

# KIC 010593110

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010593110-01	OBS	No	0.822191	132.325009	37.8	4.078	7.4	7.1	0.62	4330	0.37	567.82
010593110-03	OBS	No	283.587961	356.516235	742.1	4.733	12.3	7.8	0.62	4330	1.92	0.23
010593110-04	OBS	No	181.556830	271.668945	1017.8	3.814	15.3	8.0	0.62	4330	2.02	0.42
010593110-05	OBS	No	109.121239	204.446957	455.7	19.790	10.4	5.0	0.62	4330	1.36	0.84
010593110-06	OBS	No	120.587667	163.433496	687.0	7.664	9.1	7.3	0.62	4330	1.77	0.73
010593110-07	OBS	No	83.493941	205.287505	460.9	9.869	8.1	6.0	0.62	4330	1.41	1.20
010593110-08	OBS	No	276.493940	336.509572	965.7	2.584	8.5	6.4	0.62	4330	2.26	0.24
010593110-09	OBS	No	171.405232	287.356663	954.4	2.672	7.6	7.1	0.62	4330	2.11	0.46

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010593110-01	OBS	FP	0.00	1	0	0	0	LPP_DV
010593110-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010593110-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010593110-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS
010593110-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010593110-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—CENT_FEW_MEAS
010593110-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
010593110-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—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.

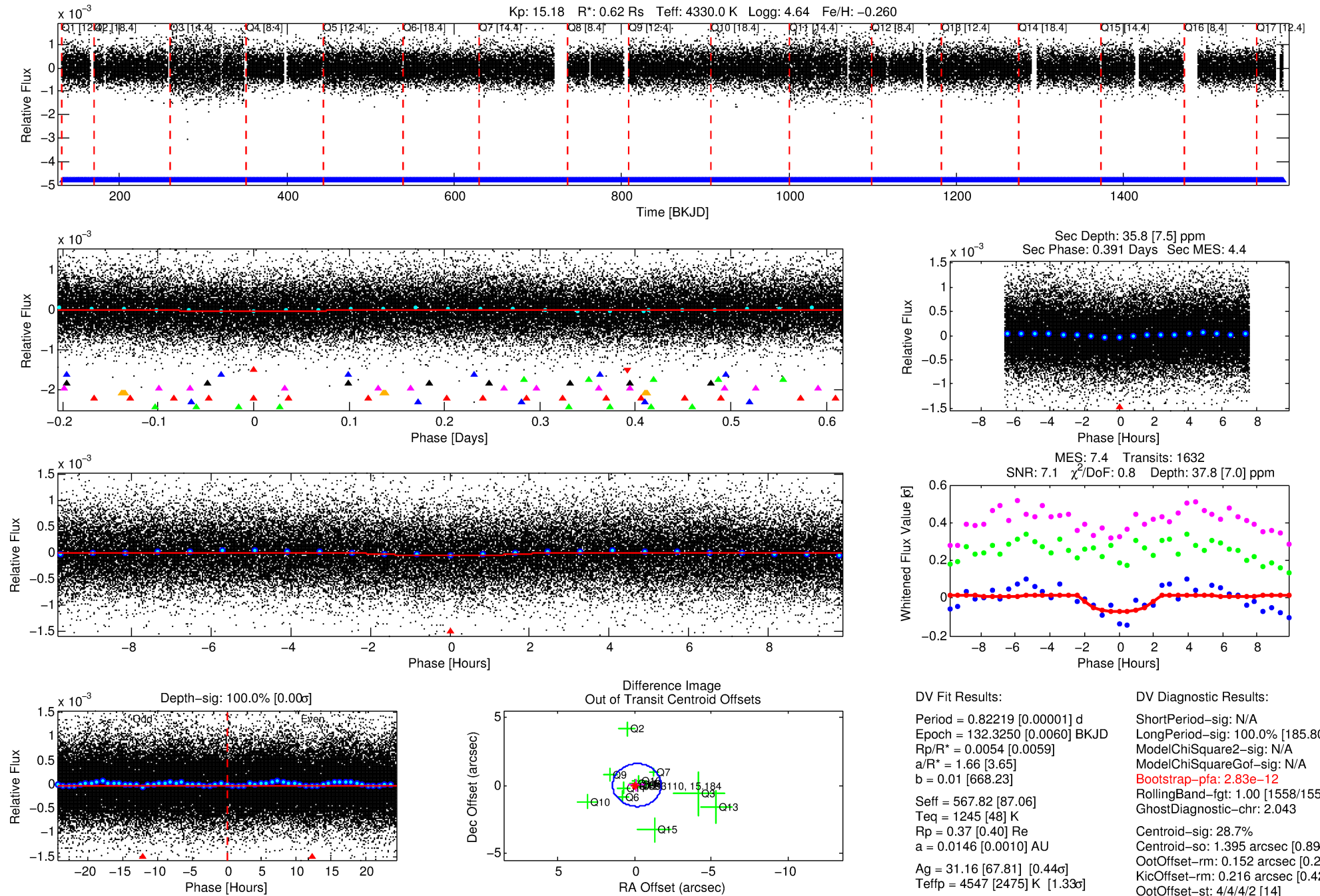
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 010593110-01

No Significant Match Found

# DV One-Page Summary

KIC: 10593110 Candidate: 1 of 9 Period: 0.822 d



## DV Fit Results:

Period = 0.82219 [0.00001] d  
Epoch = 132.3250 [0.0060] BKJD  
Rp/R\* = 0.0054 [0.0059]  
a/R\* = 1.66 [3.65]  
b = 0.01 [668.23]  
Seff = 567.82 [87.06]  
Teq = 1245 [48] K  
Rp = 0.37 [0.40] Re  
a = 0.0146 [0.0010] AU  
Ag = 31.16 [67.81] [0.44 $\sigma$ ]  
Teffp = 4547 [2475] K [1.33 $\sigma$ ]

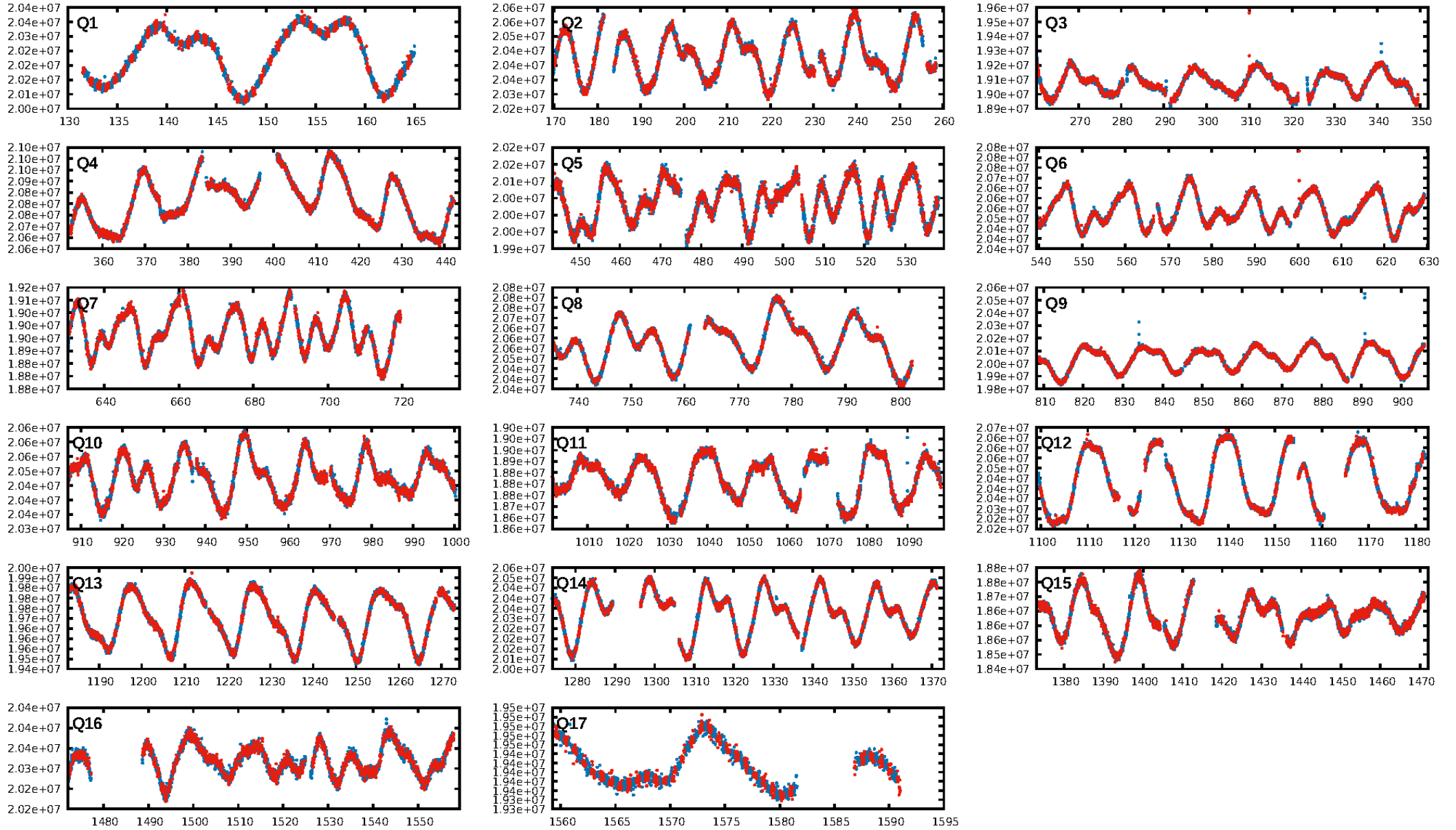
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [185.80 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
**Bootstrap-pfa: 2.83e-12**  
RollingBand-fgt: 1.00 [1558/1558]  
GhostDiagnostic-chr: 2.043  
Centroid-sig: 28.7%  
Centroid-so: 1.395 arcsec [0.89 $\sigma$ ]  
OotOffset-rm: 0.152 arcsec [0.29 $\sigma$ ]  
KicOffset-rm: 0.216 arcsec [0.42 $\sigma$ ]  
OotOffset-st: 4/4/4/2 [14]  
KicOffset-st: 4/4/4/2 [14]  
DiffImageQuality-fgm: 0.79 [11/14]  
DiffImageOverlap-fno: 1.00 [17/17]

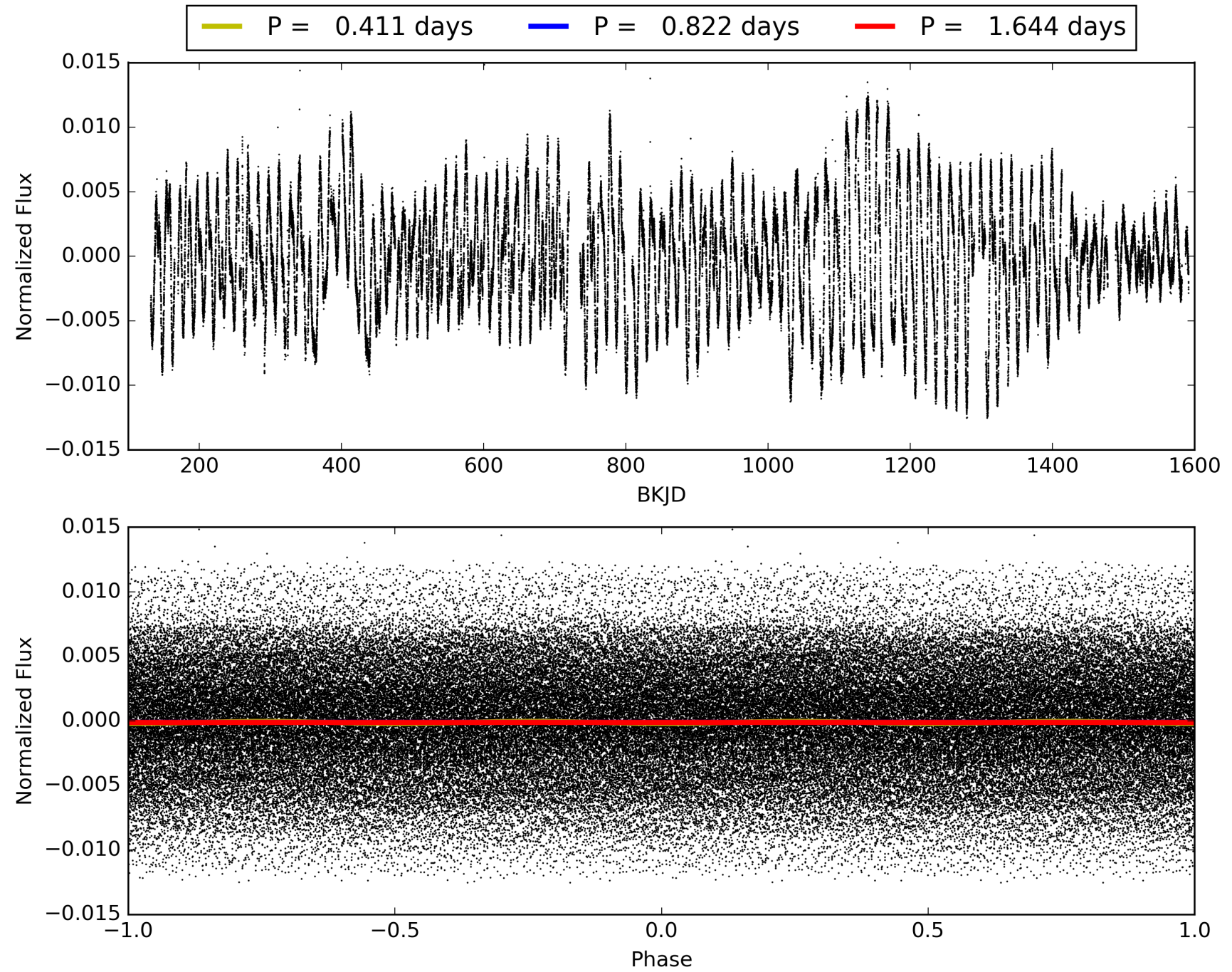
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 02:56:16 Z

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

# TCE 010593110-01, PDC Light Curves



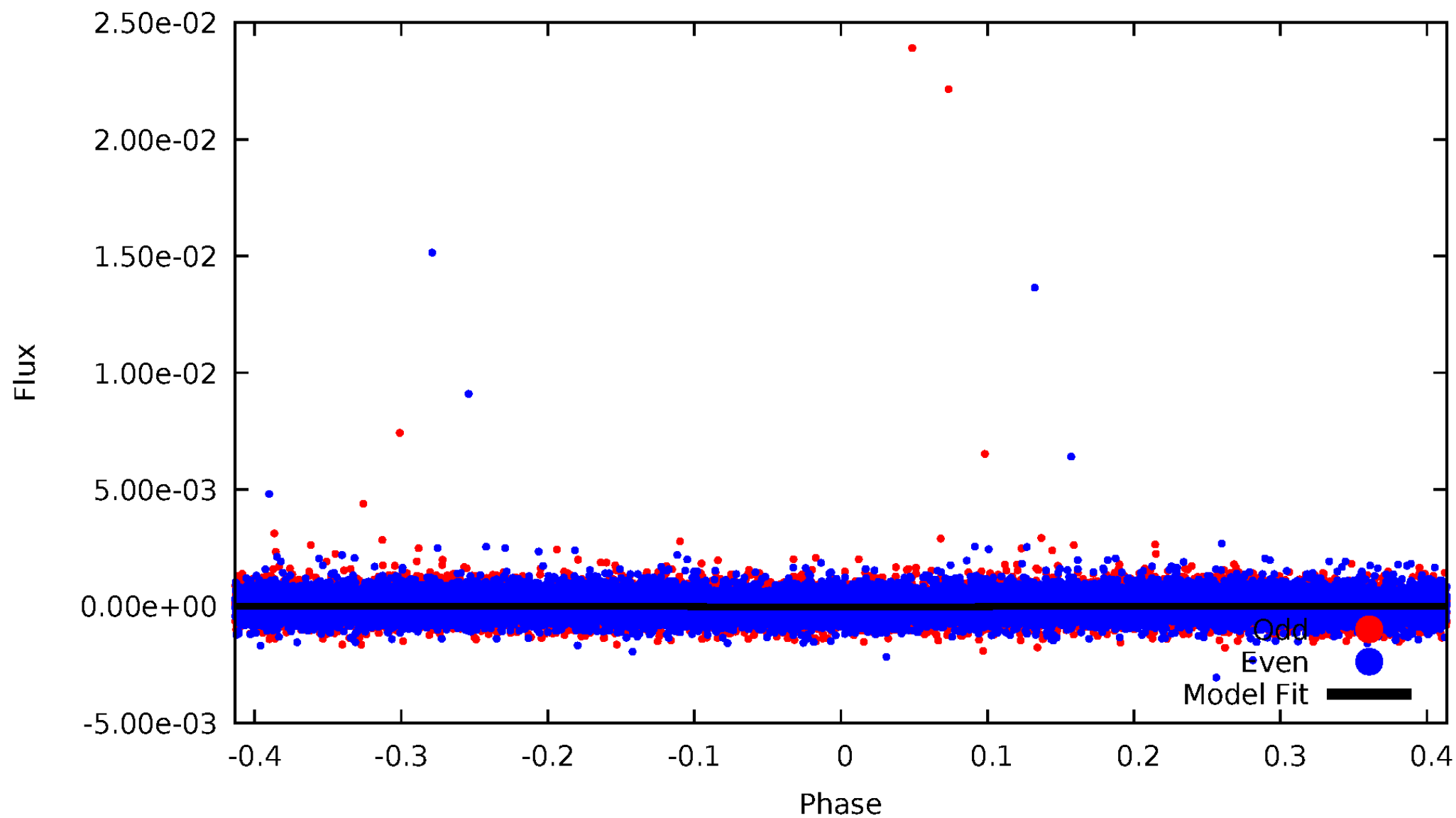
# TCE 010593110-01





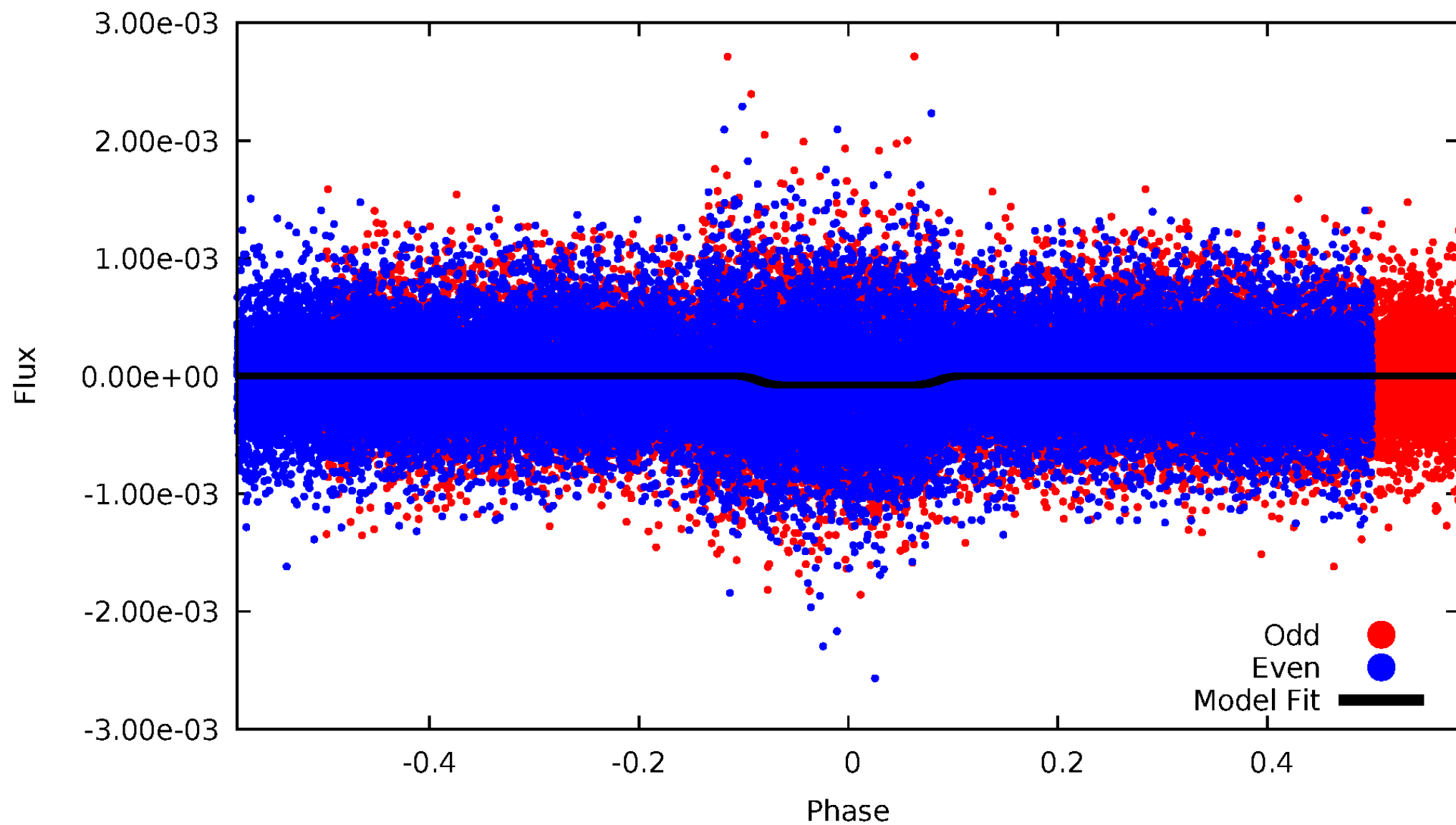
# DV Odd/Even

TCE 010593110-01

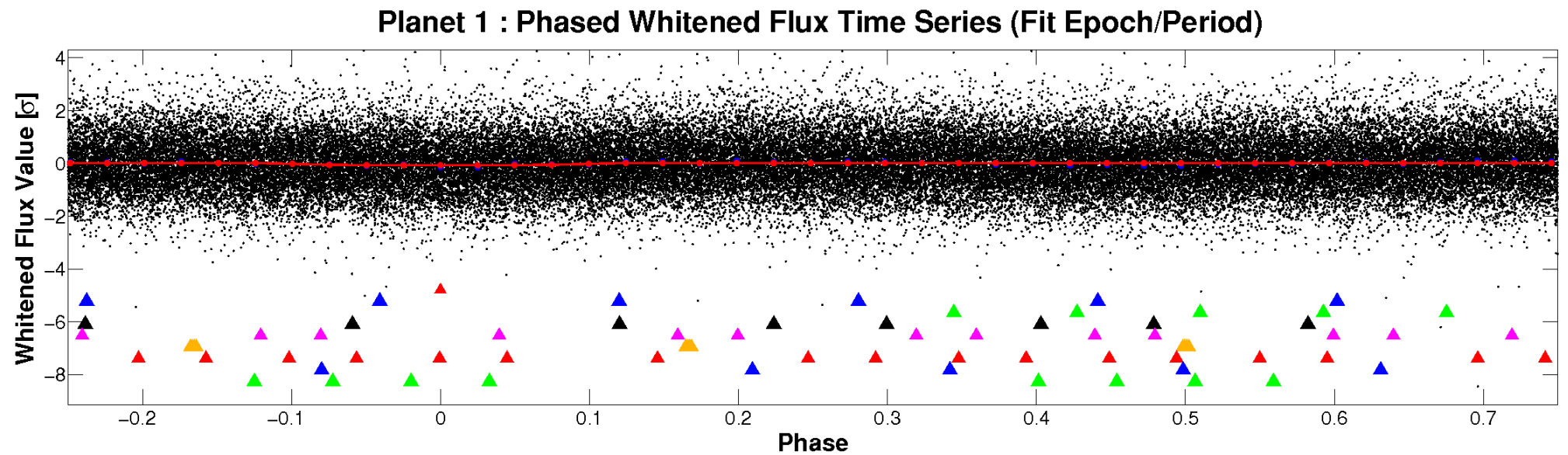
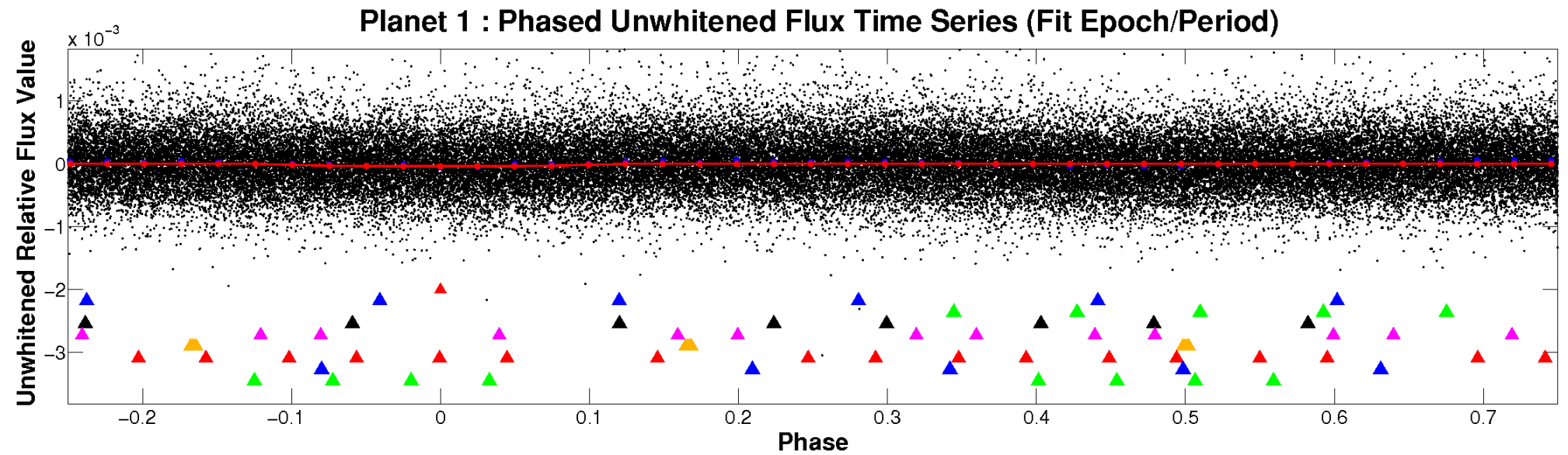


# ALT Odd/Even

TCE 010593110-01

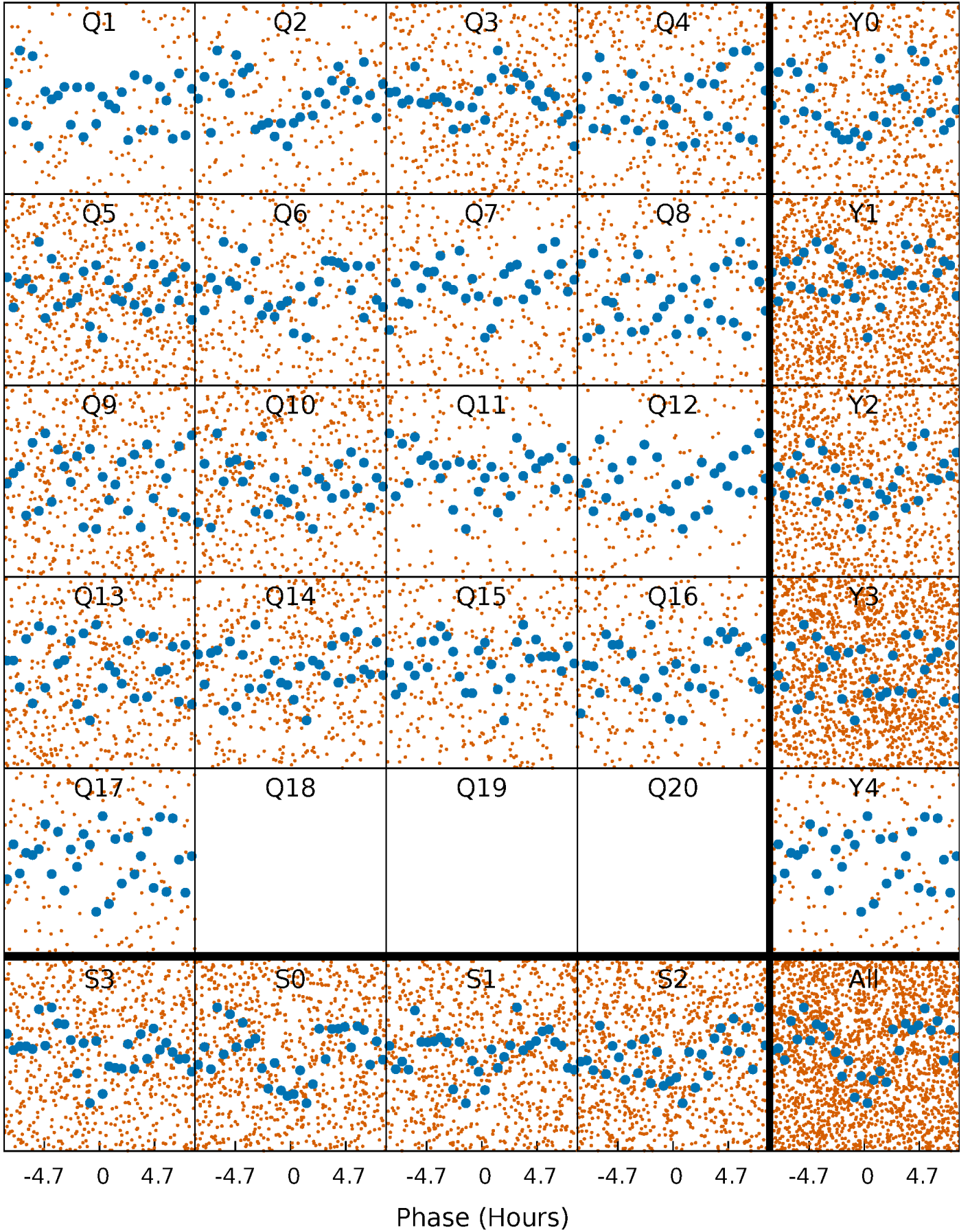


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

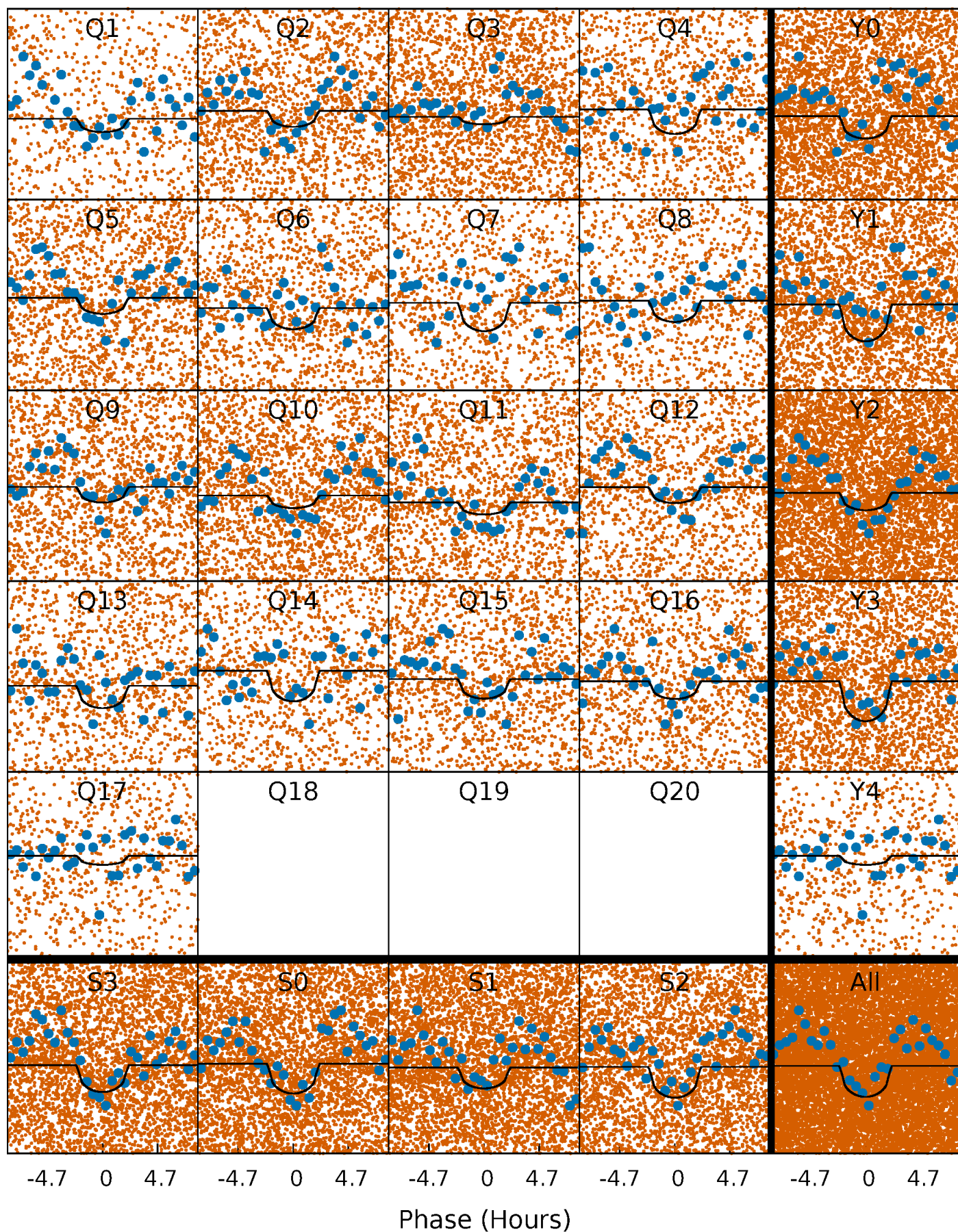
TCE 010593110-01 P= 0.822191 Days  $T_0=132.325009$  (BKJD)





# DV Quarter-Phased Transit Curves

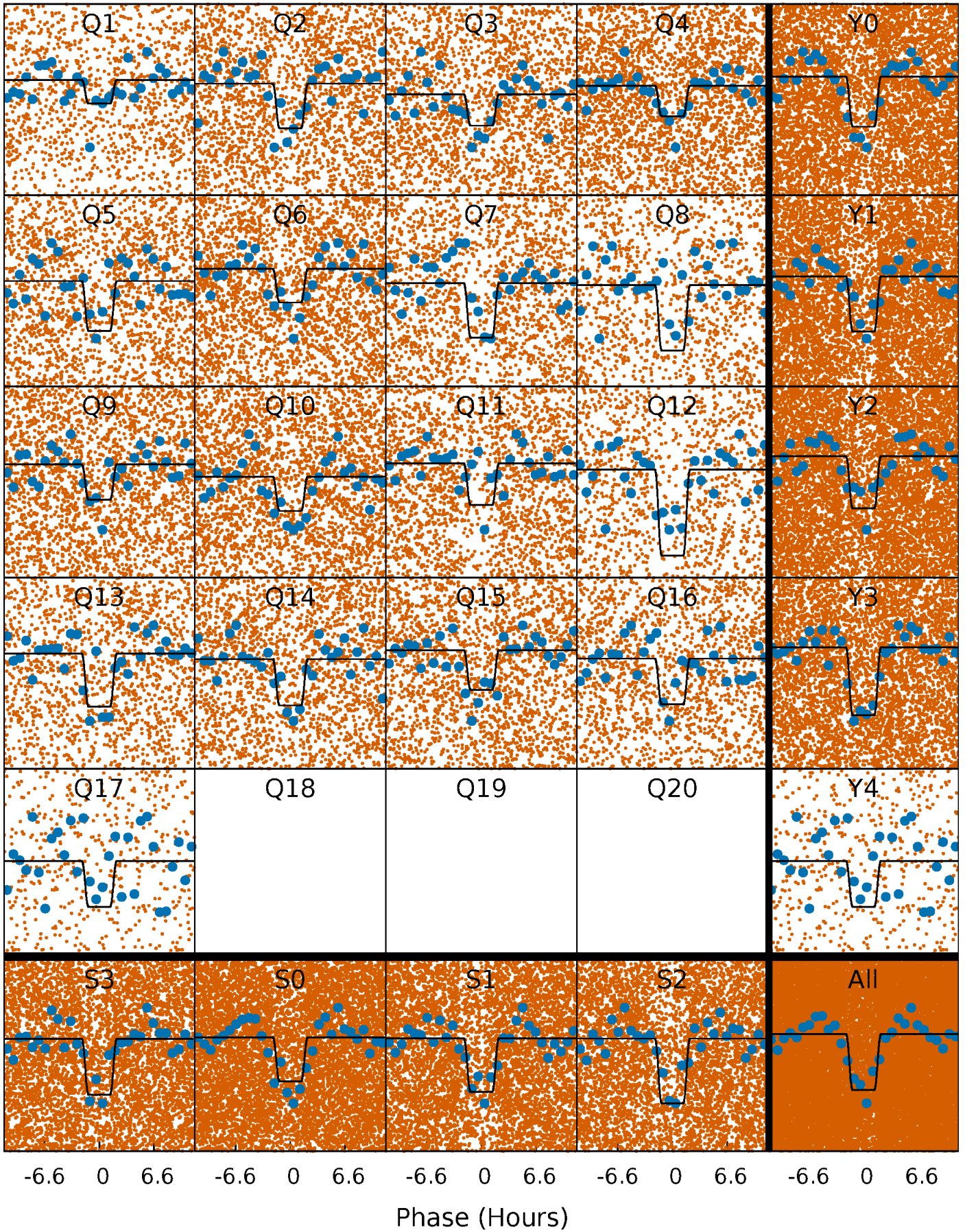
TCE 010593110-01 P= 0.822191 Days  $T_0=132.325009$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

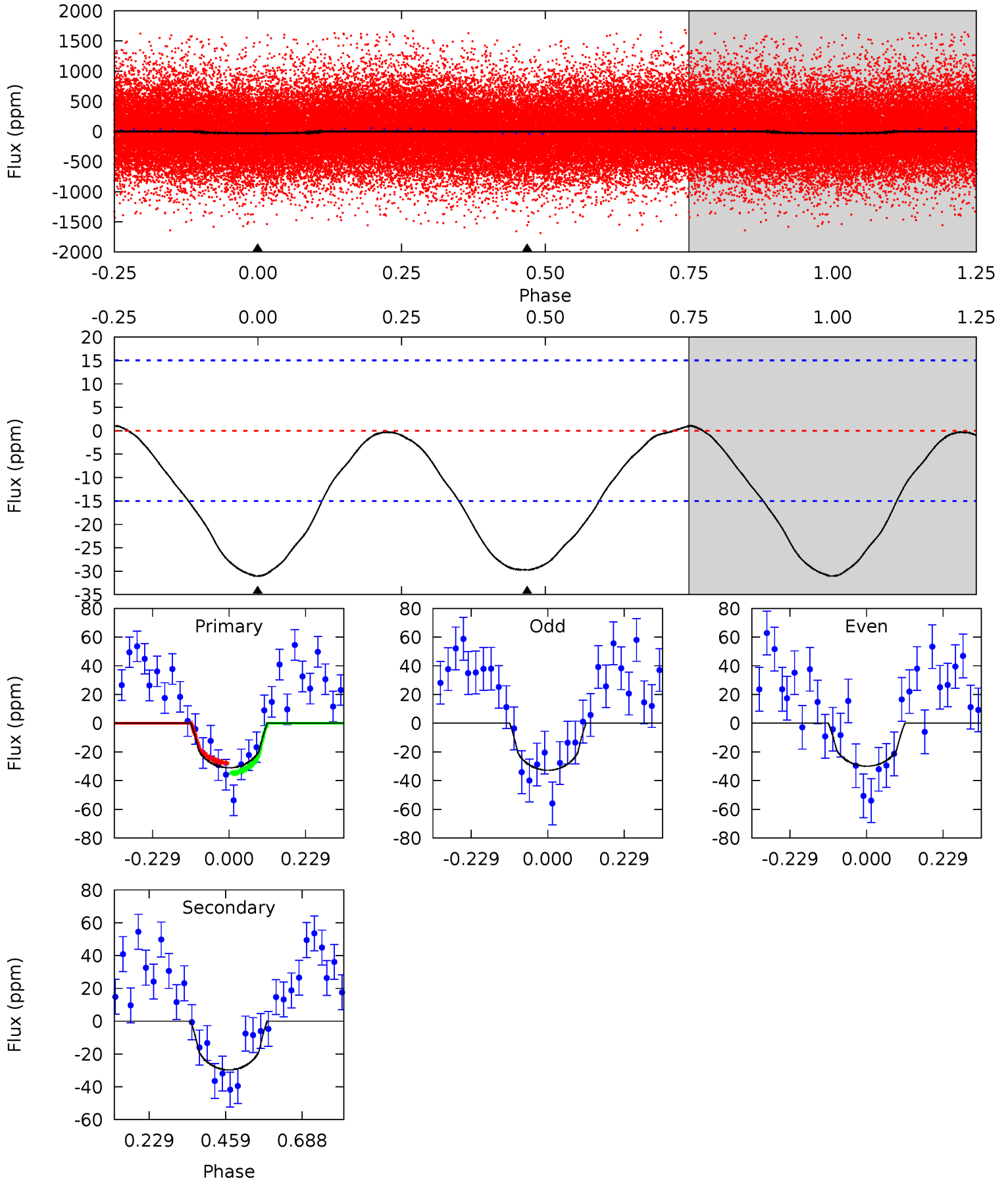
TCE 010593110-01 P= 0.822208 Days  $T_0=132.309528$  (BKJD)



# DV Model-Shift Uniqueness Test

010593110-01, P = 0.822191 Days, E = 131.502818 Days

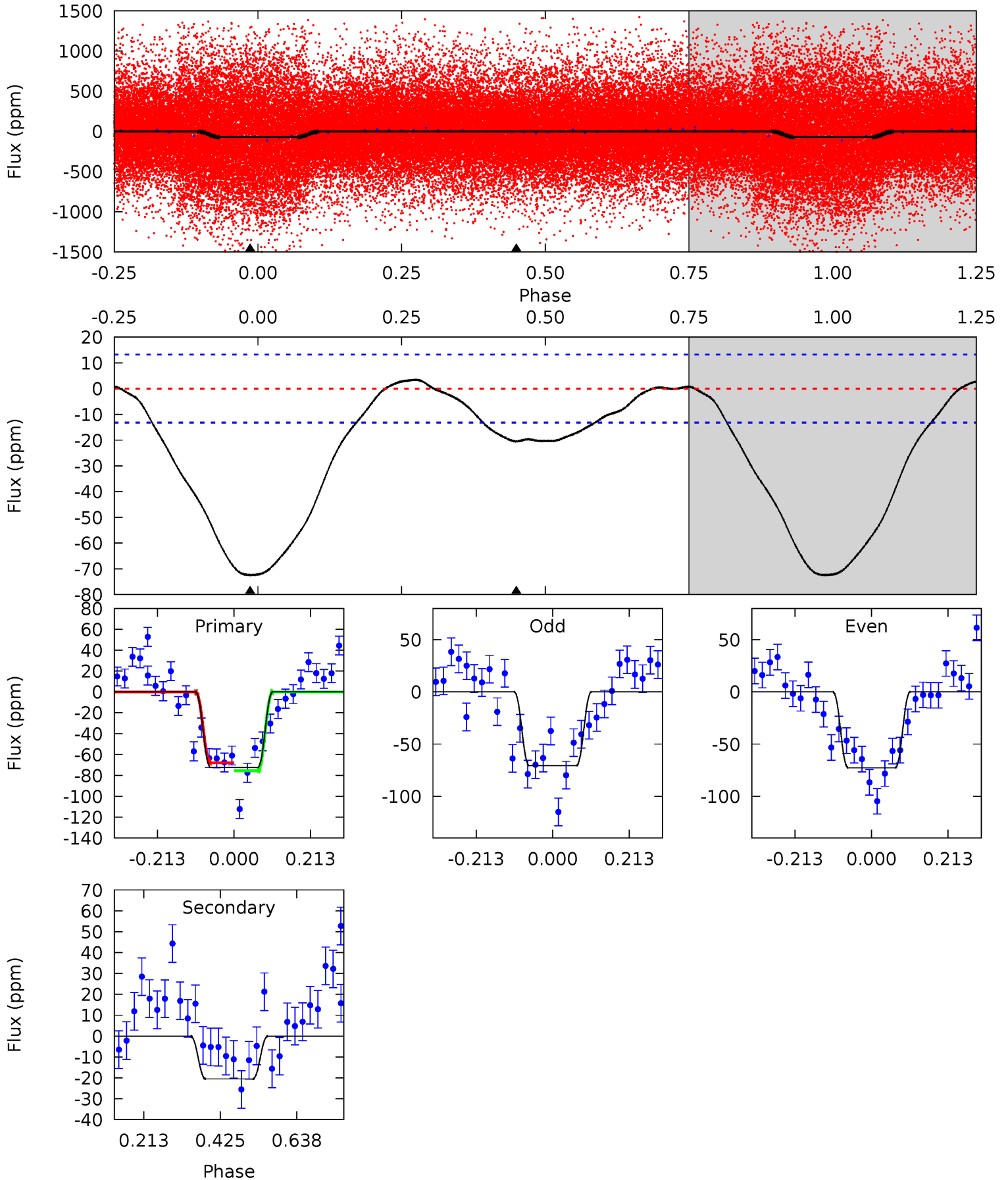
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.08	8.68	0	0	4.39	1.20	0.18	9.08	9.08	8.68	8.68	0.41	0.89	0.03	1.07



# Alt Model-Shift Uniqueness Test

010593110-01, P = 0.822208 Days, E = 131.487320 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
24.1	6.84	0	0	4.40	1.25	0.43	24.1	24.1	6.84	6.84	0.35	1.19	0.05	1.25





### Stellar Parameters For KIC 010593110

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (g \cdot \text{cm}^{-3})$
	$4330^{+129}_{-129}$	$4.640^{+0.049}_{-0.025}$	$-0.260^{+0.300}_{-0.300}$	$0.618^{+0.050}_{-0.056}$	$0.610^{+0.066}_{-0.050}$	$3.632^{+0.843}_{-0.438}$
	+3%/-3%	+1%/-1%	+115%/-115%	+8%/-9%	+11%/-8%	+23%/-12%
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 010593110-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-30 \pm 3$	$0.45^{+0.37}_{-0.28}$	$1724^{+57}_{-60}$	$3994^{+2098}_{-733}$	$18^{+110}_{-13}$
Alt.	$-21 \pm 3$	$0.60^{+0.41}_{-0.33}$	$1730^{+54}_{-60}$	$3424^{+1098}_{-551}$	$6.729^{+28.348}_{-4.444}$

$T_{max}$  = 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

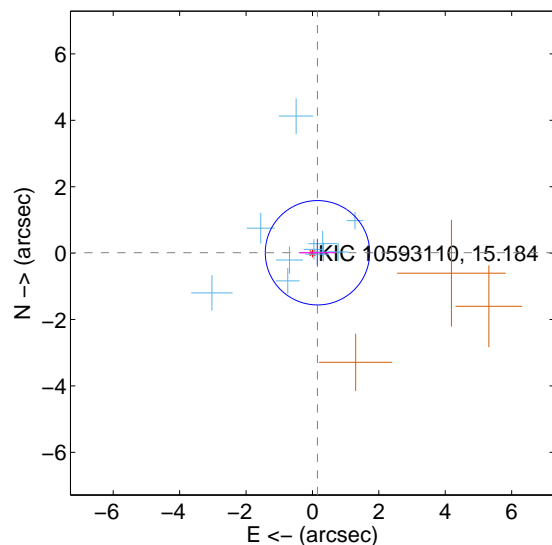
Supplemental centroid analysis for 010593110-01. Kepler magnitude: 15.18. Transit SNR 7.10

There are 11 quarters with good PRF difference image offsets

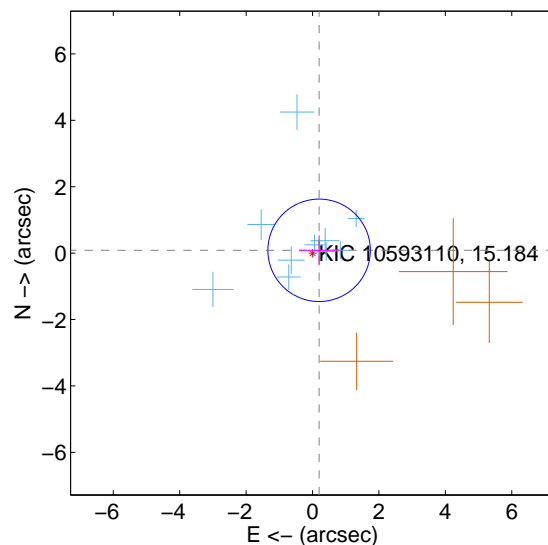
The direct PRF centroid is offset from the target star catalog position by about 0.11 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.152 \pm 0.524$	0.29	$-0.151 \pm 0.533$	$0.010 \pm 0.423$
PRF-fit source offset from KIC position	$0.216 \pm 0.514$	0.42	$-0.199 \pm 0.603$	$0.084 \pm 0.448$
photometric centroid source offset	$1.39 \pm 1.56$	0.89	$0.83 \pm 1.67$	$-1.12 \pm 1.50$

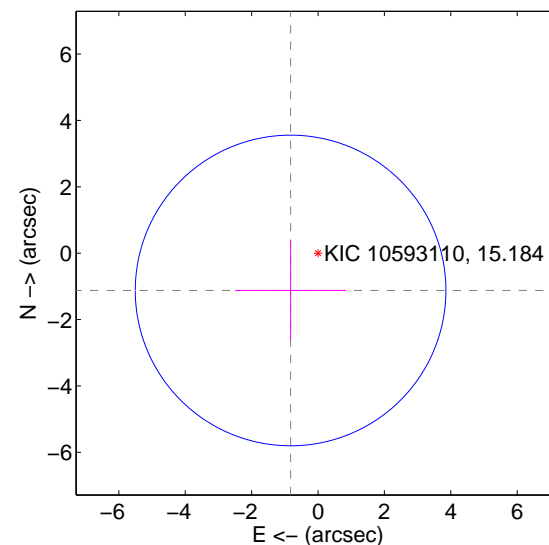
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

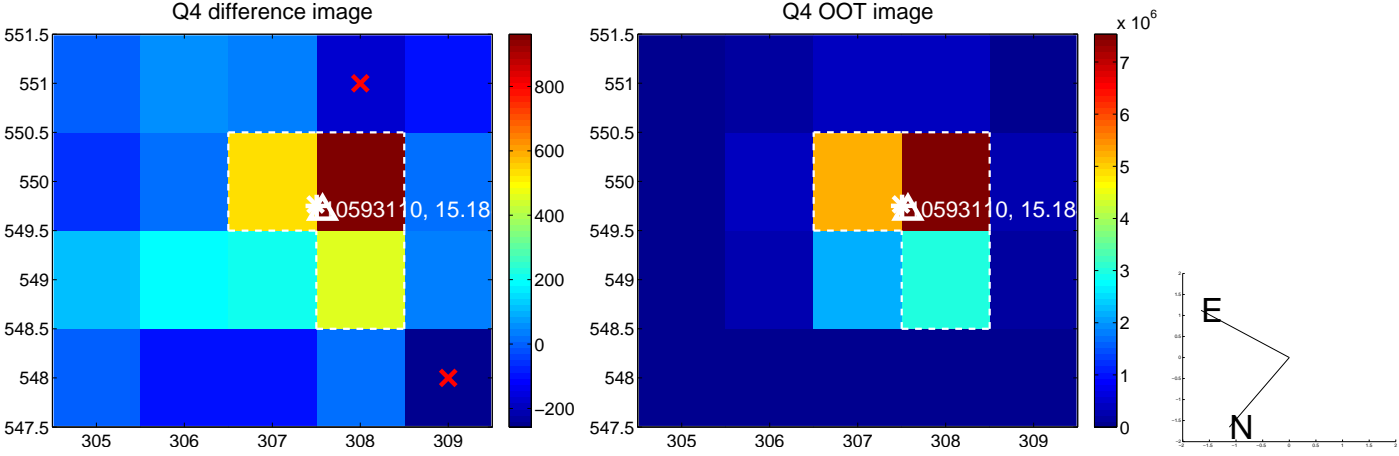
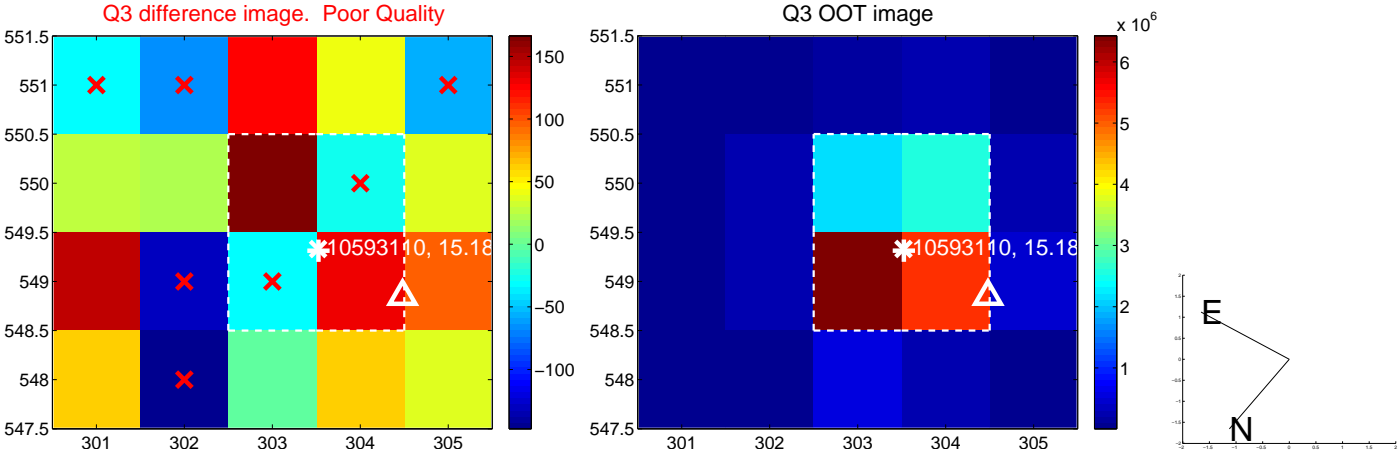
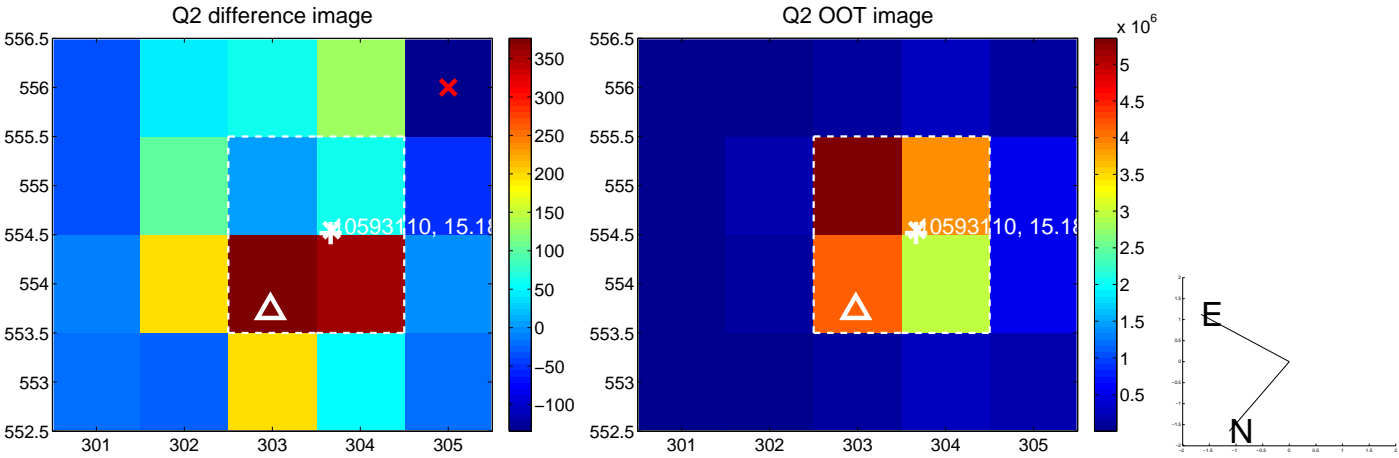
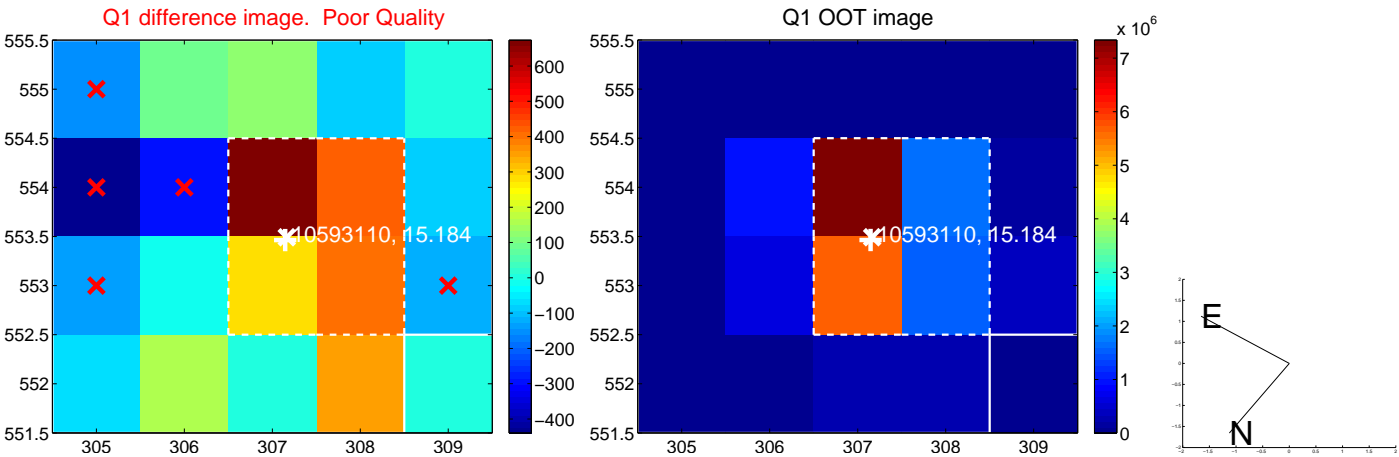


offset from photometric centroids

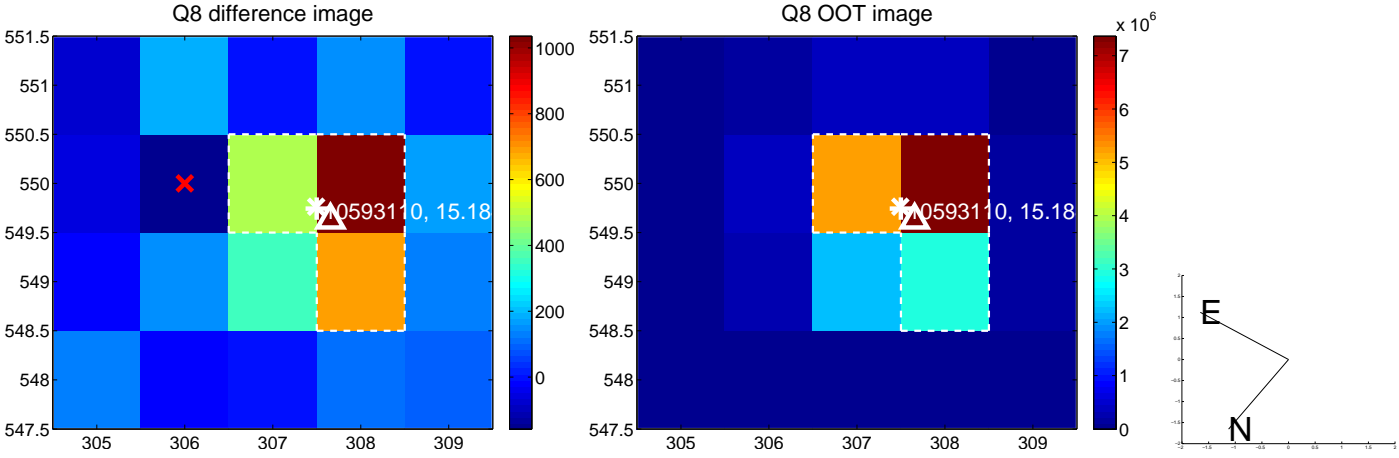
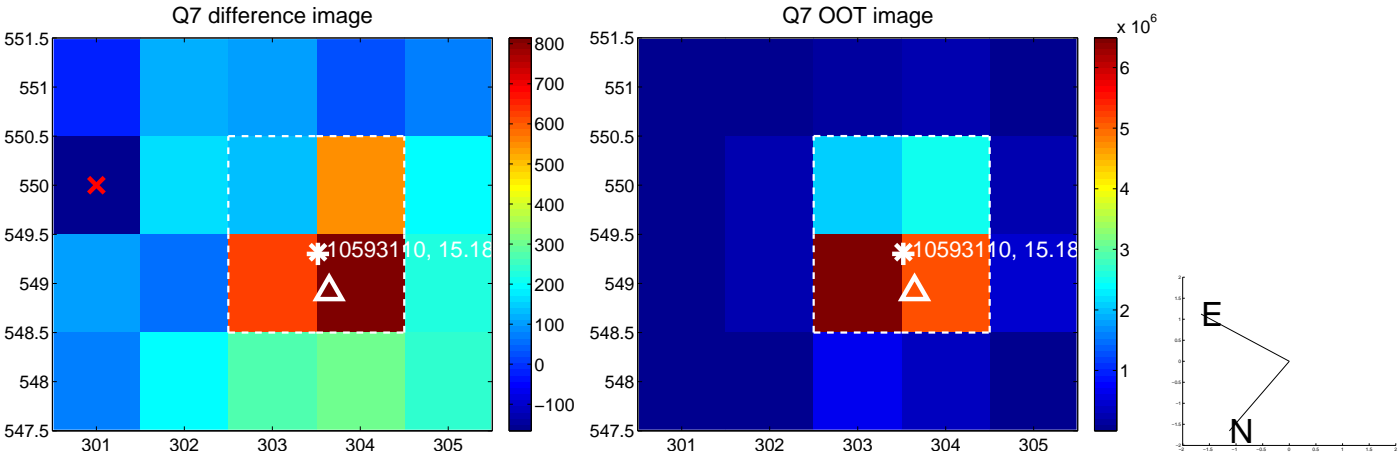
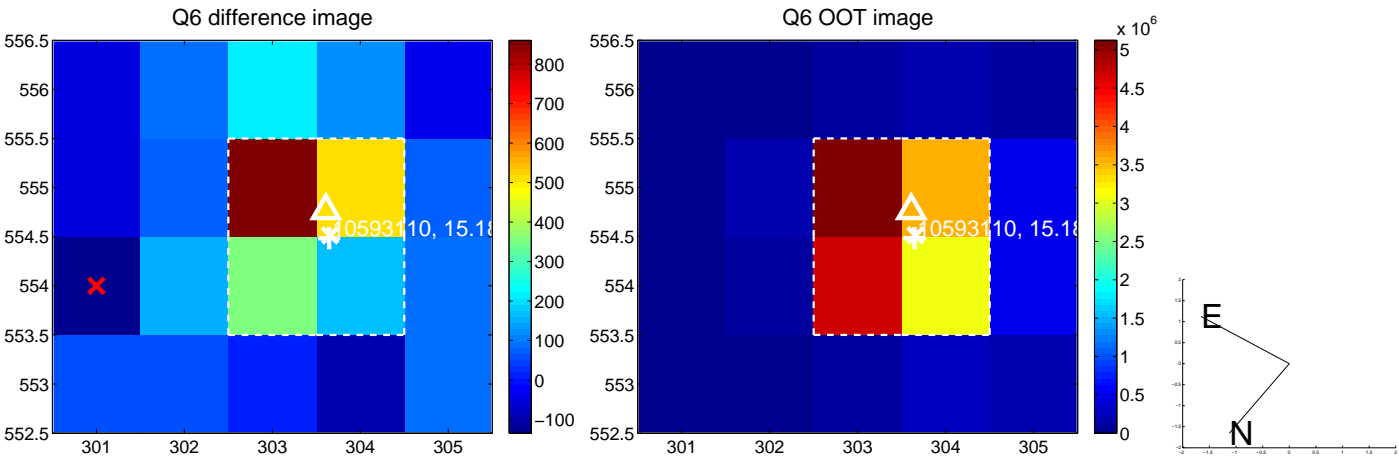
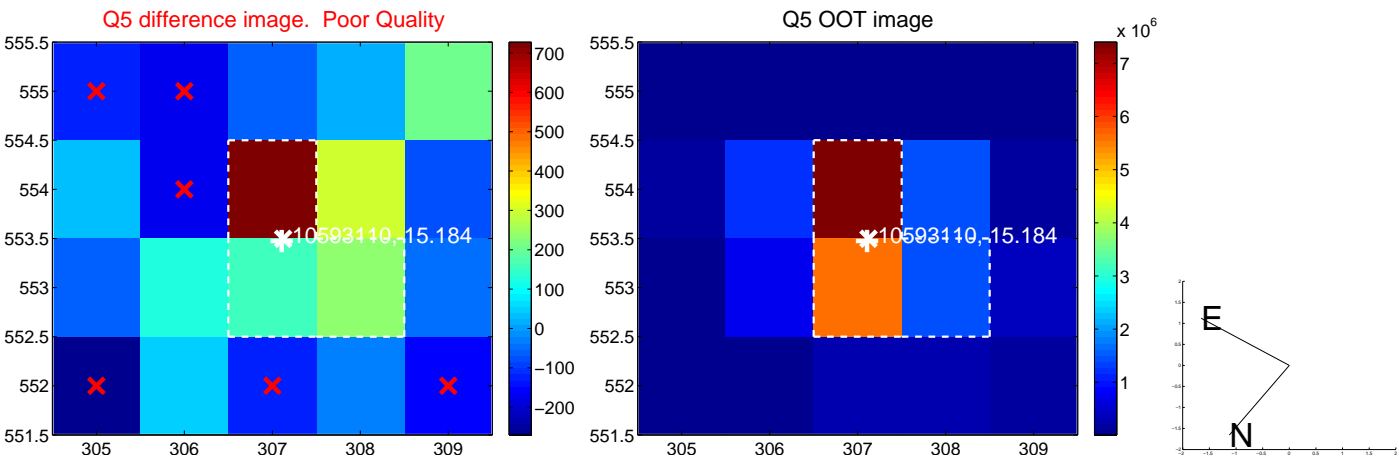


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

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

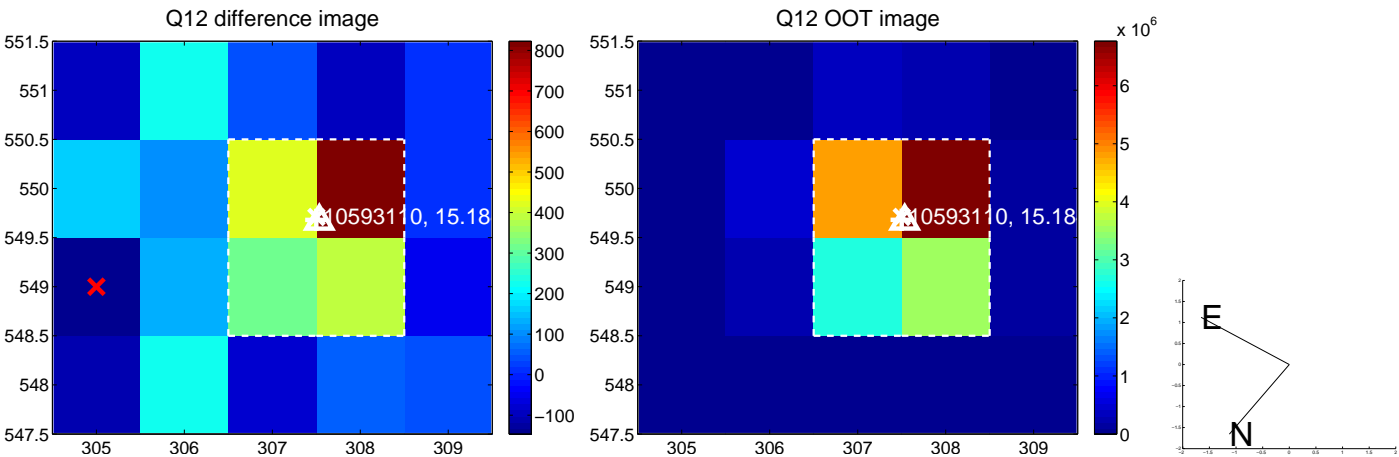
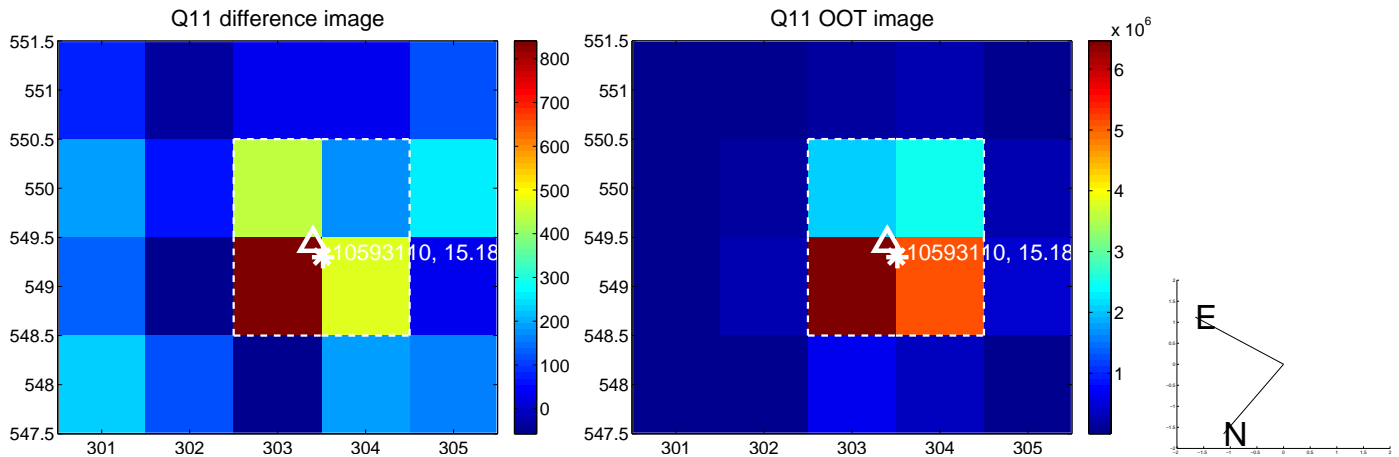
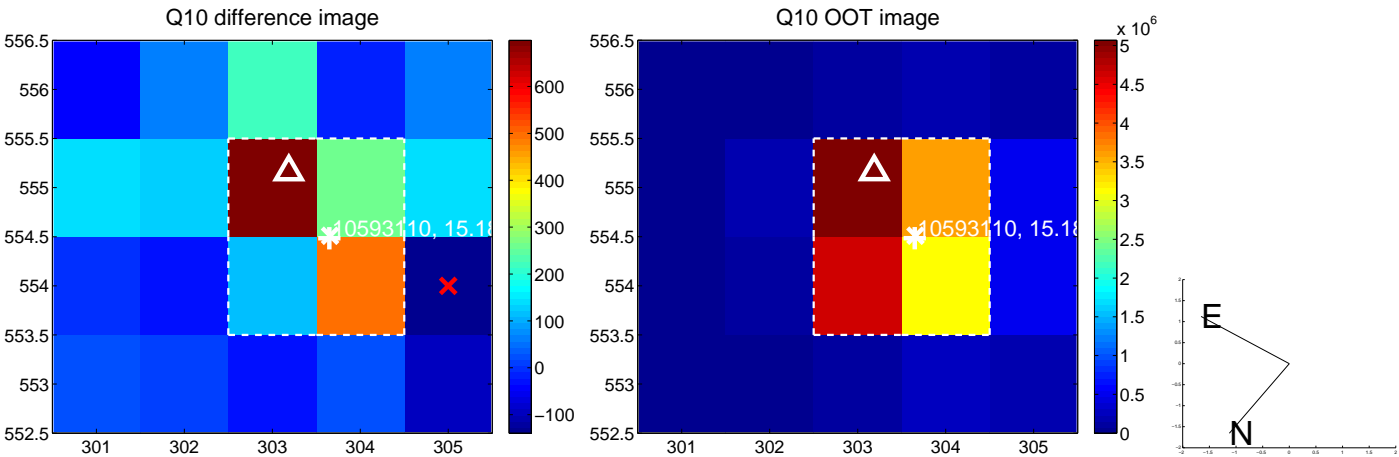
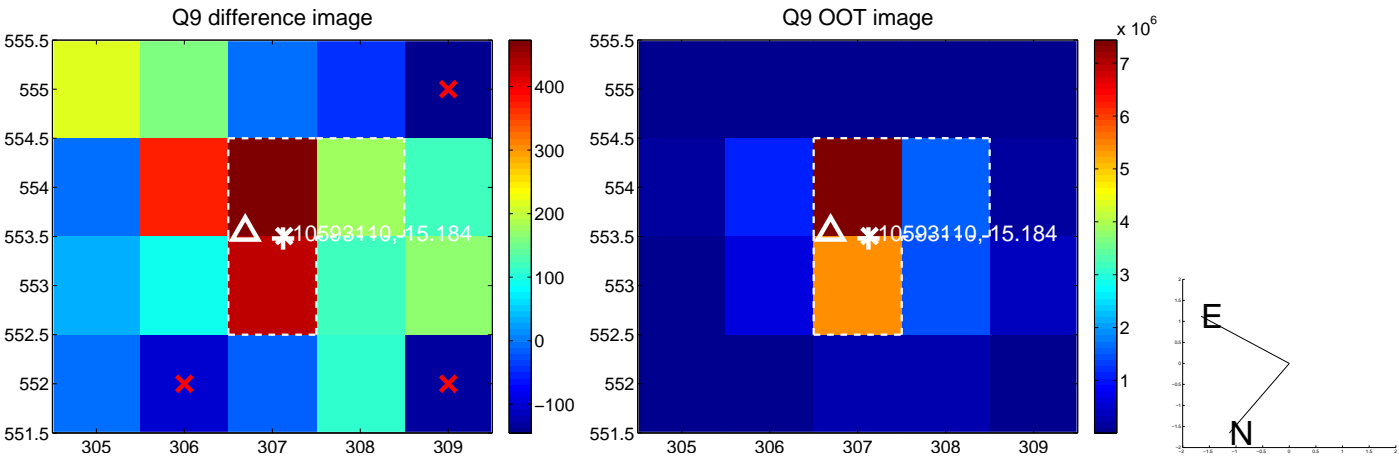


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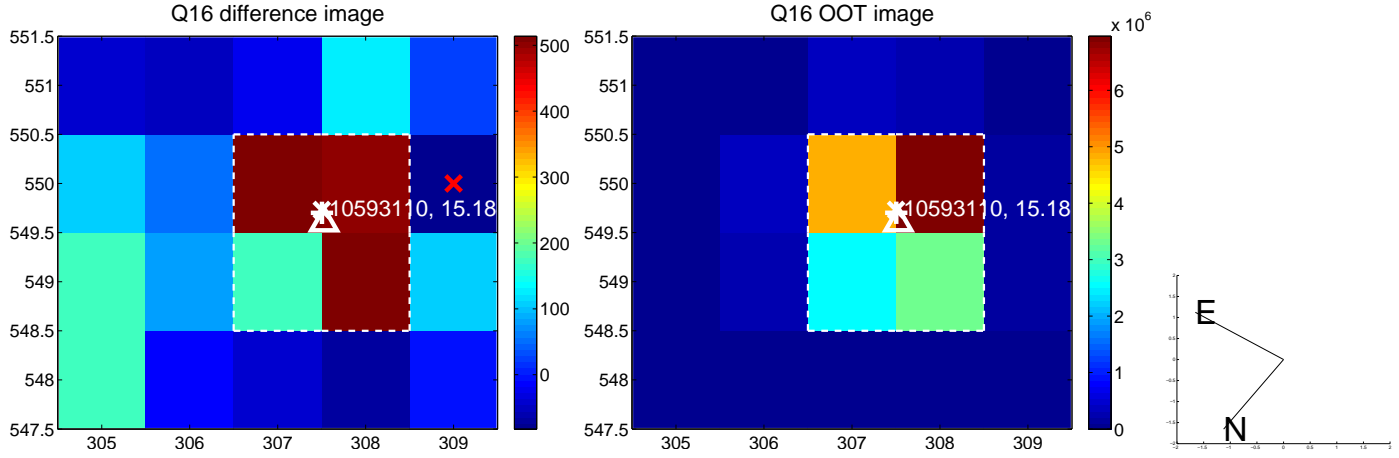
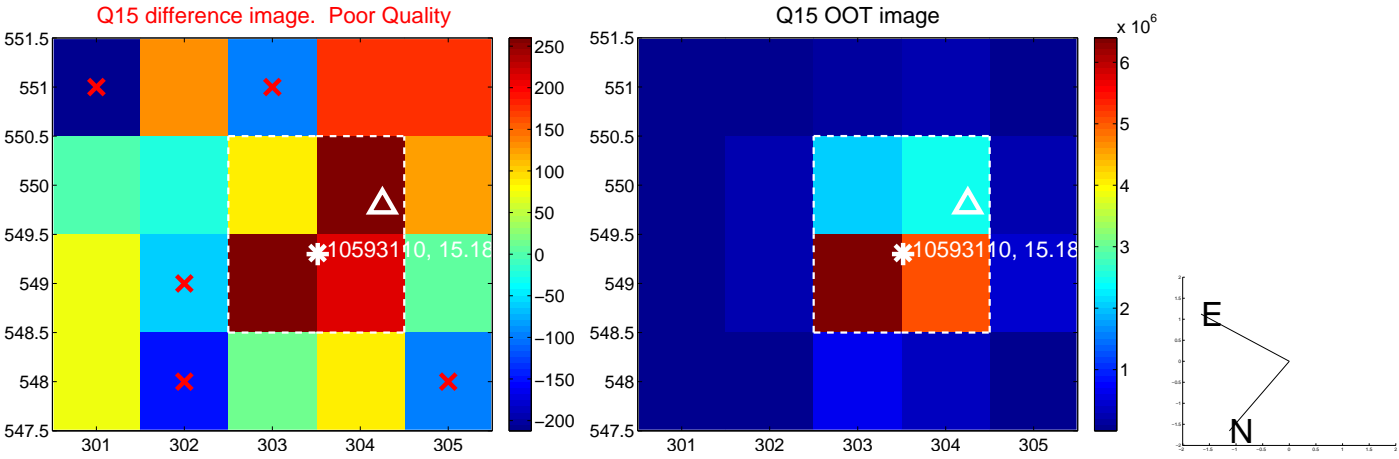
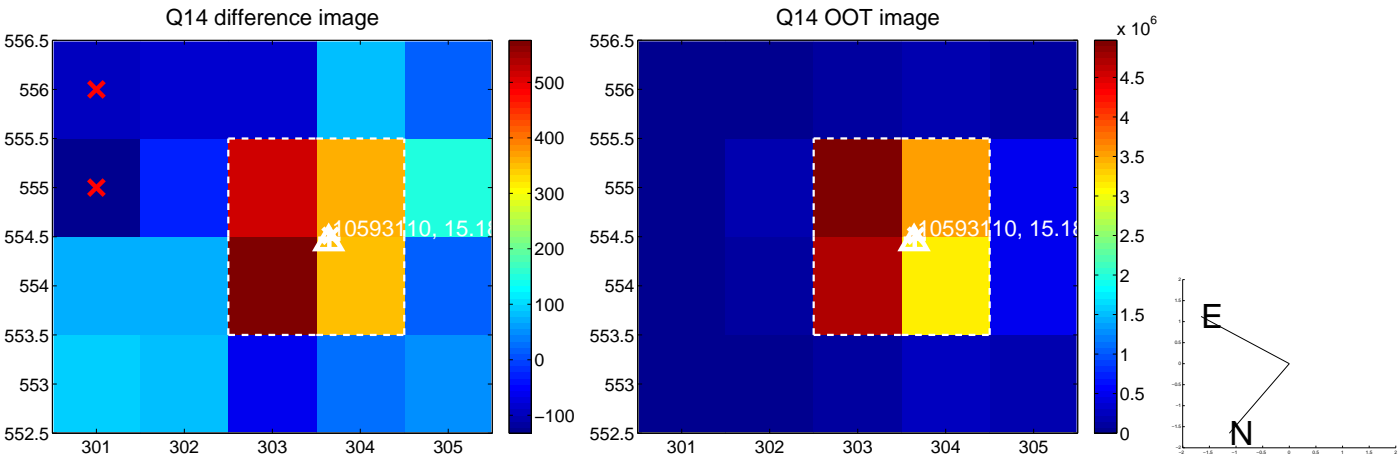
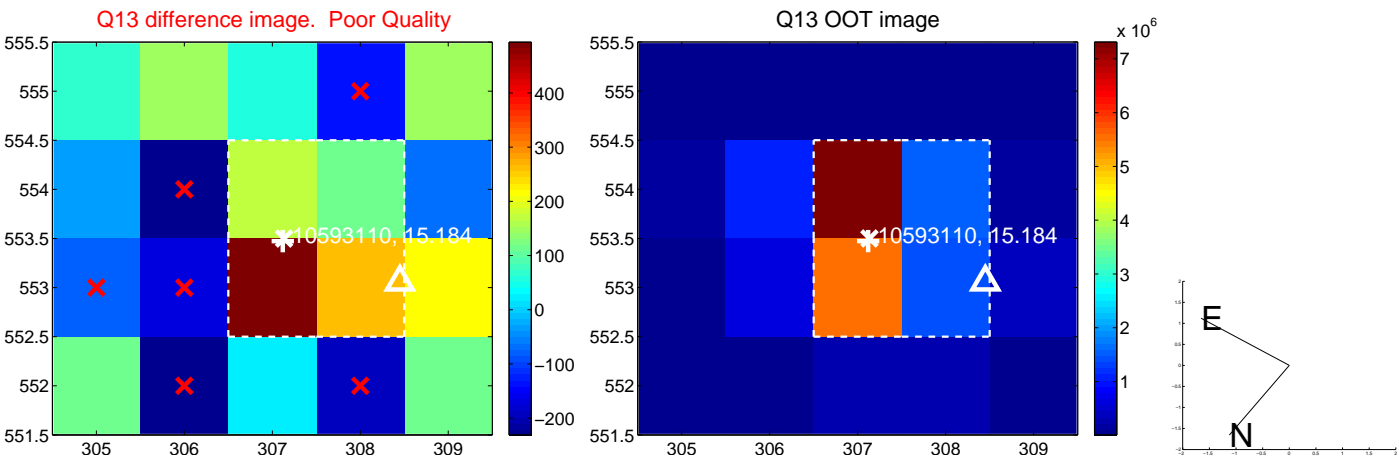




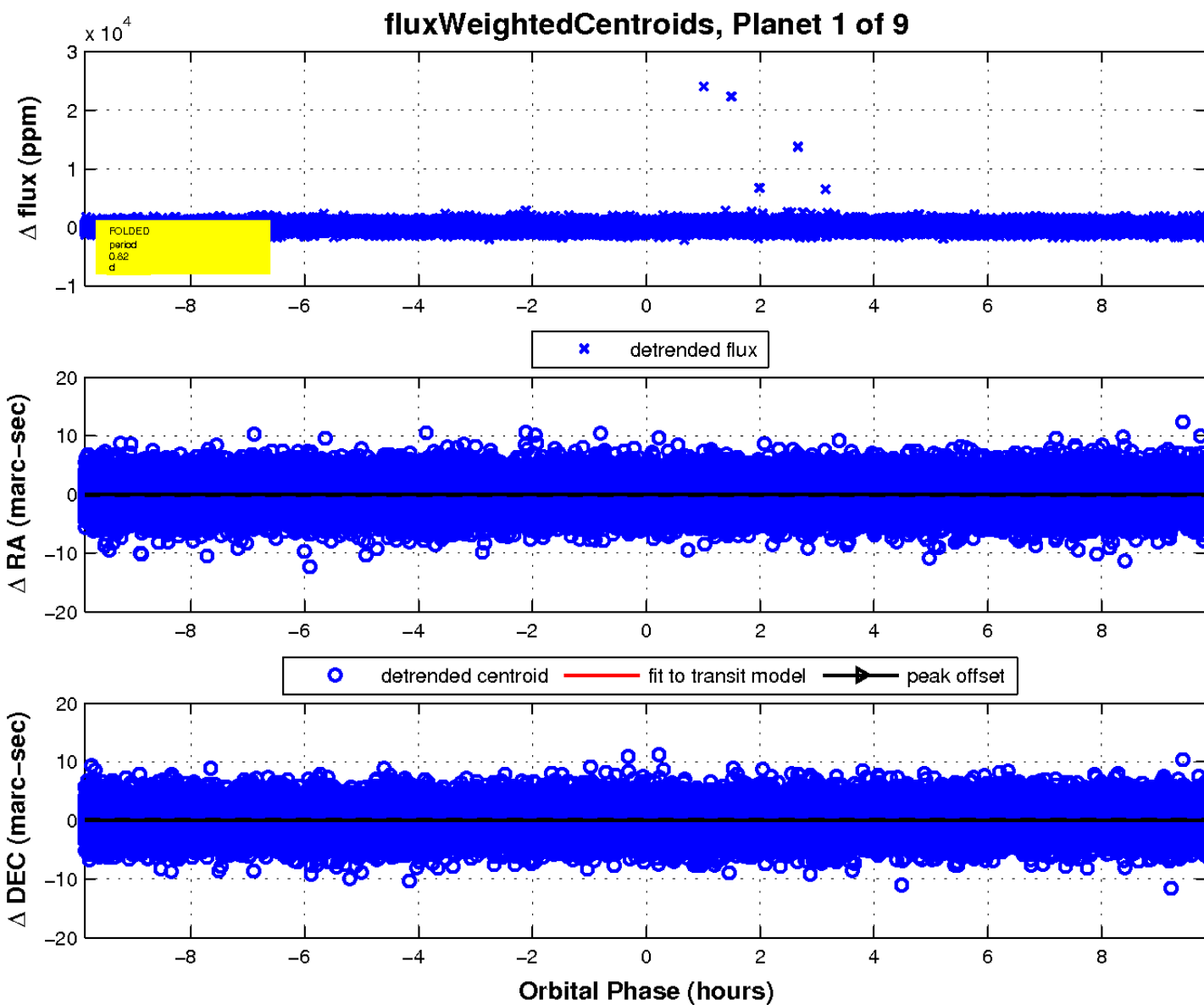
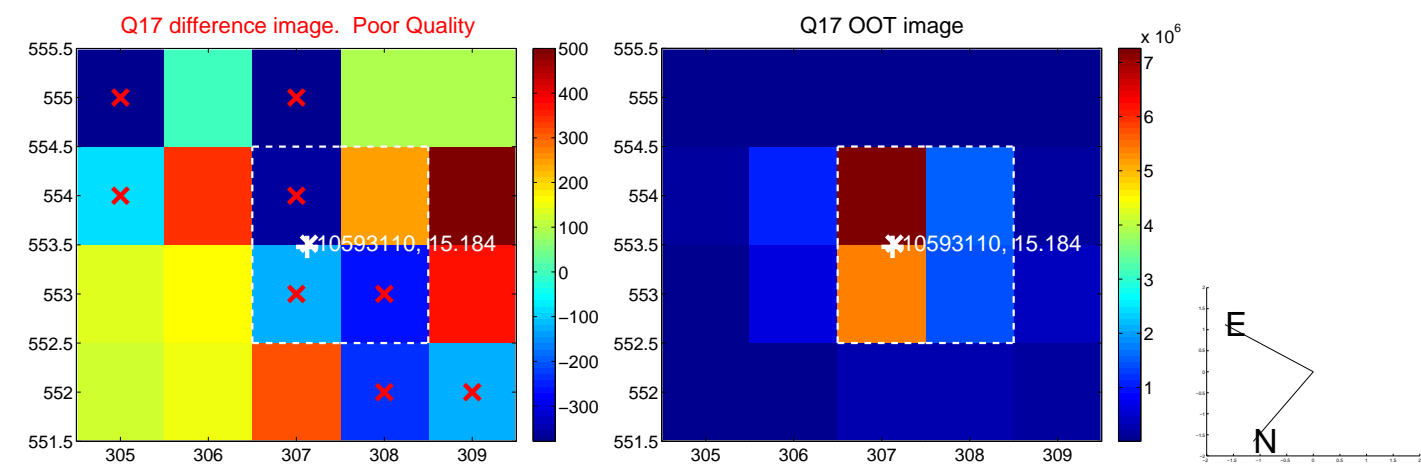
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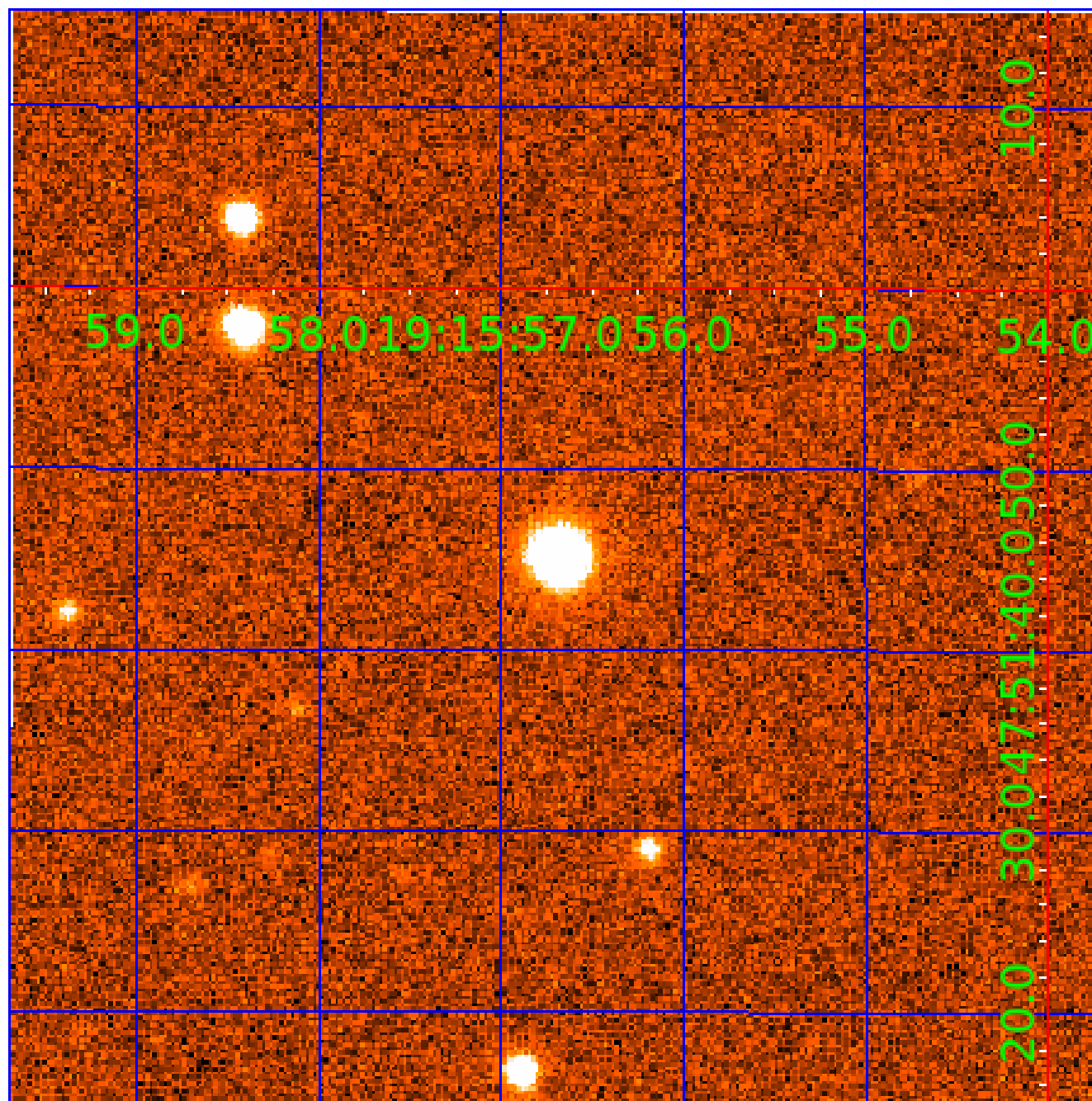


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UKIRT Image

Declination





# KIC 010593110

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010593110-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS
010593110-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
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010593110-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_FEW_DIFFS

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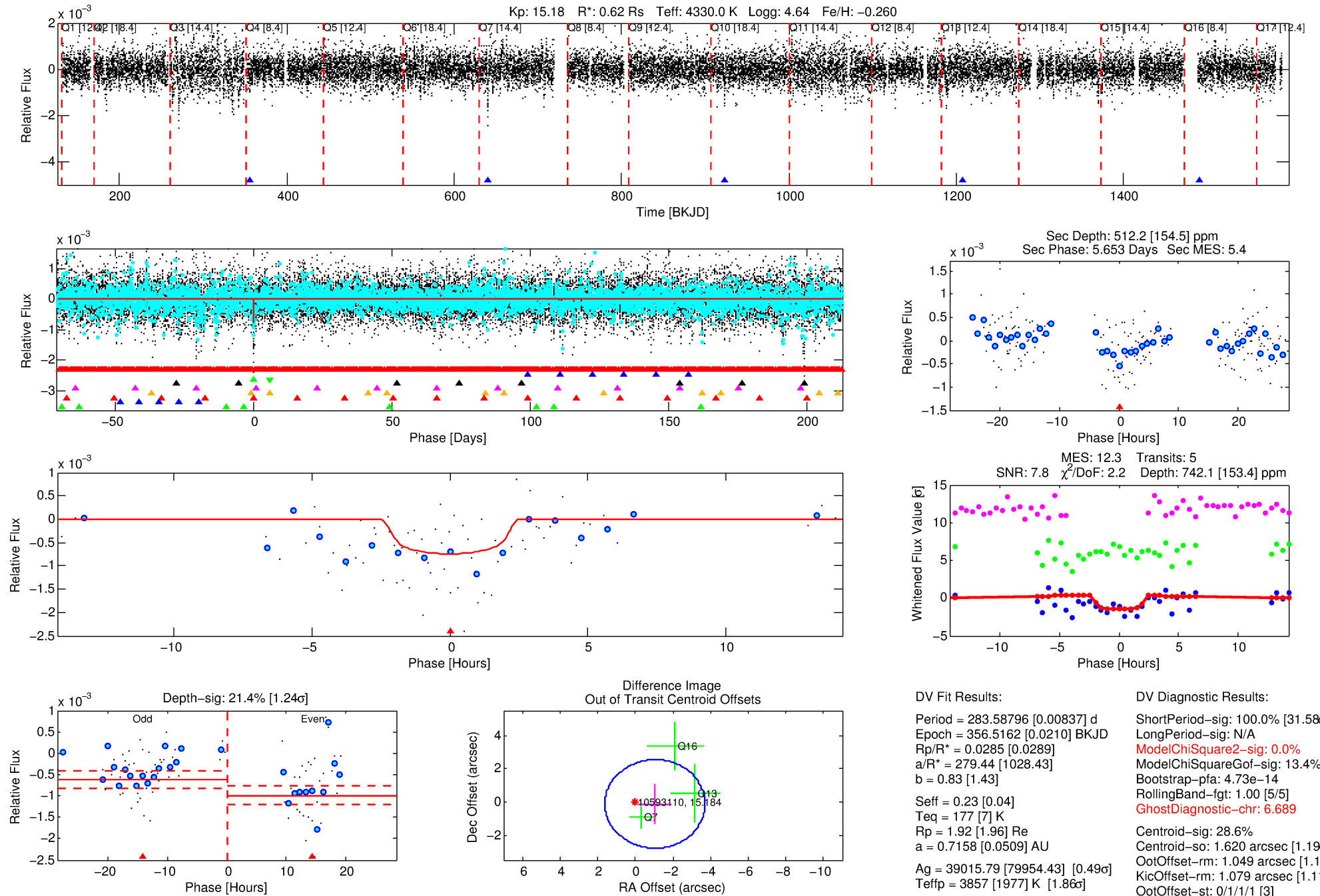
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 010593110-03

No Significant Match Found

# DV One-Page Summary

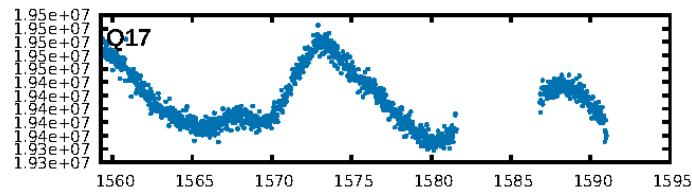
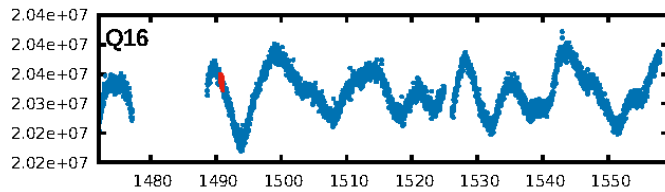
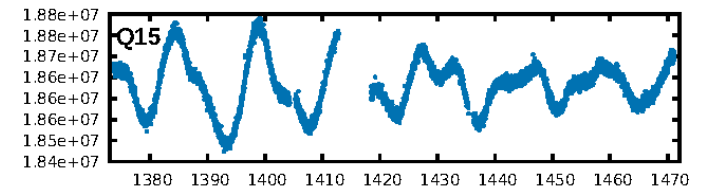
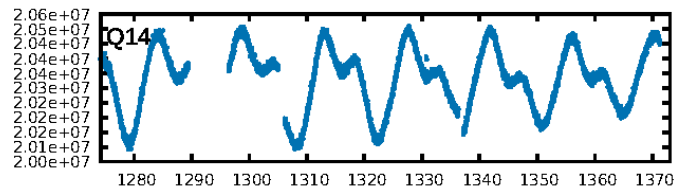
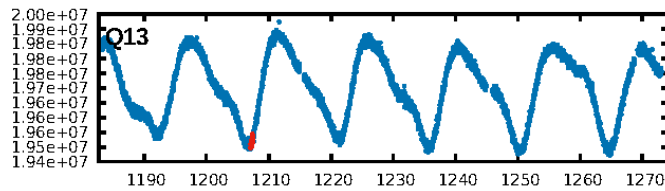
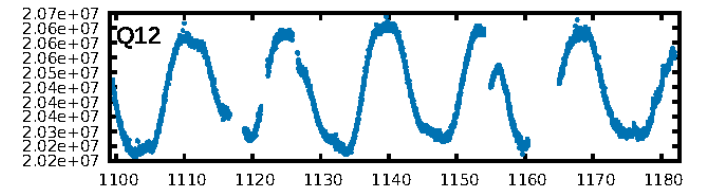
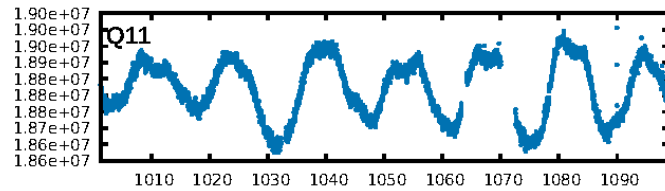
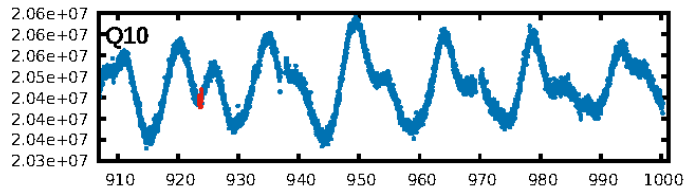
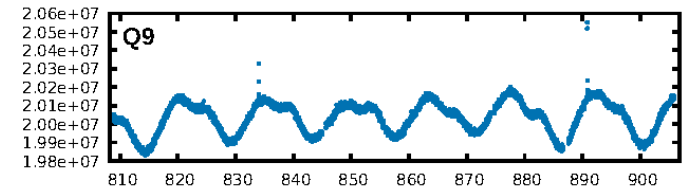
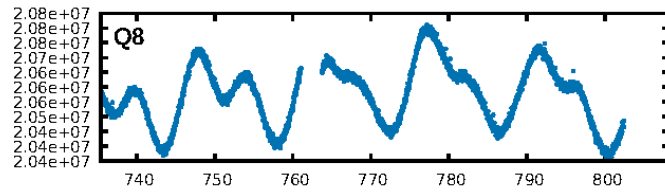
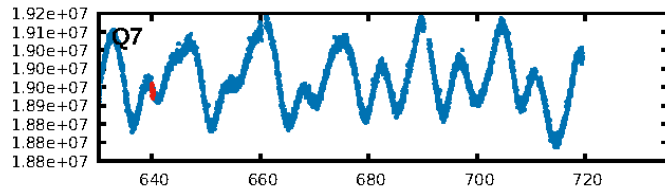
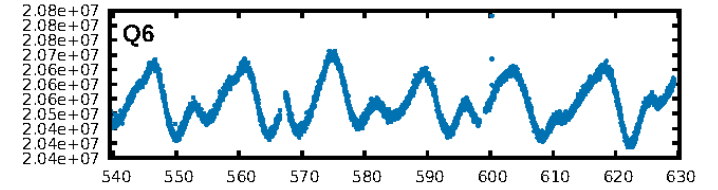
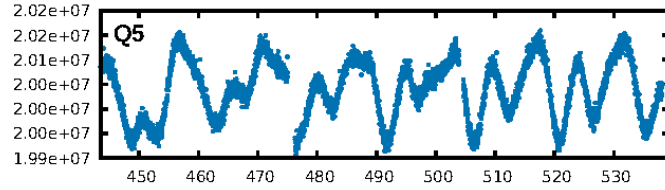
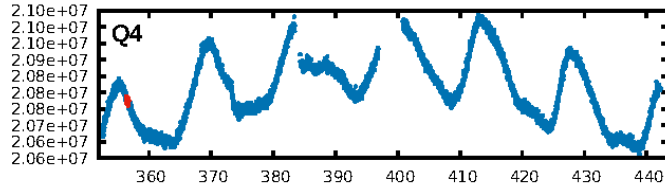
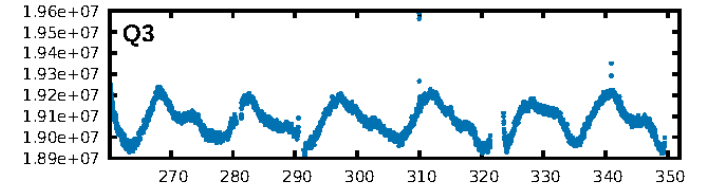
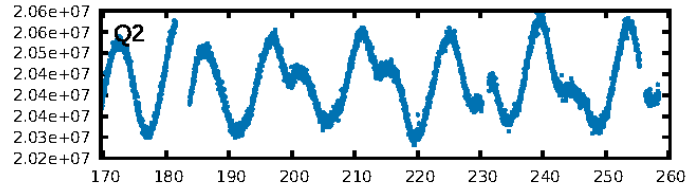
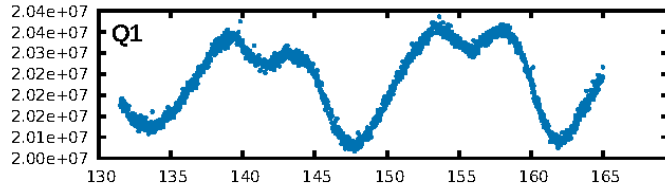
KIC: 10593110 Candidate: 3 of 9 Period: 283.588 d



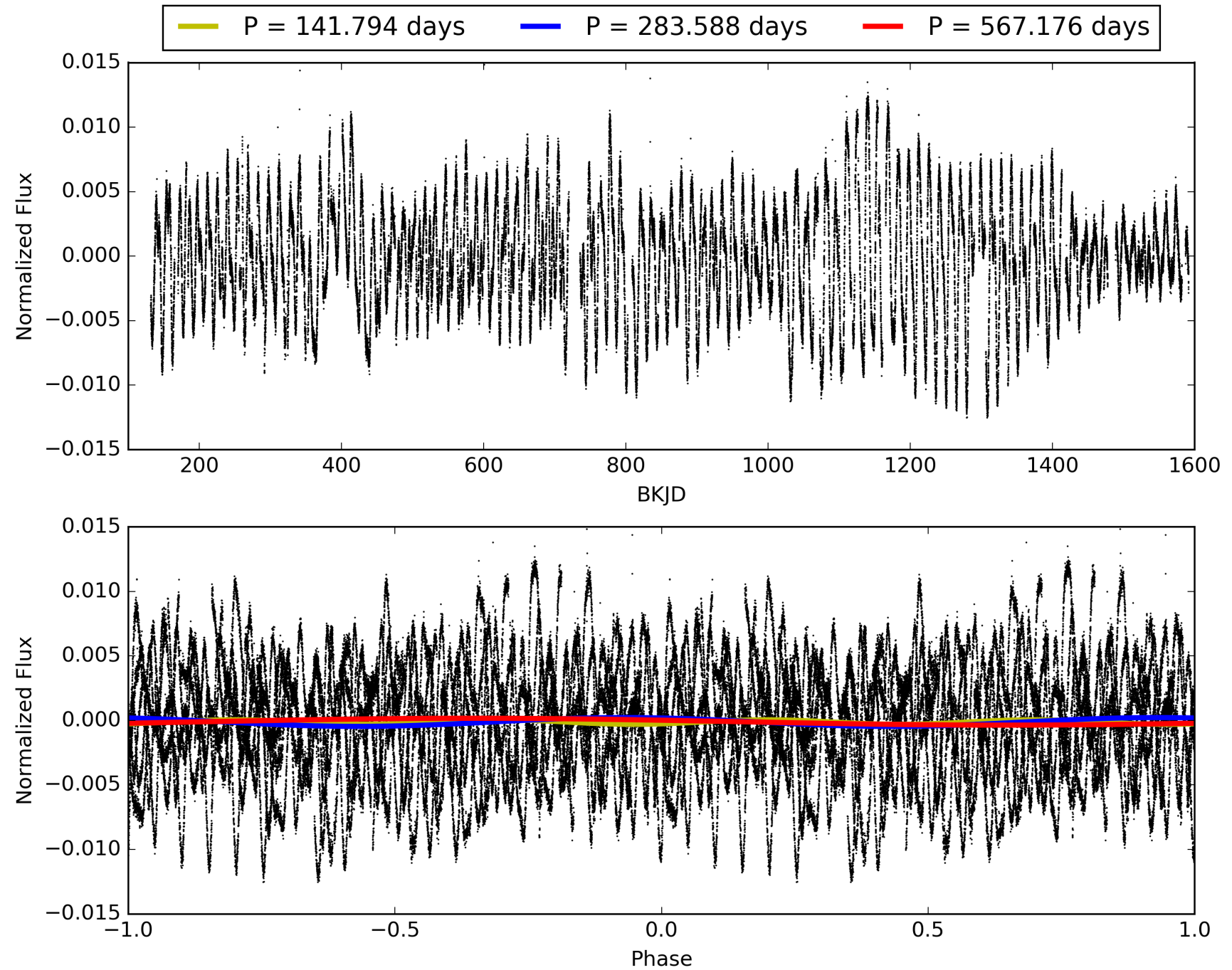
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 02:56:33 Z

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

# TCE 010593110-03, PDC Light Curves

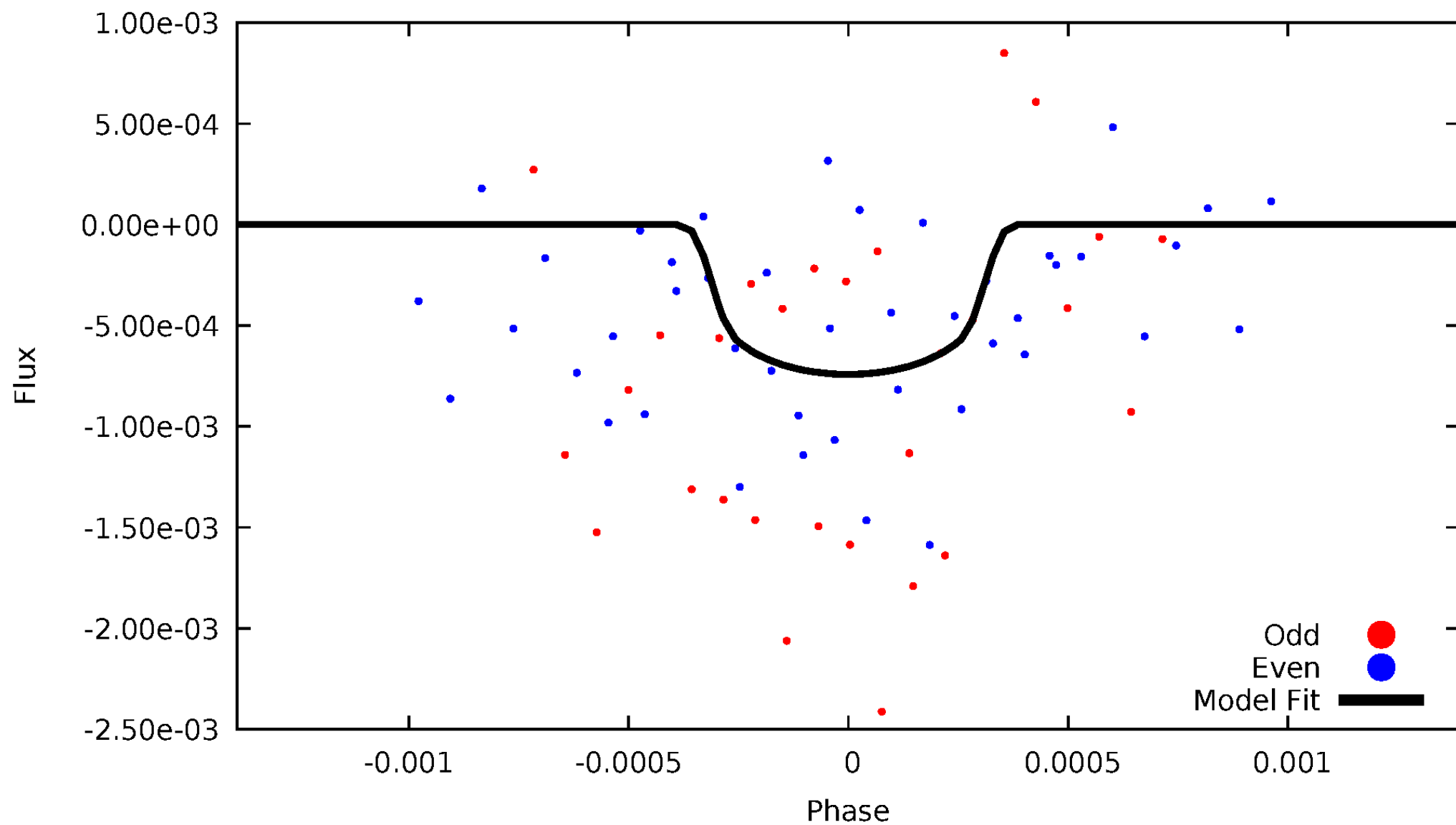


# TCE 010593110-03



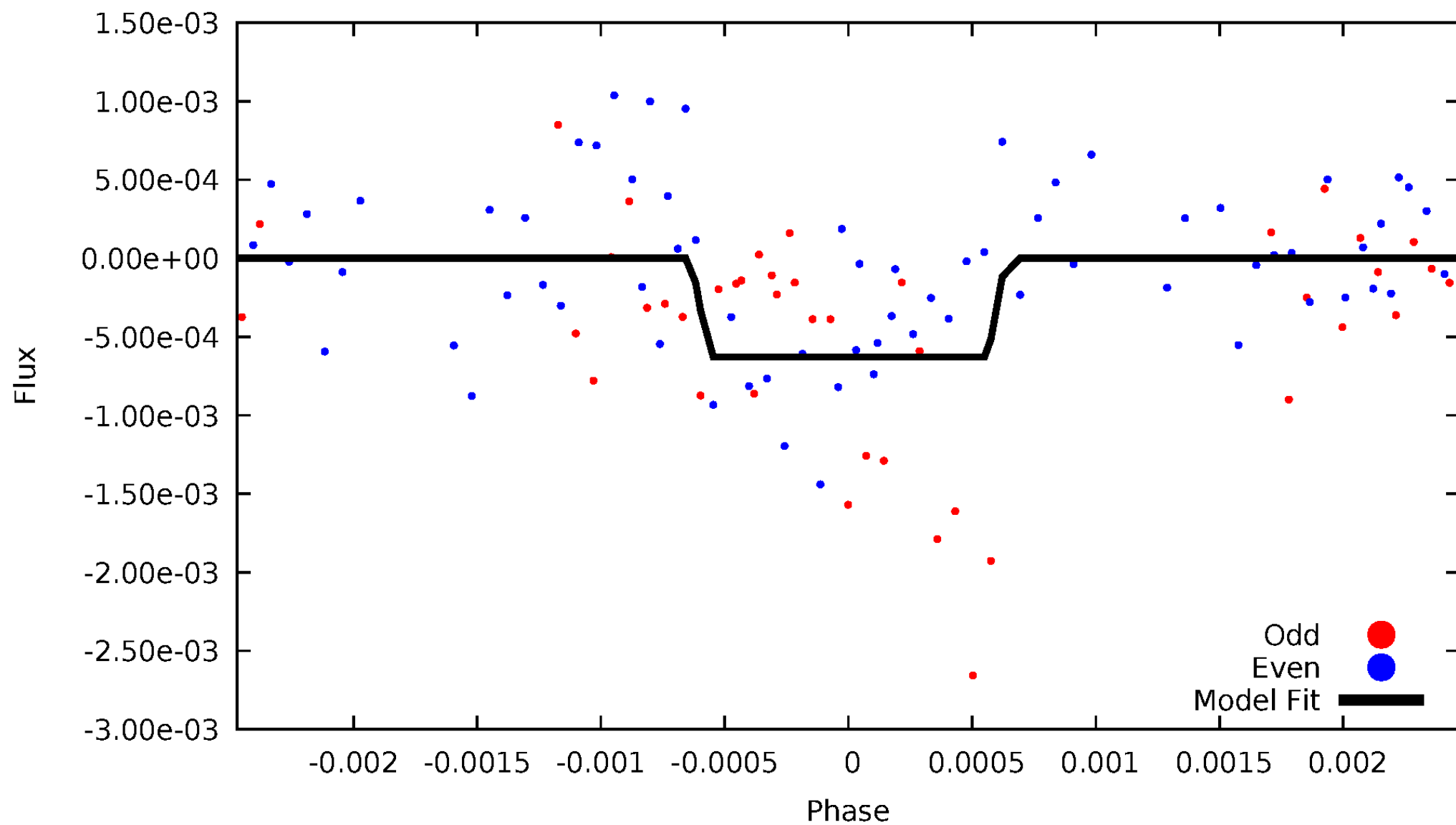
# DV Odd/Even

TCE 010593110-03



# ALT Odd/Even

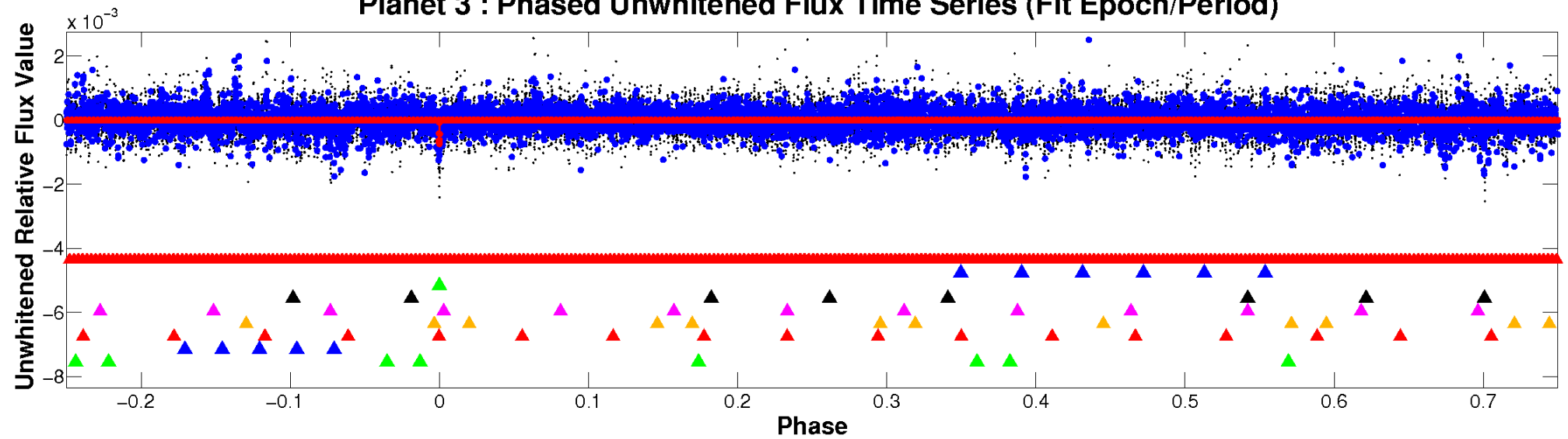
TCE 010593110-03



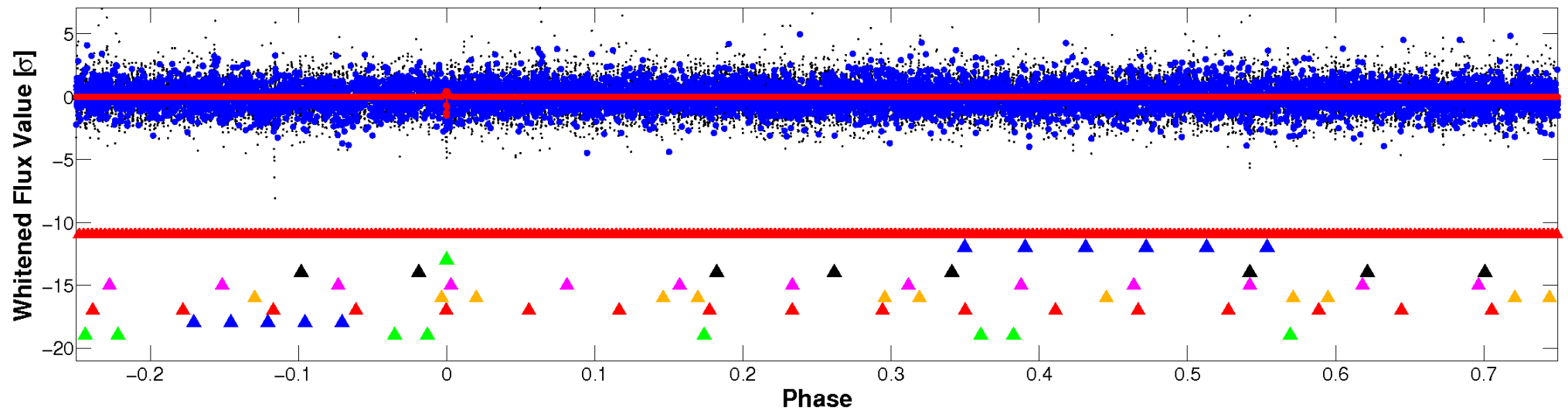


# Non-Whitened Vs. Whitened Light Curve

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

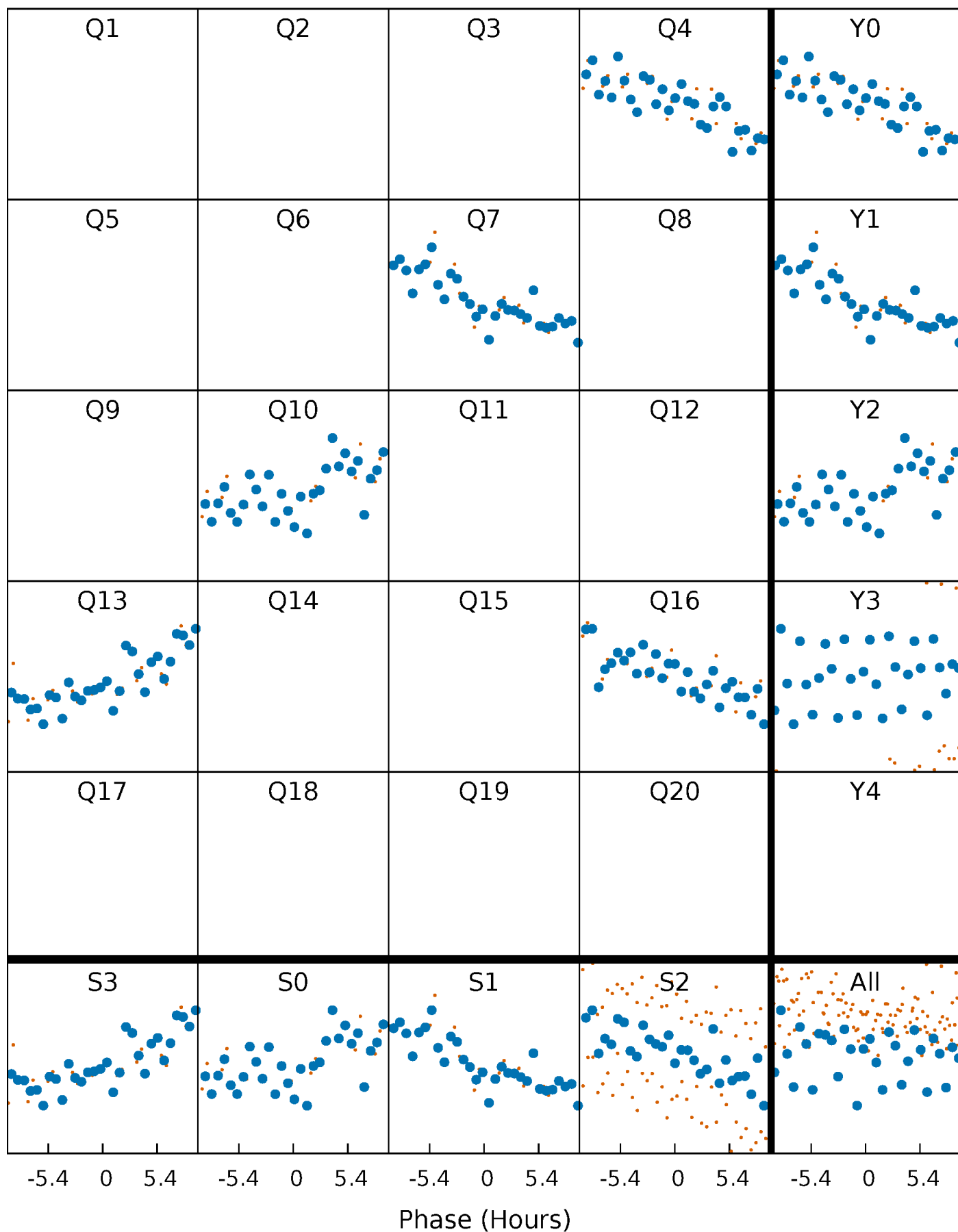


Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



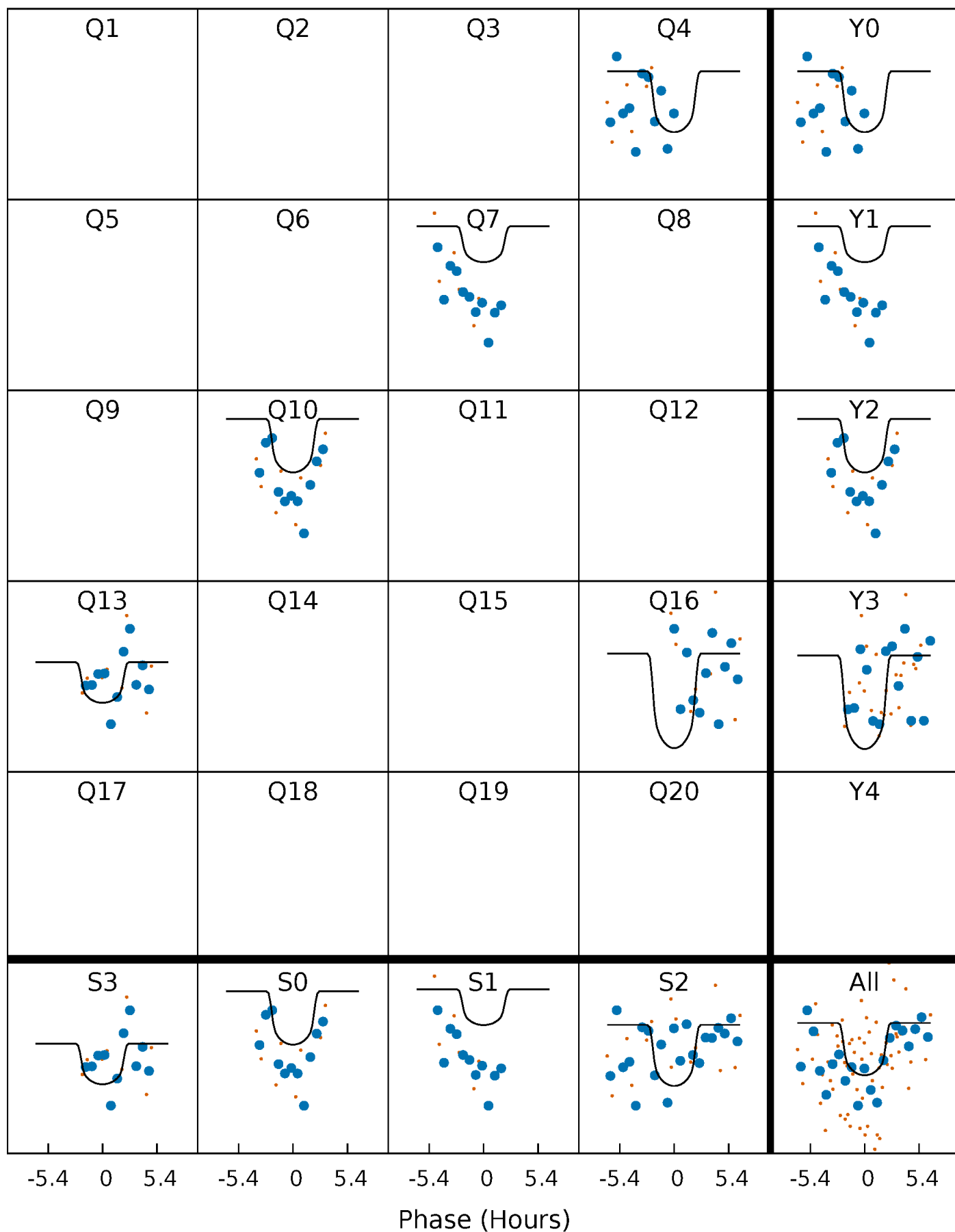
# PDC Quarter-Phased Transit Curves

TCE 010593110-03     $P=283.587961$  Days     $T_0=356.516235$  (BKJD)



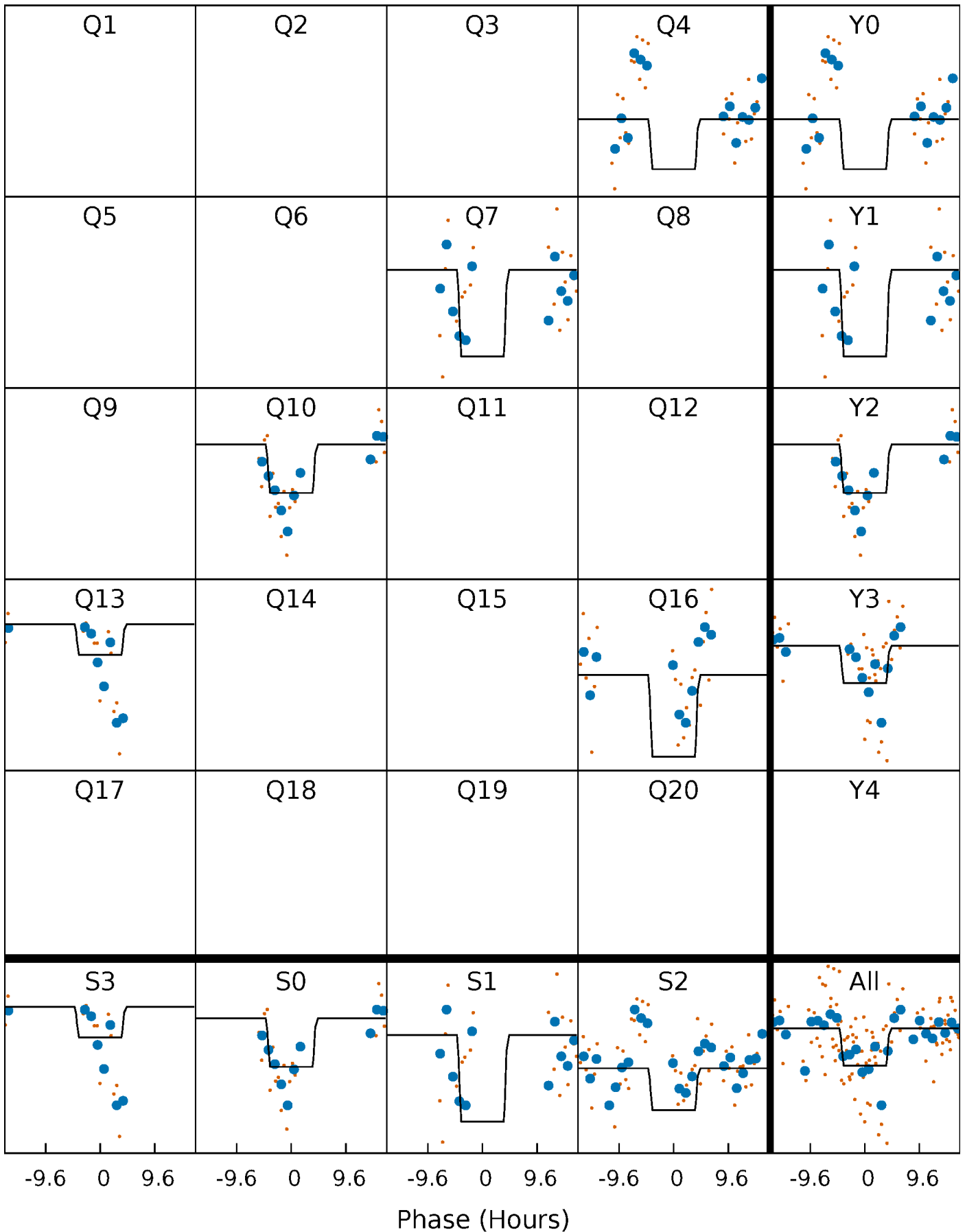
# DV Quarter-Phased Transit Curves

TCE 010593110-03 P=283.587961 Days  $T_0=356.516235$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

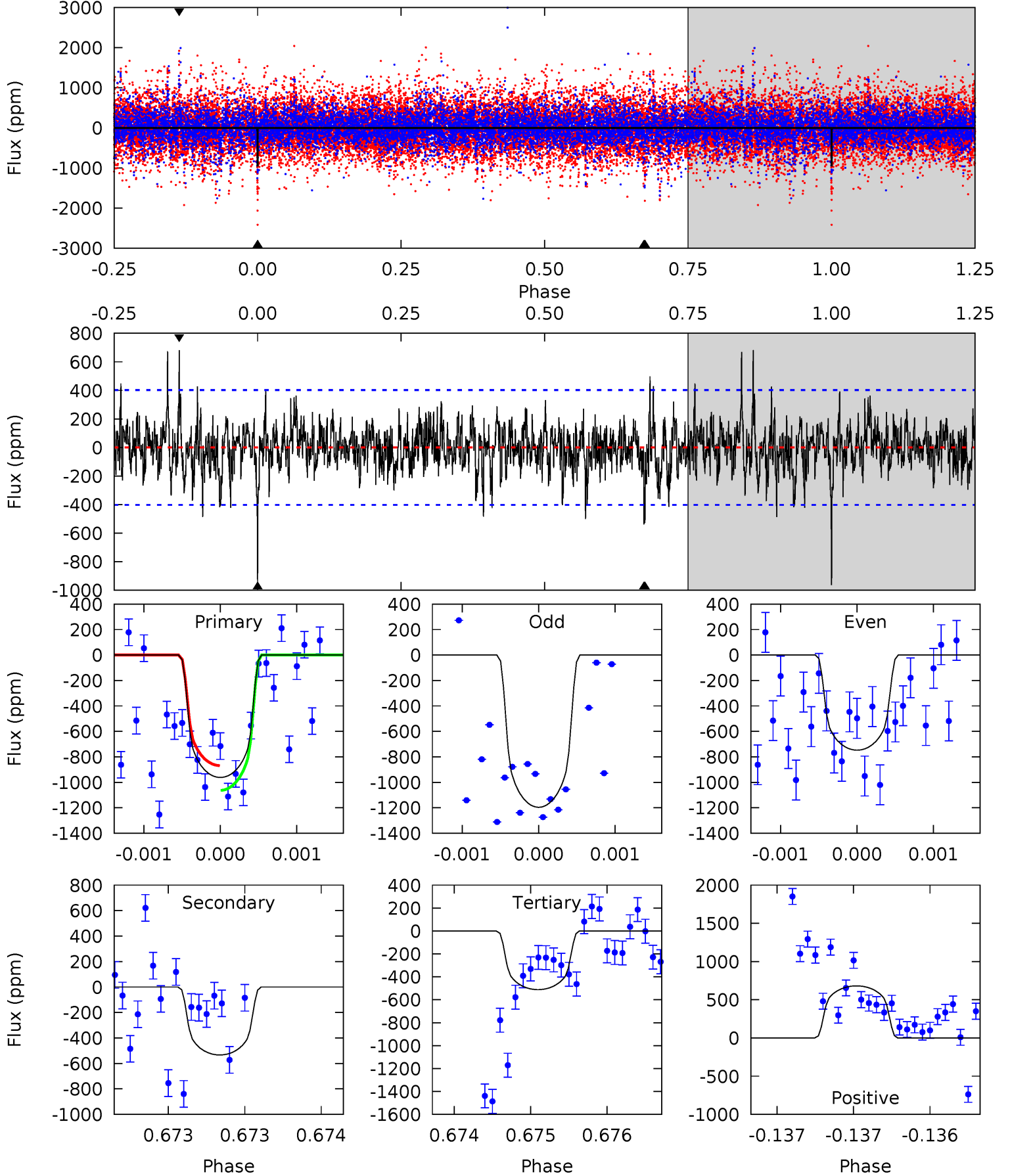
TCE 010593110-03 P=283.542890 Days  $T_0=356.690922$  (BKJD)



# DV Model-Shift Uniqueness Test

010593110-03, P = 283.587961 Days, E = 72.928274 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
13.2	7.32	7.03	9.36	5.51	3.38	1.82	6.18	3.85	0.30	-2.03	3.08	1.40	0.41	1.33

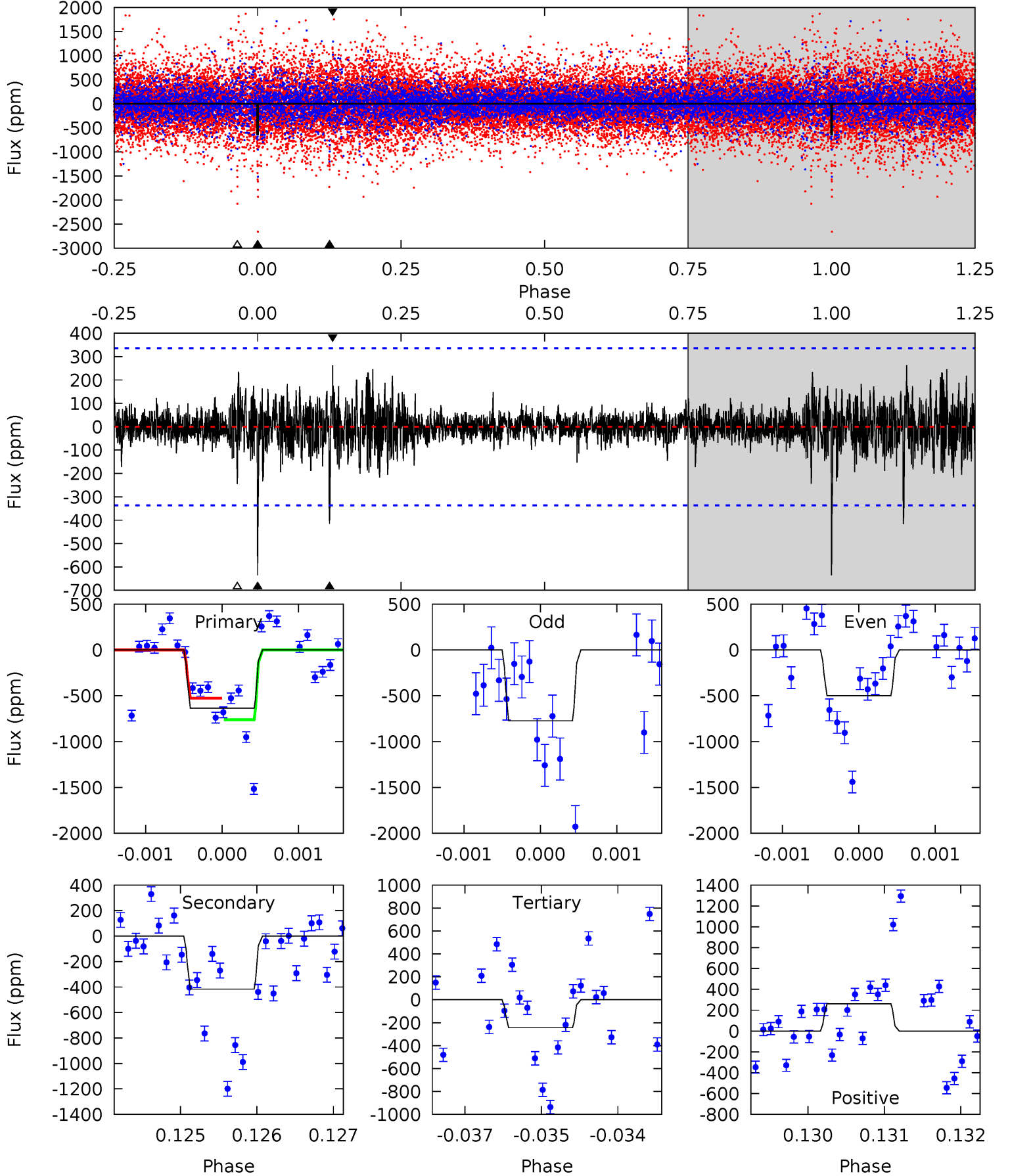




# Alt Model-Shift Uniqueness Test

010593110-03,  $P = 283.542890$  Days,  $E = 73.148032$  Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.2	6.68	3.92	4.21	5.40	3.21	0.88	6.29	6.00	2.76	2.47	2.23	1.00	0.29	1.89



### Stellar Parameters For KIC 010593110

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (g \cdot \text{cm}^{-3})$
	$4330^{+129}_{-129}$	$4.640^{+0.049}_{-0.025}$	$-0.260^{+0.300}_{-0.300}$	$0.618^{+0.050}_{-0.056}$	$0.610^{+0.066}_{-0.050}$	$3.632^{+0.843}_{-0.438}$
	+3%/-3%	+1%/-1%	+115%/-115%	+8%/-9%	+11%/-8%	+23%/-12%
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 010593110-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-533 \pm 73$	$2.34^{+1.85}_{-1.48}$	$247^{+8}_{-9}$	$3744^{+1648}_{-626}$	$27555^{+165076}_{-18914}$
Alt.	$-416 \pm 62$	$2.18^{+1.71}_{-1.39}$	$246^{+8}_{-9}$	$3672^{+1613}_{-606}$	$24640^{+157449}_{-17054}$

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

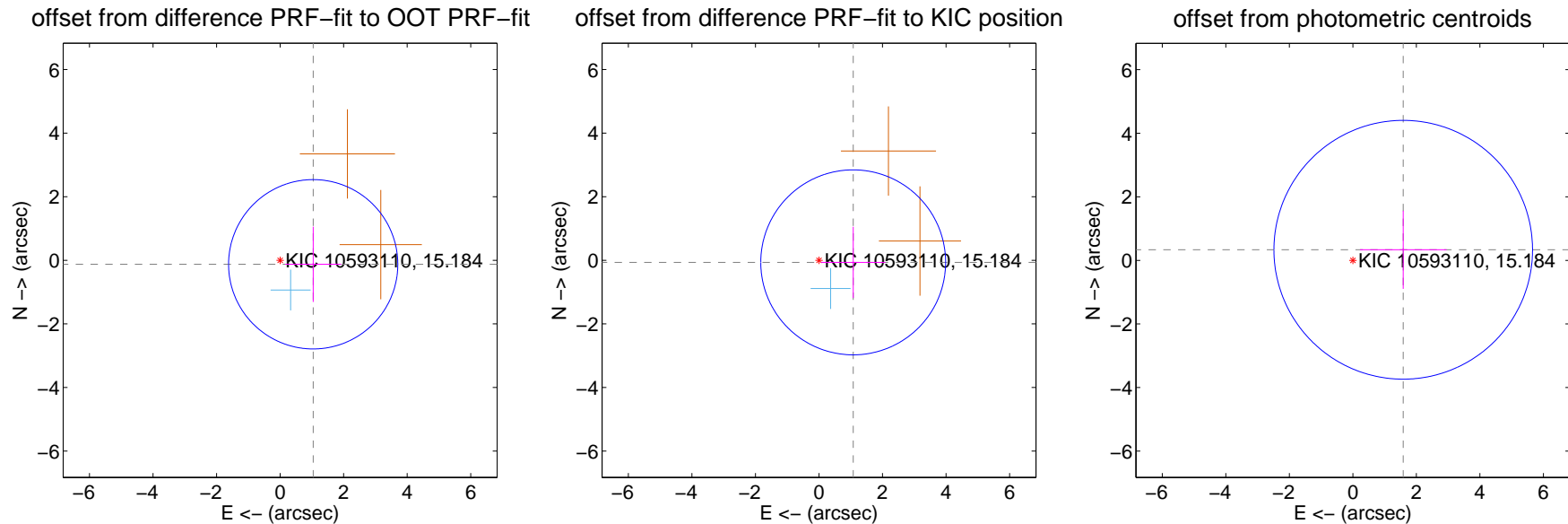
## DV Centroid Data

Supplemental centroid analysis for 010593110-03. Kepler magnitude: 15.18. Transit SNR 7.85

There are 1 quarters with good PRF difference image offsets

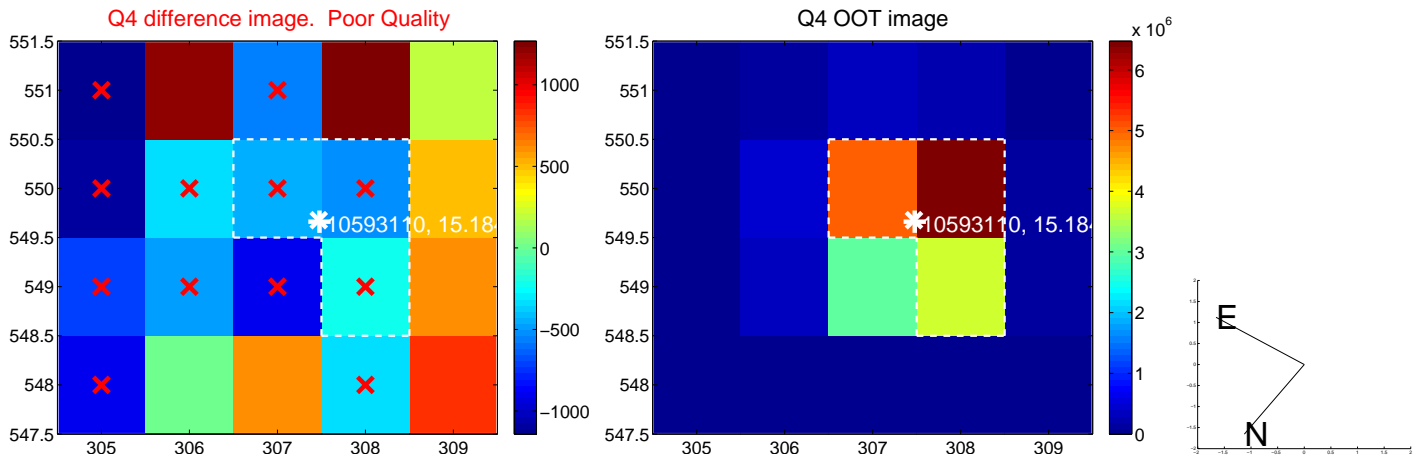
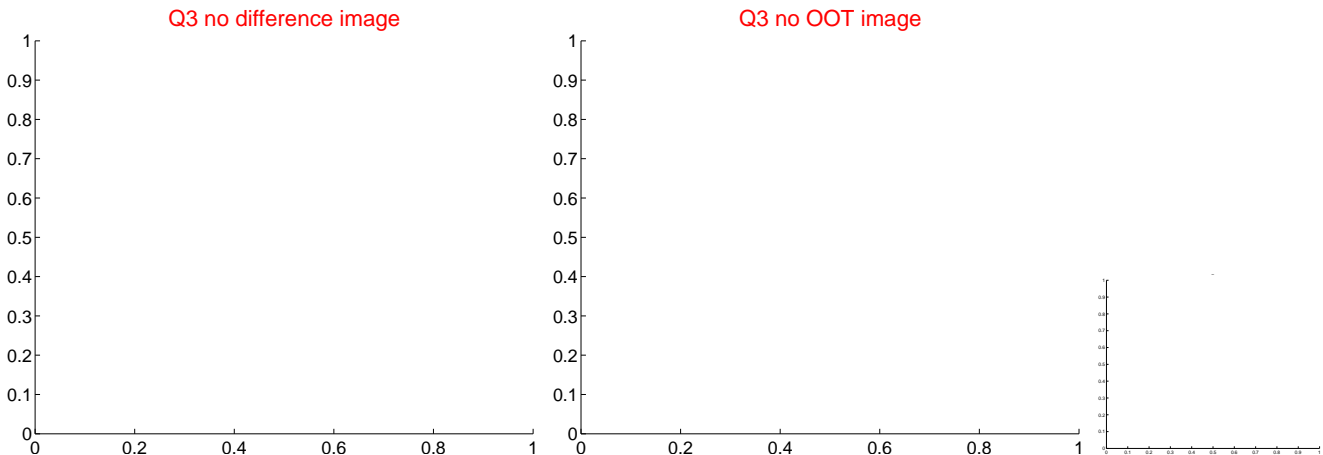
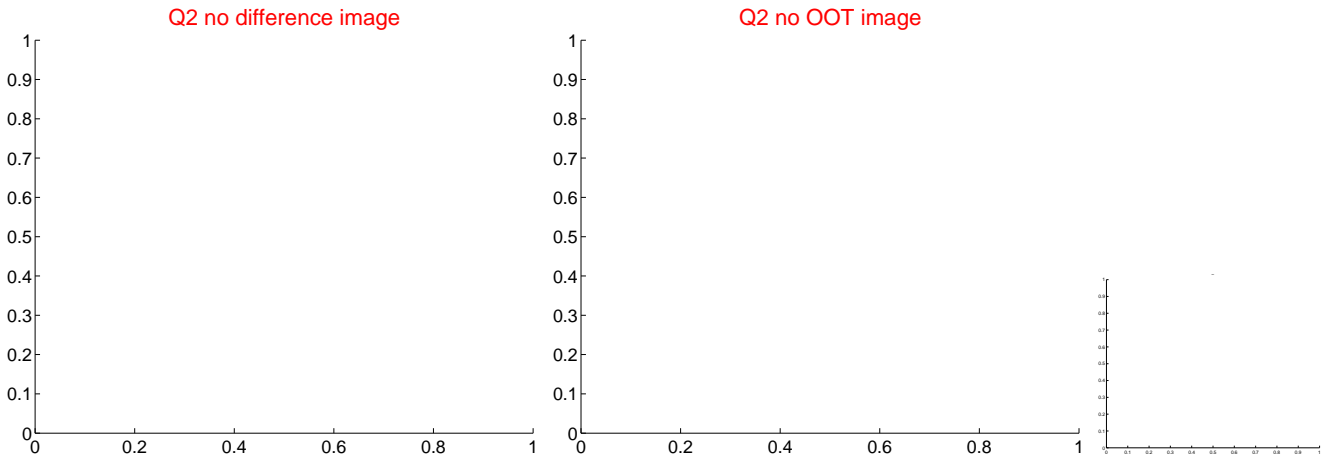
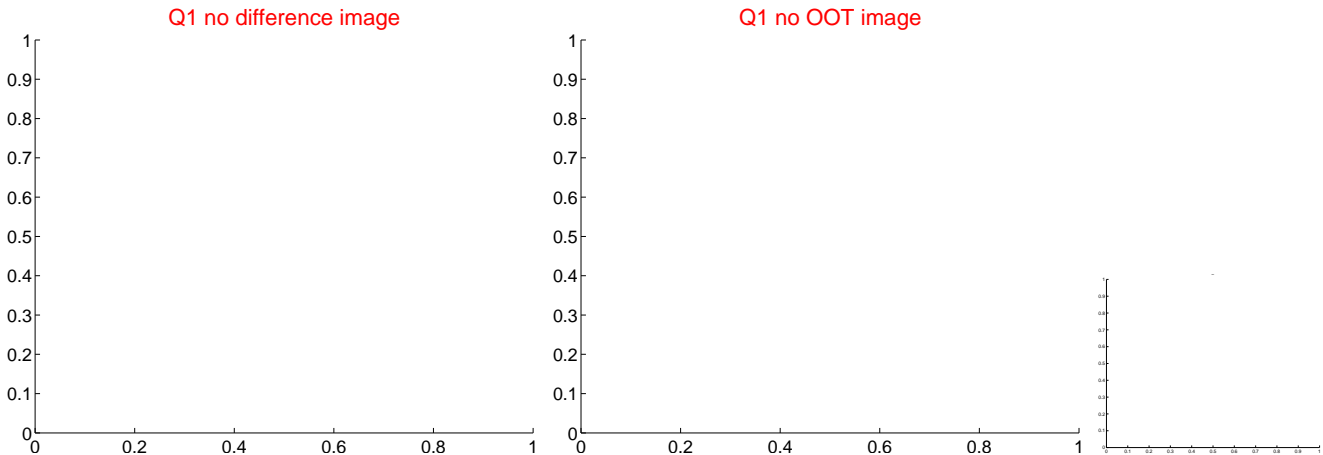
The direct PRF centroid is offset from the target star catalog position by about 0.11 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.049 \pm 0.888$	1.18	$-1.041 \pm 0.883$	$-0.125 \pm 1.185$
PRF-fit source offset from KIC position	$1.079 \pm 0.970$	1.11	$-1.077 \pm 1.013$	$-0.065 \pm 1.119$
photometric centroid source offset	$1.62 \pm 1.36$	1.19	$-1.59 \pm 1.36$	$0.33 \pm 1.23$

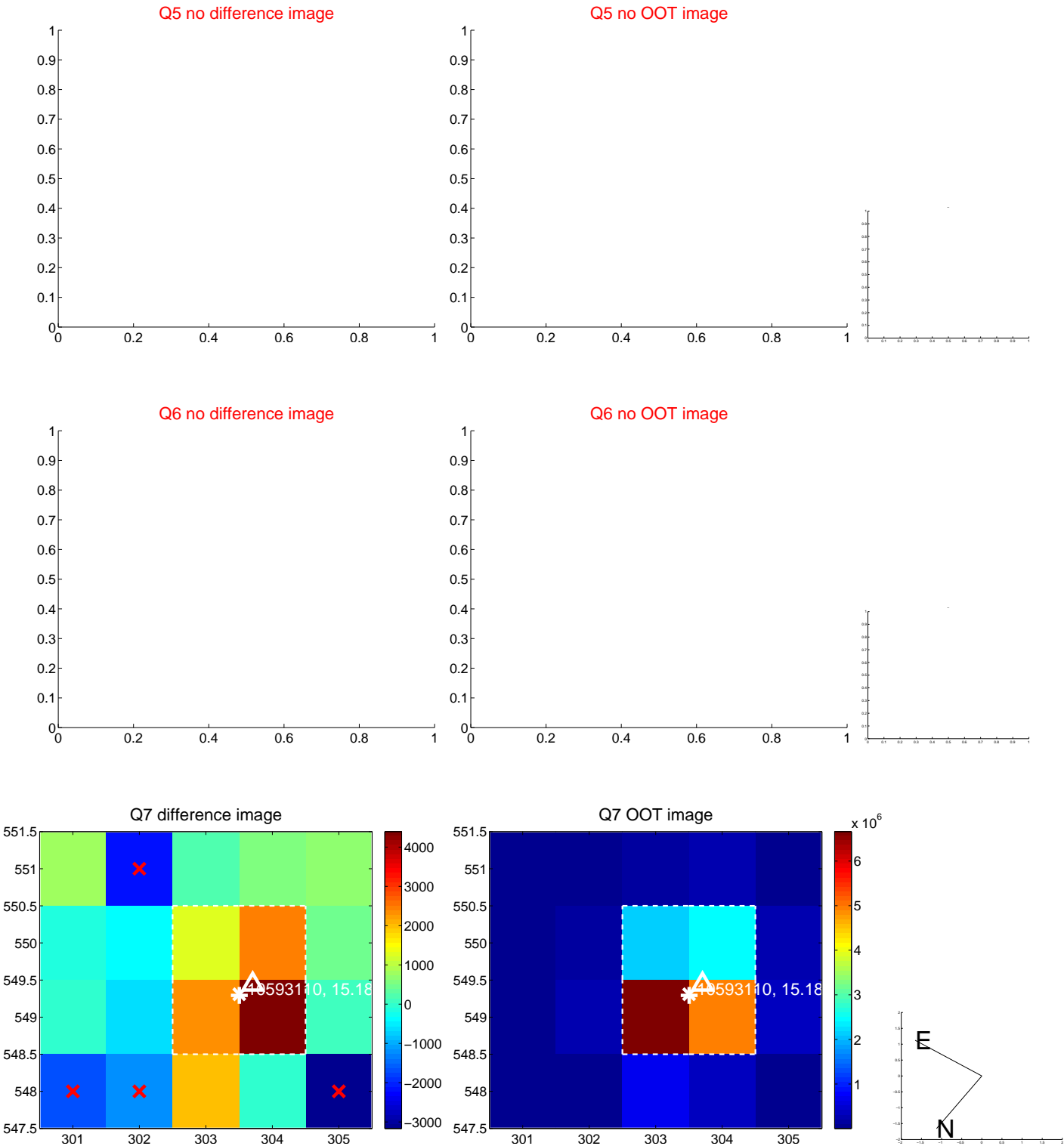


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

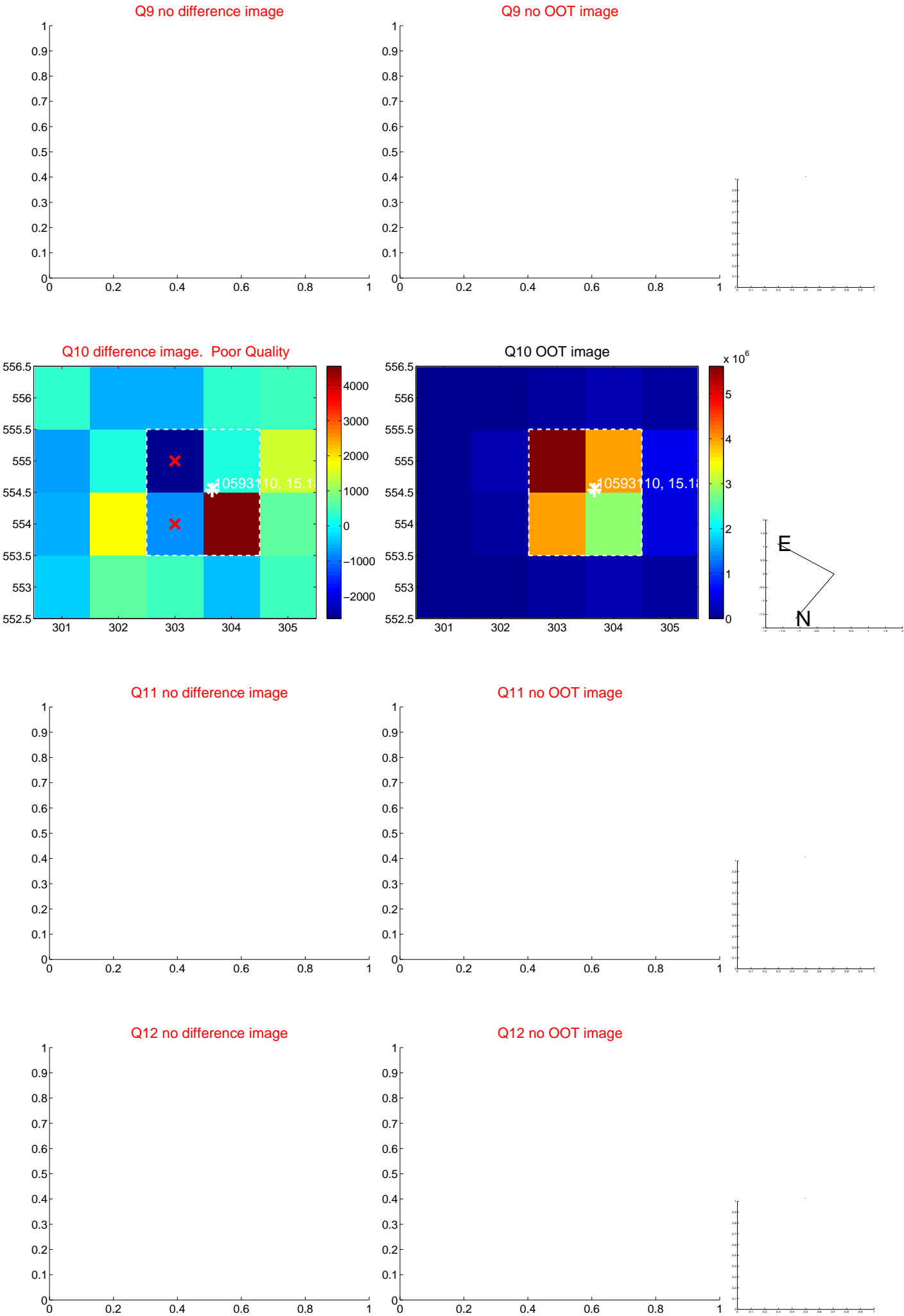


white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.

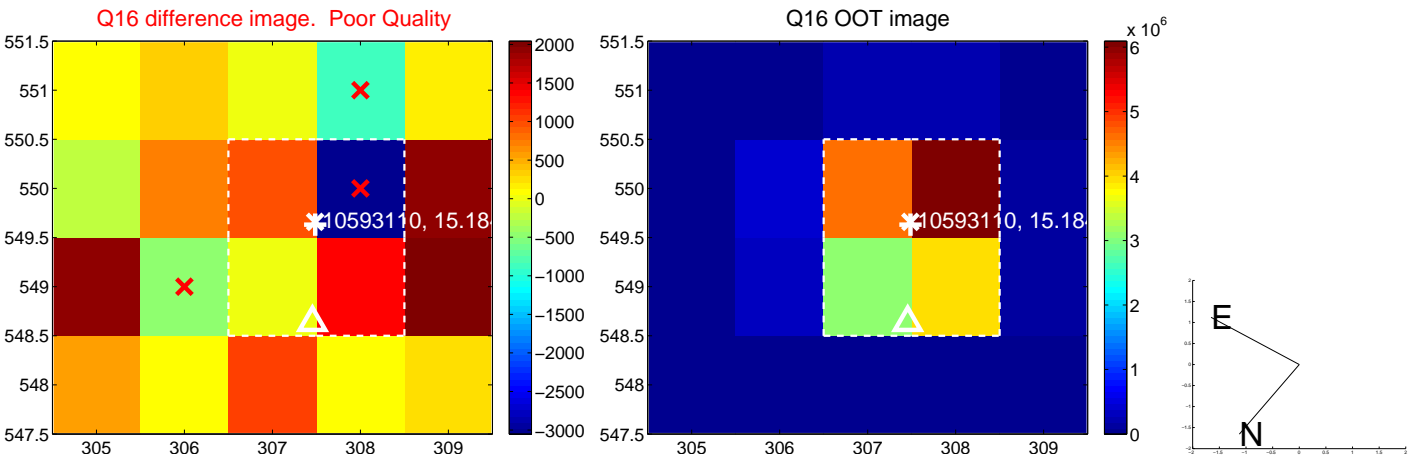
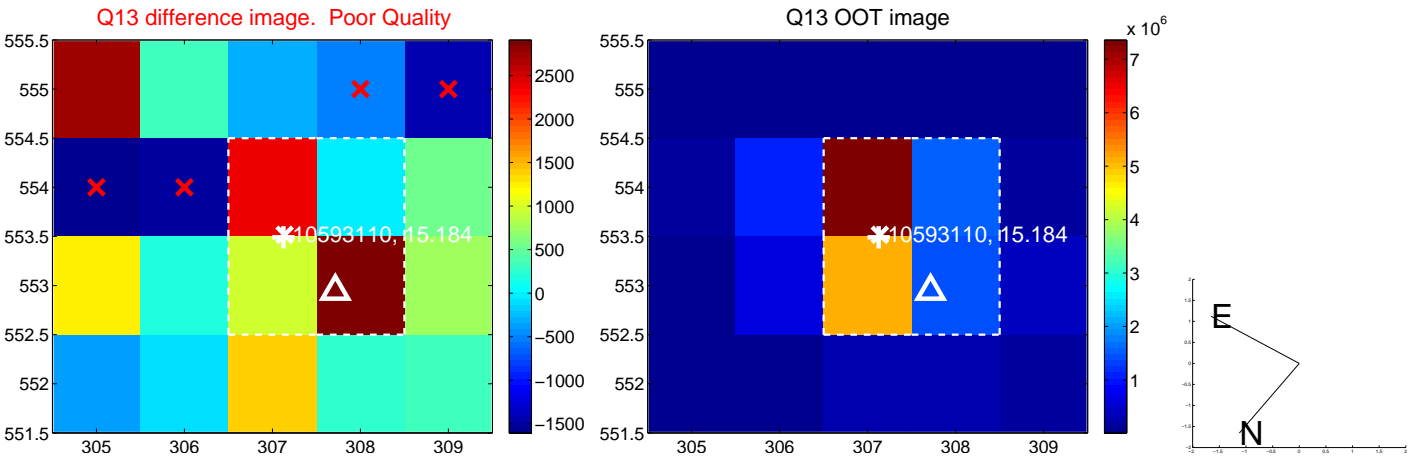




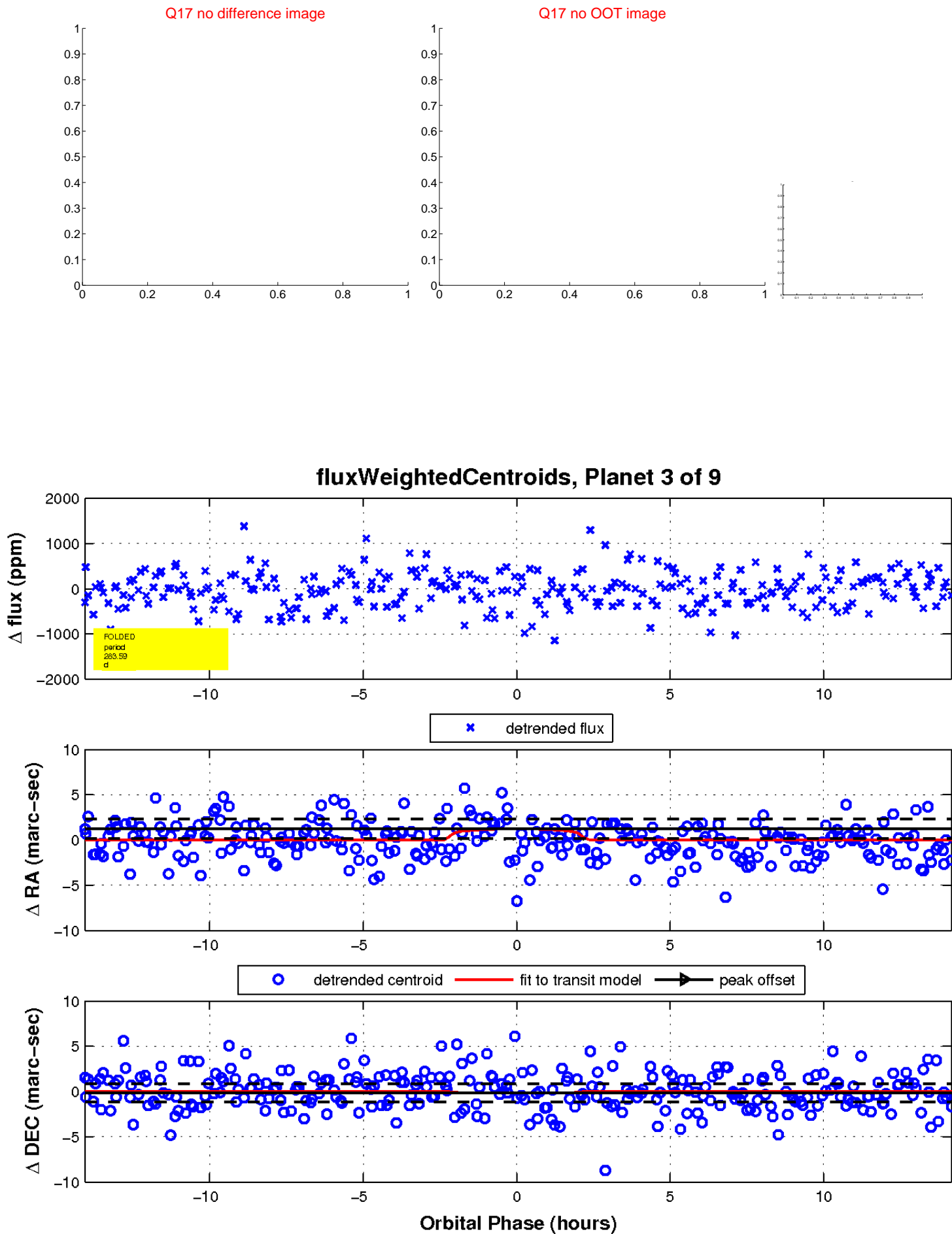
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



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

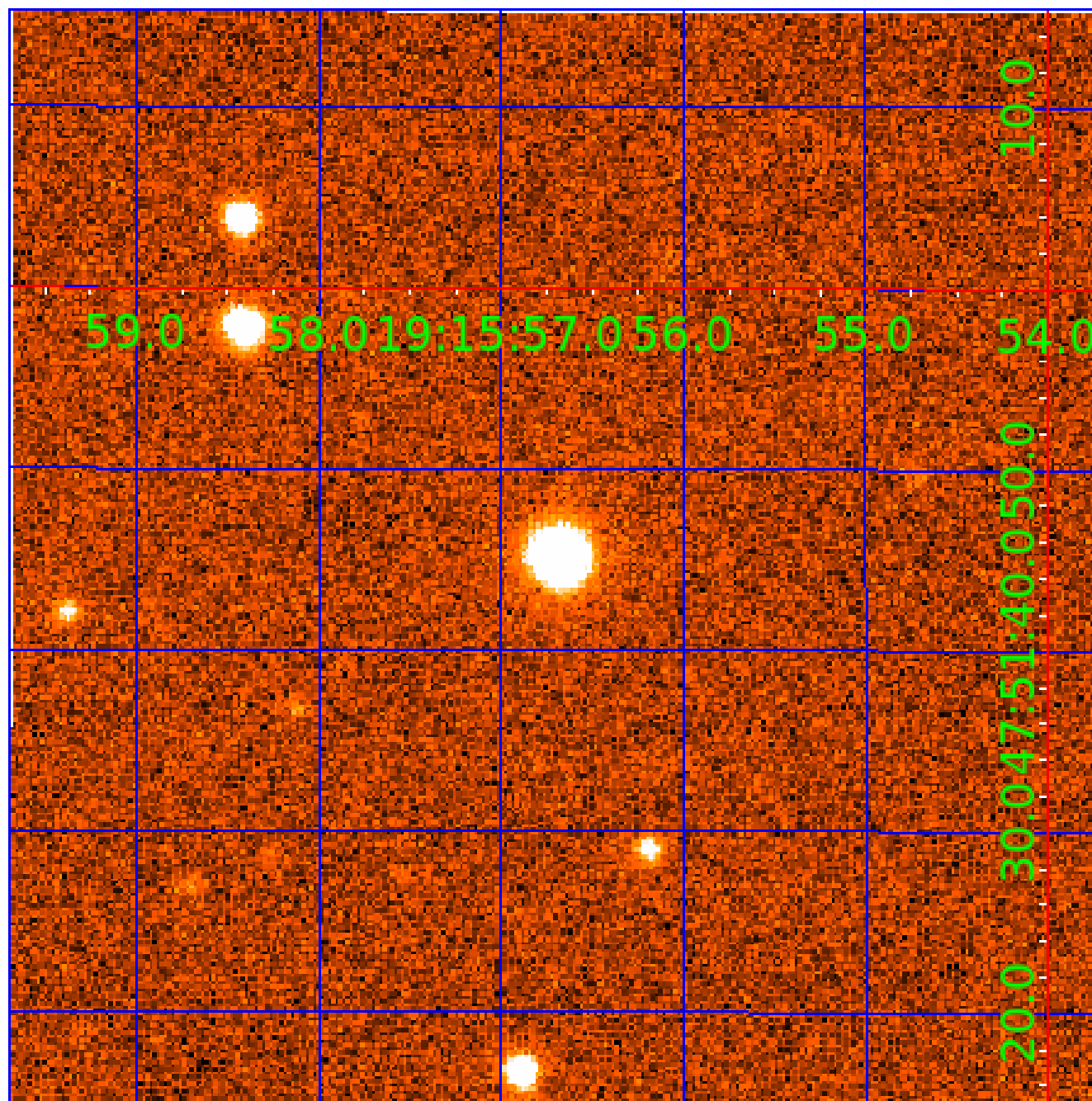


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 010593110

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010593110-01	OBS	No	0.822191	132.325009	37.8	4.078	7.4	7.1	0.62	4330	0.37	567.82
010593110-03	OBS	No	283.587961	356.516235	742.1	4.733	12.3	7.8	0.62	4330	1.92	0.23
010593110-04	OBS	No	181.556830	271.668945	1017.8	3.814	15.3	8.0	0.62	4330	2.02	0.42
010593110-05	OBS	No	109.121239	204.446957	455.7	19.790	10.4	5.0	0.62	4330	1.36	0.84
010593110-06	OBS	No	120.587667	163.433496	687.0	7.664	9.1	7.3	0.62	4330	1.77	0.73
010593110-07	OBS	No	83.493941	205.287505	460.9	9.869	8.1	6.0	0.62	4330	1.41	1.20
010593110-08	OBS	No	276.493940	336.509572	965.7	2.584	8.5	6.4	0.62	4330	2.26	0.24
010593110-09	OBS	No	171.405232	287.356663	954.4	2.672	7.6	7.1	0.62	4330	2.11	0.46

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010593110-01	OBS	FP	0.00	1	0	0	0	LPP_DV
010593110-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010593110-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010593110-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS
010593110-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010593110-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—CENT_FEW_MEAS
010593110-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
010593110-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—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.

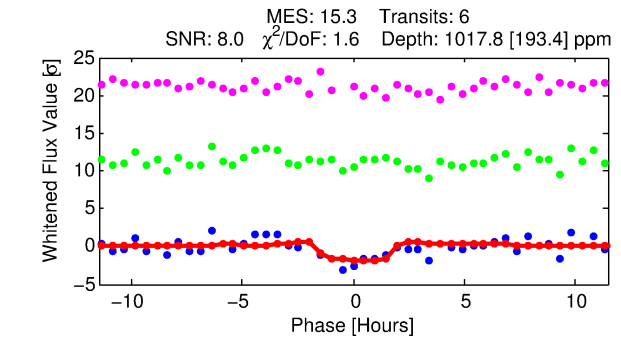
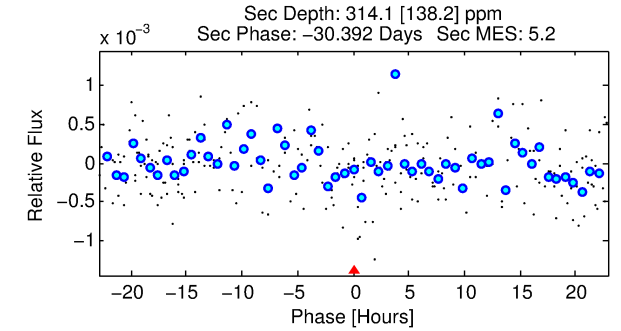
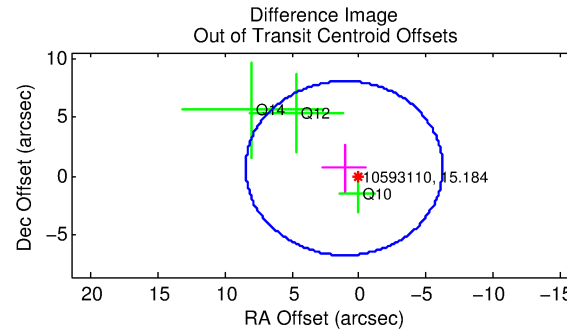
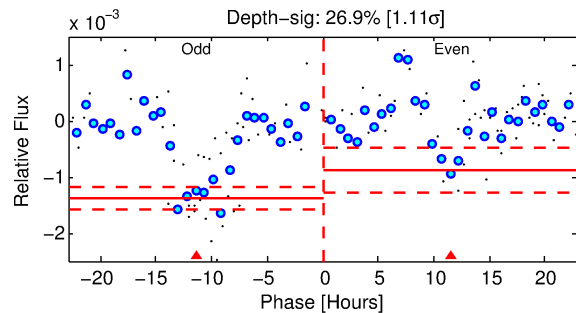
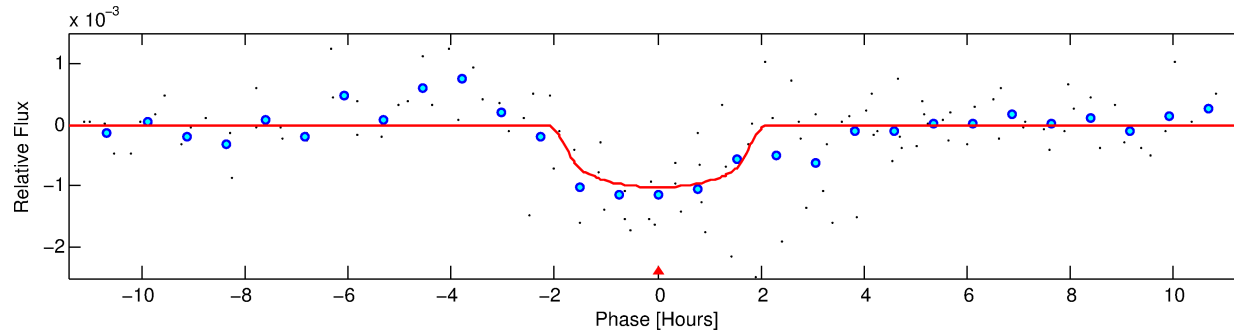
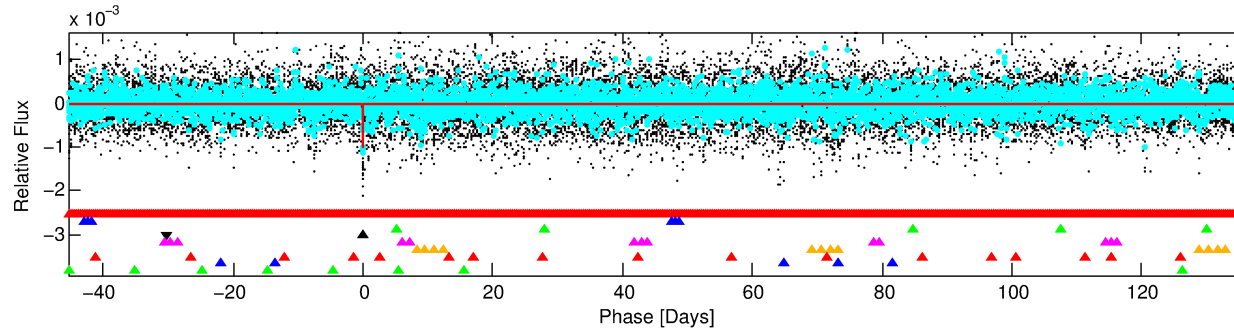
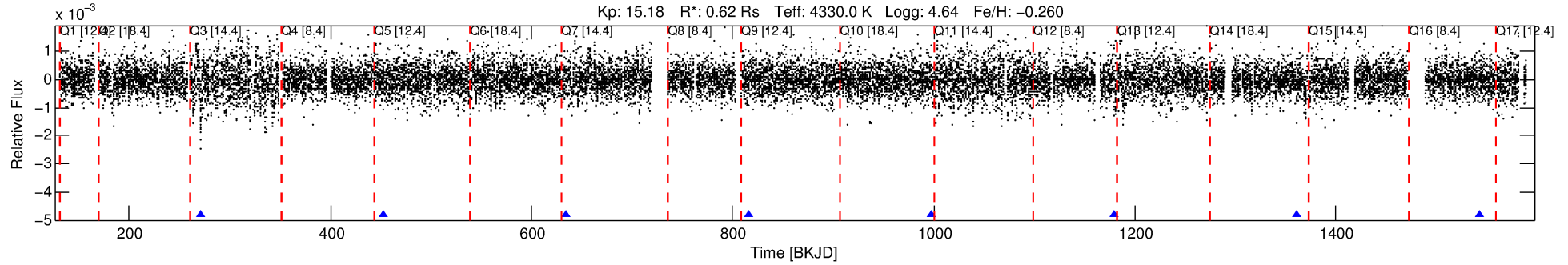
Ephemeris Match Information For 010593110-04

No Significant Match Found



# DV One-Page Summary

KIC: 10593110 Candidate: 4 of 9 Period: 181.557 d



## DV Fit Results:

Period = 181.55683 [0.00248] d  
Epoch = 271.6689 [0.0108] BKJD  
Rp/R\* = 0.0299 [0.0518]  
a/R\* = 312.84 [1788.76]  
b = 0.57 [7.02]  
Seff = 0.43 [0.07]  
Teq = 206 [8] K  
Rp = 2.02 [3.50] Re  
a = 0.5317 [0.0378] AU  
Ag = 12000.92 [41918.21] [0.29 $\sigma$ ]  
Teffp = 3333 [2911] K [1.07 $\sigma$ ]

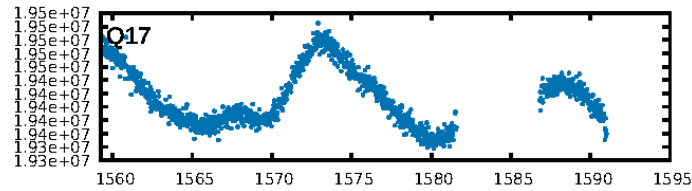
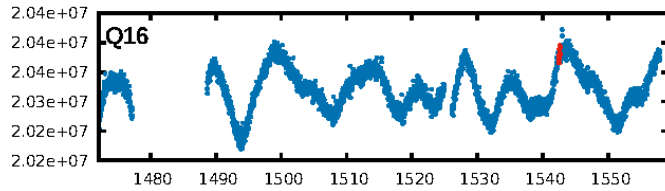
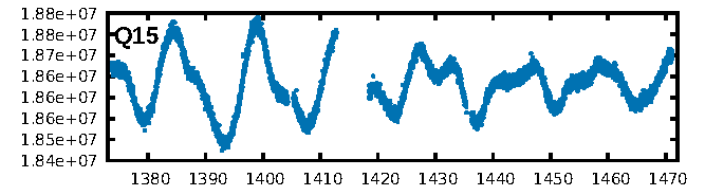
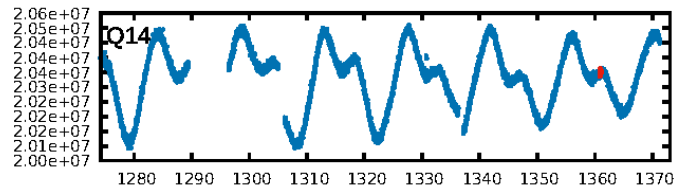
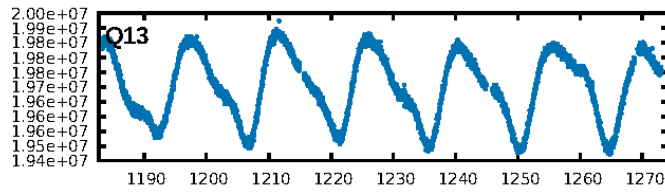
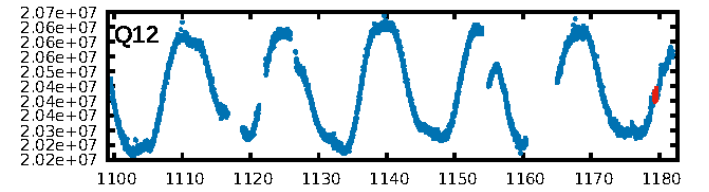
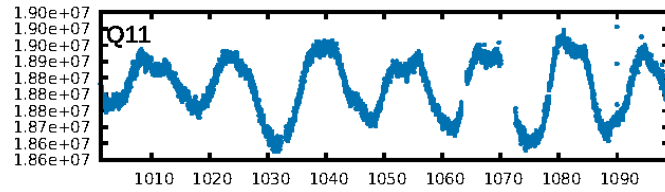
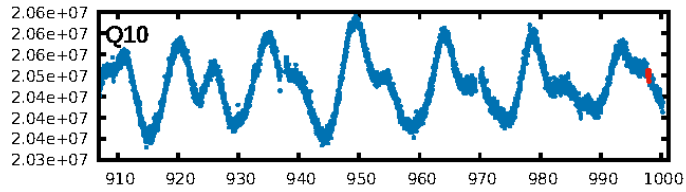
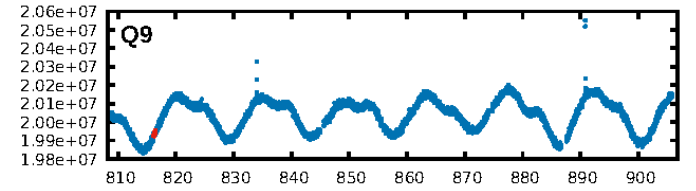
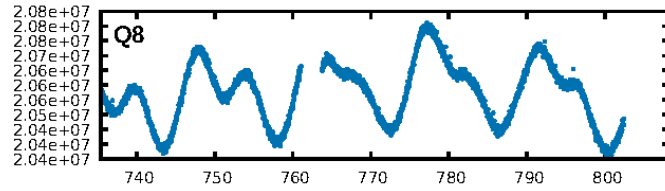
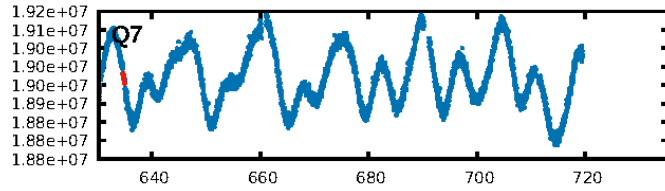
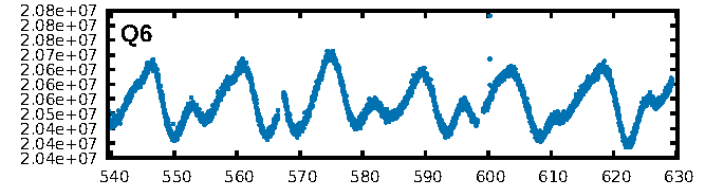
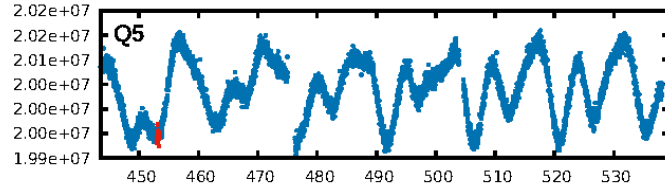
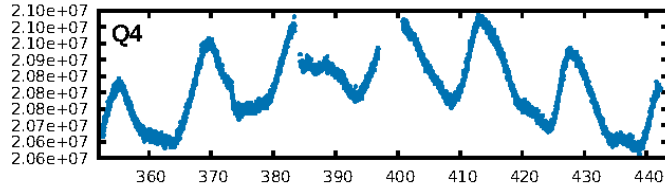
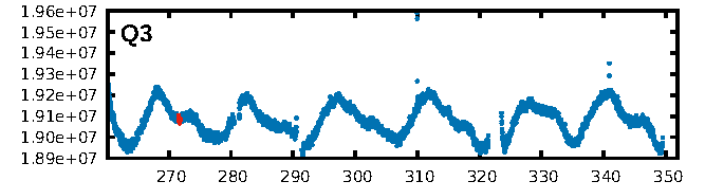
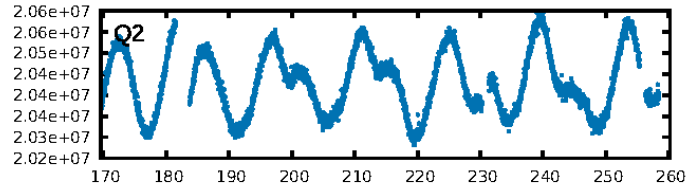
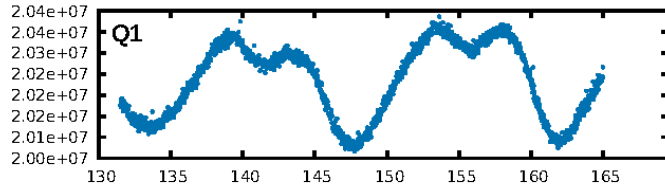
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [52.32 $\sigma$ ]  
LongPeriod-sig: 100.0% [182.08 $\sigma$ ]  
ModelChiSquare2-sig: 0.8%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 2.45e-26  
RollingBand-fgt: 1.00 [6/6]  
GhostDiagnostic-chr: 1.58  
Centroid-sig: 56.1%  
Centroid-so: 0.673 arcsec [0.78 $\sigma$ ]  
OotOffset-rm: 1.305 arcsec [0.53 $\sigma$ ]  
KicOffset-rm: 1.330 arcsec [0.34 $\sigma$ ]  
OotOffset-st: 2/0/1/0 [3]  
KicOffset-st: 2/0/1/0 [3]  
DiffImageQuality-fgm: 0.00 [0/3]  
DiffImageOverlap-fno: 0.00 [0/7]

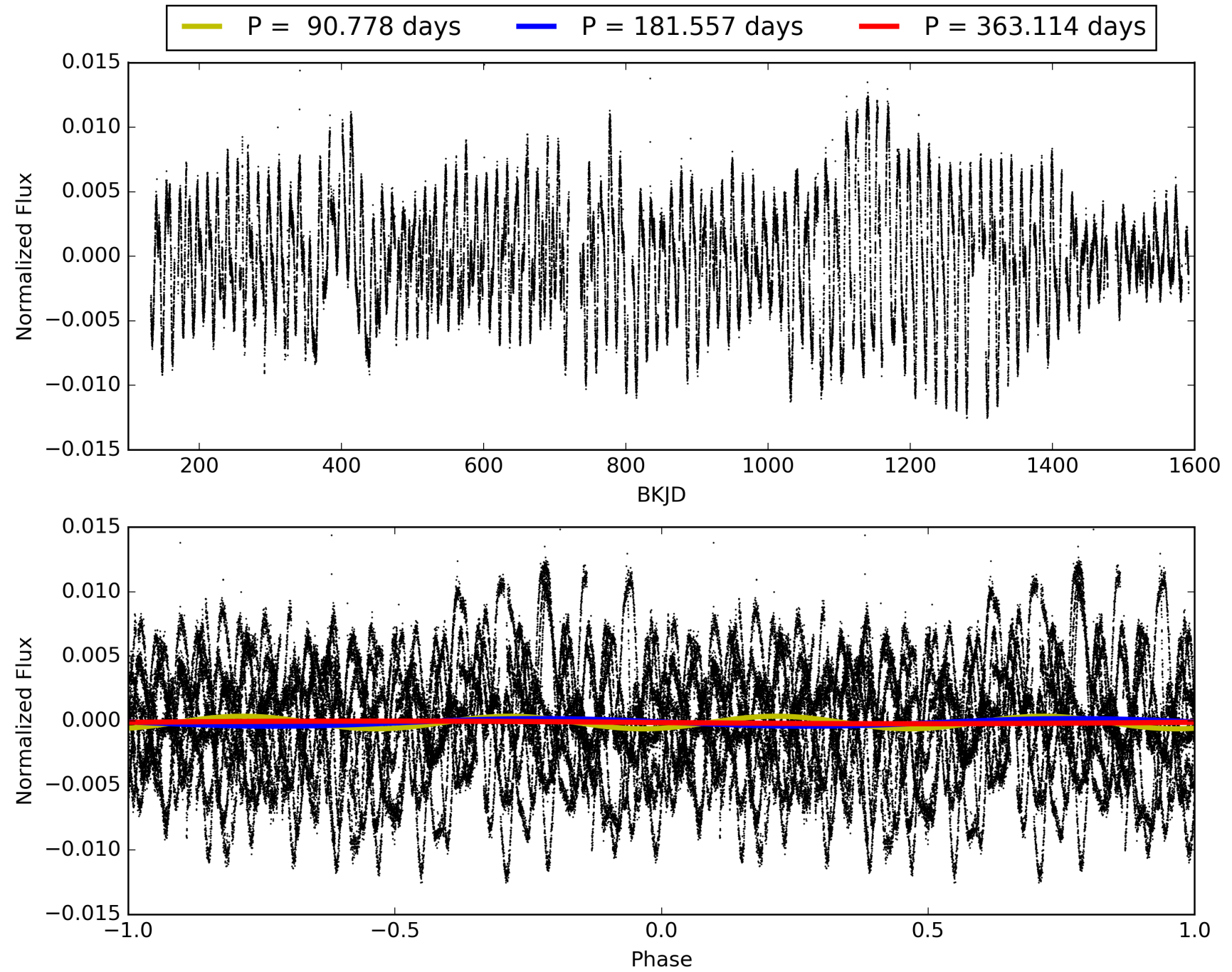
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 02:56:39 Z

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

# TCE 010593110-04, PDC Light Curves

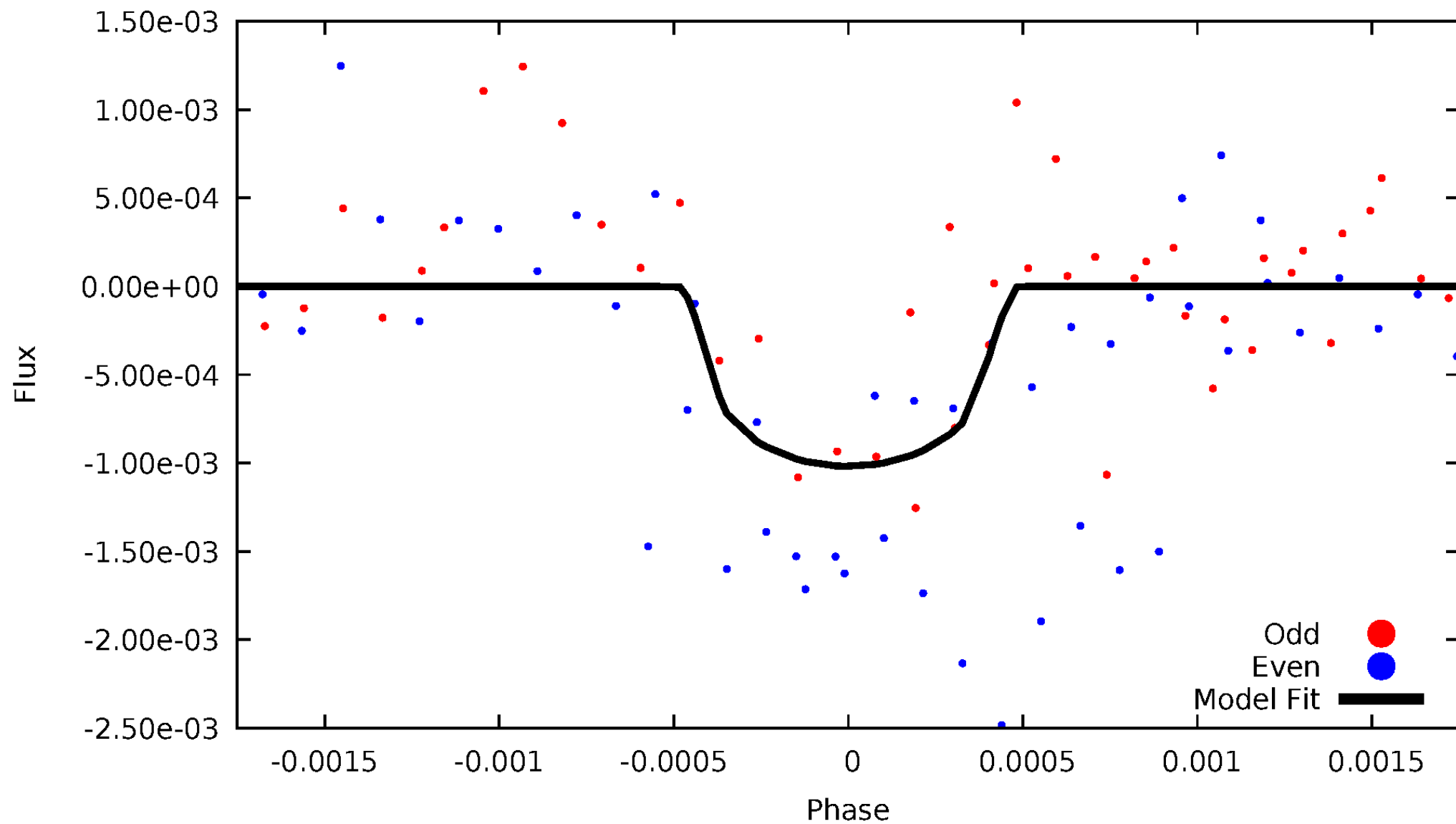


# TCE 010593110-04



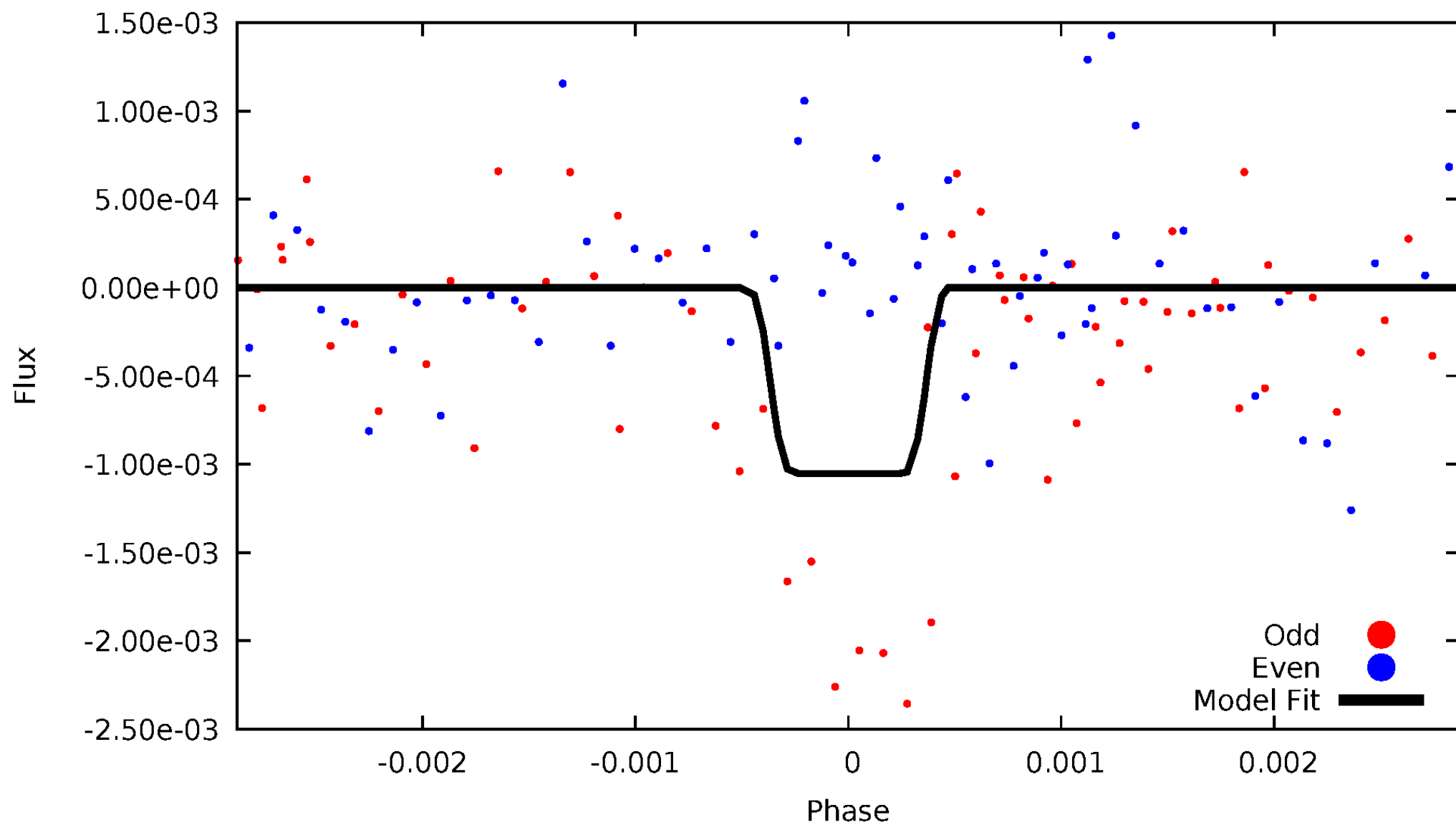
# DV Odd/Even

TCE 010593110-04



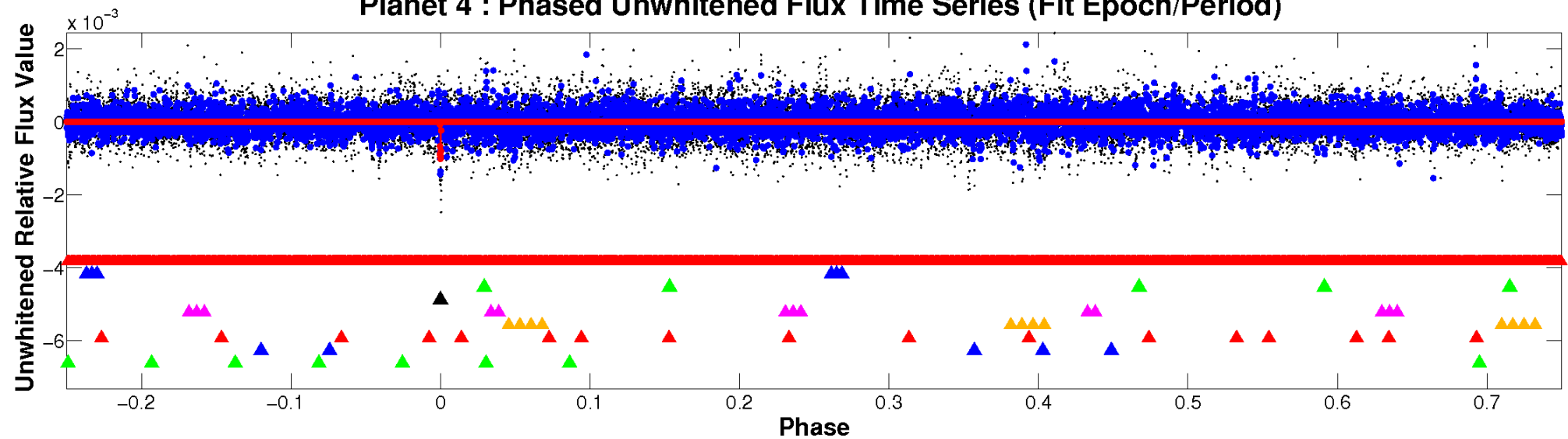
# ALT Odd/Even

TCE 010593110-04

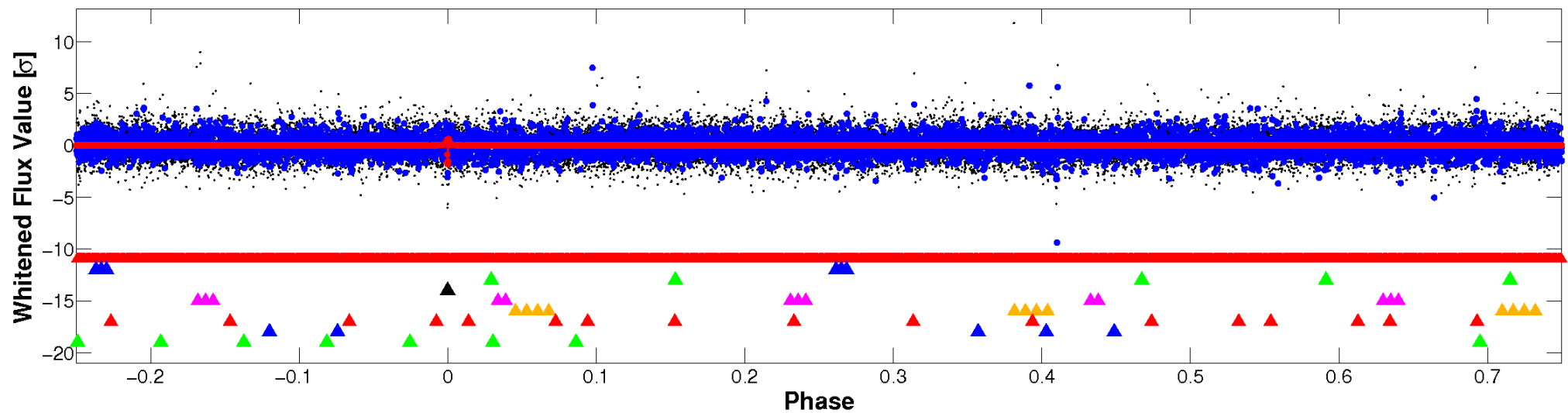


# Non-Whitened Vs. Whitened Light Curve

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

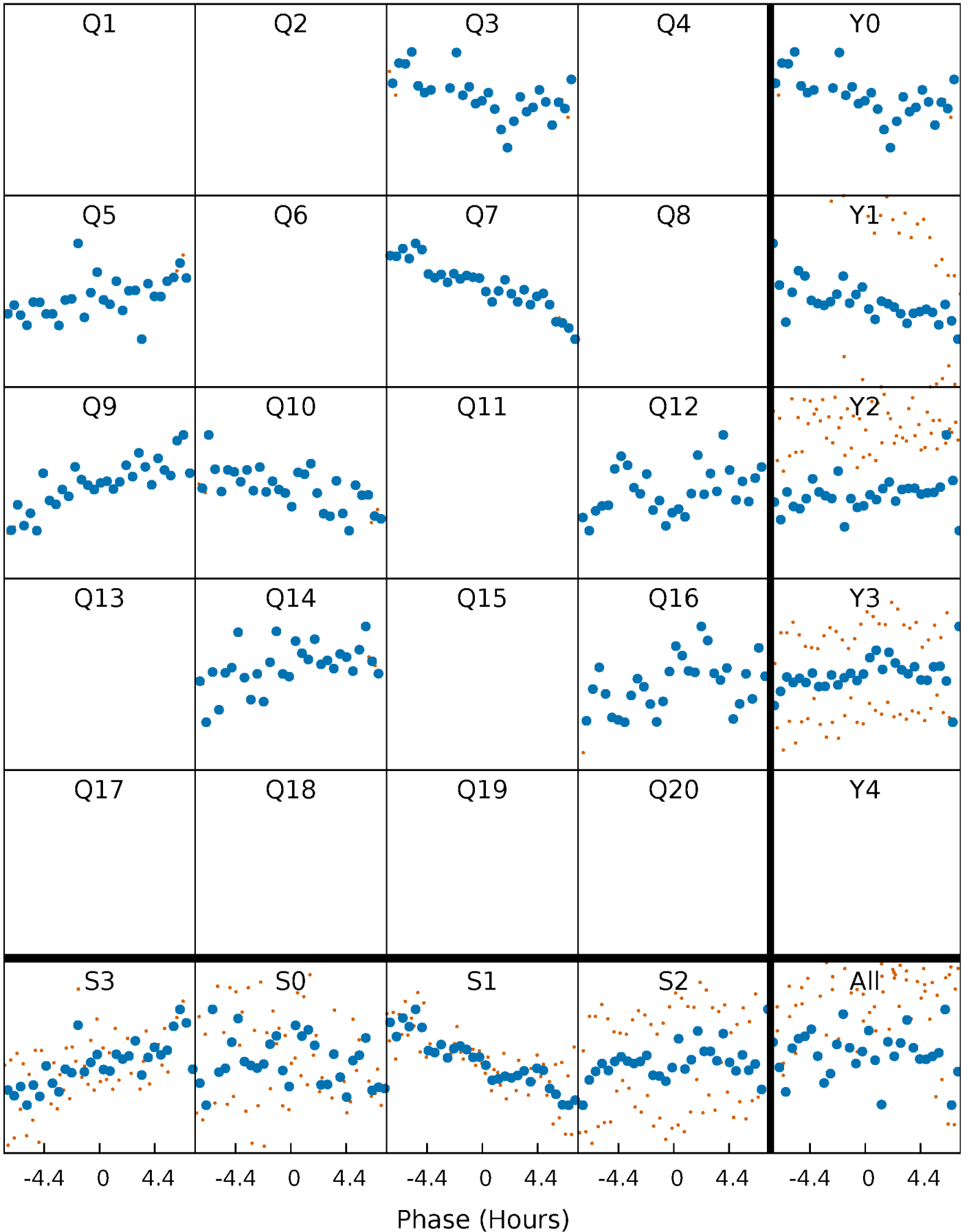


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

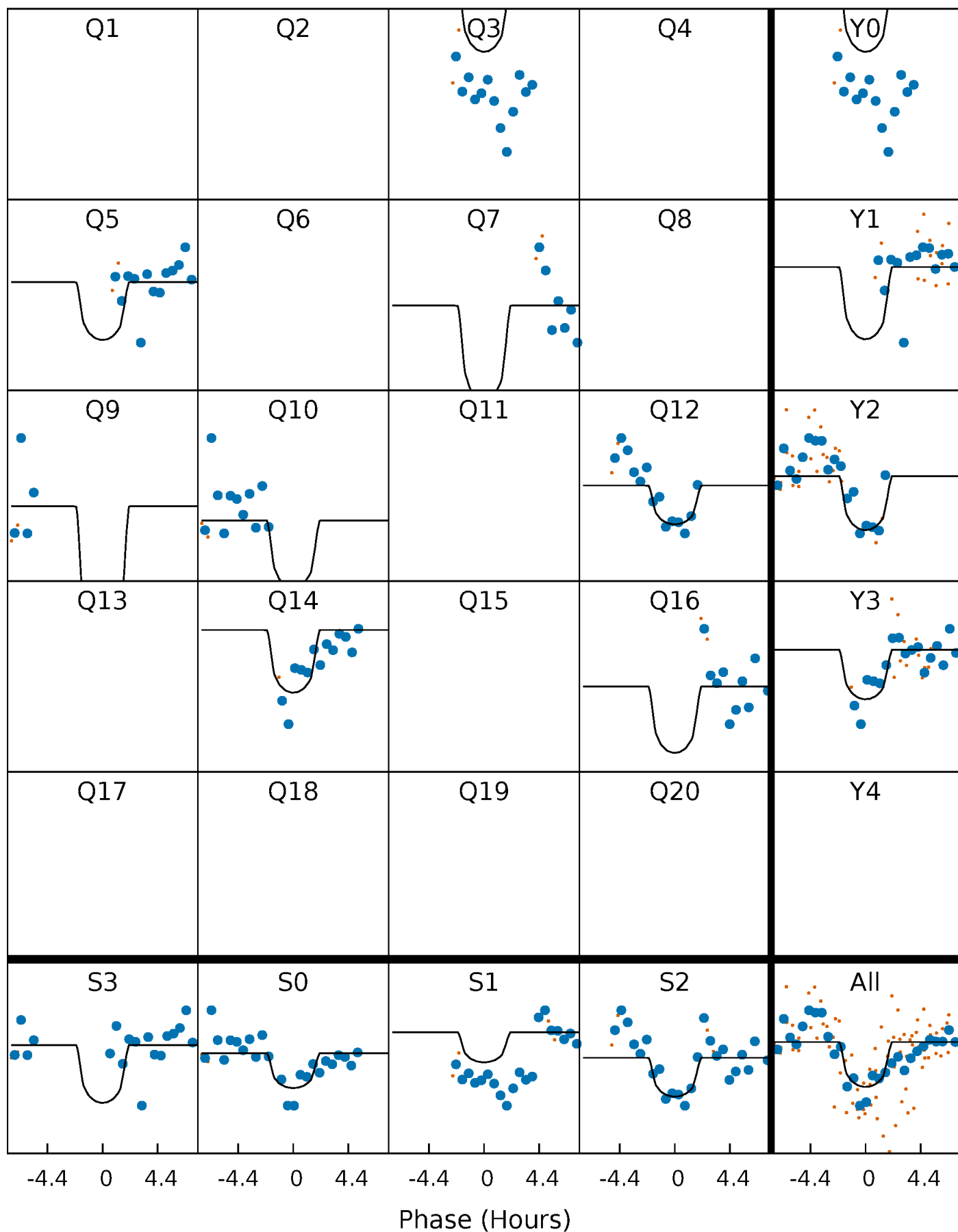
TCE 010593110-04 P=181.556830 Days  $T_0=271.668945$  (BKJD)





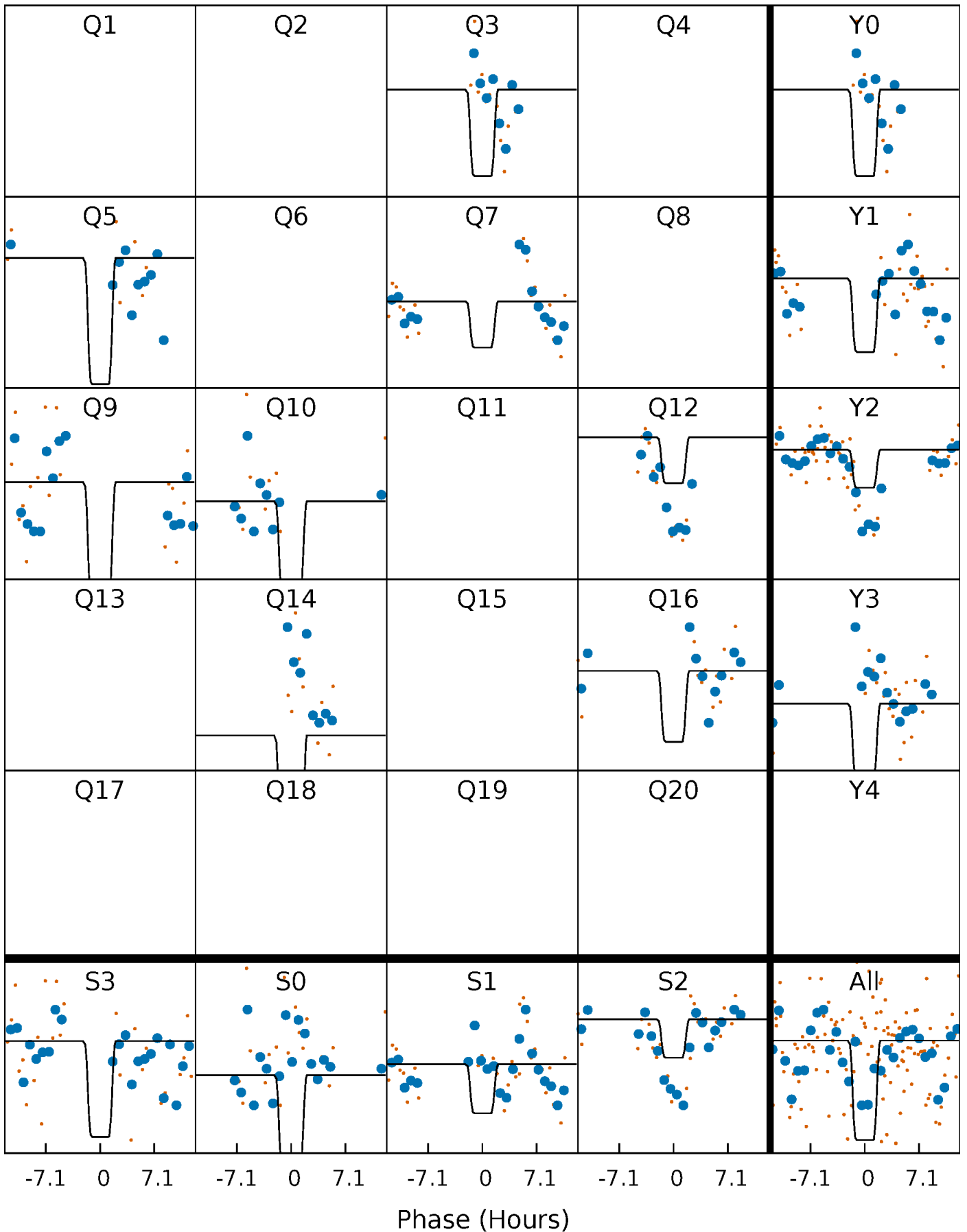
# DV Quarter-Phased Transit Curves

TCE 010593110-04 P=181.556830 Days  $T_0=271.668945$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

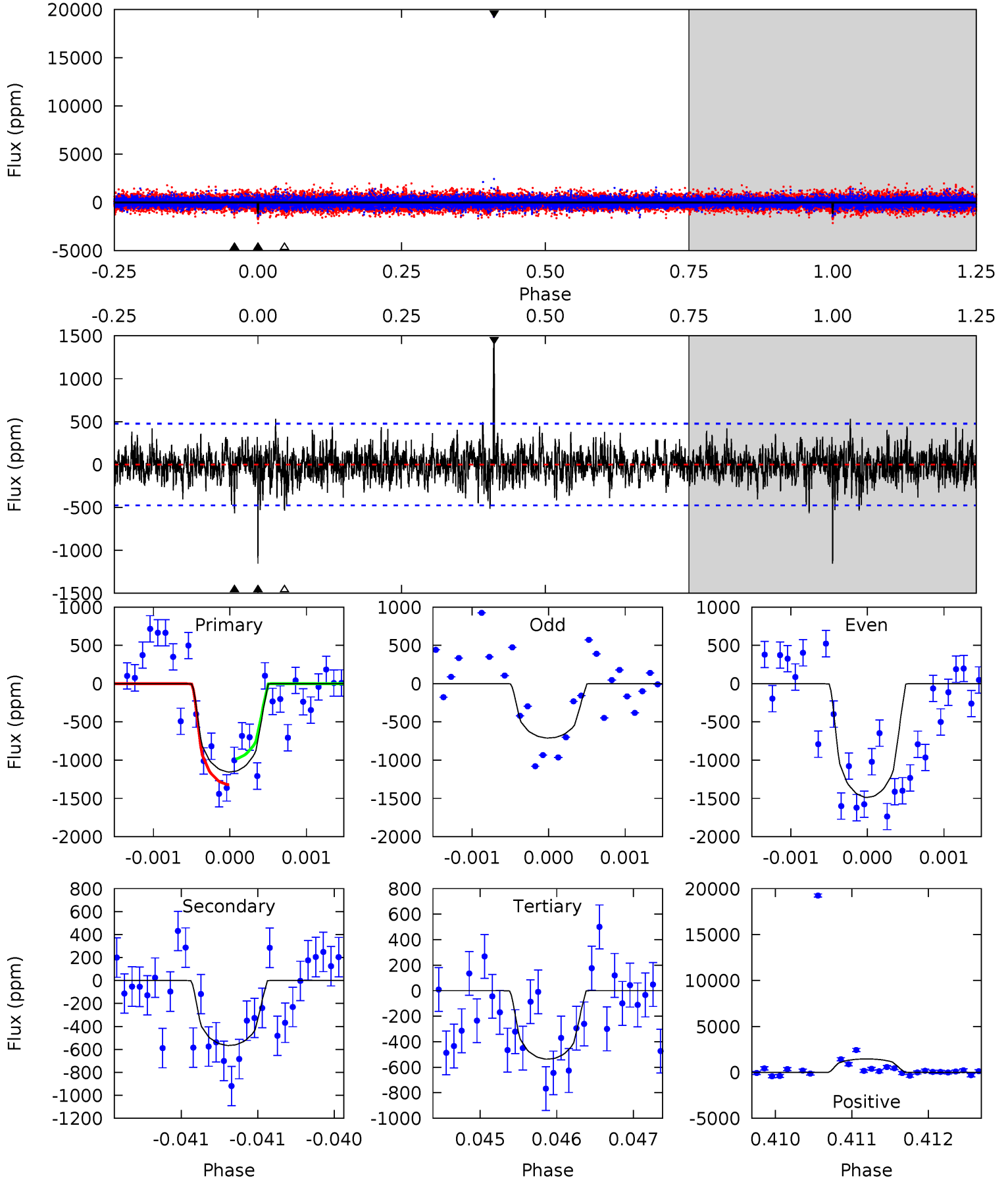
TCE 010593110-04 P=181.561936 Days  $T_0=271.628220$  (BKJD)



# DV Model-Shift Uniqueness Test

010593110-04, P = 181.556830 Days, E = 90.112115 Days

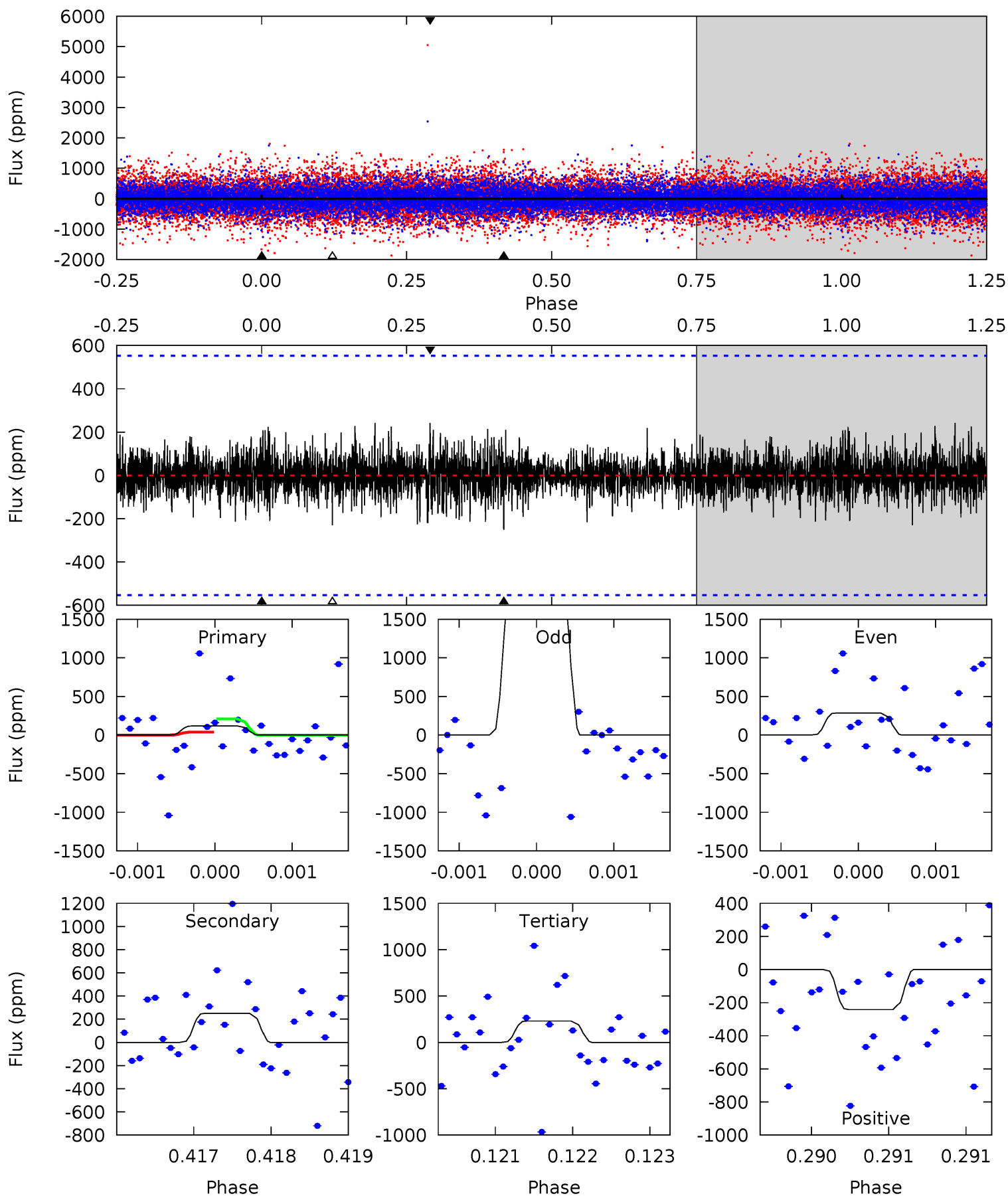
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
13.3	6.50	6.16	16.8	5.46	3.30	1.63	7.10	-3.53	0.33	-10.3	4.41	0.98	0.56	1.94



# Alt Model-Shift Uniqueness Test

010593110-04, P = 181.561936 Days, E = 90.066284 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
1.17	2.49	2.28	2.40	5.48	3.34	0.63	-1.11	-1.23	0.21	0.09	9.89	3.70	0.49	0.85



### Stellar Parameters For KIC 010593110

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4330^{+129}_{-129}$	$4.640^{+0.049}_{-0.025}$	$-0.260^{+0.300}_{-0.300}$	$0.618^{+0.050}_{-0.056}$	$0.610^{+0.066}_{-0.050}$	$3.632^{+0.843}_{-0.438}$
	+3%/-3%	+1%/-1%	+115%/-115%	+8%/-9%	+11%/-8%	+23%/-12%
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 010593110-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-566 \pm 87$	$3.26^{+2.92}_{-2.17}$	$286^{+10}_{-9}$	$3372^{+1731}_{-572}$	$8096^{+71784}_{-5855}$
Alt.	$-251 \pm 101$	$3.31^{+3.16}_{-2.17}$	$287^{+10}_{-9}$	$2932^{+1226}_{-476}$	$3181^{+25413}_{-2395}$

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

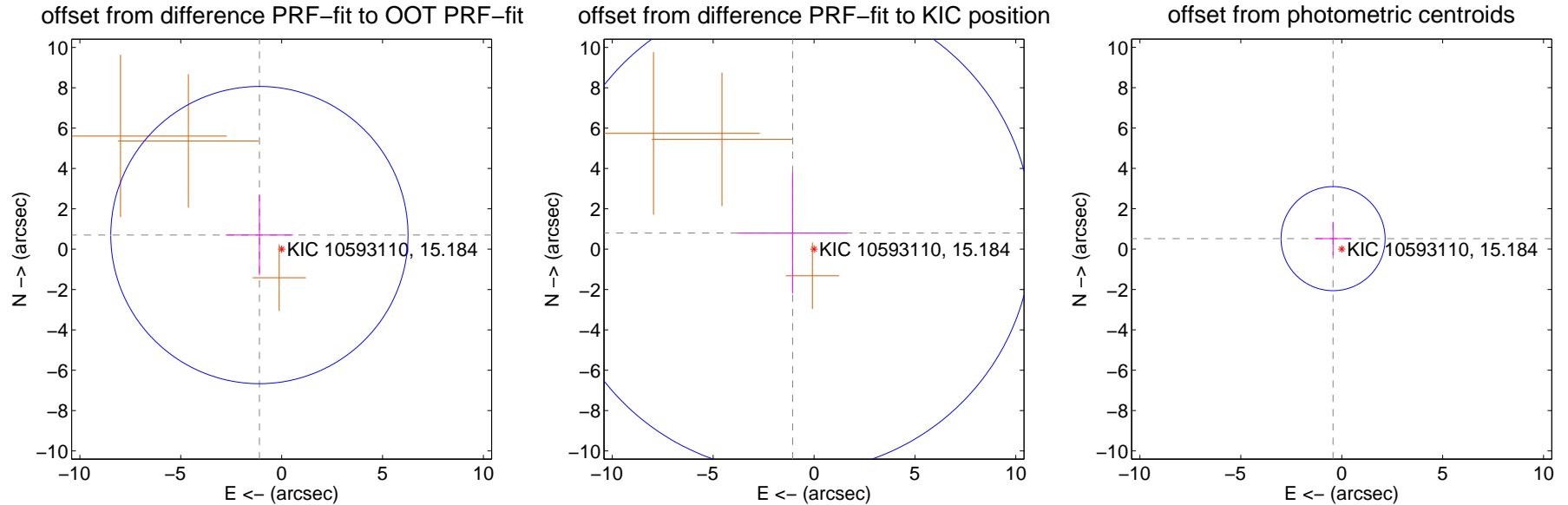
## DV Centroid Data

Supplemental centroid analysis for 010593110-04. Kepler magnitude: 15.18. Transit SNR 7.95

There are 0 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.13 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.305 \pm 2.455$	0.53	$1.102 \pm 1.667$	$0.699 \pm 1.981$
PRF-fit source offset from KIC position	$1.330 \pm 3.958$	0.34	$1.063 \pm 2.728$	$0.800 \pm 2.995$
photometric centroid source offset	$0.67 \pm 0.86$	0.78	$0.43 \pm 0.90$	$0.52 \pm 0.83$



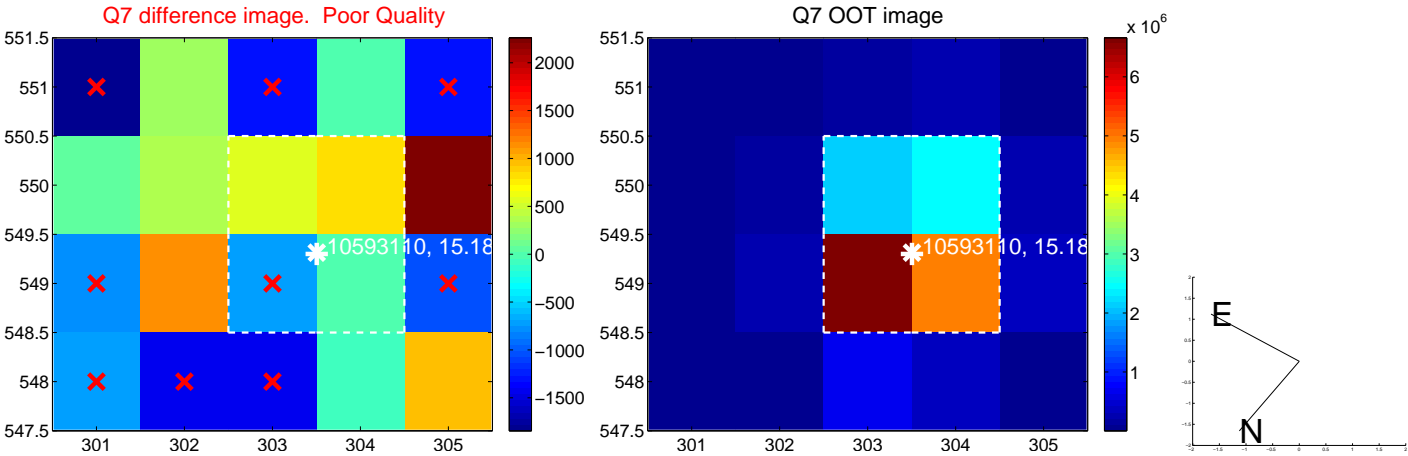
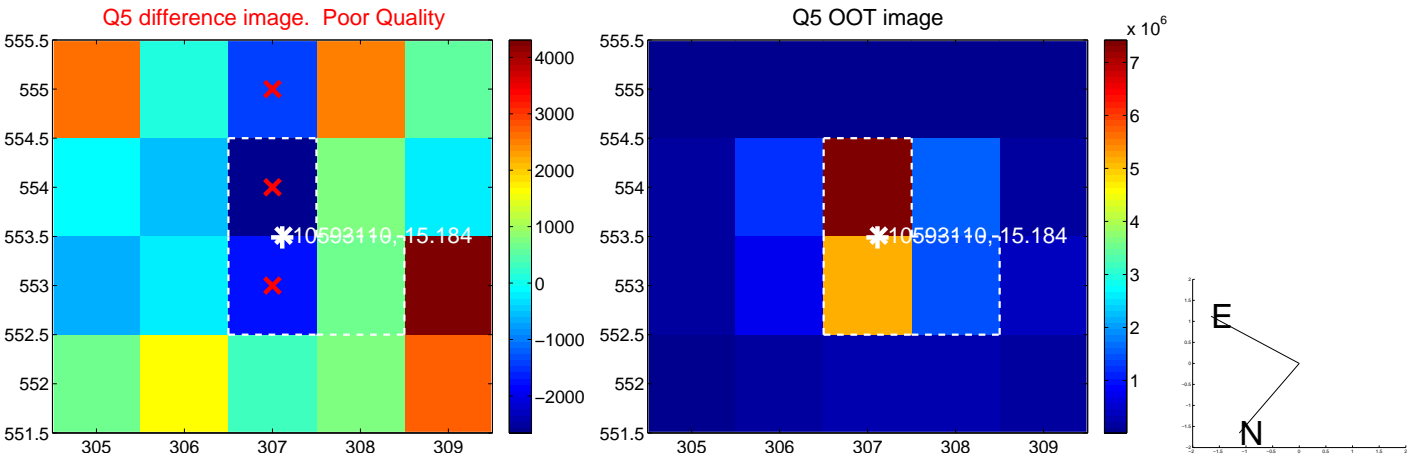
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

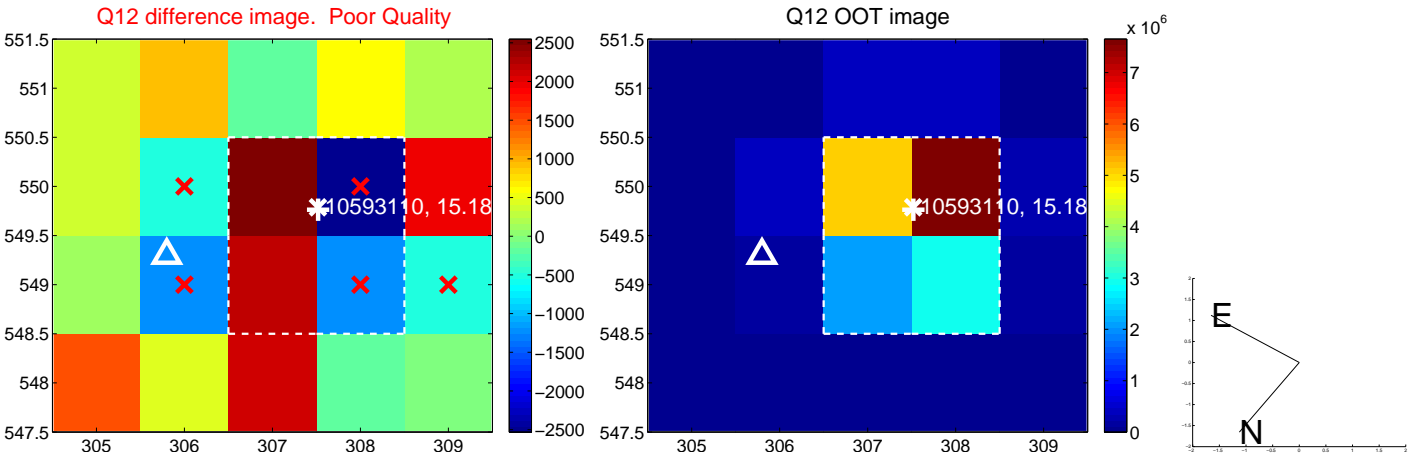
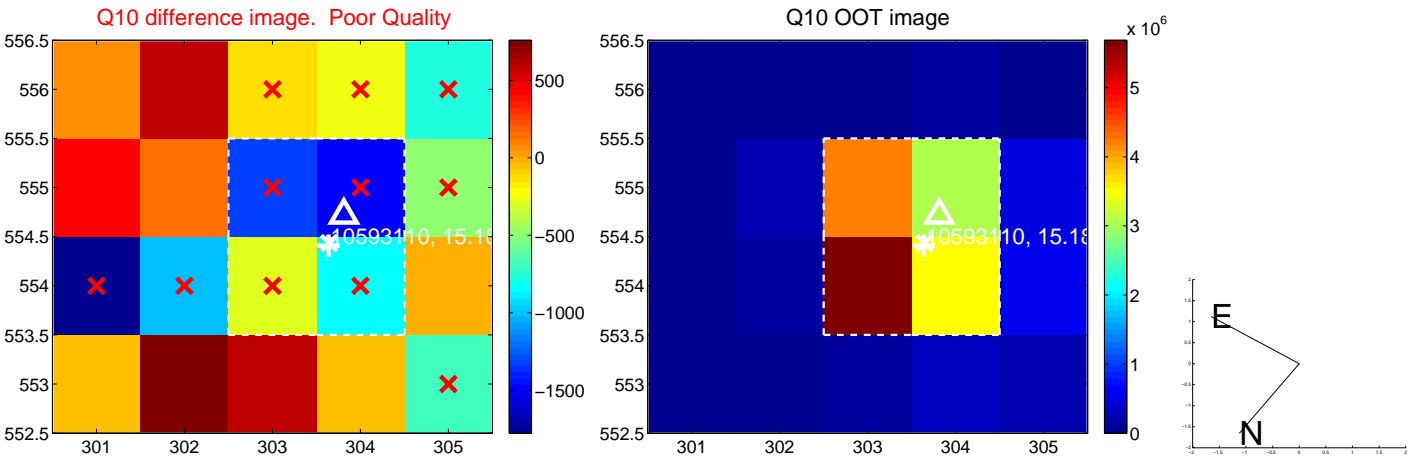
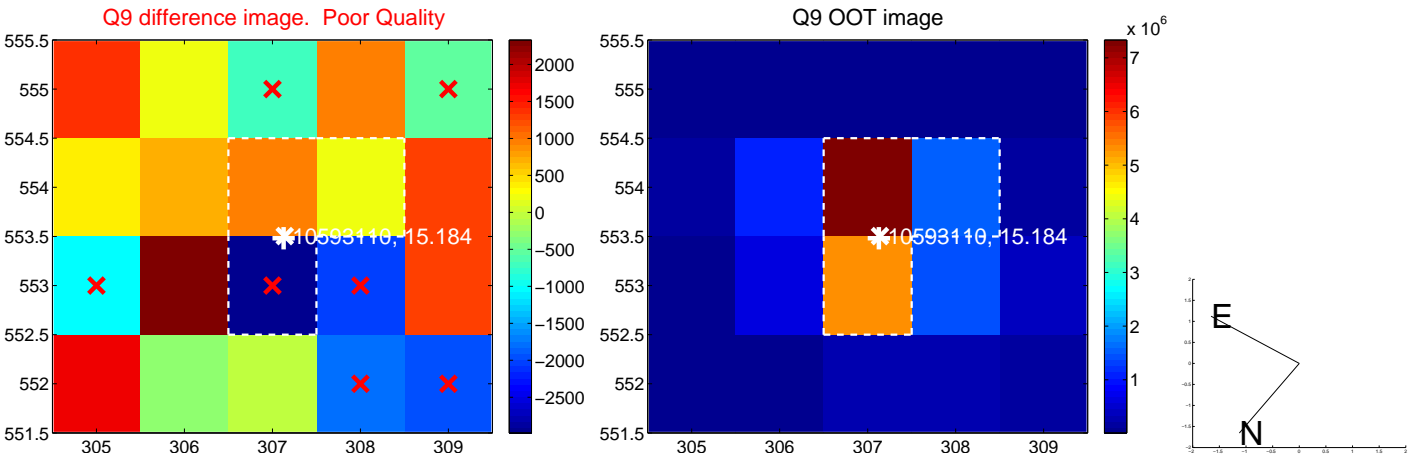




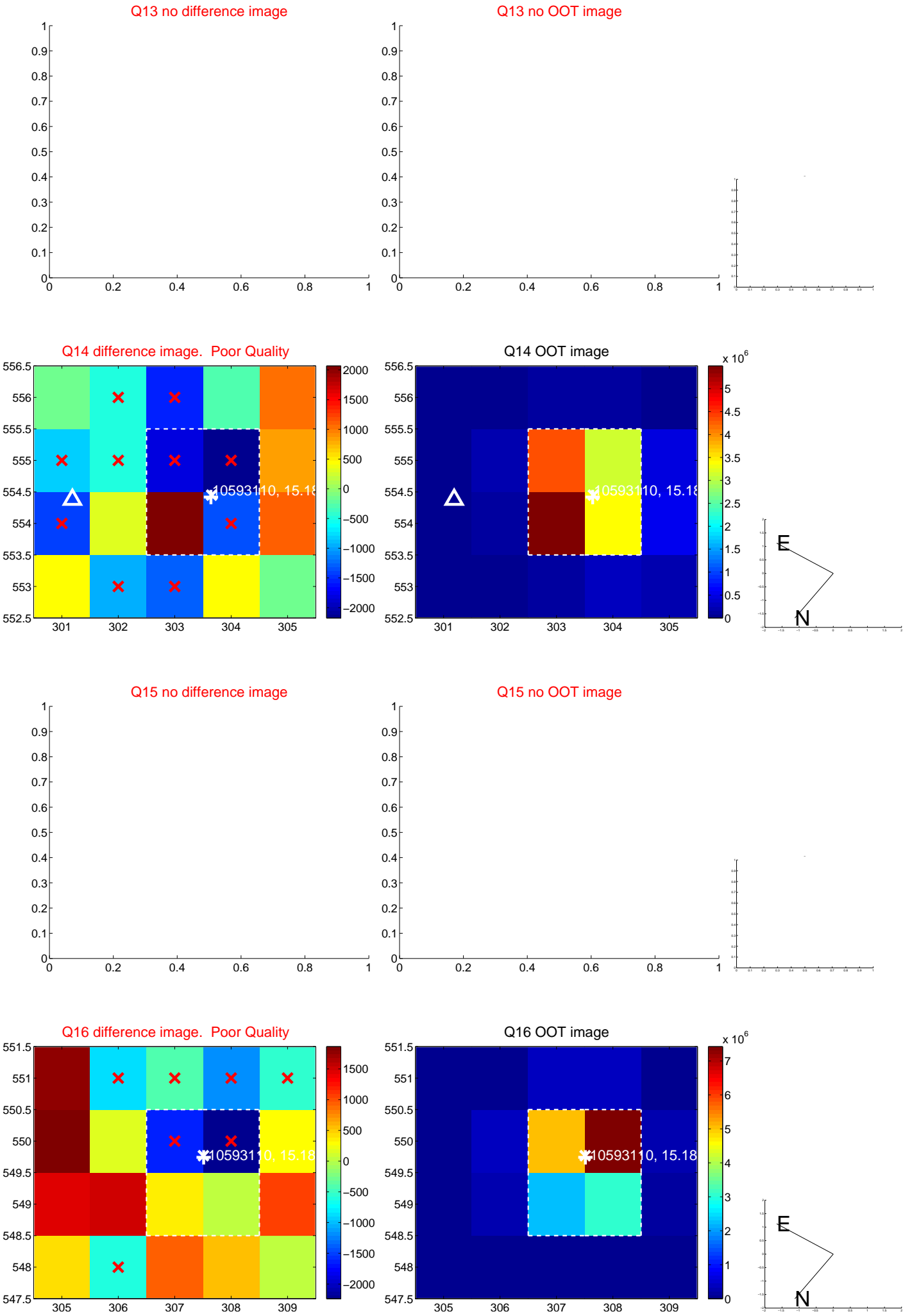
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



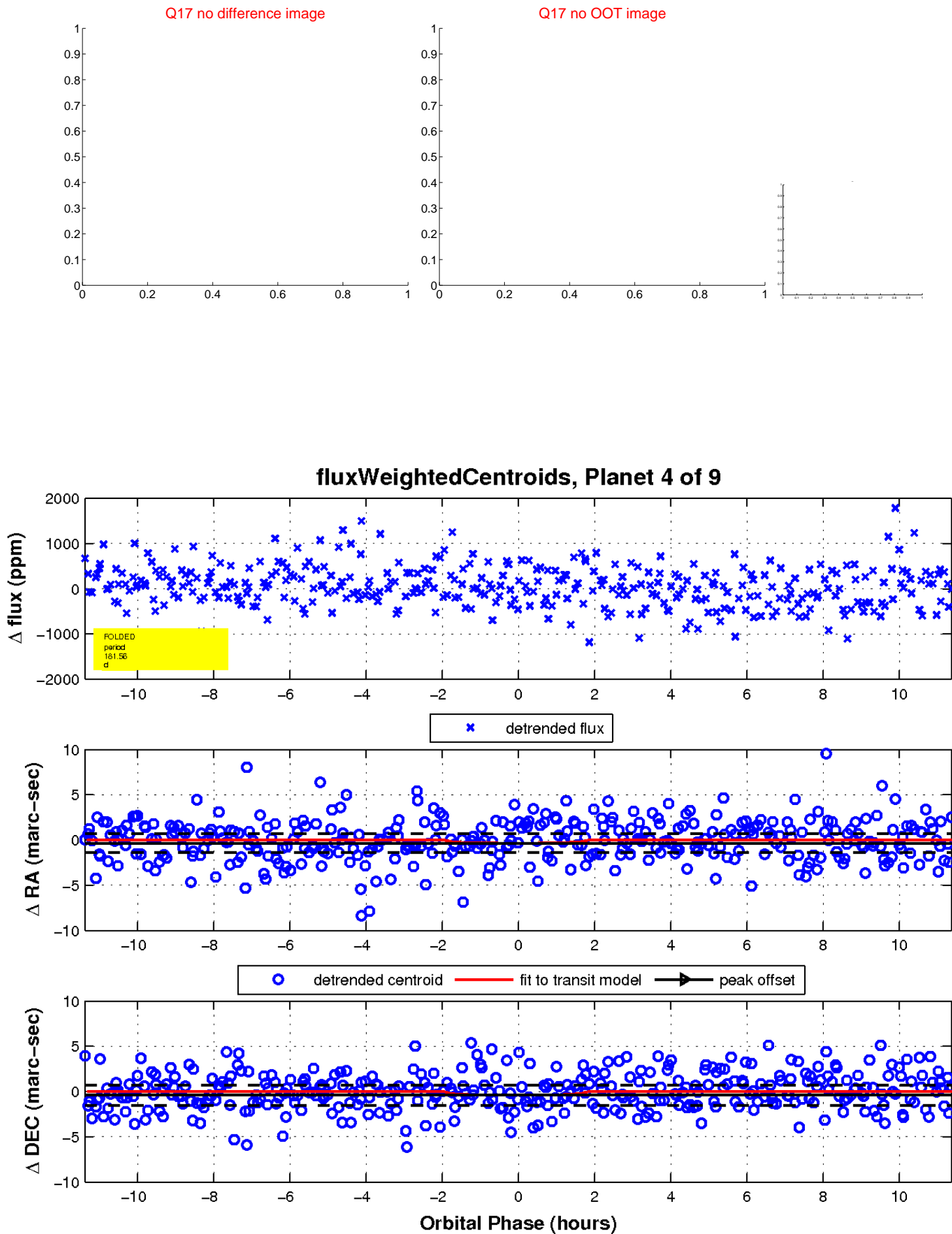
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

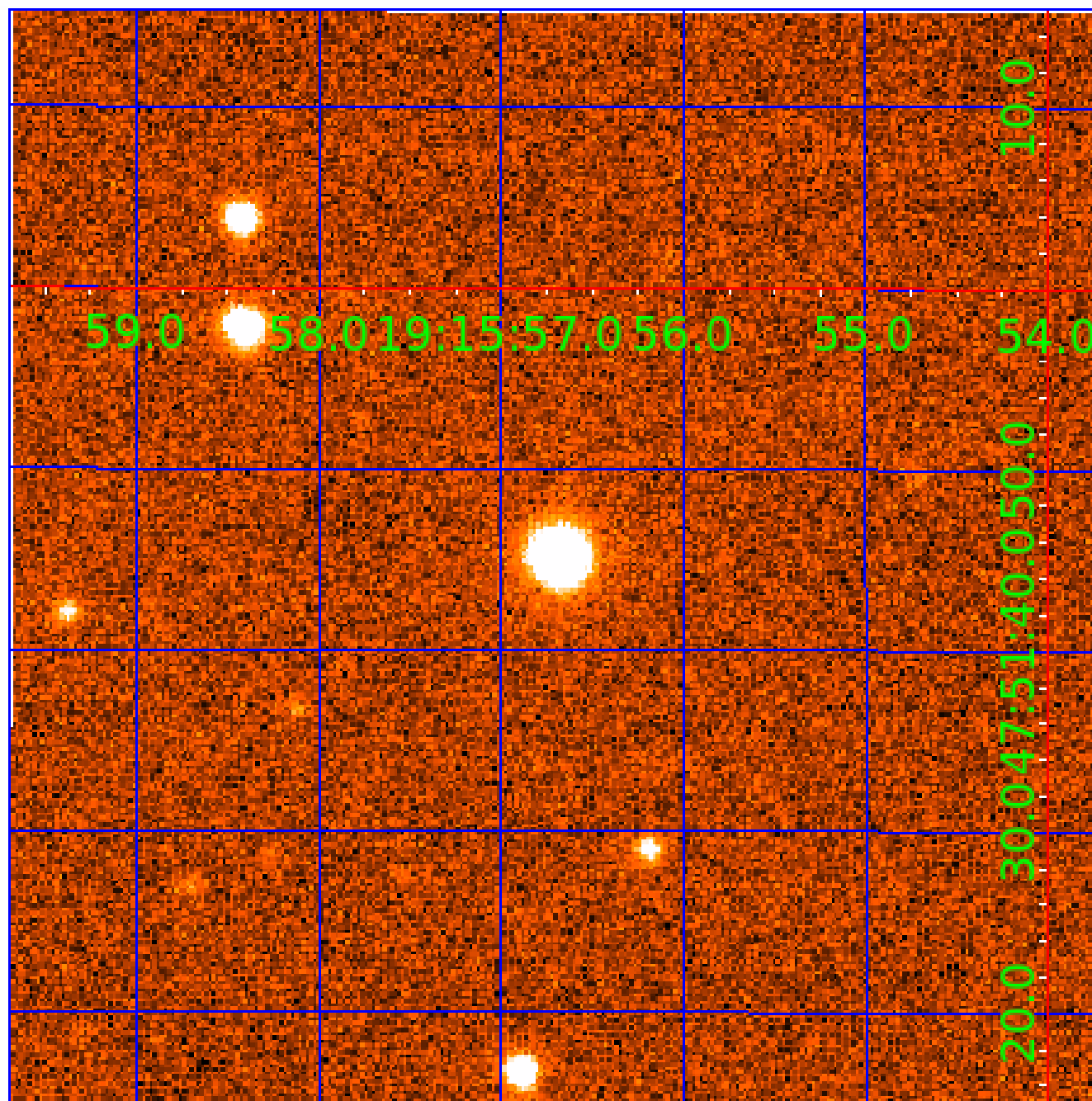


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 010593110

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010593110-01	OBS	No	0.822191	132.325009	37.8	4.078	7.4	7.1	0.62	4330	0.37	567.82
010593110-03	OBS	No	283.587961	356.516235	742.1	4.733	12.3	7.8	0.62	4330	1.92	0.23
010593110-04	OBS	No	181.556830	271.668945	1017.8	3.814	15.3	8.0	0.62	4330	2.02	0.42
010593110-05	OBS	No	109.121239	204.446957	455.7	19.790	10.4	5.0	0.62	4330	1.36	0.84
010593110-06	OBS	No	120.587667	163.433496	687.0	7.664	9.1	7.3	0.62	4330	1.77	0.73
010593110-07	OBS	No	83.493941	205.287505	460.9	9.869	8.1	6.0	0.62	4330	1.41	1.20
010593110-08	OBS	No	276.493940	336.509572	965.7	2.584	8.5	6.4	0.62	4330	2.26	0.24
010593110-09	OBS	No	171.405232	287.356663	954.4	2.672	7.6	7.1	0.62	4330	2.11	0.46

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010593110-01	OBS	FP	0.00	1	0	0	0	LPP_DV
010593110-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010593110-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010593110-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS
010593110-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010593110-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—CENT_FEW_MEAS
010593110-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
010593110-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—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.

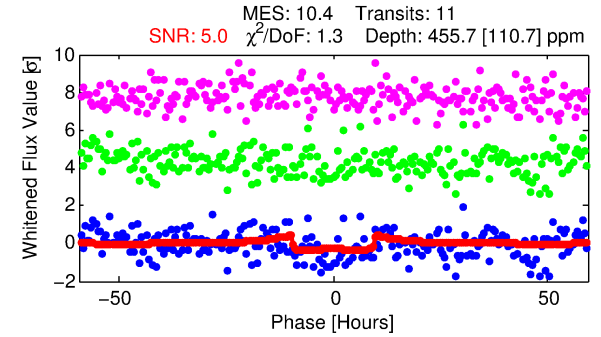
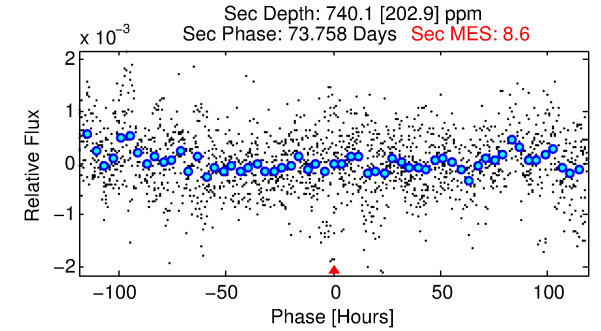
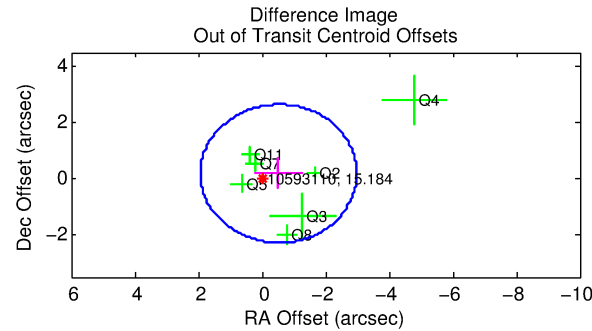
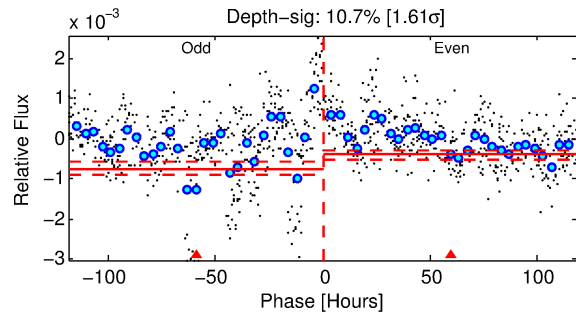
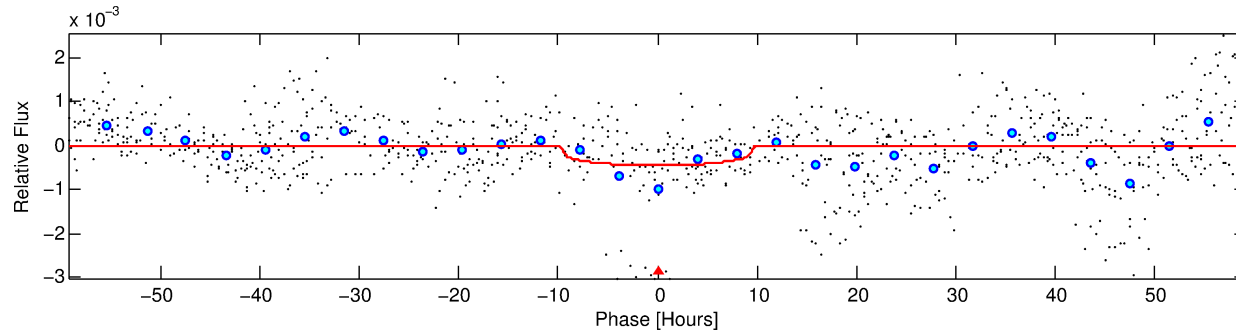
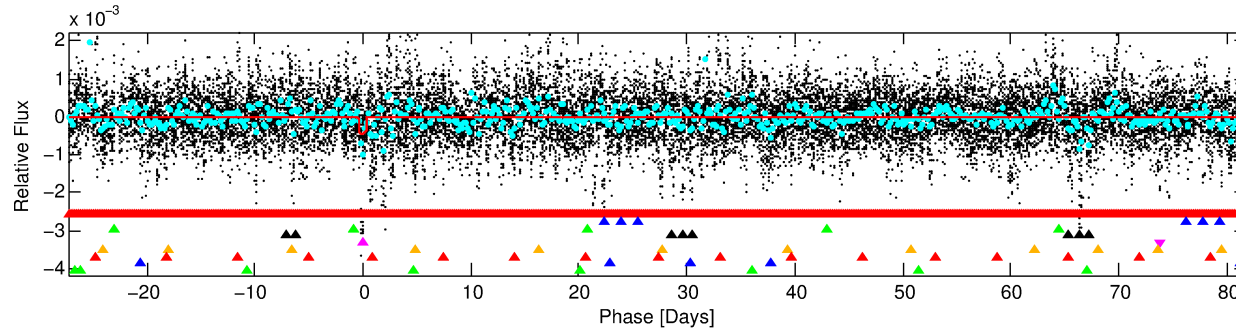
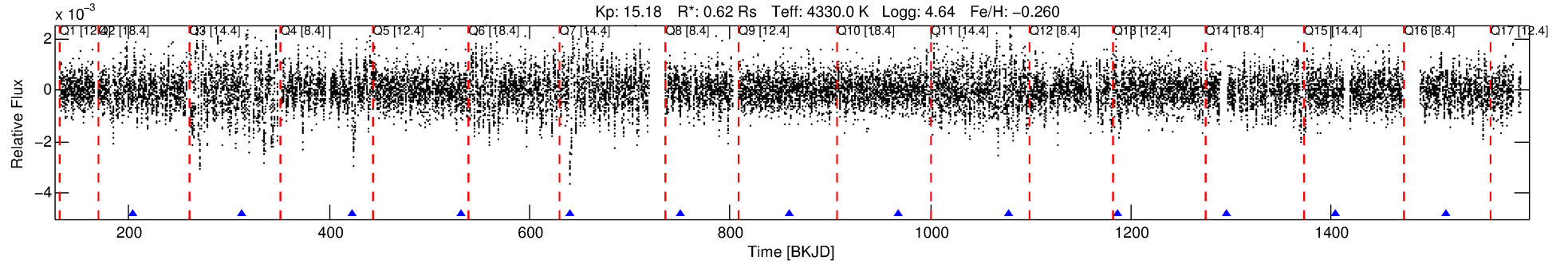
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 010593110-05

No Significant Match Found

# DV One-Page Summary

KIC: 10593110 Candidate: 5 of 9 Period: 109.121 d



## DV Fit Results:

Period = 109.12124 [0.00898] d  
Epoch = 204.4470 [0.0436] BKJD  
Rp/R\* = 0.0202 [0.0103]  
a/R\* = 34.89 [58.50]  
b = 0.60 [1.84]  
Seff = 0.84 [0.13]  
Teq = 244 [9] K  
Rp = 1.36 [0.70] Re  
a = 0.3787 [0.0269] AU  
Ag = 31602.31 [33449.91] [0.94 $\sigma$ ]  
Teffp = 5030 [1334] K [3.59 $\sigma$ ]

## DV Diagnostic Results:

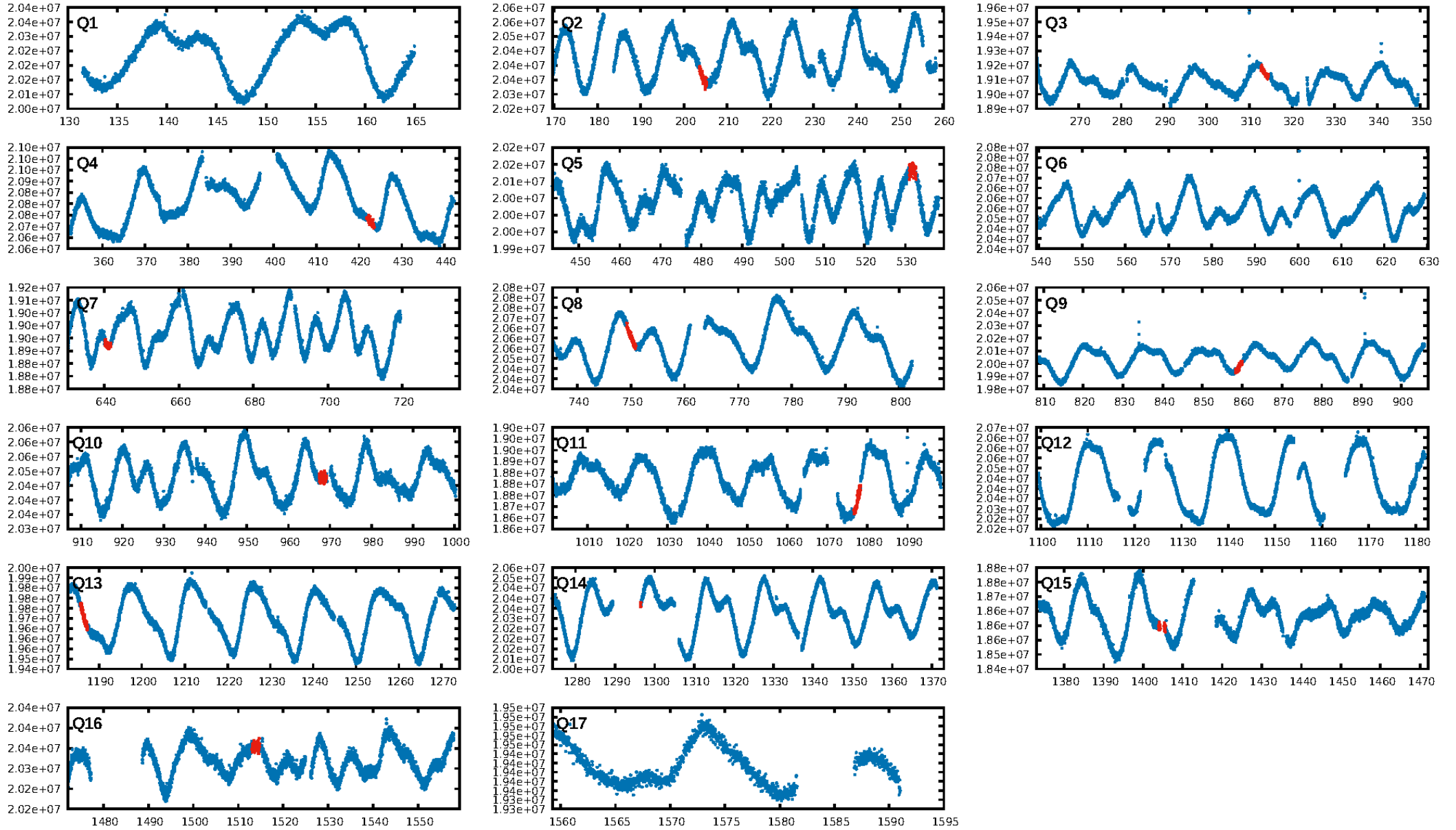
ShortPeriod-sig: 100.0% [27.81 $\sigma$ ]  
LongPeriod-sig: 100.0% [12.97 $\sigma$ ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 2.26e-12  
RollingBand-fgt: 1.00 [11/11]  
GhostDiagnostic-chr: 0.7286  
Centroid-sig: 6.9%  
Centroid-so: 0.895 arcsec [1.28 $\sigma$ ]  
OotOffset-rm: 0.552 arcsec [0.67 $\sigma$ ]  
OotOffset-st: 1/3/2/1 [7]  
KicOffset-rm: 0.615 arcsec [0.99 $\sigma$ ]  
KicOffset-st: 1/3/2/1 [7]  
DiffImageQuality-fgm: 0.57 [4/7]  
DiffImageOverlap-fno: 0.00 [0/9]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 02:56:44 Z

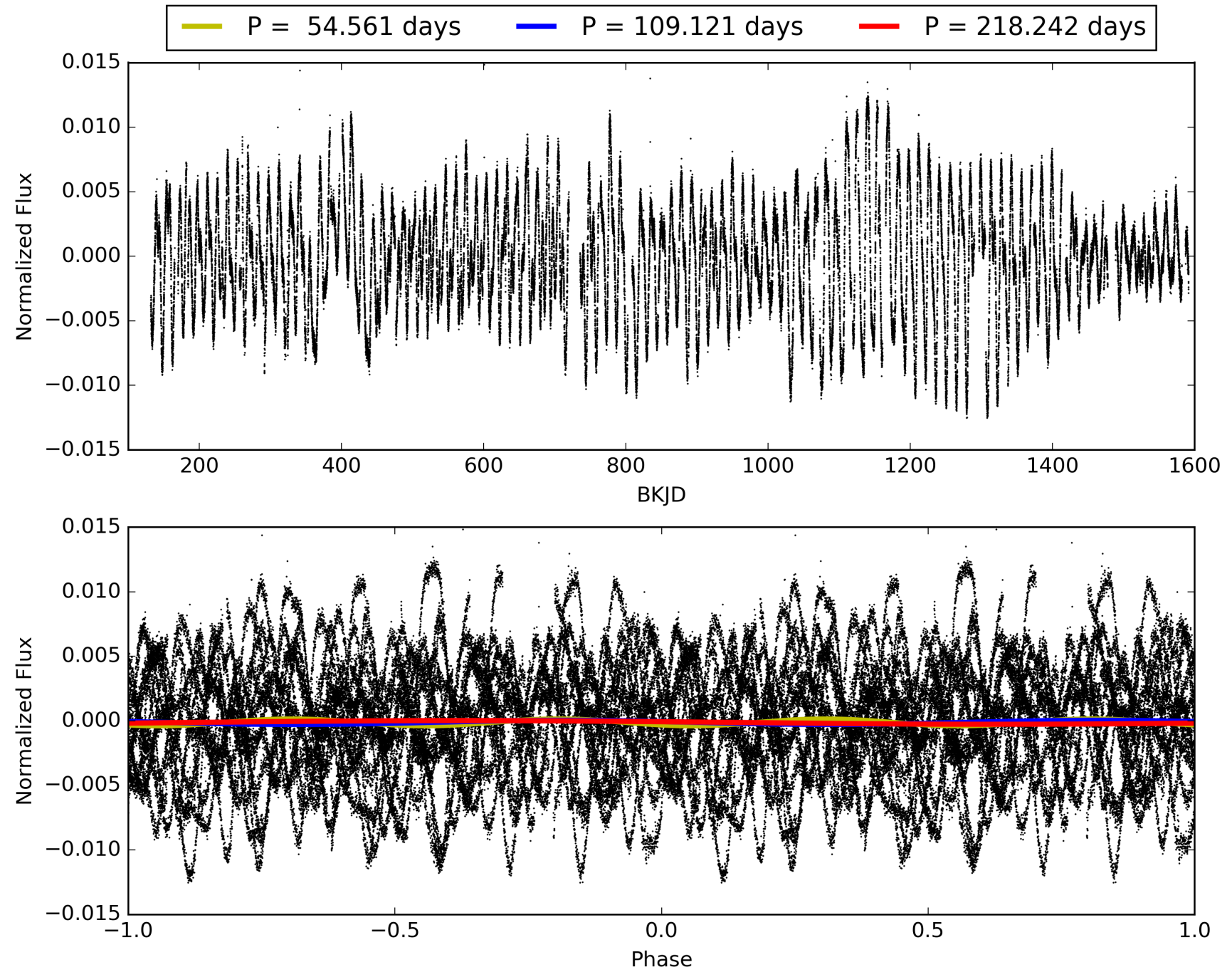
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 010593110-05, PDC Light Curves

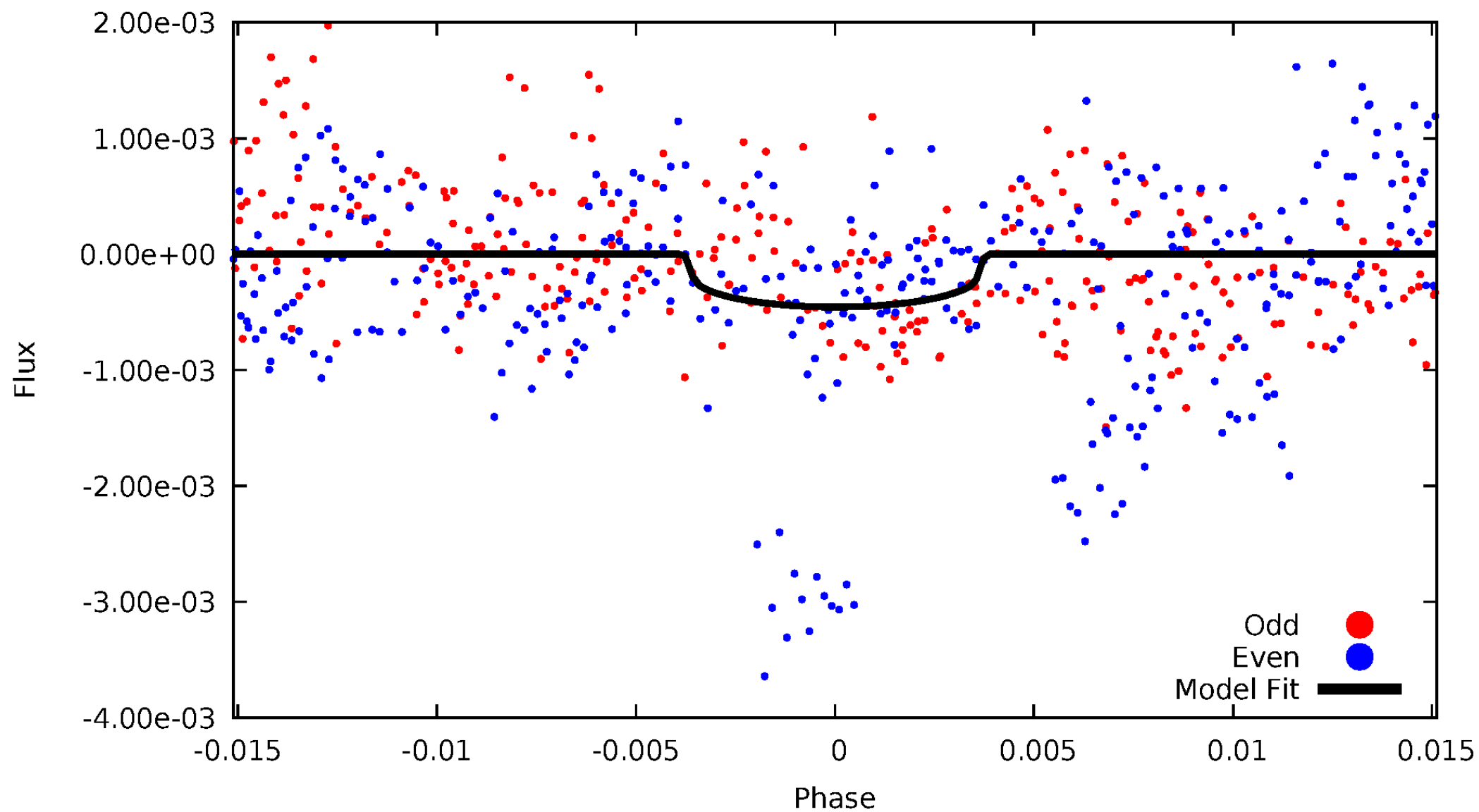


# TCE 010593110-05



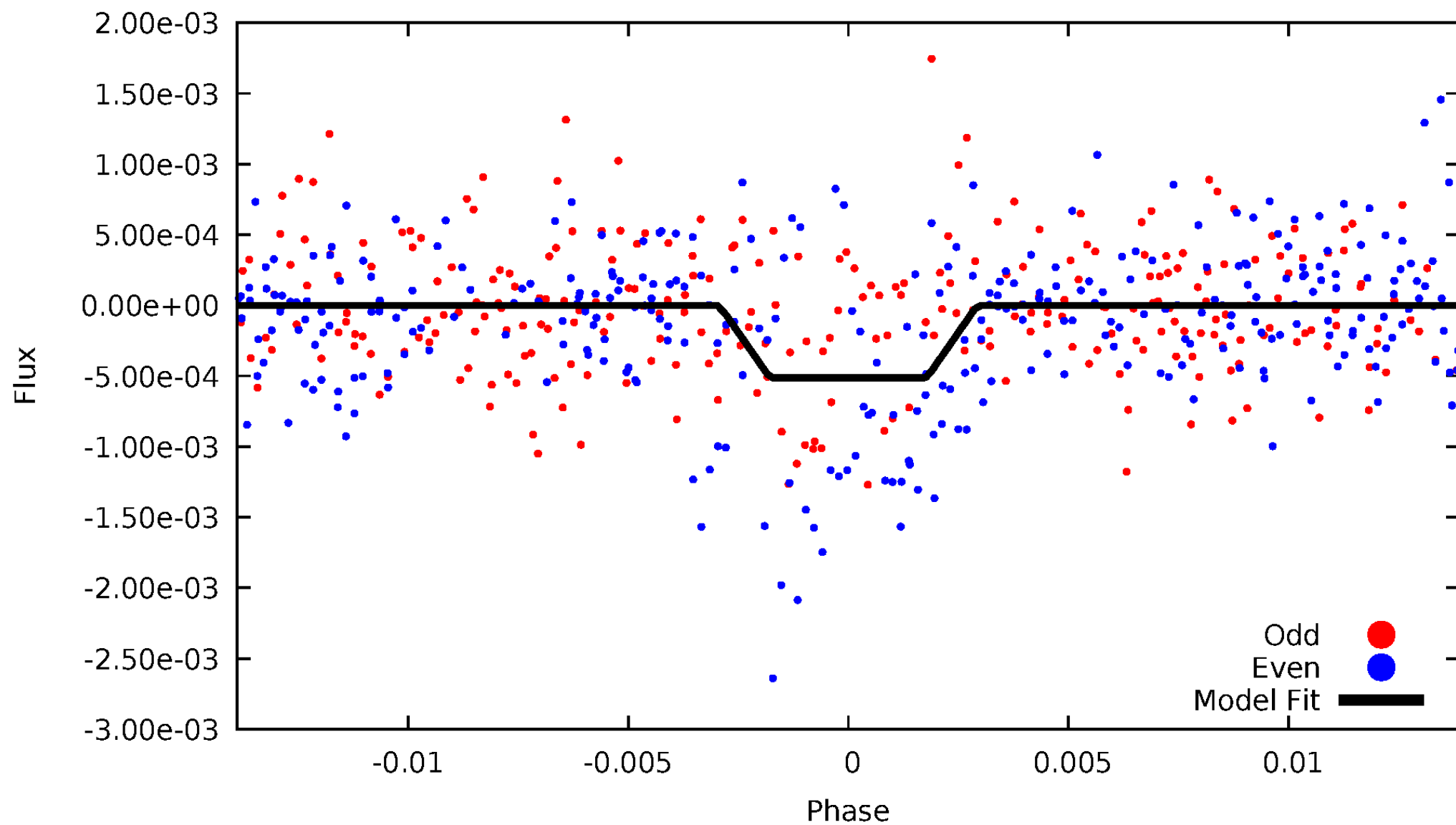
# DV Odd/Even

TCE 010593110-05



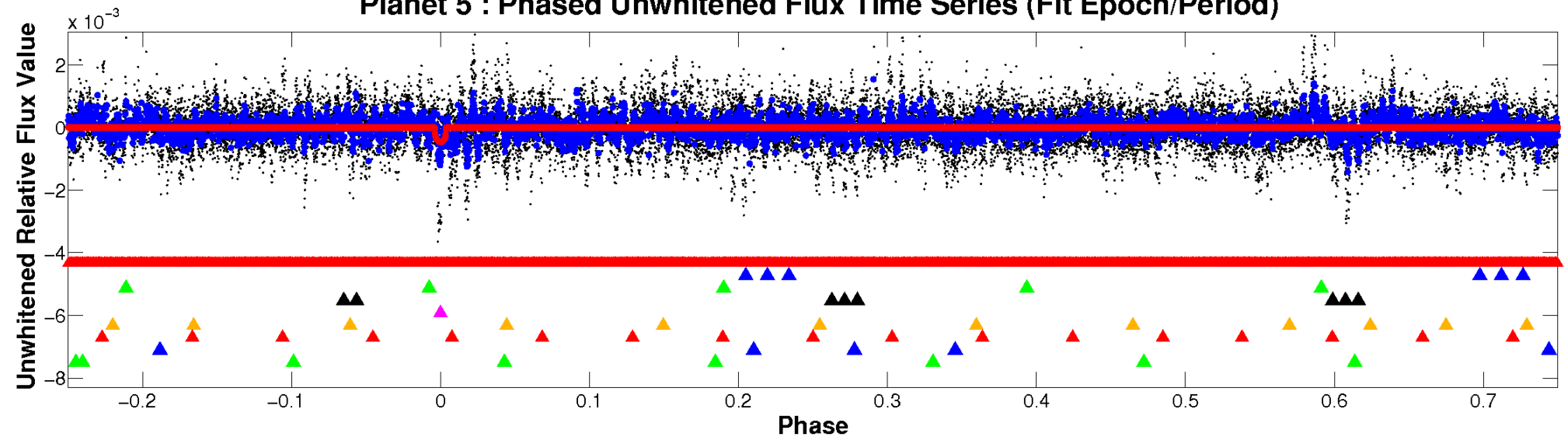
# ALT Odd/Even

TCE 010593110-05

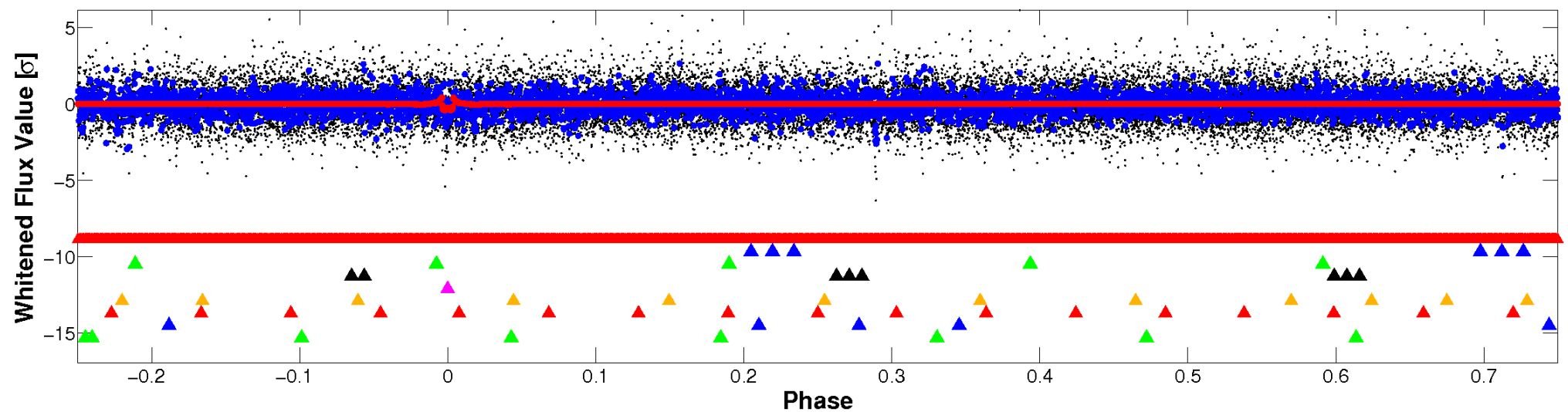


# Non-Whitened Vs. Whitened Light Curve

## Planet 5 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

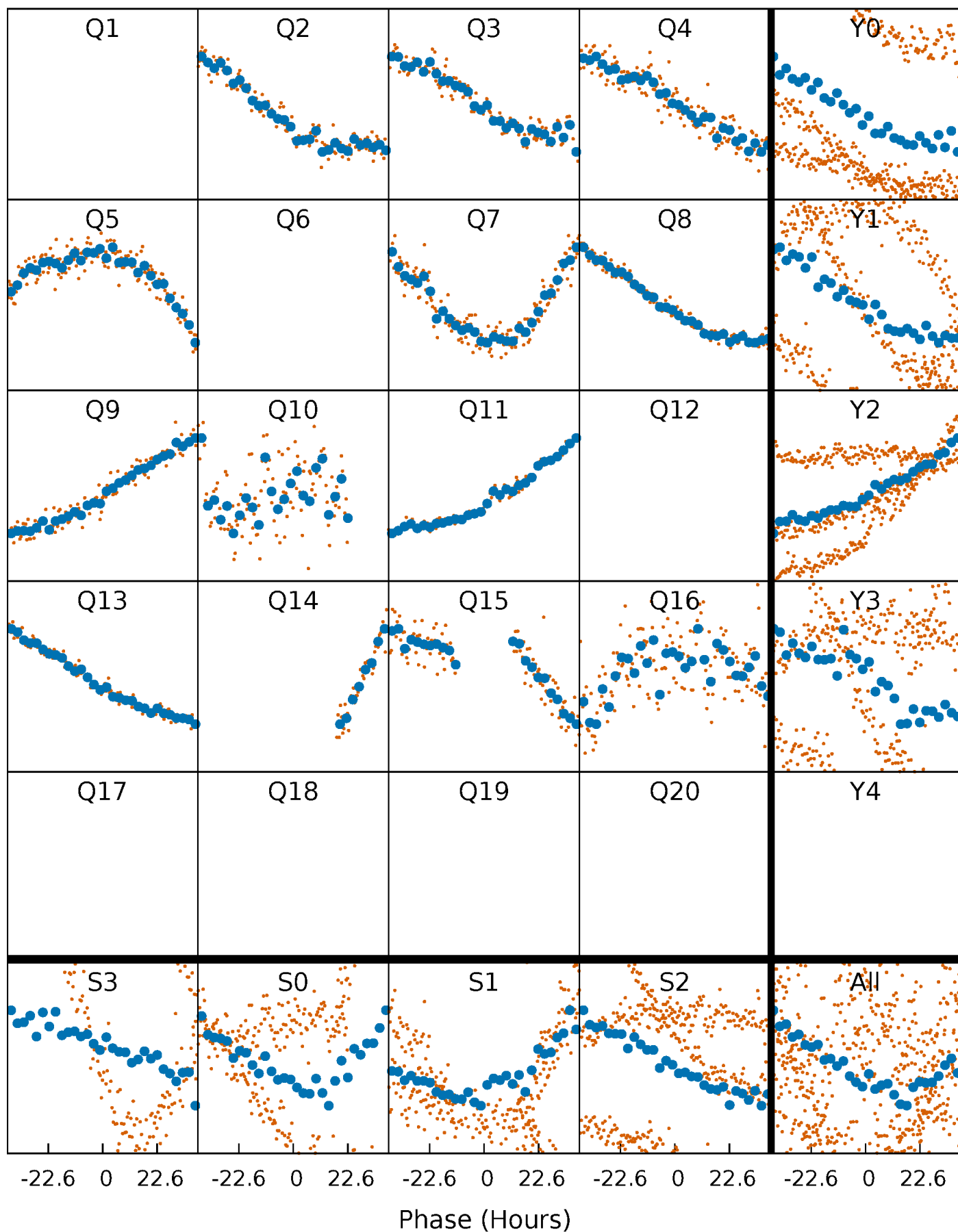


## Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)



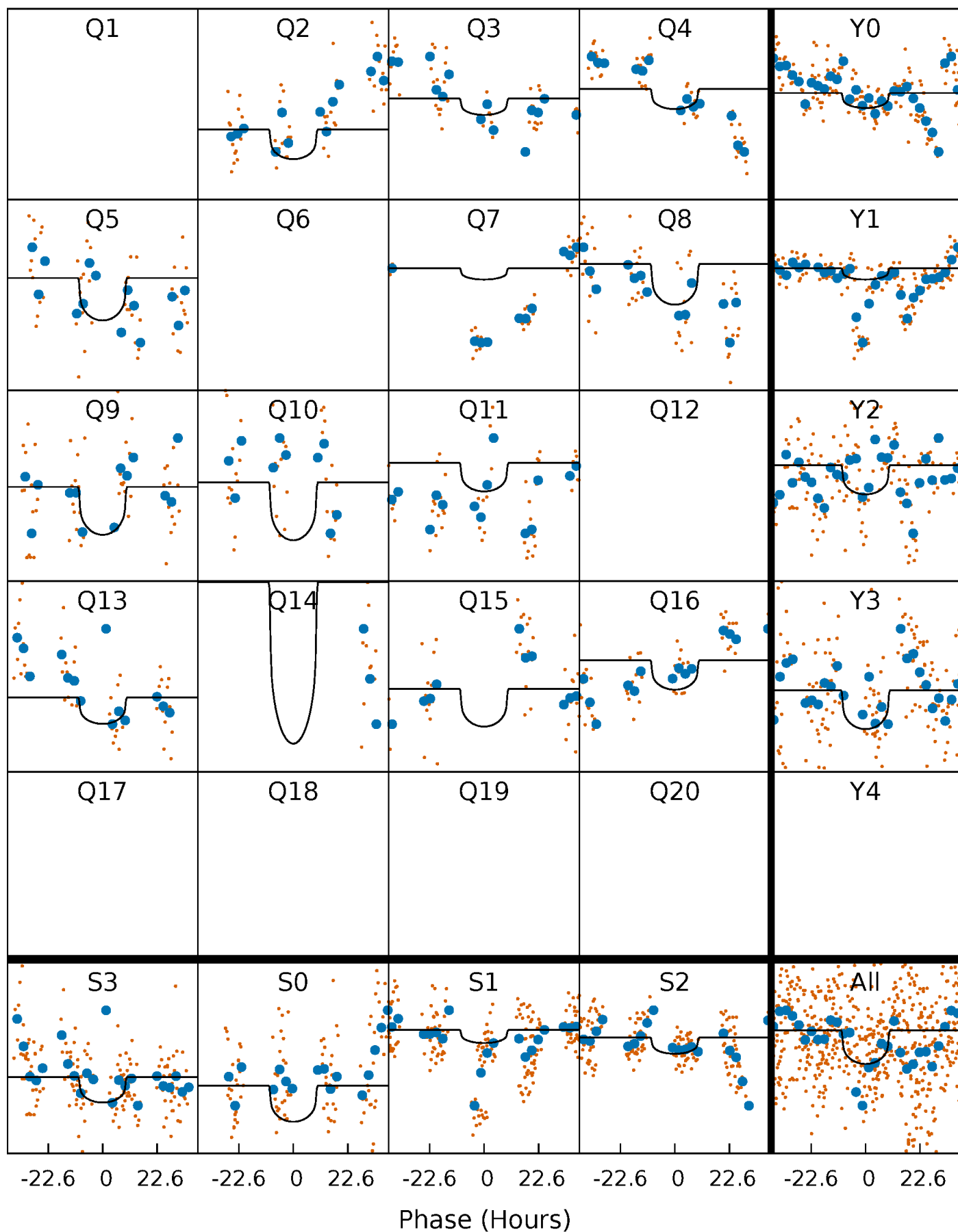
# PDC Quarter-Phased Transit Curves

TCE 010593110-05     $P=109.121239$  Days     $T_0=204.446957$  (BKJD)



# DV Quarter-Phased Transit Curves

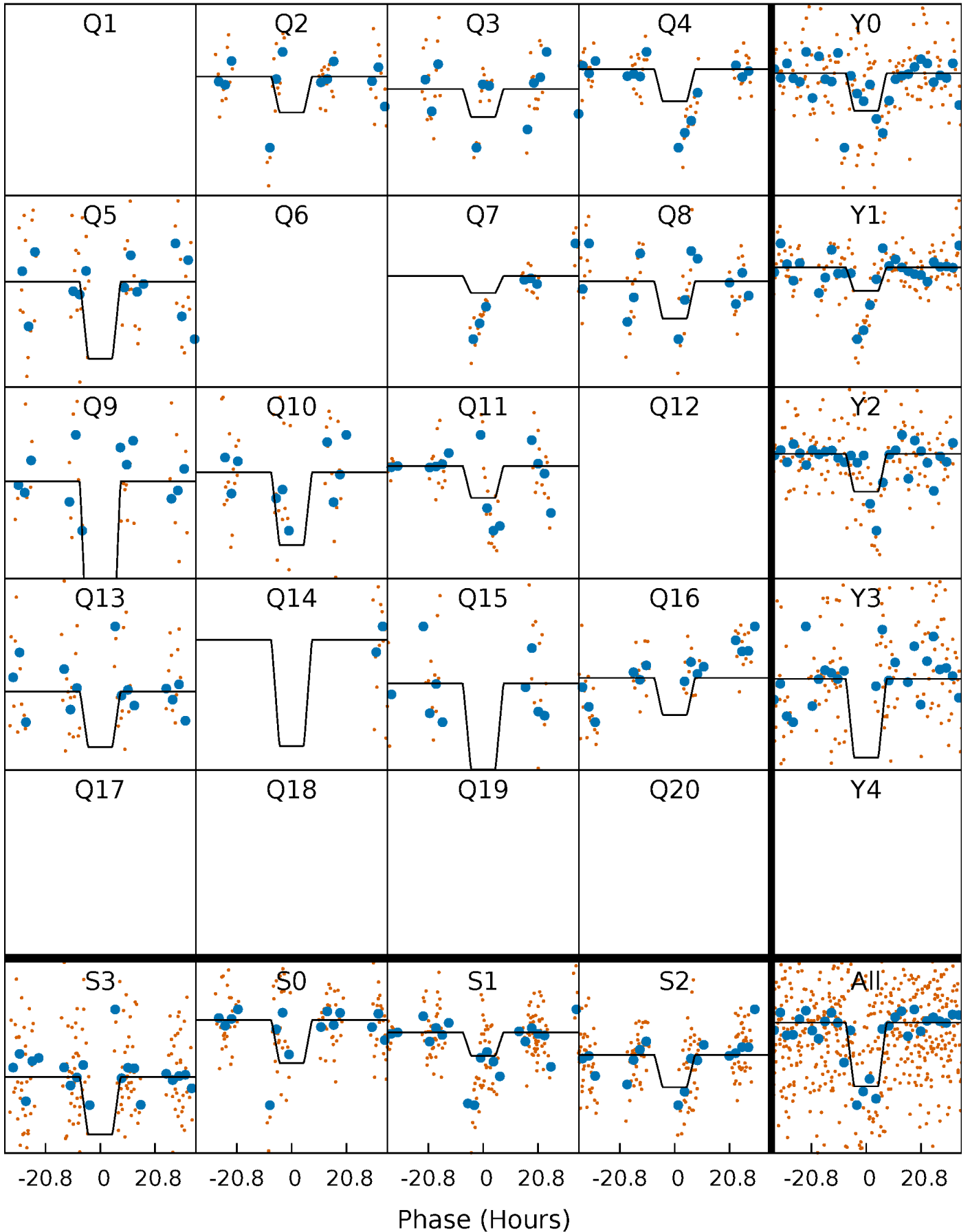
TCE 010593110-05     $P=109.121239$  Days     $T_0=204.446957$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

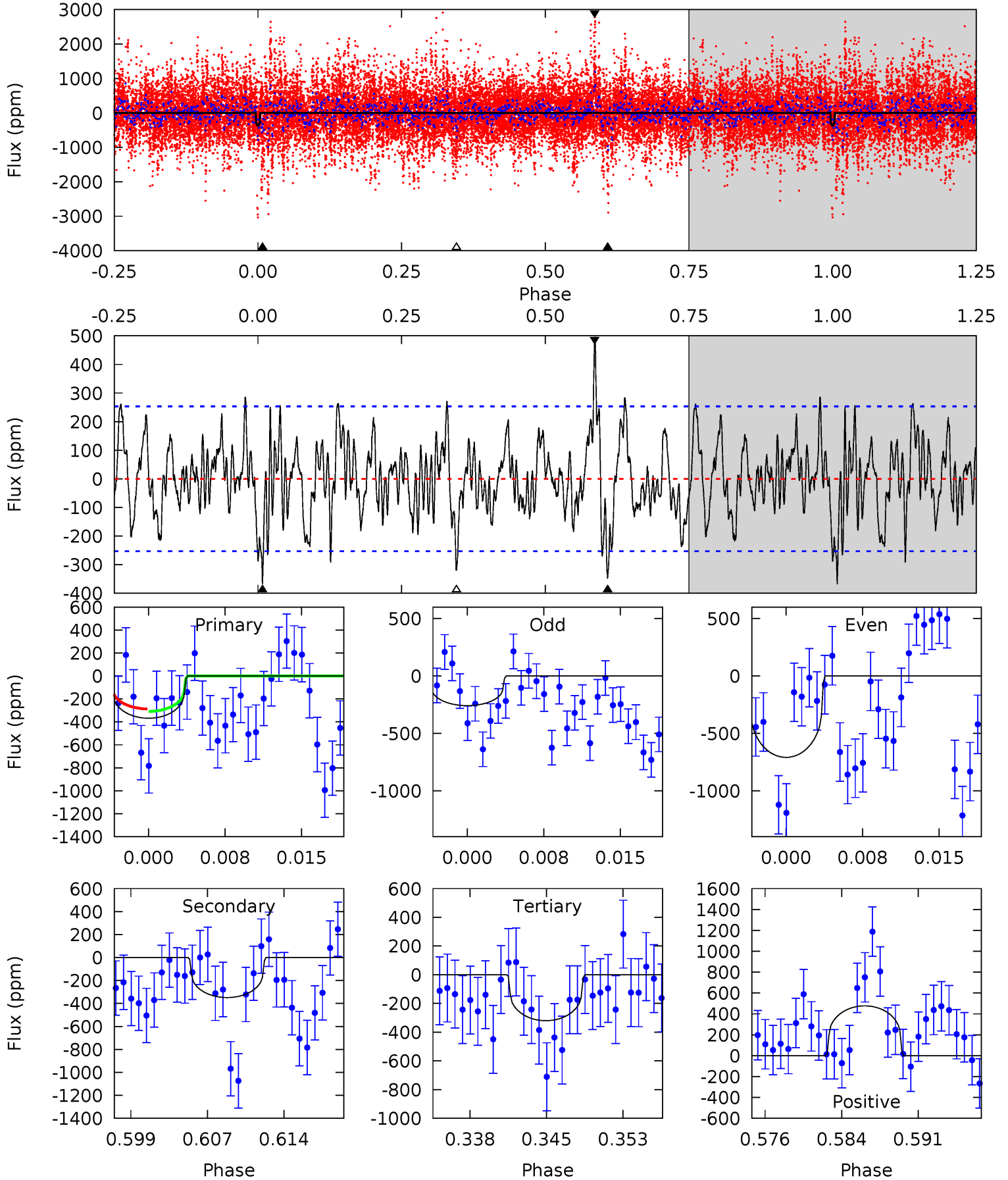
TCE 010593110-05 P=109.101588 Days  $T_0=204.519266$  (BKJD)



# DV Model-Shift Uniqueness Test

010593110-05, P = 109.121239 Days, E = 95.325718 Days

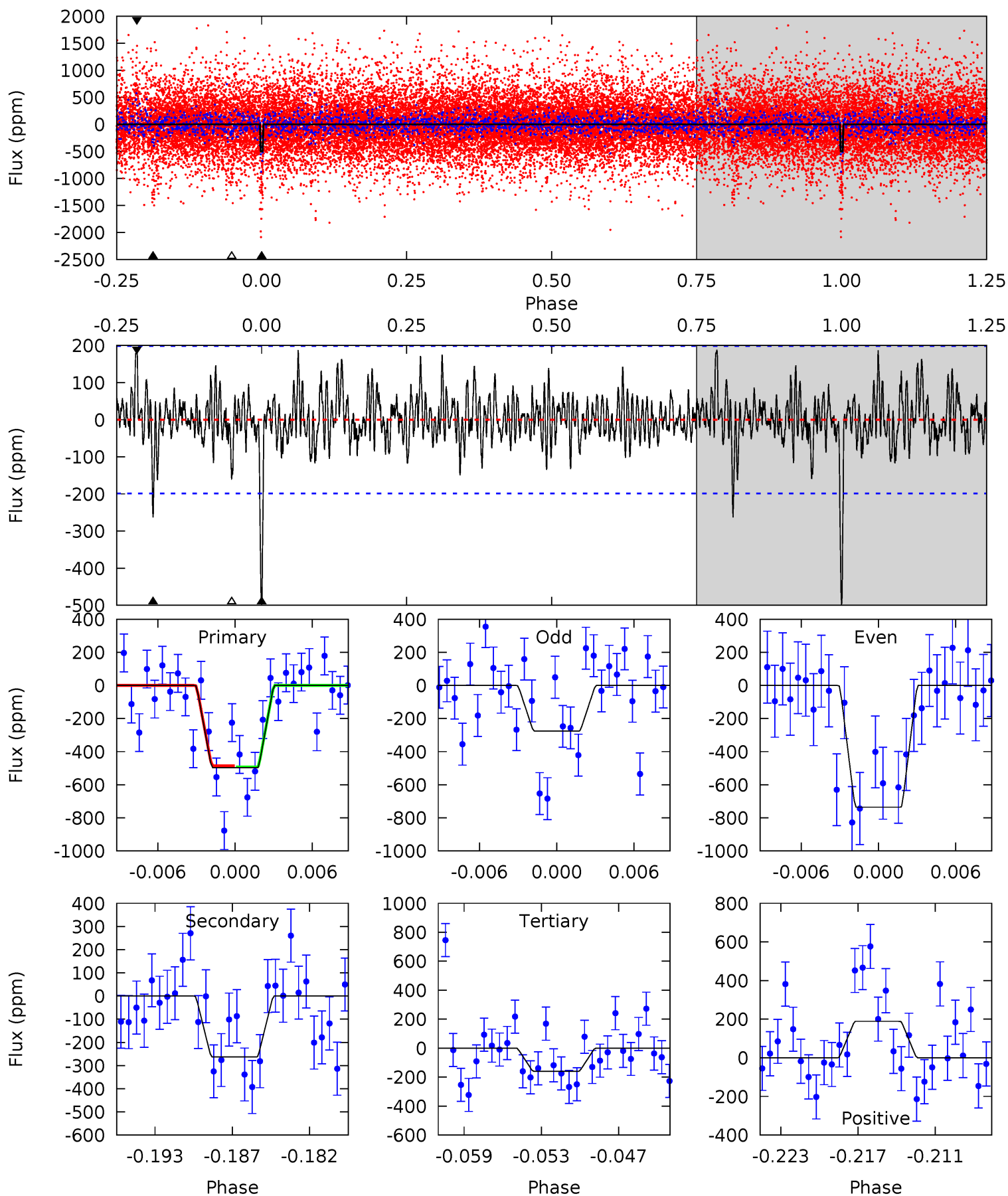
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.39	6.99	6.42	9.57	5.08	2.67	2.26	0.97	-2.18	0.57	-2.57	4.57	1.69	0.57	0



# Alt Model-Shift Uniqueness Test

010593110-05, P = 109.101588 Days, E = 95.417678 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
12.8	6.78	4.12	4.87	5.13	2.76	1.35	8.72	7.97	2.66	1.92	5.87	0.75	0.27	0



### Stellar Parameters For KIC 010593110

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (g \cdot \text{cm}^{-3})$
	$4330^{+129}_{-129}$	$4.640^{+0.049}_{-0.025}$	$-0.260^{+0.300}_{-0.300}$	$0.618^{+0.050}_{-0.056}$	$0.610^{+0.066}_{-0.050}$	$3.632^{+0.843}_{-0.438}$
	+3%/-3%	+1%/-1%	+115%/-115%	+8%/-9%	+11%/-8%	+23%/-12%
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 010593110-05 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-349 \pm 50$	$1.34^{+0.71}_{-0.62}$	$339^{+11}_{-11}$	$4242^{+1210}_{-631}$	$15908^{+36213}_{-9433}$
Alt.	$-263 \pm 39$	$1.51^{+0.67}_{-0.64}$	$340^{+11}_{-12}$	$3842^{+913}_{-455}$	$9206^{+20735}_{-4921}$

$T_{max}$  = 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

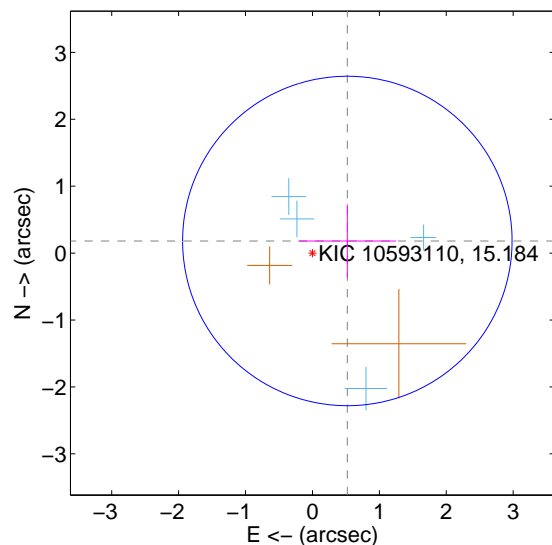
Supplemental centroid analysis for 010593110-05. Kepler magnitude: 15.18. Transit SNR 5.01

There are 4 quarters with good PRF difference image offsets

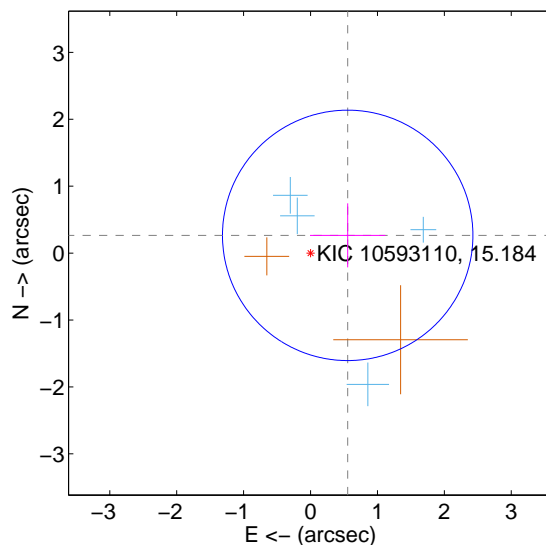
The direct PRF centroid is offset from the target star catalog position by about 0.05 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.552 \pm 0.821$	0.67	$-0.522 \pm 0.729$	$0.181 \pm 0.545$
PRF-fit source offset from KIC position	$0.615 \pm 0.624$	0.99	$-0.556 \pm 0.562$	$0.265 \pm 0.478$
photometric centroid source offset	$0.90 \pm 0.70$	1.28	$0.57 \pm 0.74$	$-0.69 \pm 0.67$

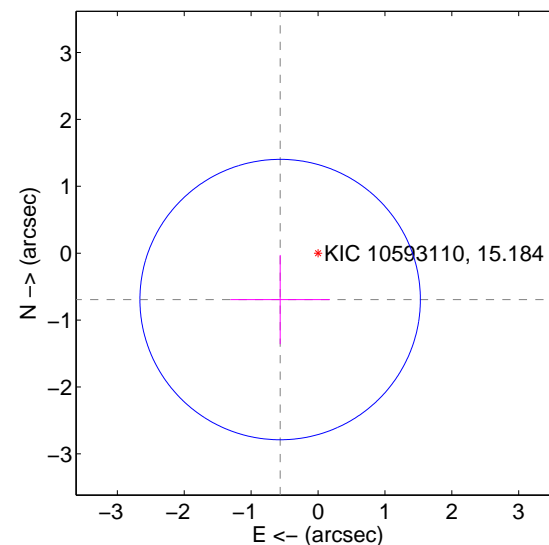
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

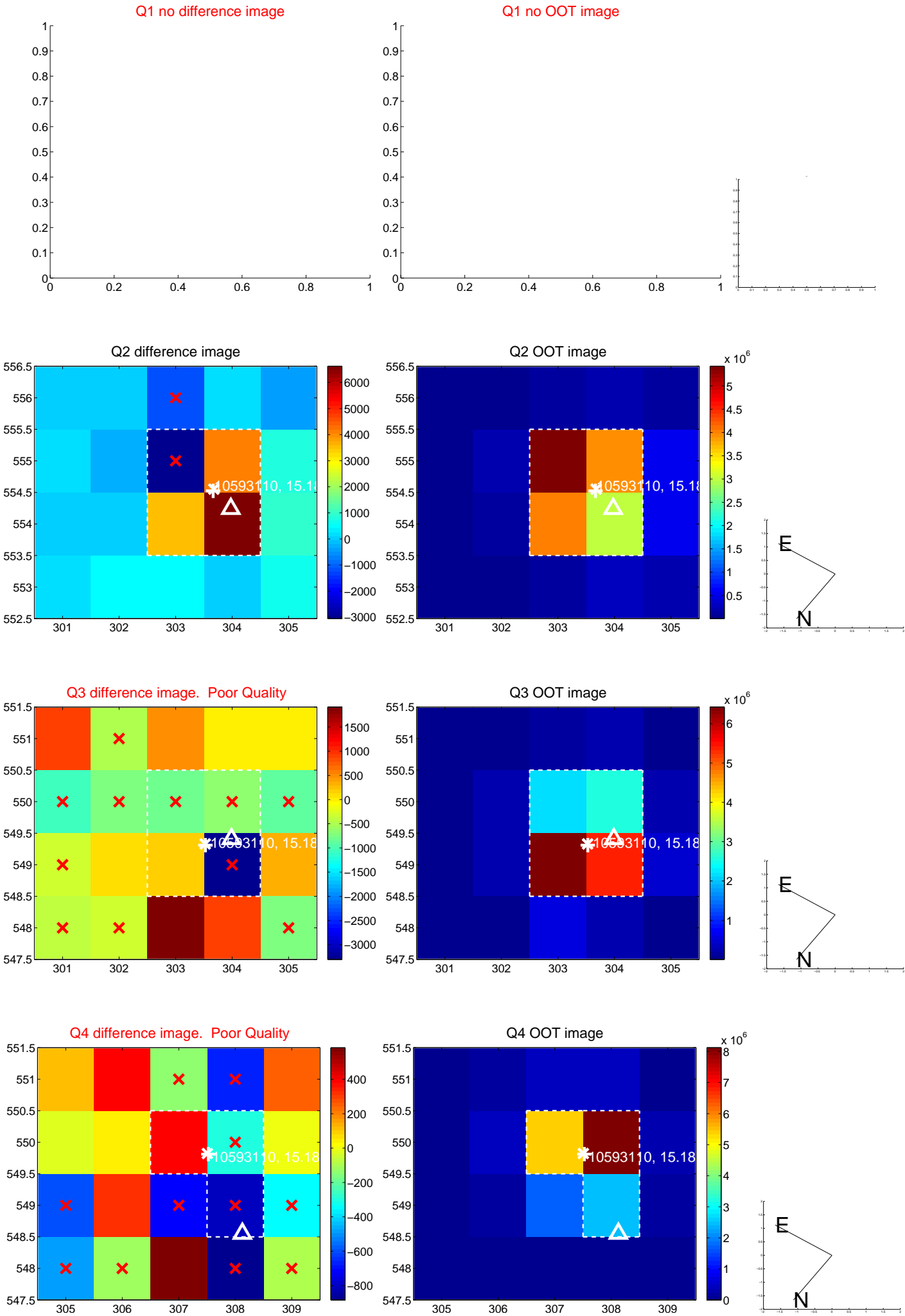


offset from photometric centroids

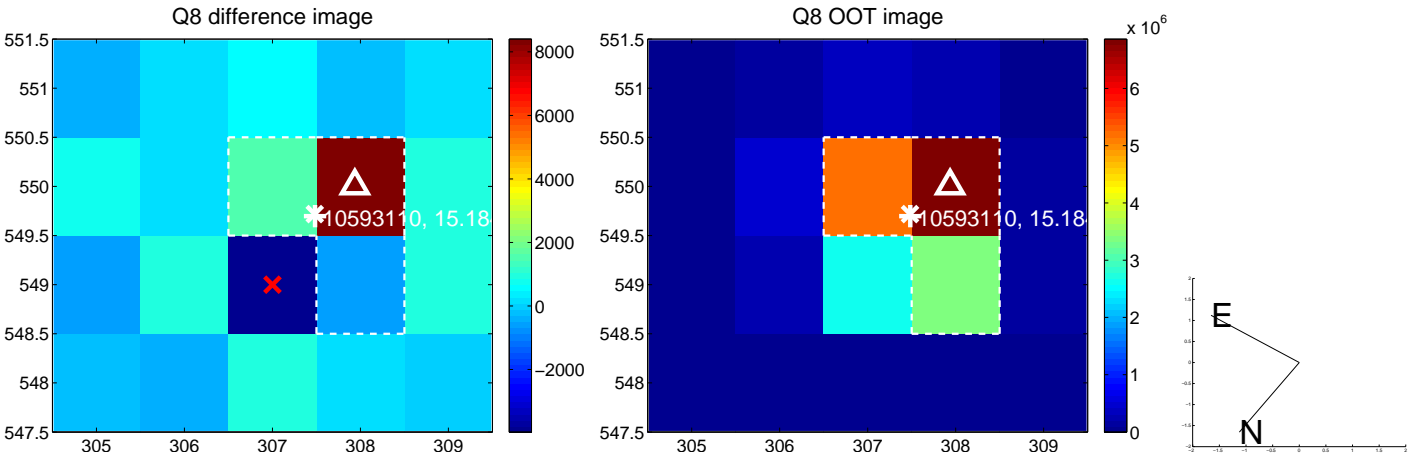
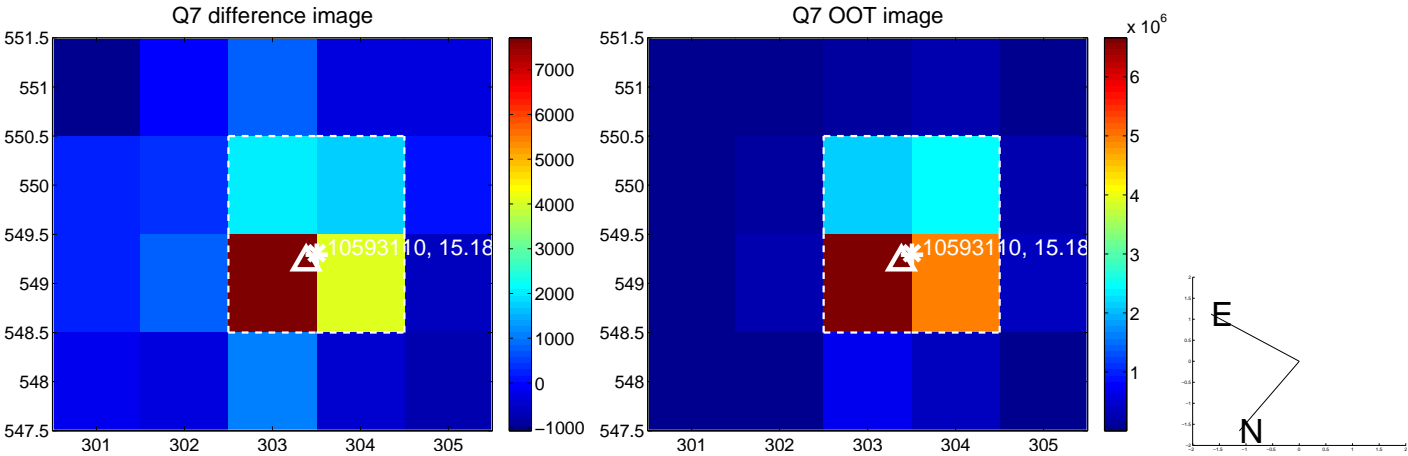
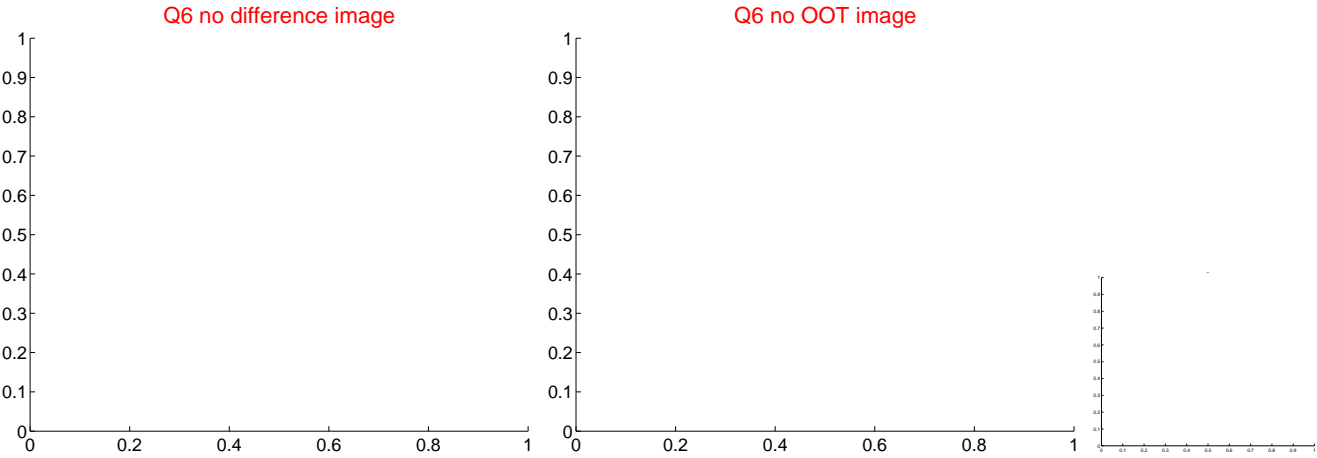
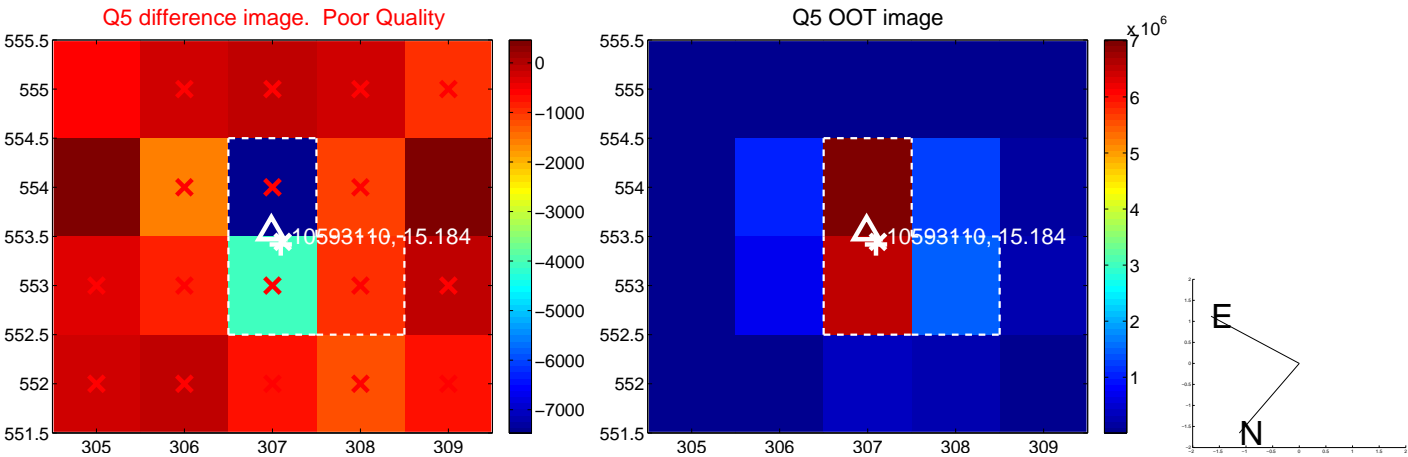


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

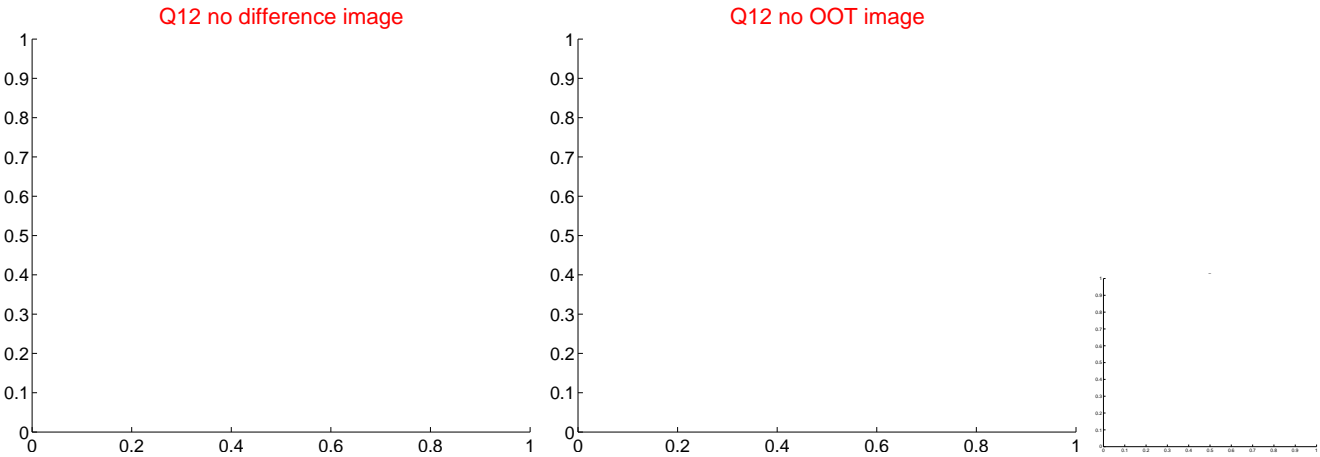
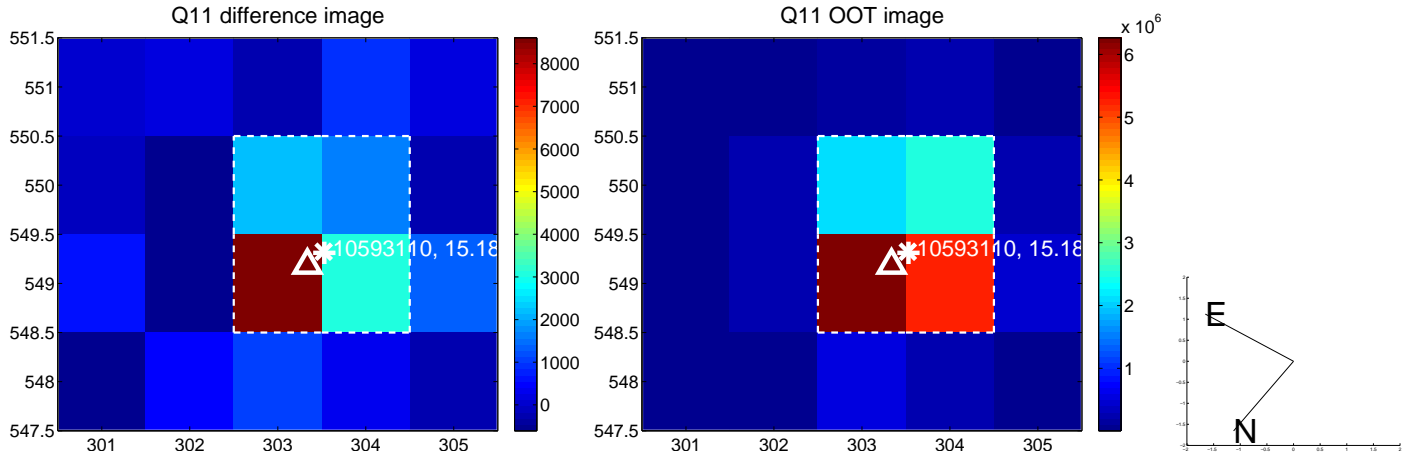
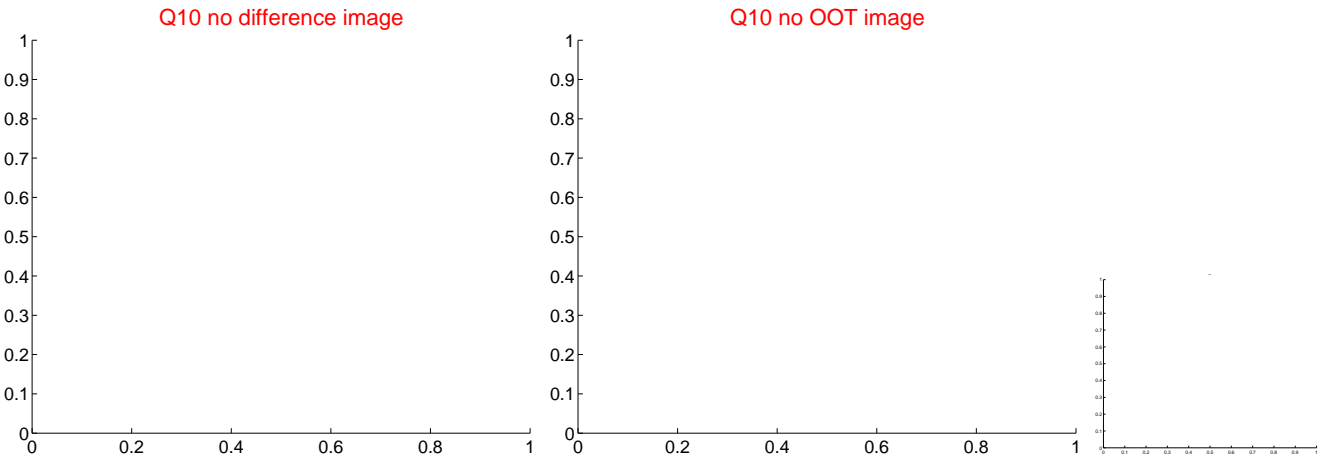
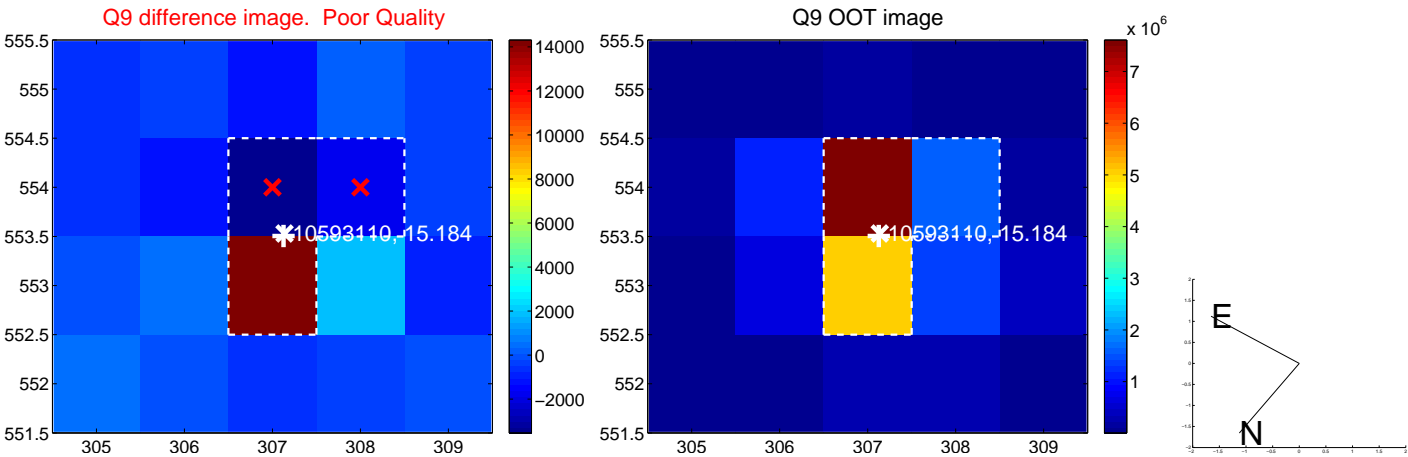
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

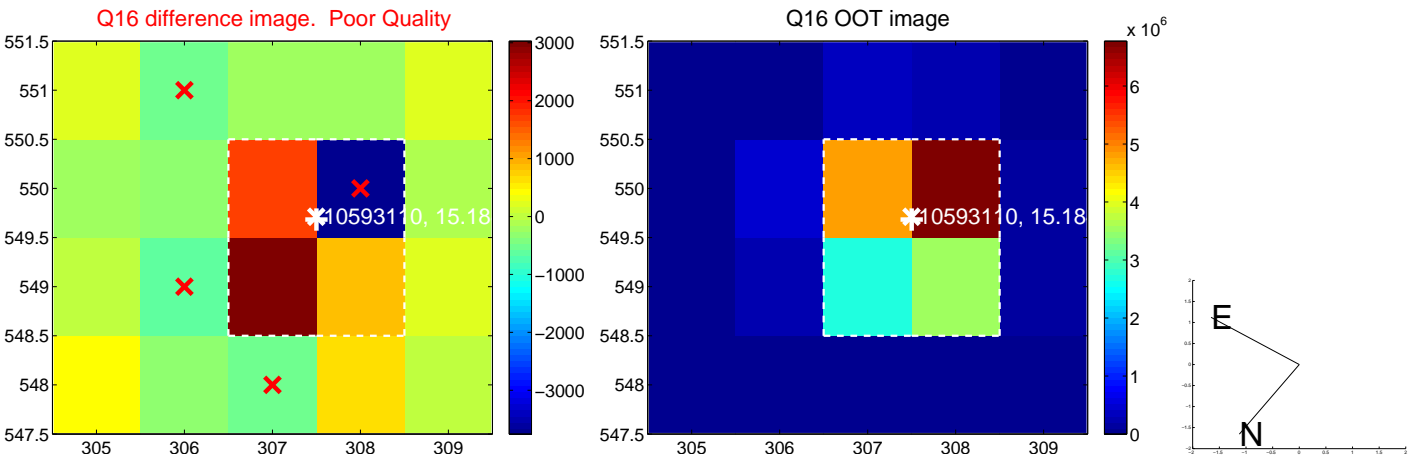


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

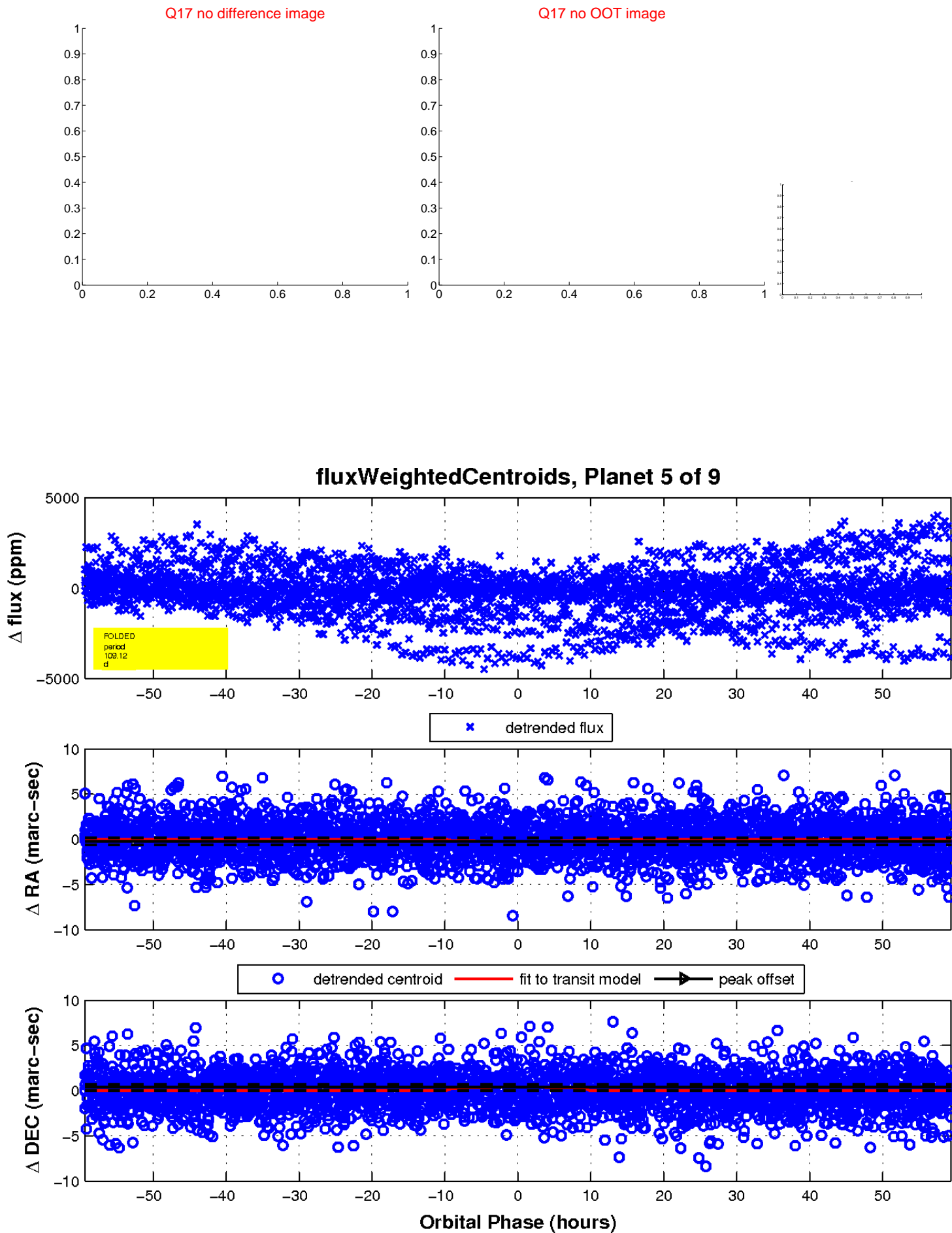




white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.

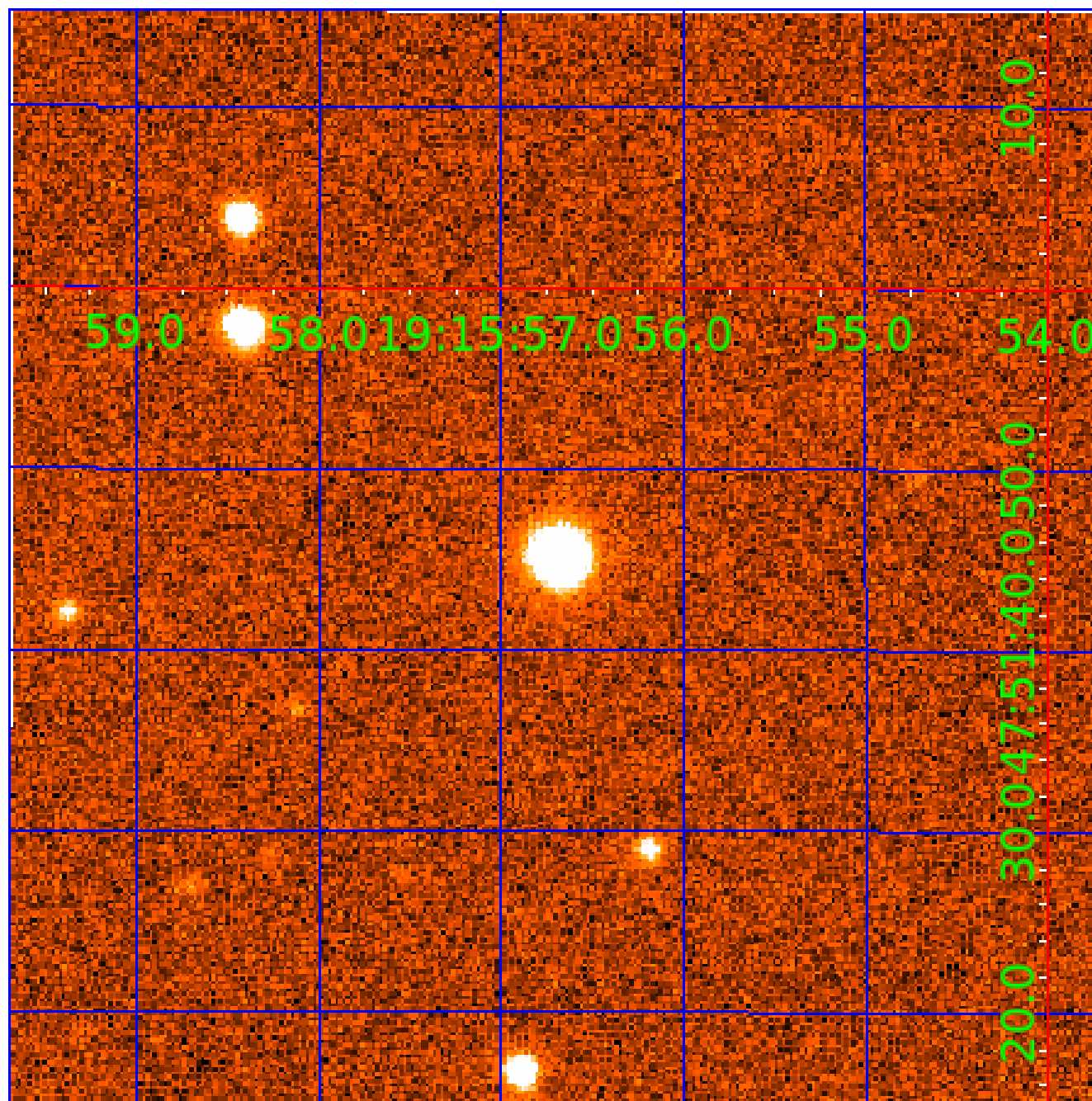


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 010593110

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010593110-01	OBS	No	0.822191	132.325009	37.8	4.078	7.4	7.1	0.62	4330	0.37	567.82
010593110-03	OBS	No	283.587961	356.516235	742.1	4.733	12.3	7.8	0.62	4330	1.92	0.23
010593110-04	OBS	No	181.556830	271.668945	1017.8	3.814	15.3	8.0	0.62	4330	2.02	0.42
010593110-05	OBS	No	109.121239	204.446957	455.7	19.790	10.4	5.0	0.62	4330	1.36	0.84
010593110-06	OBS	No	120.587667	163.433496	687.0	7.664	9.1	7.3	0.62	4330	1.77	0.73
010593110-07	OBS	No	83.493941	205.287505	460.9	9.869	8.1	6.0	0.62	4330	1.41	1.20
010593110-08	OBS	No	276.493940	336.509572	965.7	2.584	8.5	6.4	0.62	4330	2.26	0.24
010593110-09	OBS	No	171.405232	287.356663	954.4	2.672	7.6	7.1	0.62	4330	2.11	0.46

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010593110-01	OBS	FP	0.00	1	0	0	0	LPP_DV
010593110-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010593110-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010593110-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS
010593110-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010593110-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—CENT_FEW_MEAS
010593110-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
010593110-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—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.

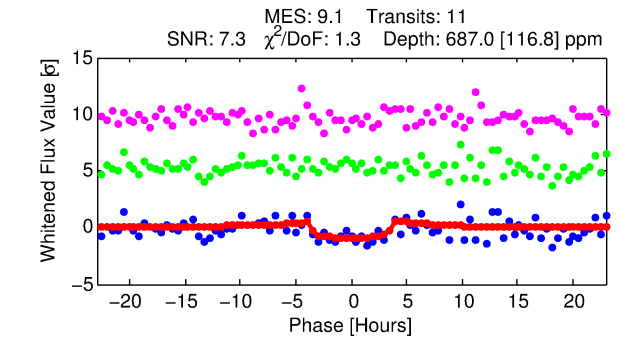
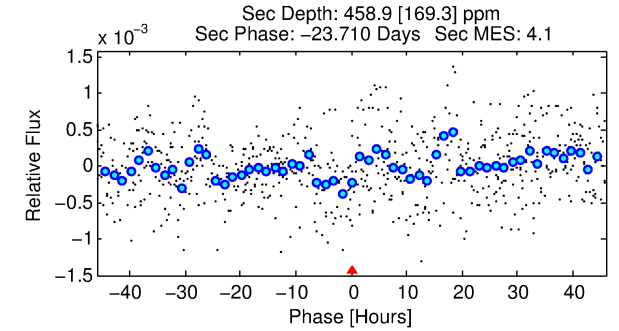
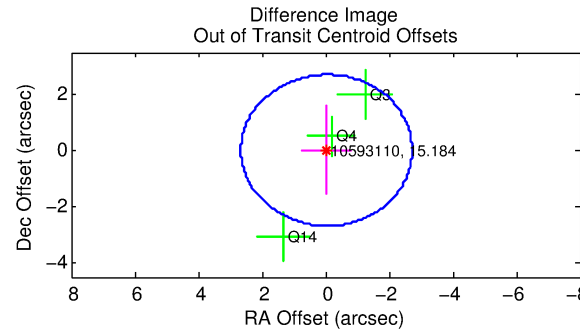
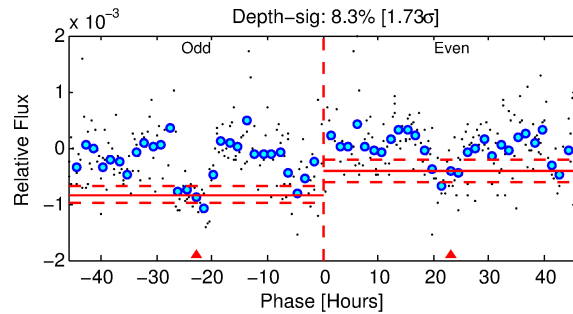
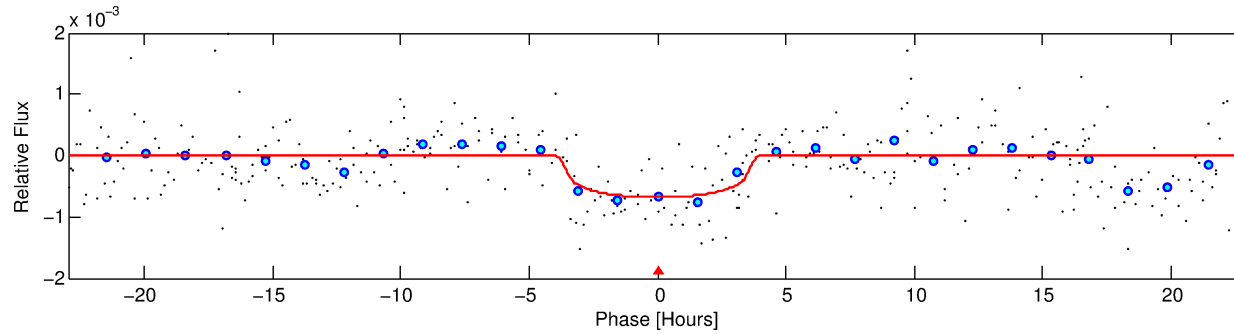
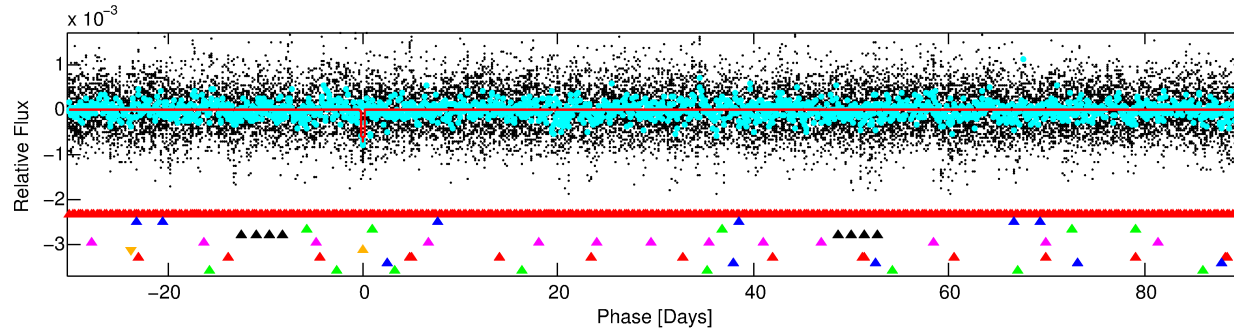
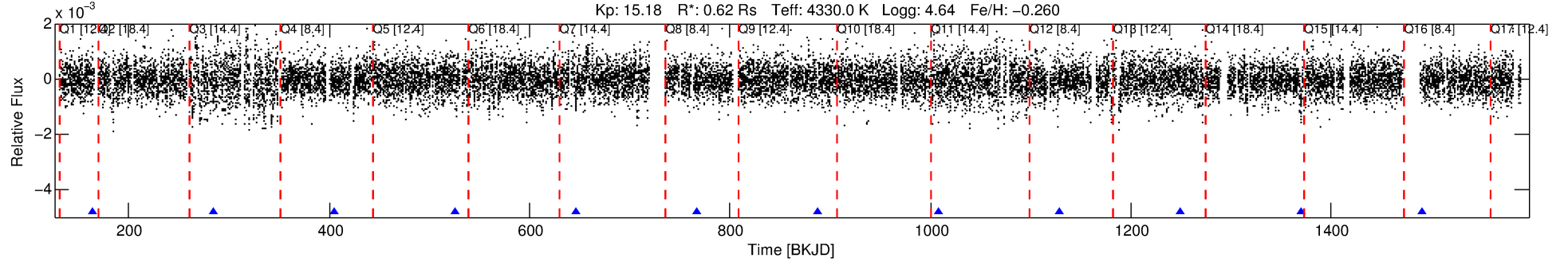
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 010593110-06

No Significant Match Found

# DV One-Page Summary

KIC: 10593110 Candidate: 6 of 9 Period: 120.588 d



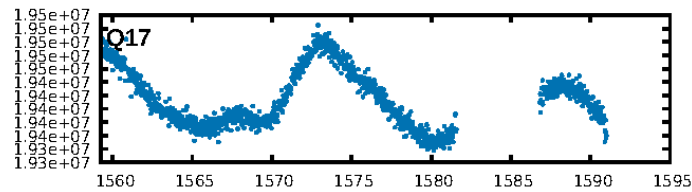
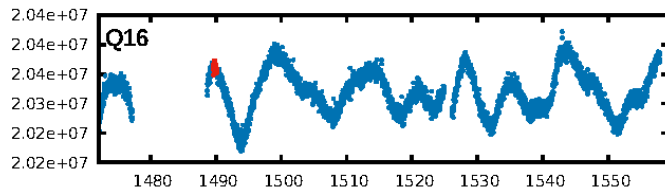
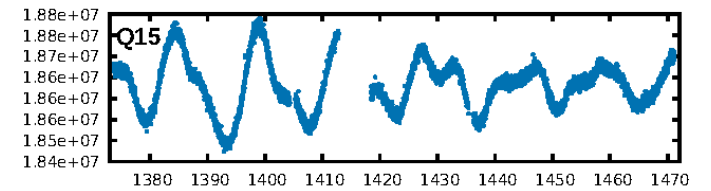
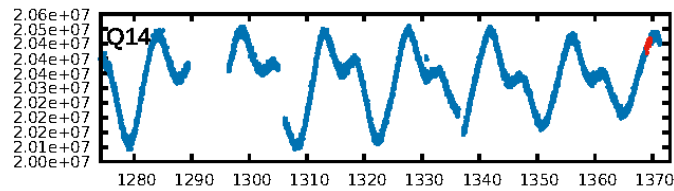
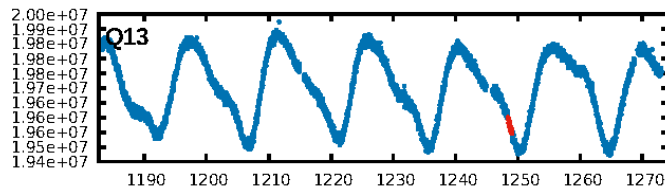
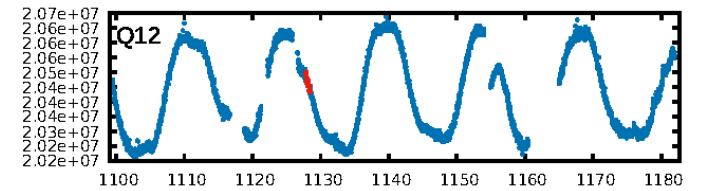
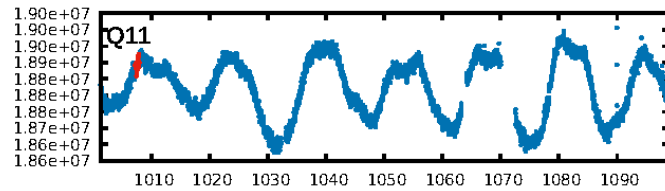
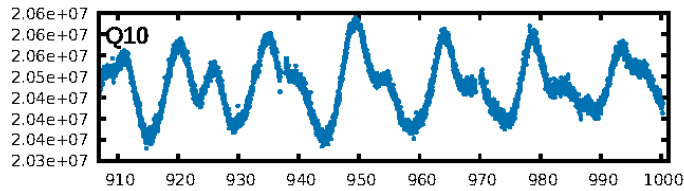
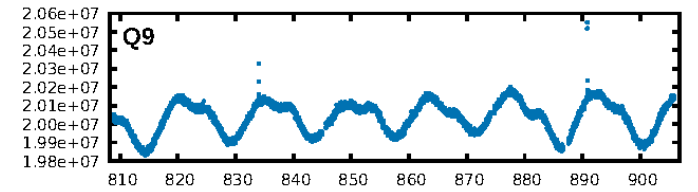
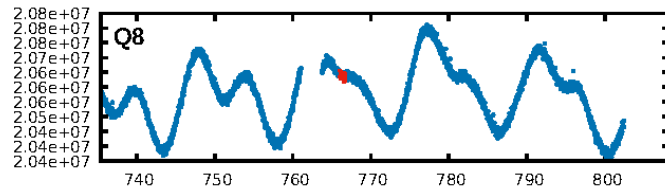
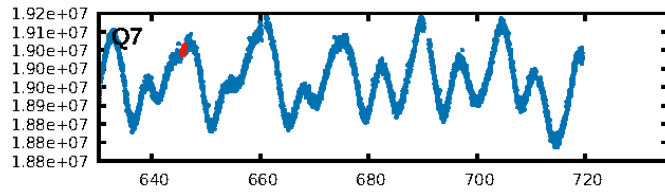
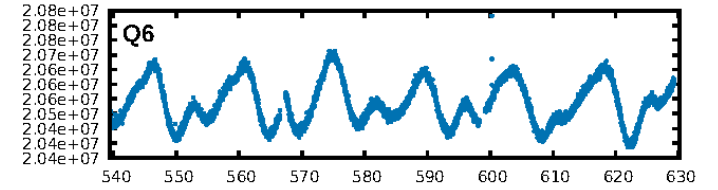
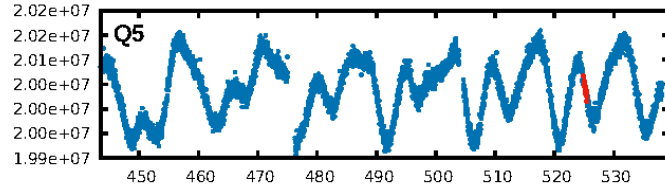
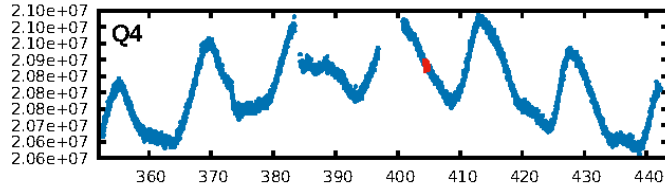
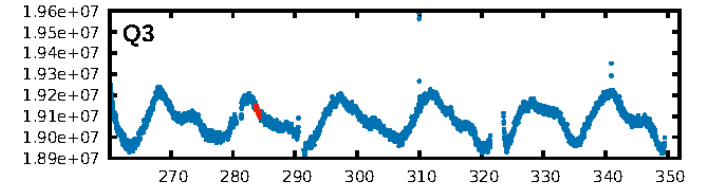
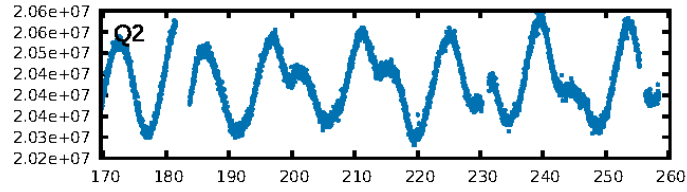
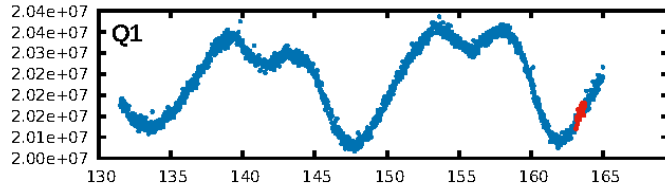
## DV Fit Results:

Period = 120.58767 [0.00220] d  
Epoch = 163.4335 [0.0139] BKJD  
Rp/R\* = 0.0262 [0.0144]  
a/R\* = 84.39 [159.94]  
b = 0.75 [1.13]  
Seff = 0.73 [0.11]  
Teq = 236 [9] K  
Rp = 1.77 [0.98] Re  
a = 0.4048 [0.0288] AU  
Ag = 13263.03 [15400.88] [0.86 $\sigma$ ]  
Teffp = 3916 [1139] K [3.23 $\sigma$ ]

## DV Diagnostic Results:

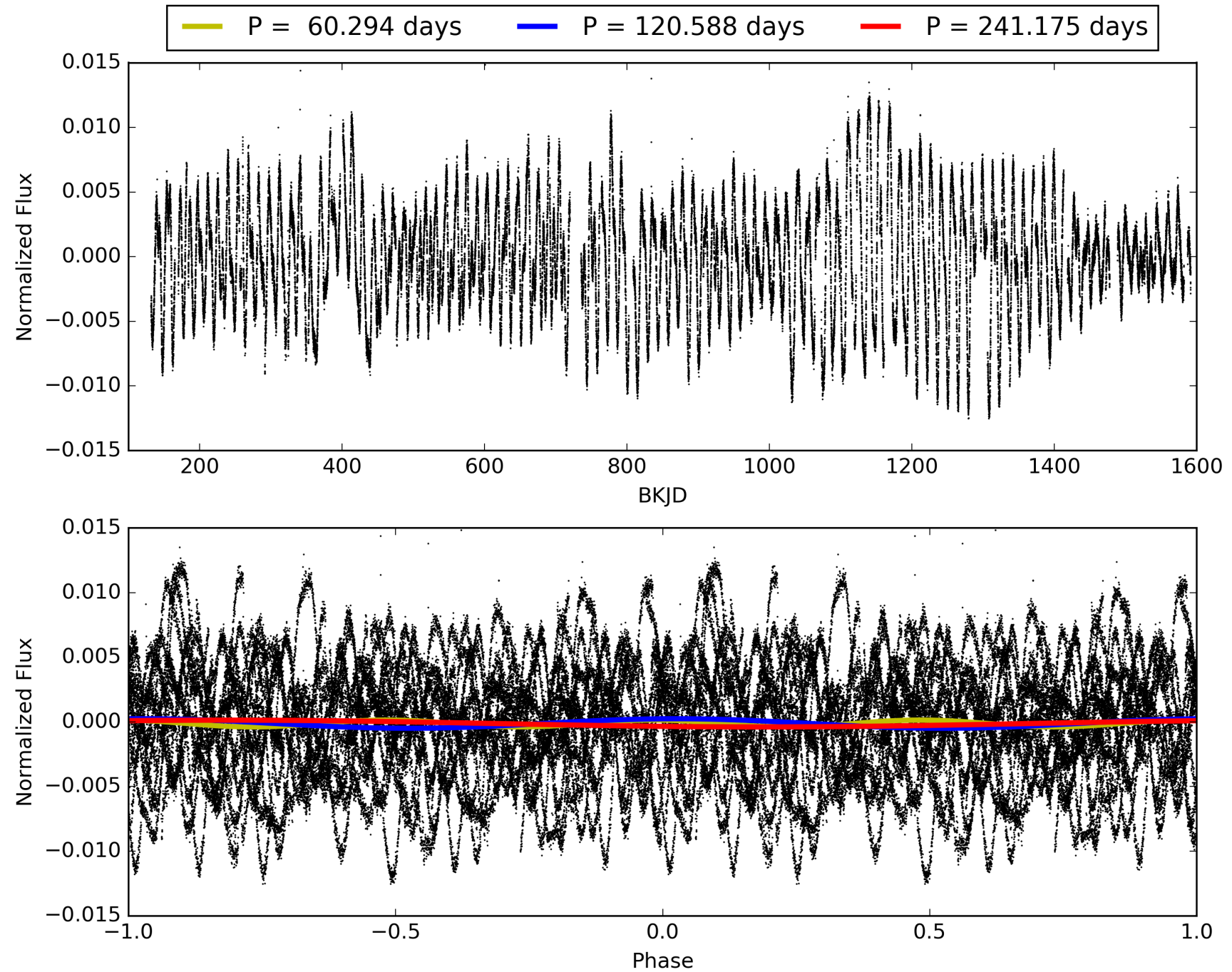
ShortPeriod-sig: 100.0% [12.97 $\sigma$ ]  
LongPeriod-sig: 100.0% [150.27 $\sigma$ ]  
ModelChiSquare2-sig: 34.8%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 8.69e-12**  
RollingBand-fgt: 1.00 [10/10]  
**GhostDiagnostic-chr: 0.303**  
Centroid-sig: 76.6%  
Centroid-so: 0.381 arcsec [0.54 $\sigma$ ]  
OotOffset-rm: 0.037 arcsec [0.04 $\sigma$ ]  
OotOffset-st: 1/1/1/0 [3]  
KicOffset-rm: 0.102 arcsec [0.09 $\sigma$ ]  
KicOffset-st: 1/1/1/0 [3]  
DiffImageQuality-fgm: 0.00 [0/3]  
DiffImageOverlap-fno: 0.00 [0/9]

# TCE 010593110-06, PDC Light Curves



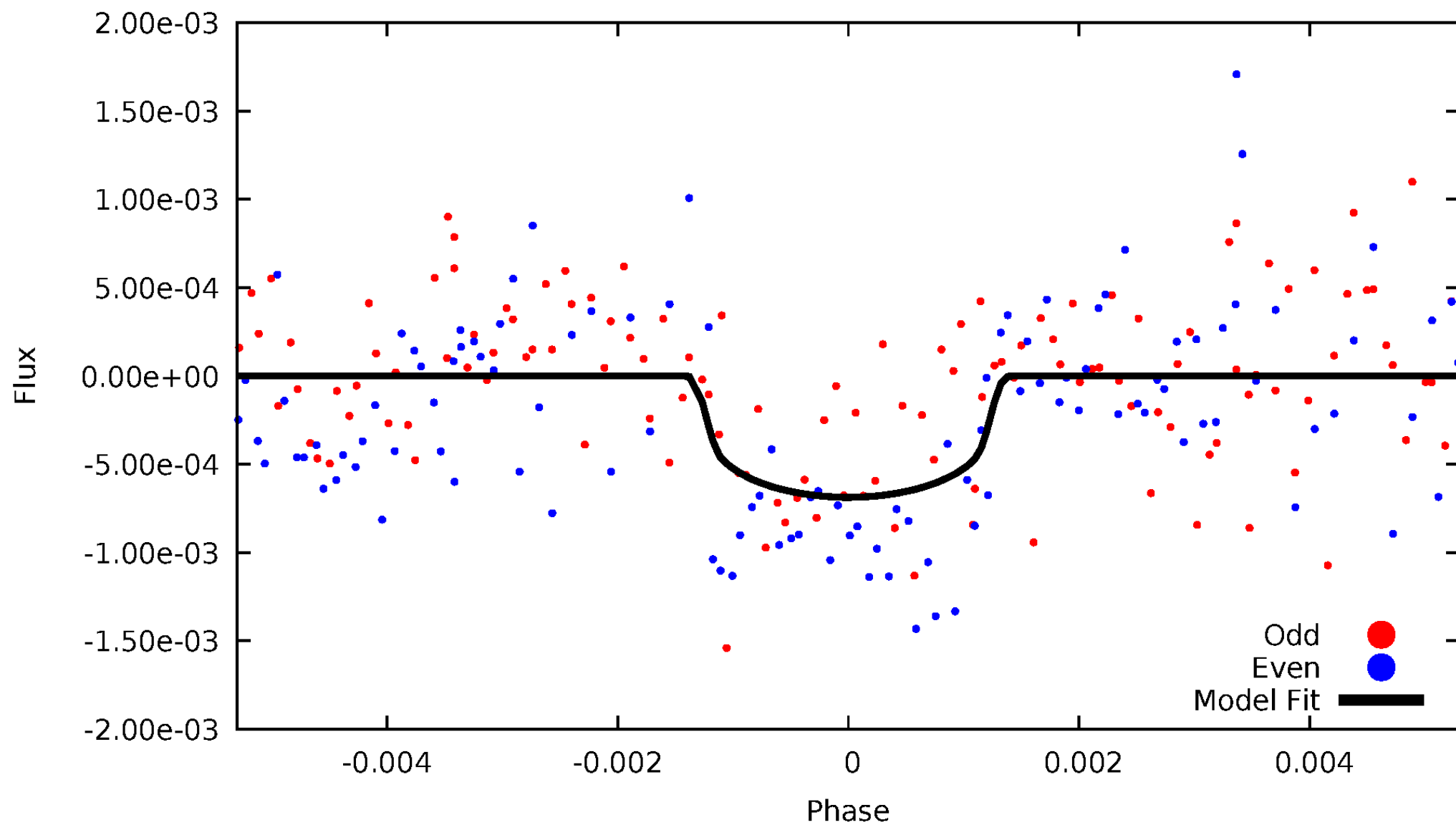


# TCE 010593110-06



# DV Odd/Even

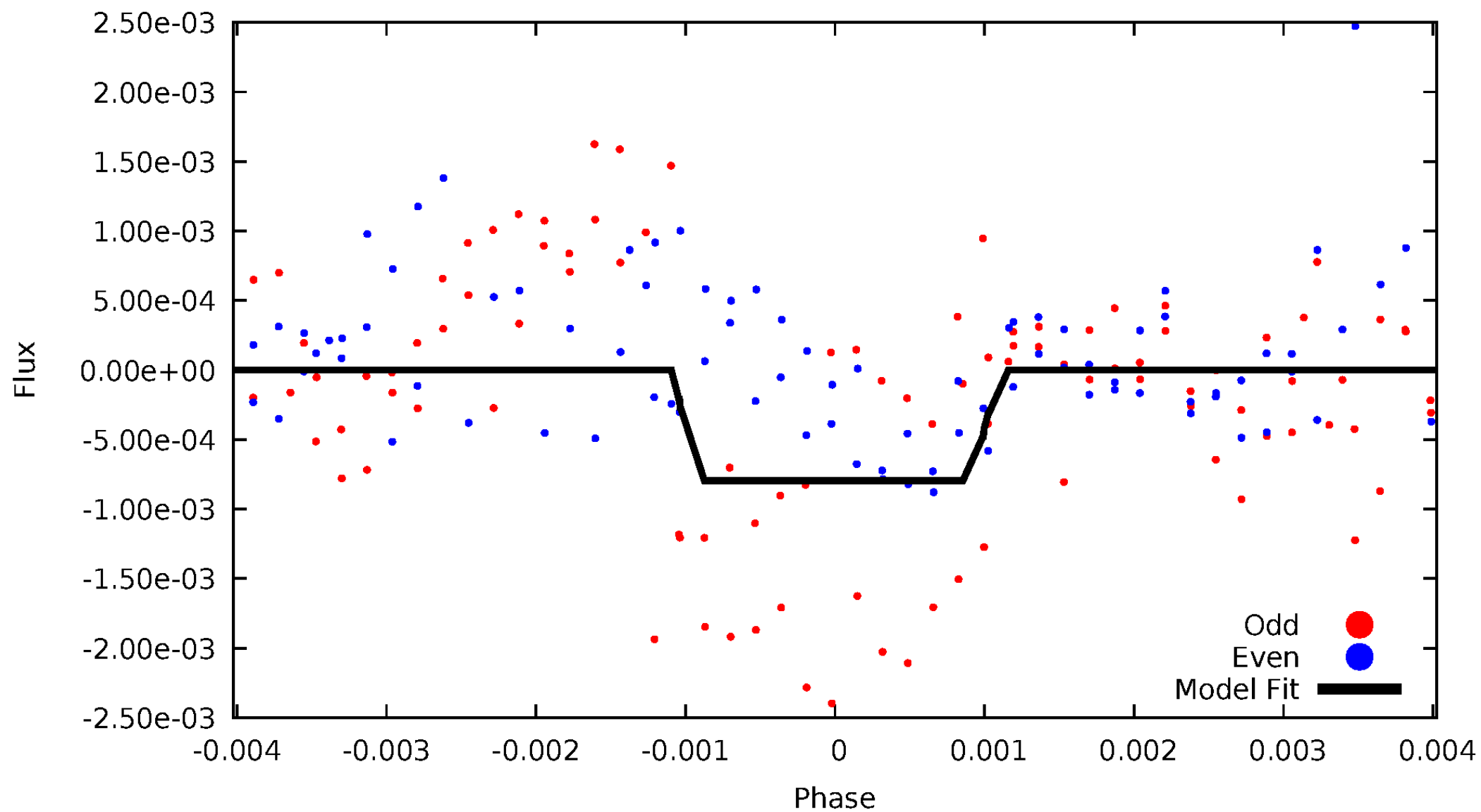
TCE 010593110-06





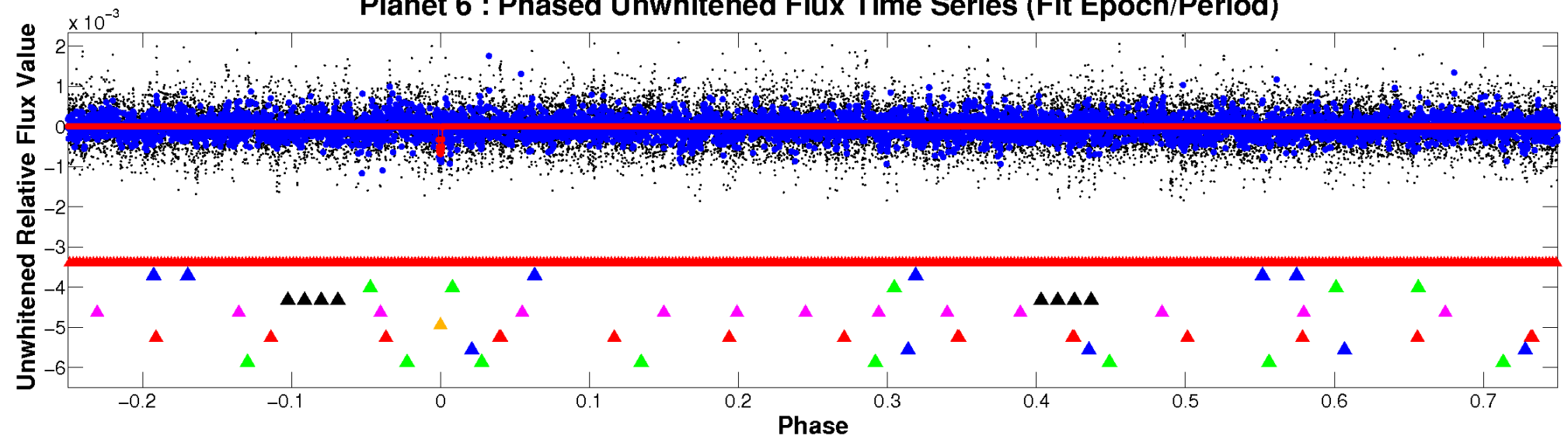
# ALT Odd/Even

TCE 010593110-06

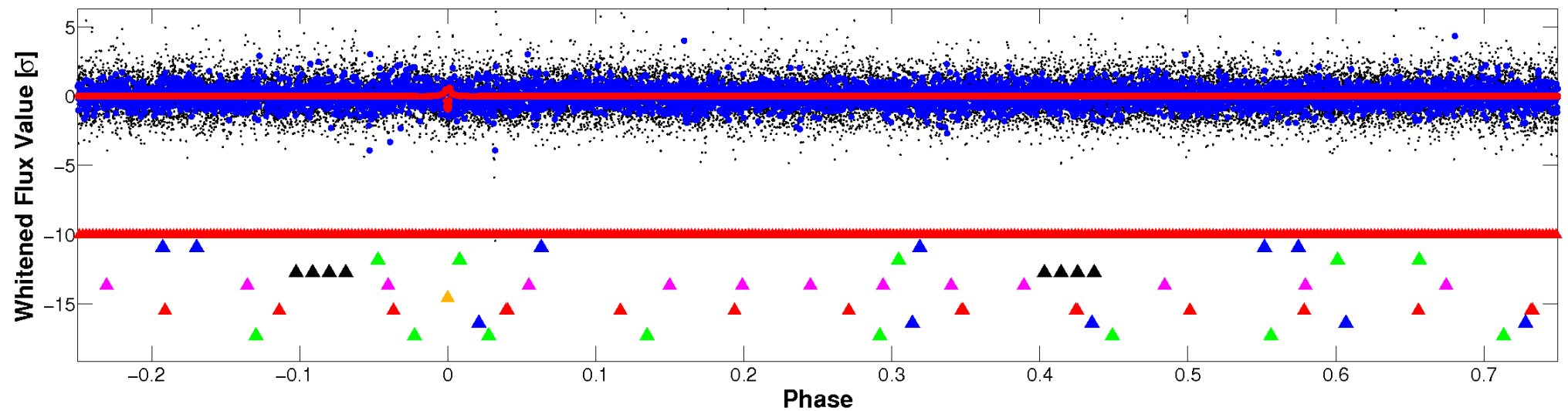


# Non-Whitened Vs. Whitened Light Curve

## Planet 6 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

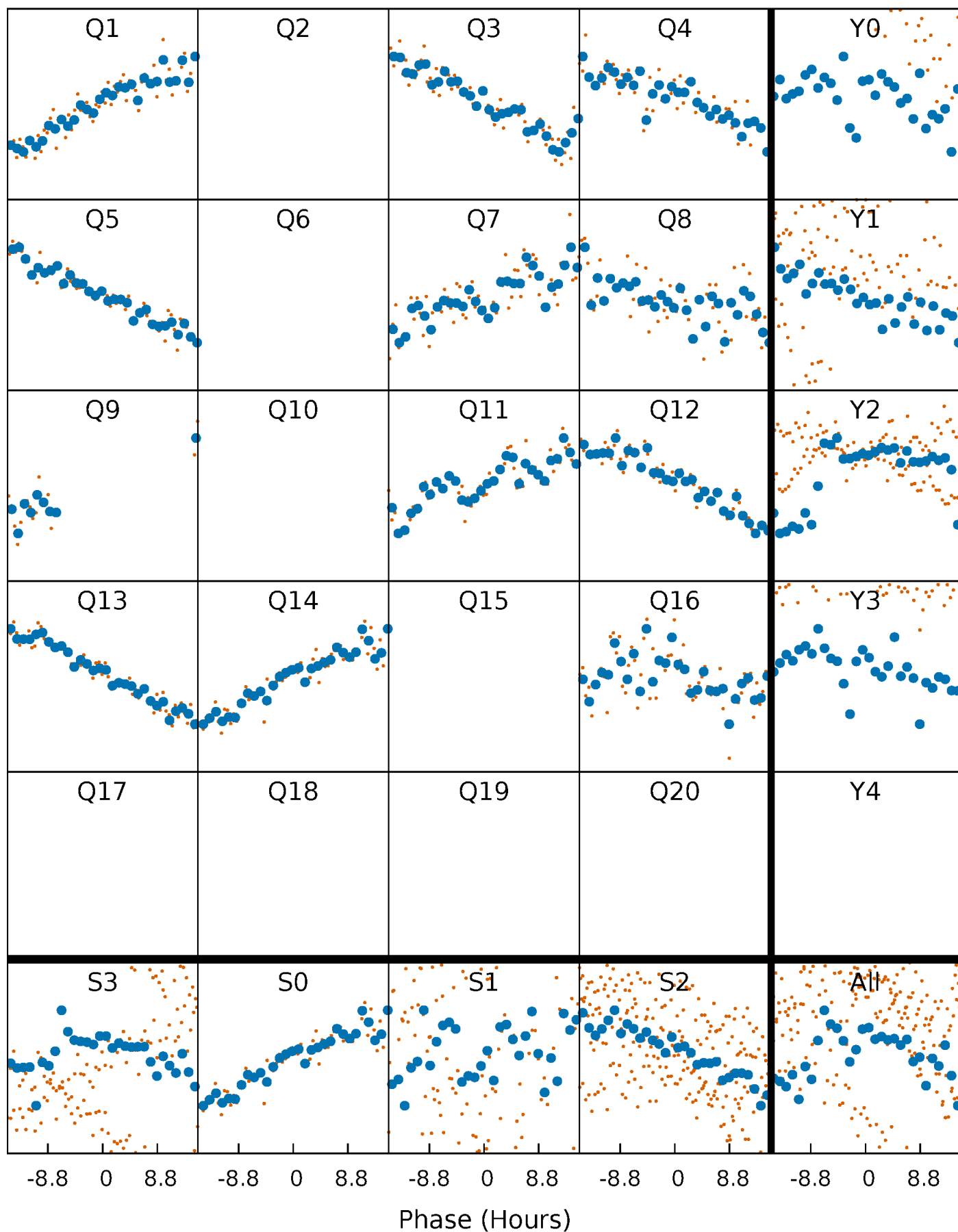


## Planet 6 : Phased Whitened Flux Time Series (Fit Epoch/Period)



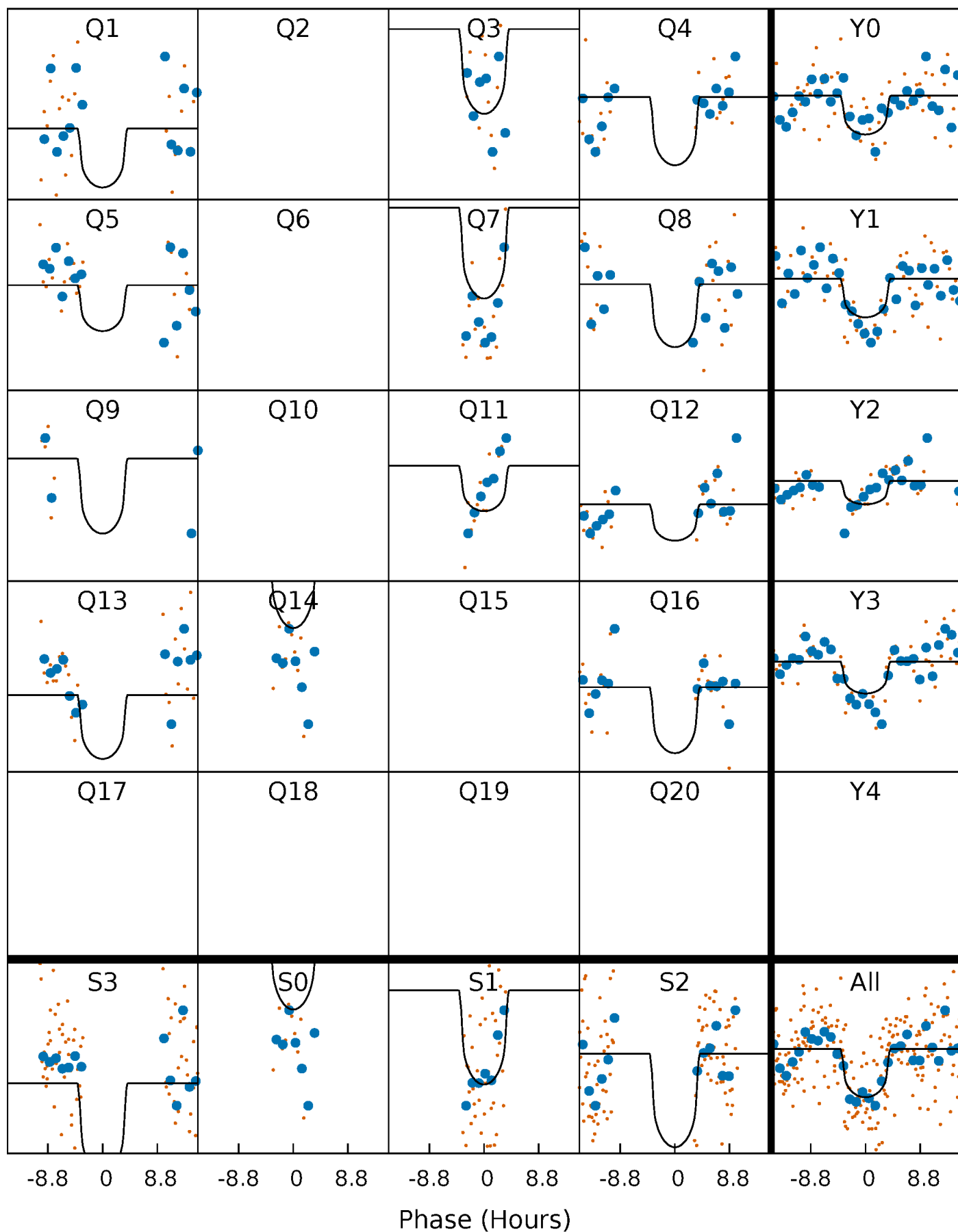
# PDC Quarter-Phased Transit Curves

TCE 010593110-06 P=120.587667 Days  $T_0=163.433496$  (BKJD)



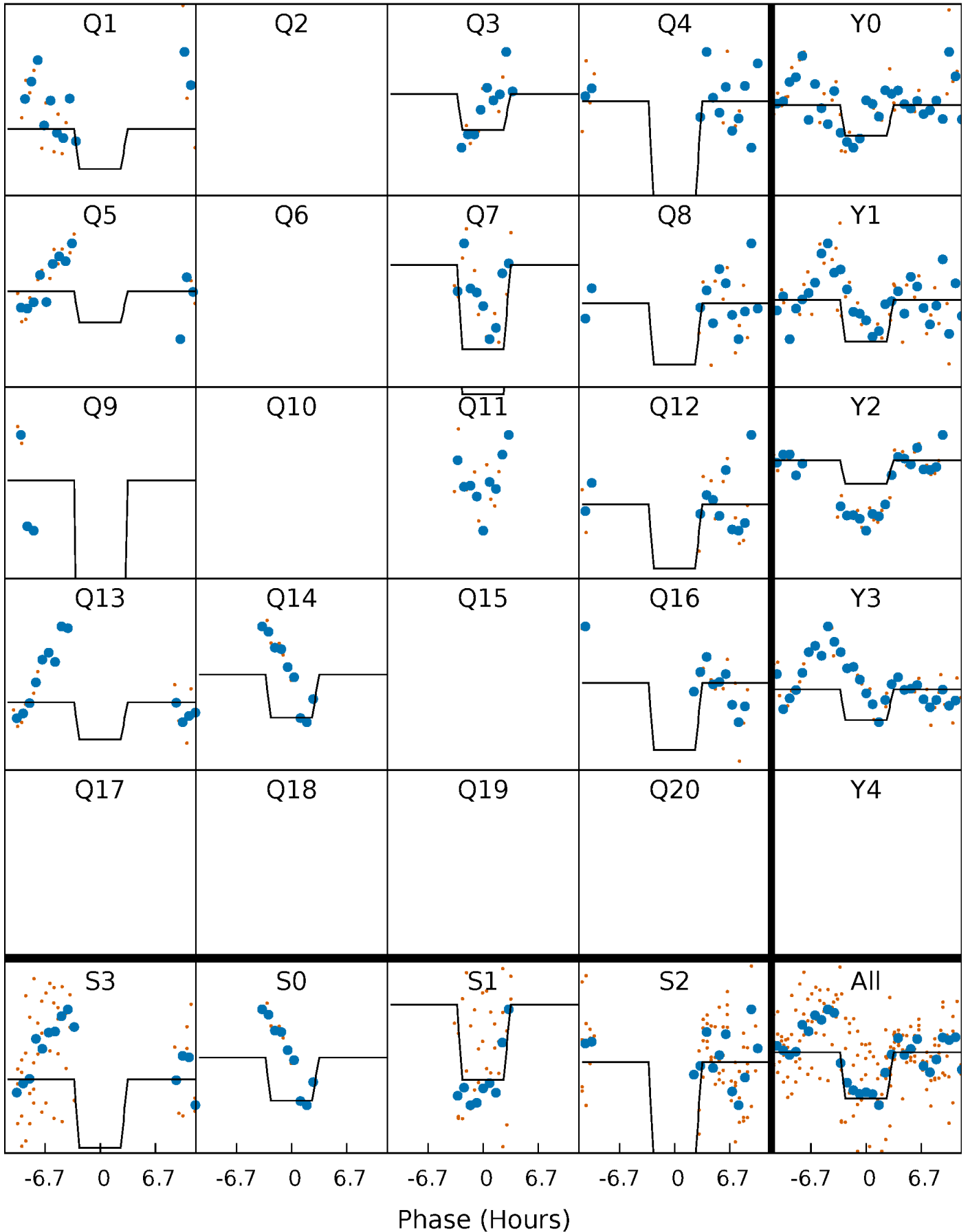
# DV Quarter-Phased Transit Curves

TCE 010593110-06 P=120.587667 Days  $T_0=163.433496$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

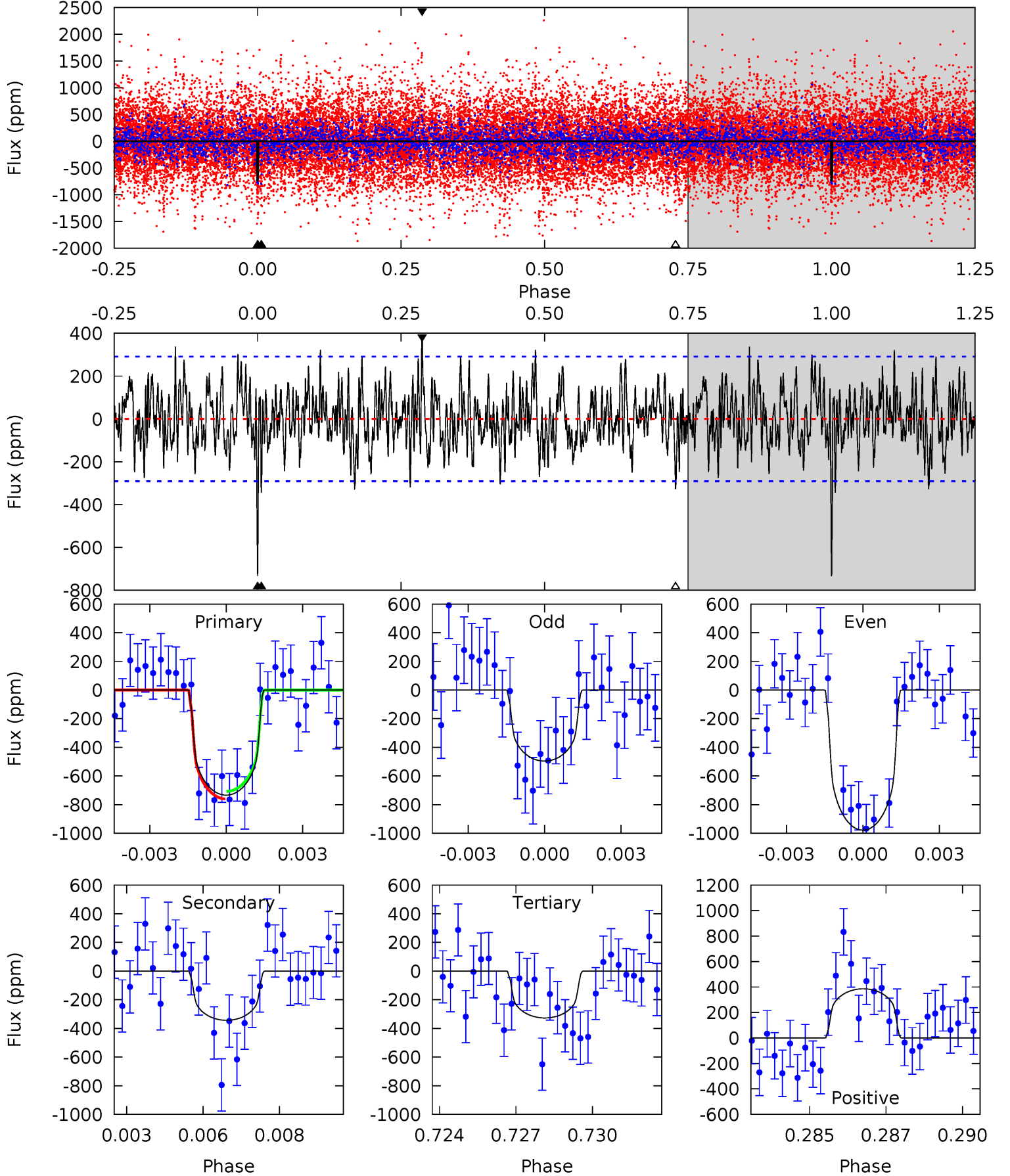
TCE 010593110-06 P=120.592265 Days  $T_0=163.419466$  (BKJD)



# DV Model-Shift Uniqueness Test

010593110-06,  $P = 120.587667$  Days,  $E = 42.845829$  Days

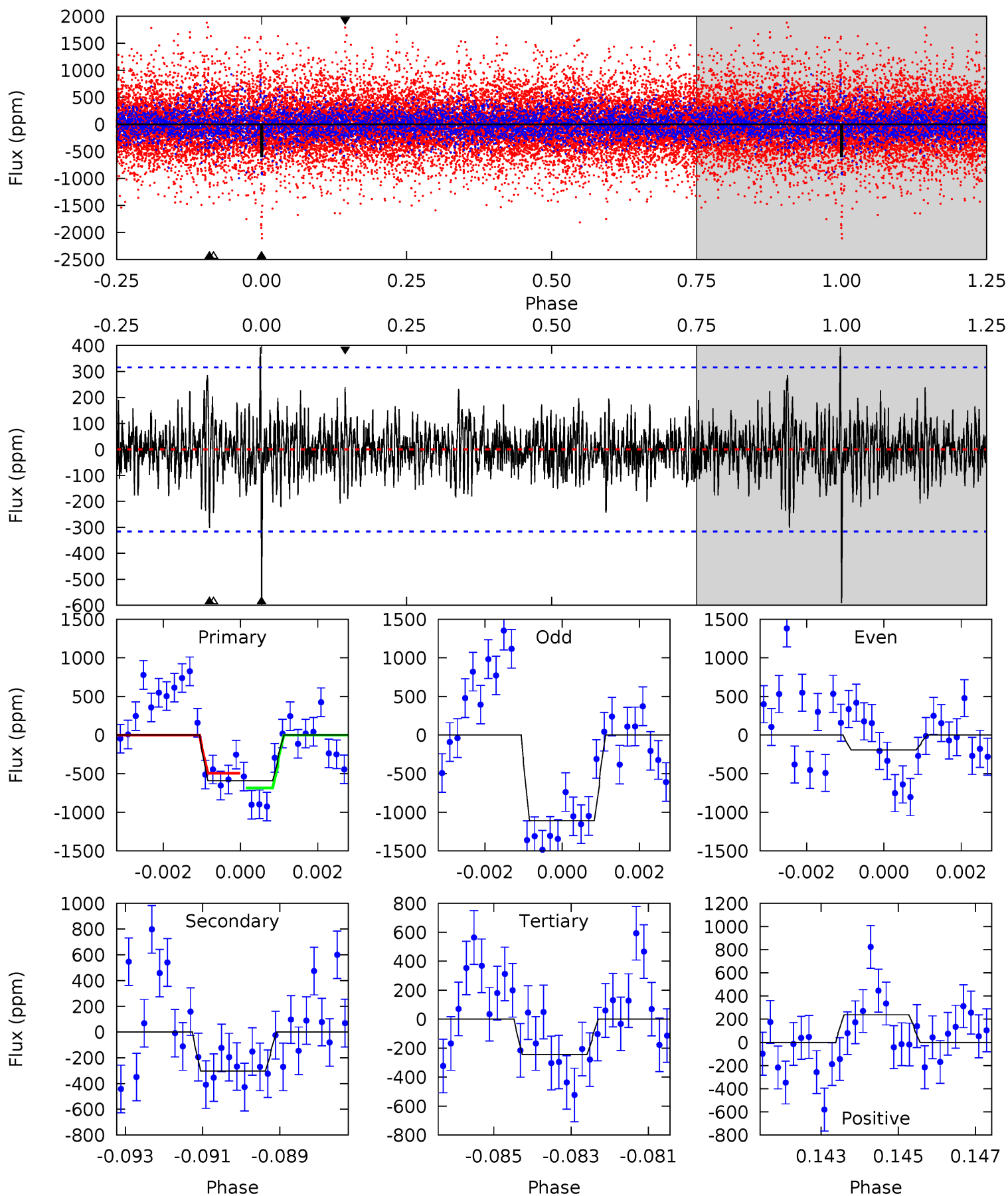
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
13.3	6.21	5.92	6.99	5.26	2.99	2.01	7.36	6.29	0.29	-0.77	4.02	1.02	0.34	0.48



# Alt Model-Shift Uniqueness Test

010593110-06,  $P = 120.592265$  Days,  $E = 42.827201$  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
9.95	5.08	4.11	4.02	5.32	3.08	1.21	5.84	5.93	0.98	1.07	7.72	1.73	0.40	1.61



### Stellar Parameters For KIC 010593110

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (g \cdot \text{cm}^{-3})$
	$4330^{+129}_{-129}$	$4.640^{+0.049}_{-0.025}$	$-0.260^{+0.300}_{-0.300}$	$0.618^{+0.050}_{-0.056}$	$0.610^{+0.066}_{-0.050}$	$3.632^{+0.843}_{-0.438}$
	+3%/-3%	+1%/-1%	+115%/-115%	+8%/-9%	+11%/-8%	+23%/-12%
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 010593110-06 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-343 \pm 55$	$1.78^{+0.89}_{-0.90}$	$328^{+11}_{-12}$	$3787^{+1191}_{-462}$	$9761^{+29974}_{-5423}$
Alt.	$-302 \pm 59$	$1.89^{+1.02}_{-0.90}$	$329^{+11}_{-11}$	$3659^{+993}_{-472}$	$7570^{+21282}_{-4299}$

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



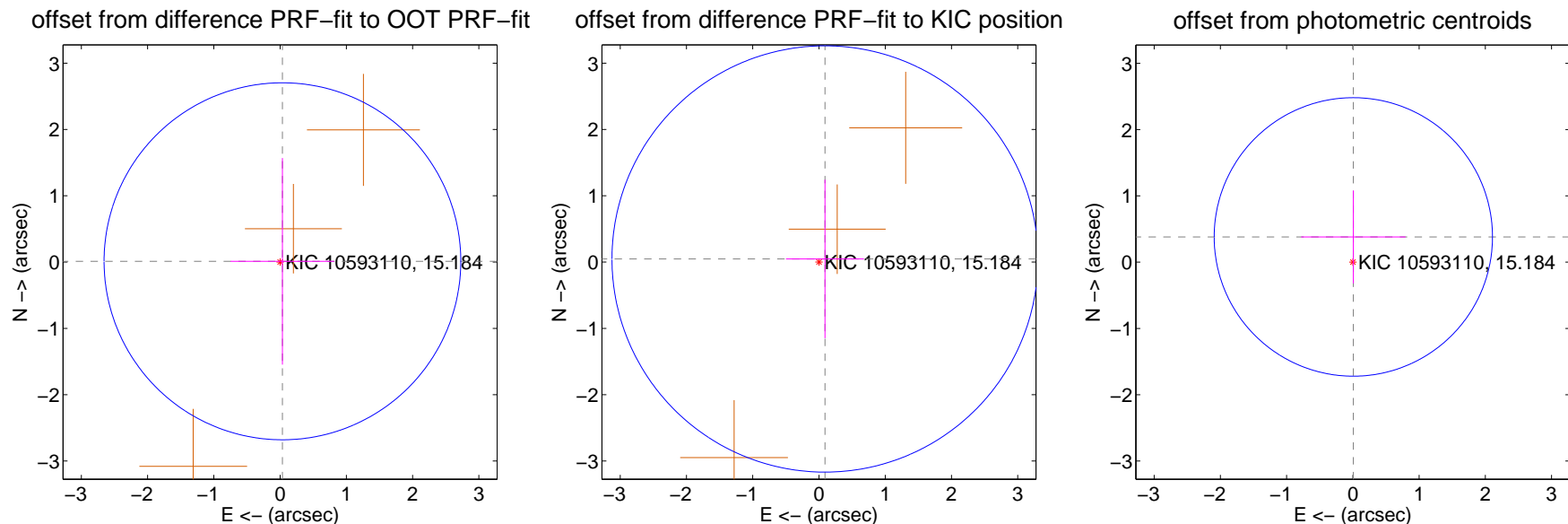
## DV Centroid Data

Supplemental centroid analysis for 010593110-06. Kepler magnitude: 15.18. Transit SNR 7.25

There are 0 quarters with good PRF difference image offsets

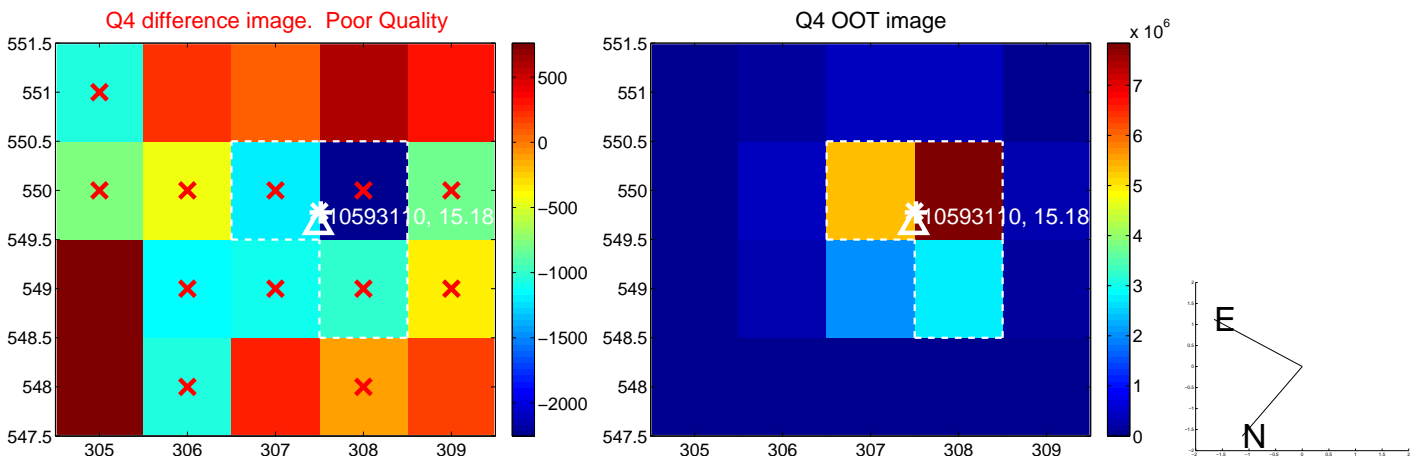
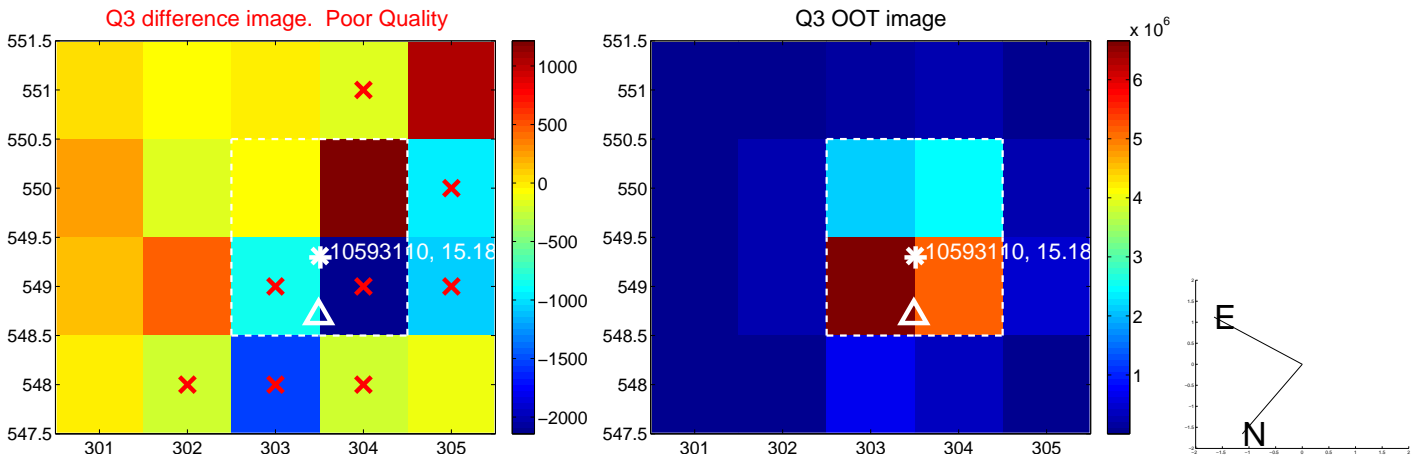
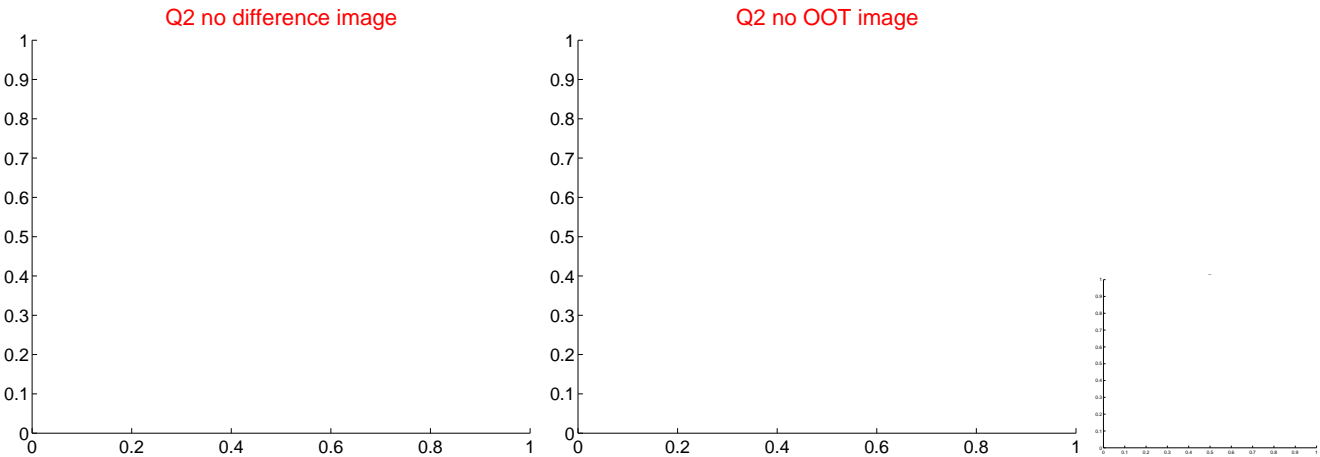
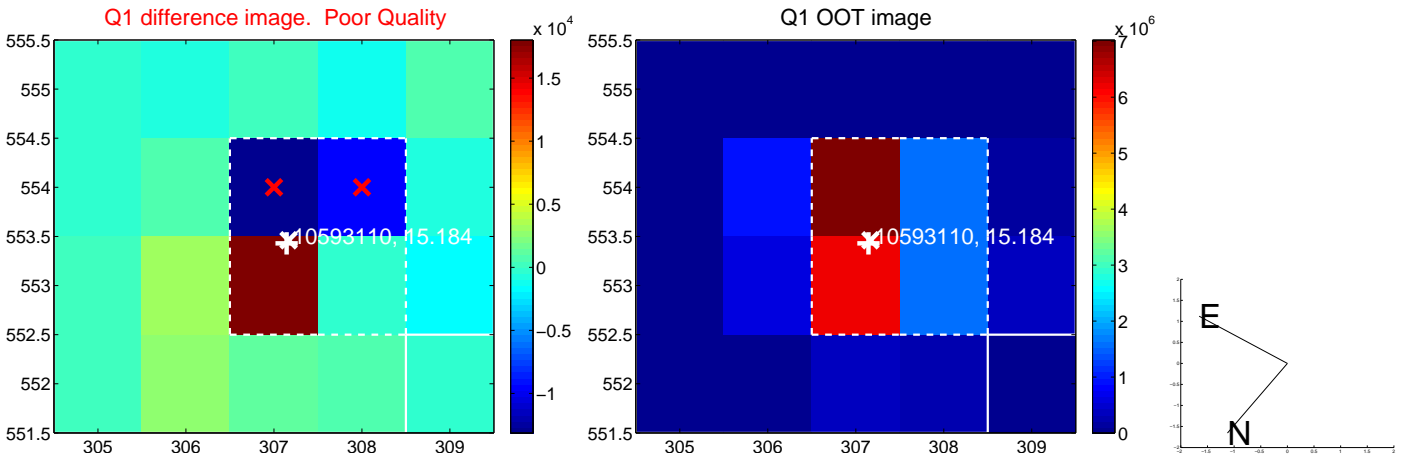
The direct PRF centroid is offset from the target star catalog position by about 0.14 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.037 \pm 0.898$	0.04	$-0.035 \pm 0.783$	$0.012 \pm 1.558$
PRF-fit source offset from KIC position	$0.102 \pm 1.072$	0.09	$-0.090 \pm 0.588$	$0.047 \pm 1.195$
photometric centroid source offset	$0.38 \pm 0.70$	0.54	$-0.01 \pm 0.79$	$0.38 \pm 0.70$

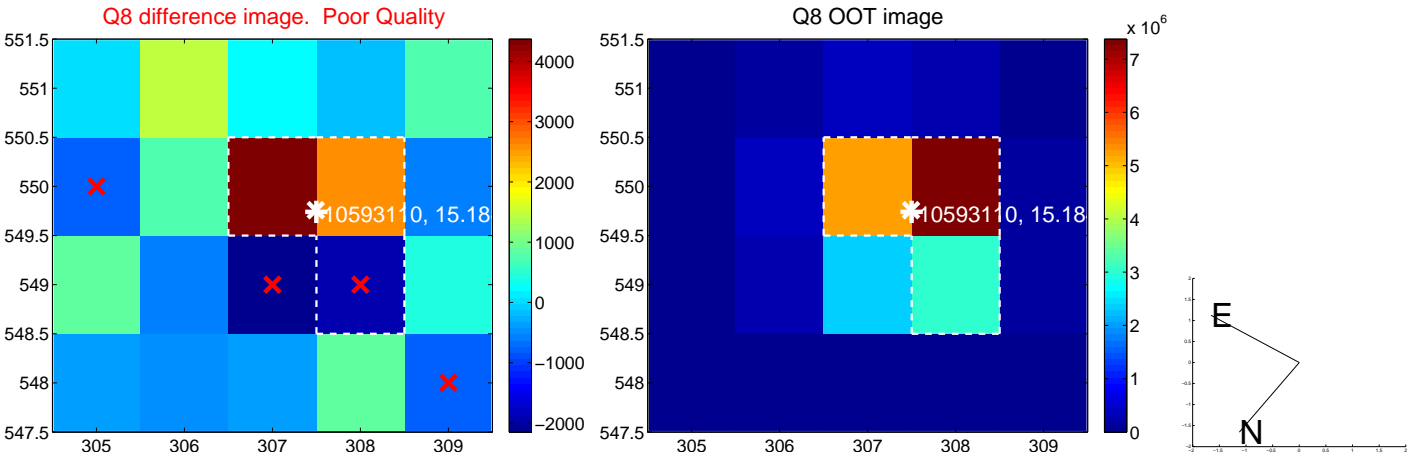
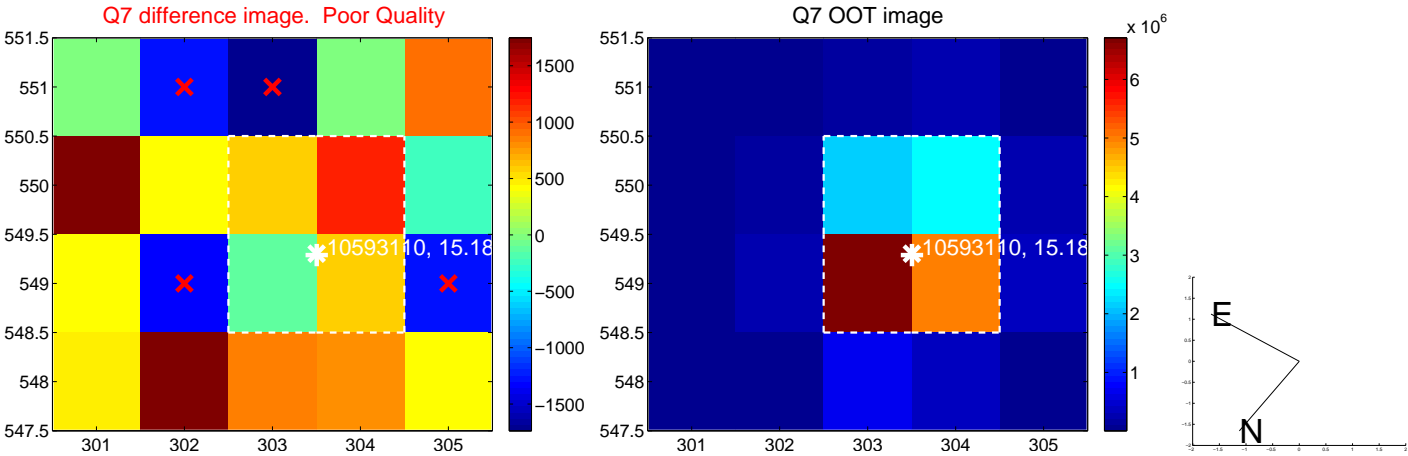
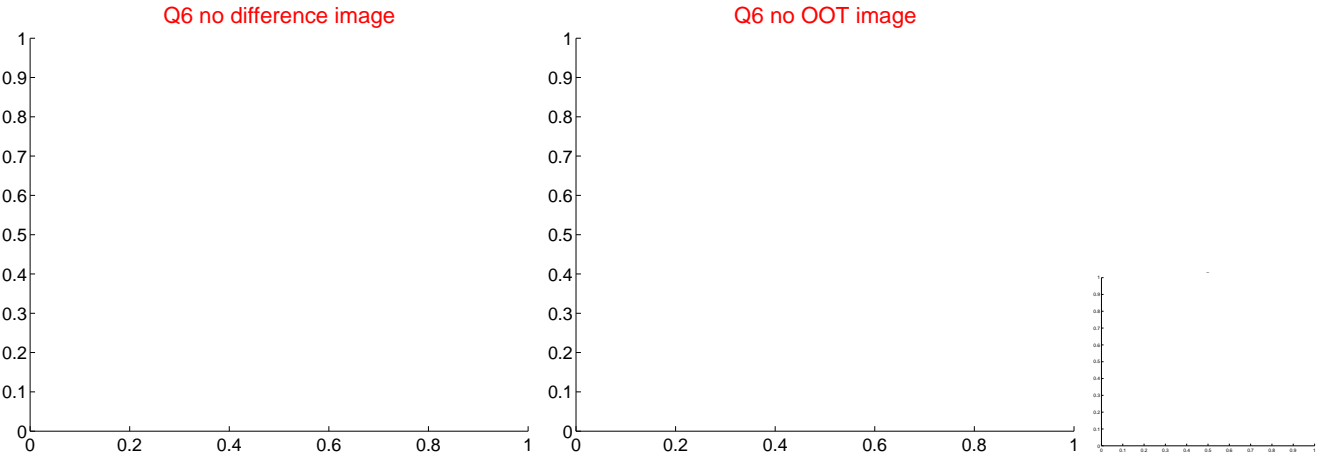
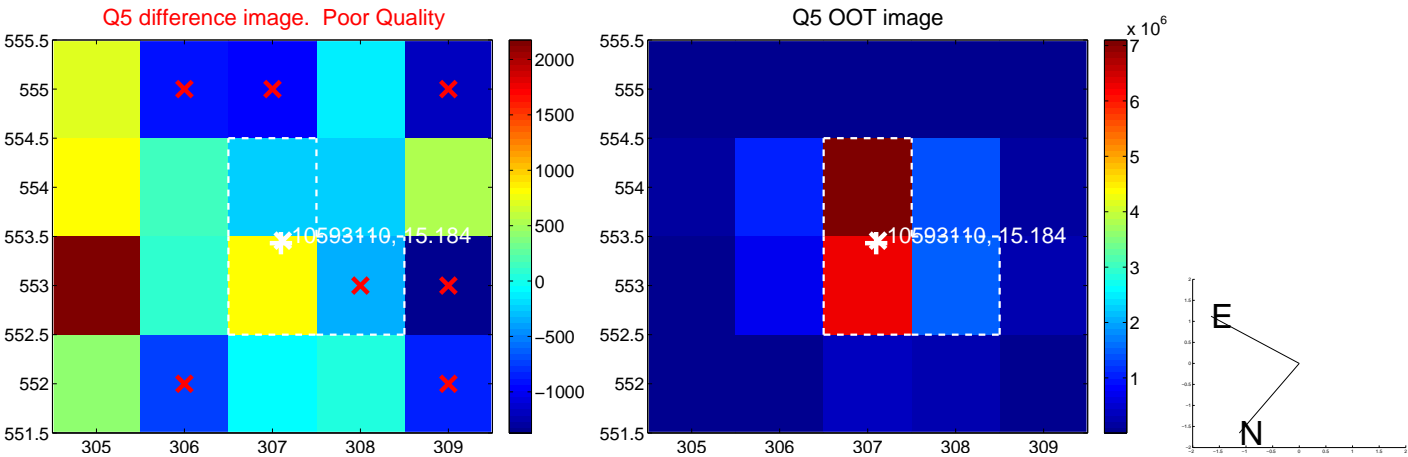


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

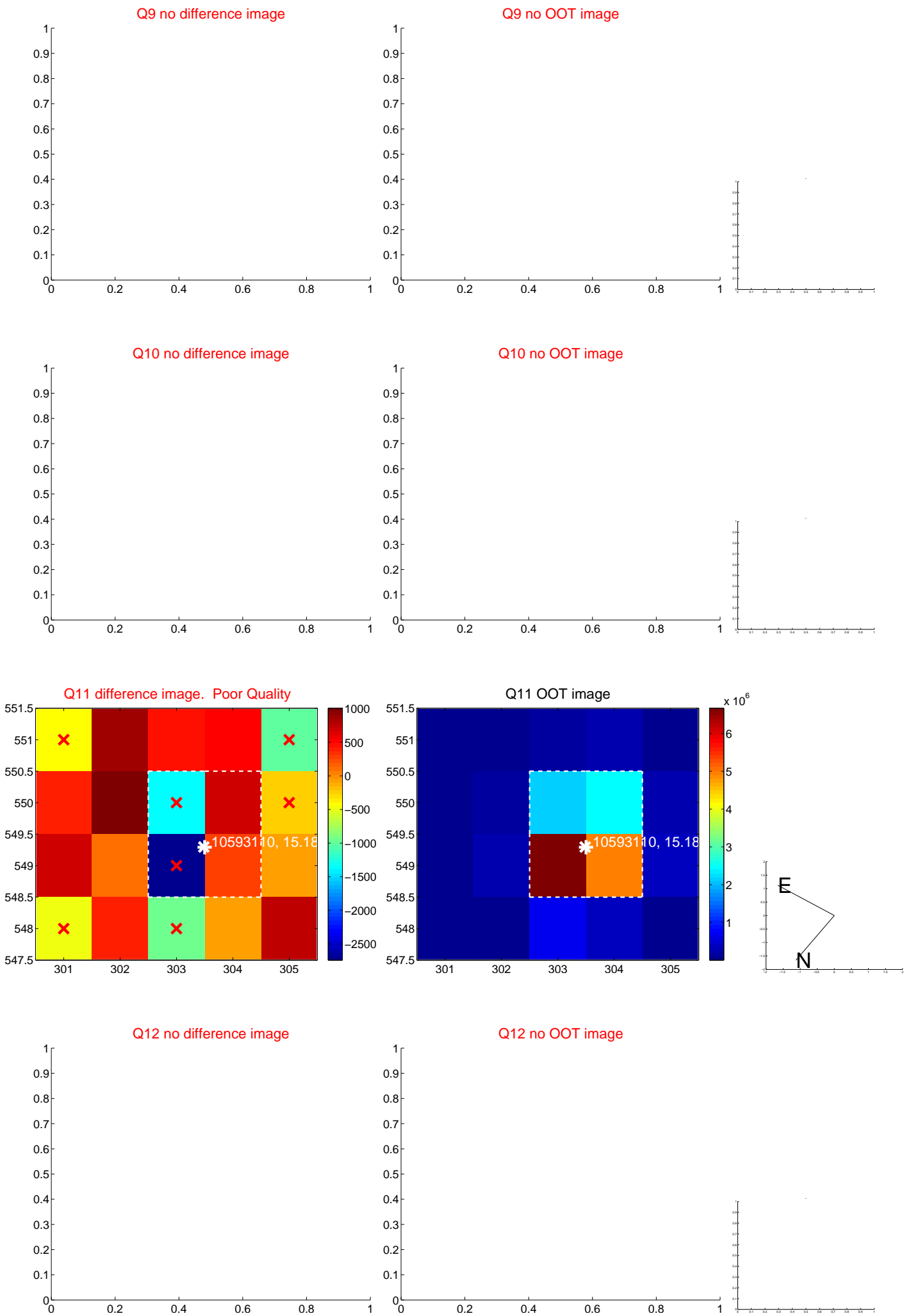
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



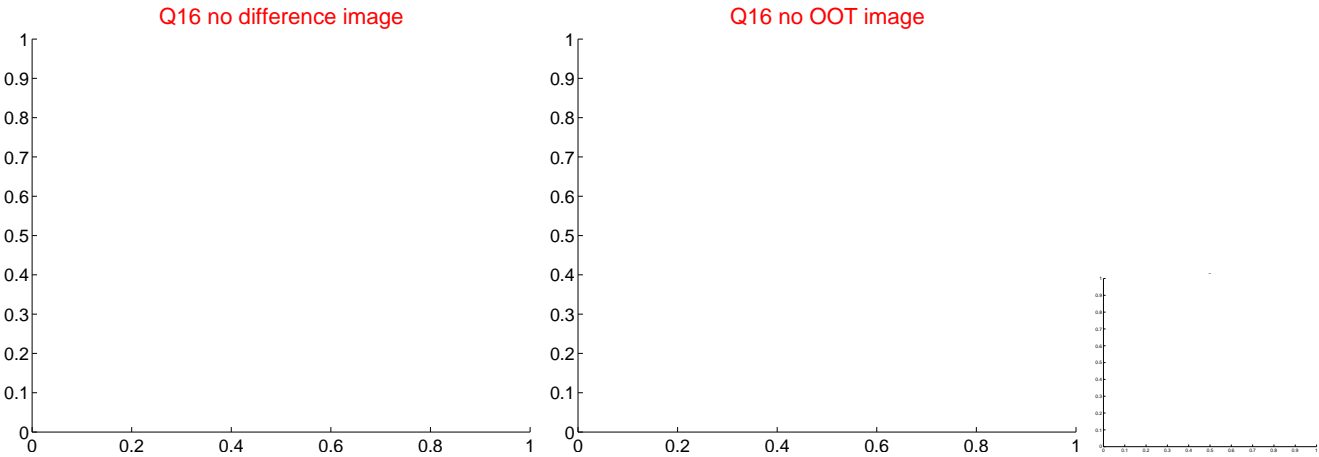
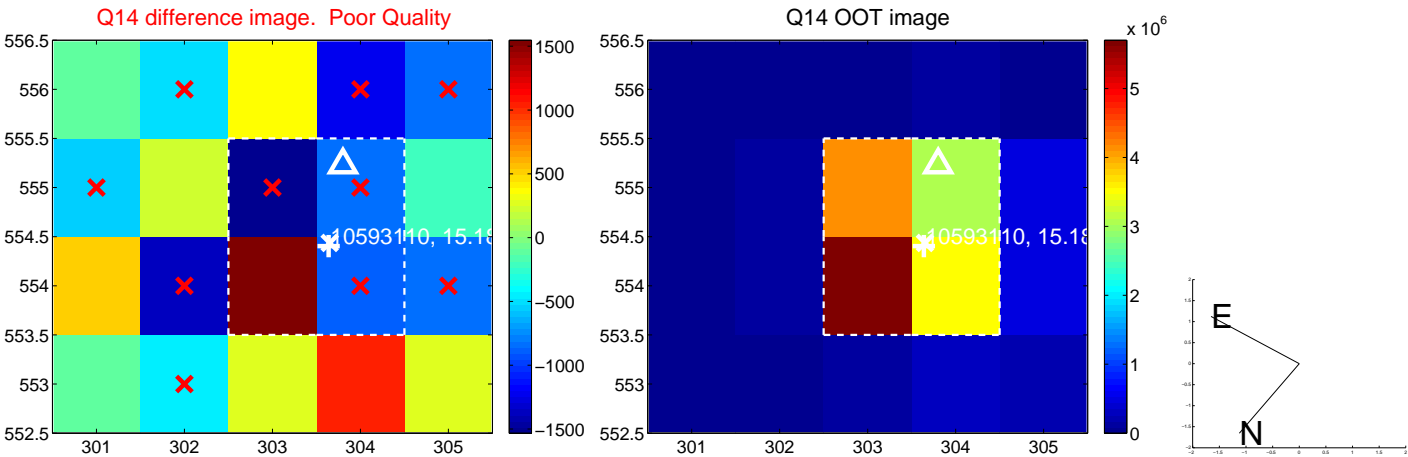
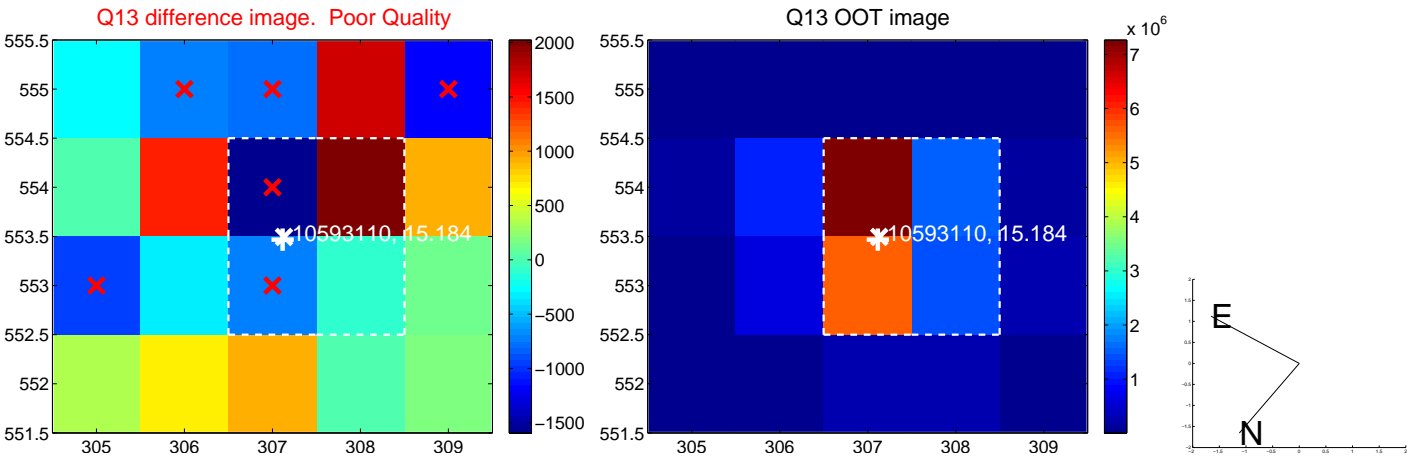
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



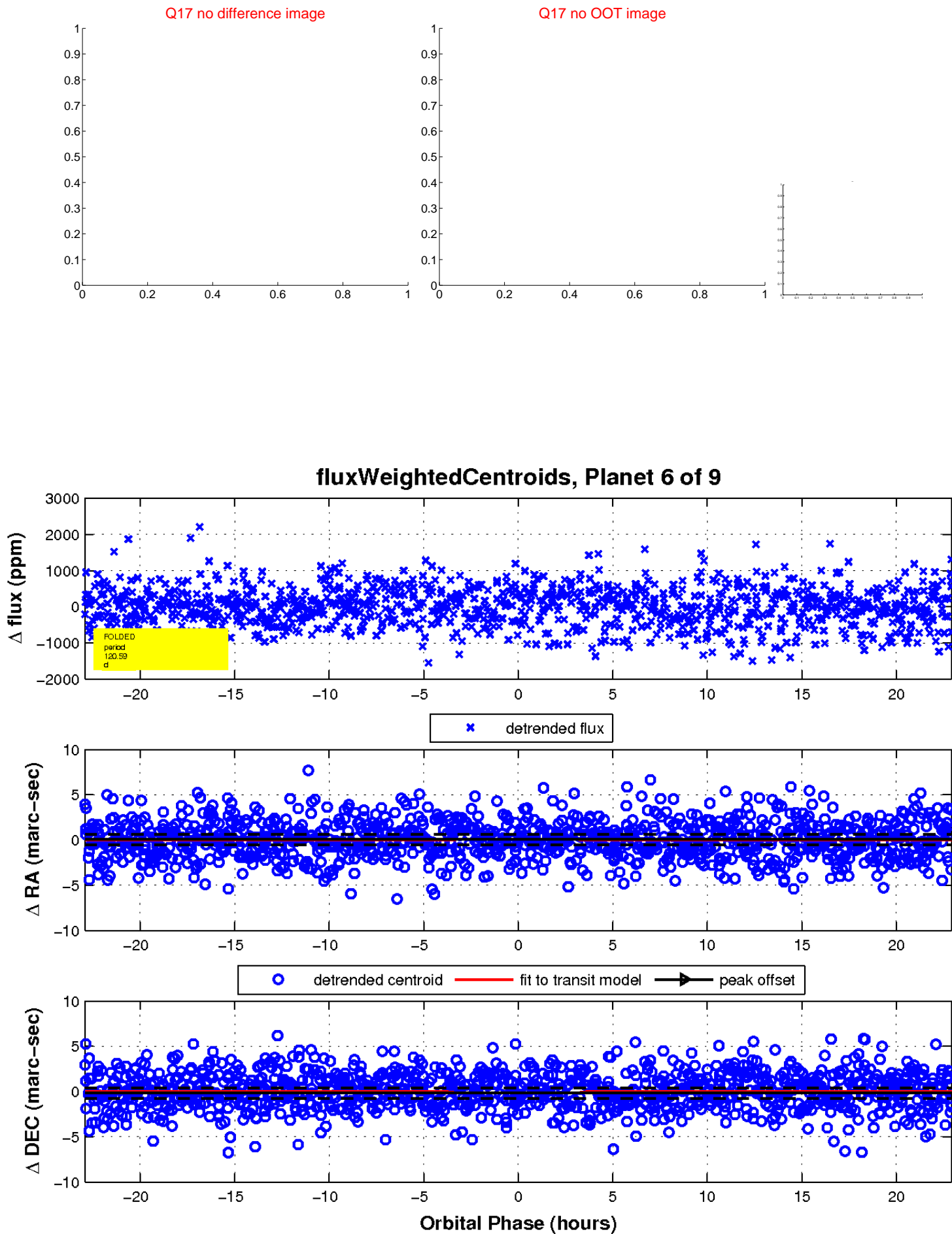
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



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

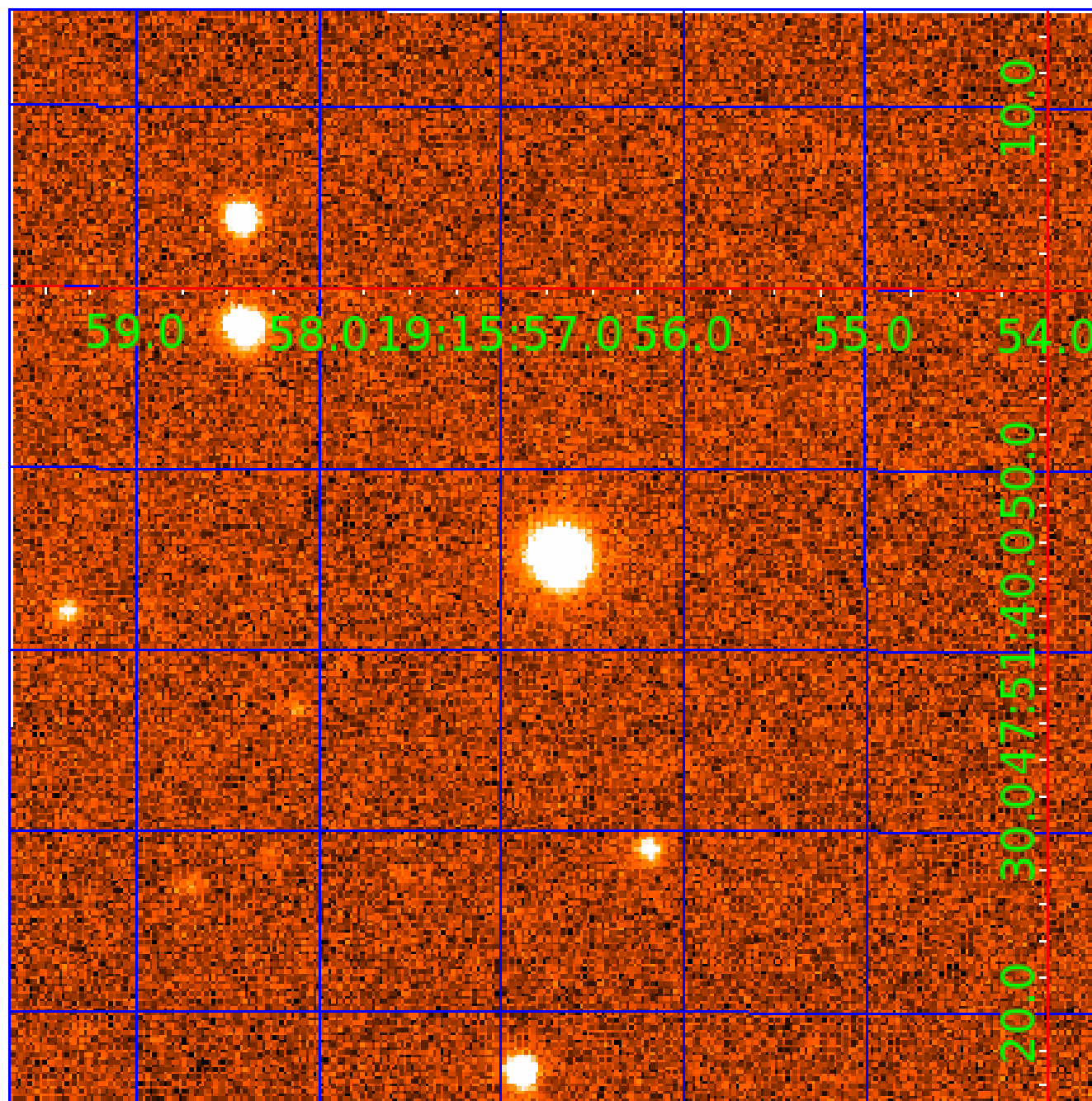


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 010593110

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010593110-01	OBS	No	0.822191	132.325009	37.8	4.078	7.4	7.1	0.62	4330	0.37	567.82
010593110-03	OBS	No	283.587961	356.516235	742.1	4.733	12.3	7.8	0.62	4330	1.92	0.23
010593110-04	OBS	No	181.556830	271.668945	1017.8	3.814	15.3	8.0	0.62	4330	2.02	0.42
010593110-05	OBS	No	109.121239	204.446957	455.7	19.790	10.4	5.0	0.62	4330	1.36	0.84
010593110-06	OBS	No	120.587667	163.433496	687.0	7.664	9.1	7.3	0.62	4330	1.77	0.73
010593110-07	OBS	No	83.493941	205.287505	460.9	9.869	8.1	6.0	0.62	4330	1.41	1.20
010593110-08	OBS	No	276.493940	336.509572	965.7	2.584	8.5	6.4	0.62	4330	2.26	0.24
010593110-09	OBS	No	171.405232	287.356663	954.4	2.672	7.6	7.1	0.62	4330	2.11	0.46

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010593110-01	OBS	FP	0.00	1	0	0	0	LPP_DV
010593110-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010593110-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010593110-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS
010593110-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010593110-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—CENT_FEW_MEAS
010593110-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
010593110-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—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.

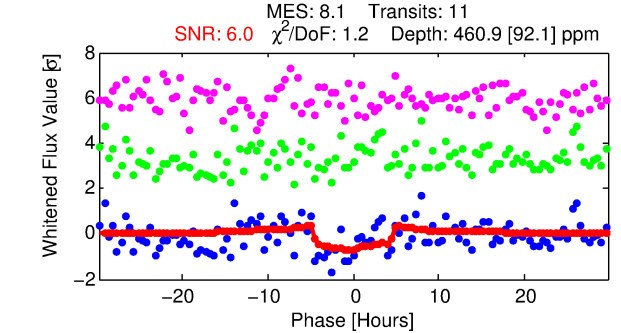
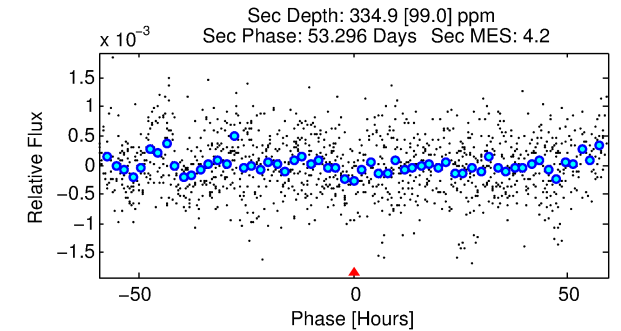
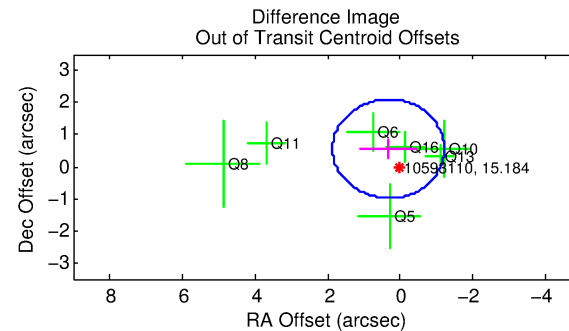
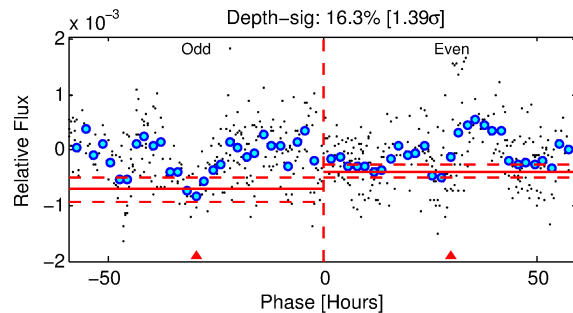
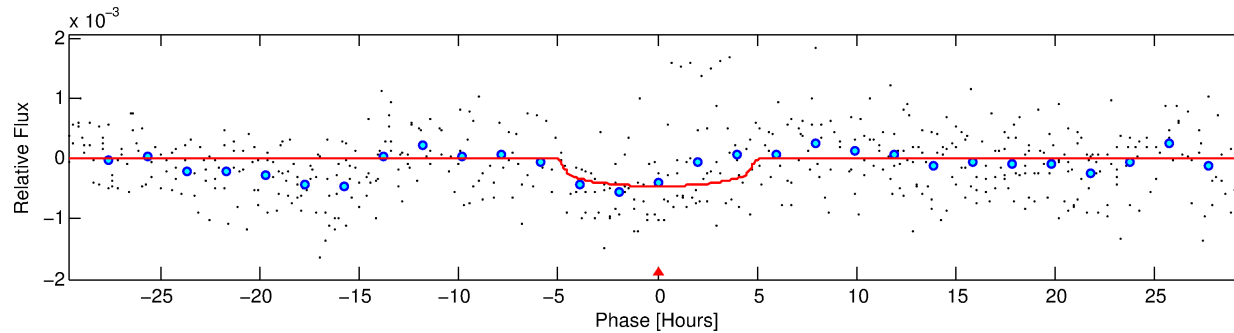
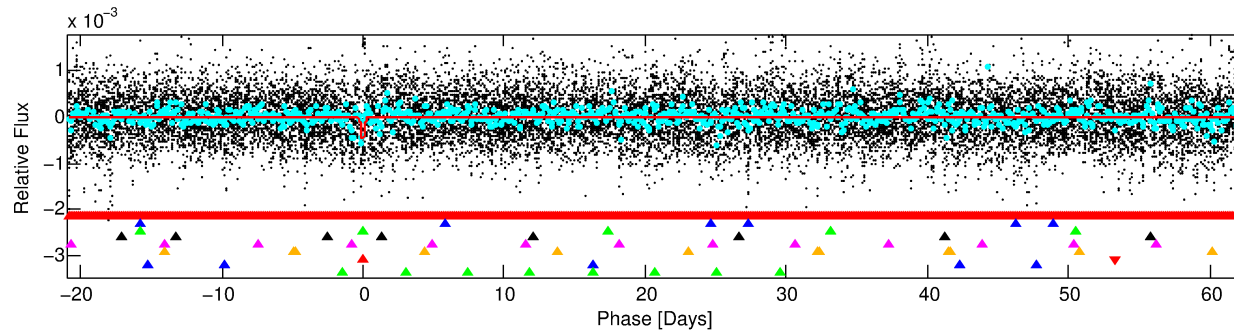
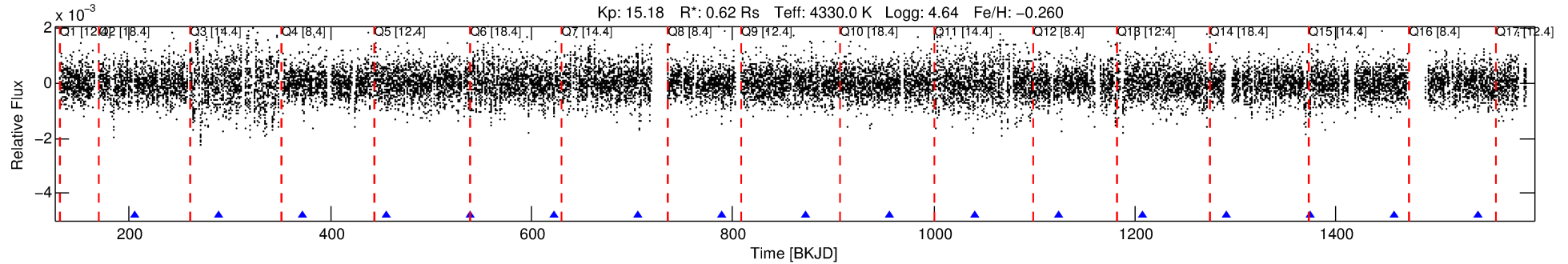
Ephemeris Match Information For 010593110-07

No Significant Match Found



# DV One-Page Summary

KIC: 10593110 Candidate: 7 of 9 Period: 83.494 d



## DV Fit Results:

Period = 83.49394 [0.00326] d  
Epoch = 205.2875 [0.0263] BKJD  
Rp/R\* = 0.0209 [0.0192]  
a/R\* = 48.76 [154.27]  
b = 0.69 [2.45]  
Seff = 1.20 [0.18]  
Teq = 267 [10] K  
Rp = 1.41 [1.30] Re  
a = 0.3168 [0.0225] AU  
Ag = 9312.91 [17366.46] [0.54 $\sigma$ ]  
Teffp = 4052 [1890] K [2.00 $\sigma$ ]

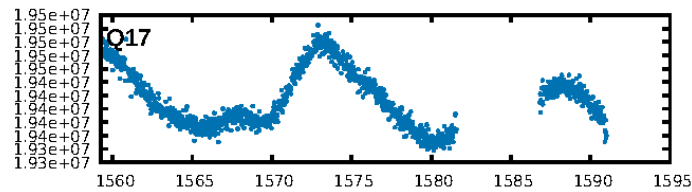
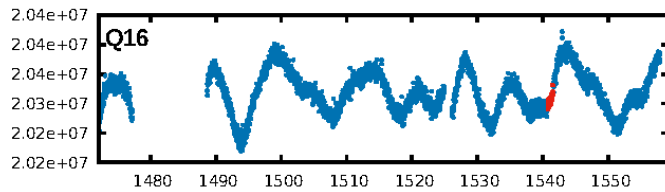
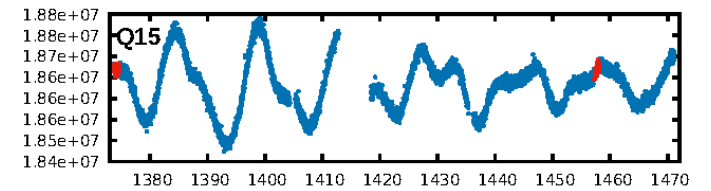
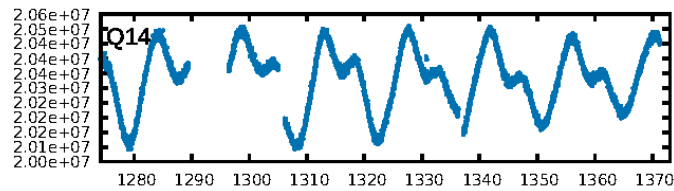
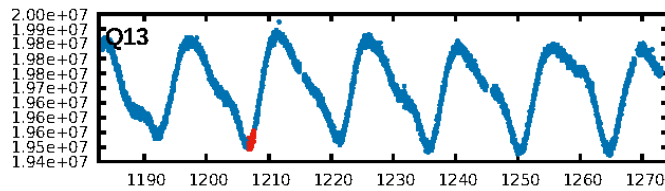
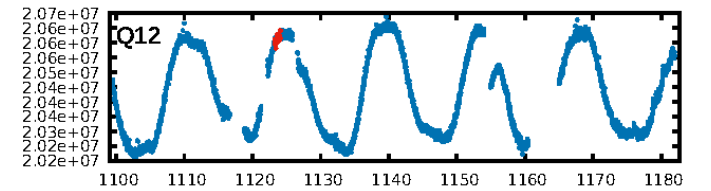
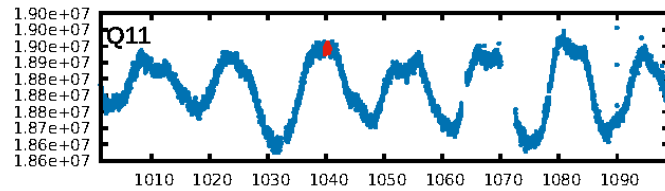
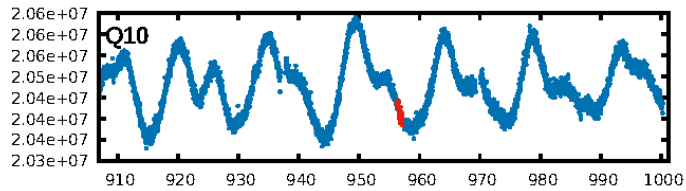
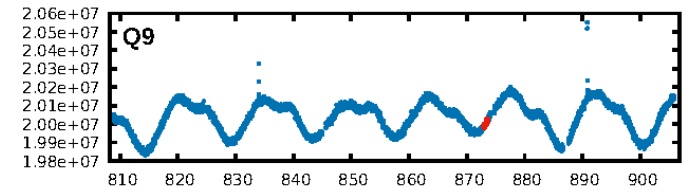
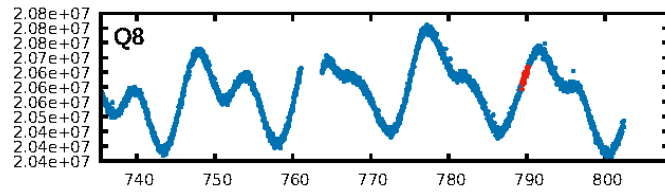
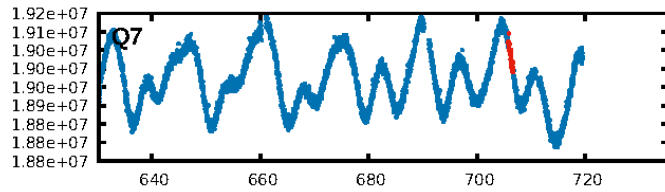
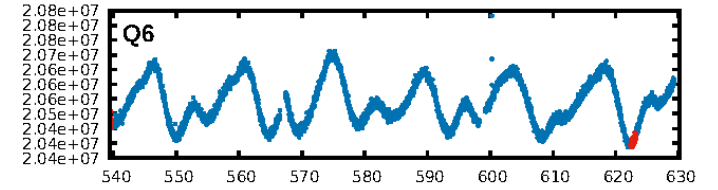
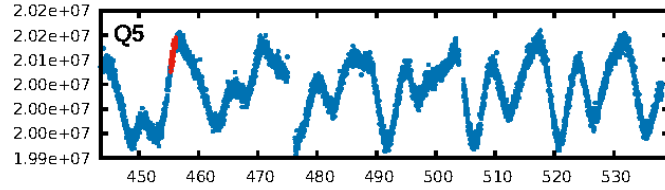
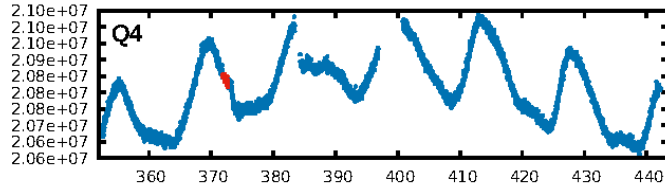
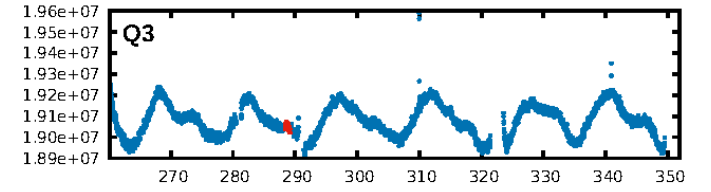
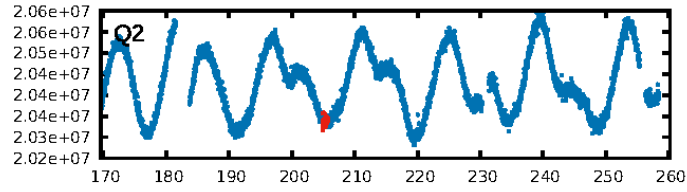
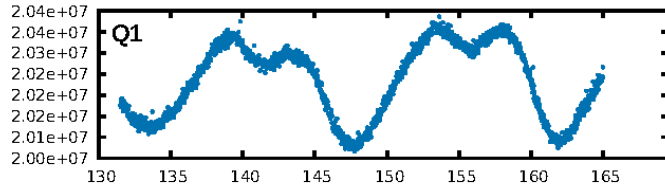
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [185.80 $\sigma$ ]  
LongPeriod-sig: 100.0% [27.81 $\sigma$ ]  
ModelChiSquare2-sig: 0.1%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 9.95e-11  
RollingBand-fgt: 1.00 [11/11]  
GhostDiagnostic-chr: 4.623  
Centroid-sig: 45.5%  
Centroid-so: 0.817 arcsec [0.93 $\sigma$ ]  
OotOffset-rm: 0.643 arcsec [1.25 $\sigma$ ]  
KicOffset-rm: 0.683 arcsec [1.59 $\sigma$ ]  
OotOffset-st: 2/1/2/2 [7]  
KicOffset-st: 2/1/2/2 [7]  
DiffImageQuality-fgm: 0.43 [3/7]  
DiffImageOverlap-fno: 0.00 [0/13]

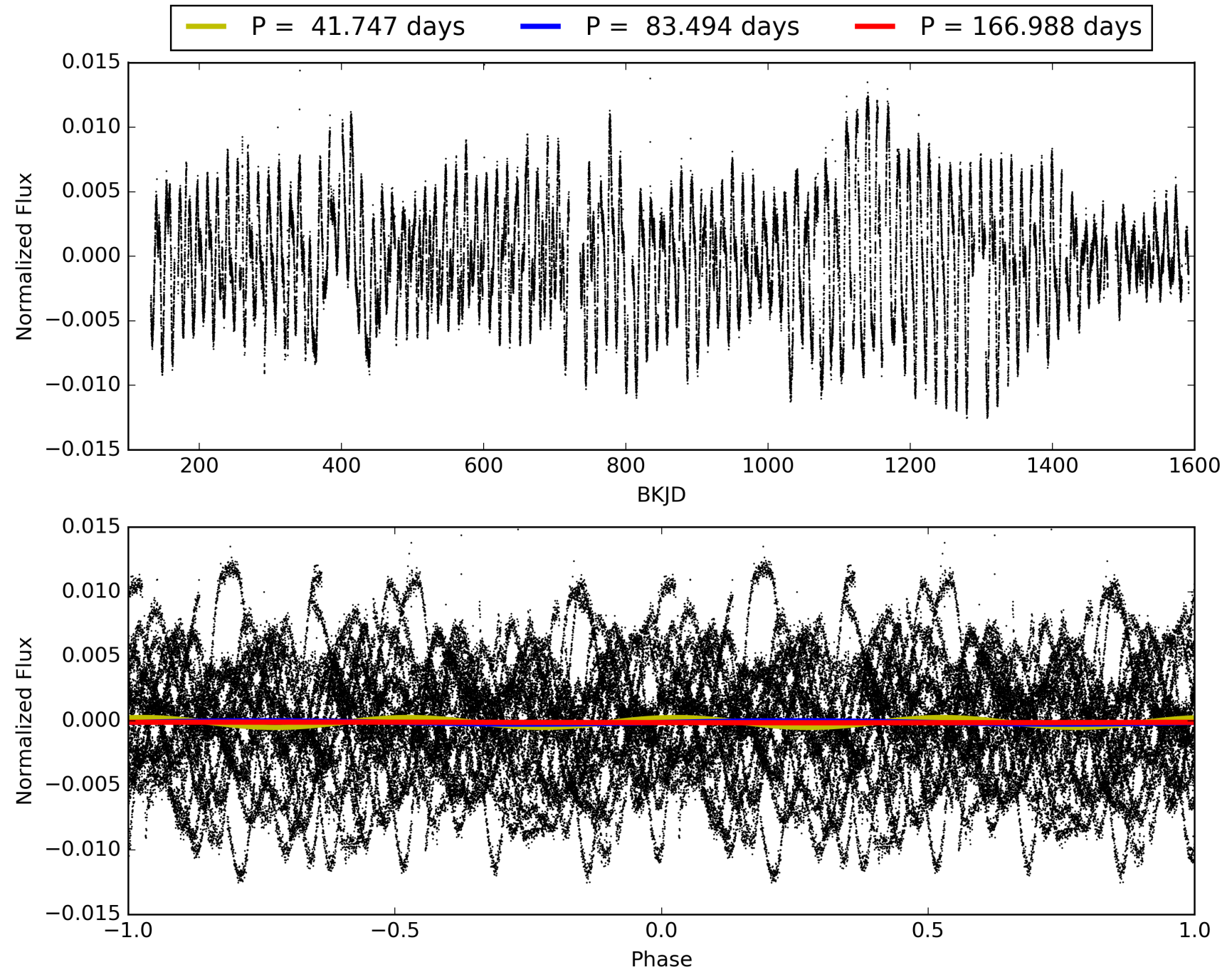
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 02:56:53 Z

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

# TCE 010593110-07, PDC Light Curves

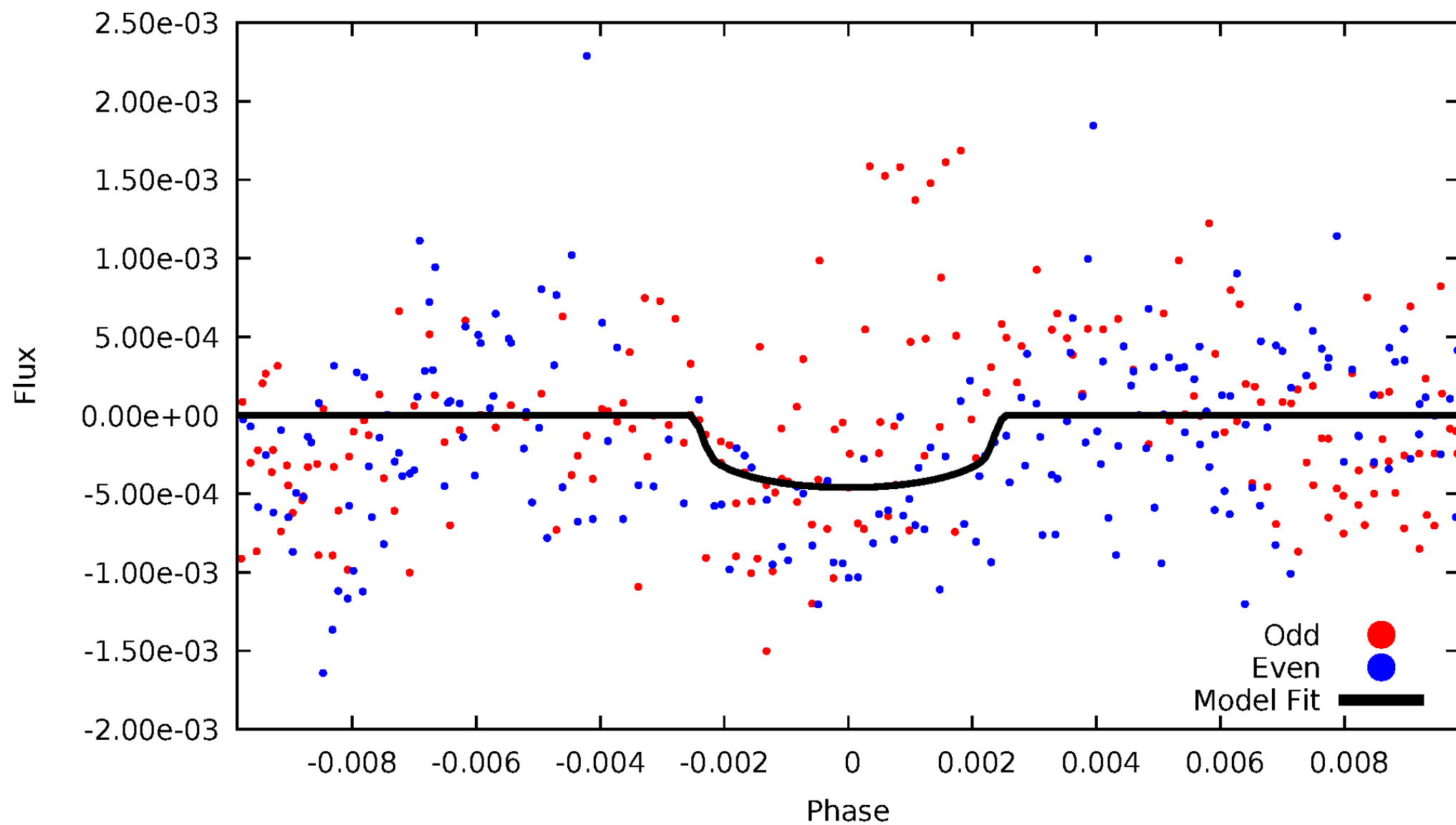


# TCE 010593110-07



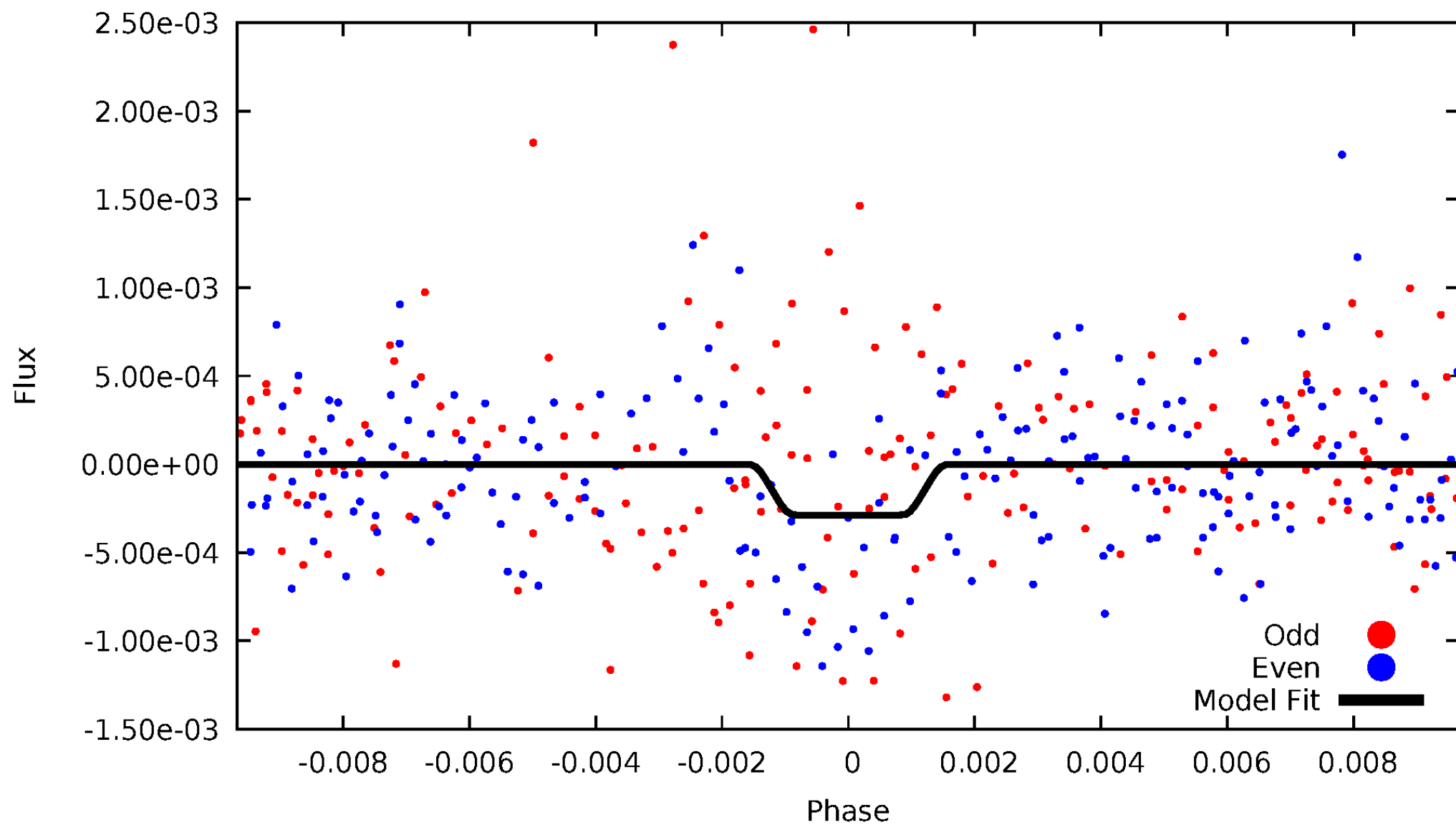
# DV Odd/Even

TCE 010593110-07



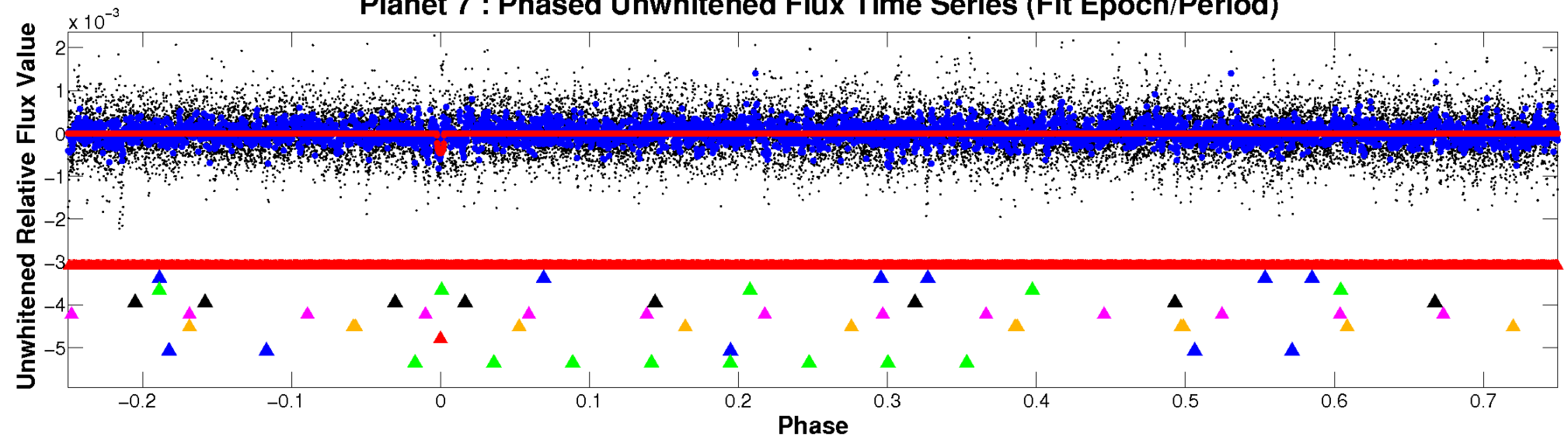
# ALT Odd/Even

TCE 010593110-07

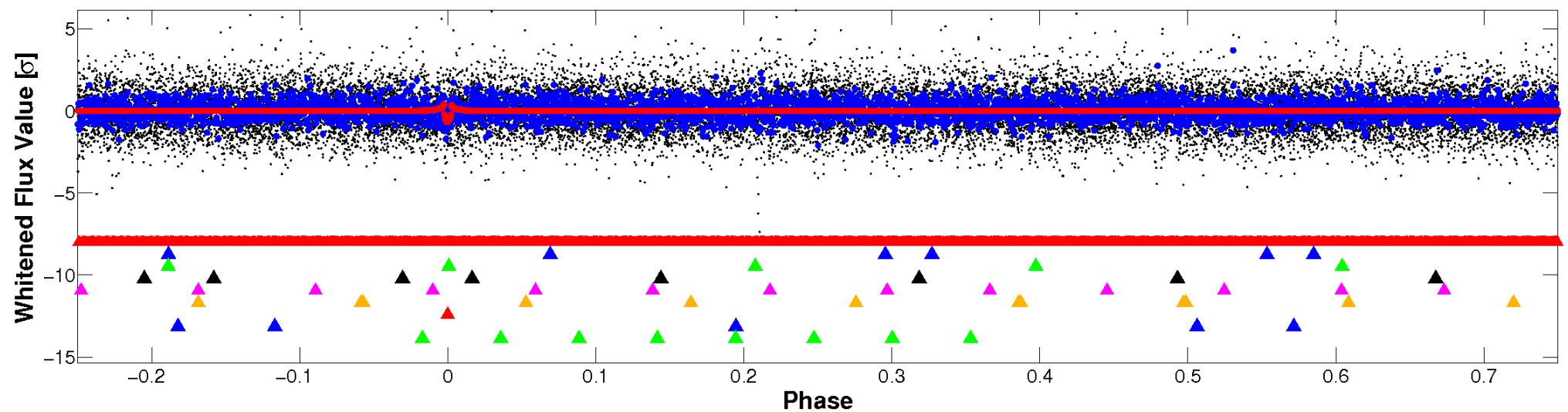


# Non-Whitened Vs. Whitened Light Curve

Planet 7 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)



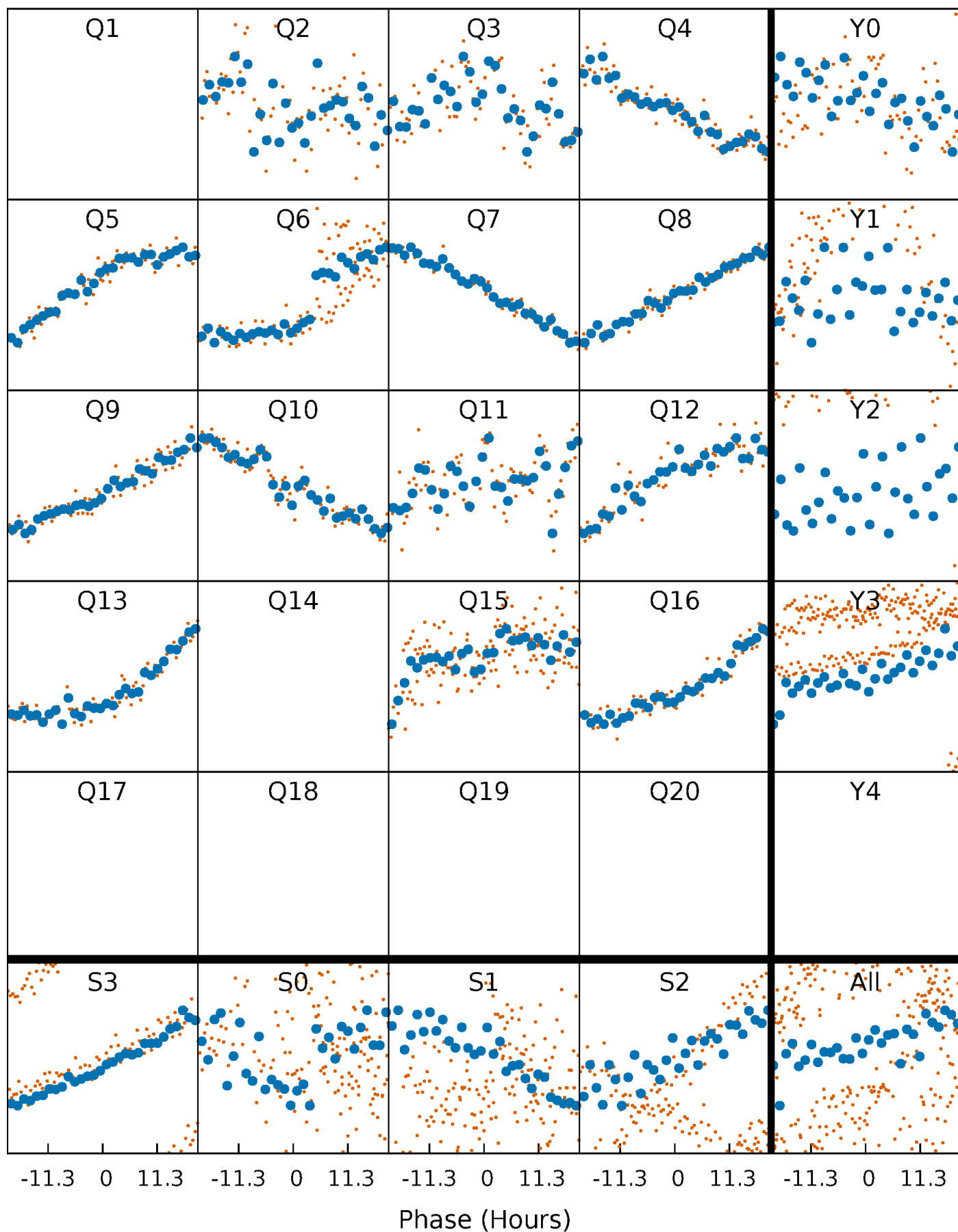
Planet 7 : Phased Whitened Flux Time Series (Fit Epoch/Period)





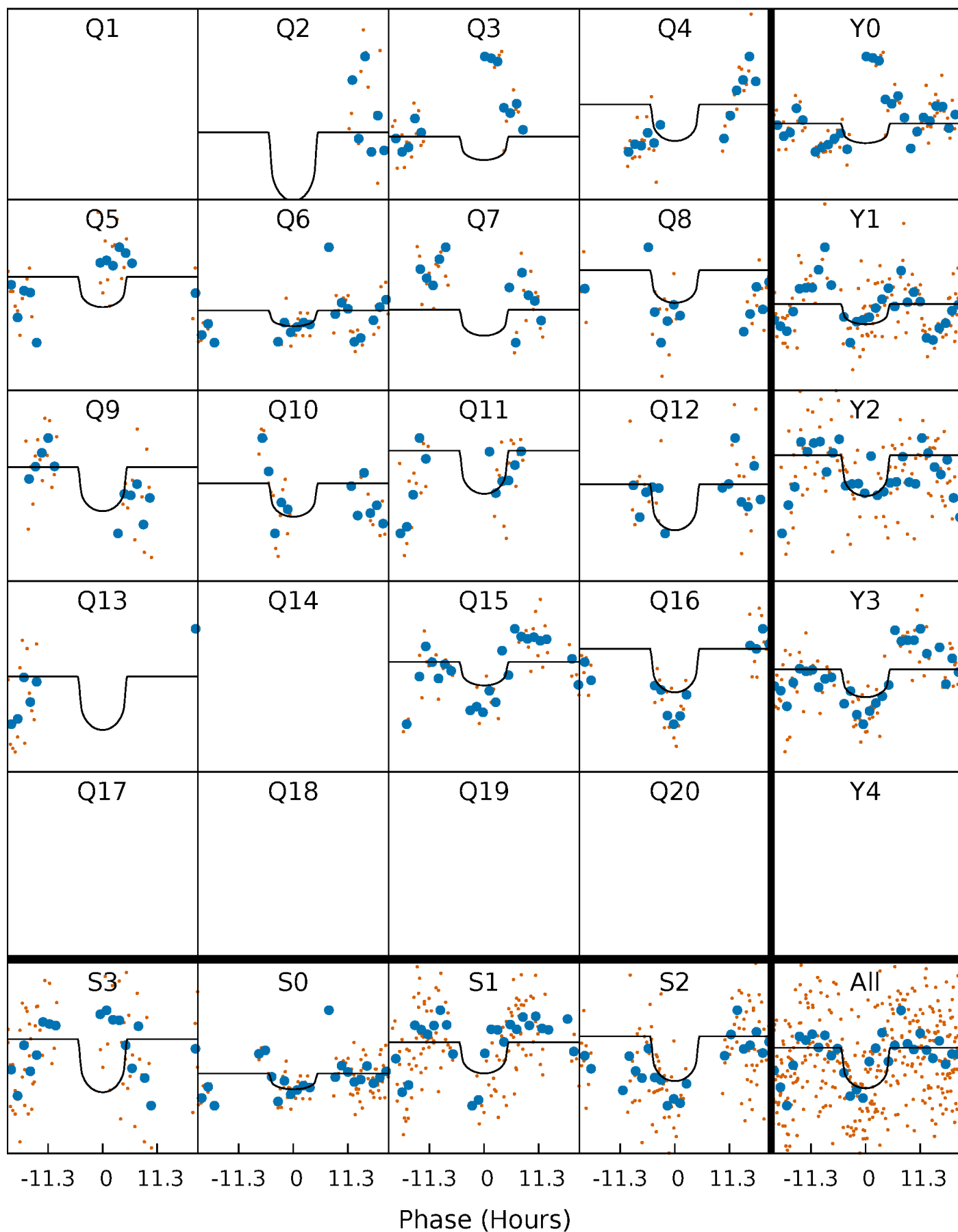
# PDC Quarter-Phased Transit Curves

TCE 010593110-07     $P = 83.493941$  Days     $T_0 = 205.287505$  (BKJD)



# DV Quarter-Phased Transit Curves

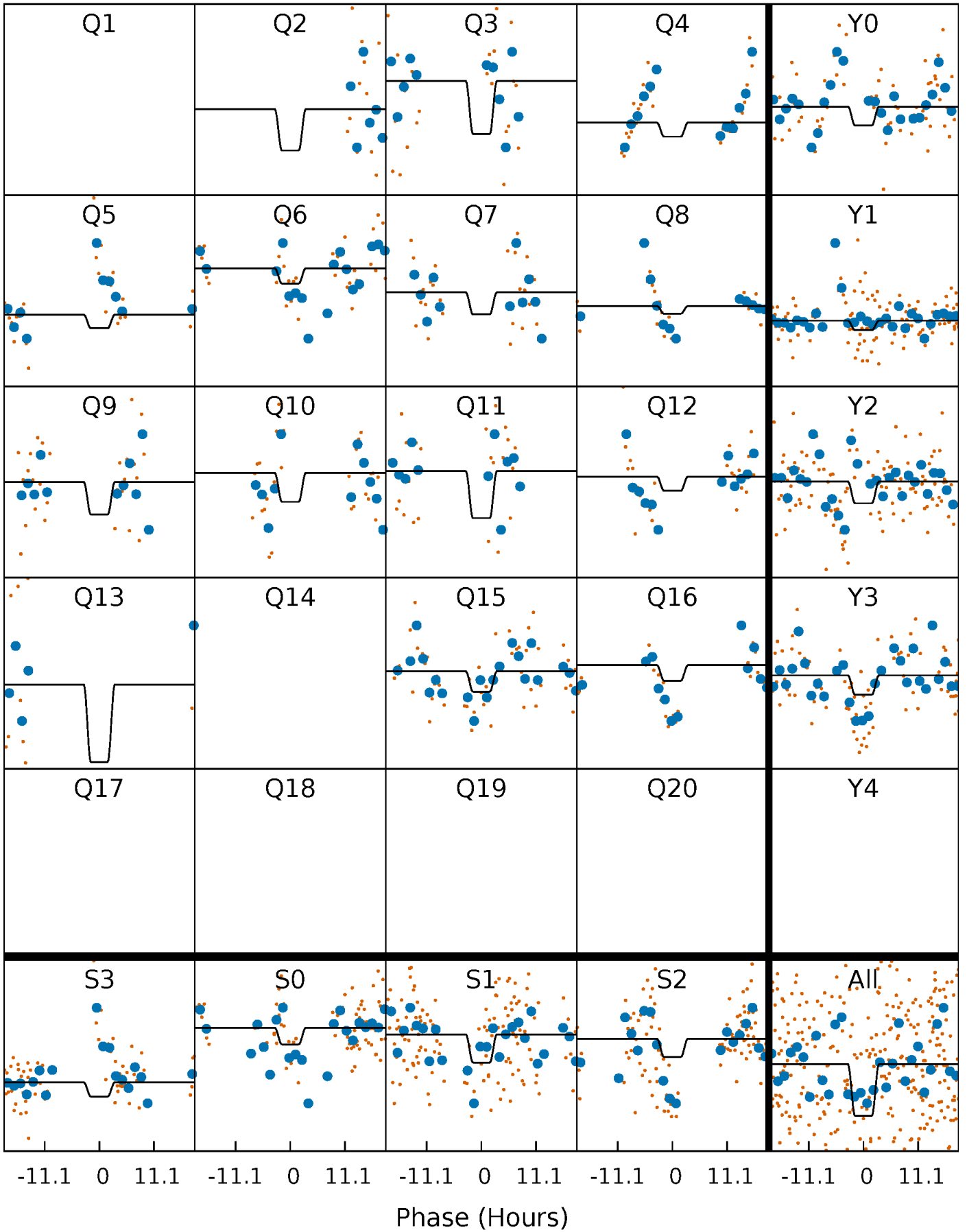
TCE 010593110-07     $P = 83.493941$  Days     $T_0 = 205.287505$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

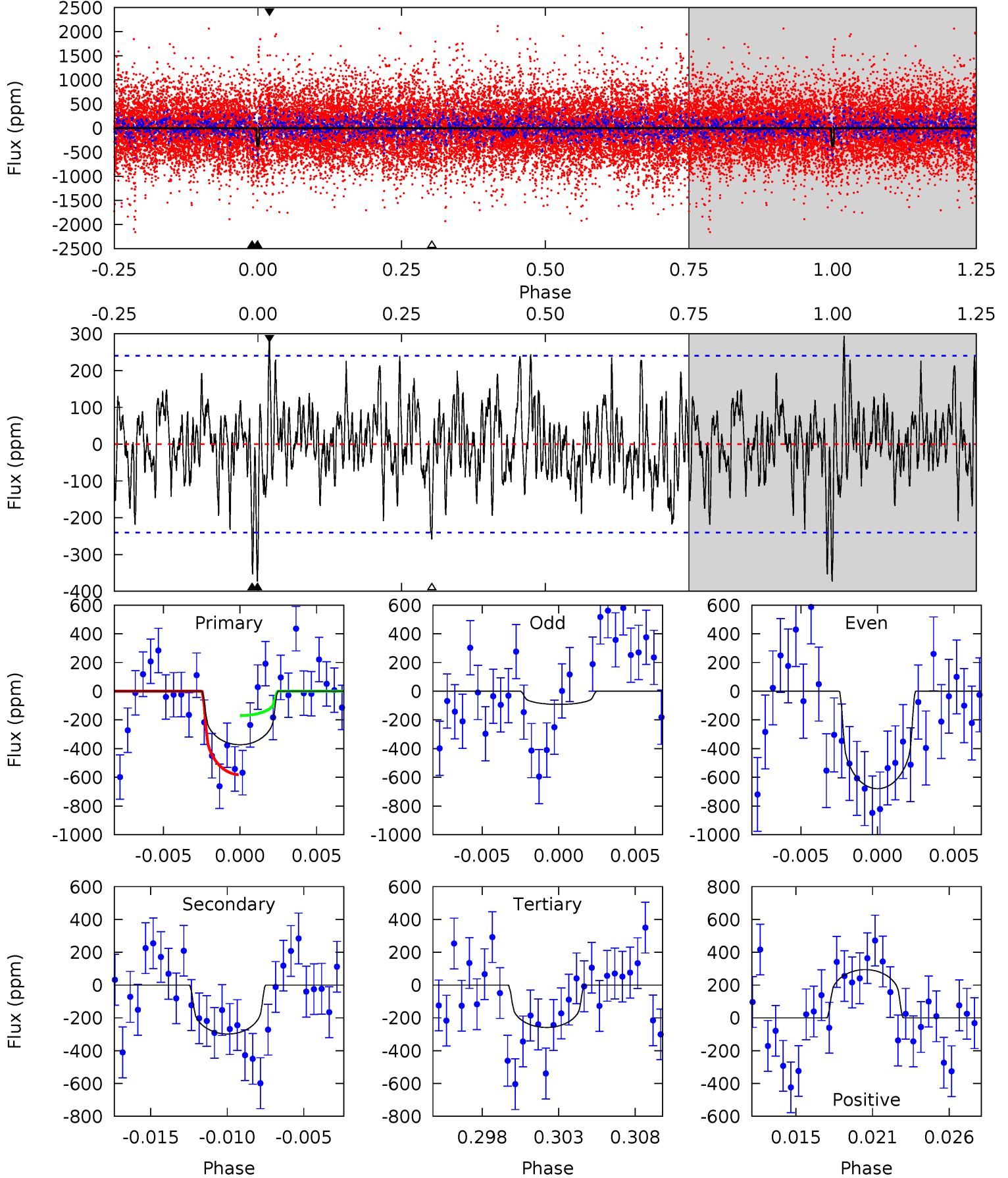
TCE 010593110-07     $P = 83.496992$  Days     $T_0 = 205.286002$  (BKJD)



# DV Model-Shift Uniqueness Test

010593110-07, P = 83.493941 Days, E = 121.793564 Days

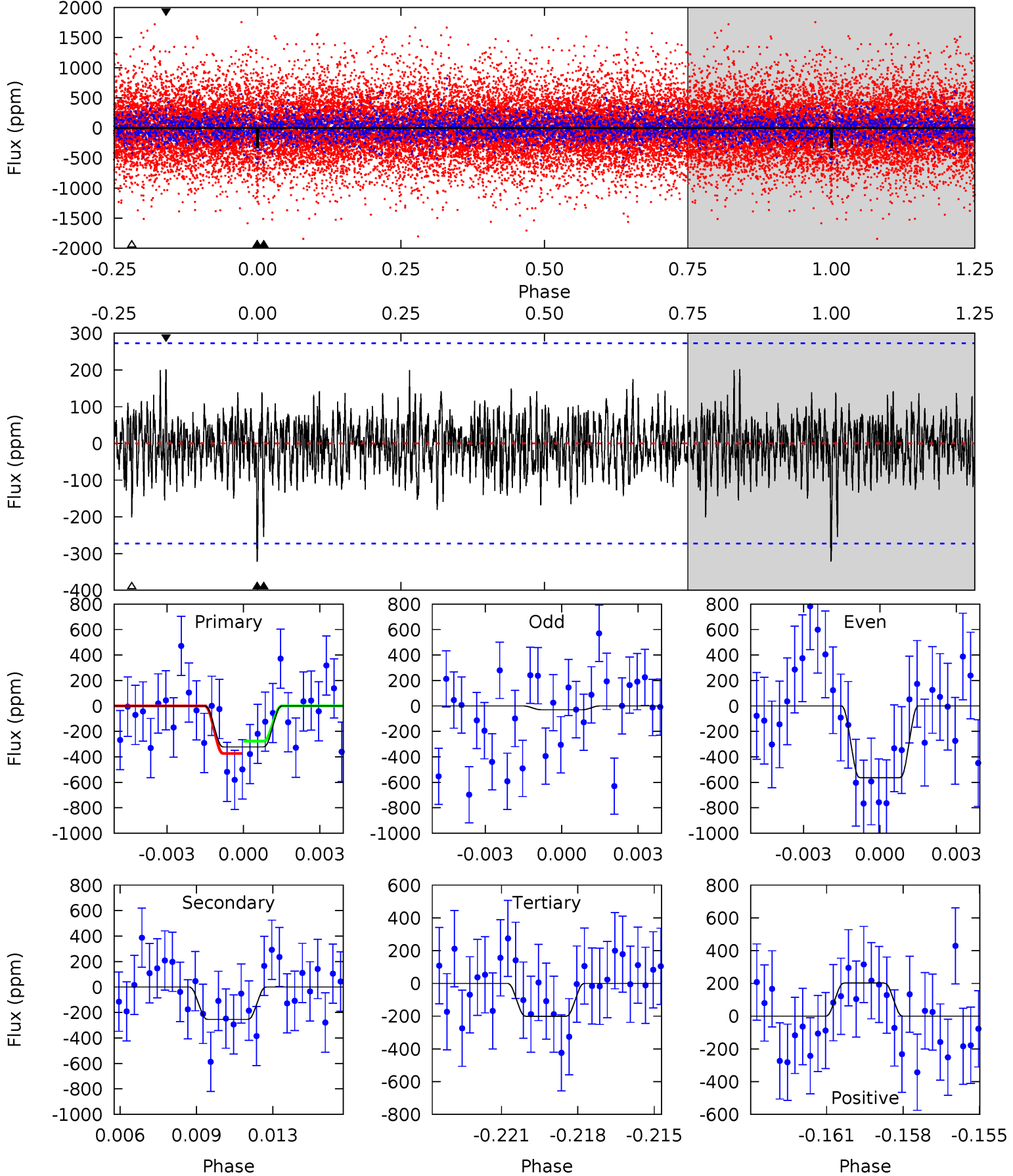
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.00	6.40	5.54	6.30	5.15	2.80	1.81	2.46	1.70	0.86	0.10	6.24	0.63	0.44	4.43



# Alt Model-Shift Uniqueness Test

010593110-07, P = 83.496992 Days, E = 121.789010 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.19	4.88	3.86	3.88	5.24	2.95	1.12	2.33	2.32	1.02	1.01	5.11	0.83	0.38	0.93



### Stellar Parameters For KIC 010593110

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (g \cdot \text{cm}^{-3})$
	$4330^{+129}_{-129}$	$4.640^{+0.049}_{-0.025}$	$-0.260^{+0.300}_{-0.300}$	$0.618^{+0.050}_{-0.056}$	$0.610^{+0.066}_{-0.050}$	$3.632^{+0.843}_{-0.438}$
	+3%/-3%	+1%/-1%	+115%/-115%	+8%/-9%	+11%/-8%	+23%/-12%
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 010593110-07 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-299 \pm 47$	$1.68^{+1.19}_{-1.06}$	$371^{+13}_{-12}$	$3817^{+1885}_{-623}$	$6034^{+36037}_{-4067}$
Alt.	$-254 \pm 52$	$1.44^{+1.04}_{-0.92}$	$371^{+11}_{-14}$	$3869^{+1947}_{-644}$	$6852^{+46208}_{-4619}$

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

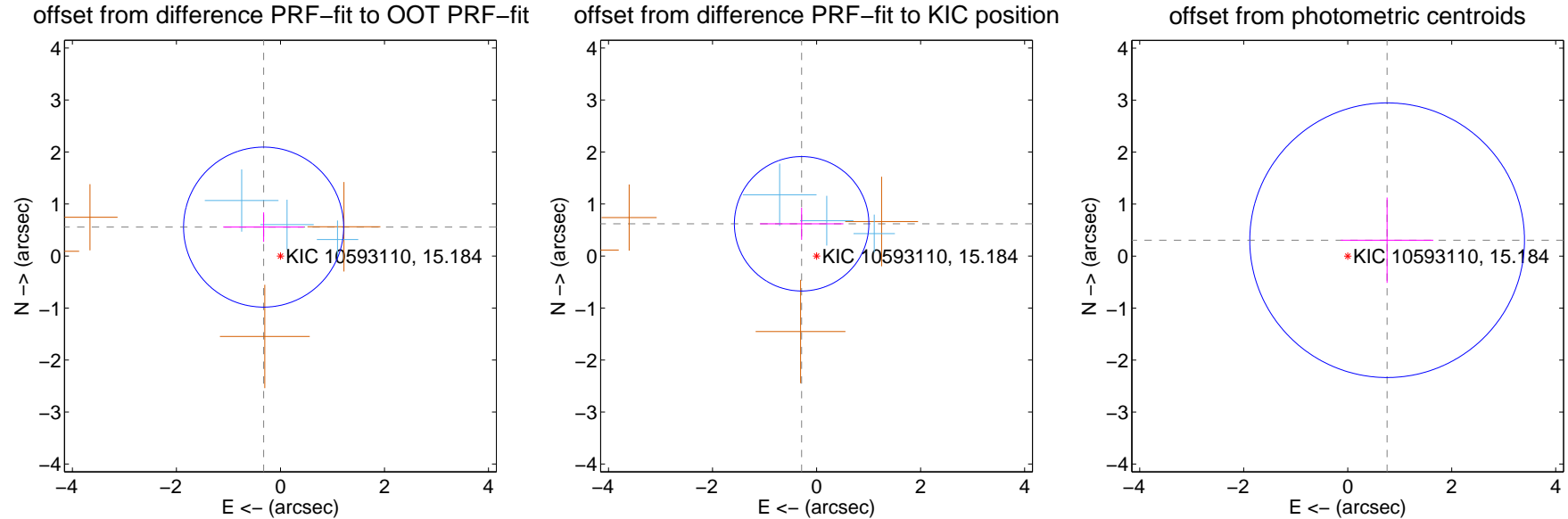
## DV Centroid Data

Supplemental centroid analysis for 010593110-07. Kepler magnitude: 15.18. Transit SNR 6.01

There are 3 quarters with good PRF difference image offsets

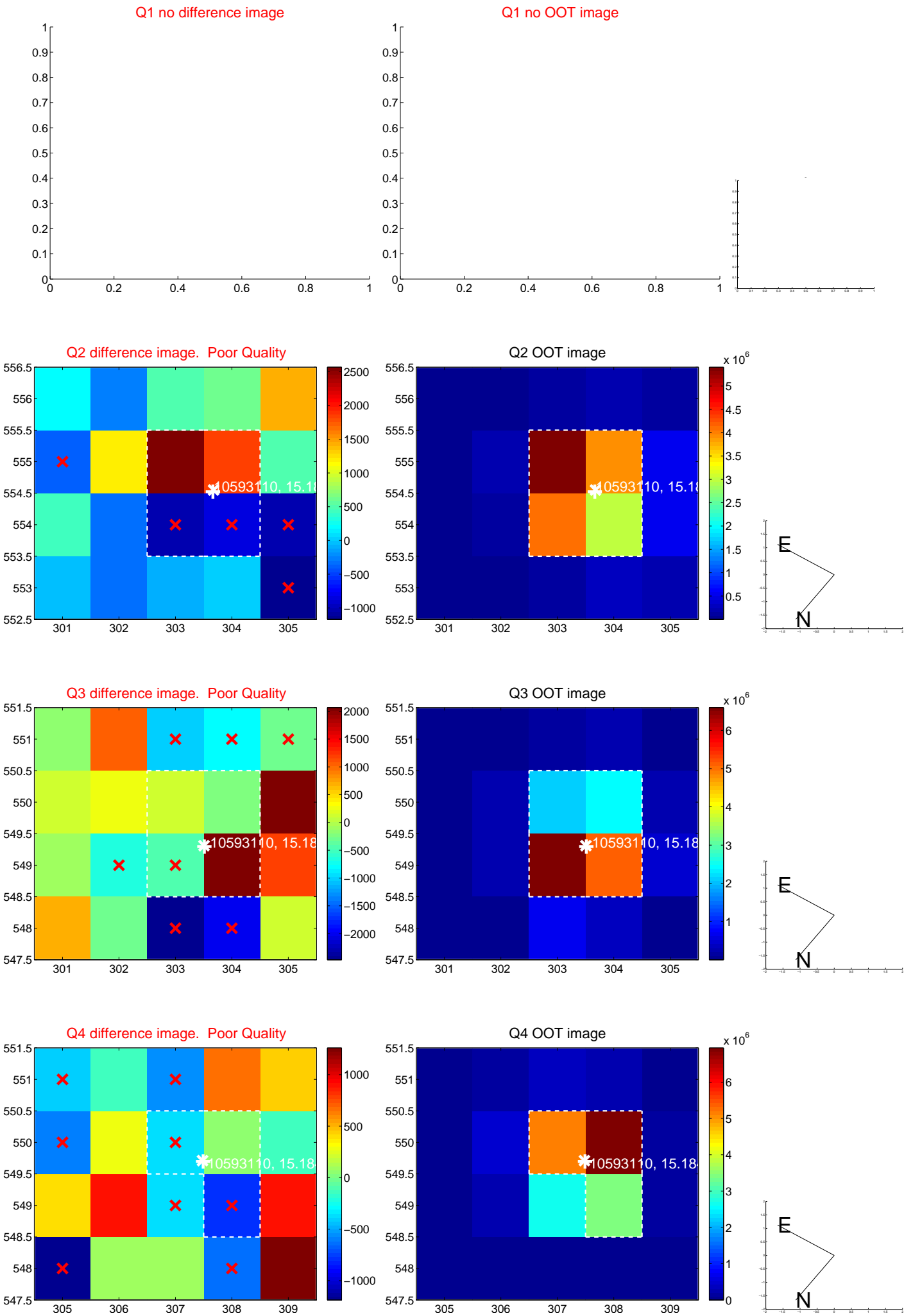
The direct PRF centroid is offset from the target star catalog position by about 0.10 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.643 \pm 0.513$	1.25	$0.324 \pm 0.777$	$0.556 \pm 0.283$
PRF-fit source offset from KIC position	$0.683 \pm 0.431$	1.59	$0.287 \pm 0.804$	$0.620 \pm 0.309$
photometric centroid source offset	$0.82 \pm 0.88$	0.93	$-0.76 \pm 0.89$	$0.31 \pm 0.82$

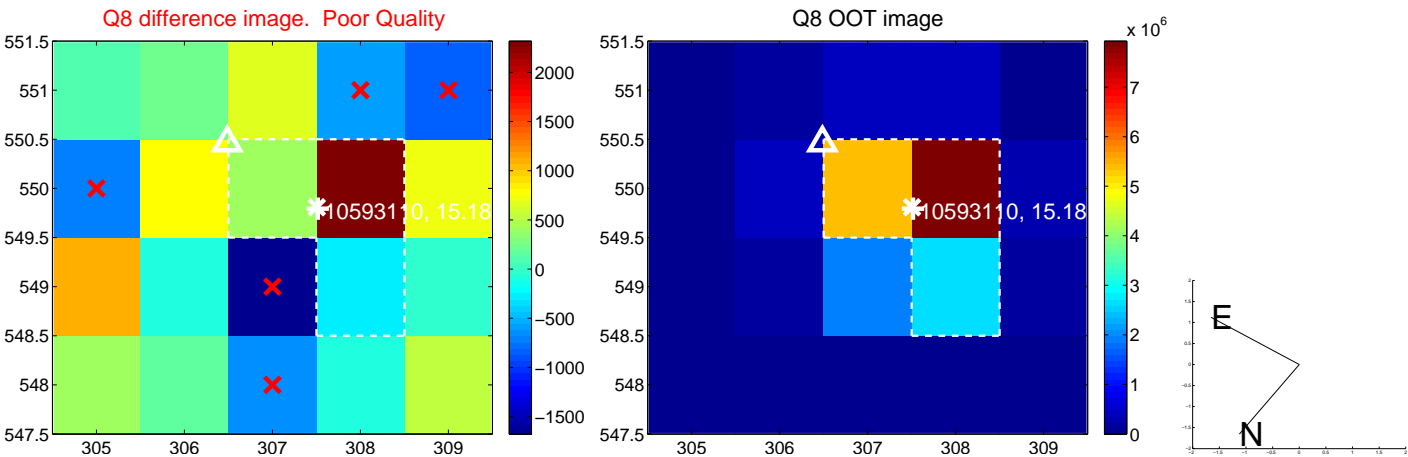
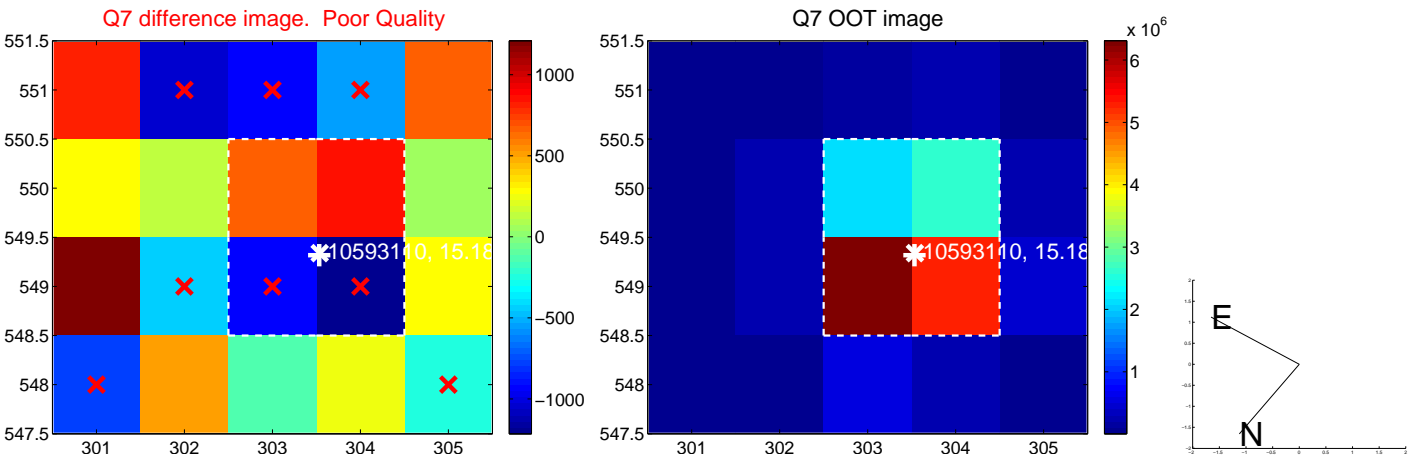
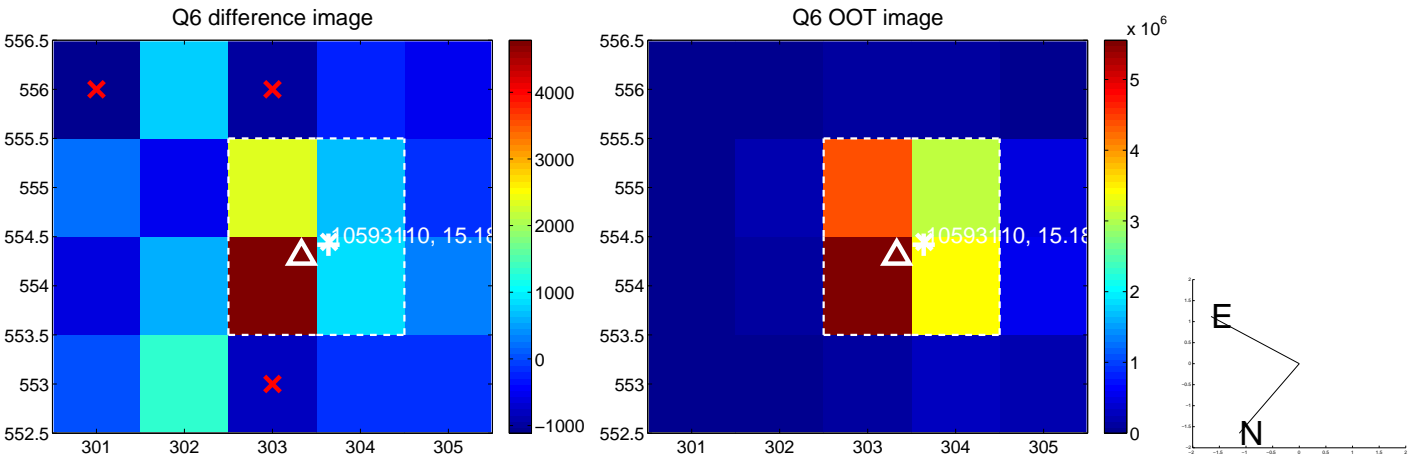
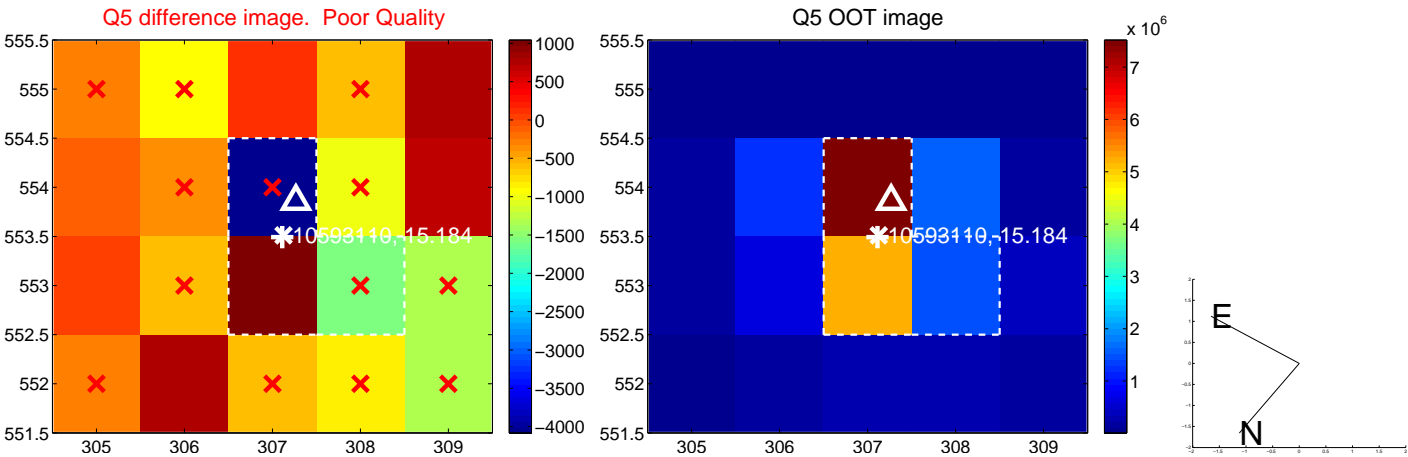


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

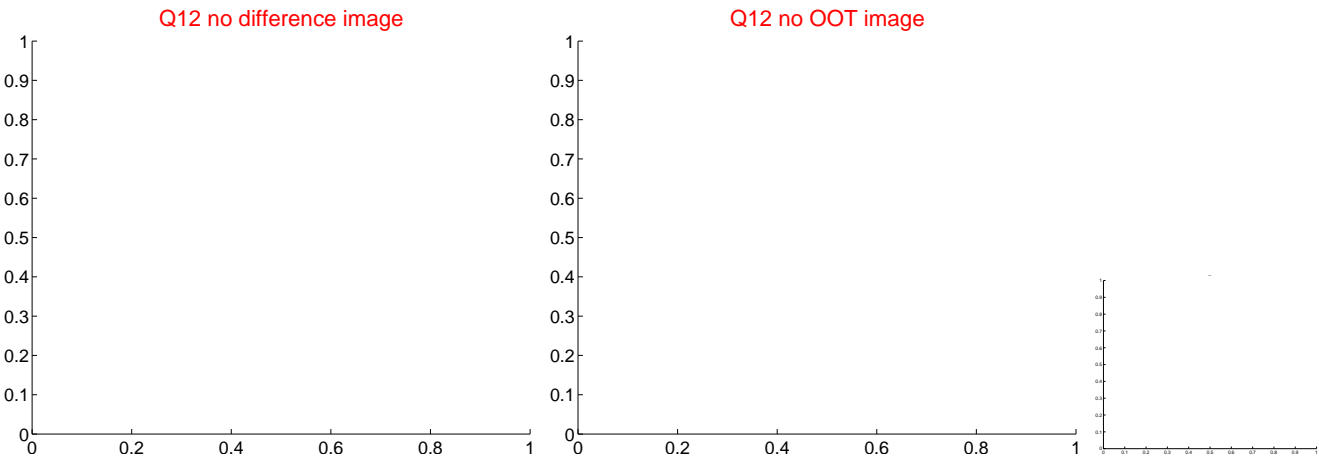
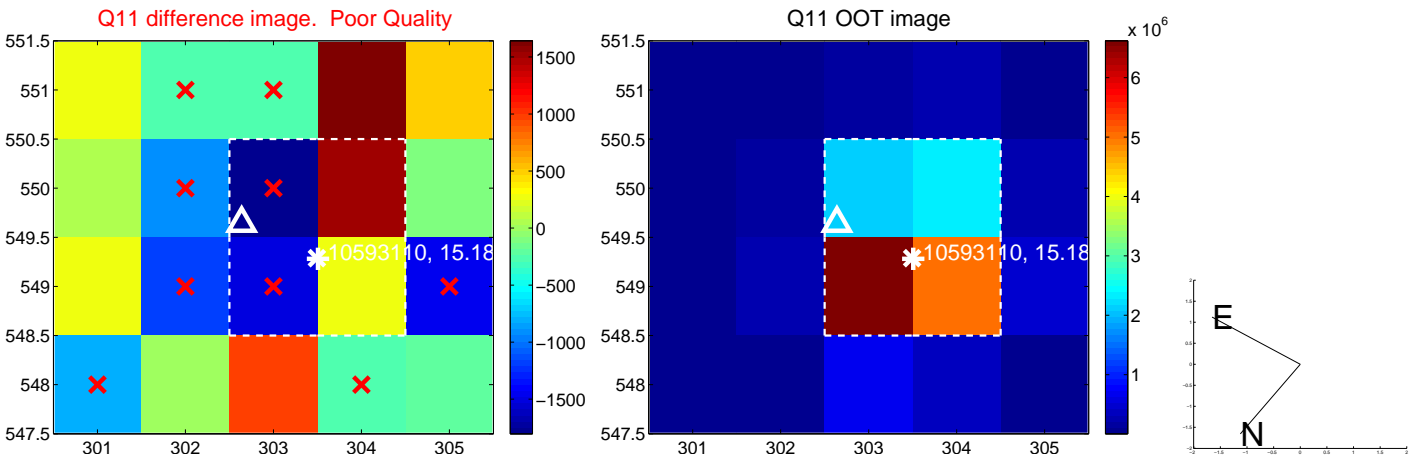
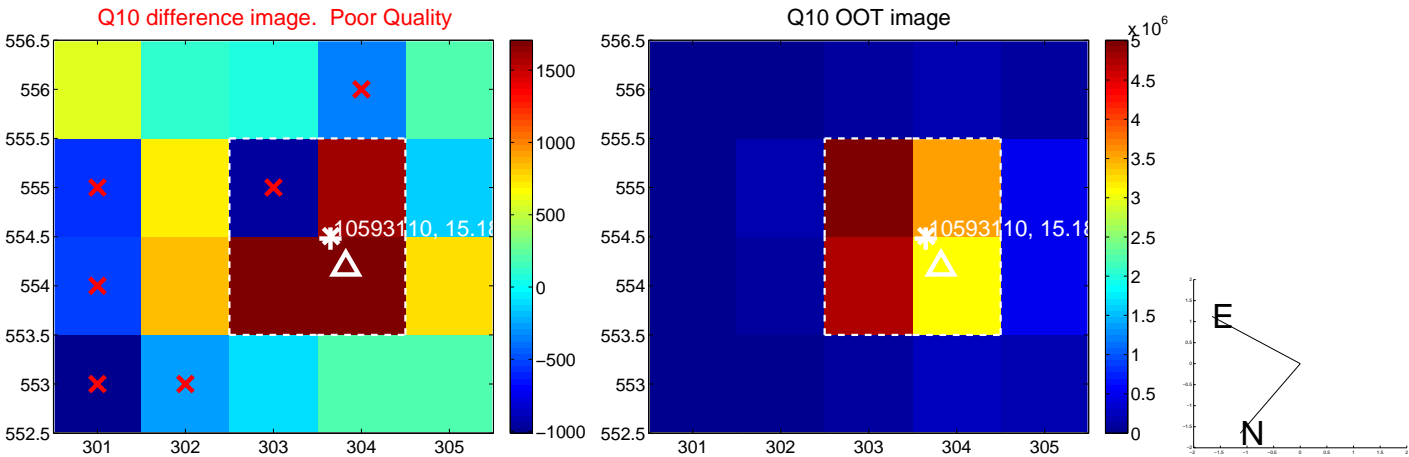
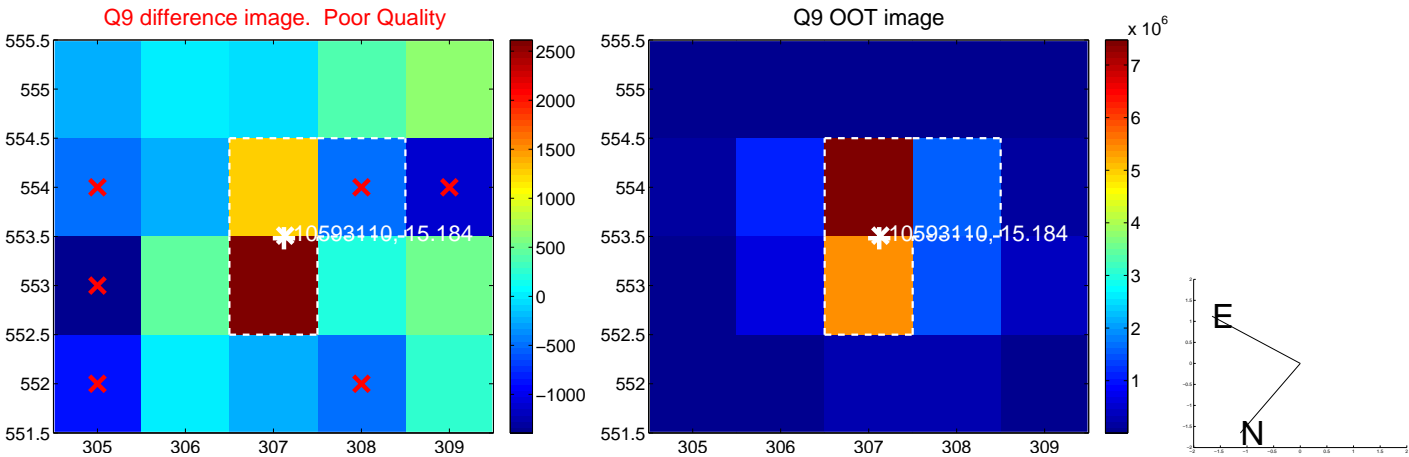
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

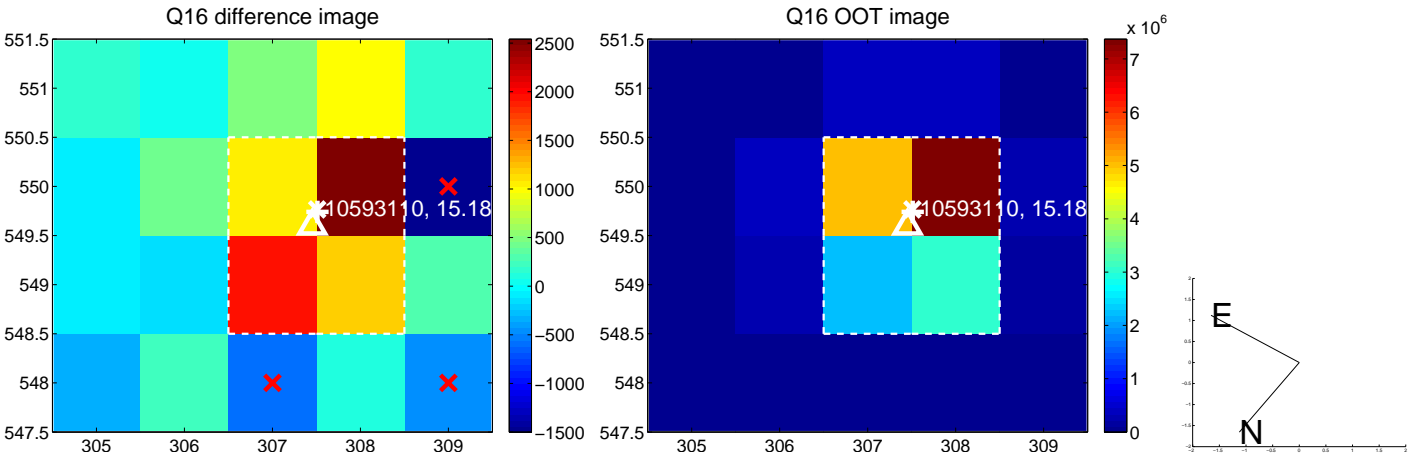
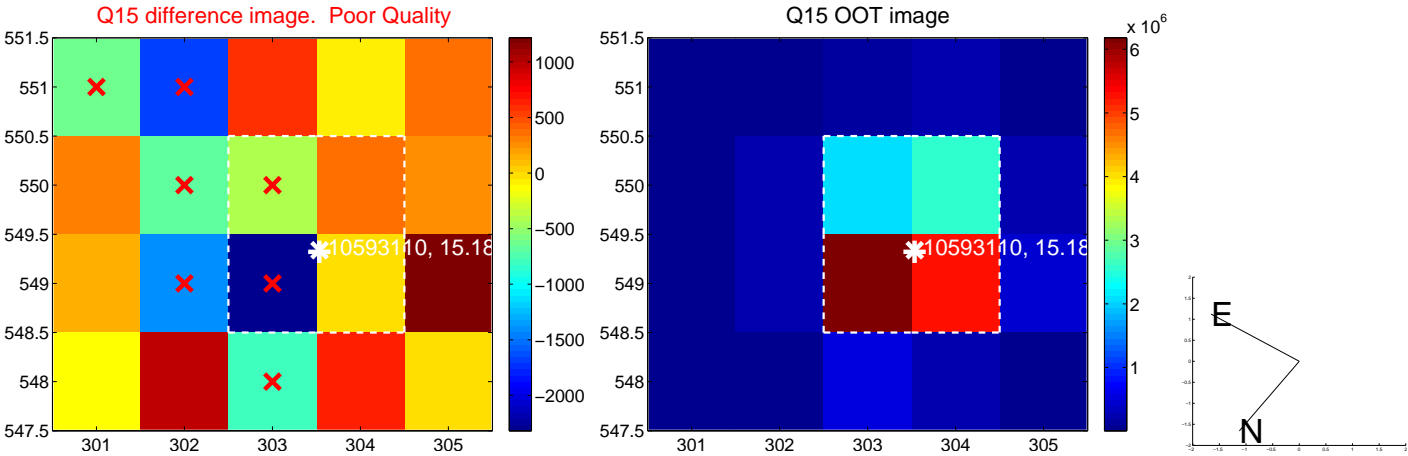
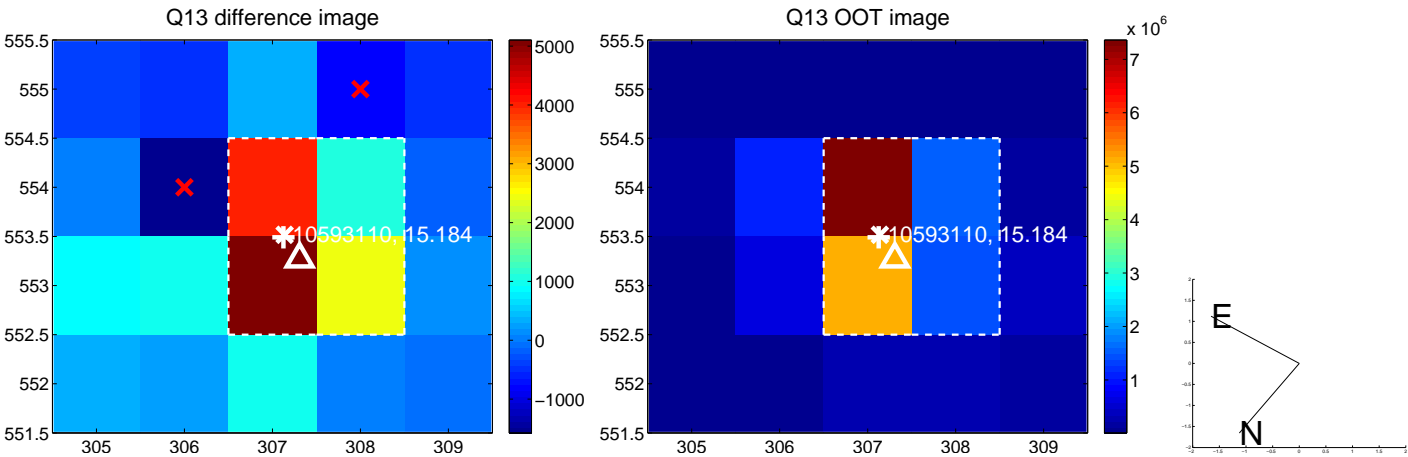


white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.

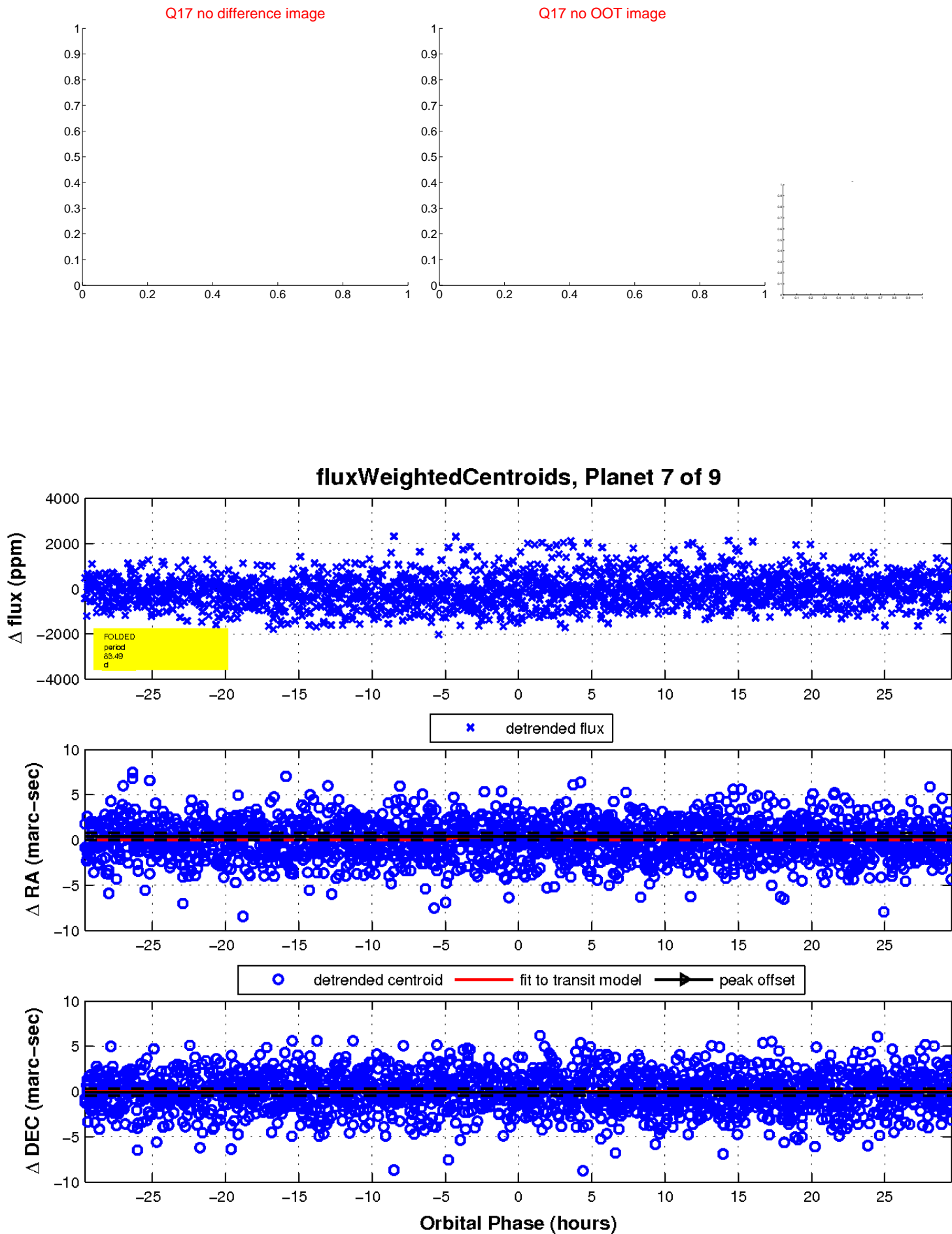




white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

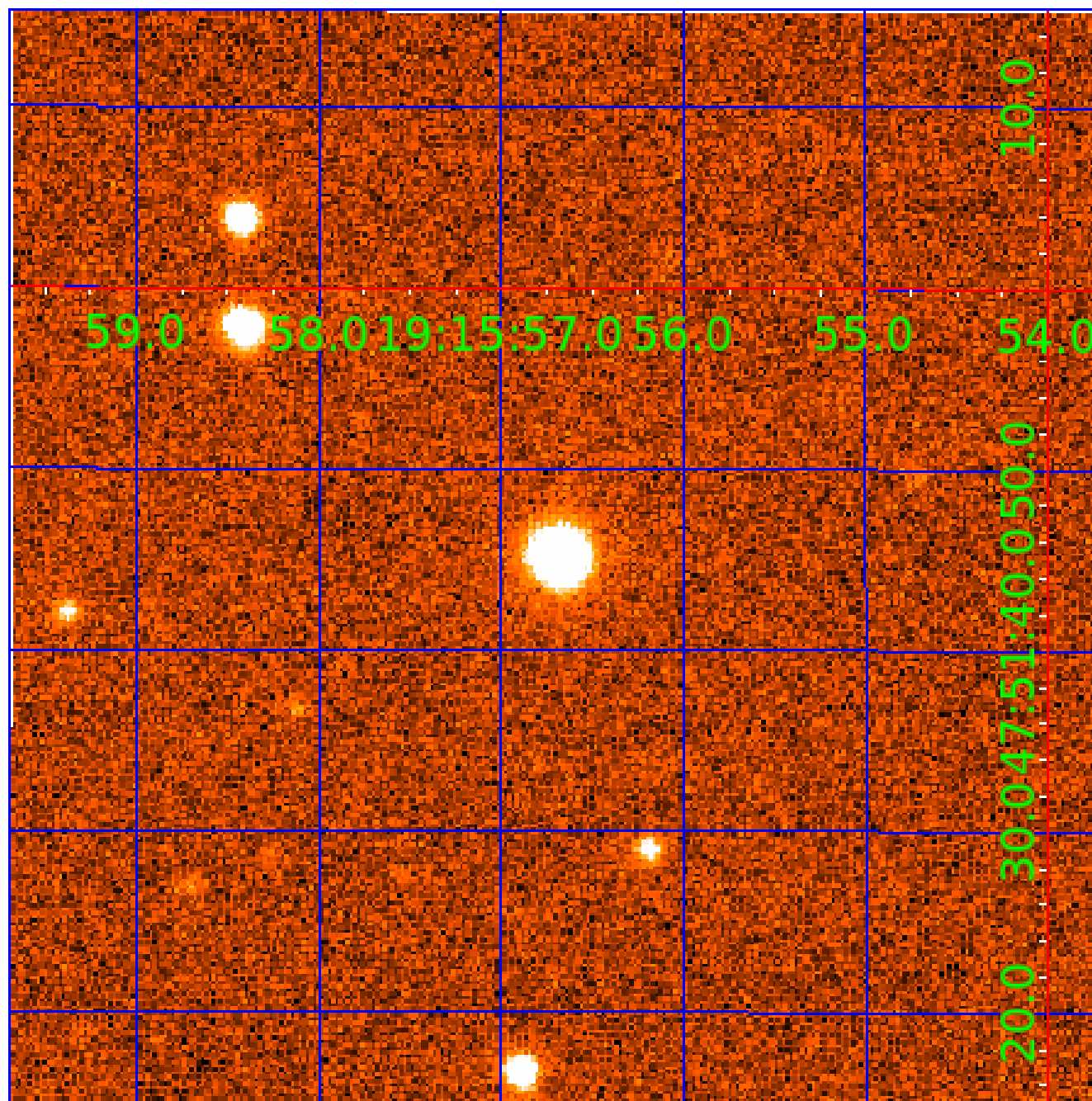


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 010593110

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010593110-01	OBS	No	0.822191	132.325009	37.8	4.078	7.4	7.1	0.62	4330	0.37	567.82
010593110-03	OBS	No	283.587961	356.516235	742.1	4.733	12.3	7.8	0.62	4330	1.92	0.23
010593110-04	OBS	No	181.556830	271.668945	1017.8	3.814	15.3	8.0	0.62	4330	2.02	0.42
010593110-05	OBS	No	109.121239	204.446957	455.7	19.790	10.4	5.0	0.62	4330	1.36	0.84
010593110-06	OBS	No	120.587667	163.433496	687.0	7.664	9.1	7.3	0.62	4330	1.77	0.73
010593110-07	OBS	No	83.493941	205.287505	460.9	9.869	8.1	6.0	0.62	4330	1.41	1.20
010593110-08	OBS	No	276.493940	336.509572	965.7	2.584	8.5	6.4	0.62	4330	2.26	0.24
010593110-09	OBS	No	171.405232	287.356663	954.4	2.672	7.6	7.1	0.62	4330	2.11	0.46

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010593110-01	OBS	FP	0.00	1	0	0	0	LPP_DV
010593110-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010593110-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010593110-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS
010593110-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010593110-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—CENT_FEW_MEAS
010593110-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
010593110-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—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.

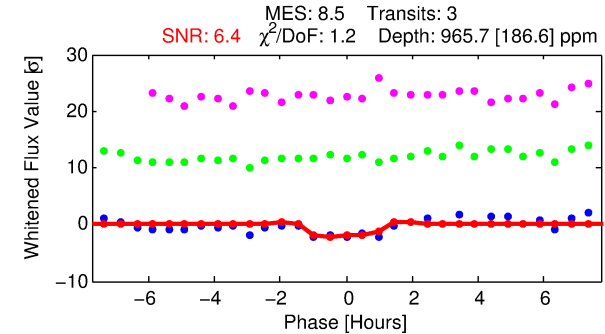
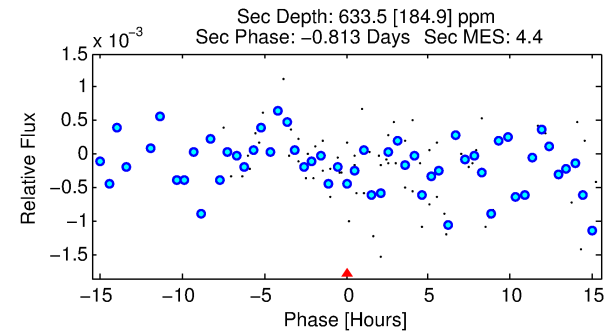
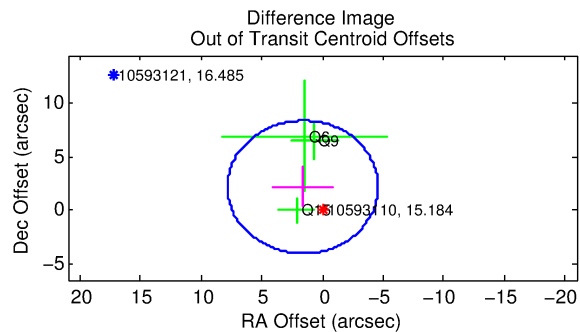
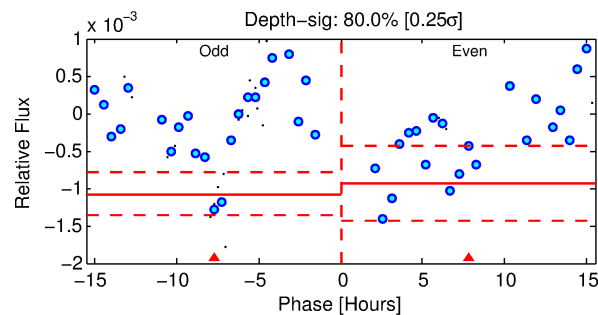
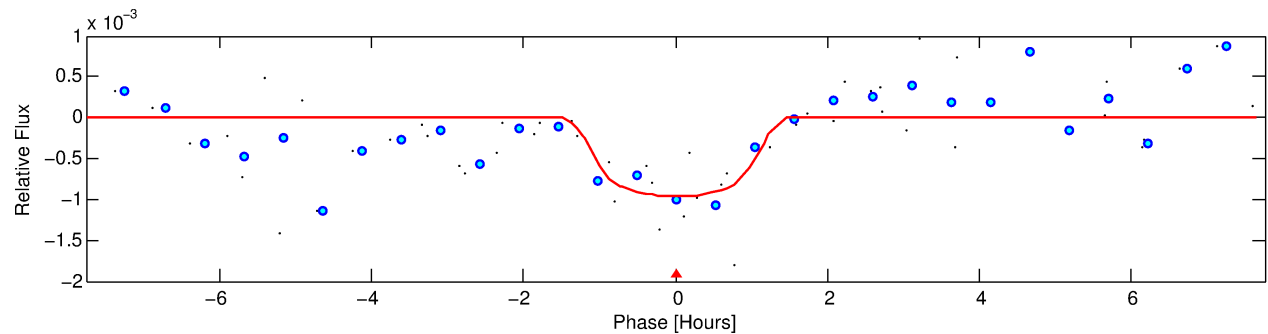
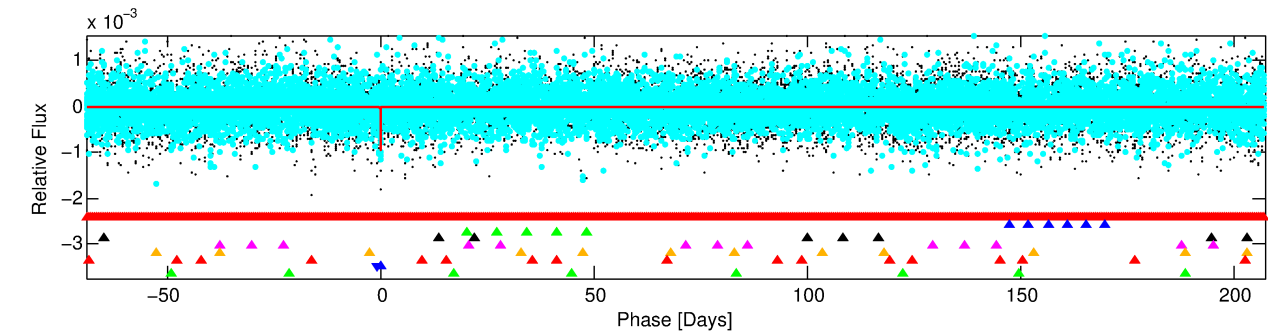
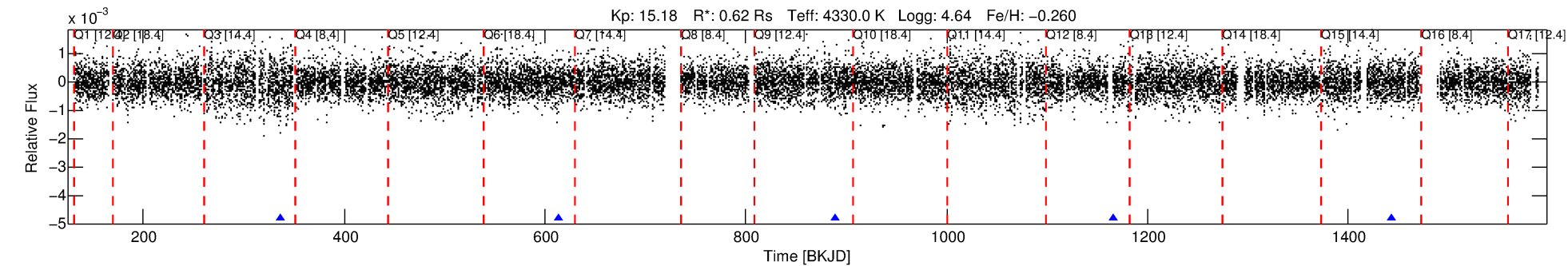
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 010593110-08

No Significant Match Found

# DV One-Page Summary

KIC: 10593110 Candidate: 8 of 9 Period: 276.494 d



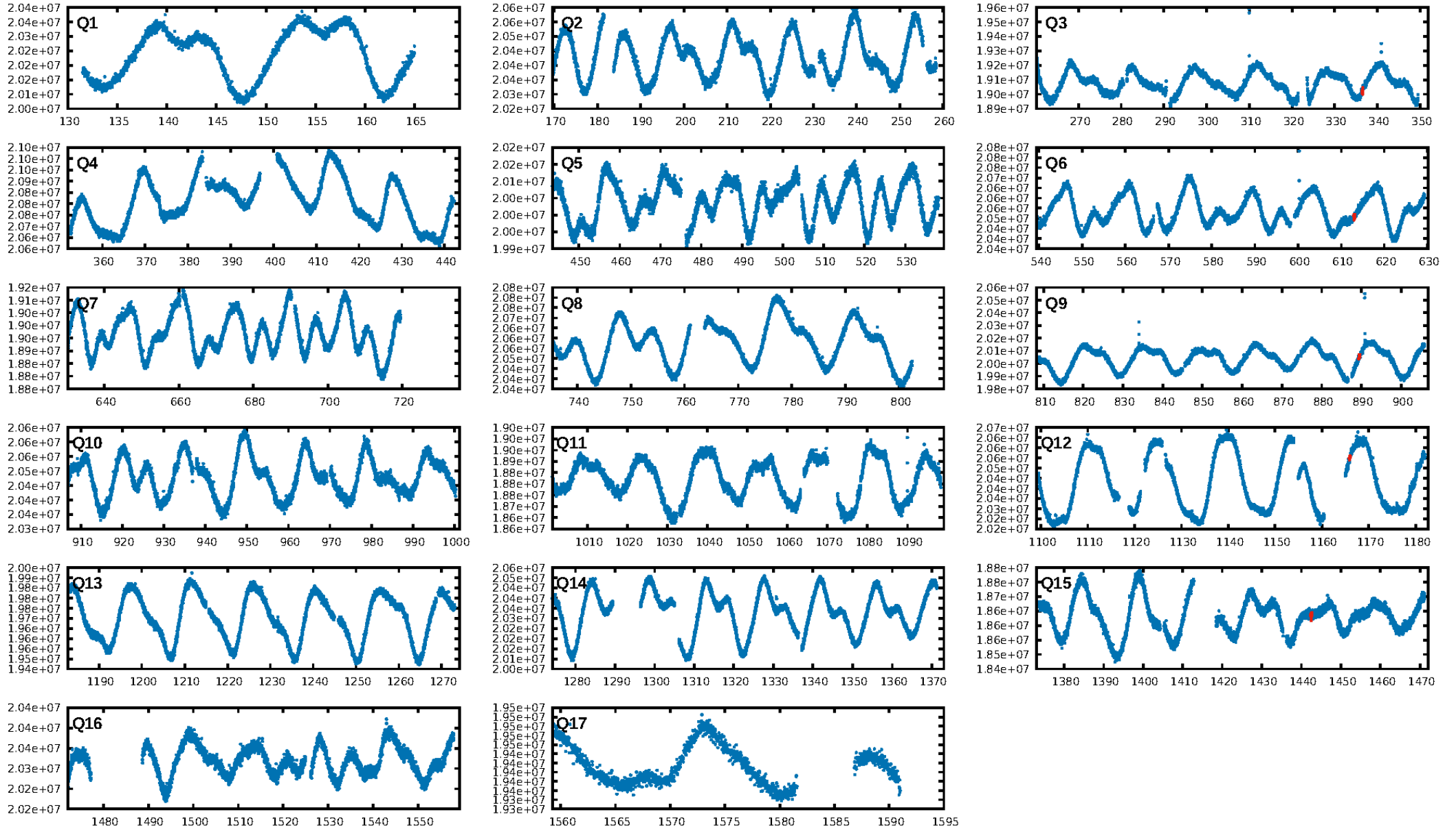
## DV Fit Results:

Period = 276.49394 [0.00358] d  
Epoch = 336.5096 [0.0120] BKJD  
Rp/R\* = 0.0335 [0.0296]  
a/R\* = 465.41 [1486.06]  
b = 0.86 [0.98]  
Seff = 0.24 [0.04]  
Teq = 179 [7] K  
Rp = 2.26 [2.00] Re  
a = 0.7038 [0.0501] AU  
Ag = 33817.79 [60566.29] [0.56 $\sigma$ ]  
Teffp = 3753 [1682] K [2.13 $\sigma$ ]

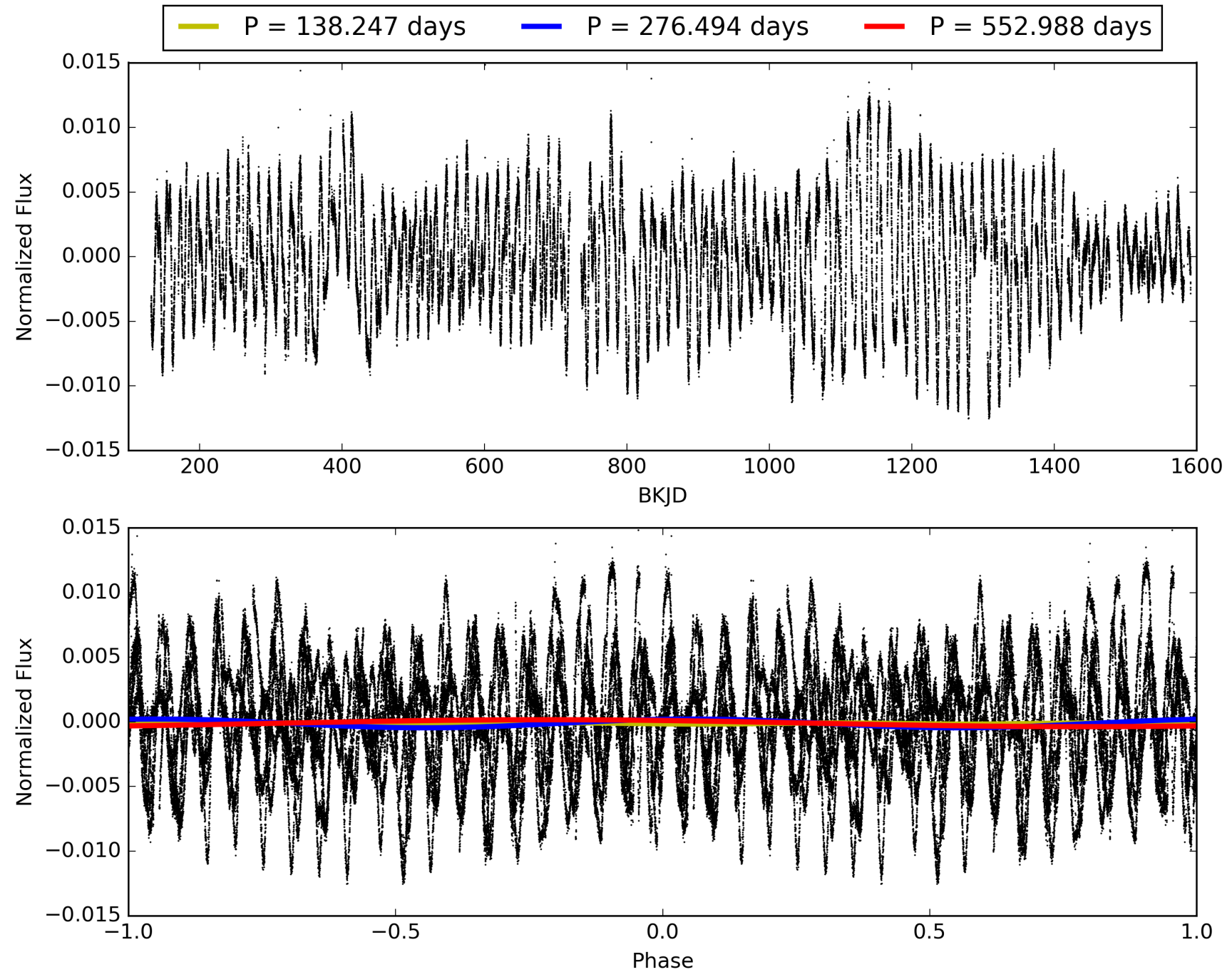
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [9.28 $\sigma$ ]  
LongPeriod-sig: 100.0% [31.58 $\sigma$ ]  
ModelChiSquare2-sig: 57.1%  
ModelChiSquareGof-sig: 95.8%  
**Bootstrap-pfa: 3.05e-10**  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 4.924  
Centroid-sig: 53.2%  
Centroid-so: 1.554 arcsec [1.01 $\sigma$ ]  
OotOffset-rm: 2.722 arcsec [1.32 $\sigma$ ]  
OotOffset-st: 1/1/0/1 [3]  
KicOffset-rm: 2.769 arcsec [1.35 $\sigma$ ]  
KicOffset-st: 1/1/0/1 [3]  
DiffImageQuality-fgm: 0.33 [1/3]  
DiffImageOverlap-fno: 0.25 [1/4]

# TCE 010593110-08, PDC Light Curves

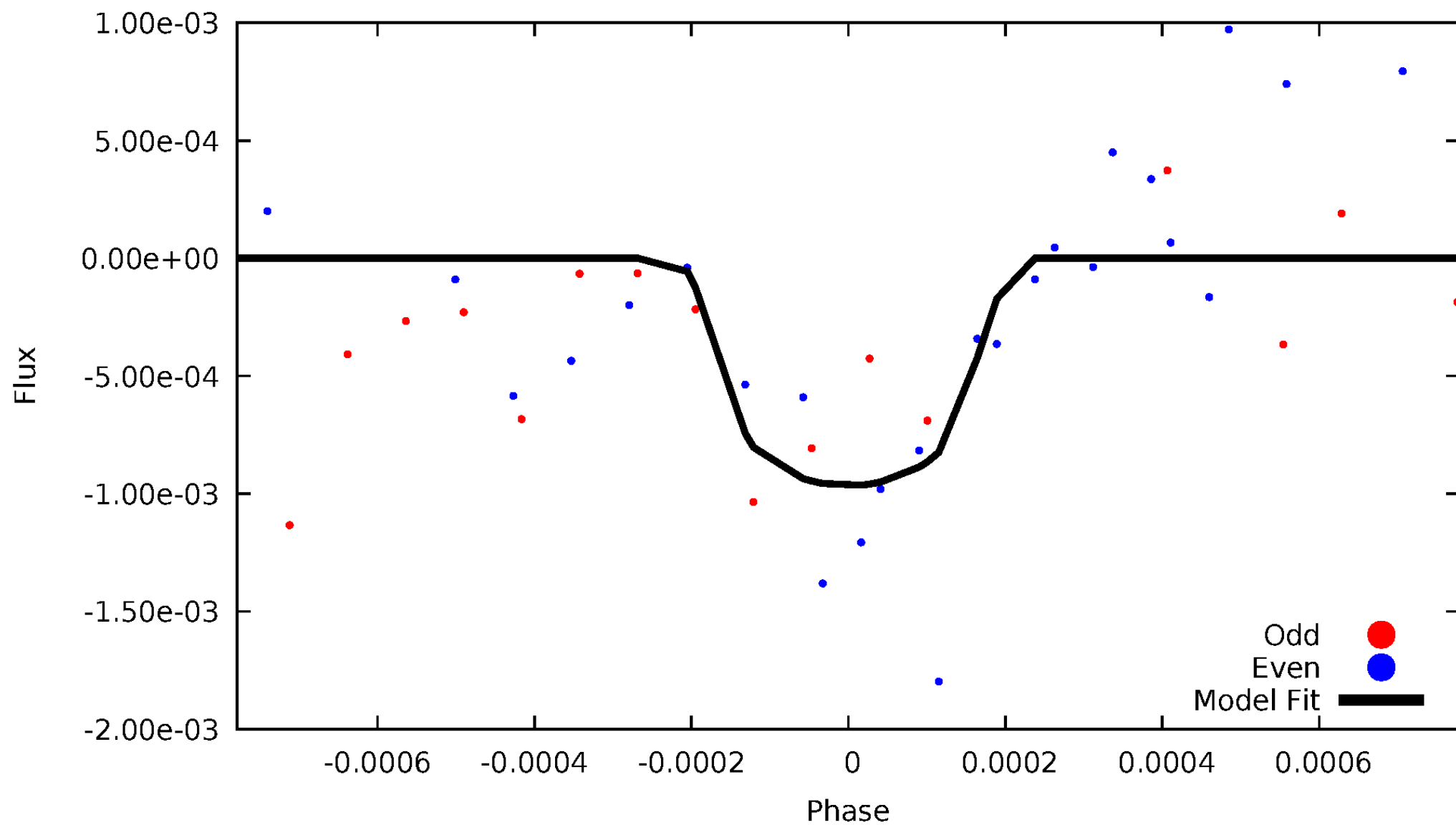


# TCE 010593110-08



# DV Odd/Even

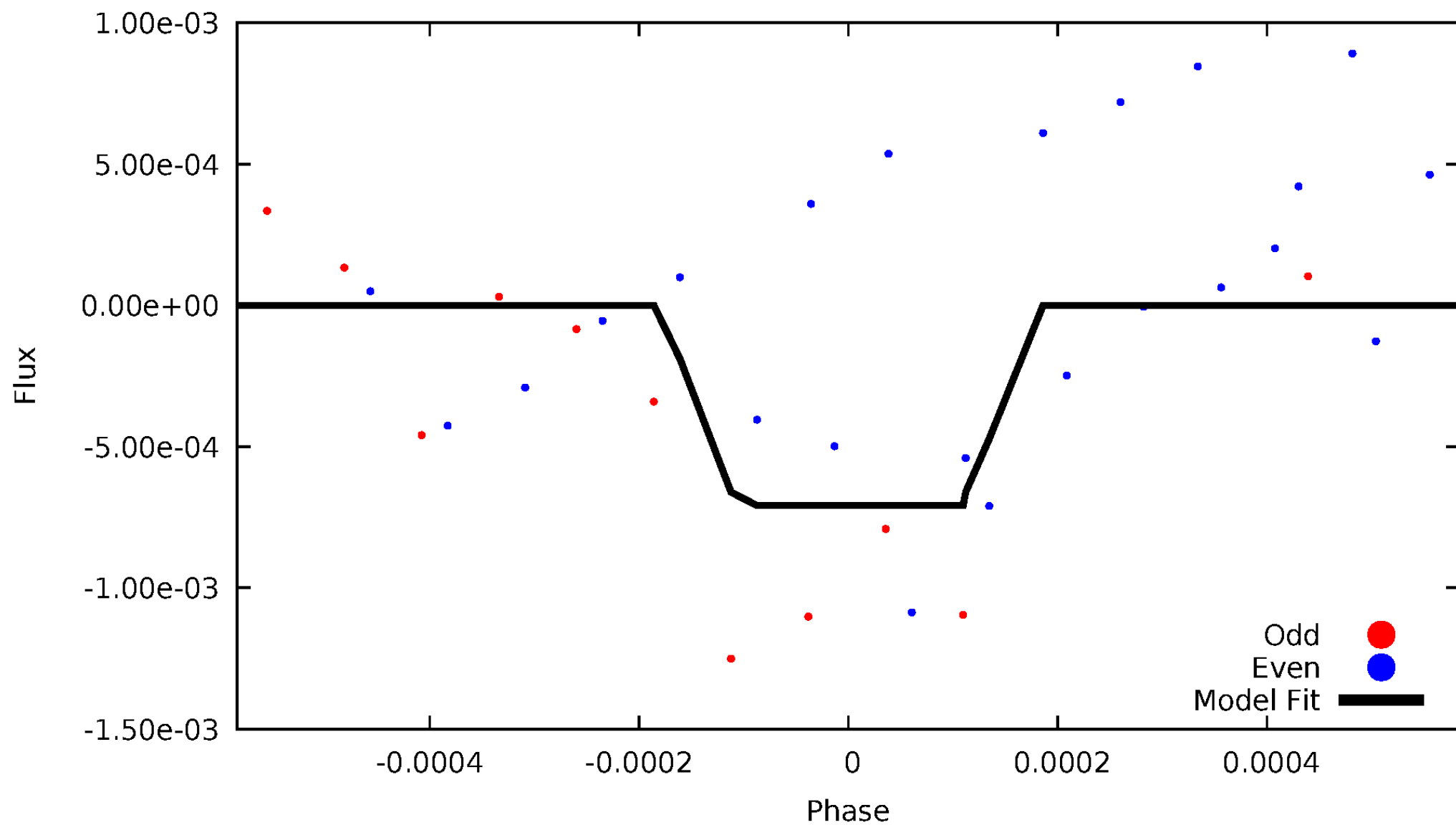
TCE 010593110-08





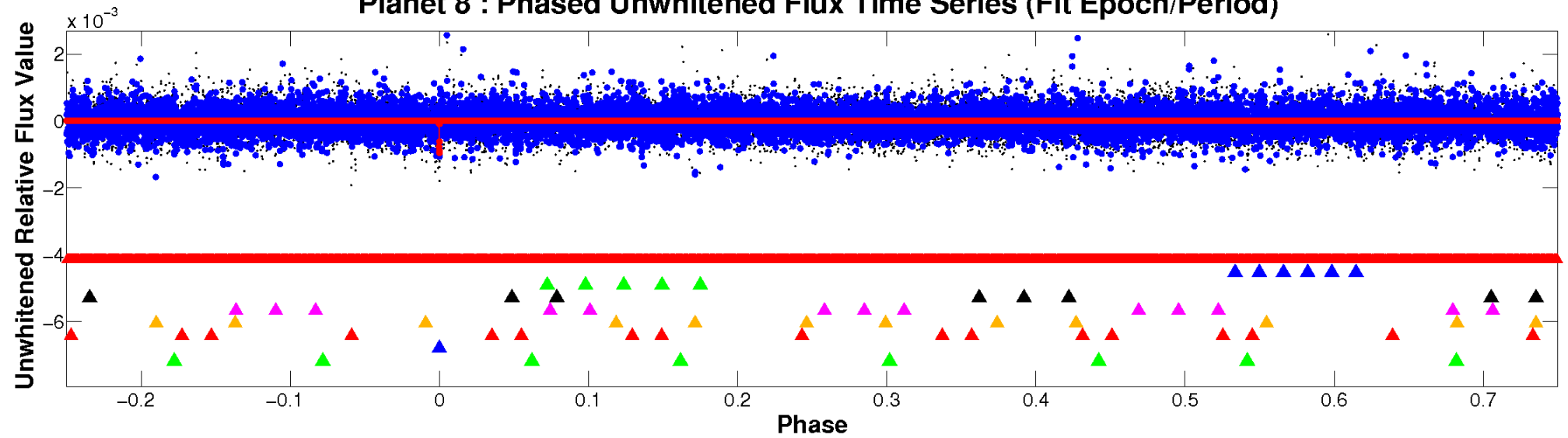
# ALT Odd/Even

TCE 010593110-08

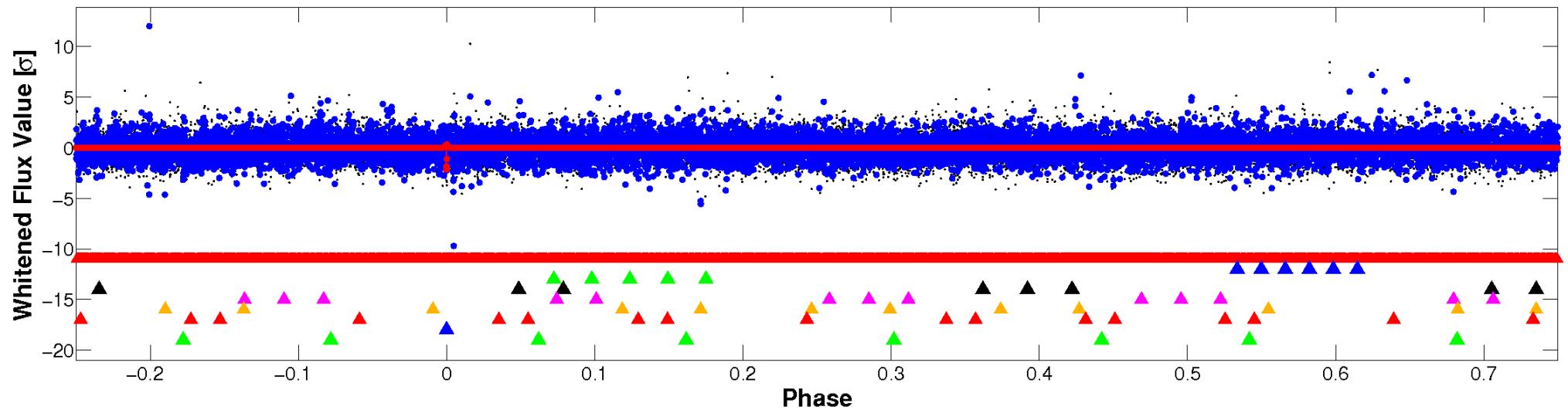


# Non-Whitened Vs. Whitened Light Curve

## Planet 8 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

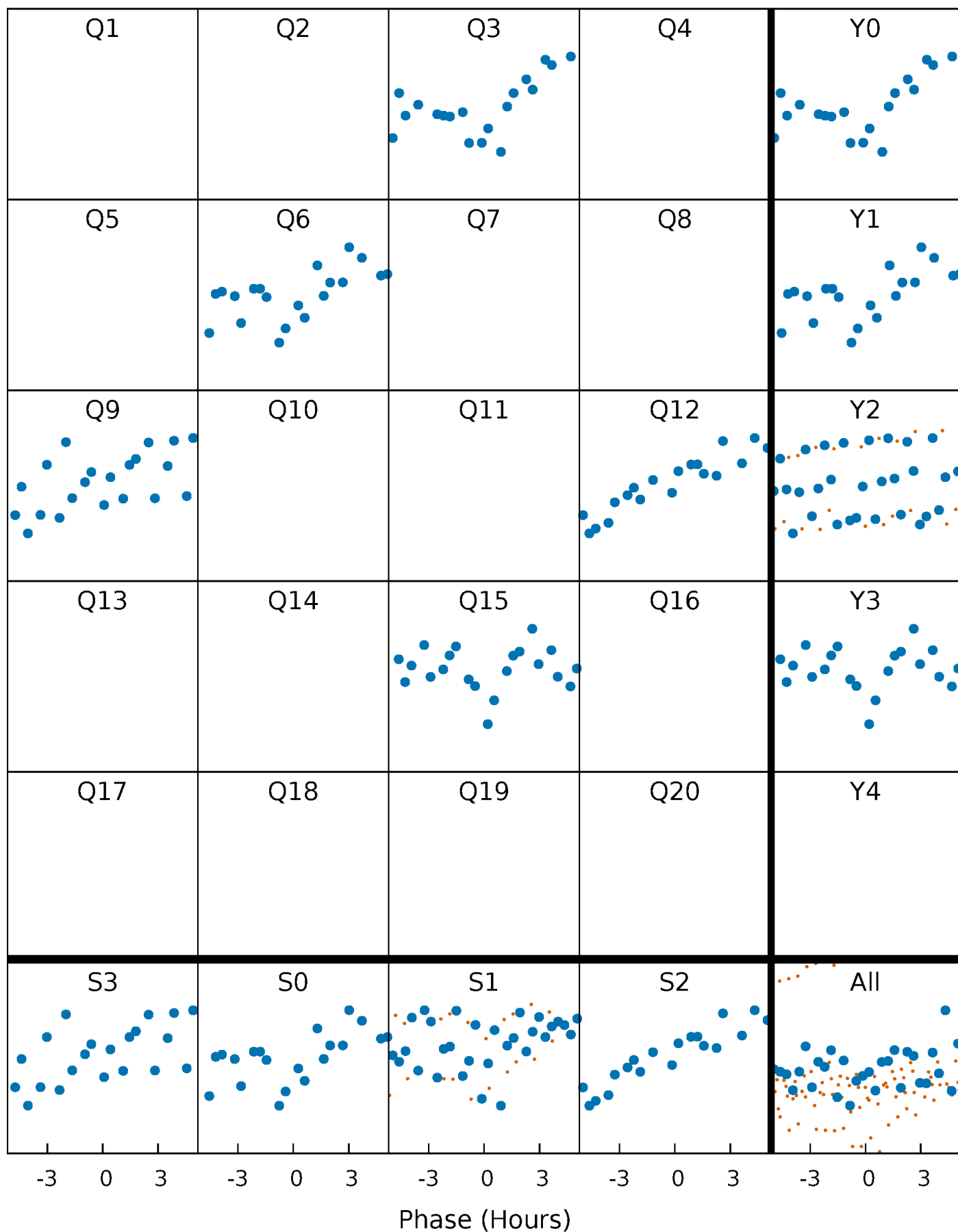


## Planet 8 : Phased Whitened Flux Time Series (Fit Epoch/Period)



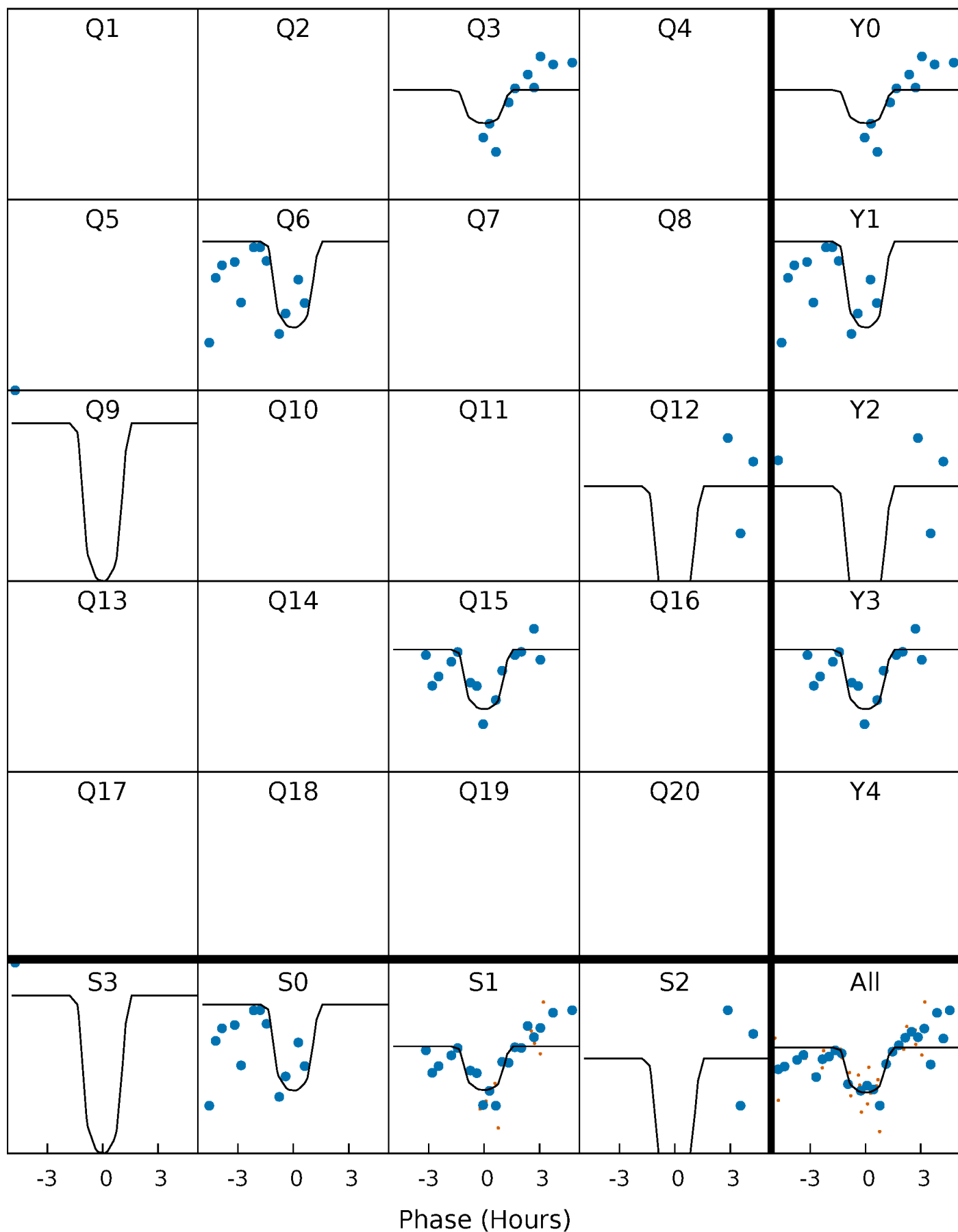
# PDC Quarter-Phased Transit Curves

TCE 010593110-08 P=276.493940 Days  $T_0=336.509572$  (BKJD)



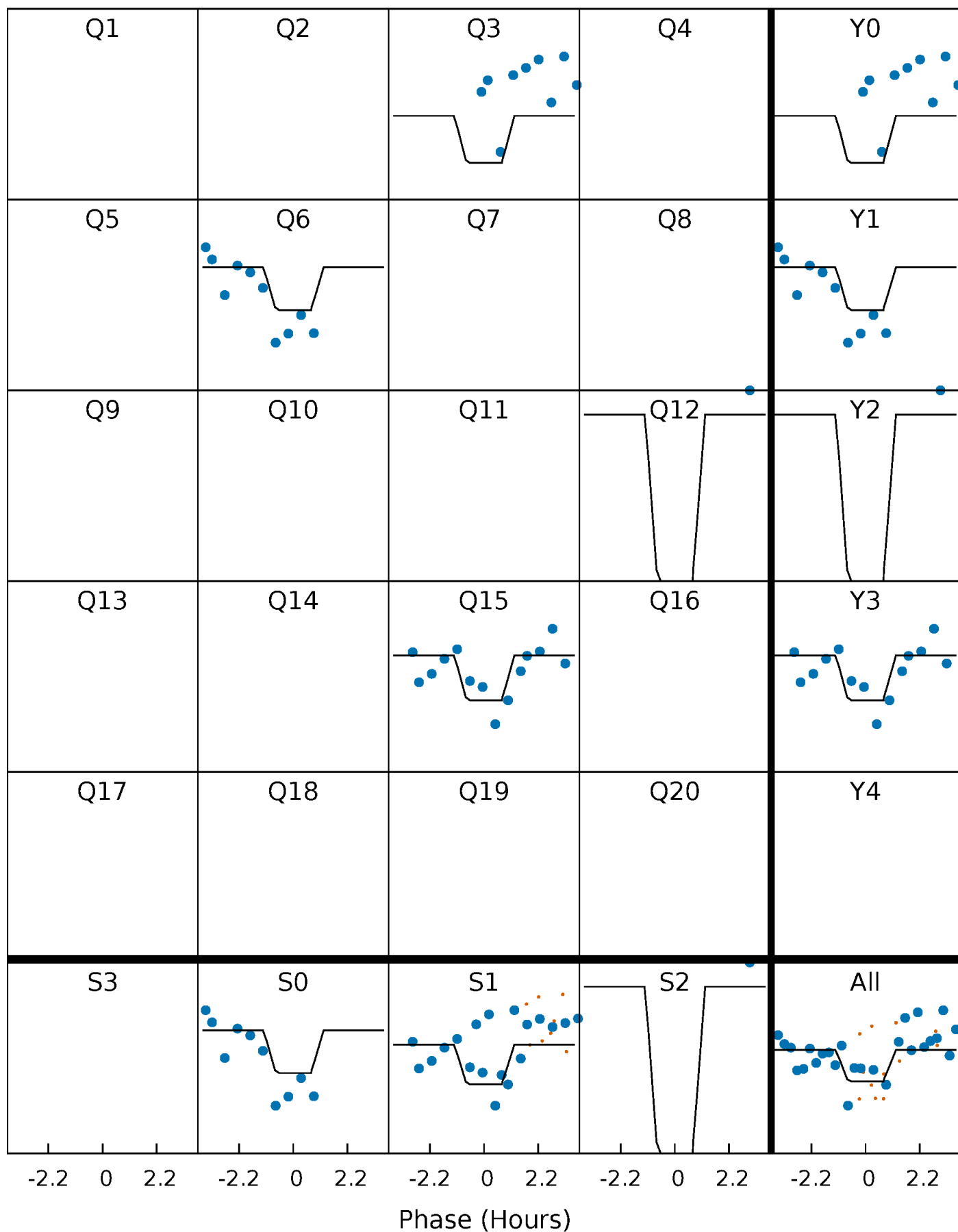
# DV Quarter-Phased Transit Curves

TCE 010593110-08     $P=276.493940$  Days     $T_0=336.509572$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

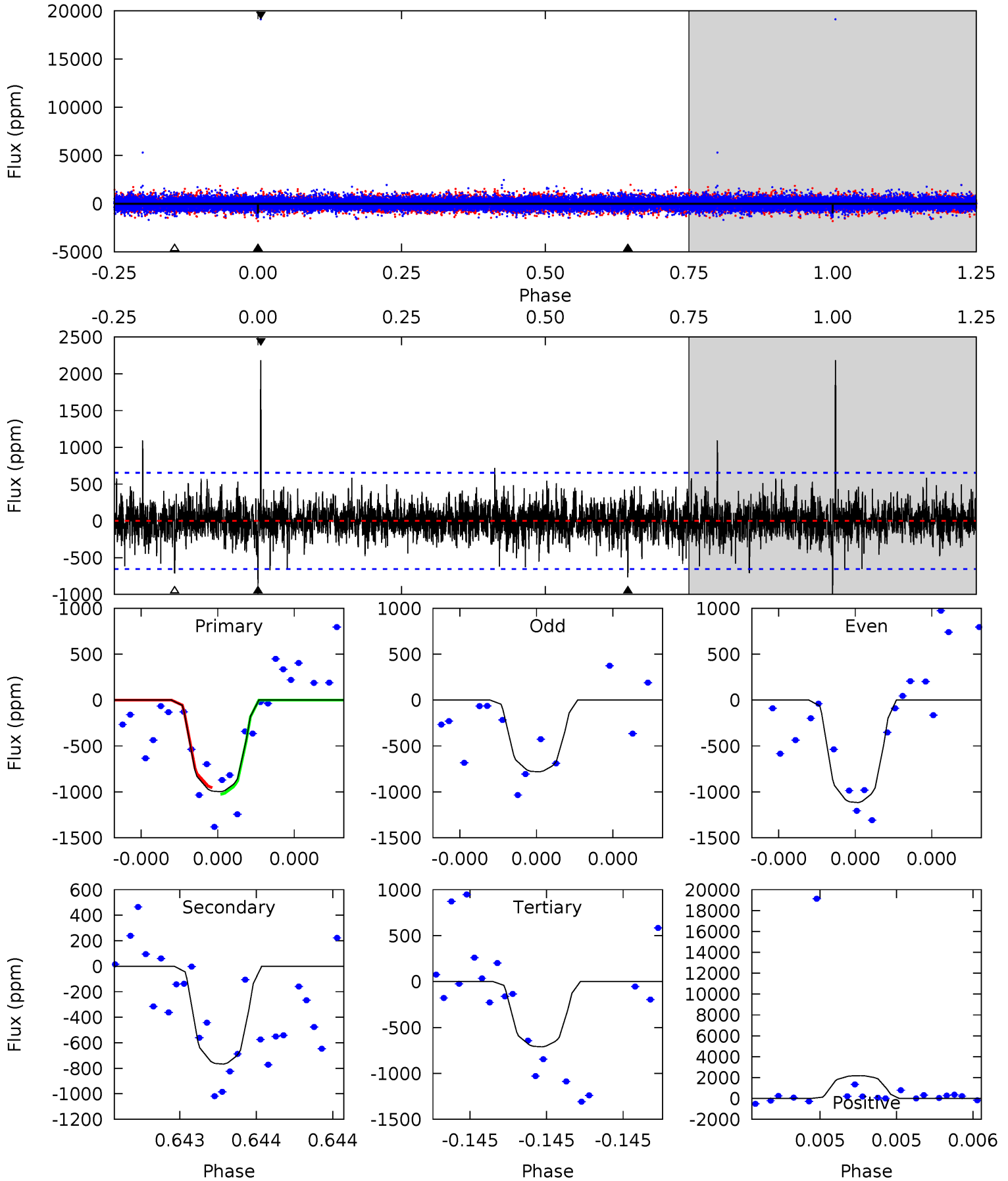
TCE 010593110-08 P=276.490666 Days  $T_0=336.510418$  (BKJD)



# DV Model-Shift Uniqueness Test

010593110-08, P = 276.493940 Days, E = 60.015632 Days

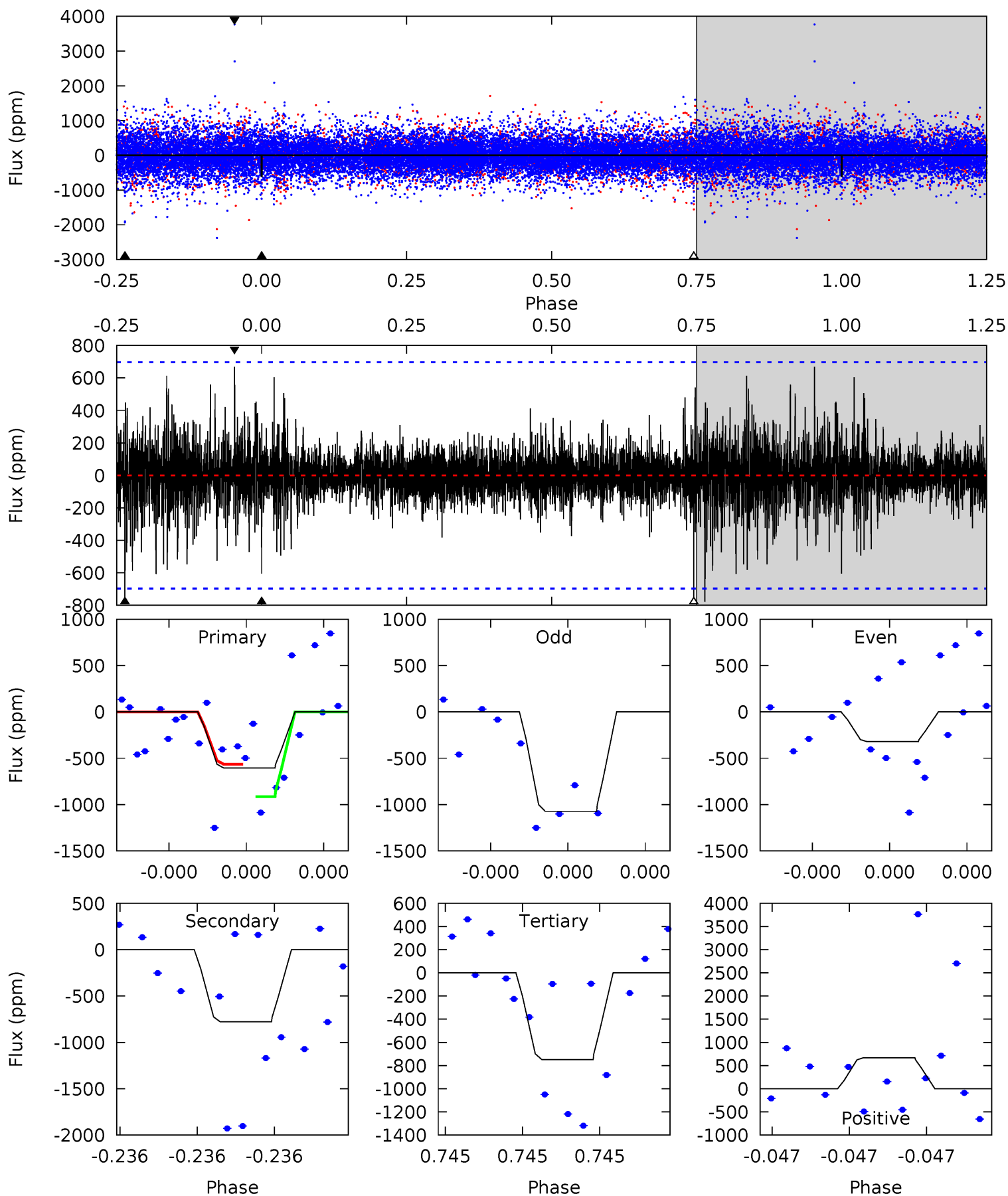
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.53	6.56	6.07	18.7	5.59	3.51	1.45	2.46	-10.1	0.48	-12.1	1.39	1.19	0.69	0.31



# Alt Model-Shift Uniqueness Test

010593110-08,  $P = 276.490666$  Days,  $E = 60.019752$  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
4.91	6.32	6.08	5.43	5.66	3.62	0.96	-1.17	-0.52	0.24	0.89	3.08	0.78	0.46	1.35



### Stellar Parameters For KIC 010593110

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (g \cdot \text{cm}^{-3})$
	$4330^{+129}_{-129}$	$4.640^{+0.049}_{-0.025}$	$-0.260^{+0.300}_{-0.300}$	$0.618^{+0.050}_{-0.056}$	$0.610^{+0.066}_{-0.050}$	$3.632^{+0.843}_{-0.438}$
	+3%/-3%	+1%/-1%	+115%/-115%	+8%/-9%	+11%/-8%	+23%/-12%
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 010593110-08 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-767 \pm 117$	$2.53^{+1.95}_{-1.49}$	$248^{+9}_{-8}$	$3871^{+1584}_{-656}$	$32634^{+158263}_{-22007}$
Alt.	$-778 \pm 123$	$2.24^{+1.74}_{-1.47}$	$249^{+8}_{-8}$	$4058^{+2319}_{-743}$	$42990^{+327622}_{-29656}$

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



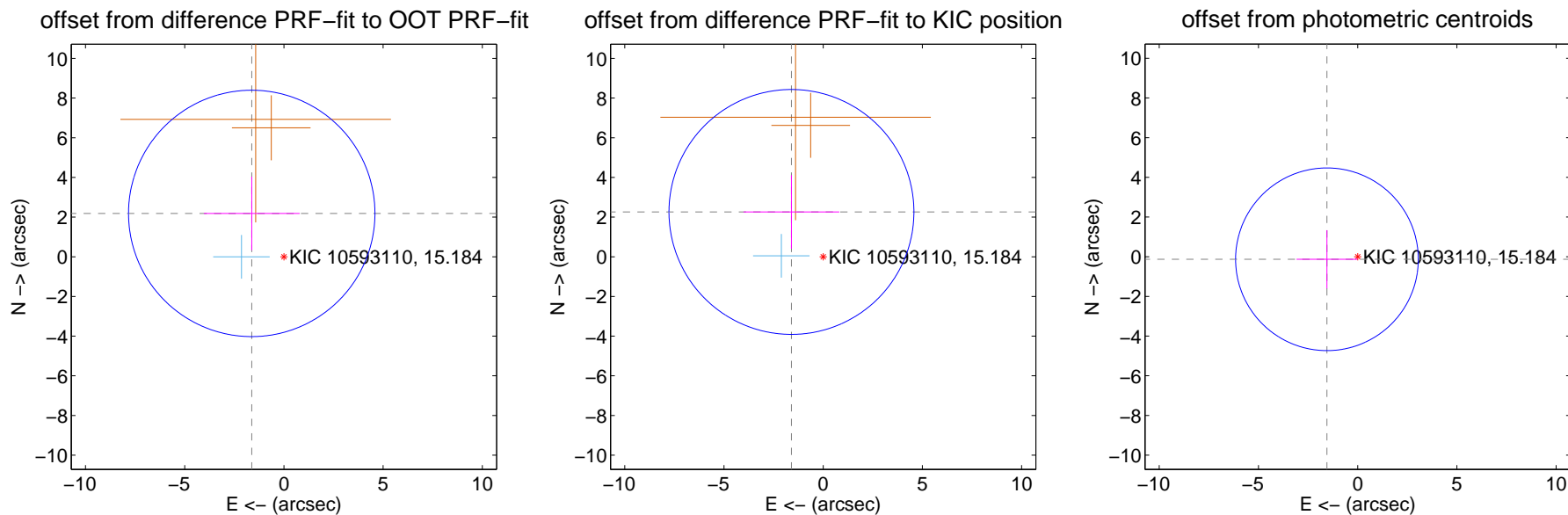
## DV Centroid Data

Supplemental centroid analysis for 010593110-08. Kepler magnitude: 15.18. Transit SNR 6.38

There are 1 quarters with good PRF difference image offsets

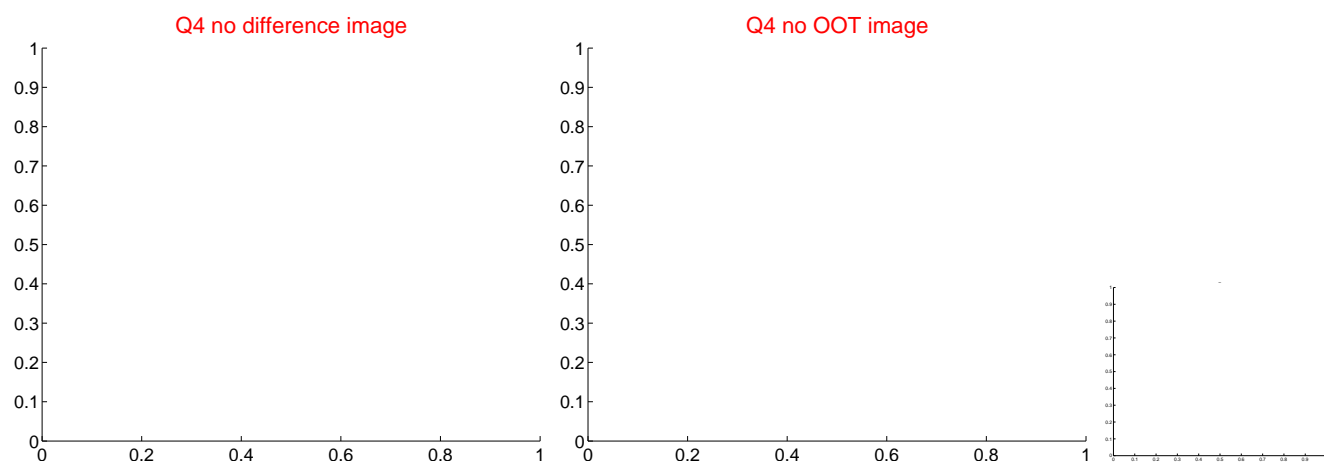
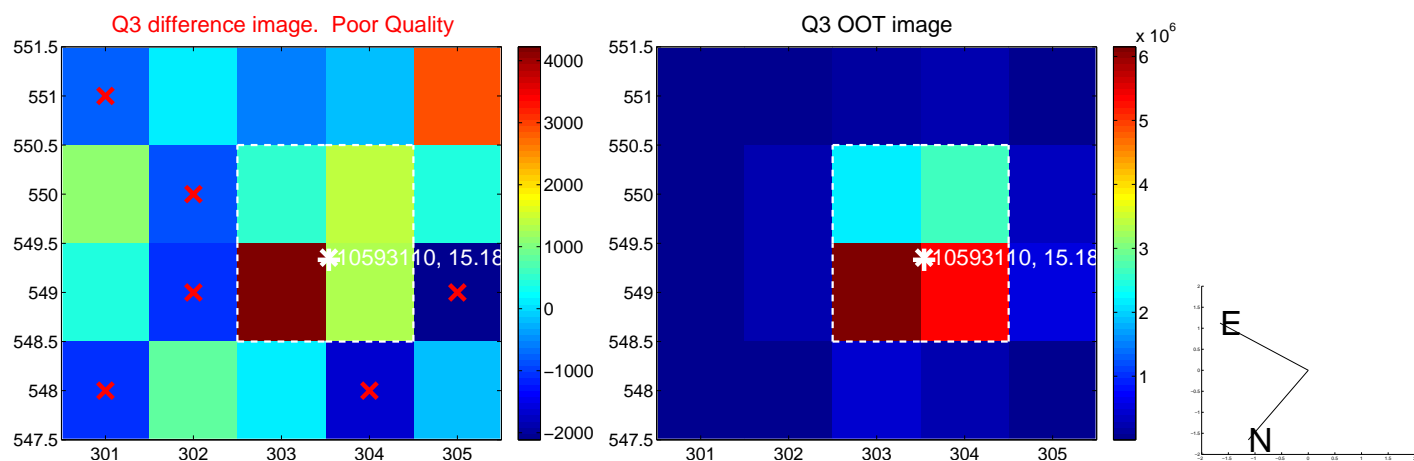
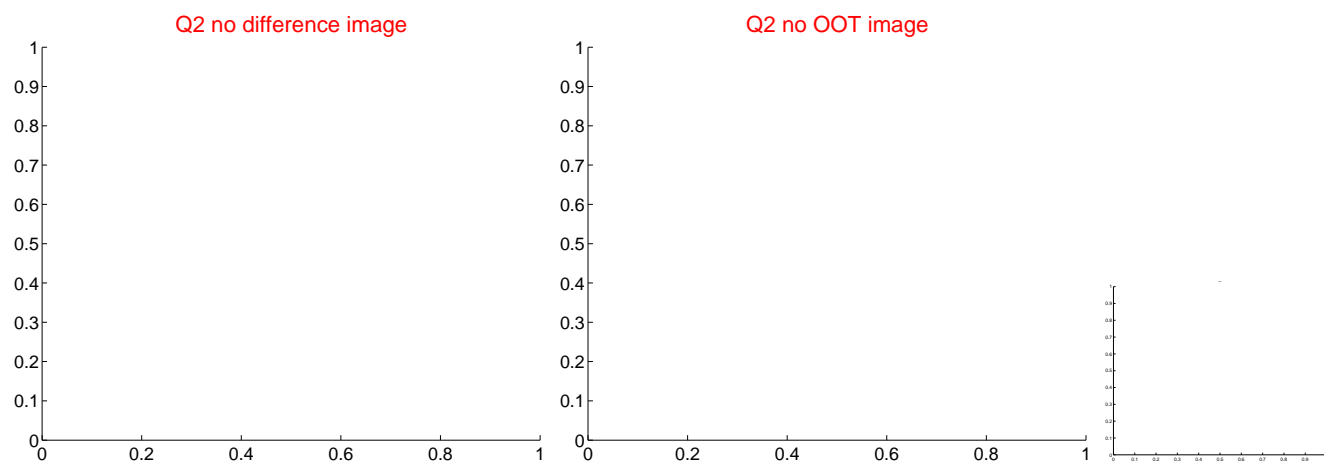
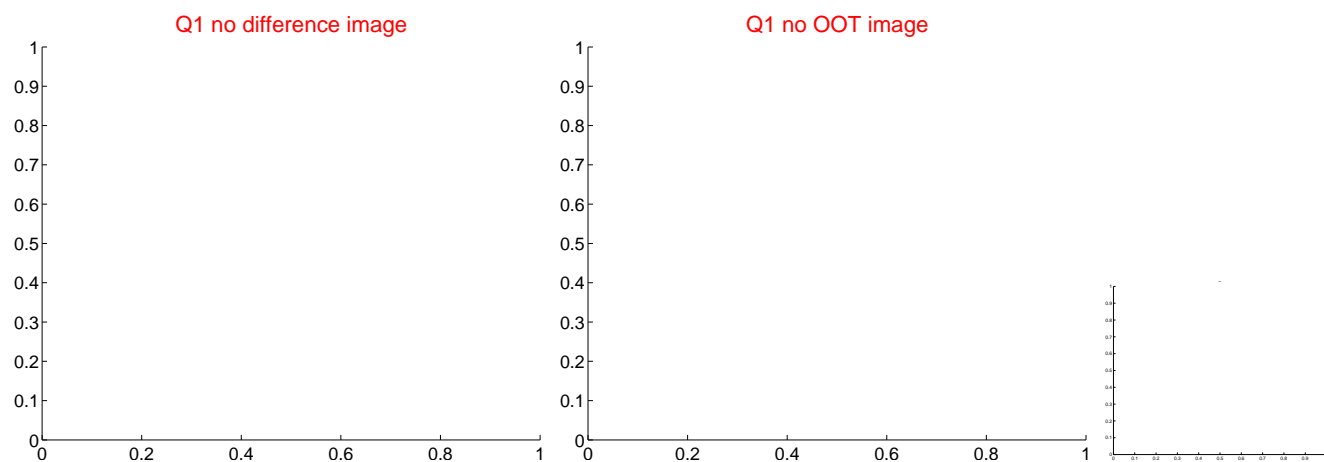
The direct PRF centroid is offset from the target star catalog position by about 0.06 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.722 \pm 2.070$	1.32	$1.622 \pm 2.414$	$2.186 \pm 1.853$
PRF-fit source offset from KIC position	$2.769 \pm 2.057$	1.35	$1.600 \pm 2.414$	$2.260 \pm 1.853$
photometric centroid source offset	$1.55 \pm 1.53$	1.01	$1.55 \pm 1.53$	$-0.13 \pm 1.47$

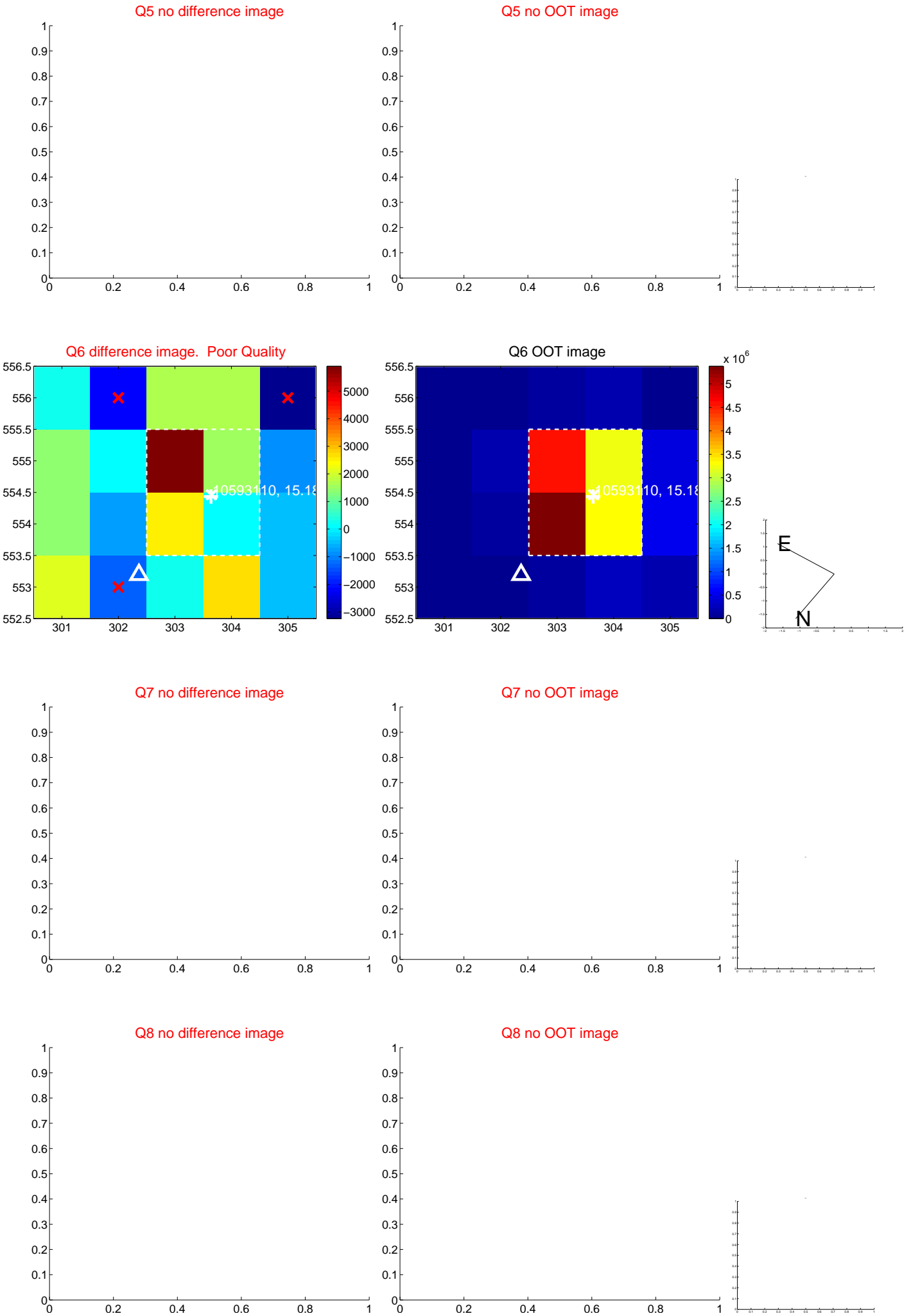


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

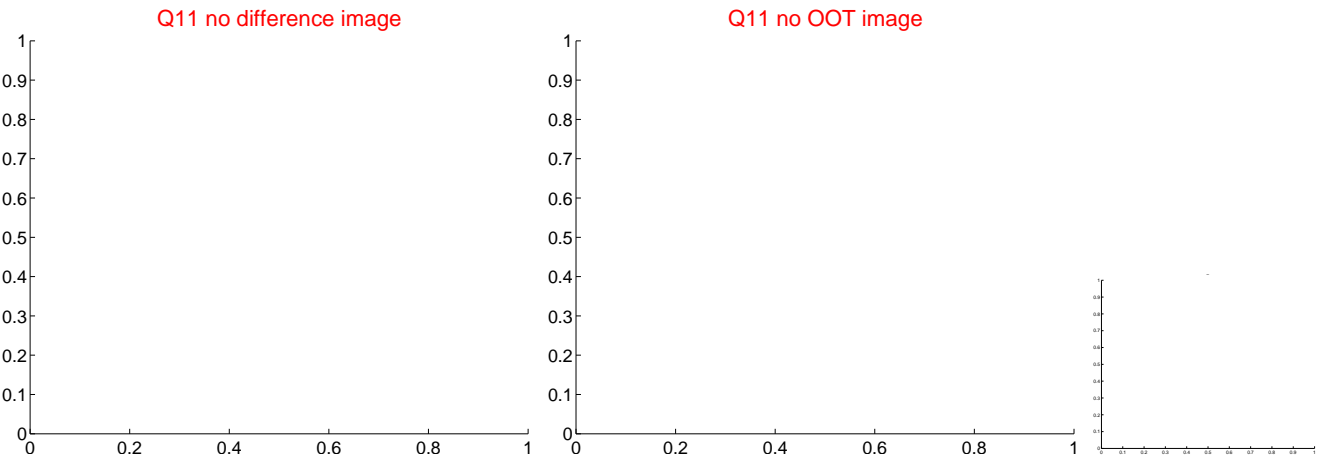
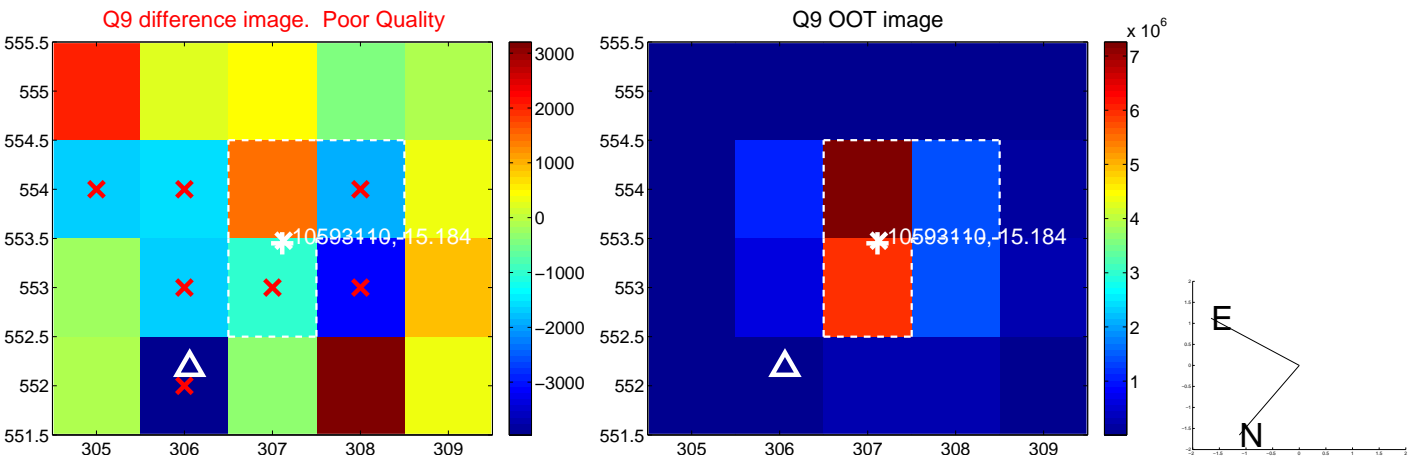
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



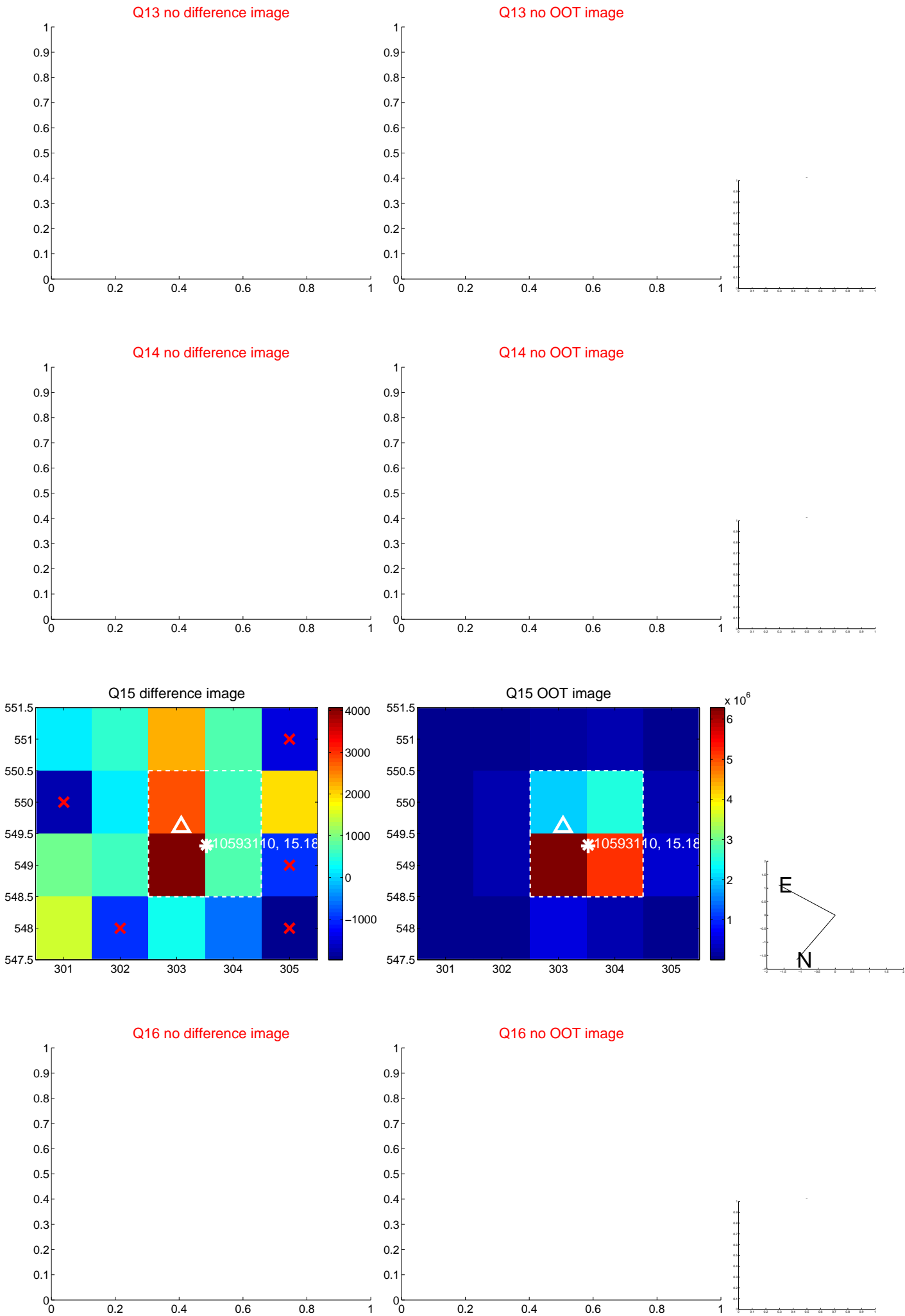
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



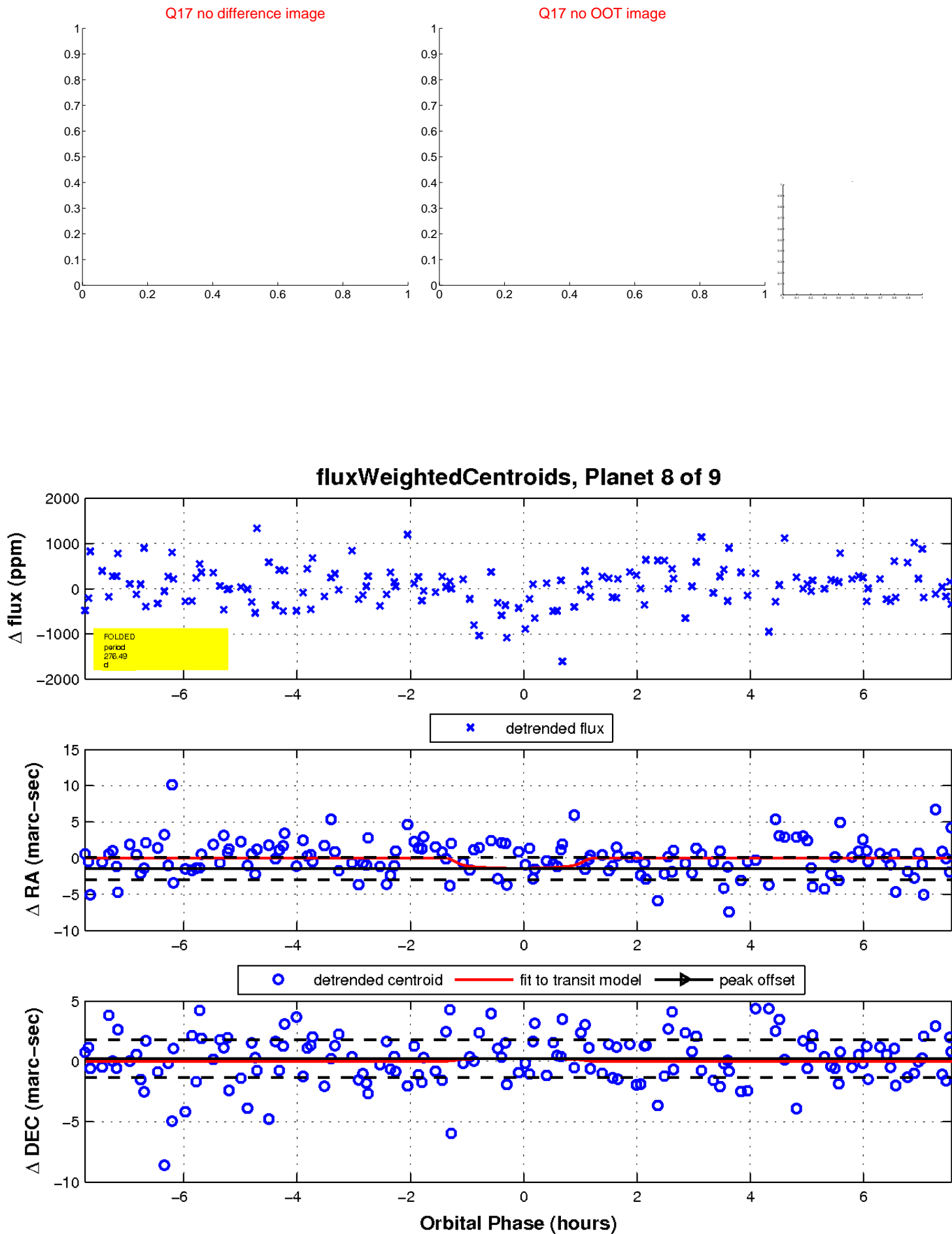
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



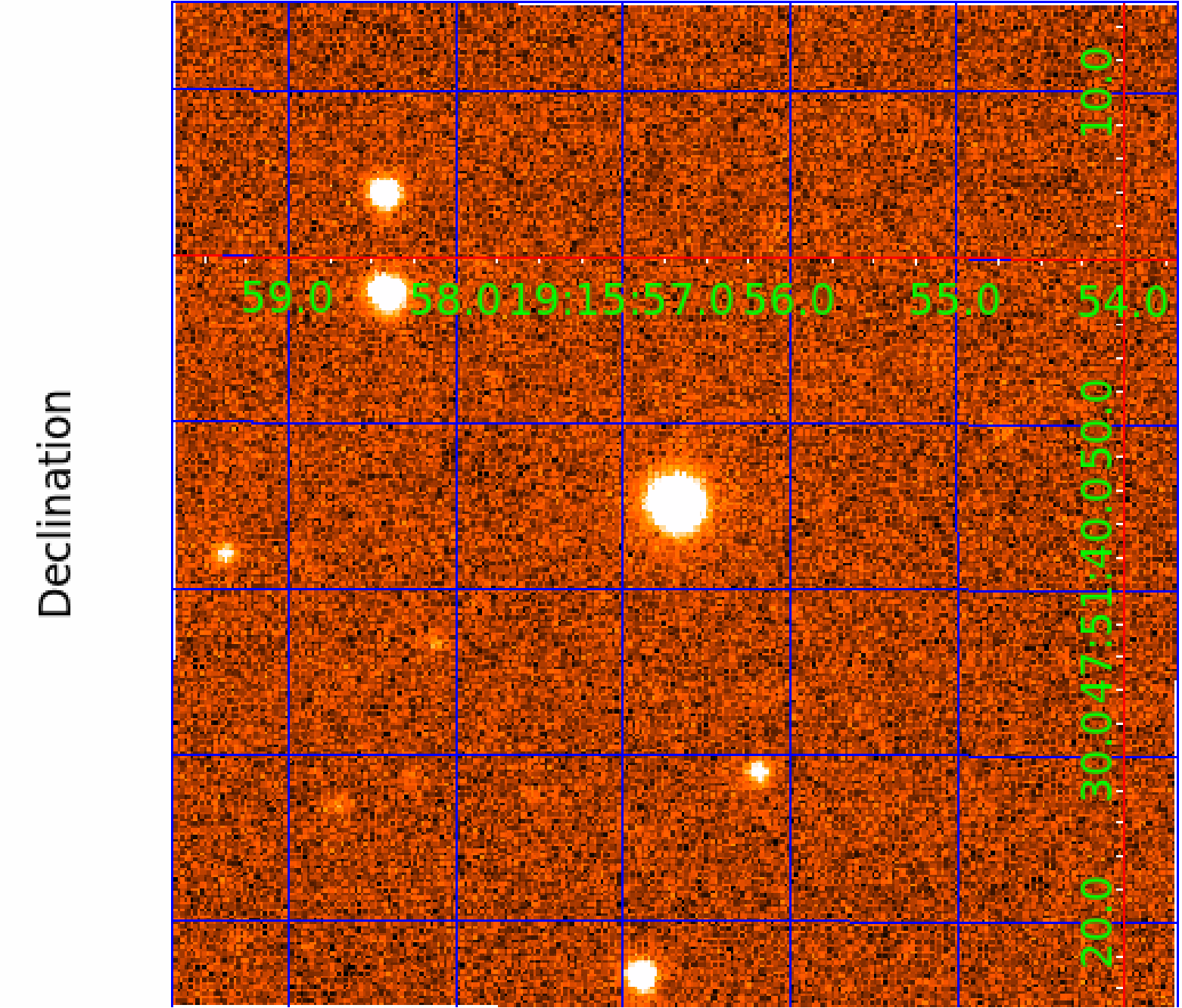
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image



# KIC 010593110

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010593110-01	OBS	No	0.822191	132.325009	37.8	4.078	7.4	7.1	0.62	4330	0.37	567.82
010593110-03	OBS	No	283.587961	356.516235	742.1	4.733	12.3	7.8	0.62	4330	1.92	0.23
010593110-04	OBS	No	181.556830	271.668945	1017.8	3.814	15.3	8.0	0.62	4330	2.02	0.42
010593110-05	OBS	No	109.121239	204.446957	455.7	19.790	10.4	5.0	0.62	4330	1.36	0.84
010593110-06	OBS	No	120.587667	163.433496	687.0	7.664	9.1	7.3	0.62	4330	1.77	0.73
010593110-07	OBS	No	83.493941	205.287505	460.9	9.869	8.1	6.0	0.62	4330	1.41	1.20
010593110-08	OBS	No	276.493940	336.509572	965.7	2.584	8.5	6.4	0.62	4330	2.26	0.24
010593110-09	OBS	No	171.405232	287.356663	954.4	2.672	7.6	7.1	0.62	4330	2.11	0.46

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010593110-01	OBS	FP	0.00	1	0	0	0	LPP_DV
010593110-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010593110-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010593110-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS
010593110-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010593110-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—CENT_FEW_MEAS
010593110-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
010593110-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—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.

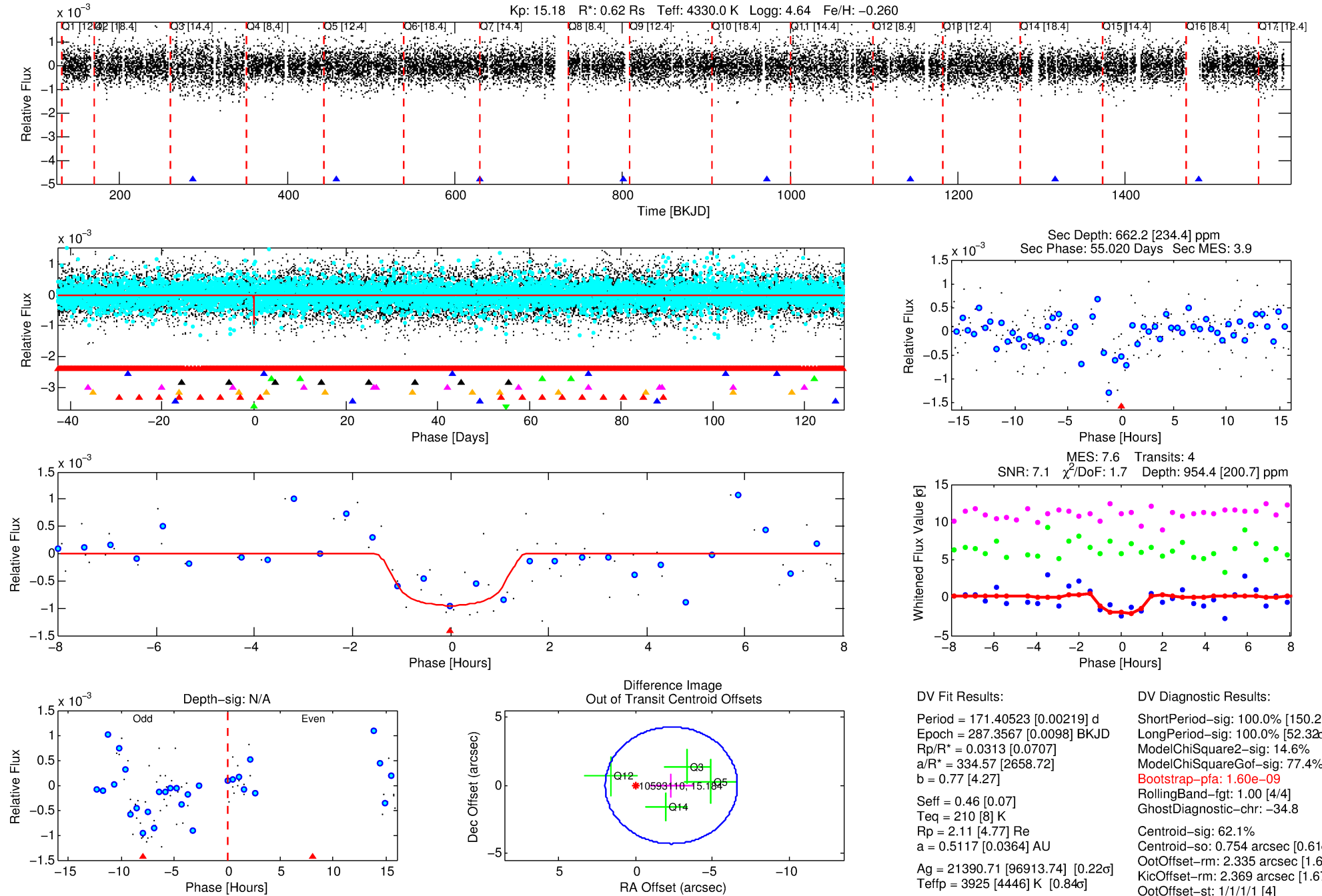
Ephemeris Match Information For 010593110-09

No Significant Match Found



# DV One-Page Summary

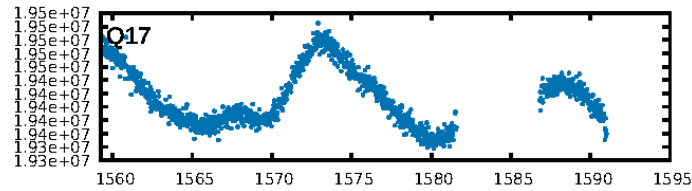
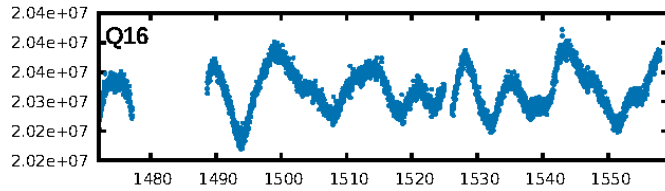
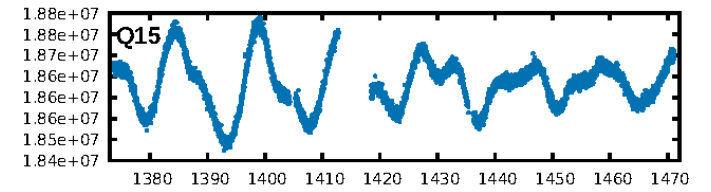
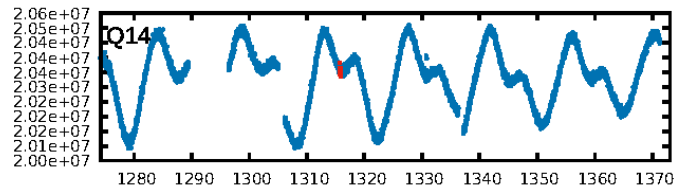
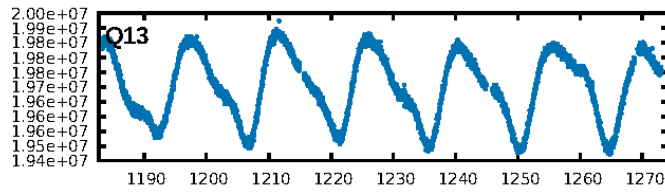
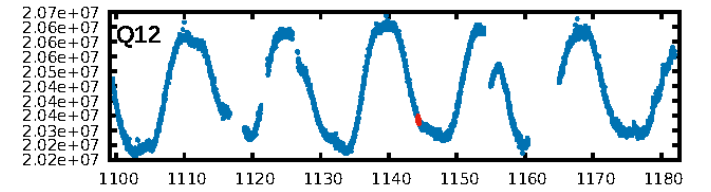
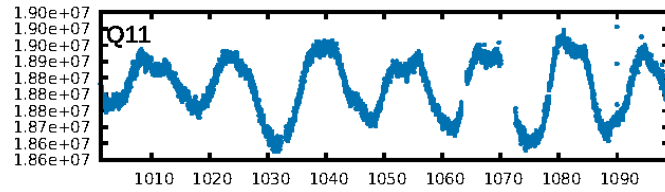
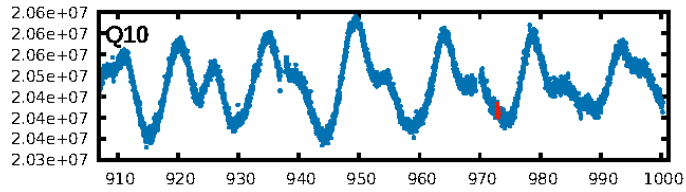
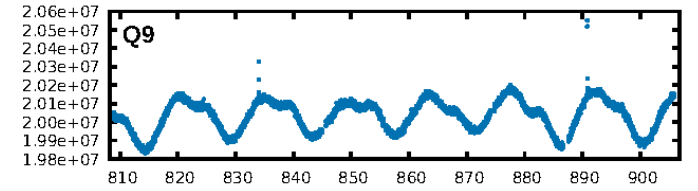
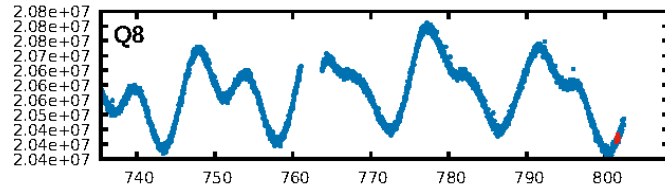
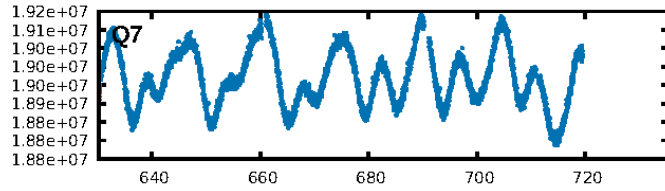
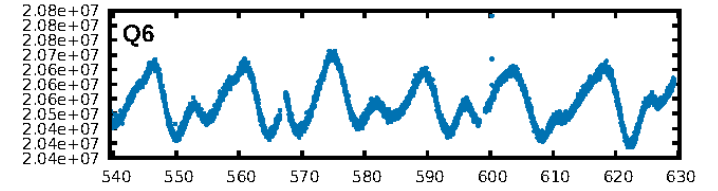
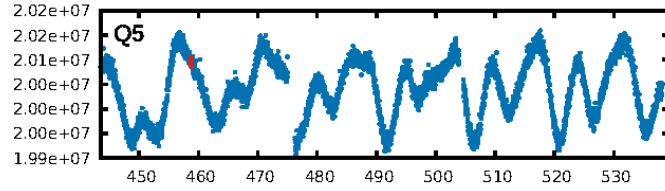
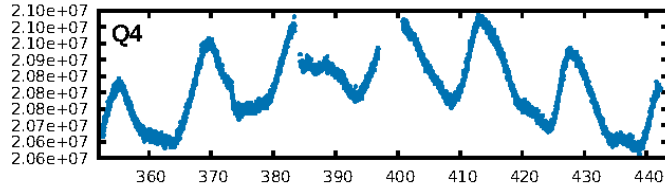
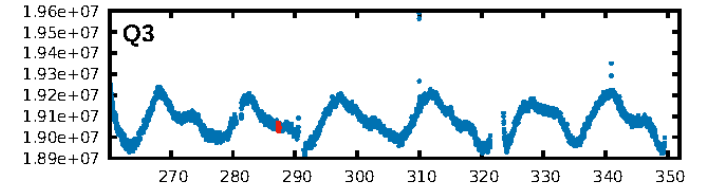
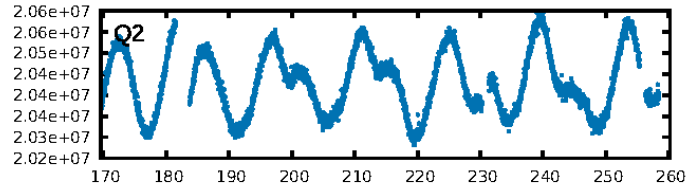
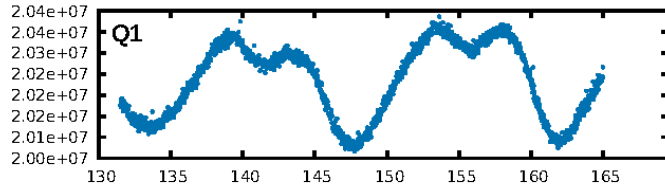
KIC: 10593110 Candidate: 9 of 9 Period: 171.405 d



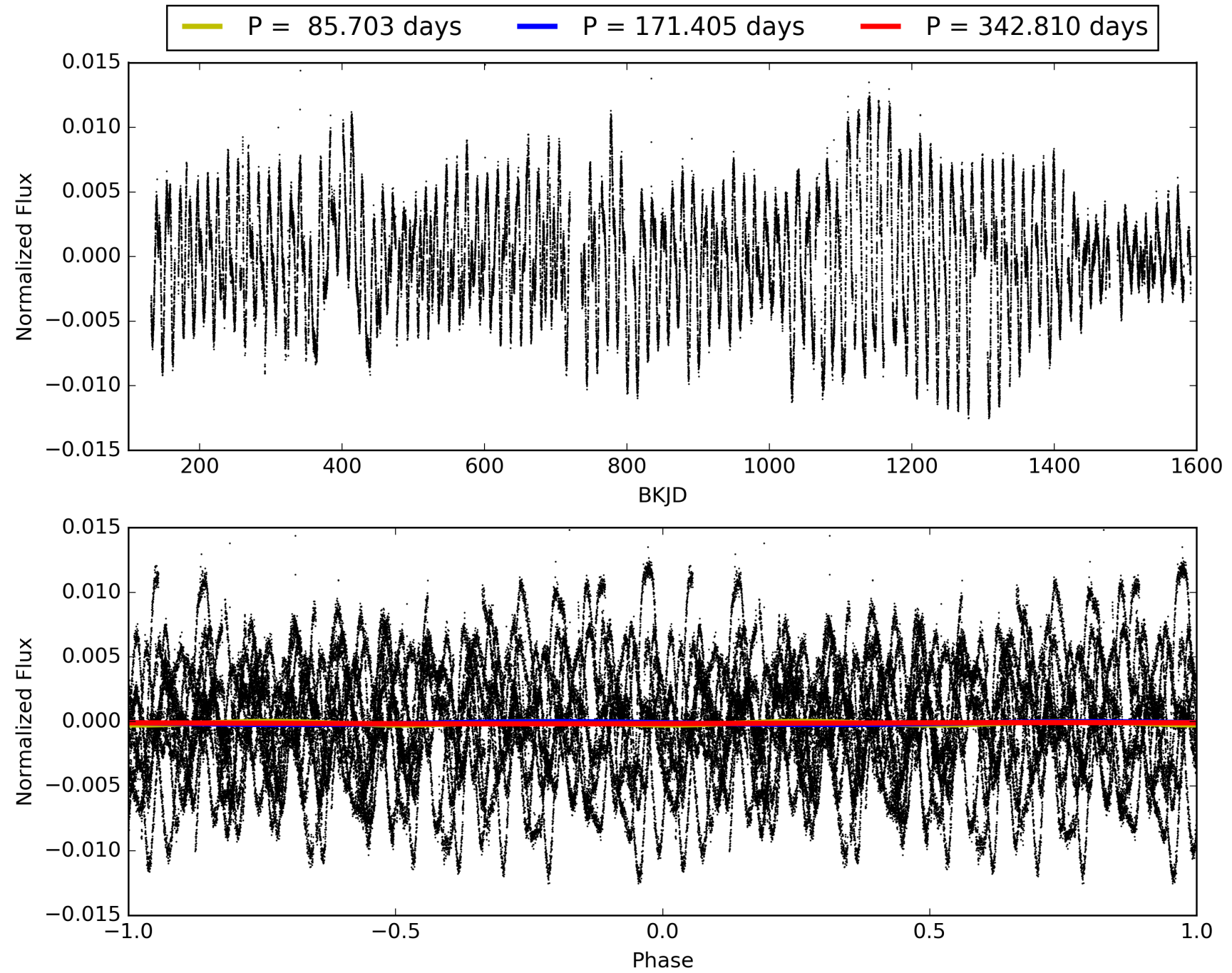
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 02:57:07 Z

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

# TCE 010593110-09, PDC Light Curves

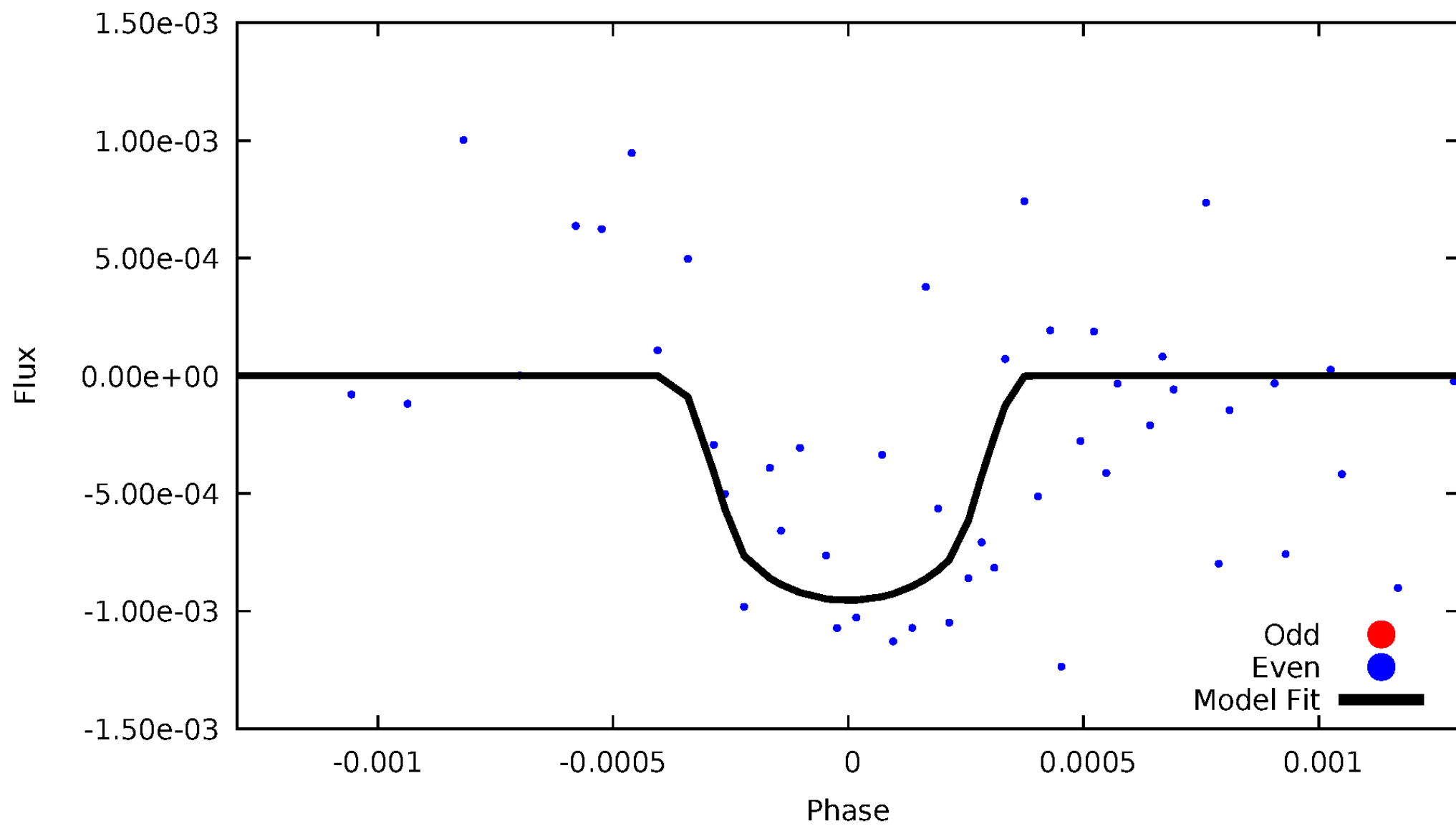


# TCE 010593110-09



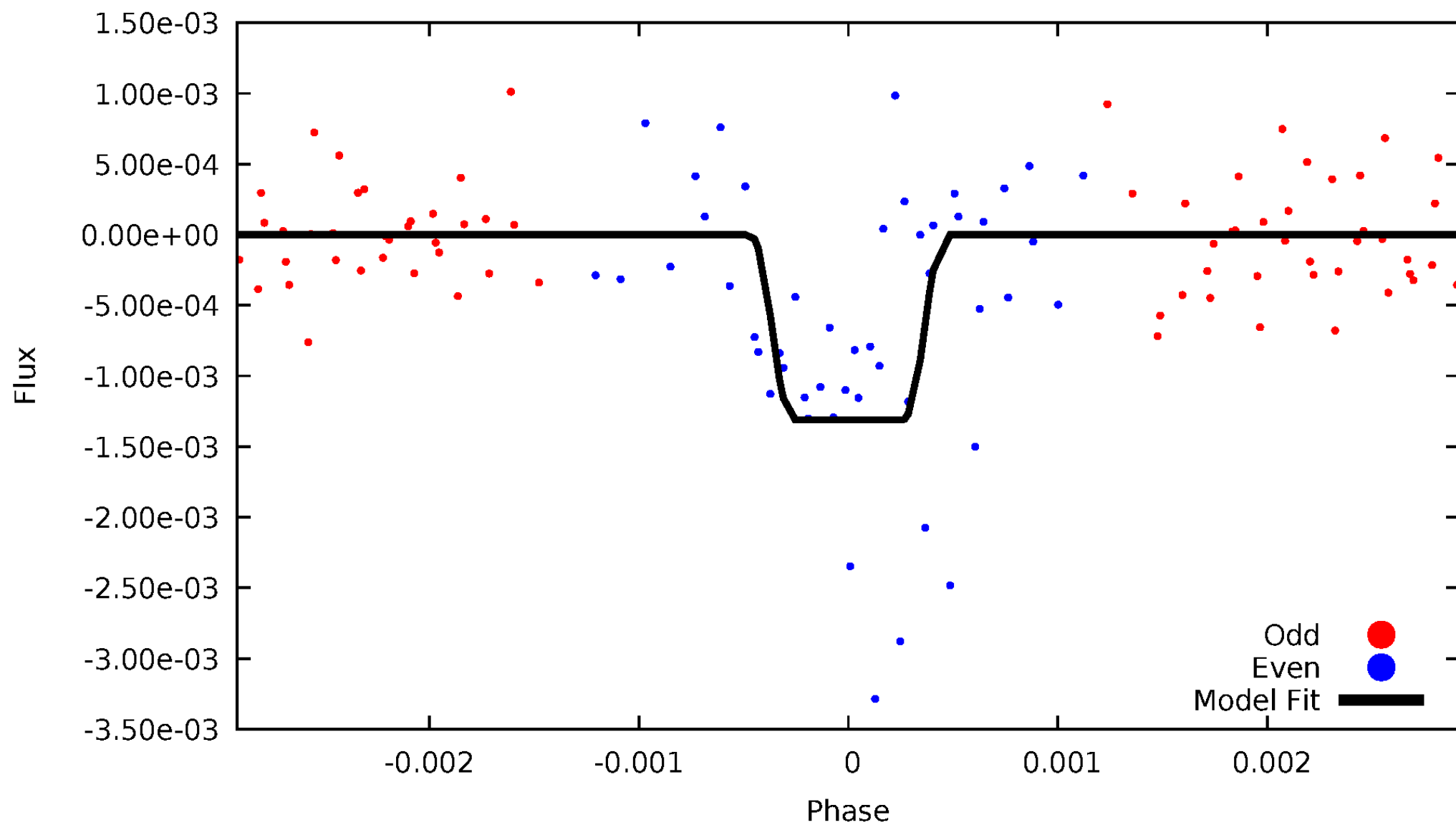
# DV Odd/Even

TCE 010593110-09



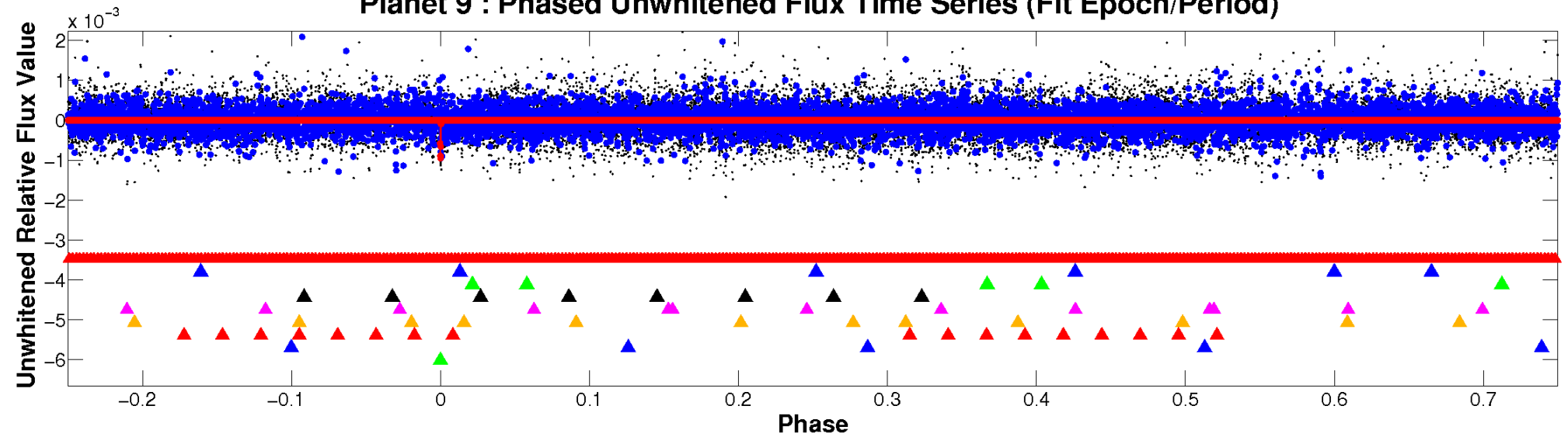
# ALT Odd/Even

TCE 010593110-09

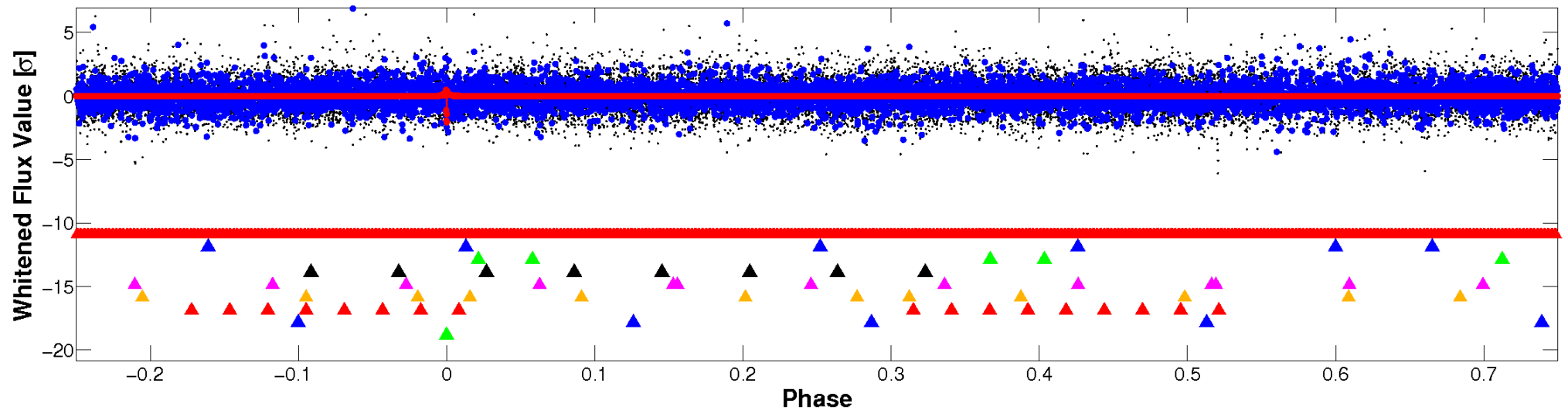


# Non-Whitened Vs. Whitened Light Curve

Planet 9 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

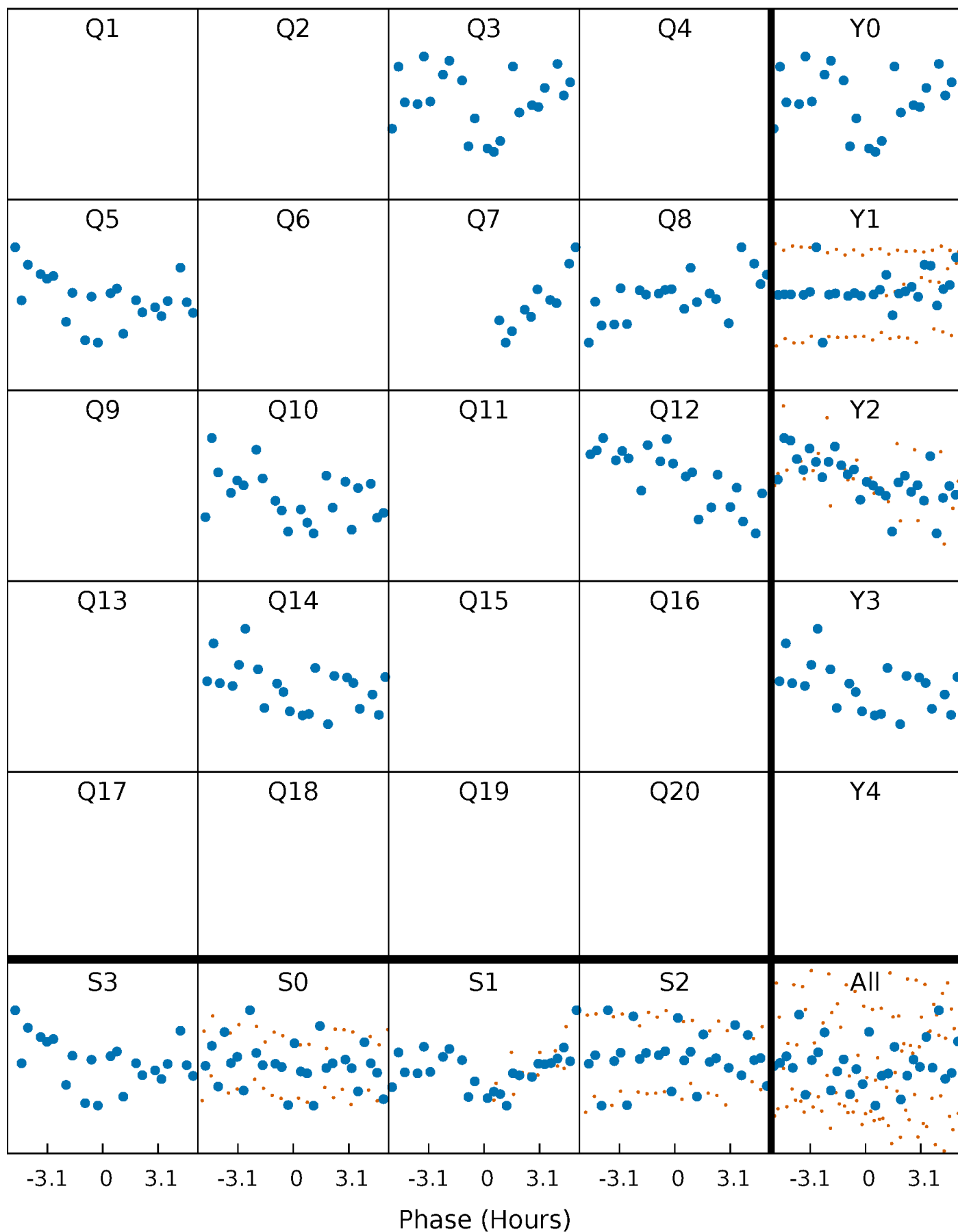


Planet 9 : Phased Whitened Flux Time Series (Fit Epoch/Period)



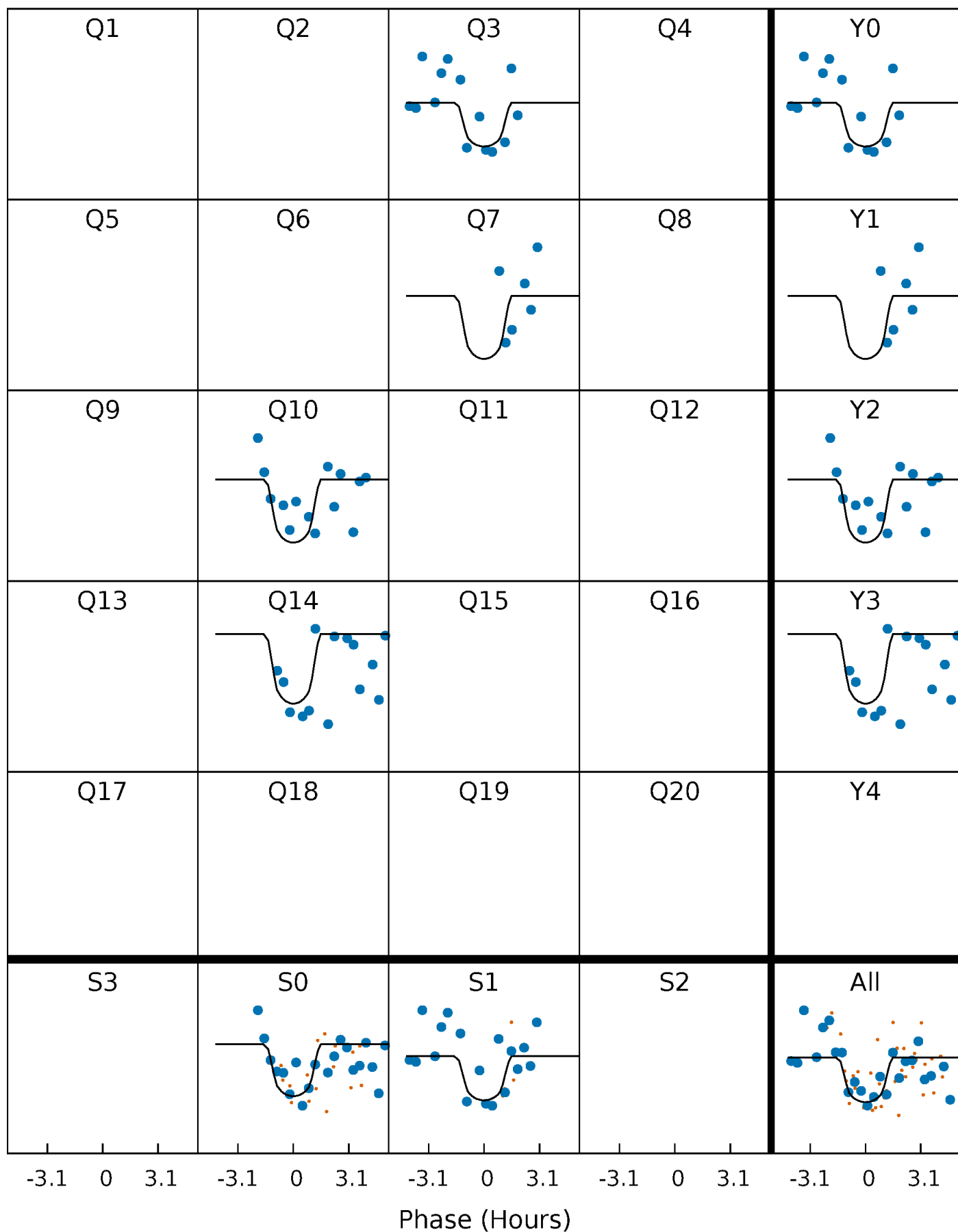
# PDC Quarter-Phased Transit Curves

TCE 010593110-09 P=171.405232 Days  $T_0=287.356663$  (BKJD)



# DV Quarter-Phased Transit Curves

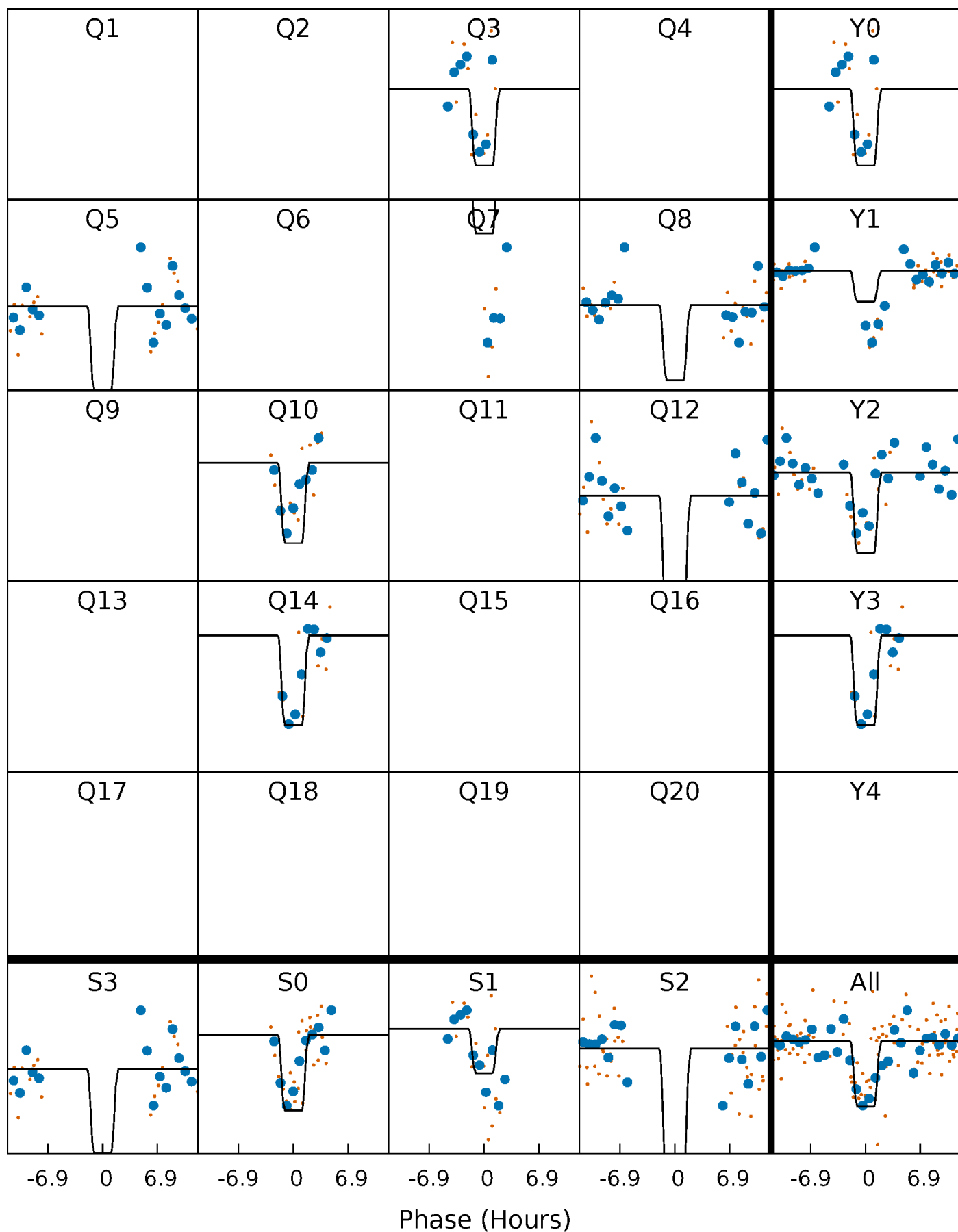
TCE 010593110-09 P=171.405232 Days  $T_0=287.356663$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

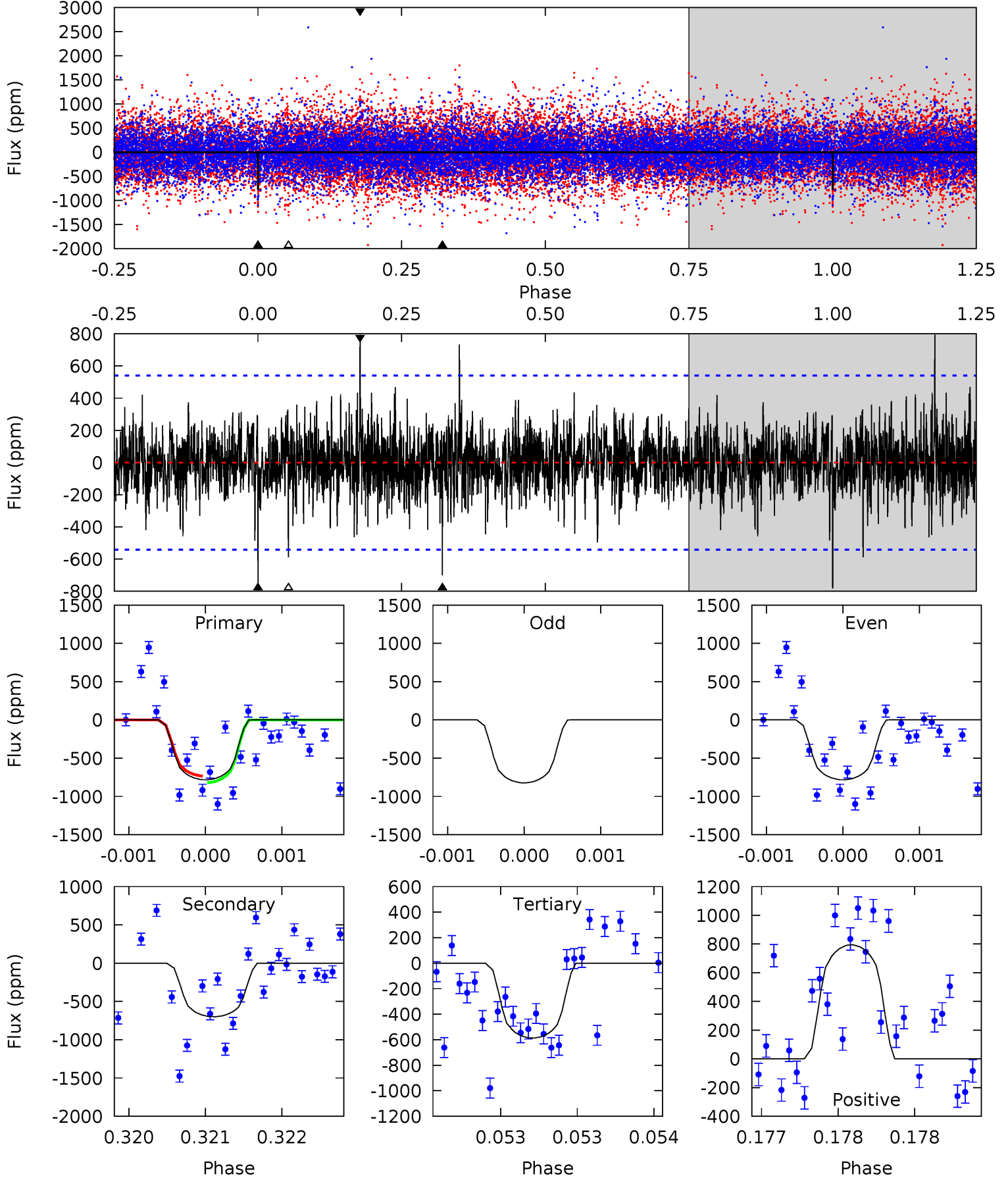
TCE 010593110-09 P=171.405700 Days  $T_0=287.382414$  (BKJD)



# DV Model-Shift Uniqueness Test

010593110-09, P = 171.405232 Days, E = 115.951431 Days

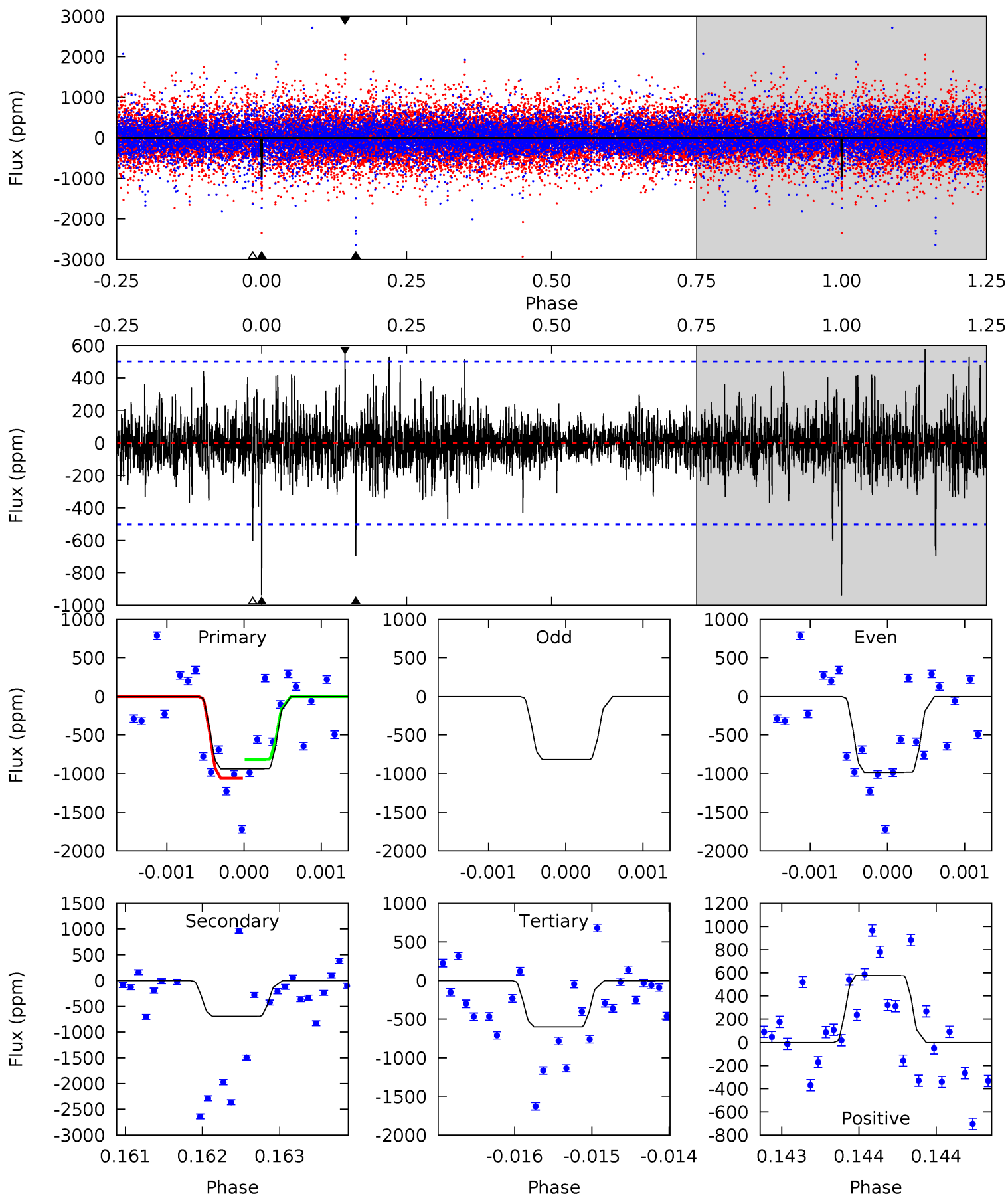
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.99	7.15	5.99	8.11	5.52	3.41	1.40	2.00	-0.12	1.15	-0.97	0.25	0.82	0.50	0.44



# Alt Model-Shift Uniqueness Test

010593110-09, P = 171.405700 Days, E = 115.976714 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.2	7.58	6.55	6.30	5.48	3.34	1.19	3.69	3.94	1.03	1.28	1.00	1.51	0.38	1.31



### Stellar Parameters For KIC 010593110

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4330^{+129}_{-129}$	$4.640^{+0.049}_{-0.025}$	$-0.260^{+0.300}_{-0.300}$	$0.618^{+0.050}_{-0.056}$	$0.610^{+0.066}_{-0.050}$	$3.632^{+0.843}_{-0.438}$
	+3%/-3%	+1%/-1%	+115%/-115%	+8%/-9%	+11%/-8%	+23%/-12%
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 010593110-09 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-700 \pm 98$	$4.23^{+3.86}_{-2.83}$	$292^{+10}_{-11}$	$3248^{+1543}_{-568}$	$5866^{+46222}_{-4338}$
Alt.	$-695 \pm 92$	$4.38^{+4.01}_{-2.95}$	$293^{+9}_{-10}$	$3213^{+1478}_{-530}$	$5396^{+44681}_{-3940}$

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

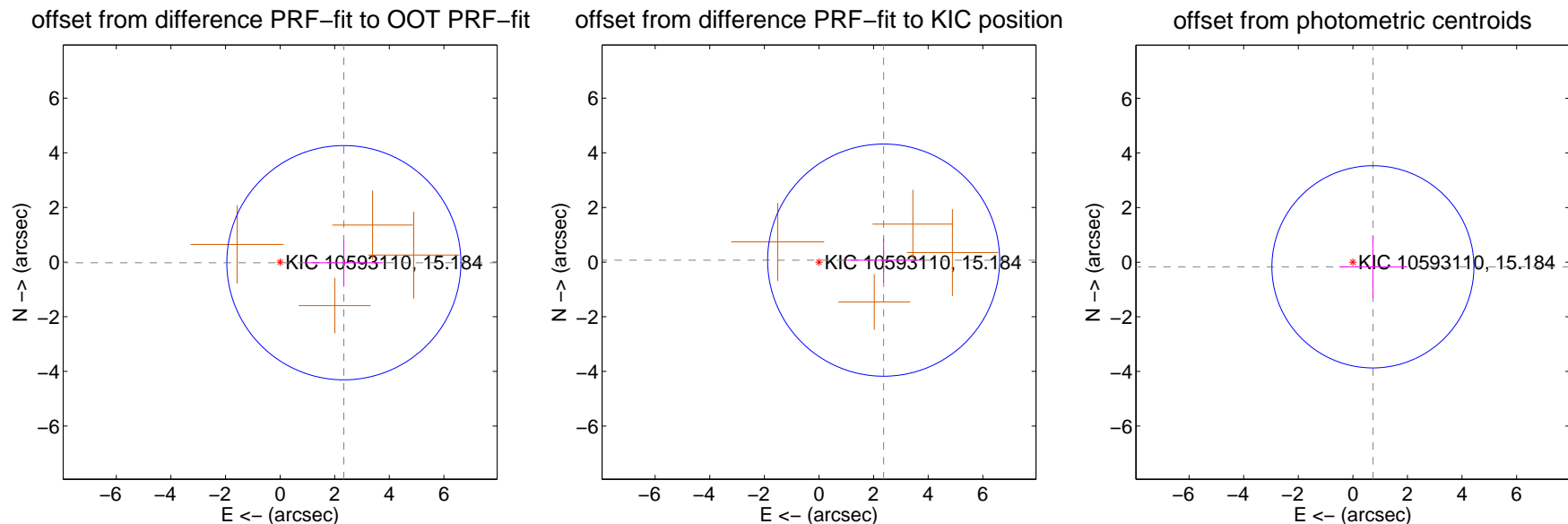
## DV Centroid Data

Supplemental centroid analysis for 010593110-09. Kepler magnitude: 15.18. Transit SNR 7.14

There are 0 quarters with good PRF difference image offsets

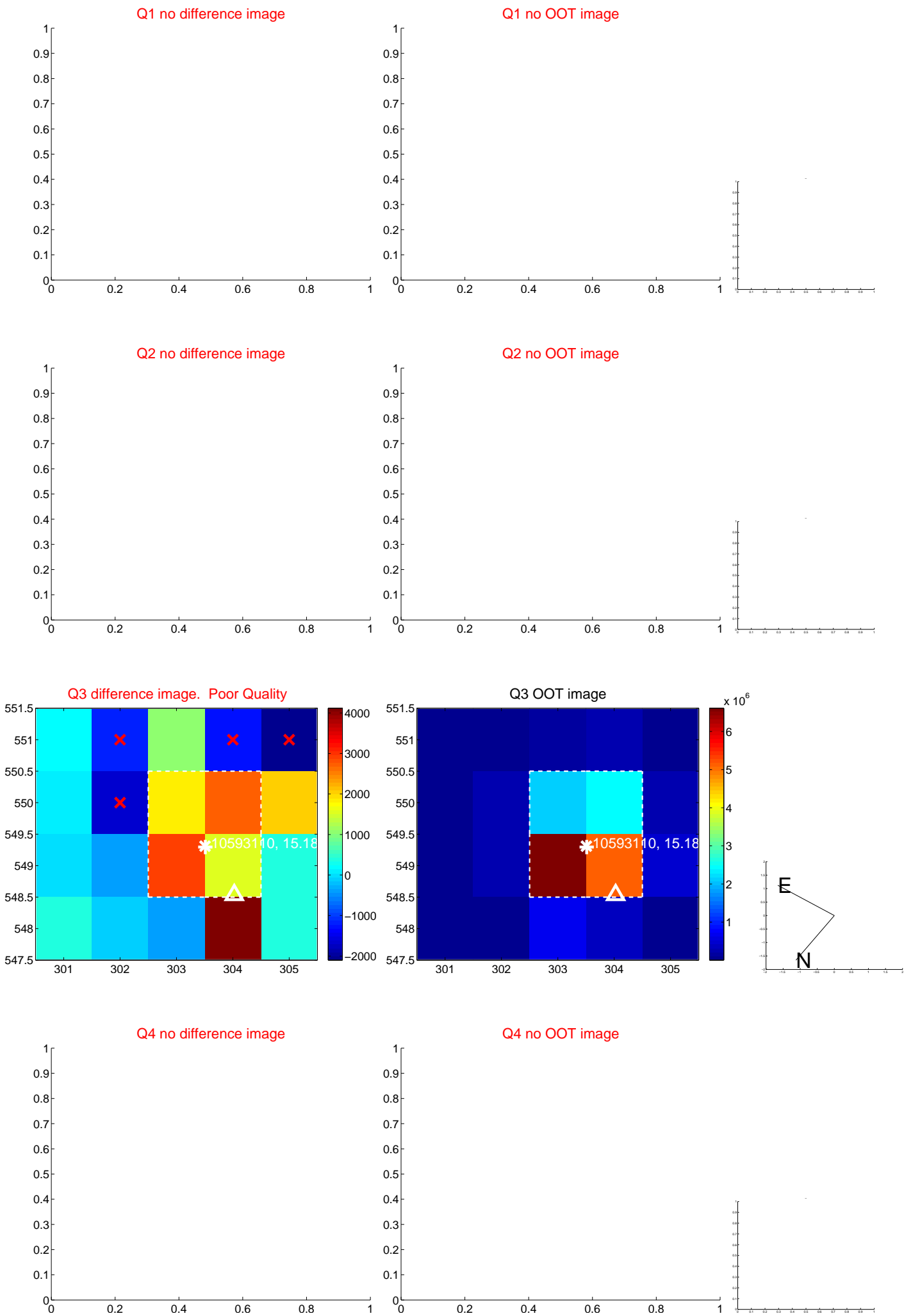
The direct PRF centroid is offset from the target star catalog position by about 0.14 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.335 \pm 1.429$	1.63	$-2.335 \pm 1.429$	$-0.023 \pm 0.834$
PRF-fit source offset from KIC position	$2.369 \pm 1.416$	1.67	$-2.368 \pm 1.416$	$0.071 \pm 0.810$
photometric centroid source offset	$0.75 \pm 1.23$	0.61	$-0.73 \pm 1.24$	$-0.17 \pm 1.14$

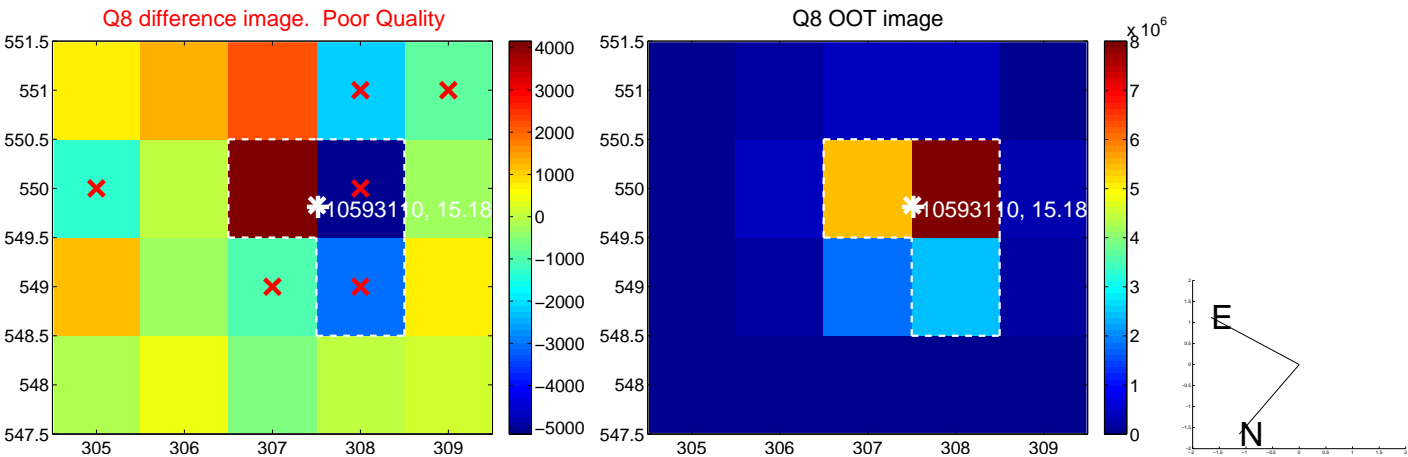
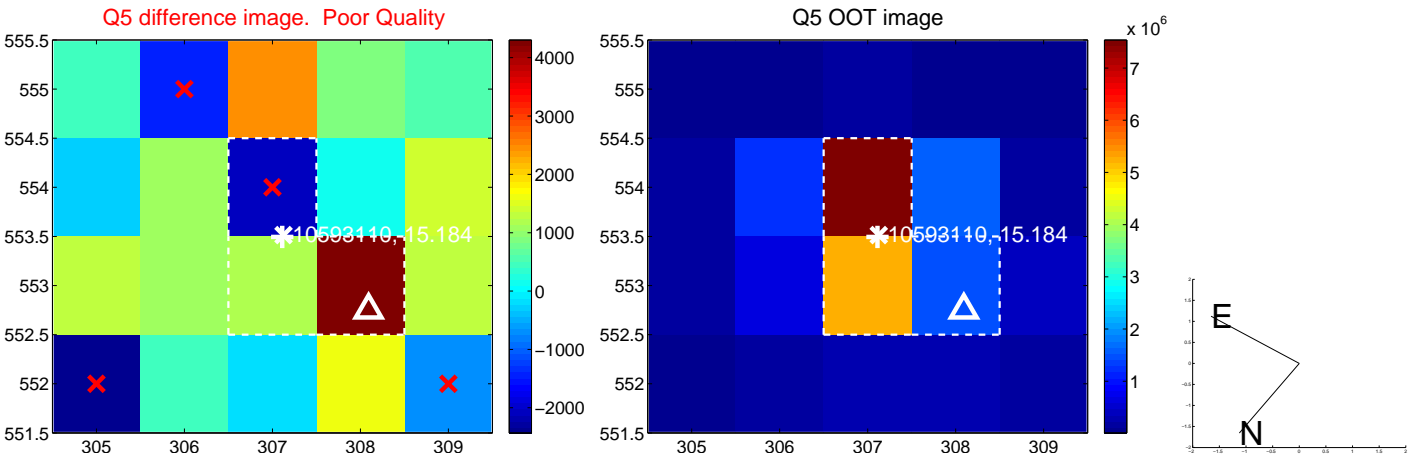


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

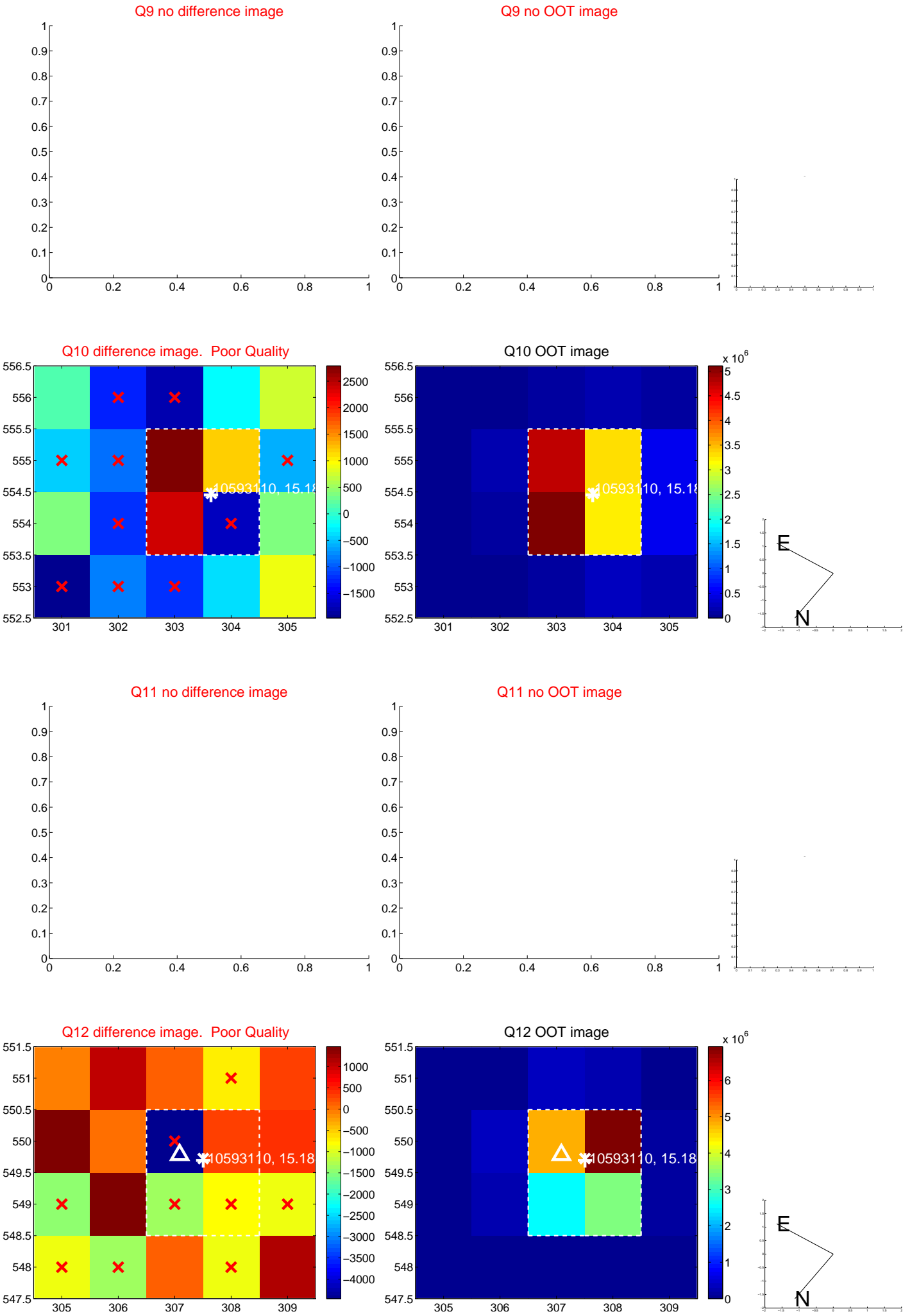
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



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

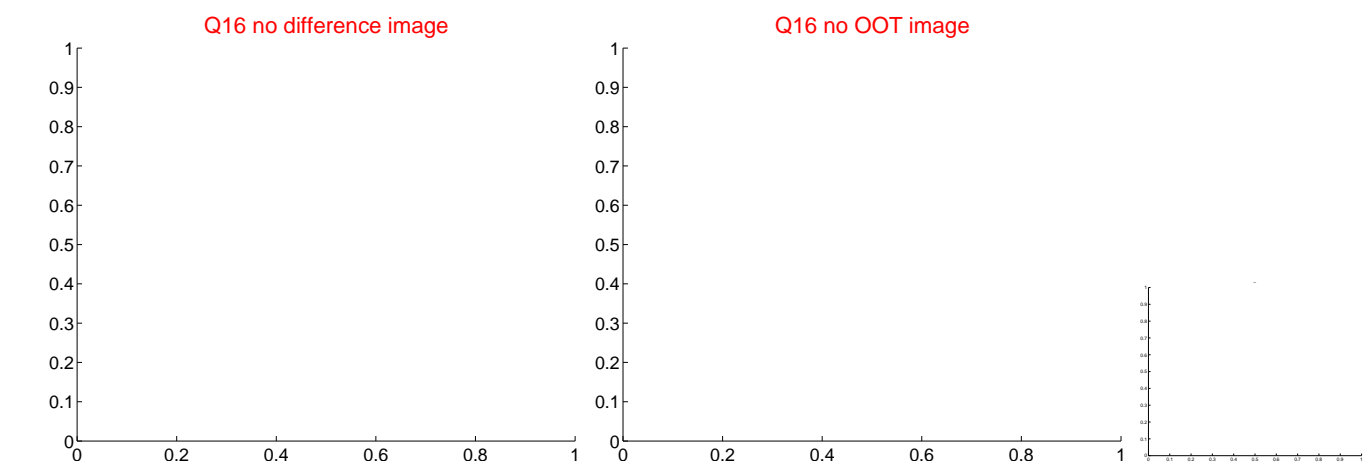
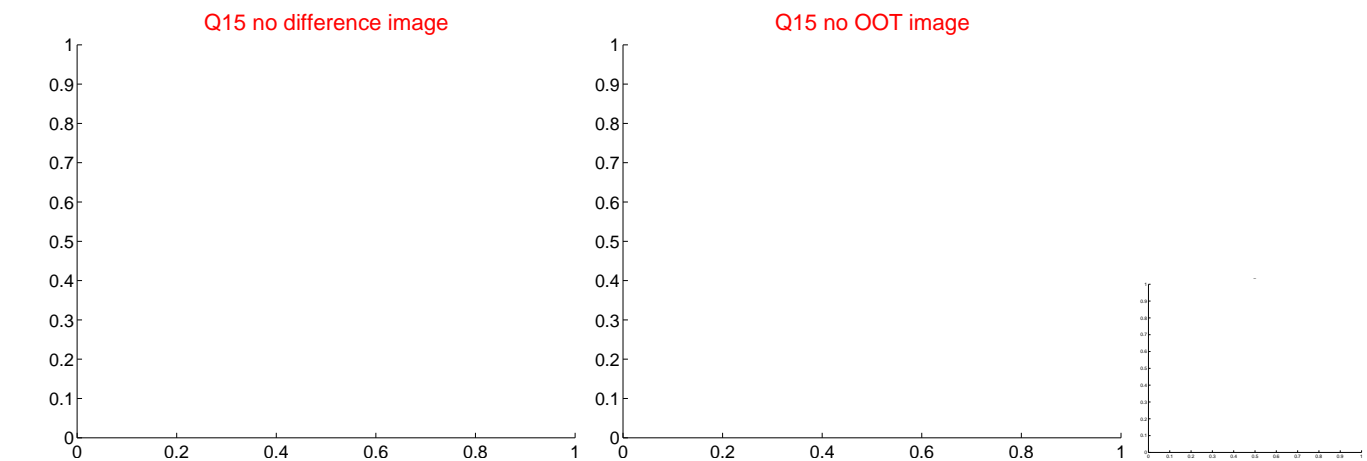
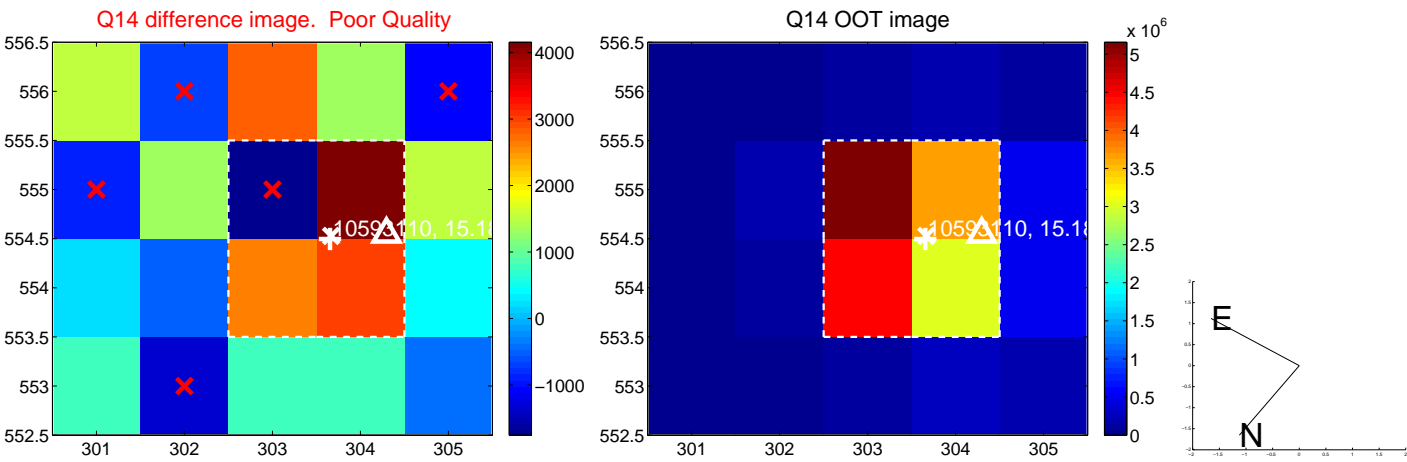
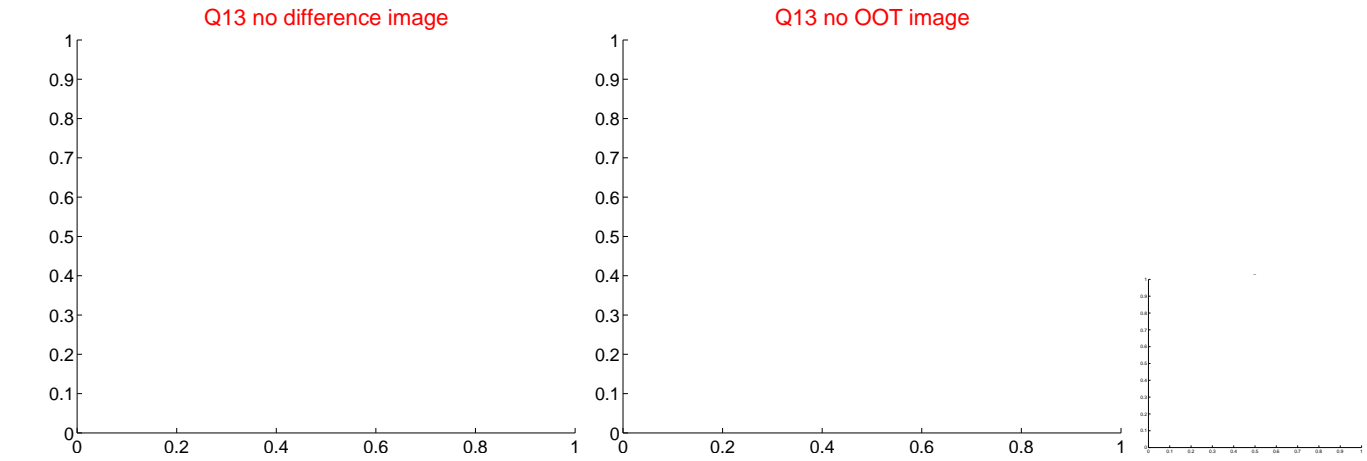


white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.

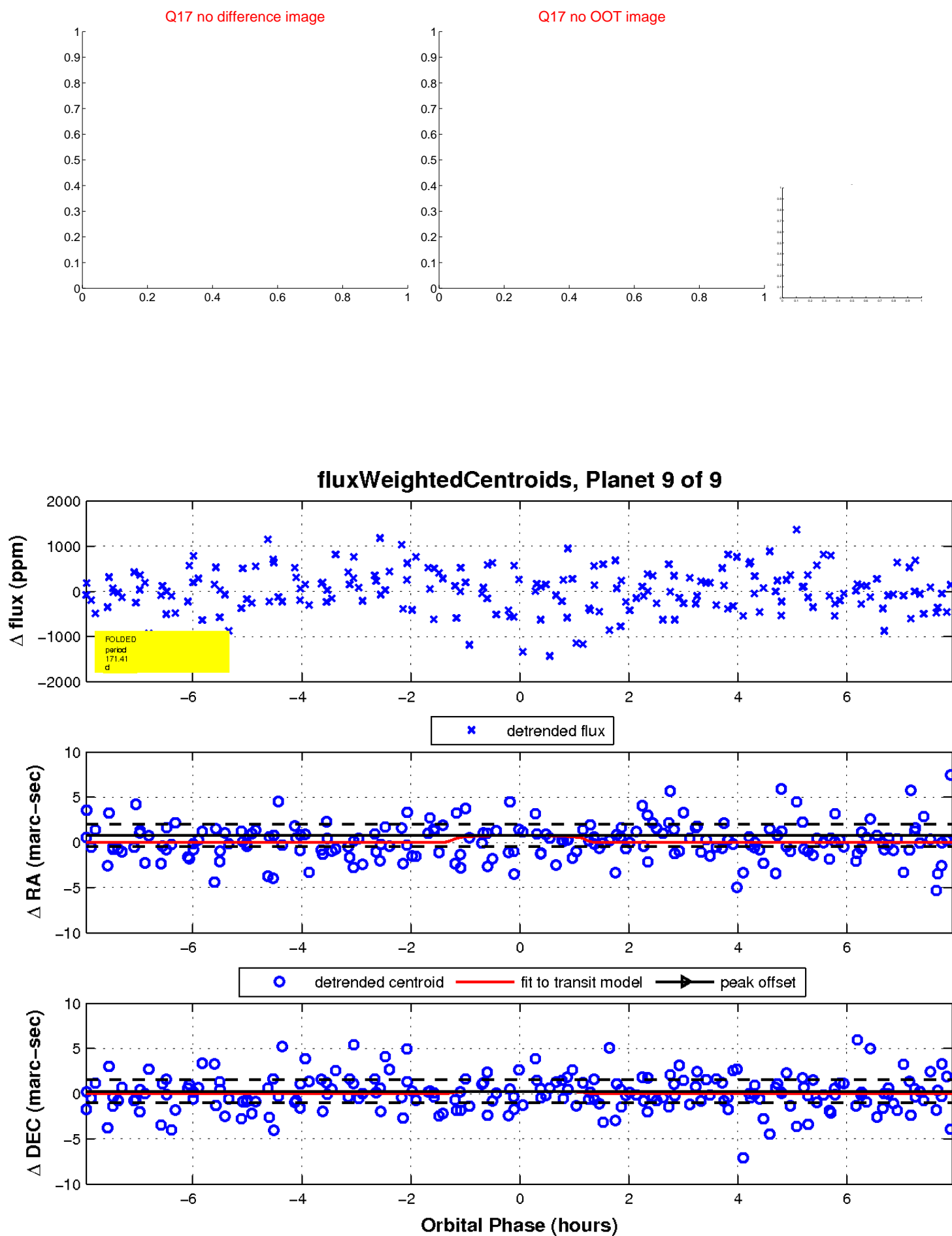




white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image

