

# KIC 006527078

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006527078-01	OBS	4657.01	7.575942	135.635821	47.0	3.349	10.2	10.9	0.77	5361	0.64	86.92
006527078-02	OBS	4657.02	10.431426	135.548273	63.7	2.041	8.9	9.8	0.77	5361	0.74	56.74

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006527078-01	OBS	PC	0.52	0	0	0	0	NO_COMMENT
006527078-02	OBS	PC	0.97	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.

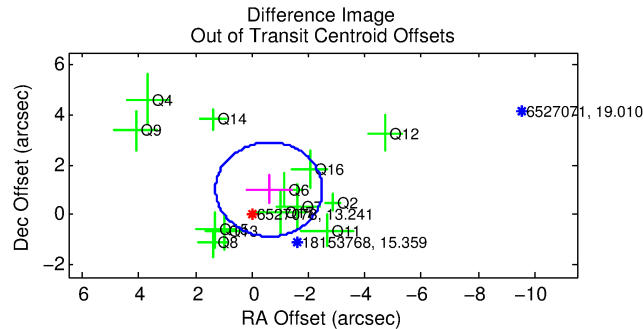
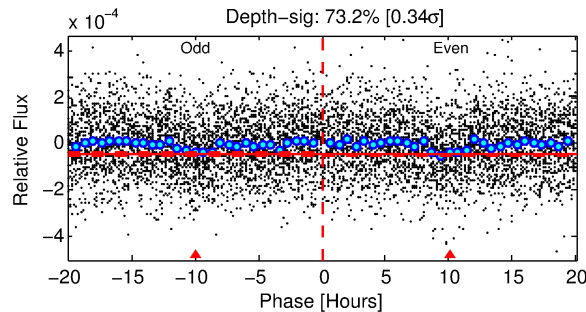
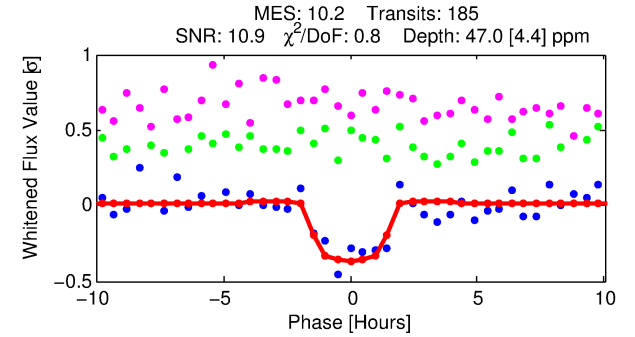
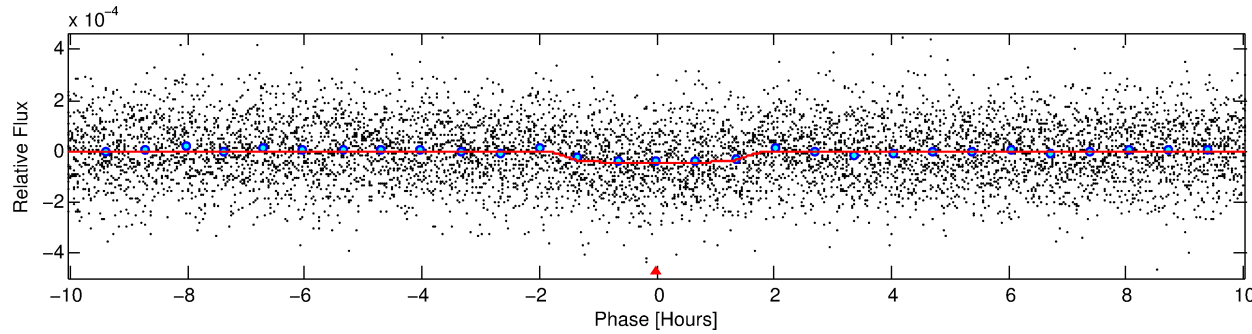
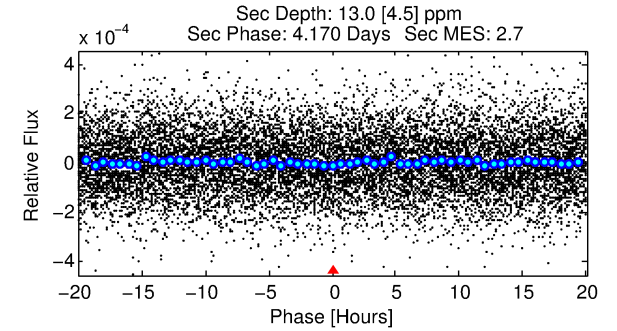
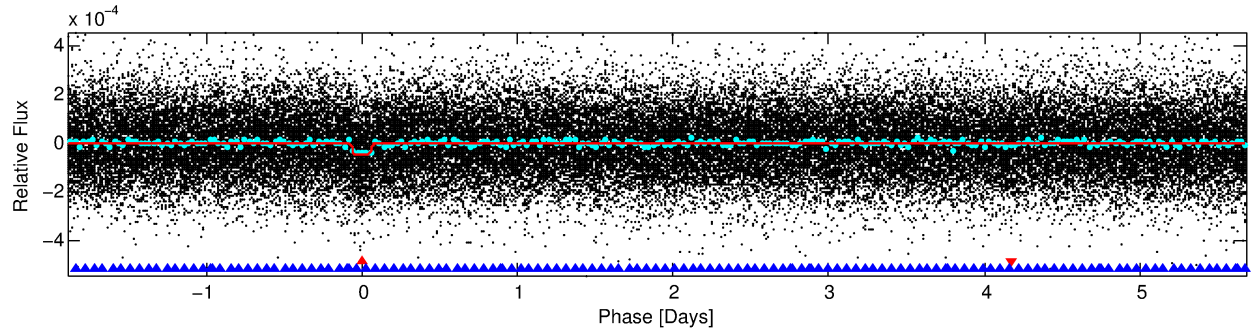
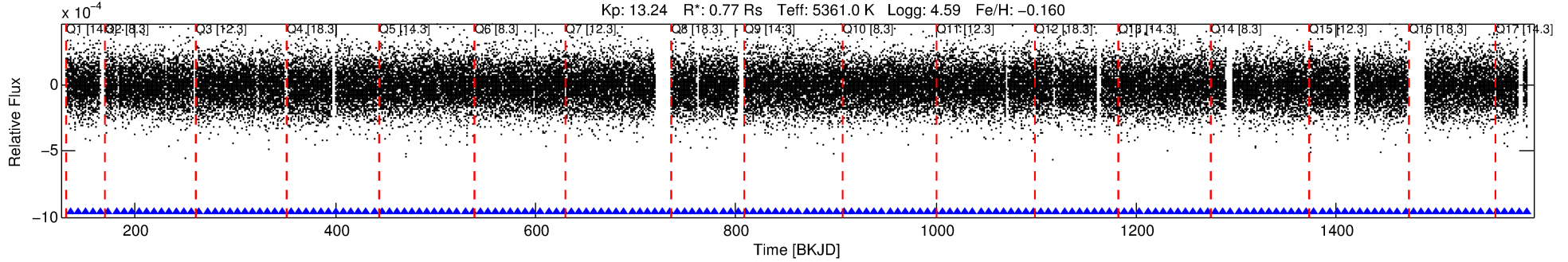
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 006527078-01

No Significant Match Found

# DV One-Page Summary

KIC: 6527078 Candidate: 1 of 2 Period: 7.576 d  
KOI: K04657.01 Corr: 0.912



## DV Fit Results:

Period = 7.57594 [0.00006] d  
Epoch = 135.6358 [0.0060] BKJD  
Rp/R\* = 0.0075 [0.0039]  
a/R\* = 7.88 [18.08]  
b = 0.90 [0.50]  
Seff = 86.92 [20.80]  
Teq = 779 [47] K  
Rp = 0.64 [0.35] Re  
a = 0.0714 [0.0103] AU  
Ag = 89.52 [100.44] [0.88σ]  
Teffp = 3703 [1027] K [2.85σ]

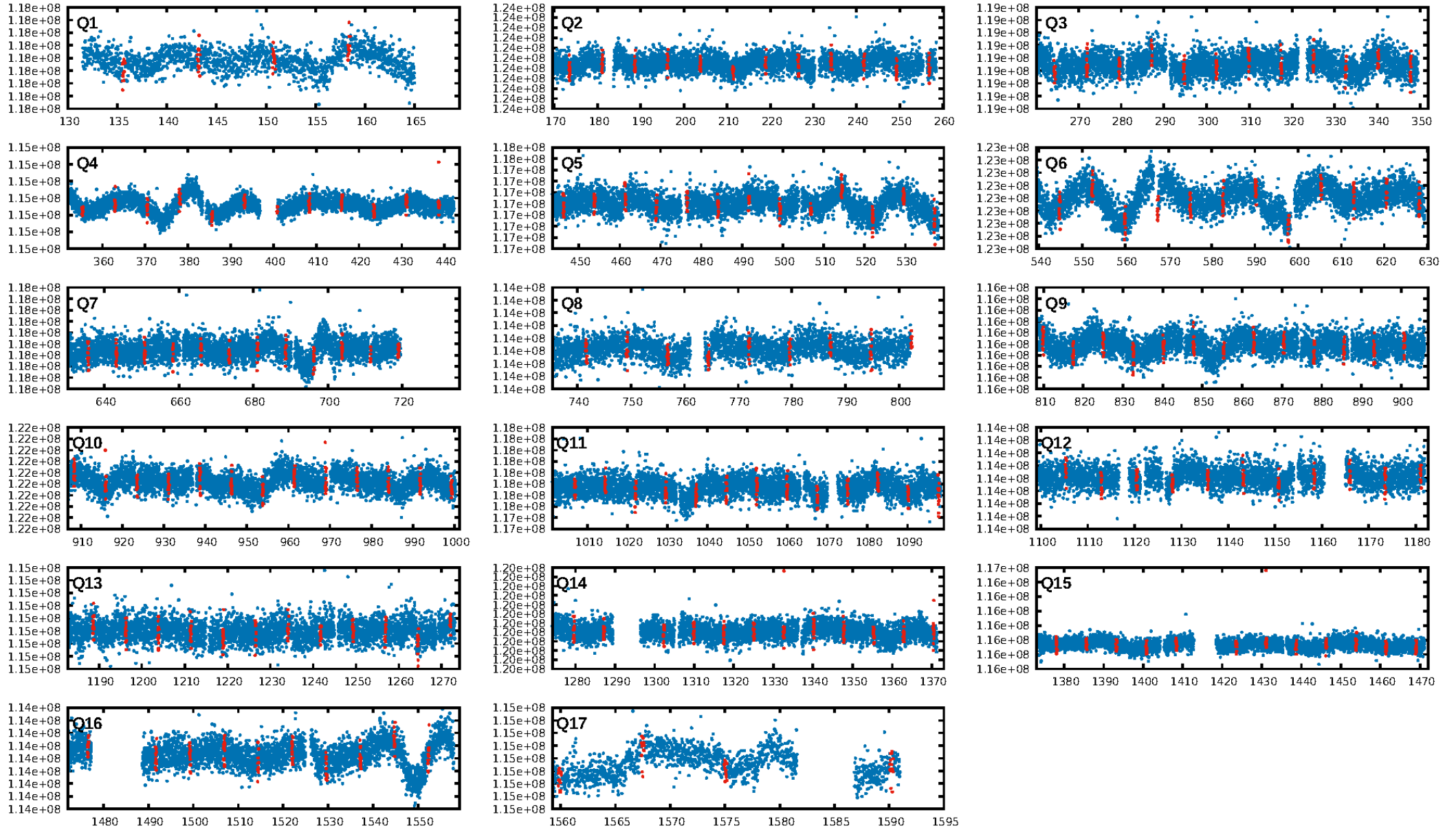
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [17.47σ]  
ModelChiSquare2-sig: 99.9%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 4.59e-24  
RollingBand-fgt: 1.00 [177/177]  
GhostDiagnostic-chr: 5.913  
Centroid-sig: 13.8%  
Centroid-so: 1.422 arcsec [1.20σ]  
OotOffset-rm: 1.172 arcsec [1.86σ]  
KicOffset-rm: 1.148 arcsec [1.83σ]  
OotOffset-st: 3/3/4/3 [13]  
KicOffset-st: 3/3/4/3 [13]  
DiffImageQuality-fgm: 0.62 [8/13]  
DiffImageOverlap-fno: 1.00 [17/17]

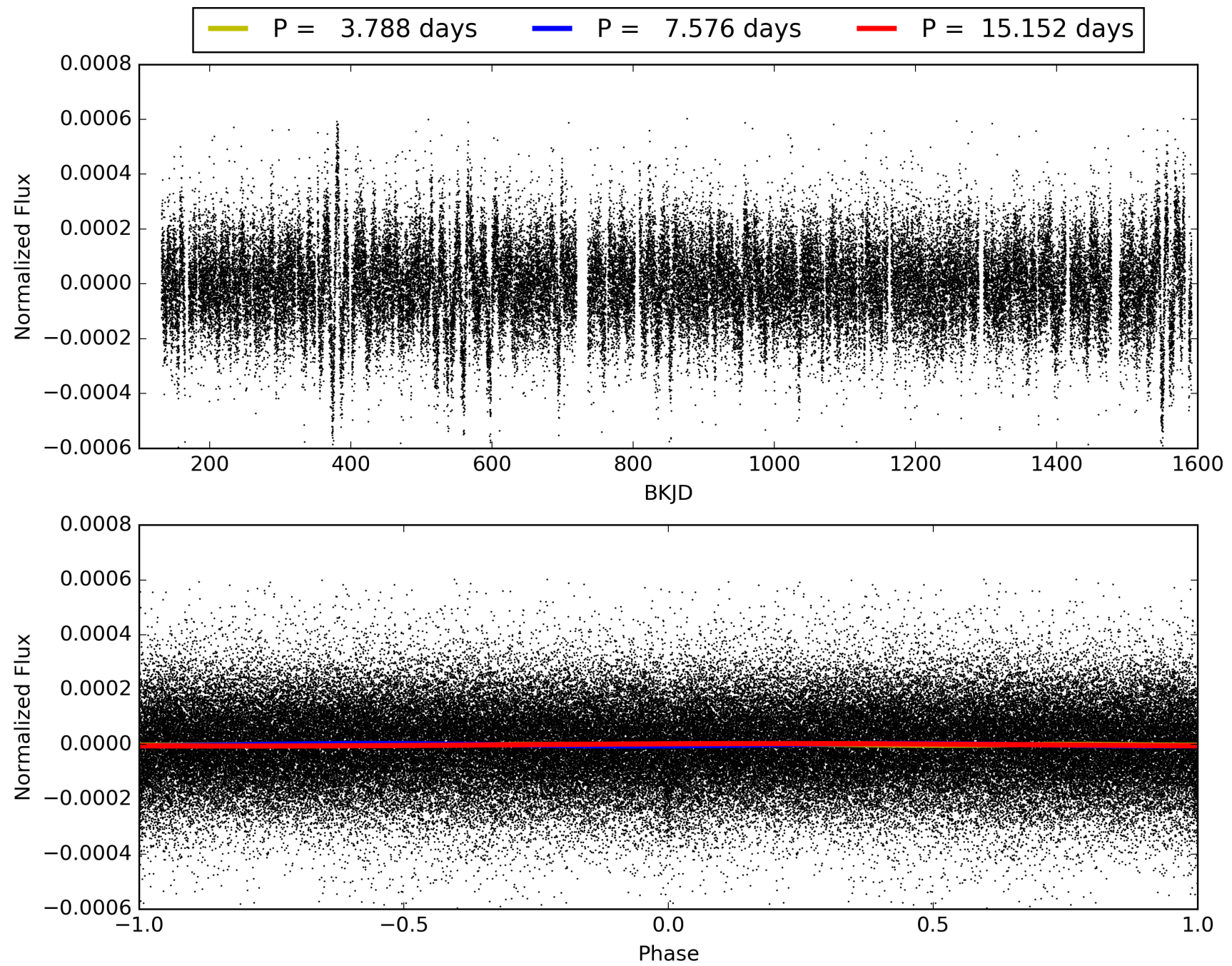
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 18:00:17 Z

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

# TCE 006527078-01, PDC Light Curves

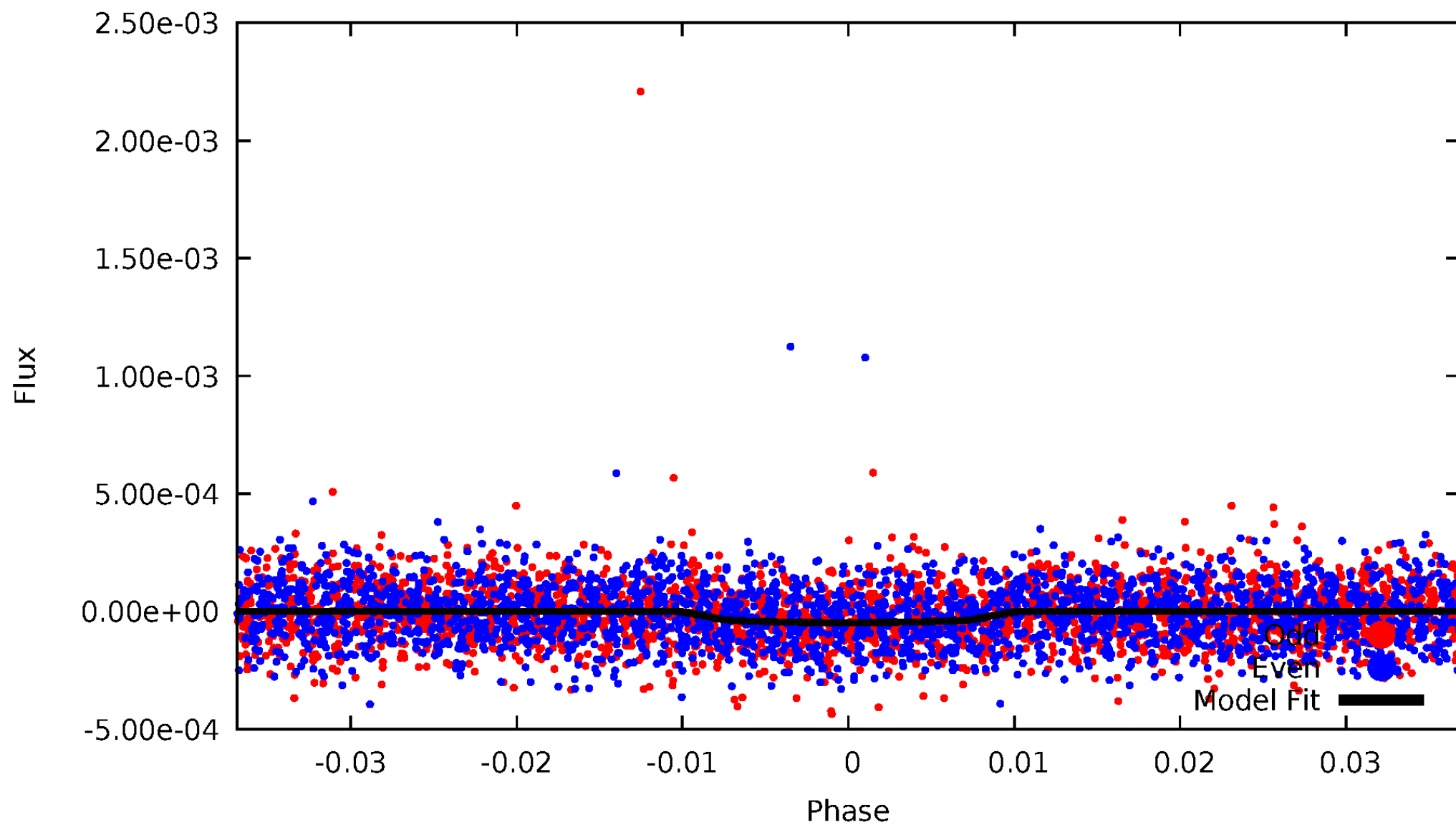


TCE 006527078-01



# DV Odd/Even

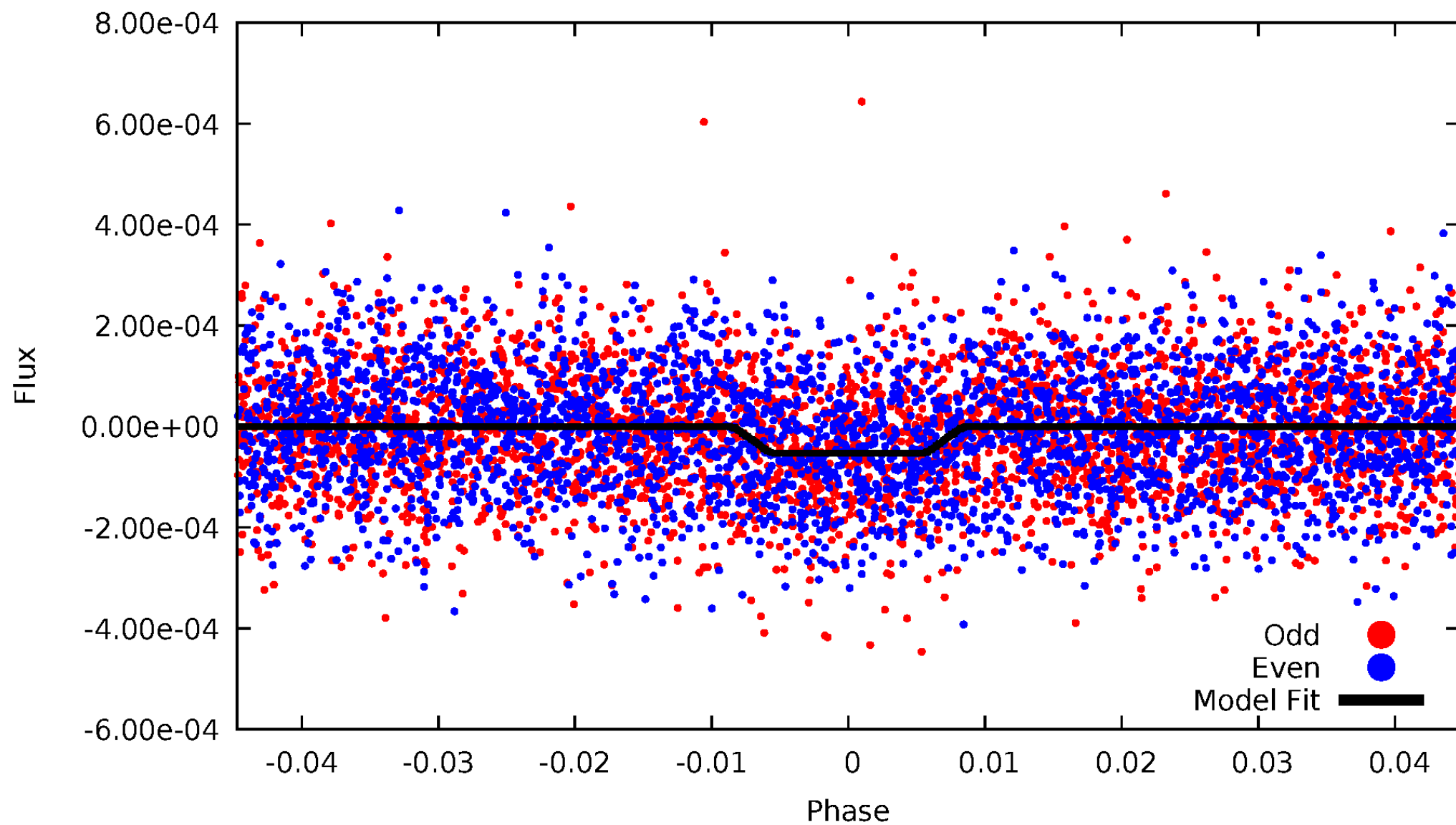
TCE 006527078-01





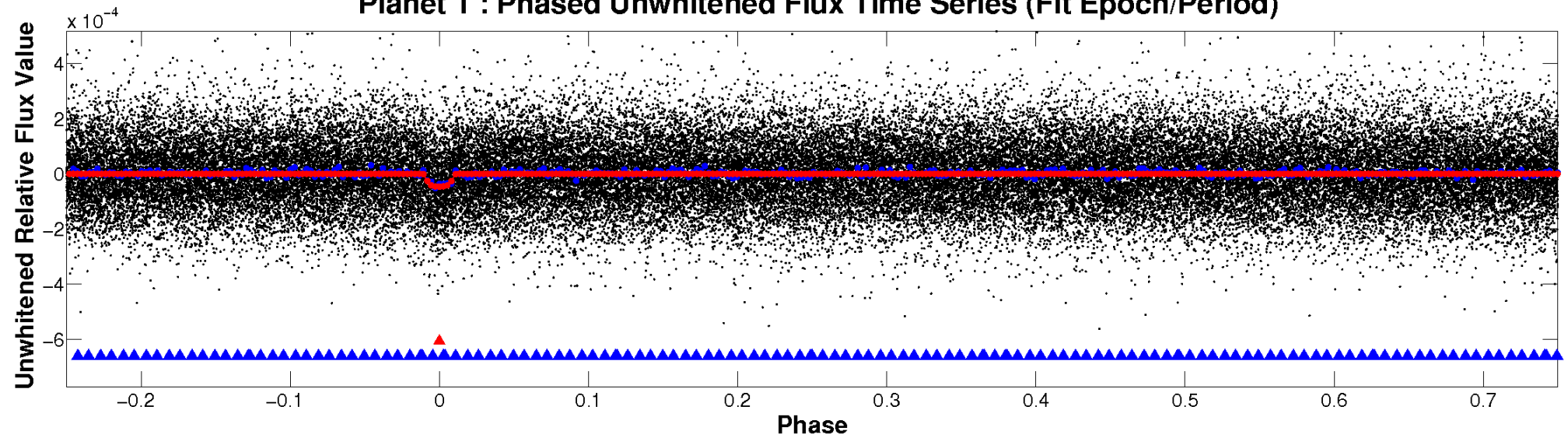
# ALT Odd/Even

TCE 006527078-01

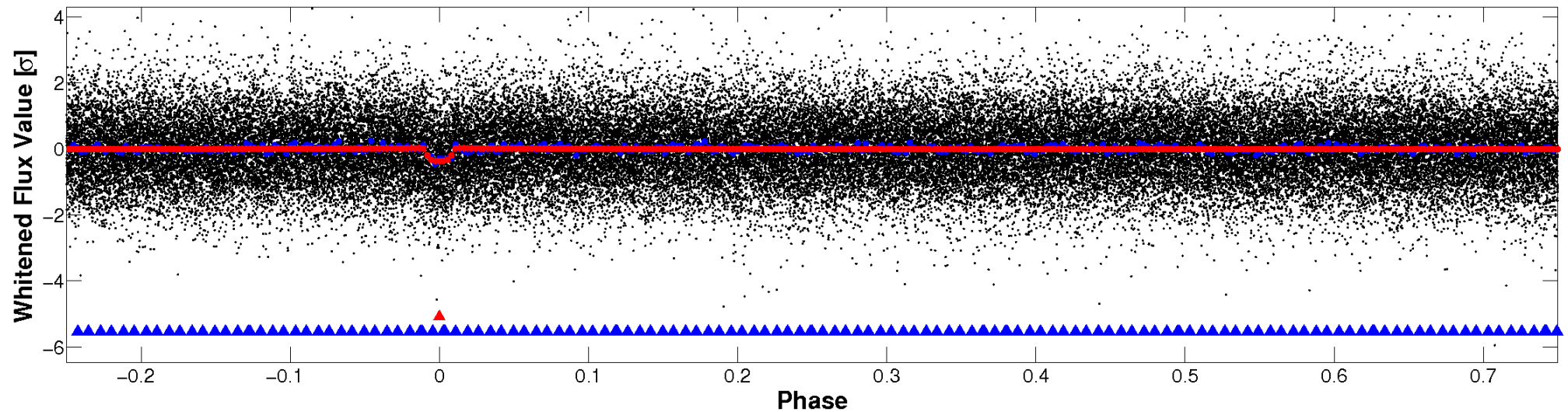


# Non-Whitened Vs. Whitened Light Curve

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

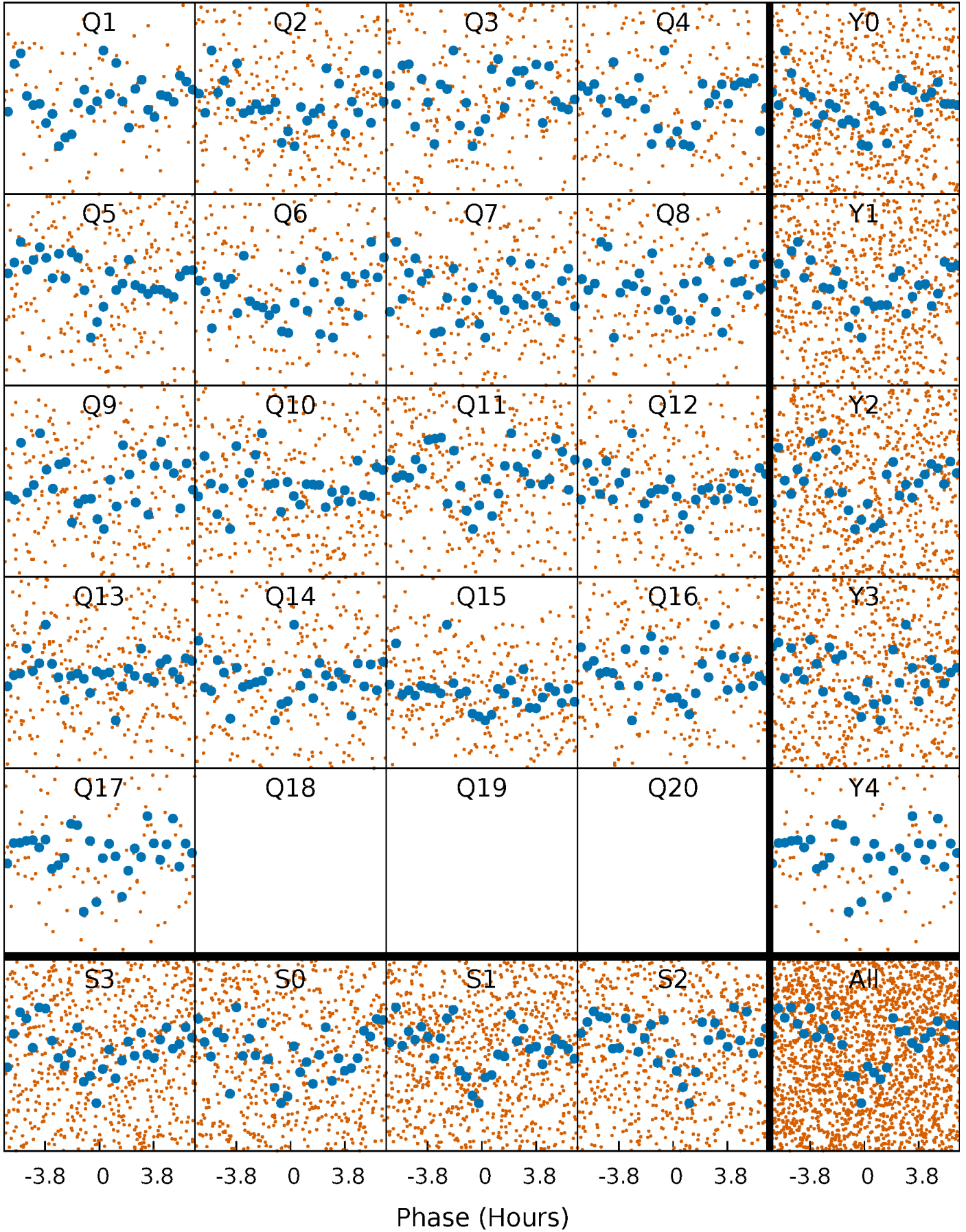


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

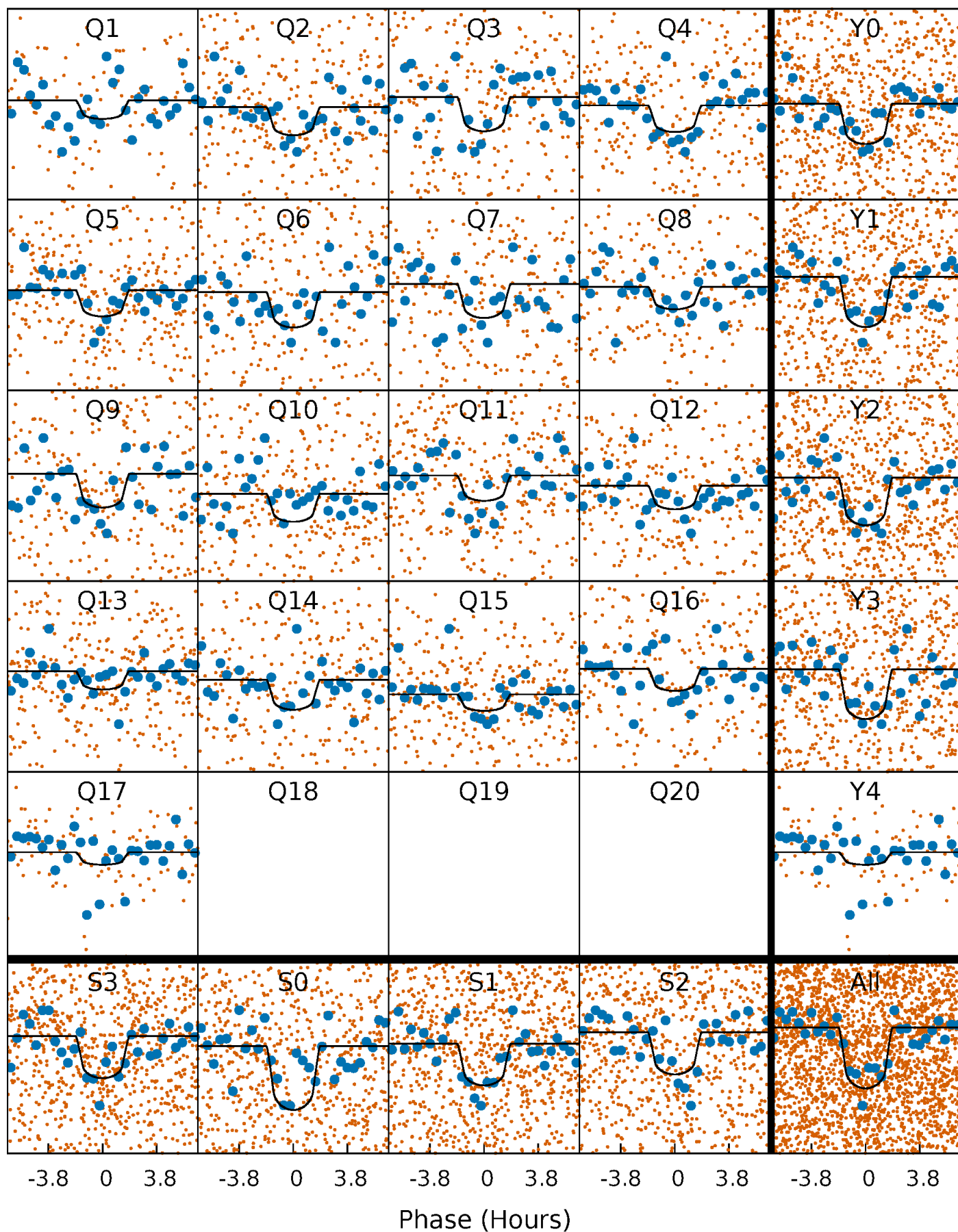
TCE 006527078-01 P= 7.575942 Days  $T_0=135.635820$  (BKJD)





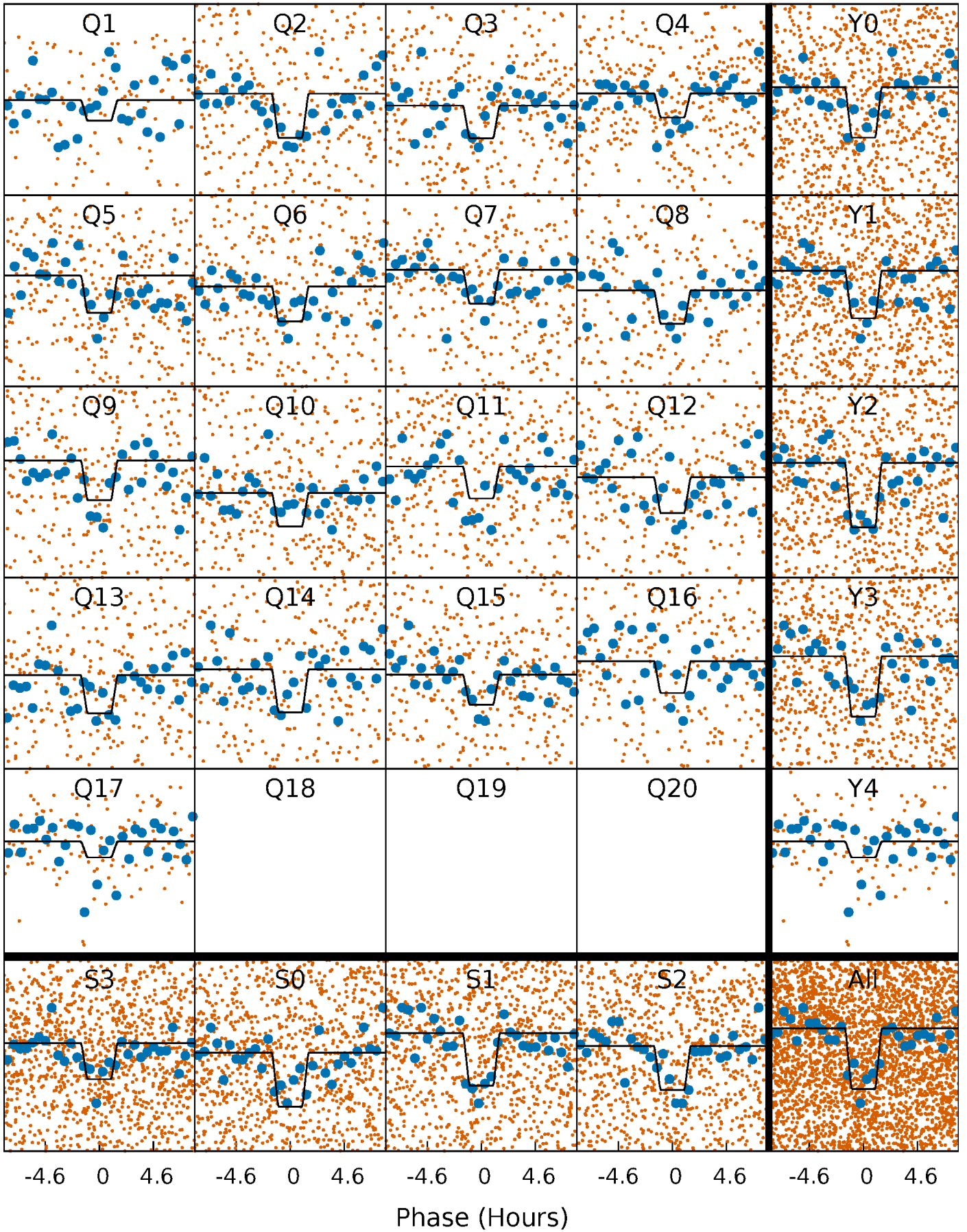
# DV Quarter-Phased Transit Curves

TCE 006527078-01 P= 7.575942 Days  $T_0=135.635820$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

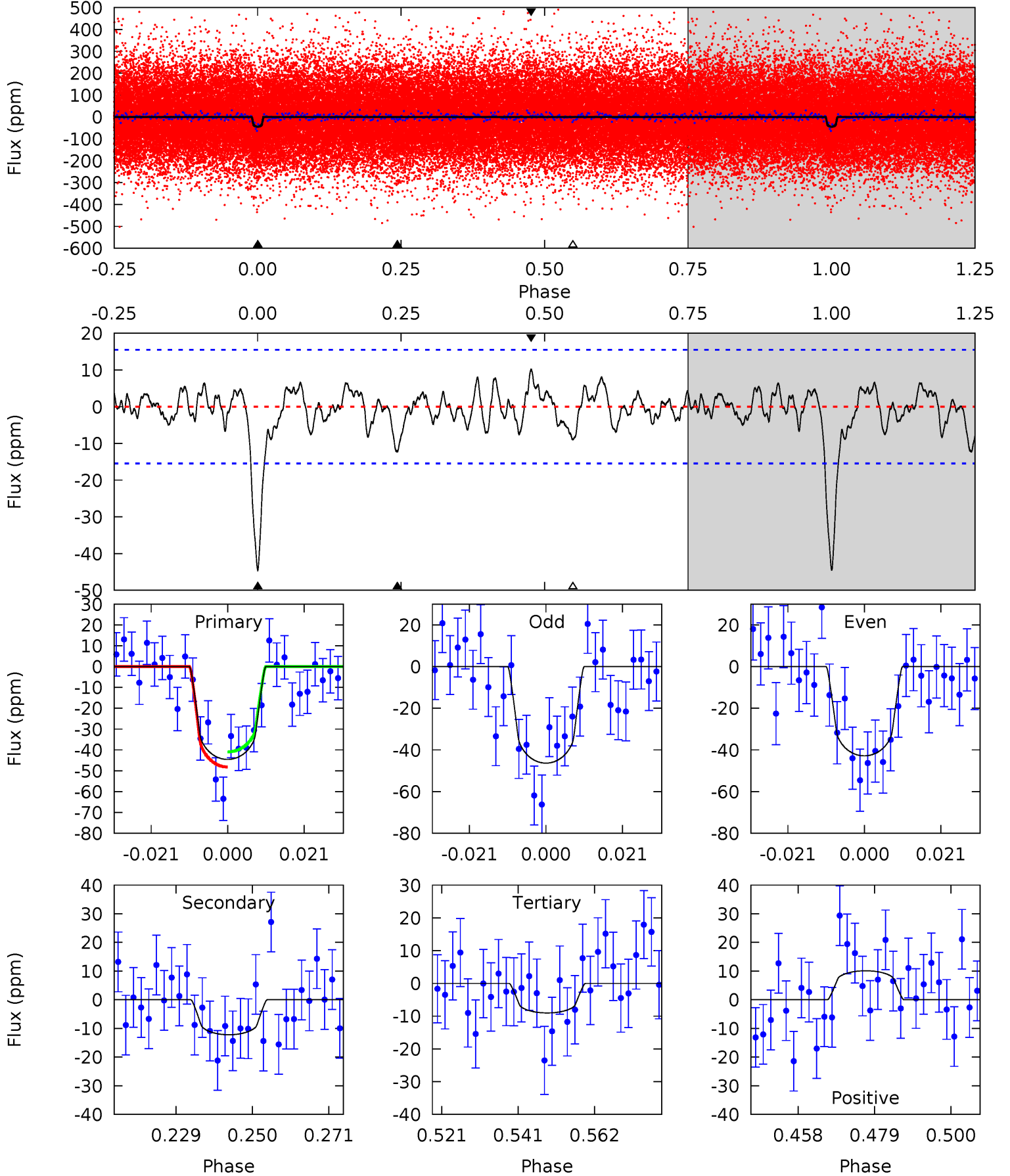
TCE 006527078-01 P= 7.576001 Days  $T_0=135.630043$  (BKJD)



# DV Model-Shift Uniqueness Test

006527078-01, P = 7.575942 Days, E = 128.059878 Days

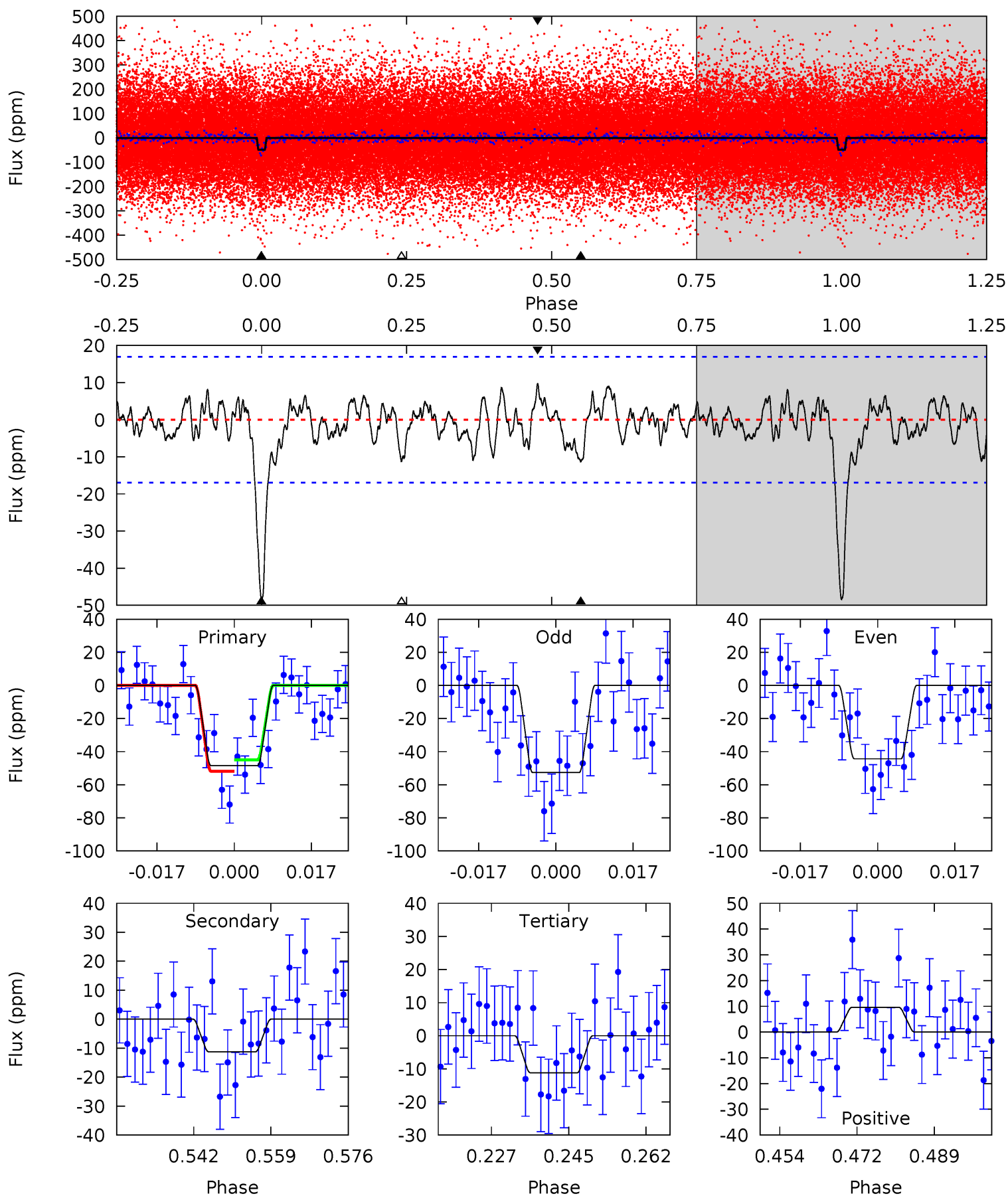
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
14.1	3.86	2.85	3.19	4.88	2.31	1.16	11.2	10.9	1.01	0.66	0.55	0.91	0.18	1.15



# Alt Model-Shift Uniqueness Test

006527078-01, P = 7.576001 Days, E = 128.054042 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
14.0	3.26	3.25	2.79	4.92	2.38	1.19	10.8	11.3	0.02	0.47	1.21	1.09	0.17	0.99



### Stellar Parameters For KIC 006527078

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5361^{+159}_{-159}$	$4.588^{+0.038}_{-0.113}$	$-0.160^{+0.300}_{-0.300}$	$0.774^{+0.133}_{-0.071}$	$0.848^{+0.078}_{-0.087}$	$2.580^{+0.488}_{-0.908}$
	+3%/-3%	+1%/-2%	+188%/-188%	+17%/-9%	+9%/-10%	+19%/-35%
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 006527078-01 / KOI 4657.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-12 \pm 3$	$0.65^{+0.33}_{-0.32}$	$1106^{+50}_{-45}$	$3976^{+1141}_{-552}$	$78^{+225}_{-43}$
Alt.	$-11 \pm 3$	$0.64^{+0.33}_{-0.30}$	$1102^{+53}_{-42}$	$3935^{+1173}_{-582}$	$76^{+216}_{-46}$

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



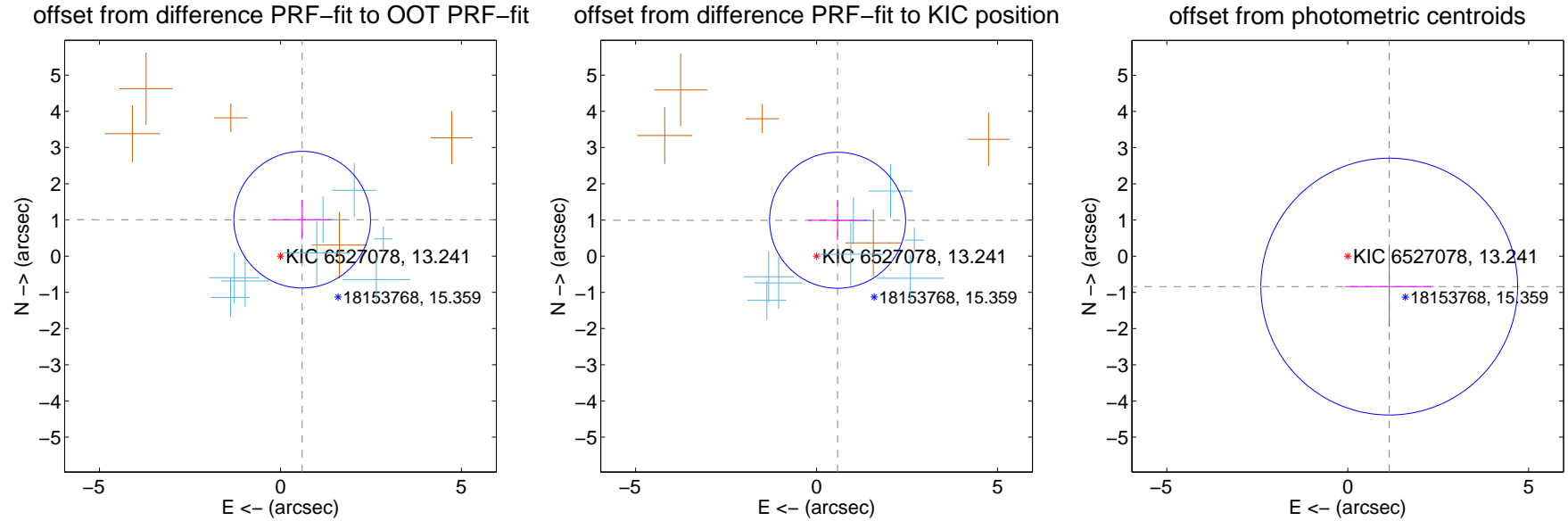
## DV Centroid Data

Supplemental centroid analysis for 006527078-01. Kepler magnitude: 13.24. Transit SNR 10.91

There are 8 quarters with good PRF difference image offsets

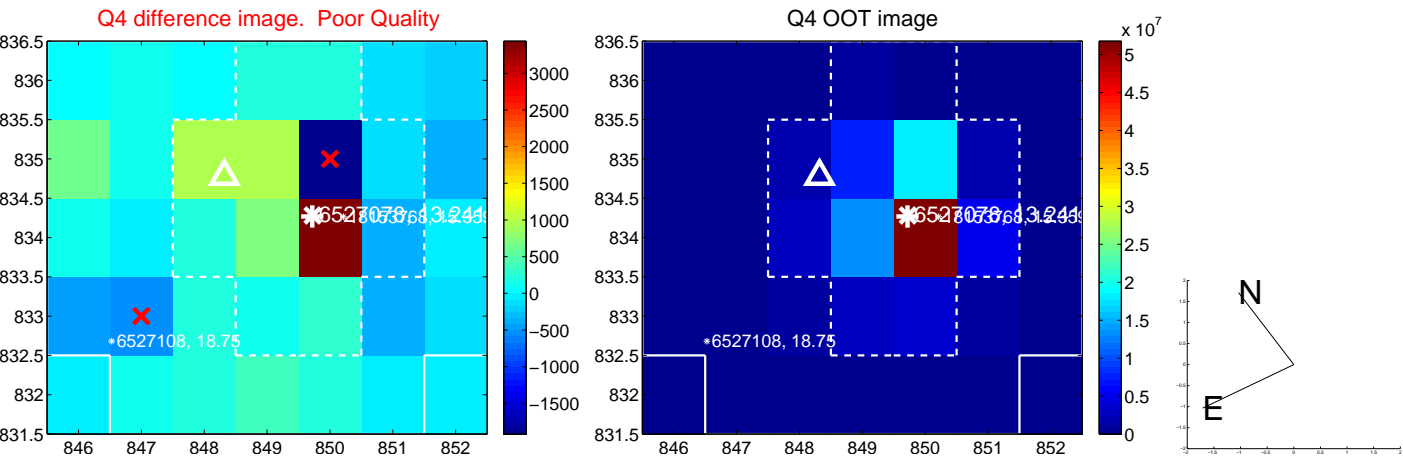
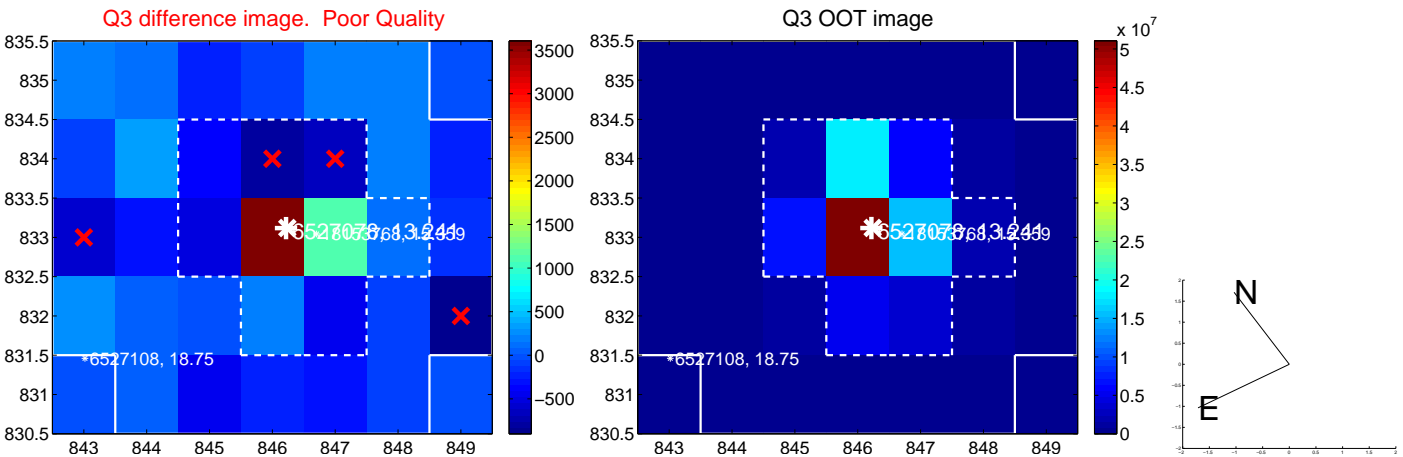
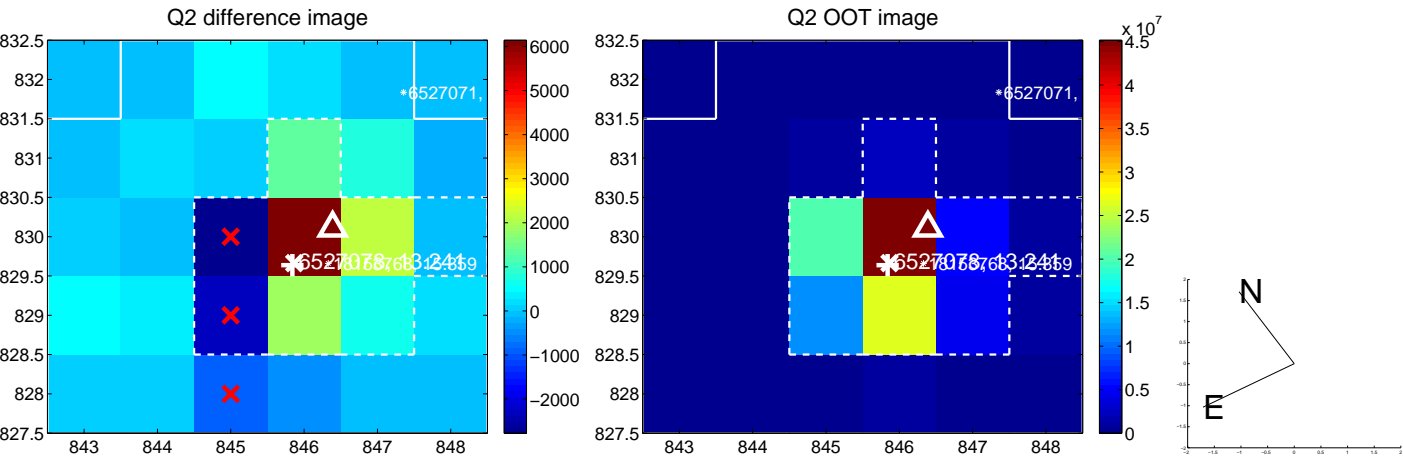
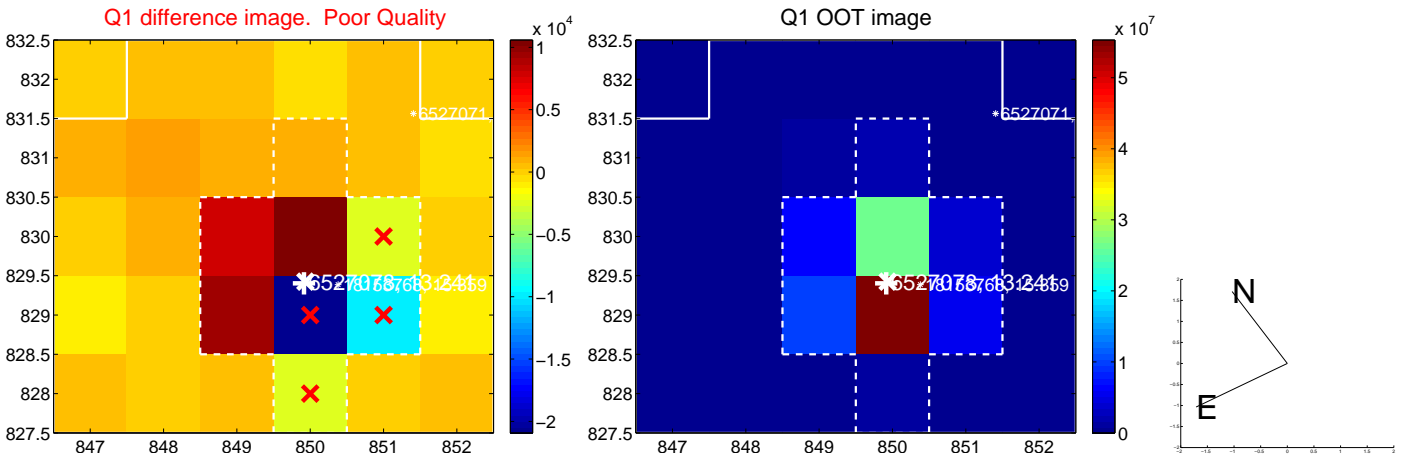
The direct PRF centroid is offset from the target star catalog position by about 0.07 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.172 \pm 0.629$	1.86	$-0.601 \pm 0.809$	$1.007 \pm 0.551$
PRF-fit source offset from KIC position	$1.148 \pm 0.626$	1.83	$-0.581 \pm 0.809$	$0.990 \pm 0.549$
photometric centroid source offset	$1.42 \pm 1.18$	1.20	$-1.15 \pm 1.22$	$-0.84 \pm 1.11$

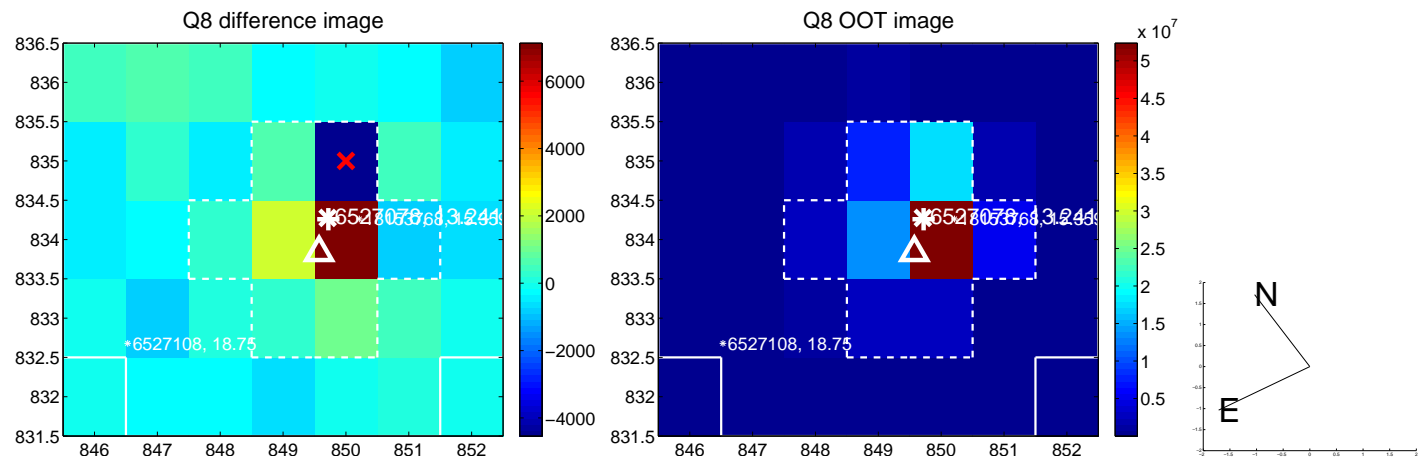
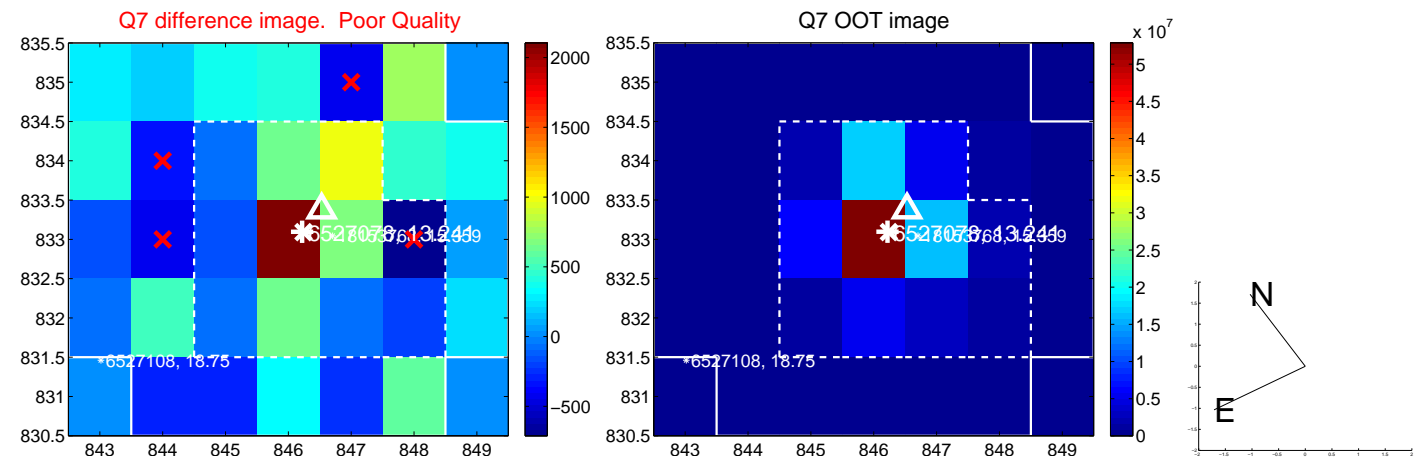
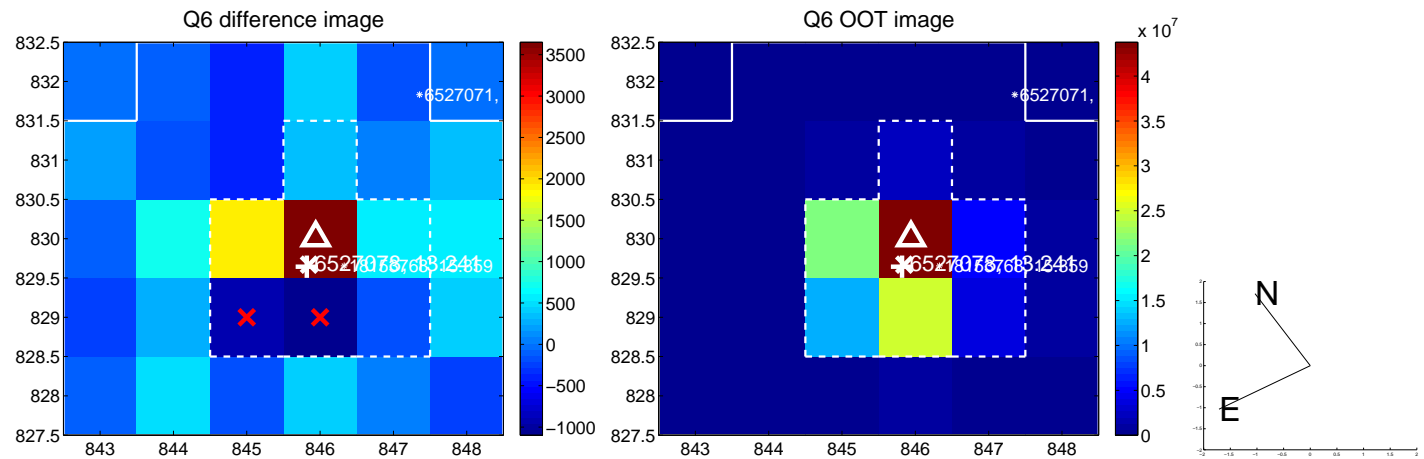
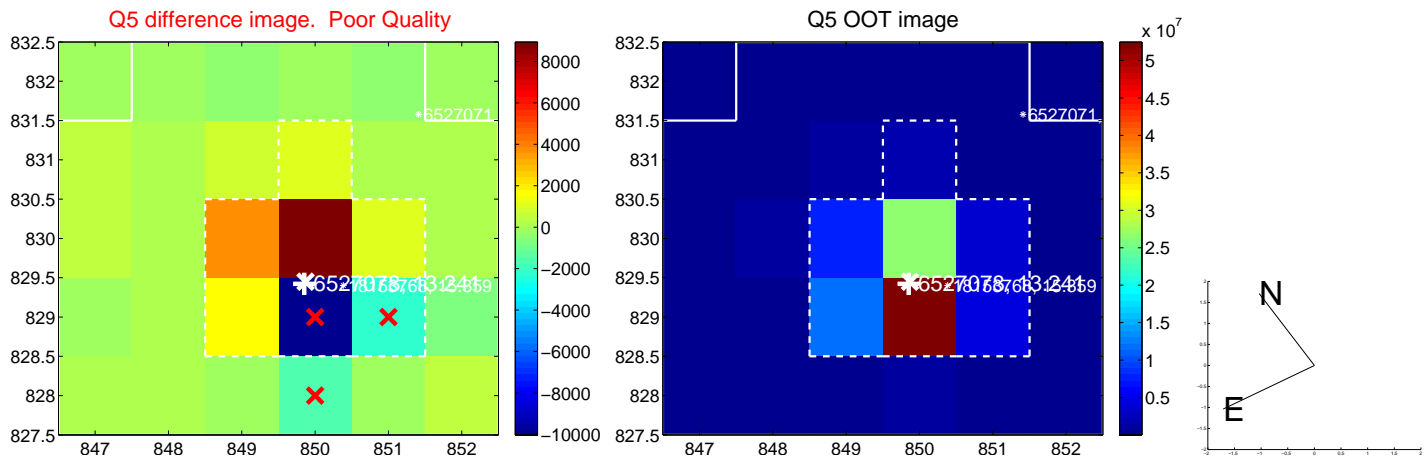


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

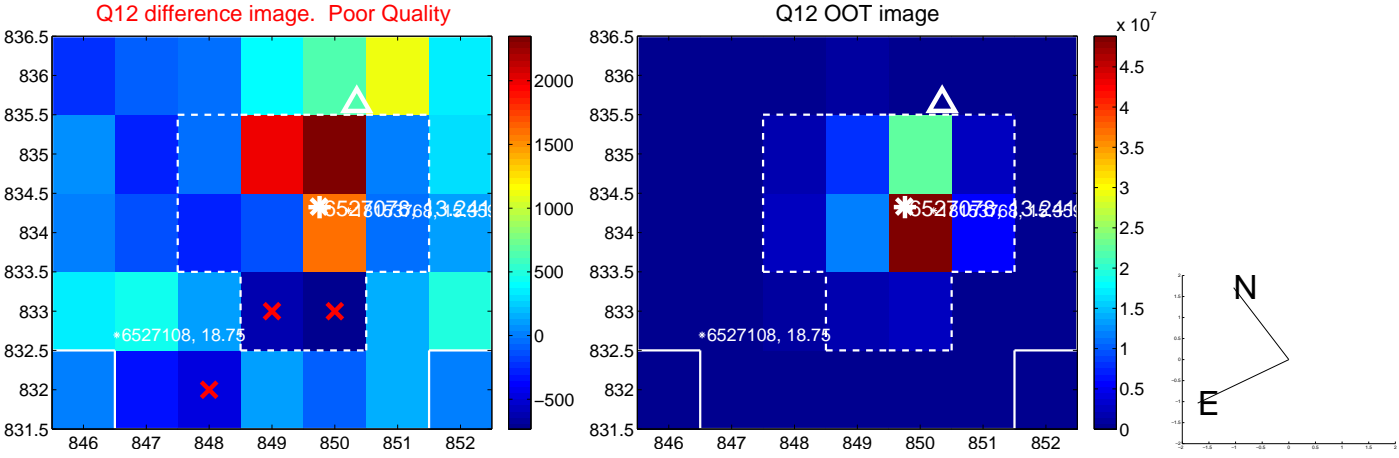
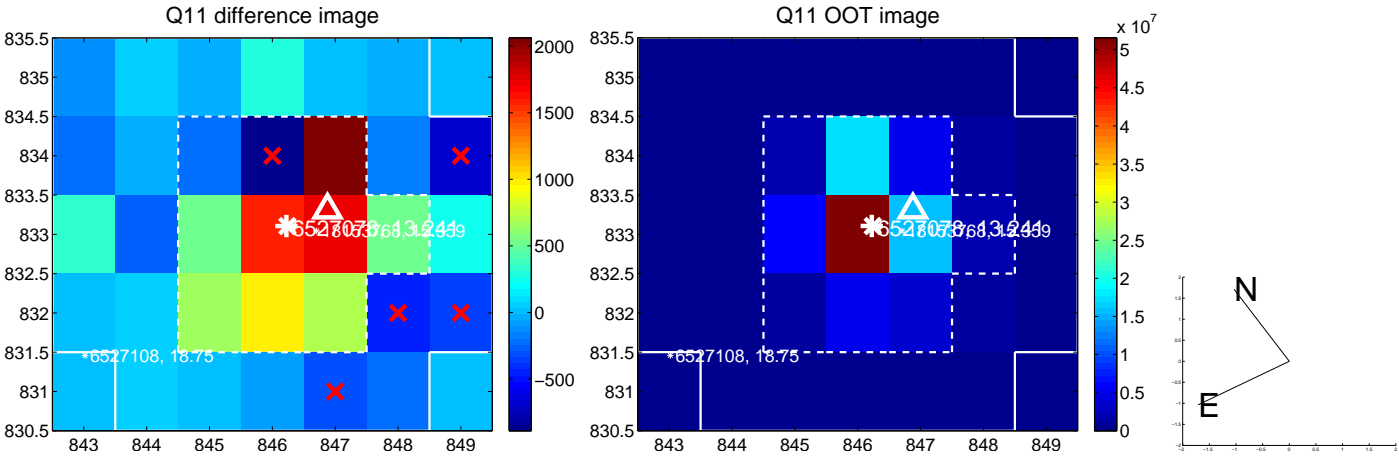
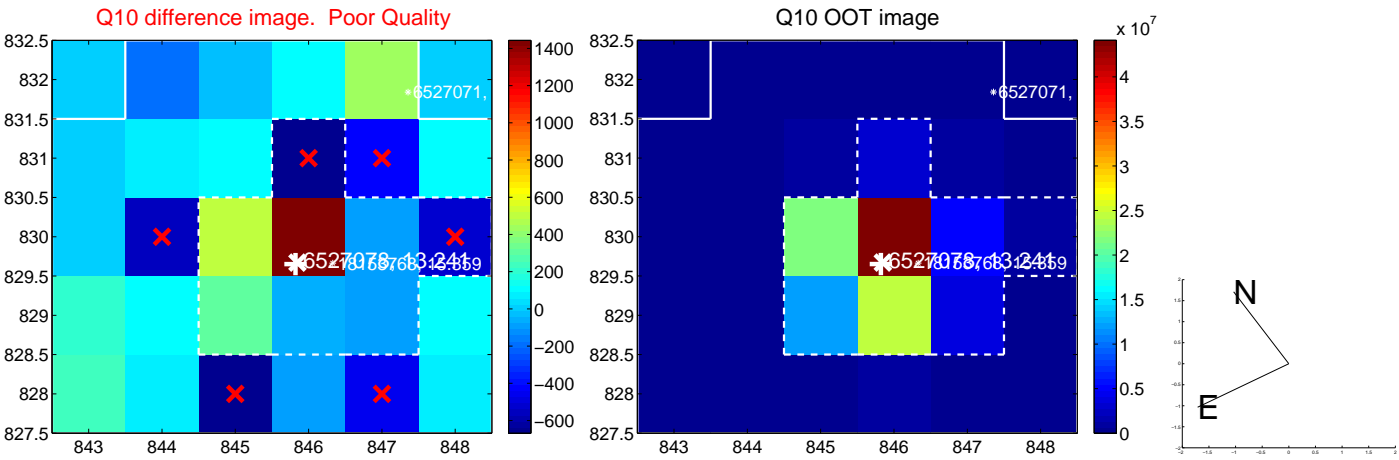
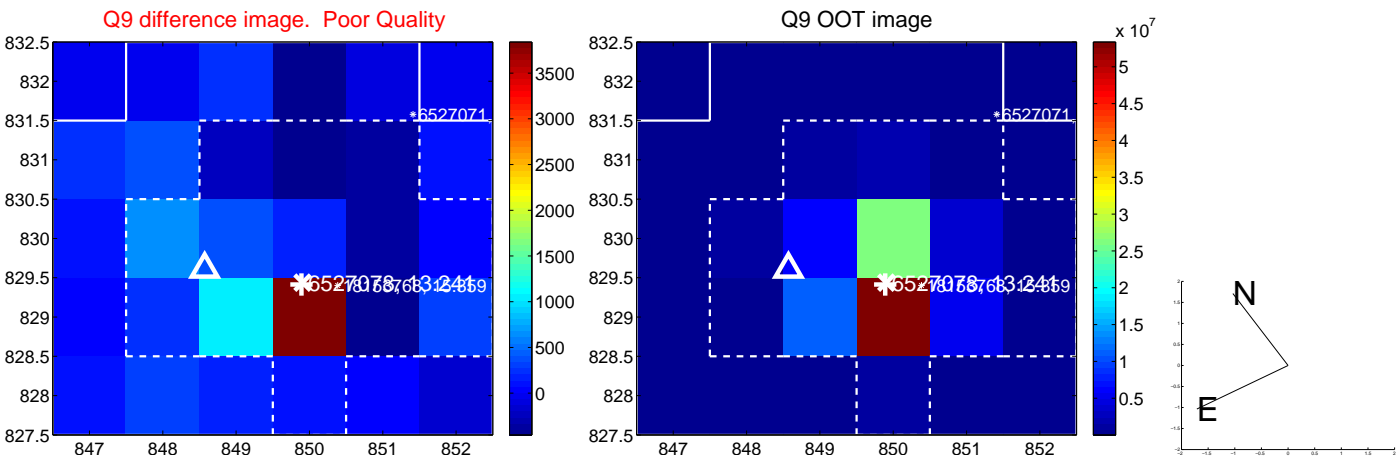
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



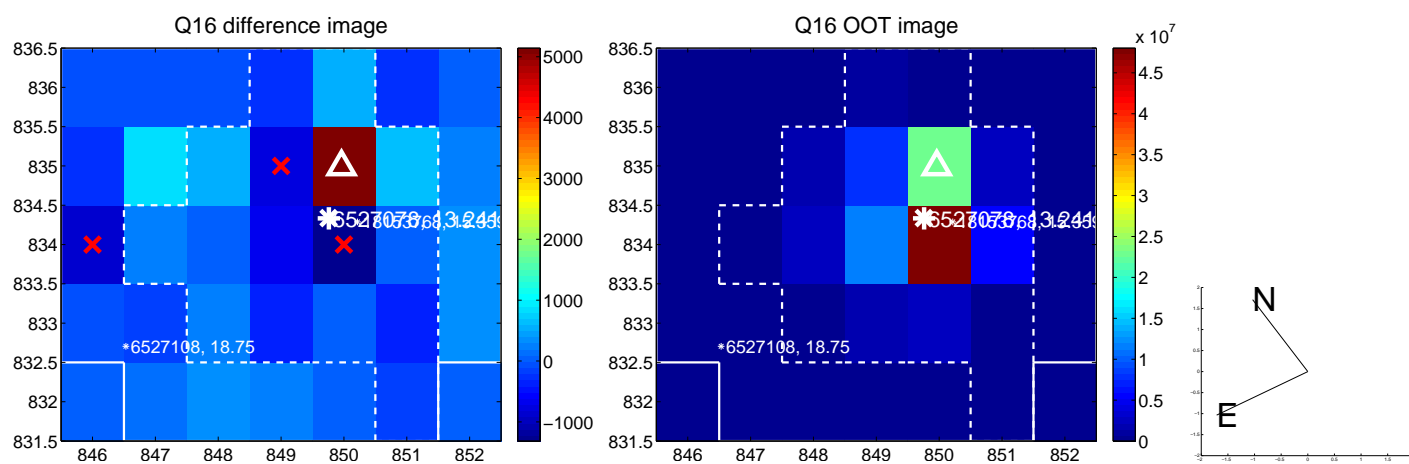
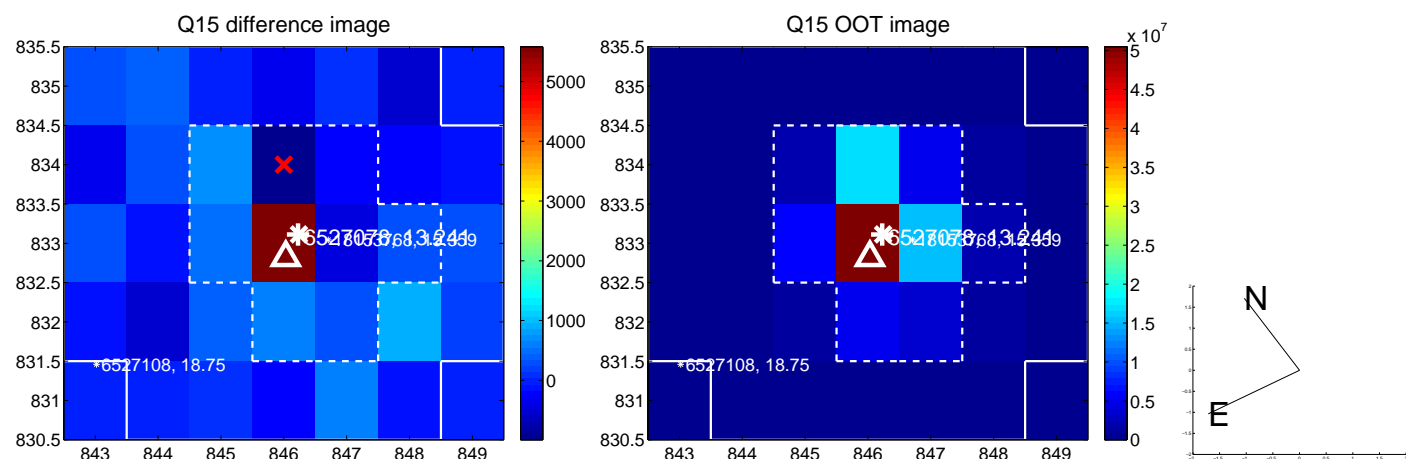
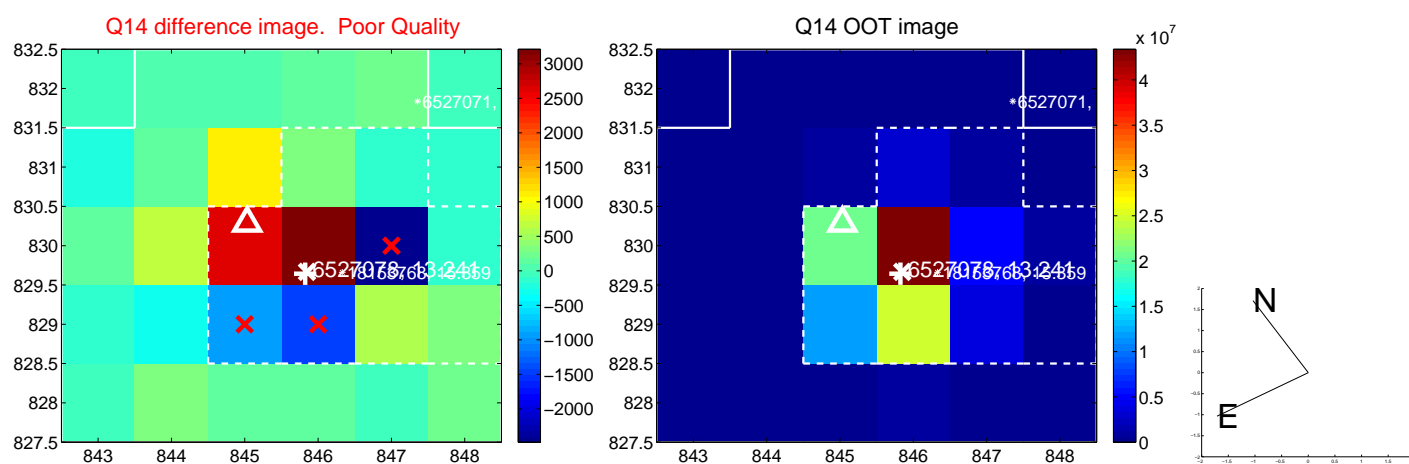
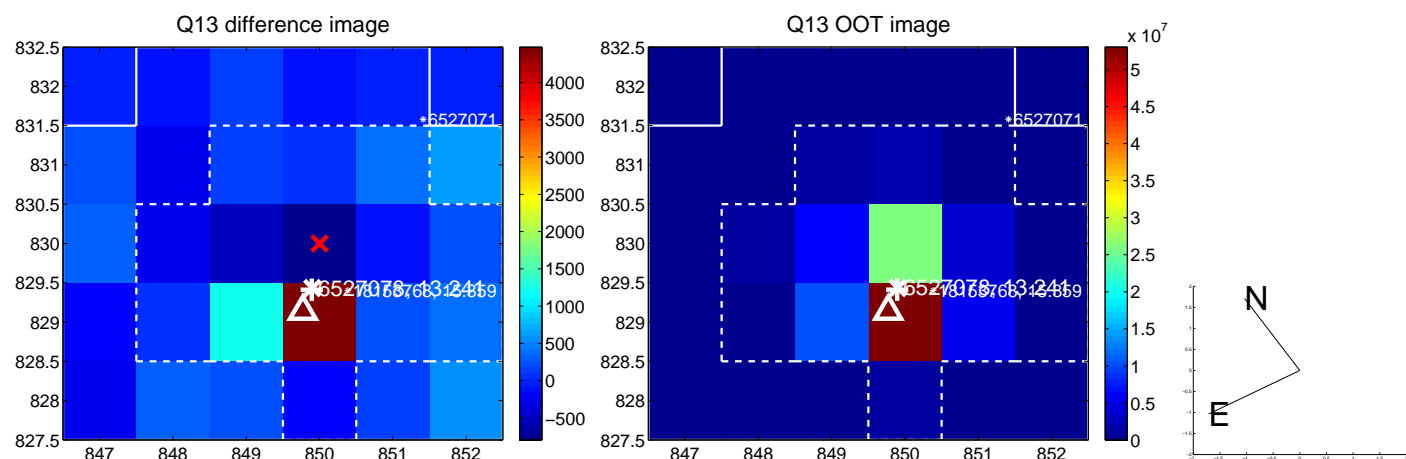
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

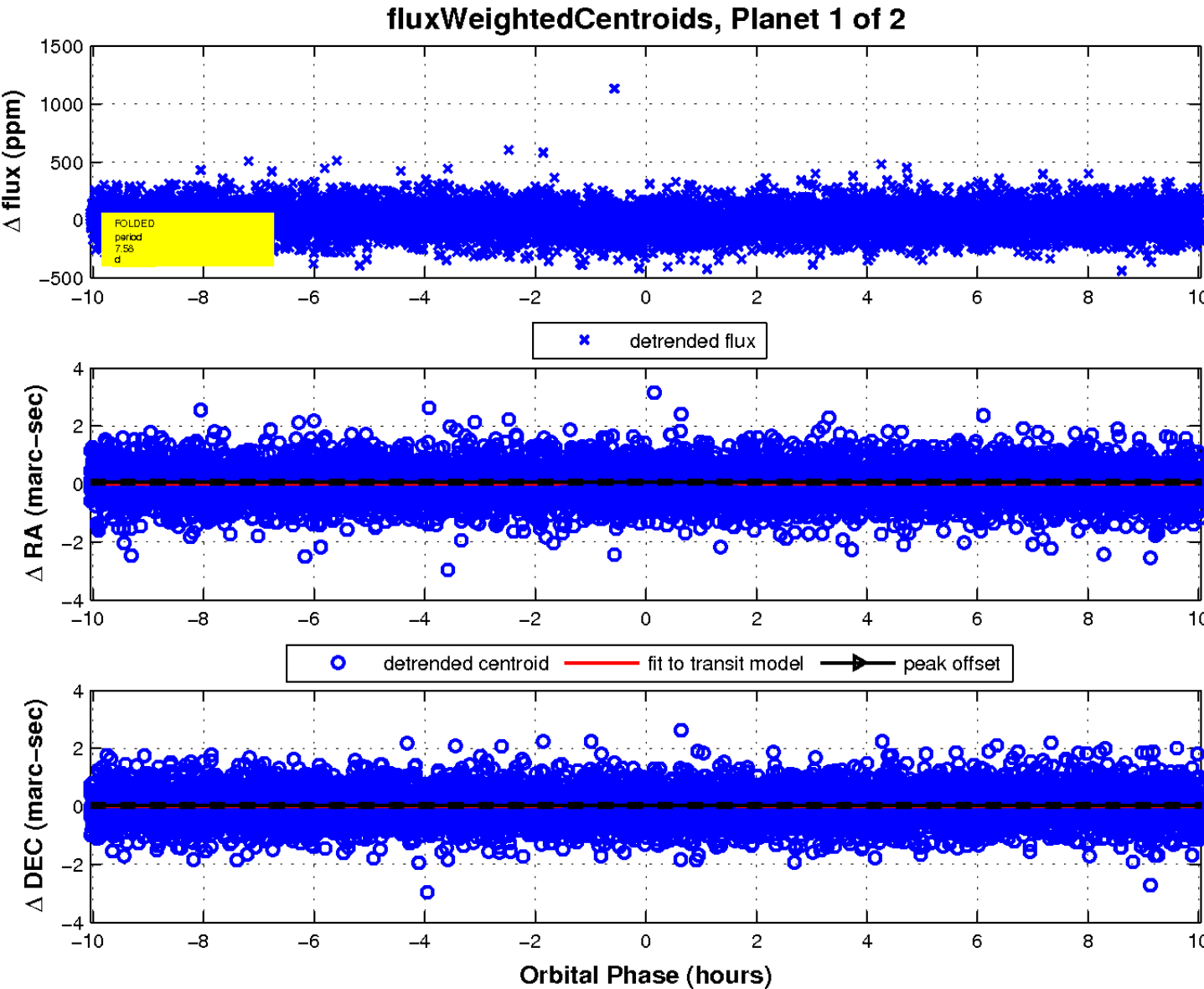
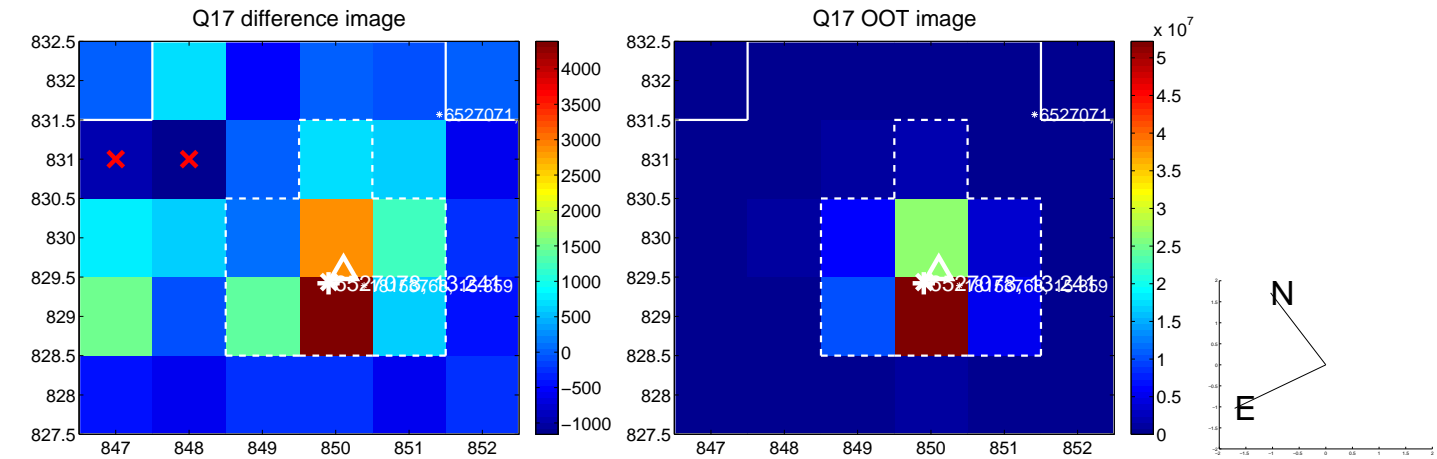


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



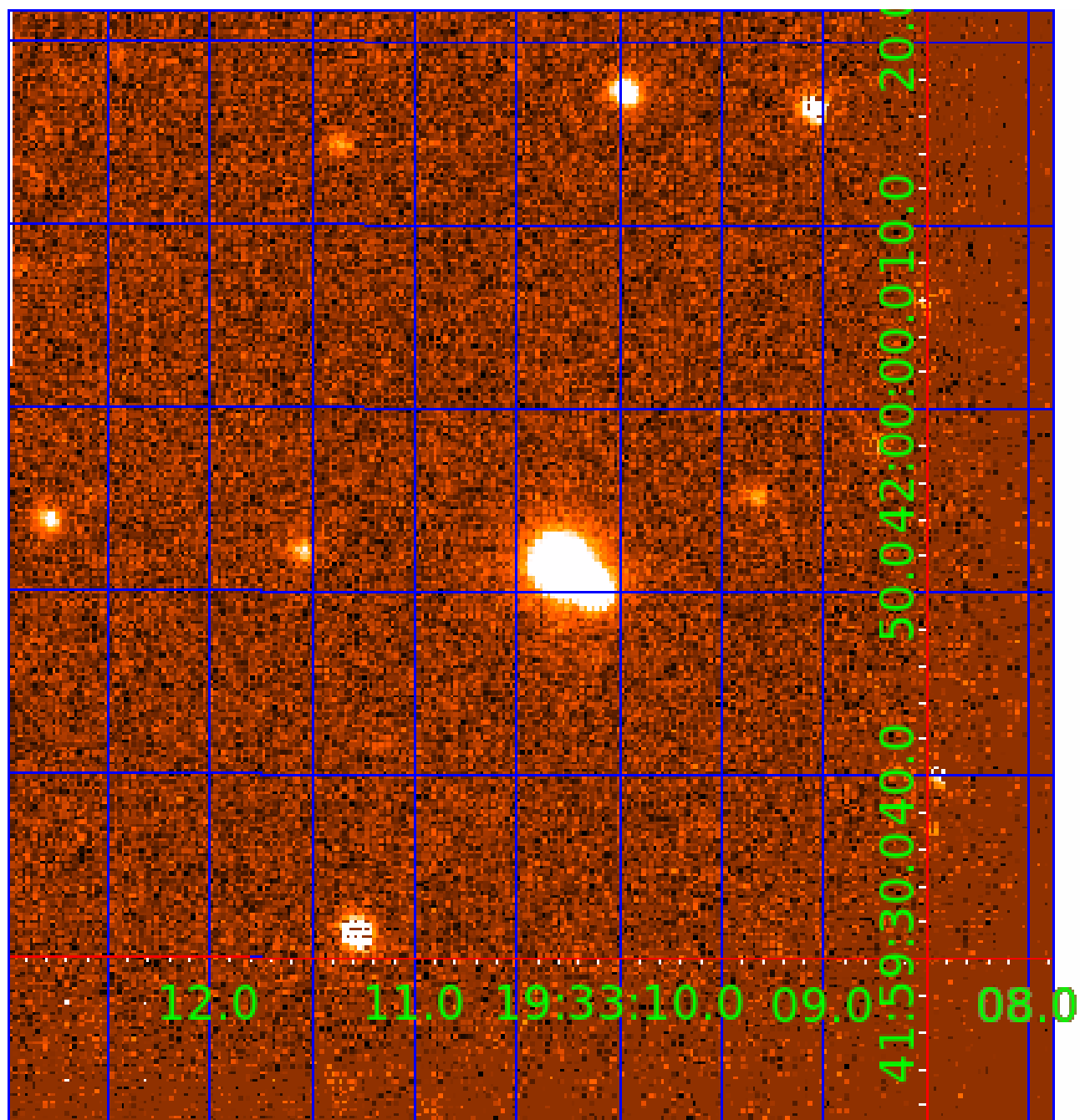


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 006527078

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006527078-01	OBS	4657.01	7.575942	135.635821	47.0	3.349	10.2	10.9	0.77	5361	0.64	86.92
006527078-02	OBS	4657.02	10.431426	135.548273	63.7	2.041	8.9	9.8	0.77	5361	0.74	56.74

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006527078-01	OBS	PC	0.52	0	0	0	0	NO_COMMENT
006527078-02	OBS	PC	0.97	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 006527078-02

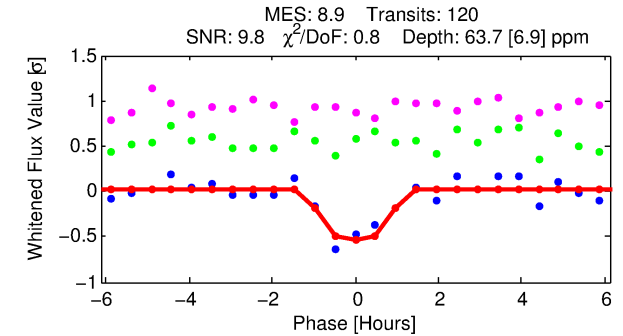
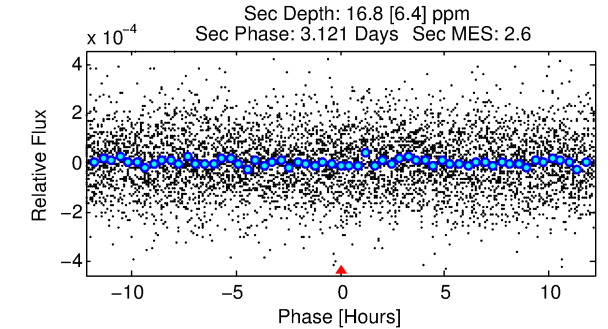
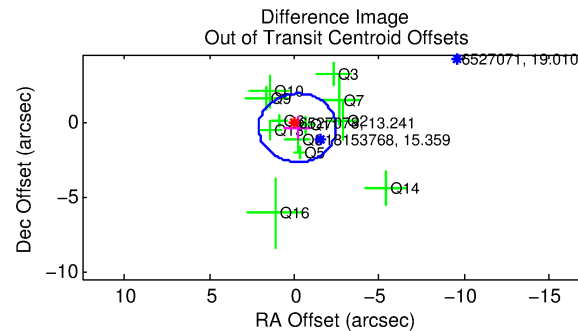
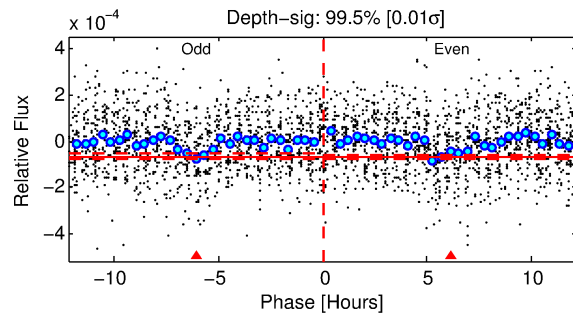
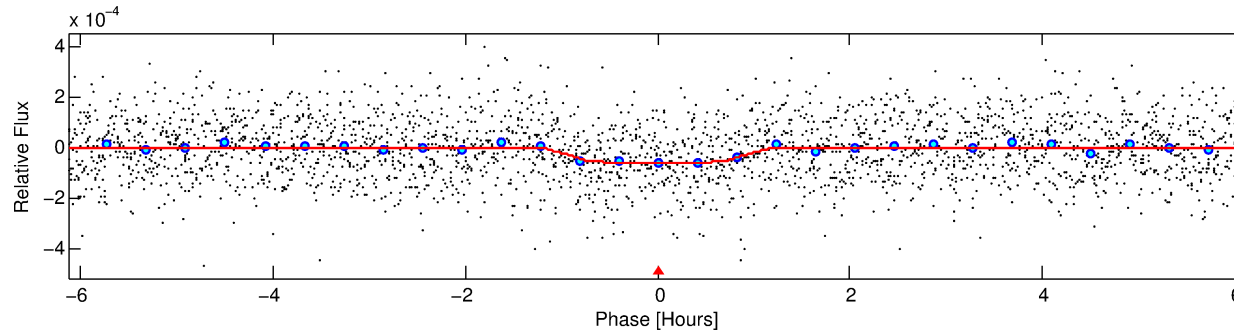
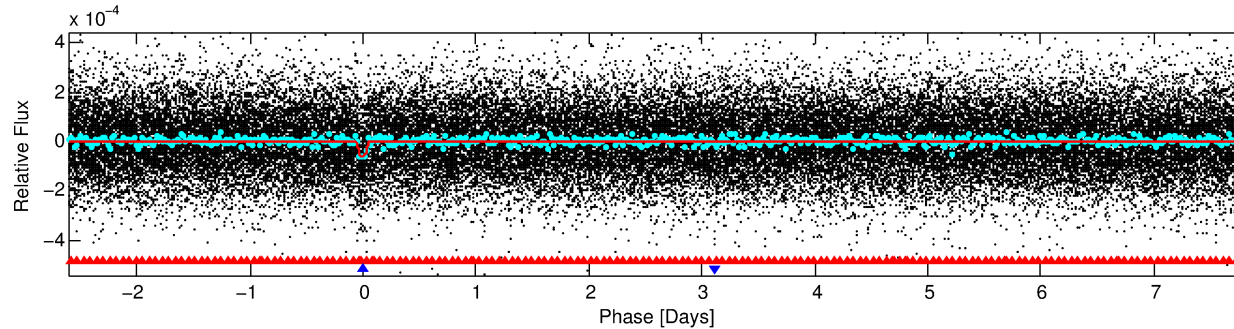
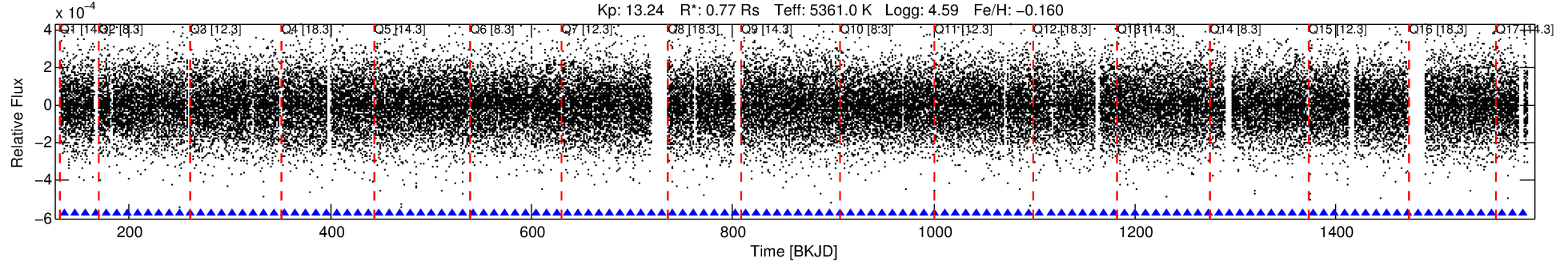
No Significant Match Found

# DV One-Page Summary

KIC: 6527078 Candidate: 2 of 2 Period: 10.431 d

KOI: K04657.02 Corr: 0.969

Kp: 13.24 R\*: 0.77 Rs Teff: 5361.0 K Logg: 4.59 Fe/H: -0.160



## DV Fit Results:

Period = 10.43143 [0.00007] d  
Epoch = 135.5483 [0.0054] BKJD  
Rp/R\* = 0.0088 [0.0058]  
a/R\* = 17.80 [52.08]  
b = 0.90 [0.63]  
Seff = 56.74 [13.58]  
Teq = 700 [42] K  
Rp = 0.74 [0.51] Re  
a = 0.0884 [0.0127] AU  
Ag = 130.46 [181.97] [0.71σ]  
Teffp = 3657 [1266] K [2.34σ]

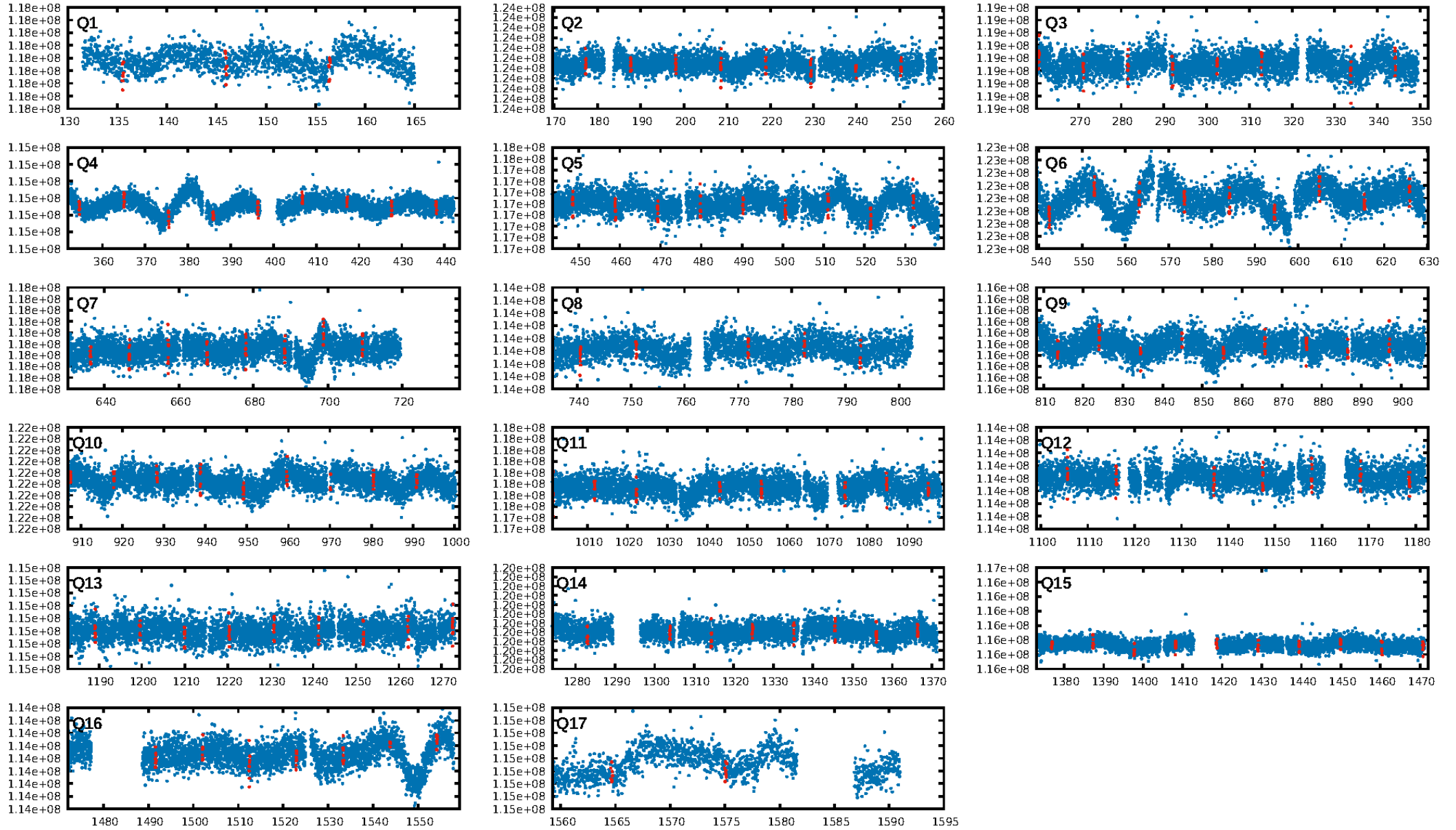
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [17.47σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 99.8%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 1.33e-18  
RollingBand-fgt: 1.00 [117/117]  
GhostDiagnostic-chr: -3.499  
Centroid-sig: 98.6%  
Centroid-so: 0.285 arcsec [0.20σ]  
OotOffset-rm: 0.451 arcsec [0.59σ]  
KicOffset-rm: 0.436 arcsec [0.57σ]  
OotOffset-st: 4/3/2/3 [12]  
KicOffset-st: 4/3/2/3 [12]  
DiffImageQuality-fgm: 0.58 [7/12]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 18:00:24 Z

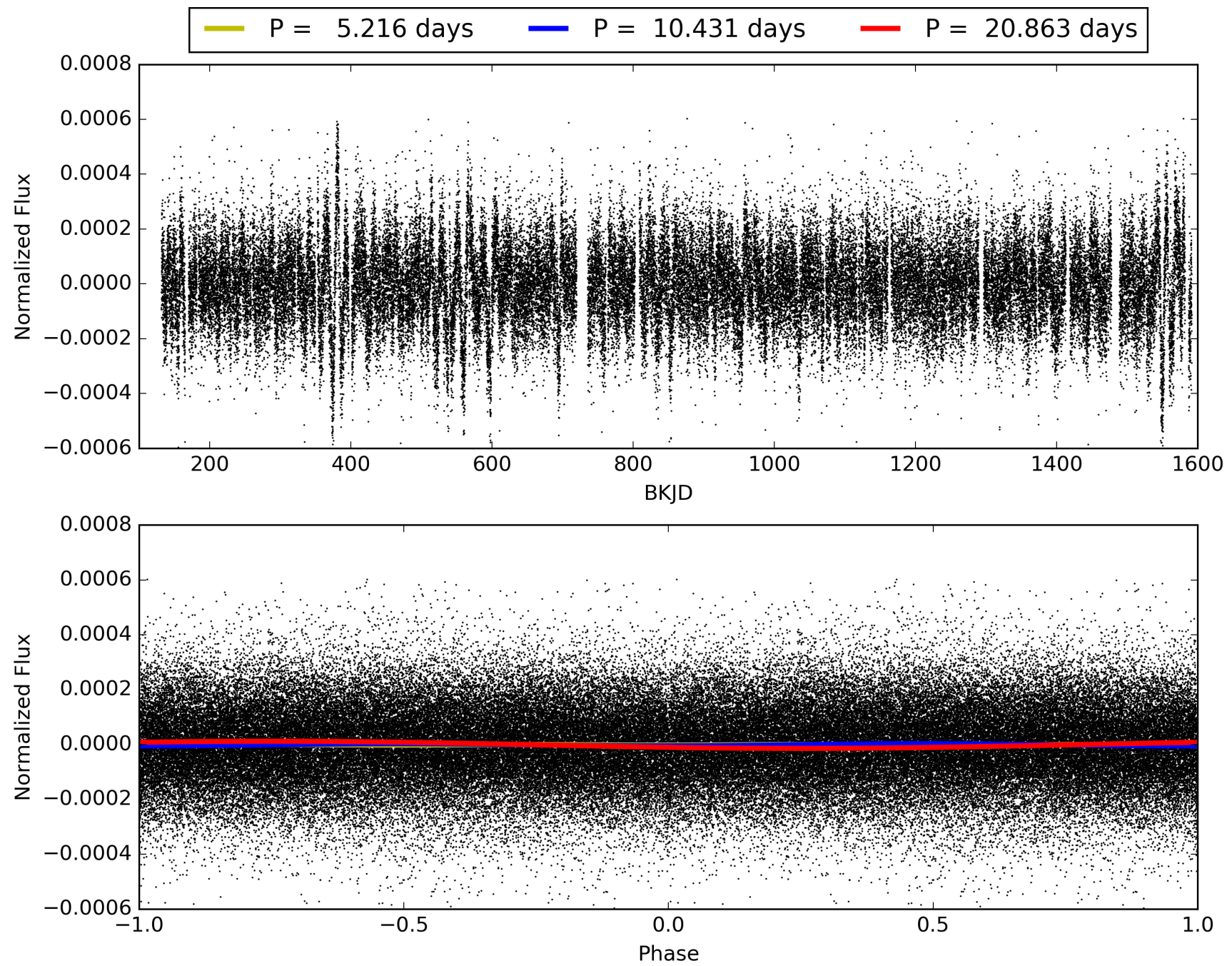
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 006527078-02, PDC Light Curves



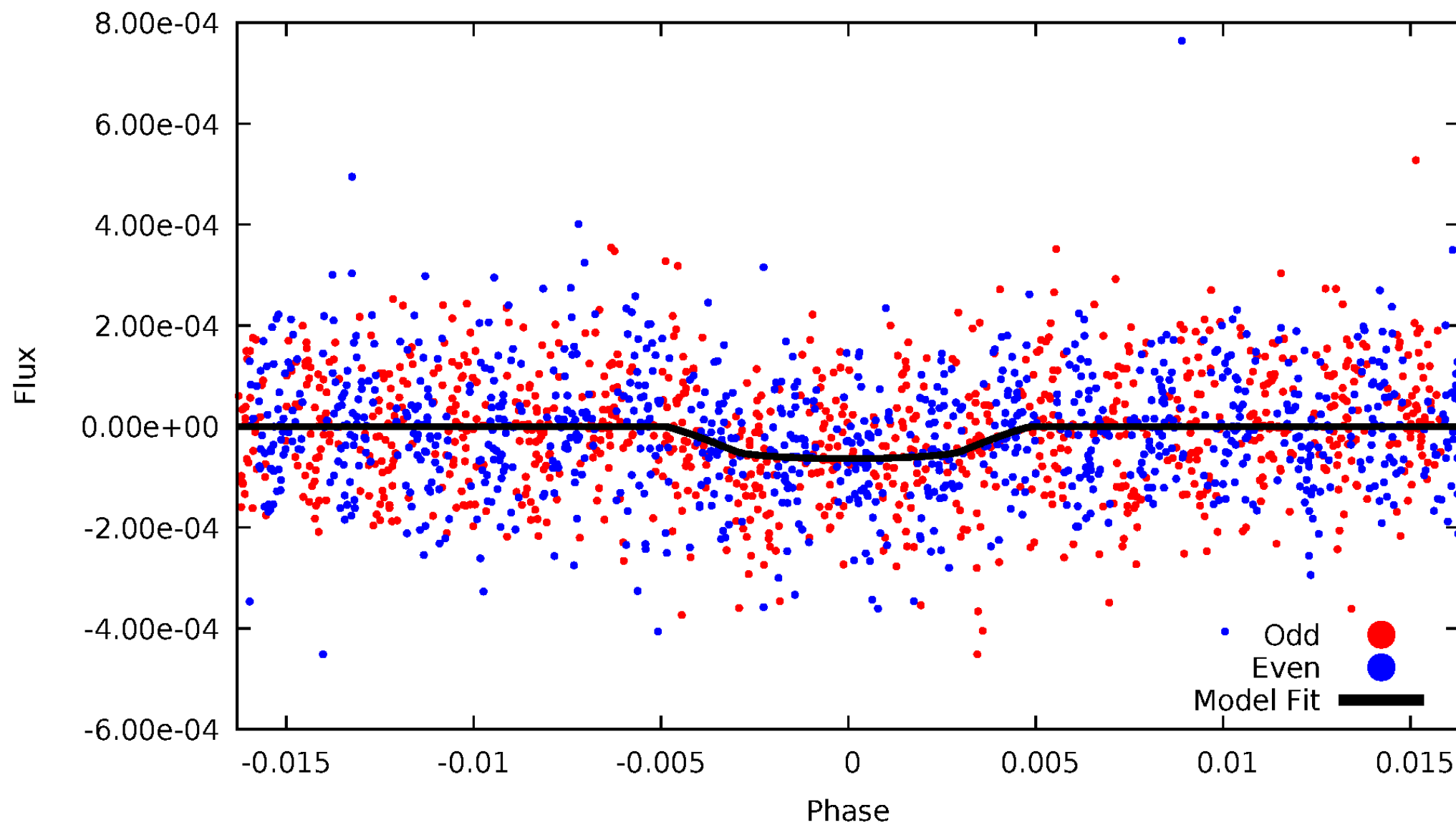


TCE 006527078-02



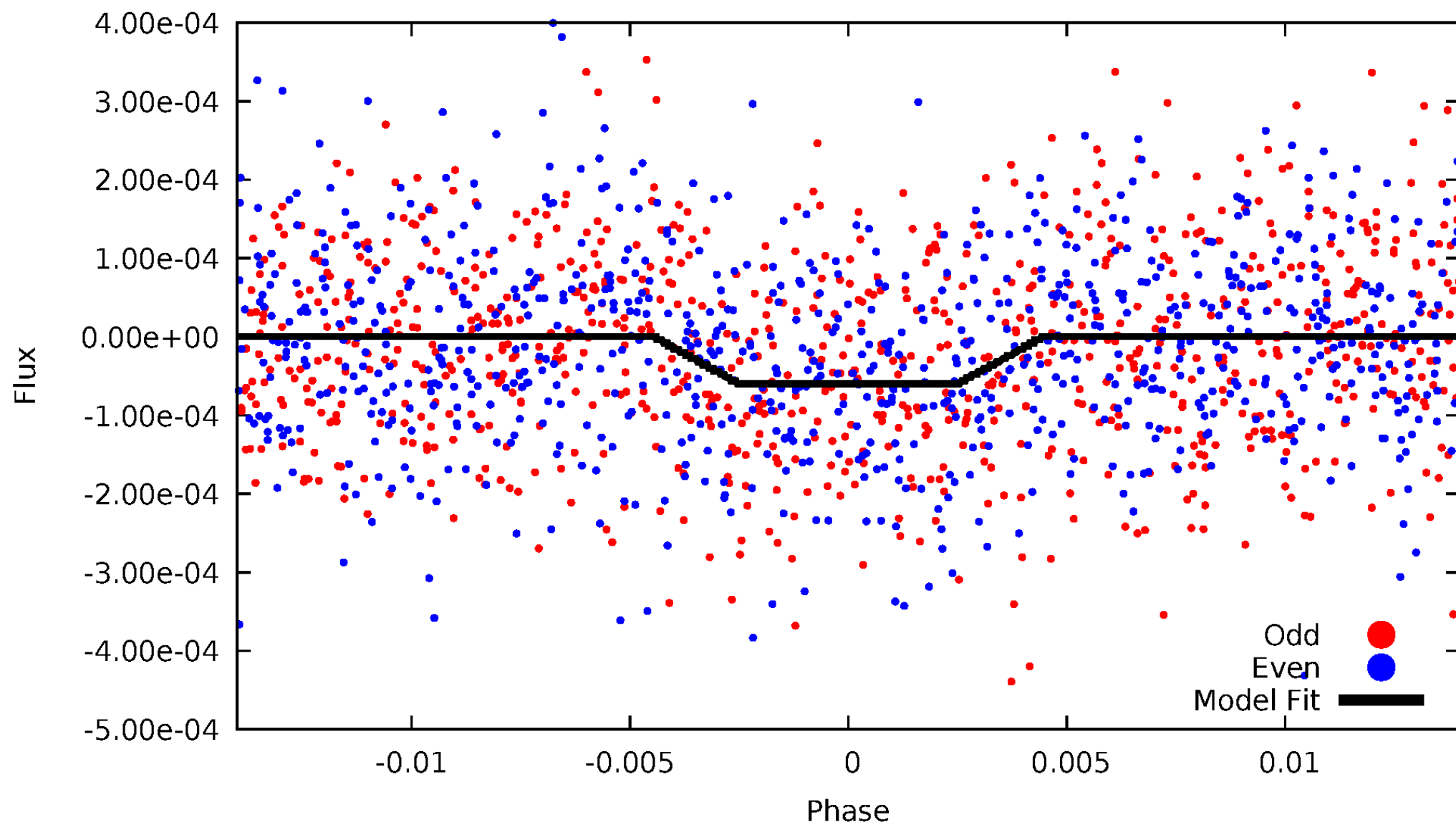
# DV Odd/Even

TCE 006527078-02



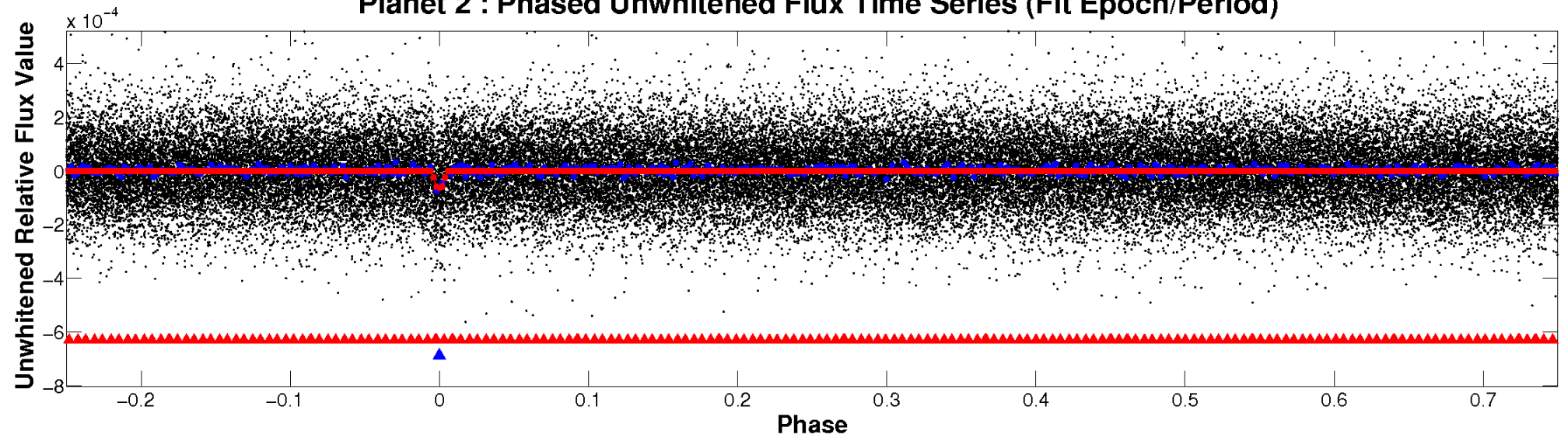
# ALT Odd/Even

TCE 006527078-02

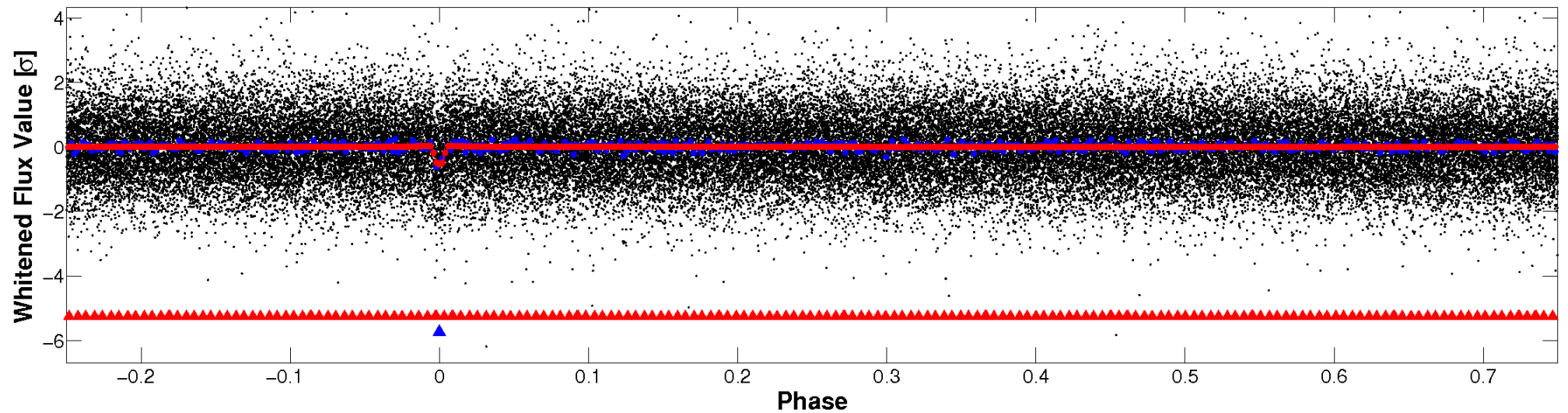


# Non-Whitened Vs. Whitened Light Curve

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

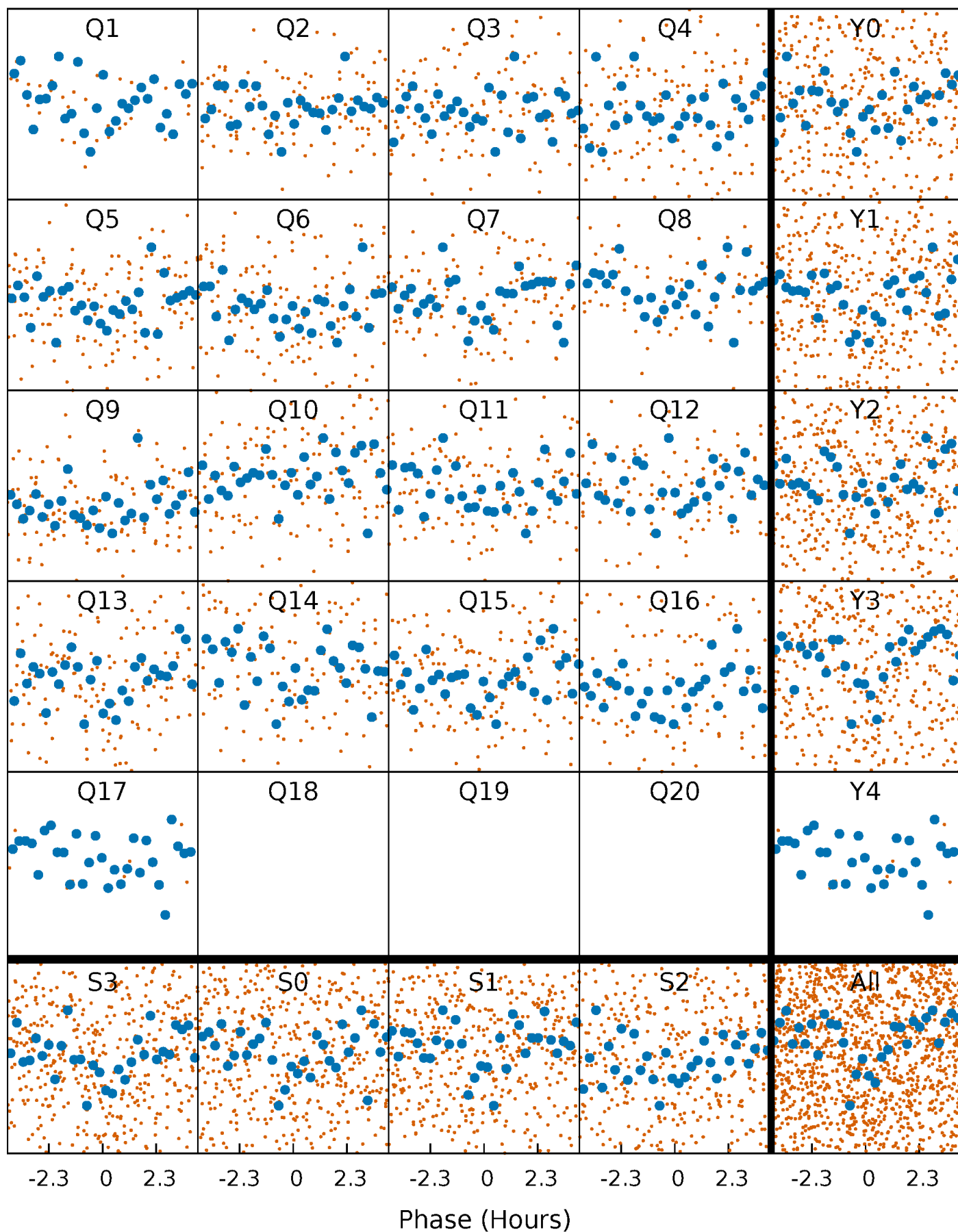


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

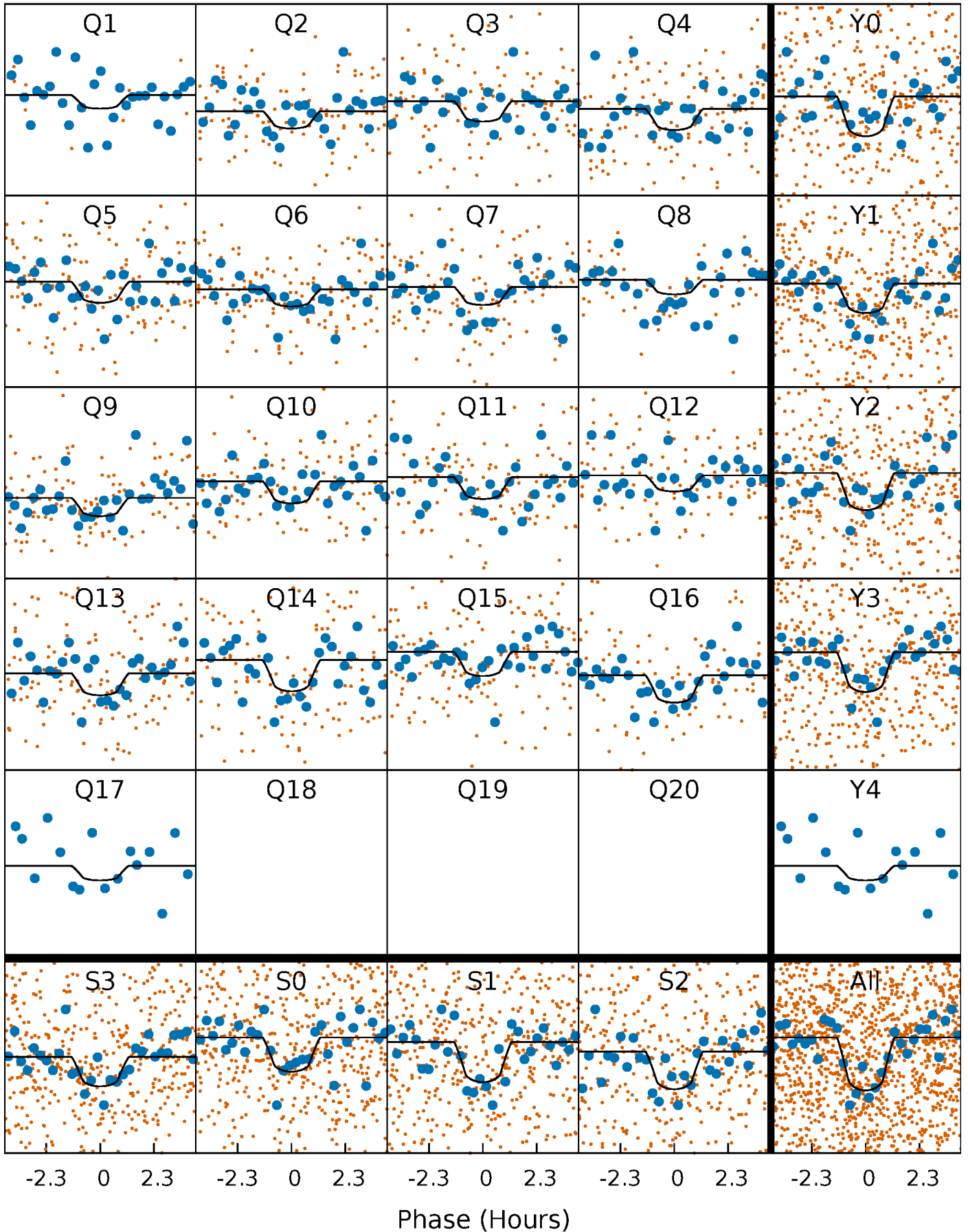
TCE 006527078-02   P= 10.431426 Days    $T_0=135.548273$  (BKJD)





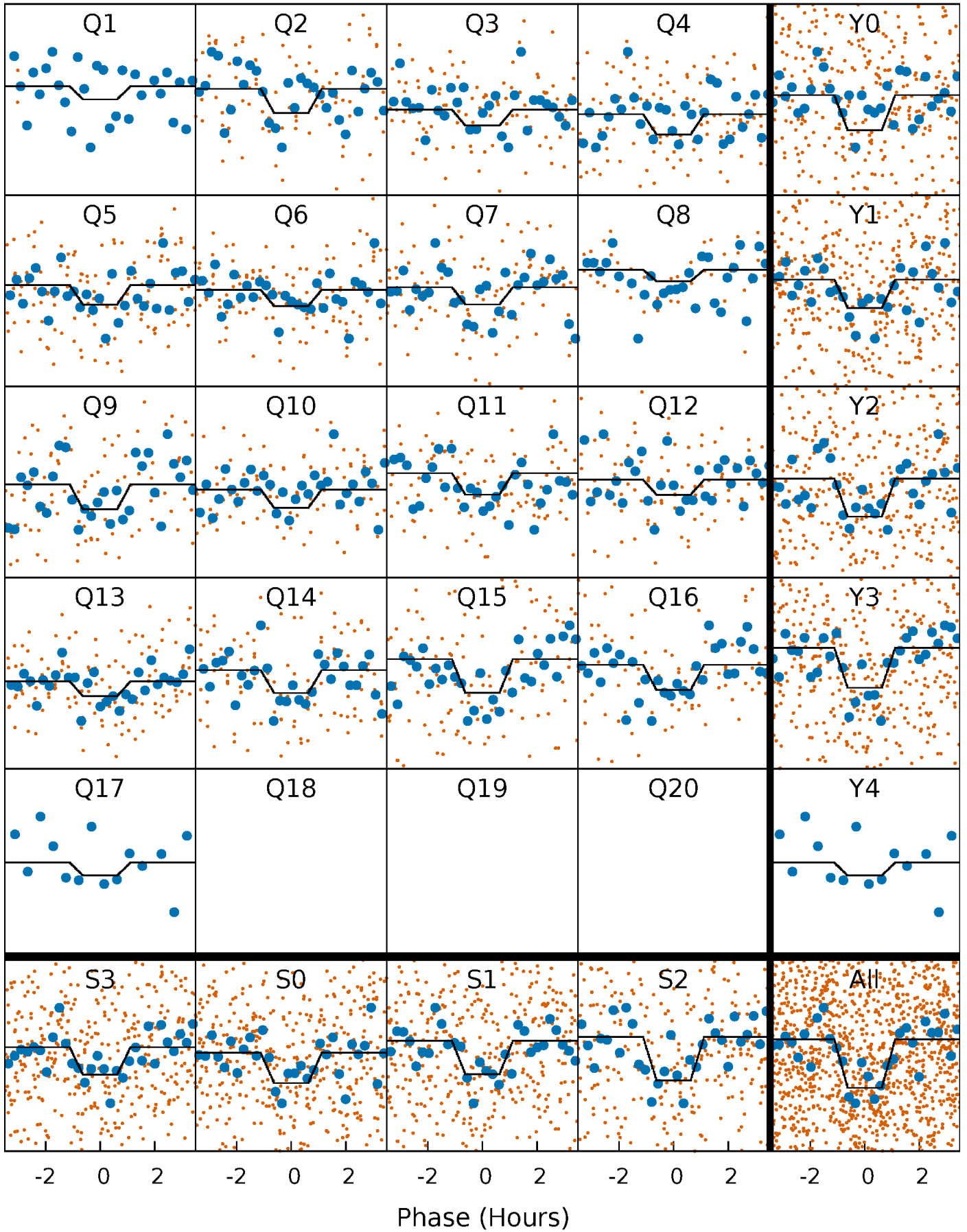
# DV Quarter-Phased Transit Curves

TCE 006527078-02 P= 10.431426 Days  $T_0=135.548273$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

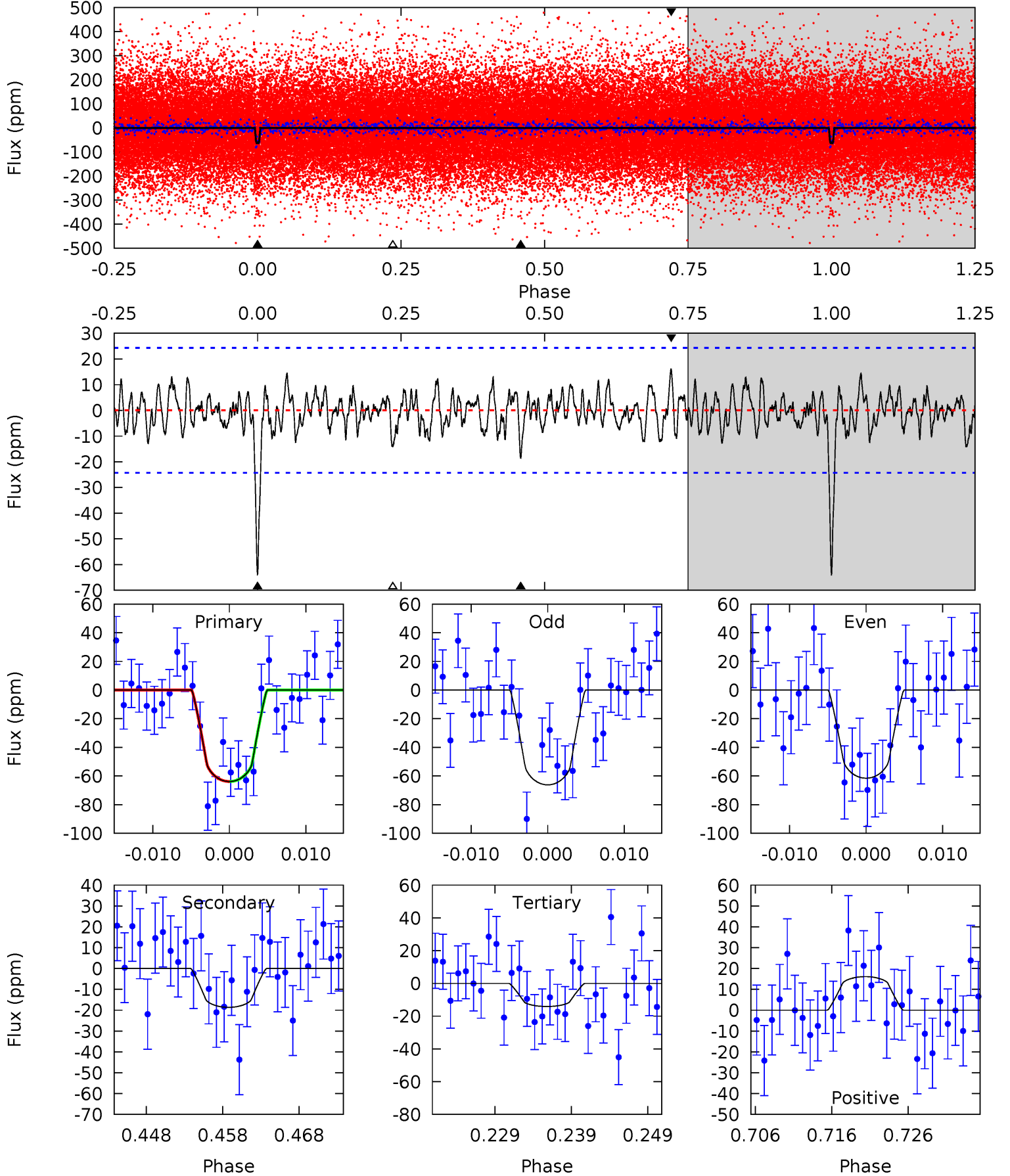
TCE 006527078-02 P= 10.431471 Days  $T_0=135.541501$  (BKJD)



# DV Model-Shift Uniqueness Test

006527078-02, P = 10.431426 Days, E = 125.116847 Days

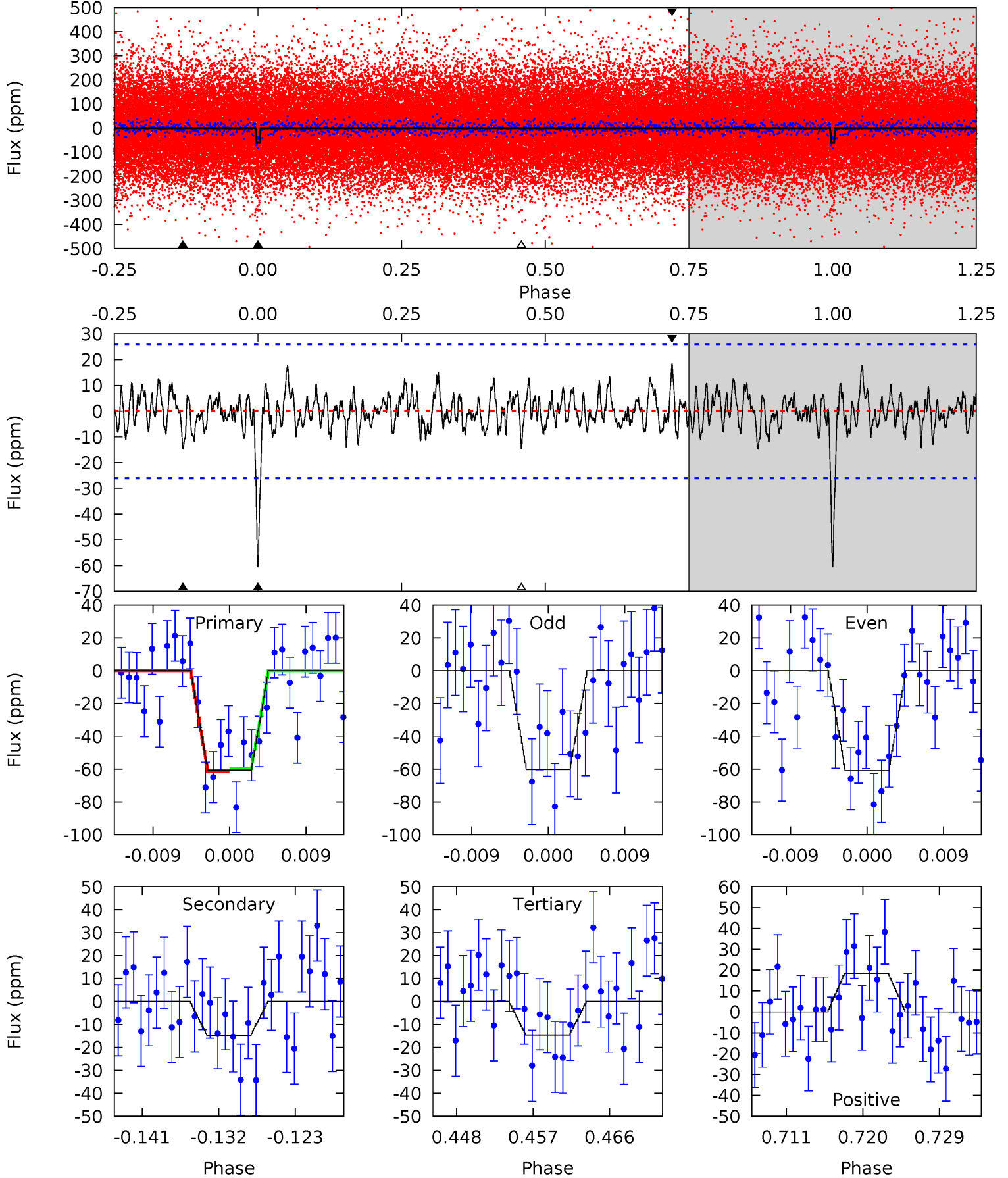
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
13.2	3.86	2.92	3.33	5.03	2.58	1.17	10.3	9.88	0.93	0.53	0.48	1.01	0.20	0.00



# Alt Model-Shift Uniqueness Test

006527078-02, P = 10.431471 Days, E = 125.110030 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
11.7	2.86	2.83	3.58	5.05	2.62	1.08	8.92	8.16	0.03	-0.73	0.07	0.95	0.23	0.17



### Stellar Parameters For KIC 006527078

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5361^{+159}_{-159}$	$4.588^{+0.038}_{-0.113}$	$-0.160^{+0.300}_{-0.300}$	$0.774^{+0.133}_{-0.071}$	$0.848^{+0.078}_{-0.087}$	$2.580^{+0.488}_{-0.908}$
	+3%/-3%	+1%/-2%	+188%/-188%	+17%/-9%	+9%/-10%	+19%/-35%
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 006527078-02 / KOI 4657.02

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-19 \pm 5$	$0.82^{+0.47}_{-0.45}$	$991^{+47}_{-37}$	$3945^{+1511}_{-608}$	$121^{+463}_{-78}$
Alt.	$-15 \pm 5$	$0.72^{+0.48}_{-0.45}$	$991^{+48}_{-40}$	$3956^{+1837}_{-697}$	$120^{+653}_{-83}$

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

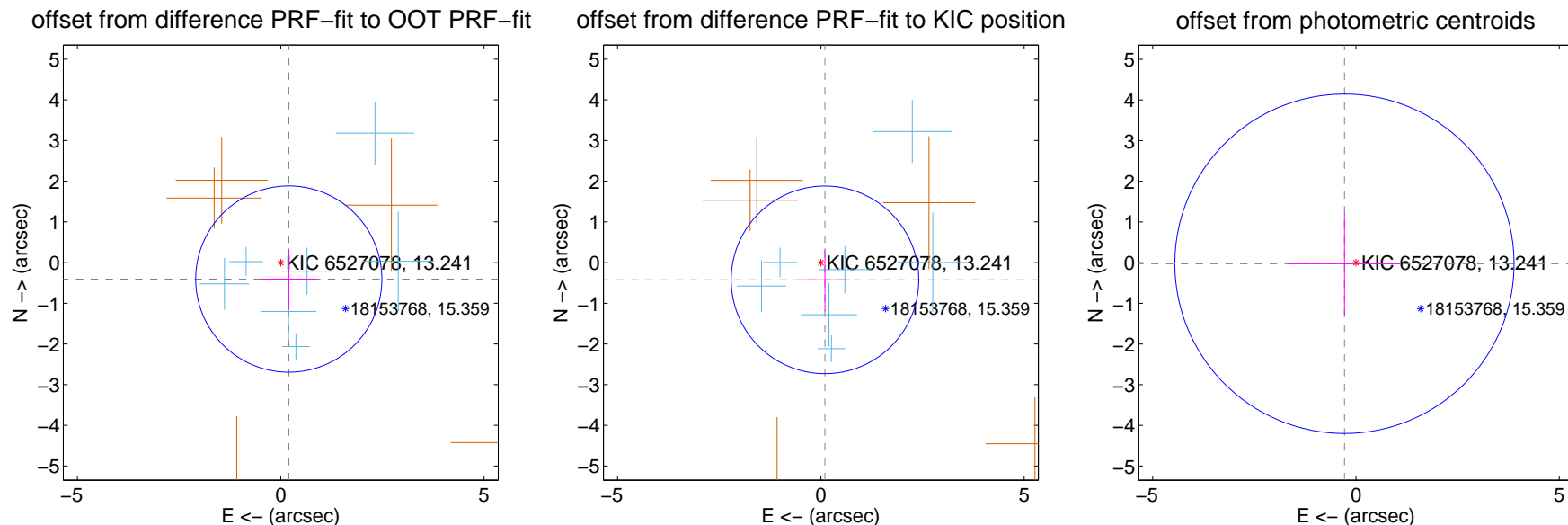
## DV Centroid Data

Supplemental centroid analysis for 006527078-02. Kepler magnitude: 13.24. Transit SNR 9.77

There are 7 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.02 arcsec

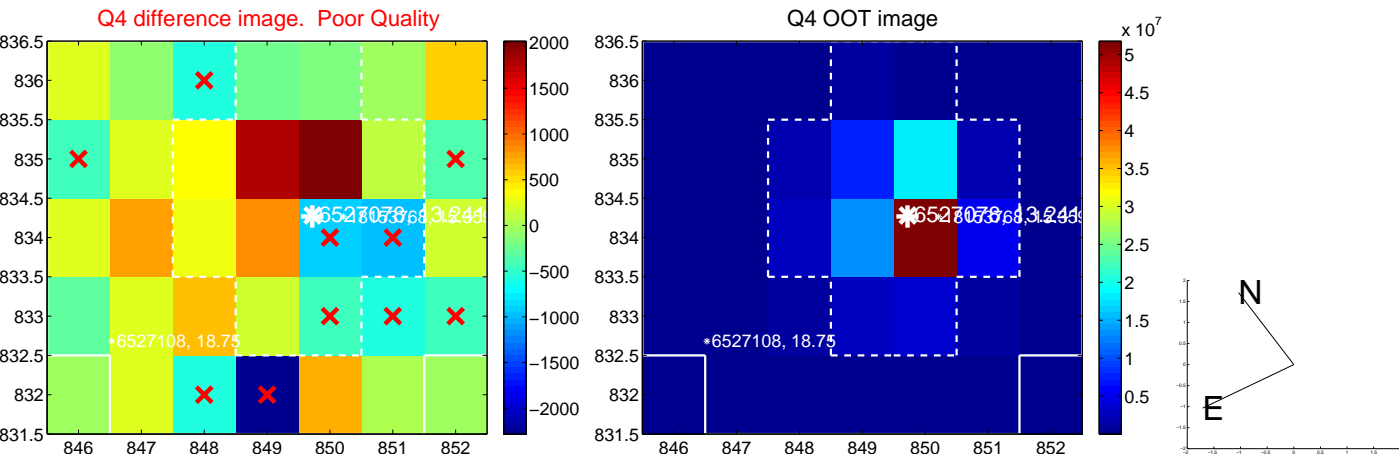
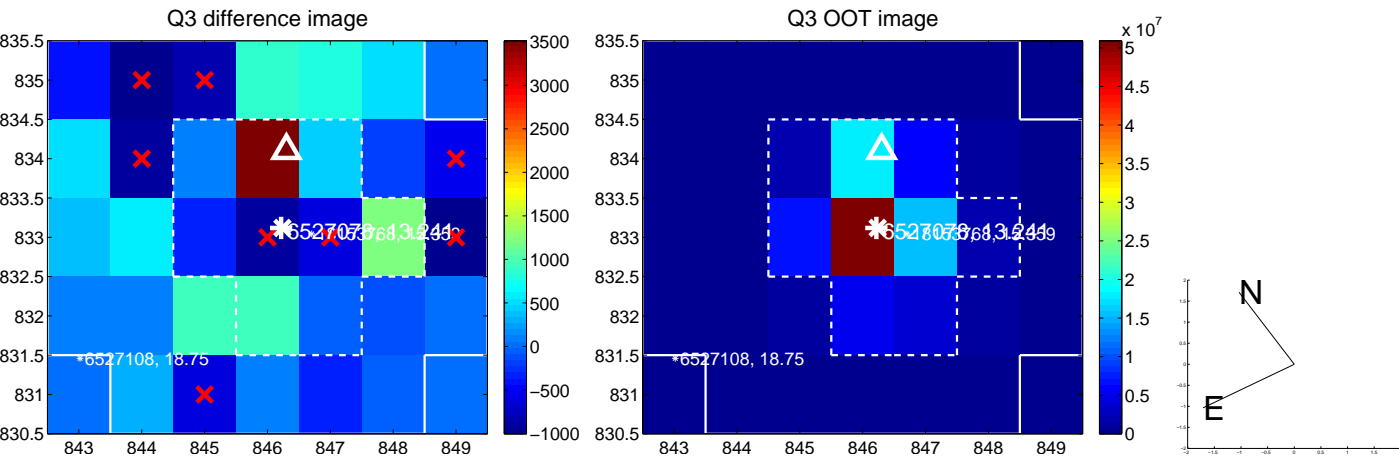
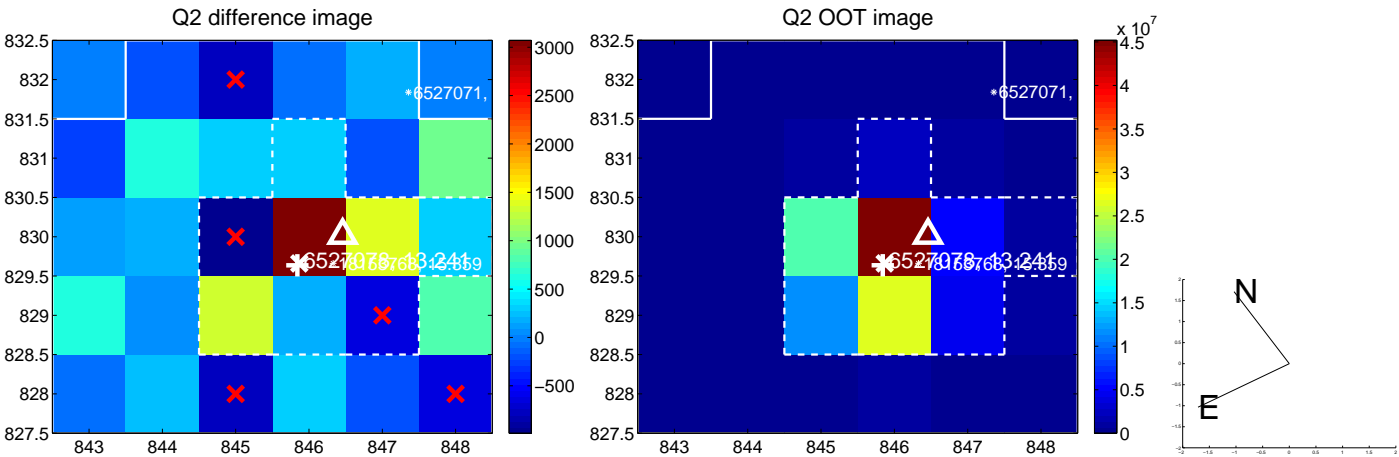
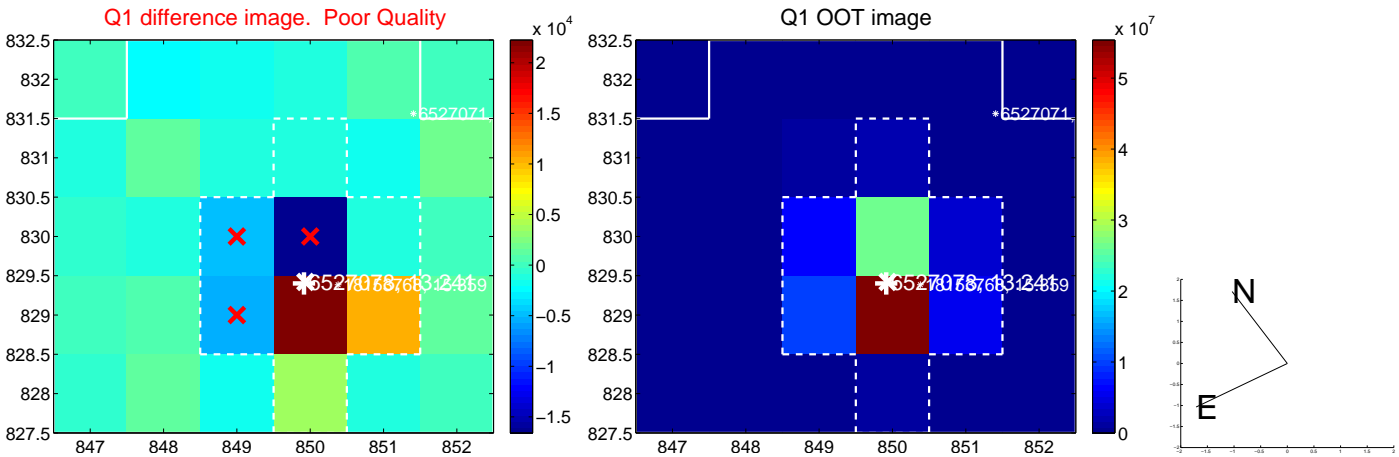
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.451 \pm 0.763$	0.59	$-0.198 \pm 0.681$	$-0.405 \pm 0.751$
PRF-fit source offset from KIC position	$0.436 \pm 0.769$	0.57	$-0.101 \pm 0.607$	$-0.425 \pm 0.773$
photometric centroid source offset	$0.28 \pm 1.39$	0.20	$0.28 \pm 1.39$	$-0.03 \pm 1.27$



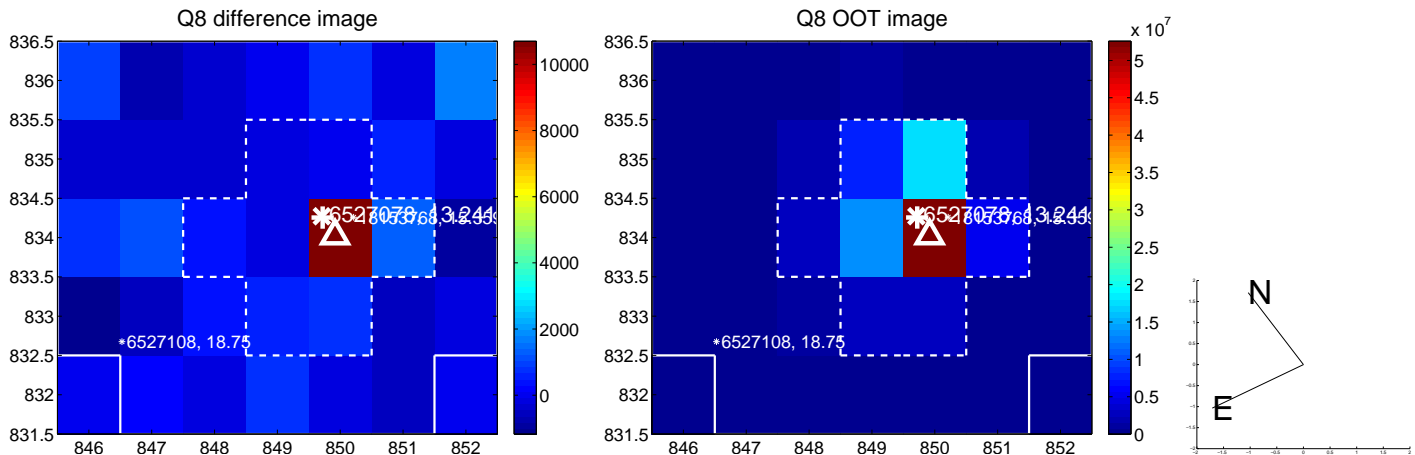
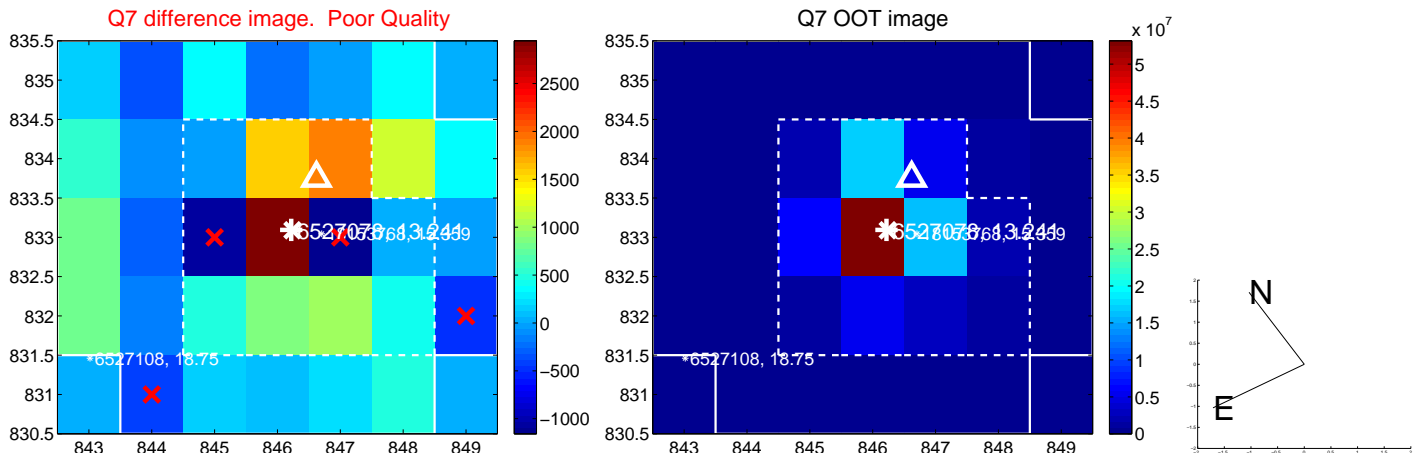
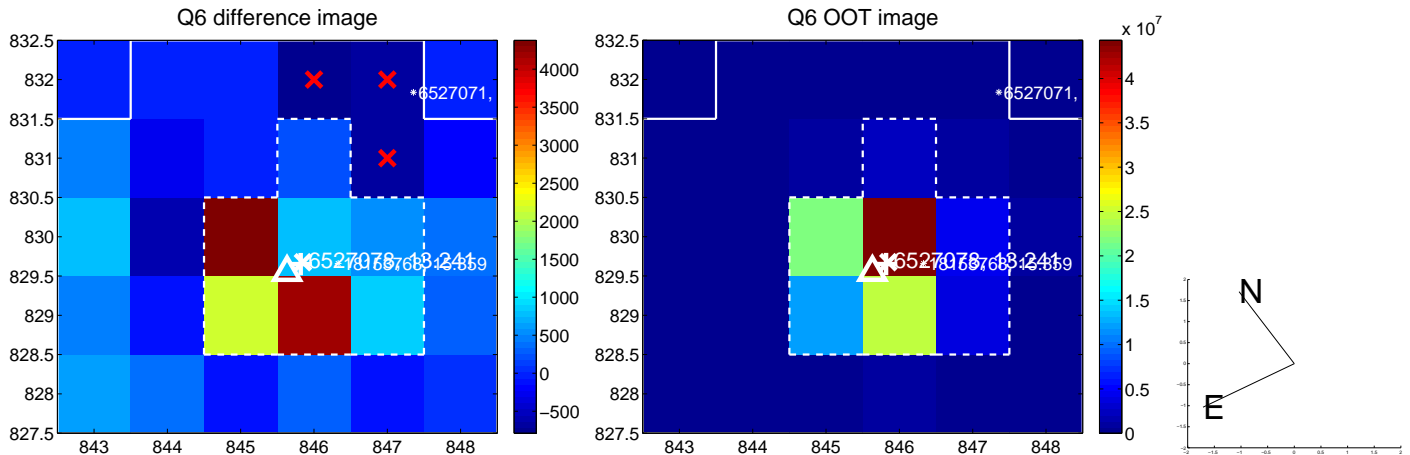
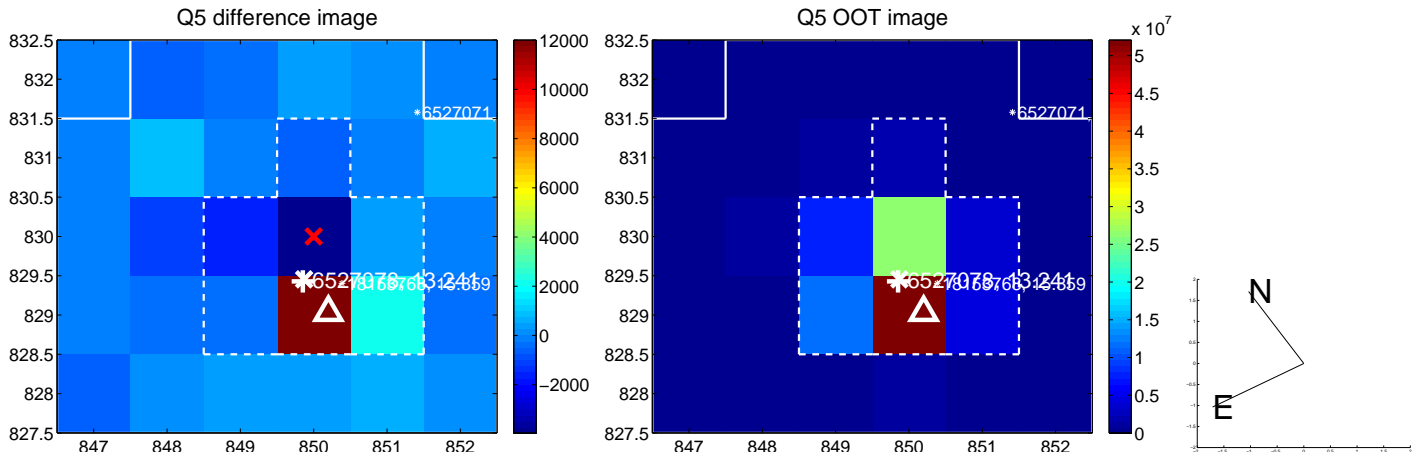
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

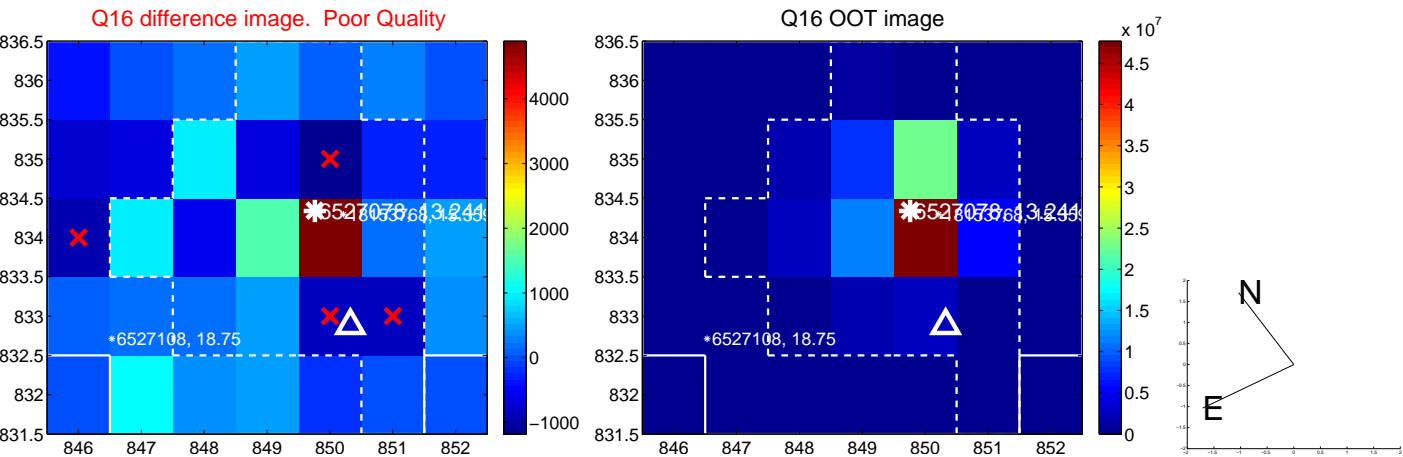
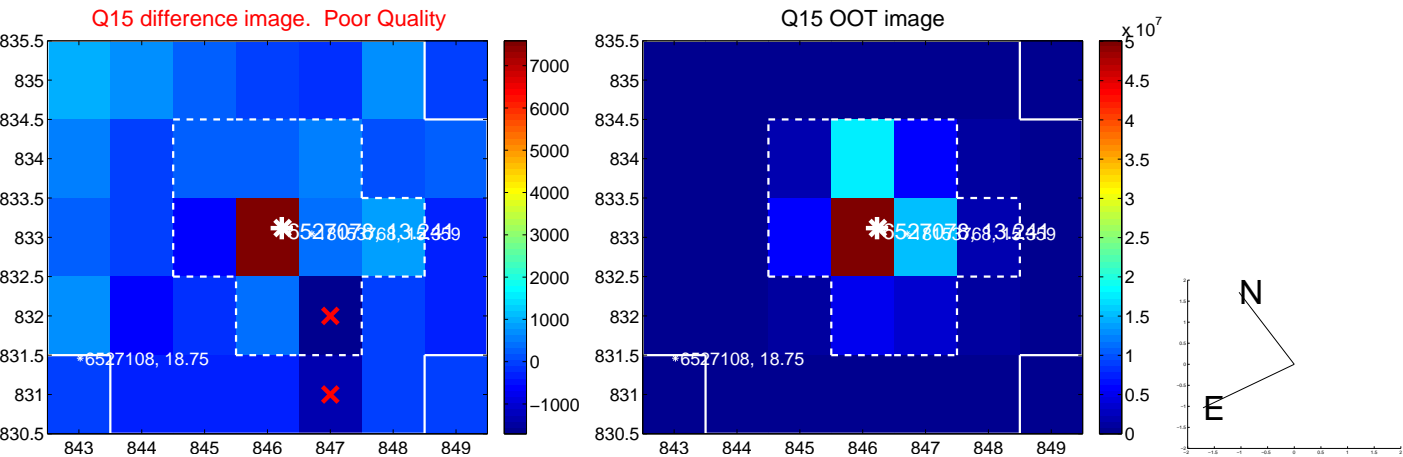
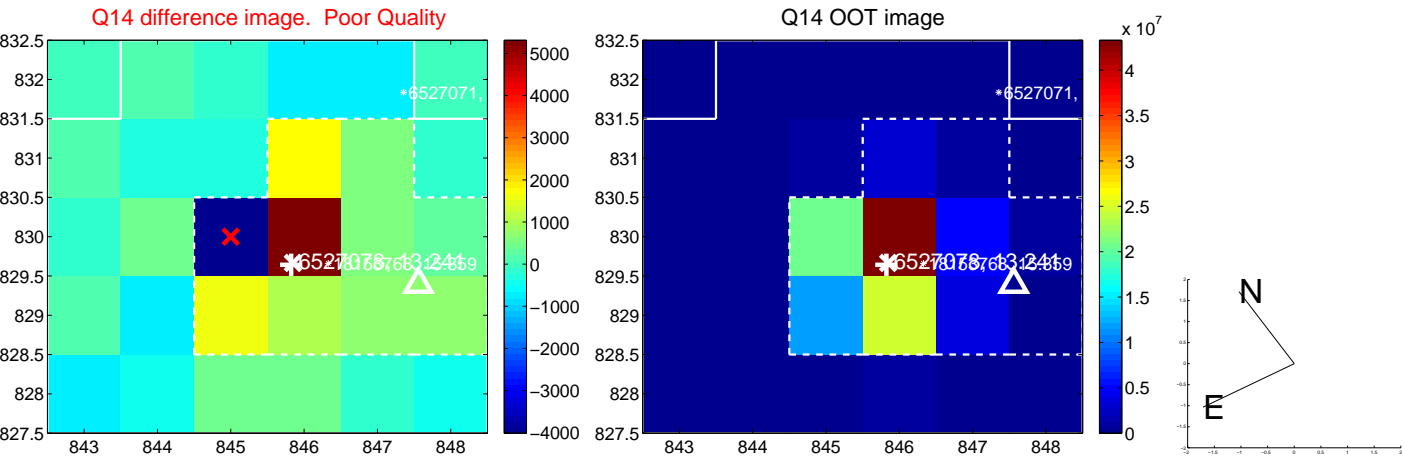
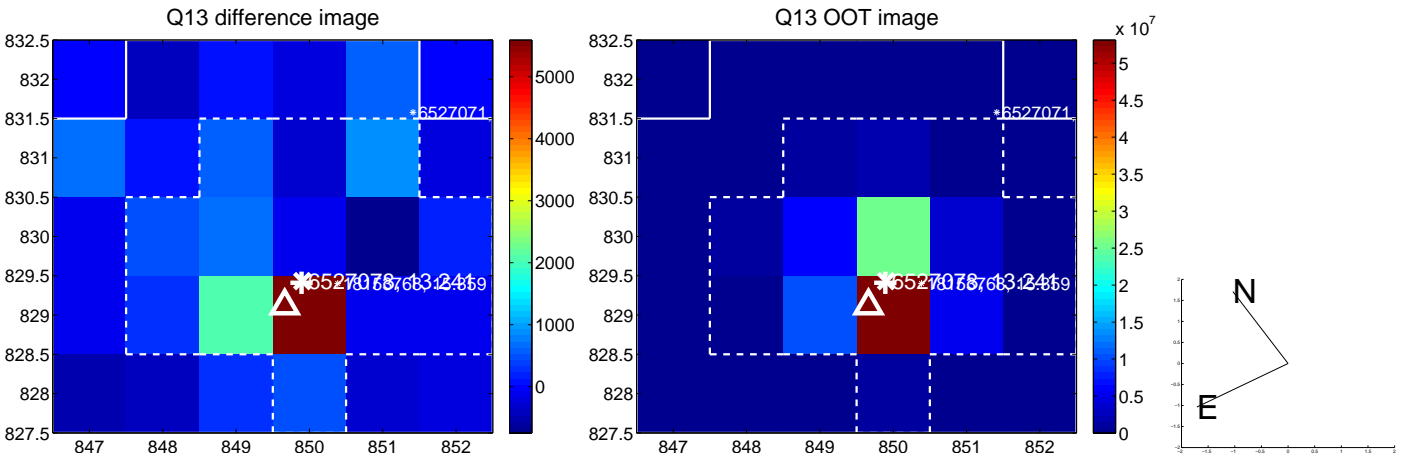


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

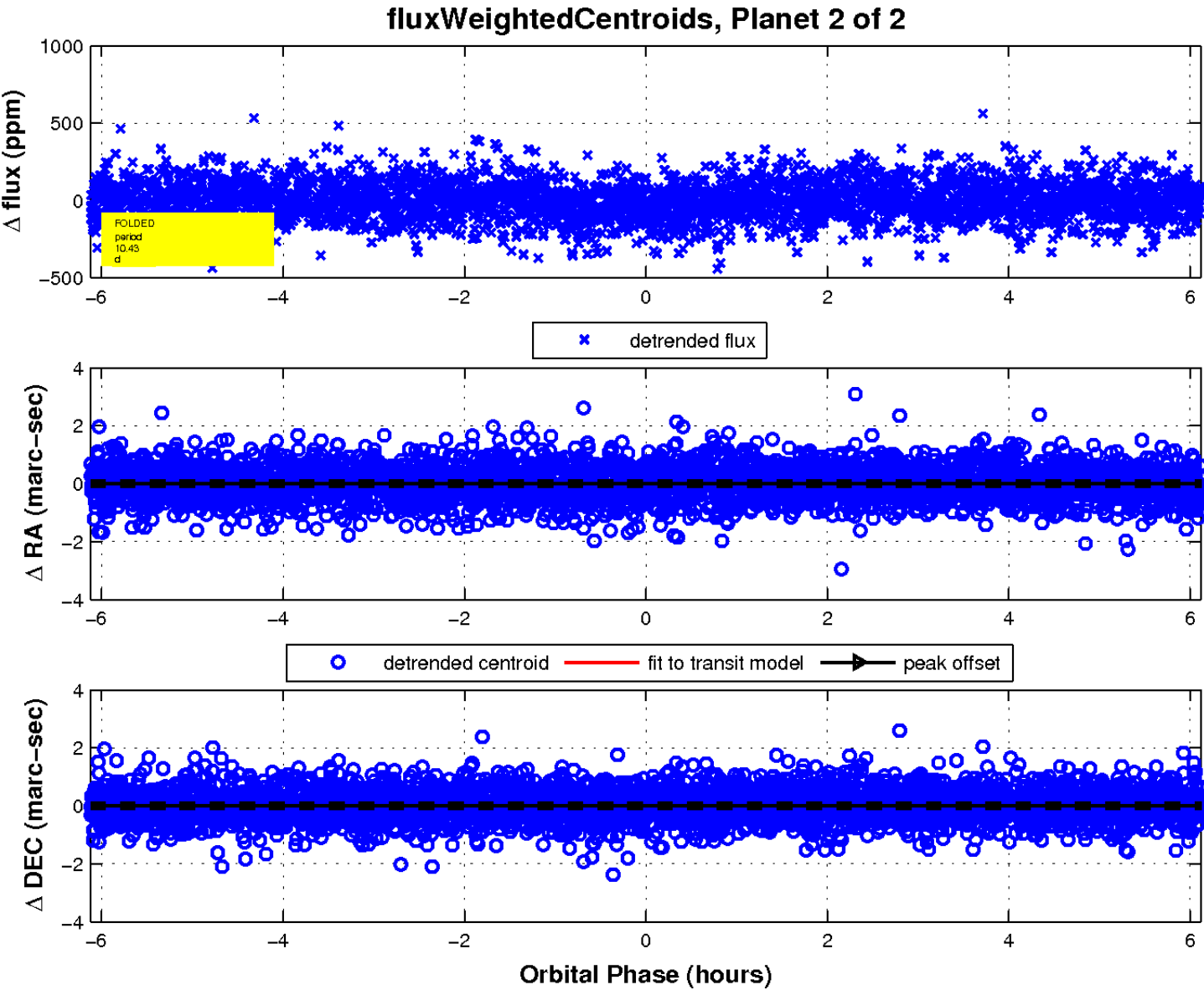
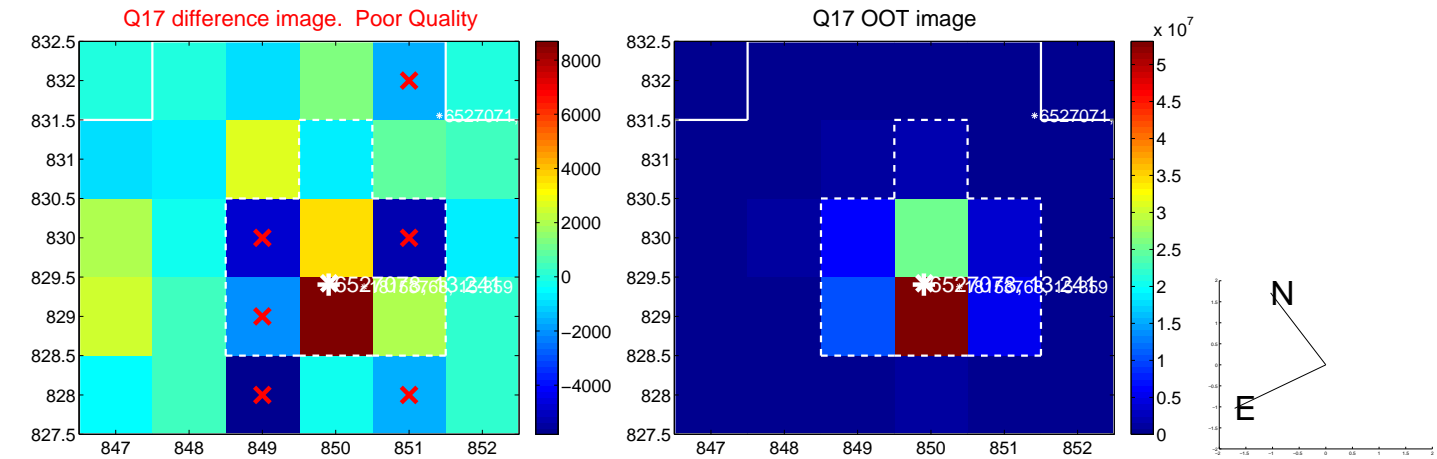




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UKIRT Image

Declination

