

# KIC 009959368

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009959368-01	OBS	7980.01	1.332538	132.070078	49.0	4.890	7.7	7.8	0.89	5161	0.73	1026.05
009959368-02	OBS	No	168.302406	151.598945	311.6	11.877	9.6	3.9	0.89	5161	1.69	1.62
009959368-03	OBS	No	321.220016	365.764063	947.3	19.408	9.0	7.6	0.89	5161	2.76	0.68

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009959368-01	OBS	FP	0.00	0	0	1	1	CENT_FEW_DIFFS—HALO_GHOST—EPHEM_MATCH
009959368-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009959368-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS

**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.

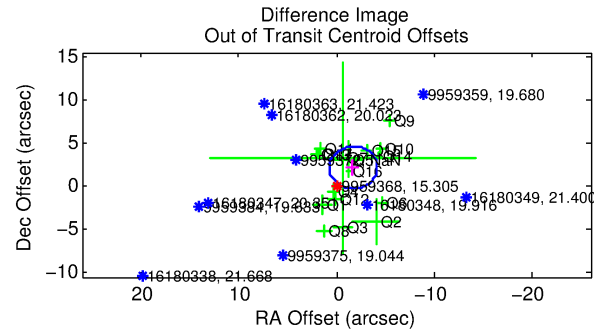
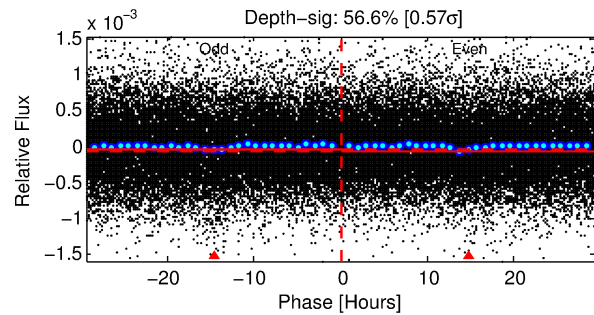
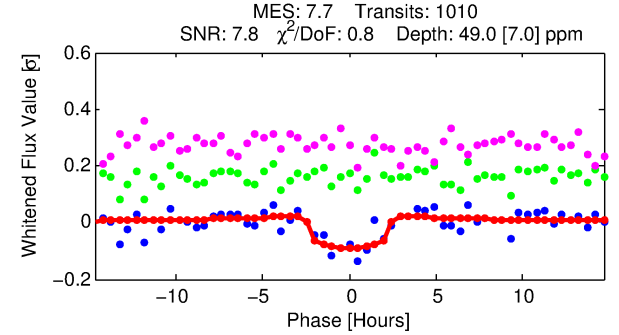
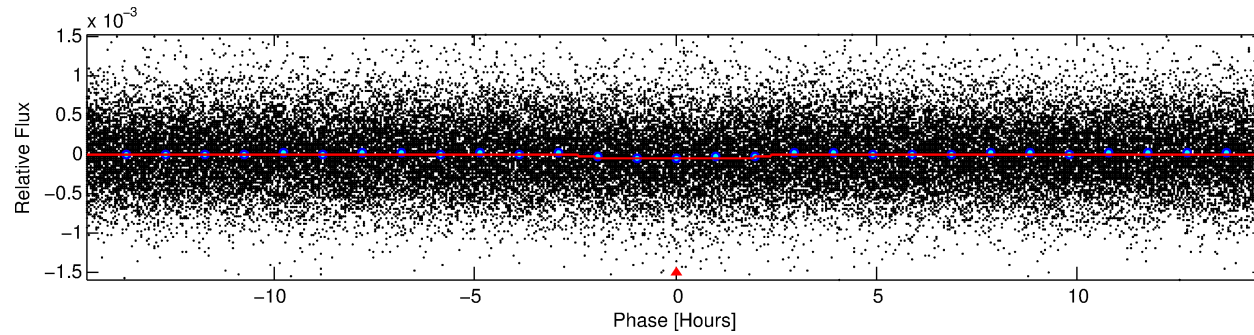
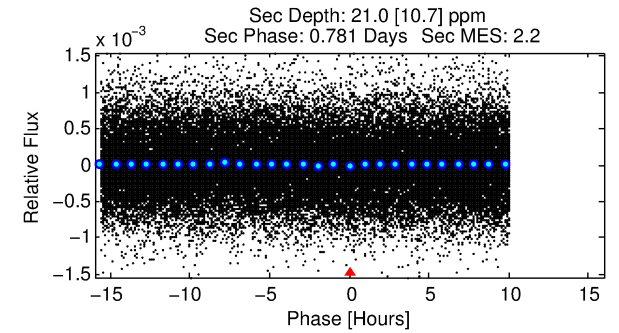
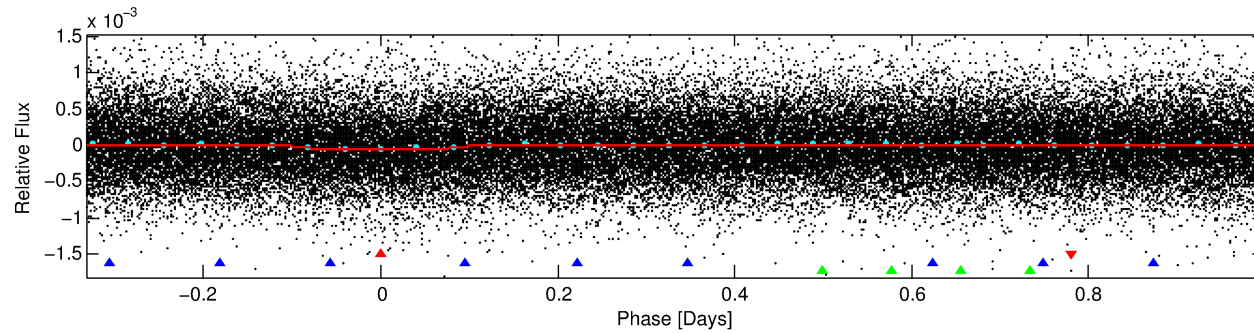
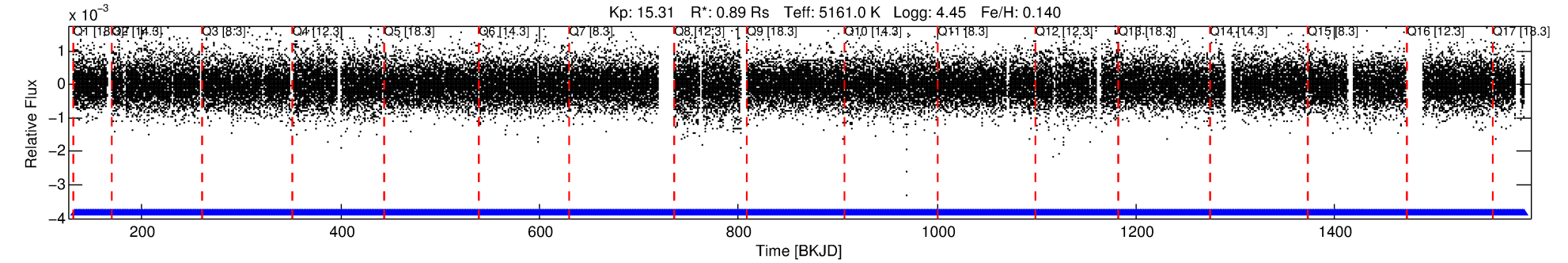
## Ephemeris Match Information For 009959368-01

TCE (1)	KIC	Parent (2)	Parent KIC	$P_1:P_2$	Dist ( $\prime$ )	$\Delta$ Row	$\Delta$ Col	$m_2$	$m_1$	$D_2/D_1$	Mechanism	Flag	$\sigma_P$	$\sigma_T$
009959368-01	9959368	BR-Cyg-pri	9899416	1:1	240.9	20	-57	10.03	15.31	13650.00	Direct-PRF	0	1.57	1.41

**Notes:**  $P_1:P_2$  is the period ratio. Dist is the distance in arcseconds.  $\Delta$ Row and  $\Delta$ Col are the number of pixels apart in row and column.  $m_2$  and  $m_1$  are the magnitudes of the parent and child.  $D_2/D_1$  is the parent's transit depth divided by the child's.  $\sigma_P$  and  $\sigma_T$  are the significance of the match in period and epoch. For a match to be considered significant  $\sigma_P < 5.0$  and  $\sigma_T < 5.0$ . Matches which have  $\sigma_P$  and  $\sigma_T$  very close to this cutoff should receive extra scrutiny, especially if the period ratio is very large.

# DV One-Page Summary

KIC: 9959368 Candidate: 1 of 3 Period: 1.333 d



## DV Fit Results:

Period = 1.33254 [0.00002] d  
Epoch = 132.0701 [0.0062] BKJD  
Rp/R\* = 0.0075 [0.0054]  
a/R\* = 1.41 [2.03]  
b = 0.87 [0.86]  
Seff = 1026.05 [303.70]  
Teff = 1443 [107] K  
Rp = 0.73 [0.54] Re  
a = 0.0222 [0.0037] AU  
Ag = 10.65 [16.53] [0.58σ]  
Teffp = 4030 [1547] K [1.67σ]

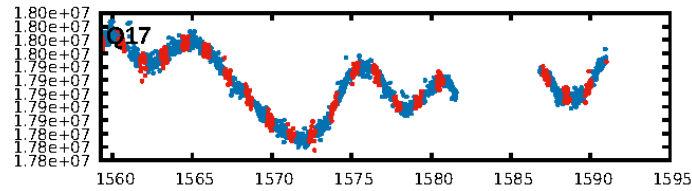
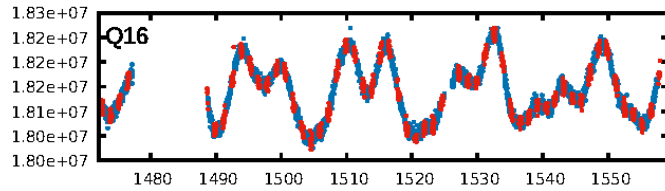
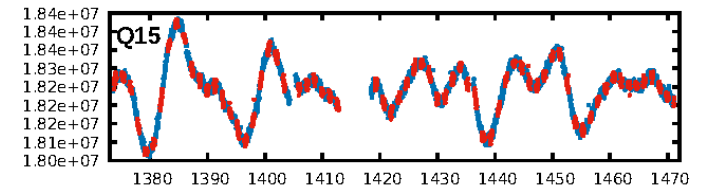
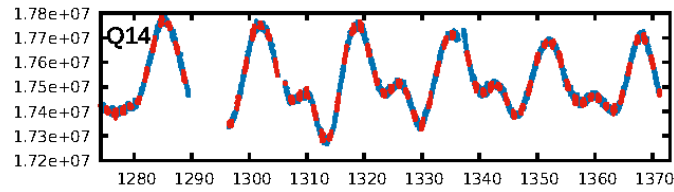
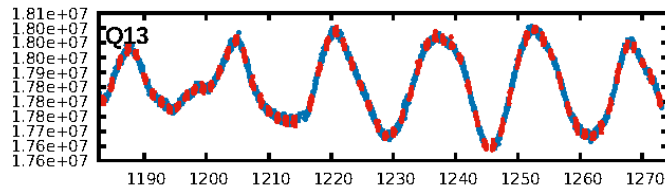
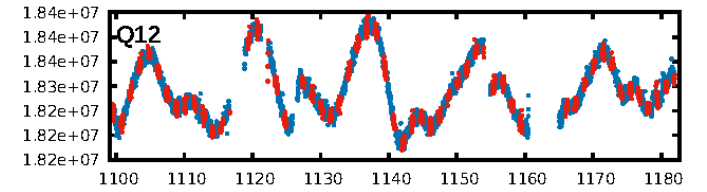
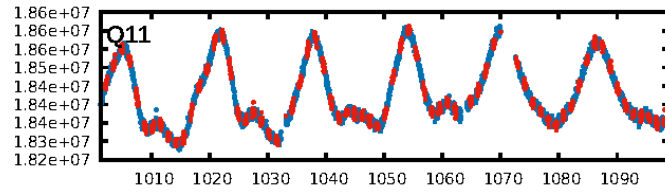
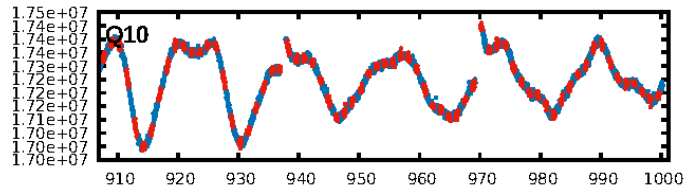
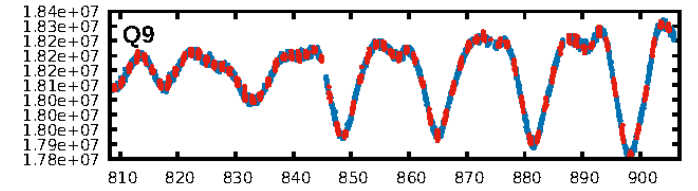
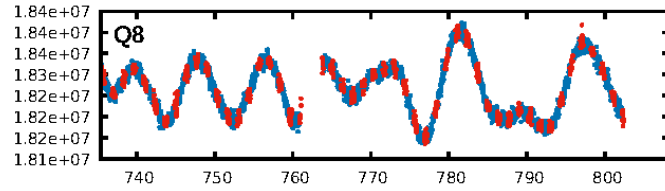
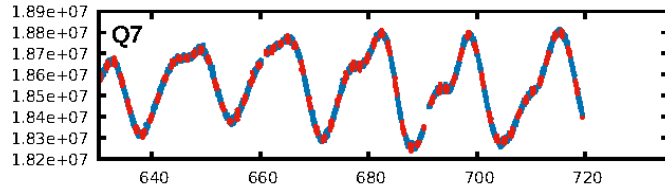
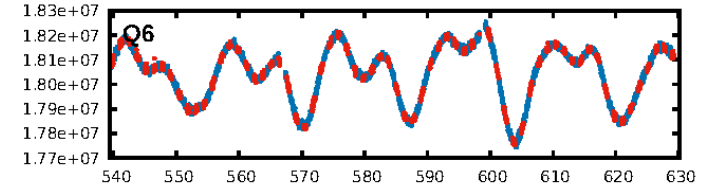
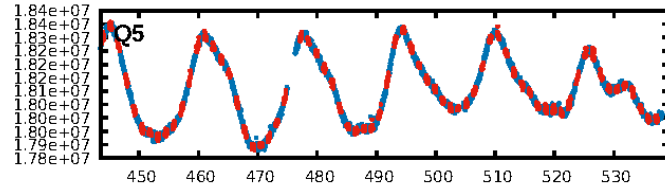
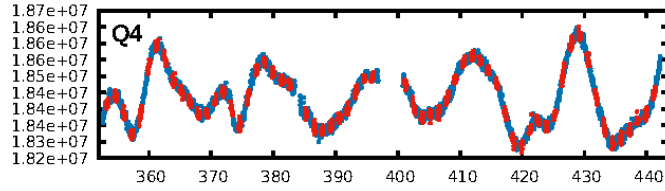
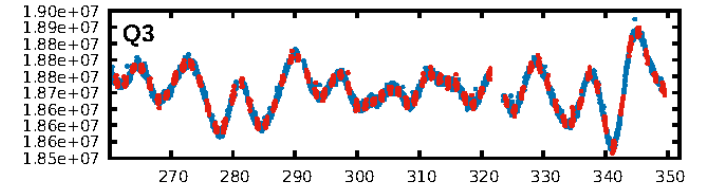
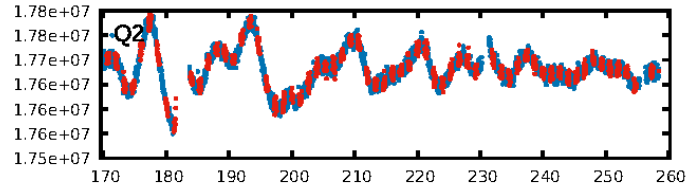
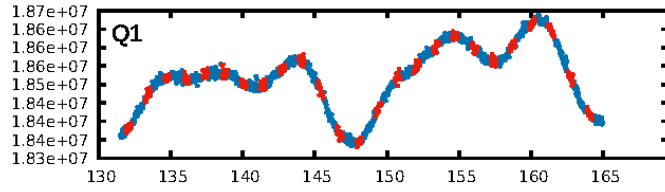
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [312.00σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 2.12e-14  
RollingBand-fgt: 1.00 [965/965]  
GhostDiagnostic-chr: 0.0906  
Centroid-sig: 0.2%  
Centroid-so: 3.468 arcsec [2.68σ]  
OotOffset-rm: 2.755 arcsec [3.37σ]  
KicOffset-rm: 2.702 arcsec [3.10σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.06 [1/17]  
DiffImageOverlap-fno: 1.00 [17/17]

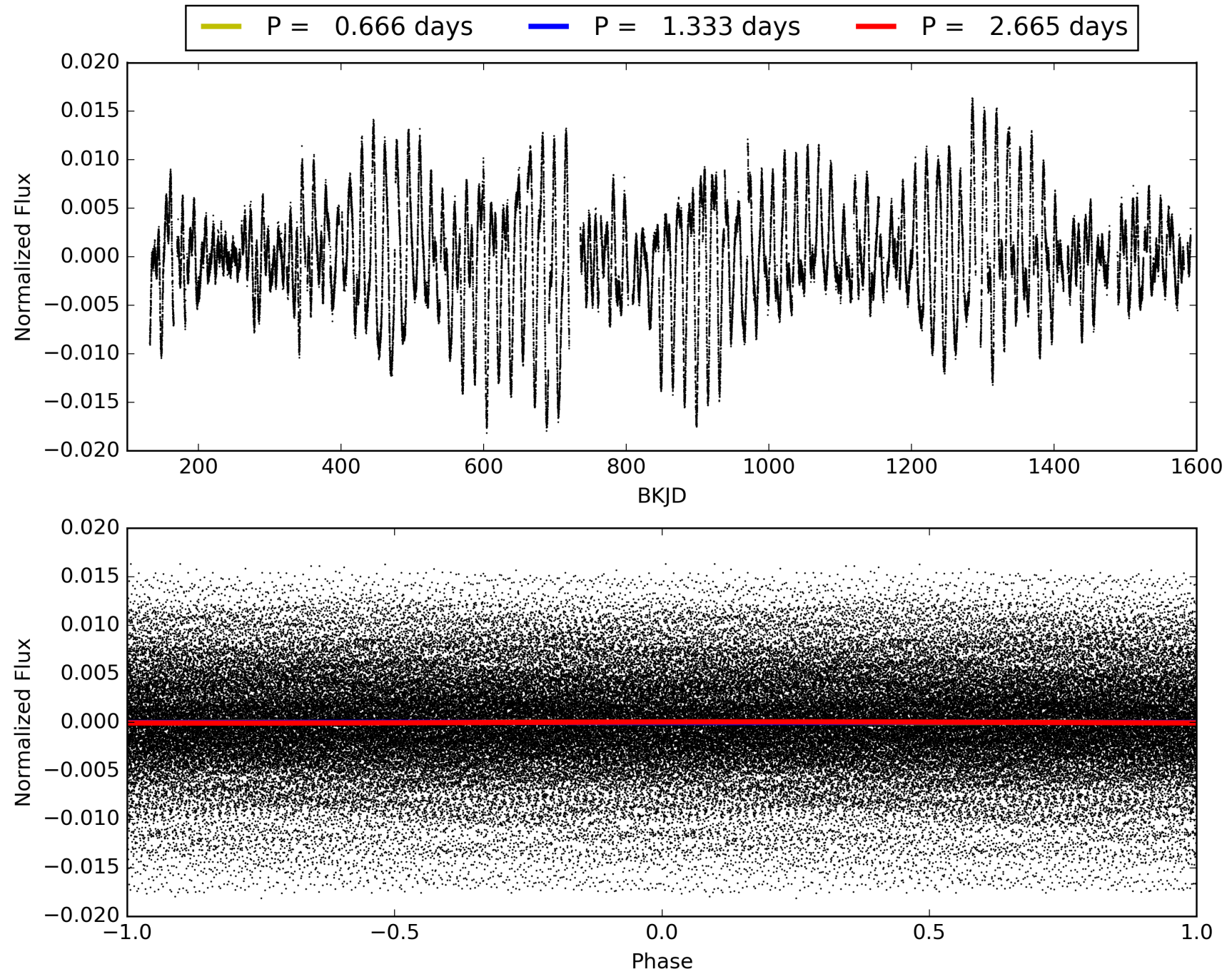
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 01:00:42 Z

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

# TCE 009959368-01, PDC Light Curves

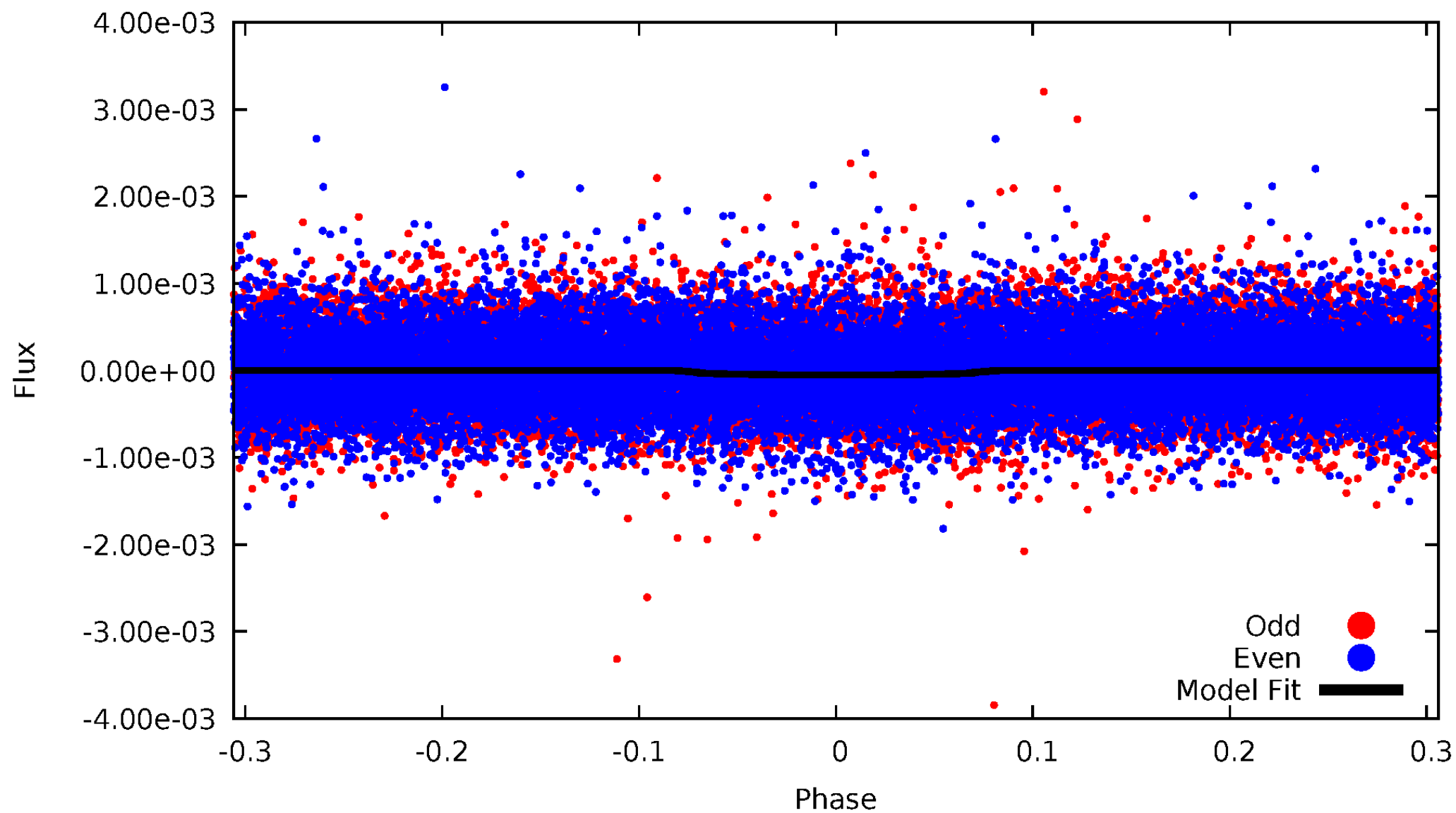


TCE 009959368-01



# DV Odd/Even

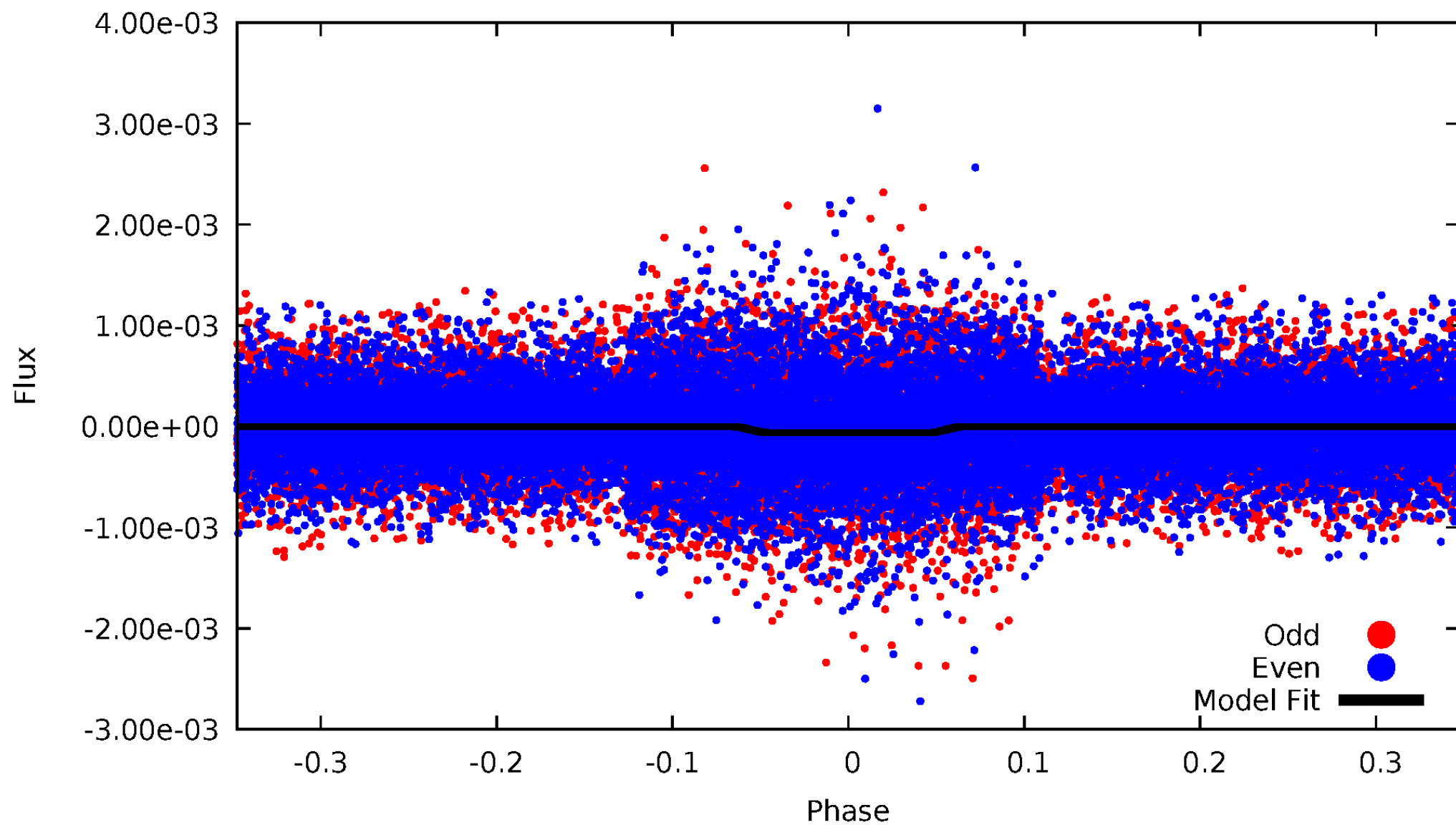
TCE 009959368-01





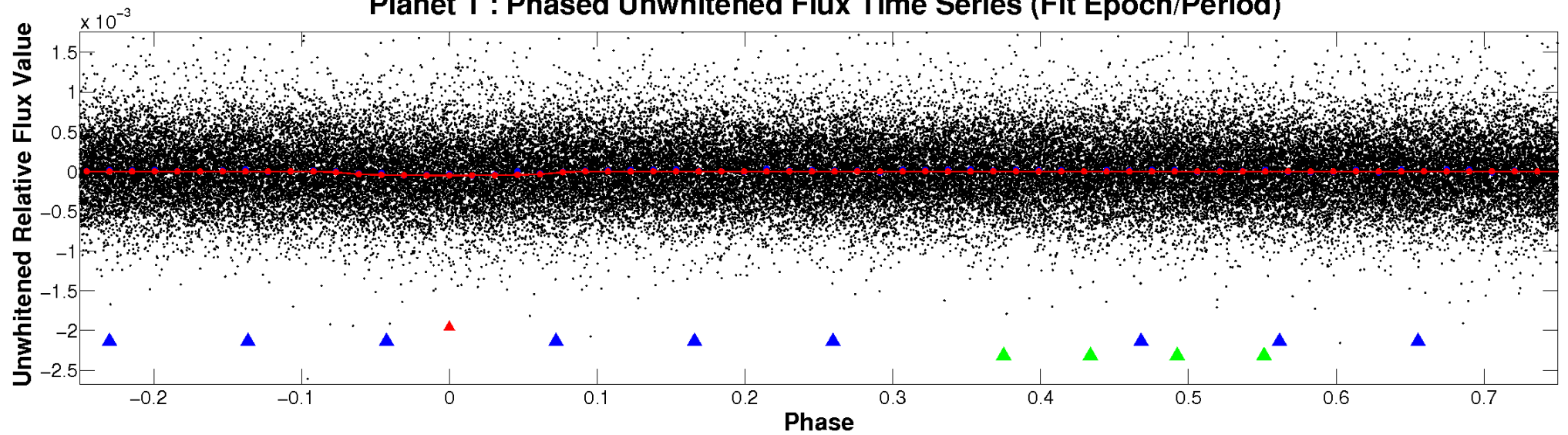
# ALT Odd/Even

TCE 009959368-01

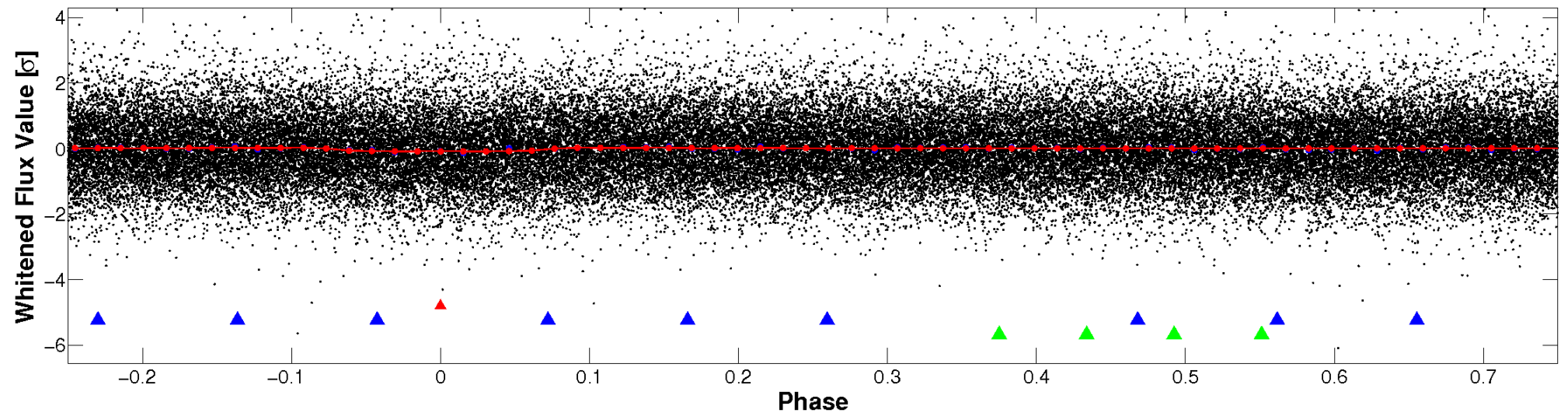


# Non-Whitened Vs. Whitened Light Curve

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

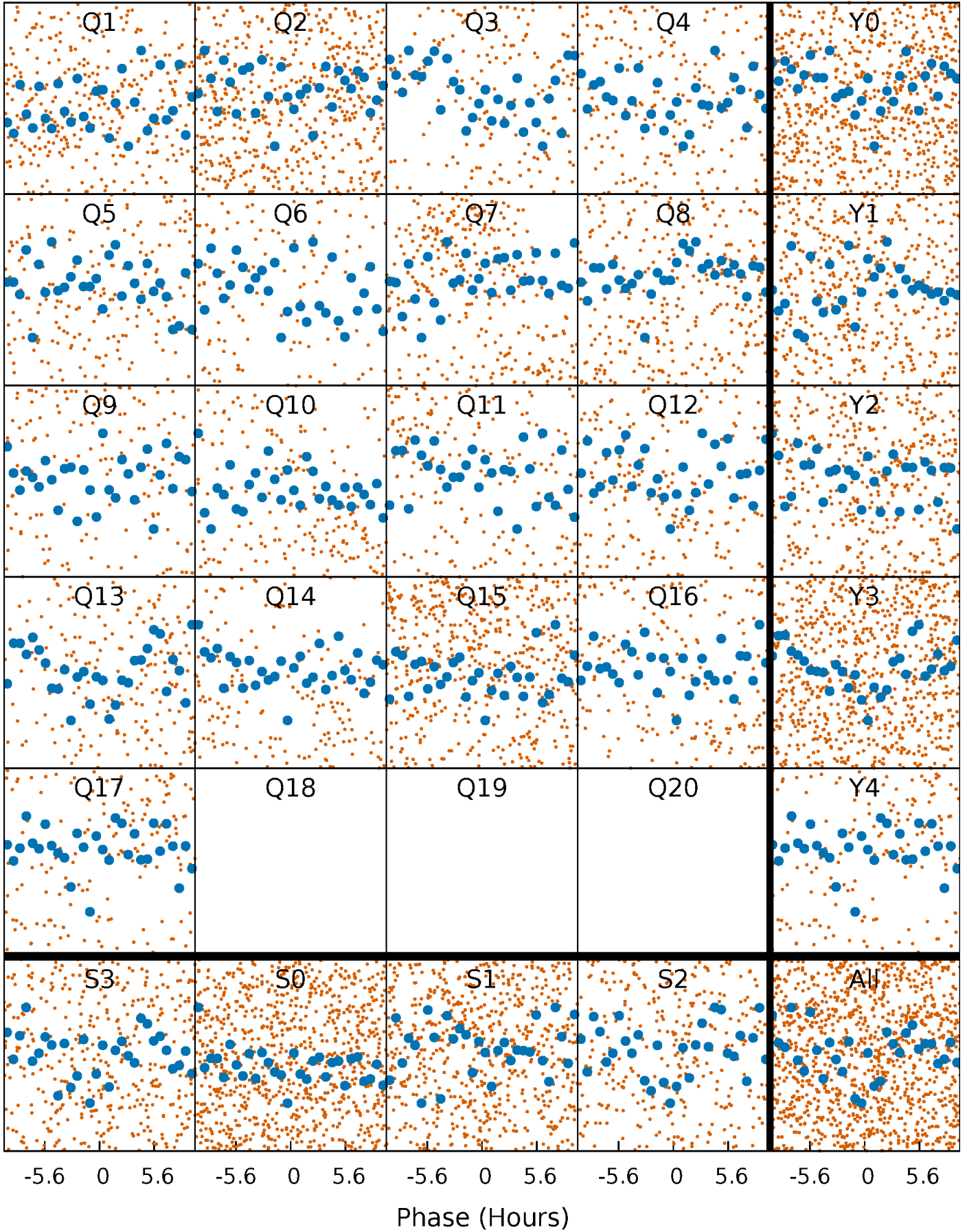


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

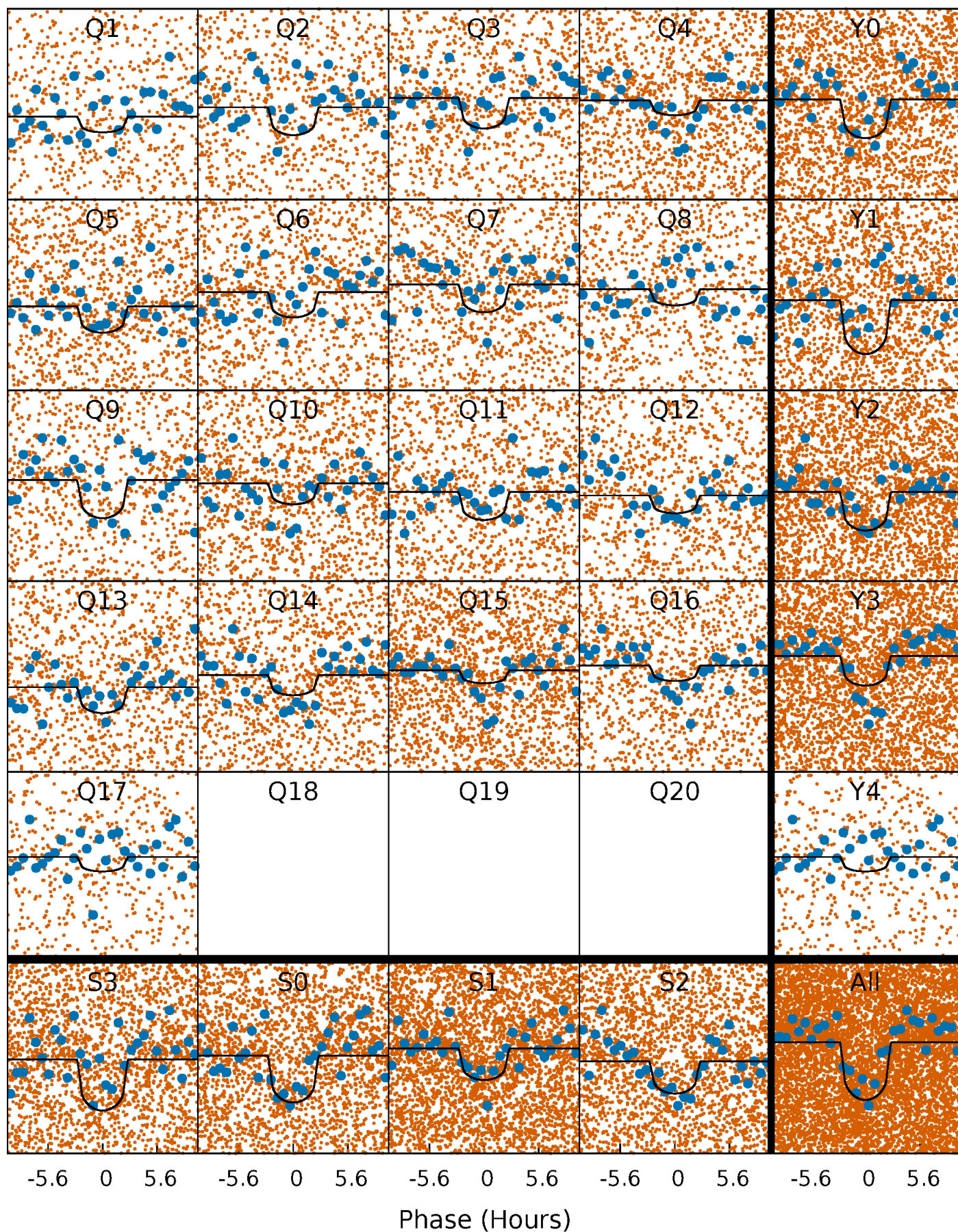
TCE 009959368-01 P= 1.332538 Days  $T_0=132.070078$  (BKJD)





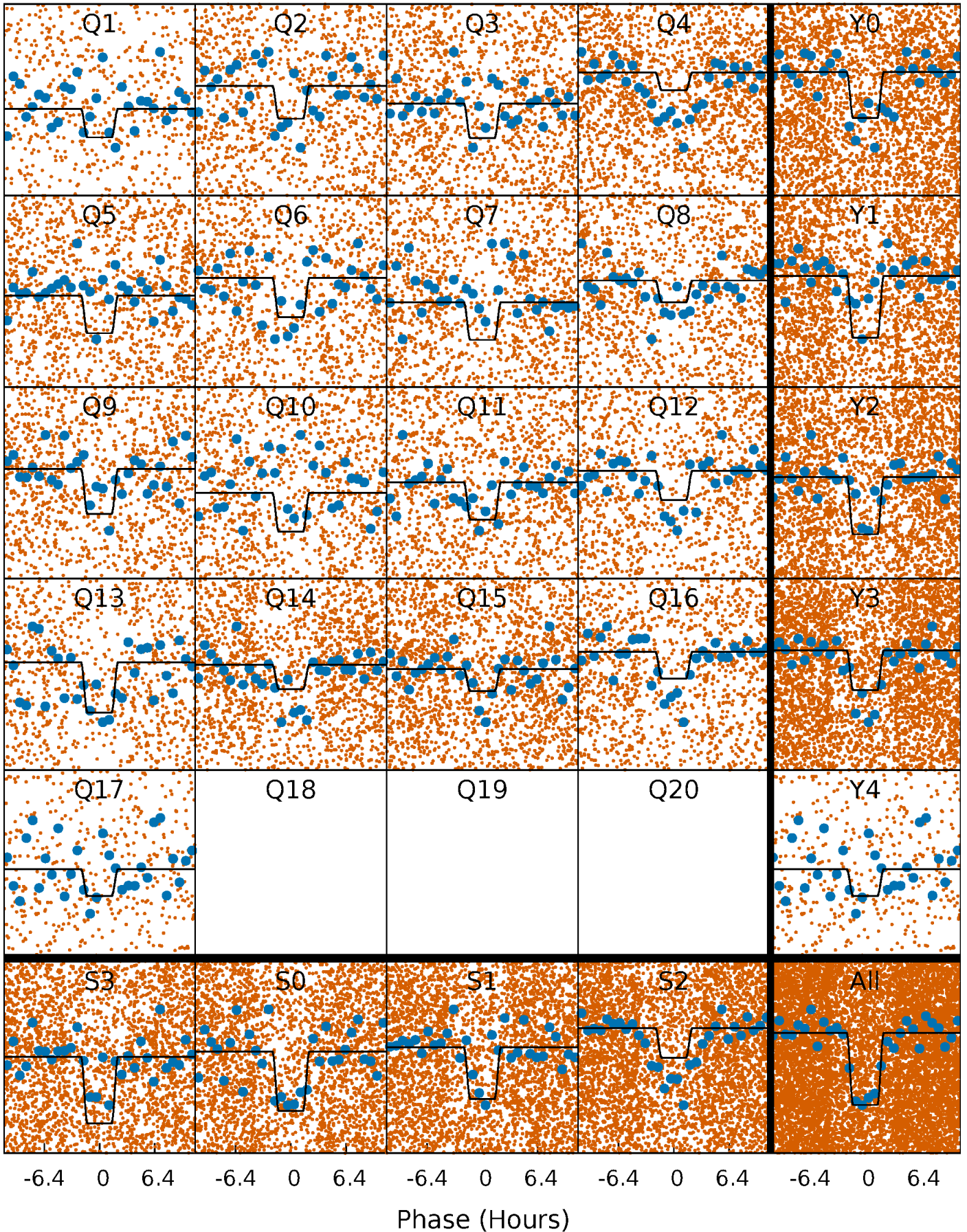
# DV Quarter-Phased Transit Curves

TCE 009959368-01 P= 1.332538 Days  $T_0=132.070078$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 009959368-01 P= 1.332568 Days  $T_0=132.054177$  (BKJD)

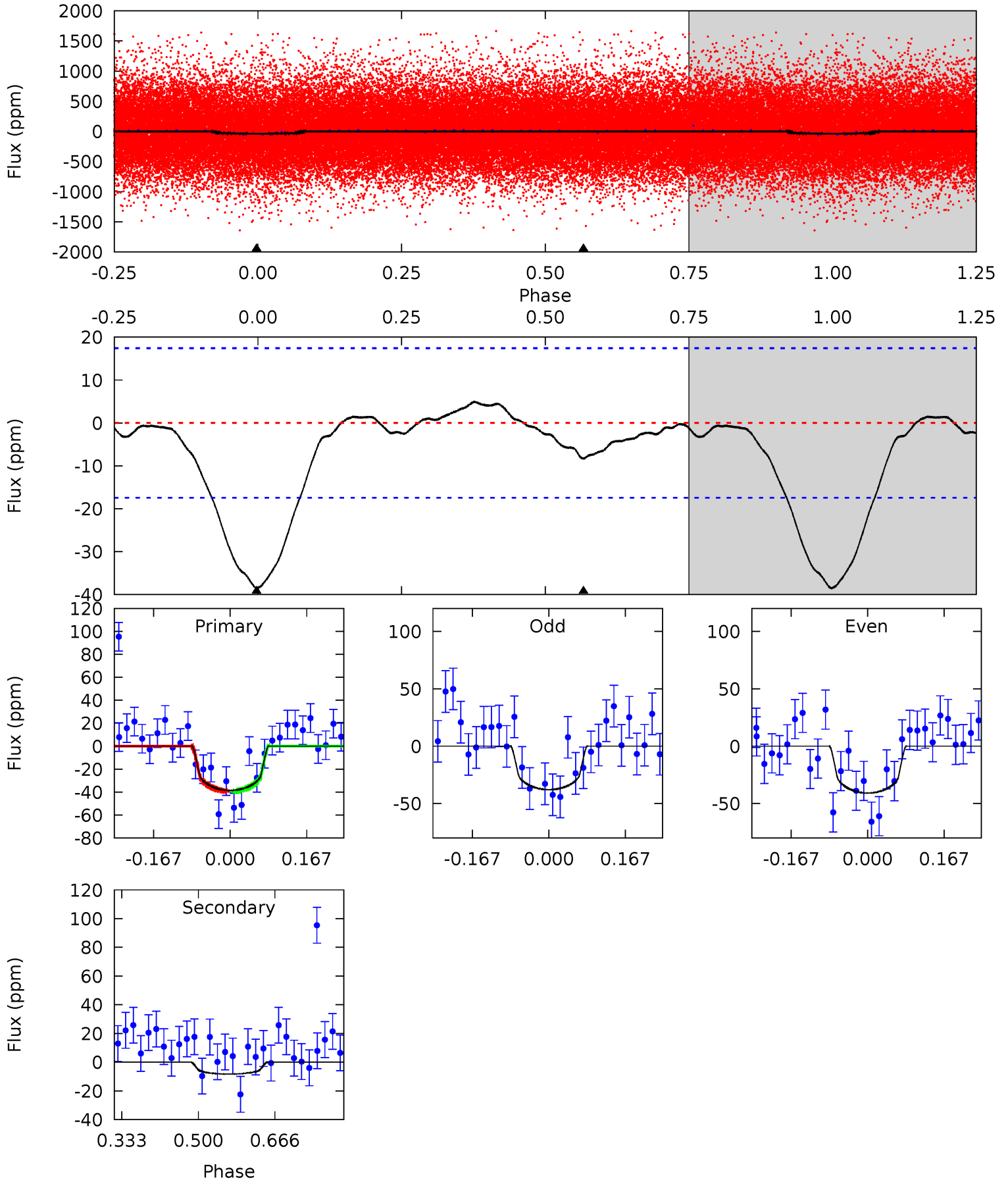




# DV Model-Shift Uniqueness Test

009959368-01, P = 1.332538 Days, E = 130.737540 Days

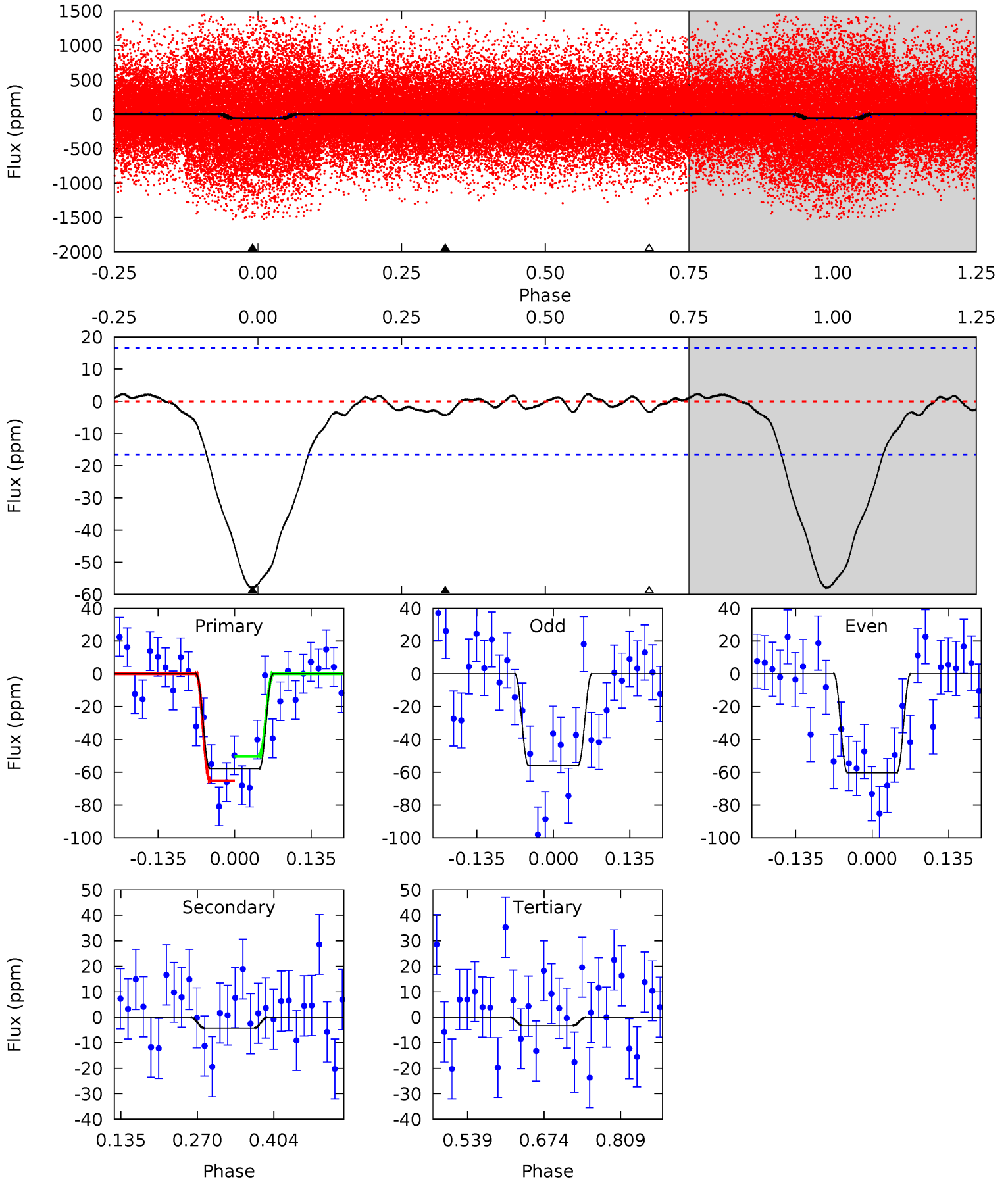
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.86	2.12	0	0	4.46	1.38	0.56	9.86	9.86	2.12	2.12	0.37	1.00	0.11	0.00



# Alt Model-Shift Uniqueness Test

009959368-01, P = 1.332568 Days, E = 130.721609 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
15.7	1.17	0.91	0	4.50	1.50	0.47	14.8	15.7	0.26	1.17	0.59	1.47	0.04	2.03



### Stellar Parameters For KIC 009959368

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5161^{+170}_{-154}$	$4.452^{+0.117}_{-0.156}$	$0.140^{+0.250}_{-0.300}$	$0.892^{+0.152}_{-0.114}$	$0.821^{+0.085}_{-0.064}$	$1.629^{+0.791}_{-0.626}$
	+3%/-3%	+3%/-4%	+179%/-214%	+17%/-13%	+10%/-8%	+49%/-38%
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 009959368-01 / KOI 7980.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-8 \pm 4$	$0.79^{+0.54}_{-0.48}$	$2038^{+118}_{-108}$	$3444^{+1444}_{-664}$	$3.330^{+19.130}_{-2.355}$
Alt.	$-4 \pm 4$	$0.88^{+0.53}_{-0.45}$	$2033^{+112}_{-111}$	$2924^{+948}_{-5153}$	$1.283^{+5.091}_{-1.098}$

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



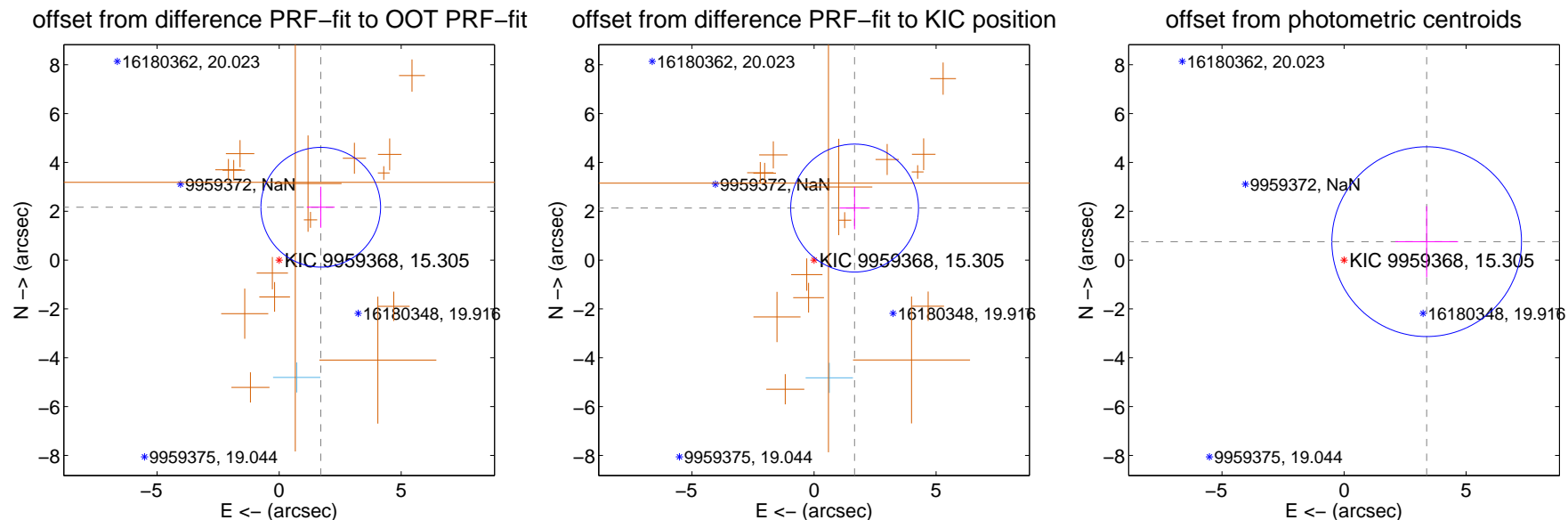
## DV Centroid Data

Supplemental centroid analysis for 009959368-01. Kepler magnitude: 15.30. Transit SNR 7.83

There are 1 quarters with good PRF difference image offsets

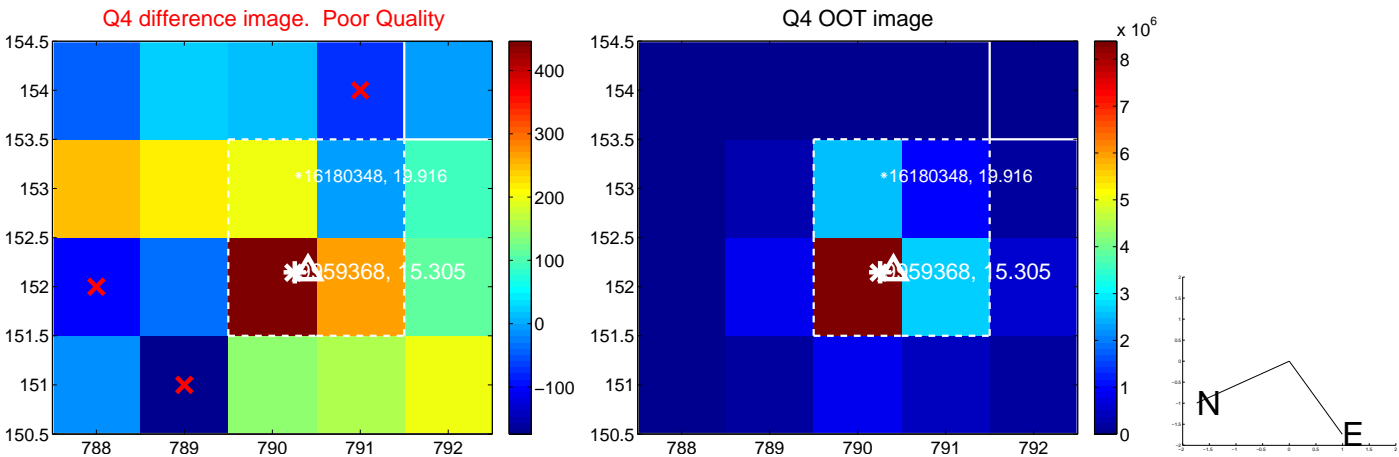
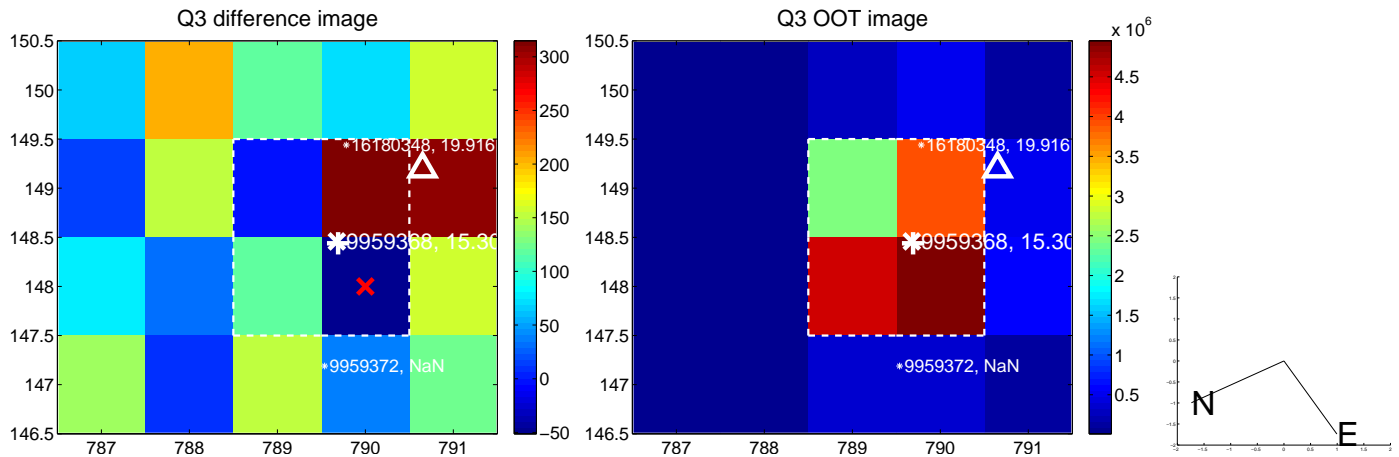
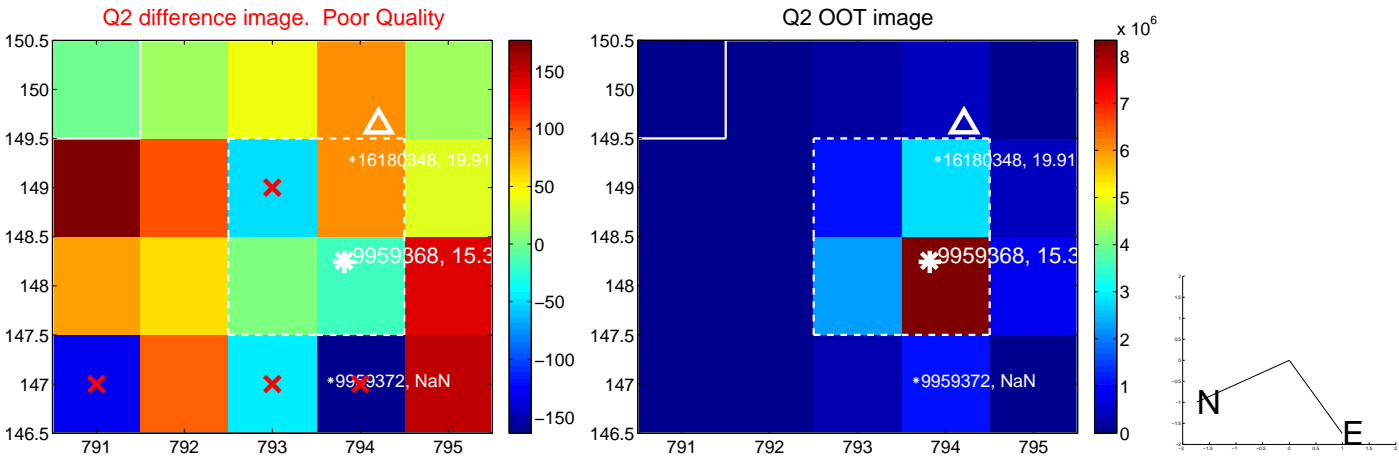
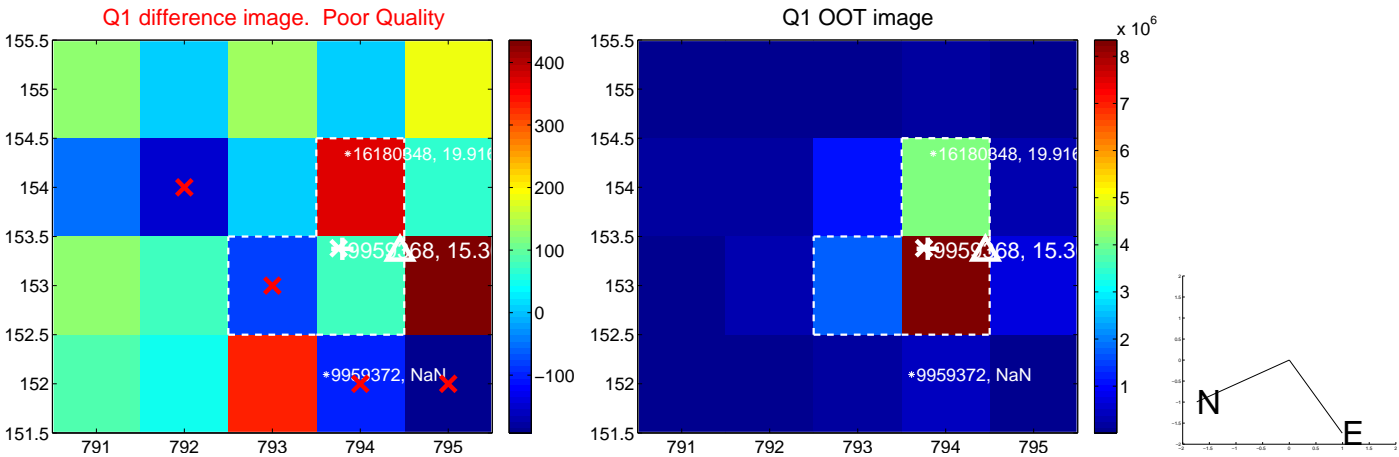
The direct PRF centroid is offset from the target star catalog position by about 0.20 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.755 \pm 0.817$	3.37	$-1.704 \pm 0.570$	$2.164 \pm 0.840$
PRF-fit source offset from KIC position	$2.702 \pm 0.873$	3.10	$-1.662 \pm 0.620$	$2.130 \pm 0.872$
photometric centroid source offset	$3.47 \pm 1.29$	2.68	$-3.39 \pm 1.29$	$0.75 \pm 1.45$

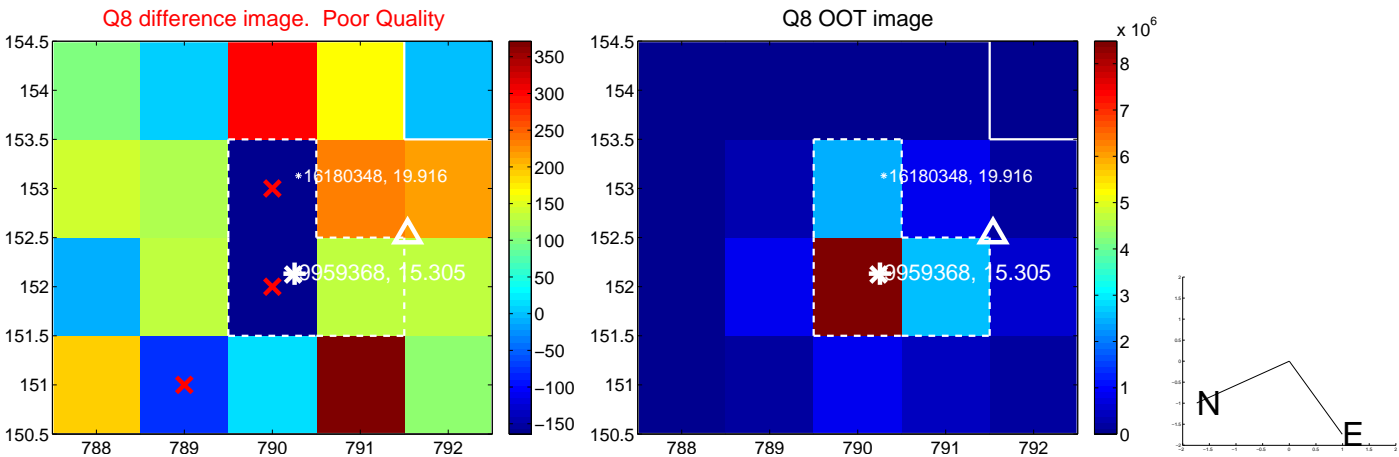
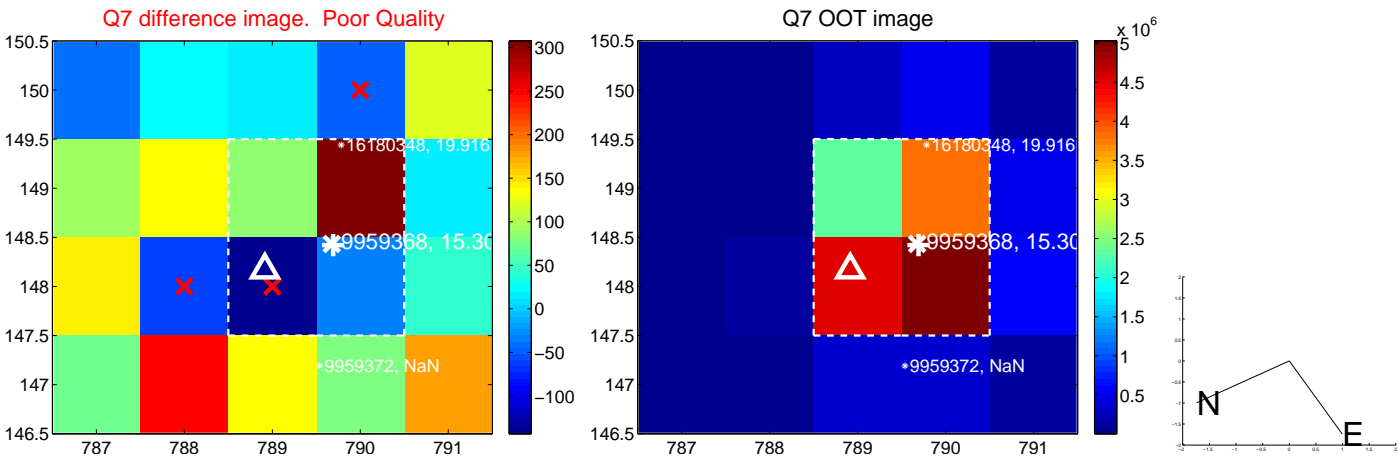
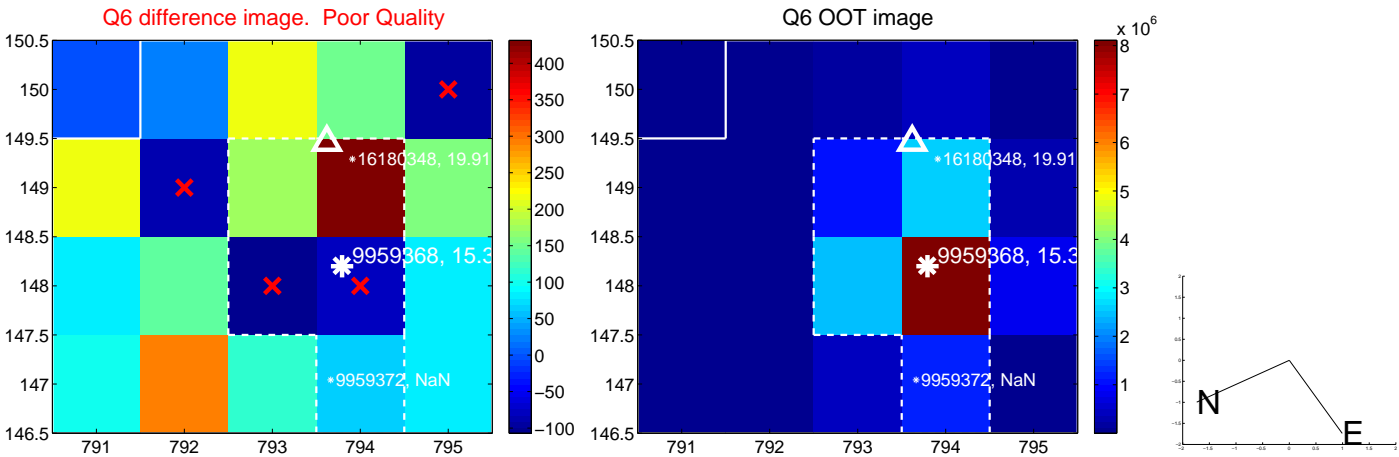
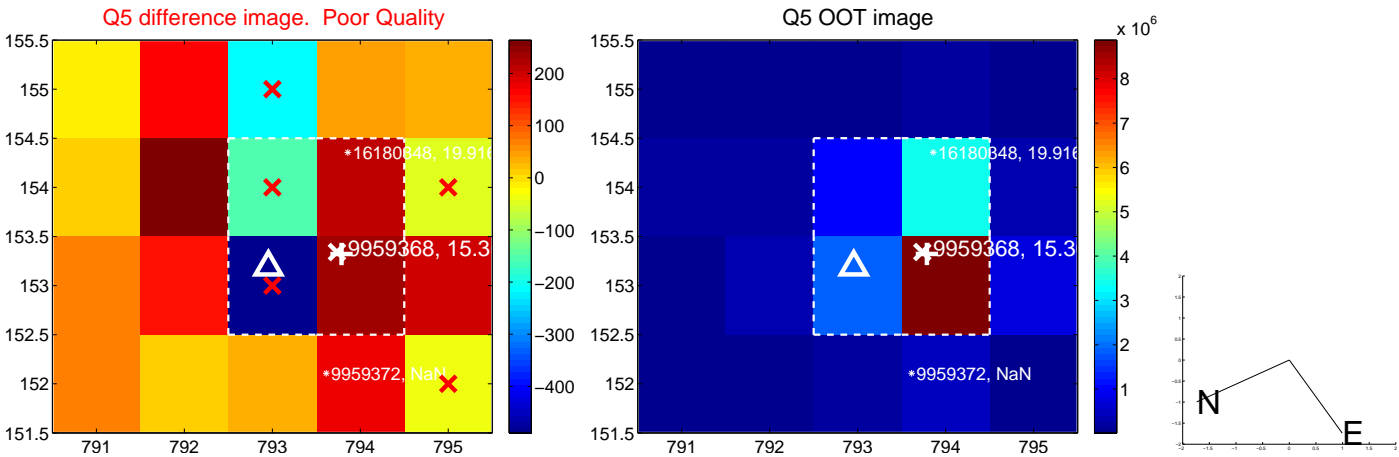


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

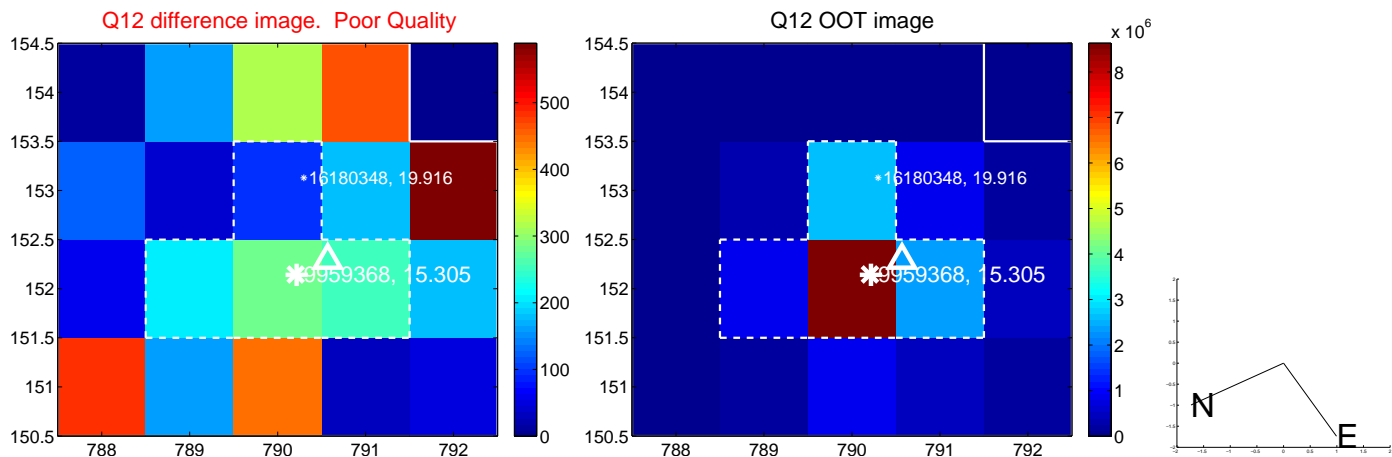
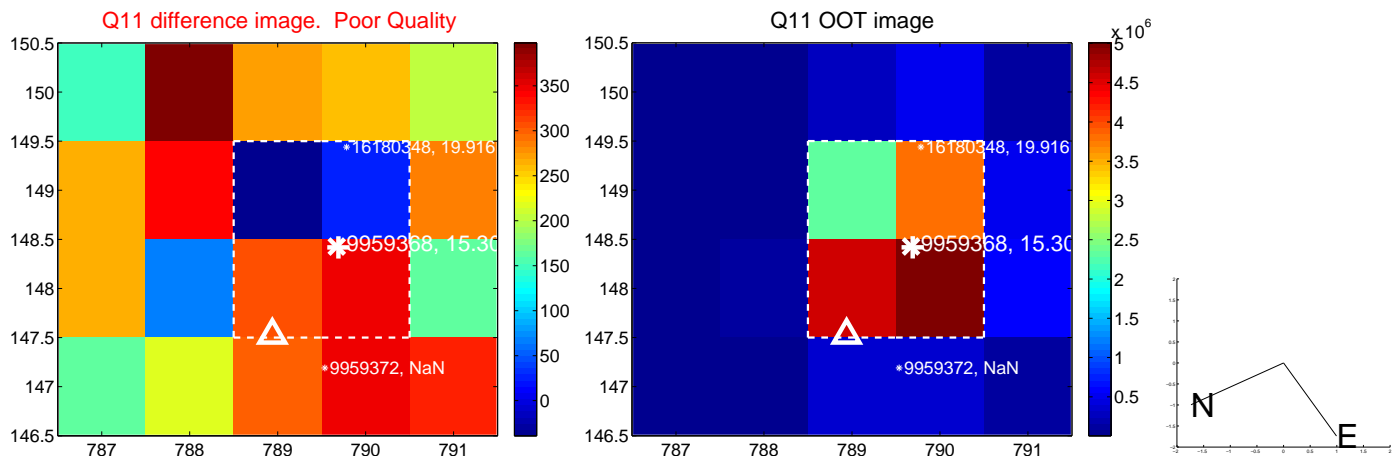
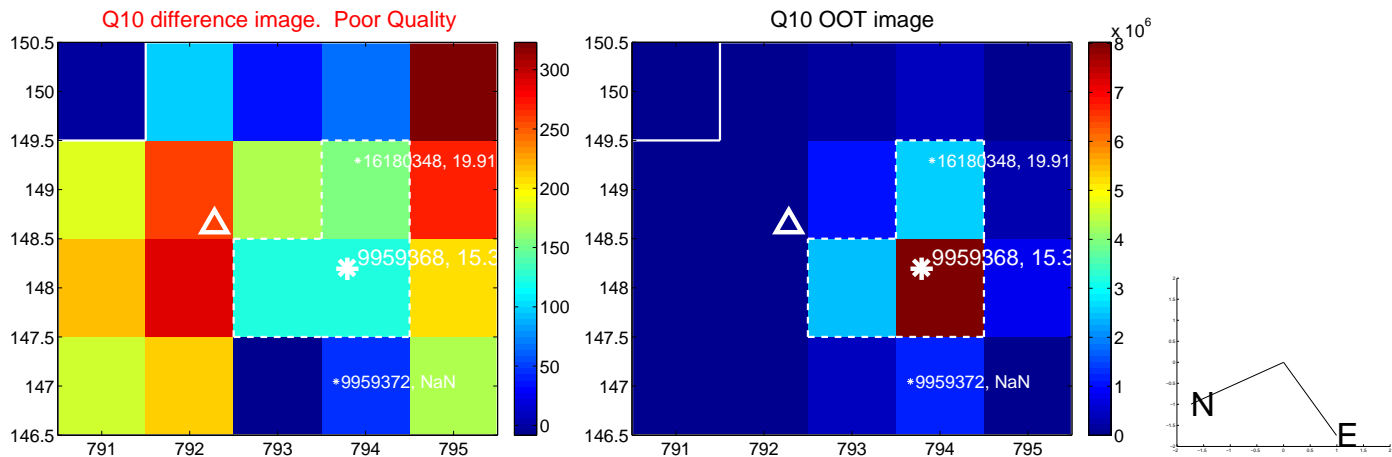
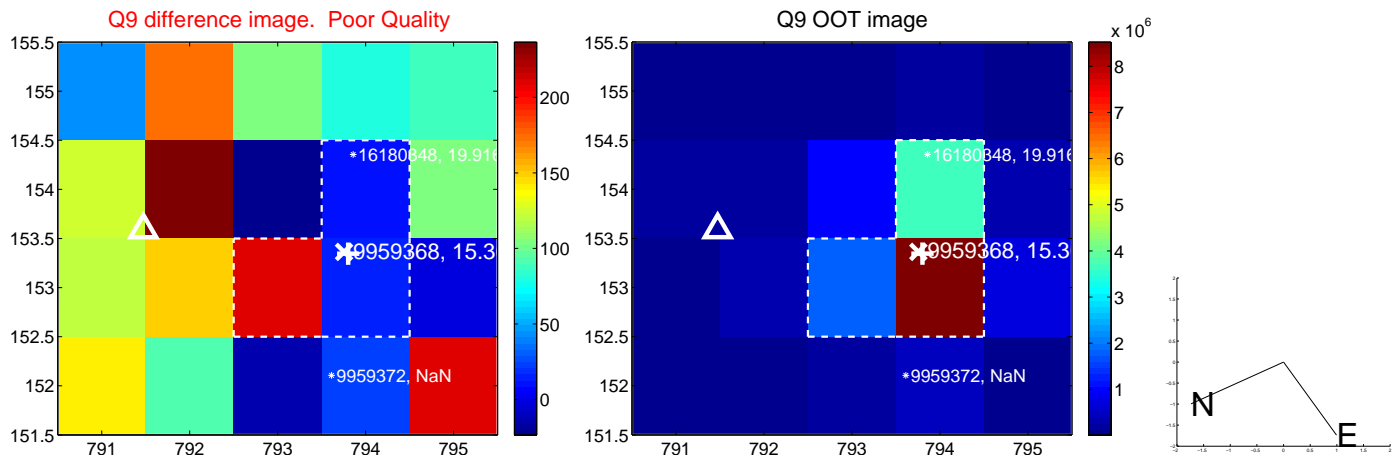
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



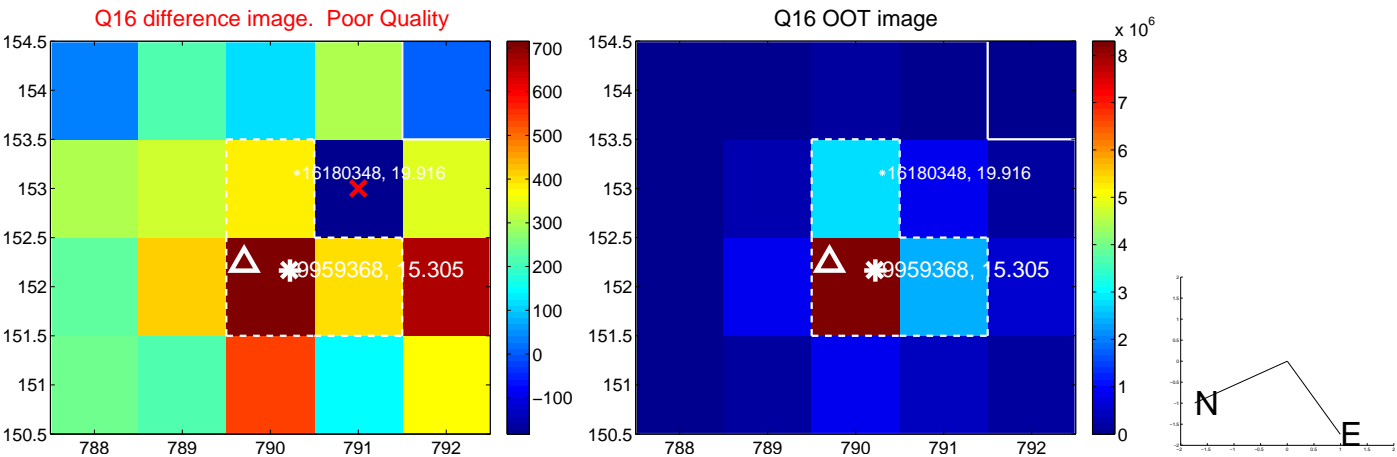
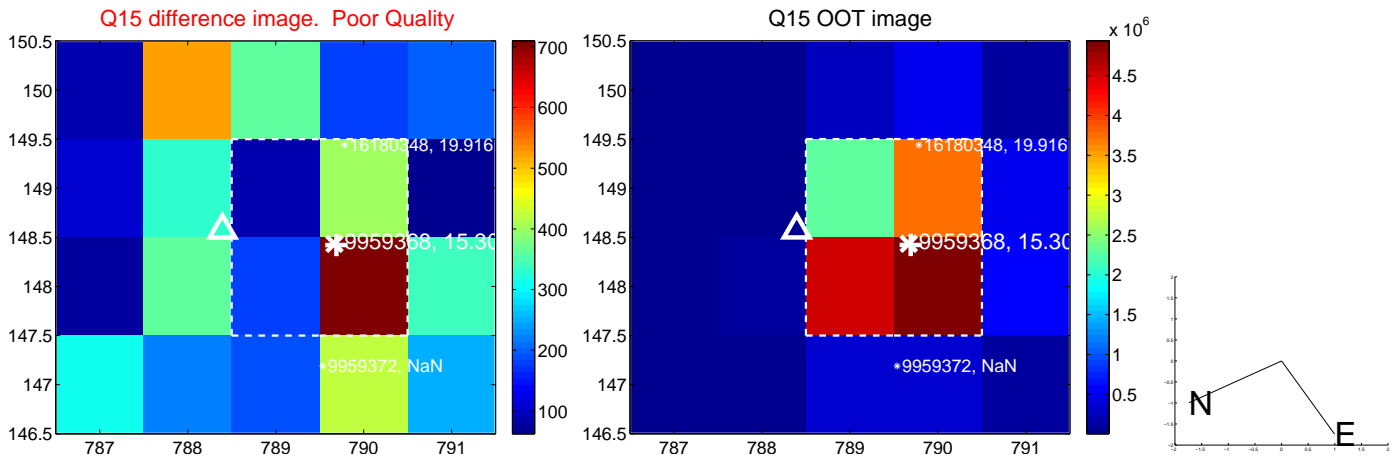
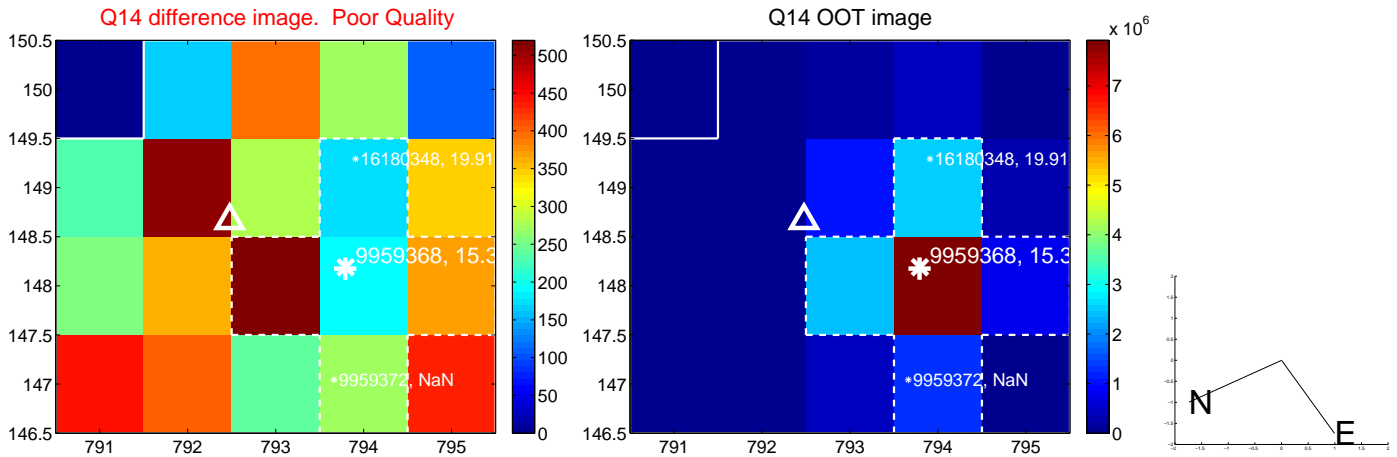
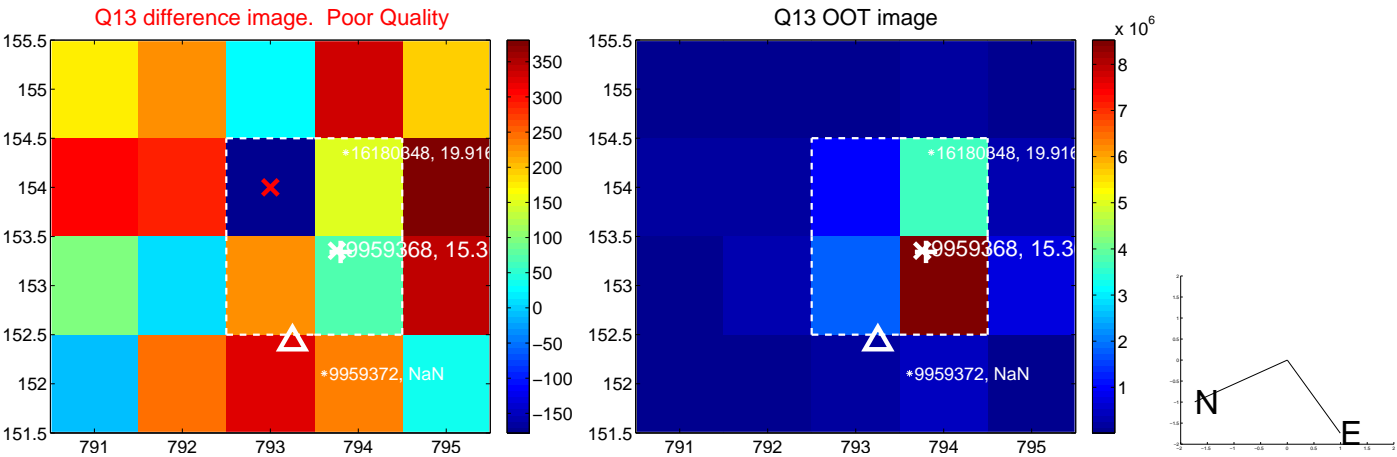
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

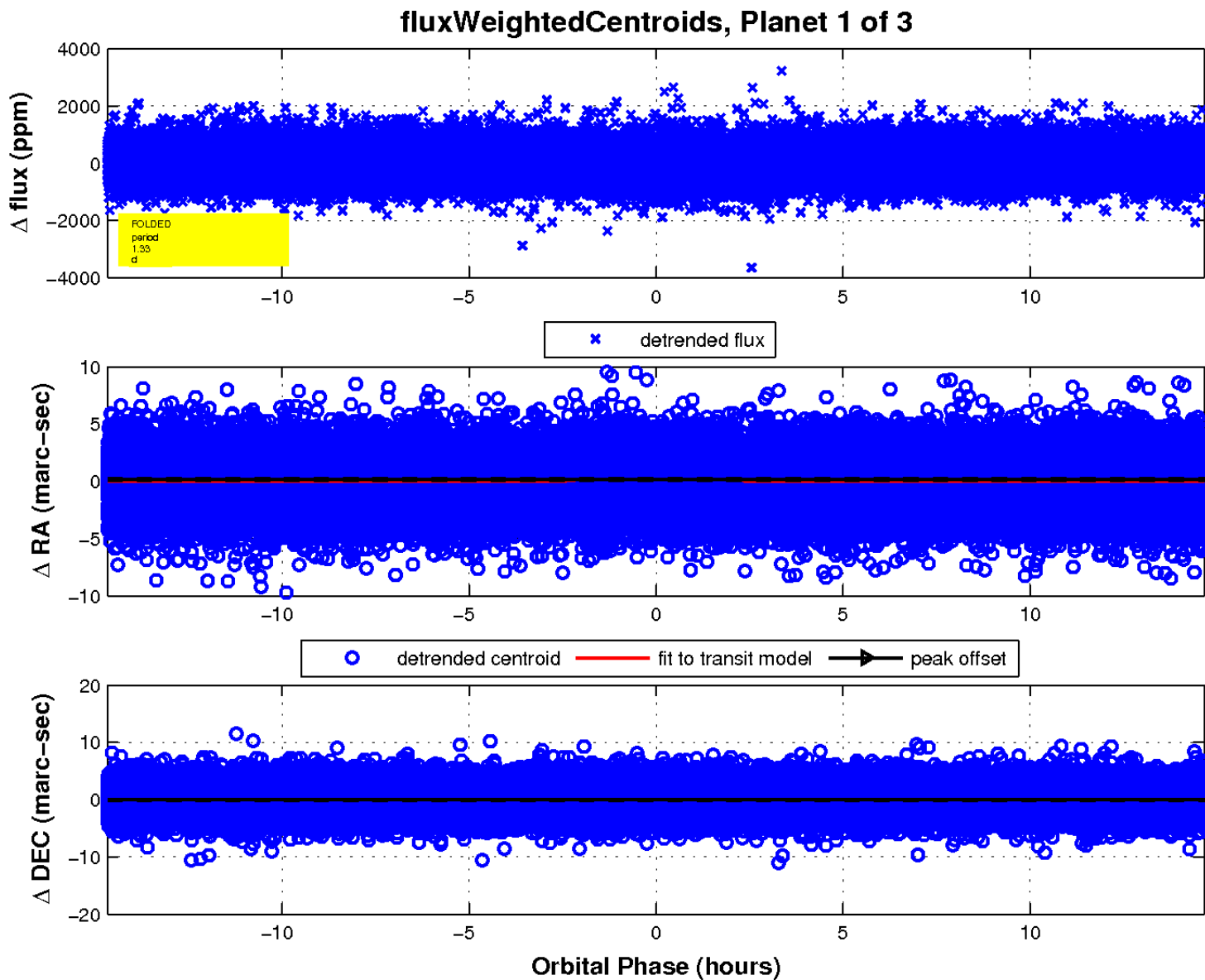
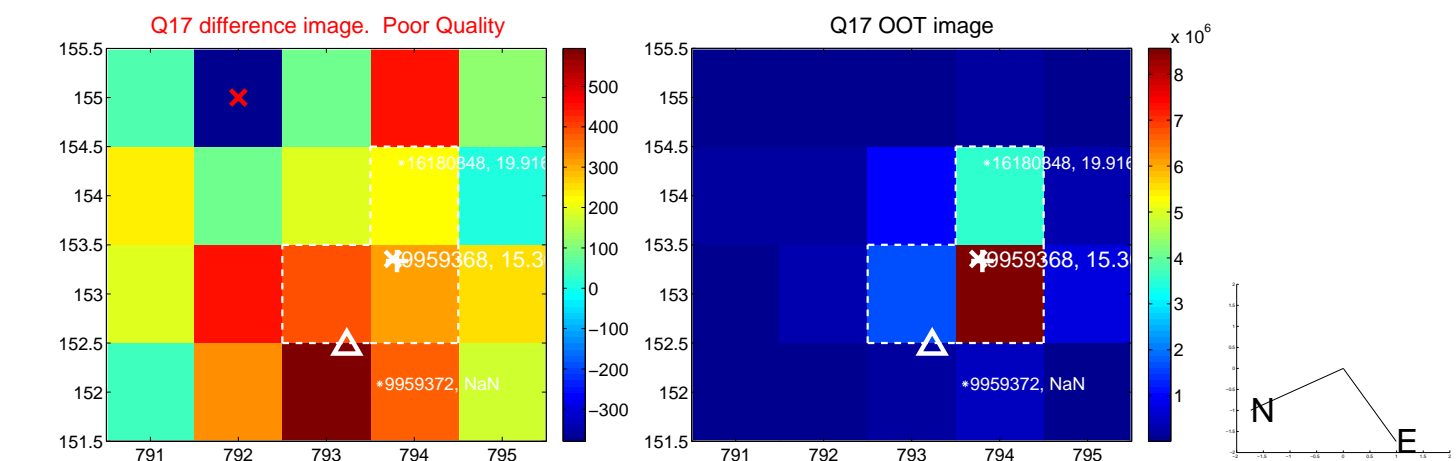


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



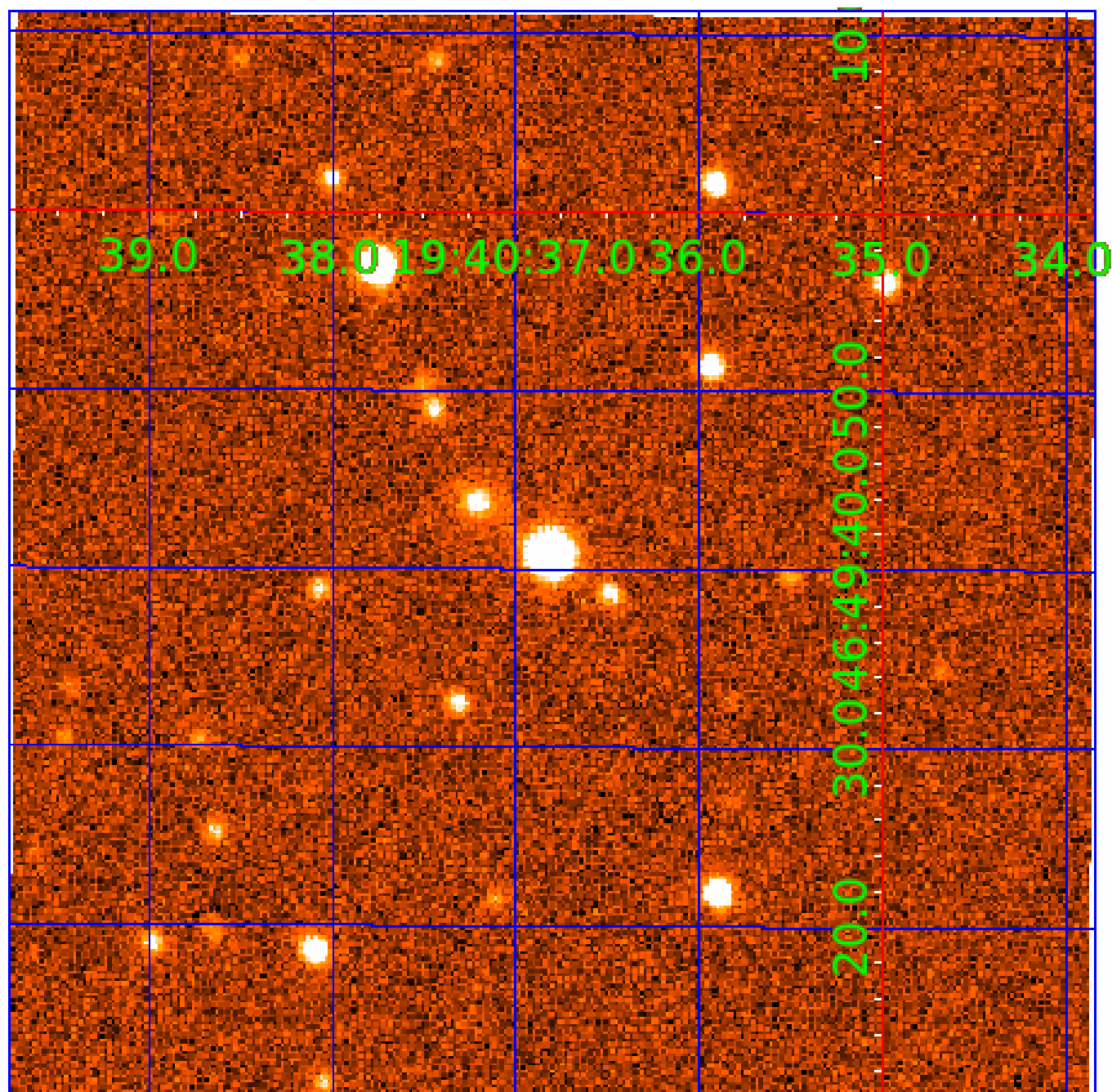


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 009959368

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009959368-01	OBS	7980.01	1.332538	132.070078	49.0	4.890	7.7	7.8	0.89	5161	0.73	1026.05
009959368-02	OBS	No	168.302406	151.598945	311.6	11.877	9.6	3.9	0.89	5161	1.69	1.62
009959368-03	OBS	No	321.220016	365.764063	947.3	19.408	9.0	7.6	0.89	5161	2.76	0.68

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009959368-01	OBS	FP	0.00	0	0	1	1	CENT_FEW_DIFFS—HALO_GHOST—EPHEM_MATCH
009959368-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV— INCONSISTENT_TRANS—CENT_FEW_DIFFS
009959368-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS

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

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

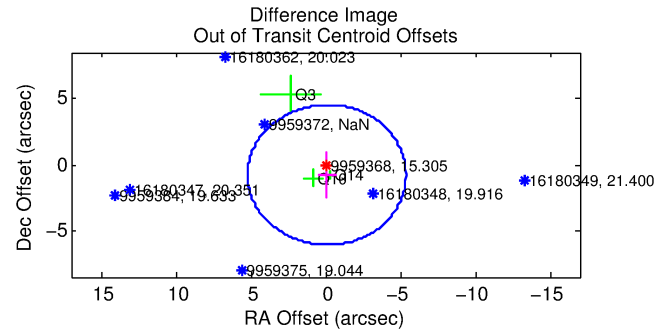
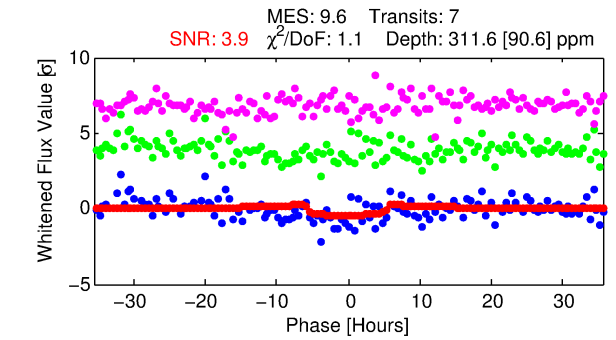
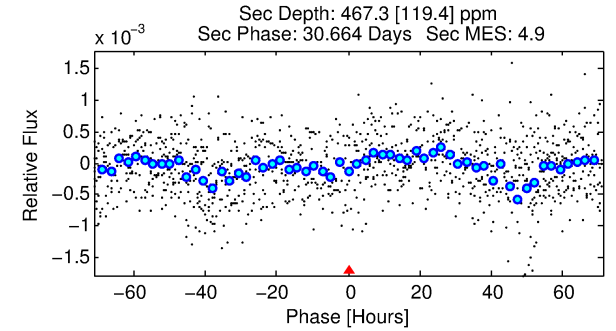
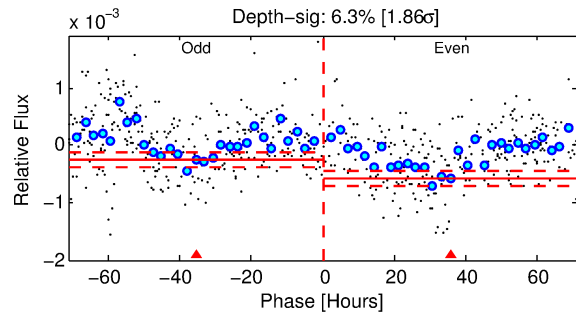
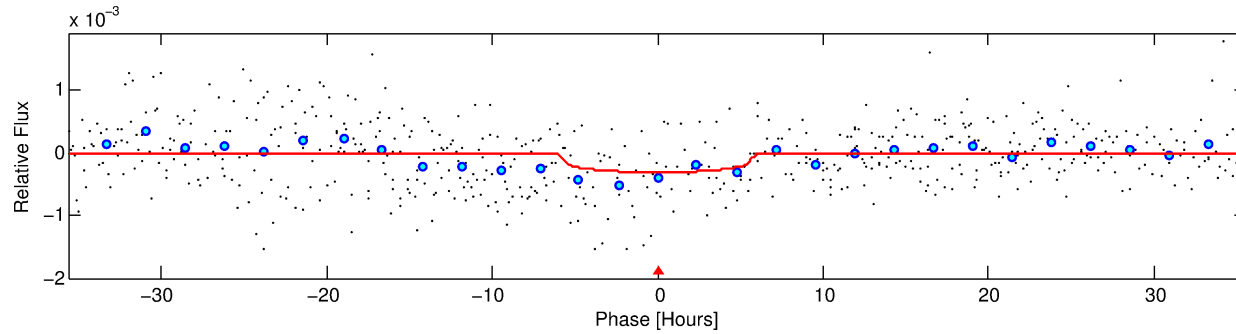
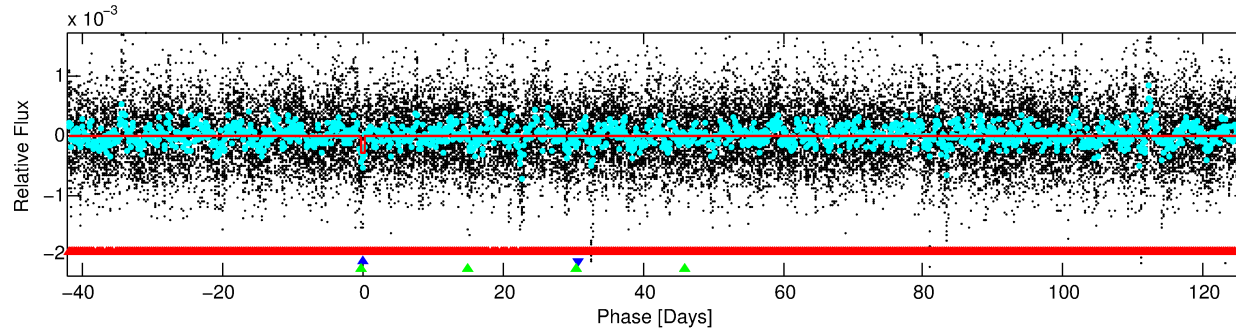
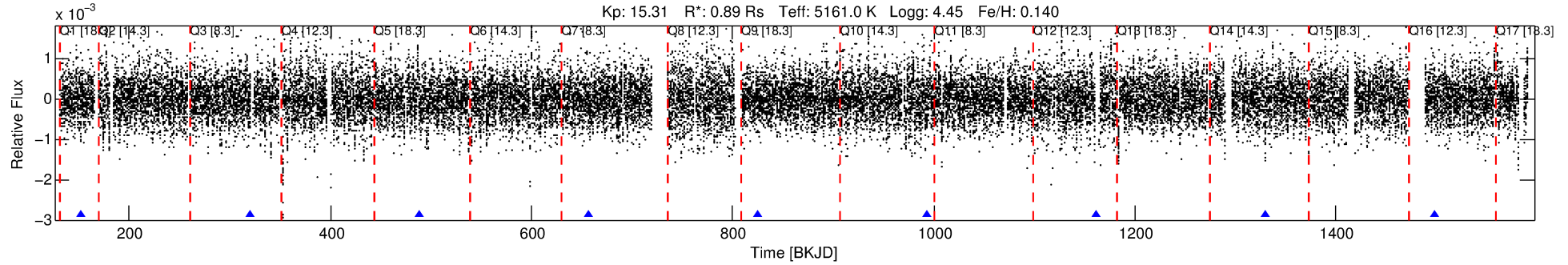
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009959368-02

No Significant Match Found

# DV One-Page Summary

KIC: 9959368 Candidate: 2 of 3 Period: 168.302 d



## DV Fit Results:

Period = 168.30241 [0.00785] d  
Epoch = 151.5989 [0.0372] BKJD  
Rp/R\* = 0.0173 [0.0211]  
a/R\* = 78.93 [348.09]  
b = 0.71 [3.13]  
Seff = 1.62 [0.48]  
Teq = 288 [21] K  
Rp = 1.68 [2.08] Re  
a = 0.5589 [0.0922] AU  
Ag = 28287.83 [69795.68] [0.41 $\sigma$ ]  
Teffp = 5768 [3542] K [1.55 $\sigma$ ]

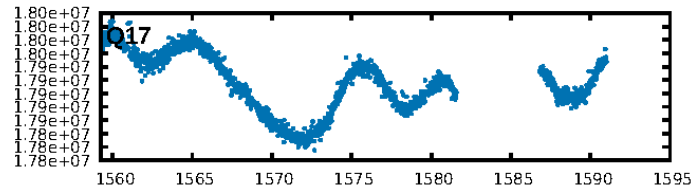
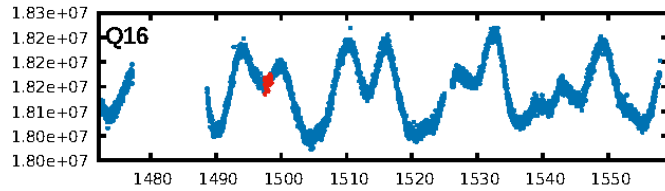
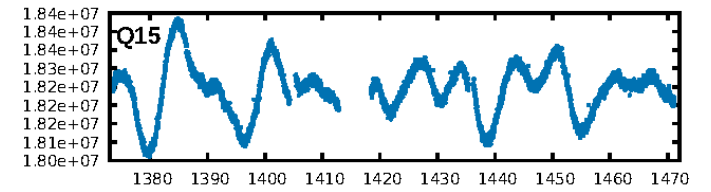
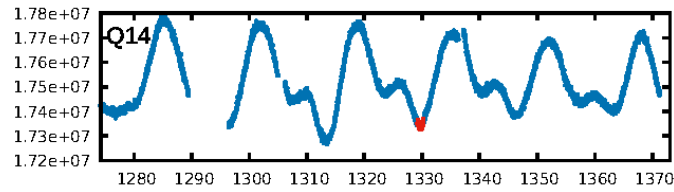
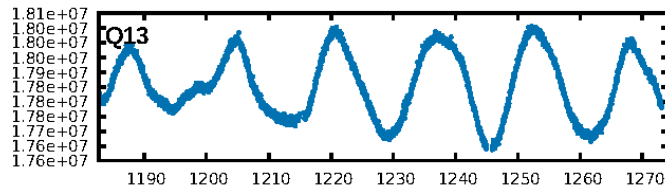
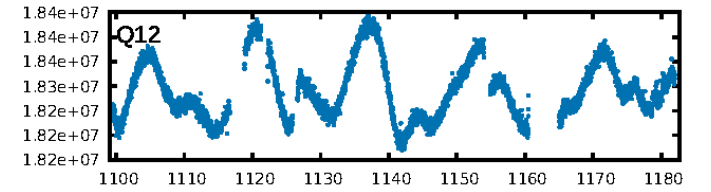
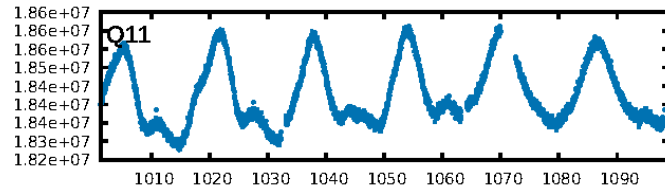
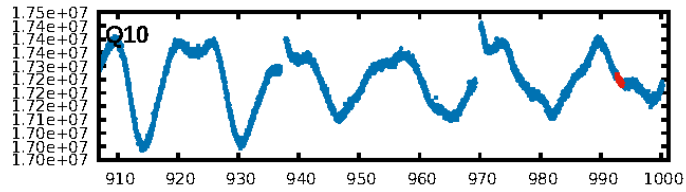
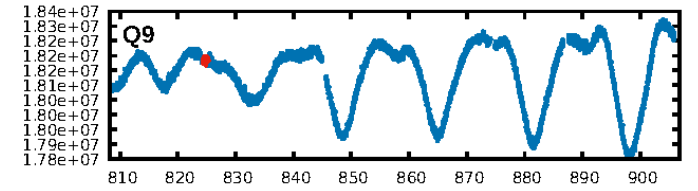
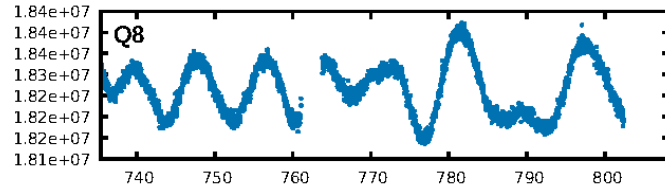
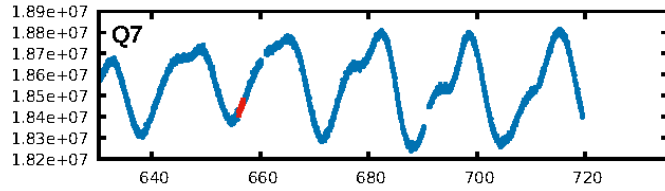
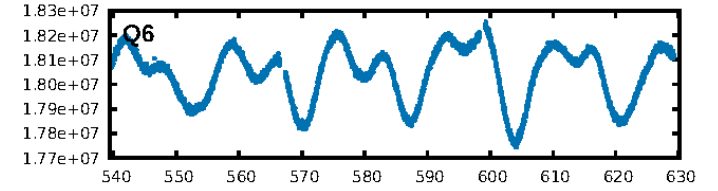
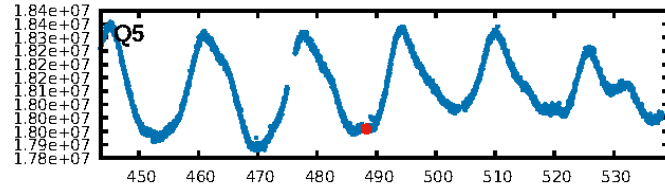
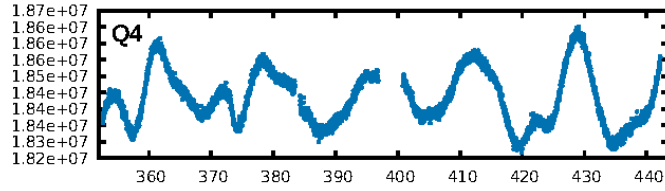
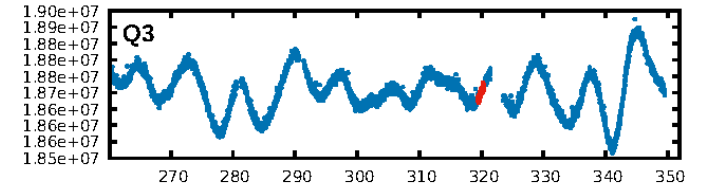
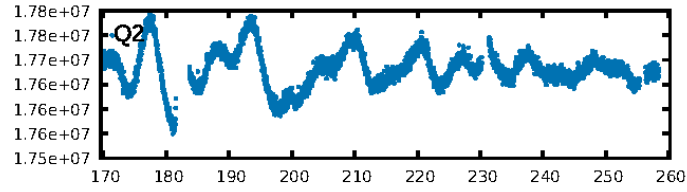
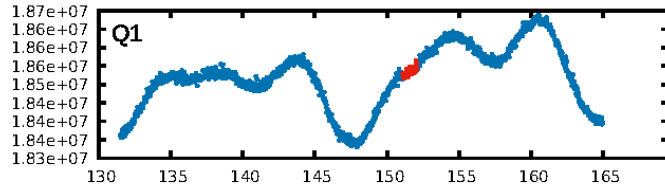
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [312.00 $\sigma$ ]  
LongPeriod-sig: 100.0% [161.29 $\sigma$ ]  
ModelChiSquare2-sig: 12.2%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 5.90e-13  
RollingBand-fgt: 1.00 [6/6]  
**GhostDiagnostic-chr: -1.592**  
Centroid-sig: 11.1%  
Centroid-so: 2.279 arcsec [1.57 $\sigma$ ]  
OotOffset-rm: 0.782 arcsec [0.44 $\sigma$ ]  
OotOffset-st: 2/1/0/0 [3]  
KicOffset-rm: 0.730 arcsec [0.36 $\sigma$ ]  
KicOffset-st: 2/1/0/0 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 0.00 [0/7]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 01:00:52 Z

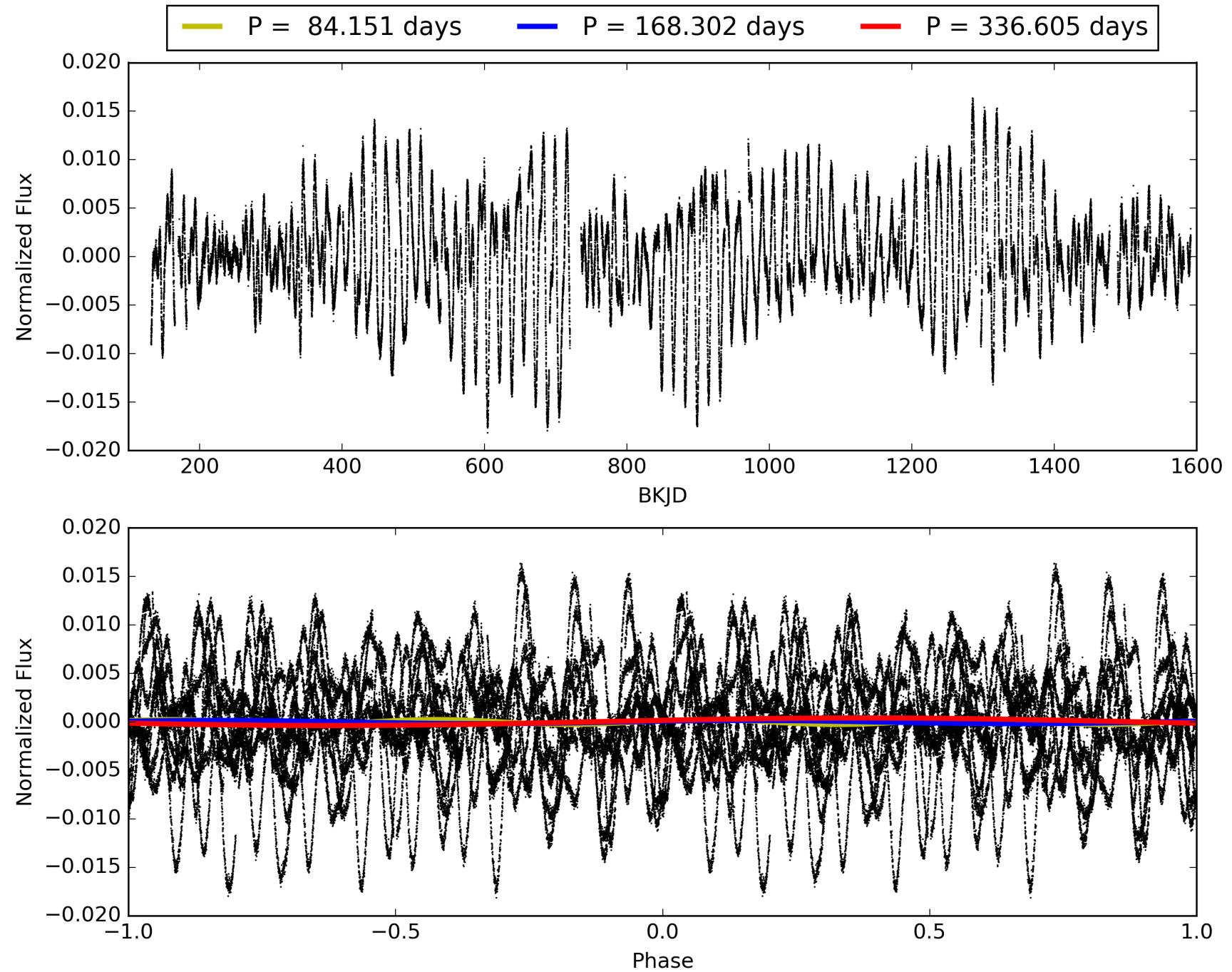
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 009959368-02, PDC Light Curves



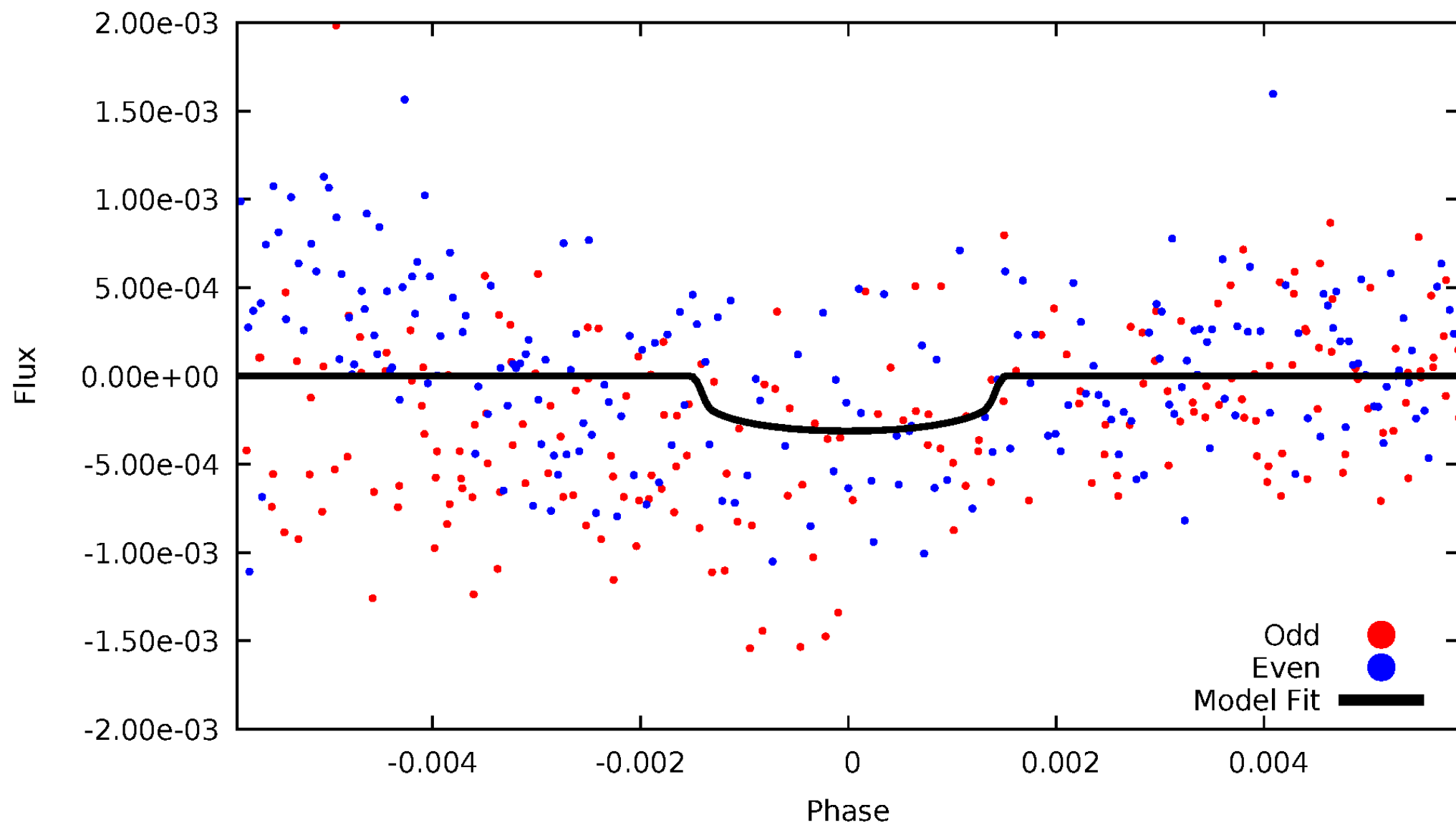


# TCE 009959368-02



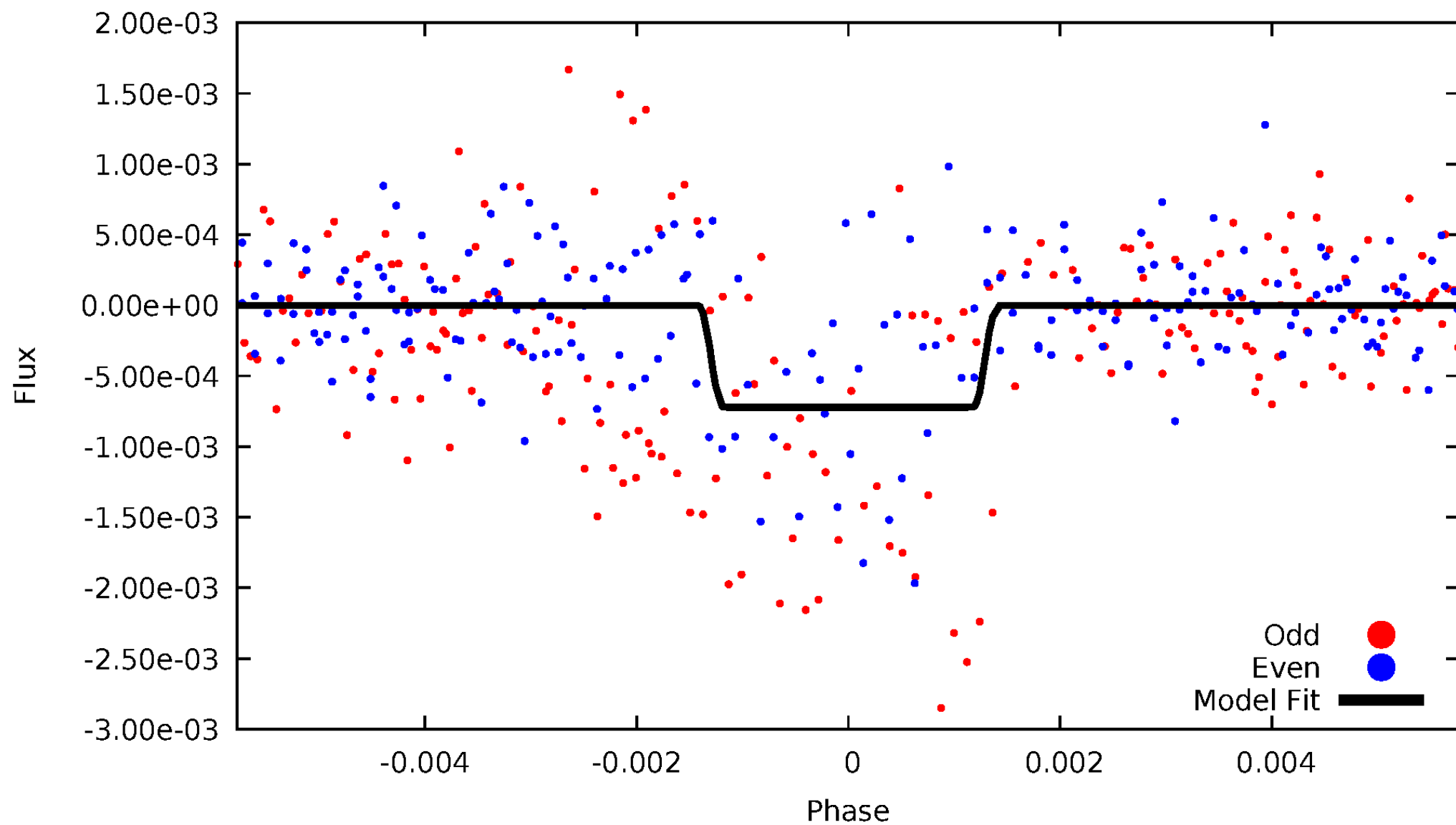
# DV Odd/Even

TCE 009959368-02



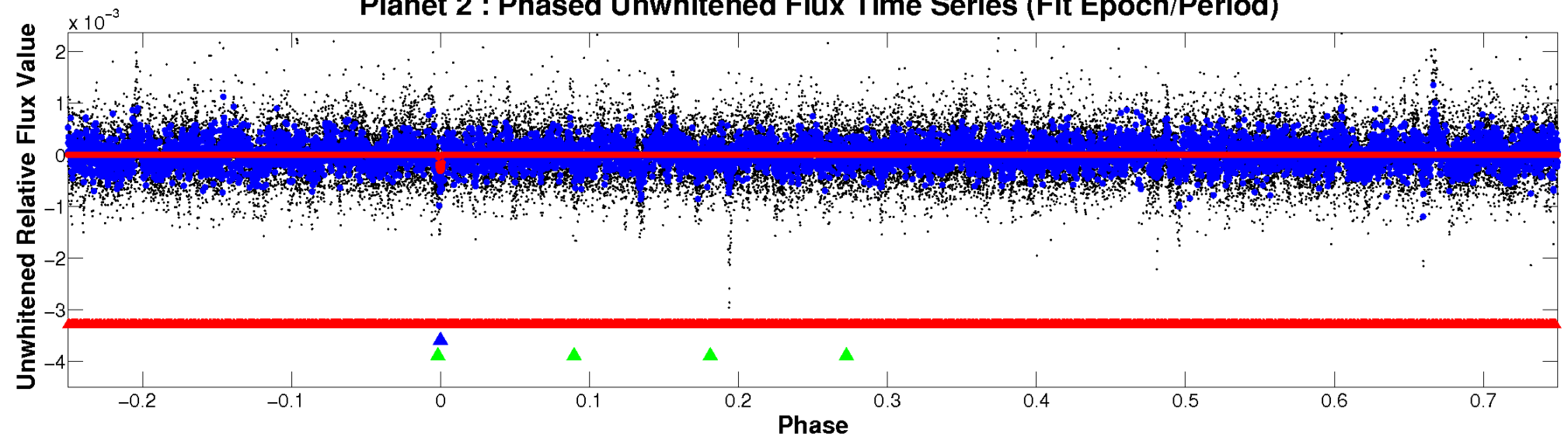
# ALT Odd/Even

TCE 009959368-02

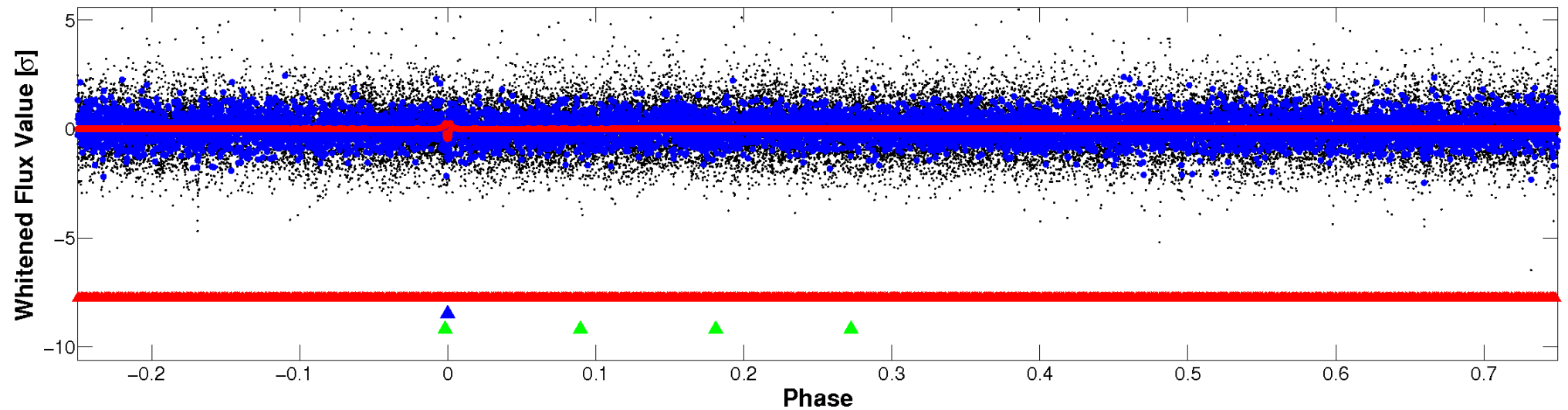


# Non-Whitened Vs. Whitened Light Curve

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

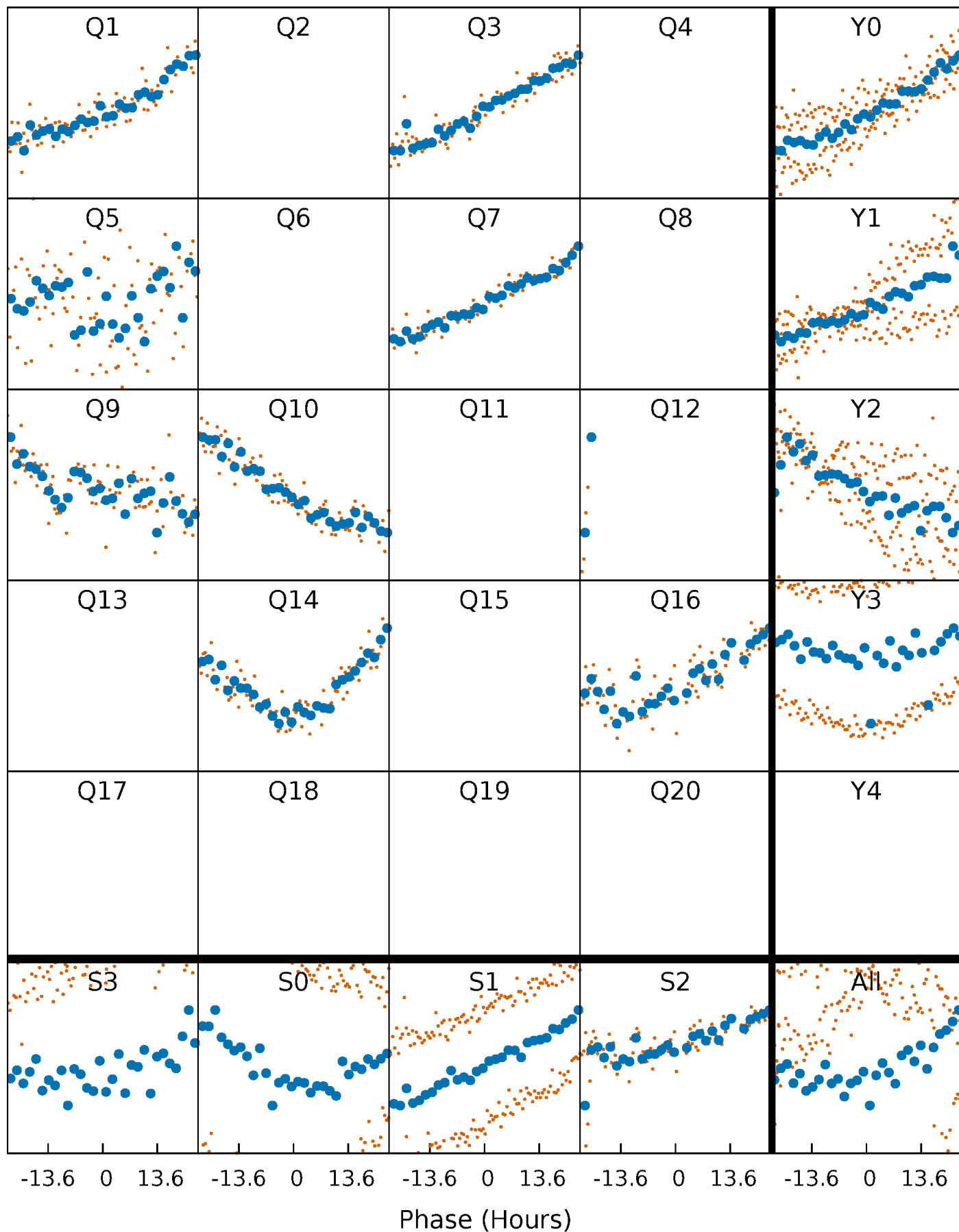


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

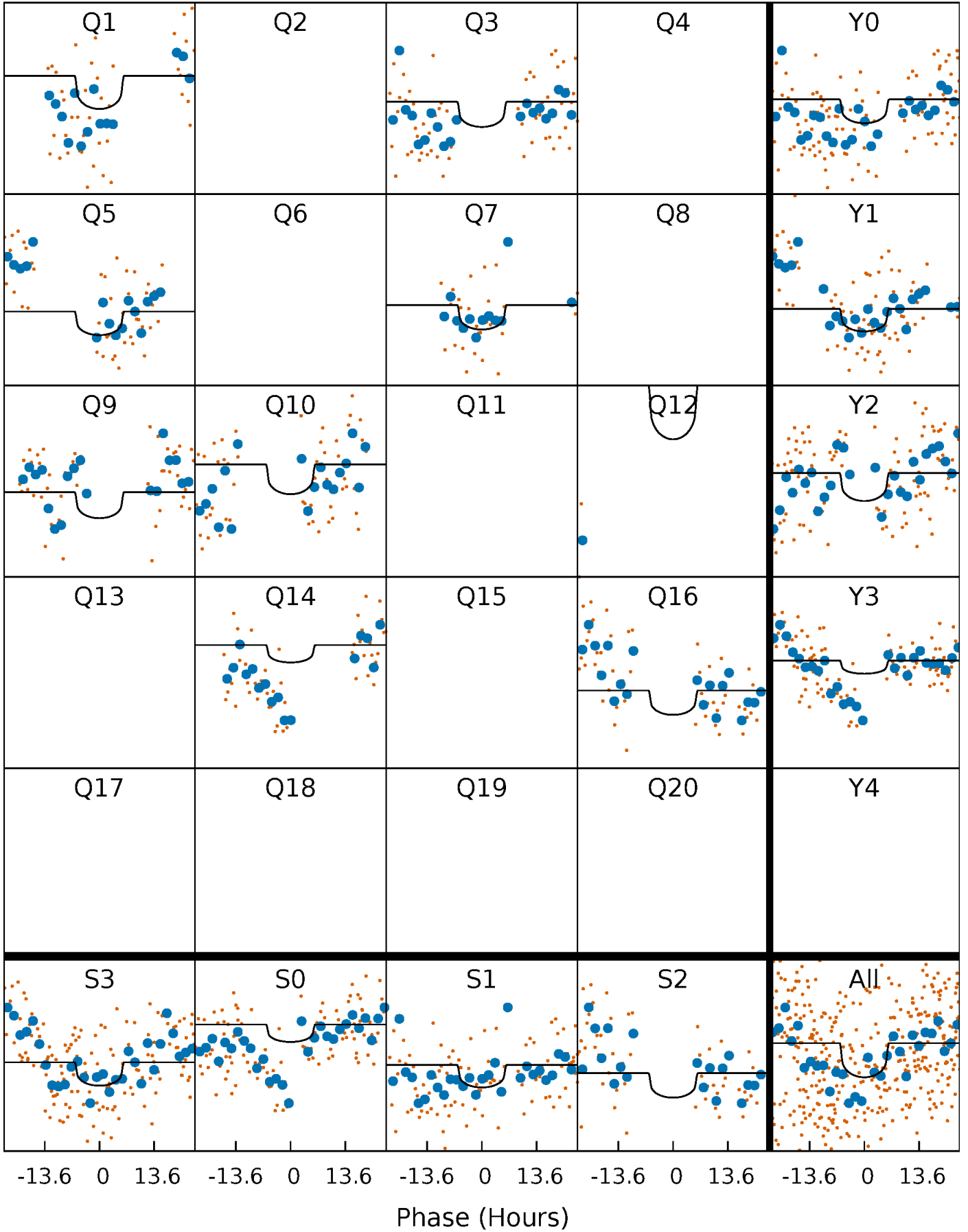
TCE 009959368-02 P=168.302406 Days  $T_0=151.598945$  (BKJD)





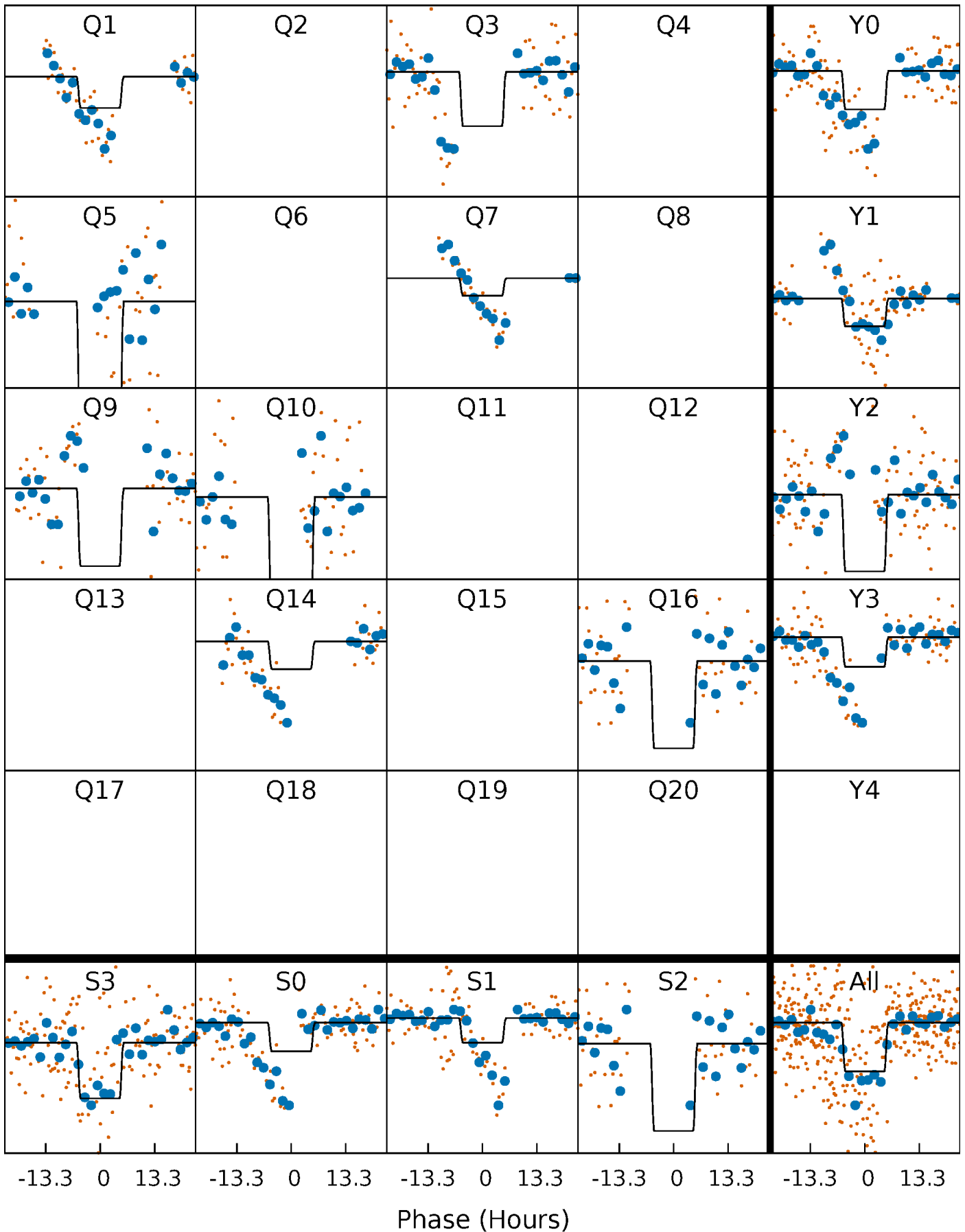
# DV Quarter-Phased Transit Curves

TCE 009959368-02   P=168.302406 Days    $T_0=151.598945$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

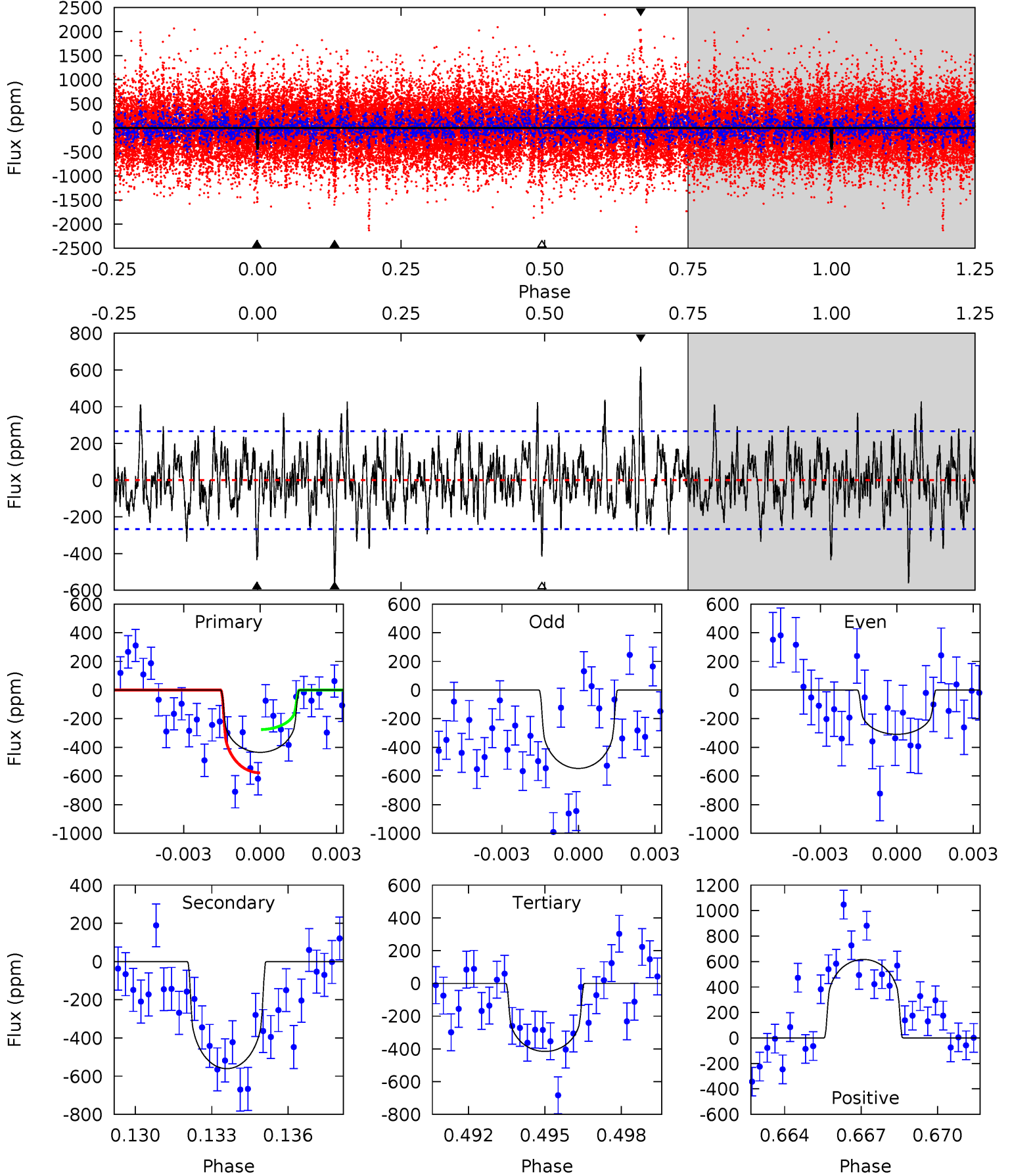
TCE 009959368-02 P=168.304422 Days  $T_0=151.615895$  (BKJD)



# DV Model-Shift Uniqueness Test

009959368-02, P = 168.302406 Days, E = 151.598945 Days

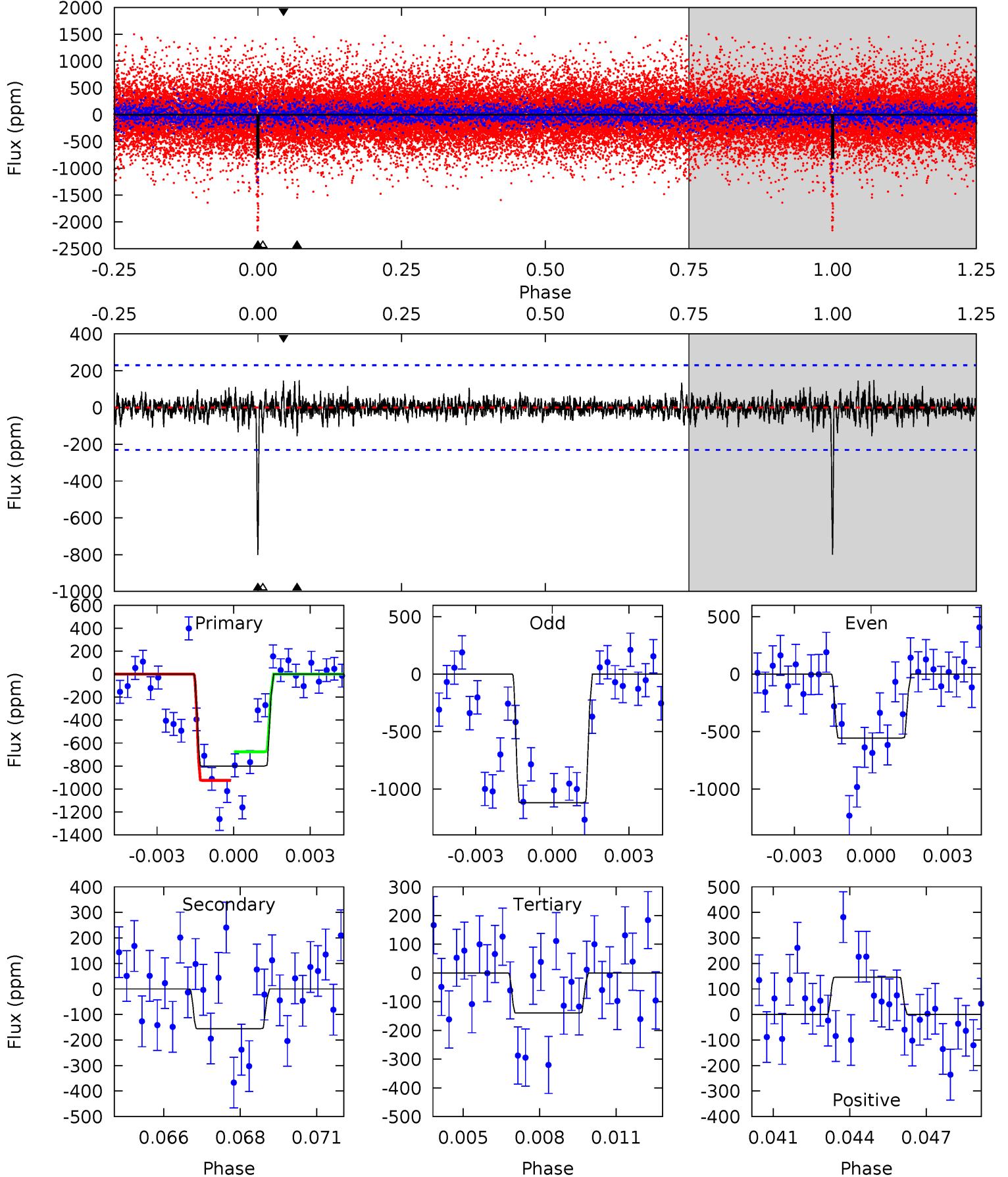
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.59	11.1	8.21	12.2	5.25	2.97	2.49	0.38	-3.58	2.86	-1.10	2.35	1.22	0.52	2.98



# Alt Model-Shift Uniqueness Test

009959368-02, P = 168.304422 Days, E = 151.615895 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
18.3	3.56	3.19	3.34	5.27	3.00	0.75	15.1	15.0	0.38	0.22	6.56	2.16	0.16	0



### Stellar Parameters For KIC 009959368

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5161^{+170}_{-154}$	$4.452^{+0.117}_{-0.156}$	$0.140^{+0.250}_{-0.300}$	$0.892^{+0.152}_{-0.114}$	$0.821^{+0.085}_{-0.064}$	$1.629^{+0.791}_{-0.626}$
	+3%/-3%	+3%/-4%	+179%/-214%	+17%/-13%	+10%/-8%	+49%/-38%
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 009959368-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-561 \pm 51$	$2.30^{+1.85}_{-1.46}$	$404^{+24}_{-22}$	$5244^{+3573}_{-1090}$	$18748^{+114894}_{-13097}$
Alt.	$-156 \pm 44$	$2.97^{+2.15}_{-1.61}$	$403^{+24}_{-21}$	$3669^{+1294}_{-571}$	$2962^{+11525}_{-2015}$

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

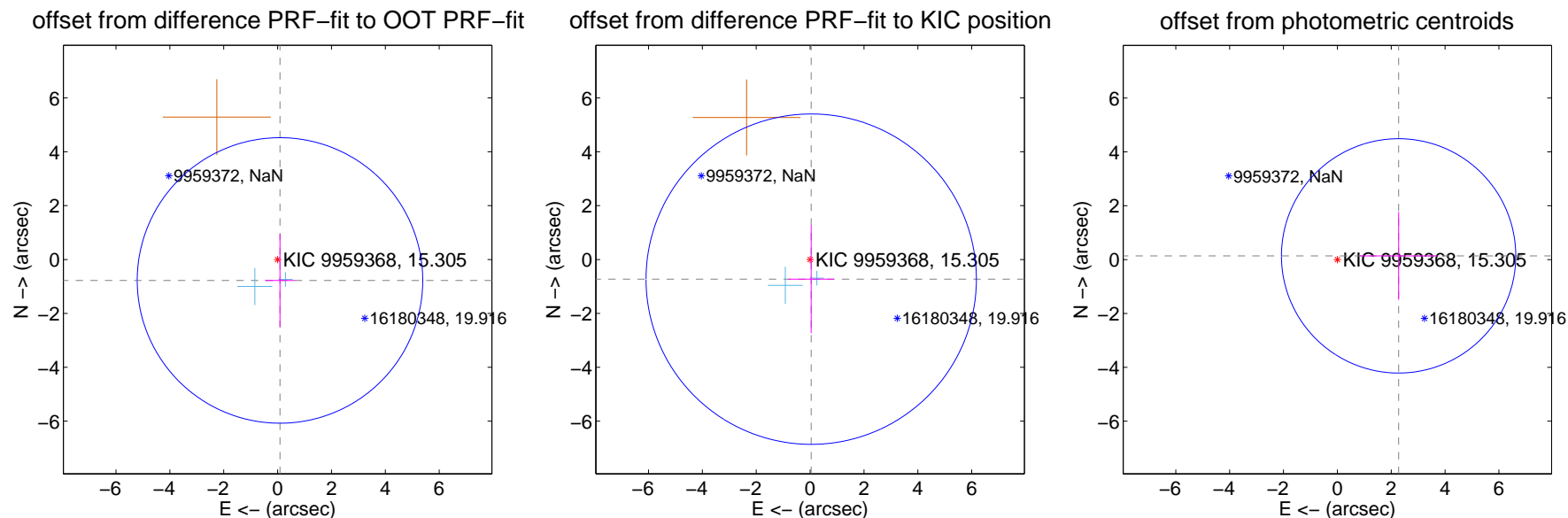
## DV Centroid Data

Supplemental centroid analysis for 009959368-02. Kepler magnitude: 15.30. Transit SNR 3.90

There are 2 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.06 arcsec

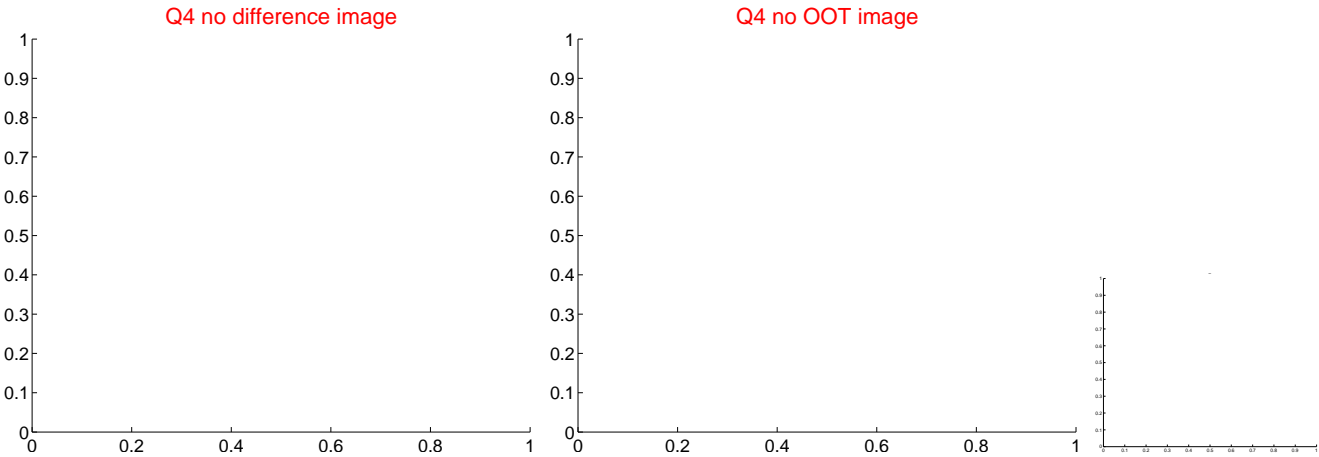
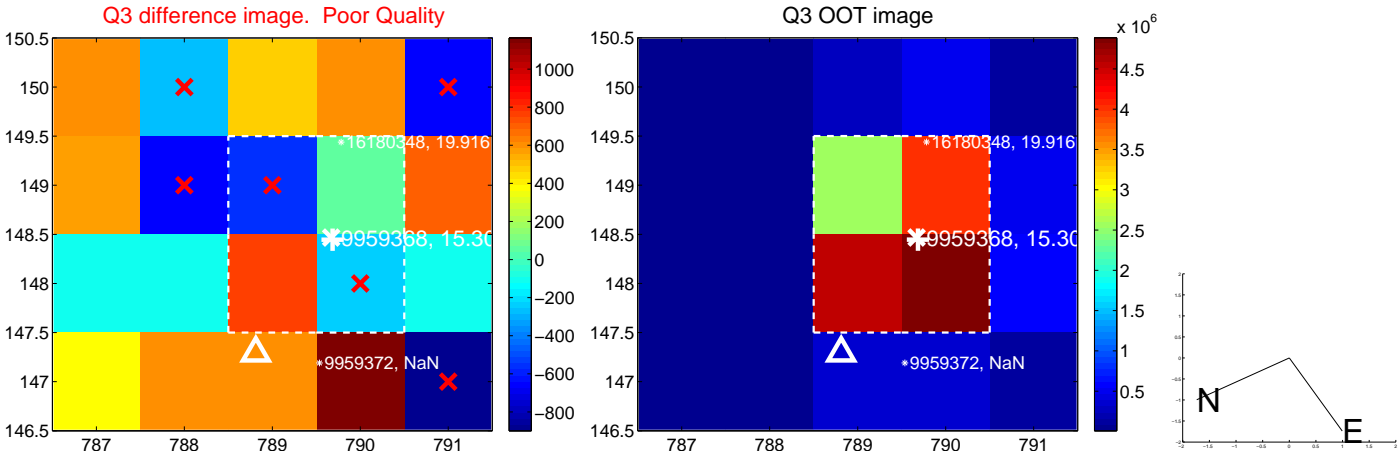
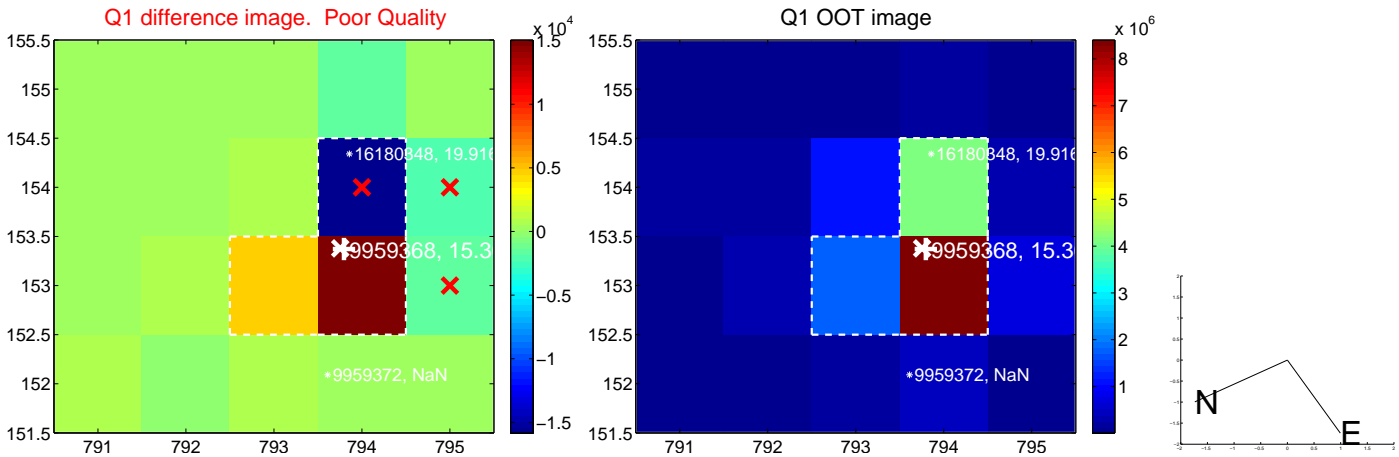
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.782 \pm 1.767$	0.44	$-0.088 \pm 0.555$	$-0.777 \pm 1.720$
PRF-fit source offset from KIC position	$0.730 \pm 2.045$	0.36	$-0.041 \pm 0.845$	$-0.729 \pm 2.002$
photometric centroid source offset	$2.28 \pm 1.45$	1.57	$-2.27 \pm 1.45$	$0.14 \pm 1.63$



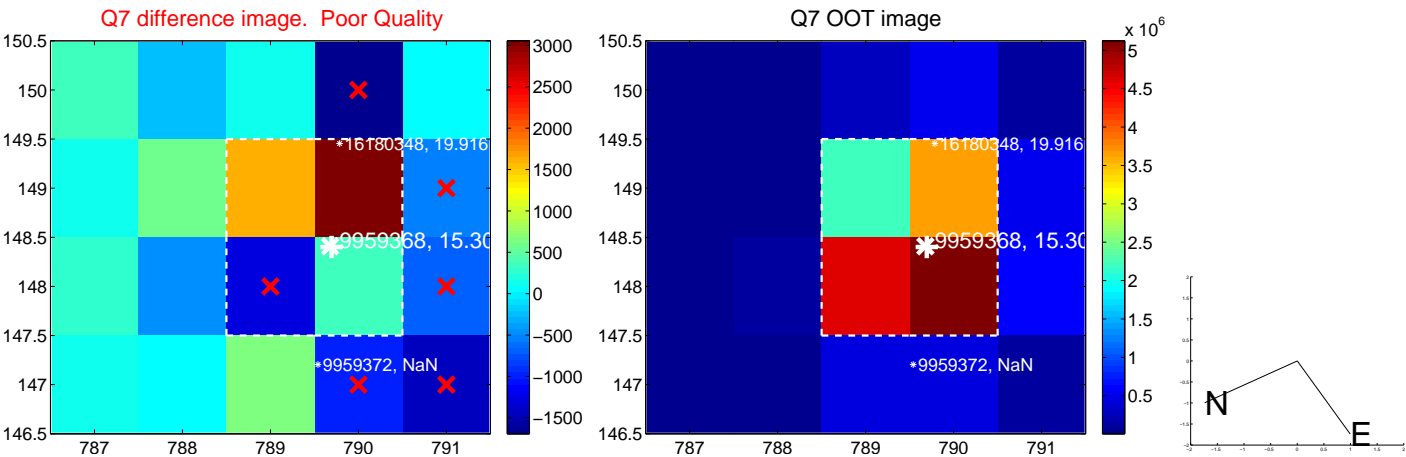
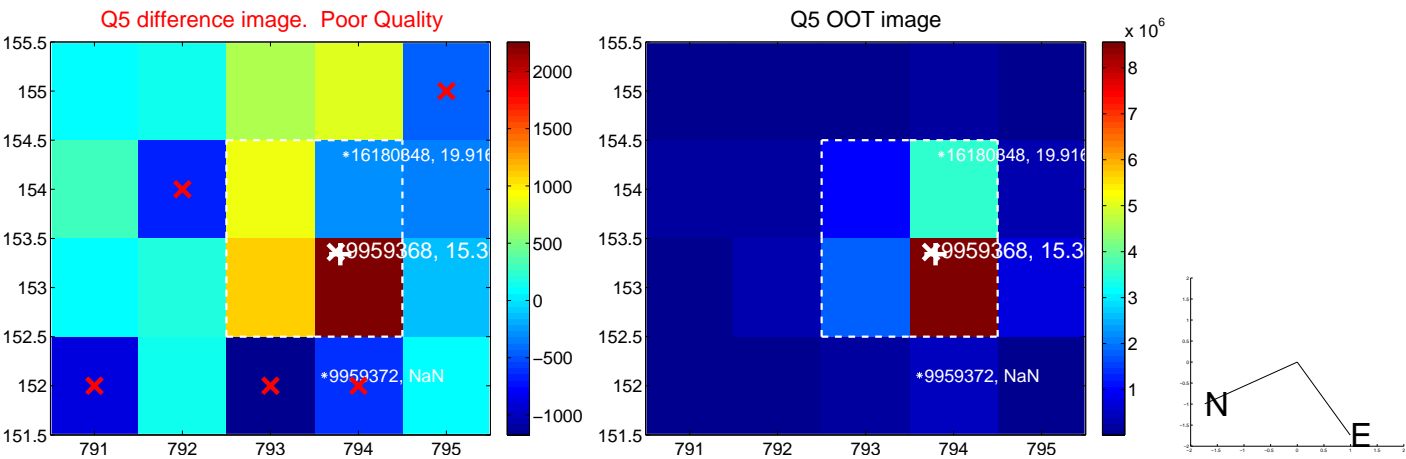
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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



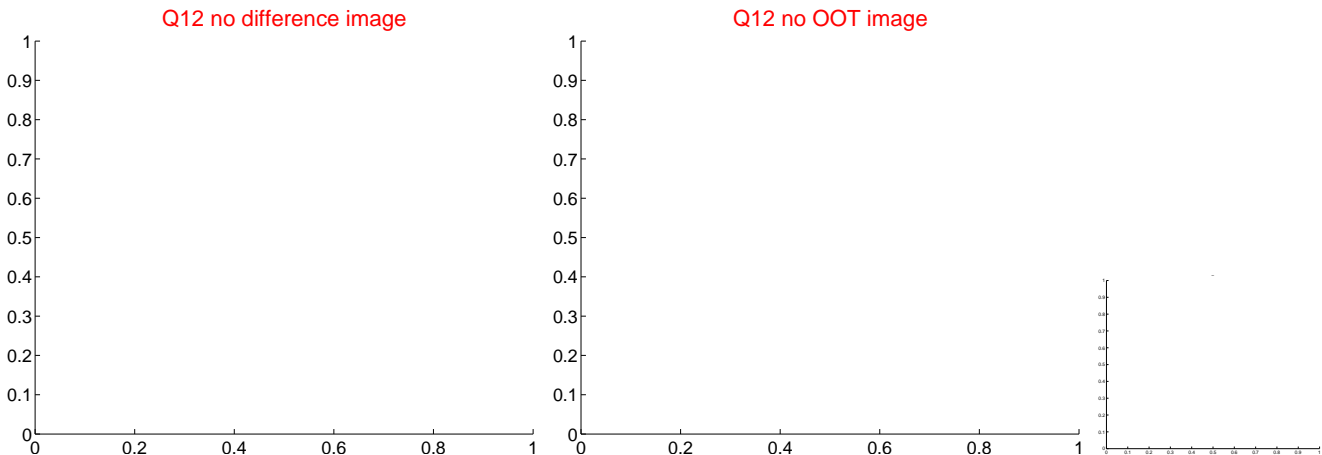
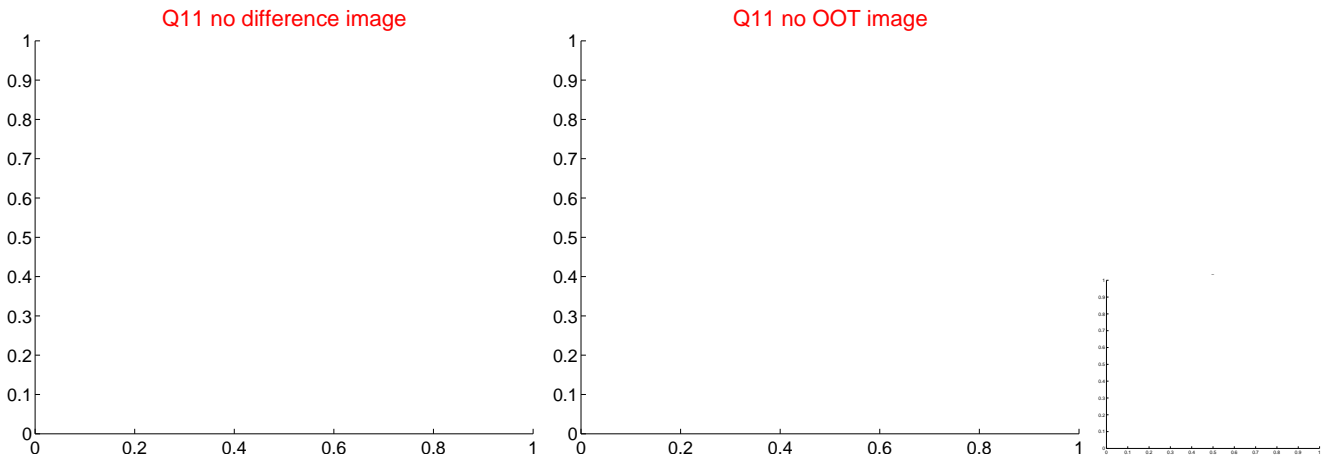
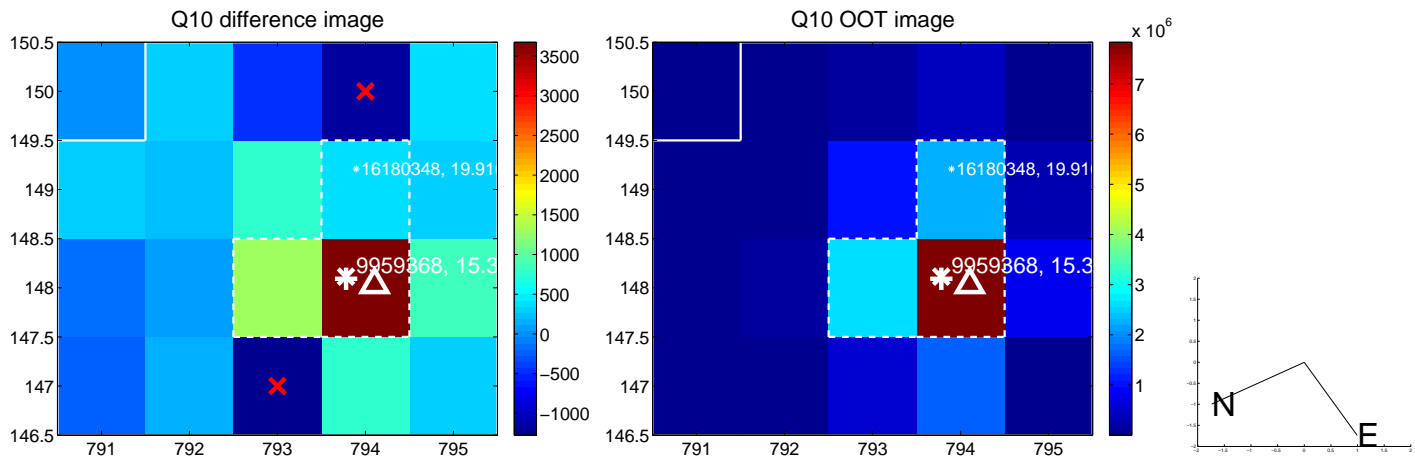
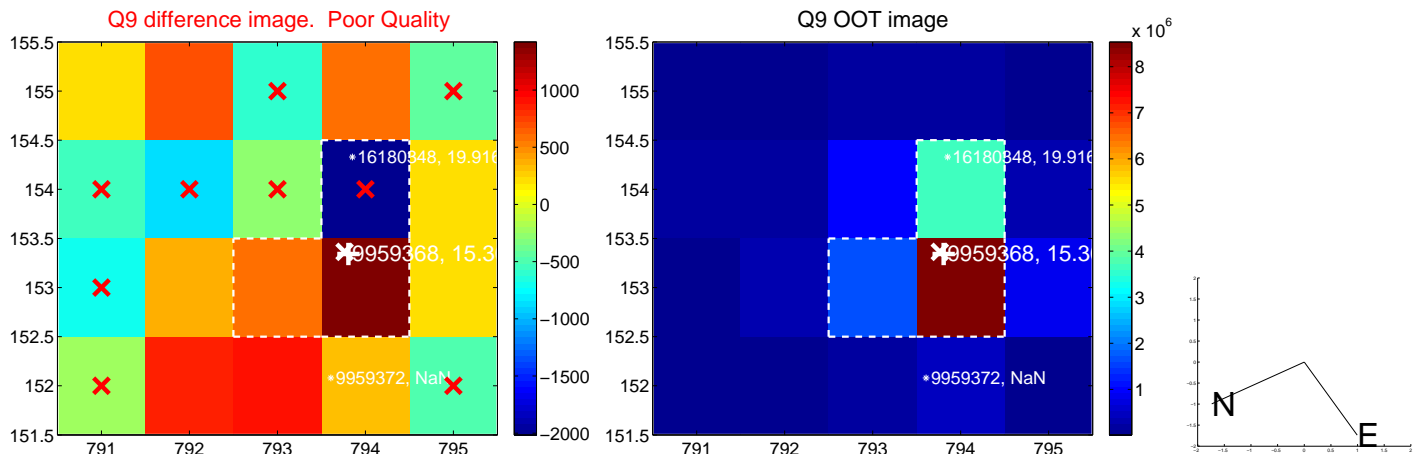
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



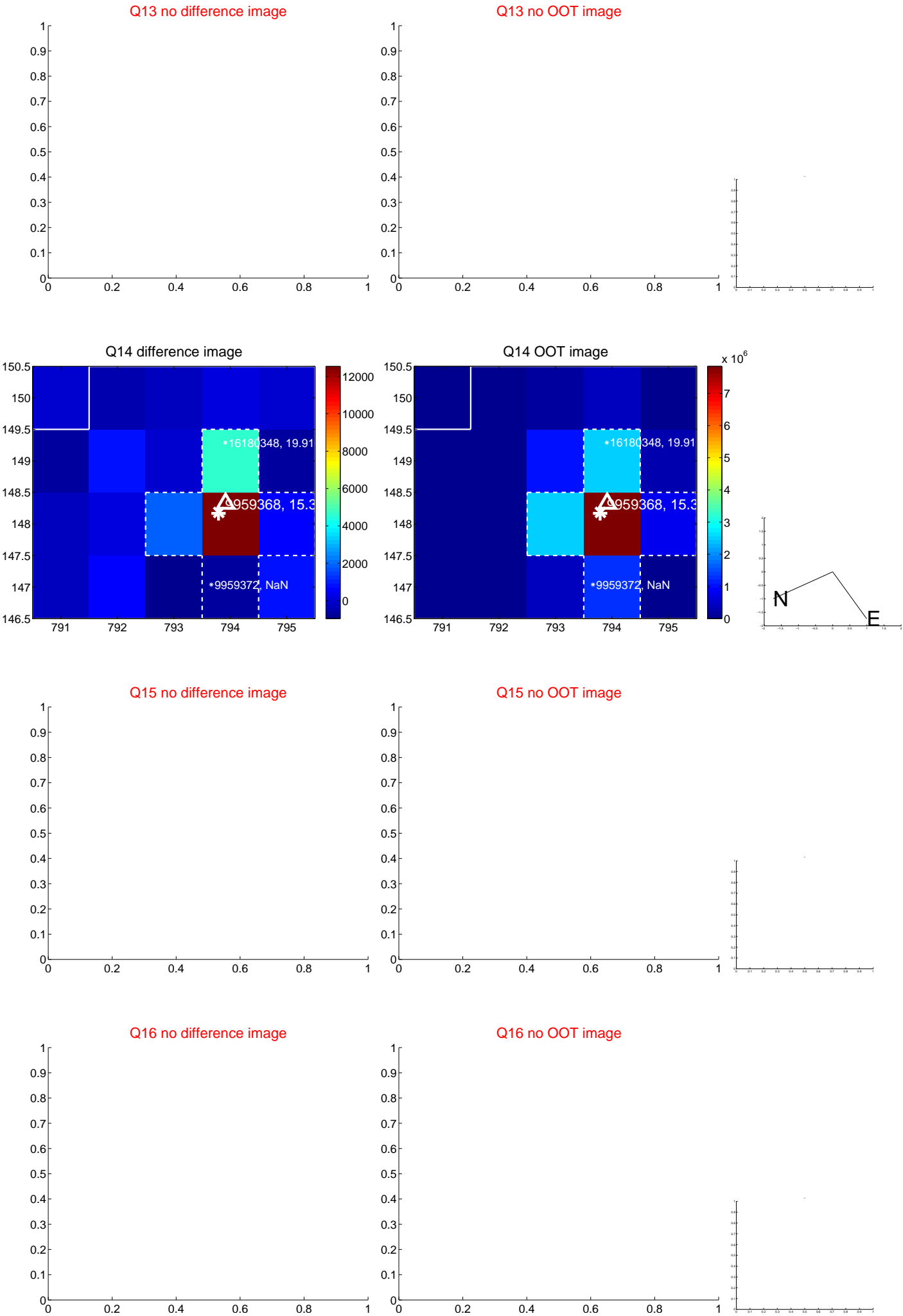
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.



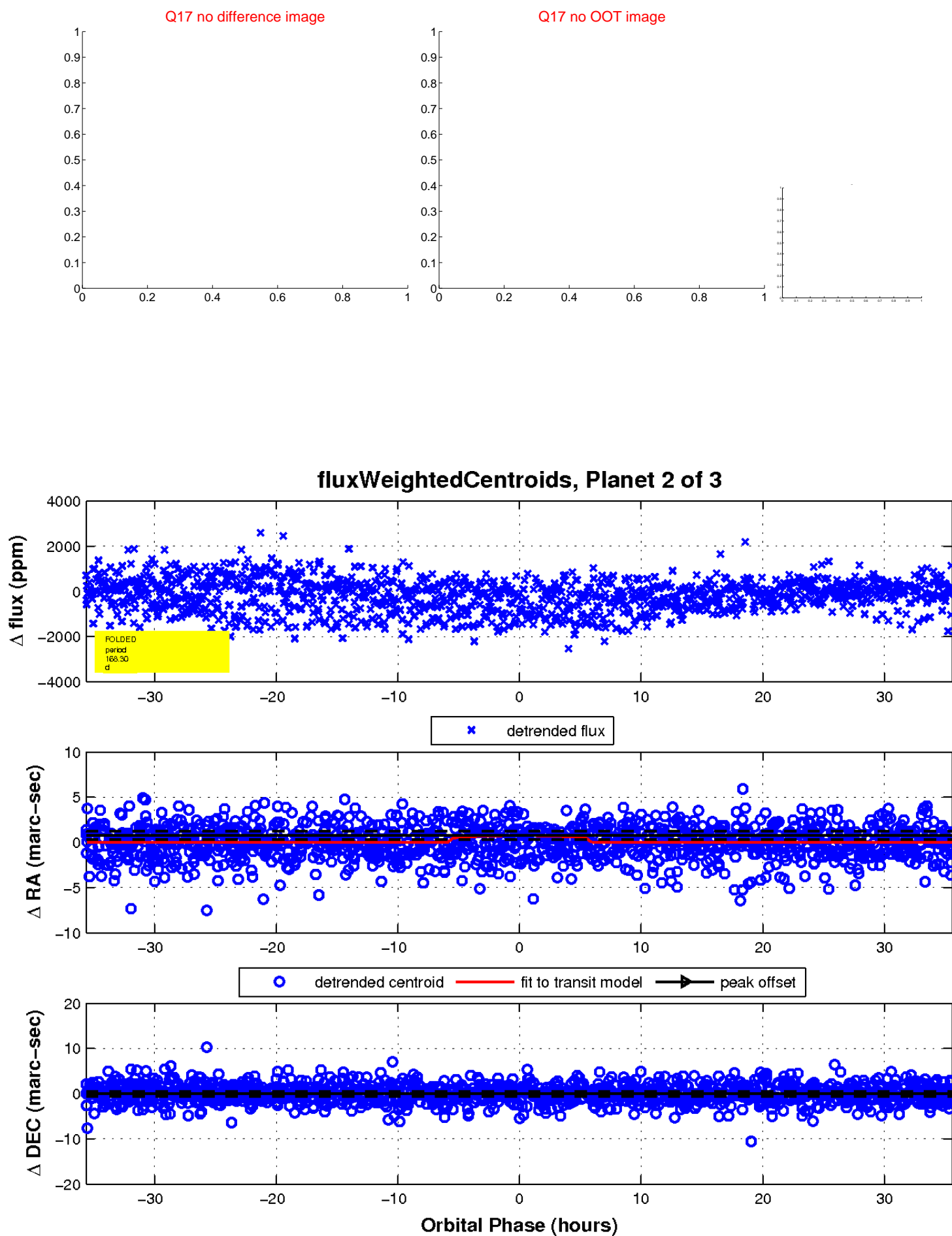
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



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

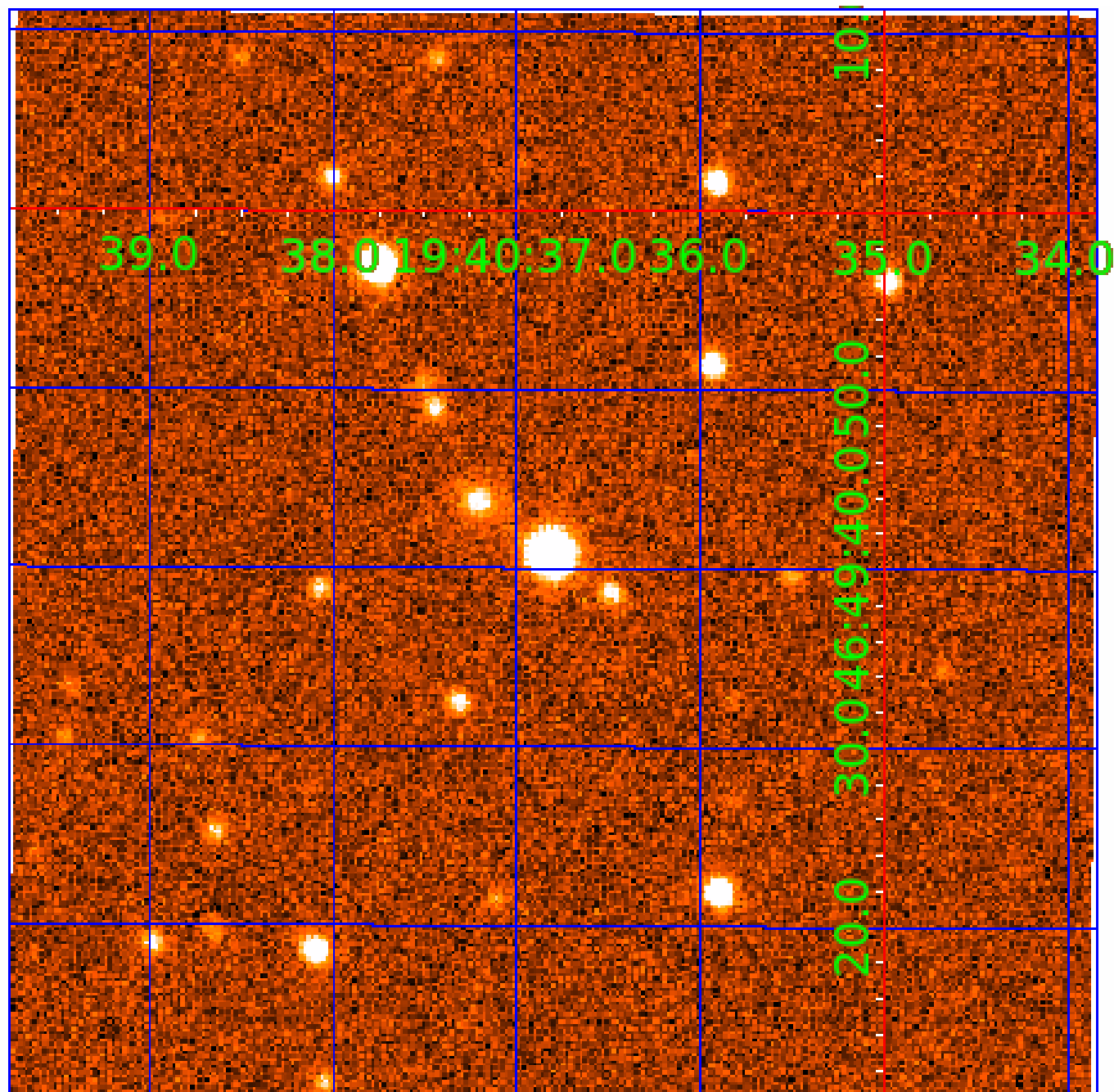


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 009959368

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009959368-01	OBS	7980.01	1.332538	132.070078	49.0	4.890	7.7	7.8	0.89	5161	0.73	1026.05
009959368-02	OBS	No	168.302406	151.598945	311.6	11.877	9.6	3.9	0.89	5161	1.69	1.62
009959368-03	OBS	No	321.220016	365.764063	947.3	19.408	9.0	7.6	0.89	5161	2.76	0.68

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009959368-01	OBS	FP	0.00	0	0	1	1	CENT_FEW_DIFFS—HALO_GHOST—EPHEM_MATCH
009959368-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009959368-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS

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

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

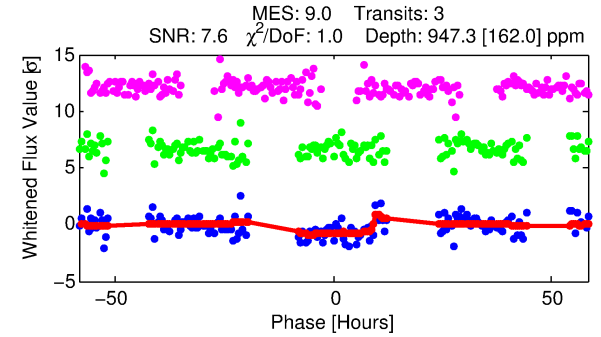
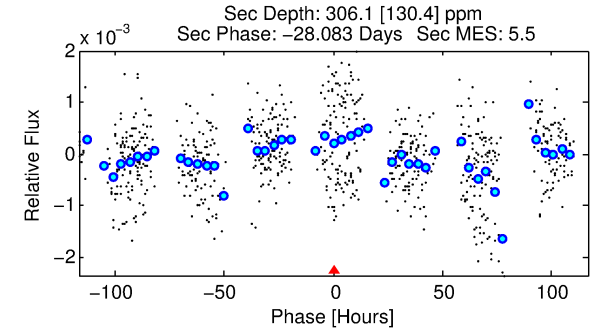
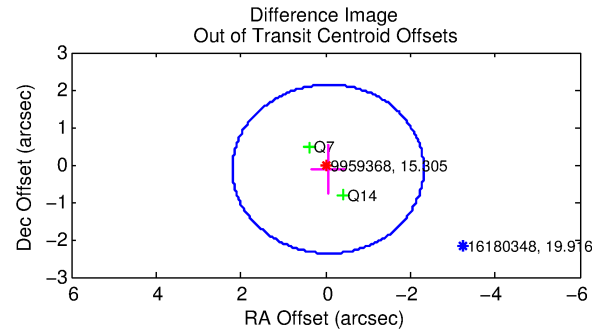
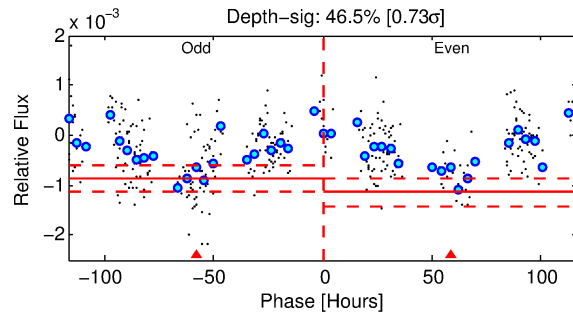
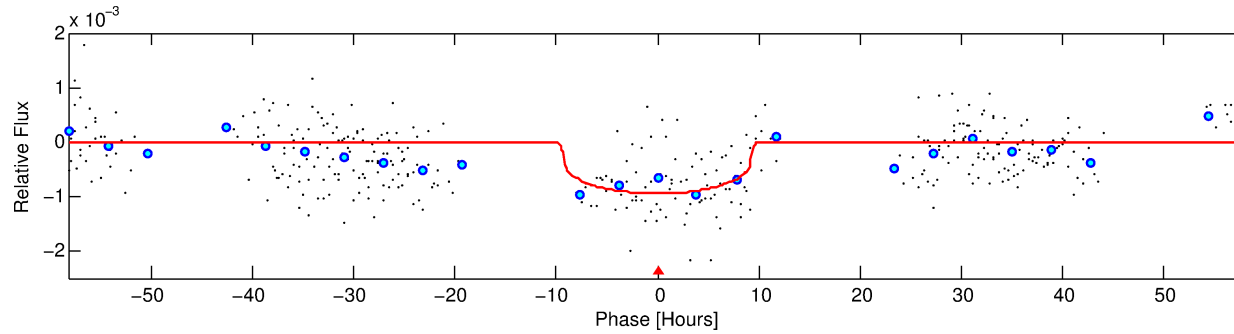
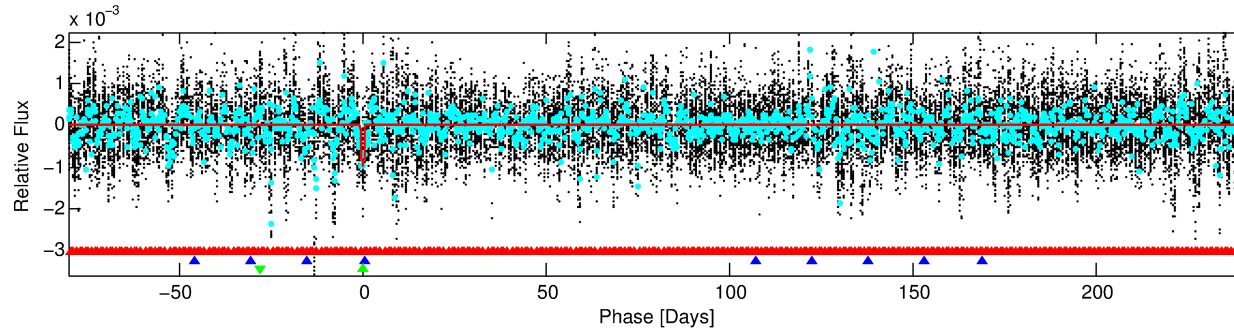
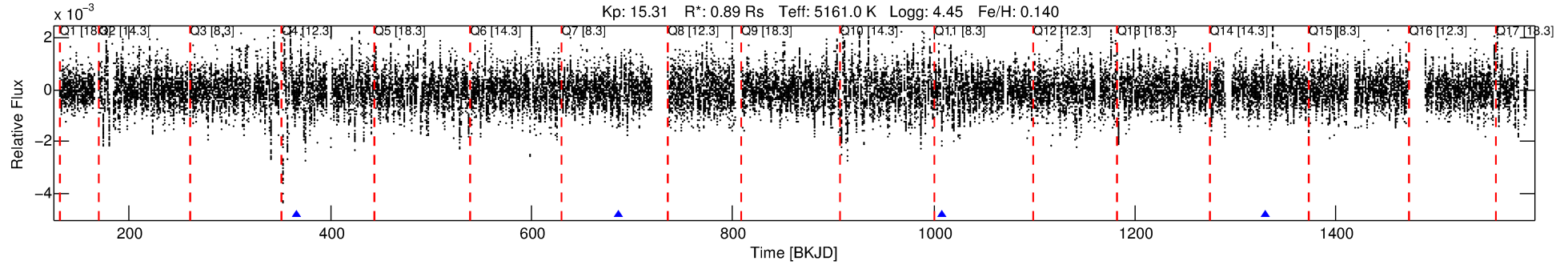
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009959368-03

No Significant Match Found

# DV One-Page Summary

KIC: 9959368 Candidate: 3 of 3 Period: 321.220 d



## DV Fit Results:

Period = 321.22002 [0.02797] d  
Epoch = 365.7641 [0.0604] BKJD  
Rp/R\* = 0.0283 [0.0141]  
a/R\* = 115.82 [197.33]  
b = 0.47 [2.81]  
Seff = 0.68 [0.20]  
Teq = 232 [17] K  
Rp = 2.76 [1.45] Re  
a = 0.8600 [0.1419] AU  
Ag = 16385.47 [18274.36] [0.90 $\sigma$ ]  
Teff = 4056 [1107] K [3.46 $\sigma$ ]

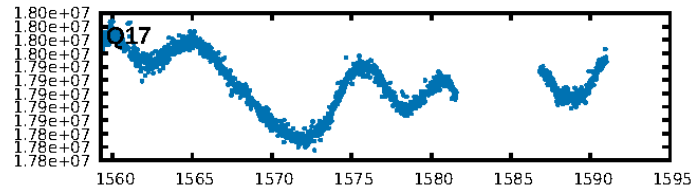
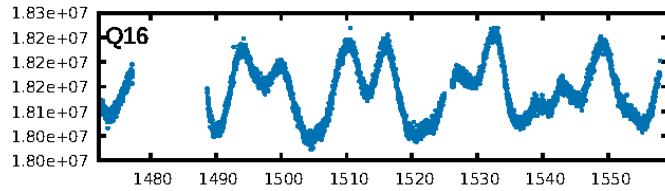
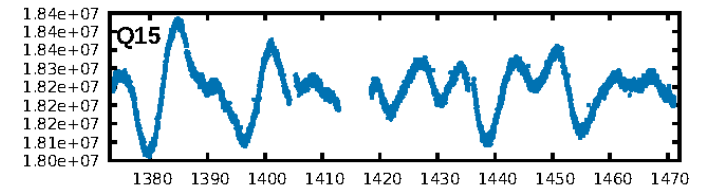
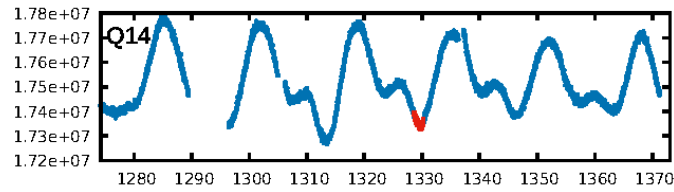
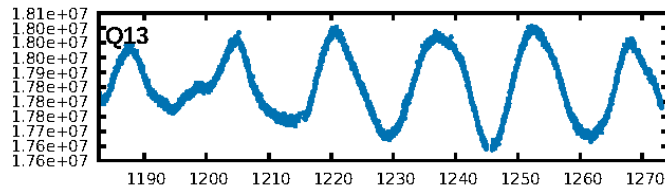
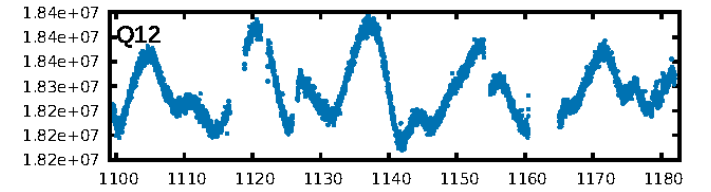
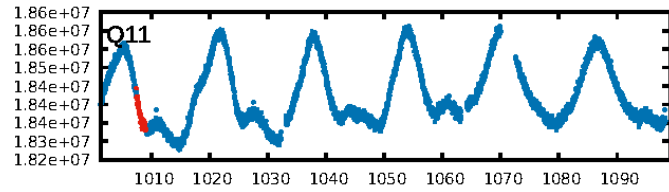
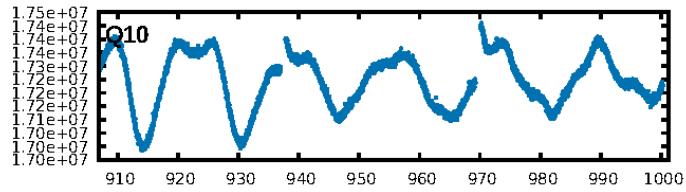
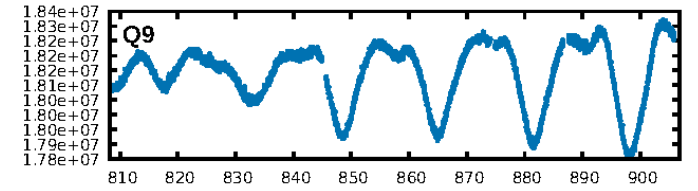
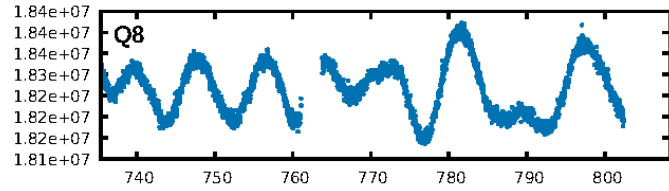
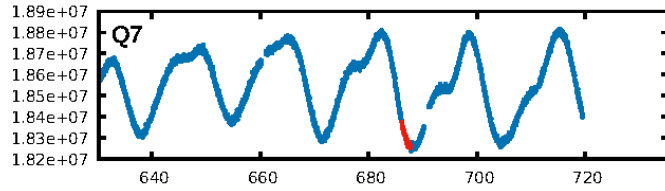
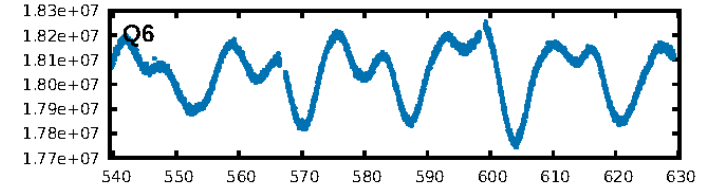
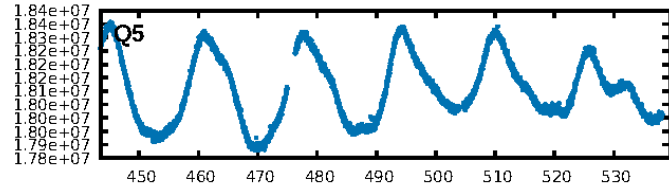
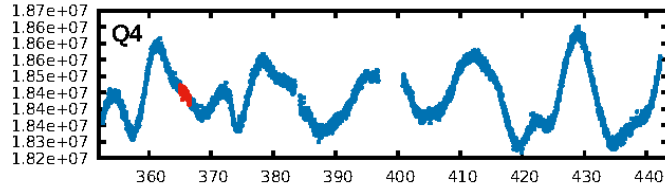
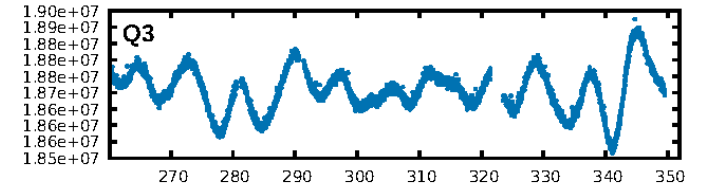
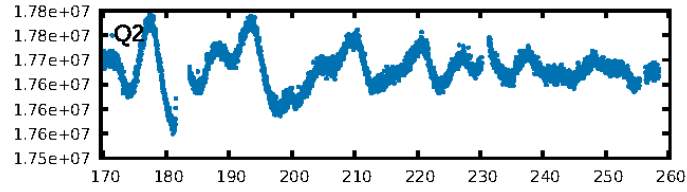
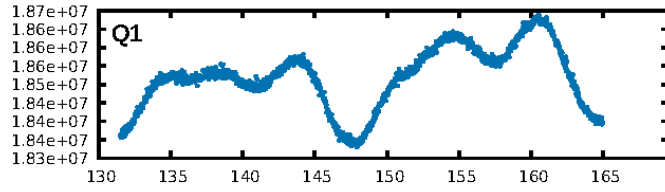
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [161.29 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 24.4%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 1.82e-09**  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -3.45  
Centroid-sig: 10.9%  
Centroid-so: 1.108 arcsec [1.91 $\sigma$ ]  
OotOffset-rm: 0.132 arcsec [0.18 $\sigma$ ]  
OotOffset-st: 1/1/0/0 [2]  
KicOffset-rm: 0.111 arcsec [0.16 $\sigma$ ]  
KicOffset-st: 1/1/0/0 [2]  
DiffImageQuality-fgm: 1.00 [2/2]  
DiffImageOverlap-fno: 0.00 [0/3]

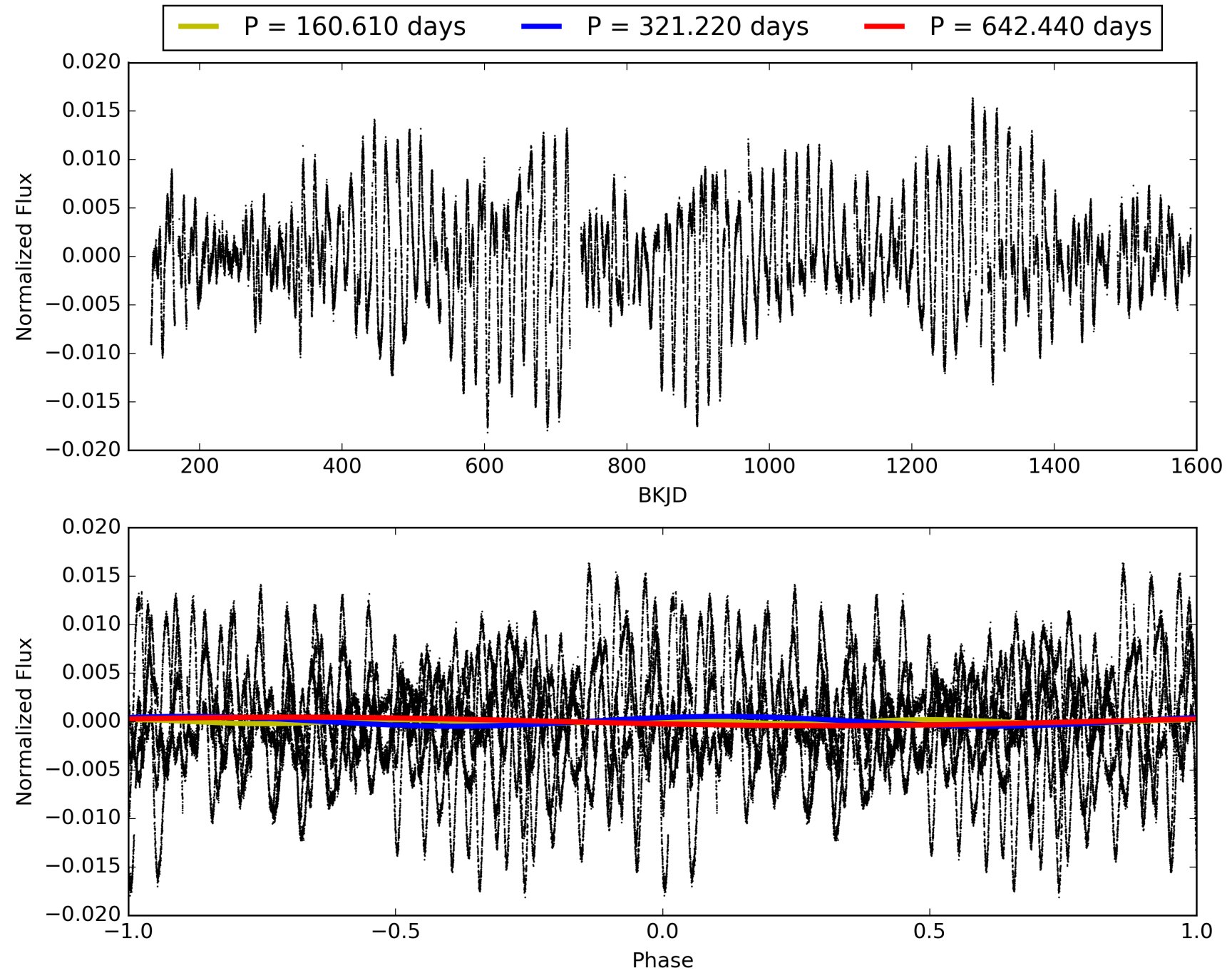
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 01:00:58 Z

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

# TCE 009959368-03, PDC Light Curves

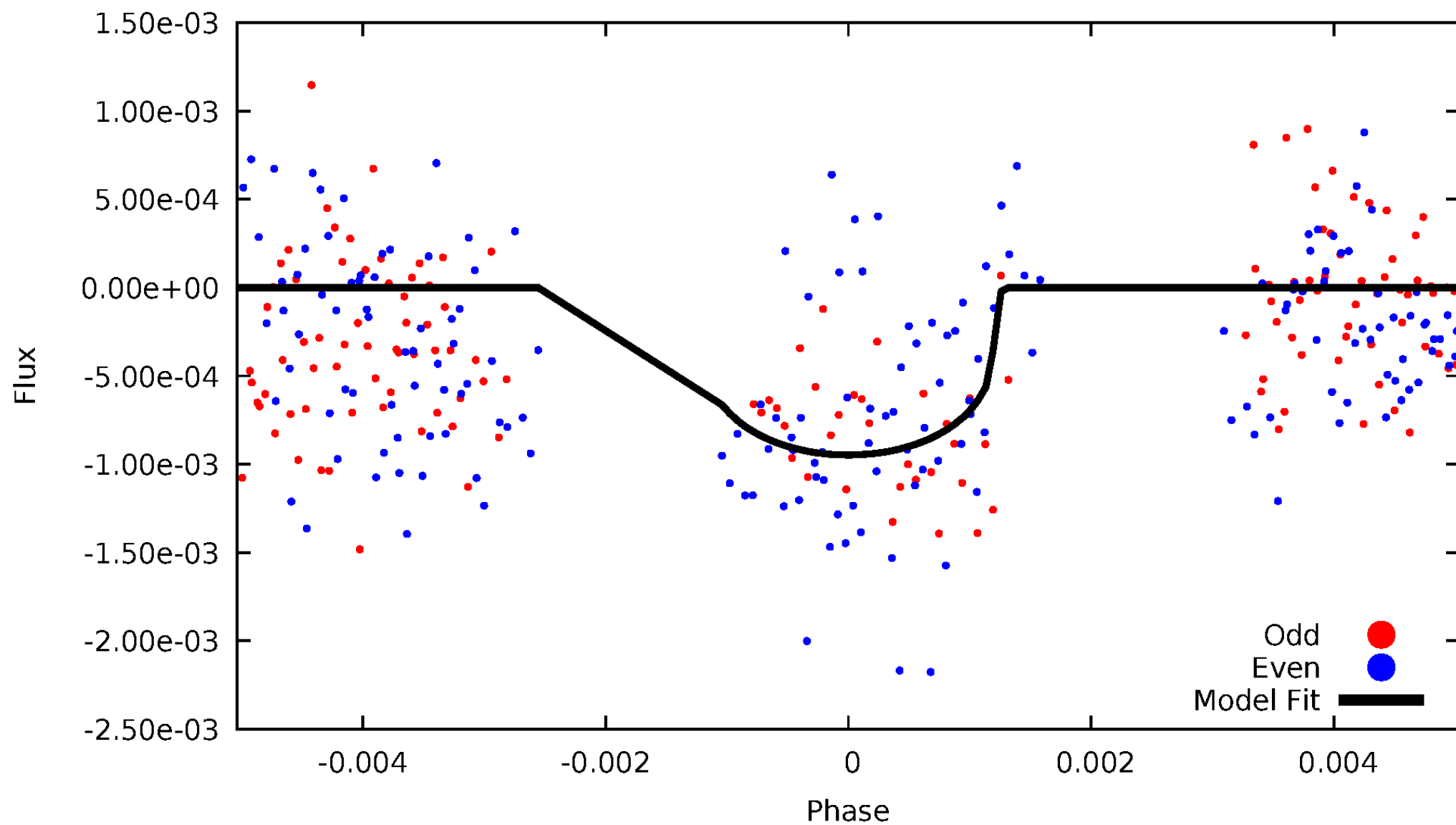


TCE 009959368-03



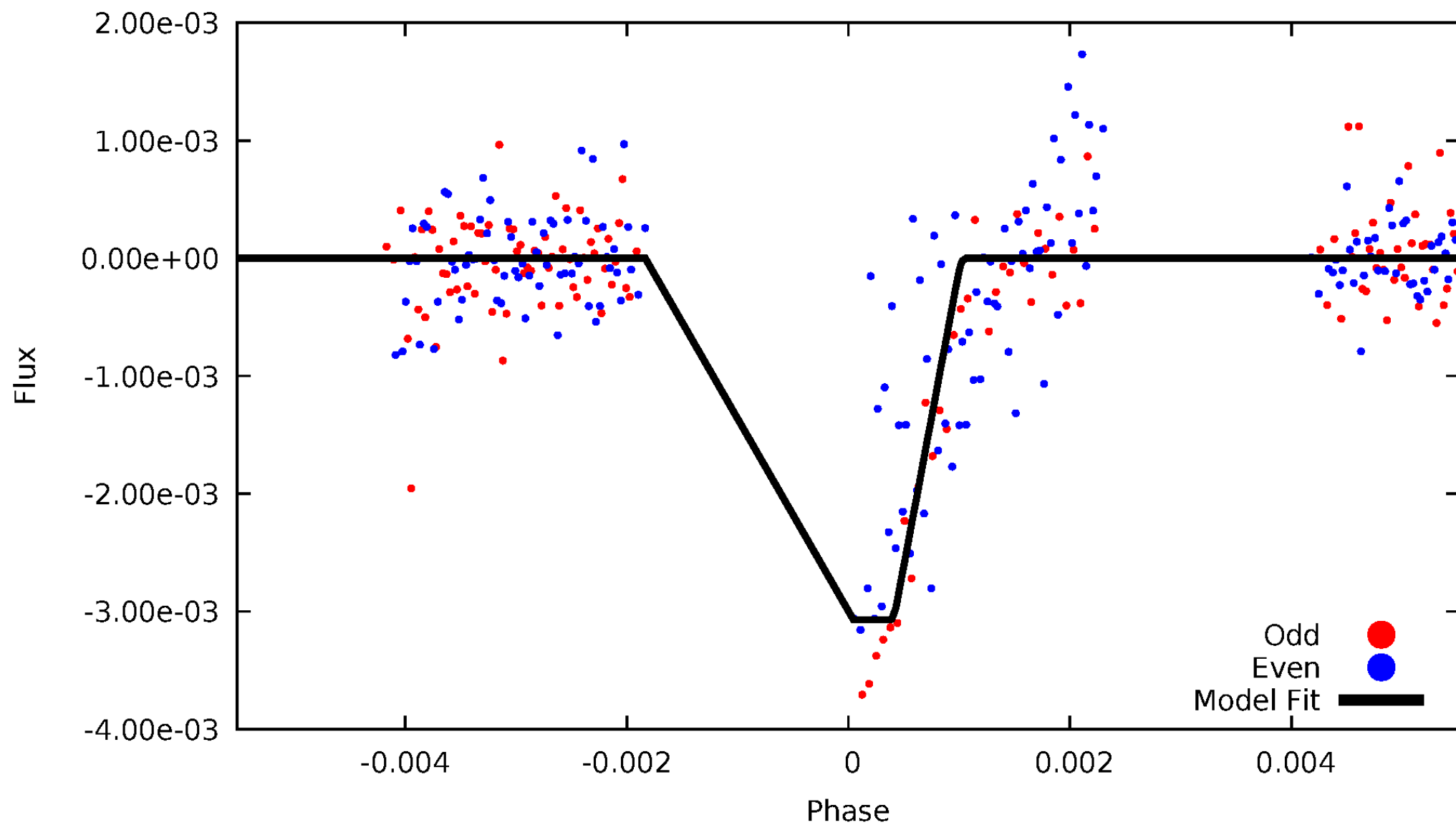
# DV Odd/Even

TCE 009959368-03



# ALT Odd/Even

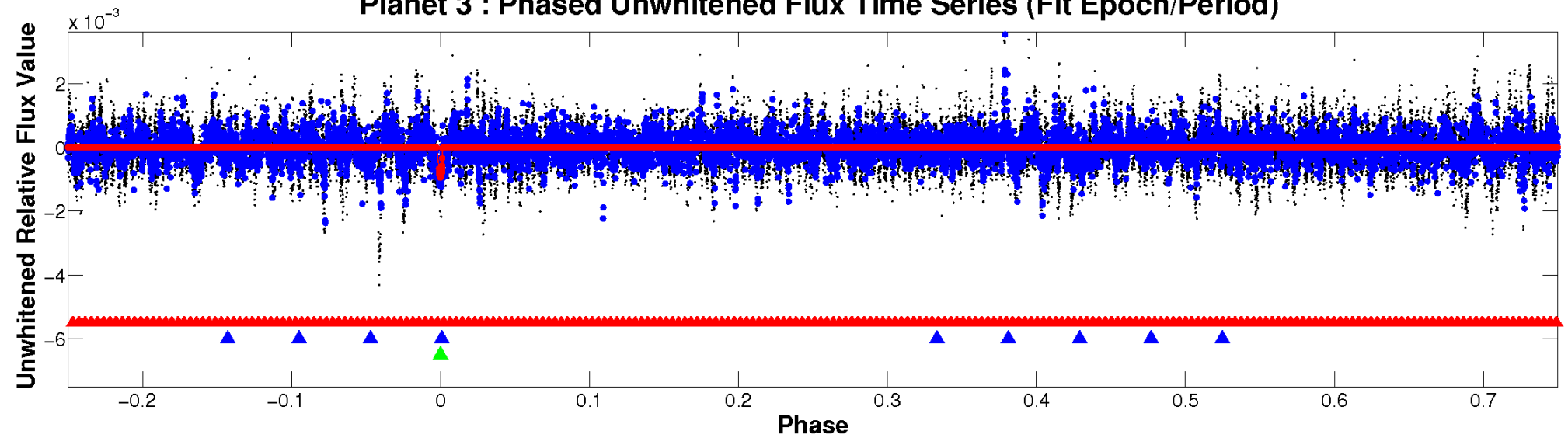
TCE 009959368-03



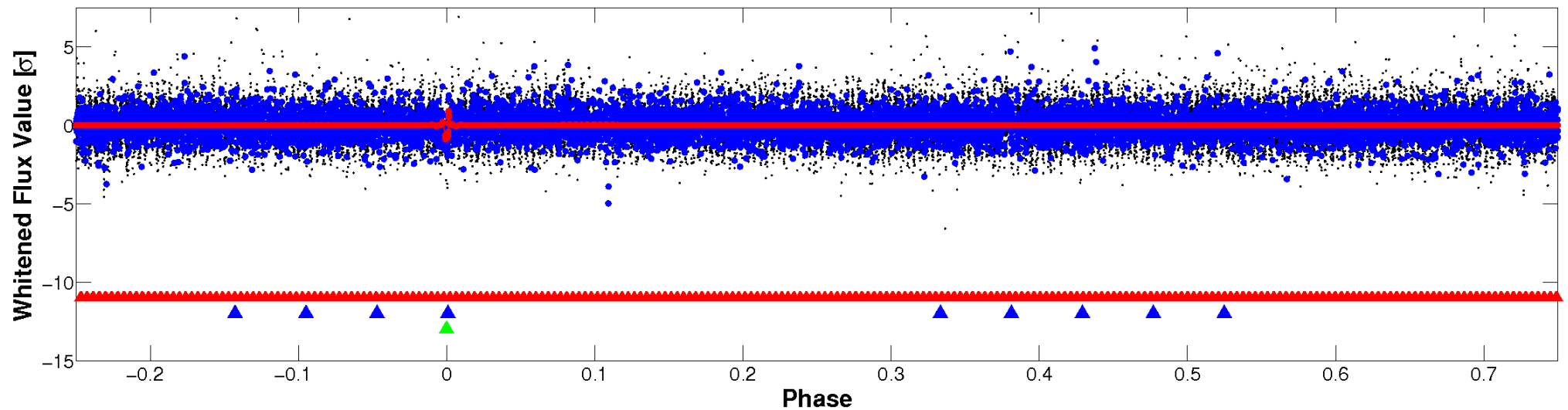


# Non-Whitened Vs. Whitened Light Curve

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

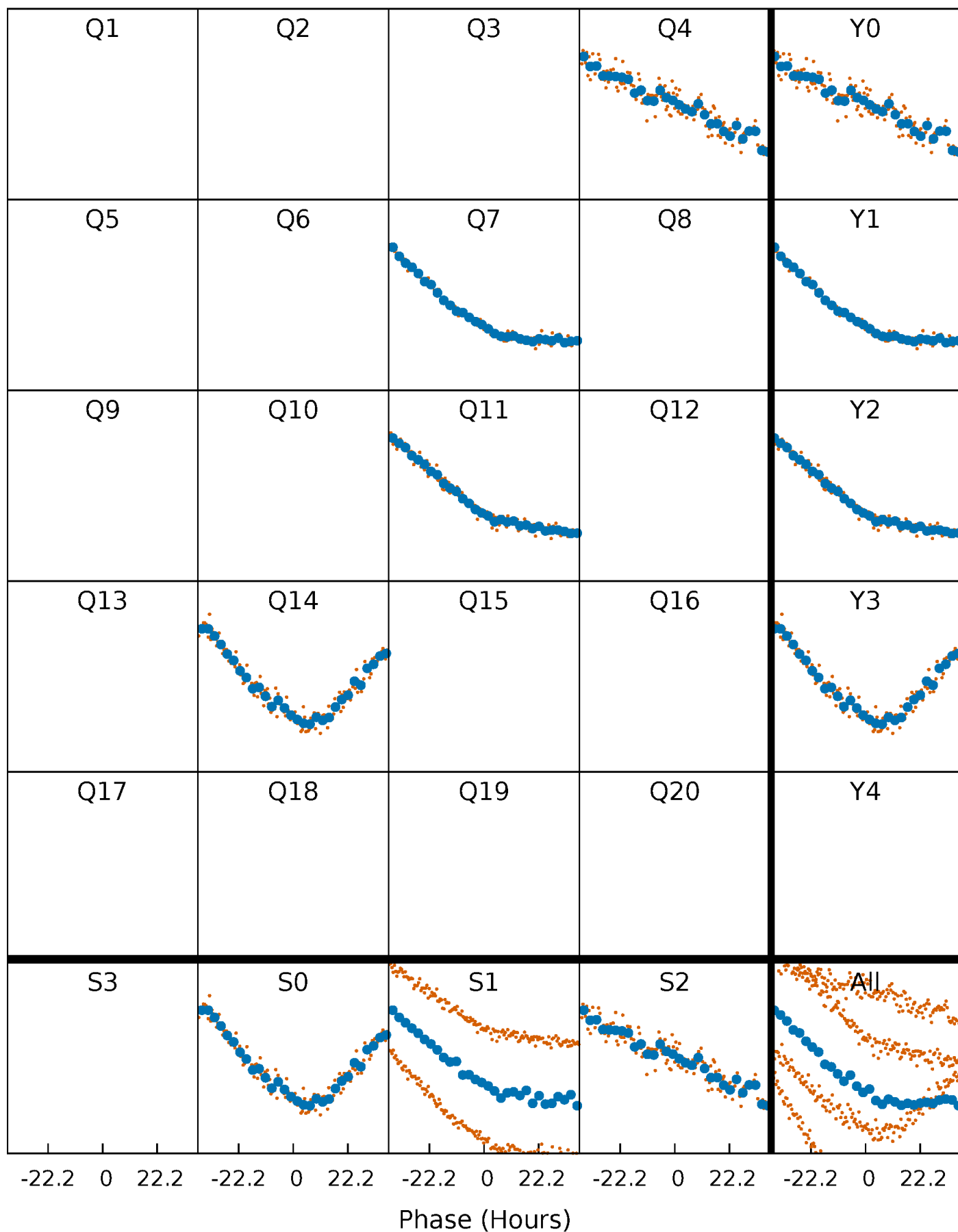


**Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



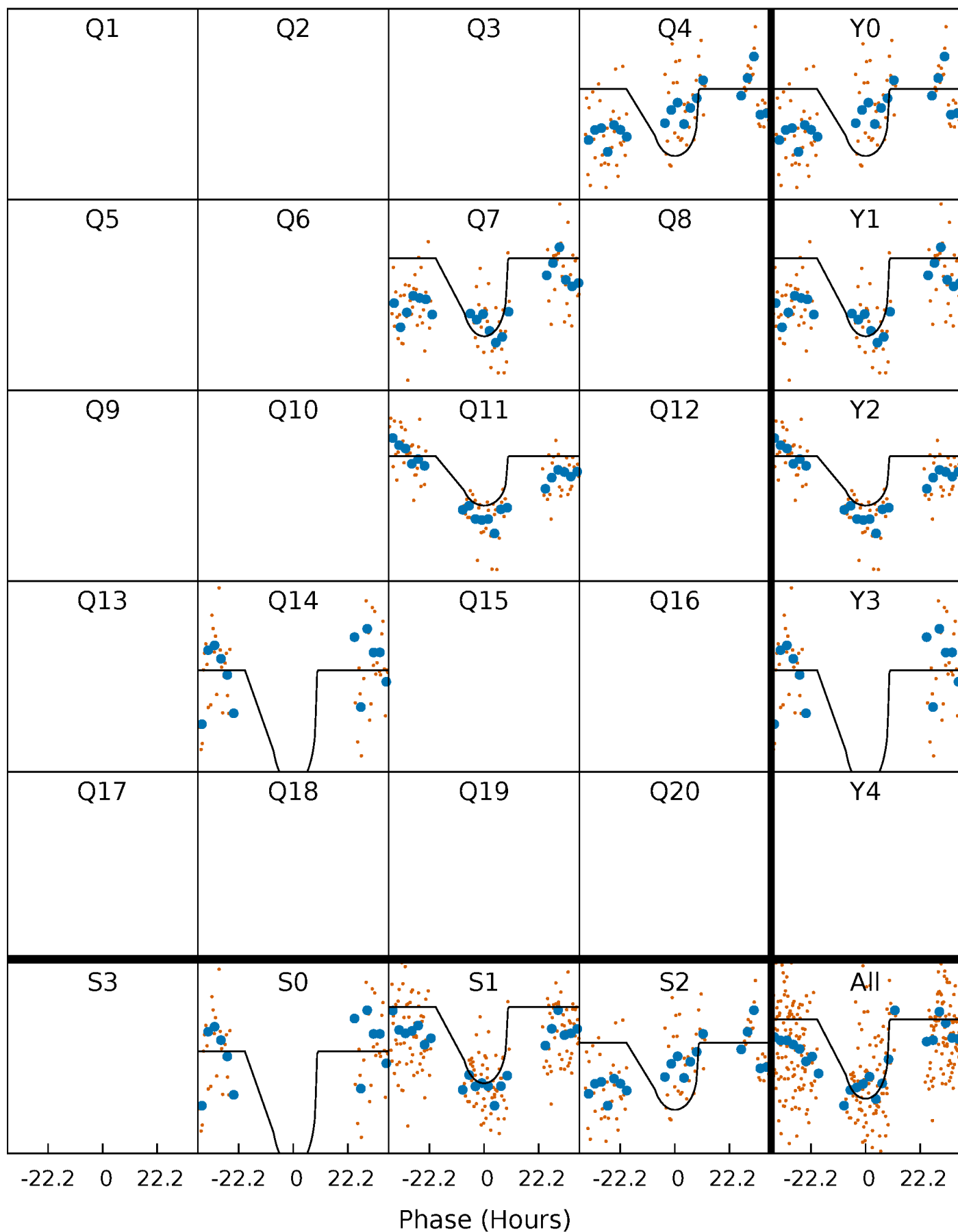
# PDC Quarter-Phased Transit Curves

TCE 009959368-03     $P=321.220016$  Days     $T_0=365.764063$  (BKJD)



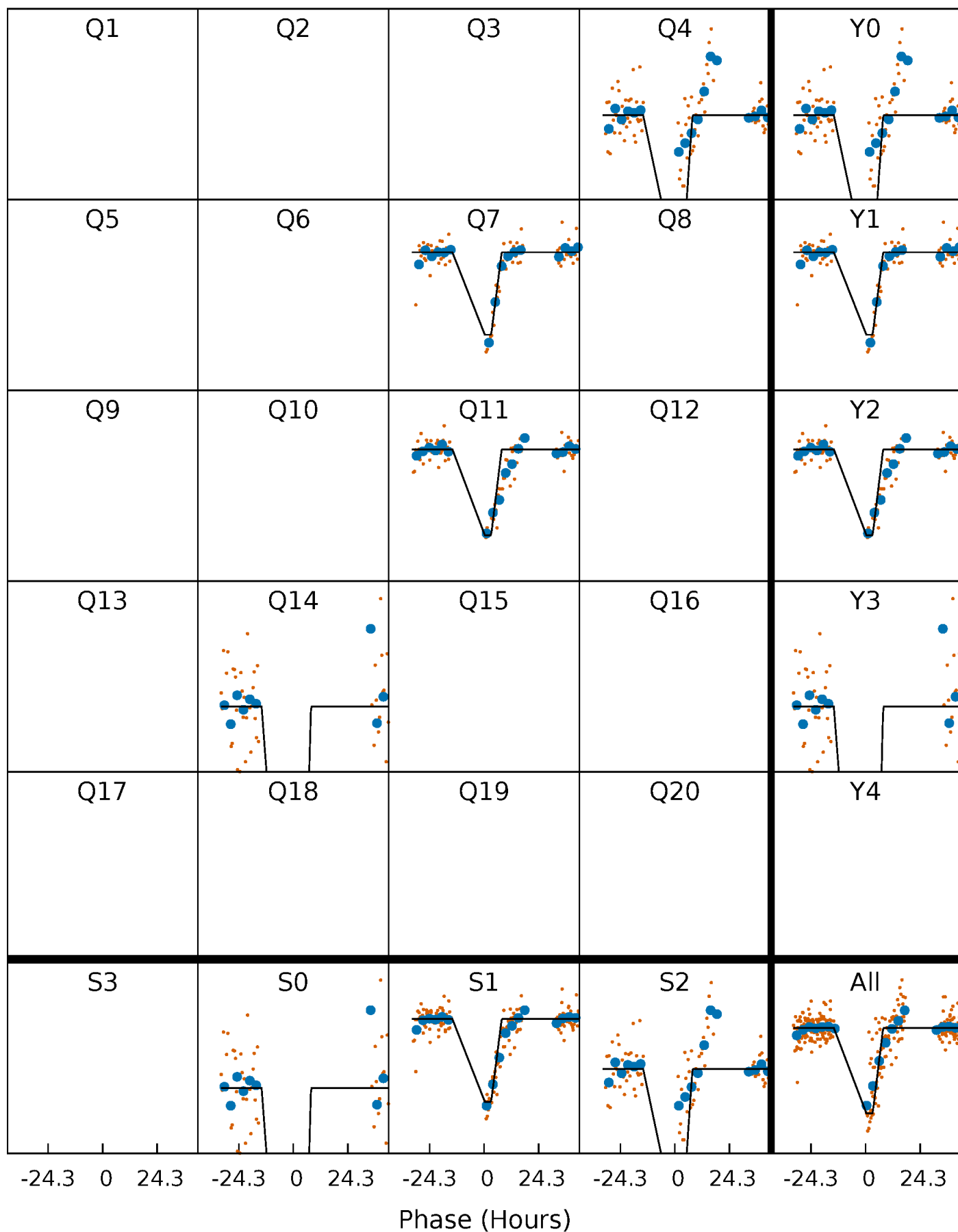
# DV Quarter-Phased Transit Curves

TCE 009959368-03     $P=321.220016$  Days     $T_0=365.764063$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

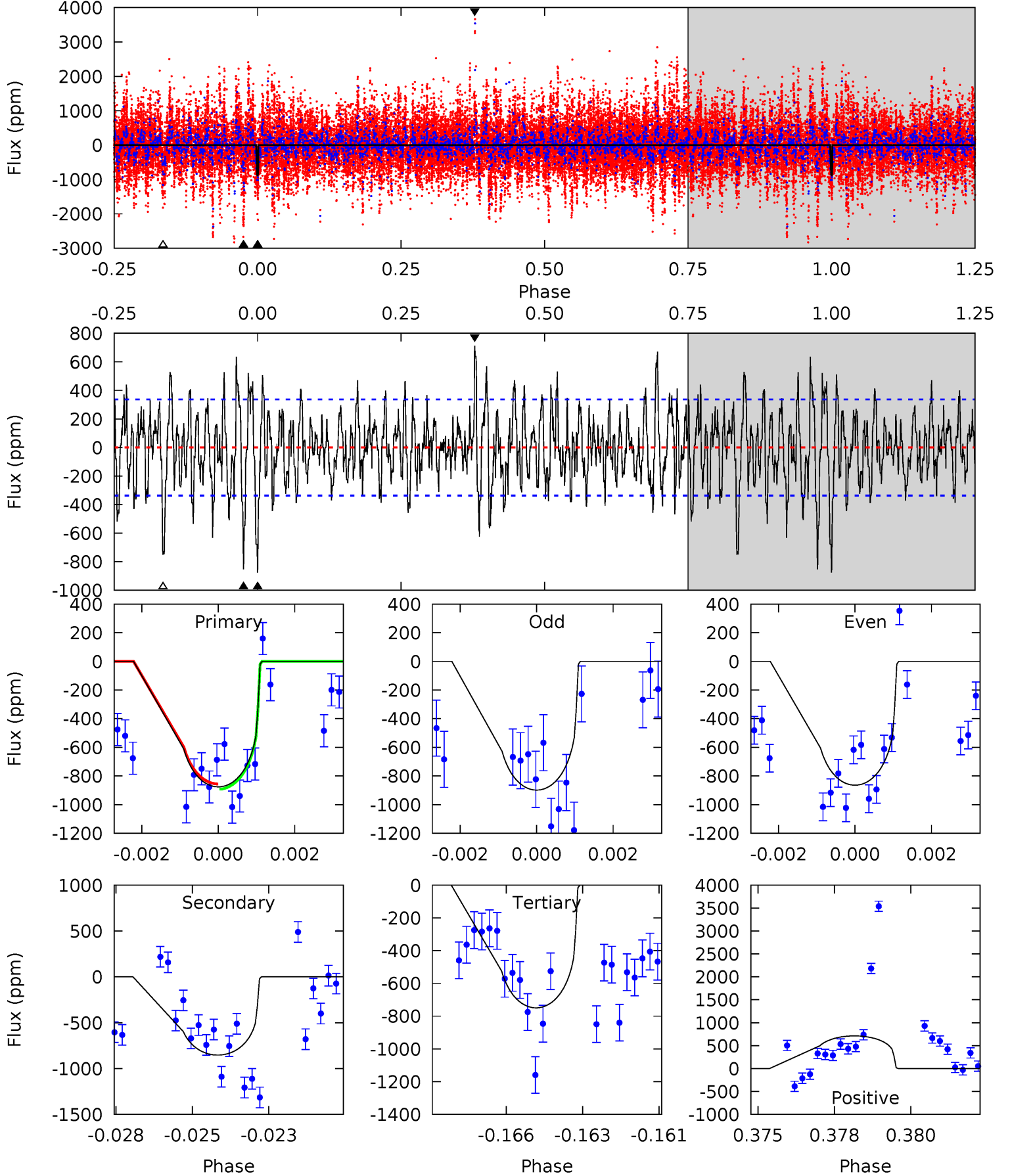
TCE 009959368-03     $P=321.161074$  Days     $T_0=365.532401$  (BKJD)



# DV Model-Shift Uniqueness Test

009959368-03, P = 321.220016 Days, E = 44.544047 Days

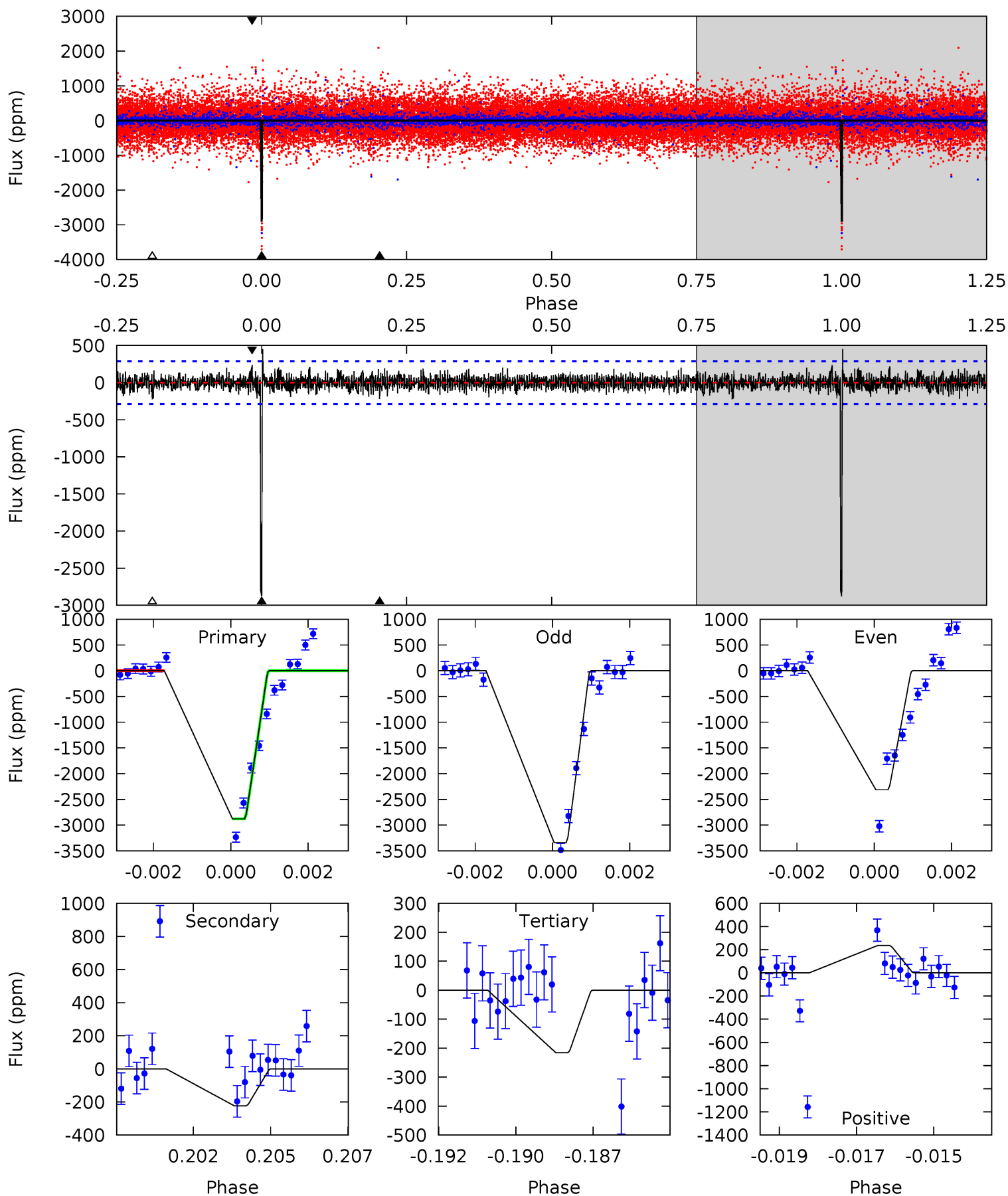
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
13.8	13.4	11.8	11.2	5.30	3.05	3.47	1.99	2.58	1.63	2.22	0.26	0.95	0.45	0.28



# Alt Model-Shift Uniqueness Test

009959368-03, P = 321.161074 Days, E = 44.371327 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
52.8	4.09	3.96	4.33	5.32	3.07	1.02	48.8	48.5	0.14	-0.23	9.34	0.79	0.14	0





### Stellar Parameters For KIC 009959368

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (g \cdot \text{cm}^{-3})$
	$5161^{+170}_{-154}$	$4.452^{+0.117}_{-0.156}$	$0.140^{+0.250}_{-0.300}$	$0.892^{+0.152}_{-0.114}$	$0.821^{+0.085}_{-0.064}$	$1.629^{+0.791}_{-0.626}$
	+3%/-3%	+3%/-4%	+179%/-214%	+17%/-13%	+10%/-8%	+49%/-38%
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 009959368-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	-853±64	$2.81^{+1.45}_{-1.45}$	$326^{+19}_{-17}$	$5227^{+2275}_{-797}$	$43684^{+146944}_{-24196}$
Alt.	-223±55	$5.55^{+1.54}_{-1.36}$	$326^{+18}_{-18}$	$3195^{+336}_{-232}$	$2844^{+2613}_{-1242}$

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

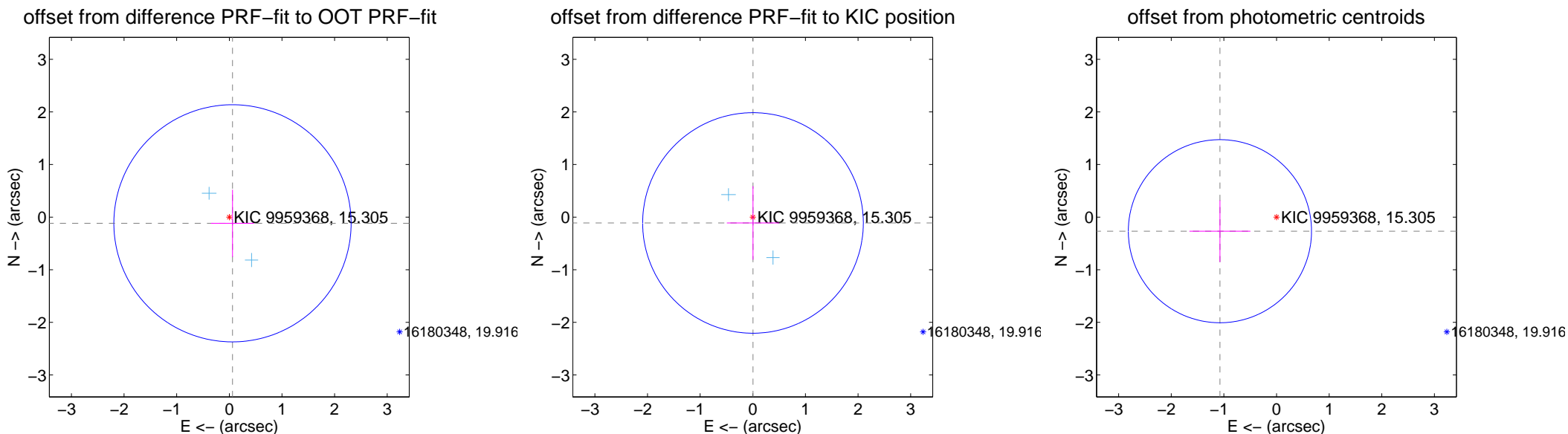
## DV Centroid Data

Supplemental centroid analysis for 009959368-03. Kepler magnitude: 15.30. Transit SNR 7.56

There are 2 quarters with good PRF difference image offsets

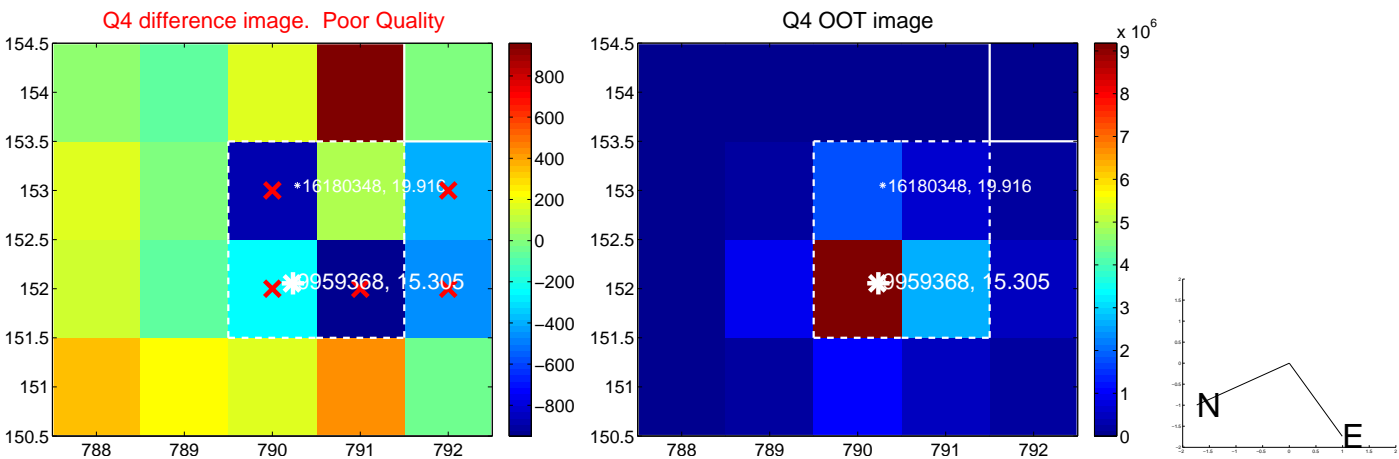
The direct PRF centroid is offset from the target star catalog position by about 0.06 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.132 \pm 0.751$	0.18	$-0.060 \pm 0.408$	$-0.118 \pm 0.638$
PRF-fit source offset from KIC position	$0.111 \pm 0.699$	0.16	$-0.004 \pm 0.496$	$-0.111 \pm 0.699$
photometric centroid source offset	$1.11 \pm 0.58$	1.91	$1.08 \pm 0.58$	$-0.27 \pm 0.59$

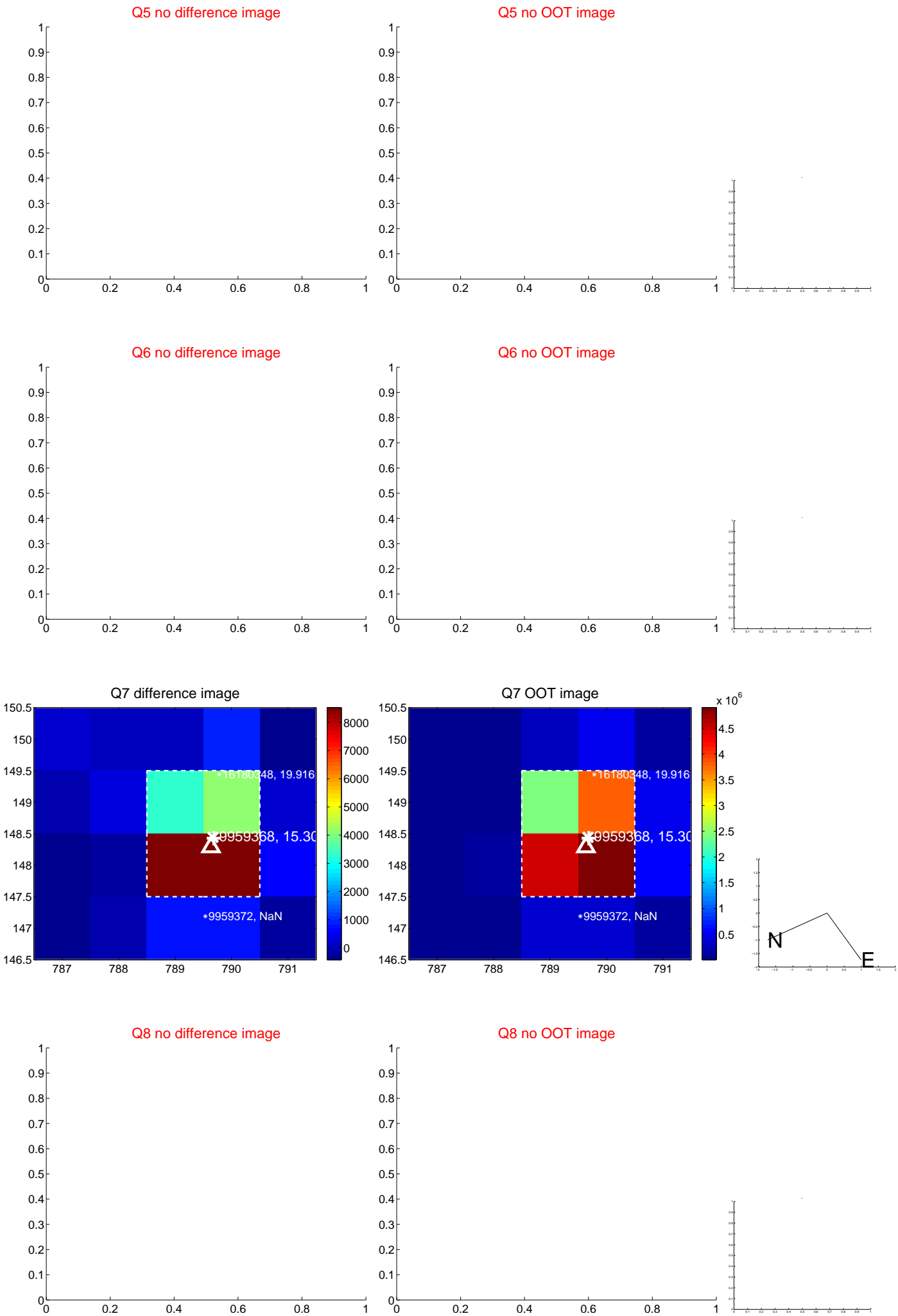


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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



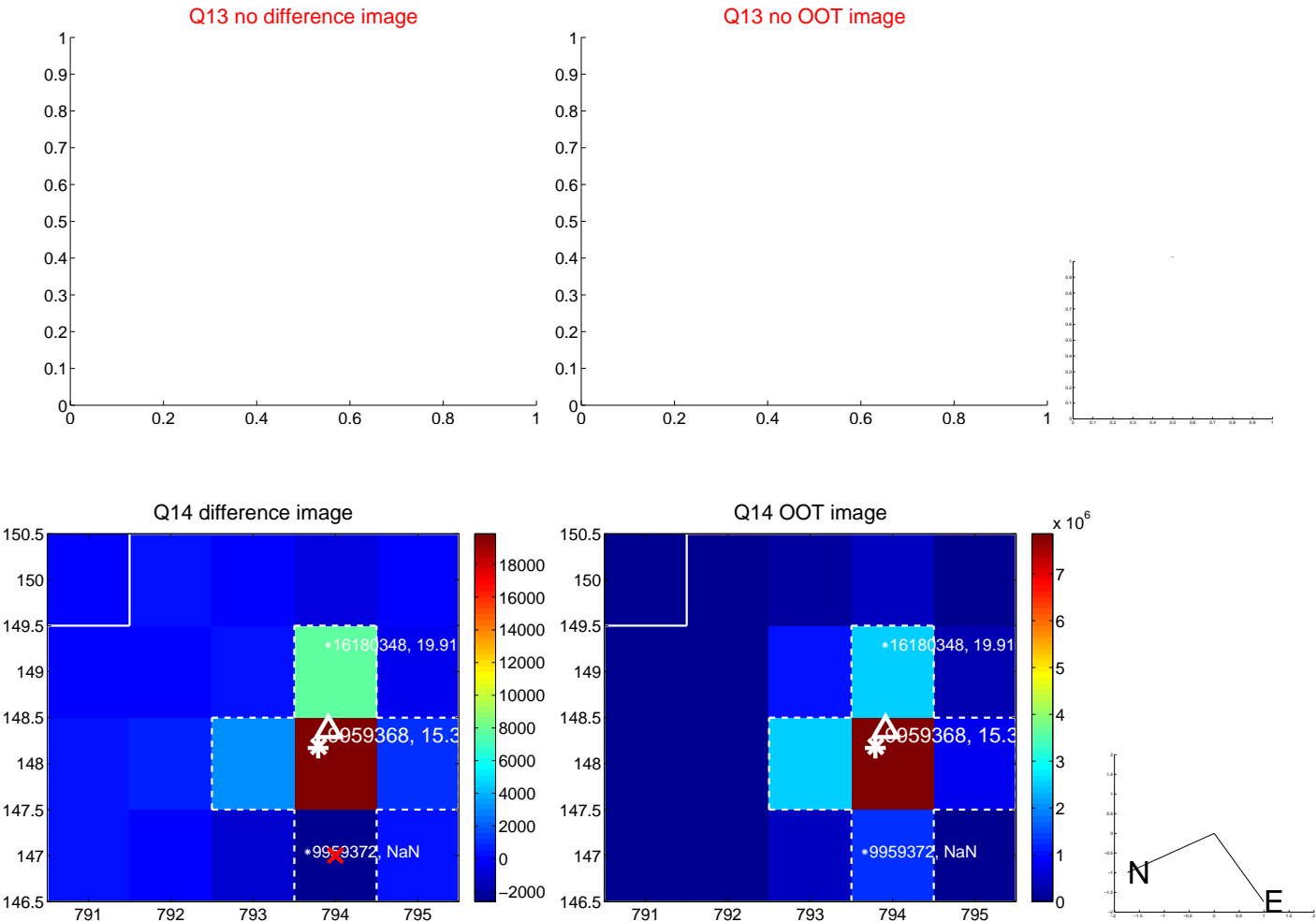
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



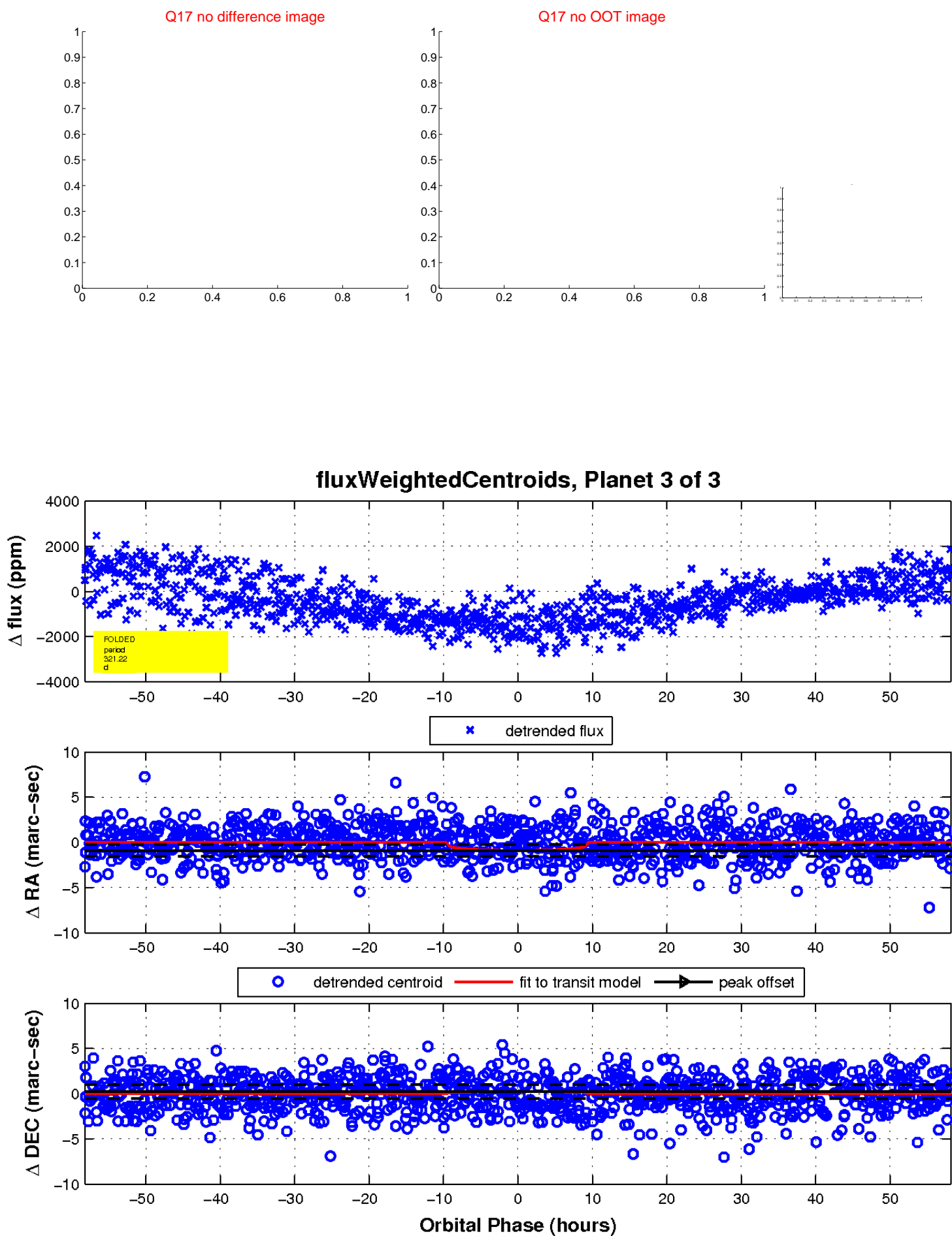
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



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





UKIRT Image

Declination

