

# KIC 009456932

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009456932-01	OBS	No	1.053977	131.779744	838.2	1.500	19.5	-1.0	0.95	5873	2.73	2344.91
009456932-02	OBS	No	1.053953	131.804510	72.0	7.729	8.7	11.1	0.95	5873	0.80	2344.98
009456932-03	OBS	No	16.324614	141.315646	512.0	1.708	8.2	10.2	0.95	5873	2.15	60.74
009456932-04	OBS	No	18.944733	135.506892	384.8	1.767	10.6	9.3	0.95	5873	2.17	49.80

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009456932-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—LPP_ALT—CENT_NOFITS
009456932-02	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—SAME_NTL_PERIOD—CENT_RESOLVED_OFFSET
009456932-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_RESOLVED_OFFSET
009456932-04	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_KIC_POS—HALO_GHOST

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

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

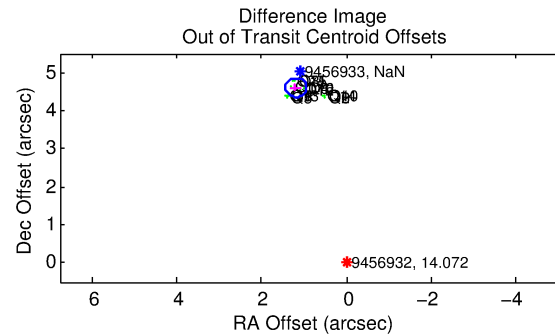
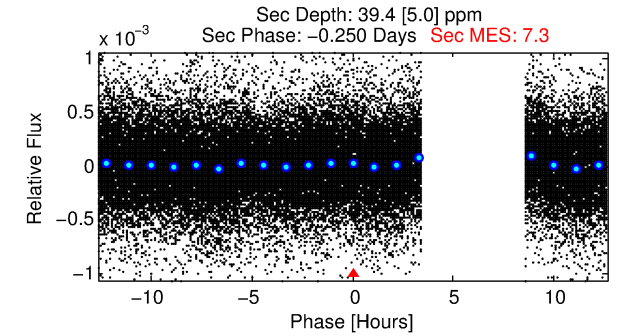
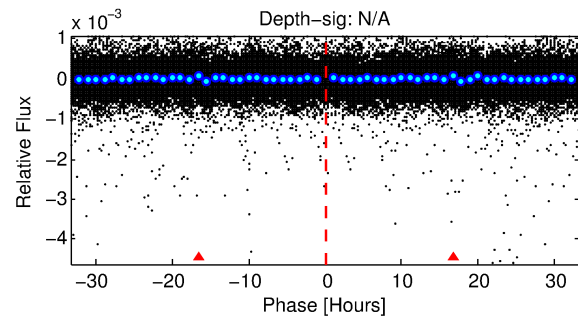
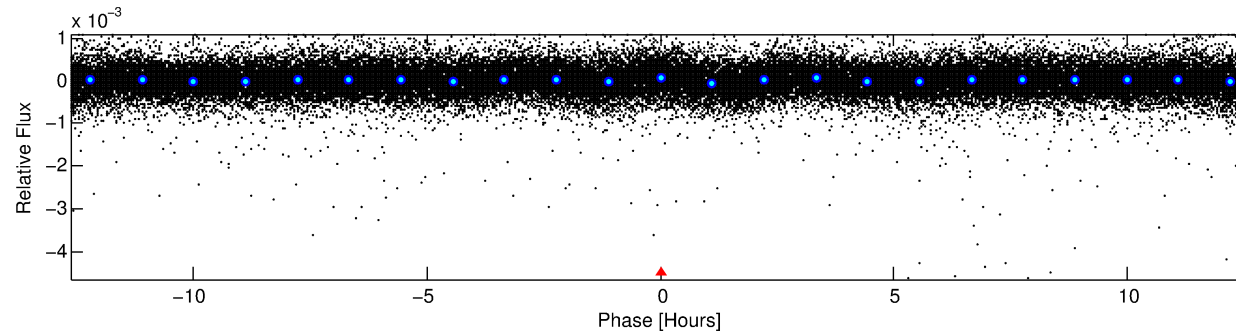
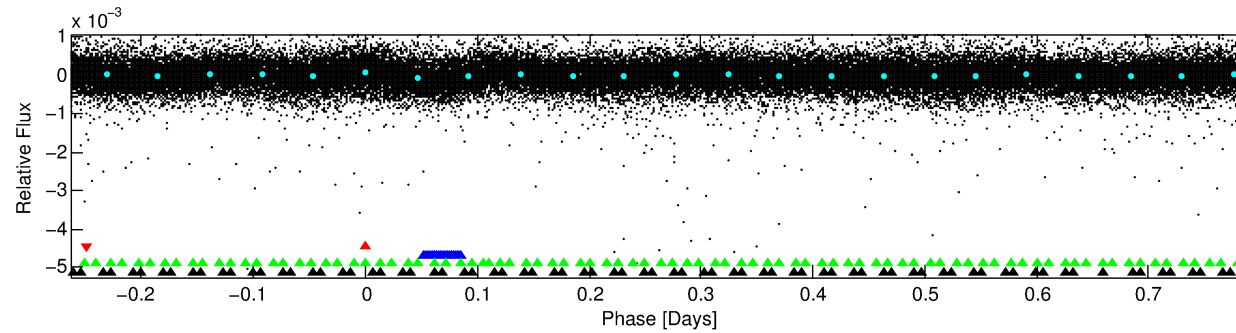
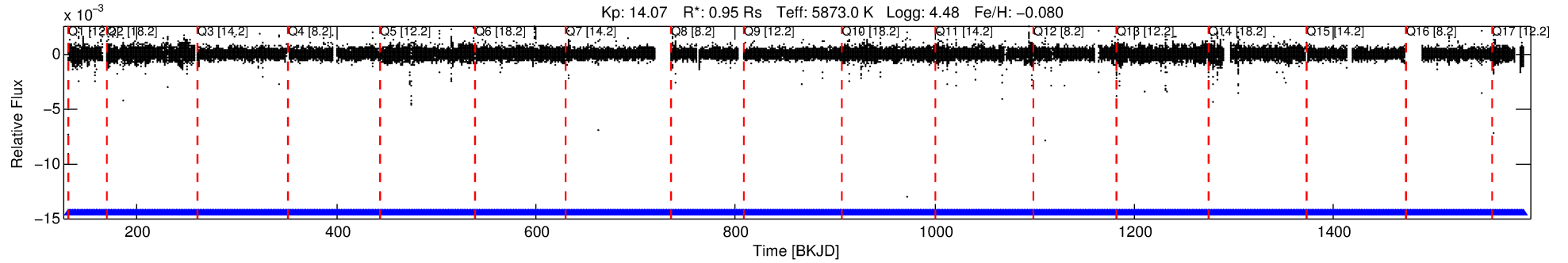
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 009456932-01

No Significant Match Found

# DV One-Page Summary

KIC: 9456932 Candidate: 1 of 4 Period: 1.054 d



## TPS TCE Results:

Period = 1.05398 d  
Epoch = 131.7797 BKJD

DV fit results are unavailable

## DV Diagnostic Results:

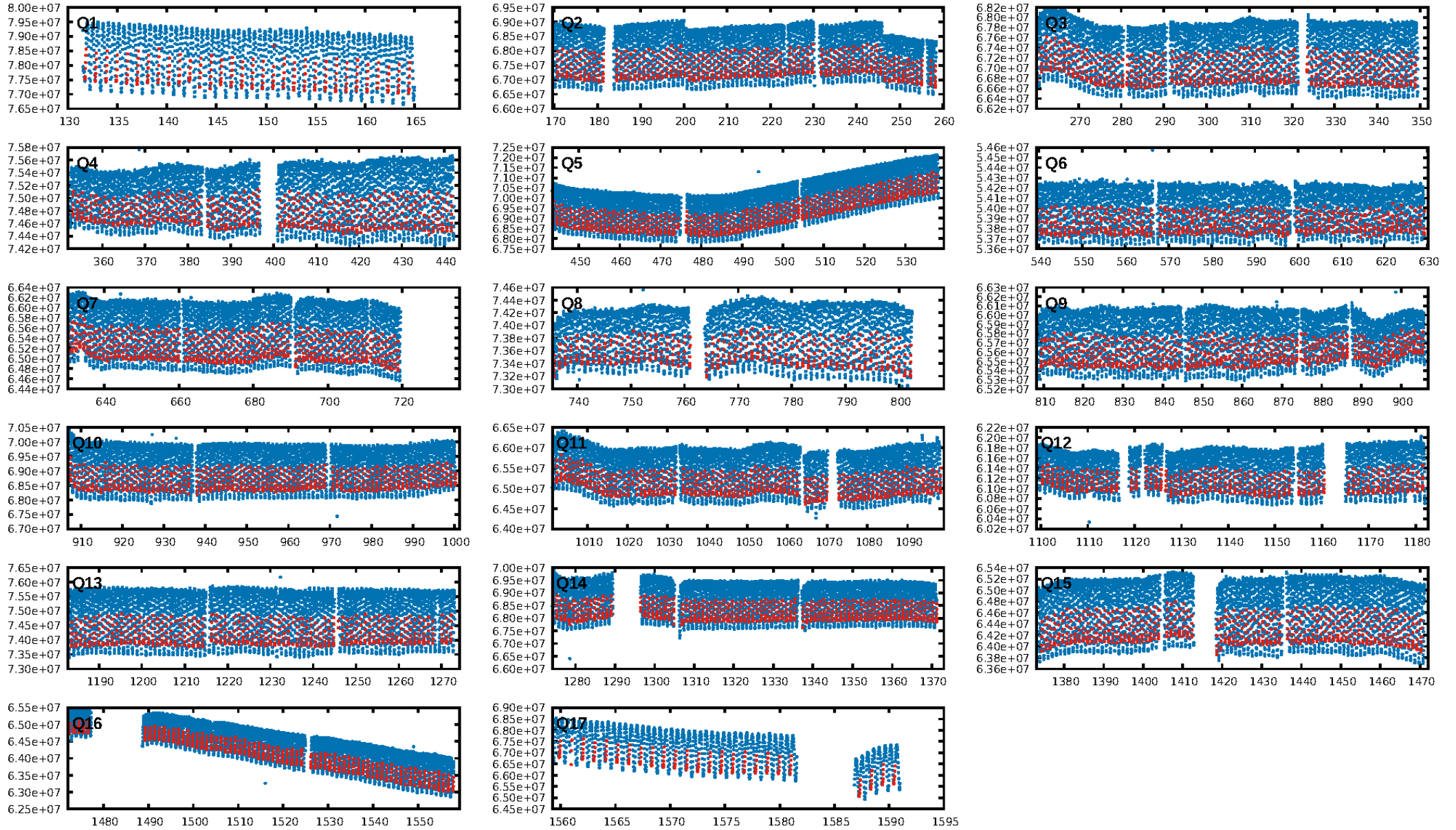
ShortPeriod-sig: 0.0% [0.00 $\sigma$ ]  
LongPeriod-sig: 100.0% [161.23 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 2.87e-44  
RollingBand-fgt: 1.00 [1223/1223]  
GhostDiagnostic-chr: 0.938

Centroid-sig: 0.0%  
Centroid-so: 1.352 arcsec [23.29 $\sigma$ ]  
OotOffset-rm: 4.760 arcsec [56.63 $\sigma$ ]  
KicOffset-rm: 5.233 arcsec [77.90 $\sigma$ ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 0.00 [0/17]

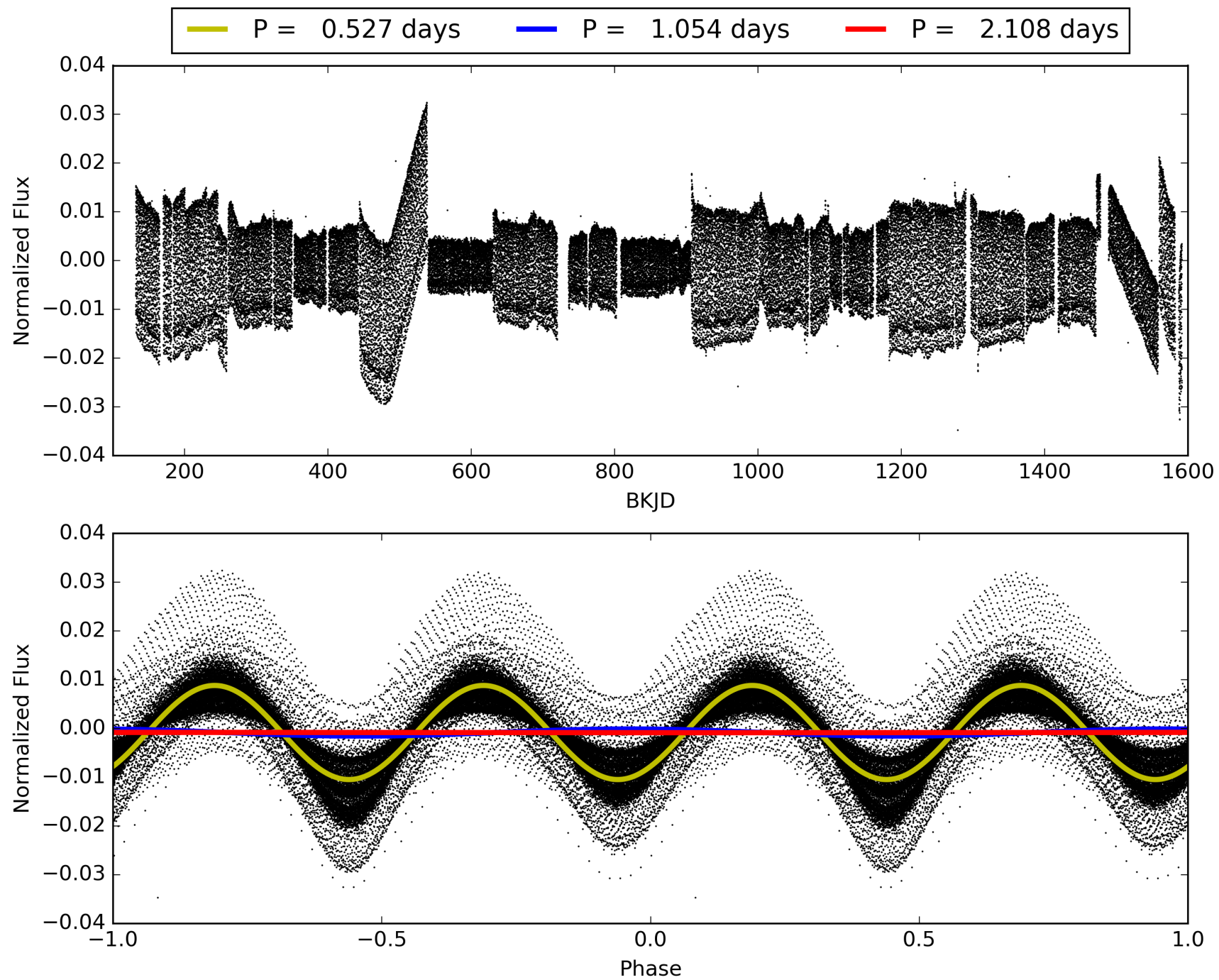
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 00:17:25 Z

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

# TCE 009456932-01, PDC Light Curves



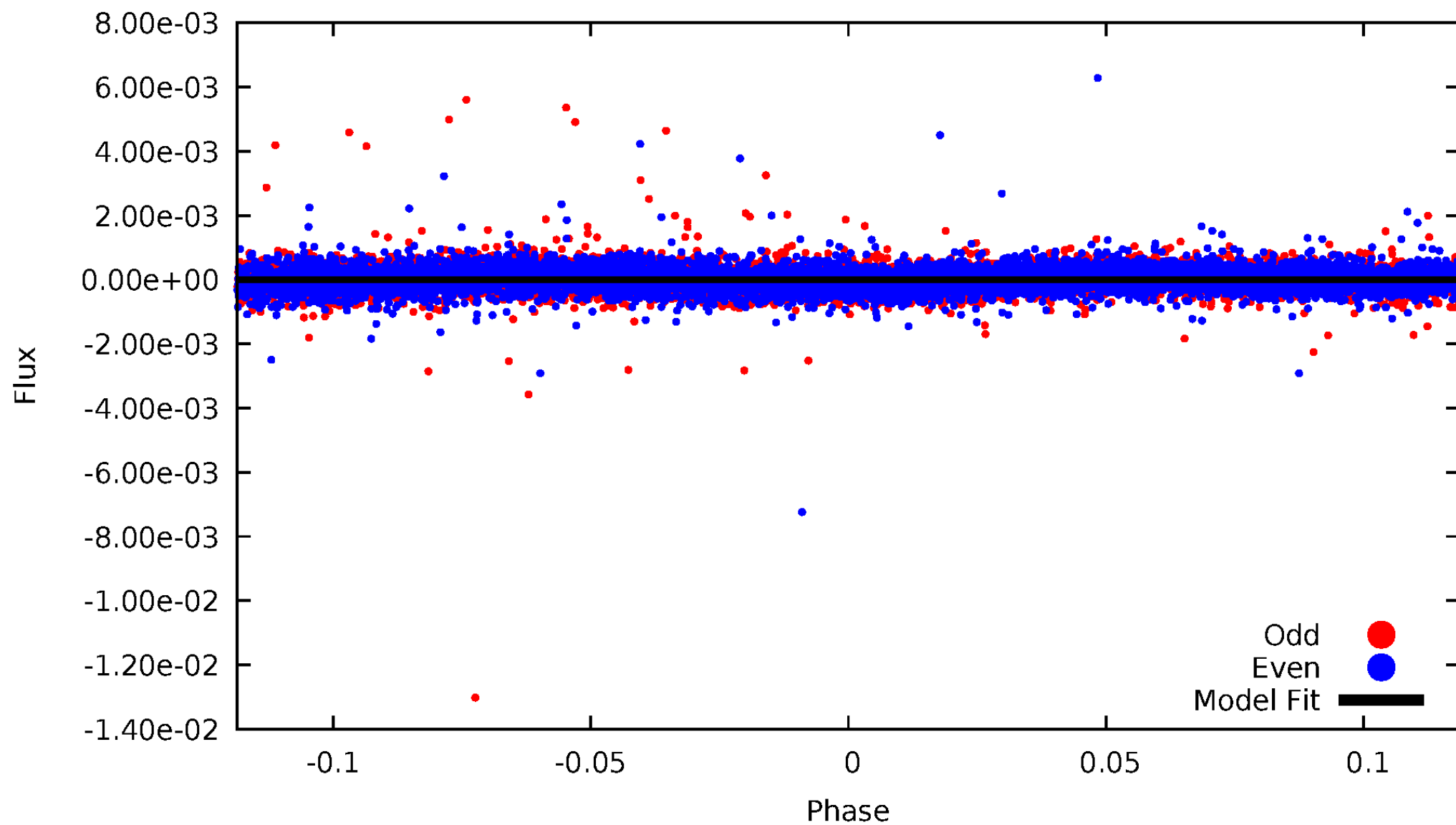
TCE 009456932-01





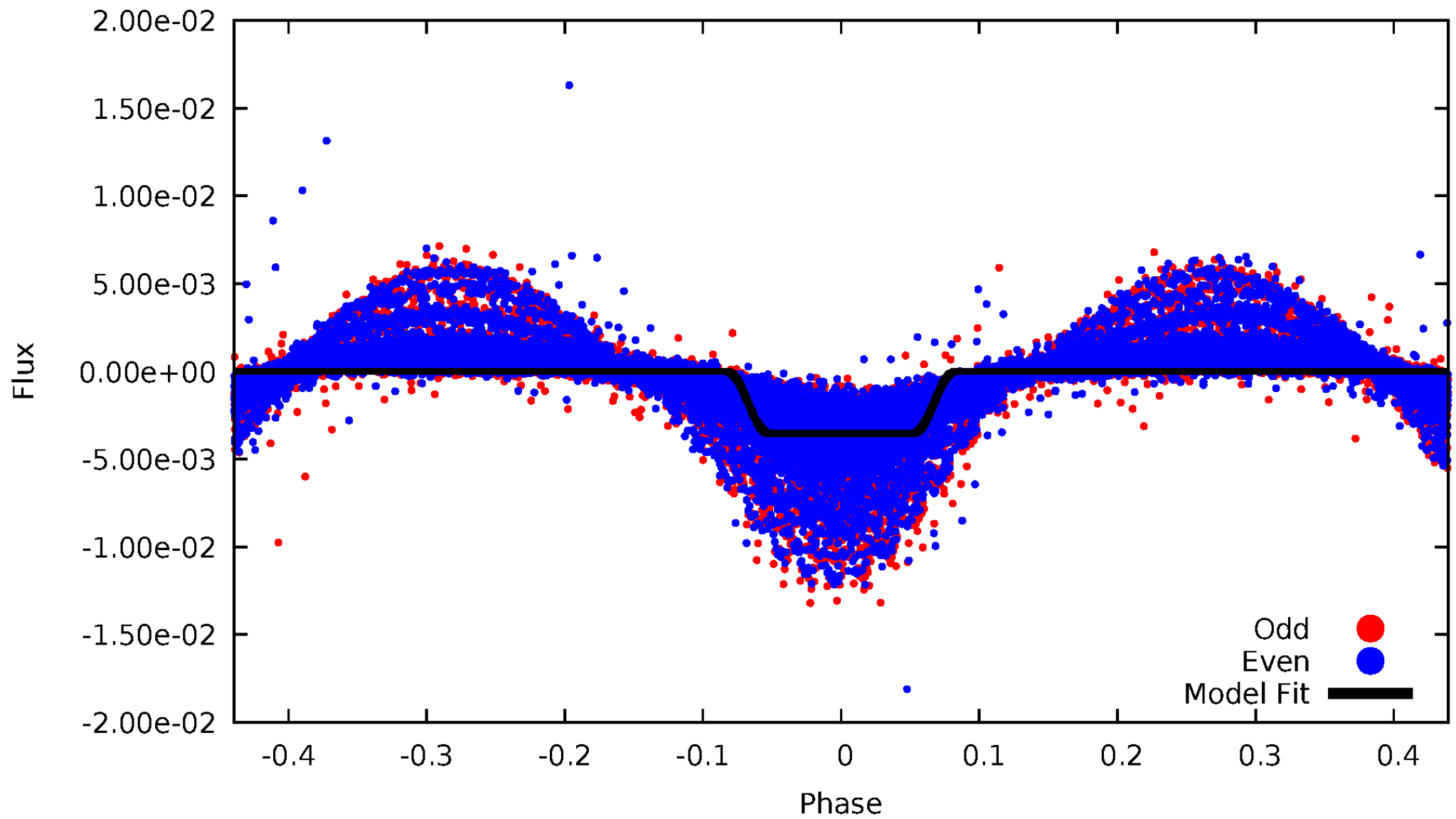
# DV Odd/Even

TCE 009456932-01

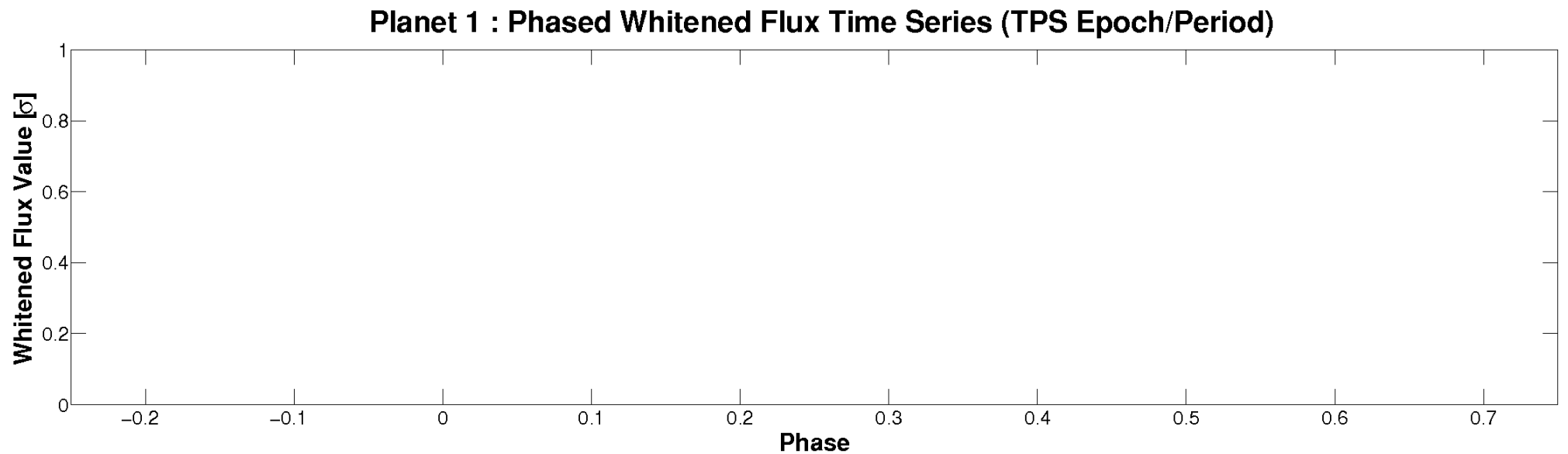
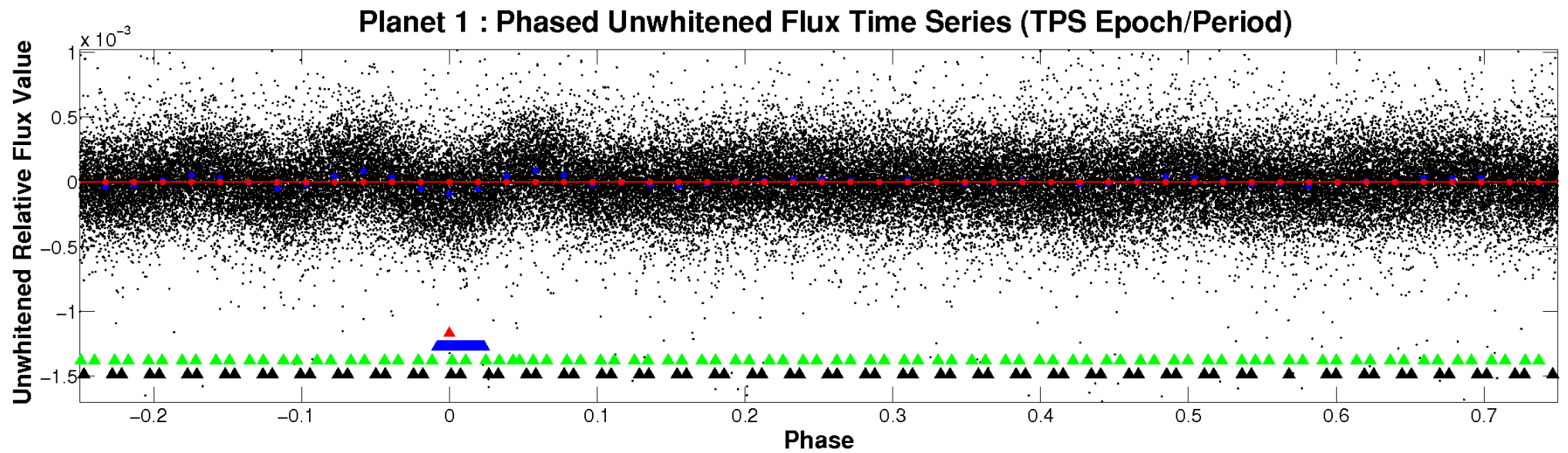


# ALT Odd/Even

TCE 009456932-01

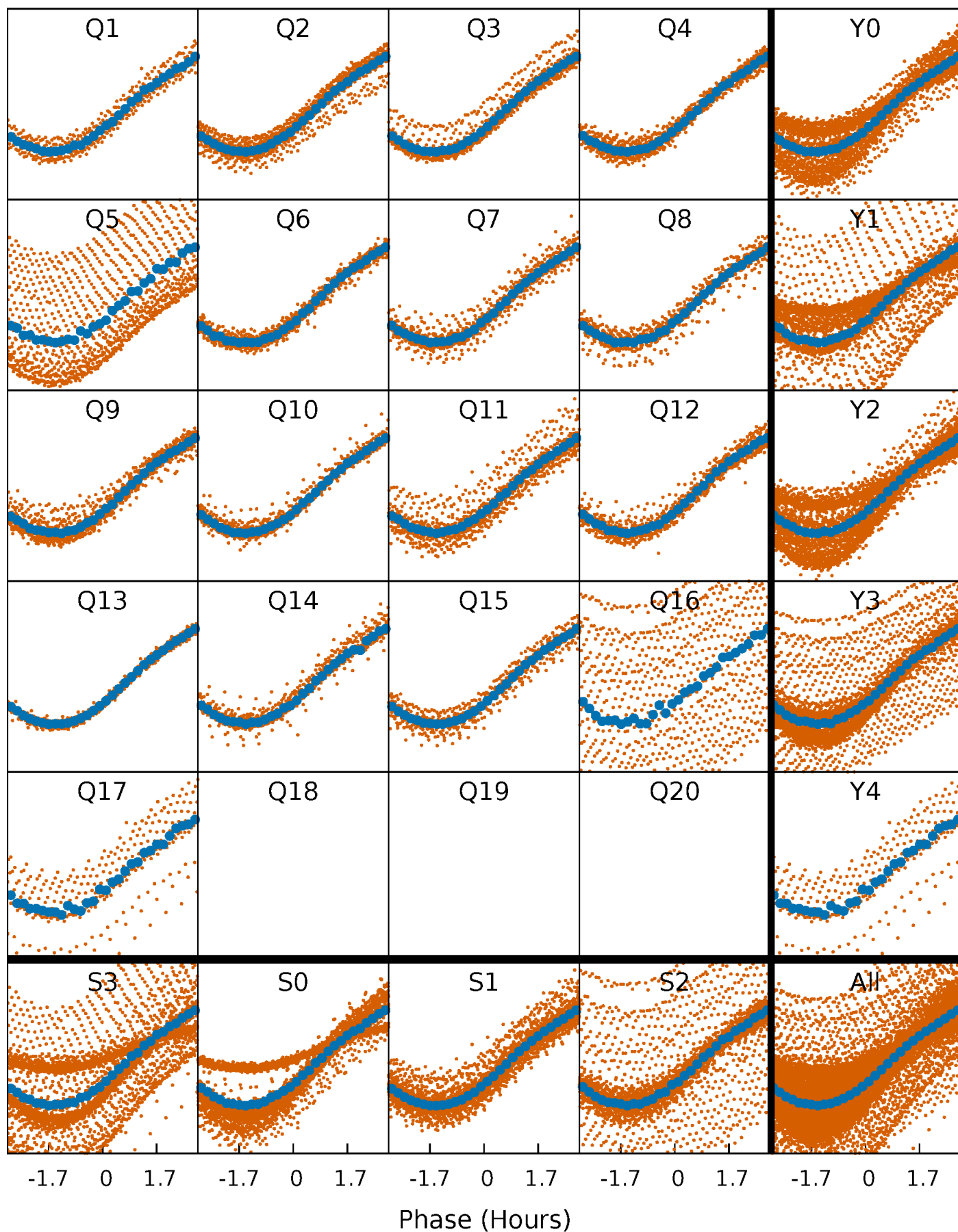


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

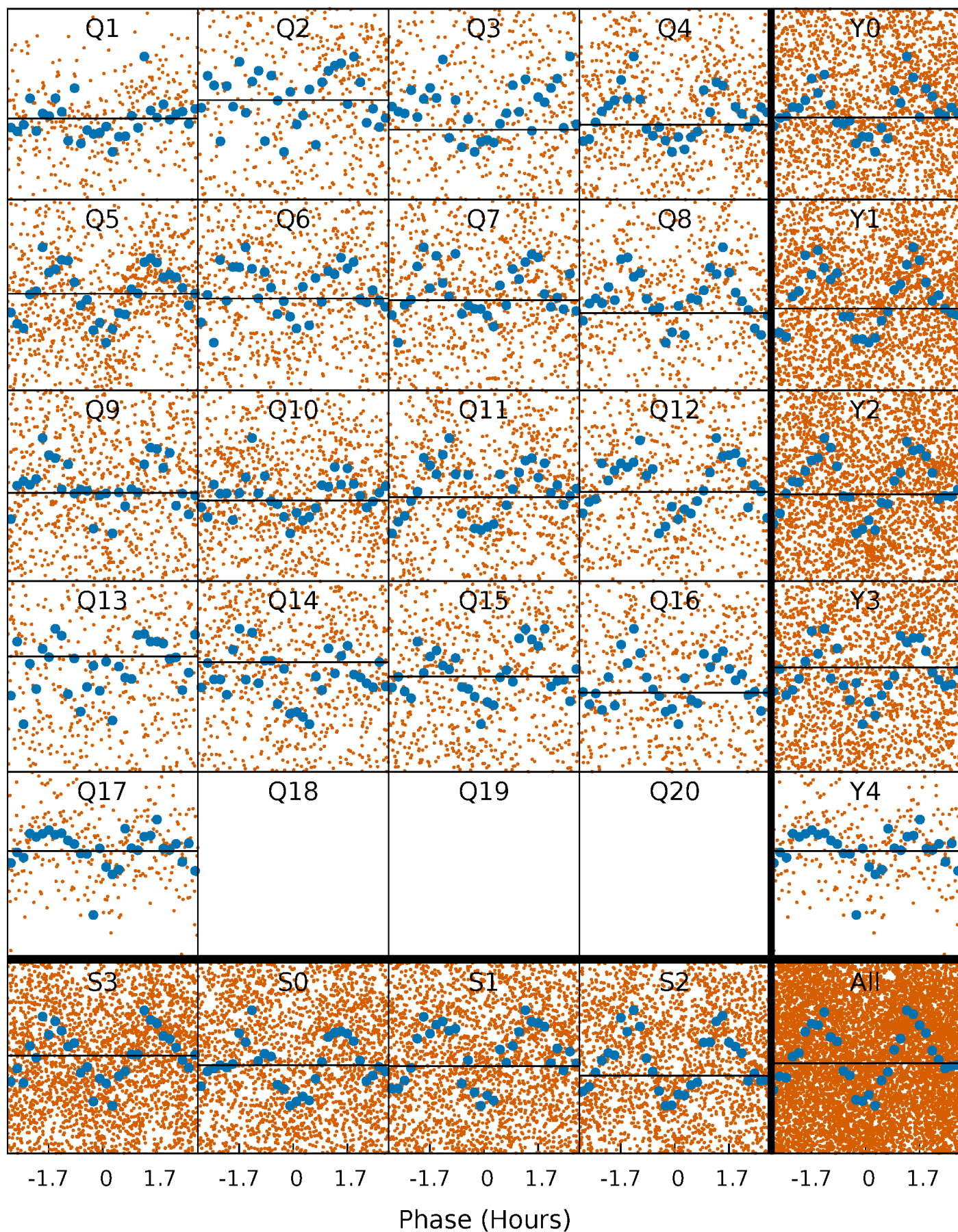
TCE 009456932-01 P= 1.053977 Days  $T_0=131.779744$  (BKJD)





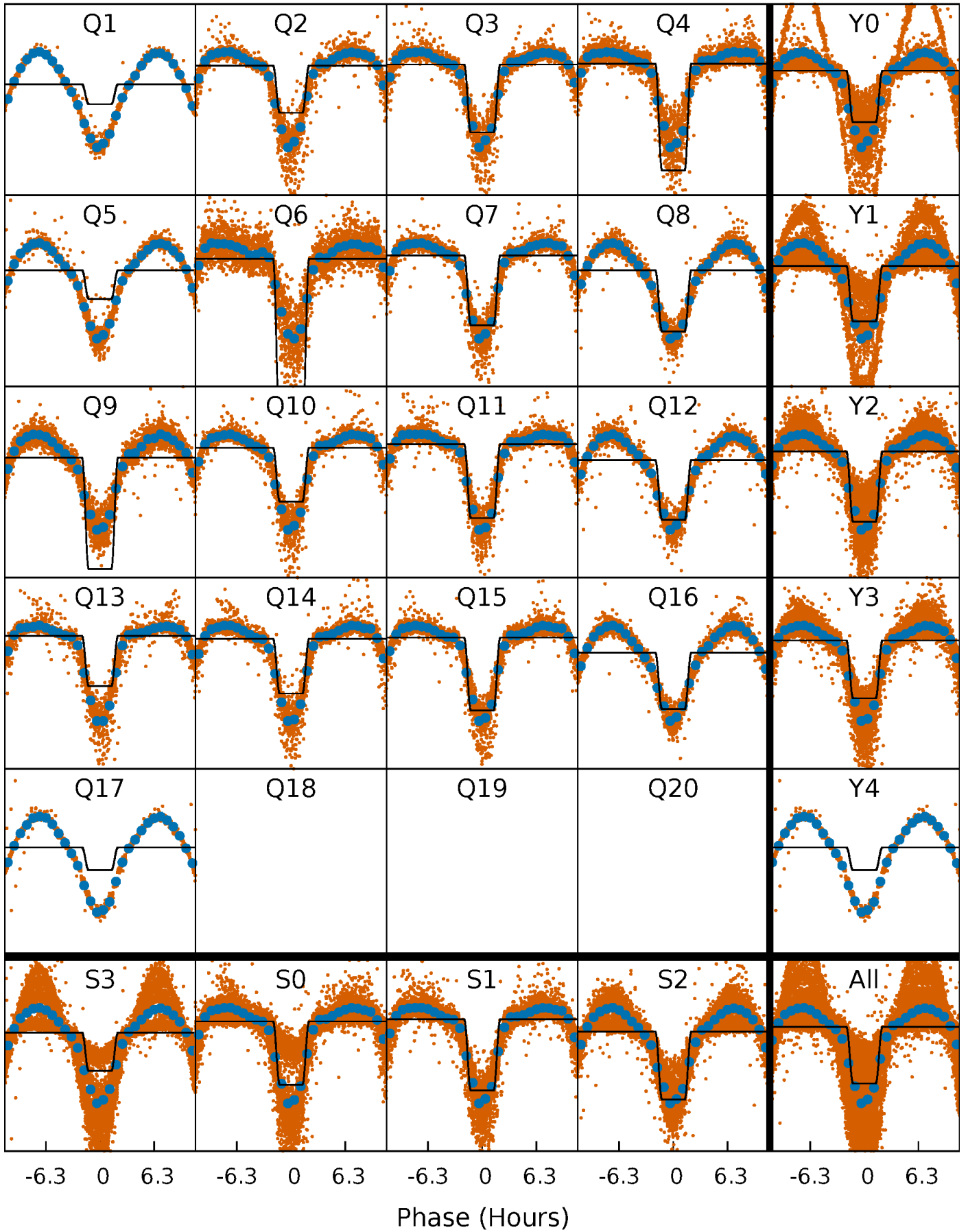
# DV Quarter-Phased Transit Curves

TCE 009456932-01 P= 1.053977 Days  $T_0=131.779744$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

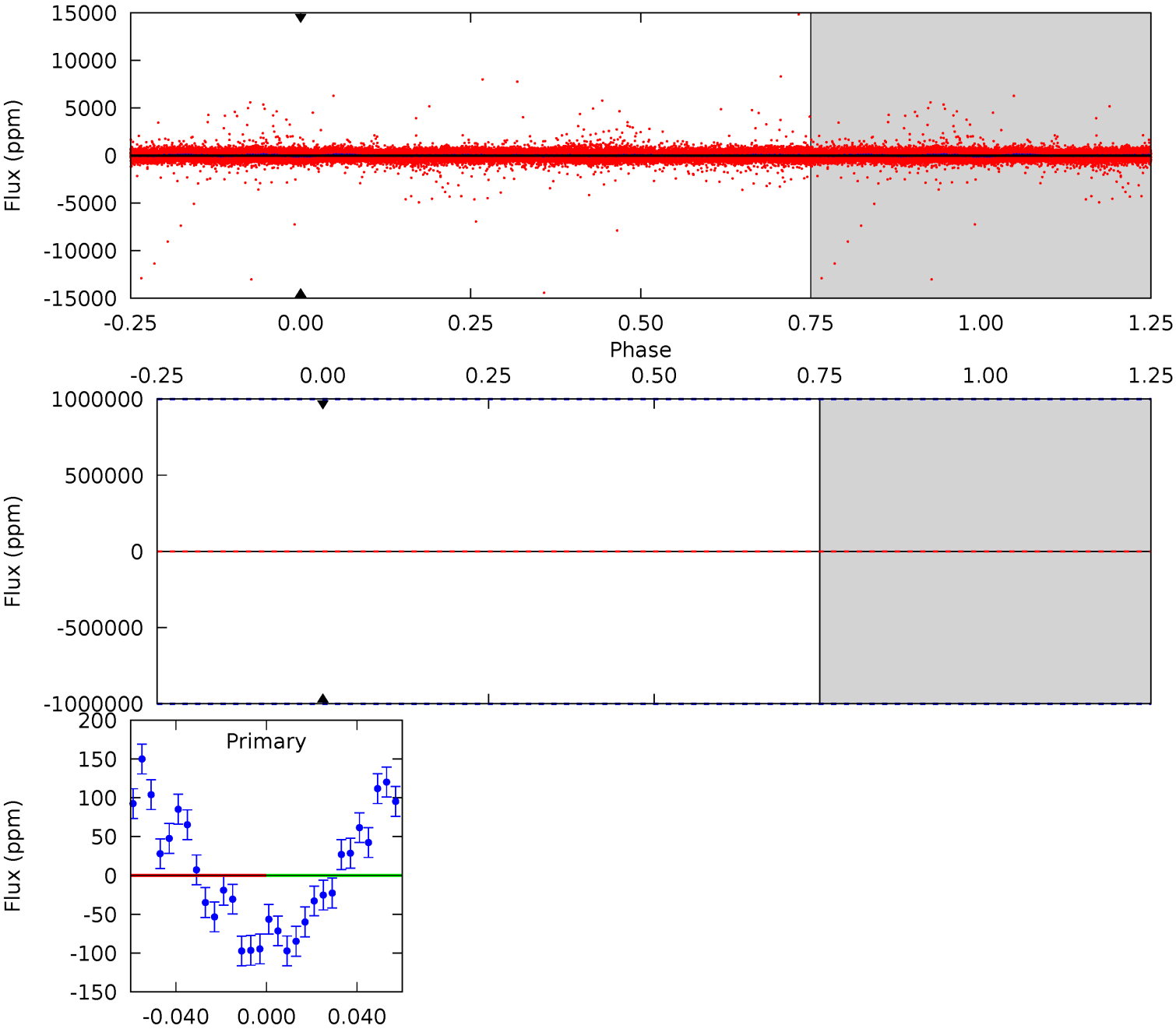
TCE 009456932-01 P= 1.053977 Days  $T_0=131.719919$  (BKJD)



# DV Model-Shift Uniqueness Test

009456932-01, P = 1.053977 Days, E = 130.725767 Days

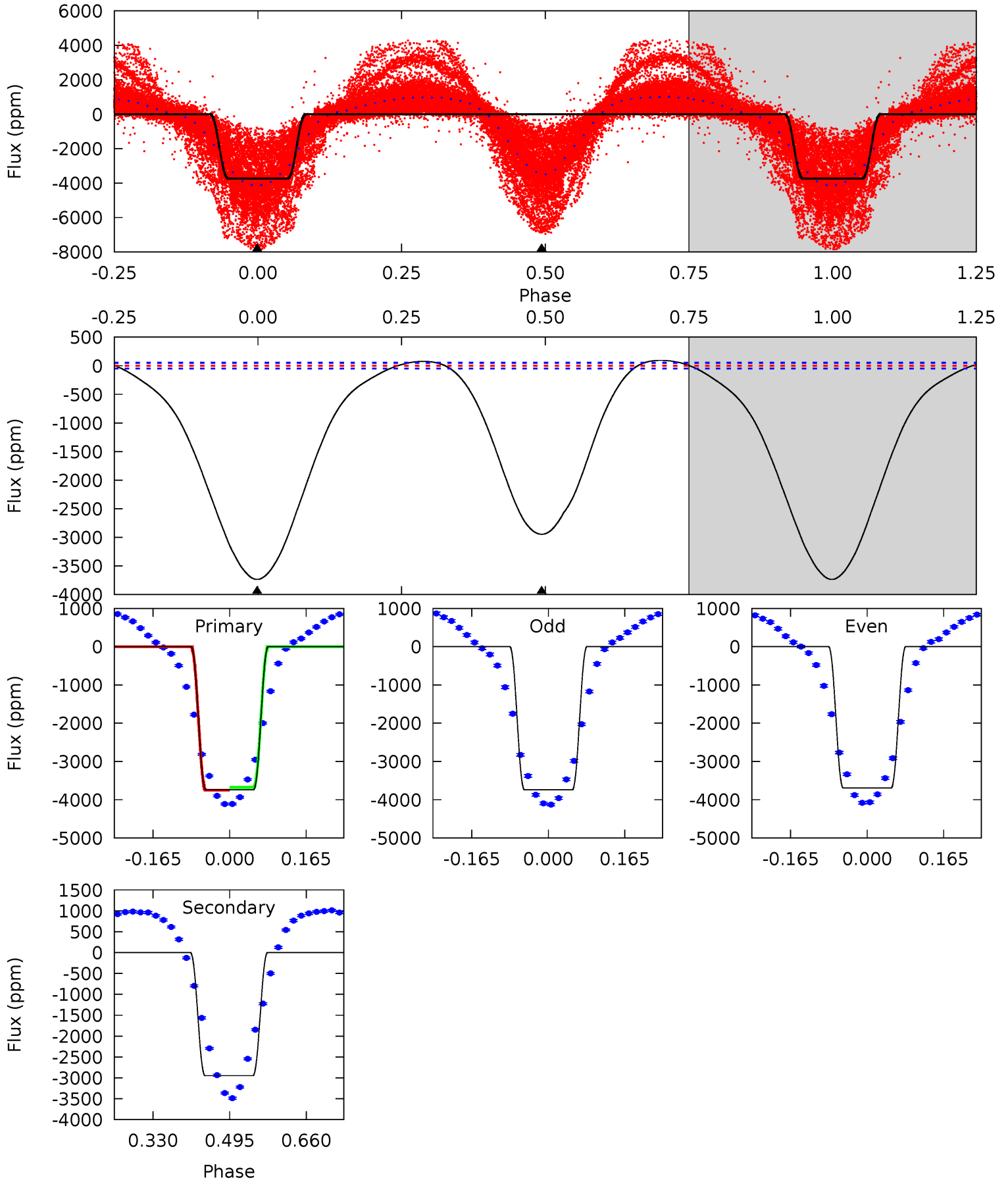
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



# Alt Model-Shift Uniqueness Test

009456932-01, P = 1.053977 Days, E = 130.665942 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
329.5	259.9	0	0	4.46	1.39	15.3	329.5	329.5	259.9	259.9	2.06	1.11	0.02	3.39





### Stellar Parameters For KIC 009456932

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5873^{+146}_{-176}$	$4.480^{+0.065}_{-0.208}$	$-0.080^{+0.300}_{-0.300}$	$0.947^{+0.282}_{-0.094}$	$0.988^{+0.128}_{-0.117}$	$1.638^{+0.466}_{-0.869}$
	+2%/-3%	+1%/-5%	+375%/-375%	+30%/-10%	+13%/-12%	+28%/-53%
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 009456932-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$0 \pm 1000000$	$8.49^{+8.83}_{-5.95}$	$2517^{+178}_{-120}$	$4037^{+20316}_{-21750}$	$2.695^{+734.162}_{-429.255}$
Alt.	$-2946 \pm 11$	$10.75^{+9.11}_{-7.20}$	$2523^{+178}_{-117}$	$4477^{+3199}_{-930}$	$5.813^{+45.724}_{-4.113}$

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

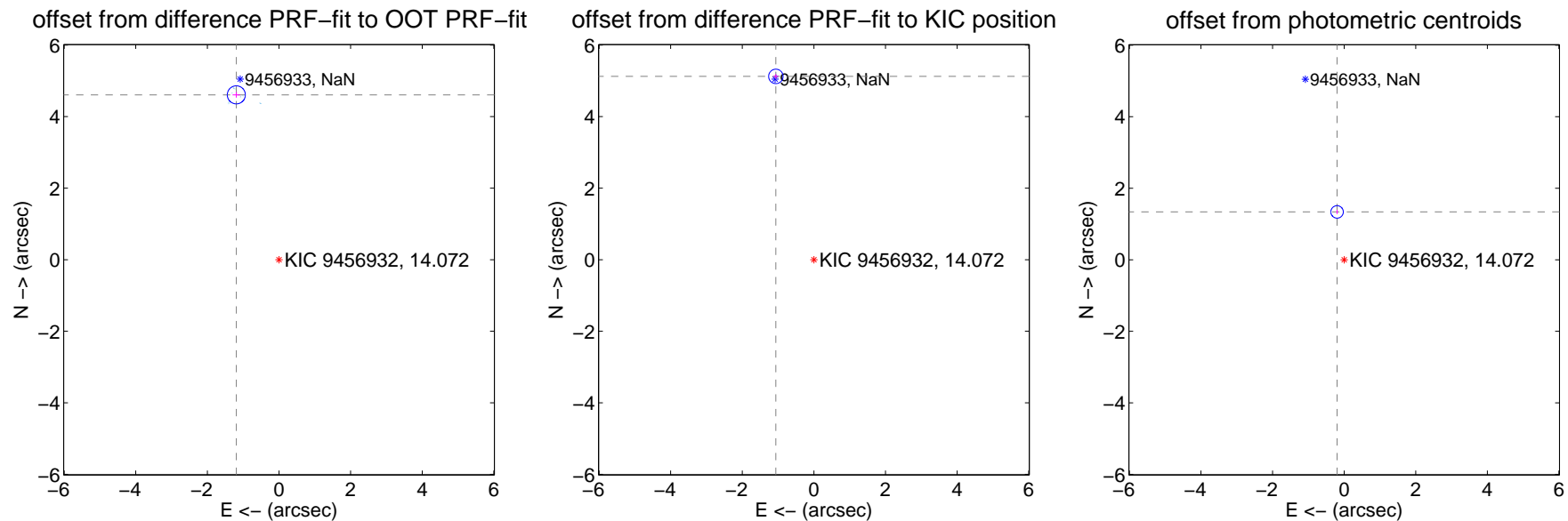
## DV Centroid Data

Supplemental centroid analysis for 009456932-01. Kepler magnitude: 14.07. Transit SNR -1.00

There are 17 quarters with good PRF difference image offsets

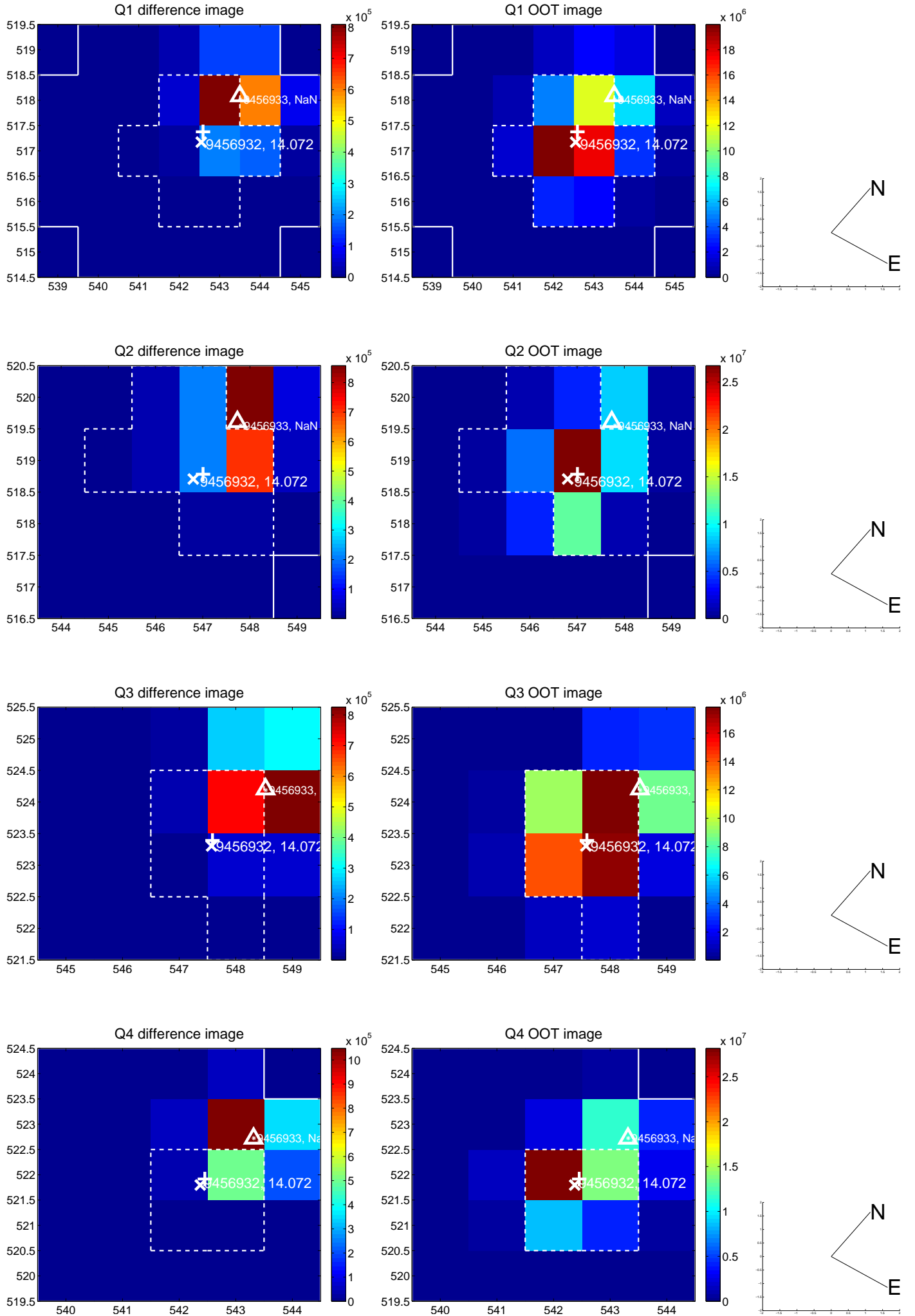
The direct PRF centroid is offset from the target star catalog position by about 0.56 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$4.760 \pm 0.084$	<b>56.63</b>	$1.192 \pm 0.106$	$4.608 \pm 0.078$
PRF-fit source offset from KIC position	$5.233 \pm 0.067$	<b>77.90</b>	$1.062 \pm 0.067$	$5.125 \pm 0.067$
photometric centroid source offset	$1.35 \pm 0.06$	<b>23.29</b>	$0.20 \pm 0.02$	$1.34 \pm 0.06$

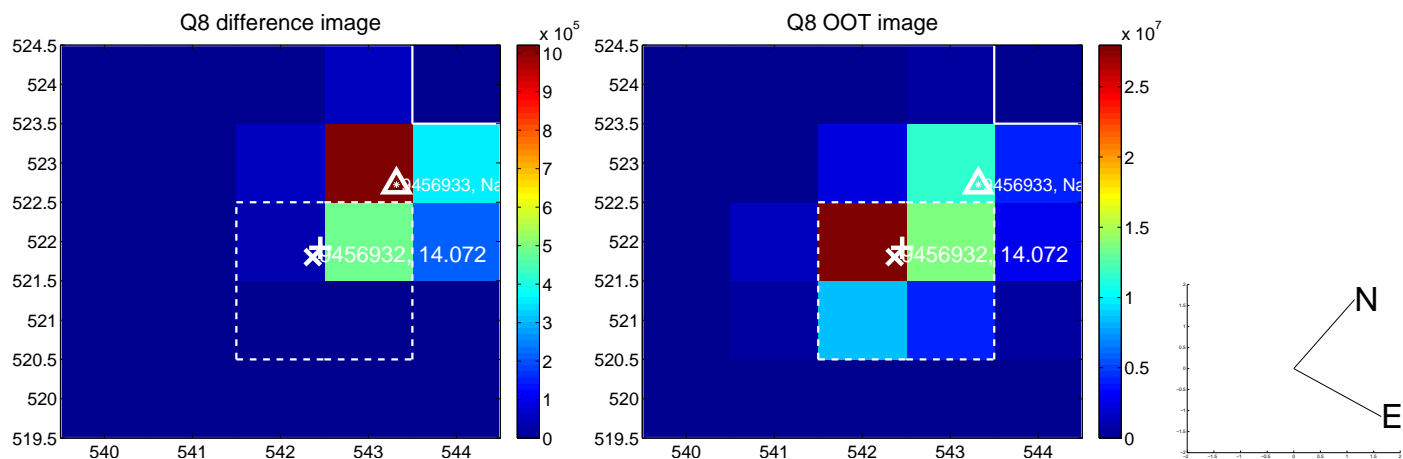
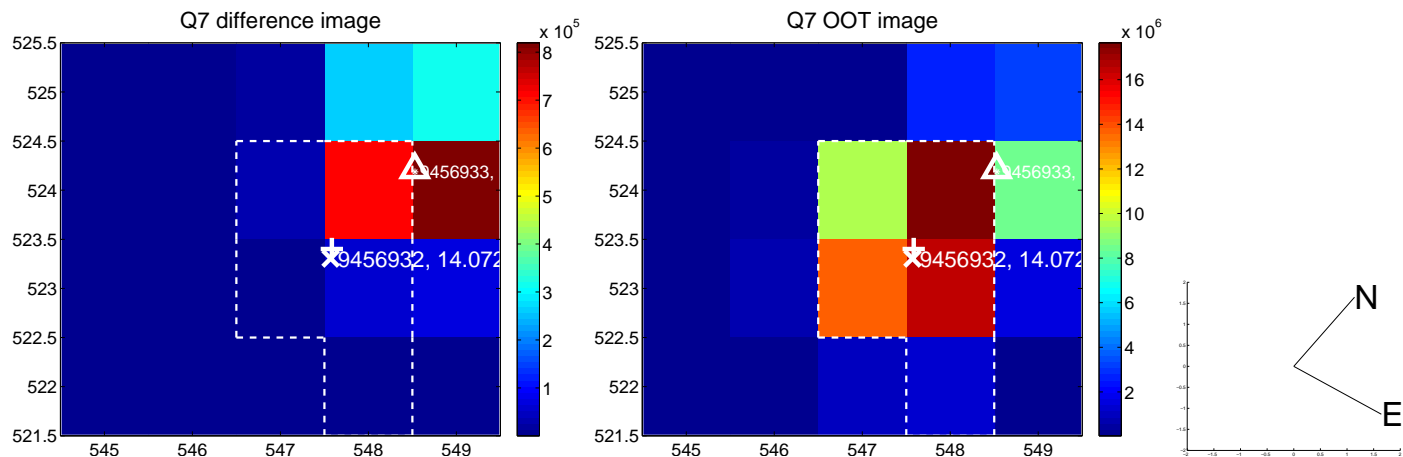
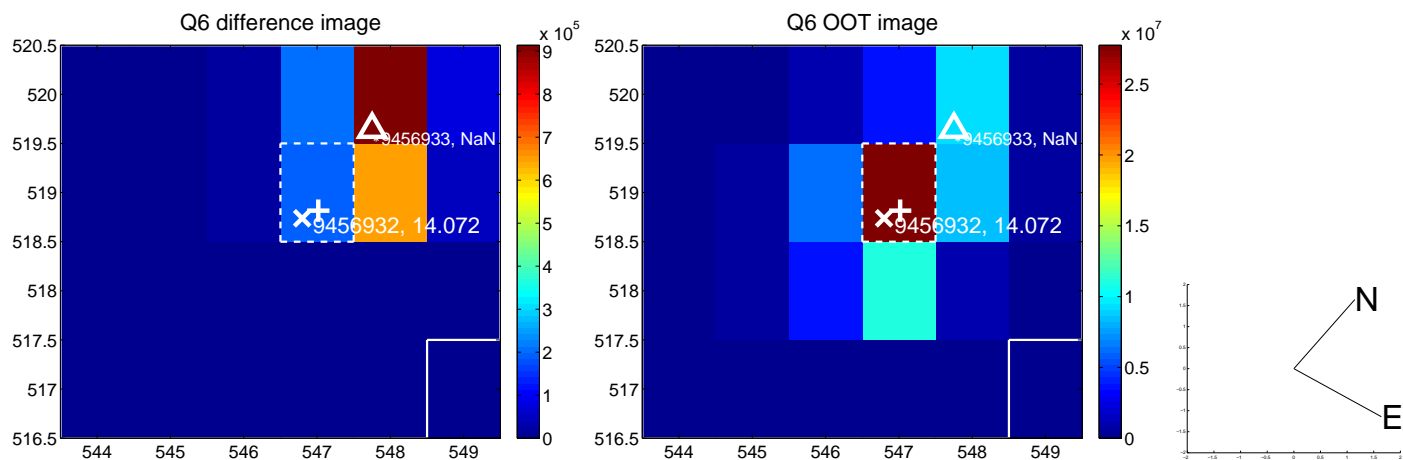
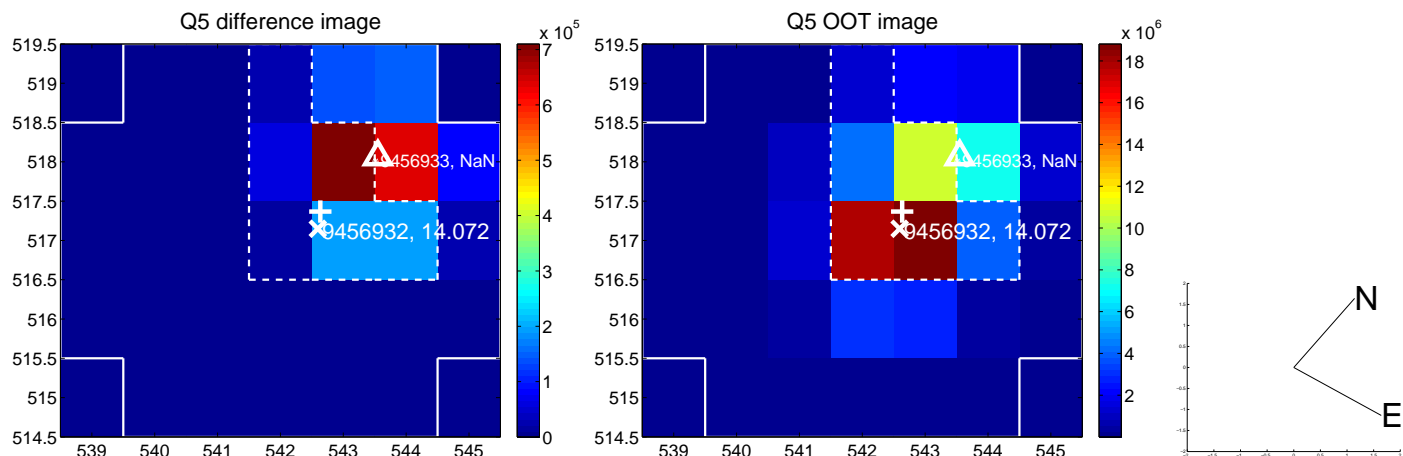


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

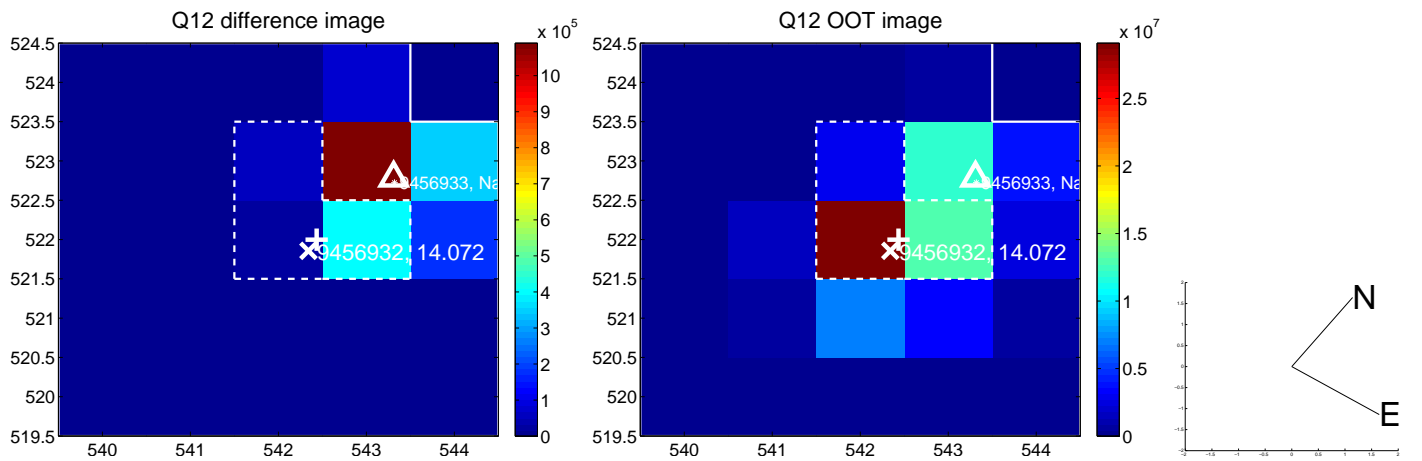
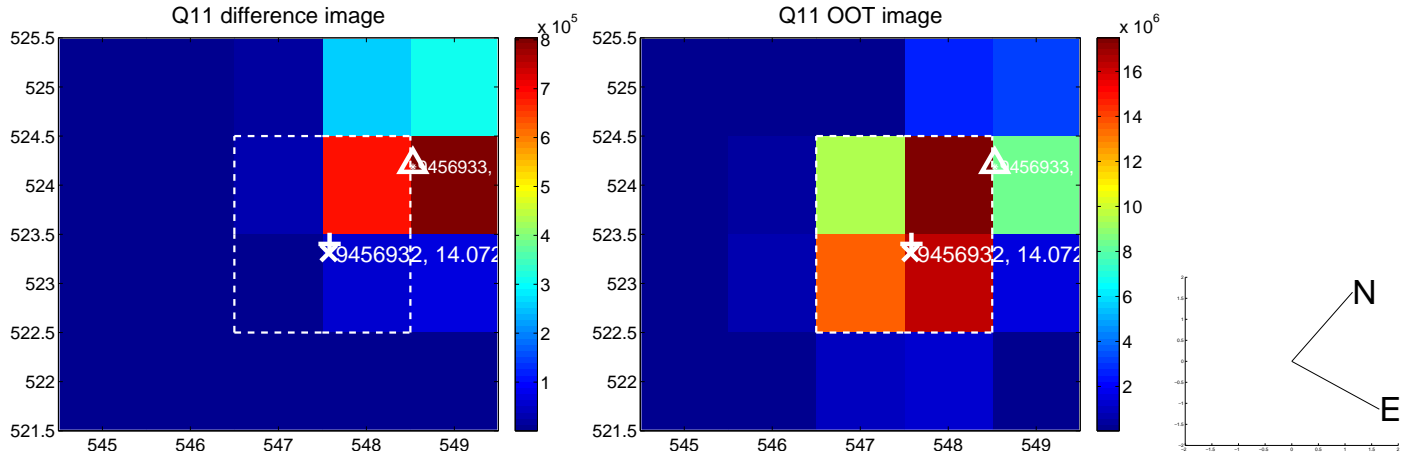
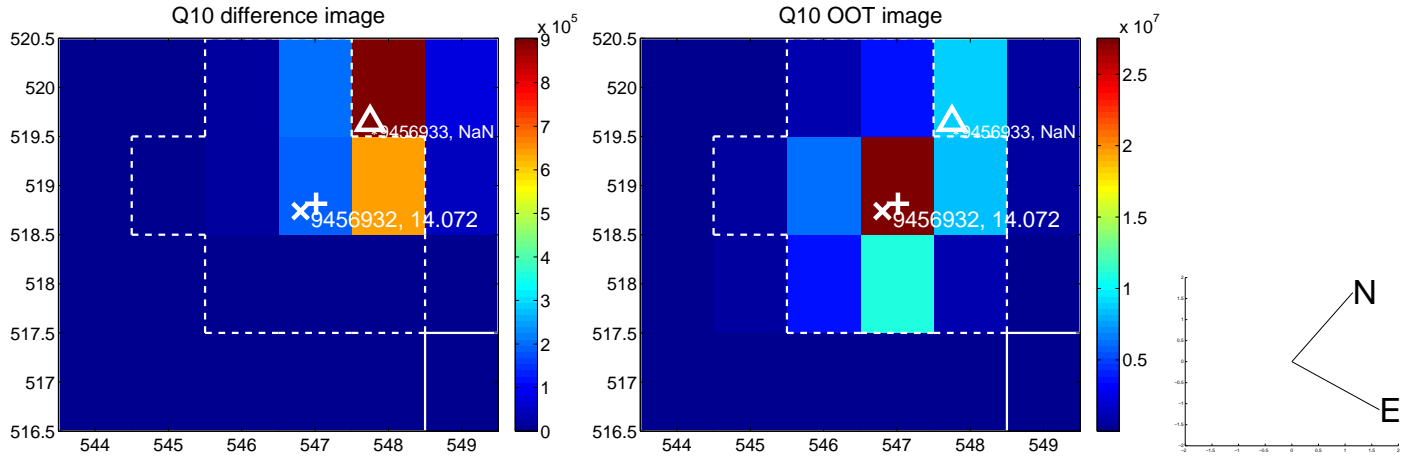
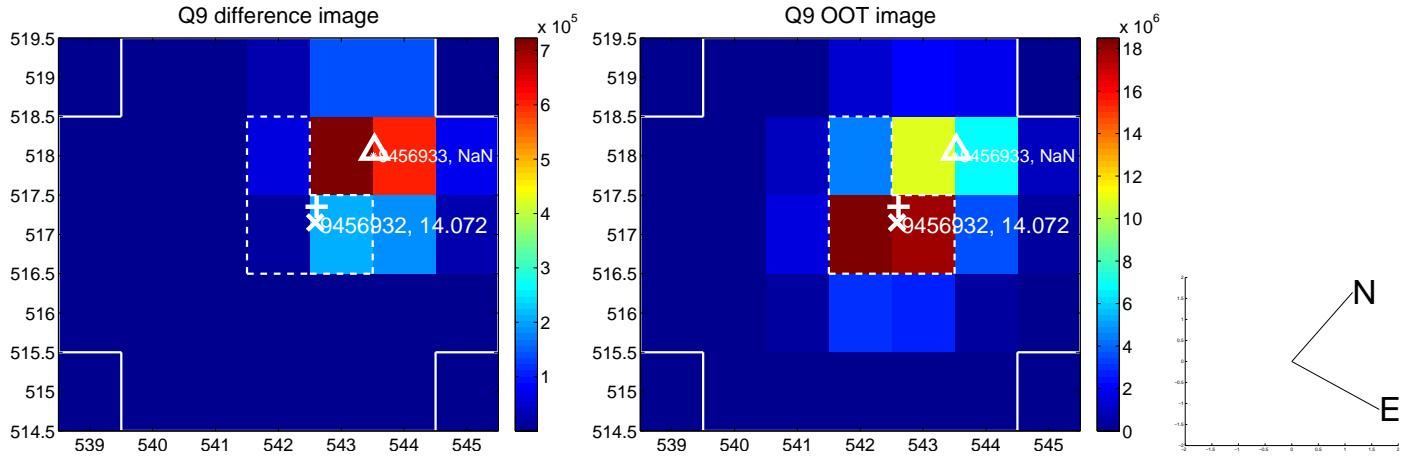


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

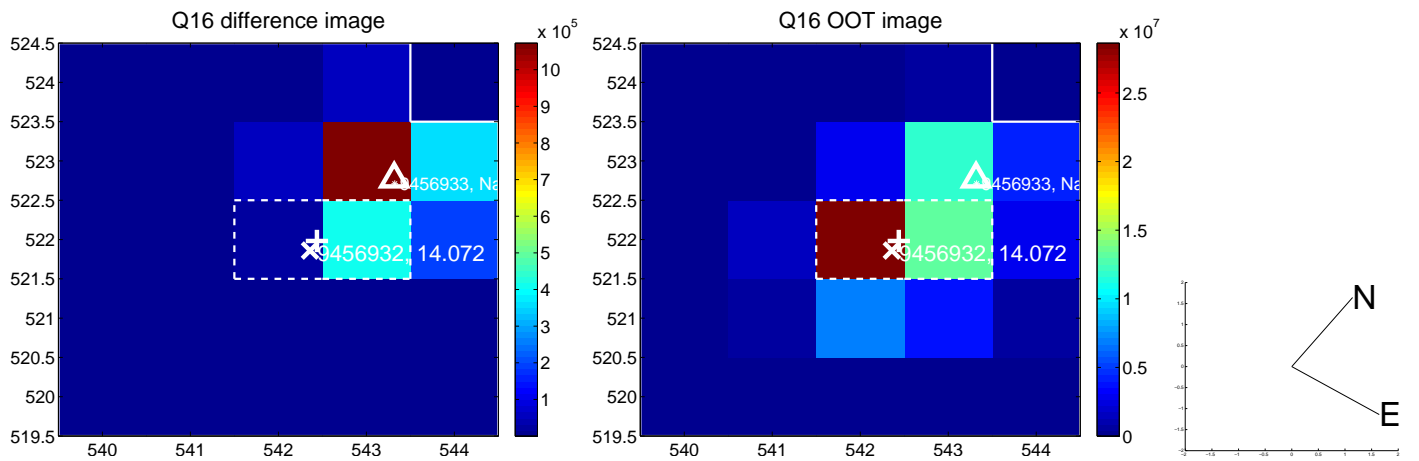
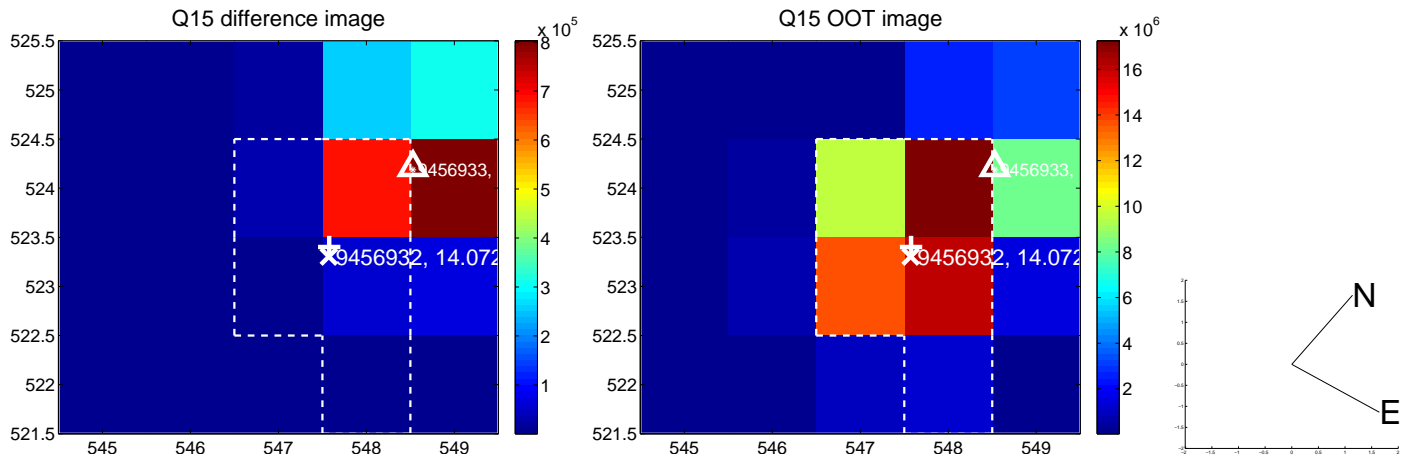
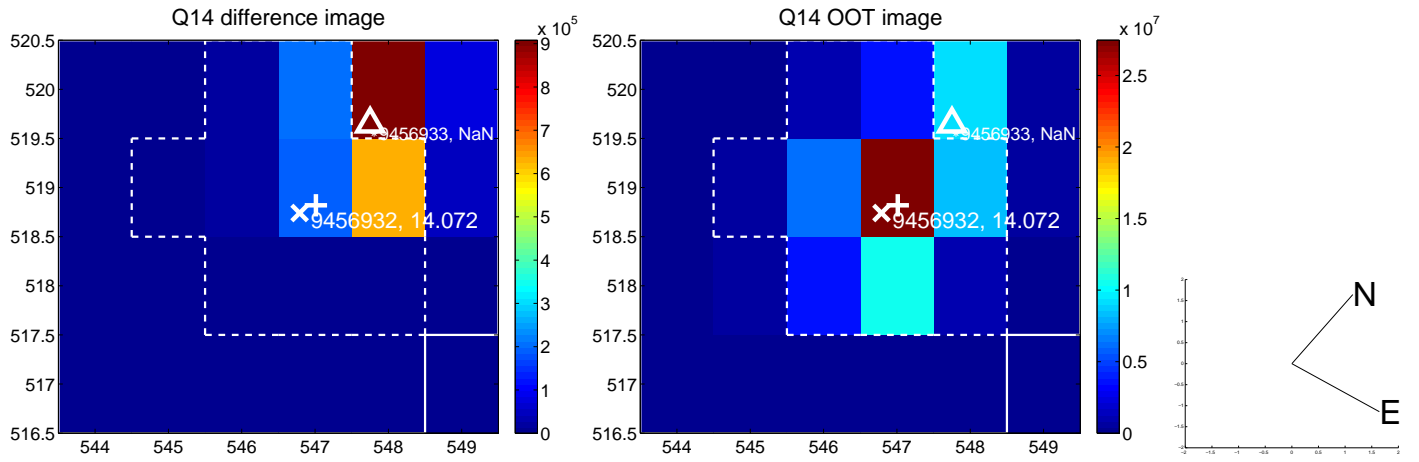
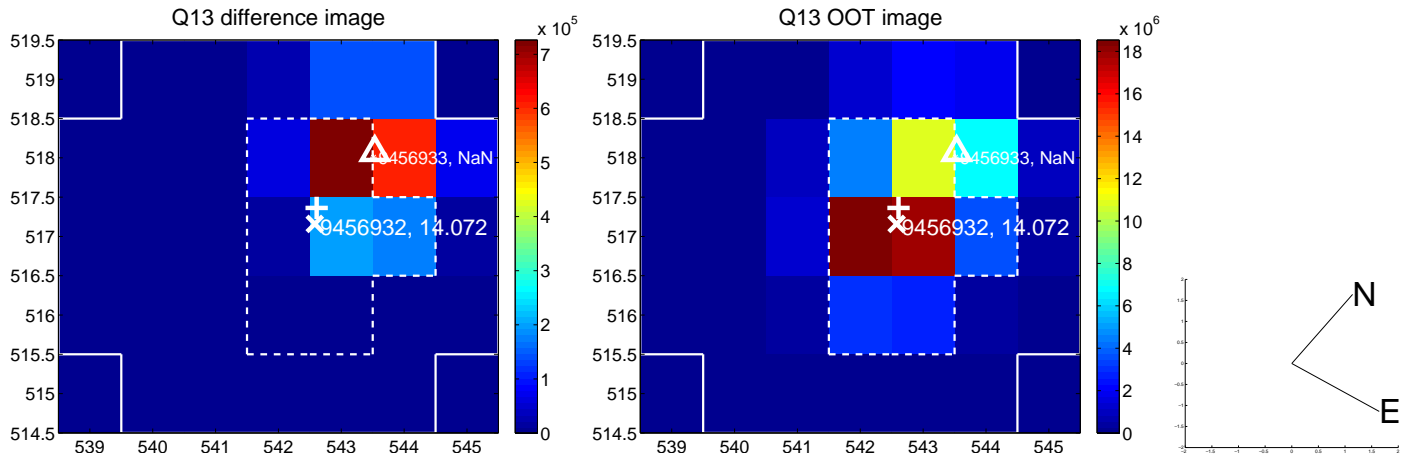




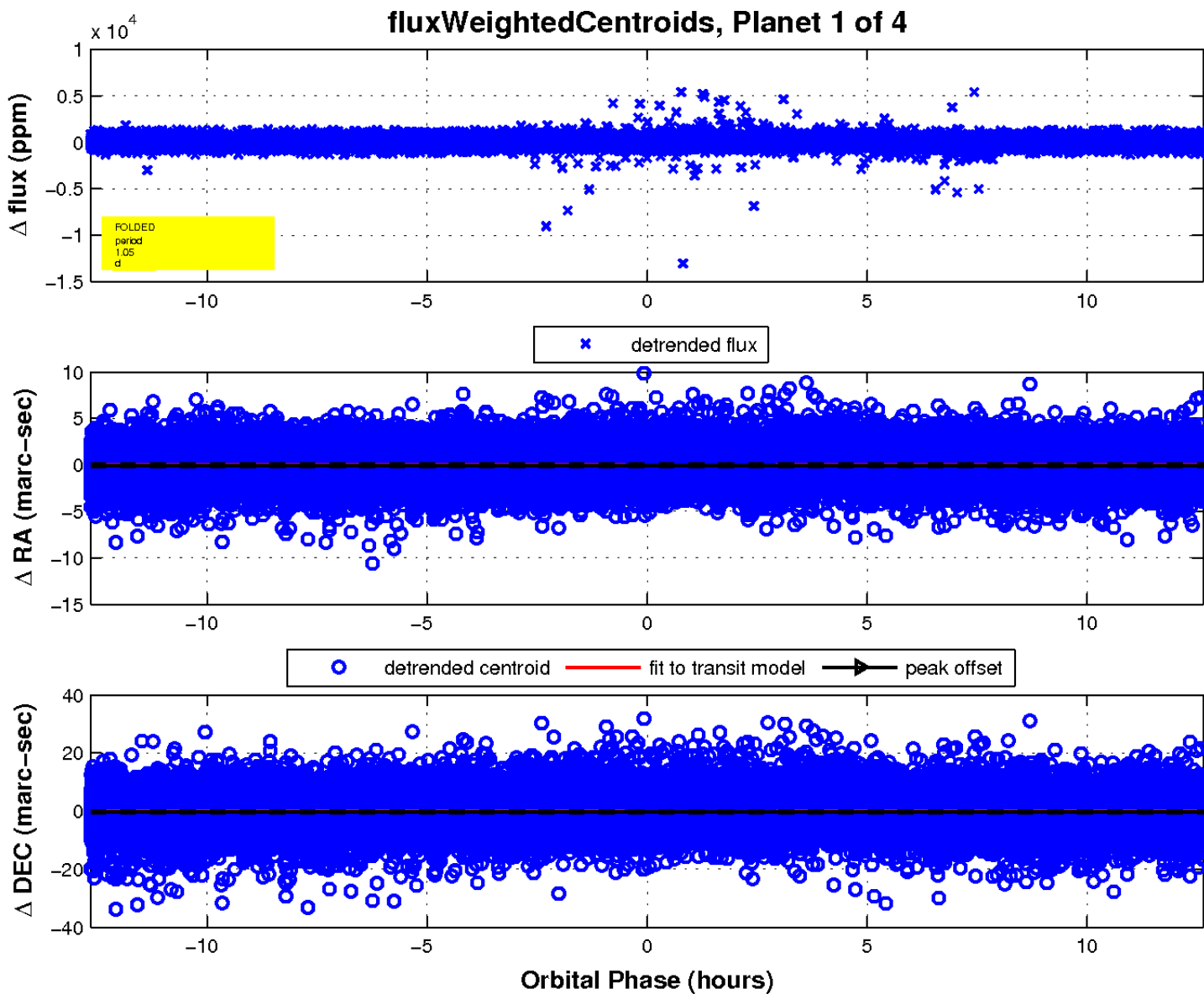
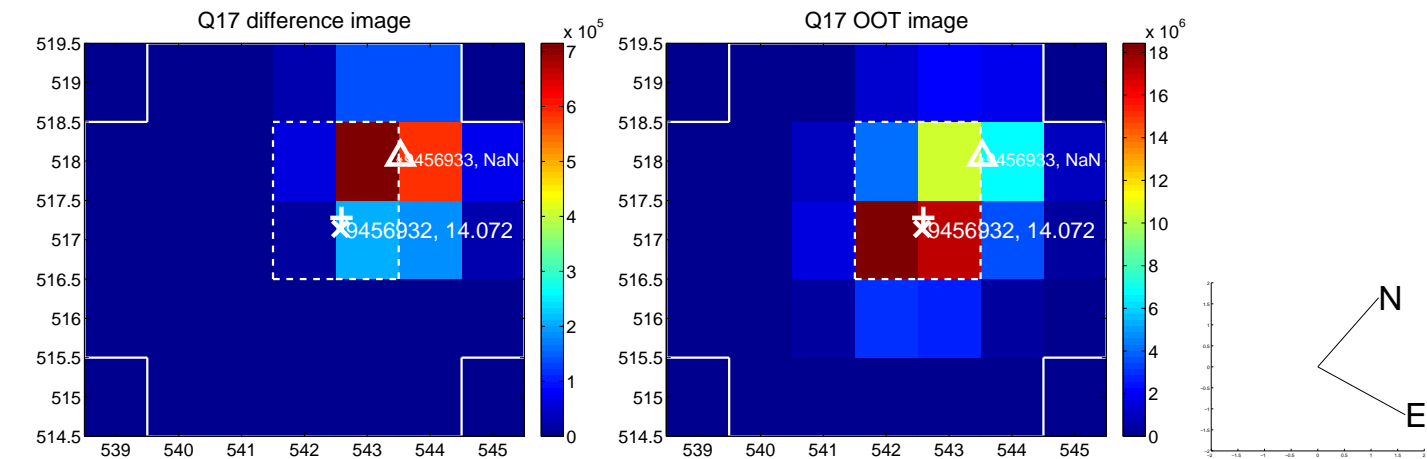
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

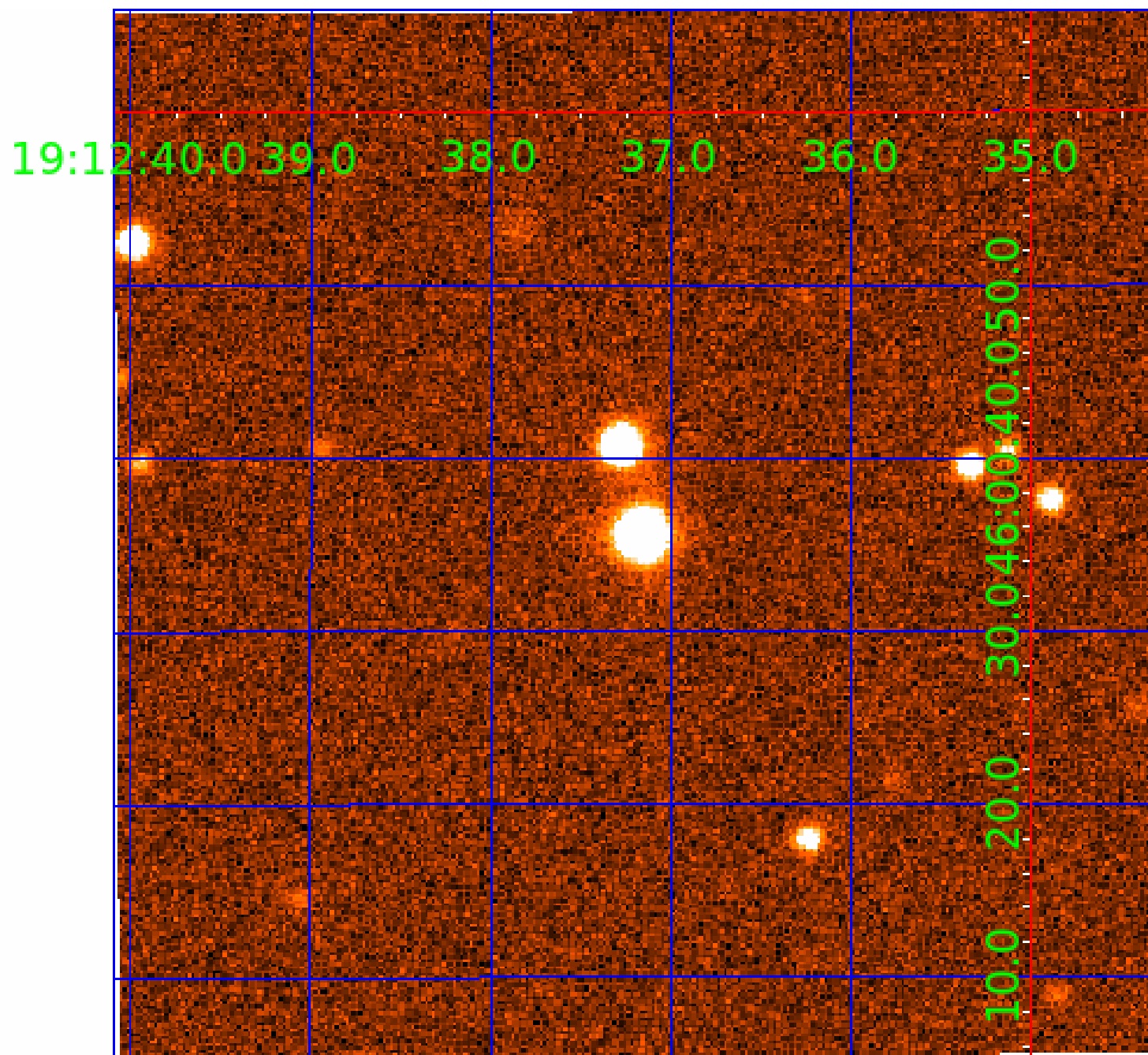


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 009456932

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009456932-01	OBS	No	1.053977	131.779744	838.2	1.500	19.5	-1.0	0.95	5873	2.73	2344.91
009456932-02	OBS	No	1.053953	131.804510	72.0	7.729	8.7	11.1	0.95	5873	0.80	2344.98
009456932-03	OBS	No	16.324614	141.315646	512.0	1.708	8.2	10.2	0.95	5873	2.15	60.74
009456932-04	OBS	No	18.944733	135.506892	384.8	1.767	10.6	9.3	0.95	5873	2.17	49.80

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009456932-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—LPP_ALT—CENT_NOFITS
009456932-02	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—SAME_NTL_PERIOD—CENT_RESOLVED_OFFSET
009456932-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_RESOLVED_OFFSET
009456932-04	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_KIC_POS—HALO_GHOST

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

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

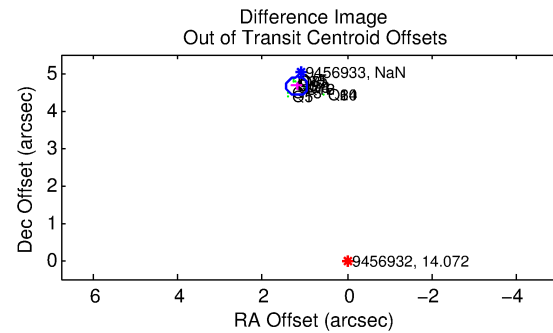
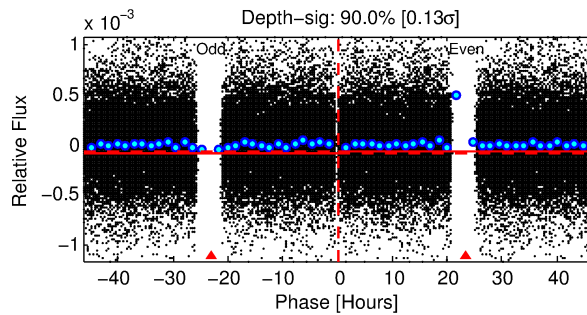
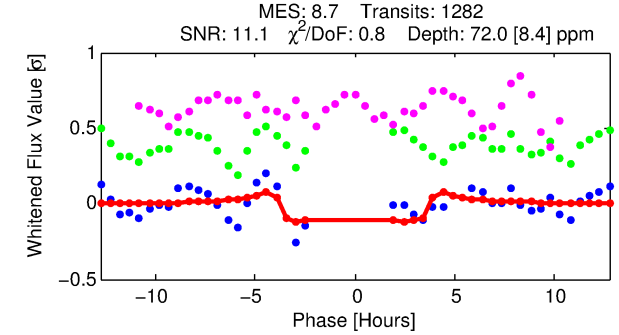
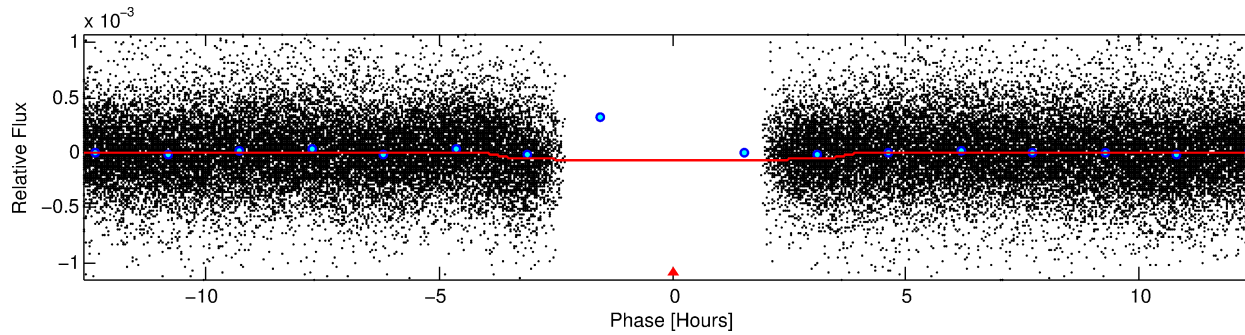
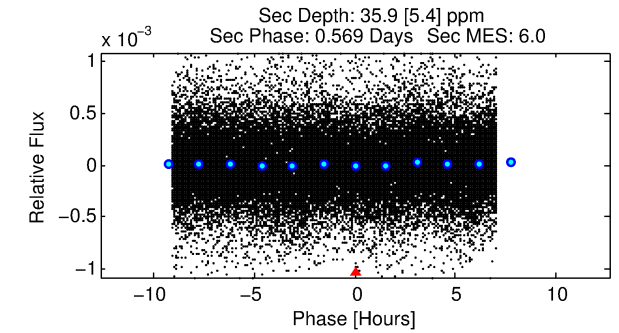
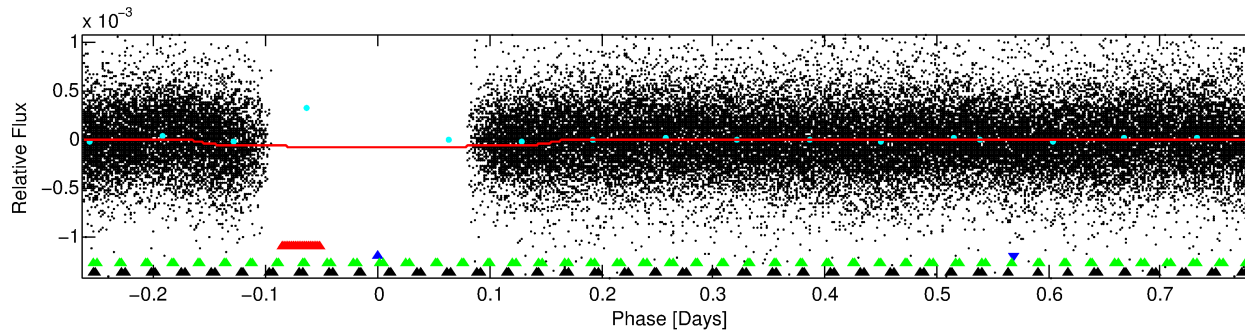
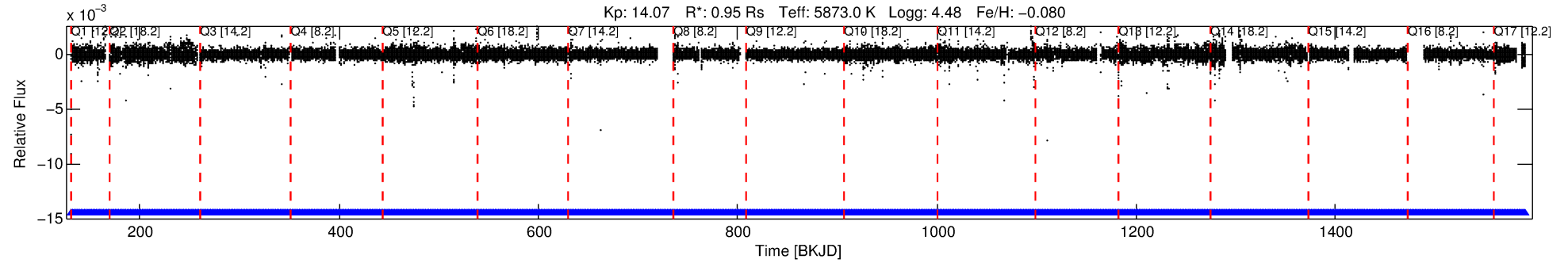
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 009456932-02

No Significant Match Found

# DV One-Page Summary

KIC: 9456932 Candidate: 2 of 4 Period: 1.054 d



## DV Fit Results:

Period = 1.05395 [0.00001] d  
Epoch = 131.8045 [0.0022] BKJD  
Rp/R\* = 0.0077 [0.0044]  
a/R\* = 1.23 [1.12]  
b = 0.13 [21.36]  
Seff = 2344.98 [925.38]  
Teq = 1774 [175] K  
Rp = 0.80 [0.51] Re  
a = 0.0202 [0.0051] AU  
Ag = 12.63 [15.32] [0.76σ]  
Teffp = 5172 [1499] K [2.25σ]

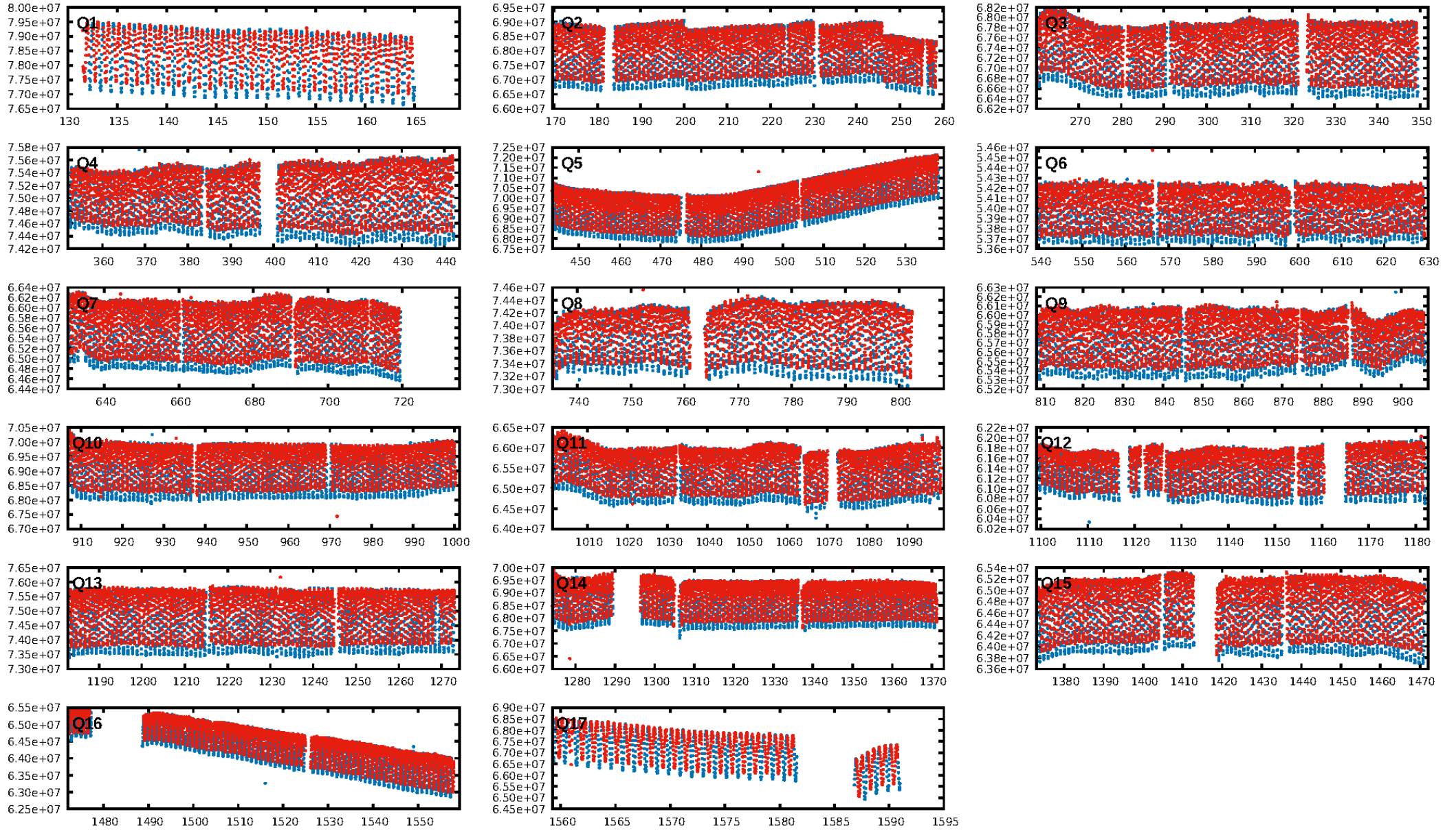
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 3.01e-12  
RollingBand-fgt: 1.00 [1225/1225]  
GhostDiagnostic-chr: -2.379  
Centroid-sig: 5.0%  
Centroid-so: 3.583 arcsec [1.48σ]  
OotOffset-rm: 4.803 arcsec [57.94σ]  
KicOffset-rm: 5.236 arcsec [77.96σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 0.00 [0/17]

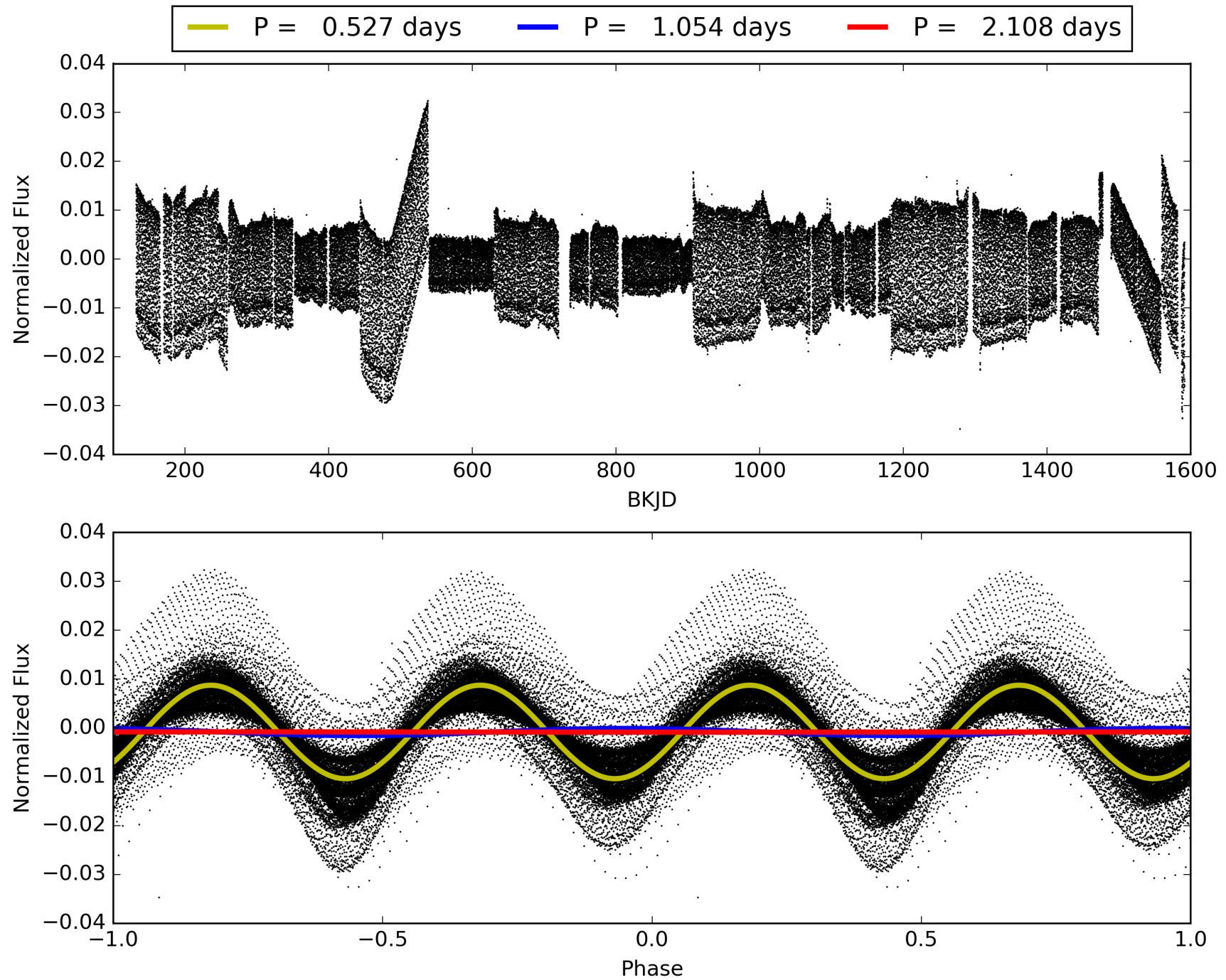
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 00:17:39 Z

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

# TCE 009456932-02, PDC Light Curves



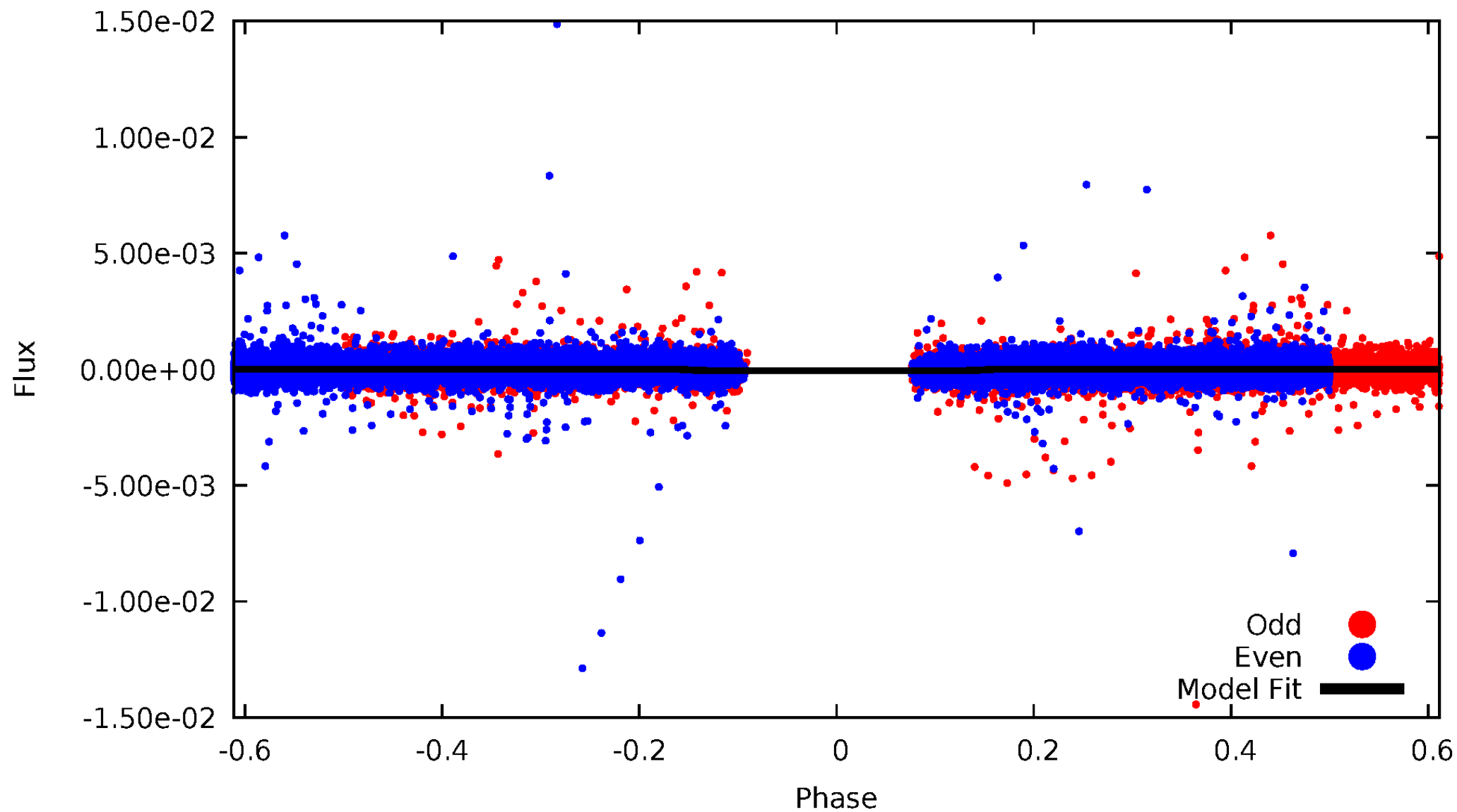
TCE 009456932-02





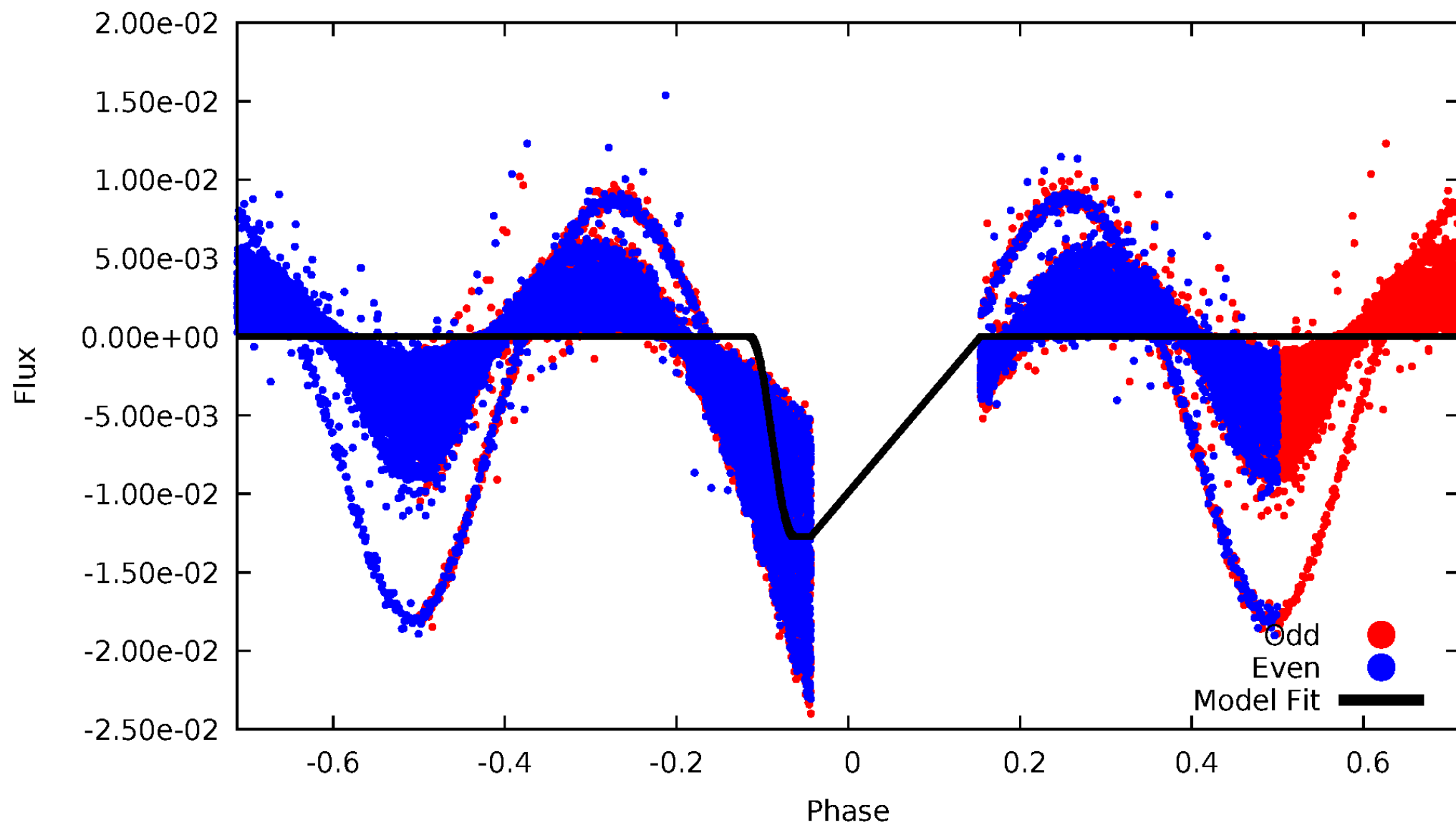
# DV Odd/Even

TCE 009456932-02



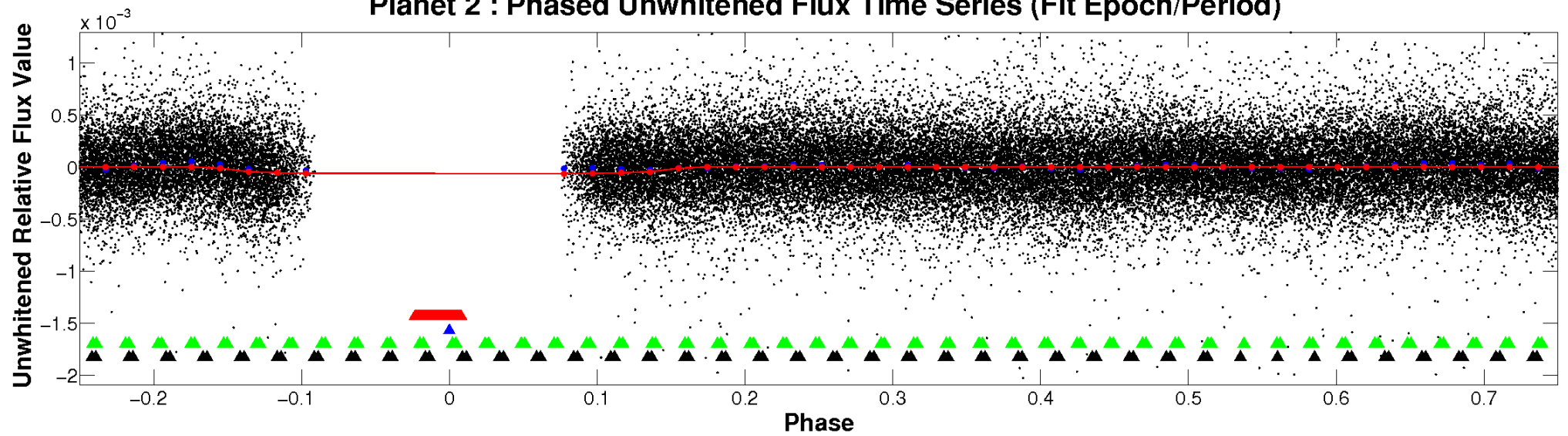
# ALT Odd/Even

TCE 009456932-02

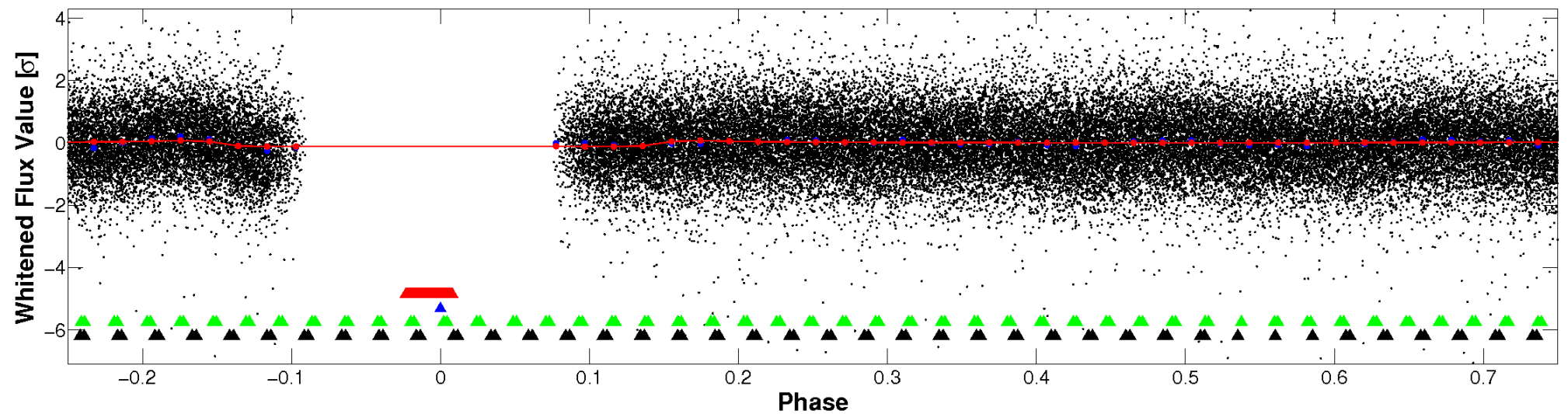


# Non-Whitened Vs. Whitened Light Curve

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



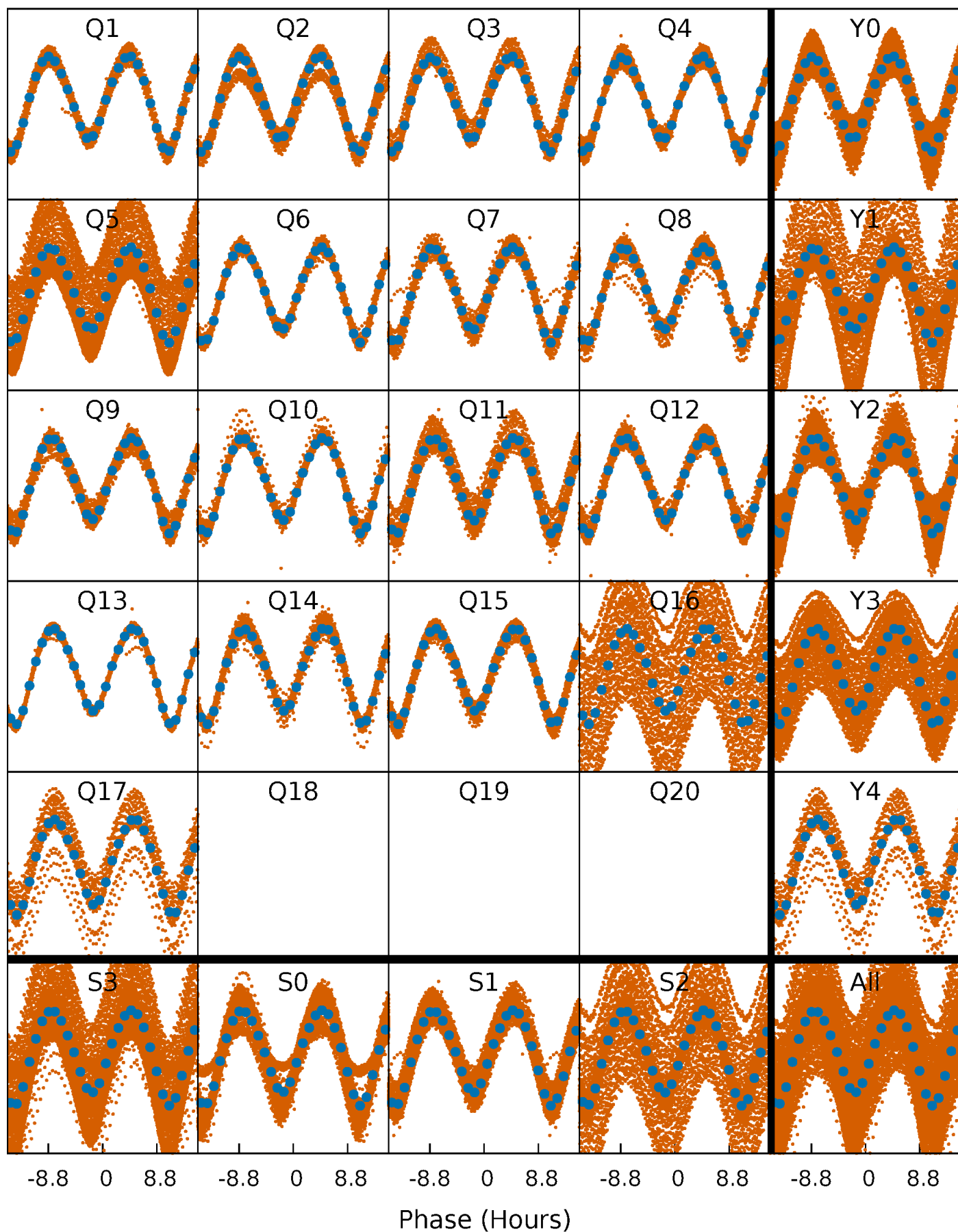
## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)





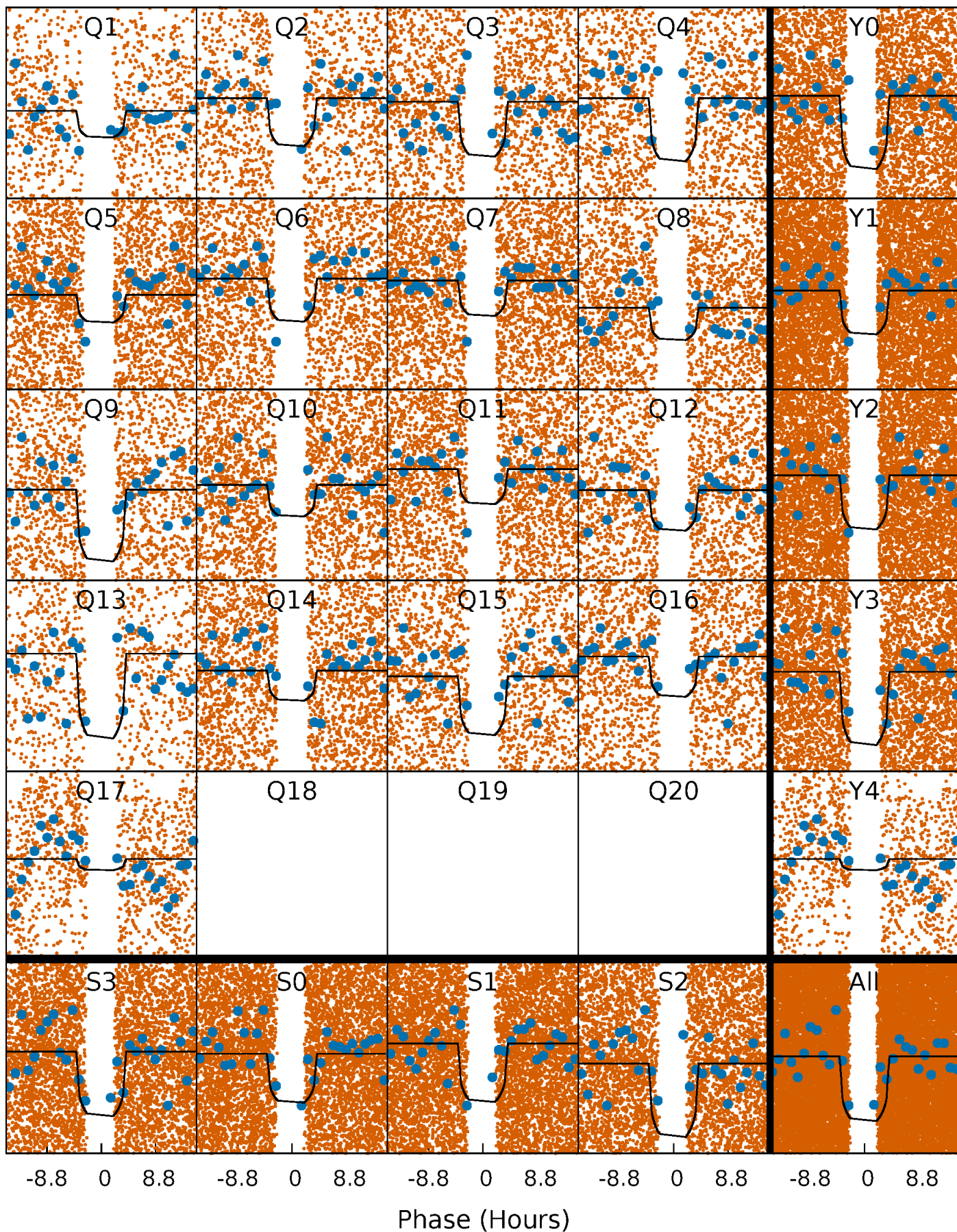
# PDC Quarter-Phased Transit Curves

TCE 009456932-02   P= 1.053953 Days    $T_0=131.804510$  (BKJD)



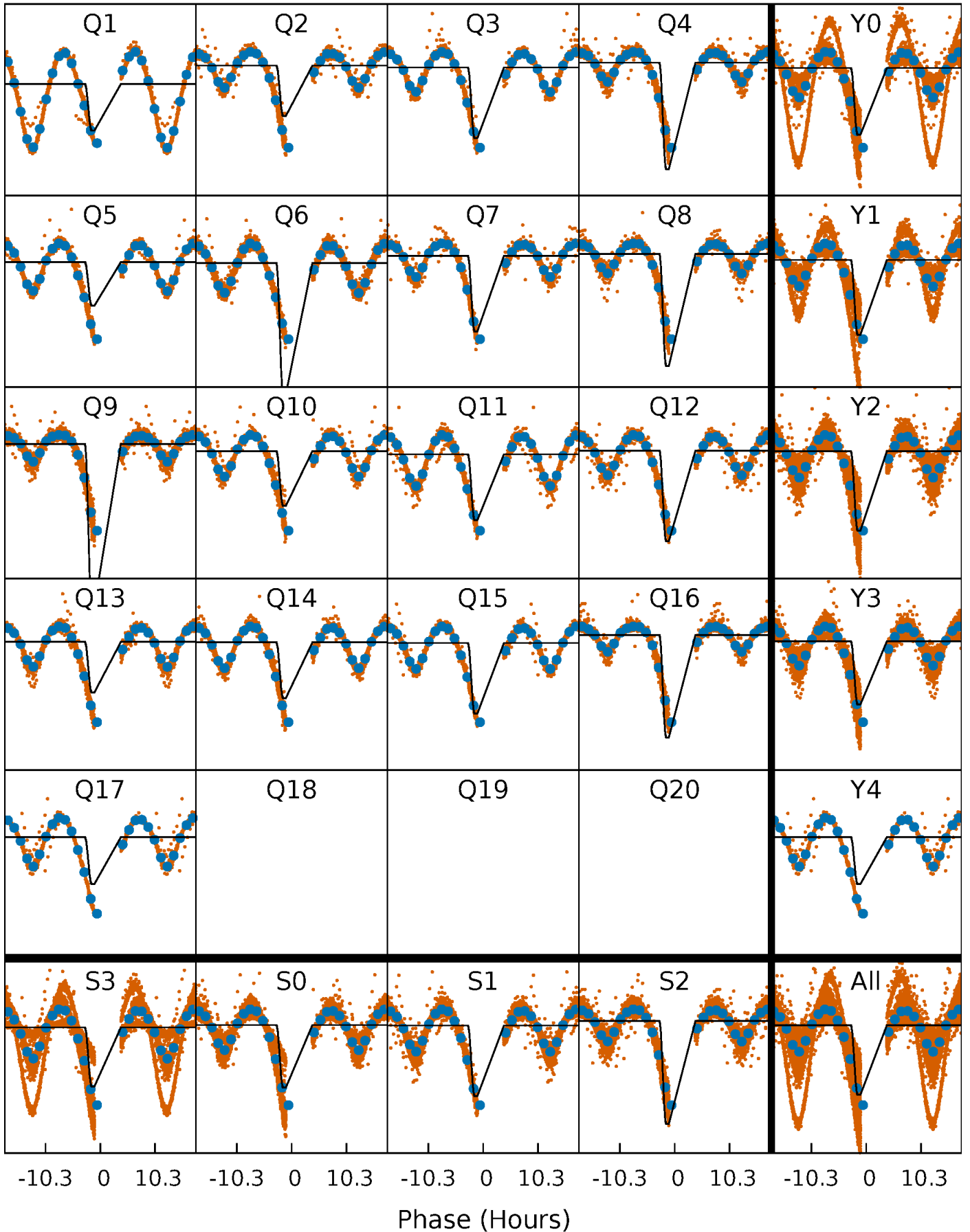
# DV Quarter-Phased Transit Curves

TCE 009456932-02 P= 1.053953 Days  $T_0=131.804510$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

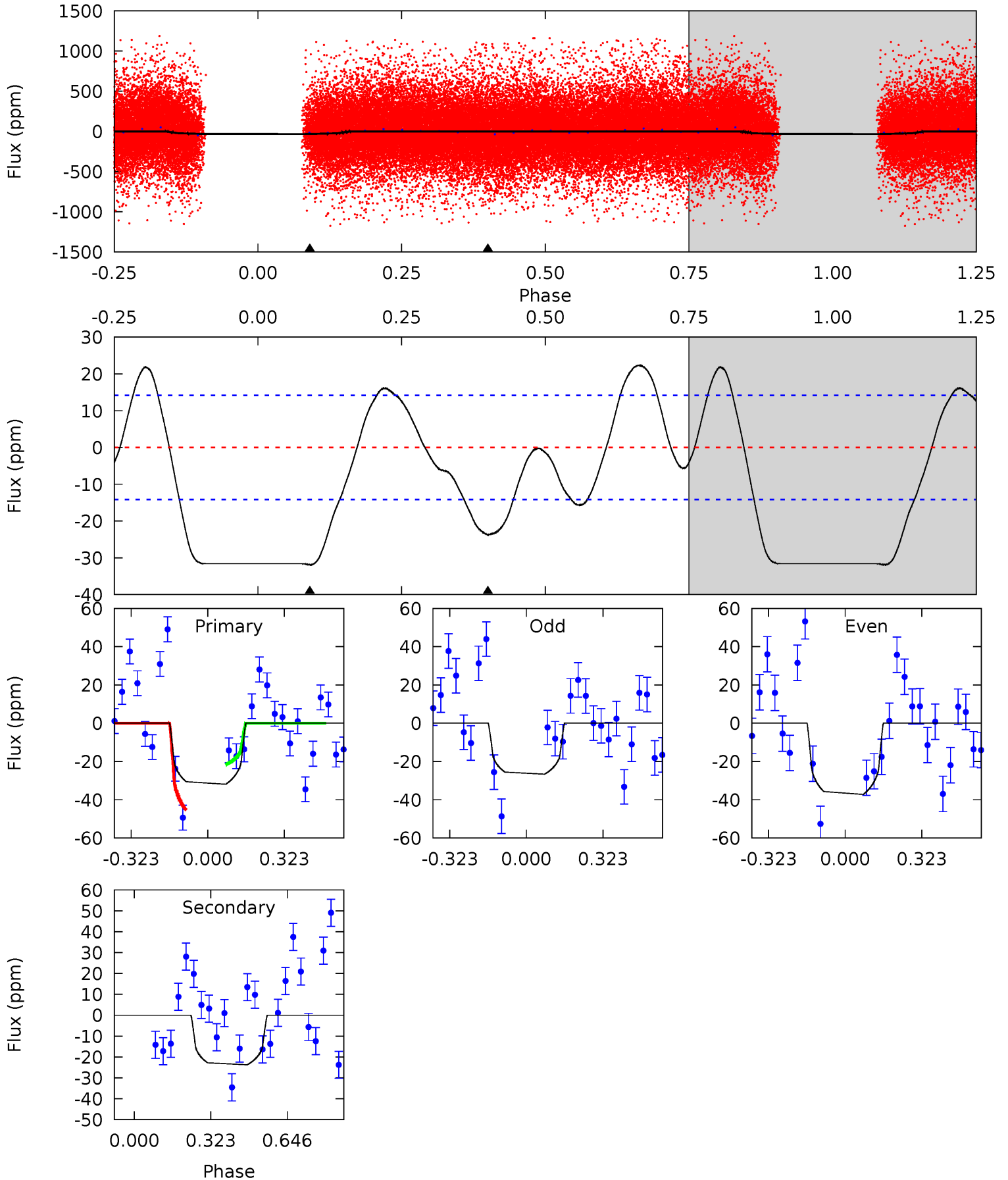
TCE 009456932-02     $P = 1.053977$  Days     $T_0 = 131.721589$  (BKJD)



# DV Model-Shift Uniqueness Test

009456932-02, P = 1.053953 Days, E = 130.750557 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
9.73	7.24	0	0	4.31	0.99	1.91	9.73	9.73	7.24	7.24	1.63	0.96	0.41	3.74

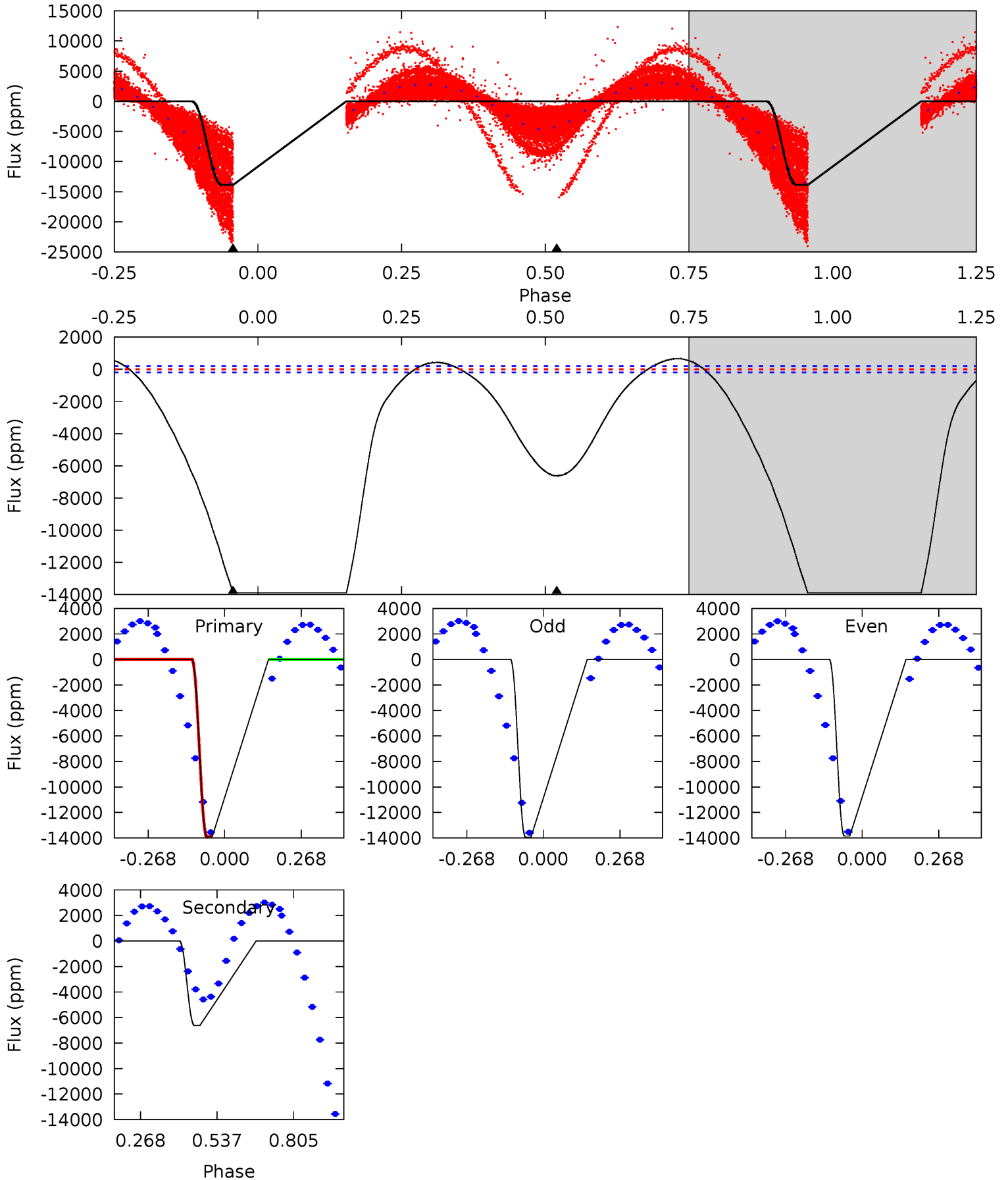




# Alt Model-Shift Uniqueness Test

009456932-02, P = 1.053977 Days, E = 130.667612 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
313.4	149.5	0	0	4.35	1.11	12.7	313.4	313.4	149.5	149.5	1.13	0	0.05	0



### Stellar Parameters For KIC 009456932

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5873^{+146}_{-176}$	$4.480^{+0.065}_{-0.208}$	$-0.080^{+0.300}_{-0.300}$	$0.947^{+0.282}_{-0.094}$	$0.988^{+0.128}_{-0.117}$	$1.638^{+0.466}_{-0.869}$
	+2%/-3%	+1%/-5%	+375%/-375%	+30%/-10%	+13%/-12%	+28%/-53%
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 009456932-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-24 \pm 3$	$0.86^{+0.48}_{-0.43}$	$2526^{+176}_{-129}$	$4668^{+1879}_{-770}$	$7.112^{+21.077}_{-4.299}$
Alt.	$-6625 \pm 44$	$11.79^{+1.87}_{-0.94}$	$2510^{+163}_{-119}$	$5039^{+152}_{-156}$	$10^{+2}_{-2}$

$T_{max}$  = 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

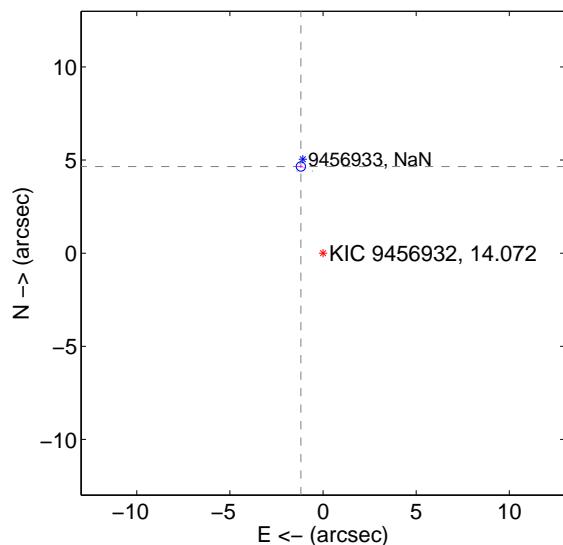
Supplemental centroid analysis for 009456932-02. Kepler magnitude: 14.07. Transit SNR 11.07

There are 17 quarters with good PRF difference image offsets

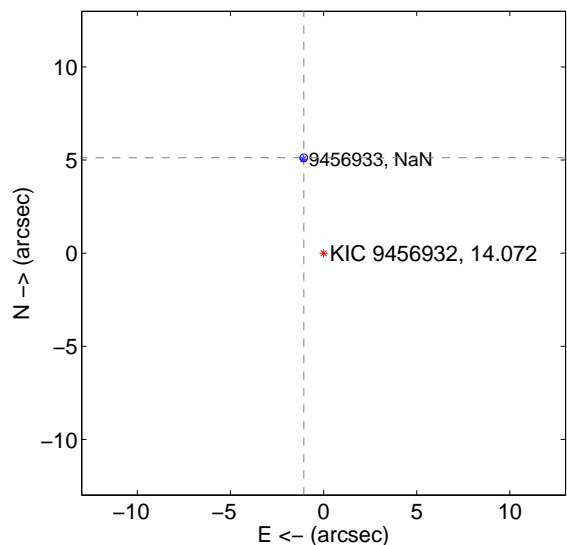
The direct PRF centroid is offset from the target star catalog position by about 0.53 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b>4.803 <math>\pm</math> 0.083</b>	<b>57.94</b>	1.190 $\pm$ 0.103	4.653 $\pm$ 0.077
PRF-fit source offset from KIC position	<b>5.236 <math>\pm</math> 0.067</b>	<b>77.96</b>	1.062 $\pm$ 0.067	5.127 $\pm$ 0.067
photometric centroid source offset	3.58 $\pm$ 2.41	1.48	0.42 $\pm$ 0.69	3.56 $\pm$ 2.43

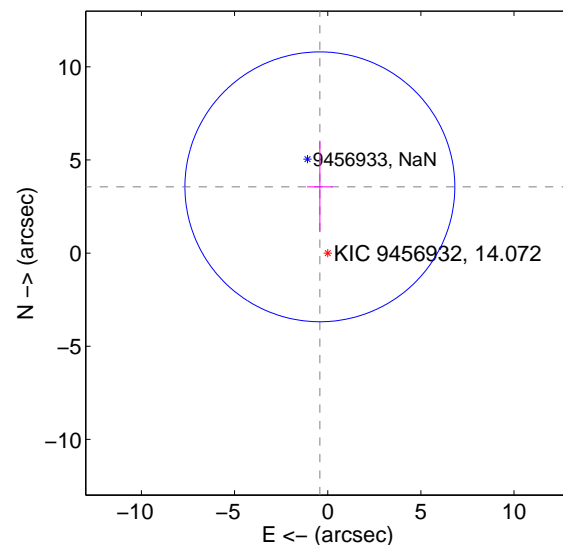
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

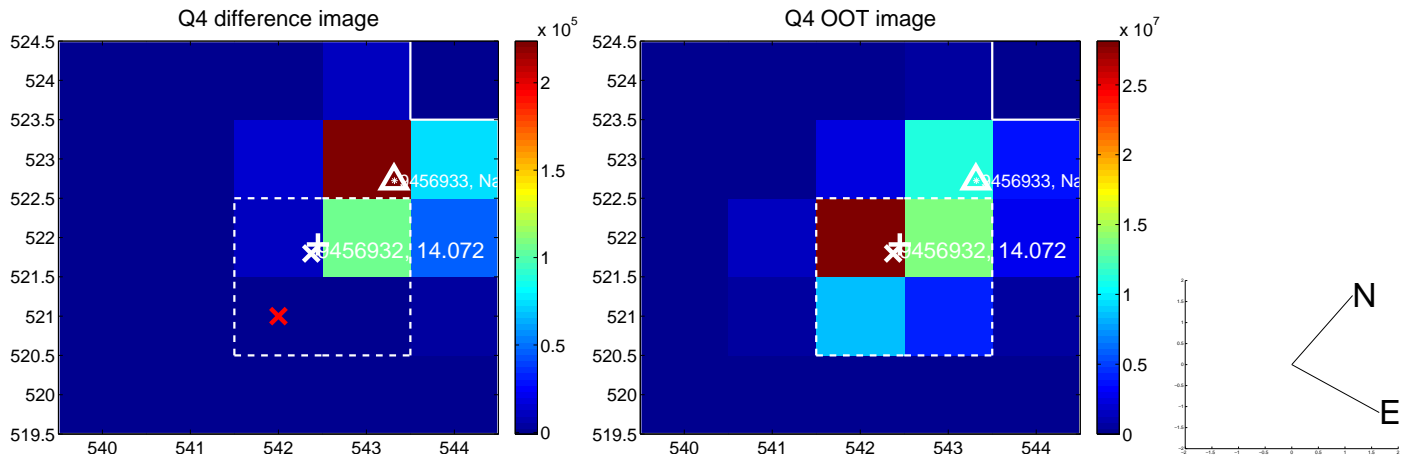
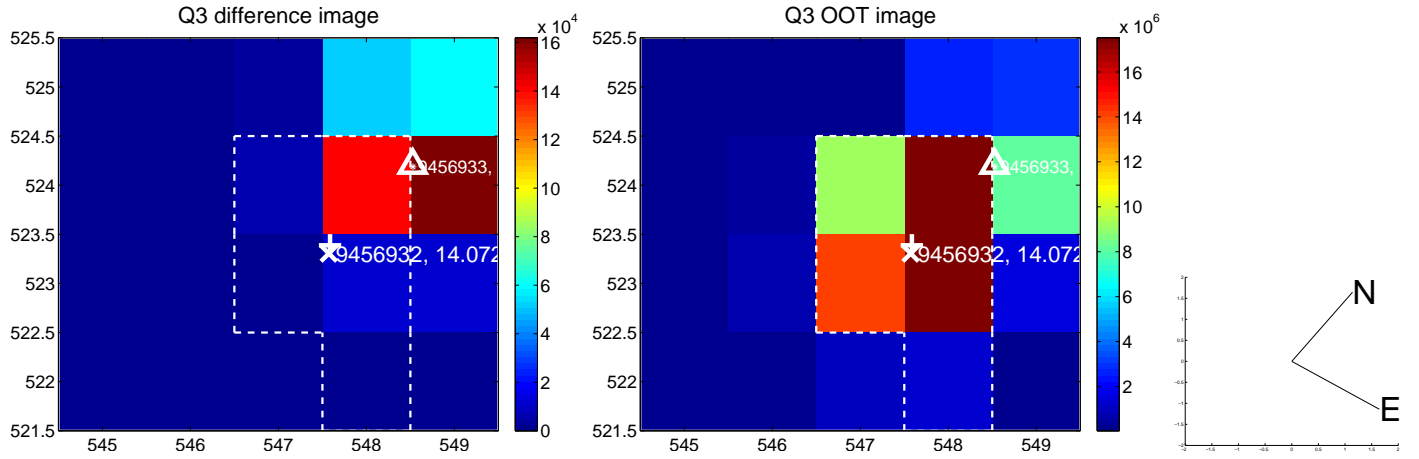
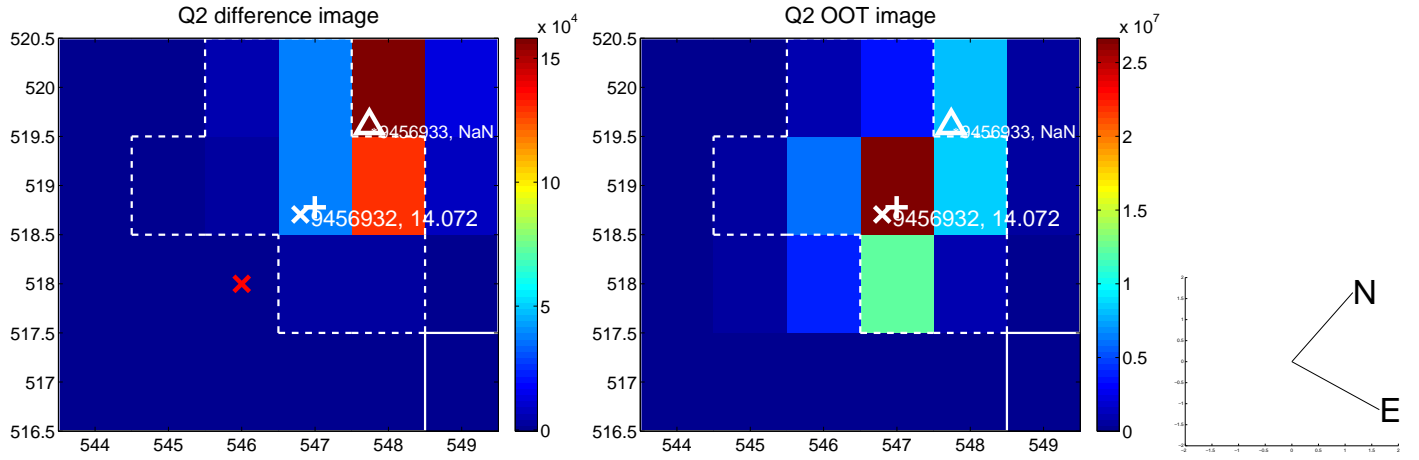
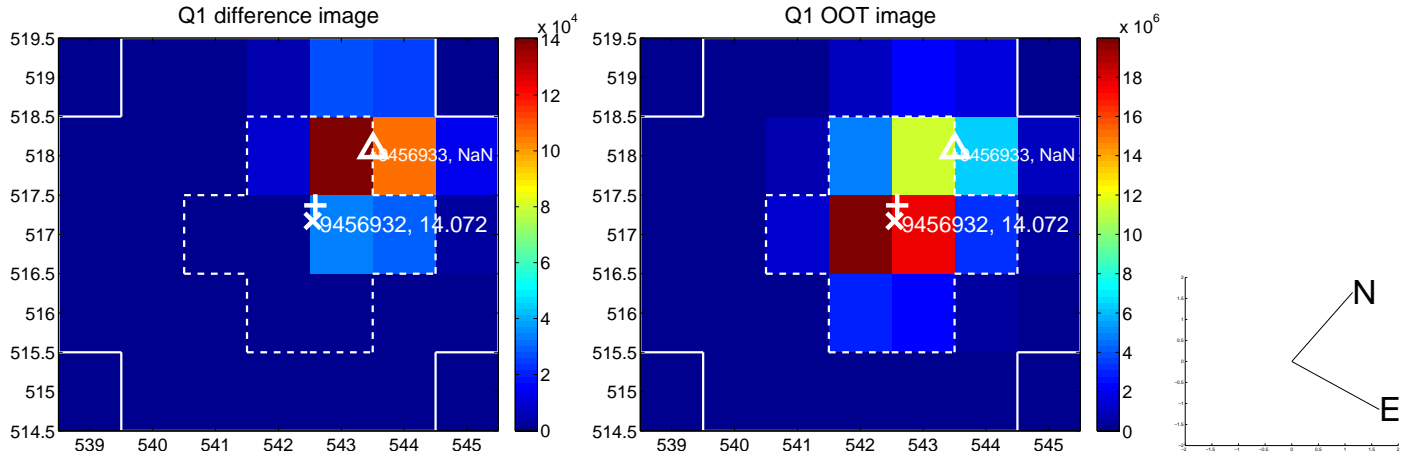


offset from photometric centroids



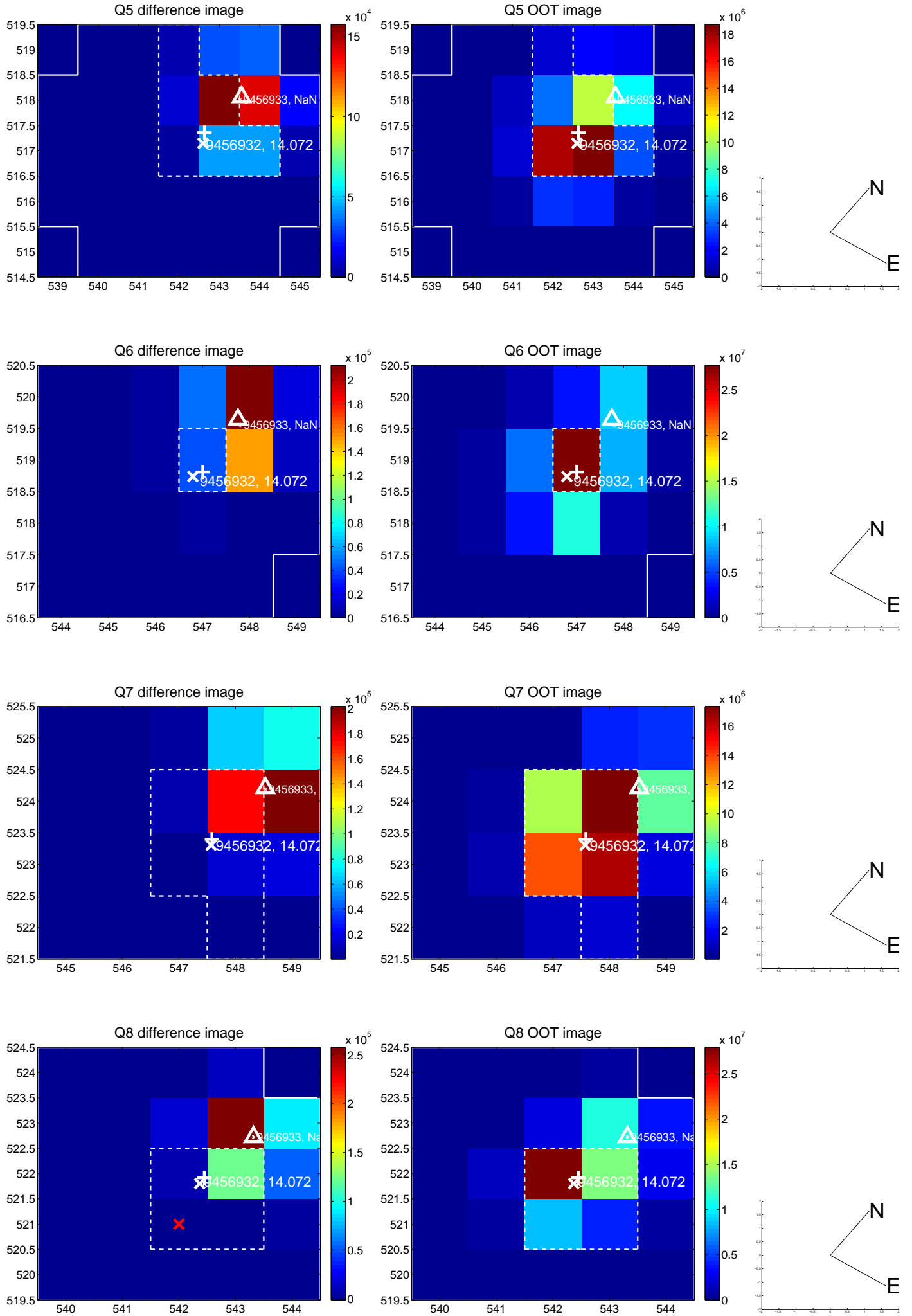
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

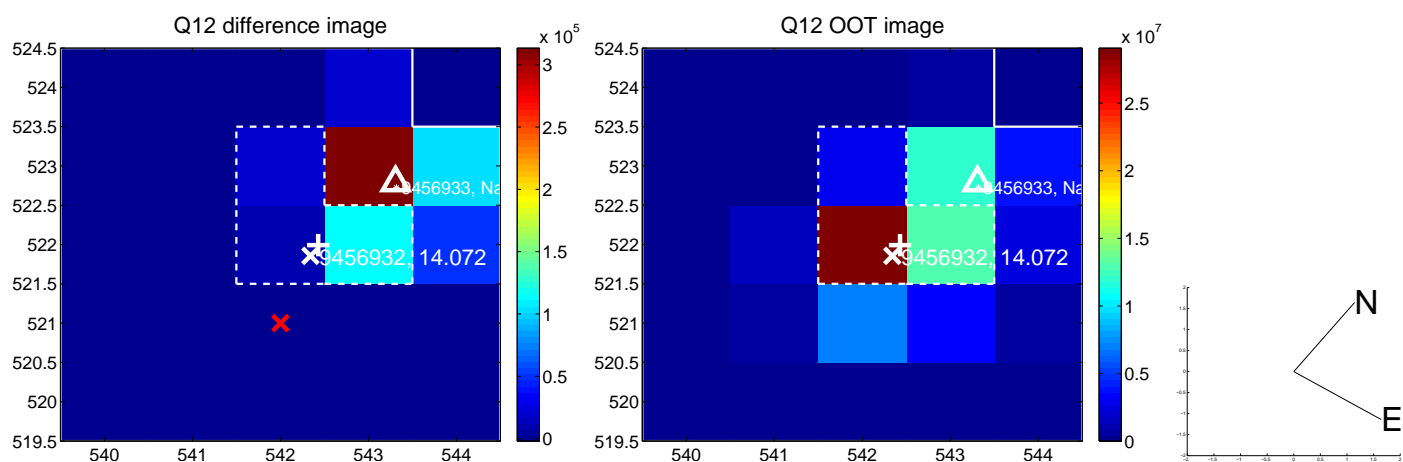
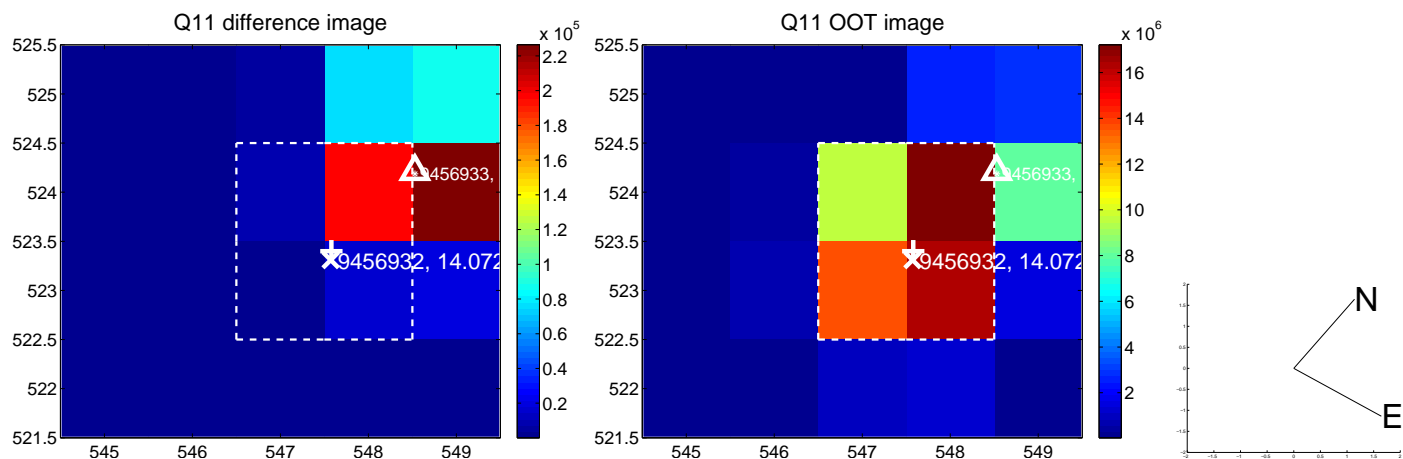
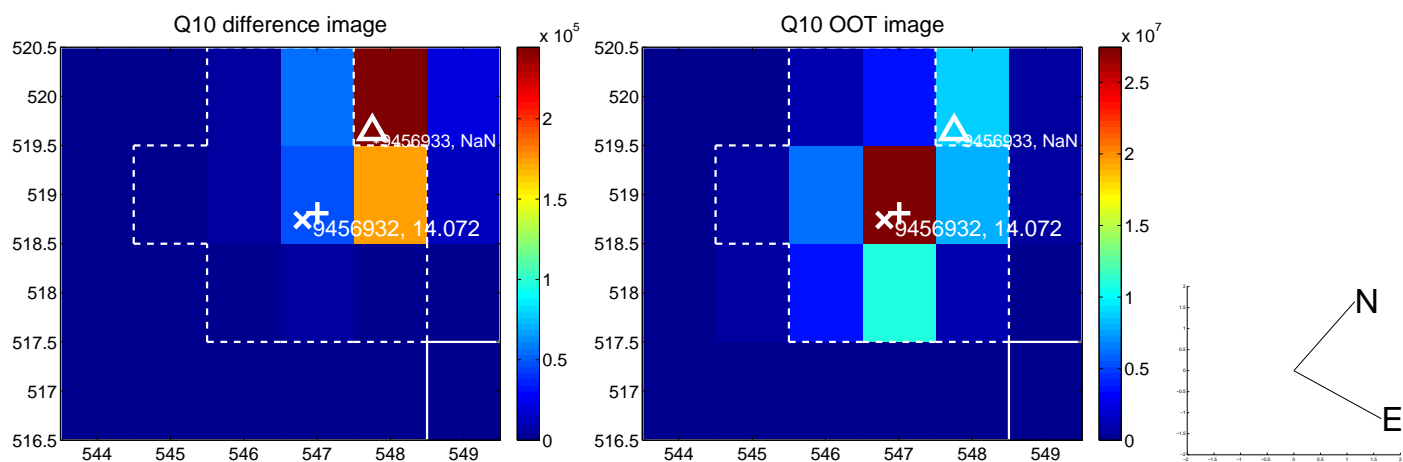
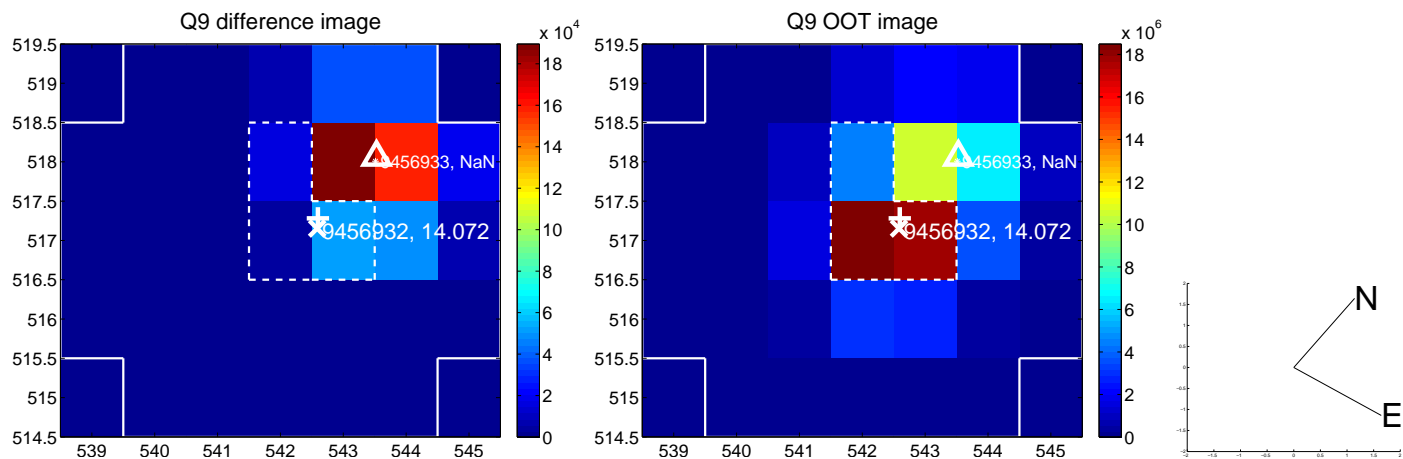




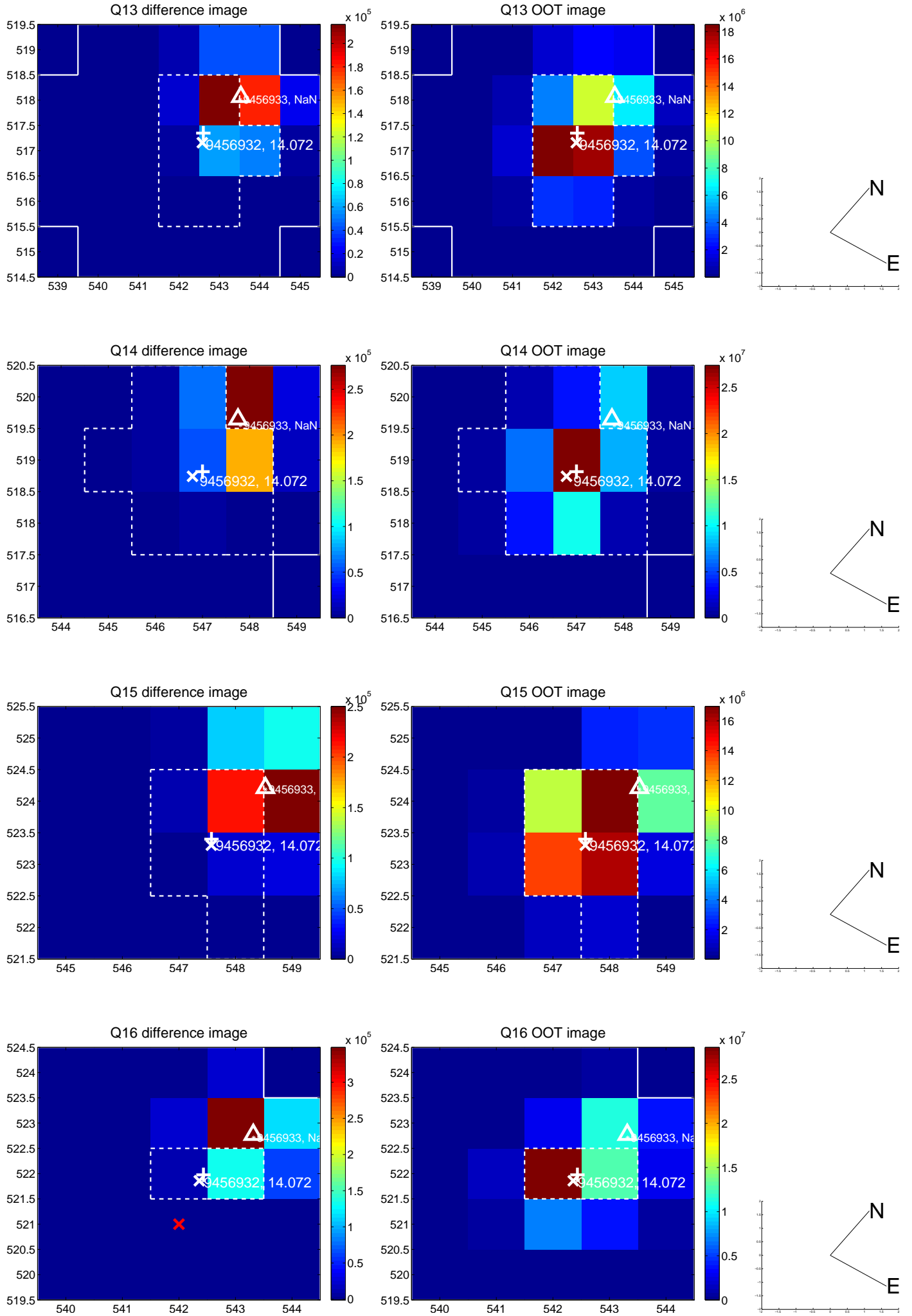
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



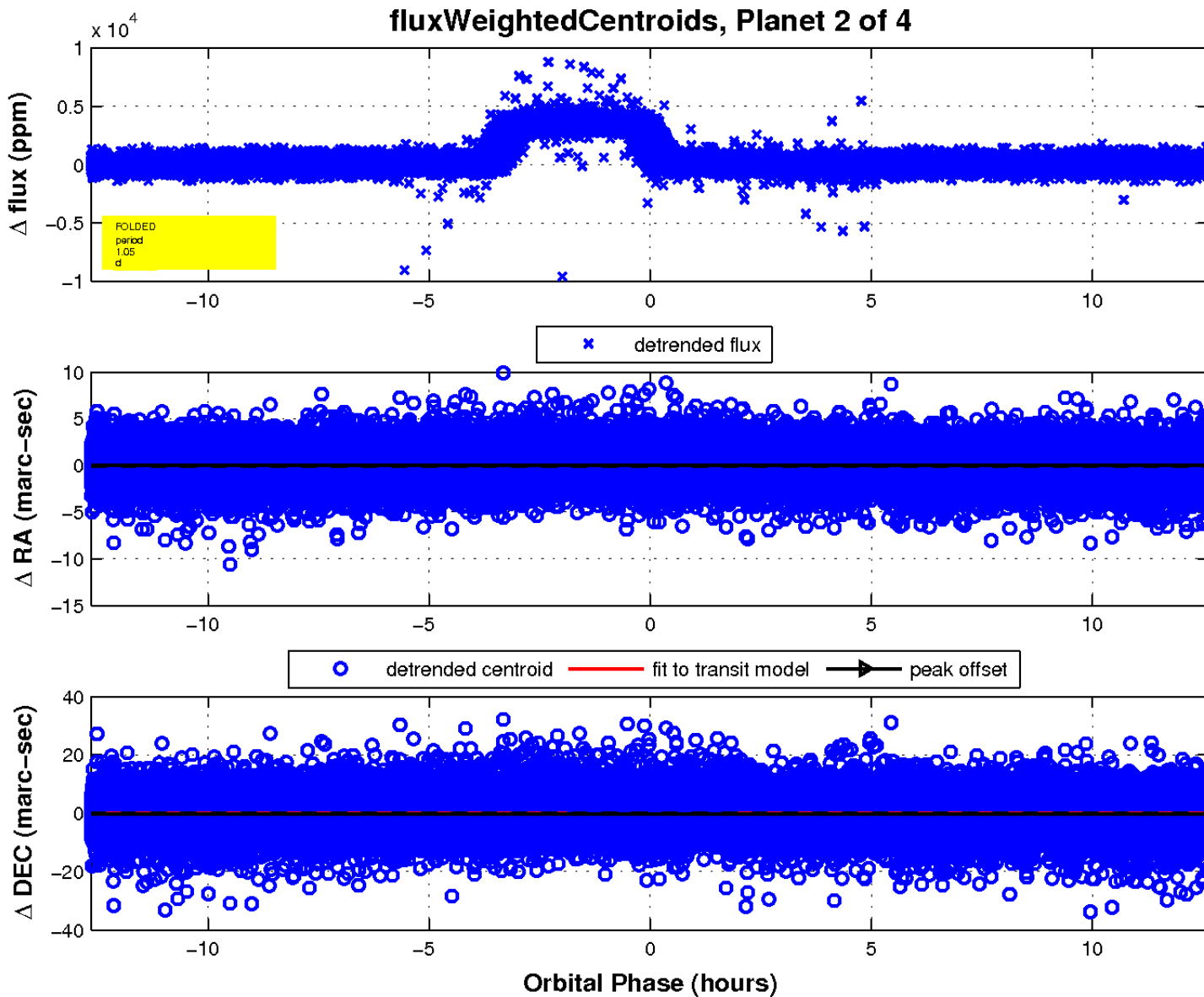
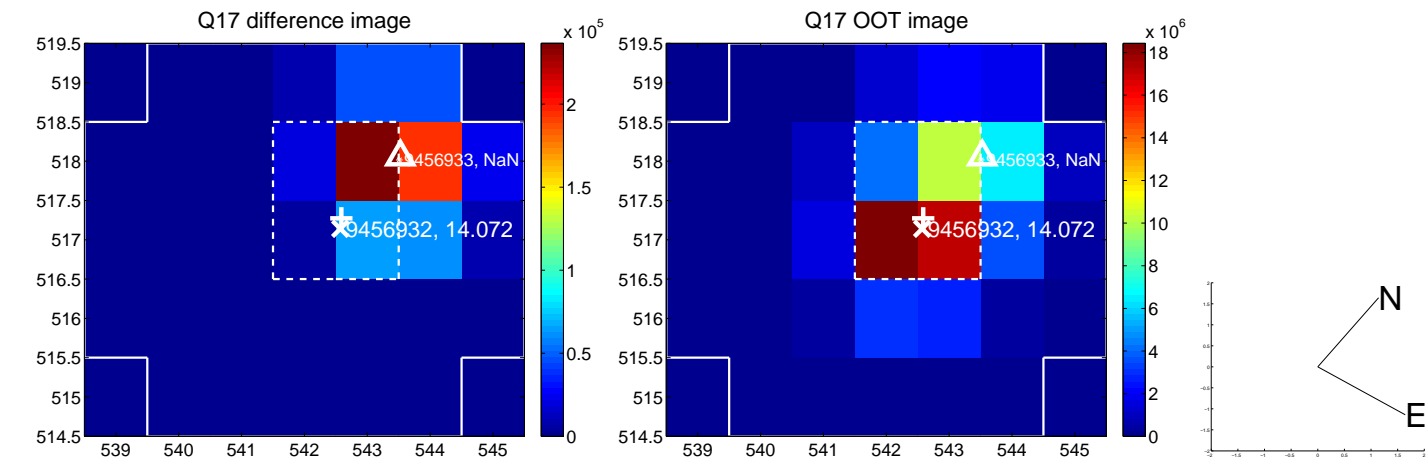
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

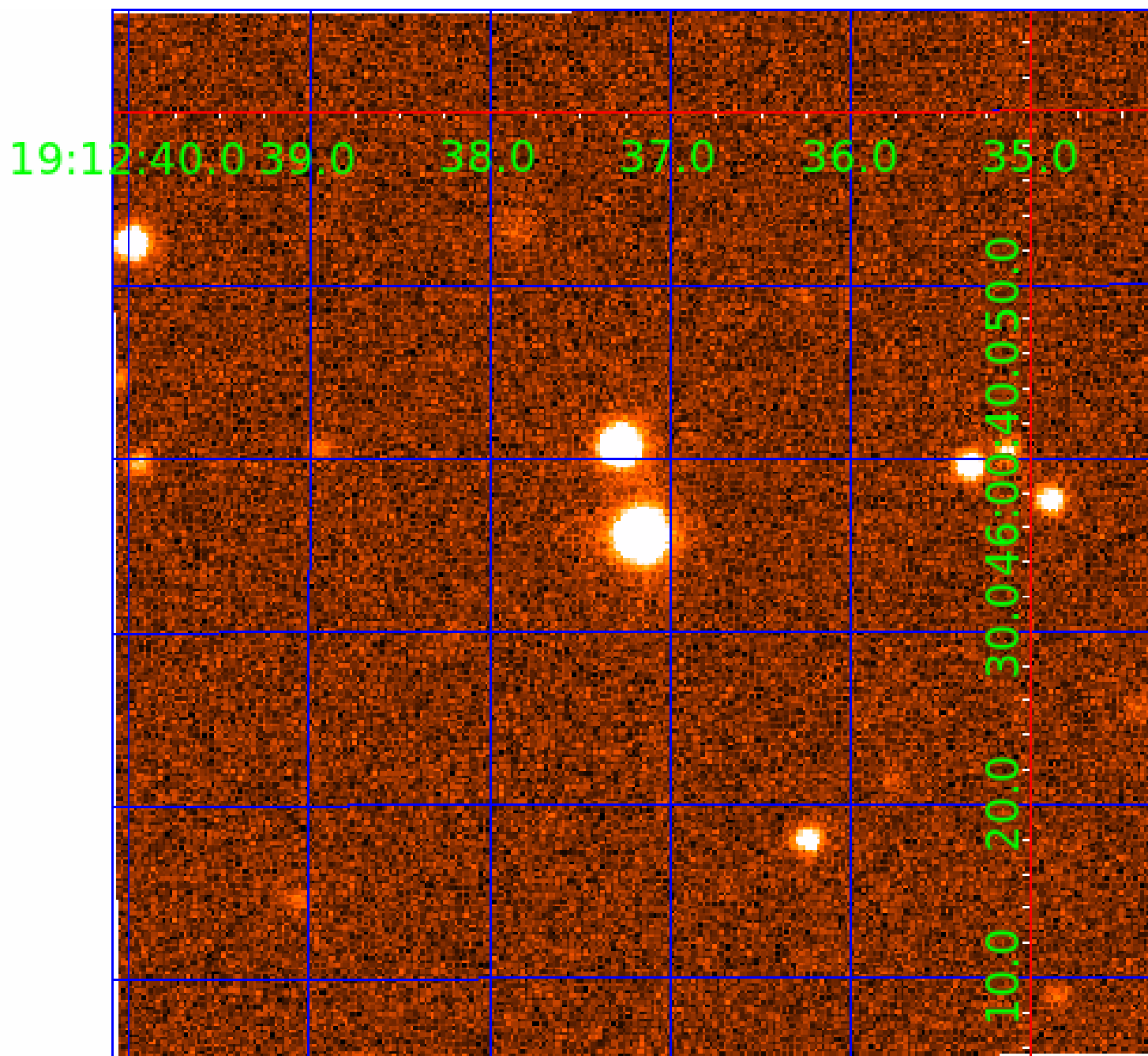


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 009456932

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009456932-01	OBS	No	1.053977	131.779744	838.2	1.500	19.5	-1.0	0.95	5873	2.73	2344.91
009456932-02	OBS	No	1.053953	131.804510	72.0	7.729	8.7	11.1	0.95	5873	0.80	2344.98
009456932-03	OBS	No	16.324614	141.315646	512.0	1.708	8.2	10.2	0.95	5873	2.15	60.74
009456932-04	OBS	No	18.944733	135.506892	384.8	1.767	10.6	9.3	0.95	5873	2.17	49.80

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009456932-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—LPP_ALT—CENT_NOFITS
009456932-02	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—SAME_NTL_PERIOD—CENT_RESOLVED_OFFSET
009456932-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_RESOLVED_OFFSET
009456932-04	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_KIC_POS—HALO_GHOST

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

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

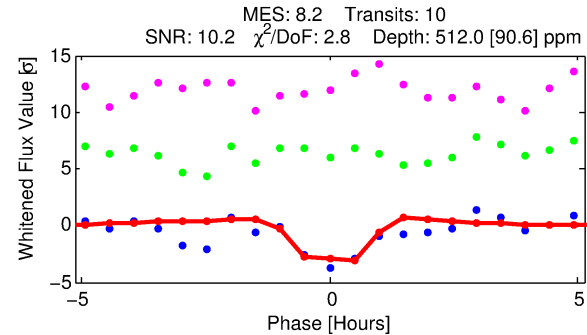
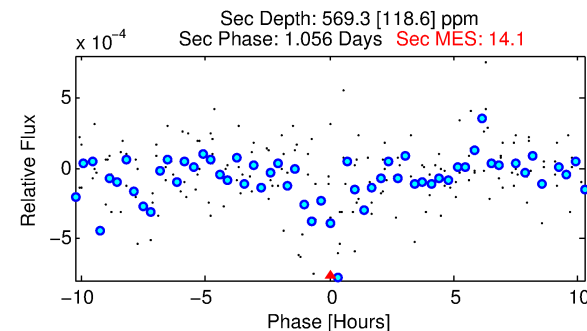
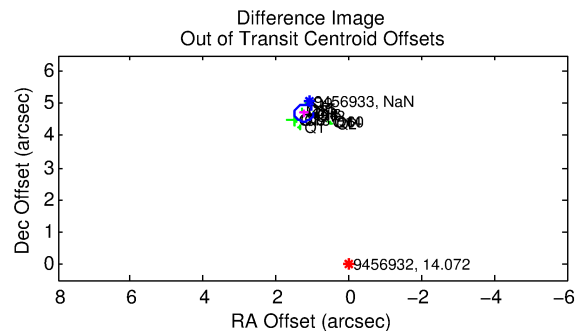
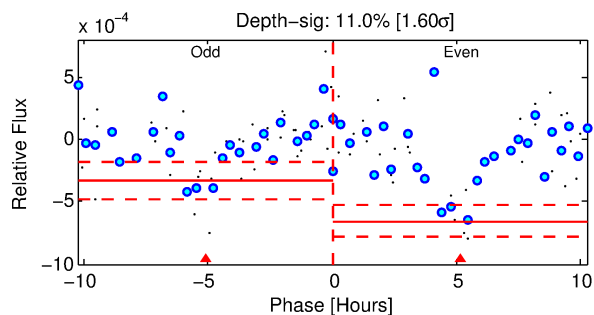
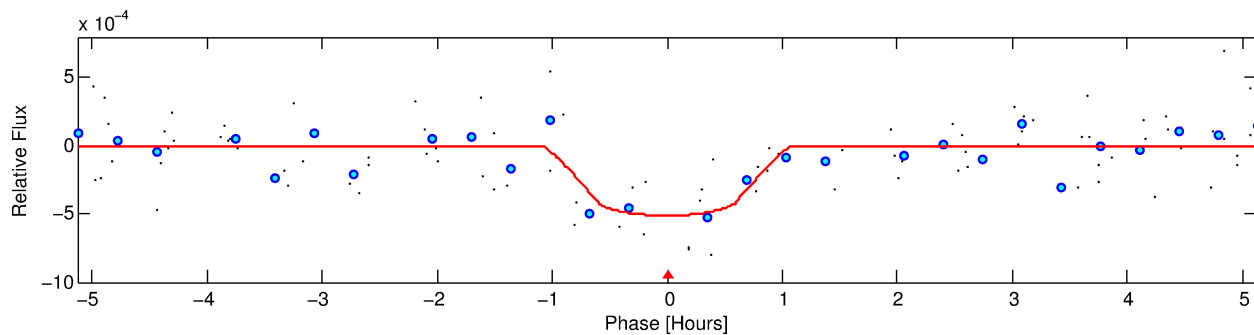
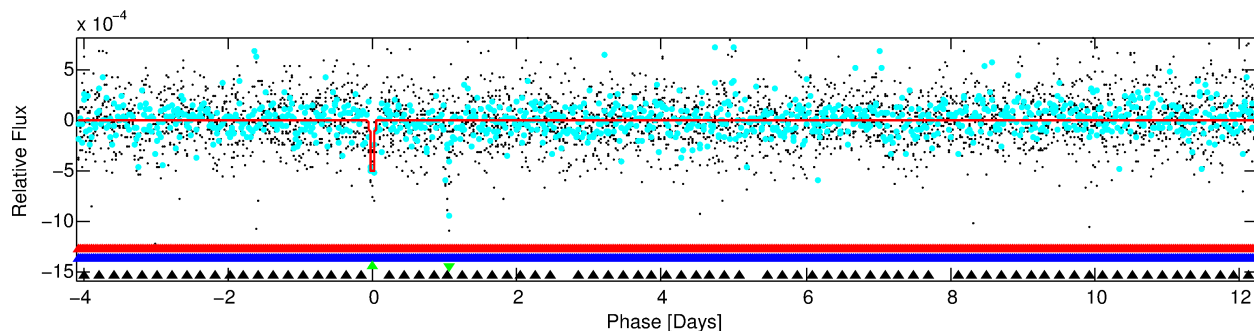
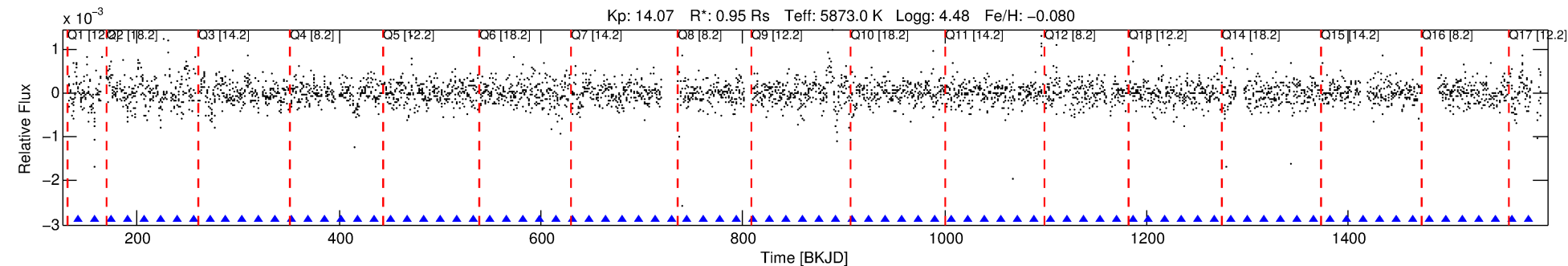
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009456932-03

No Significant Match Found

# DV One-Page Summary

KIC: 9456932 Candidate: 3 of 4 Period: 16.325 d



## DV Fit Results:

Period = 16.32461 [0.00025] d  
Epoch = 141.3156 [0.0108] BKJD  
Rp/R\* = 0.0209 [0.0650]  
a/R\* = 71.27 [1005.11]  
b = 0.30 [43.37]  
Seff = 60.74 [23.97]  
Teq = 712 [70] K  
Rp = 2.15 [6.75] Re  
a = 0.1255 [0.0320] AU  
Ag = 1061.78 [6635.67] [0.16 $\sigma$ ]  
Teffp = 6283 [9800] K [0.57 $\sigma$ ]

## DV Diagnostic Results:

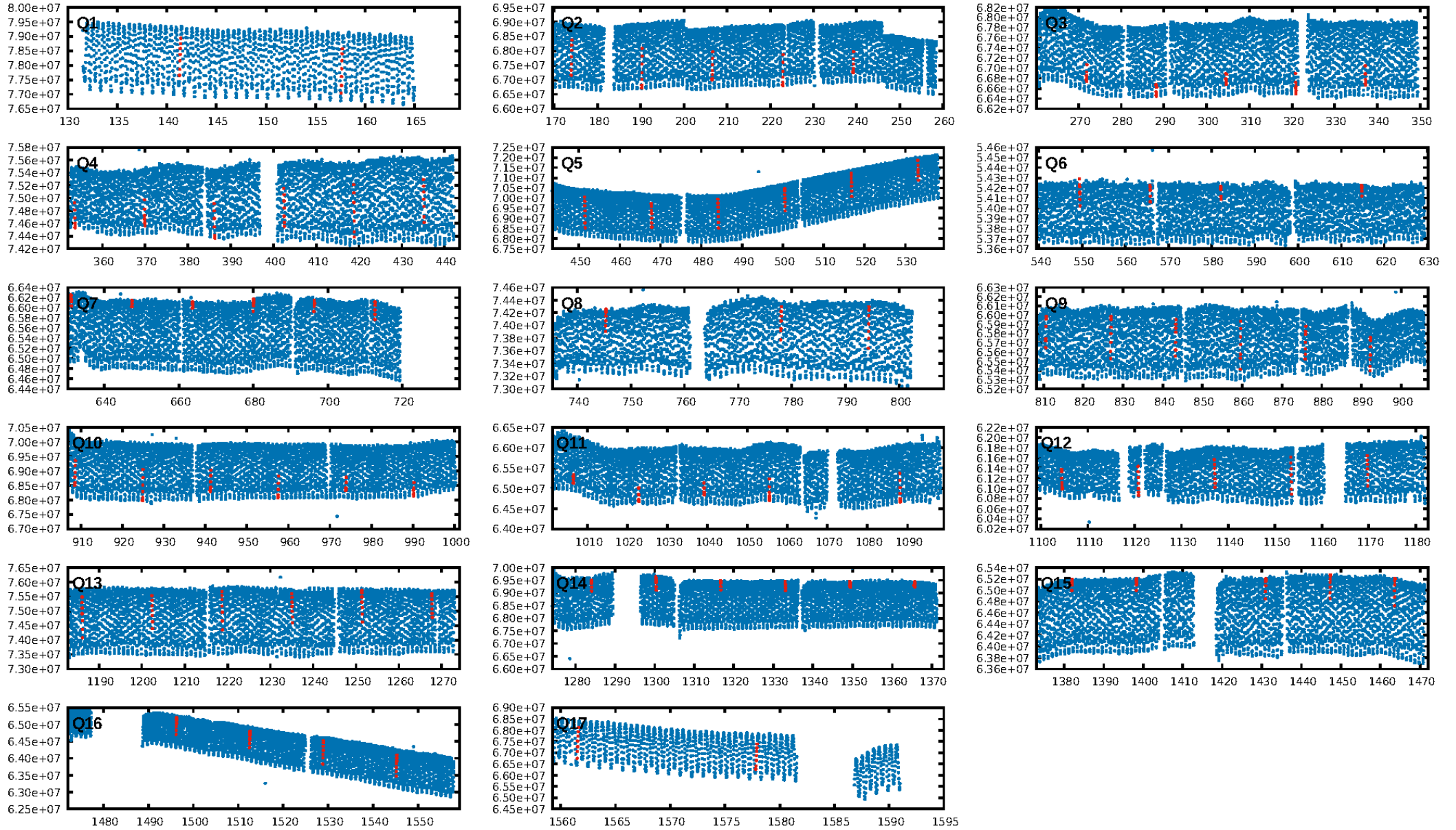
ShortPeriod-sig: 100.0% [161.23 $\sigma$ ]  
LongPeriod-sig: 100.0% [25.58 $\sigma$ ]  
ModelChiSquare2-sig: 0.1%  
ModelChiSquareGof-sig: 55.1%  
Bootstrap-pfa: 4.63e-17  
RollingBand-fgt: 1.00 [8/8]  
GhostDiagnostic-chr: 0.3615  
Centroid-sig: 0.6%  
Centroid-so: 3.736 arcsec [2.12 $\sigma$ ]  
OotOffset-rm: 4.874 arcsec [55.51 $\sigma$ ]  
KicOffset-rm: 5.232 arcsec [73.72 $\sigma$ ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.47 [8/17]  
DiffImageOverlap-fno: 0.53 [9/17]

Software Revision: svn-ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 00:17:49 Z

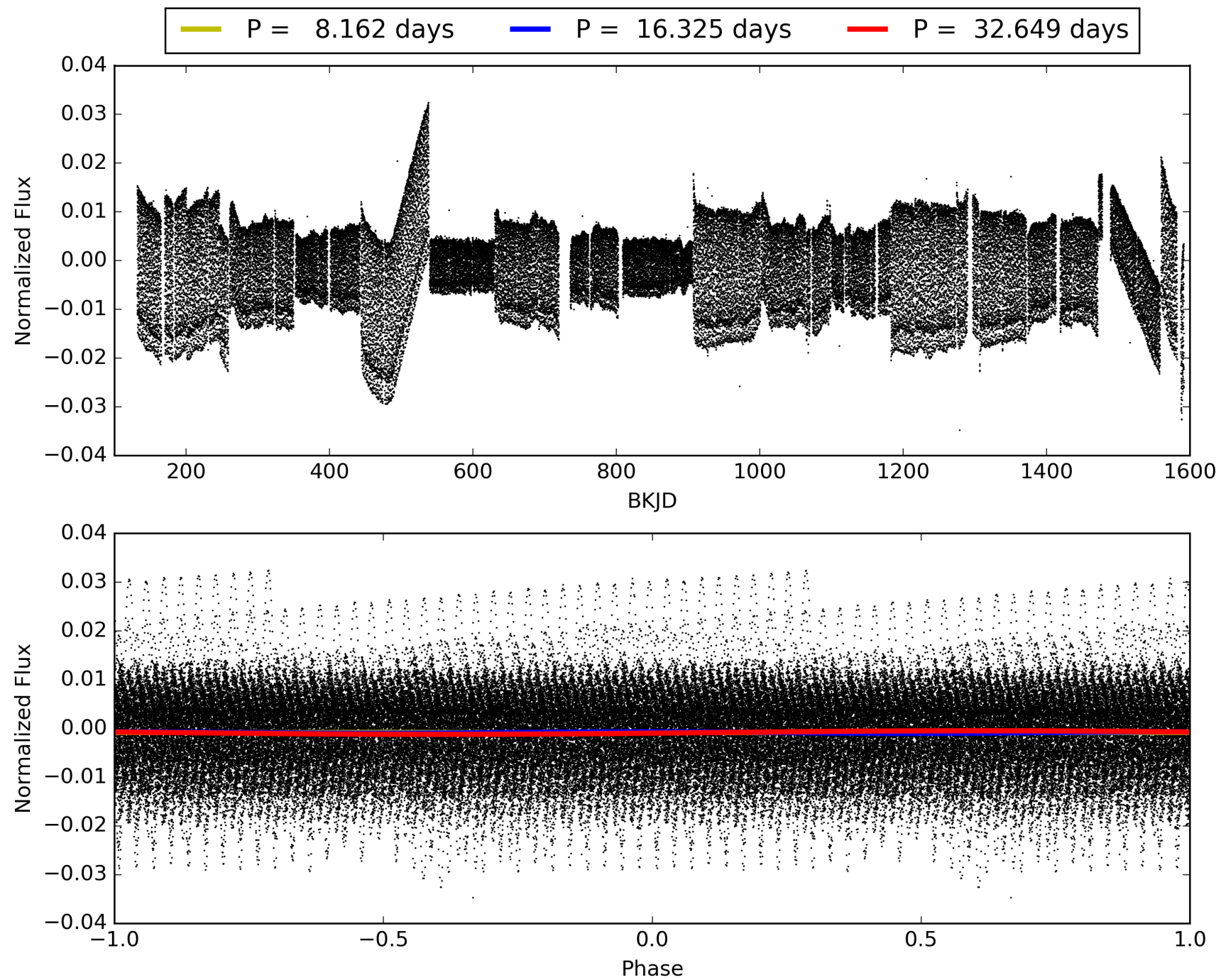
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 009456932-03, PDC Light Curves

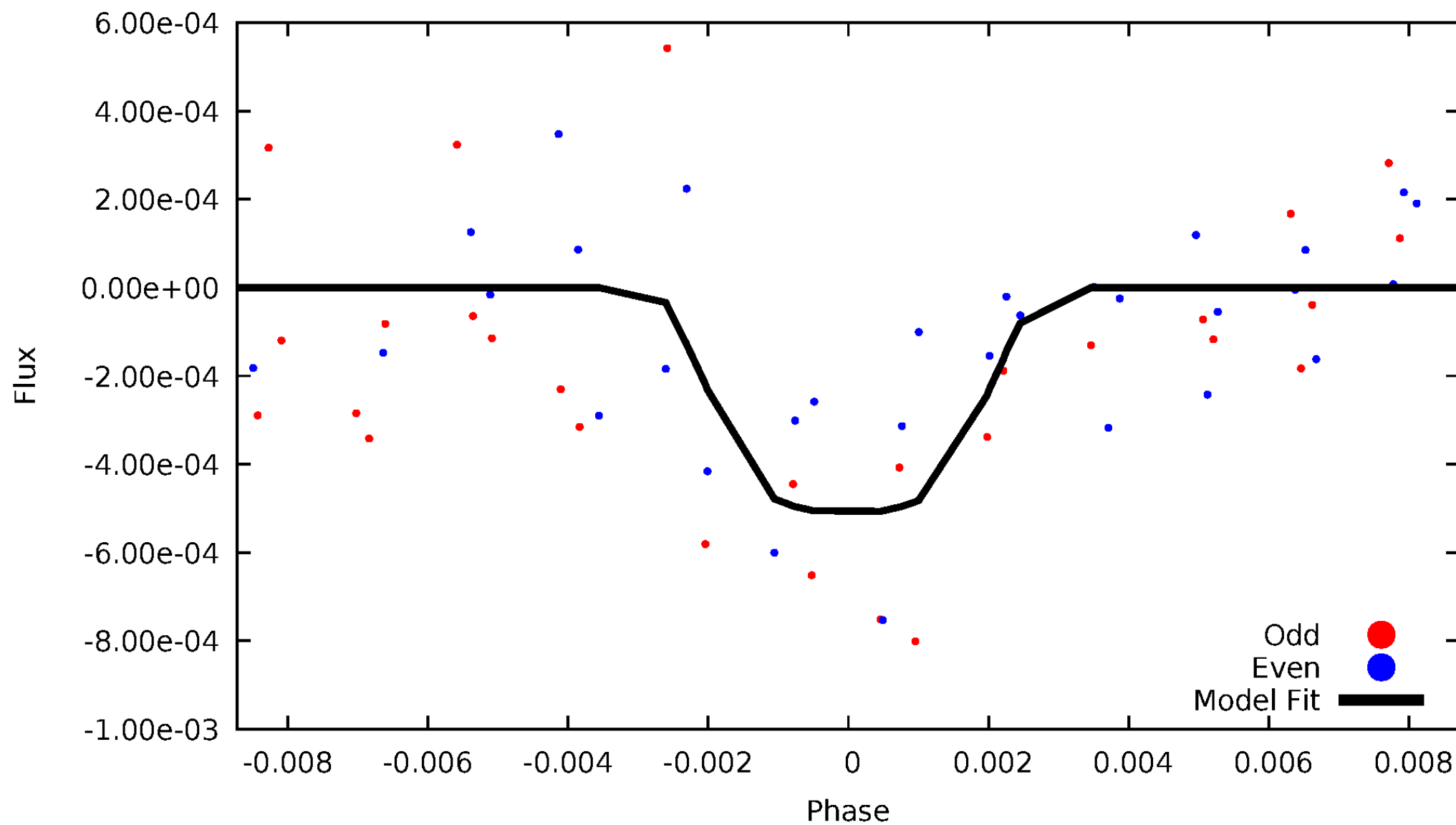


# TCE 009456932-03



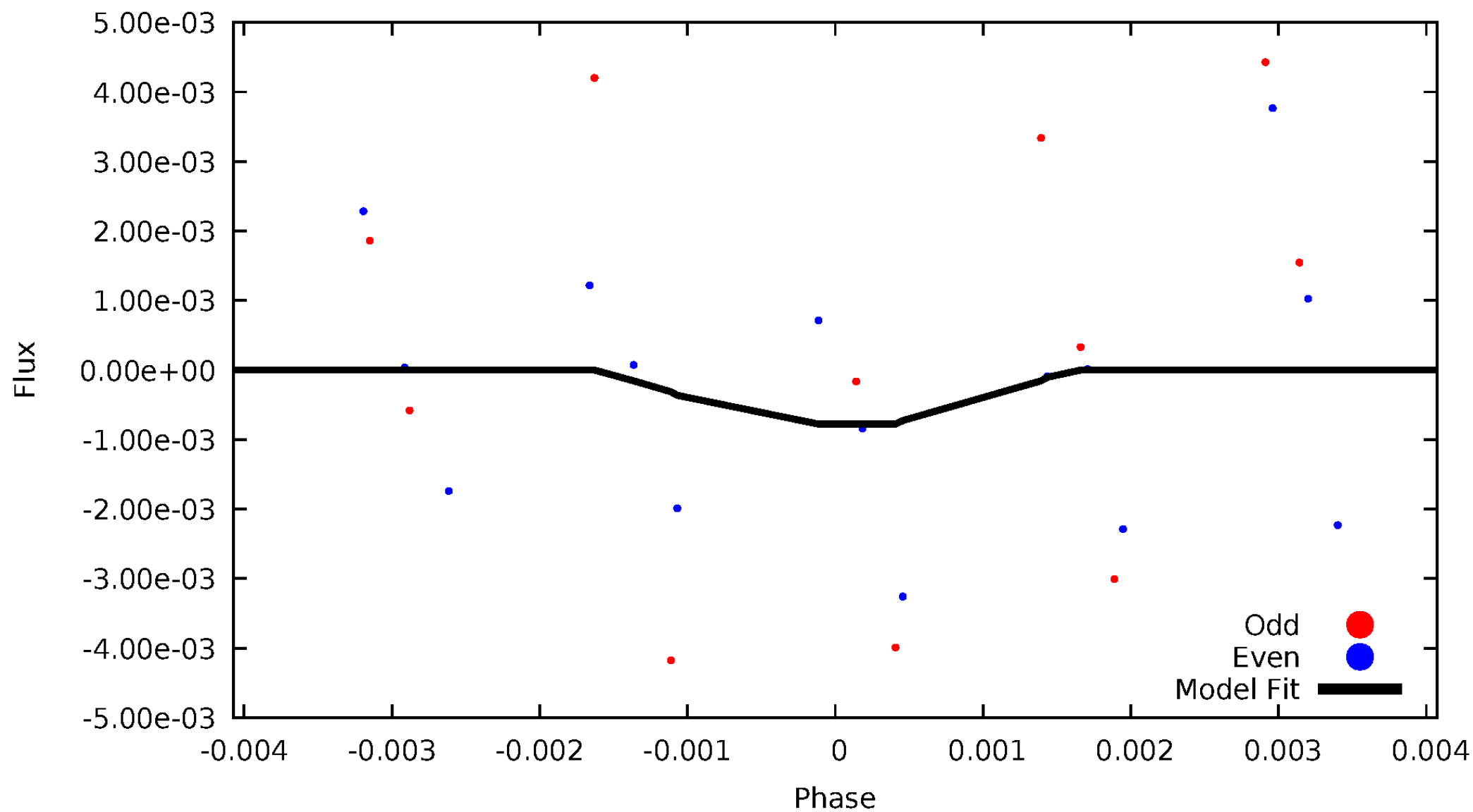
# DV Odd/Even

TCE 009456932-03



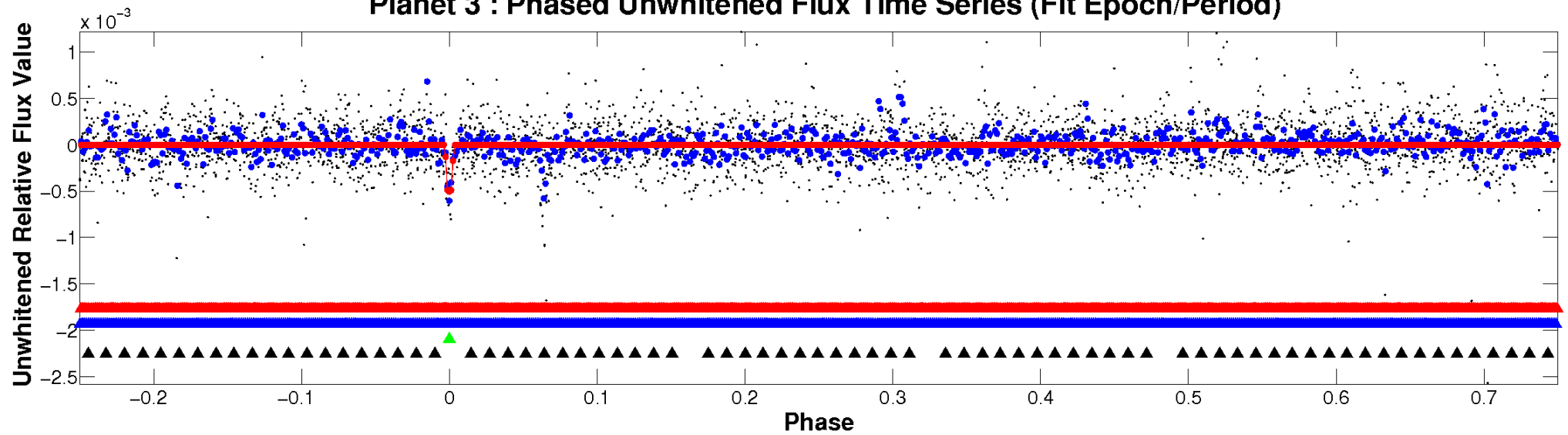
# ALT Odd/Even

TCE 009456932-03

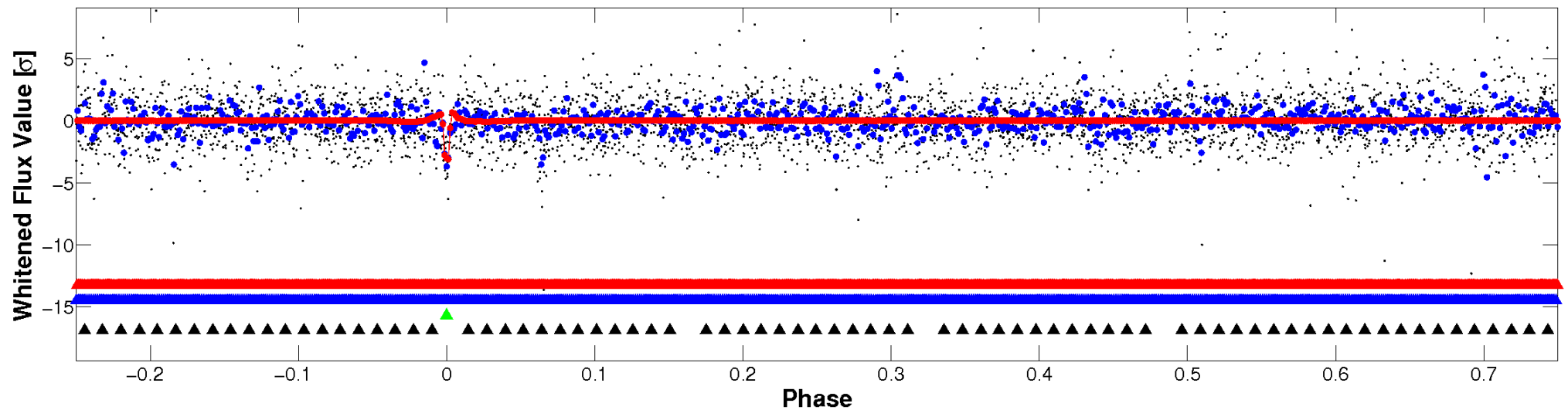


# Non-Whitened Vs. Whitened Light Curve

## Planet 3 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

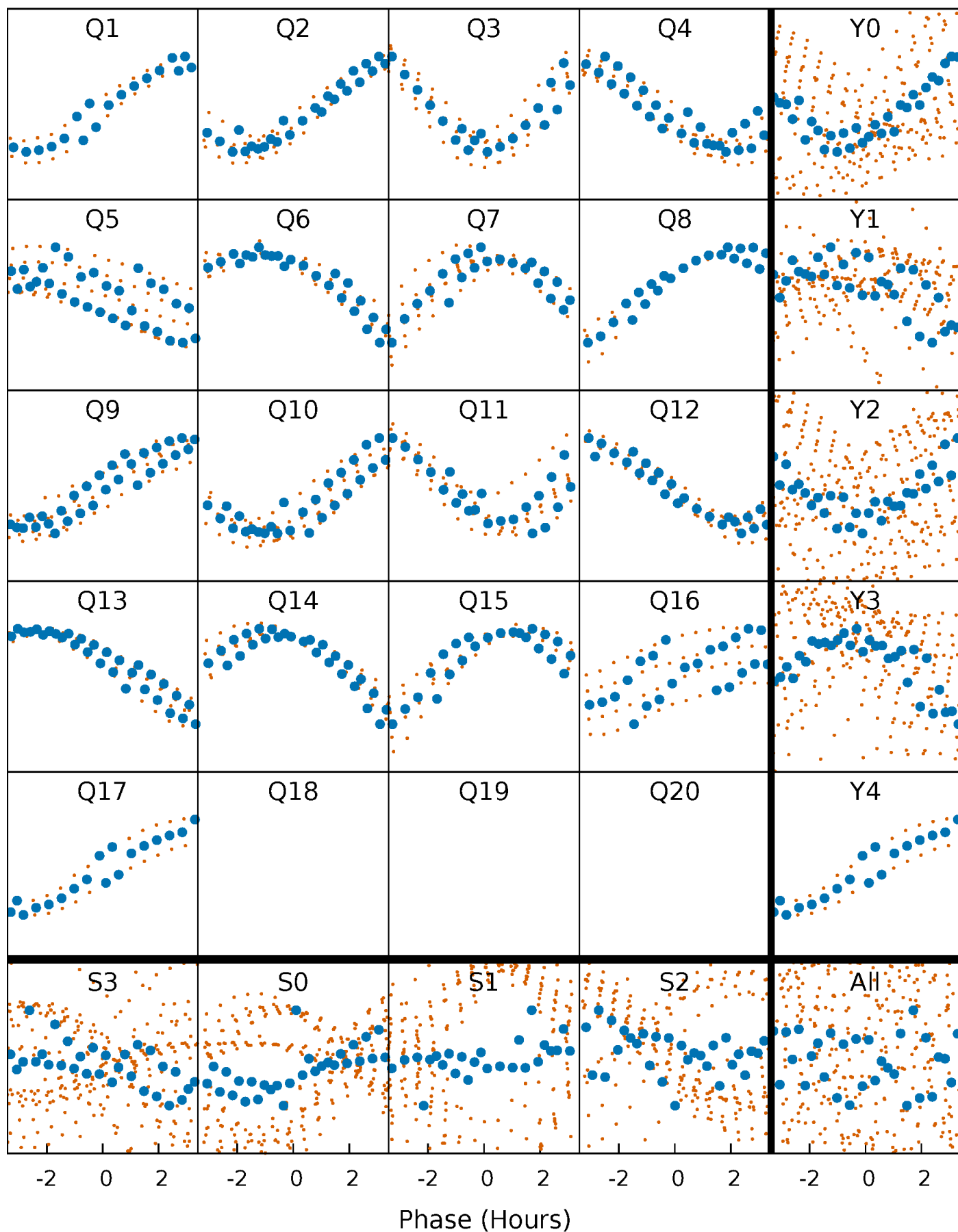


## Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



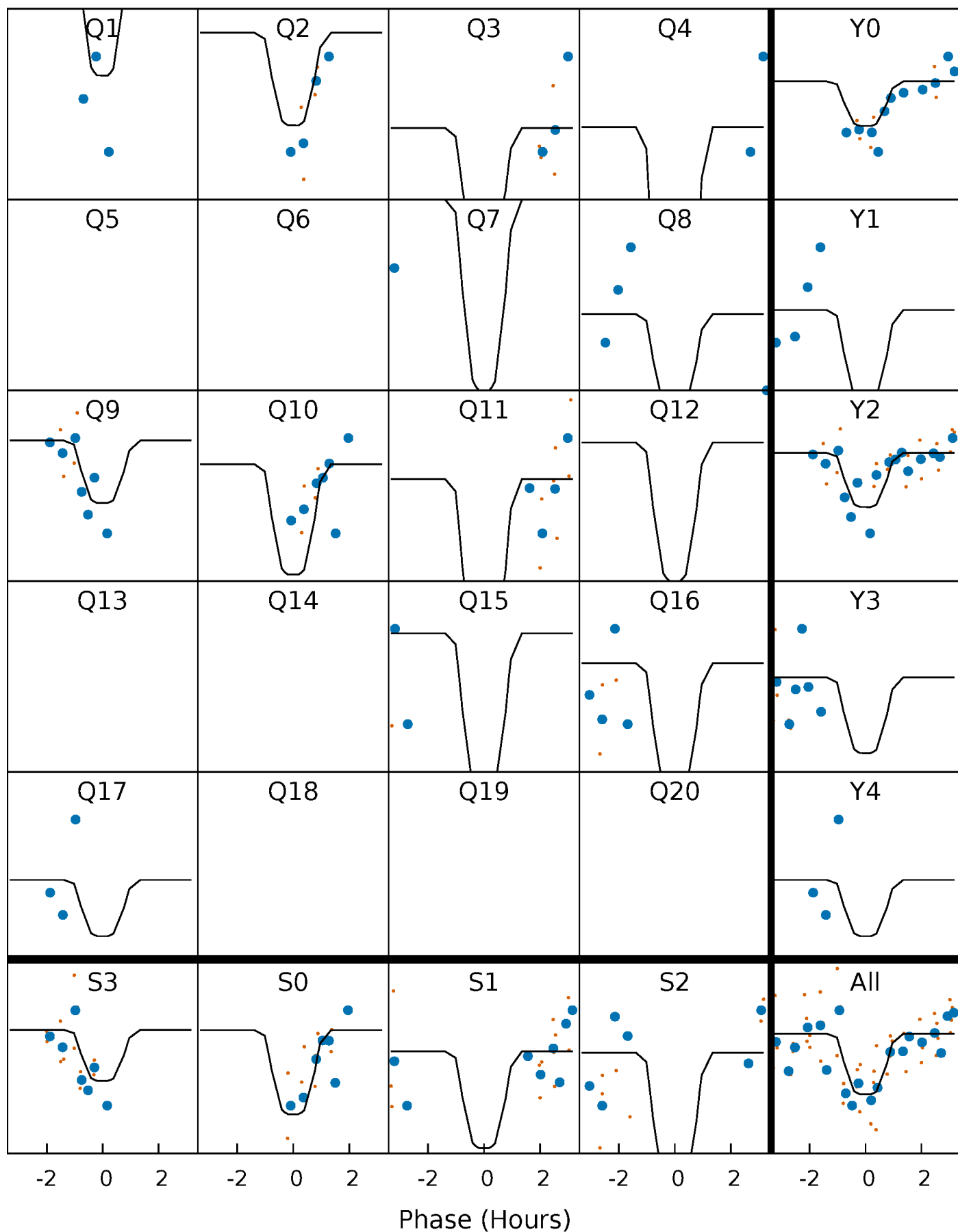
# PDC Quarter-Phased Transit Curves

TCE 009456932-03   P= 16.324614 Days    $T_0=141.315646$  (BKJD)



# DV Quarter-Phased Transit Curves

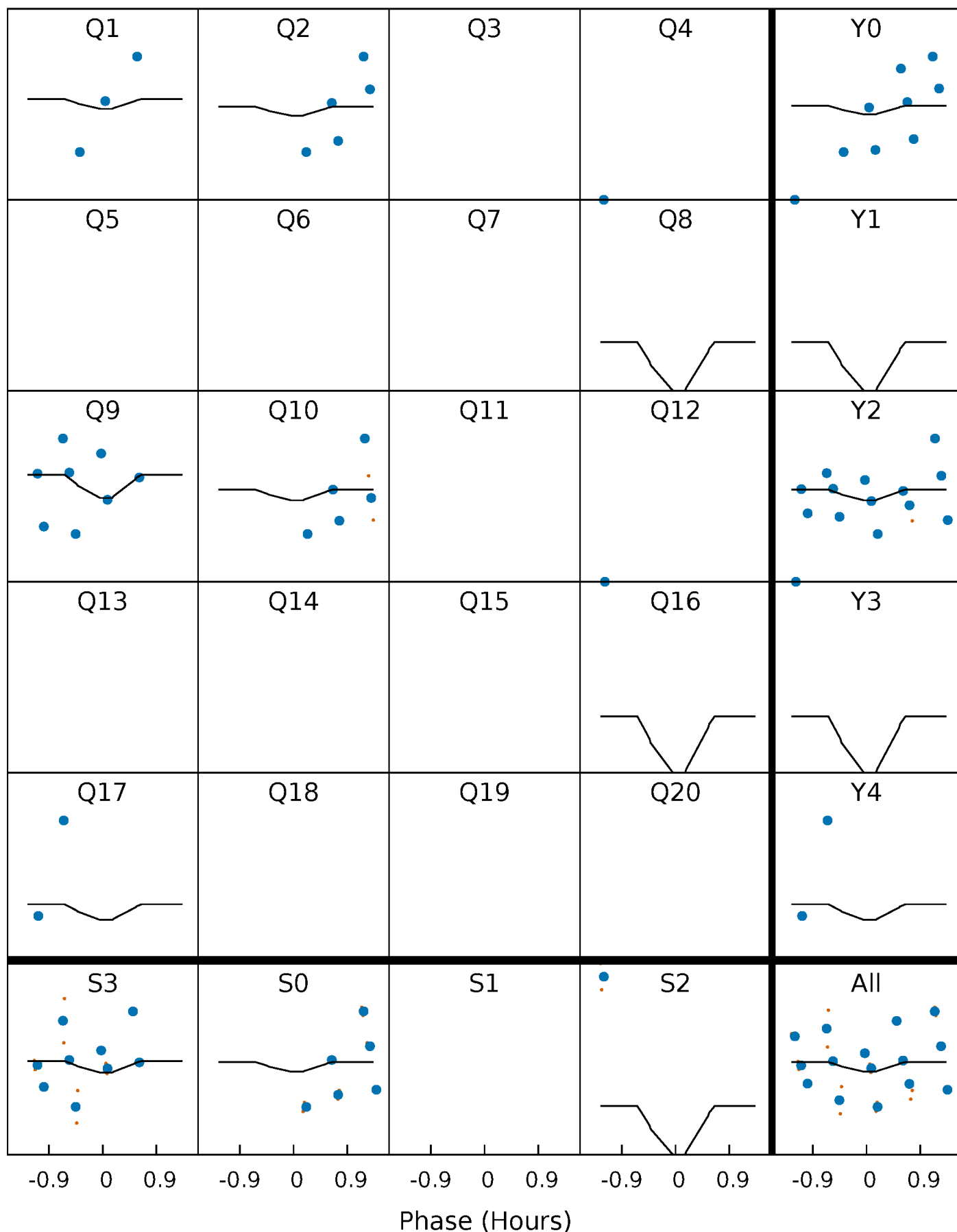
TCE 009456932-03 P= 16.324614 Days  $T_0=141.315646$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

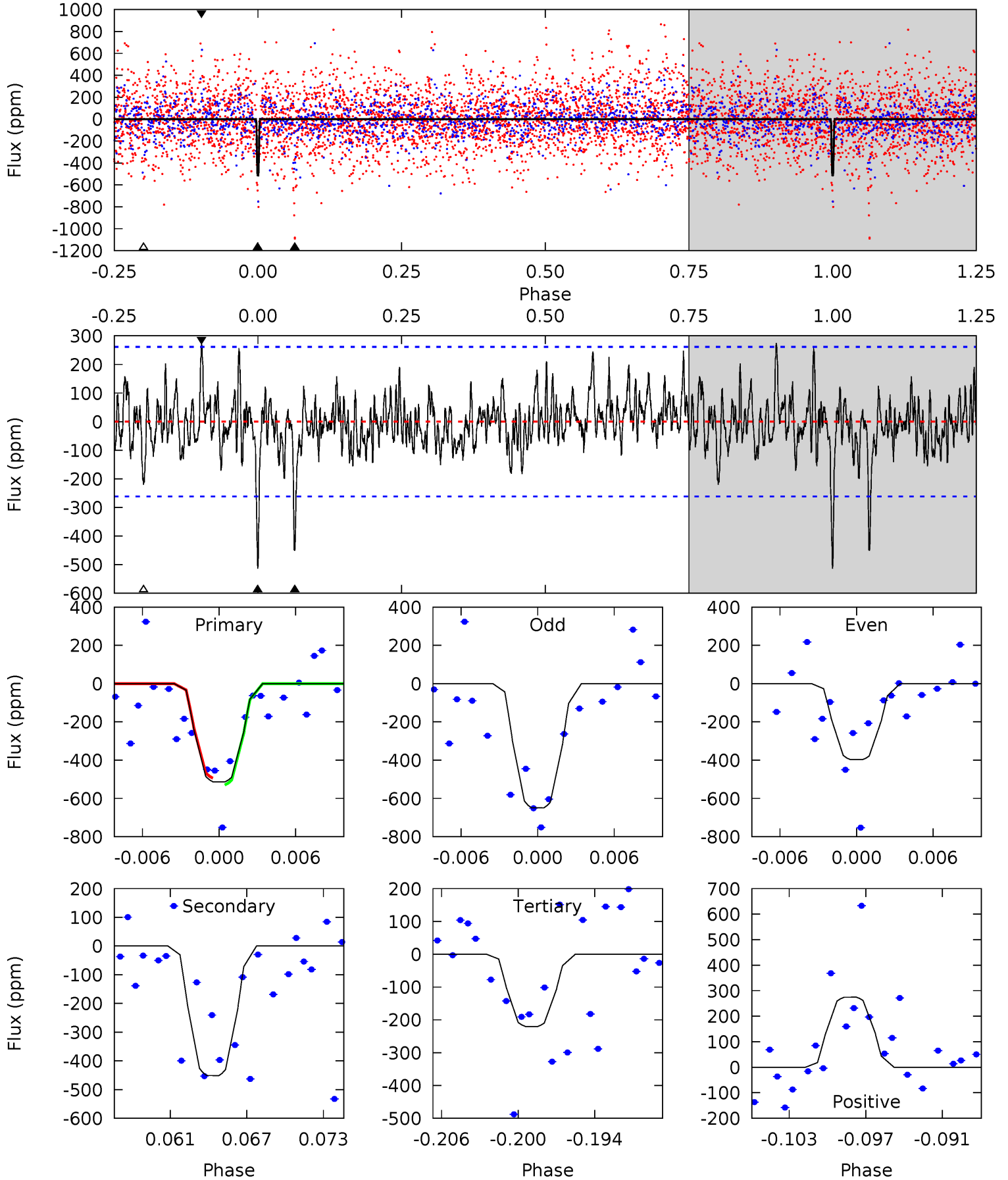
TCE 009456932-03 P= 16.324609 Days  $T_0=141.300473$  (BKJD)



# DV Model-Shift Uniqueness Test

009456932-03, P = 16.324614 Days, E = 124.991032 Days

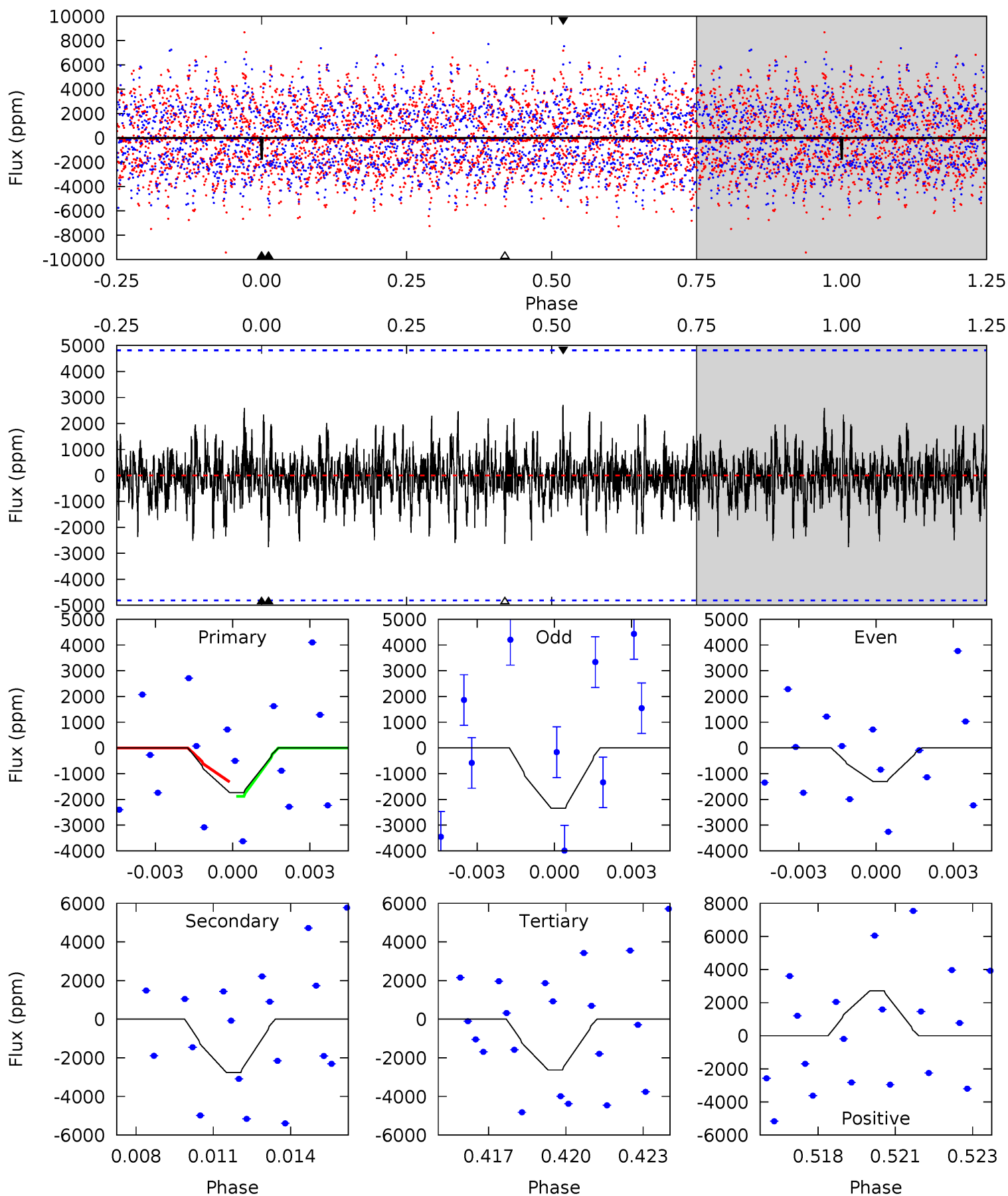
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.1	8.85	4.32	5.38	5.12	2.74	1.45	5.75	4.68	4.53	3.46	2.40	0.91	0.35	0.35



# Alt Model-Shift Uniqueness Test

009456932-03, P = 16.324609 Days, E = 124.975864 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
1.89	3.02	2.88	2.97	5.27	2.99	0.81	-0.99	-1.07	0.14	0.06	0.60	0.59	0.50	0.30



### Stellar Parameters For KIC 009456932

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5873^{+146}_{-176}$	$4.480^{+0.065}_{-0.208}$	$-0.080^{+0.300}_{-0.300}$	$0.947^{+0.282}_{-0.094}$	$0.988^{+0.128}_{-0.117}$	$1.638^{+0.466}_{-0.869}$
	+2%/-3%	+1%/-5%	+375%/-375%	+30%/-10%	+13%/-12%	+28%/-53%
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 009456932-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-451 \pm 51$	$5.53^{+5.47}_{-3.40}$	$1011^{+70}_{-48}$	$4071^{+2097}_{-816}$	$126^{+768}_{-94}$
Alt.	$-2763 \pm 914$	$6.02^{+6.14}_{-4.12}$	$1009^{+68}_{-47}$	$5626^{+5677}_{-1431}$	$609^{+5830}_{-469}$

$T_{max}$  = 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

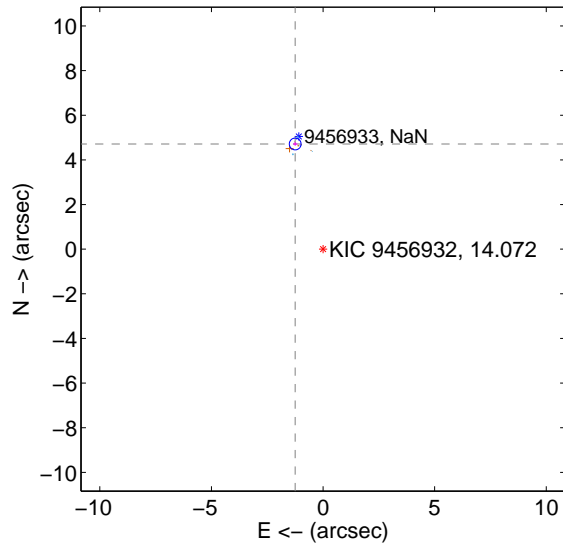
Supplemental centroid analysis for 009456932-03. Kepler magnitude: 14.07. Transit SNR 10.24

There are 8 quarters with good PRF difference image offsets

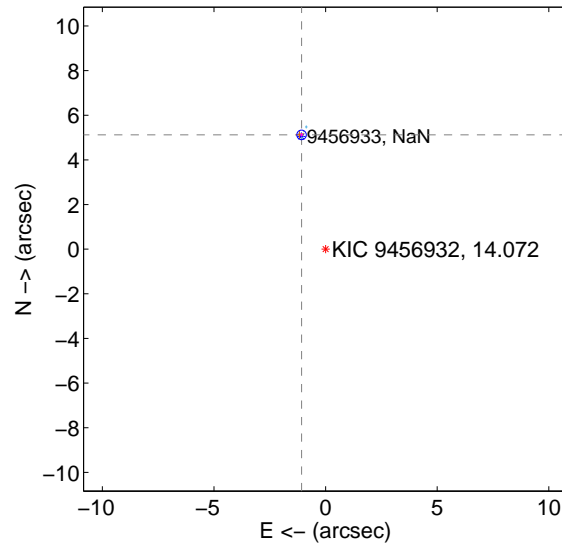
The direct PRF centroid is offset from the target star catalog position by about 0.70 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$4.874 \pm 0.088$	55.51	$1.248 \pm 0.101$	$4.711 \pm 0.083$
PRF-fit source offset from KIC position	$5.232 \pm 0.071$	73.72	$1.075 \pm 0.069$	$5.120 \pm 0.072$
photometric centroid source offset	$3.74 \pm 1.76$	2.12	$0.96 \pm 0.55$	$3.61 \pm 1.82$

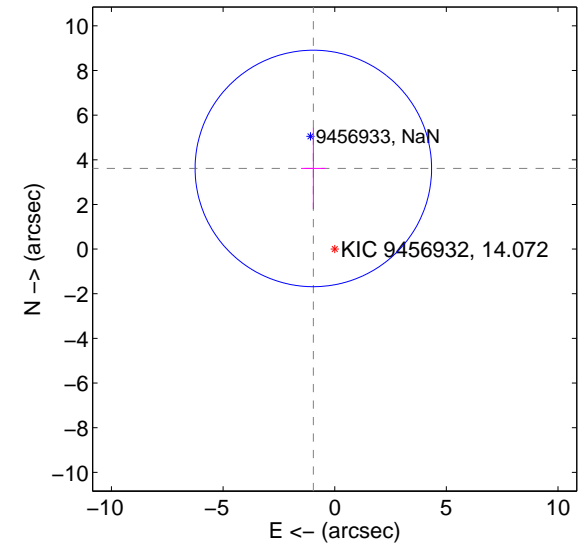
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

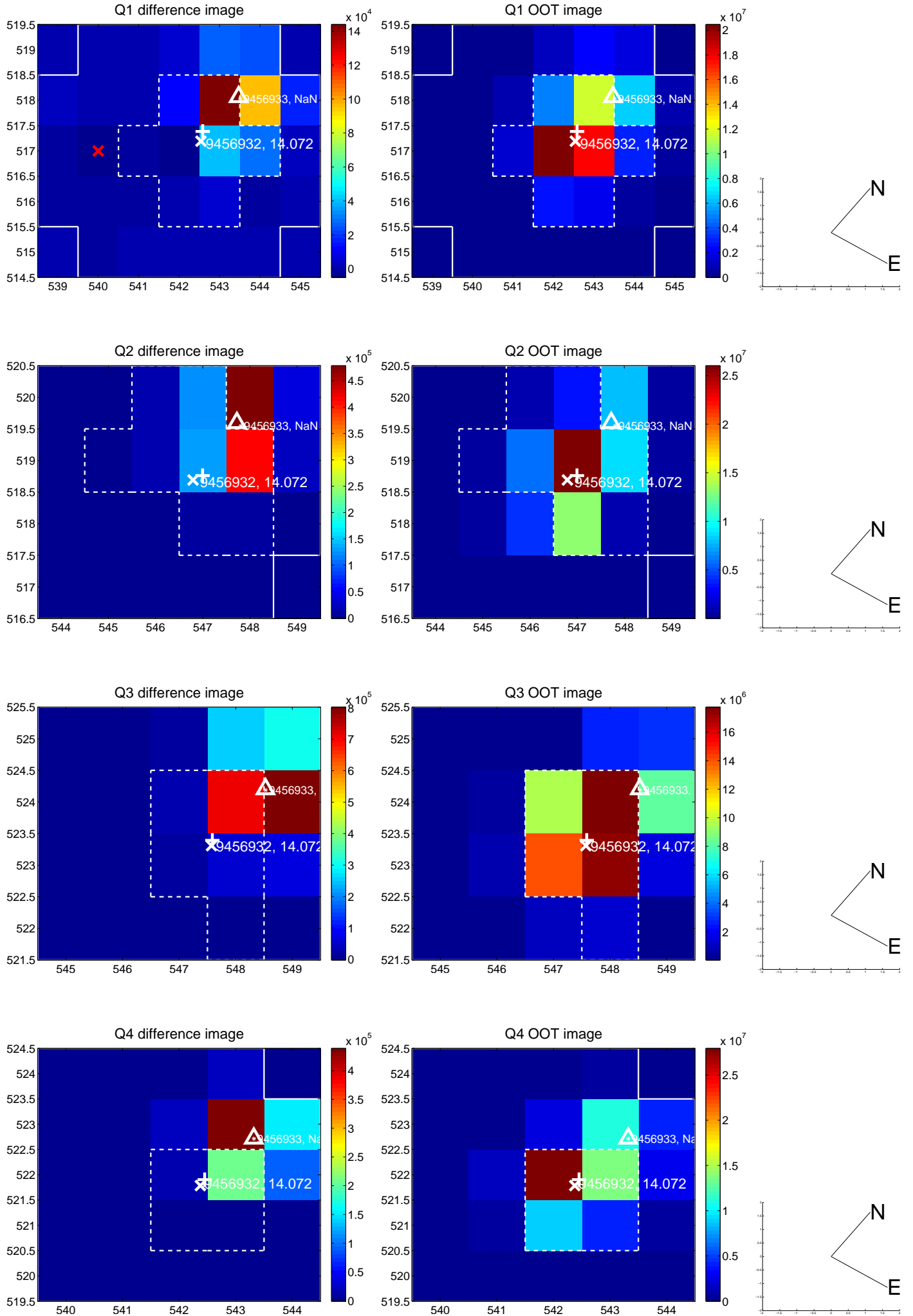


offset from photometric centroids

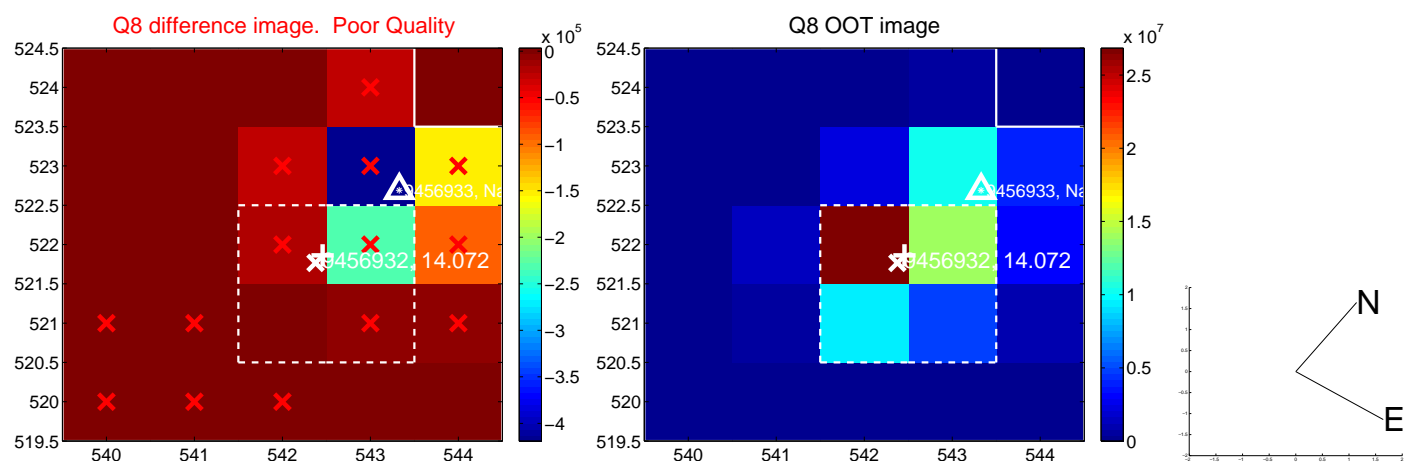
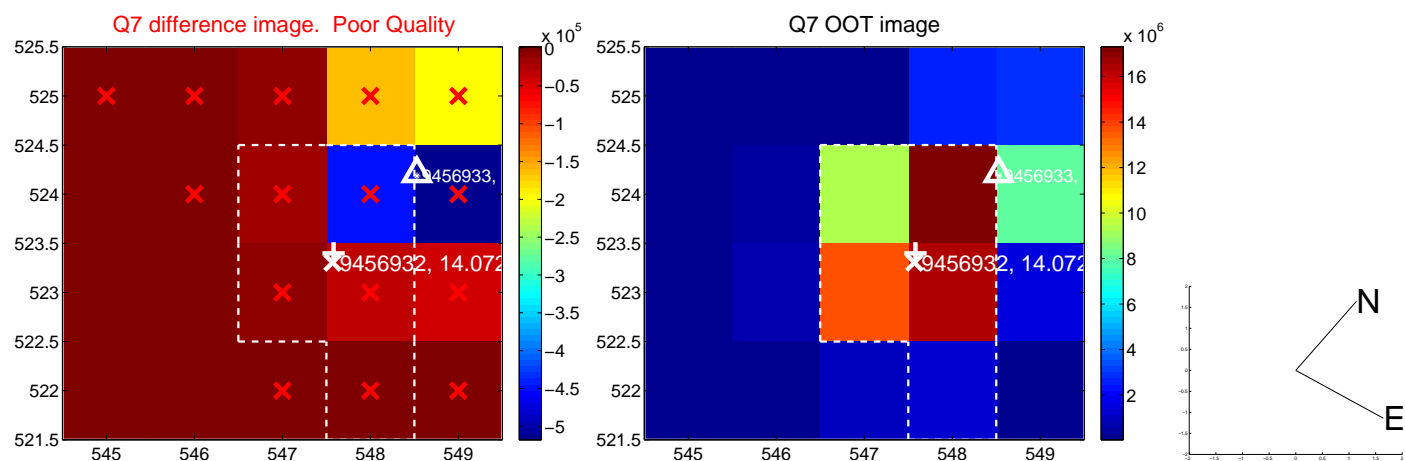
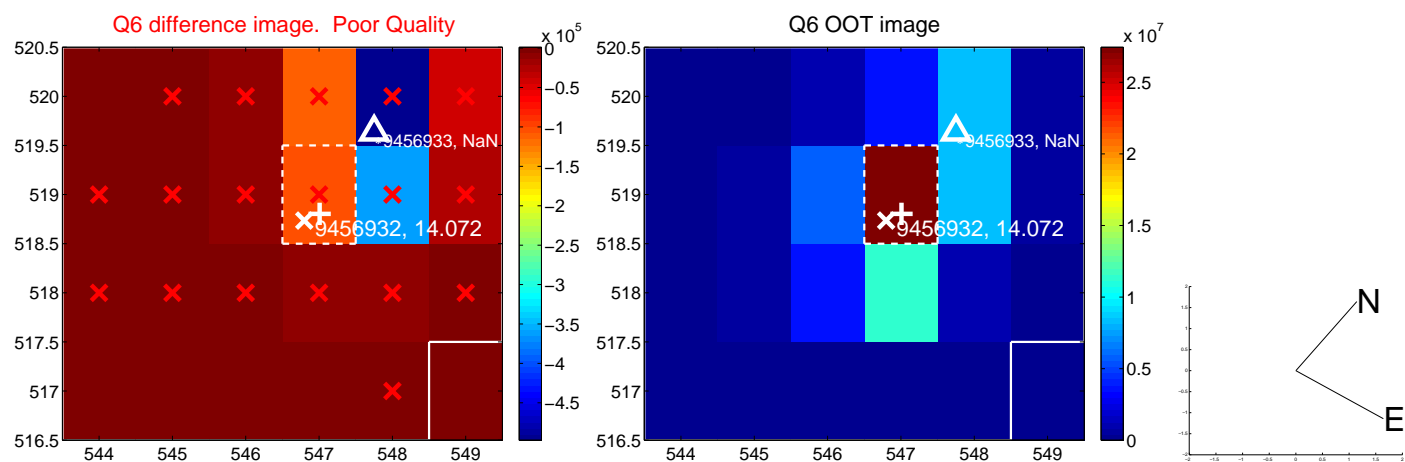
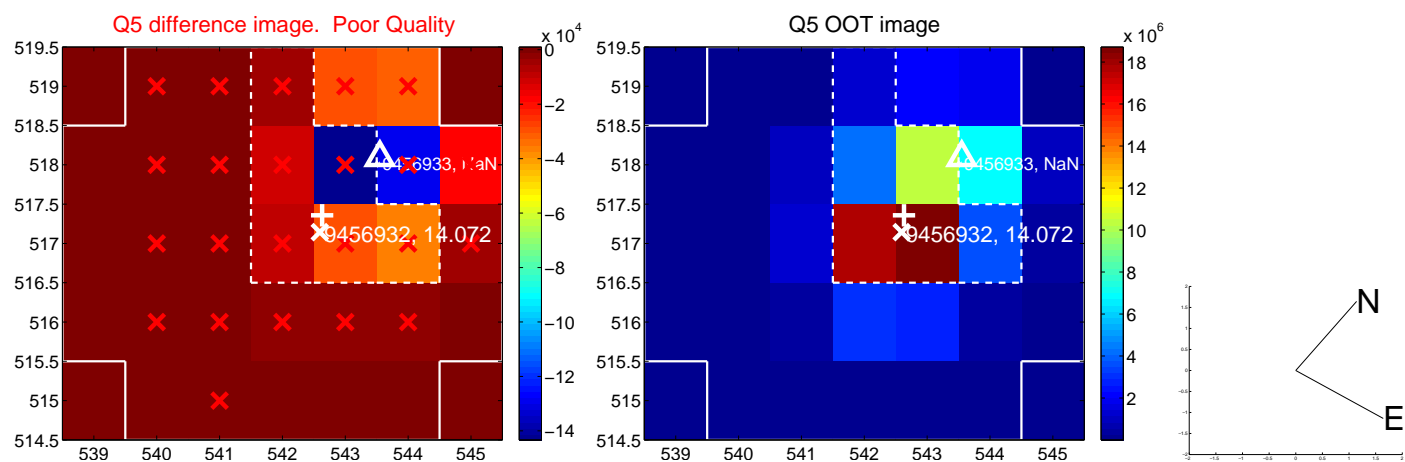


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

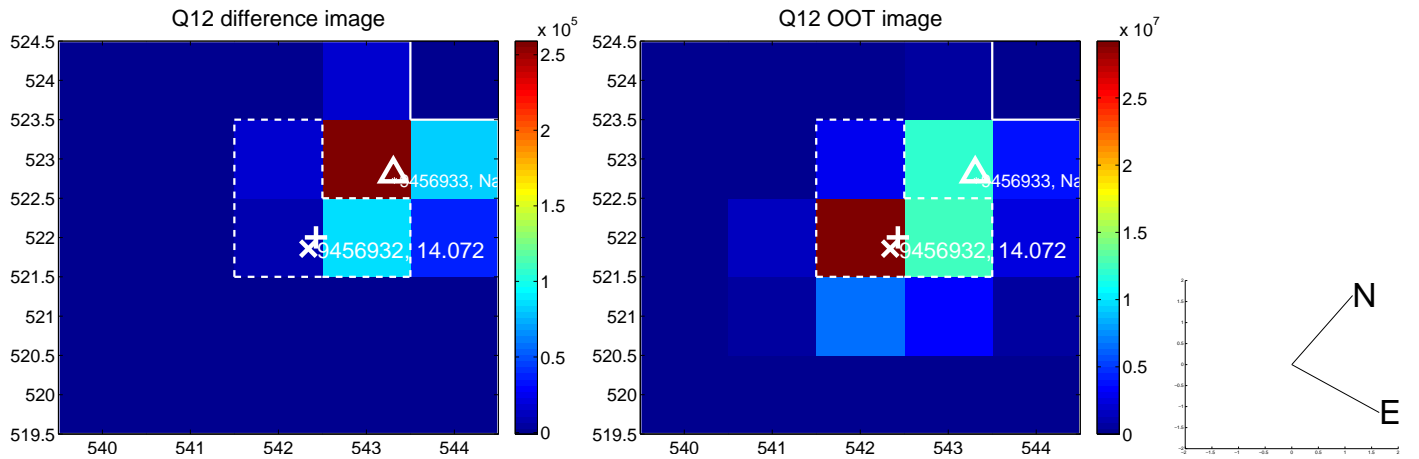
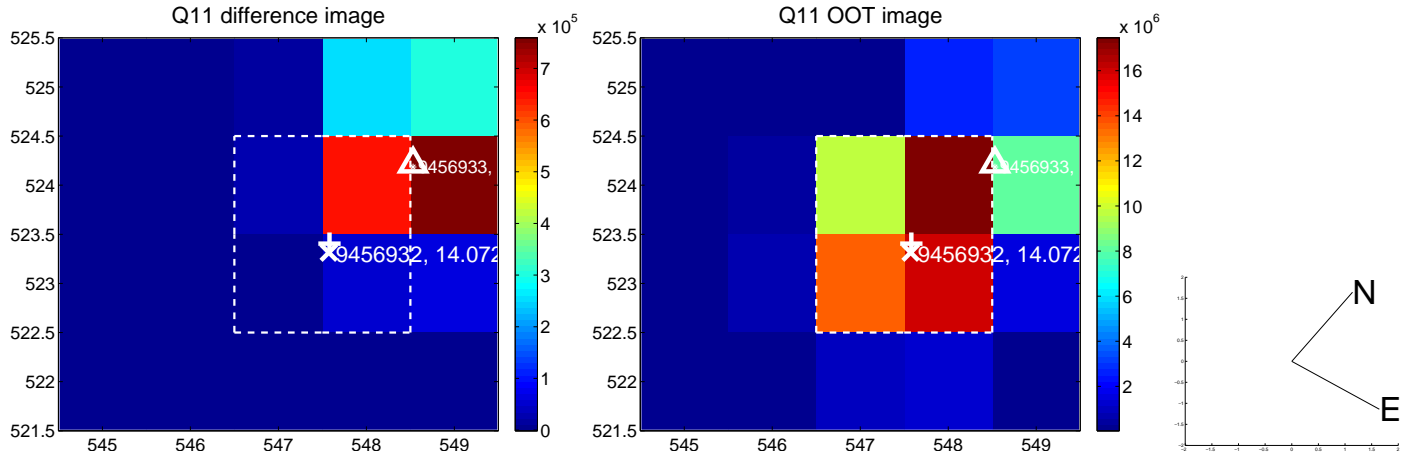
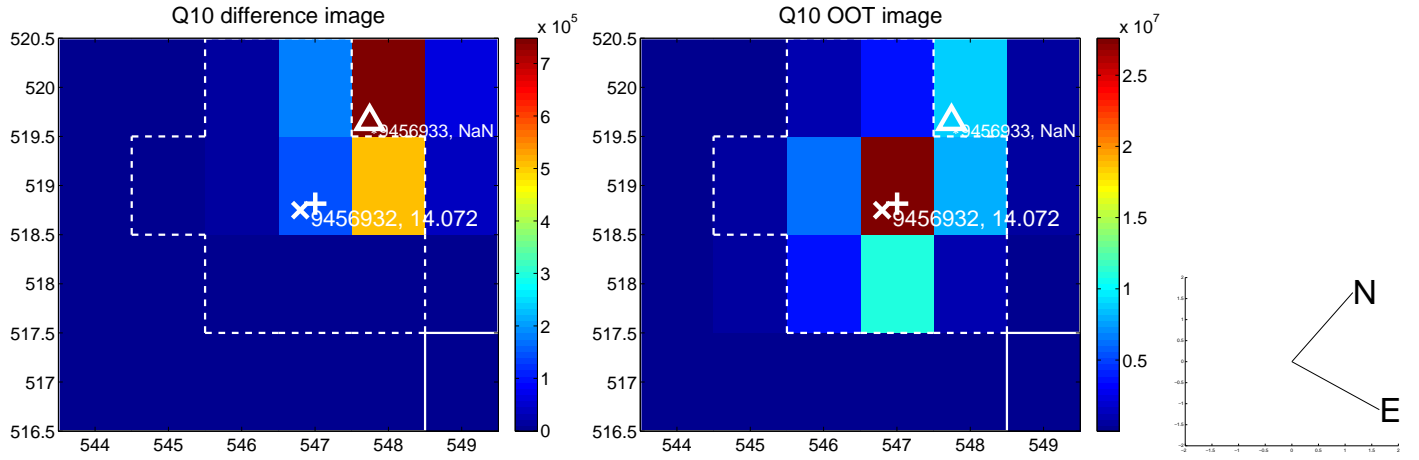
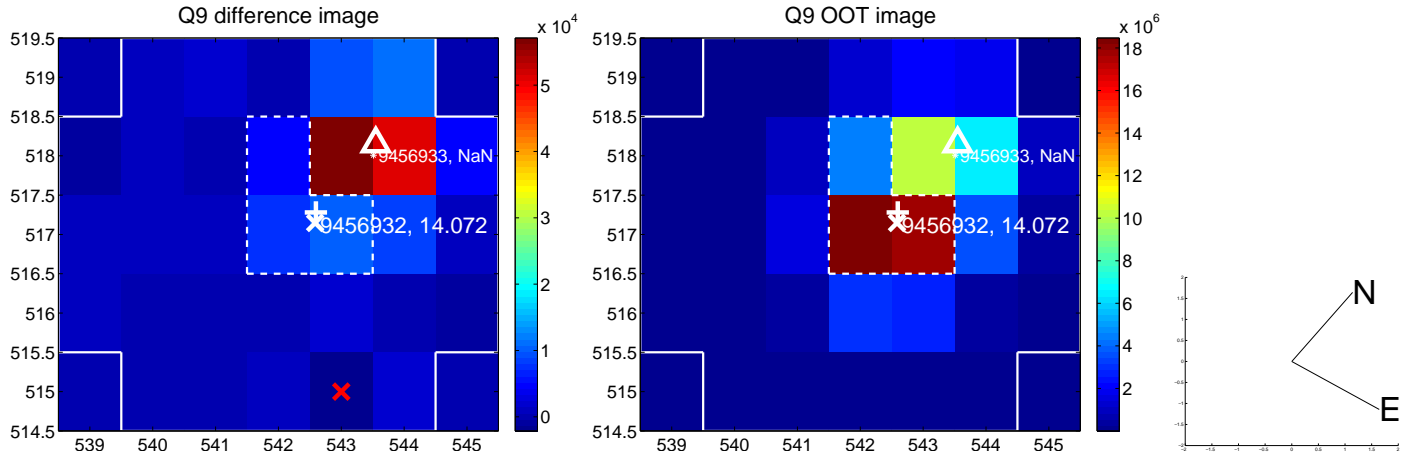


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

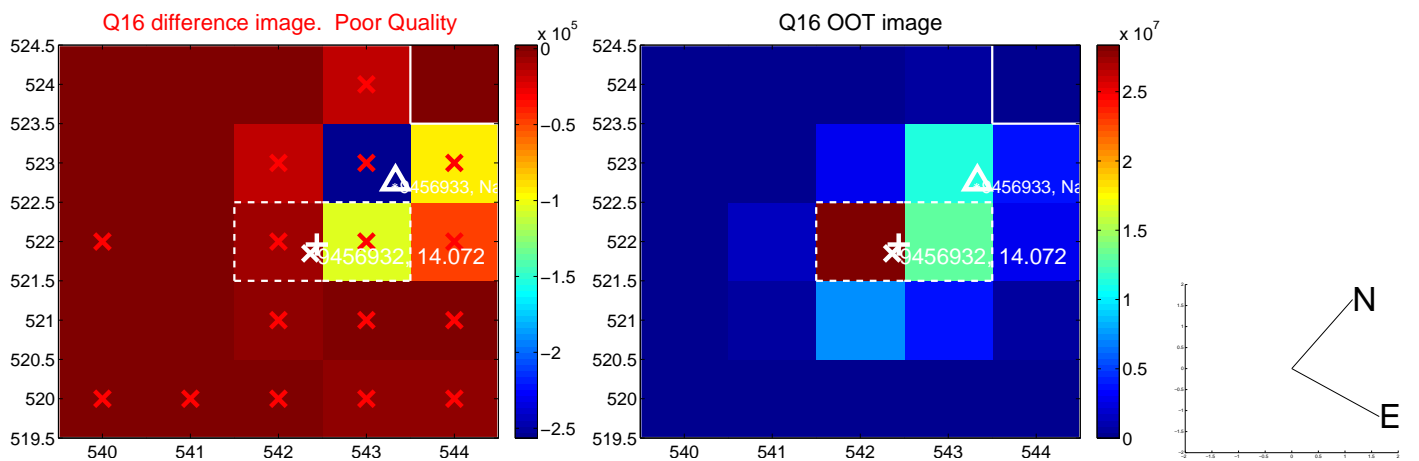
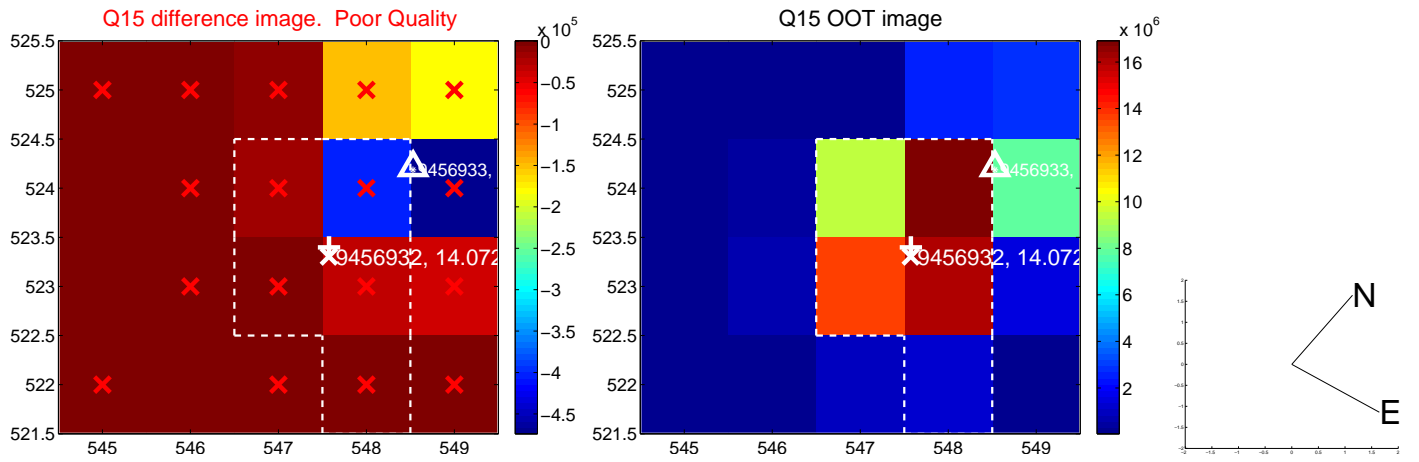
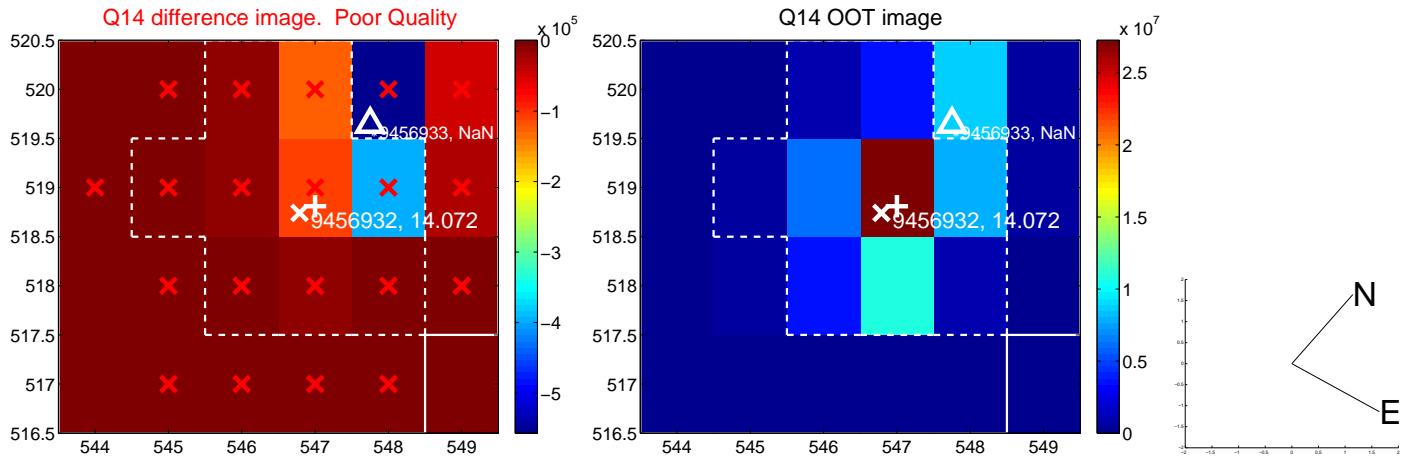
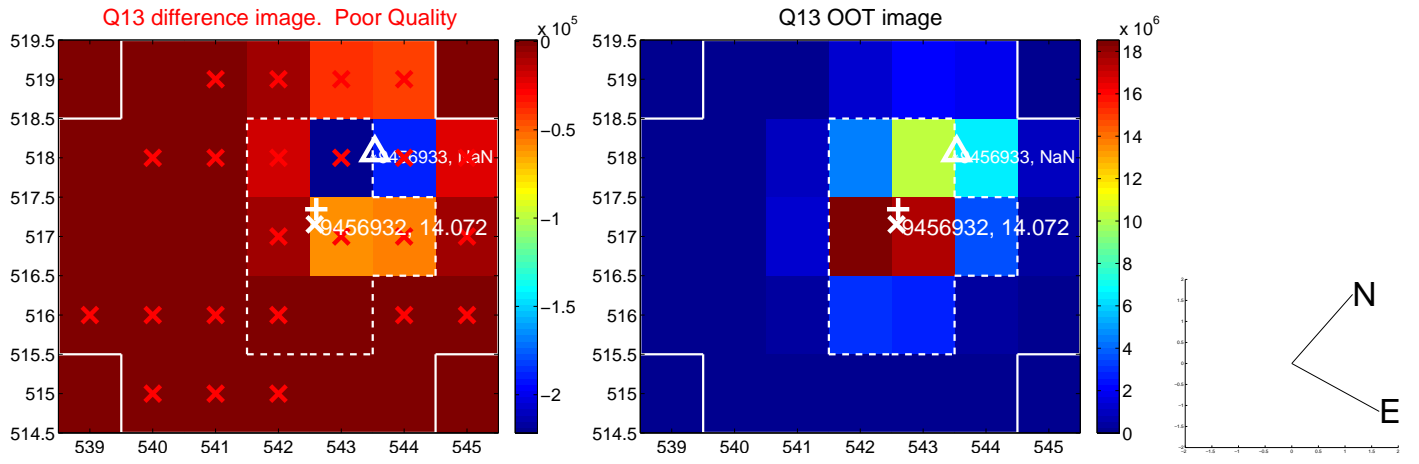




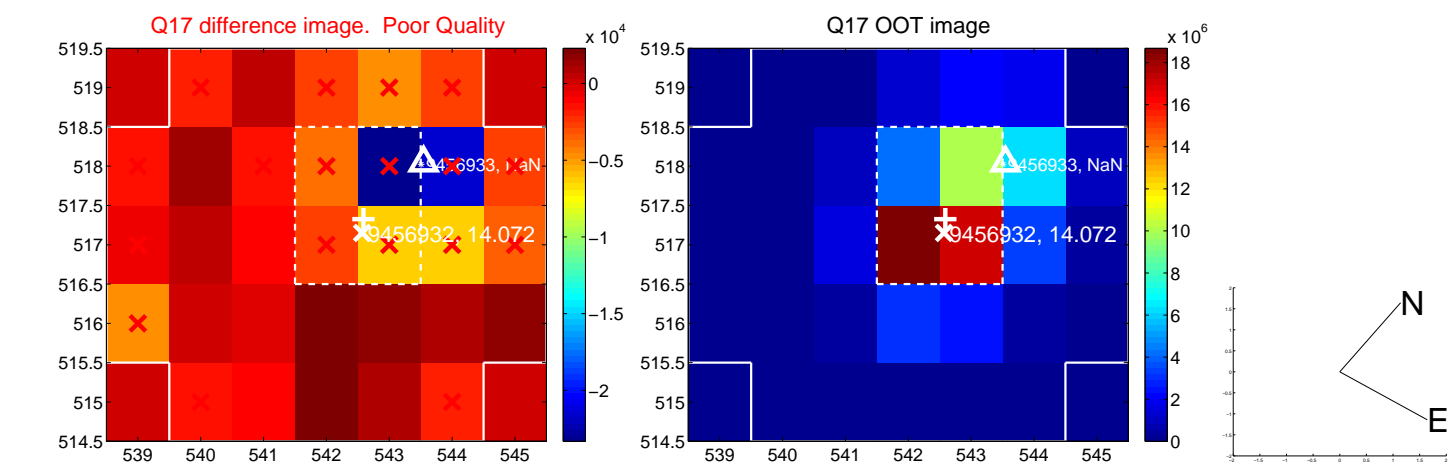
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



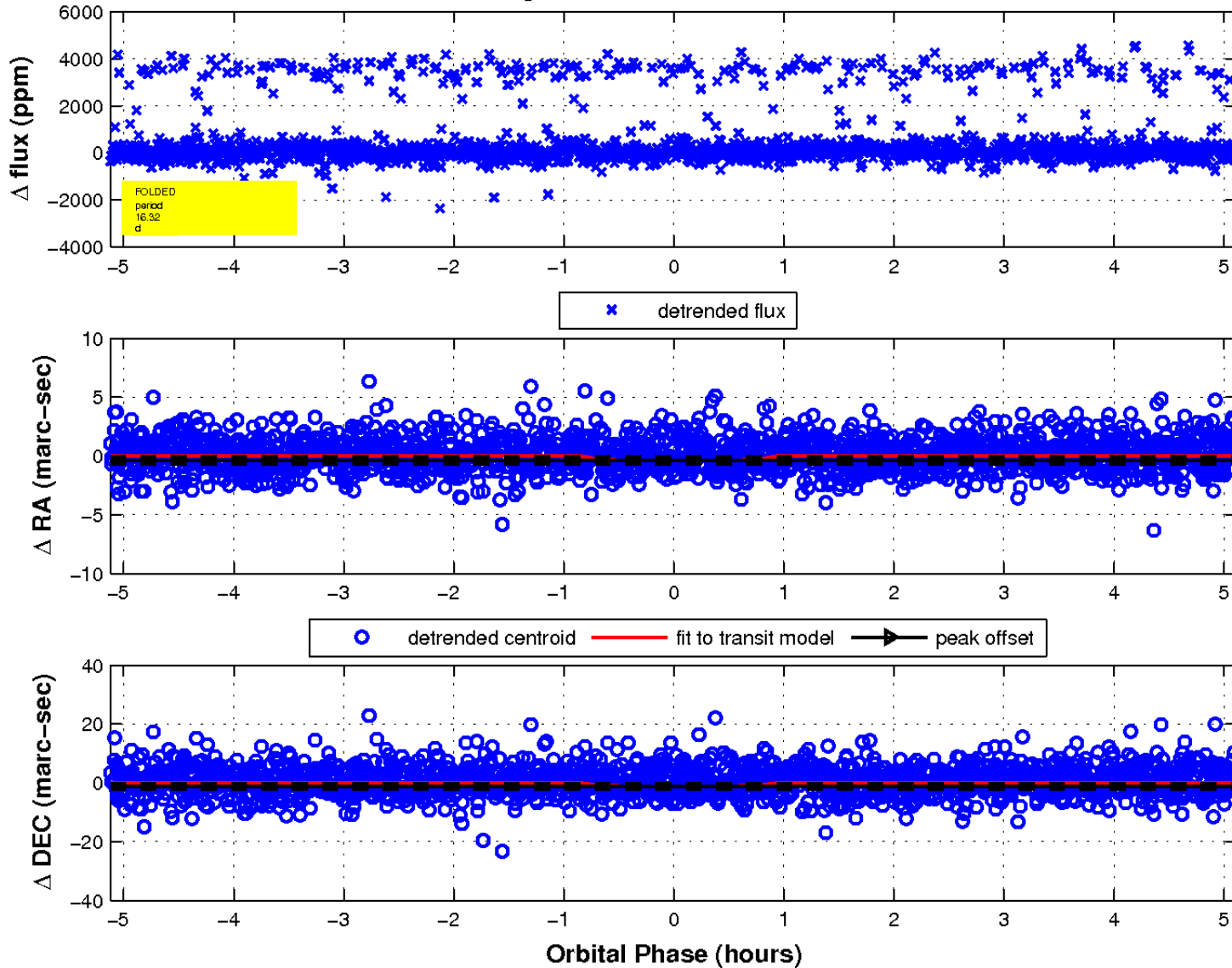
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

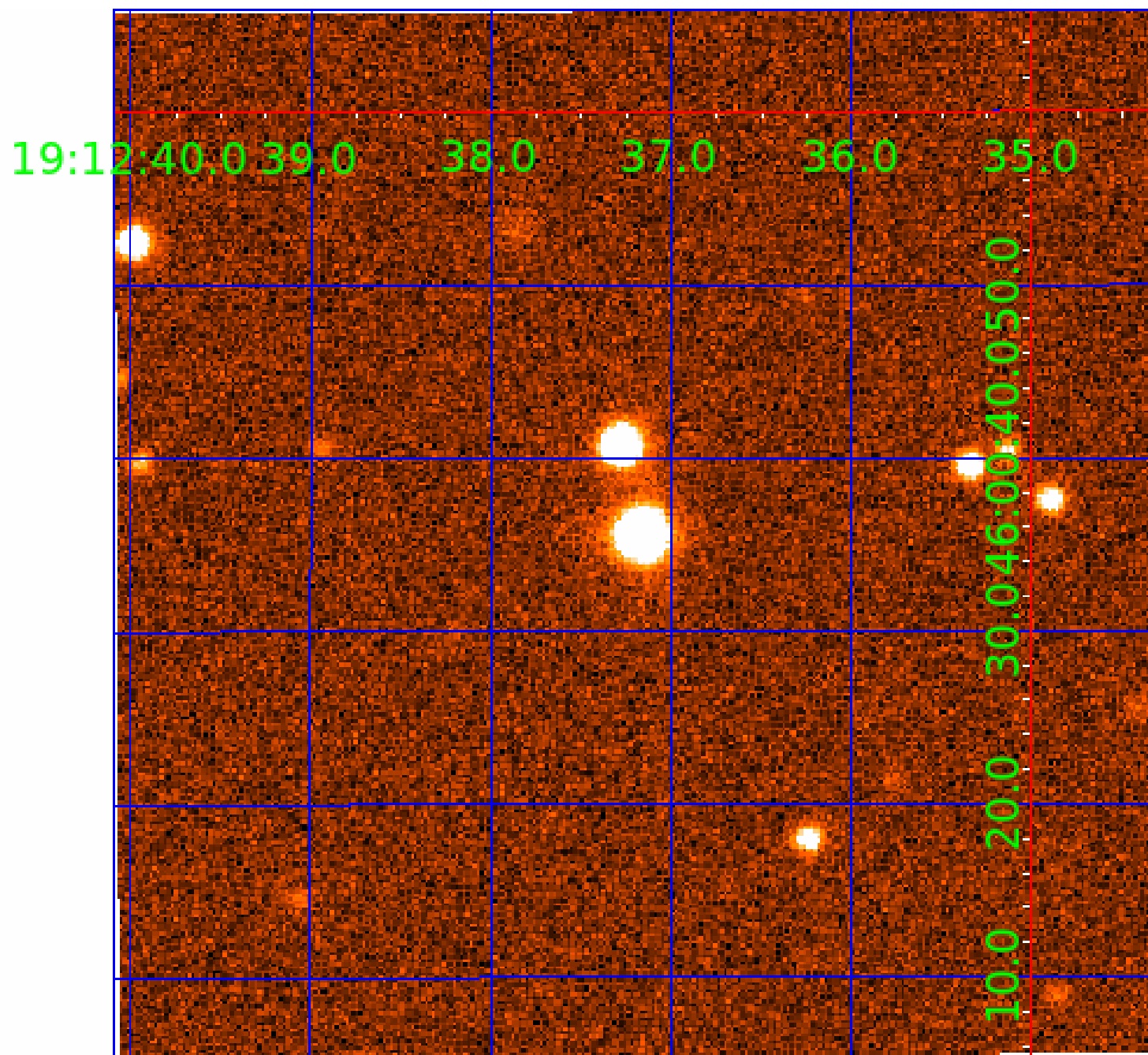


fluxWeightedCentroids, Planet 3 of 4



UKIRT Image

Declination



# KIC 009456932

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009456932-01	OBS	No	1.053977	131.779744	838.2	1.500	19.5	-1.0	0.95	5873	2.73	2344.91
009456932-02	OBS	No	1.053953	131.804510	72.0	7.729	8.7	11.1	0.95	5873	0.80	2344.98
009456932-03	OBS	No	16.324614	141.315646	512.0	1.708	8.2	10.2	0.95	5873	2.15	60.74
009456932-04	OBS	No	18.944733	135.506892	384.8	1.767	10.6	9.3	0.95	5873	2.17	49.80

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009456932-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—LPP_ALT—CENT_NOFITS
009456932-02	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—SAME_NTL_PERIOD—CENT_RESOLVED_OFFSET
009456932-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_RESOLVED_OFFSET
009456932-04	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_KIC_POS—HALO_GHOST

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

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

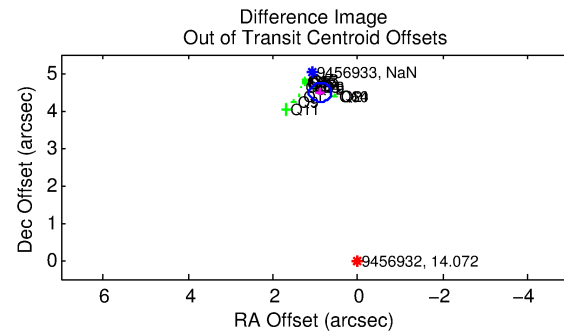
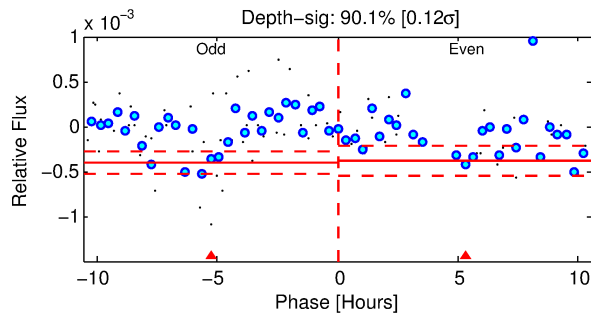
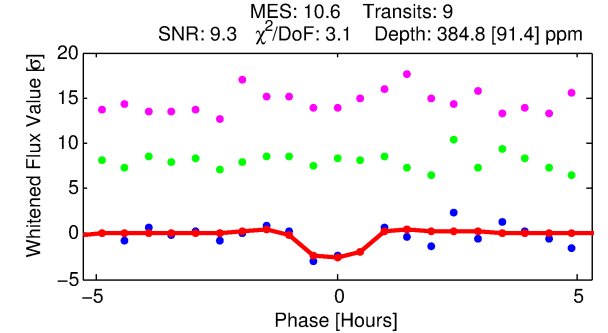
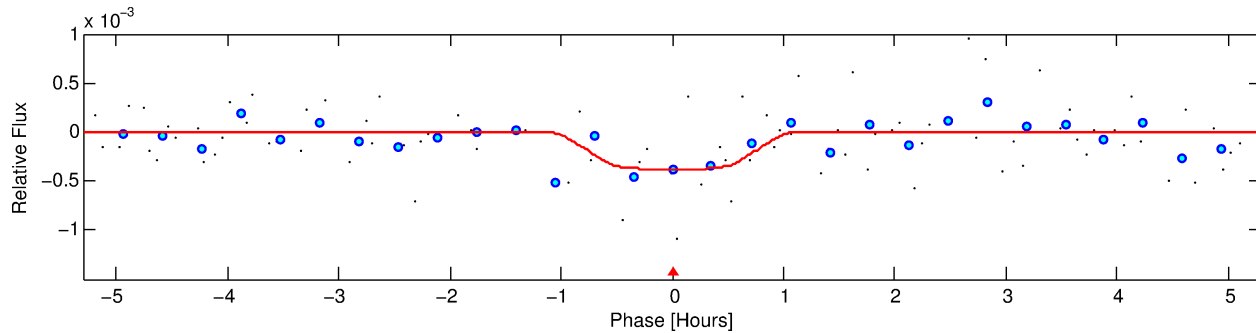
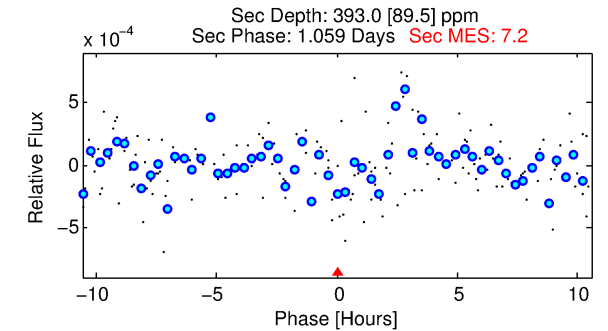
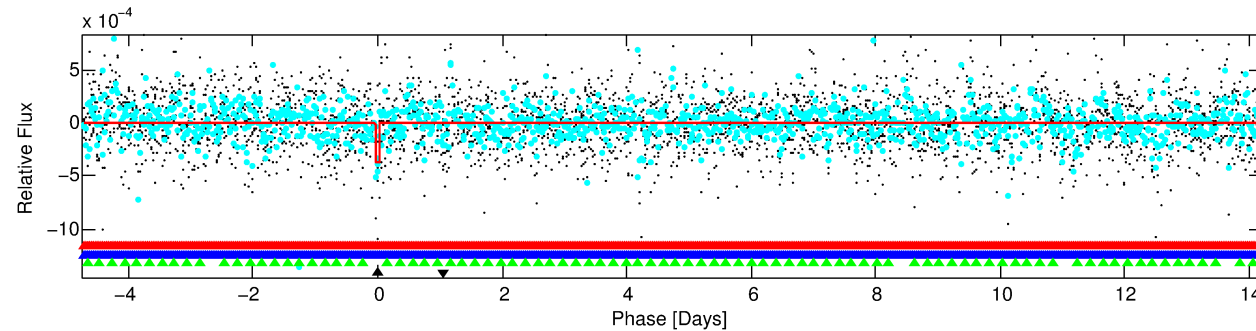
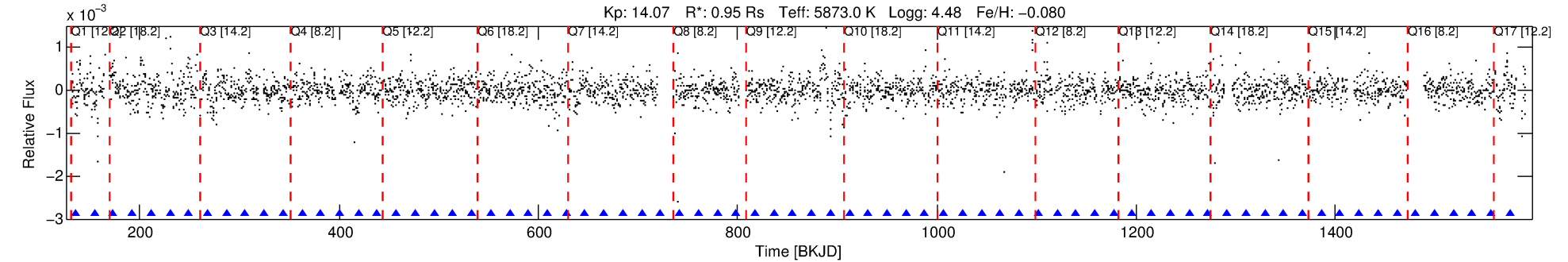
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 009456932-04

No Significant Match Found

# DV One-Page Summary

KIC: 9456932 Candidate: 4 of 4 Period: 18.945 d



## DV Fit Results:

Period = 18.94473 [0.00026] d  
Epoch = 135.5069 [0.0072] BKJD  
Rp/R\* = 0.0210 [0.0648]  
a/R\* = 42.43 [634.91]  
b = 0.88 [3.94]  
Seff = 49.80 [19.65]  
Teq = 677 [67] K  
Rp = 2.17 [6.73] Re  
a = 0.1385 [0.0353] AU  
Ag = 882.92 [5469.96] [0.16σ]  
Teffp = 5709 [8828] K [0.57σ]

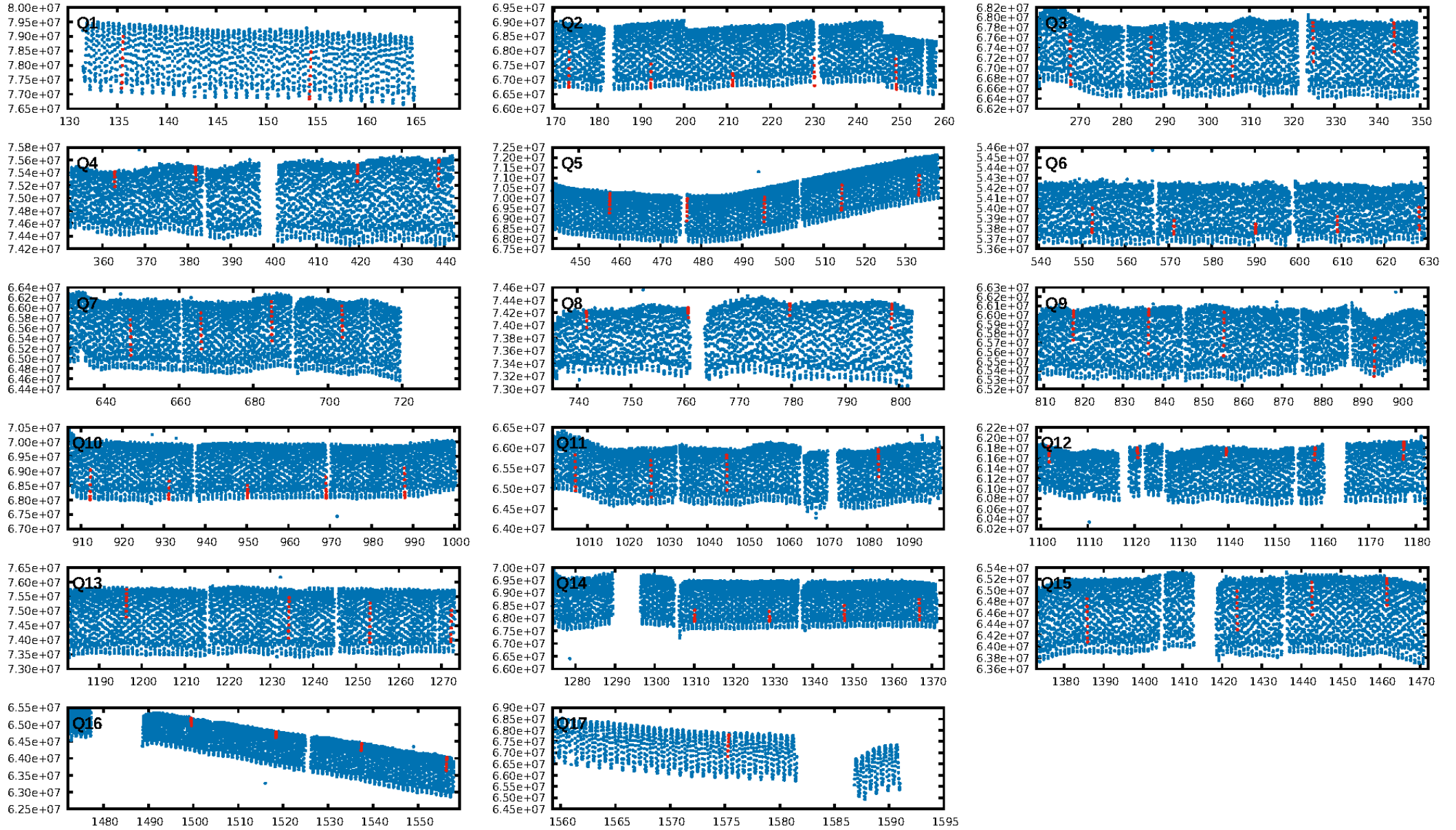
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [25.58σ]  
LongPeriod-sig: N/A  
**ModelChiSquare2-sig: 0.0%**  
ModelChiSquareGof-sig: 60.1%  
**Bootstrap-pfa: 1.39e-12**  
RollingBand-fgt: 1.00 [7/7]  
GhostDiagnostic-chr: -0.1673  
Centroid-sig: 16.0%  
Centroid-so: 1.440 arcsec [0.54σ]  
**OotOffset-rm: 4.574 arcsec [53.83σ]**  
**KicOffset-rm: 5.226 arcsec [58.40σ]**  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.41 [7/17]  
DiffImageOverlap-fno: 0.29 [5/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 00:17:52 Z

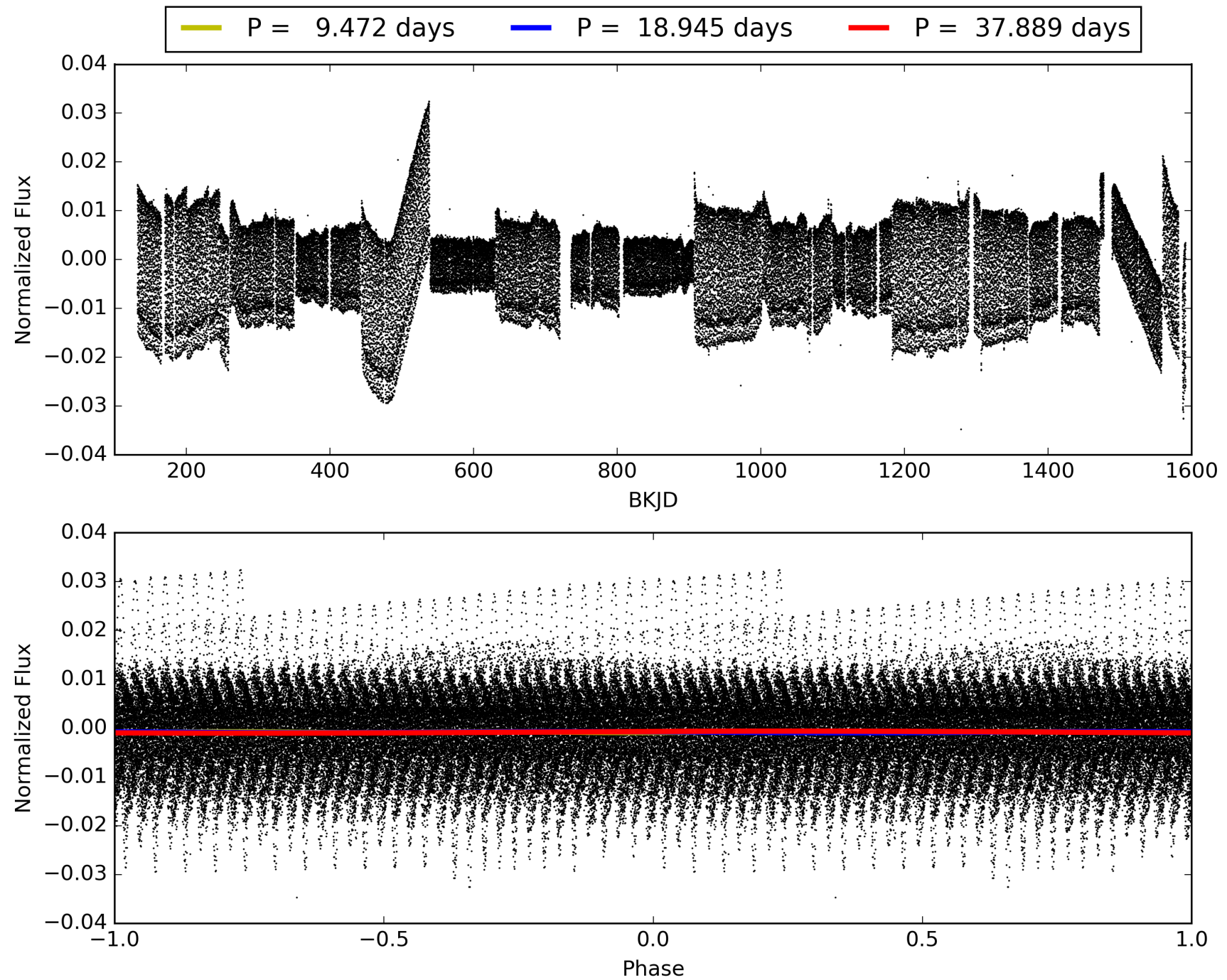
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 009456932-04, PDC Light Curves



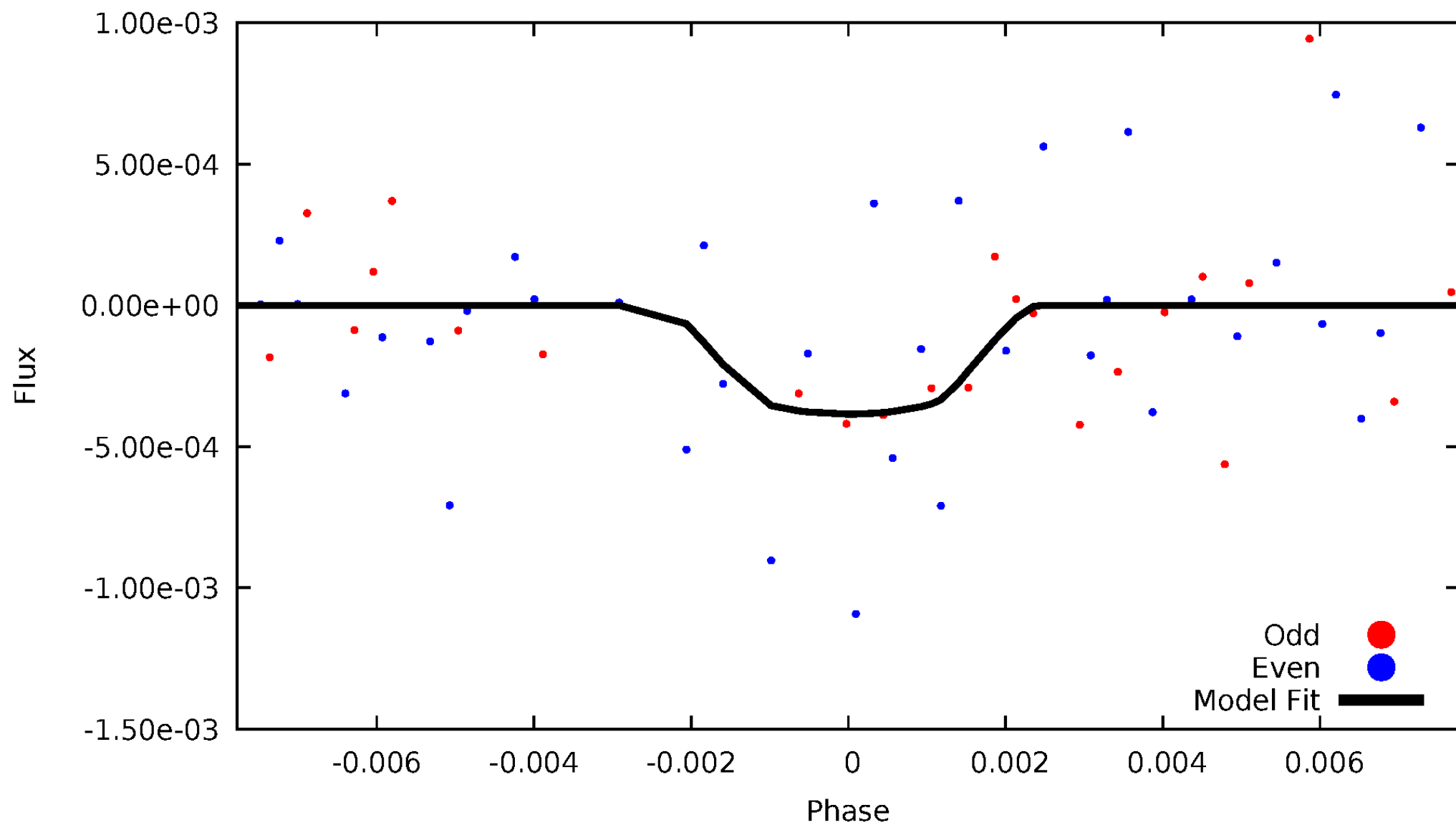


TCE 009456932-04



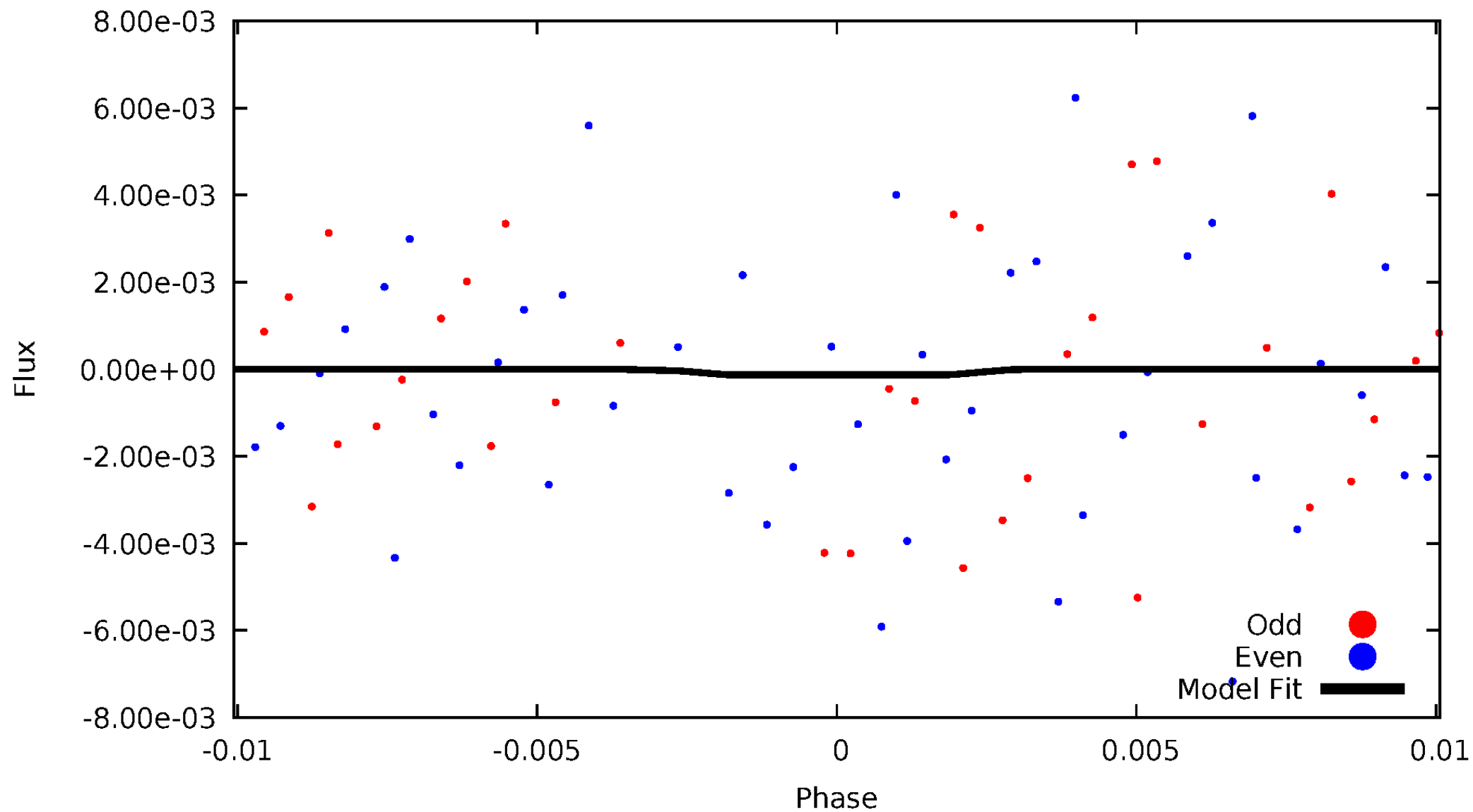
# DV Odd/Even

TCE 009456932-04



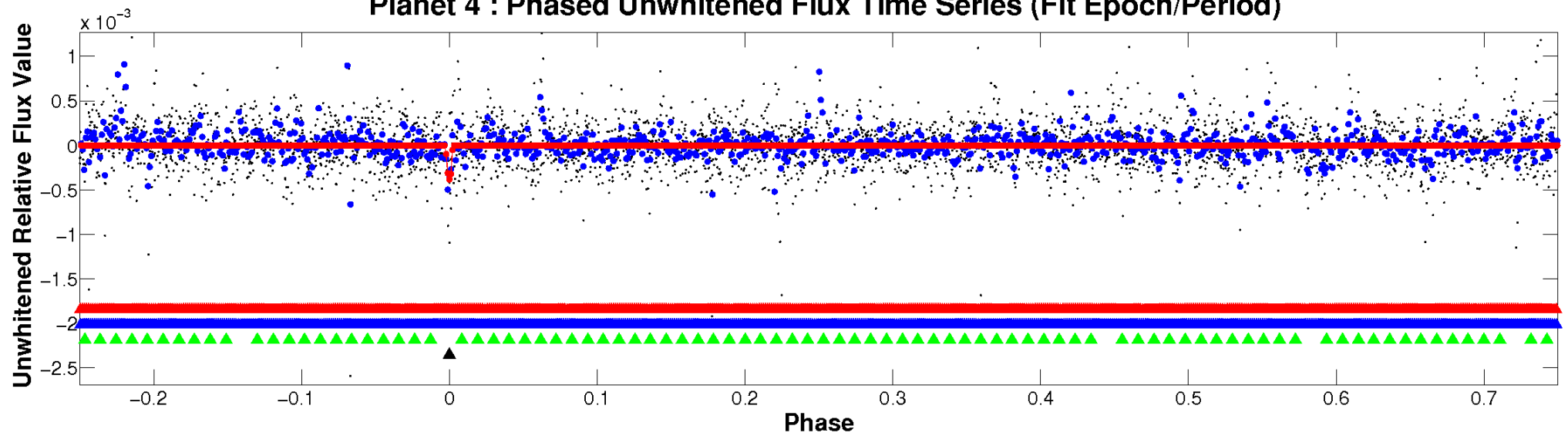
# ALT Odd/Even

TCE 009456932-04

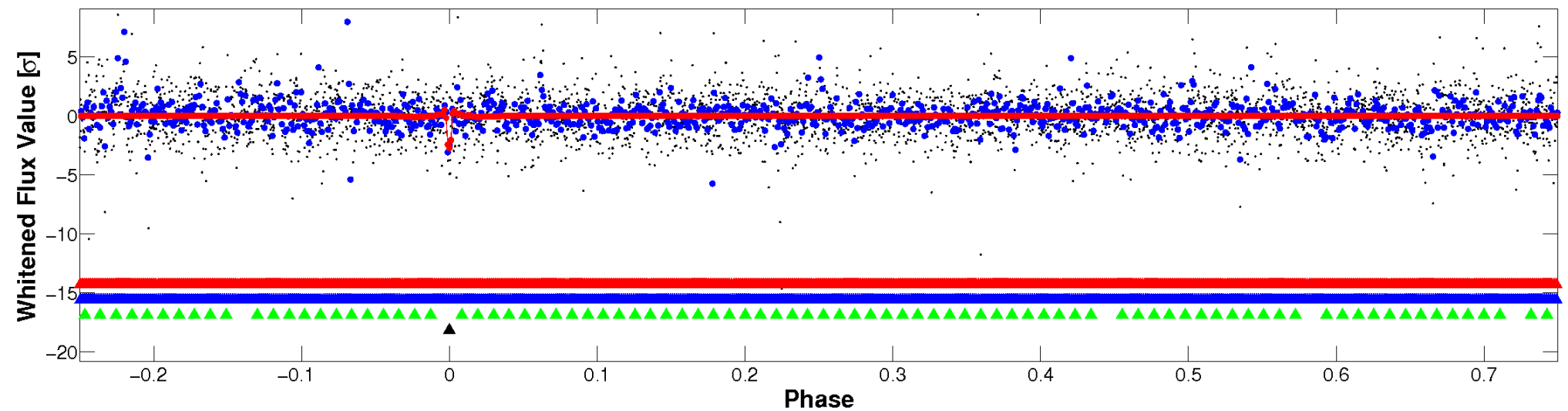


# Non-Whitened Vs. Whitened Light Curve

## Planet 4 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

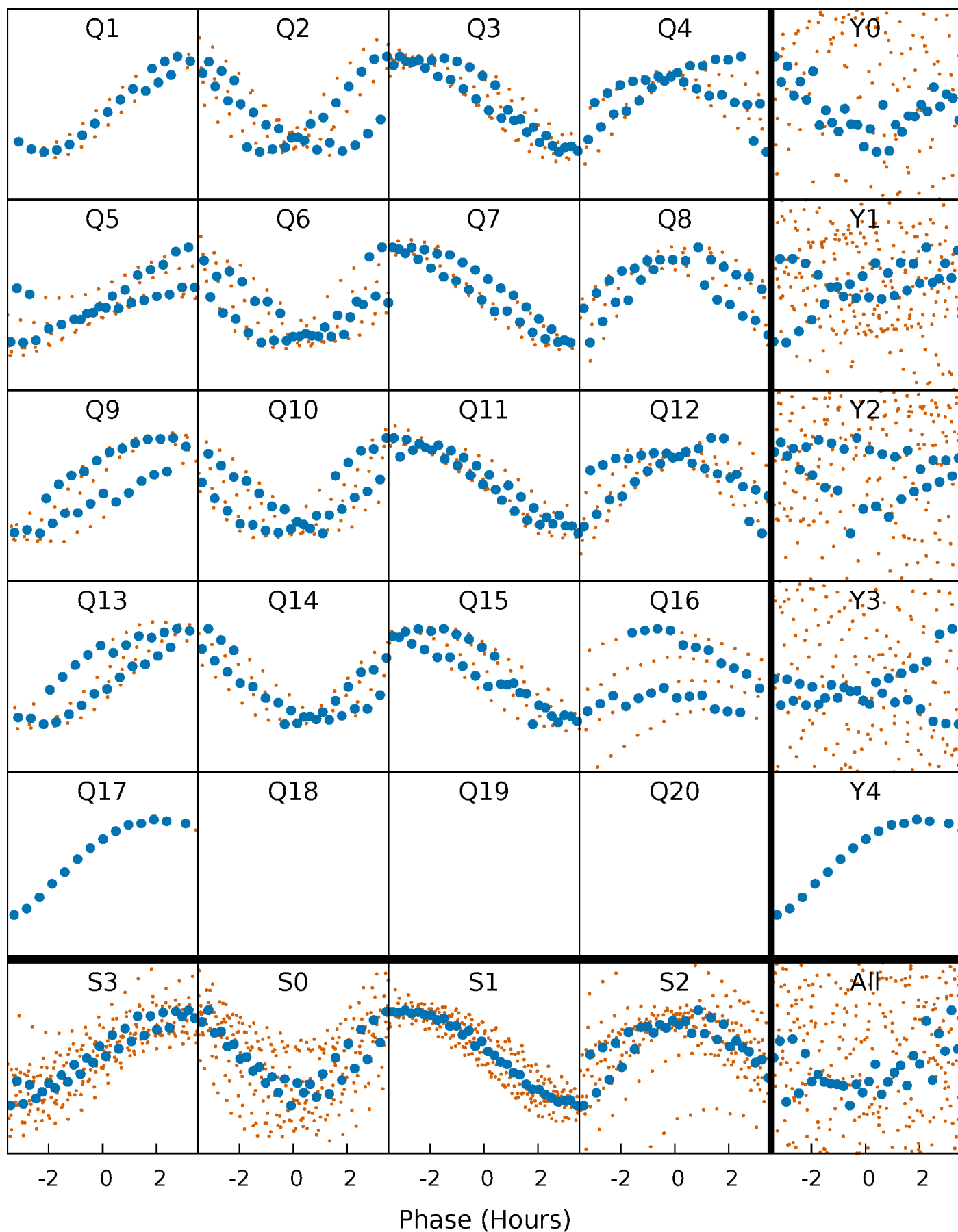


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



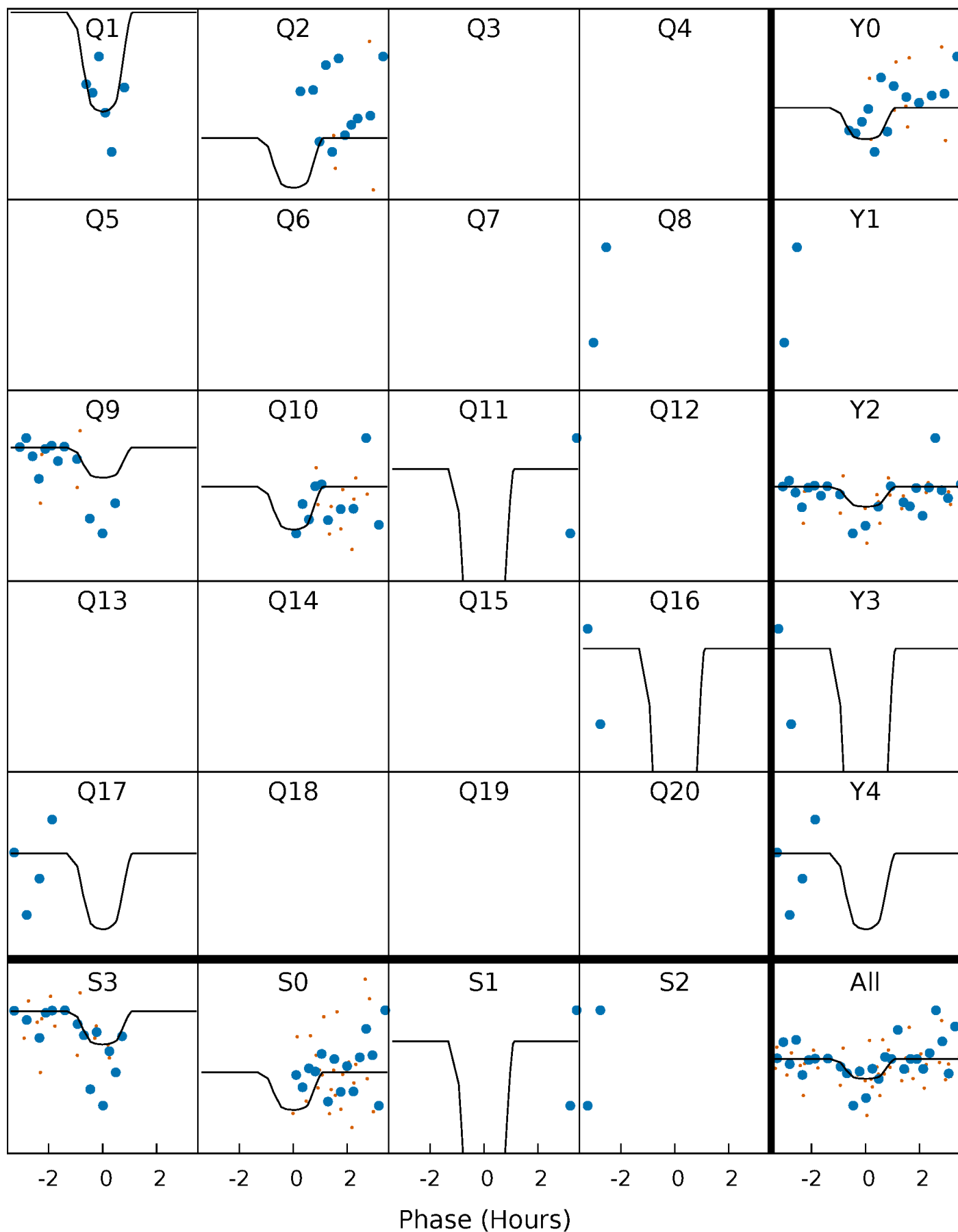
# PDC Quarter-Phased Transit Curves

TCE 009456932-04 P= 18.944733 Days  $T_0=135.506892$  (BKJD)



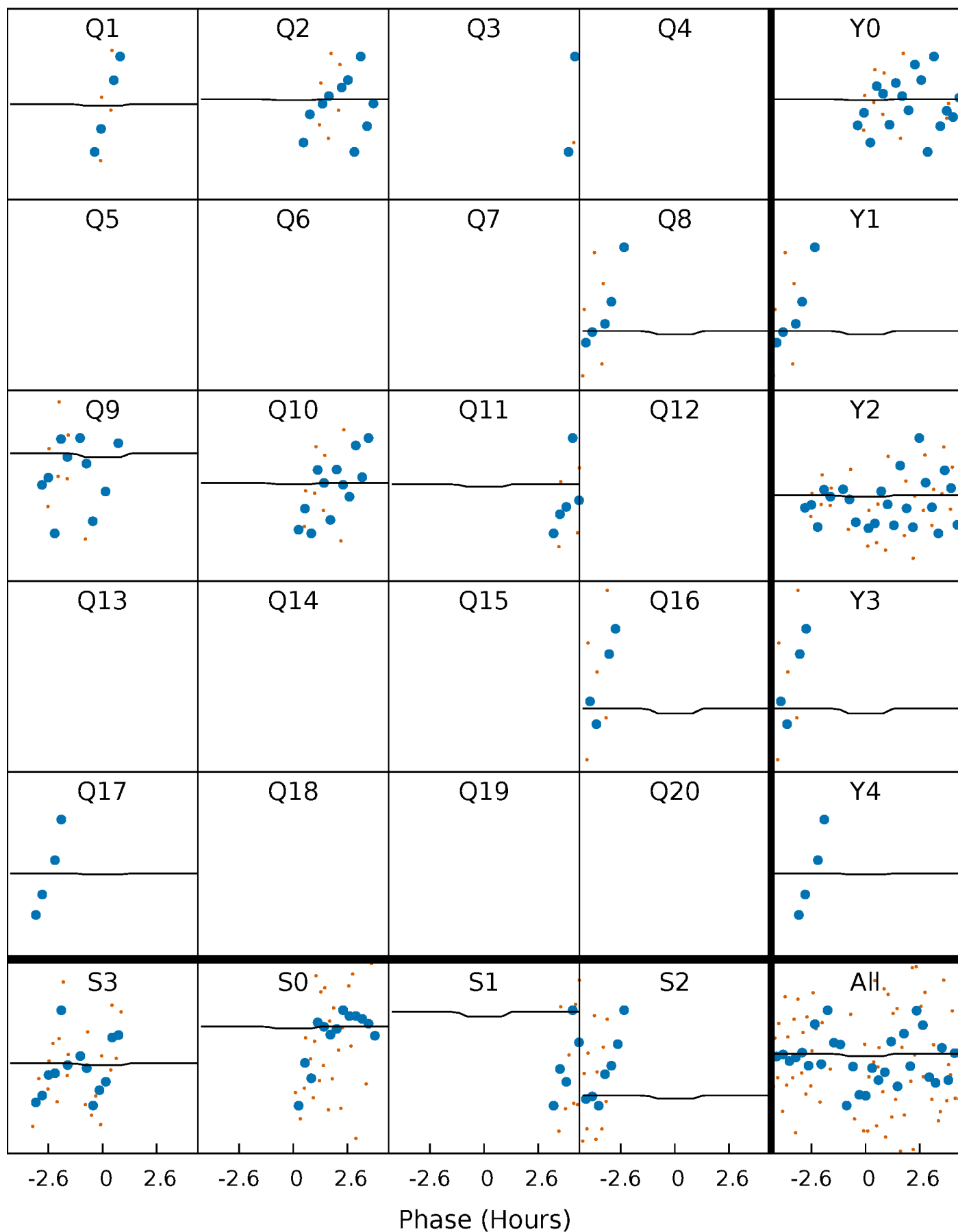
# DV Quarter-Phased Transit Curves

TCE 009456932-04 P= 18.944733 Days  $T_0=135.506892$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 009456932-04 P= 18.944815 Days  $T_0=135.498772$  (BKJD)

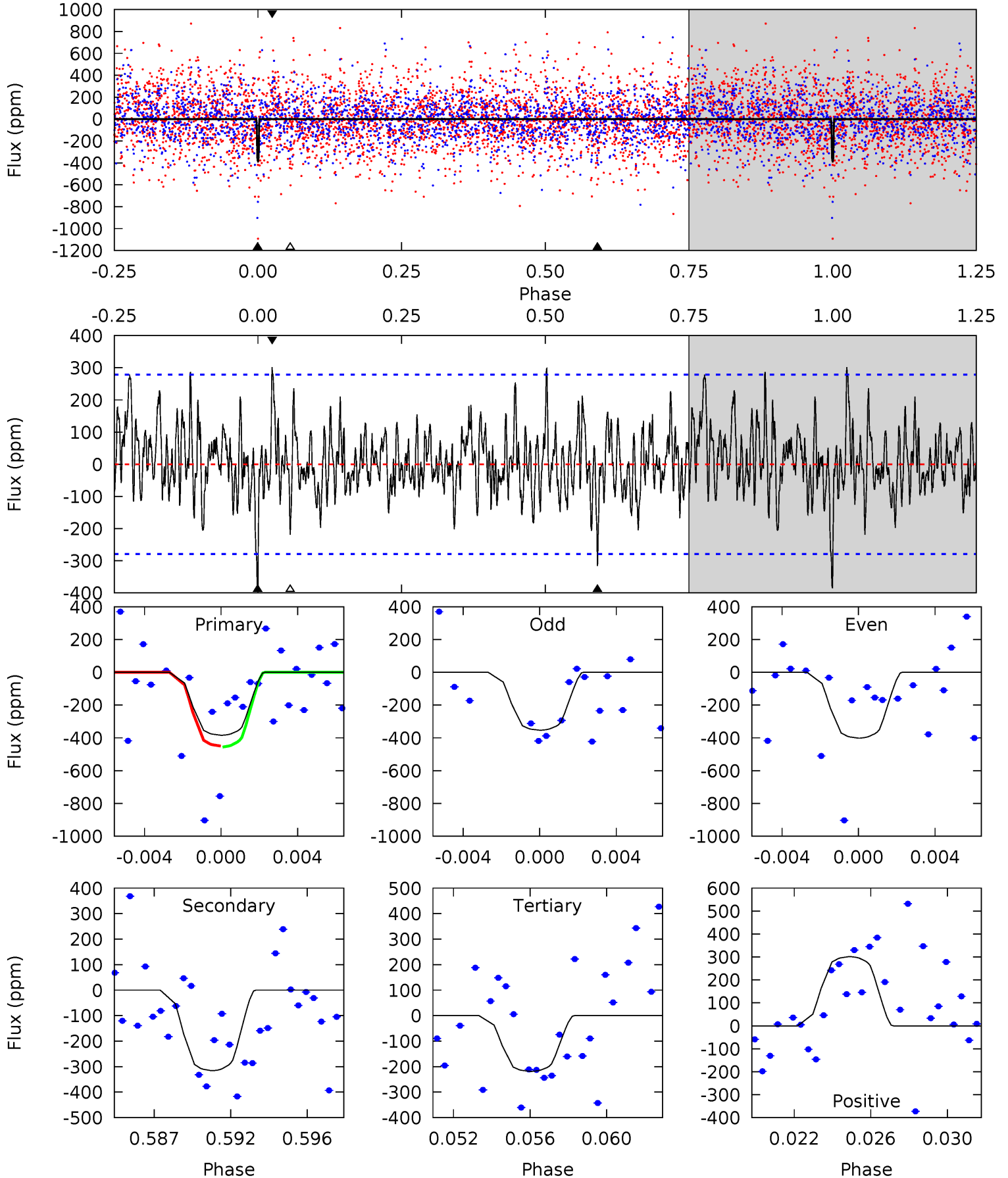




# DV Model-Shift Uniqueness Test

009456932-04, P = 18.944733 Days, E = 116.562159 Days

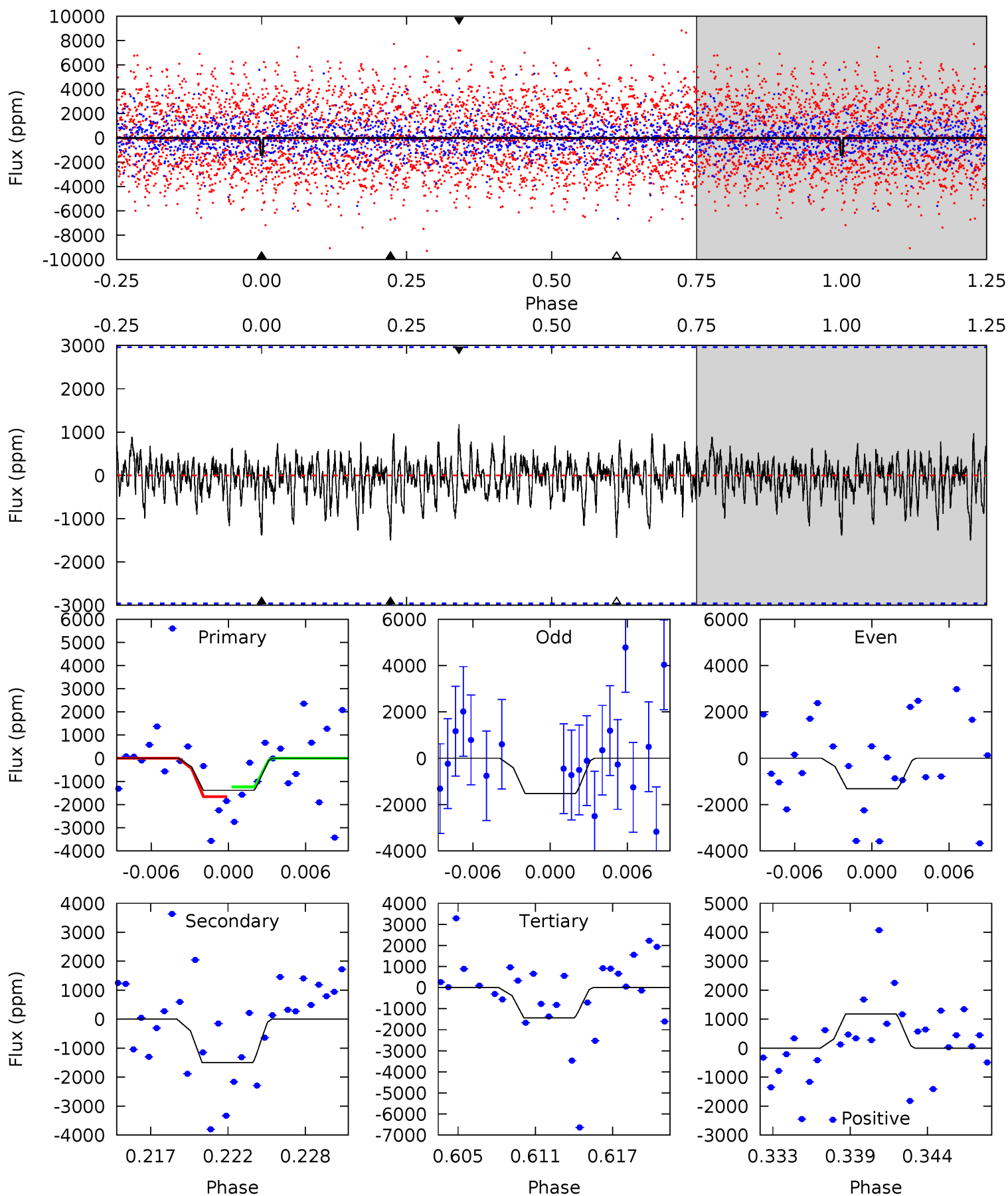
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.15	5.88	4.07	5.61	5.19	2.85	1.61	3.08	1.54	1.81	0.27	0.44	0.85	0.44	0.05



# Alt Model-Shift Uniqueness Test

009456932-04, P = 18.944815 Days, E = 116.553957 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
2.40	2.60	2.49	2.05	5.14	2.77	0.62	-0.09	0.36	0.11	0.56	0.17	0.81	0.44	0.33



### Stellar Parameters For KIC 009456932

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5873^{+146}_{-176}$	$4.480^{+0.065}_{-0.208}$	$-0.080^{+0.300}_{-0.300}$	$0.947^{+0.282}_{-0.094}$	$0.988^{+0.128}_{-0.117}$	$1.638^{+0.466}_{-0.869}$
	+2%/-3%	+1%/-5%	+375%/-375%	+30%/-10%	+13%/-12%	+28%/-53%
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 009456932-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-316 \pm 54$	$5.95^{+5.32}_{-3.98}$	$962^{+65}_{-48}$	$3747^{+2008}_{-691}$	$96^{+723}_{-71}$
Alt.	$-1500 \pm 576$	$4.86^{+5.56}_{-3.16}$	$963^{+67}_{-46}$	$5353^{+4340}_{-1461}$	$613^{+4623}_{-498}$

$T_{max}$  = 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

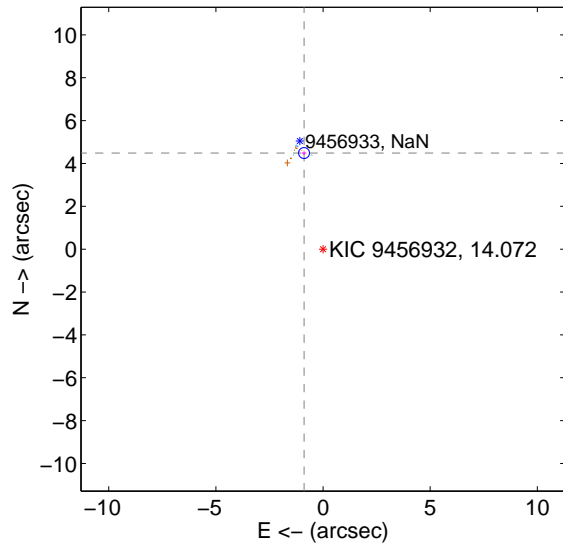
Supplemental centroid analysis for 009456932-04. Kepler magnitude: 14.07. Transit SNR 9.28

There are 7 quarters with good PRF difference image offsets

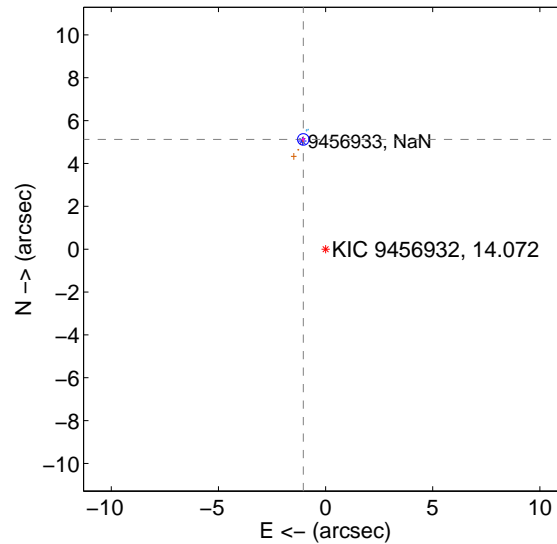
The direct PRF centroid is offset from the target star catalog position by about 0.52 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b>4.574 <math>\pm</math> 0.085</b>	<b>53.83</b>	0.886 $\pm$ 0.106	4.487 $\pm$ 0.084
PRF-fit source offset from KIC position	<b>5.226 <math>\pm</math> 0.089</b>	<b>58.40</b>	1.039 $\pm$ 0.075	5.122 $\pm$ 0.095
photometric centroid source offset	1.44 $\pm$ 2.66	0.54	0.11 $\pm$ 0.80	-1.44 $\pm$ 2.66

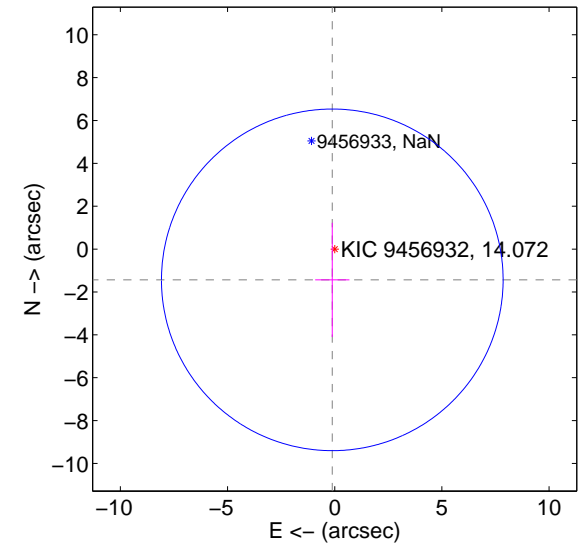
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



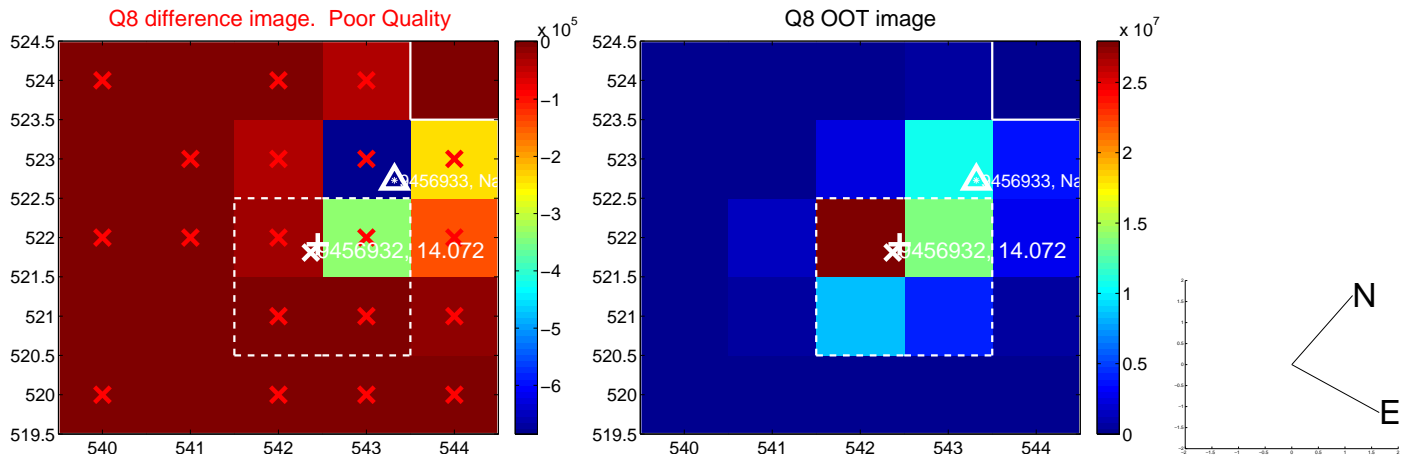
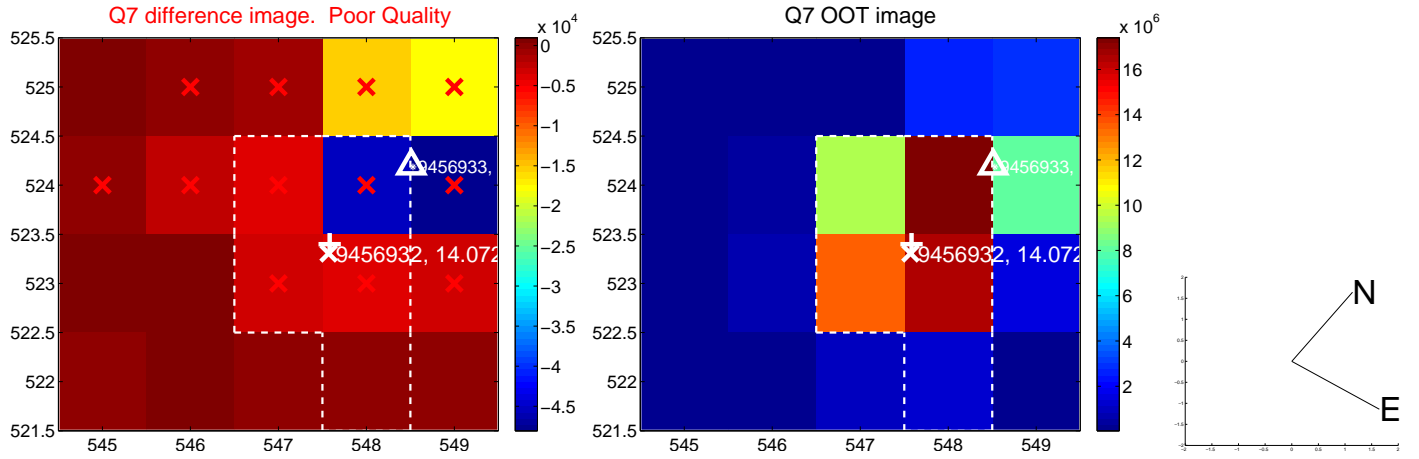
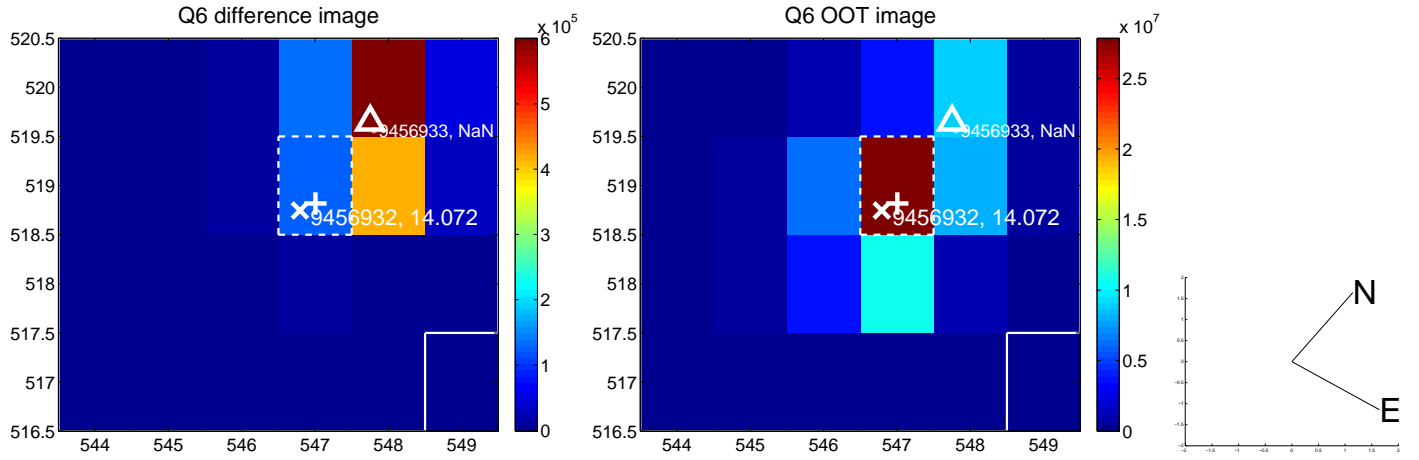
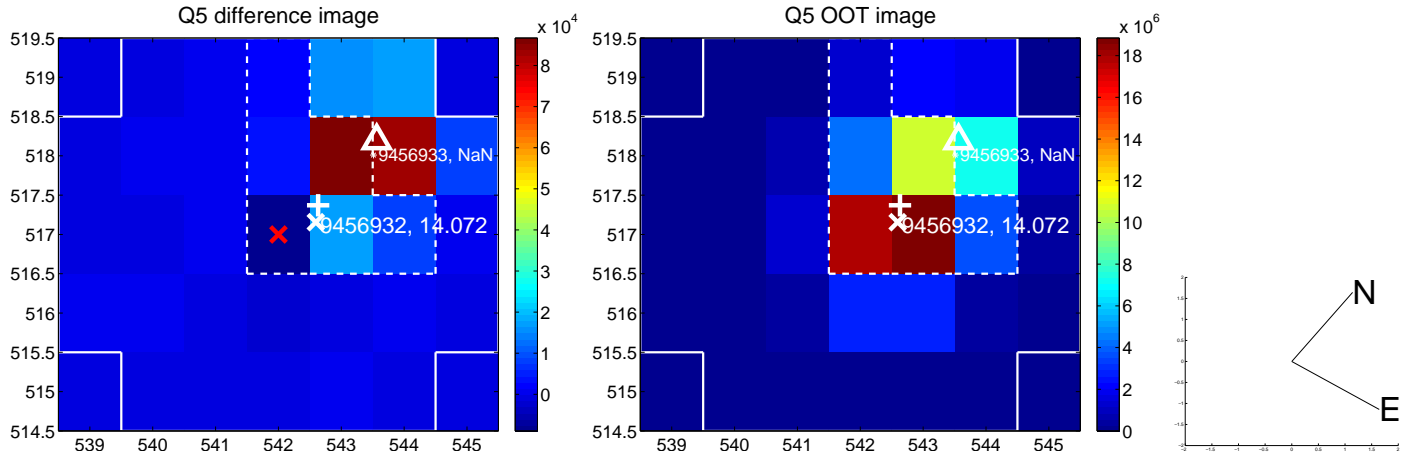
offset from photometric centroids



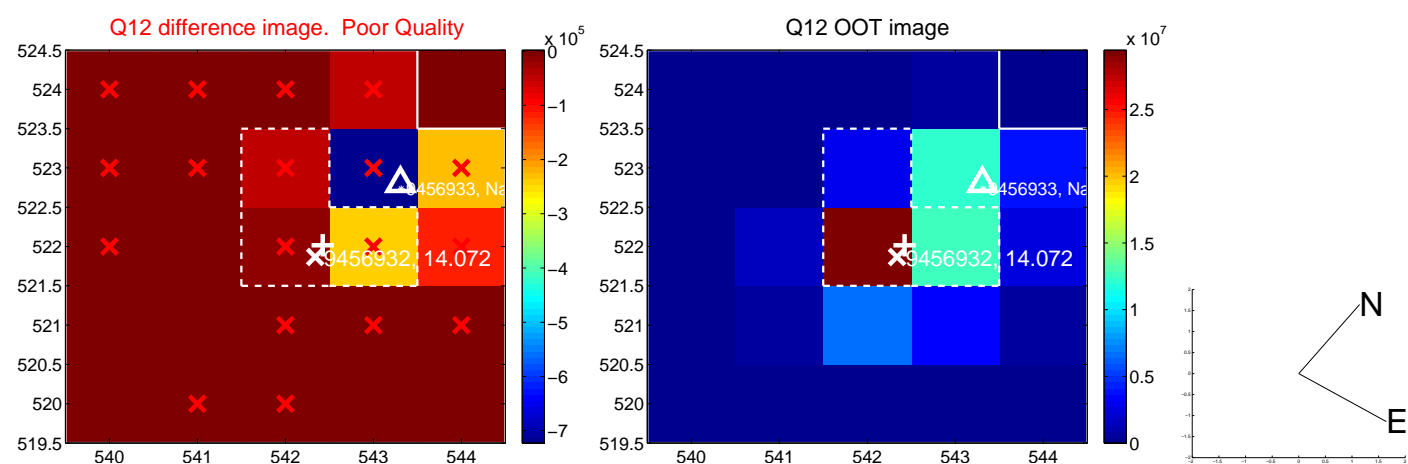
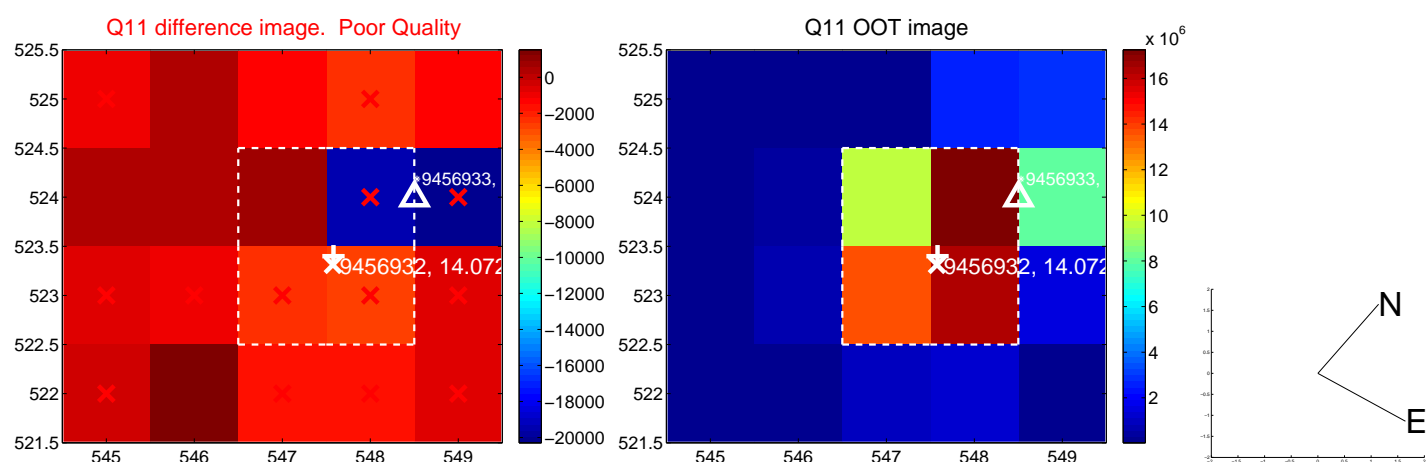
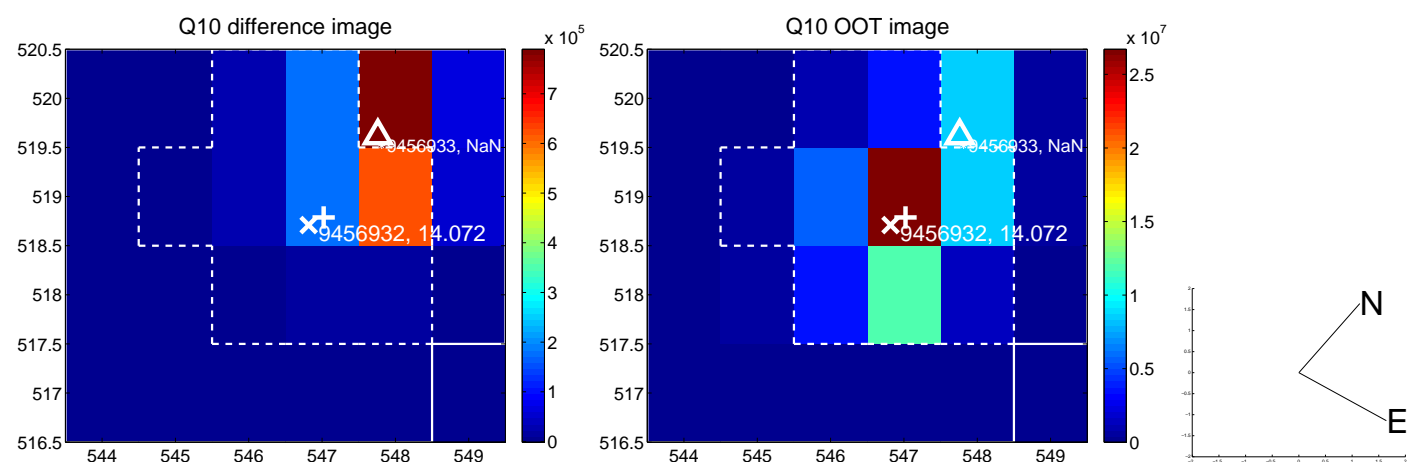
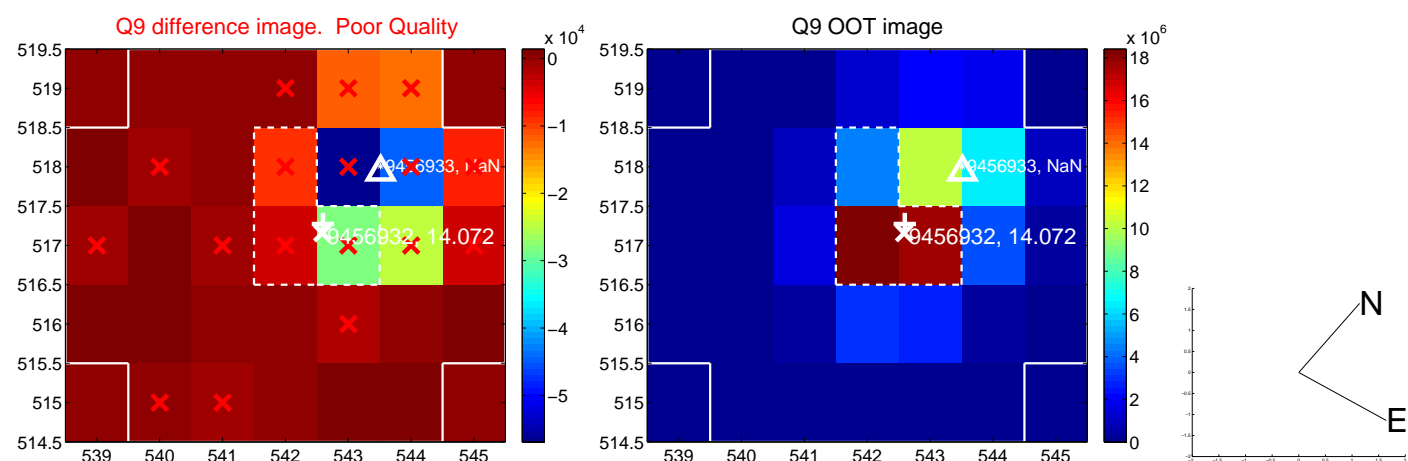
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

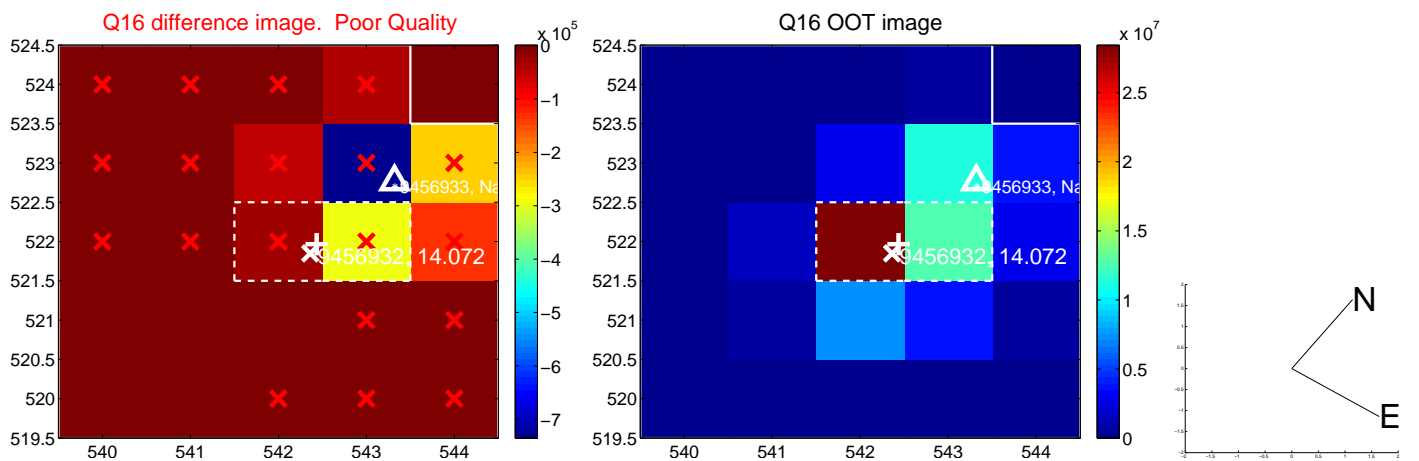
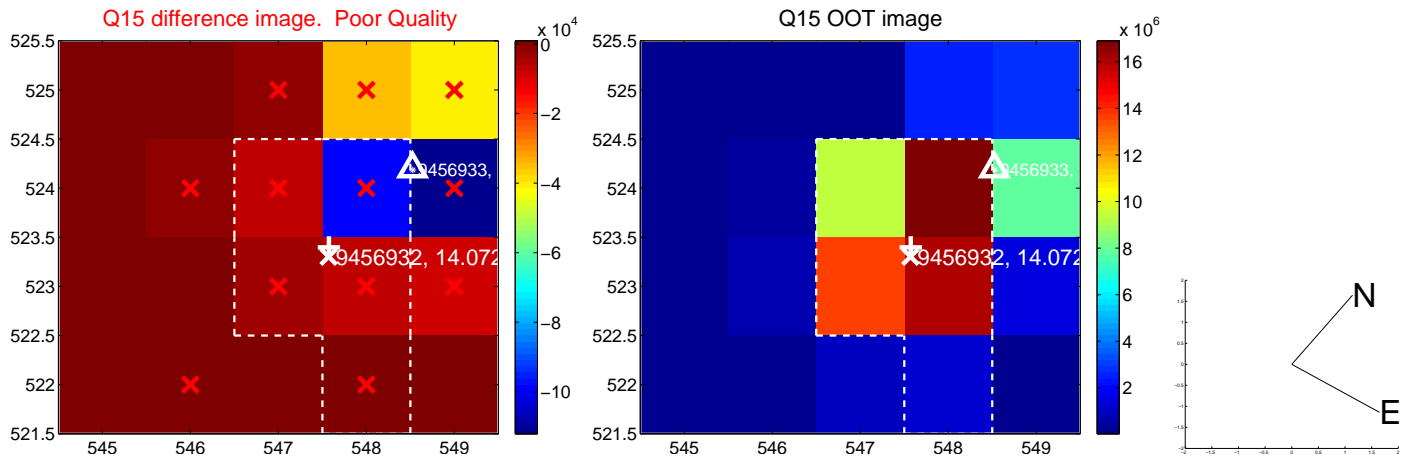
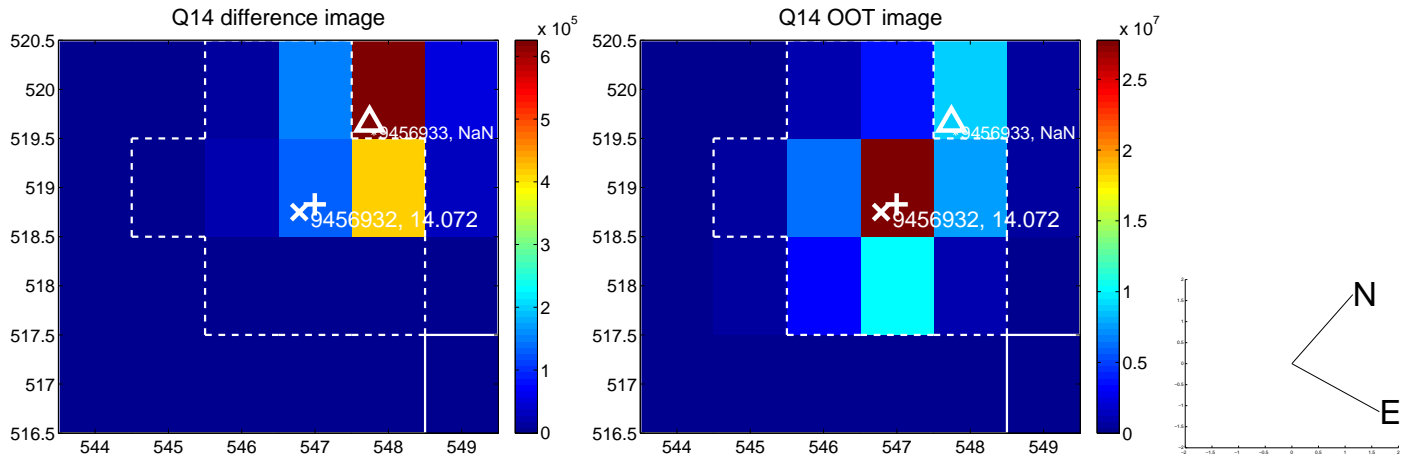
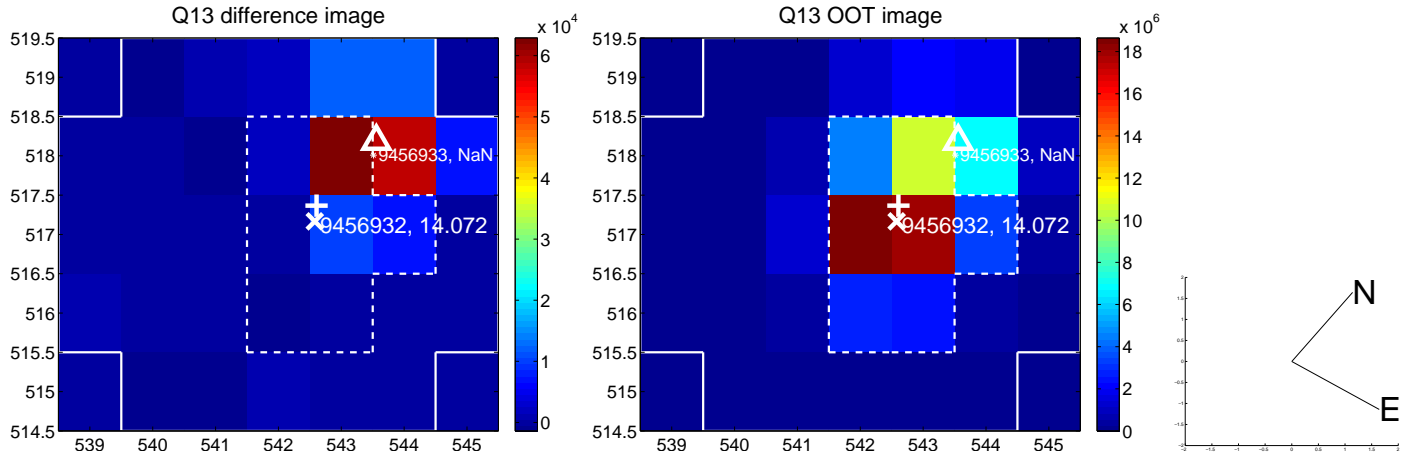


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

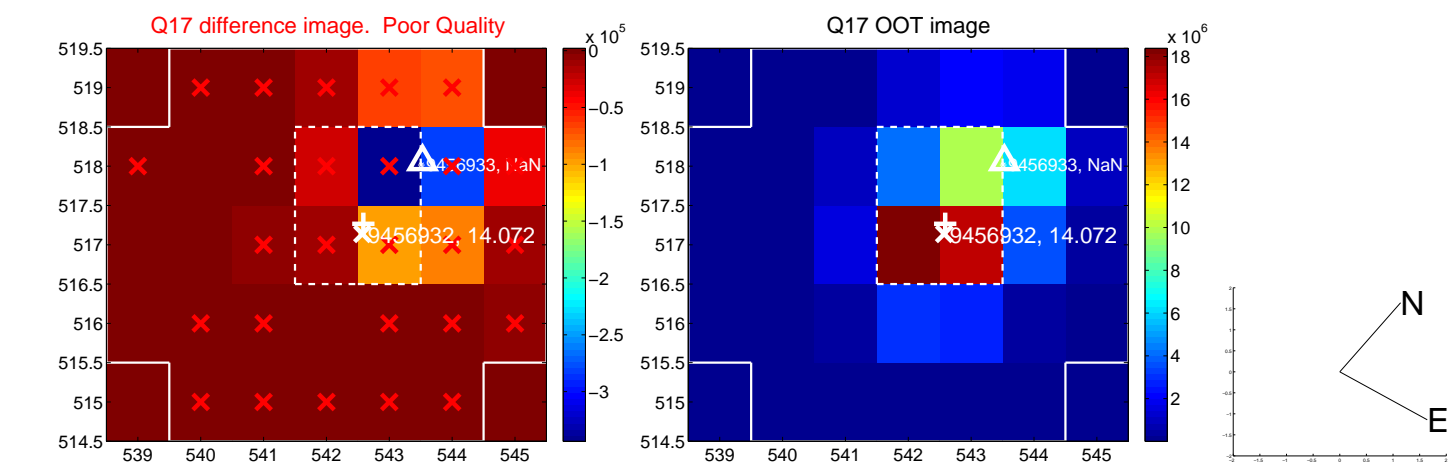




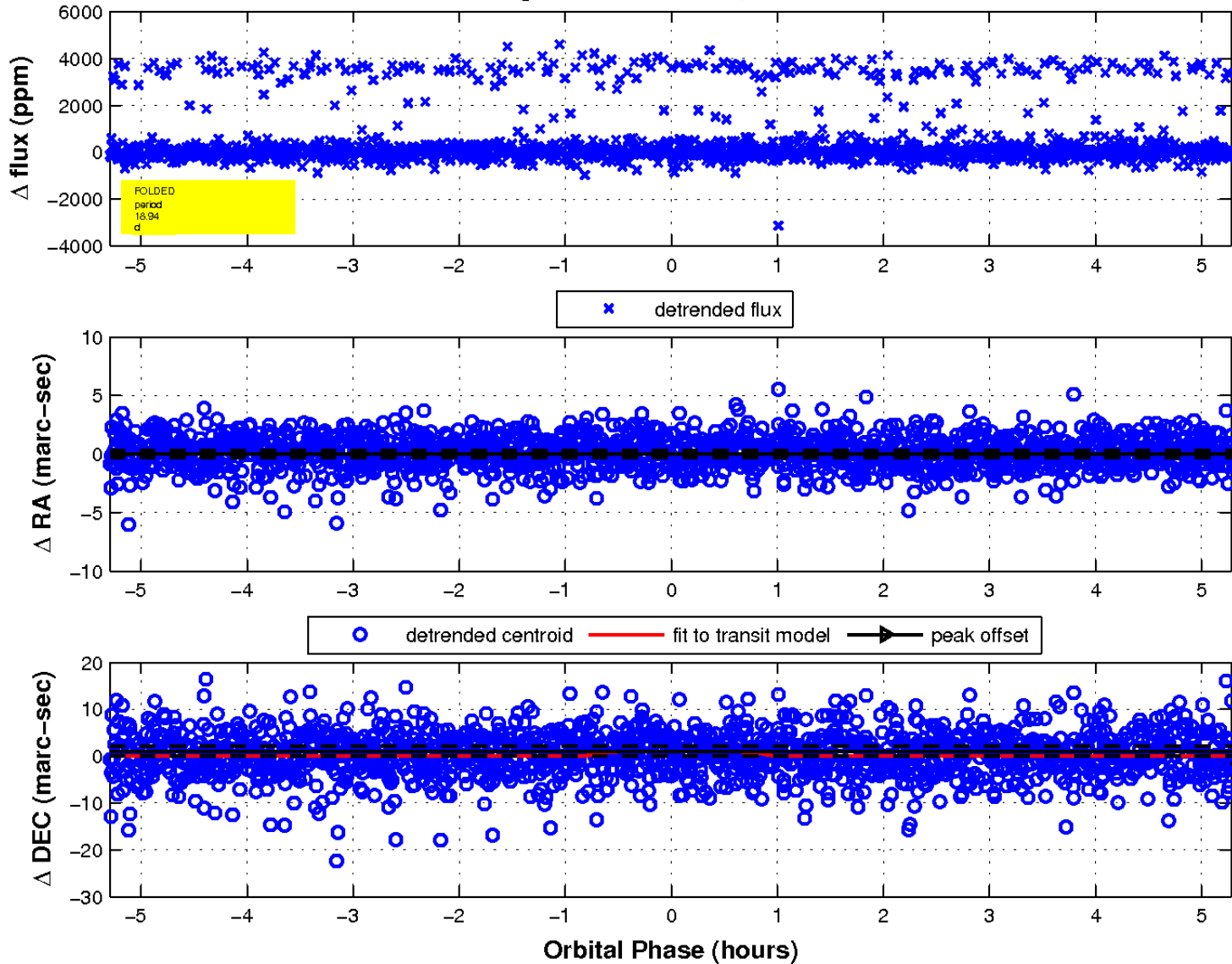
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 4 of 4



UKIRT Image

Declination

