

# KIC 009666465

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009666465-01	OBS	No	4.844361	134.501105	69.8	15.000	11.1	-1.0	1.80	7292	1.52	1969.39
009666465-02	OBS	No	4.844885	136.164832	94.3	26.459	13.7	16.2	1.80	7292	1.87	1969.10

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009666465-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—CENT_NOFITS
009666465-02	OBS	FP	0.00	1	0	0	0	LPP_DV—SAME_NTL_PERIOD

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

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

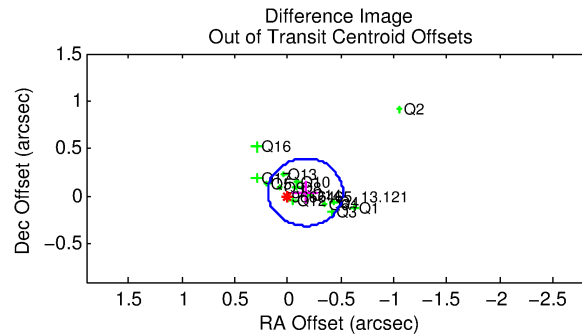
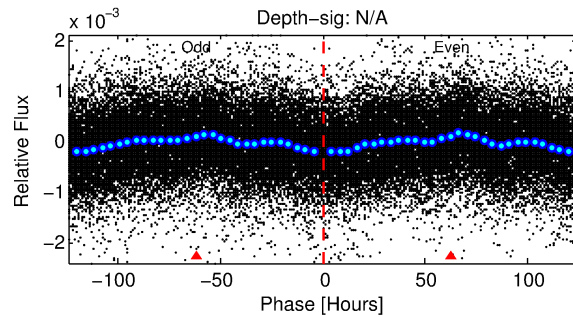
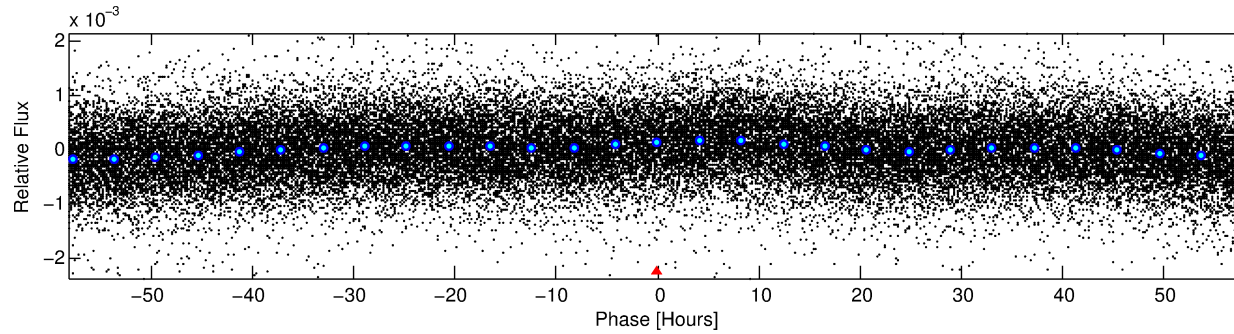
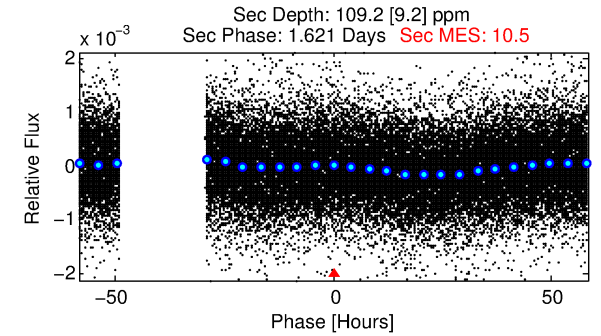
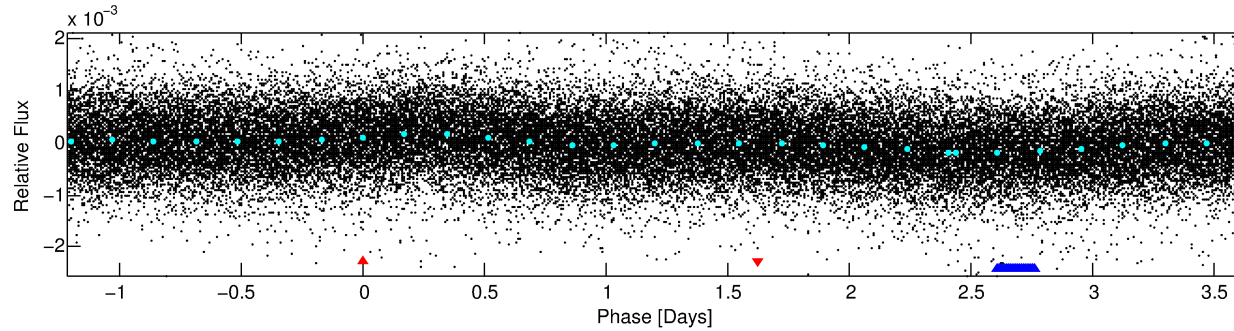
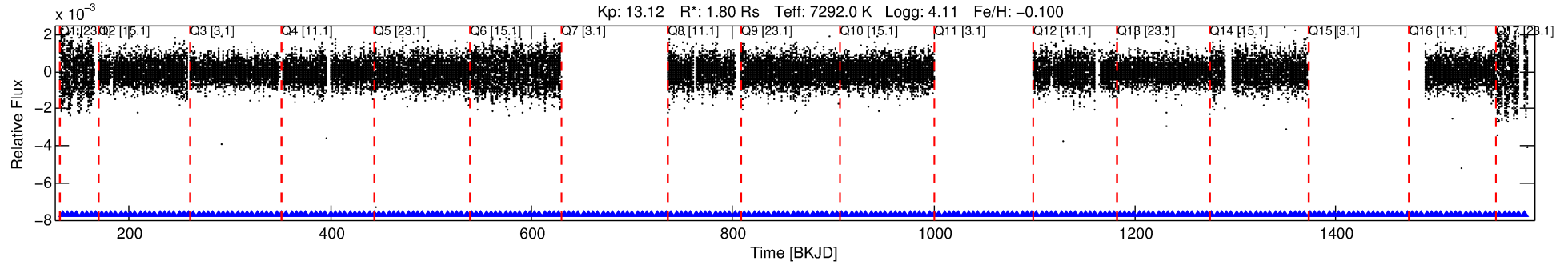
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009666465-01

No Significant Match Found

# DV One-Page Summary

KIC: 9666465 Candidate: 1 of 2 Period: 4.844 d



## TPS TCE Results:

Period = 4.84436 d  
Epoch = 134.5011 BKJD

DV fit results are unavailable

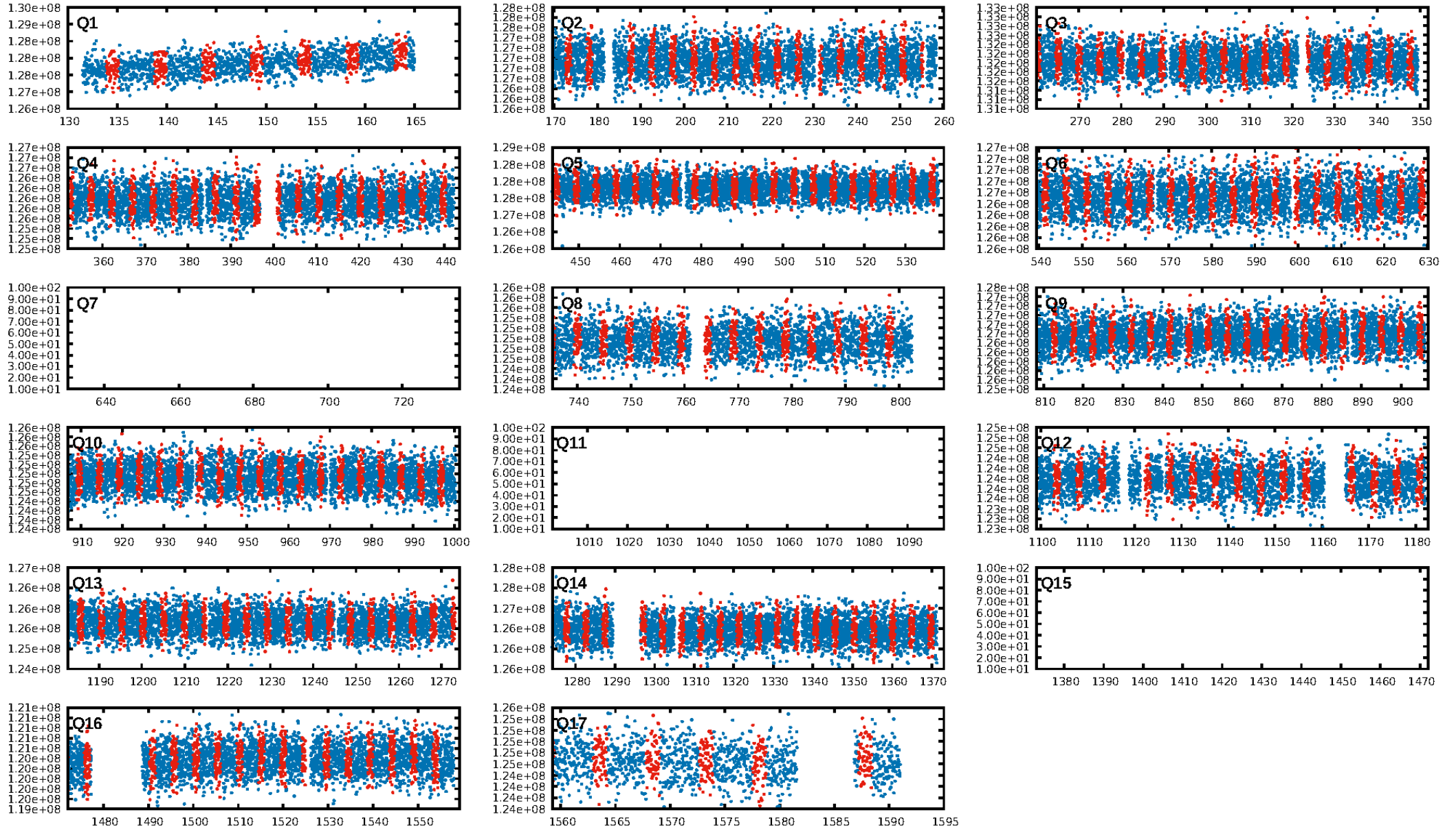
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
**LongPeriod-sig: 0.0% [0.00σ]**  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 4.46e-52  
RollingBand-fgt: 1.00 [212/212]  
**GhostDiagnostic-chr: 4.91**  
Centroid-sig: 0.7%  
Centroid-so: 0.253 arcsec [2.17σ]  
OotOffset-rm: 0.172 arcsec [1.45σ]  
KicOffset-rm: 0.179 arcsec [1.52σ]  
OotOffset-st: 4/1/4/5 [14]  
KicOffset-st: 4/1/4/5 [14]  
DiffImageQuality-fgm: 1.00 [14/14]  
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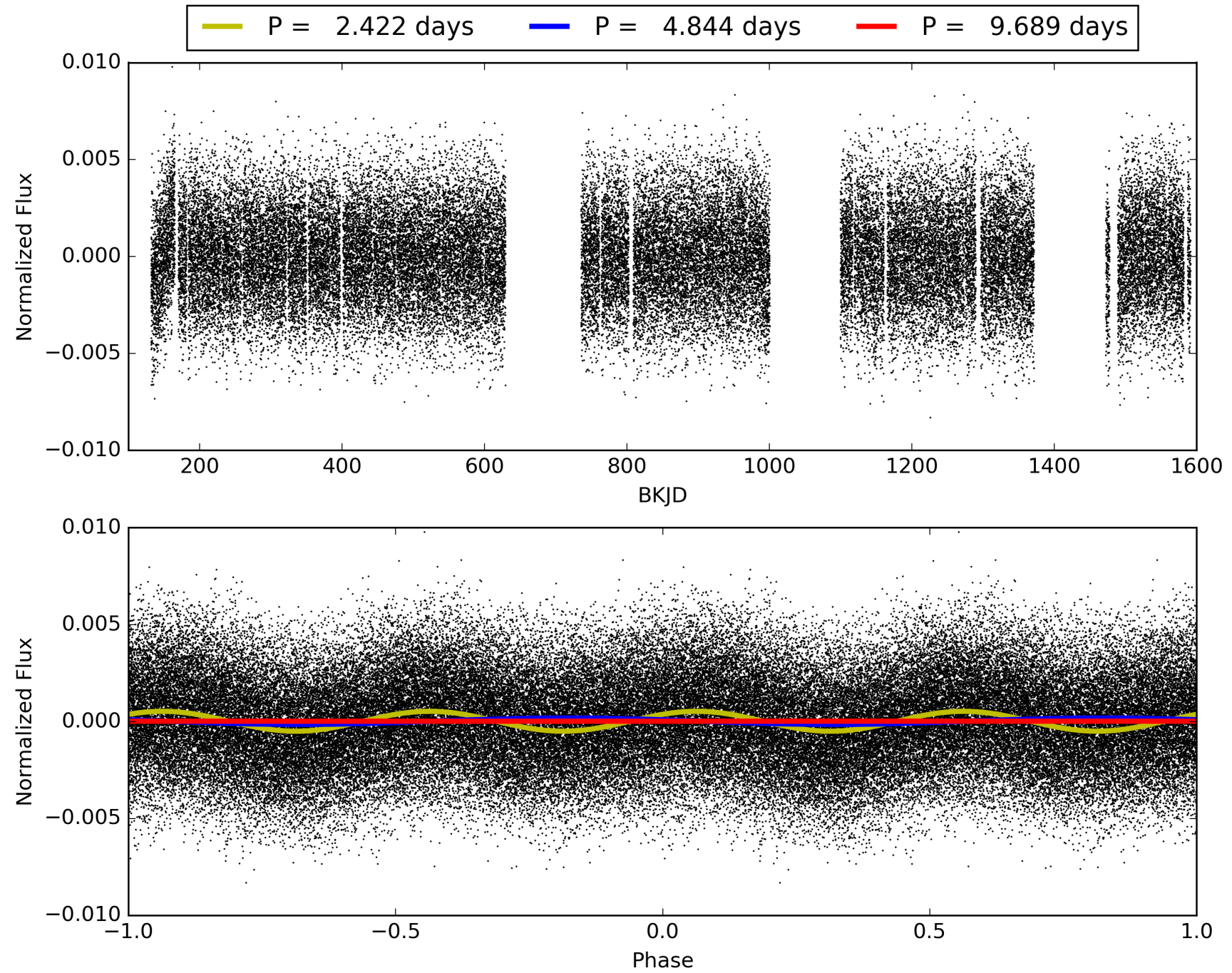
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 15:20:57 Z

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

# TCE 009666465-01, PDC Light Curves



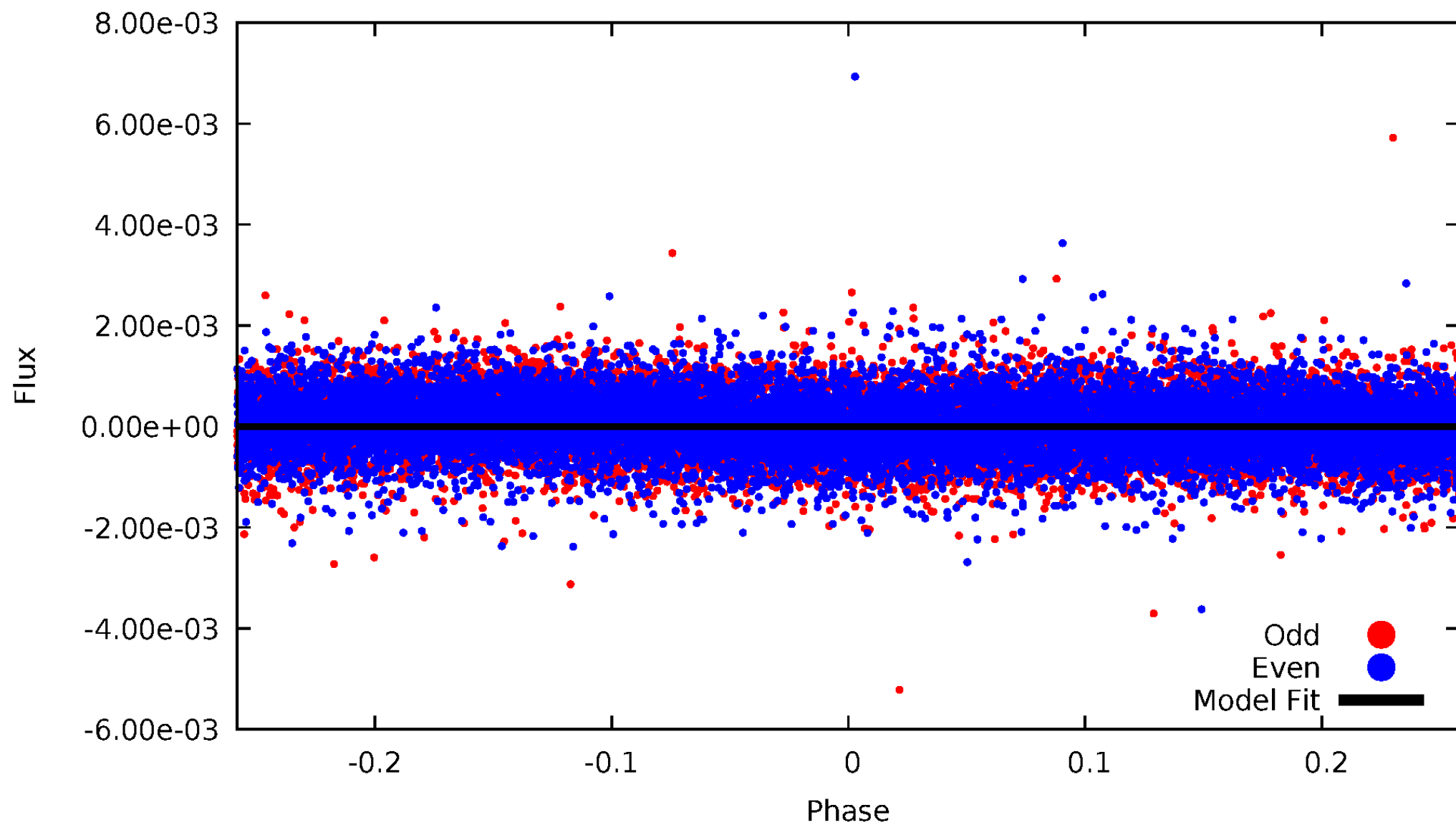
TCE 009666465-01





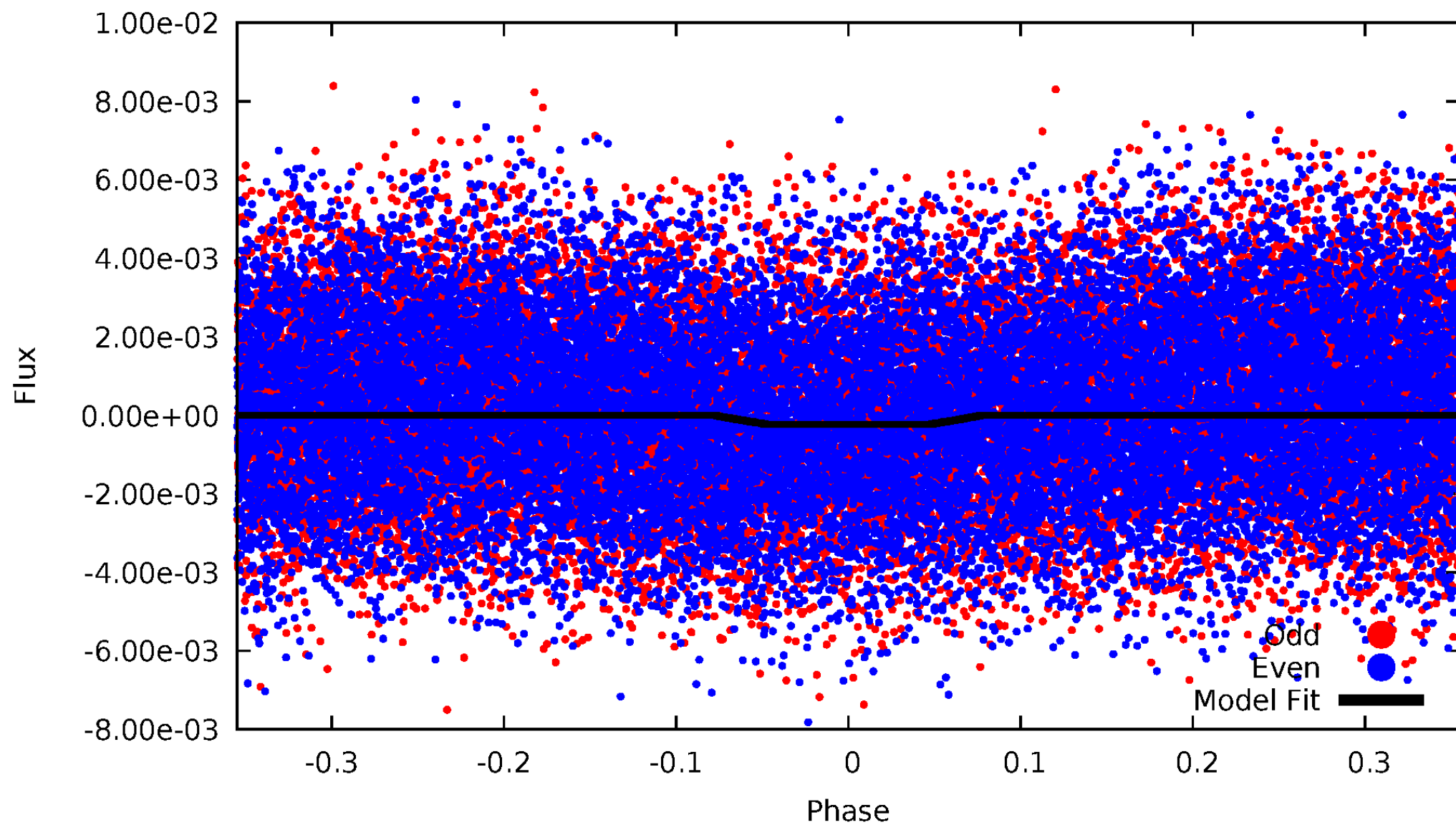
# DV Odd/Even

TCE 009666465-01



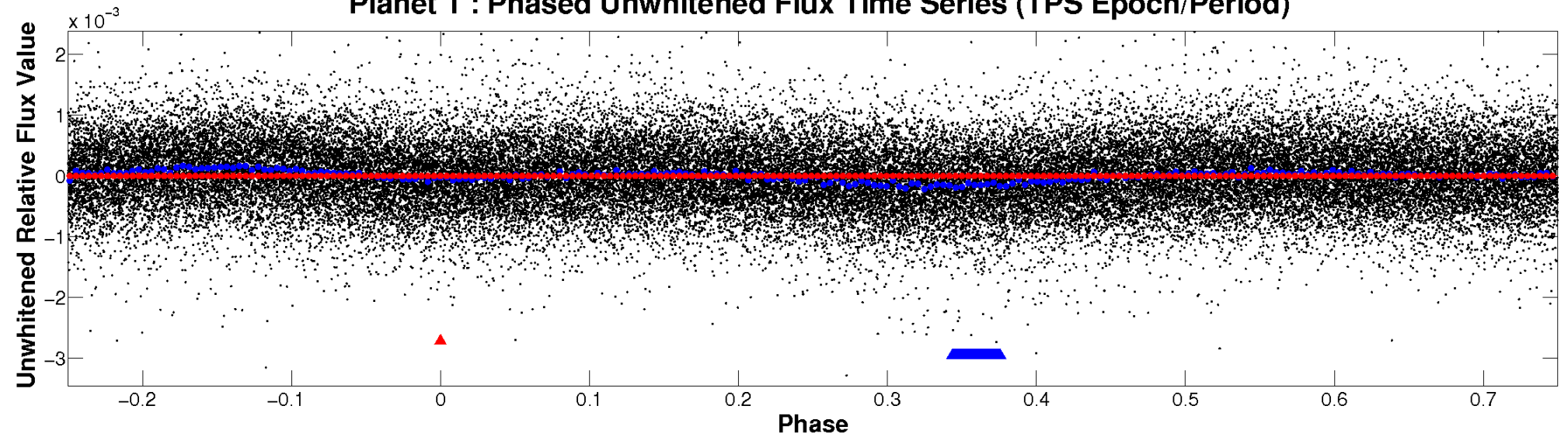
# ALT Odd/Even

TCE 009666465-01



# Non-Whitened Vs. Whitened Light Curve

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

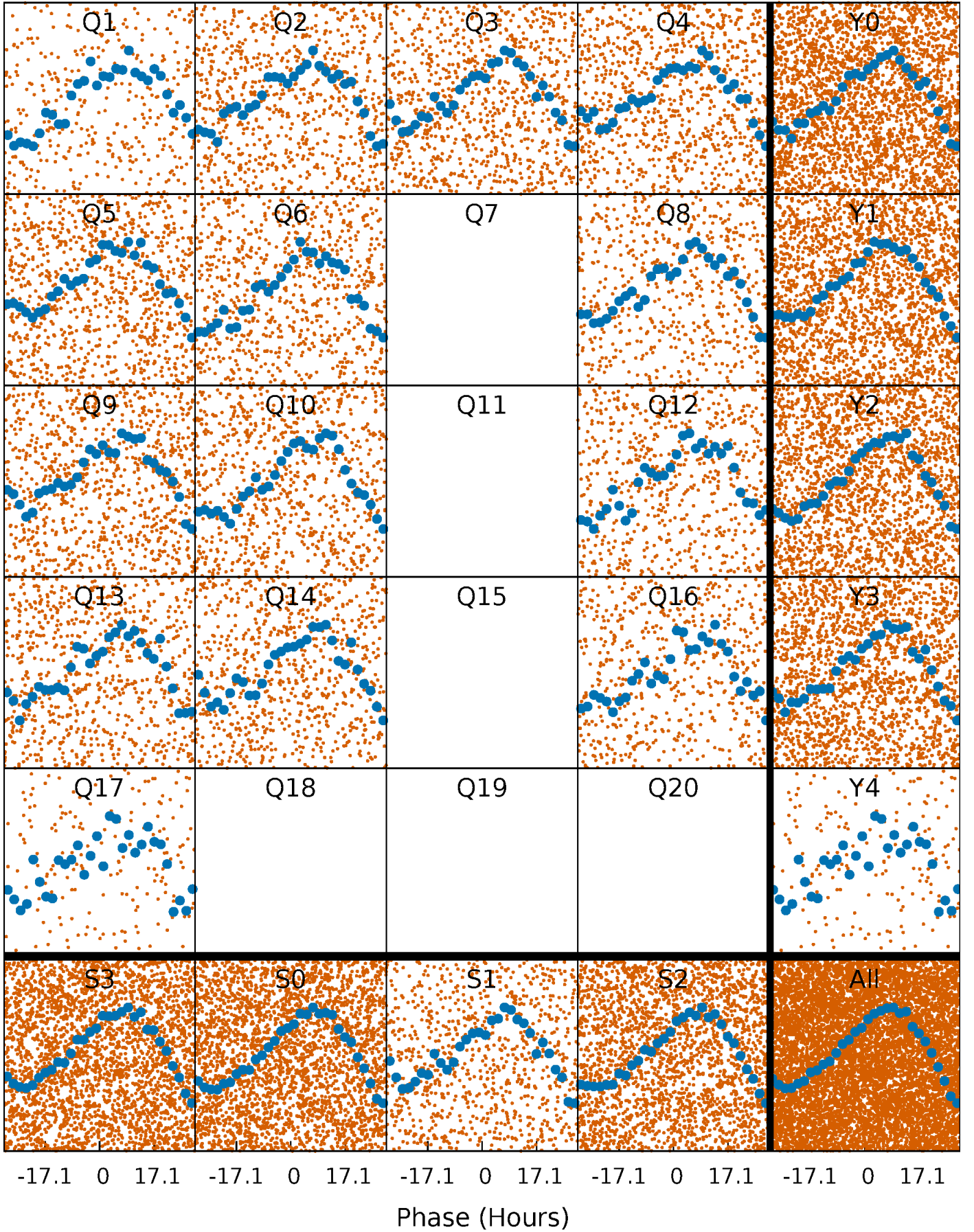


**Planet 1 : Phased Whitened Flux Time Series (TPS Epoch/Period)**



# PDC Quarter-Phased Transit Curves

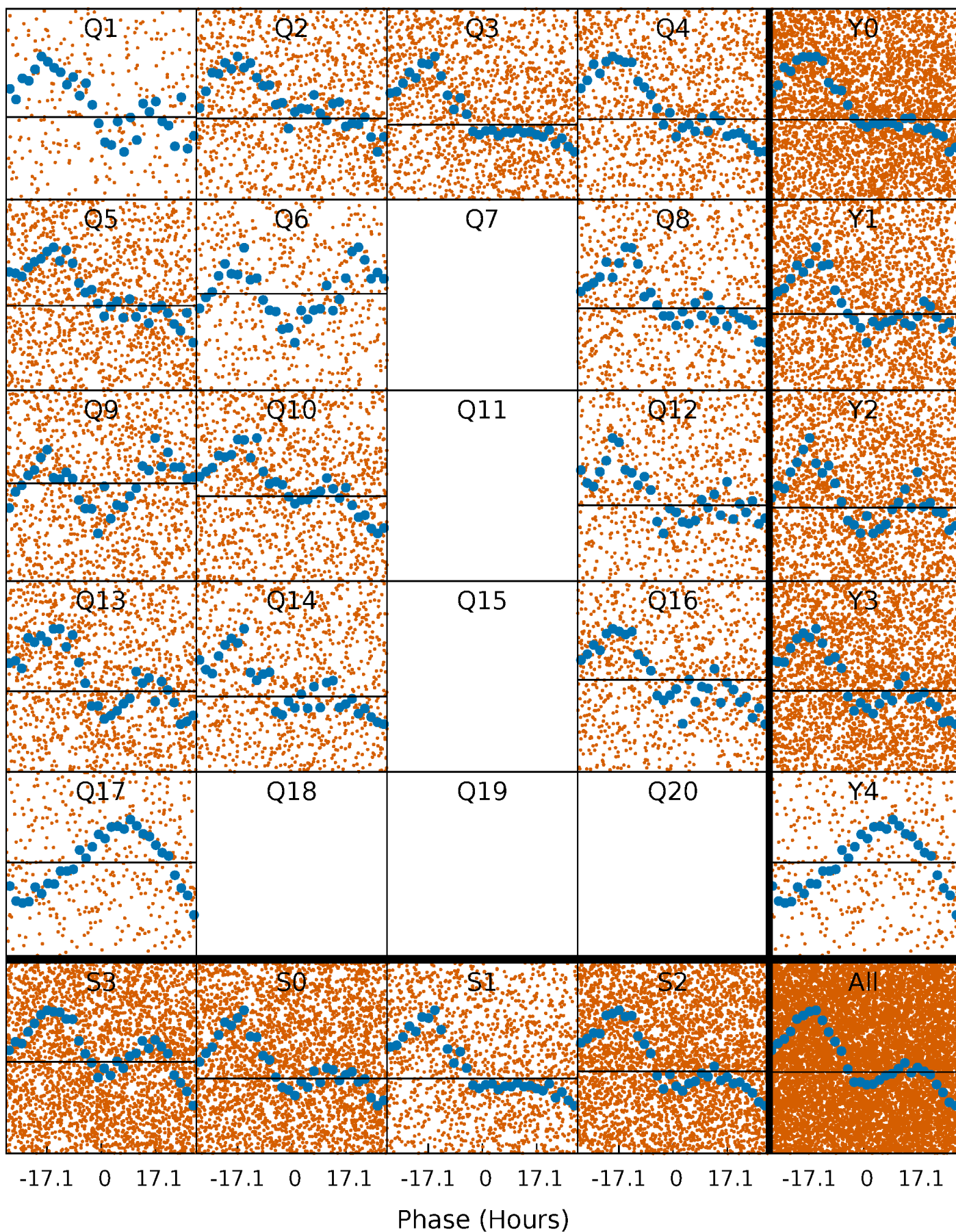
TCE 009666465-01 P= 4.844361 Days  $T_0=134.501105$  (BKJD)





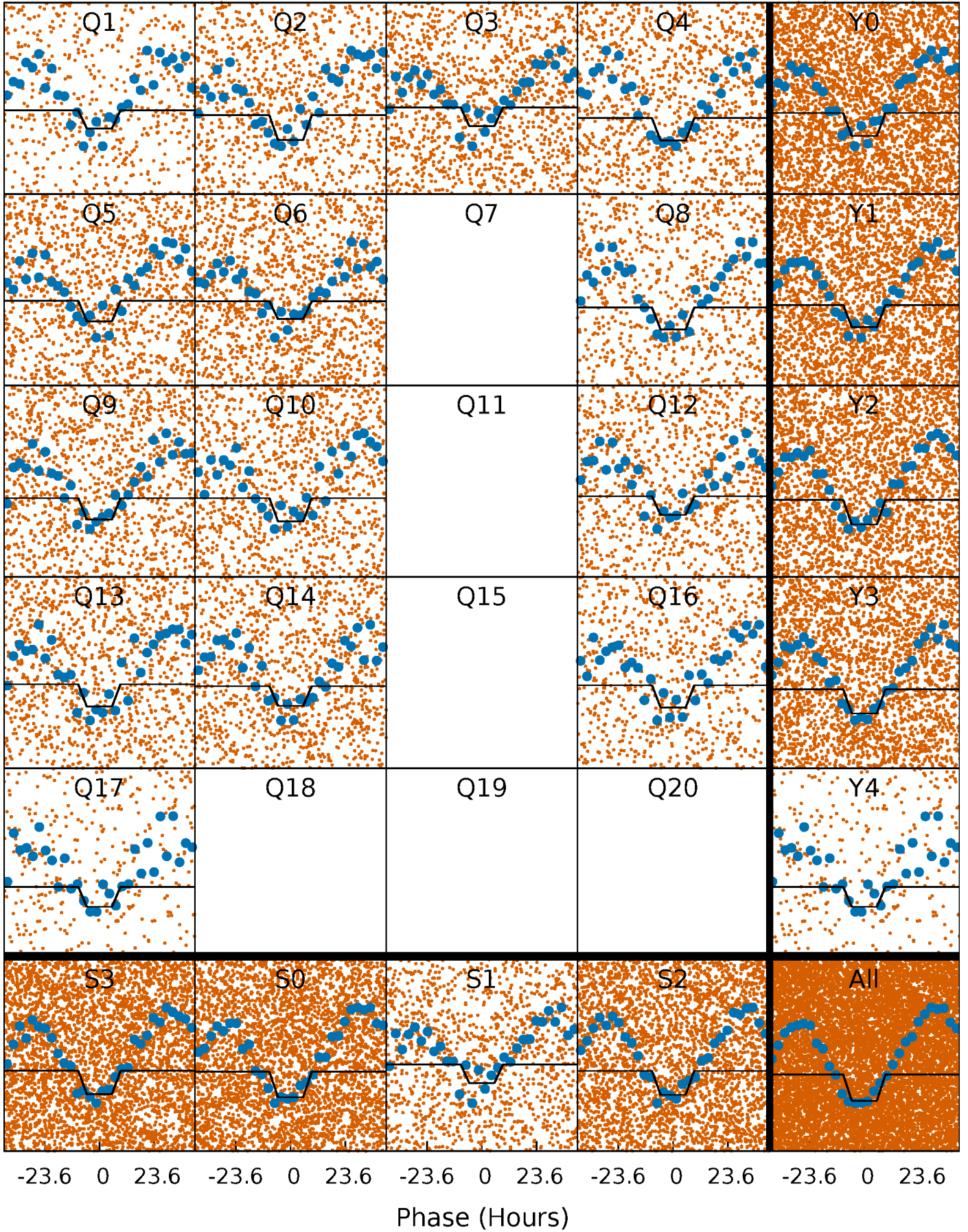
# DV Quarter-Phased Transit Curves

TCE 009666465-01 P= 4.844361 Days  $T_0=134.501105$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

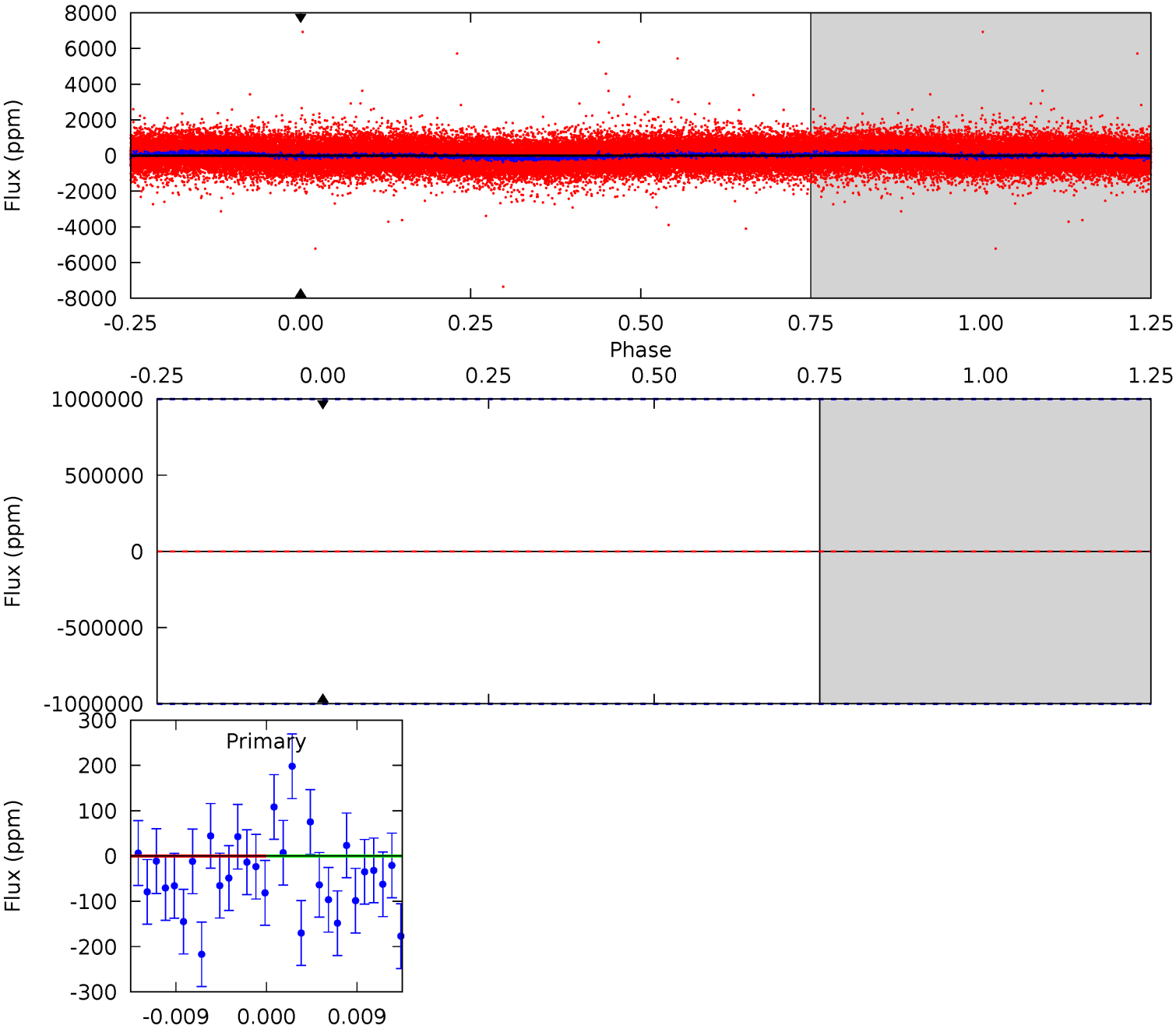
TCE 009666465-01 P= 4.844361 Days  $T_0=133.557721$  (BKJD)



DV Model-Shift Uniqueness Test

009666465-01, P = 4.844361 Days, E = 129.656744 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
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0

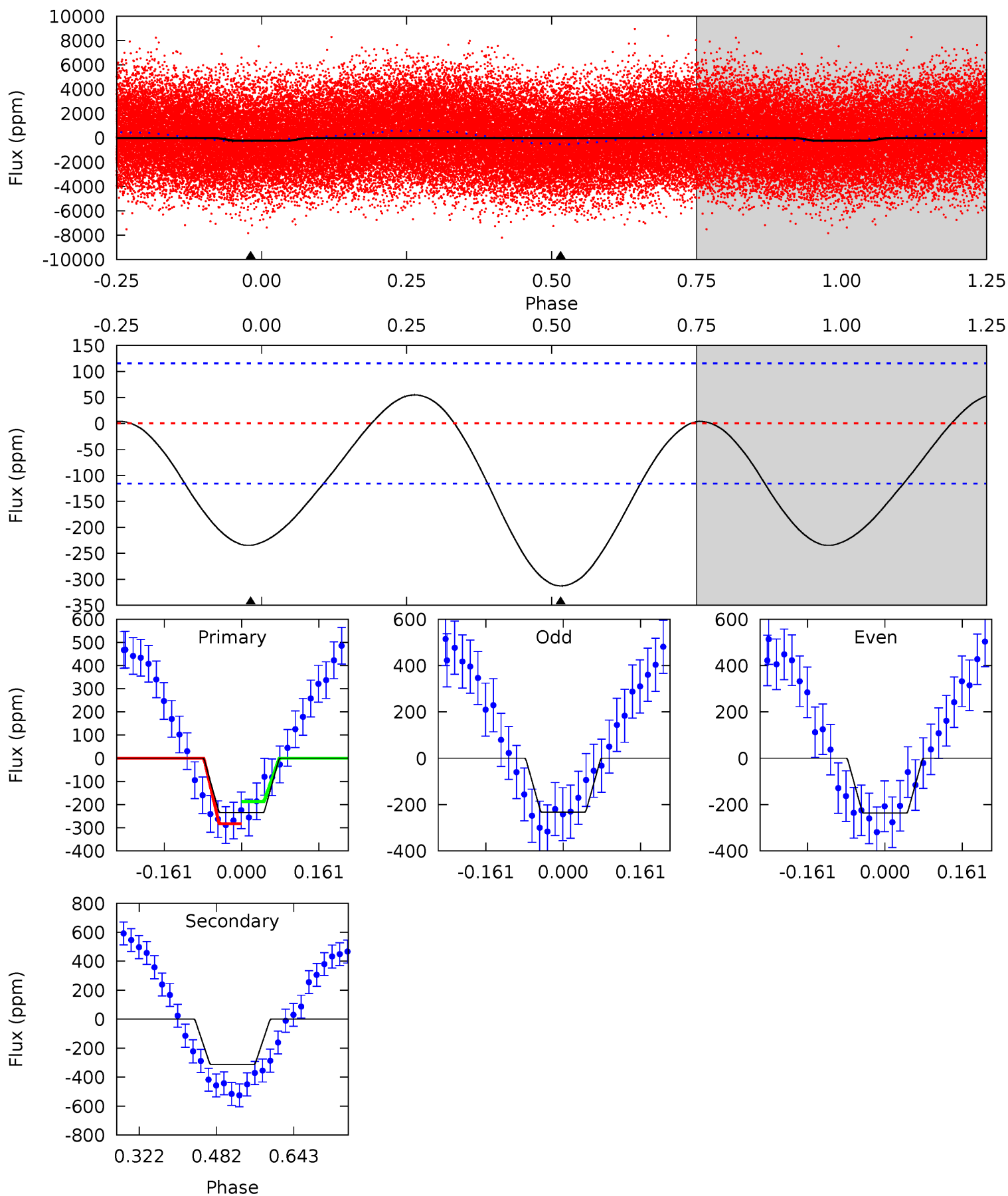




# Alt Model-Shift Uniqueness Test

009666465-01, P = 4.844361 Days, E = 128.713360 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
9.05	12.1	0	0	4.46	1.40	1.29	9.05	9.05	12.1	12.1	0.09	1.23	0.15	1.85





### Stellar Parameters For KIC 009666465

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7292^{+232}_{-319}$	$4.111^{+0.149}_{-0.182}$	$-0.100^{+0.200}_{-0.350}$	$1.797^{+0.555}_{-0.416}$	$1.518^{+0.211}_{-0.234}$	$0.369^{+0.320}_{-0.182}$
	+3%/-4%	+4%/-4%	+200%/-350%	+31%/-23%	+14%/-15%	+87%/-49%
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 009666465-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$0 \pm 1000000$	$13.35^{+14.27}_{-9.20}$	$2373^{+171}_{-150}$	$3379^{+41098}_{-40487}$	$2.066^{+2381.837}_{-1947.553}$
Alt.	$-313 \pm 26$	$14.76^{+15.46}_{-10.63}$	$2372^{+187}_{-171}$	$3779^{+2720}_{-903}$	$3.215^{+36.493}_{-2.441}$

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

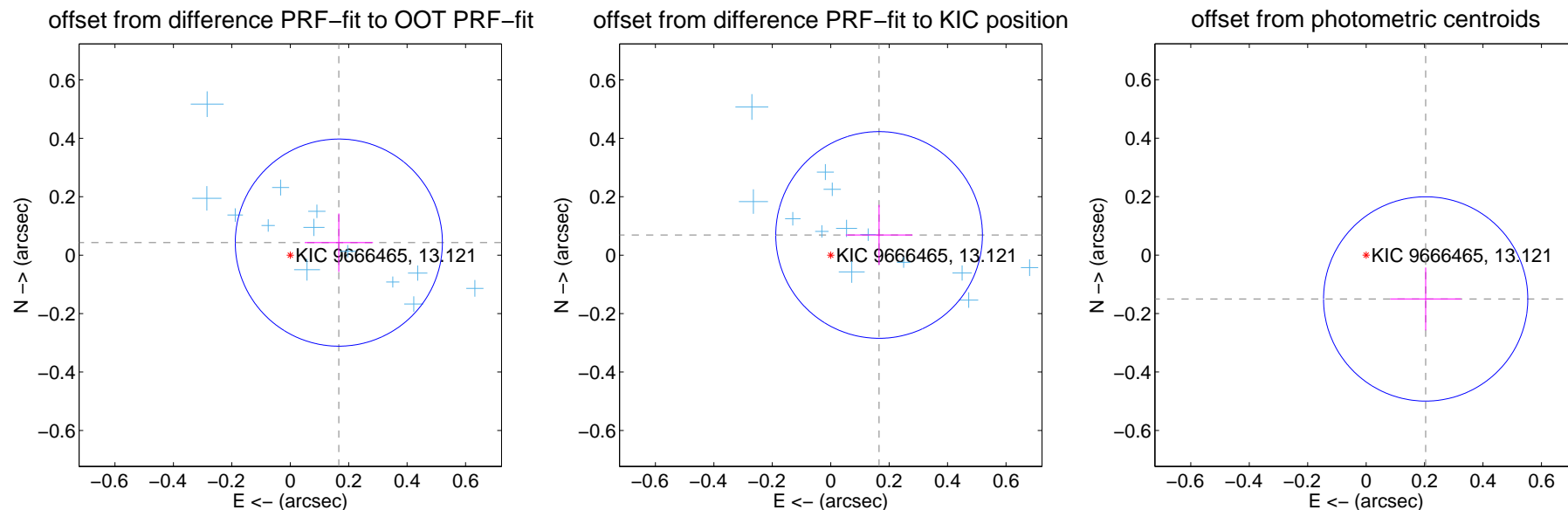
## DV Centroid Data

Supplemental centroid analysis for 009666465-01. Kepler magnitude: 13.12. Transit SNR -1.00

There are 14 quarters with good PRF difference image offsets

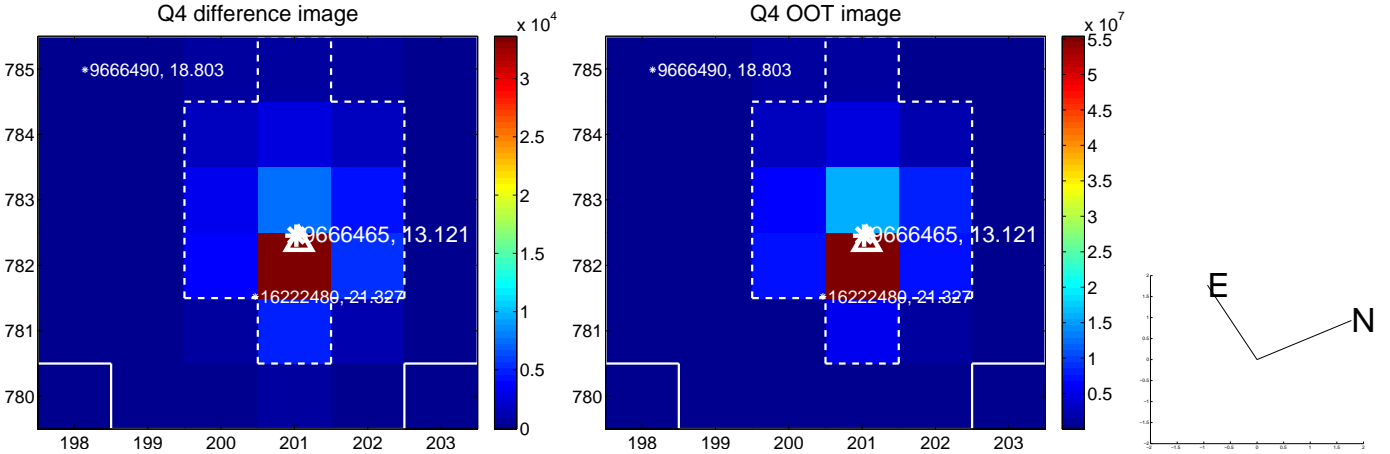
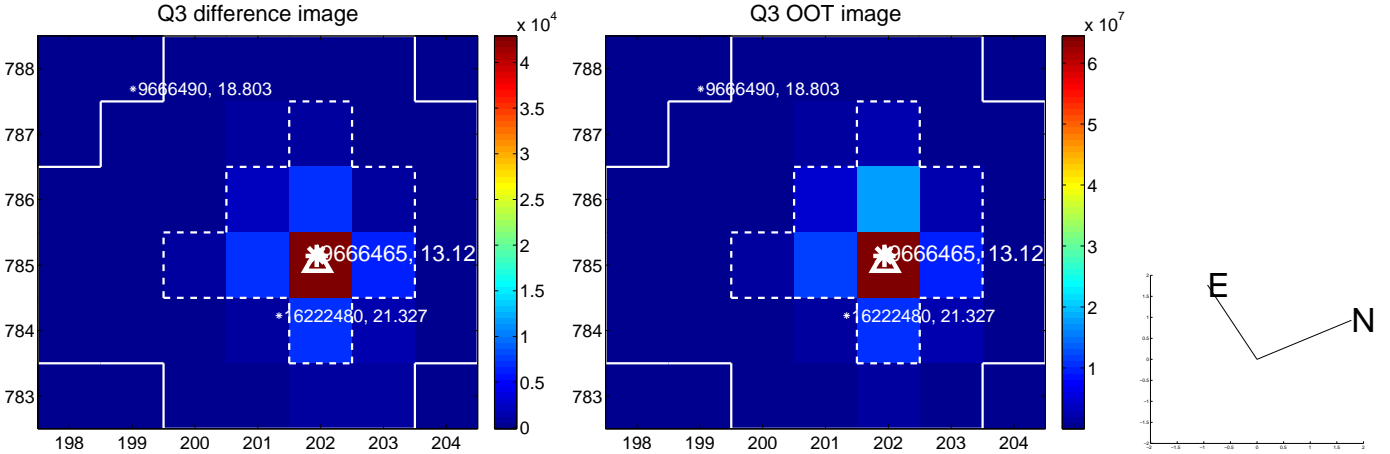
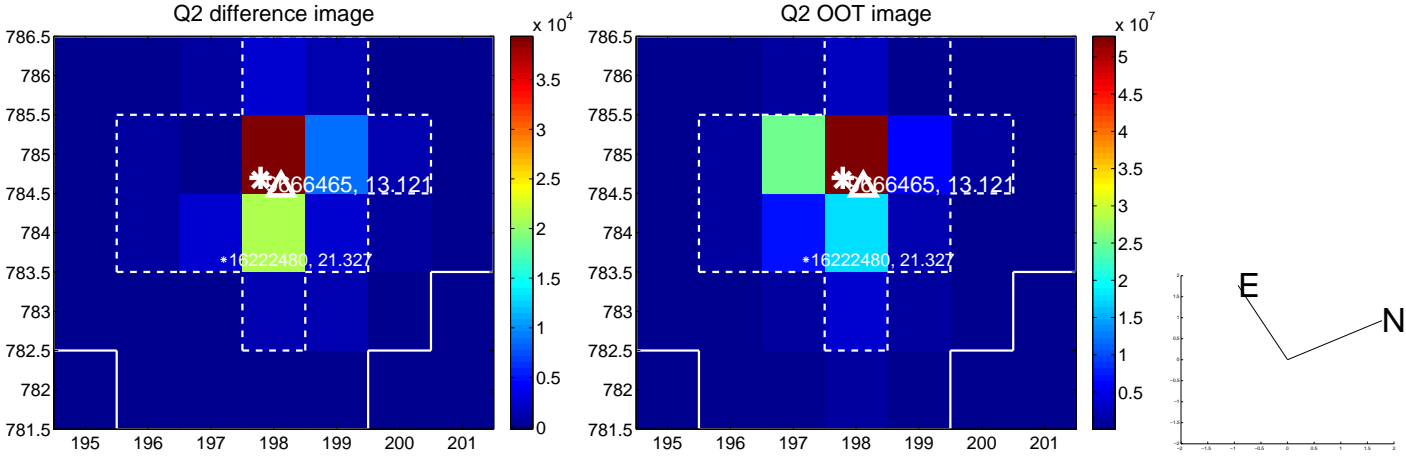
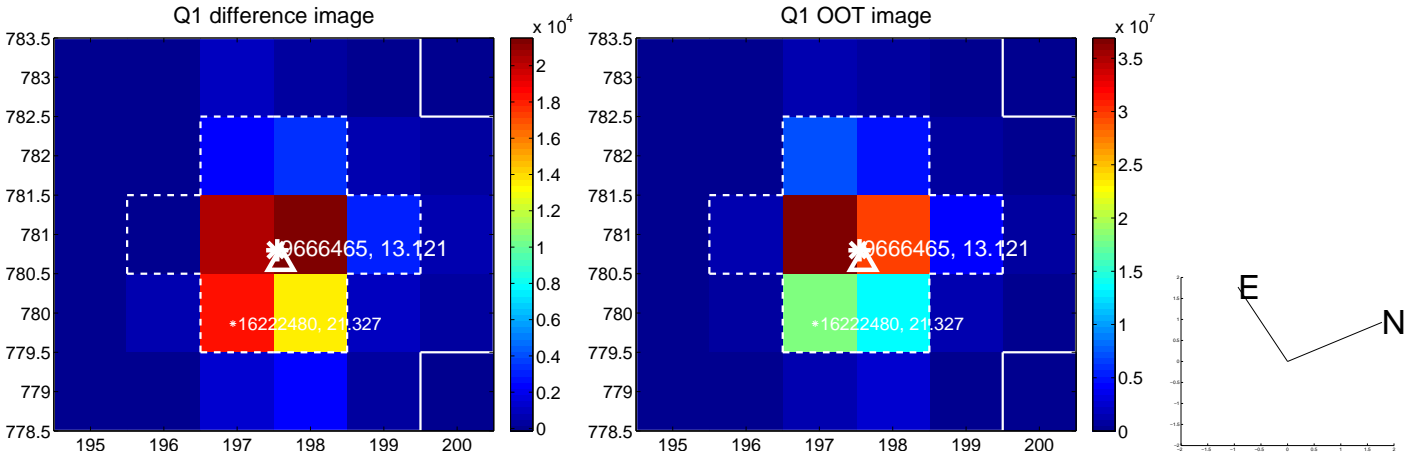
The direct PRF centroid is offset from the target star catalog position by about 0.02 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.172 \pm 0.118$	1.45	$-0.166 \pm 0.117$	$0.043 \pm 0.100$
PRF-fit source offset from KIC position	$0.179 \pm 0.118$	1.52	$-0.166 \pm 0.114$	$0.069 \pm 0.103$
photometric centroid source offset	$0.25 \pm 0.12$	2.17	$-0.20 \pm 0.12$	$-0.15 \pm 0.11$

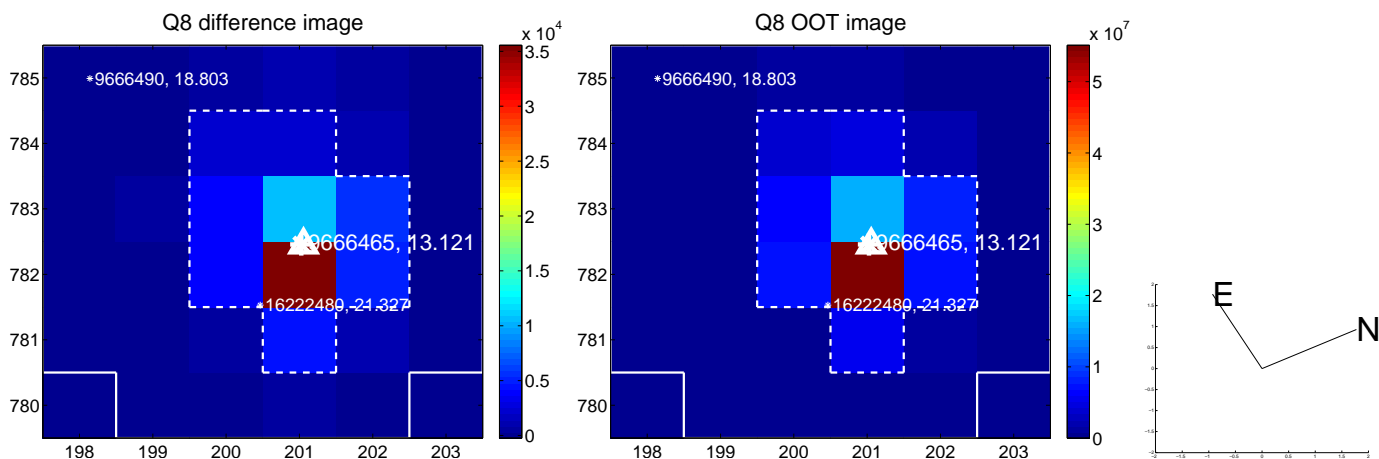
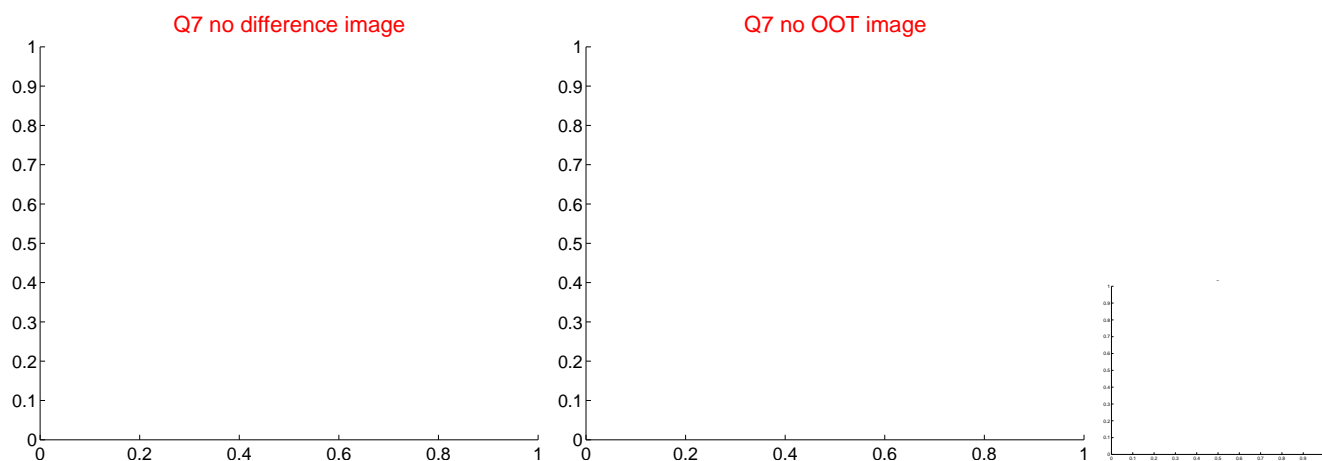
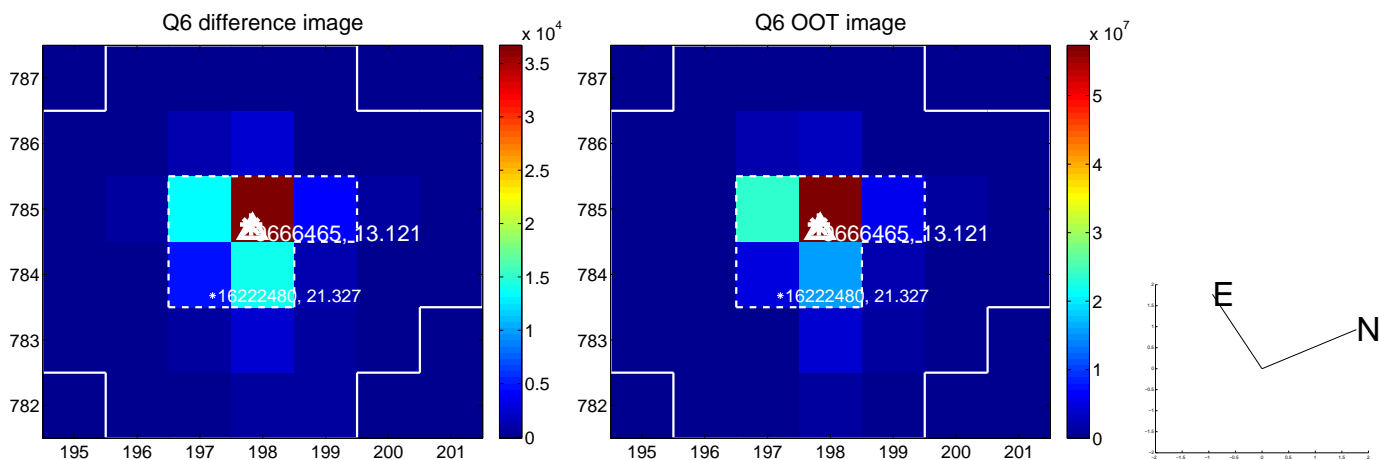
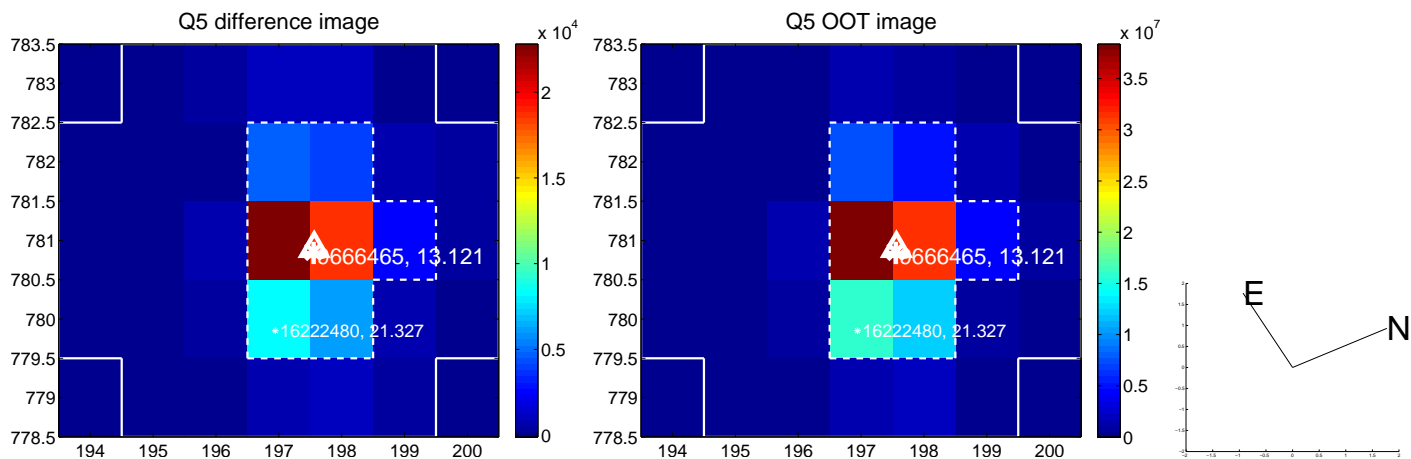


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

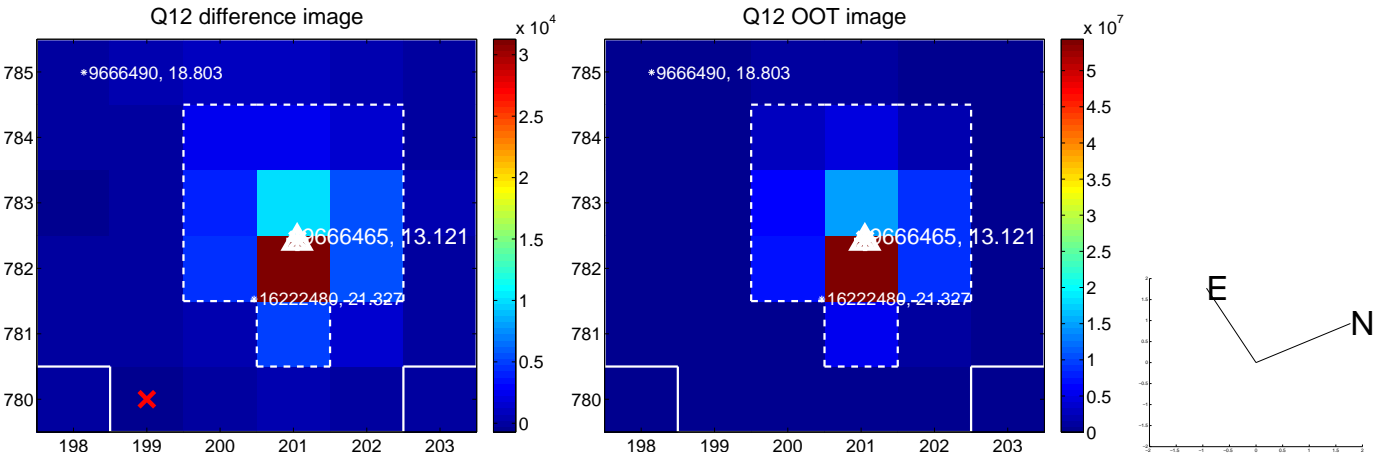
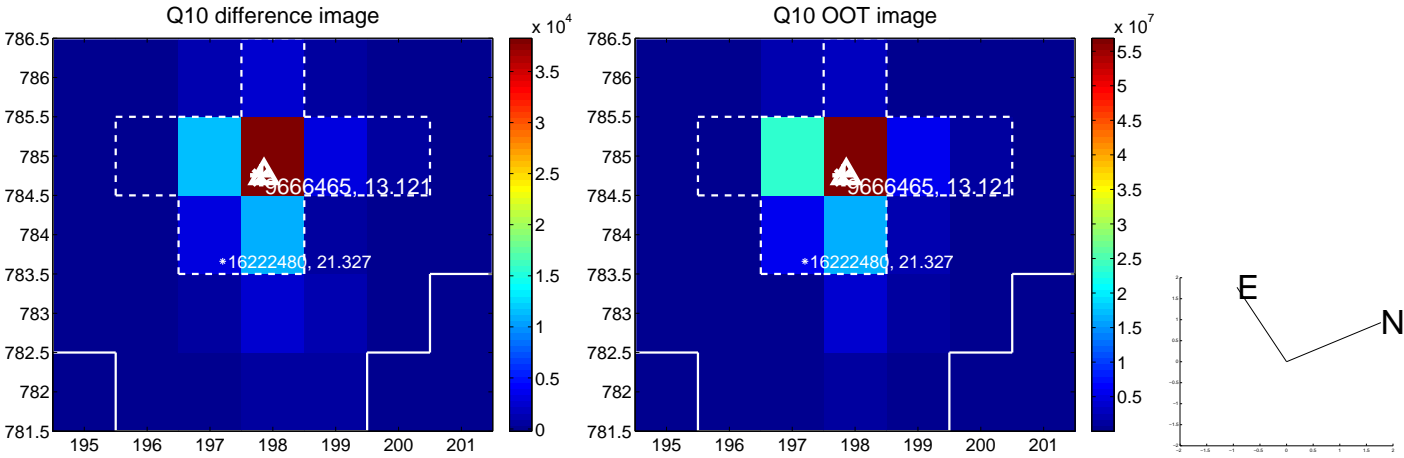
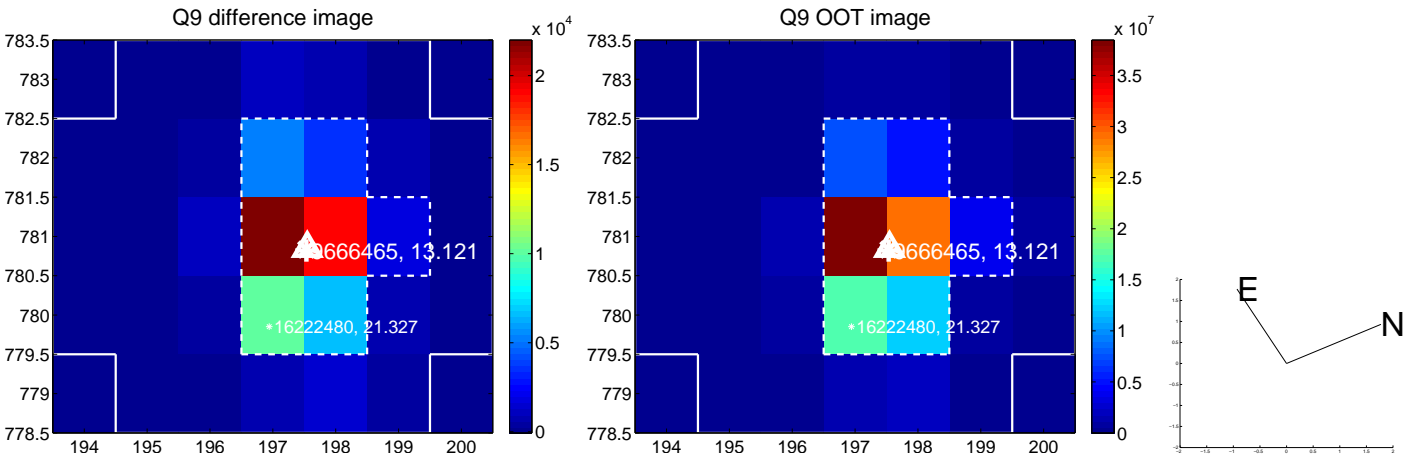


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

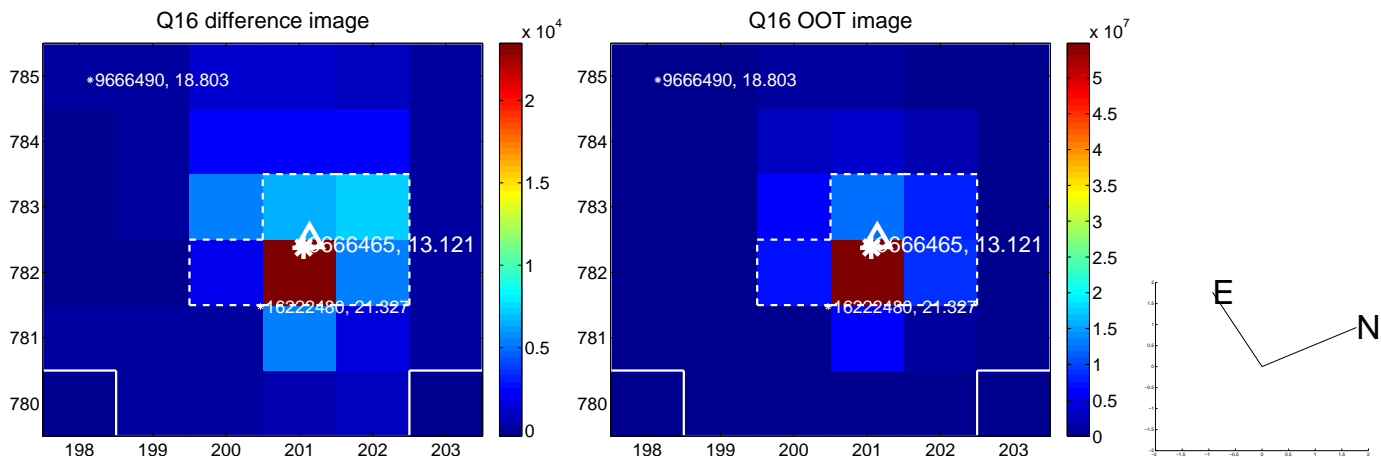
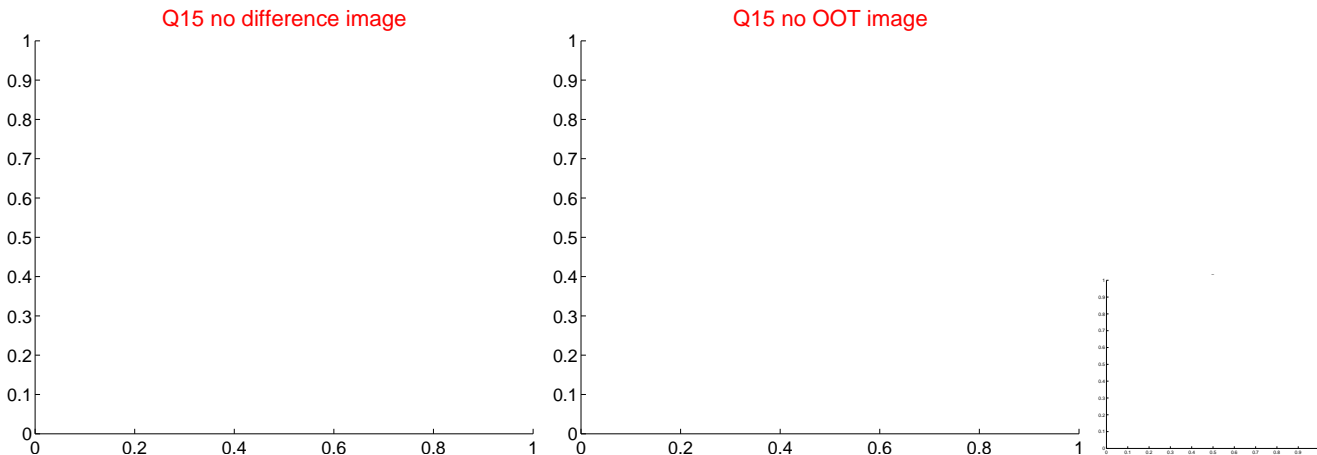
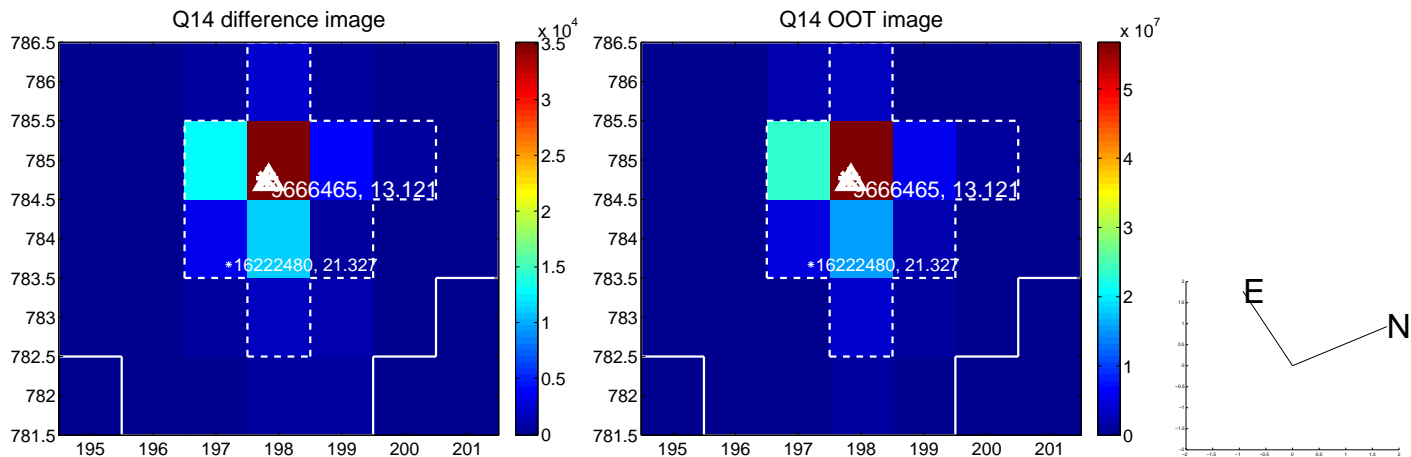
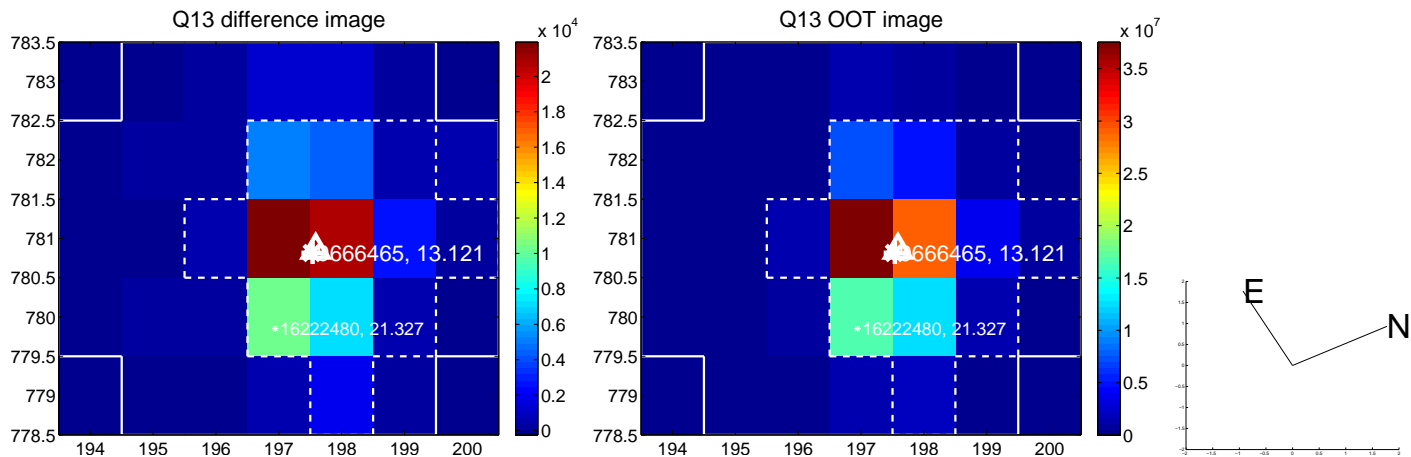




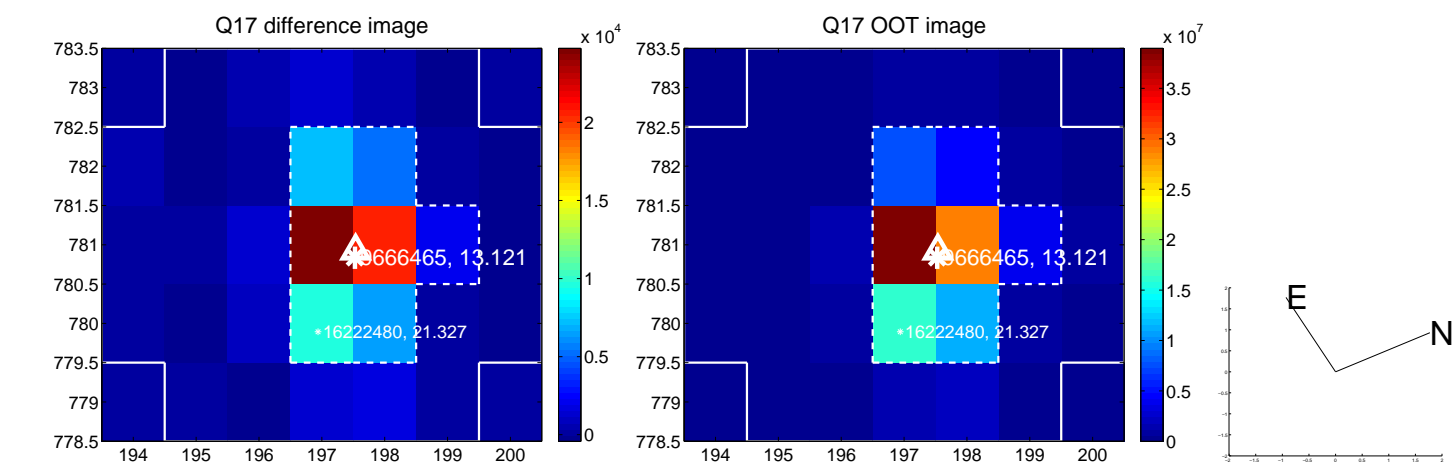
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



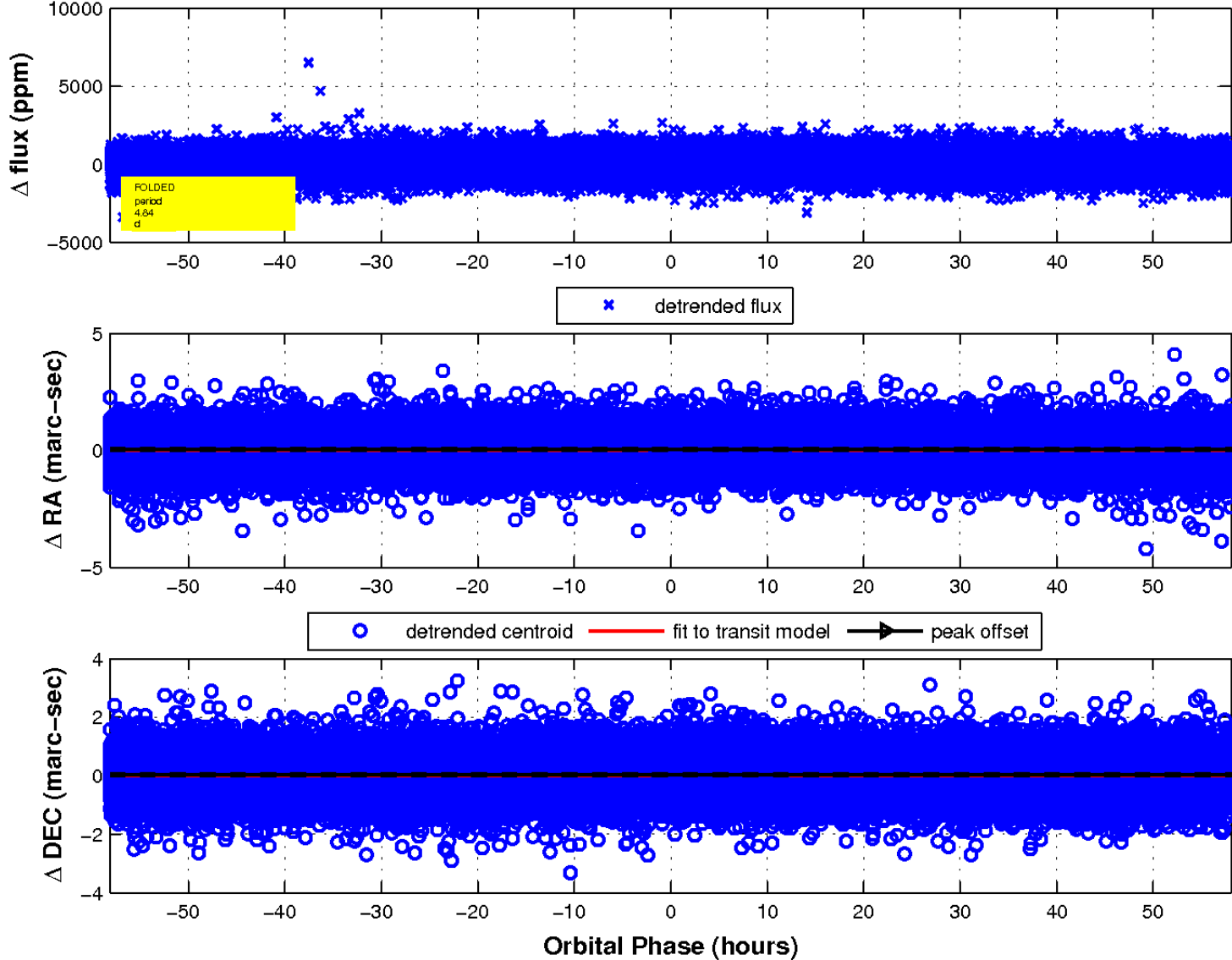
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



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

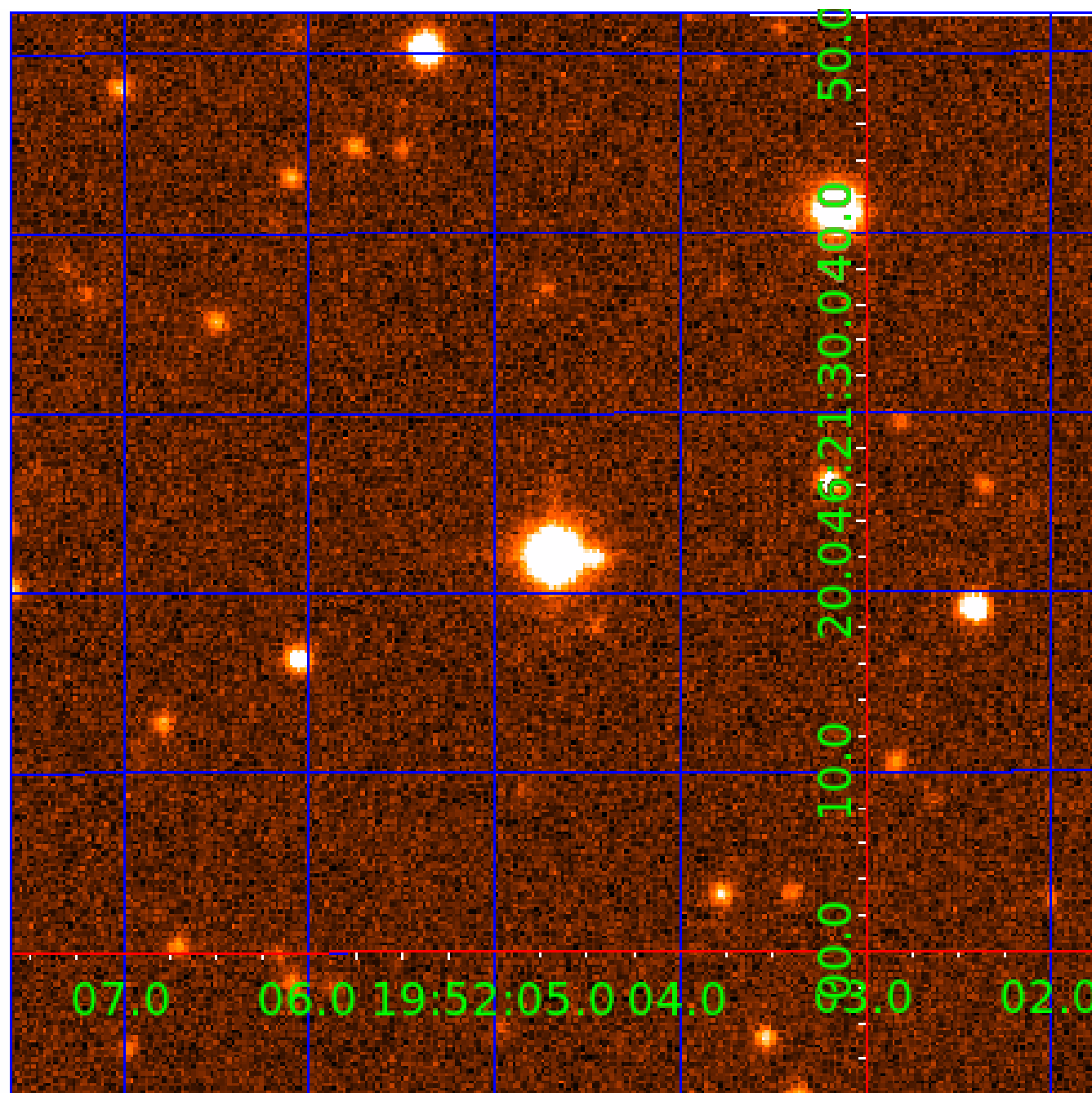


fluxWeightedCentroids, Planet 1 of 2



UKIRT Image

Declination





# KIC 009666465

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009666465-01	OBS	No	4.844361	134.501105	69.8	15.000	11.1	-1.0	1.80	7292	1.52	1969.39
009666465-02	OBS	No	4.844885	136.164832	94.3	26.459	13.7	16.2	1.80	7292	1.87	1969.10

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009666465-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—CENT_NOFITS
009666465-02	OBS	FP	0.00	1	0	0	0	LPP_DV—SAME_NTL_PERIOD

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

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

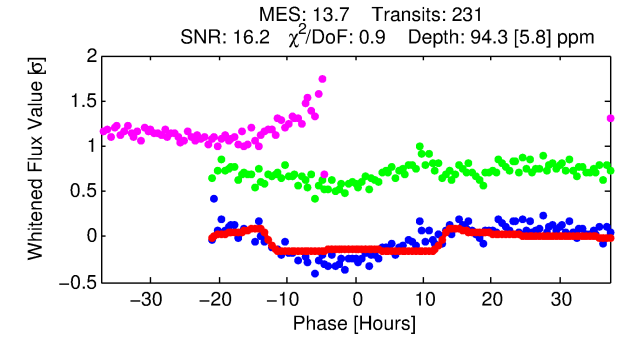
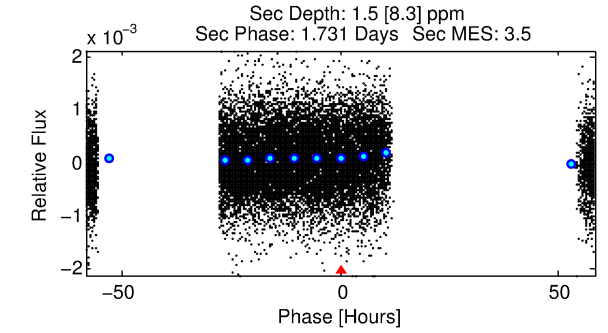
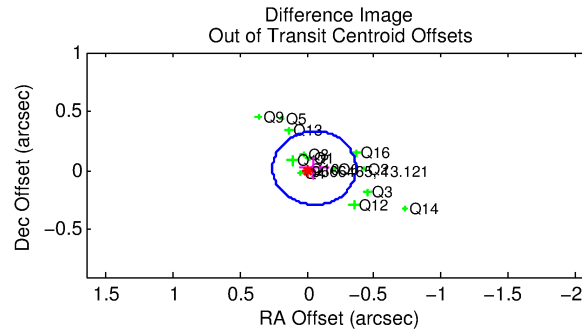
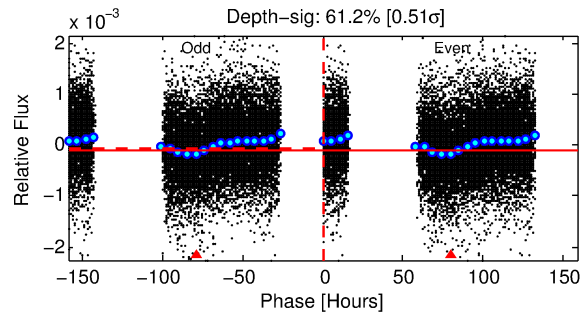
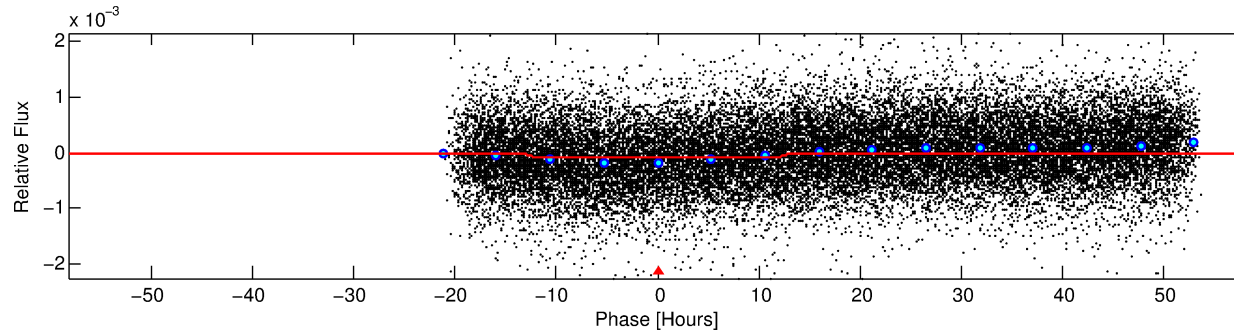
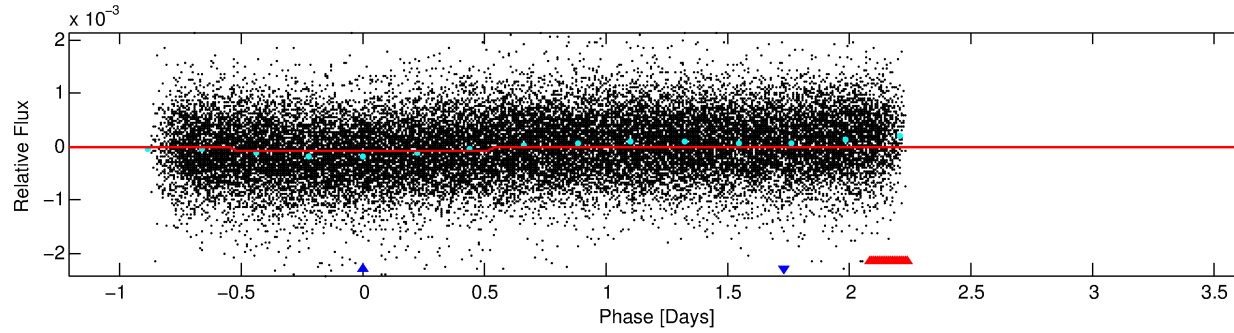
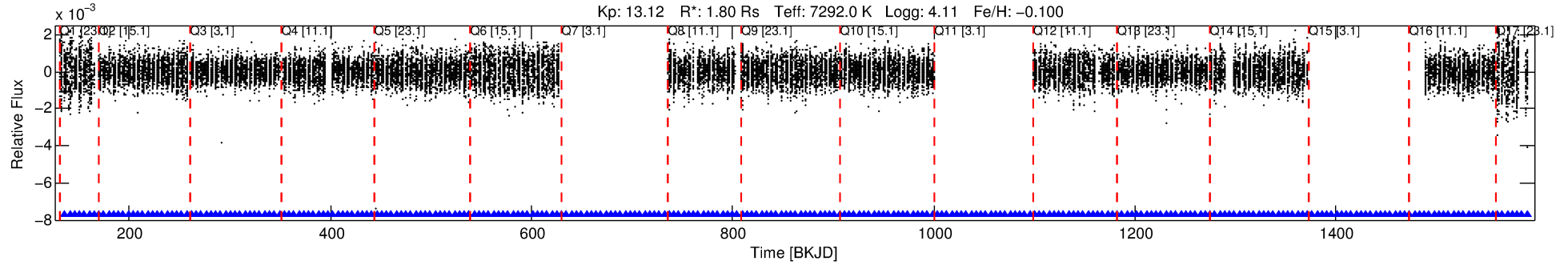
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009666465-02

No Significant Match Found

# DV One-Page Summary

KIC: 9666465 Candidate: 2 of 2 Period: 4.845 d



## DV Fit Results:

Period = 4.84488 [0.00008] d  
Epoch = 136.1648 [0.0123] BKJD  
Rp/R\* = 0.0095 [0.0017]  
a/R\* = 1.31 [0.60]  
b = 0.70 [0.81]  
Seff = 1969.10 [765.34]  
Teq = 1699 [165] K  
Rp = 1.87 [0.67] Re  
a = 0.0645 [0.0160] AU  
Ag = 0.97 [5.43] [-0.01 $\sigma$ ]  
Teffp = 2607 [3639] K [0.25 $\sigma$ ]

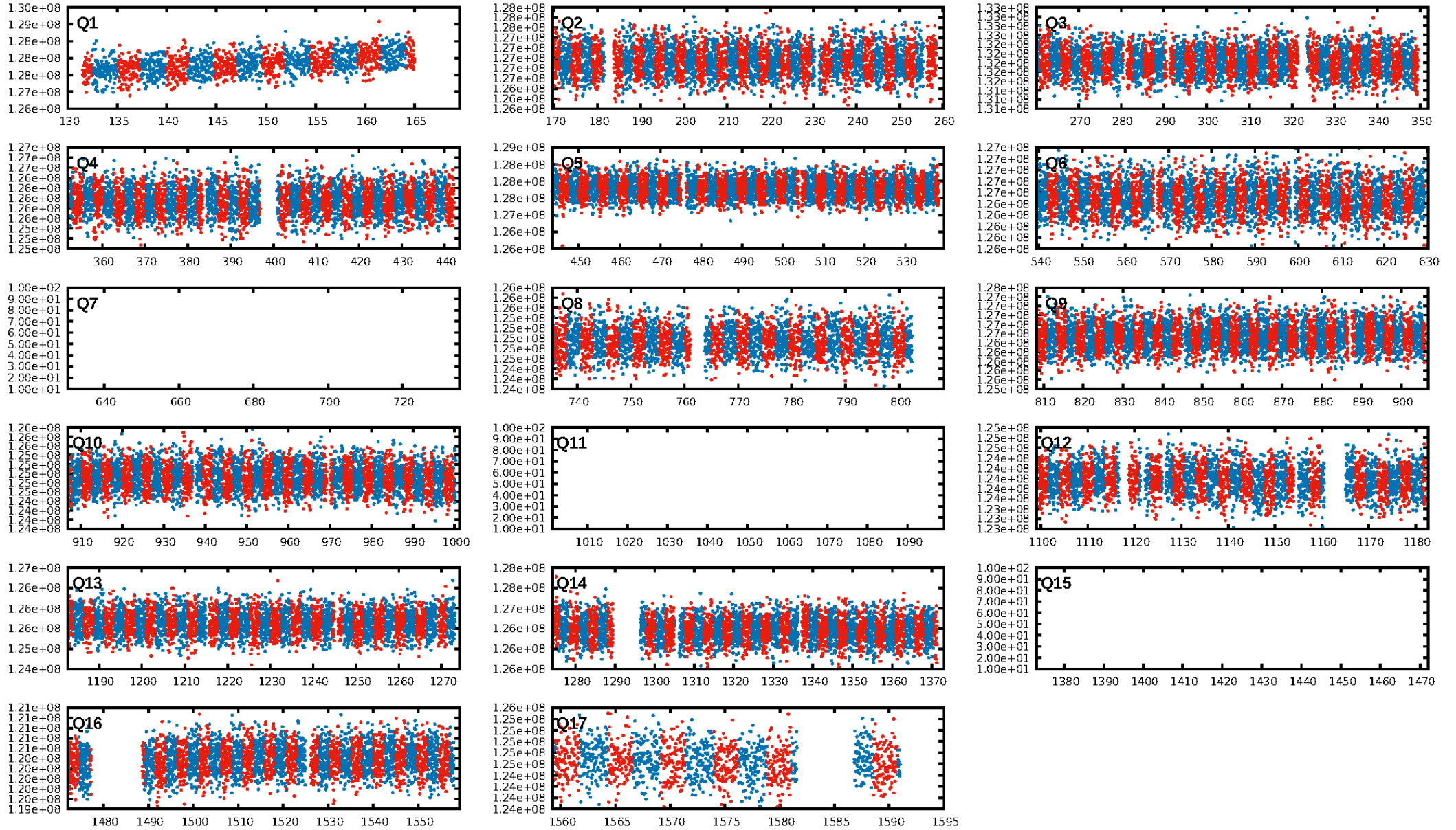
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 8.74e-72  
RollingBand-fgt: 1.00 [217/217]  
GhostDiagnostic-chr: 1.785  
Centroid-sig: 0.0%  
Centroid-so: 0.828 arcsec [3.53 $\sigma$ ]  
OotOffset-rm: 0.058 arcsec [0.56 $\sigma$ ]  
KicOffset-rm: 0.095 arcsec [1.04 $\sigma$ ]  
OotOffset-st: 4/1/4/5 [14]  
KicOffset-st: 4/1/4/5 [14]  
DiffImageQuality-fgm: 1.00 [14/14]  
DiffImageOverlap-fno: 0.21 [3/14]

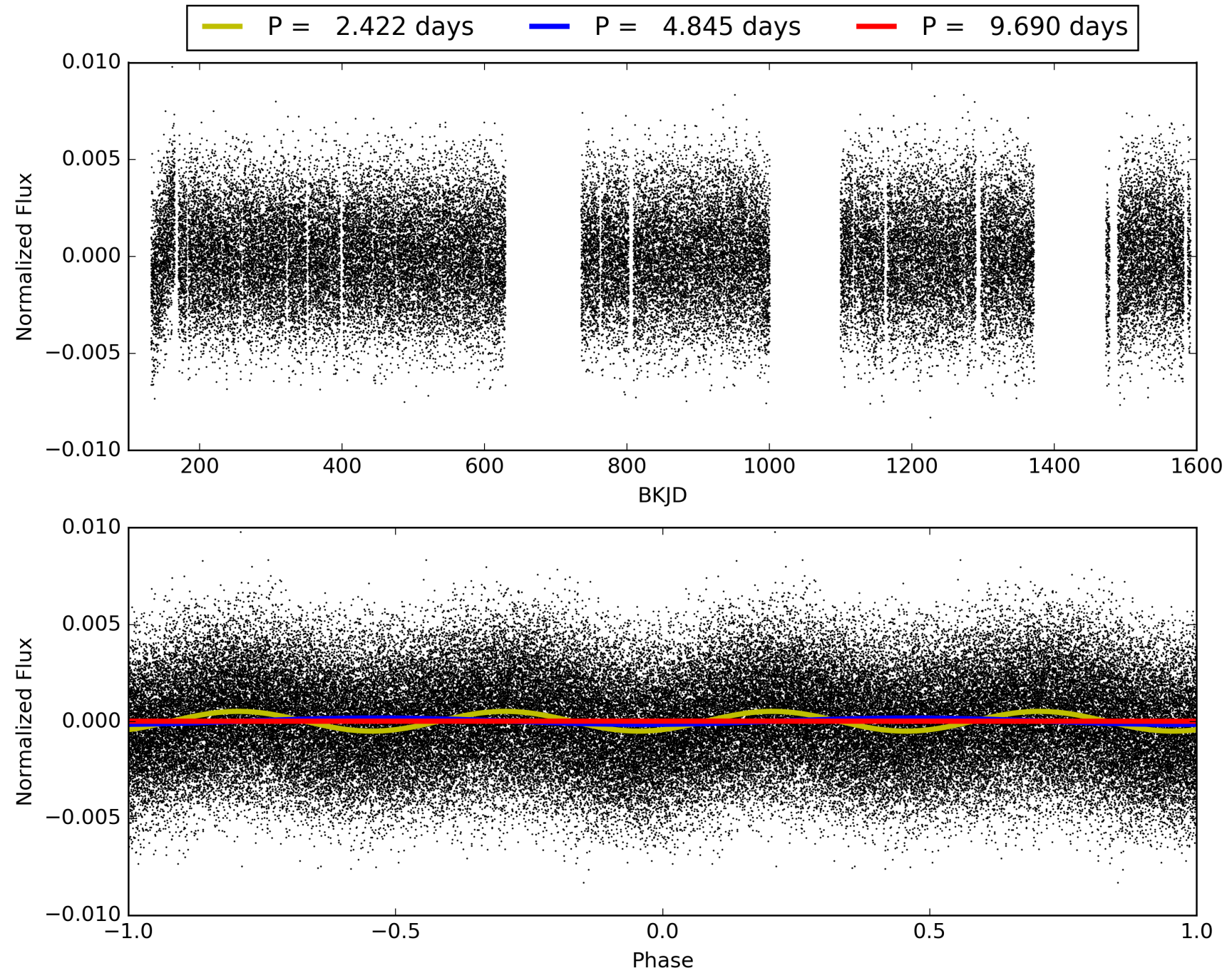
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 15:21:10 Z

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

# TCE 009666465-02, PDC Light Curves



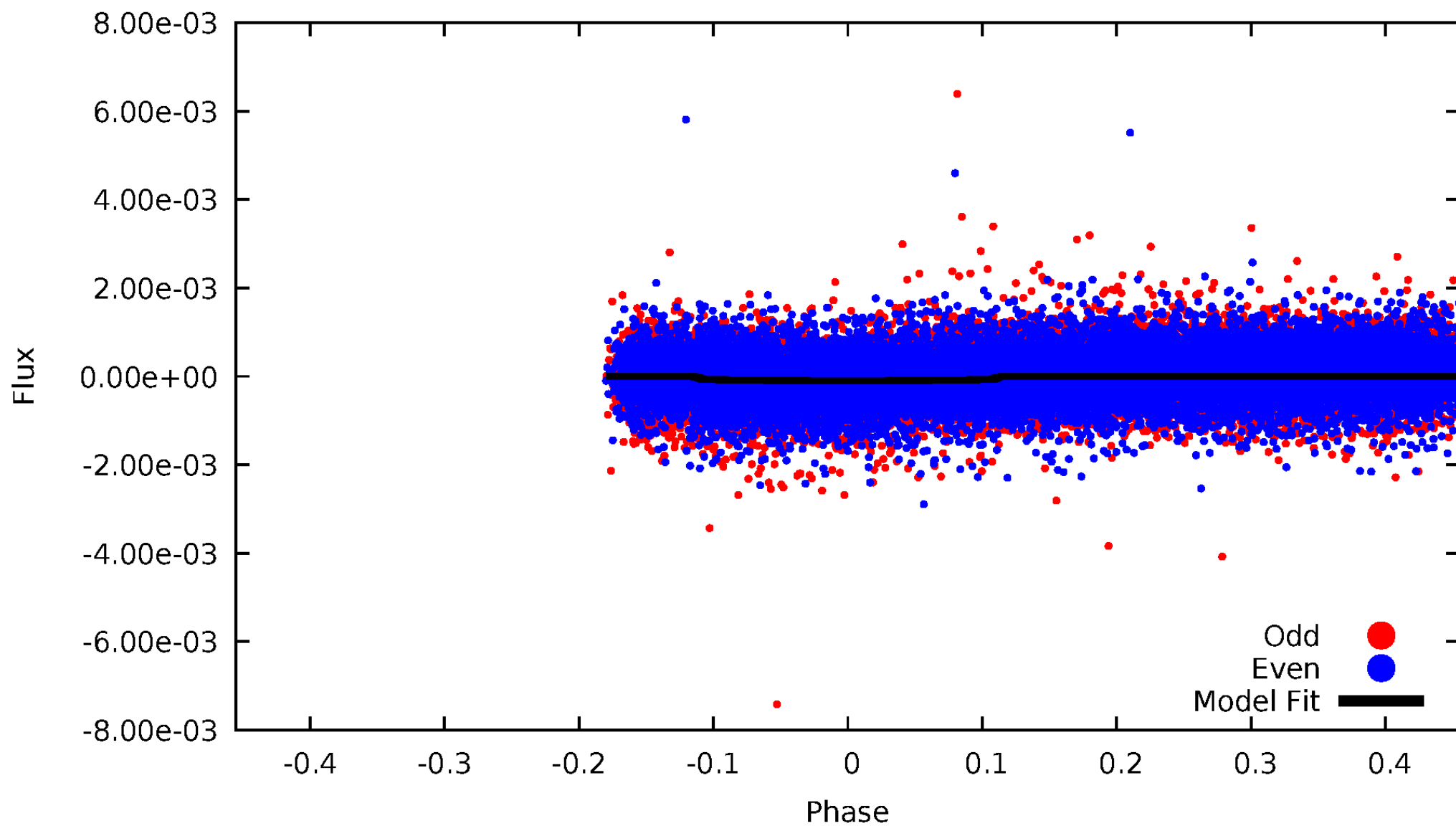
TCE 009666465-02





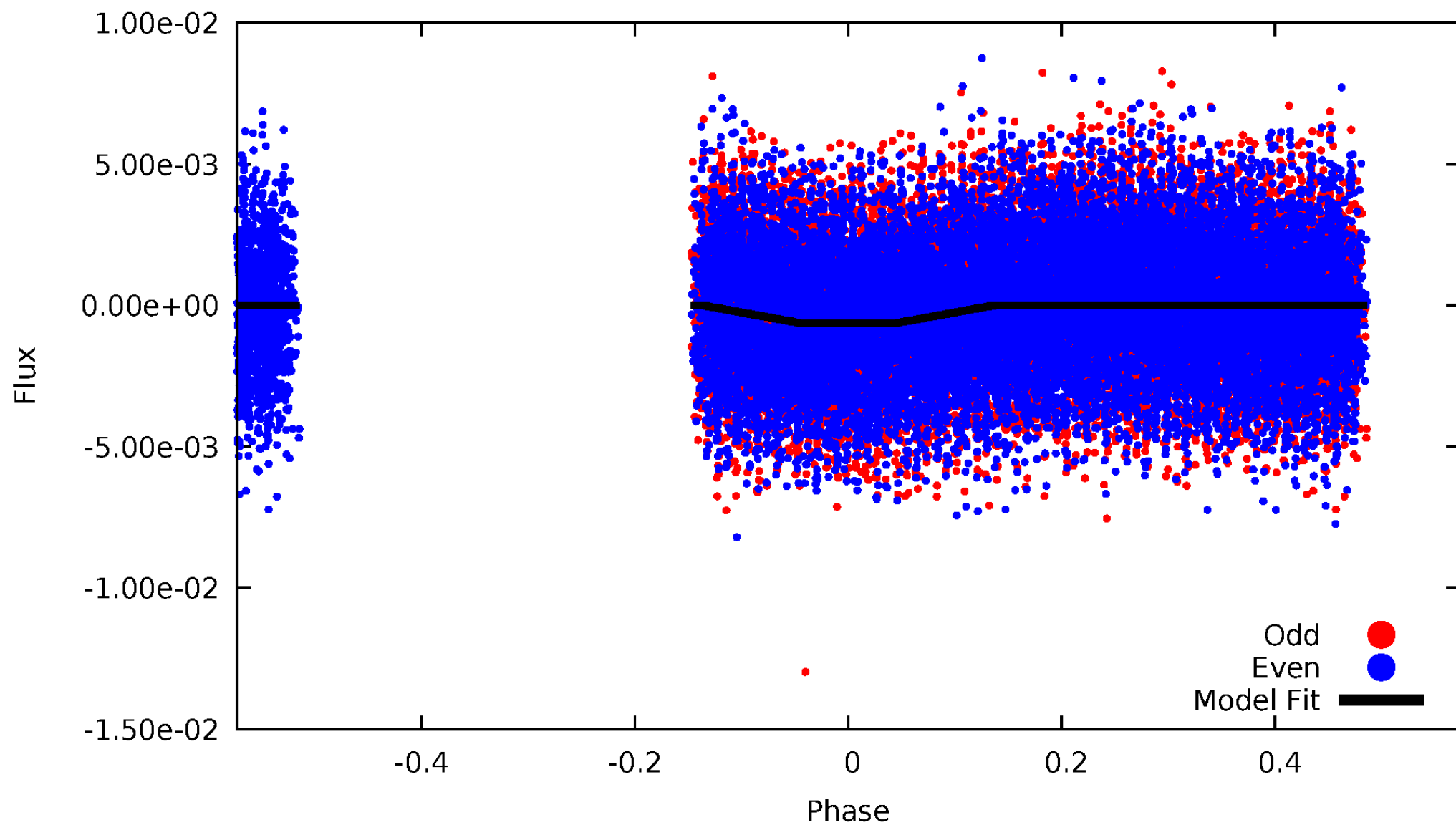
# DV Odd/Even

TCE 009666465-02



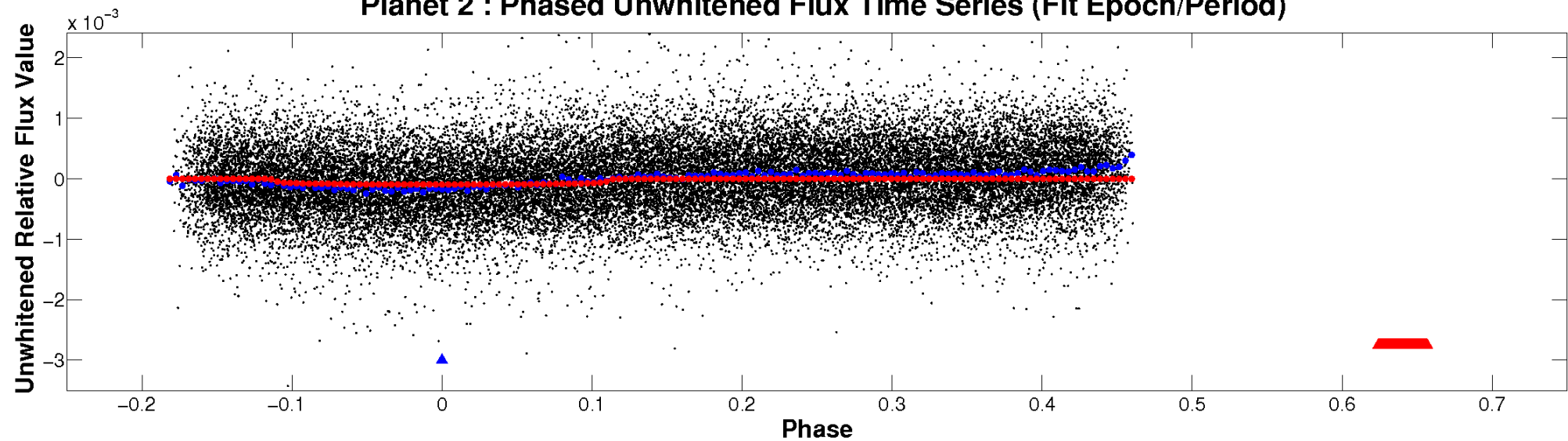
# ALT Odd/Even

TCE 009666465-02

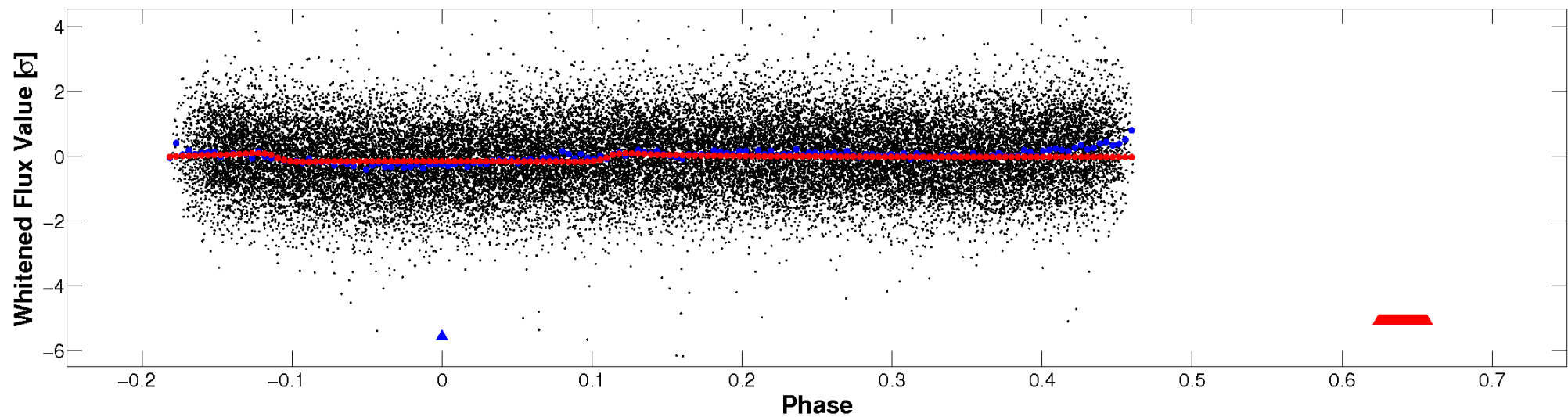


# Non-Whitened Vs. Whitened Light Curve

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

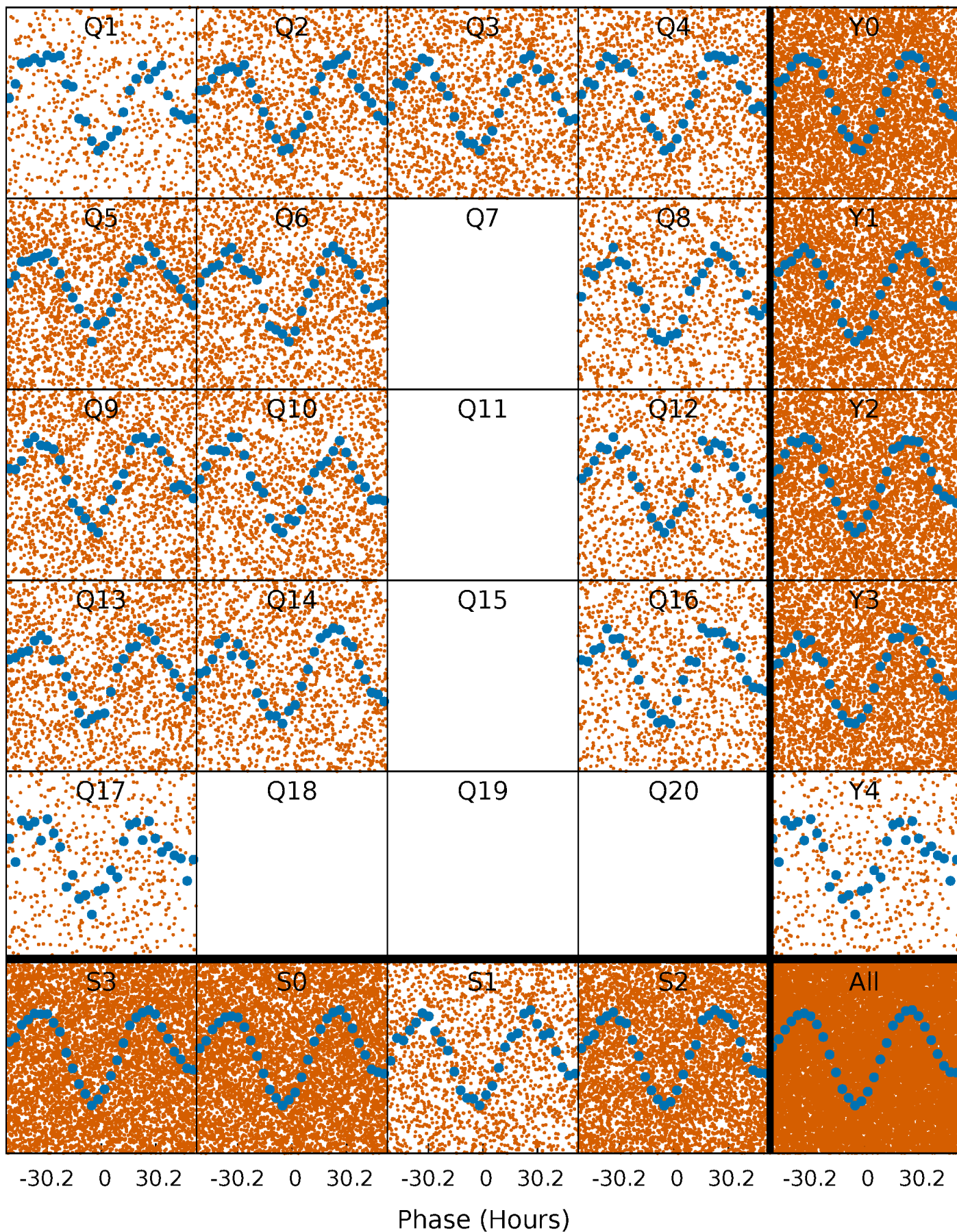


**Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

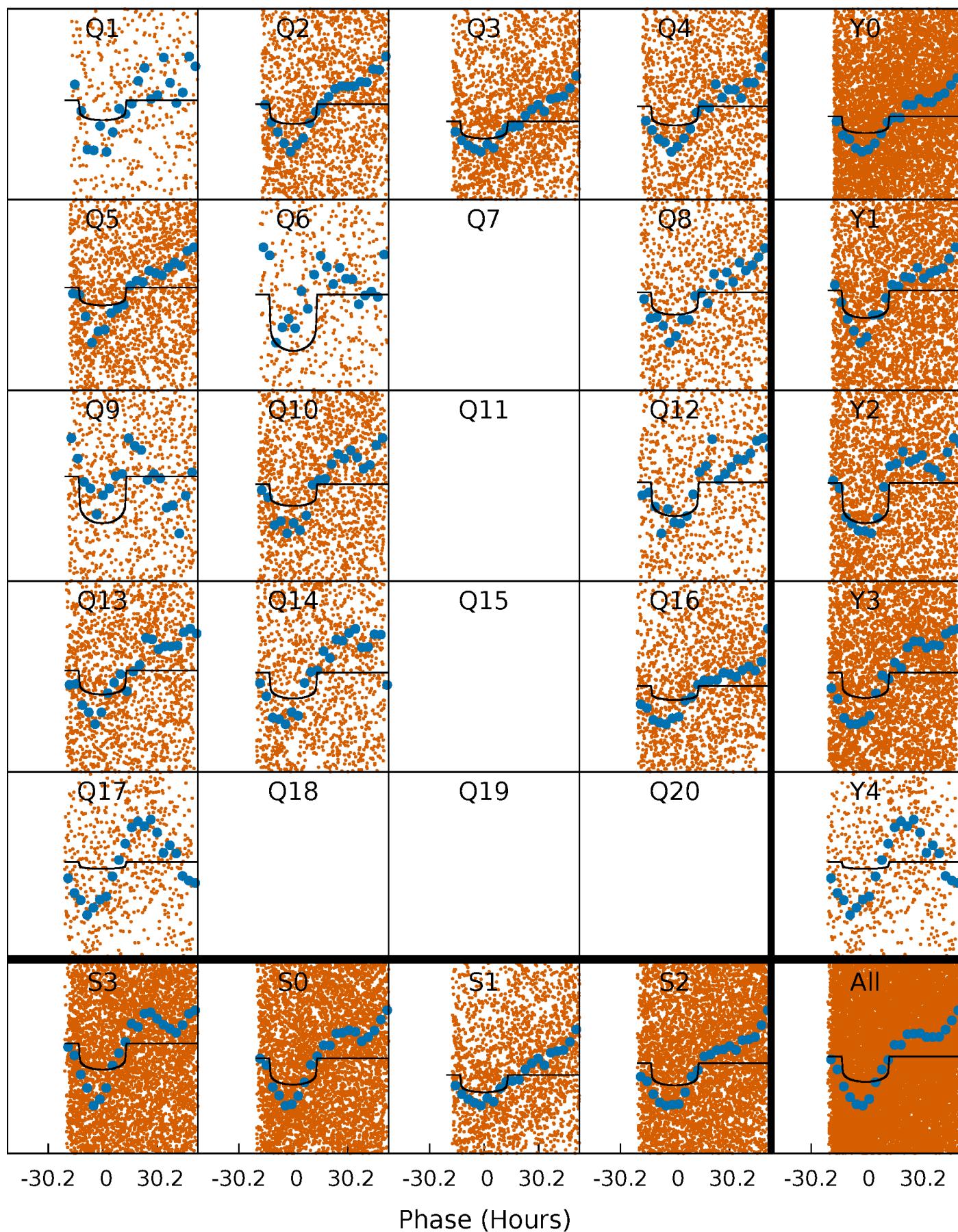
TCE 009666465-02   P= 4.844885 Days    $T_0=136.164832$  (BKJD)





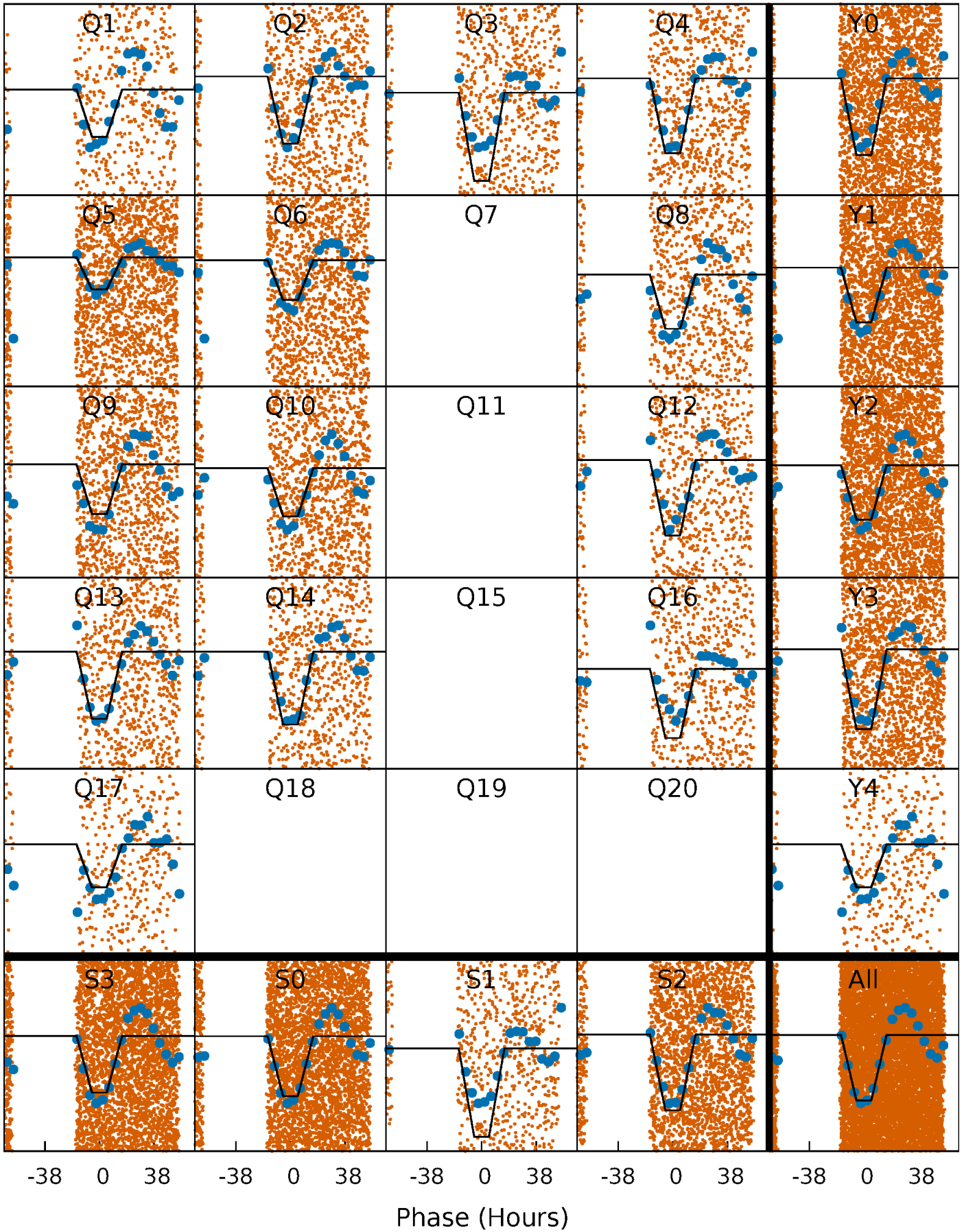
# DV Quarter-Phased Transit Curves

TCE 009666465-02     $P = 4.844885$  Days     $T_0 = 136.164832$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

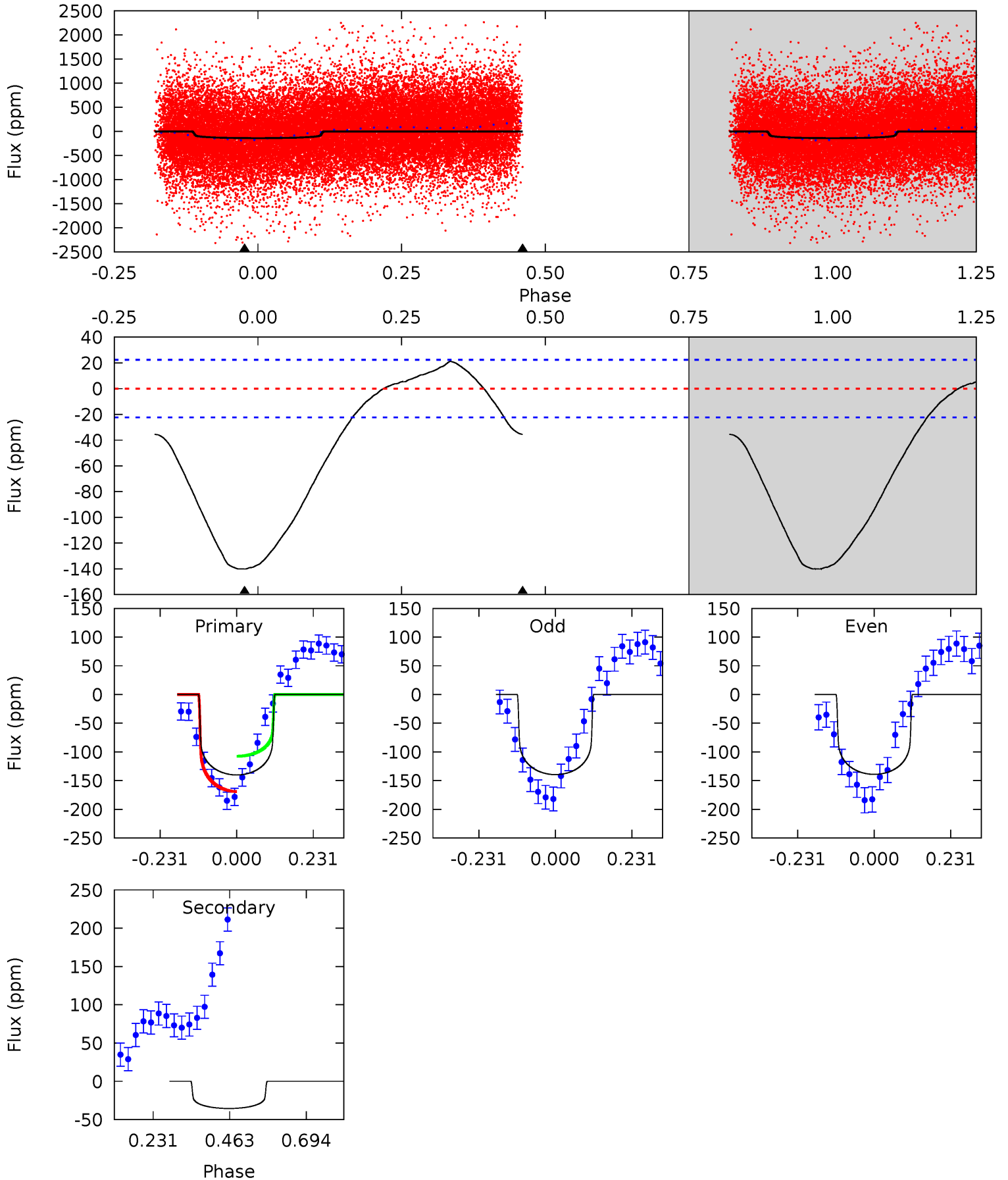
TCE 009666465-02 P= 4.843947 Days  $T_0=136.164683$  (BKJD)



# DV Model-Shift Uniqueness Test

009666465-02, P = 4.844885 Days, E = 131.319947 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
27.5	6.96	0	0	4.39	1.20	0.88	27.5	27.5	6.96	6.96	0.04	0.98	0.13	6.16

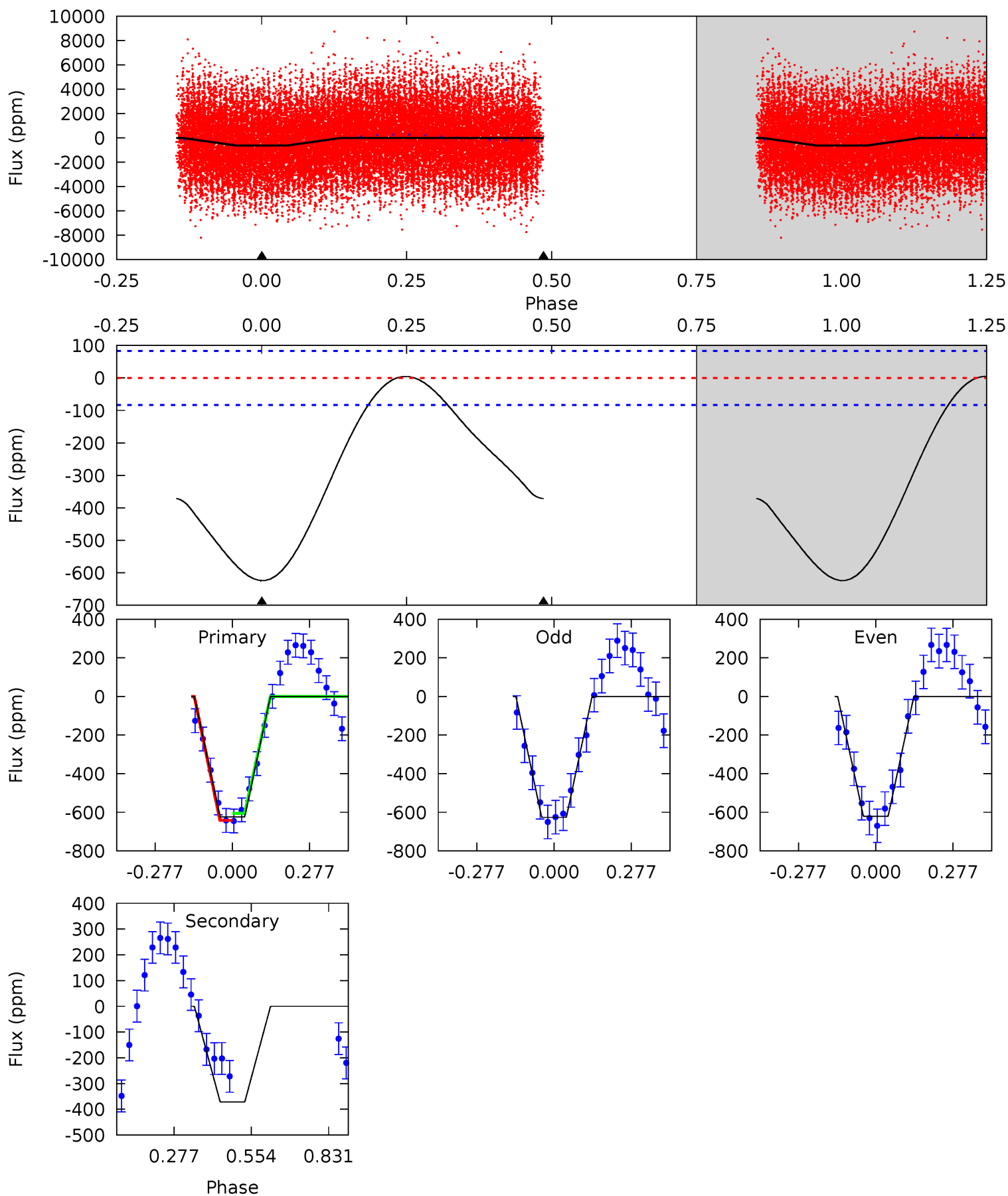




# Alt Model-Shift Uniqueness Test

009666465-02, P = 4.843947 Days, E = 131.320736 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
32.6	19.4	0	0	4.35	1.09	0.37	32.6	32.6	19.4	19.4	0.12	0.97	0.01	0.93



### Stellar Parameters For KIC 009666465

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7292^{+232}_{-319}$	$4.111^{+0.149}_{-0.182}$	$-0.100^{+0.200}_{-0.350}$	$1.797^{+0.555}_{-0.416}$	$1.518^{+0.211}_{-0.234}$	$0.369^{+0.320}_{-0.182}$
	+3%/-4%	+4%/-4%	+200%/-350%	+31%/-23%	+14%/-15%	+87%/-49%
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 009666465-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-35 \pm 5$	$1.88^{+0.48}_{-0.39}$	$2383^{+186}_{-171}$	$5664^{+649}_{-512}$	$22^{+14}_{-9}$
Alt.	$-371 \pm 19$	$5.05^{+0.89}_{-0.75}$	$2391^{+202}_{-164}$	$6266^{+310}_{-286}$	$33^{+11}_{-9}$

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

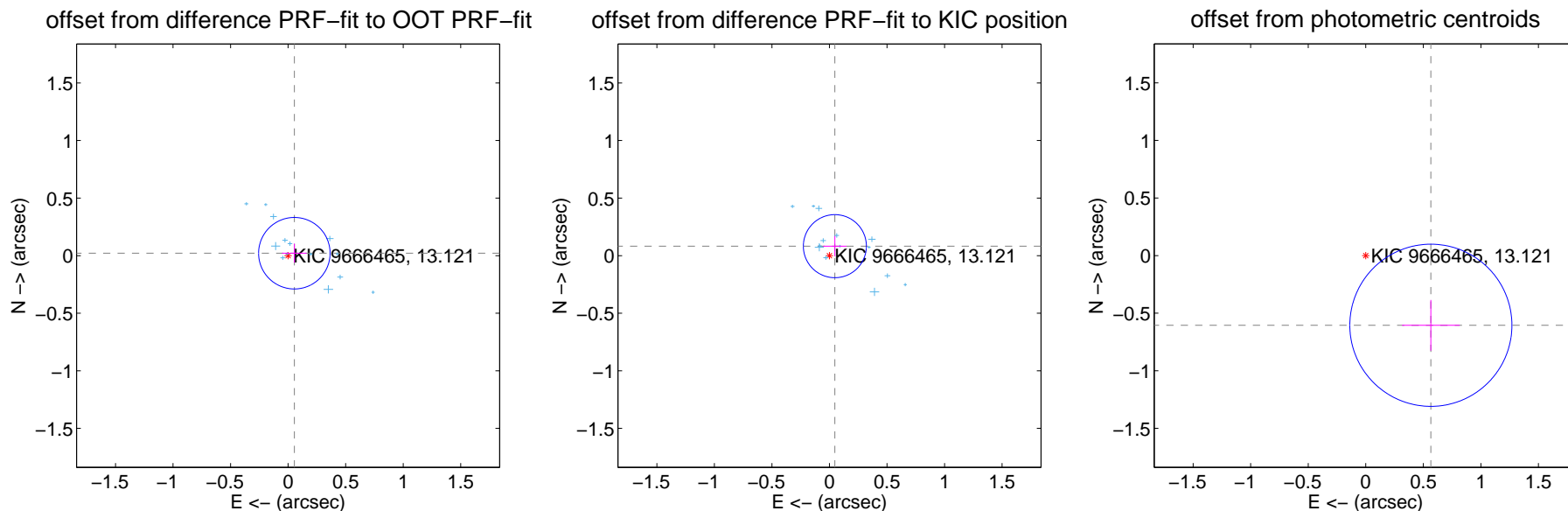
## DV Centroid Data

Supplemental centroid analysis for 009666465-02. Kepler magnitude: 13.12. Transit SNR 16.21

There are 14 quarters with good PRF difference image offsets

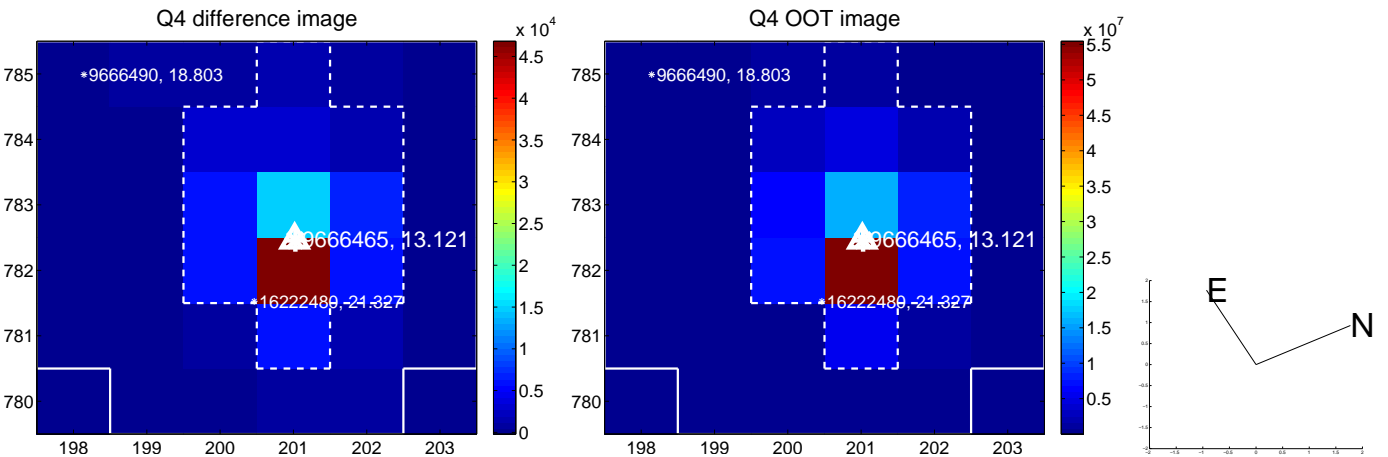
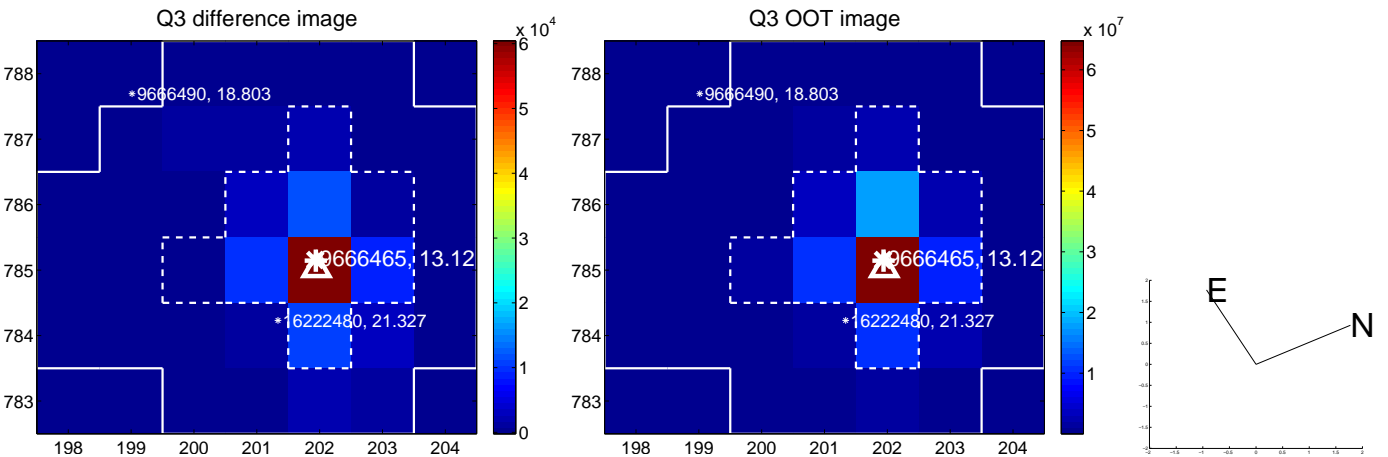
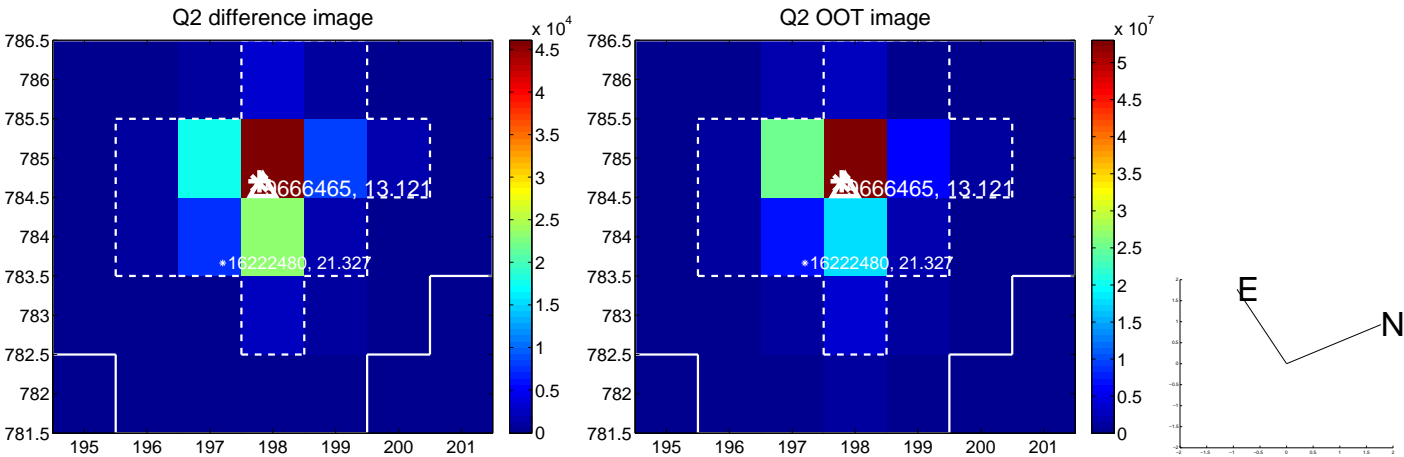
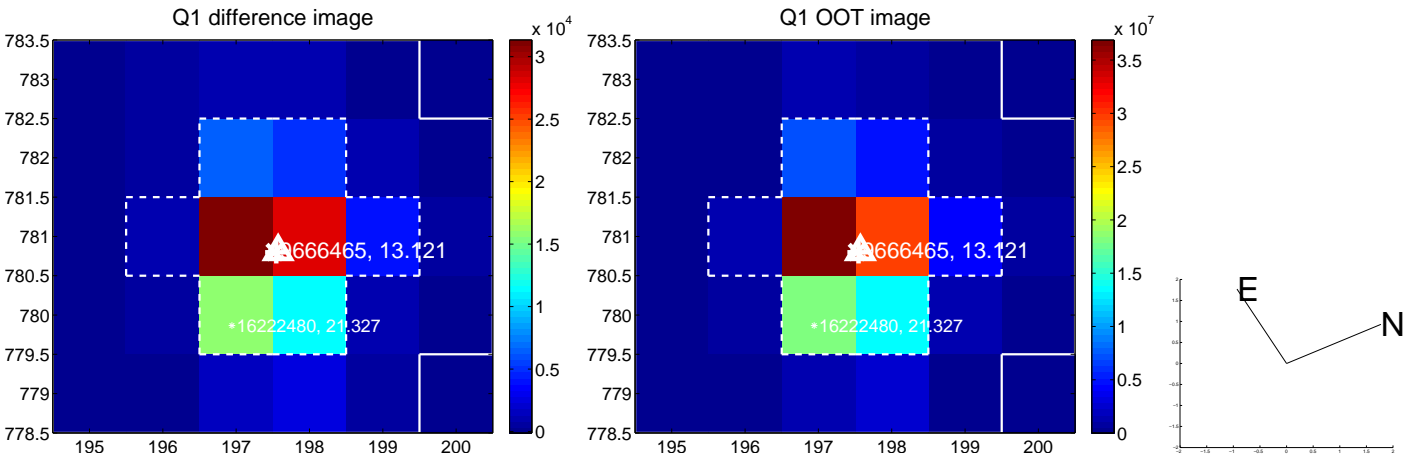
The direct PRF centroid is offset from the target star catalog position by about 0.02 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.058 \pm 0.104$	0.56	$-0.054 \pm 0.106$	$0.021 \pm 0.083$
PRF-fit source offset from KIC position	$0.095 \pm 0.091$	1.04	$-0.047 \pm 0.101$	$0.082 \pm 0.088$
photometric centroid source offset	$0.83 \pm 0.23$	3.53	$-0.57 \pm 0.25$	$-0.61 \pm 0.22$

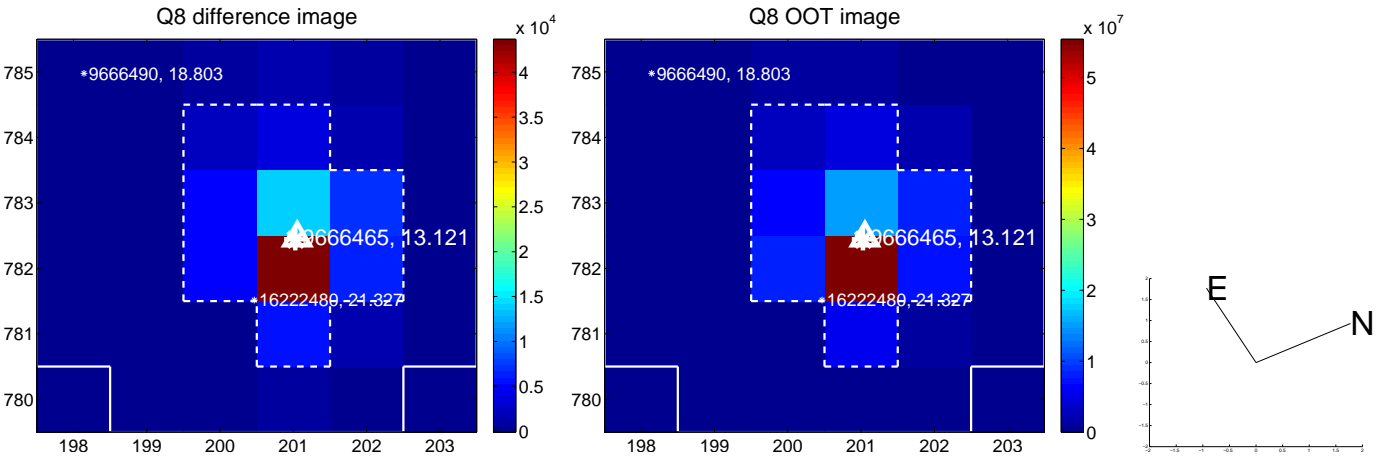
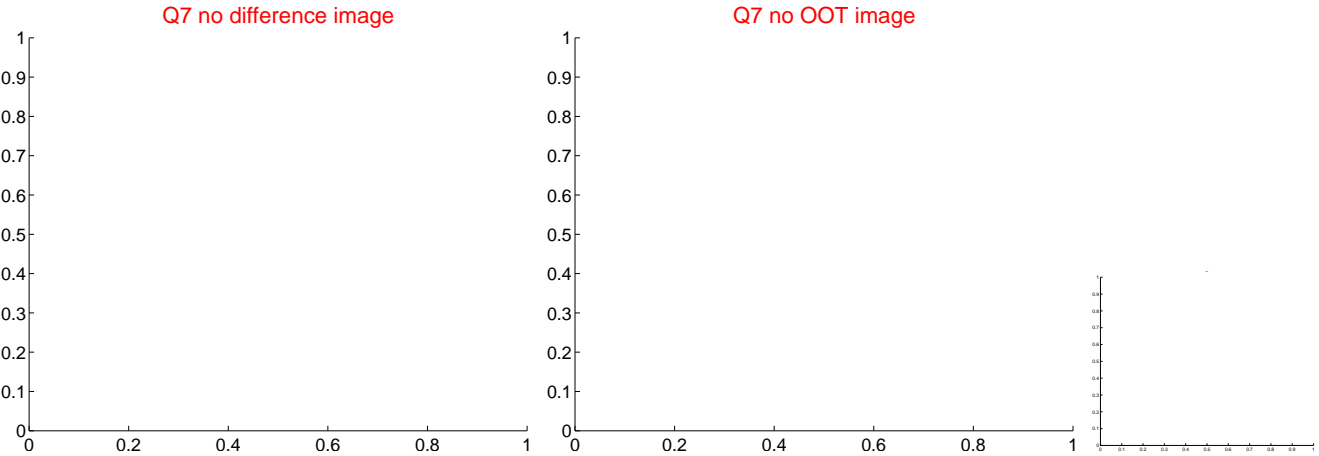
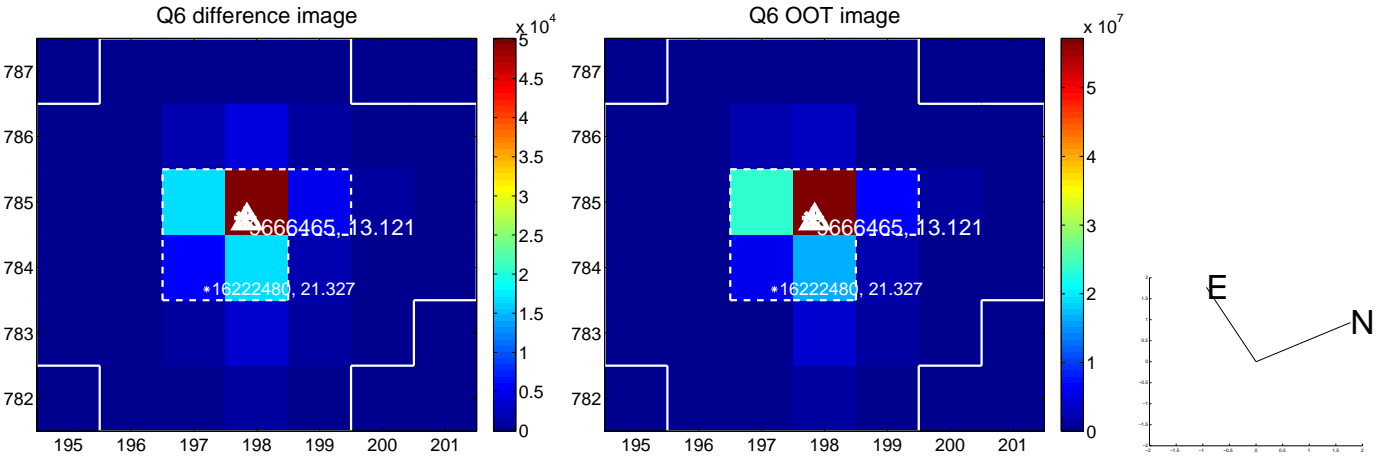
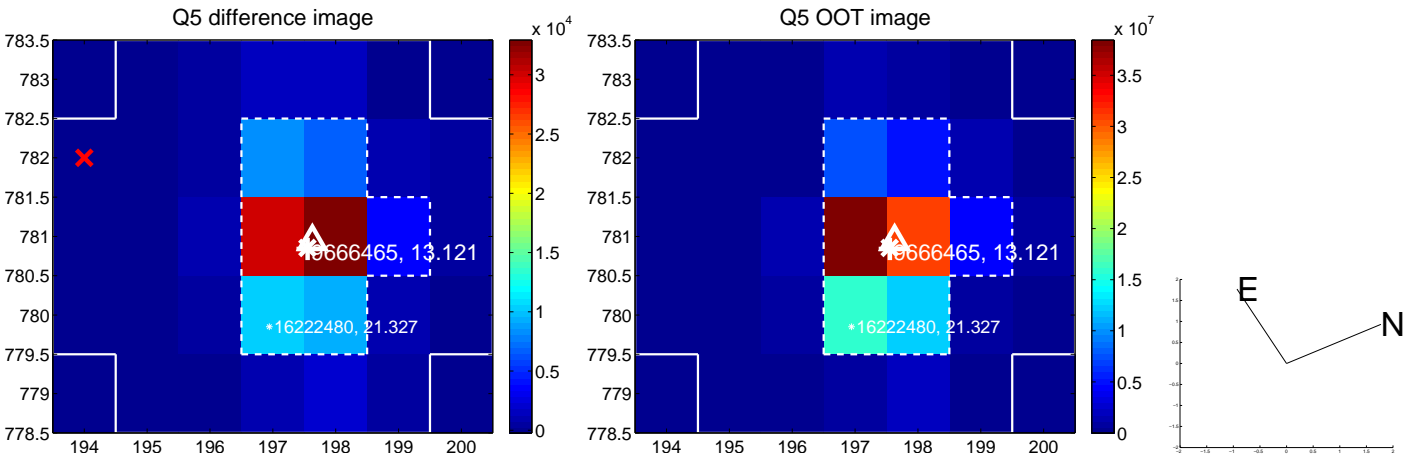


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

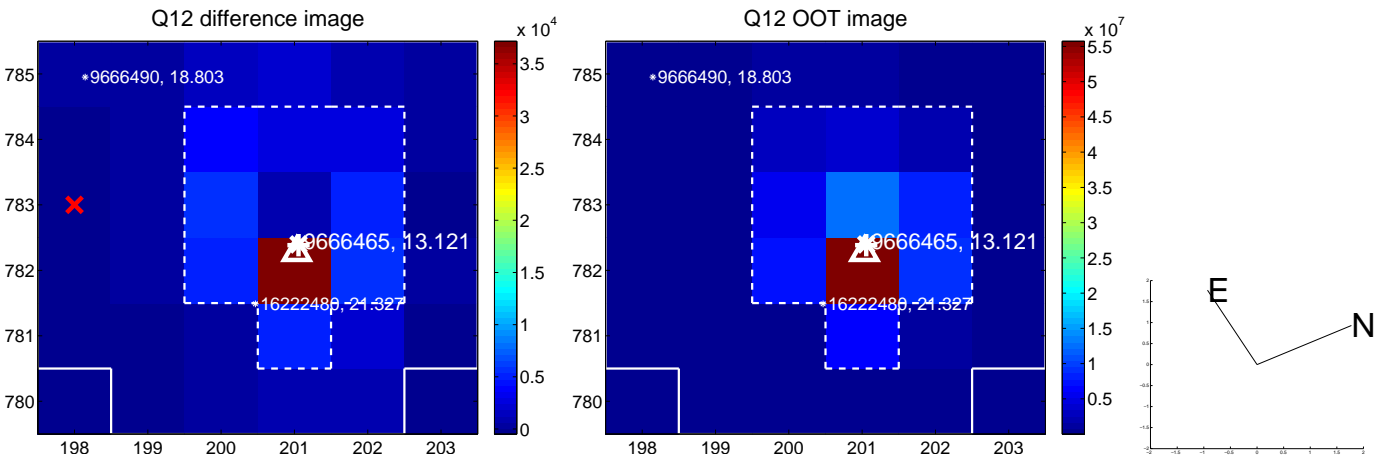
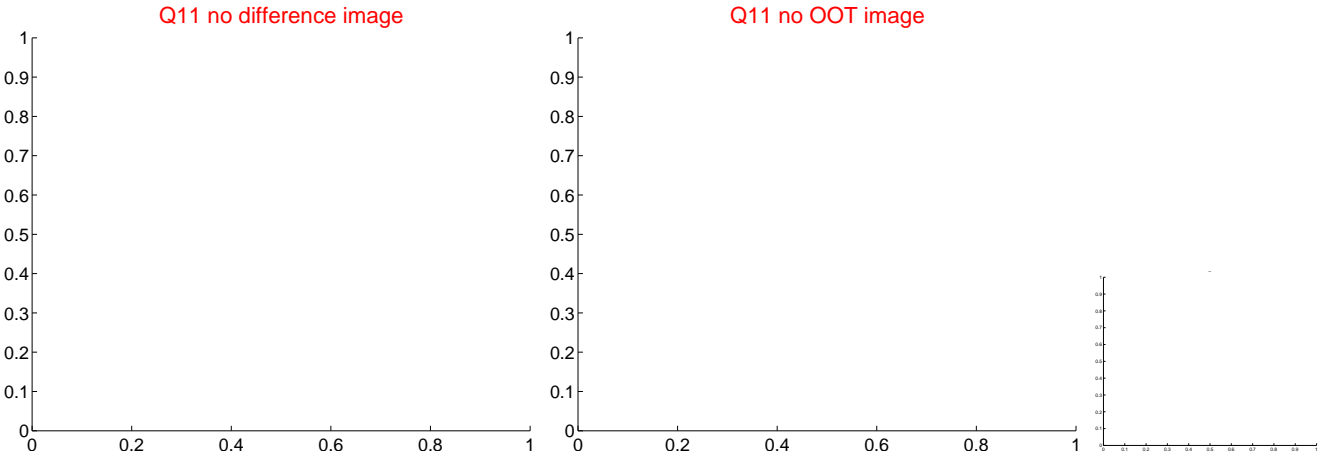
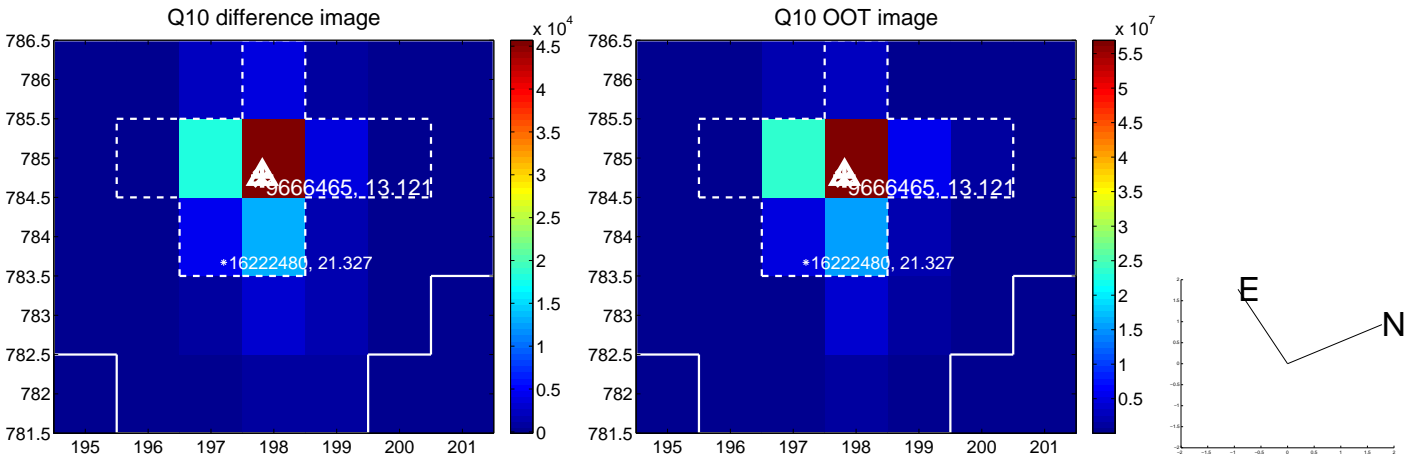
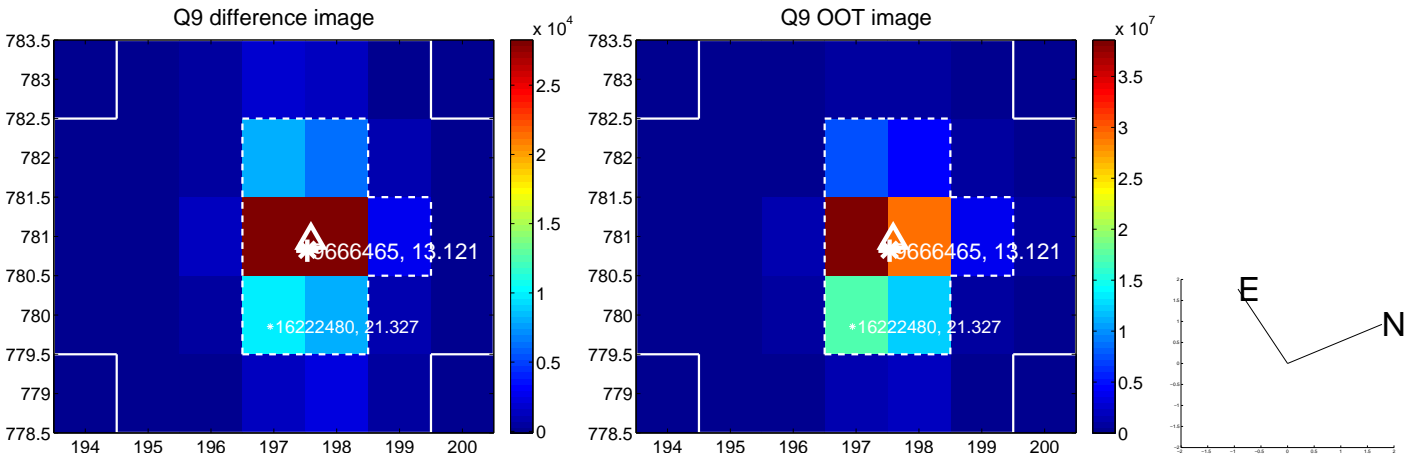
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



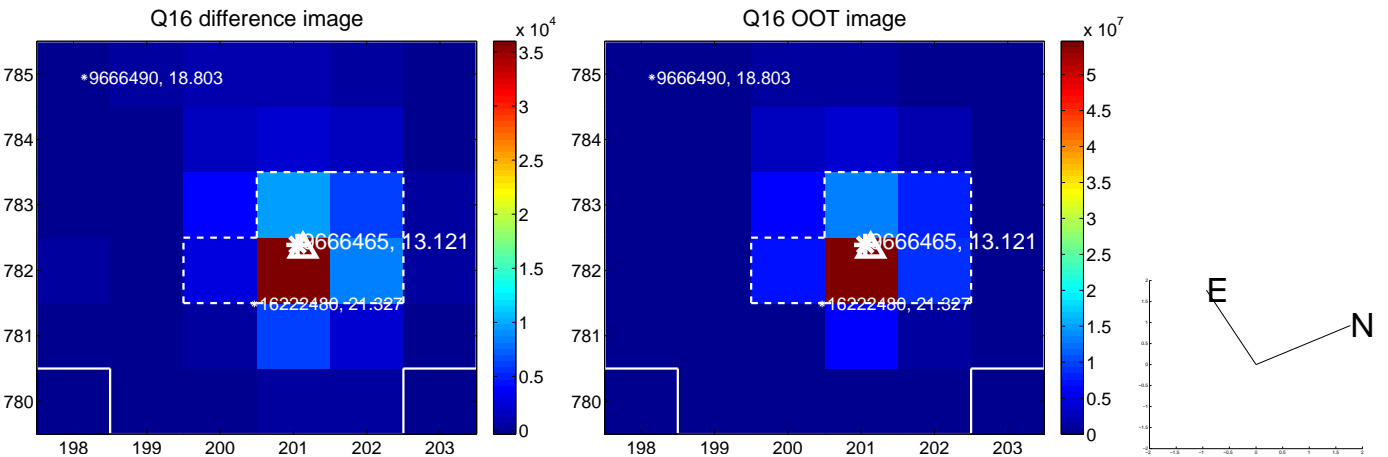
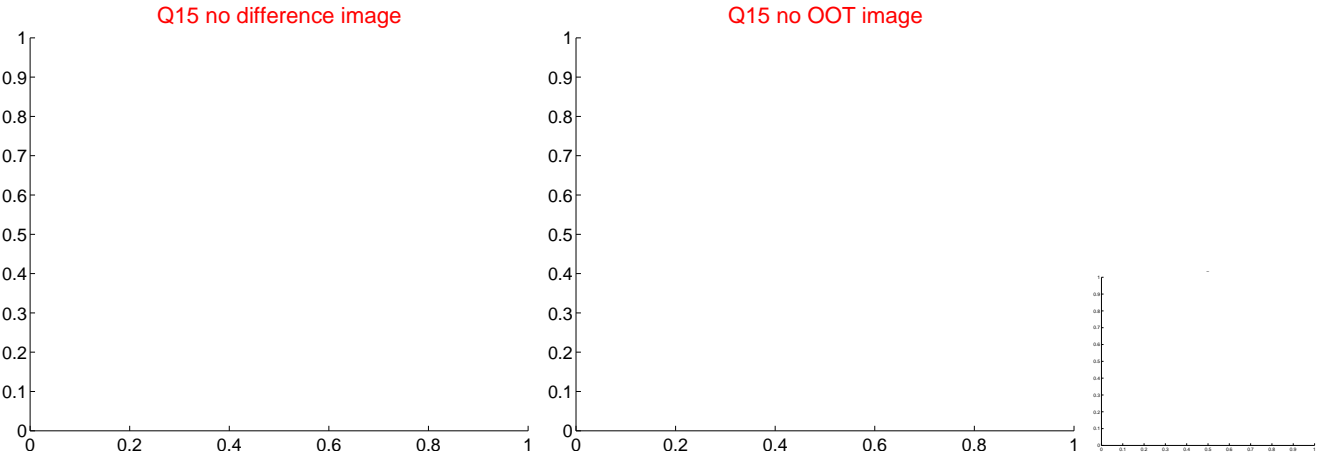
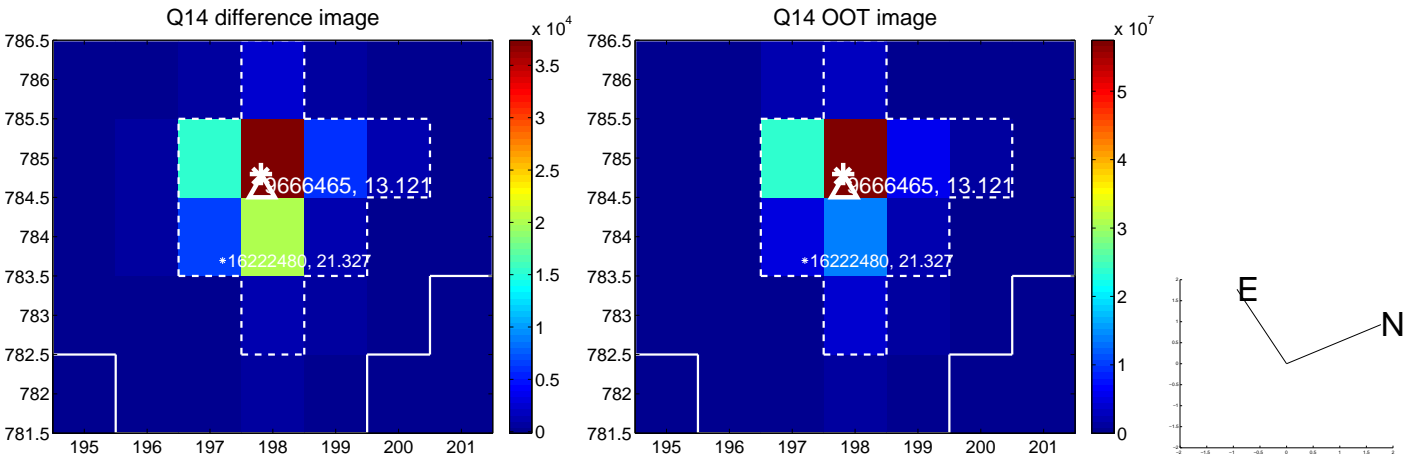
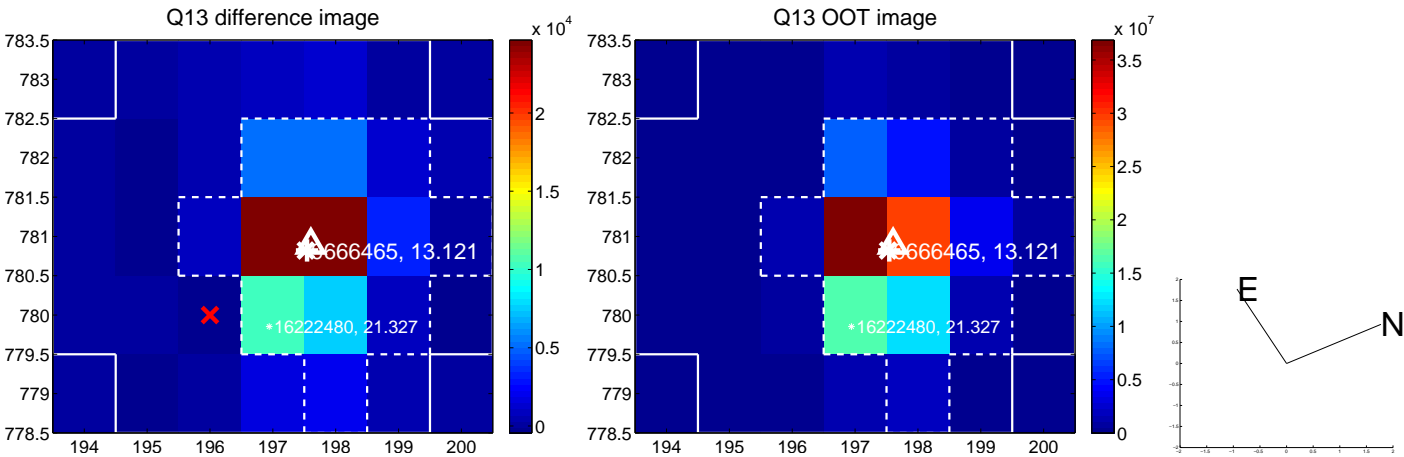
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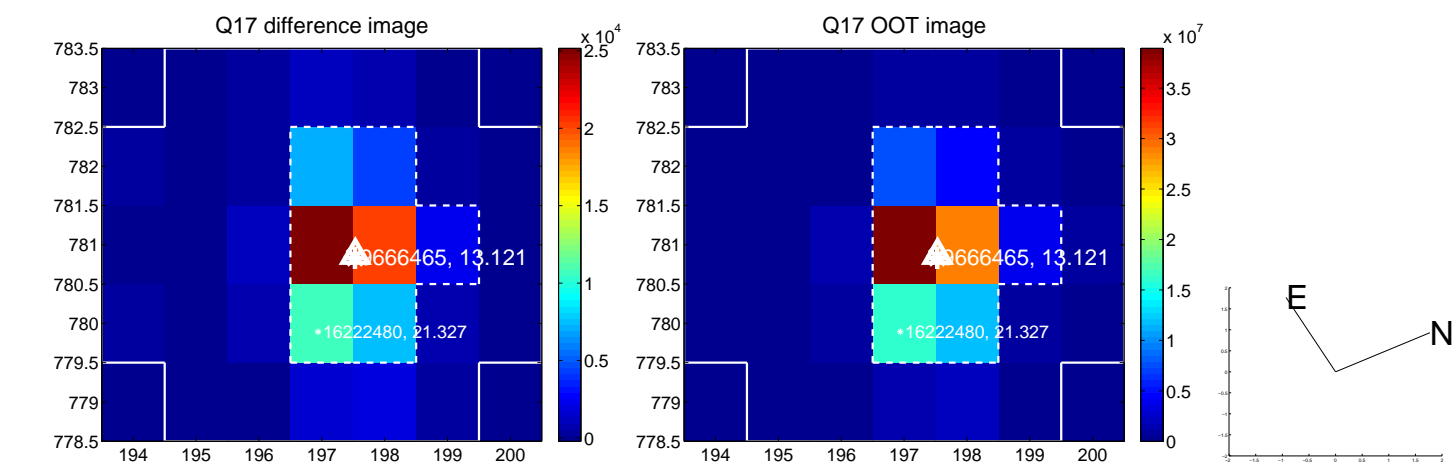


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

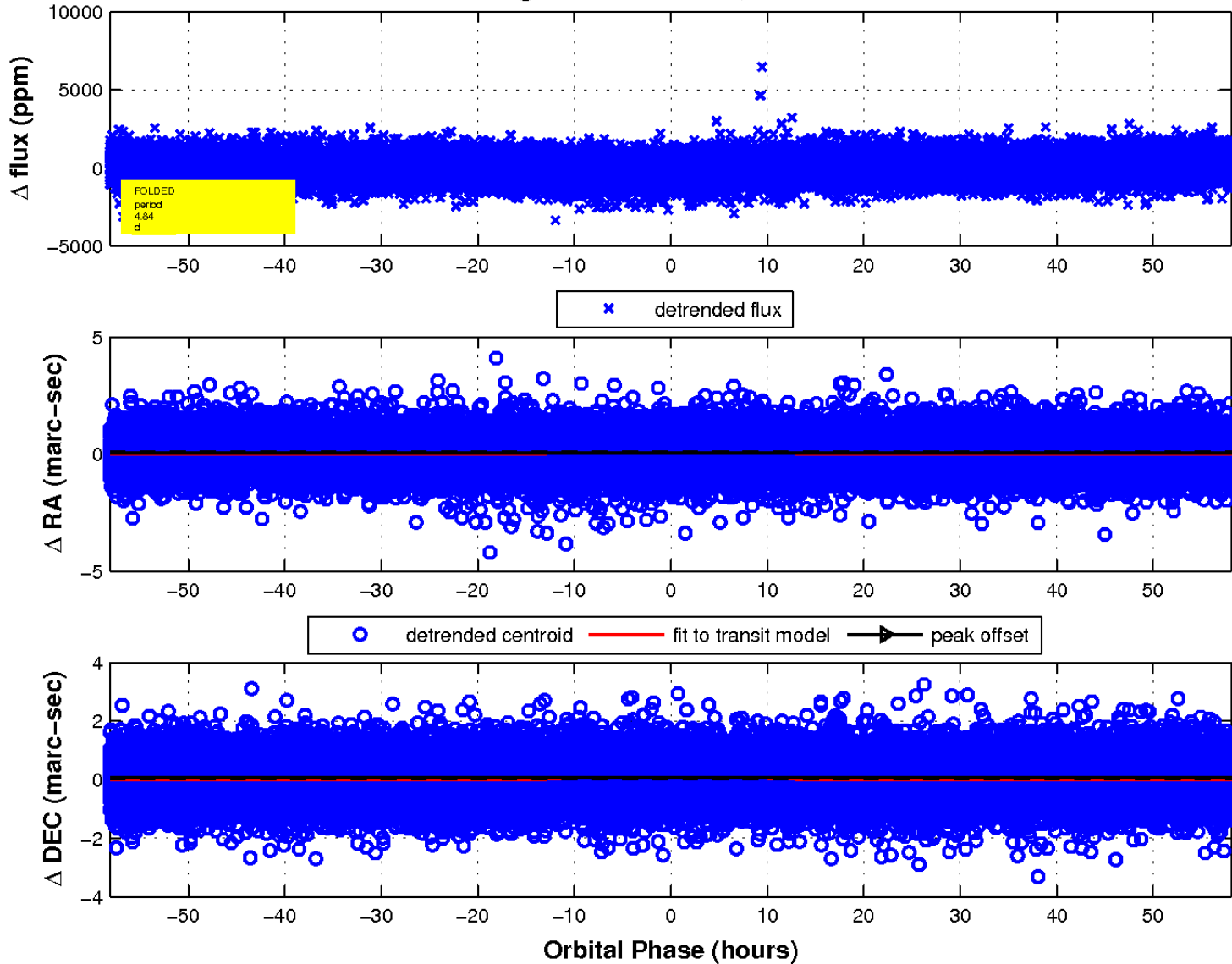




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

Declination

