

# KIC 010033959

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010033959-01	OBS	No	128.618249	222.847522	1962.9	1.981	54.1	15.0	1.00	5780	8.59	4.02
010033959-02	OBS	No	290.960892	155.185149	1275.4	3.384	42.0	29.5	1.00	5780	6.94	1.35
010033959-03	OBS	No	204.916993	131.552661	586.8	2.500	33.4	-1.0	1.00	5780	2.40	2.16

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010033959-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010033959-02	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL_ZUMA_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
010033959-03	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_NOFITS

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

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

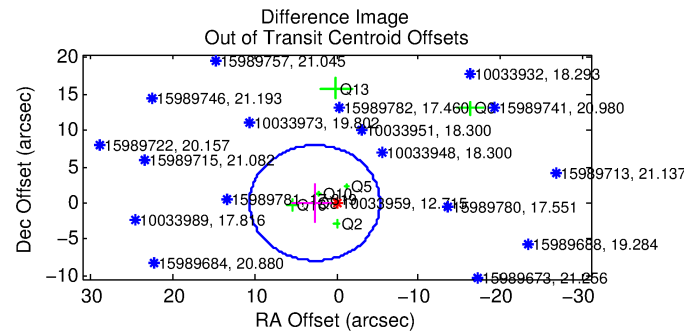
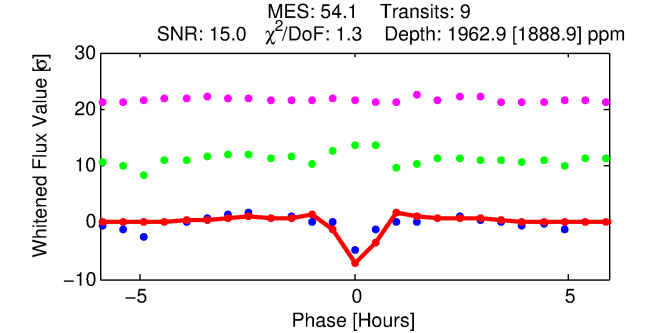
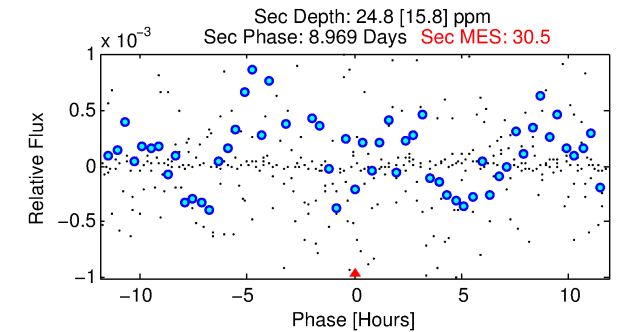
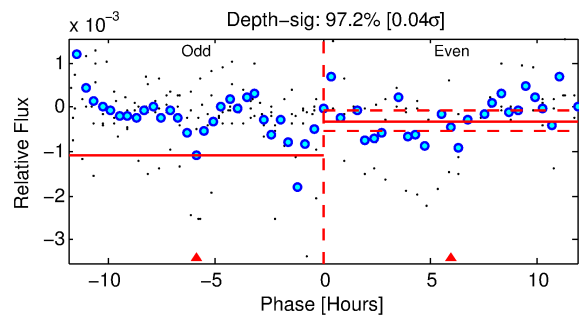
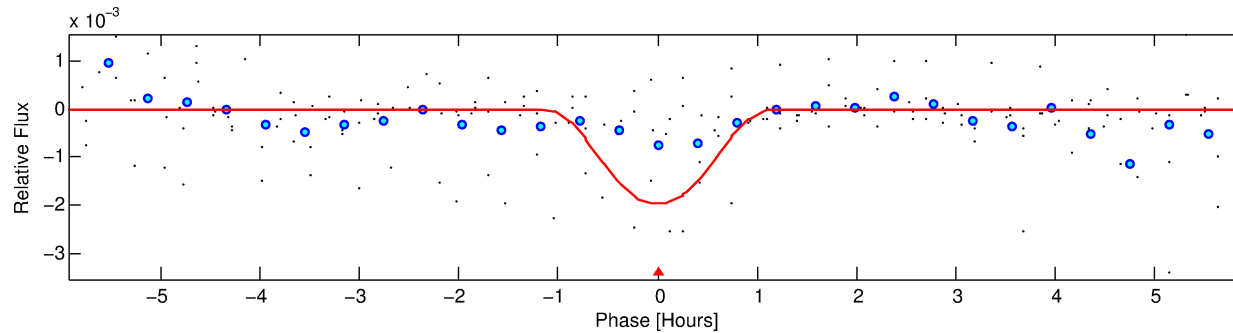
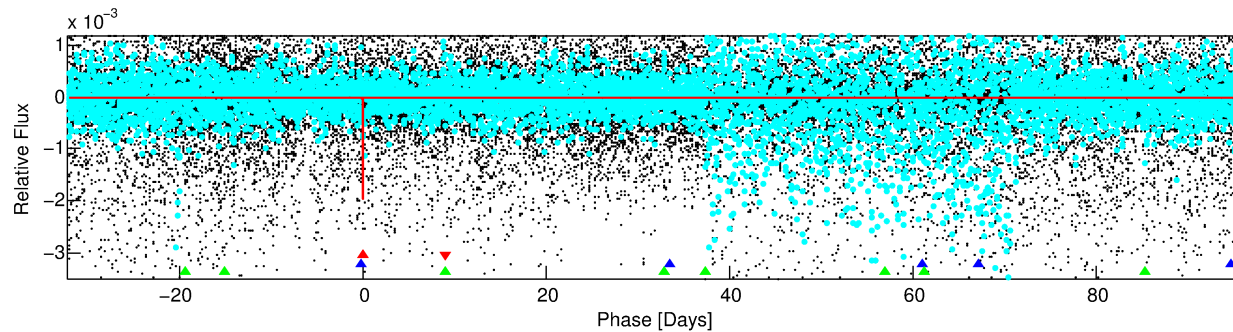
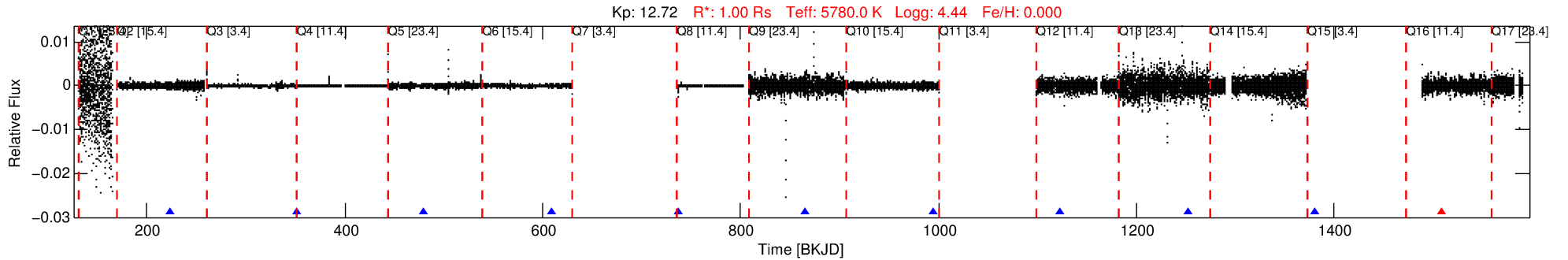
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010033959-01

No Significant Match Found

# DV One-Page Summary

KIC: 10033959 Candidate: 1 of 3 Period: 128.618 d



## DV Fit Results:

Period = 128.61825 [0.00039] d  
Epoch = 222.8475 [0.0019] BKJD  
 $R_p/R^* = 0.0787$  [0.1264]  
 $a/R^* = 200.68$  [71.41]  
 $b = 1.00$  [0.23]  
Seff = 4.02 [0.00]  
Teq = 361 [0] K  
 $R_p = 8.59$  [13.79] Re  
 $a = 0.4988$  [0.0000] AU  
 $Ag = 46.06$  [150.69] [0.30 $\sigma$ ]  
Teffp = 1454 [1190] K [0.92 $\sigma$ ]

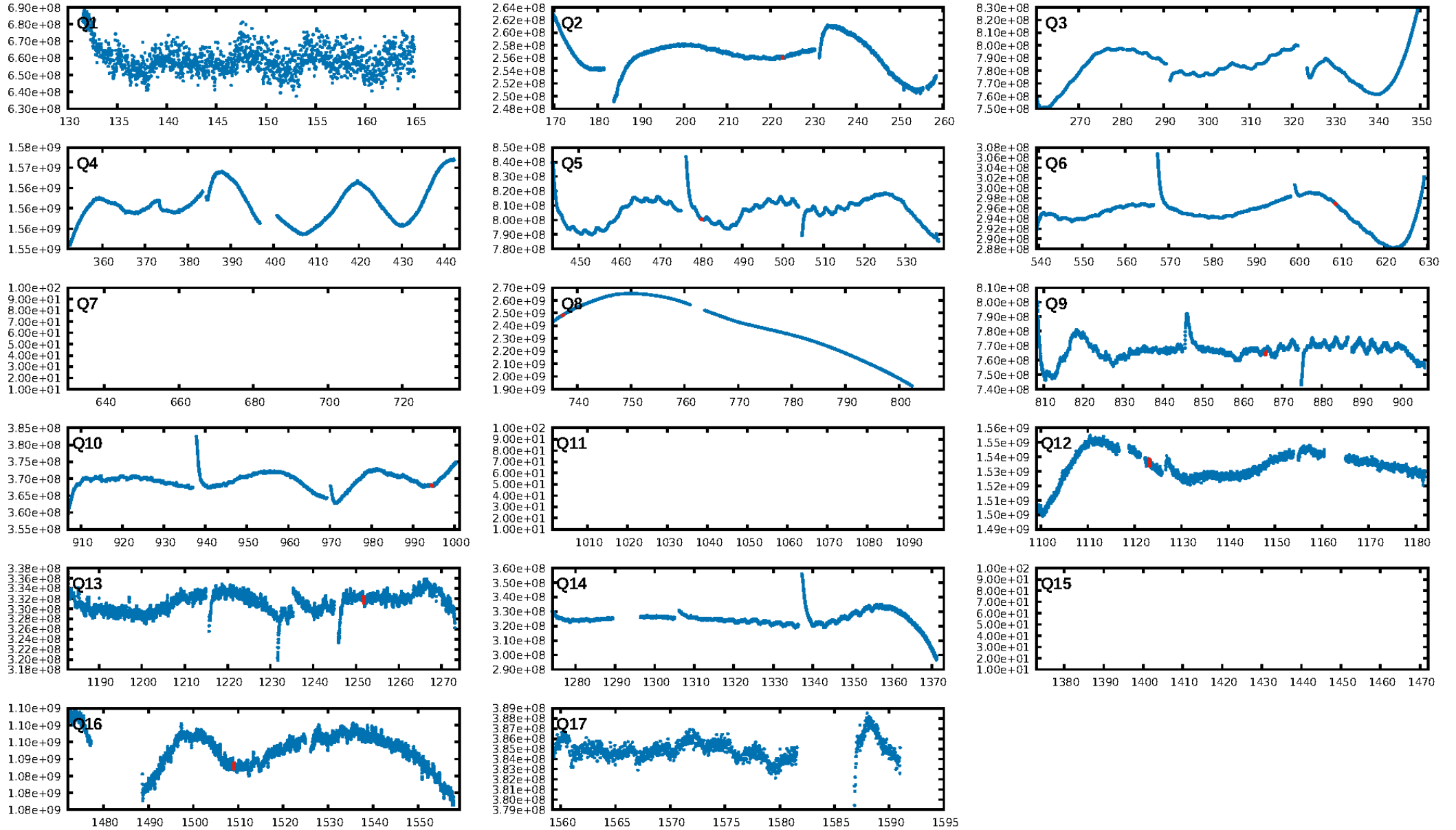
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [574.08 $\sigma$ ]  
ModelChiSquare2-sig: 80.2%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 0.89 [8/9]  
GhostDiagnostic-chr: 1.054  
Centroid-sig: 13.6%  
Centroid-so: 0.464 arcsec [2.17 $\sigma$ ]  
OotOffset-rm: 2.652 arcsec [1.00 $\sigma$ ]  
KicOffset-rm: 3.876 arcsec [1.20 $\sigma$ ]  
OotOffset-st: 3/0/2/2 [7]  
KicOffset-st: 3/0/2/2 [7]  
DiffImageQuality-fgm: 0.14 [1/7]  
DiffImageOverlap-fno: 0.89 [8/9]

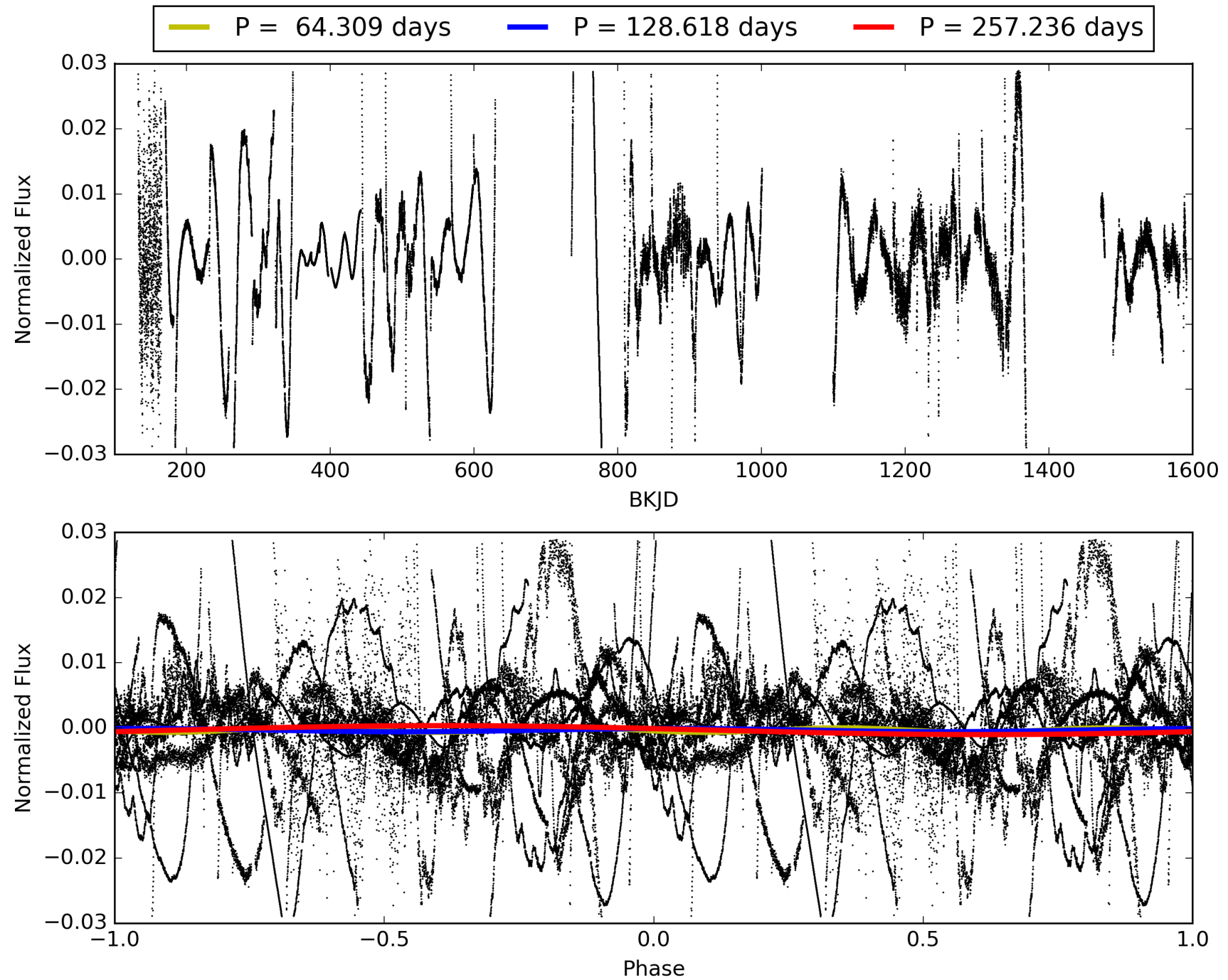
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 17:33:42 Z

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

# TCE 010033959-01, PDC Light Curves

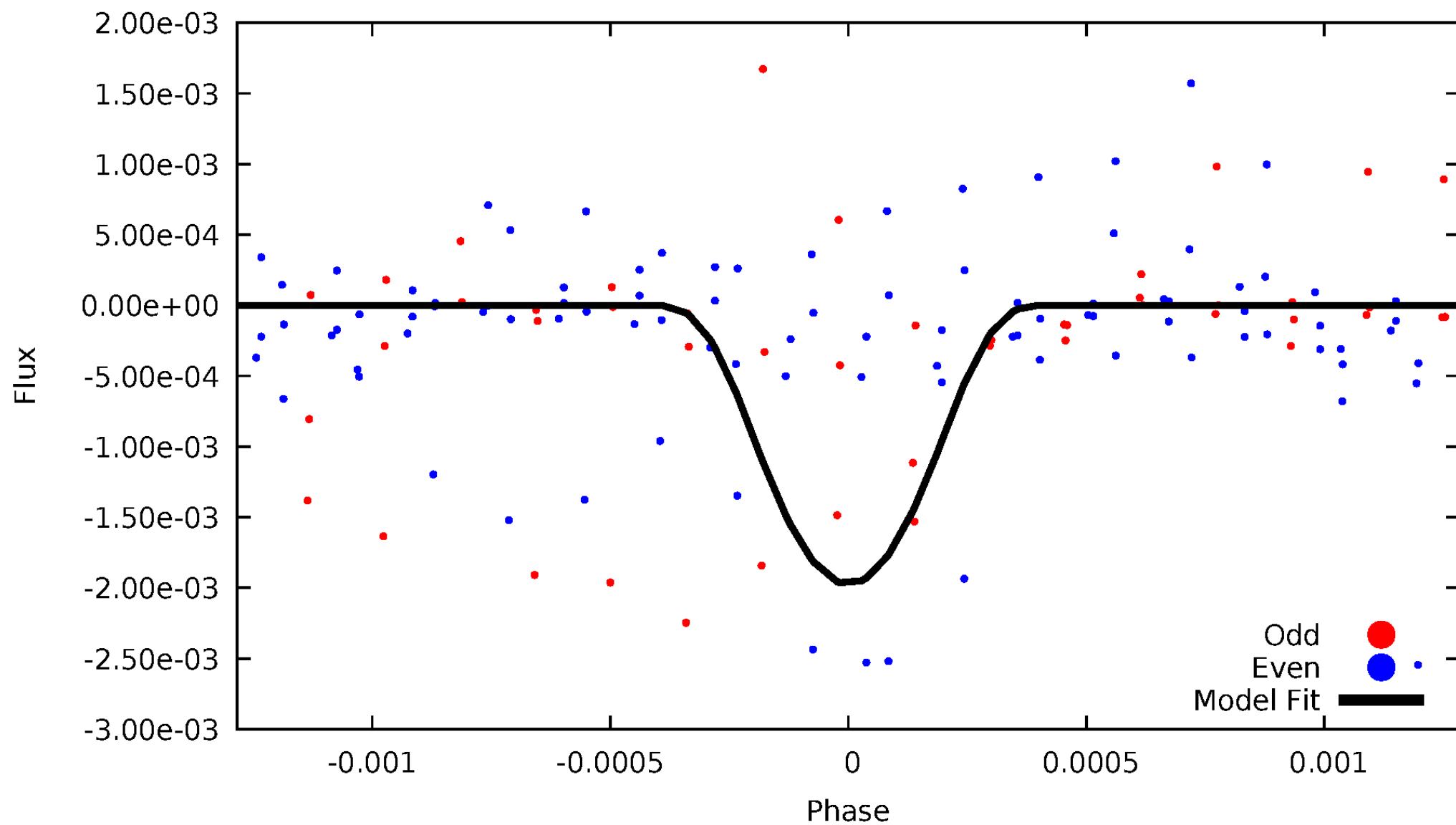


# TCE 010033959-01



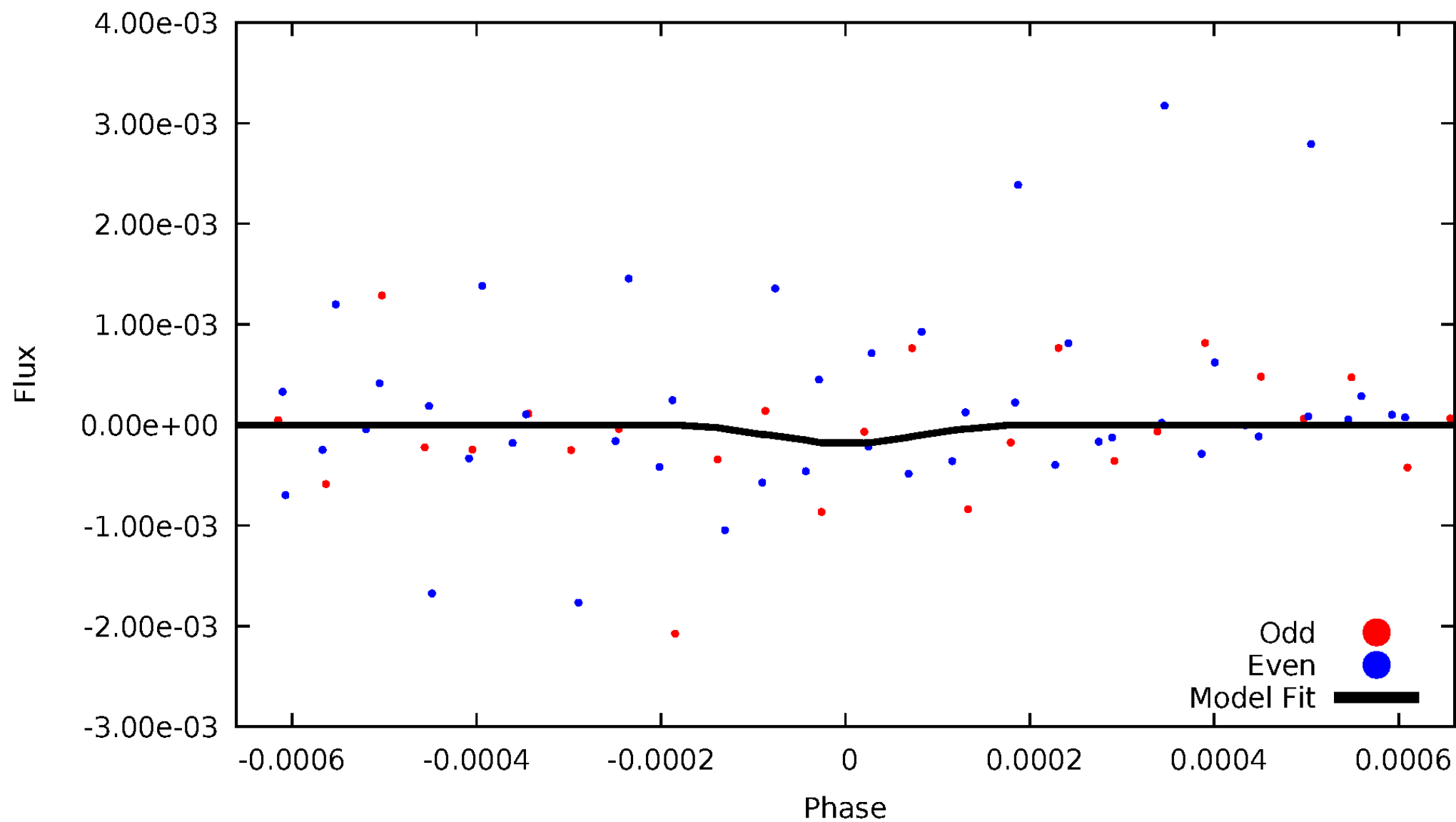
# DV Odd/Even

TCE 010033959-01

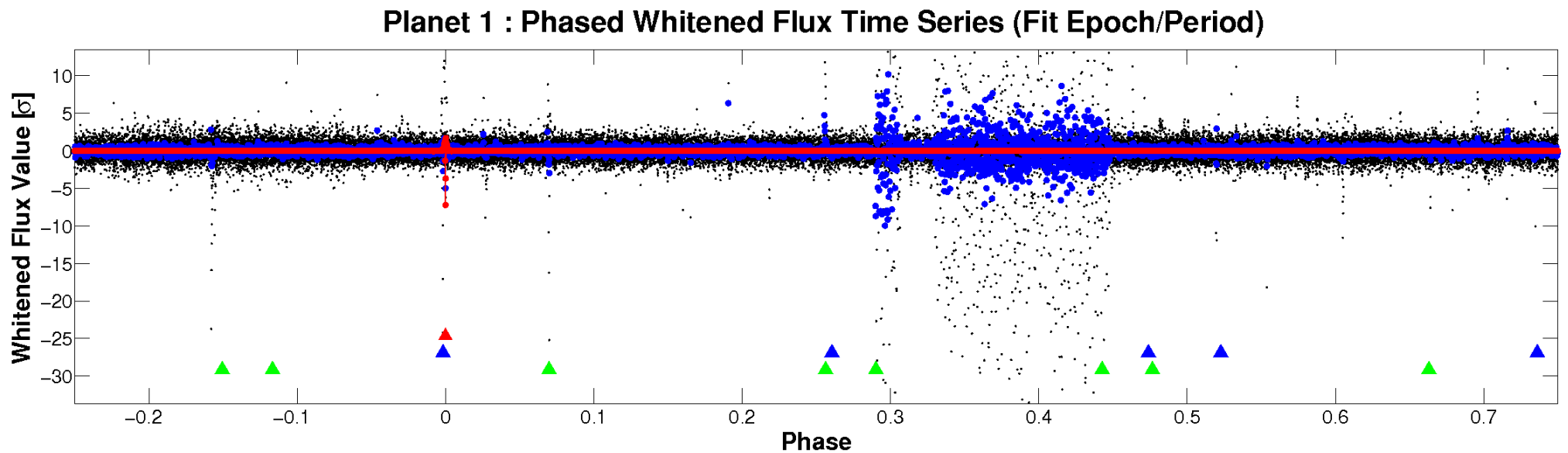
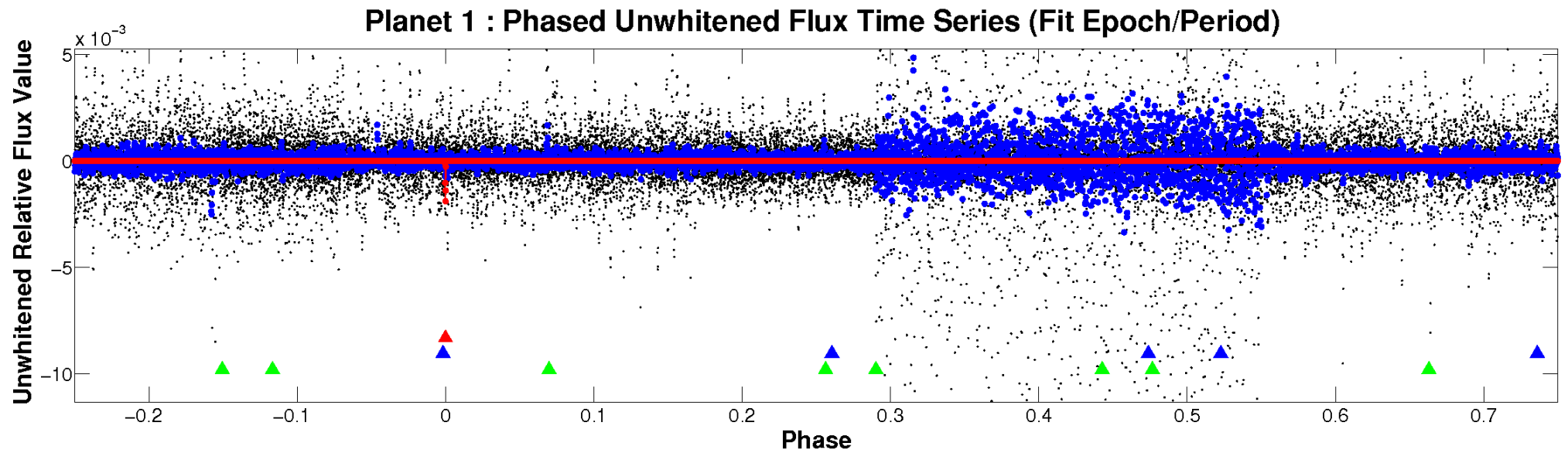


# ALT Odd/Even

TCE 010033959-01

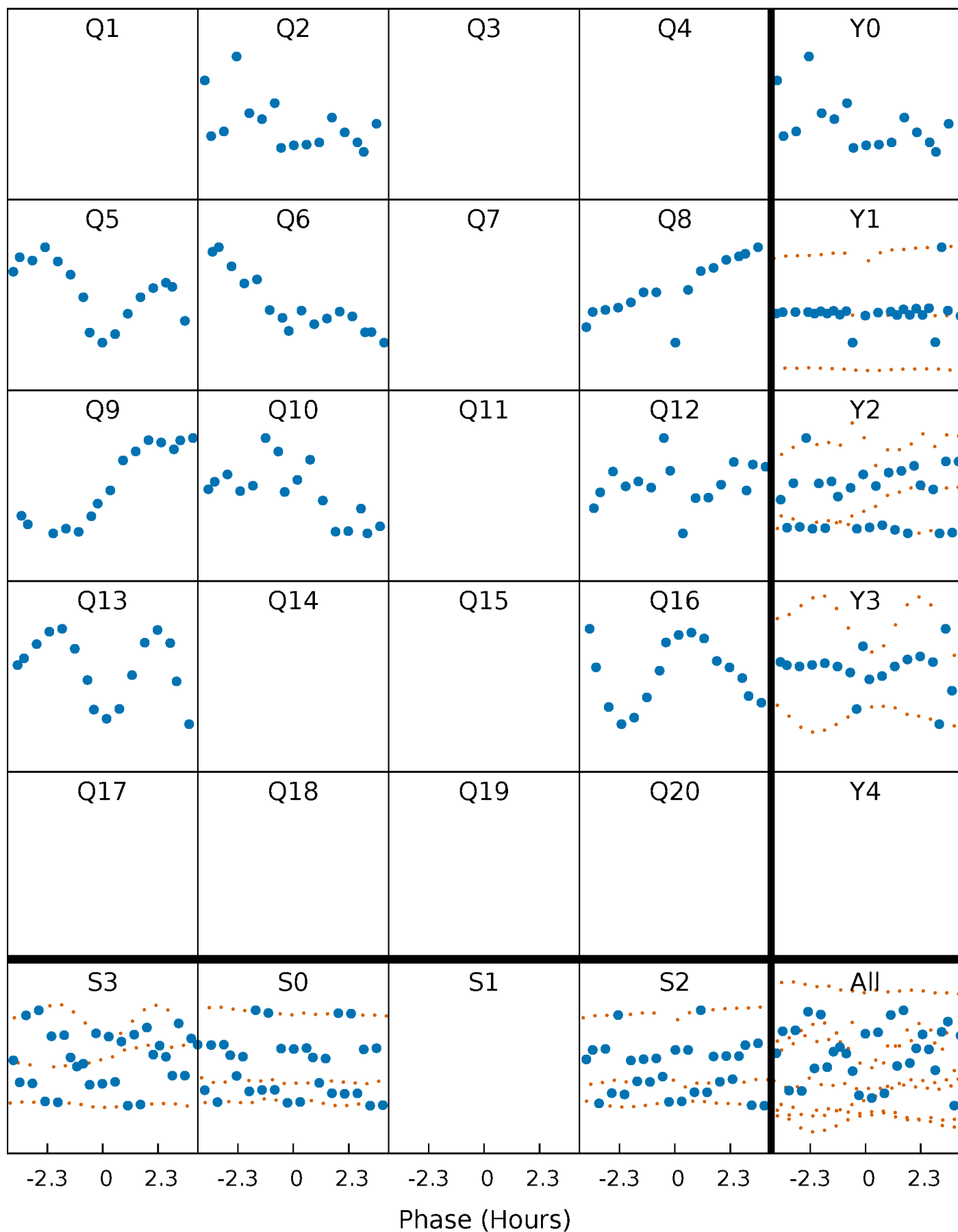


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

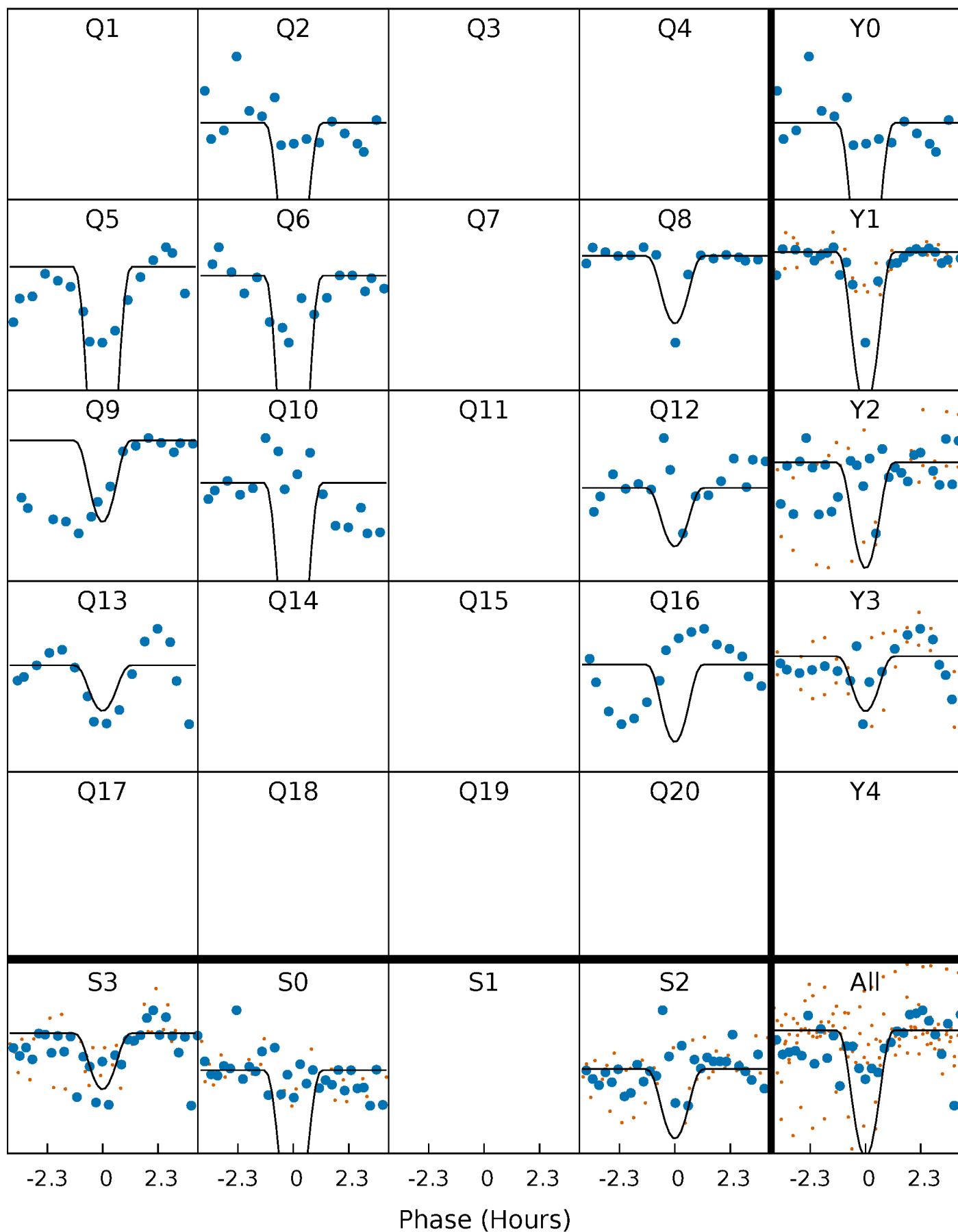
TCE 010033959-01 P=128.618249 Days  $T_0=222.847522$  (BKJD)





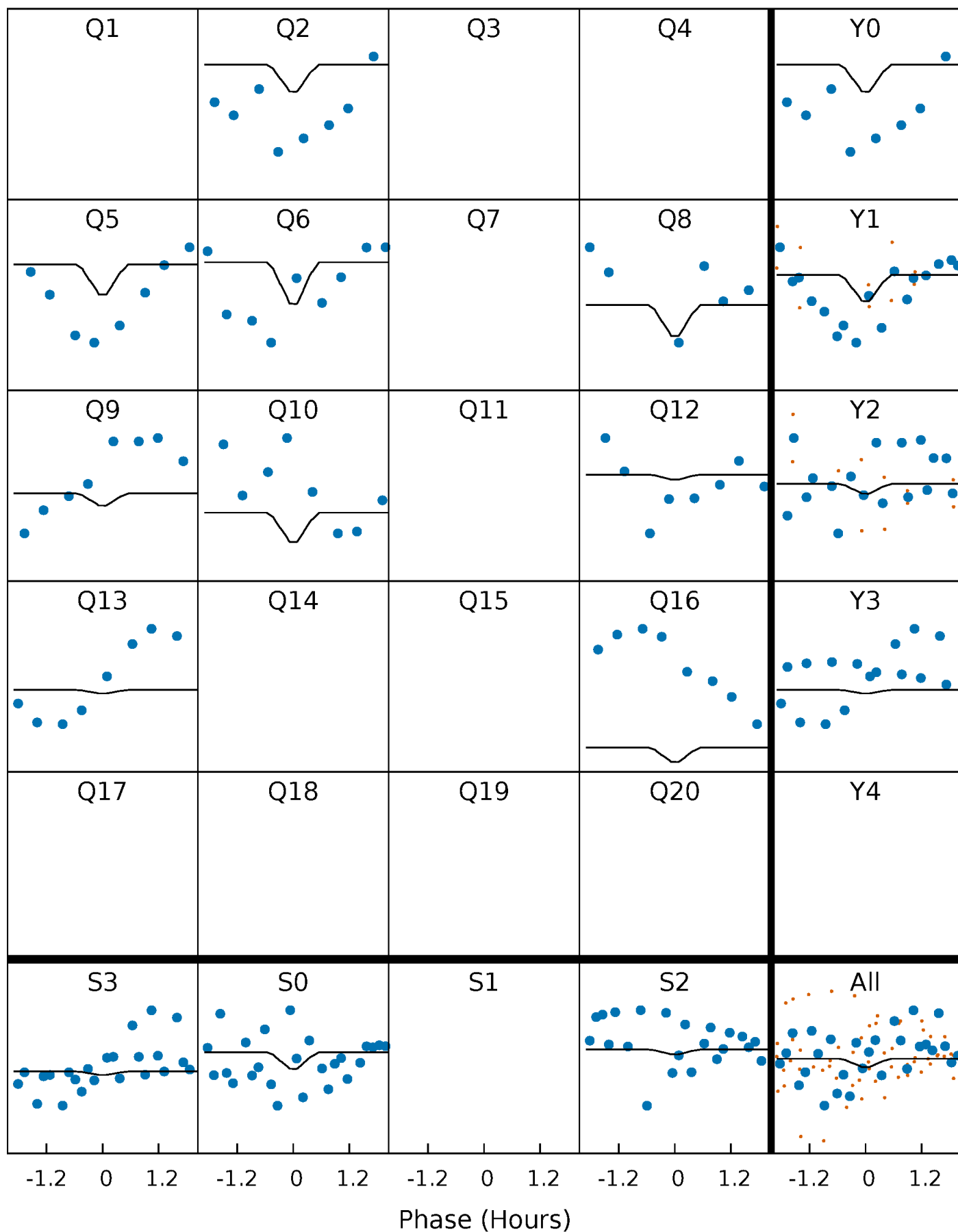
# DV Quarter-Phased Transit Curves

TCE 010033959-01 P=128.618249 Days  $T_0=222.847522$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

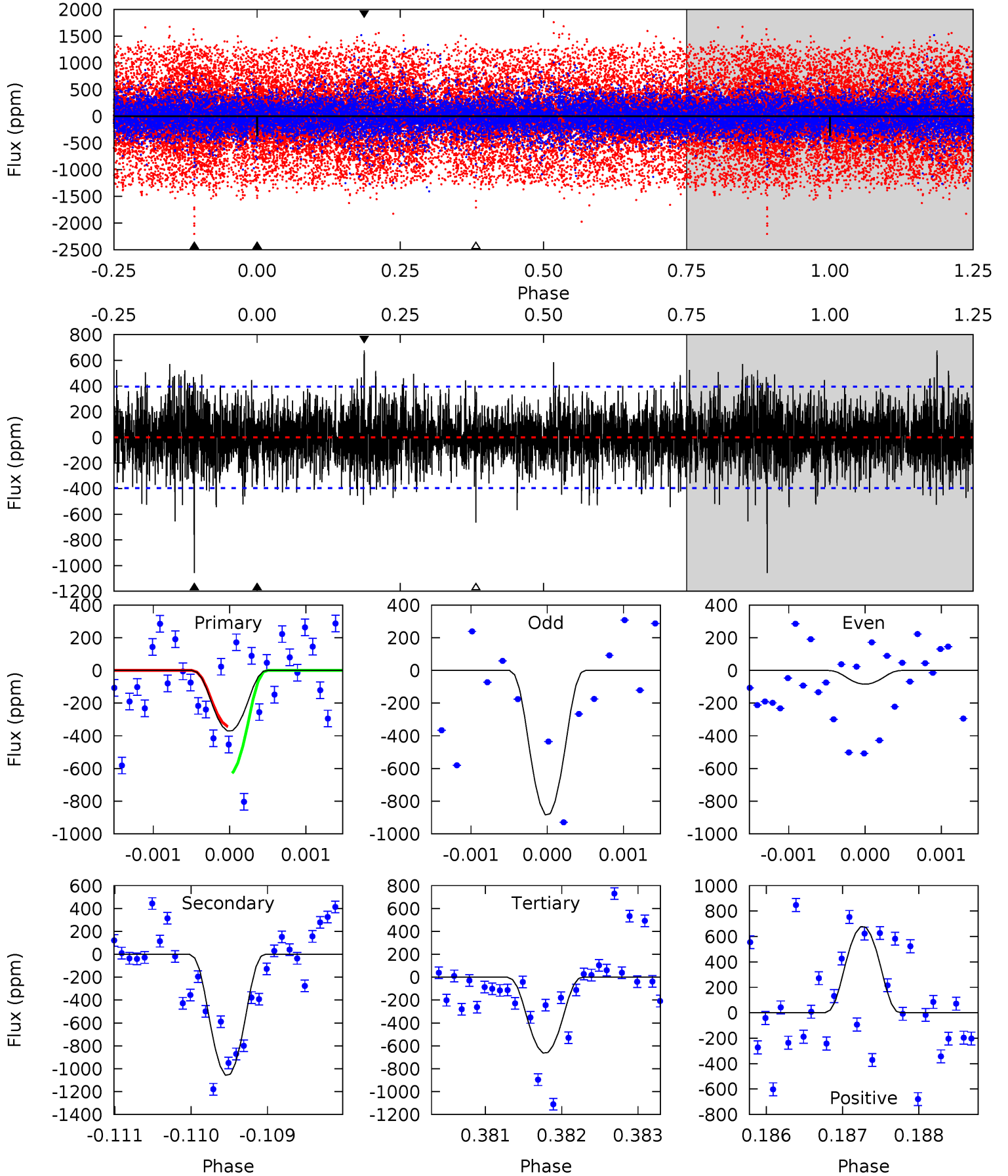
TCE 010033959-01 P=128.624755 Days  $T_0=222.843570$  (BKJD)



# DV Model-Shift Uniqueness Test

010033959-01,  $P = 128.618249$  Days,  $E = 94.229273$  Days

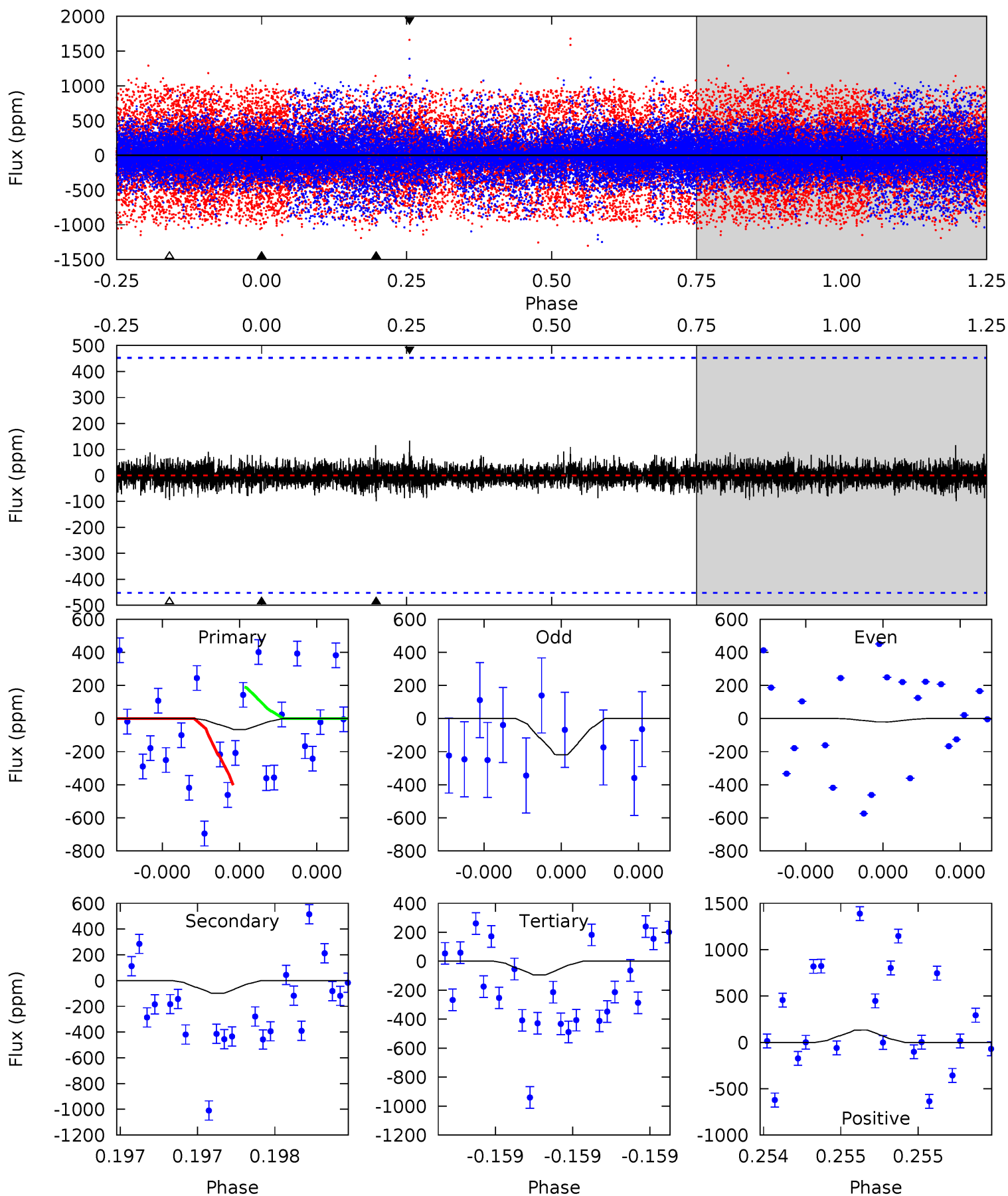
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.15	14.7	9.21	9.42	5.49	3.36	2.20	-4.06	-4.27	5.47	5.26	4.94	2.05	0.39	1.97



# Alt Model-Shift Uniqueness Test

010033959-01,  $P = 128.624755$  Days,  $E = 94.218815$  Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0.83	1.23	1.18	1.66	5.65	3.60	0.31	-0.35	-0.84	0.06	-0.43	1.13	0.80	0.57	1.32



### Stellar Parameters For KIC 010033959

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5780^{+1}_{-1}$	$4.438^{+1.000}_{-1.000}$	$0.000^{+1.000}_{-1.000}$	$1.000^{+1.000}_{-1.000}$	$-1.000^{+1.000}_{-1.000}$	$-1.000^{+1.000}_{-1.000}$
	+0%/-0%	+23%/-23%	+inf%/-inf%	+100%/-100%	+100%/-100%	+100%/-100%
Source	Solar	Solar	Solar	Solar		

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

### Secondary Eclipse Parameters for KIC 010033959-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-1057 \pm 72$	$13.86^{+11.36}_{-8.89}$	$506^{+23}_{-25}$	$3438^{+1504}_{-556}$	$762^{+5296}_{-531}$
Alt.	$-99 \pm 80$	$10.47^{+10.20}_{-7.17}$	$504^{+25}_{-23}$	$2589^{+1159}_{-607}$	$103^{+1122}_{-93}$

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

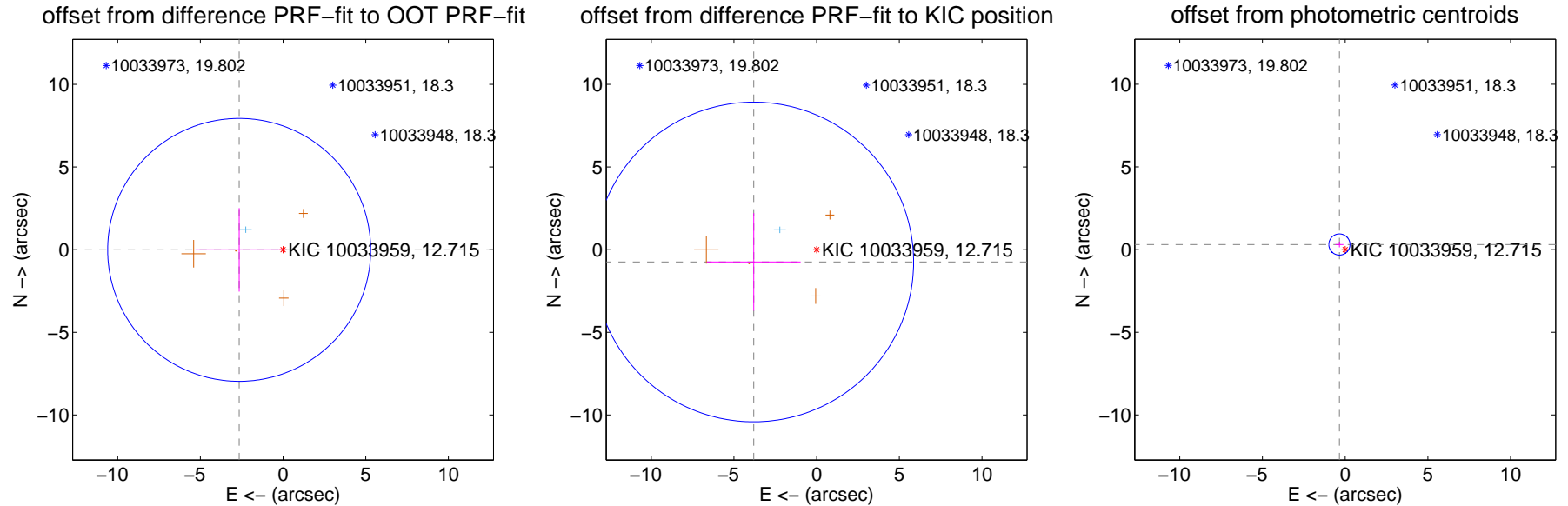
## DV Centroid Data

Supplemental centroid analysis for 010033959-01. Kepler magnitude: 12.71. Transit SNR 15.04

There are 1 quarters with good PRF difference image offsets

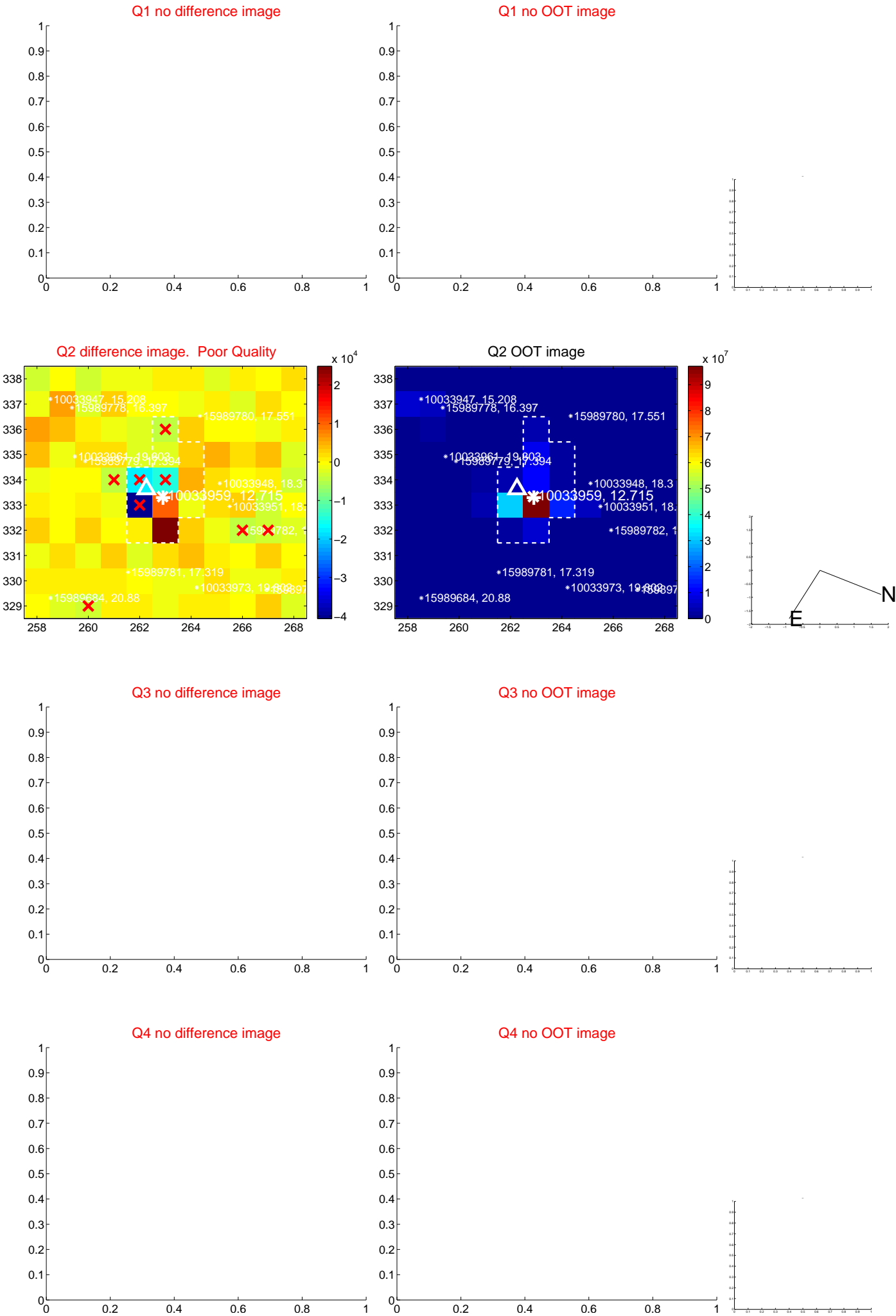
The direct PRF centroid is offset from the target star catalog position by about 1.29 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.652 \pm 2.650$	1.00	$2.652 \pm 2.642$	$-0.012 \pm 2.524$
PRF-fit source offset from KIC position	$3.876 \pm 3.223$	1.20	$3.804 \pm 2.835$	$-0.743 \pm 2.950$
photometric centroid source offset	$0.46 \pm 0.21$	2.17	$0.35 \pm 0.24$	$0.31 \pm 0.17$

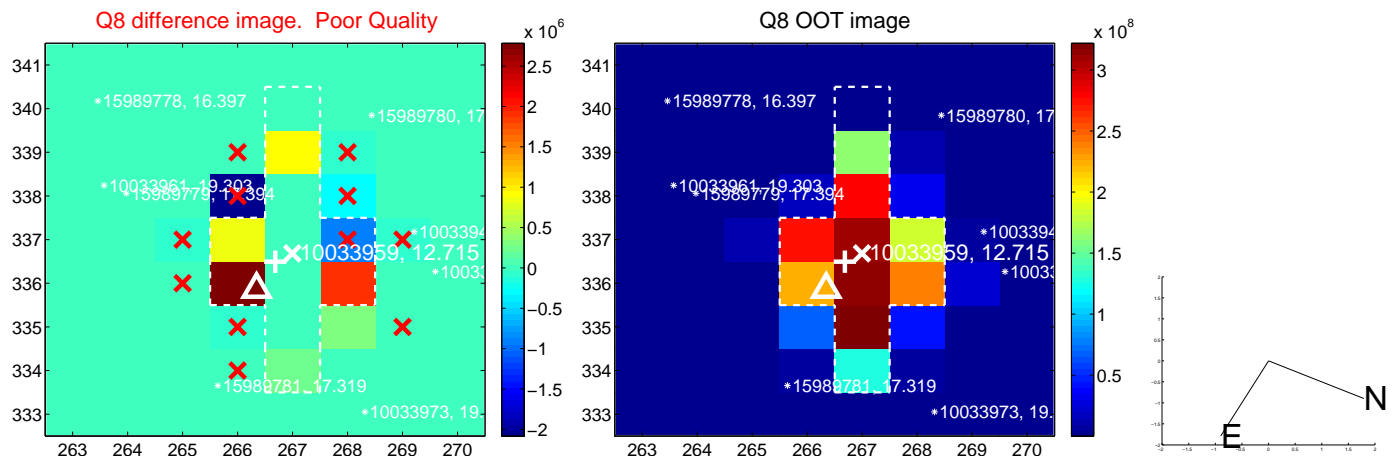
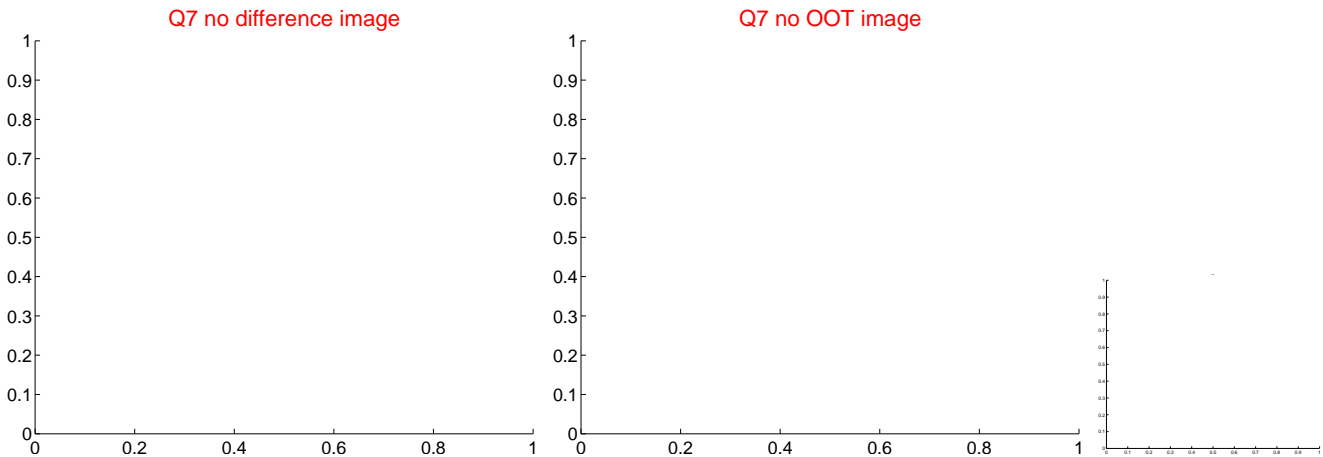
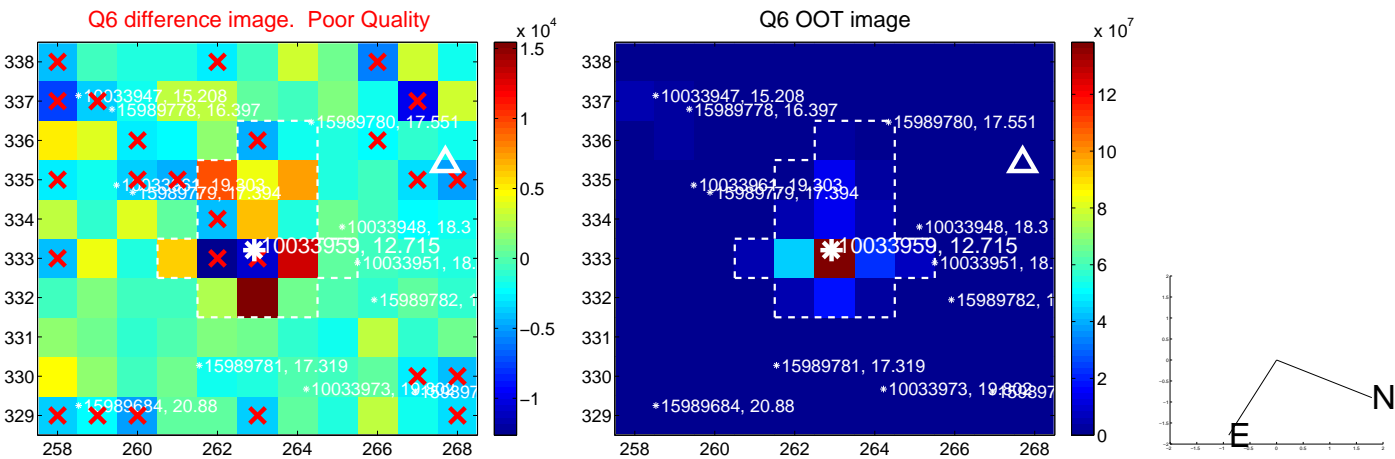
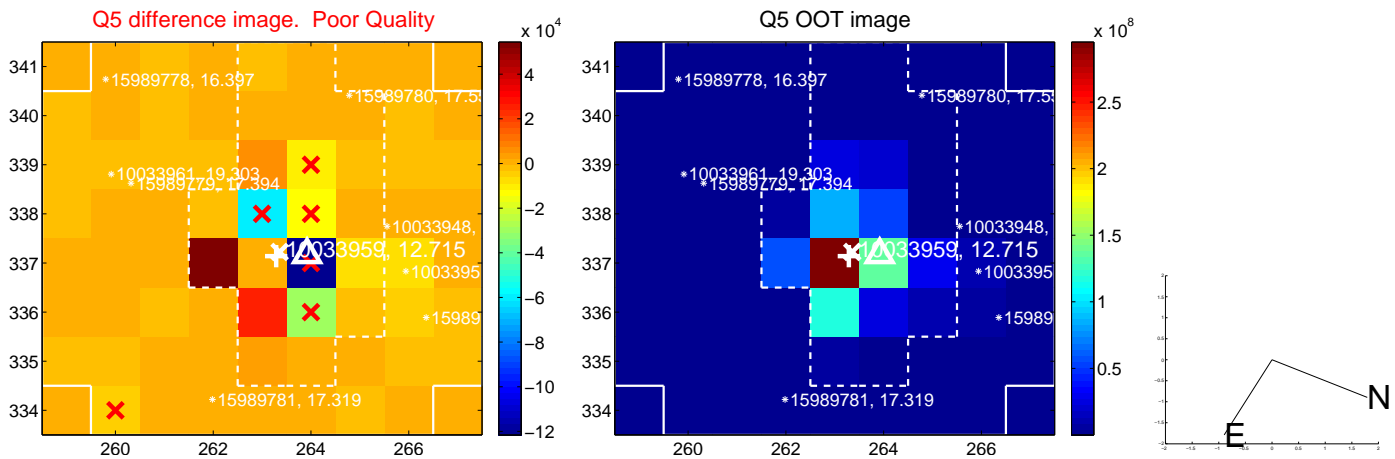


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

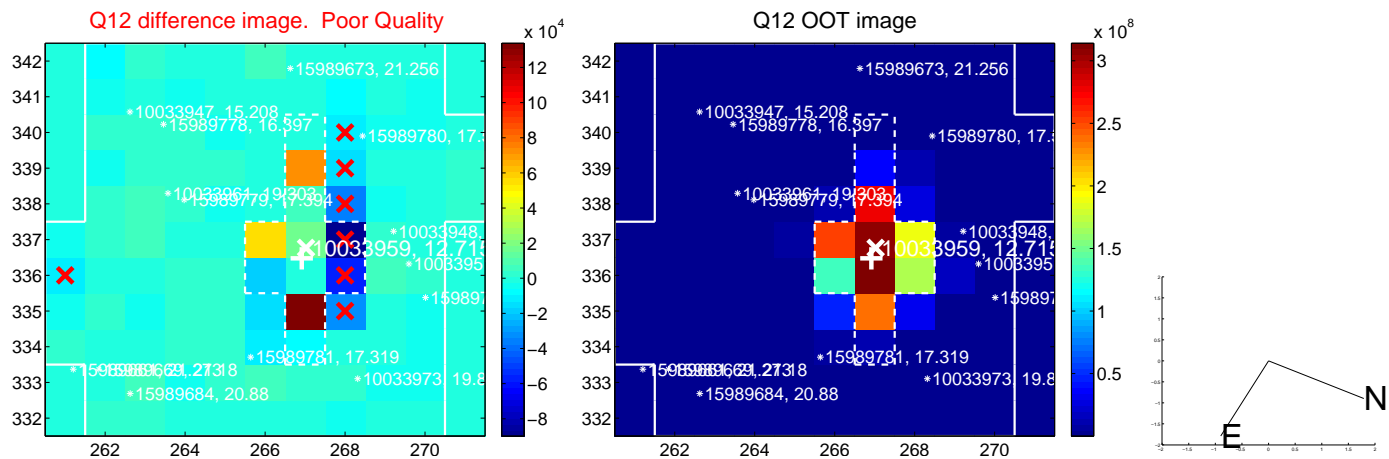
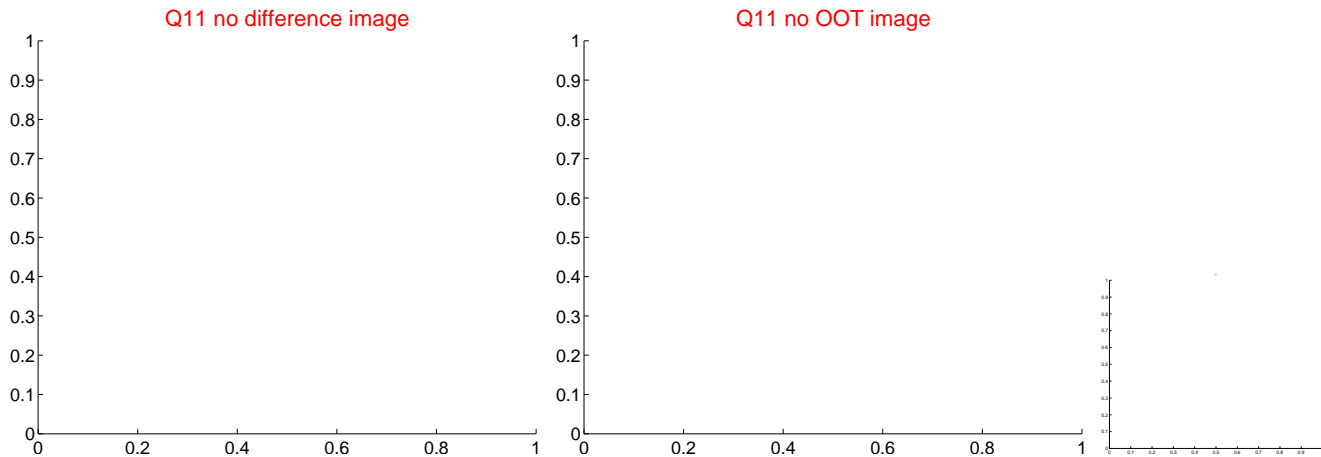
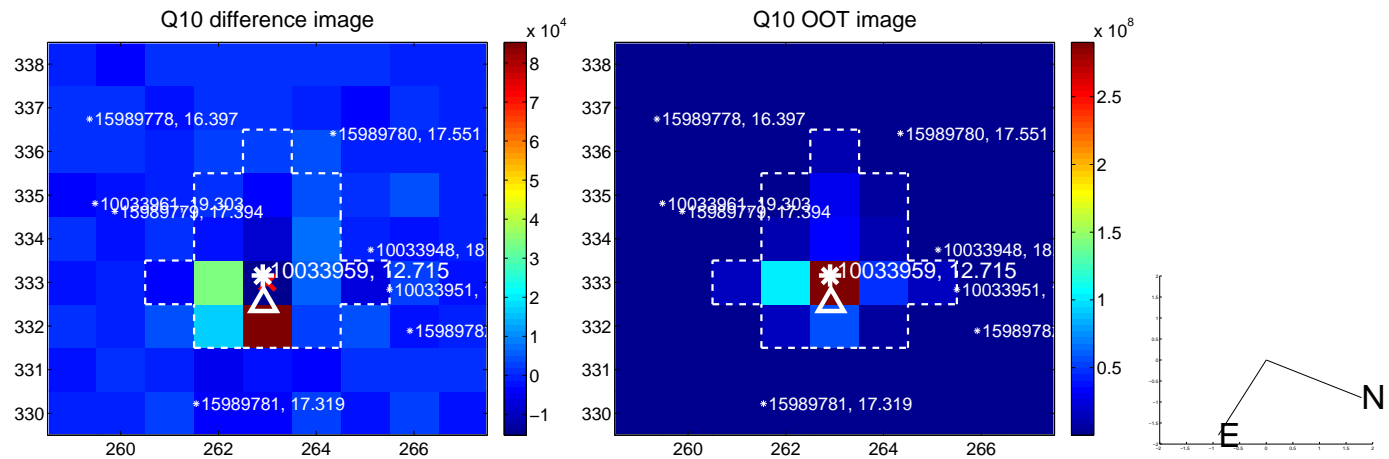
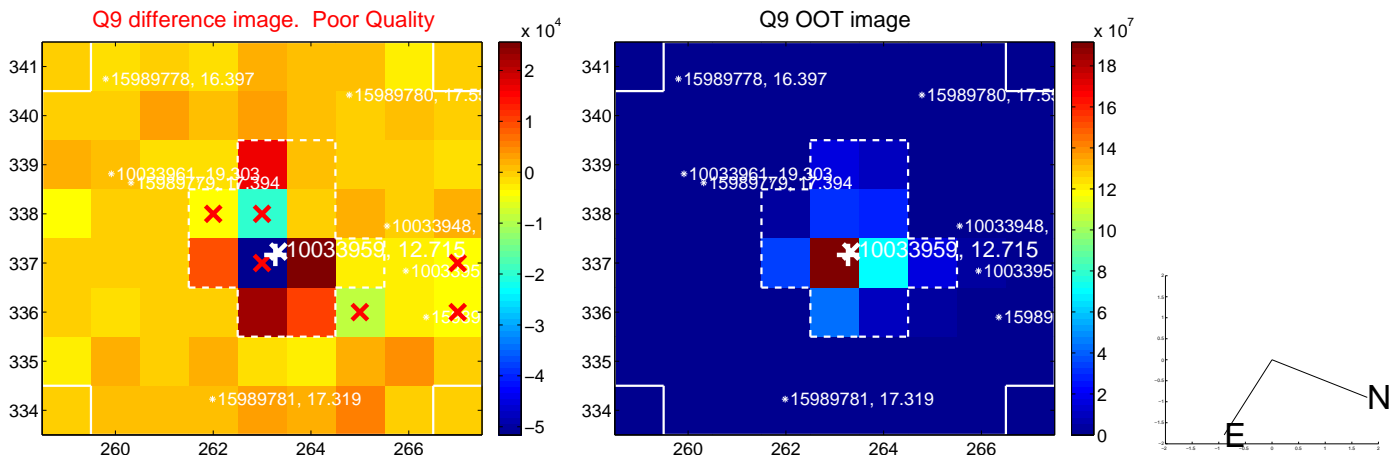


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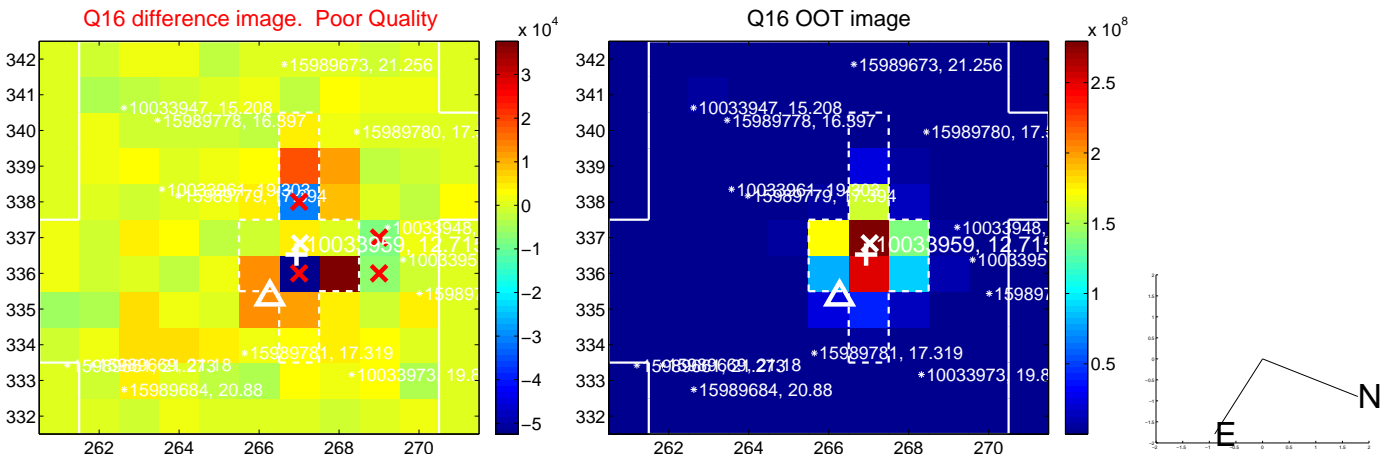
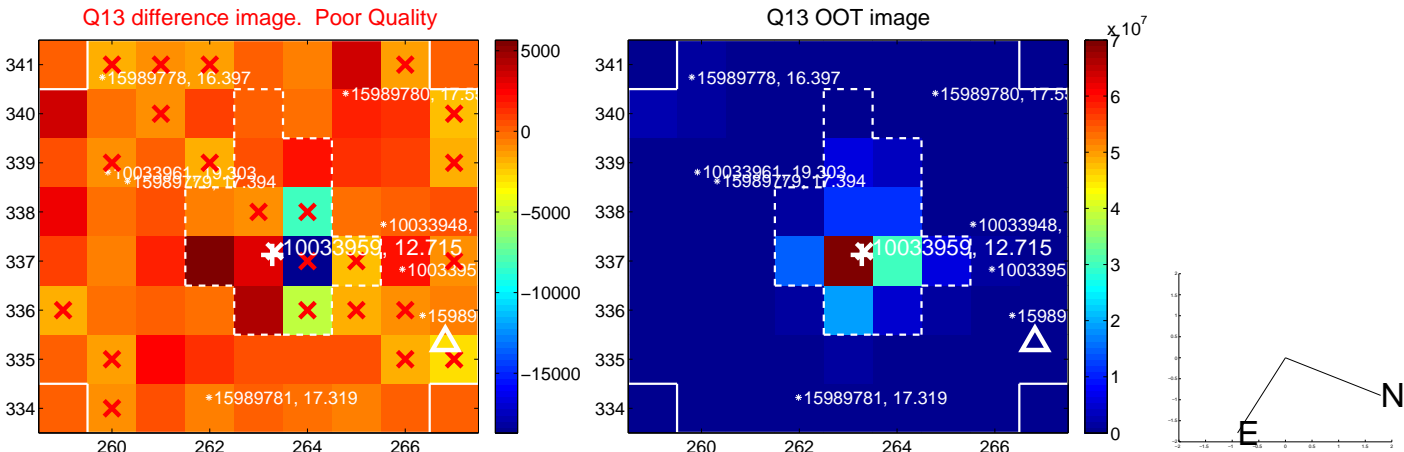




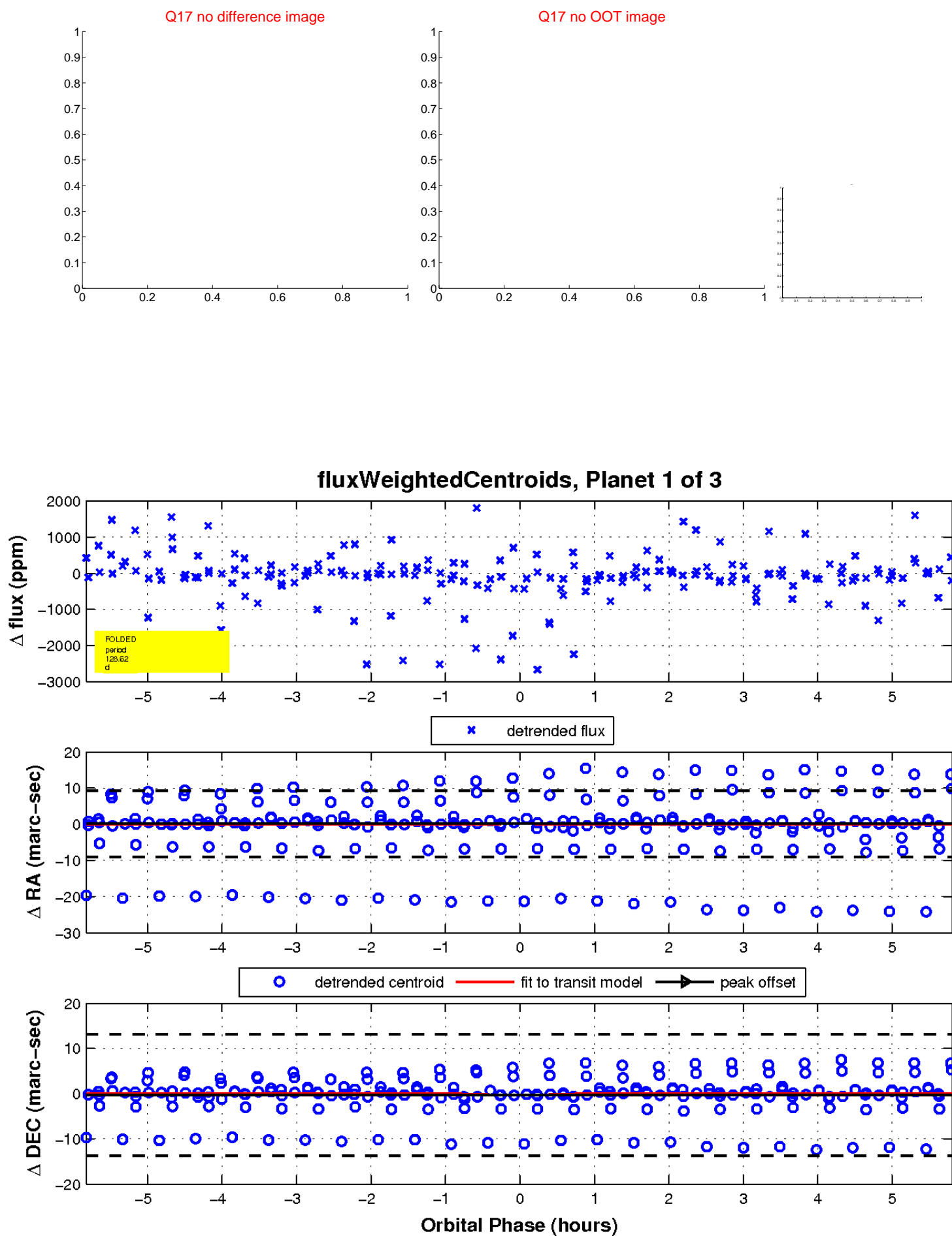
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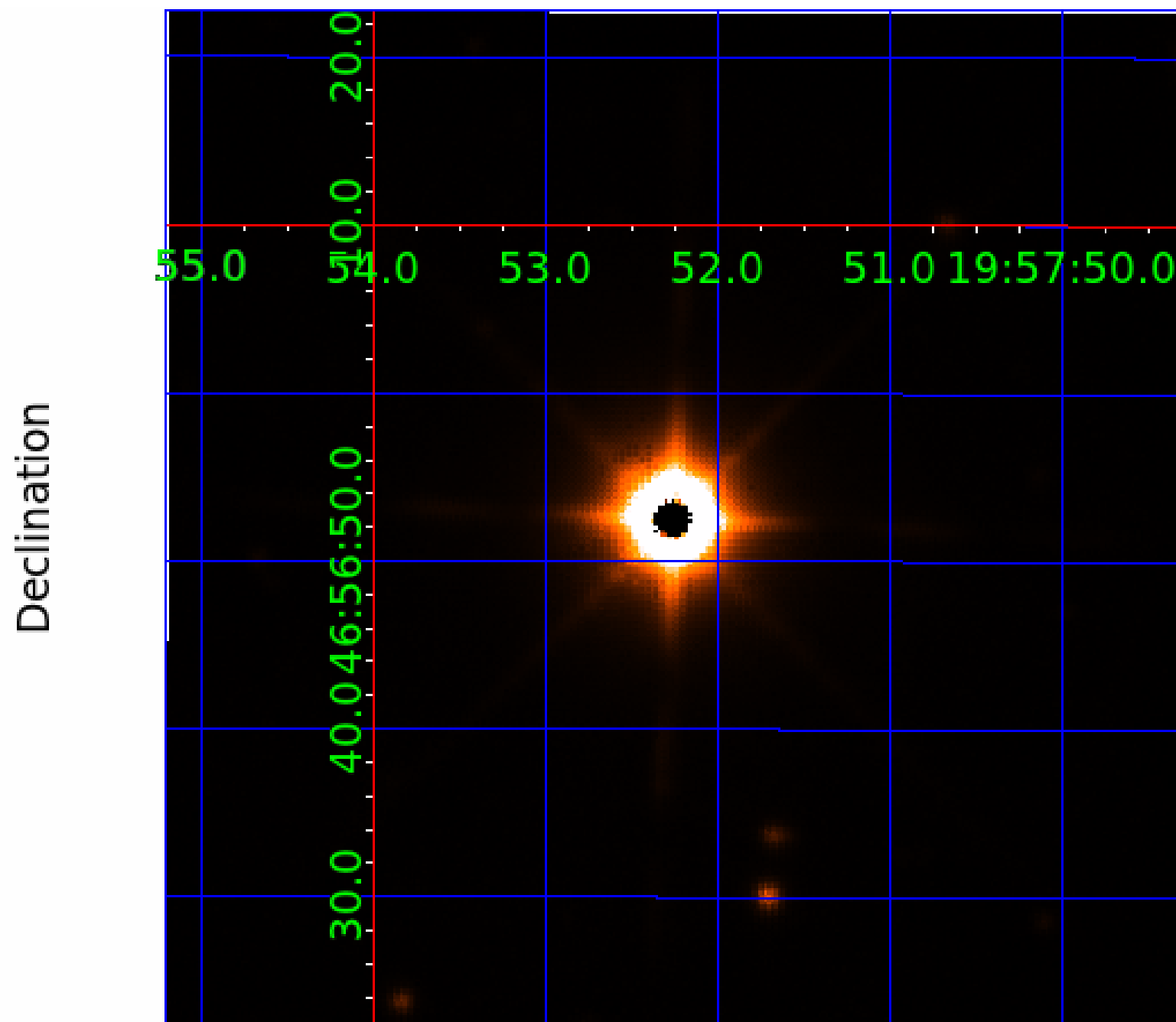
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UKIRT Image



# KIC 010033959

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
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010033959-02	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL_ZUMA_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
010033959-03	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_NOFITS

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

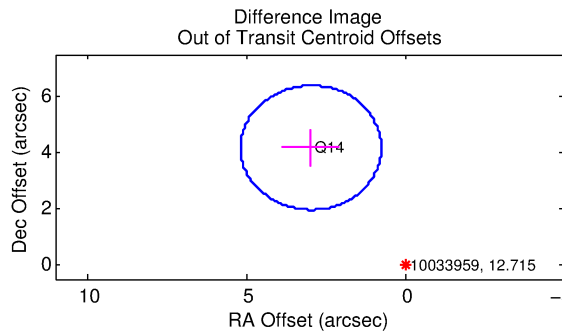
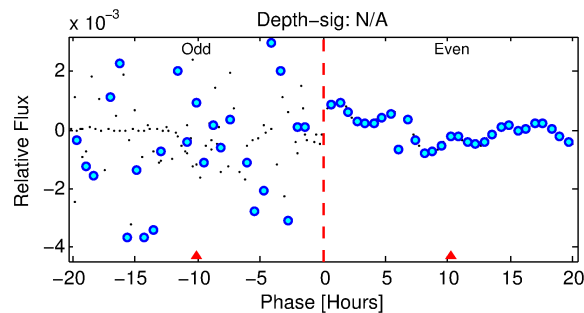
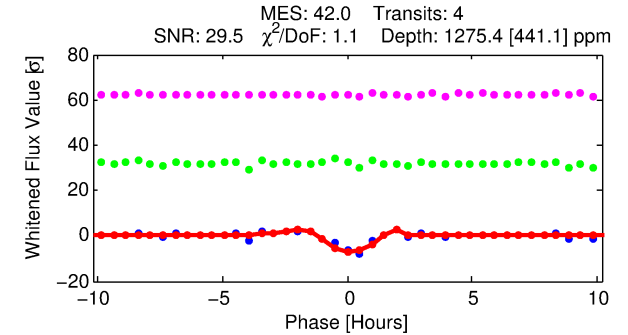
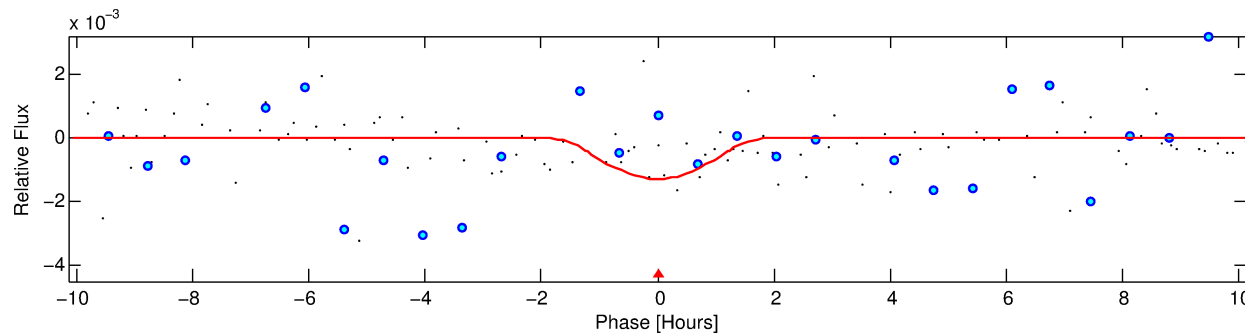
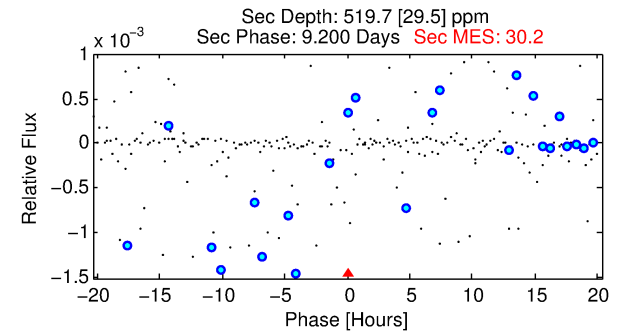
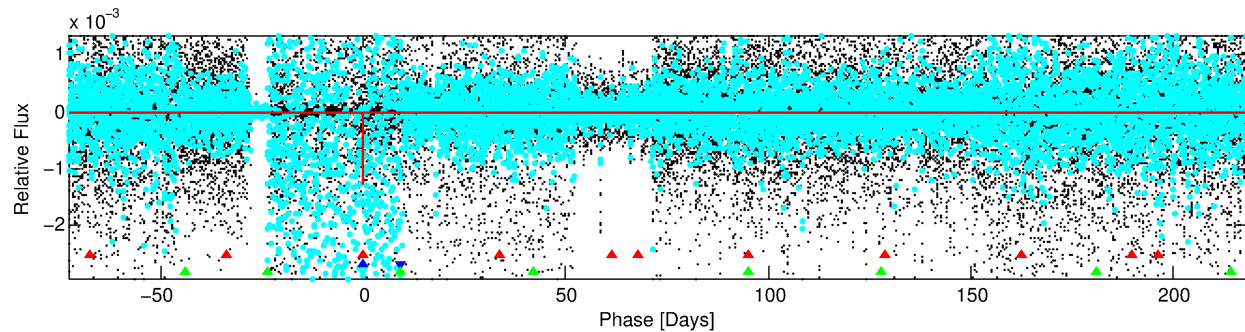
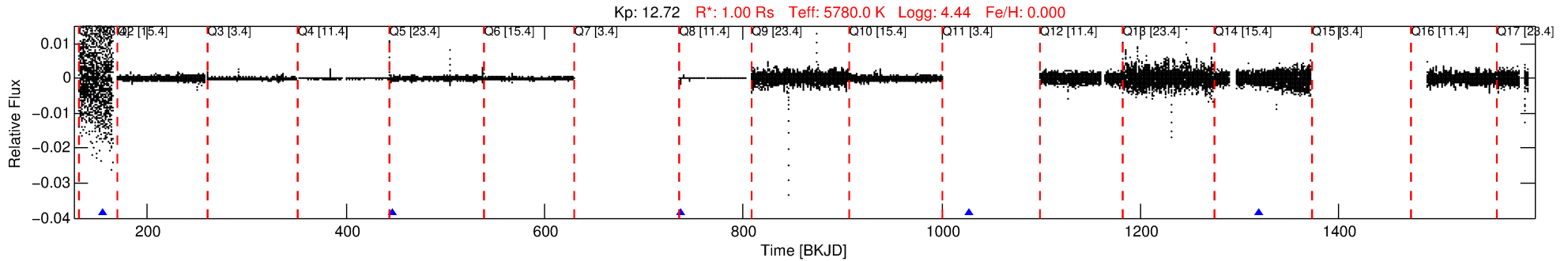
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## Ephemeris Match Information For 010033959-02

No Significant Match Found

# DV One-Page Summary

KIC: 10033959 Candidate: 2 of 3 Period: 290.961 d



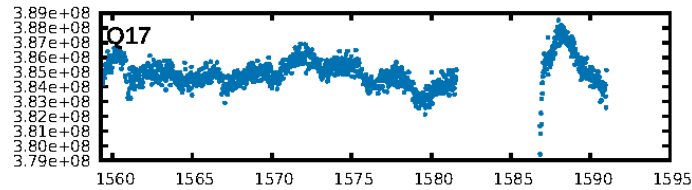
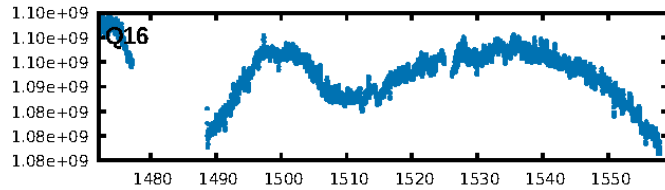
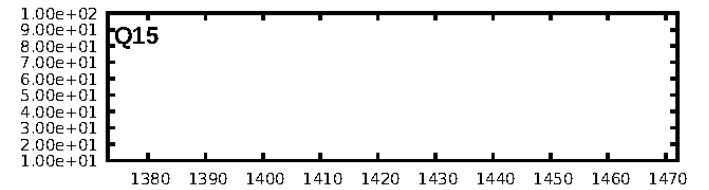
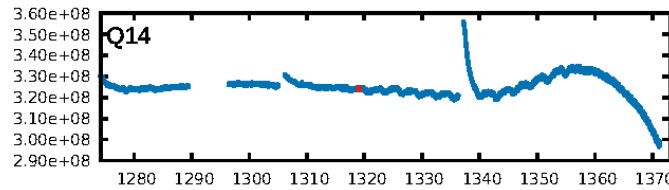
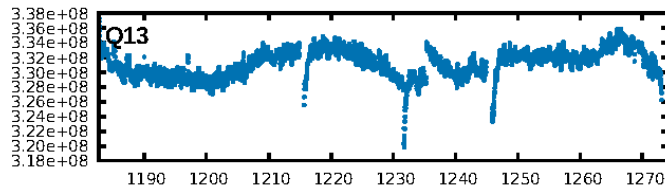
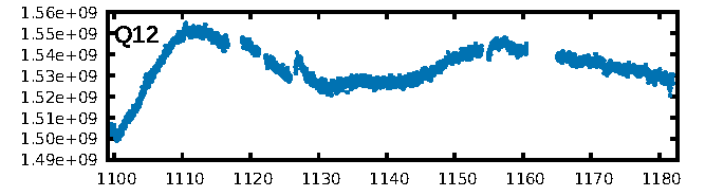
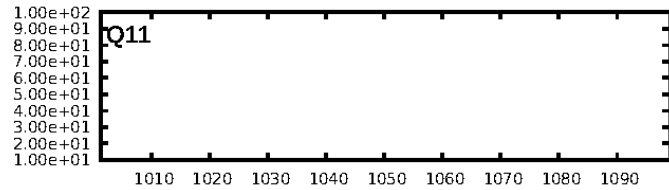
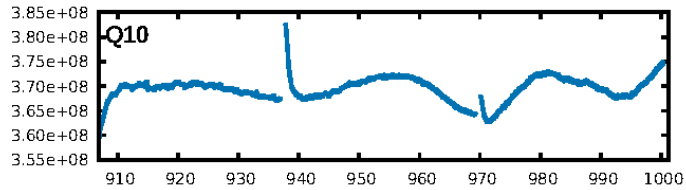
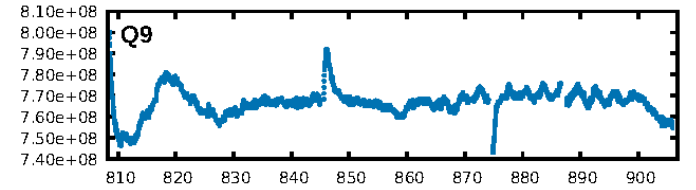
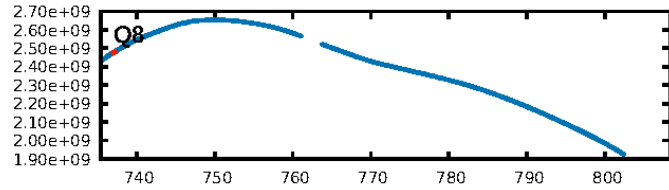
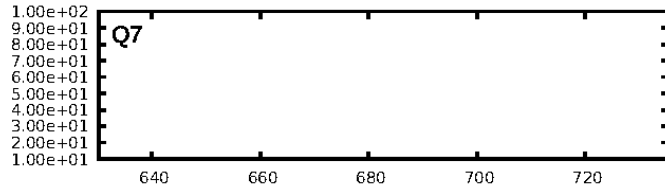
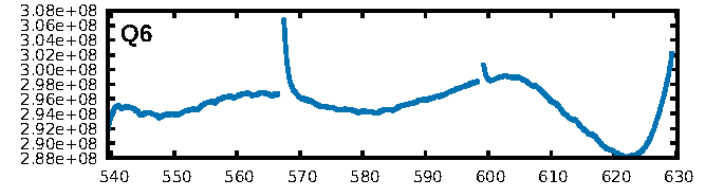
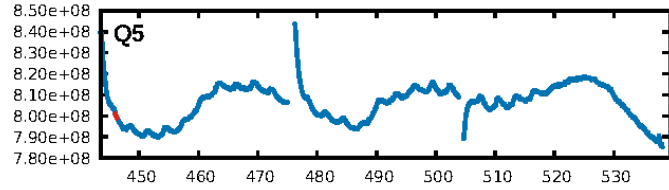
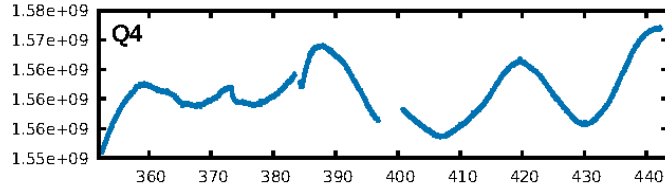
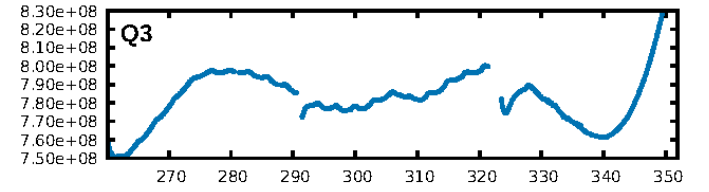
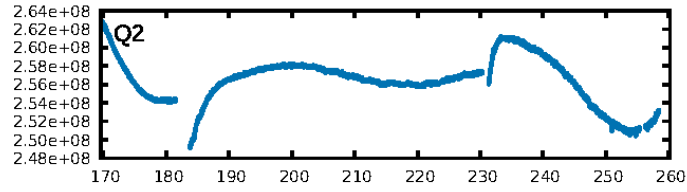
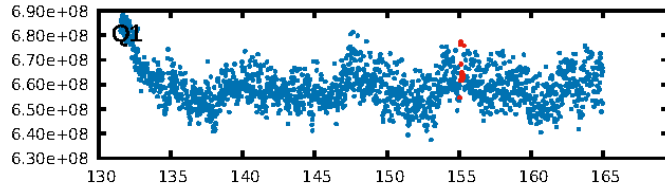
## DV Fit Results:

Period = 290.96089 [0.00574] d  
Epoch = 155.1851 [0.0115] BKJD  
 $R_p/R^* = 0.0636$  [0.1031]  
 $a/R^* = 238.05$  [90.42]  
 $b = 1.00$  [0.13]  
Seff = 1.35 [0.00]  
Teq = 275 [0] K  
 $R_p = 6.94$  [11.25] Re  
 $a = 0.8595$  [0.0000] AU  
 $A_g = 4380.29$  [14194.22] [0.31σ]  
Teffp = 3460 [2803] K [1.14σ]

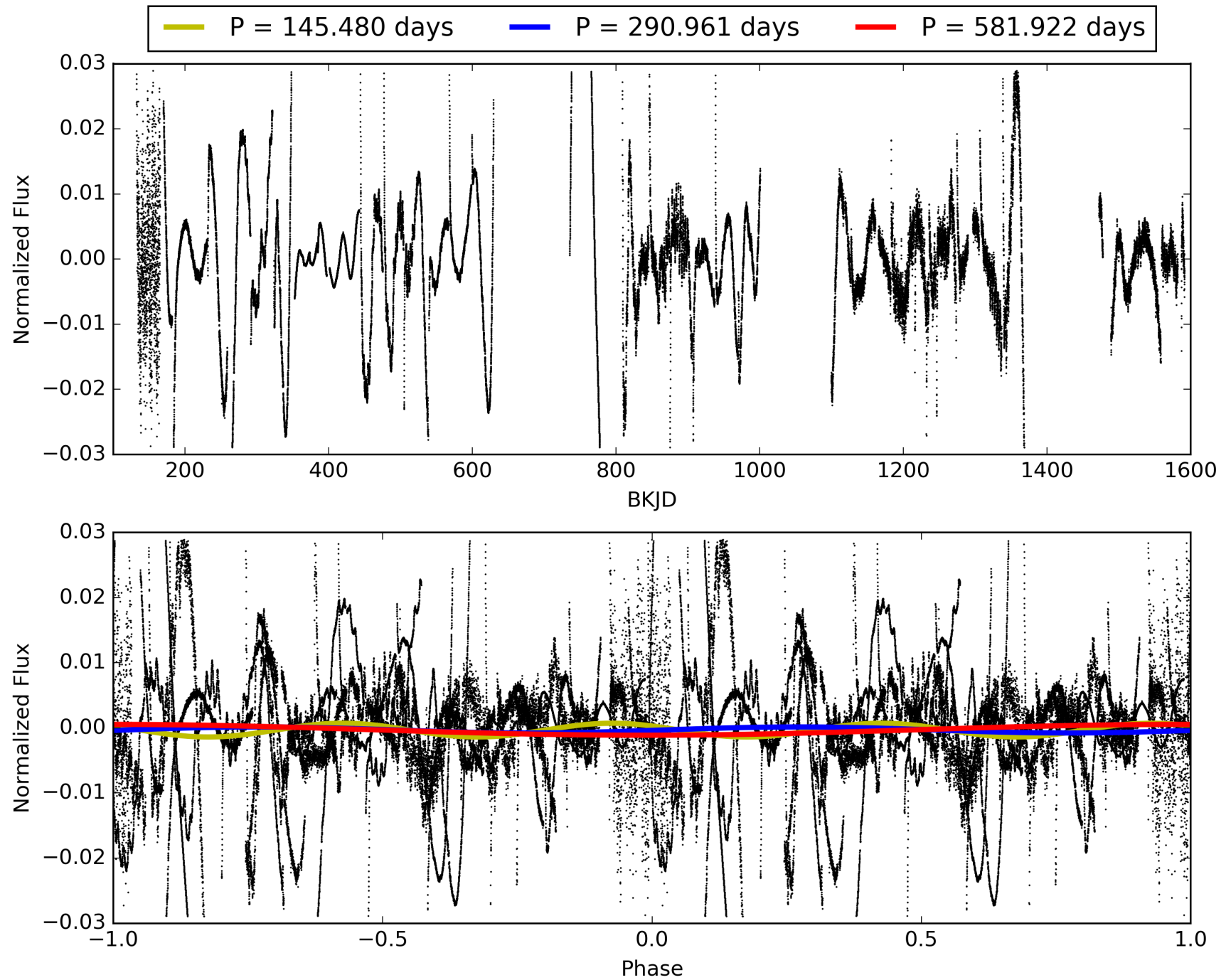
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [490.80σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.2%  
ModelChiSquareGof-sig: 85.6%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -0.03508  
Centroid-sig: 0.0%  
Centroid-so: 4.049 arcsec [6.41σ]  
OotOffset-rm: 5.117 arcsec [6.94σ]  
KicOffset-rm: 5.328 arcsec [7.23σ]  
OotOffset-st: 1/0/0/0 [1]  
KicOffset-st: 1/0/0/0 [1]  
DiffImageQuality-fgm: 0.00 [0/1]  
DiffImageOverlap-fno: 0.75 [3/4]

# TCE 010033959-02, PDC Light Curves



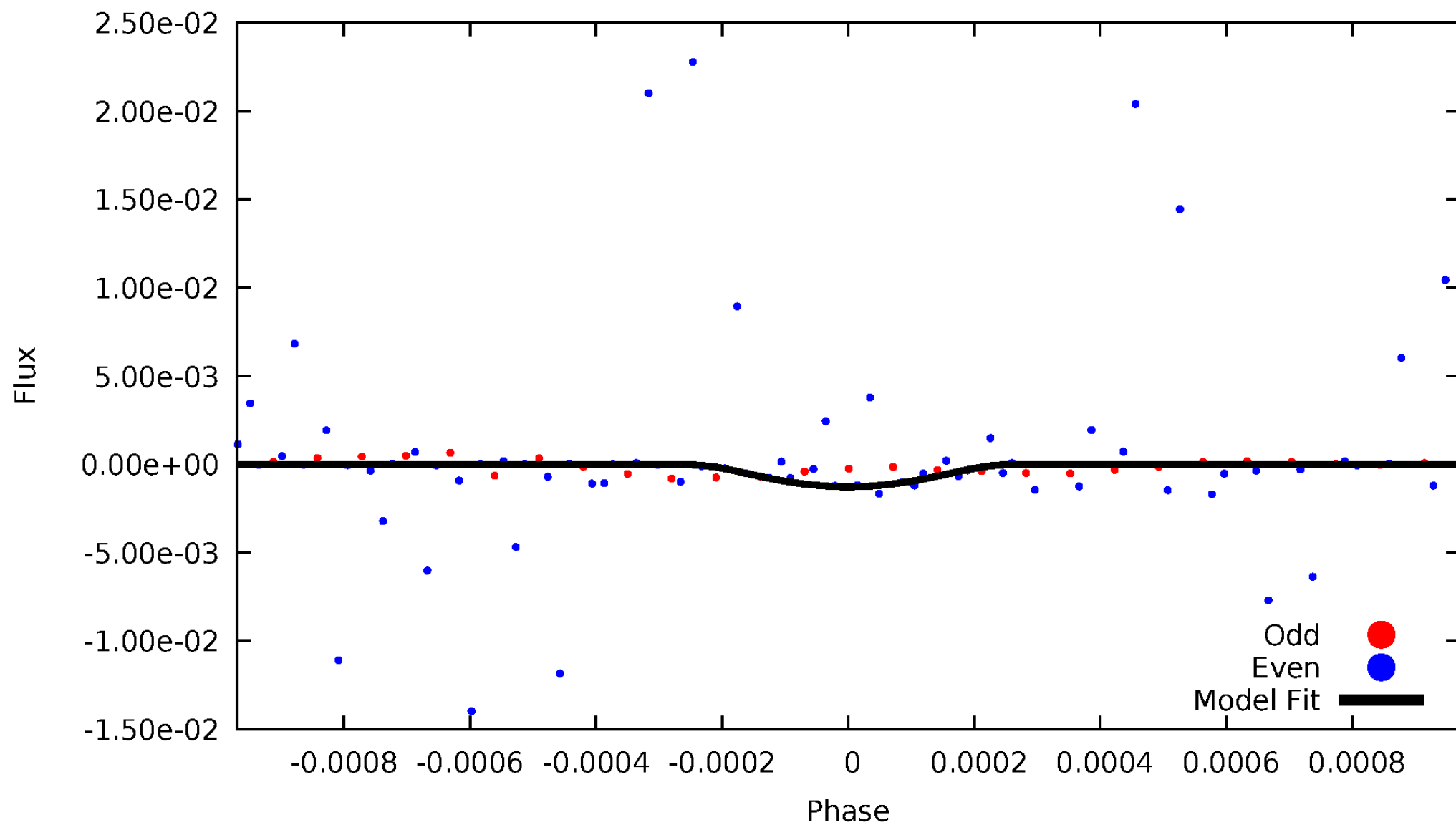
# TCE 010033959-02





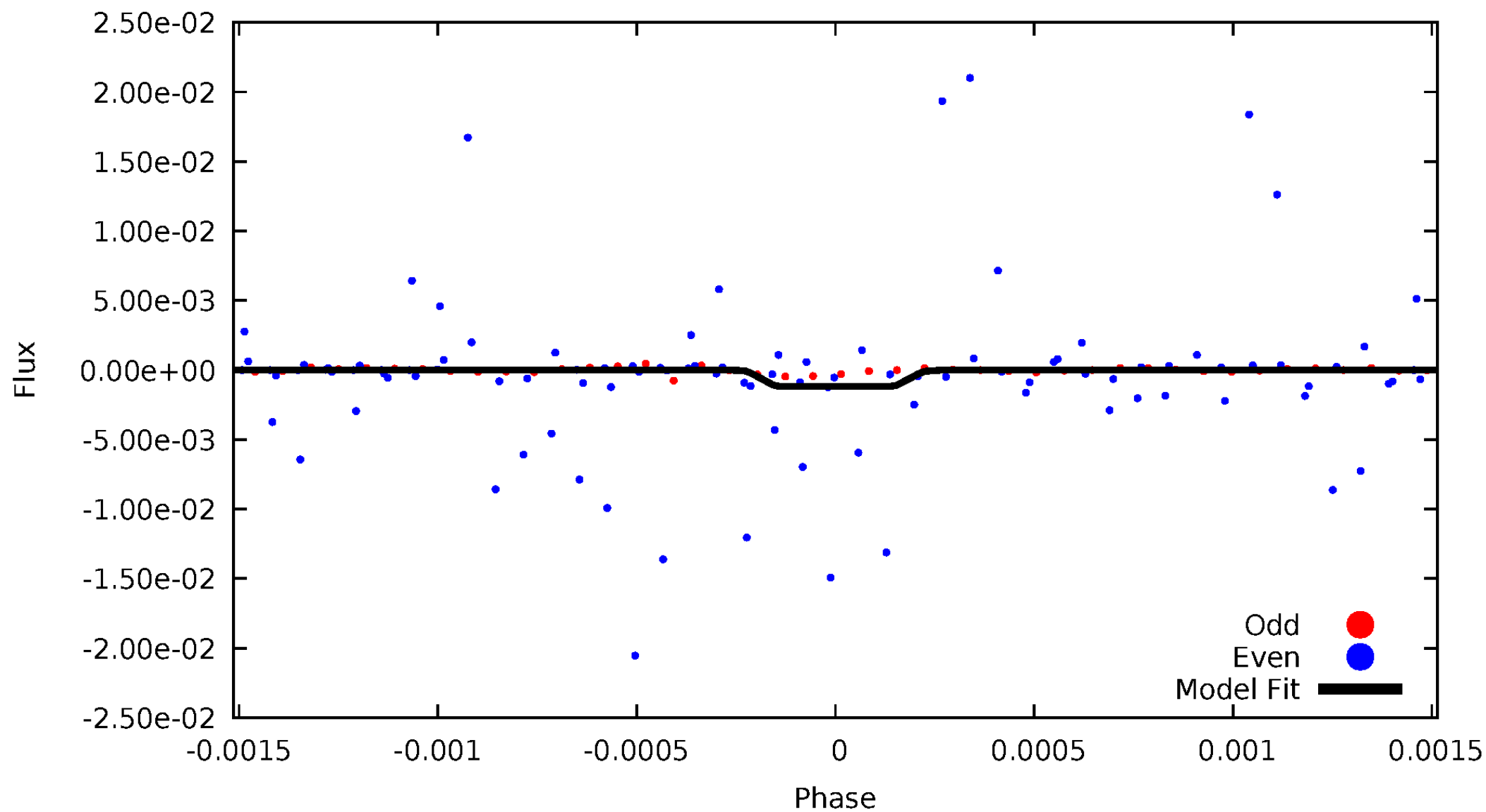
# DV Odd/Even

TCE 010033959-02



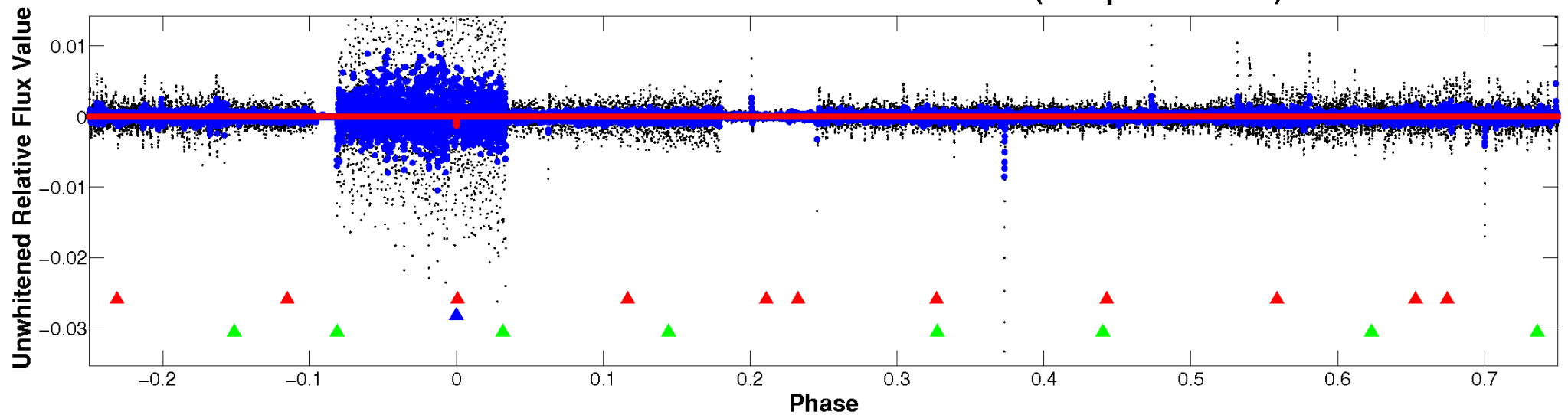
# ALT Odd/Even

TCE 010033959-02

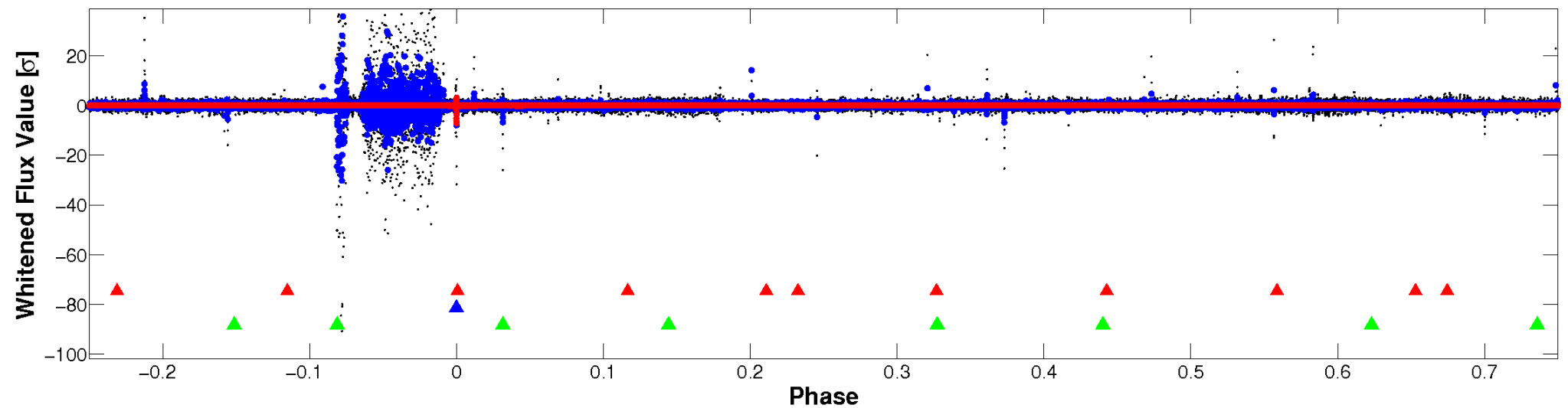


# Non-Whitened Vs. Whitened Light Curve

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

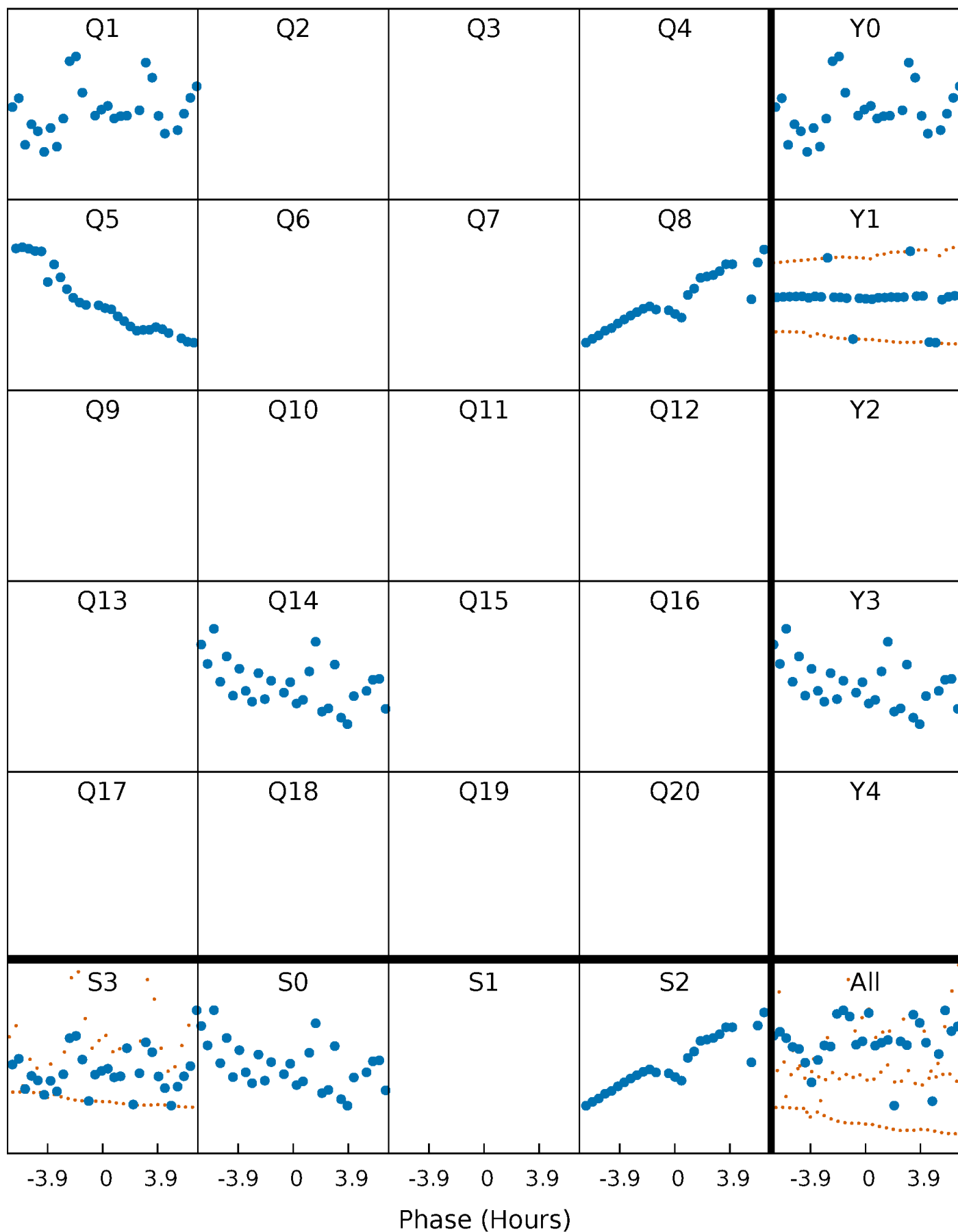


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

TCE 010033959-02     $P=290.960892$  Days     $T_0=155.185148$  (BKJD)



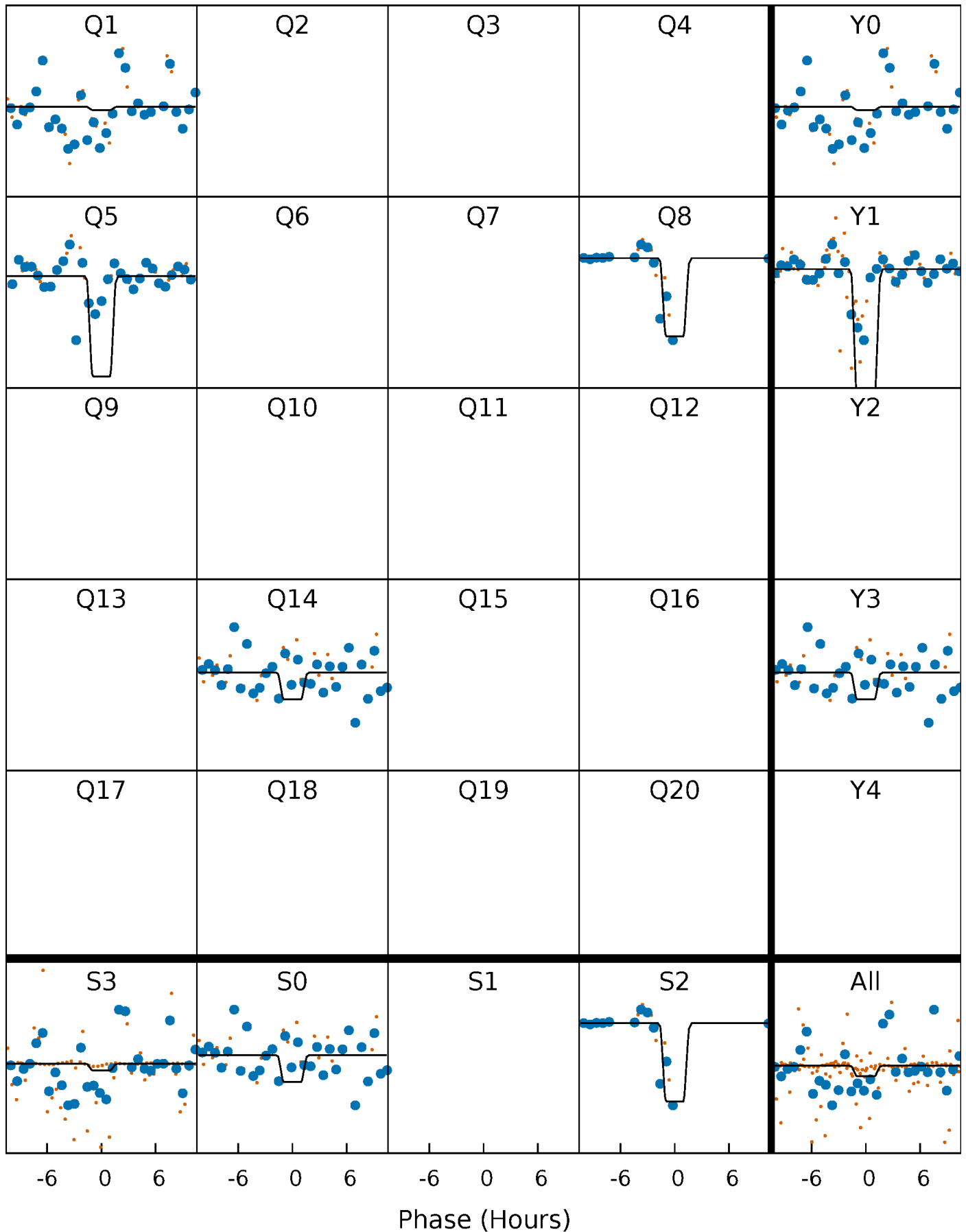
# DV Quarter-Phased Transit Curves

TCE 010033959-02     $P=290.960892$  Days     $T_0=155.185148$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

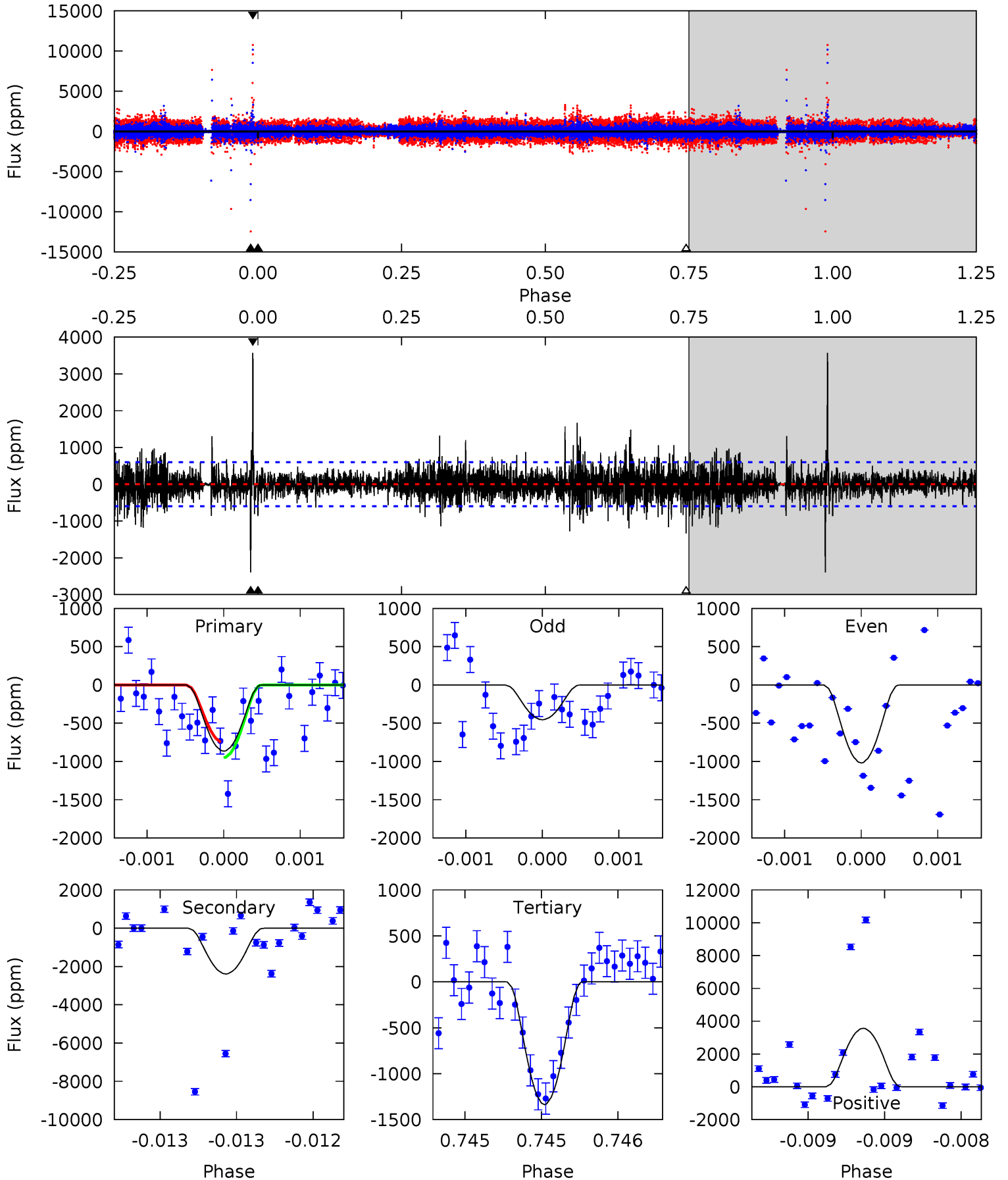
TCE 010033959-02     $P=291.086502$  Days     $T_0=155.014798$  (BKJD)



# DV Model-Shift Uniqueness Test

010033959-02, P = 290.960892 Days, E = 155.185148 Days

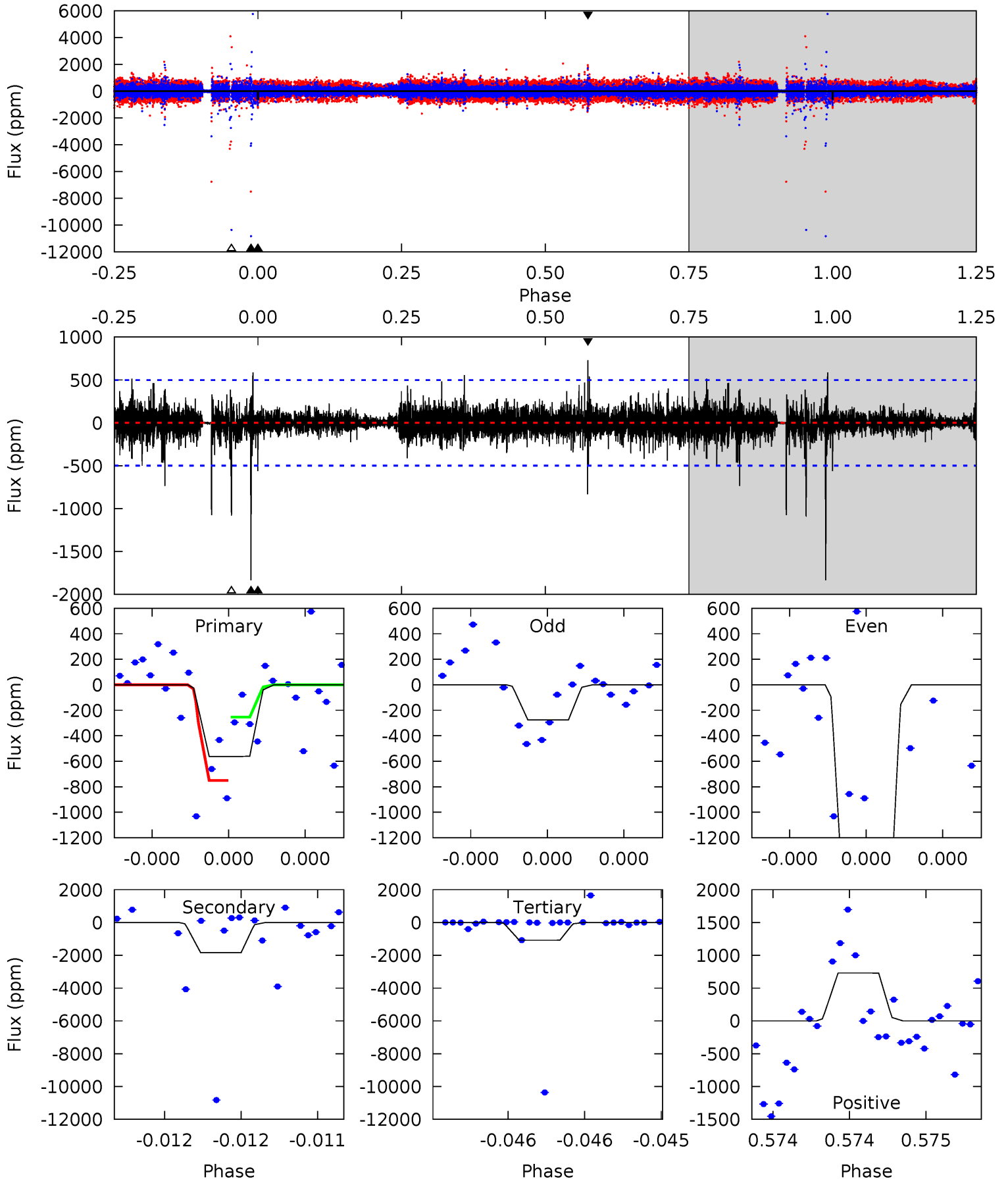
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.02	22.2	12.4	33.1	5.56	3.46	2.58	-4.37	-25.1	9.78	-10.9	1.79	-0.03	0.60	0.89



# Alt Model-Shift Uniqueness Test

010033959-02, P = 291.086502 Days, E = 155.014798 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
6.29	20.5	12.1	8.17	5.57	3.48	1.09	-5.81	-1.88	8.40	12.3	6.51	4.45	0.28	2.93





### Stellar Parameters For KIC 010033959

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5780^{+1}_{-1}$	$4.438^{+1.000}_{-1.000}$	$0.000^{+1.000}_{-1.000}$	$1.000^{+1.000}_{-1.000}$	$-1.000^{+1.000}_{-1.000}$	$-1.000^{+1.000}_{-1.000}$
	+0%/-0%	+23%/-23%	+inf%/-inf%	+100%/-100%	+100%/-100%	+100%/-100%
Source	Solar	Solar	Solar	Solar		

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

### Secondary Eclipse Parameters for KIC 010033959-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-2392 \pm 108$	$11.15^{+9.29}_{-7.20}$	$385^{+18}_{-19}$	$4265^{+2560}_{-829}$	$7855^{+54625}_{-5499}$
Alt.	$-1833 \pm 89$	$9.27^{+9.83}_{-6.26}$	$384^{+18}_{-18}$	$4293^{+3042}_{-896}$	$8437^{+74318}_{-6357}$

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

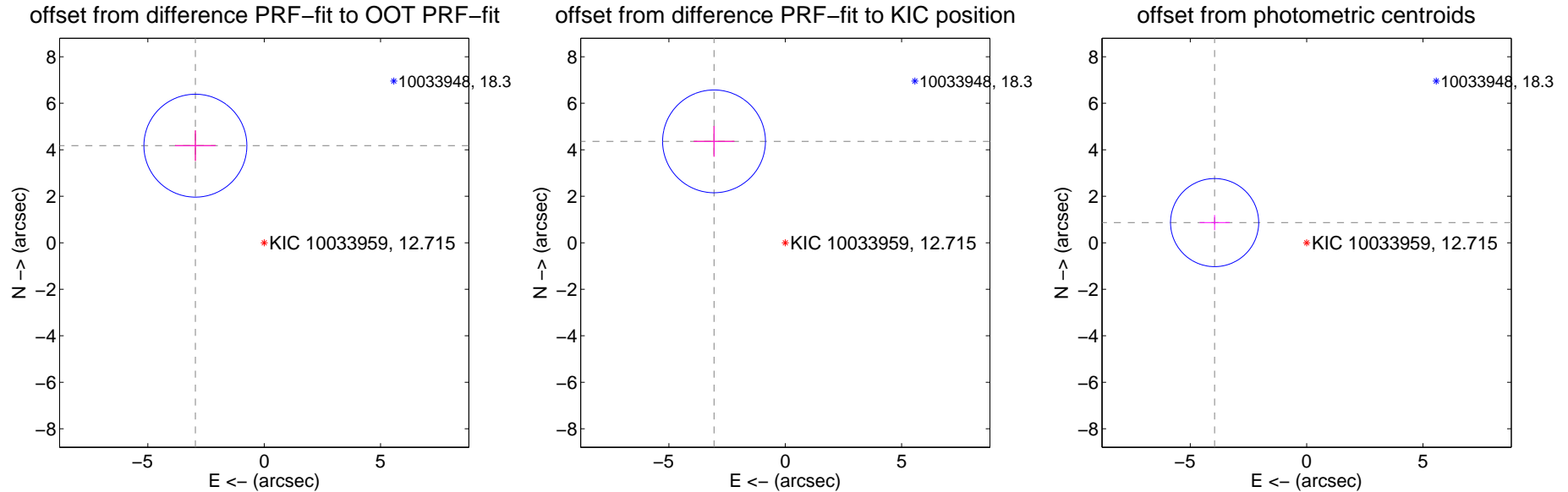
## DV Centroid Data

Supplemental centroid analysis for 010033959-02. Kepler magnitude: 12.71. Transit SNR 29.47

There are 0 quarters with good PRF difference image offsets

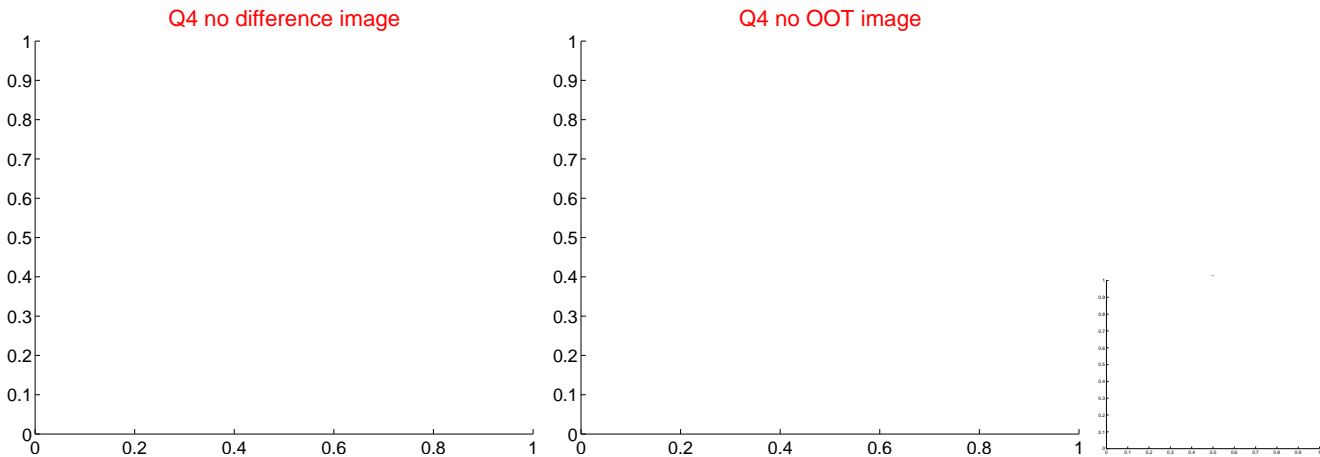
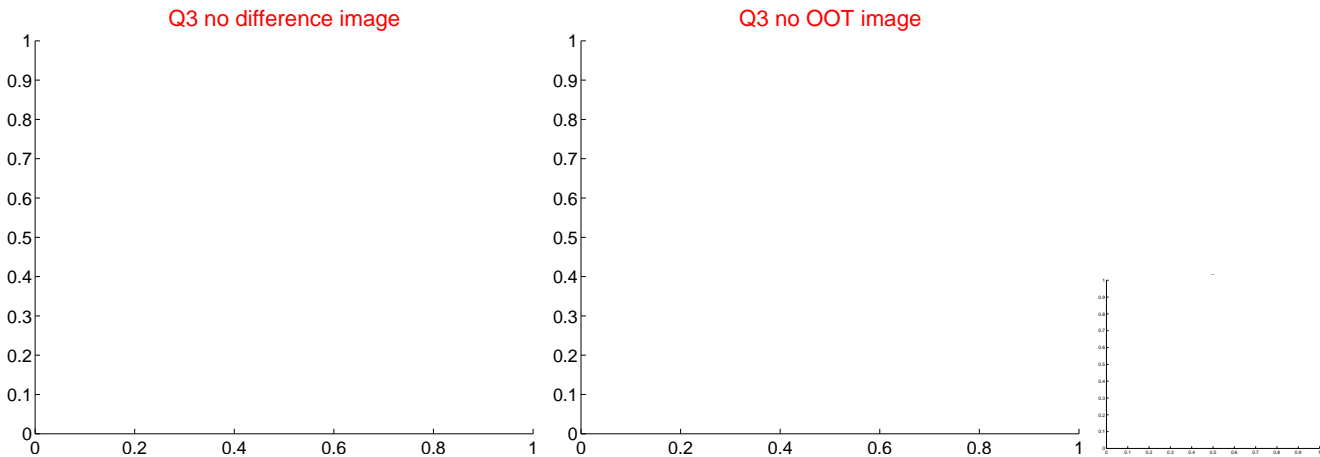
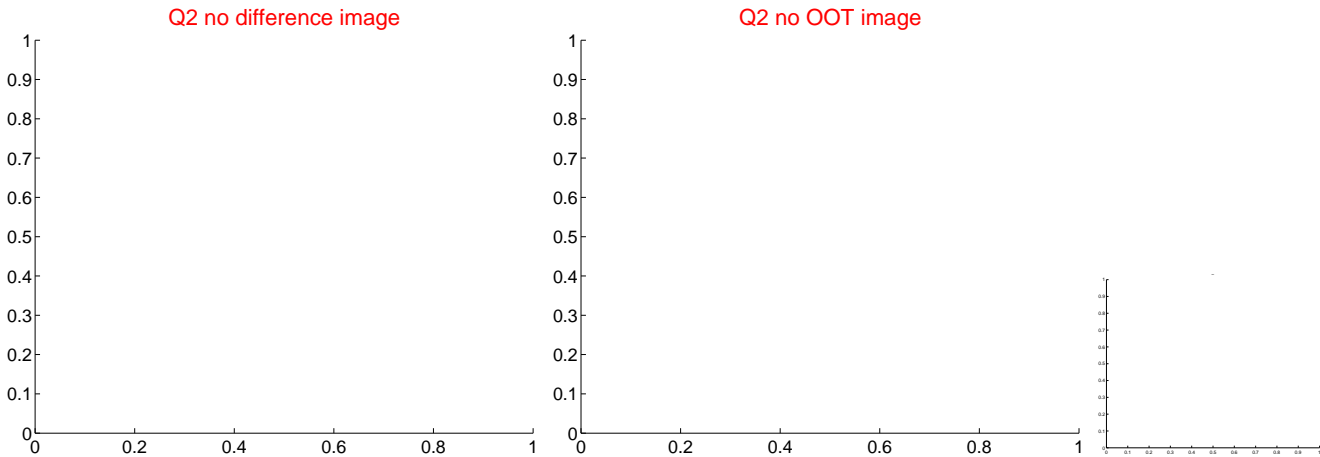
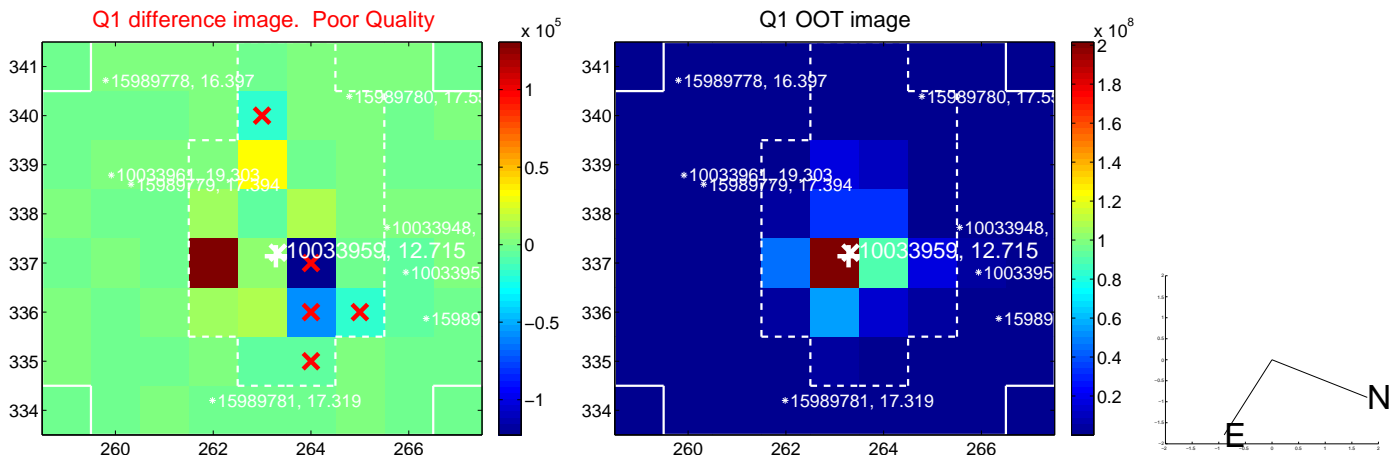
The direct PRF centroid is offset from the target star catalog position by about 0.21 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$5.117 \pm 0.738$	6.94	$2.957 \pm 0.876$	$4.175 \pm 0.657$
PRF-fit source offset from KIC position	$5.328 \pm 0.737$	7.23	$3.062 \pm 0.876$	$4.361 \pm 0.657$
photometric centroid source offset	$4.05 \pm 0.63$	6.41	$3.96 \pm 0.64$	$0.87 \pm 0.32$

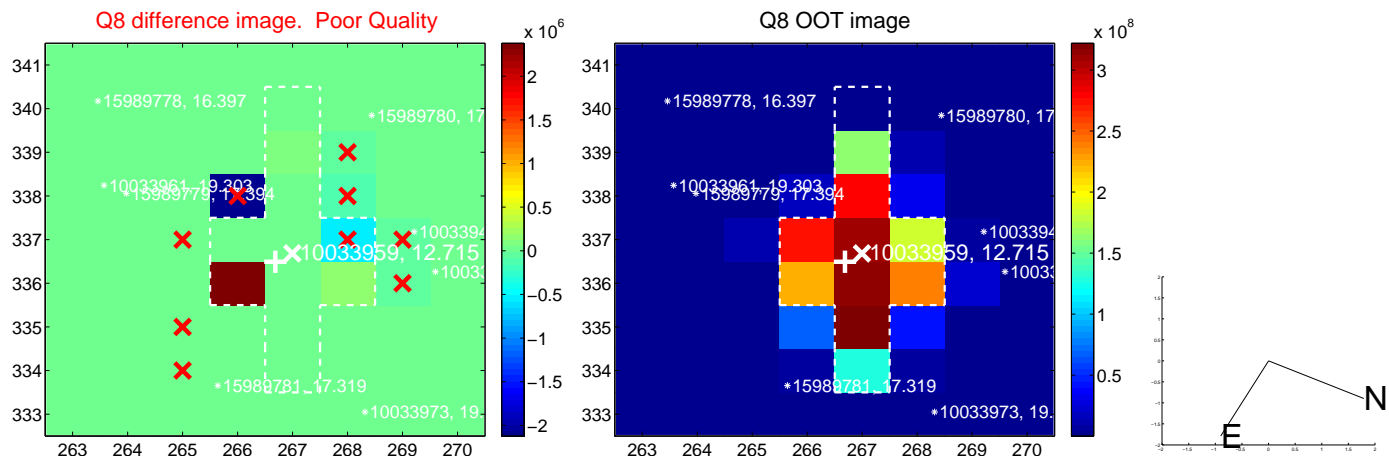
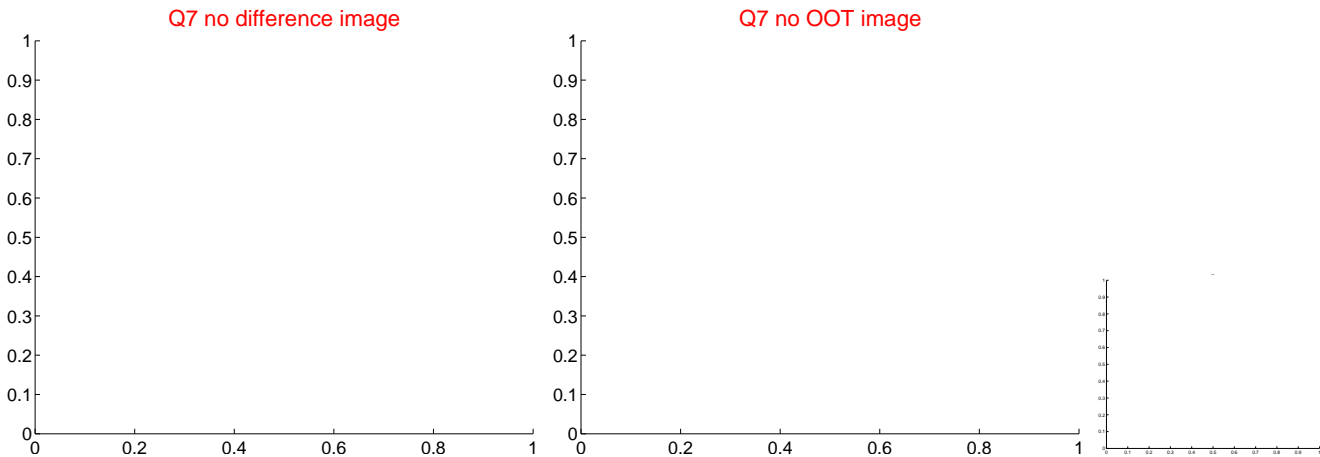
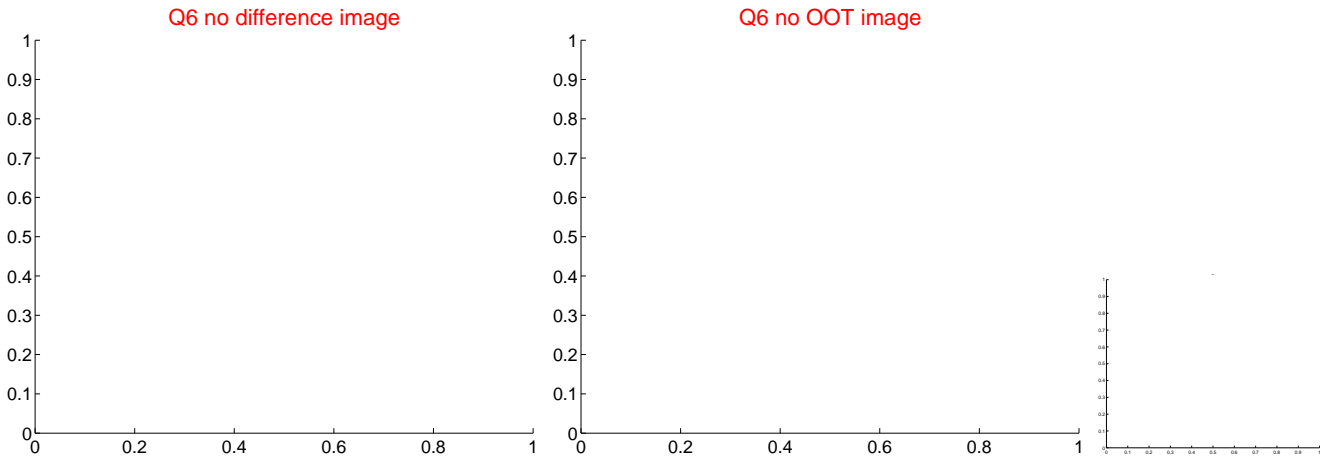
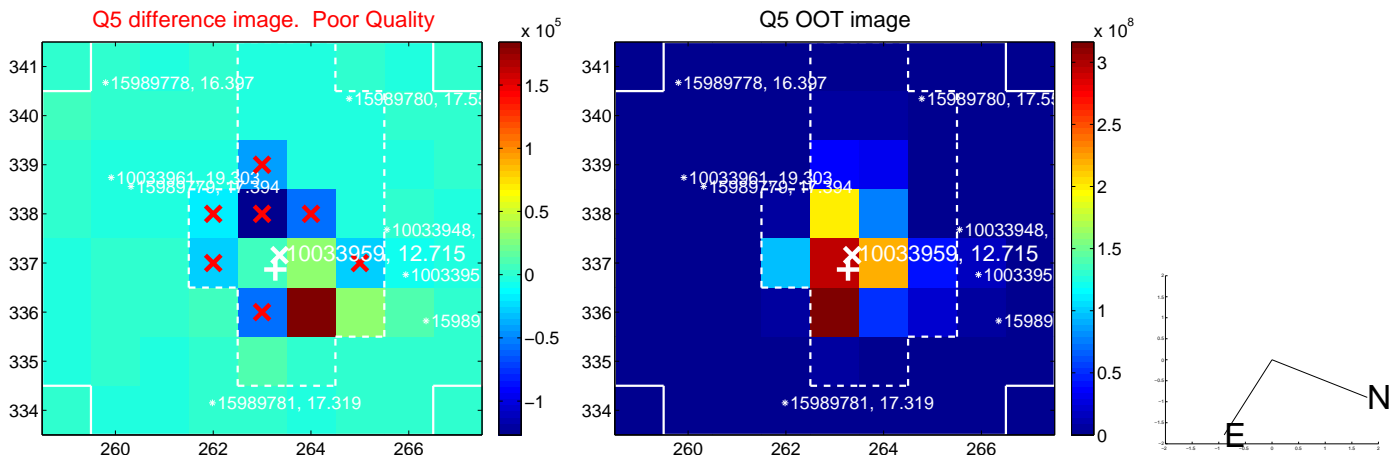


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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



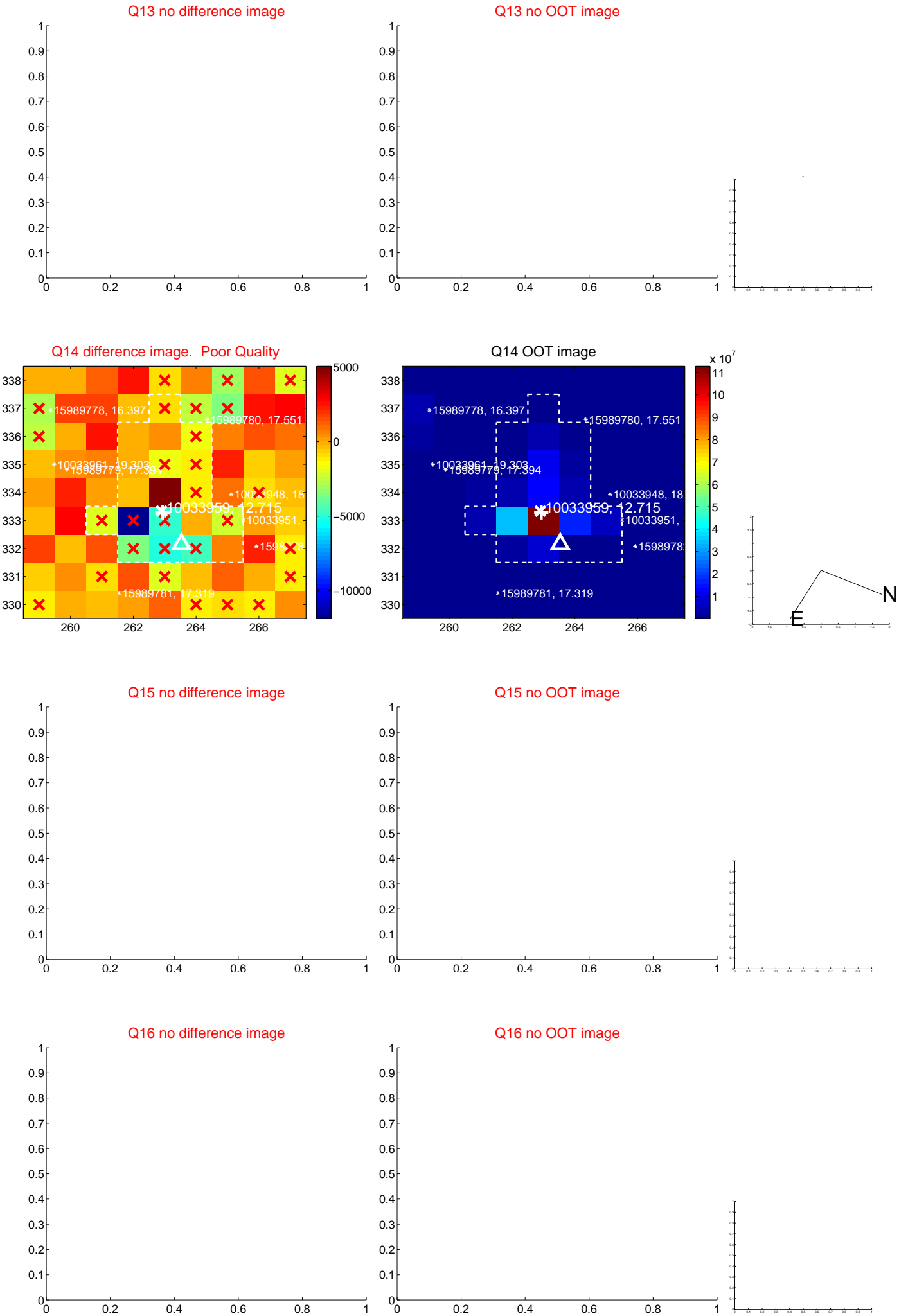
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



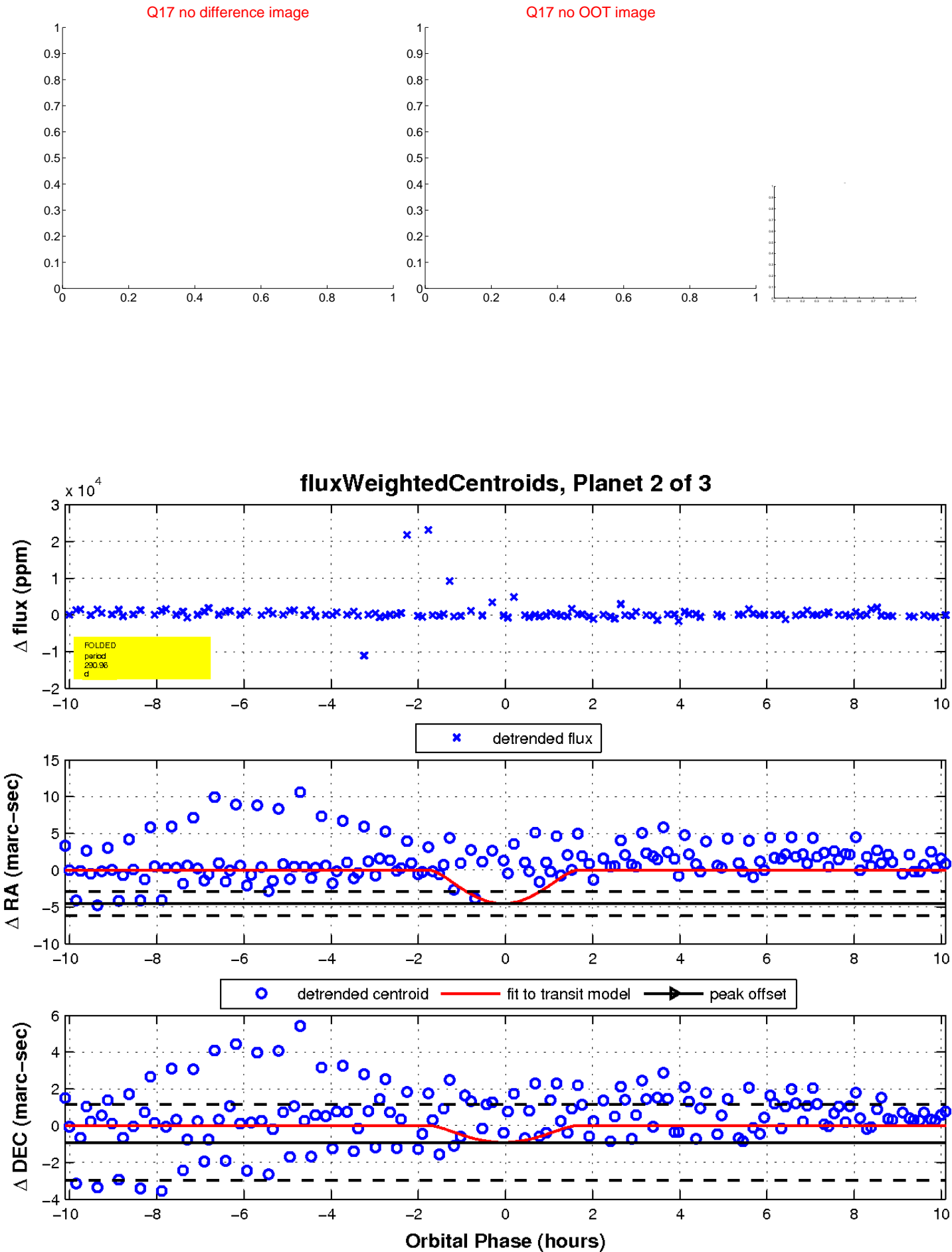
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



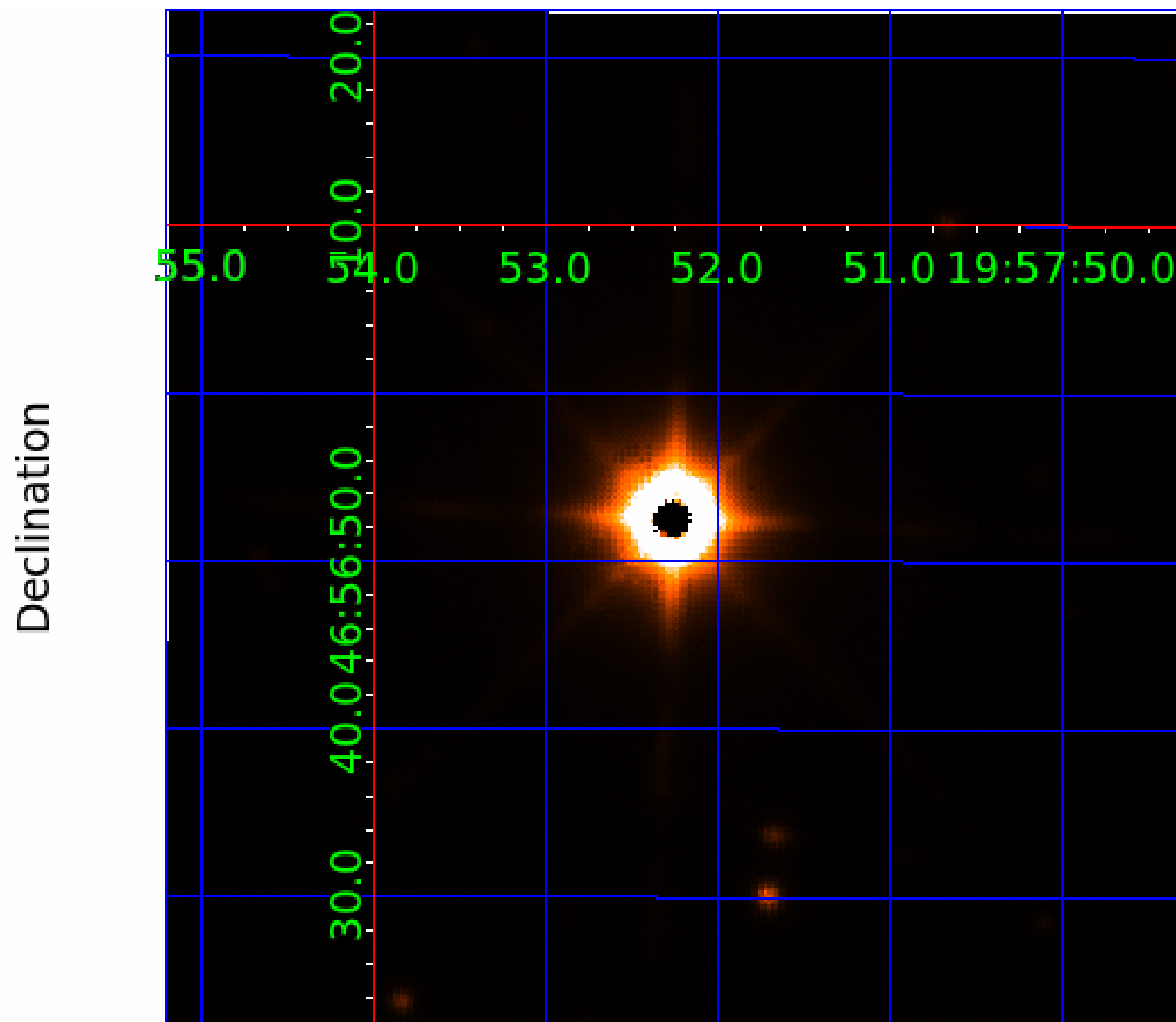
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image





# KIC 010033959

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010033959-01	OBS	No	128.618249	222.847522	1962.9	1.981	54.1	15.0	1.00	5780	8.59	4.02
010033959-02	OBS	No	290.960892	155.185149	1275.4	3.384	42.0	29.5	1.00	5780	6.94	1.35
010033959-03	OBS	No	204.916993	131.552661	586.8	2.500	33.4	-1.0	1.00	5780	2.40	2.16

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010033959-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010033959-02	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL_ZUMA_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
010033959-03	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_NOFITS

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

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

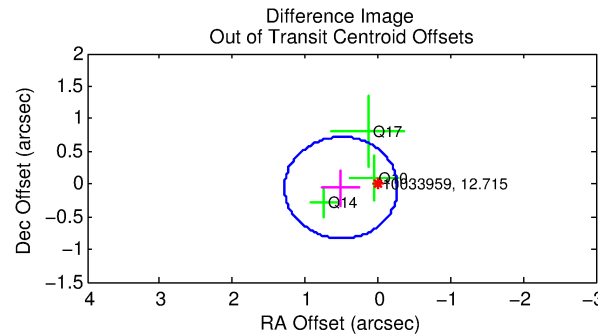
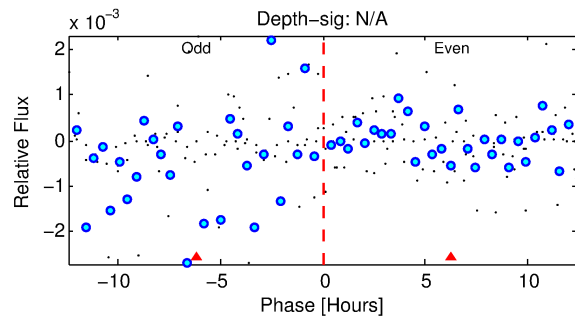
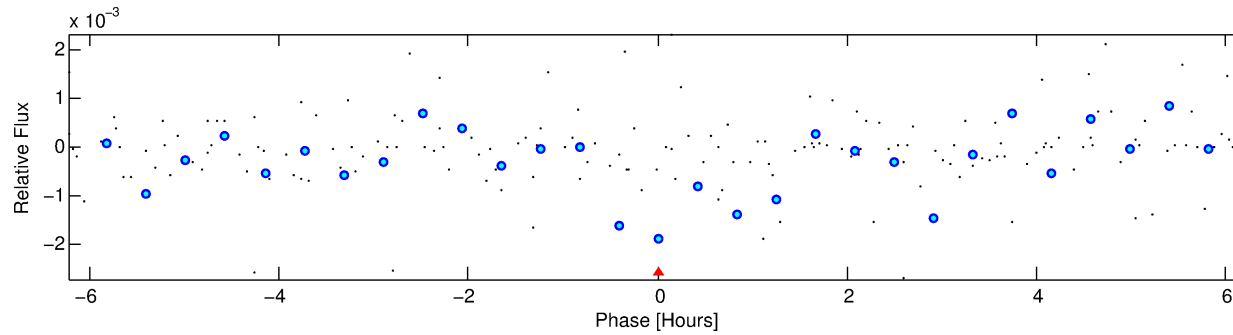
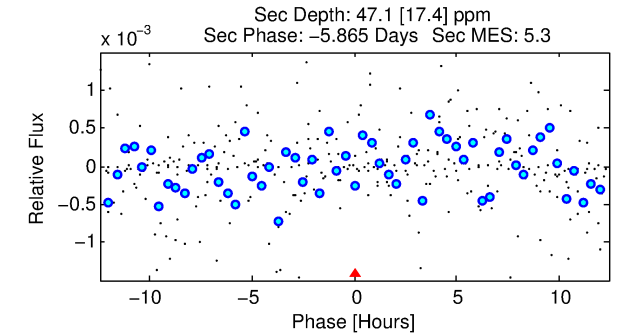
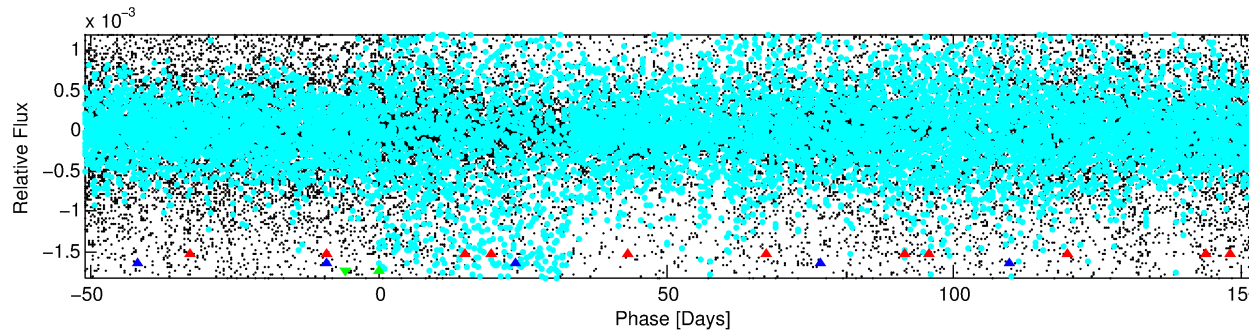
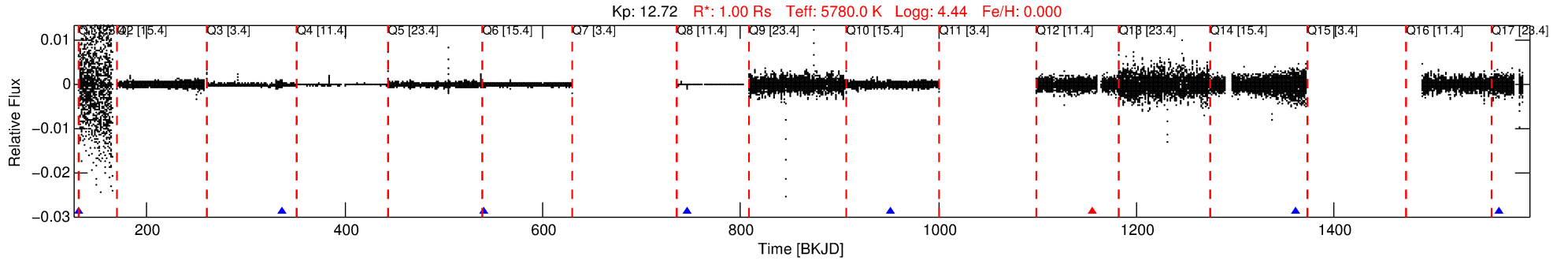
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010033959-03

No Significant Match Found

# DV One-Page Summary

KIC: 10033959 Candidate: 3 of 3 Period: 204.917 d



## TPS TCE Results:

Period = 204.91699 d  
Epoch = 131.5527 BKJD

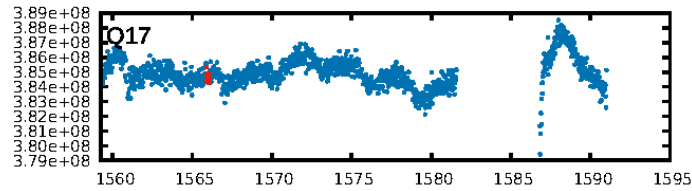
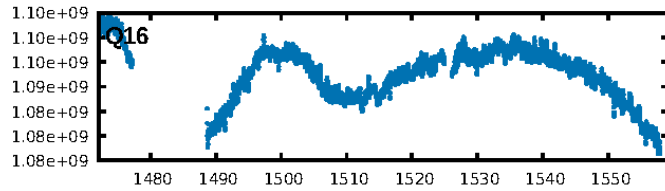
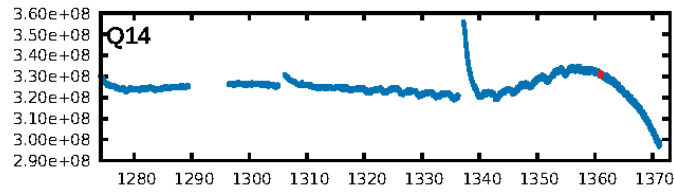
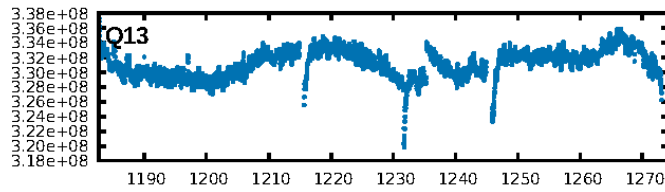
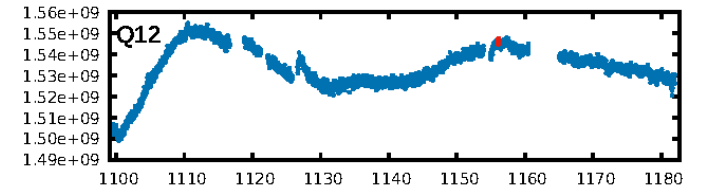
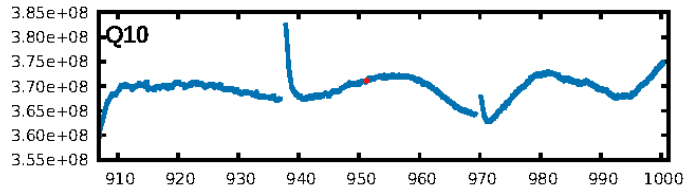
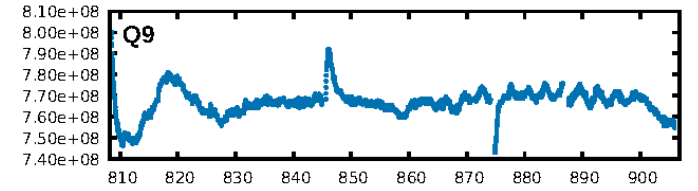
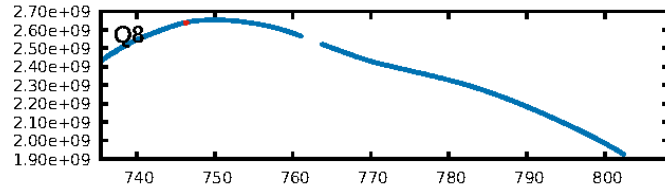
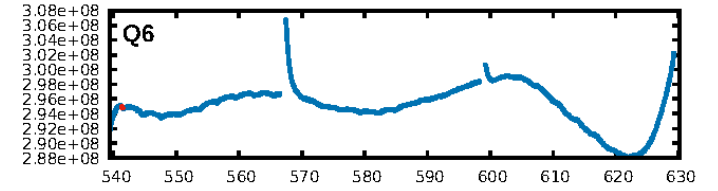
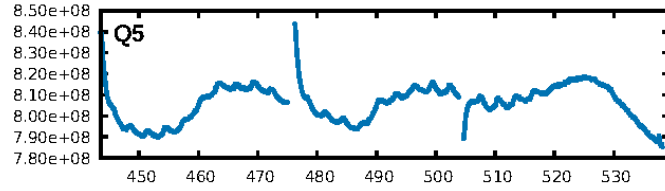
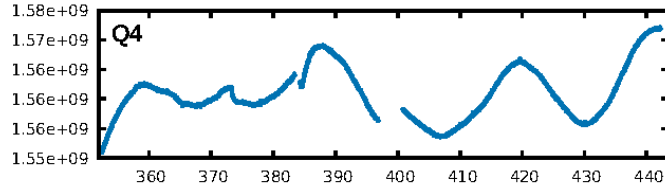
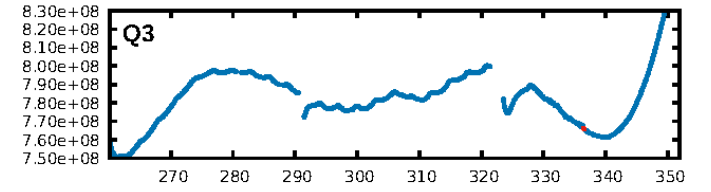
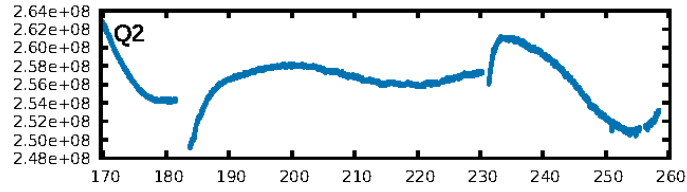
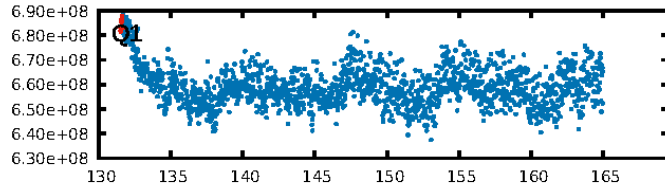
DV fit results are unavailable

## DV Diagnostic Results:

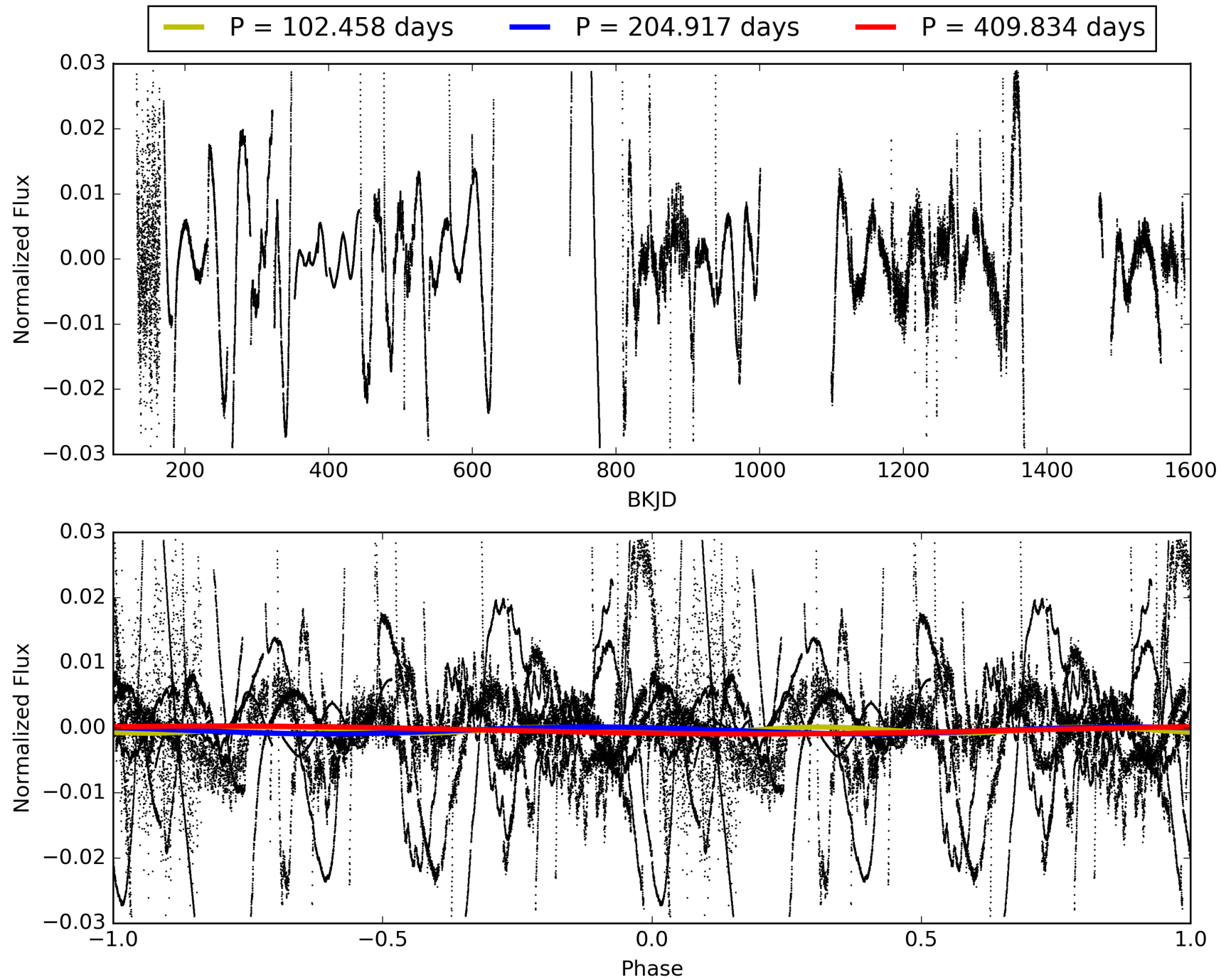
ShortPeriod-sig: 100.0% [574.08 $\sigma$ ]  
LongPeriod-sig: 100.0% [490.80 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 0.83 [5/6]  
GhostDiagnostic-chr: 0.6295

Centroid-sig: 0.5%  
Centroid-so: 1.556 arcsec [2.92 $\sigma$ ]  
OotOffset-rm: 0.510 arcsec [1.97 $\sigma$ ]  
KicOffset-rm: 0.524 arcsec [2.38 $\sigma$ ]  
OotOffset-st: 2/0/0/1 [3]  
KicOffset-st: 2/0/0/1 [3]  
DiffImageQuality-fgm: 0.00 [0/3]  
DiffImageOverlap-fno: 1.00 [7/7]

# TCE 010033959-03, PDC Light Curves

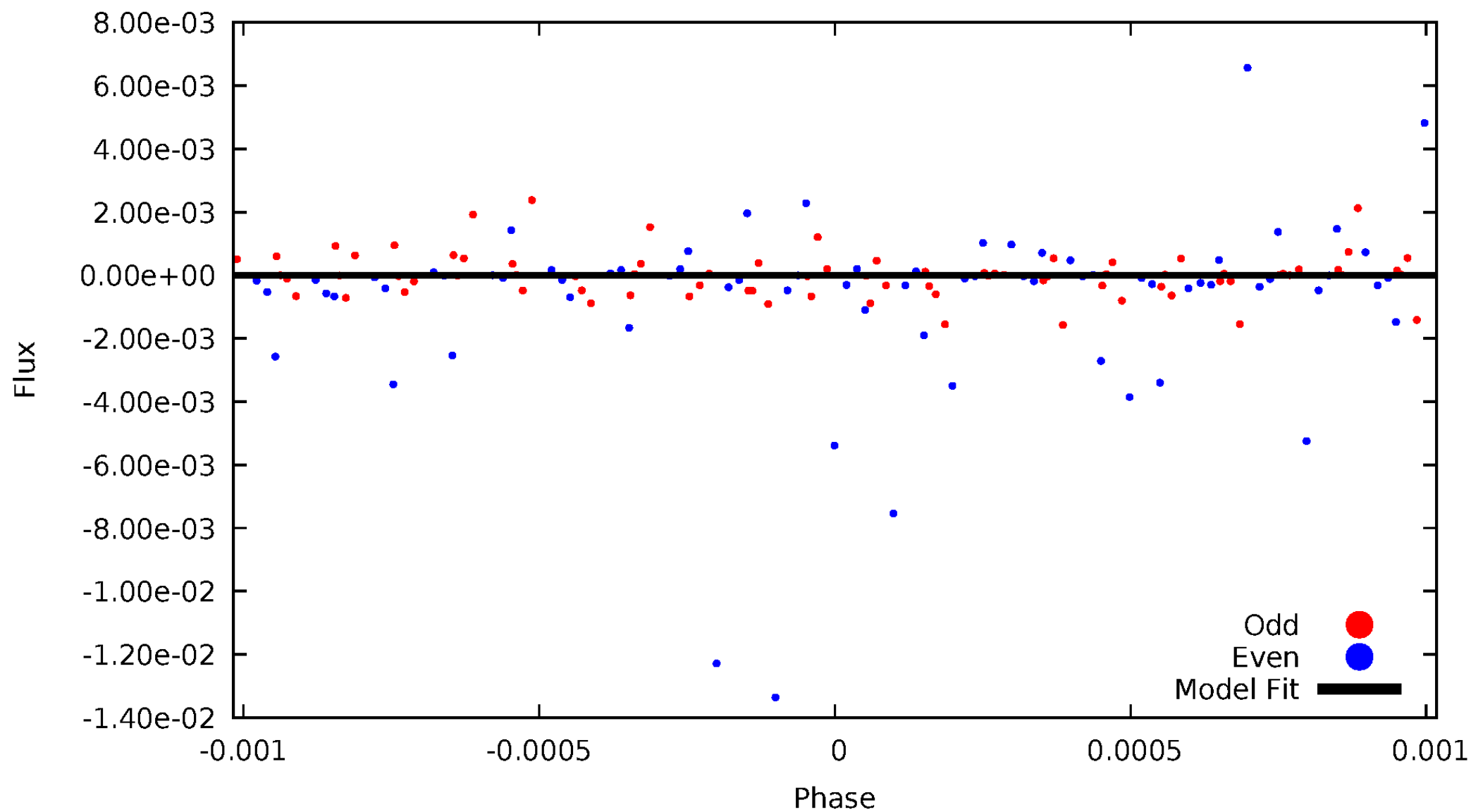


# TCE 010033959-03



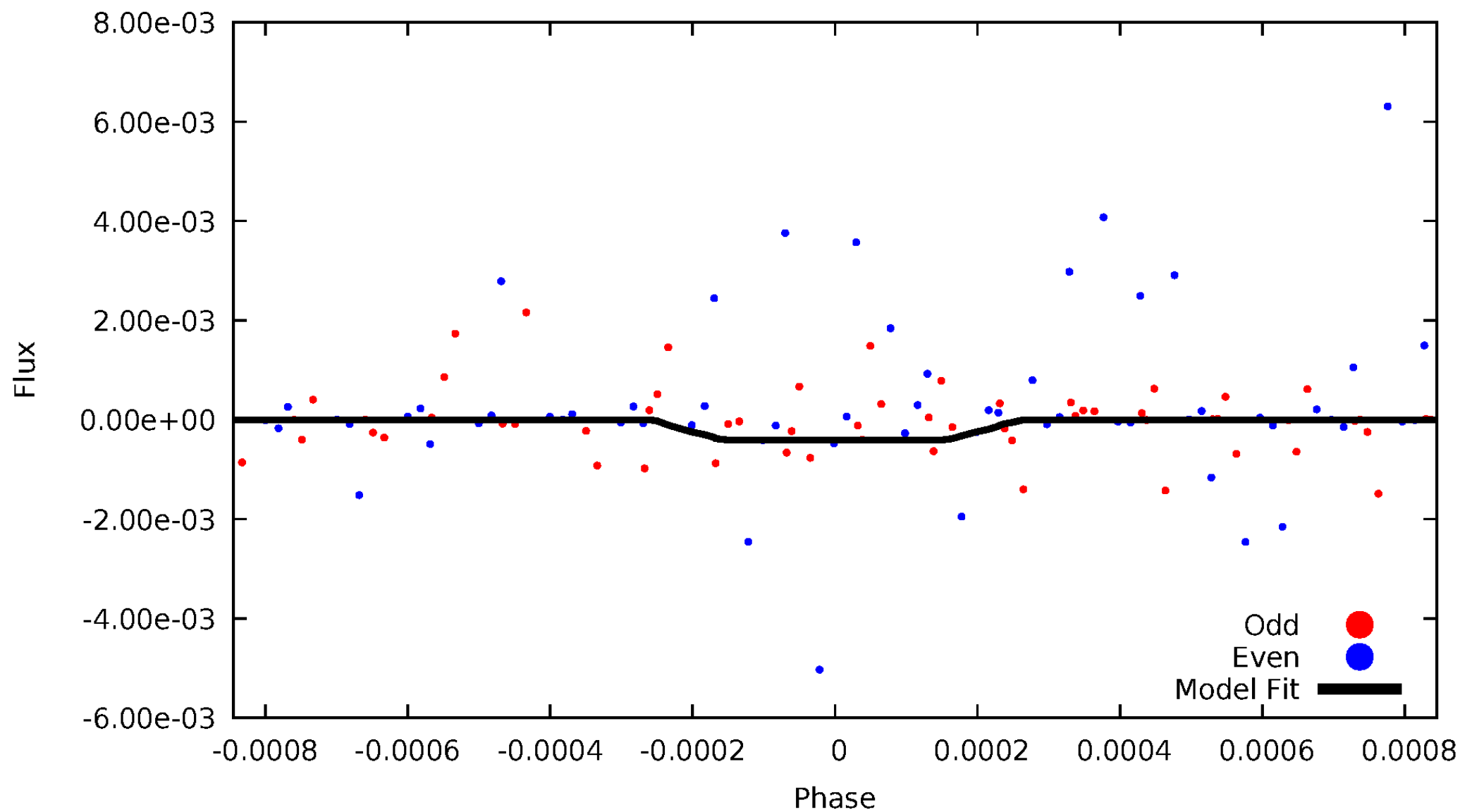
# DV Odd/Even

TCE 010033959-03



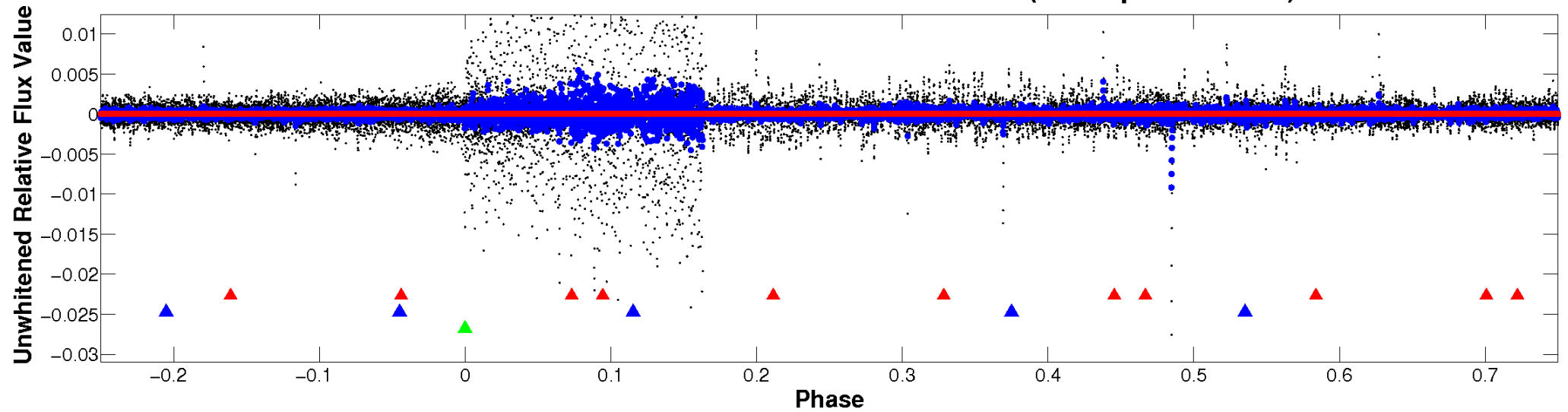
# ALT Odd/Even

TCE 010033959-03



# Non-Whitened Vs. Whitened Light Curve

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

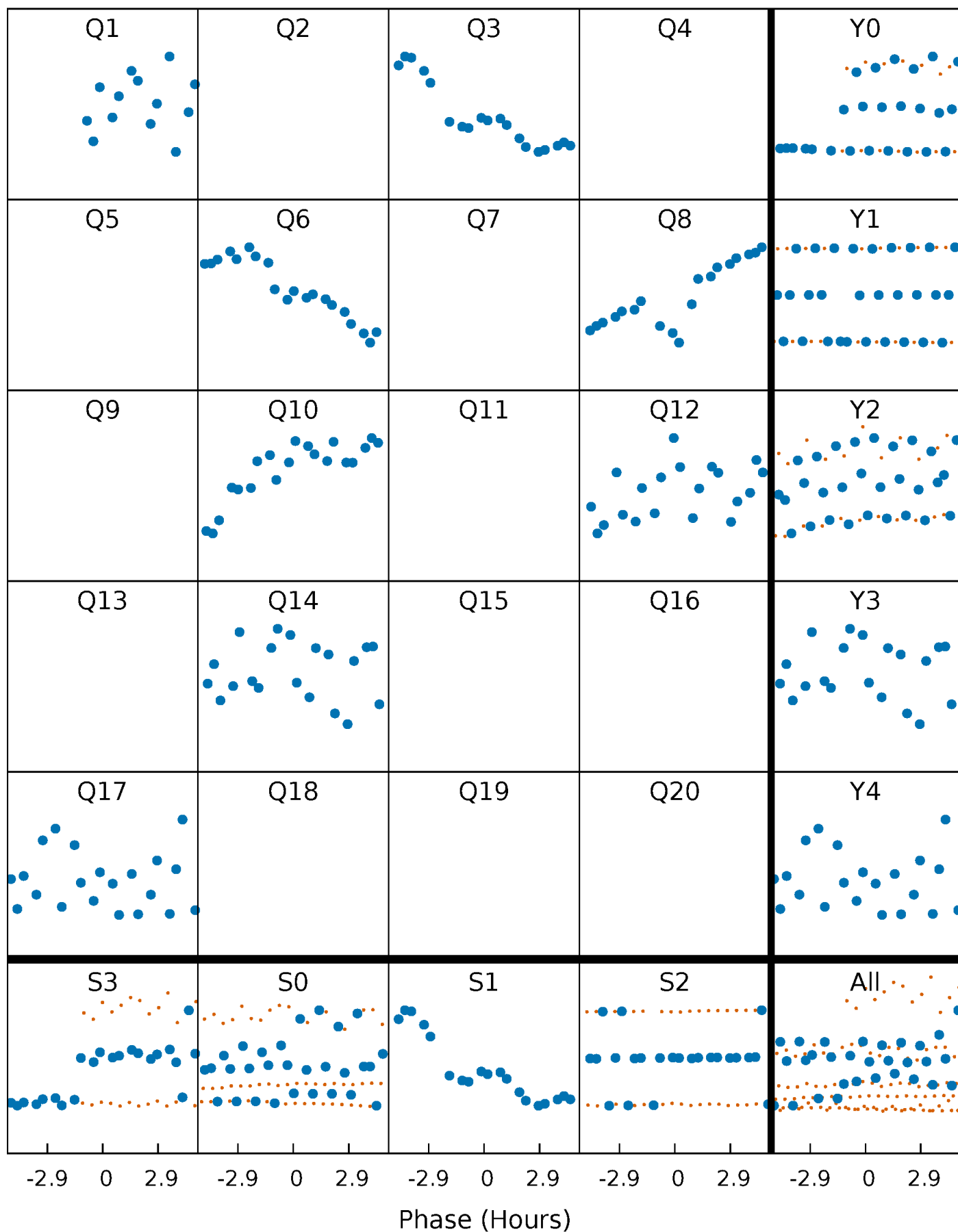


**Planet 3 : Phased Whitened Flux Time Series (TPS Epoch/Period)**



# PDC Quarter-Phased Transit Curves

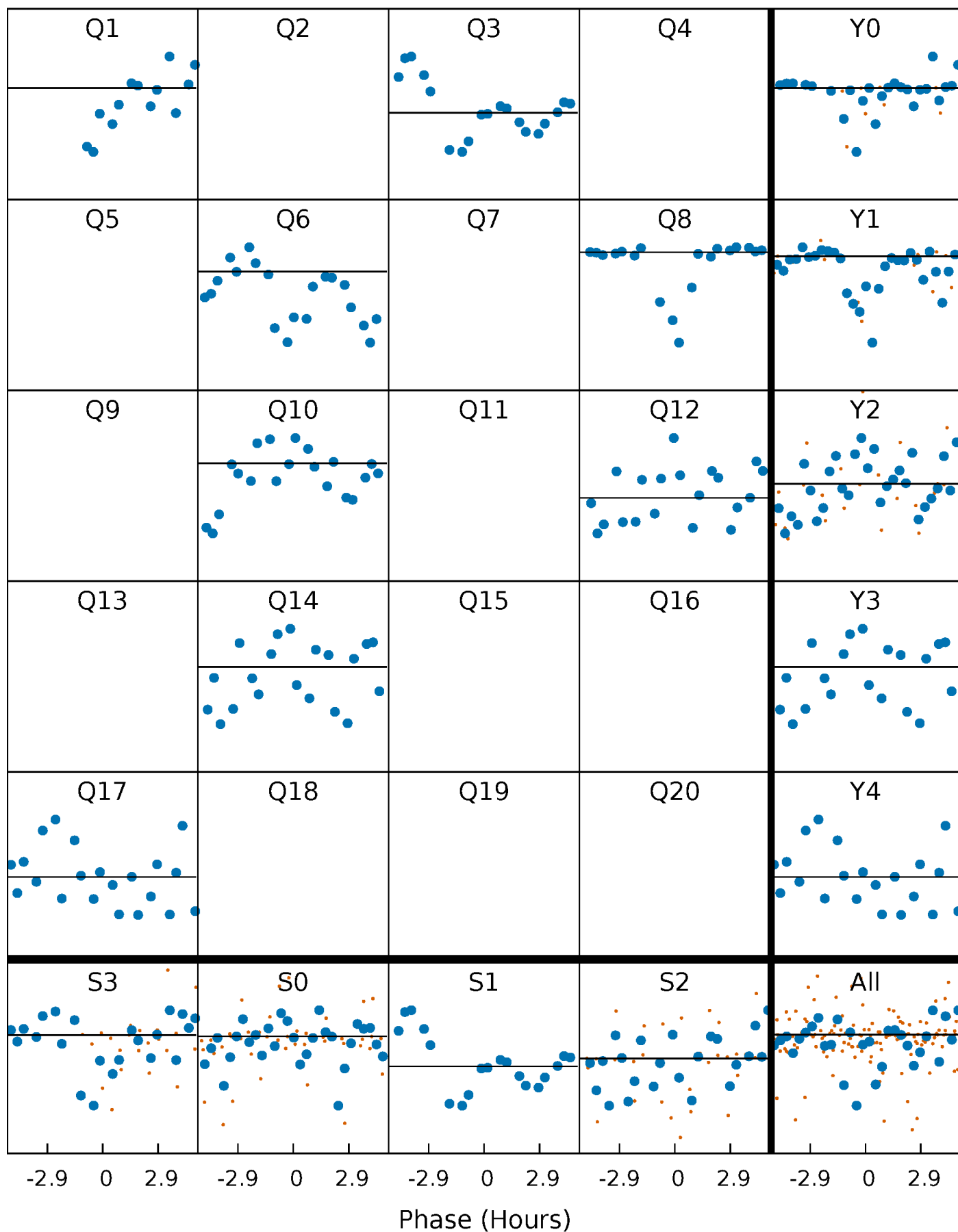
TCE 010033959-03     $P=204.916993$  Days     $T_0=131.552661$  (BKJD)





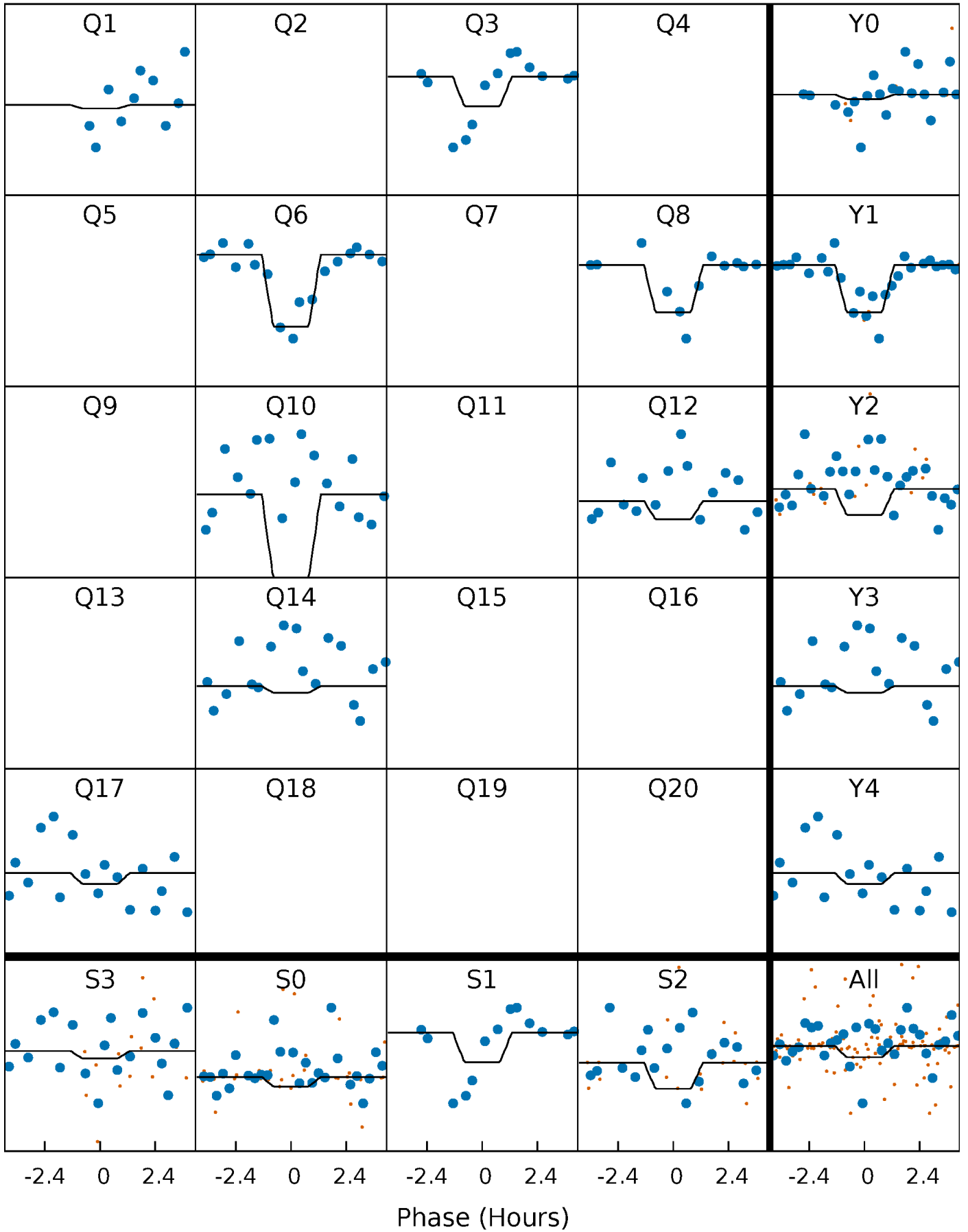
# DV Quarter-Phased Transit Curves

TCE 010033959-03 P=204.916993 Days  $T_0=131.552661$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

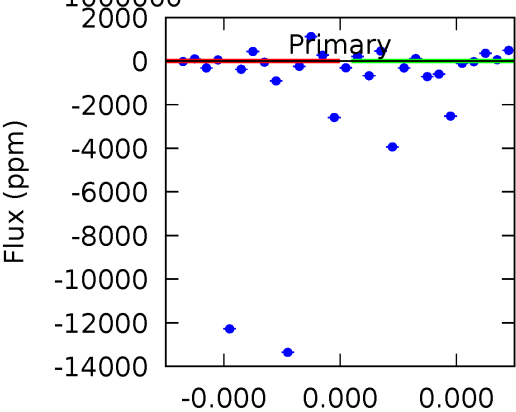
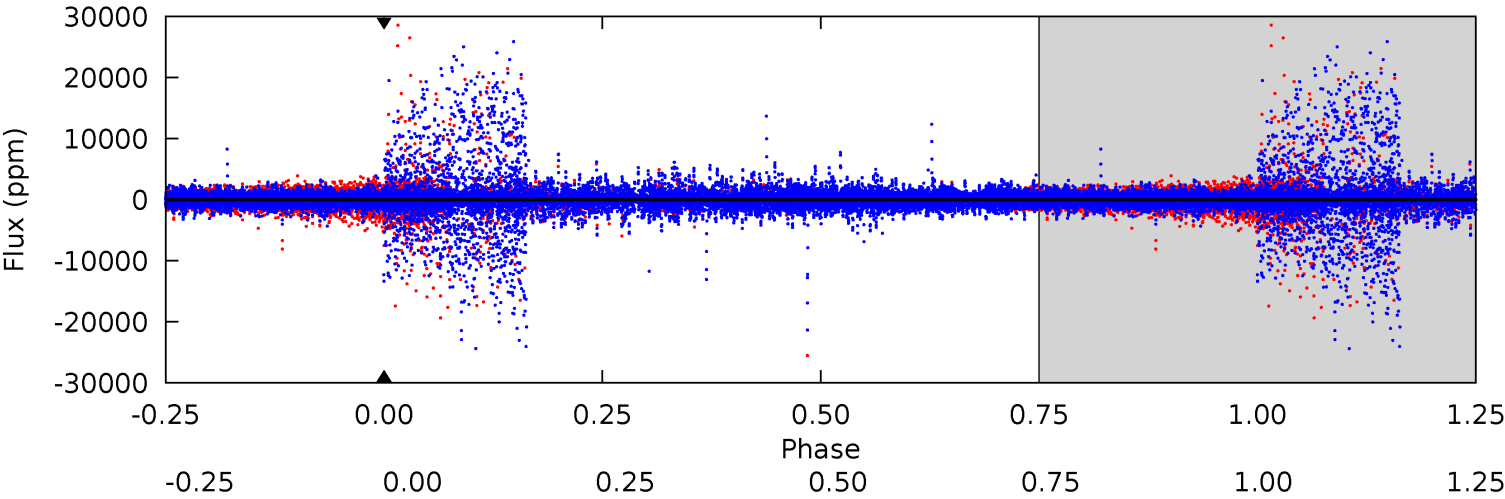
TCE 010033959-03     $P=204.916993$  Days     $T_0=131.536601$  (BKJD)



# DV Model-Shift Uniqueness Test

010033959-03, P = 204.916993 Days, E = 131.552661 Days

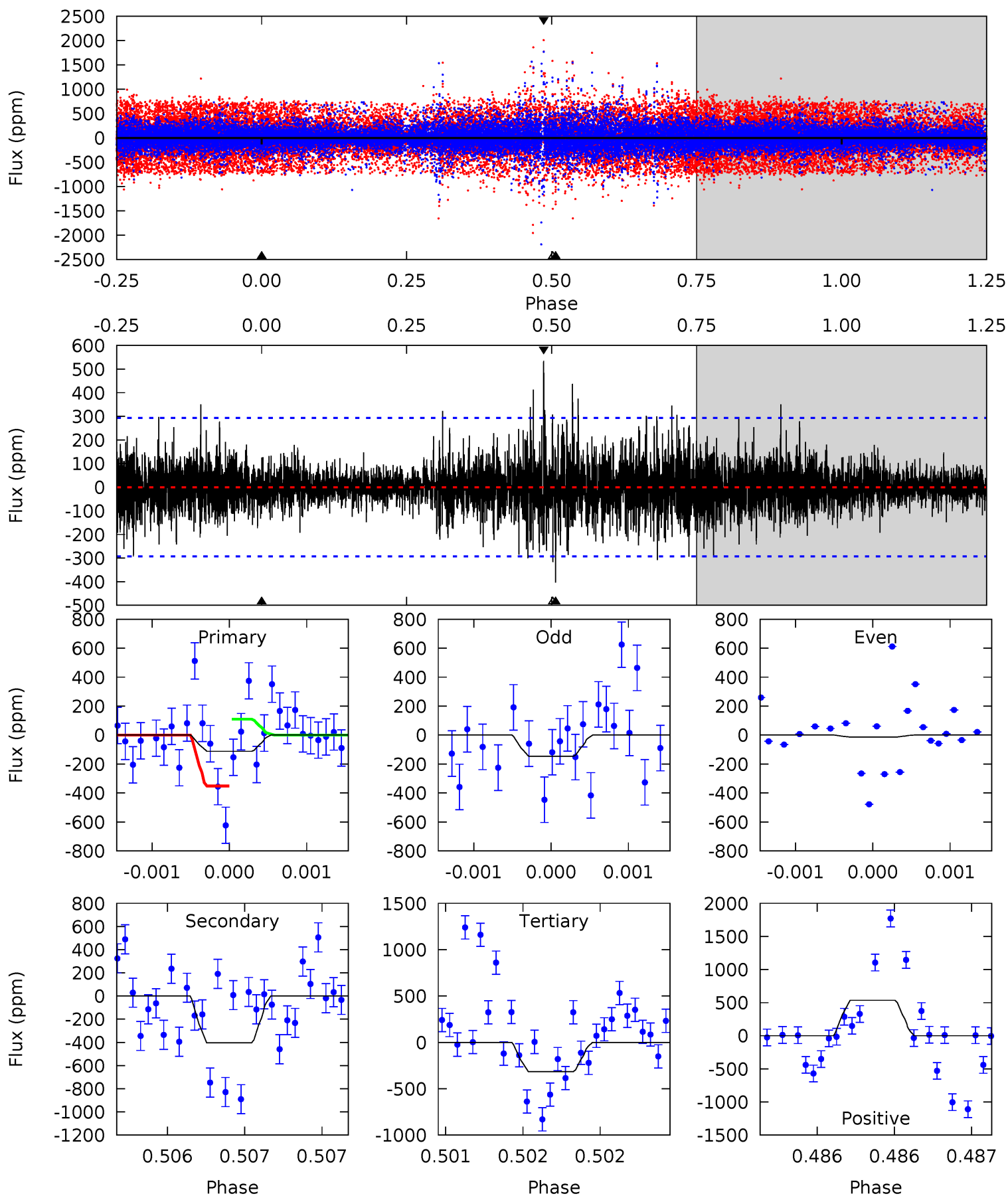
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



# Alt Model-Shift Uniqueness Test

010033959-03, P = 204.916993 Days, E = 131.536601 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
2.12	7.67	6.01	10.2	5.57	3.47	1.44	-3.89	-8.04	1.66	-2.50	1.07	-0.20	0.57	2.21



### Stellar Parameters For KIC 010033959

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5780^{+1}_{-1}$	$4.438^{+1.000}_{-1.000}$	$0.000^{+1.000}_{-1.000}$	$1.000^{+1.000}_{-1.000}$	$-1.000^{+1.000}_{-1.000}$	$-1.000^{+1.000}_{-1.000}$
	+0%/-0%	+23%/-23%	+inf%/-inf%	+100%/-100%	+100%/-100%	+100%/-100%
Source	Solar	Solar	Solar	Solar		

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

### Secondary Eclipse Parameters for KIC 010033959-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$0 \pm 1000000$	$8.25^{+8.44}_{-5.71}$	$432^{+19}_{-20}$	$2564^{+20545}_{-20547}$	$165^{+823960}_{-538086}$
Alt.	$-404 \pm 53$	$8.13^{+8.36}_{-5.73}$	$433^{+20}_{-21}$	$3489^{+2099}_{-662}$	$1541^{+16026}_{-1163}$

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

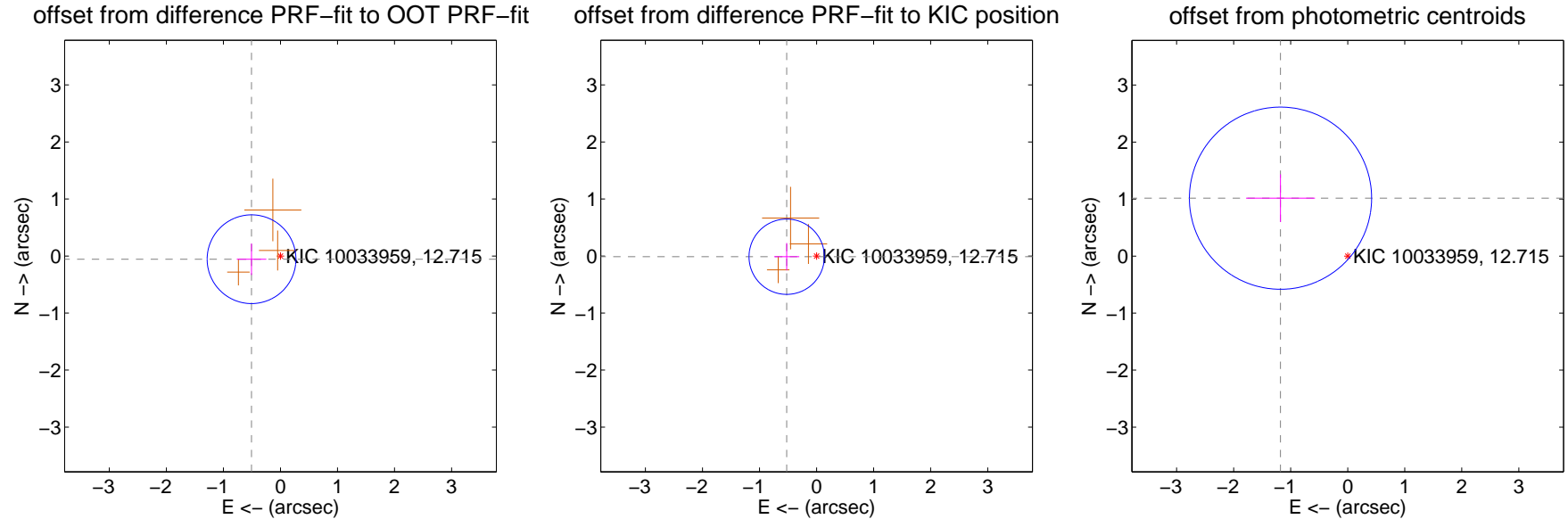
## DV Centroid Data

Supplemental centroid analysis for 010033959-03. Kepler magnitude: 12.71. Transit SNR -1.00

There are 0 quarters with good PRF difference image offsets

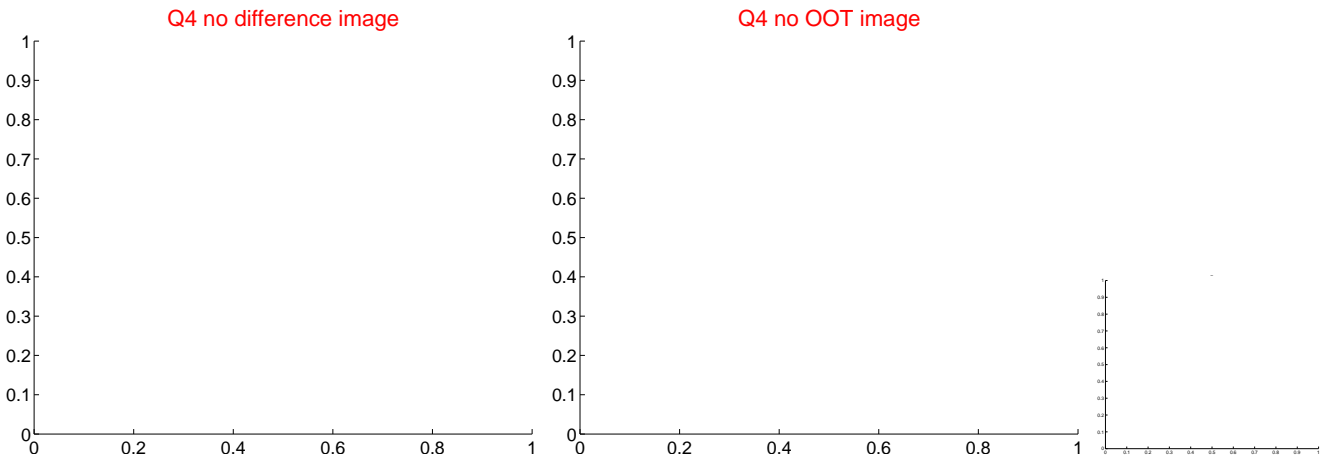
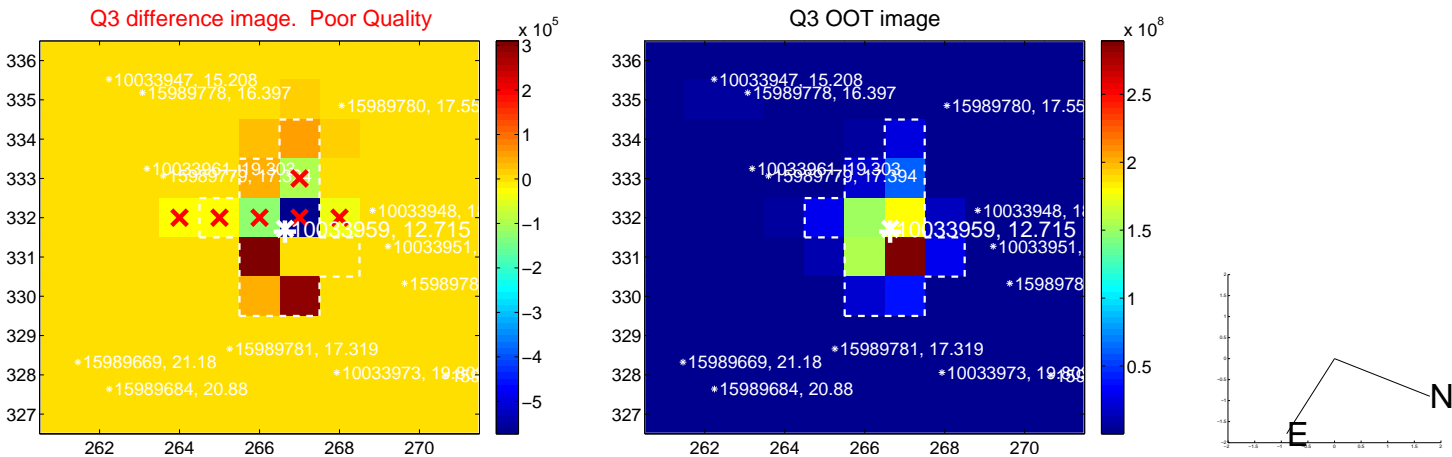
The direct PRF centroid is offset from the target star catalog position by about 0.35 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.510 \pm 0.259$	1.97	$0.507 \pm 0.259$	$-0.056 \pm 0.276$
PRF-fit source offset from KIC position	$0.524 \pm 0.220$	2.38	$0.524 \pm 0.220$	$-0.012 \pm 0.240$
photometric centroid source offset	$1.56 \pm 0.53$	2.92	$1.18 \pm 0.60$	$1.02 \pm 0.42$

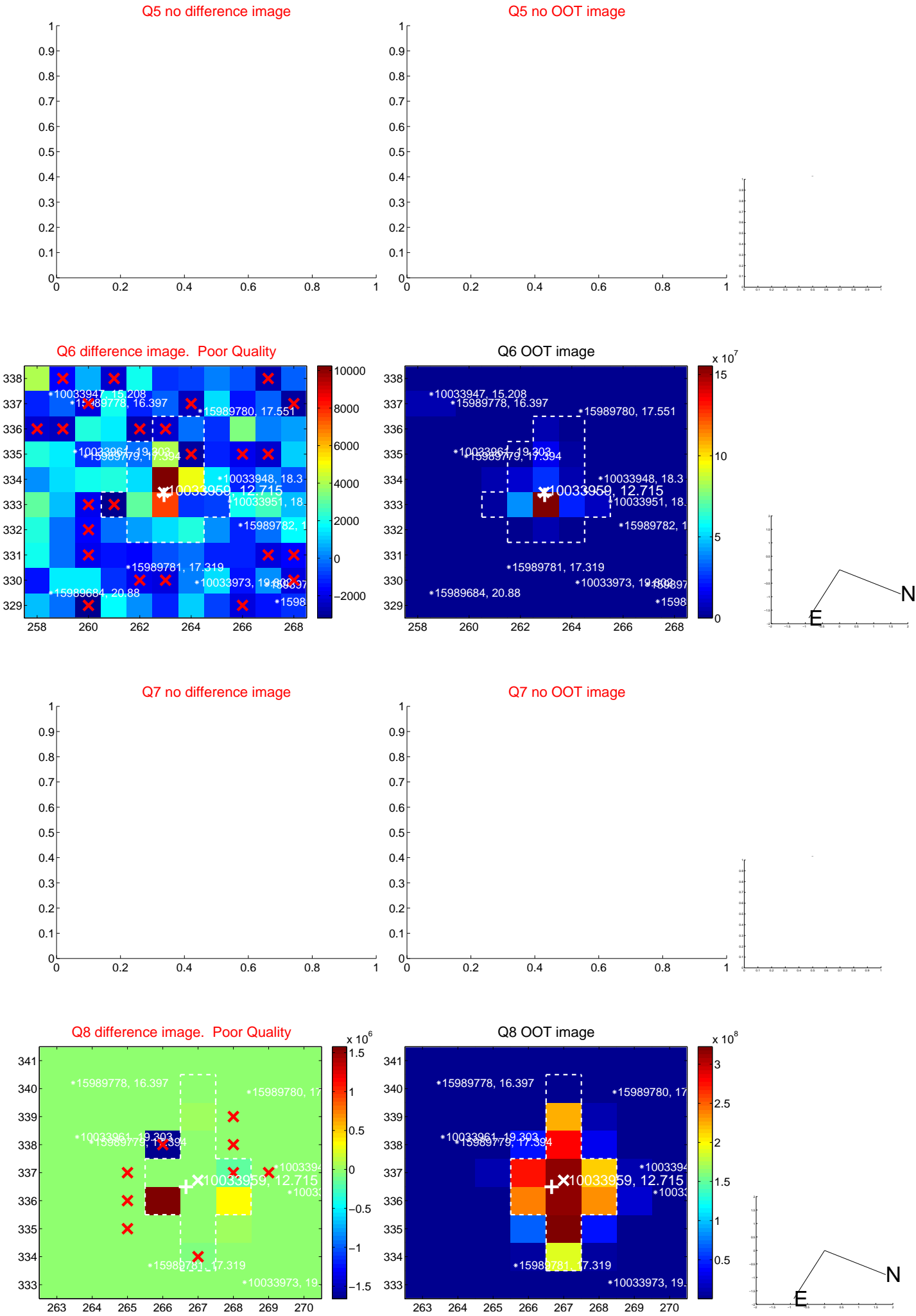


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

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

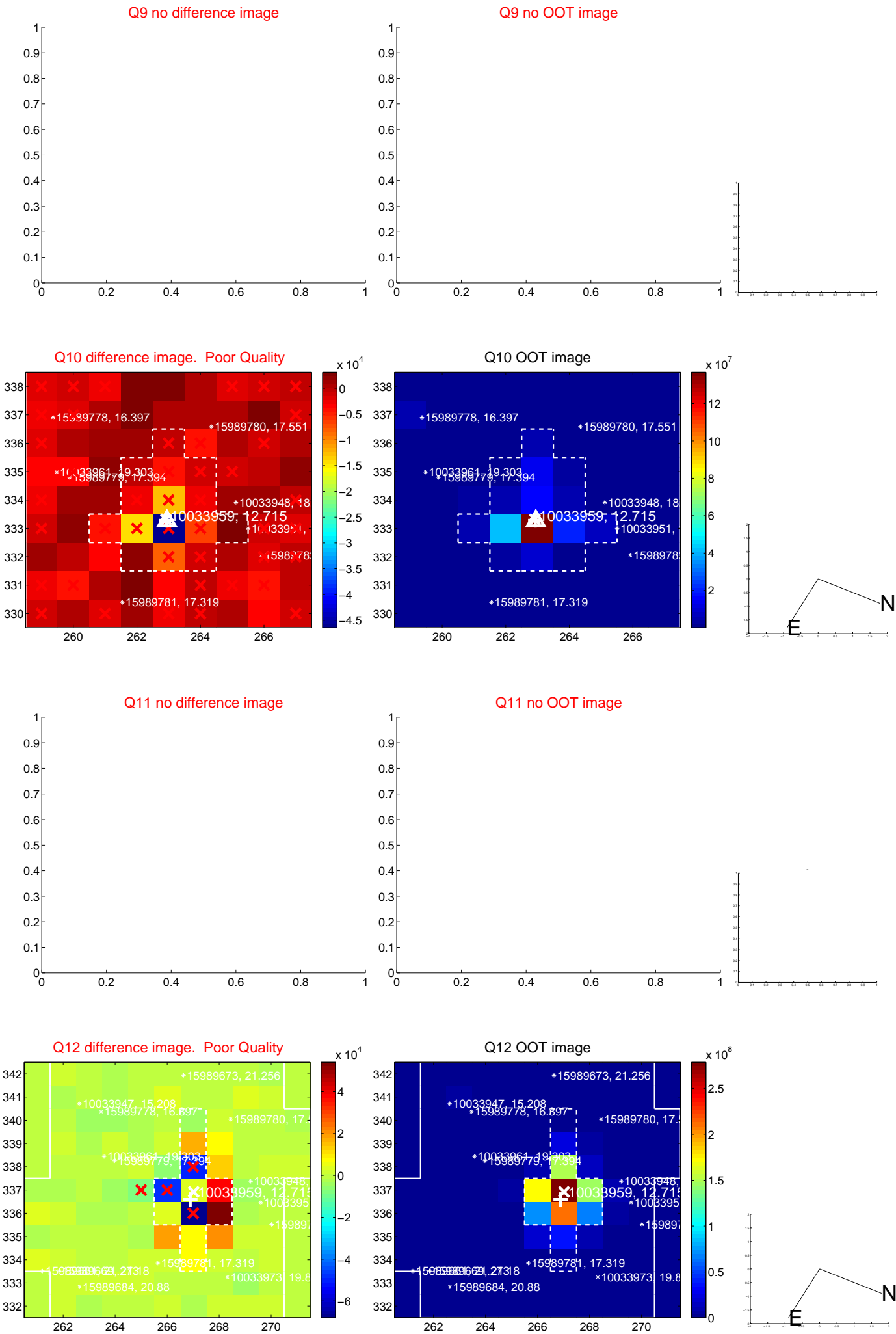


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

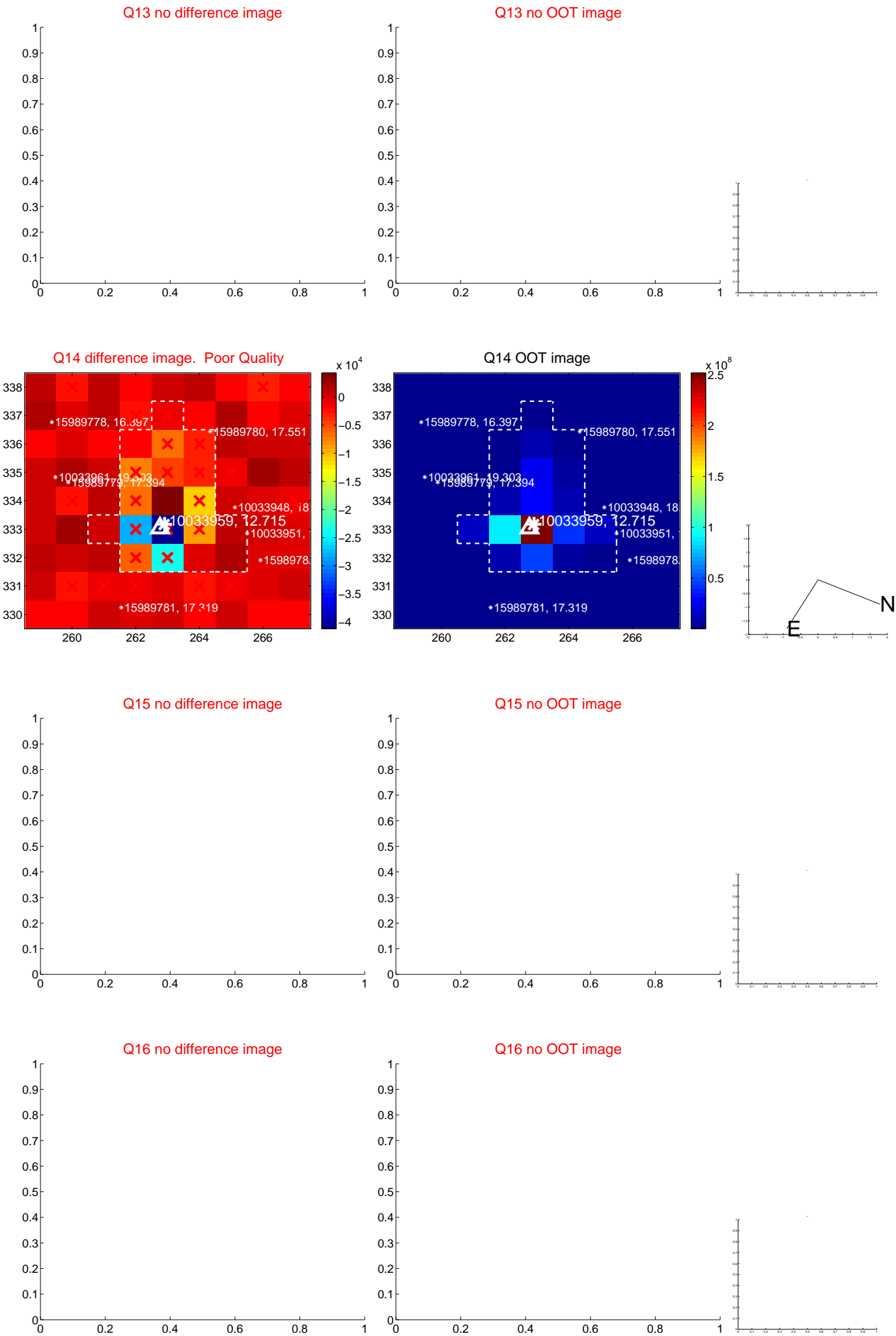




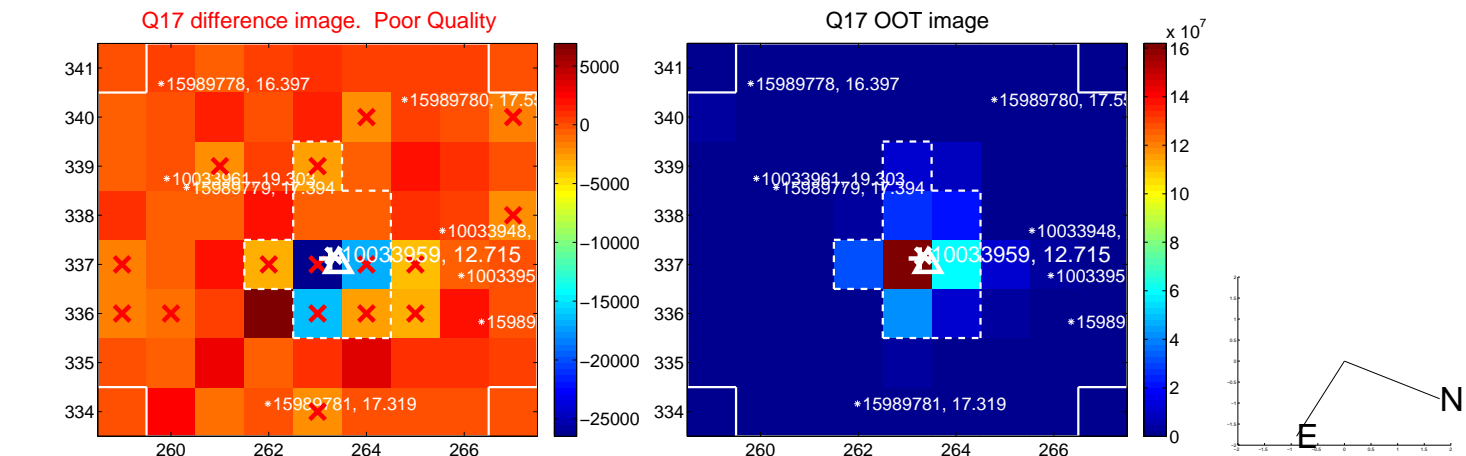
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



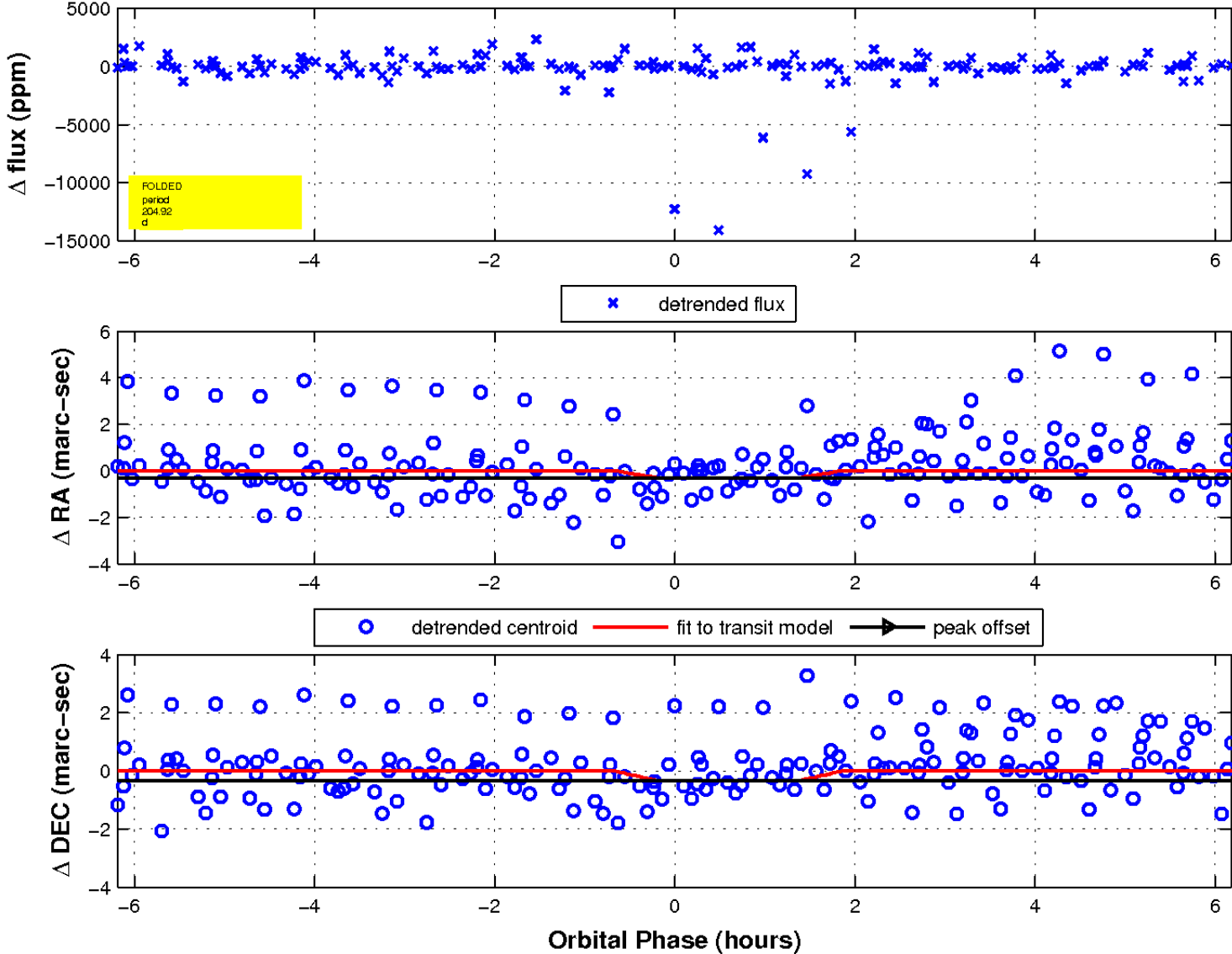
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 3 of 3



UKIRT Image

