

# KIC 009828127

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009828127-01	OBS	4192.01	18.054147	147.793825	267.3	4.766	15.7	16.4	0.91	5505	1.74	38.62
009828127-02	OBS	4192.02	32.027311	150.632441	168.7	5.265	8.0	8.1	0.91	5505	1.36	17.99

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009828127-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
009828127-02	OBS	PC	0.99	0	0	0	0	NO_COMMENT

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

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

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

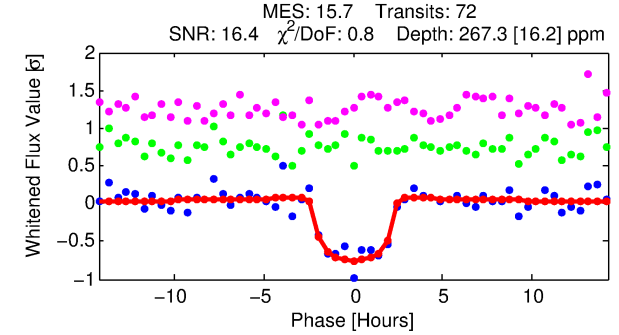
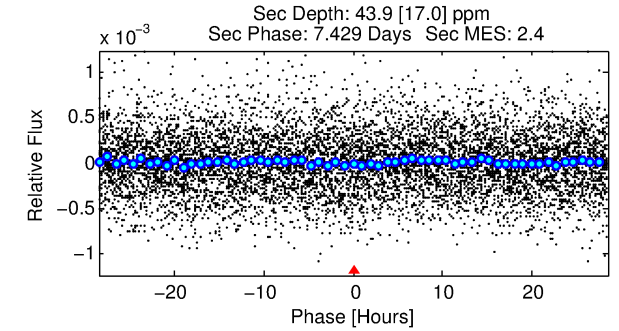
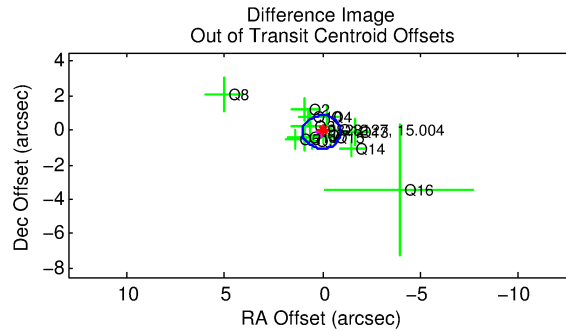
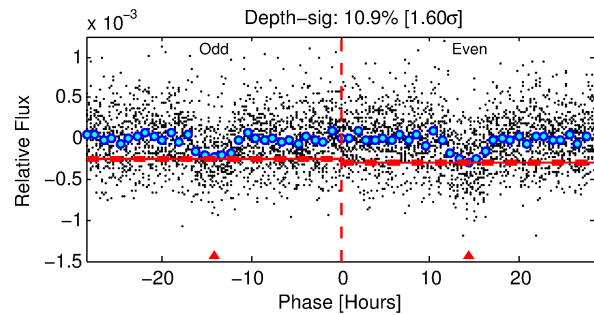
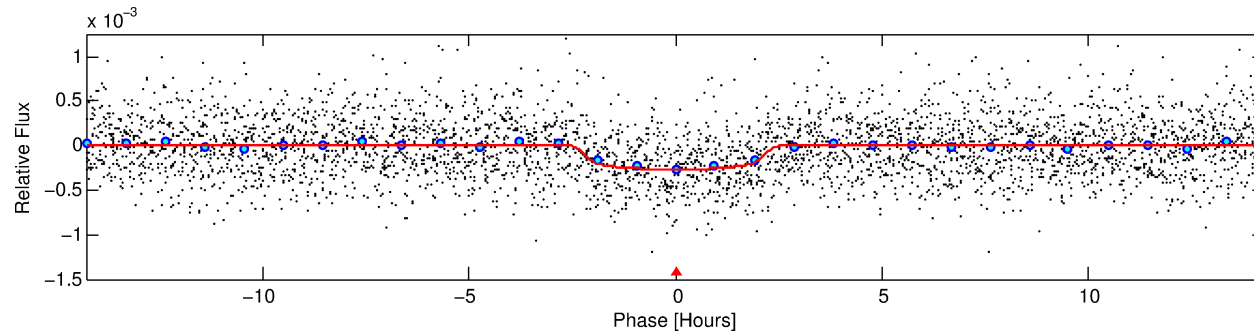
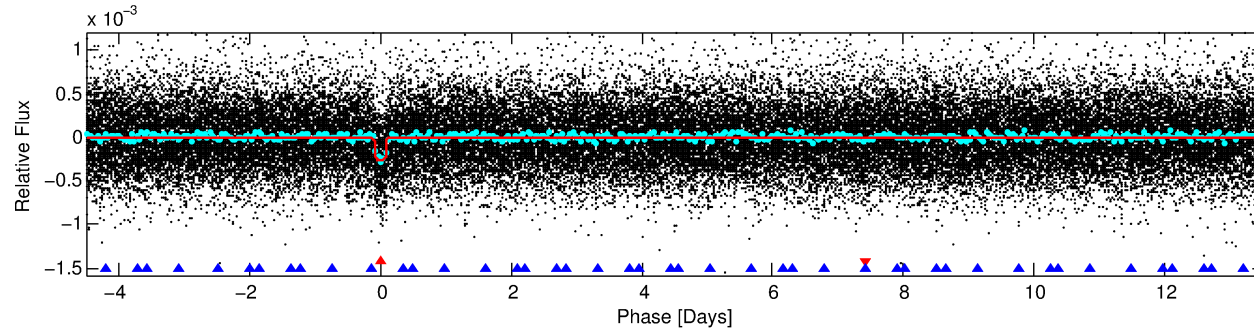
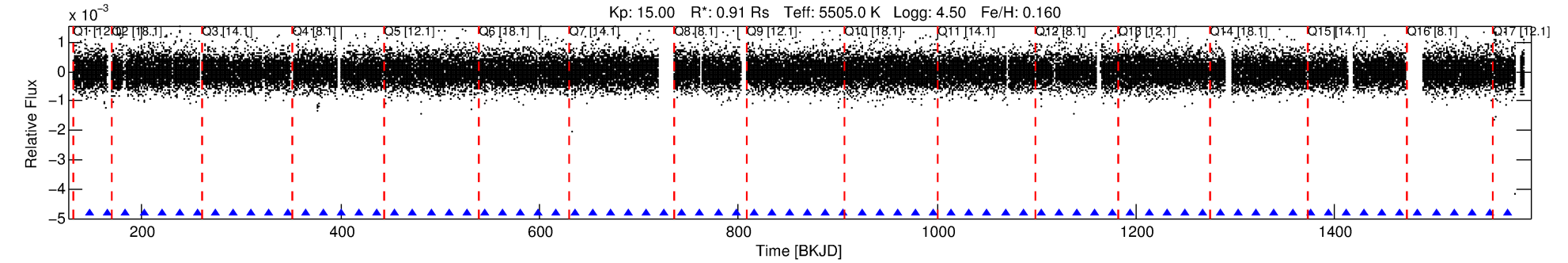
## Ephemeris Match Information For 009828127-01

No Significant Match Found

# DV One-Page Summary

KIC: 9828127 Candidate: 1 of 2 Period: 18.054 d

KOI: K04192.01 Corr: 0.962



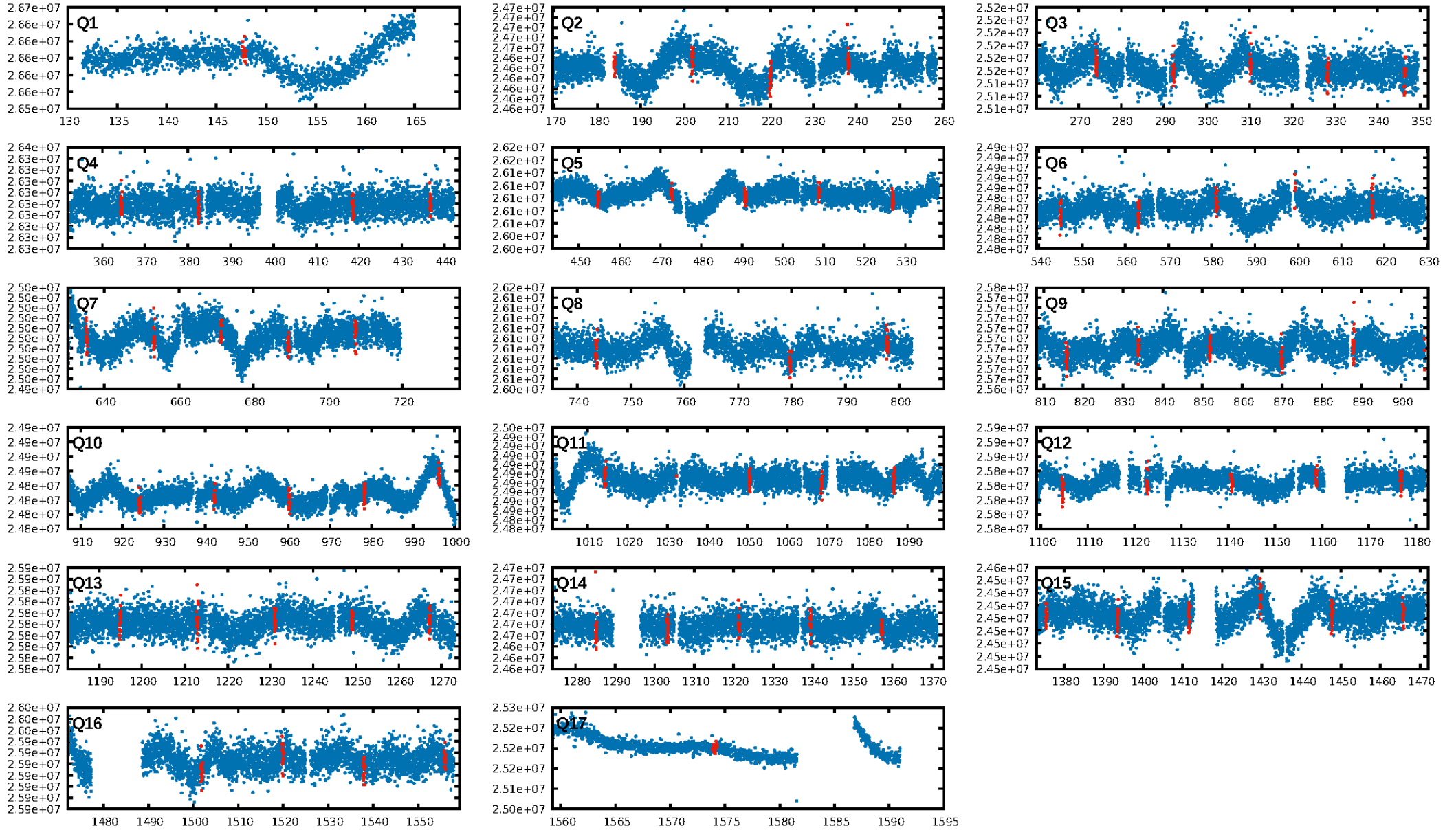
## DV Fit Results:

Period = 18.05415 [0.00012] d  
Epoch = 147.7938 [0.0058] BKJD  
Rp/R\* = 0.0176 [0.0047]  
a/R\* = 15.01 [17.01]  
b = 0.88 [0.31]  
Seff = 38.62 [7.37]  
Teq = 636 [30] K  
Rp = 1.74 [0.51] Re  
a = 0.1327 [0.0153] AU  
Ag = 139.85 [95.64] [1.45σ]  
Teffp = 3380 [559] K [4.90σ]

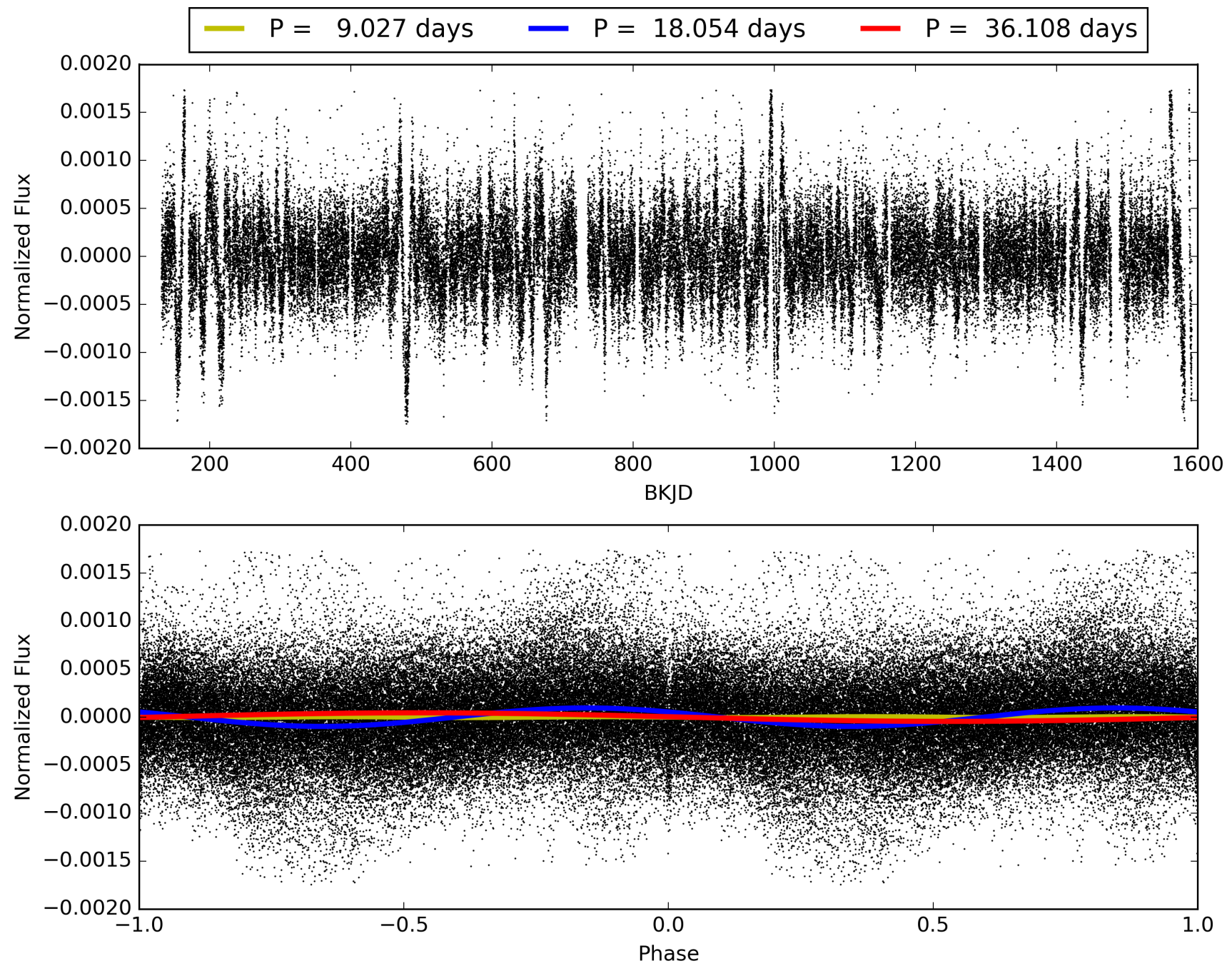
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [47.22σ]  
ModelChiSquare2-sig: 99.0%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 3.25e-54  
RollingBand-fgt: 1.00 [70/70]  
GhostDiagnostic-chr: 9.736  
Centroid-sig: 44.5%  
Centroid-so: 0.423 arcsec [0.59σ]  
OotOffset-rm: 0.120 arcsec [0.37σ]  
KicOffset-rm: 0.119 arcsec [0.24σ]  
OotOffset-st: 3/4/4/3 [14]  
KicOffset-st: 3/4/4/3 [14]  
DiffImageQuality-fgm: 0.86 [12/14]  
DiffImageOverlap-fno: 1.00 [17/17]

# TCE 009828127-01, PDC Light Curves

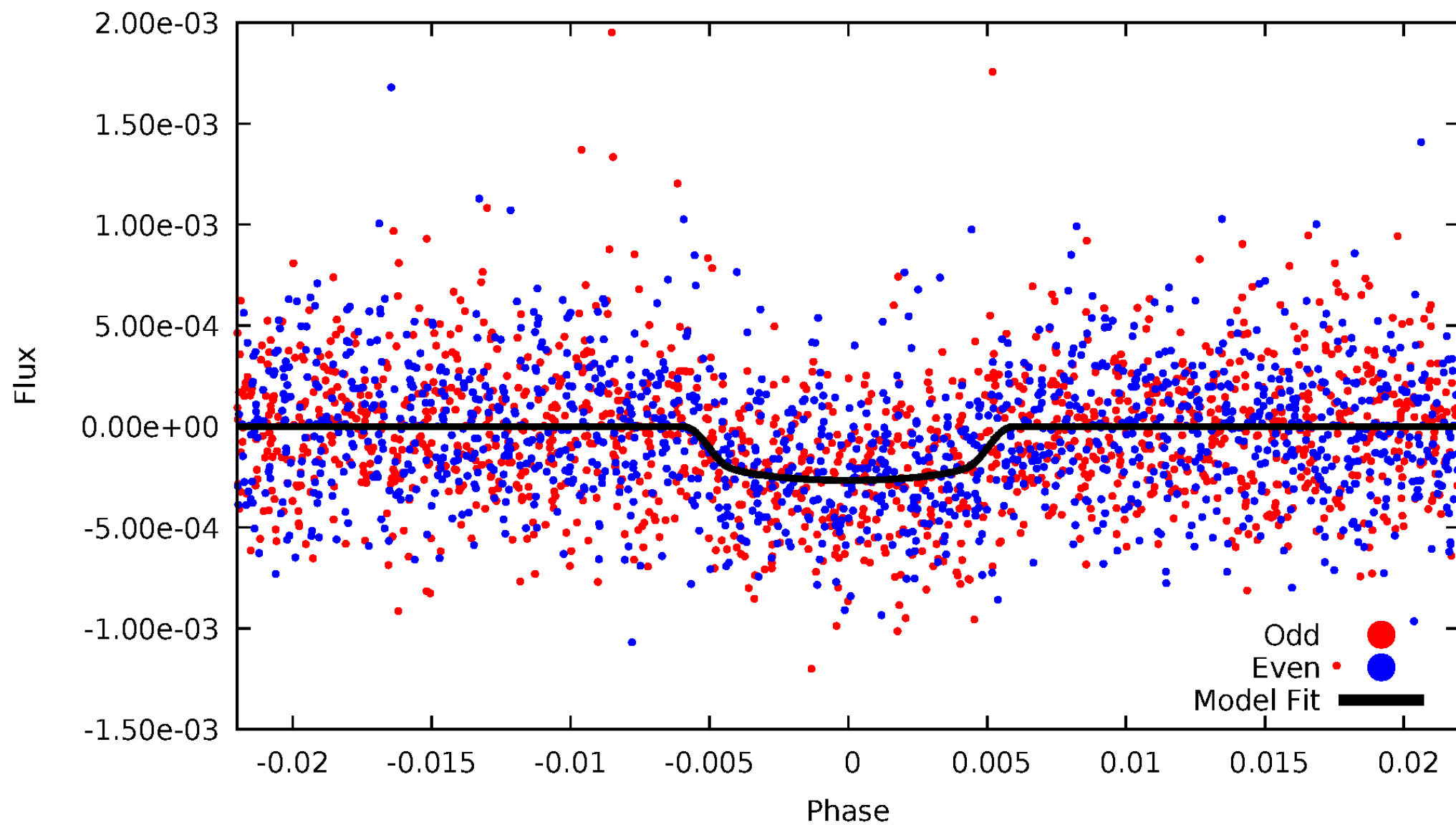


TCE 009828127-01



# DV Odd/Even

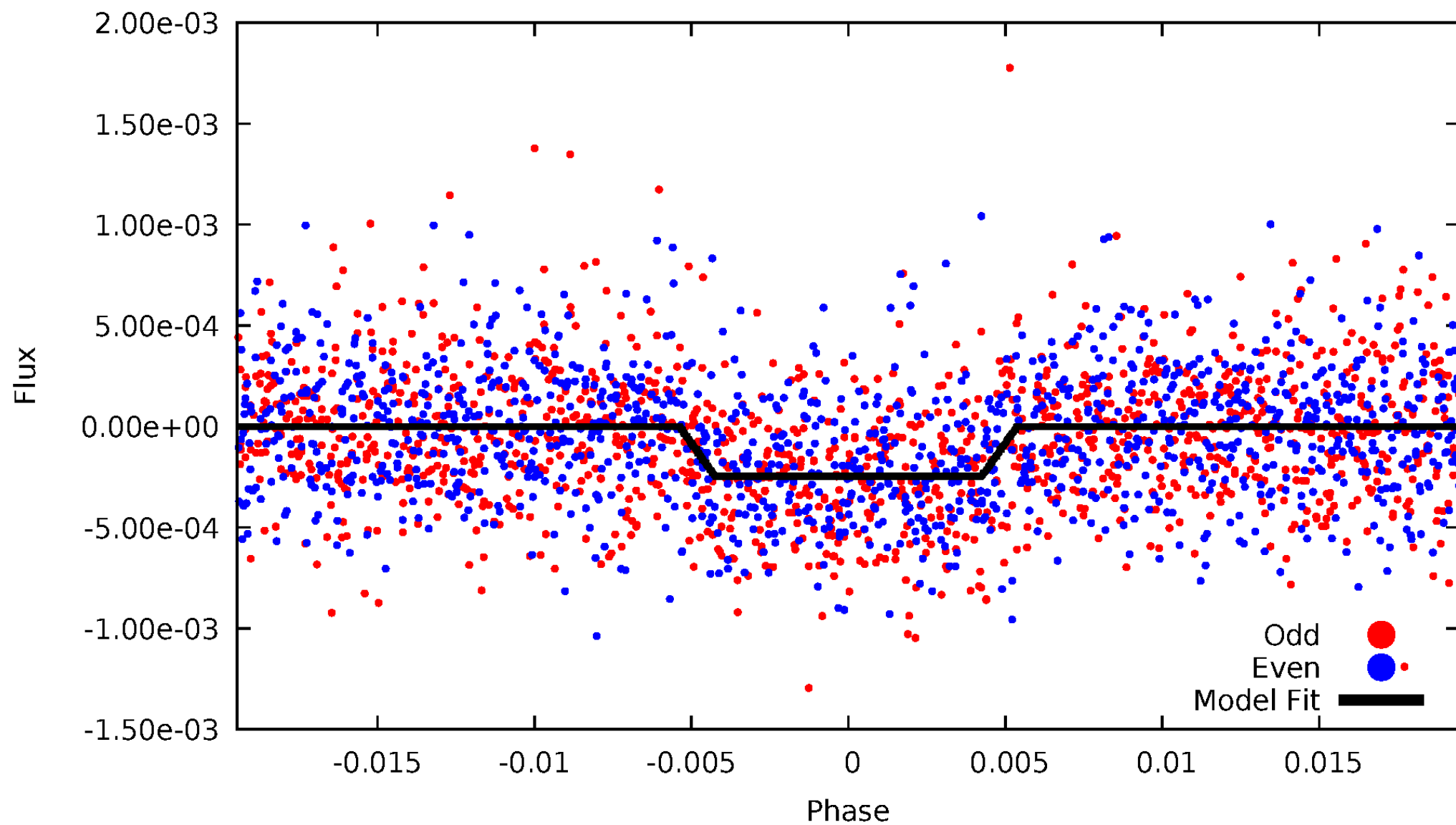
TCE 009828127-01





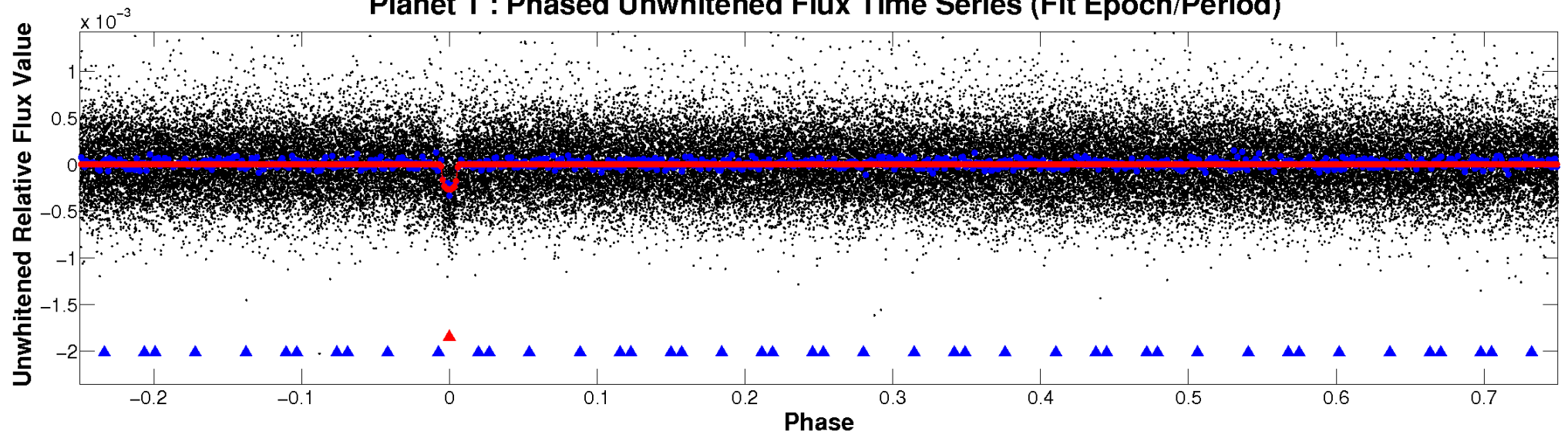
# ALT Odd/Even

TCE 009828127-01

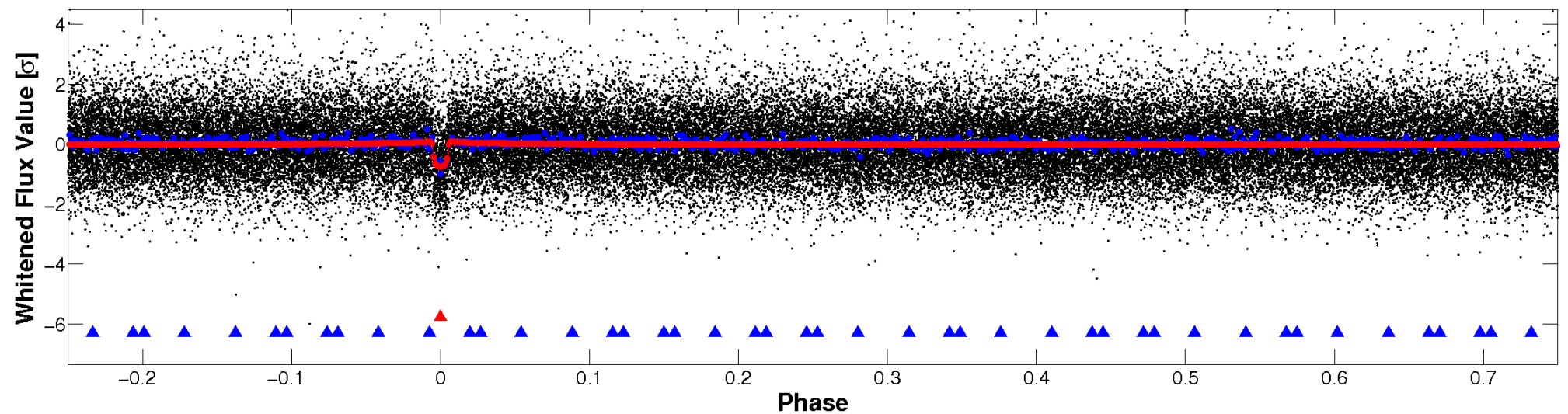


# Non-Whitened Vs. Whitened Light Curve

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

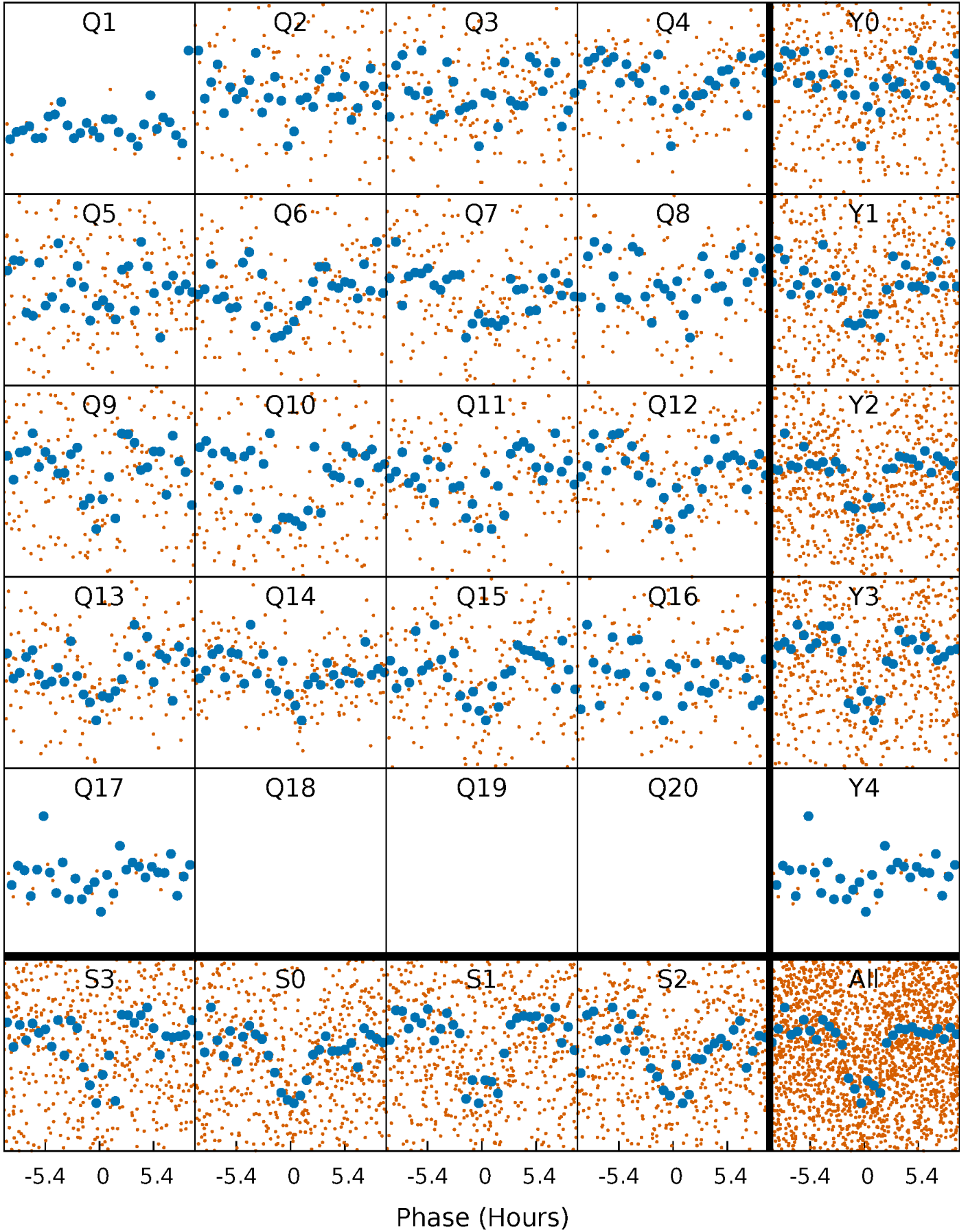


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

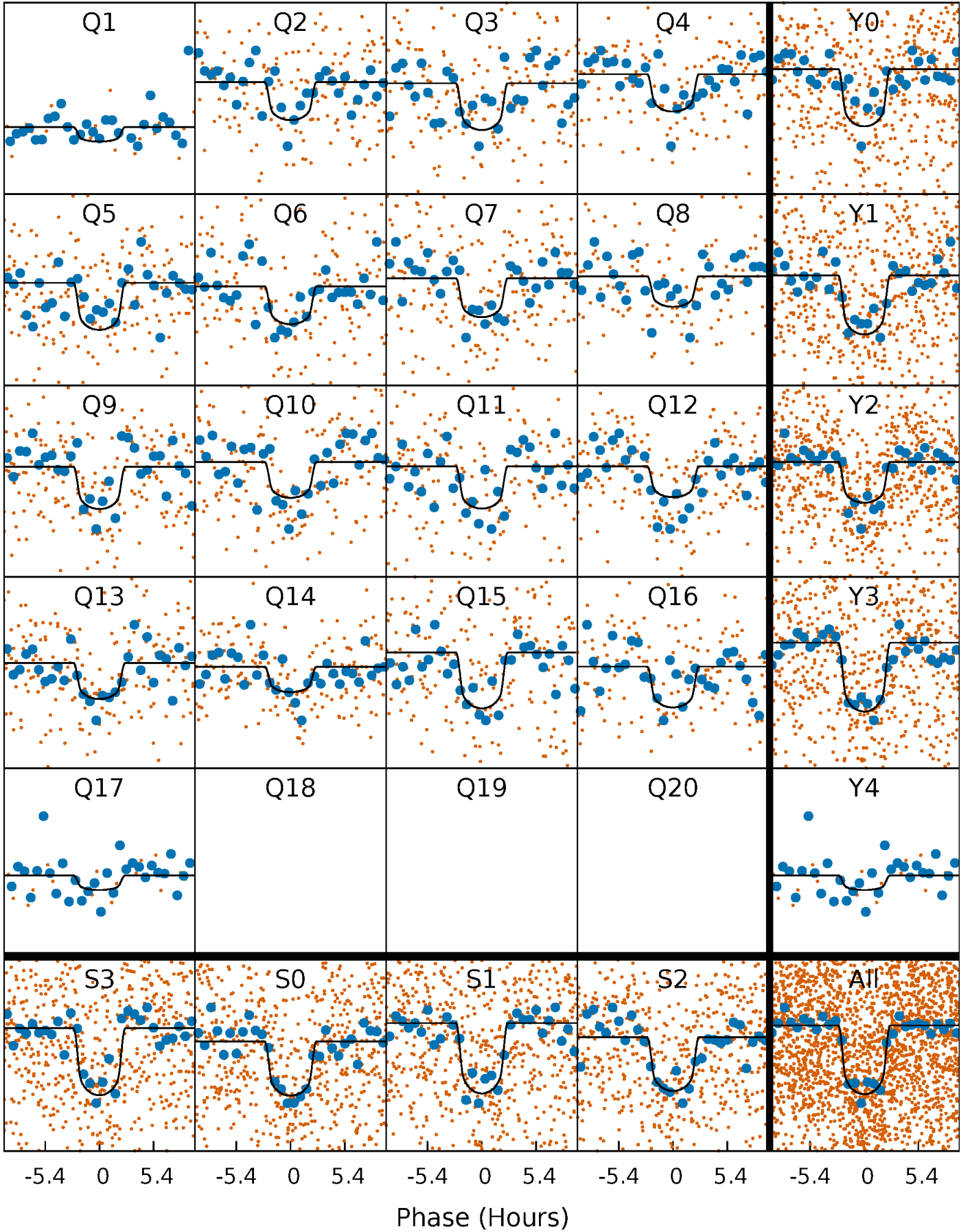
TCE 009828127-01 P= 18.054147 Days  $T_0=147.793825$  (BKJD)





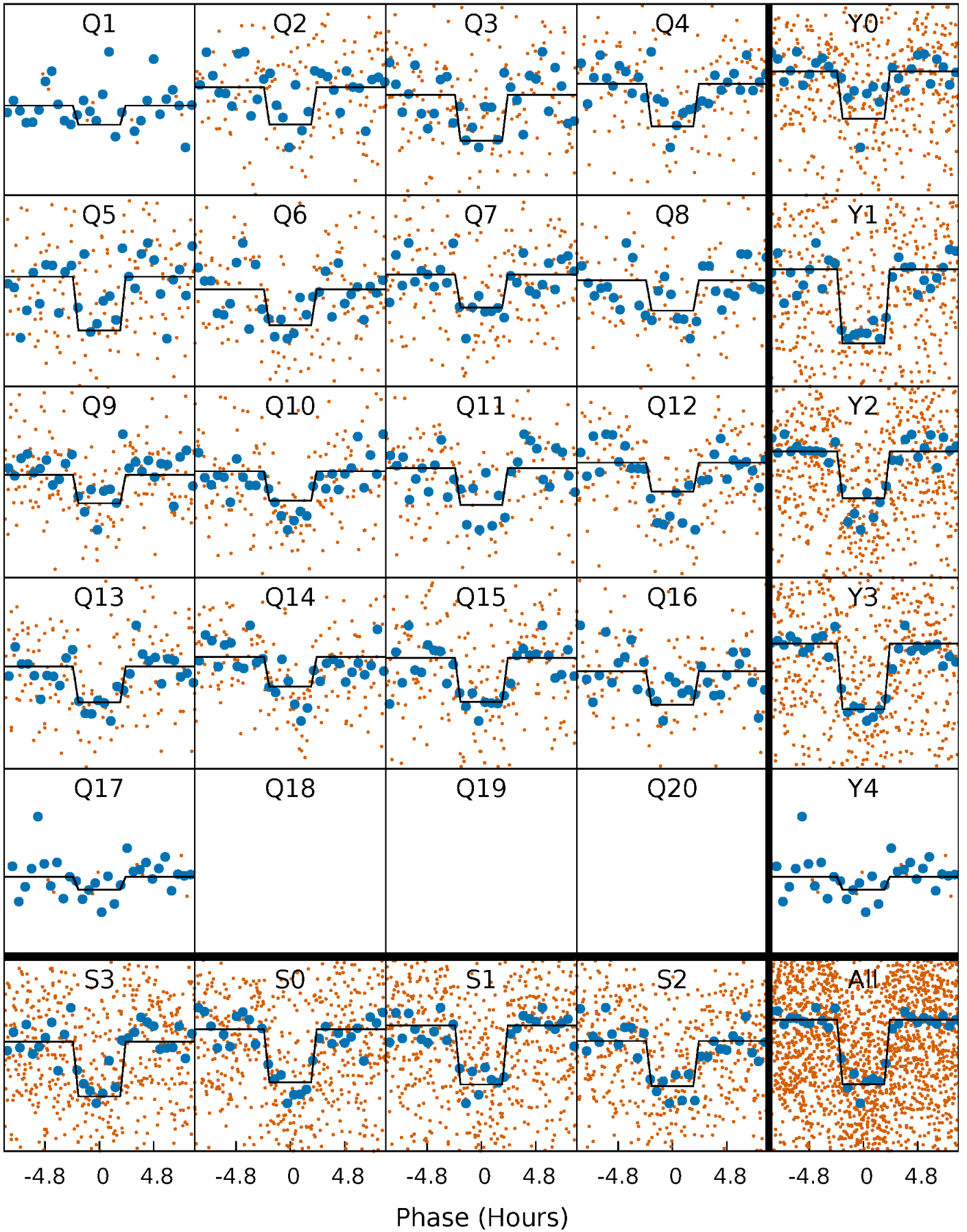
# DV Quarter-Phased Transit Curves

TCE 009828127-01 P= 18.054147 Days  $T_0=147.793825$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

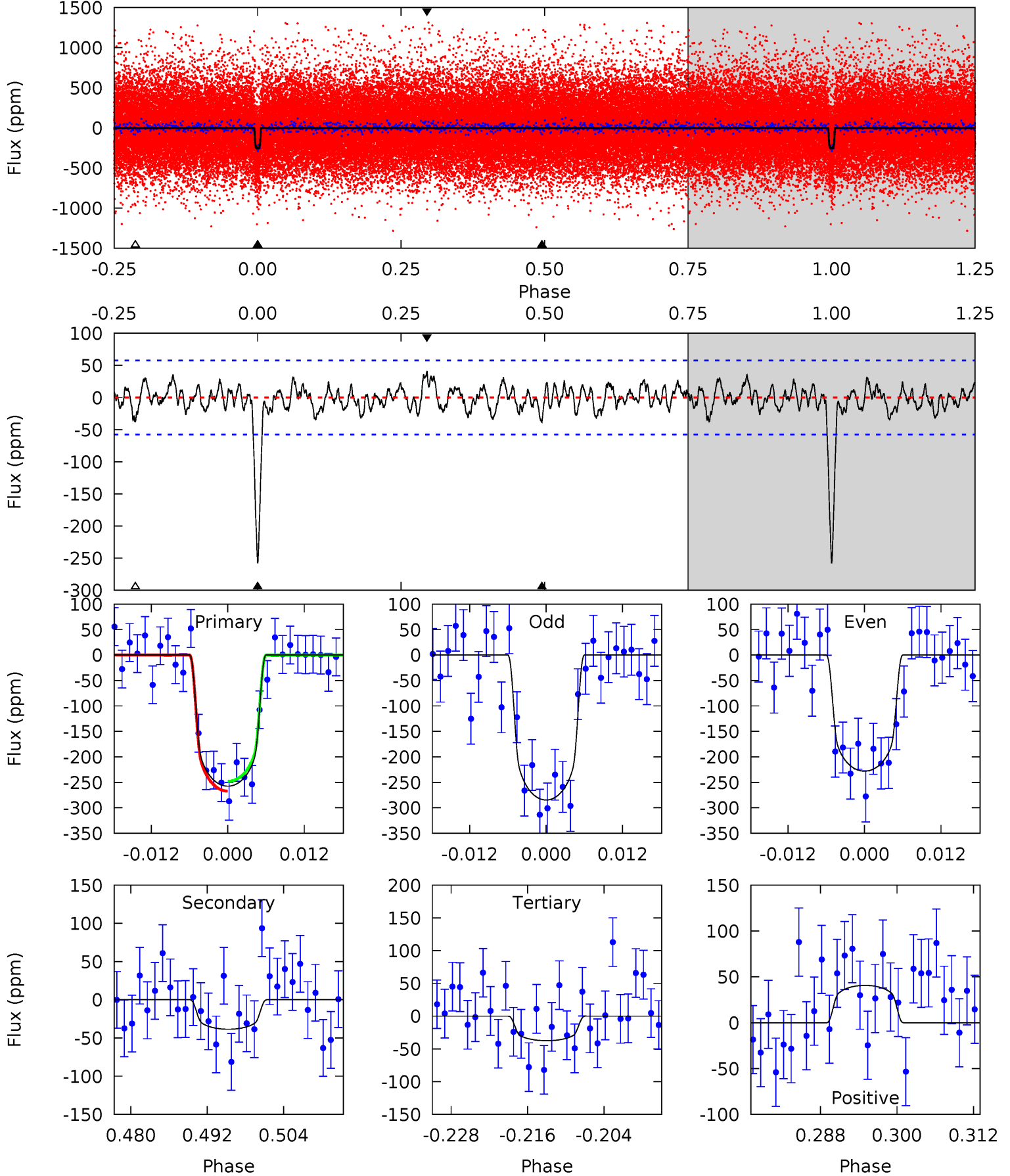
TCE 009828127-01 P= 18.053975 Days  $T_0=147.801735$  (BKJD)



# DV Model-Shift Uniqueness Test

009828127-01,  $P = 18.054147$  Days,  $E = 129.739678$  Days

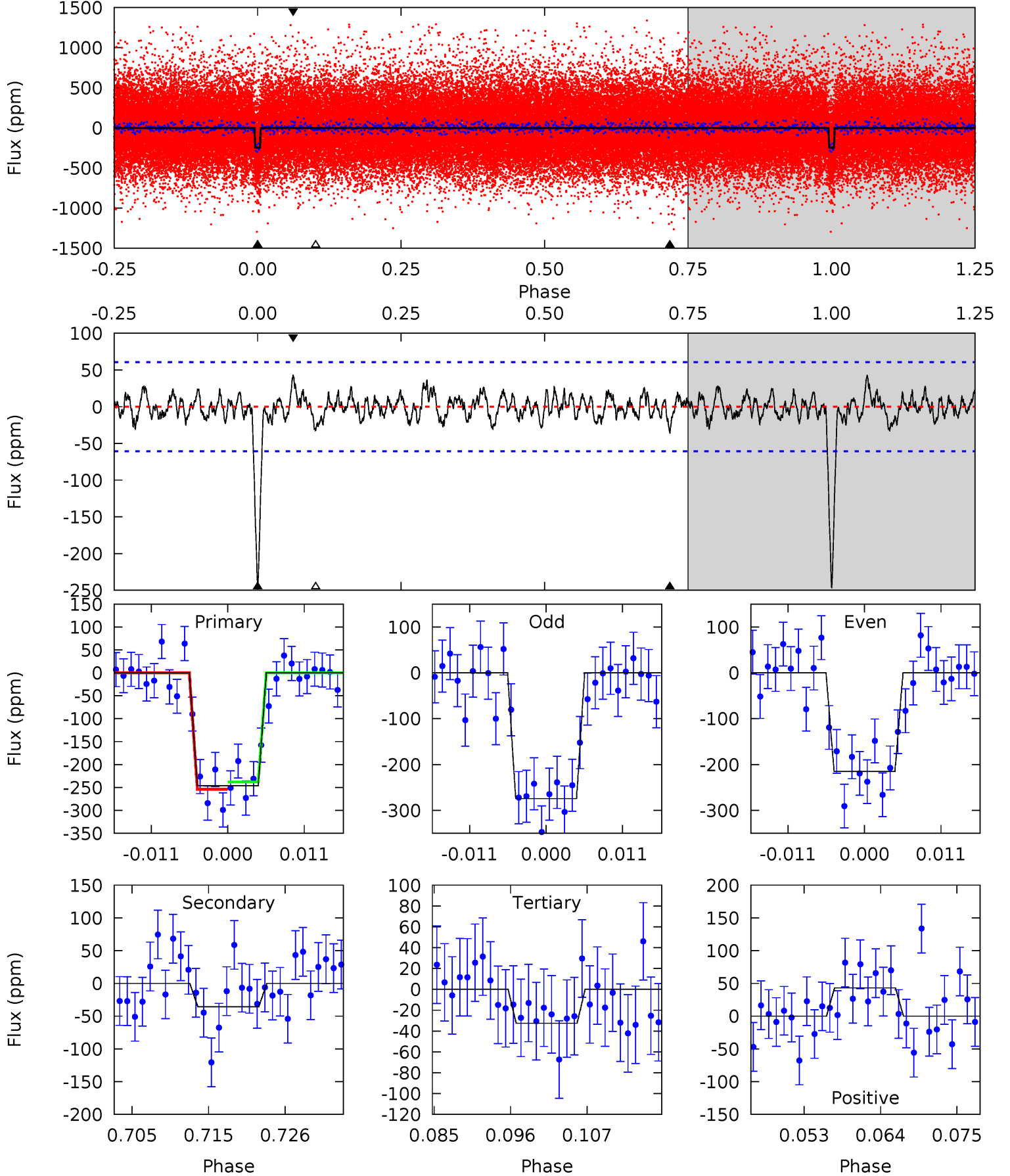
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
22.3	3.34	3.25	3.52	4.99	2.51	1.28	19.0	18.8	0.09	-0.18	2.45	0.96	0.14	0.83



# Alt Model-Shift Uniqueness Test

009828127-01,  $P = 18.053975$  Days,  $E = 129.747760$  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
20.3	2.96	2.69	3.56	5.01	2.55	1.08	17.6	16.8	0.27	-0.60	2.45	0.94	0.15	0.66



### Stellar Parameters For KIC 009828127

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5505^{+74}_{-82}$	$4.501^{+0.038}_{-0.105}$	$0.160^{+0.150}_{-0.150}$	$0.909^{+0.113}_{-0.052}$	$0.955^{+0.044}_{-0.058}$	$1.790^{+0.281}_{-0.548}$
	+1%/-1%	+1%/-2%	+94%/-94%	+12%/-6%	+5%/-6%	+16%/-31%
Source	SPE90	SPE90	SPE90	DSEP		

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

### Secondary Eclipse Parameters for KIC 009828127-01 / KOI 4192.01

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-39 \pm 12$	$1.78^{+0.50}_{-0.44}$	$896^{+29}_{-22}$	$3658^{+453}_{-325}$	$116^{+106}_{-52}$
Alt.	$-36 \pm 12$	$1.55^{+0.56}_{-0.46}$	$893^{+33}_{-20}$	$3781^{+529}_{-427}$	$138^{+151}_{-72}$

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



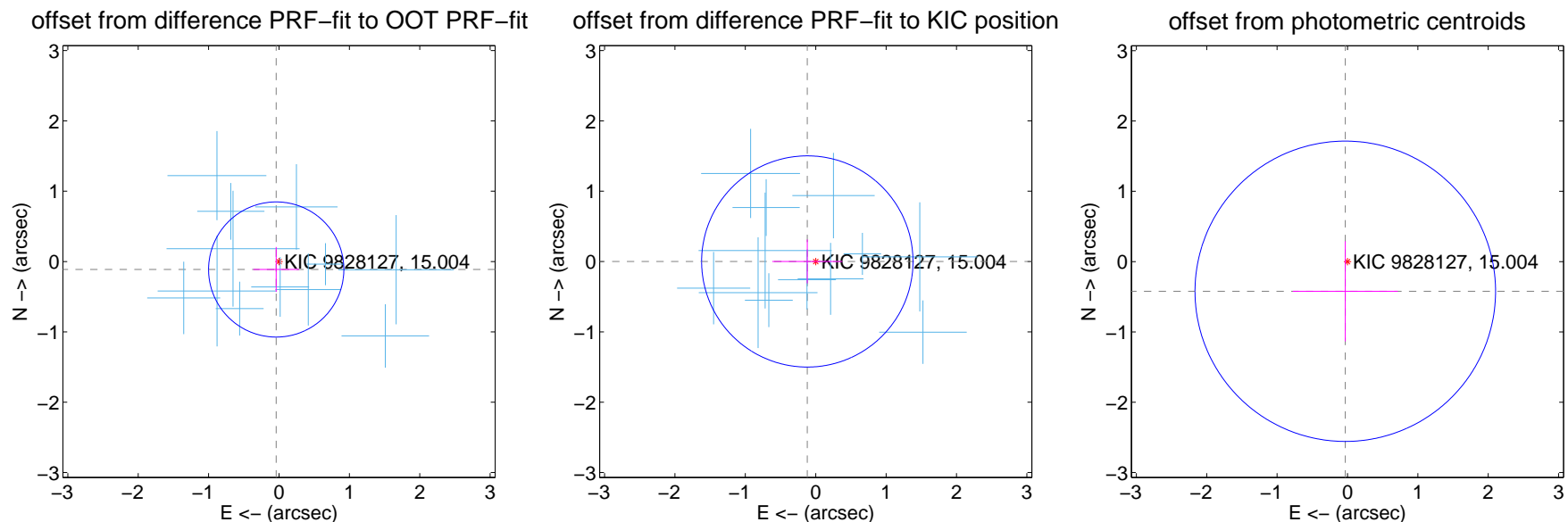
## DV Centroid Data

Supplemental centroid analysis for 009828127-01. Kepler magnitude: 15.00. Transit SNR 16.45

There are 12 quarters with good PRF difference image offsets

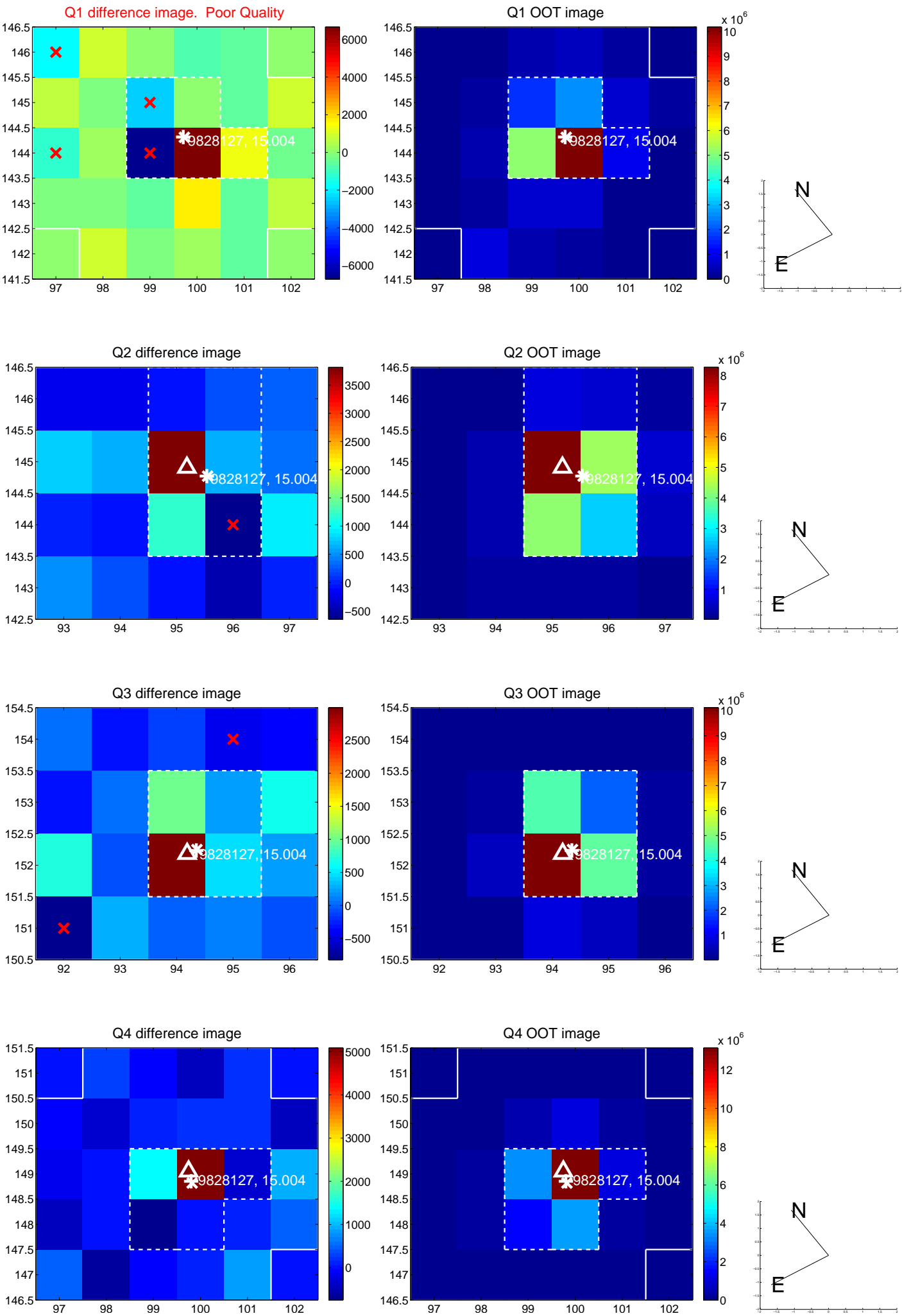
The direct PRF centroid is offset from the target star catalog position by about 0.26 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.120 \pm 0.320$	0.37	$0.039 \pm 0.325$	$-0.113 \pm 0.320$
PRF-fit source offset from KIC position	$0.119 \pm 0.501$	0.24	$0.119 \pm 0.498$	$0.001 \pm 0.312$
photometric centroid source offset	$0.42 \pm 0.71$	0.59	$0.03 \pm 0.75$	$-0.42 \pm 0.71$



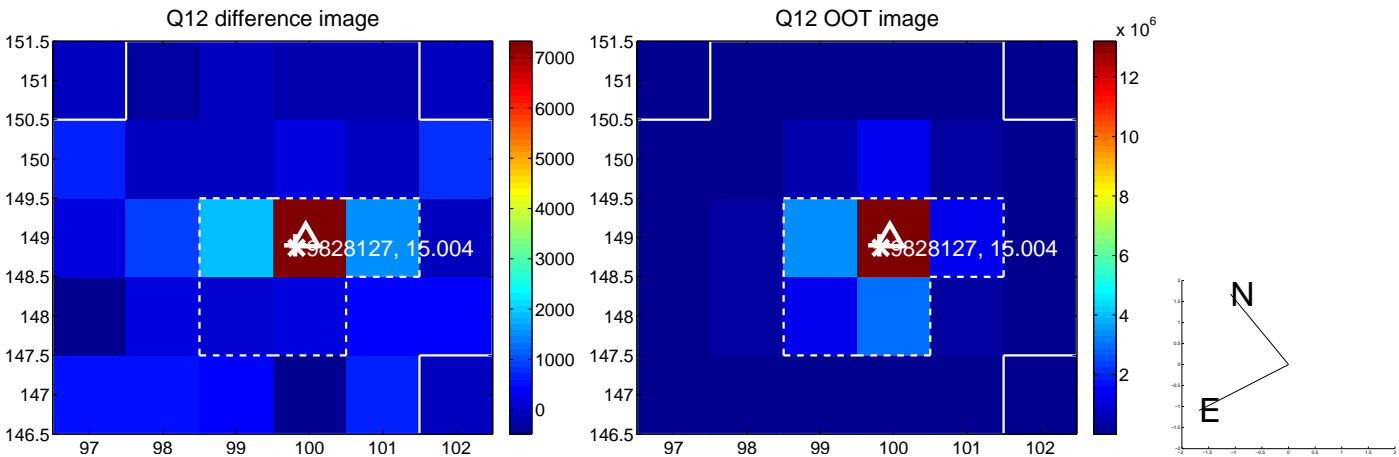
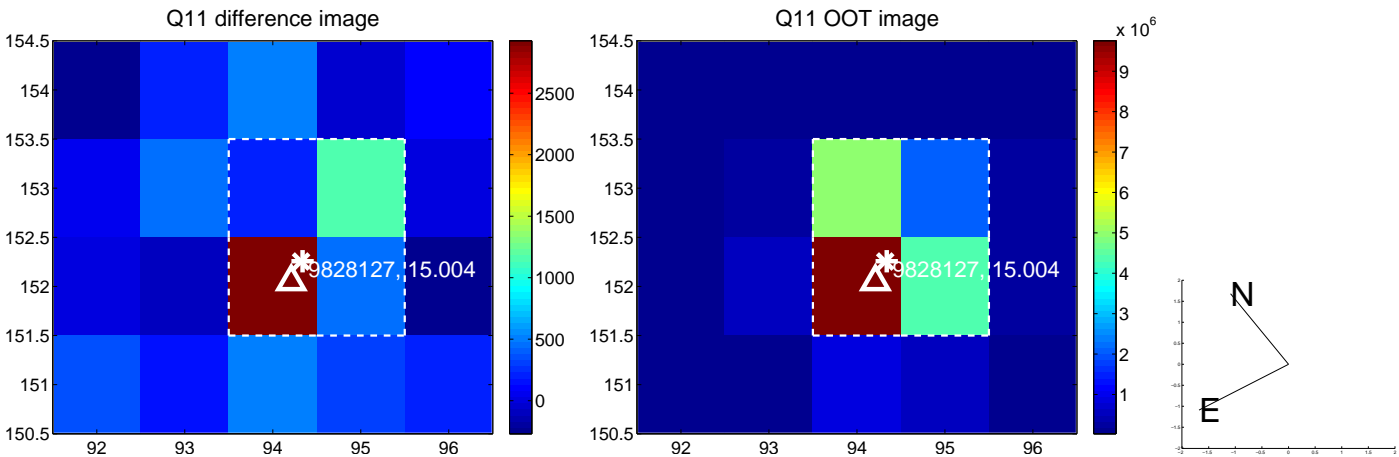
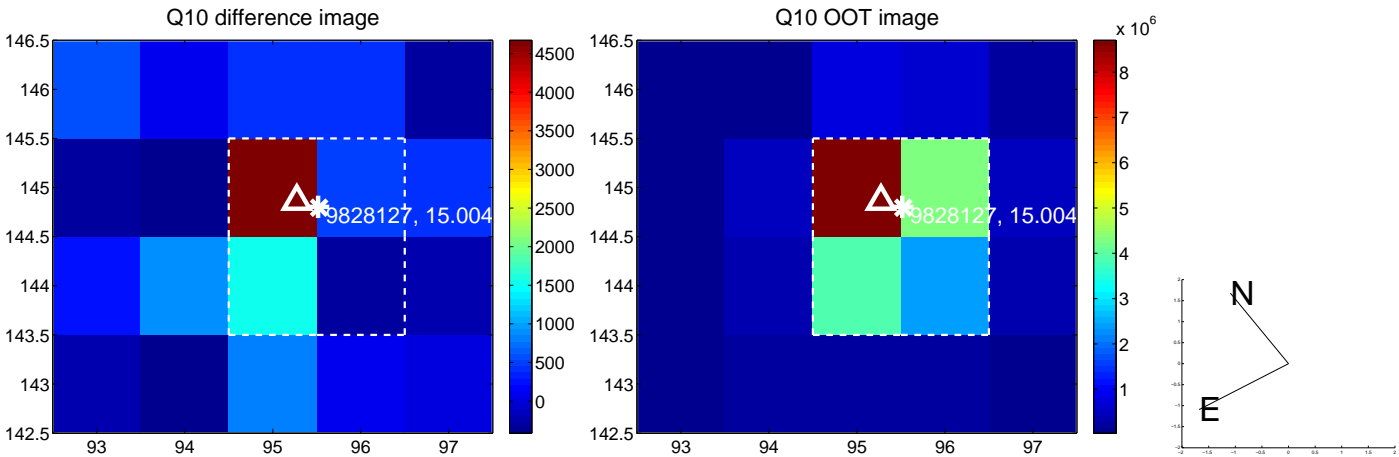
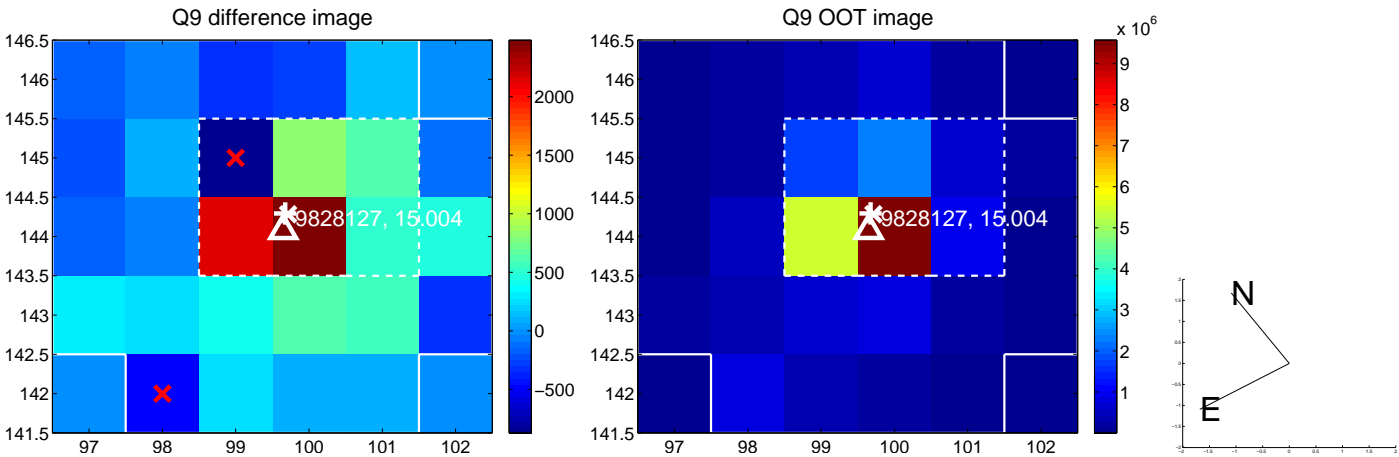
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

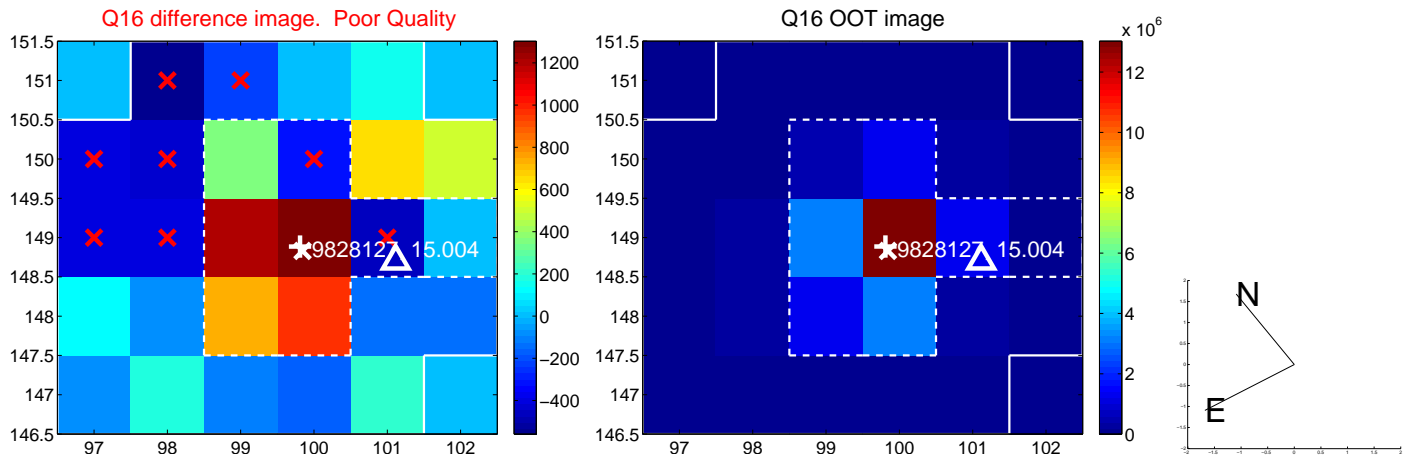
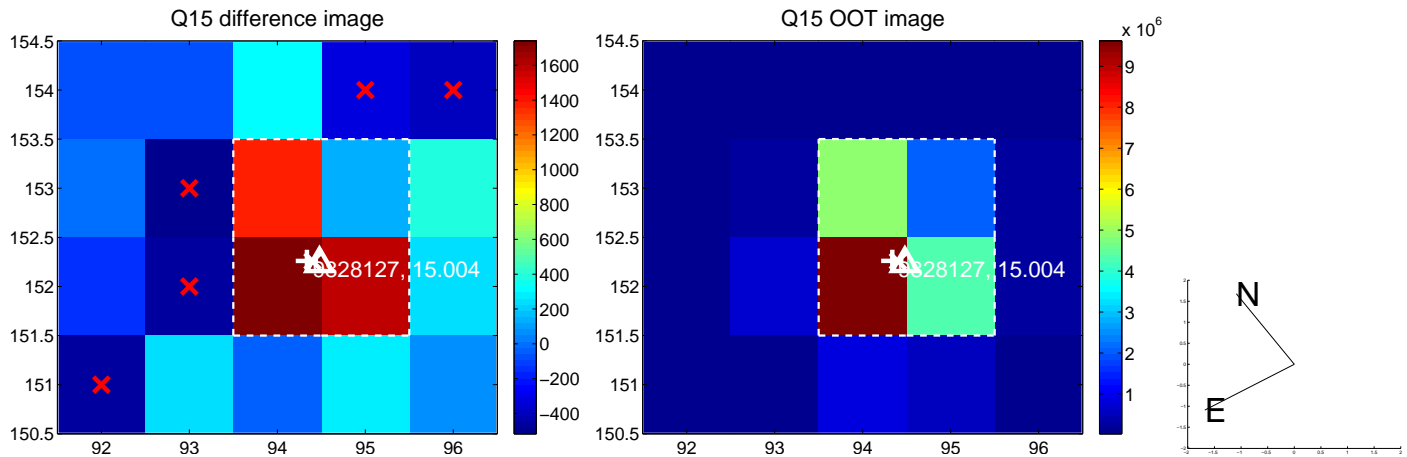
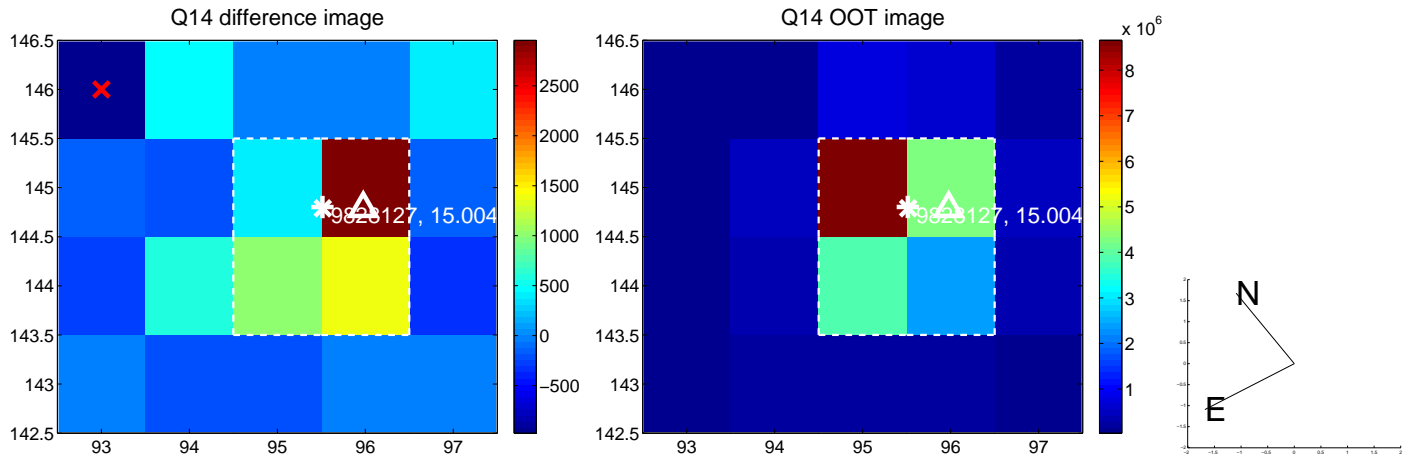
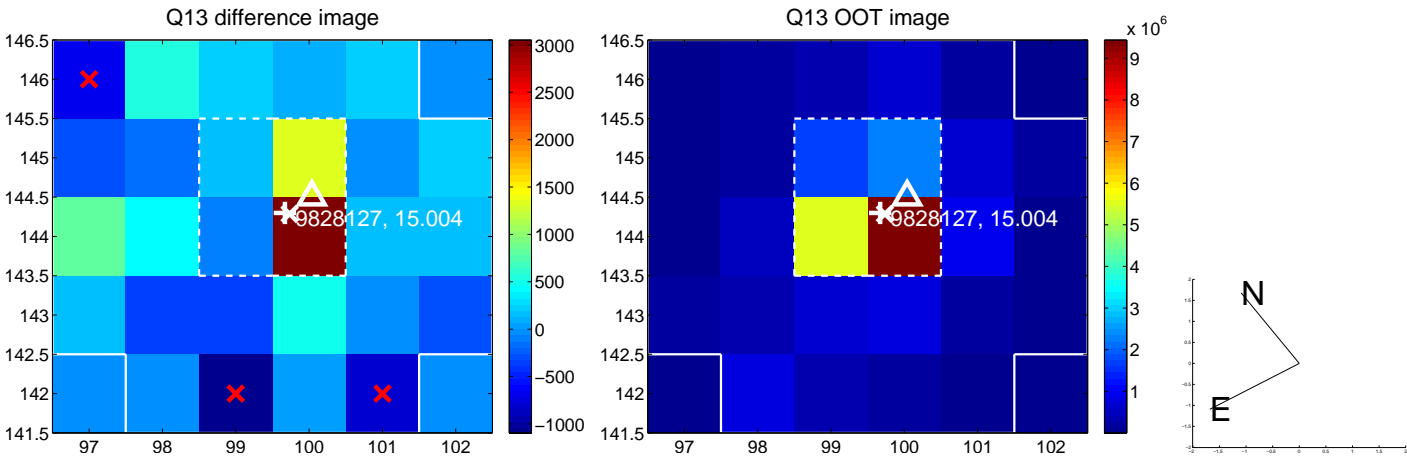




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

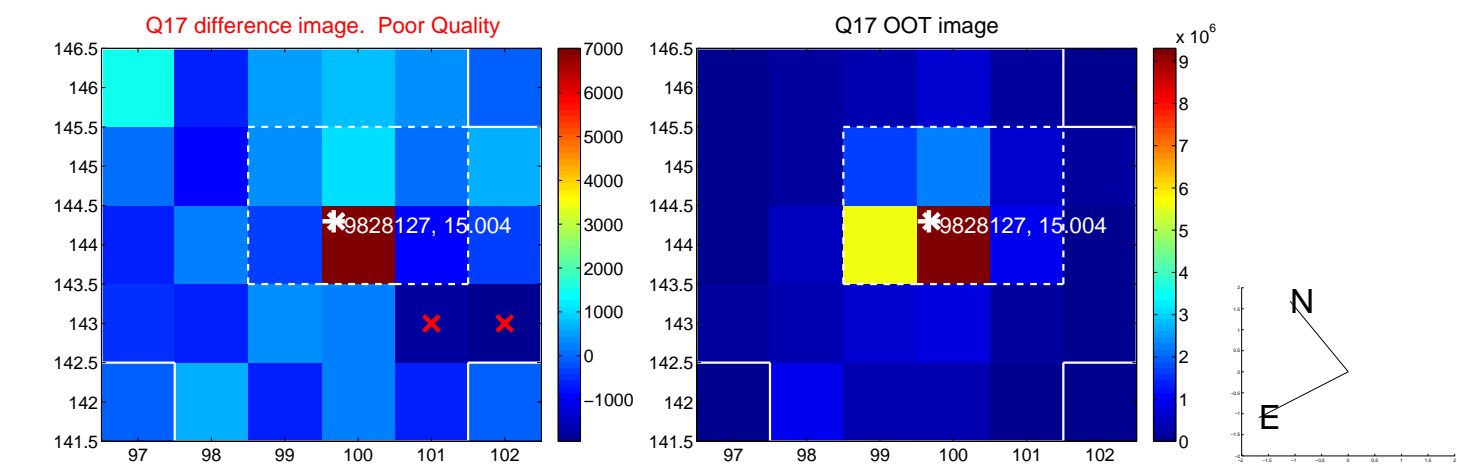


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

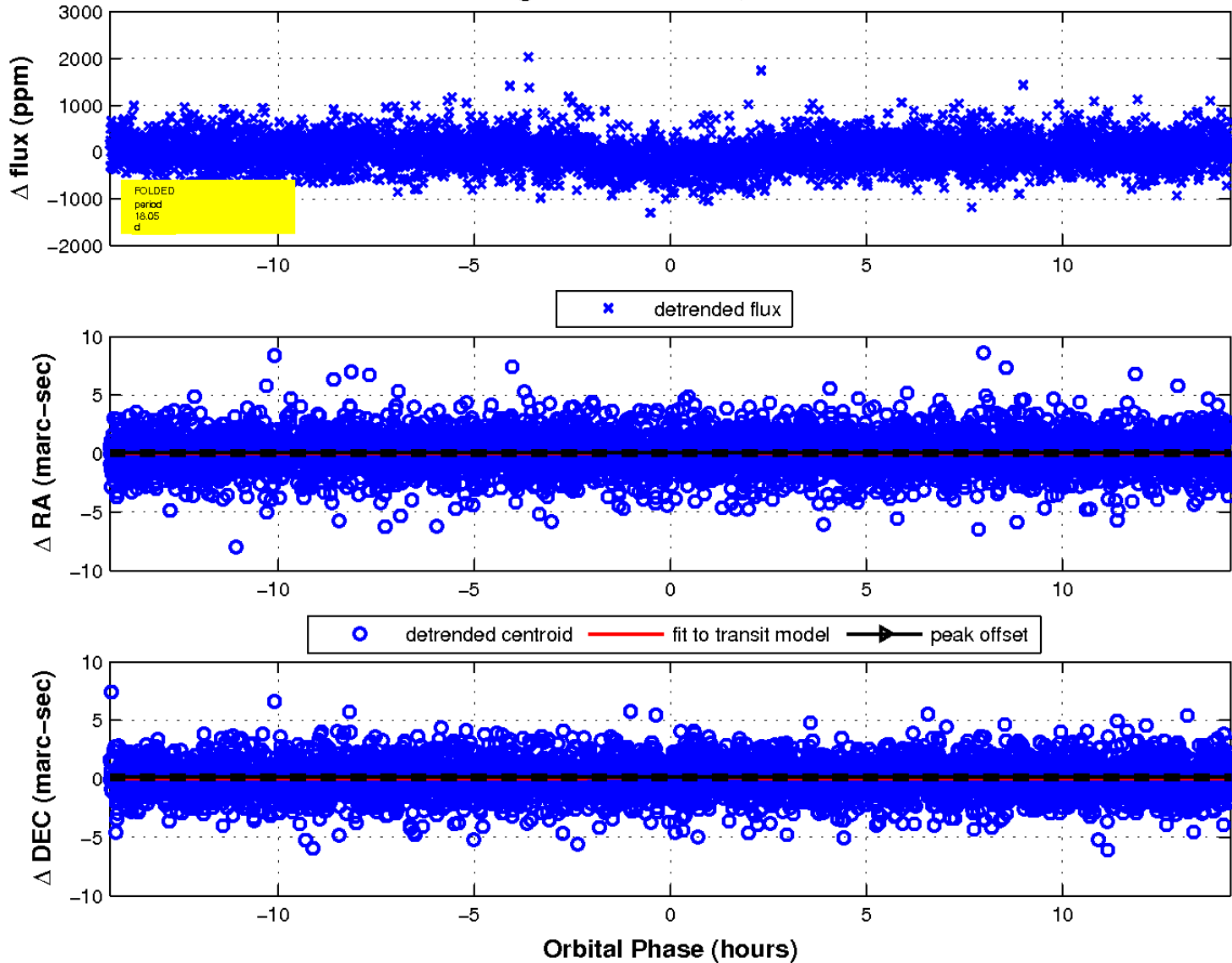




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

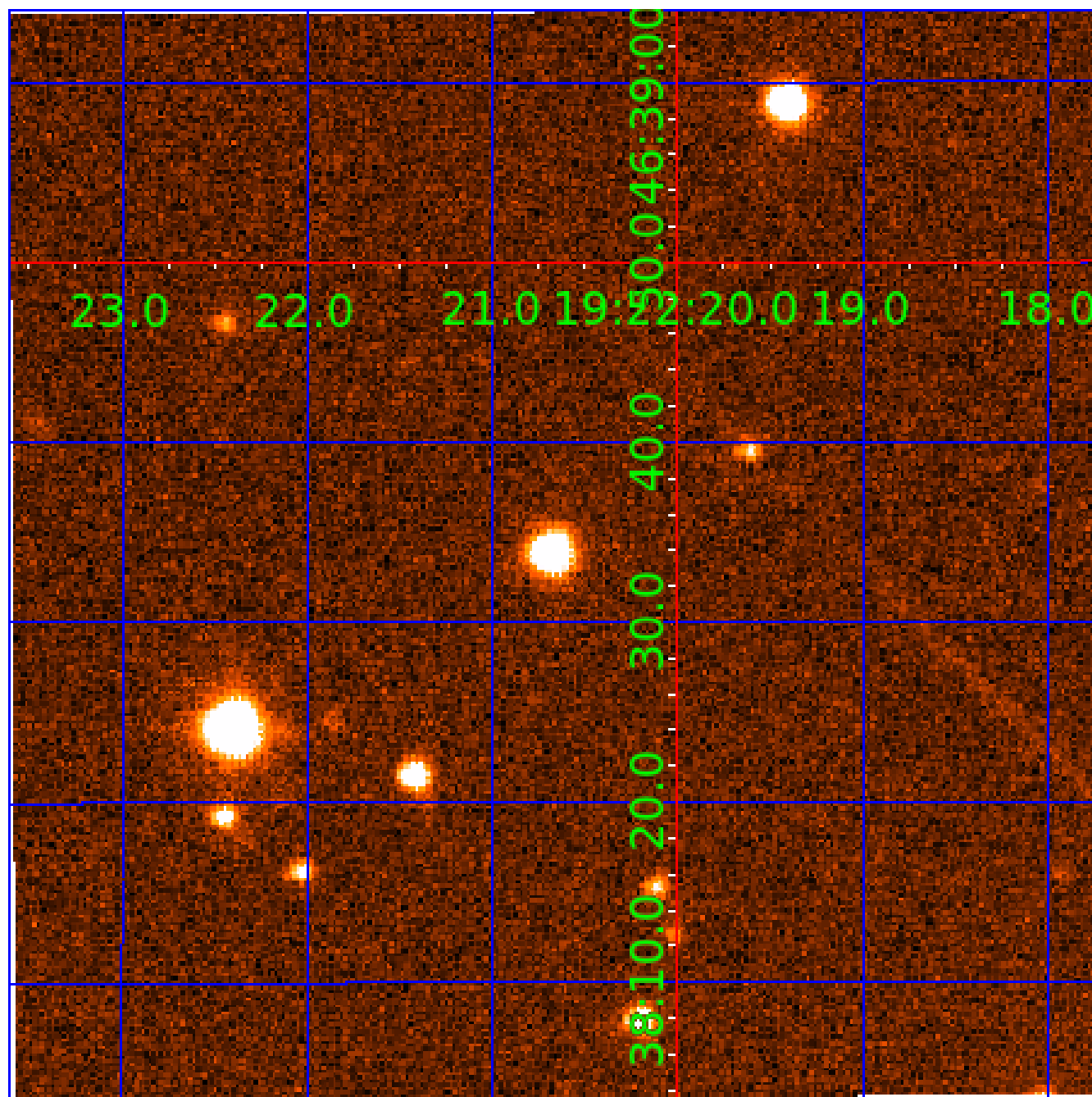


fluxWeightedCentroids, Planet 1 of 2



UKIRT Image

Declination



# KIC 009828127

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009828127-01	OBS	4192.01	18.054147	147.793825	267.3	4.766	15.7	16.4	0.91	5505	1.74	38.62
009828127-02	OBS	4192.02	32.027311	150.632441	168.7	5.265	8.0	8.1	0.91	5505	1.36	17.99

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009828127-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
009828127-02	OBS	PC	0.99	0	0	0	0	NO_COMMENT

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

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

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

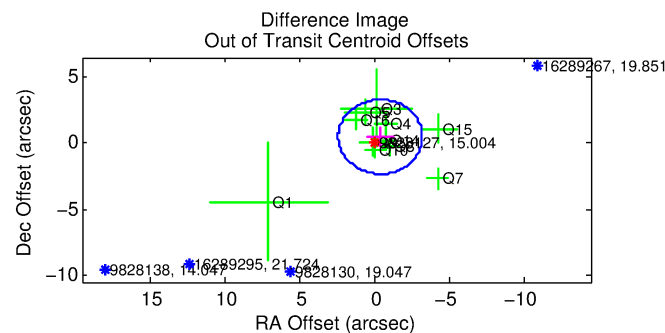
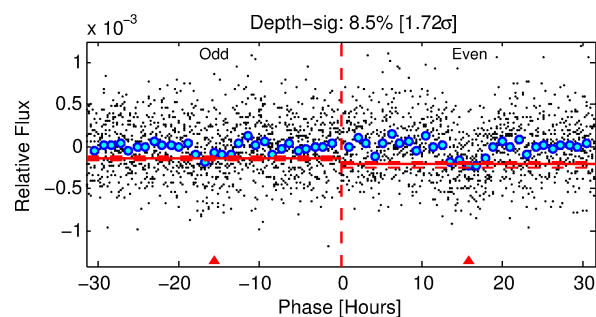
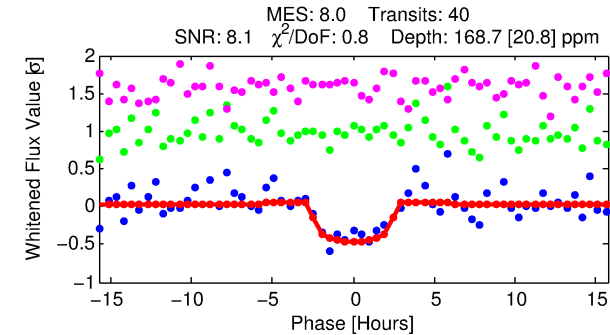
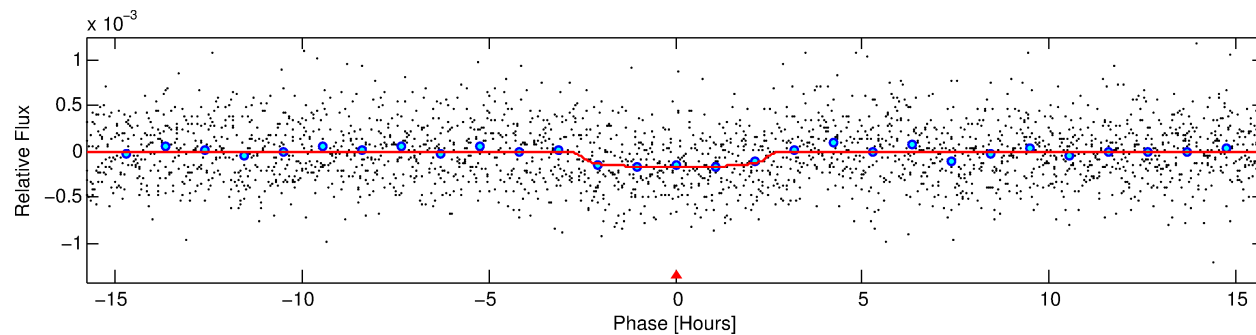
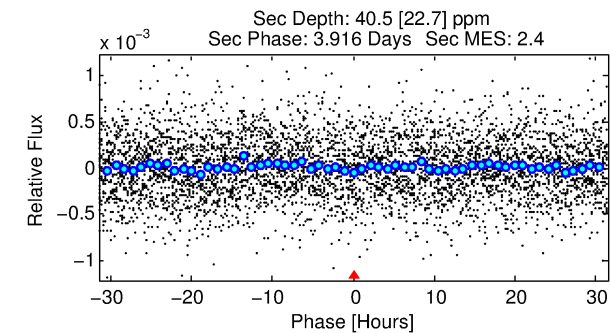
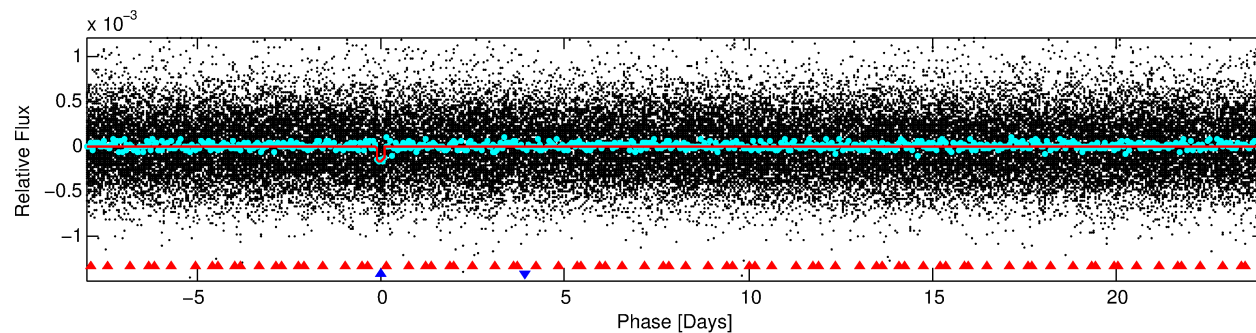
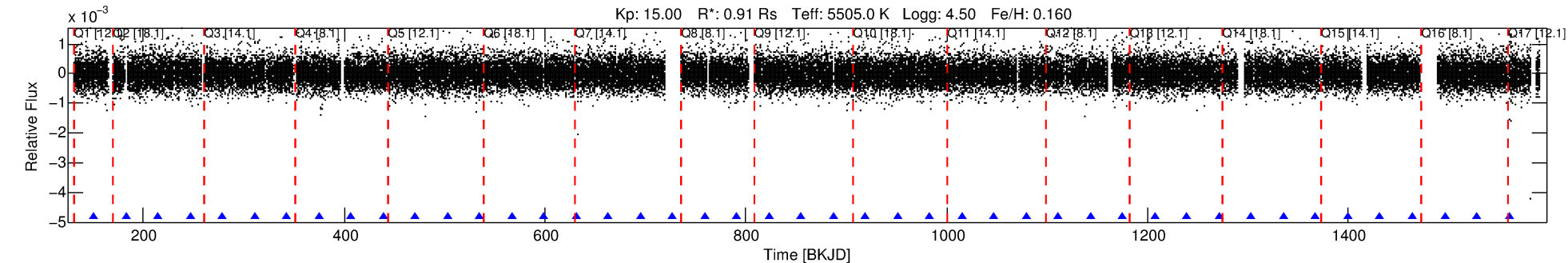
## Ephemeris Match Information For 009828127-02

No Significant Match Found

# DV One-Page Summary

KIC: 9828127 Candidate: 2 of 2 Period: 32.027 d

KOI: K04192.02 Corr: 0.949



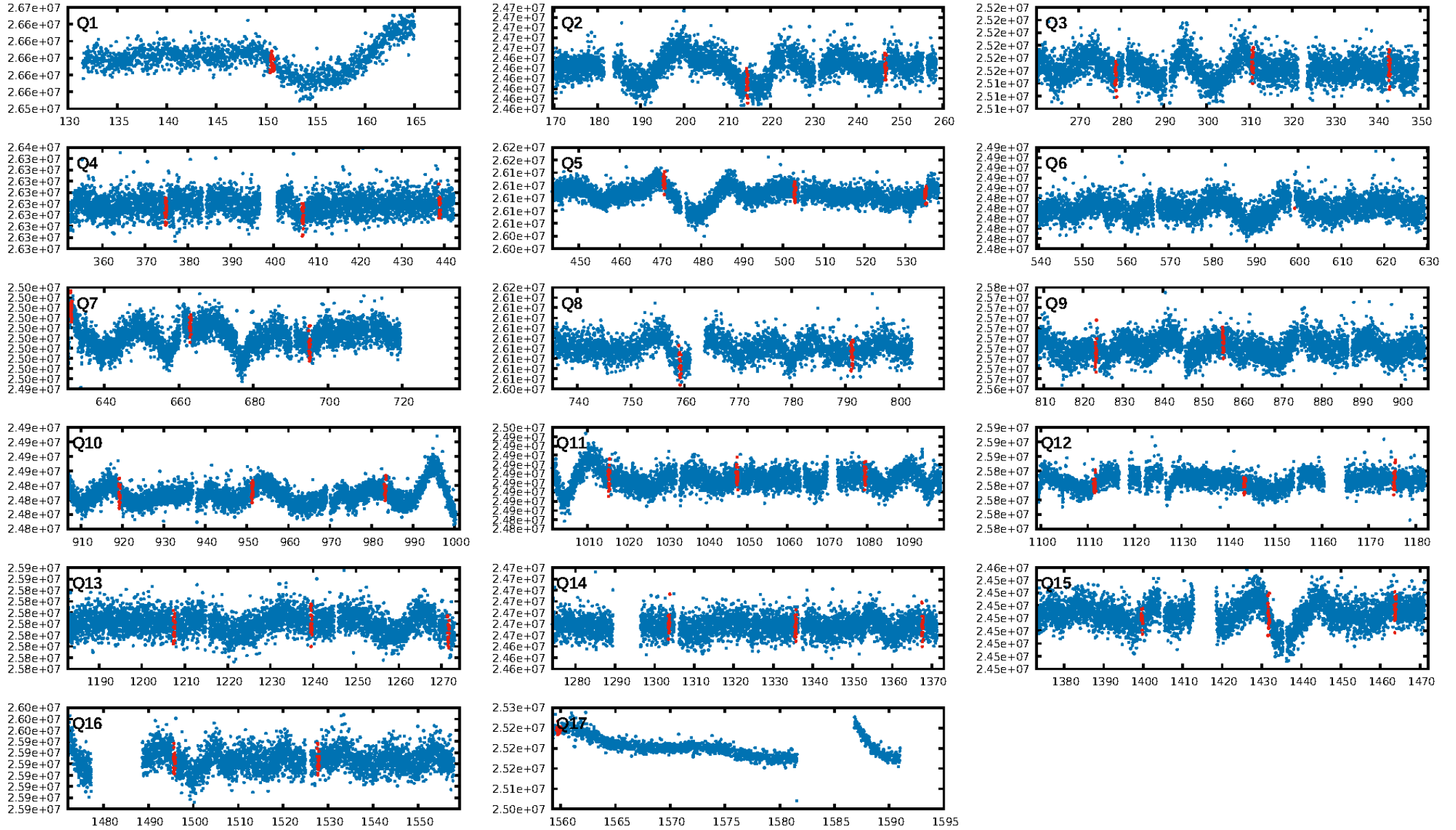
## DV Fit Results:

Period = 32.02731 [0.00048] d  
Epoch = 150.6324 [0.0130] BKJD  
Rp/R\* = 0.0137 [0.0102]  
a/R\* = 25.62 [80.71]  
b = 0.85 [1.04]  
Seff = 17.99 [3.43]  
Teq = 525 [25] K  
Rp = 1.36 [1.02] Re  
a = 0.1944 [0.0225] AU  
Ag = 456.48 [729.95] [0.62σ]  
Teffp = 3753 [1492] K [2.16σ]

## DV Diagnostic Results:

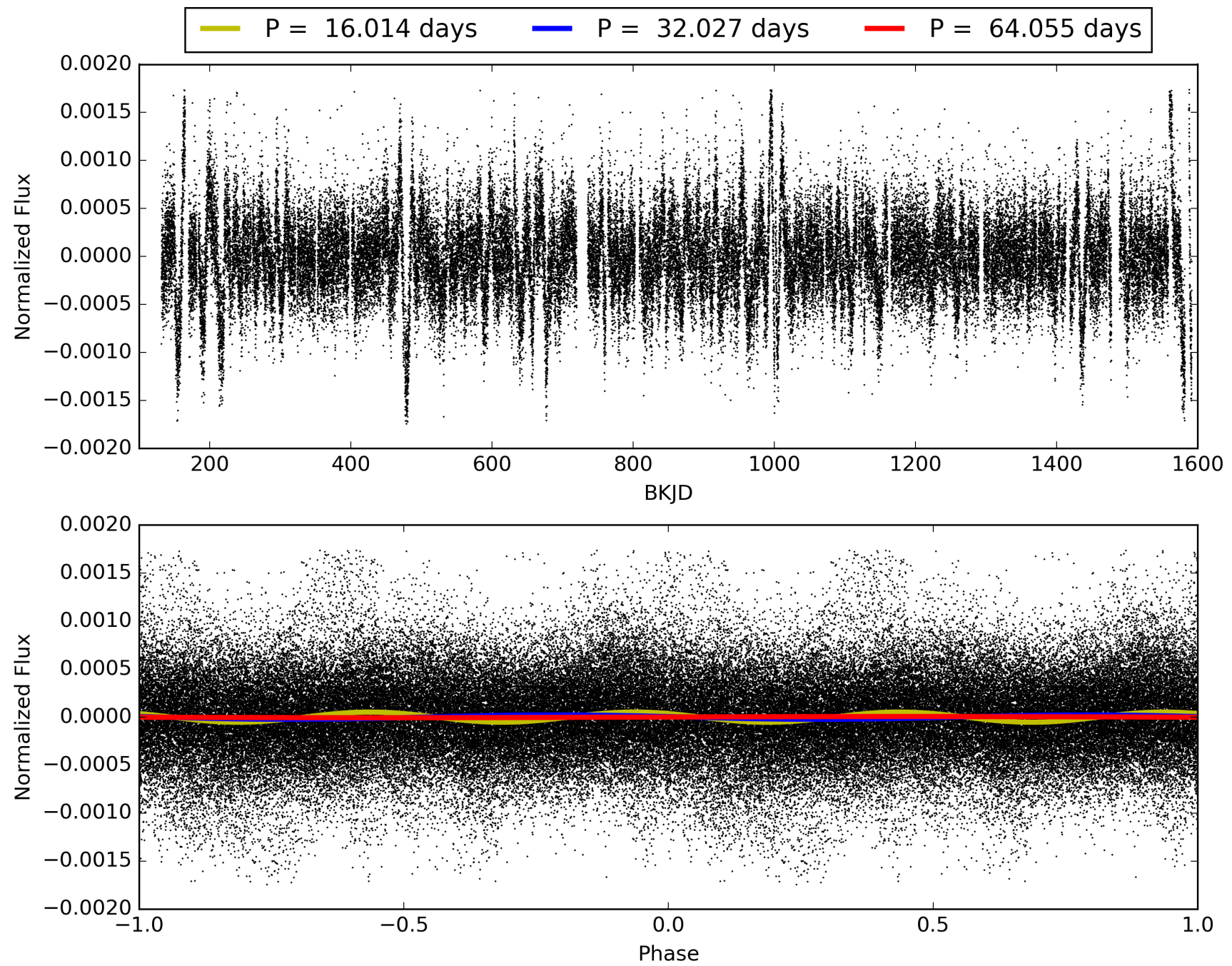
ShortPeriod-sig: 100.0% [47.22σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 85.6%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 1.51e-15  
RollingBand-fgt: 1.00 [38/38]  
GhostDiagnostic-chr: -16.85  
Centroid-sig: 9.8%  
Centroid-so: 1.937 arcsec [1.31σ]  
OotOffset-rm: 0.645 arcsec [0.69σ]  
KicOffset-rm: 0.735 arcsec [0.88σ]  
OotOffset-st: 2/3/3/3 [11]  
KicOffset-st: 2/3/3/3 [11]  
DiffImageQuality-fgm: 0.55 [6/11]  
DiffImageOverlap-fno: 1.00 [15/15]

# TCE 009828127-02, PDC Light Curves



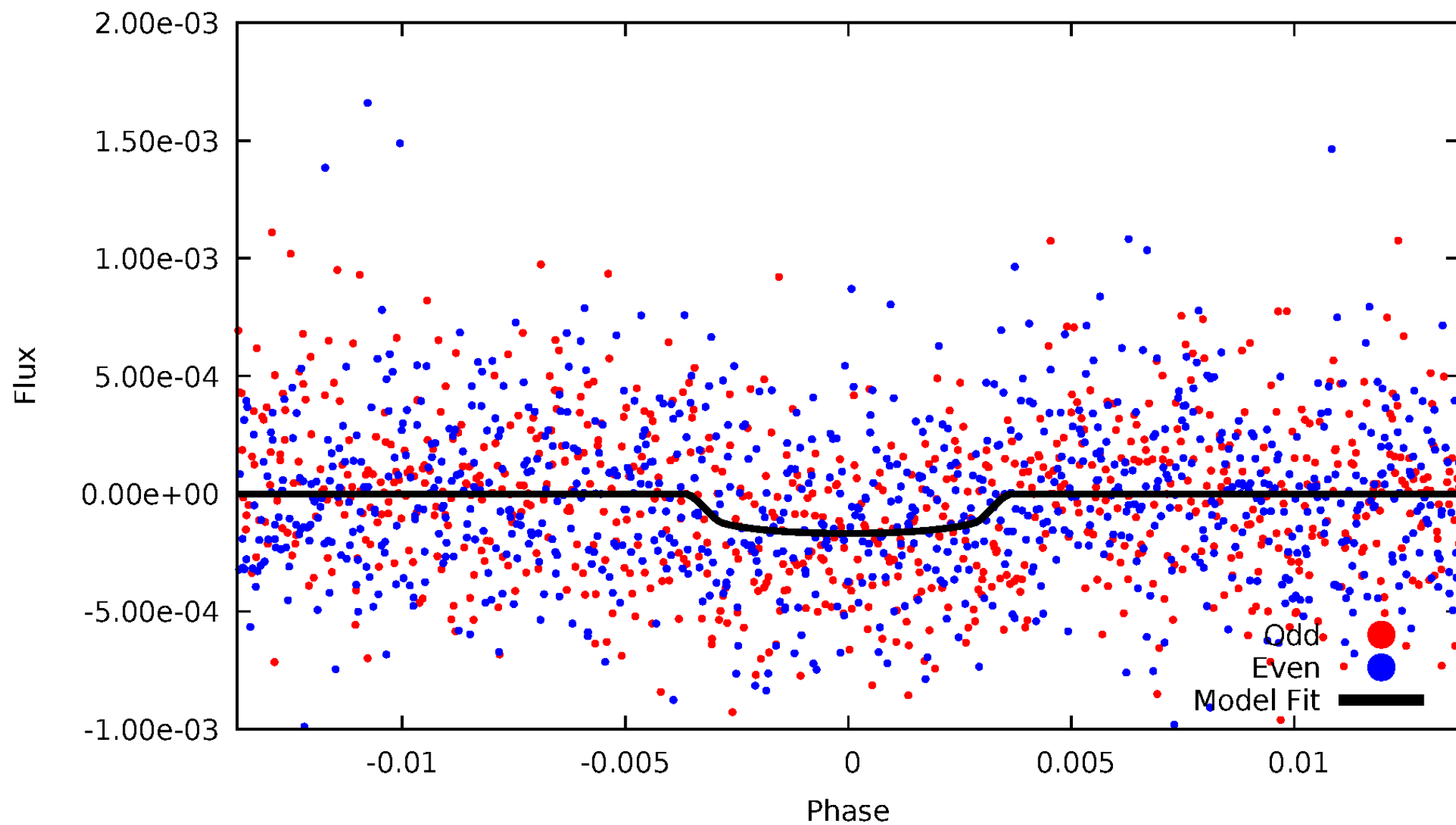


TCE 009828127-02



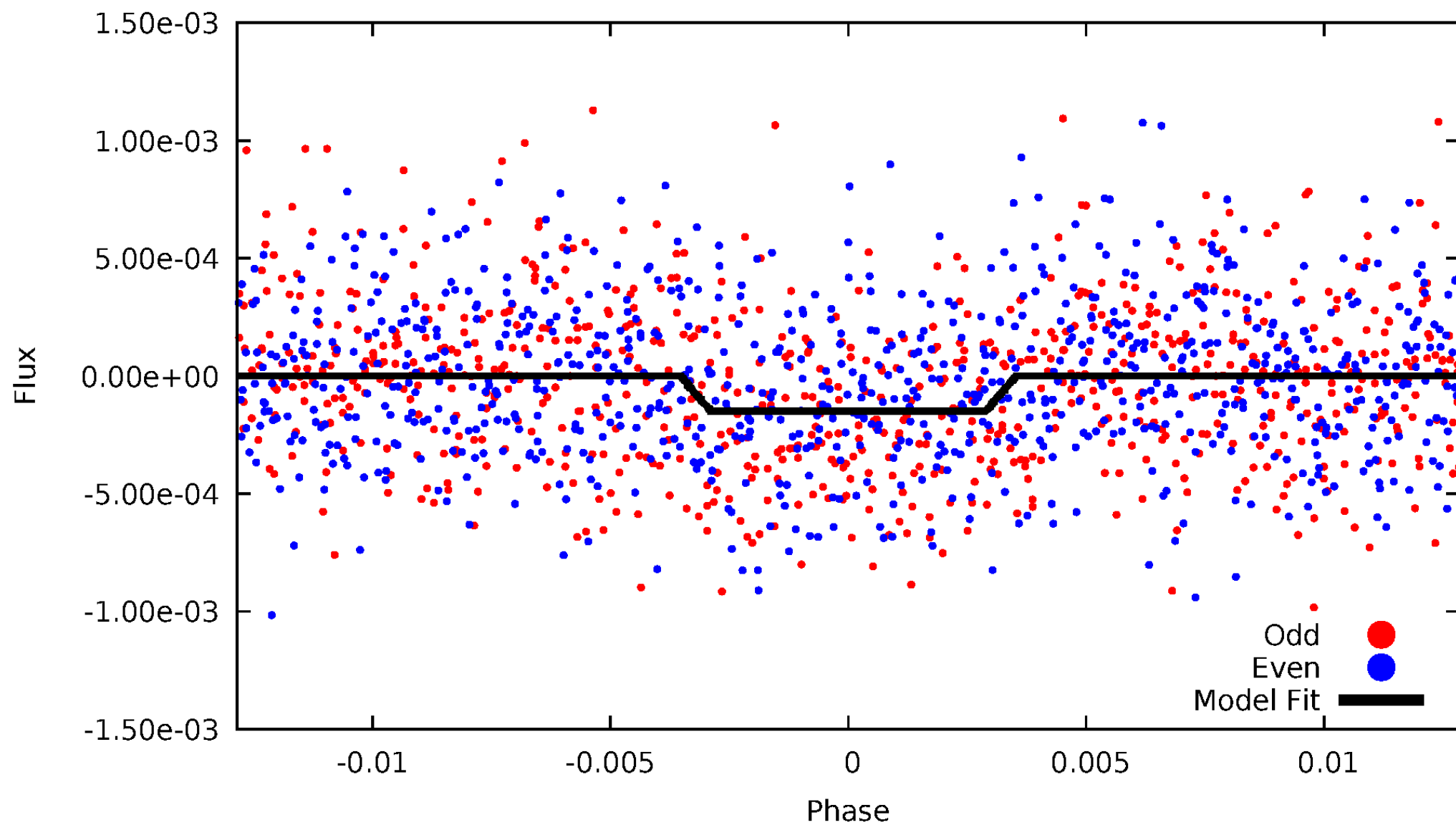
# DV Odd/Even

TCE 009828127-02



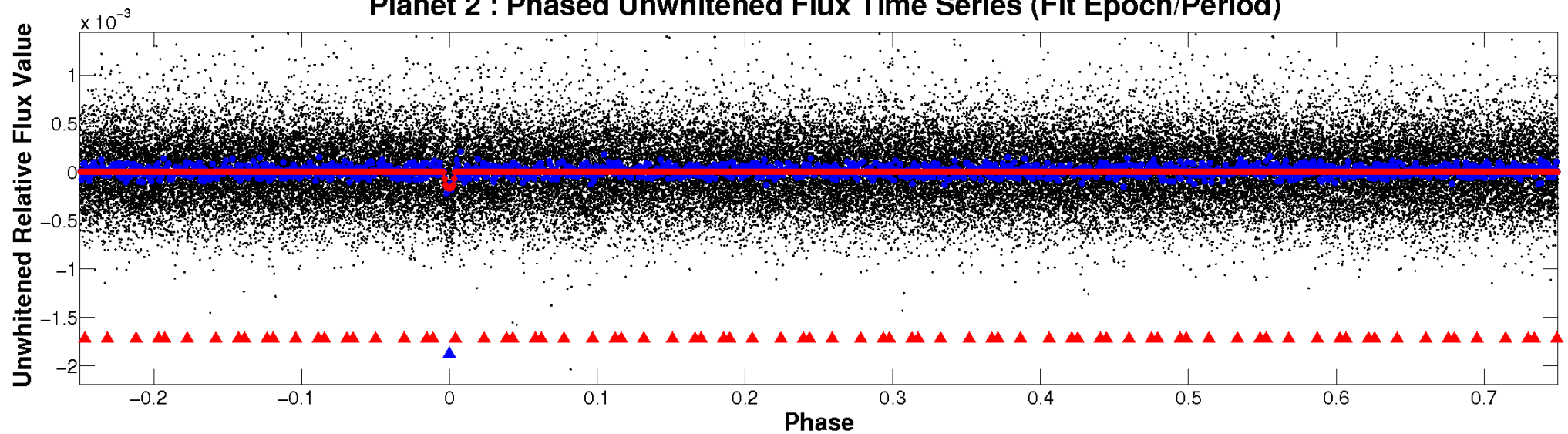
# ALT Odd/Even

TCE 009828127-02

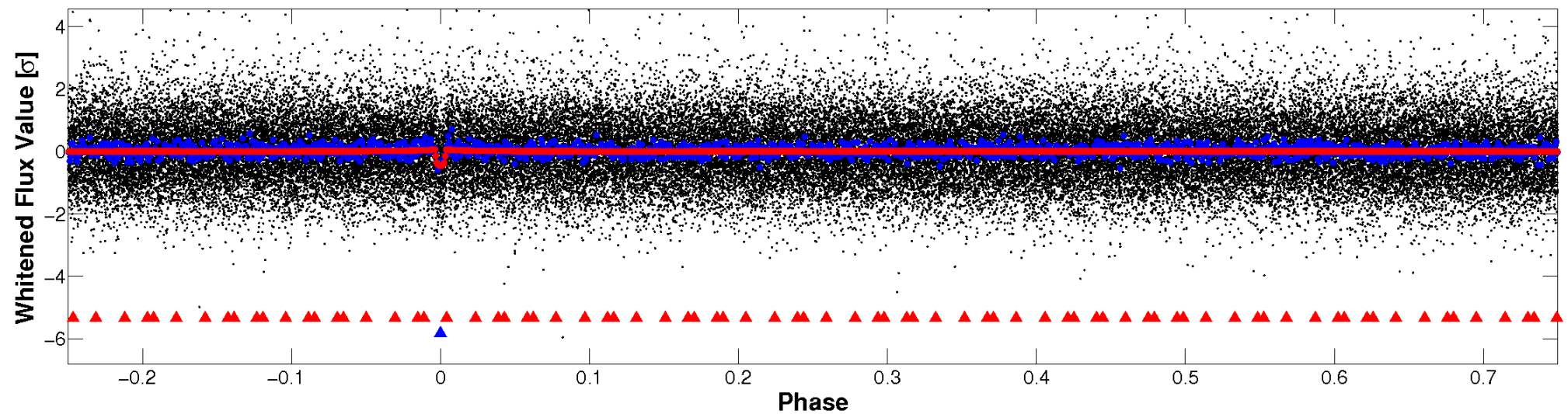


# Non-Whitened Vs. Whitened Light Curve

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

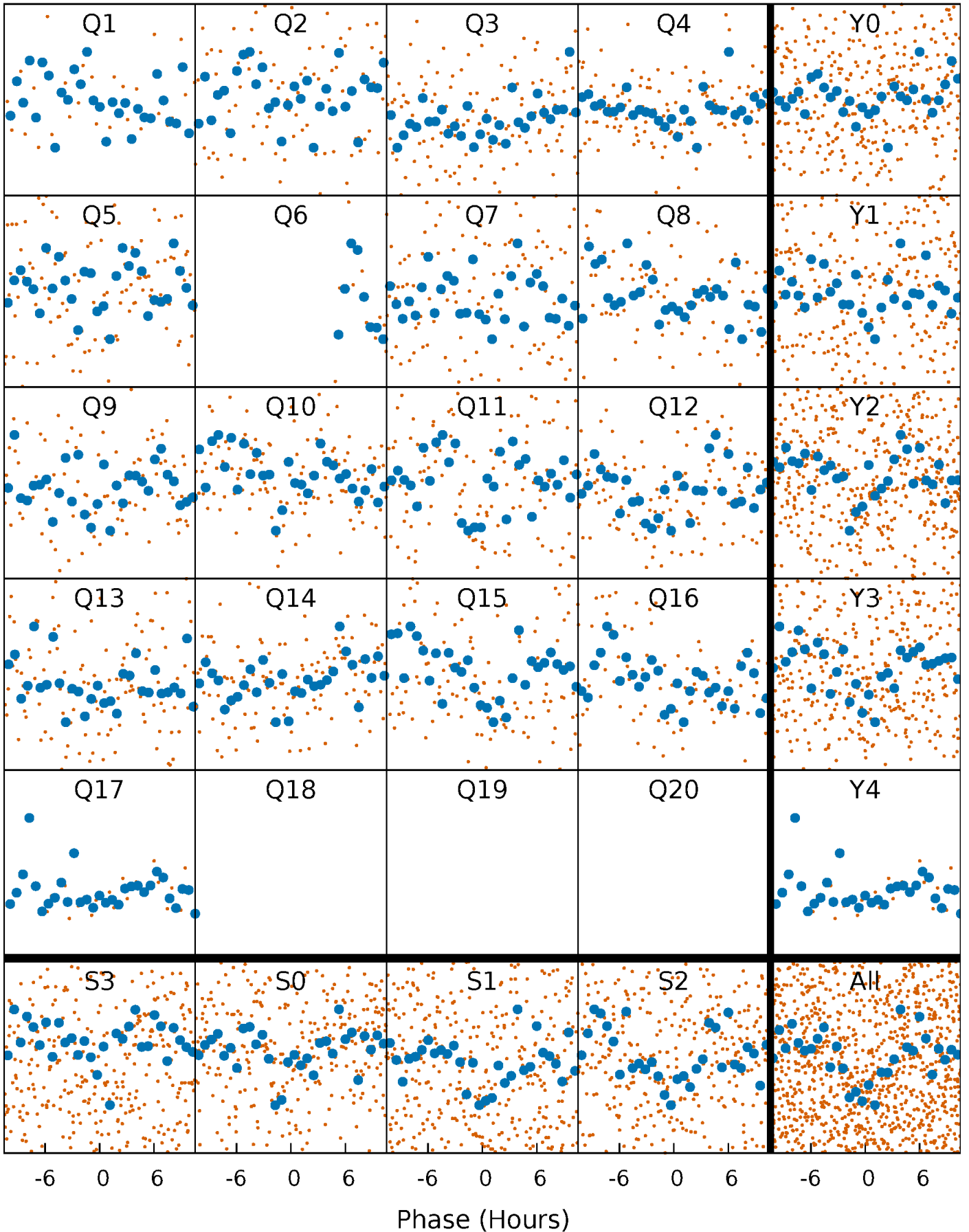


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

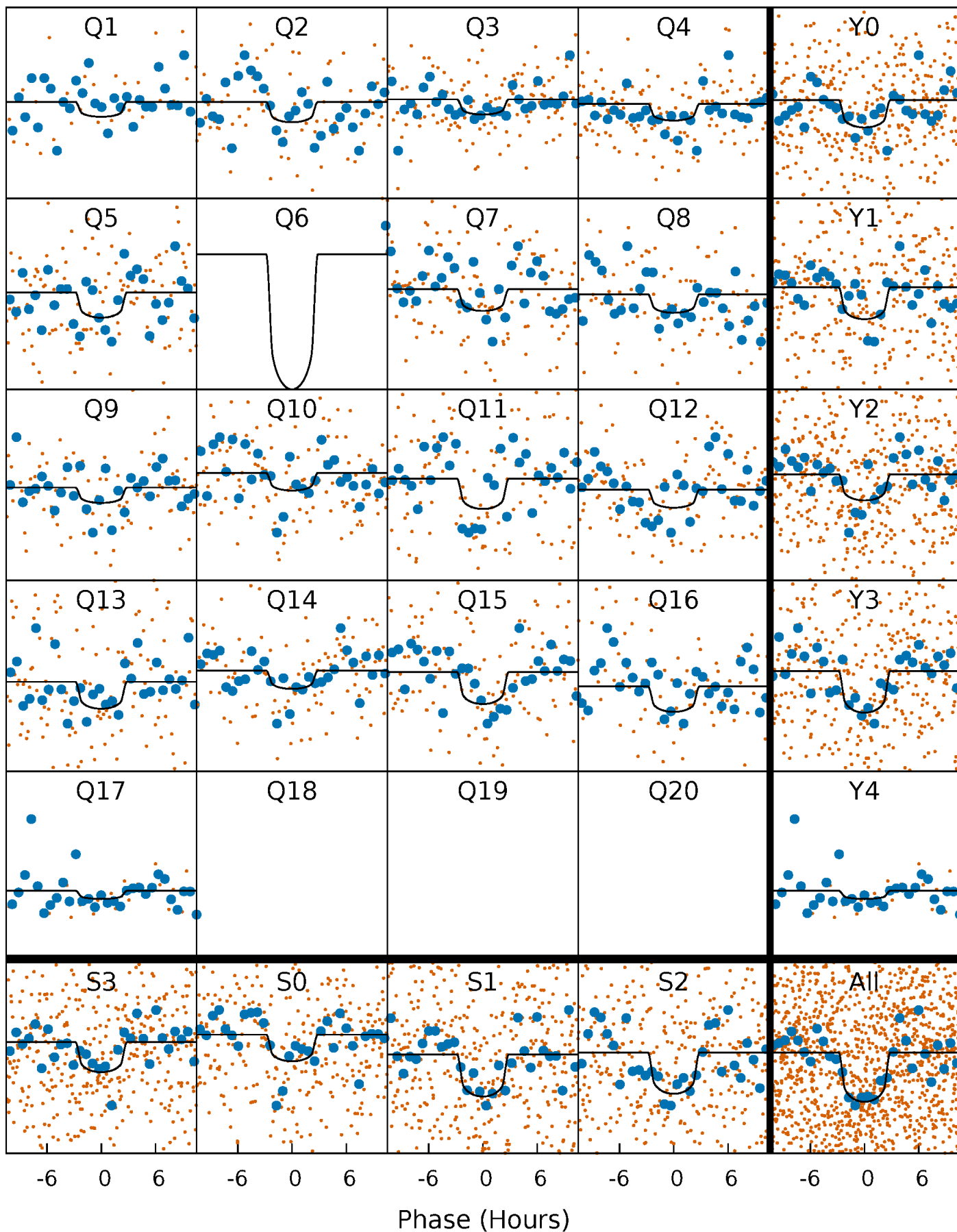
TCE 009828127-02 P= 32.027311 Days  $T_0=150.632441$  (BKJD)





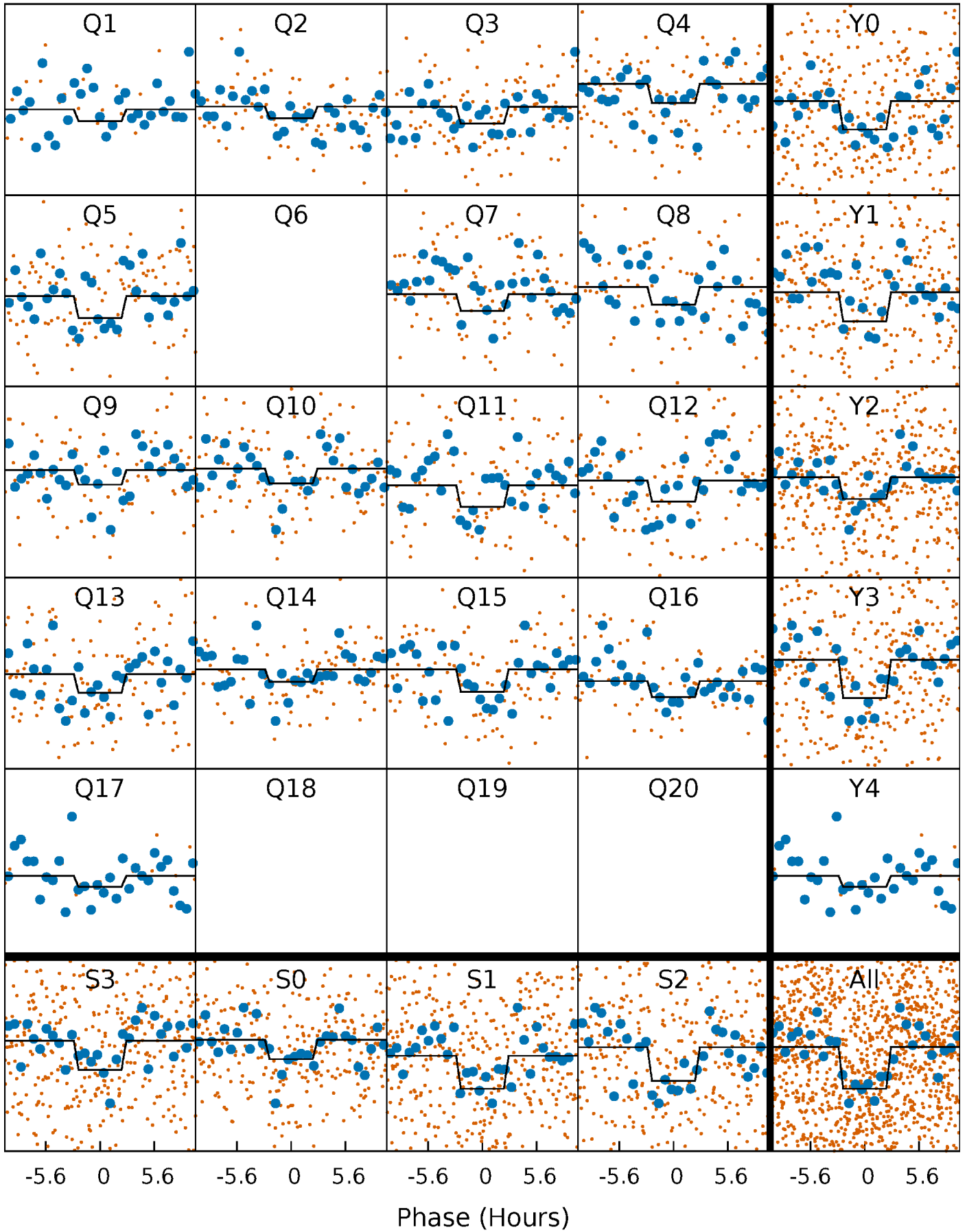
# DV Quarter-Phased Transit Curves

TCE 009828127-02 P= 32.027311 Days  $T_0=150.632441$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

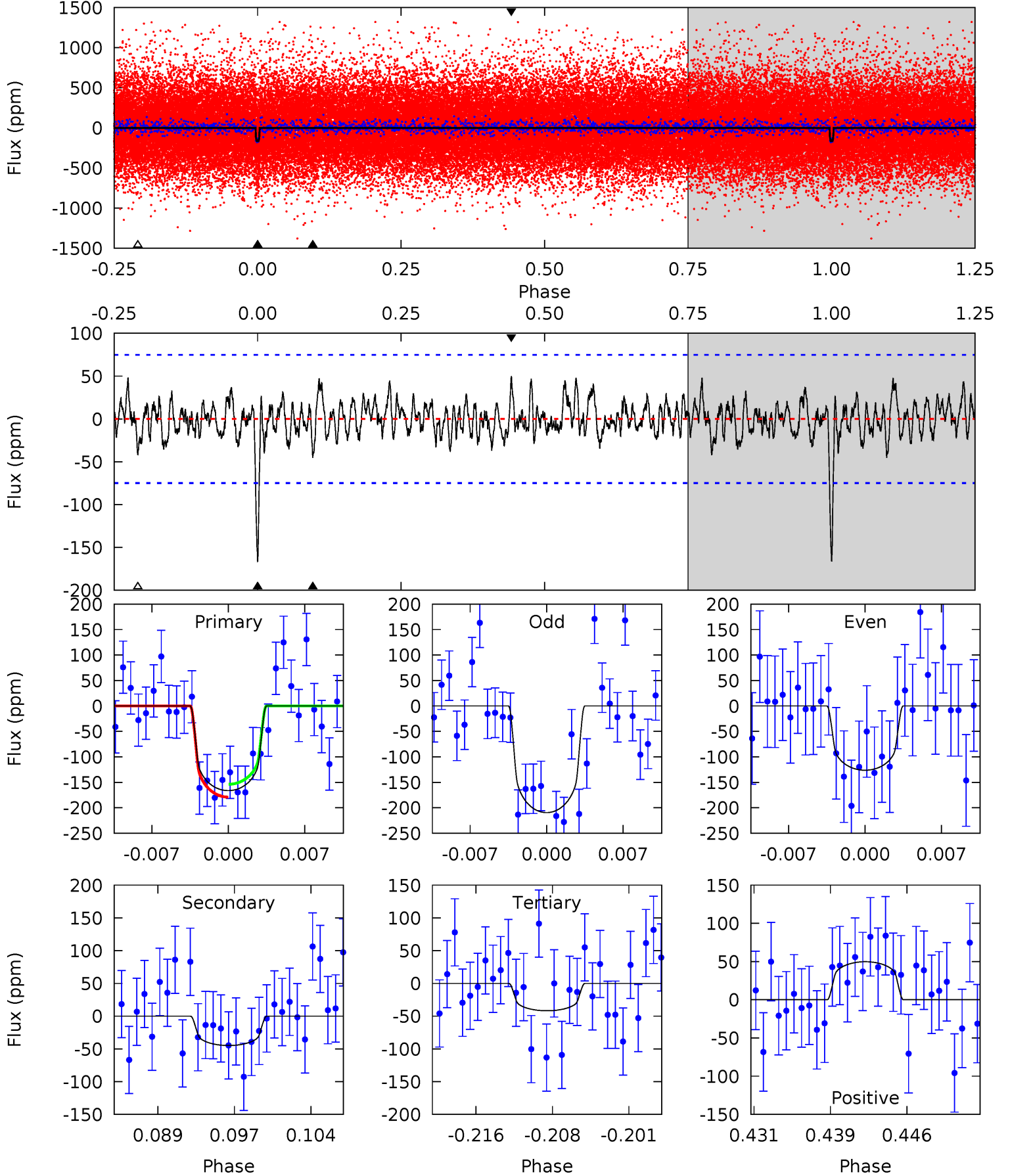
TCE 009828127-02 P= 32.027520 Days  $T_0=150.628757$  (BKJD)



# DV Model-Shift Uniqueness Test

009828127-02, P = 32.027311 Days, E = 118.605130 Days

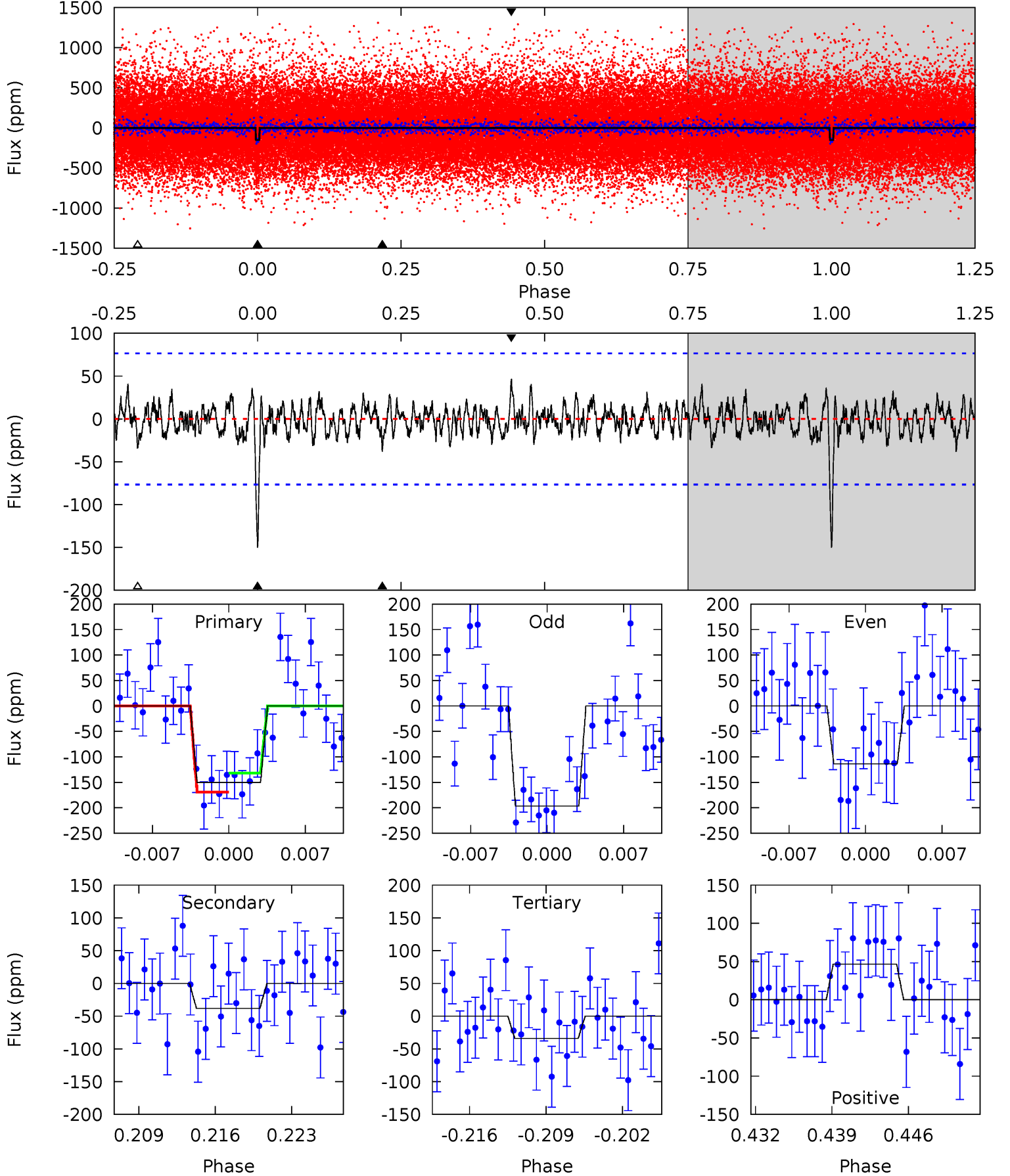
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.3	3.05	2.84	3.38	5.08	2.68	1.11	8.45	7.91	0.21	-0.33	2.83	0.88	0.23	0.86



# Alt Model-Shift Uniqueness Test

009828127-02, P = 32.027520 Days, E = 118.601237 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
10.0	2.55	2.26	3.11	5.10	2.70	0.90	7.74	6.90	0.28	-0.56	2.76	0.85	0.24	1.24



### Stellar Parameters For KIC 009828127

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5505^{+74}_{-82}$	$4.501^{+0.038}_{-0.105}$	$0.160^{+0.150}_{-0.150}$	$0.909^{+0.113}_{-0.052}$	$0.955^{+0.044}_{-0.058}$	$1.790^{+0.281}_{-0.548}$
	+1%/-1%	+1%/-2%	+94%/-94%	+12%/-6%	+5%/-6%	+16%/-31%
Source	SPE90	SPE90	SPE90	DSEP		

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

### Secondary Eclipse Parameters for KIC 009828127-02 / KOI 4192.02

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-45 \pm 15$	$1.49^{+0.99}_{-0.87}$	$739^{+25}_{-18}$	$3997^{+1597}_{-682}$	$401^{+1837}_{-274}$
Alt.	$-38 \pm 15$	$1.33^{+0.89}_{-0.78}$	$741^{+22}_{-18}$	$3998^{+1926}_{-650}$	$419^{+2397}_{-284}$

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

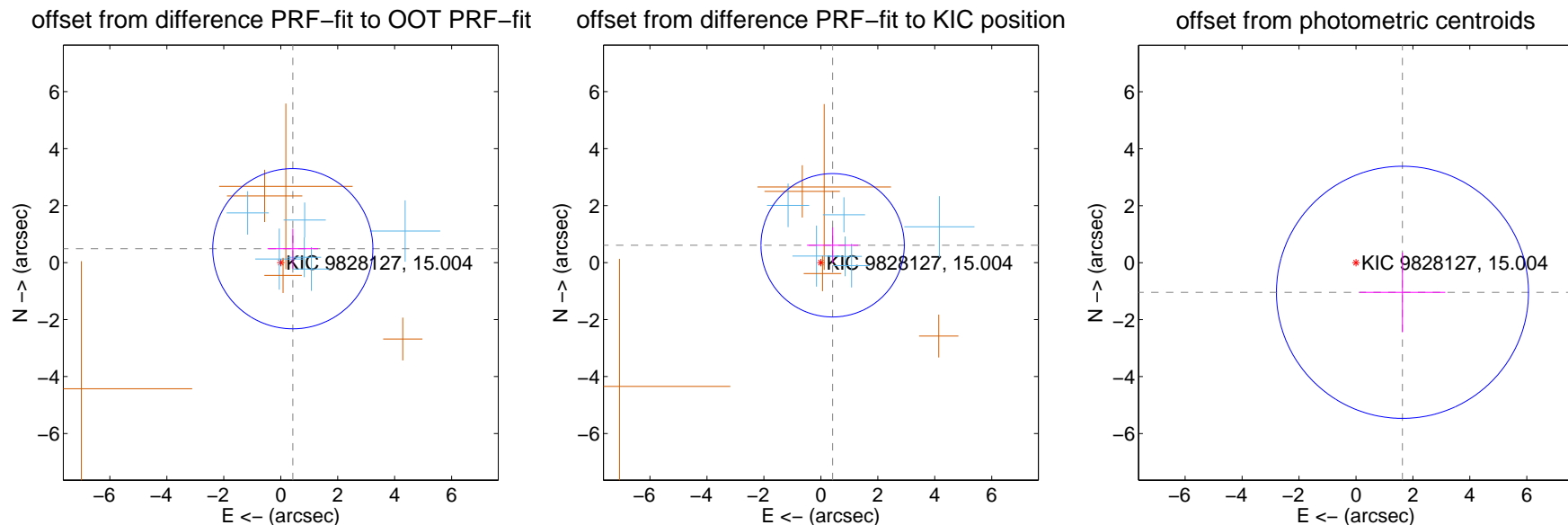
## DV Centroid Data

Supplemental centroid analysis for 009828127-02. Kepler magnitude: 15.00. Transit SNR 8.06

There are 6 quarters with good PRF difference image offsets

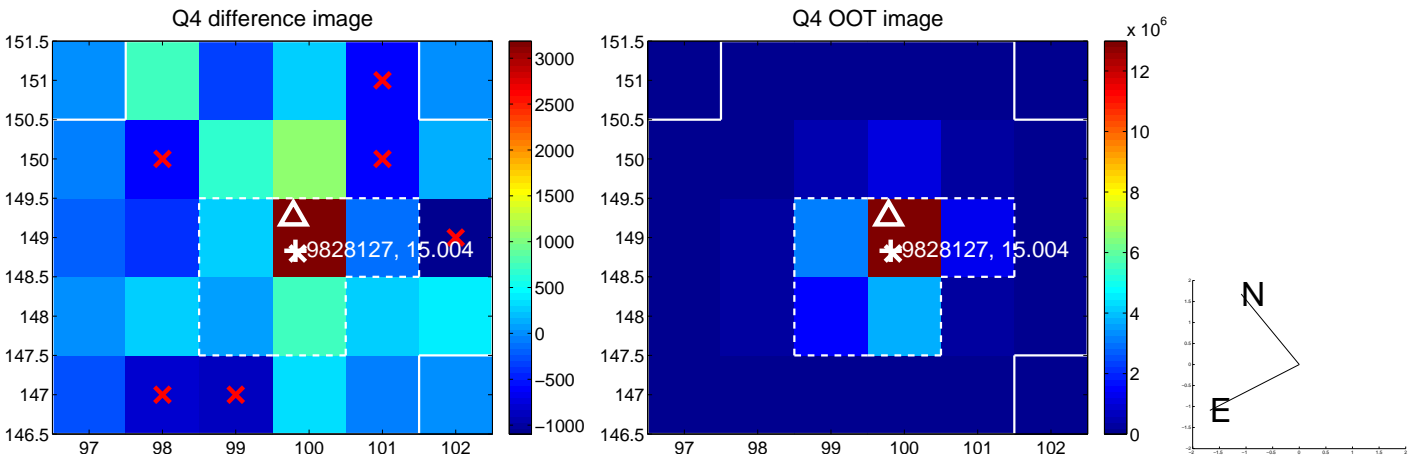
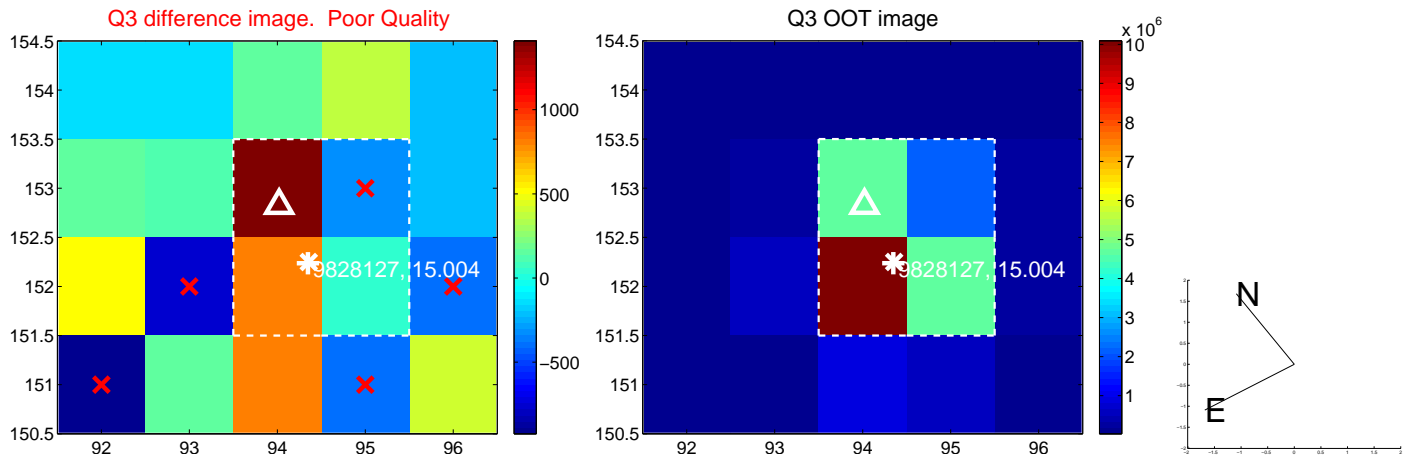
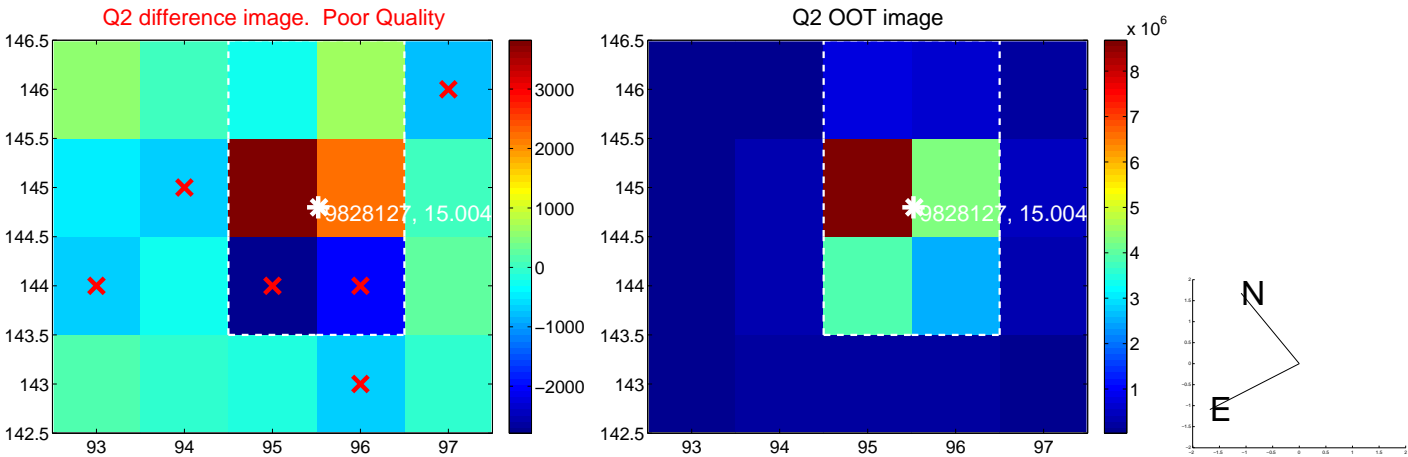
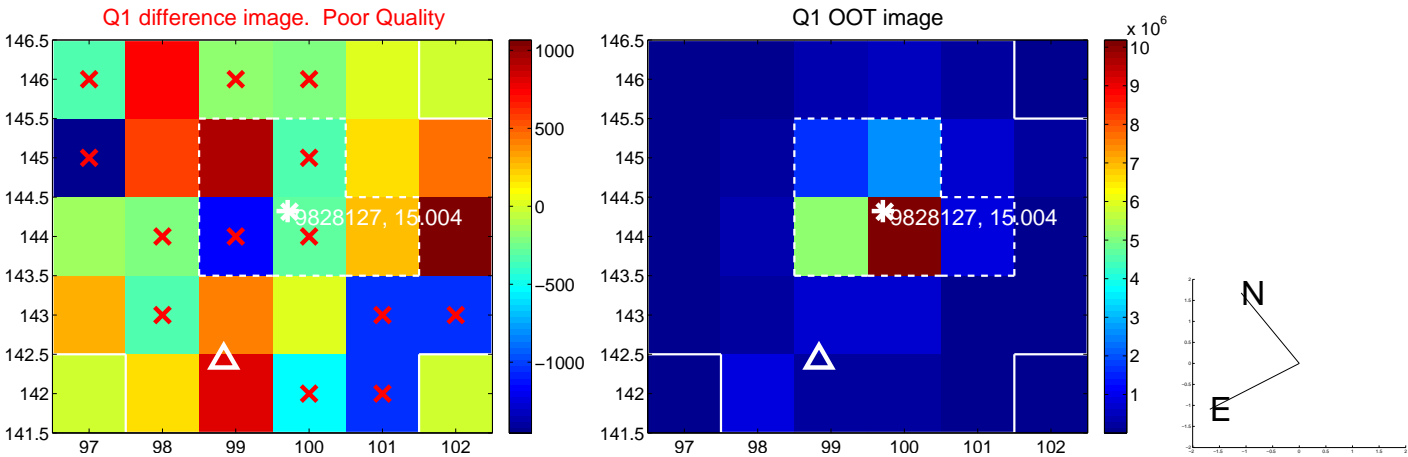
The direct PRF centroid is offset from the target star catalog position by about 0.27 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.645 \pm 0.937$	0.69	$-0.423 \pm 0.886$	$0.487 \pm 0.699$
PRF-fit source offset from KIC position	$0.735 \pm 0.839$	0.88	$-0.413 \pm 0.900$	$0.608 \pm 0.621$
photometric centroid source offset	$1.94 \pm 1.48$	1.31	$-1.63 \pm 1.51$	$-1.04 \pm 1.40$



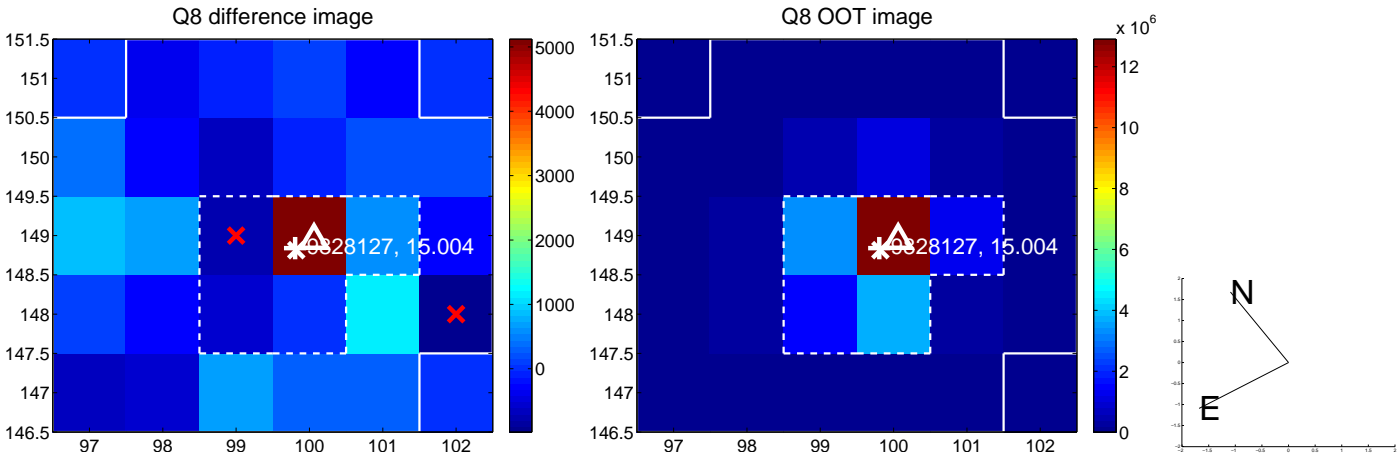
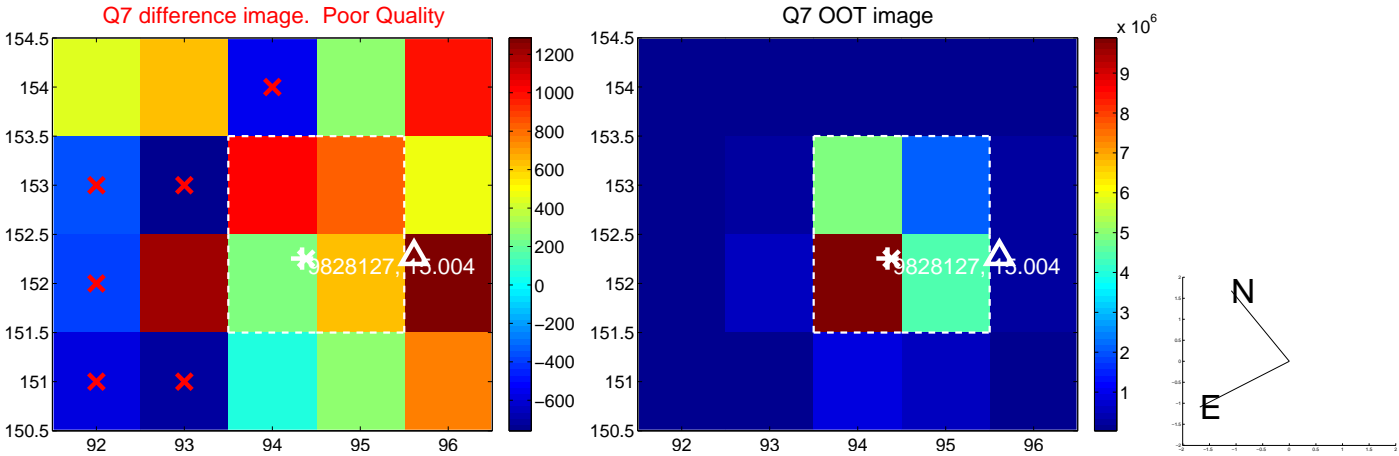
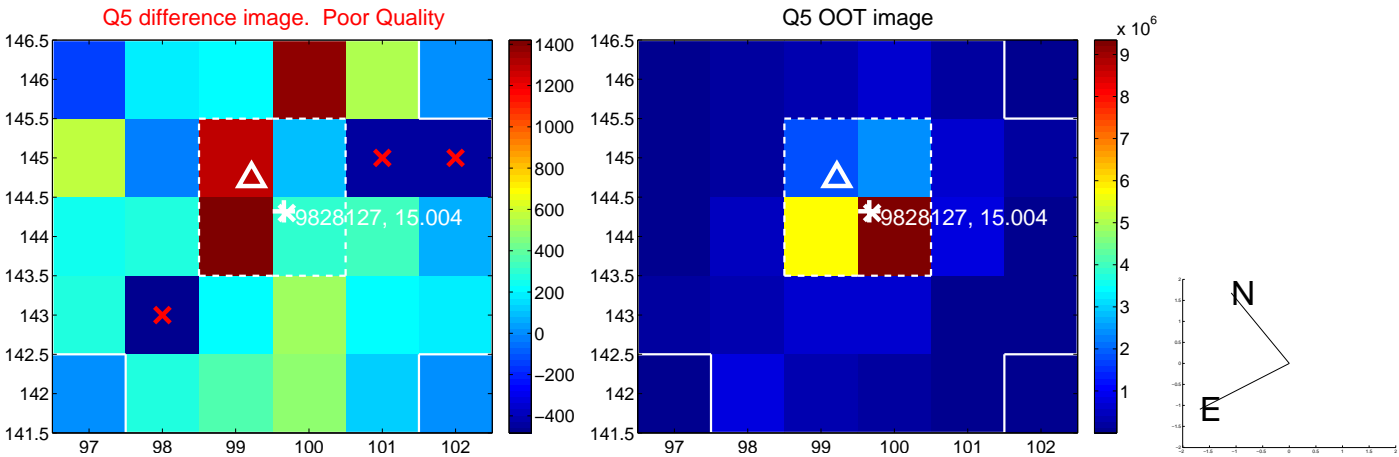
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

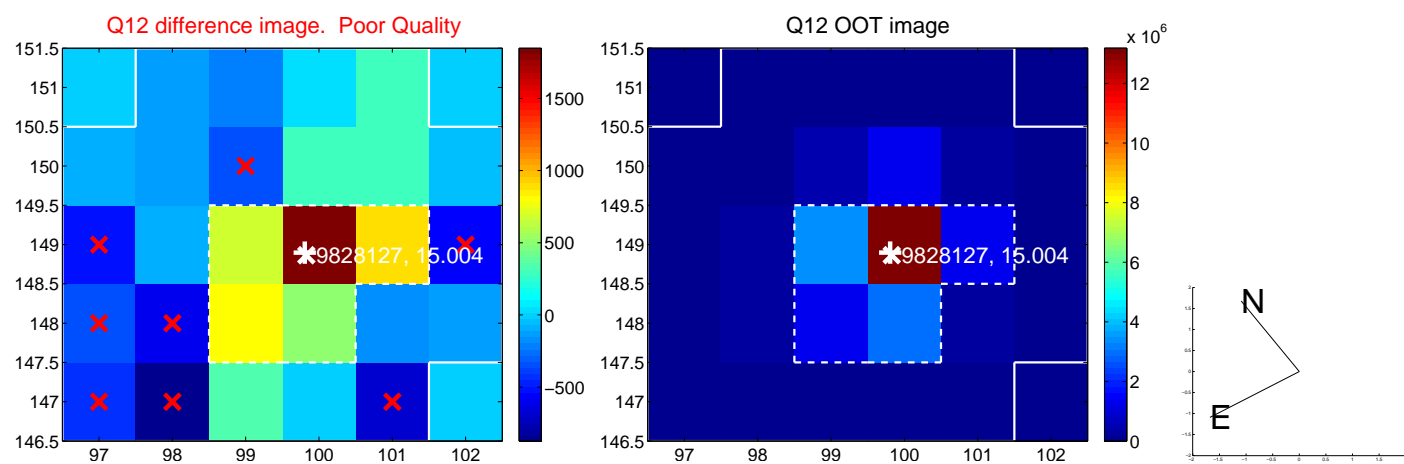
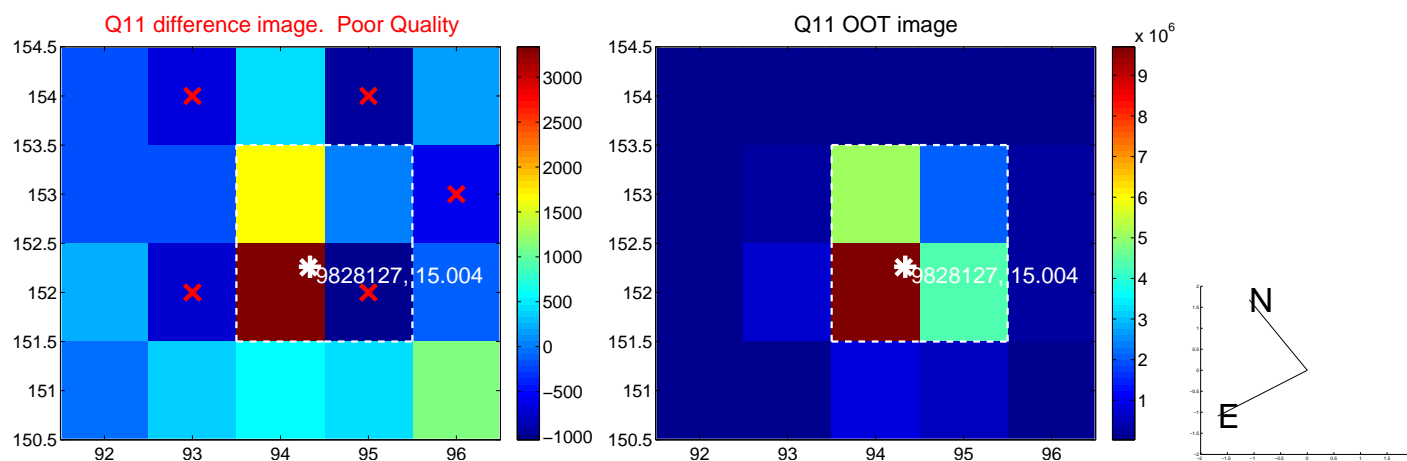
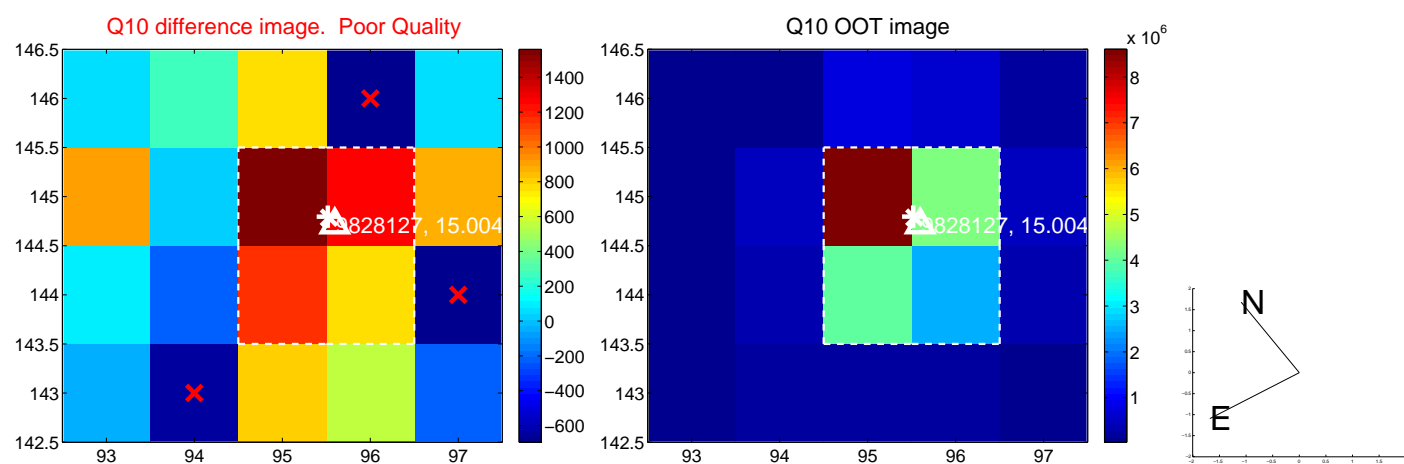
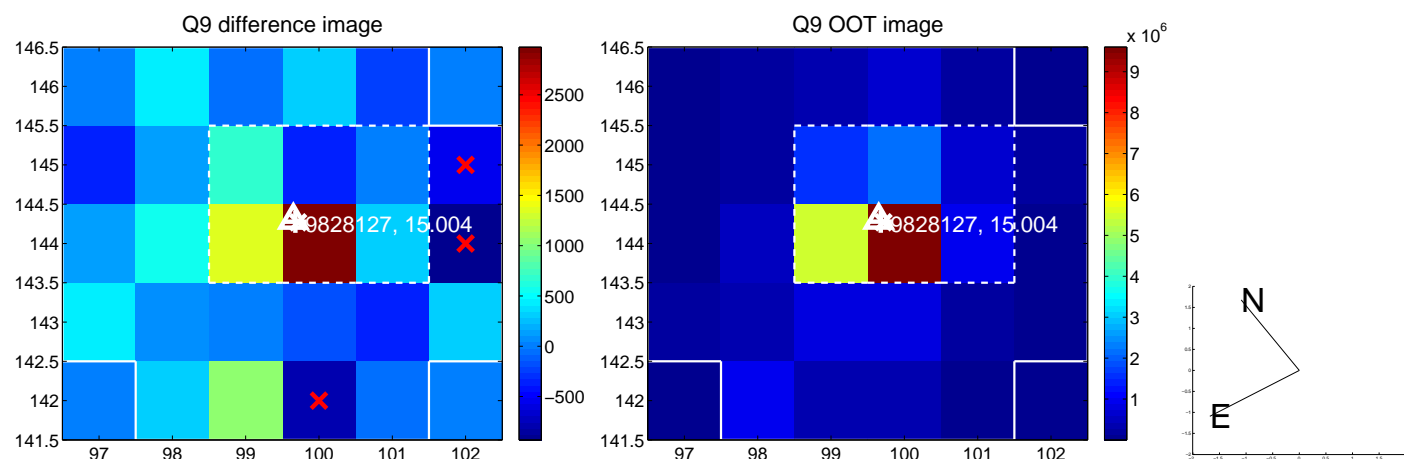




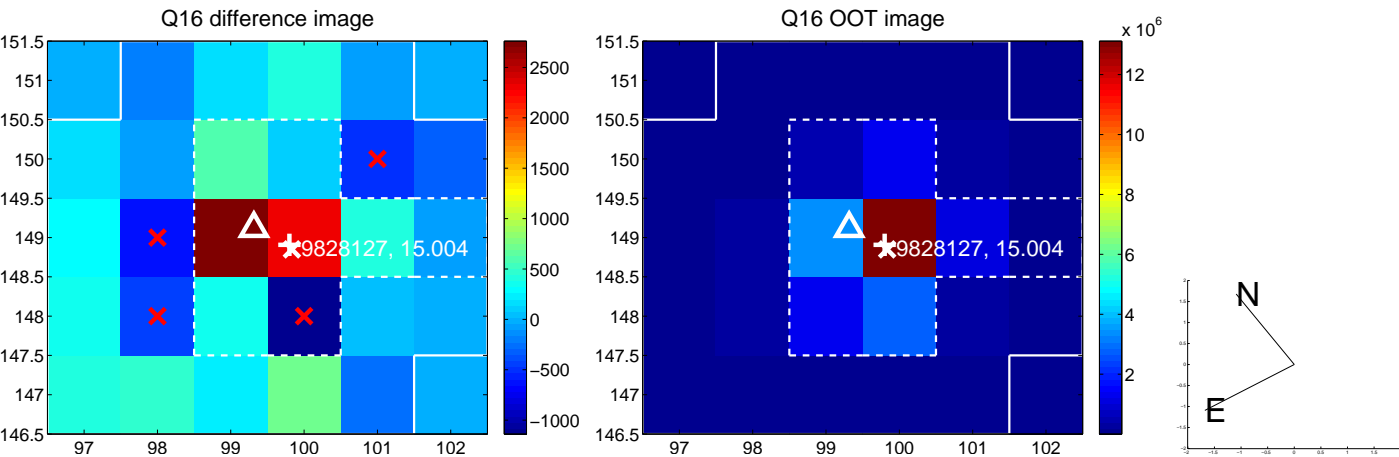
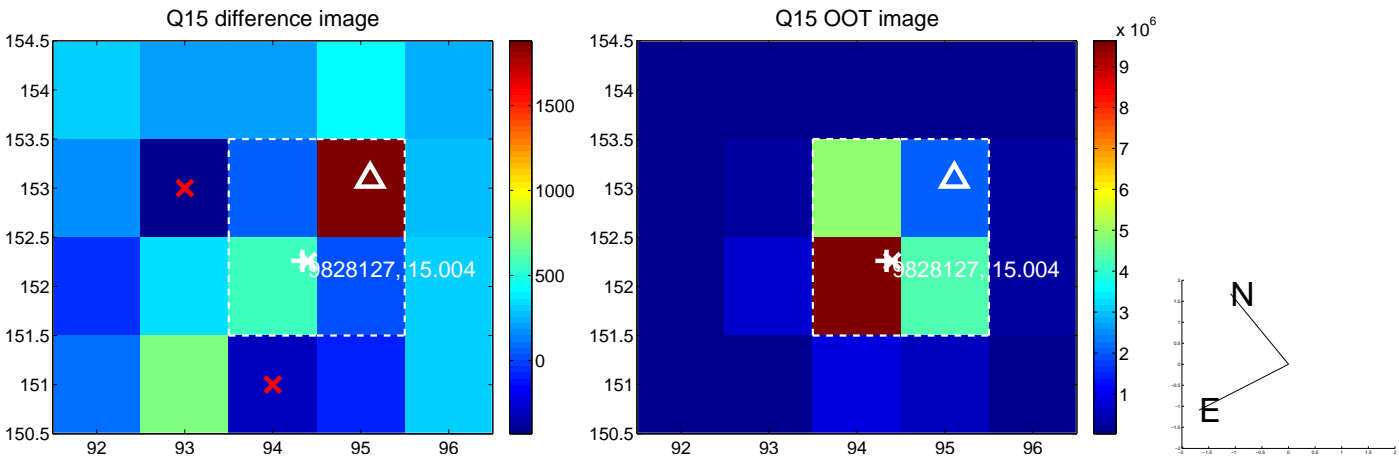
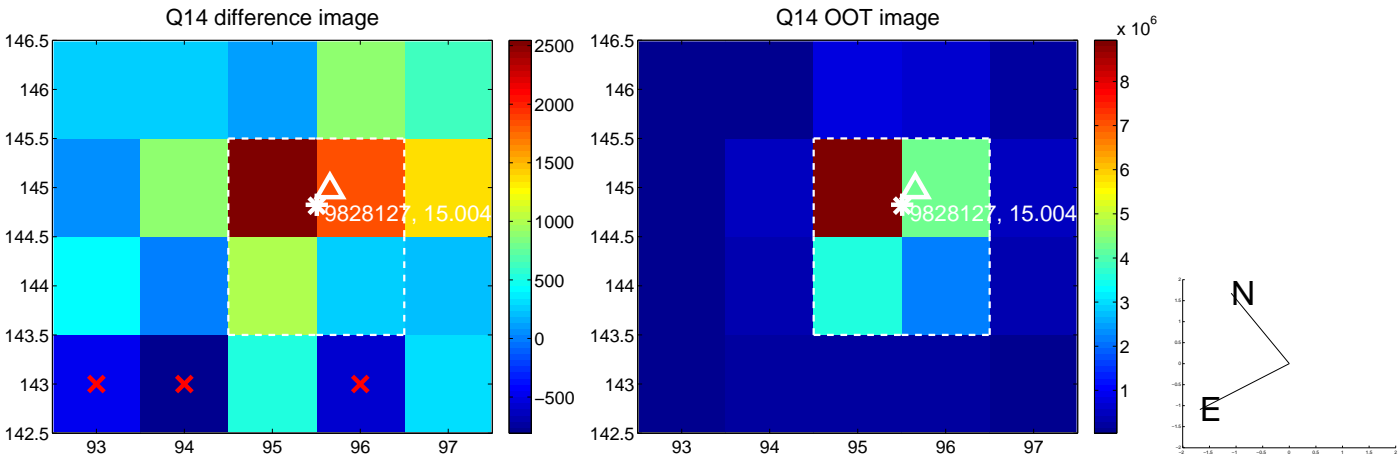
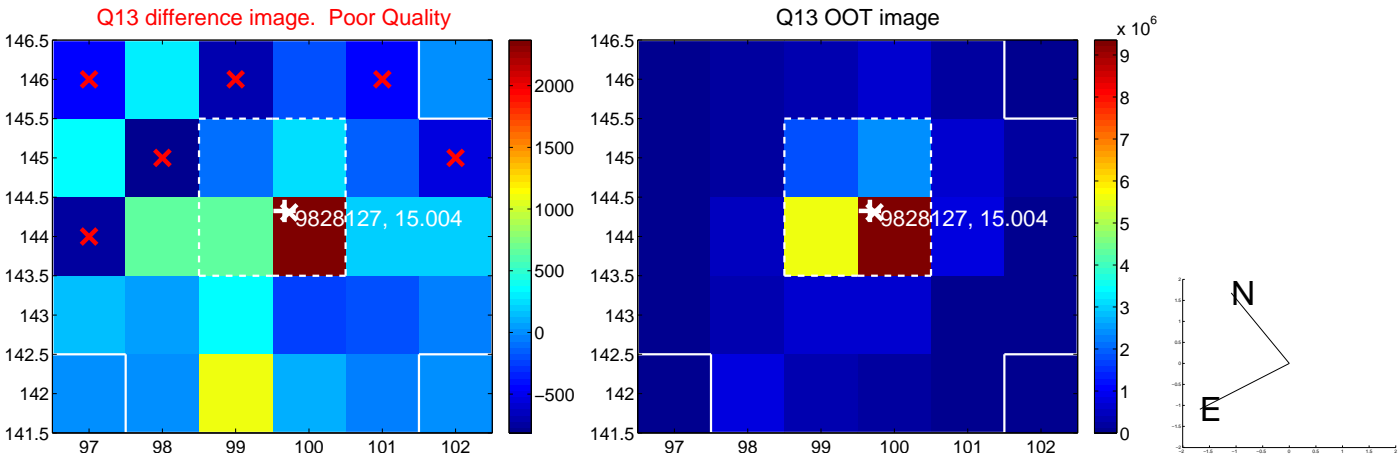
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



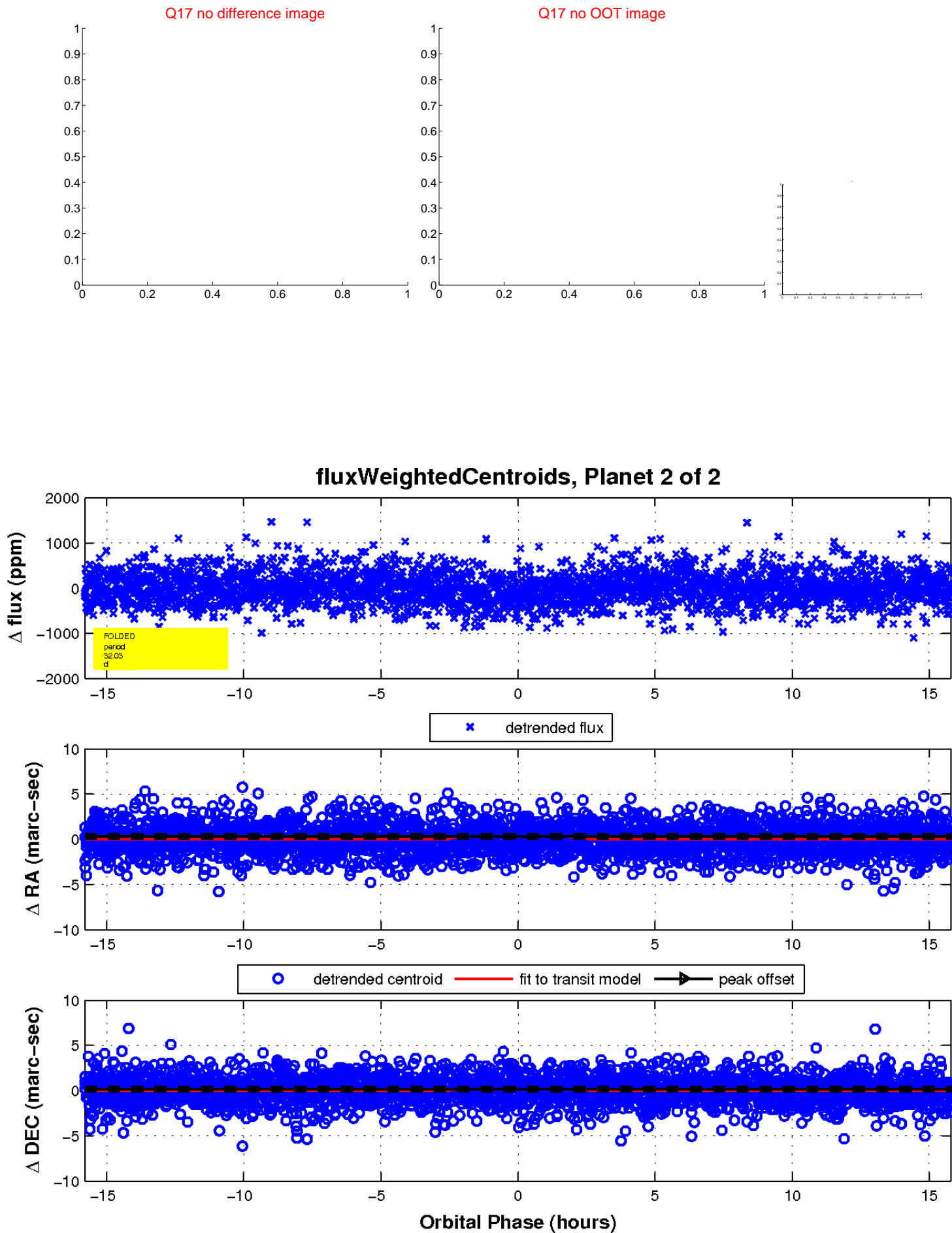
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

