

KIC 004157933

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})
004157933-01	OBS	No	490.260058	547.947486	2189.1	7.121	18.1	12.3	5.50	5492	49.15	10.38
004157933-02	OBS	No	547.376338	238.077589	1856.8	7.788	18.3	10.3	5.50	5492	45.65	8.96
004157933-03	OBS	No	477.699902	511.616688	892.4	3.226	22.3	6.4	5.50	5492	16.56	10.75
004157933-04	OBS	No	371.591100	146.825947	324.8	6.000	19.6	-1.0	5.50	5492	9.78	15.02

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004157933-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004157933-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004157933-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004157933-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—ALL_TRANS_CHASES—CENT_NOFITS

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

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

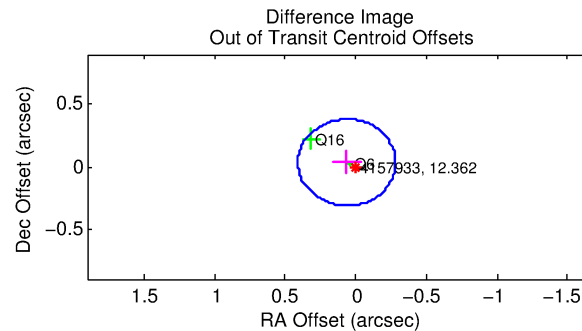
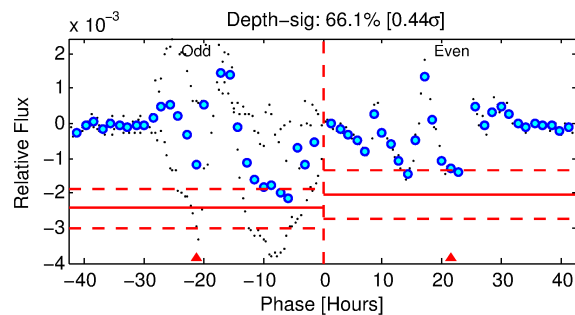
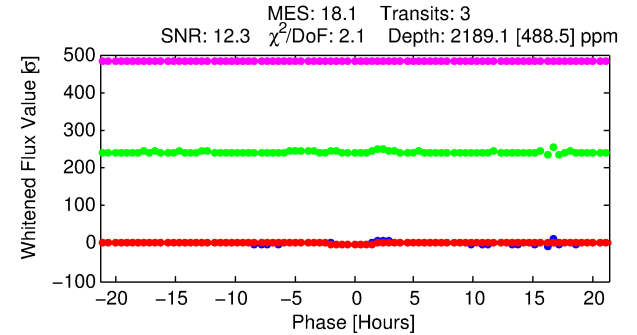
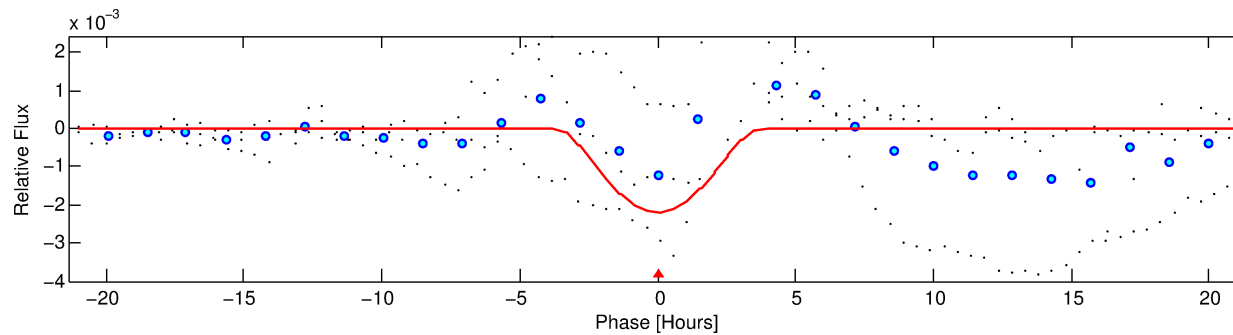
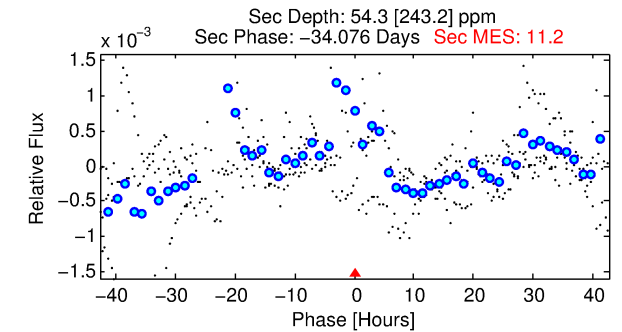
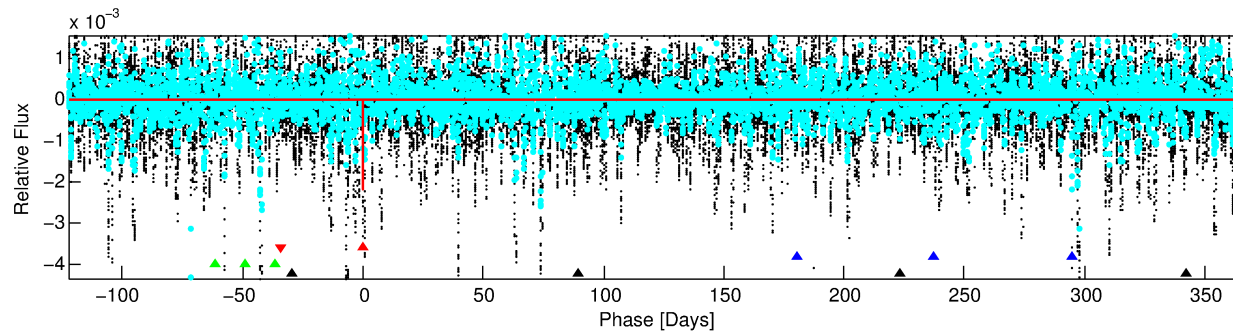
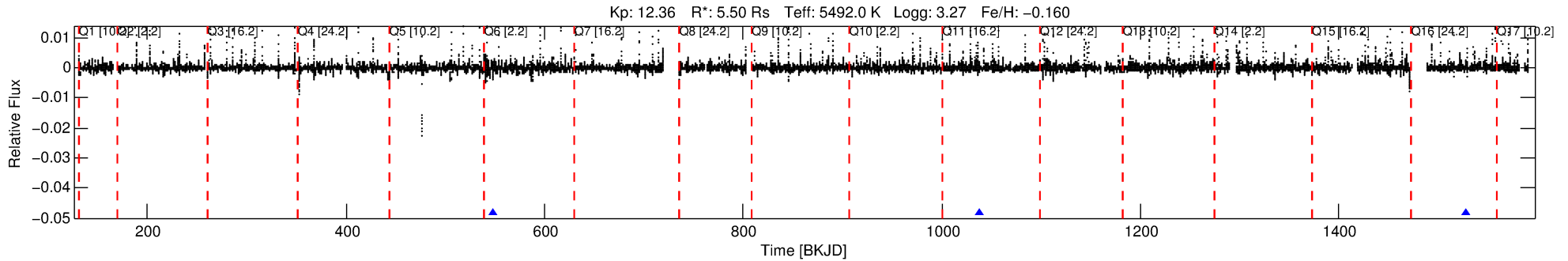
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 004157933-01

No Significant Match Found

DV One-Page Summary

KIC: 4157933 Candidate: 1 of 4 Period: 490.260 d



DV Fit Results:

Period = 490.26006 [0.00873] d
Epoch = 547.9475 [0.0126] BKJD
Rp/R* = 0.0819 [0.1639]
a/R* = 217.62 [91.05]
b = 1.00 [0.24]
Seff = 10.38 [13.23]
Teq = 458 [146] K
Rp = 49.15 [104.71] Re
a = 1.5415 [1.1710] AU
Ag = 29.38 [180.40] [0.16 σ]
Teffp = 1648 [2476] K [0.48 σ]

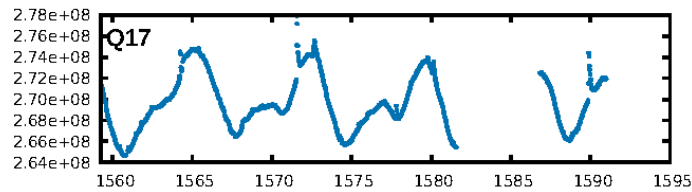
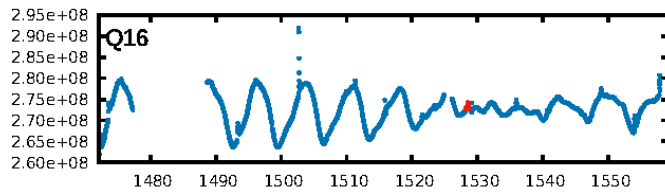
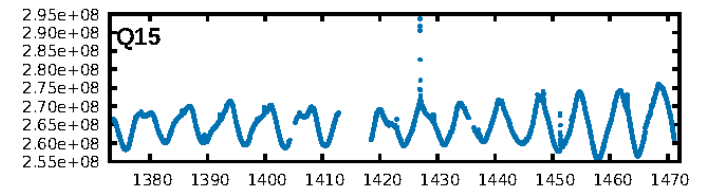
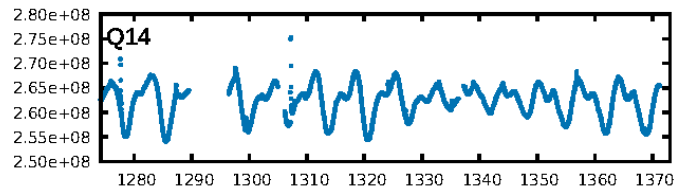
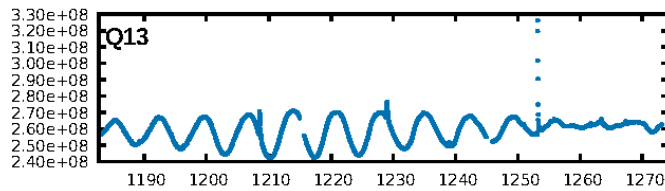
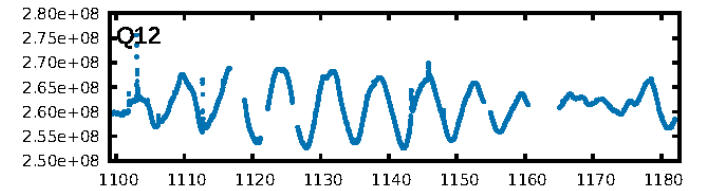
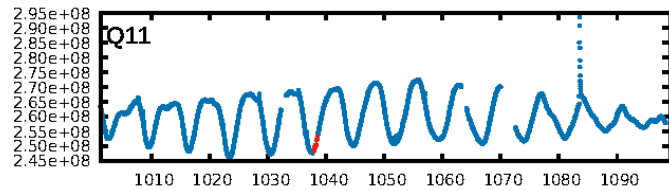
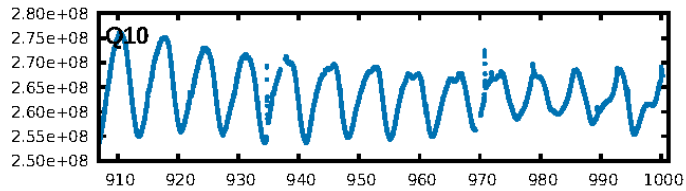
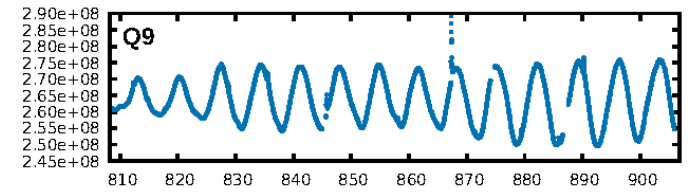
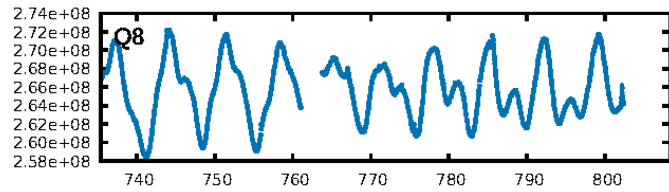
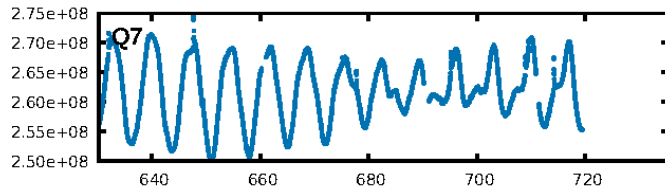
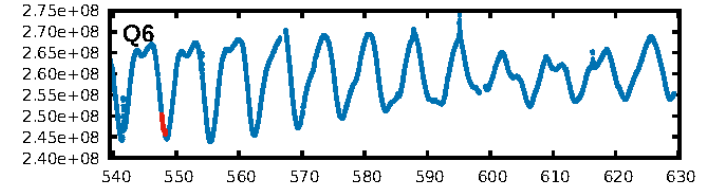
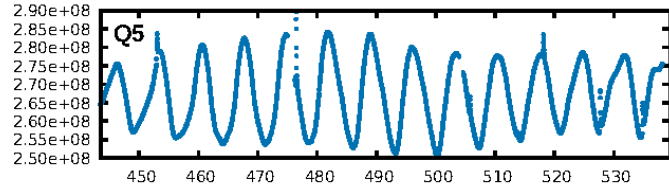
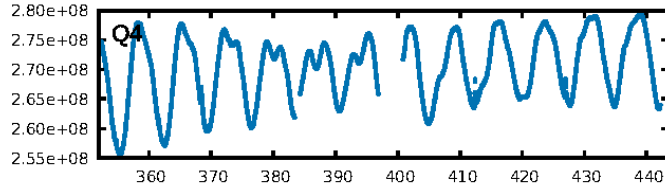
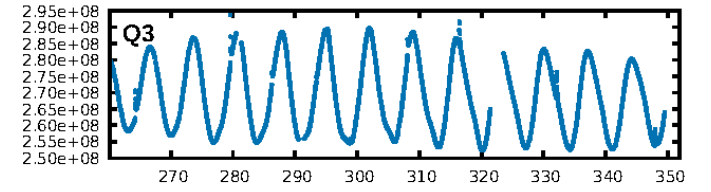
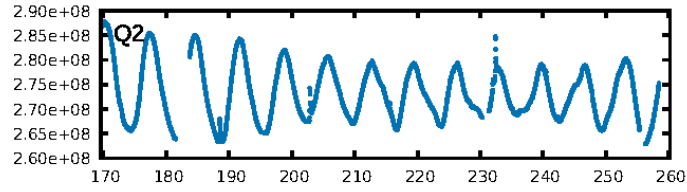
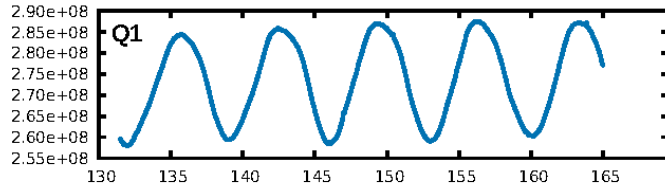
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [38.56 σ]
LongPeriod-sig: 100.0% [129.89 σ]
ModelChiSquare2-sig: 34.3%
ModelChiSquareGof-sig: 45.2%
Bootstrap-pfa: N/A
RollingBand-fgt: 1.00 [3/3]
GhostDiagnostic-chr: 4.291
Centroid-sig: 42.4%
Centroid-so: 0.142 arcsec [0.68 σ]
OotOffset-rm: 0.072 arcsec [0.62 σ]
KicOffset-rm: 0.140 arcsec [1.81 σ]
OotOffset-st: 1/0/1/0 [2]
KicOffset-st: 1/0/1/0 [2]
DiffImageQuality-fgm: 0.50 [1/2]
DiffImageOverlap-fno: 1.00 [2/2]

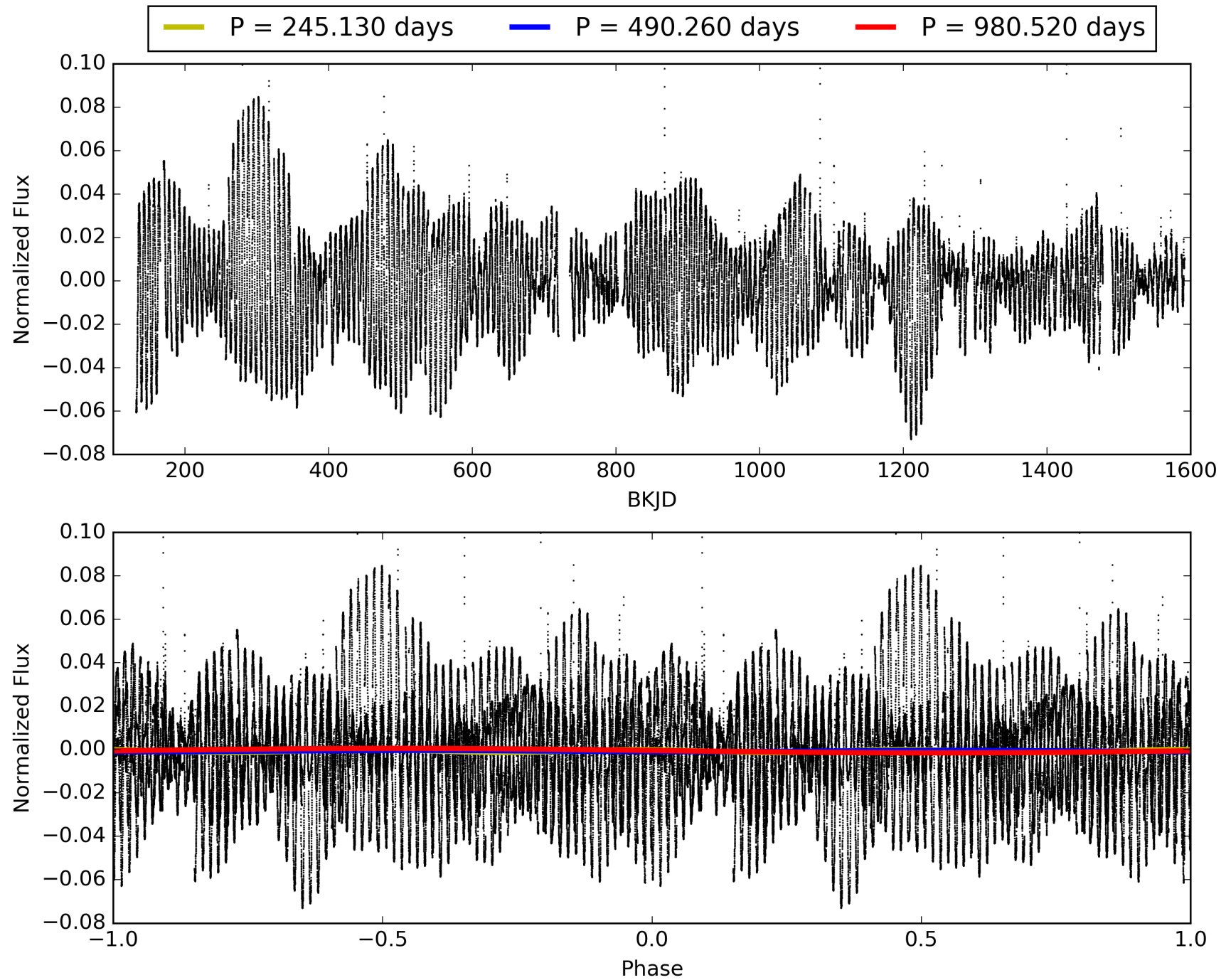
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This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

TCE 004157933-01, PDC Light Curves

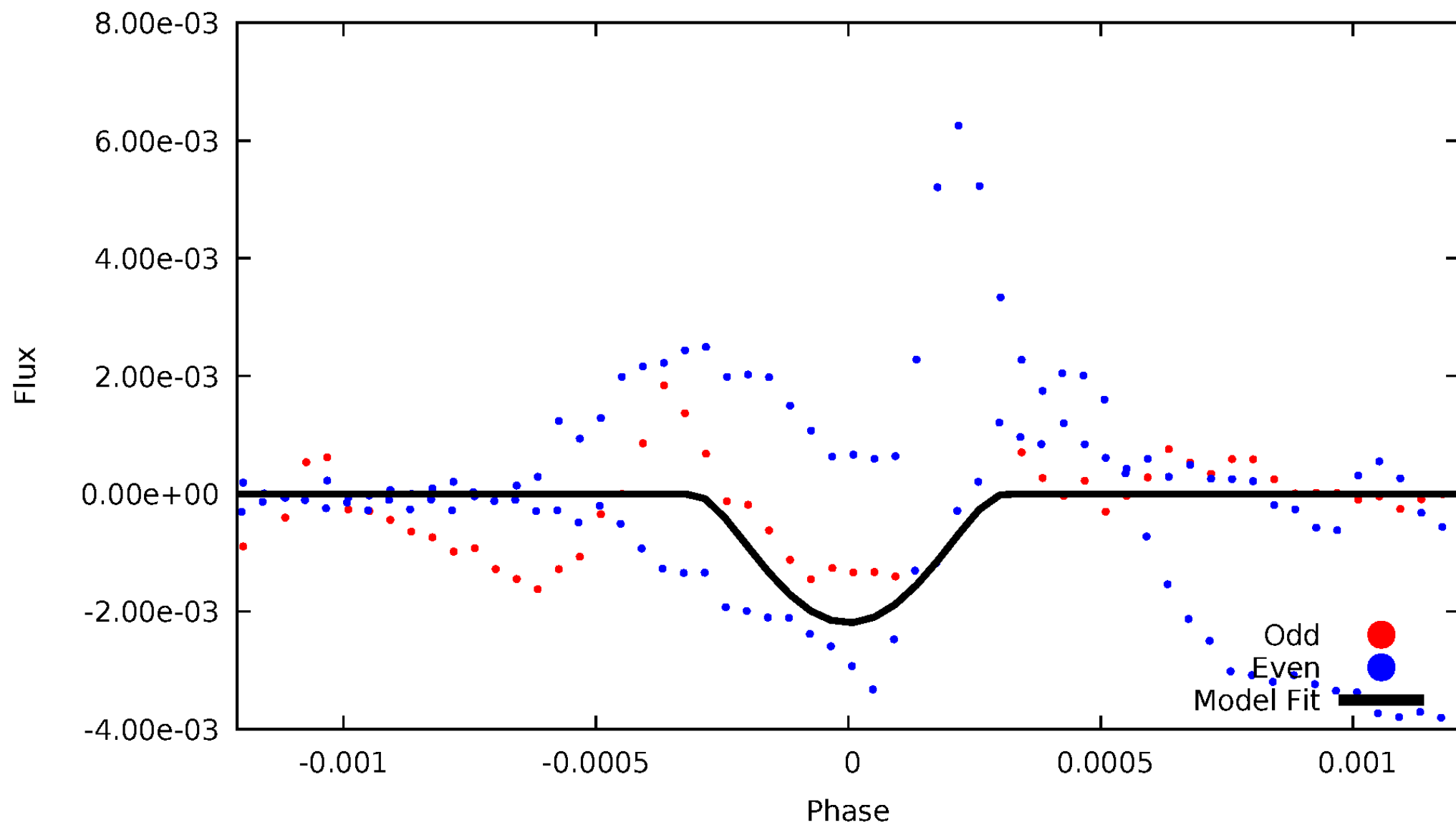


TCE 004157933-01



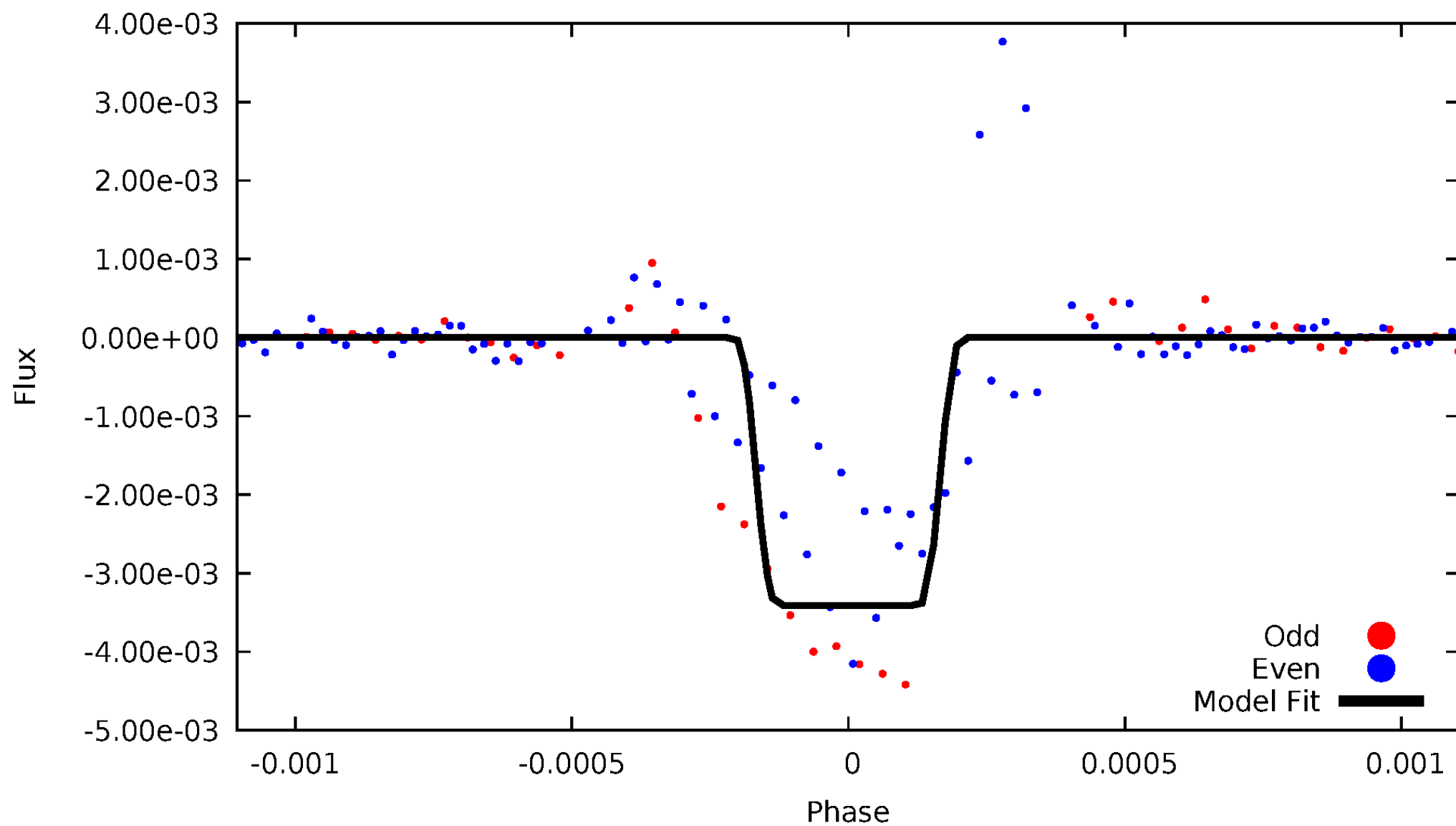
DV Odd/Even

TCE 004157933-01



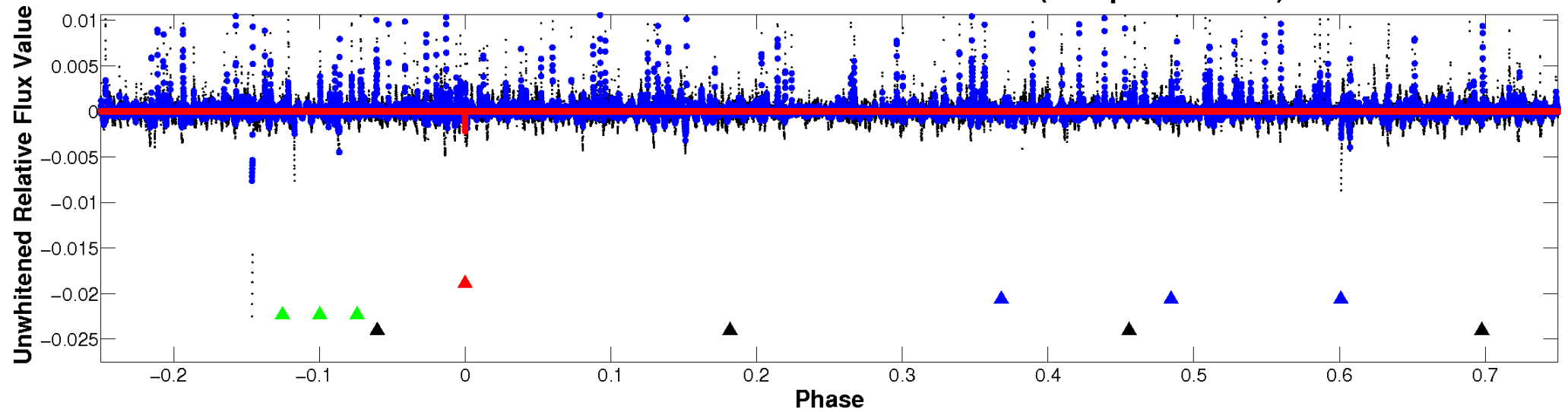
ALT Odd/Even

TCE 004157933-01

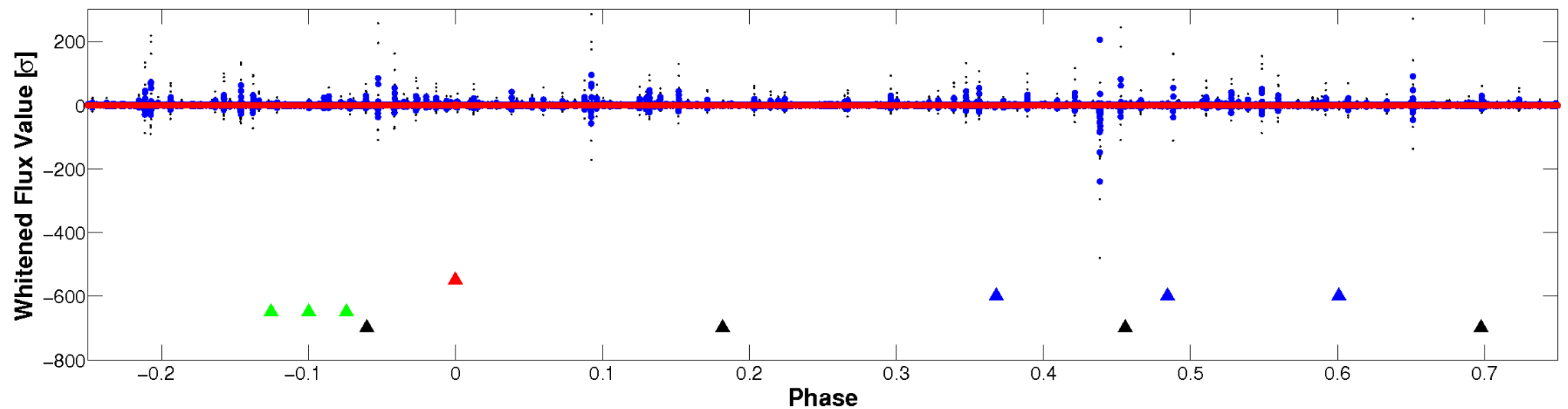


Non-Whitened Vs. Whitened Light Curve

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

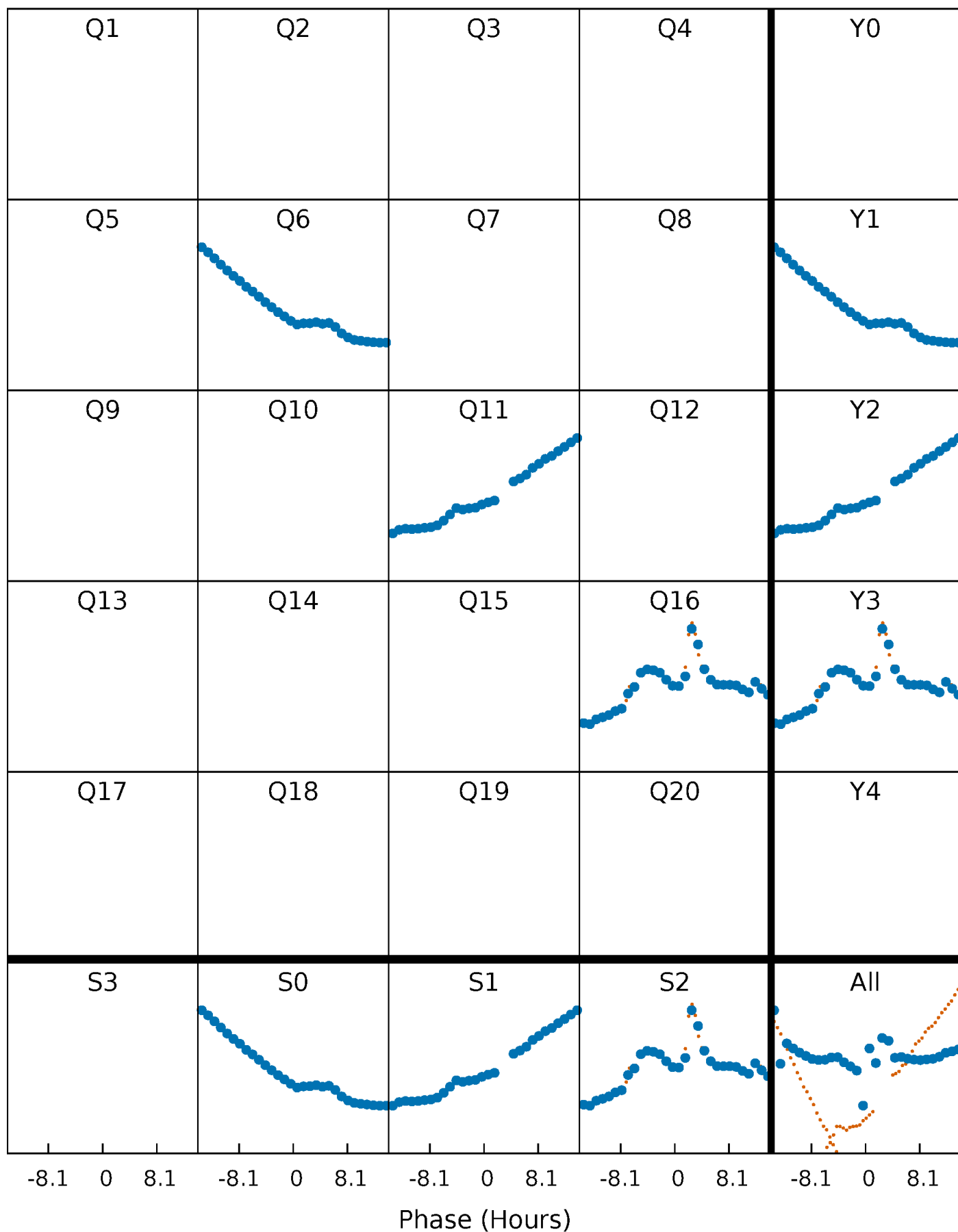


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



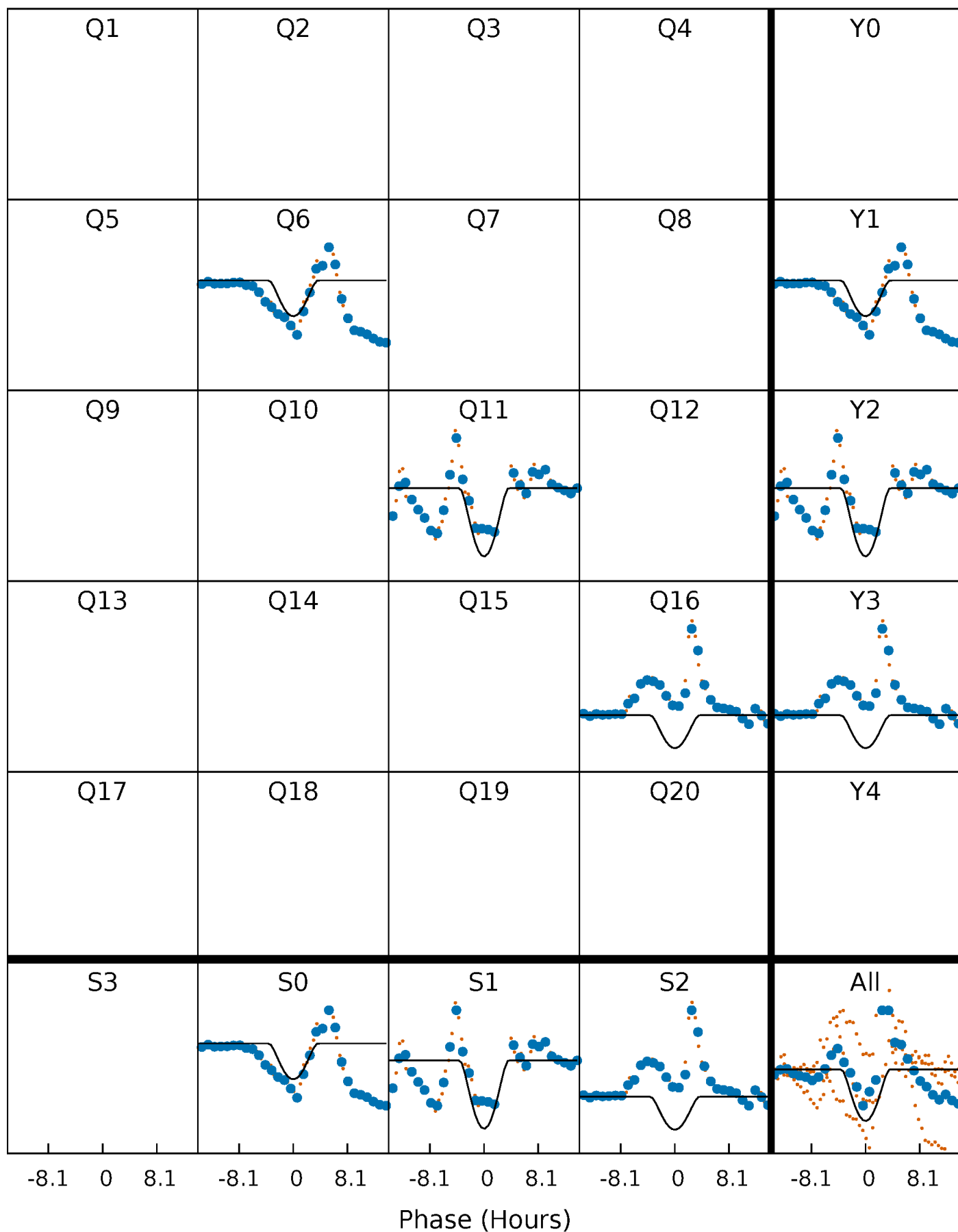
PDC Quarter-Phased Transit Curves

TCE 004157933-01 P=490.260058 Days $T_0=547.947486$ (BKJD)



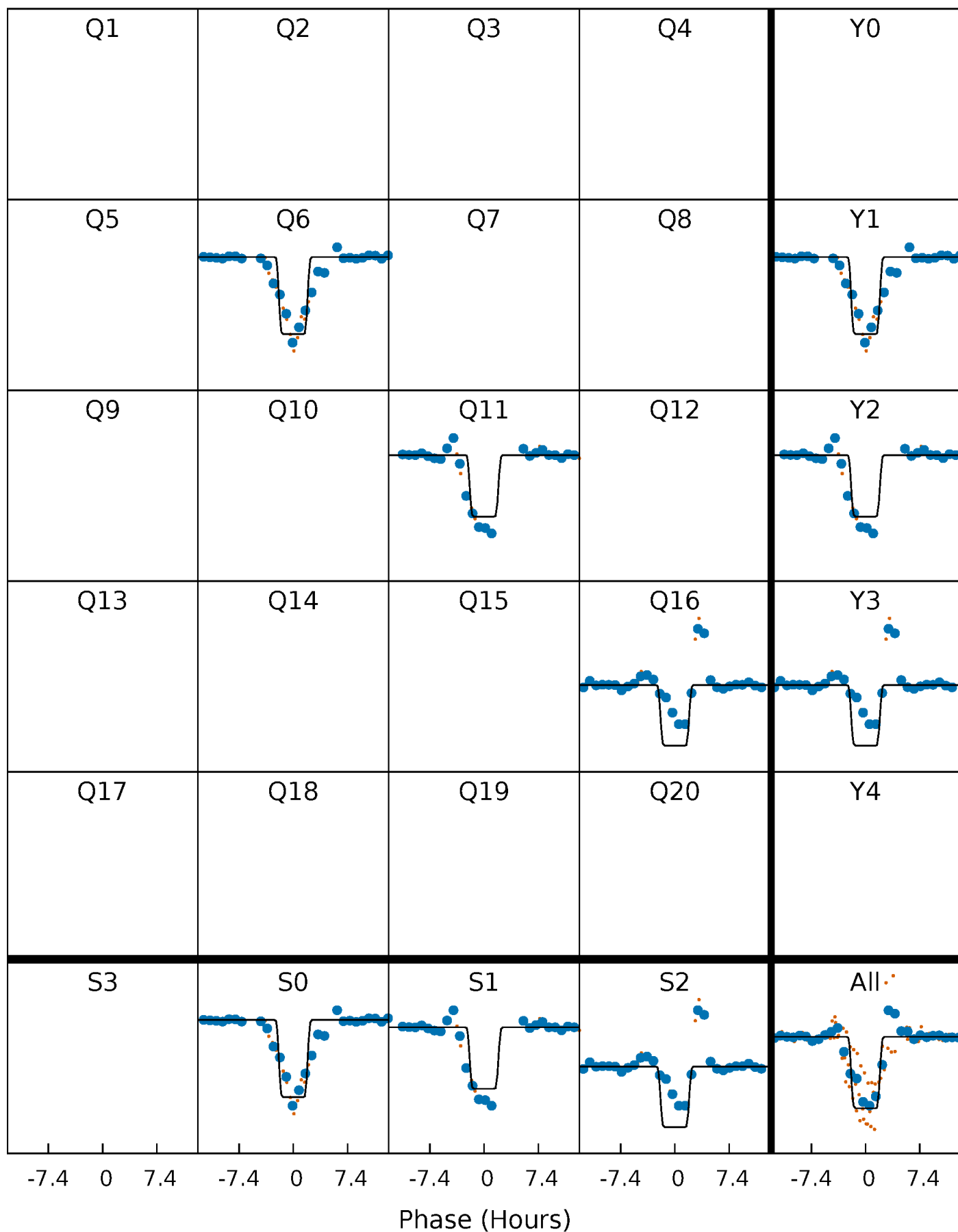
DV Quarter-Phased Transit Curves

TCE 004157933-01 P=490.260058 Days $T_0=547.947486$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

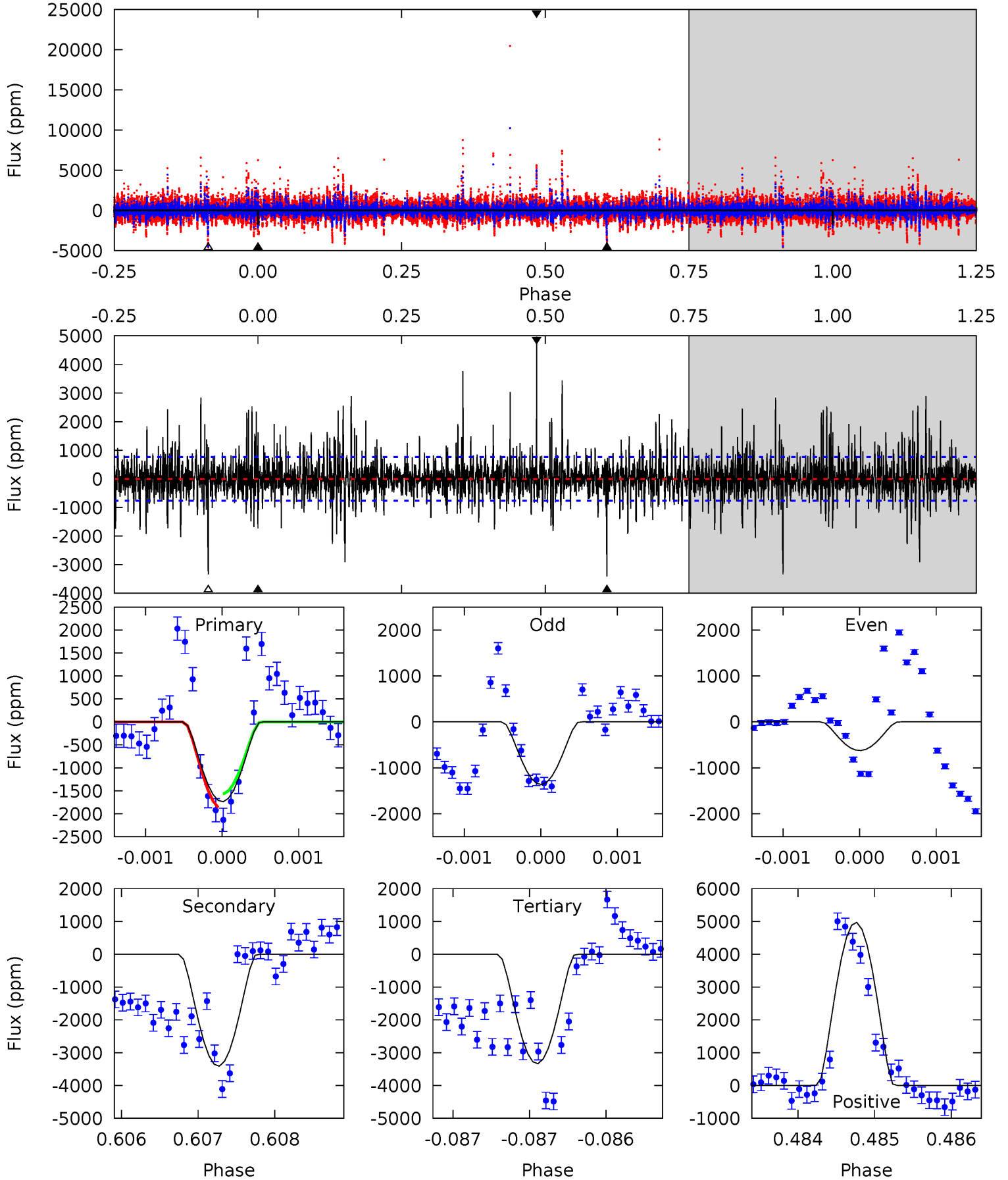
TCE 004157933-01 P=490.235160 Days $T_0=547.967327$ (BKJD)



DV Model-Shift Uniqueness Test

004157933-01, P = 490.260058 Days, E = 57.687428 Days

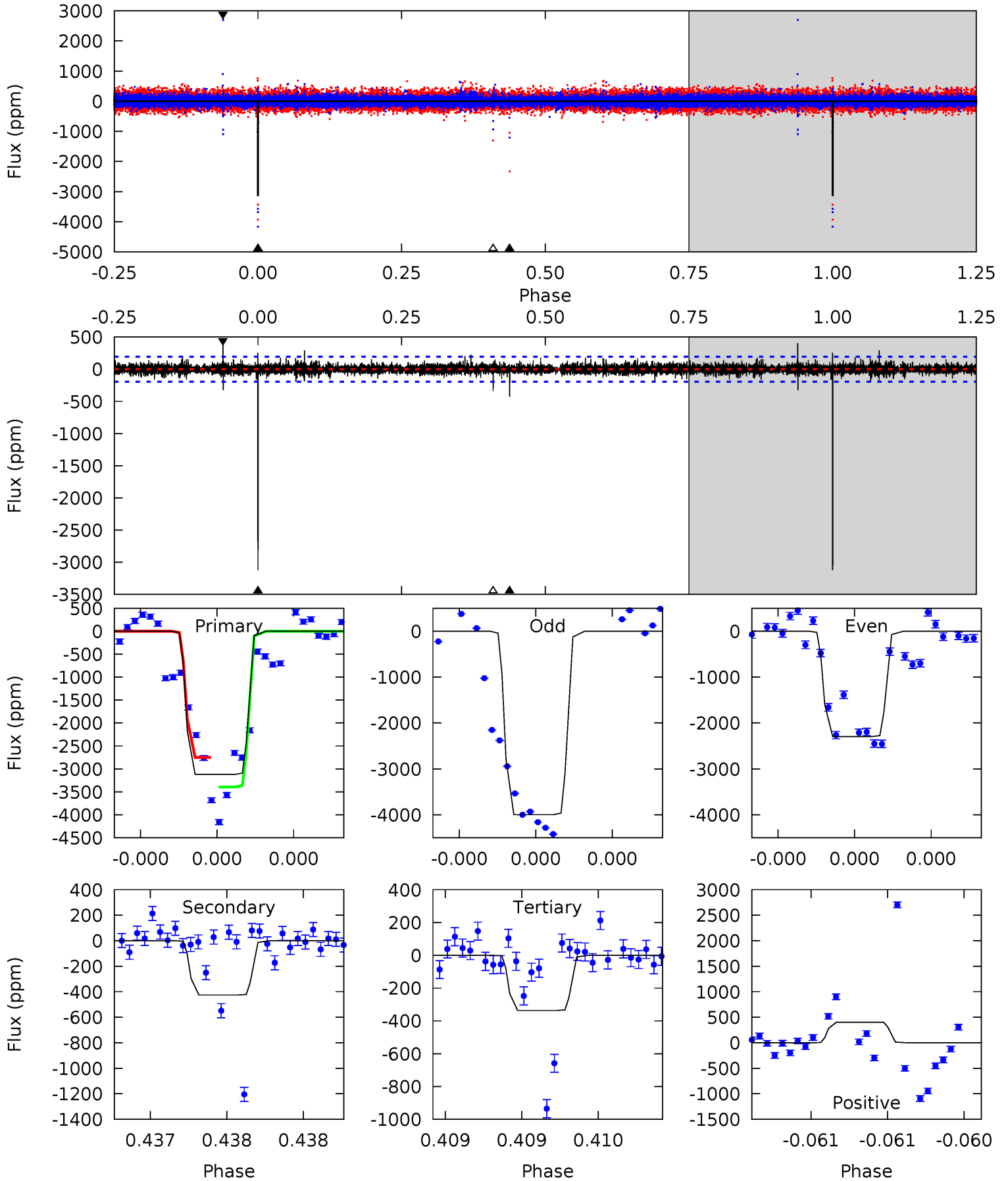
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.5	24.6	24.1	35.9	5.53	3.42	3.76	-11.5	-23.3	0.56	-11.2	1.32	0.51	0.59	1.07



Alt Model-Shift Uniqueness Test

004157933-01, P = 490.235160 Days, E = 57.732167 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
90.1	12.3	9.71	11.7	5.61	3.54	1.07	80.4	78.4	2.58	0.61	26.3	0.95	0.11	0



Stellar Parameters For KIC 004157933

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	5492^{+170}_{-227}	$3.265^{+0.760}_{-0.190}$	$-0.160^{+0.350}_{-0.350}$	$5.501^{+1.255}_{-4.015}$	$2.032^{+0.357}_{-1.071}$	$0.017^{+0.327}_{-0.007}$
	+3%/-4%	+23%/-6%	+219%/-219%	+23%/-73%	+18%/-53%	+1901%/-39%
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 004157933-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	-3411 ± 139	$75.85^{+86.56}_{-53.66}$	632^{+54}_{-113}	3829^{+2529}_{-710}	773^{+7677}_{-600}
Alt.	-425 ± 35	$69.10^{+84.92}_{-47.28}$	623^{+59}_{-108}	2842^{+1275}_{-462}	112^{+1053}_{-87}

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 $A_{obs} \gg 1.0$

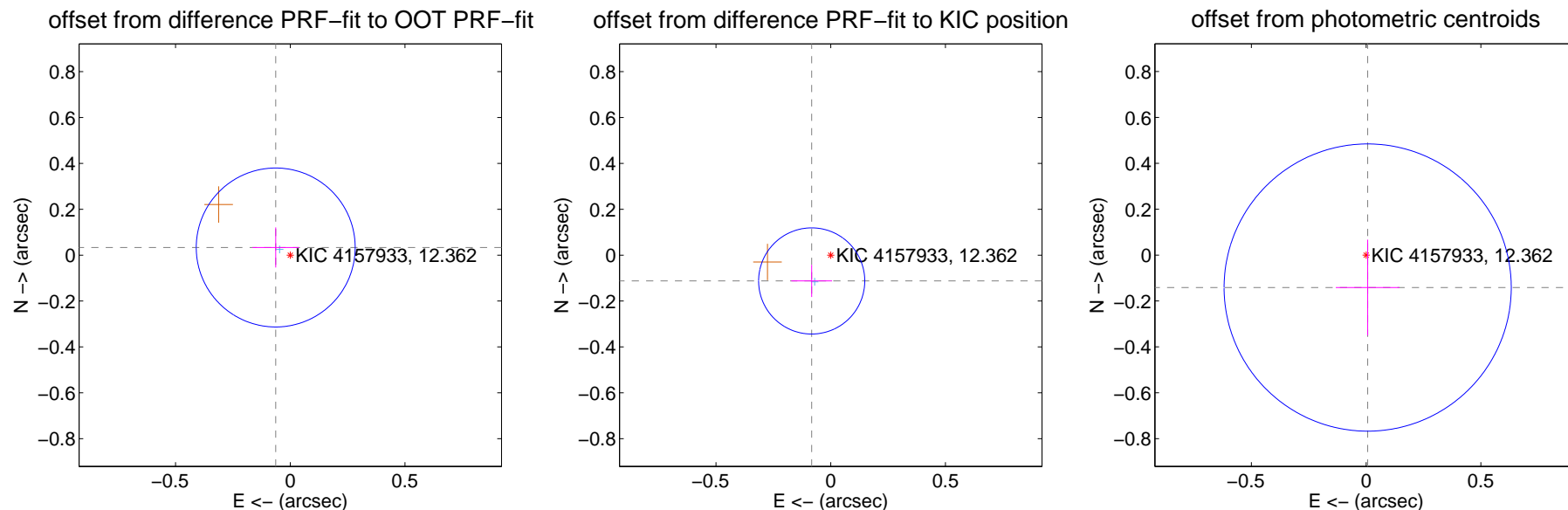
DV Centroid Data

Supplemental centroid analysis for 004157933-01. Kepler magnitude: 12.36. Transit SNR 12.25

There are 1 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.25 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.072 ± 0.115	0.62	0.063 ± 0.102	0.033 ± 0.087
PRF-fit source offset from KIC position	0.140 ± 0.077	1.81	0.083 ± 0.089	-0.112 ± 0.070
photometric centroid source offset	0.14 ± 0.21	0.68	-0.01 ± 0.14	-0.14 ± 0.21

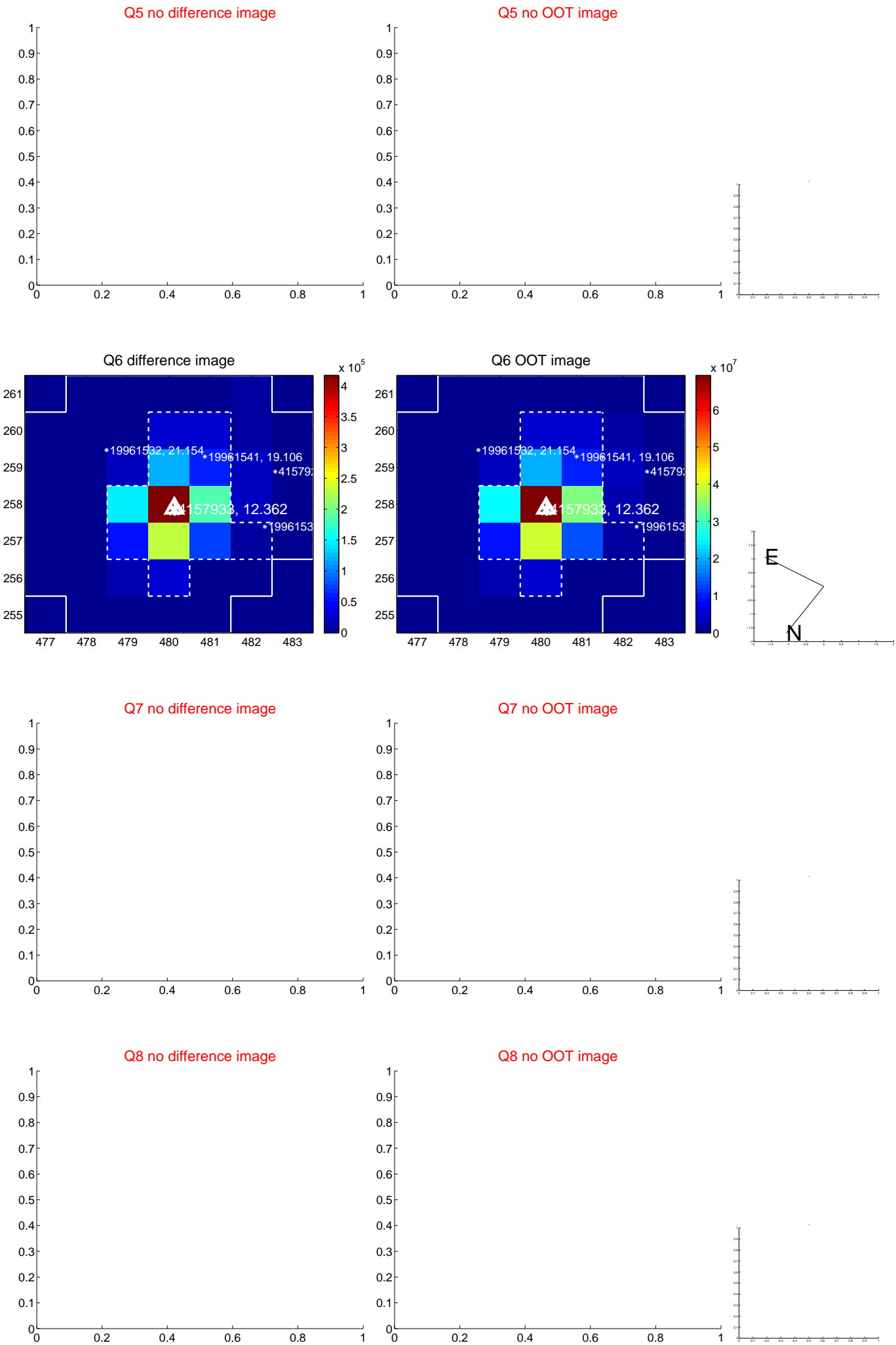


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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



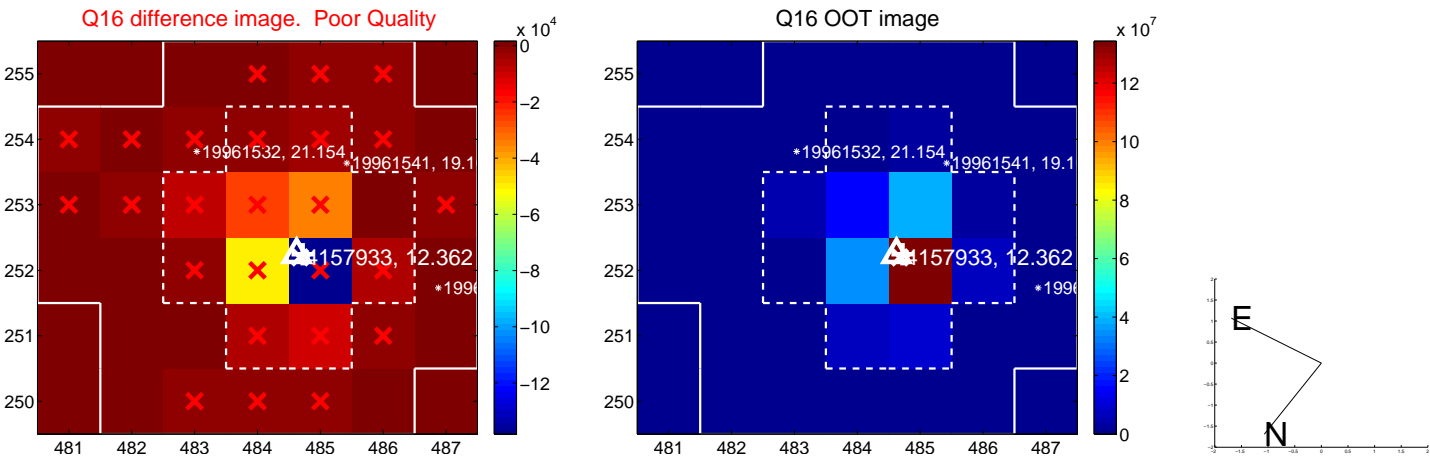
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



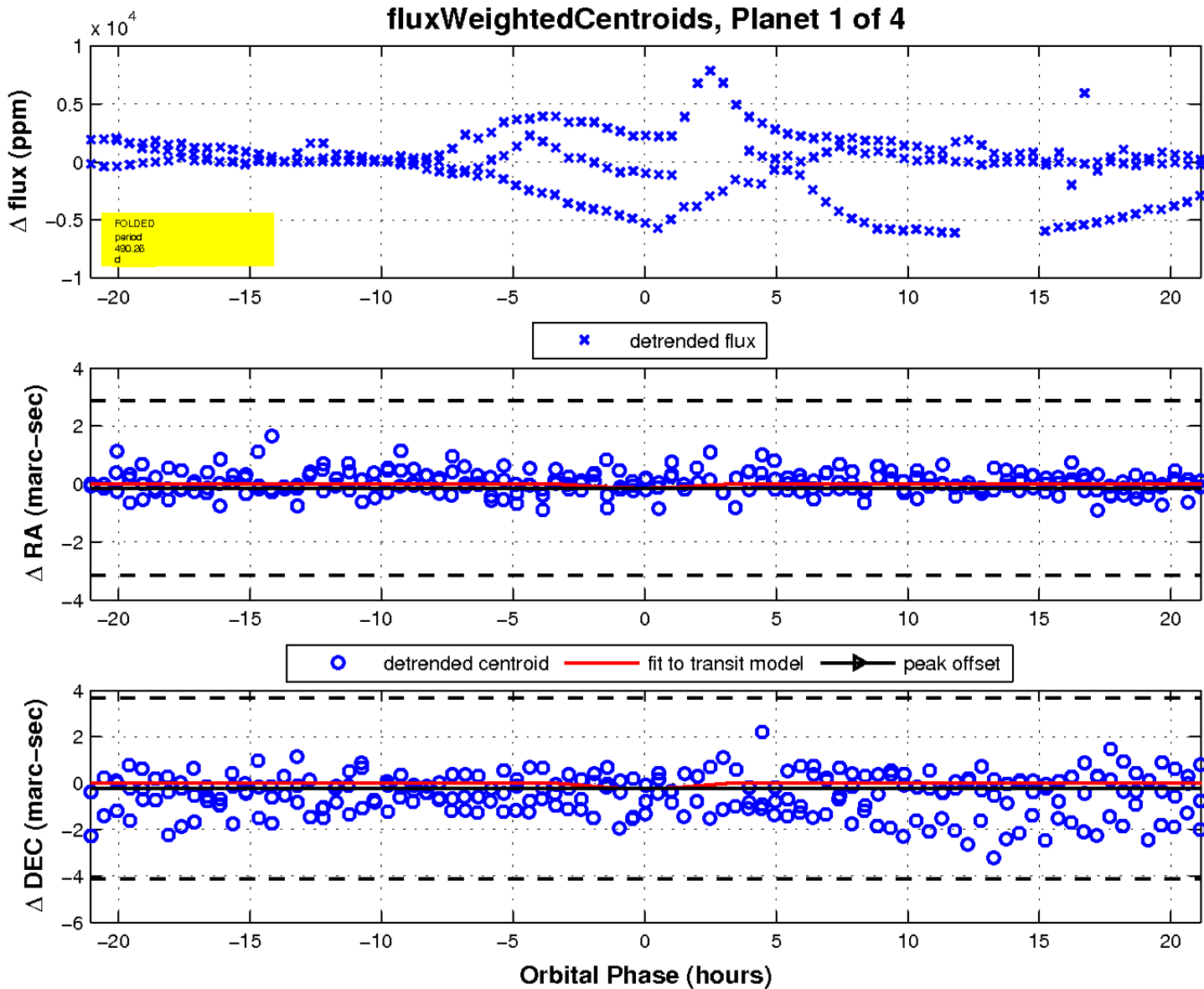
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

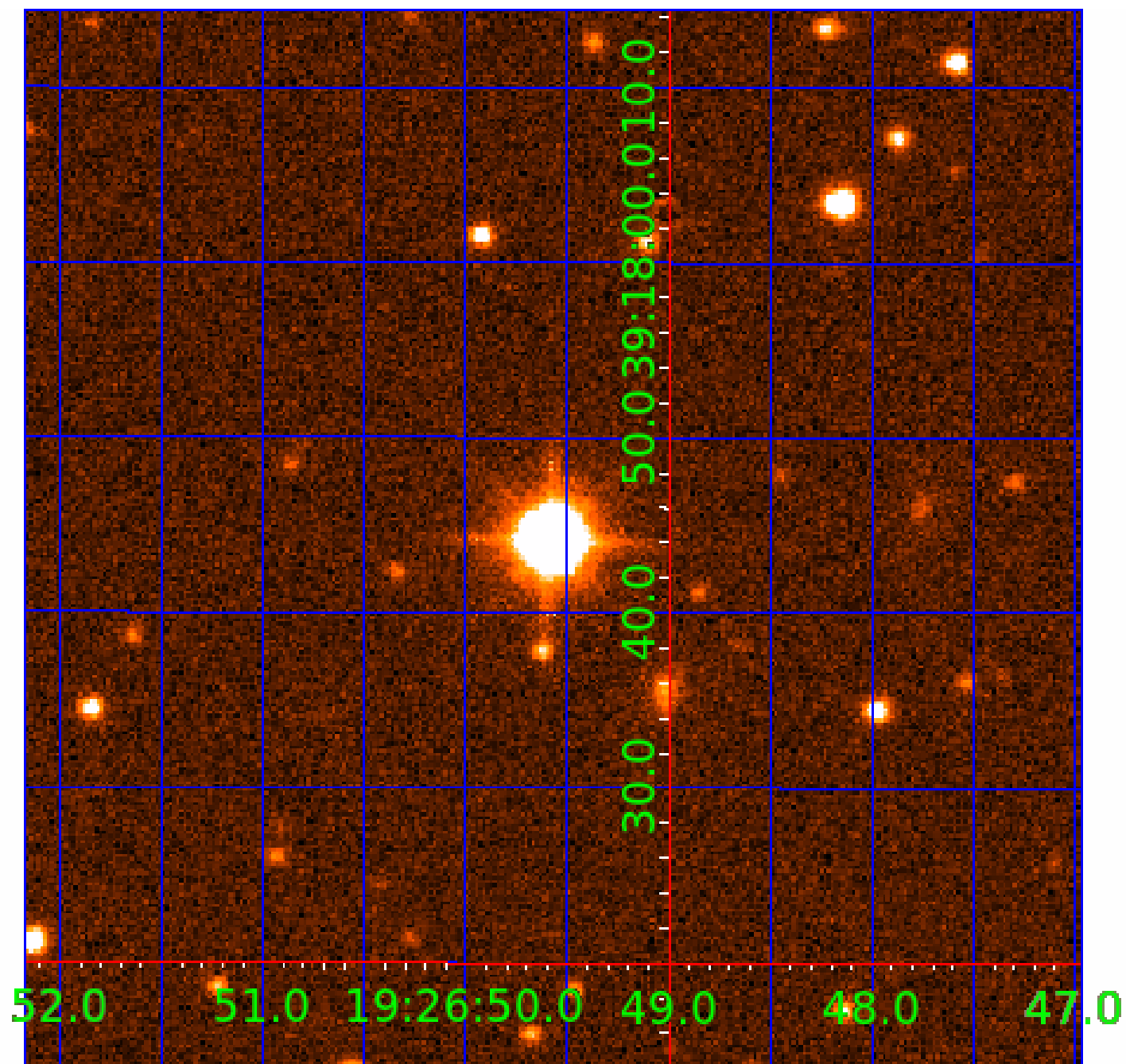
Q17 no difference image

Q17 no OOT image



UKIRT Image

Declination



KIC 004157933

Q1-17 DR25 TCE Parameters

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004157933-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004157933-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004157933-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—ALL_TRANS_CHASES—CENT_NOFITS

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

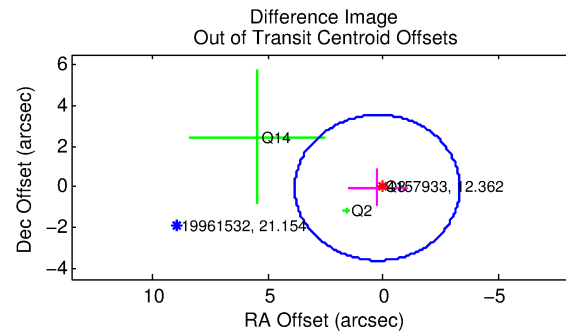
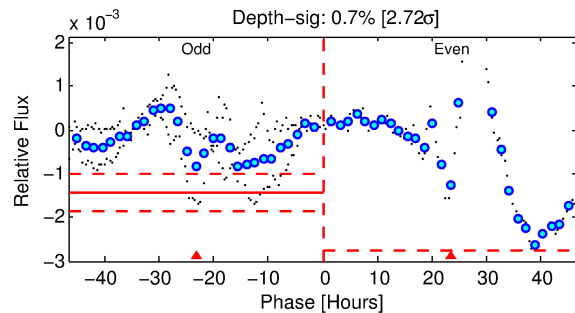
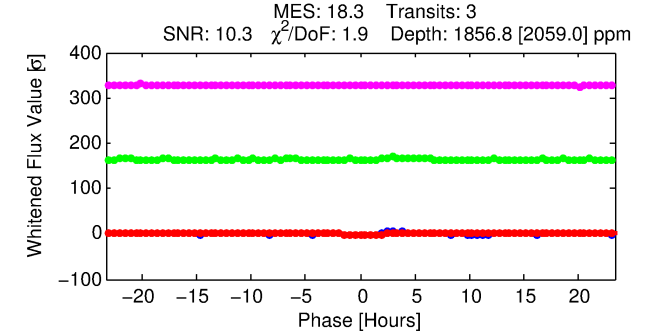
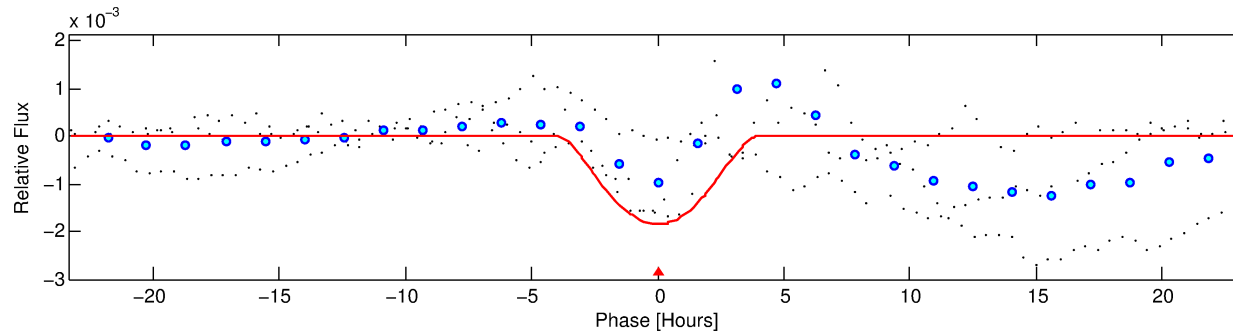
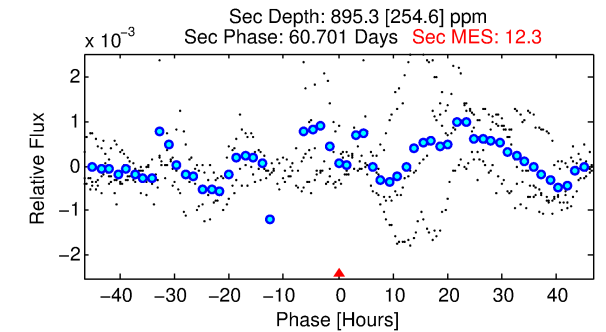
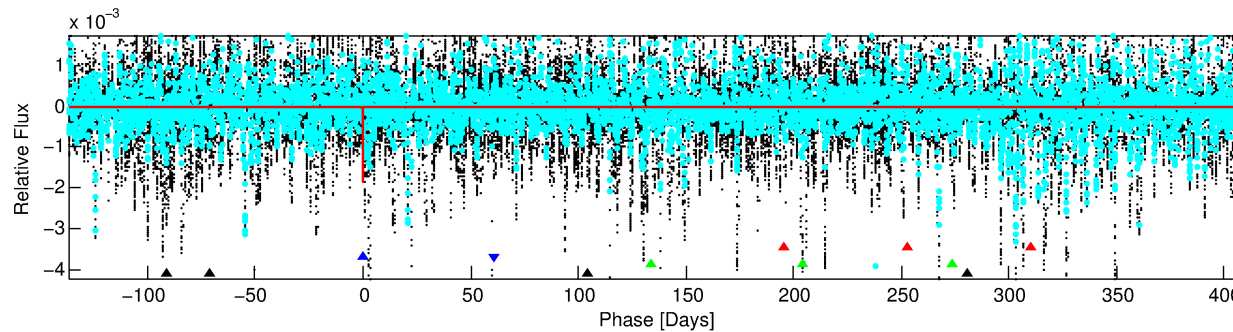
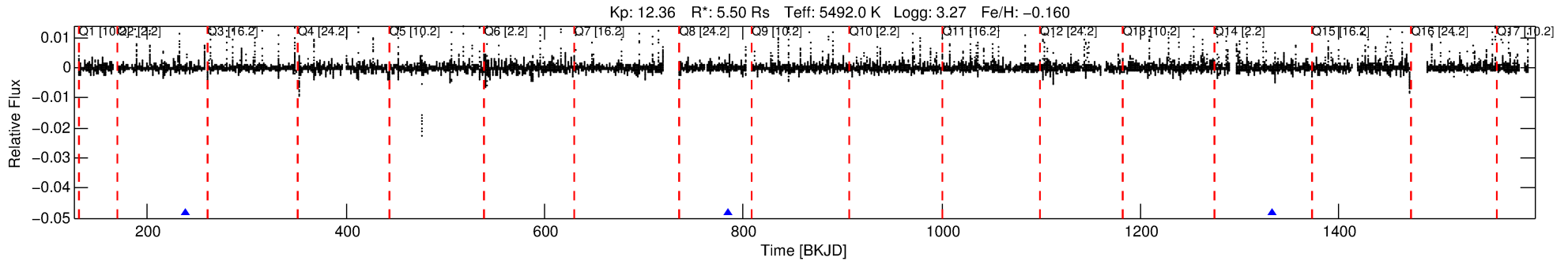
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 004157933-02

No Significant Match Found

DV One-Page Summary

KIC: 4157933 Candidate: 2 of 4 Period: 547.376 d



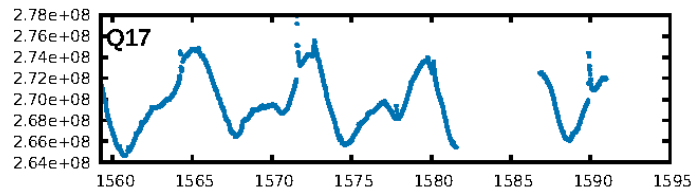
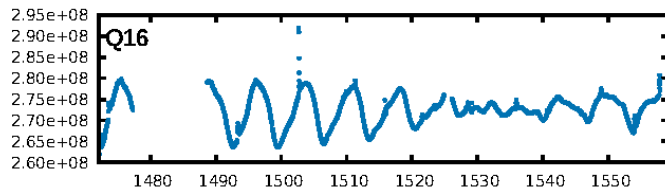
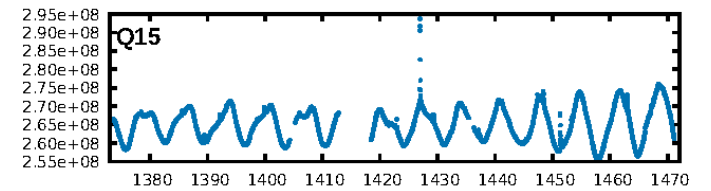
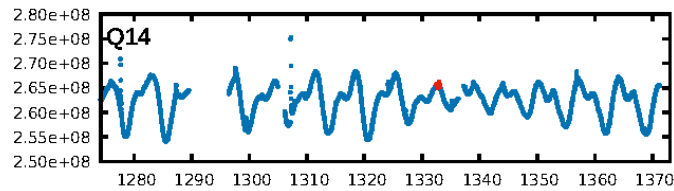
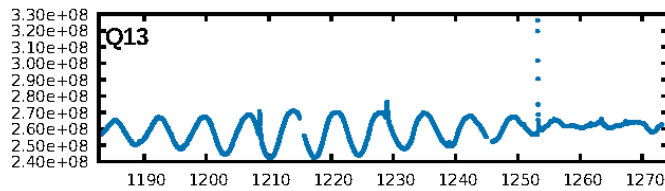
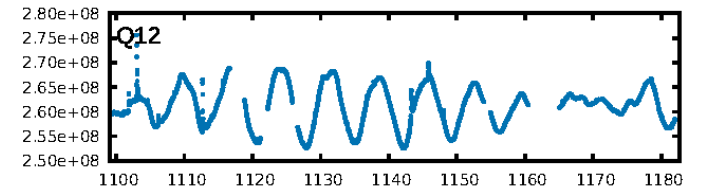
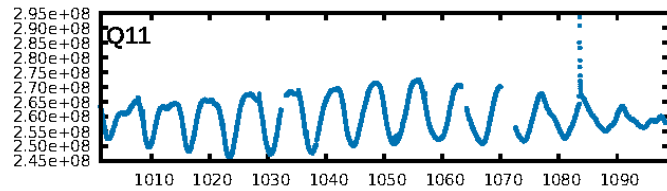
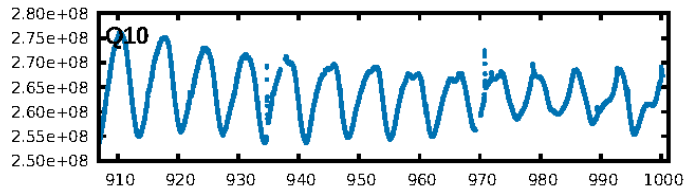
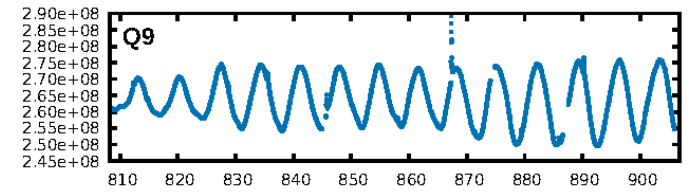
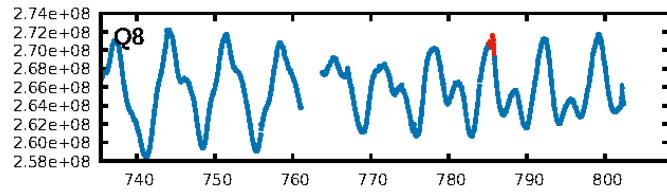
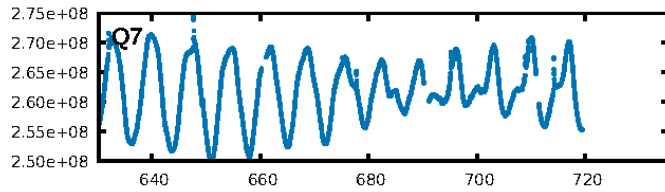
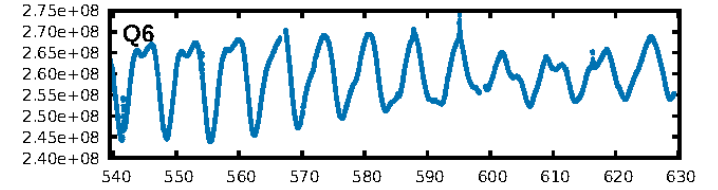
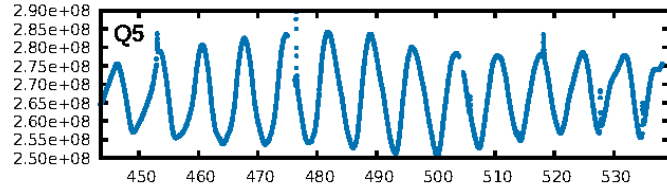
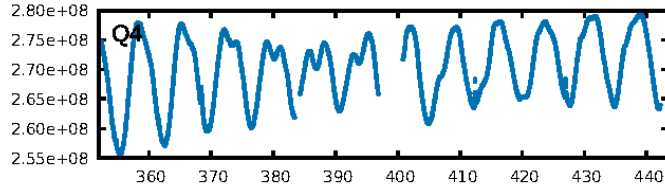
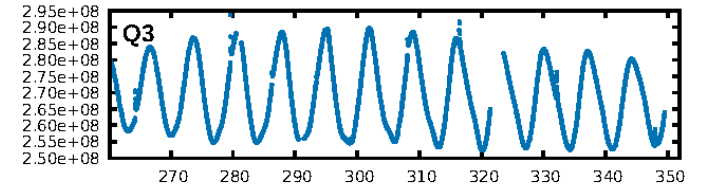
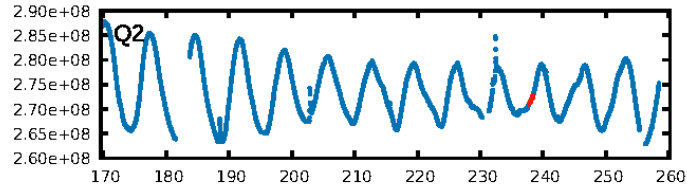
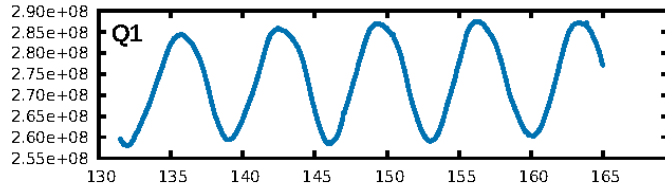
DV Fit Results:

Period = 547.37634 [0.00936] d
Epoch = 238.0776 [0.0109] BKJD
Rp/R* = 0.0760 [0.1331]
a/R* = 213.34 [78.01]
b = 1.00 [0.24]
Seff = 8.96 [11.42]
Teq = 441 [141] K
Rp = 45.65 [86.56] Re
a = 1.6590 [1.2602] AU
Ag = 650.69 [2428.73] [0.27 σ]
Teffp = 3445 [3028] K [0.99 σ]

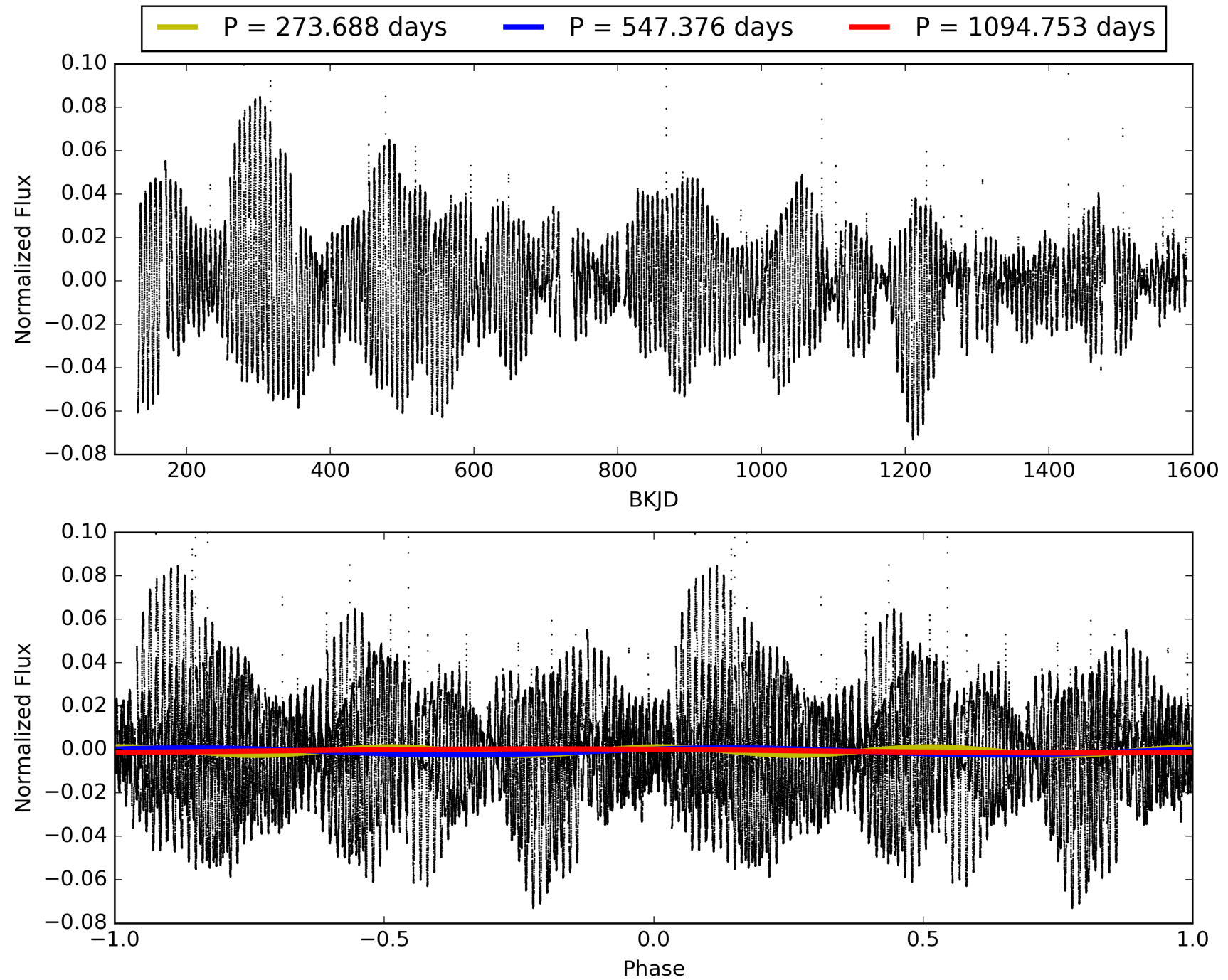
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [129.89 σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 0.0%
ModelChiSquareGof-sig: 1.2%
Bootstrap-pfa: N/A
RollingBand-fgt: 1.00 [3/3]
GhostDiagnostic-chr: 1.677
Centroid-sig: 0.8%
Centroid-so: 0.565 arcsec [2.38 σ]
OotOffset-rm: 0.262 arcsec [0.22 σ]
KicOffset-rm: 0.326 arcsec [0.31 σ]
OotOffset-st: 2/0/1/0 [3]
KicOffset-st: 2/0/1/0 [3]
DiffImageQuality-fgm: 0.33 [1/3]
DiffImageOverlap-fno: 1.00 [3/3]

TCE 004157933-02, PDC Light Curves

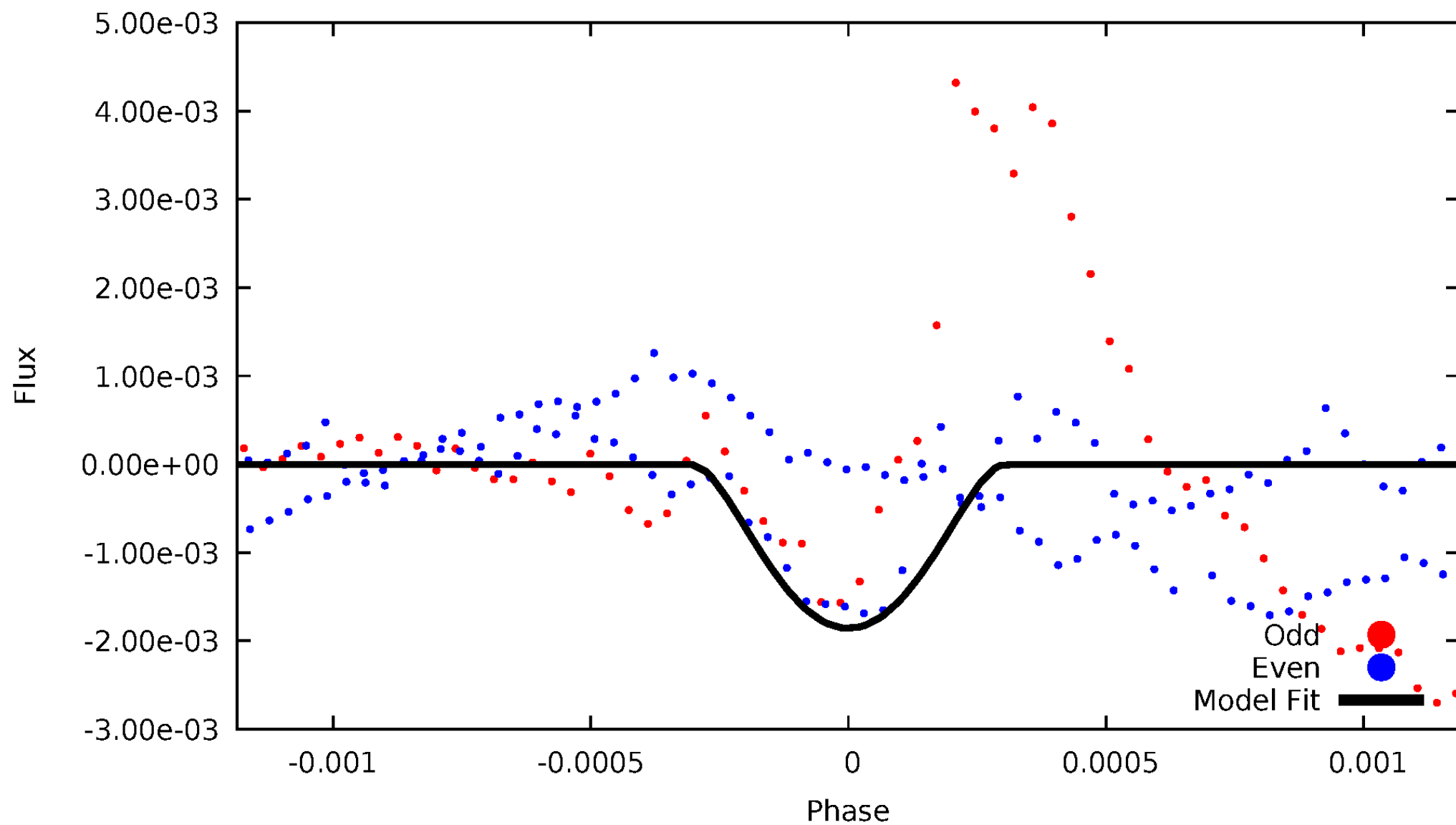


TCE 004157933-02



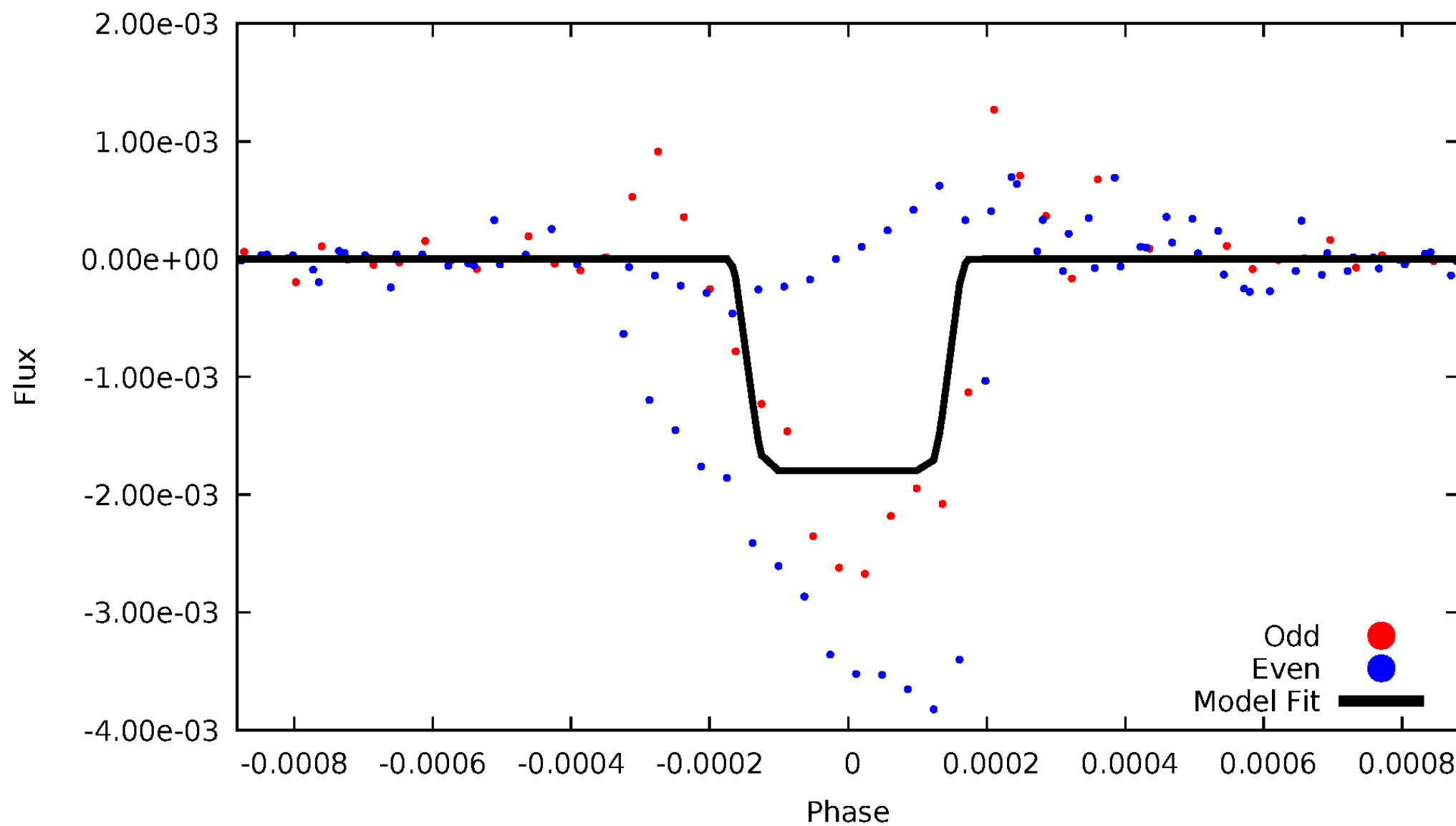
DV Odd/Even

TCE 004157933-02



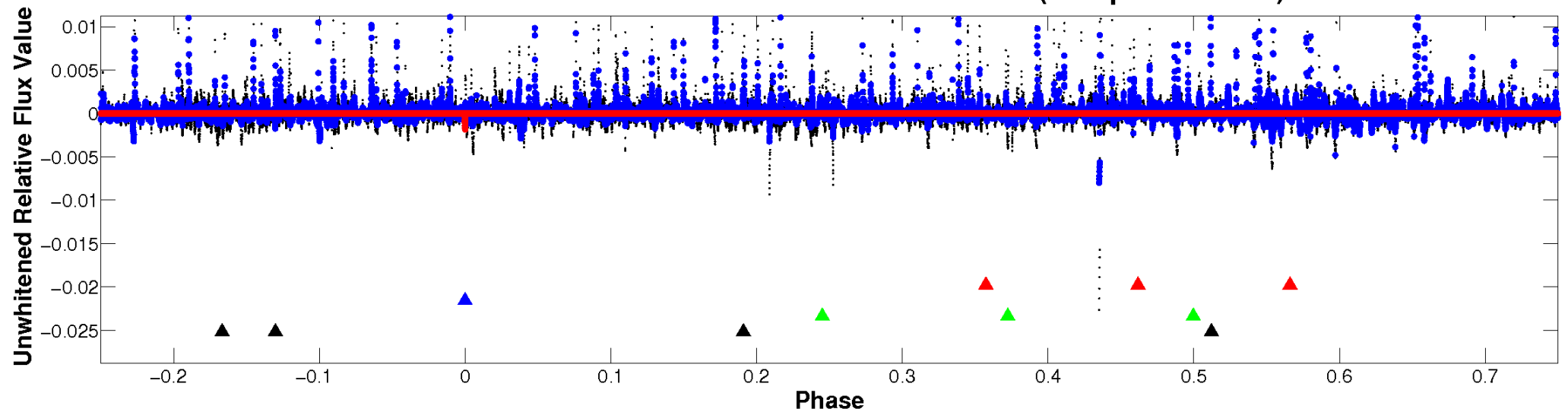
ALT Odd/Even

TCE 004157933-02

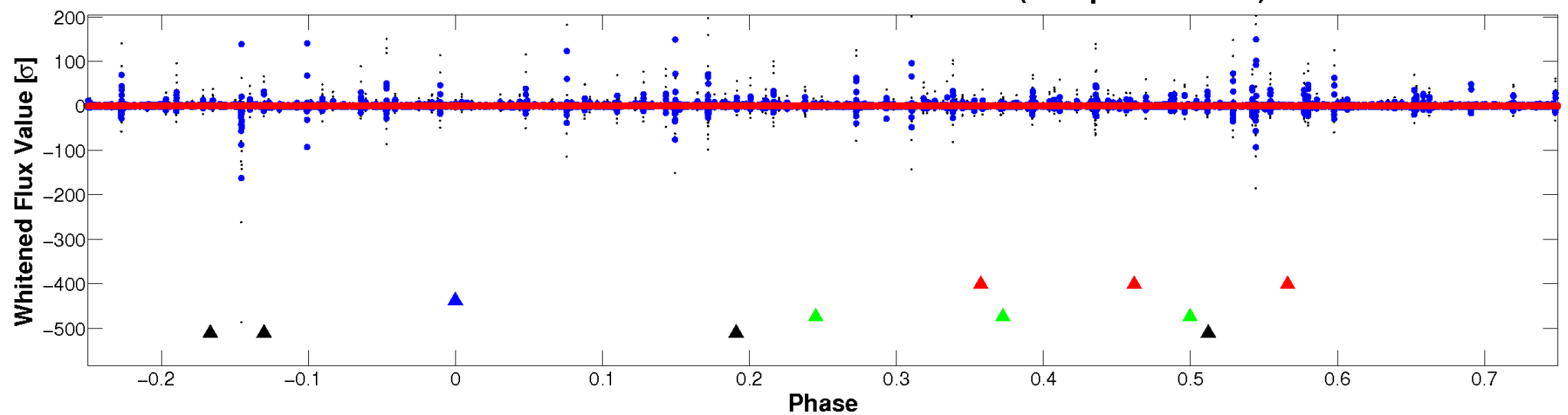


Non-Whitened Vs. Whitened Light Curve

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

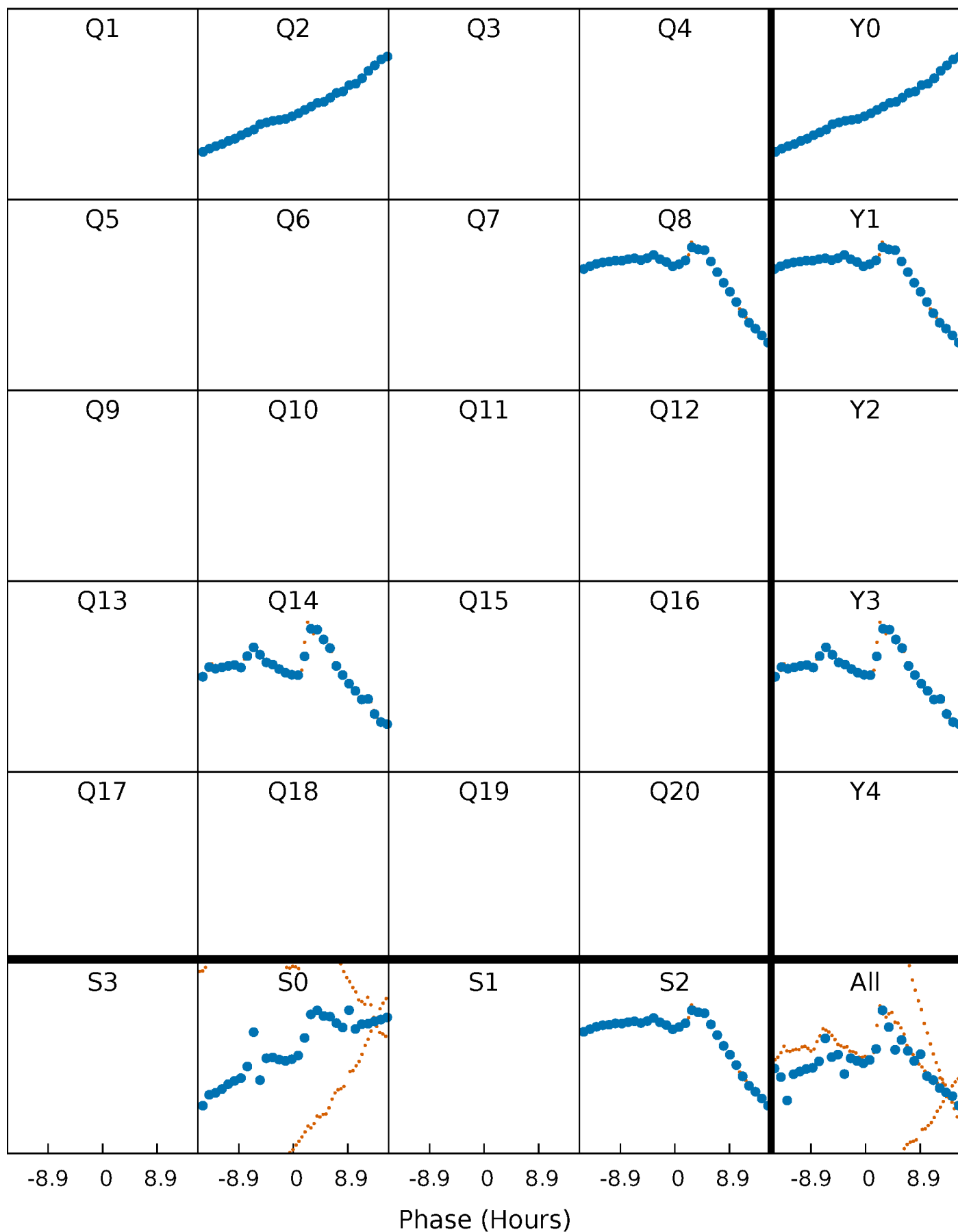


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



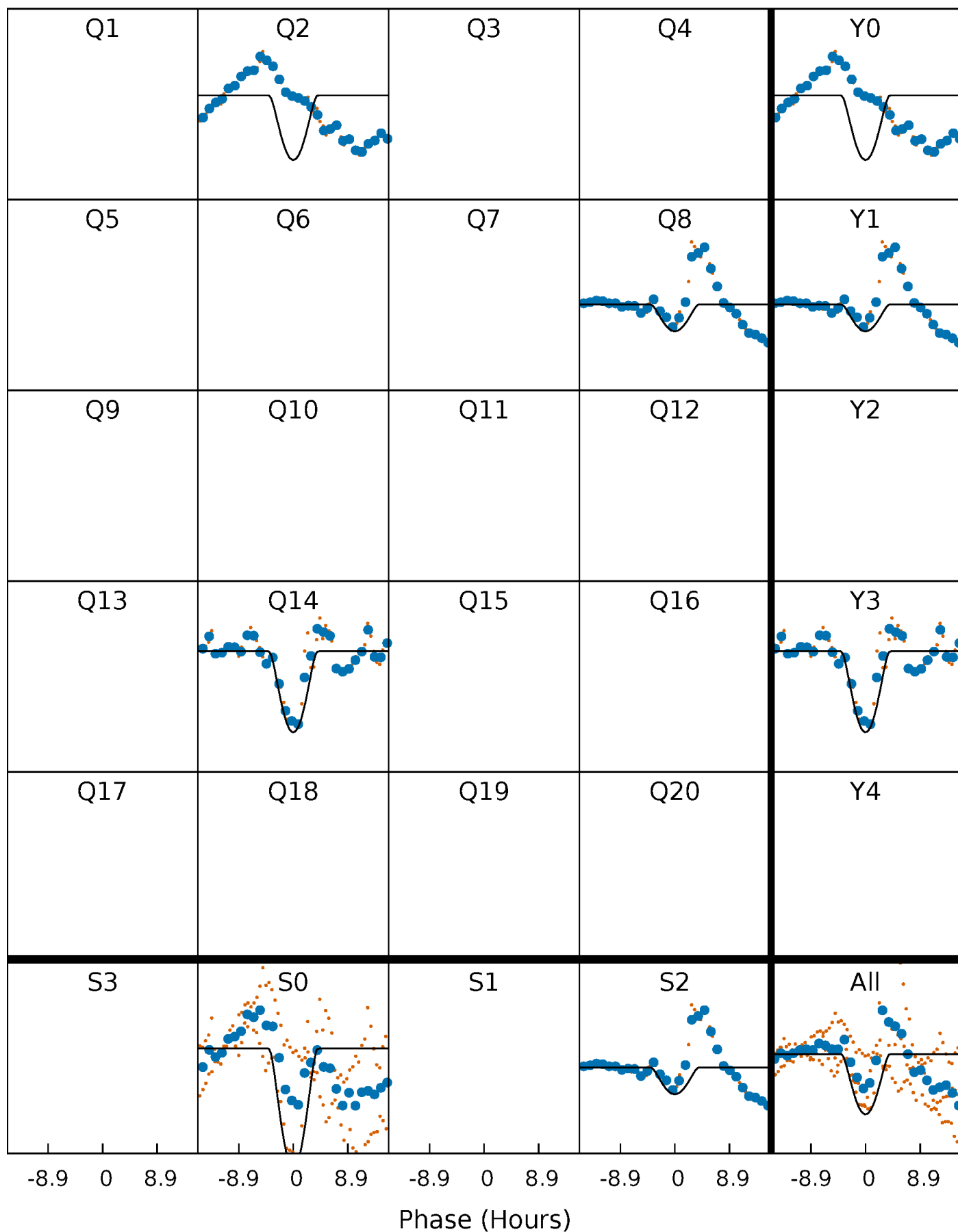
PDC Quarter-Phased Transit Curves

TCE 004157933-02 P=547.376338 Days $T_0=238.077589$ (BKJD)



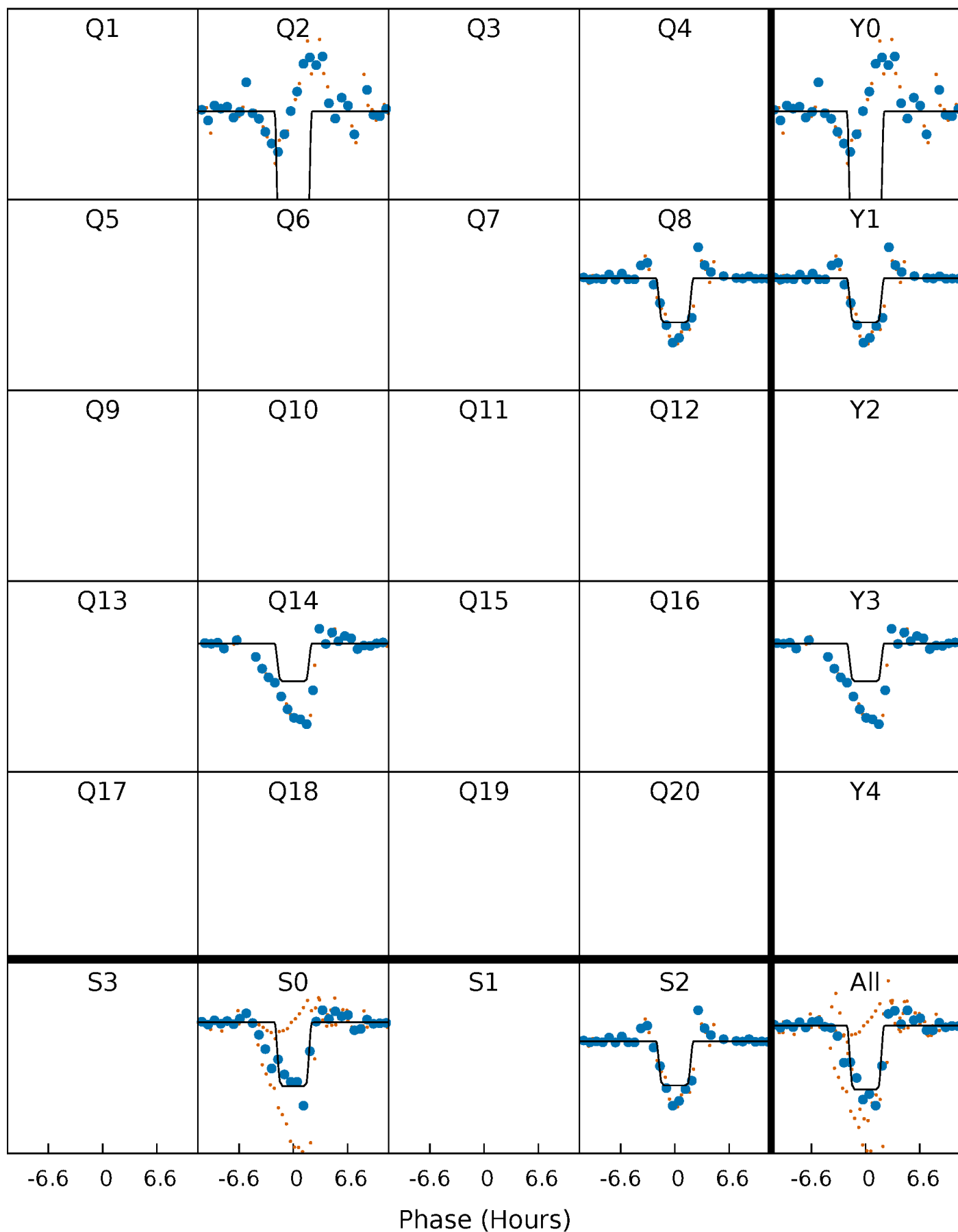
DV Quarter-Phased Transit Curves

TCE 004157933-02 P=547.376338 Days $T_0=238.077589$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

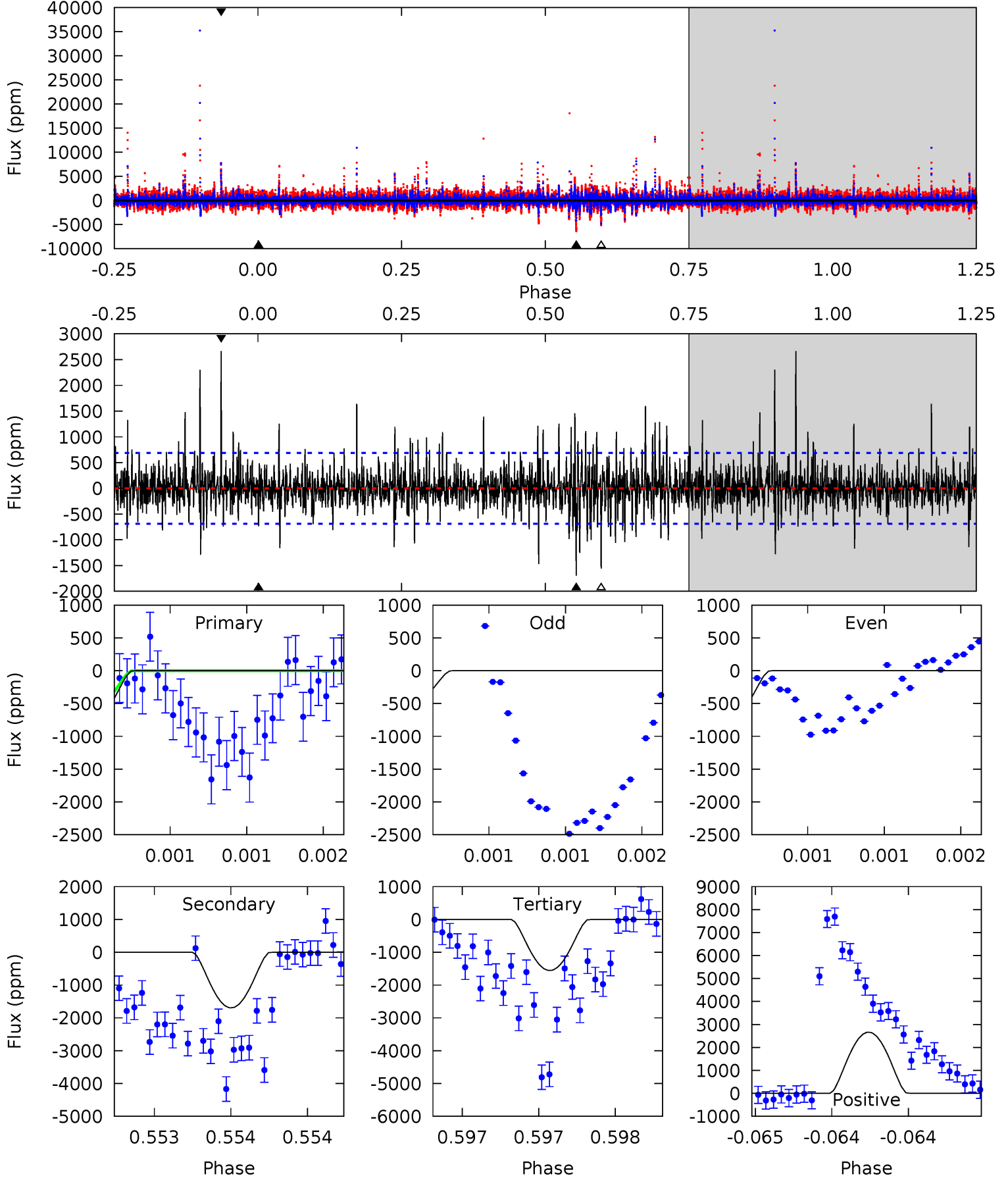
TCE 004157933-02 P=547.346961 Days $T_0=238.105864$ (BKJD)



DV Model-Shift Uniqueness Test

004157933-02, P = 547.376338 Days, E = 238.077589 Days

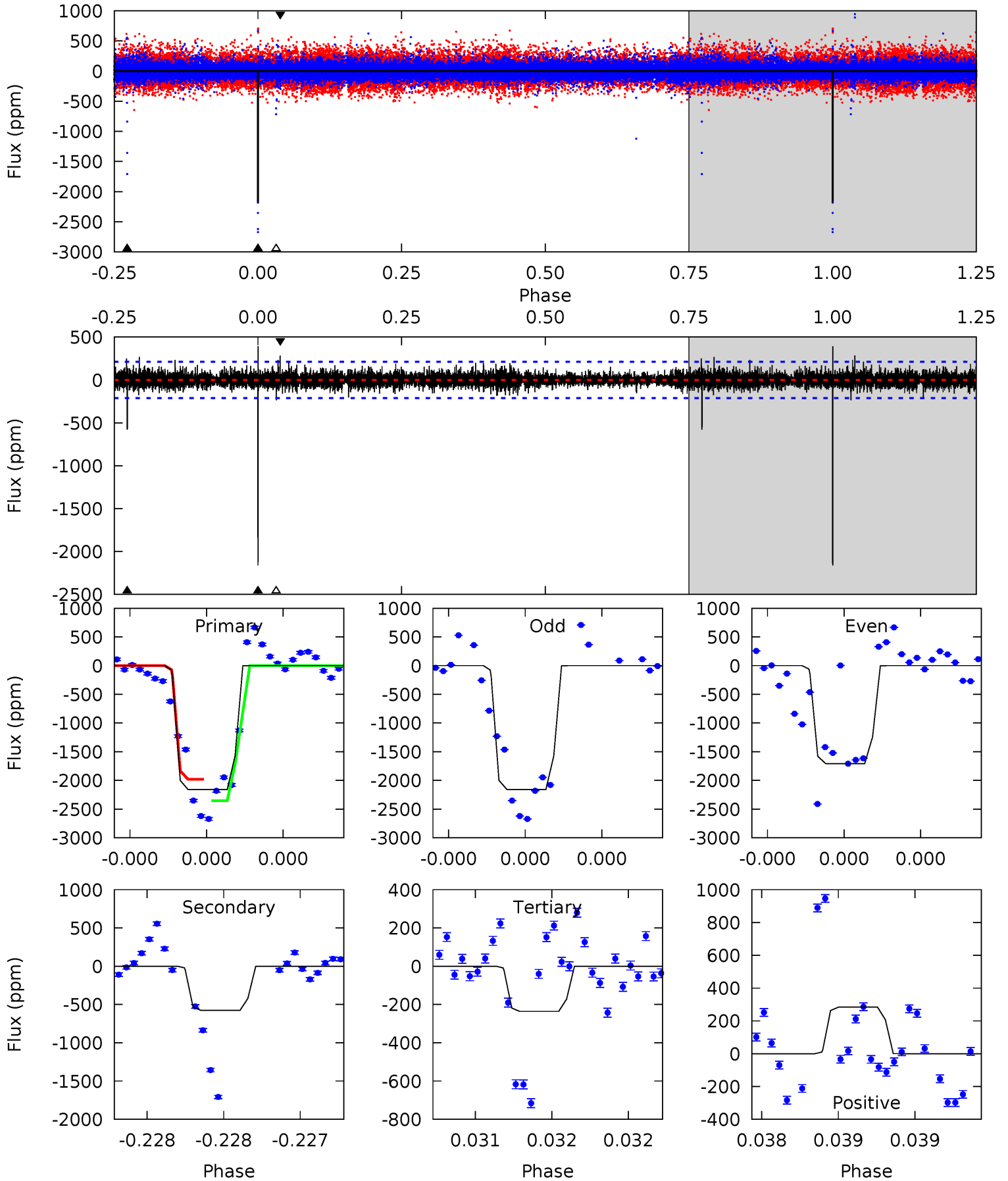
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.93	13.7	12.5	21.5	5.54	3.43	2.39	-6.61	-15.5	1.12	-7.80	0.47	1.31	0.61	1.37



Alt Model-Shift Uniqueness Test

004157933-02, P = 547.346961 Days, E = 238.105864 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
57.3	15.3	6.26	7.53	5.63	3.56	1.10	51.1	49.8	9.05	7.78	5.89	0.85	0.15	4.69



Stellar Parameters For KIC 004157933

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	5492^{+170}_{-227}	$3.265^{+0.760}_{-0.190}$	$-0.160^{+0.350}_{-0.350}$	$5.501^{+1.255}_{-4.015}$	$2.032^{+0.357}_{-1.071}$	$0.017^{+0.327}_{-0.007}$
	+3%/-4%	+23%/-6%	+219%/-219%	+23%/-73%	+18%/-53%	+1901%/-39%
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 004157933-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	-1695 ± 124	$64.30^{+67.91}_{-43.71}$	599^{+65}_{-107}	3549^{+1906}_{-608}	612^{+5042}_{-471}
Alt.	-577 ± 38	$55.87^{+66.14}_{-38.95}$	600^{+60}_{-112}	3164^{+1529}_{-536}	279^{+2648}_{-221}

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 $A_{obs} \gg 1.0$

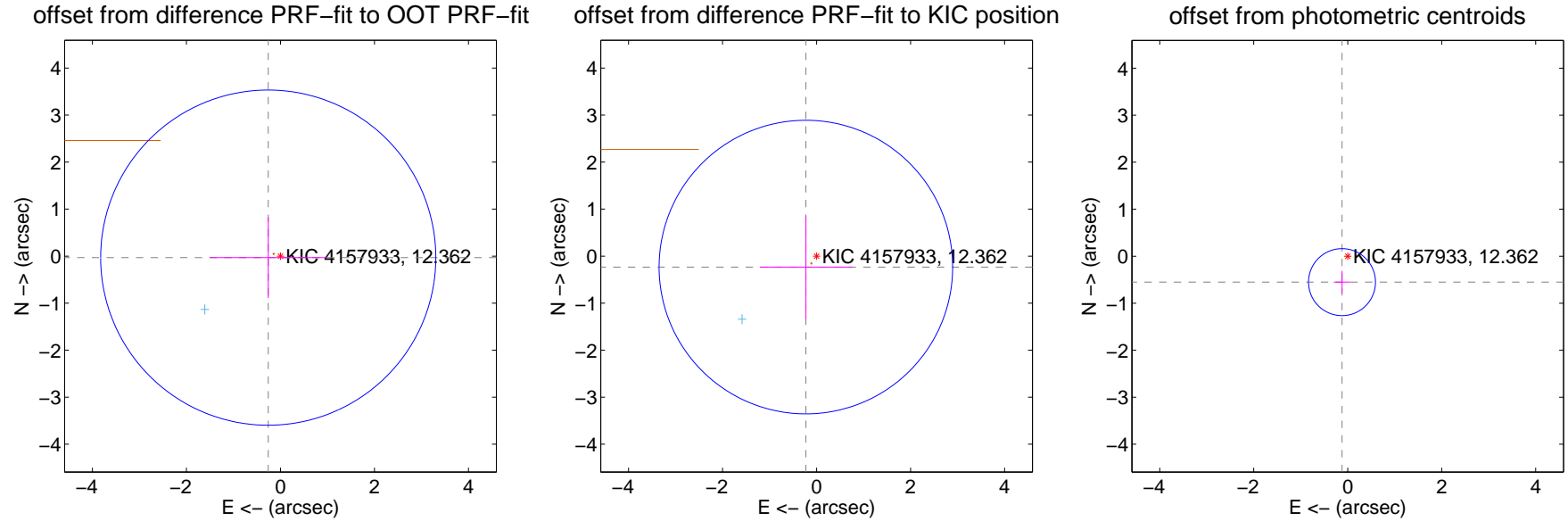
DV Centroid Data

Supplemental centroid analysis for 004157933-02. Kepler magnitude: 12.36. Transit SNR 10.34

There are 1 quarters with good PRF difference image offsets

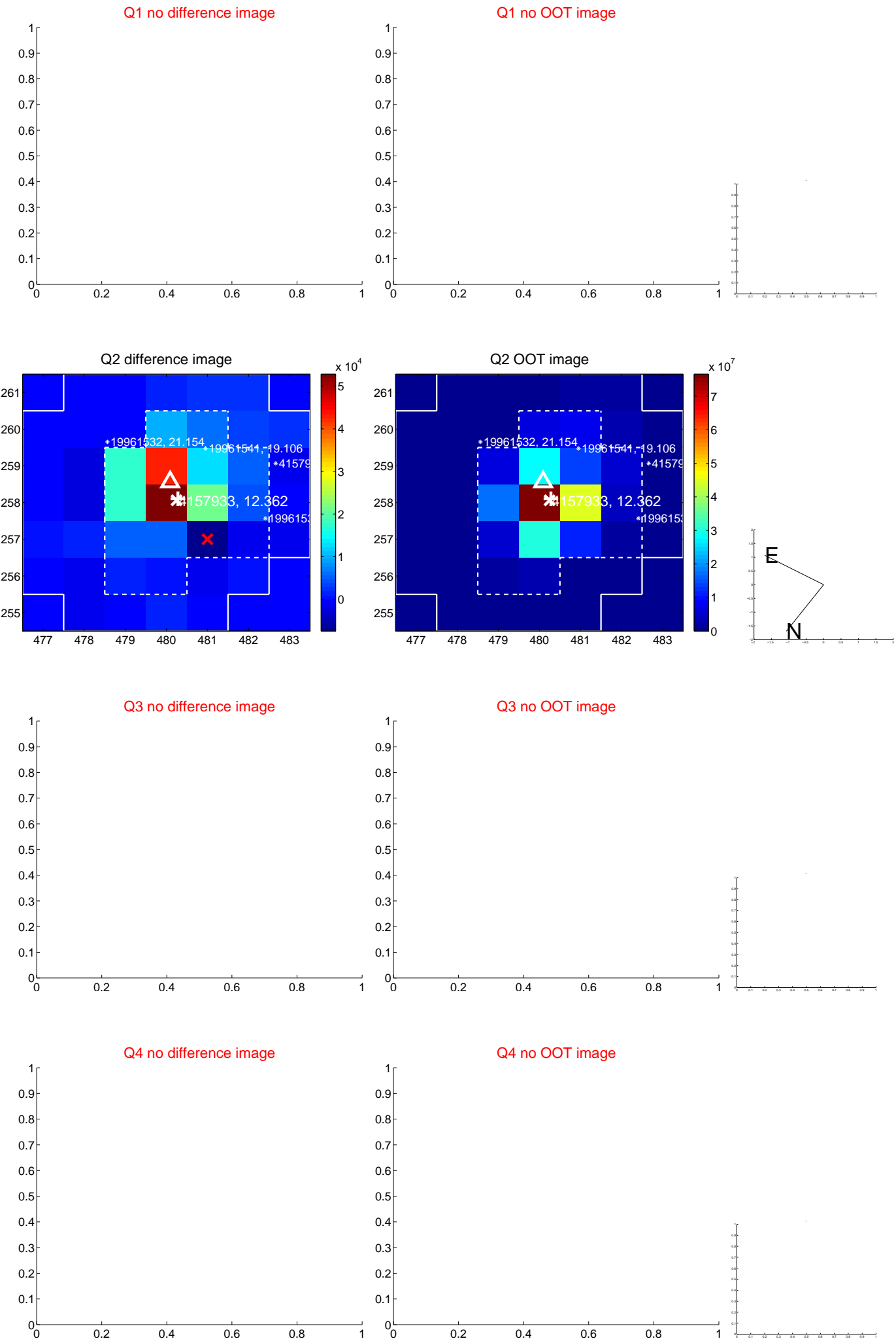
The direct PRF centroid is offset from the target star catalog position by about 0.20 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.262 ± 1.188	0.22	0.260 ± 1.249	-0.032 ± 0.858
PRF-fit source offset from KIC position	0.326 ± 1.041	0.31	0.228 ± 0.979	-0.233 ± 1.097
photometric centroid source offset	0.56 ± 0.24	2.38	0.12 ± 0.17	-0.55 ± 0.24

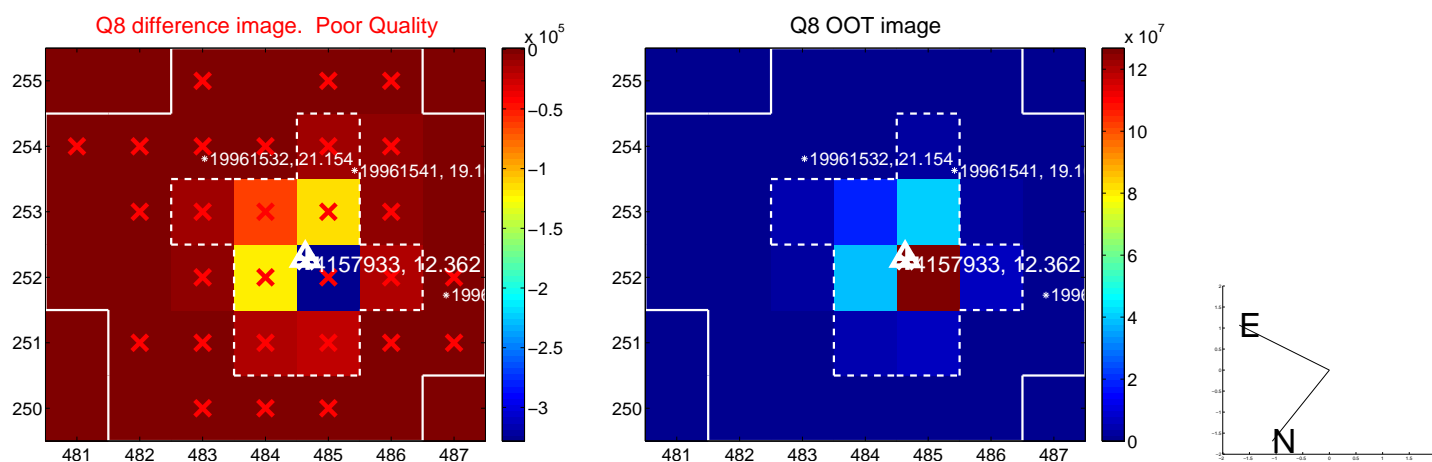
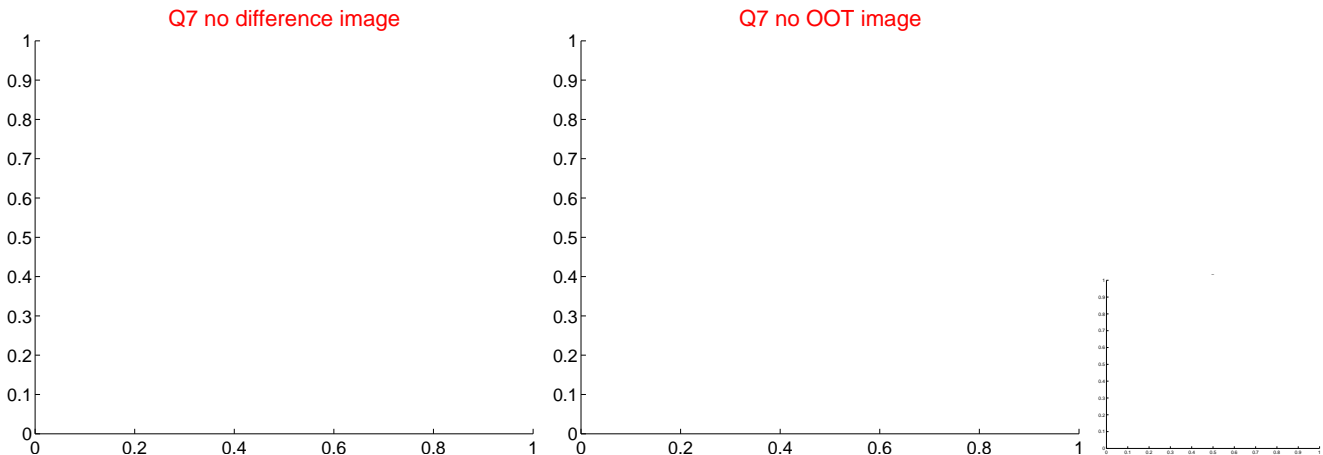
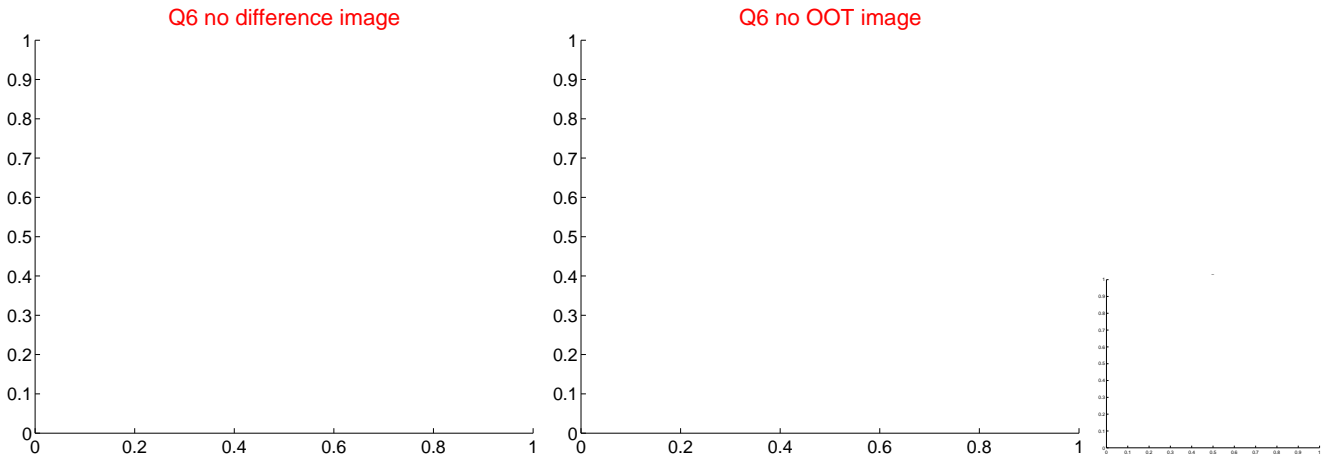
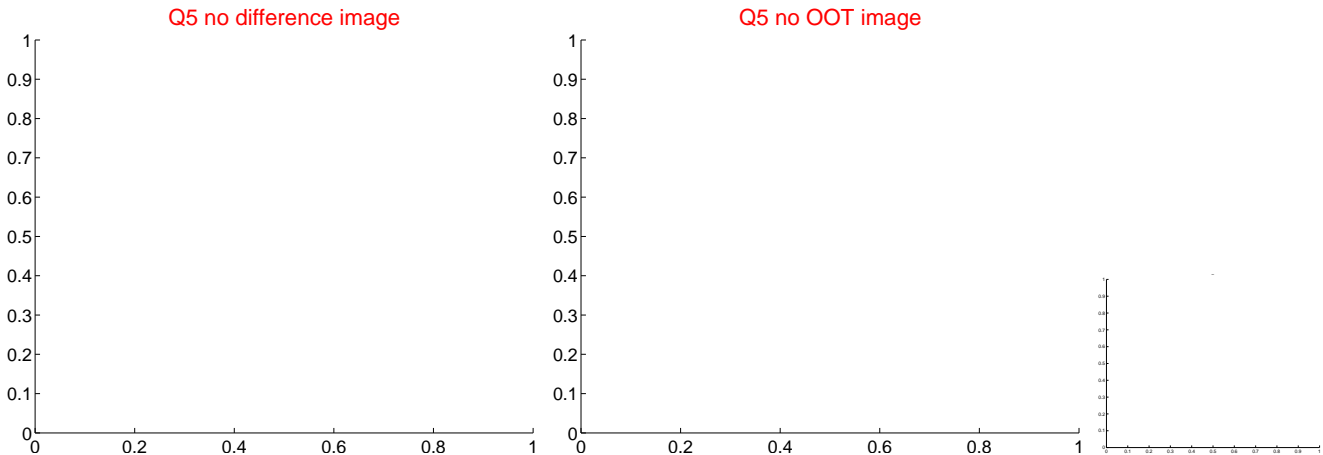


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

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



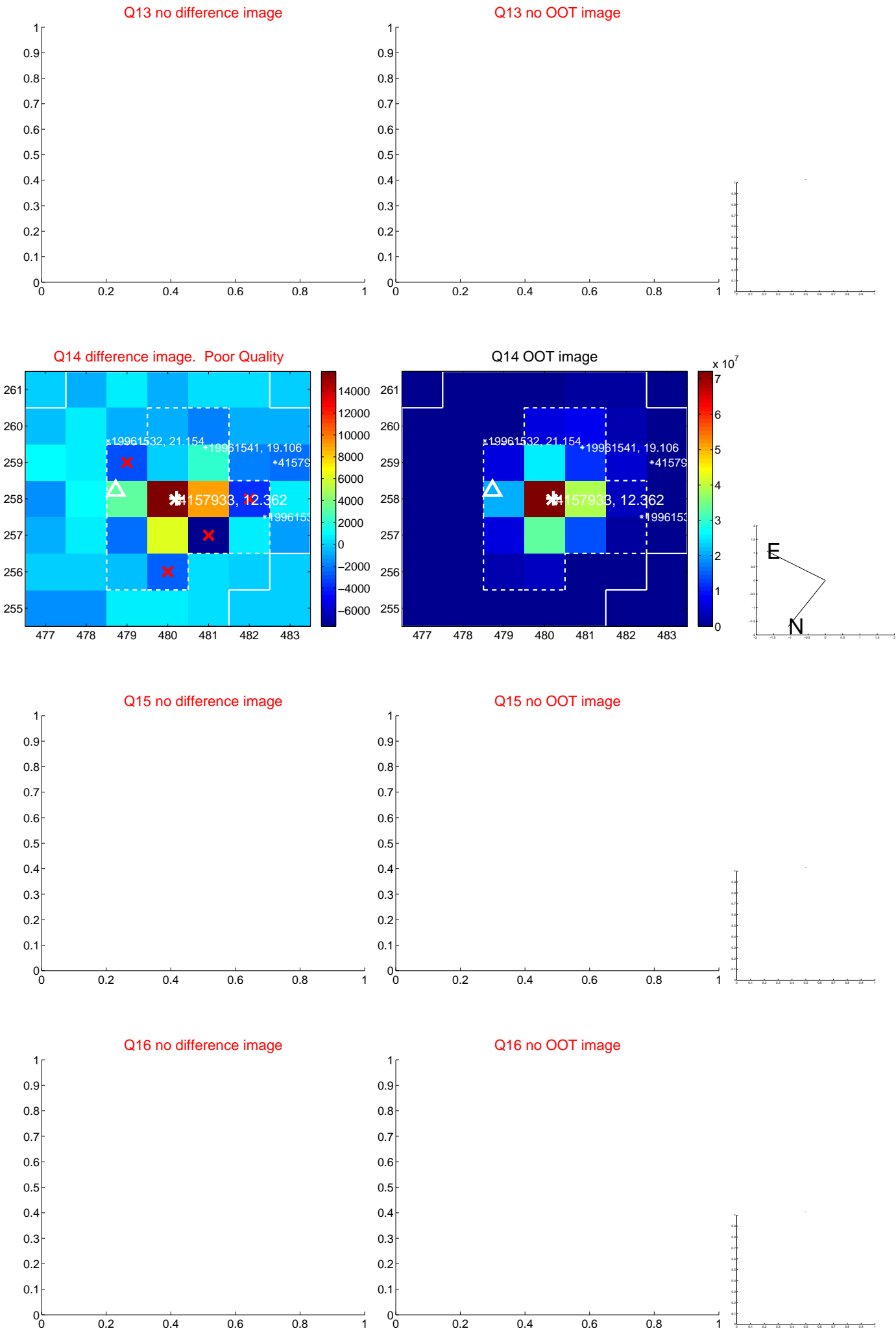
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value



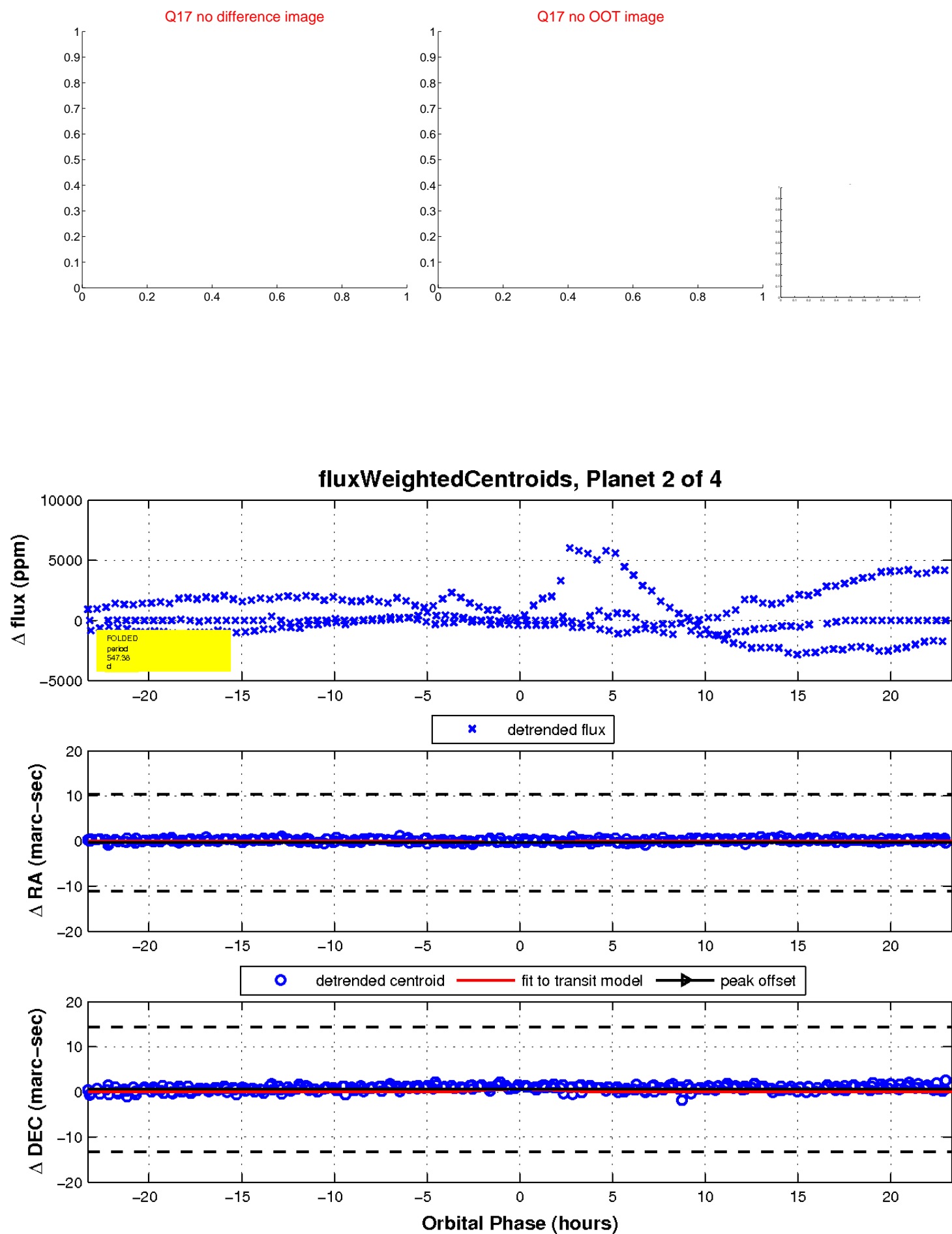
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

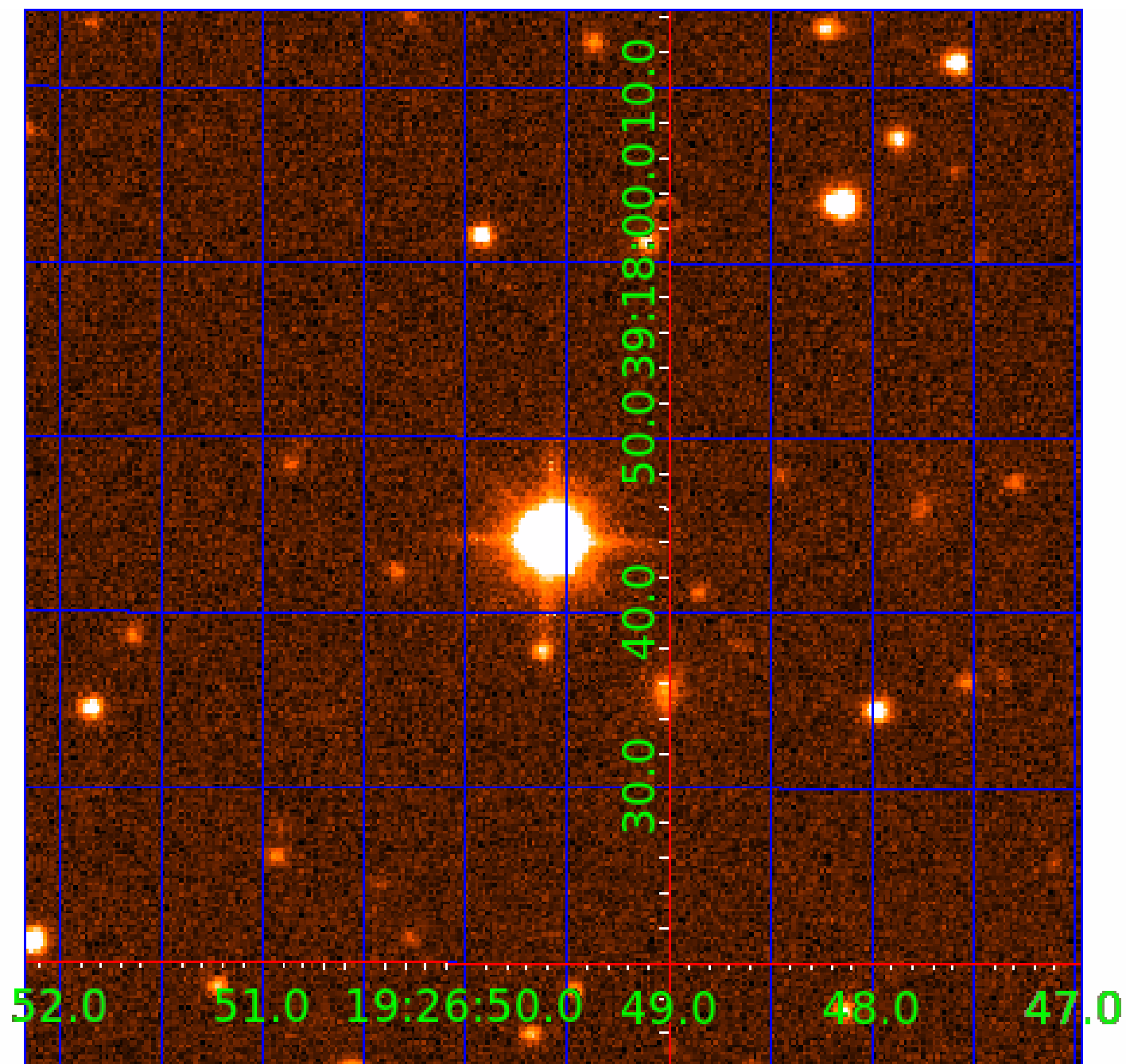


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 004157933

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})
004157933-01	OBS	No	490.260058	547.947486	2189.1	7.121	18.1	12.3	5.50	5492	49.15	10.38
004157933-02	OBS	No	547.376338	238.077589	1856.8	7.788	18.3	10.3	5.50	5492	45.65	8.96
004157933-03	OBS	No	477.699902	511.616688	892.4	3.226	22.3	6.4	5.50	5492	16.56	10.75
004157933-04	OBS	No	371.591100	146.825947	324.8	6.000	19.6	-1.0	5.50	5492	9.78	15.02

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004157933-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004157933-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004157933-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004157933-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—ALL_TRANS_CHASES—CENT_NOFITS

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

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

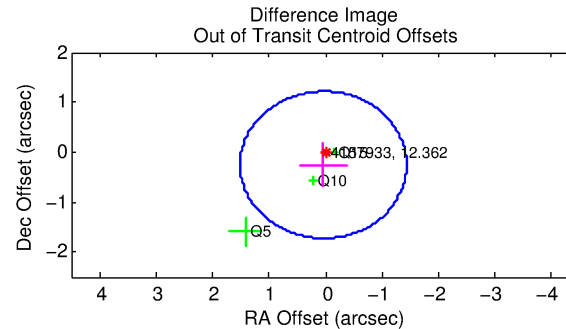
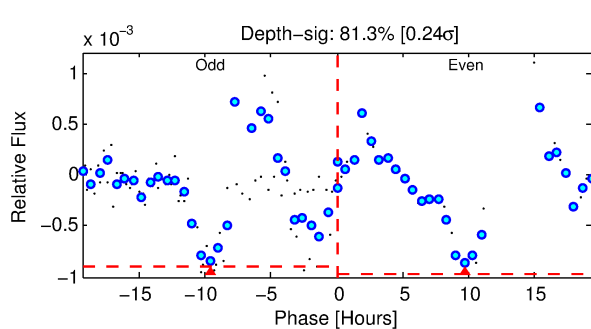
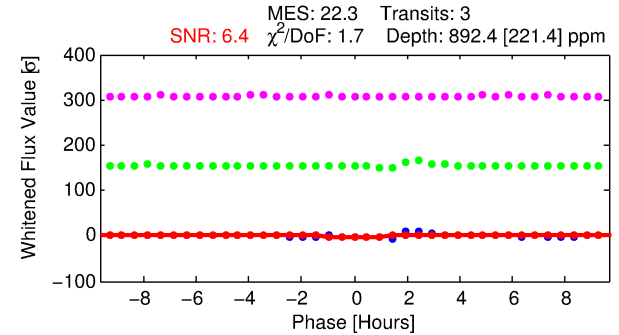
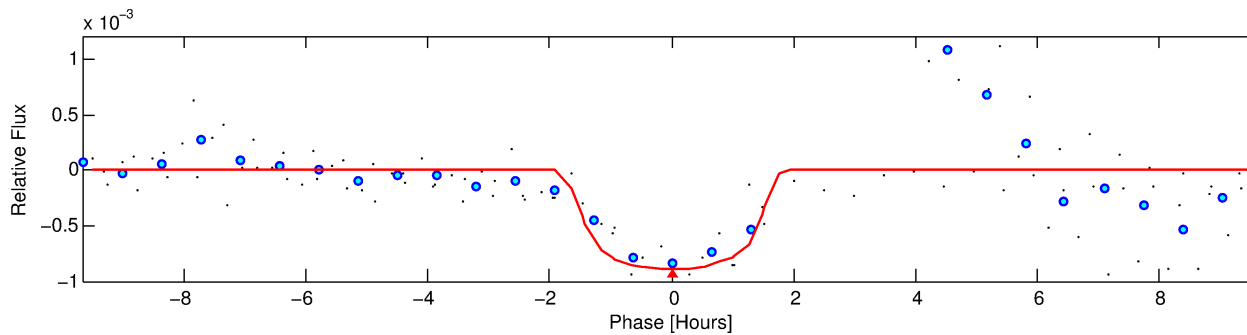
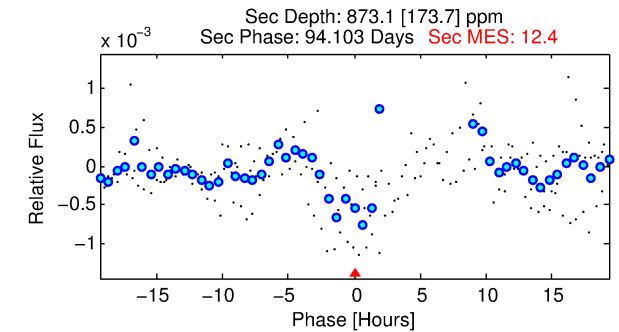
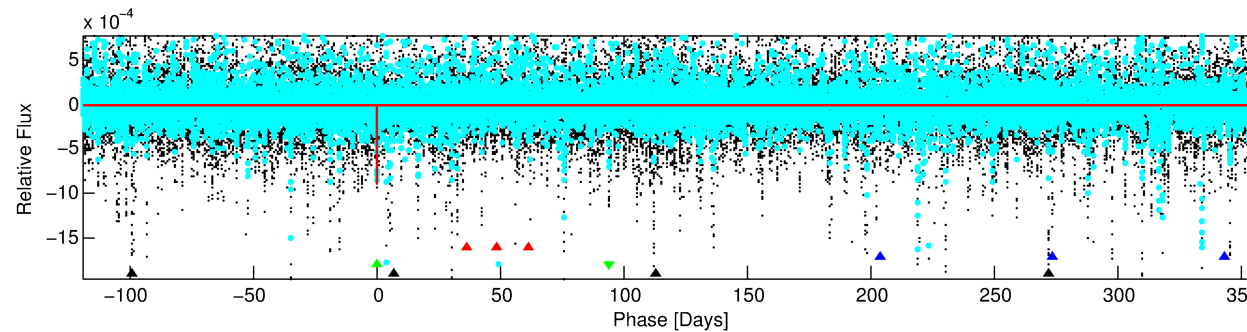
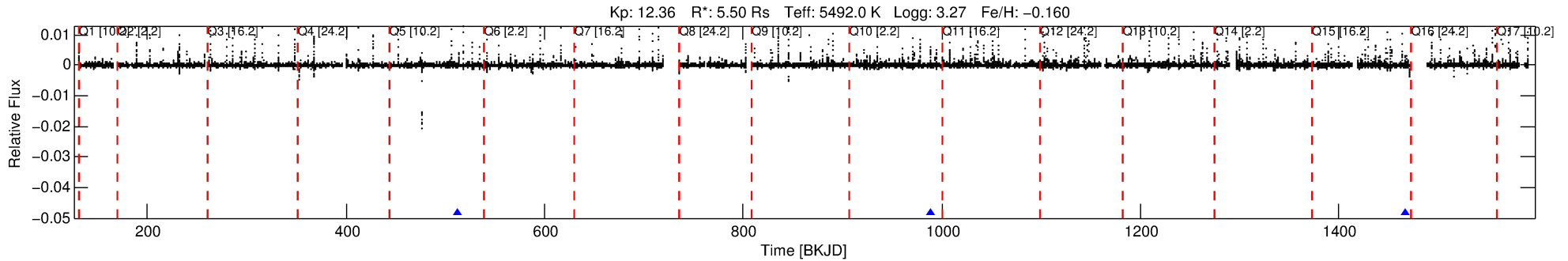
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 004157933-03

No Significant Match Found

DV One-Page Summary

KIC: 4157933 Candidate: 3 of 4 Period: 477.700 d



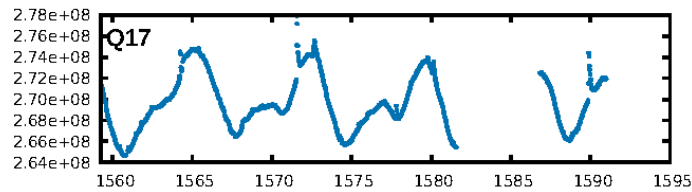
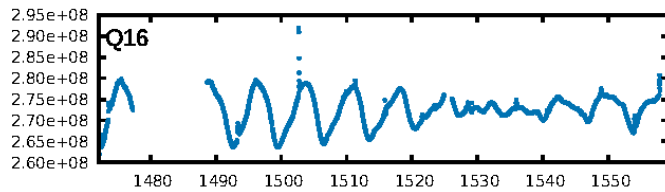
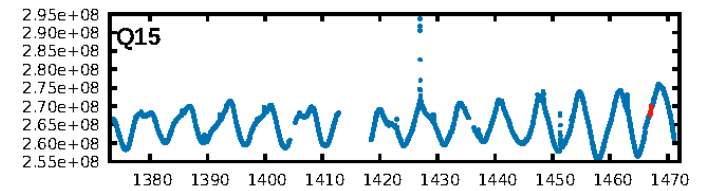
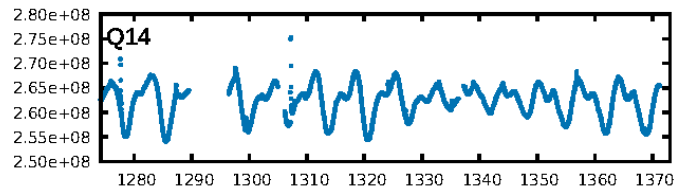
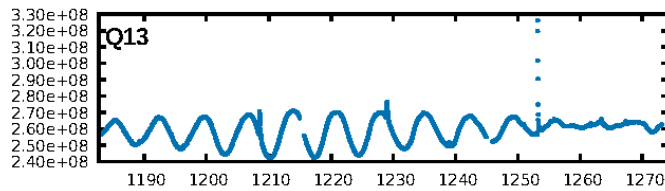
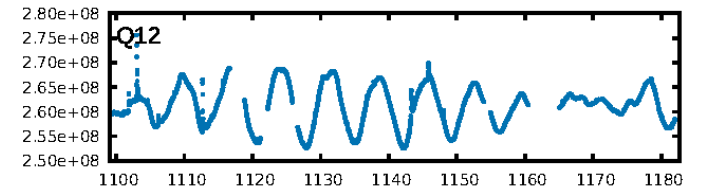
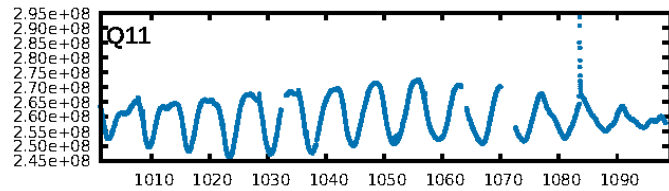
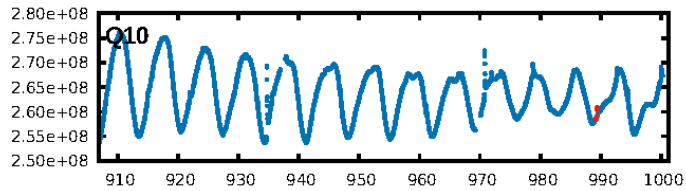
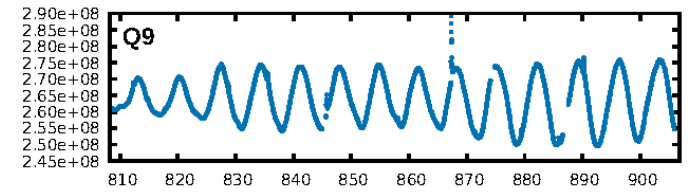
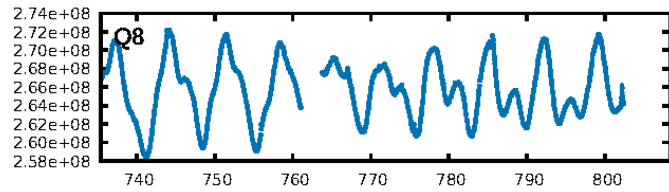
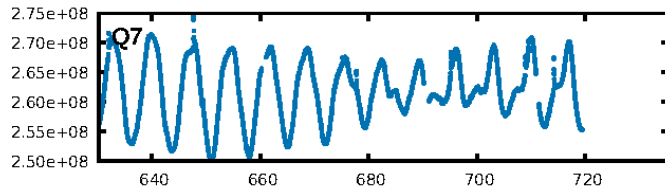
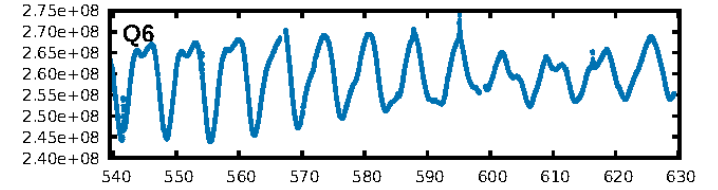
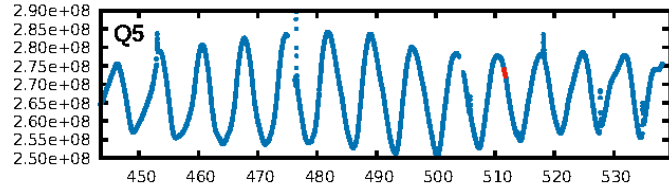
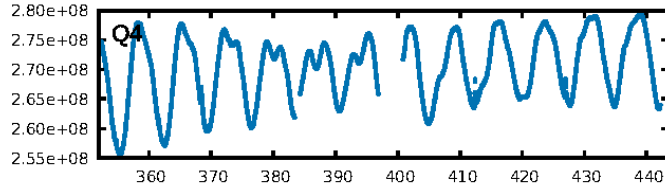
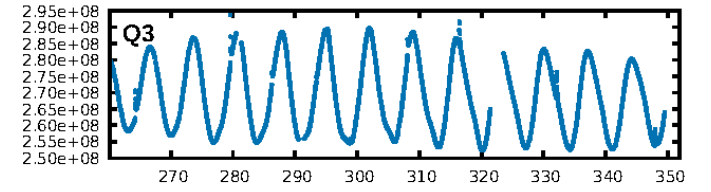
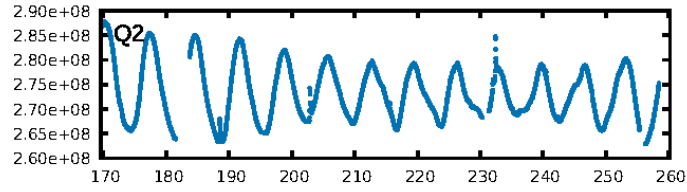
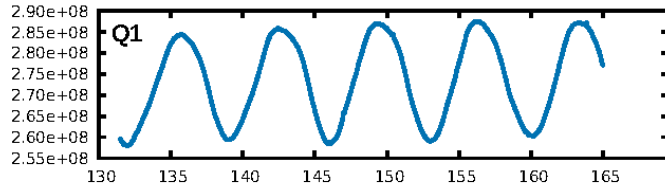
DV Fit Results:

Period = 477.69990 [0.00610] d
Epoch = 511.6167 [0.0056] BKJD
Rp/R* = 0.0276 [0.1147]
a/R* = 1066.51 [18398.92]
b = 0.41 [35.53]
Seff = 10.75 [13.70]
Teq = 462 [147] K
Rp = 16.56 [69.92] Re
a = 1.5151 [1.1509] AU
Ag = 4020.01 [33827.12] [0.12 σ]
Teffp = 5684 [11823] K [0.44 σ]

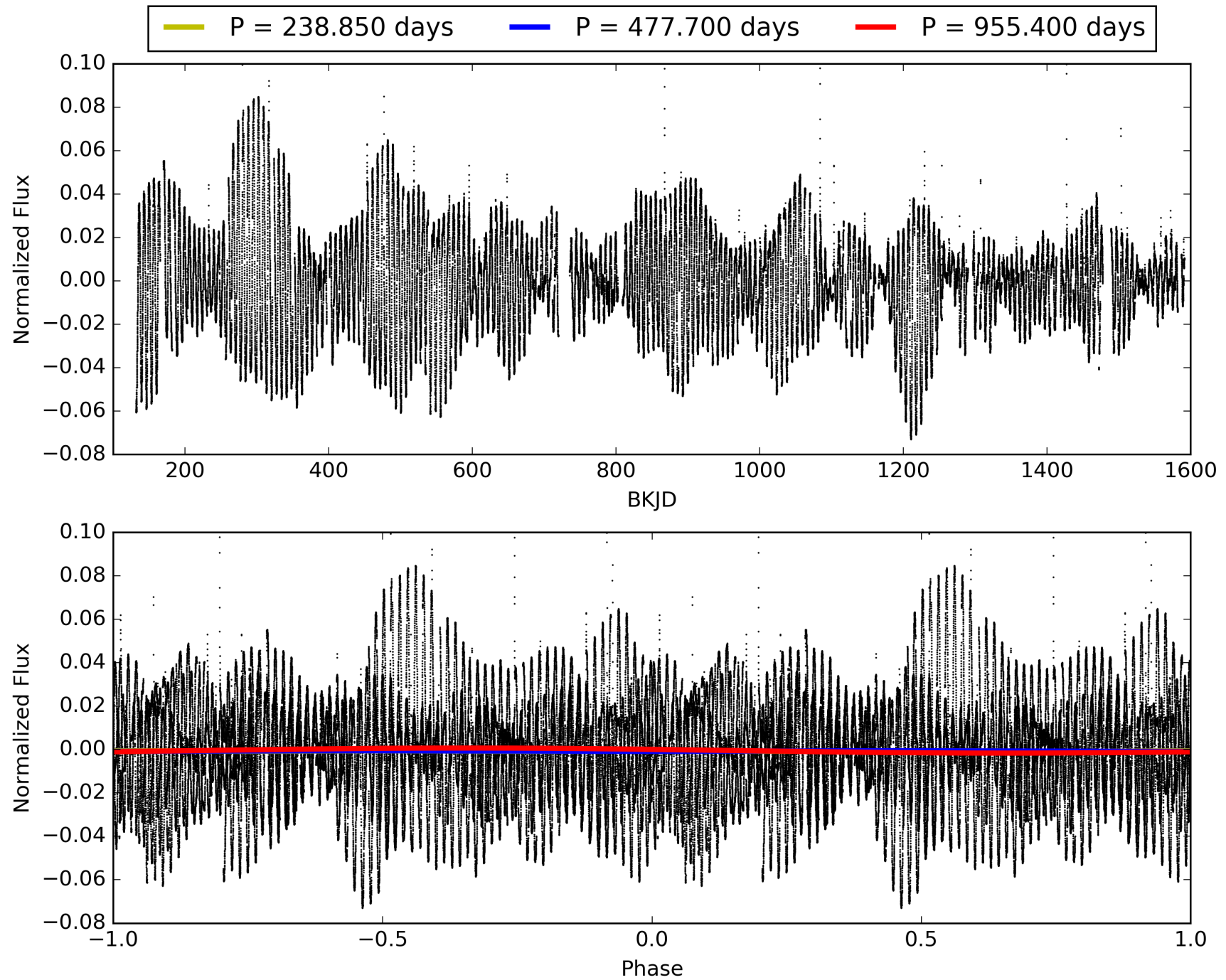
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [373.84 σ]
LongPeriod-sig: 100.0% [38.56 σ]
ModelChiSquare2-sig: 0.1%
ModelChiSquareGof-sig: 30.0%
Bootstrap-pfa: N/A
RollingBand-fgt: 1.00 [3/3]
GhostDiagnostic-chr: 0.3916
Centroid-sig: 85.1%
Centroid-so: 0.066 arcsec [0.12 σ]
OotOffset-rm: 0.257 arcsec [0.52 σ]
KicOffset-rm: 0.466 arcsec [1.67 σ]
OotOffset-st: 1/1/0/1 [3]
KicOffset-st: 1/1/0/1 [3]
DiffImageQuality-fgm: 0.67 [2/3]
DiffImageOverlap-fno: 1.00 [3/3]

TCE 004157933-03, PDC Light Curves

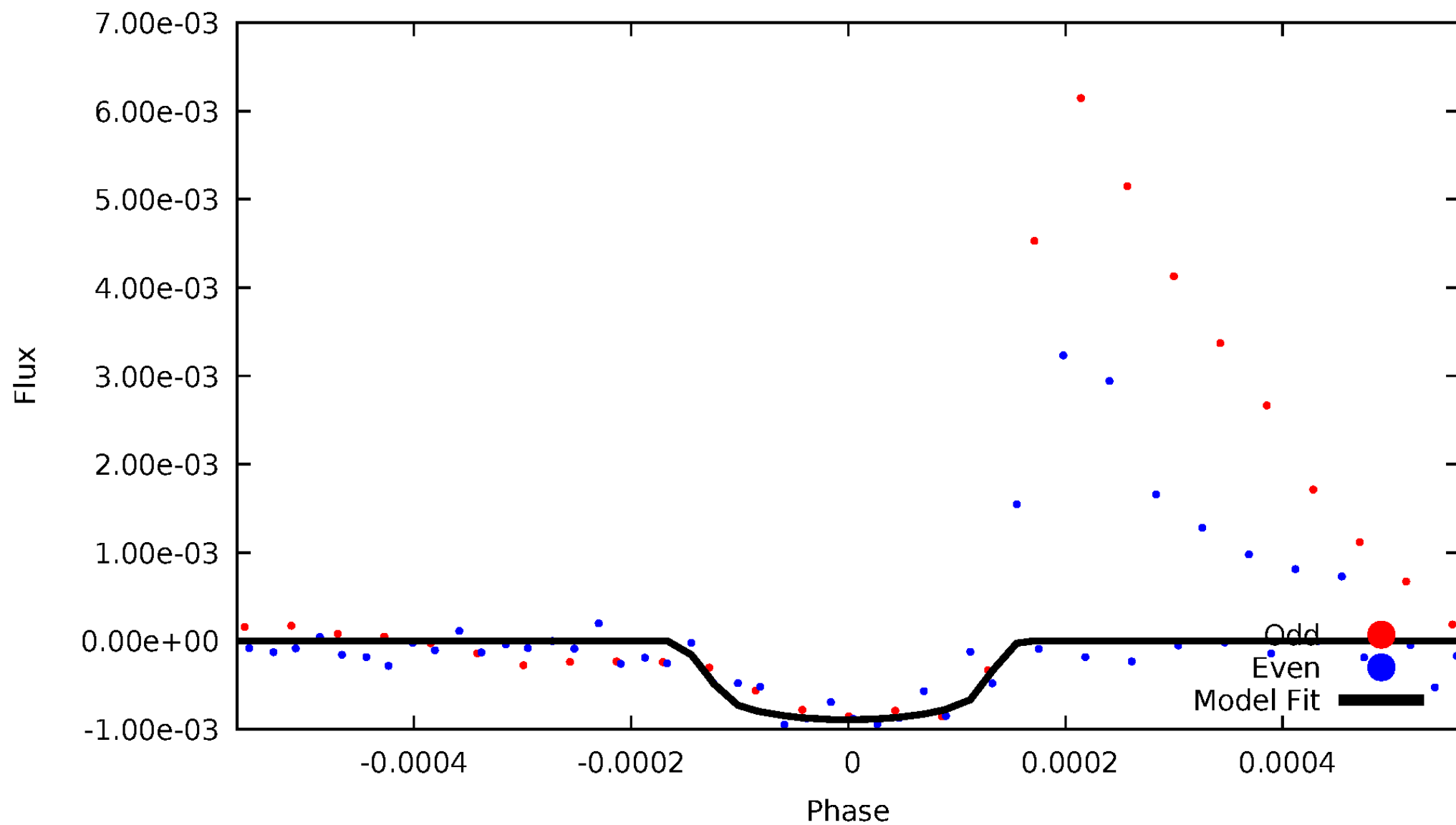


TCE 004157933-03



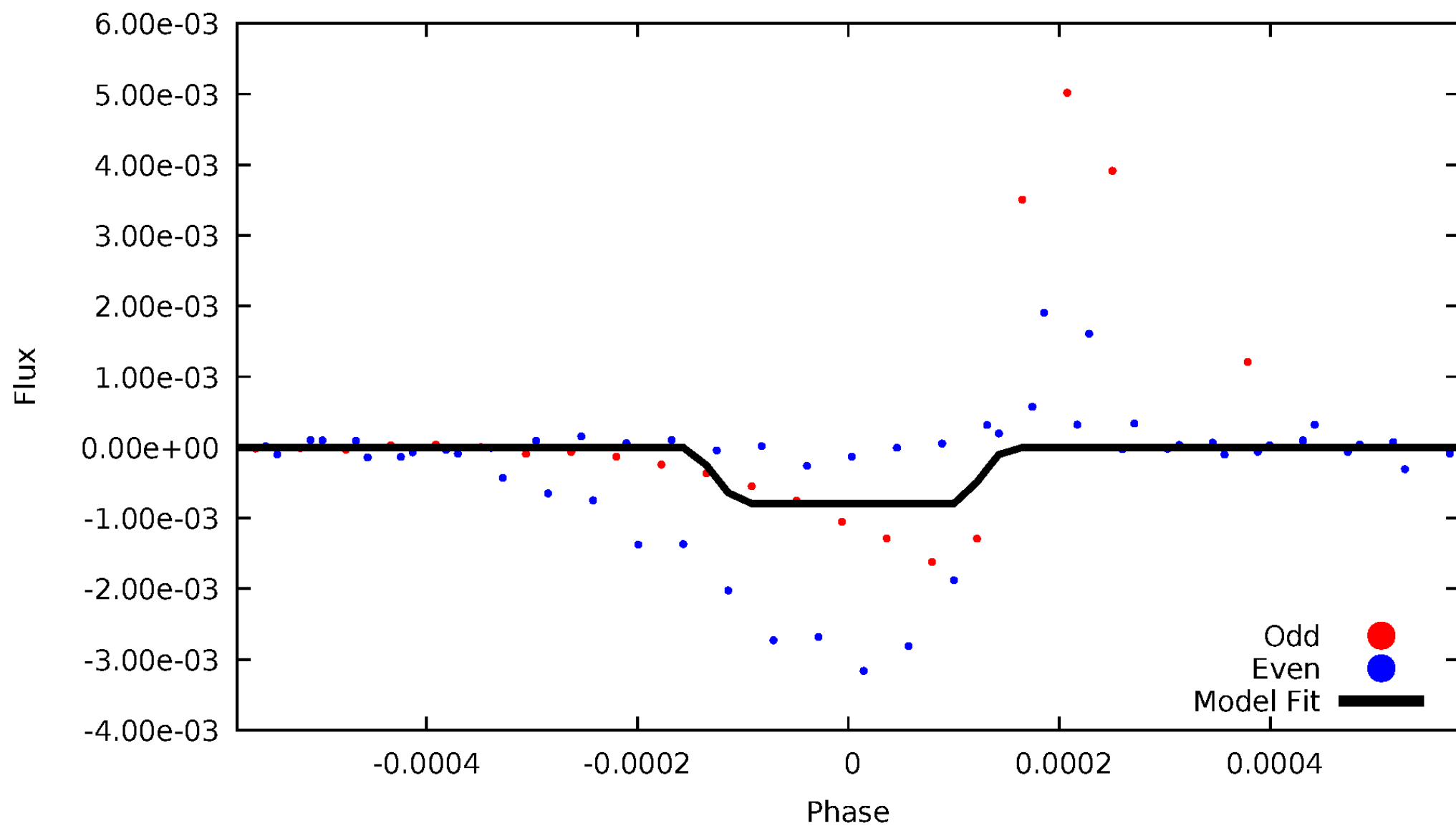
DV Odd/Even

TCE 004157933-03



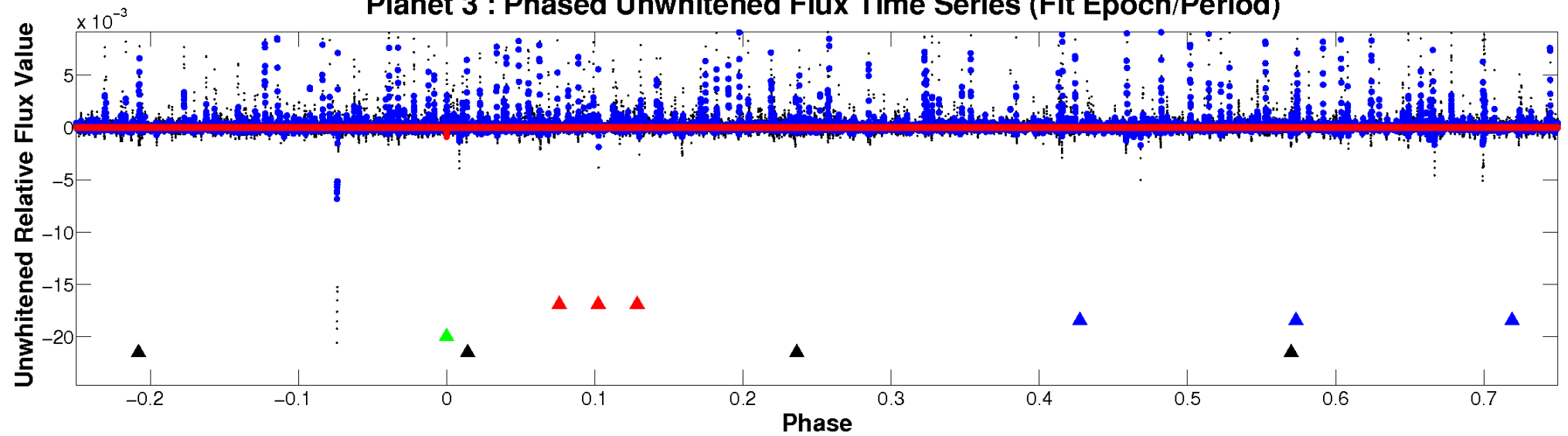
ALT Odd/Even

TCE 004157933-03

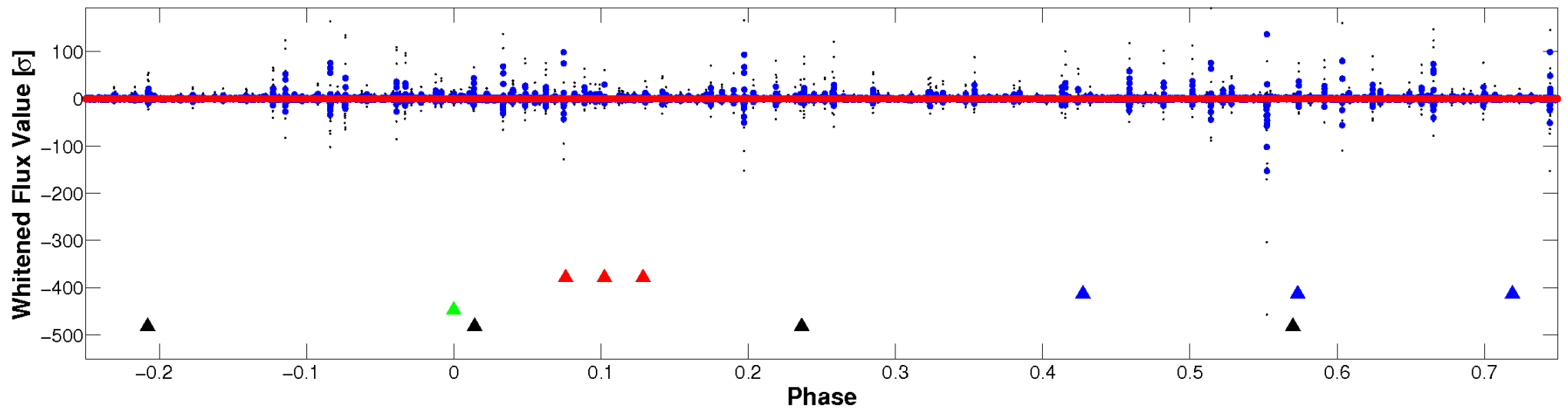


Non-Whitened Vs. Whitened Light Curve

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



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



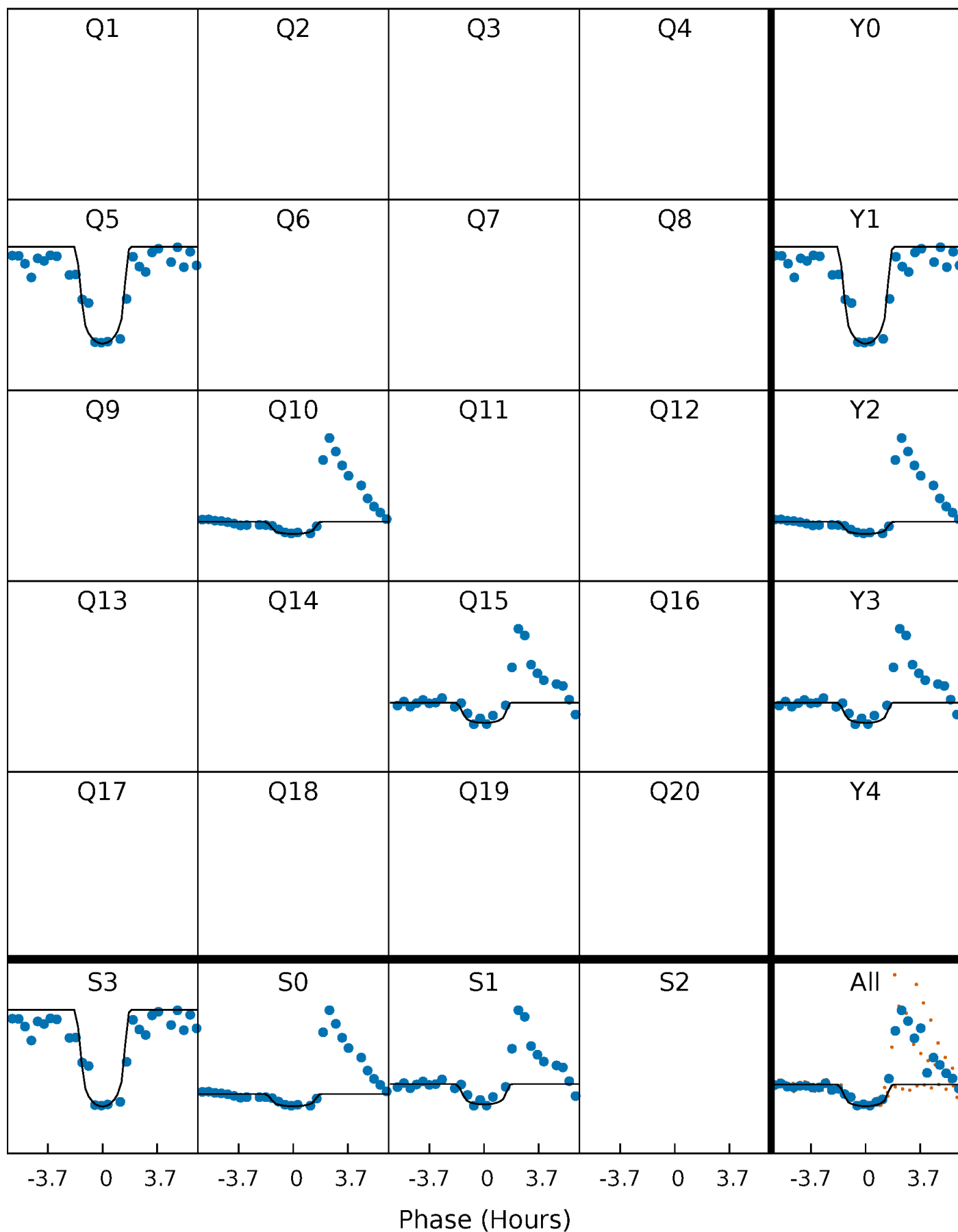
PDC Quarter-Phased Transit Curves

TCE 004157933-03 P=477.699902 Days $T_0=511.616688$ (BKJD)



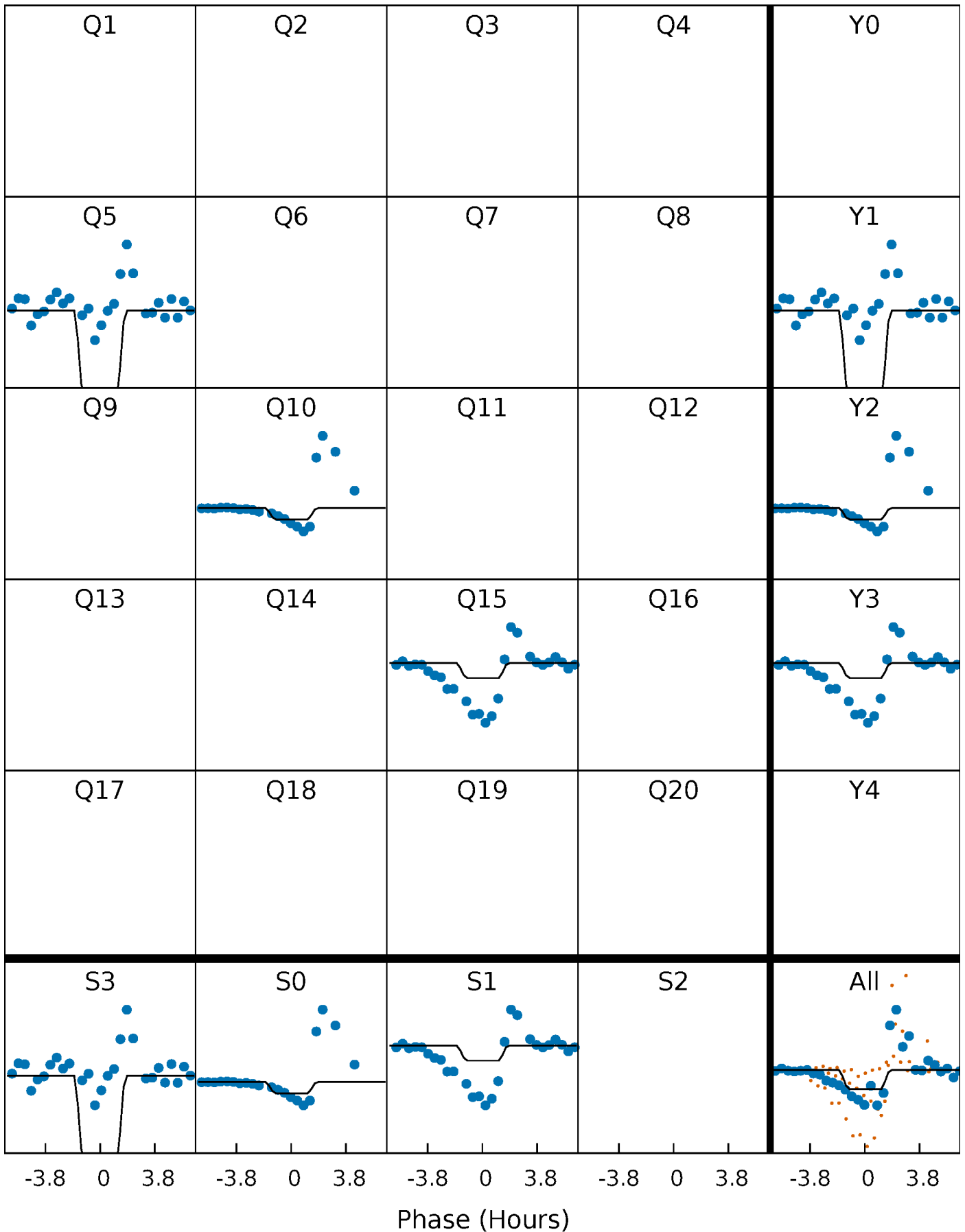
DV Quarter-Phased Transit Curves

TCE 004157933-03 P=477.699902 Days $T_0=511.616688$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

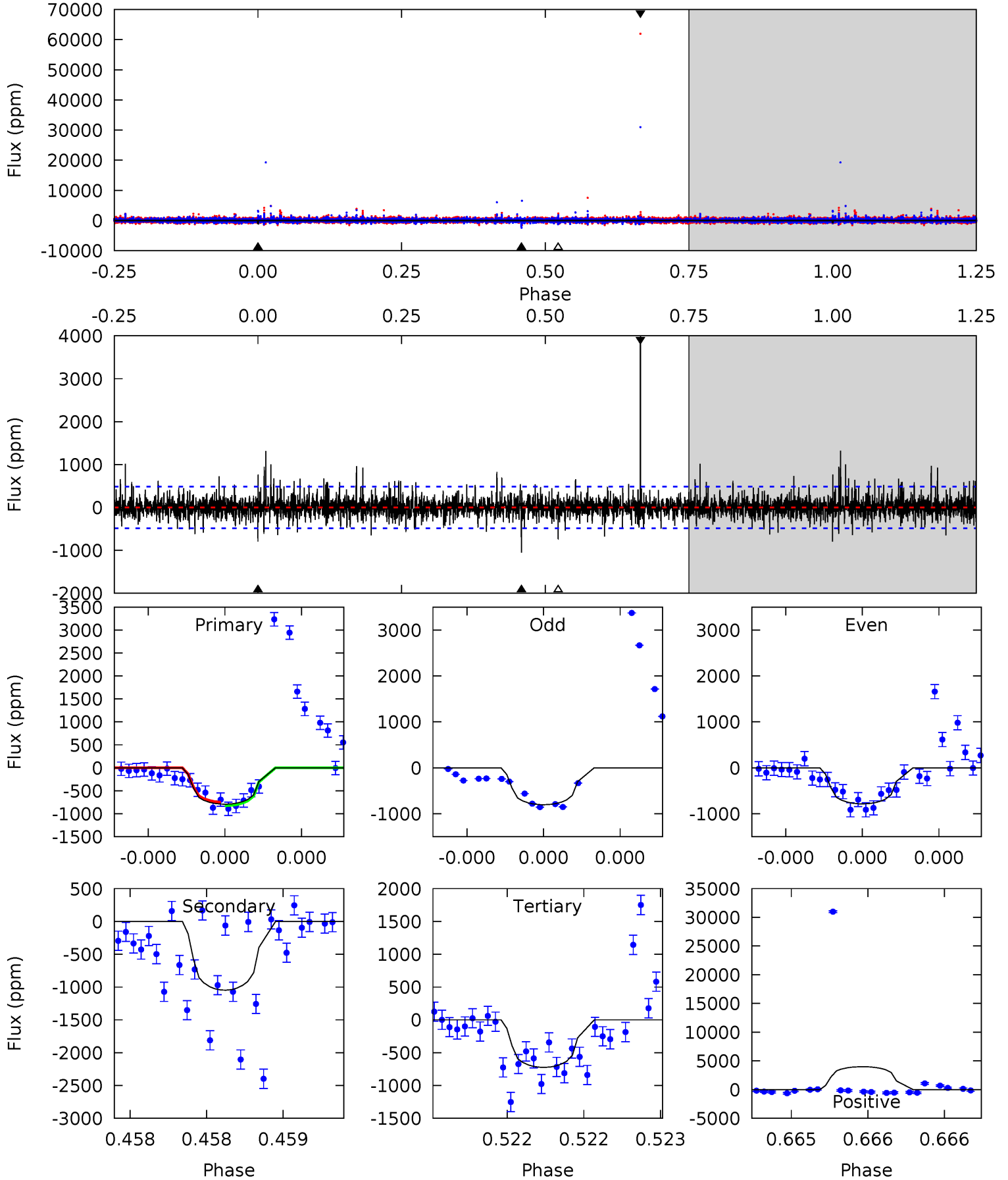
TCE 004157933-03 P=477.702577 Days $T_0=511.617152$ (BKJD)



DV Model-Shift Uniqueness Test

004157933-03, P = 477.699902 Days, E = 33.916786 Days

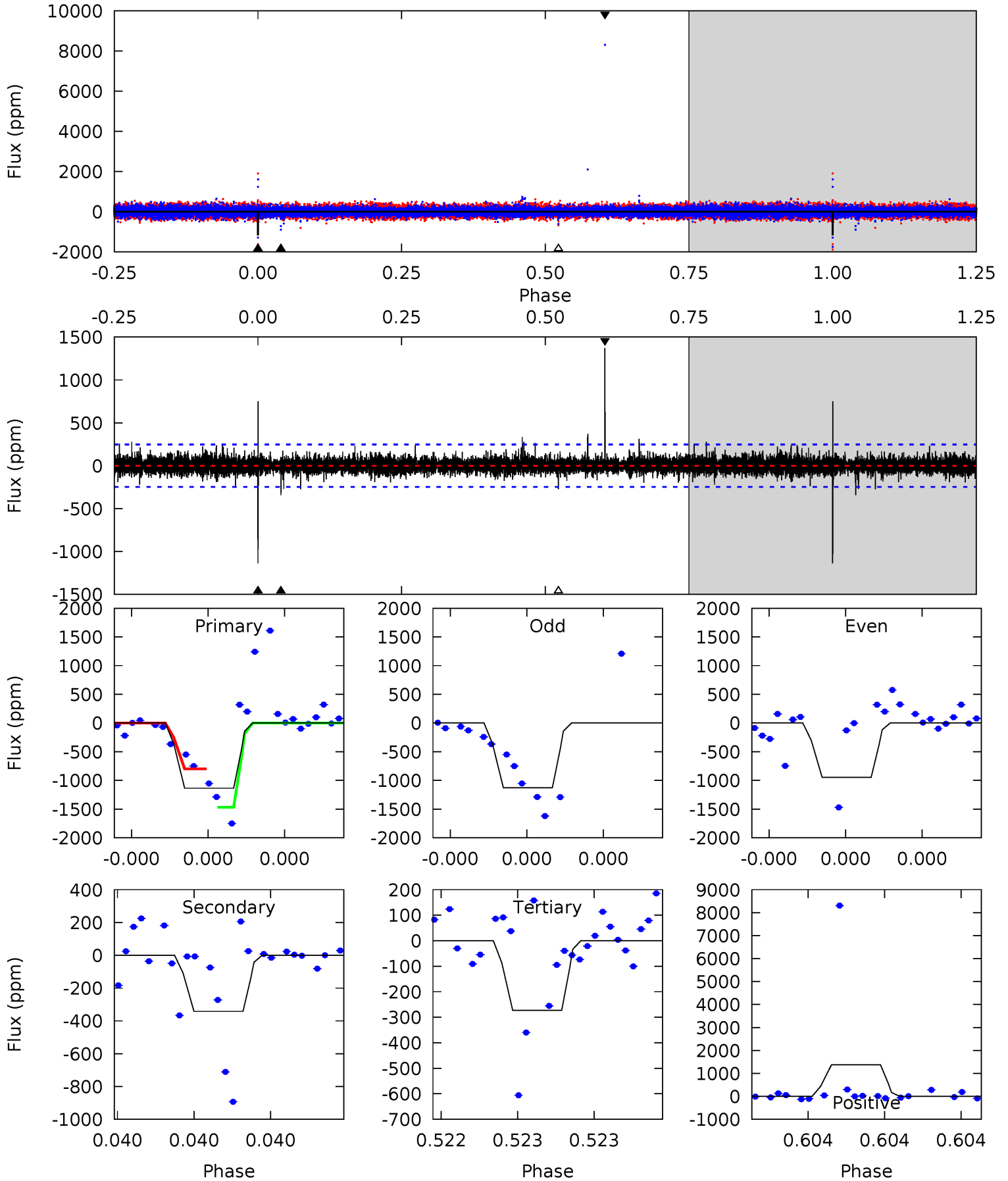
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.24	12.2	8.45	46.6	5.66	3.62	1.90	0.79	-37.3	3.77	-34.3	0.03	0.98	0.79	0.42



Alt Model-Shift Uniqueness Test

004157933-03, P = 477.702577 Days, E = 33.914575 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
26.1	7.86	6.27	31.6	5.66	3.62	1.12	19.8	-5.45	1.59	-23.7	2.32	1.12	0.55	7.39



Stellar Parameters For KIC 004157933

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	5492^{+170}_{-227}	$3.265^{+0.760}_{-0.190}$	$-0.160^{+0.350}_{-0.350}$	$5.501^{+1.255}_{-4.015}$	$2.032^{+0.357}_{-1.071}$	$0.017^{+0.327}_{-0.007}$
	+3%/-4%	+23%/-6%	+219%/-219%	+23%/-73%	+18%/-53%	+1901%/-39%
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 004157933-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	-1048 ± 86	$43.87^{+56.83}_{-31.91}$	631^{+58}_{-114}	3771^{+2288}_{-792}	696^{+7398}_{-568}
Alt.	-342 ± 43	$44.87^{+56.68}_{-32.56}$	631^{+58}_{-111}	3114^{+1553}_{-524}	211^{+2490}_{-167}

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 $A_{obs} \gg 1.0$

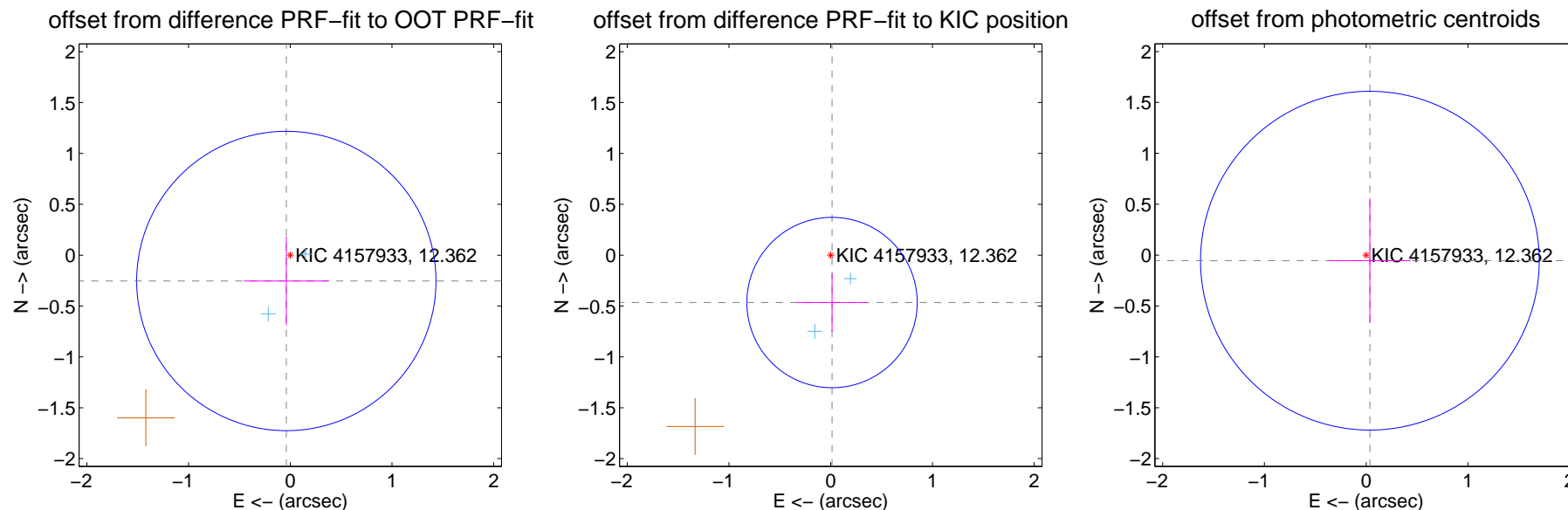
DV Centroid Data

Supplemental centroid analysis for 004157933-03. Kepler magnitude: 12.36. Transit SNR 6.42

There are 2 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.25 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.257 ± 0.490	0.52	0.039 ± 0.419	-0.254 ± 0.434
PRF-fit source offset from KIC position	0.466 ± 0.279	1.67	-0.013 ± 0.350	-0.466 ± 0.288
photometric centroid source offset	0.07 ± 0.55	0.12	-0.04 ± 0.40	-0.05 ± 0.61

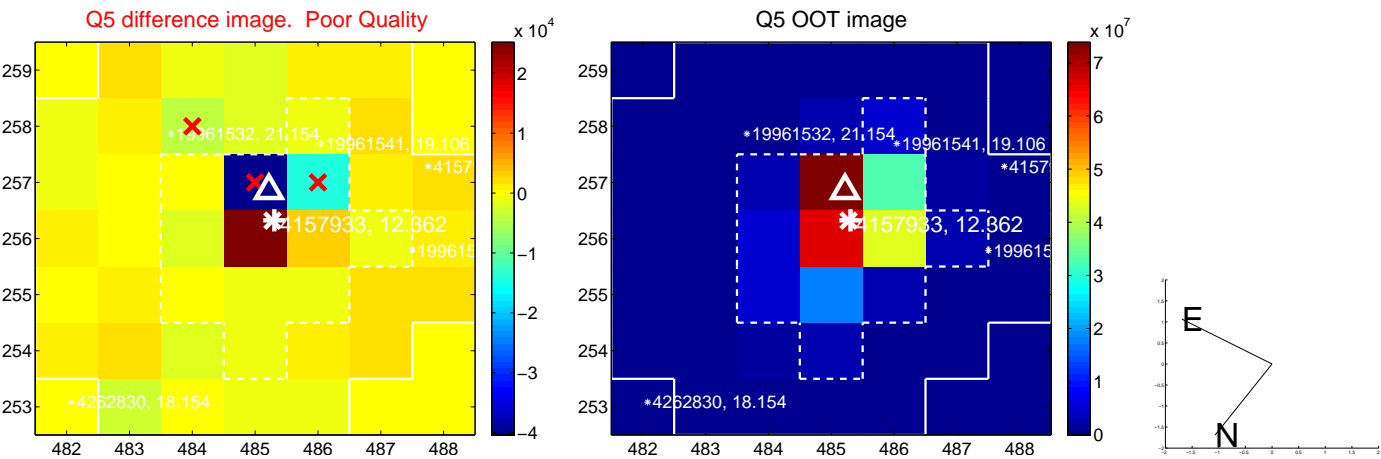


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

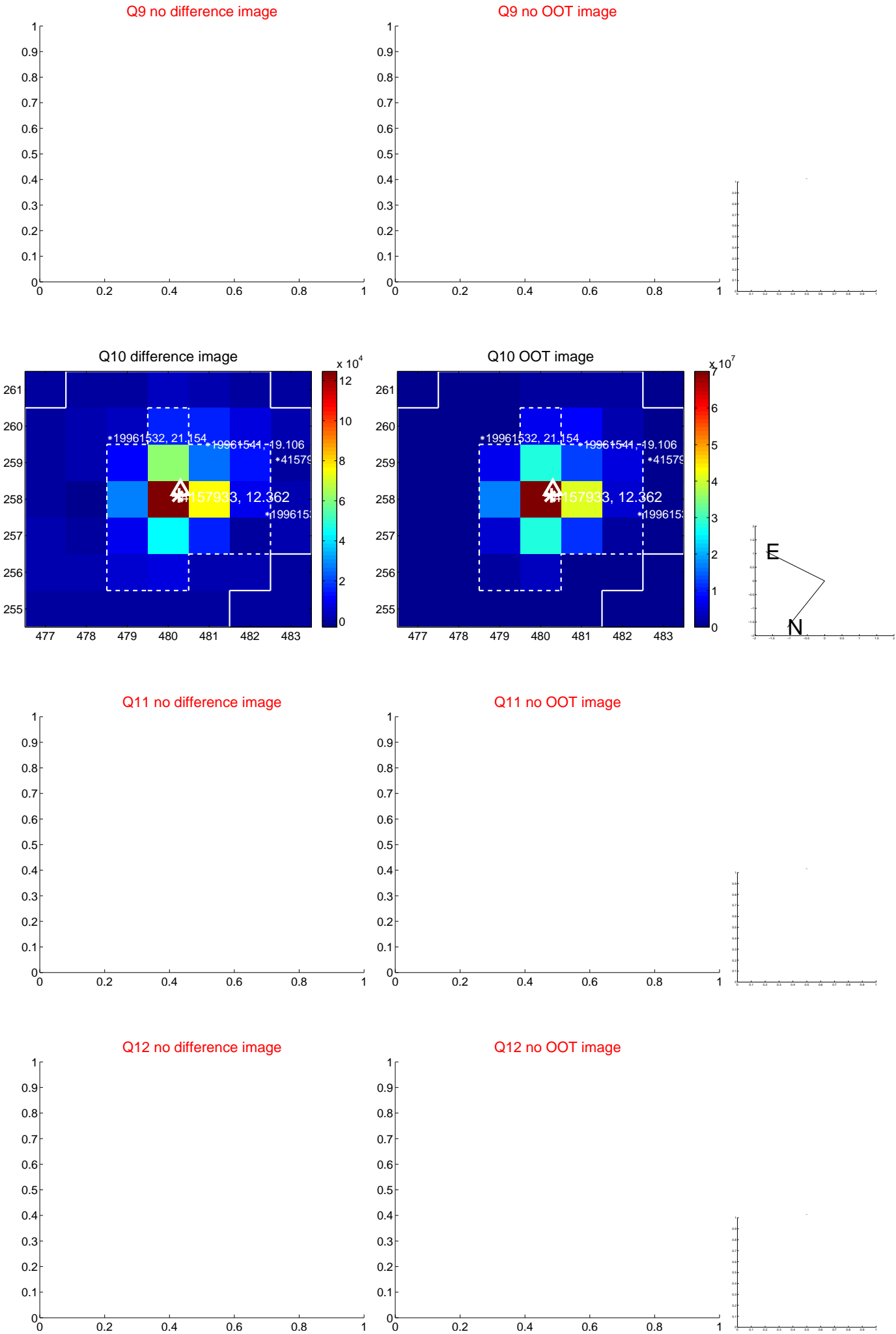
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



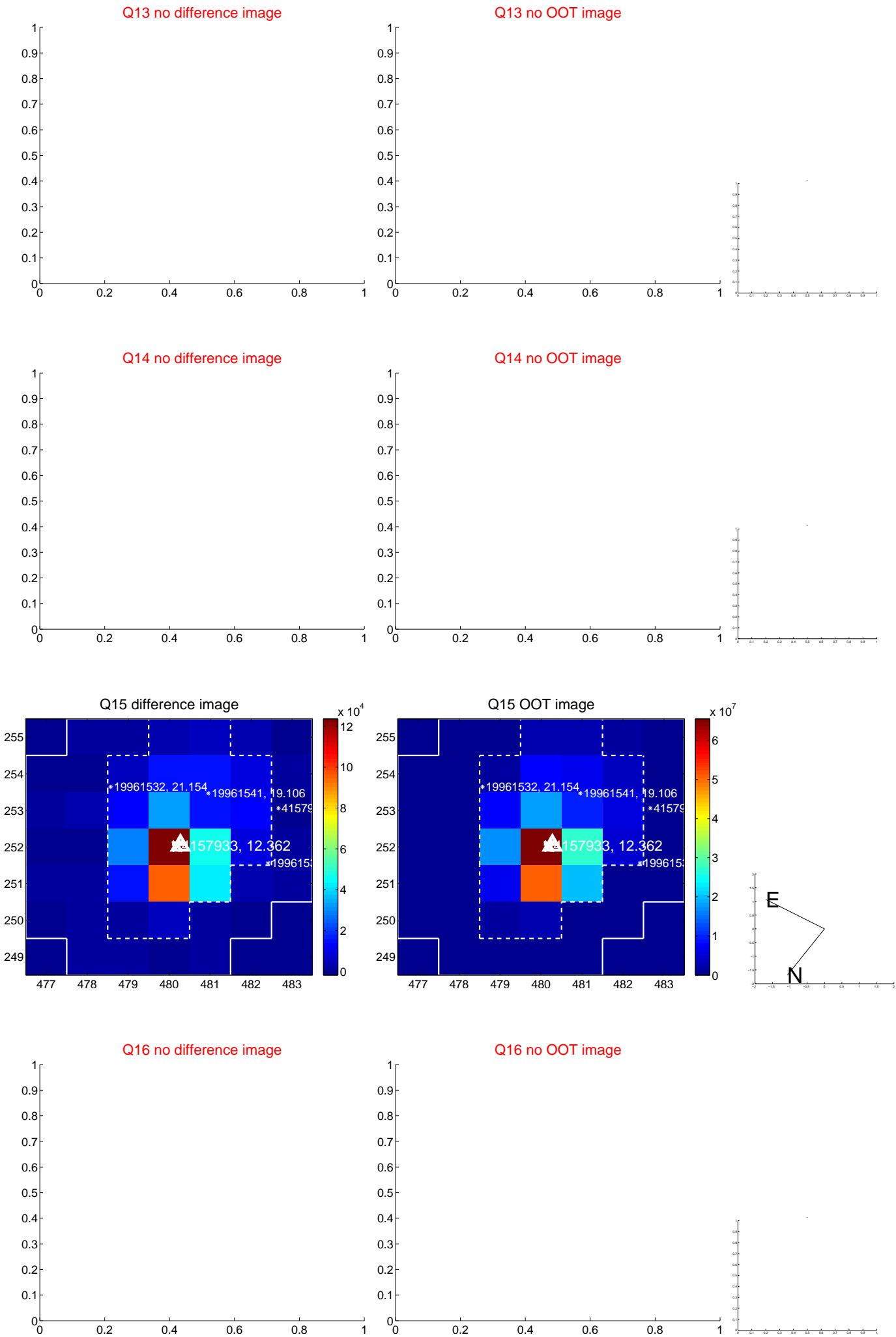
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



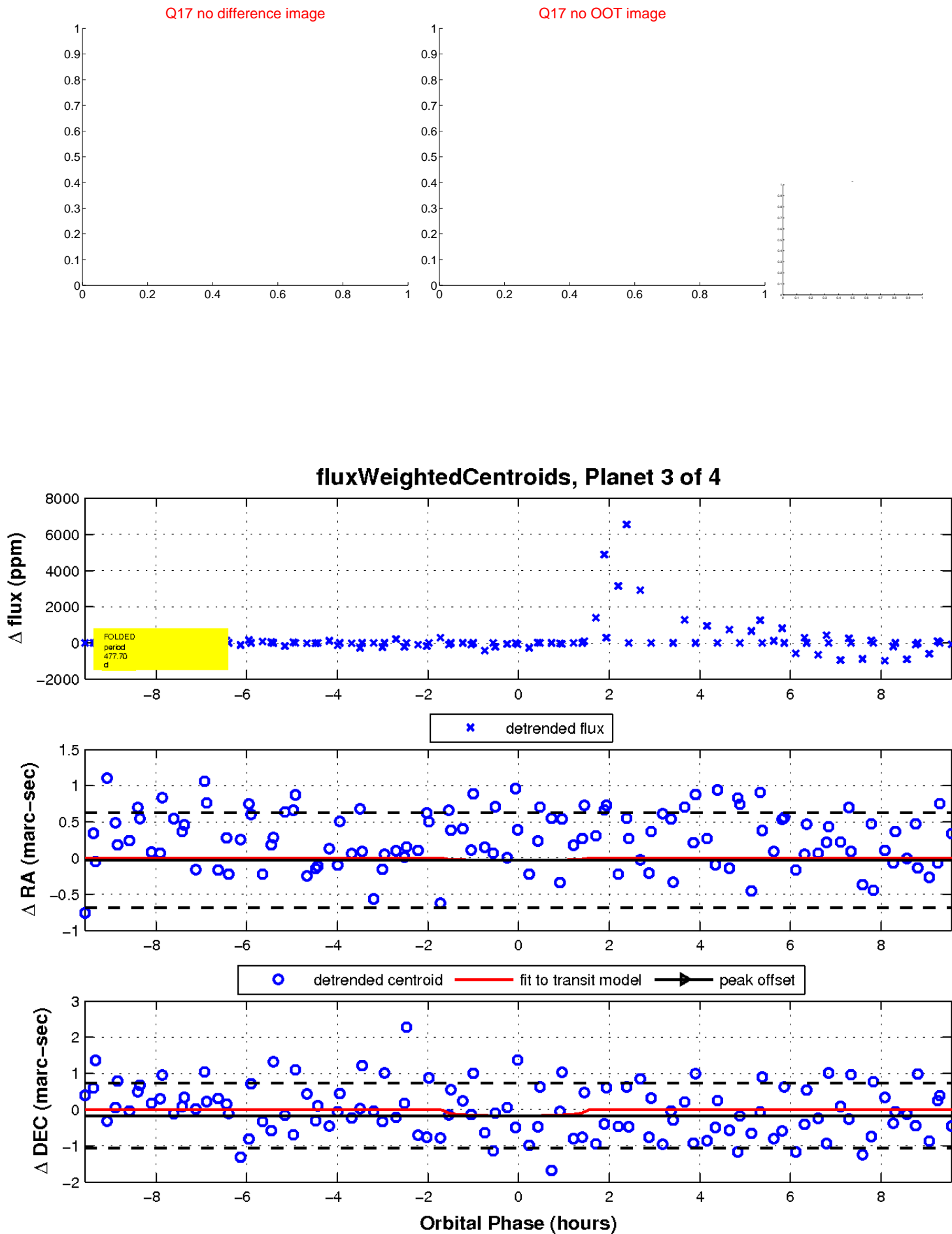
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

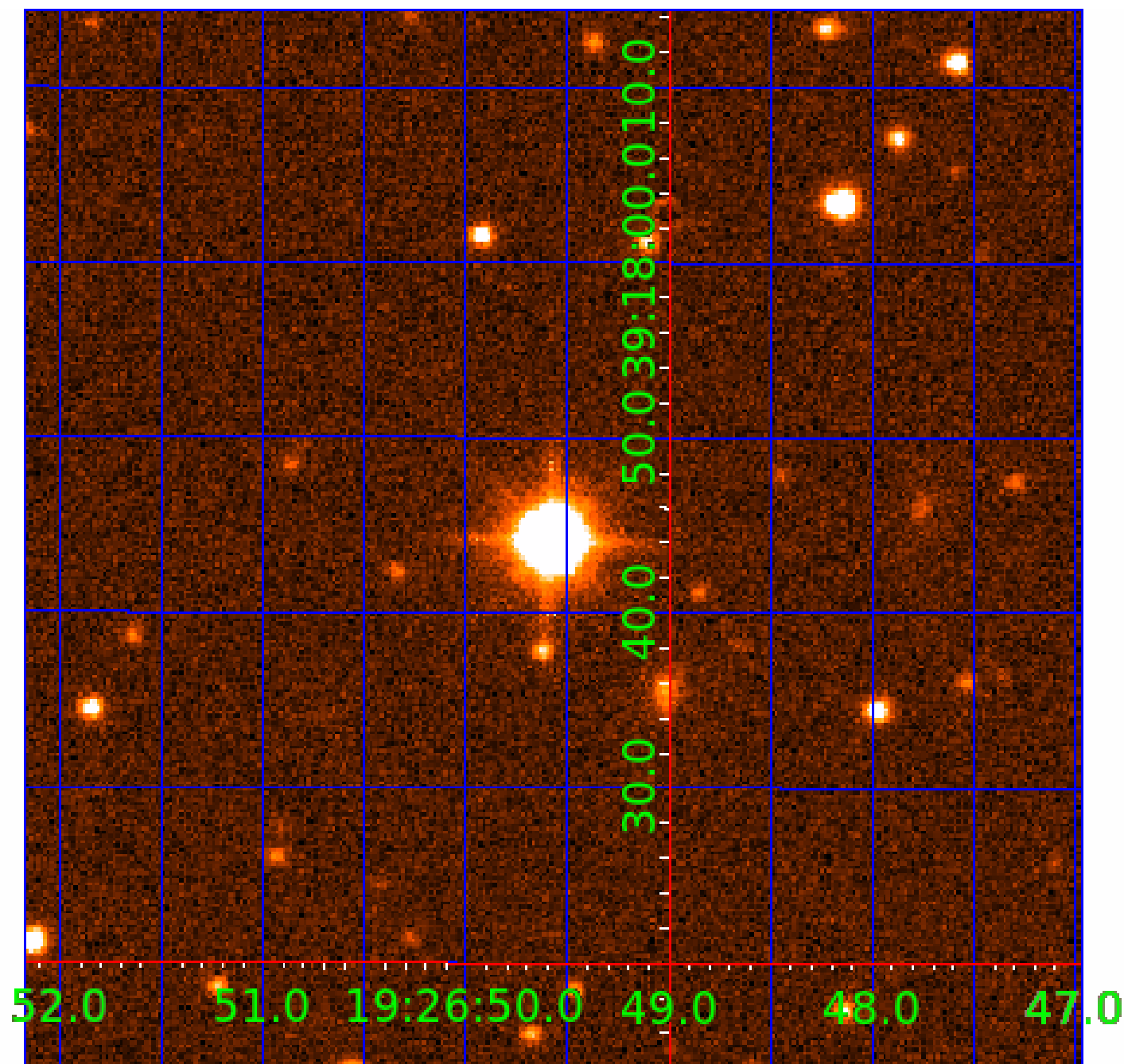


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 004157933

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})
004157933-01	OBS	No	490.260058	547.947486	2189.1	7.121	18.1	12.3	5.50	5492	49.15	10.38
004157933-02	OBS	No	547.376338	238.077589	1856.8	7.788	18.3	10.3	5.50	5492	45.65	8.96
004157933-03	OBS	No	477.699902	511.616688	892.4	3.226	22.3	6.4	5.50	5492	16.56	10.75
004157933-04	OBS	No	371.591100	146.825947	324.8	6.000	19.6	-1.0	5.50	5492	9.78	15.02

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004157933-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004157933-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004157933-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004157933-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—ALL_TRANS_CHASES—CENT_NOFITS

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

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

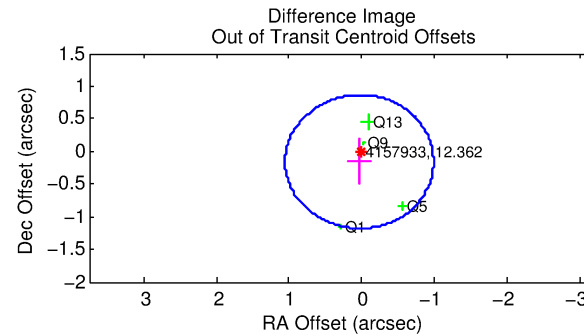
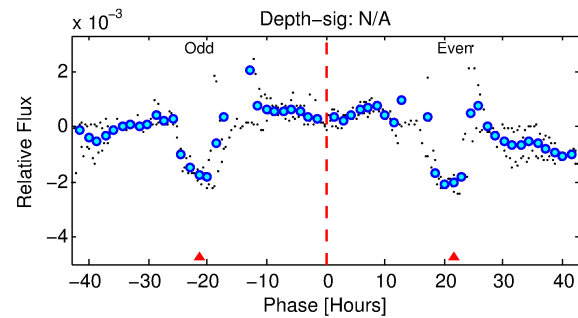
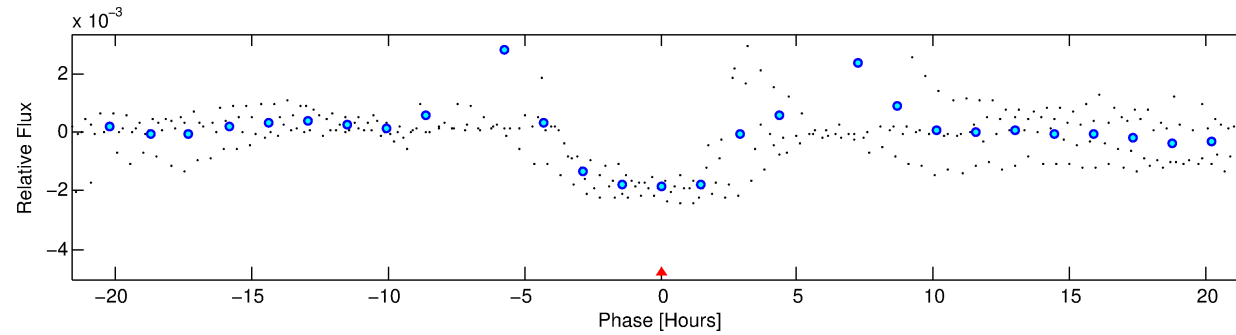
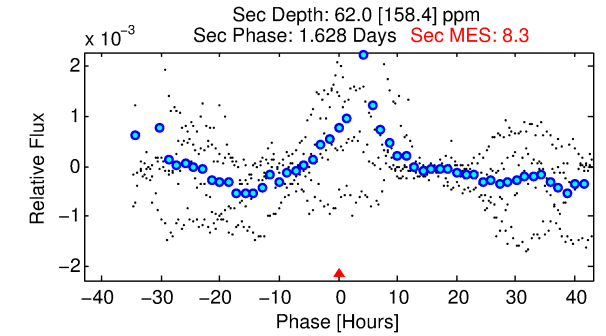
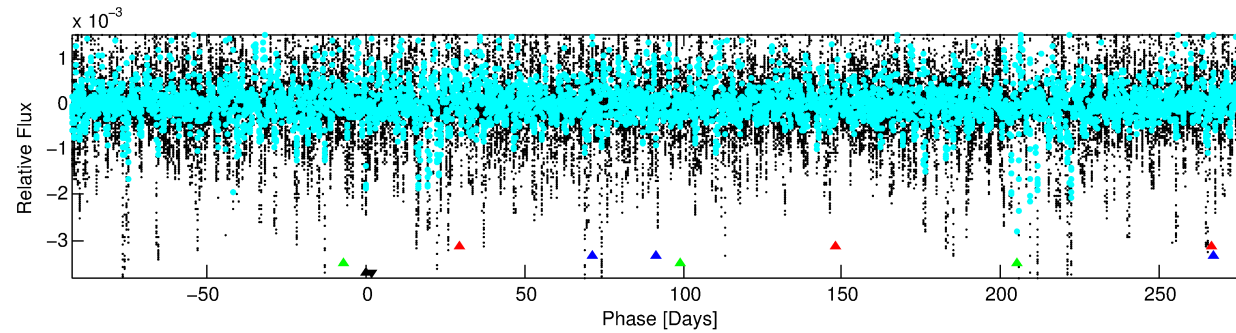
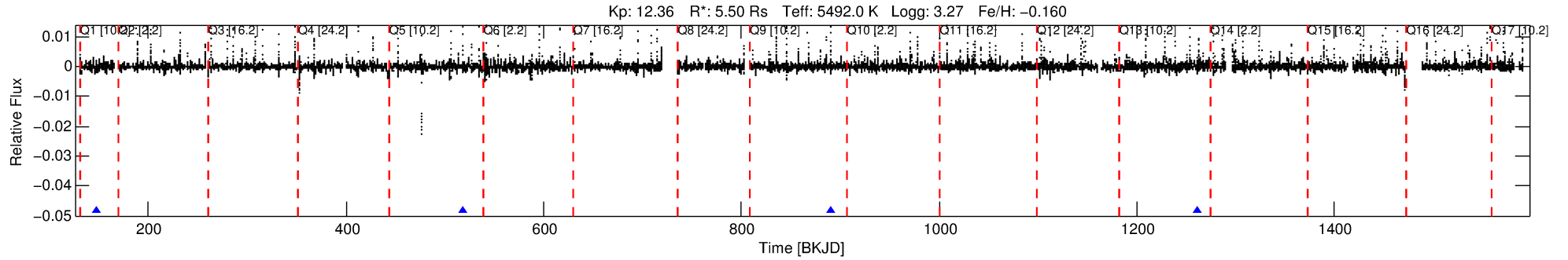
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 004157933-04

No Significant Match Found

DV One-Page Summary

KIC: 4157933 Candidate: 4 of 4 Period: 371.591 d



TPS TCE Results:

Period = 371.59110 d
Epoch = 146.8259 BKJD

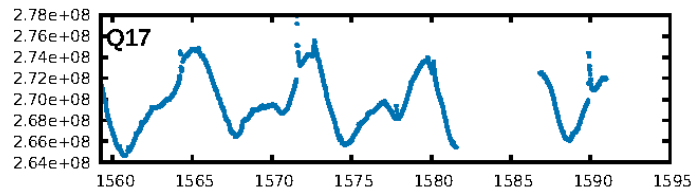
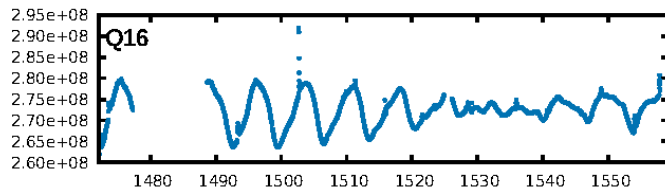
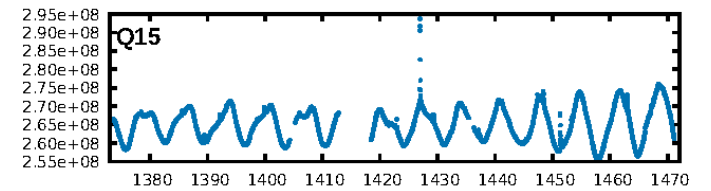
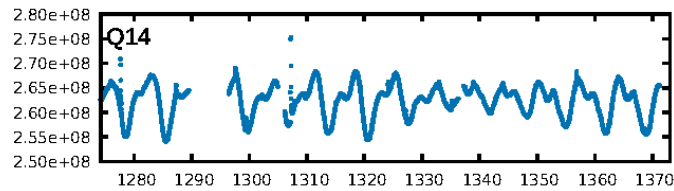
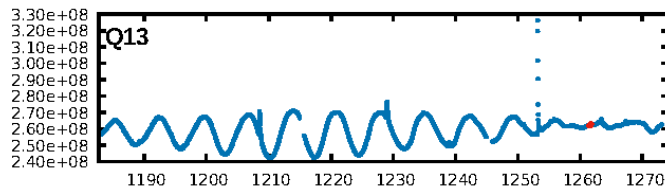
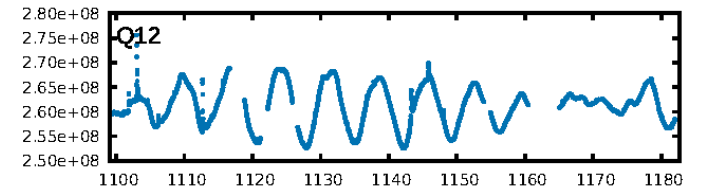
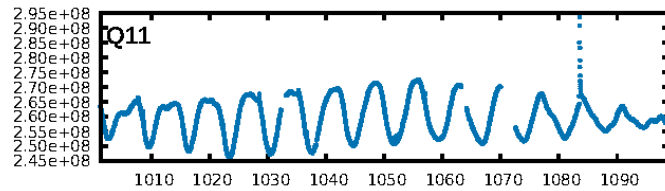
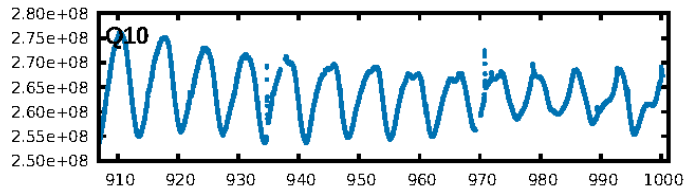
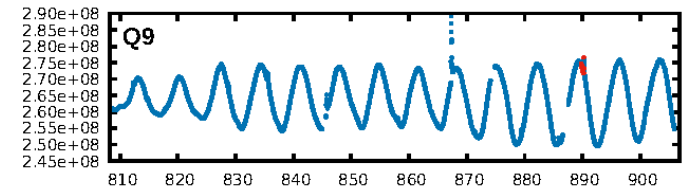
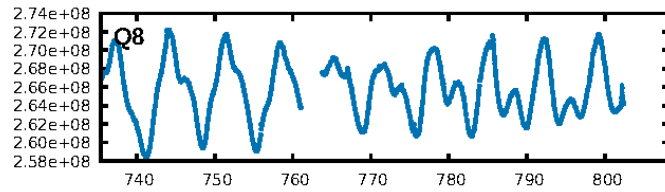
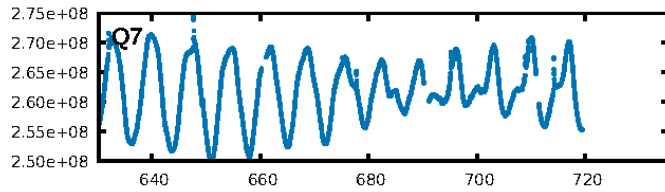
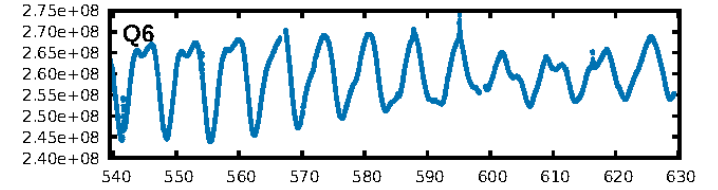
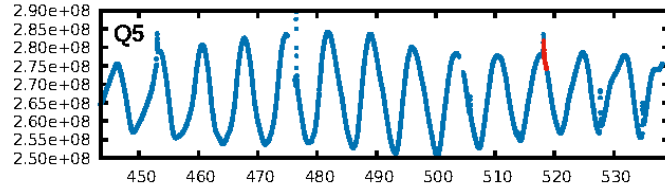
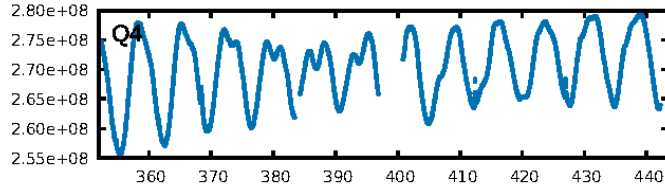
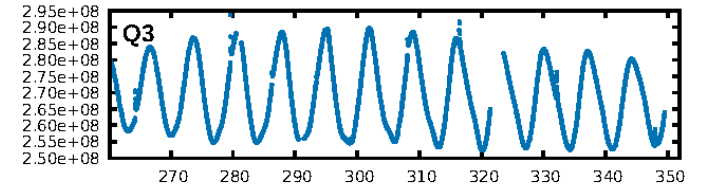
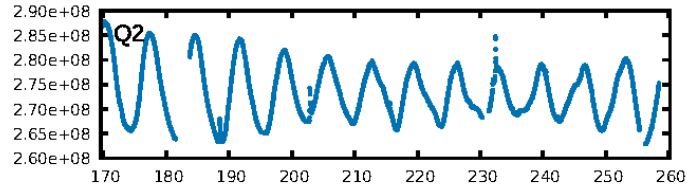
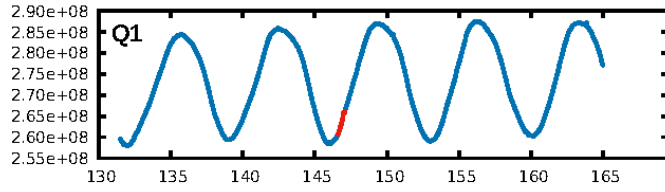
DV fit results are unavailable

DV Diagnostic Results:

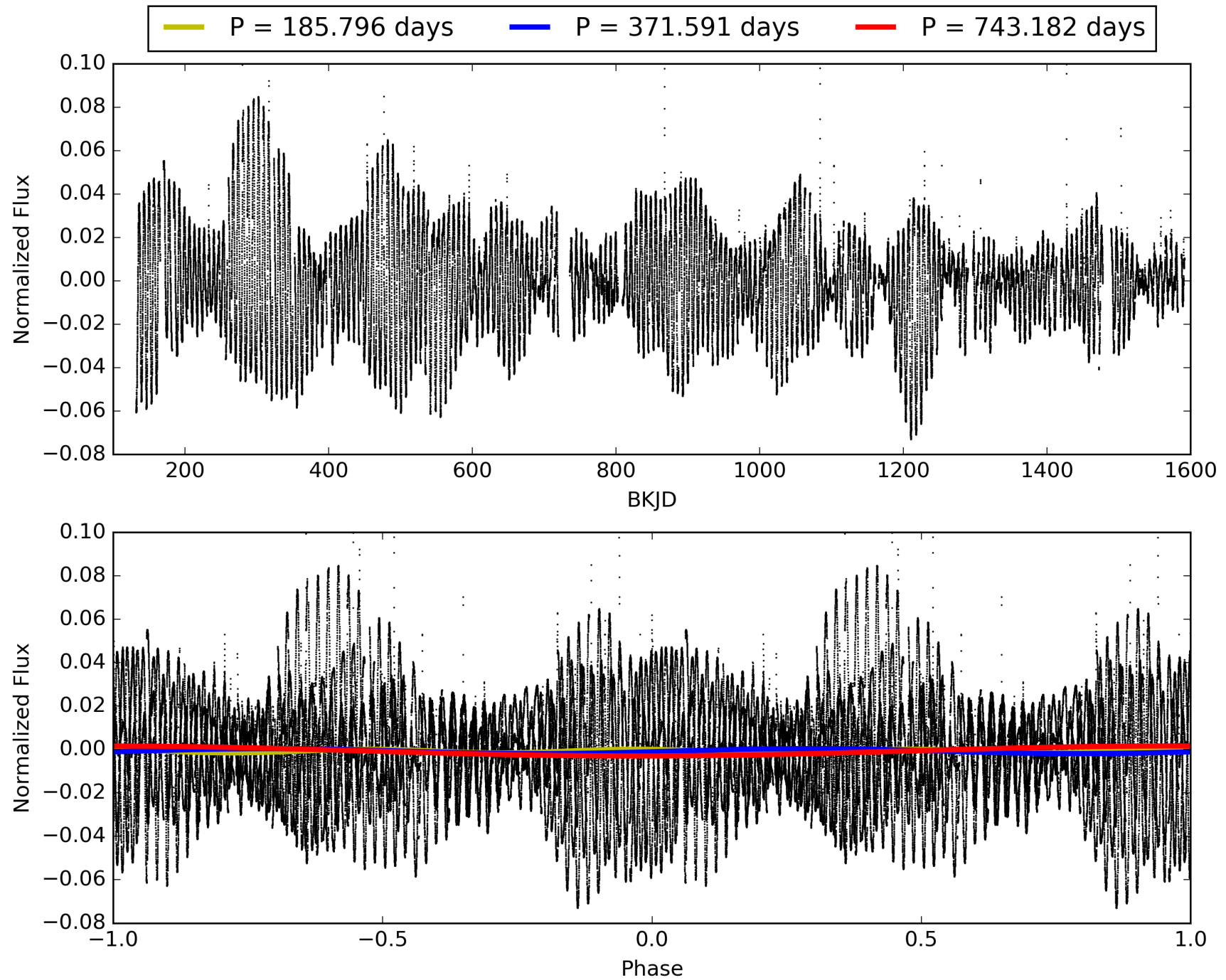
ShortPeriod-sig: N/A
LongPeriod-sig: 100.0% [373.84σ]
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: N/A
RollingBand-fgt: 1.00 [3/3]
GhostDiagnostic-chr: 2.044

Centroid-sig: 69.6%
Centroid-so: 0.323 arcsec [2.01σ]
OotOffset-rm: 0.161 arcsec [0.47σ]
KicOffset-rm: 0.227 arcsec [0.64σ]
OotOffset-st: 0/0/0/4 [4]
KicOffset-st: 0/0/0/4 [4]
DiffImageQuality-fgm: 1.00 [4/4]
DiffImageOverlap-fno: 1.00 [4/4]

TCE 004157933-04, PDC Light Curves

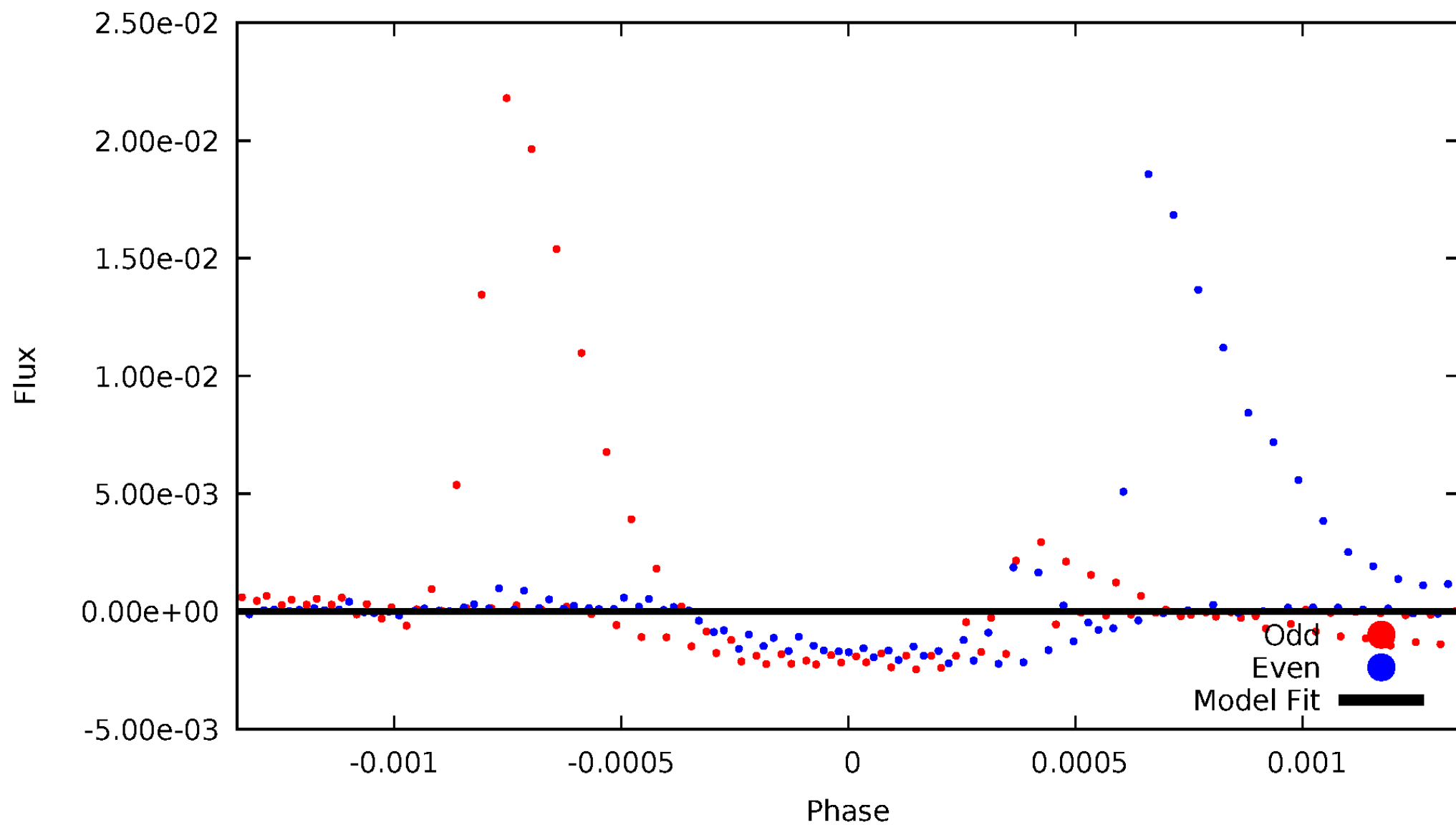


TCE 004157933-04



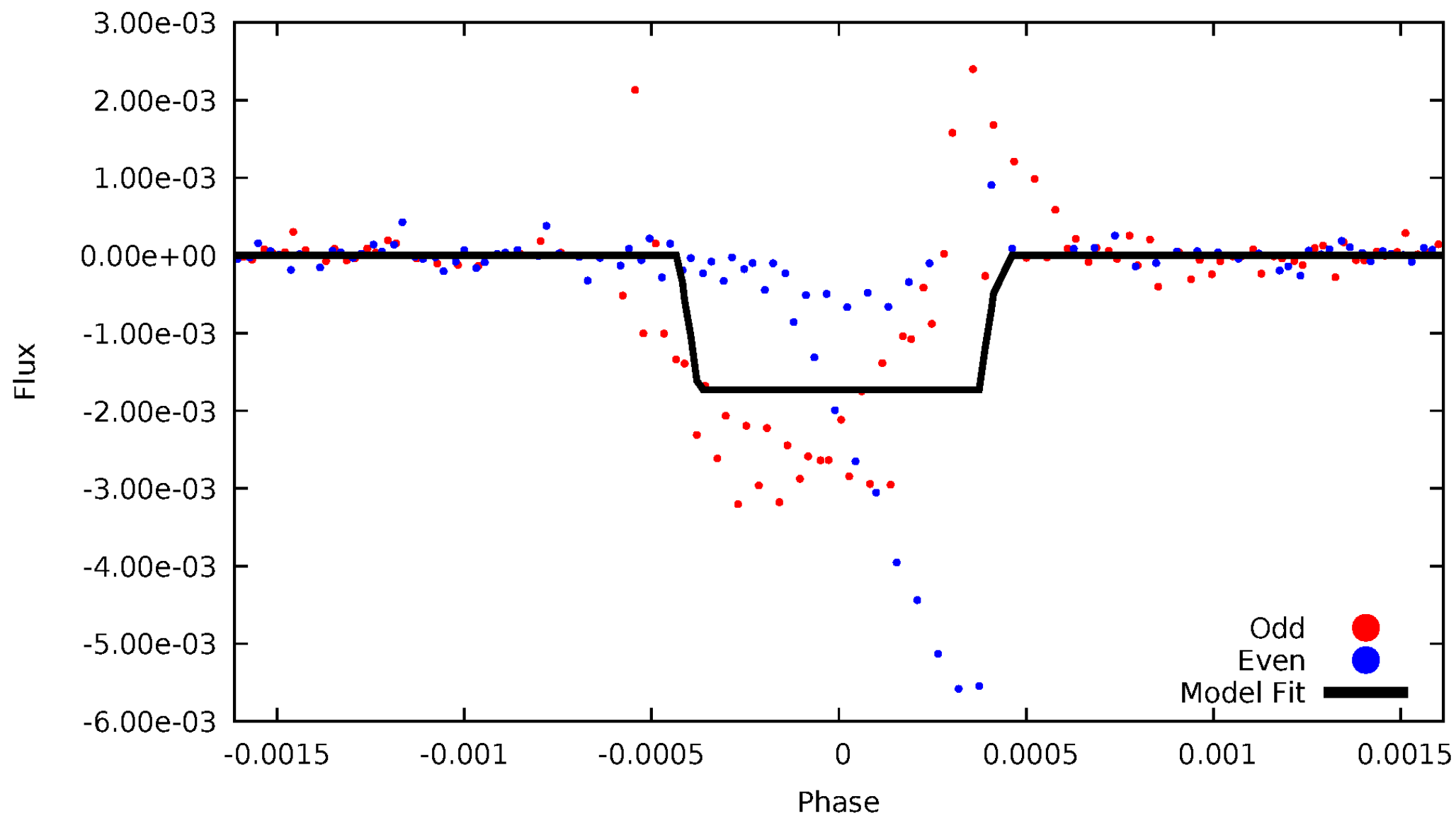
DV Odd/Even

TCE 004157933-04



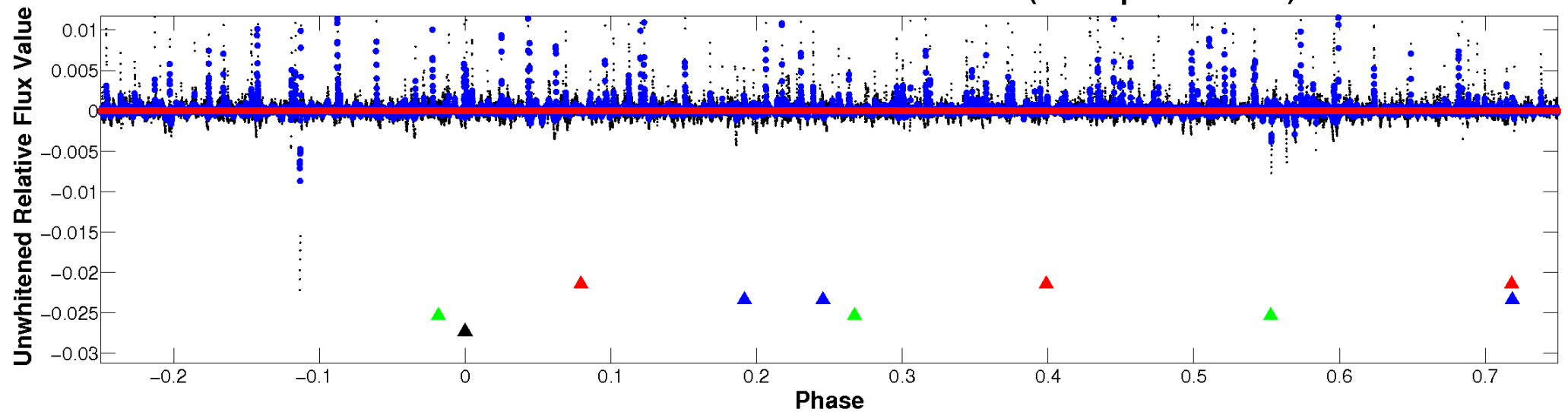
ALT Odd/Even

TCE 004157933-04



Non-Whitened Vs. Whitened Light Curve

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

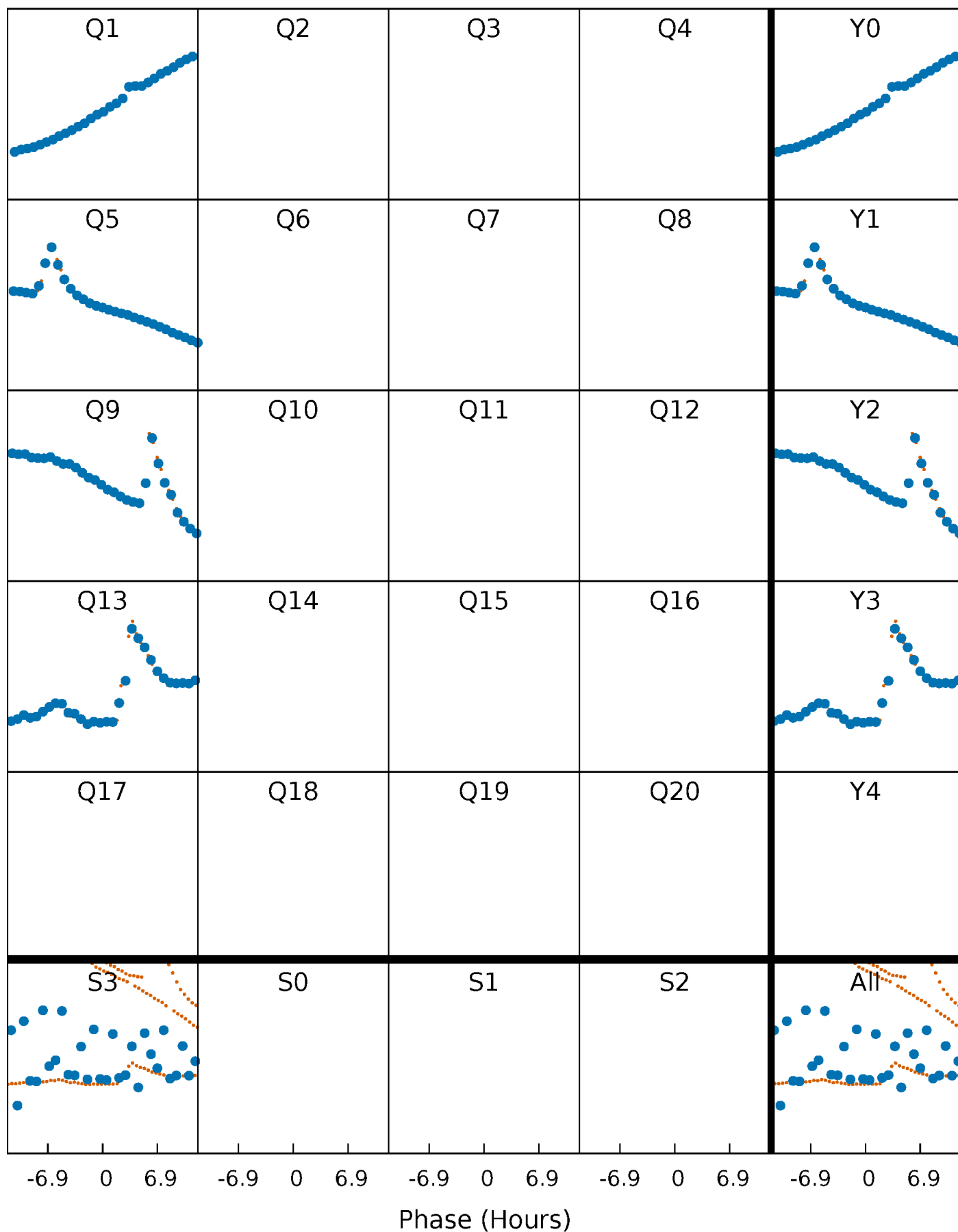


Planet 4 : Phased Whitened Flux Time Series (TPS Epoch/Period)



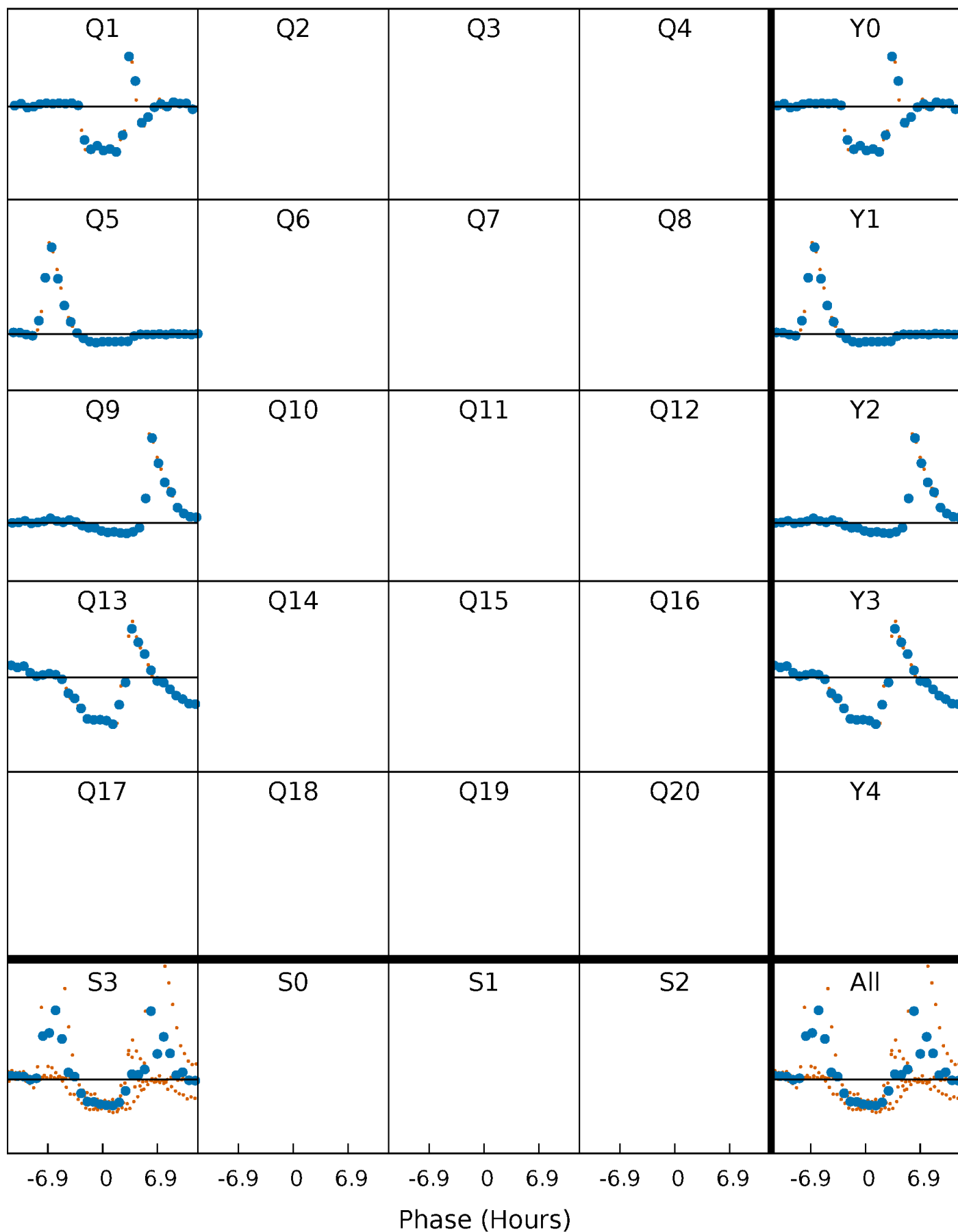
PDC Quarter-Phased Transit Curves

TCE 004157933-04 $P=371.591100$ Days $T_0=146.825947$ (BKJD)



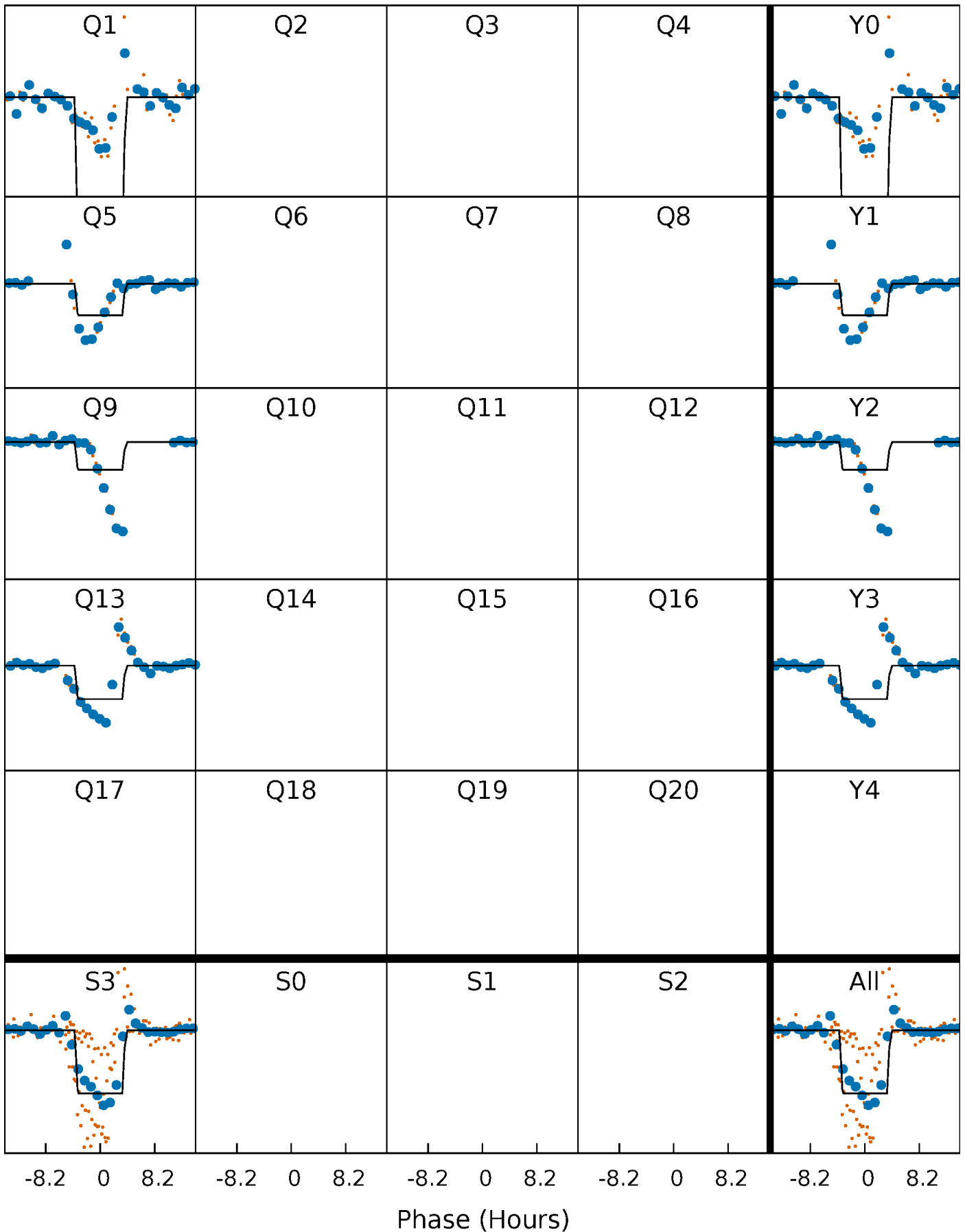
DV Quarter-Phased Transit Curves

TCE 004157933-04 P=371.591100 Days $T_0=146.825947$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

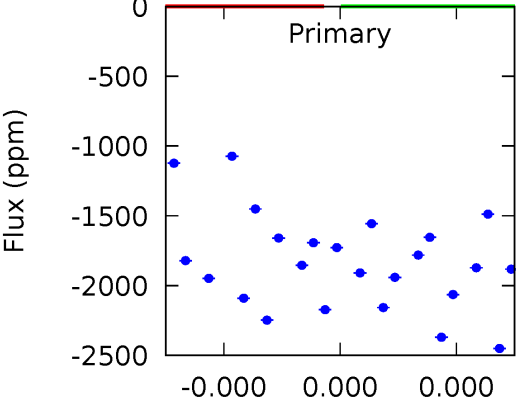
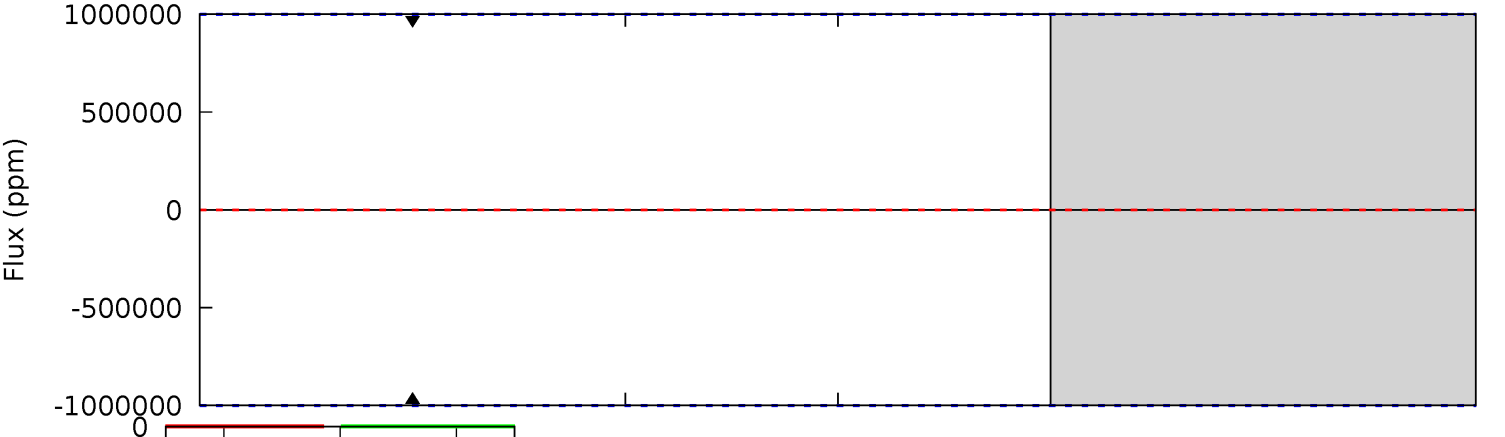
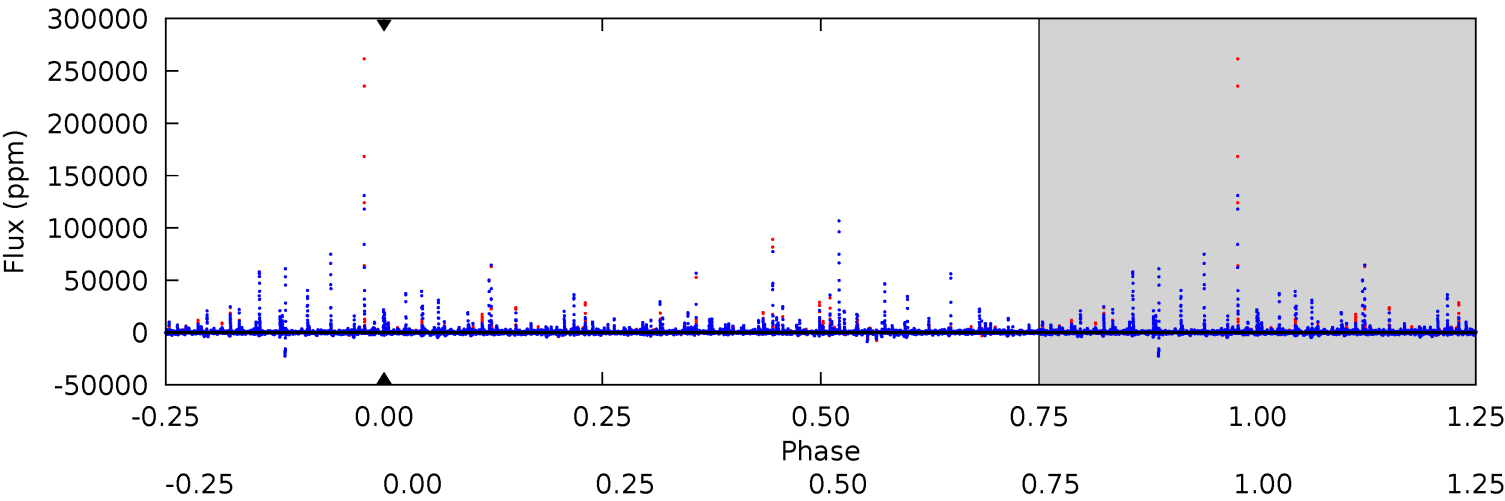
TCE 004157933-04 $P=371.591100$ Days $T_0=146.850568$ (BKJD)



DV Model-Shift Uniqueness Test

004157933-04, P = 371.591100 Days, E = 146.825947 Days

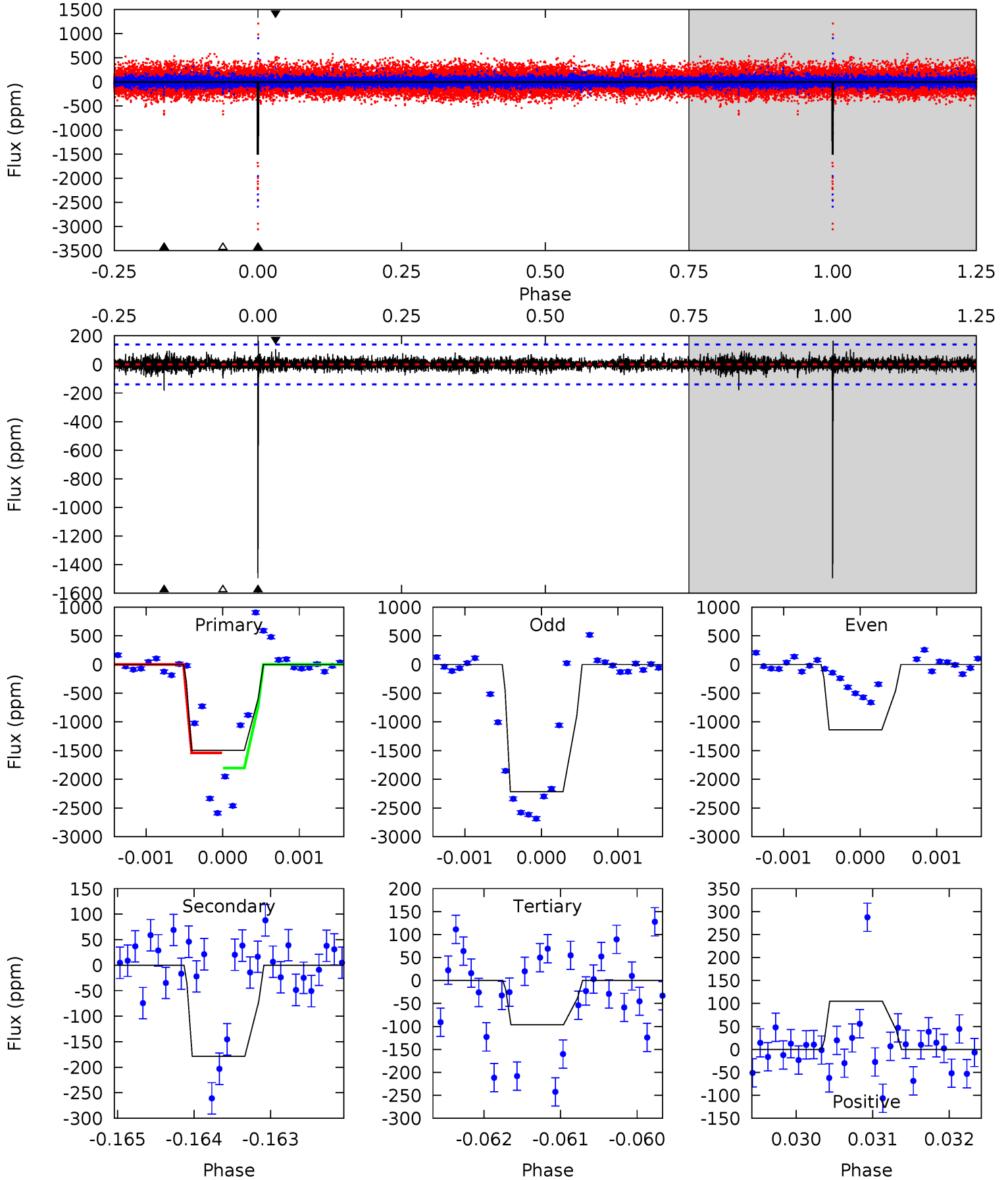
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



Alt Model-Shift Uniqueness Test

004157933-04, P = 371.591100 Days, E = 146.850568 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
58.6	7.01	3.79	4.12	5.47	3.33	0.79	54.9	54.5	3.23	2.89	28.0	0.89	0.10	5.54



Stellar Parameters For KIC 004157933

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	5492^{+170}_{-227}	$3.265^{+0.760}_{-0.190}$	$-0.160^{+0.350}_{-0.350}$	$5.501^{+1.255}_{-4.015}$	$2.032^{+0.357}_{-1.071}$	$0.017^{+0.327}_{-0.007}$
	+3%/-4%	+23%/-6%	+219%/-219%	+23%/-73%	+18%/-53%	+1901%/-39%
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 004157933-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	A_{obs}
DV	0 ± 1000000	$40.23^{+46.85}_{-28.83}$	683^{+73}_{-120}	-4454^{+22564}_{-11751}	$-913.167^{+117751.562}_{-92093.395}$
Alt.	-179 ± 25	$42.50^{+53.76}_{-30.23}$	683^{+63}_{-110}	2890^{+1411}_{-485}	84^{+922}_{-65}

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

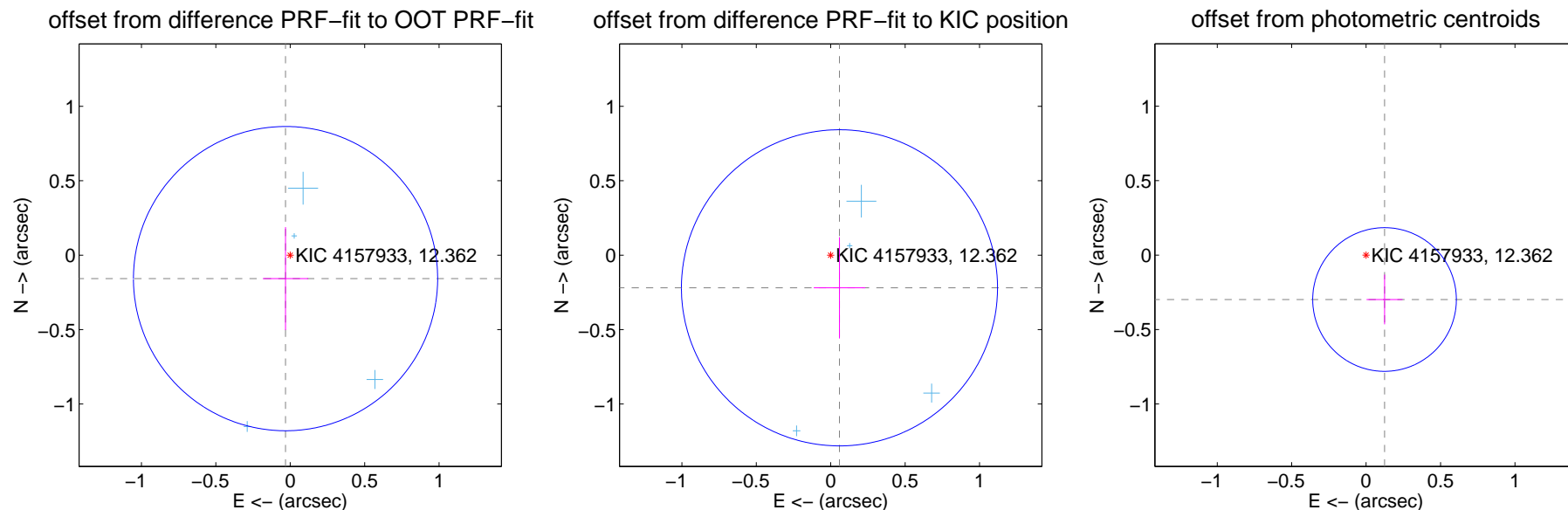
DV Centroid Data

Supplemental centroid analysis for 004157933-04. Kepler magnitude: 12.36. Transit SNR -1.00

There are 4 quarters with good PRF difference image offsets

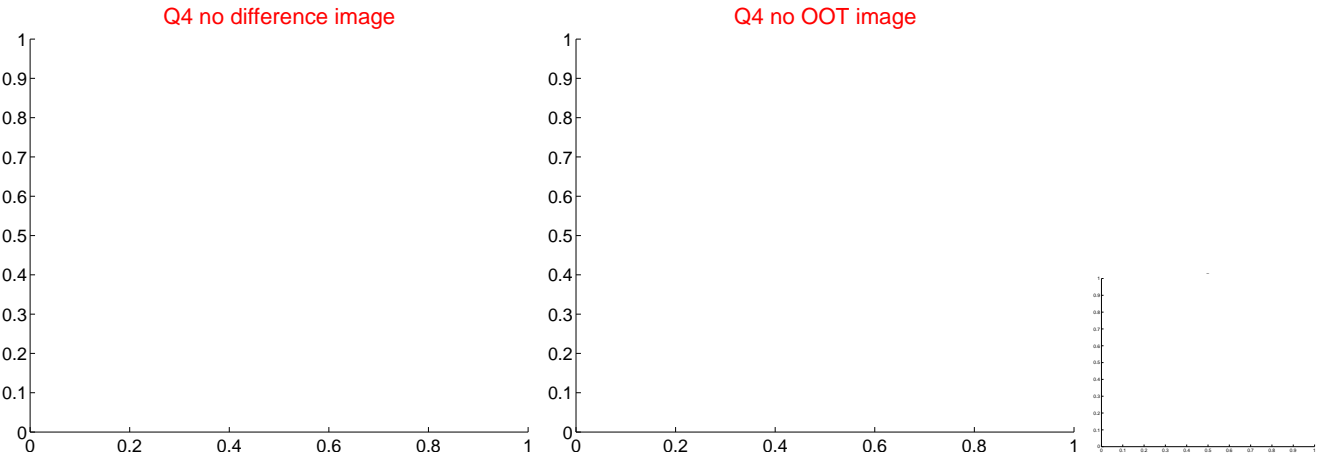
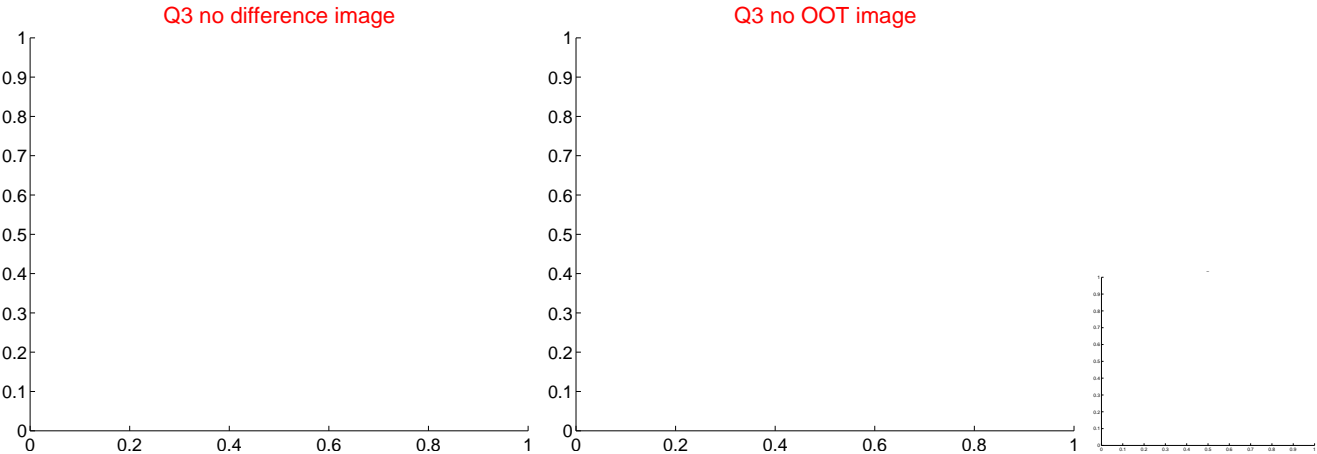
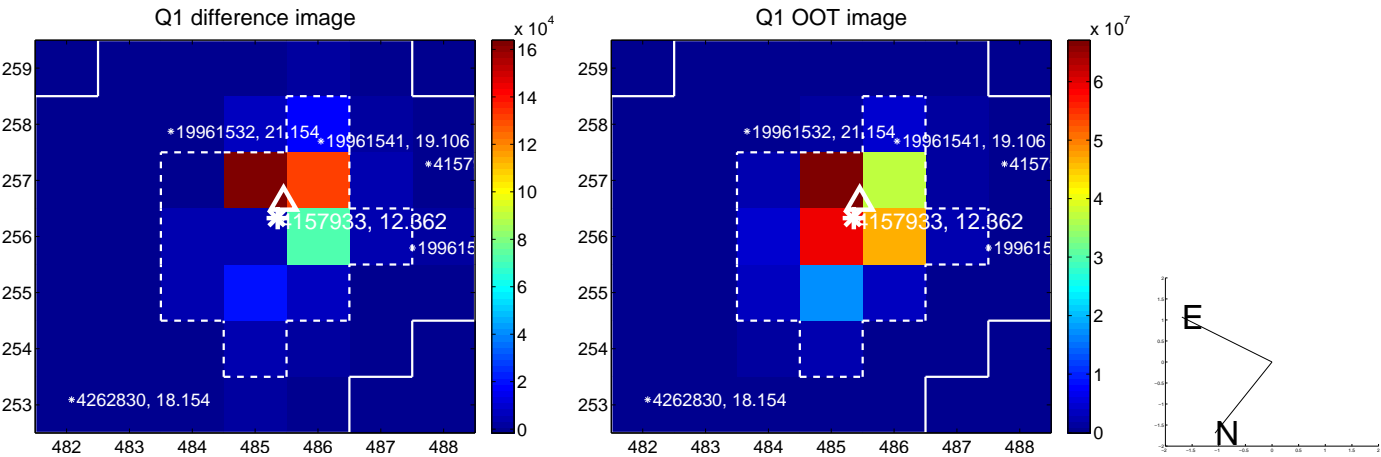
The direct PRF centroid is offset from the target star catalog position by about 0.15 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.161 ± 0.341	0.47	0.032 ± 0.153	-0.158 ± 0.346
PRF-fit source offset from KIC position	0.227 ± 0.354	0.64	-0.059 ± 0.173	-0.219 ± 0.340
photometric centroid source offset	0.32 ± 0.16	2.01	-0.12 ± 0.12	-0.30 ± 0.17

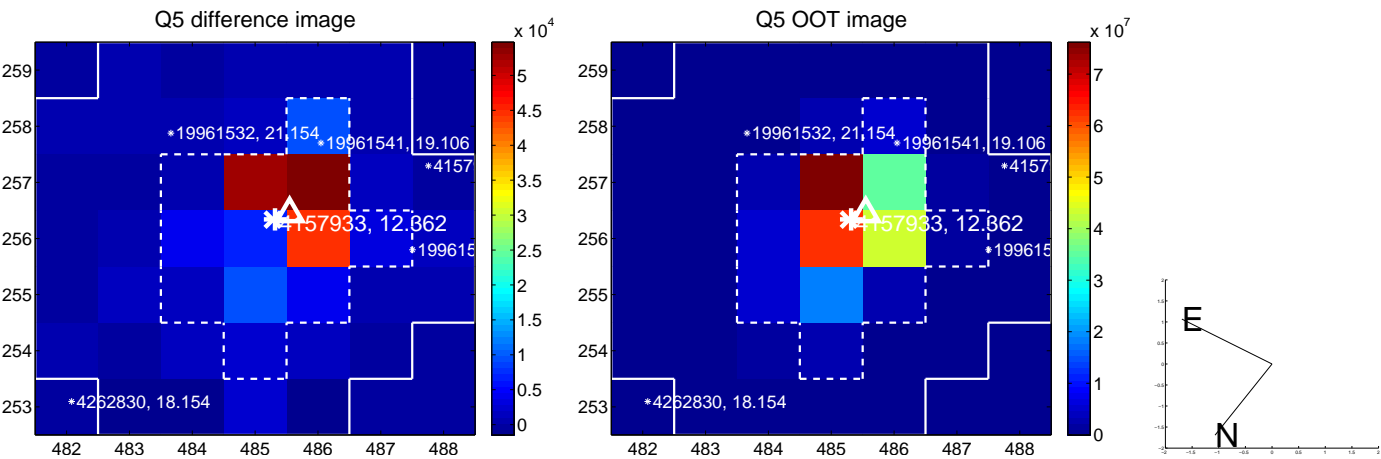


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

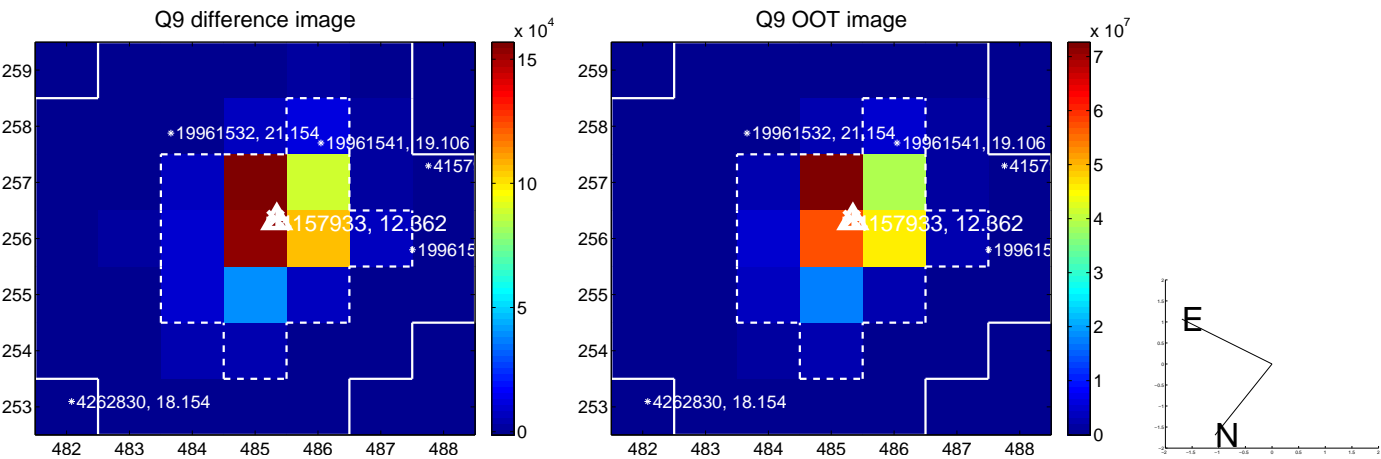
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



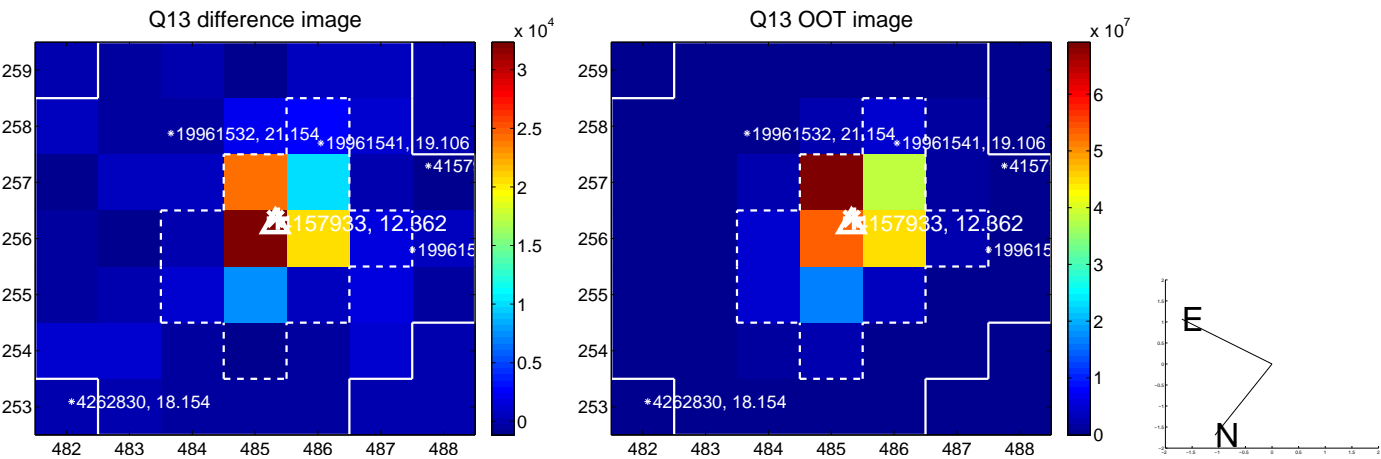
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



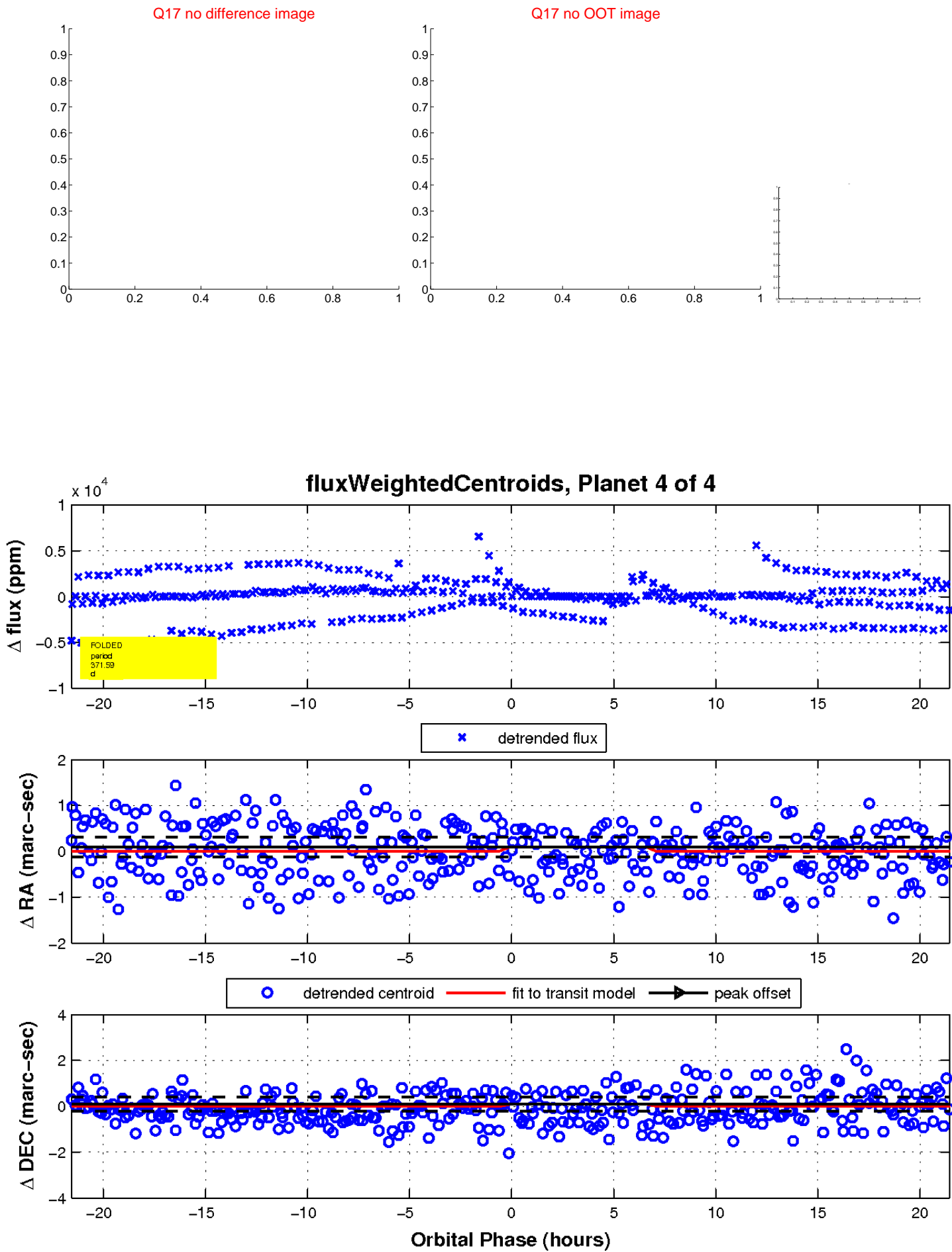
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



UKIRT Image

Declination

