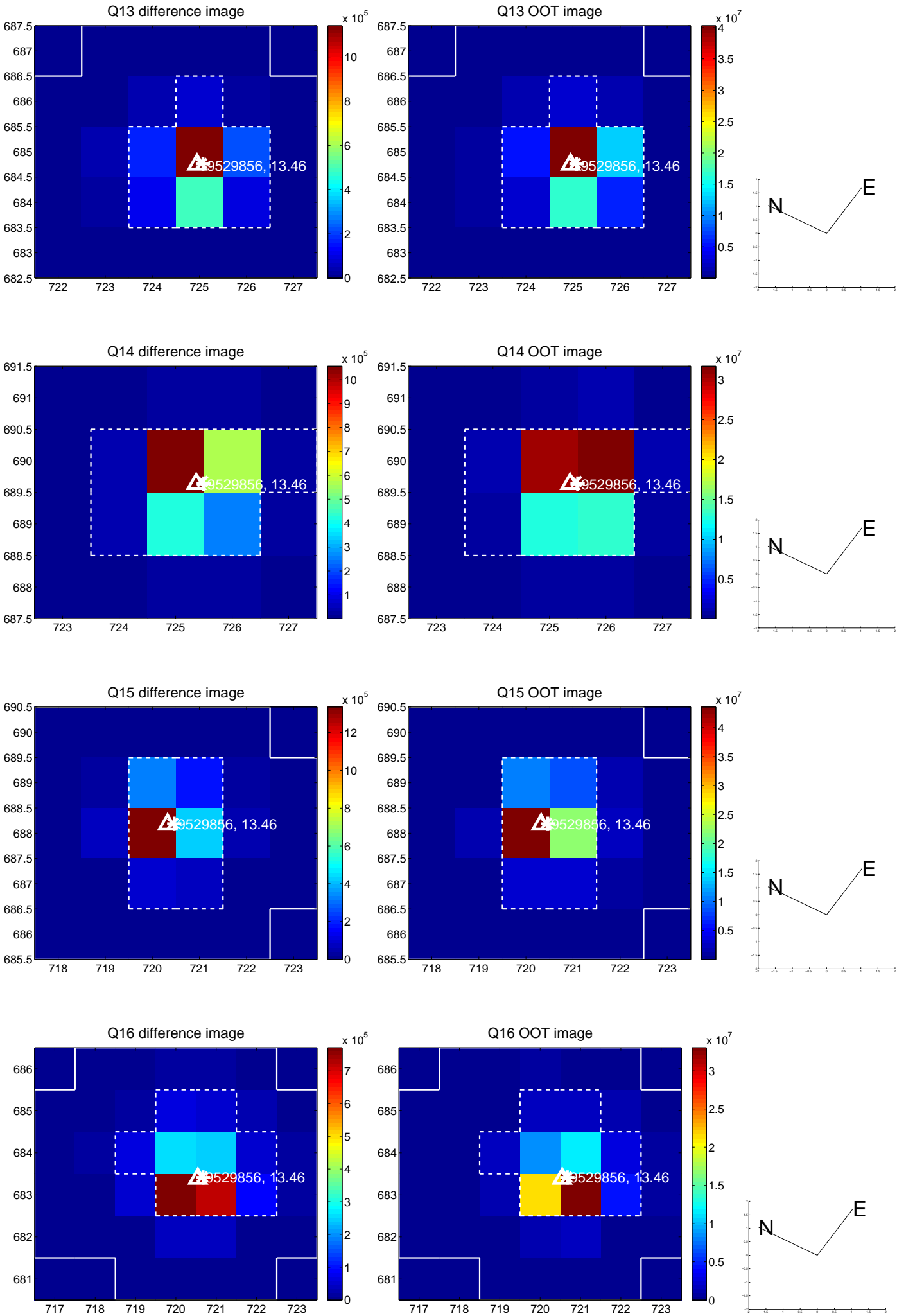




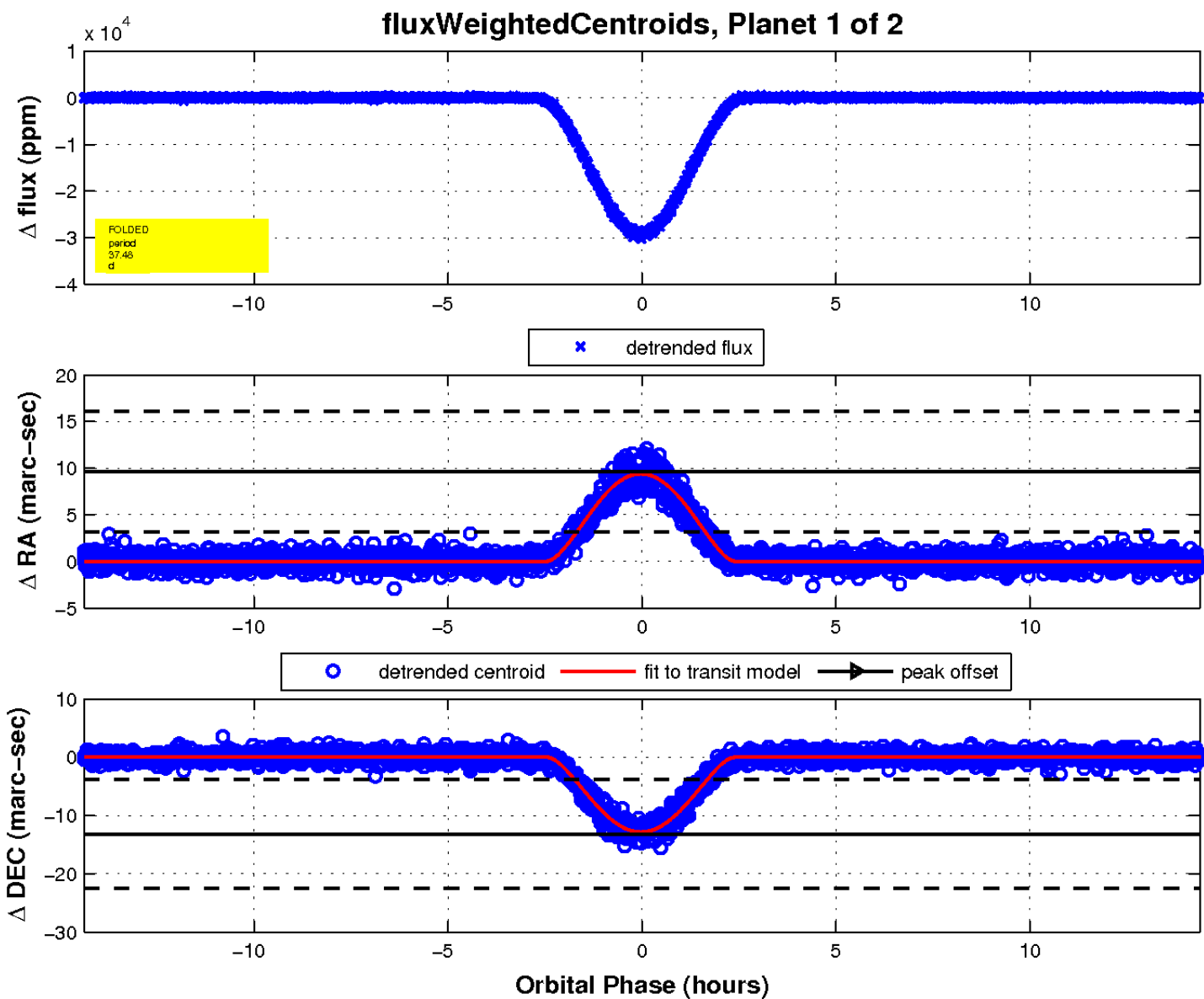
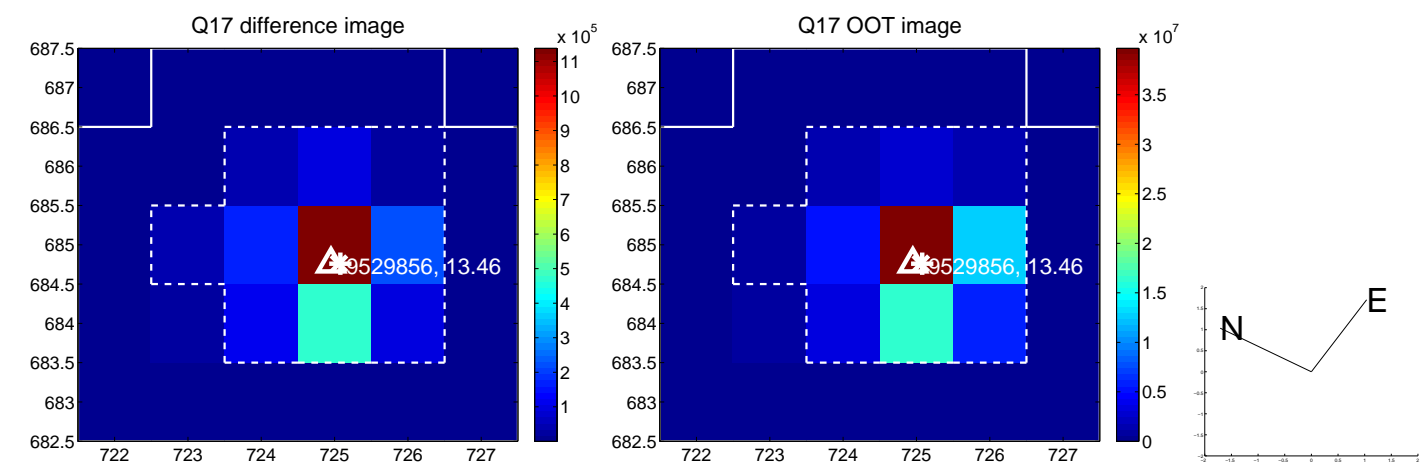
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

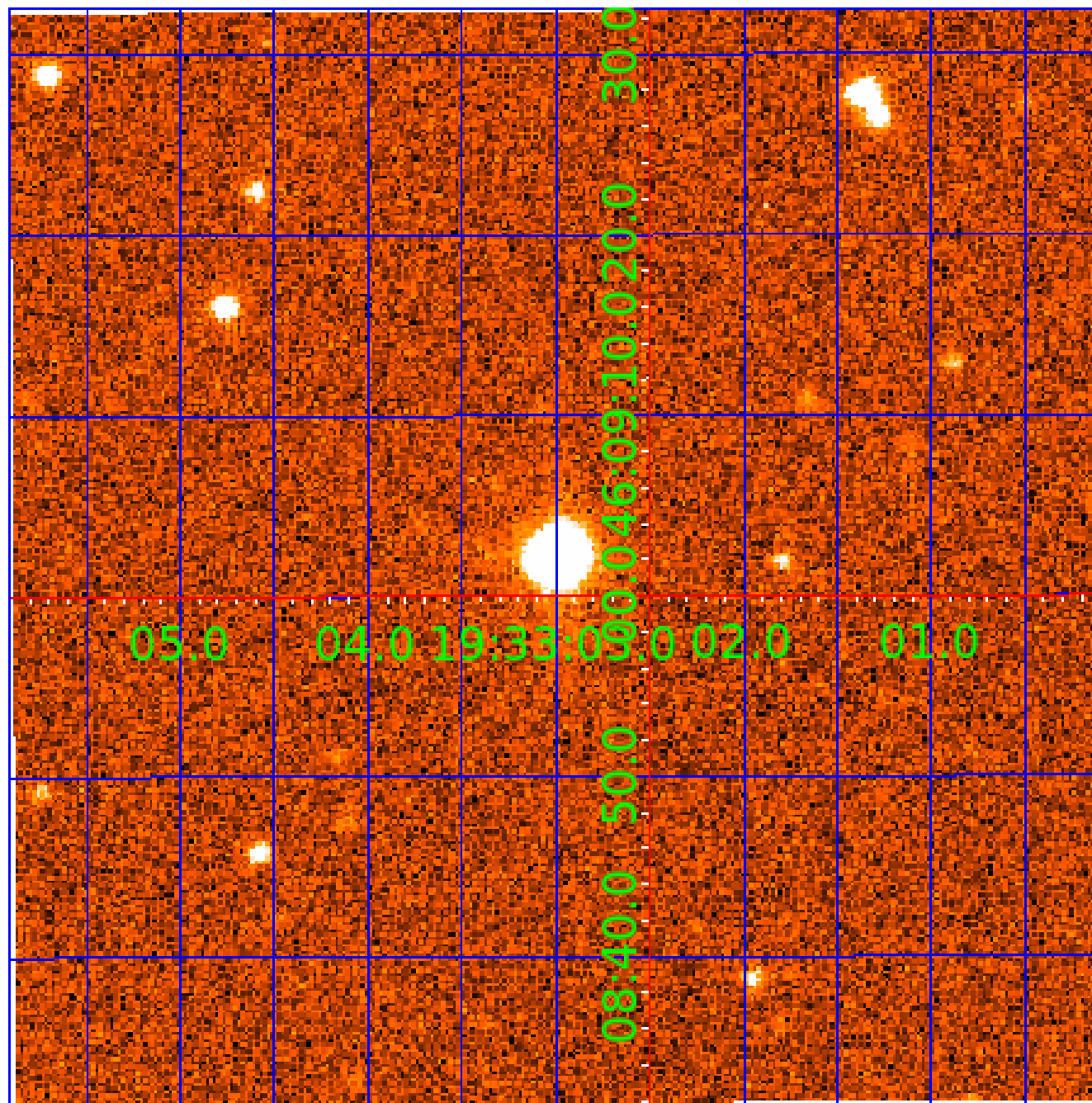


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 009529856

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009529856-01	OBS	7185.01	37.482218	155.840419	28704.8	4.802	1860.0	1351.4	2.42	6422	70.45	156.71
009529856-02	OBS	No	37.482205	163.975509	7475.4	5.024	485.7	466.5	2.42	6422	37.18	156.71

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009529856-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—MOD_ODDEVEN_DV—MOD_ODDEVEN_ALT—DEEP_V_SHAPED—HAS_SEC_TCE
009529856-02	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.

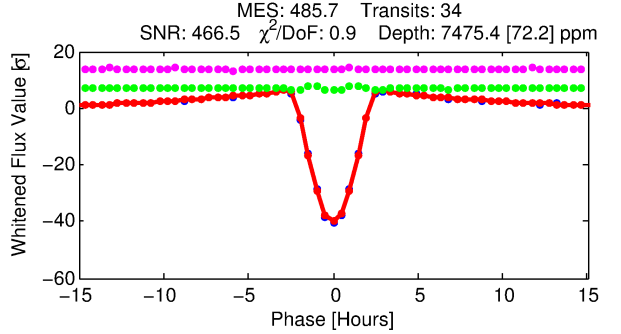
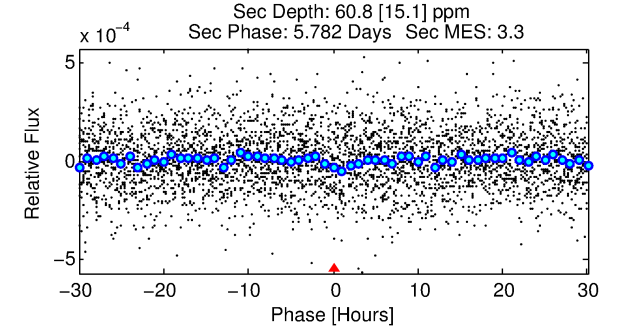
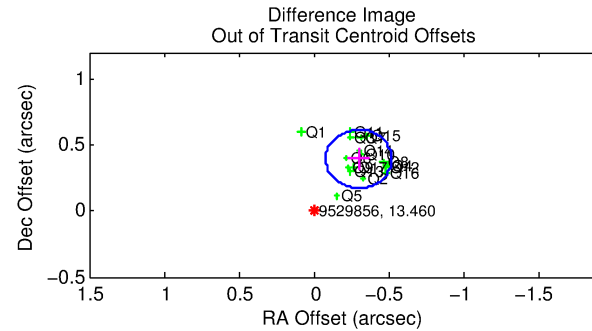
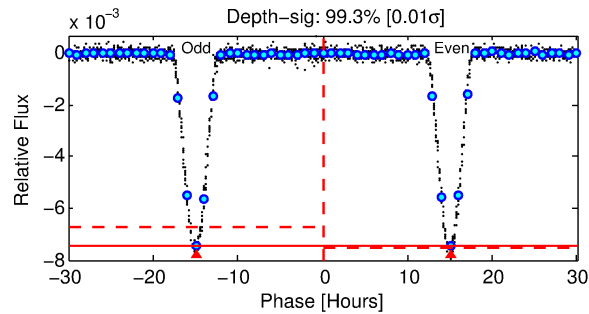
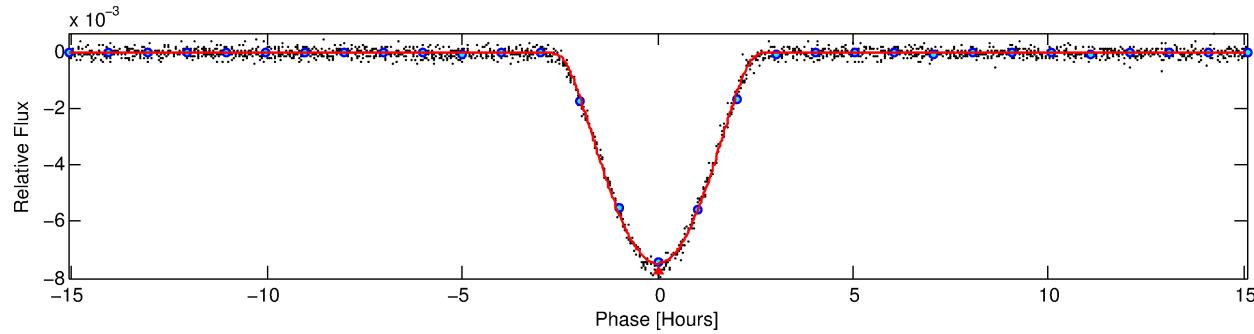
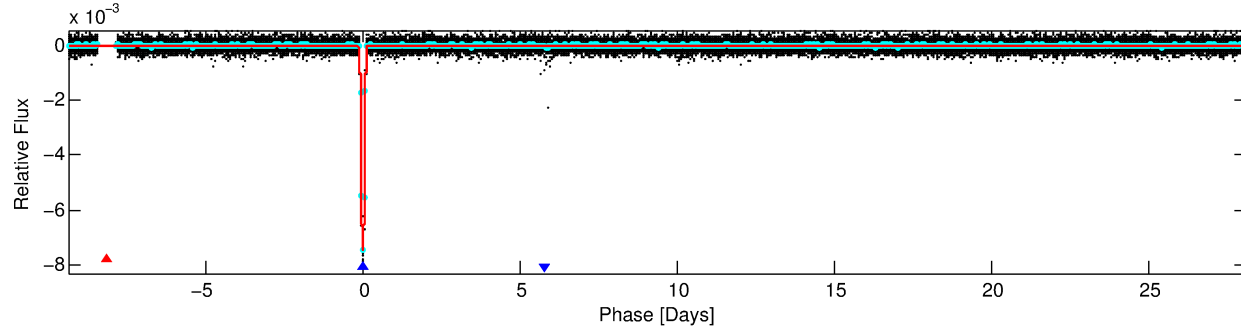
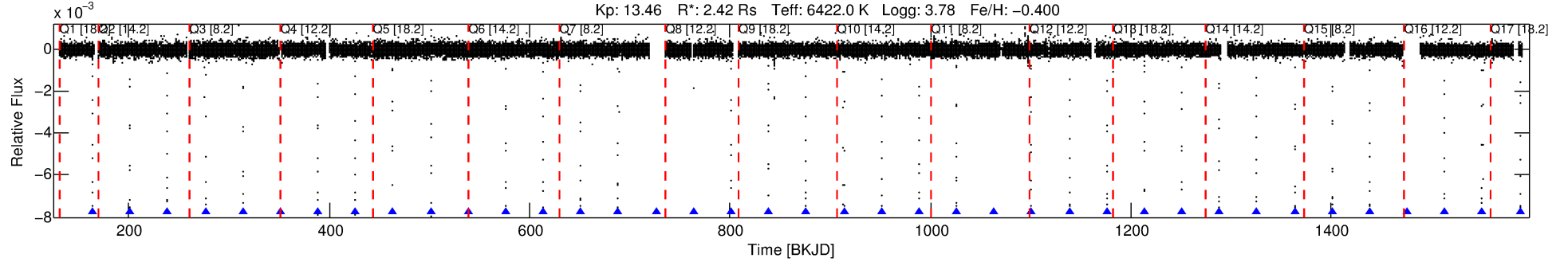
## Ephemeris Match Information For 009529856-02

No Significant Match Found

# DV One-Page Summary

KIC: 9529856 Candidate: 2 of 2 Period: 37.482 d  
KOI: K07185 Corr: No Ephemeris Match

Kp: 13.46 R\*: 2.42 Rs Teff: 6422.0 K Logg: 3.78 Fe/H: -0.400



## DV Fit Results:

Period = 37.48221 [0.00001] d  
Epoch = 163.9755 [0.0002] BKJD  
Rp/R\* = 0.1411 [0.0129]  
a/R\* = 31.36 [0.49]  
b = 1.00 [0.02]  
Seff = 156.71 [88.39]  
Teq = 902 [127] K  
Rp = 37.18 [14.32] Re  
a = 0.2382 [0.0833] AU  
Ag = 1.37 [0.87] [0.43σ]  
Teffp = 1510 [125] K [3.40σ]

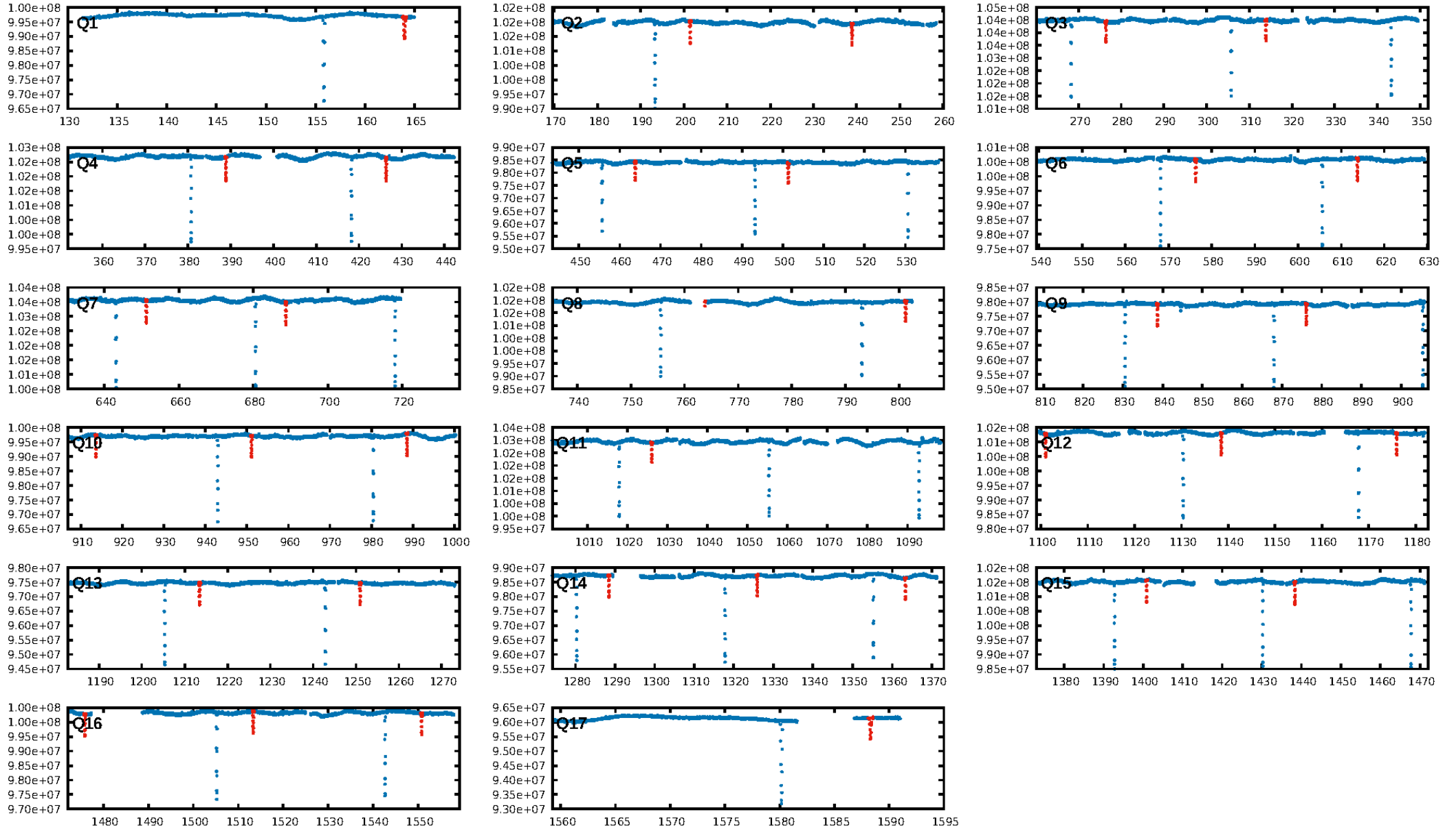
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: 45.1%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [32/32]  
GhostDiagnostic-chr: 4.685  
Centroid-sig: 0.0%  
Centroid-so: 0.504 arcsec [21.90σ]  
OotOffset-rm: 0.495 arcsec [6.75σ]  
KicOffset-rm: 0.407 arcsec [5.53σ]  
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]

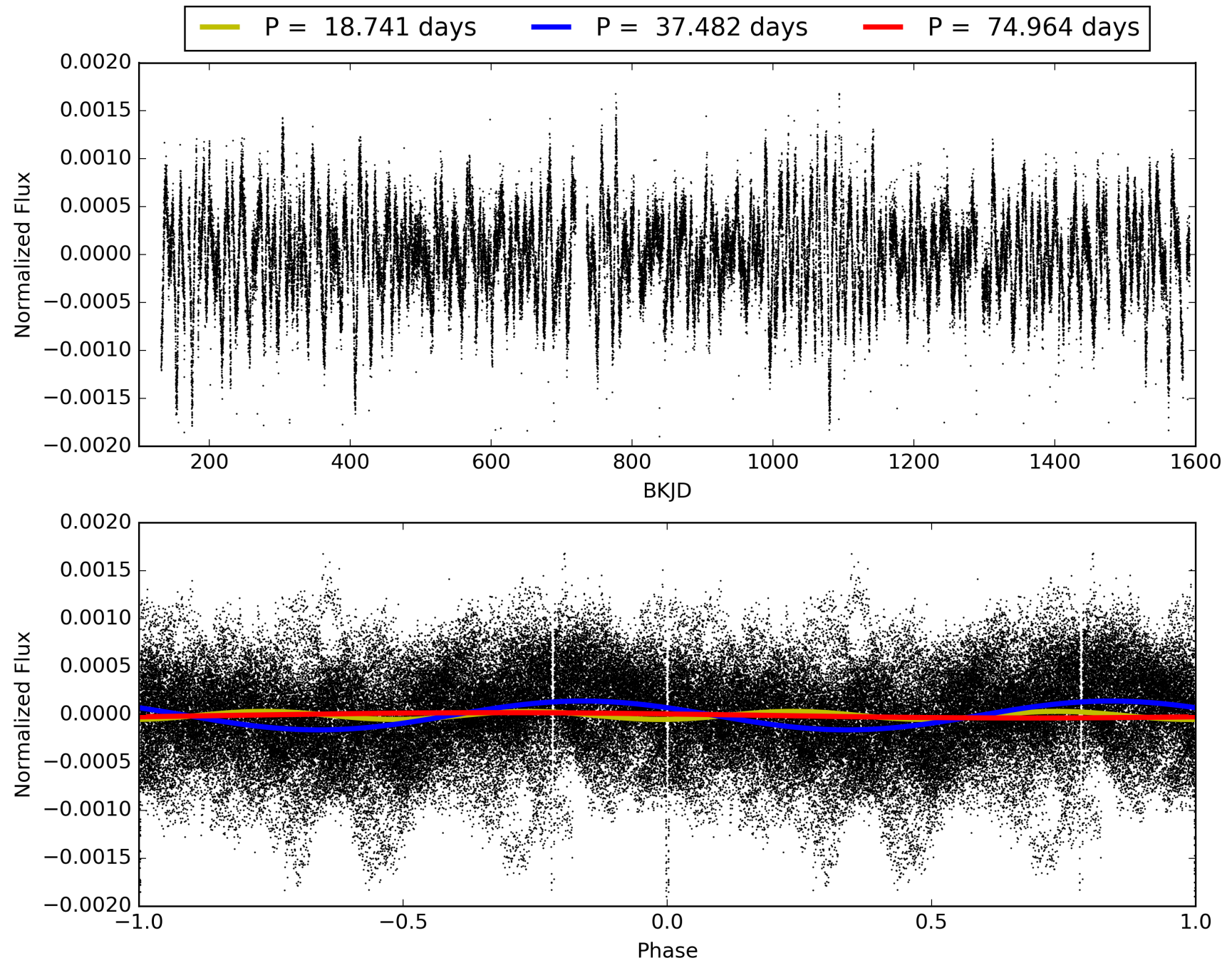
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This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 009529856-02, PDC Light Curves



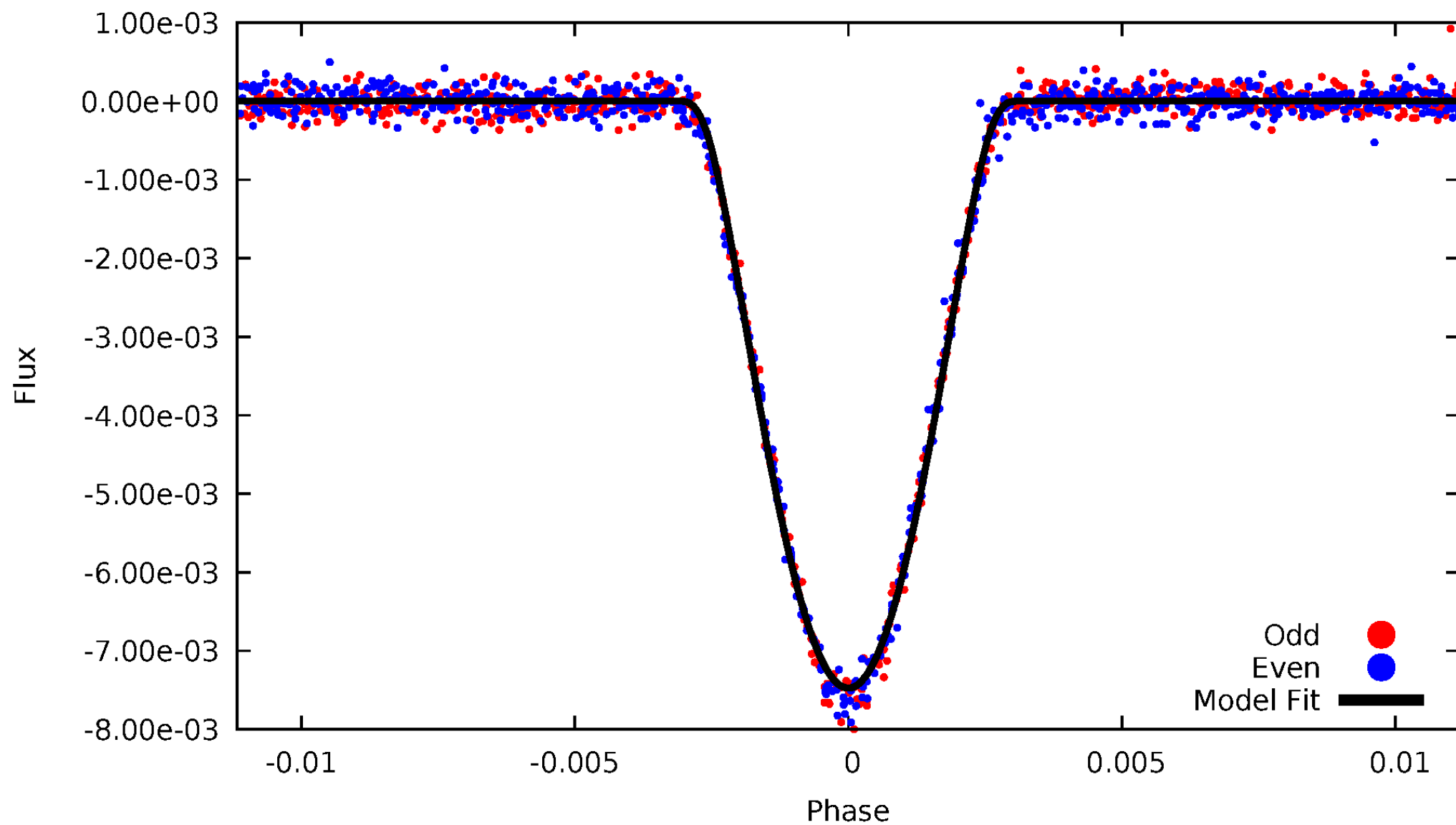
TCE 009529856-02





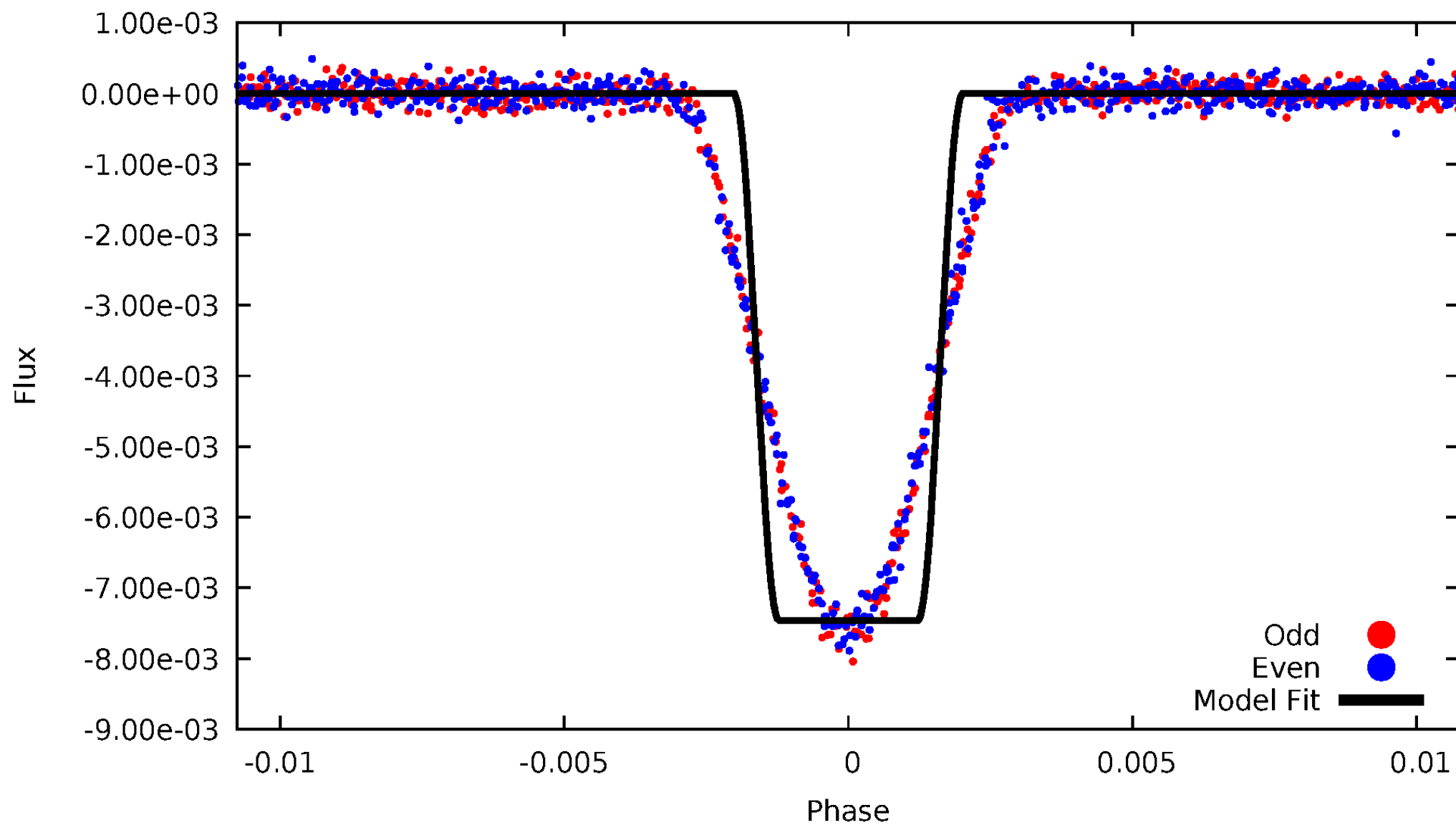
# DV Odd/Even

TCE 009529856-02



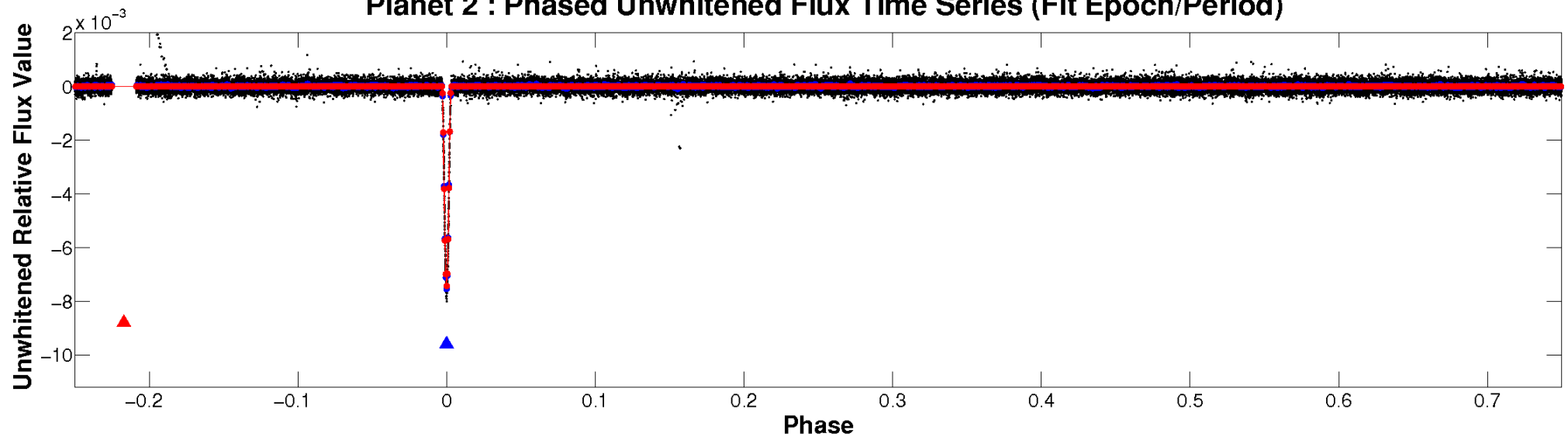
# ALT Odd/Even

TCE 009529856-02

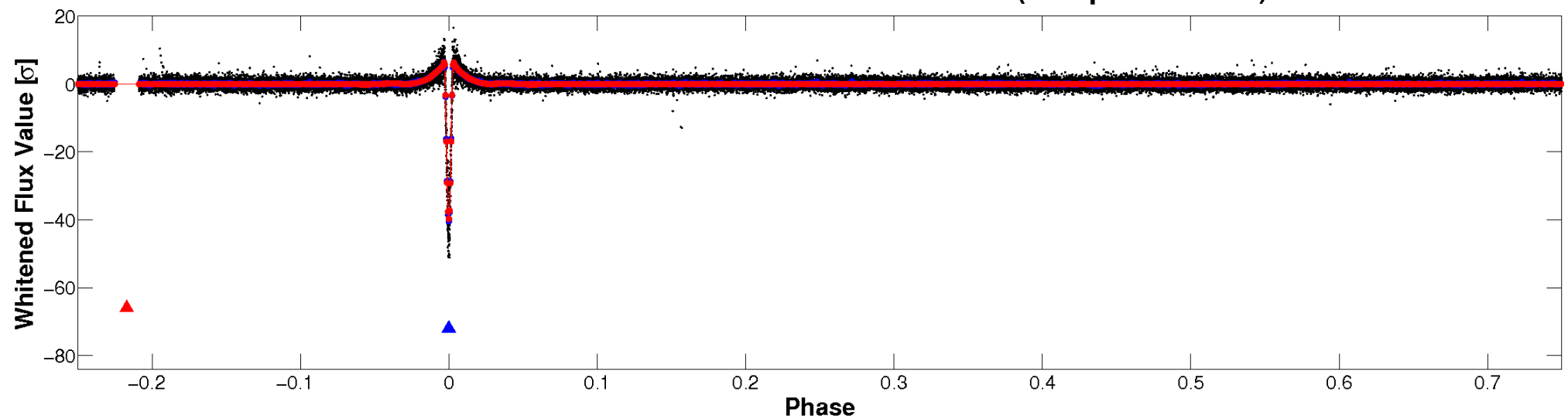


# Non-Whitened Vs. Whitened Light Curve

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

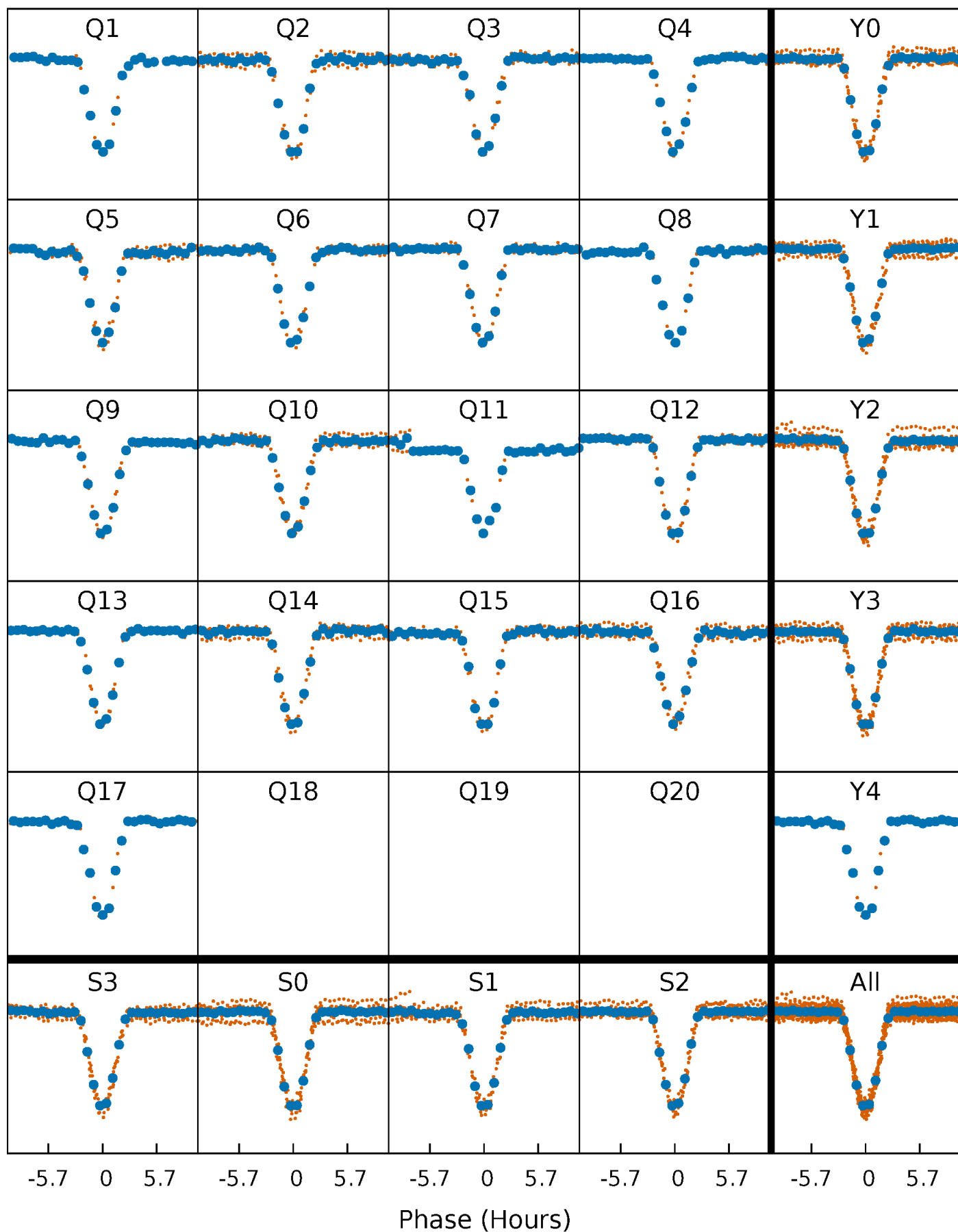


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



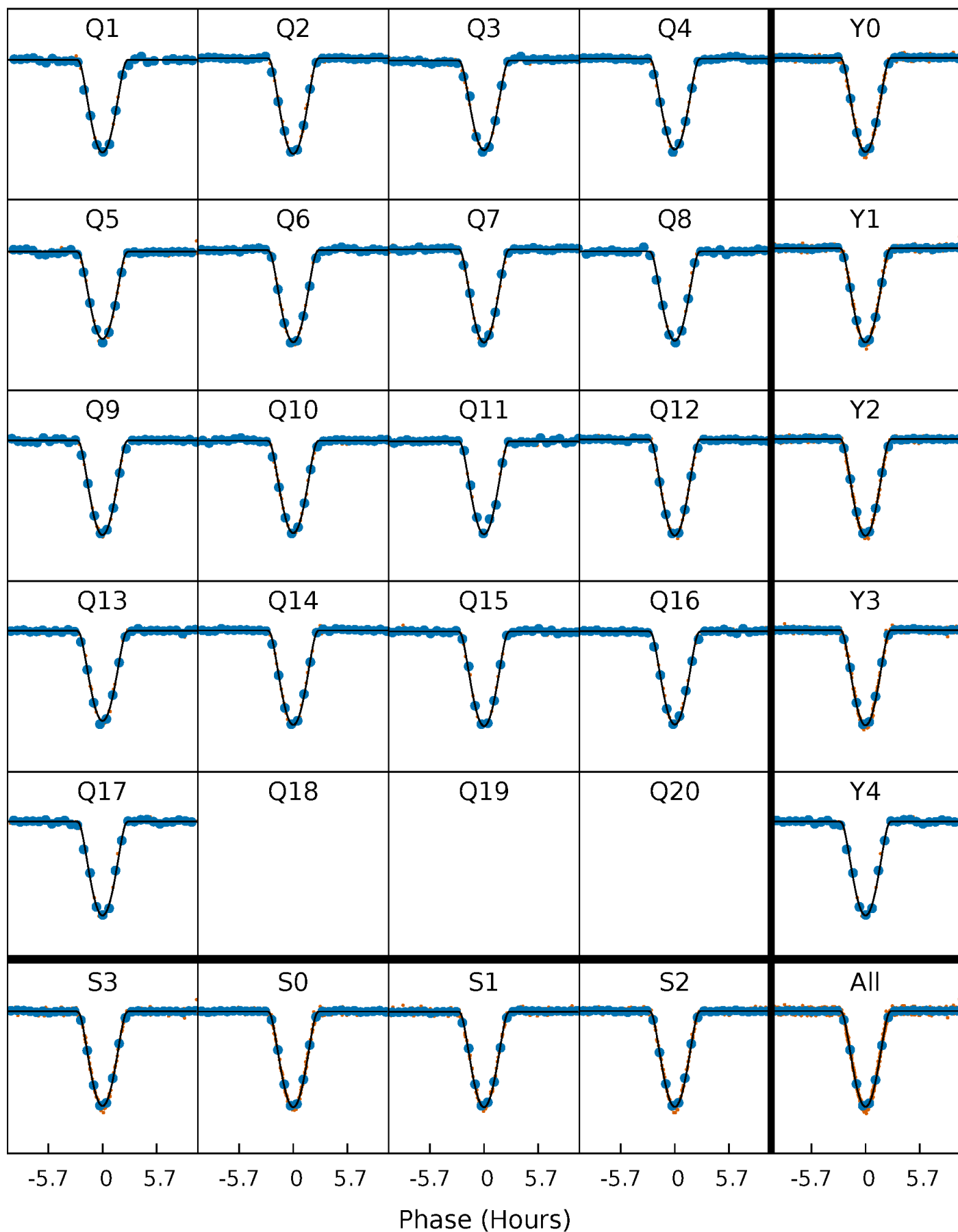
# PDC Quarter-Phased Transit Curves

TCE 009529856-02   P= 37.482205 Days    $T_0=163.975508$  (BKJD)



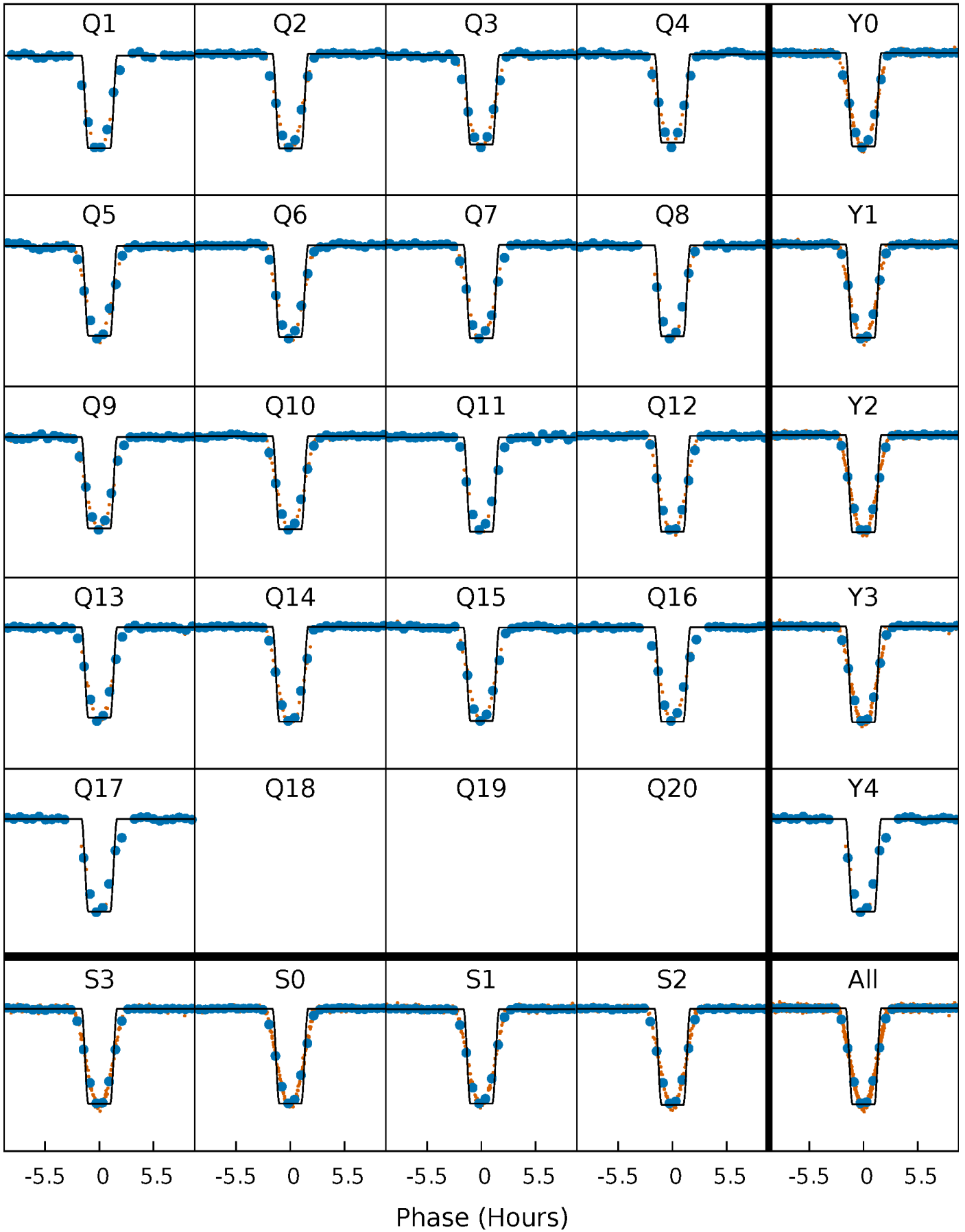
# DV Quarter-Phased Transit Curves

TCE 009529856-02 P= 37.482205 Days  $T_0=163.975508$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

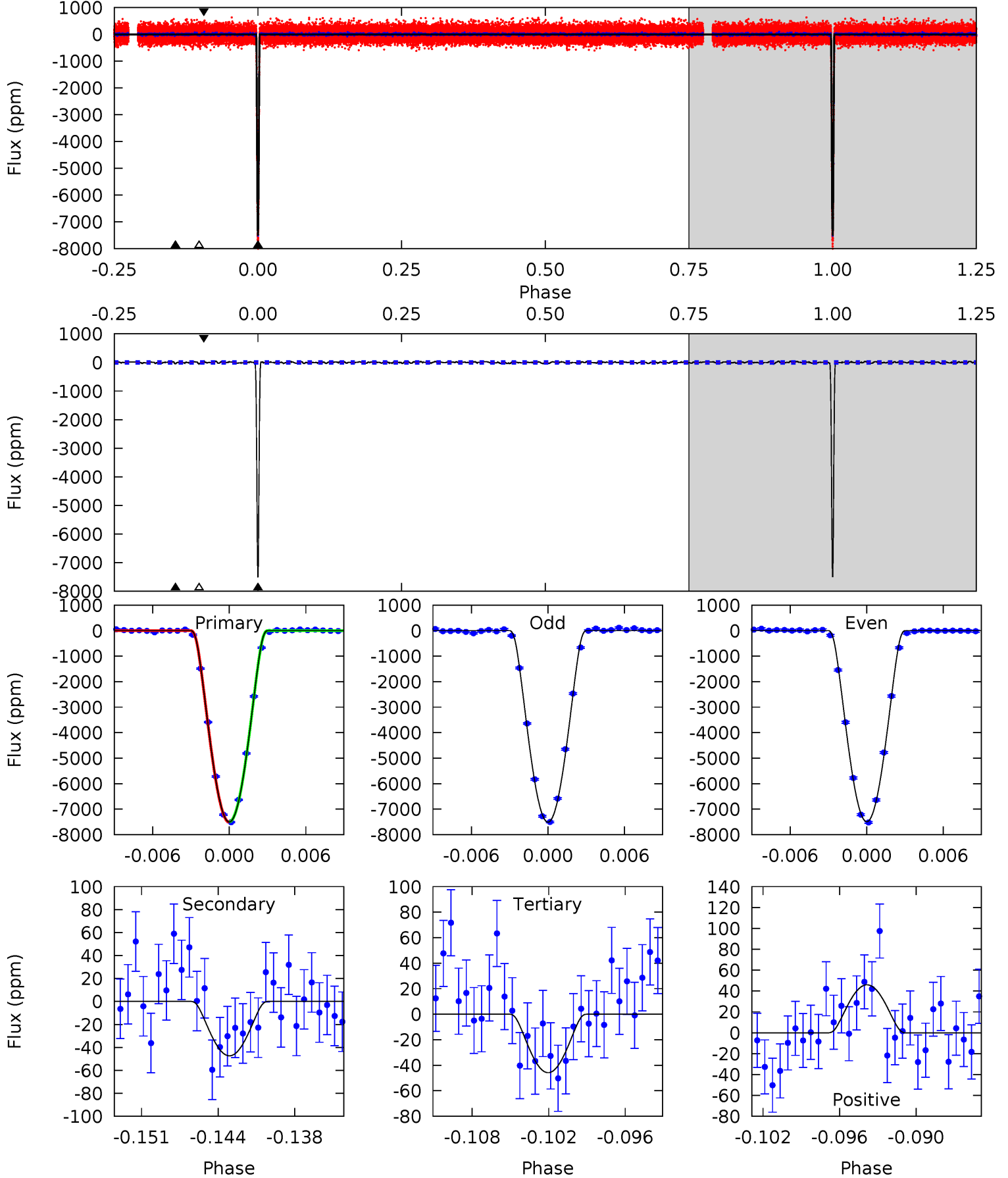
TCE 009529856-02   P= 37.482108 Days    $T_0=163.977276$  (BKJD)



# DV Model-Shift Uniqueness Test

009529856-02, P = 37.482205 Days, E = 126.493303 Days

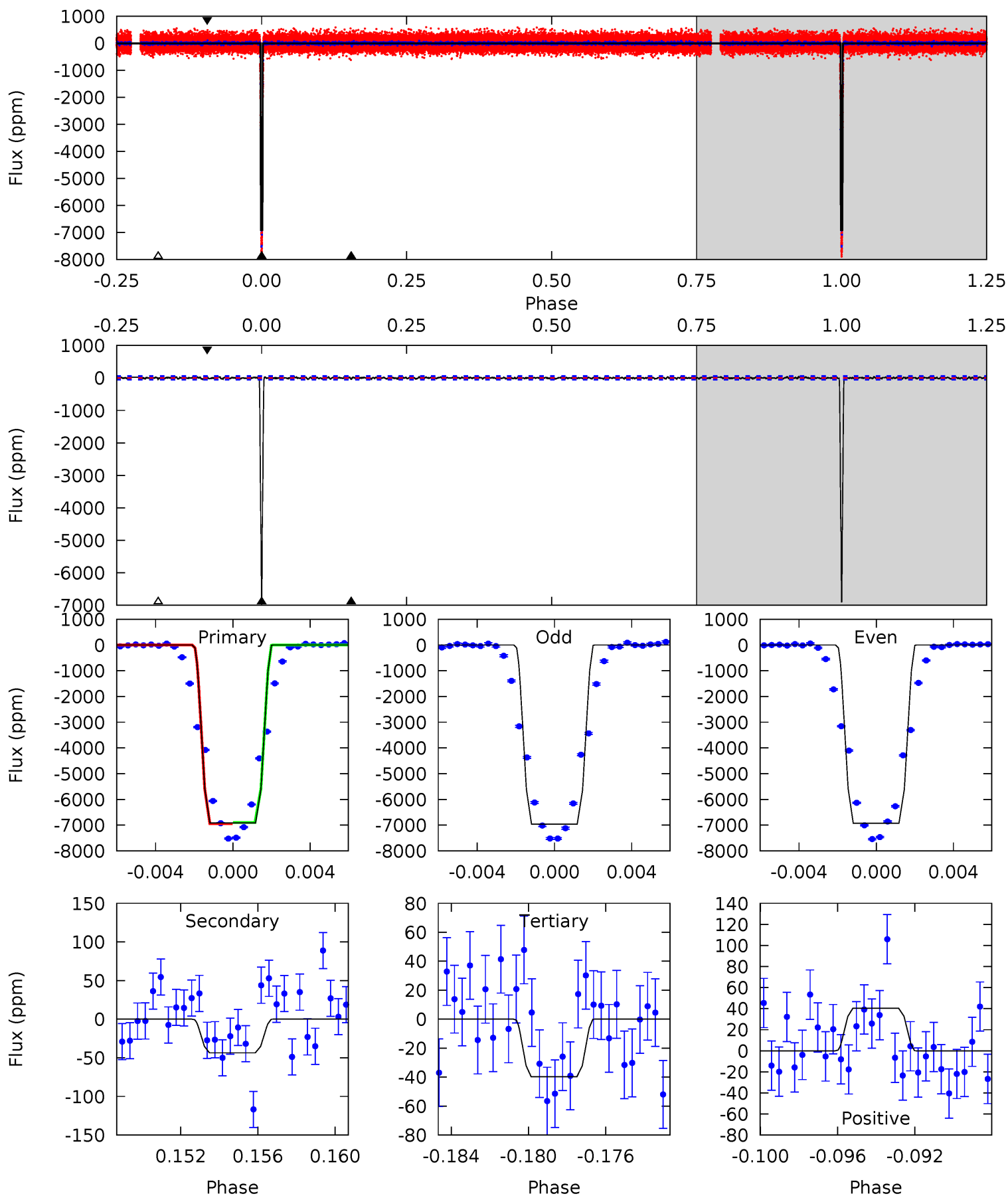
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
955.5	6.03	5.84	5.85	5.12	2.75	1.92	949.7	949.7	0.19	0.17	1.10	0.99	0.01	1.08



# Alt Model-Shift Uniqueness Test

009529856-02, P = 37.482108 Days, E = 126.495168 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
662.3	4.18	3.81	3.87	5.20	2.88	1.20	658.5	658.4	0.37	0.30	1.54	1.00	0.01	2.26





### Stellar Parameters For KIC 009529856

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6422^{+195}_{-176}$	$3.780^{+0.320}_{-0.080}$	$-0.400^{+0.350}_{-0.300}$	$2.415^{+0.387}_{-0.903}$	$1.284^{+0.222}_{-0.247}$	$0.128^{+0.273}_{-0.041}$
	+3%/-3%	+8%/-2%	+87%/-75%	+16%/-37%	+17%/-19%	+213%/-32%
Source	PHO1	FLK73	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 009529856-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-47 \pm 8$	$35.86^{+5.65}_{-7.75}$	$1234^{+70}_{-114}$	$2260^{+91}_{-103}$	$1.219^{+0.637}_{-0.365}$
Alt.	$-44 \pm 10$	$21.75^{+4.46}_{-4.94}$	$1239^{+69}_{-110}$	$2563^{+152}_{-142}$	$2.972^{+2.021}_{-1.094}$

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

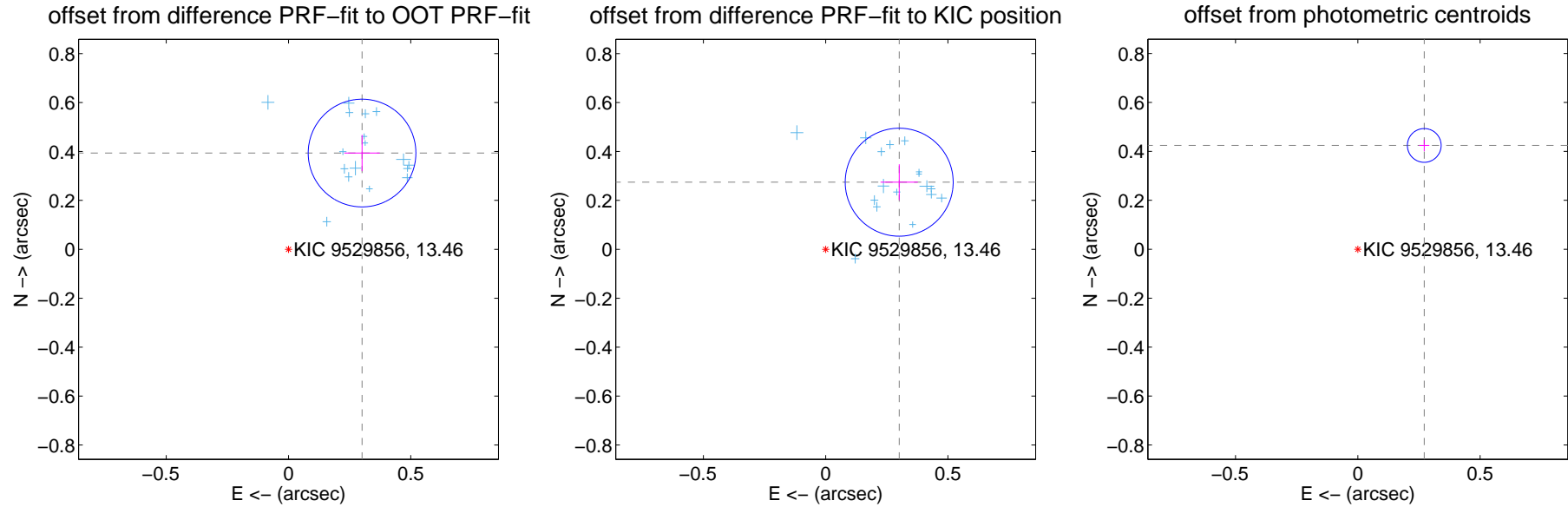
## DV Centroid Data

Supplemental centroid analysis for 009529856-02. Kepler magnitude: 13.46. Transit SNR 466.55

There are 17 quarters with good PRF difference image offsets

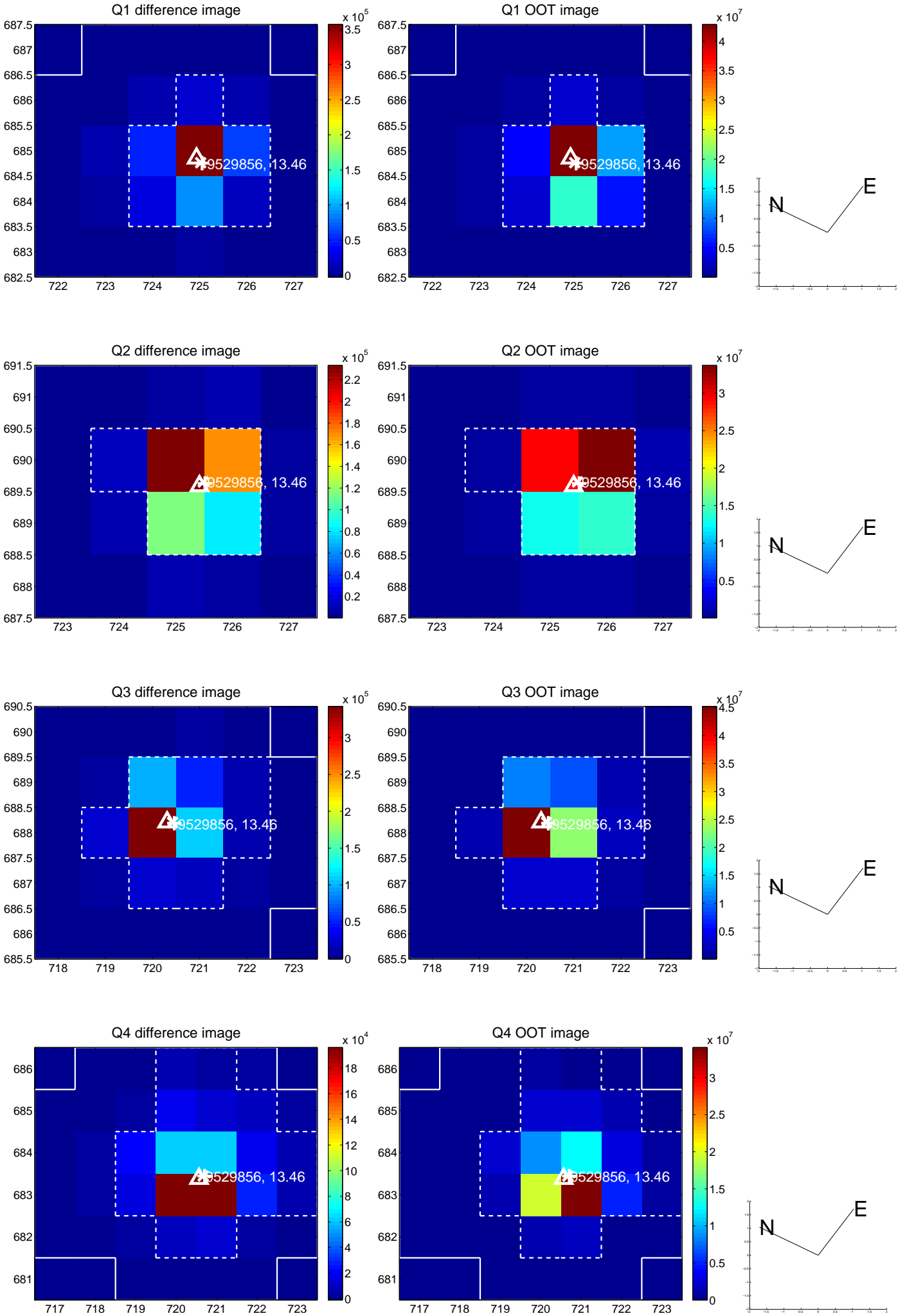
The direct PRF centroid is offset from the target star catalog position by about 0.08 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.495 \pm 0.073$	$6.75$	$-0.301 \pm 0.073$	$0.394 \pm 0.074$
PRF-fit source offset from KIC position	$0.407 \pm 0.074$	$5.53$	$-0.301 \pm 0.076$	$0.274 \pm 0.073$
photometric centroid source offset	$0.50 \pm 0.02$	$21.90$	$-0.27 \pm 0.02$	$0.42 \pm 0.02$

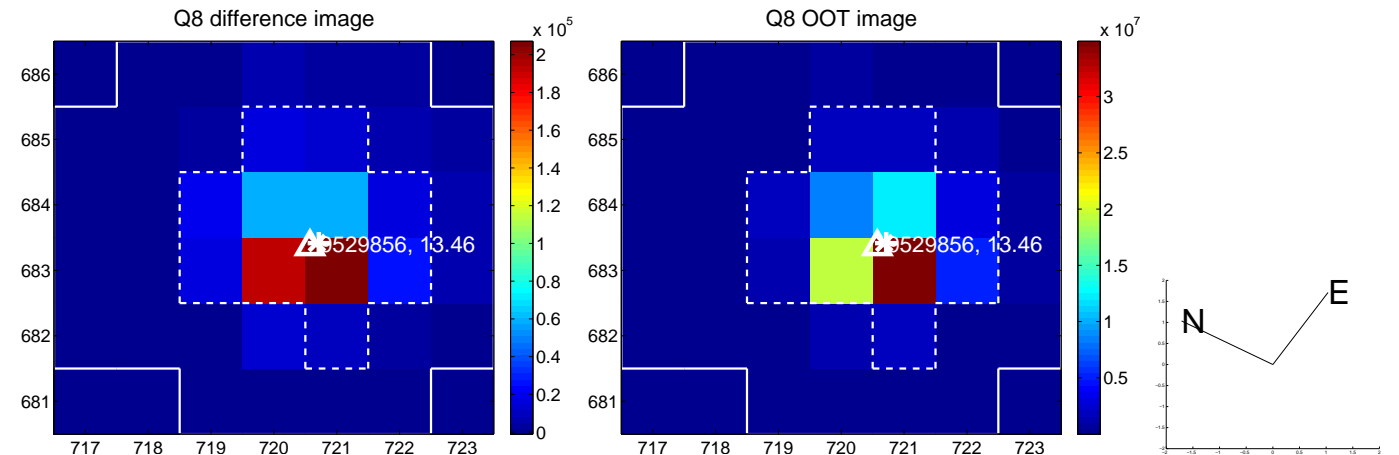
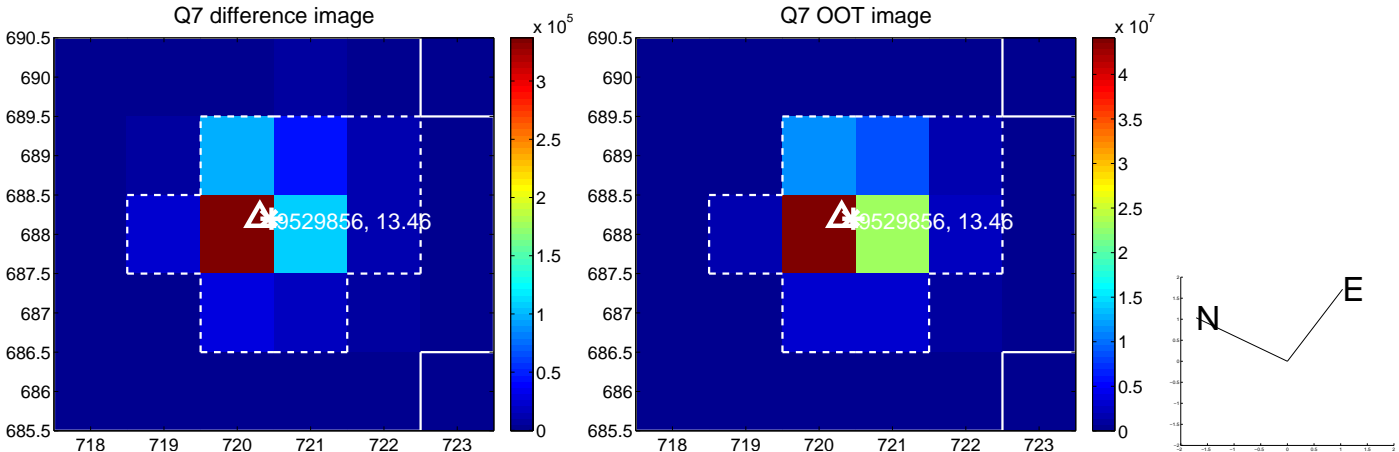
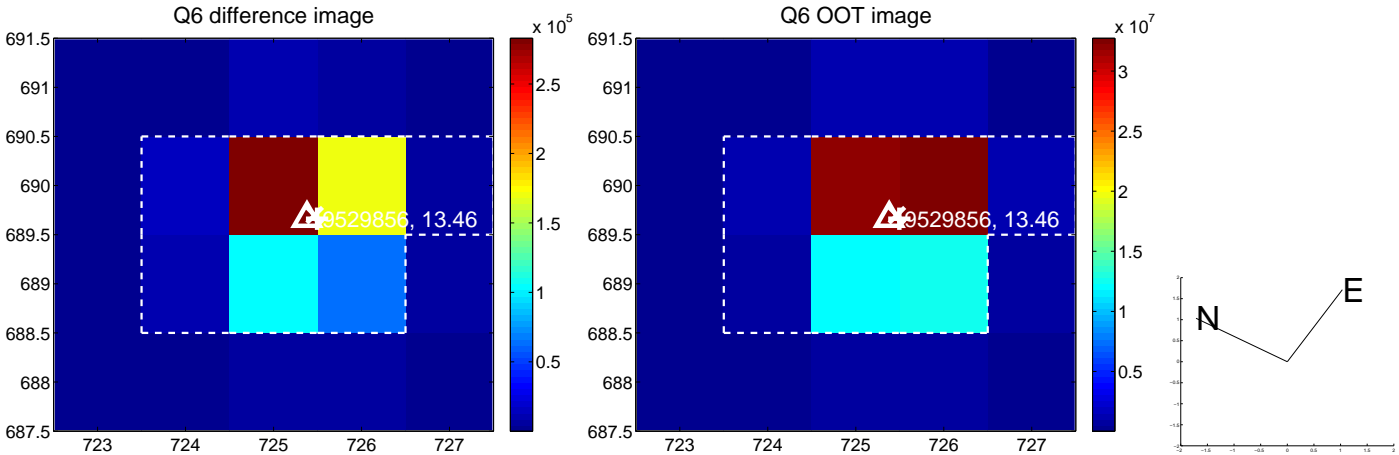
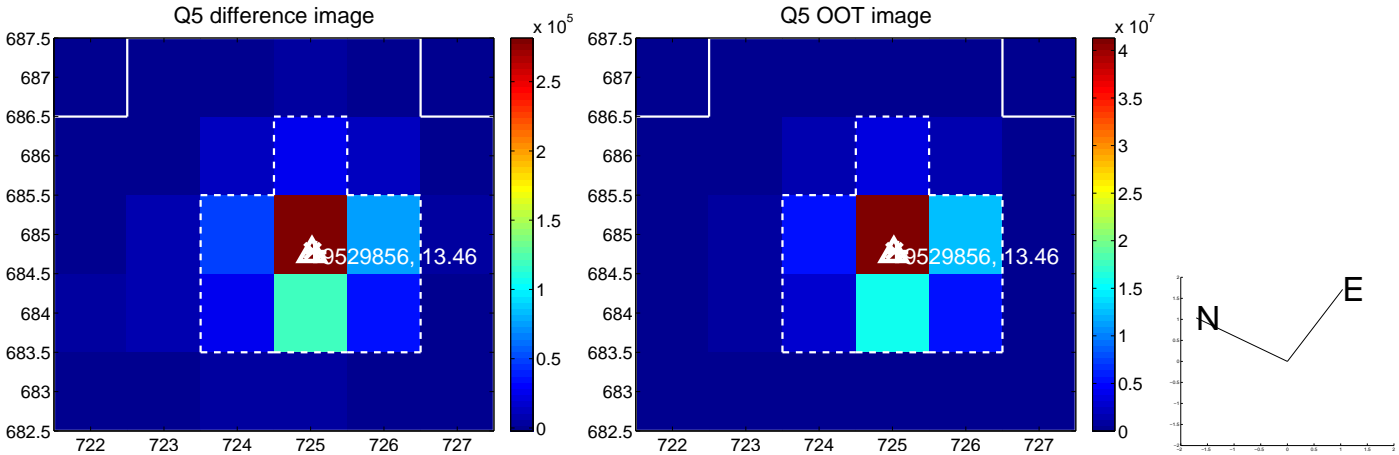


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

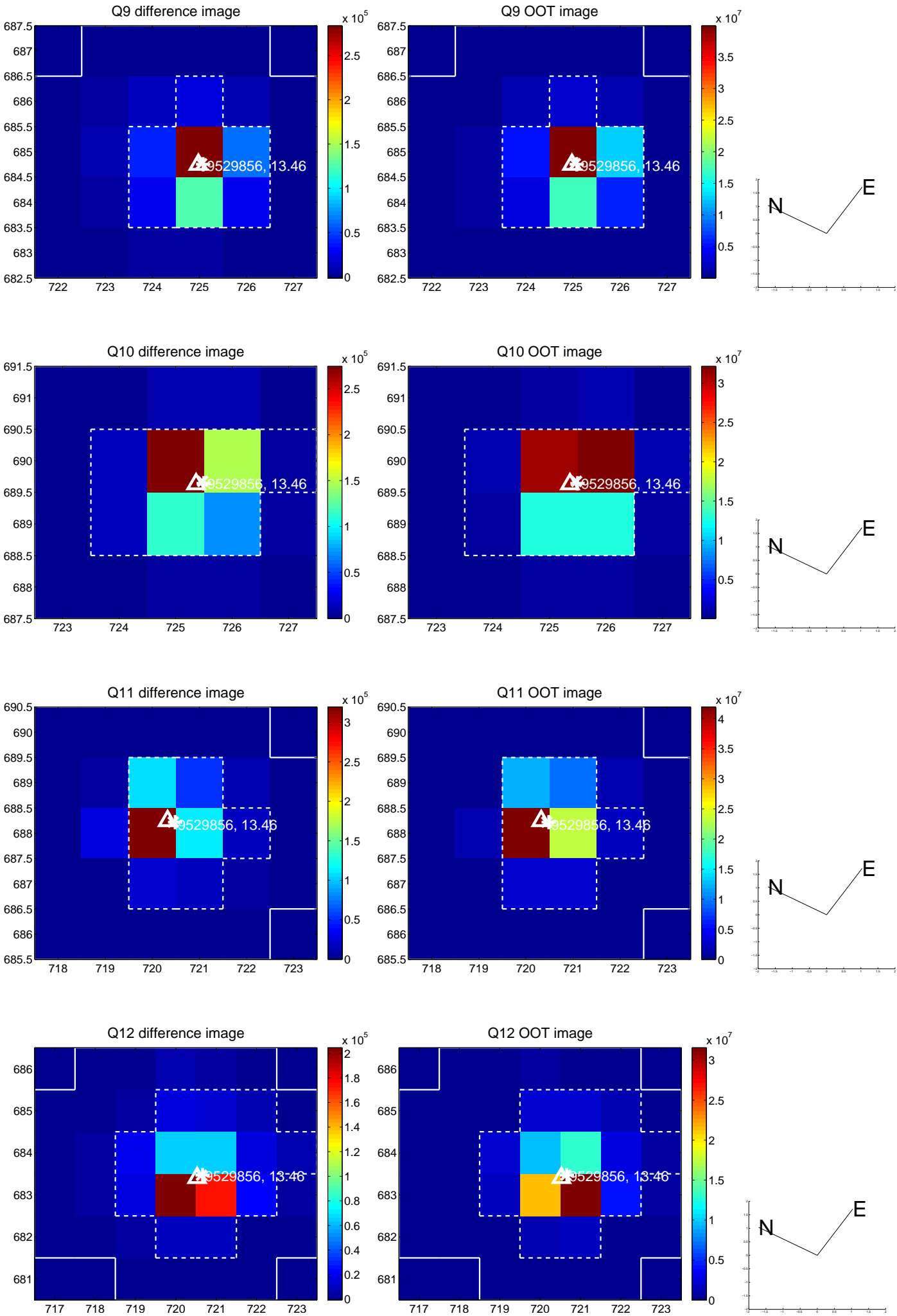
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



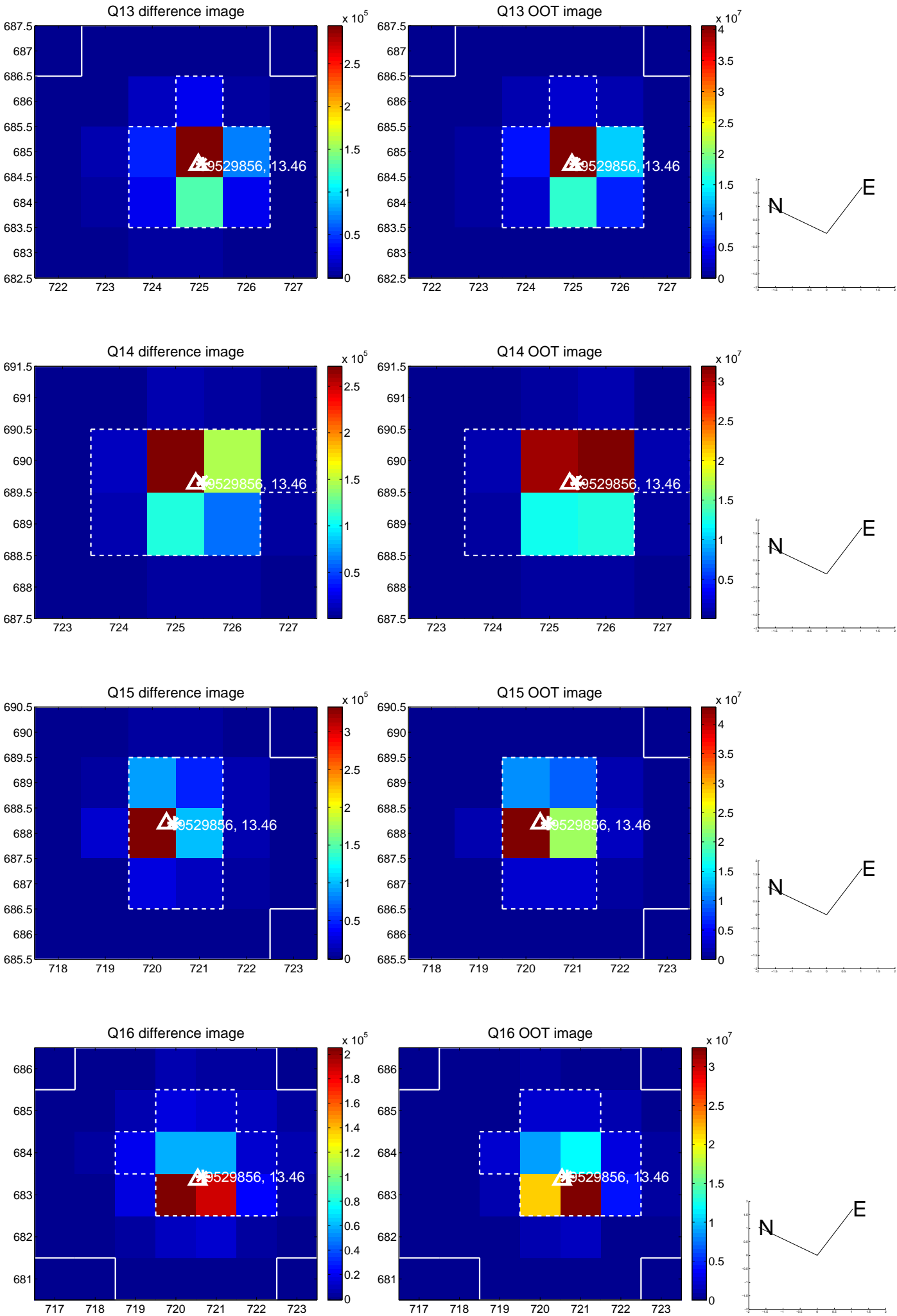
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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.





UKIRT Image

Declination

