

# KIC 009529073

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009529073-01	OBS	No	0.822864	132.139265	216.0	1.369	14.3	15.3	2.04	7274	3.48	25045.81
009529073-02	OBS	No	0.822853	131.737839	163.9	1.274	12.0	12.2	2.04	7274	3.03	25046.27
009529073-03	OBS	No	0.730239	132.005310	161.5	2.337	8.9	8.3	2.04	7274	3.00	29368.80
009529073-04	OBS	No	32.676012	159.066512	1366.6	2.070	7.6	9.3	2.04	7274	8.16	184.87

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009529073-01	OBS	FP	0.00	1	0	0	0	LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
009529073-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD
009529073-03	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
009529073-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

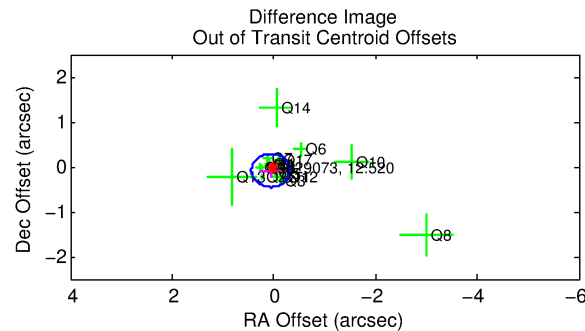
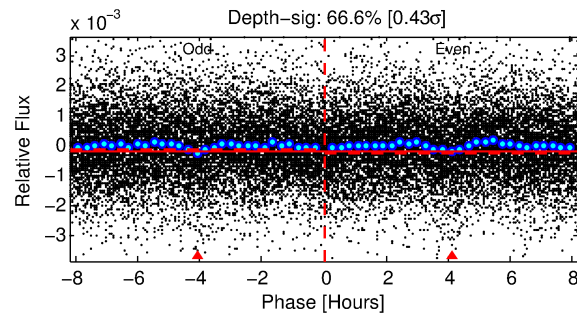
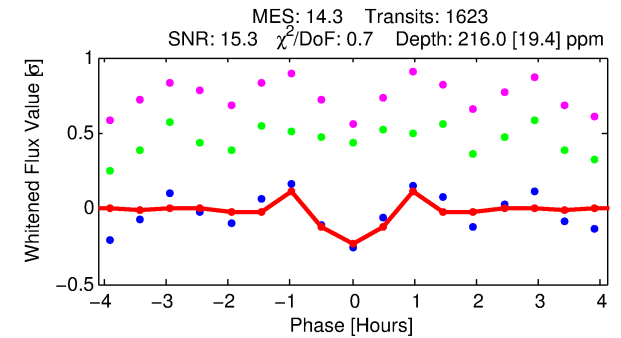
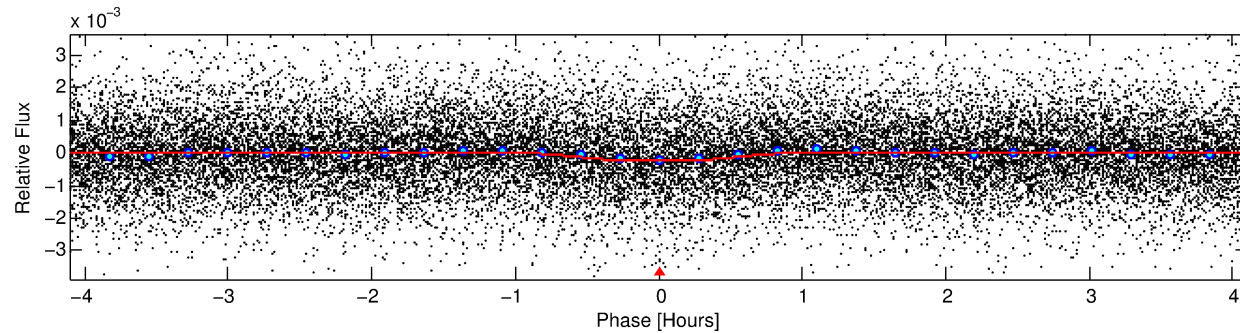
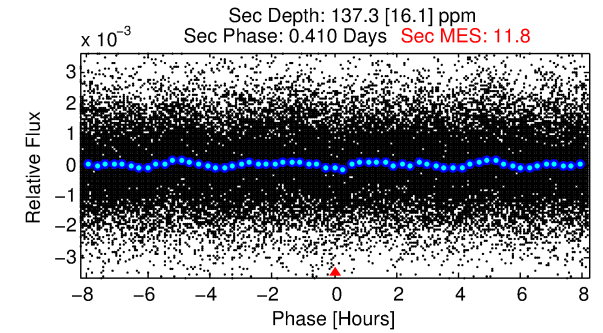
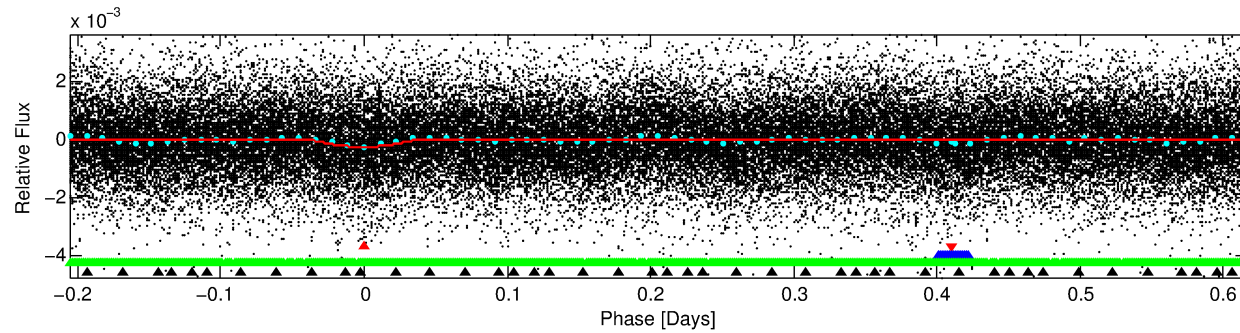
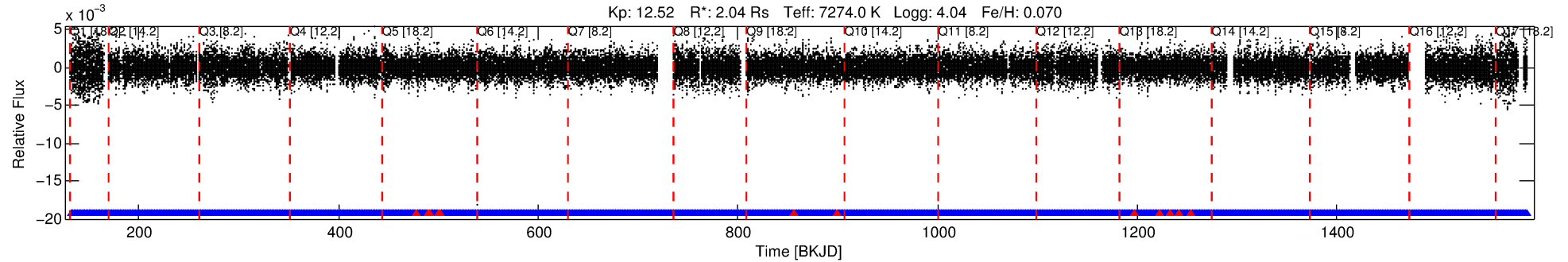
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 009529073-01

No Significant Match Found

# DV One-Page Summary

KIC: 9529073 Candidate: 1 of 4 Period: 0.823 d



## DV Fit Results:

Period = 0.82286 [0.00001] d  
Epoch = 132.1393 [0.0007] BKJD  
Rp/R\* = 0.0157 [0.0025]  
a/R\* = 2.37 [1.82]  
b = 0.90 [0.20]  
Seff = 25045.81 [8993.78]  
Teff = 3208 [288] K  
Rp = 3.48 [1.07] Re  
a = 0.0204 [0.0045] AU  
Ag = 2.59 [1.20] [1.32σ]  
Teffp = 6293 [601] K [4.63σ]

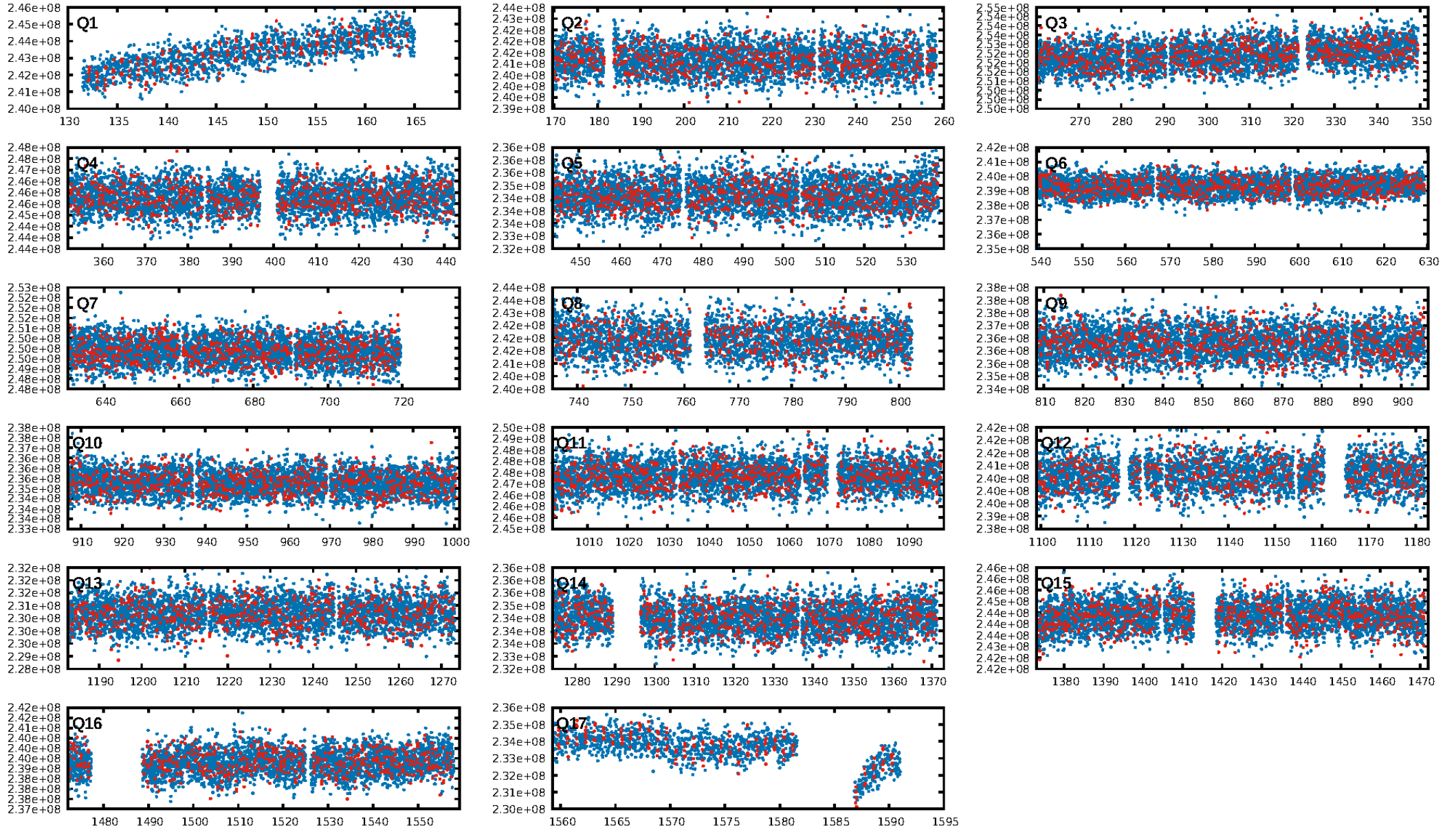
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: 100.0% [308.07σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 6.75e-48  
RollingBand-fgt: 0.99 [1539/1551]  
GhostDiagnostic-chr: 1.508  
Centroid-sig: 0.1%  
Centroid-so: 0.162 arcsec [1.83σ]  
OotOffset-rm: 0.107 arcsec [0.86σ]  
KicOffset-rm: 0.097 arcsec [0.64σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.65 [11/17]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 22:32:07 Z

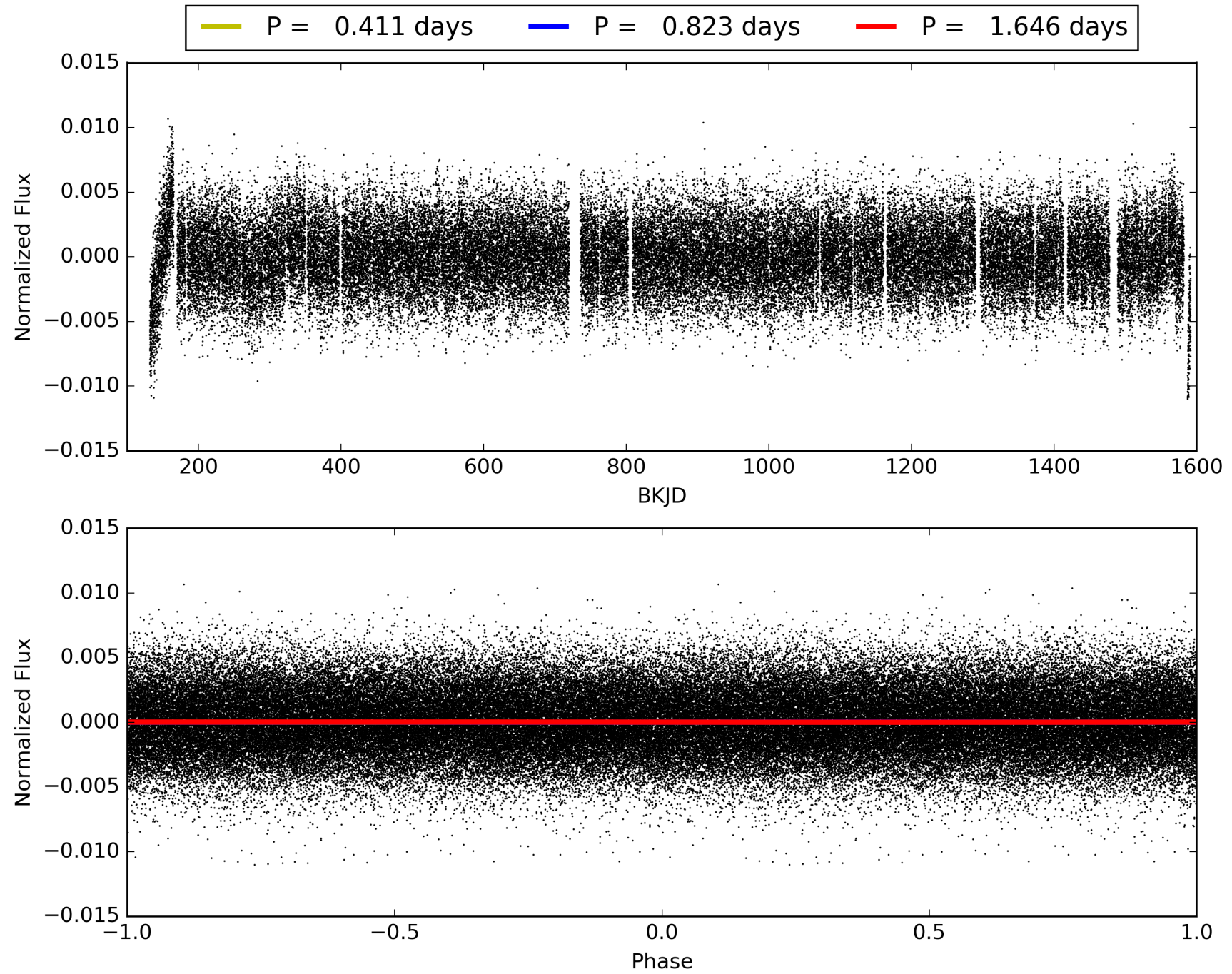
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 009529073-01, PDC Light Curves





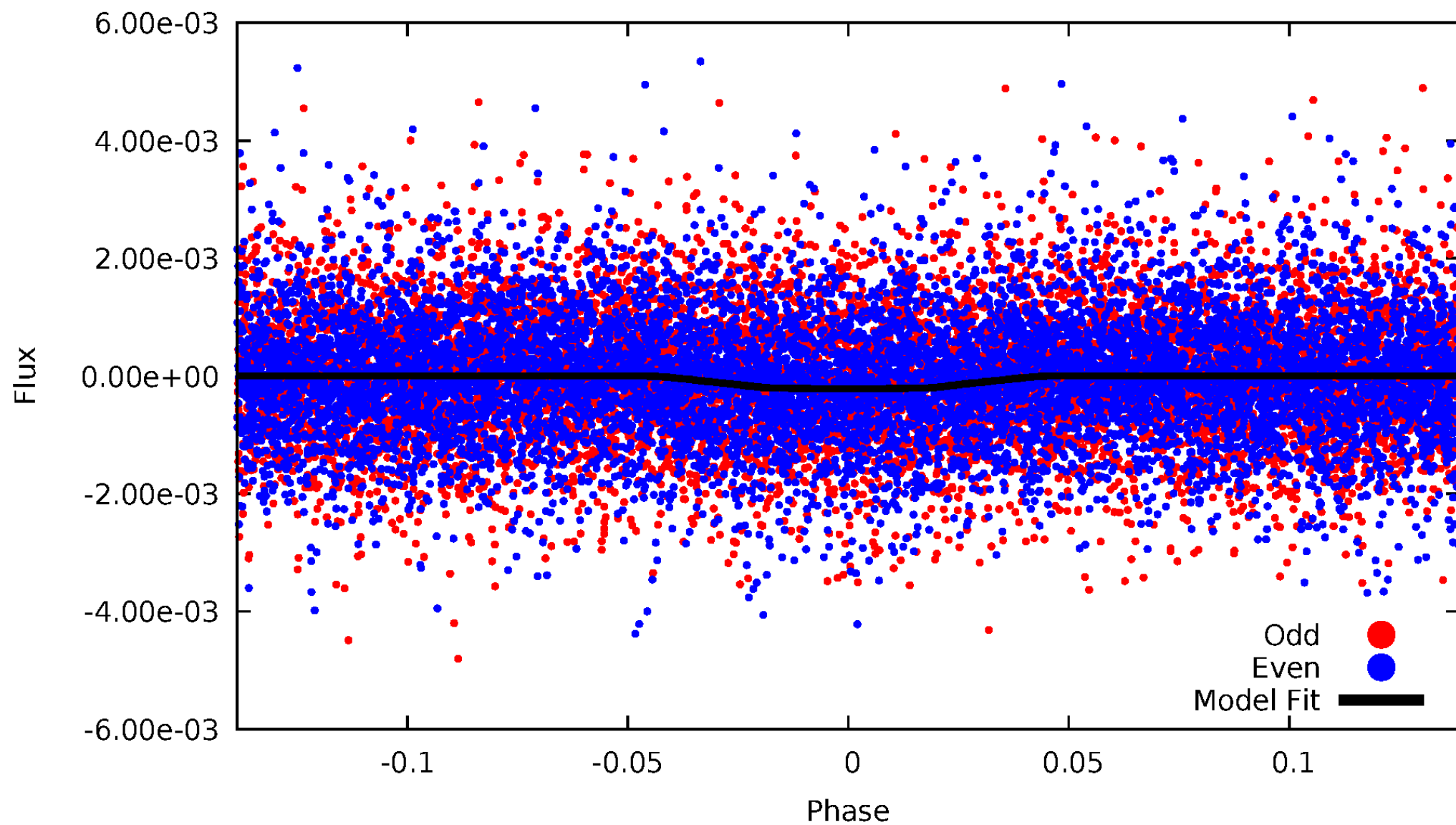
TCE 009529073-01





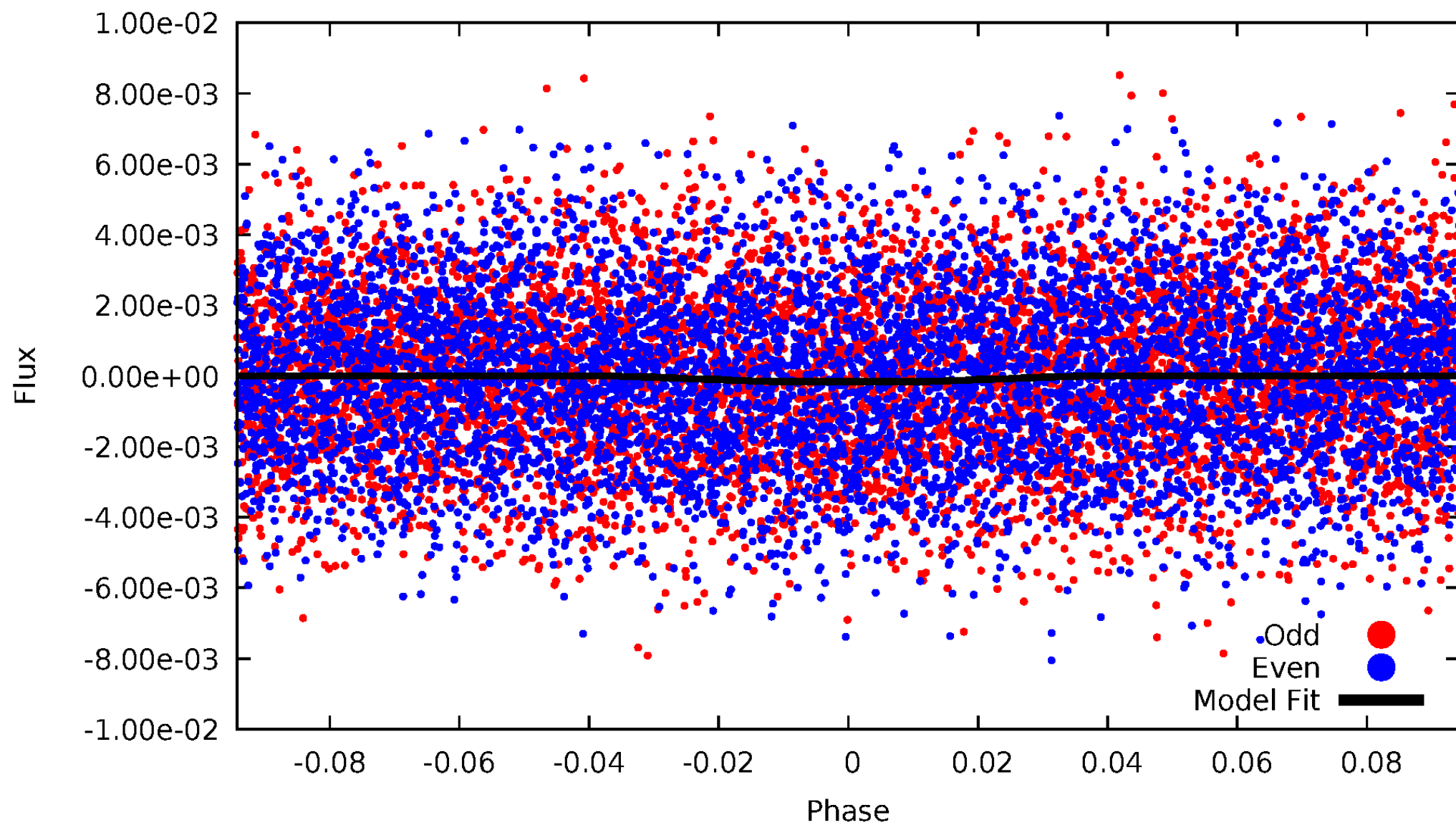
# DV Odd/Even

TCE 009529073-01



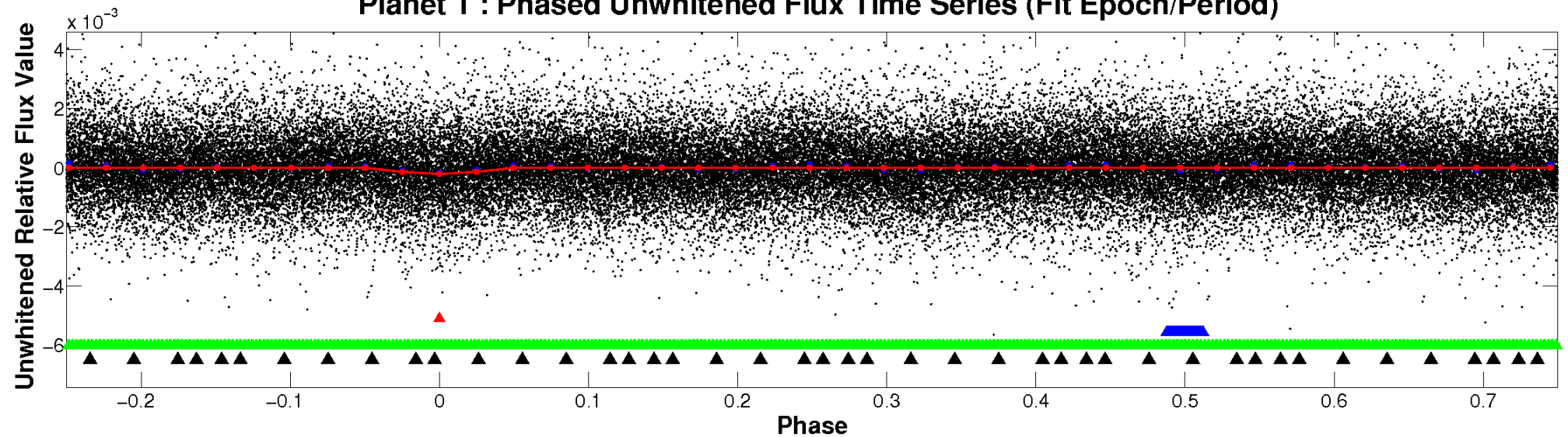
# ALT Odd/Even

TCE 009529073-01

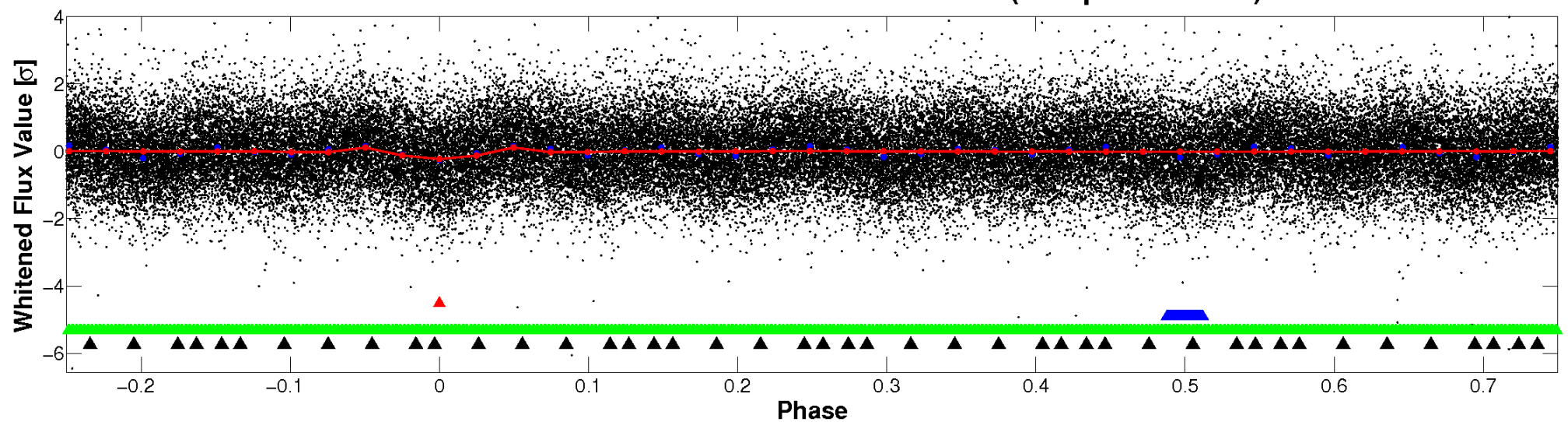


# Non-Whitened Vs. Whitened Light Curve

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



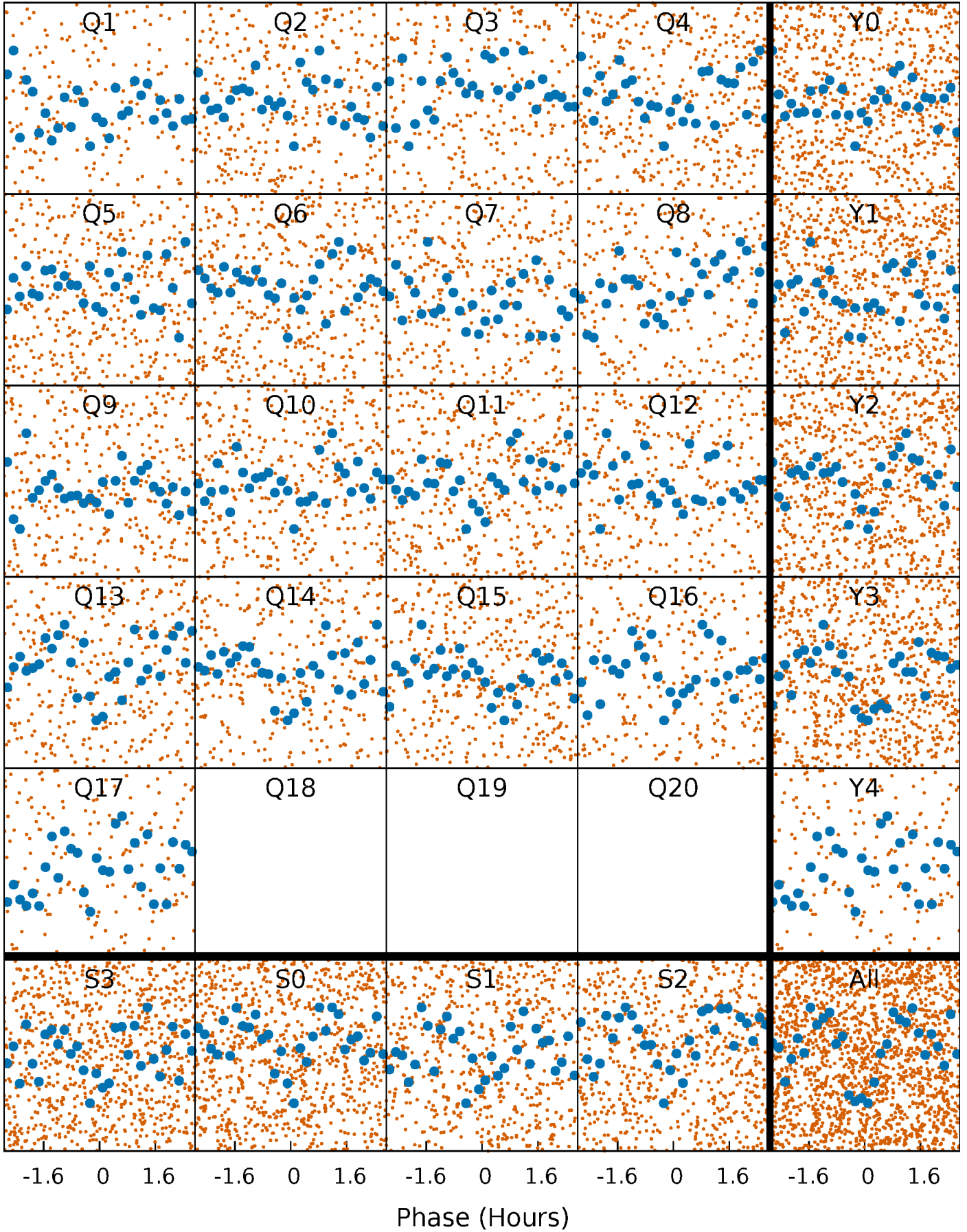
Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)





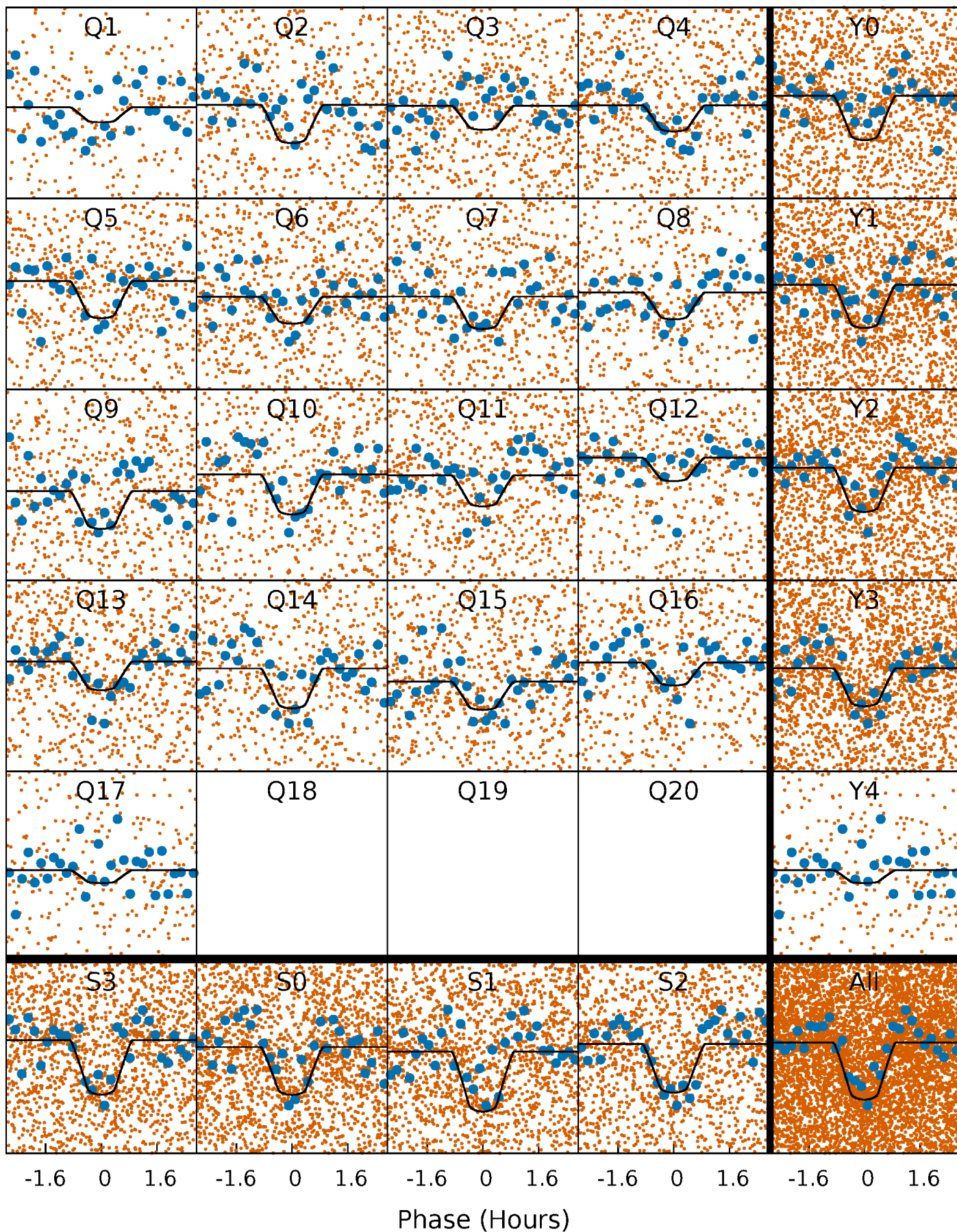
# PDC Quarter-Phased Transit Curves

TCE 009529073-01 P= 0.822864 Days  $T_0=132.139265$  (BKJD)



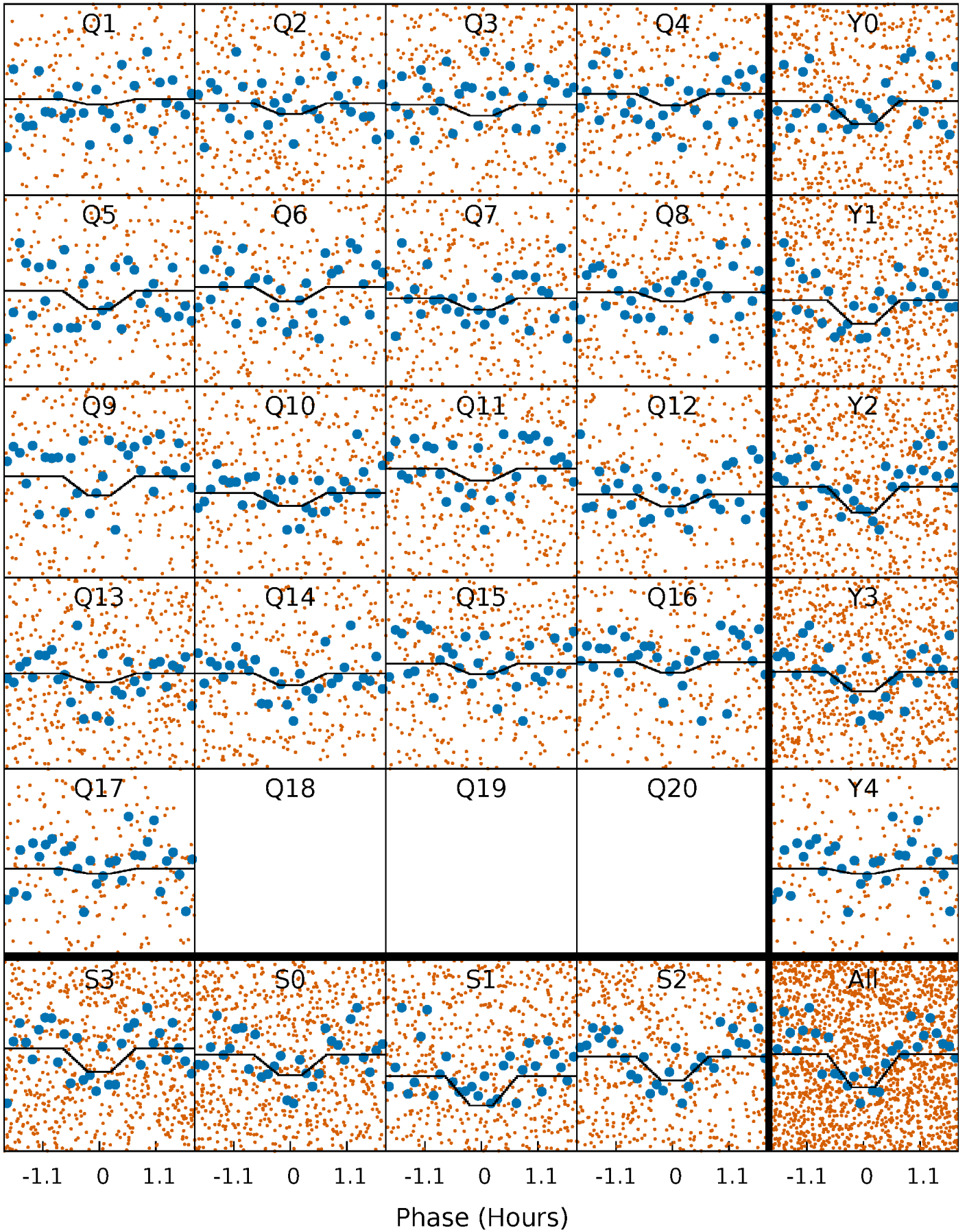
# DV Quarter-Phased Transit Curves

TCE 009529073-01   P= 0.822864 Days    $T_0=132.139265$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 009529073-01 P= 0.822862 Days  $T_0=132.139763$  (BKJD)

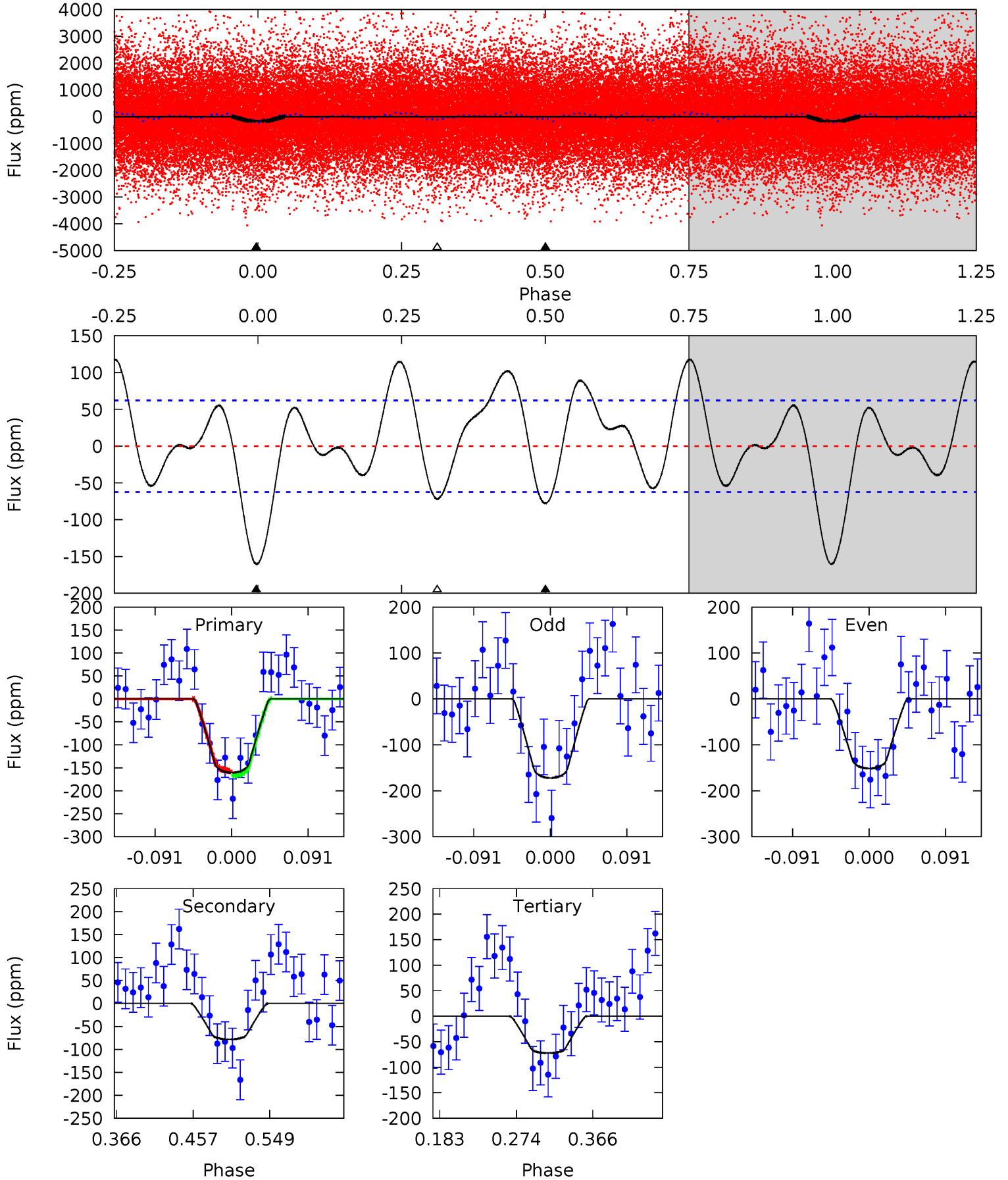




# DV Model-Shift Uniqueness Test

009529073-01, P = 0.822864 Days, E = 131.316401 Days

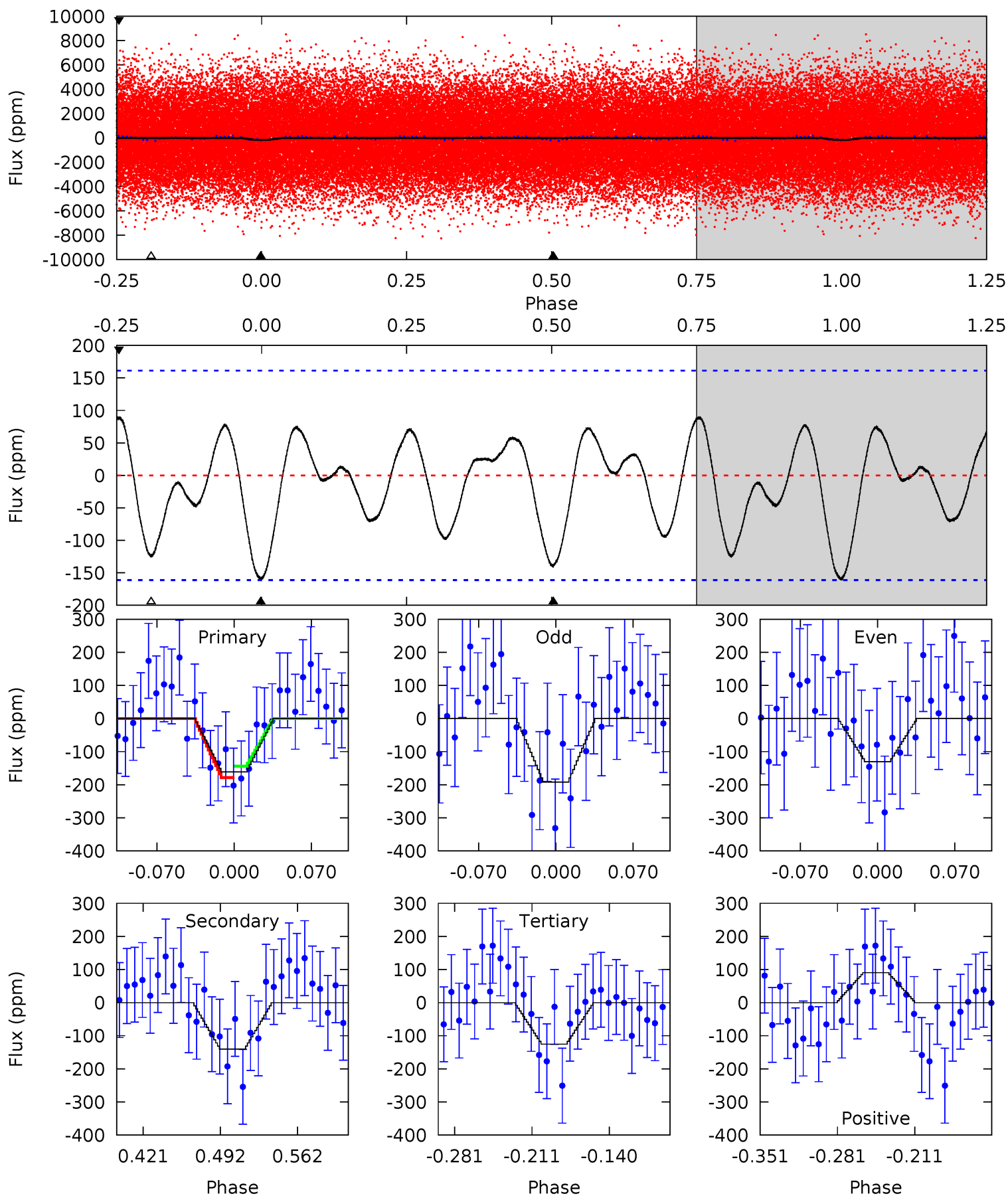
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.8	5.76	5.34	0	4.58	1.69	3.55	6.51	11.8	0.42	5.76	0.77	0.91	0.42	0.34



# Alt Model-Shift Uniqueness Test

009529073-01, P = 0.822862 Days, E = 131.316901 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
4.63	4.04	3.61	2.60	4.64	1.81	1.45	1.03	2.03	0.43	1.44	0.89	1.14	0.36	0.50



### Stellar Parameters For KIC 009529073

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7274^{+200}_{-314}$	$4.042^{+0.170}_{-0.170}$	$0.070^{+0.200}_{-0.350}$	$2.036^{+0.538}_{-0.538}$	$1.666^{+0.181}_{-0.272}$	$0.278^{+0.260}_{-0.135}$
	+3%/-4%	+4%/-4%	+286%/-500%	+26%/-26%	+11%/-16%	+93%/-48%
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 009529073-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-78 \pm 14$	$3.49^{+0.73}_{-0.71}$	$4464^{+325}_{-316}$	$5090^{+587}_{-460}$	$1.450^{+0.835}_{-0.497}$
Alt.	$-141 \pm 35$	$2.82^{+0.70}_{-0.64}$	$4488^{+341}_{-325}$	$6807^{+1039}_{-915}$	$3.925^{+2.798}_{-1.599}$

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



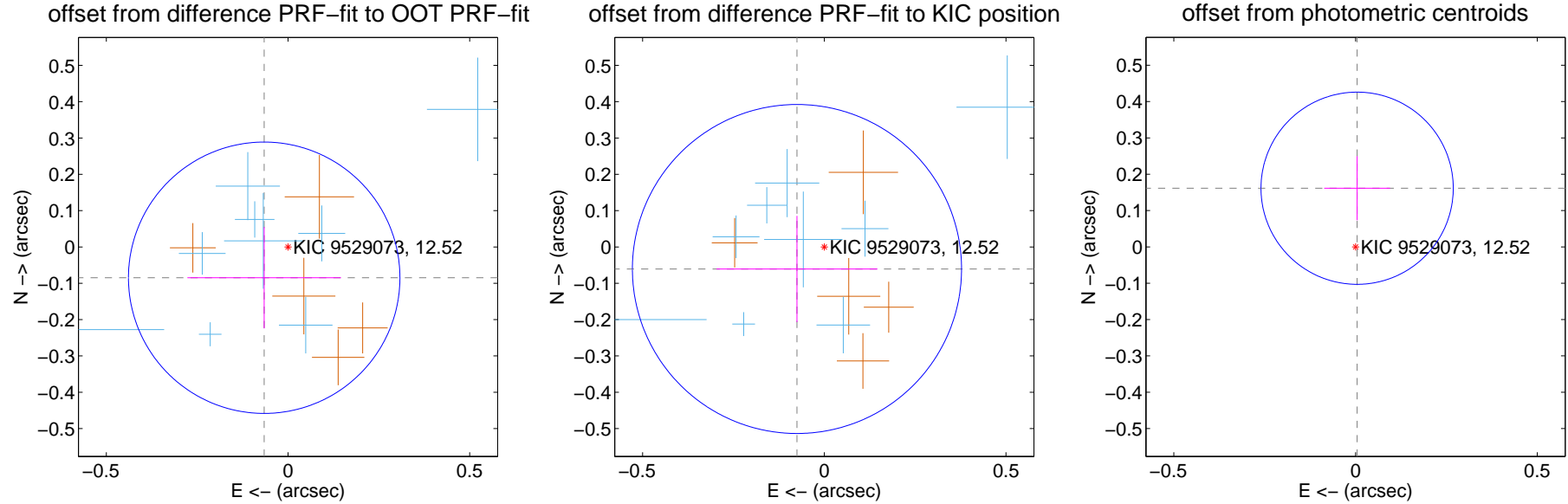
## DV Centroid Data

Supplemental centroid analysis for 009529073-01. Kepler magnitude: 12.52. Transit SNR 15.32

There are 11 quarters with good PRF difference image offsets

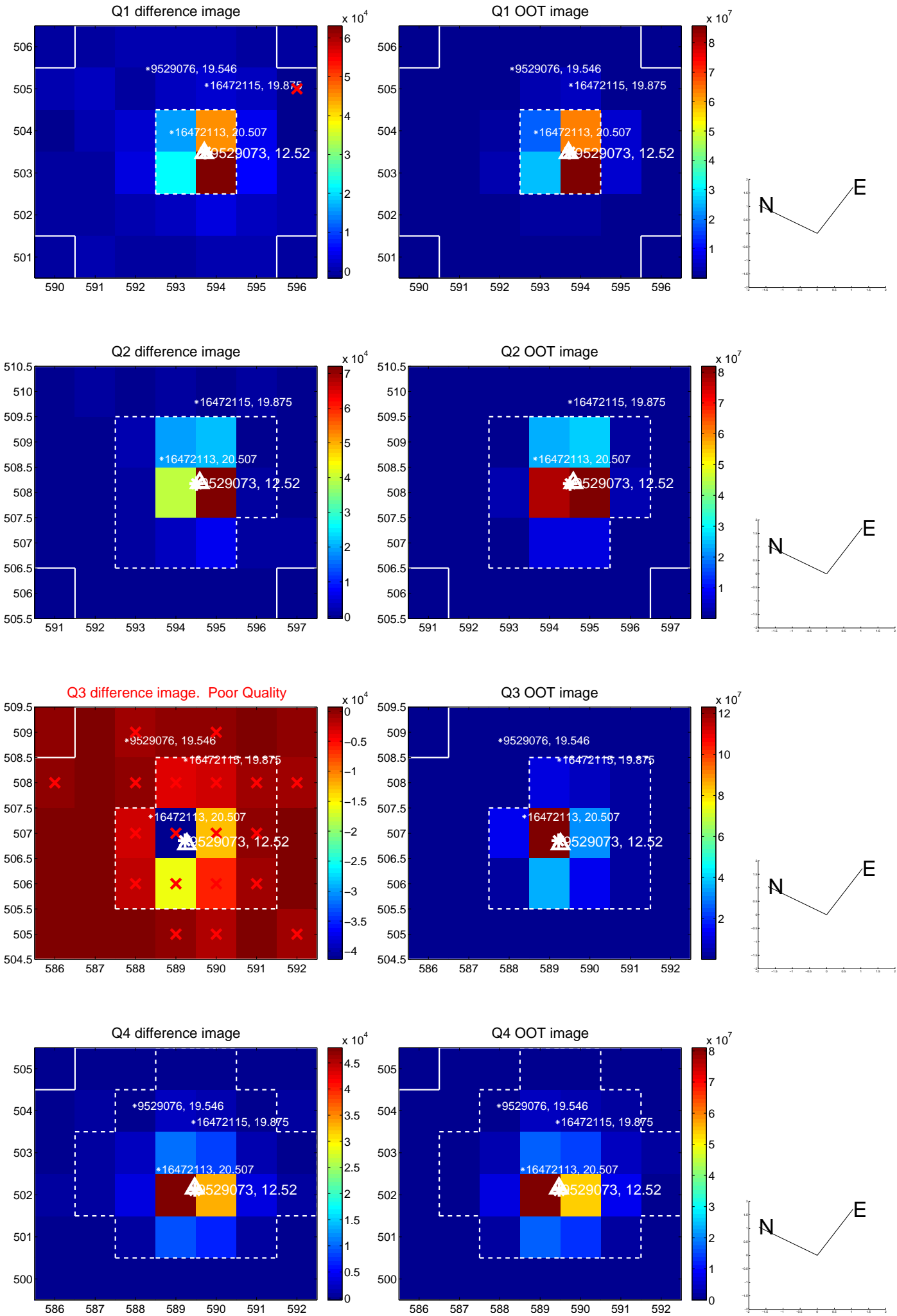
The direct PRF centroid is offset from the target star catalog position by about 0.07 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.107 \pm 0.125$	0.86	$0.066 \pm 0.211$	$-0.085 \pm 0.140$
PRF-fit source offset from KIC position	$0.097 \pm 0.151$	0.64	$0.075 \pm 0.221$	$-0.061 \pm 0.146$
photometric centroid source offset	$0.16 \pm 0.09$	1.83	$-0.00 \pm 0.09$	$0.16 \pm 0.09$

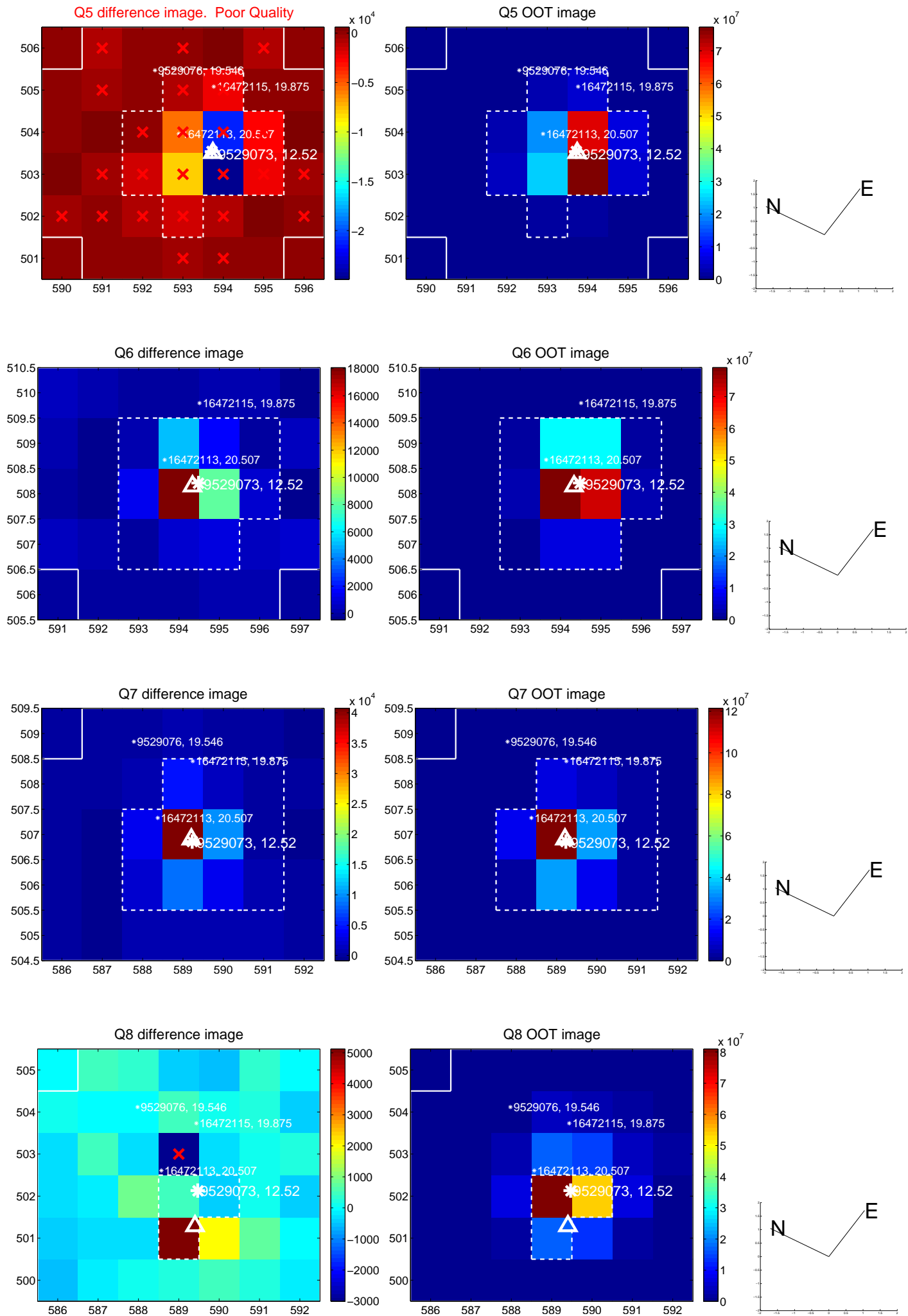


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

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

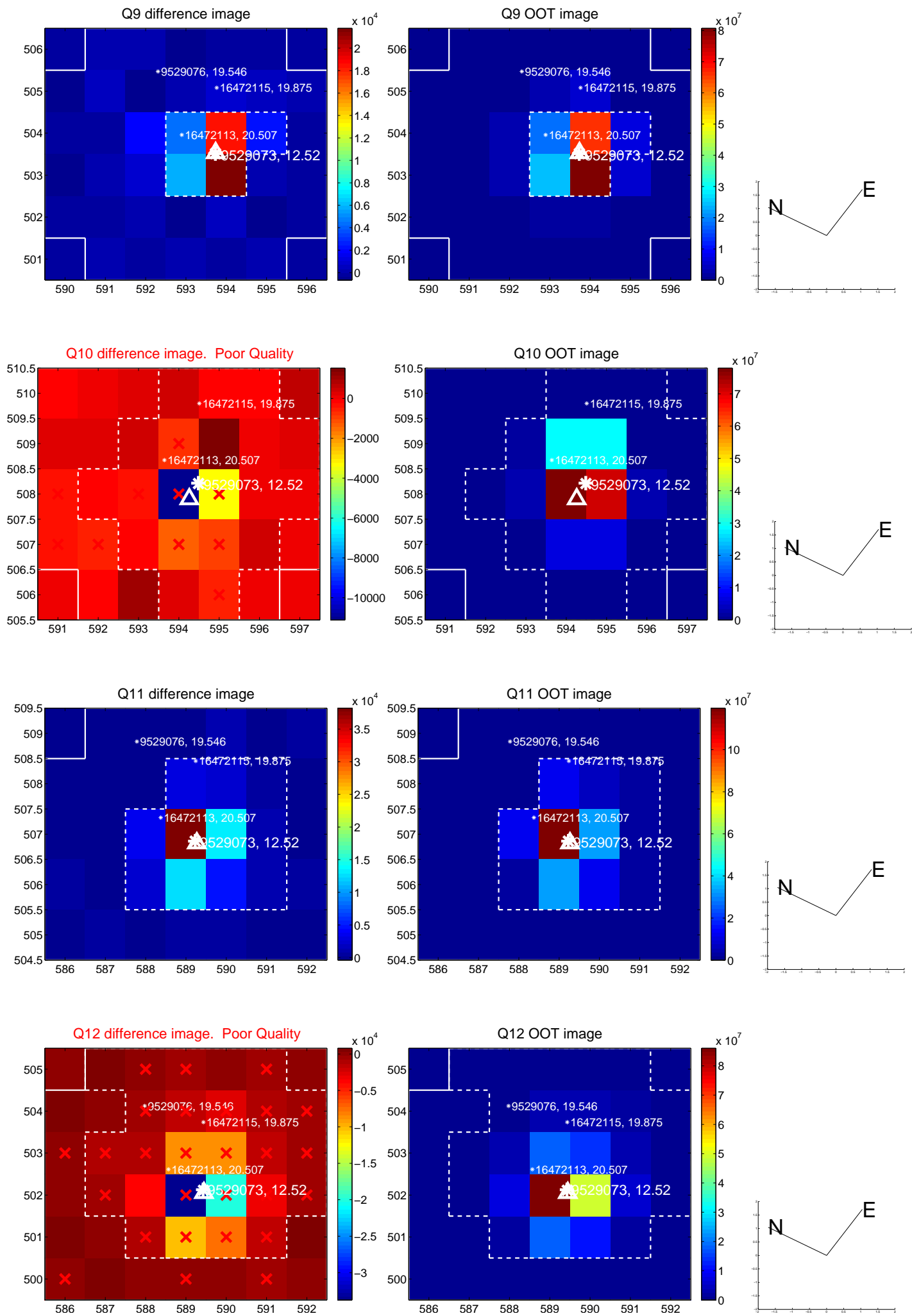


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

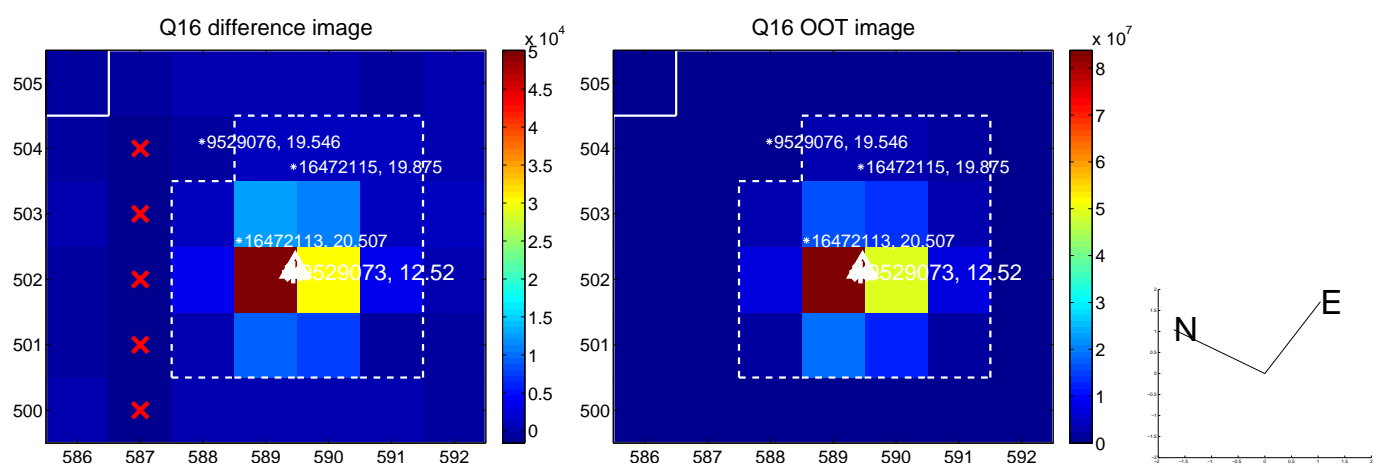
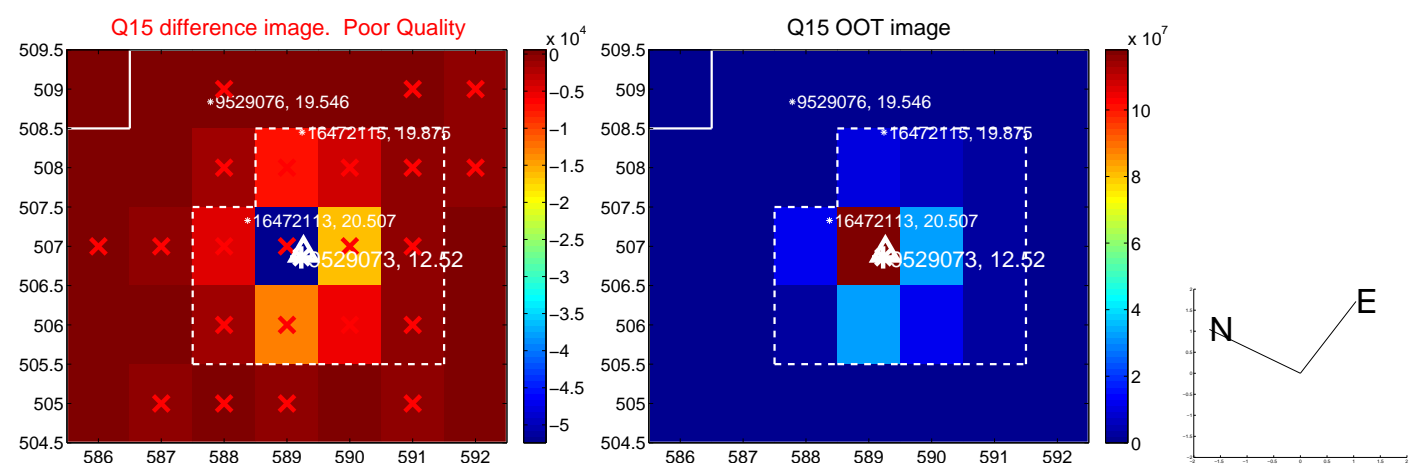
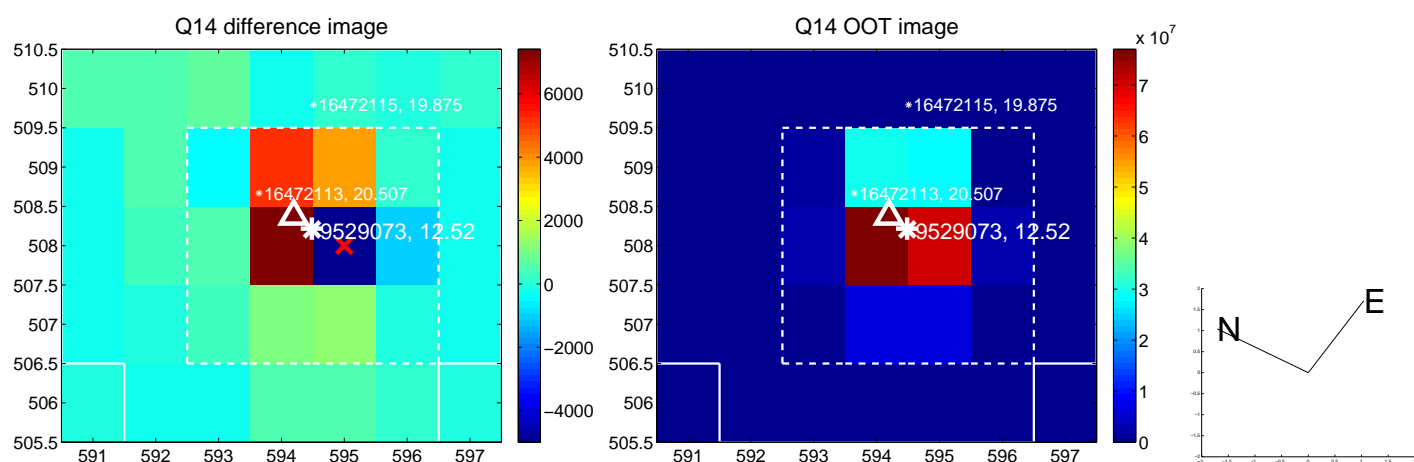
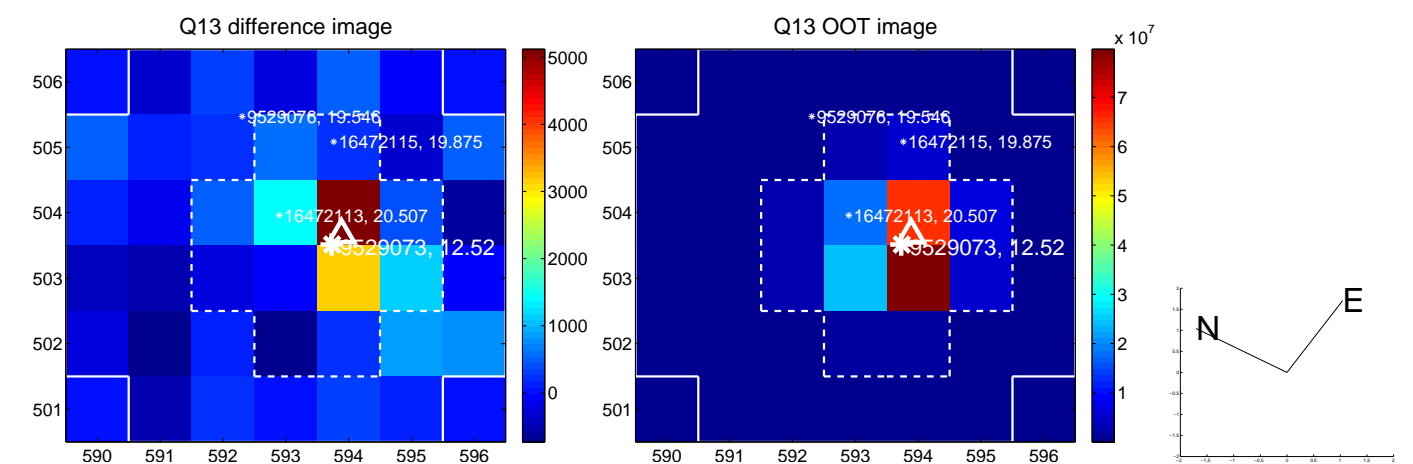




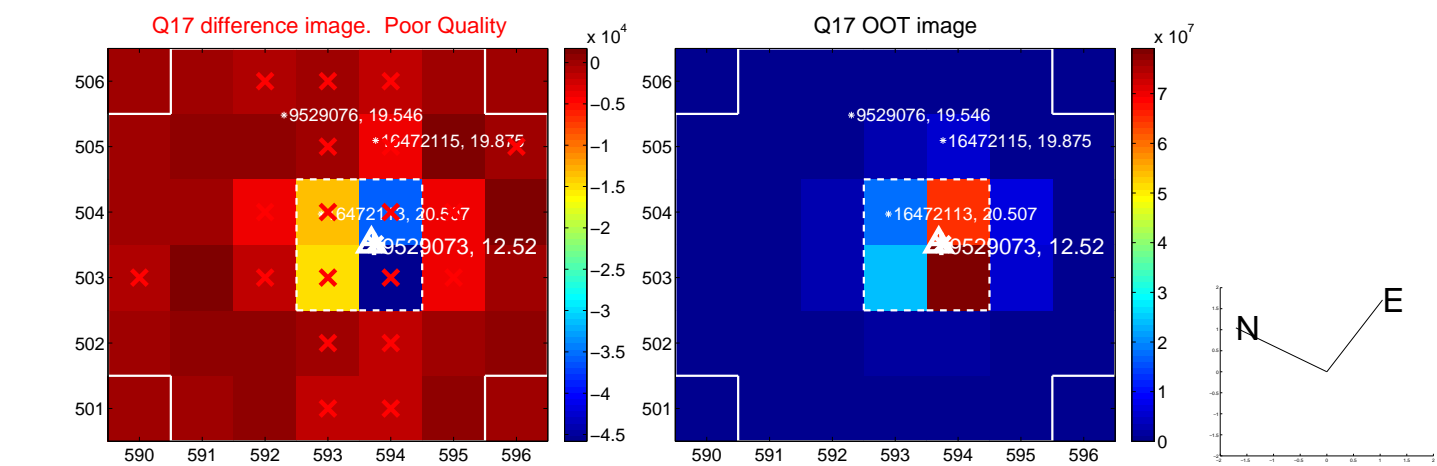
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



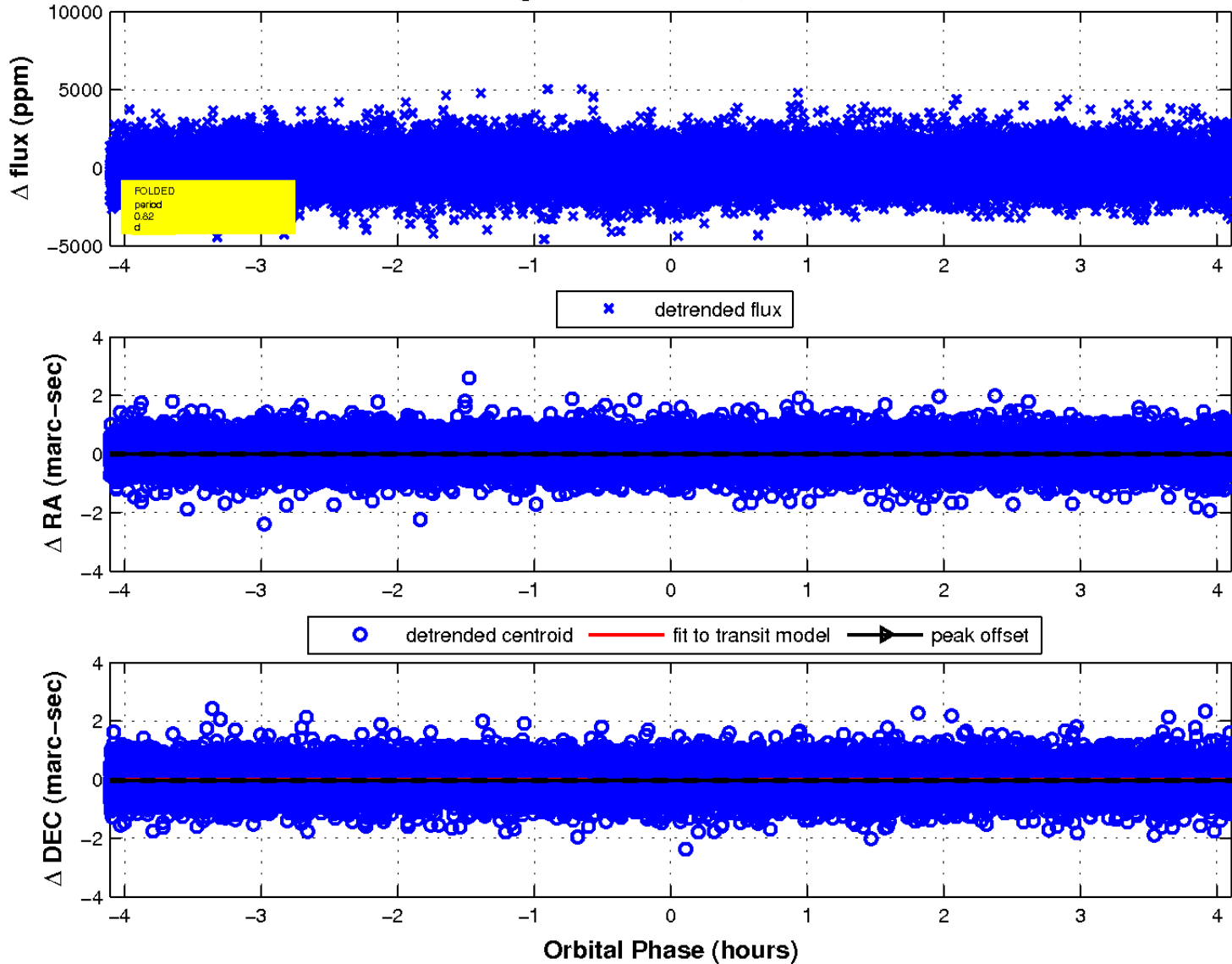
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



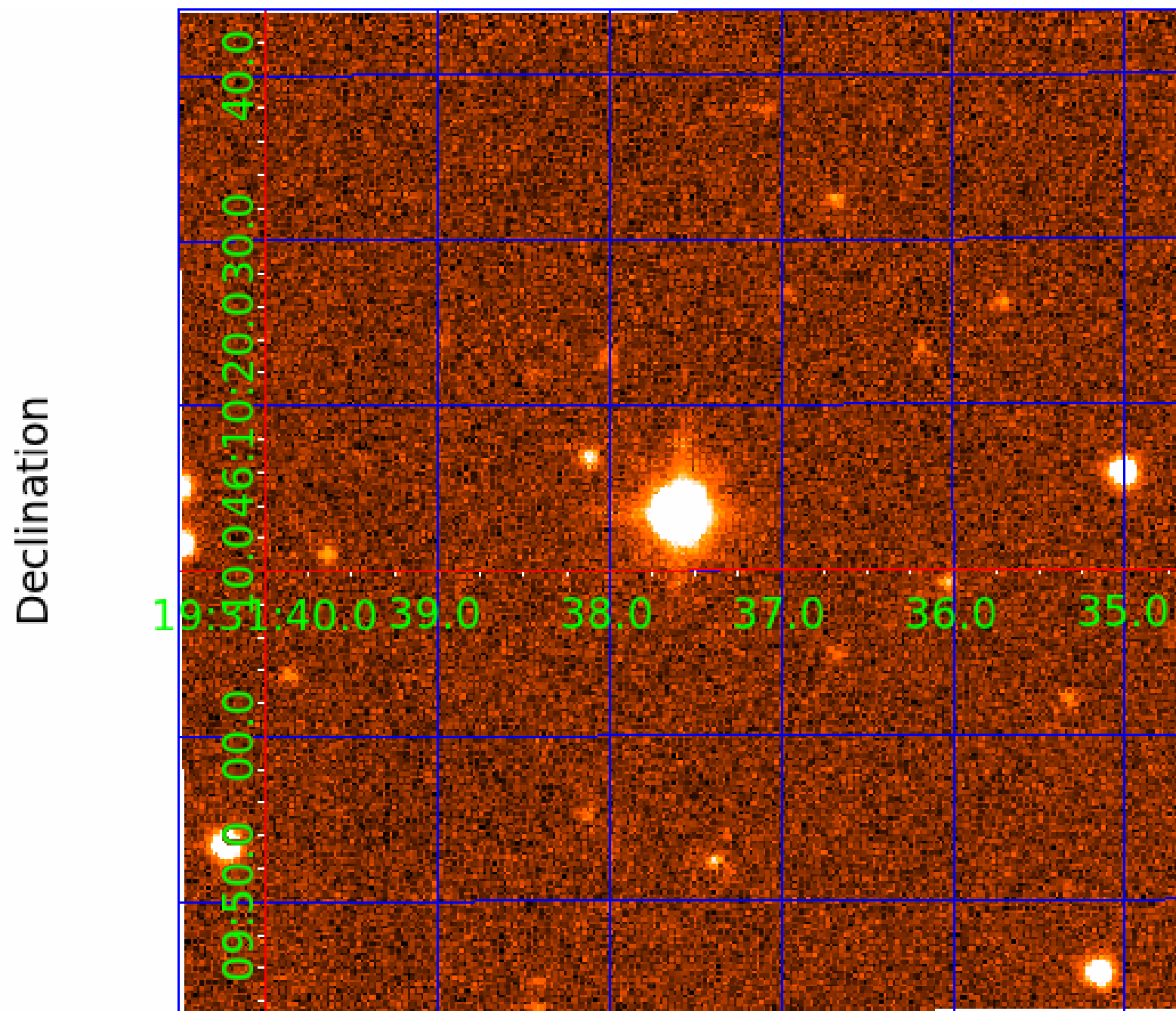
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



fluxWeightedCentroids, Planet 1 of 4



UKIRT Image



# KIC 009529073

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009529073-01	OBS	No	0.822864	132.139265	216.0	1.369	14.3	15.3	2.04	7274	3.48	25045.81
009529073-02	OBS	No	0.822853	131.737839	163.9	1.274	12.0	12.2	2.04	7274	3.03	25046.27
009529073-03	OBS	No	0.730239	132.005310	161.5	2.337	8.9	8.3	2.04	7274	3.00	29368.80
009529073-04	OBS	No	32.676012	159.066512	1366.6	2.070	7.6	9.3	2.04	7274	8.16	184.87

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009529073-01	OBS	FP	0.00	1	0	0	0	LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
009529073-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD
009529073-03	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
009529073-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_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.

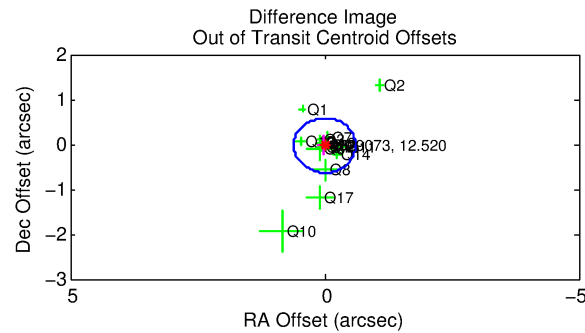
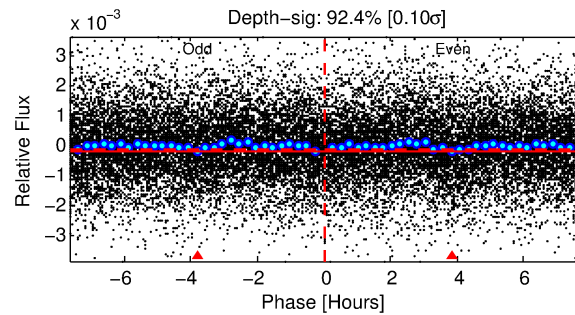
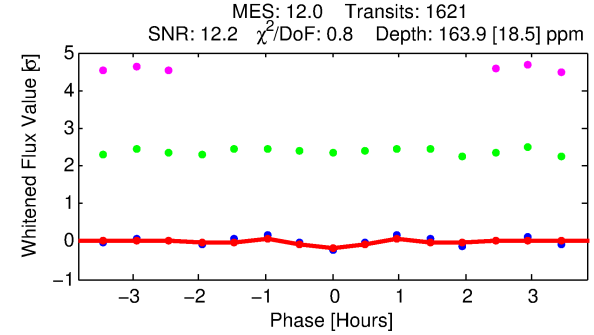
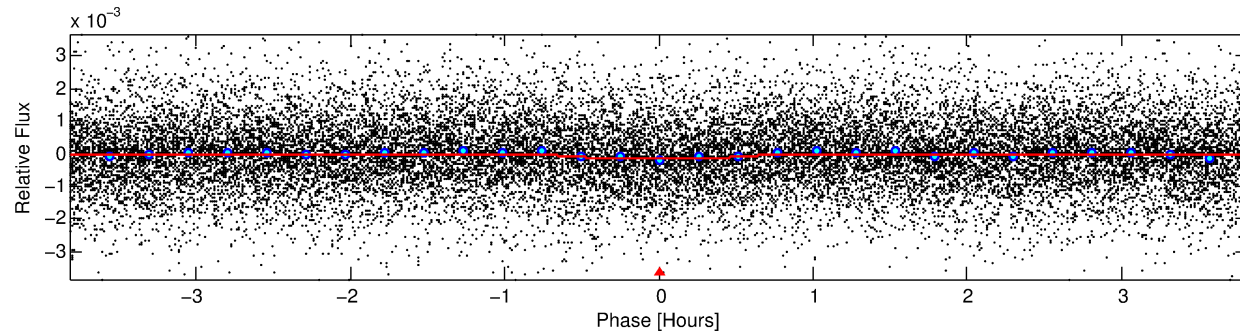
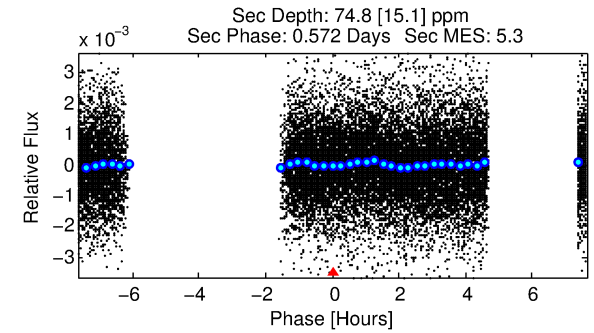
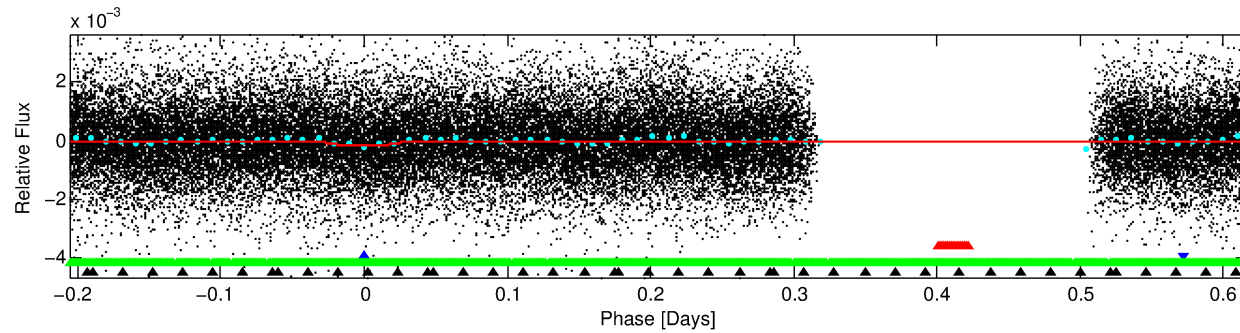
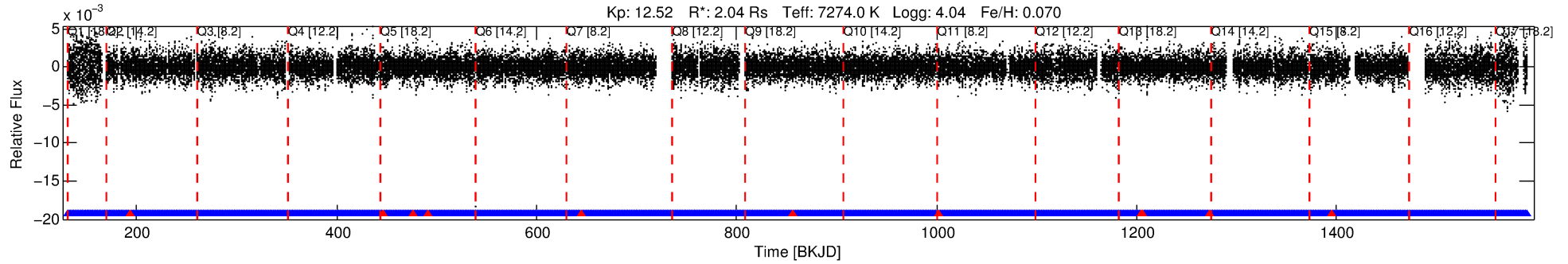
Ephemeris Match Information For 009529073-02

No Significant Match Found



# DV One-Page Summary

KIC: 9529073 Candidate: 2 of 4 Period: 0.823 d



## DV Fit Results:

Period = 0.82285 [0.00001] d  
Epoch = 131.7378 [0.0009] BKJD  
Rp/R\* = 0.0137 [0.0026]  
a/R\* = 2.48 [2.36]  
b = 0.90 [0.24]  
Seff = 25046.27 [8993.95]  
Teff = 3208 [288] K  
Rp = 3.03 [0.99] Re  
a = 0.0204 [0.0045] AU  
Ag = 1.86 [0.99] [0.86σ]  
Teffp = 5789 [675] K [3.52σ]

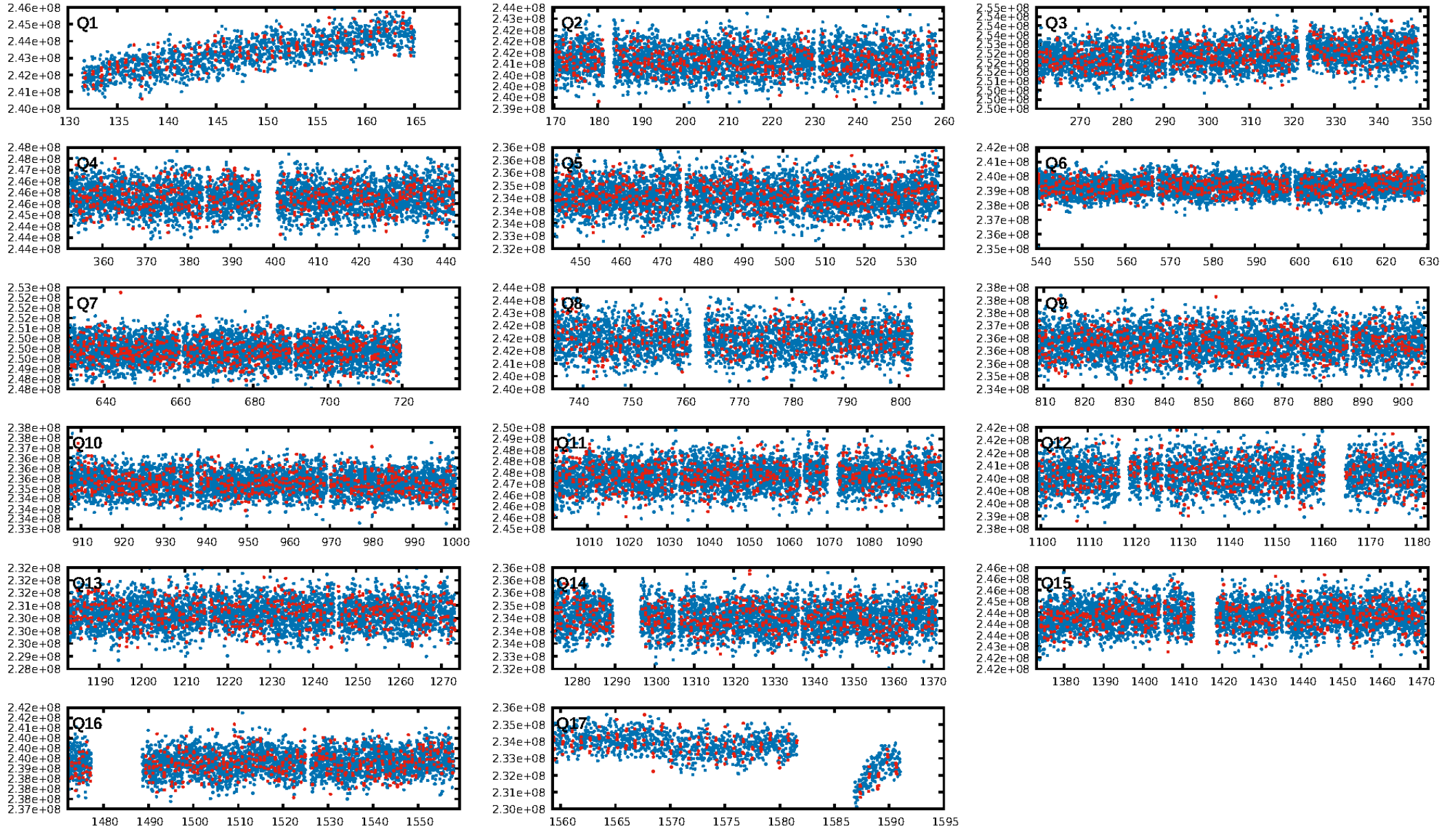
## DV Diagnostic Results:

ShortPeriod-sig: 59.6% [0.83σ]  
**LongPeriod-sig: 0.0% [0.00σ]**  
ModelChiSquare2-sig: N/A  
ModelChiSquareGoF-sig: N/A  
Bootstrap-pfa: 1.65e-34  
RollingBand-fgt: 0.99 [1536/1547]  
GhostDiagnostic-chr: 1.841  
Centroid-sig: 27.5%  
Centroid-so: 0.121 arcsec [1.01σ]  
OotOffset-rm: 0.029 arcsec [0.14σ]  
OotOffset-st: 4/4/4/4 [16]  
KicOffset-rm: 0.037 arcsec [0.26σ]  
KicOffset-st: 4/4/4/4 [16]  
DiffImageQuality-fgm: 0.44 [7/16]  
DiffImageOverlap-fno: 1.00 [17/17]

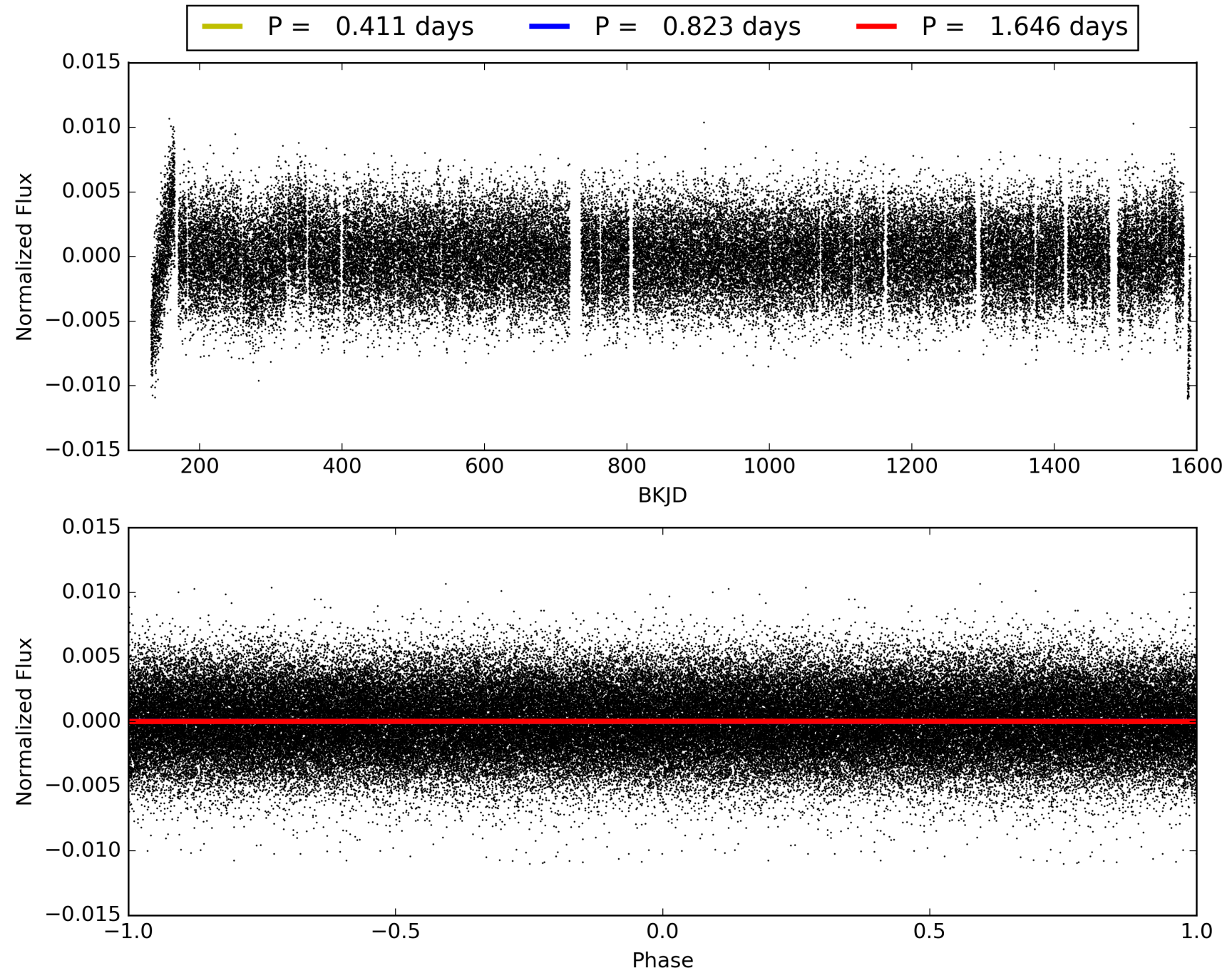
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 22:32:16 Z

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

# TCE 009529073-02, PDC Light Curves

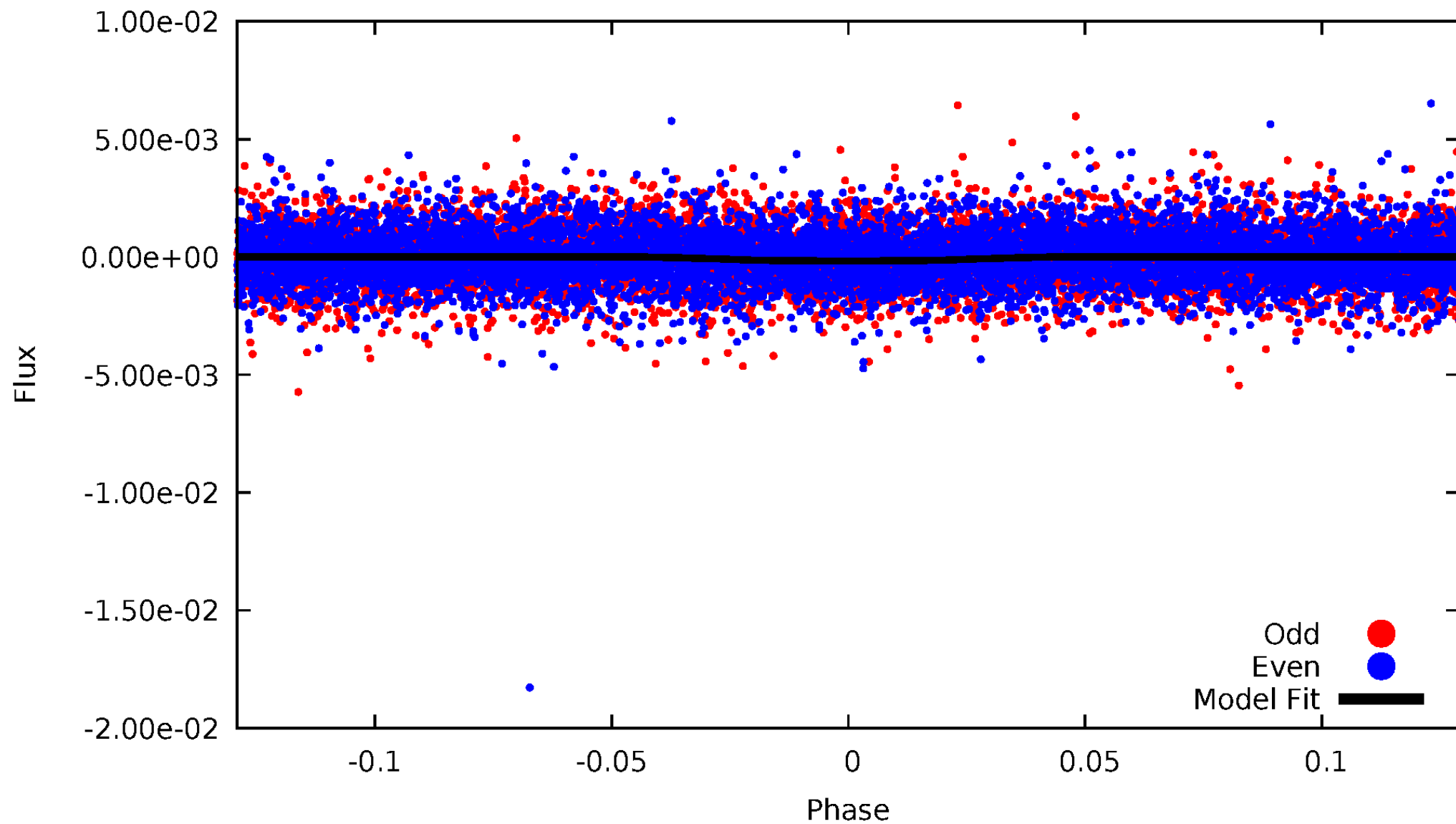


TCE 009529073-02



# DV Odd/Even

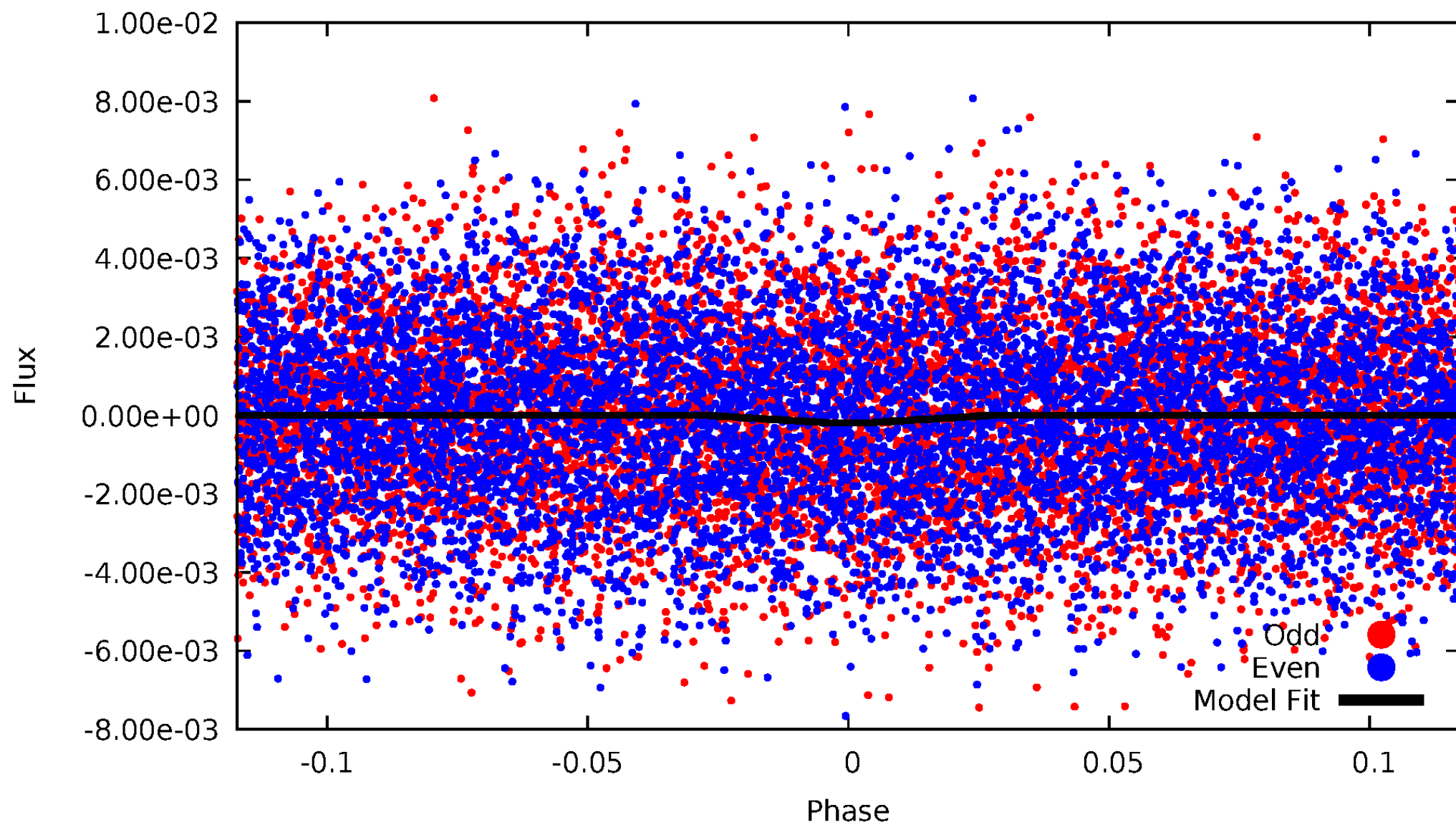
TCE 009529073-02





# ALT Odd/Even

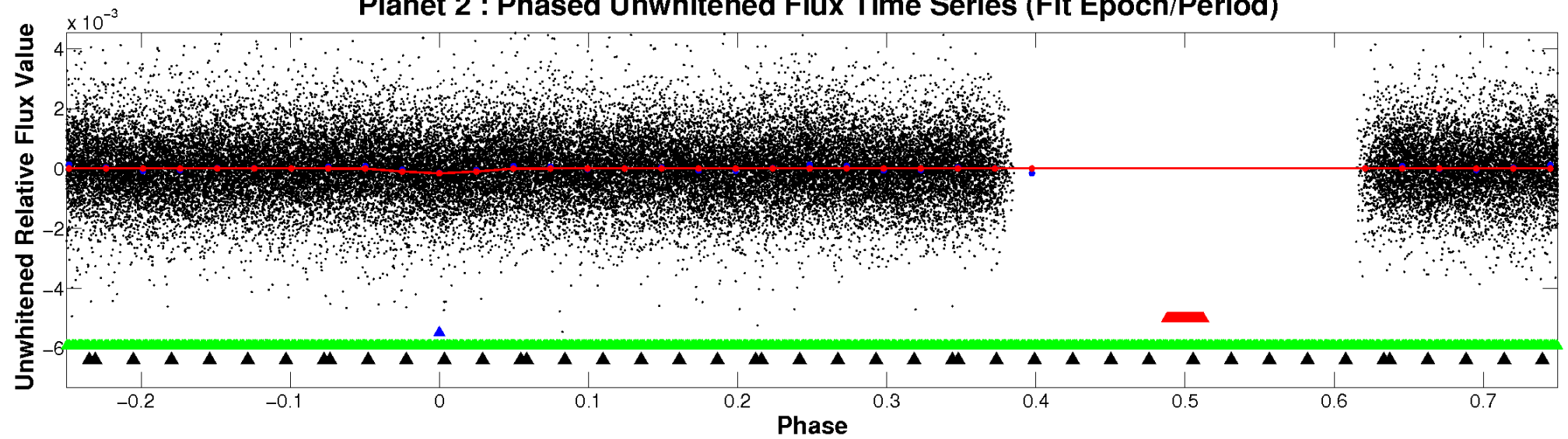
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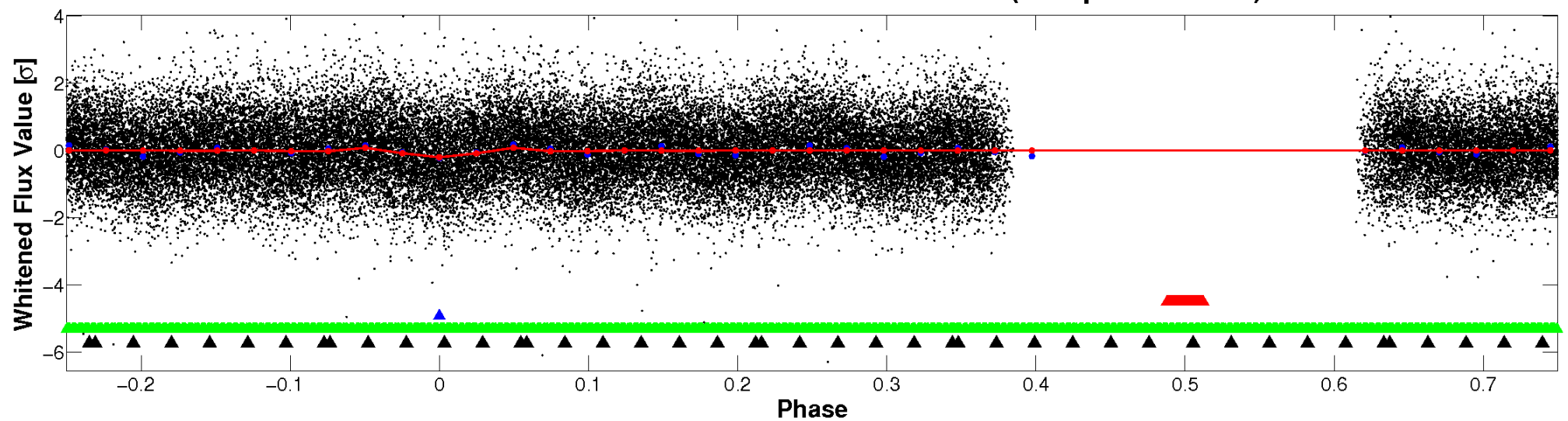


# Non-Whitened Vs. Whitened Light Curve

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

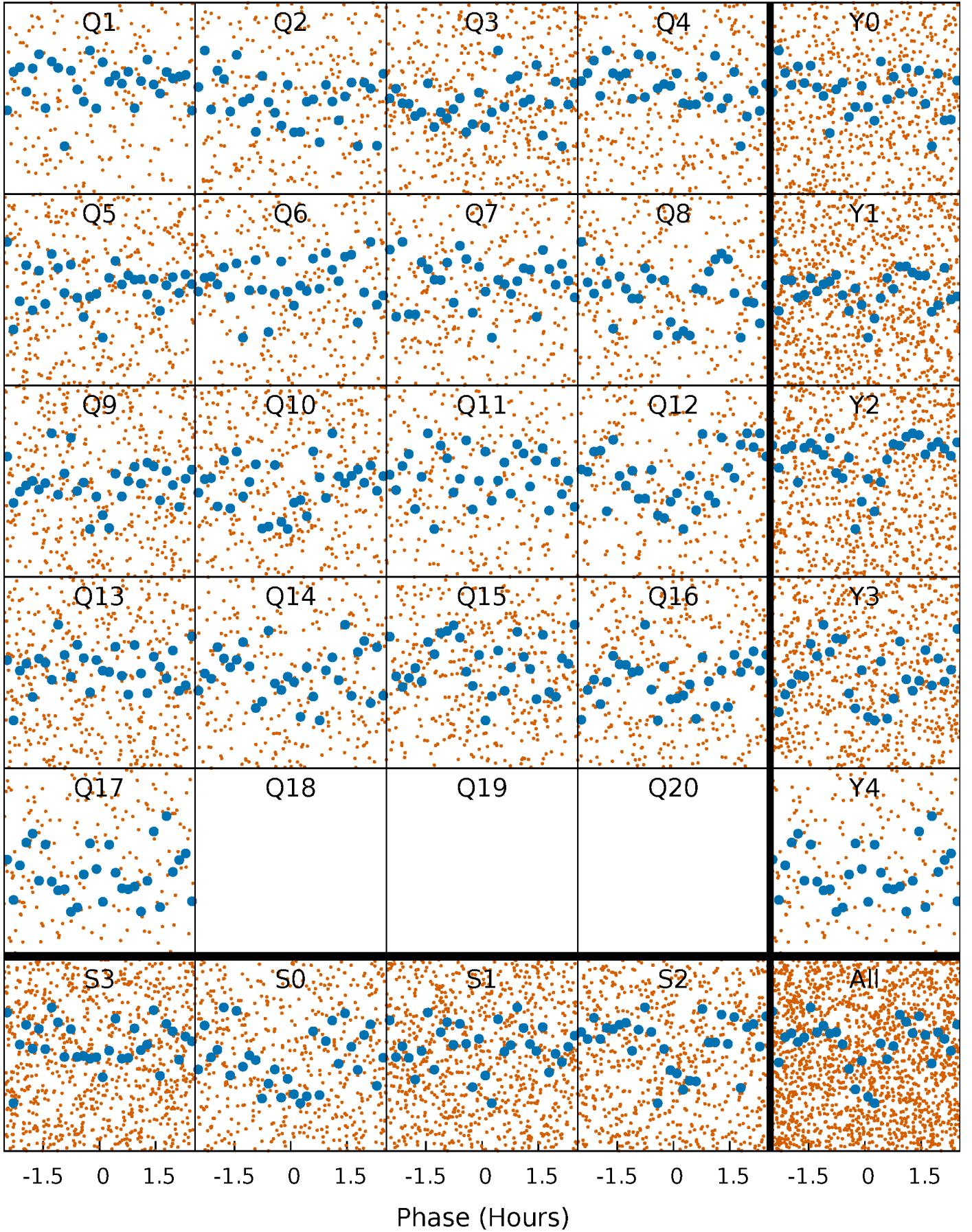


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



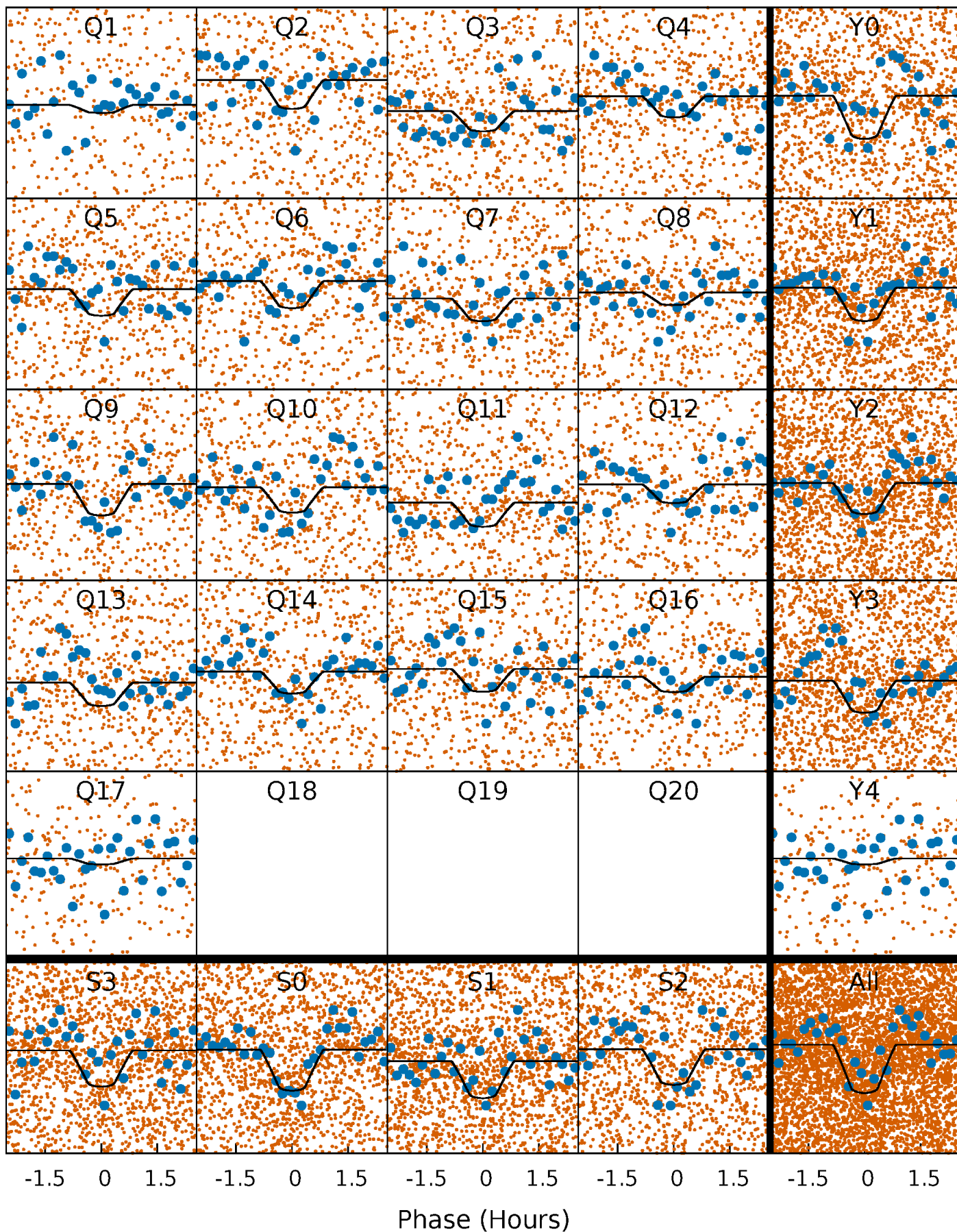
# PDC Quarter-Phased Transit Curves

TCE 009529073-02   P= 0.822853 Days    $T_0=131.737839$  (BKJD)



# DV Quarter-Phased Transit Curves

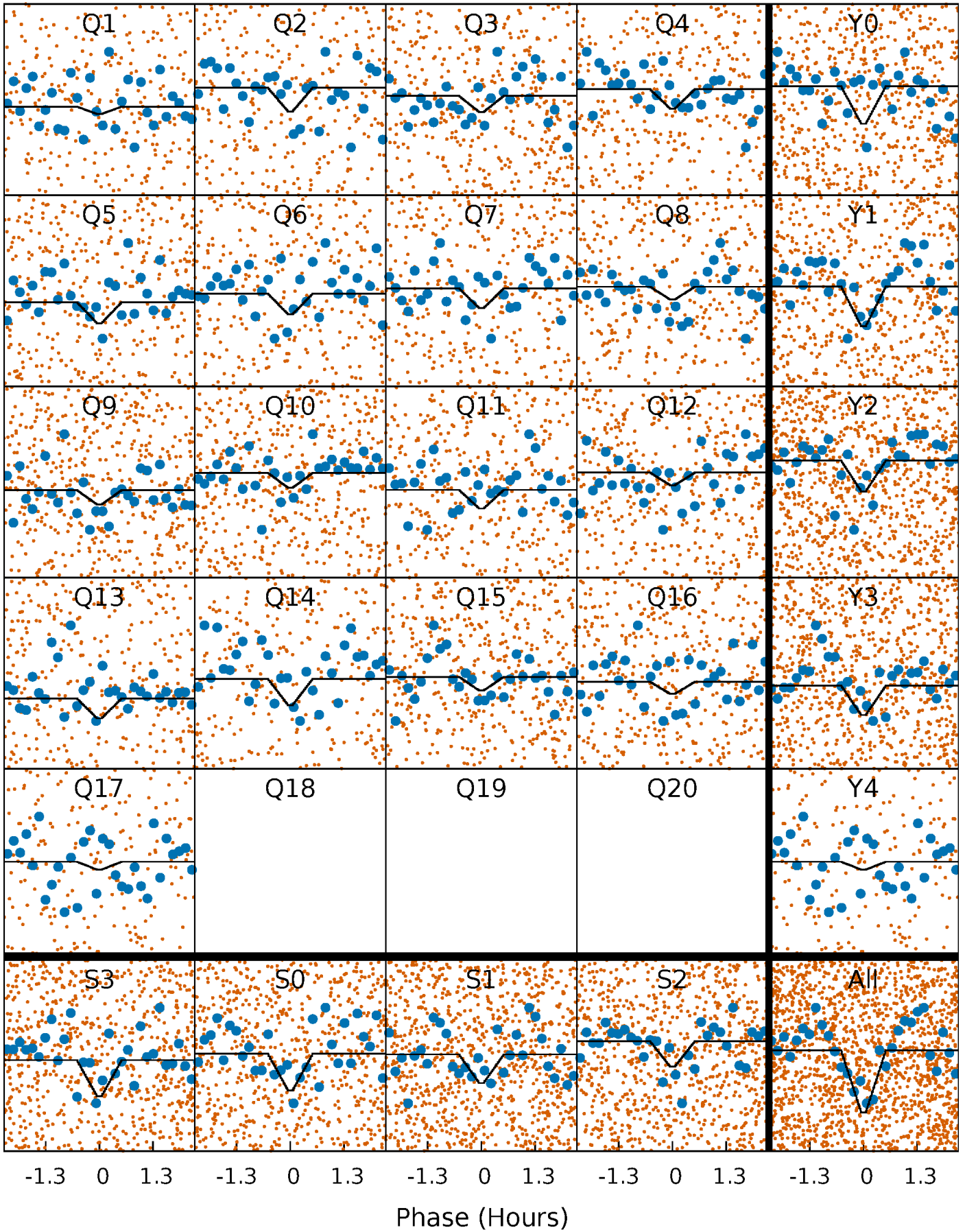
TCE 009529073-02     $P = 0.822853$  Days     $T_0 = 131.737839$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

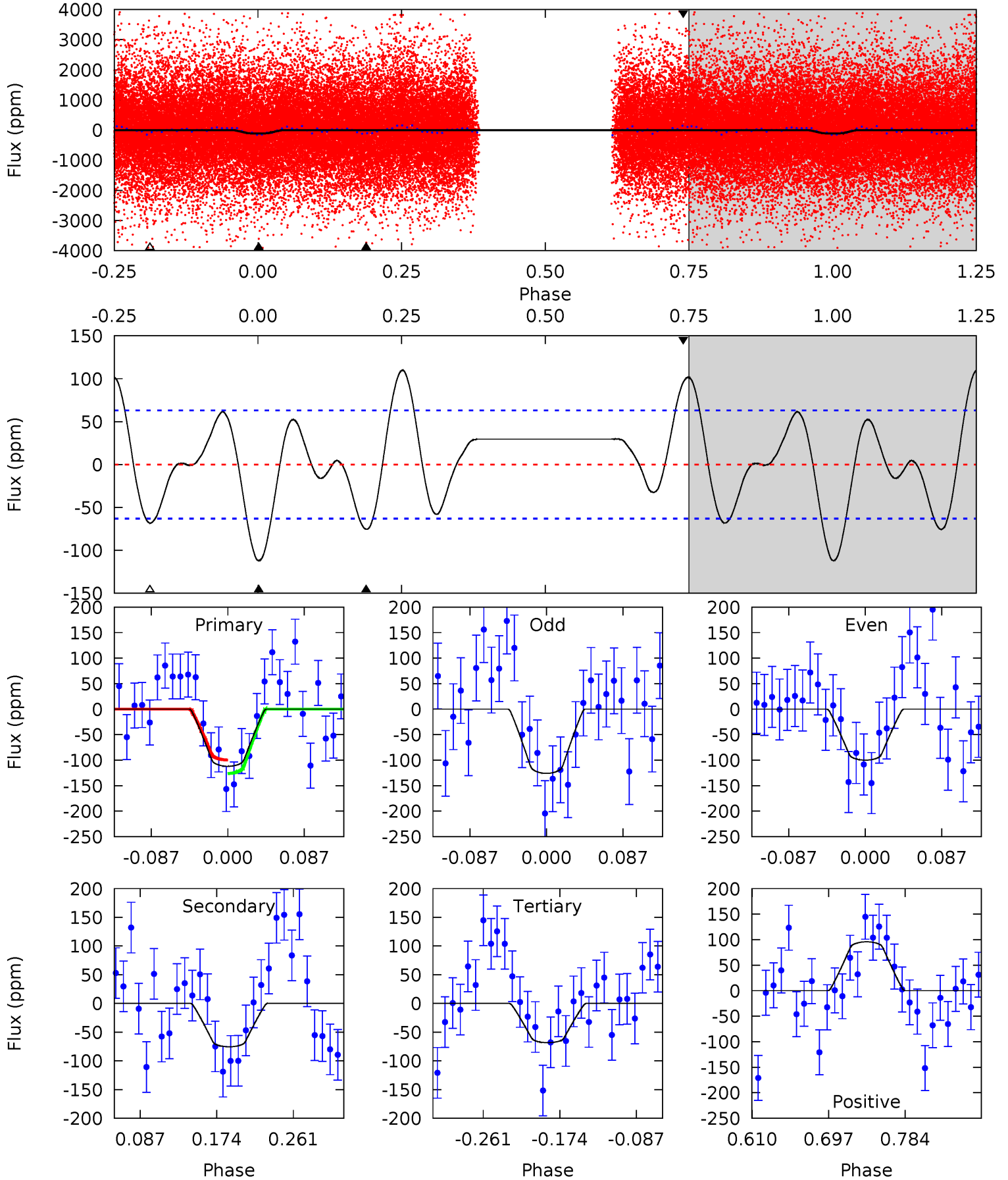
TCE 009529073-02   P= 0.822855 Days    $T_0=131.737465$  (BKJD)



# DV Model-Shift Uniqueness Test

009529073-02, P = 0.822853 Days, E = 130.914986 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
8.16	5.50	4.97	6.98	4.59	1.71	3.03	3.19	1.18	0.53	-1.48	0.95	0.77	0.50	0.95

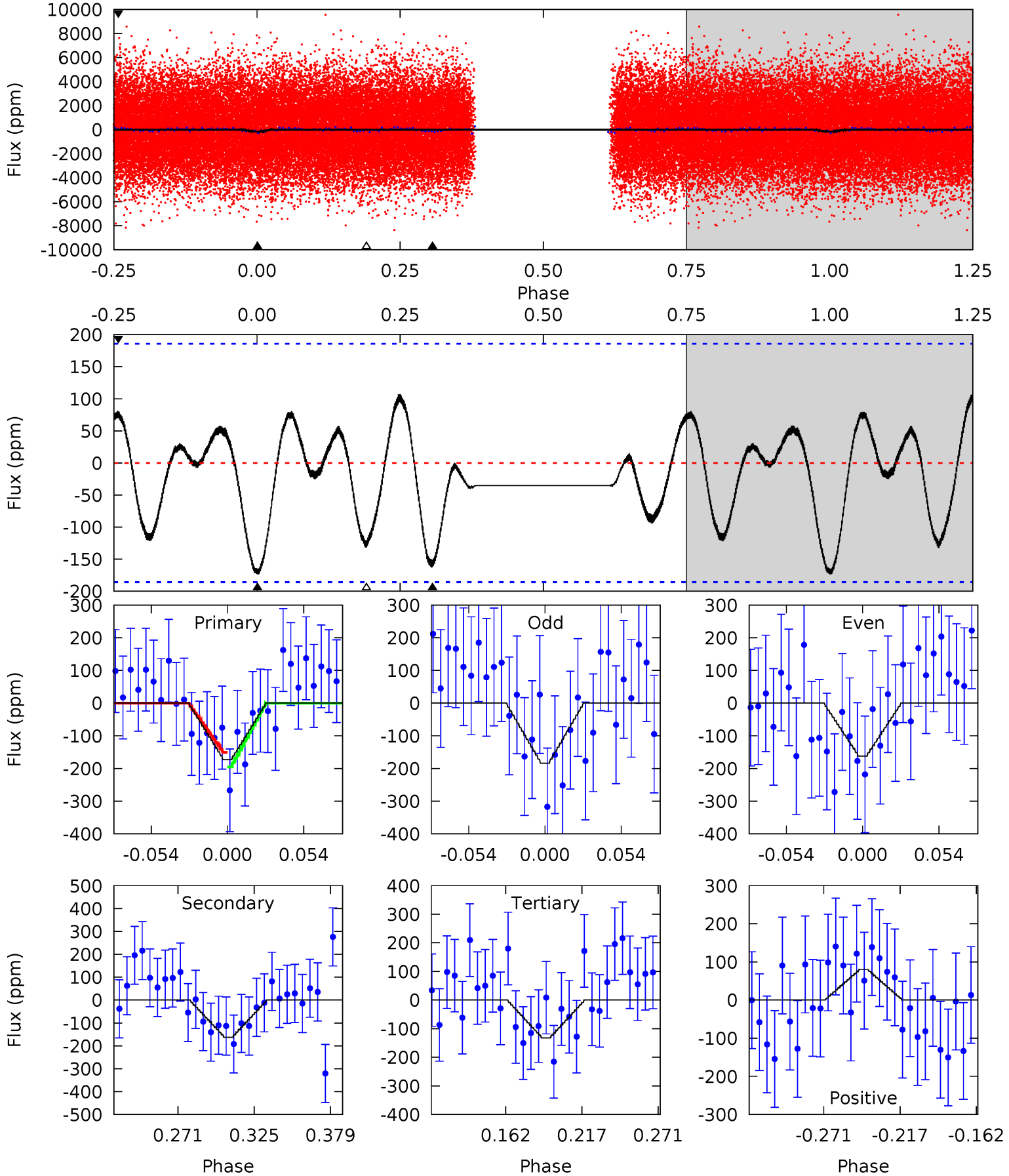




# Alt Model-Shift Uniqueness Test

009529073-02, P = 0.822855 Days, E = 130.914610 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
4.37	4.09	3.33	2.02	4.69	1.93	1.42	1.04	2.35	0.77	2.08	0.27	0.78	0.38	0.56



### Stellar Parameters For KIC 009529073

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7274^{+200}_{-314}$	$4.042^{+0.170}_{-0.170}$	$0.070^{+0.200}_{-0.350}$	$2.036^{+0.538}_{-0.538}$	$1.666^{+0.181}_{-0.272}$	$0.278^{+0.260}_{-0.135}$
	+3%/-4%	+4%/-4%	+286%/-500%	+26%/-26%	+11%/-16%	+93%/-48%
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 009529073-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-75 \pm 14$	$3.01^{+0.74}_{-0.73}$	$4461^{+328}_{-326}$	$5485^{+830}_{-576}$	$1.891^{+1.385}_{-0.750}$
Alt.	$-162 \pm 40$	$3.14^{+0.81}_{-0.69}$	$4476^{+304}_{-305}$	$6641^{+1005}_{-703}$	$3.751^{+2.242}_{-1.484}$

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

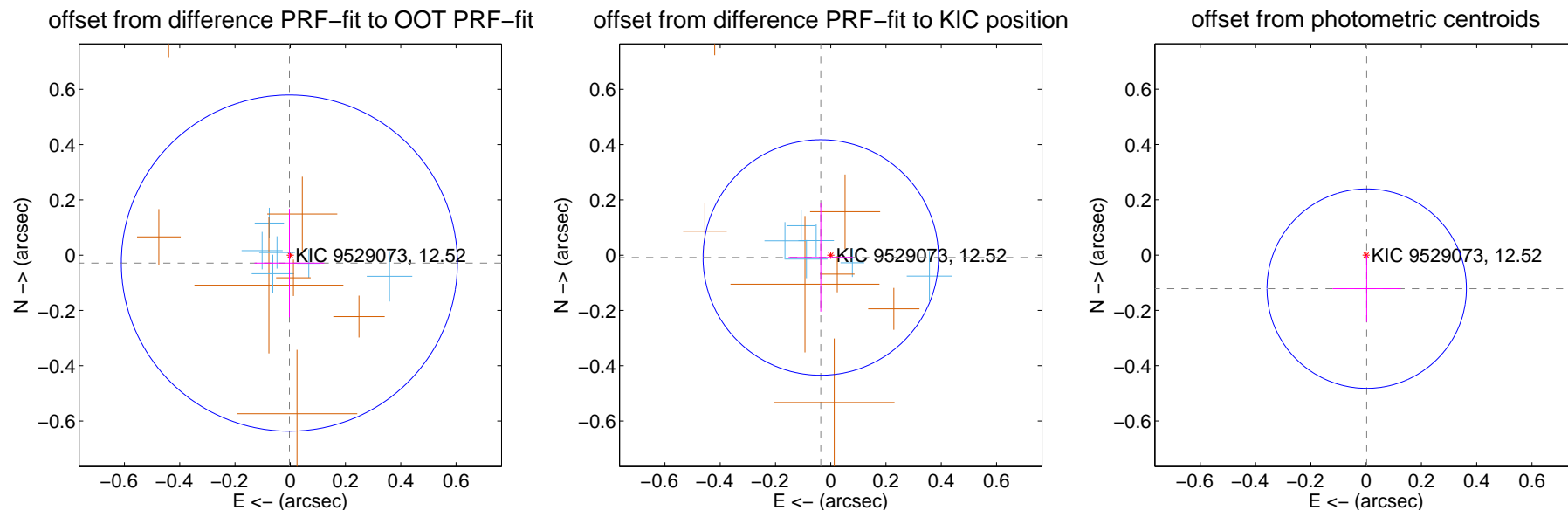
## DV Centroid Data

Supplemental centroid analysis for 009529073-02. Kepler magnitude: 12.52. Transit SNR 12.23

There are 7 quarters with good PRF difference image offsets

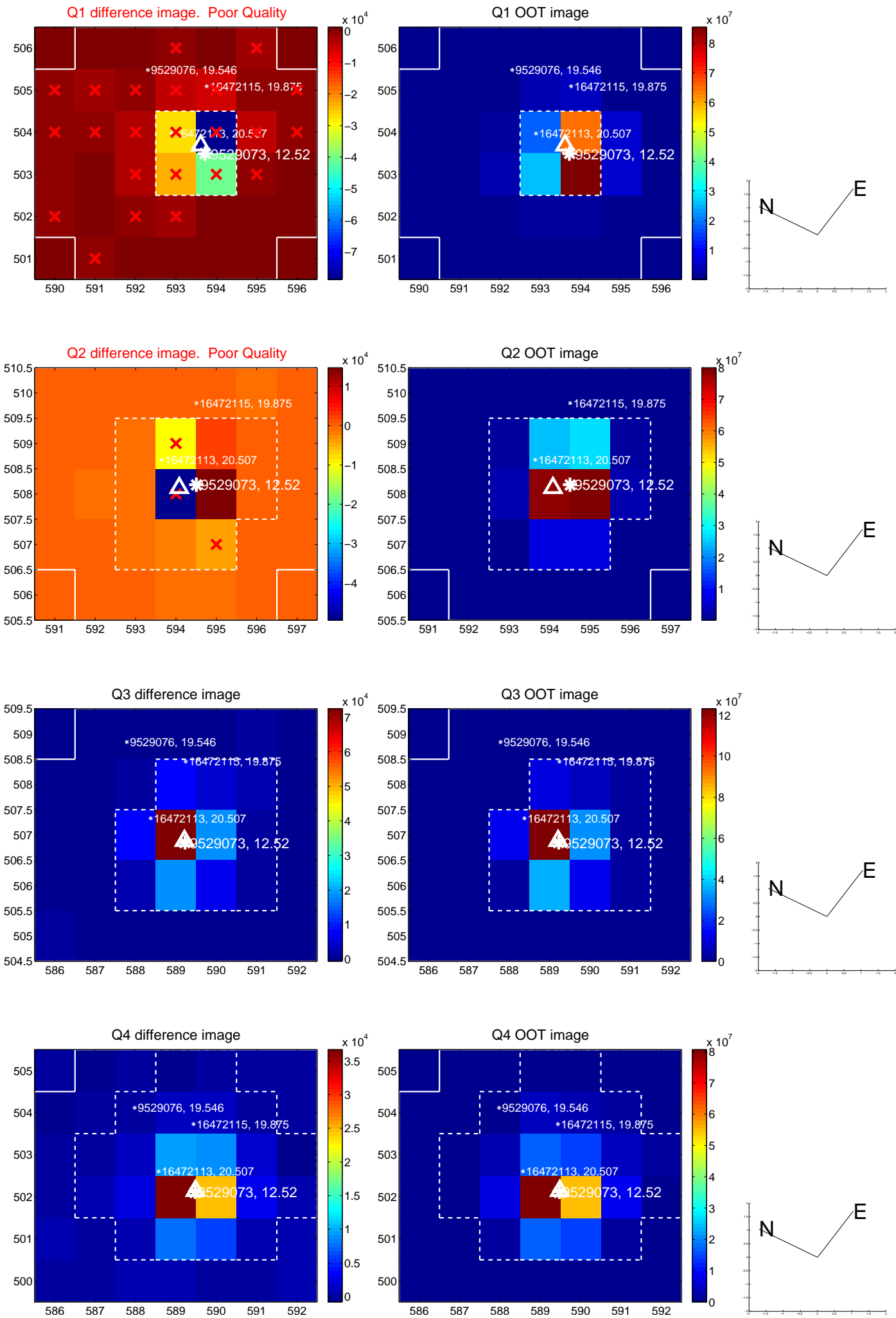
The direct PRF centroid is offset from the target star catalog position by about 0.07 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.029 \pm 0.203$	0.14	$0.003 \pm 0.126$	$-0.029 \pm 0.196$
PRF-fit source offset from KIC position	$0.037 \pm 0.142$	0.26	$0.036 \pm 0.117$	$-0.008 \pm 0.196$
photometric centroid source offset	$0.12 \pm 0.12$	1.01	$-0.00 \pm 0.12$	$-0.12 \pm 0.12$

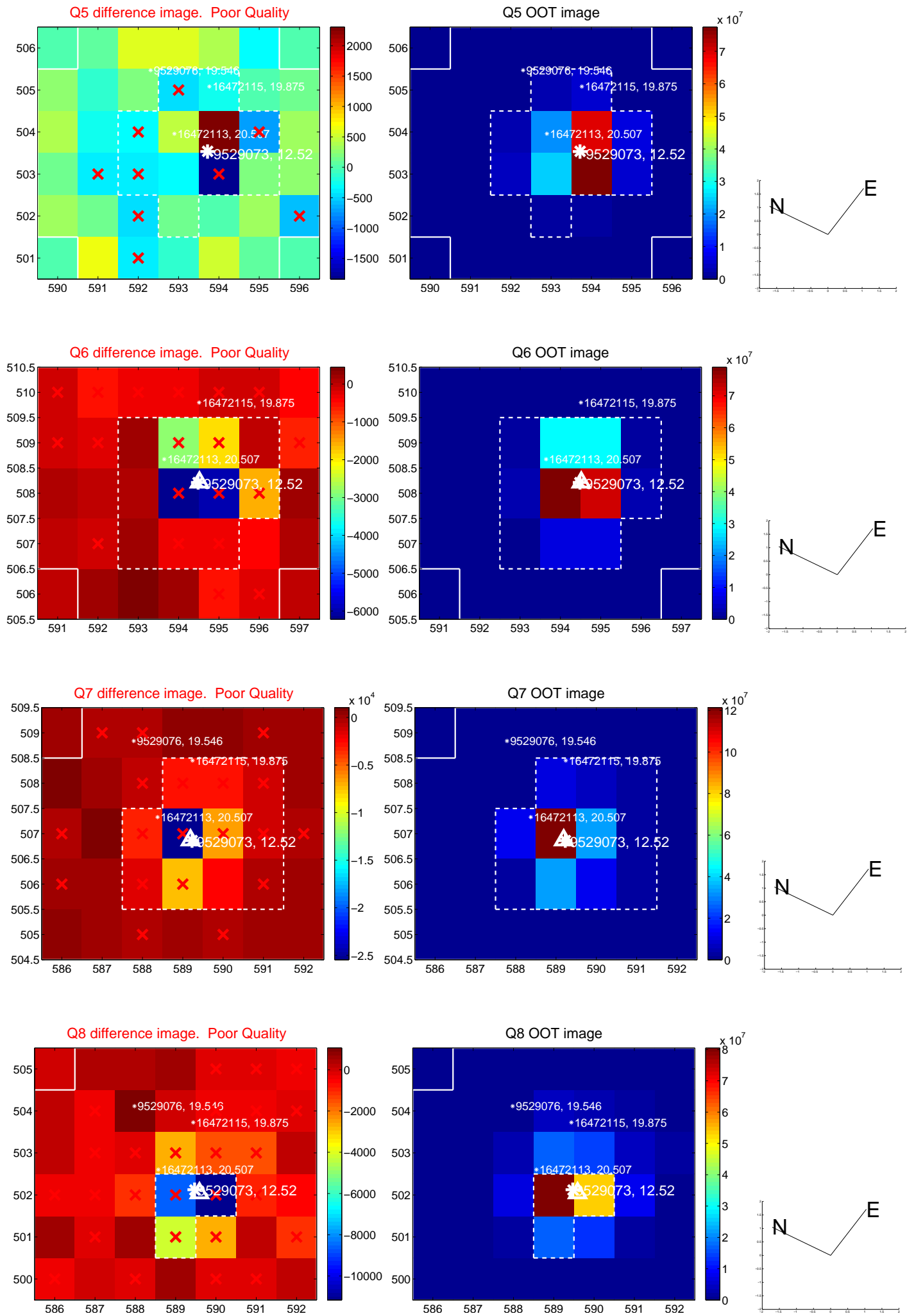


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

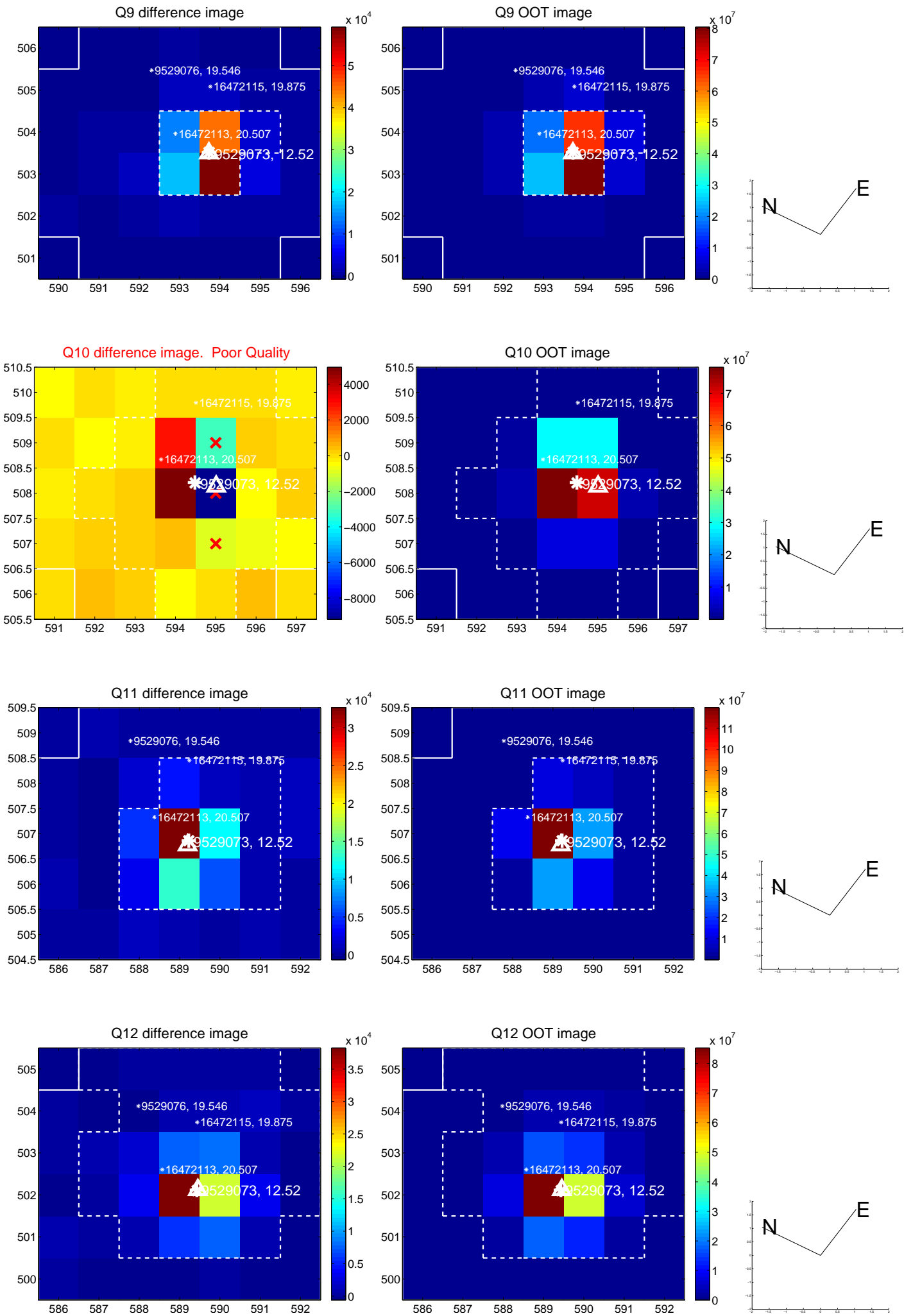


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

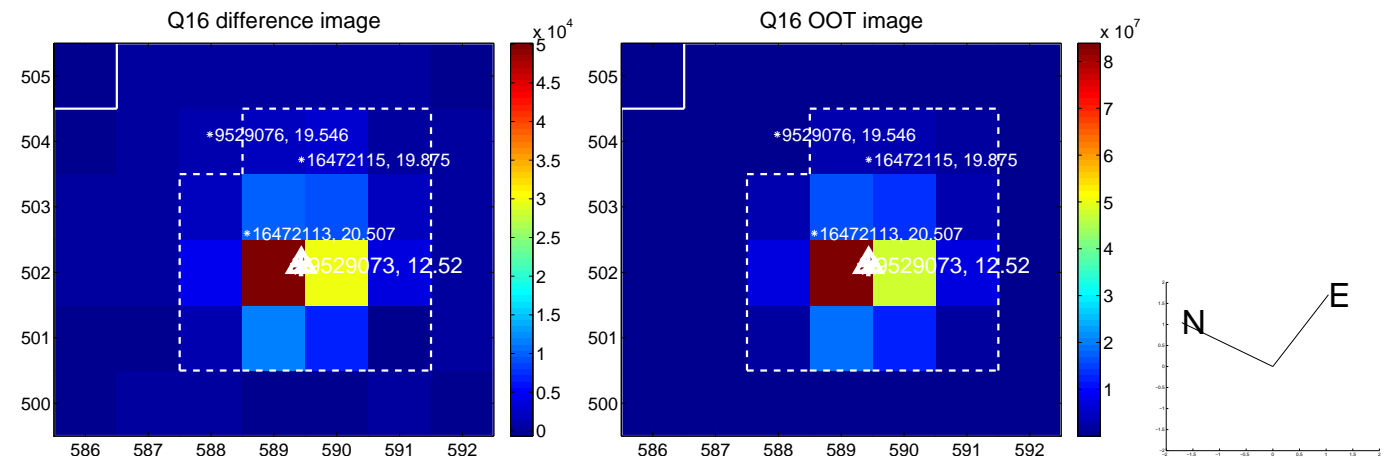
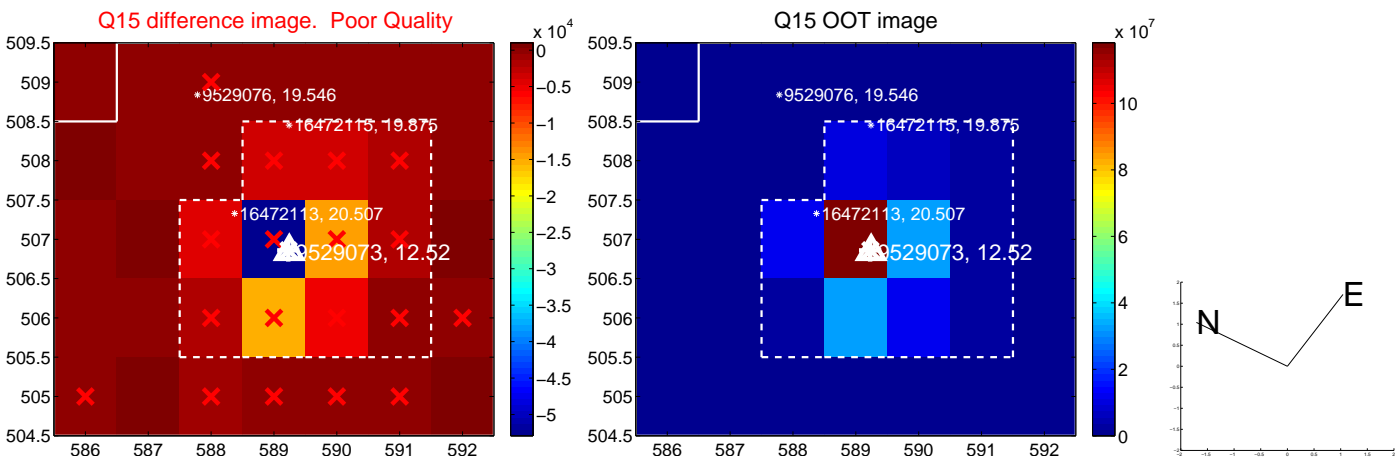
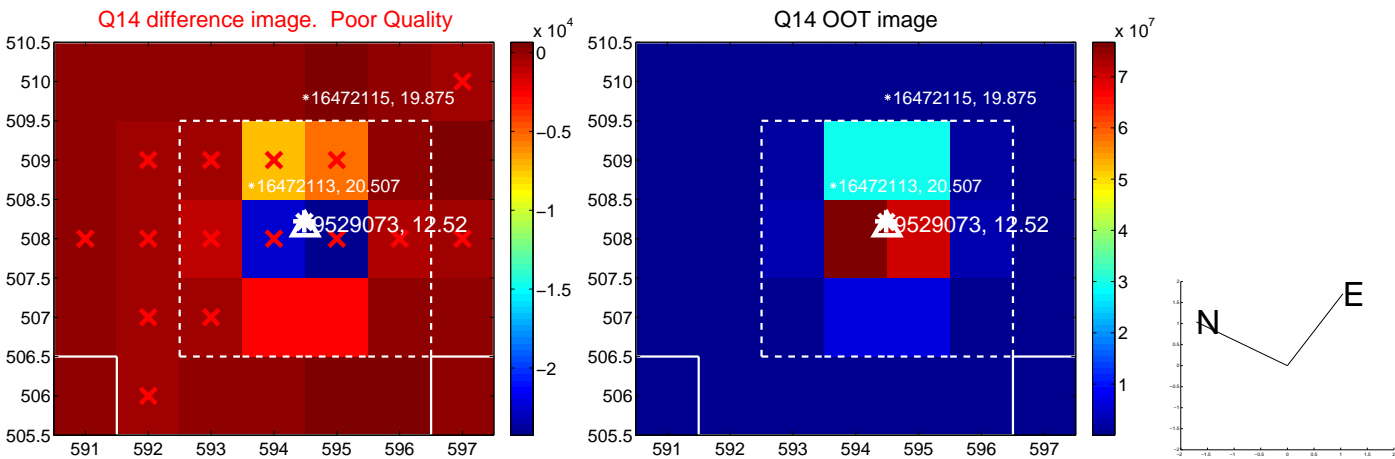
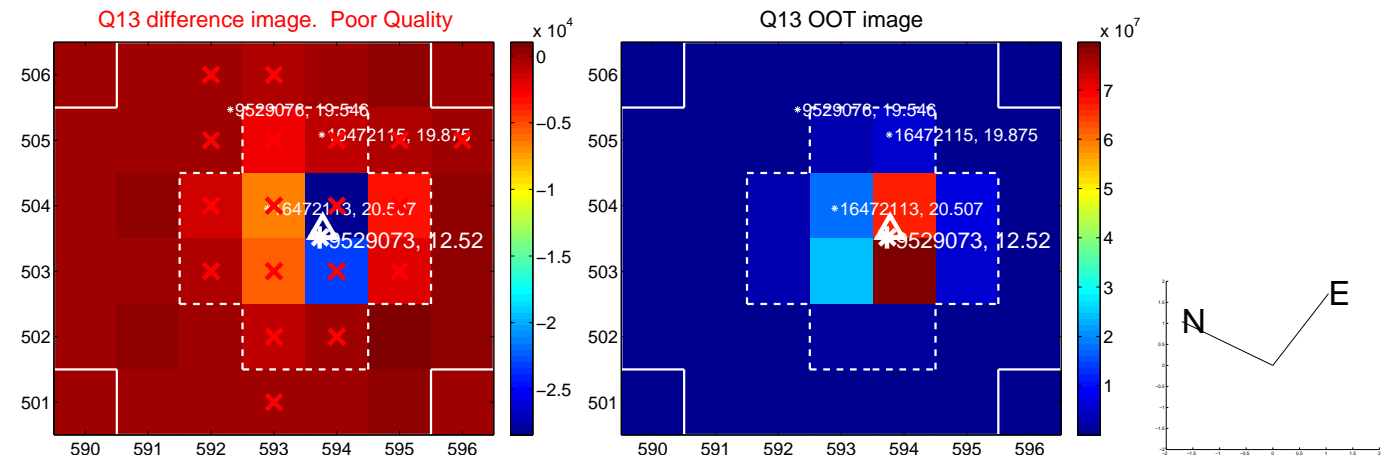




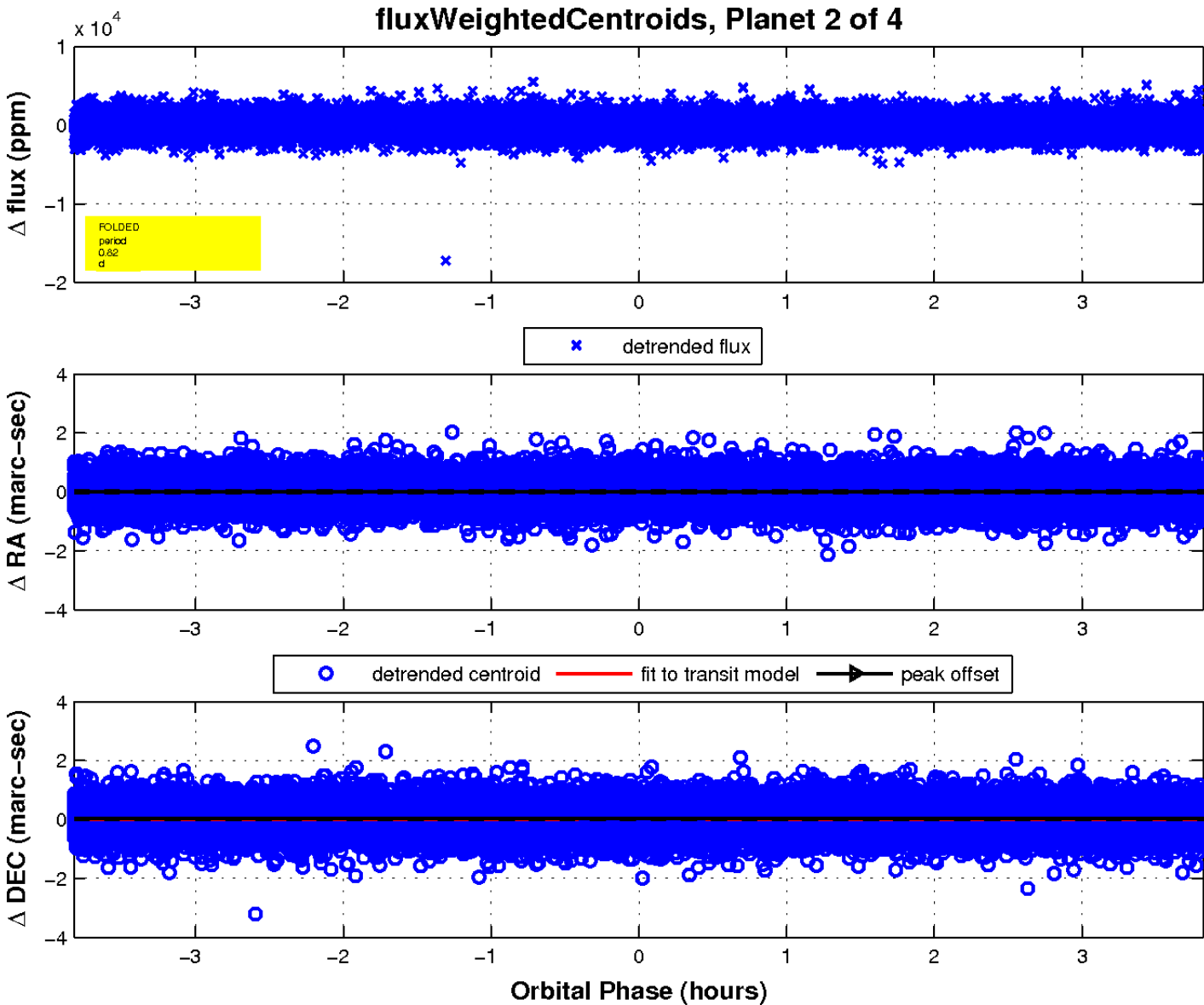
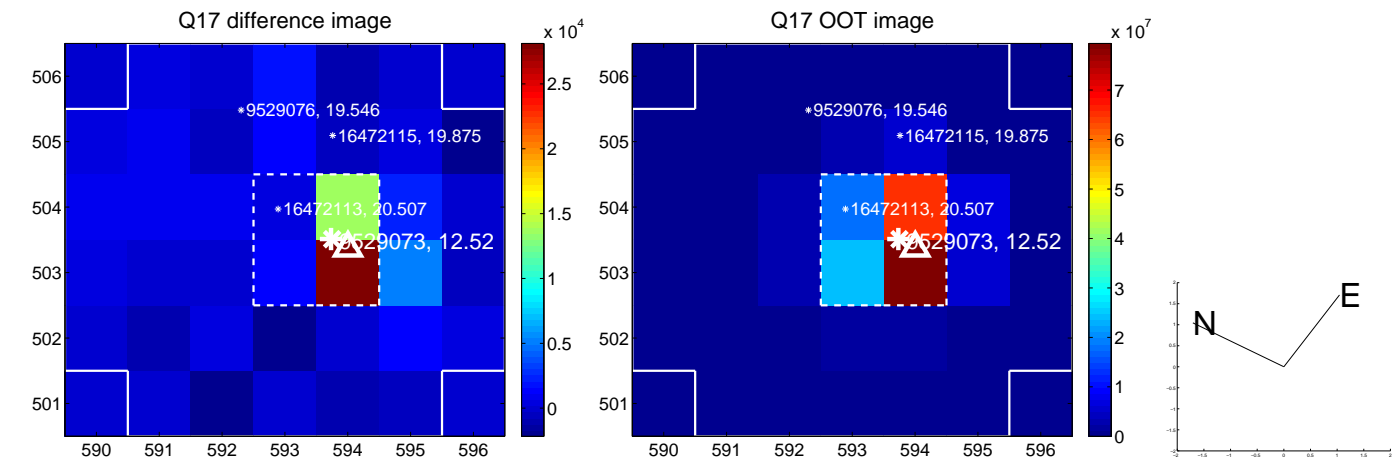
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



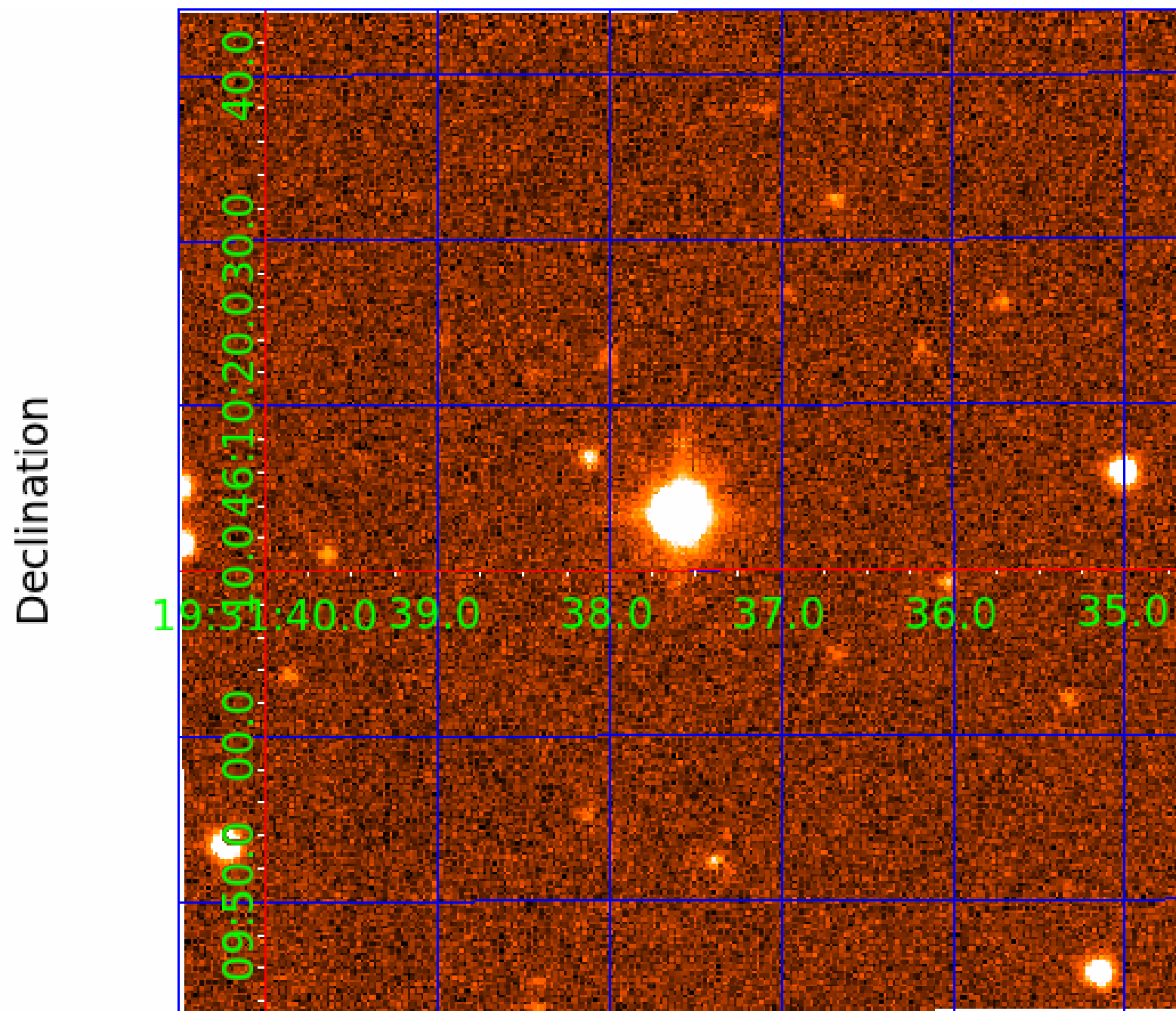
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image



# KIC 009529073

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009529073-01	OBS	No	0.822864	132.139265	216.0	1.369	14.3	15.3	2.04	7274	3.48	25045.81
009529073-02	OBS	No	0.822853	131.737839	163.9	1.274	12.0	12.2	2.04	7274	3.03	25046.27
009529073-03	OBS	No	0.730239	132.005310	161.5	2.337	8.9	8.3	2.04	7274	3.00	29368.80
009529073-04	OBS	No	32.676012	159.066512	1366.6	2.070	7.6	9.3	2.04	7274	8.16	184.87

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009529073-01	OBS	FP	0.00	1	0	0	0	LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
009529073-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD
009529073-03	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
009529073-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

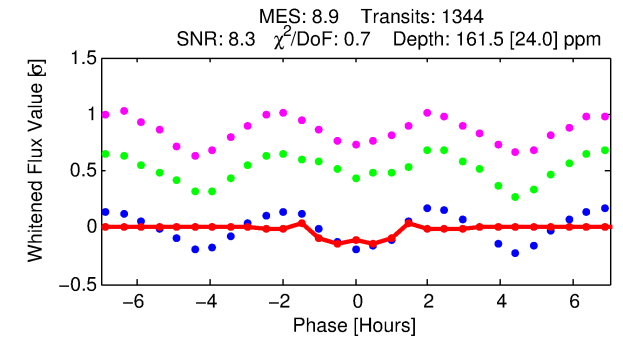
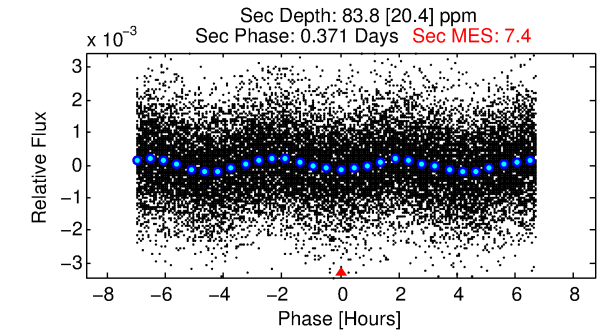
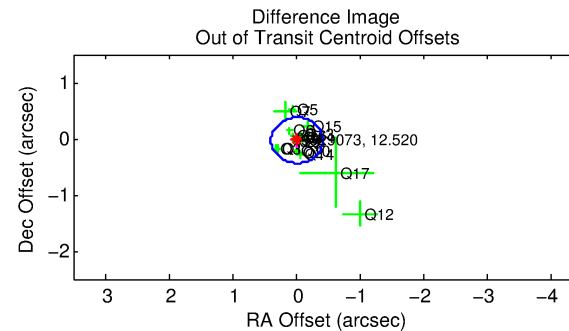
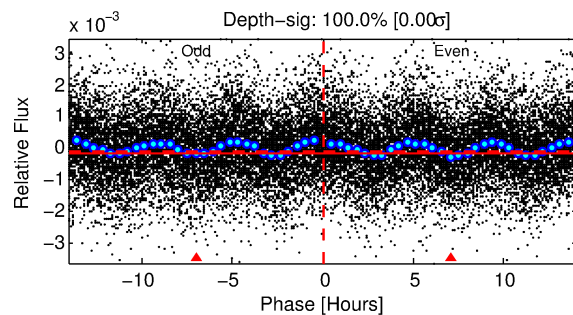
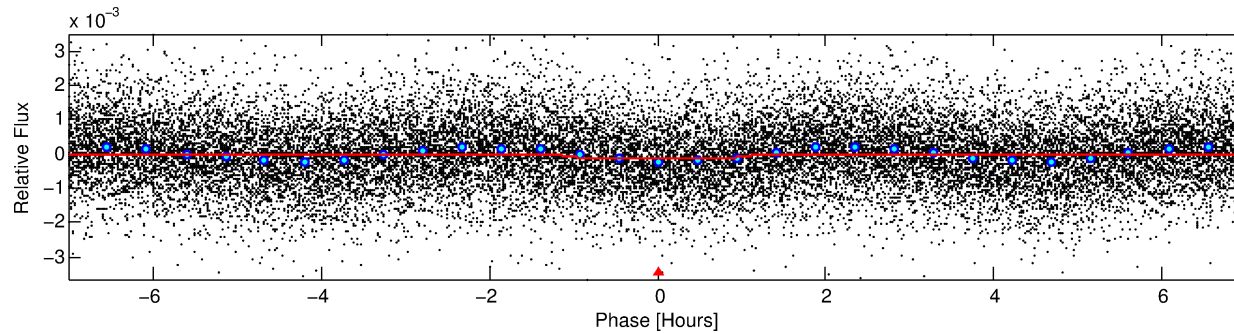
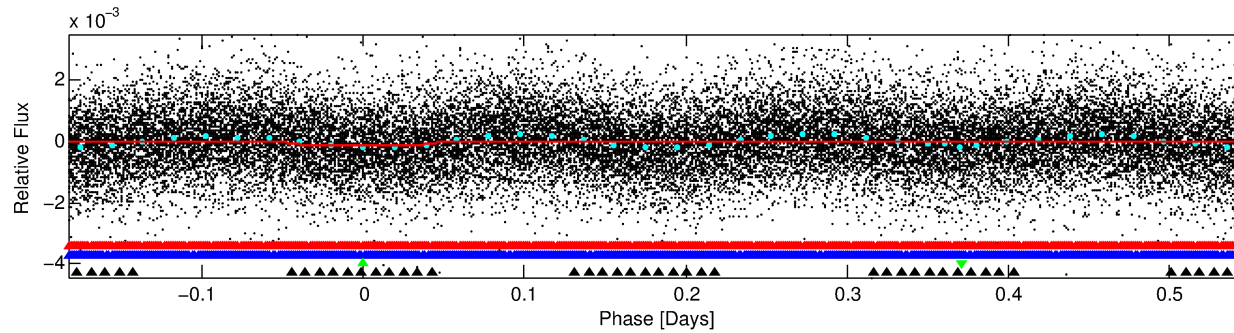
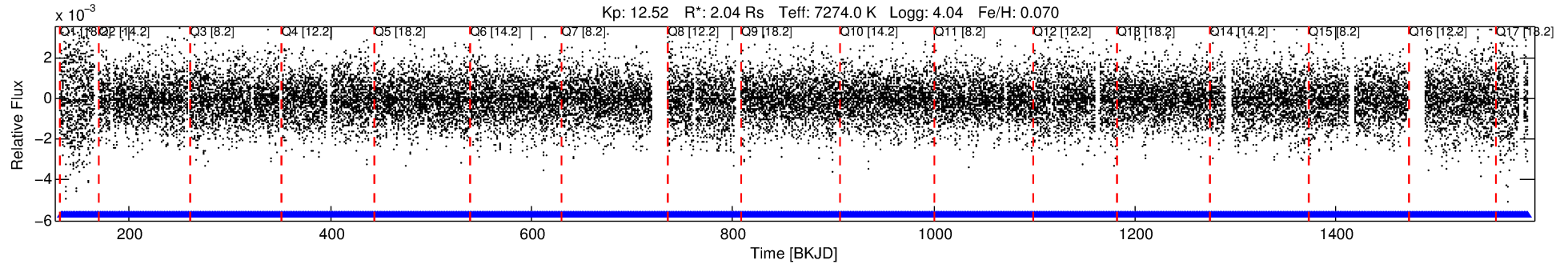
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 009529073-03

No Significant Match Found

# DV One-Page Summary

KIC: 9529073 Candidate: 3 of 4 Period: 0.730 d



## DV Fit Results:

Period = 0.73024 [0.00001] d  
Epoch = 132.0053 [0.0021] BKJD  
Rp/R\* = 0.0135 [0.0041]  
a/R\* = 1.46 [1.41]  
b = 0.90 [0.39]  
Seff = 29368.80 [10546.14]  
Teq = 3338 [300] K  
Rp = 3.00 [1.21] Re  
a = 0.0188 [0.0041] AU  
Ag = 1.81 [1.31] [0.62σ]  
Teffp = 5987 [1012] K [2.51σ]

## DV Diagnostic Results:

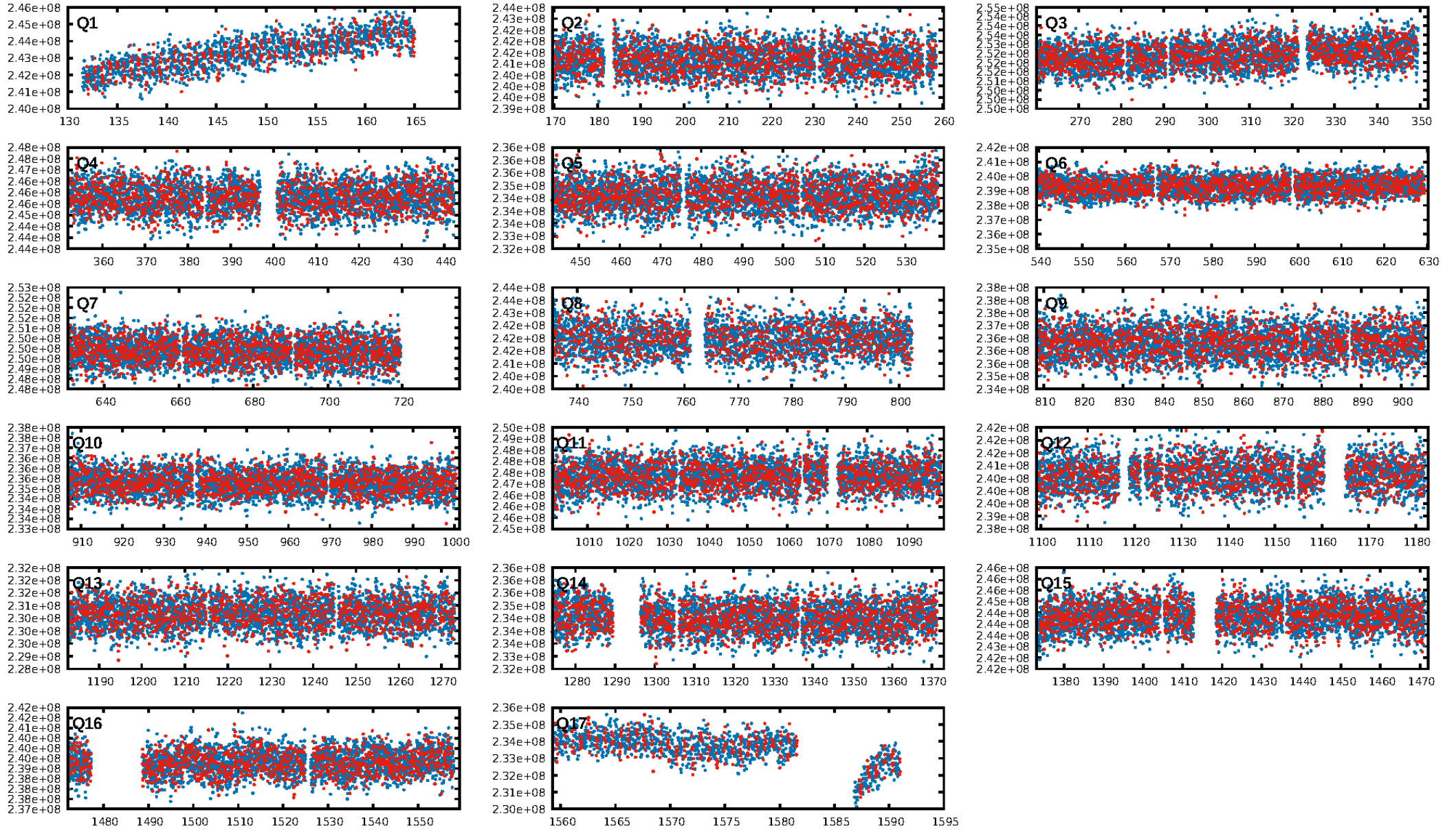
ShortPeriod-sig: N/A  
LongPeriod-sig: 59.6% [0.83σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
**Bootstrap-pfa: 3.98e-12**  
RollingBand-fgt: 1.00 [1286/1286]  
GhostDiagnostic-chr: 1.059  
**Centroid-sig: 0.0%**  
Centroid-so: 0.222 arcsec [2.58σ]  
OotOffset-rm: 0.036 arcsec [0.27σ]  
KicOffset-rm: 0.007 arcsec [0.08σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.59 [10/17]  
DiffImageOverlap-fno: 0.00 [0/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 22:32:25 Z

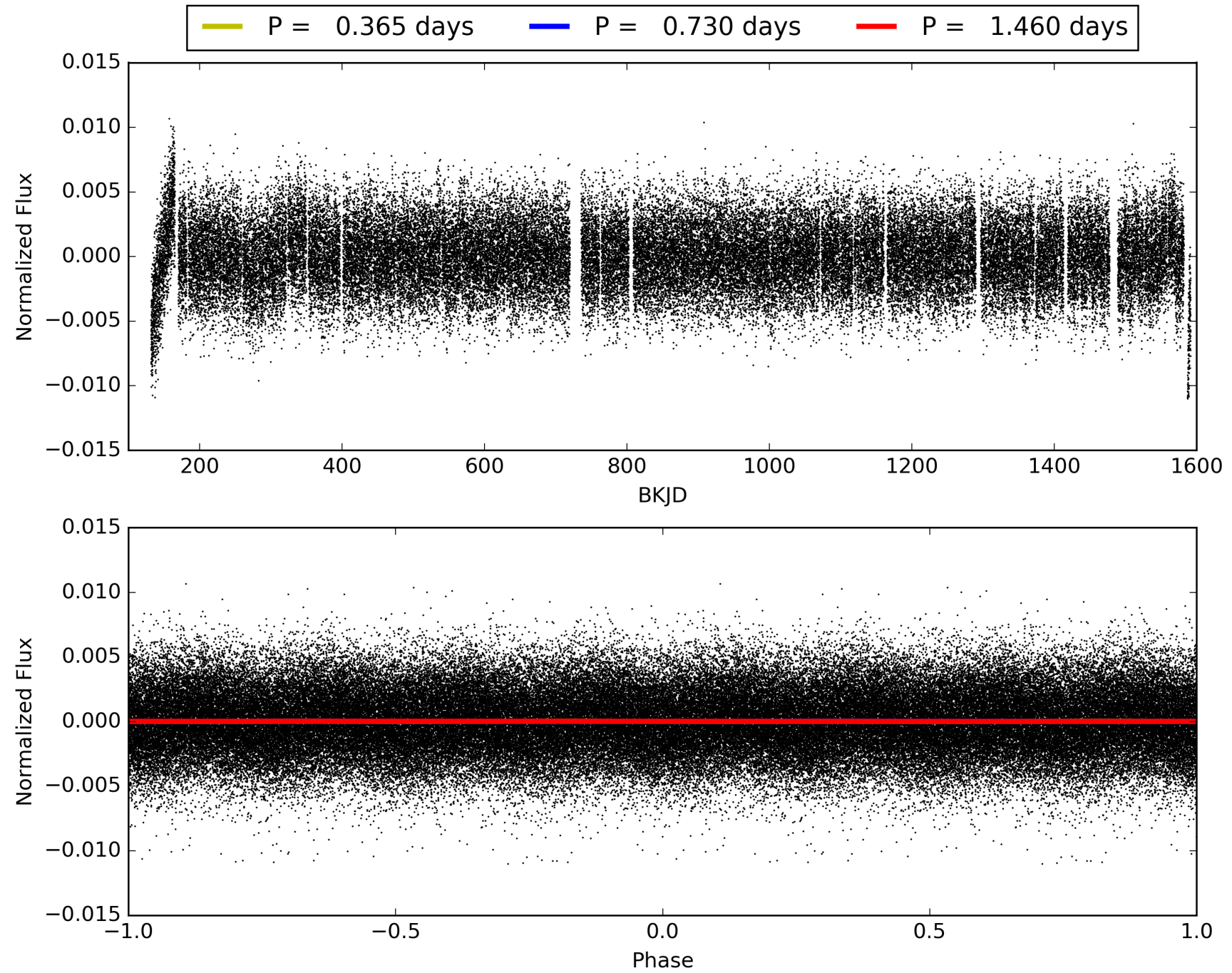
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 009529073-03, PDC Light Curves

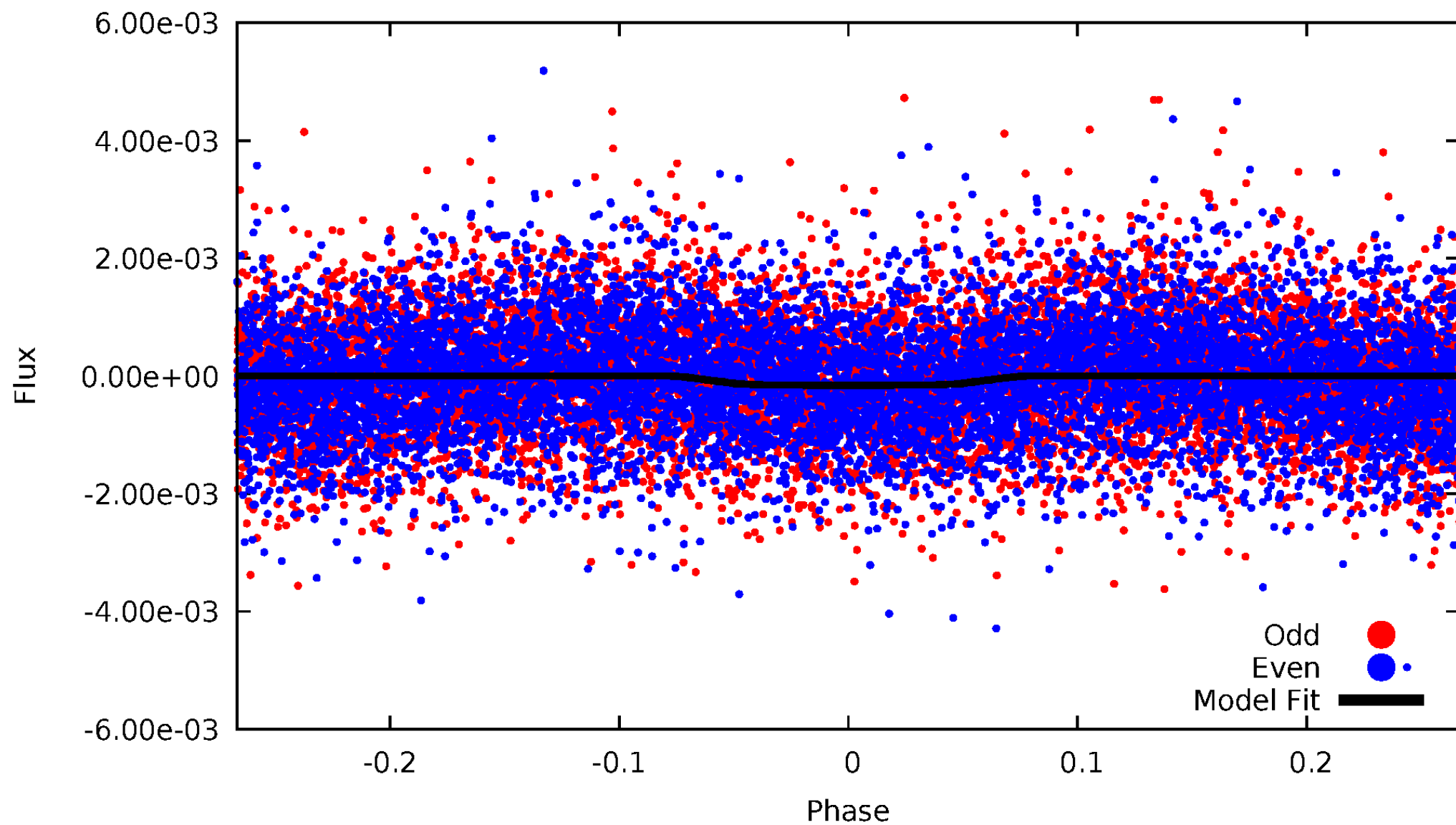


TCE 009529073-03



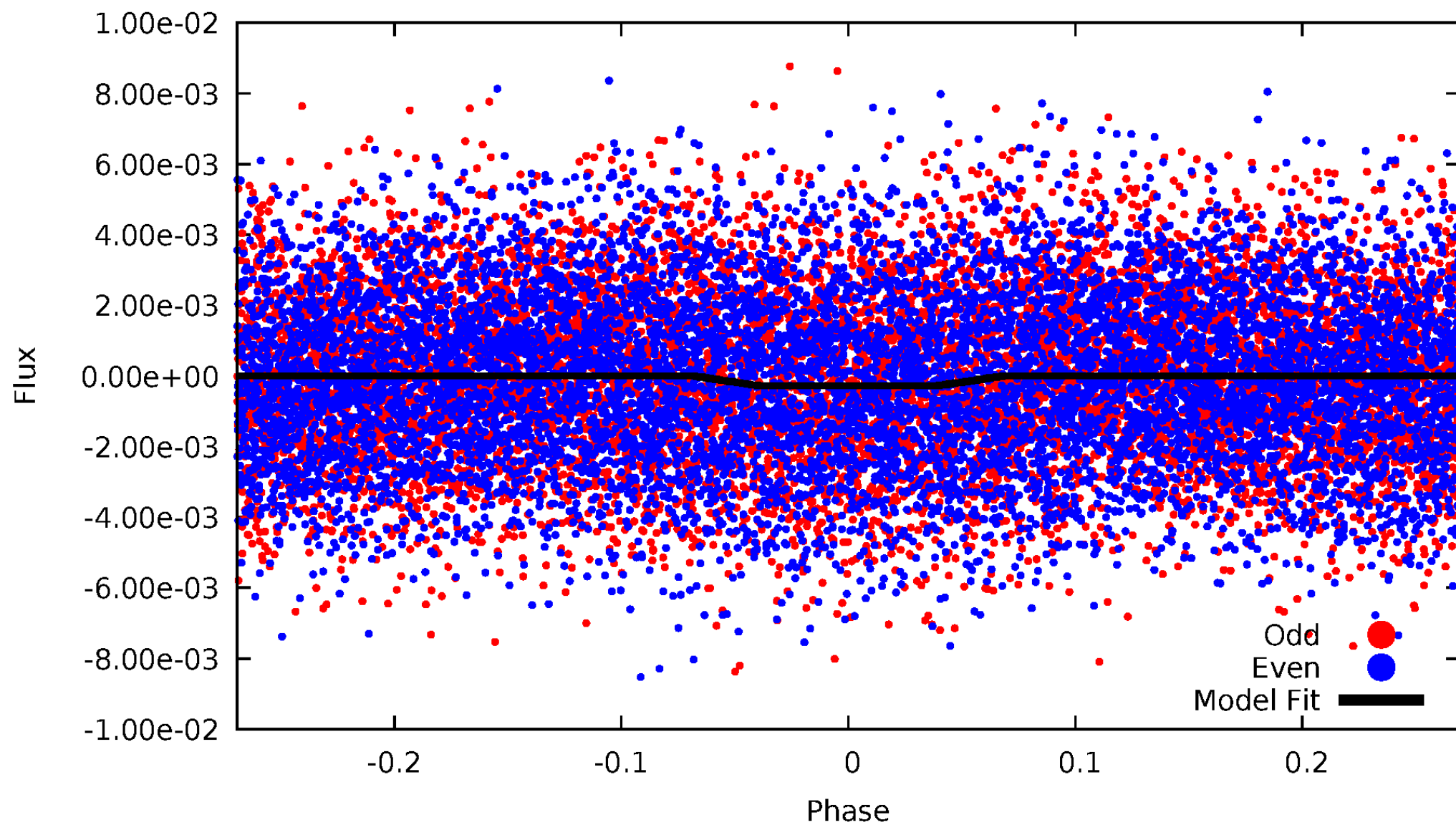
DV Odd/Even

TCE 009529073-03



# ALT Odd/Even

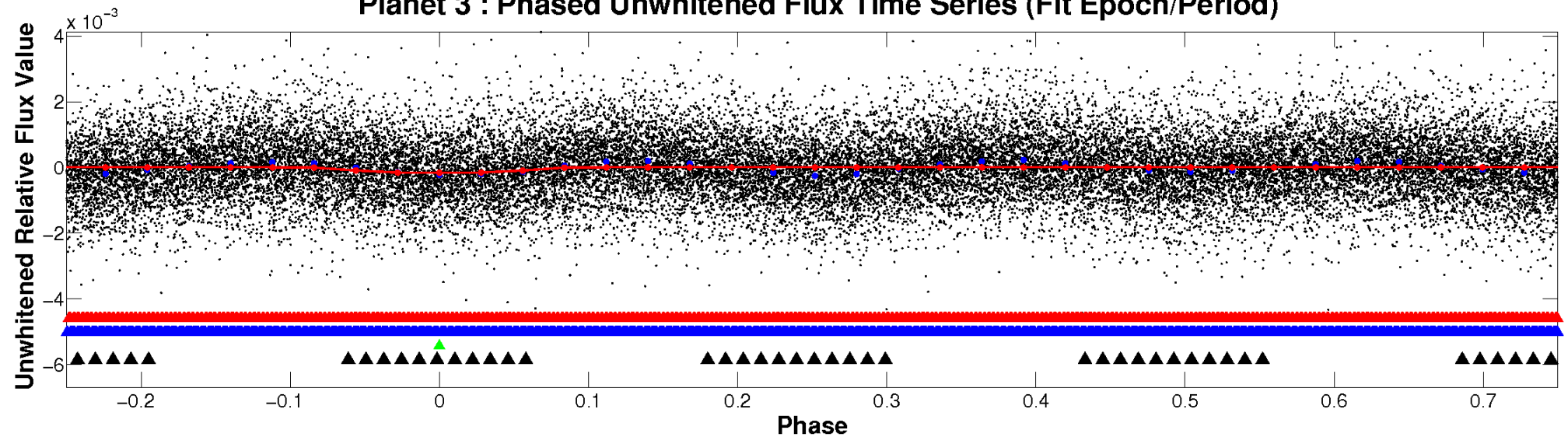
TCE 009529073-03



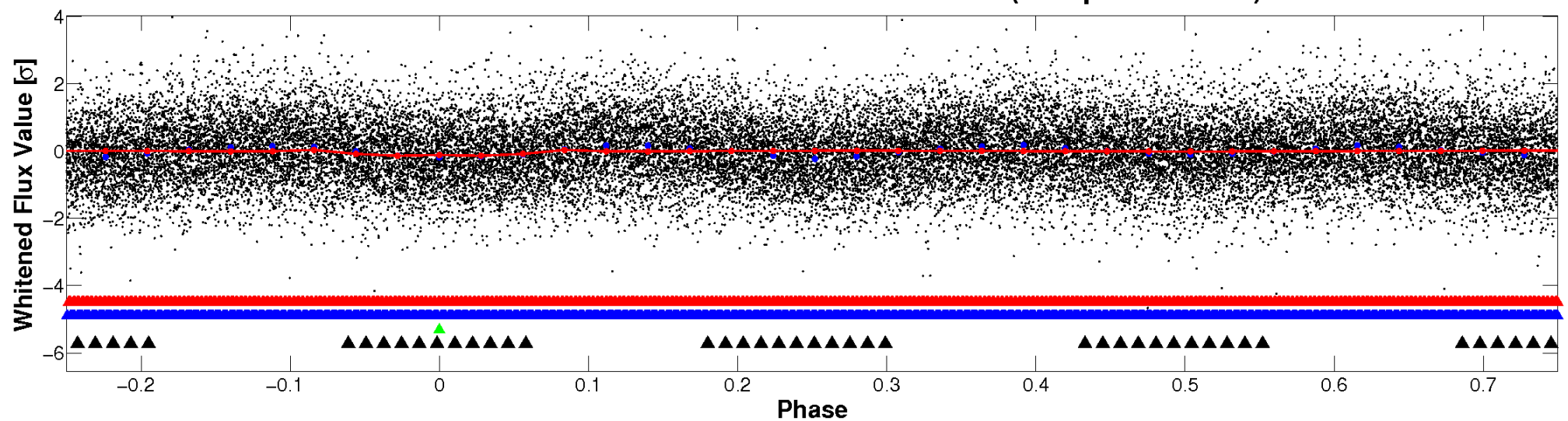


# Non-Whitened Vs. Whitened Light Curve

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

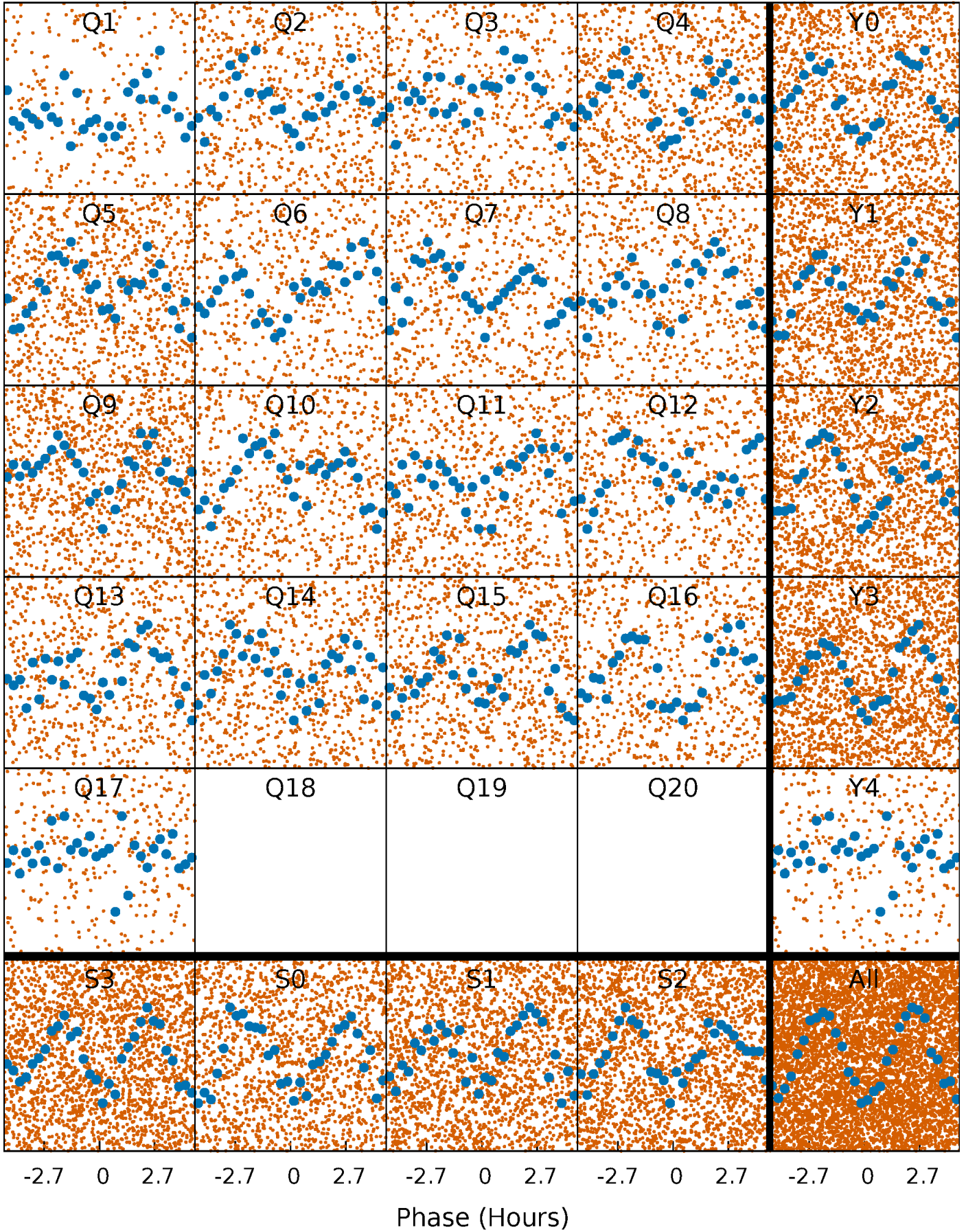


## Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

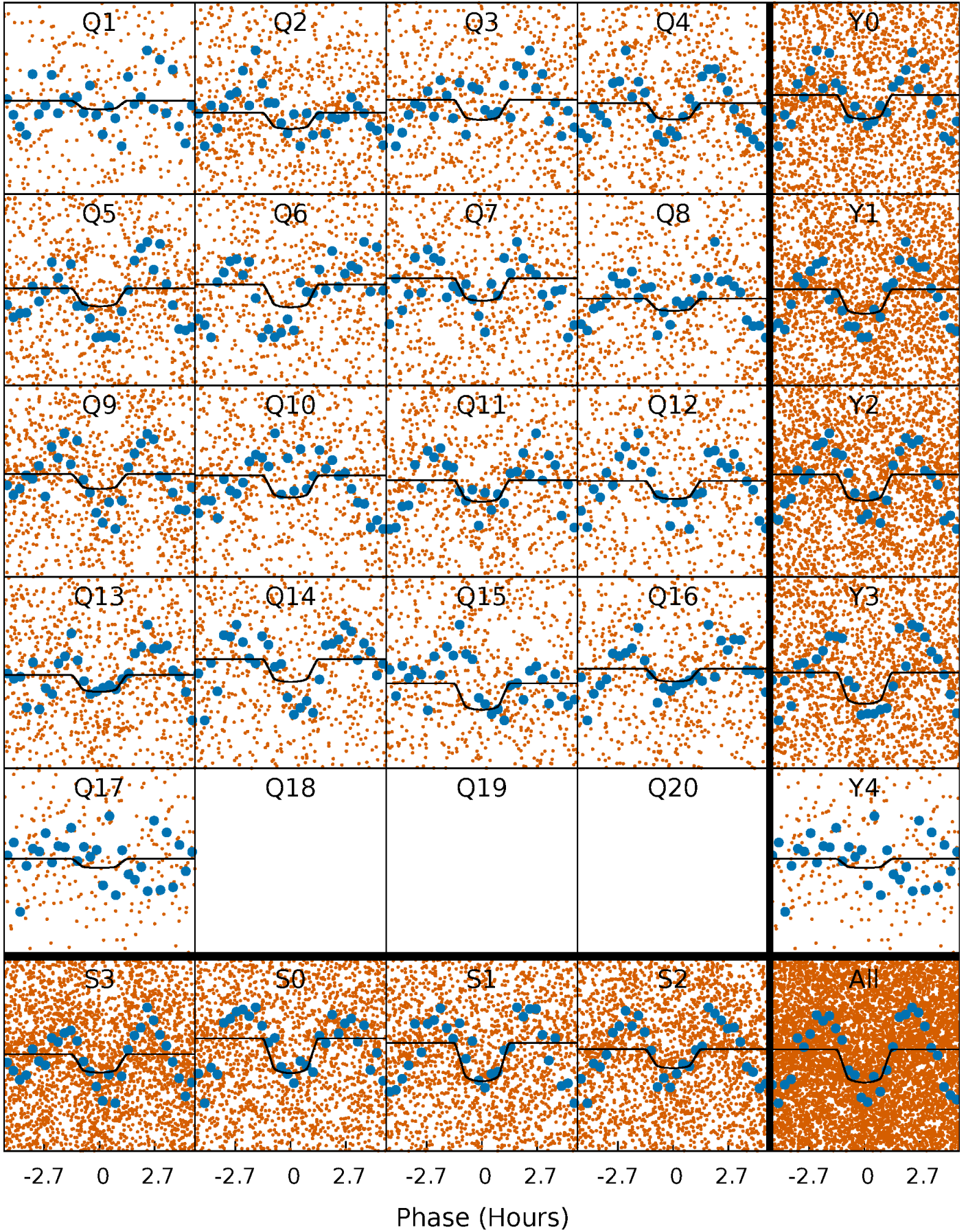
TCE 009529073-03 P= 0.730239 Days  $T_0=132.005310$  (BKJD)





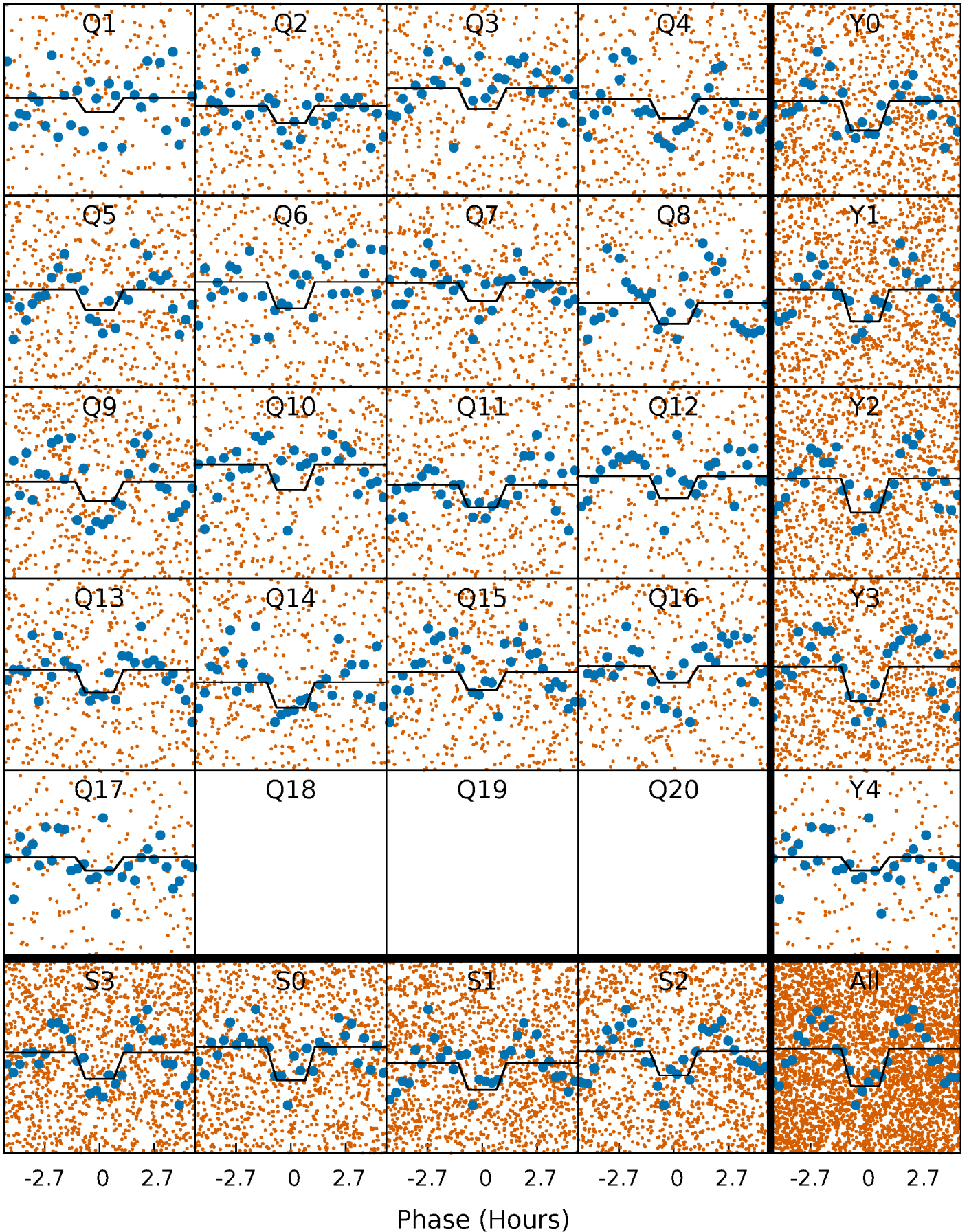
# DV Quarter-Phased Transit Curves

TCE 009529073-03 P= 0.730239 Days  $T_0=132.005310$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

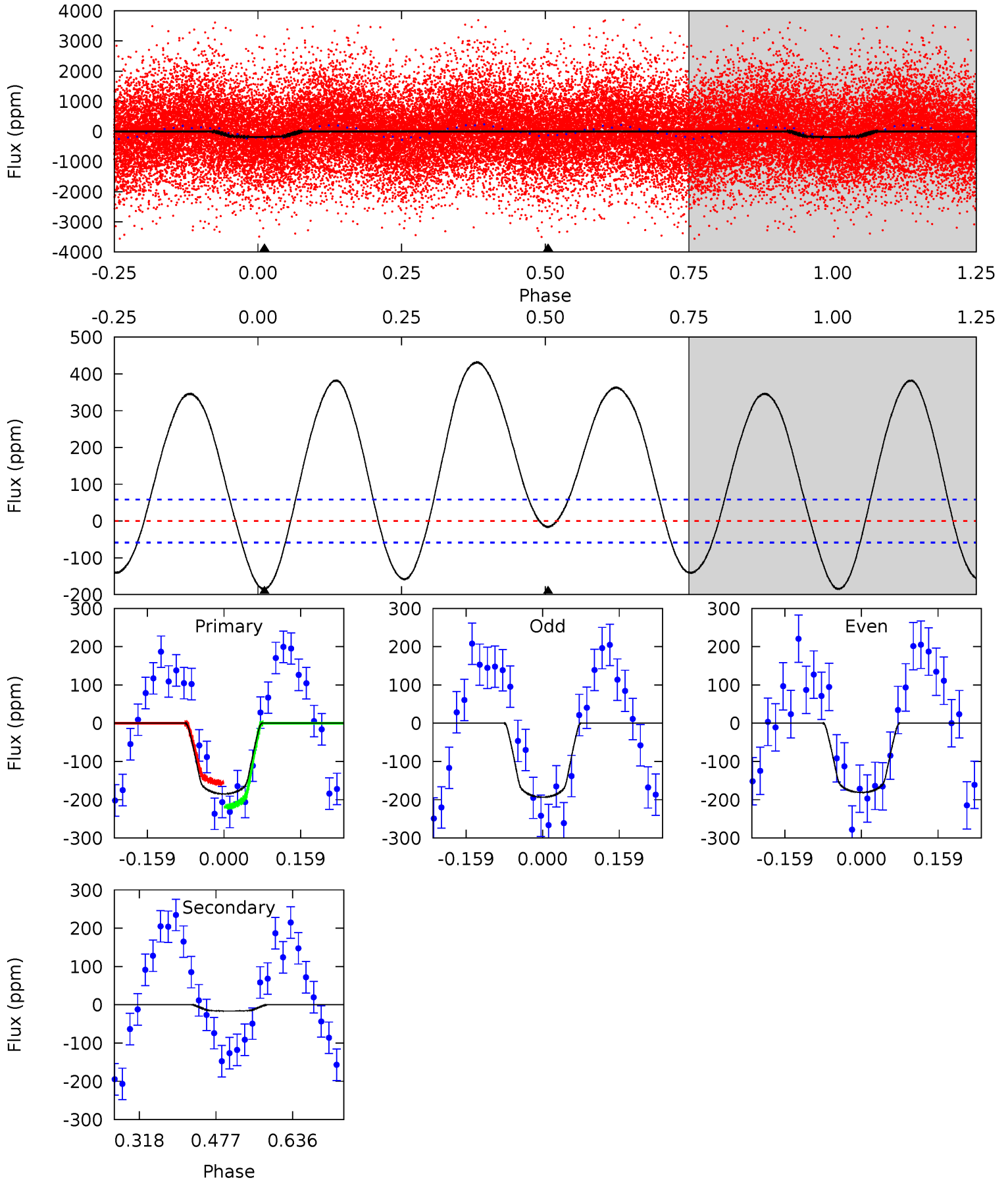
TCE 009529073-03 P= 0.730246 Days  $T_0=132.005740$  (BKJD)



# DV Model-Shift Uniqueness Test

009529073-03, P = 0.730239 Days, E = 131.275071 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
14.1	1.26	0	0	4.47	1.41	10.8	14.1	14.1	1.26	1.26	0.47	0.95	0.70	2.50

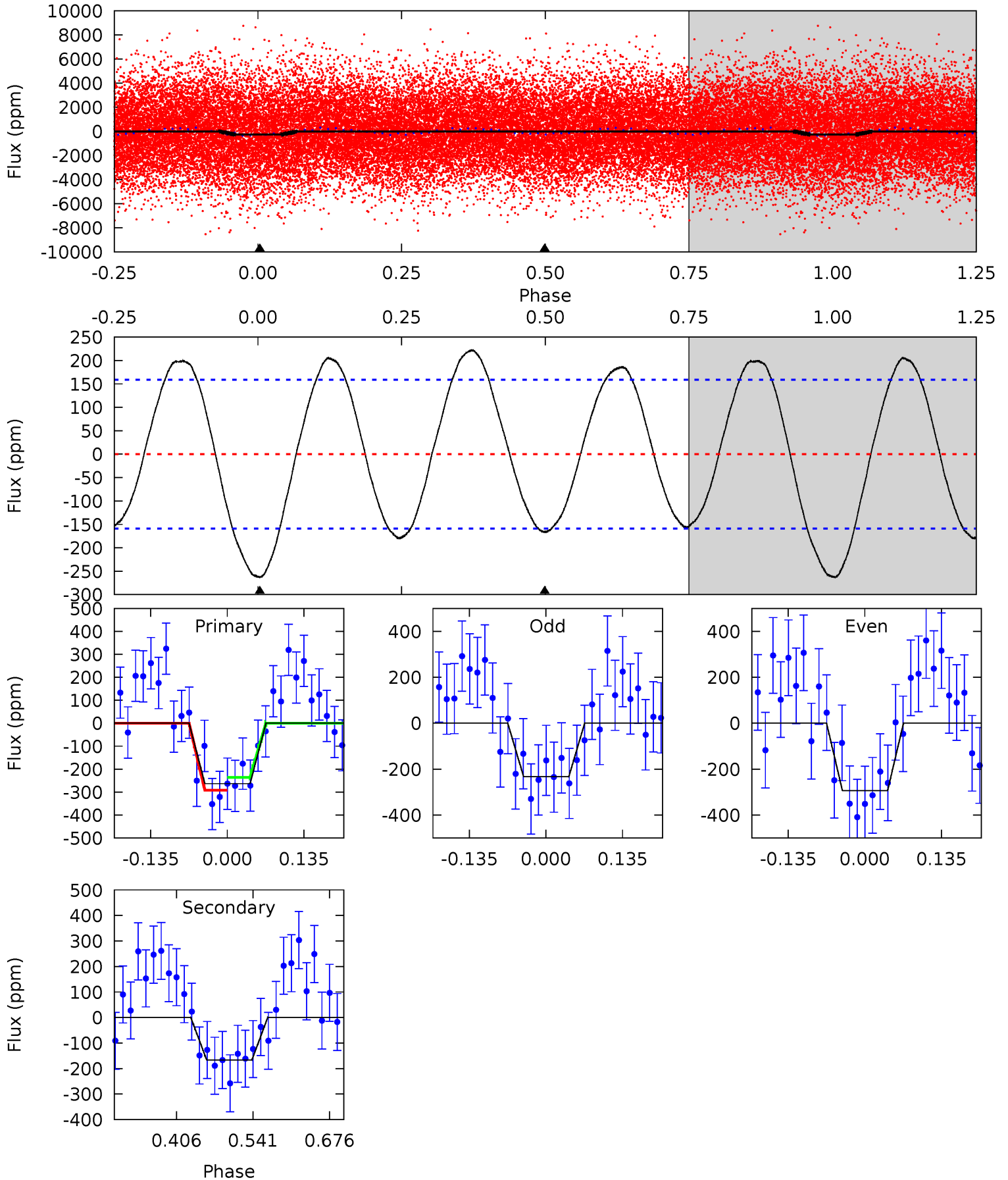




# Alt Model-Shift Uniqueness Test

009529073-03, P = 0.730246 Days, E = 131.275494 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
7.46	4.72	0	0	4.50	1.49	3.66	7.46	7.46	4.72	4.72	0.86	1.14	0.46	0.75



### Stellar Parameters For KIC 009529073

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7274^{+200}_{-314}$	$4.042^{+0.170}_{-0.170}$	$0.070^{+0.200}_{-0.350}$	$2.036^{+0.538}_{-0.538}$	$1.666^{+0.181}_{-0.272}$	$0.278^{+0.260}_{-0.135}$
	+3%/-4%	+4%/-4%	+286%/-500%	+26%/-26%	+11%/-16%	+93%/-48%
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 009529073-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-16 \pm 13$	$3.04^{+1.06}_{-0.97}$	$4651^{+334}_{-317}$	$2522^{+2103}_{-6492}$	$0.311^{+0.582}_{-0.243}$
Alt.	$-167 \pm 35$	$3.68^{+1.03}_{-0.99}$	$4658^{+332}_{-318}$	$6105^{+1147}_{-788}$	$2.333^{+2.113}_{-0.926}$

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



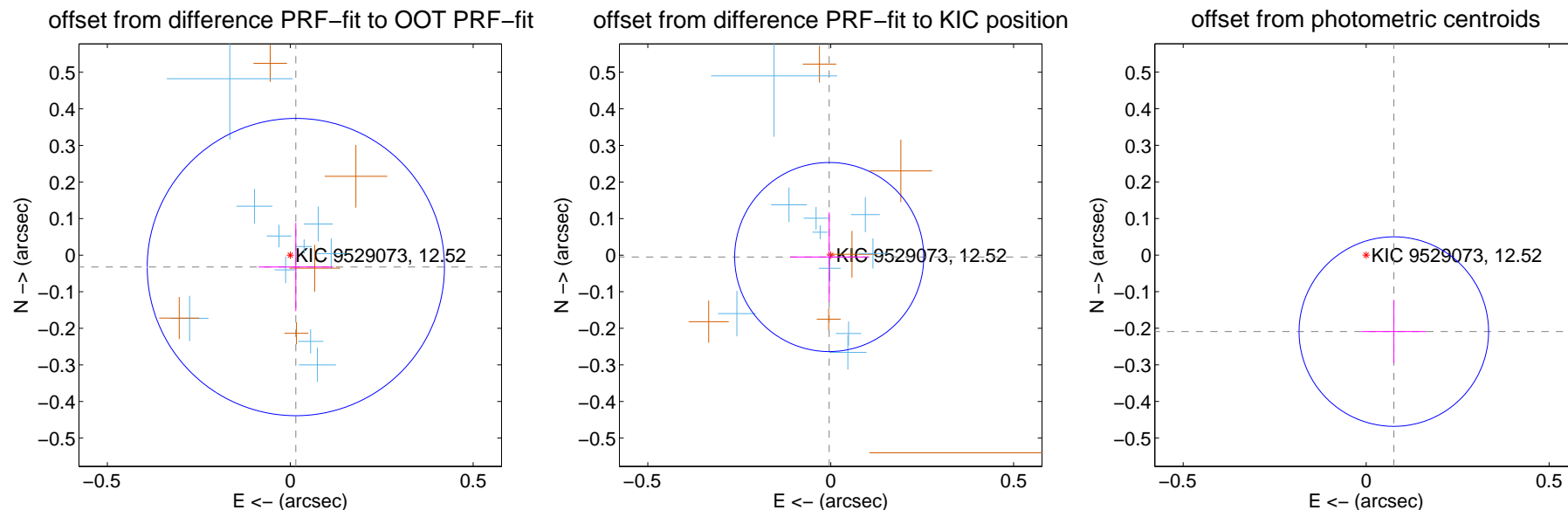
## DV Centroid Data

Supplemental centroid analysis for 009529073-03. Kepler magnitude: 12.52. Transit SNR 8.31

There are 10 quarters with good PRF difference image offsets

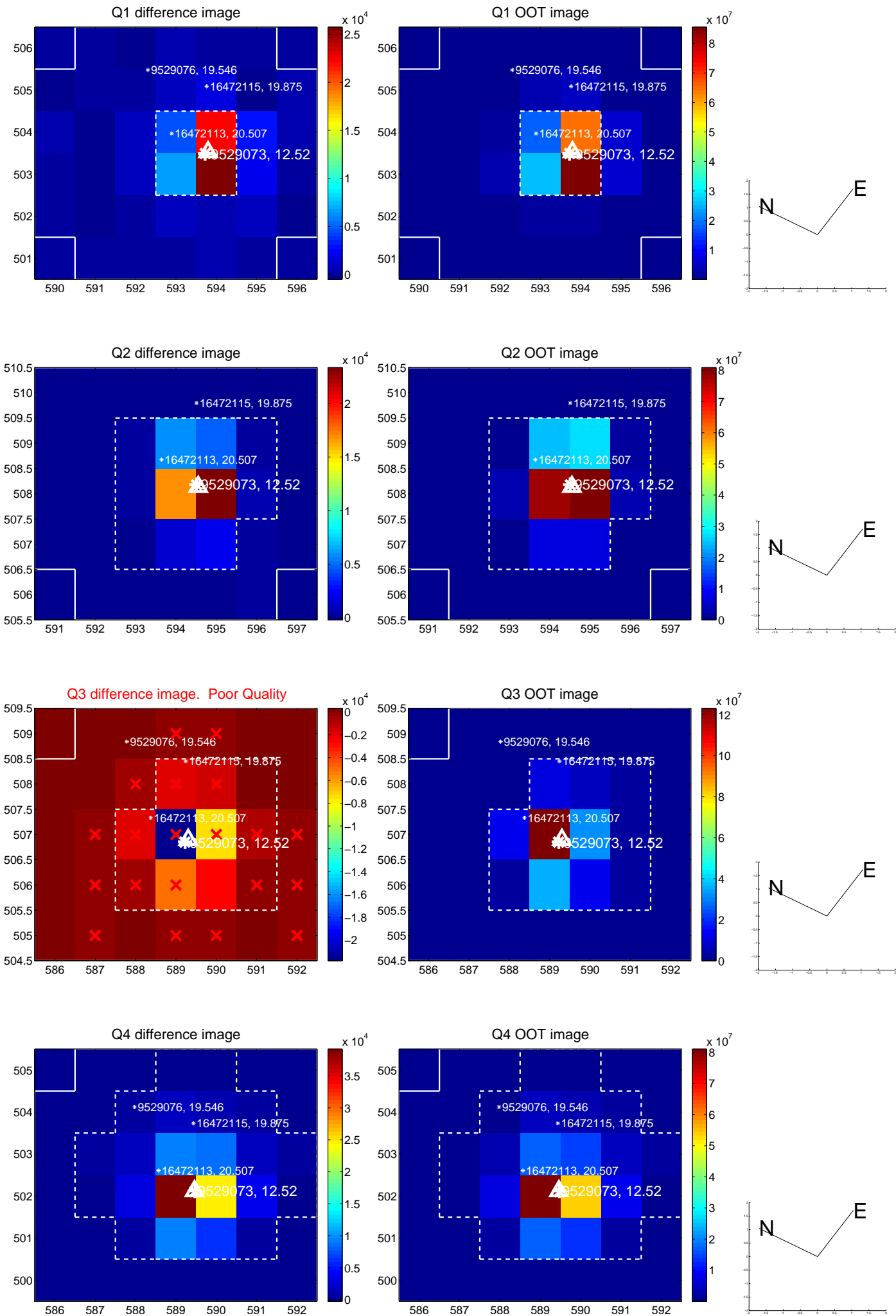
The direct PRF centroid is offset from the target star catalog position by about 0.07 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.036 \pm 0.135$	0.27	$-0.015 \pm 0.102$	$-0.033 \pm 0.121$
PRF-fit source offset from KIC position	$0.007 \pm 0.086$	0.08	$0.004 \pm 0.107$	$-0.005 \pm 0.122$
photometric centroid source offset	$0.22 \pm 0.09$	2.58	$-0.08 \pm 0.09$	$-0.21 \pm 0.09$

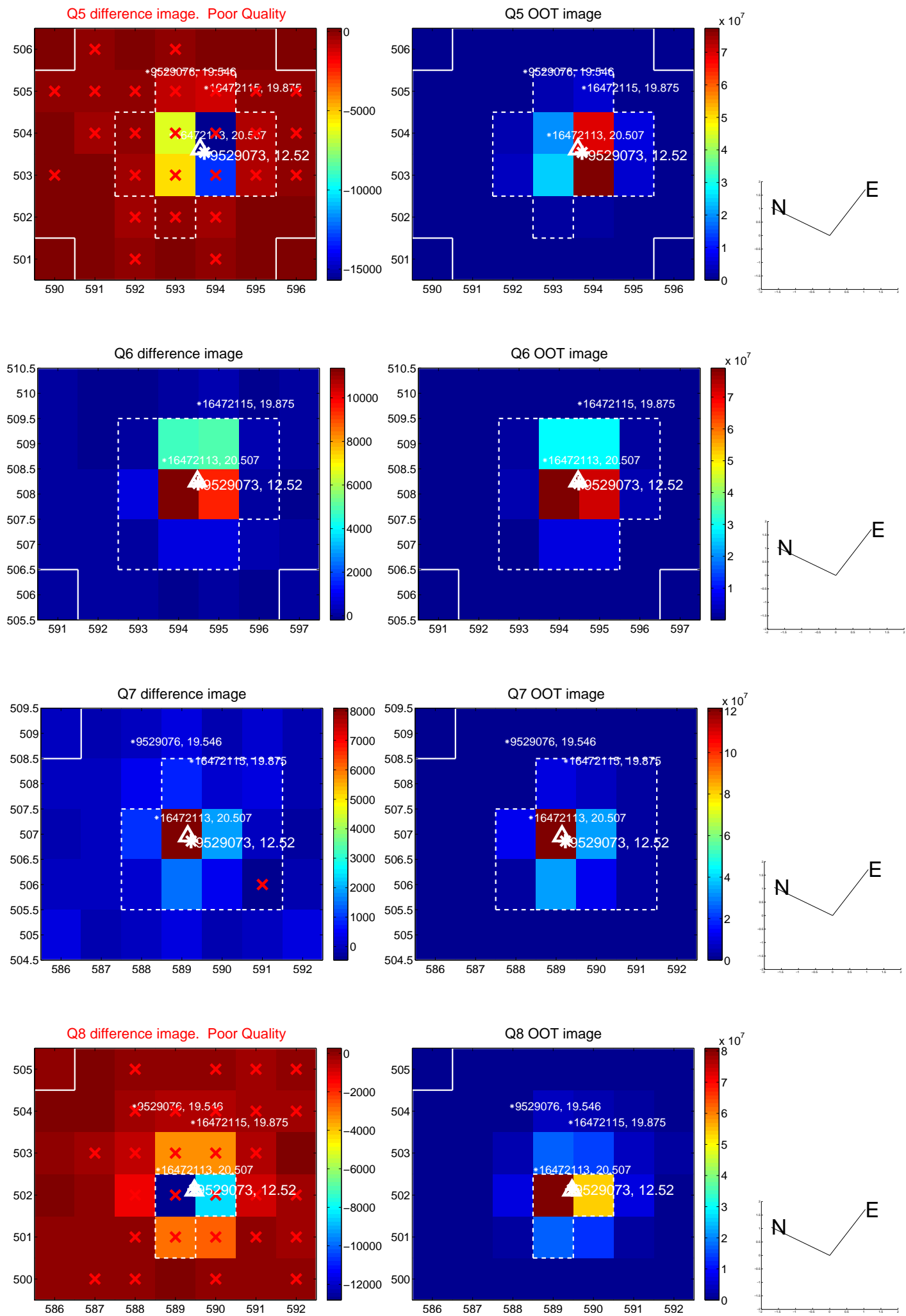


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

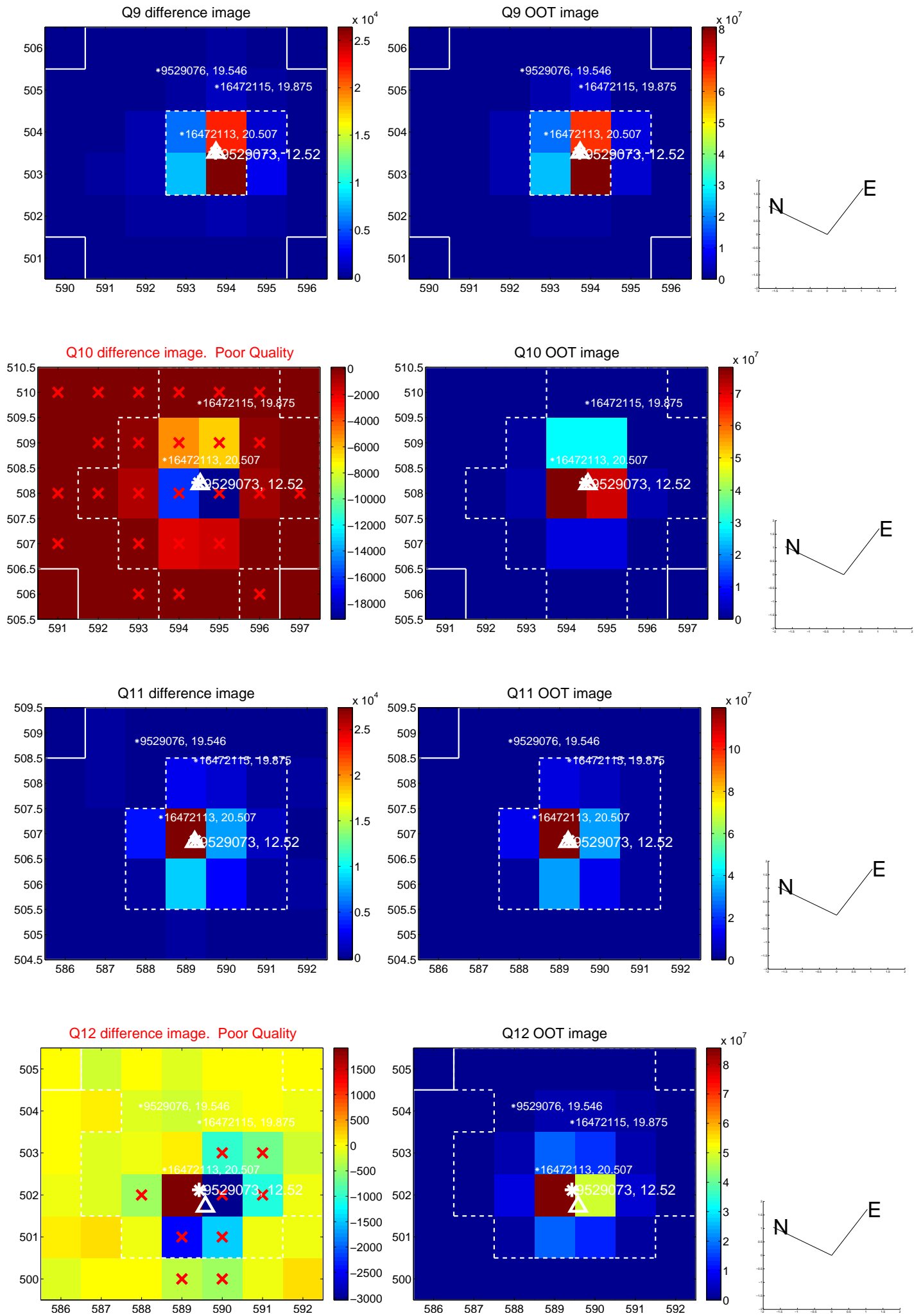
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



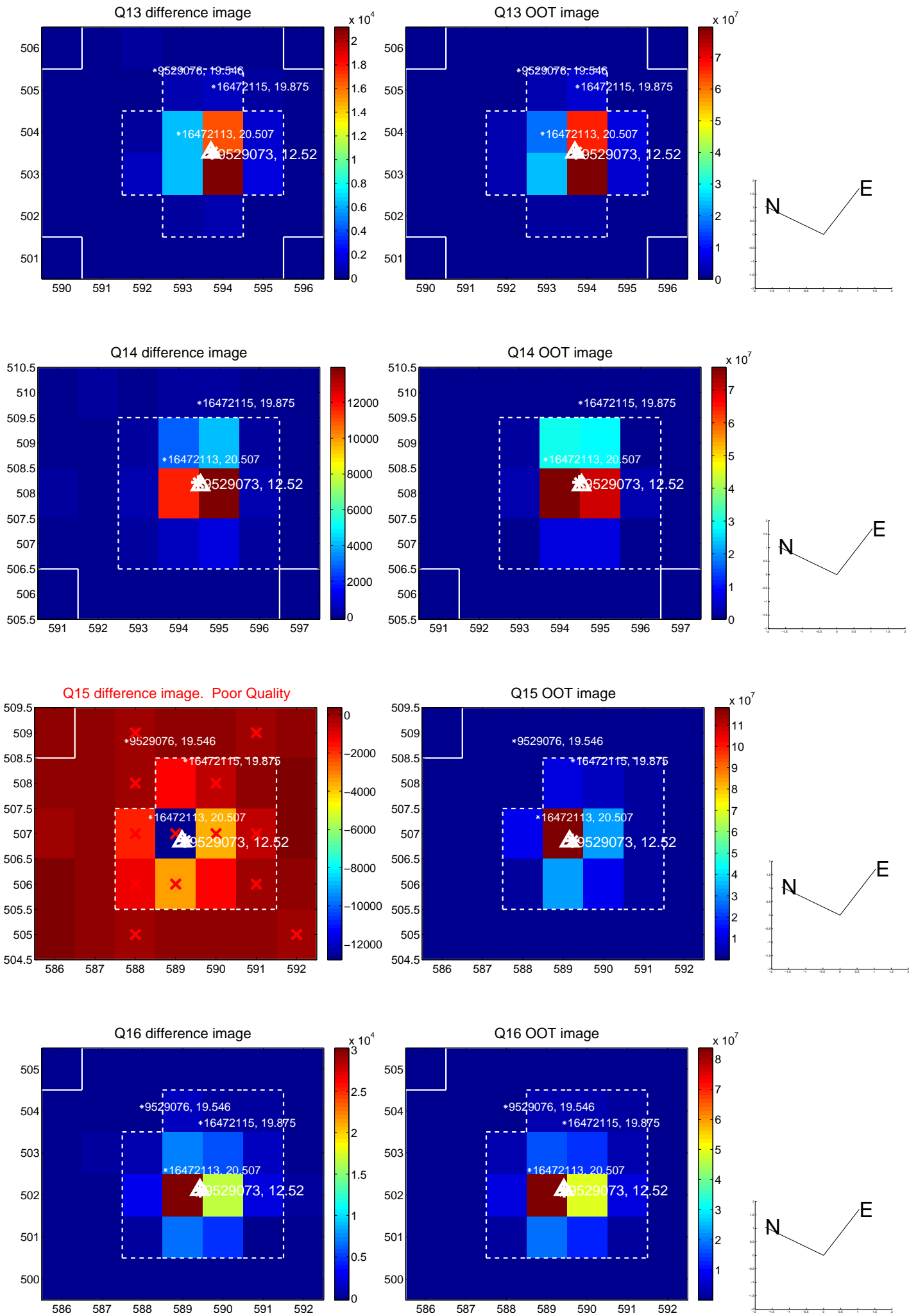
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

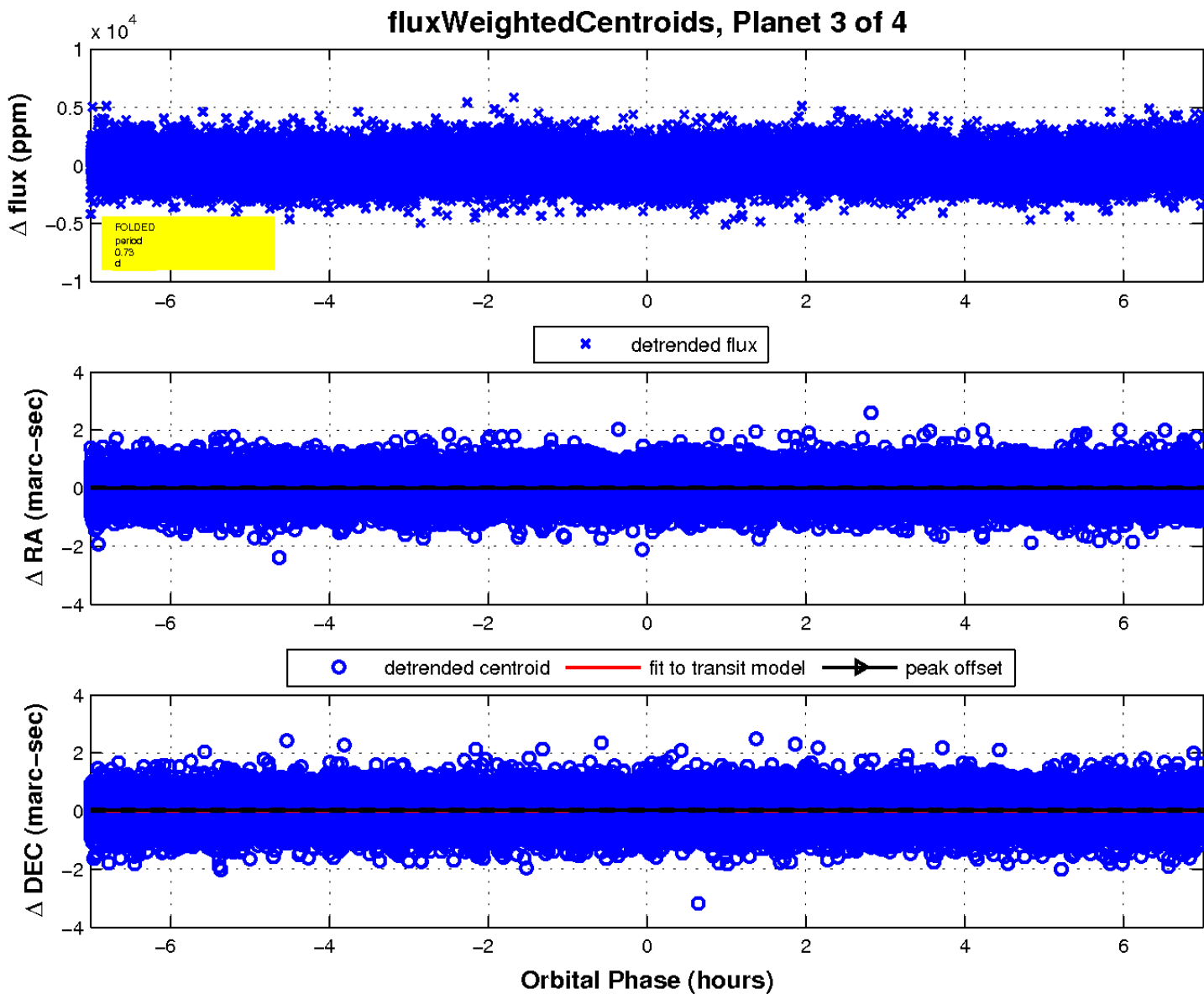
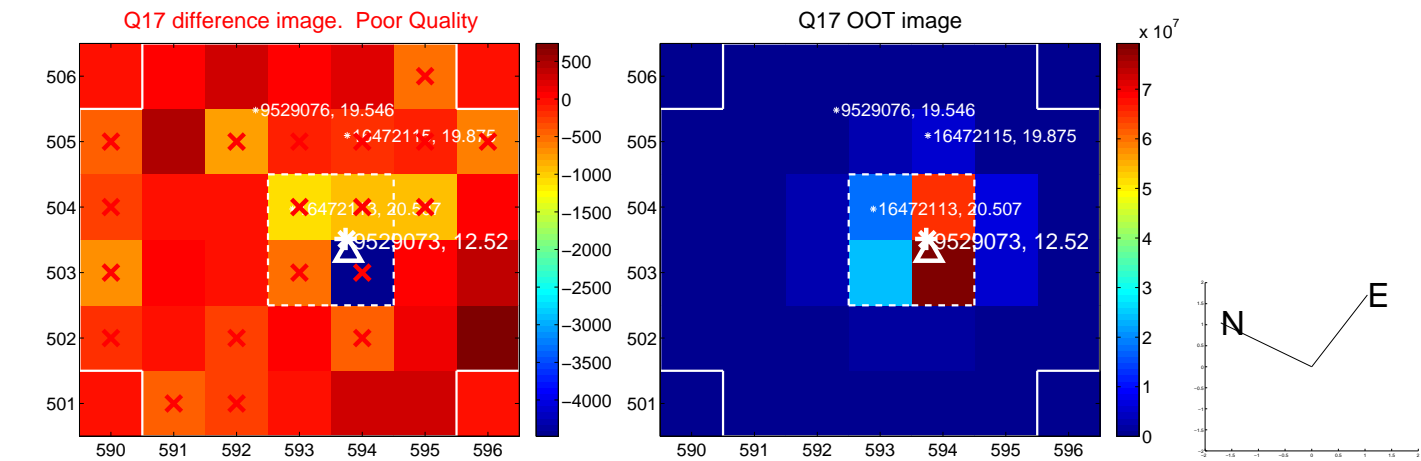


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

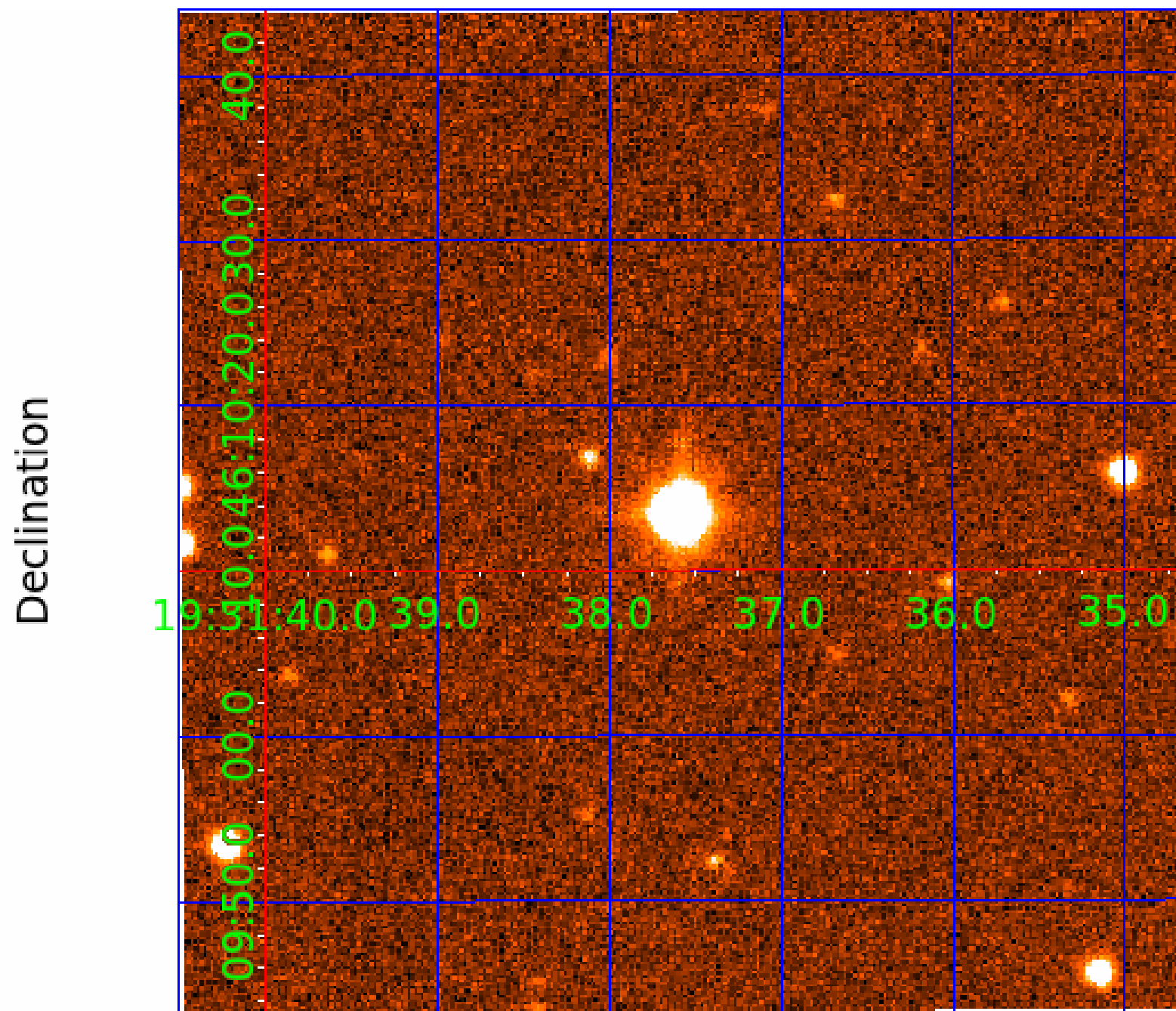




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image



# KIC 009529073

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009529073-01	OBS	No	0.822864	132.139265	216.0	1.369	14.3	15.3	2.04	7274	3.48	25045.81
009529073-02	OBS	No	0.822853	131.737839	163.9	1.274	12.0	12.2	2.04	7274	3.03	25046.27
009529073-03	OBS	No	0.730239	132.005310	161.5	2.337	8.9	8.3	2.04	7274	3.00	29368.80
009529073-04	OBS	No	32.676012	159.066512	1366.6	2.070	7.6	9.3	2.04	7274	8.16	184.87

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009529073-01	OBS	FP	0.00	1	0	0	0	LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
009529073-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD
009529073-03	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
009529073-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

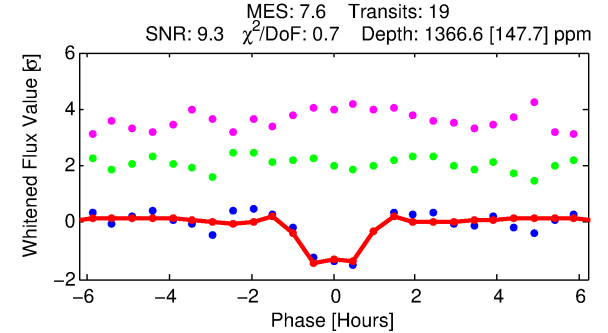
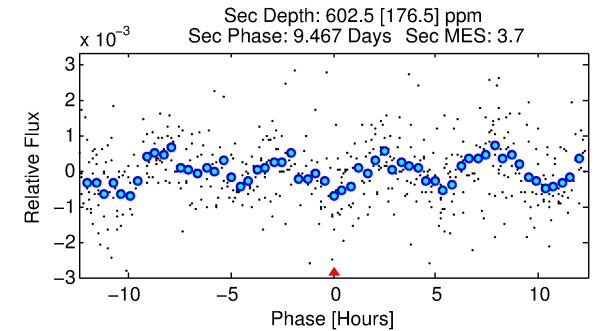
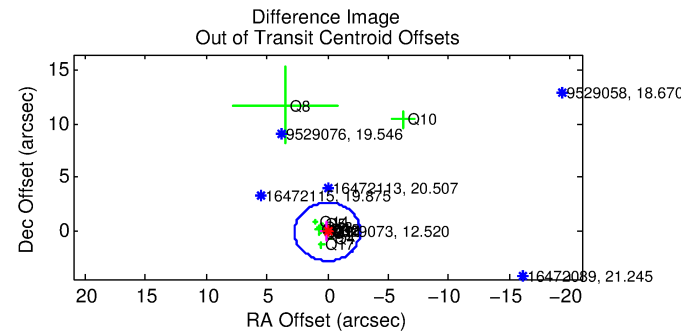
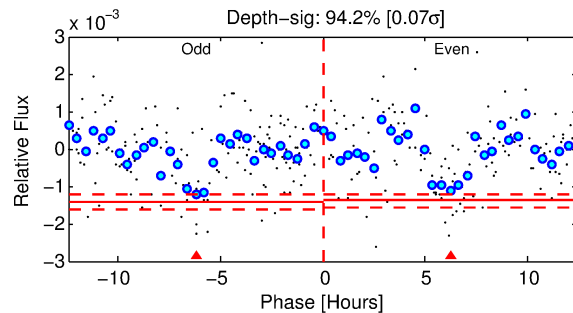
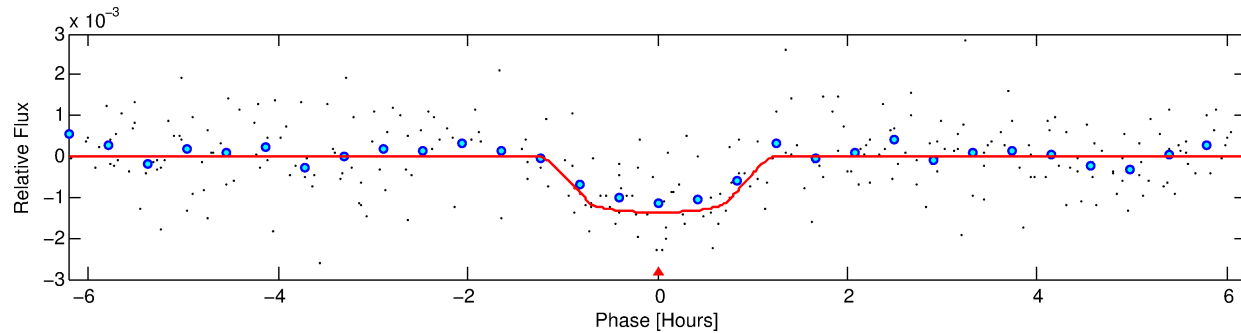
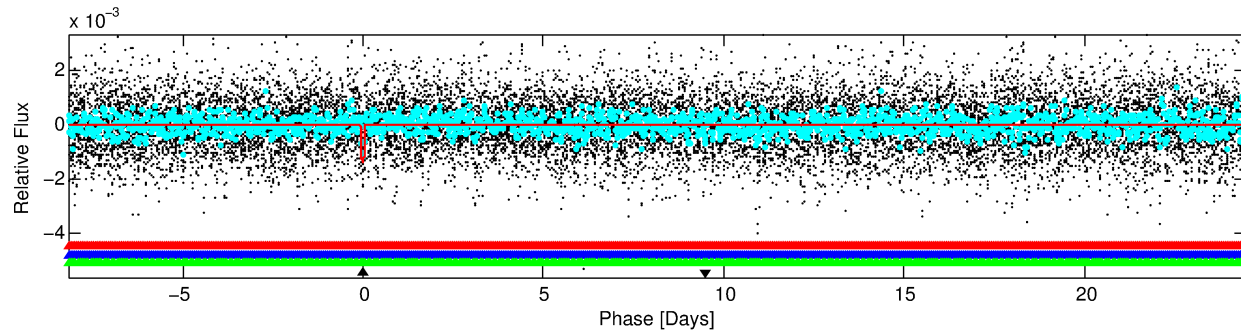
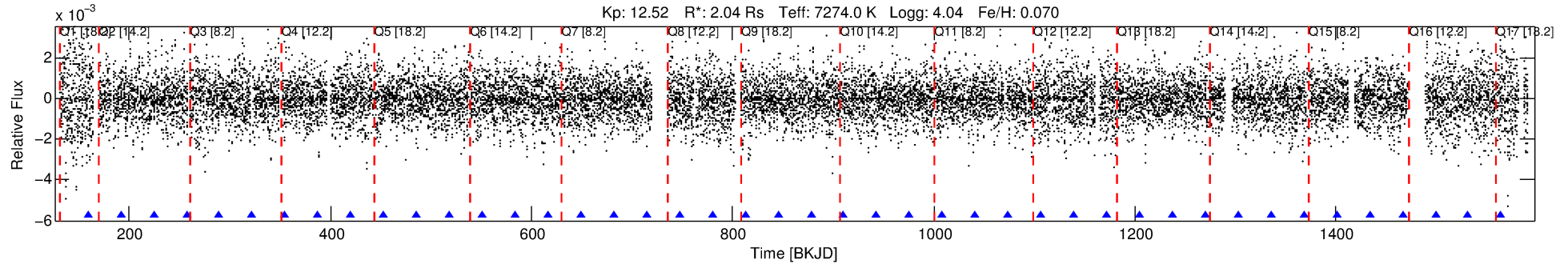
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 009529073-04

No Significant Match Found

# DV One-Page Summary

KIC: 9529073 Candidate: 4 of 4 Period: 32.676 d



## DV Fit Results:

Period = 32.67601 [0.00019] d  
Epoch = 159.0665 [0.0049] BKJD  
Rp/R\* = 0.0367 [0.0148]  
a/R\* = 87.69 [209.07]  
b = 0.74 [1.47]  
Seff = 184.87 [66.39]  
Teq = 940 [84] K  
Rp = 8.16 [3.93] Re  
a = 0.2372 [0.0520] AU  
Ag = 280.26 [256.37] [1.09 $\sigma$ ]  
Teffp = 5948 [1303] K [3.84 $\sigma$ ]

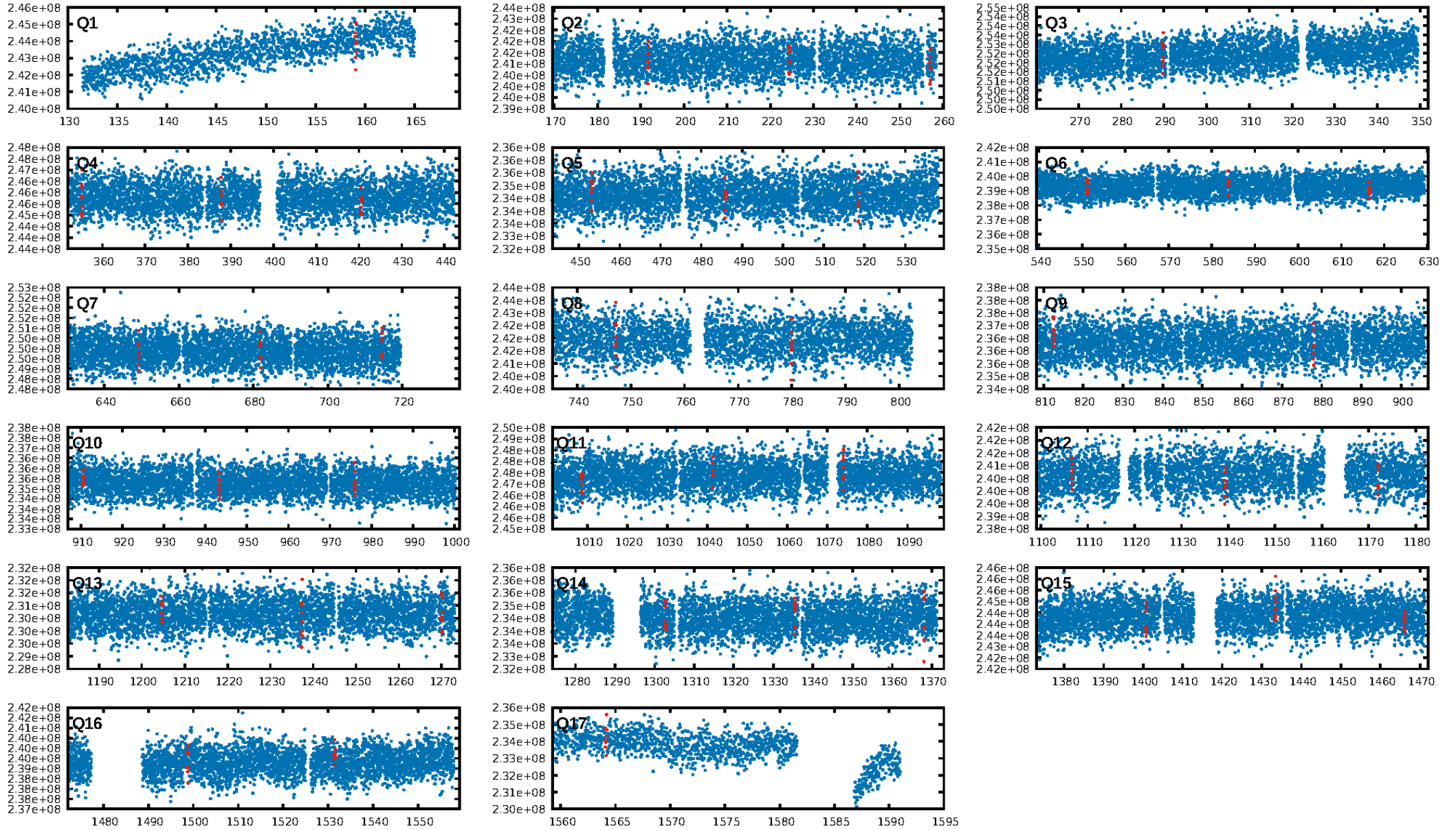
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [308.07 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 83.7%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 4.60e-09**  
RollingBand-fgt: 1.00 [18/18]  
GhostDiagnostic-chr: -0.9341  
Centroid-sig: 0.5%  
Centroid-so: 0.153 arcsec [2.09 $\sigma$ ]  
OotOffset-rm: 0.089 arcsec [0.10 $\sigma$ ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-rm: 0.092 arcsec [0.12 $\sigma$ ]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.47 [8/17]  
DiffImageOverlap-fno: 0.00 [0/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 22:32:33 Z

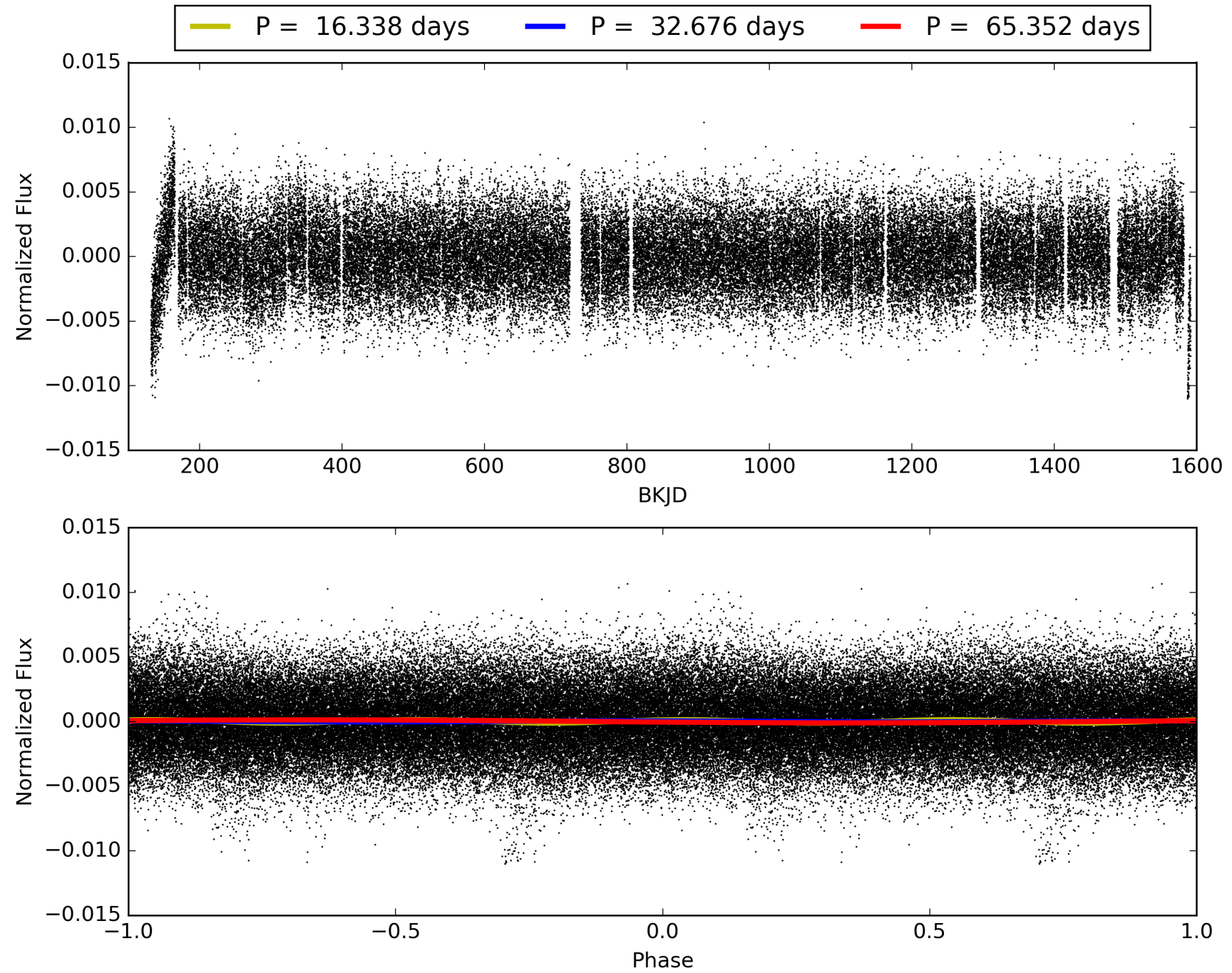
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 009529073-04, PDC Light Curves



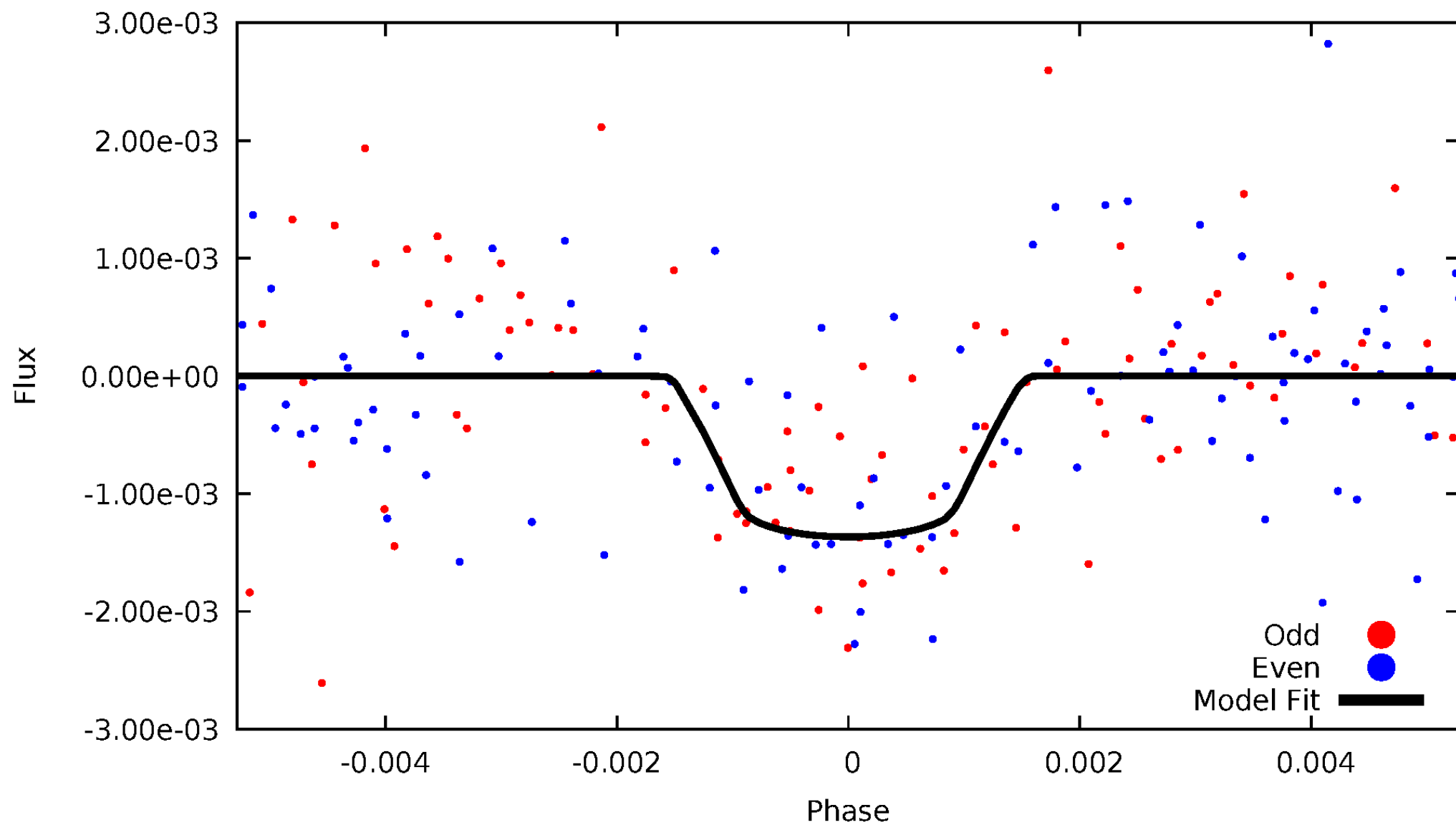


TCE 009529073-04



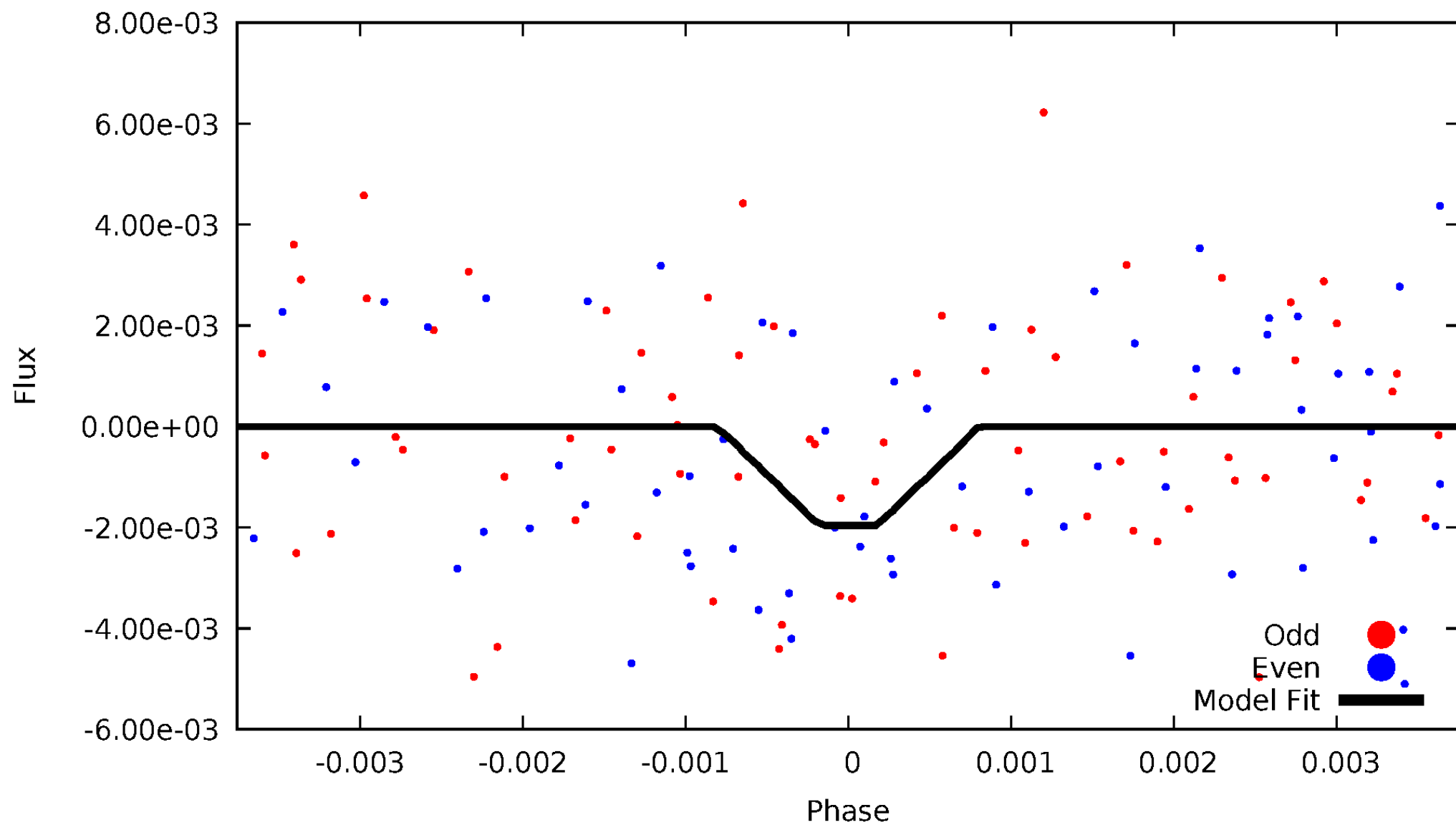
# DV Odd/Even

TCE 009529073-04



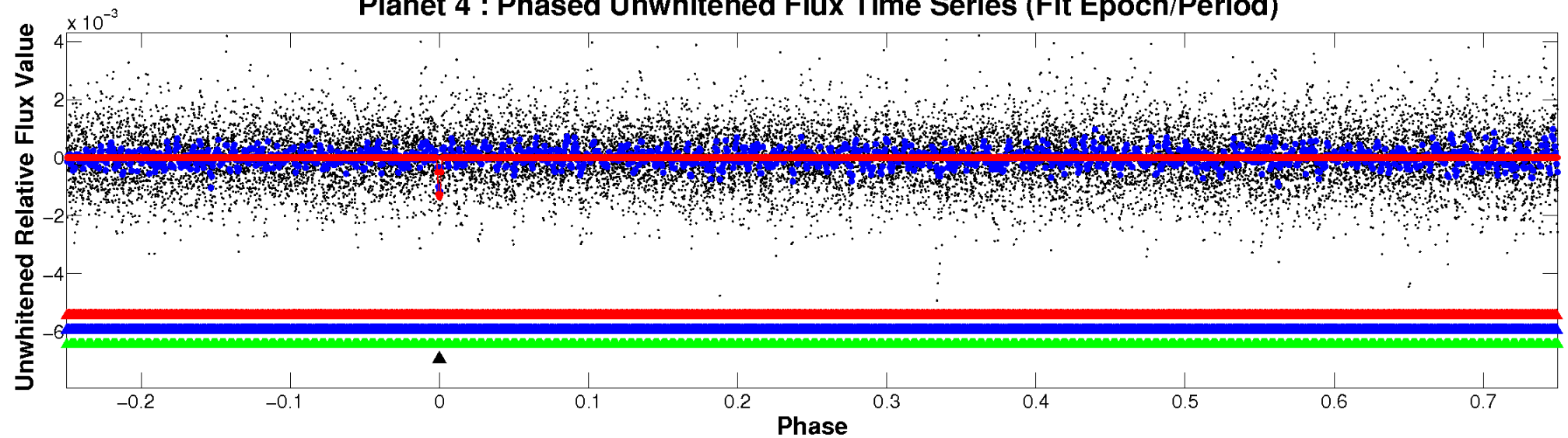
# ALT Odd/Even

TCE 009529073-04

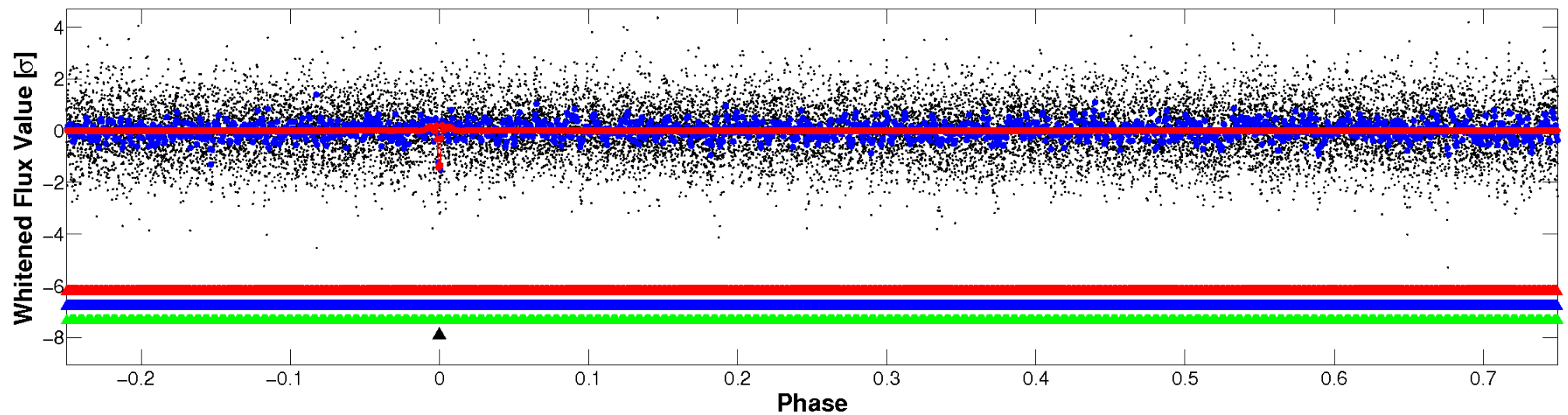


# Non-Whitened Vs. Whitened Light Curve

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

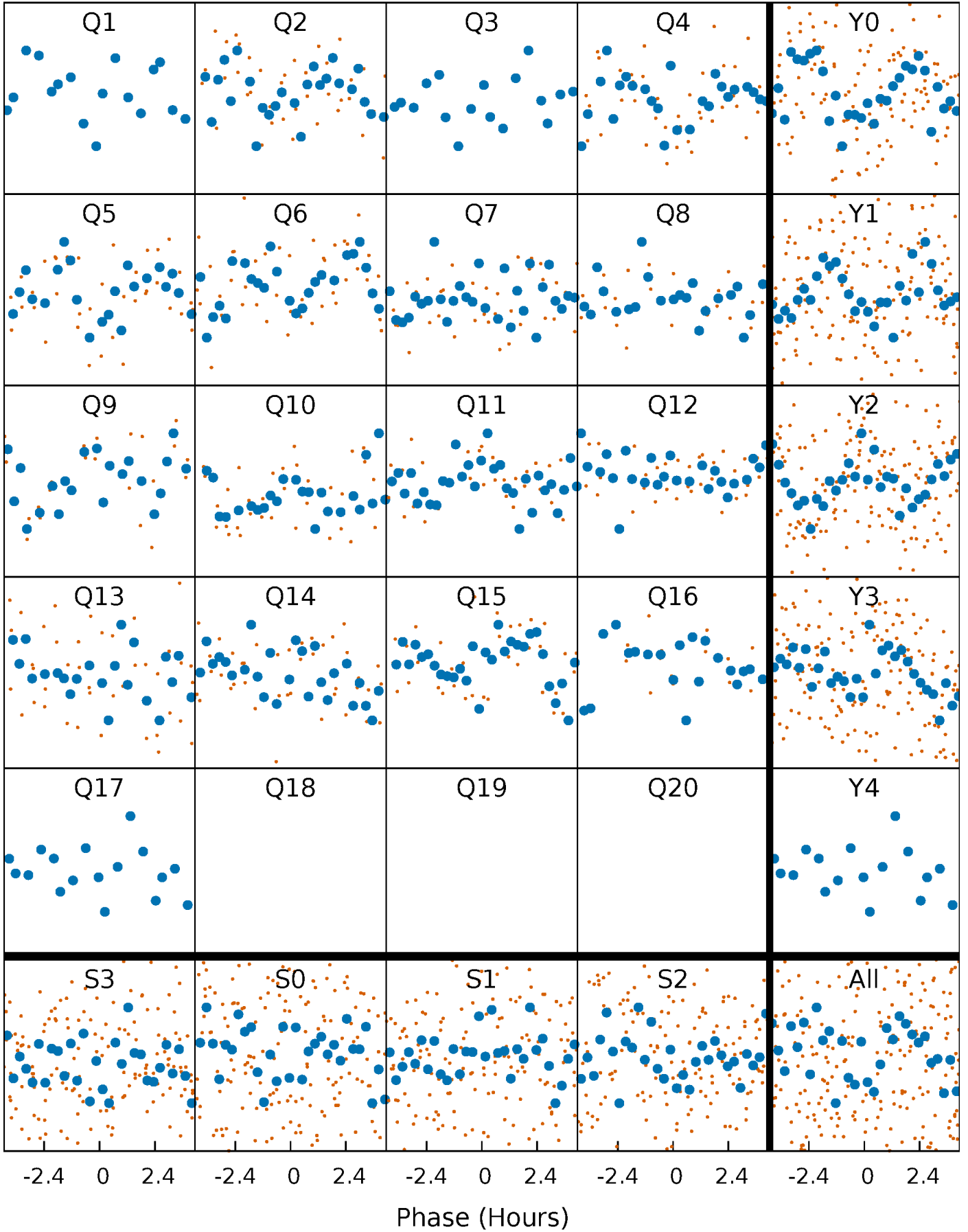


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

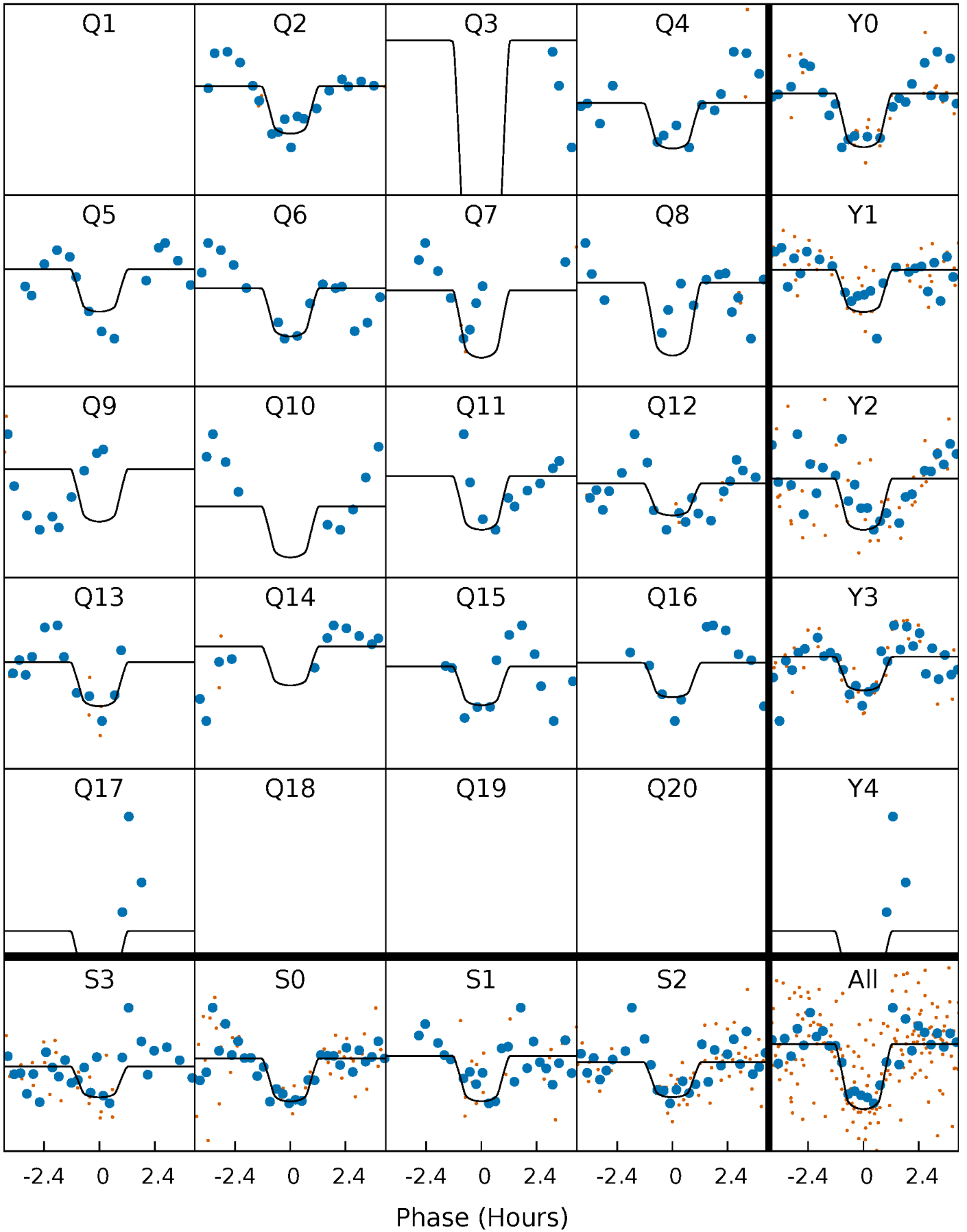
TCE 009529073-04   P= 32.676012 Days    $T_0=159.066512$  (BKJD)





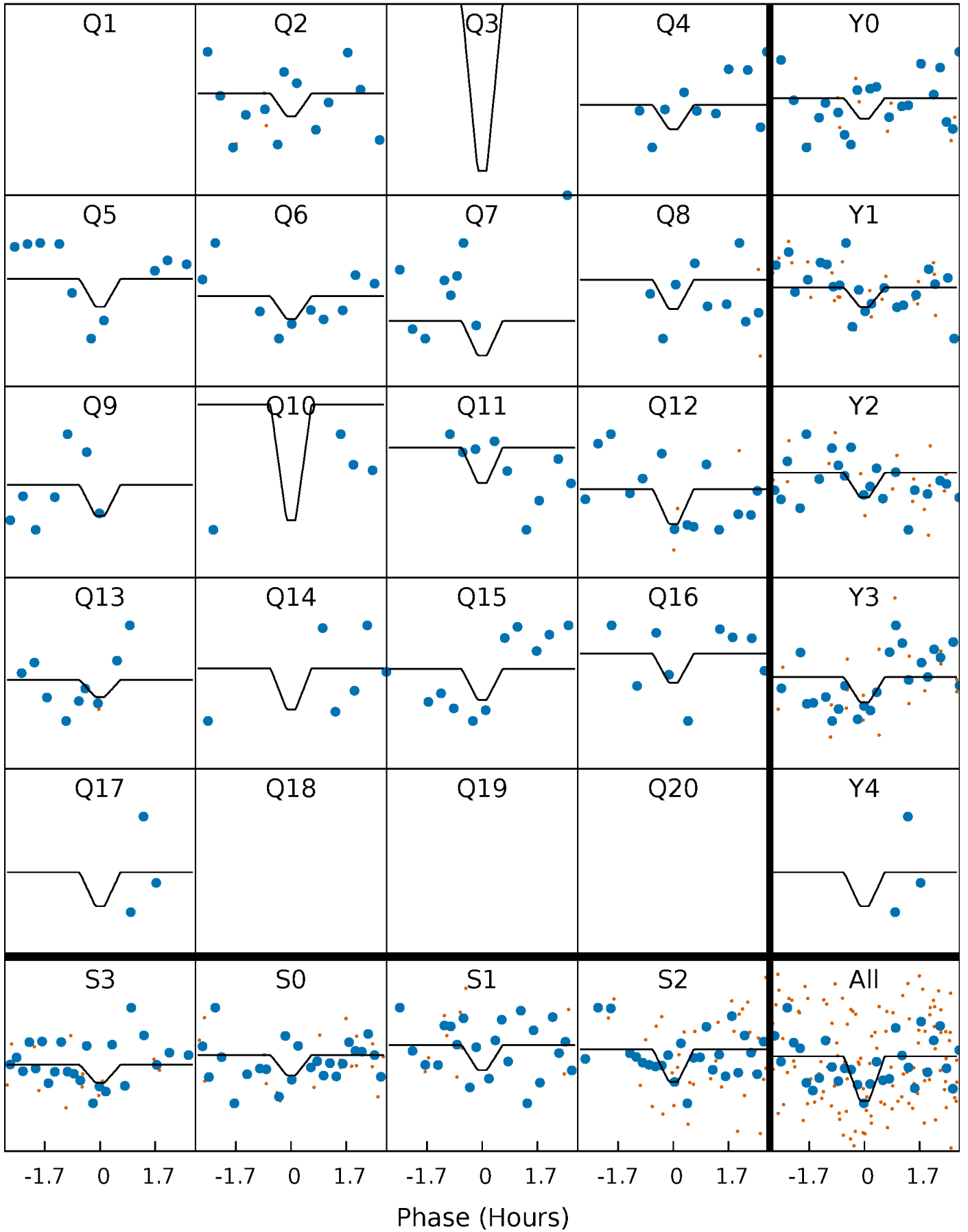
# DV Quarter-Phased Transit Curves

TCE 009529073-04 P= 32.676012 Days  $T_0=159.066512$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

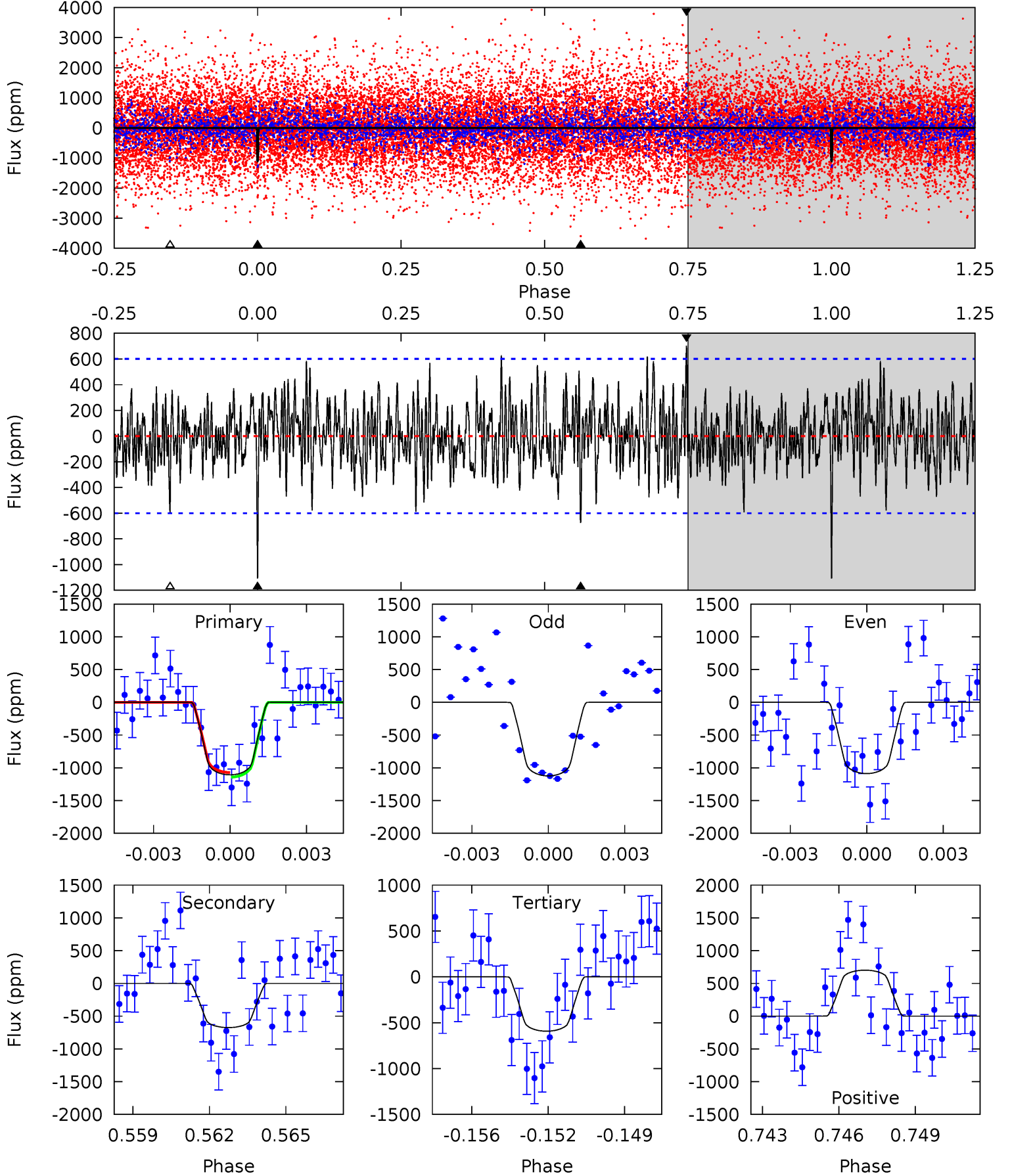
TCE 009529073-04 P= 32.675577 Days  $T_0=159.085744$  (BKJD)



# DV Model-Shift Uniqueness Test

009529073-04, P = 32.676012 Days, E = 126.390500 Days

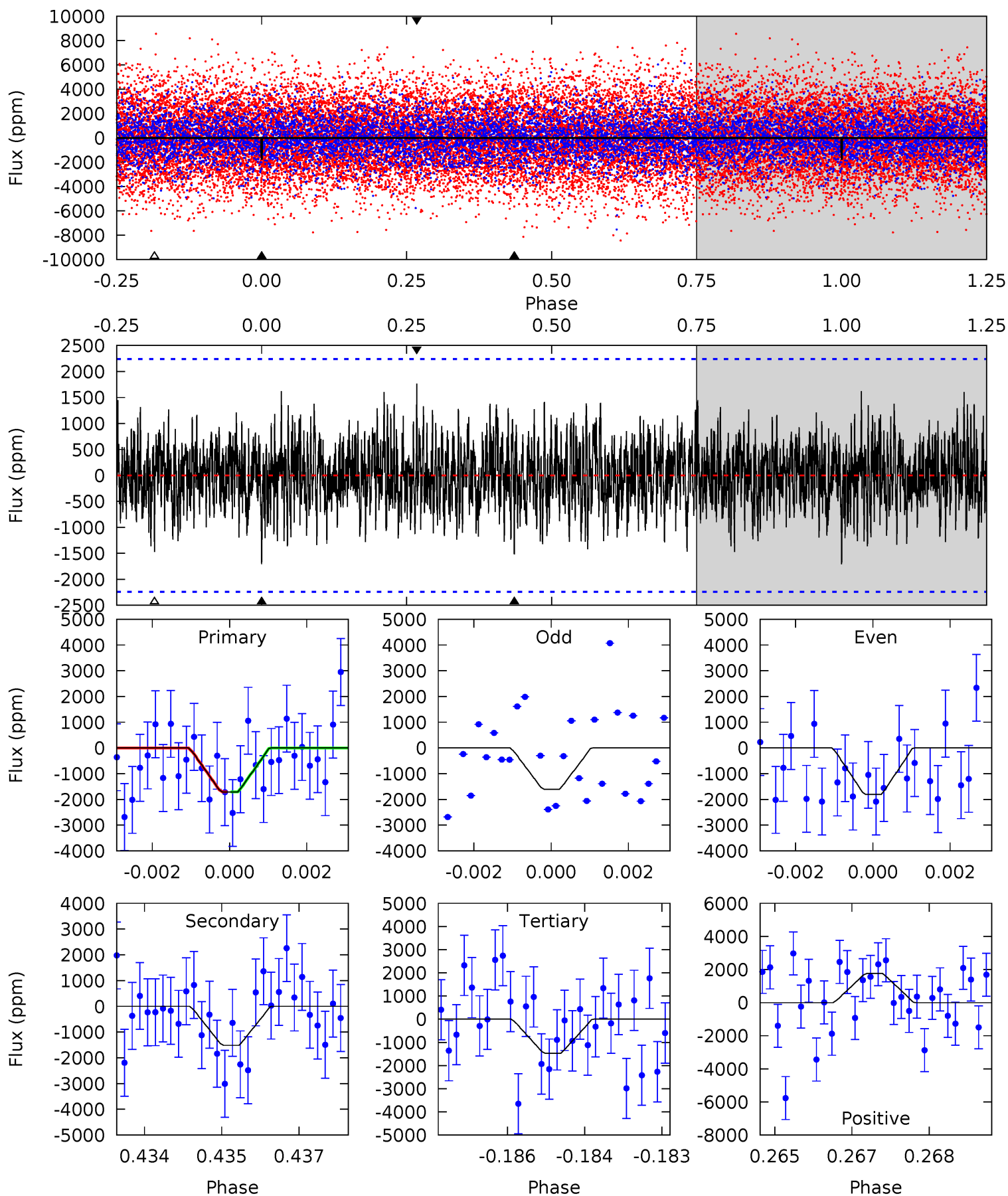
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.66	5.89	5.17	6.12	5.24	2.95	1.76	4.49	3.54	0.72	-0.23	0.16	0.94	0.39	0.31



# Alt Model-Shift Uniqueness Test

009529073-04, P = 32.675577 Days, E = 126.410167 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
4.09	3.64	3.53	4.24	5.37	3.16	1.25	0.56	-0.14	0.10	-0.60	0.25	0.77	0.51	0.00



### Stellar Parameters For KIC 009529073

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7274^{+200}_{-314}$	$4.042^{+0.170}_{-0.170}$	$0.070^{+0.200}_{-0.350}$	$2.036^{+0.538}_{-0.538}$	$1.666^{+0.181}_{-0.272}$	$0.278^{+0.260}_{-0.135}$
	+3%/-4%	+4%/-4%	+286%/-500%	+26%/-26%	+11%/-16%	+93%/-48%
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 009529073-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-675 \pm 115$	$8.22^{+3.57}_{-3.37}$	$1309^{+97}_{-98}$	$6020^{+1815}_{-949}$	$313^{+566}_{-172}$
Alt.	$-1517 \pm 417$	$9.83^{+4.11}_{-3.36}$	$1317^{+92}_{-96}$	$6728^{+1997}_{-1073}$	$468^{+668}_{-244}$

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



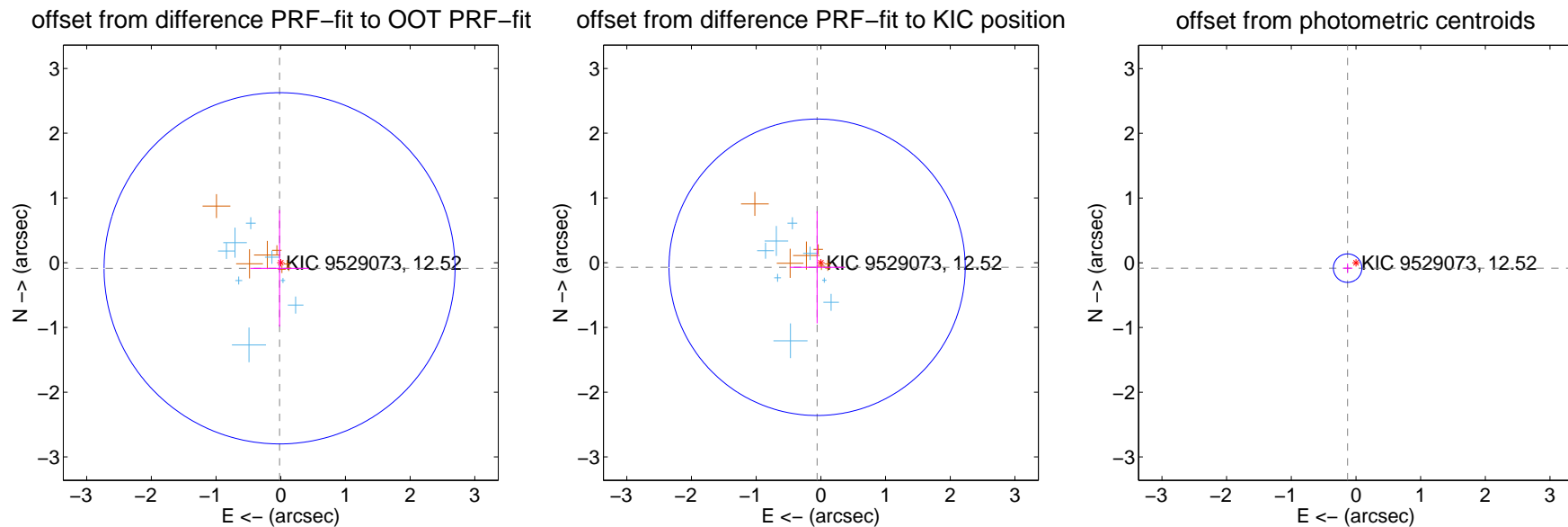
## DV Centroid Data

Supplemental centroid analysis for 009529073-04. Kepler magnitude: 12.52. Transit SNR 9.25

There are 8 quarters with good PRF difference image offsets

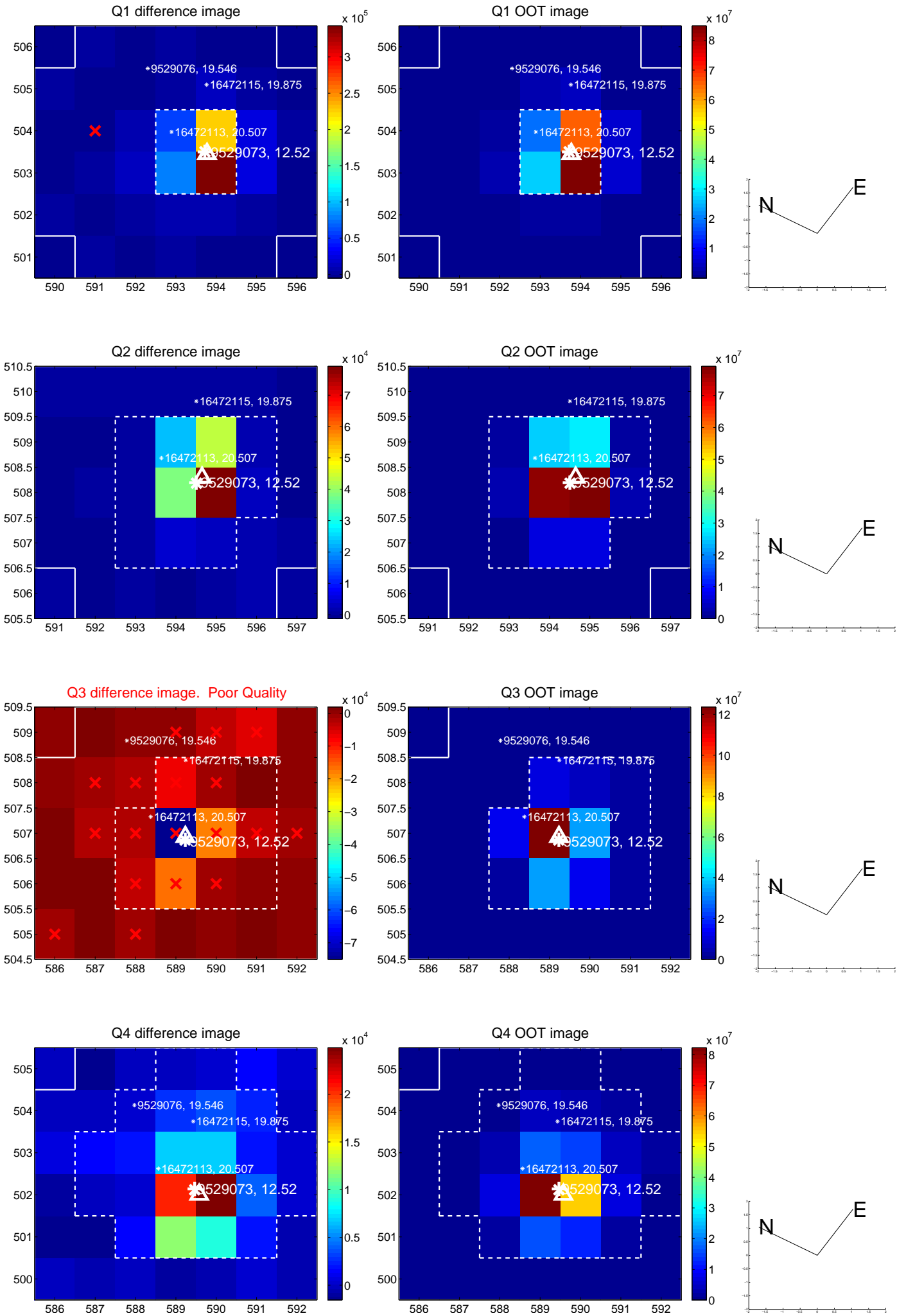
The direct PRF centroid is offset from the target star catalog position by about 0.07 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.089 \pm 0.904$	0.10	$0.018 \pm 0.453$	$-0.087 \pm 0.900$
PRF-fit source offset from KIC position	$0.092 \pm 0.763$	0.12	$0.058 \pm 0.424$	$-0.071 \pm 0.867$
photometric centroid source offset	$0.15 \pm 0.07$	2.09	$0.13 \pm 0.07$	$-0.08 \pm 0.07$

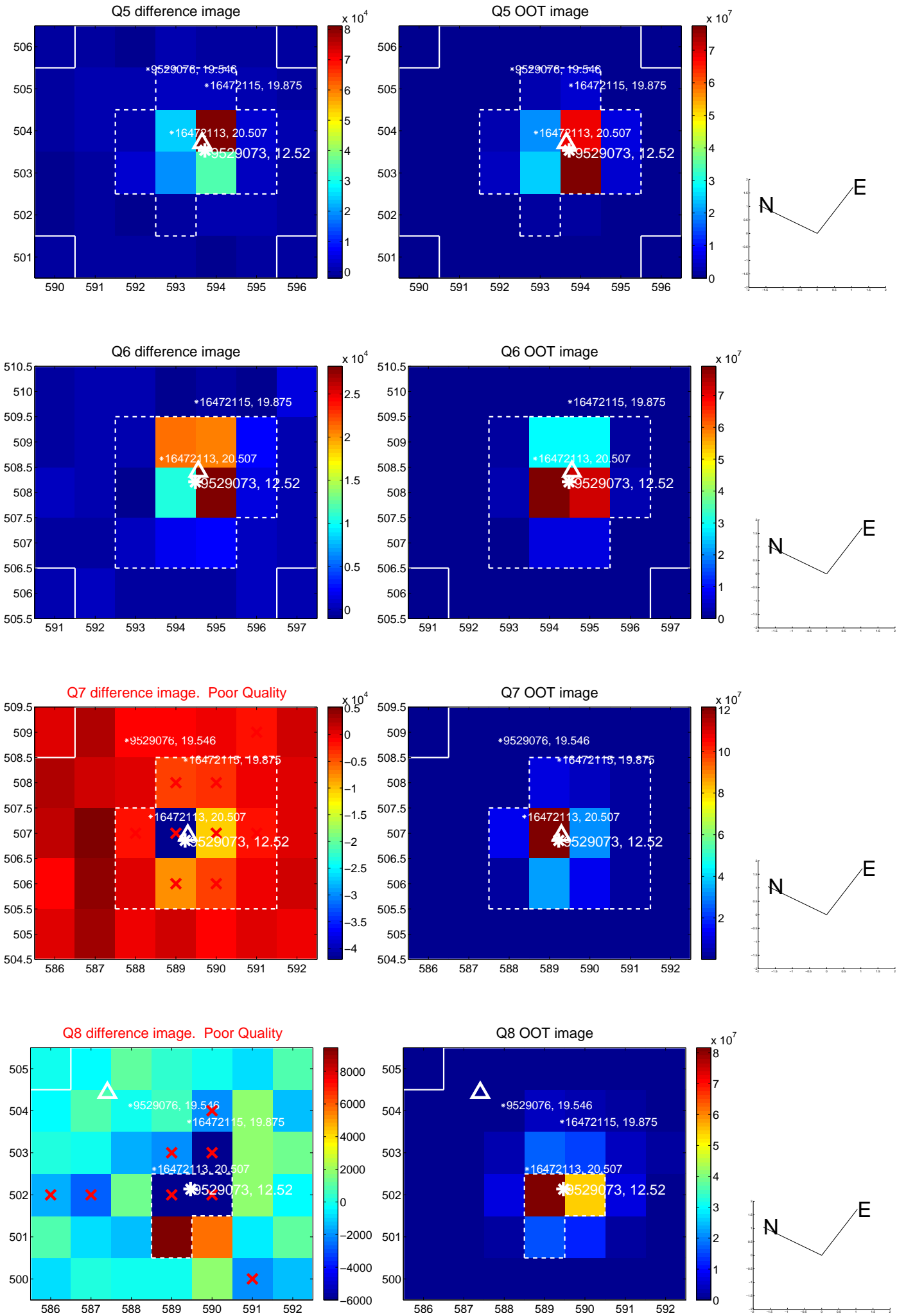


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

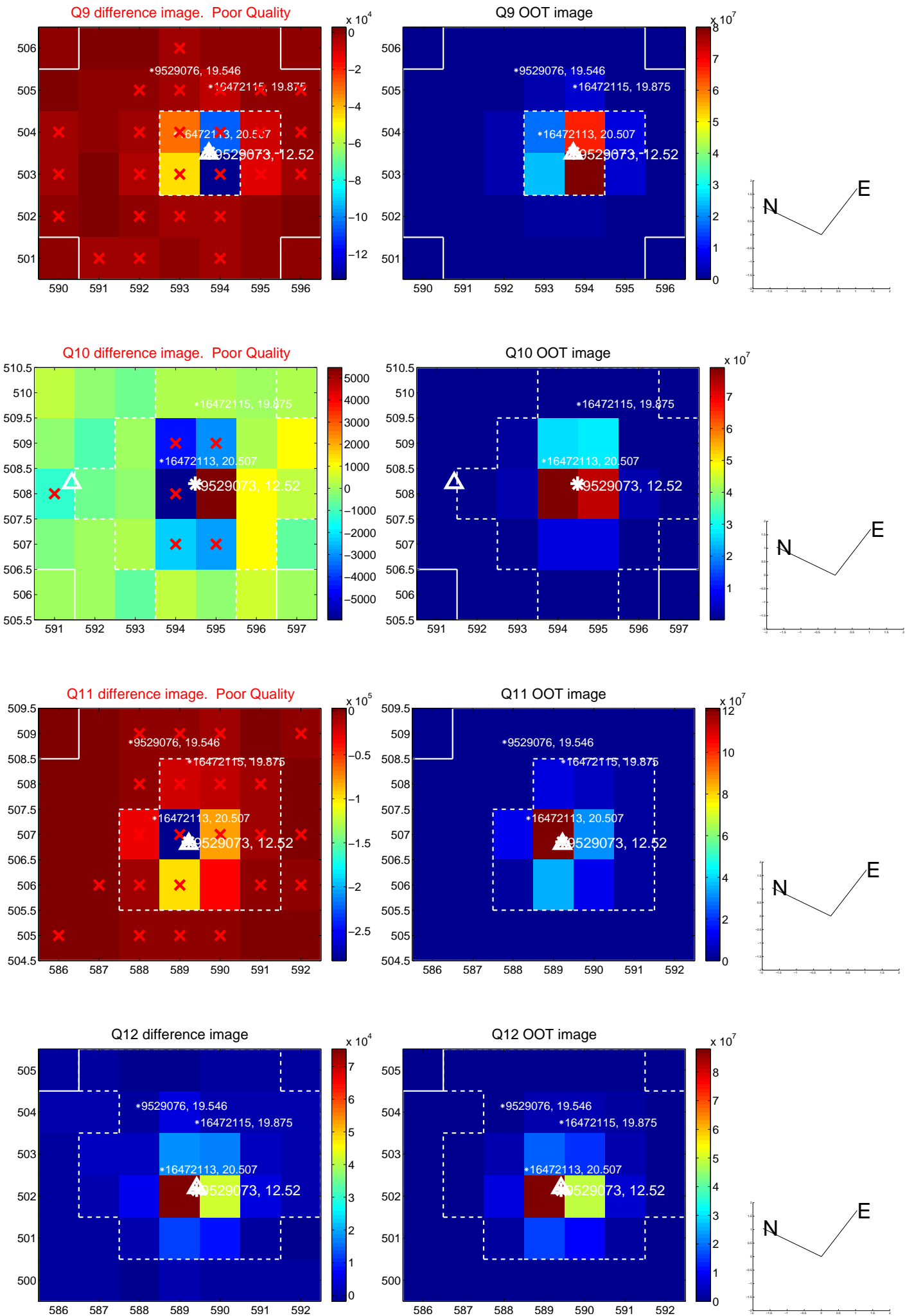
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



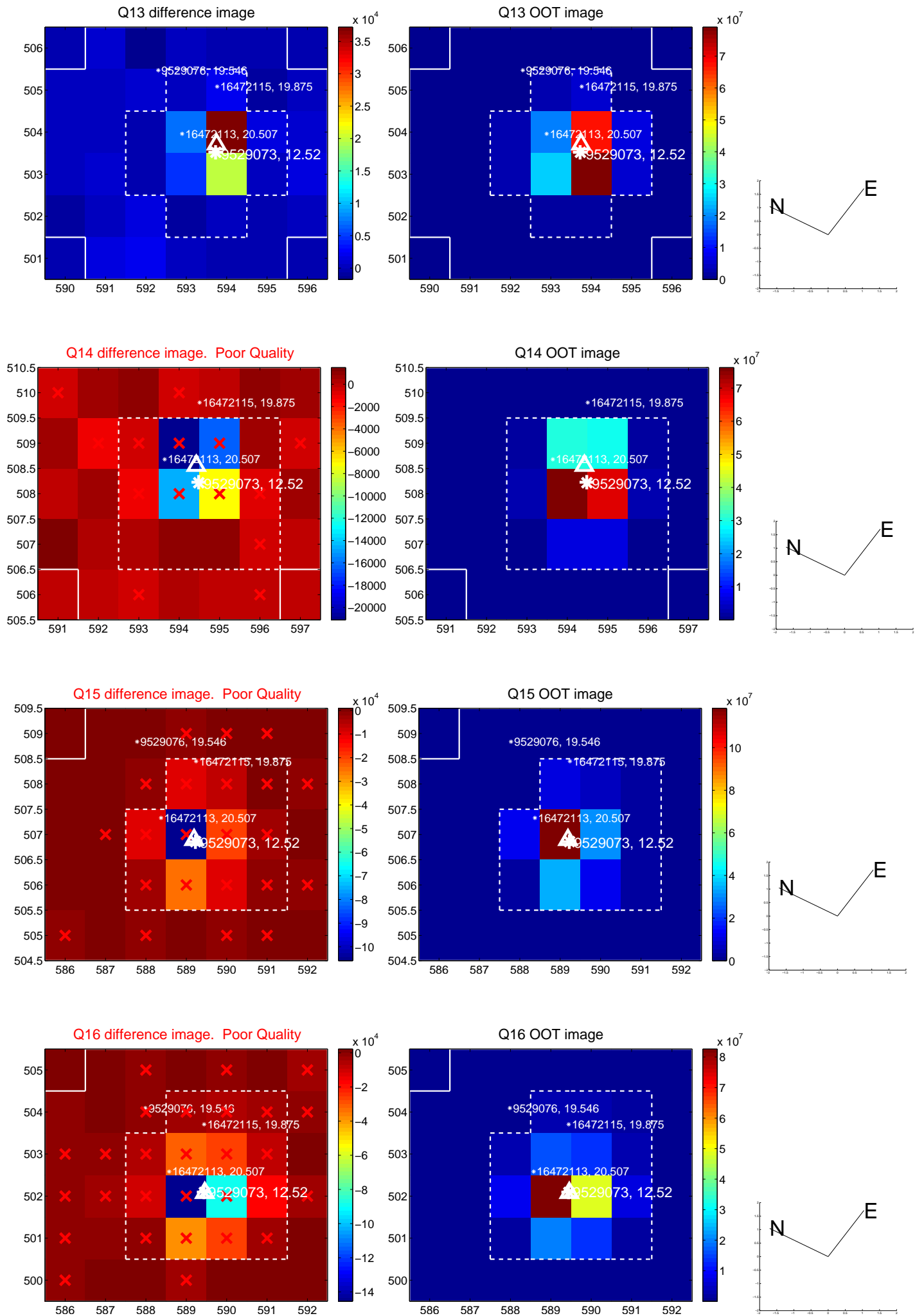
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

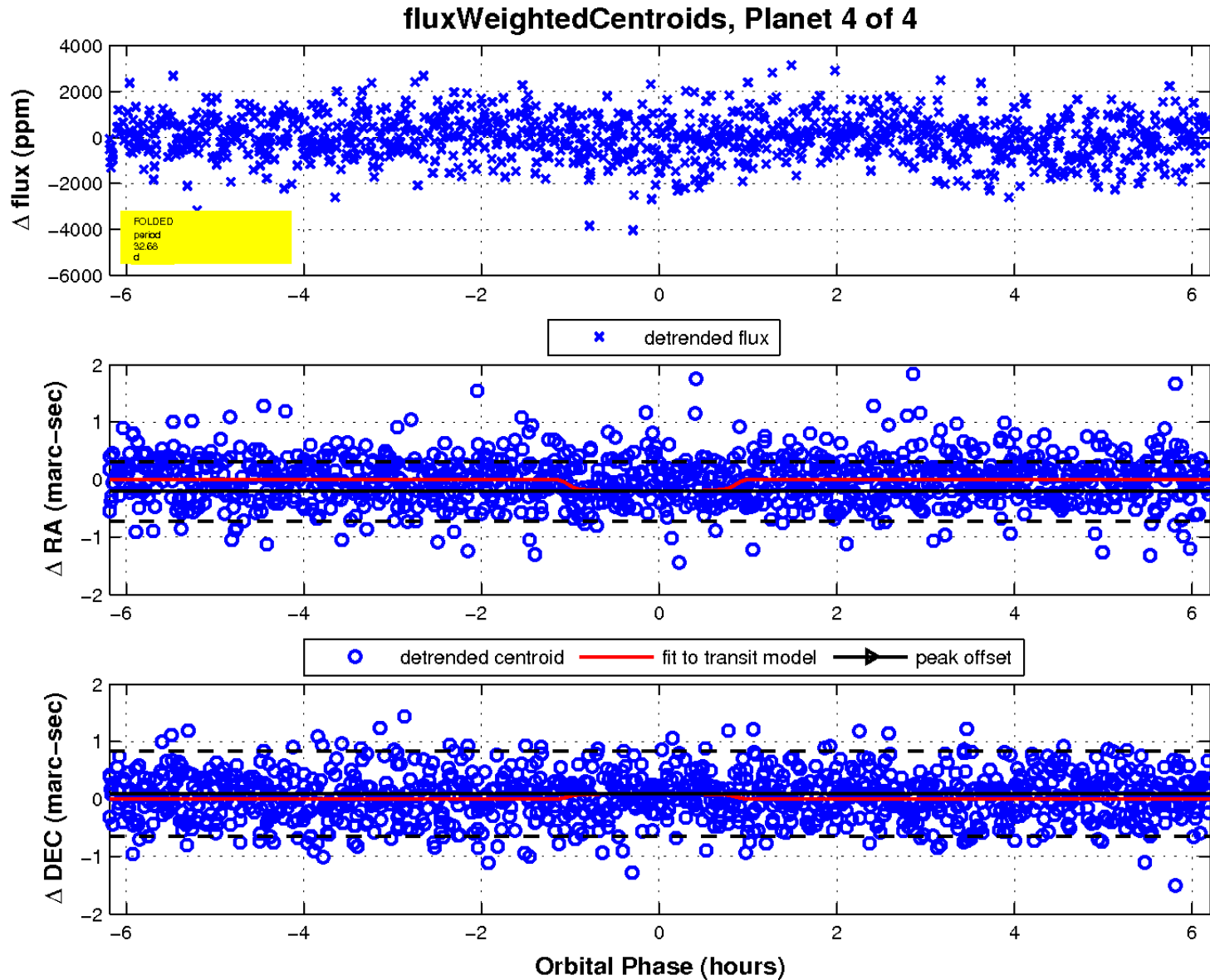
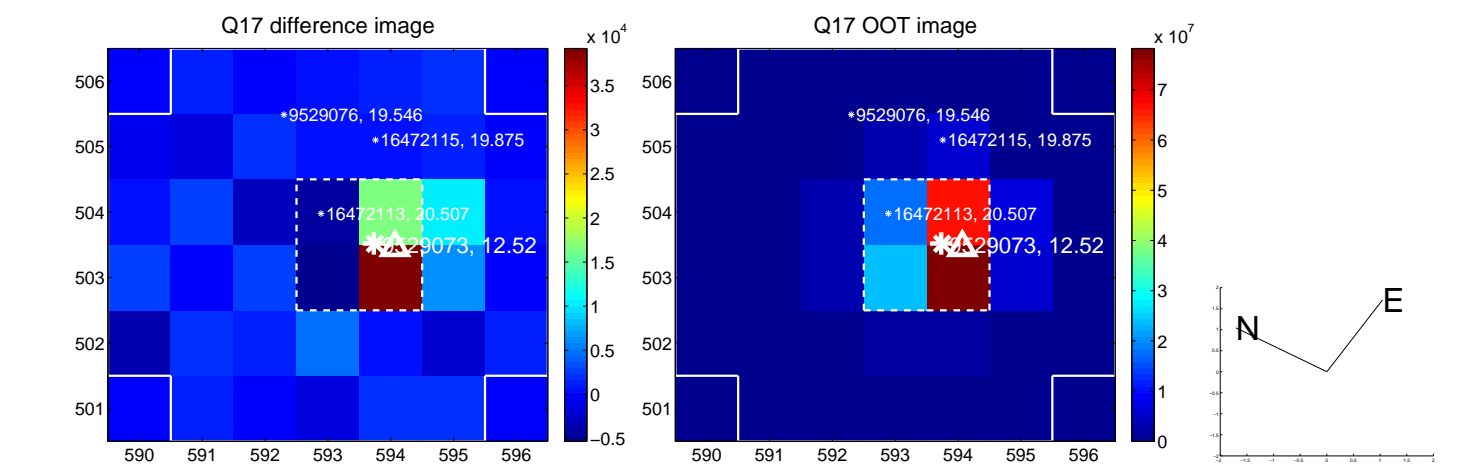


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





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



UKIRT Image

