

# KIC 005309353

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005309353-01	OBS	0643.01	1.376376	132.570981	331.9	1.883	33.1	41.2	0.75	5278	1.64	770.81
005309353-02	OBS	No	1.376357	131.888728	73.9	2.119	10.3	10.2	0.75	5278	0.77	770.83

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005309353-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE—CENT_KIC_POS
005309353-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE

**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 005309353-01

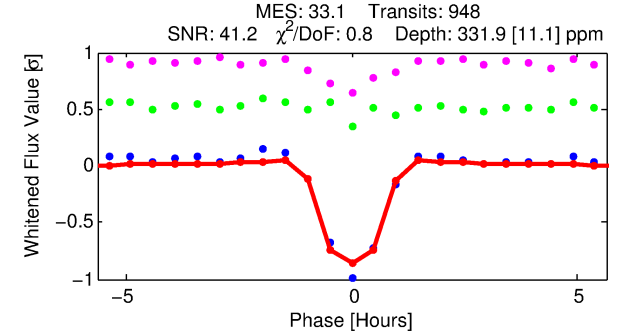
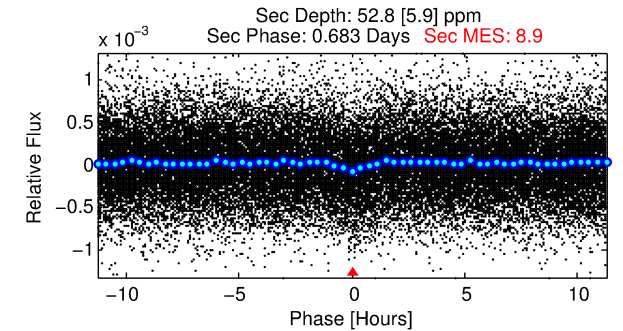
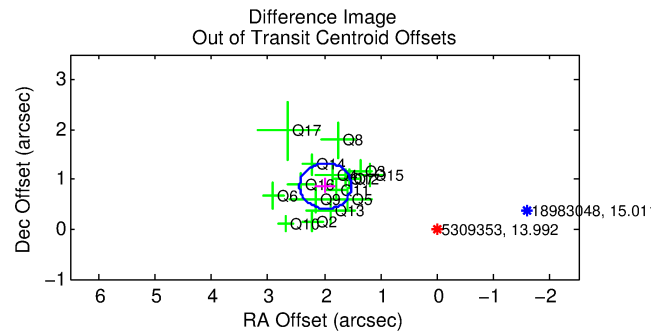
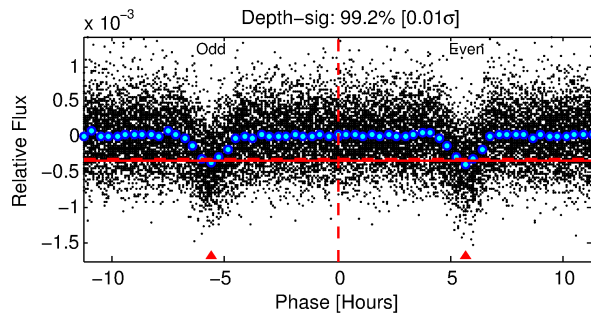
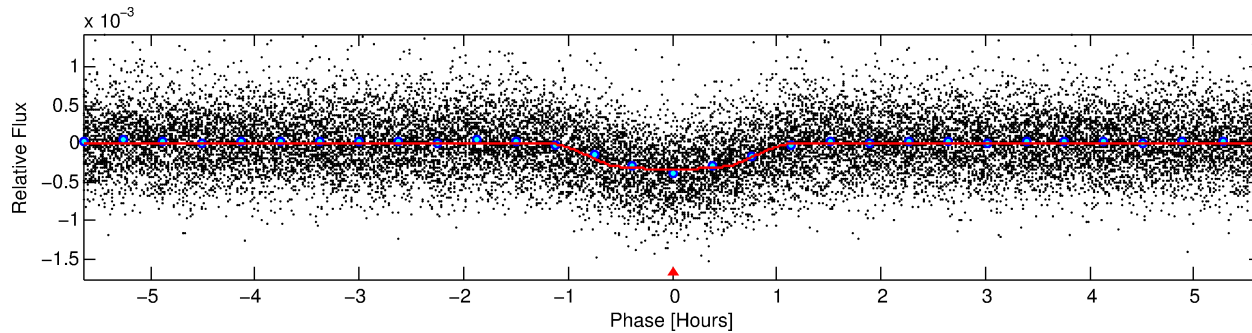
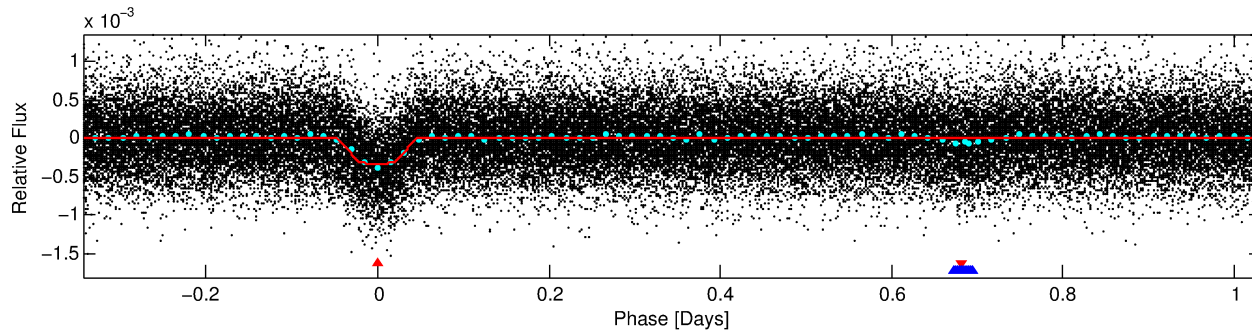
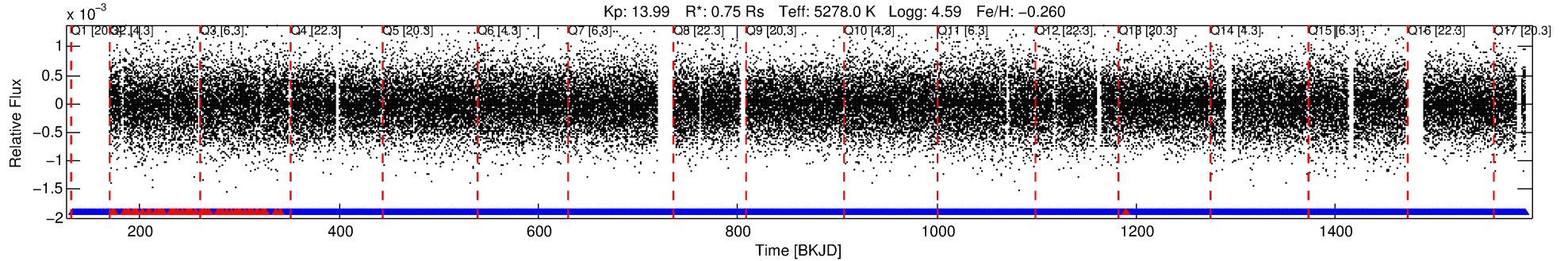
No Significant Match Found

# DV One-Page Summary

KIC: 5309353 Candidate: 1 of 2 Period: 1.376 d

KOI: K00643.01 Corr: 0.958

Kp: 13.99 R\*: 0.75 Rs Teff: 5278.0 K Logg: 4.59 Fe/H: -0.260



## DV Fit Results:

Period = 1.37638 [0.00000] d  
Epoch = 132.5710 [0.0007] BKJD  
Rp/R\* = 0.0201 [0.0035]  
a/R\* = 2.84 [1.81]  
b = 0.90 [0.16]  
Seff = 770.81 [173.84]  
Teq = 1344 [76] K  
Rp = 1.64 [0.39] Re  
a = 0.0224 [0.0029] AU  
Ag = 5.43 [2.18] [2.03σ]  
Teffp = 3171 [307] K [5.78σ]

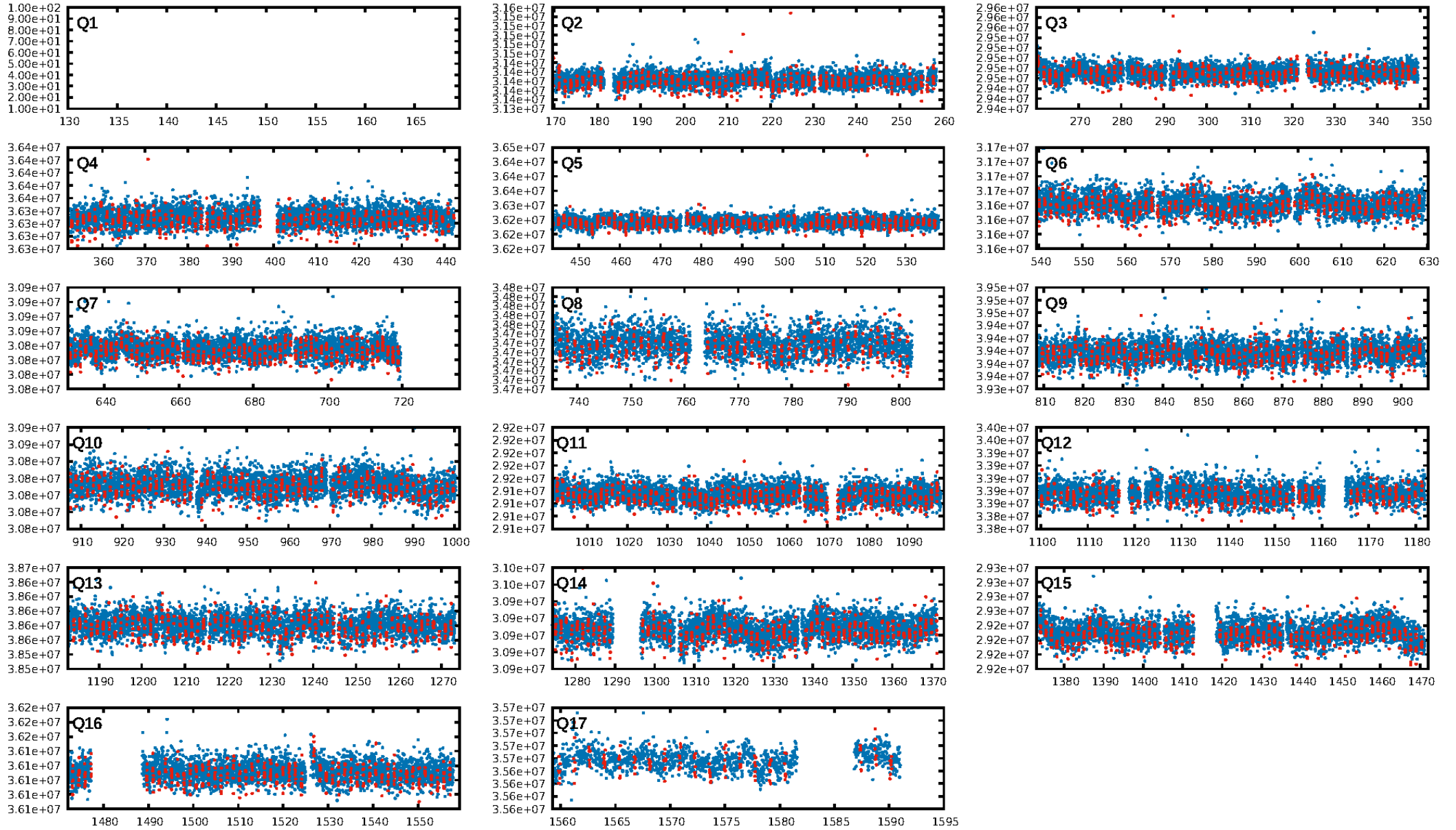
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 1.57e-223  
RollingBand-fgt: 0.95 [879/929]  
GhostDiagnostic-chr: 3.245  
Centroid-sig: 0.0%  
Centroid-so: 2.223 arcsec [9.59σ]  
OotOffset-rm: 2.158 arcsec [14.14σ]  
KicOffset-rm: 1.902 arcsec [14.79σ]  
OotOffset-st: 4/4/4/4 [16]  
KicOffset-st: 4/4/4/4 [16]  
DiffImageQuality-fgm: 1.00 [16/16]  
DiffImageOverlap-fno: 1.00 [16/16]

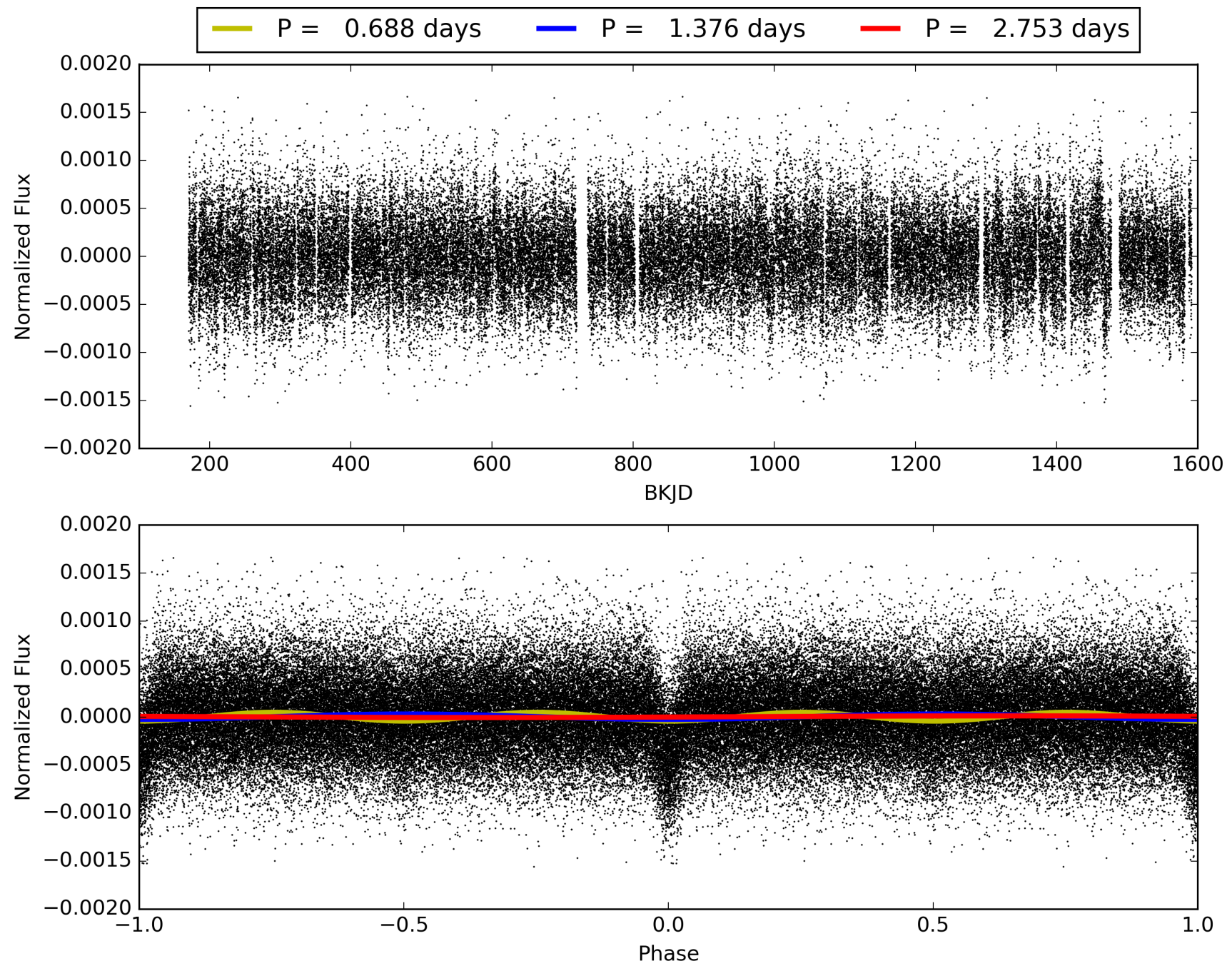
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 16:36:33 Z

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

# TCE 005309353-01, PDC Light Curves



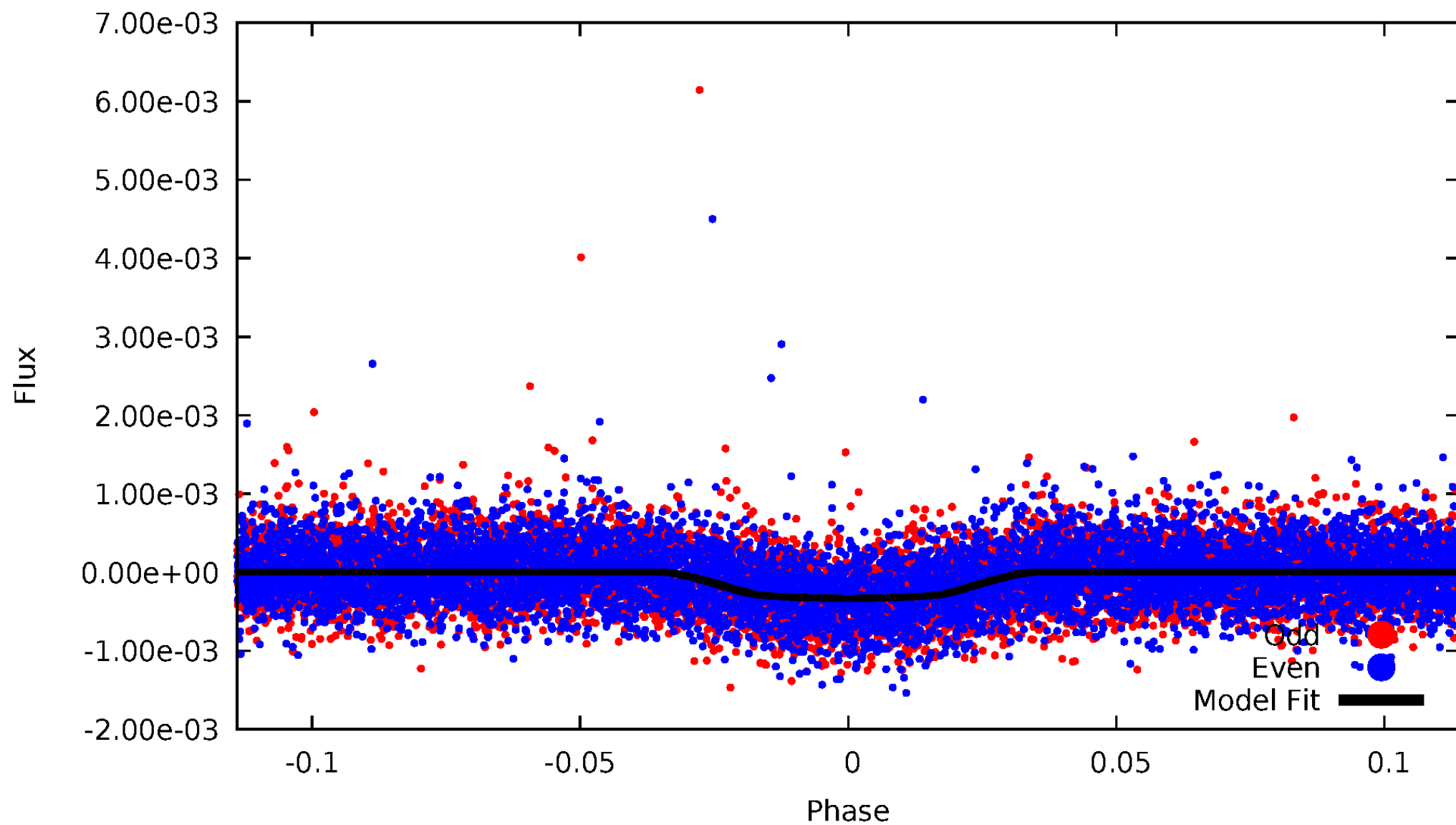
TCE 005309353-01





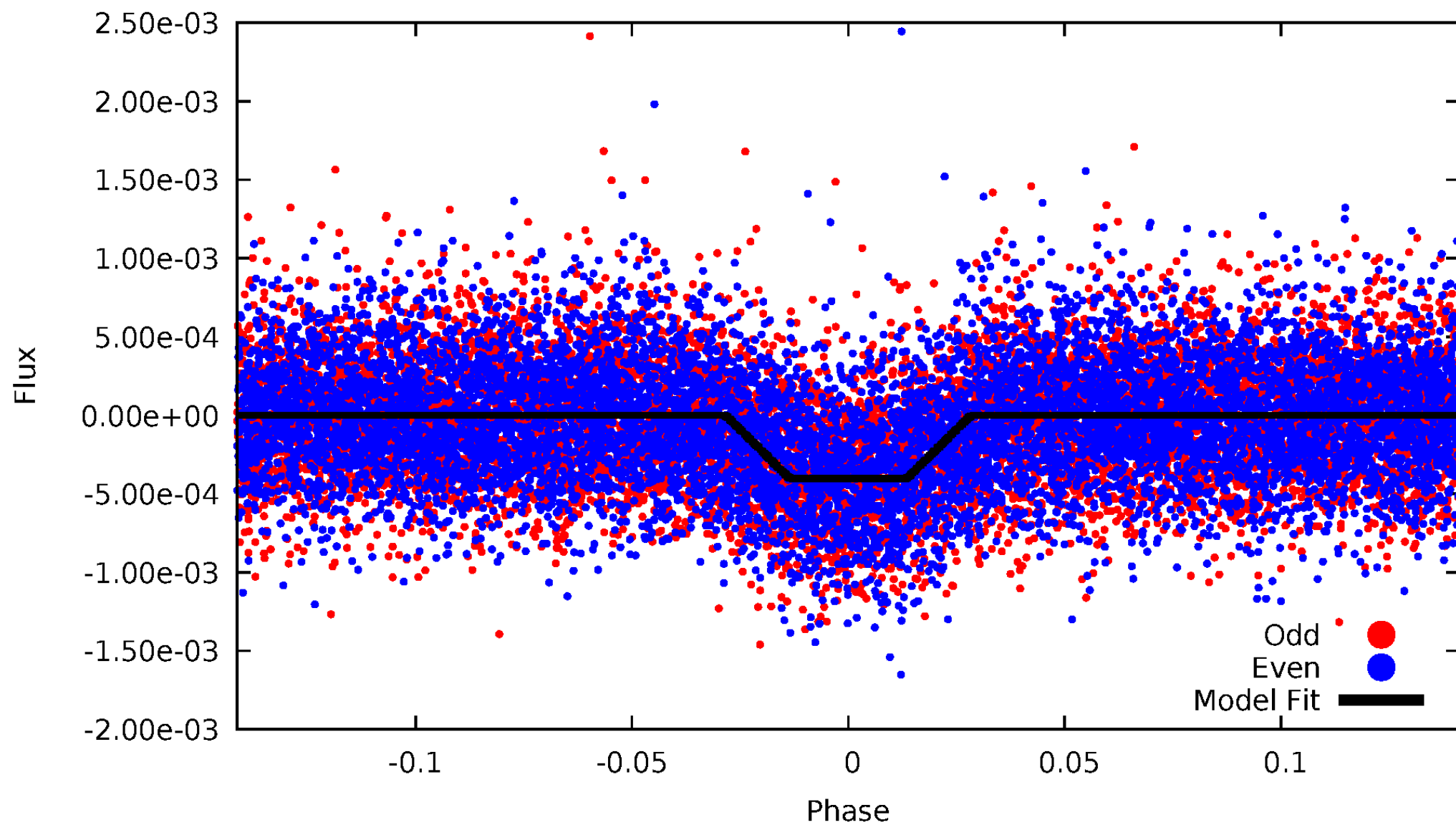
# DV Odd/Even

TCE 005309353-01



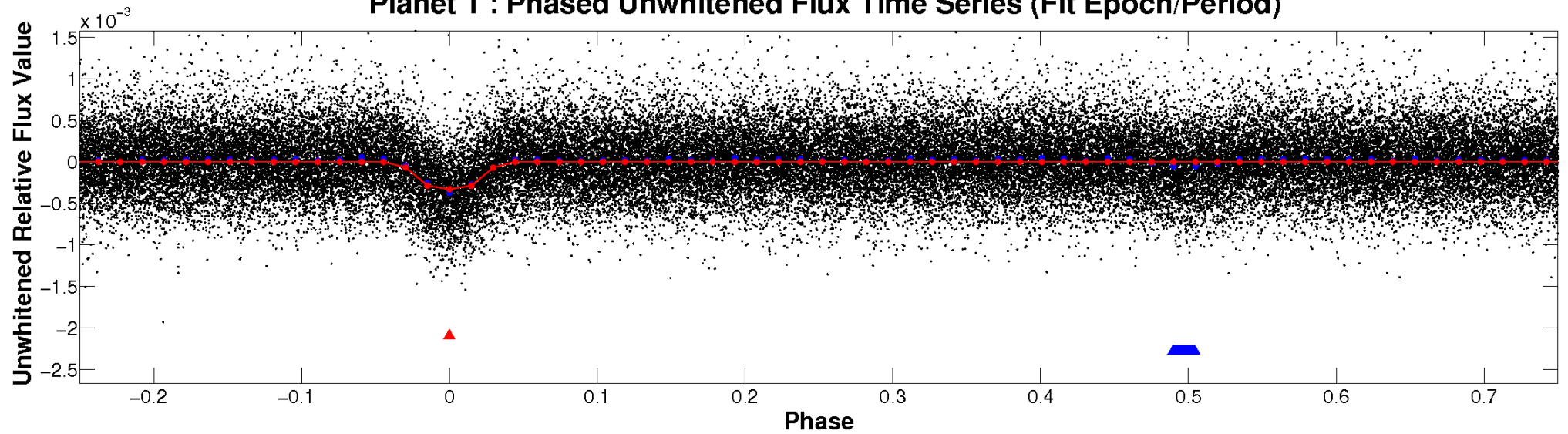
# ALT Odd/Even

TCE 005309353-01

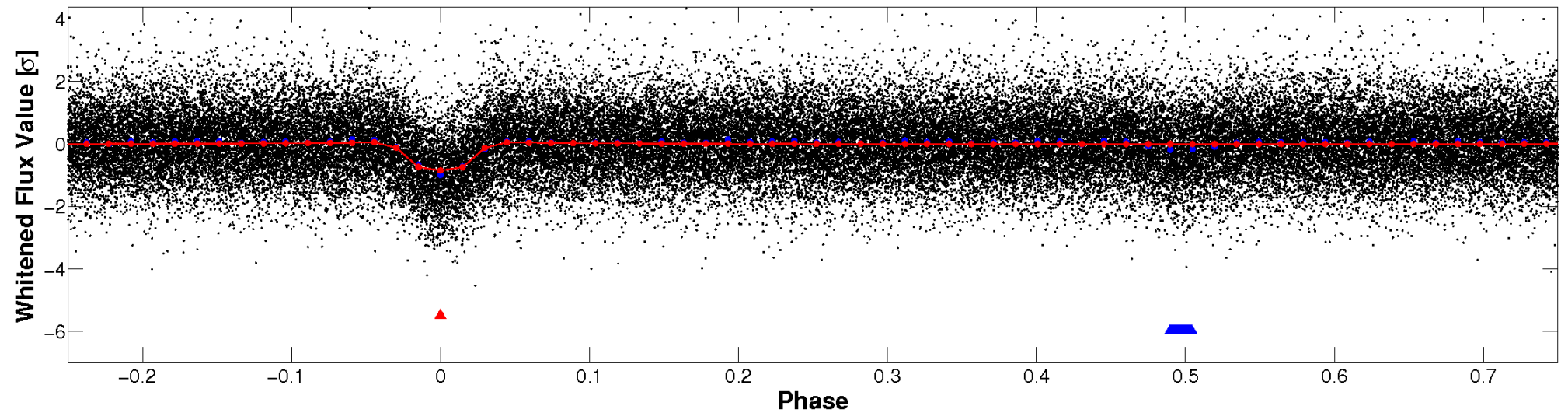


# Non-Whitened Vs. Whitened Light Curve

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

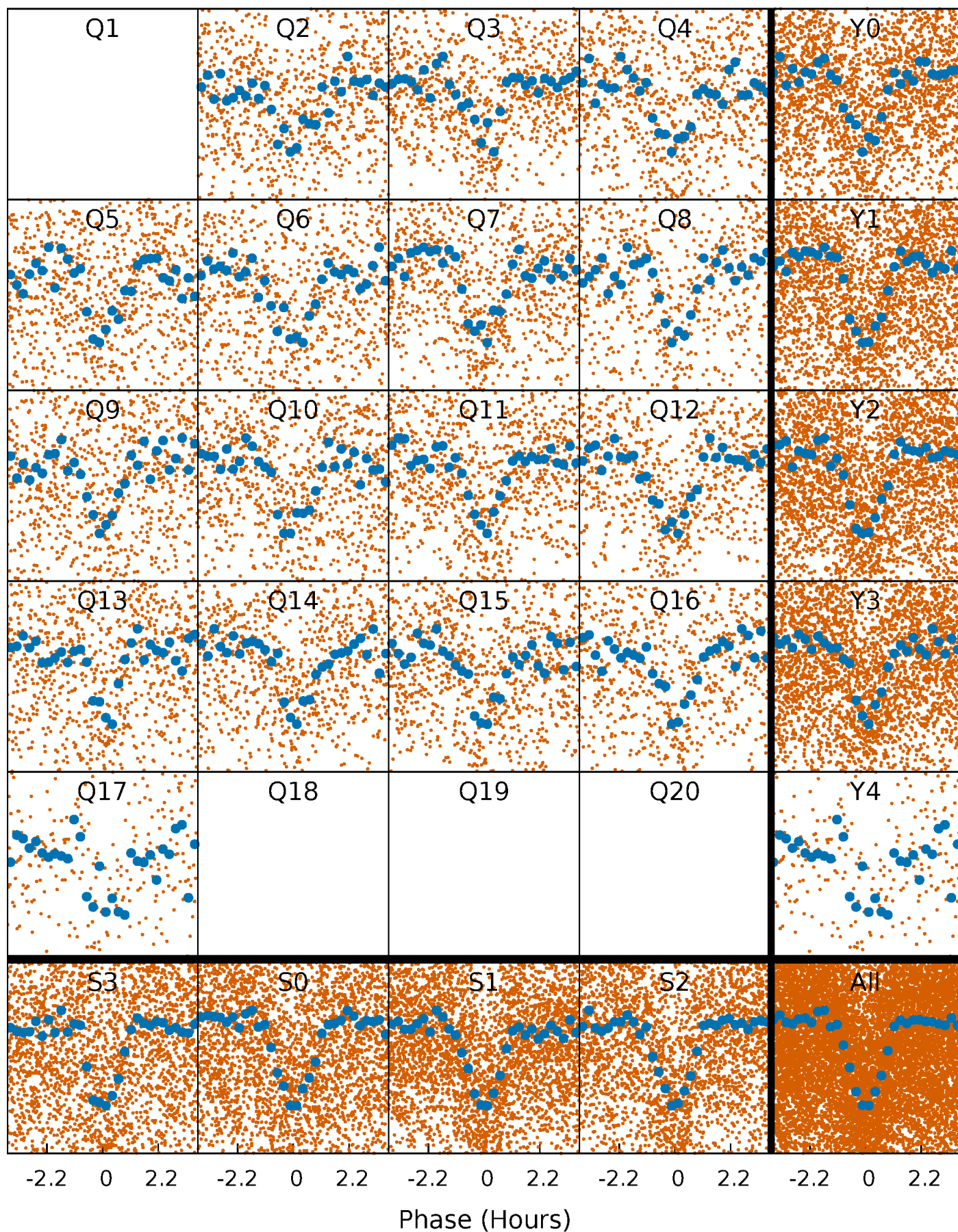


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

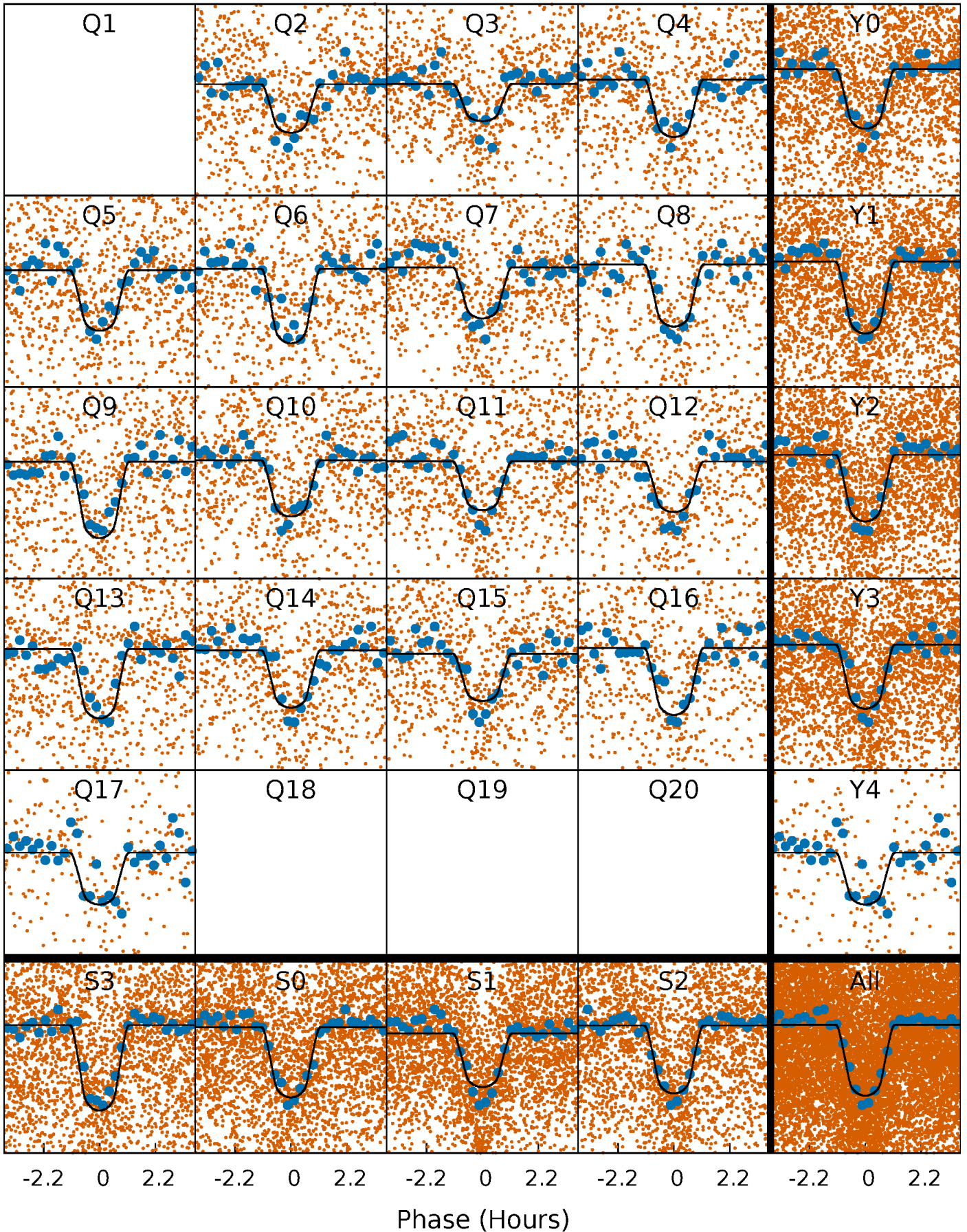
TCE 005309353-01 P= 1.376376 Days  $T_0=132.570981$  (BKJD)





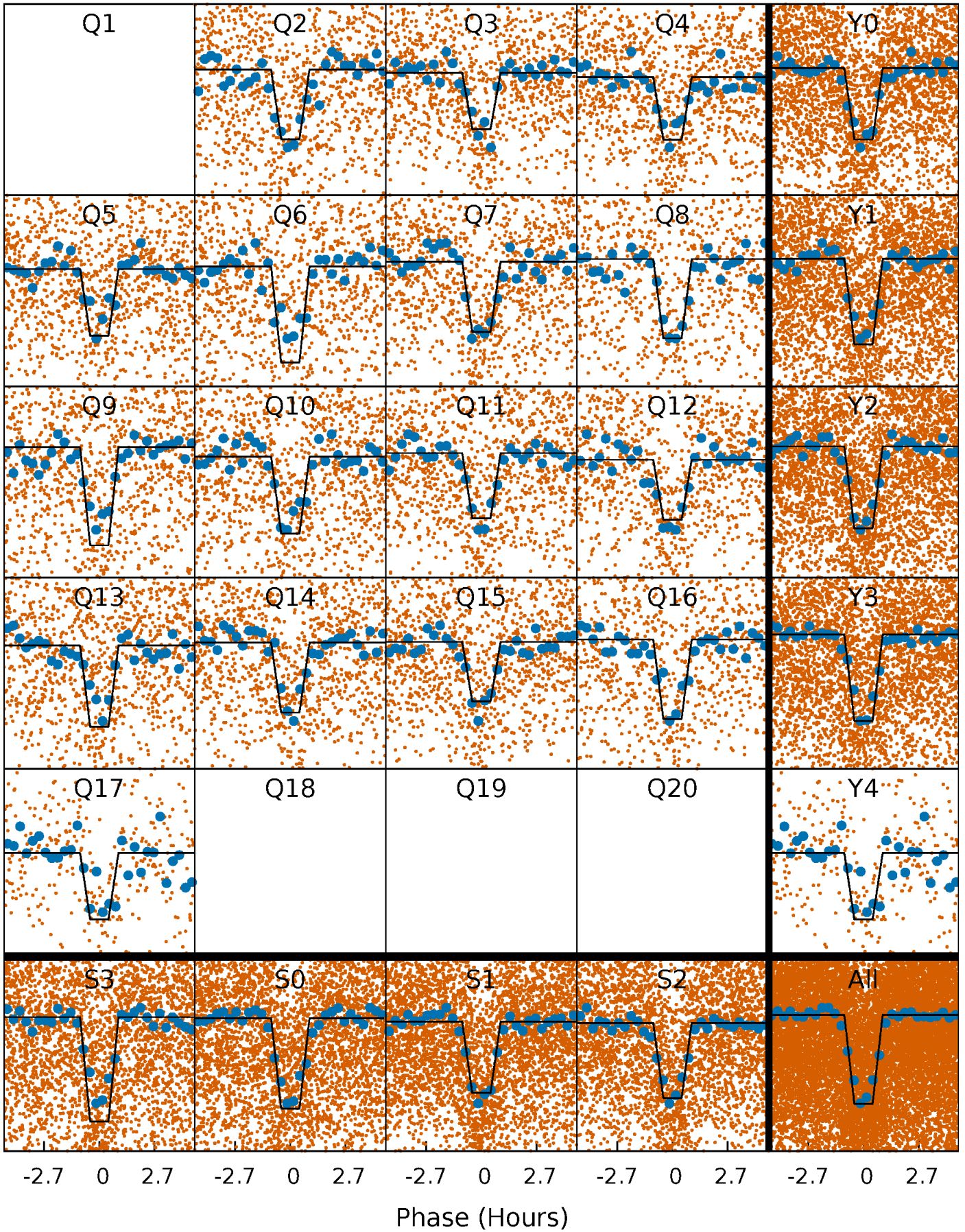
# DV Quarter-Phased Transit Curves

TCE 005309353-01 P= 1.376376 Days  $T_0=132.570981$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

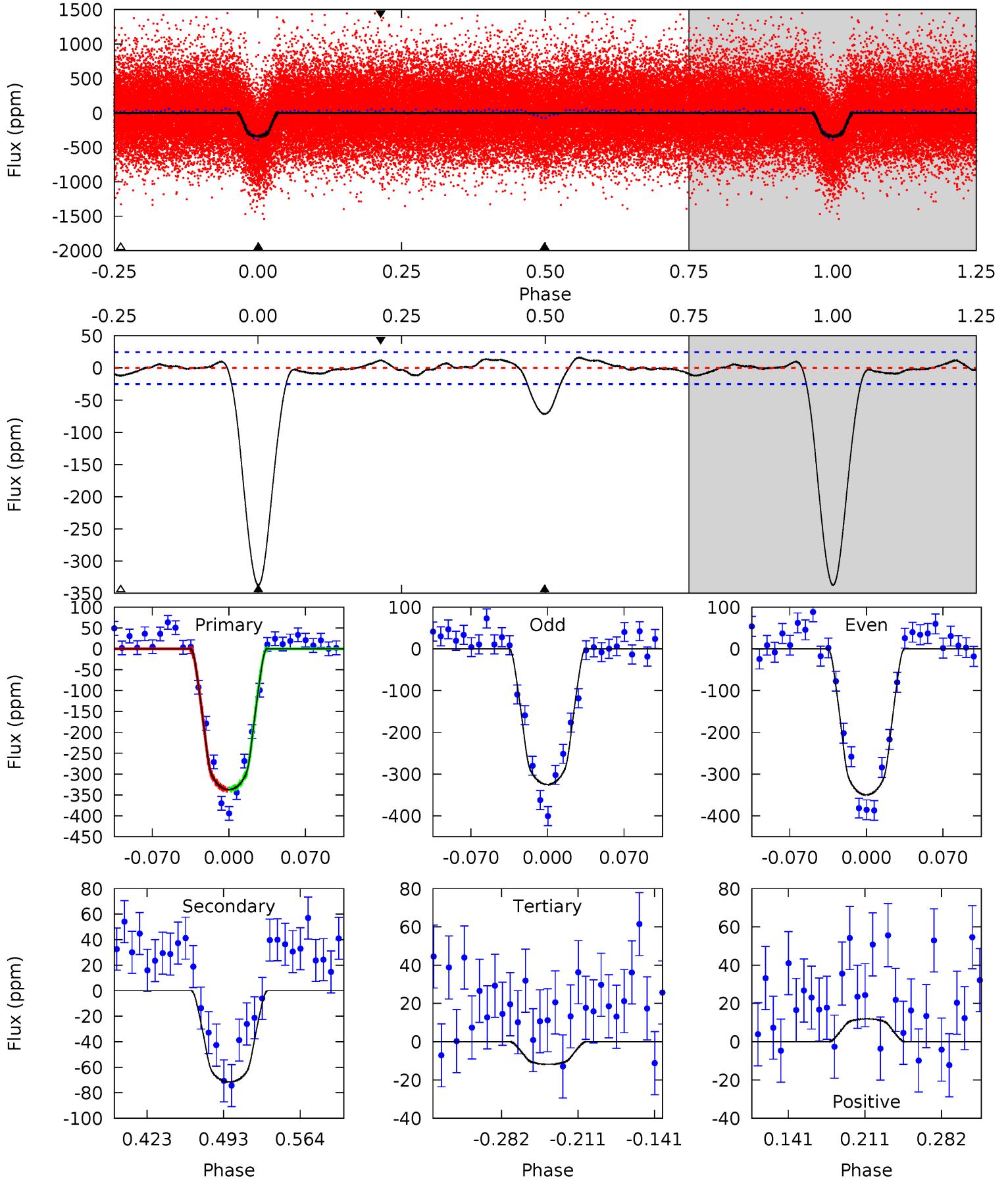
TCE 005309353-01 P= 1.376381 Days  $T_0=132.568455$  (BKJD)



# DV Model-Shift Uniqueness Test

005309353-01, P = 1.376376 Days, E = 132.570981 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
62.9	13.3	2.19	2.22	4.64	1.81	1.17	60.7	60.7	11.1	11.1	2.32	0.98	0.05	0.04

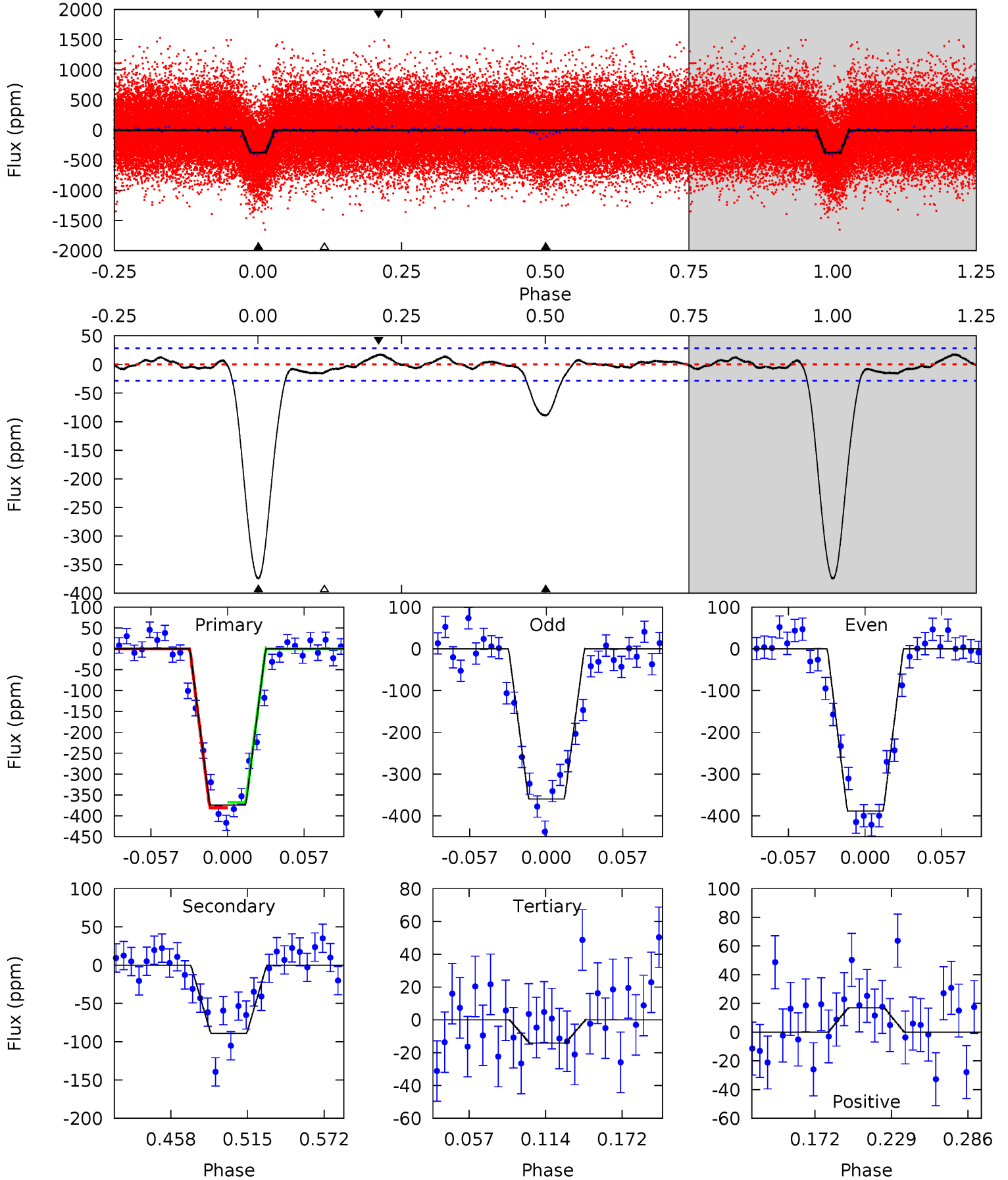




# Alt Model-Shift Uniqueness Test

005309353-01, P = 1.376381 Days, E = 132.568455 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
62.0	14.7	2.34	2.82	4.68	1.90	1.14	59.6	59.1	12.4	11.9	2.38	1.01	0.04	1.09





### Stellar Parameters For KIC 005309353

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5278^{+185}_{-185}$	$4.591^{+0.045}_{-0.091}$	$-0.260^{+0.300}_{-0.300}$	$0.746^{+0.121}_{-0.060}$	$0.791^{+0.086}_{-0.078}$	$2.687^{+0.553}_{-0.790}$
	+4%/-4%	+1%/-2%	+115%/-115%	+16%/-8%	+11%/-10%	+21%/-29%
Source	PHO54	PHO54	PHO54	DSEP		

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

### Secondary Eclipse Parameters for KIC 005309353-01 / KOI 0643.01

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-72 \pm 5$	$1.67^{+0.32}_{-0.28}$	$1897^{+87}_{-76}$	$3752^{+274}_{-225}$	$7.073^{+3.058}_{-2.073}$
Alt.	$-89 \pm 6$	$1.67^{+0.32}_{-0.31}$	$1895^{+91}_{-82}$	$3893^{+309}_{-239}$	$8.832^{+4.598}_{-2.660}$

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

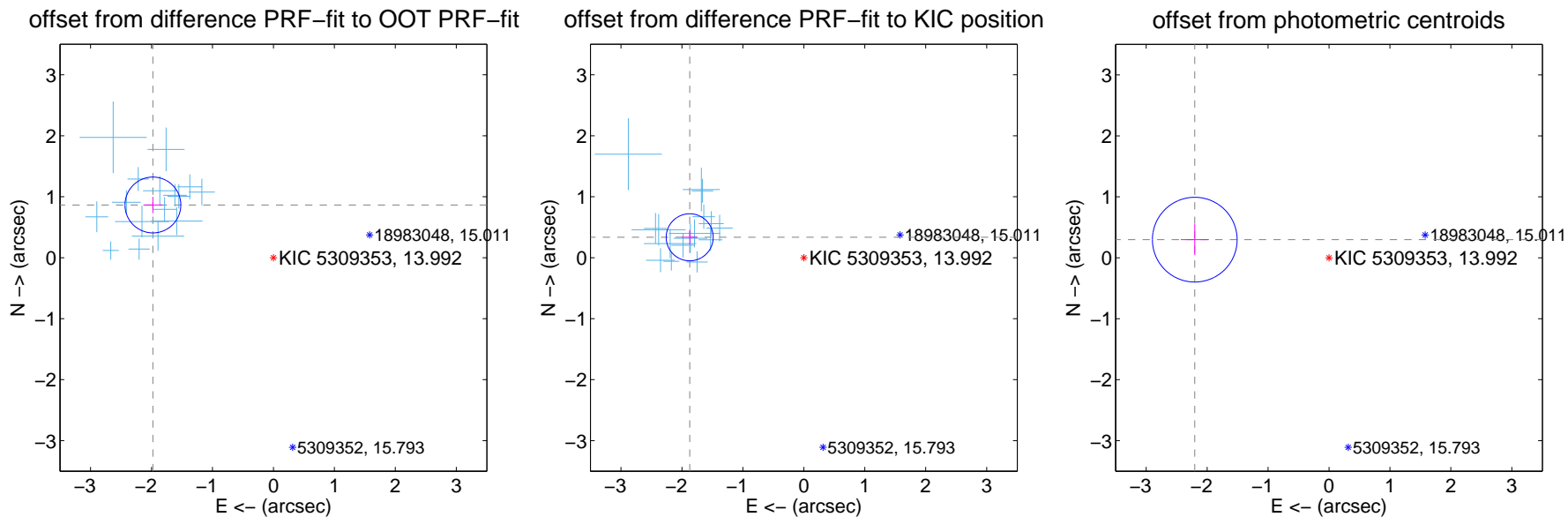
## DV Centroid Data

Supplemental centroid analysis for 005309353-01. Kepler magnitude: 13.99. Transit SNR 41.24

There are 16 quarters with good PRF difference image offsets

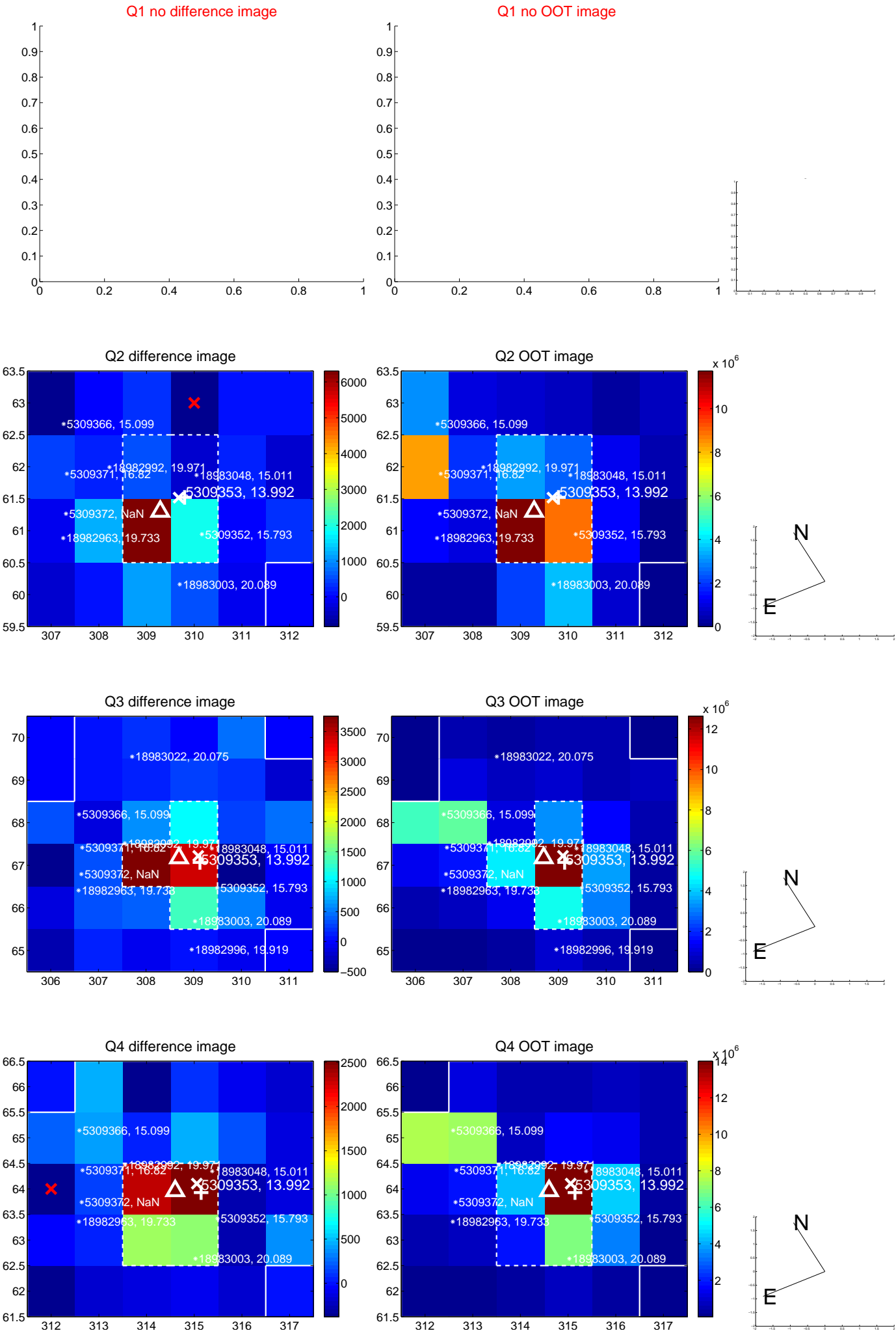
The direct PRF centroid is offset from the target star catalog position by about 0.37 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.158 \pm 0.153$	14.14	$1.978 \pm 0.156$	$0.865 \pm 0.135$
PRF-fit source offset from KIC position	$1.902 \pm 0.129$	14.79	$1.873 \pm 0.127$	$0.335 \pm 0.123$
photometric centroid source offset	$2.22 \pm 0.23$	9.59	$2.20 \pm 0.23$	$0.30 \pm 0.25$

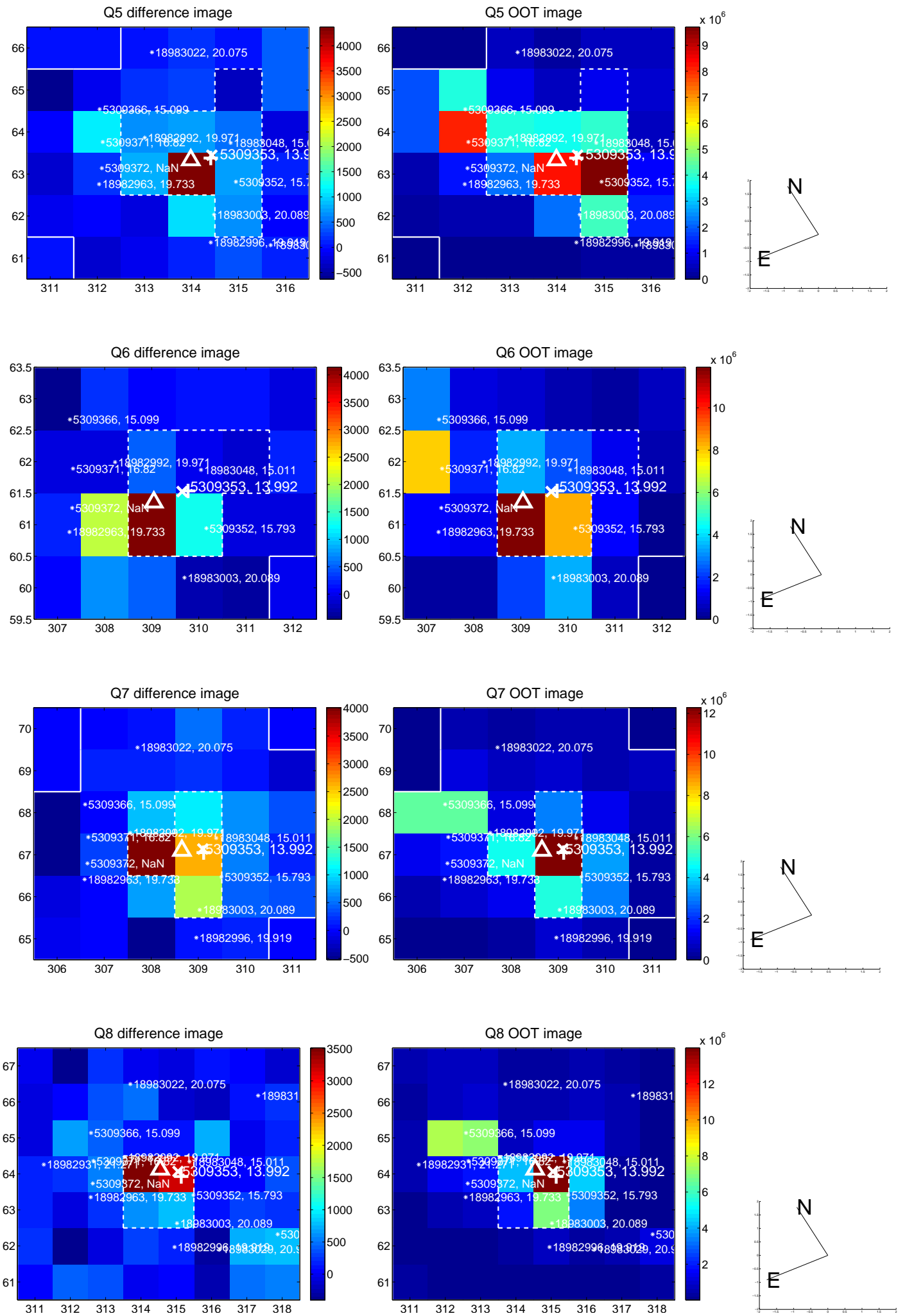


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

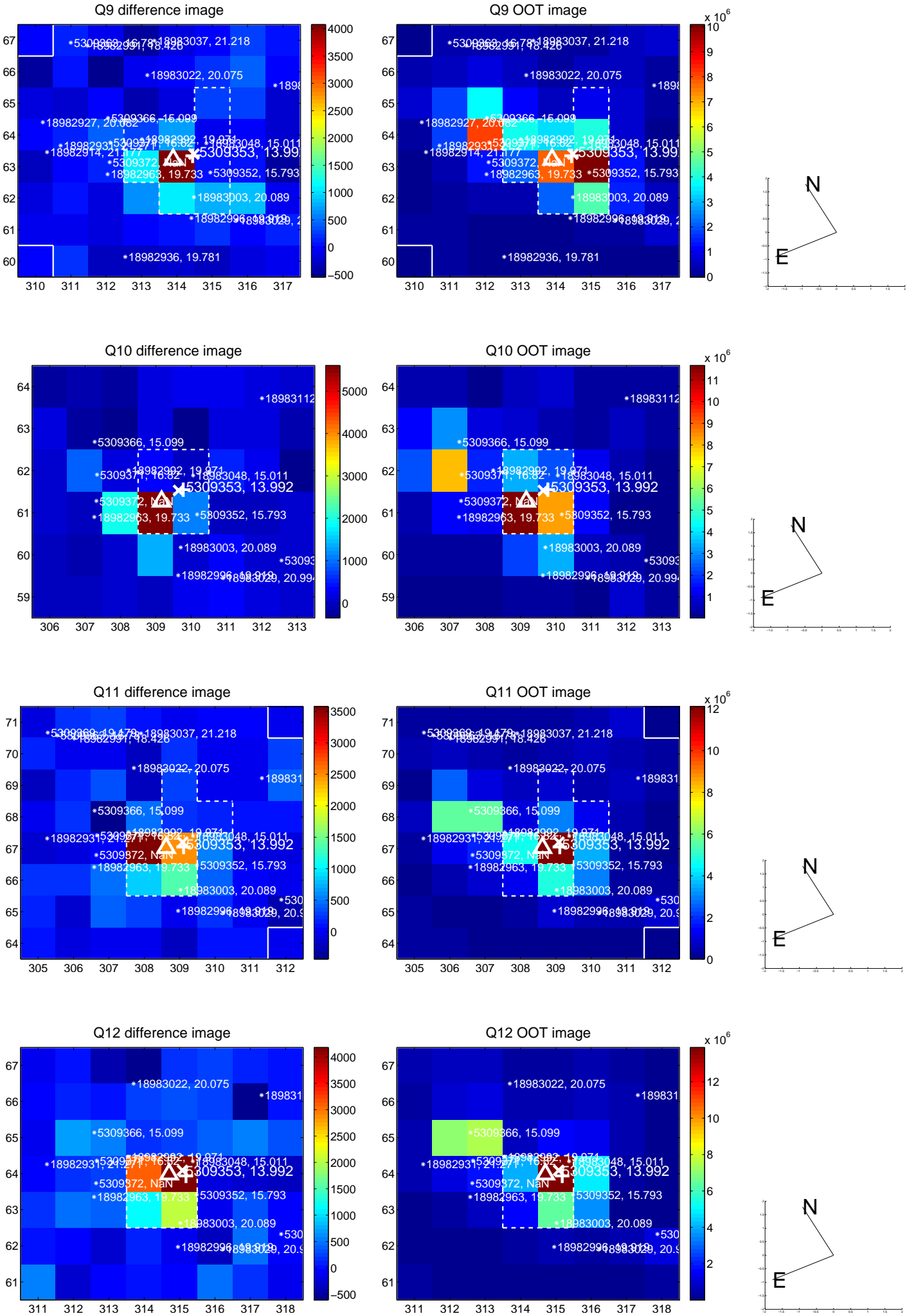


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

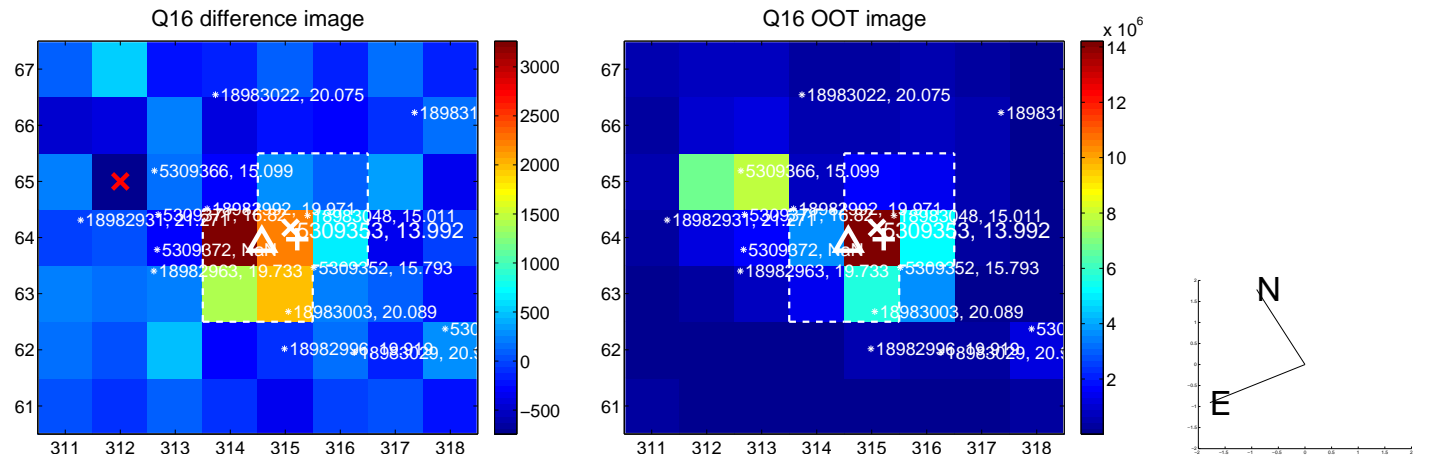
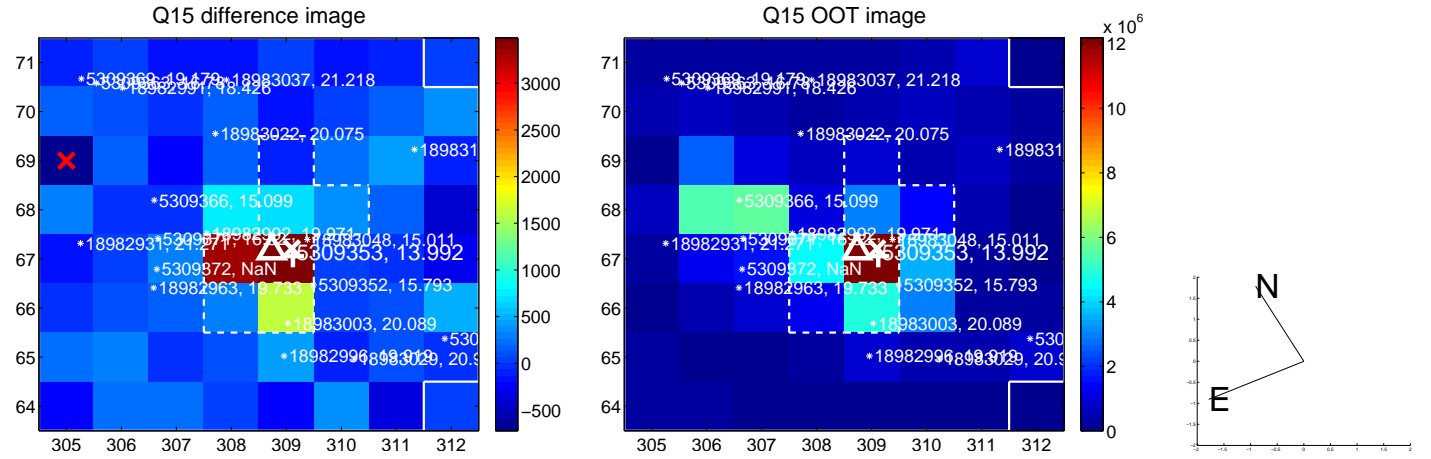
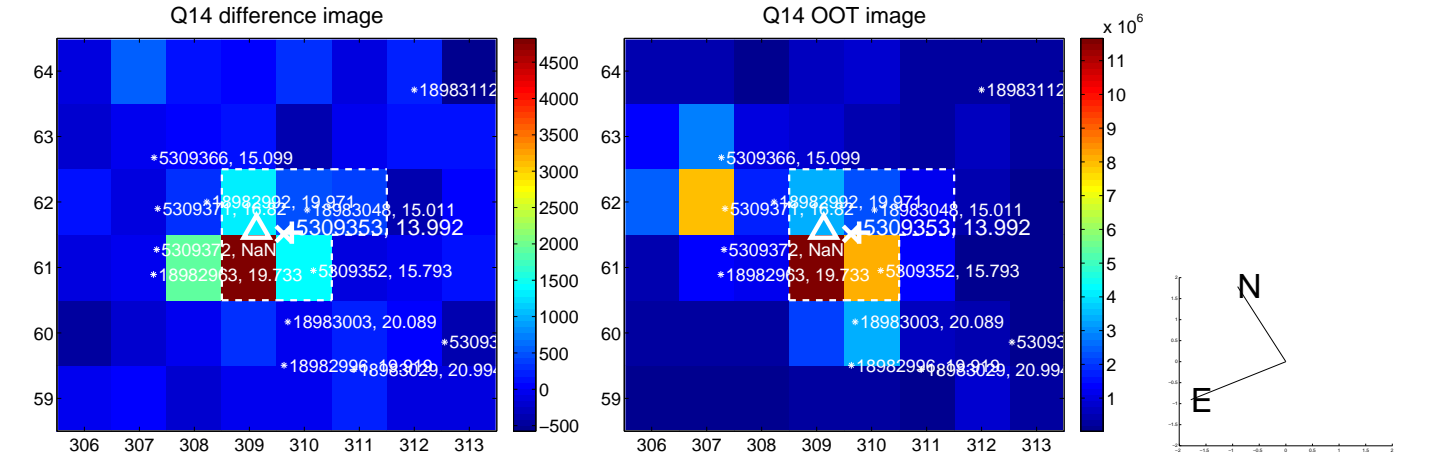
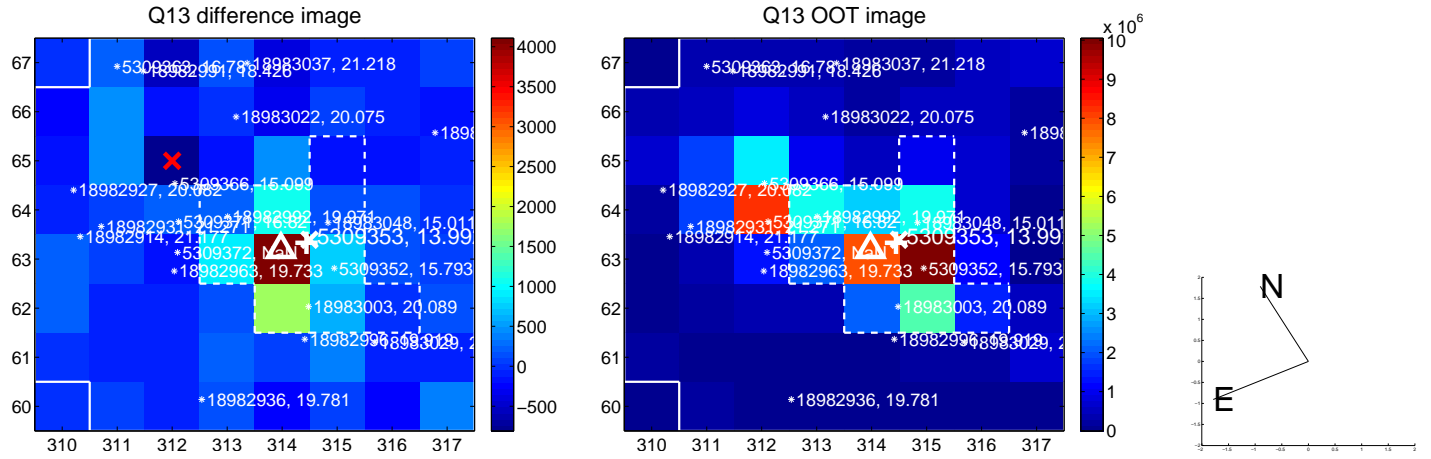




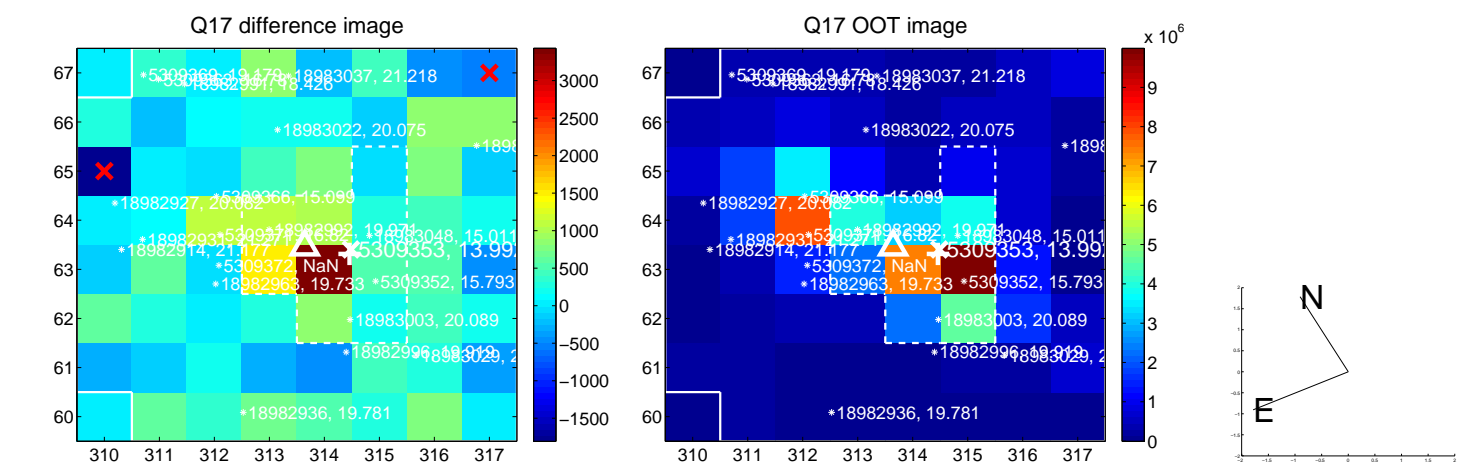
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.



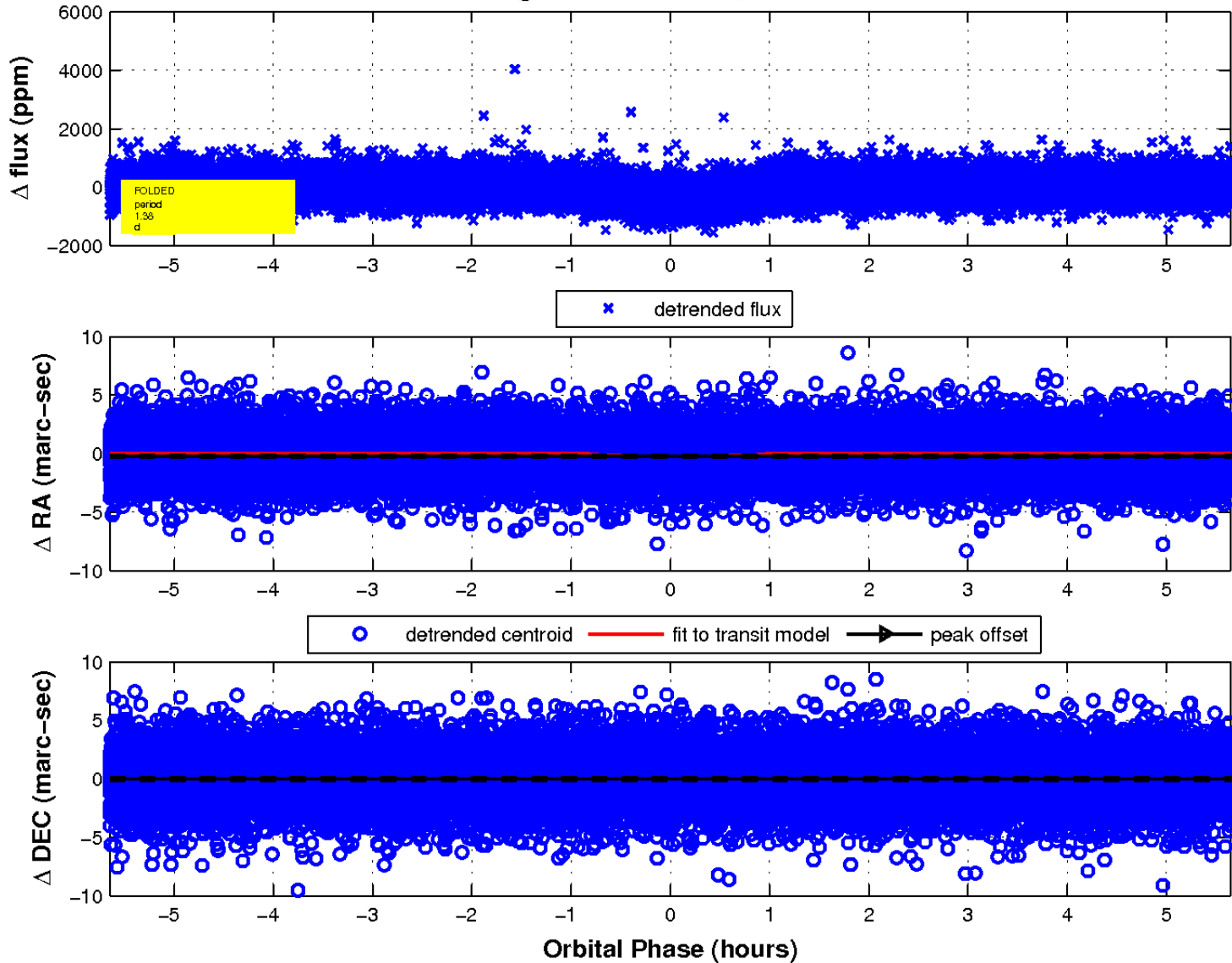
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

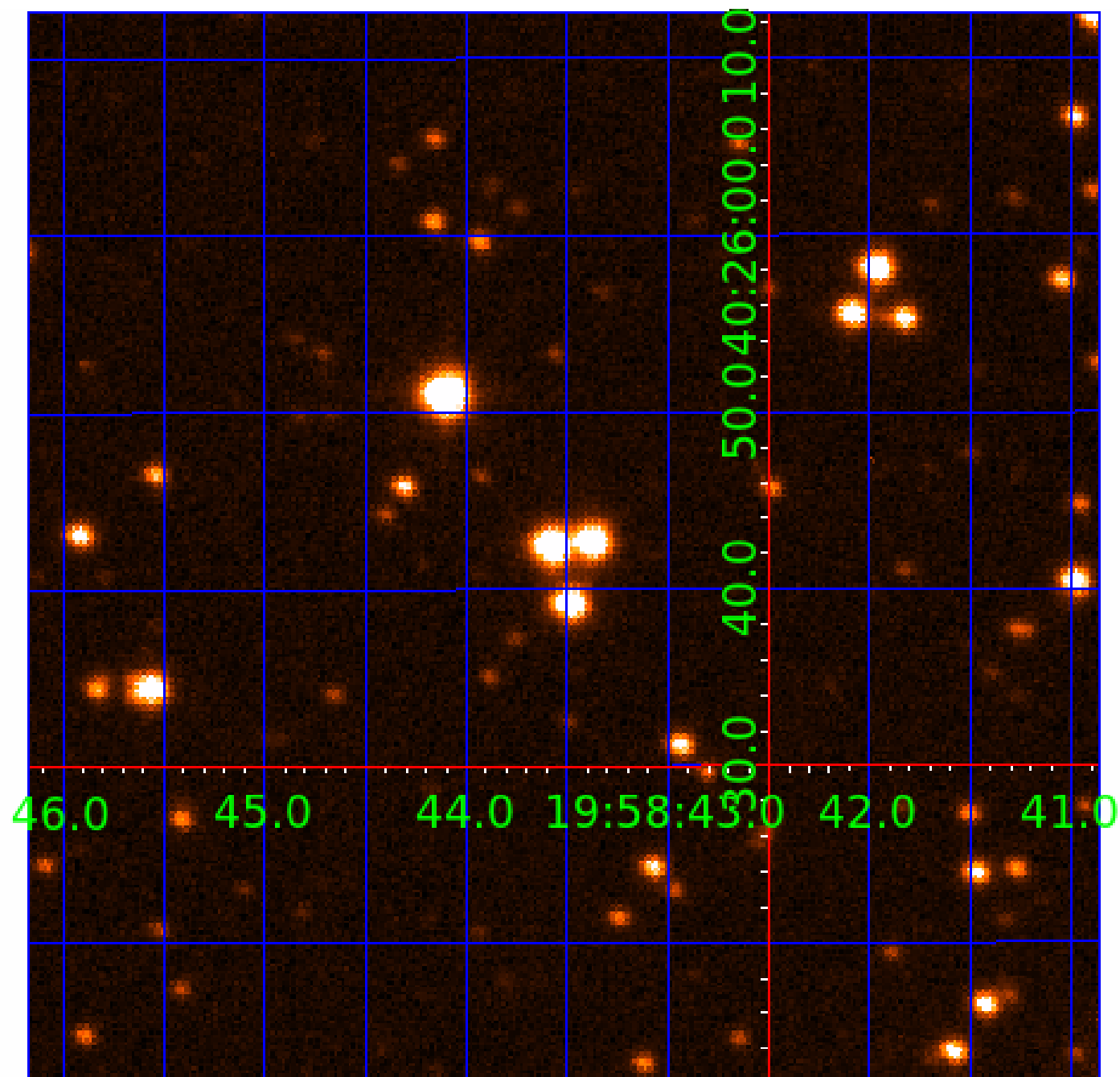


fluxWeightedCentroids, Planet 1 of 2



UKIRT Image

Declination





# KIC 005309353

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005309353-01	OBS	0643.01	1.376376	132.570981	331.9	1.883	33.1	41.2	0.75	5278	1.64	770.81
005309353-02	OBS	No	1.376357	131.888728	73.9	2.119	10.3	10.2	0.75	5278	0.77	770.83

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005309353-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE—CENT_KIC_POS
005309353-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE

**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.

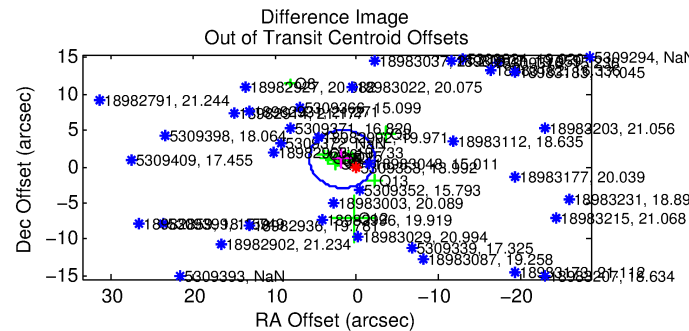
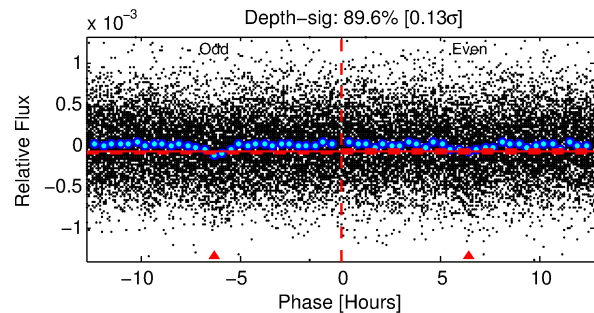
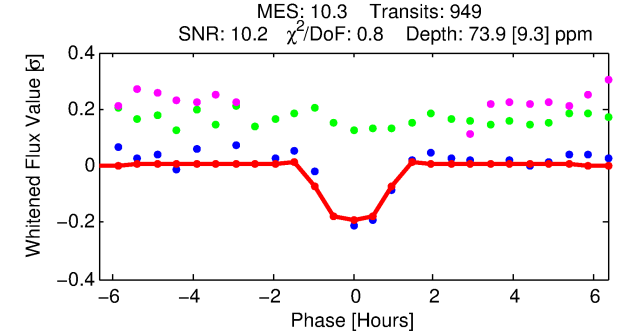
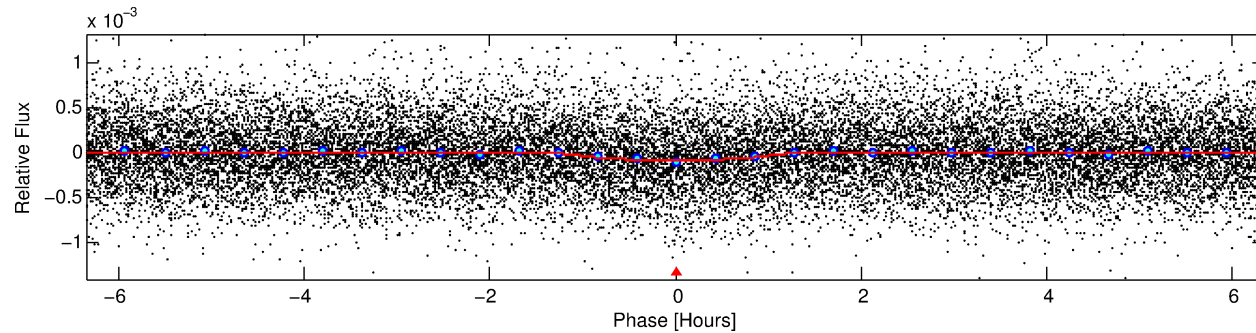
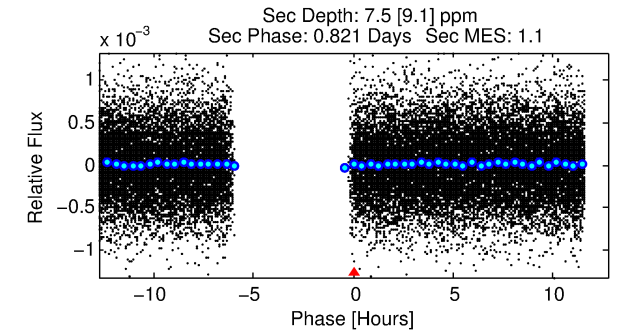
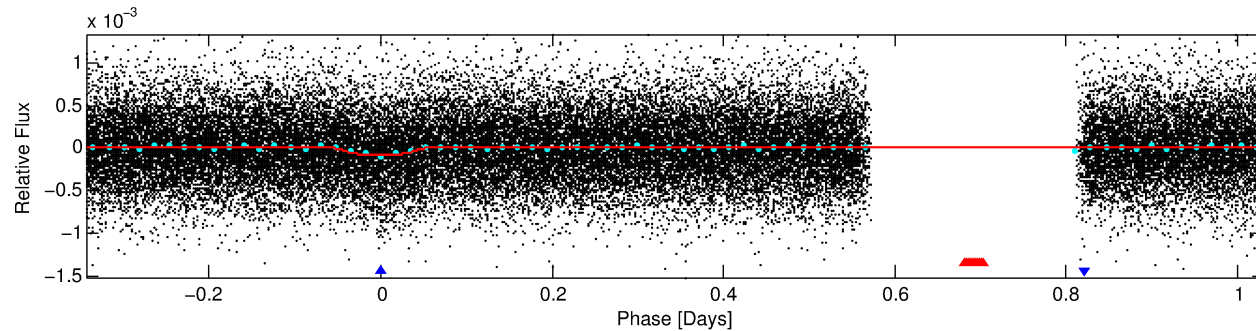
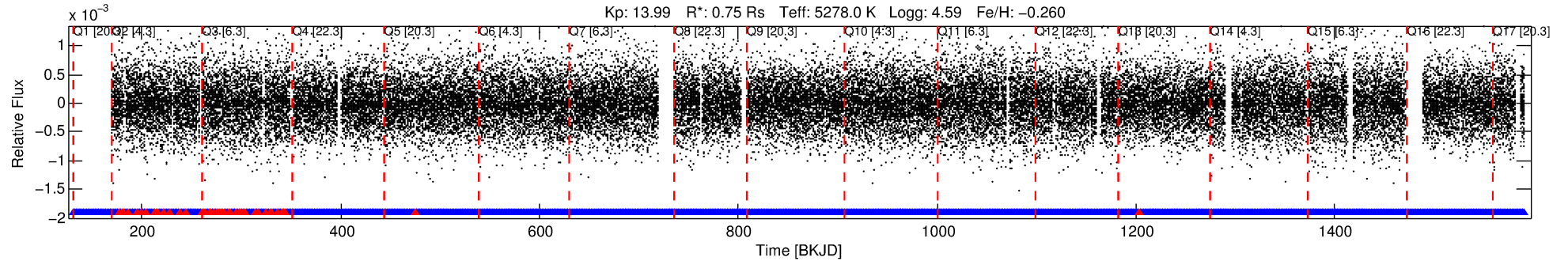
## Ephemeris Match Information For 005309353-02

No Significant Match Found

# DV One-Page Summary

KIC: 5309353 Candidate: 2 of 2 Period: 1.376 d

KOI: K00643 Corr: No Ephemeris Match



## DV Fit Results:

Period = 1.37636 [0.00001] d  
Epoch = 131.8887 [0.0029] BKJD  
Rp/R\* = 0.0095 [0.0074]  
a/R\* = 2.46 [6.93]  
b = 0.90 [0.73]  
Seff = 770.83 [173.84]  
Teq = 1344 [76] K  
Rp = 0.77 [0.61] Re  
a = 0.0224 [0.0029] AU  
Ag = 3.48 [6.87] [0.36σ]  
Teffp = 2837 [1397] K [1.07σ]

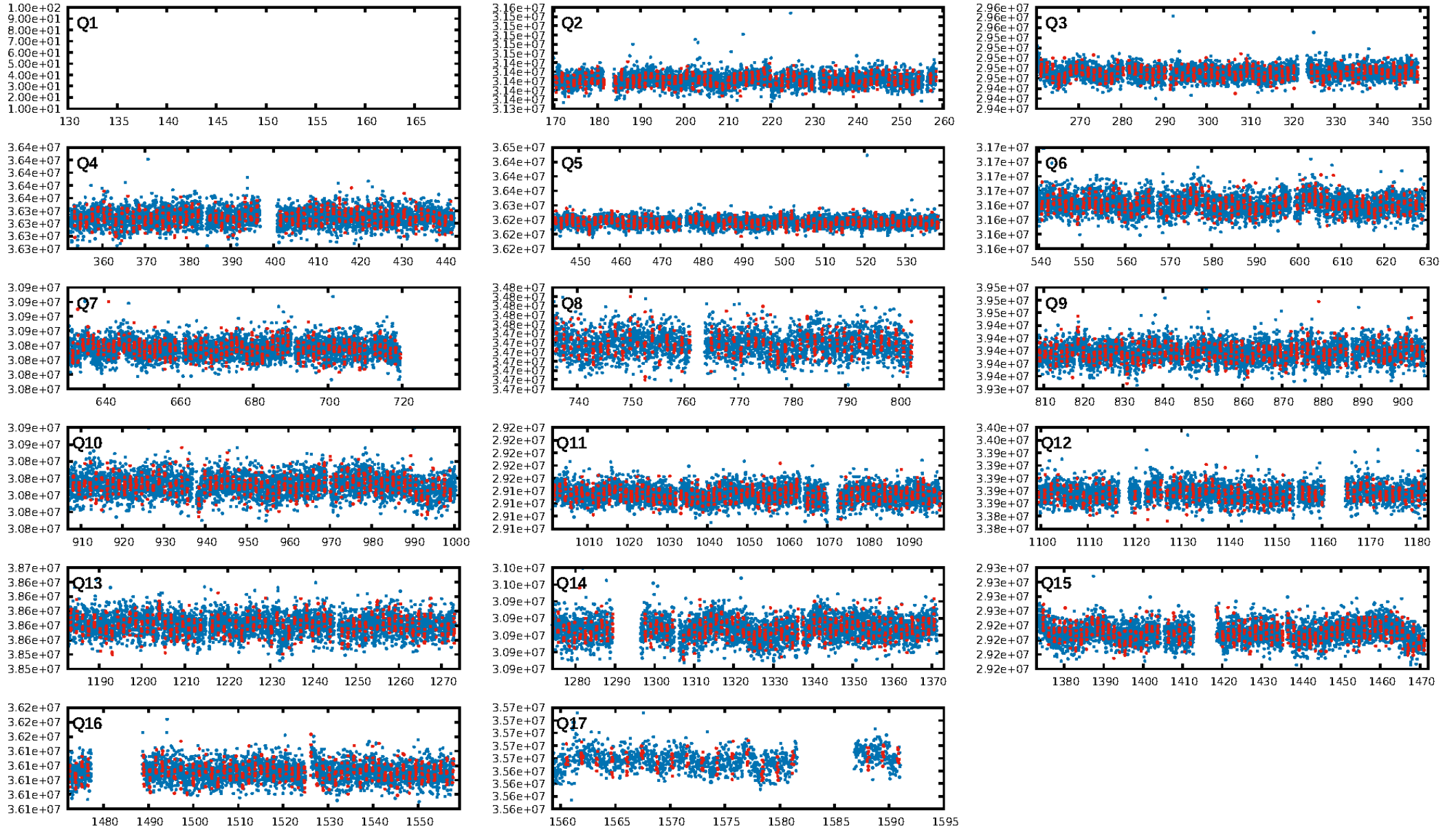
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 1.83e-25  
RollingBand-fgt: 0.95 [885/930]  
GhostDiagnostic-chr: 3.13  
Centroid-sig: 49.0%  
Centroid-so: 2.362 arcsec [2.46σ]  
OotOffset-rm: 2.110 arcsec [1.59σ]  
OotOffset-st: 2/4/4/2 [12]  
KicOffset-rm: 1.825 arcsec [1.70σ]  
KicOffset-st: 2/4/4/2 [12]  
DiffImageQuality-fgm: 0.17 [2/12]  
DiffImageOverlap-fno: 1.00 [16/16]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 16:36:42 Z

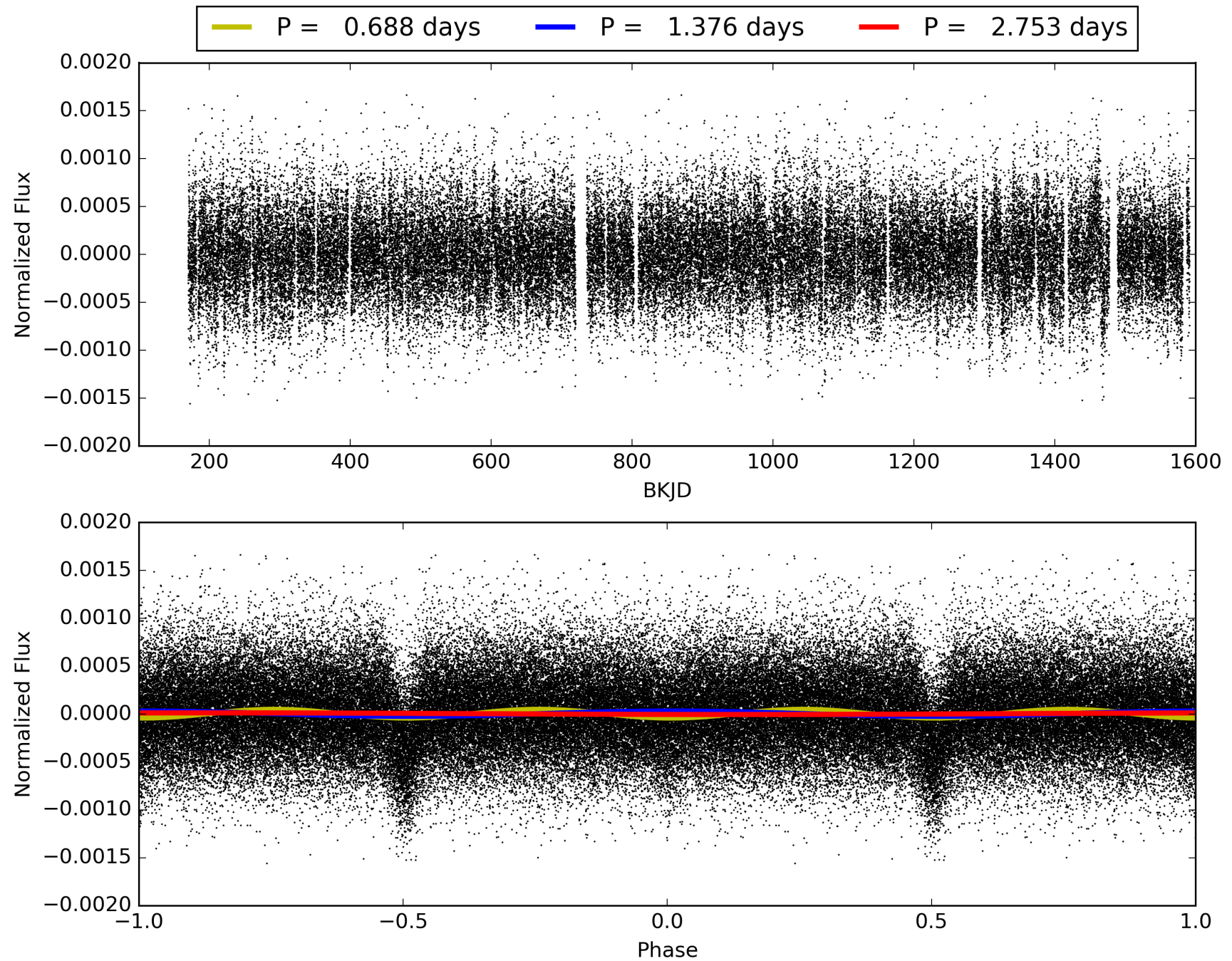
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 005309353-02, PDC Light Curves





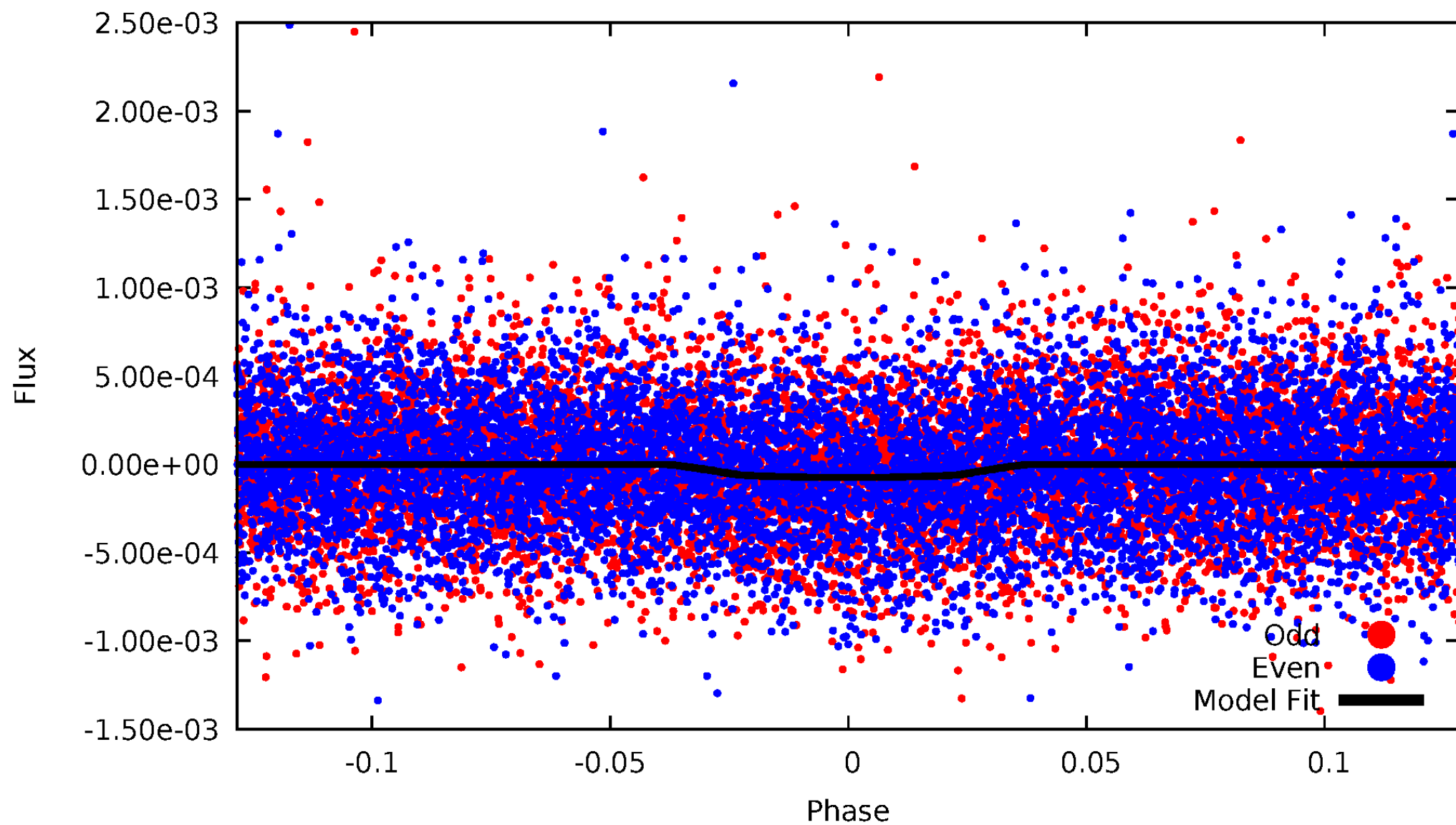
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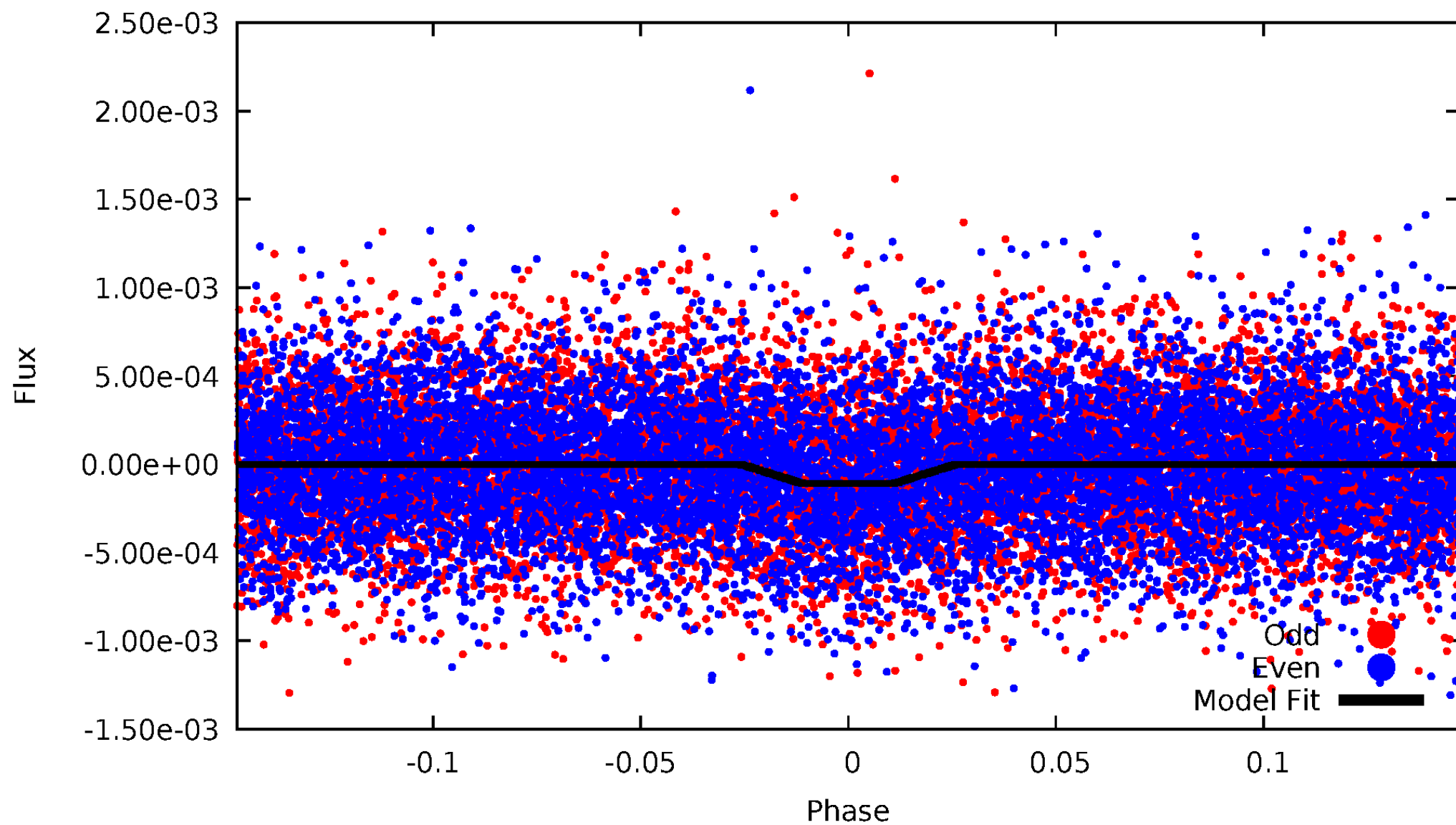
# DV Odd/Even

TCE 005309353-02



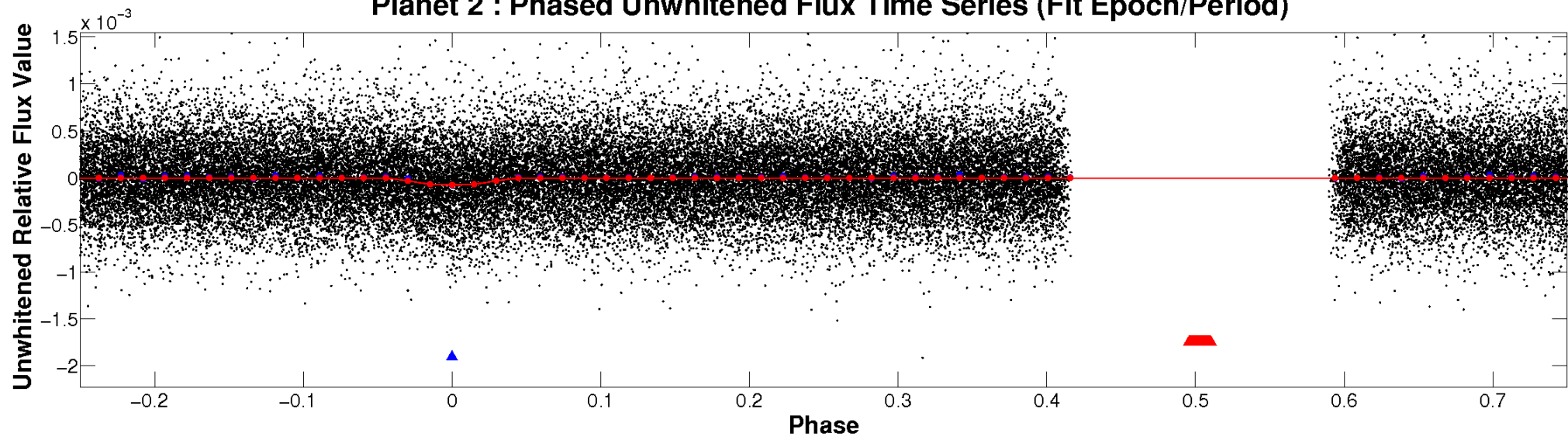
# ALT Odd/Even

TCE 005309353-02

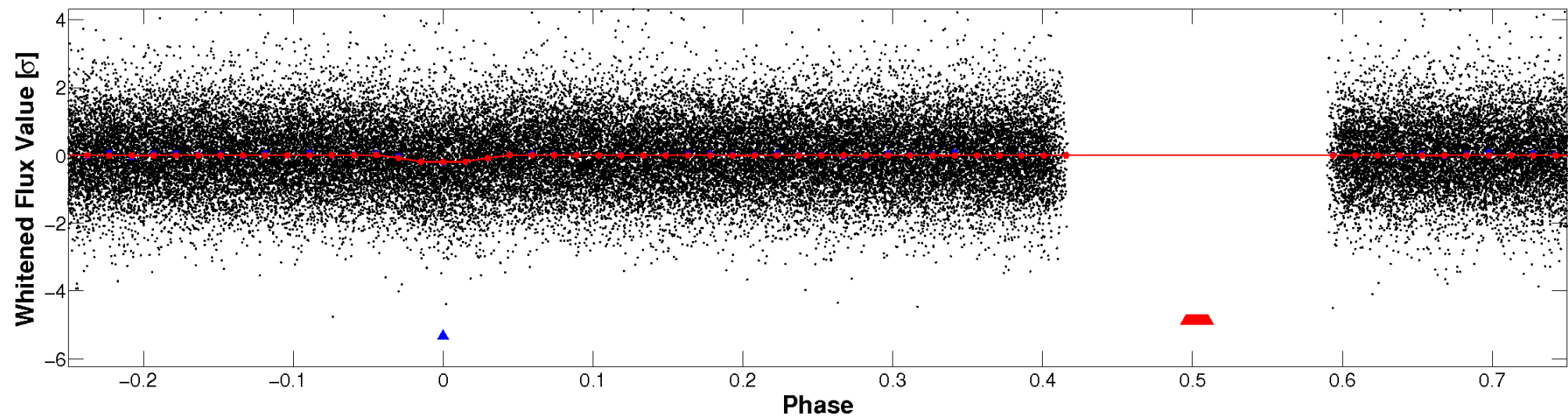


# Non-Whitened Vs. Whitened Light Curve

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

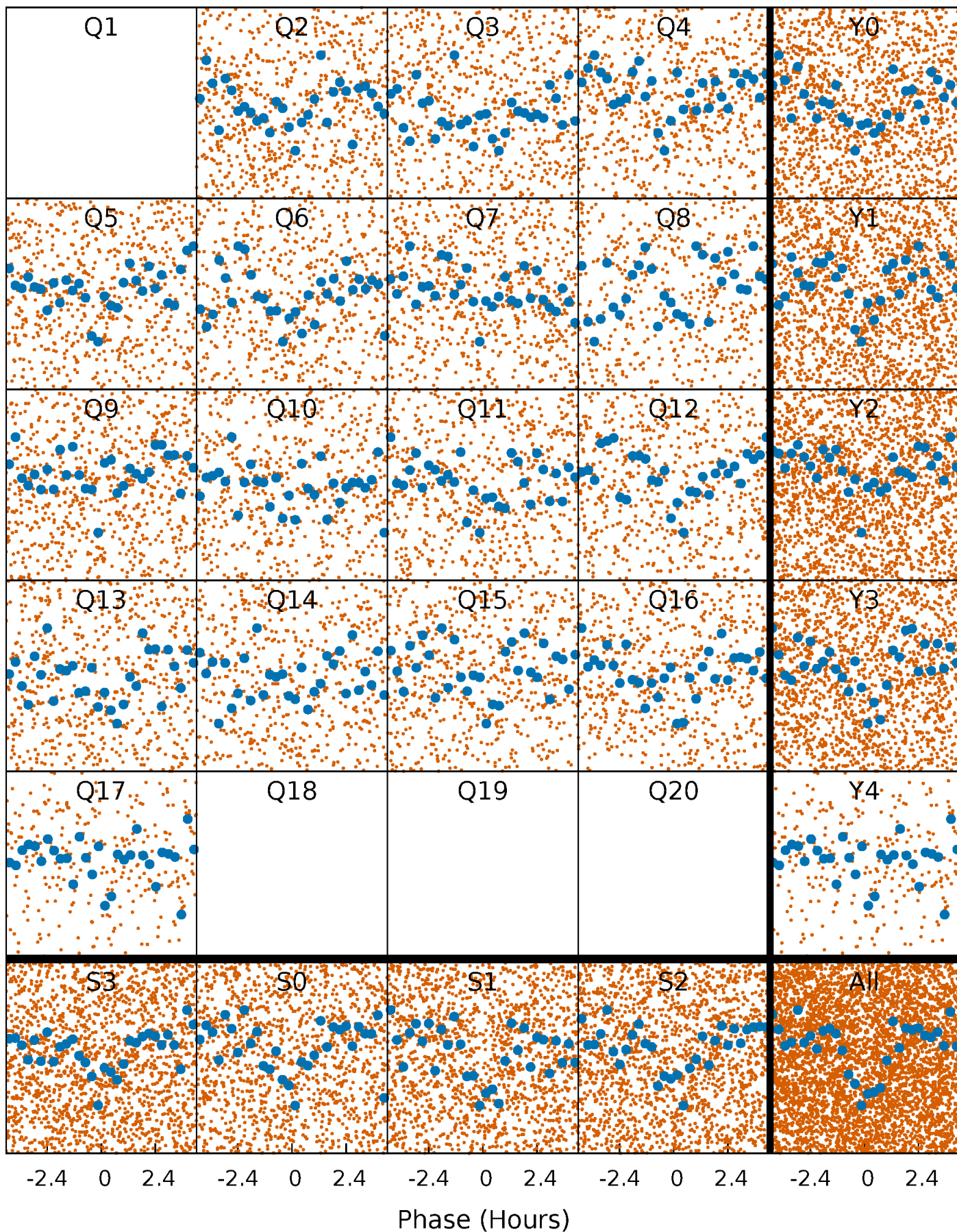


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

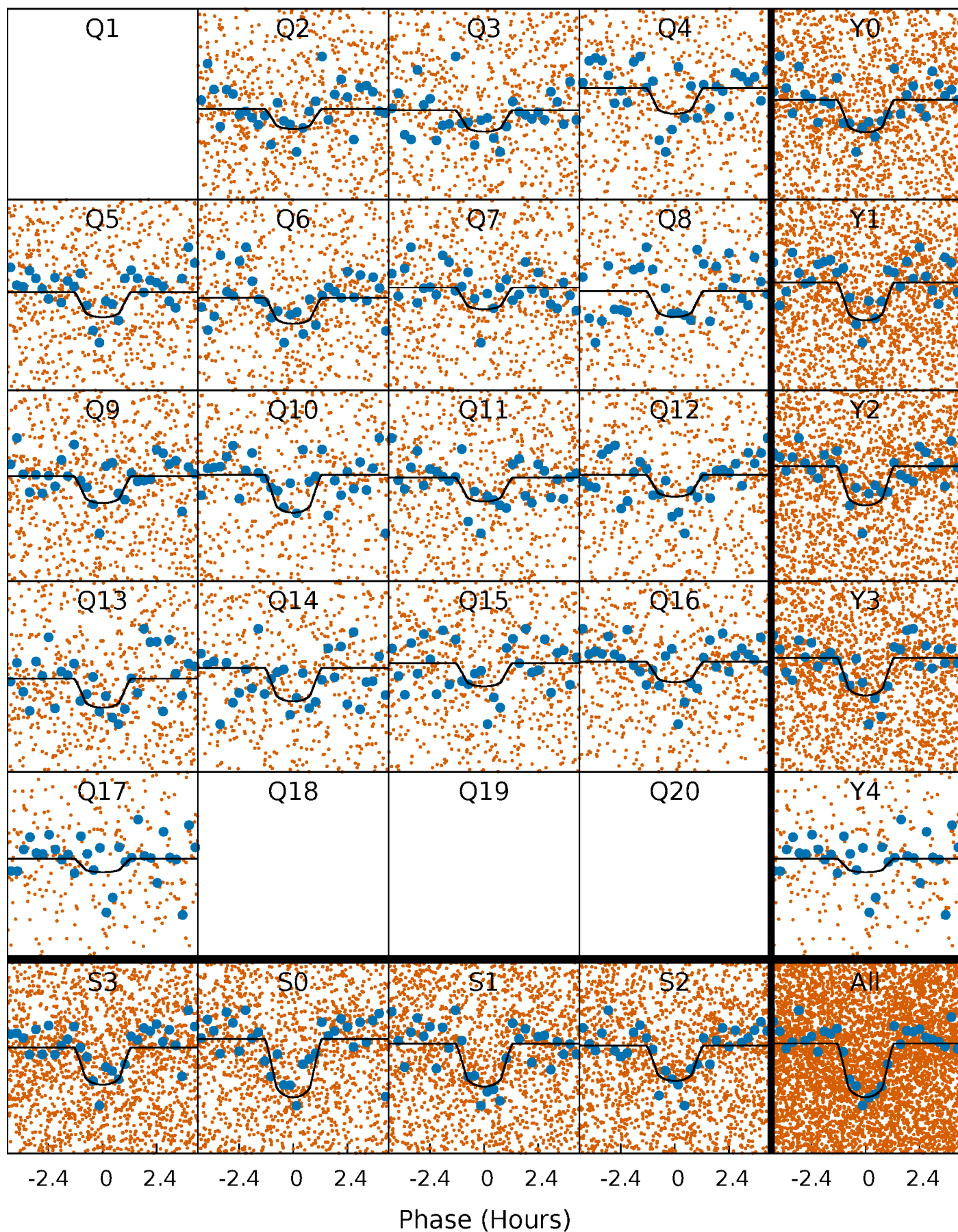
TCE 005309353-02 P= 1.376357 Days  $T_0=131.888728$  (BKJD)





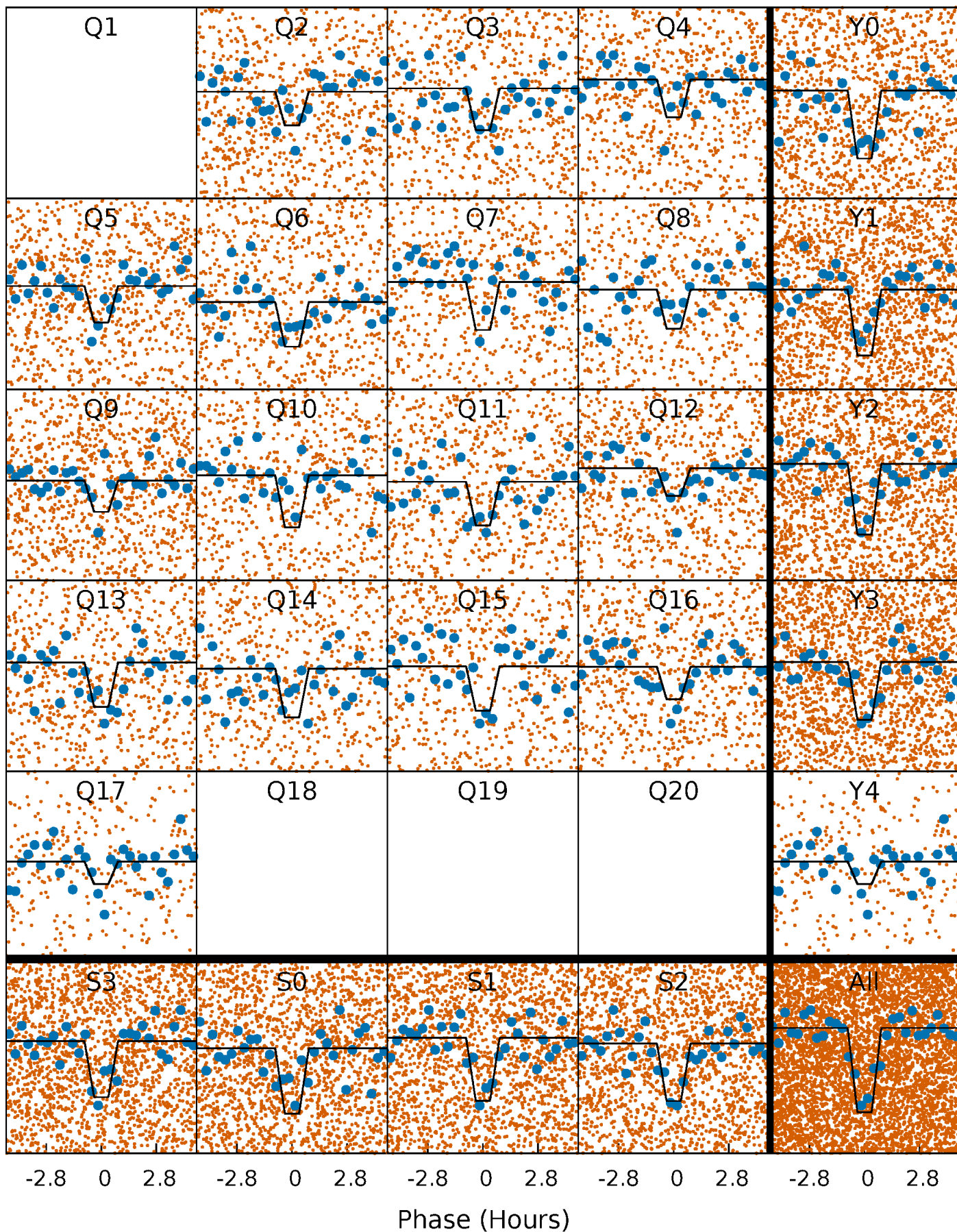
# DV Quarter-Phased Transit Curves

TCE 005309353-02   P= 1.376357 Days    $T_0=131.888728$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 005309353-02 P= 1.376371 Days  $T_0=131.882610$  (BKJD)

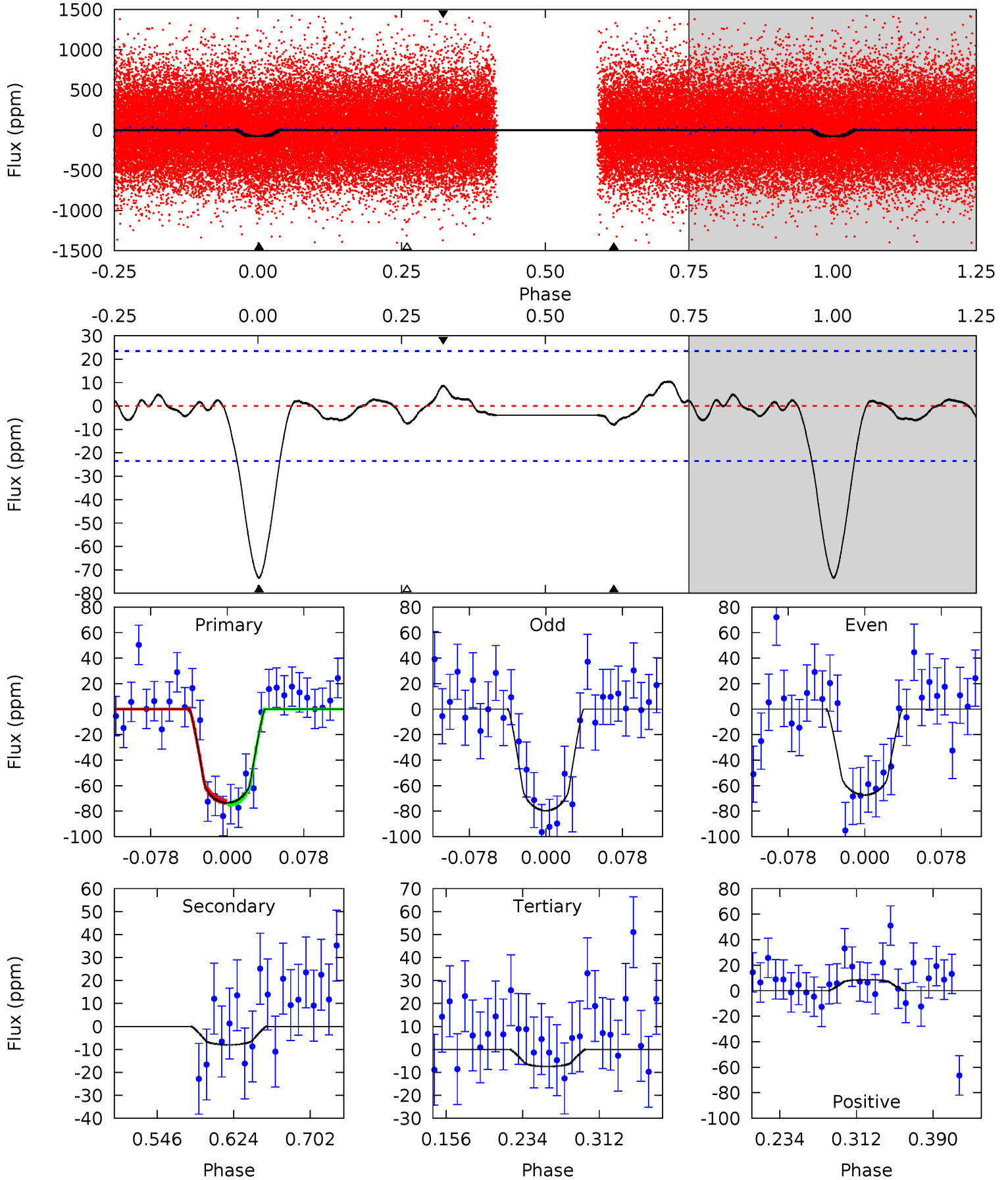




# DV Model-Shift Uniqueness Test

005309353-02, P = 1.376357 Days, E = 131.888728 Days

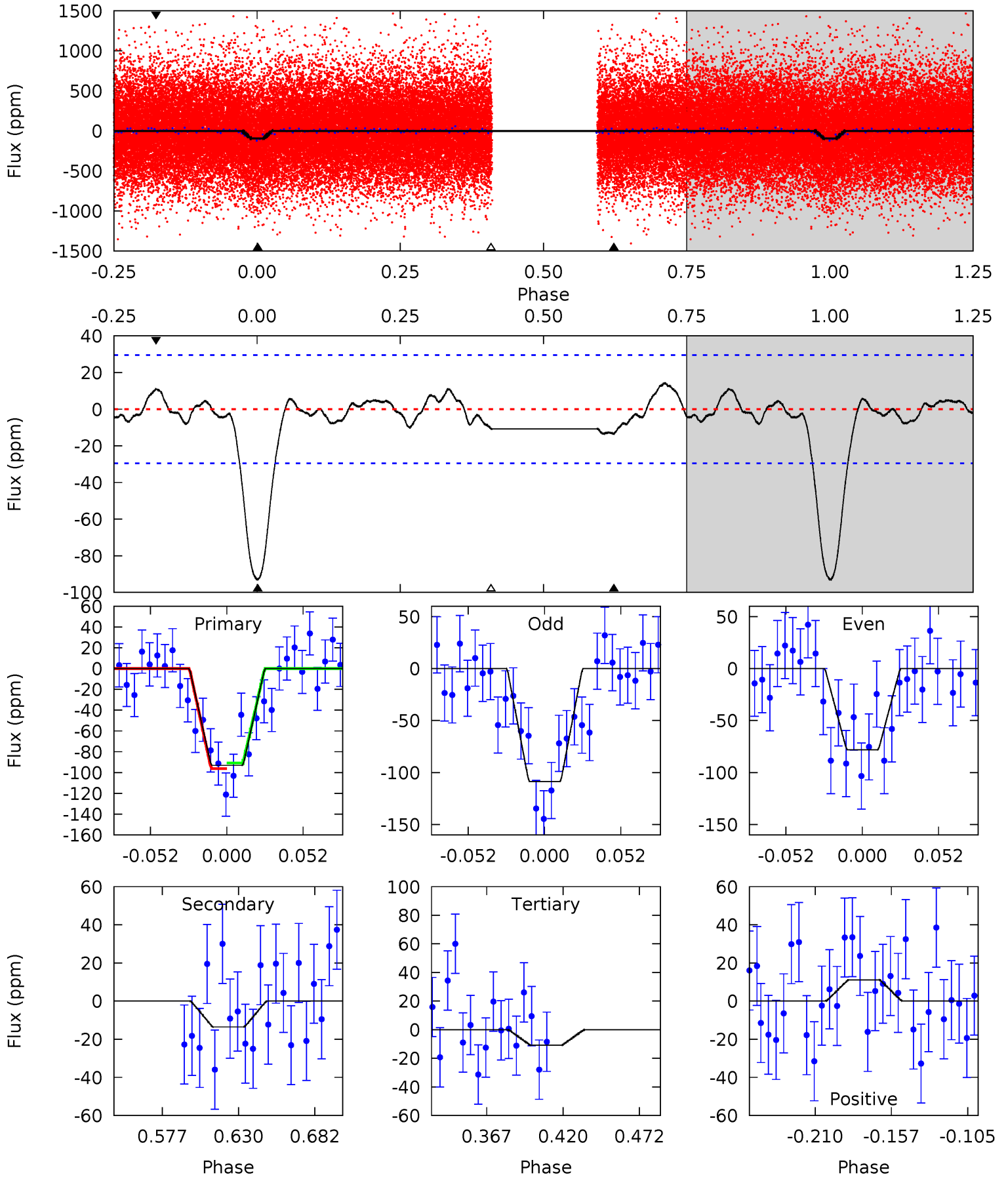
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
14.4	1.58	1.47	1.70	4.62	1.76	0.81	13.0	12.7	0.11	-0.12	1.21	0.98	0.12	0.21



# Alt Model-Shift Uniqueness Test

005309353-02, P = 1.376371 Days, E = 131.882610 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
14.8	2.15	1.72	1.76	4.70	1.94	0.91	13.1	13.0	0.43	0.39	2.43	0.86	0.13	0.43



### Stellar Parameters For KIC 005309353

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5278^{+185}_{-185}$	$4.591^{+0.045}_{-0.091}$	$-0.260^{+0.300}_{-0.300}$	$0.746^{+0.121}_{-0.060}$	$0.791^{+0.086}_{-0.078}$	$2.687^{+0.553}_{-0.790}$
	+4%/-4%	+1%/-2%	+115%/-115%	+16%/-8%	+11%/-10%	+21%/-29%
Source	PHO54	PHO54	PHO54	DSEP		

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

### Secondary Eclipse Parameters for KIC 005309353-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-8 \pm 5$	$0.86^{+0.62}_{-0.52}$	$1893^{+91}_{-74}$	$3170^{+1380}_{-844}$	$2.710^{+16.167}_{-2.186}$
Alt.	$-14 \pm 6$	$0.91^{+0.57}_{-0.49}$	$1895^{+87}_{-80}$	$3439^{+1188}_{-601}$	$4.295^{+15.713}_{-2.982}$

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

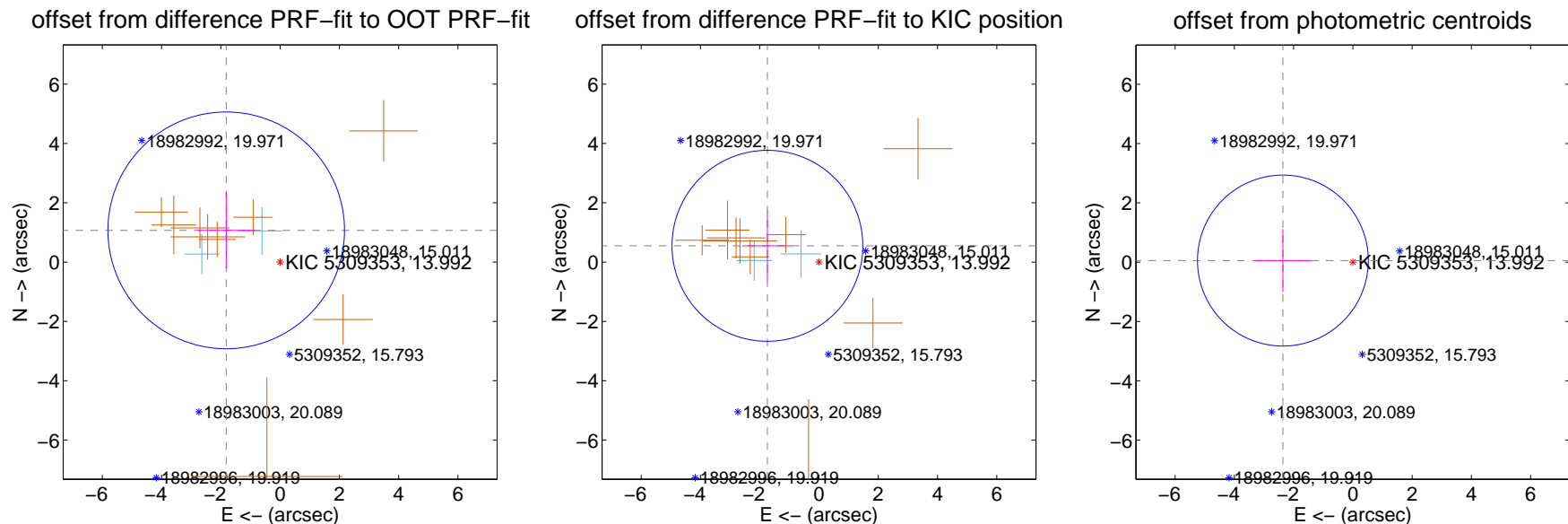
## DV Centroid Data

Supplemental centroid analysis for 005309353-02. Kepler magnitude: 13.99. Transit SNR 10.23

There are 2 quarters with good PRF difference image offsets

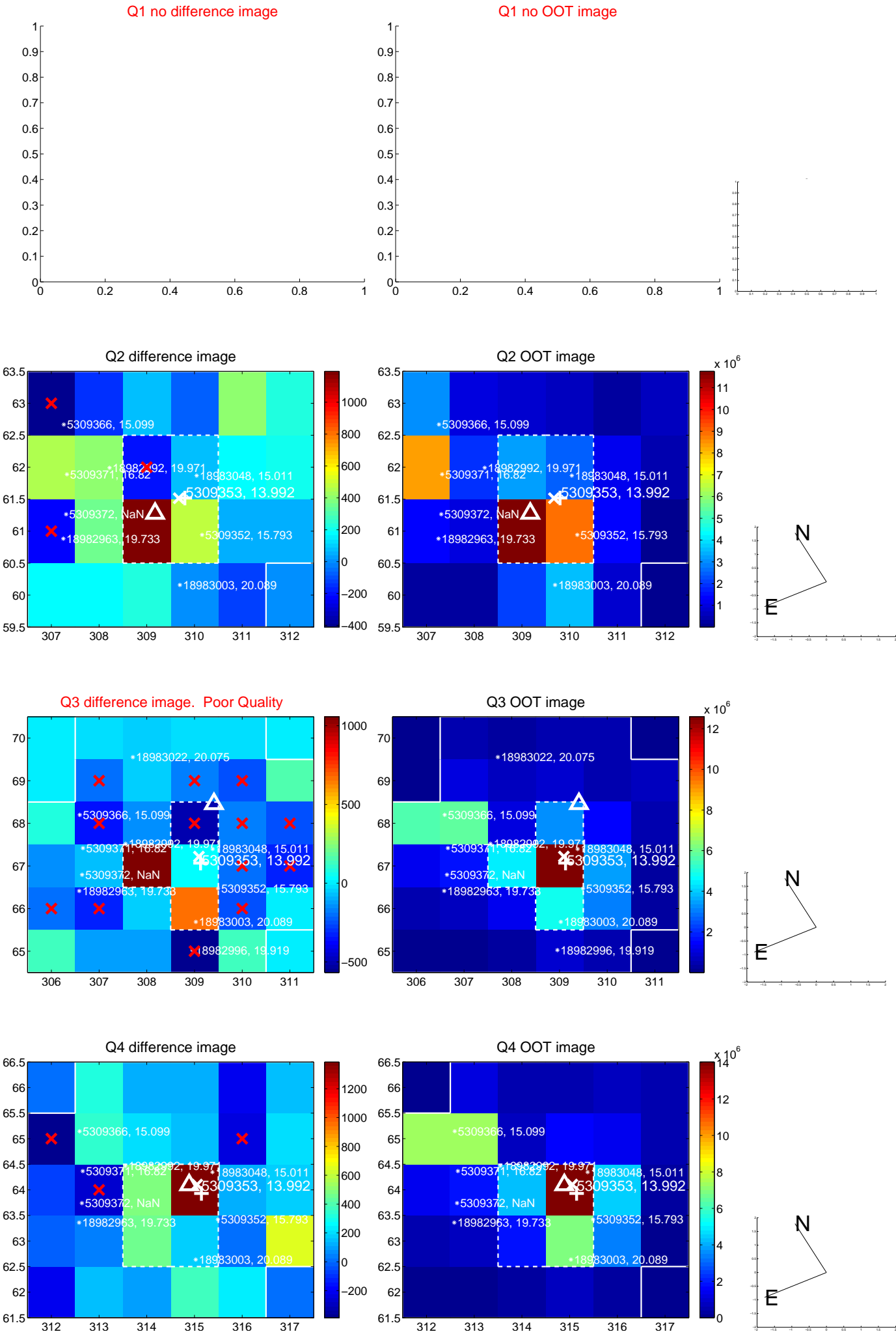
The direct PRF centroid is offset from the target star catalog position by about 0.95 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.110 \pm 1.330$	1.59	$1.819 \pm 0.964$	$1.070 \pm 1.281$
PRF-fit source offset from KIC position	$1.825 \pm 1.073$	1.70	$1.740 \pm 0.857$	$0.549 \pm 1.163$
photometric centroid source offset	$2.36 \pm 0.96$	2.46	$2.36 \pm 0.96$	$0.05 \pm 1.06$

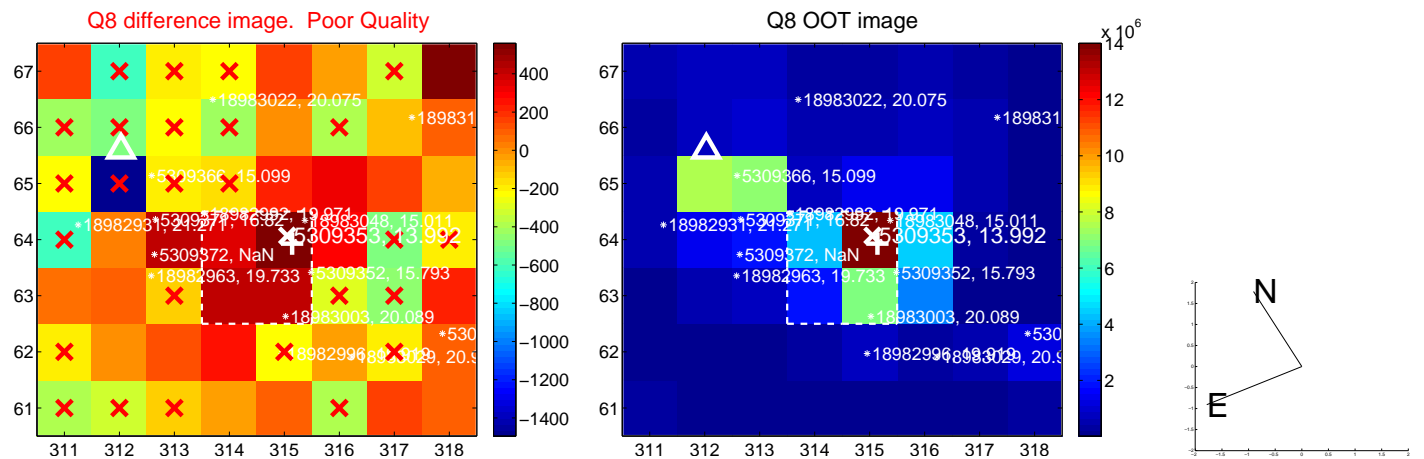
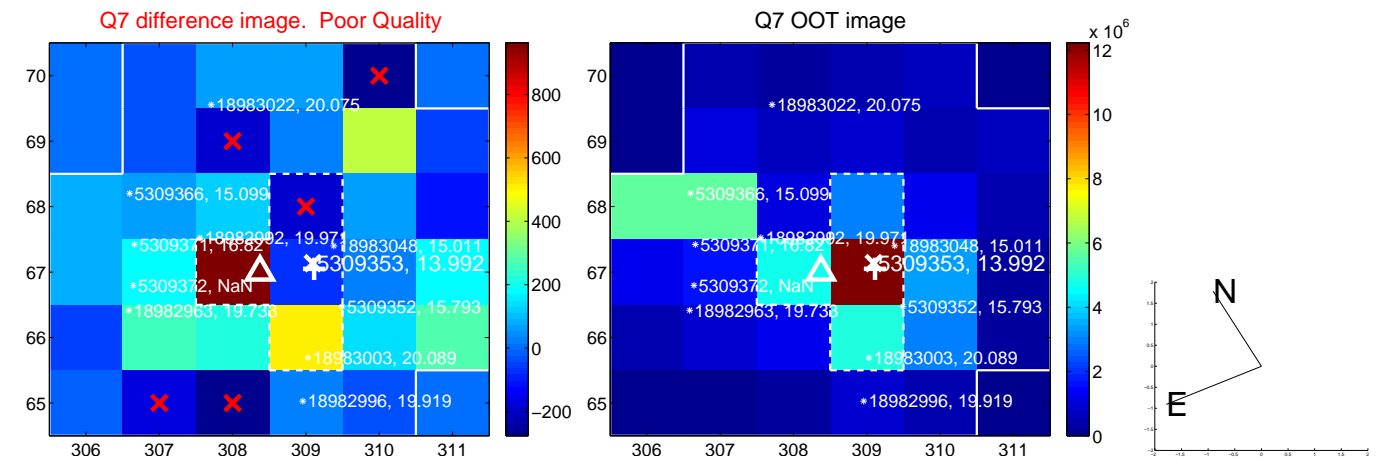
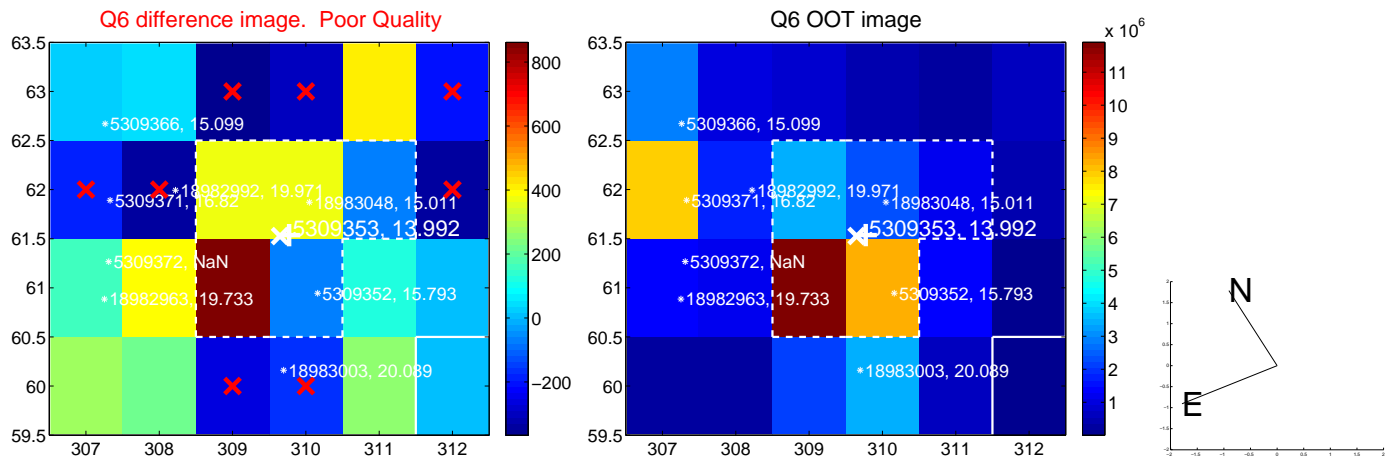
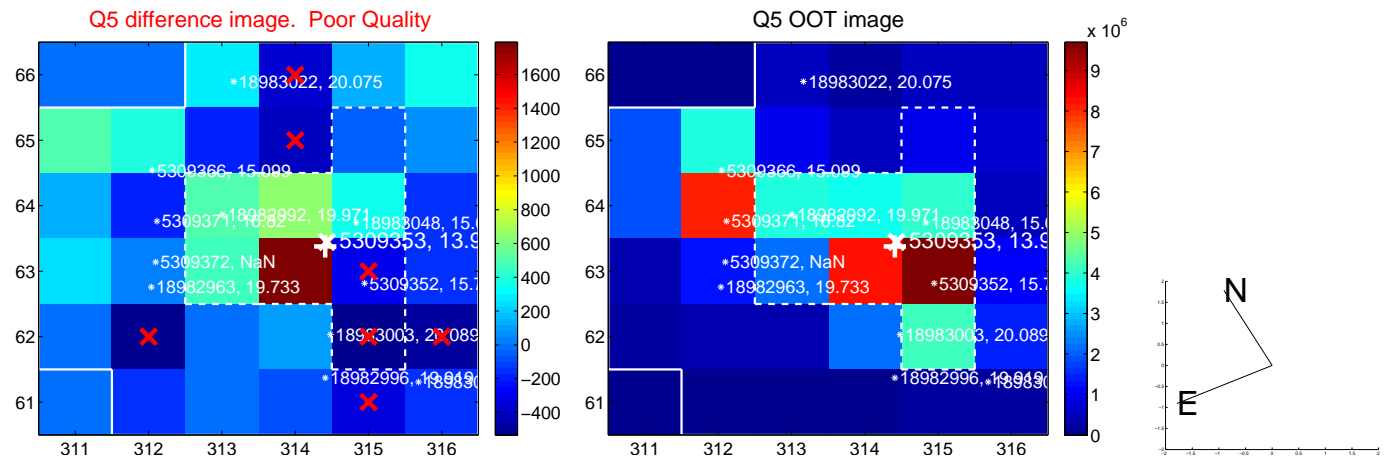


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

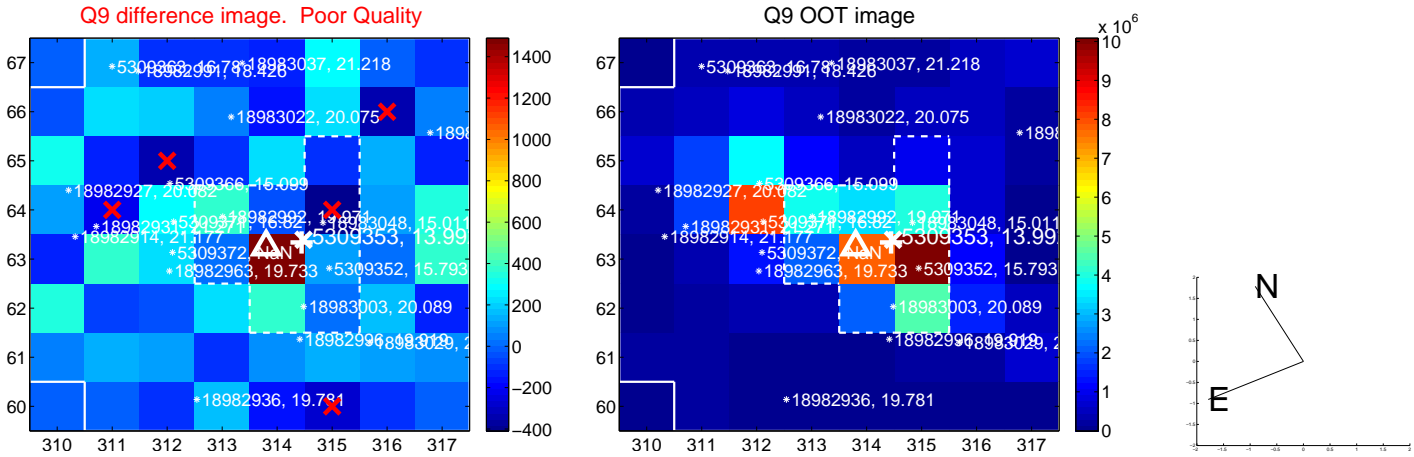


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

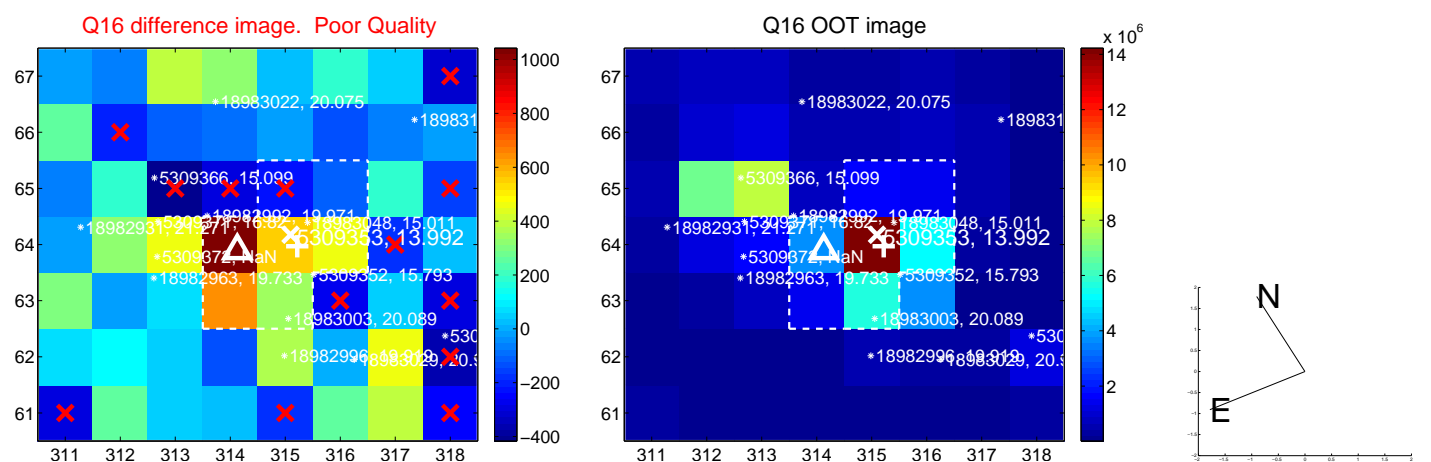
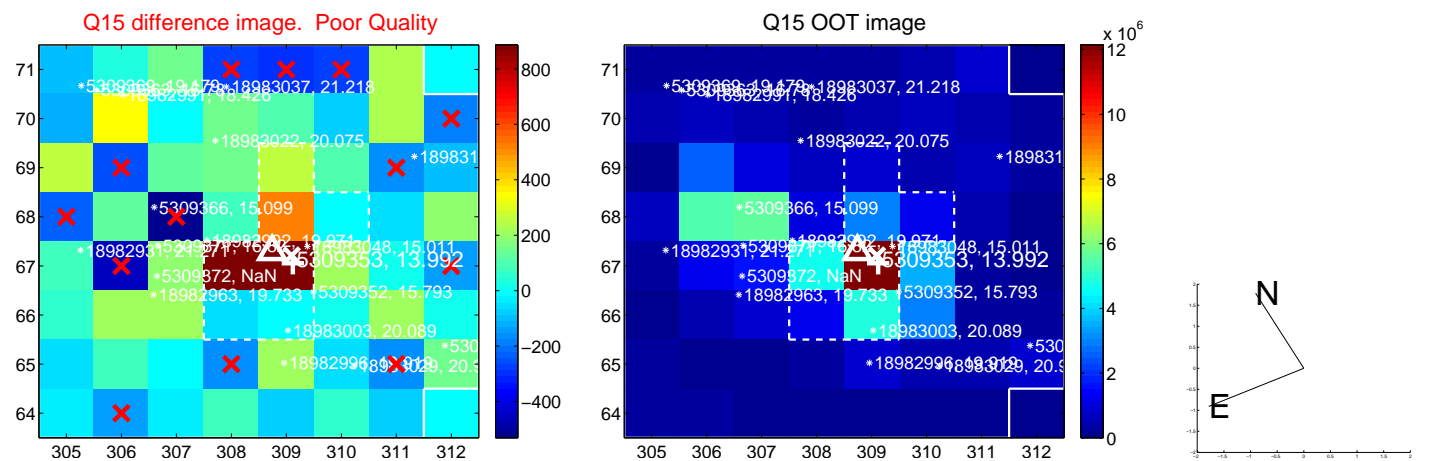
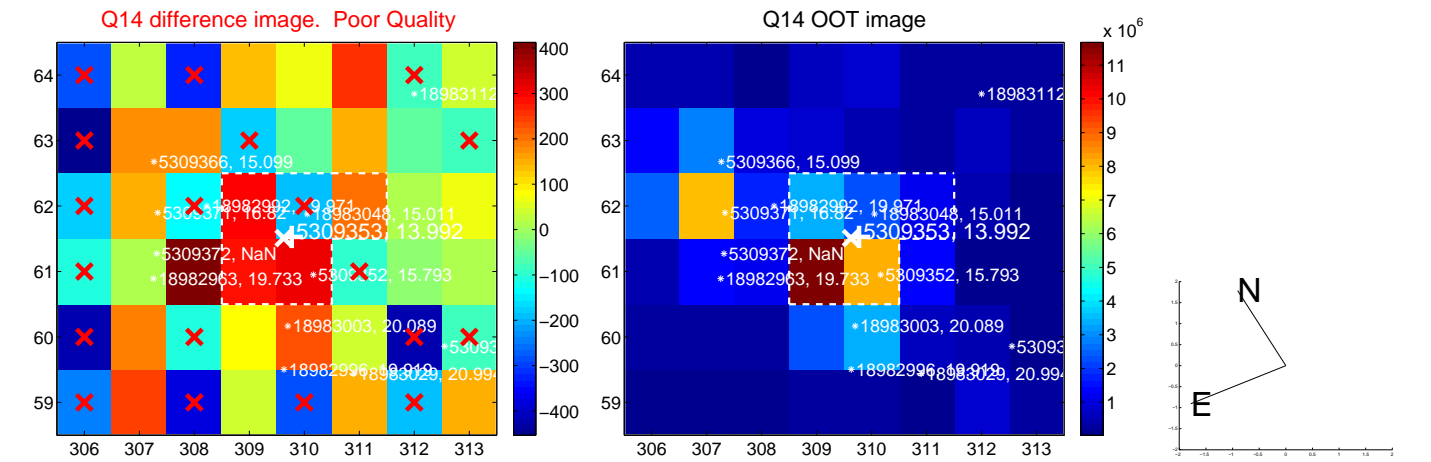
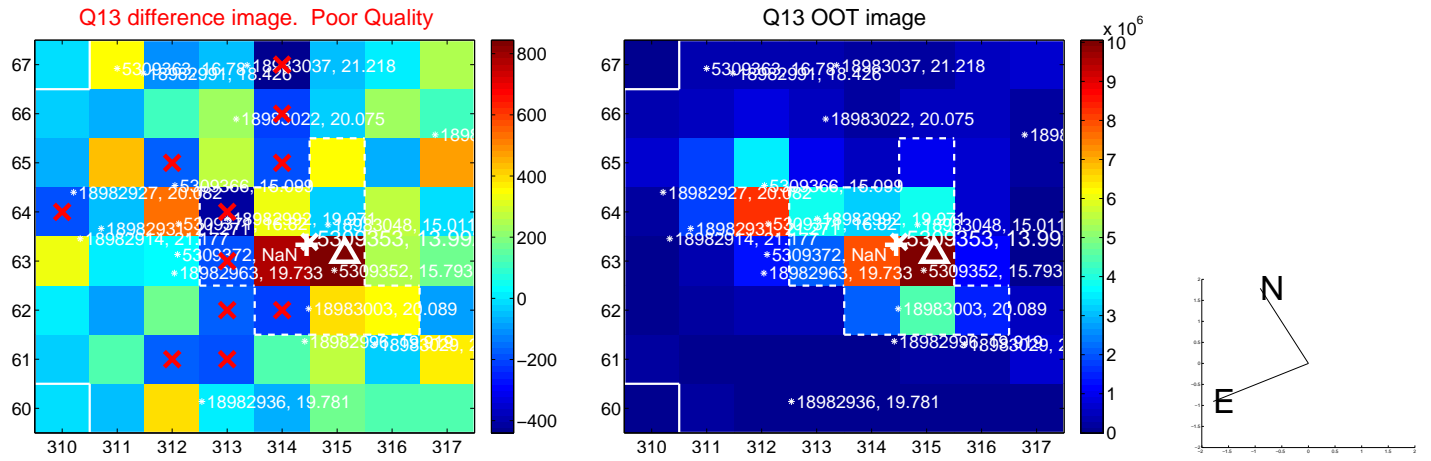




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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





UKIRT Image

Declination

