

# KIC 009596469

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009596469-01	OBS	No	0.579469	131.952899	48.5	1.401	11.7	11.3	2.51	7389	1.82	59079.91
009596469-02	OBS	No	0.963224	131.994418	55.0	5.851	9.9	11.6	2.51	7389	2.02	30003.89

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009596469-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009596469-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—LPP_ALT

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

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

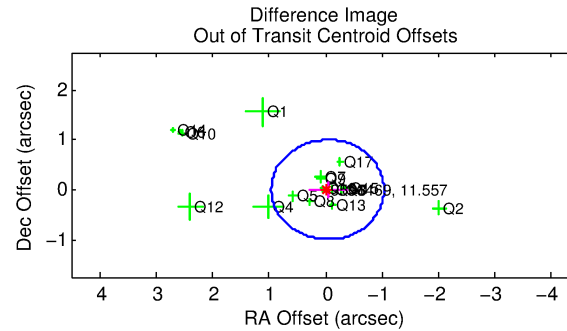
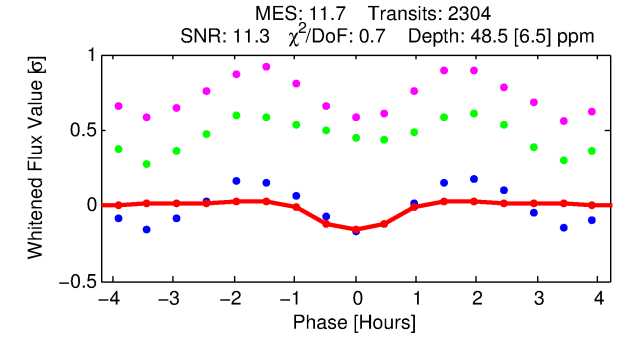
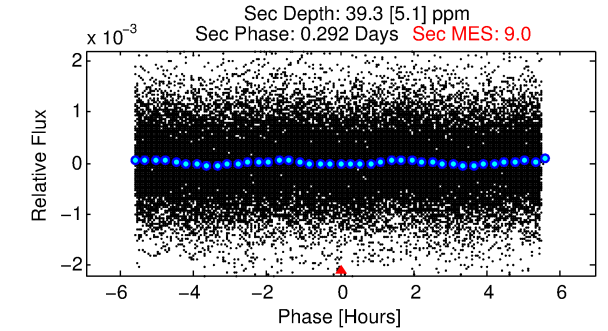
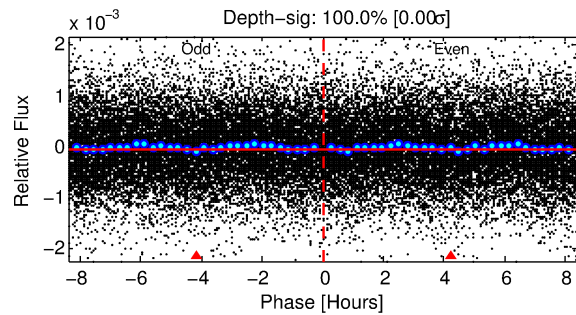
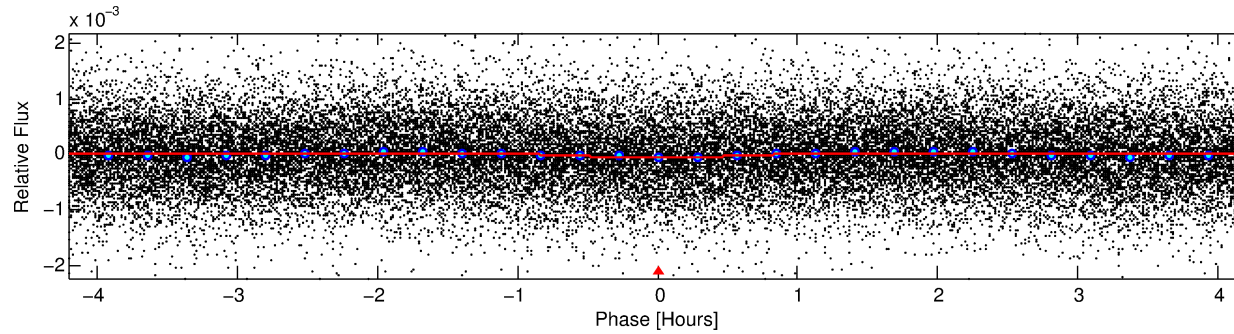
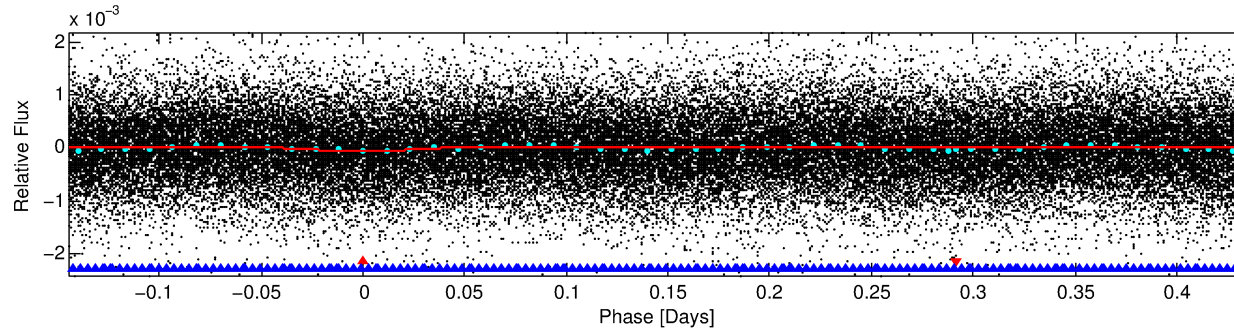
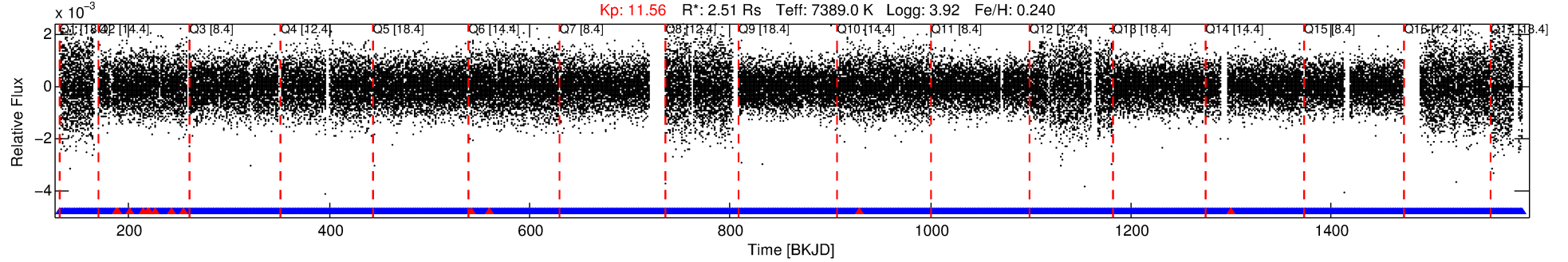
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009596469-01

No Significant Match Found

# DV One-Page Summary

KIC: 9596469 Candidate: 1 of 2 Period: 0.579 d



## DV Fit Results:

Period = 0.57947 [0.00001] d  
Epoch = 131.9529 [0.0022] BKJD  
Rp/R\* = 0.0066 [0.0027]  
a/R\* = 2.85 [6.00]  
b = 0.50 [3.62]  
Seff = 59079.91 [15455.00]  
Teq = 3975 [260] K  
Rp = 1.82 [0.82] Re  
a = 0.0169 [0.0029] AU  
Ag = 1.86 [1.60] [0.54 $\sigma$ ]  
Teffp = 7178 [1471] K [2.14 $\sigma$ ]

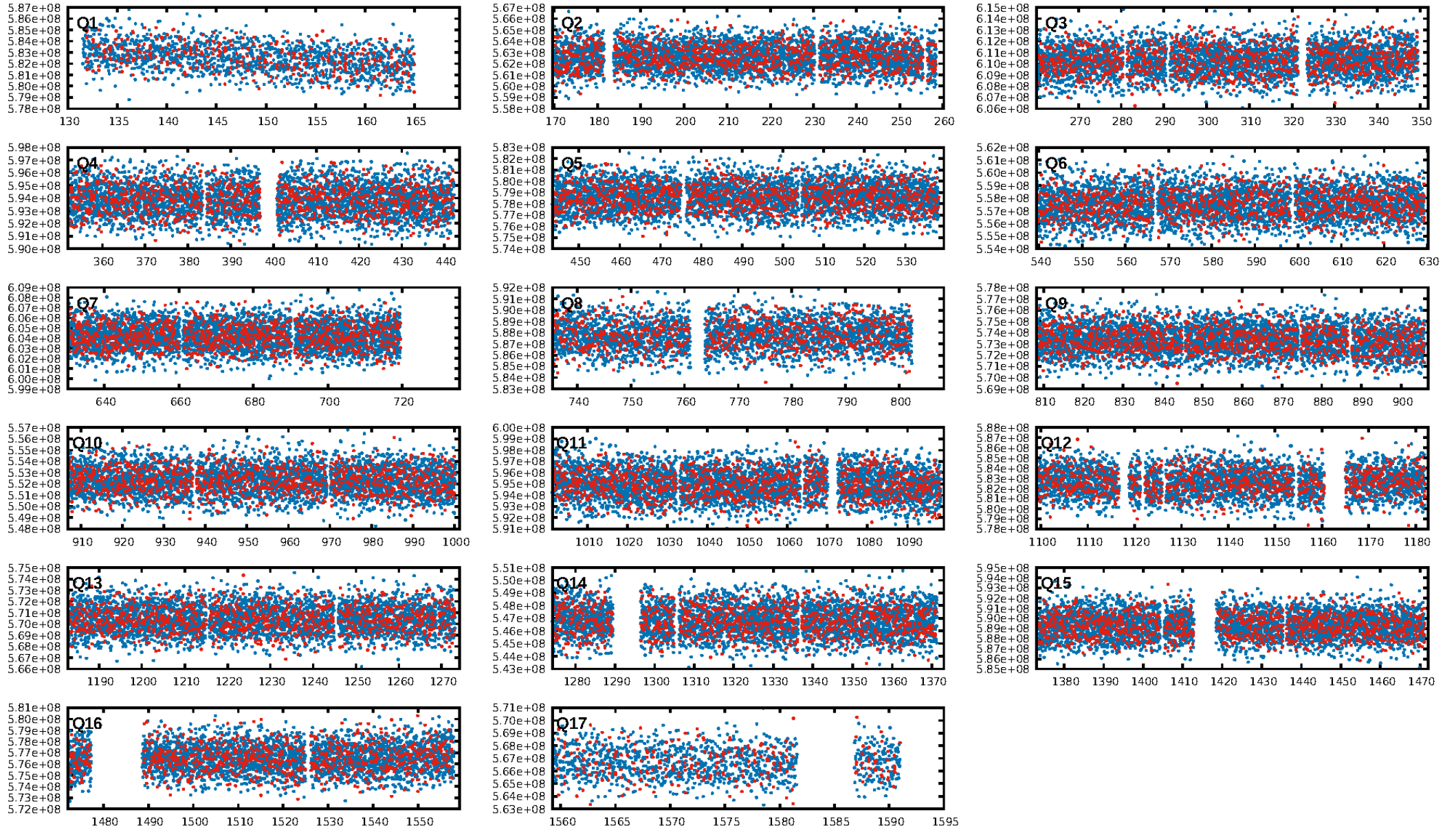
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 87.4% [1.53 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 3.65e-19  
RollingBand-fgt: 0.99 [2188/2201]  
GhostDiagnostic-chr: 1.12  
Centroid-sig: N/A  
Centroid-so: 0.118 arcsec [0.62 $\sigma$ ]  
OotOffset-rm: 0.036 arcsec [0.11 $\sigma$ ]  
KicOffset-rm: 0.145 arcsec [0.41 $\sigma$ ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.59 [10/17]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 16:59:12 Z

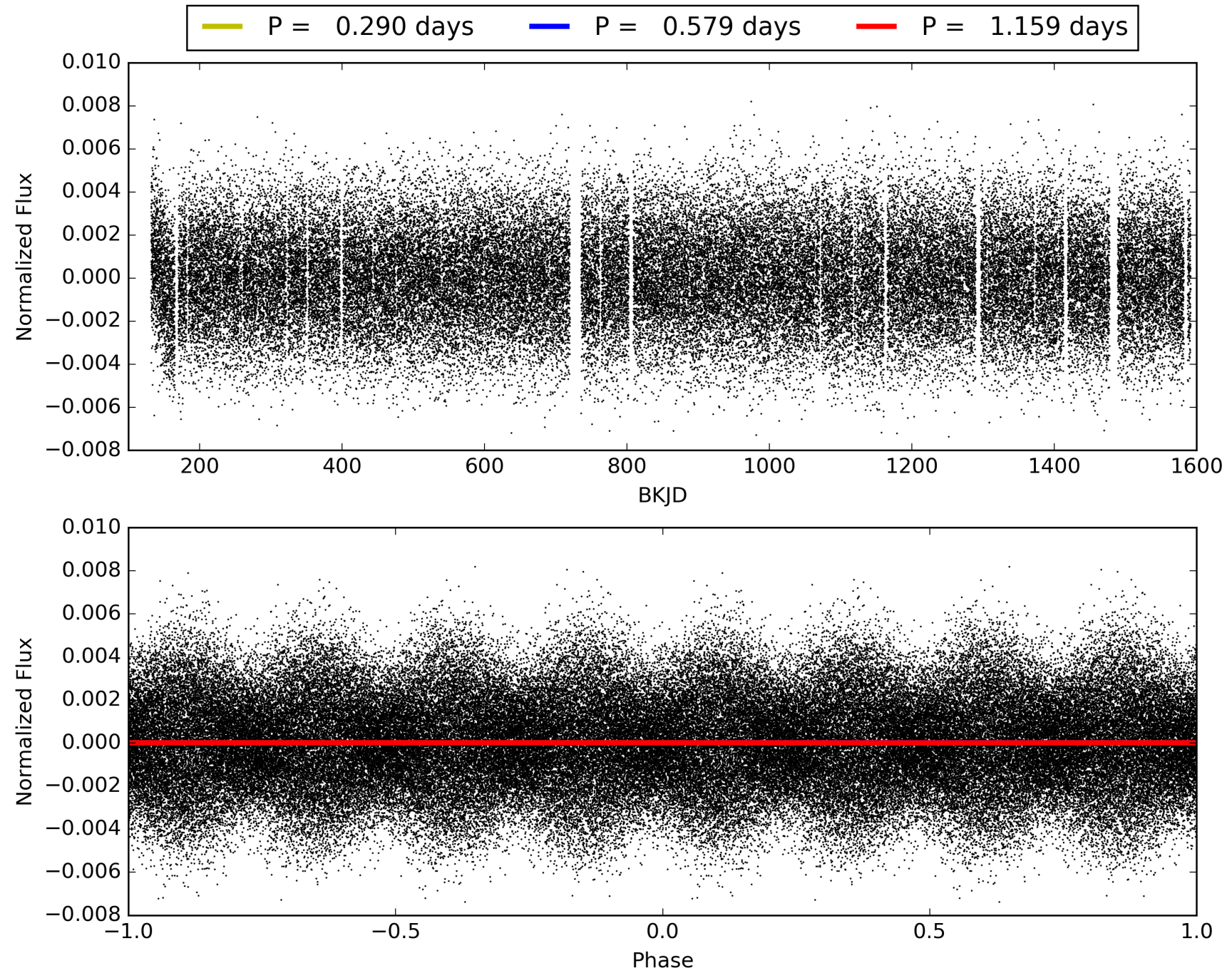
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 009596469-01, PDC Light Curves



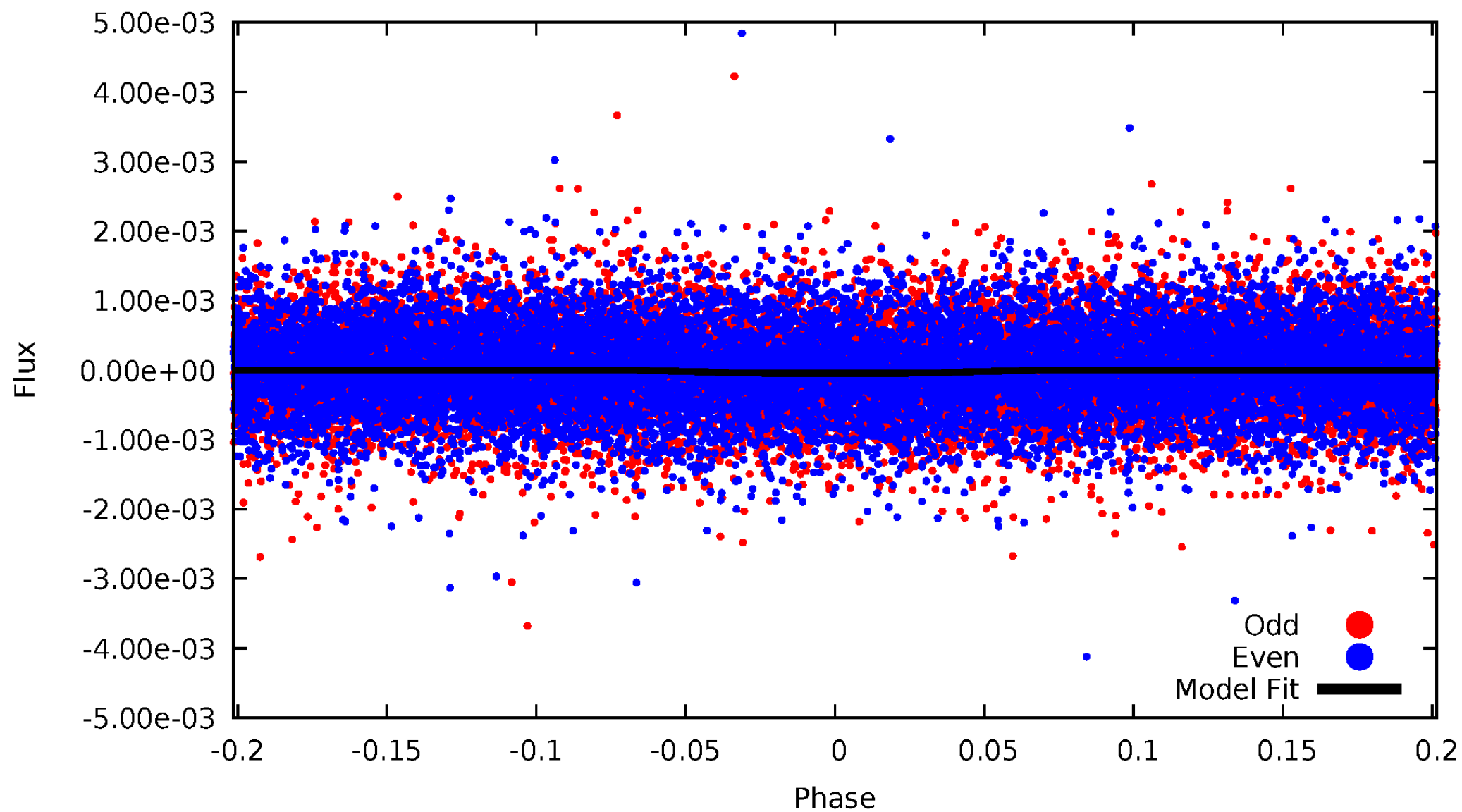


TCE 009596469-01



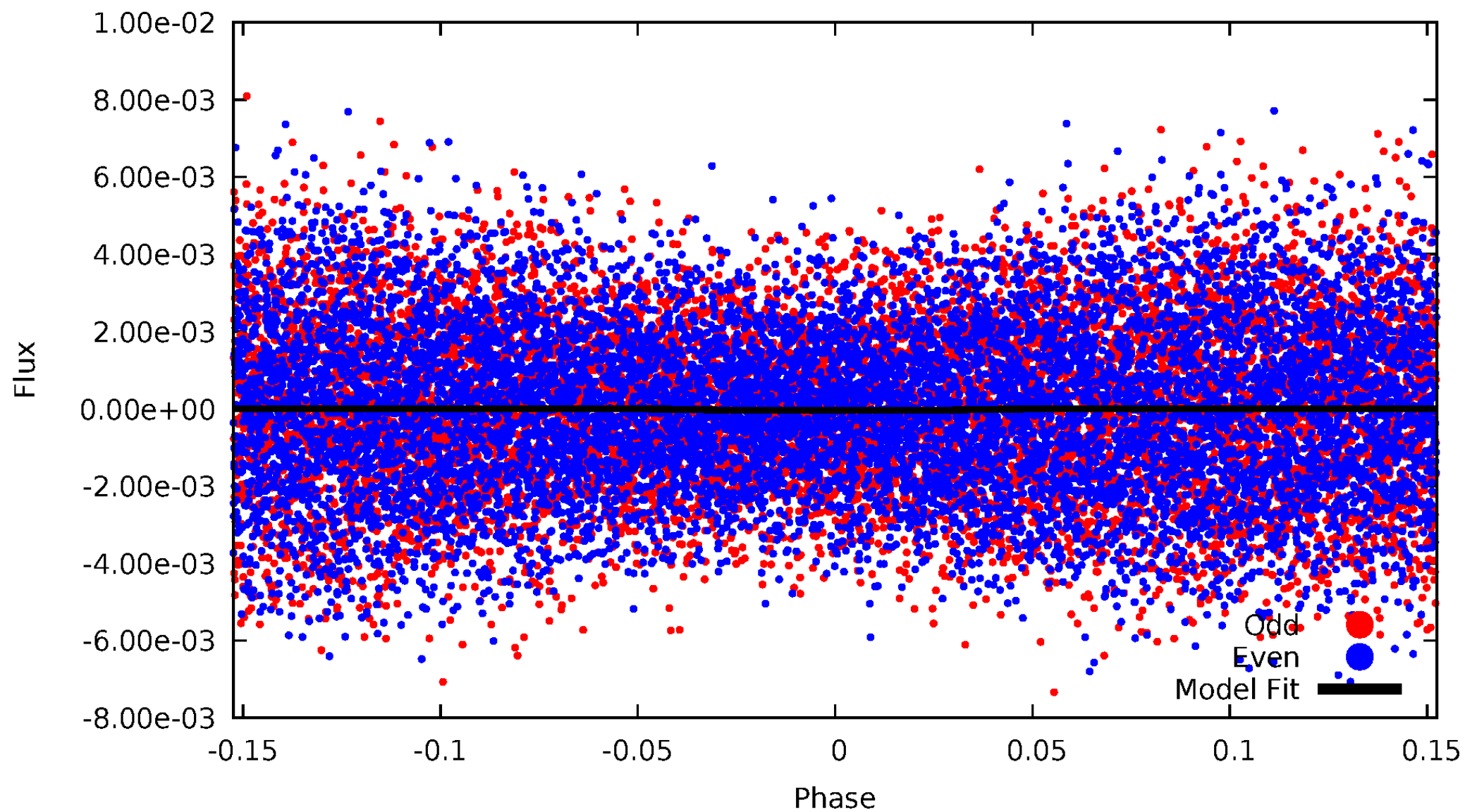
# DV Odd/Even

TCE 009596469-01



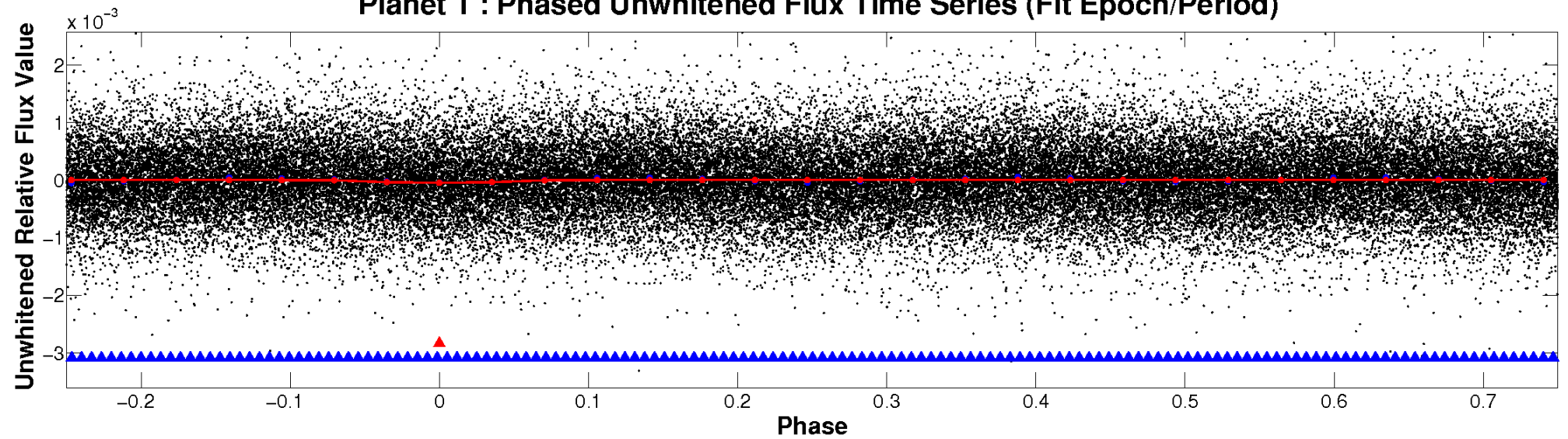
# ALT Odd/Even

TCE 009596469-01

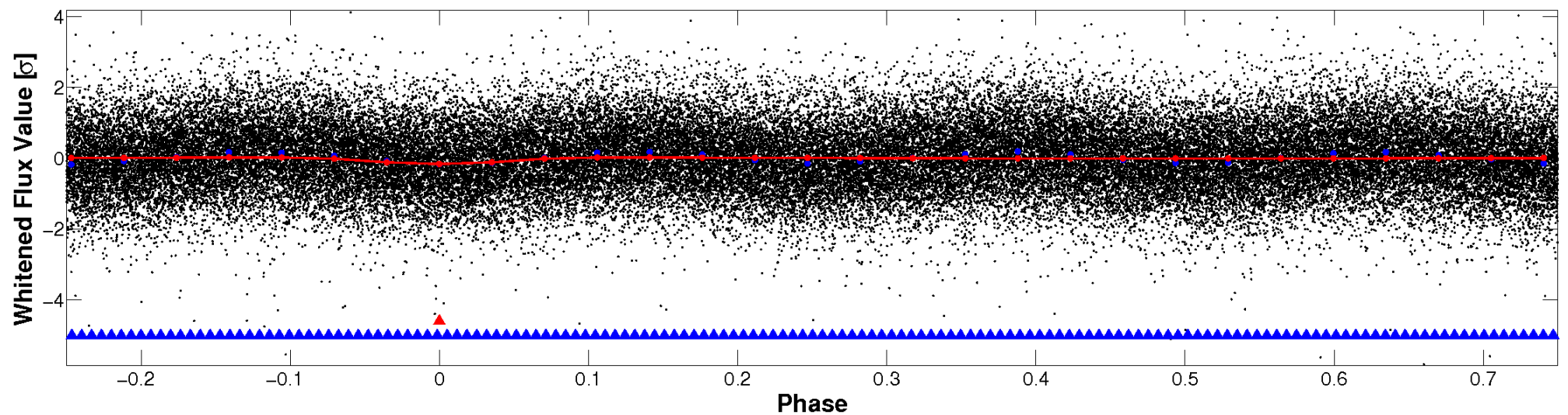


# Non-Whitened Vs. Whitened Light Curve

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



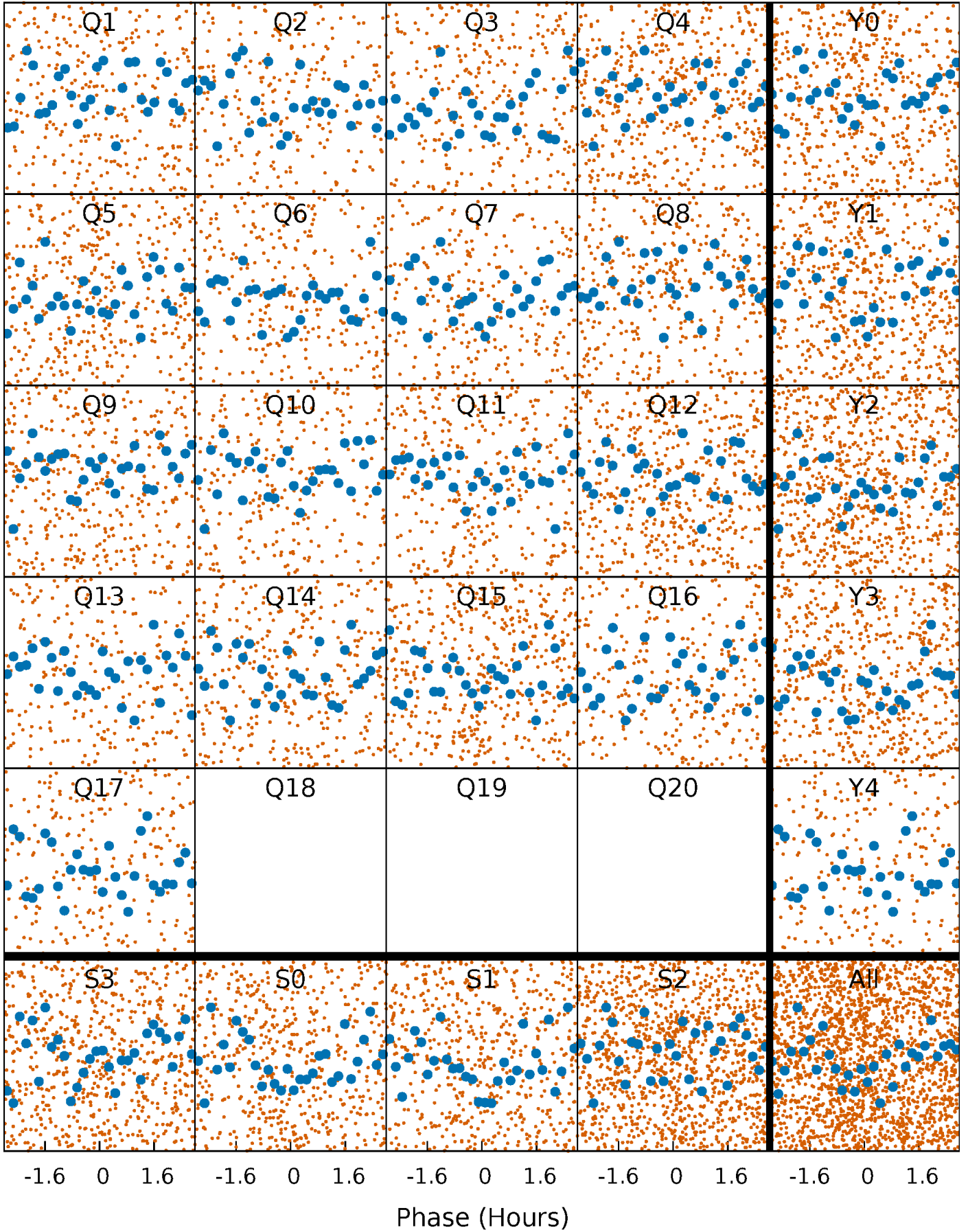
**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**





# PDC Quarter-Phased Transit Curves

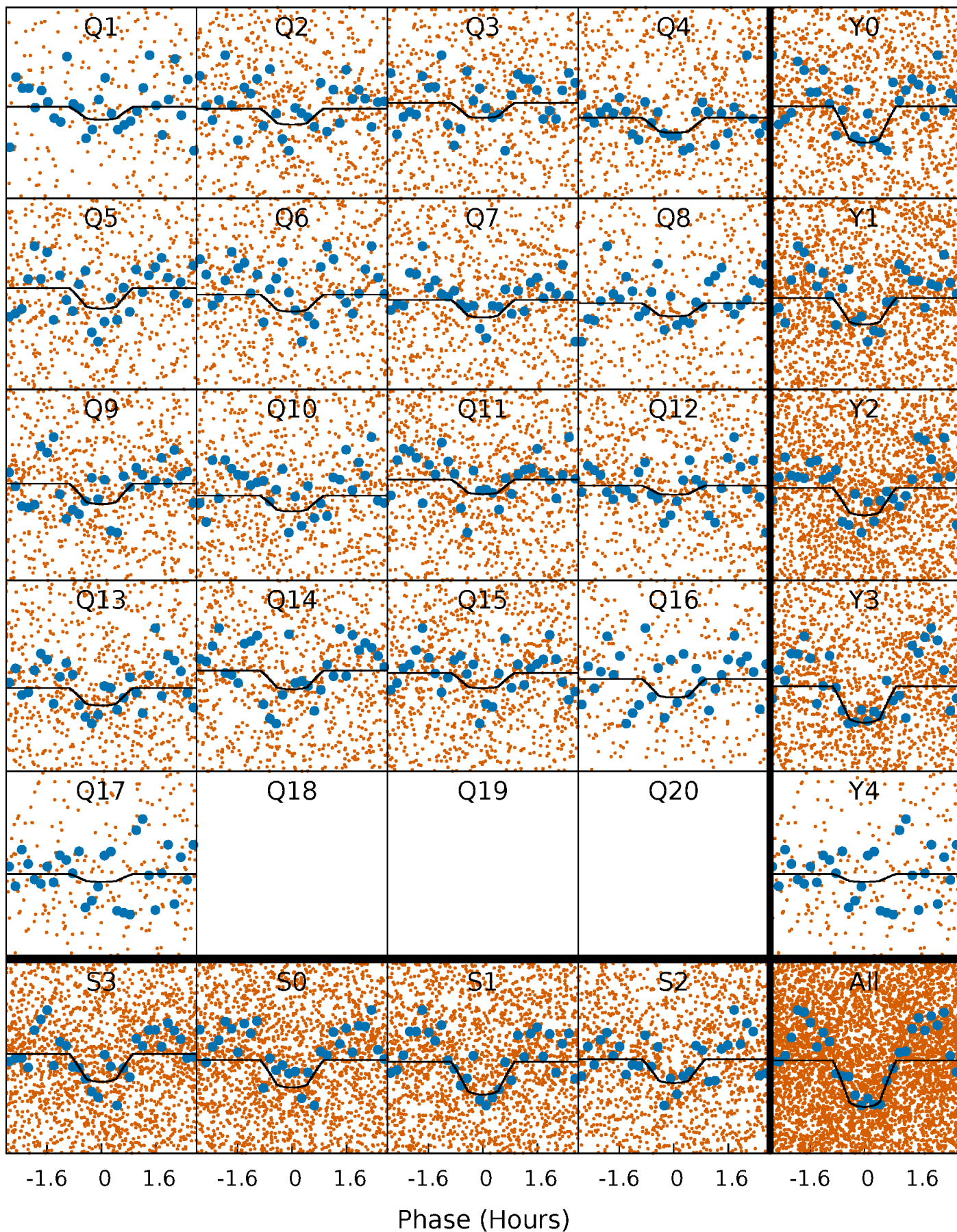
TCE 009596469-01   P= 0.579469 Days    $T_0=131.952899$  (BKJD)





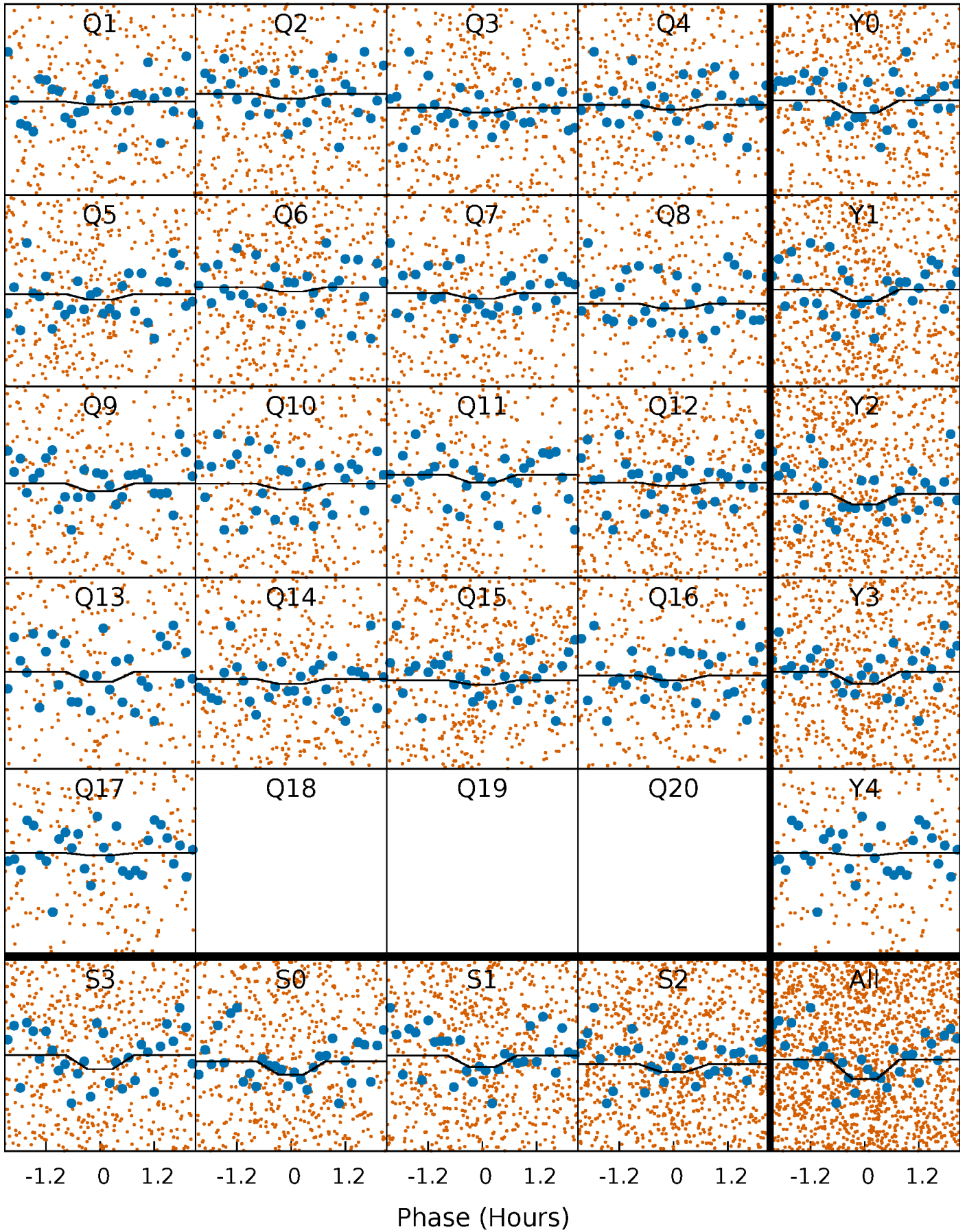
# DV Quarter-Phased Transit Curves

TCE 009596469-01 P= 0.579469 Days  $T_0=131.952899$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

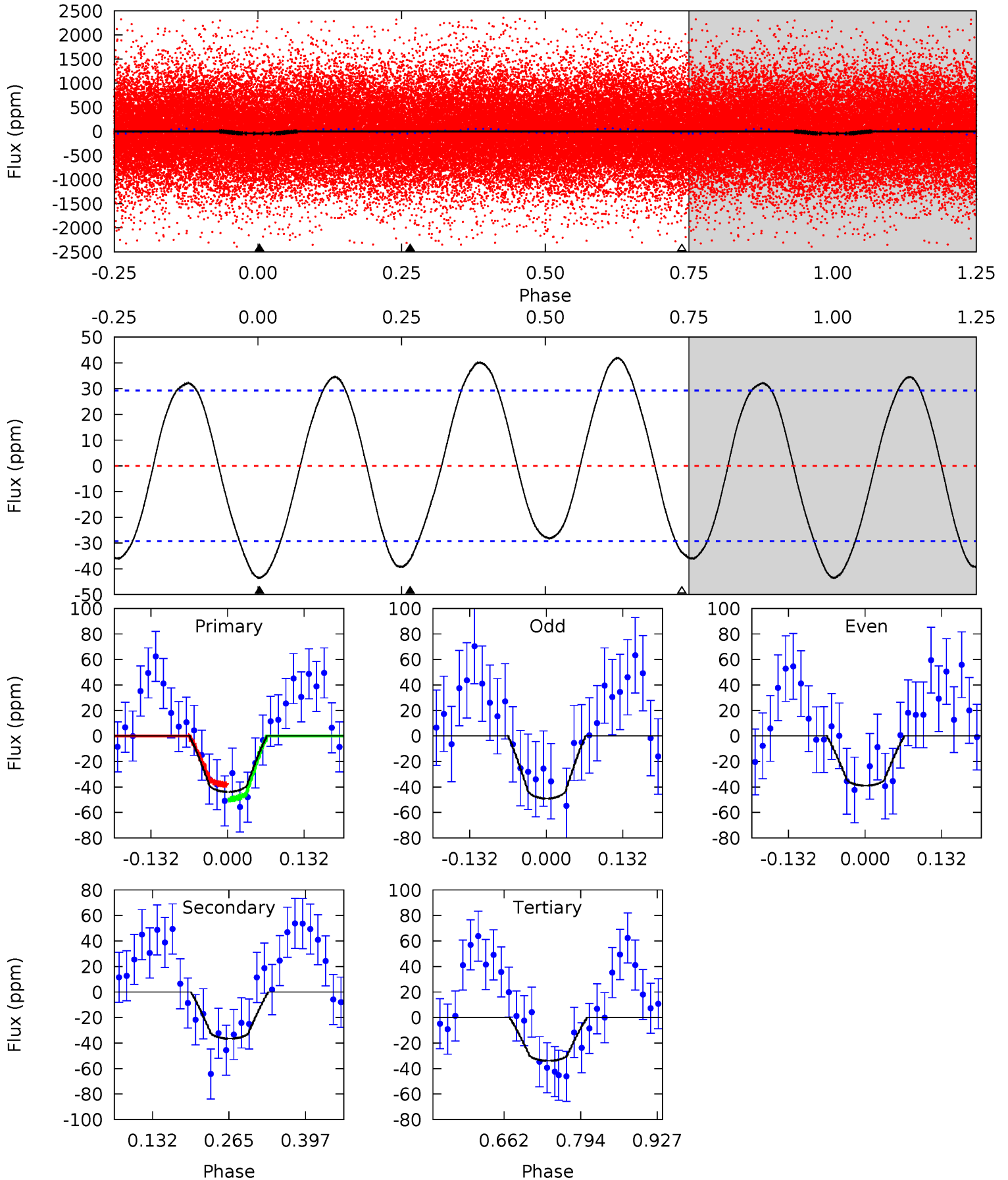
TCE 009596469-01   P= 0.579469 Days    $T_0=131.952899$  (BKJD)



# DV Model-Shift Uniqueness Test

009596469-01, P = 0.579469 Days, E = 131.373430 Days

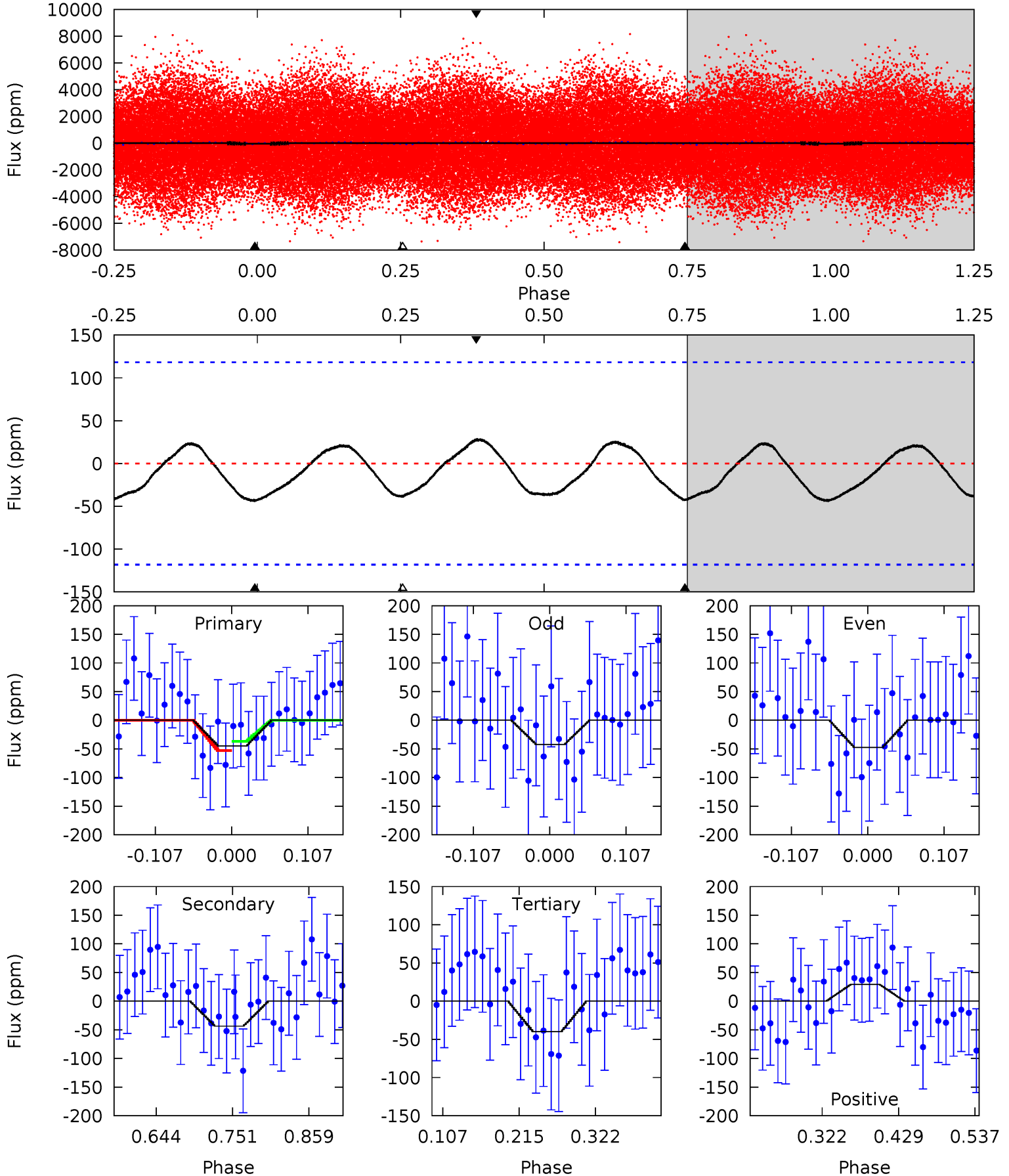
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.76	5.63	5.22	0	4.51	1.50	3.89	1.54	6.76	0.42	5.63	0.78	0.88	0.49	0.89



# Alt Model-Shift Uniqueness Test

009596469-01, P = 0.579469 Days, E = 131.373430 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
1.72	1.68	1.54	1.13	4.55	1.61	0.85	0.19	0.59	0.14	0.55	0.10	0.69	0.40	0.31





### Stellar Parameters For KIC 009596469

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$7389^{+73}_{-88}$	$3.920^{+0.144}_{-0.096}$	$0.240^{+0.100}_{-0.150}$	$2.514^{+0.331}_{-0.496}$	$1.915^{+0.074}_{-0.207}$	$0.170^{+0.119}_{-0.051}$
	+1%/-1%	+4%/-2%	+42%/-62%	+13%/-20%	+4%/-11%	+70%/-30%
Source	SPE68	SPE68	SPE68	DSEP		

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

### Secondary Eclipse Parameters for KIC 009596469-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-37 \pm 6$	$1.75^{+0.80}_{-0.70}$	$5547^{+206}_{-279}$	$6645^{+2829}_{-1347}$	$1.820^{+3.093}_{-0.934}$
Alt.	$-44 \pm 26$	$1.77^{+0.81}_{-0.69}$	$5541^{+229}_{-249}$	$6957^{+3484}_{-2317}$	$2.027^{+4.420}_{-1.430}$

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

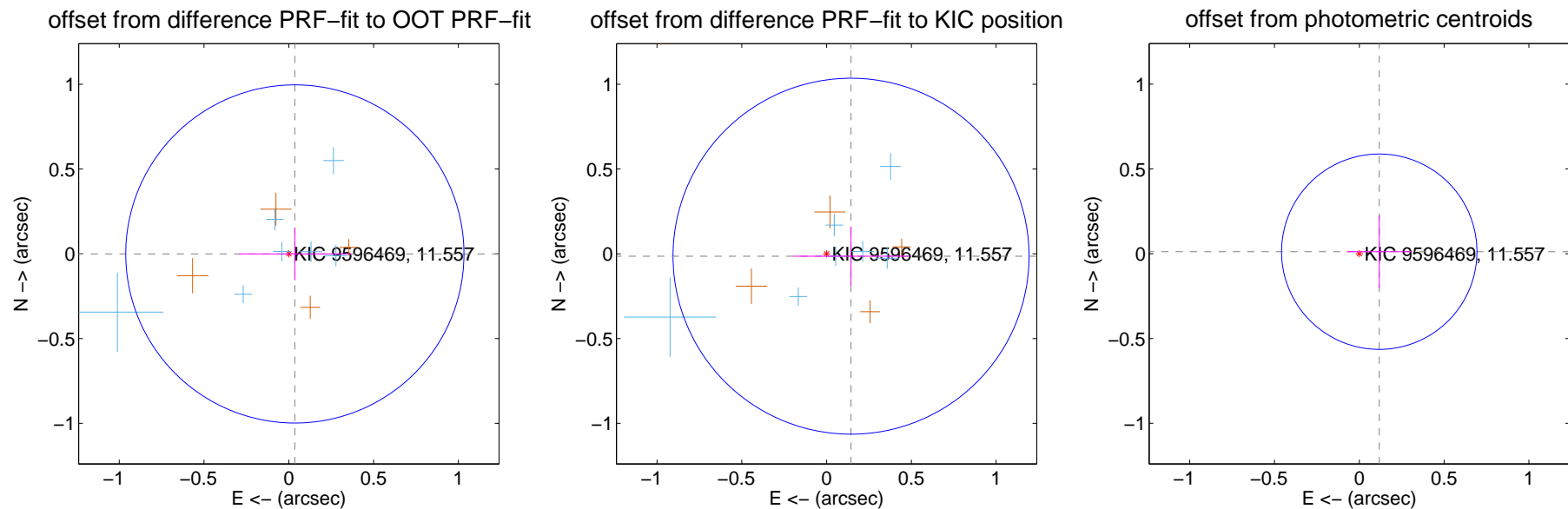
## DV Centroid Data

Supplemental centroid analysis for 009596469-01. **Kepler magnitude: 11.56.** Transit SNR 11.28

There are 10 quarters with good PRF difference image offsets

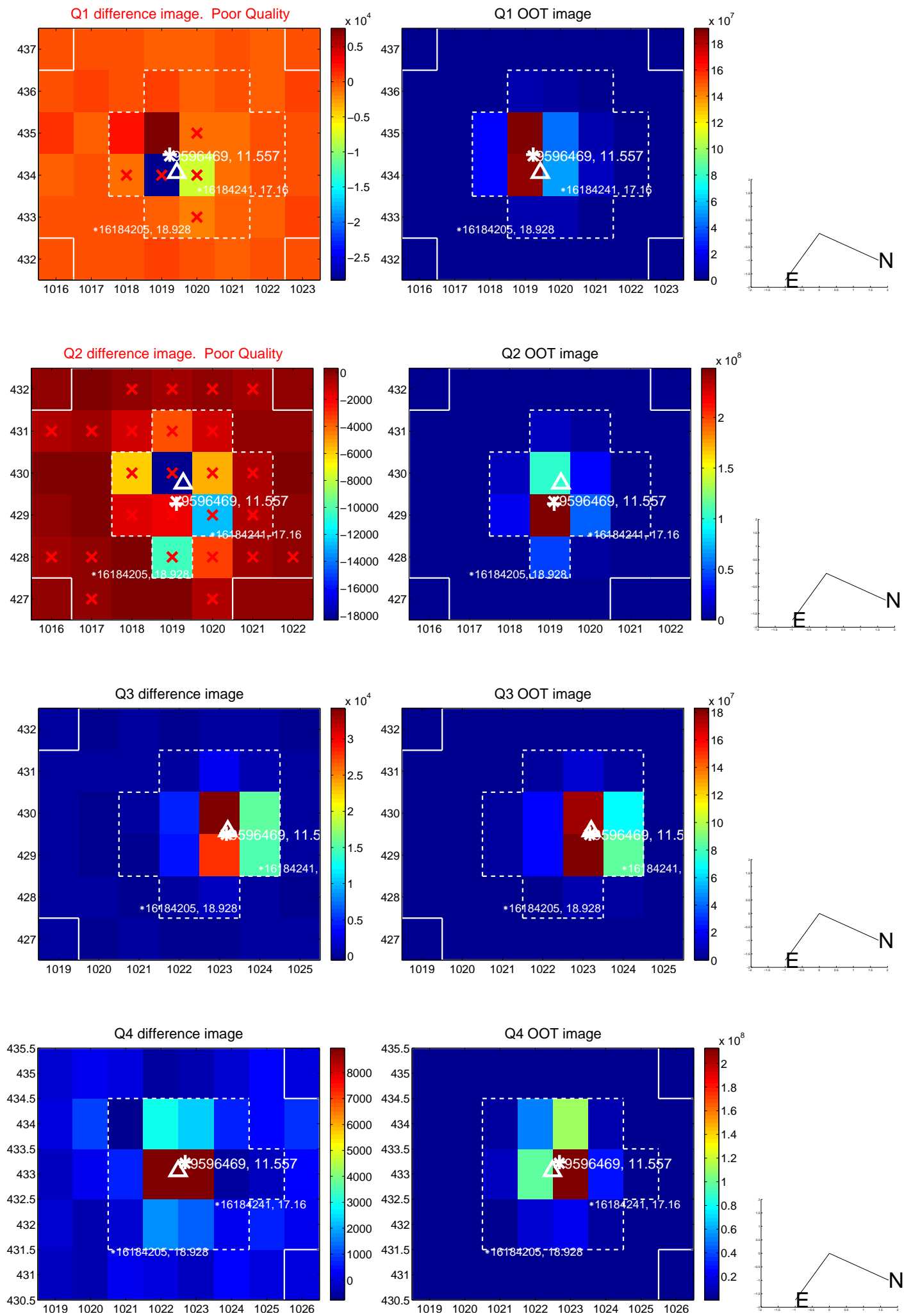
The direct PRF centroid is offset from the target star catalog position by about 0.12 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.036 \pm 0.332$	0.11	$-0.036 \pm 0.330$	$-0.001 \pm 0.156$
PRF-fit source offset from KIC position	$0.145 \pm 0.350$	0.41	$-0.144 \pm 0.342$	$-0.014 \pm 0.175$
photometric centroid source offset	$0.12 \pm 0.19$	0.62	$-0.12 \pm 0.19$	$0.01 \pm 0.21$

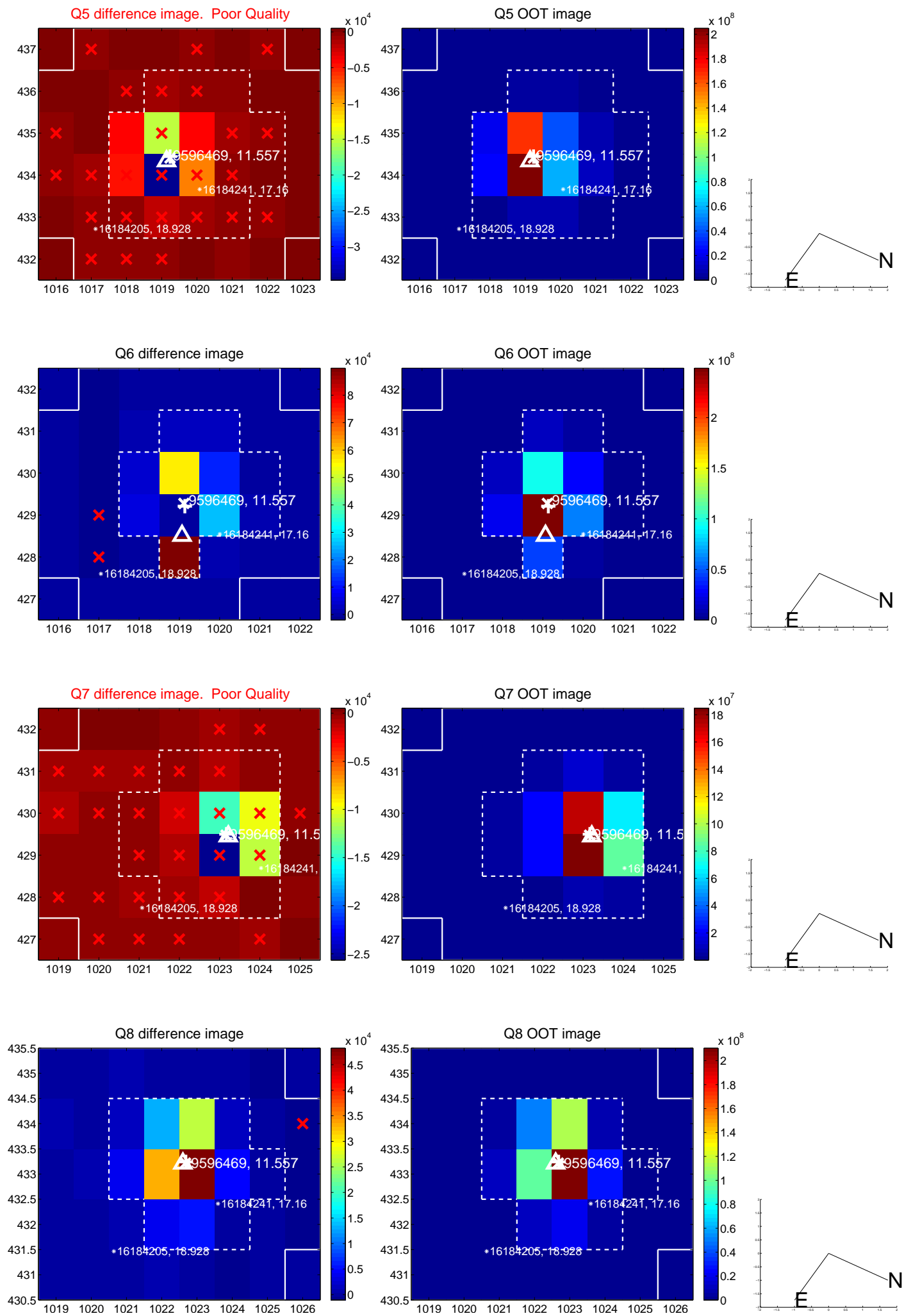


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

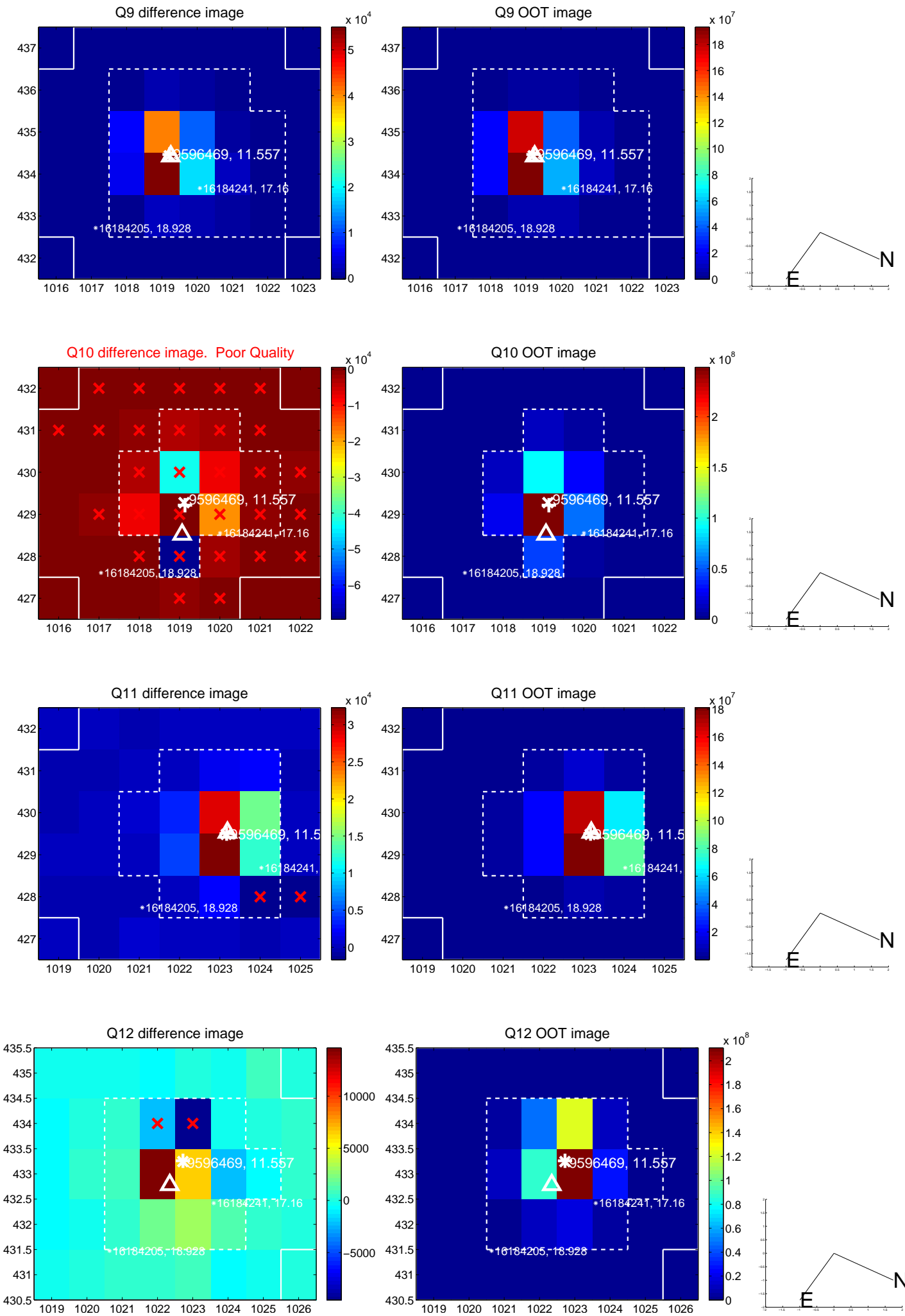


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

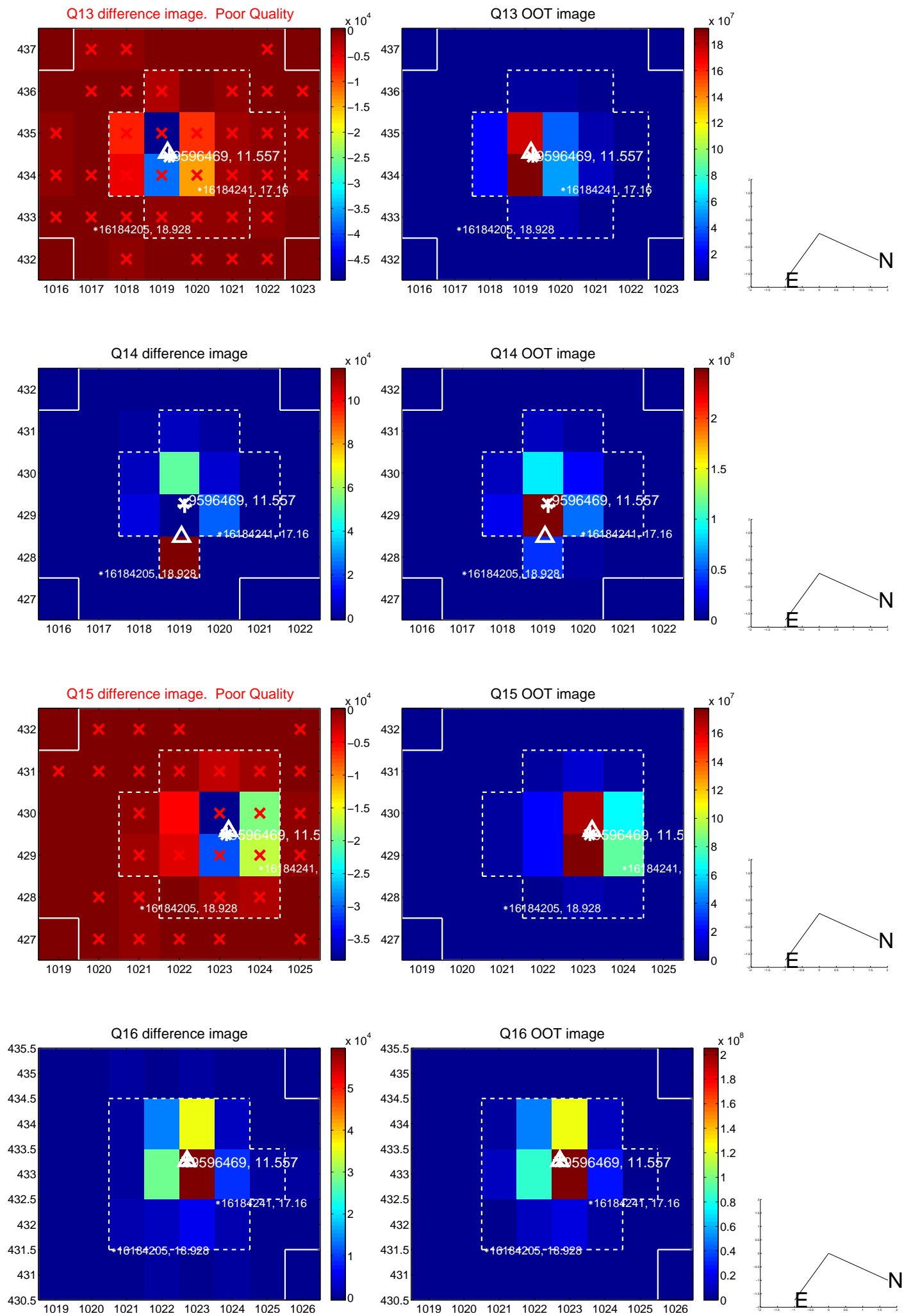




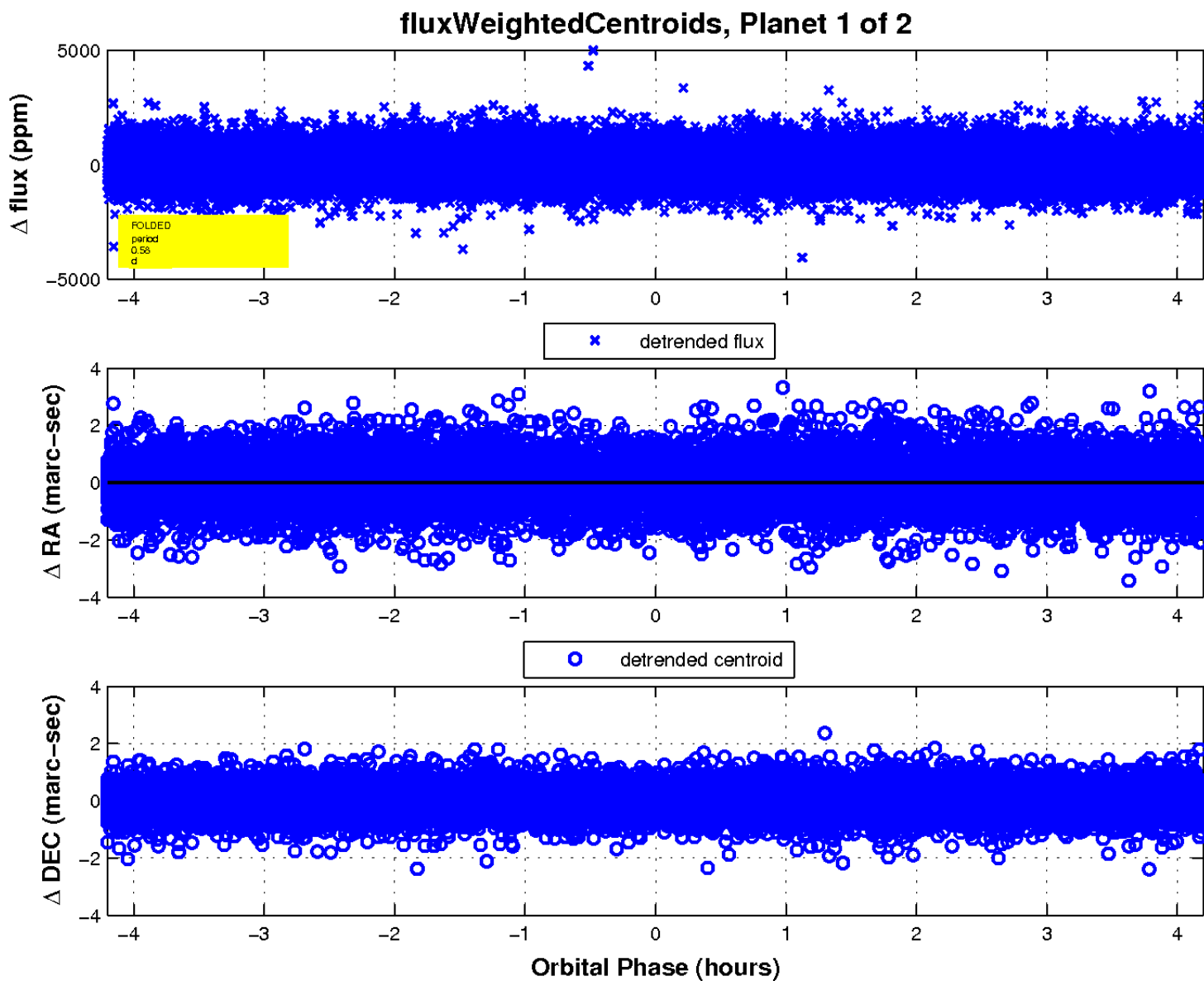
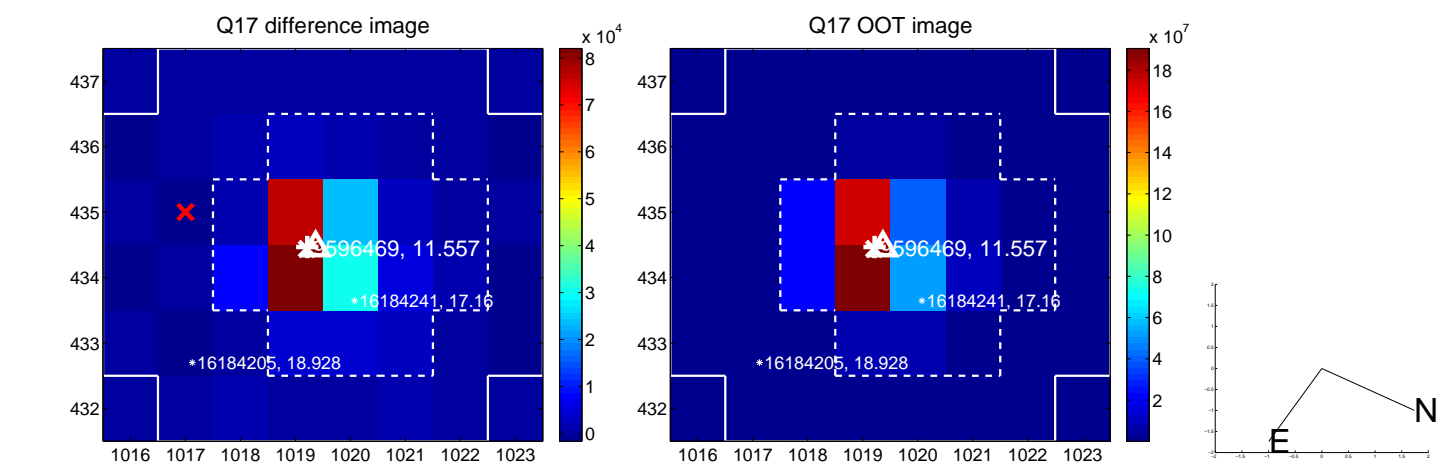
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

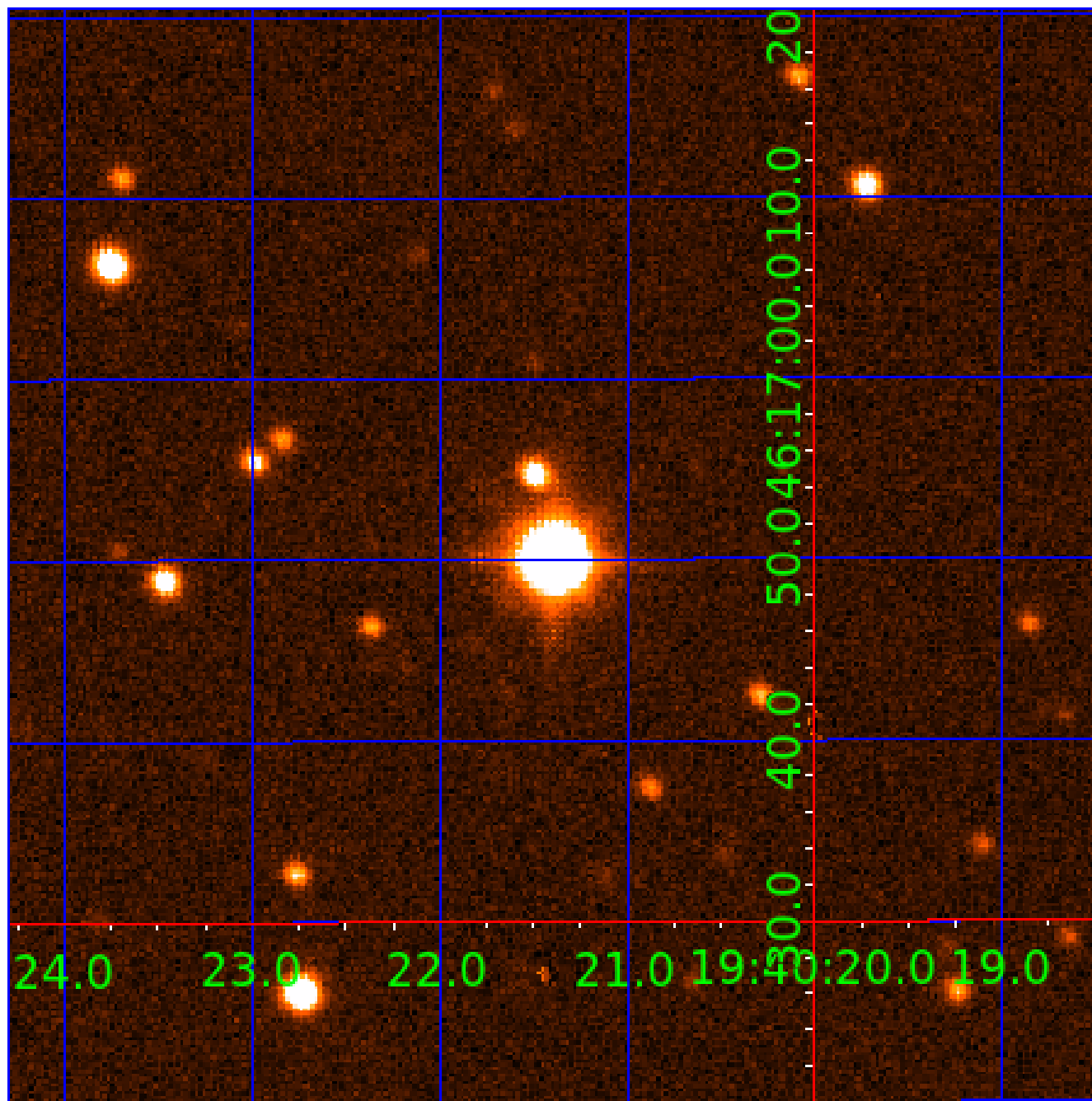


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 009596469

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009596469-01	OBS	No	0.579469	131.952899	48.5	1.401	11.7	11.3	2.51	7389	1.82	59079.91
009596469-02	OBS	No	0.963224	131.994418	55.0	5.851	9.9	11.6	2.51	7389	2.02	30003.89

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009596469-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009596469-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—LPP_ALT

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

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

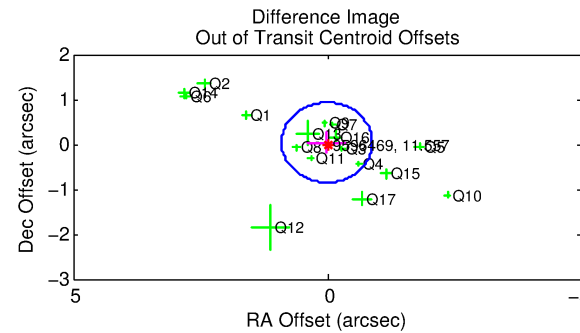
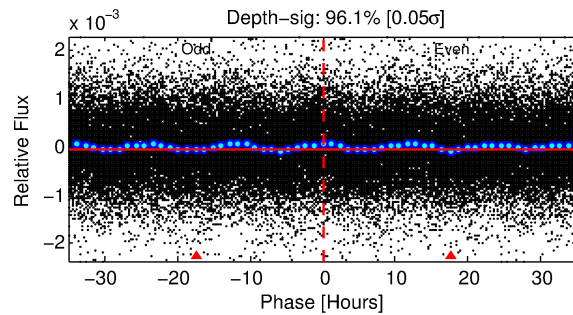
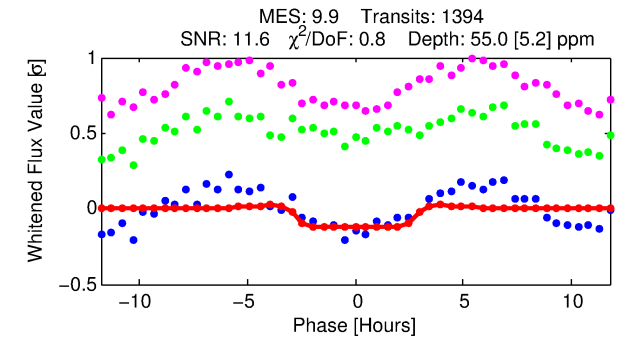
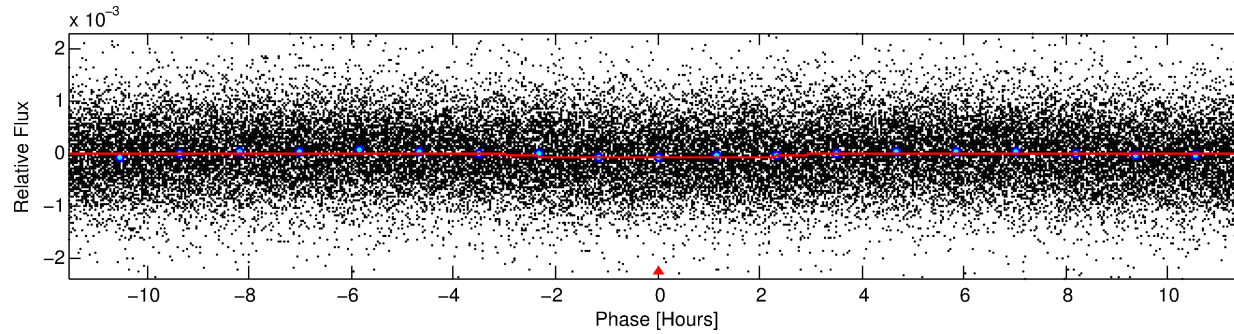
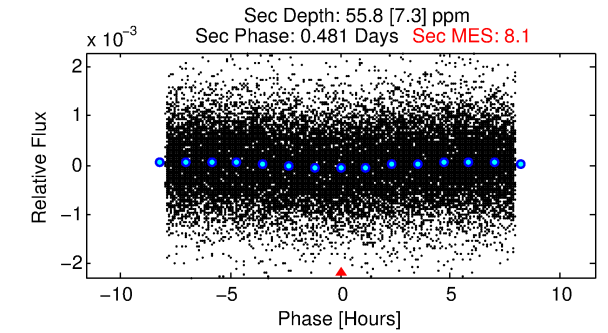
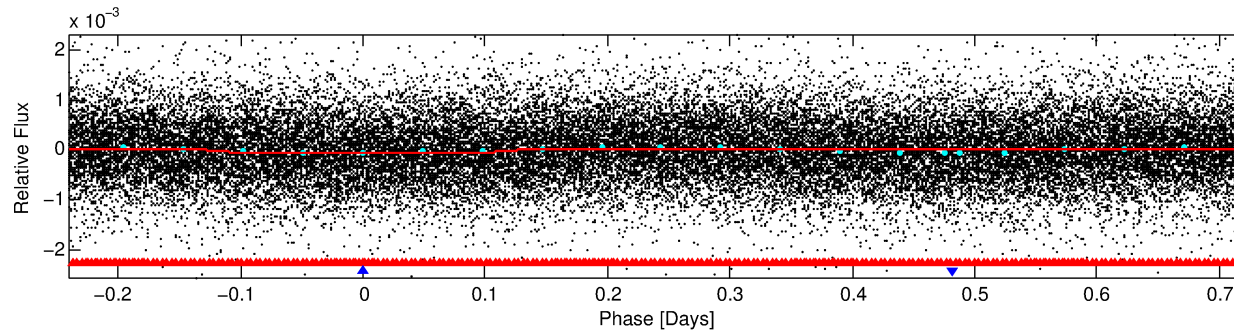
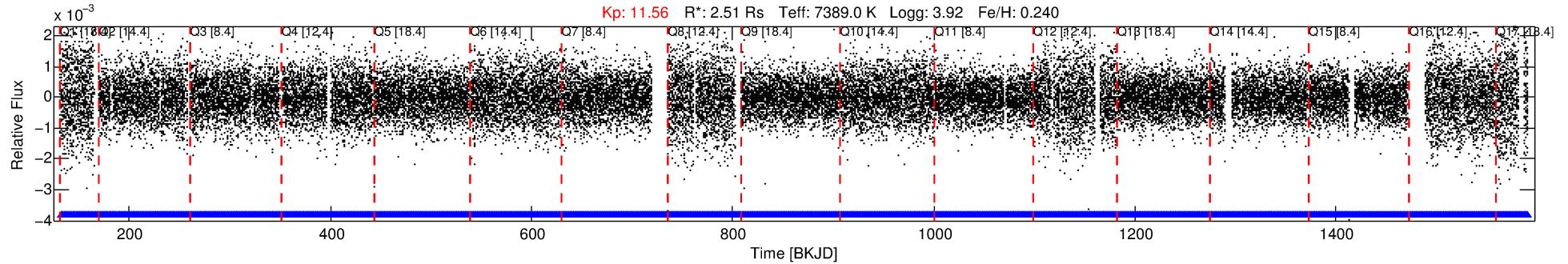
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009596469-02

No Significant Match Found

# DV One-Page Summary

KIC: 9596469 Candidate: 2 of 2 Period: 0.963 d



## DV Fit Results:

Period = 0.96322 [0.00001] d  
Epoch = 131.9944 [0.0056] BKJD  
Rp/R\* = 0.0074 [0.0061]  
a/R\* = 1.21 [1.93]  
b = 0.74 [3.09]  
Seff = 30003.89 [7848.86]  
Teq = 3356 [219] K  
Rp = 2.02 [1.71] Re  
a = 0.0237 [0.0041] AU  
Ag = 4.24 [7.07] [0.46σ]  
Teffp = 7444 [3071] K [1.33σ]

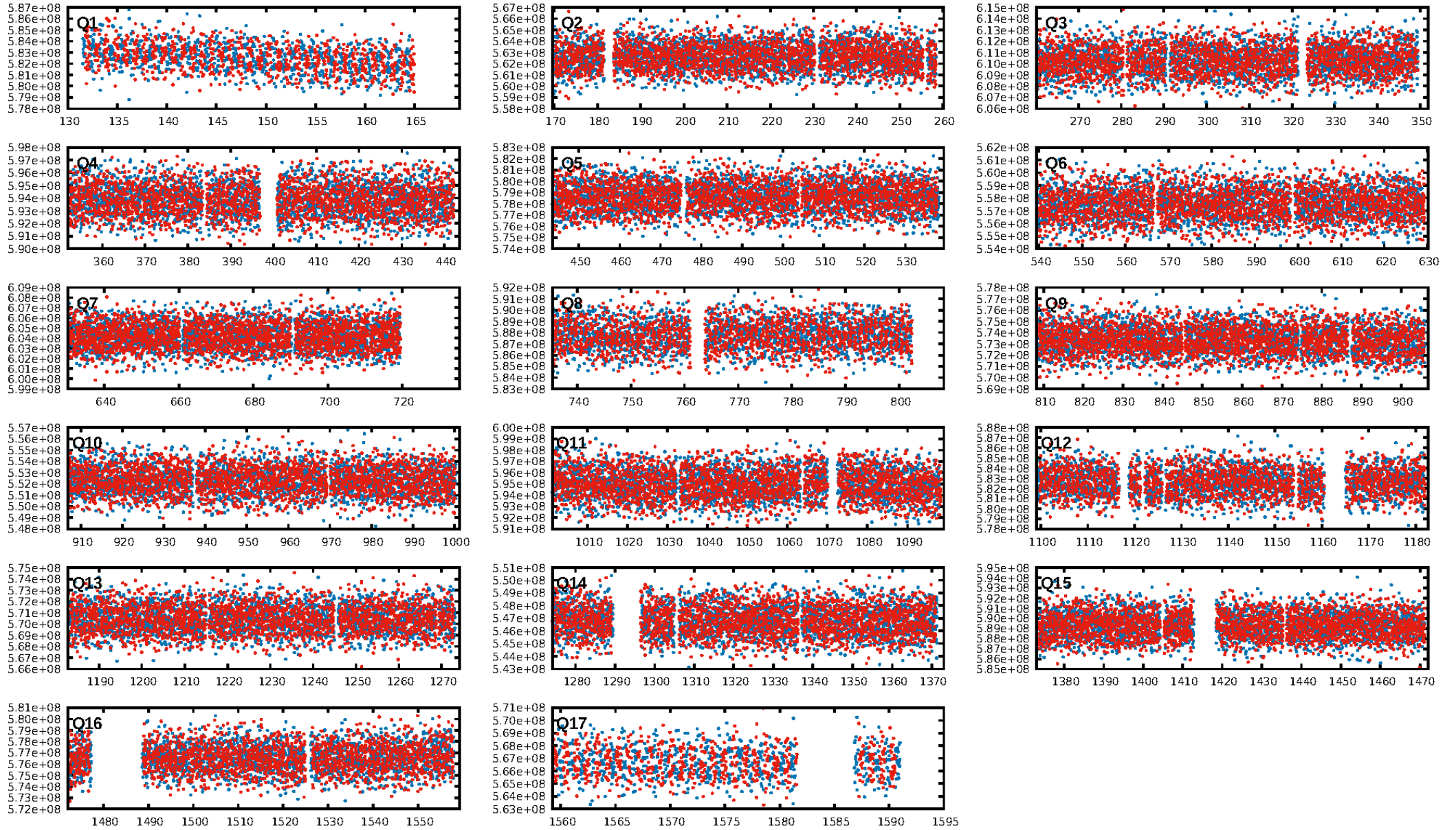
## DV Diagnostic Results:

ShortPeriod-sig: 87.4% [1.53σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 1.85e-13  
RollingBand-fgt: 1.00 [1331/1331]  
GhostDiagnostic-chr: 2.978  
Centroid-sig: N/A  
Centroid-so: 0.125 arcsec [1.08σ]  
OotOffset-rm: 0.040 arcsec [0.14σ]  
KicOffset-rm: 0.116 arcsec [0.37σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.88 [15/17]  
DiffImageOverlap-fno: 0.00 [0/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 16:59:34 Z

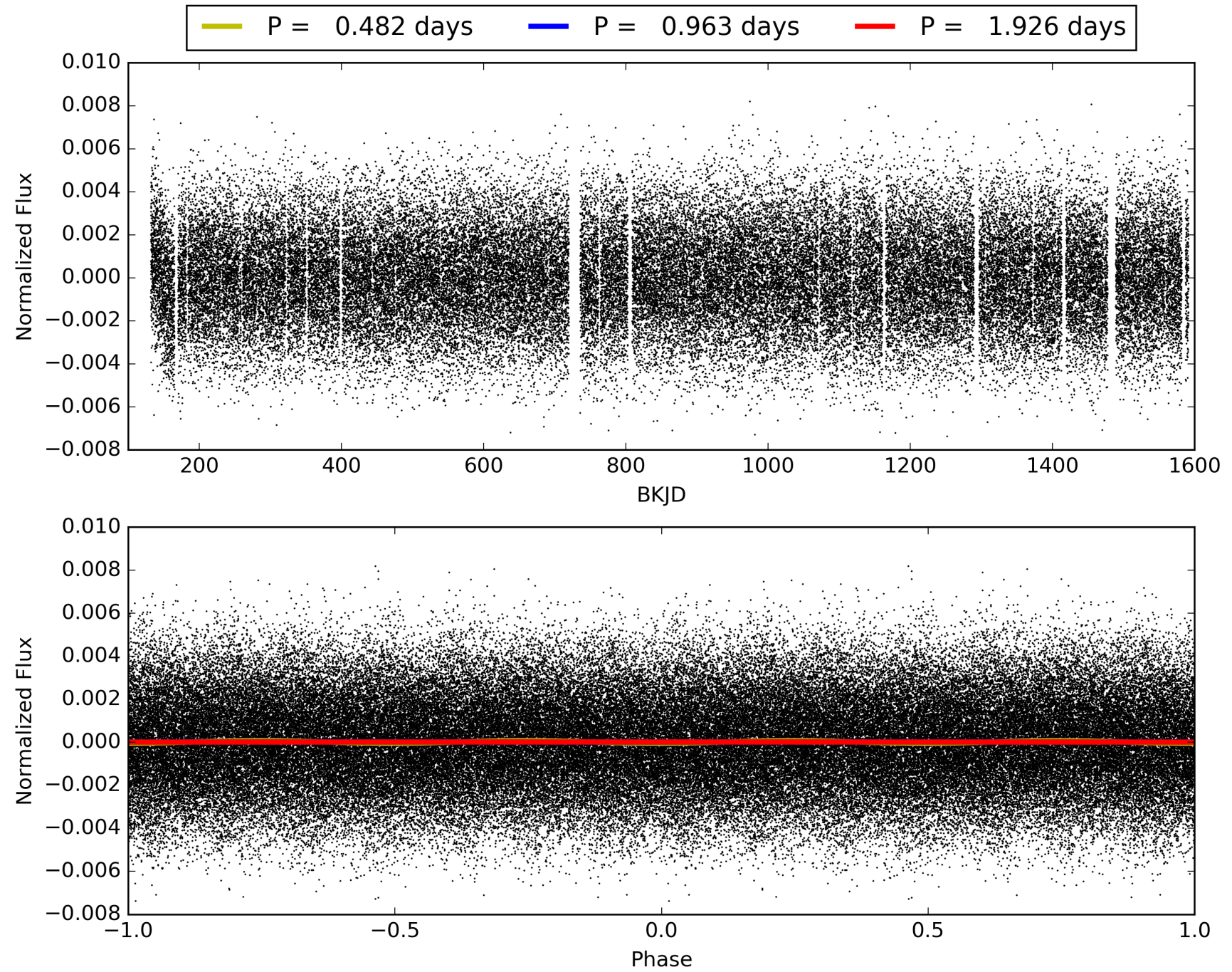
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 009596469-02, PDC Light Curves





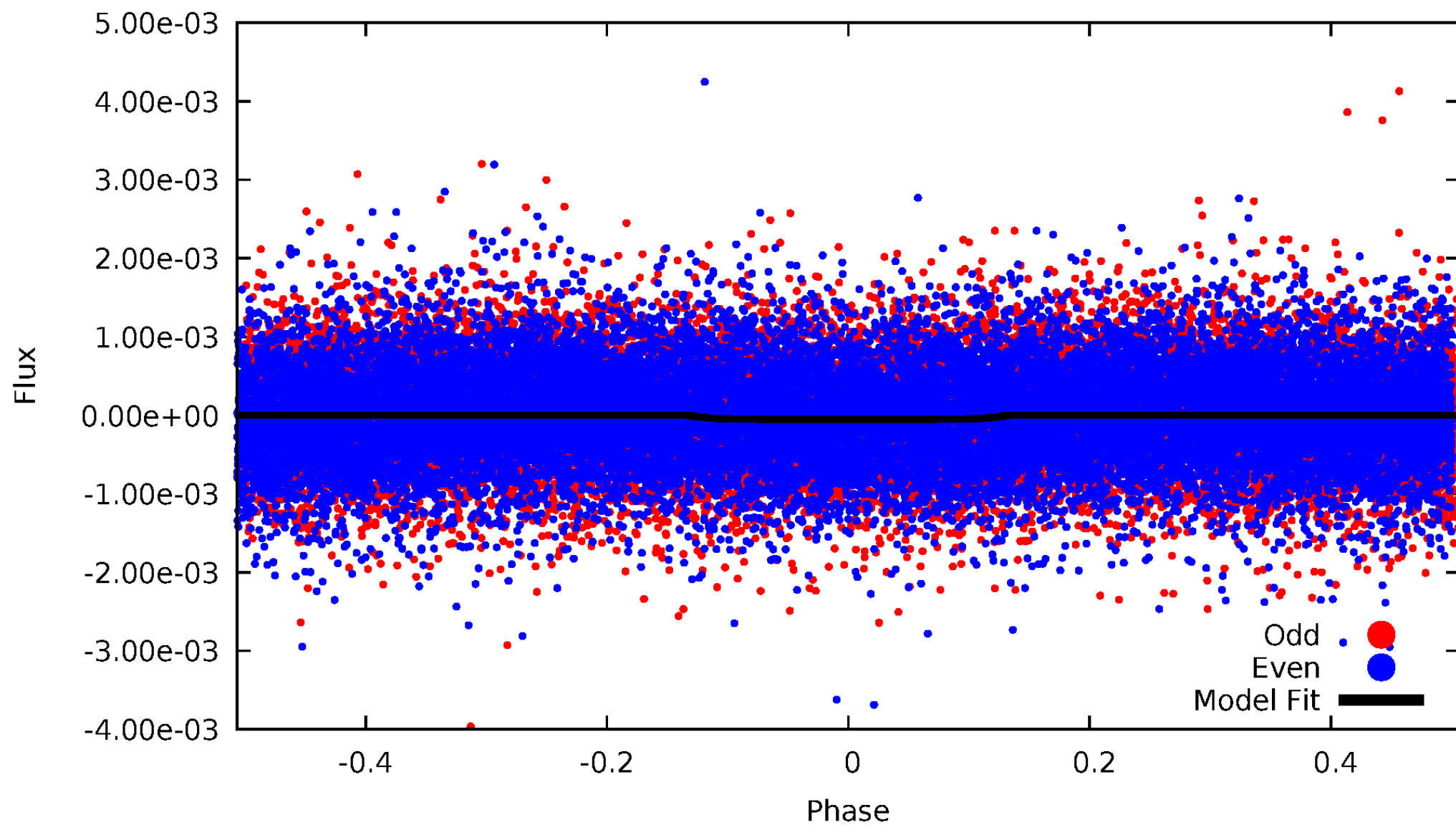
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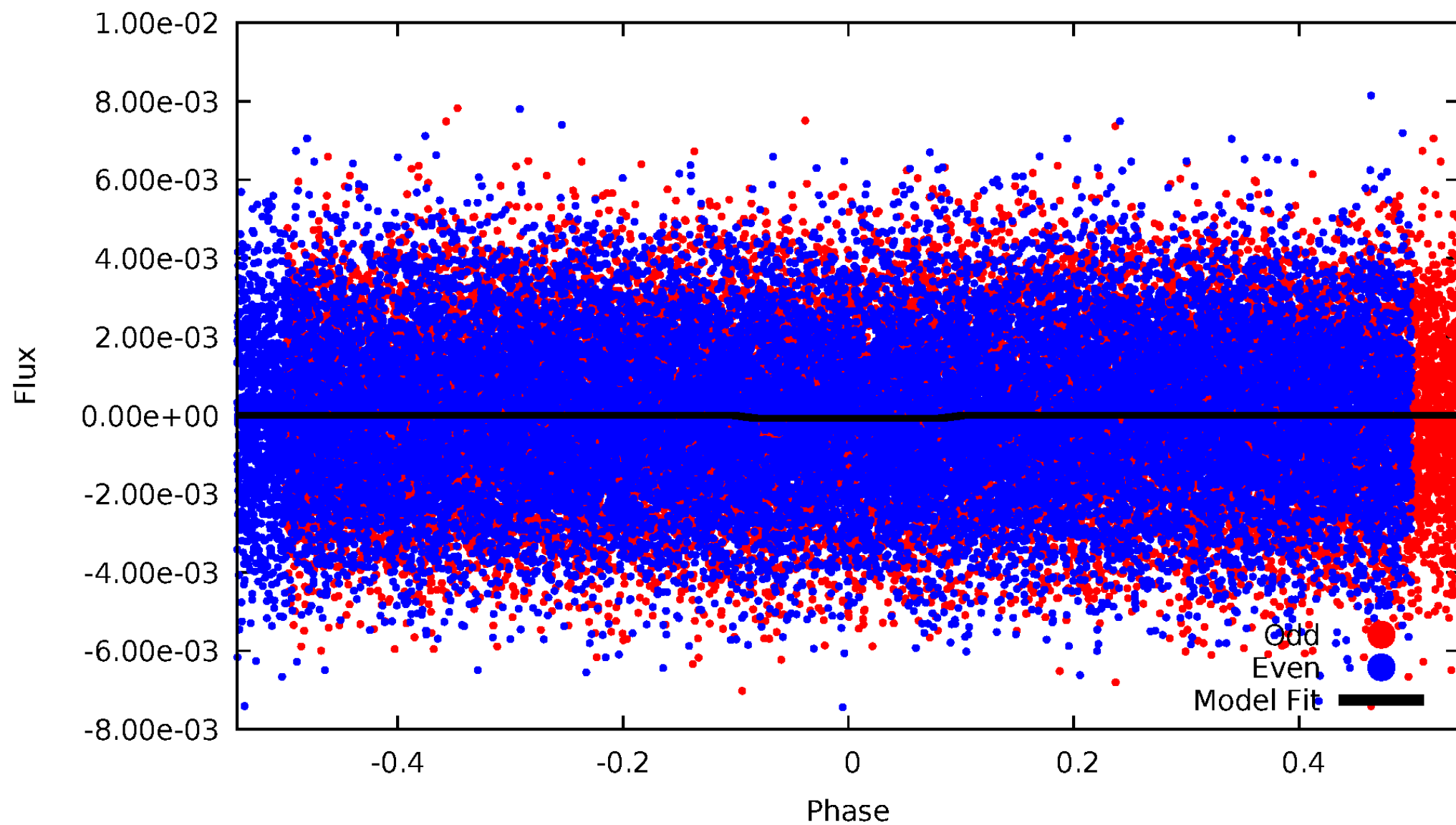
# DV Odd/Even

TCE 009596469-02



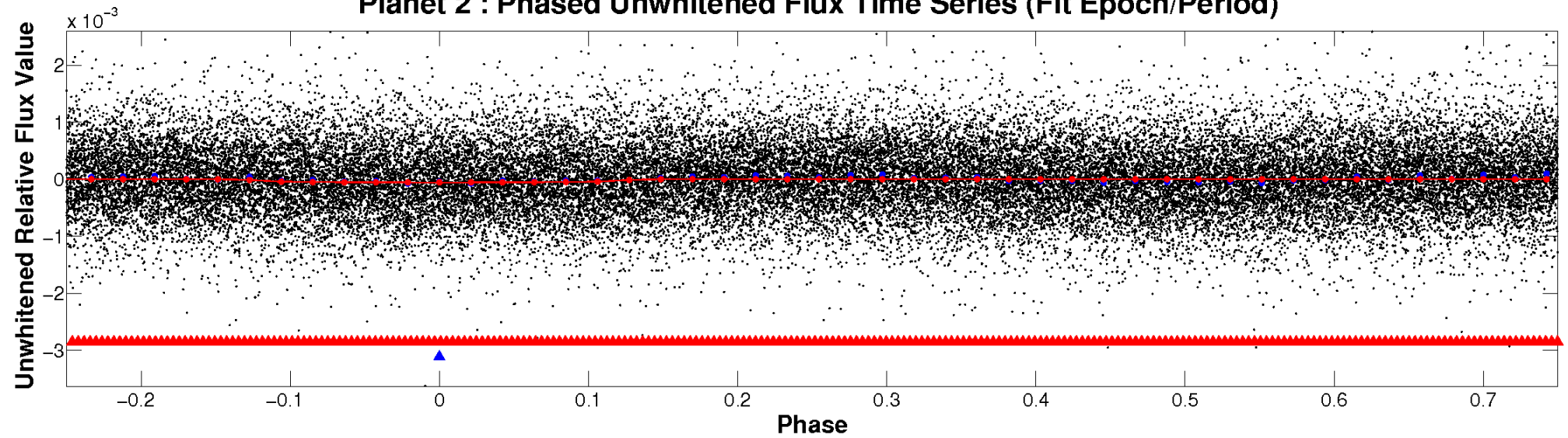
# ALT Odd/Even

TCE 009596469-02

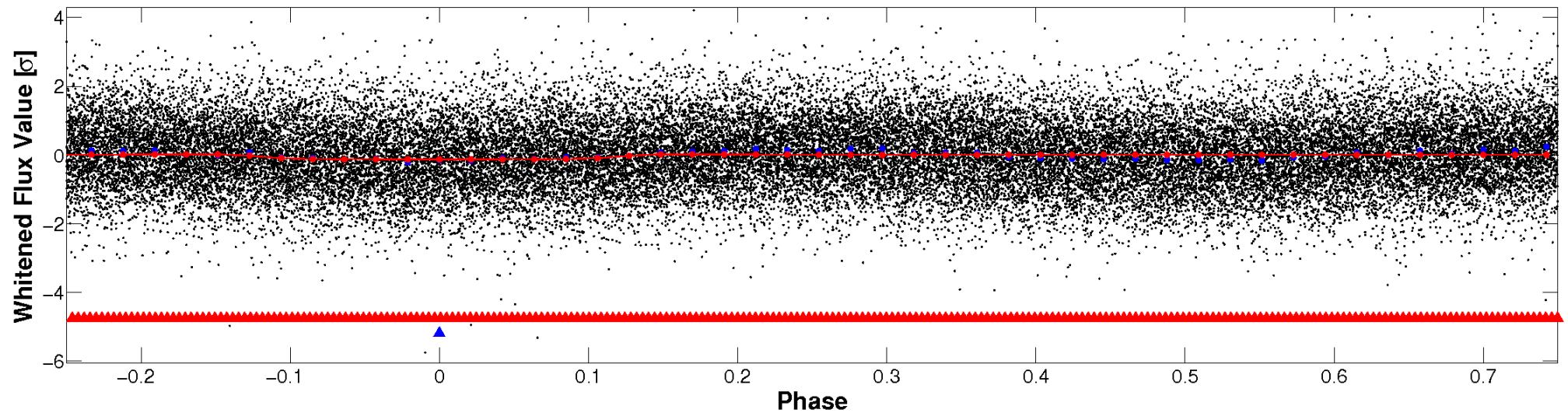


# Non-Whitened Vs. Whitened Light Curve

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

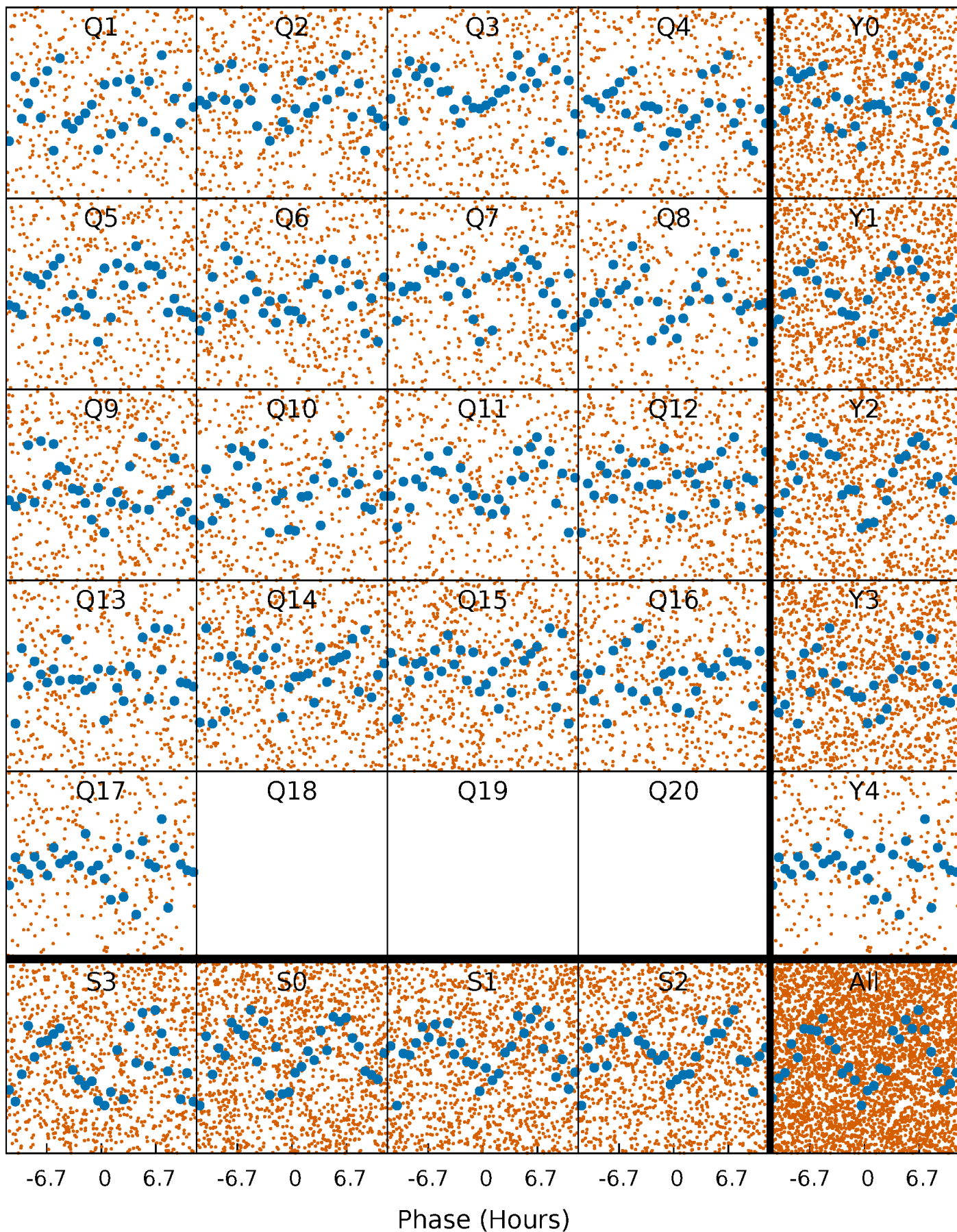


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

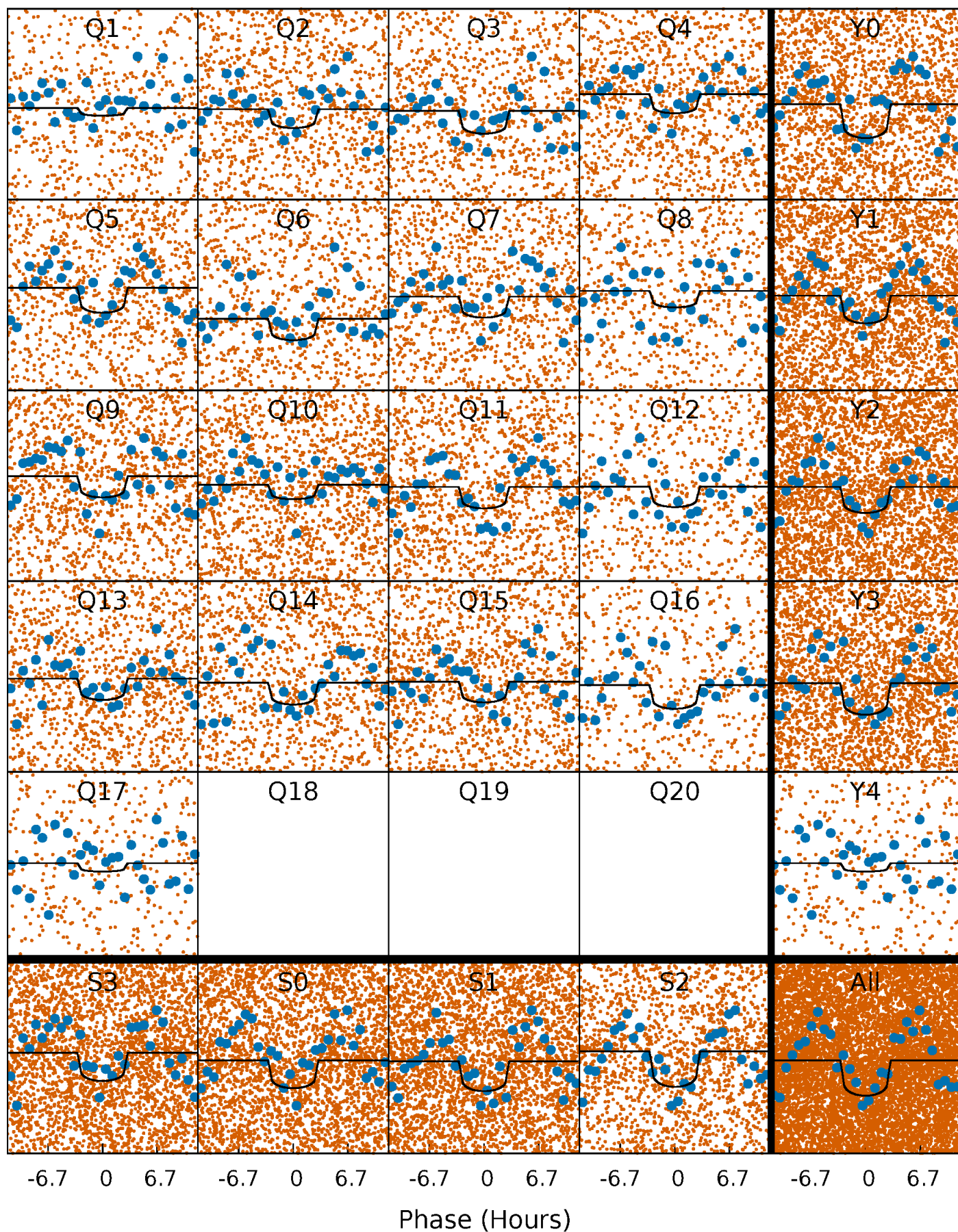
TCE 009596469-02   P= 0.963224 Days    $T_0=131.994418$  (BKJD)





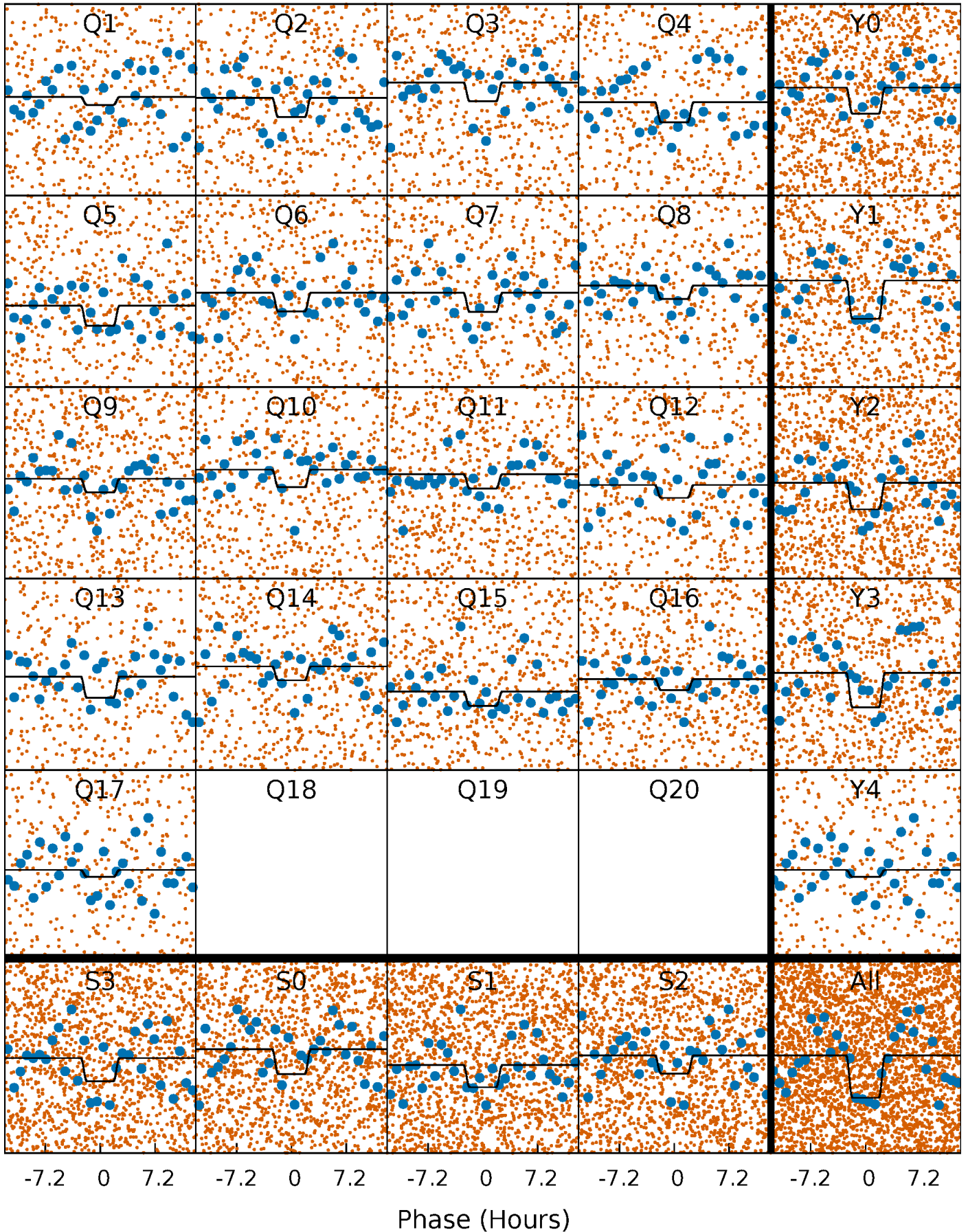
# DV Quarter-Phased Transit Curves

TCE 009596469-02   P= 0.963224 Days    $T_0=131.994418$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 009596469-02   P= 0.963289 Days    $T_0=131.936049$  (BKJD)

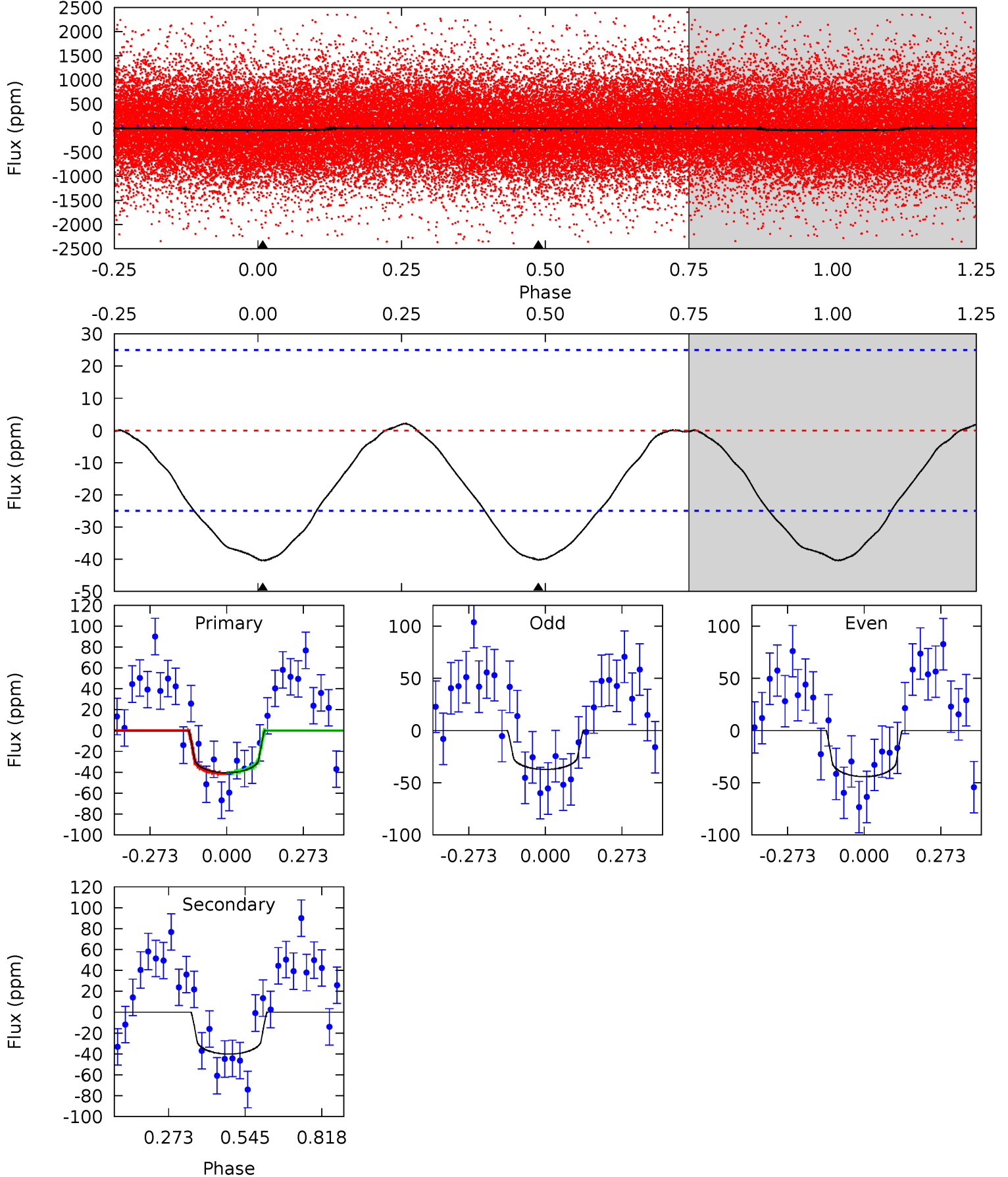




# DV Model-Shift Uniqueness Test

009596469-02, P = 0.963224 Days, E = 131.031194 Days

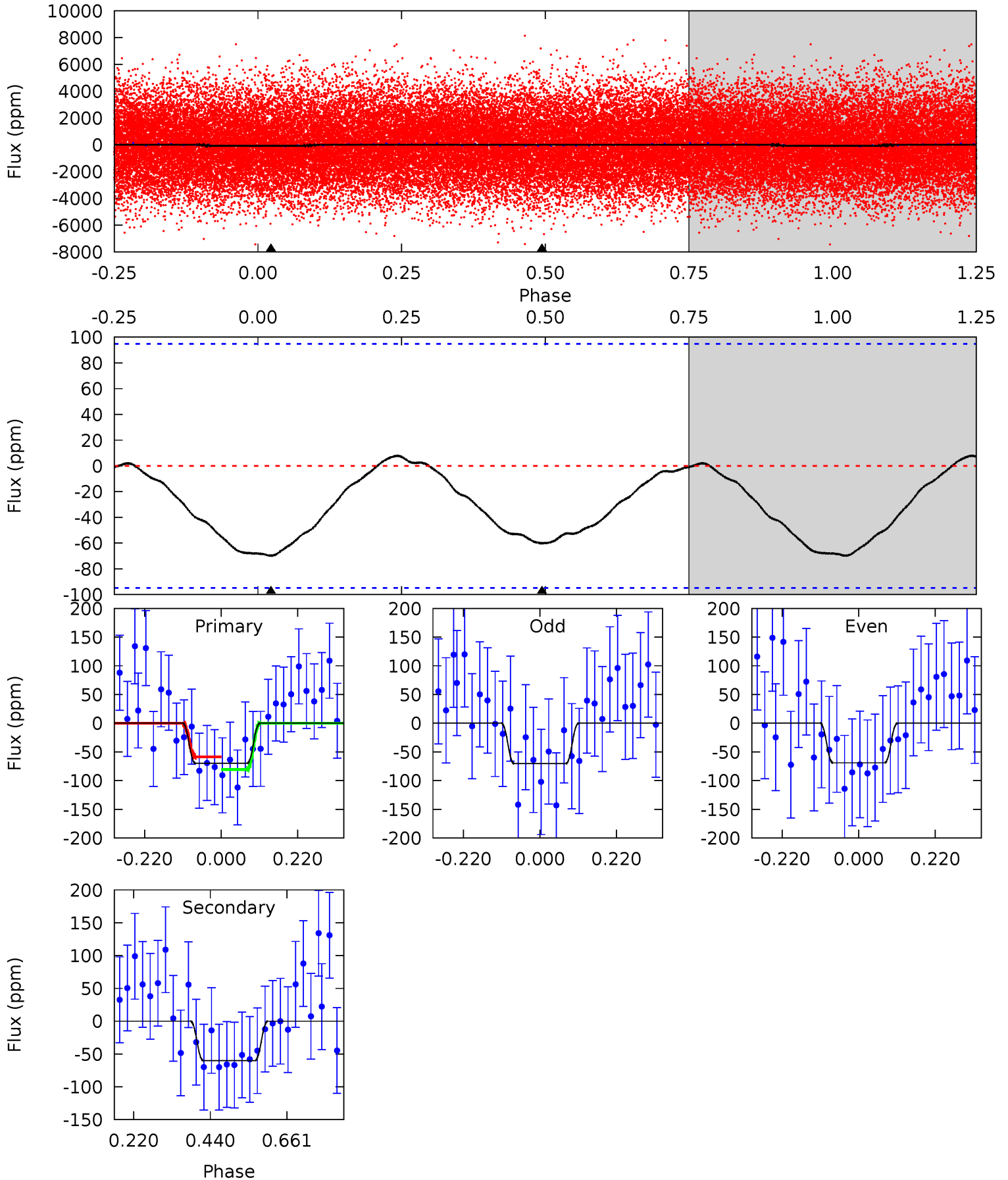
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.03	6.99	0	0	4.35	1.10	0.18	7.03	7.03	6.99	6.99	0.60	0.99	0.05	0.11



# Alt Model-Shift Uniqueness Test

009596469-02, P = 0.963289 Days, E = 130.972760 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
3.24	2.79	0	0	4.40	1.23	0.16	3.24	3.24	2.79	2.79	0.03	1.43	0.10	0.50



### Stellar Parameters For KIC 009596469

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$7389^{+73}_{-88}$	$3.920^{+0.144}_{-0.096}$	$0.240^{+0.100}_{-0.150}$	$2.514^{+0.331}_{-0.496}$	$1.915^{+0.074}_{-0.207}$	$0.170^{+0.119}_{-0.051}$
	+1%/-1%	+4%/-2%	+42%/-62%	+13%/-20%	+4%/-11%	+70%/-30%
Source	SPE68	SPE68	SPE68	DSEP		

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

### Secondary Eclipse Parameters for KIC 009596469-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-40 \pm 6$	$2.16^{+1.63}_{-1.31}$	$4684^{+177}_{-220}$	$6305^{+5460}_{-1739}$	$2.676^{+14.286}_{-1.844}$
Alt.	$-60 \pm 22$	$2.41^{+1.57}_{-1.29}$	$4685^{+179}_{-231}$	$6476^{+4503}_{-1635}$	$2.912^{+11.295}_{-1.874}$

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

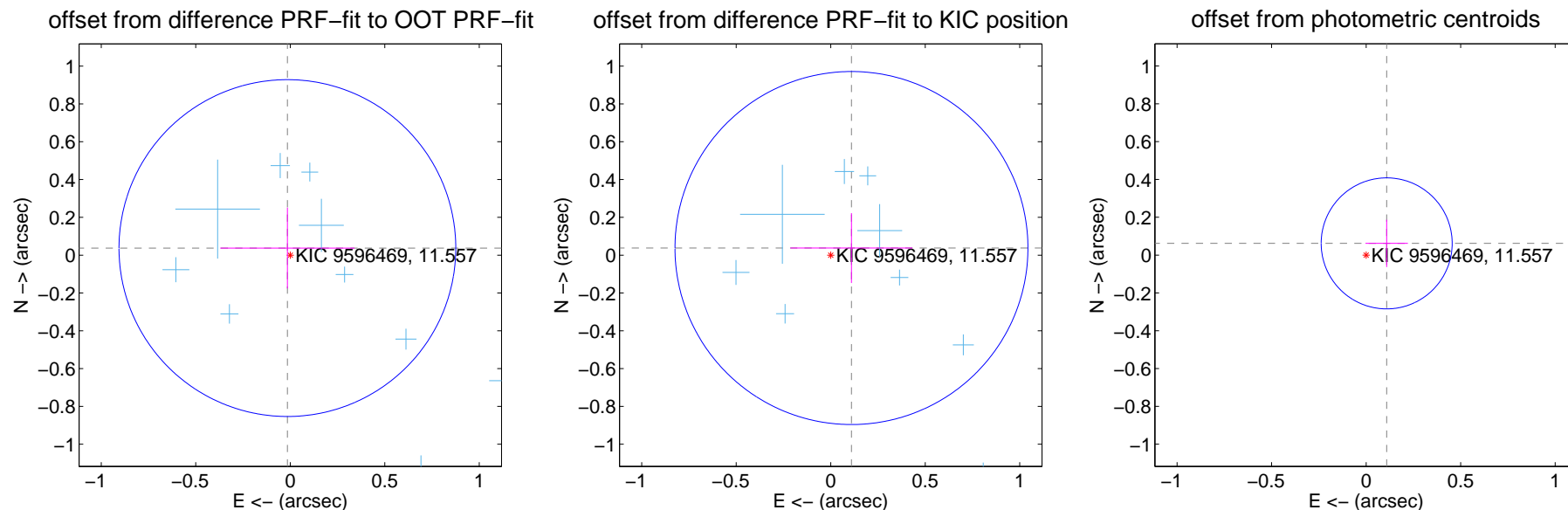
## DV Centroid Data

Supplemental centroid analysis for 009596469-02. **Kepler magnitude: 11.56.** Transit SNR 11.61

There are 15 quarters with good PRF difference image offsets

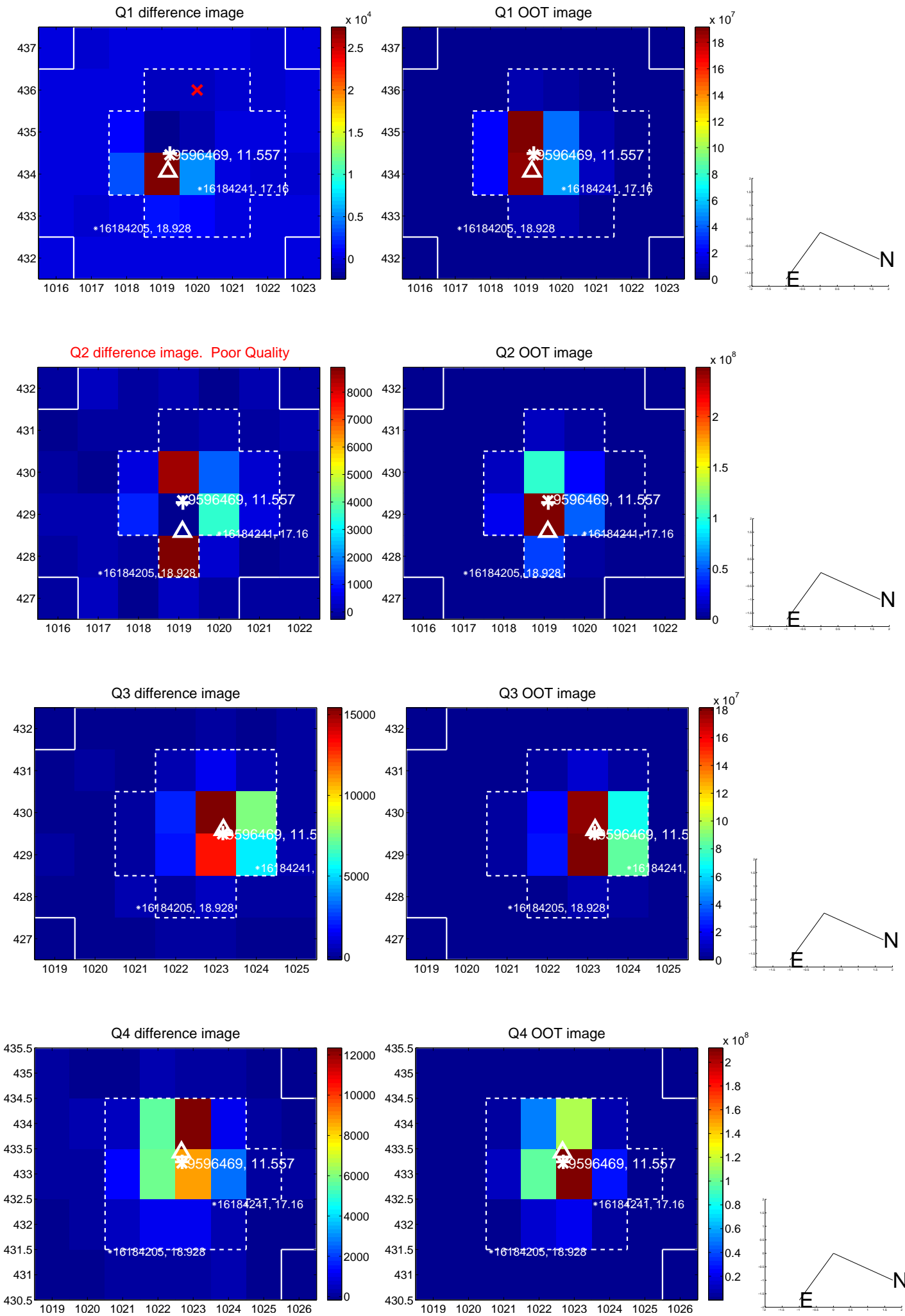
The direct PRF centroid is offset from the target star catalog position by about 0.12 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.040 \pm 0.297$	0.14	$0.015 \pm 0.355$	$0.037 \pm 0.214$
PRF-fit source offset from KIC position	$0.116 \pm 0.311$	0.37	$-0.110 \pm 0.323$	$0.038 \pm 0.185$
photometric centroid source offset	$0.13 \pm 0.12$	1.08	$-0.11 \pm 0.11$	$0.06 \pm 0.13$

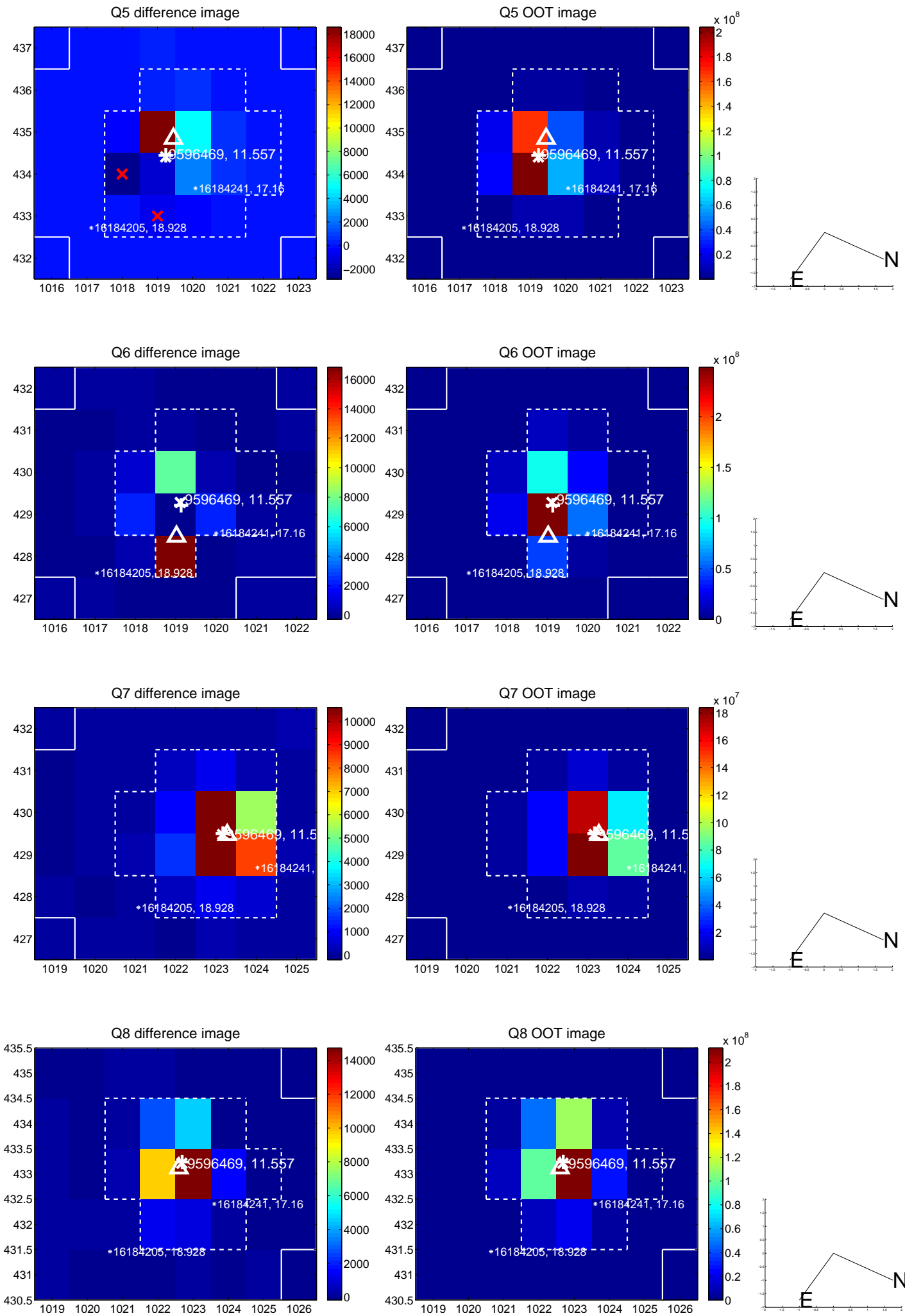


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

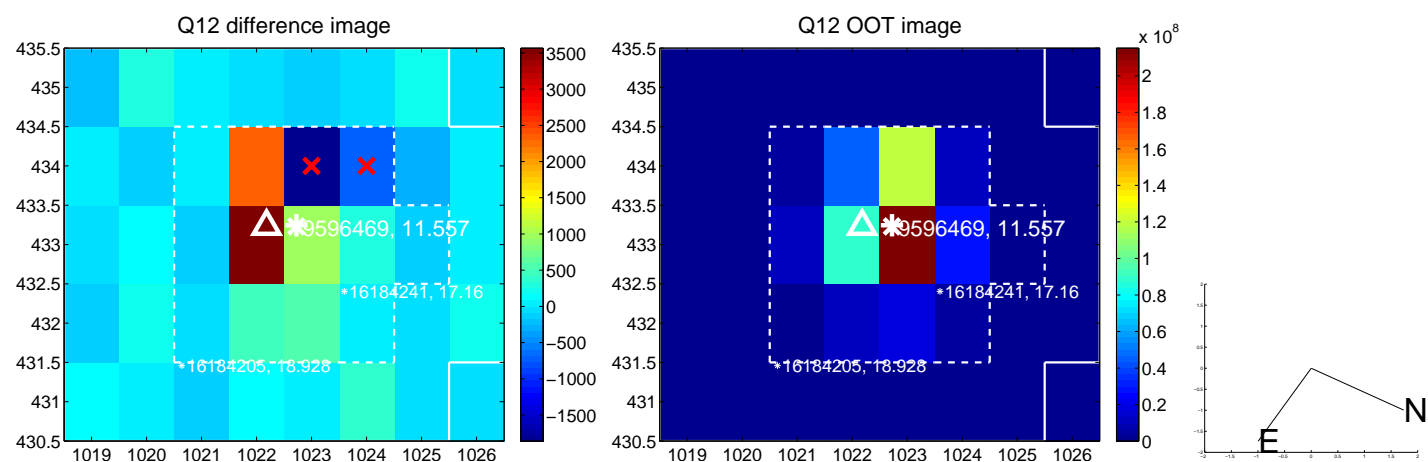
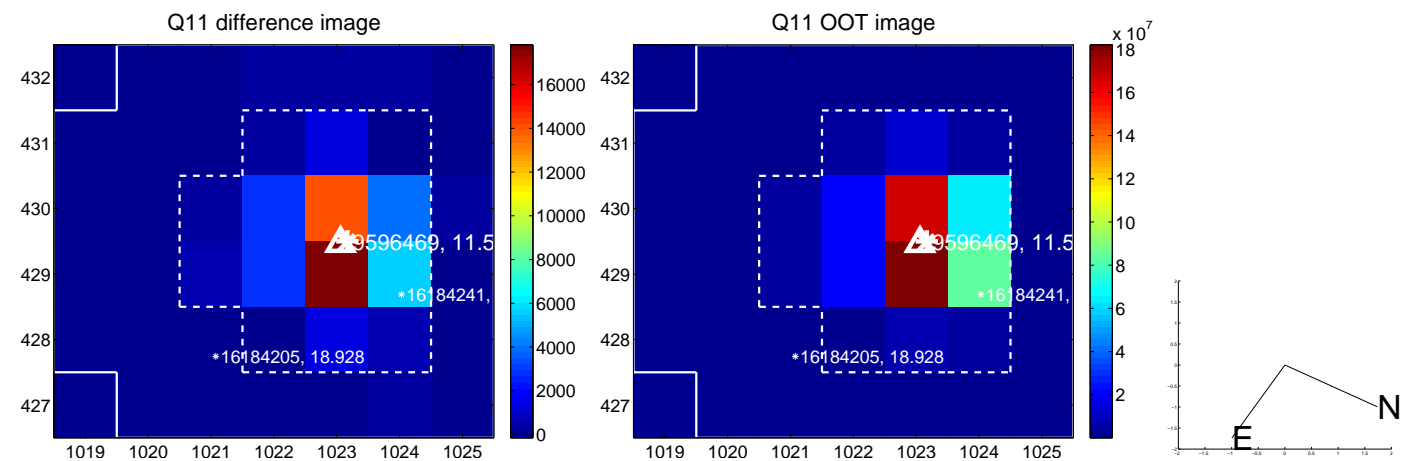
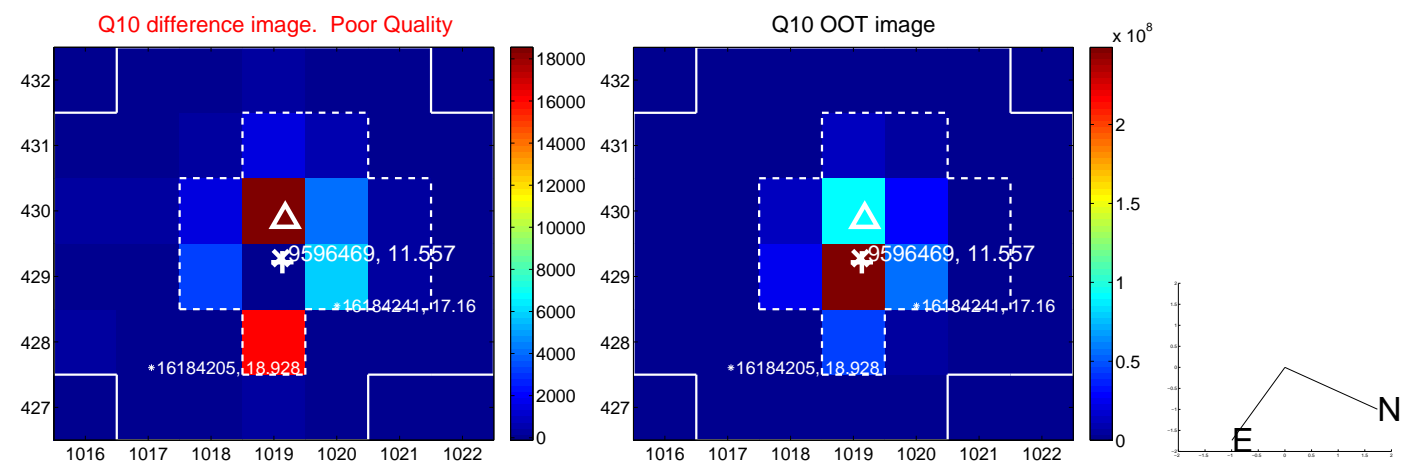
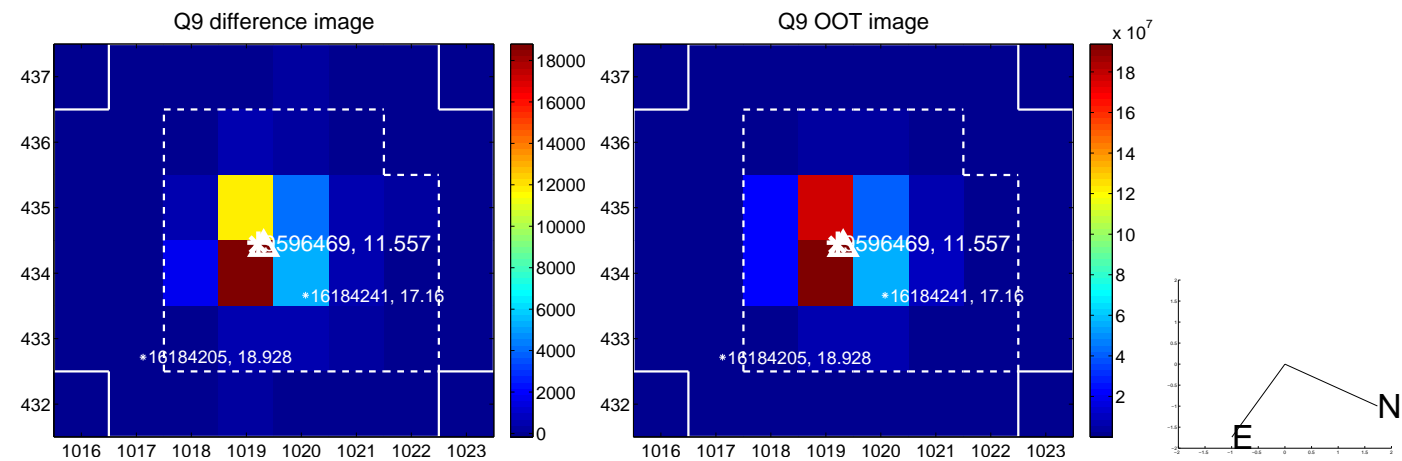


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

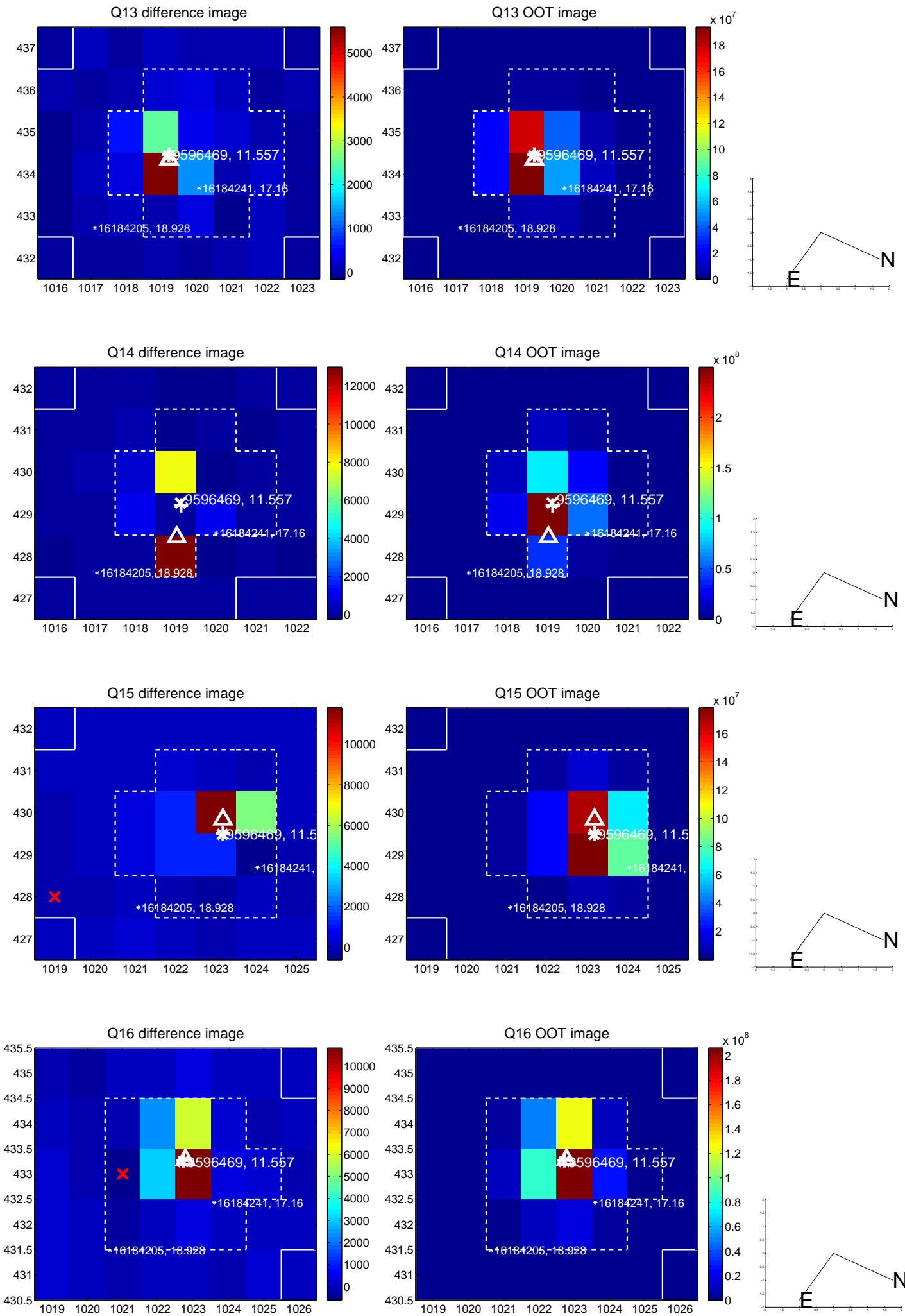




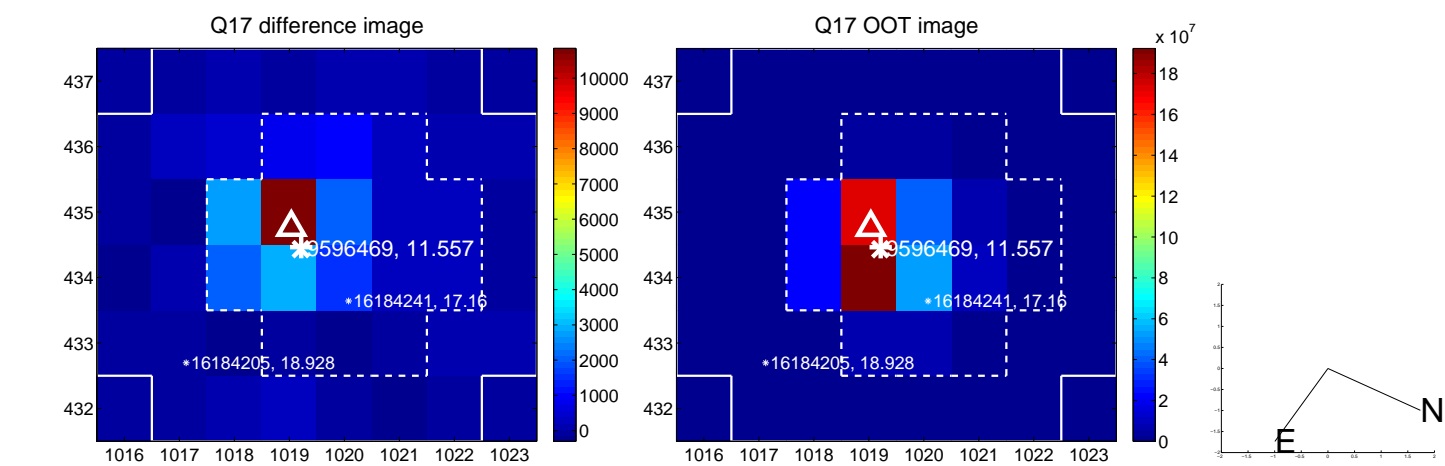
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



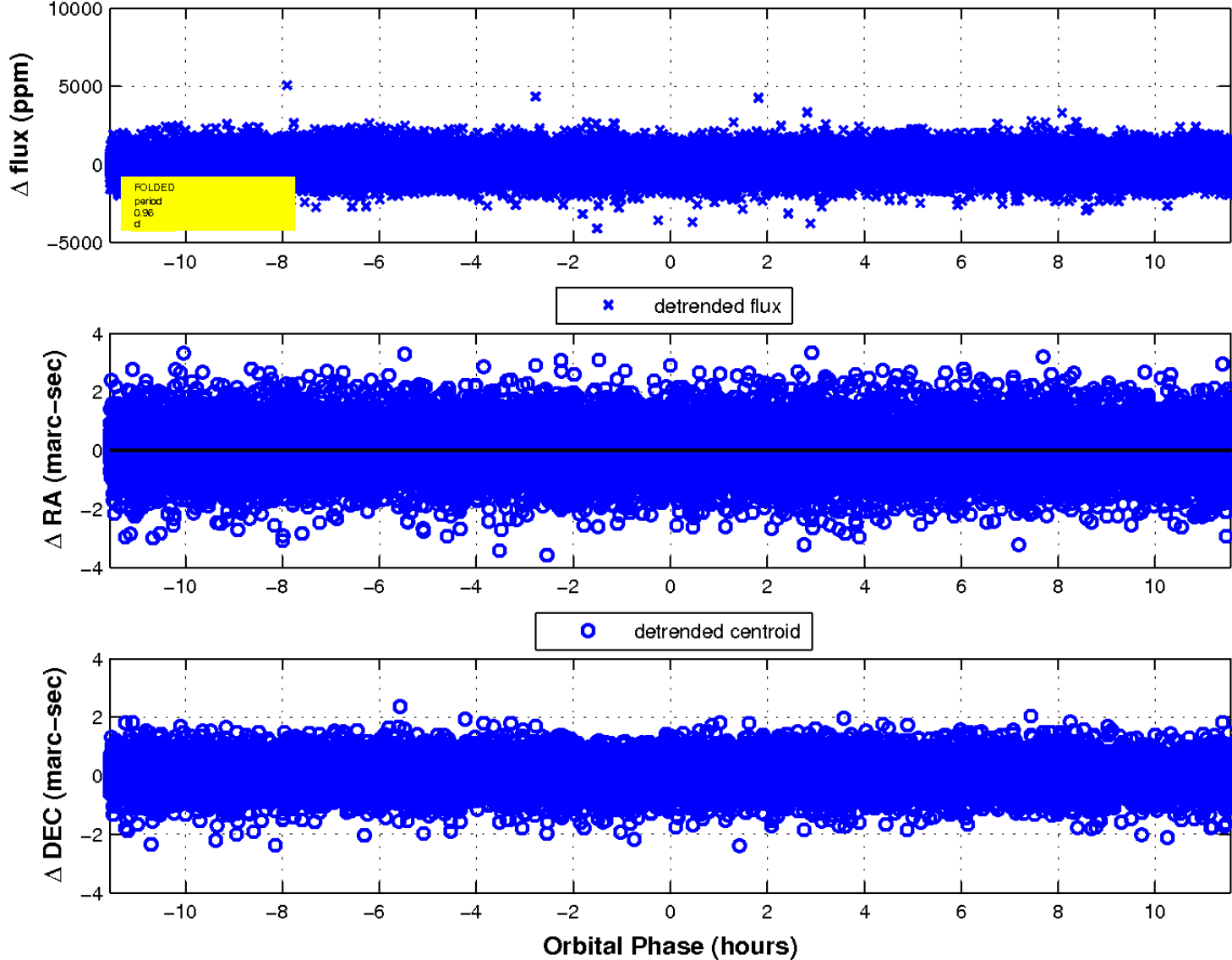
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

Declination

