

# KIC 008879427

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008879427-01	OBS	7104.01	16.313282	136.853931	71644.5	4.460	2901.1	2327.2	1.01	6008	31.02	73.70
008879427-02	OBS	No	16.313280	133.221949	2116.1	4.603	91.1	93.3	1.01	6008	7.80	73.70

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008879427-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—DEEP_V_SHAPED—HAS_SEC_TCE
008879427-02	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.

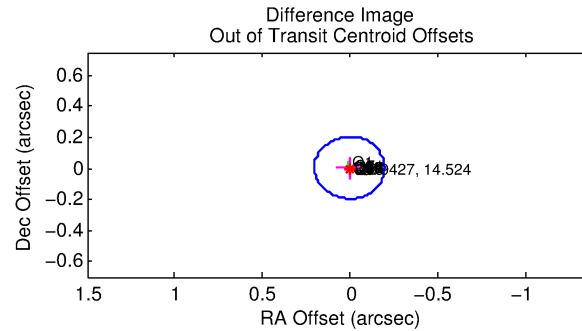
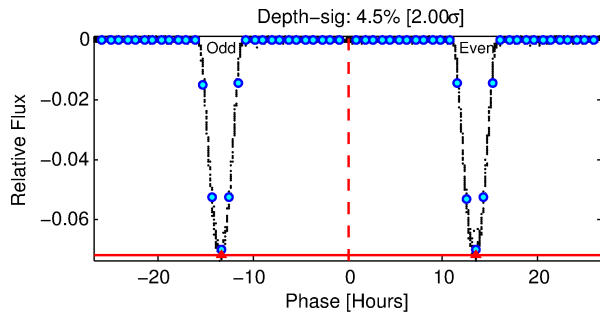
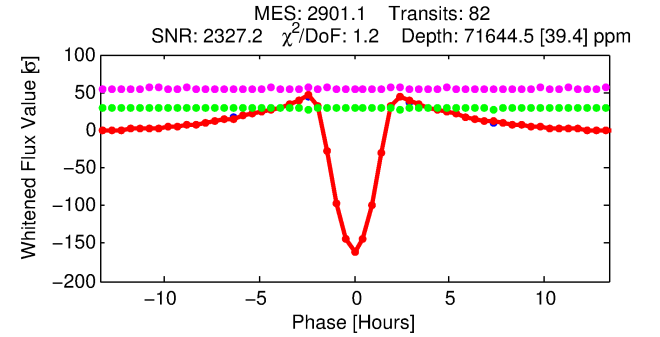
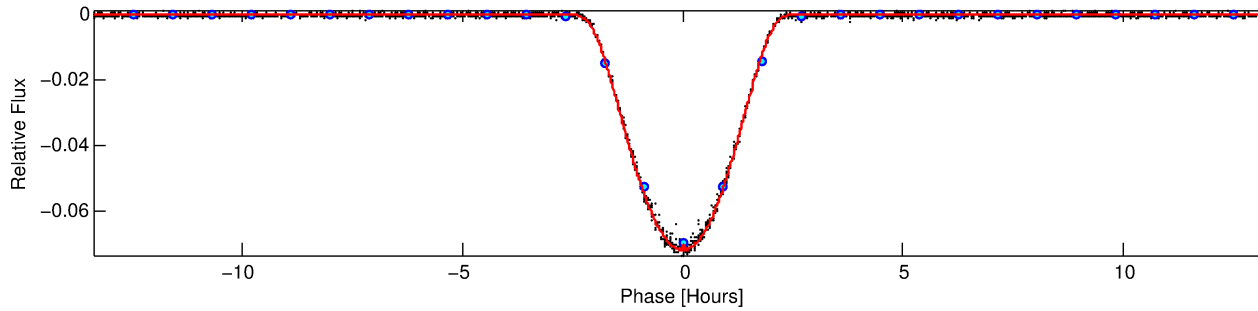
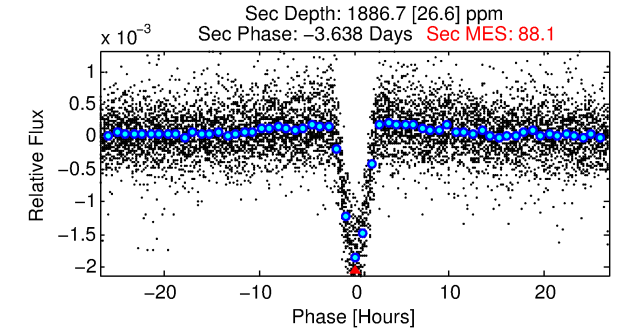
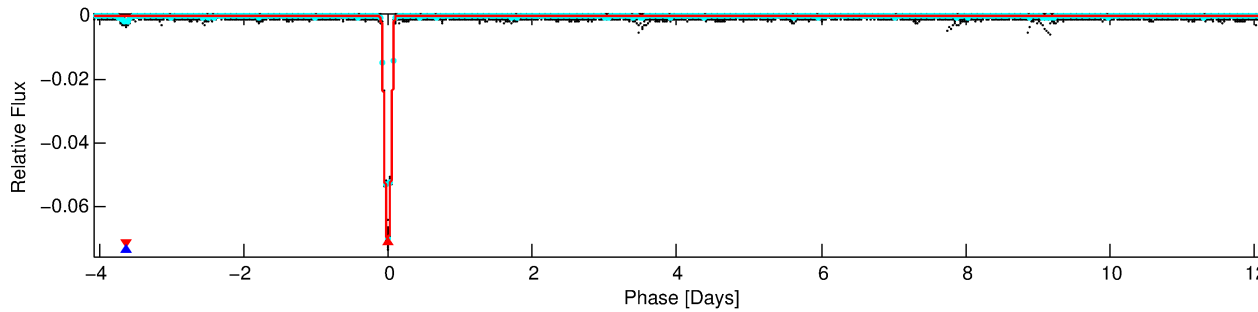
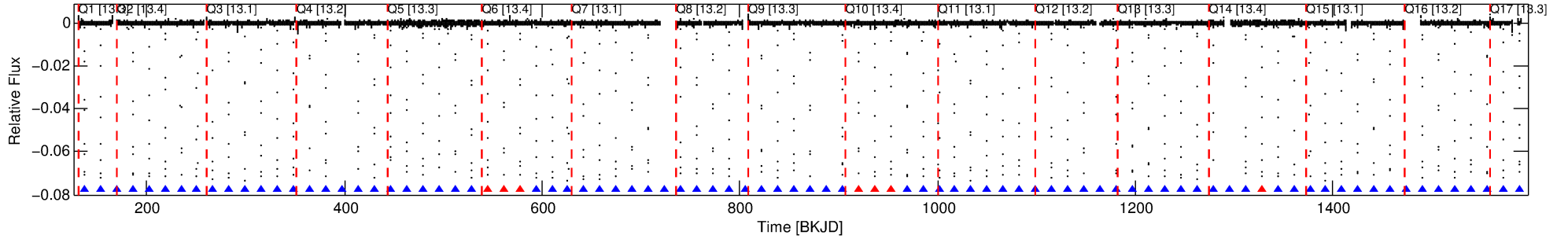
## Ephemeris Match Information For 008879427-01

No Significant Match Found

# DV One-Page Summary

KIC: 8879427 Candidate: 1 of 2 Period: 16.313 d  
KOI: K07104.01 Corr: 1.000

Kp: 14.52 R\*: 1.01 Rs Teff: 6008.0 K Logg: 4.44 Fe/H: -0.100



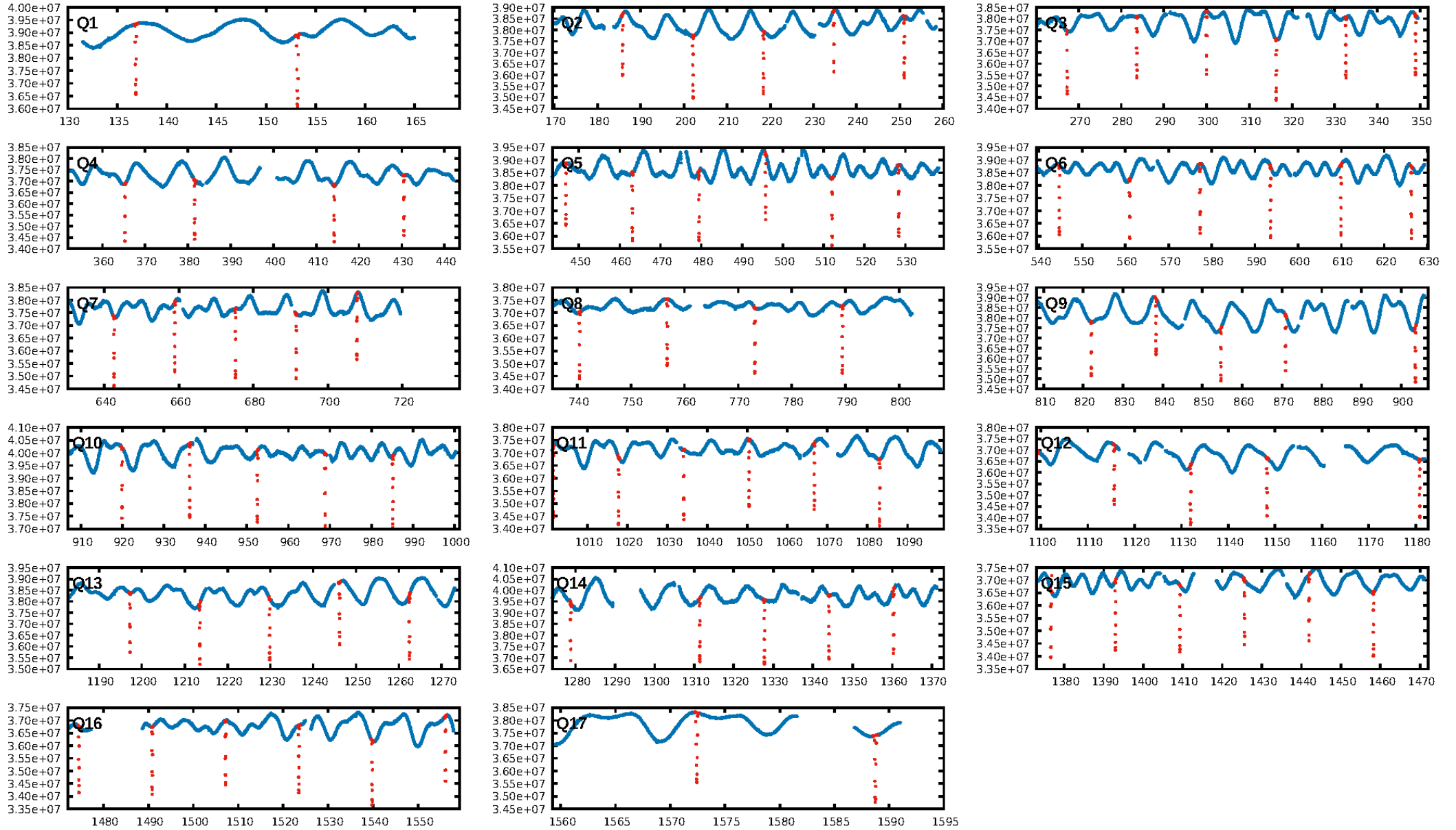
## DV Fit Results:

Period = 16.31328 [0.00000] d  
Epoch = 136.8539 [0.0000] BKJD  
Rp/R\* = 0.2826 [0.0006]  
a/R\* = 28.62 [0.02]  
b = 0.77 [0.00]  
Seff = 73.70 [29.75]  
Teq = 747 [75] K  
Rp = 31.02 [9.50] Re  
a = 0.1266 [0.0329] AU  
Ag = 17.29 [6.60] [2.47σ]  
Teffp = 2355 [78] K [14.81σ]

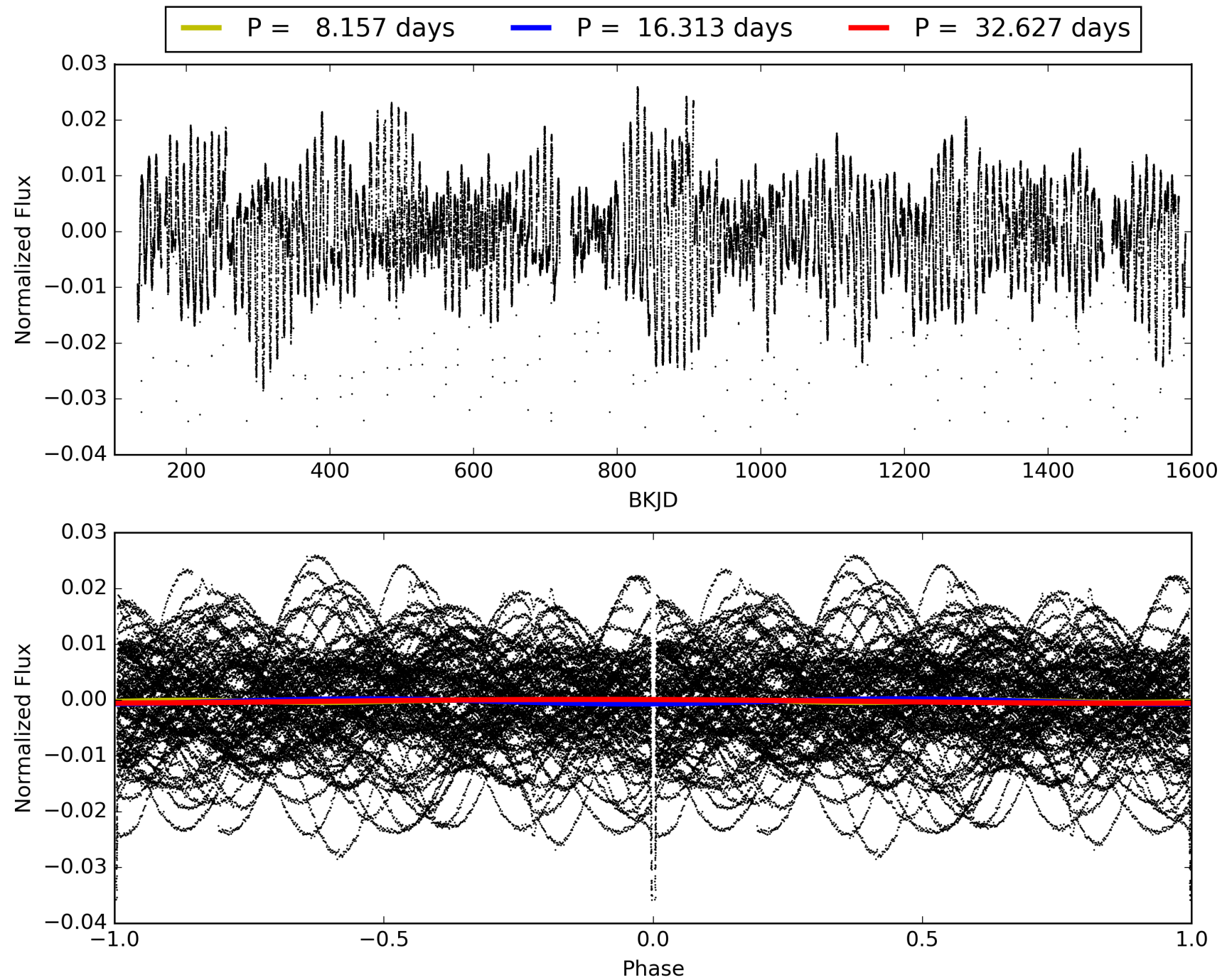
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 78.8%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 0.91 [71/78]  
GhostDiagnostic-chr: 1.858  
Centroid-sig: 0.0%  
Centroid-so: 0.101 arcsec [32.77σ]  
OotOffset-rm: 0.007 arcsec [0.10σ]  
KicOffset-rm: 0.121 arcsec [1.80σ]  
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 008879427-01, PDC Light Curves

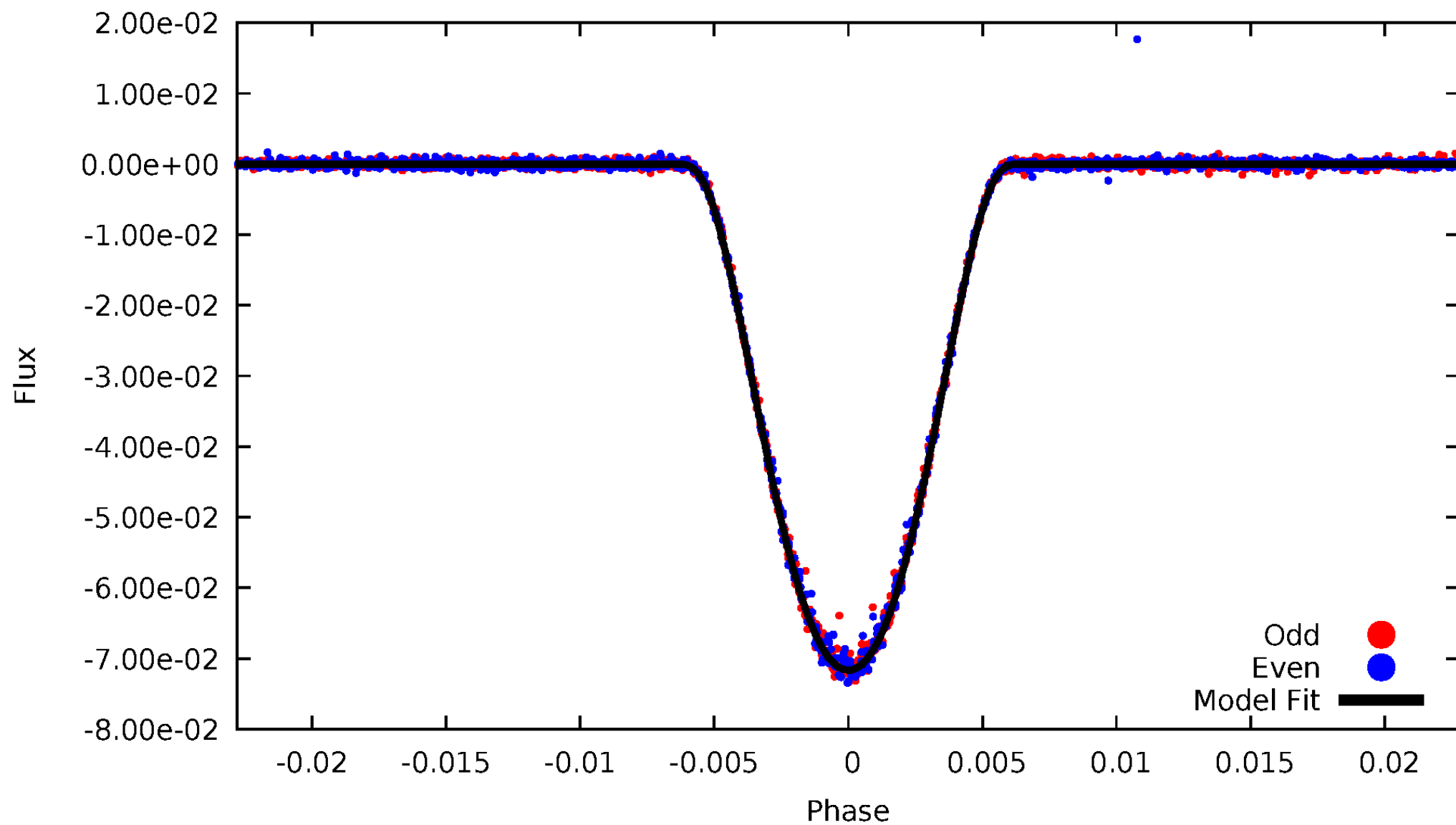


TCE 008879427-01



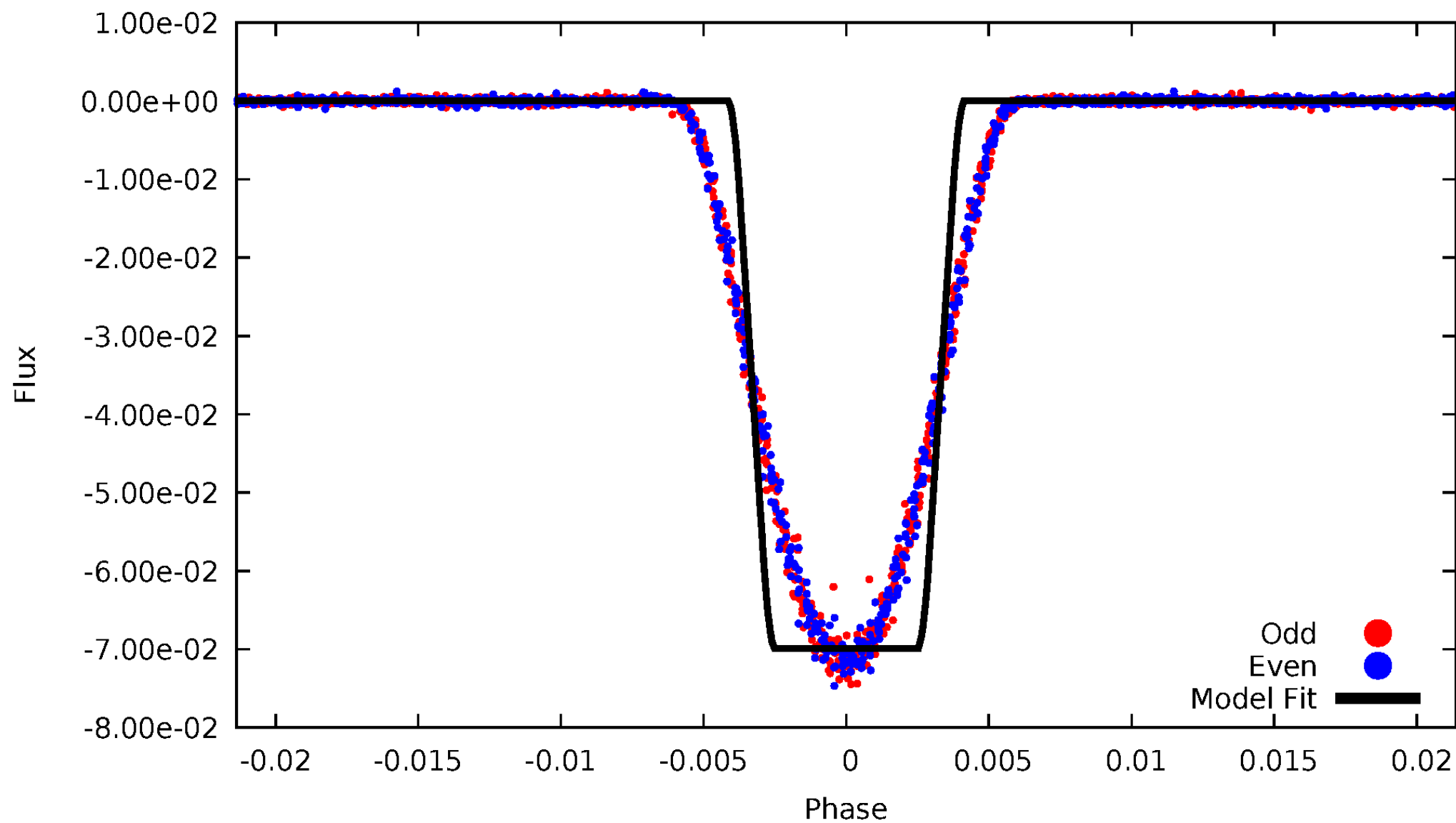
# DV Odd/Even

TCE 008879427-01



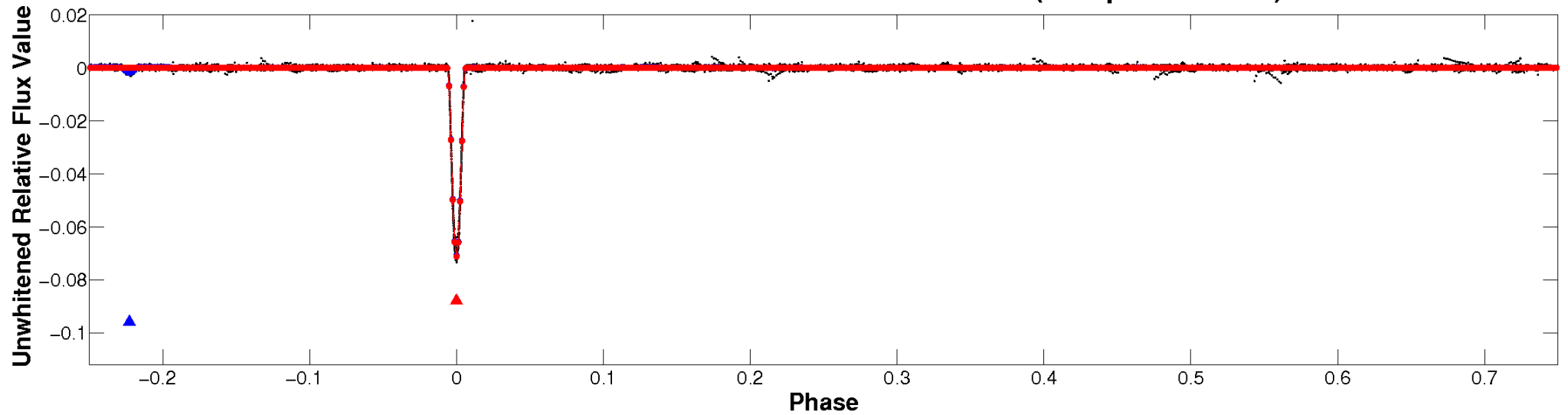
# ALT Odd/Even

TCE 008879427-01

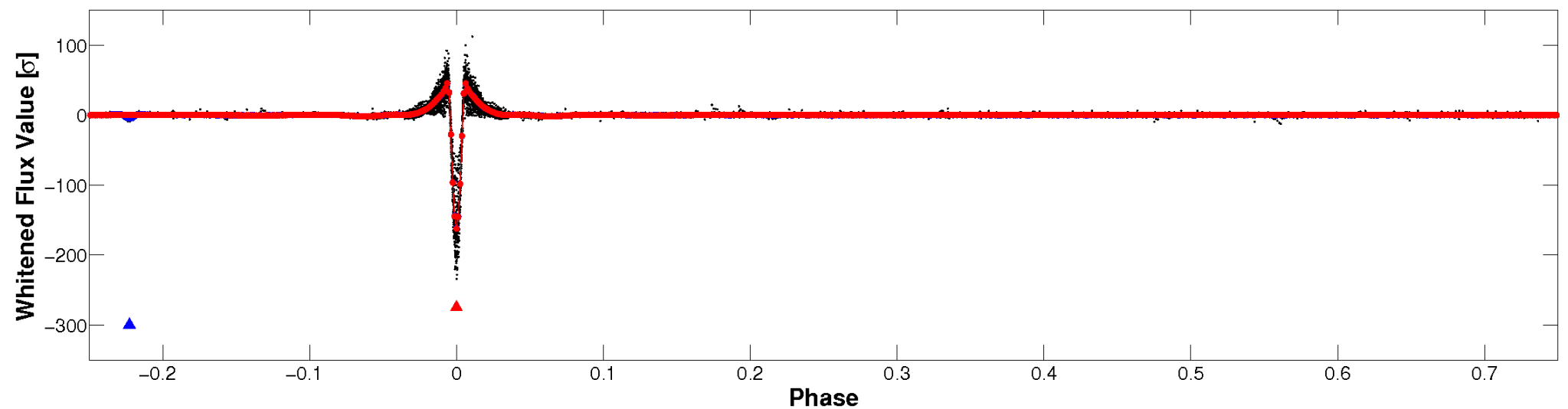


# Non-Whitened Vs. Whitened Light Curve

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

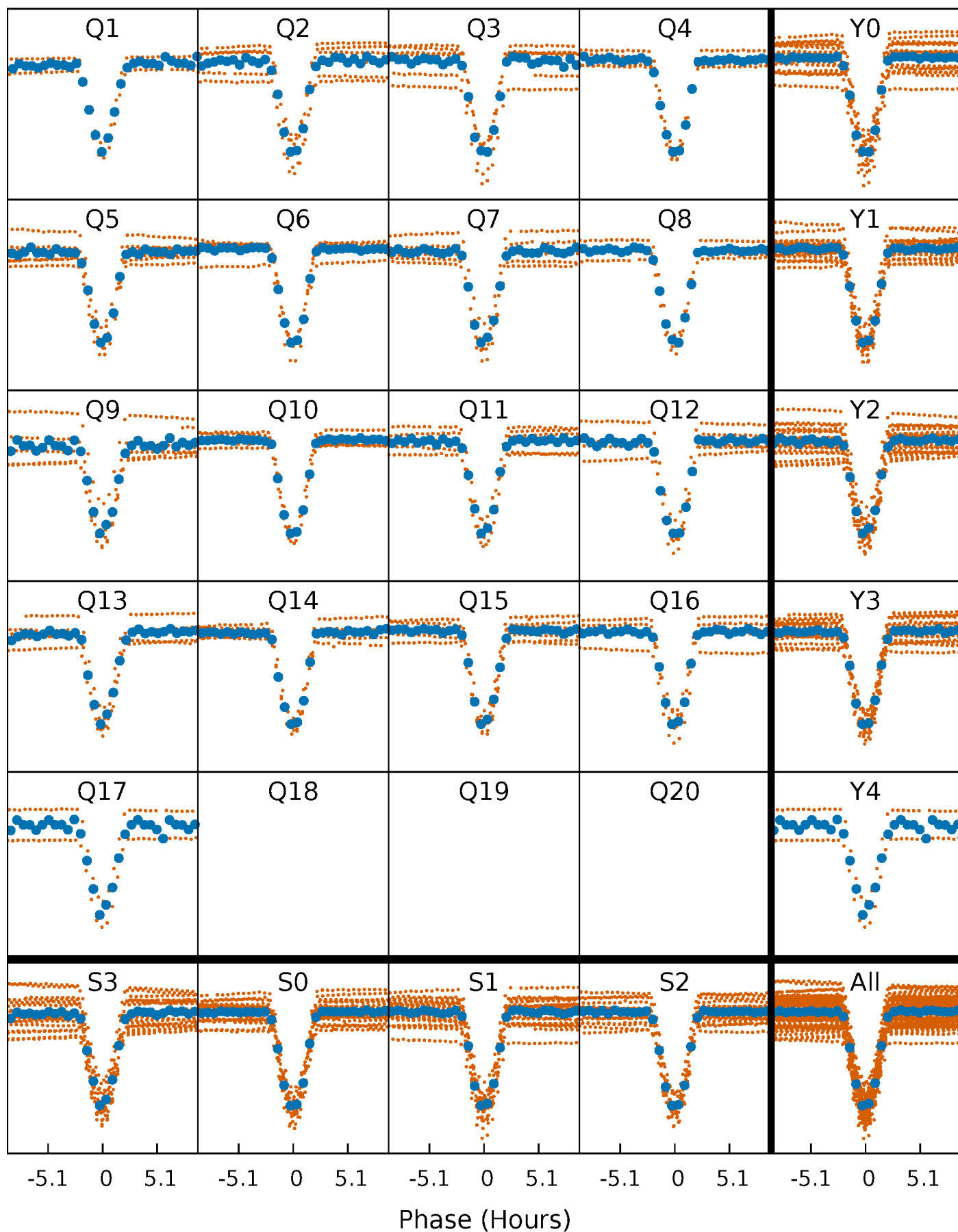


## Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

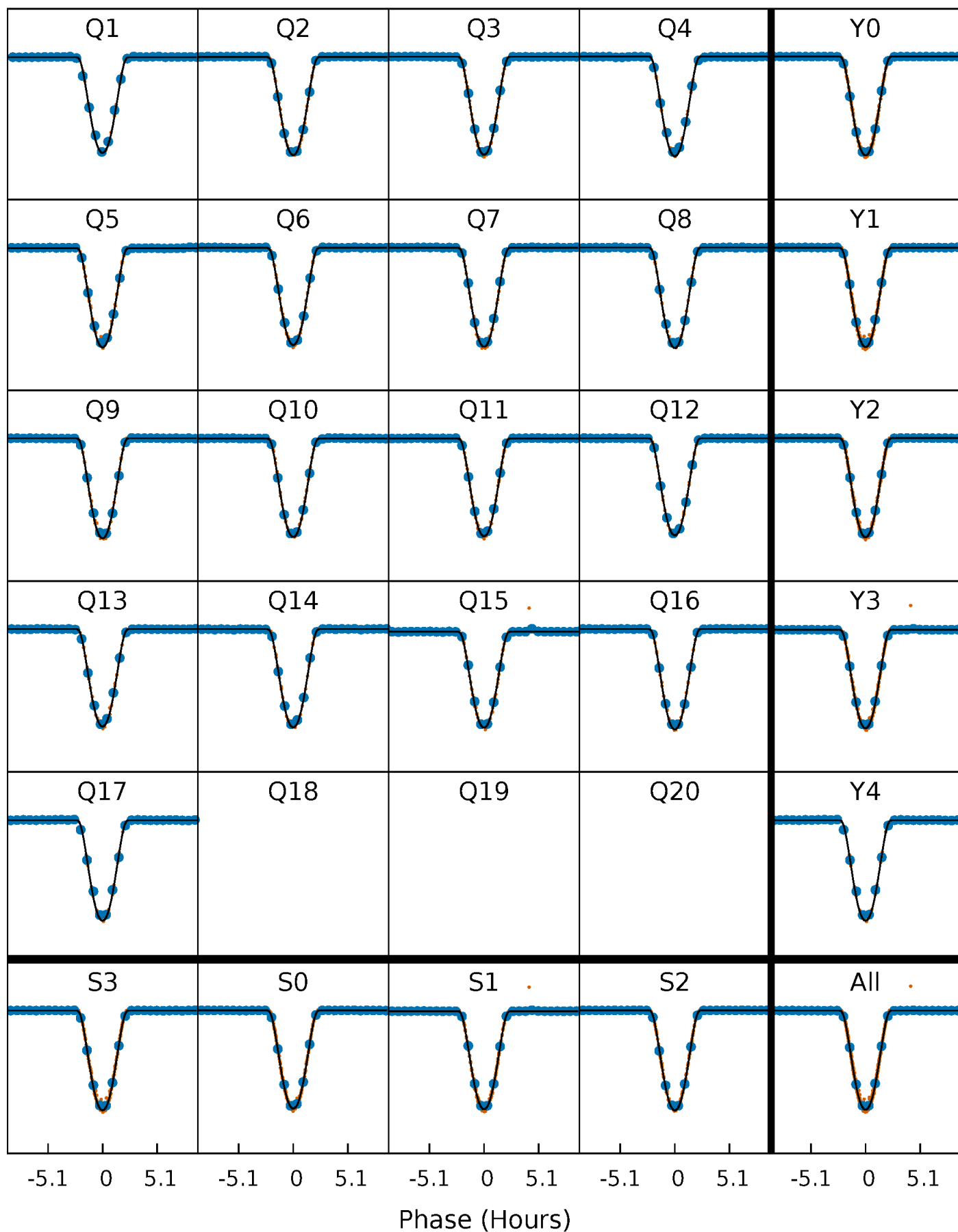
TCE 008879427-01 P= 16.313282 Days  $T_0=136.853930$  (BKJD)





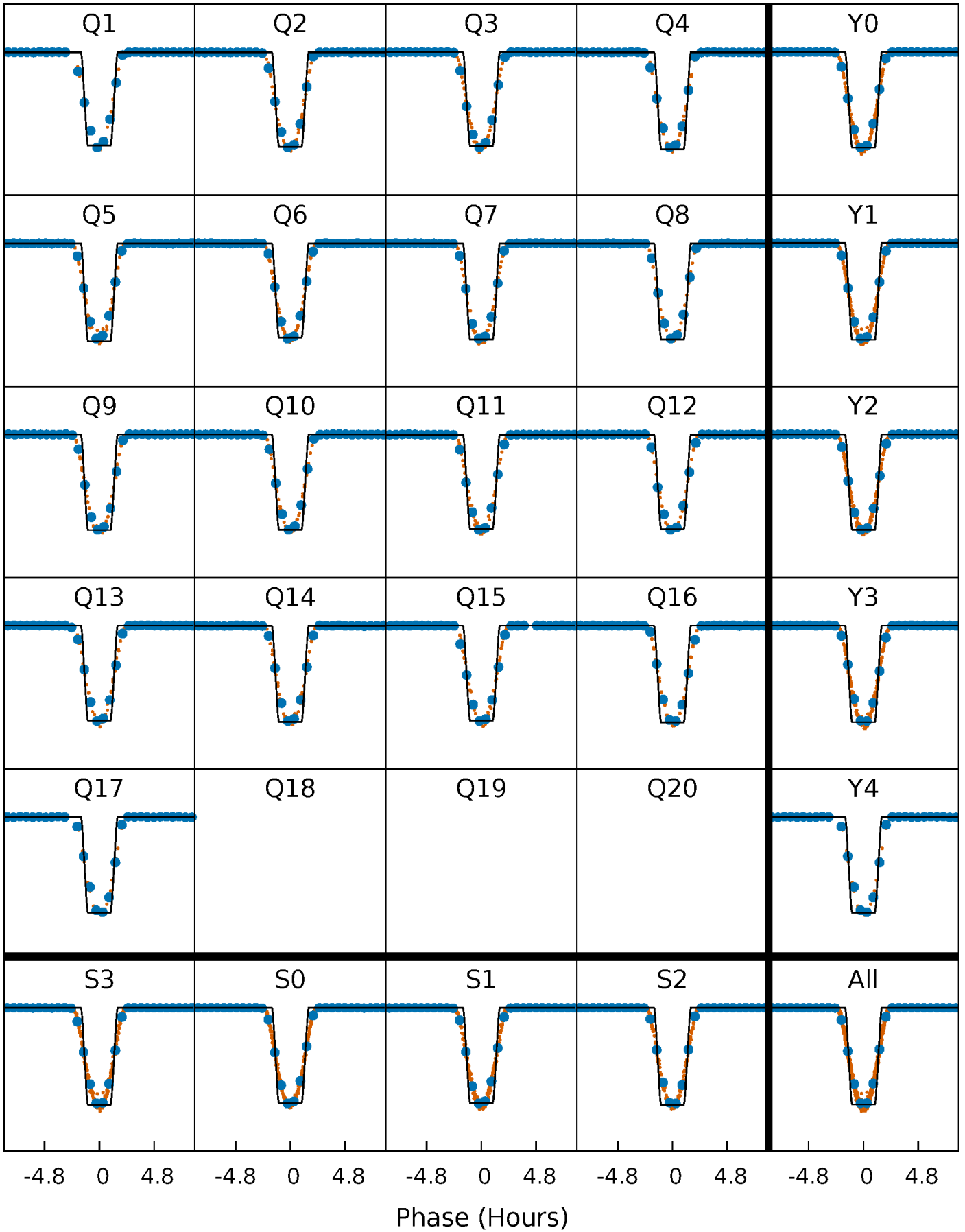
# DV Quarter-Phased Transit Curves

TCE 008879427-01 P= 16.313282 Days  $T_0=136.853930$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

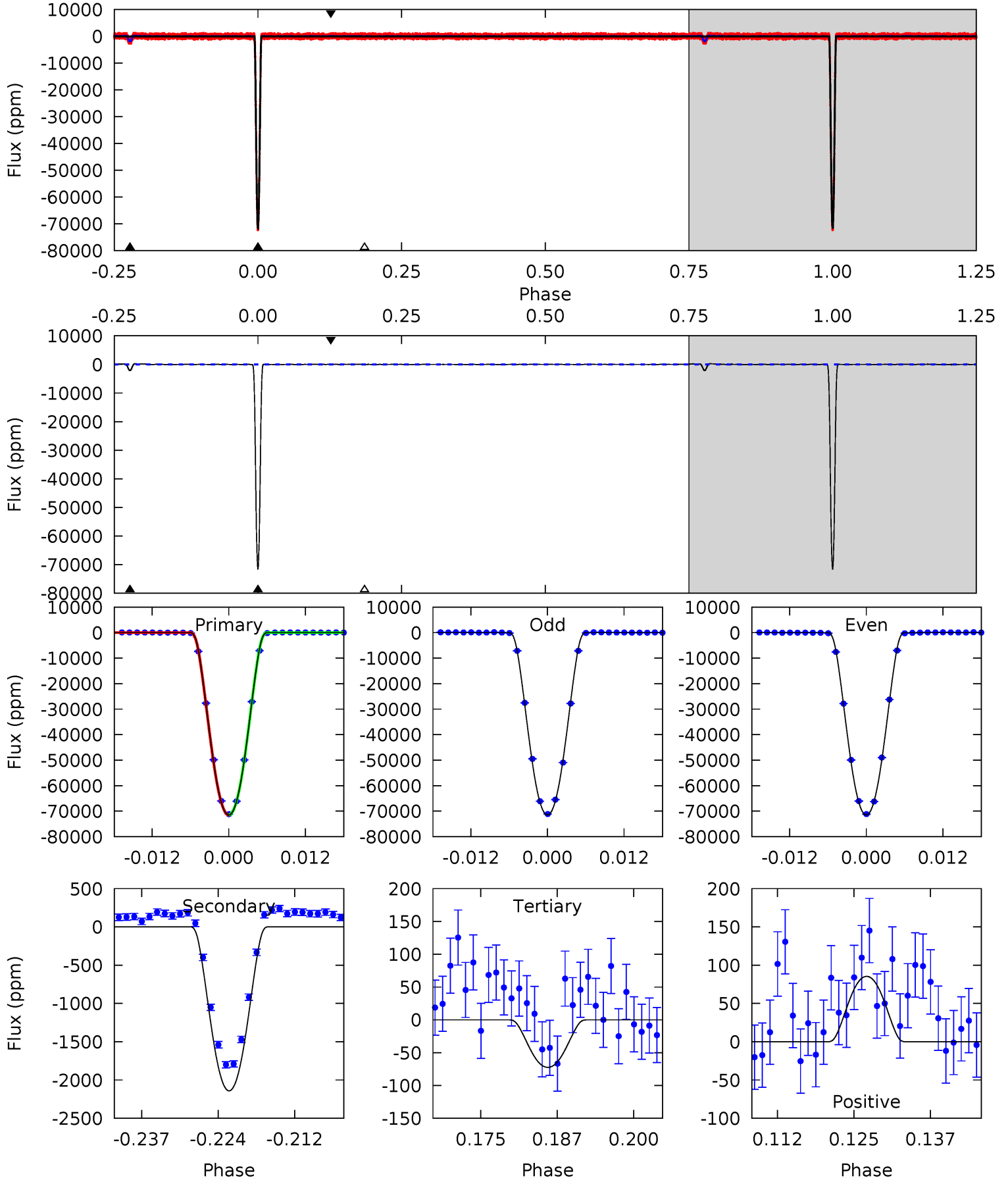
TCE 008879427-01 P= 16.313220 Days  $T_0=136.856807$  (BKJD)



# DV Model-Shift Uniqueness Test

008879427-01, P = 16.313282 Days, E = 120.540648 Days

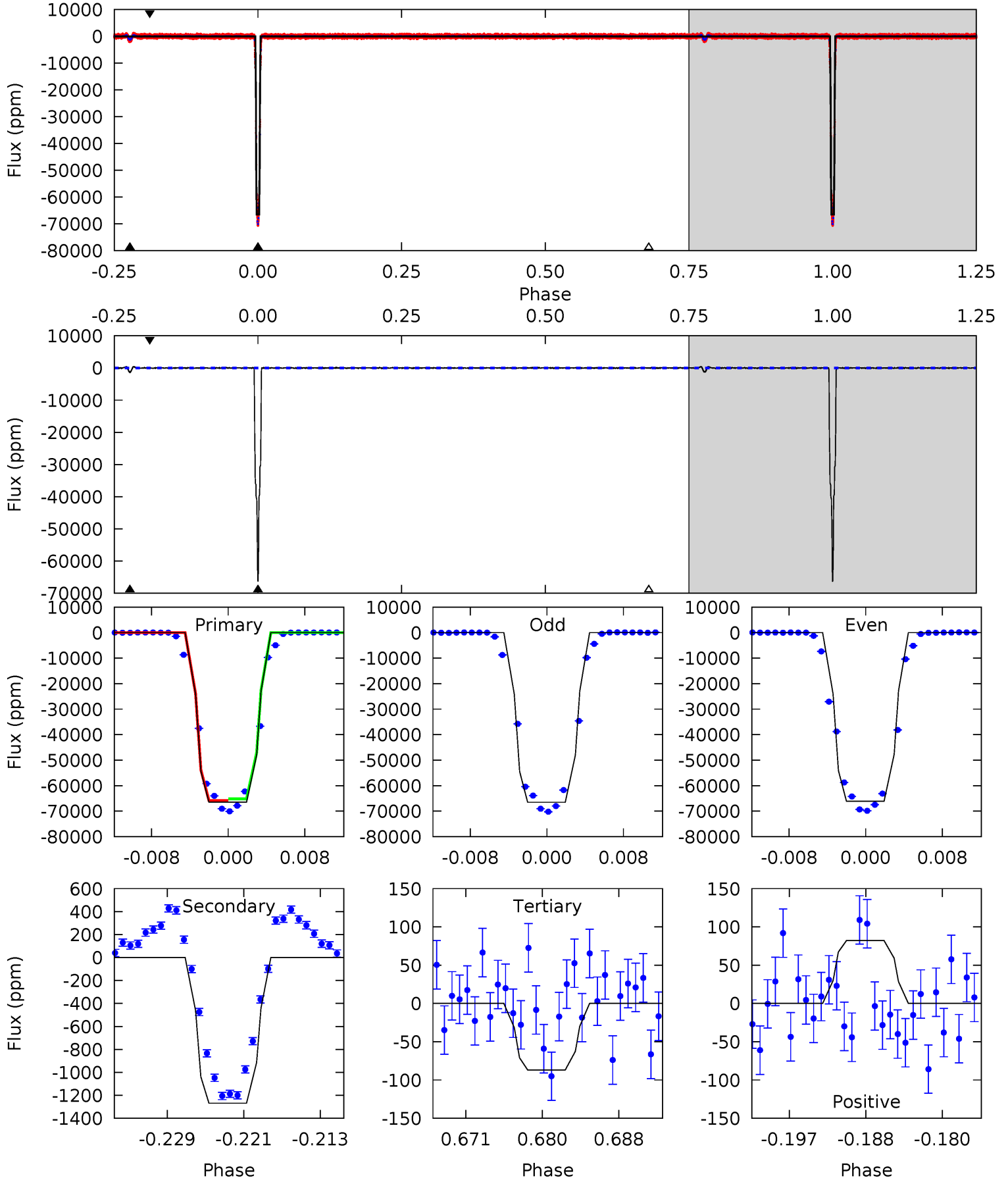
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5690	170.4	5.76	6.79	4.98	2.50	2.87	5685	5684	164.6	163.6	0.26	1.00	0.00	0.41



# Alt Model-Shift Uniqueness Test

008879427-01, P = 16.313220 Days, E = 120.543587 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
3076	58.7	4.02	3.80	5.06	2.64	1.29	3072	3072	54.7	54.9	9.73	1.00	0.01	12.4



### Stellar Parameters For KIC 008879427

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6008^{+180}_{-198}$	$4.440^{+0.070}_{-0.210}$	$-0.100^{+0.300}_{-0.300}$	$1.006^{+0.308}_{-0.132}$	$1.018^{+0.139}_{-0.126}$	$1.406^{+0.524}_{-0.742}$
	+3%/-3%	+2%/-5%	+300%/-300%	+31%/-13%	+14%/-12%	+37%/-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 008879427-01 / KOI 7104.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-2141 \pm 13$	$31.97^{+5.42}_{-2.96}$	$1065^{+86}_{-57}$	$3071^{+52}_{-60}$	$18^{+3}_{-5}$
Alt.	$-1268 \pm 22$	$29.65^{+5.15}_{-2.55}$	$1065^{+85}_{-54}$	$2902^{+45}_{-51}$	$13^{+2}_{-3}$

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

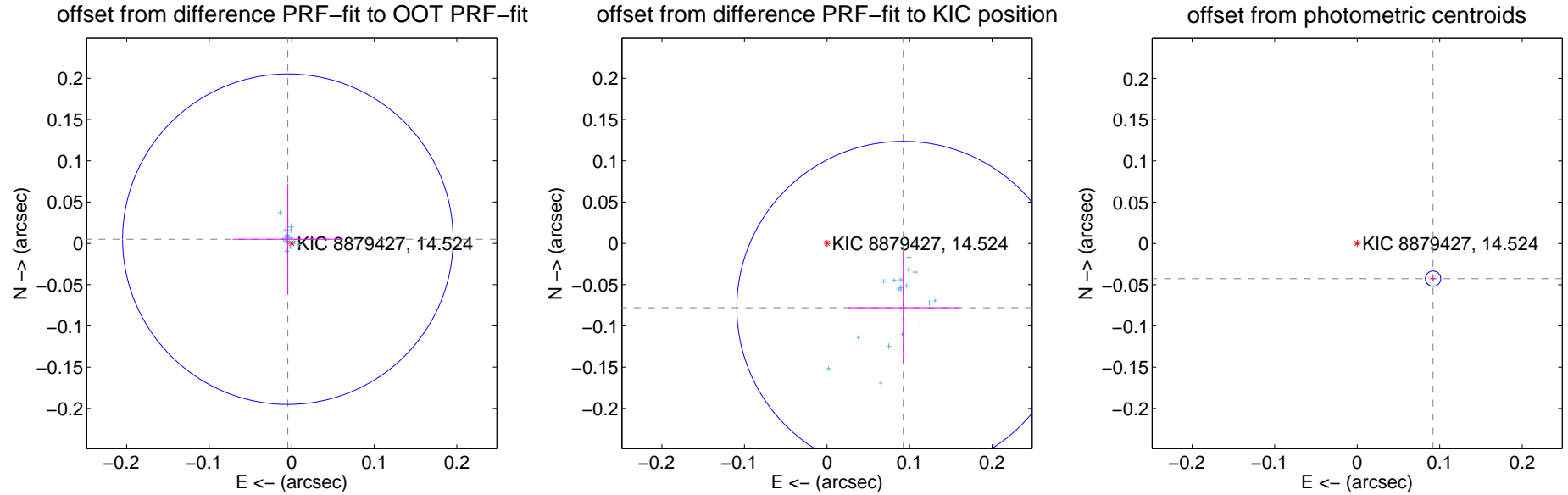
## DV Centroid Data

Supplemental centroid analysis for 008879427-01. Kepler magnitude: 14.52. Transit SNR 2327.24

There are 17 quarters with good PRF difference image offsets

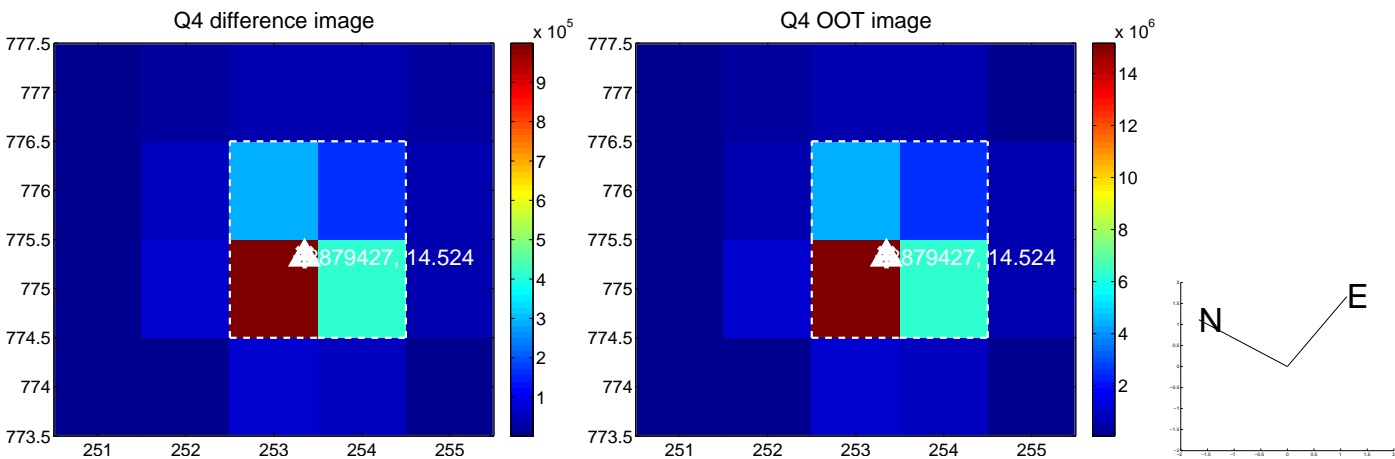
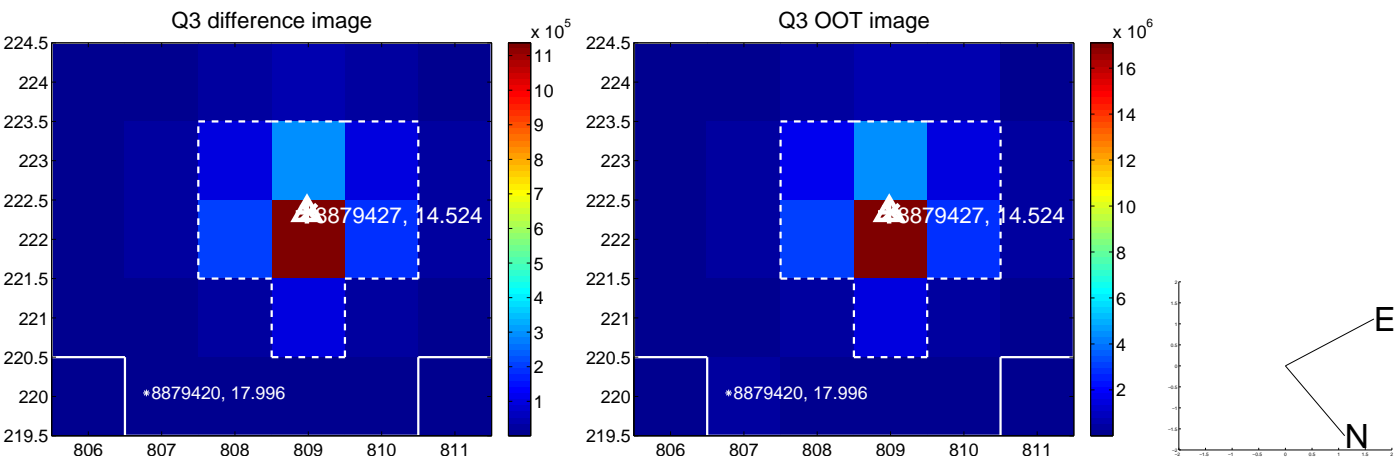
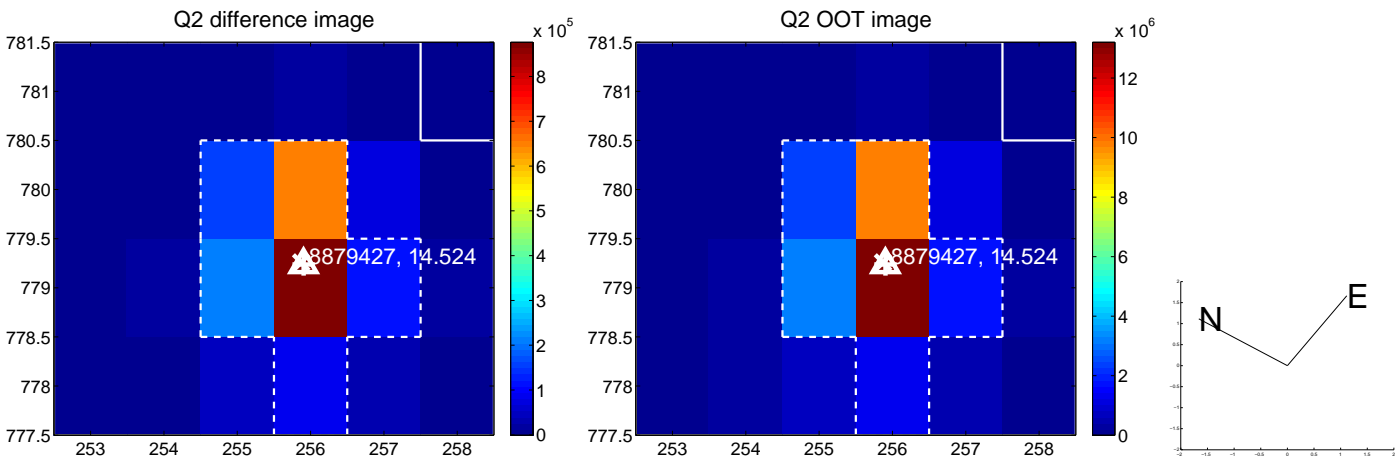
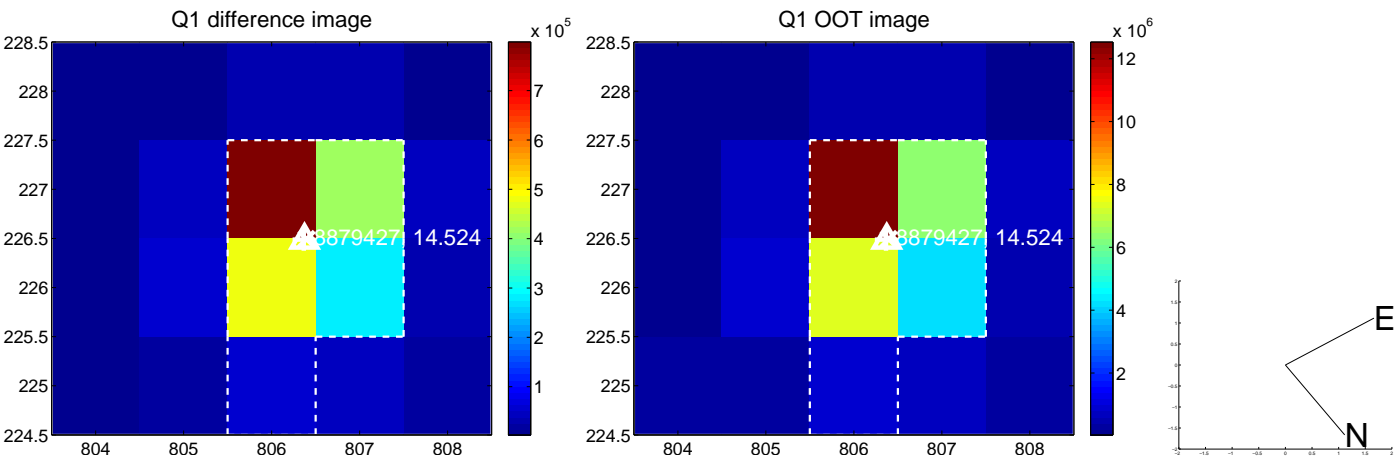
The direct PRF centroid is offset from the target star catalog position by about 0.12 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.007 \pm 0.067$	0.10	$0.005 \pm 0.067$	$0.005 \pm 0.067$
PRF-fit source offset from KIC position	$0.121 \pm 0.067$	1.80	$-0.092 \pm 0.067$	$-0.078 \pm 0.068$
photometric centroid source offset	$0.10 \pm 0.00$	32.77	$-0.09 \pm 0.00$	$-0.04 \pm 0.00$

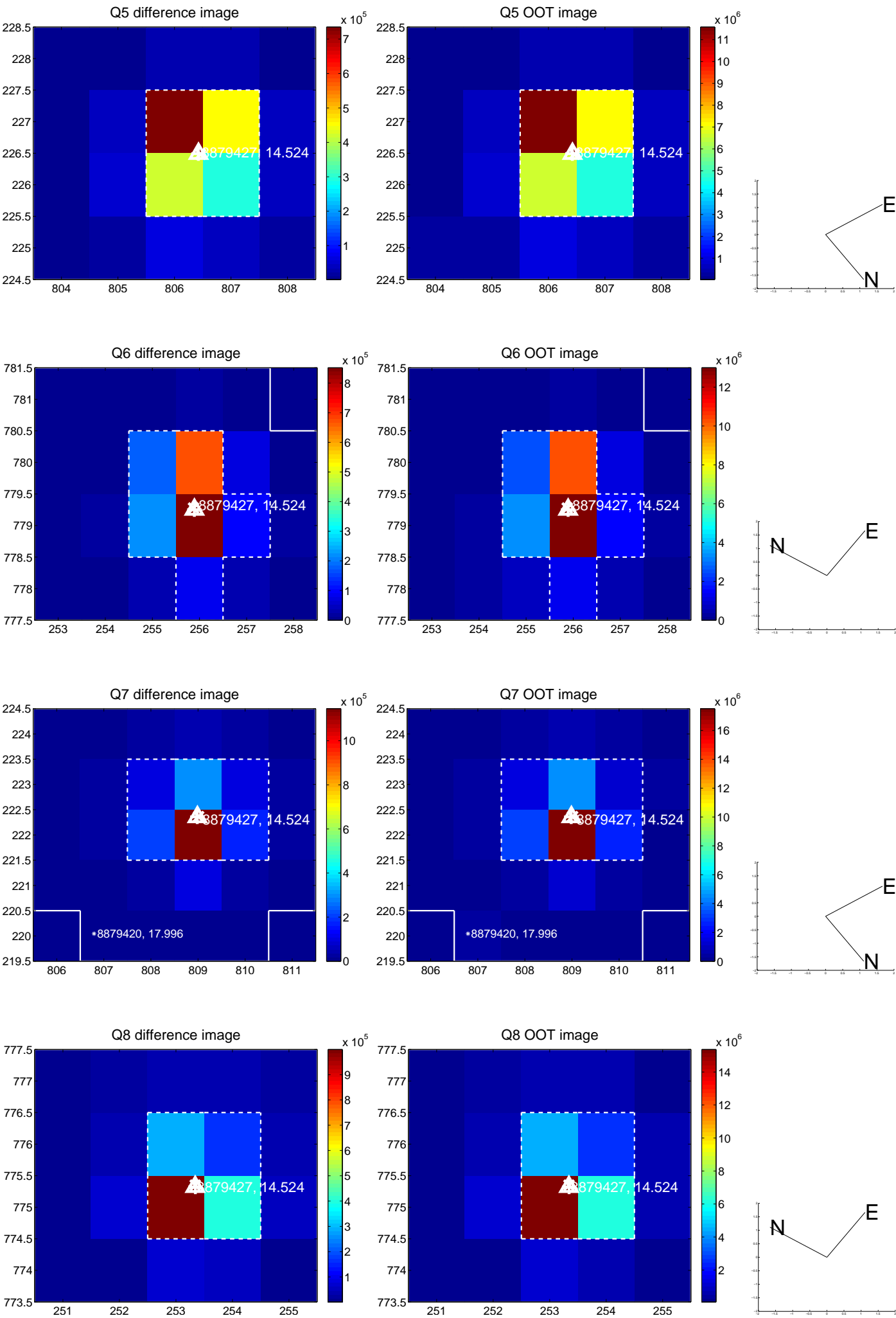


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

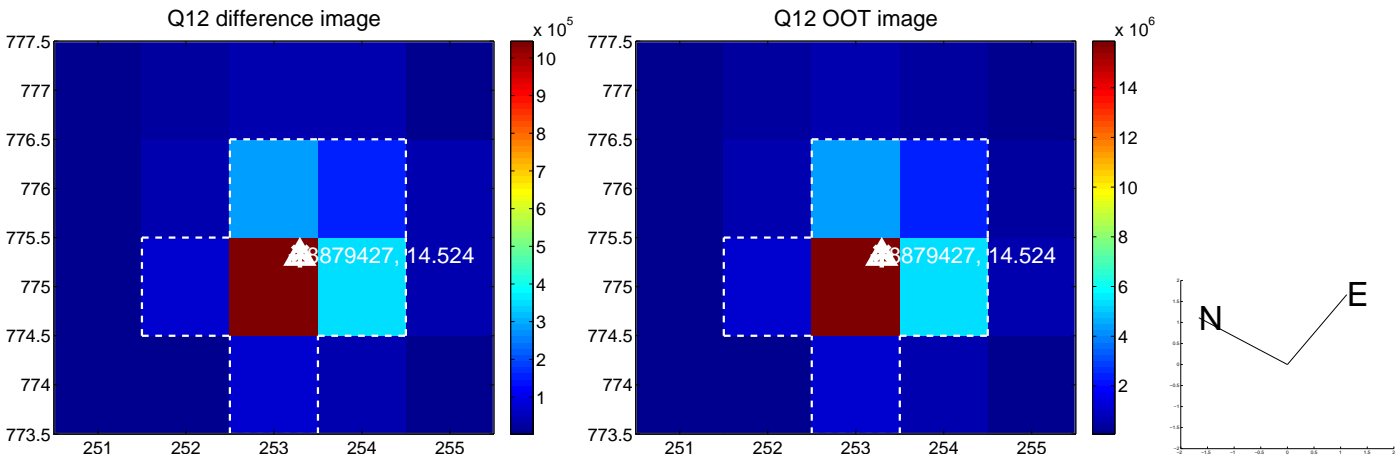
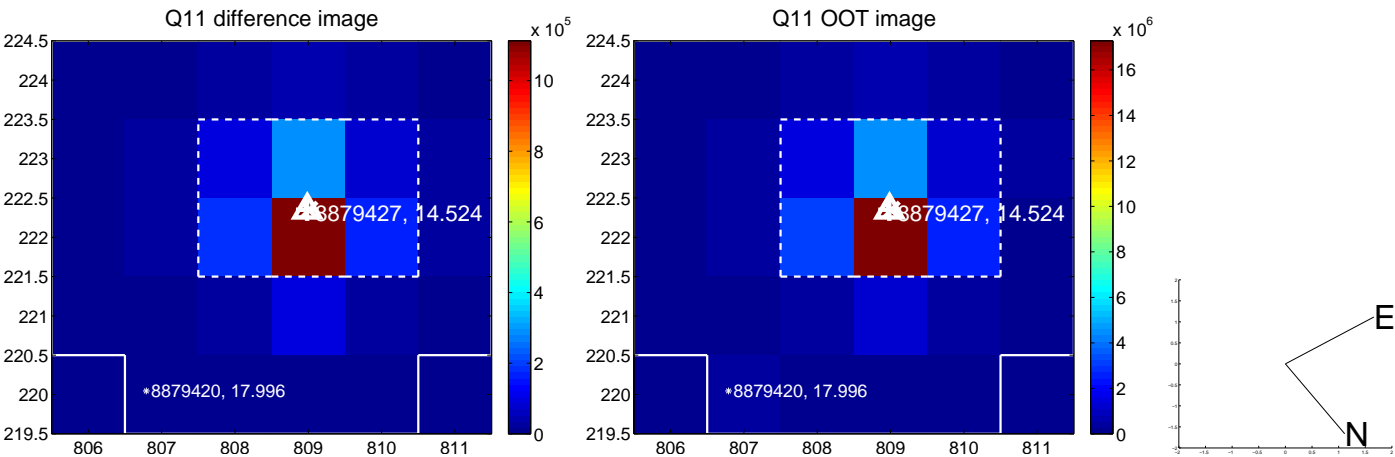
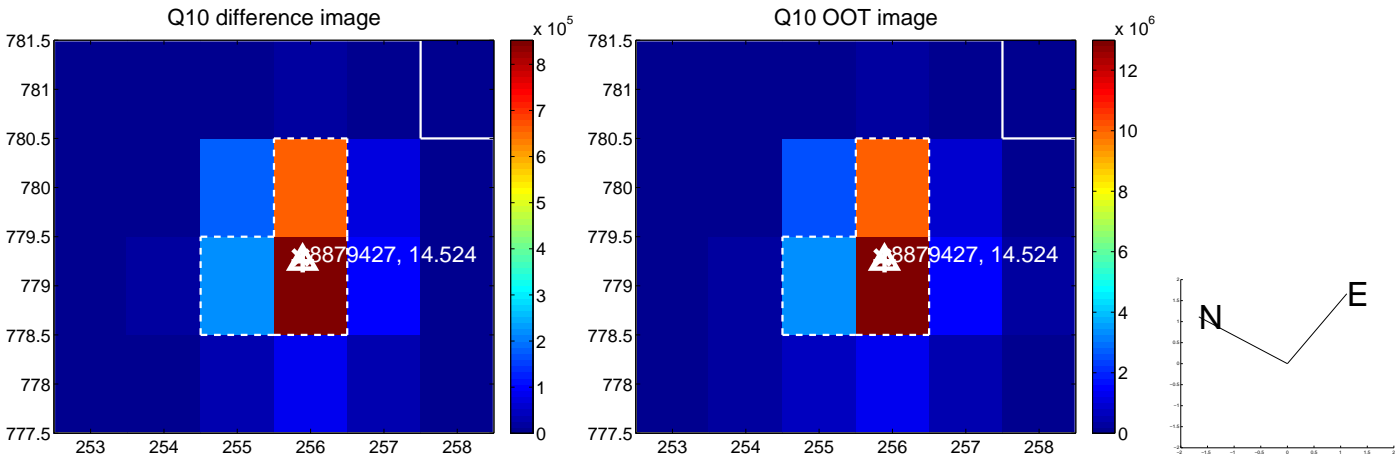
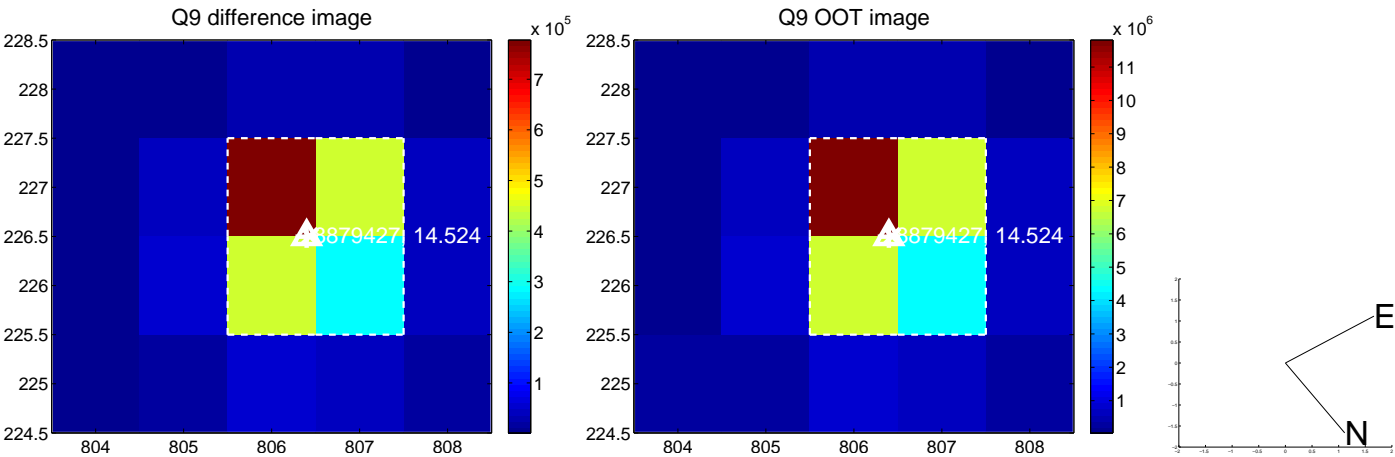


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

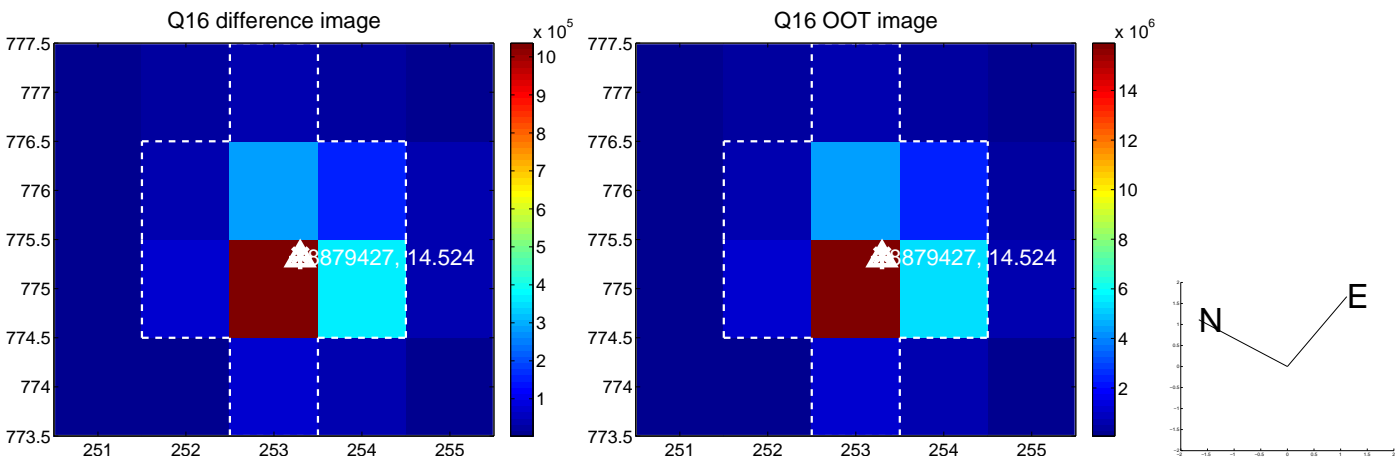
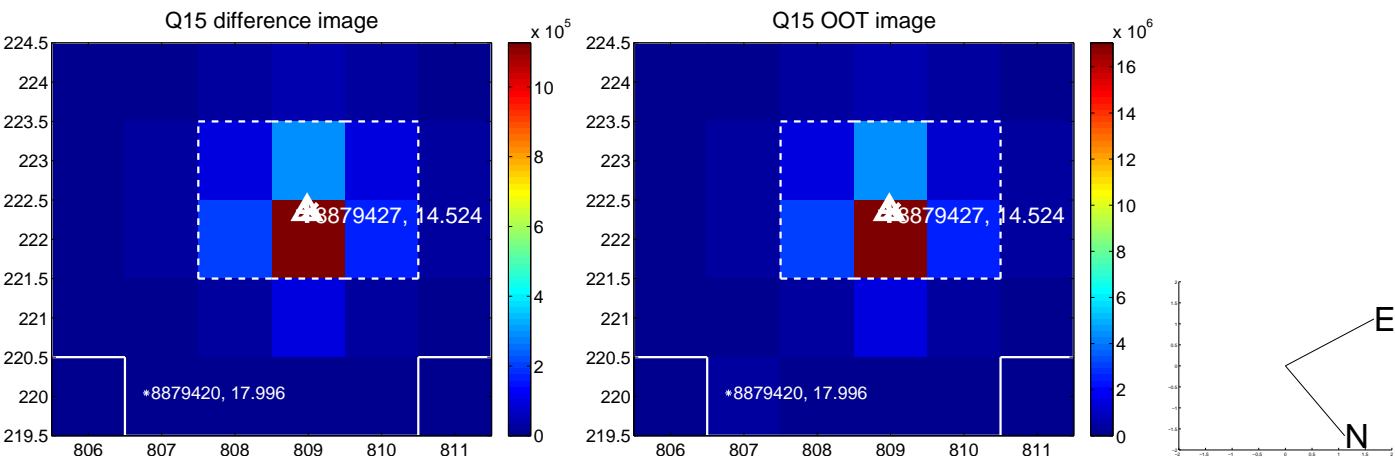
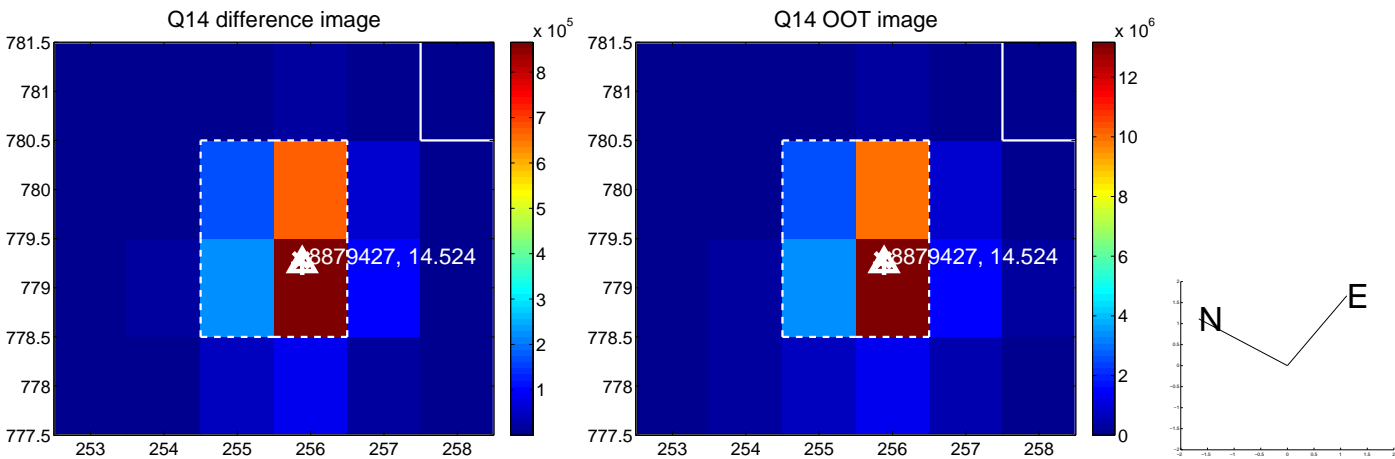
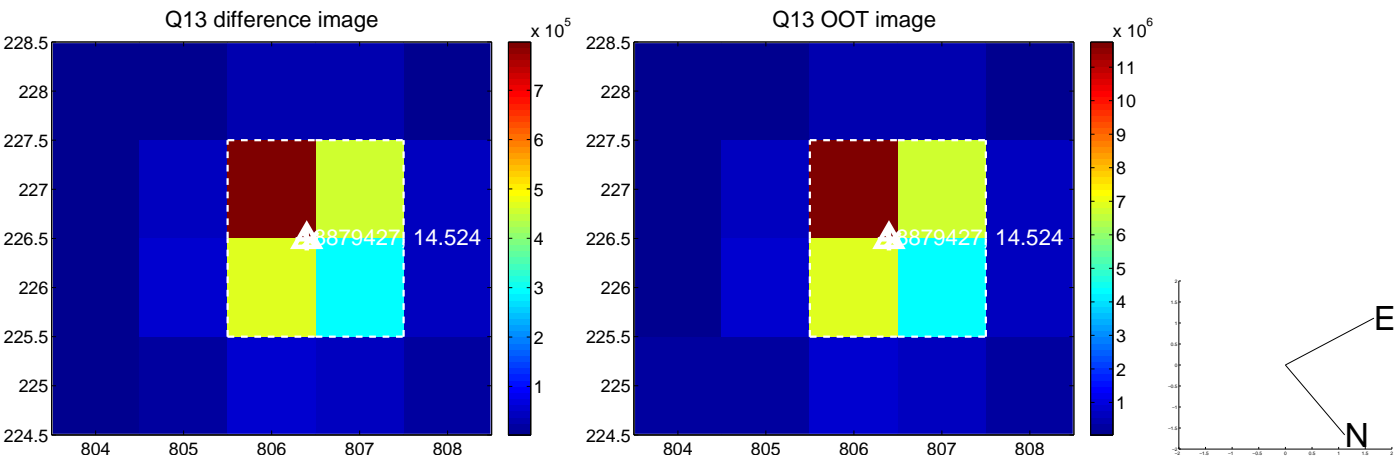




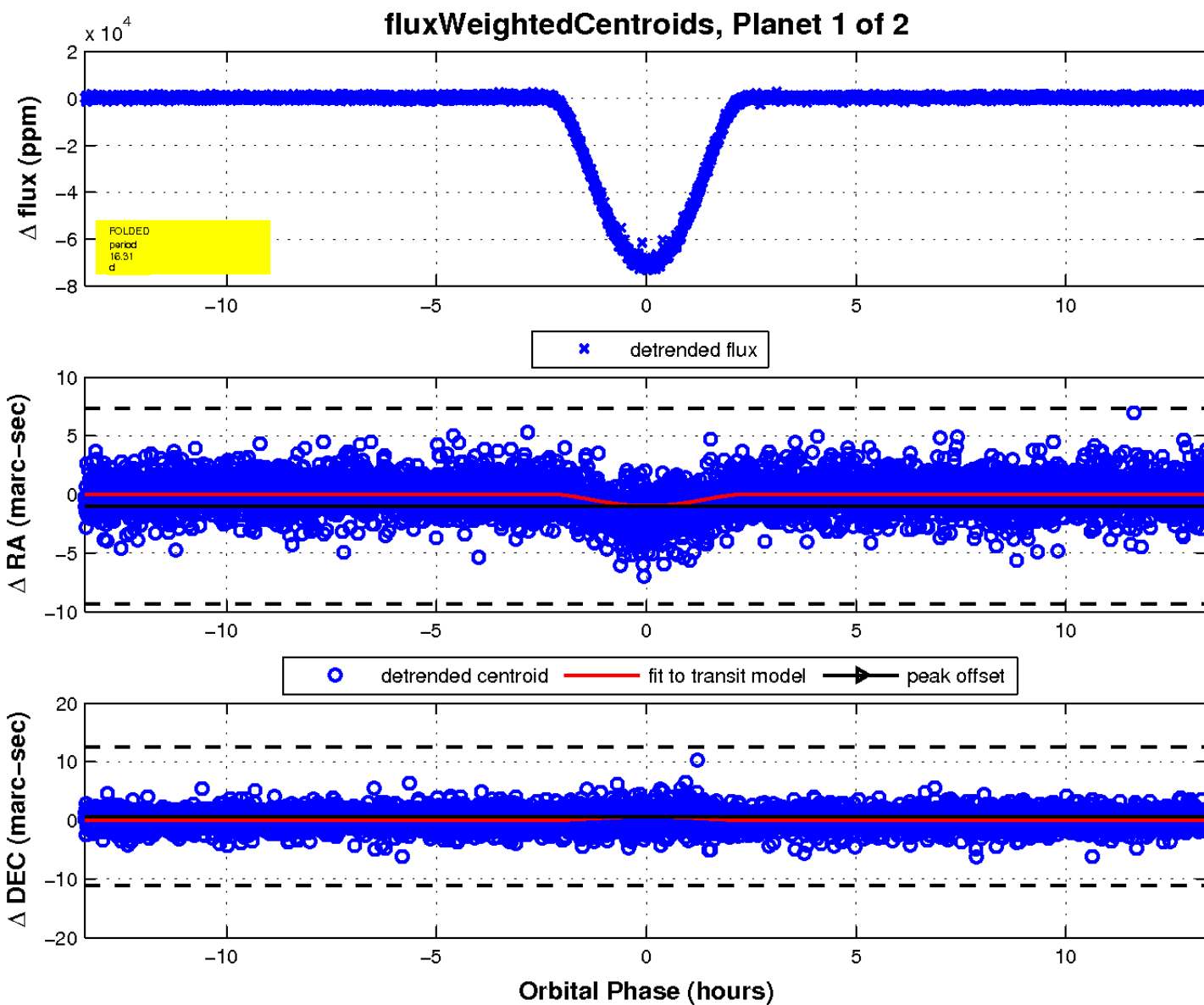
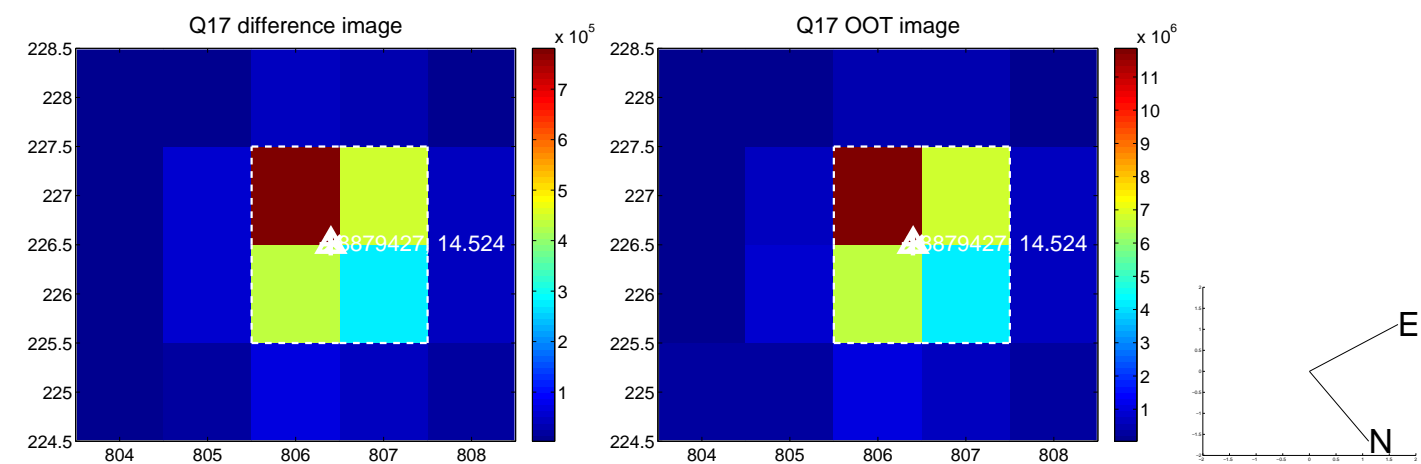
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

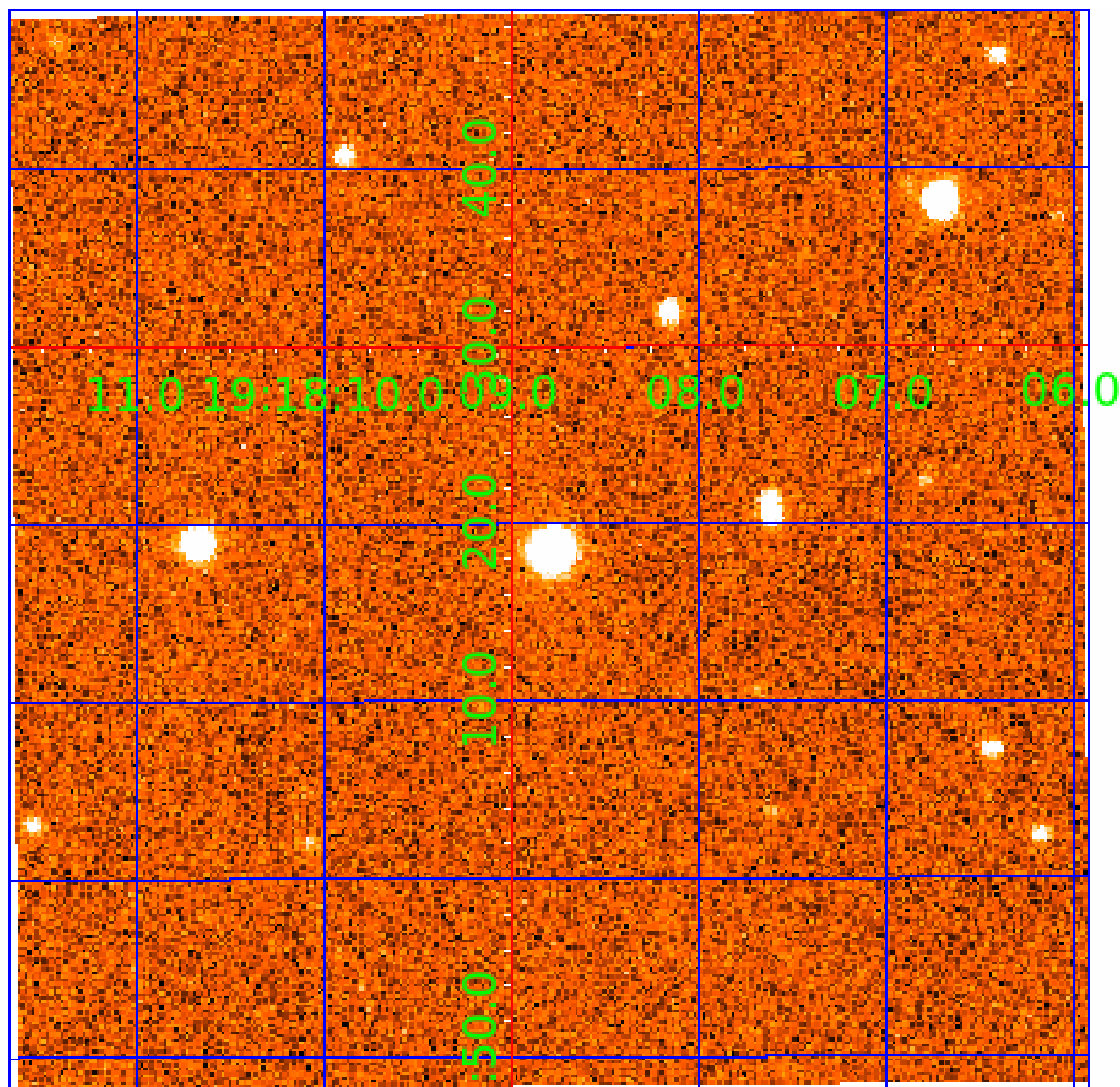


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 008879427

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008879427-01	OBS	7104.01	16.313282	136.853931	71644.5	4.460	2901.1	2327.2	1.01	6008	31.02	73.70
008879427-02	OBS	No	16.313280	133.221949	2116.1	4.603	91.1	93.3	1.01	6008	7.80	73.70

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008879427-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—DEEP_V_SHAPED—HAS_SEC_TCE
008879427-02	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.

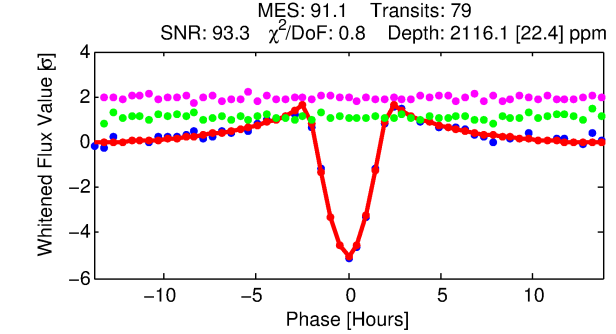
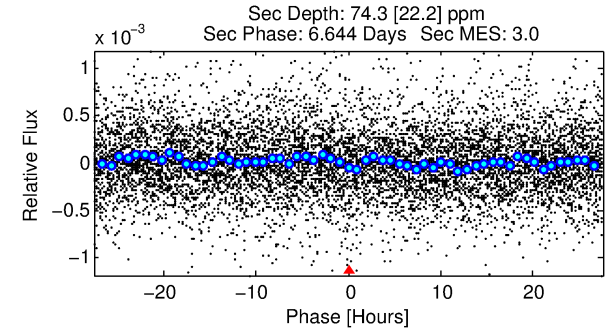
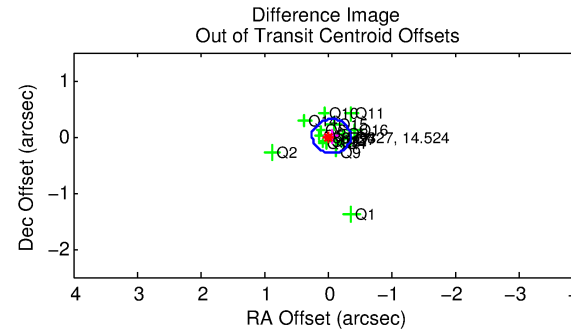
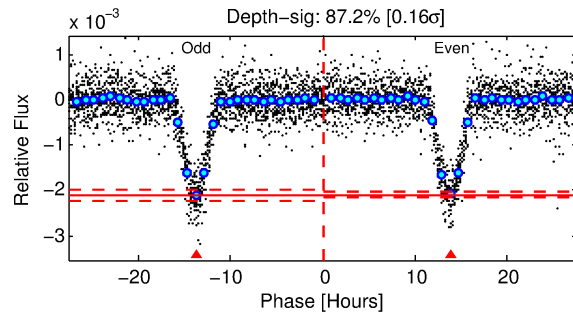
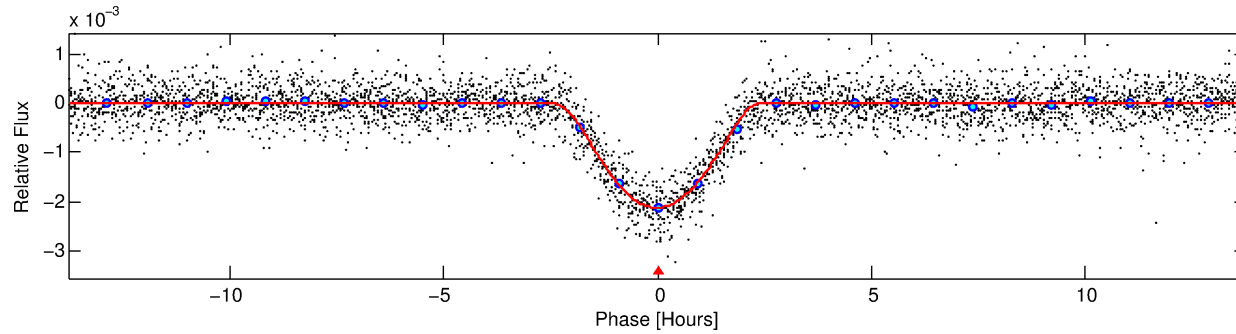
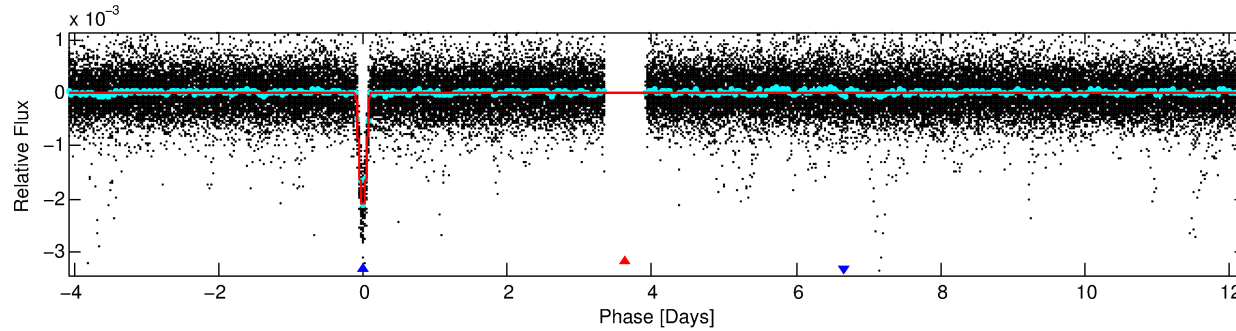
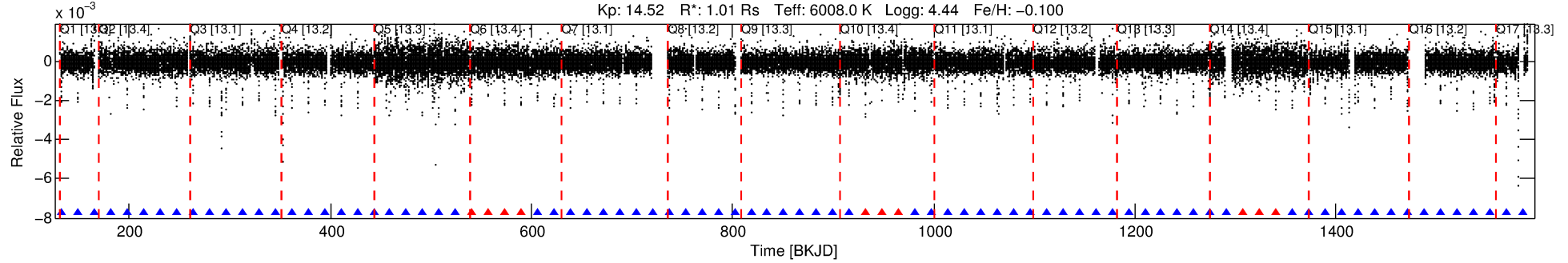
## Ephemeris Match Information For 008879427-02

No Significant Match Found

# DV One-Page Summary

KIC: 8879427 Candidate: 2 of 2 Period: 16.313 d  
KOI: K07104 Corr: No Ephemeris Match

Kp: 14.52 R\*: 1.01 Rs Teff: 6008.0 K Logg: 4.44 Fe/H: -0.100



## DV Fit Results:

Period = 16.31328 [0.00002] d  
Epoch = 133.2219 [0.0010] BKJD  
Rp/R\* = 0.0710 [0.0156]  
a/R\* = 11.29 [0.65]  
b = 0.99 [0.02]  
Seff = 73.70 [29.75]  
Teq = 747 [75] K  
Rp = 7.80 [2.94] Re  
a = 0.1266 [0.0329] AU  
Ag = 10.78 [7.05] [1.39σ]  
Teffp = 2093 [286] K [4.55σ]

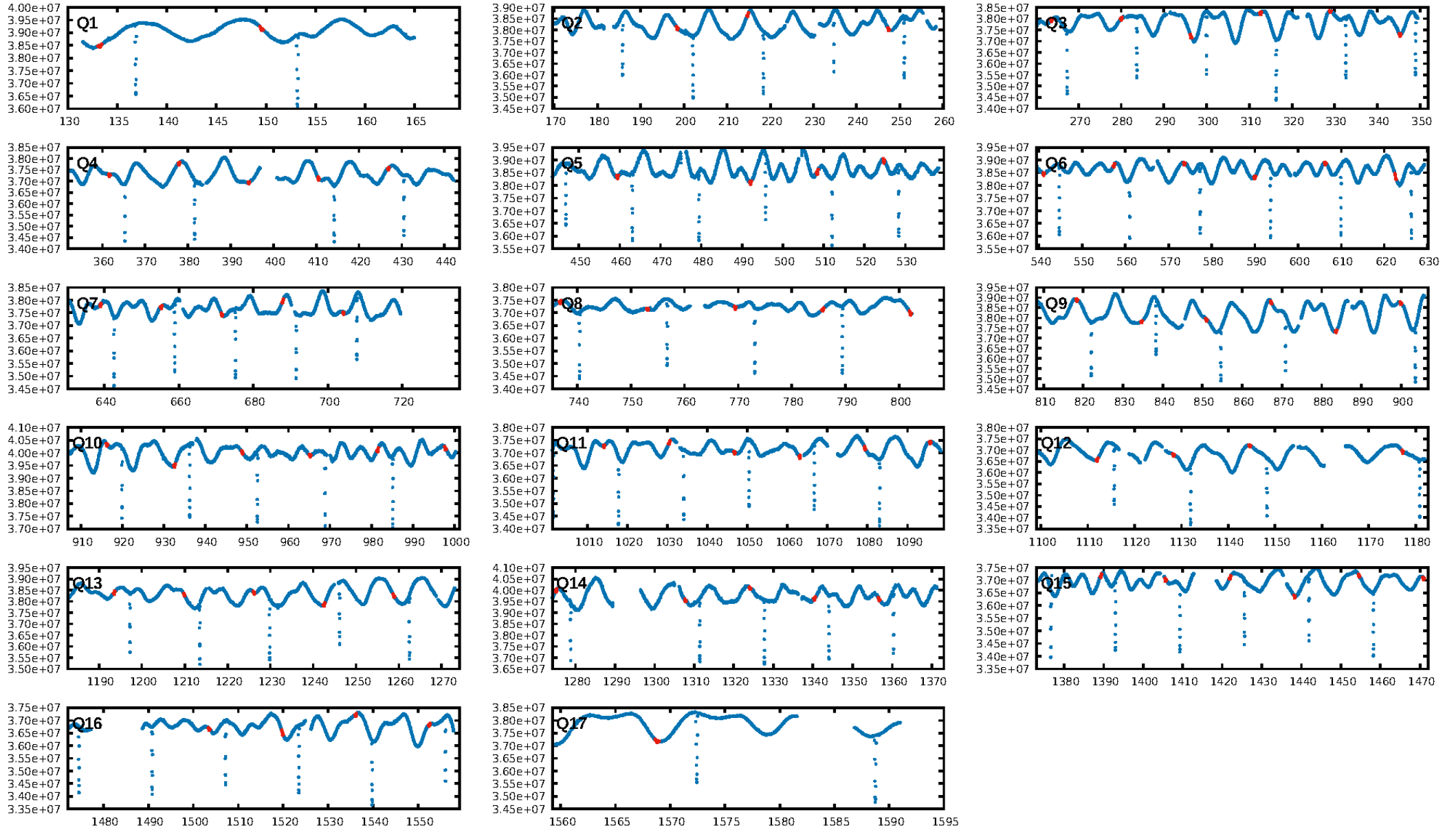
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: 99.8%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 0.87 [66/76]  
GhostDiagnostic-chr: 2.006  
Centroid-sig: 83.2%  
Centroid-so: 0.135 arcsec [1.32σ]  
OotOffset-rm: 0.061 arcsec [0.60σ]  
KicOffset-rm: 0.171 arcsec [1.58σ]  
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: 31-Jan-2016 09:48:34 Z

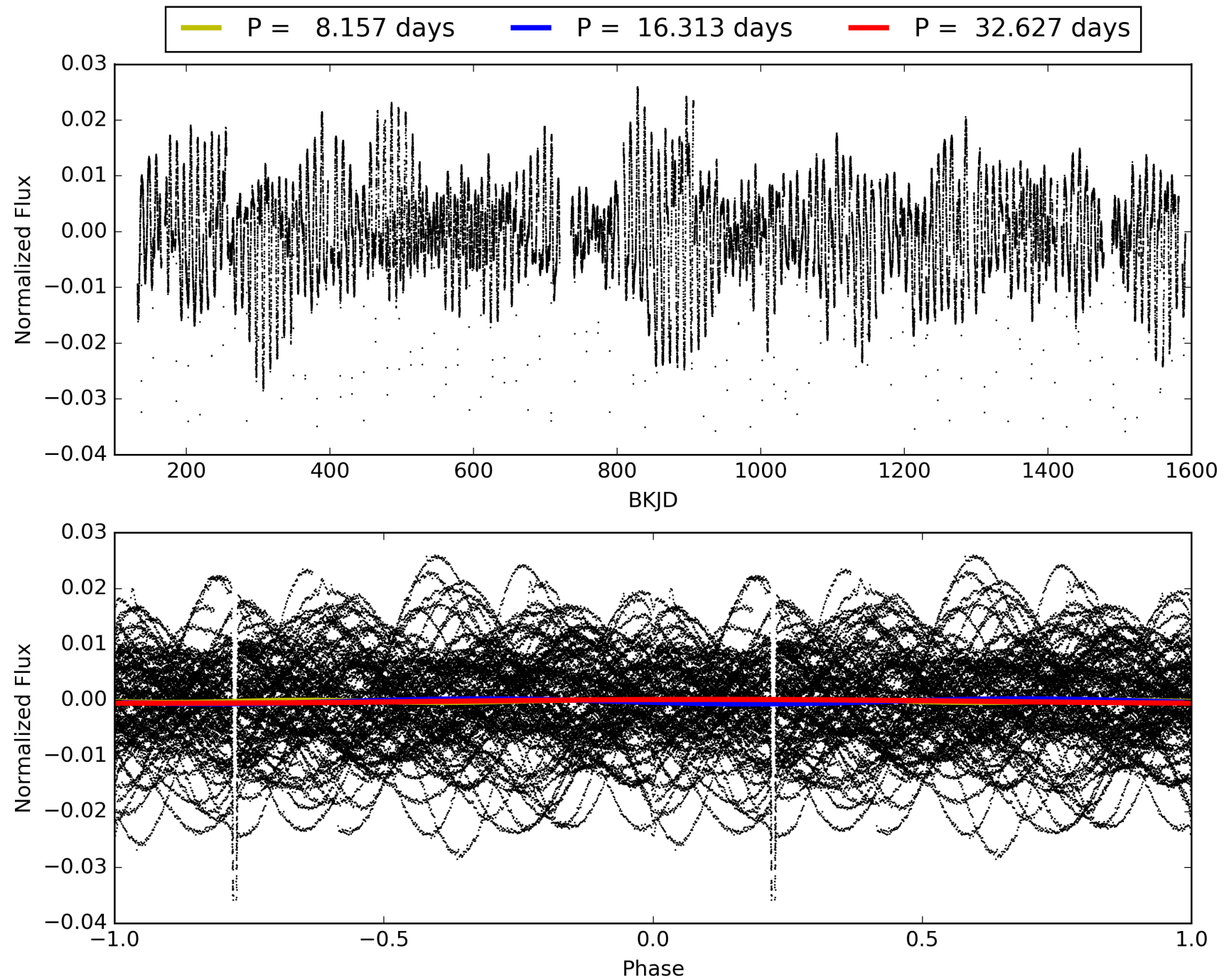
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 008879427-02, PDC Light Curves





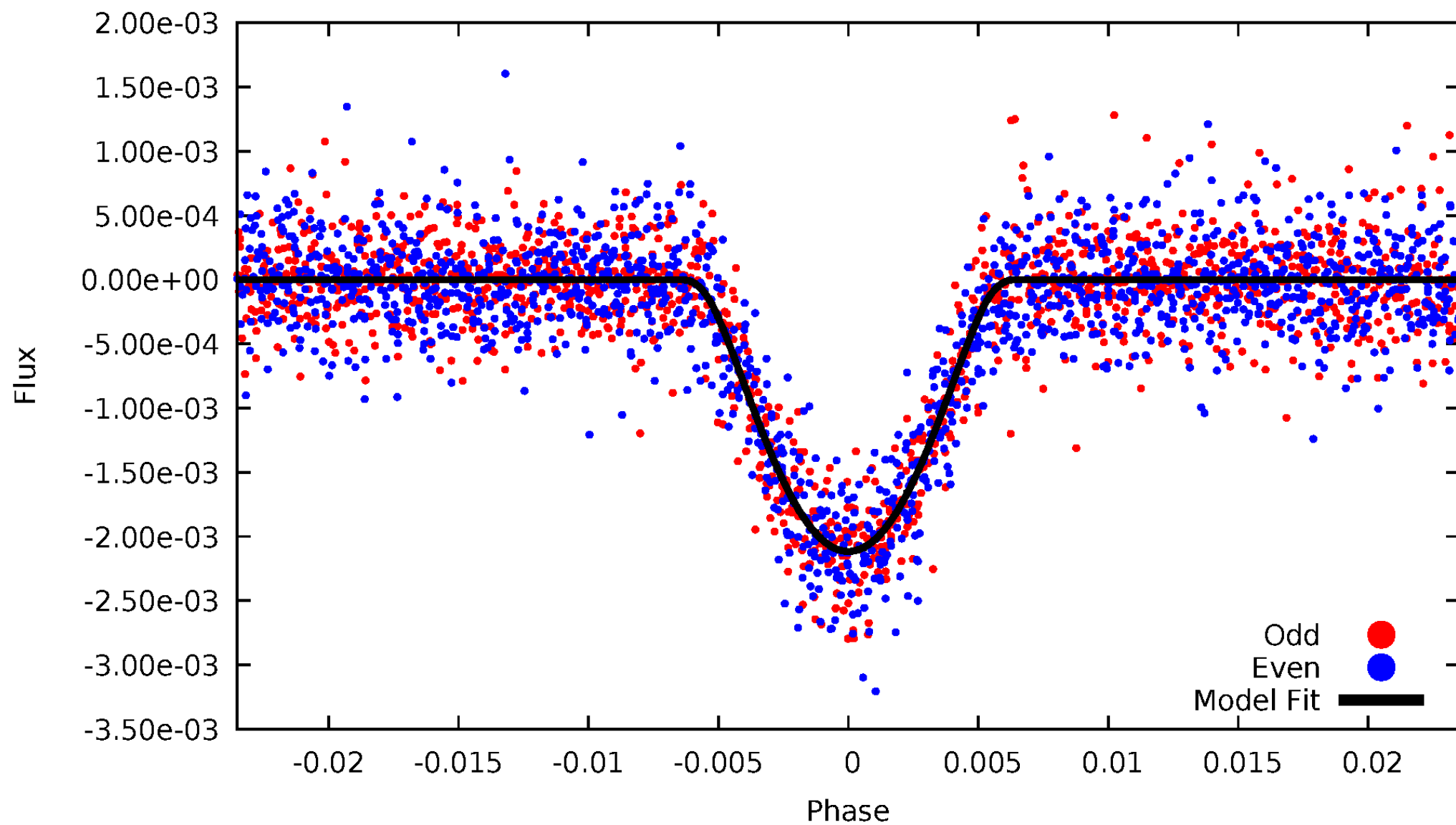
# TCE 008879427-02





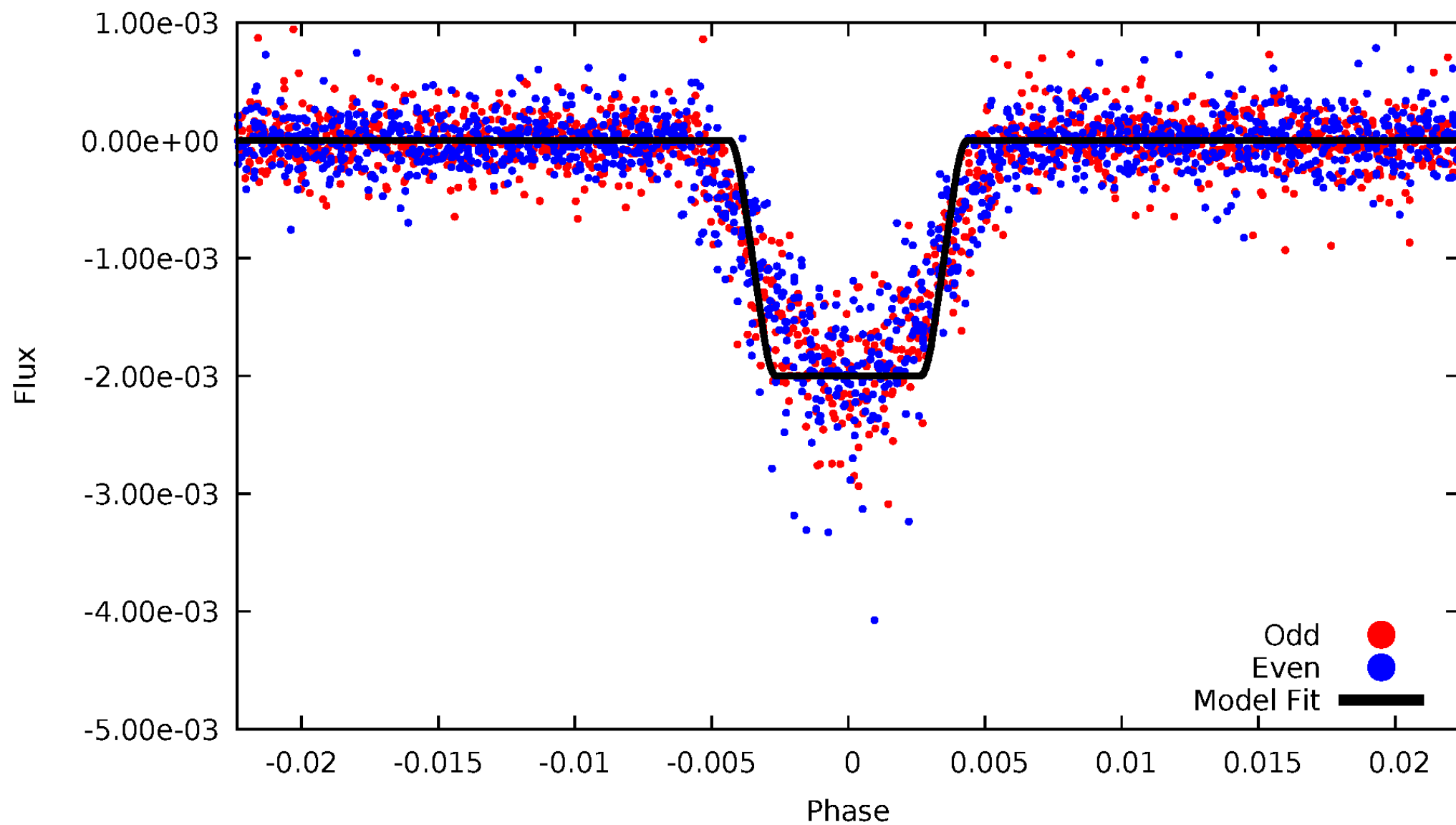
# DV Odd/Even

TCE 008879427-02



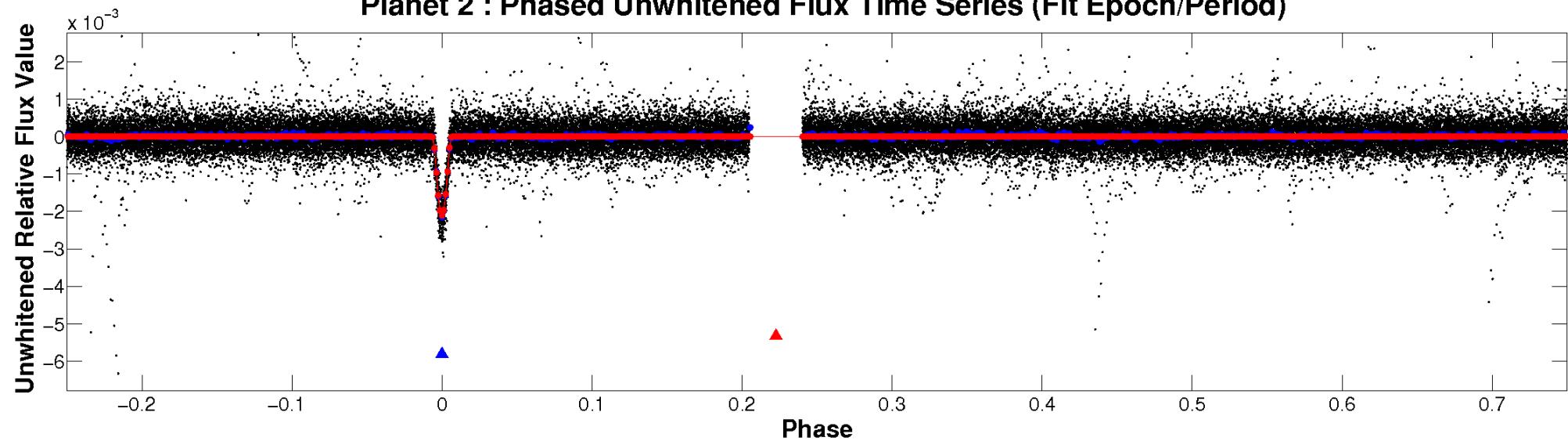
# ALT Odd/Even

TCE 008879427-02

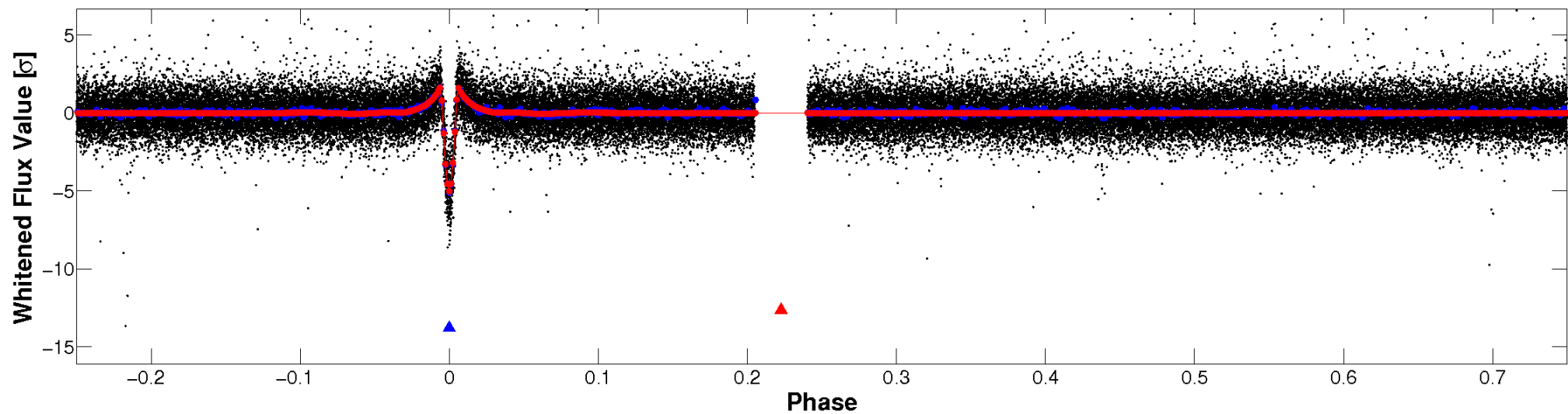


# Non-Whitened Vs. Whitened Light Curve

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

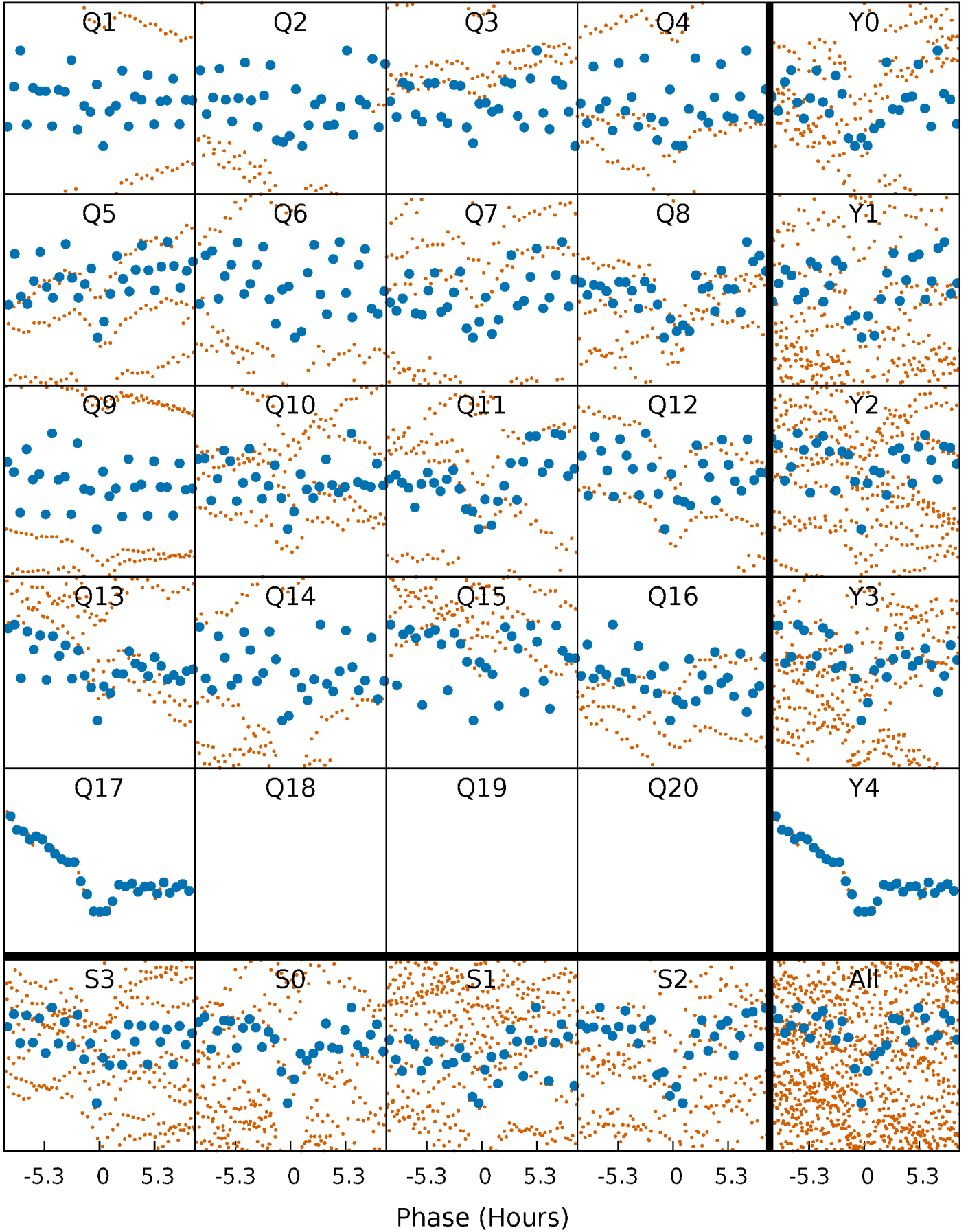


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



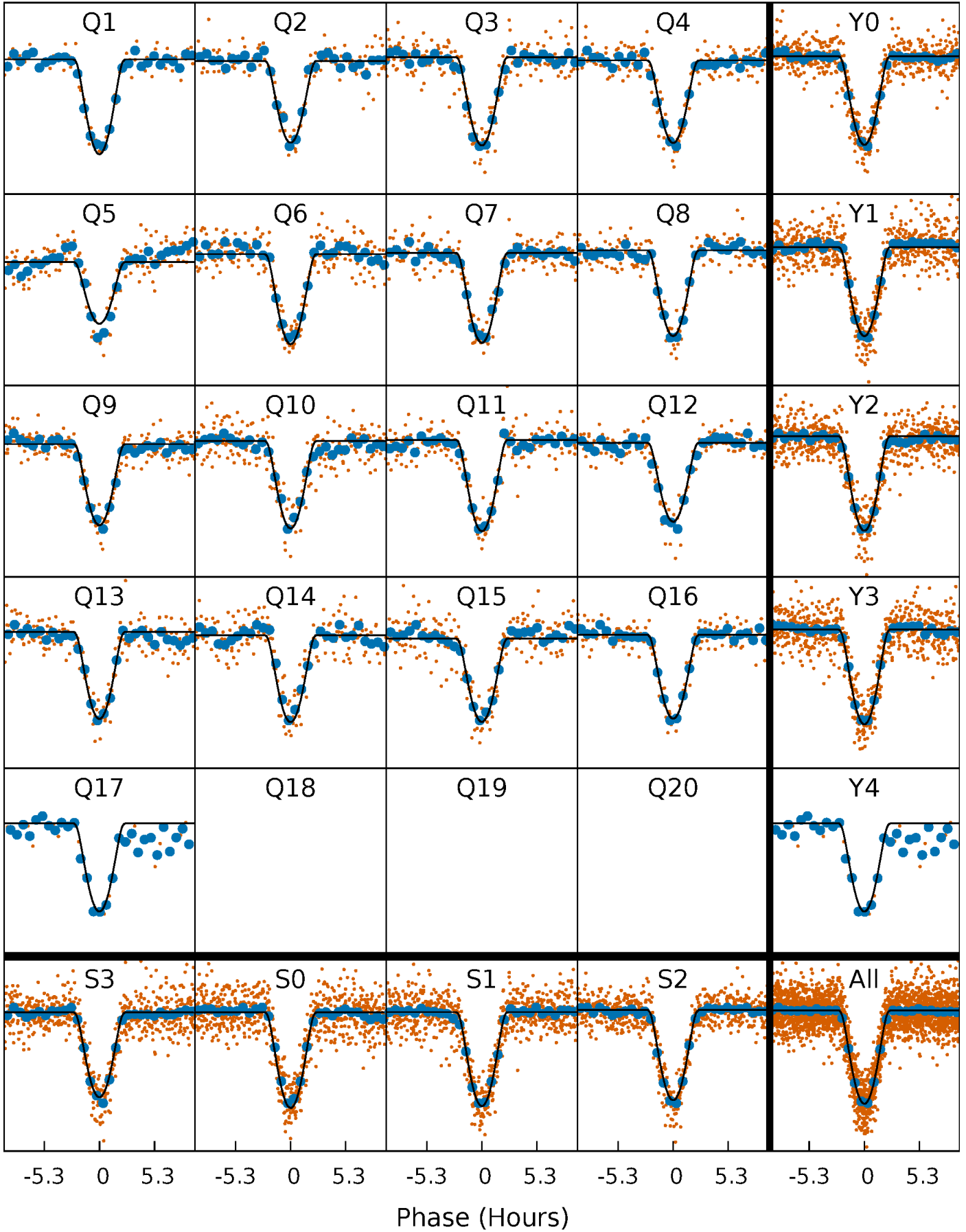
# PDC Quarter-Phased Transit Curves

TCE 008879427-02 P= 16.313280 Days  $T_0=133.221949$  (BKJD)



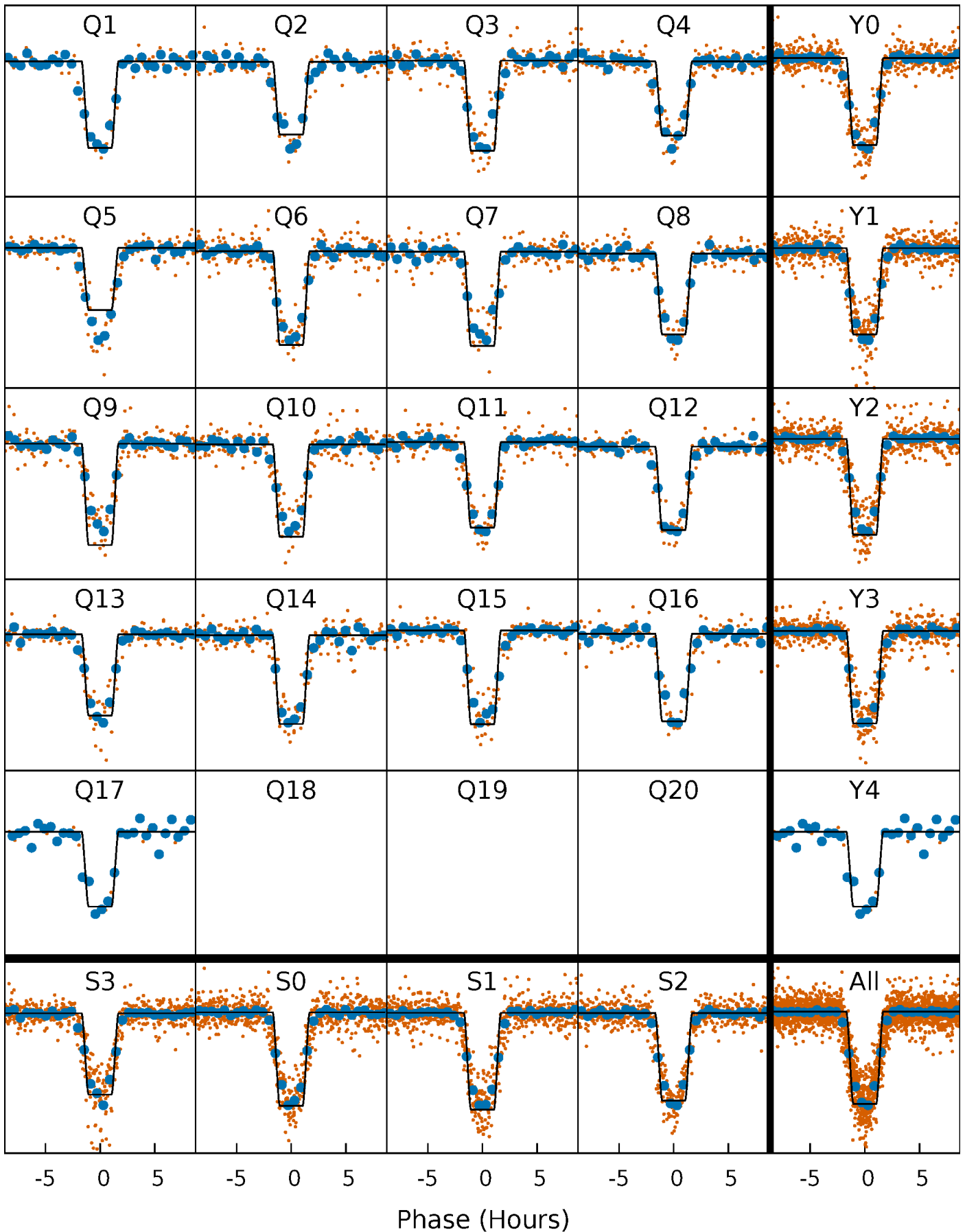
# DV Quarter-Phased Transit Curves

TCE 008879427-02   P= 16.313280 Days    $T_0=133.221949$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

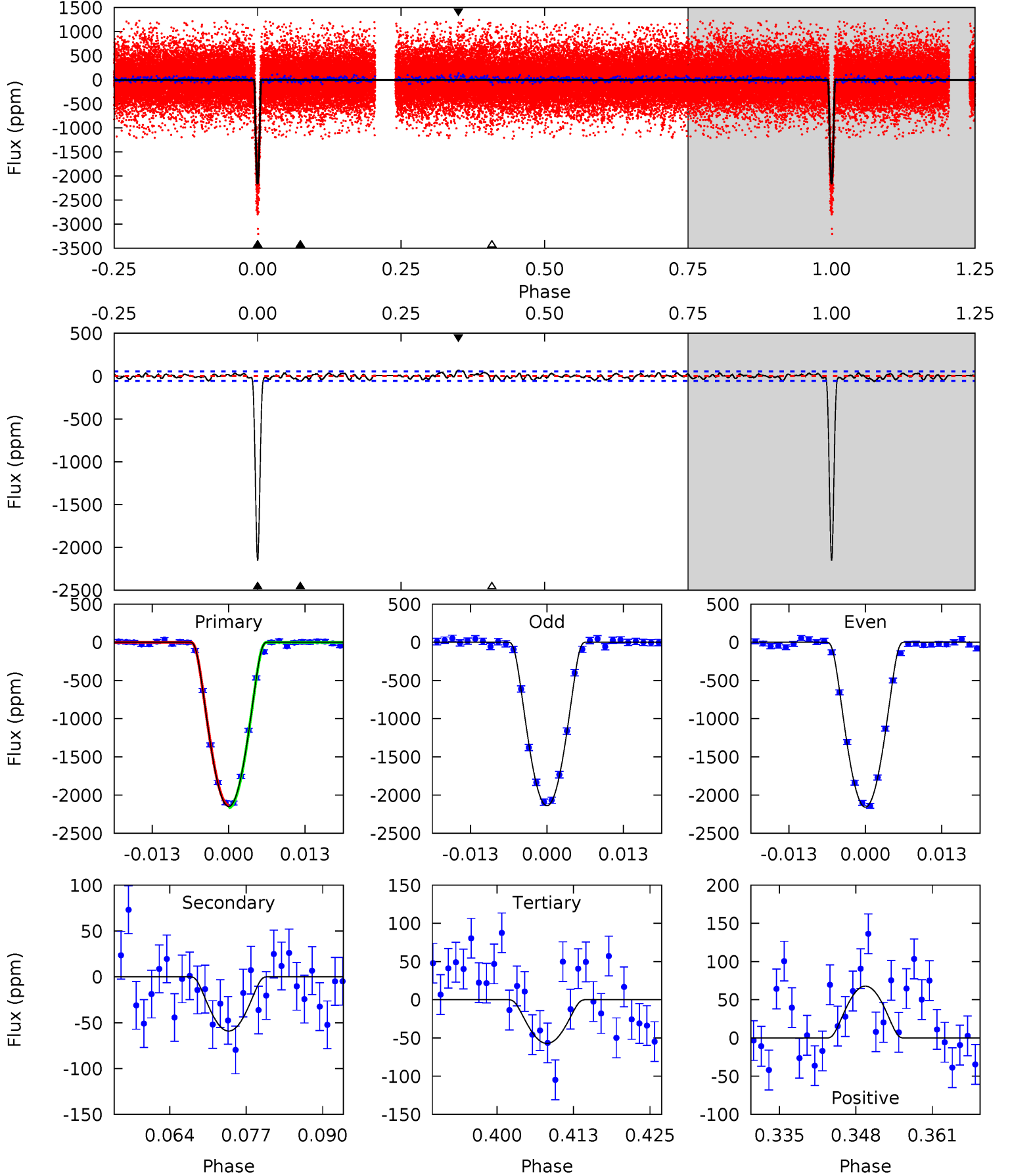
TCE 008879427-02 P= 16.313220 Days  $T_0=133.224771$  (BKJD)



# DV Model-Shift Uniqueness Test

008879427-02, P = 16.313280 Days, E = 116.908669 Days

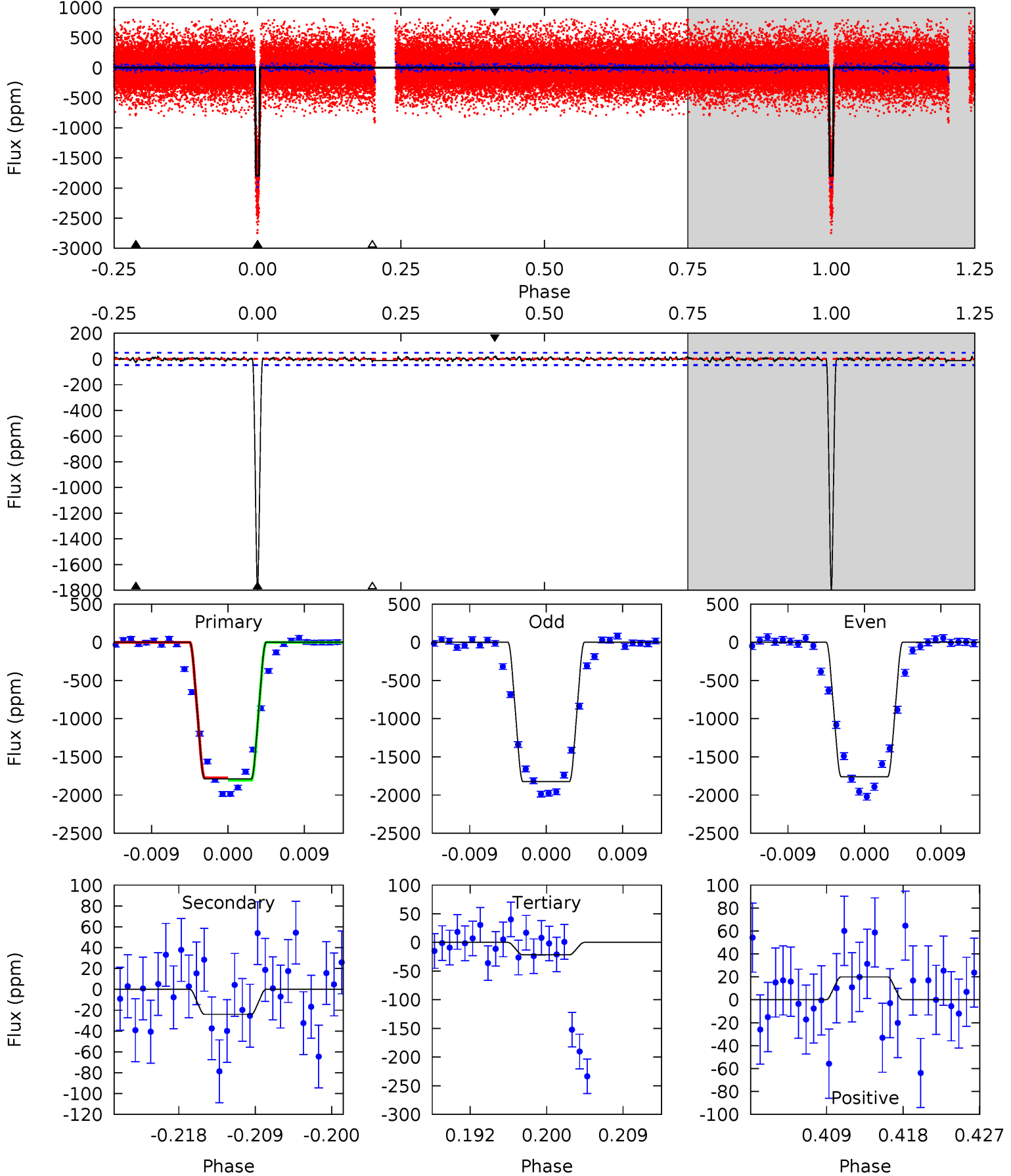
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
190.0	5.23	5.05	6.00	4.98	2.49	1.93	185.0	184.0	0.18	-0.77	0.78	1.01	0.03	1.40



# Alt Model-Shift Uniqueness Test

008879427-02, P = 16.313220 Days, E = 116.911551 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
189.5	2.55	2.29	2.11	5.05	2.62	0.72	187.2	187.4	0.26	0.43	3.37	1.01	0.01	1.68





### Stellar Parameters For KIC 008879427

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6008^{+180}_{-198}$	$4.440^{+0.070}_{-0.210}$	$-0.100^{+0.300}_{-0.300}$	$1.006^{+0.308}_{-0.132}$	$1.018^{+0.139}_{-0.126}$	$1.406^{+0.524}_{-0.742}$
	+3%/-3%	+2%/-5%	+300%/-300%	+31%/-13%	+14%/-12%	+37%/-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 008879427-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-59 \pm 11$	$8.17^{+2.25}_{-1.87}$	$1063^{+81}_{-51}$	$2720^{+216}_{-174}$	$7.530^{+5.790}_{-2.941}$
Alt.	$-24 \pm 9$	$5.16^{+1.92}_{-1.82}$	$1064^{+80}_{-59}$	$2718^{+404}_{-257}$	$7.713^{+12.951}_{-4.309}$

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

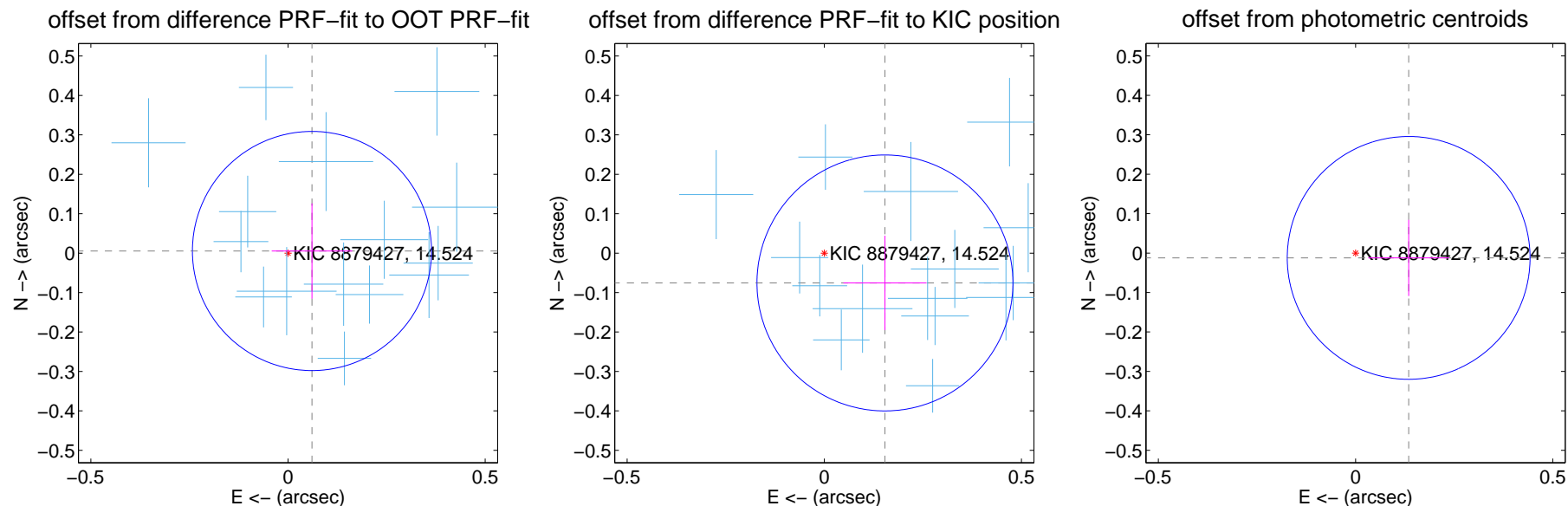
## DV Centroid Data

Supplemental centroid analysis for 008879427-02. Kepler magnitude: 14.52. Transit SNR 93.30

There are 17 quarters with good PRF difference image offsets

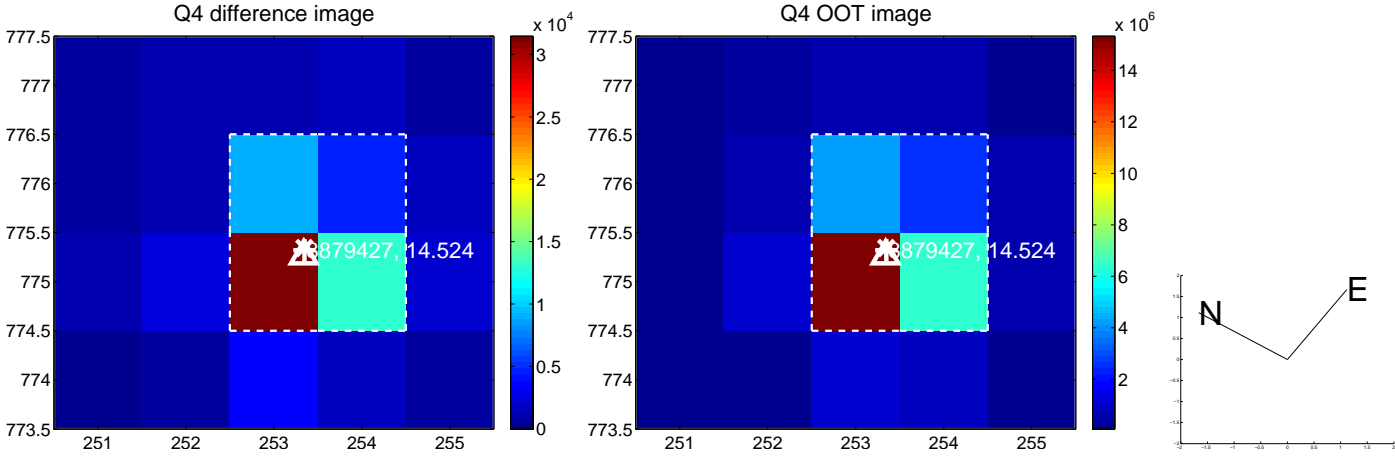
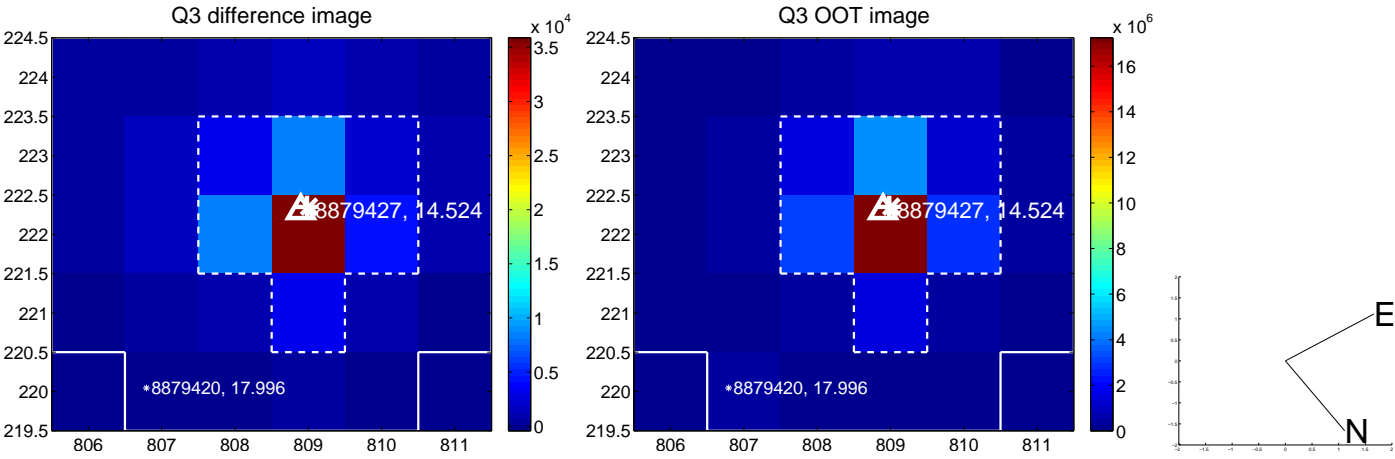
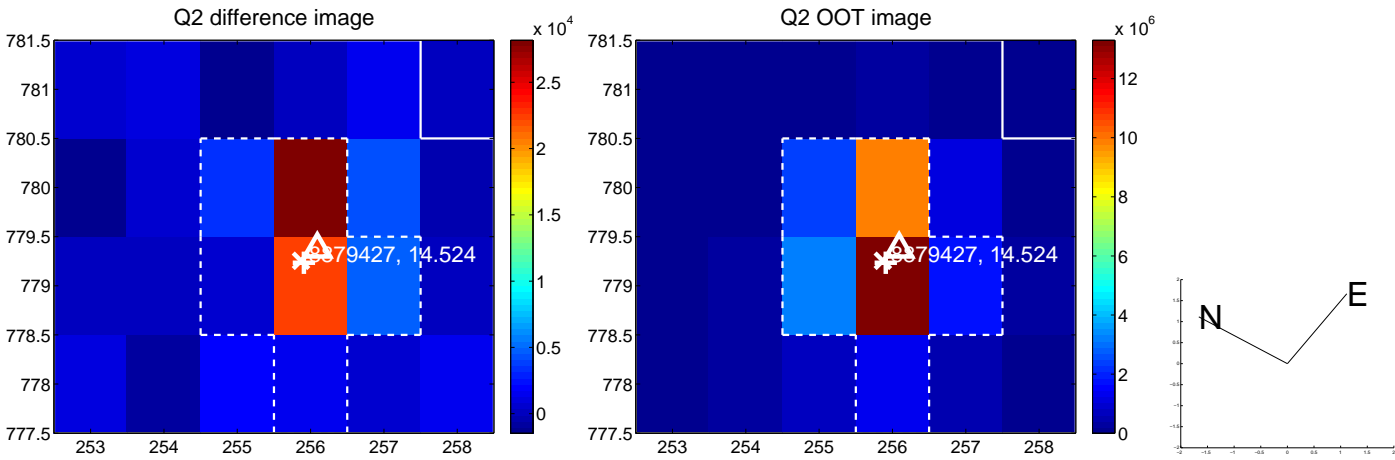
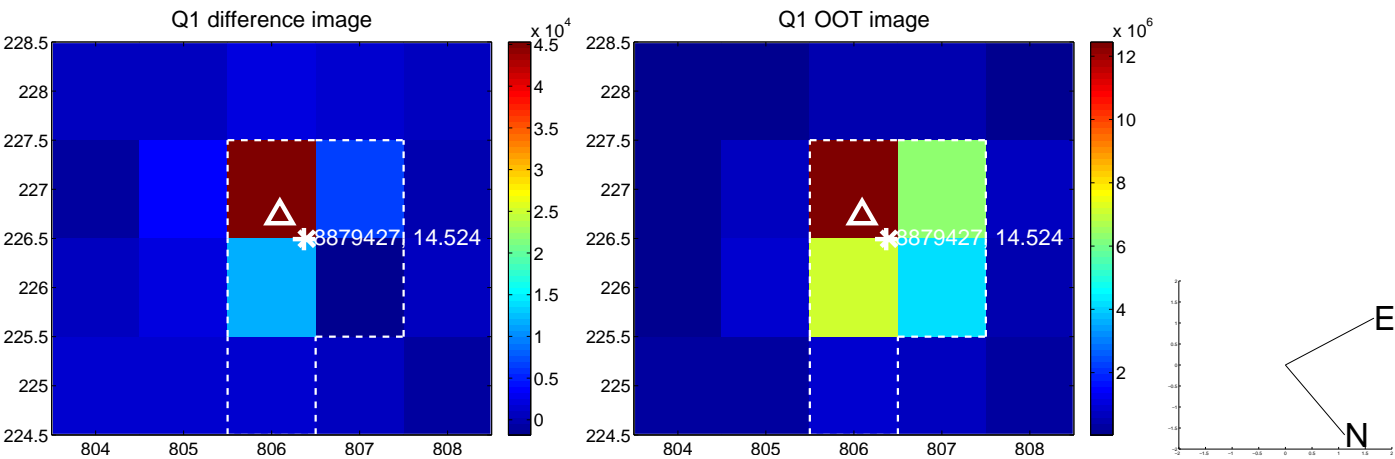
The direct PRF centroid is offset from the target star catalog position by about 0.13 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.061 \pm 0.101$	0.60	$-0.061 \pm 0.102$	$0.005 \pm 0.121$
PRF-fit source offset from KIC position	$0.171 \pm 0.108$	1.58	$-0.154 \pm 0.105$	$-0.076 \pm 0.120$
photometric centroid source offset	$0.14 \pm 0.10$	1.32	$-0.13 \pm 0.10$	$-0.01 \pm 0.10$

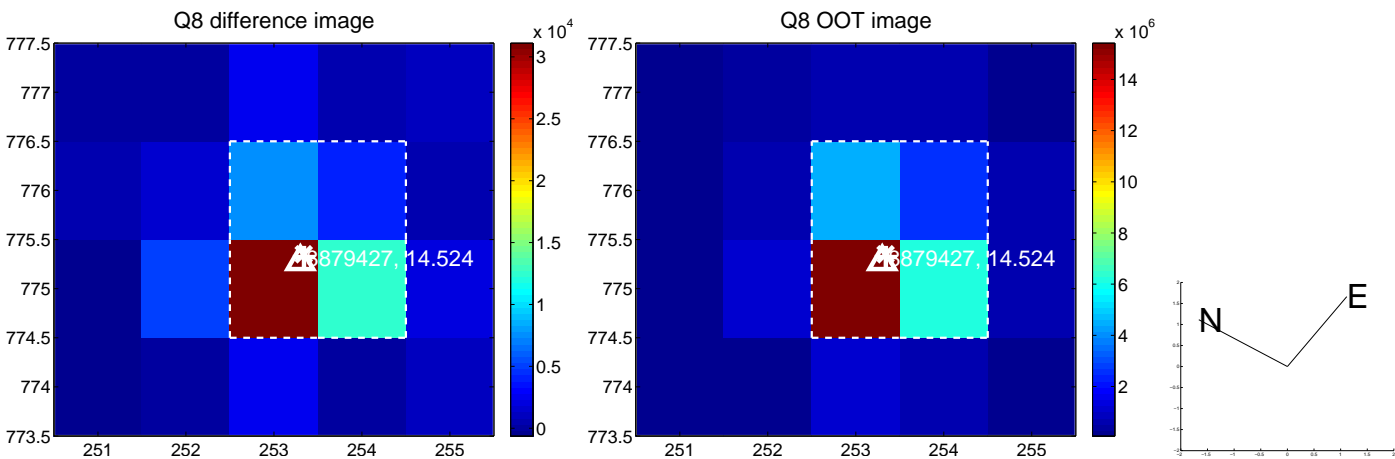
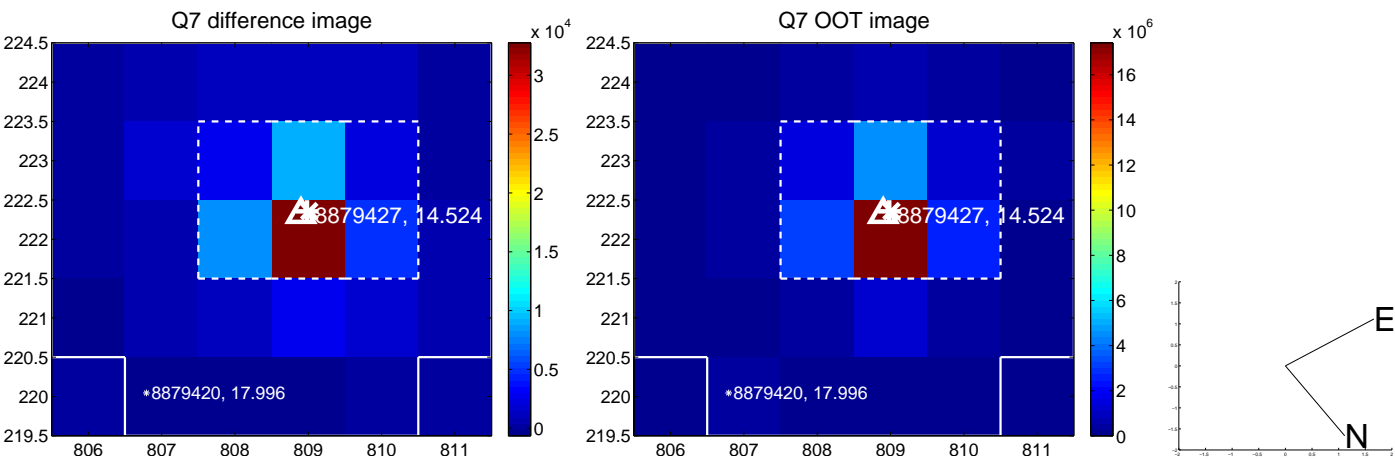
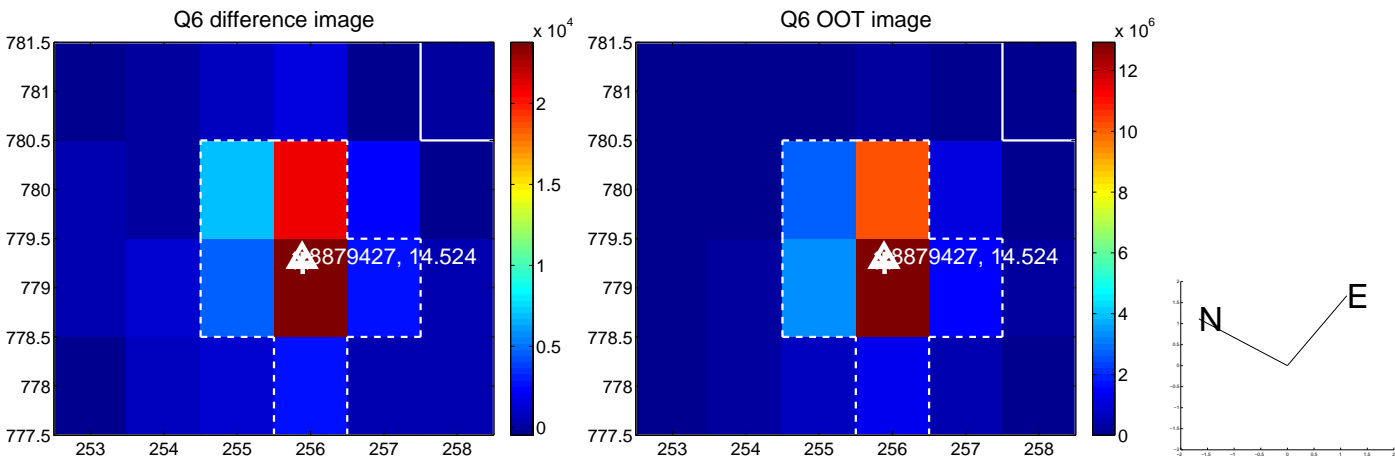
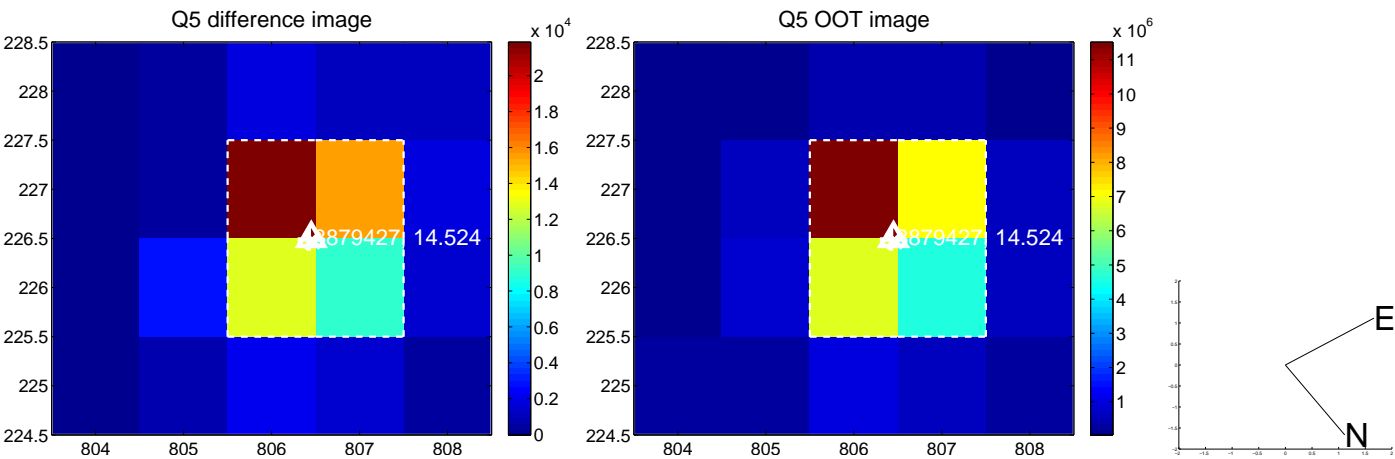


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

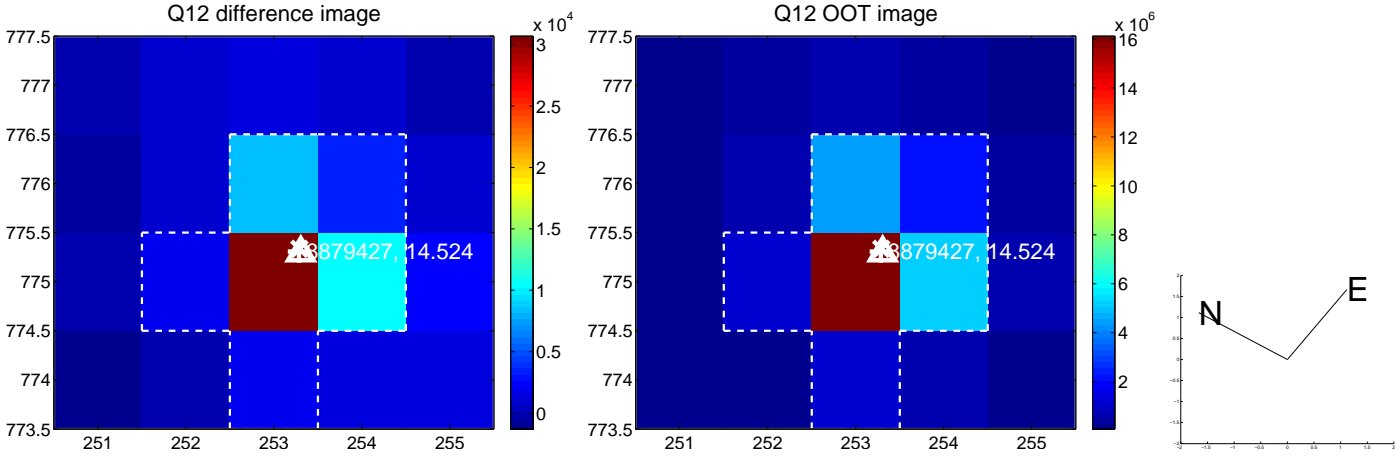
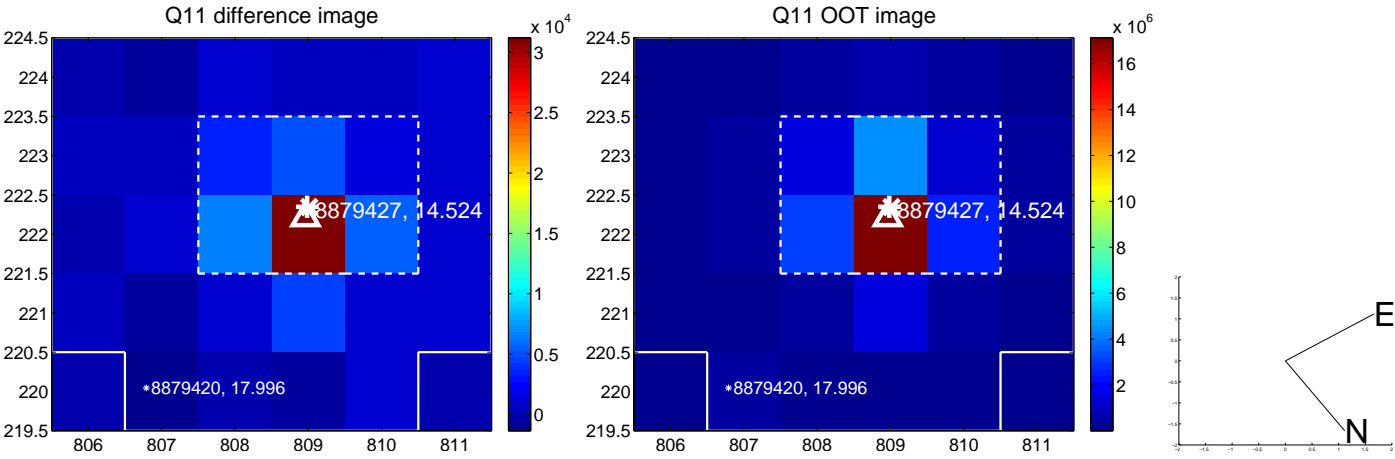
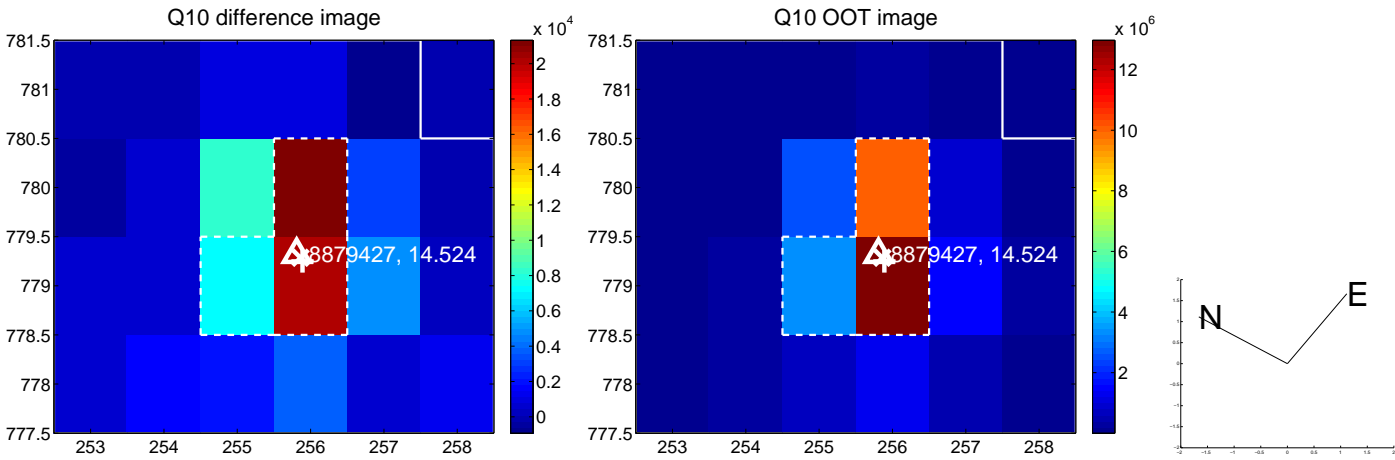
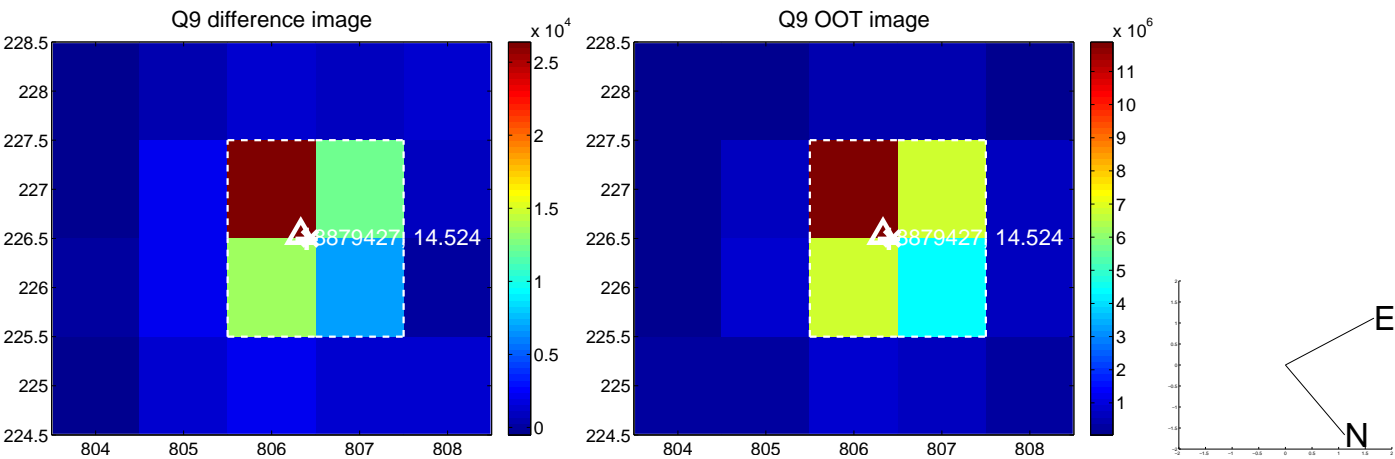
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



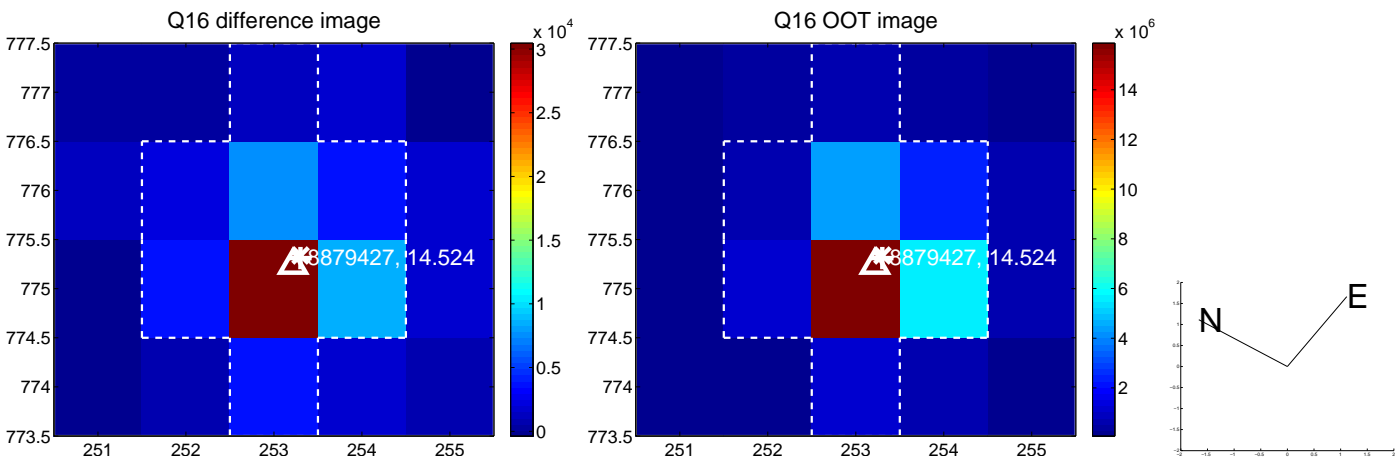
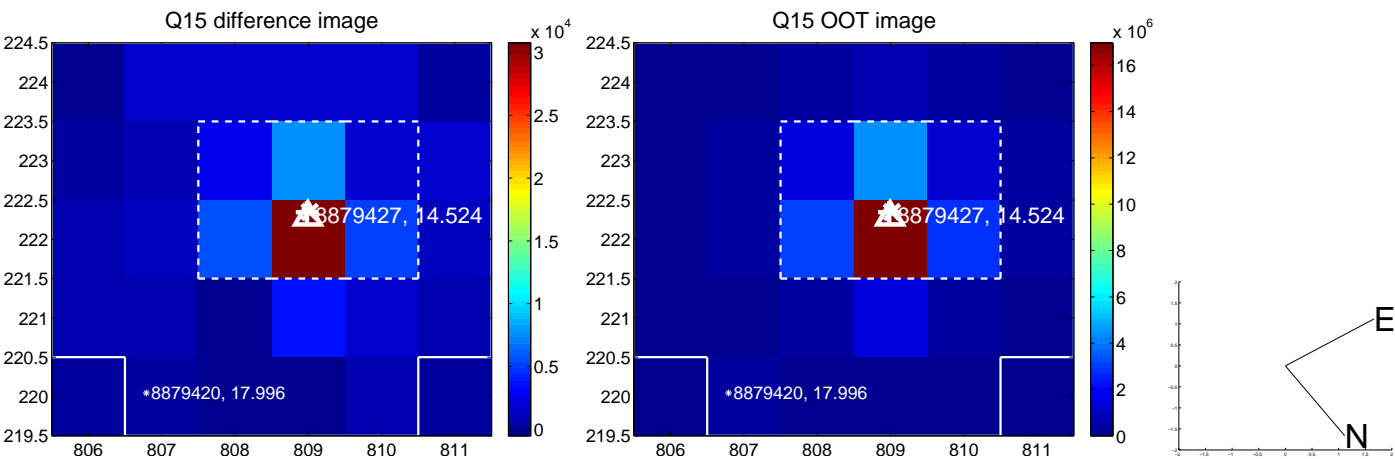
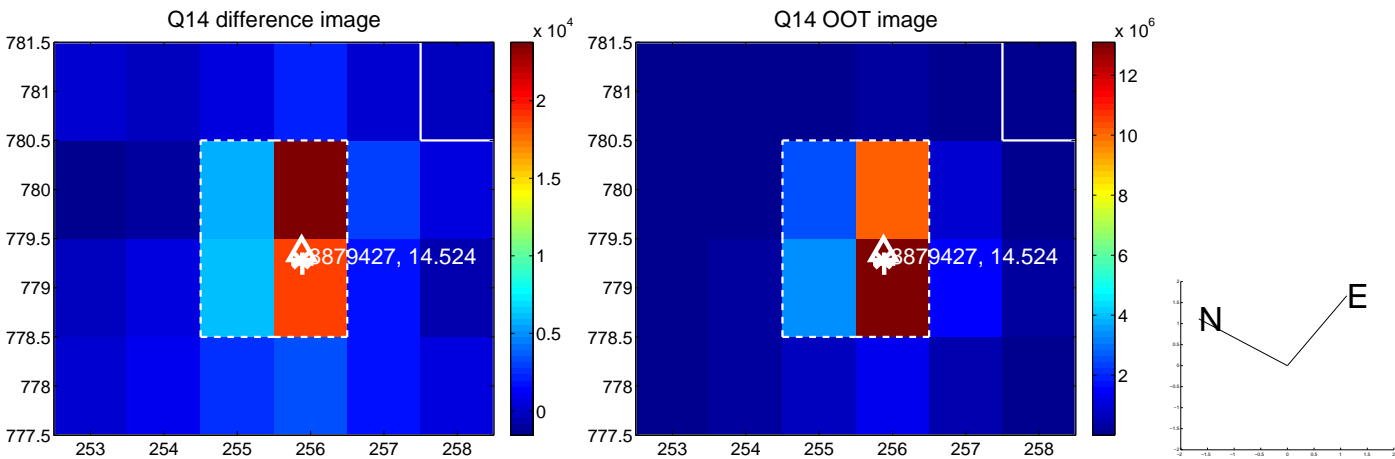
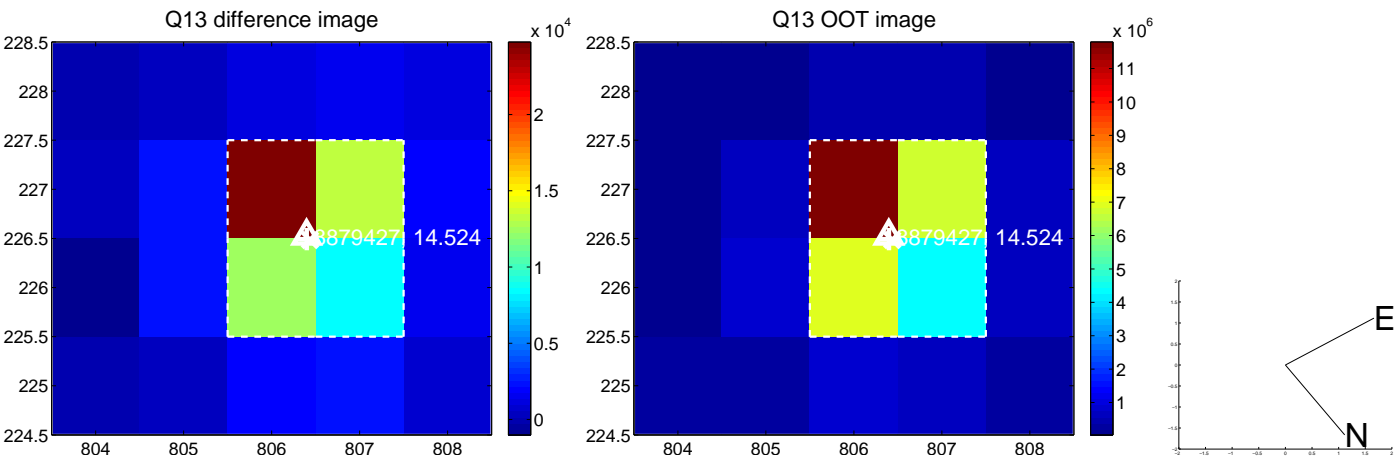
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



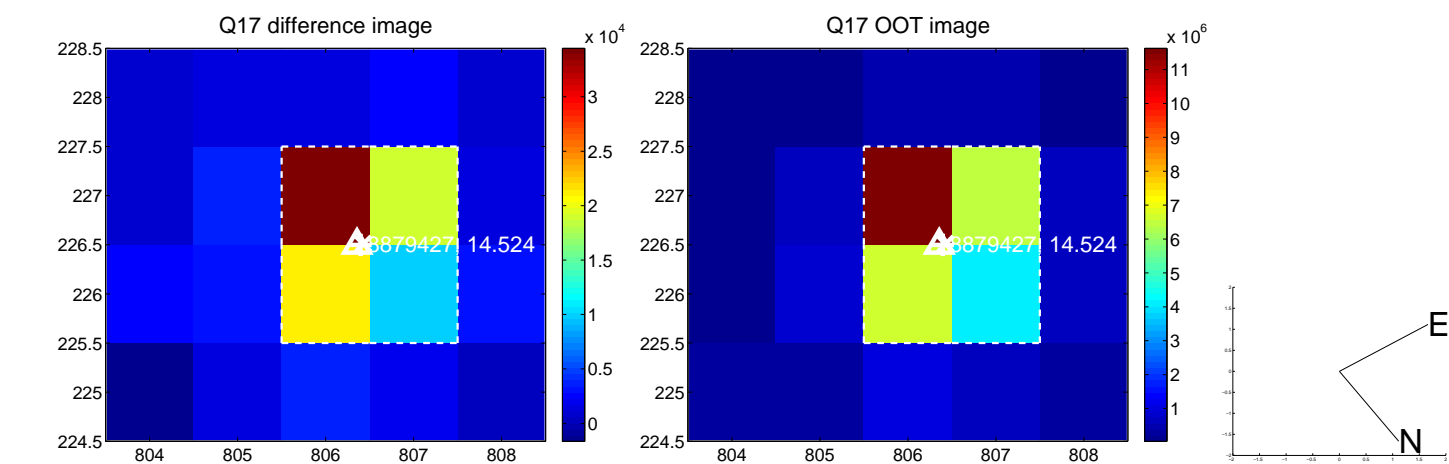
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



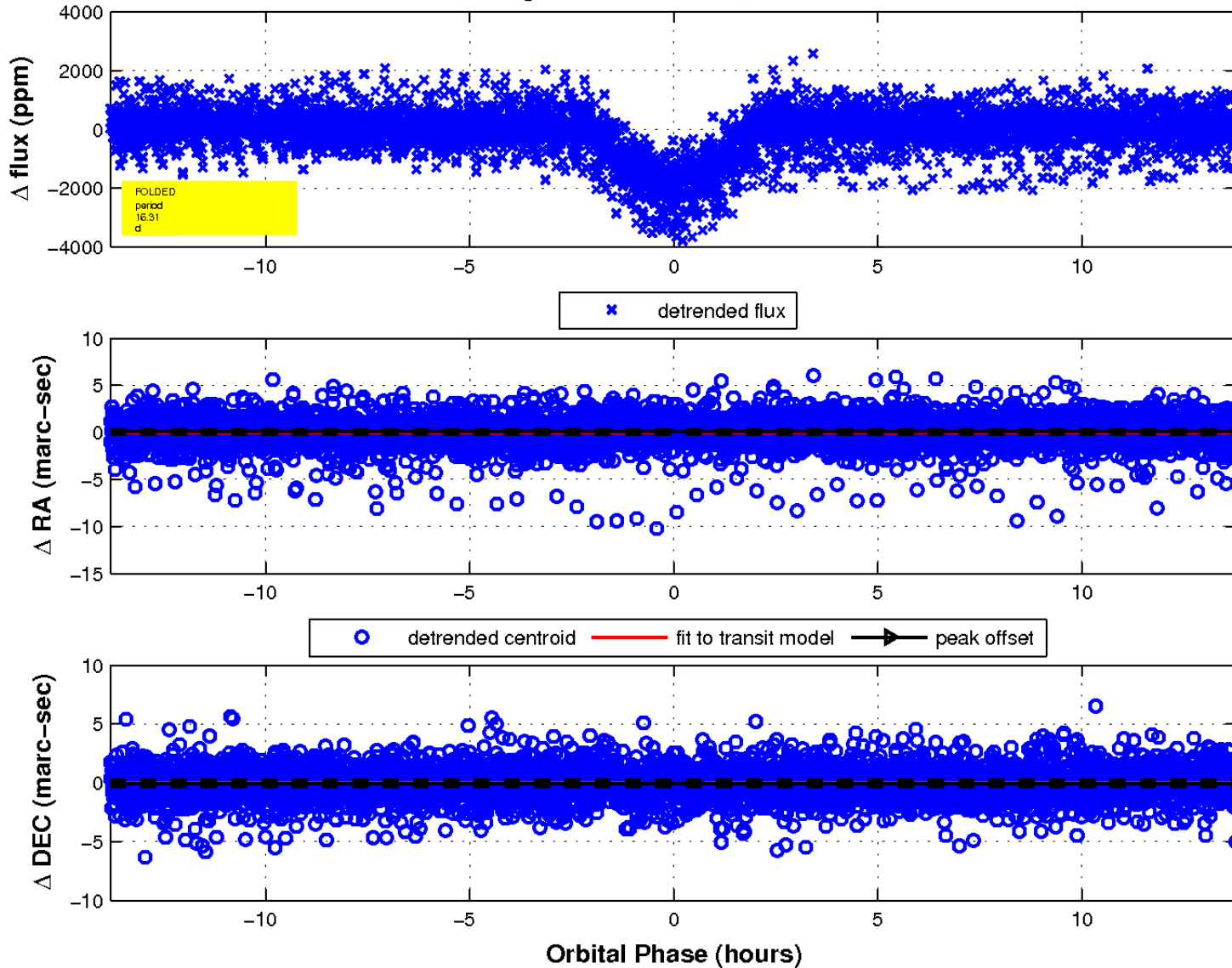
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

Declination

