

# KIC 009487546

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009487546-01	OBS	No	0.720719	132.128682	10.4	2.751	9.4	6.3	1.99	7904	0.75	37821.95
009487546-02	OBS	No	0.720746	131.771928	7.8	4.549	9.6	6.2	1.99	7904	0.56	37820.12

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009487546-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT
009487546-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—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.

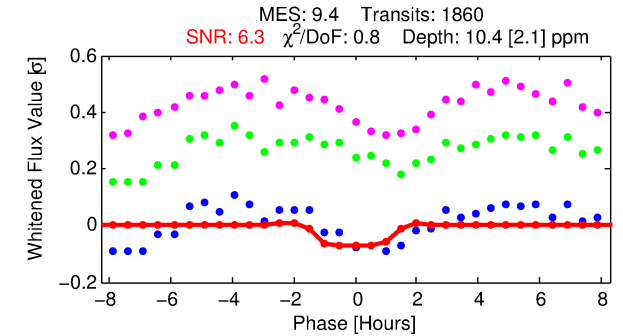
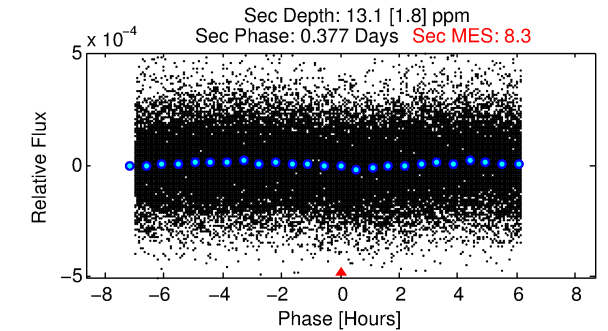
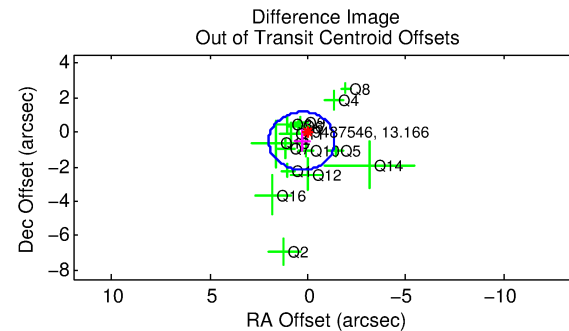
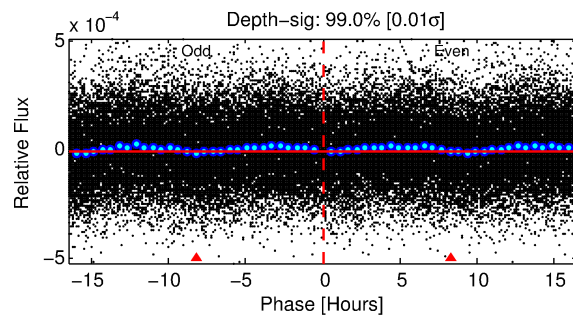
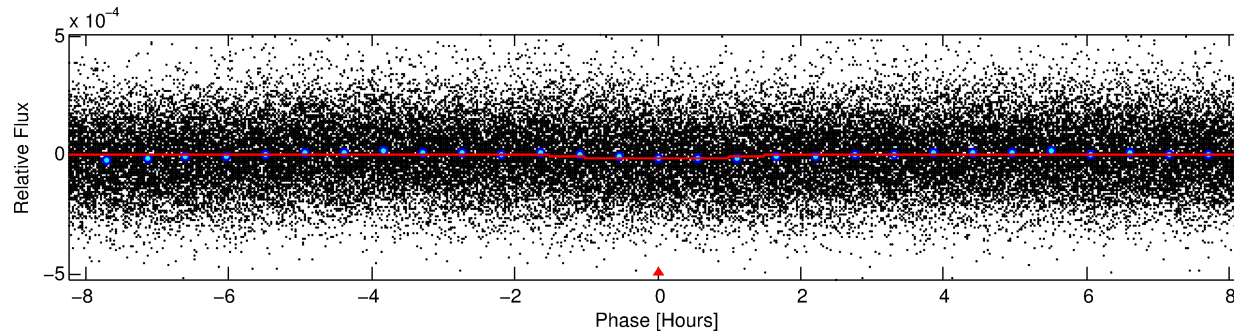
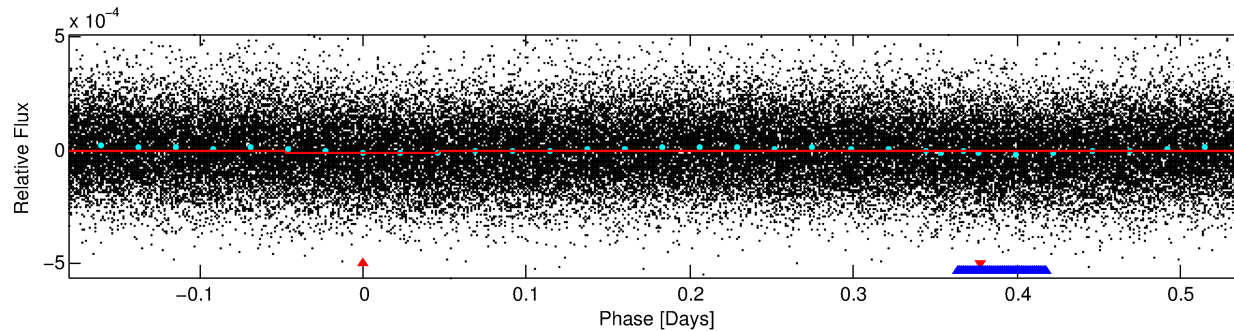
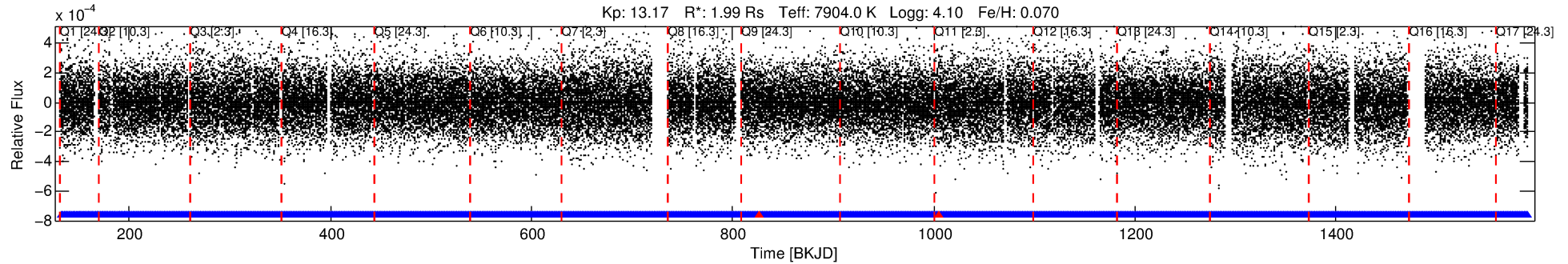
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009487546-01

No Significant Match Found

# DV One-Page Summary

KIC: 9487546 Candidate: 1 of 2 Period: 0.721 d



## DV Fit Results:

Period = 0.72072 [0.00002] d  
Epoch = 132.1287 [0.0052] BKJD  
Rp/R\* = 0.0034 [0.0015]  
a/R\* = 1.29 [1.47]  
b = 0.90 [0.61]  
Seff = 37821.95 [13122.84]  
Teq = 3556 [308] K  
Rp = 0.75 [0.39] Re  
a = 0.0192 [0.0040] AU  
Ag = 4.75 [4.56] [0.82 $\sigma$ ]  
Teffp = 8118 [1885] K [2.39 $\sigma$ ]

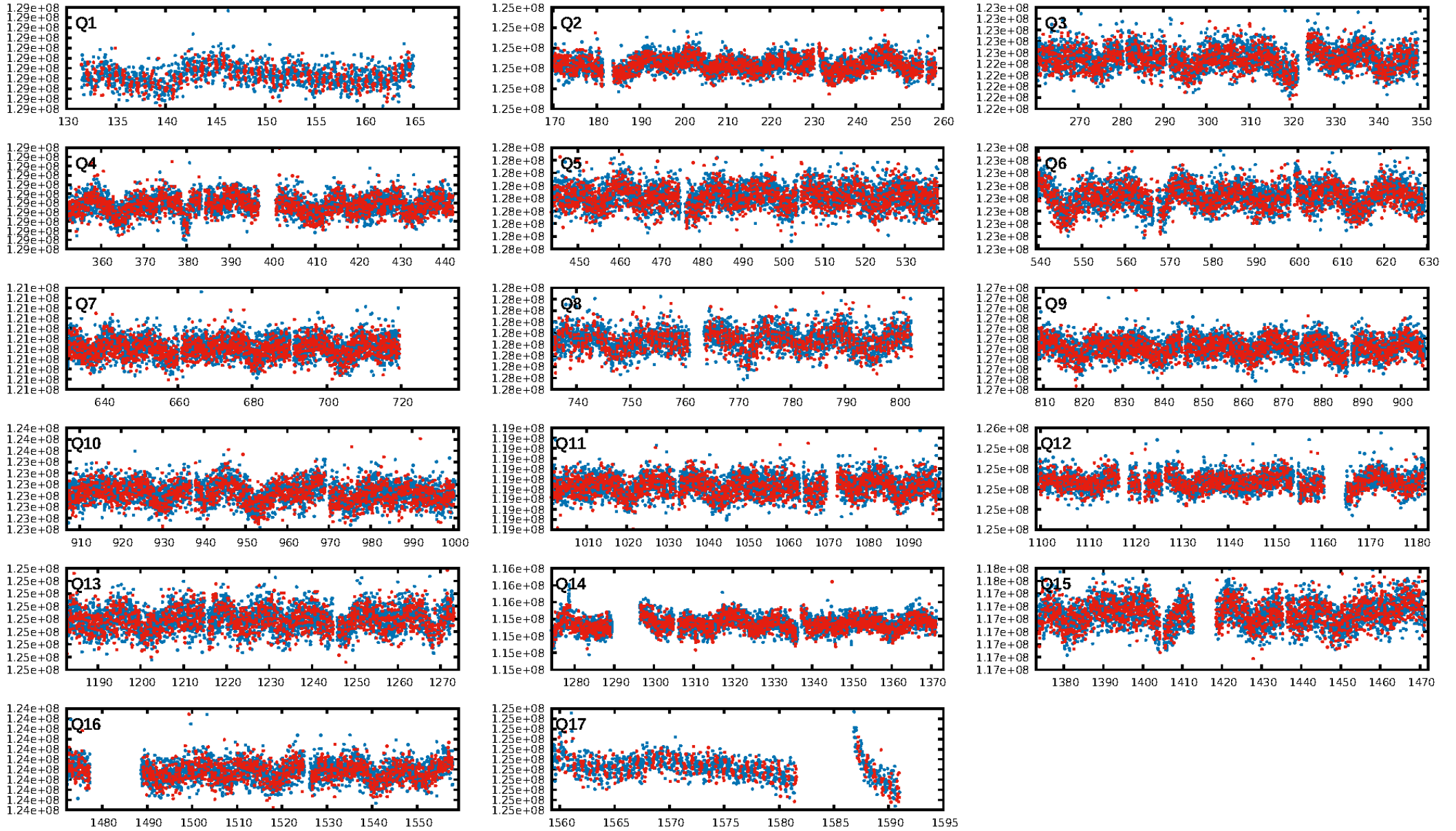
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
**LongPeriod-sig: 0.0% [0.00 $\sigma$ ]**  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [1775/1777]  
GhostDiagnostic-chr: 3.307  
Centroid-sig: 29.6%  
Centroid-so: 2.049 arcsec [1.01 $\sigma$ ]  
OotOffset-rm: 0.607 arcsec [1.08 $\sigma$ ]  
OotOffset-st: 4/3/4/4 [15]  
KicOffset-rm: 0.653 arcsec [1.11 $\sigma$ ]  
KicOffset-st: 4/3/4/4 [15]  
DiffImageQuality-fgm: 0.67 [10/15]  
DiffImageOverlap-fno: 0.00 [0/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 17:33:40 Z

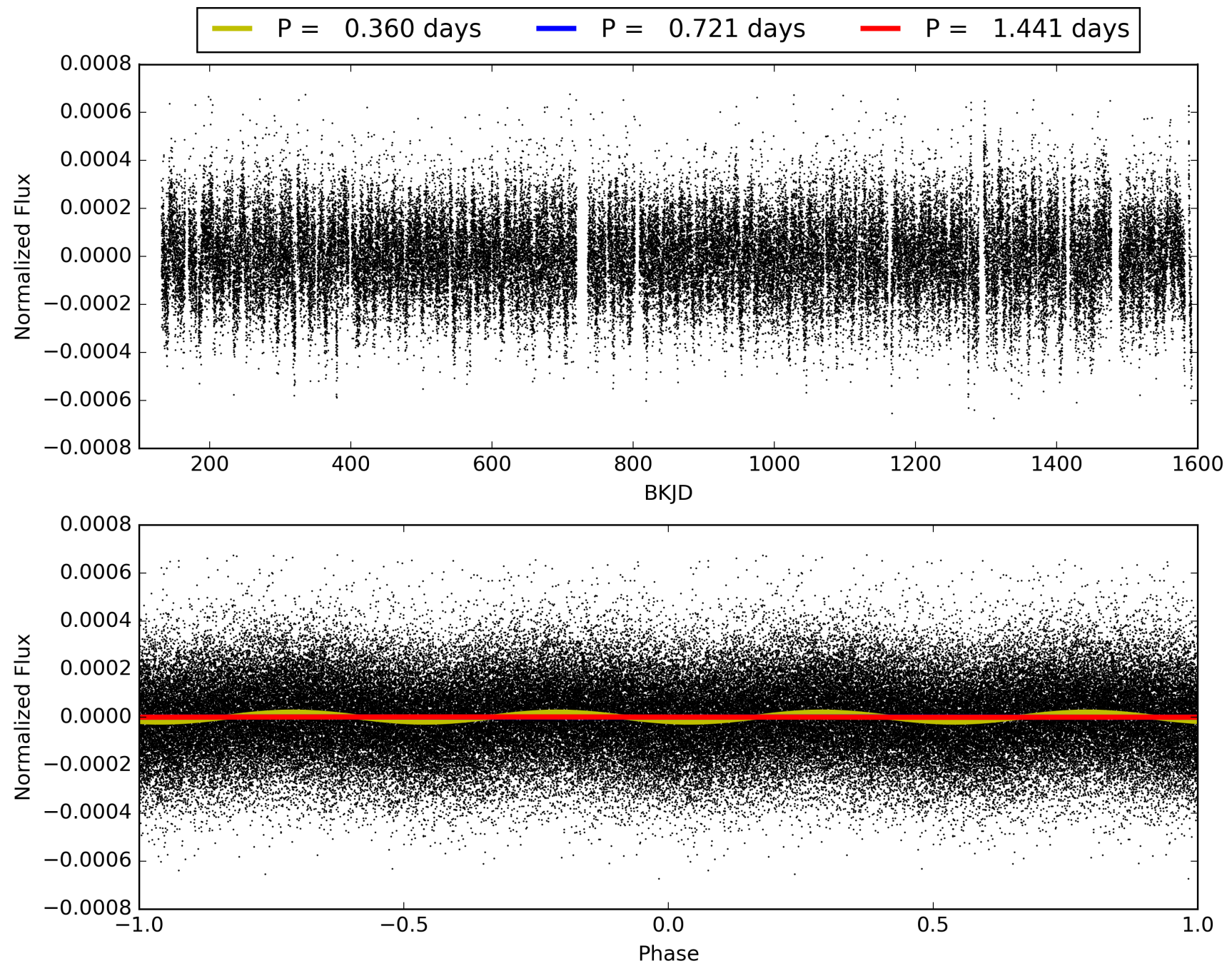
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 009487546-01, PDC Light Curves



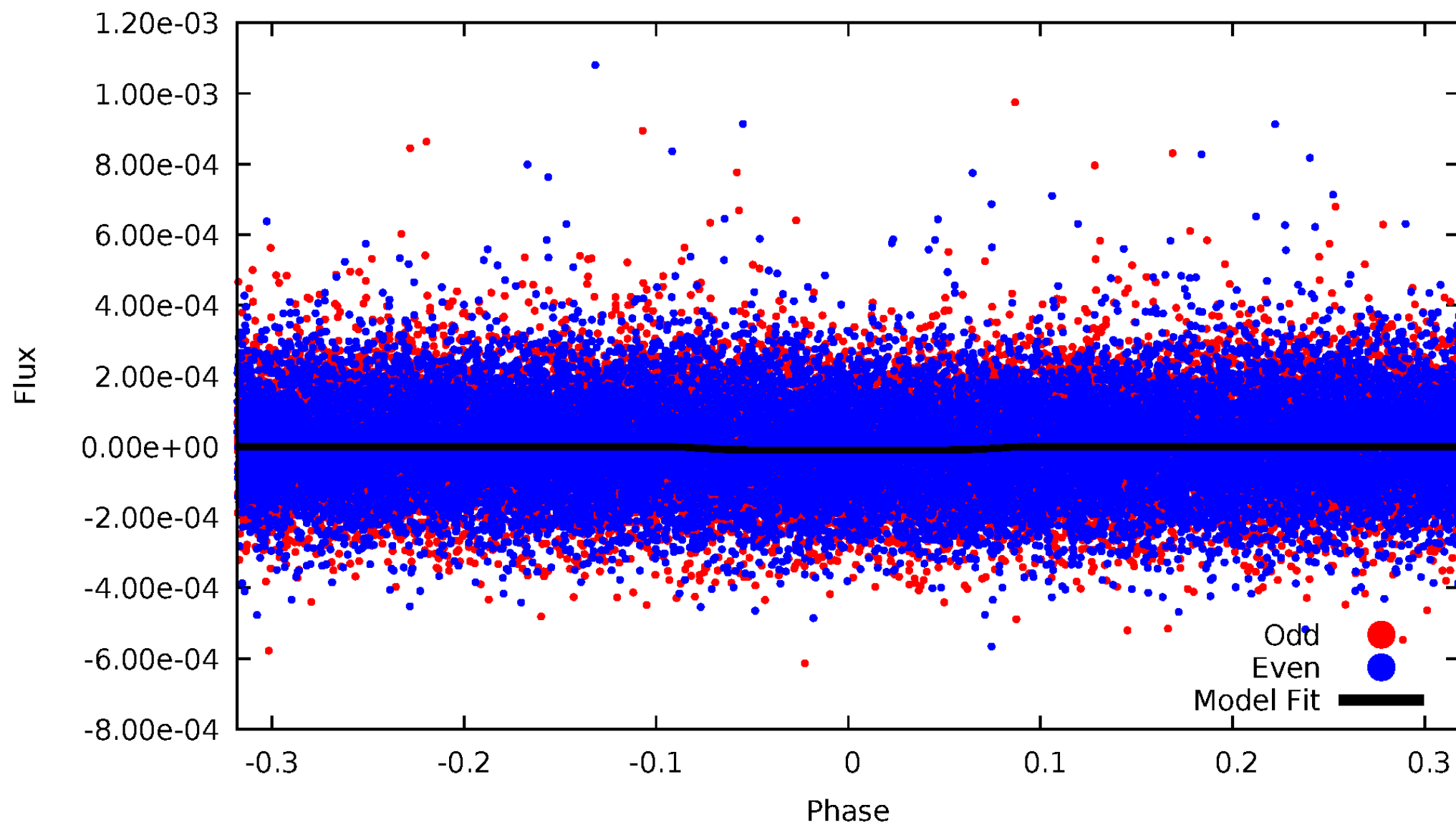


TCE 009487546-01



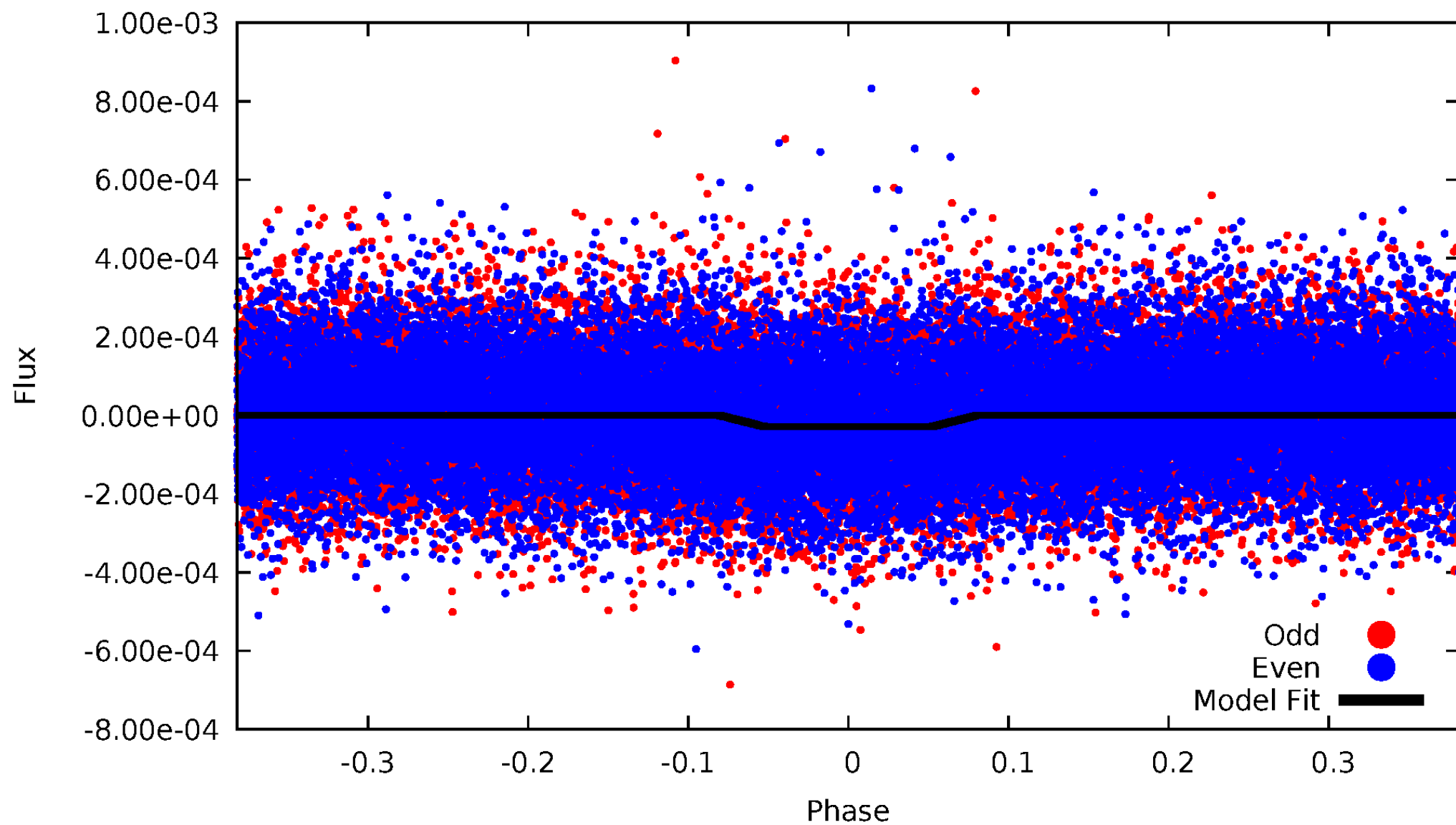
# DV Odd/Even

TCE 009487546-01



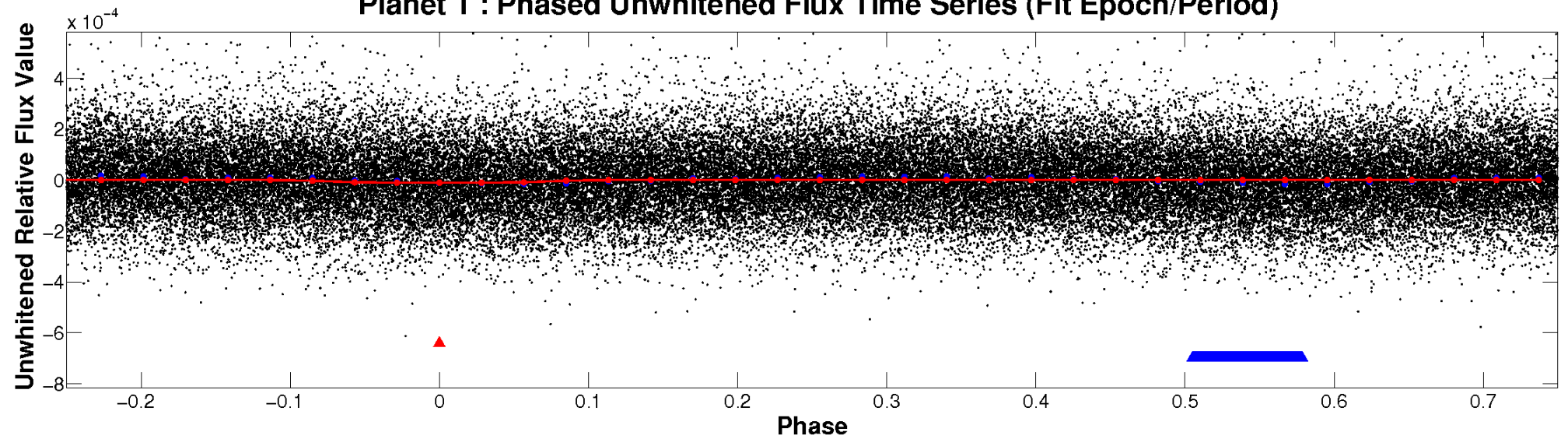
# ALT Odd/Even

TCE 009487546-01

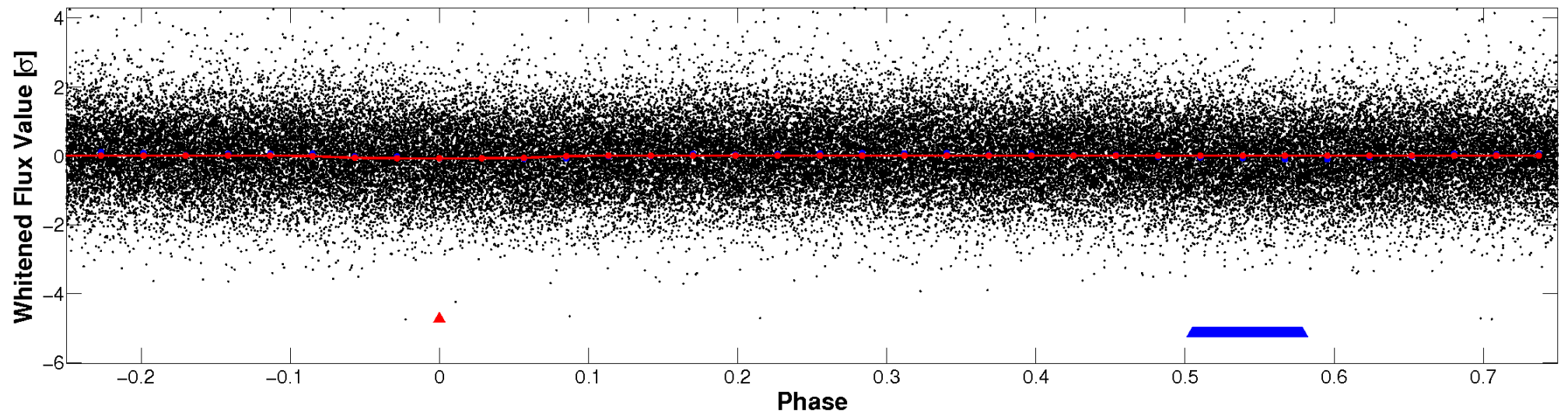


# Non-Whitened Vs. Whitened Light Curve

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



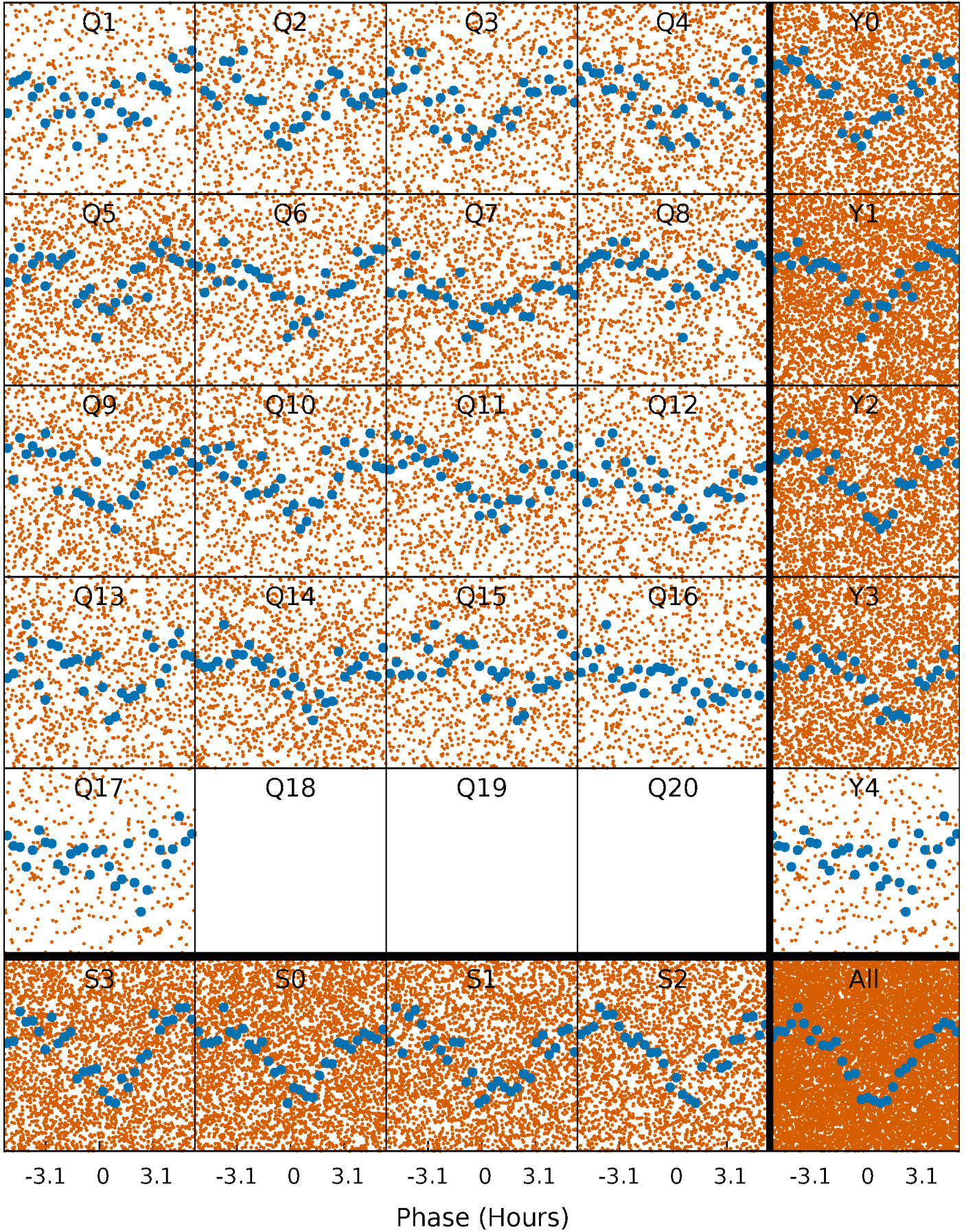
**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**





# PDC Quarter-Phased Transit Curves

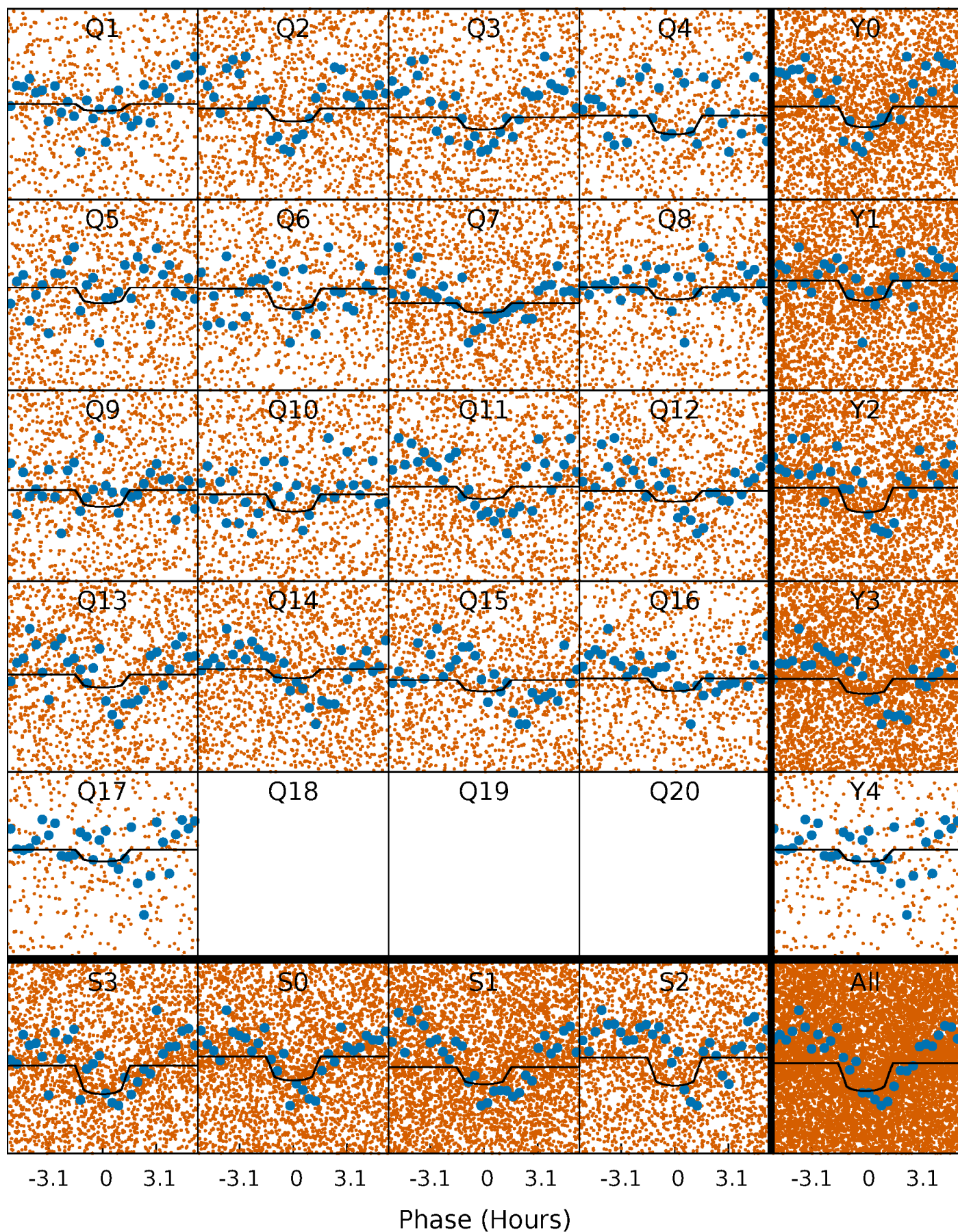
TCE 009487546-01 P= 0.720719 Days  $T_0=132.128682$  (BKJD)





# DV Quarter-Phased Transit Curves

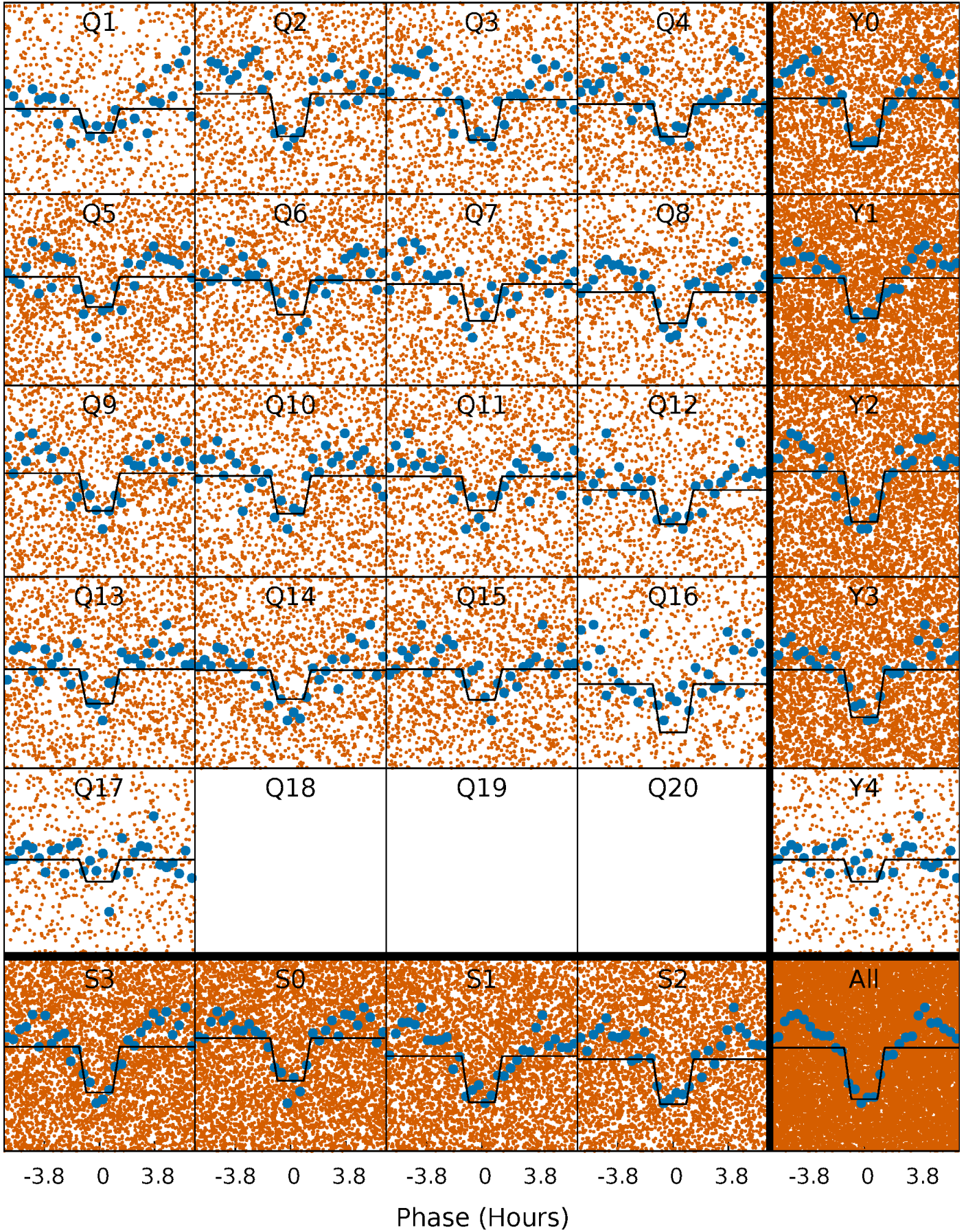
TCE 009487546-01 P= 0.720719 Days  $T_0=132.128682$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

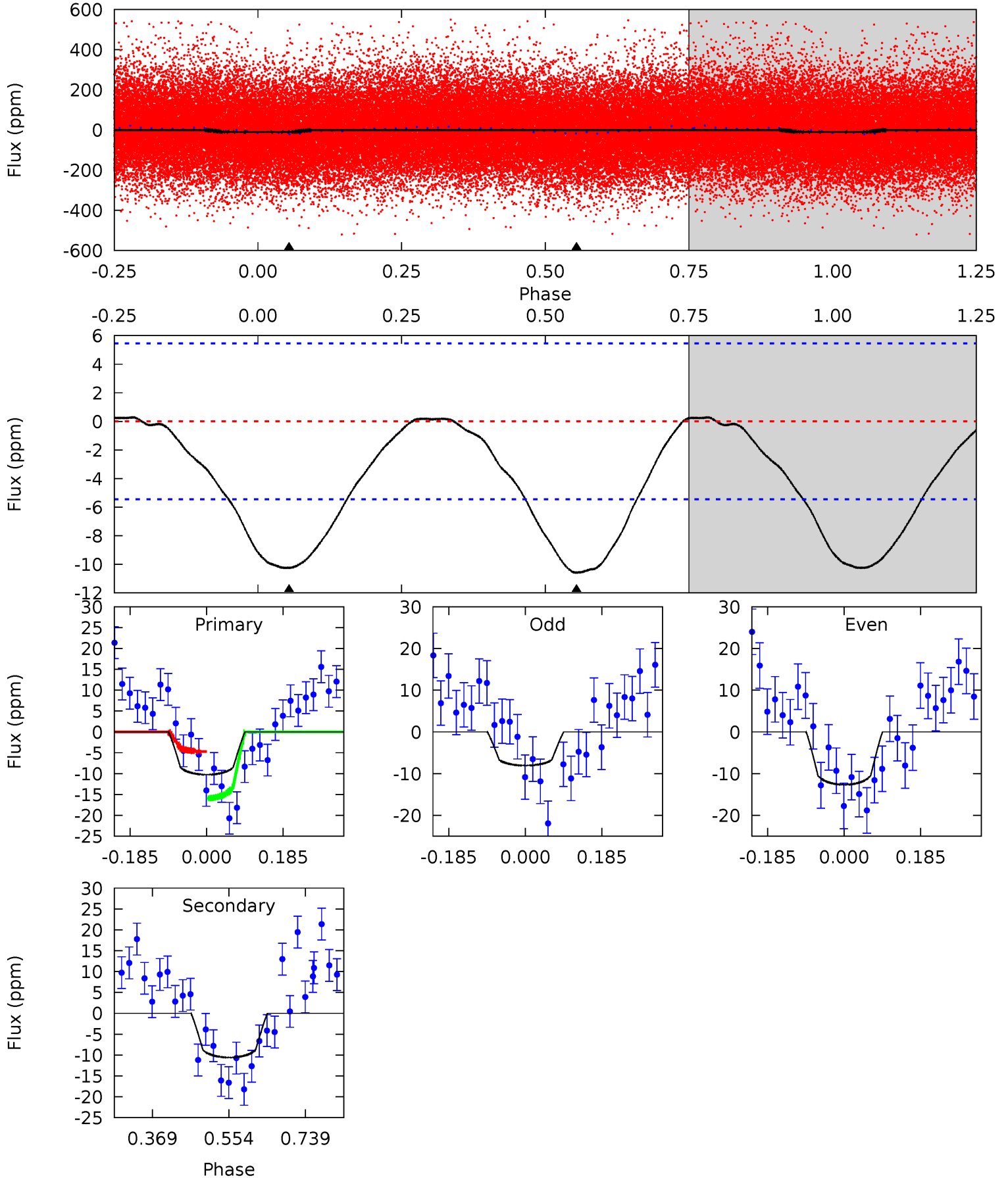
TCE 009487546-01 P= 0.720763 Days  $T_0=132.113134$  (BKJD)



# DV Model-Shift Uniqueness Test

009487546-01, P = 0.720719 Days, E = 131.407963 Days

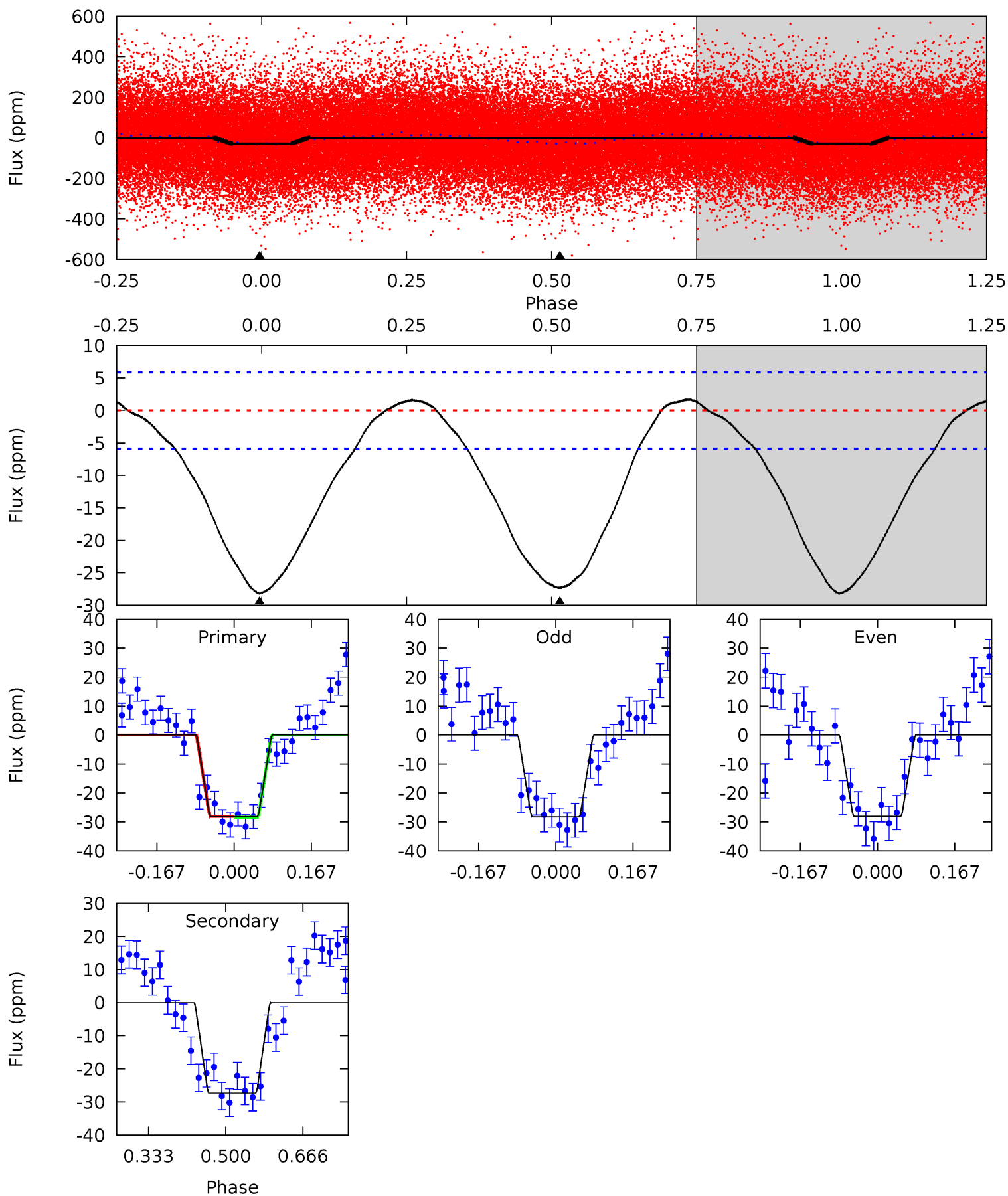
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.33	8.60	0	0	4.43	1.33	0.36	8.33	8.33	8.60	8.60	1.87	1.04	0.03	4.54



# Alt Model-Shift Uniqueness Test

009487546-01, P = 0.720763 Days, E = 131.392371 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
21.4	20.7	0	0	4.46	1.38	1.42	21.4	21.4	20.7	20.7	0.09	1.01	0.06	0.10





### Stellar Parameters For KIC 009487546

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7904^{+216}_{-351}$	$4.096^{+0.131}_{-0.160}$	$0.070^{+0.250}_{-0.450}$	$1.994^{+0.505}_{-0.413}$	$1.808^{+0.160}_{-0.321}$	$0.321^{+0.238}_{-0.135}$
	+3%/-4%	+3%/-4%	+357%/-643%	+25%/-21%	+9%/-18%	+74%/-42%
Source	KIC0	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 009487546-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-11 \pm 1$	$0.75^{+0.33}_{-0.32}$	$4985^{+309}_{-317}$	$7408^{+3393}_{-1460}$	$3.603^{+7.638}_{-1.777}$
Alt.	$-27 \pm 1$	$1.16^{+0.36}_{-0.35}$	$4977^{+311}_{-328}$	$7574^{+1885}_{-1162}$	$4.032^{+3.964}_{-1.722}$

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

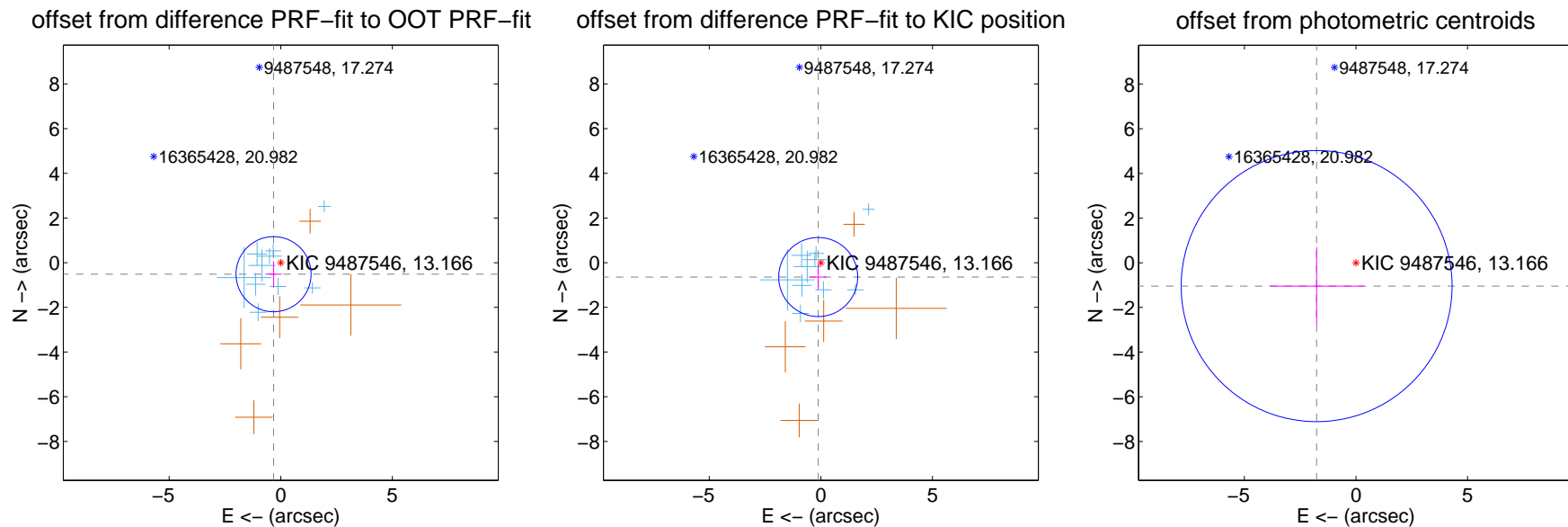
## DV Centroid Data

Supplemental centroid analysis for 009487546-01. Kepler magnitude: 13.17. Transit SNR 6.34

There are 10 quarters with good PRF difference image offsets

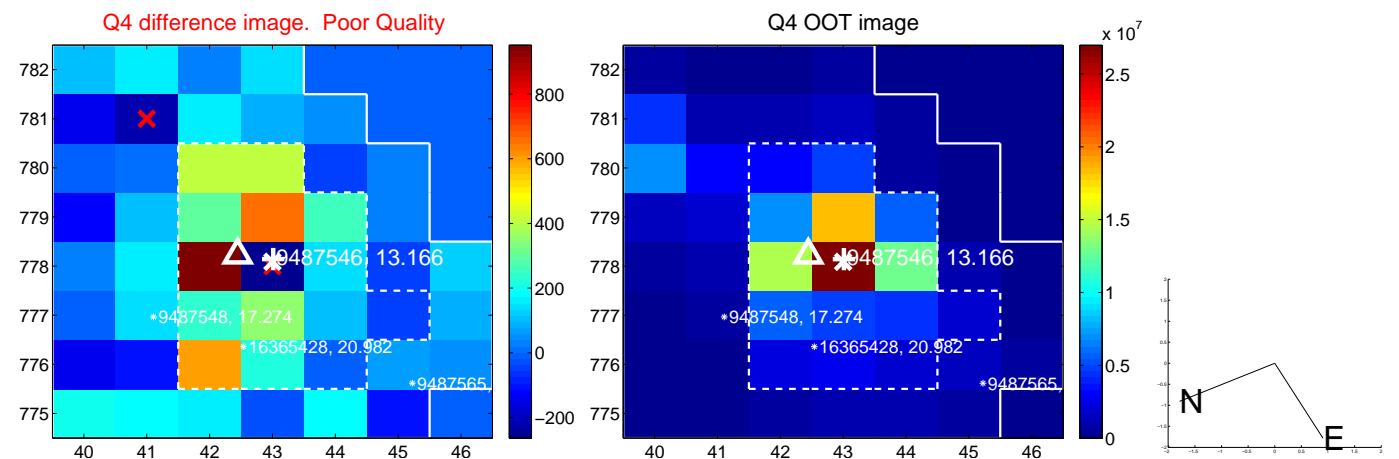
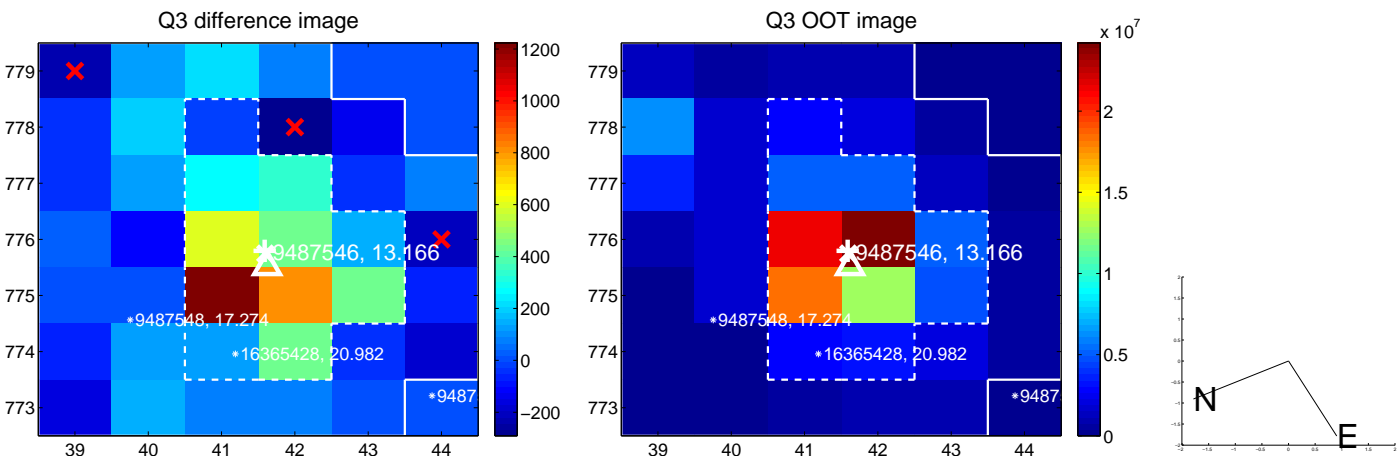
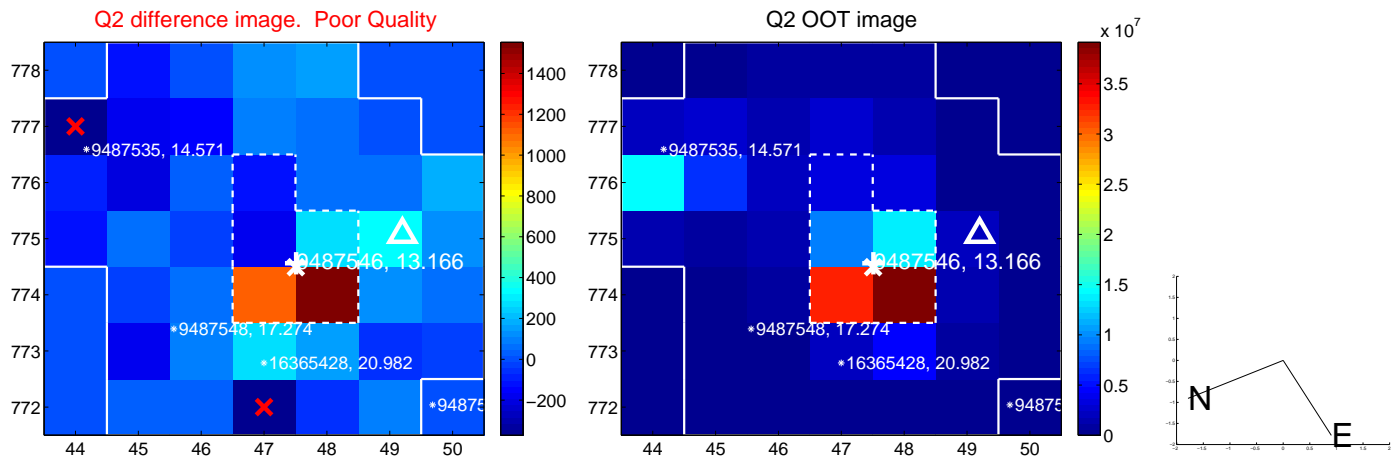
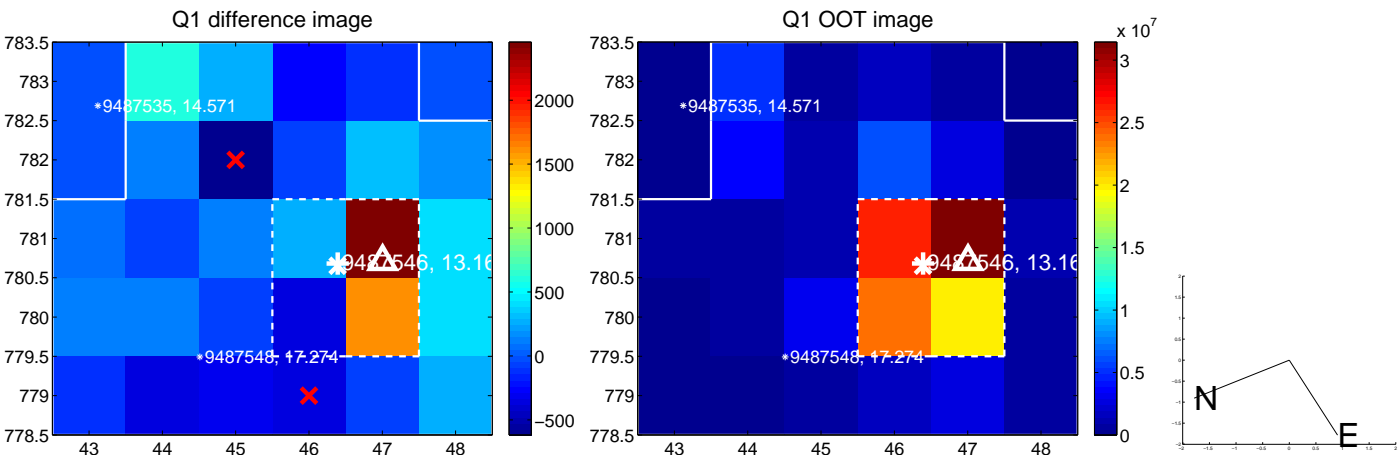
The direct PRF centroid is offset from the target star catalog position by about 0.24 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.607 \pm 0.560$	1.08	$0.322 \pm 0.371$	$-0.515 \pm 0.576$
PRF-fit source offset from KIC position	$0.653 \pm 0.590$	1.11	$0.119 \pm 0.379$	$-0.641 \pm 0.573$
photometric centroid source offset	$2.05 \pm 2.02$	1.01	$1.76 \pm 2.11$	$-1.04 \pm 1.74$

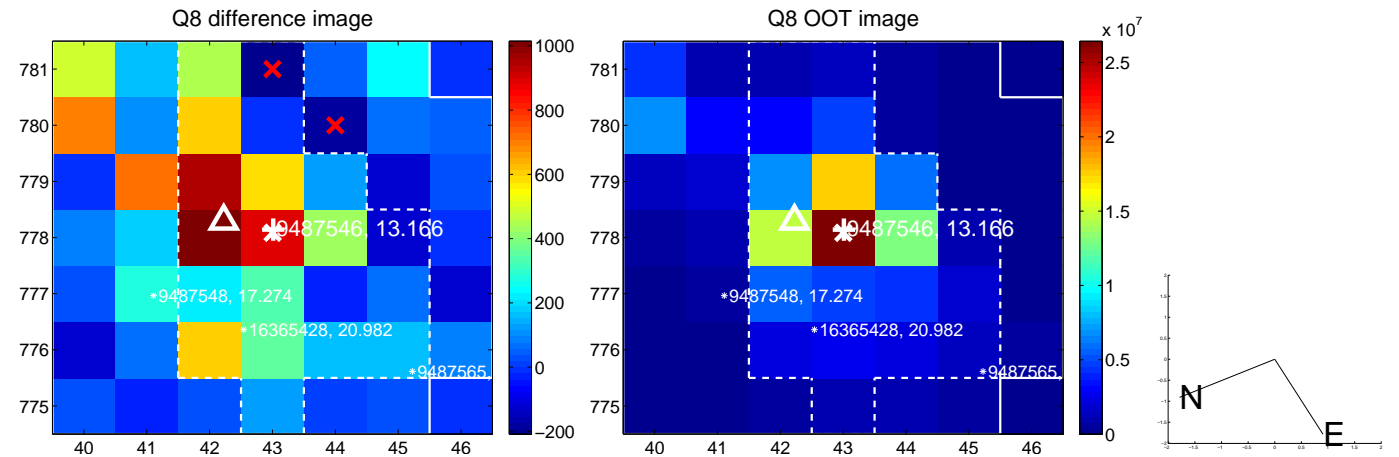
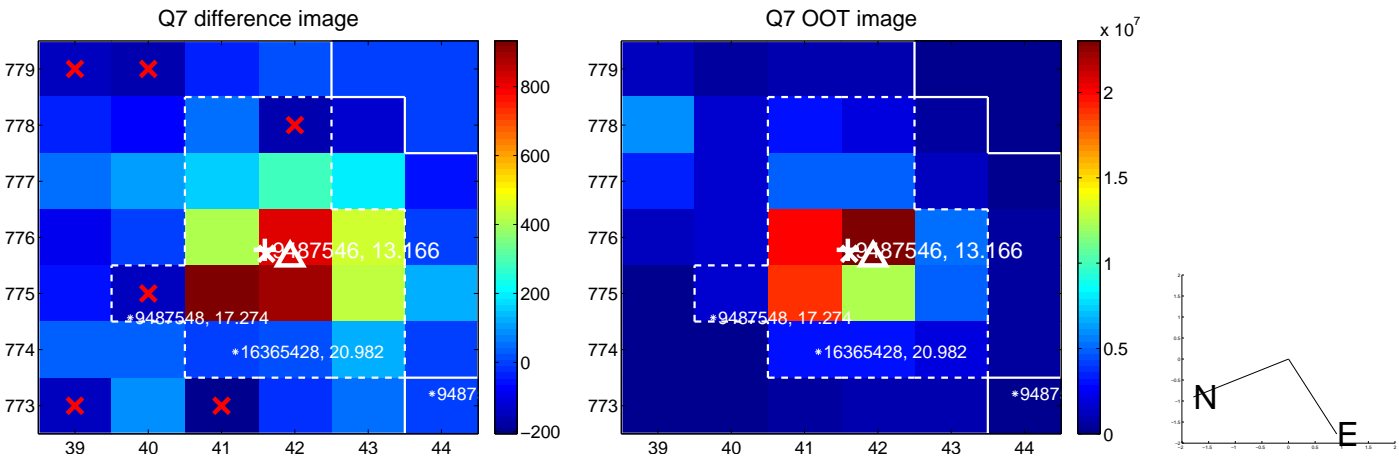
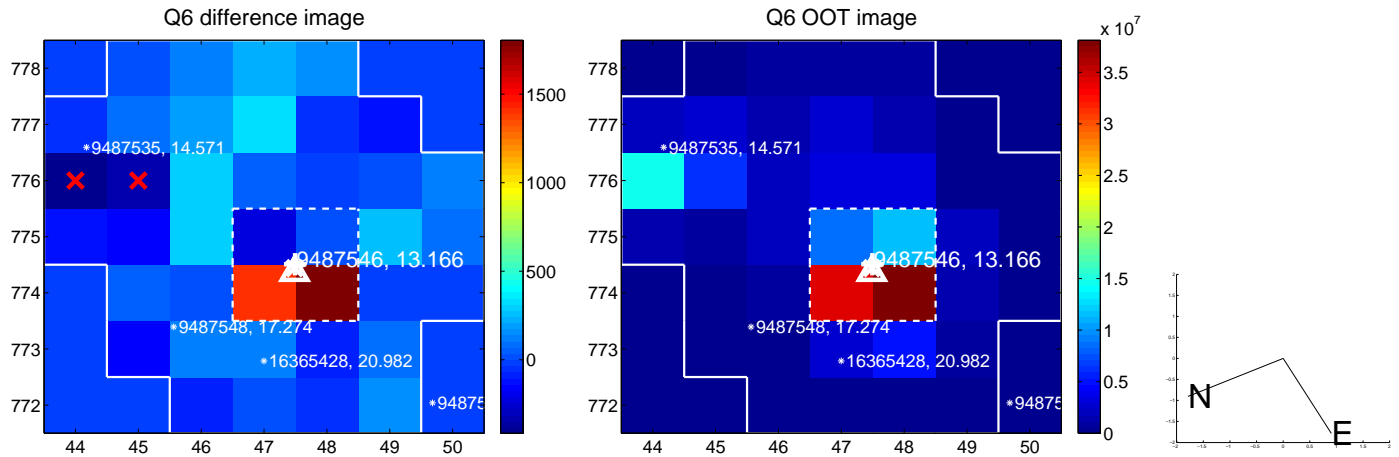
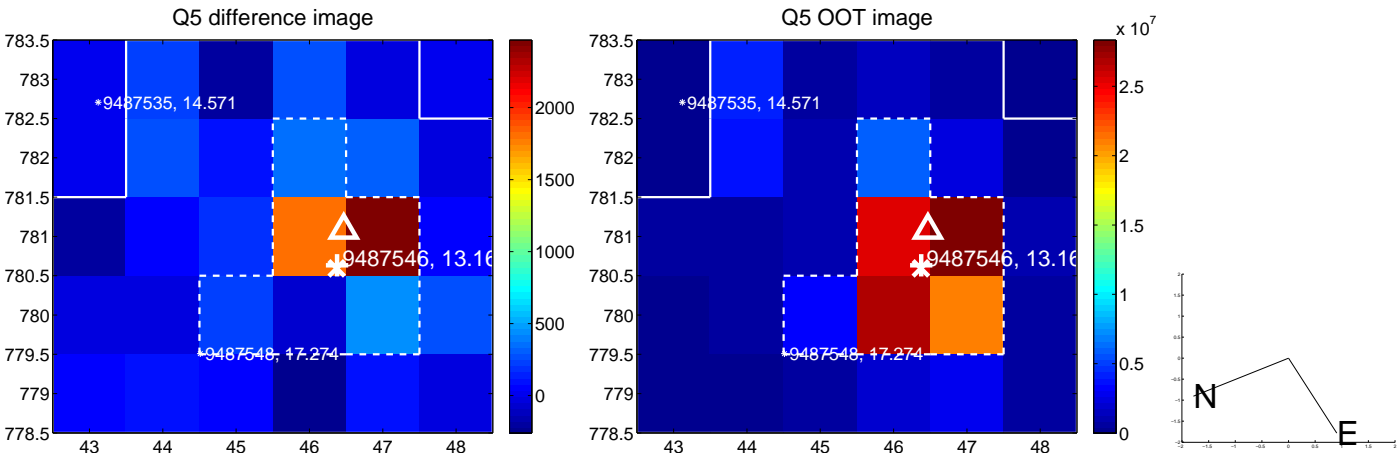


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

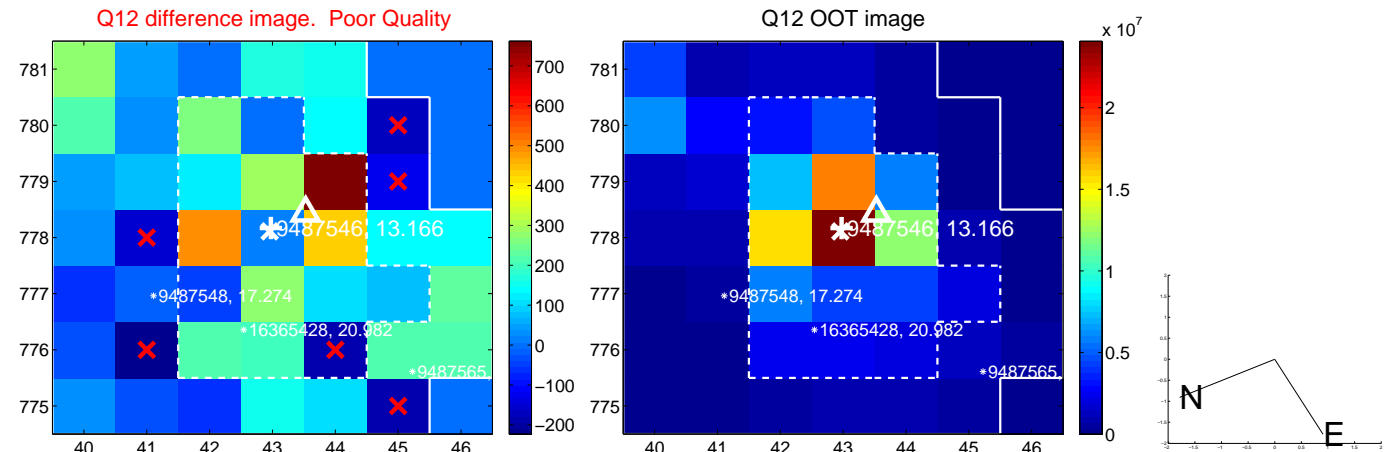
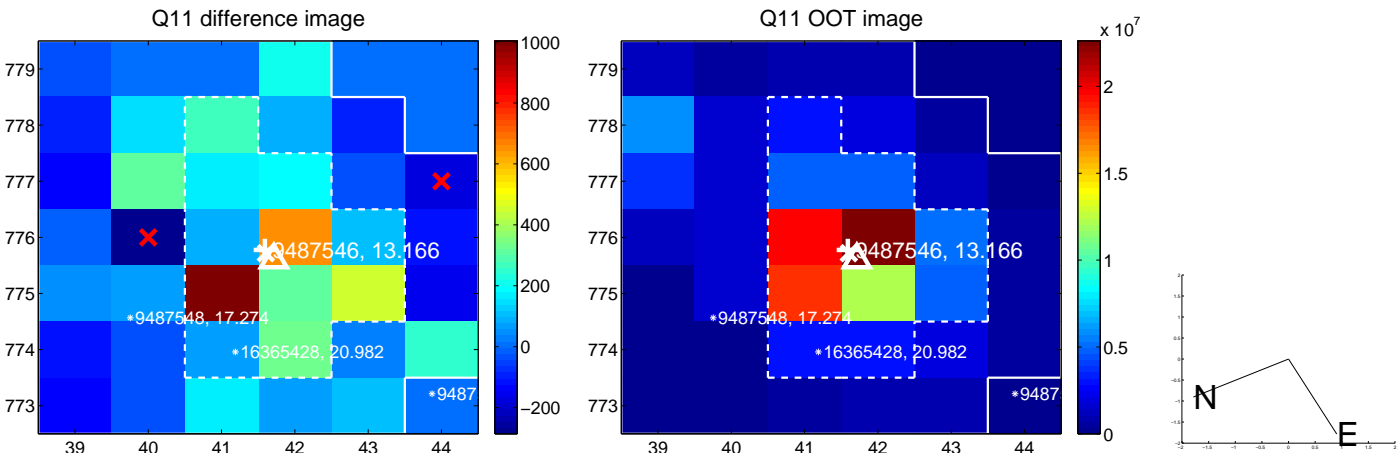
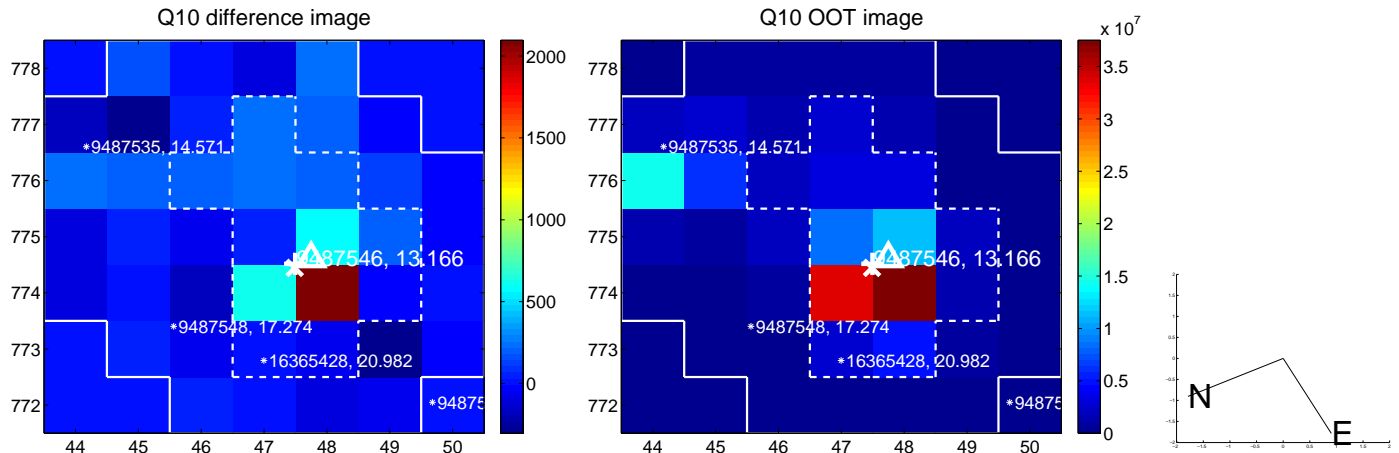
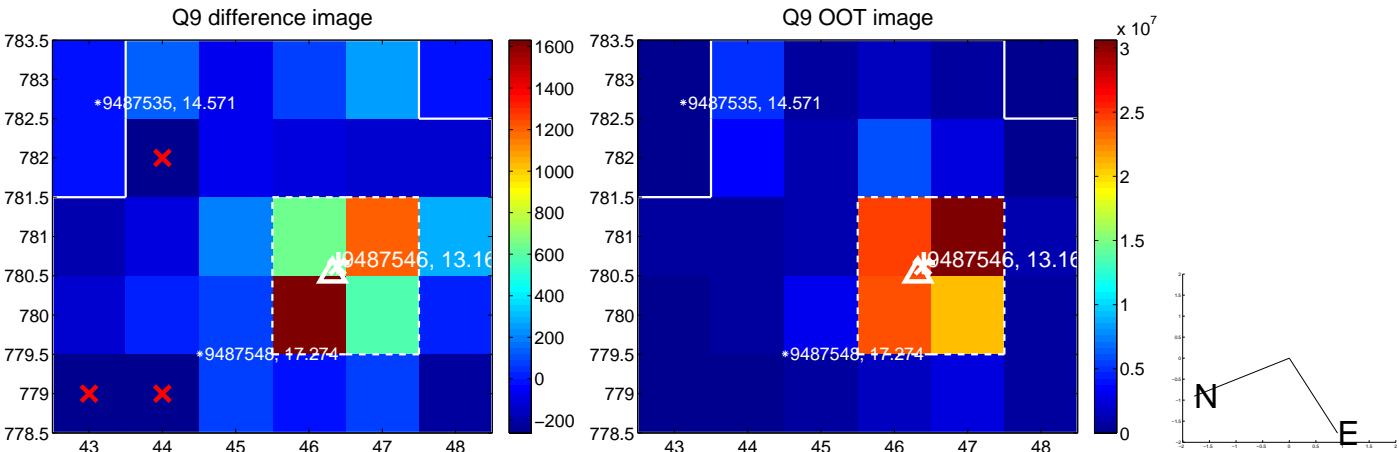


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

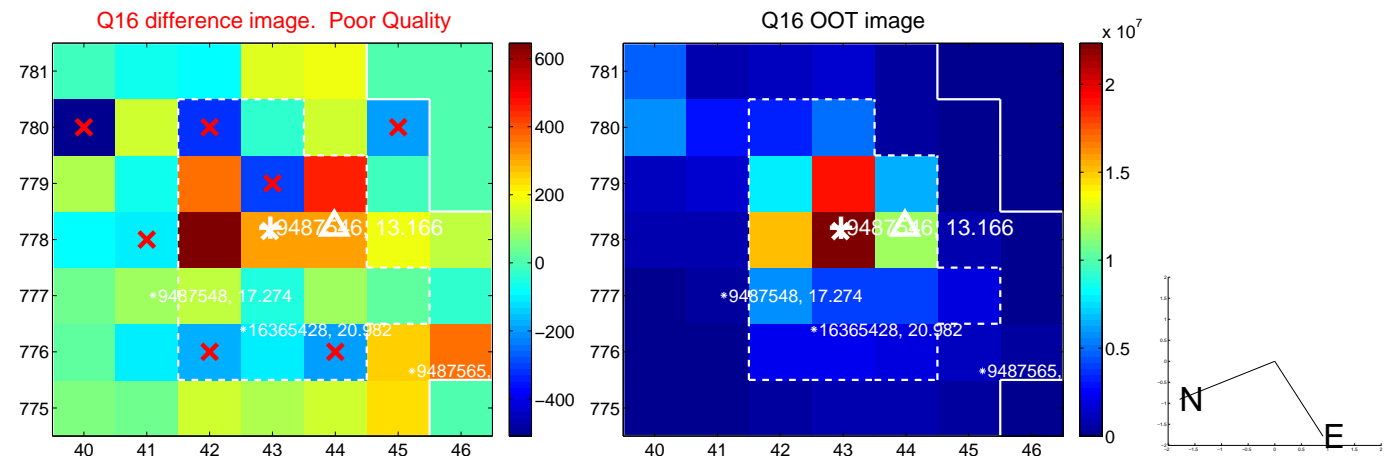
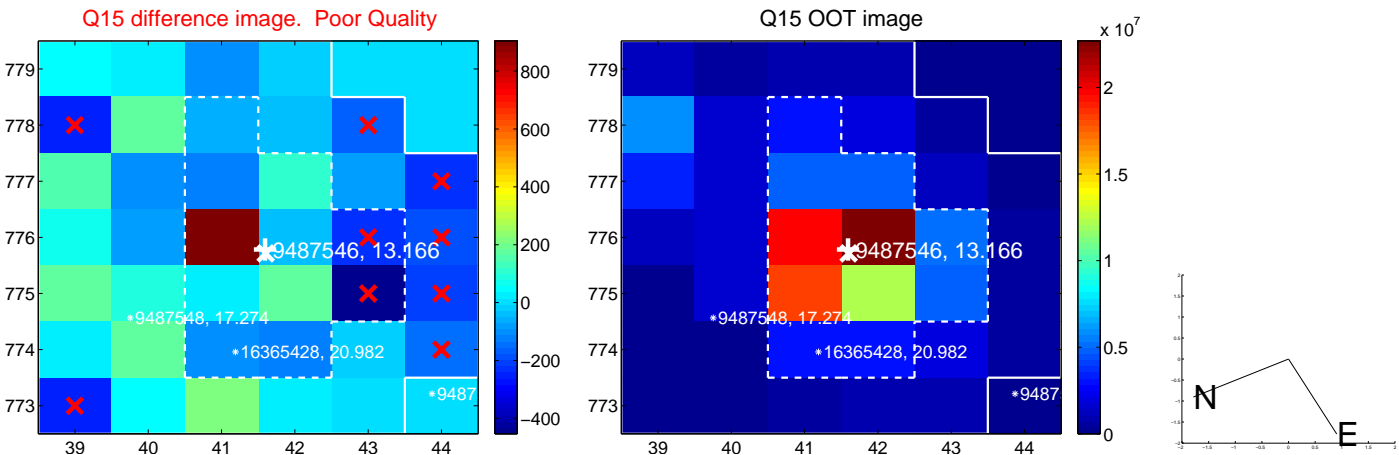
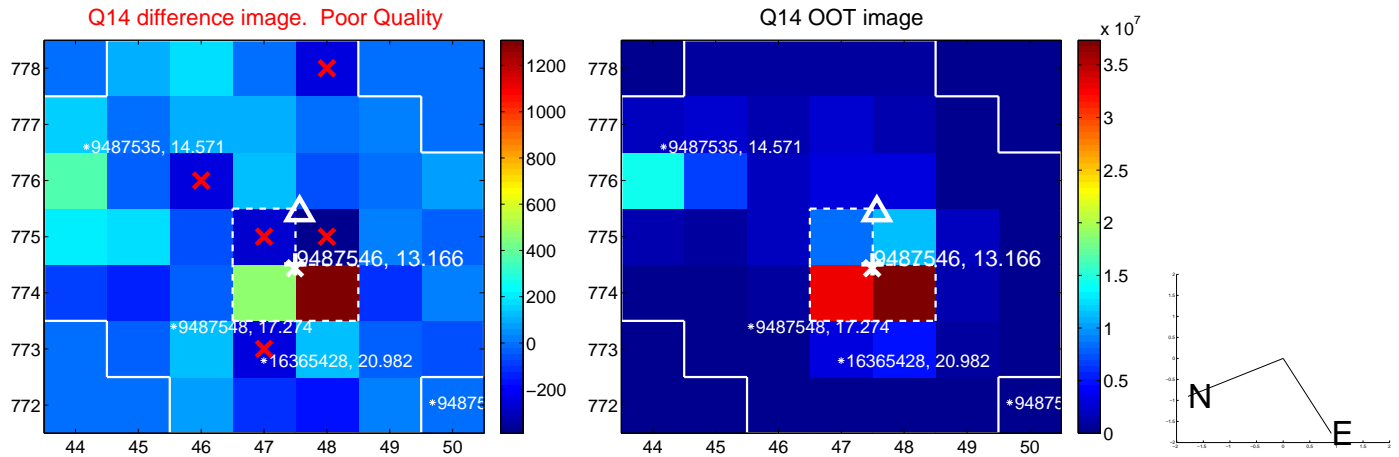
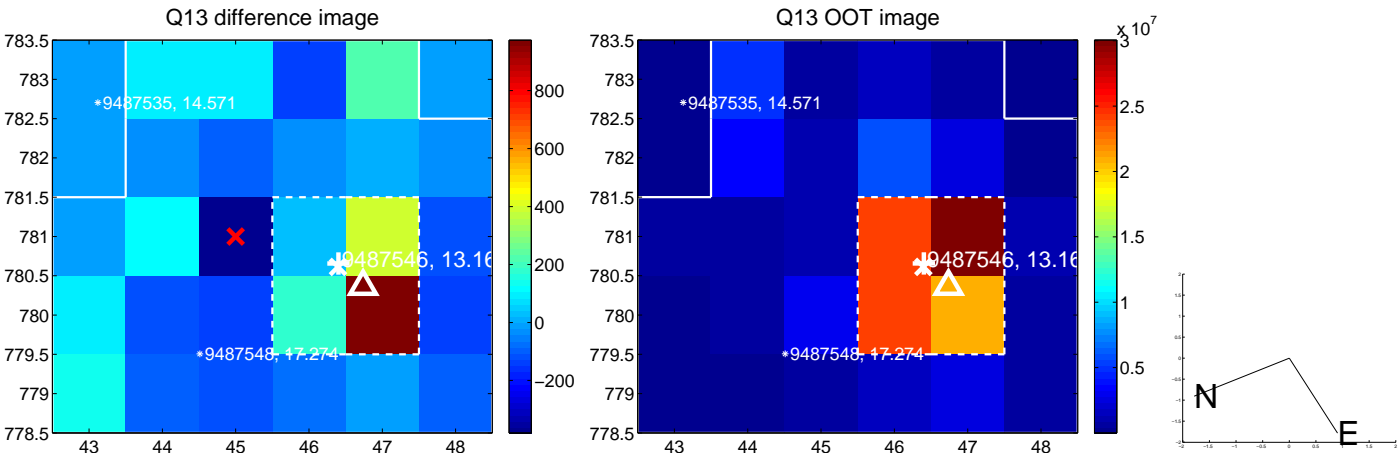




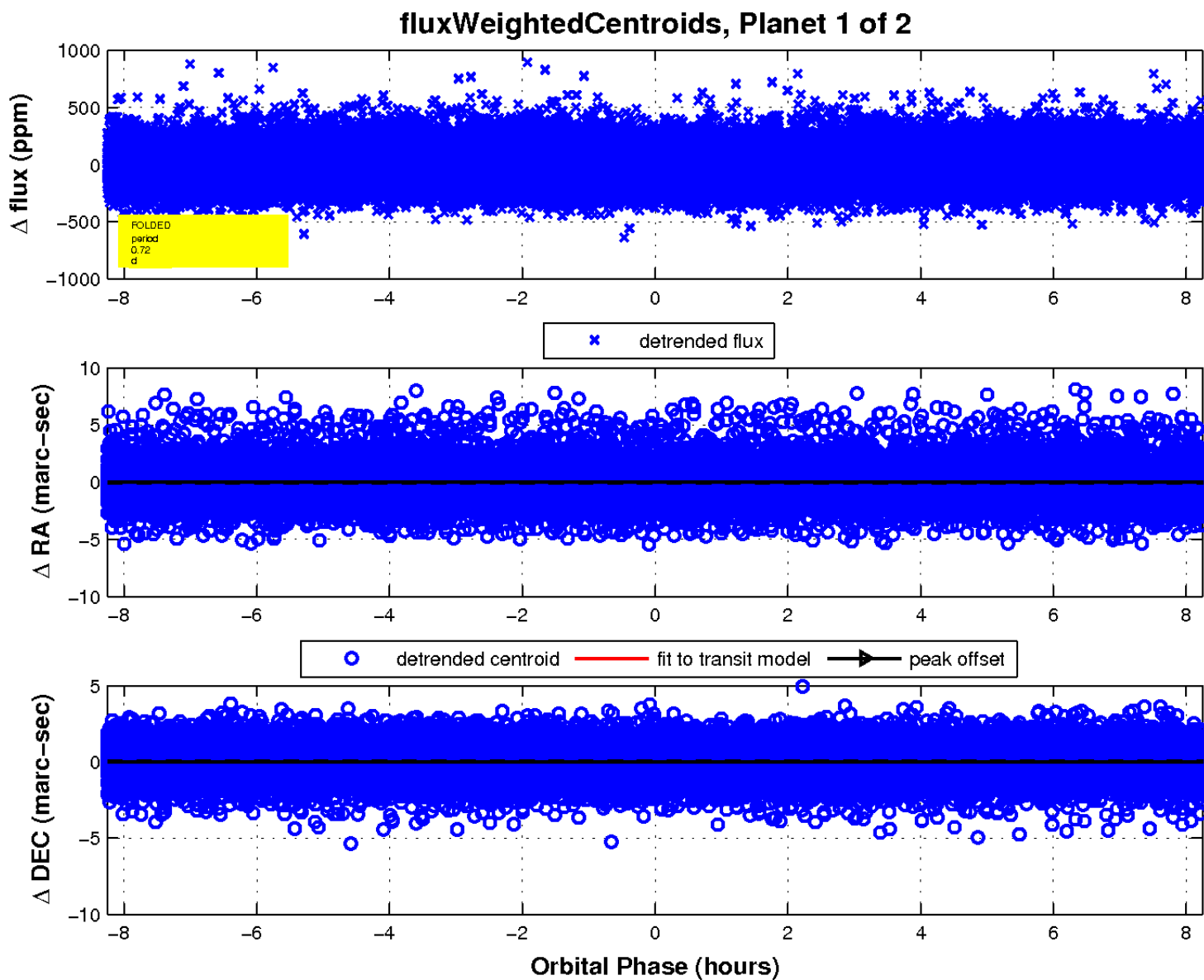
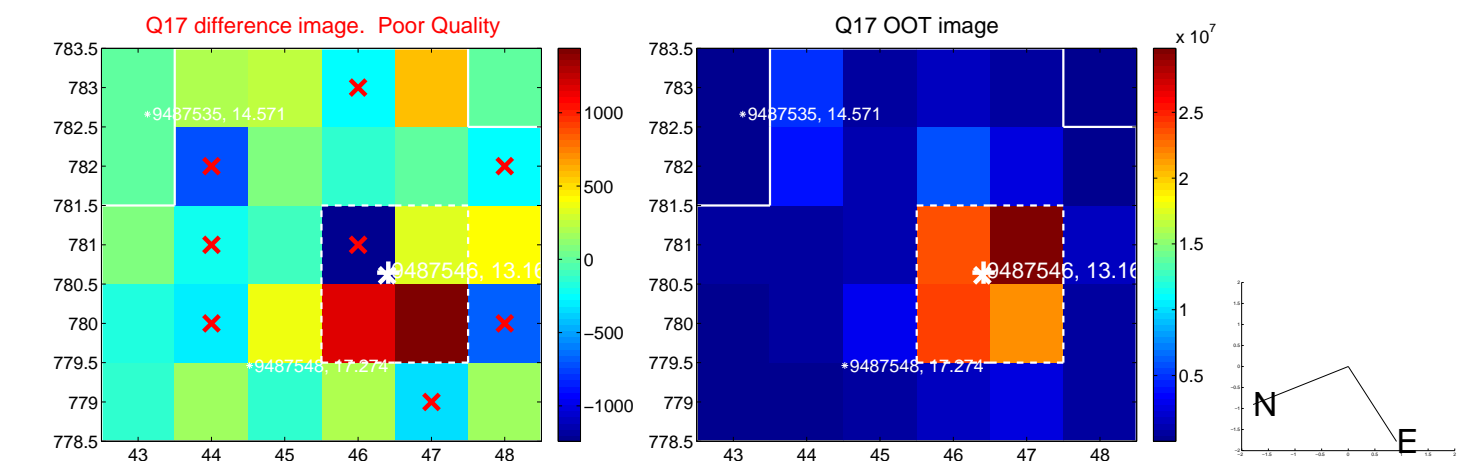
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



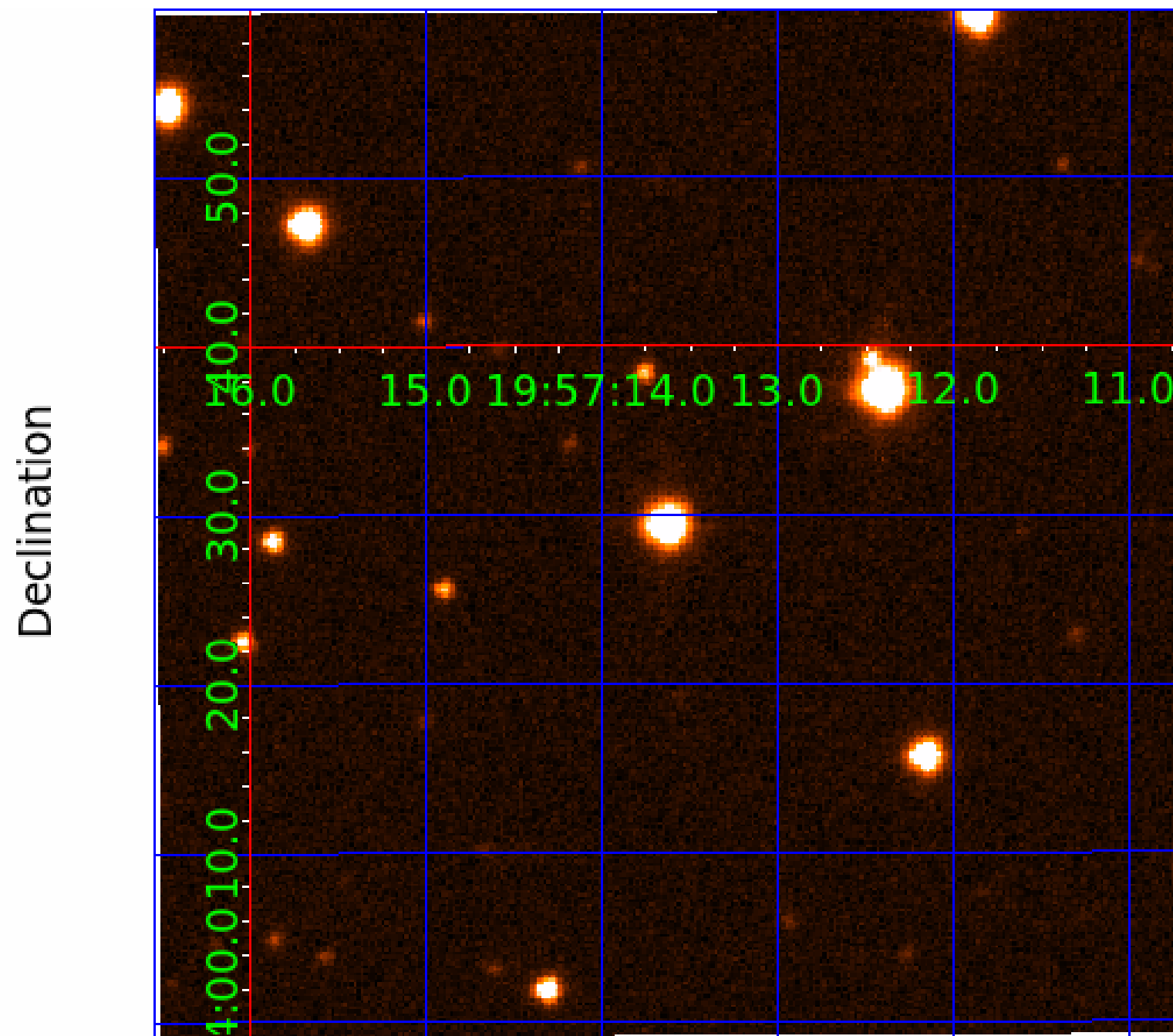
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image





# KIC 009487546

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009487546-01	OBS	No	0.720719	132.128682	10.4	2.751	9.4	6.3	1.99	7904	0.75	37821.95
009487546-02	OBS	No	0.720746	131.771928	7.8	4.549	9.6	6.2	1.99	7904	0.56	37820.12

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009487546-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT
009487546-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—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.

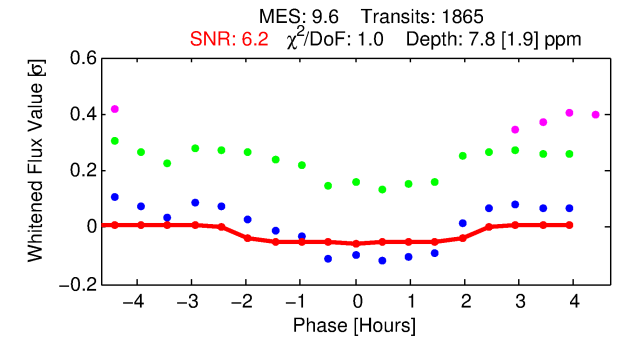
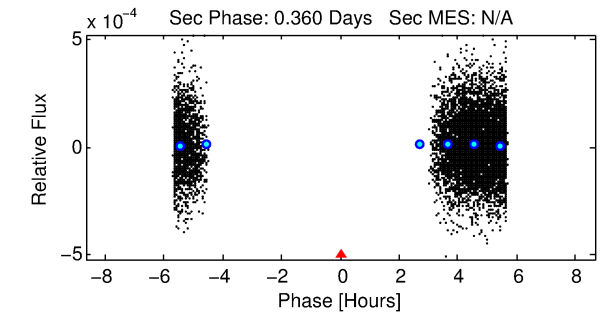
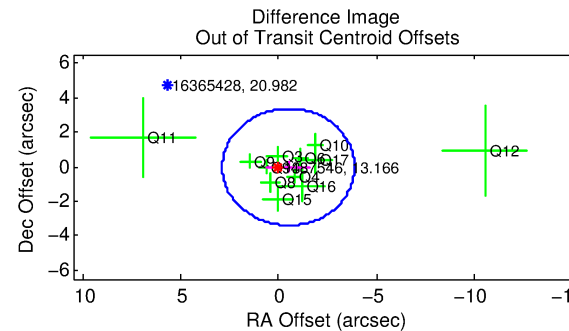
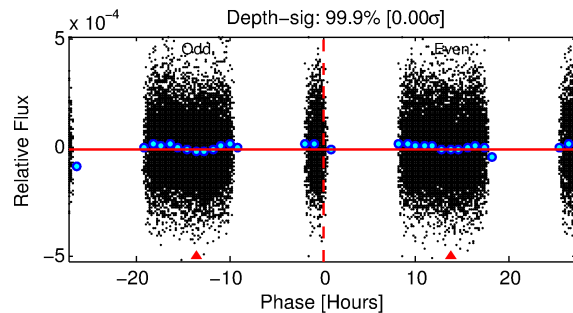
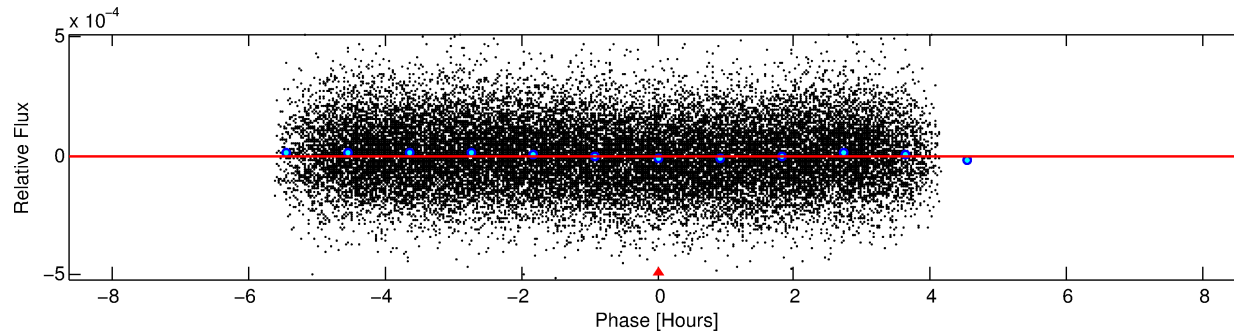
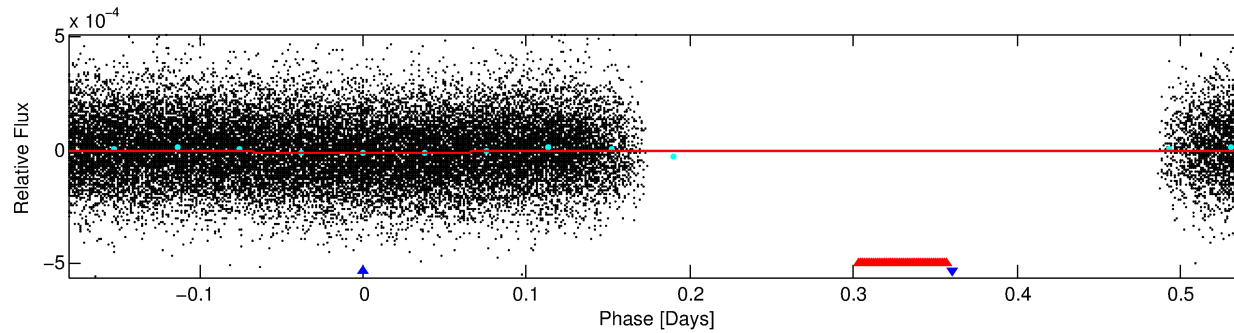
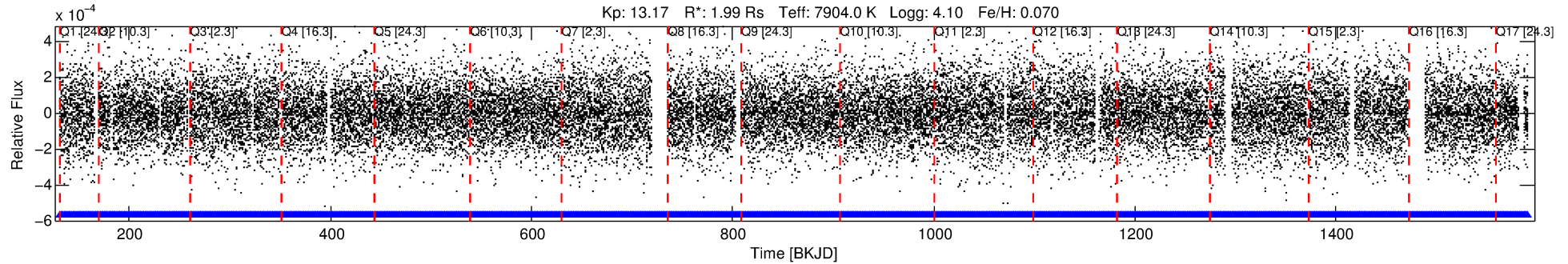
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009487546-02

No Significant Match Found

# DV One-Page Summary

KIC: 9487546 Candidate: 2 of 2 Period: 0.721 d



## DV Fit Results:

Period = 0.72075 [0.00002] d  
Epoch = 131.7719 [0.0083] BKJD  
Rp/R\* = 0.0026 [0.0055]  
a/R\* = 1.36 [7.93]  
b = 0.10 [125.50]  
Seff = 37820.12 [13122.20]  
Teq = 3556 [308] K  
Rp = 0.57 [1.20] Re  
a = 0.0192 [0.0040] AU

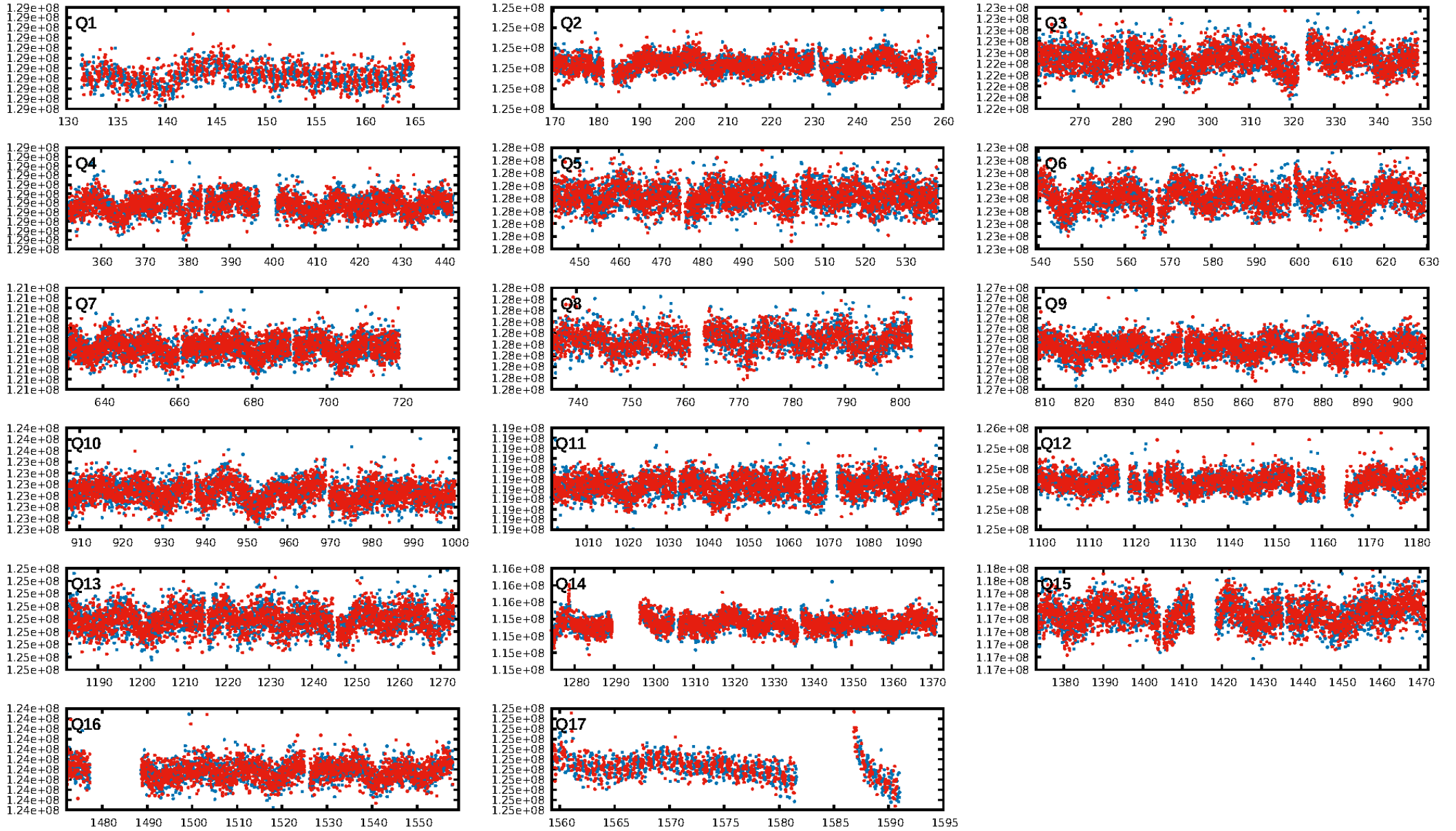
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [1781/1781]  
GhostDiagnostic-chr: 5.526  
Centroid-sig: 1.5%  
Centroid-so: 5.015 arcsec [2.22σ]  
OotOffset-rm: 0.503 arcsec [0.45σ]  
KicOffset-rm: 0.709 arcsec [0.68σ]  
OotOffset-st: 2/3/4/3 [12]  
KicOffset-st: 2/3/4/3 [12]  
DiffImageQuality-fgm: 0.58 [7/12]  
DiffImageOverlap-fno: 0.00 [0/17]

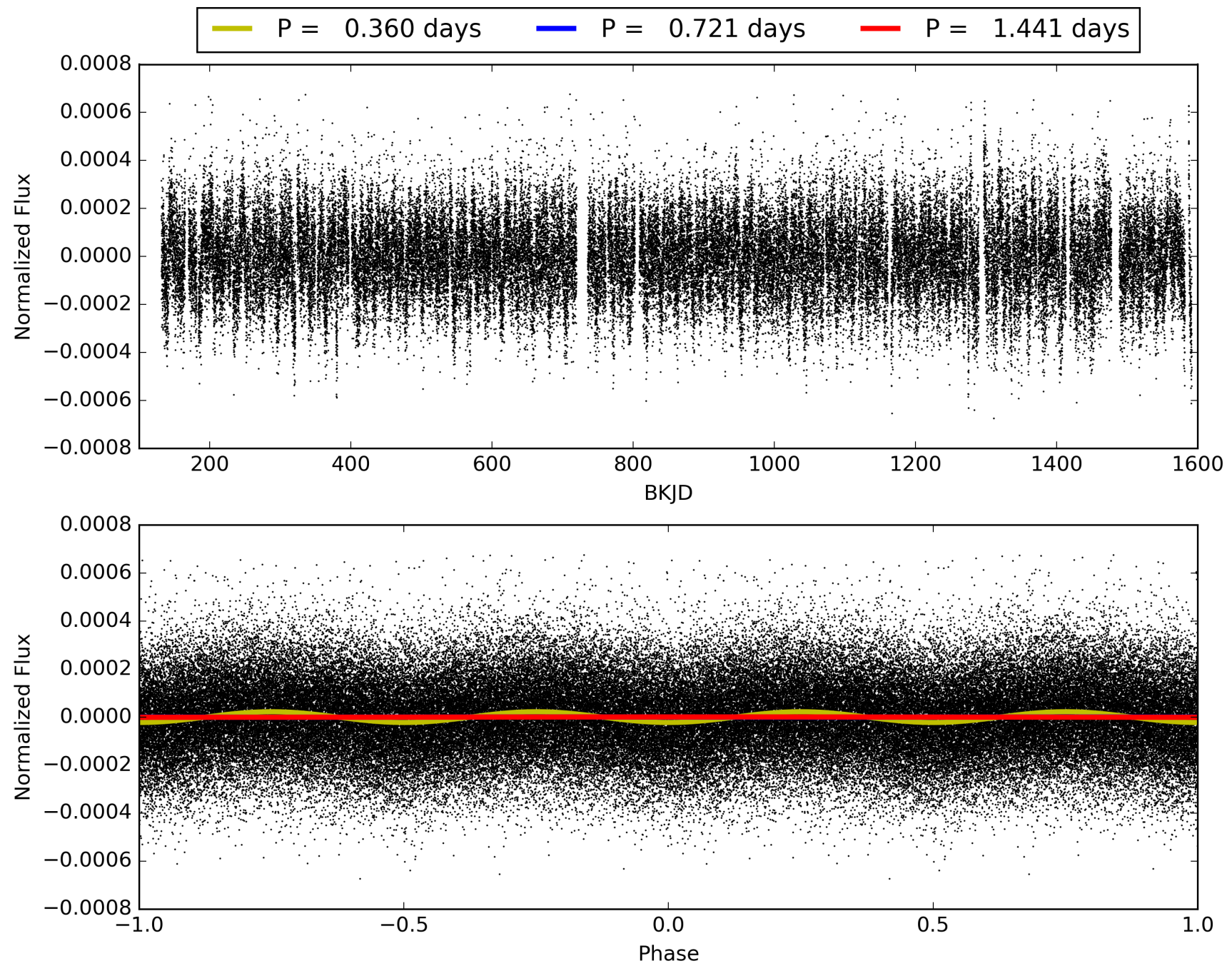
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 17:33:59 Z

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

# TCE 009487546-02, PDC Light Curves



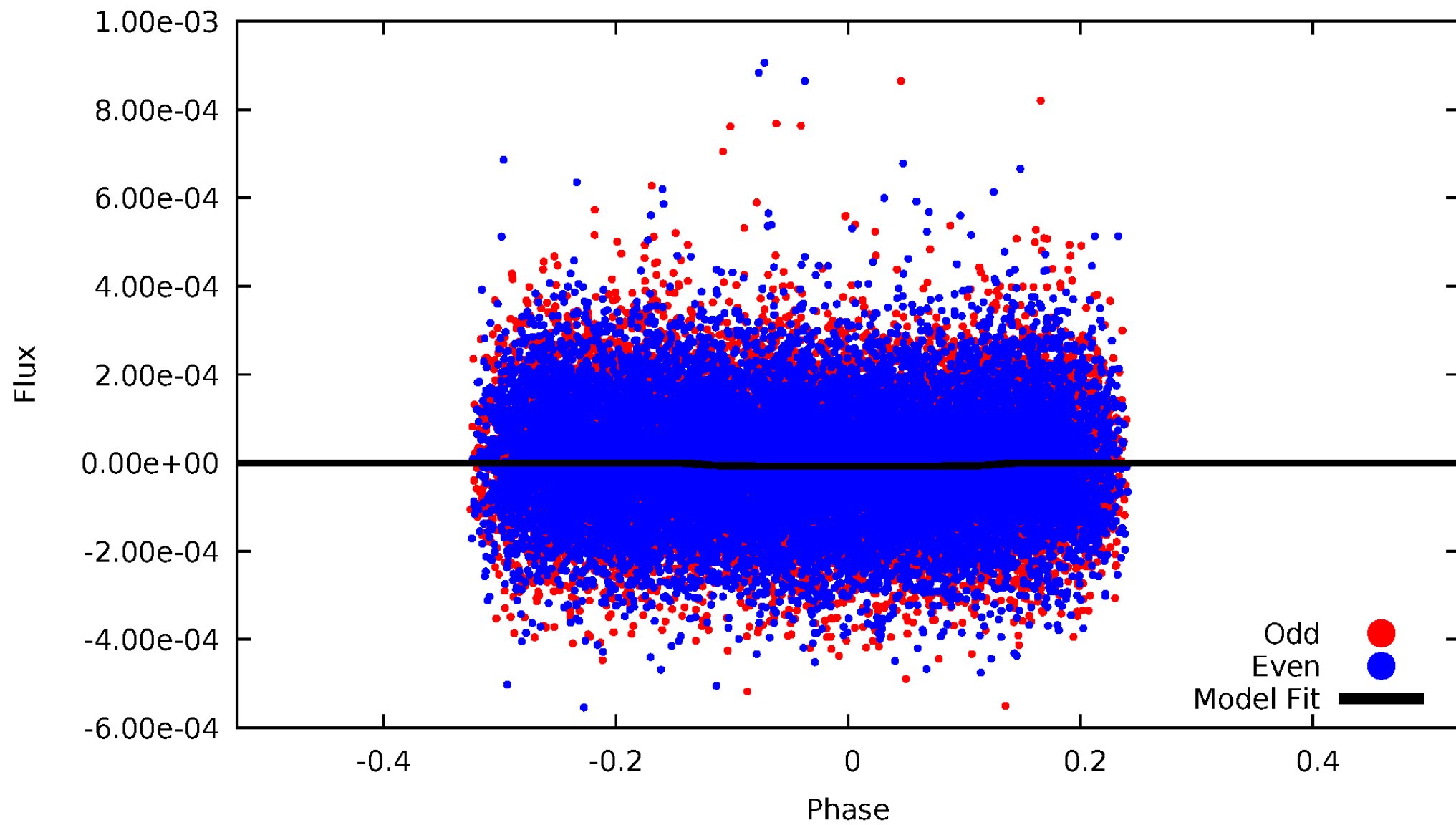
TCE 009487546-02





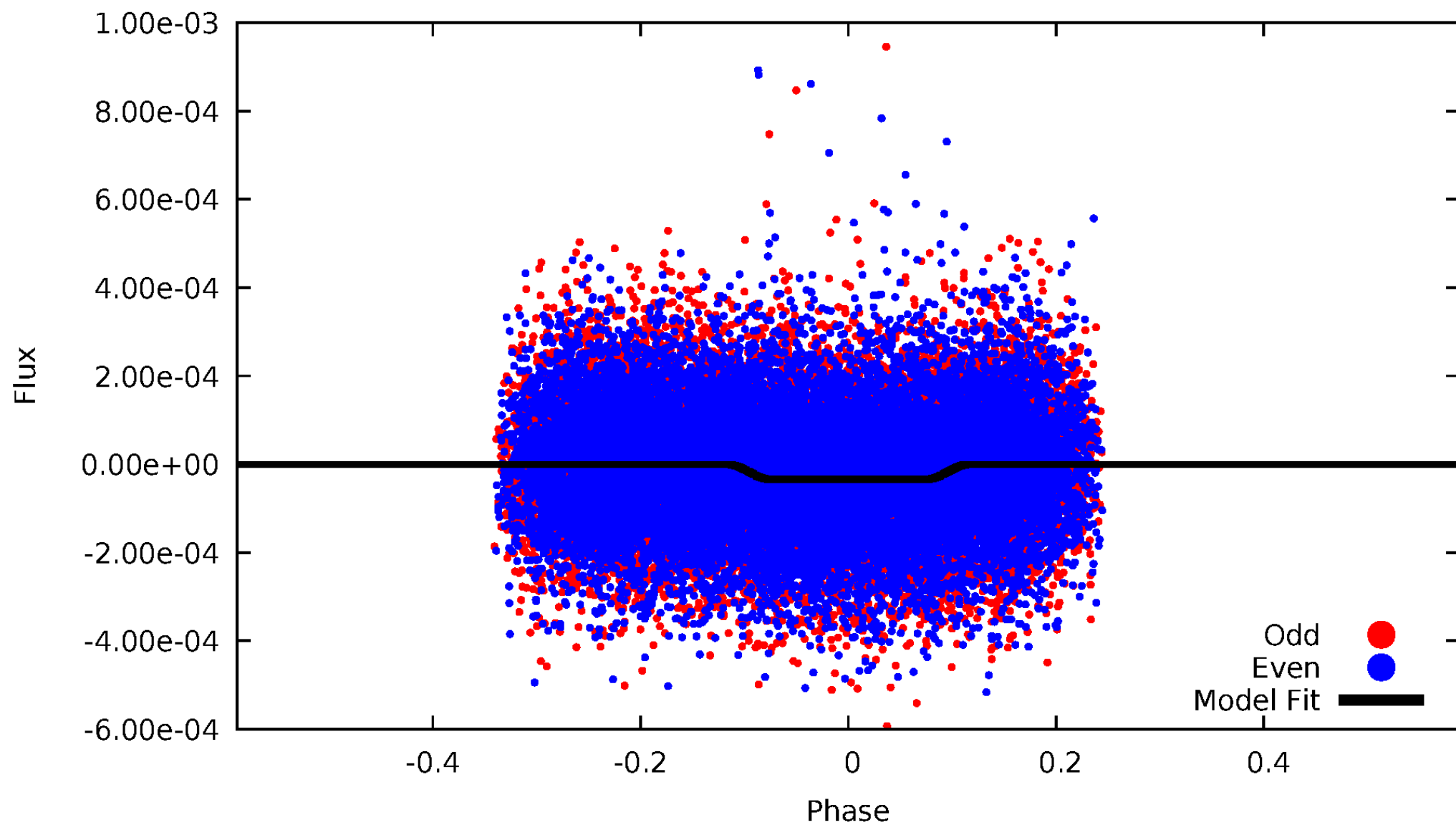
# DV Odd/Even

TCE 009487546-02



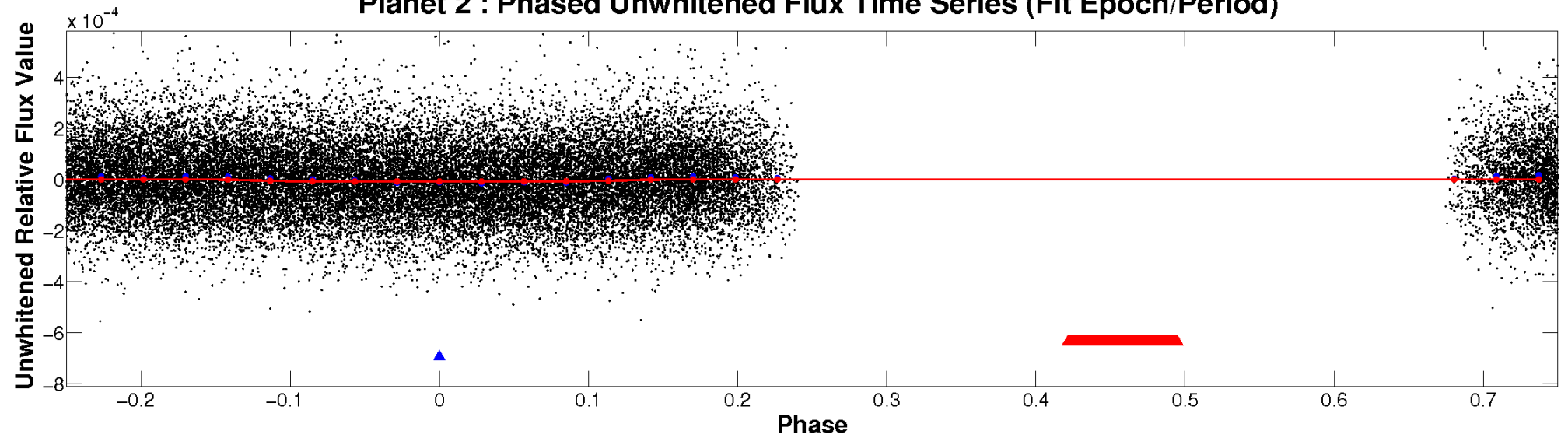
# ALT Odd/Even

TCE 009487546-02

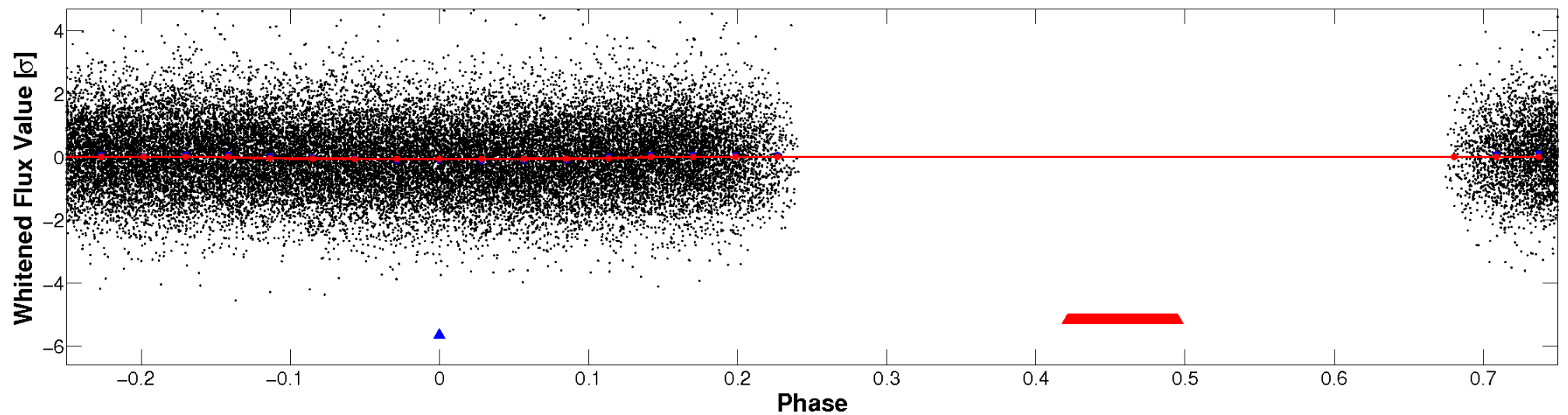


# Non-Whitened Vs. Whitened Light Curve

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

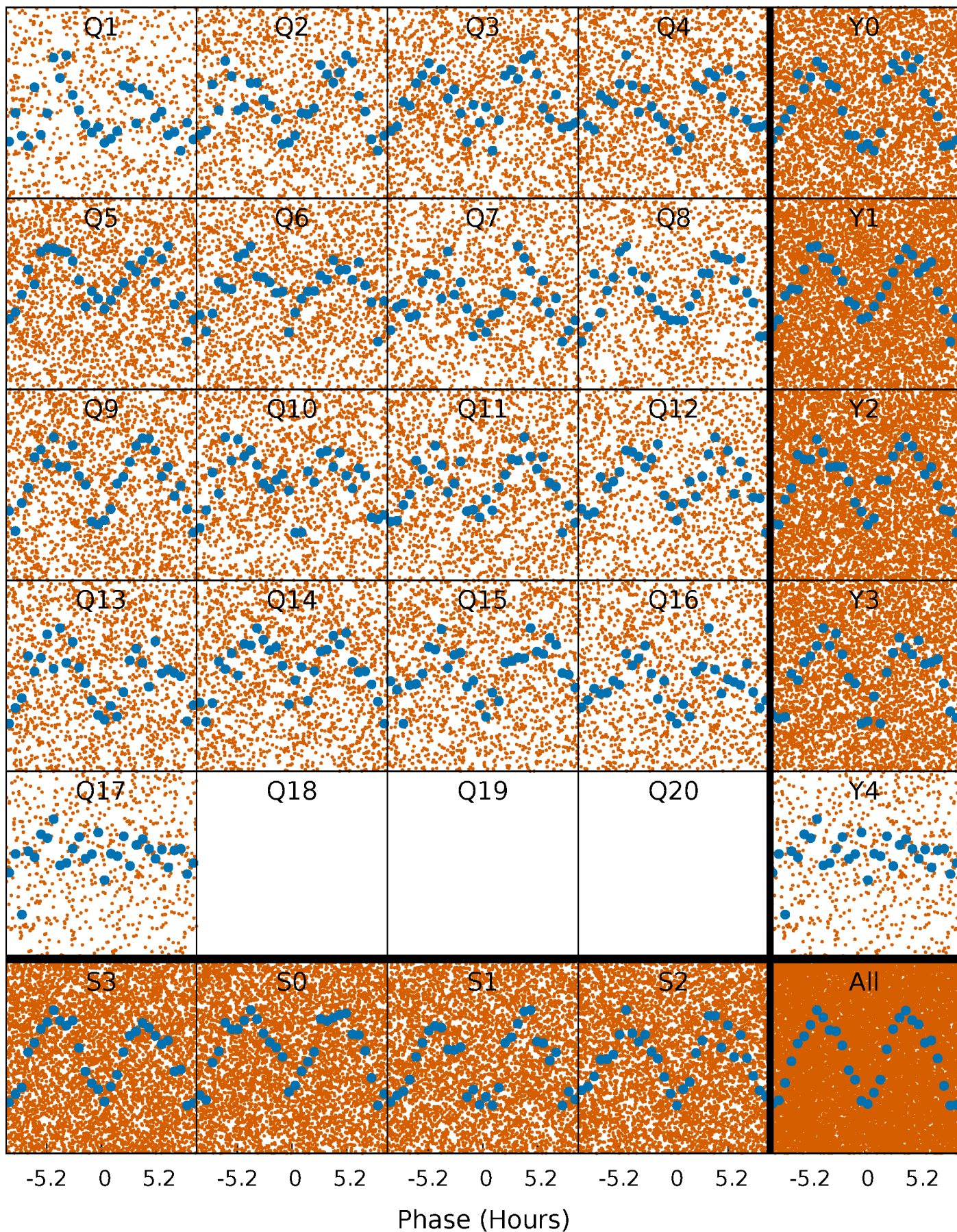


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

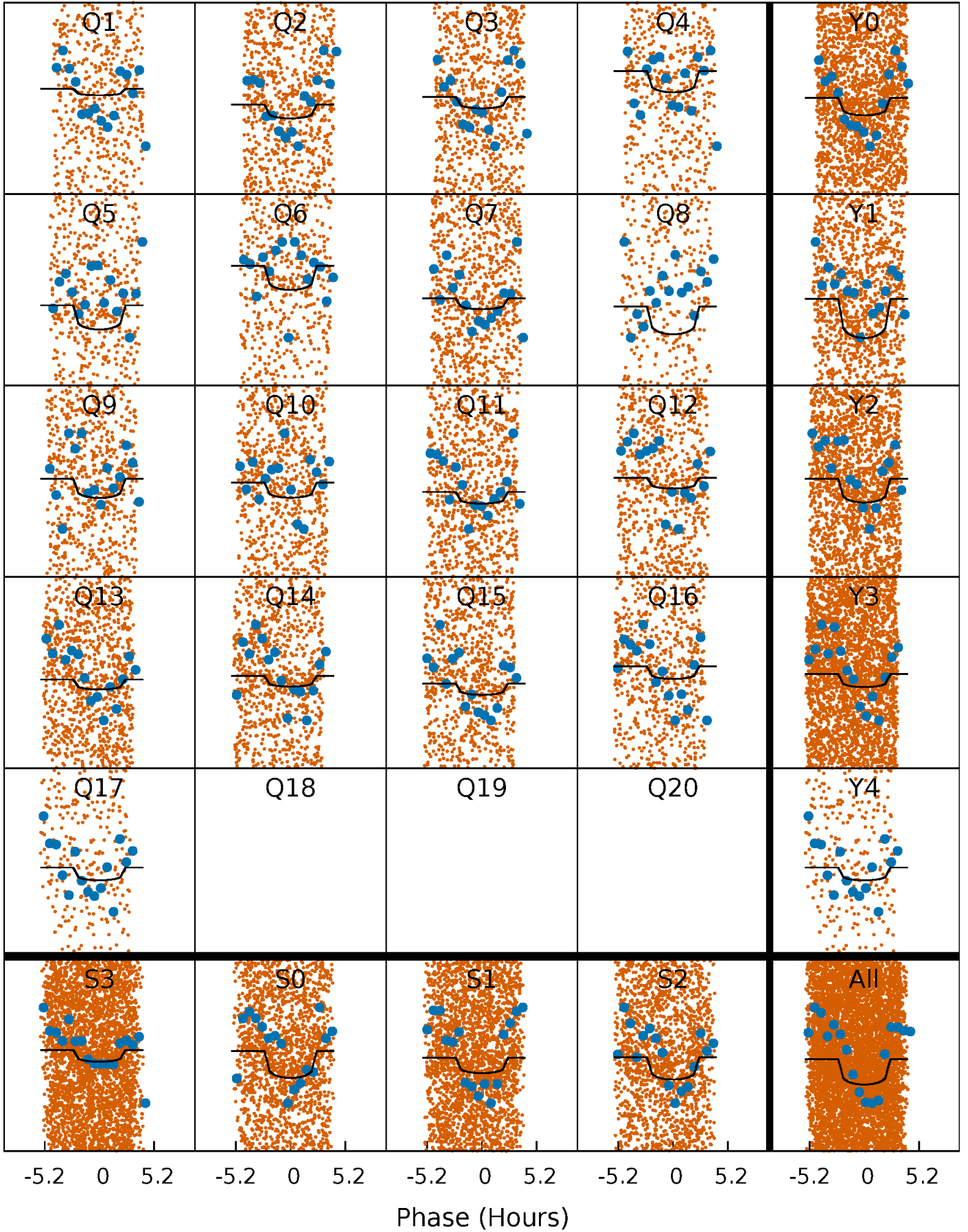
TCE 009487546-02   P= 0.720746 Days    $T_0=131.771928$  (BKJD)





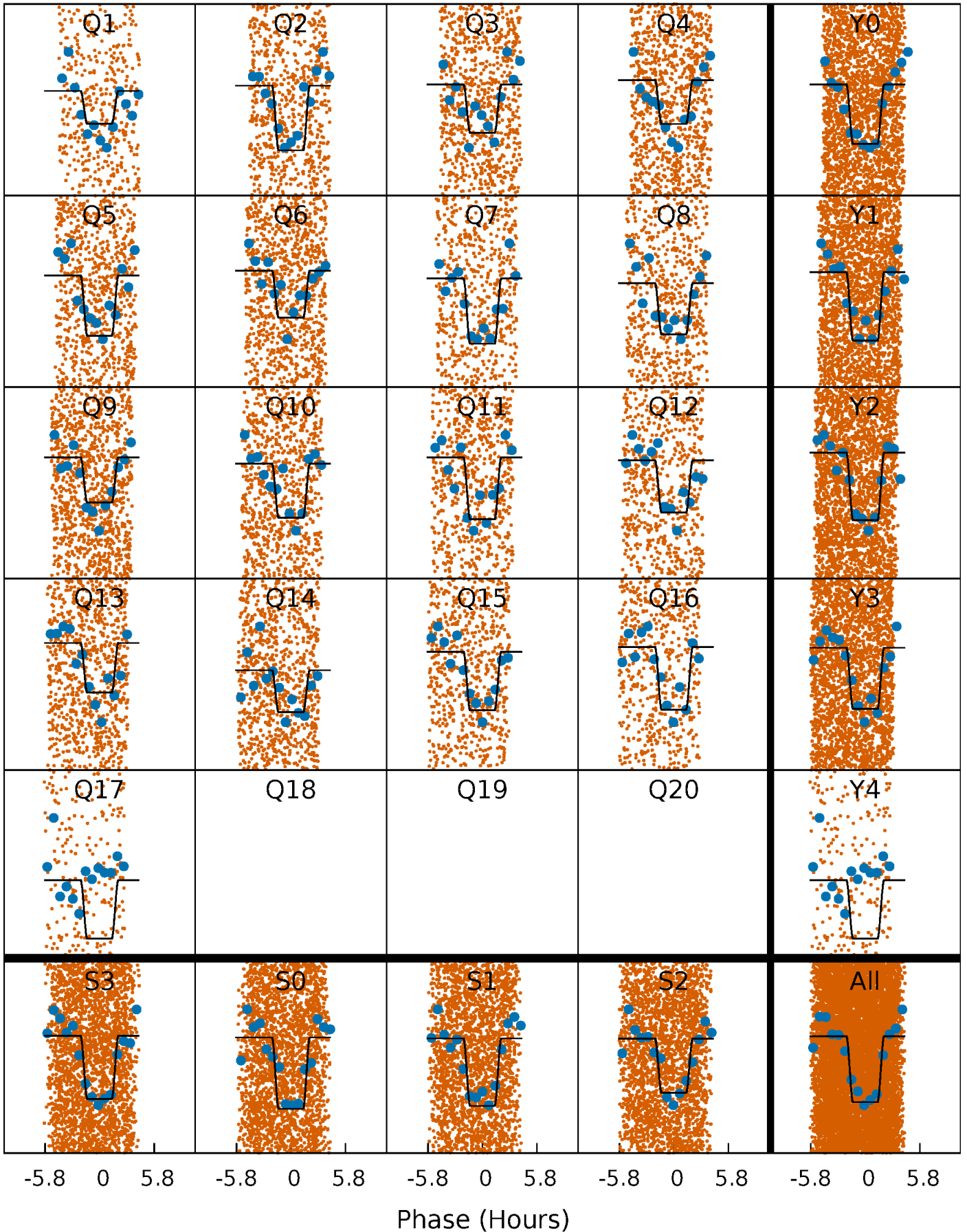
# DV Quarter-Phased Transit Curves

TCE 009487546-02   P= 0.720746 Days    $T_0=131.771928$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 009487546-02     $P = 0.720752$  Days     $T_0 = 131.769100$  (BKJD)

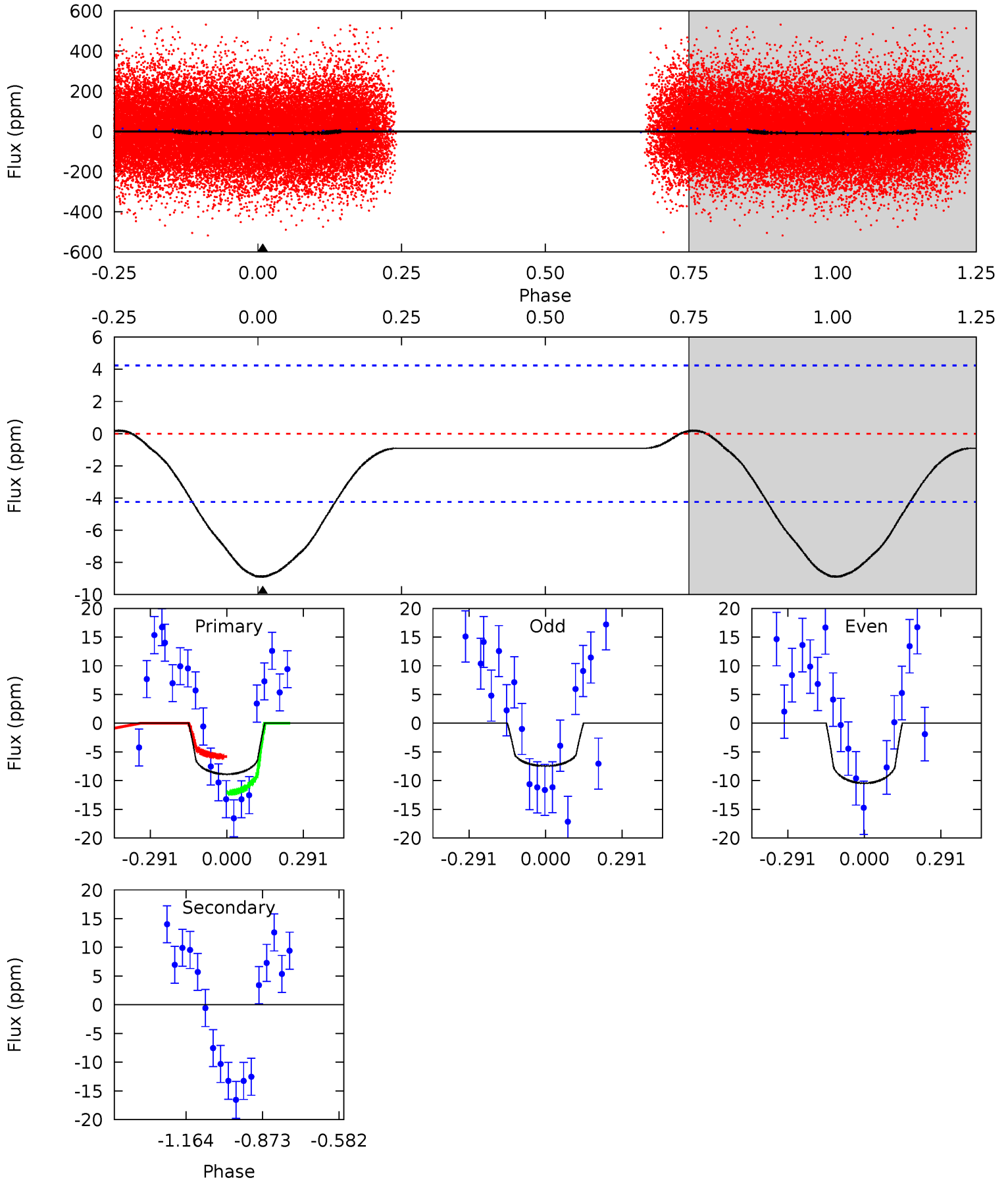




# DV Model-Shift Uniqueness Test

009487546-02, P = 0.720746 Days, E = 131.051182 Days

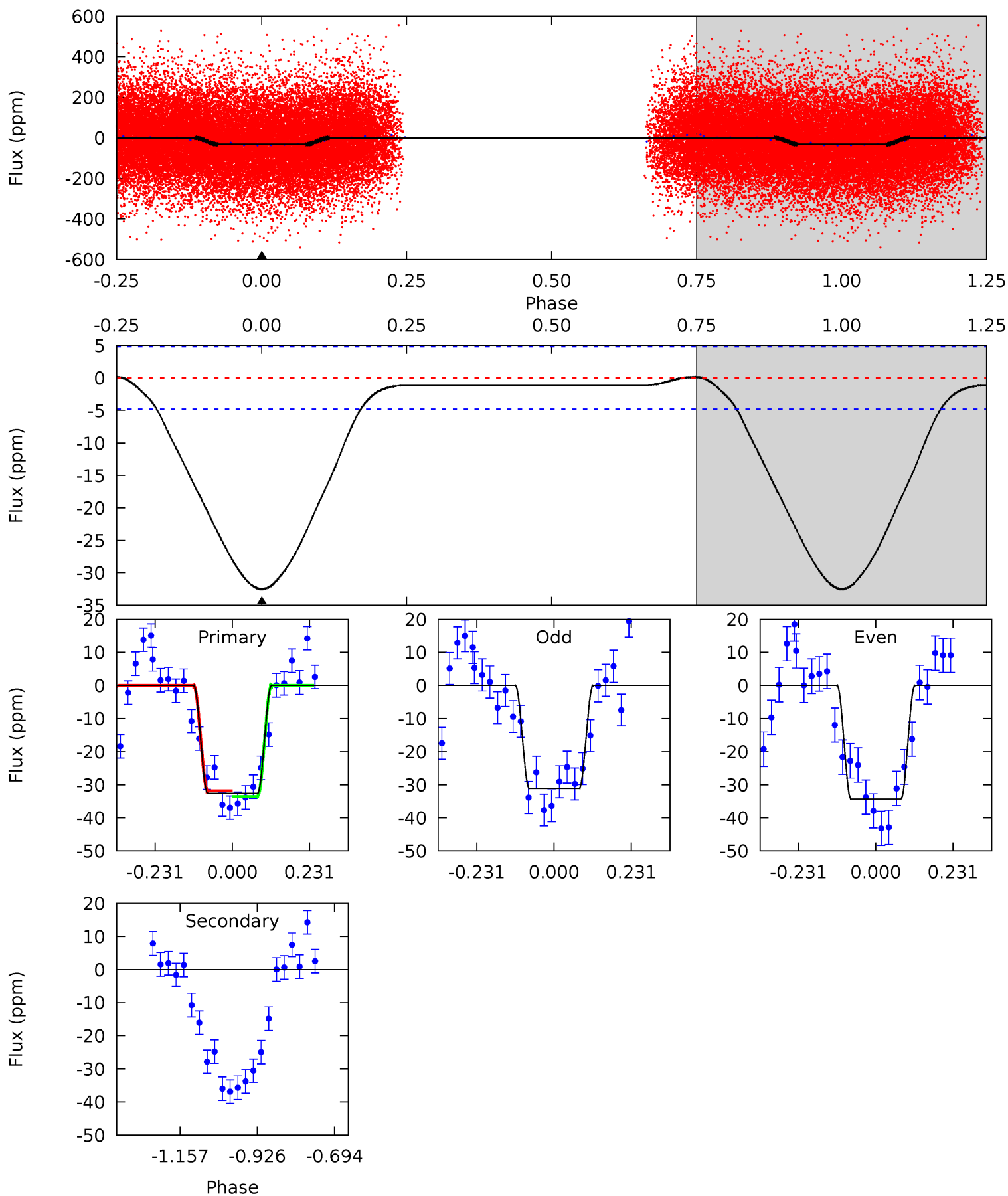
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.08	0	0	0	4.34	1.06	0.34	9.08	9.08	0	0	1.53	1.00	0.02	3.28



# Alt Model-Shift Uniqueness Test

009487546-02, P = 0.720752 Days, E = 131.048348 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
29.5	0	0	0	4.39	1.20	0.32	29.5	29.5	0	0	1.43	1.00	0.00	0.76



### Stellar Parameters For KIC 009487546

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7904^{+216}_{-351}$	$4.096^{+0.131}_{-0.160}$	$0.070^{+0.250}_{-0.450}$	$1.994^{+0.505}_{-0.413}$	$1.808^{+0.160}_{-0.321}$	$0.321^{+0.238}_{-0.135}$
	+3%/-4%	+3%/-4%	+357%/-643%	+25%/-21%	+9%/-18%	+74%/-42%
Source	KIC0	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 009487546-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$0 \pm 1$	$1.10^{+1.05}_{-0.77}$	$4979^{+329}_{-340}$	$-4242^{+1577}_{-651}$	$0.001^{+0.279}_{-0.320}$
Alt.	$0 \pm 1$	$1.53^{+1.11}_{-0.90}$	$4981^{+319}_{-313}$	$-4241^{+454}_{-404}$	$0.001^{+0.121}_{-0.127}$

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

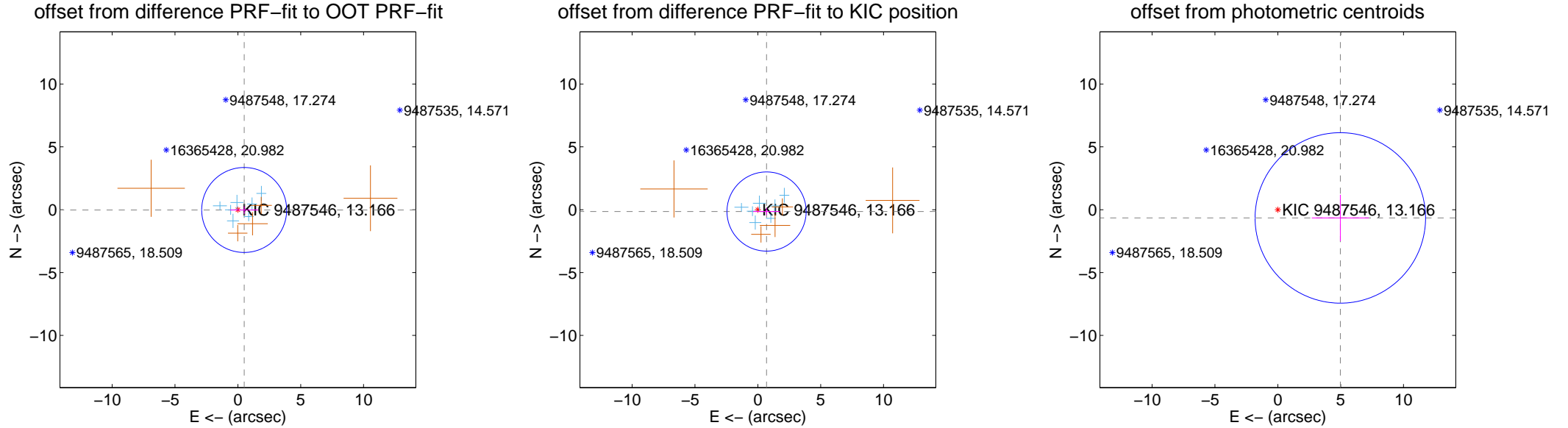
## DV Centroid Data

Supplemental centroid analysis for 009487546-02. Kepler magnitude: 13.17. Transit SNR 6.23

There are 7 quarters with good PRF difference image offsets

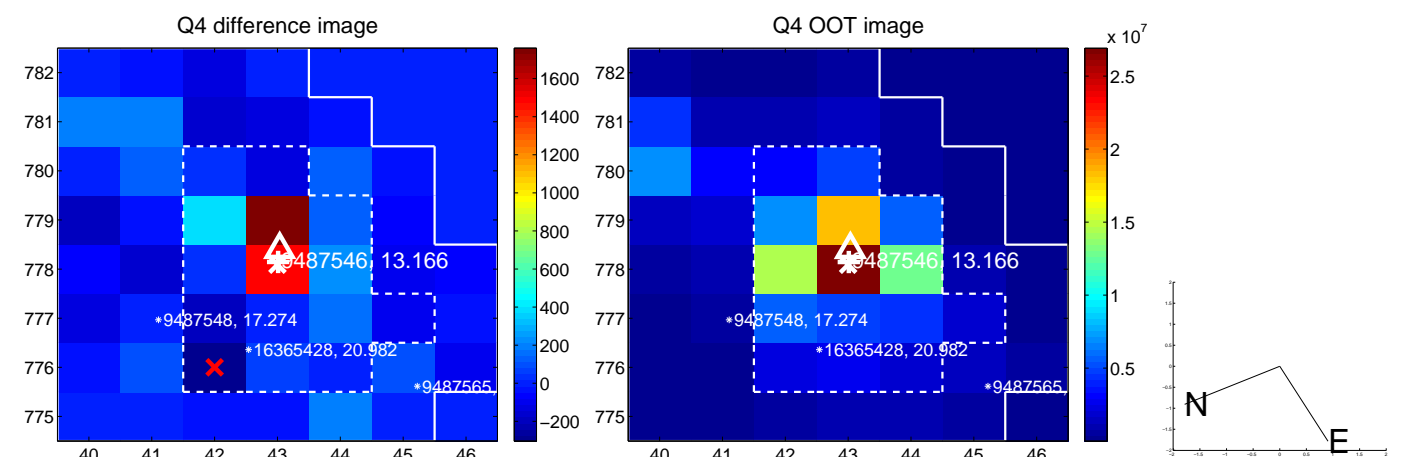
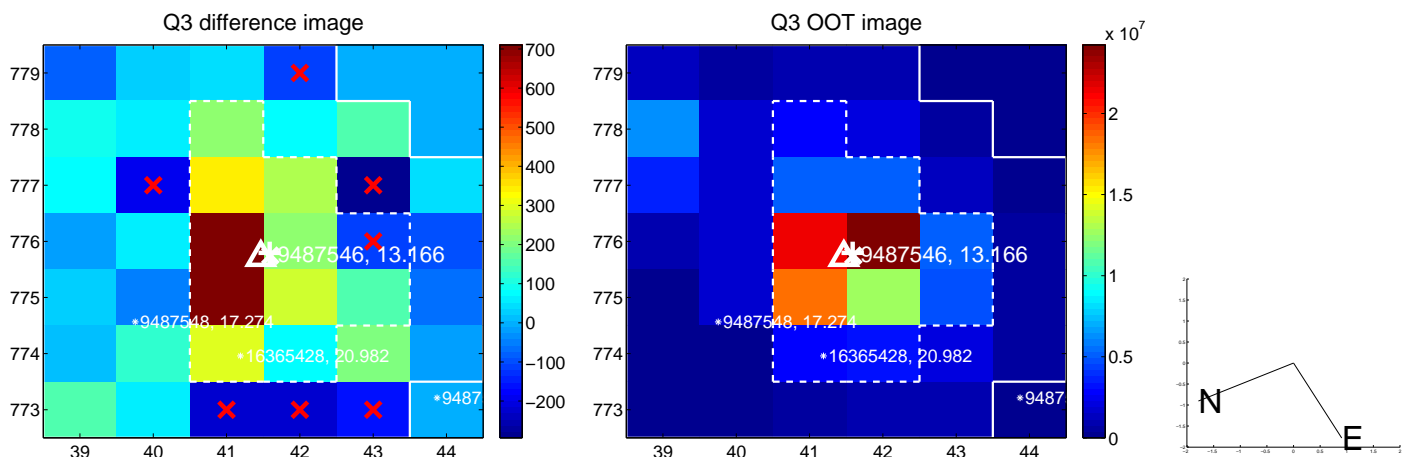
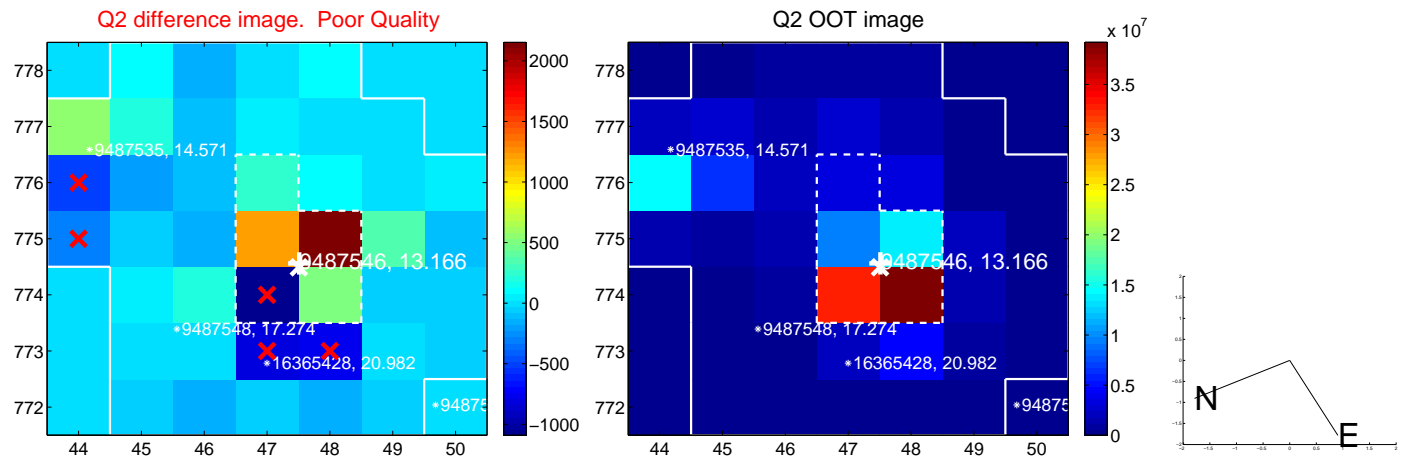
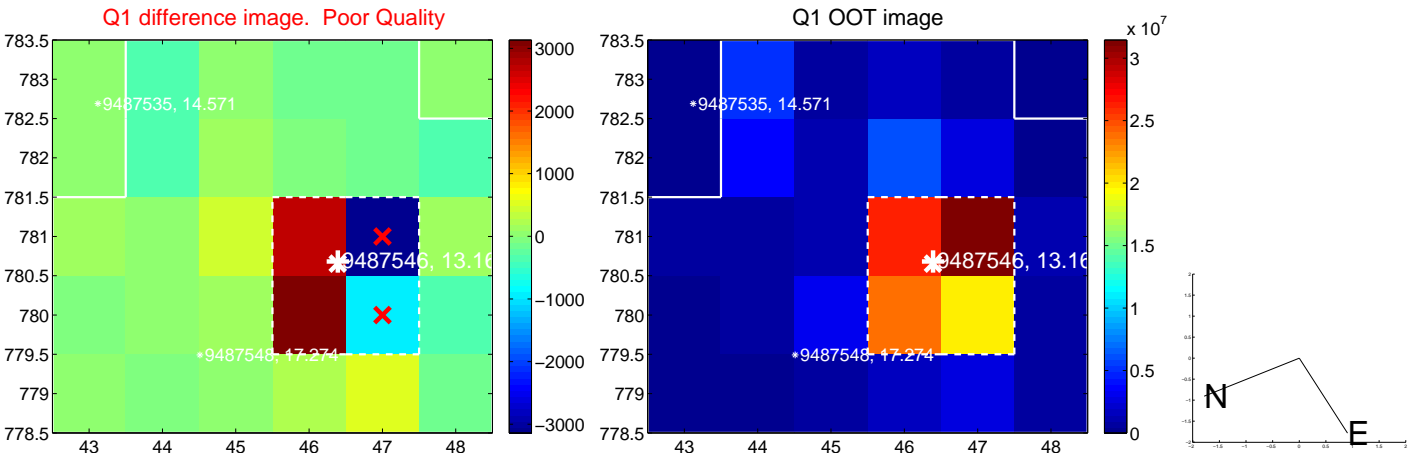
The direct PRF centroid is offset from the target star catalog position by about 0.15 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.503 \pm 1.127$	0.45	$-0.503 \pm 1.126$	$-0.021 \pm 0.302$
PRF-fit source offset from KIC position	$0.709 \pm 1.050$	0.68	$-0.694 \pm 1.066$	$-0.145 \pm 0.289$
photometric centroid source offset	$5.02 \pm 2.26$	2.22	$-4.97 \pm 2.27$	$-0.65 \pm 1.85$



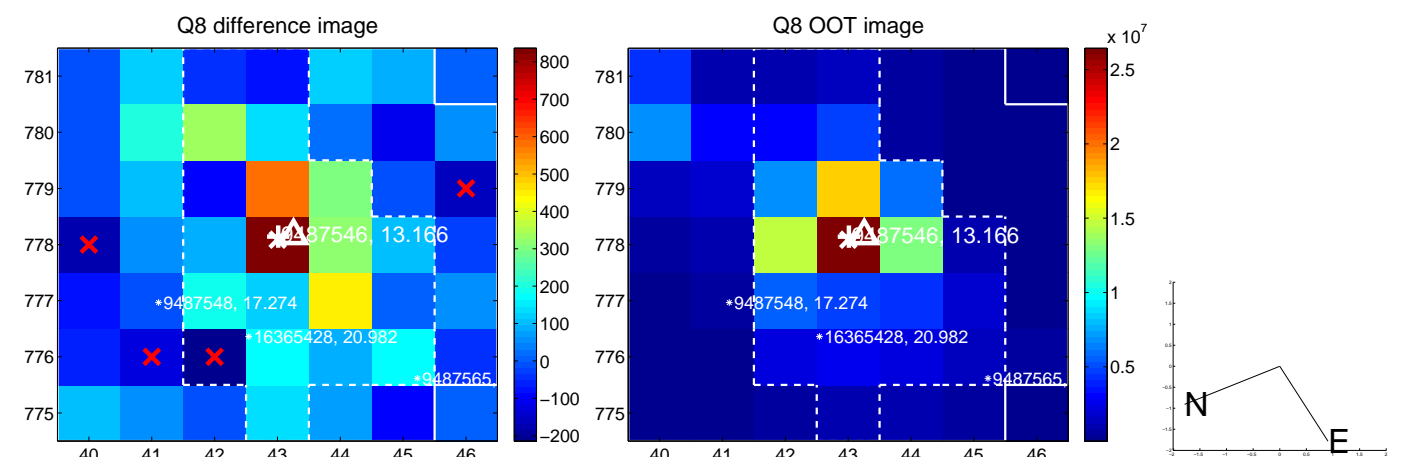
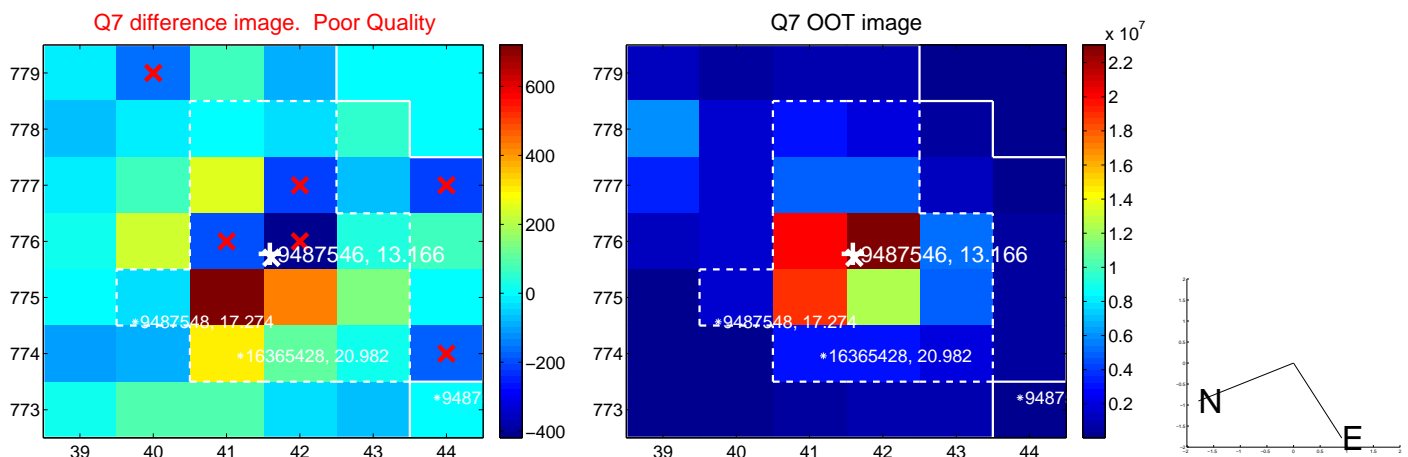
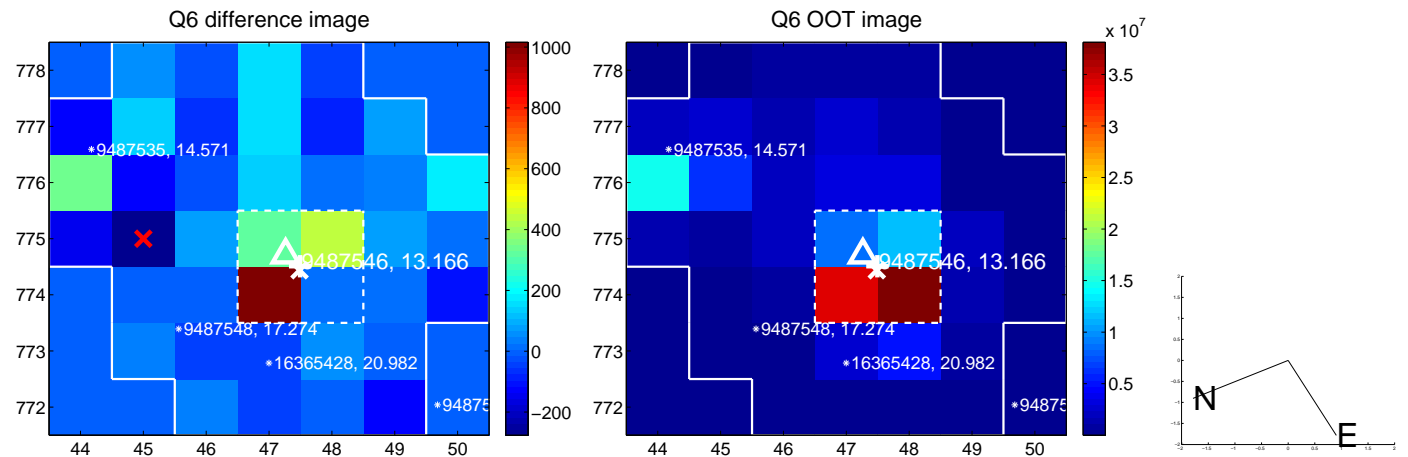
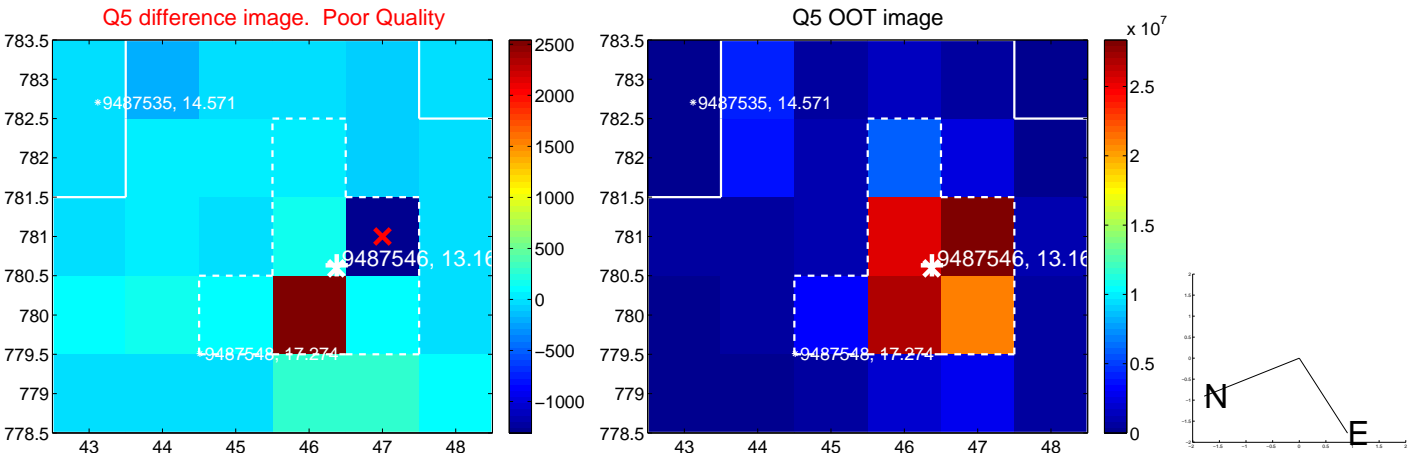
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

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

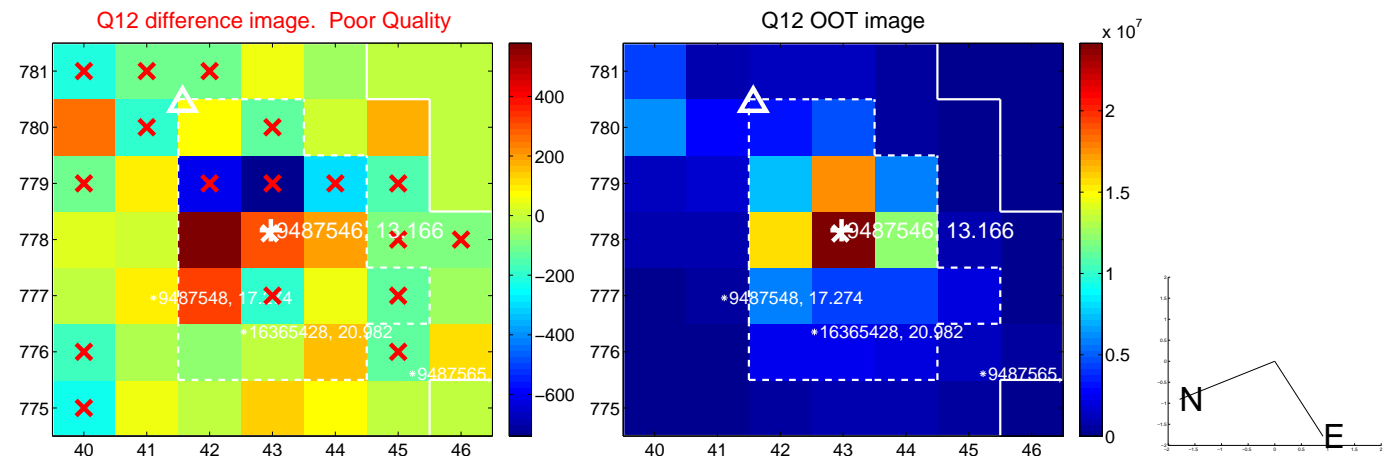
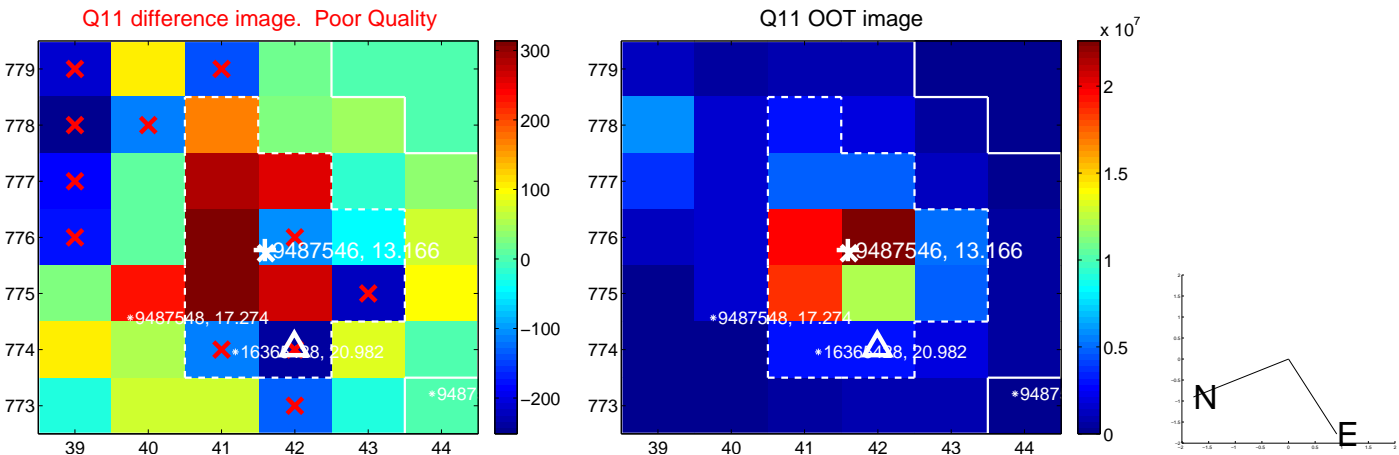
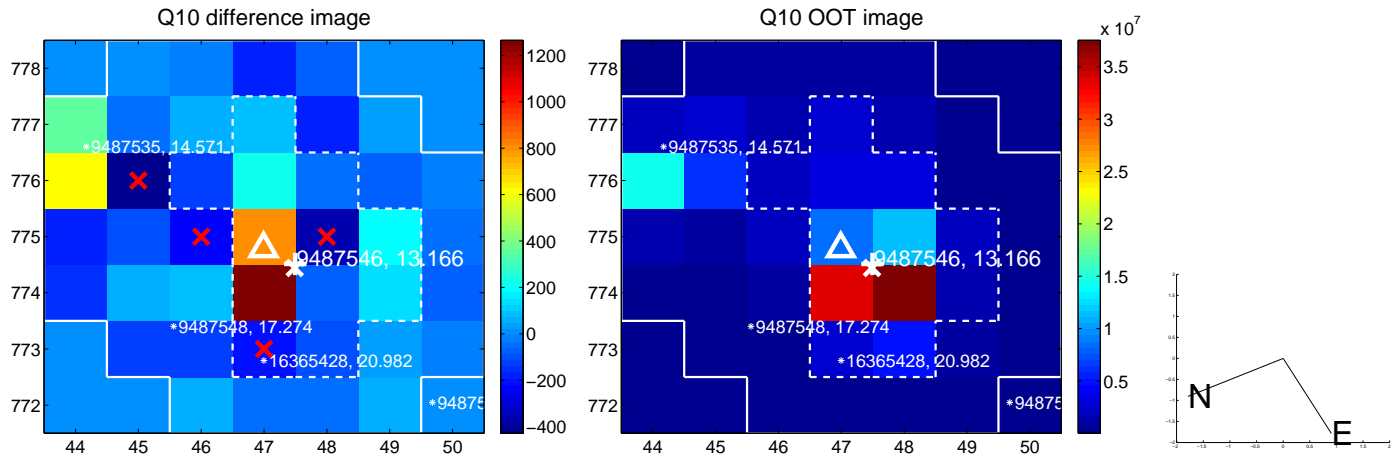
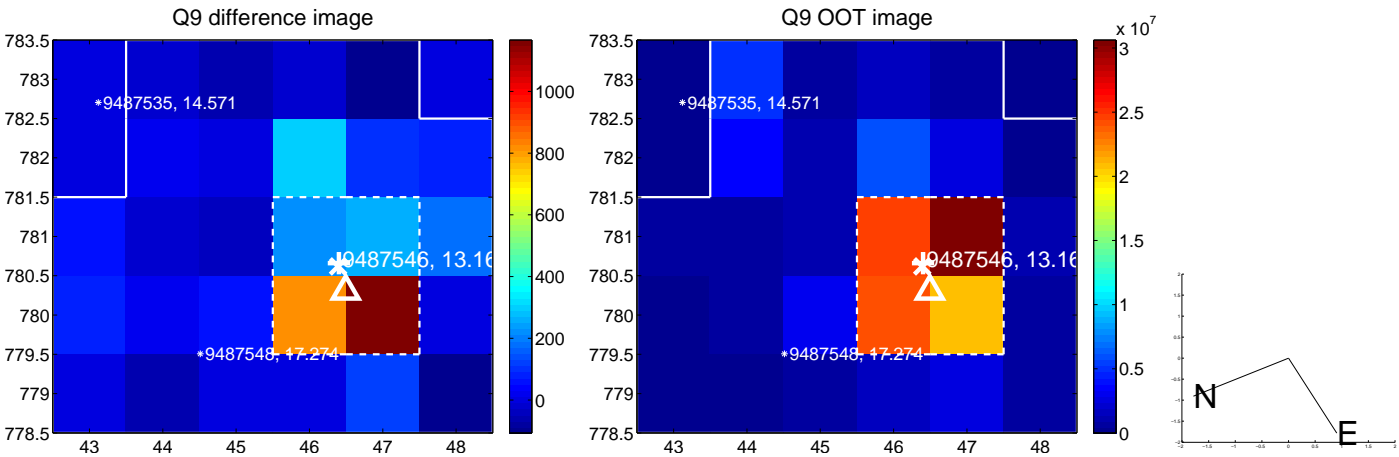




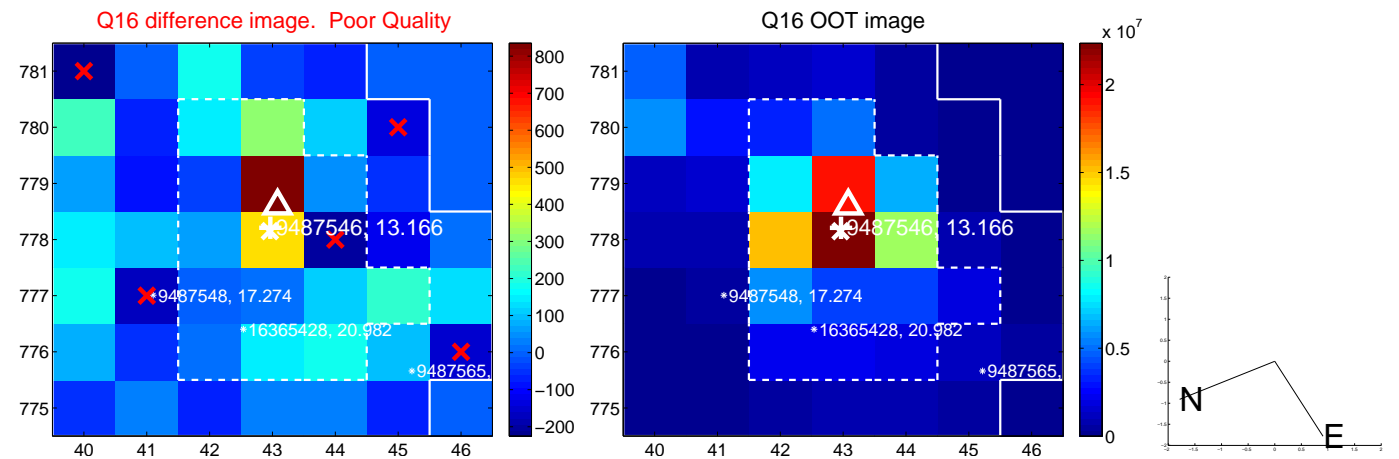
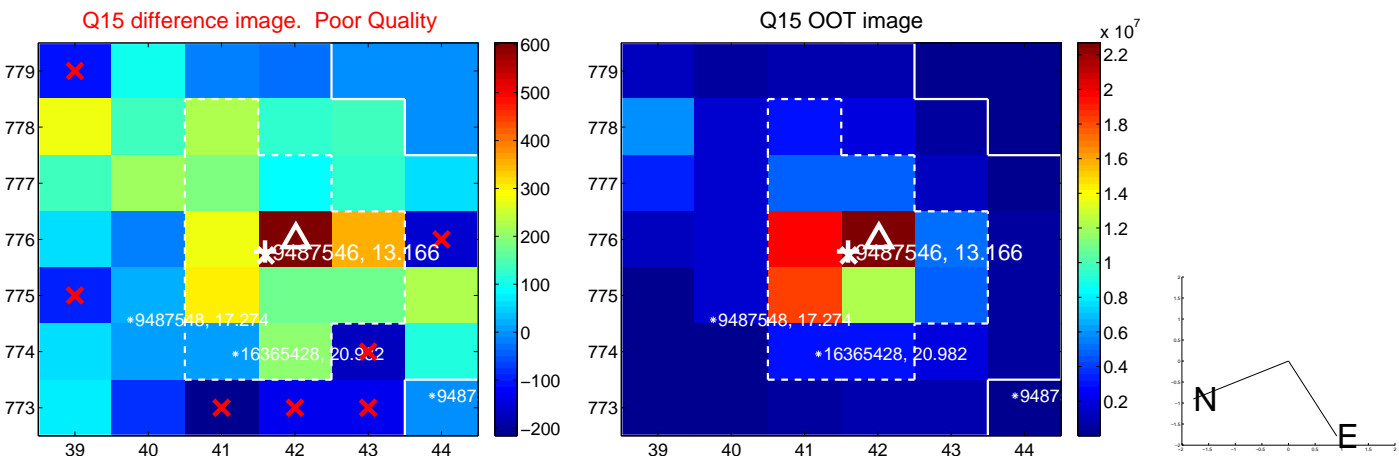
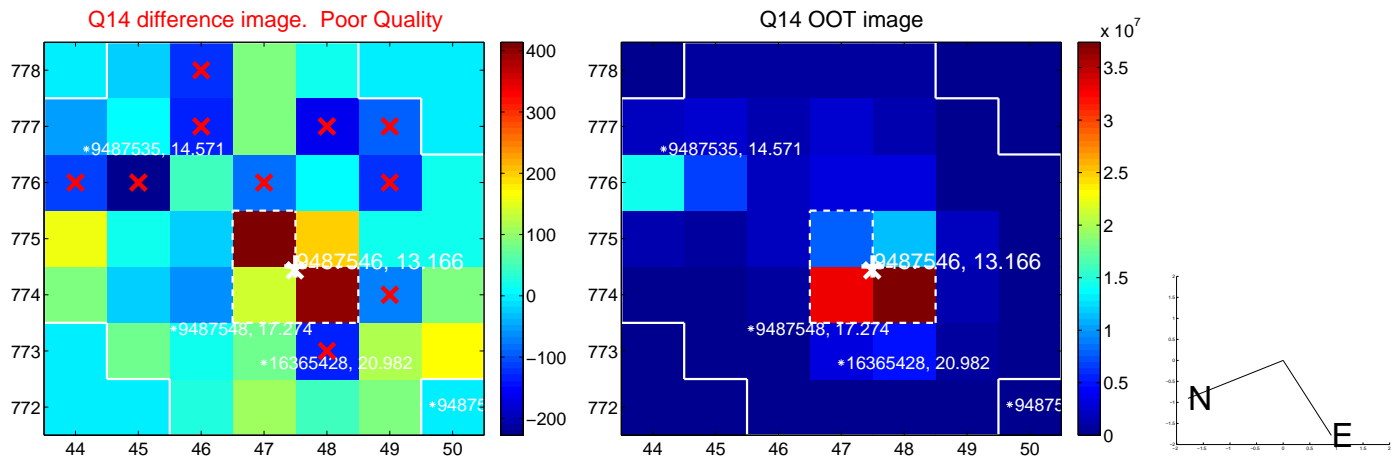
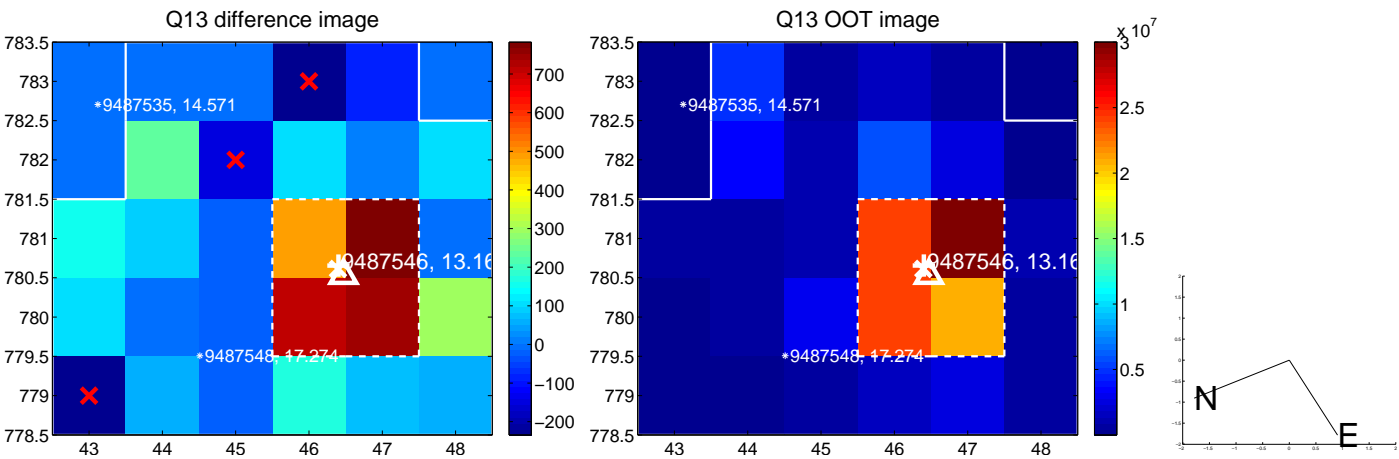
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



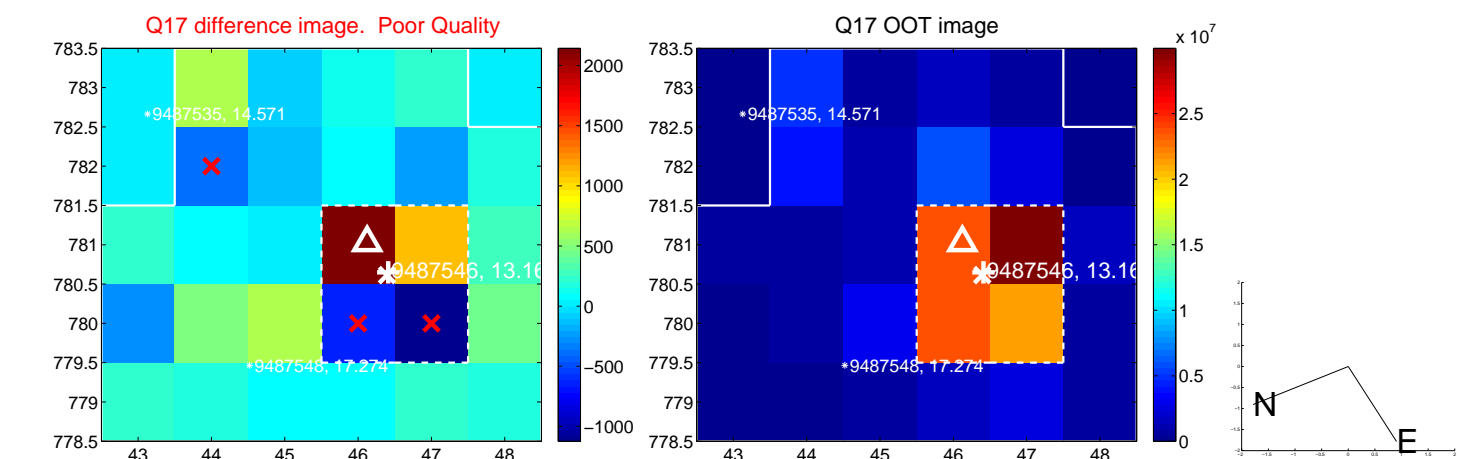
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



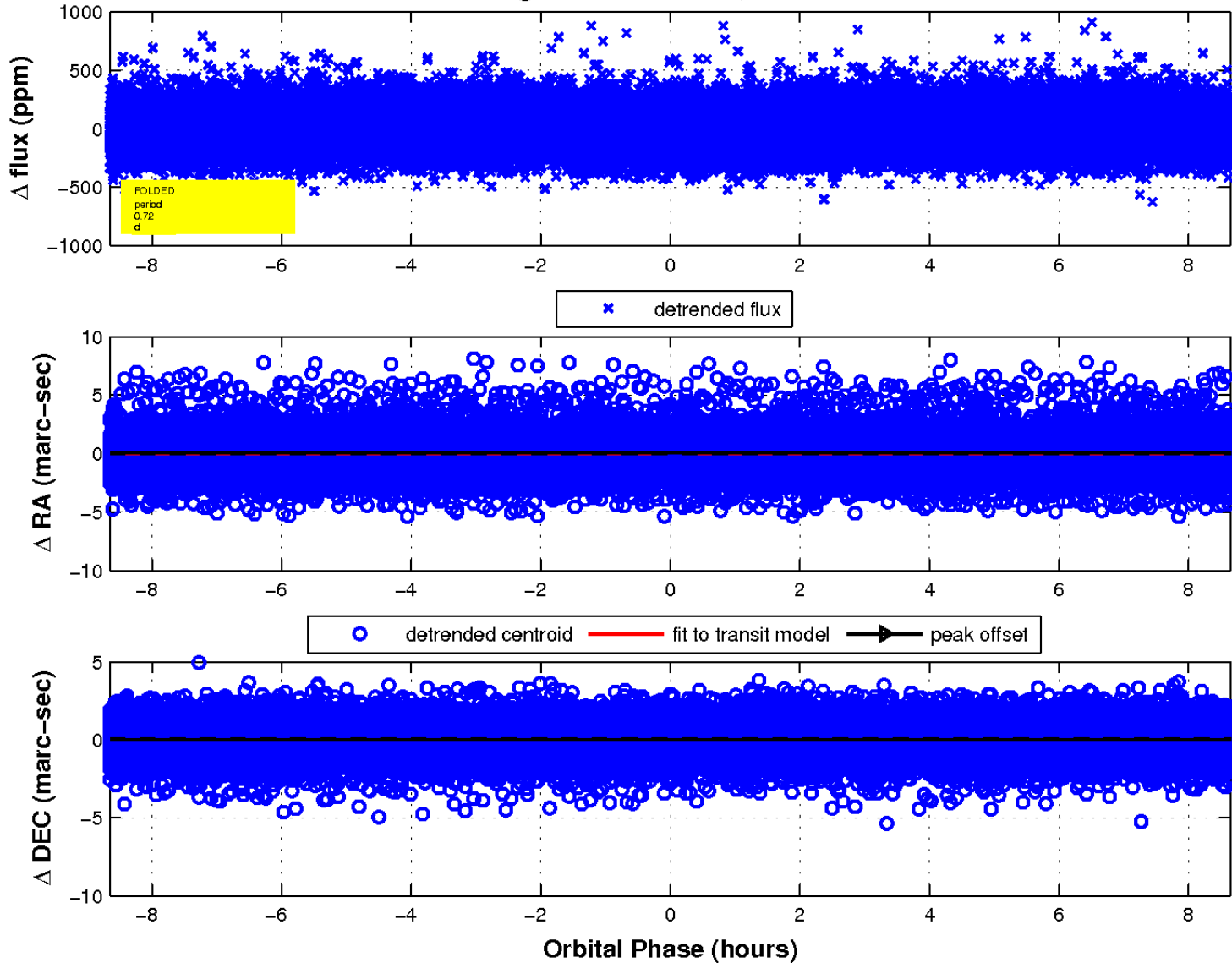
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

