

# KIC 009388479

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009388479-01	OBS	0936.01	9.467812	140.545186	2235.0	2.506	110.1	109.4	0.46	3582	2.26	6.48
009388479-02	OBS	0936.02	0.893043	131.860396	550.7	1.061	45.2	61.8	0.46	3582	1.31	150.94

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009388479-01	OBS	PC	0.95	0	0	0	0	CENT_KIC_POS
009388479-02	OBS	PC	0.70	0	0	0	0	CENT_KIC_POS

**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.

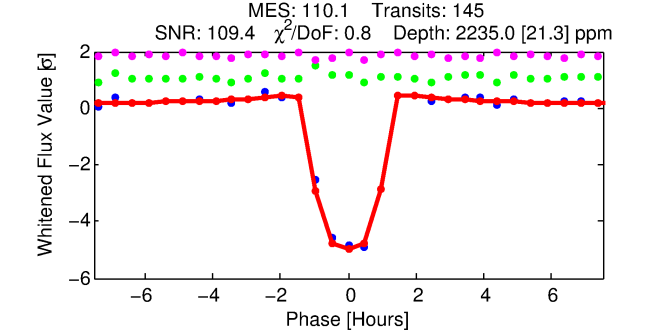
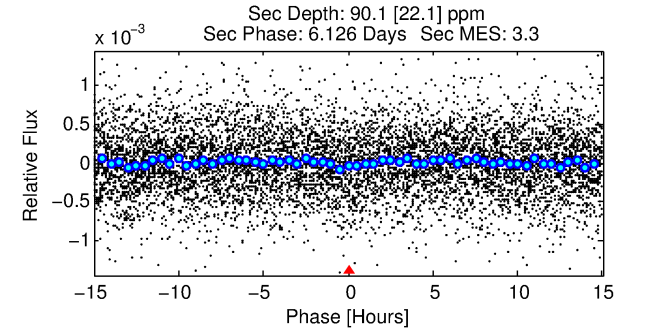
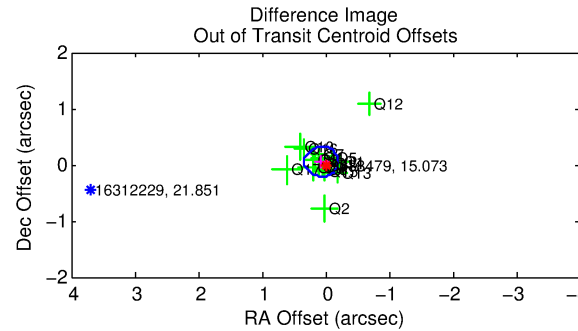
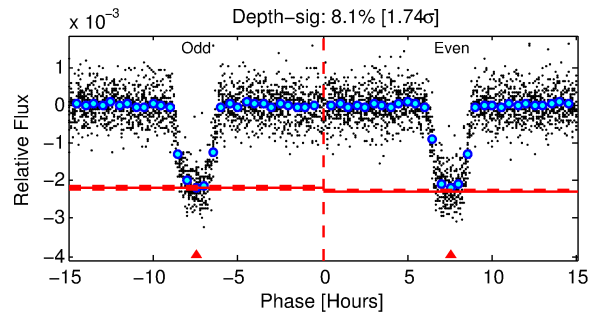
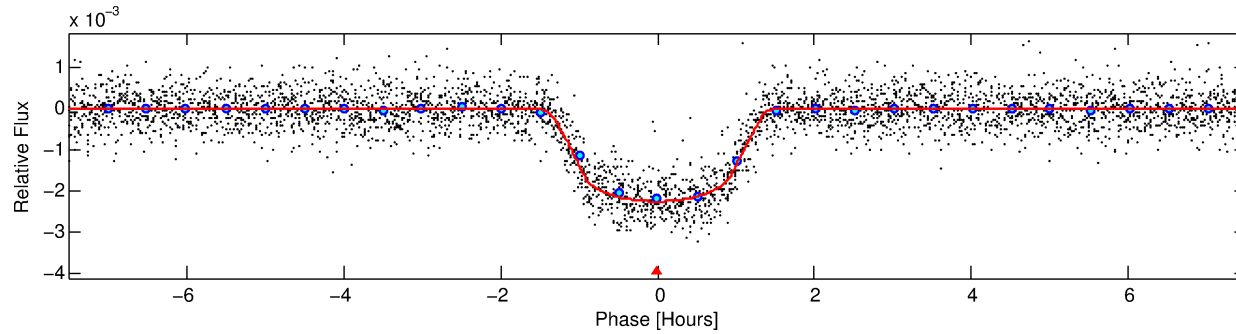
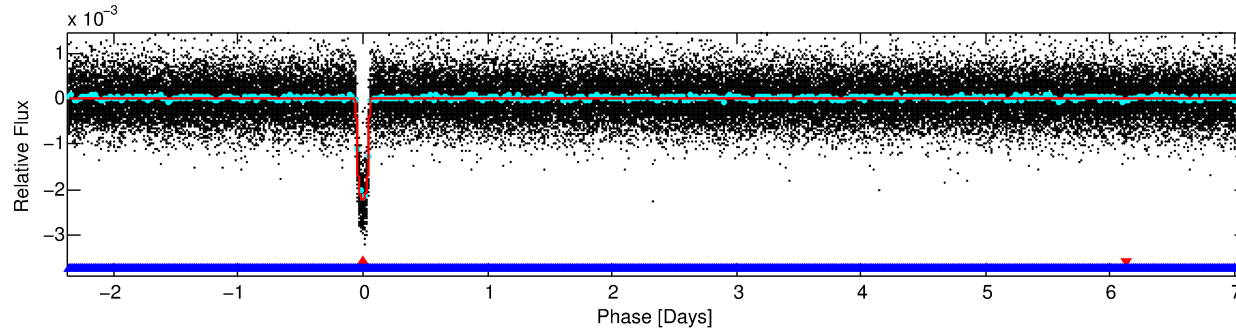
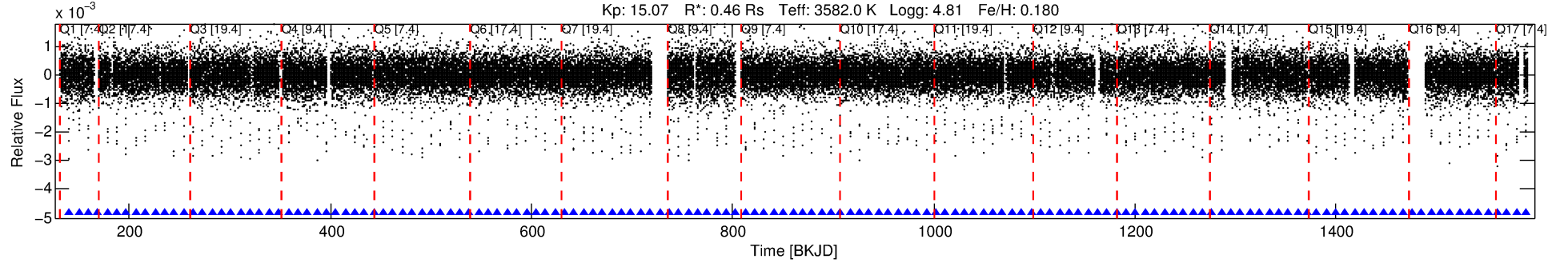
## Ephemeris Match Information For 009388479-01

No Significant Match Found

# DV One-Page Summary

KIC: 9388479 Candidate: 1 of 2 Period: 9.468 d  
KOI: K00936.01 Corr: 0.987

Kp: 15.07 R\*: 0.46 Rs Teff: 3582.0 K Logg: 4.81 Fe/H: 0.180



## DV Fit Results:

Period = 9.46781 [0.00001] d  
Epoch = 140.5452 [0.0005] BKJD  
Rp/R\* = 0.0452 [0.0040]  
a/R\* = 24.18 [8.47]  
b = 0.63 [0.34]  
Seff = 6.48 [0.97]  
Teq = 407 [15] K  
Rp = 2.26 [0.34] Re  
a = 0.0691 [0.0061] AU  
Ag = 46.33 [14.97] [3.03σ]  
Teffp = 1641 [131] K [9.36σ]

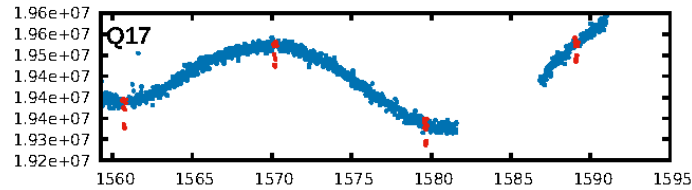
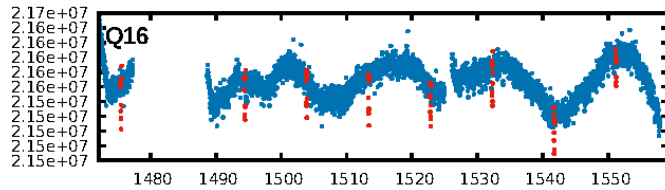
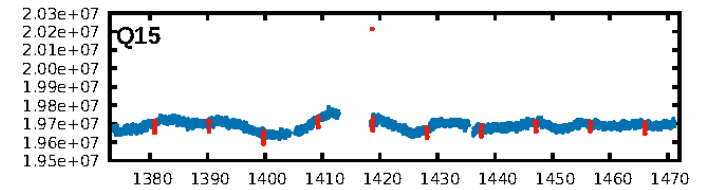
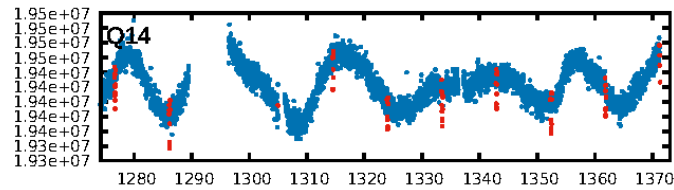
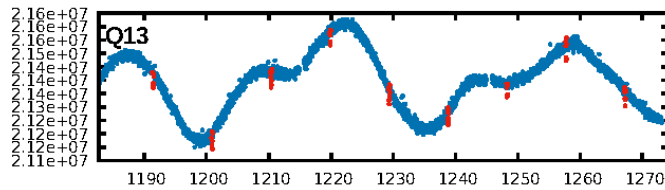
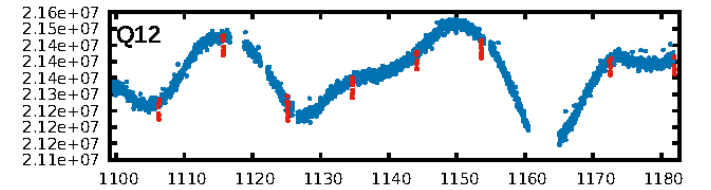
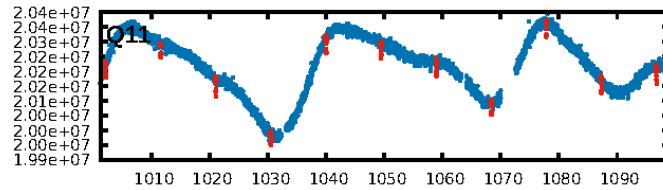
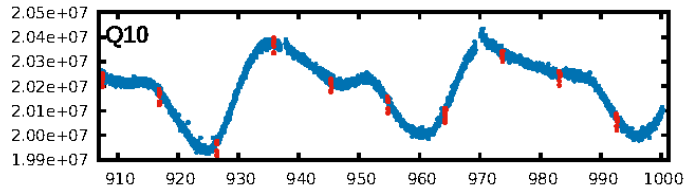
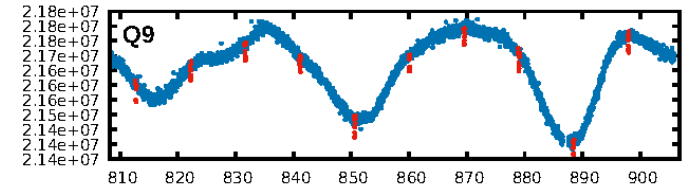
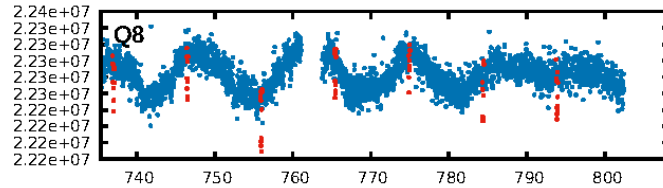
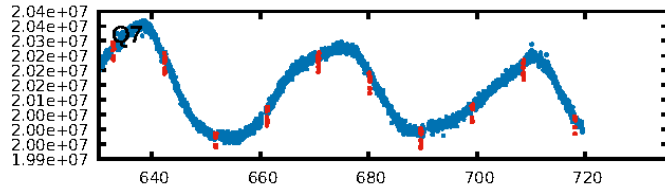
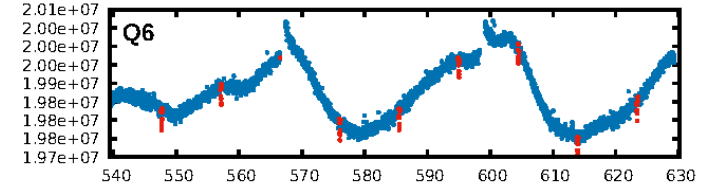
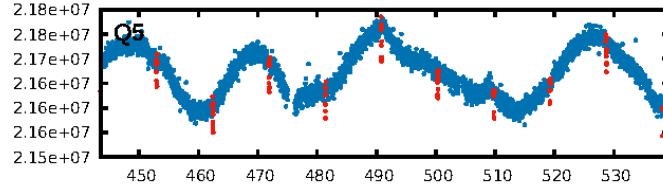
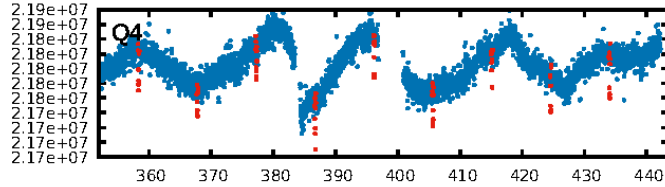
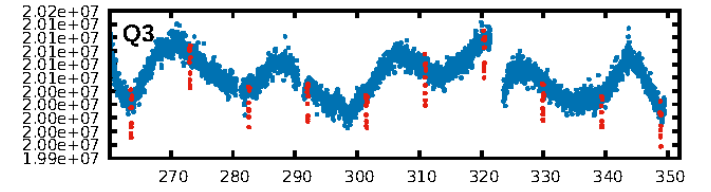
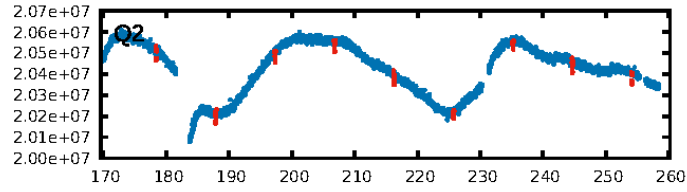
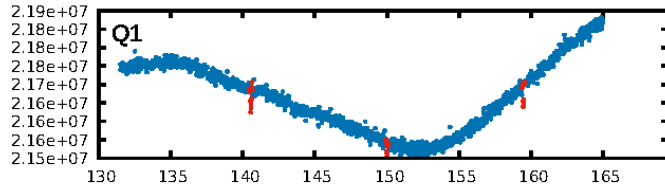
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [75.63σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 99.8%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [138/138]  
GhostDiagnostic-chr: 3.269  
Centroid-sig: 45.5%  
Centroid-so: 1.045 arcsec [11.18σ]  
OotOffset-rm: 0.085 arcsec [0.95σ]  
KicOffset-rm: 0.848 arcsec [8.55σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 0.94 [16/17]

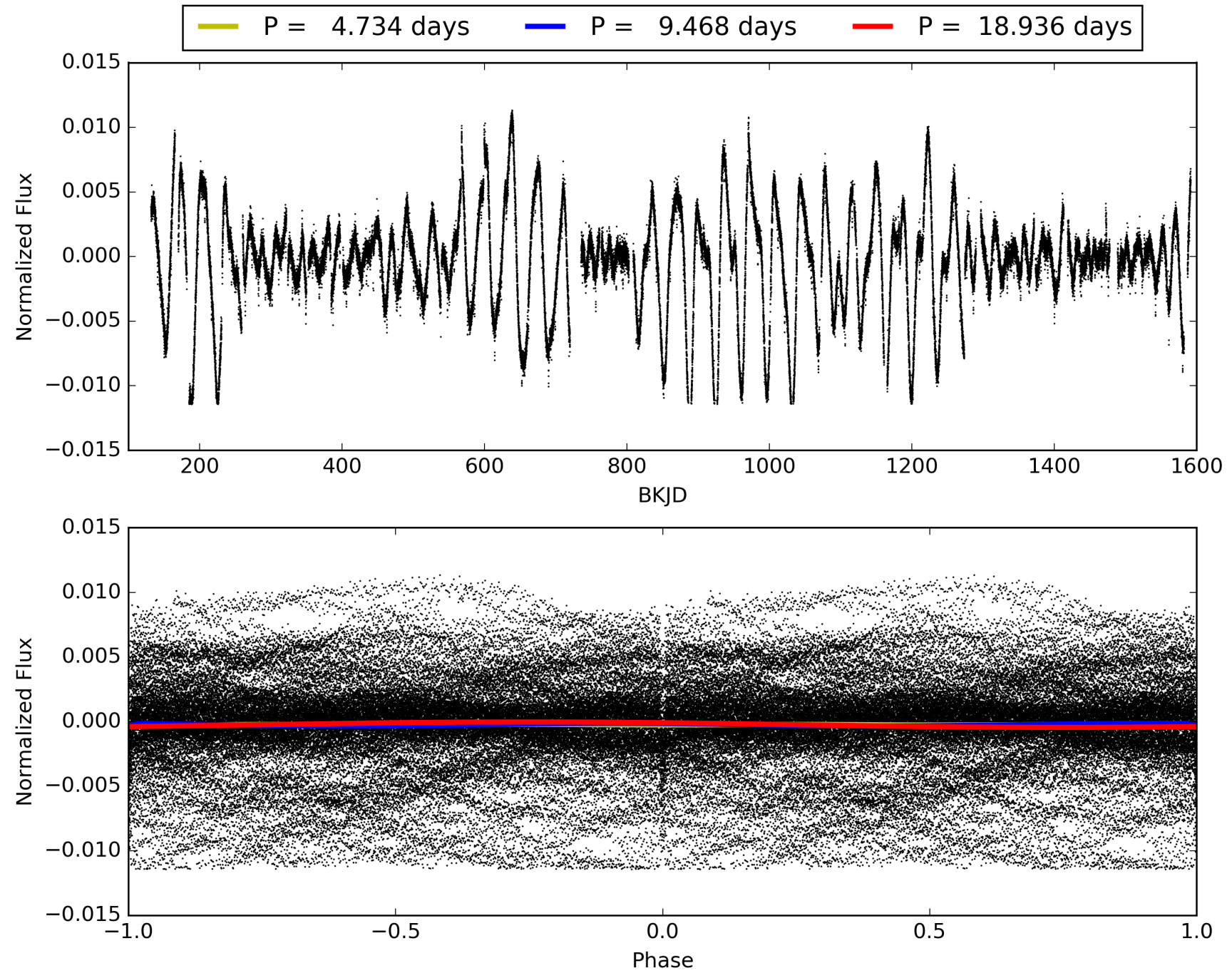
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 22:52:21 Z

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

# TCE 009388479-01, PDC Light Curves

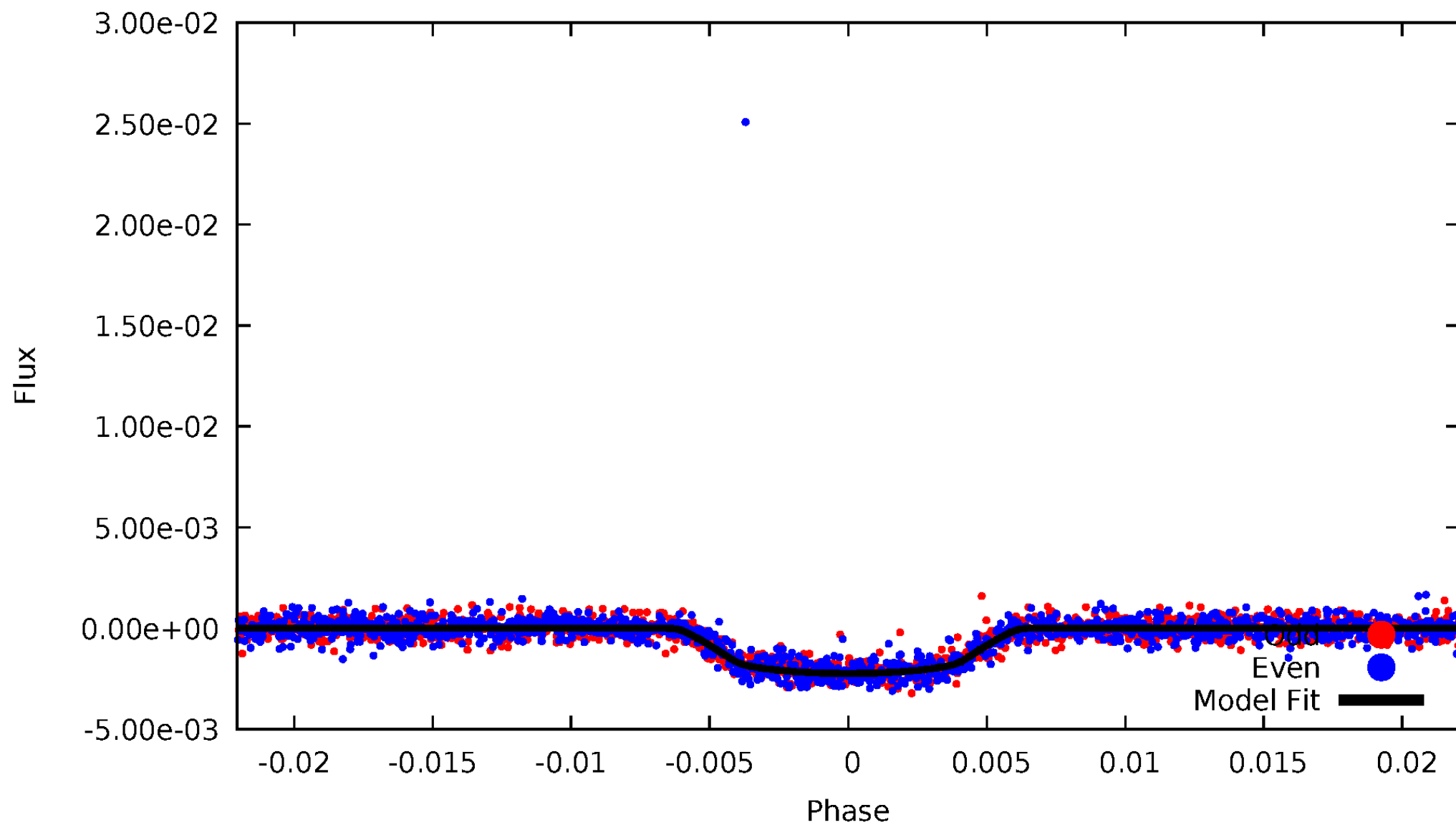


TCE 009388479-01



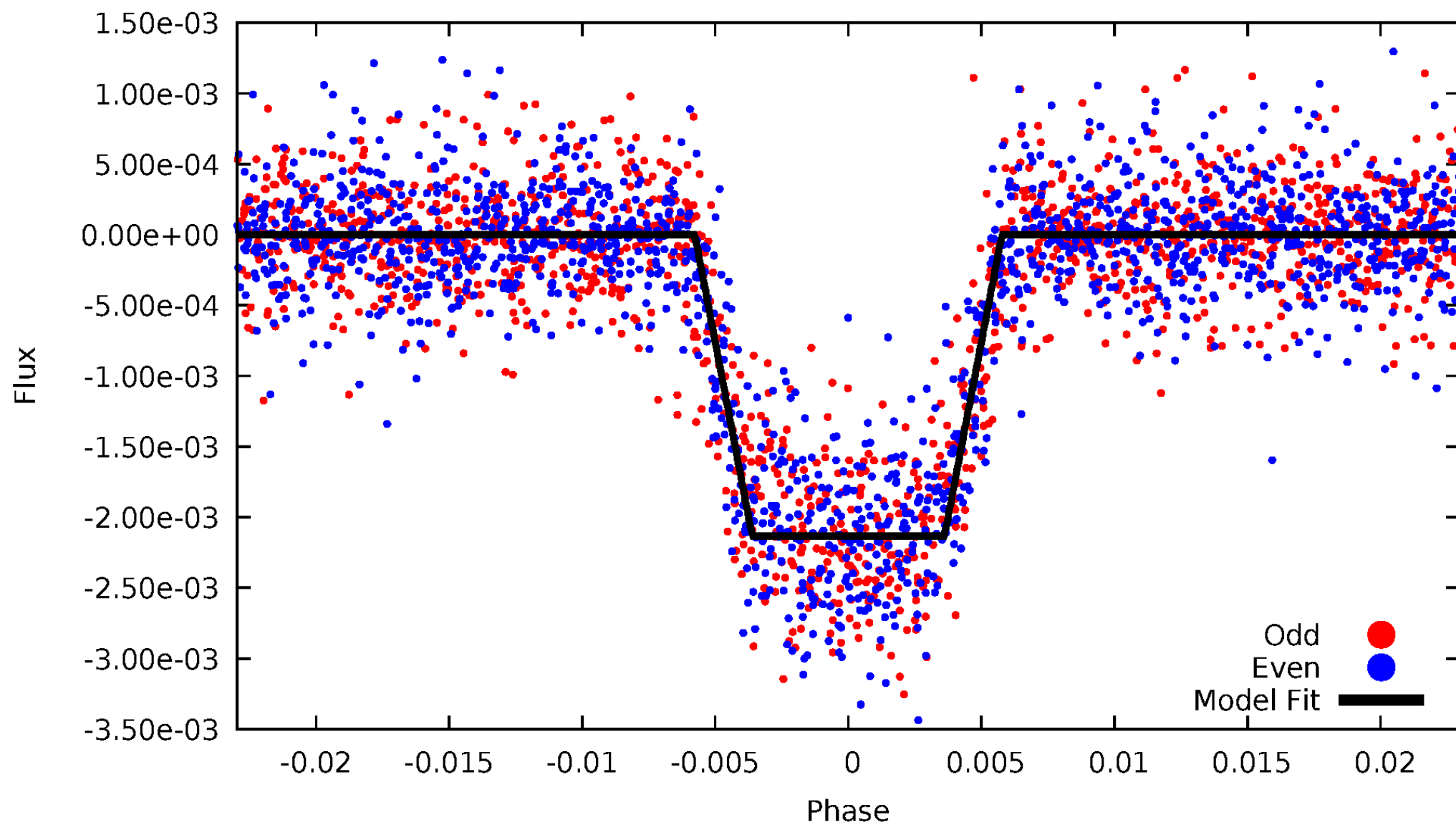
# DV Odd/Even

TCE 009388479-01



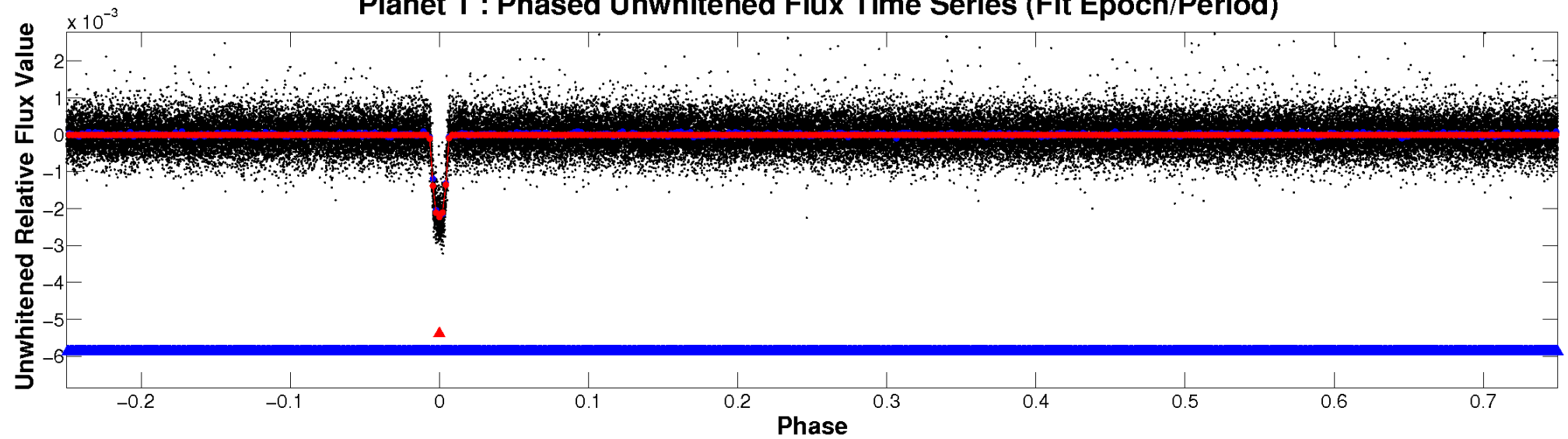
# ALT Odd/Even

TCE 009388479-01

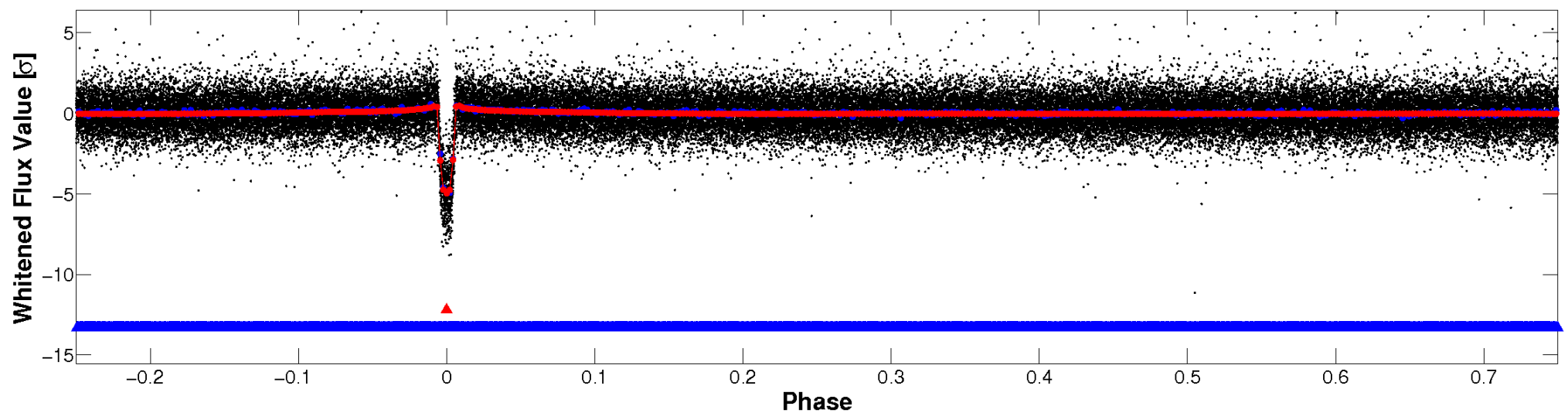


# Non-Whitened Vs. Whitened Light Curve

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

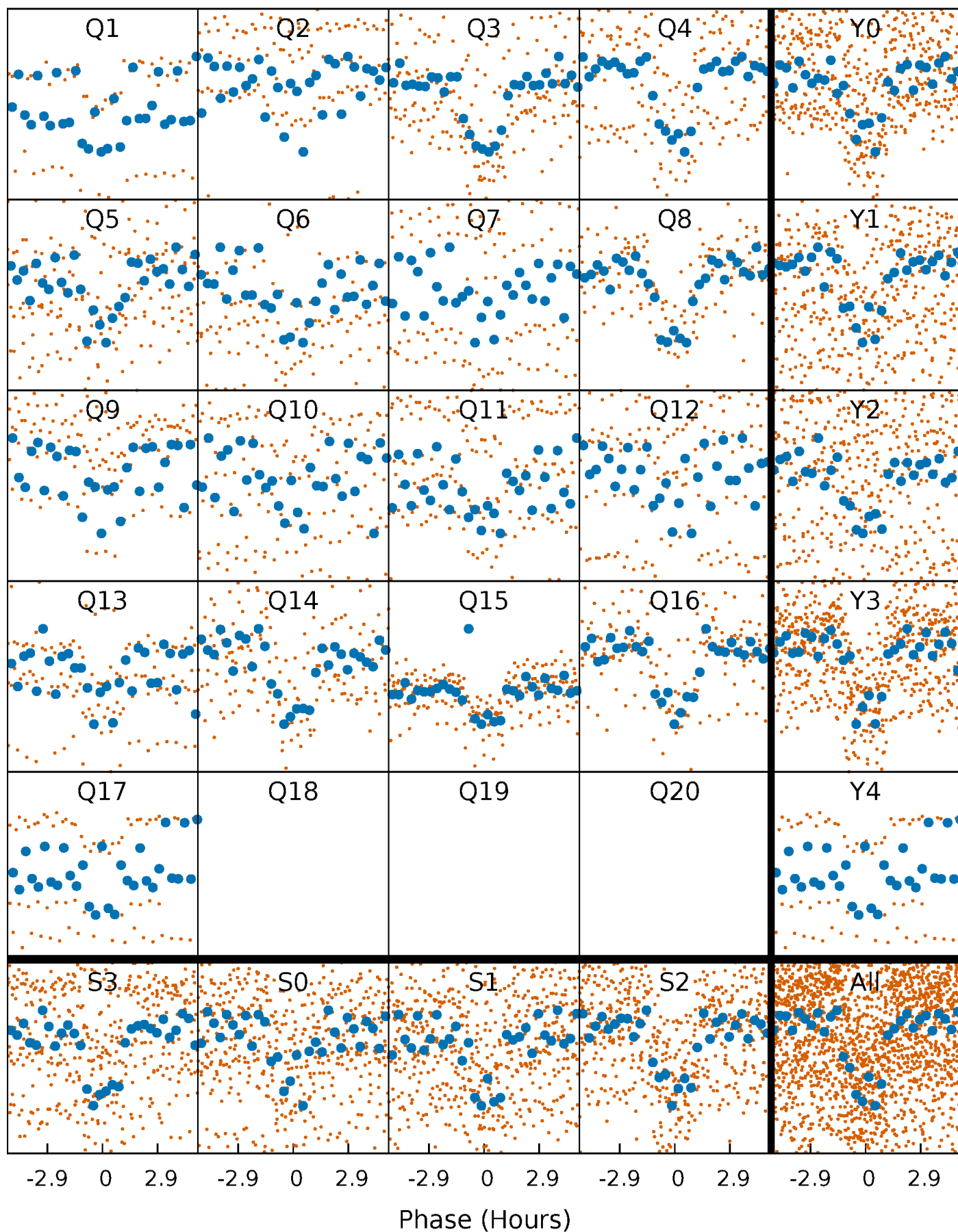


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



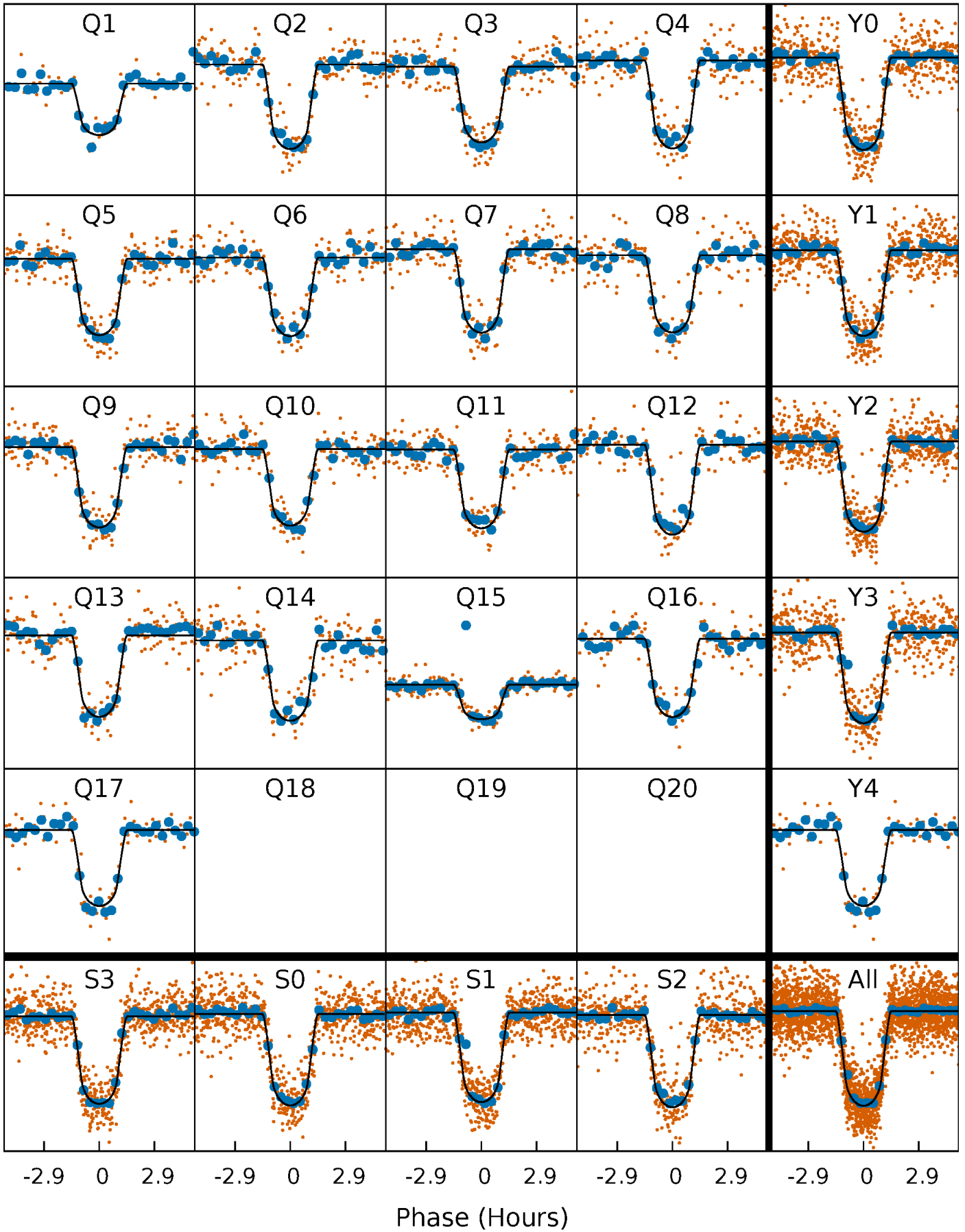
# PDC Quarter-Phased Transit Curves

TCE 009388479-01 P= 9.467812 Days  $T_0=140.545186$  (BKJD)



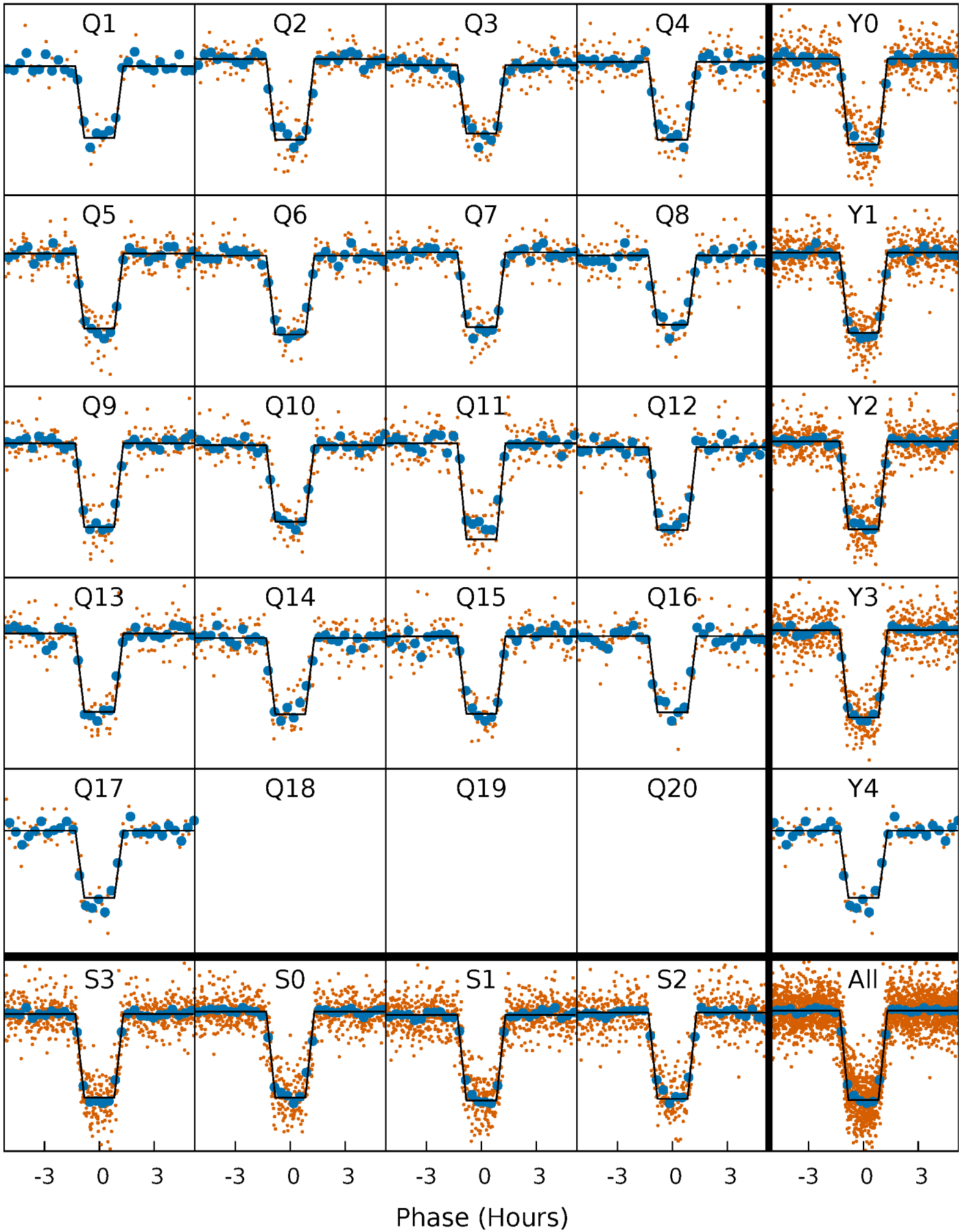
# DV Quarter-Phased Transit Curves

TCE 009388479-01   P= 9.467812 Days    $T_0=140.545186$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

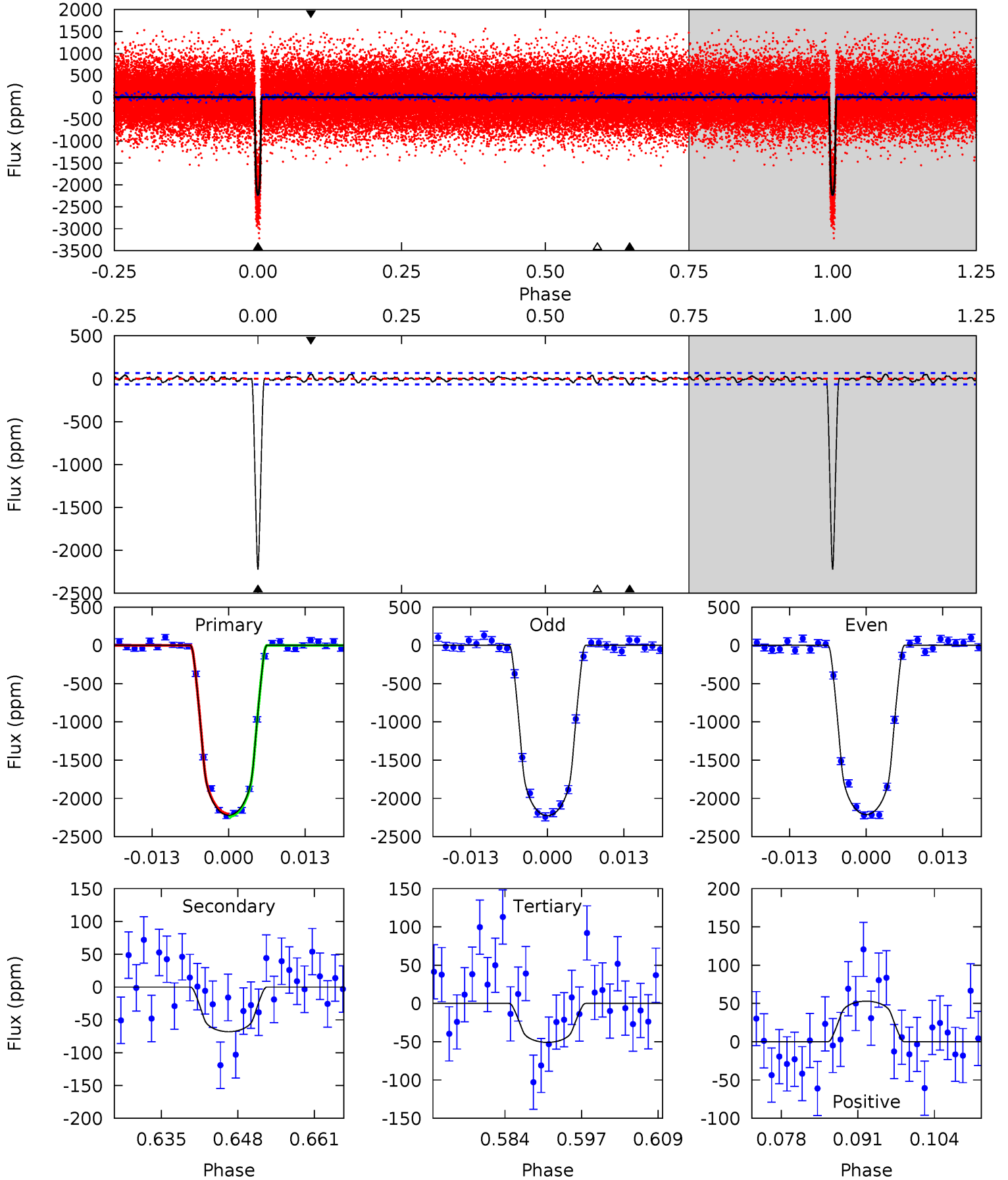
TCE 009388479-01   P= 9.467839 Days    $T_0=140.543083$  (BKJD)



# DV Model-Shift Uniqueness Test

009388479-01, P = 9.467812 Days, E = 131.077374 Days

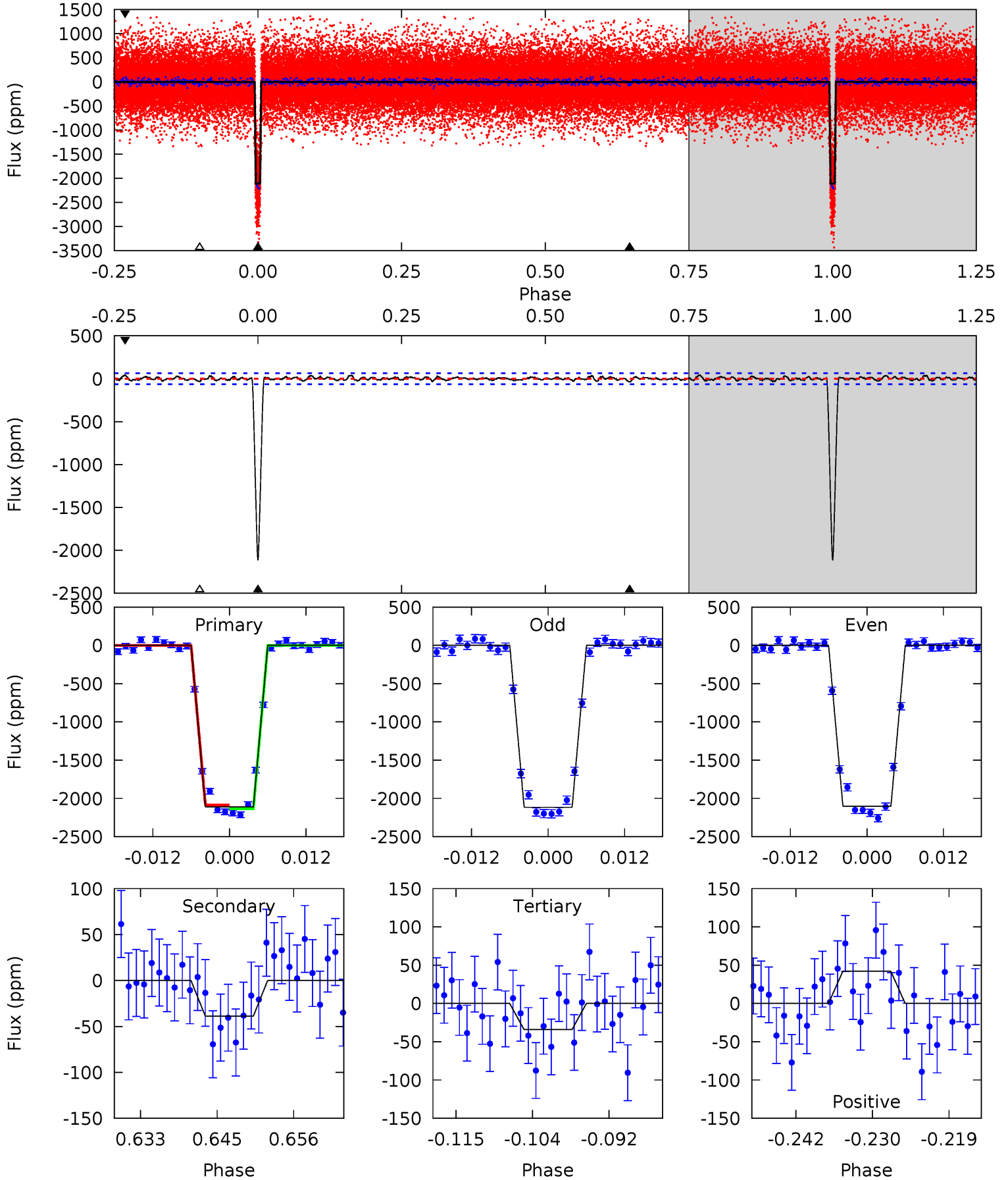
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
166.1	5.09	3.80	3.97	4.98	2.48	1.32	162.3	162.2	1.29	1.13	0.57	0.97	0.02	1.19



# Alt Model-Shift Uniqueness Test

009388479-01, P = 9.467839 Days, E = 131.075244 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
167.0	3.08	2.70	3.33	5.00	2.53	1.05	164.3	163.6	0.38	-0.25	0.59	1.00	0.02	0



### Stellar Parameters For KIC 009388479

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$3582^{+71}_{-89}$	$4.807^{+0.050}_{-0.045}$	$0.180^{+0.150}_{-0.150}$	$0.458^{+0.040}_{-0.055}$	$0.491^{+0.034}_{-0.063}$	$7.203^{+1.980}_{-1.301}$
	+2%/-2%	+1%/-1%	+83%/-83%	+9%/-12%	+7%/-13%	+27%/-18%
Source	SPE70	SPE60	SPE70	DSEP		

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

### Secondary Eclipse Parameters for KIC 009388479-01 / KOI 0936.01

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-68 \pm 13$	$2.26^{+0.25}_{-0.26}$	$568^{+16}_{-19}$	$2259^{+81}_{-82}$	$35^{+11}_{-9}$
Alt.	$-39 \pm 13$	$2.32^{+0.24}_{-0.25}$	$569^{+16}_{-18}$	$2113^{+92}_{-93}$	$19^{+8}_{-7}$

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

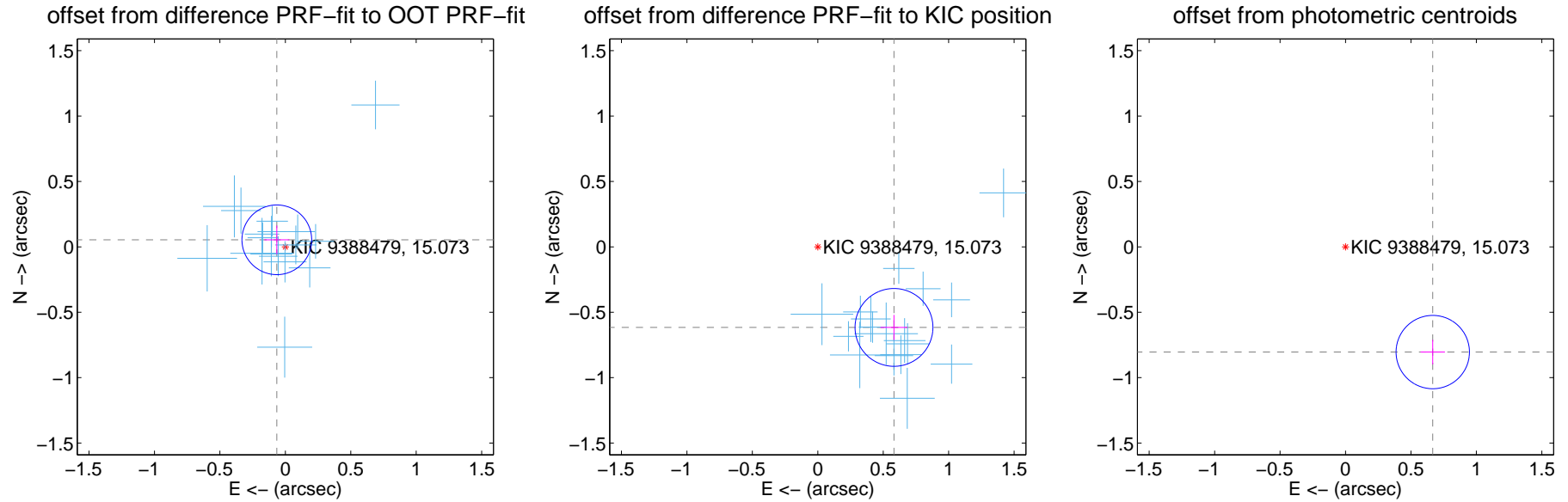
## DV Centroid Data

Supplemental centroid analysis for 009388479-01. Kepler magnitude: 15.07. Transit SNR 109.38

There are 17 quarters with good PRF difference image offsets

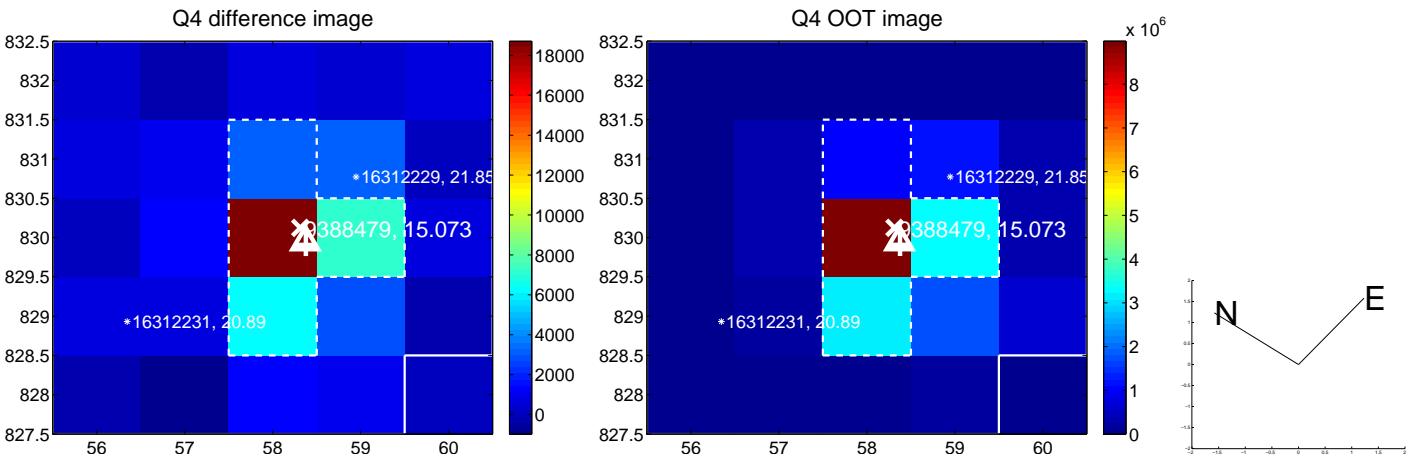
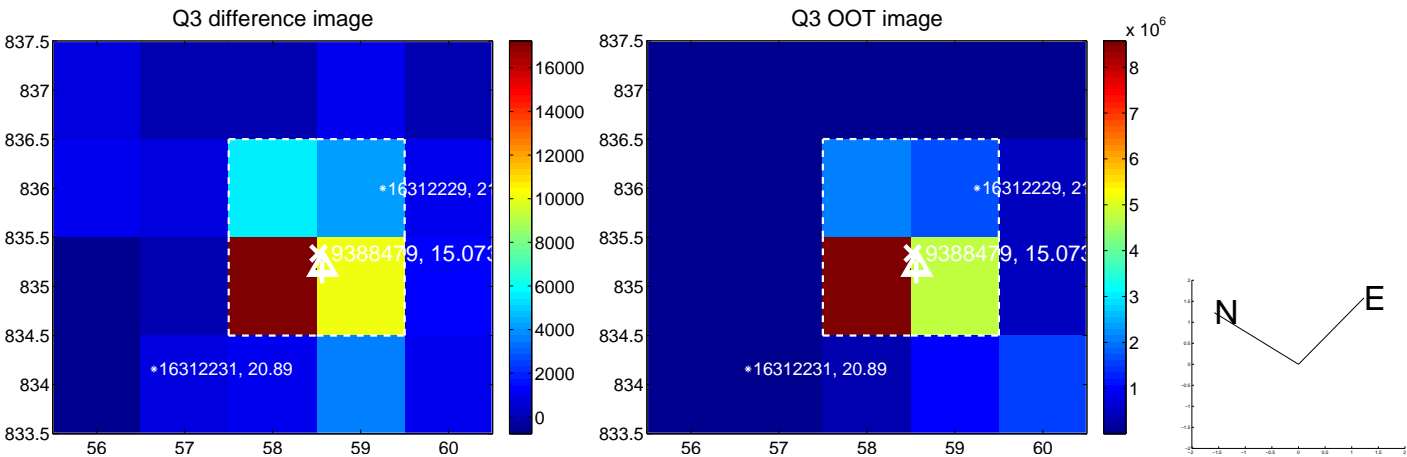
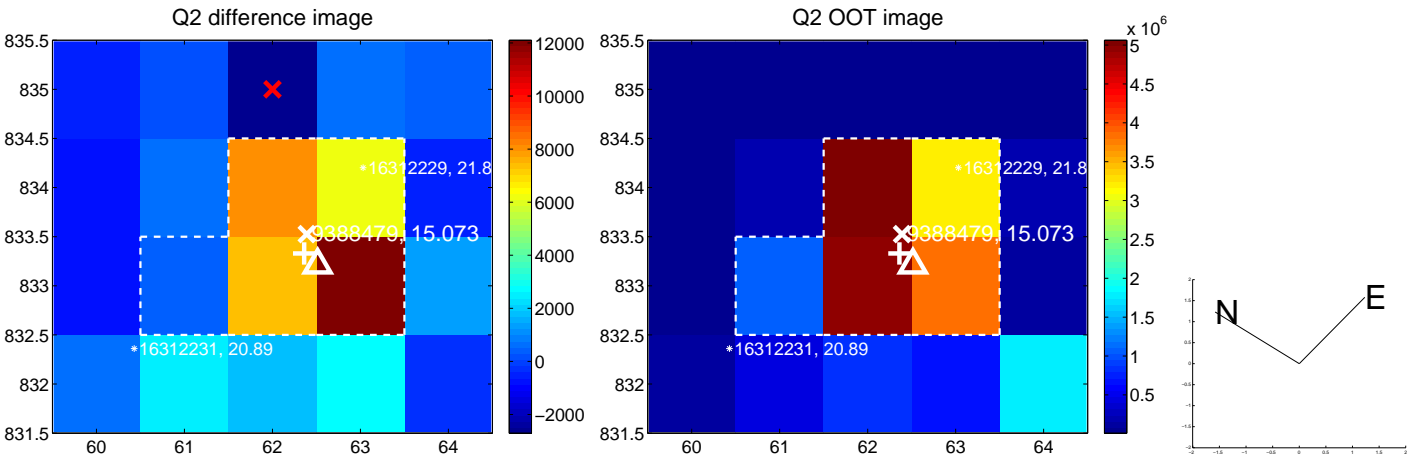
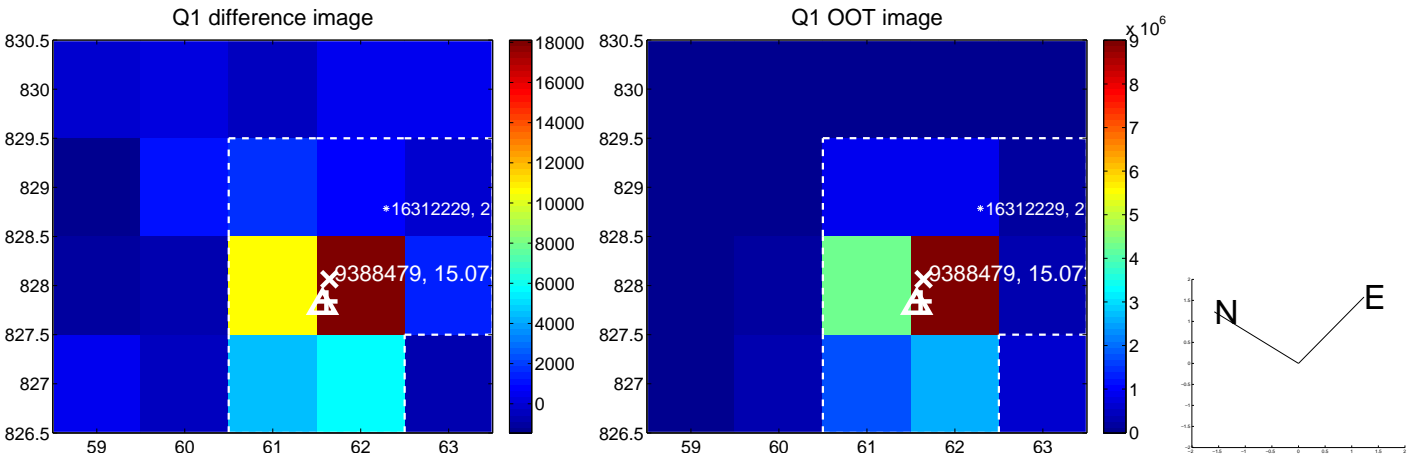
The direct PRF centroid is offset from the target star catalog position by about 1.18 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.085 \pm 0.089$	0.95	$0.065 \pm 0.096$	$0.054 \pm 0.109$
PRF-fit source offset from KIC position	$0.848 \pm 0.099$	8.55	$-0.582 \pm 0.103$	$-0.616 \pm 0.096$
photometric centroid source offset	$1.04 \pm 0.09$	11.18	$-0.67 \pm 0.09$	$-0.80 \pm 0.09$

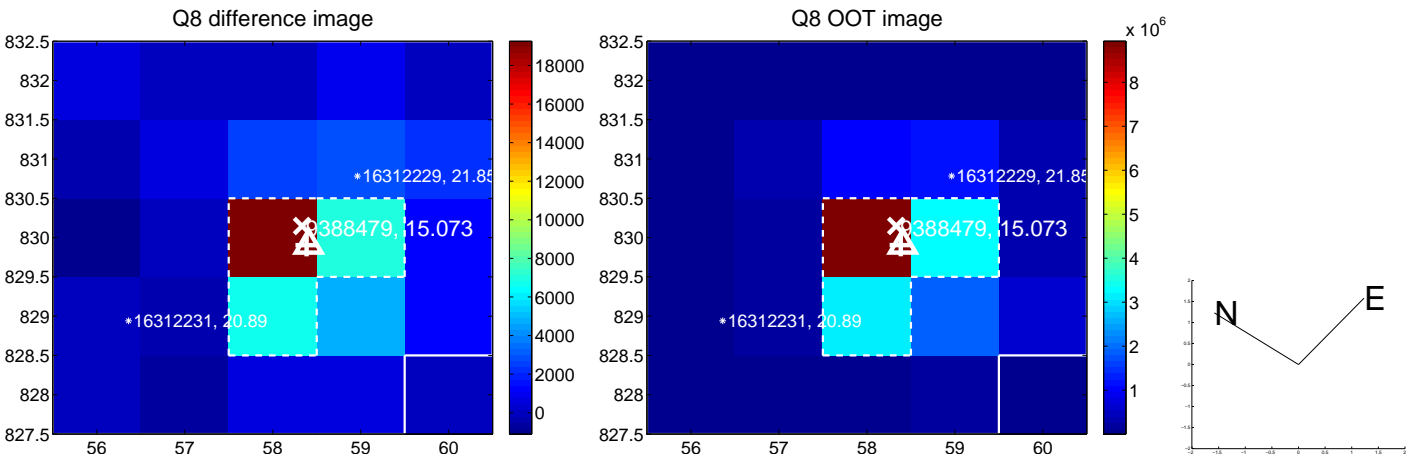
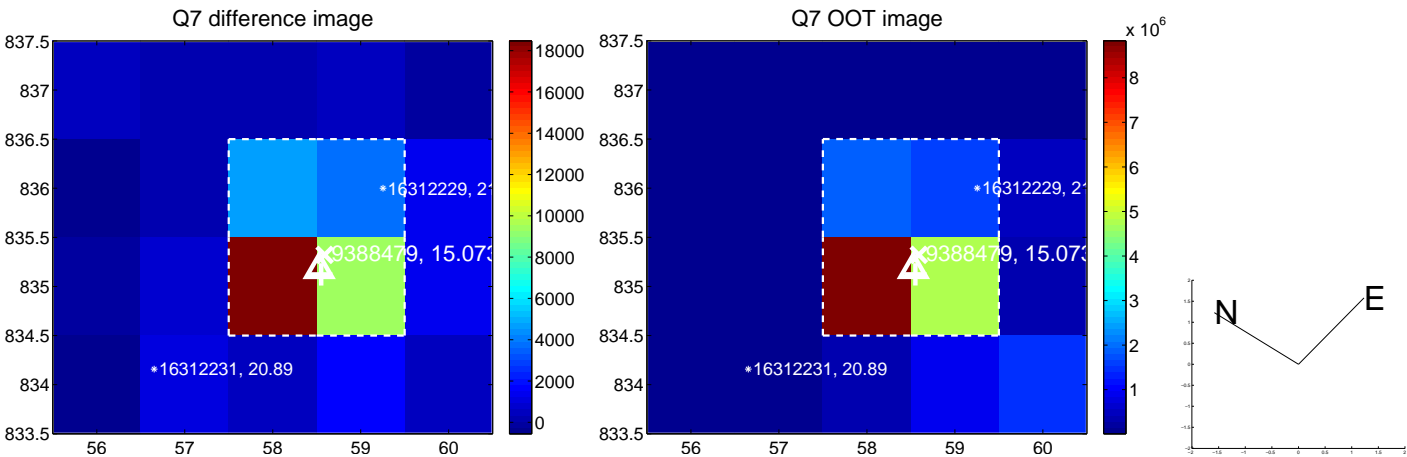
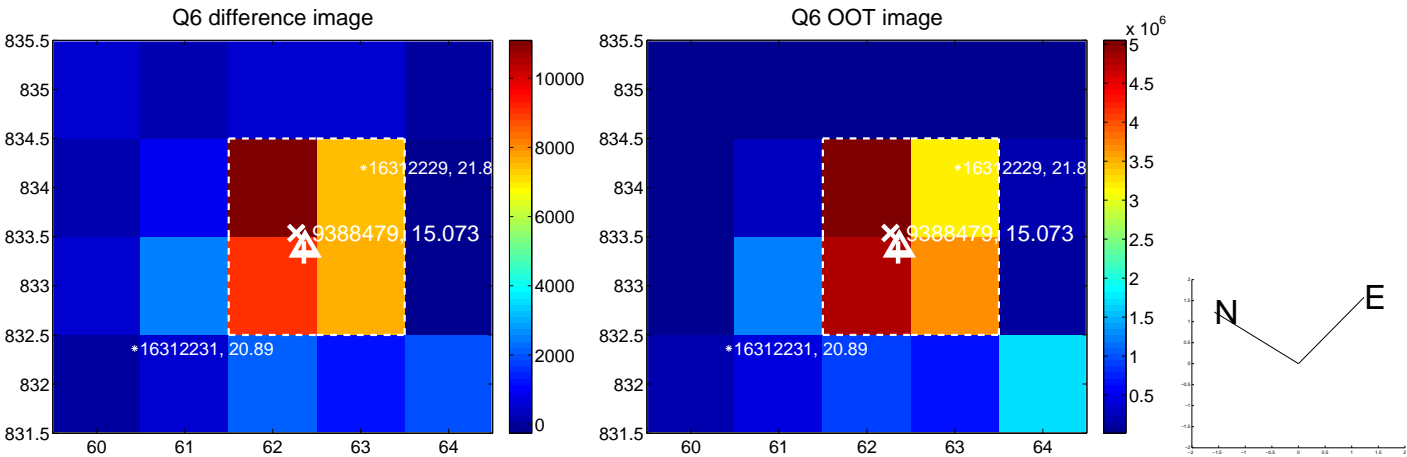
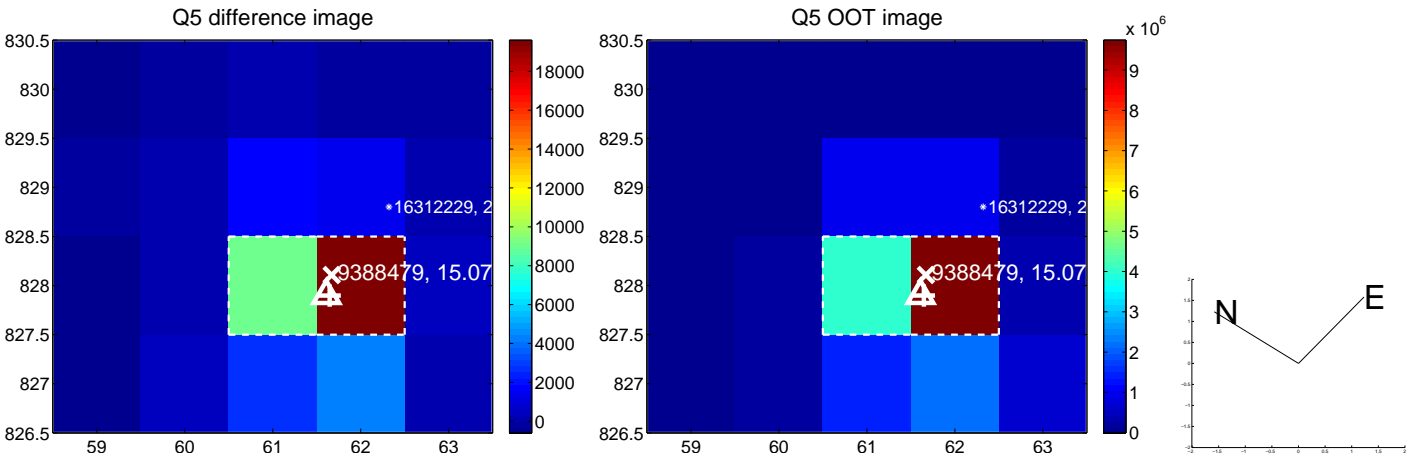


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

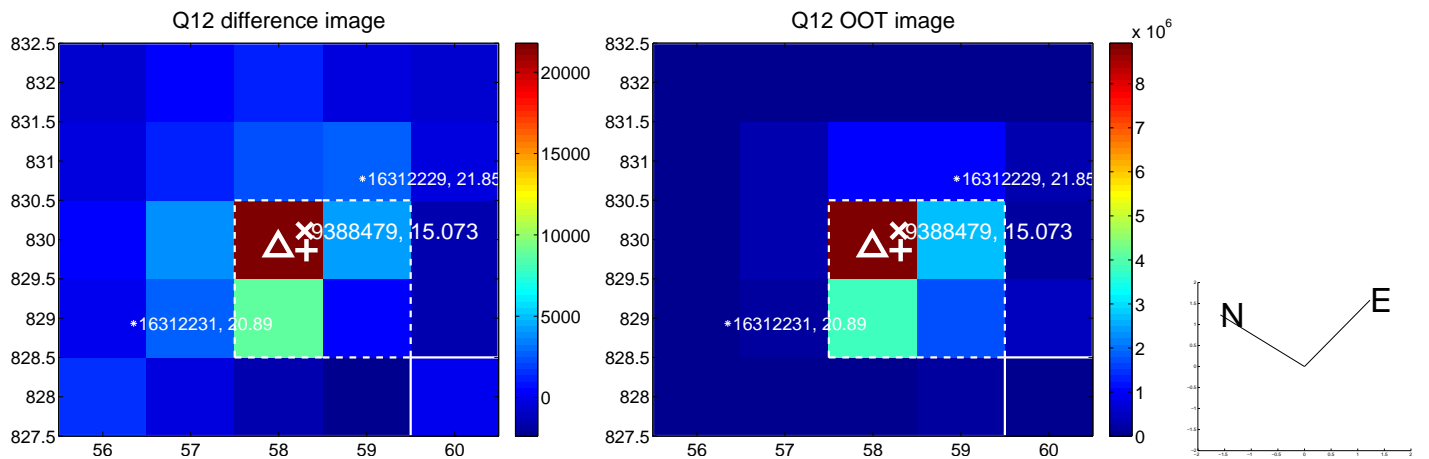
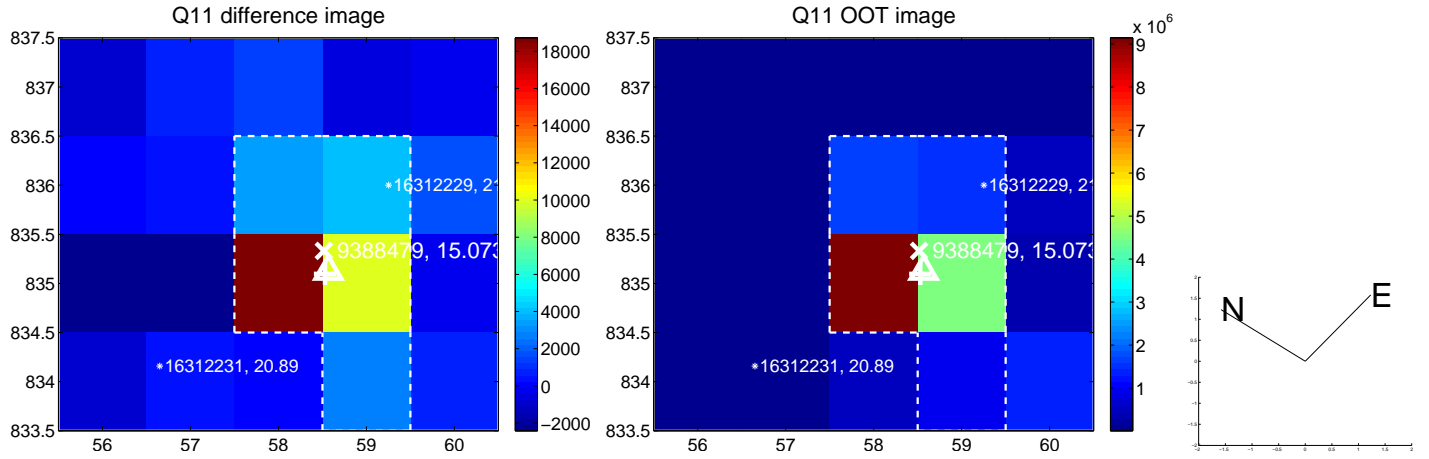
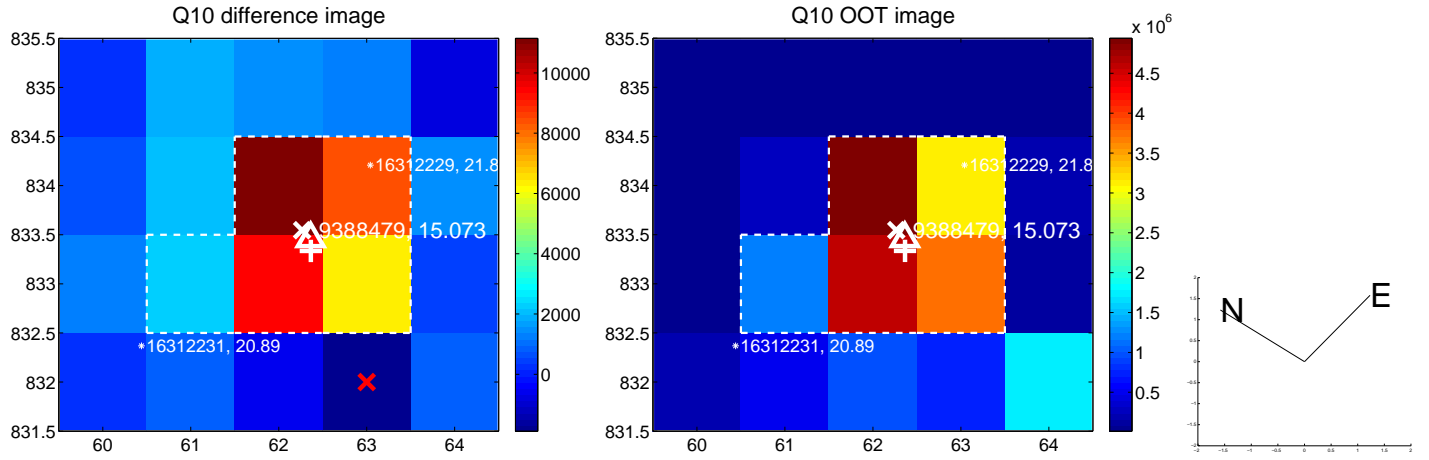
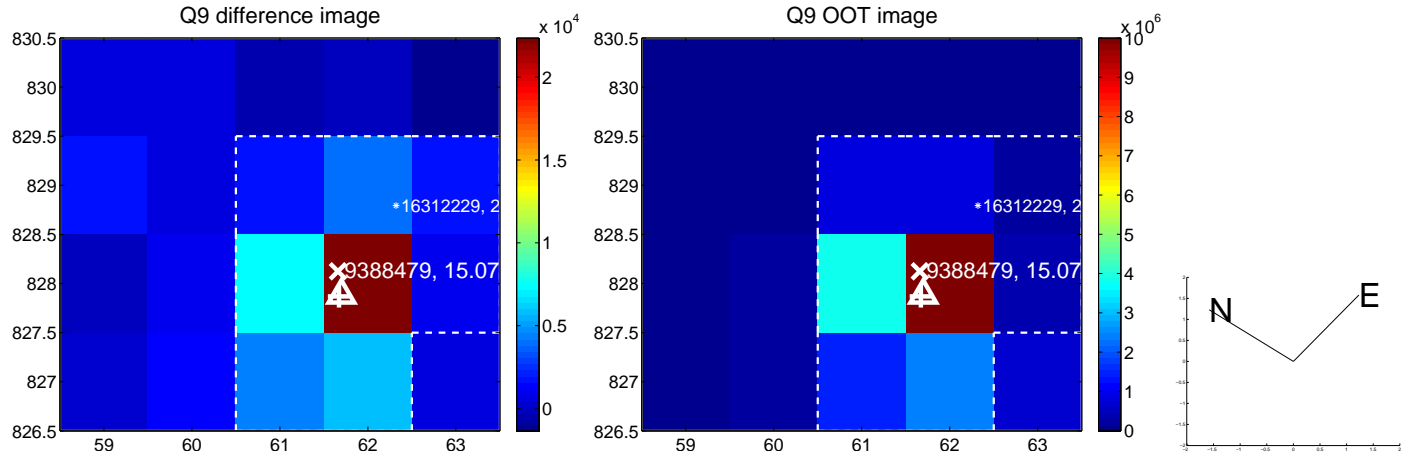
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



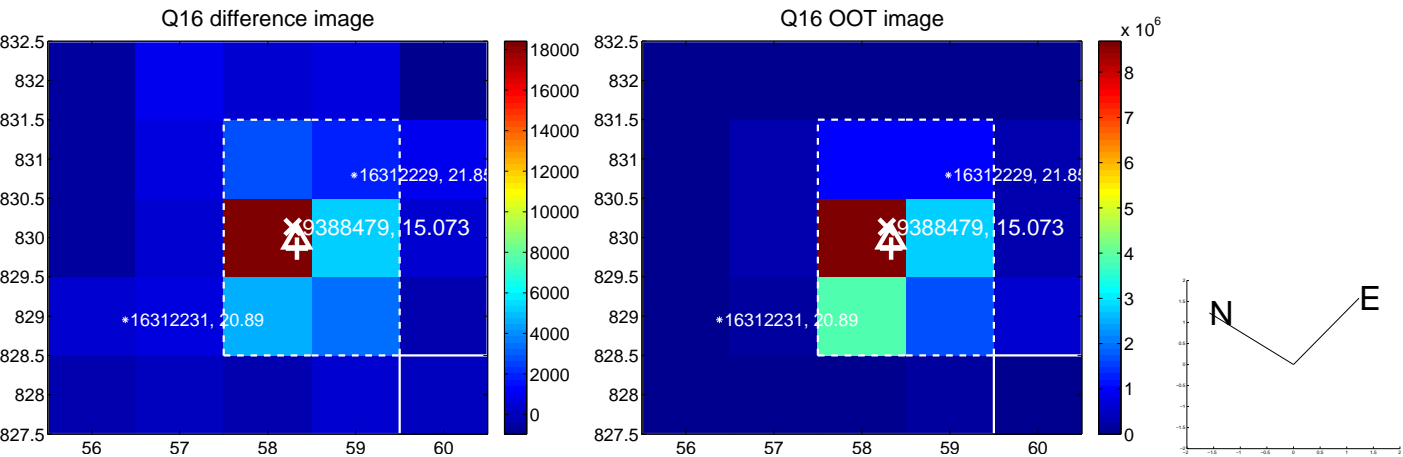
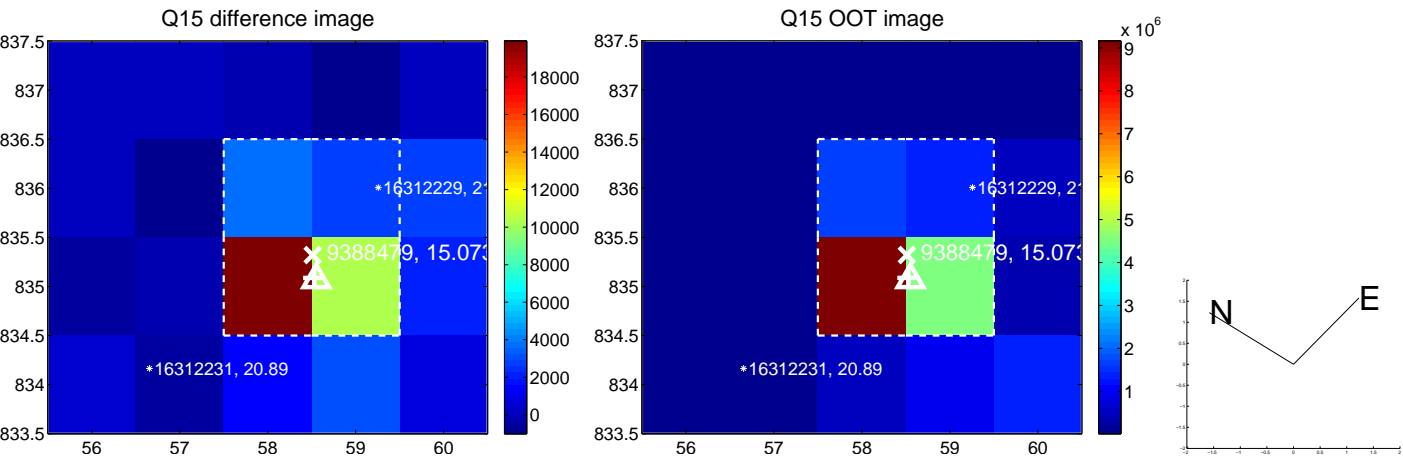
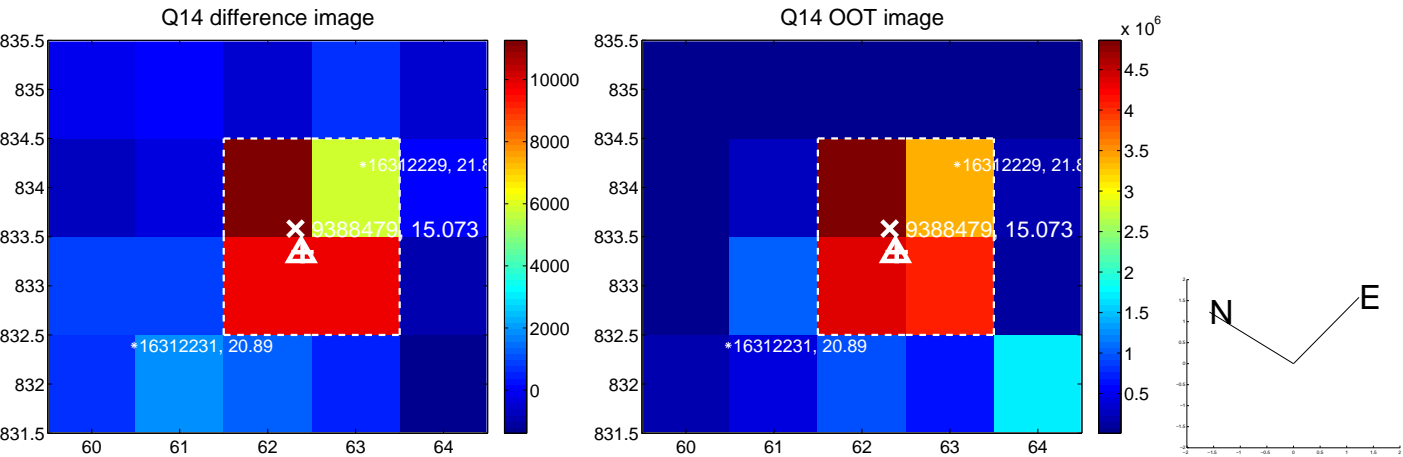
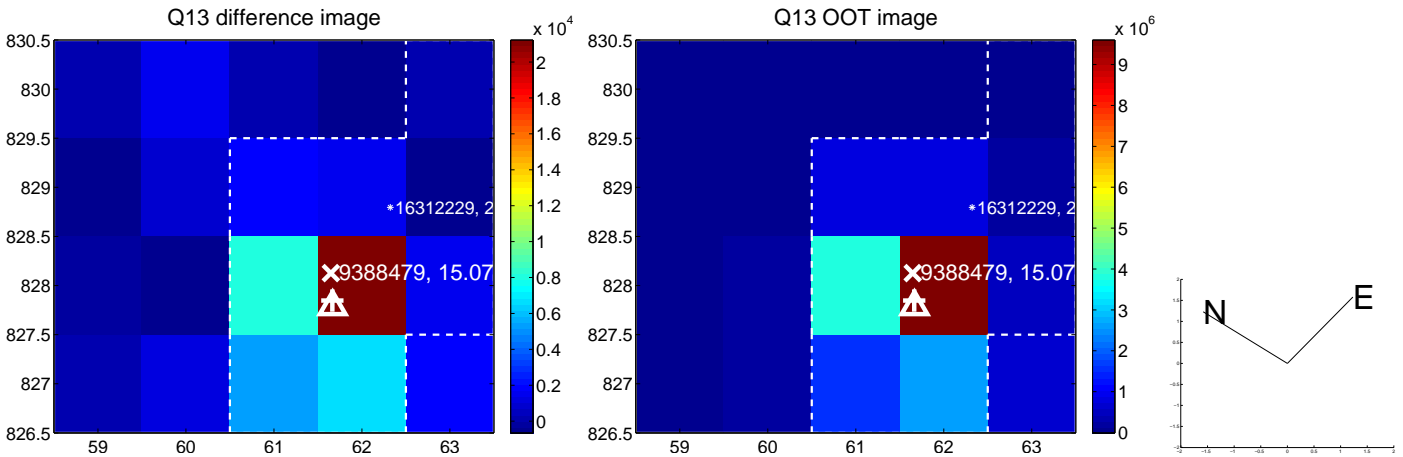
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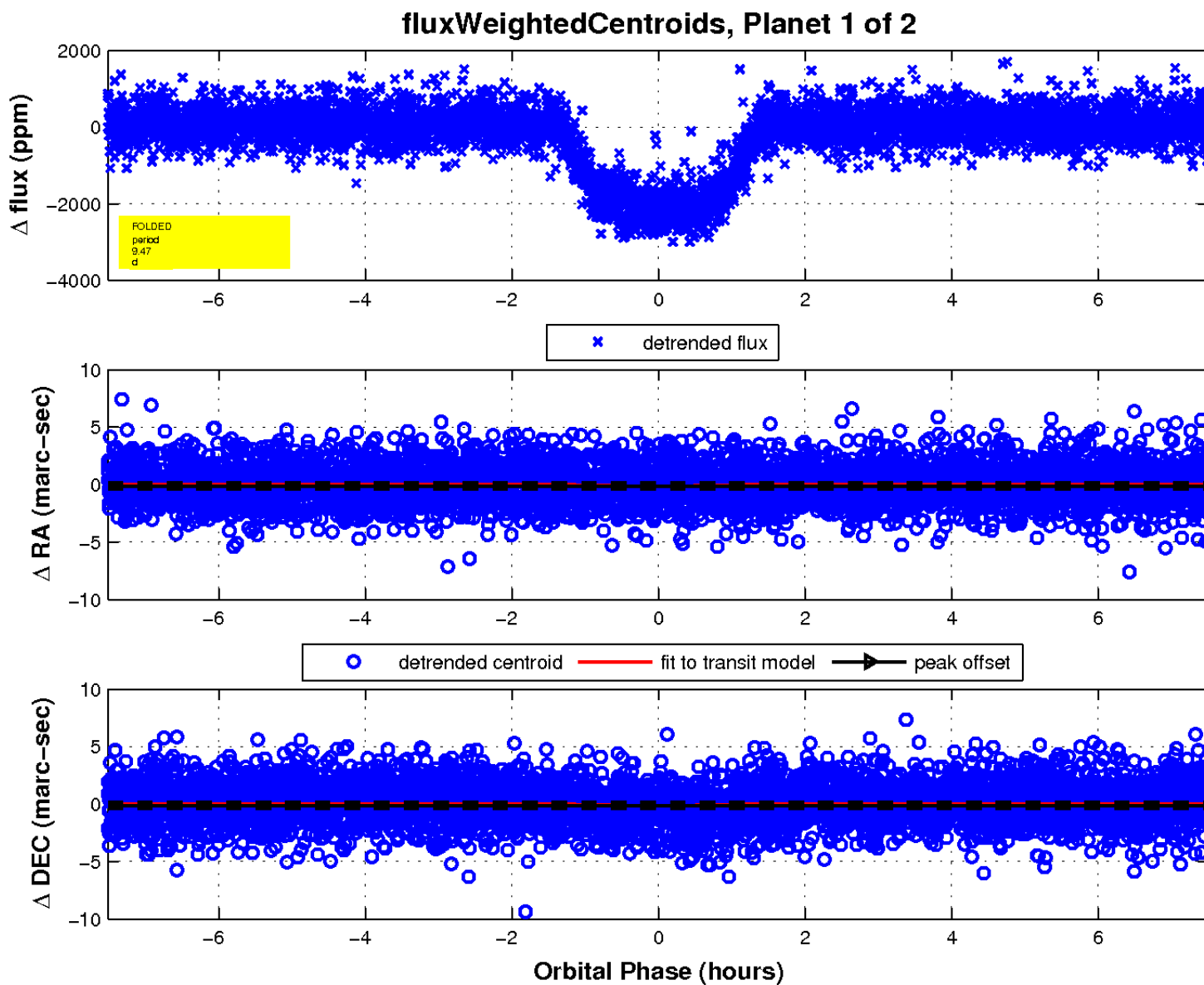
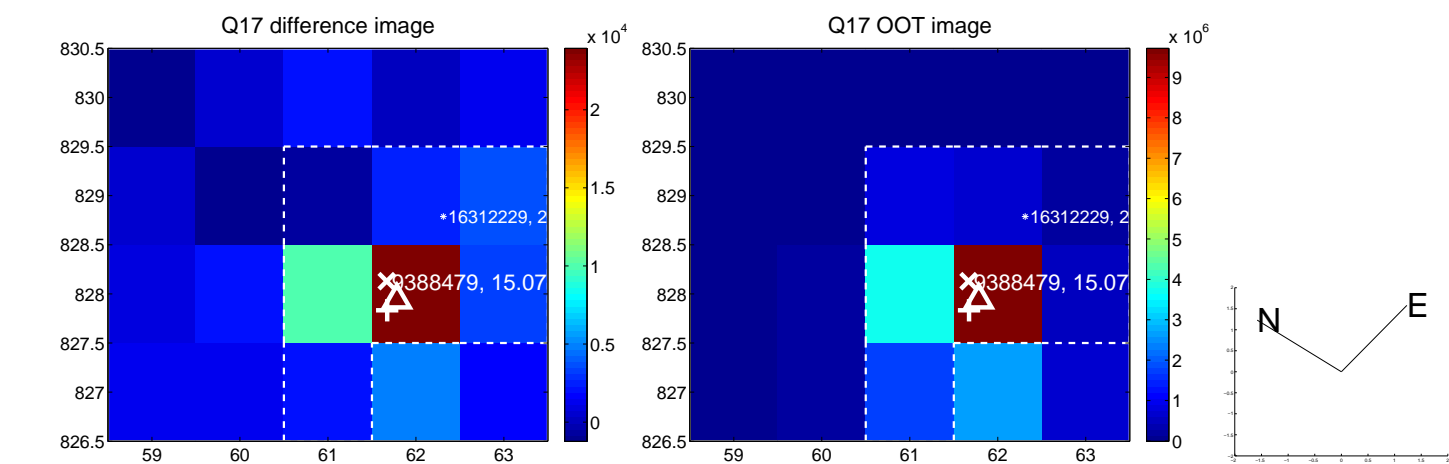
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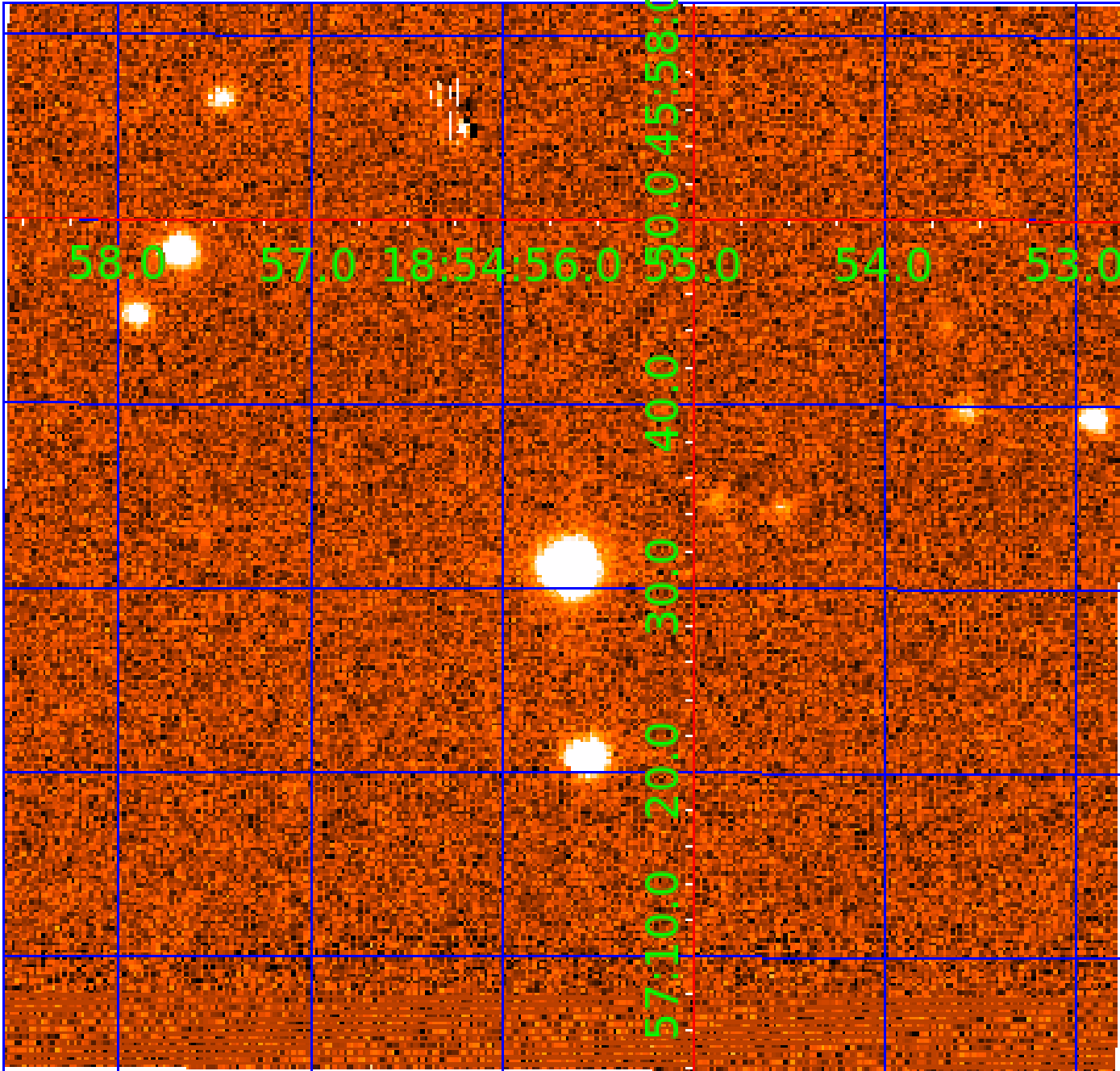


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UKIRT Image

Declination



# KIC 009388479

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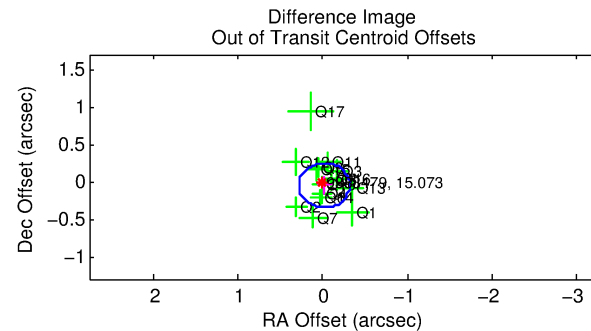
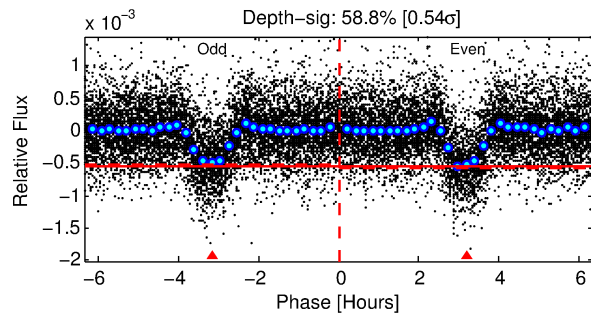
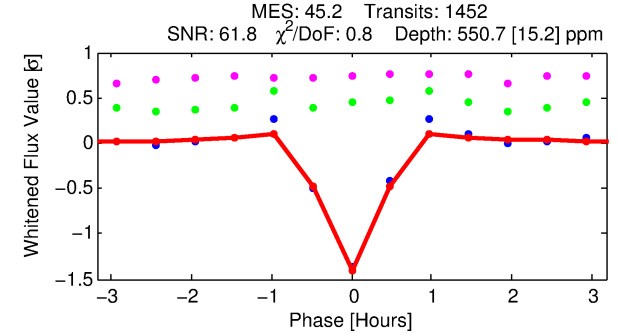
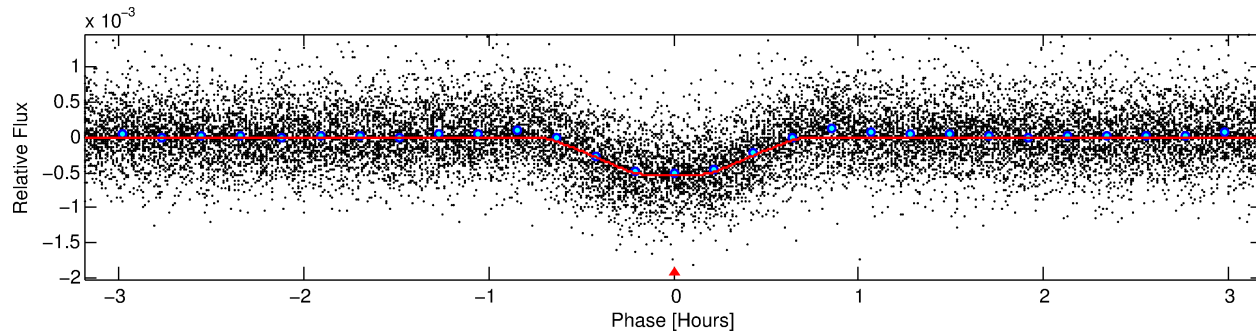
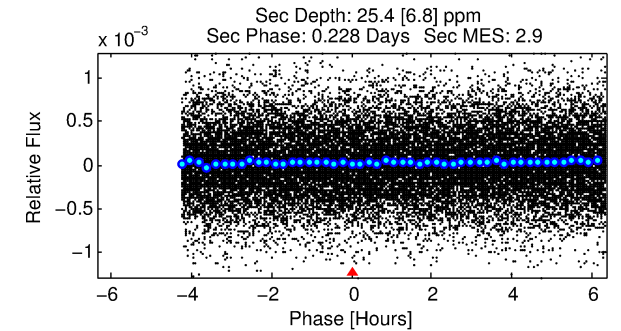
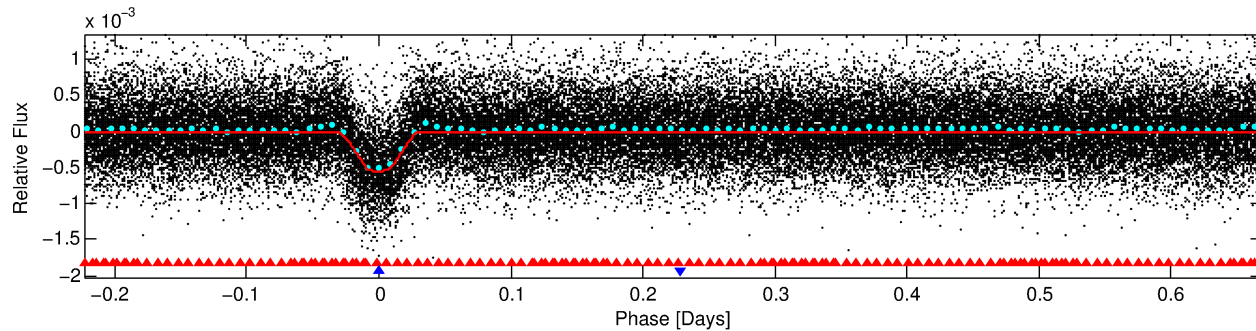
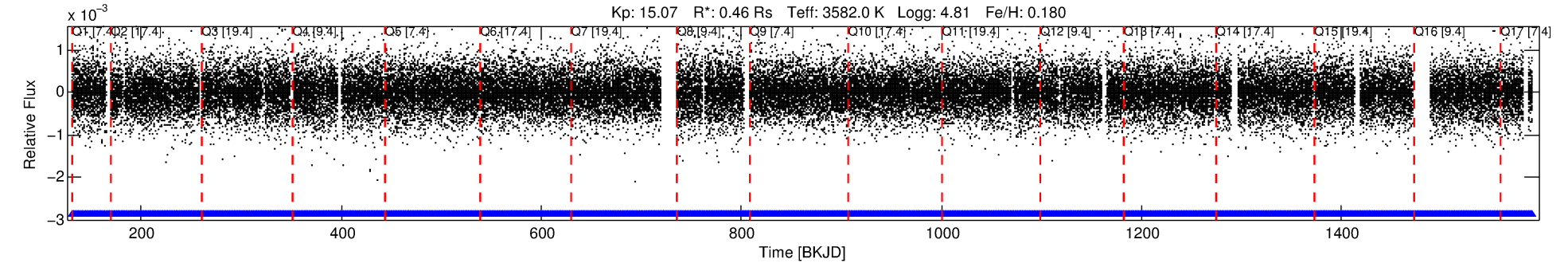
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009388479-02

No Significant Match Found

# DV One-Page Summary

KIC: 9388479 Candidate: 2 of 2 Period: 0.893 d  
KOI: K00936.02 Corr: 0.979



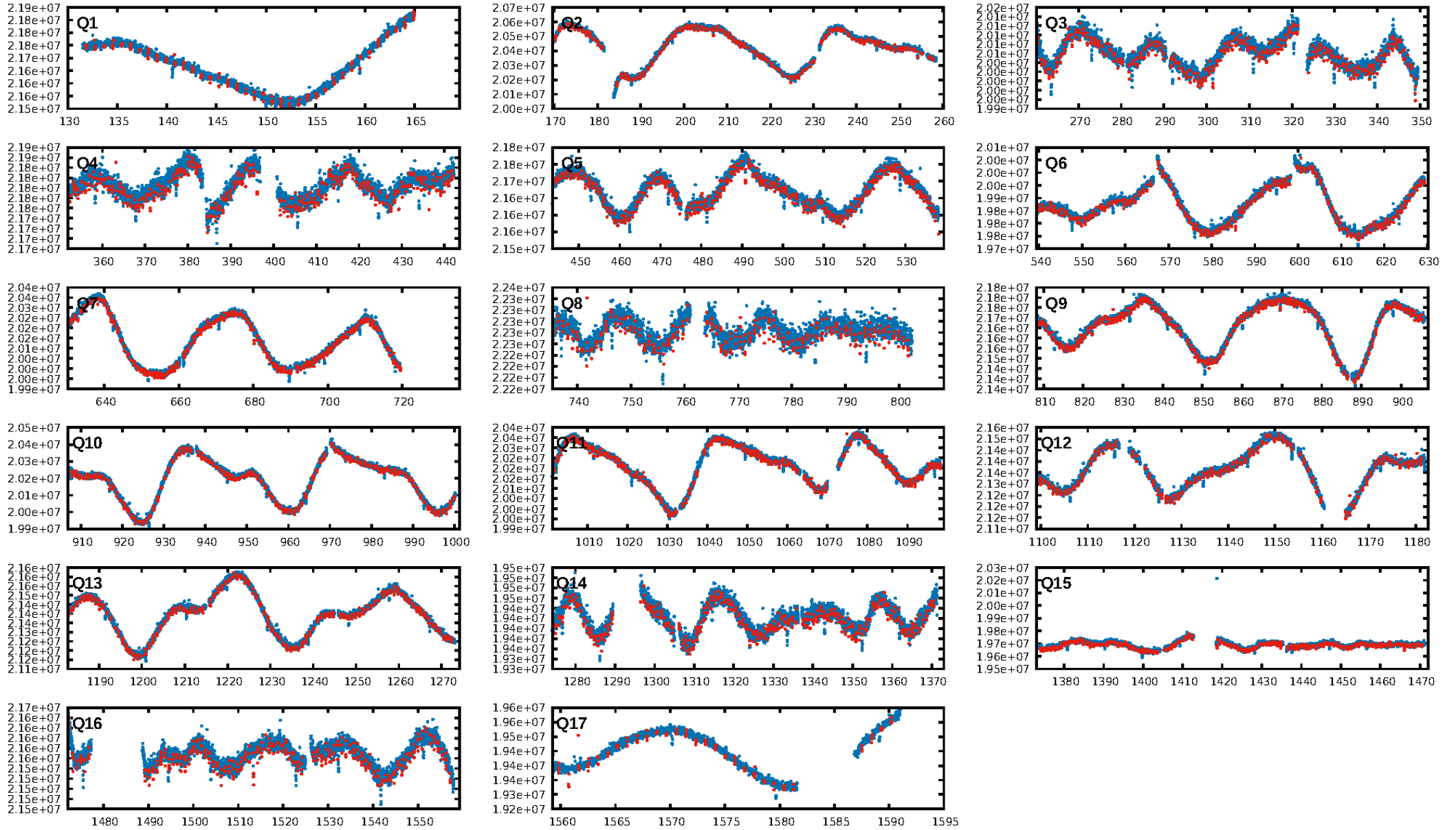
## DV Fit Results:

Period = 0.89304 [0.00000] d  
Epoch = 131.8604 [0.0003] BKJD  
Rp/R\* = 0.0261 [0.0033]  
a/R\* = 3.30 [1.52]  
b = 0.90 [0.11]  
Seff = 150.94 [22.48]  
Teff = 894 [33] K  
Rp = 1.31 [0.23] Re  
a = 0.0143 [0.0013] AU  
Ag = 1.68 [0.65] [1.05σ]  
Teffp = 1573 [150] K [4.41σ]

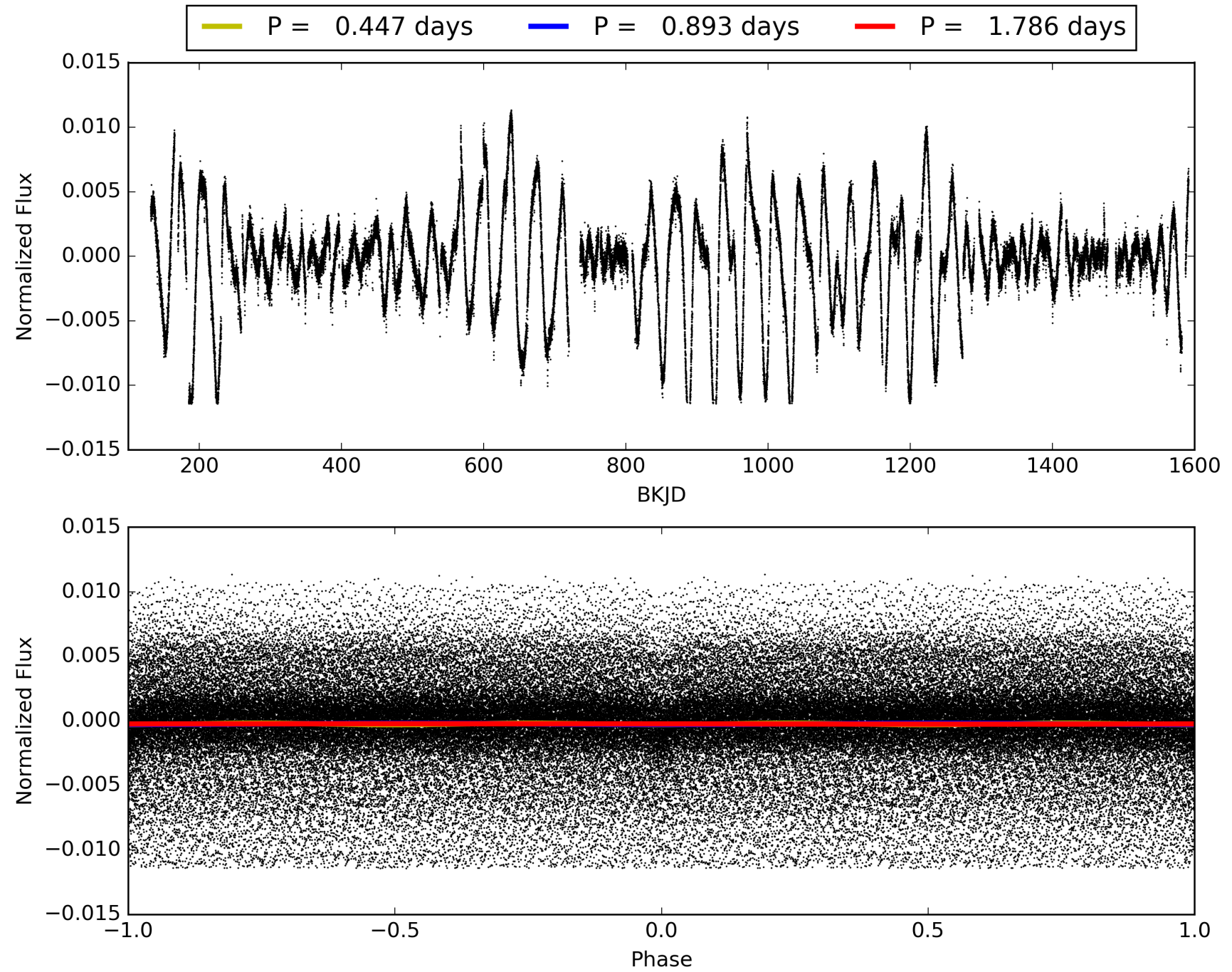
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [75.63σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [1387/1387]  
GhostDiagnostic-chr: 3.449  
Centroid-sig: 0.0%  
Centroid-so: 0.802 arcsec [4.31σ]  
OotOffset-rm: 0.055 arcsec [0.55σ]  
KicOffset-rm: 0.966 arcsec [10.44σ]  
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 009388479-02, PDC Light Curves

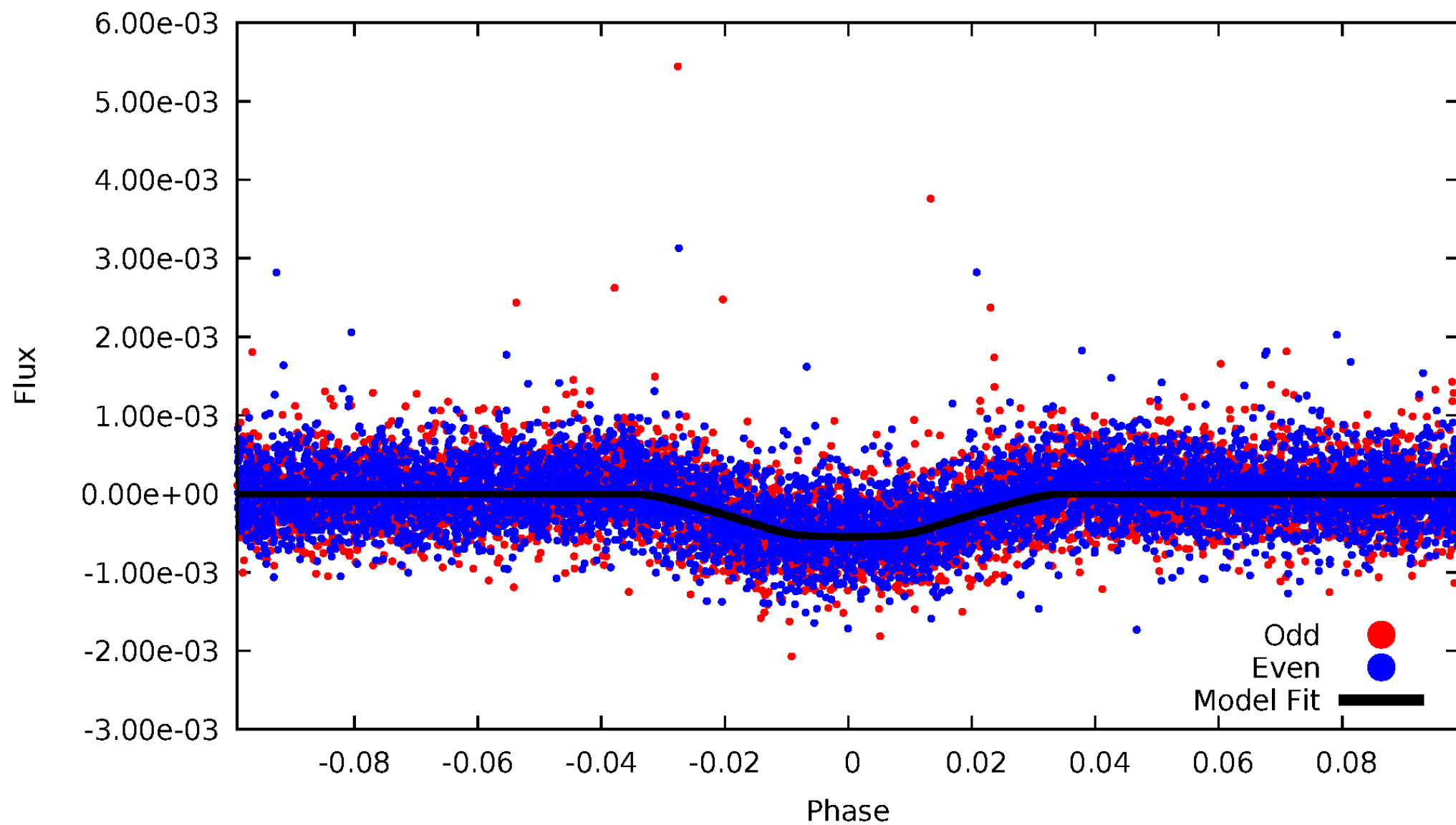


# TCE 009388479-02



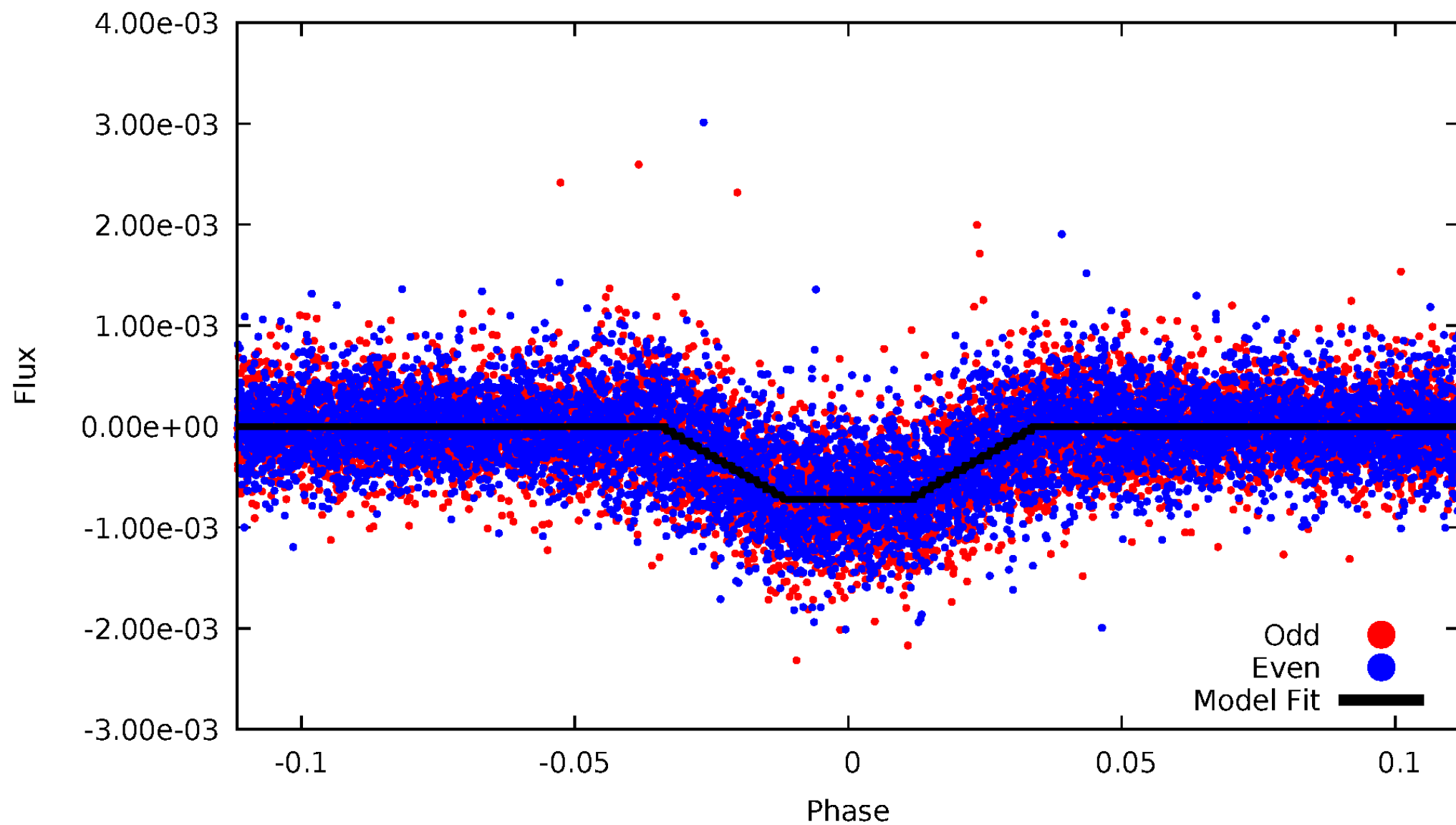
# DV Odd/Even

TCE 009388479-02



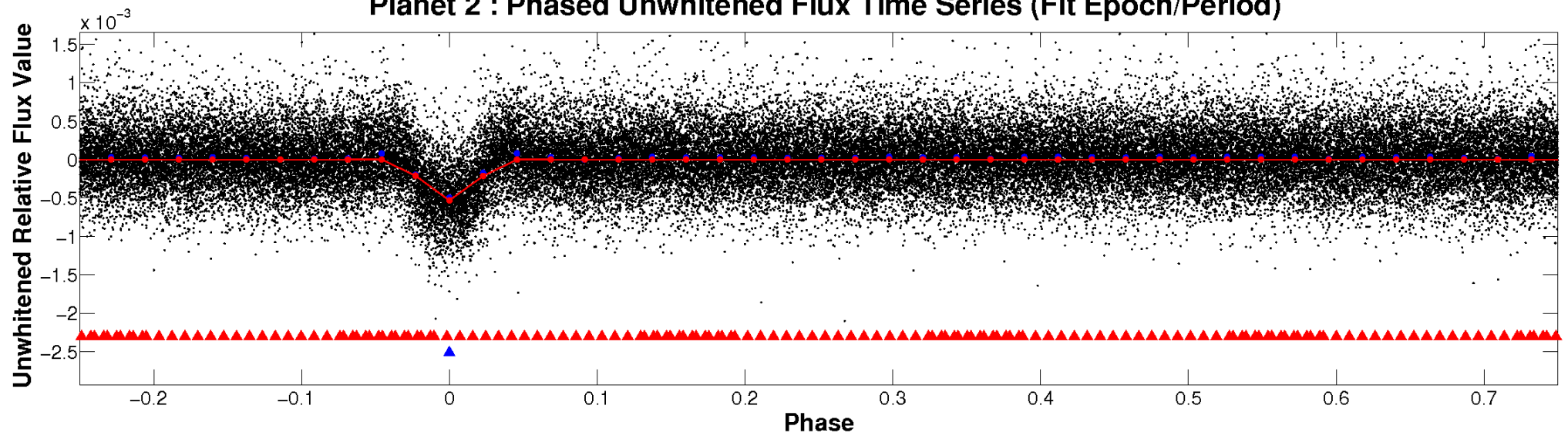
# ALT Odd/Even

TCE 009388479-02

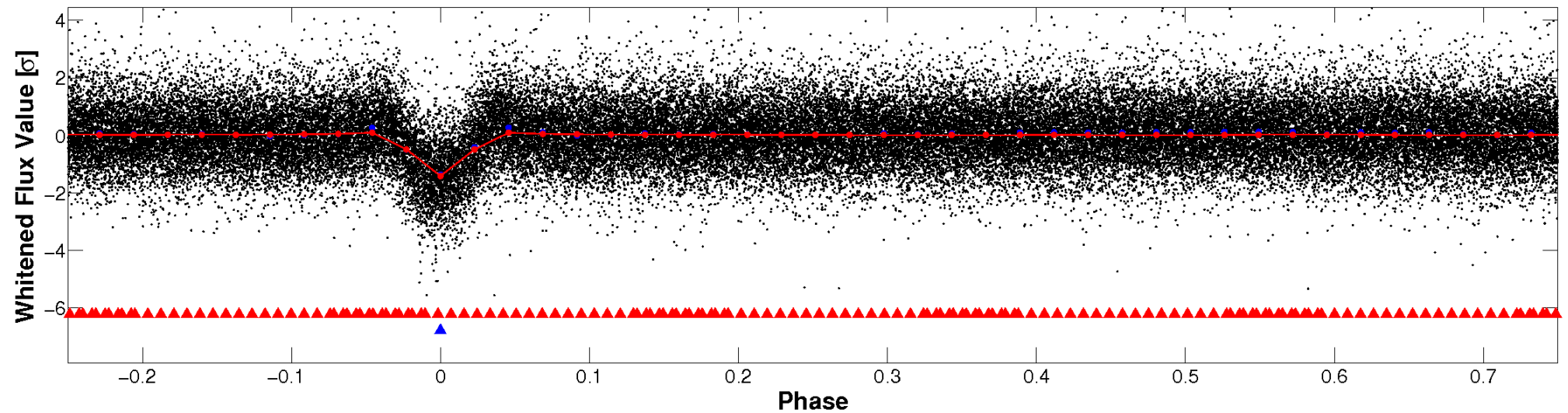


# Non-Whitened Vs. Whitened Light Curve

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

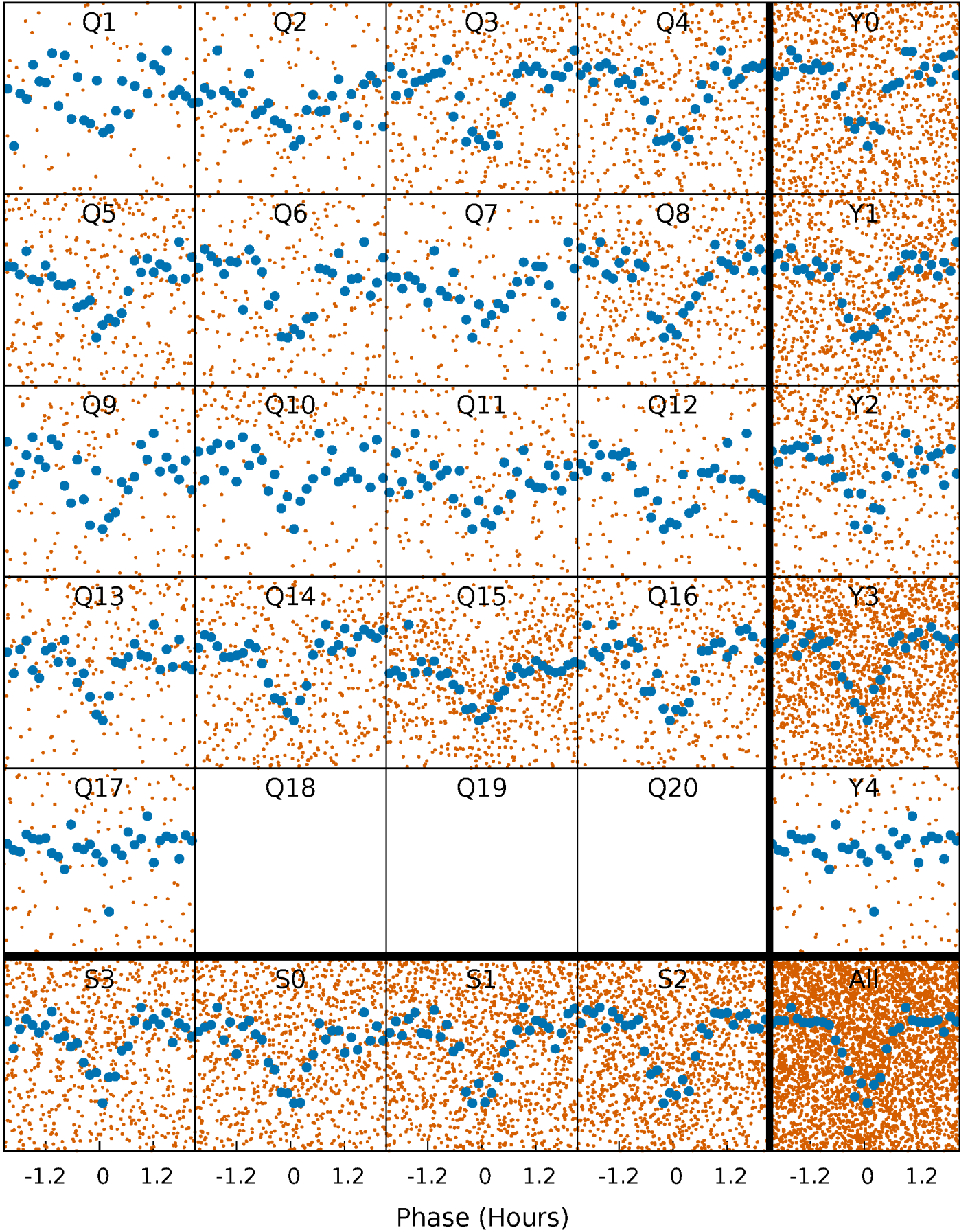


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



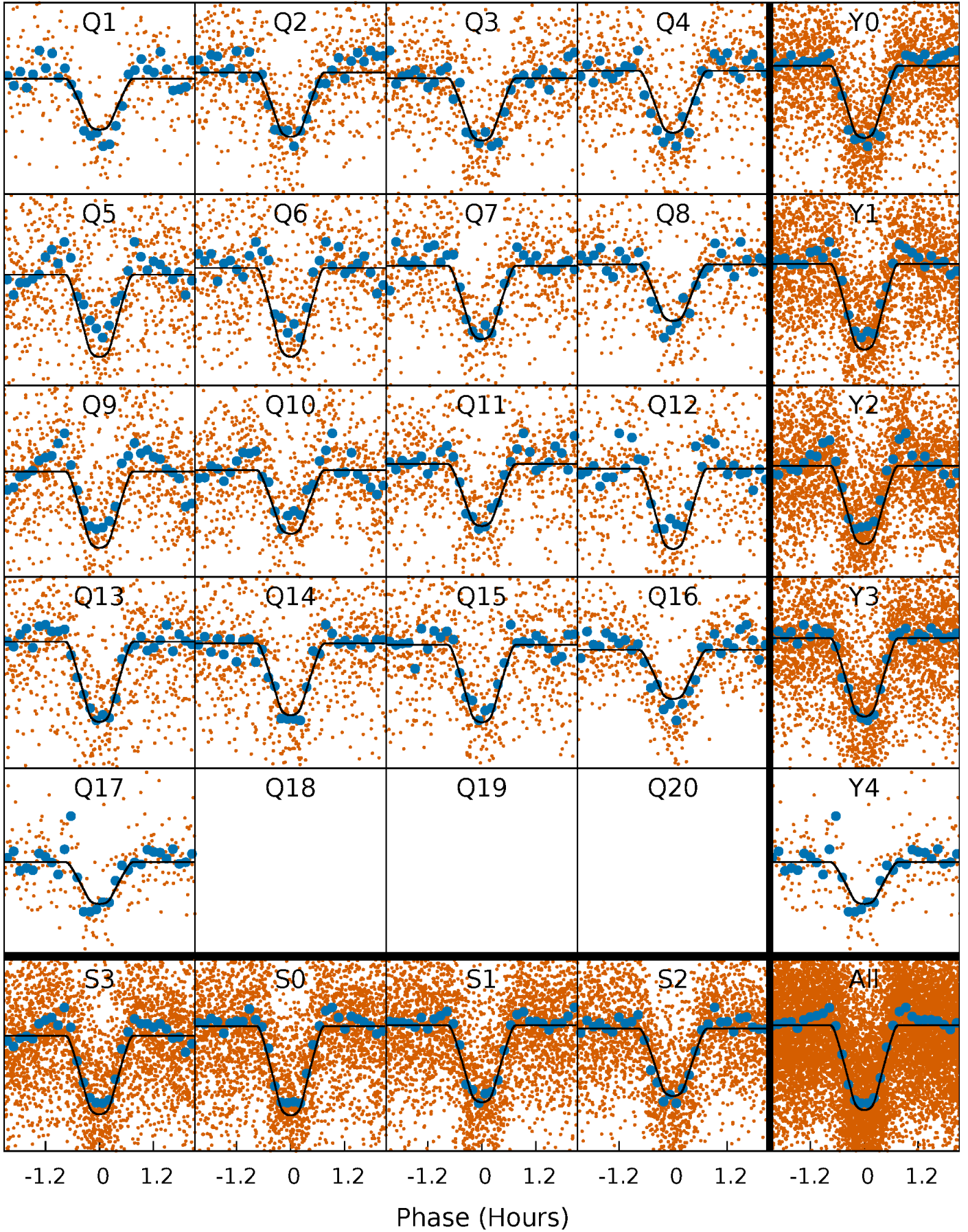
# PDC Quarter-Phased Transit Curves

TCE 009388479-02   P= 0.893043 Days    $T_0=131.860396$  (BKJD)



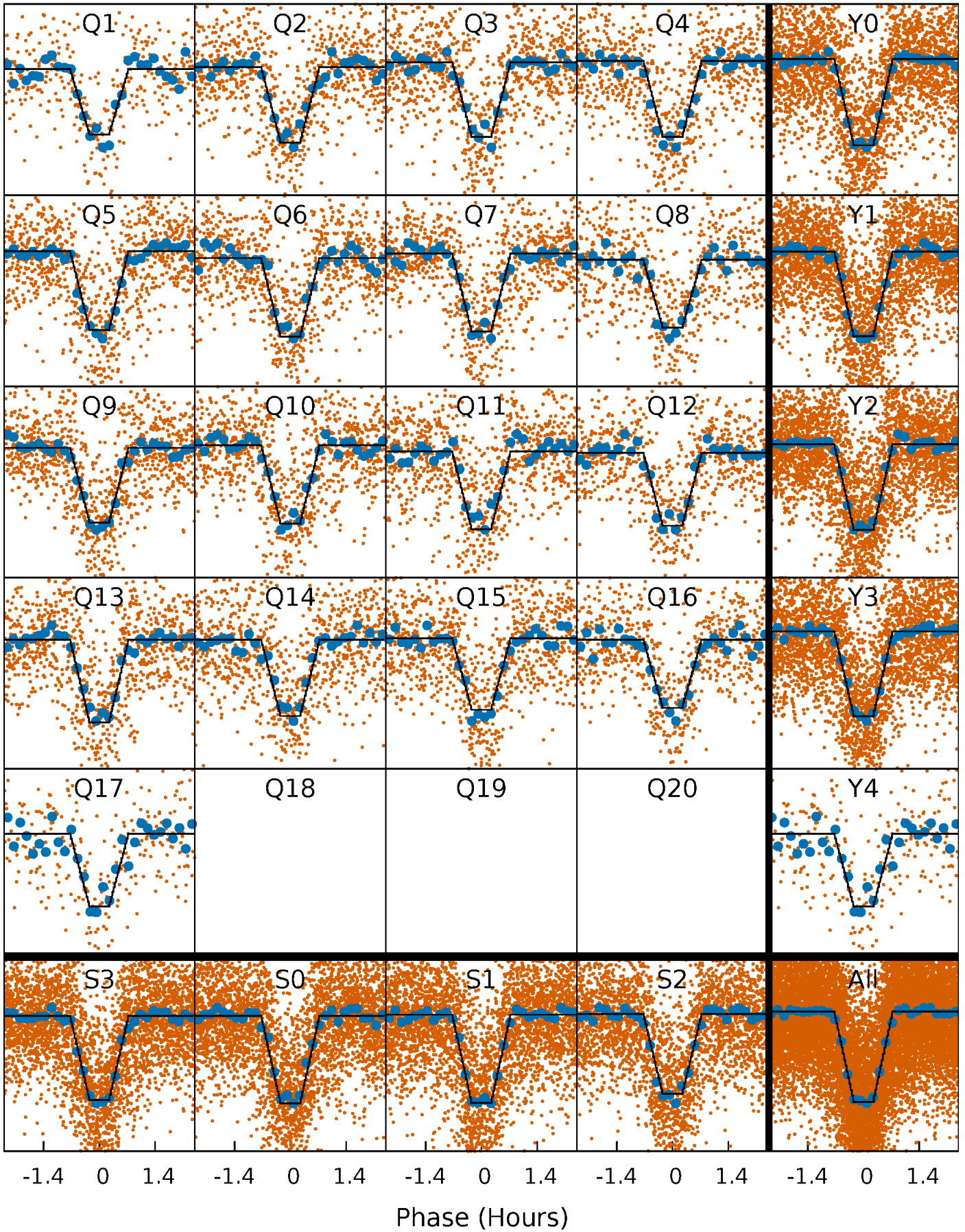
# DV Quarter-Phased Transit Curves

TCE 009388479-02   P= 0.893043 Days    $T_0=131.860396$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

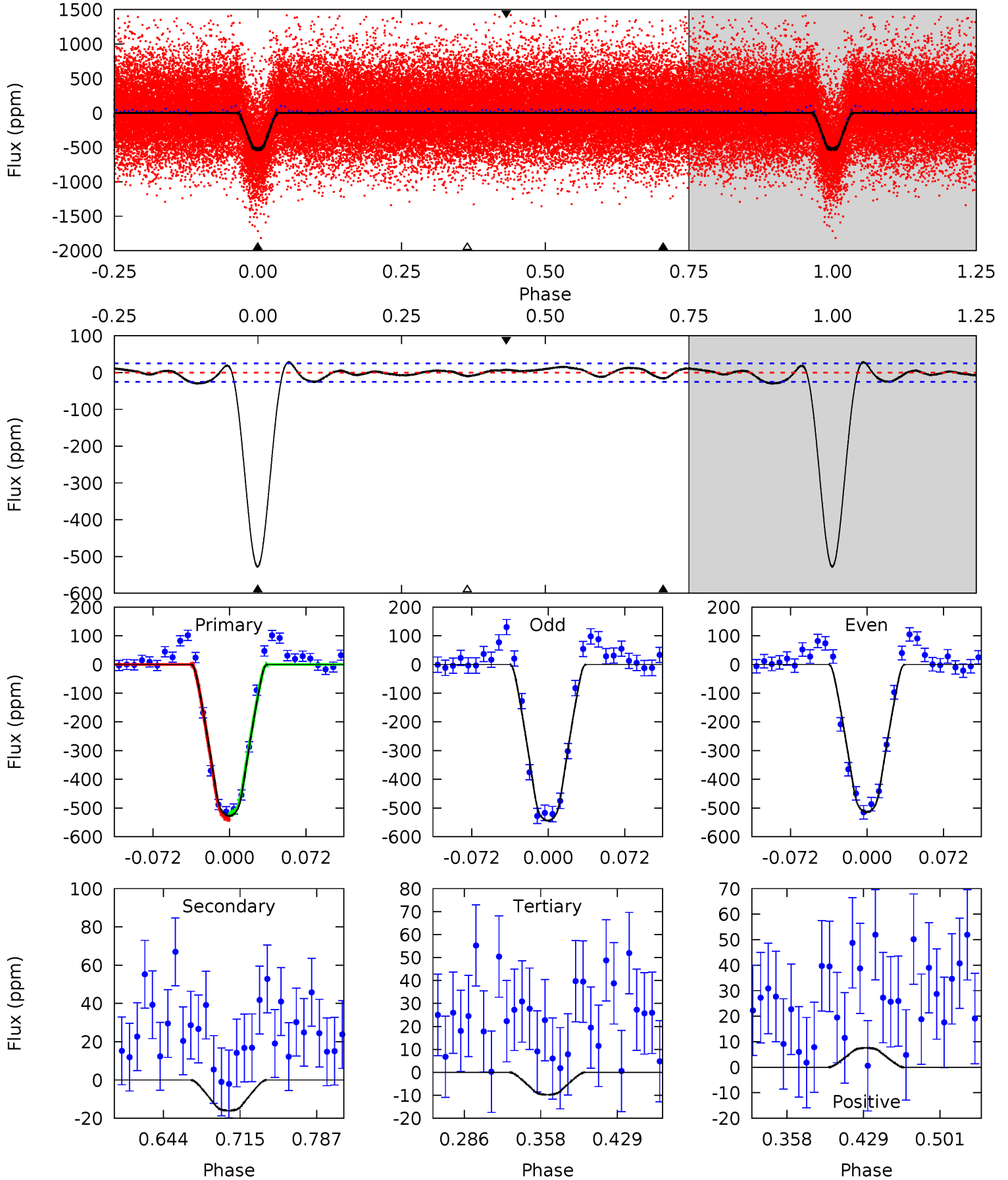
TCE 009388479-02     $P = 0.893041$  Days     $T_0 = 131.861210$  (BKJD)



# DV Model-Shift Uniqueness Test

009388479-02, P = 0.893043 Days, E = 130.967353 Days

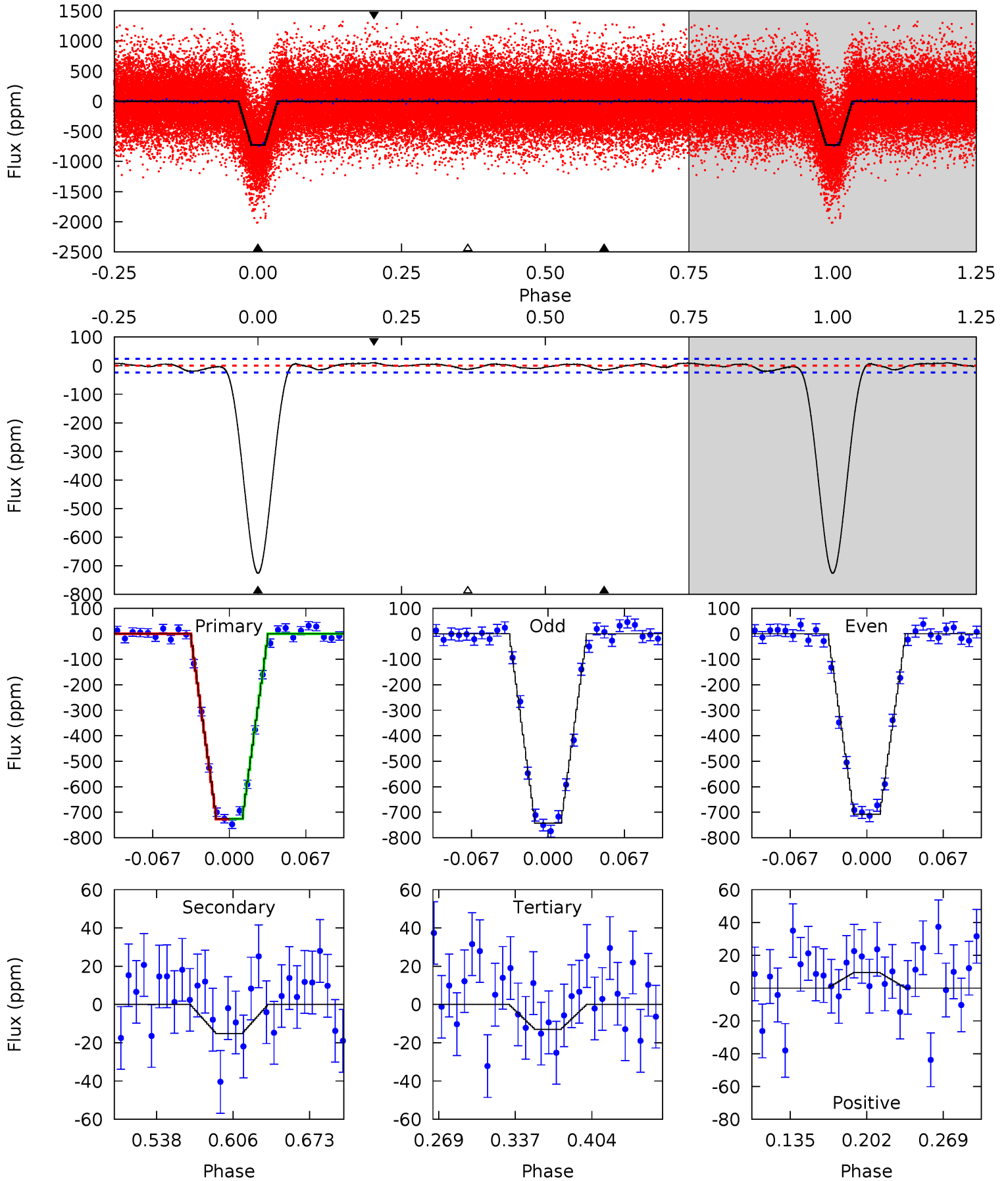
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
97.7	2.96	1.81	1.41	4.63	1.80	1.90	95.9	96.3	1.16	1.55	2.74	0.98	0.05	1.64



# Alt Model-Shift Uniqueness Test

009388479-02, P = 0.893041 Days, E = 130.968169 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
142.4	2.99	2.55	1.87	4.65	1.83	1.36	139.9	140.6	0.44	1.12	3.44	0.99	0.01	0.04



### Stellar Parameters For KIC 009388479

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$3582^{+71}_{-89}$	$4.807^{+0.050}_{-0.045}$	$0.180^{+0.150}_{-0.150}$	$0.458^{+0.040}_{-0.055}$	$0.491^{+0.034}_{-0.063}$	$7.203^{+1.980}_{-1.301}$
	+2%/-2%	+1%/-1%	+83%/-83%	+9%/-12%	+7%/-13%	+27%/-18%
Source	SPE70	SPE60	SPE70	DSEP		

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

### Secondary Eclipse Parameters for KIC 009388479-02 / KOI 0936.02

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-16 \pm 5$	$1.30^{+0.20}_{-0.18}$	$1248^{+36}_{-41}$	$2100^{+122}_{-158}$	$1.054^{+0.511}_{-0.401}$
Alt.	$-15 \pm 5$	$1.34^{+0.18}_{-0.20}$	$1248^{+37}_{-39}$	$2063^{+140}_{-153}$	$0.965^{+0.477}_{-0.360}$

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

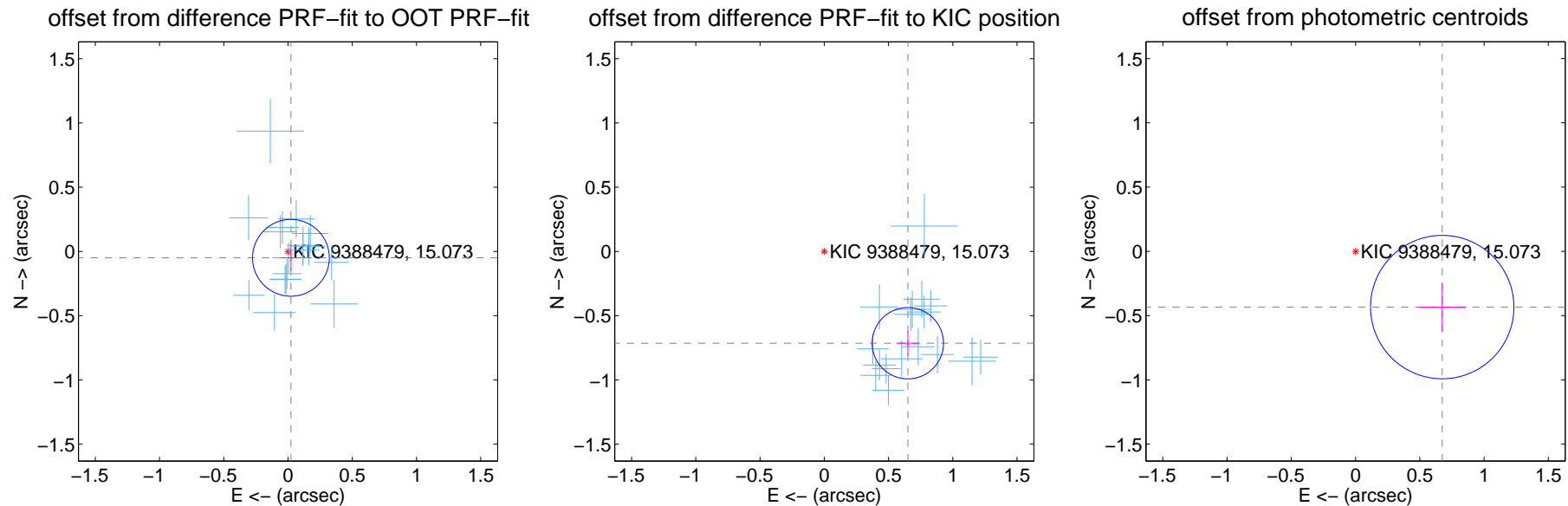
## DV Centroid Data

Supplemental centroid analysis for 009388479-02. Kepler magnitude: 15.07. Transit SNR 61.75

There are 17 quarters with good PRF difference image offsets

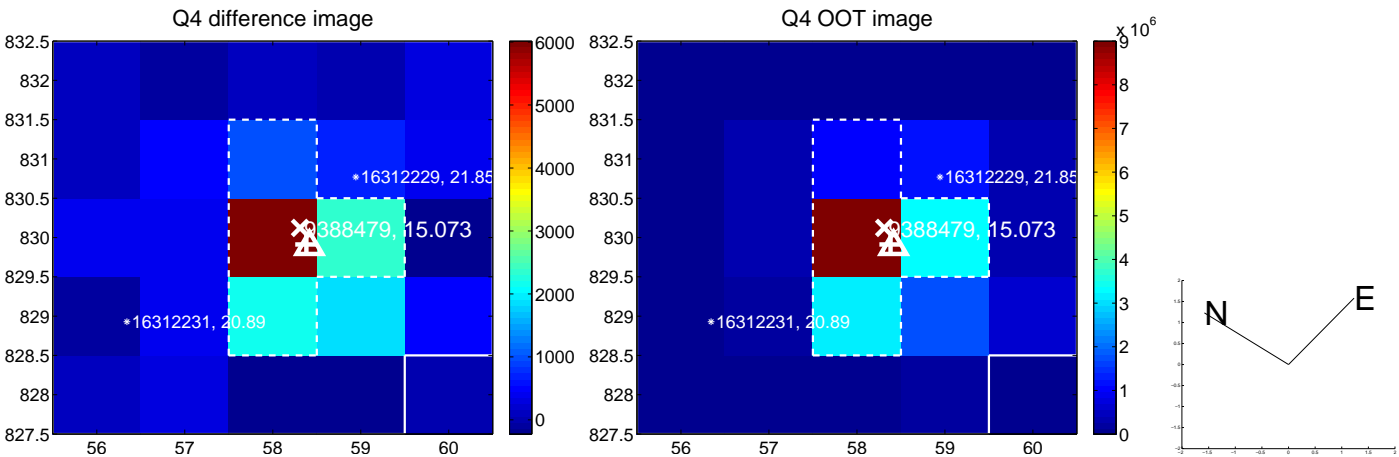
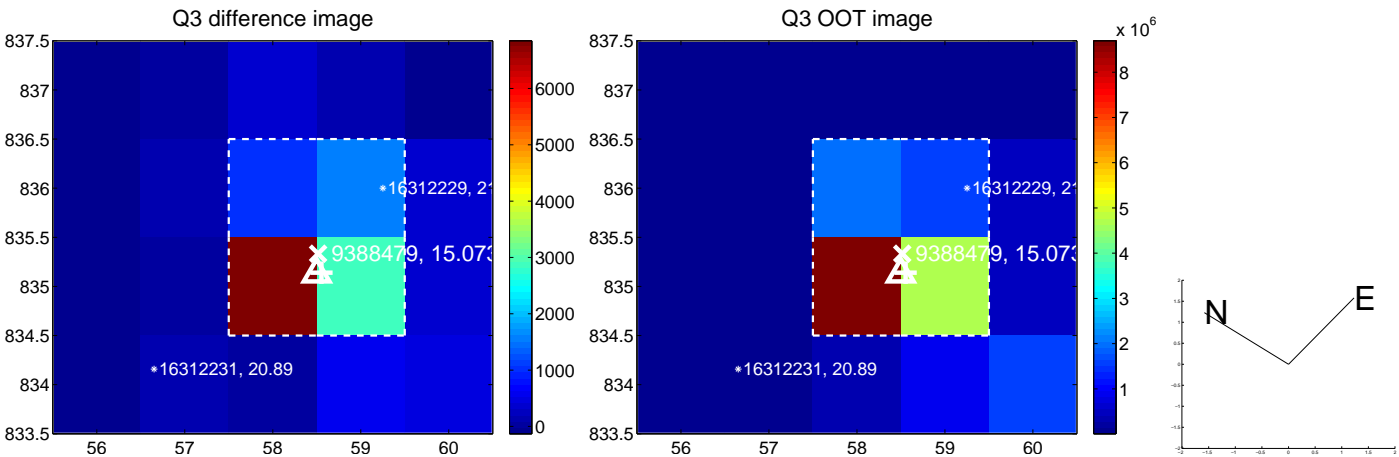
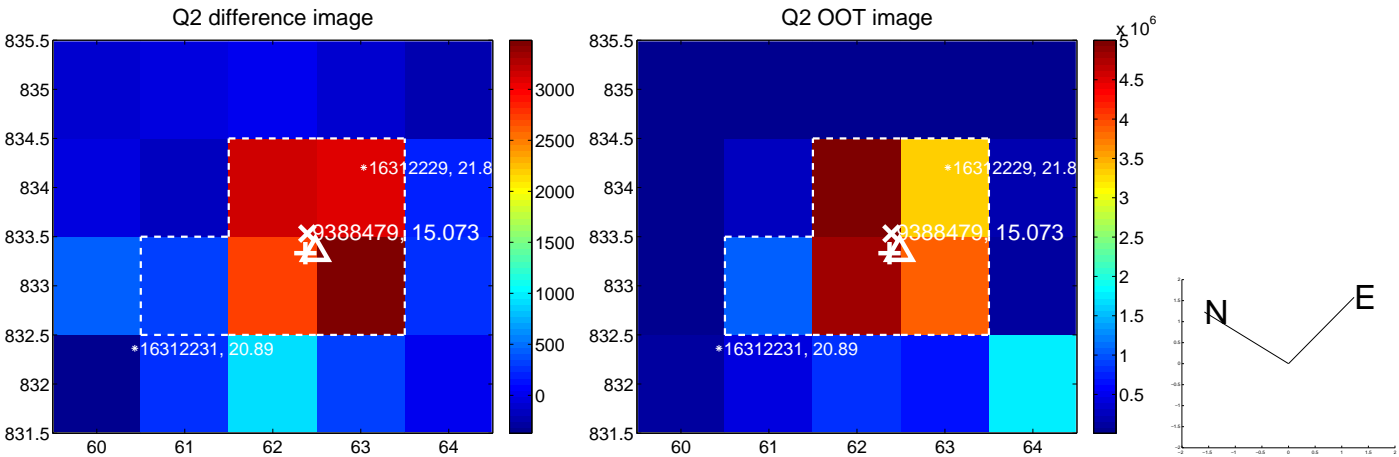
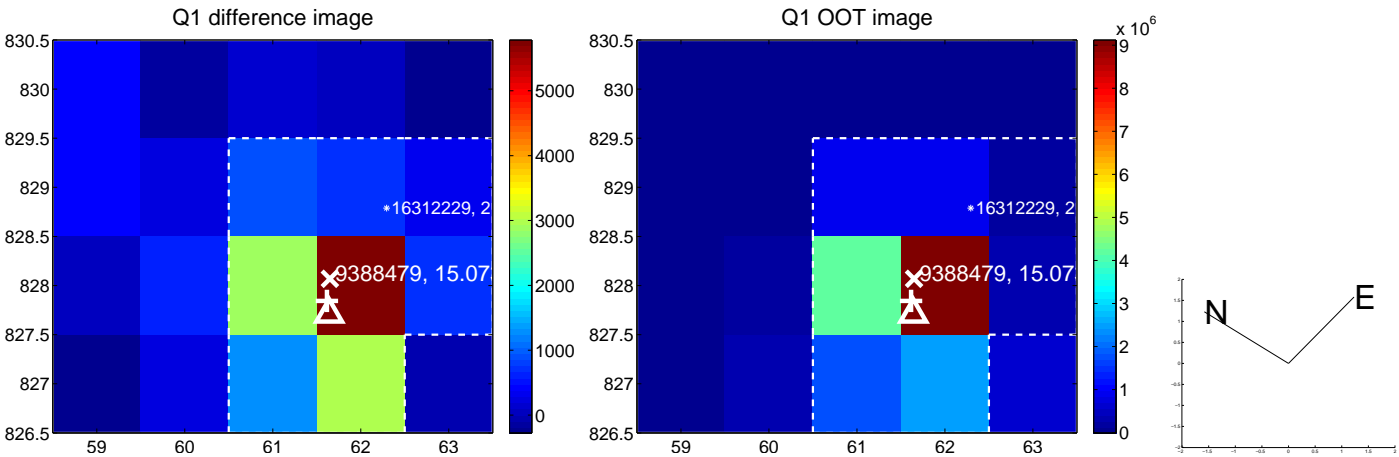
The direct PRF centroid is offset from the target star catalog position by about 1.18 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.055 \pm 0.100$	0.55	$-0.023 \pm 0.080$	$-0.050 \pm 0.101$
PRF-fit source offset from KIC position	$0.966 \pm 0.093$	10.44	$-0.650 \pm 0.090$	$-0.714 \pm 0.095$
photometric centroid source offset	$0.80 \pm 0.19$	4.31	$-0.67 \pm 0.19$	$-0.43 \pm 0.19$

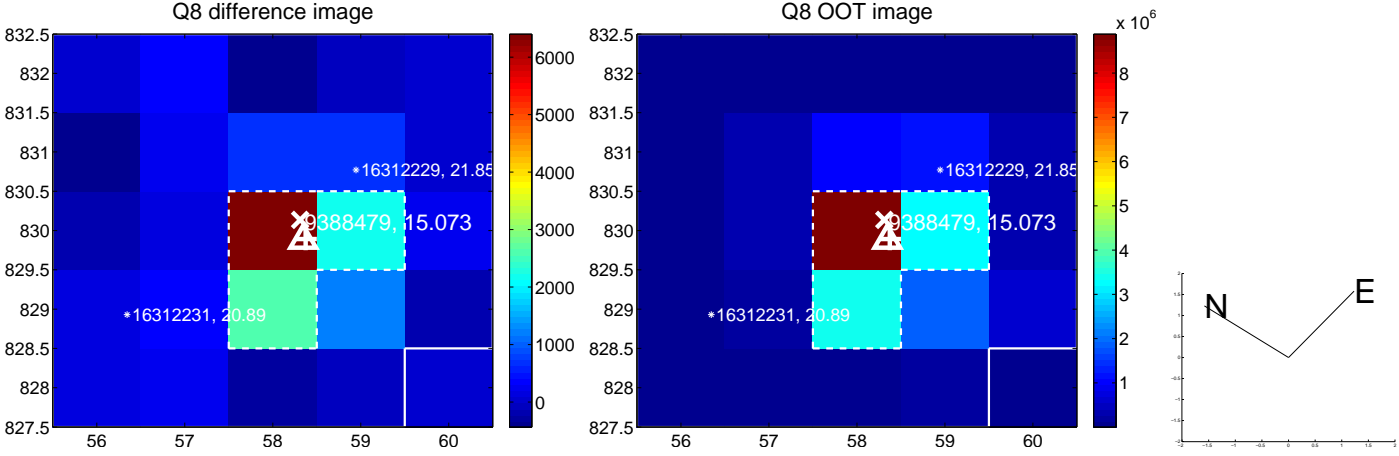
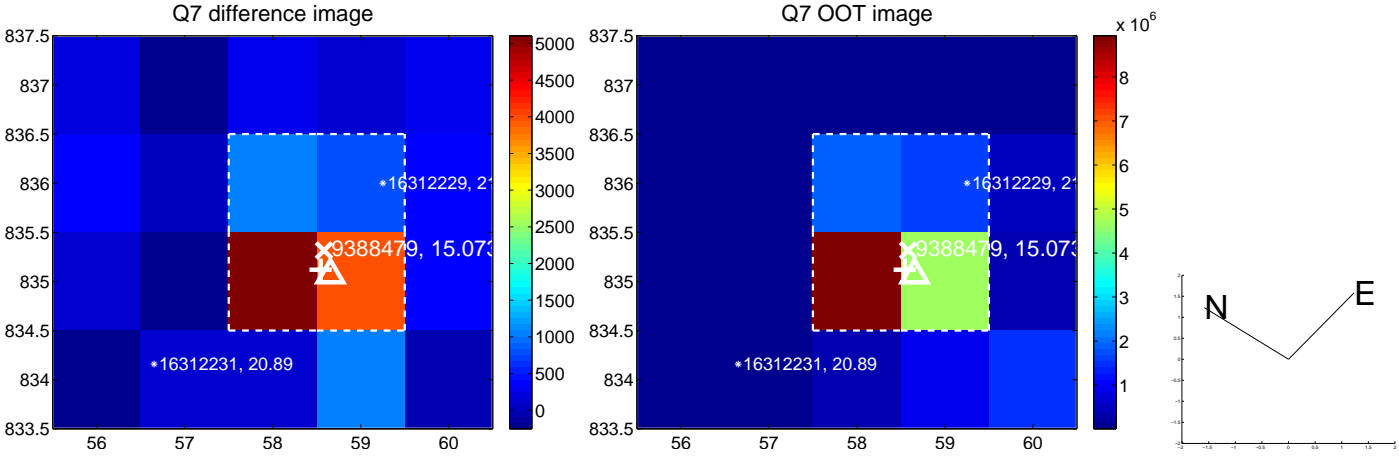
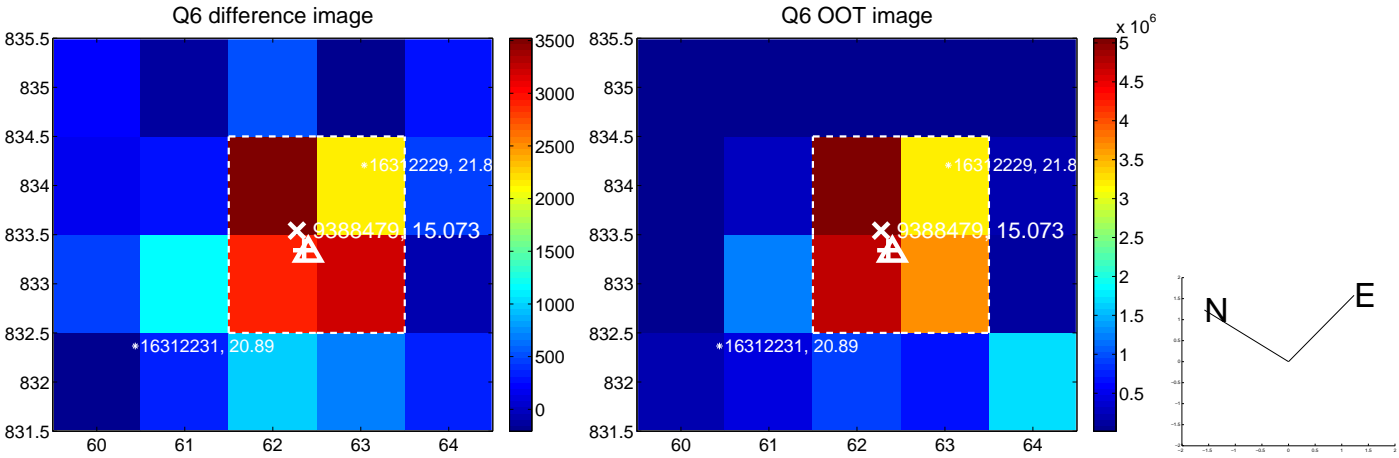
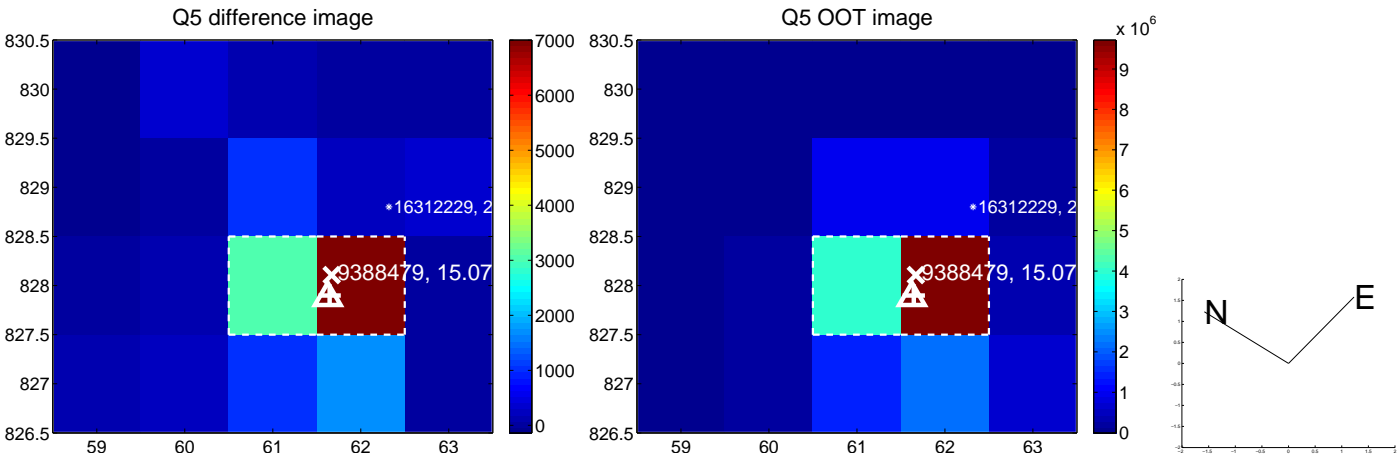


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

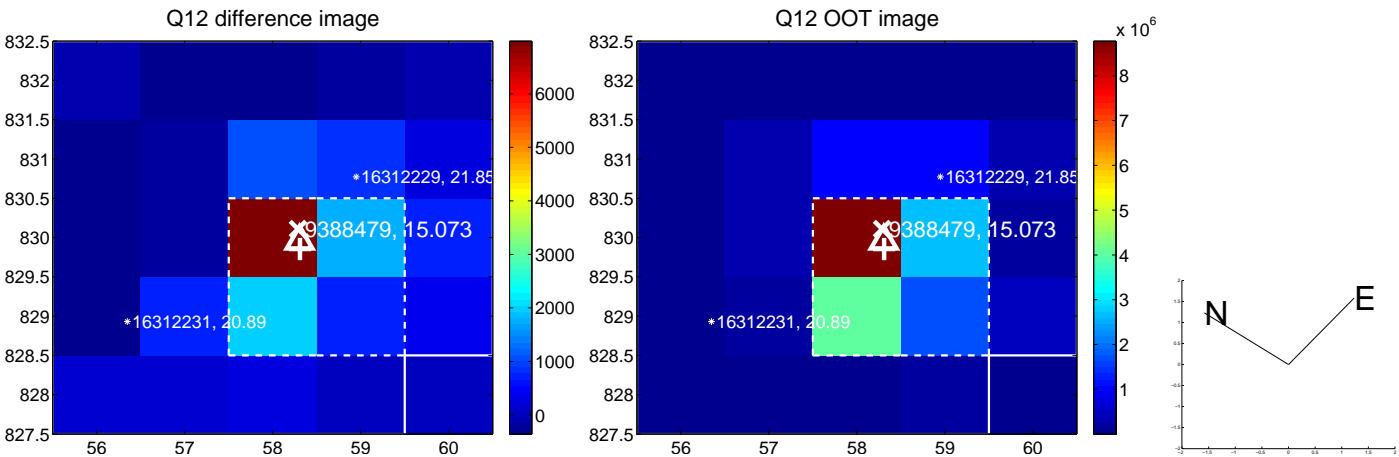
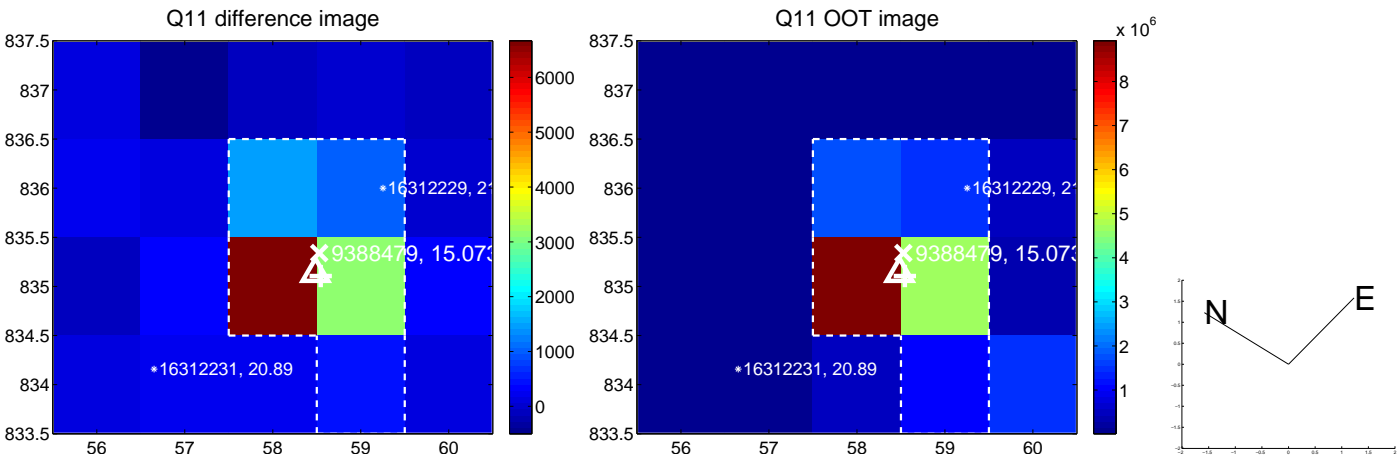
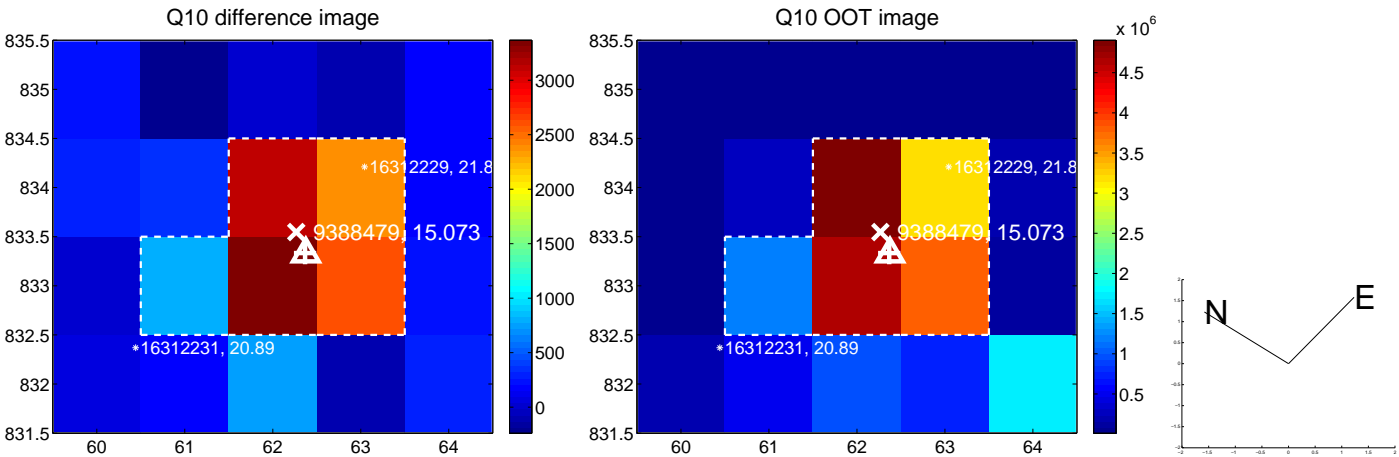
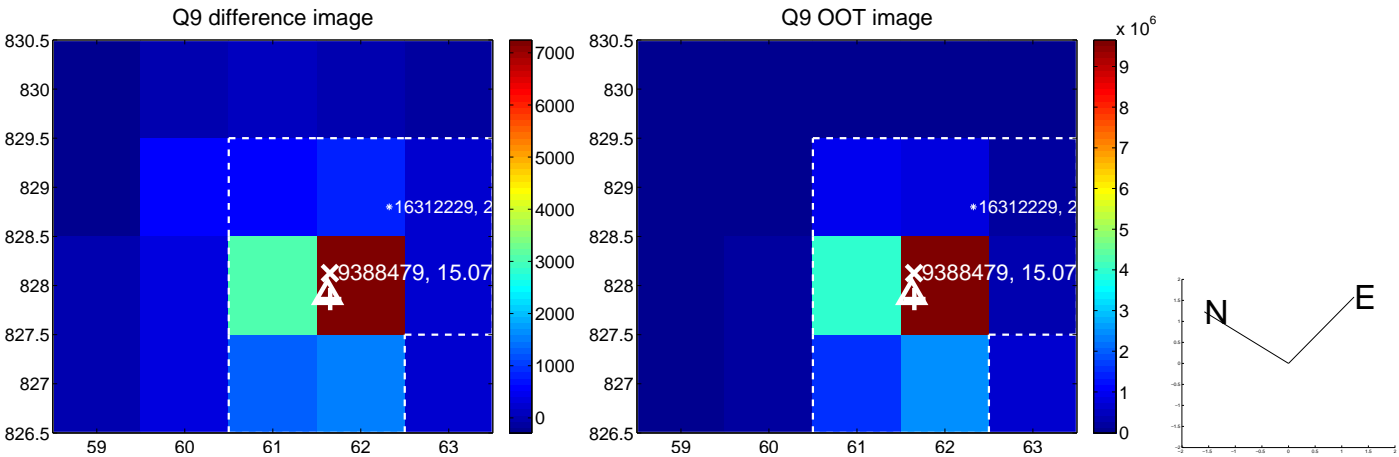
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



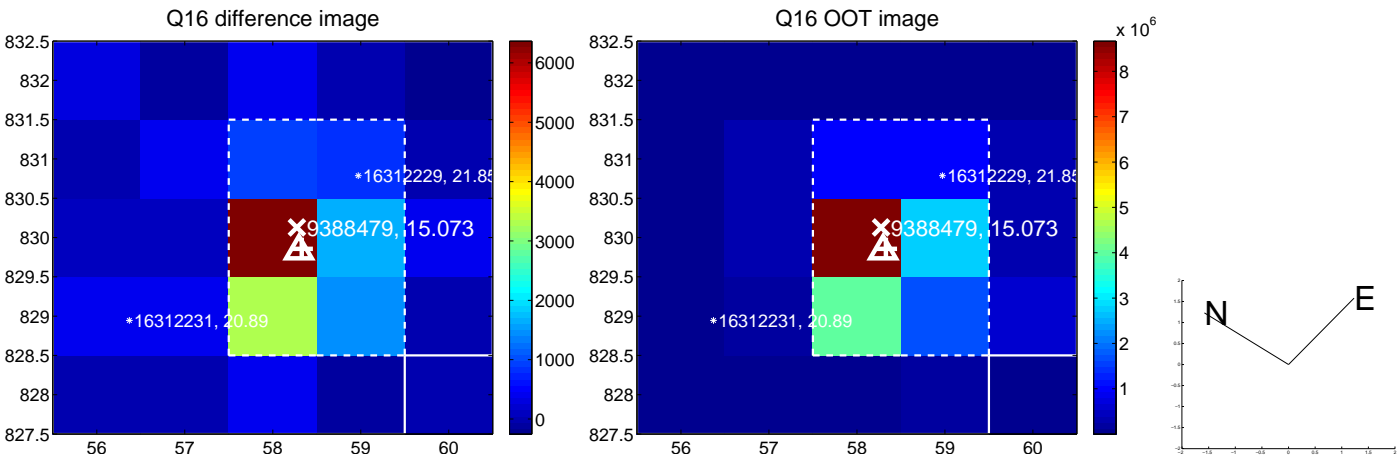
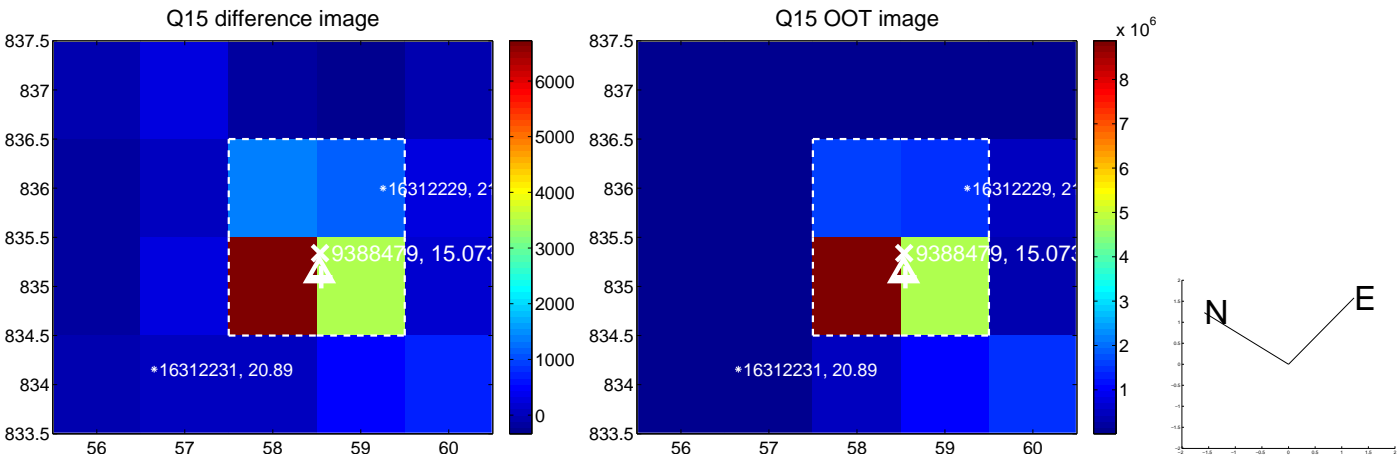
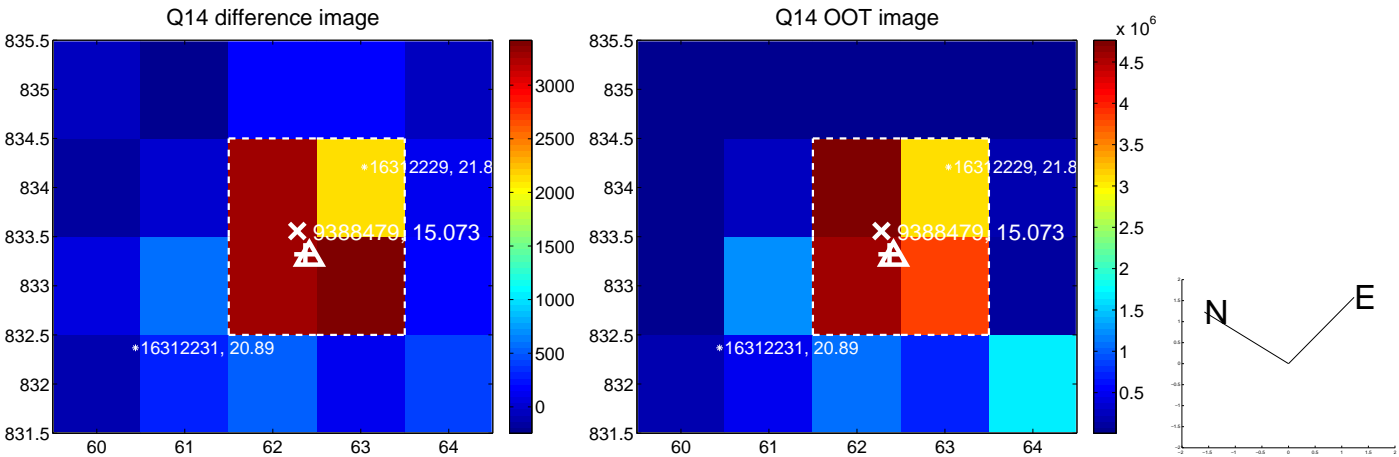
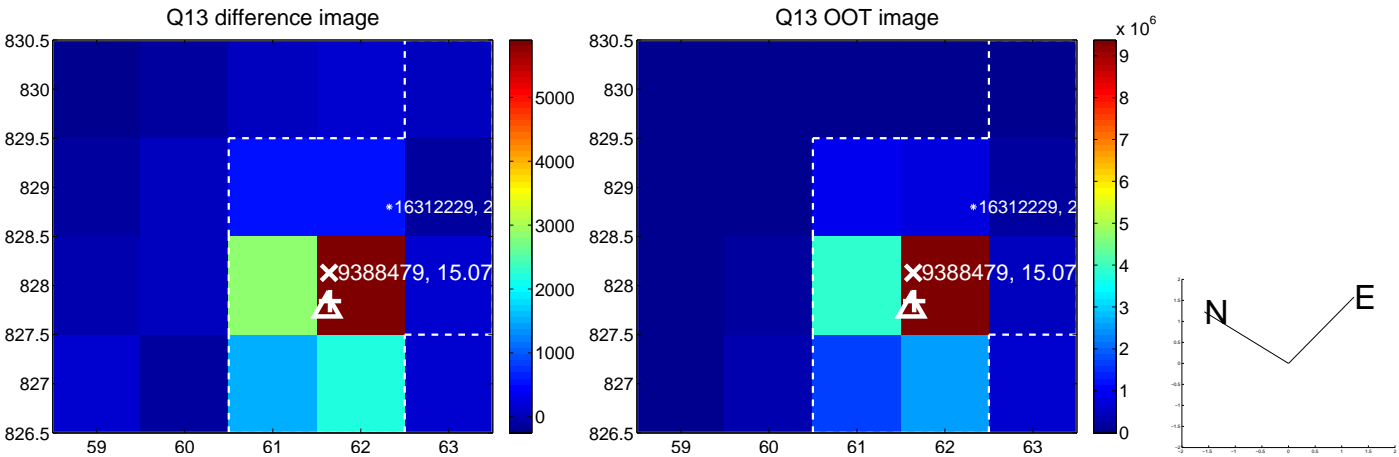
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



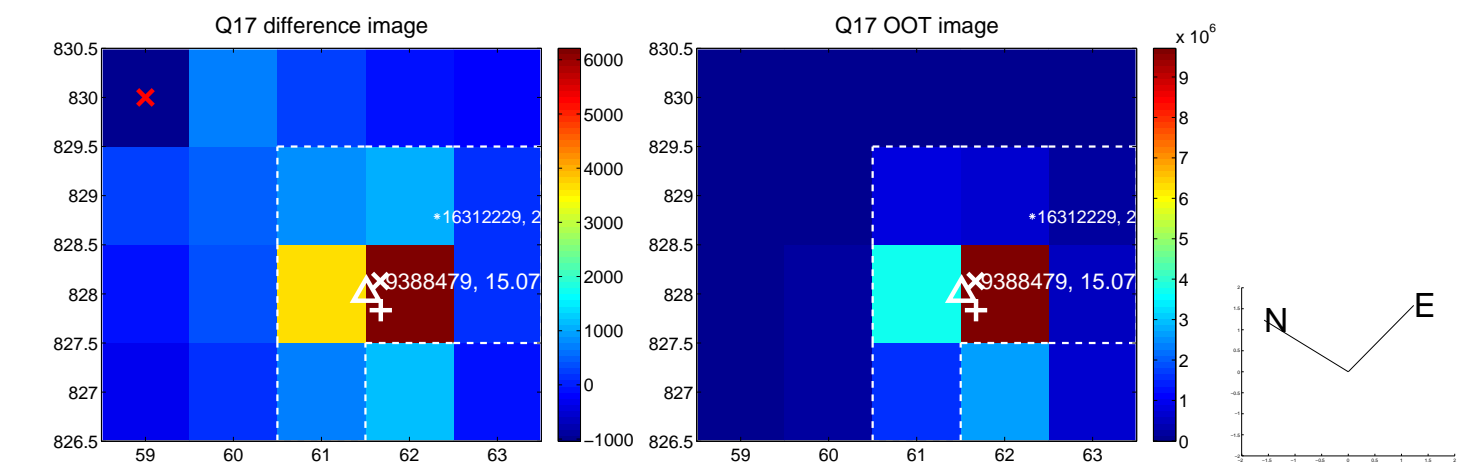
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



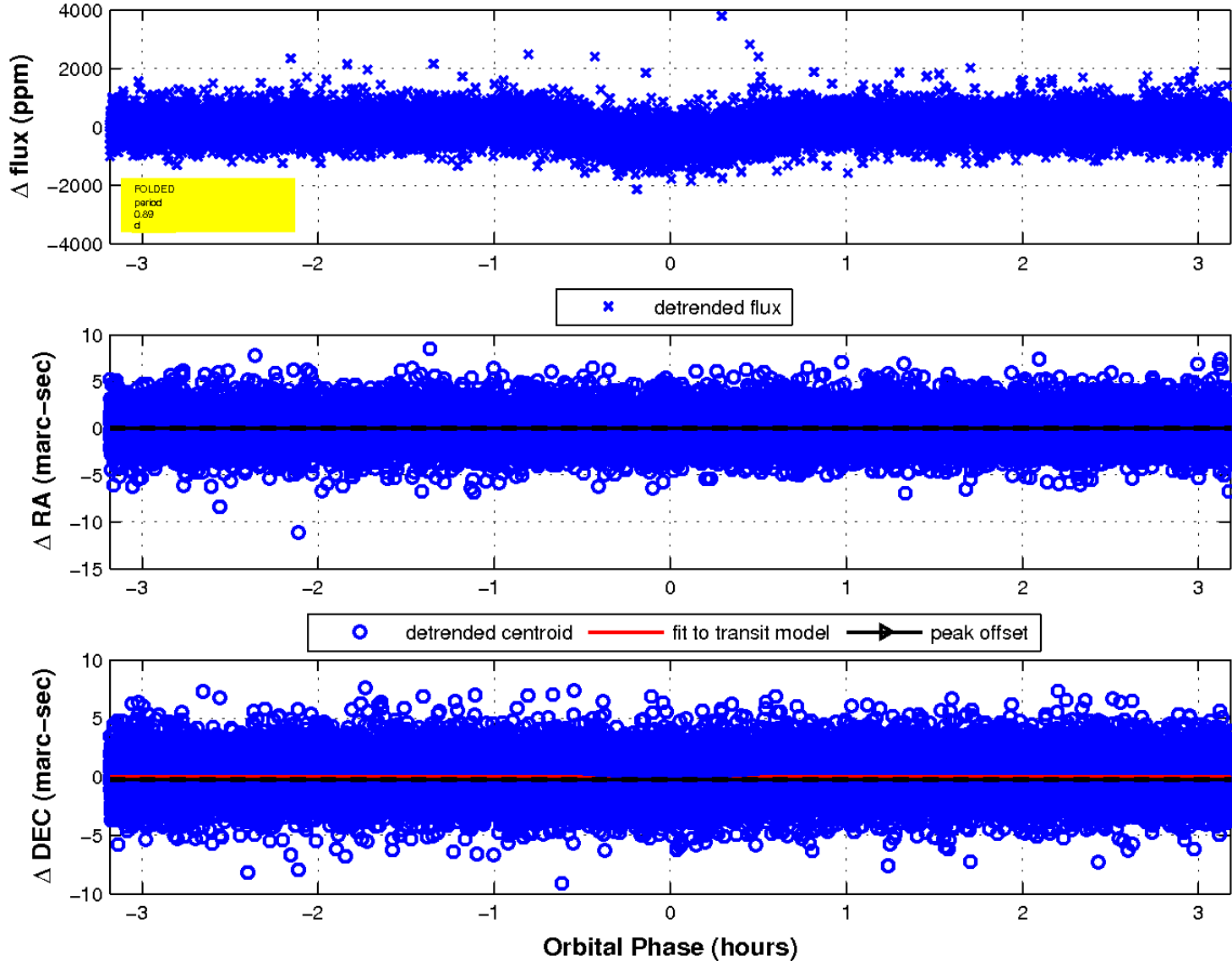
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

Declination

