

KIC 009532421

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})
009532421-01	OBS	3710.01	4.309074	134.713384	23584.0	2.199	295.9	277.7	0.79	4897	16.98	143.05
009532421-02	OBS	No	4.309068	132.553034	5521.1	2.068	64.6	71.3	0.79	4897	8.20	143.05

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009532421-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—DEEP_V_SHAPED—HAS_SEC_TCE—CENT_KIC_POS
009532421-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE—CENT_KIC_POS

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 009532421-01

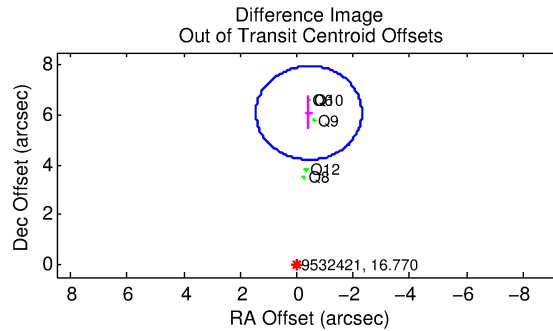
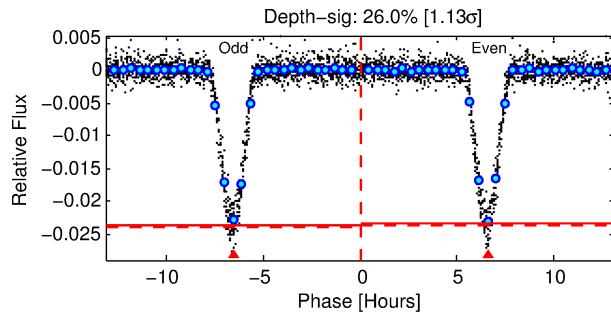
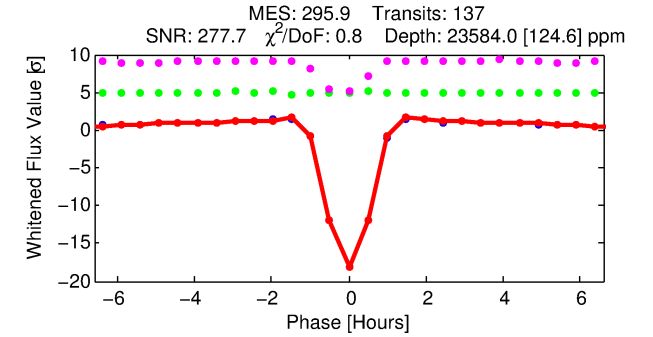
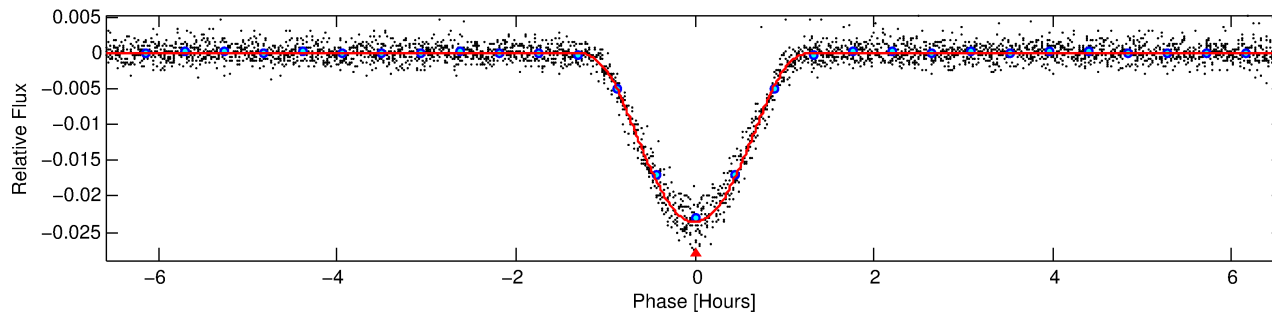
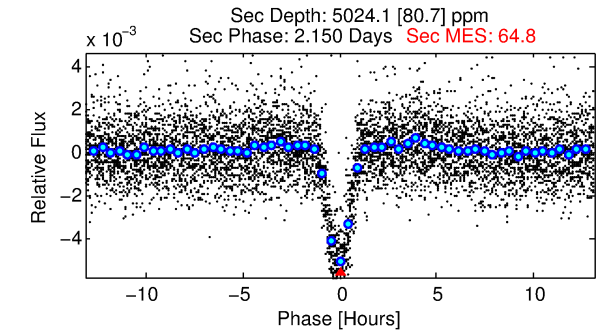
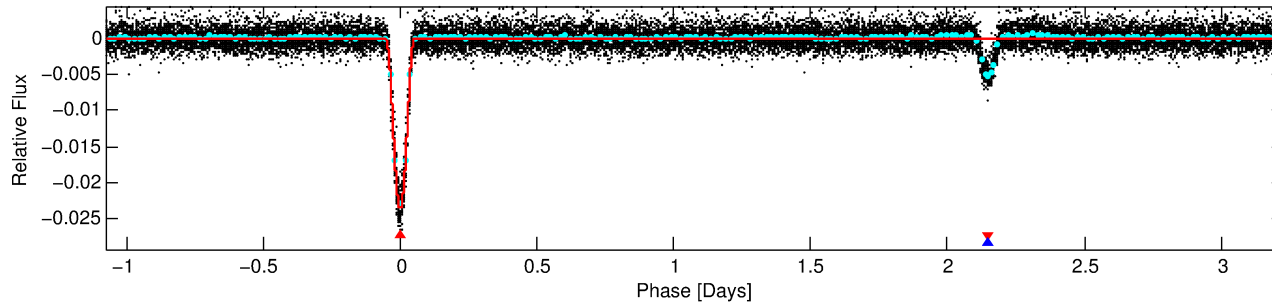
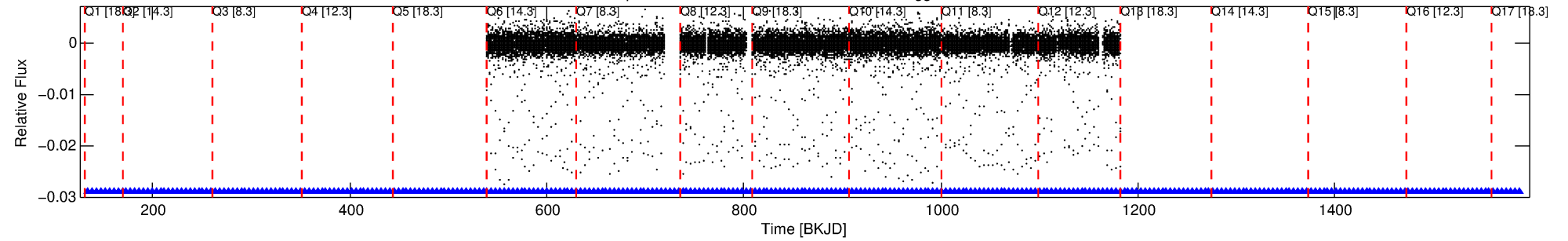
No Significant Match Found

DV One-Page Summary

KIC: 9532421 Candidate: 1 of 2 Period: 4.309 d

KOI: K03710.01 Corr: 0.994

Kp: 16.77 R*: 0.79 Rs Teff: 4897.0 K Logg: 4.53 Fe/H: 0.080



DV Fit Results:

Period = 4.30907 [0.00000] d
Epoch = 134.7134 [0.0003] BKJD
Rp/R* = 0.1972 [0.0187]
a/R* = 11.72 [0.25]
b = 0.91 [0.03]
Seff = 143.05 [30.35]
Teq = 882 [47] K
Rp = 16.98 [2.31] Re
a = 0.0474 [0.0047] AU
Ag = 21.49 [5.36] [3.83σ]
Teffp = 2936 [172] K [11.49σ]

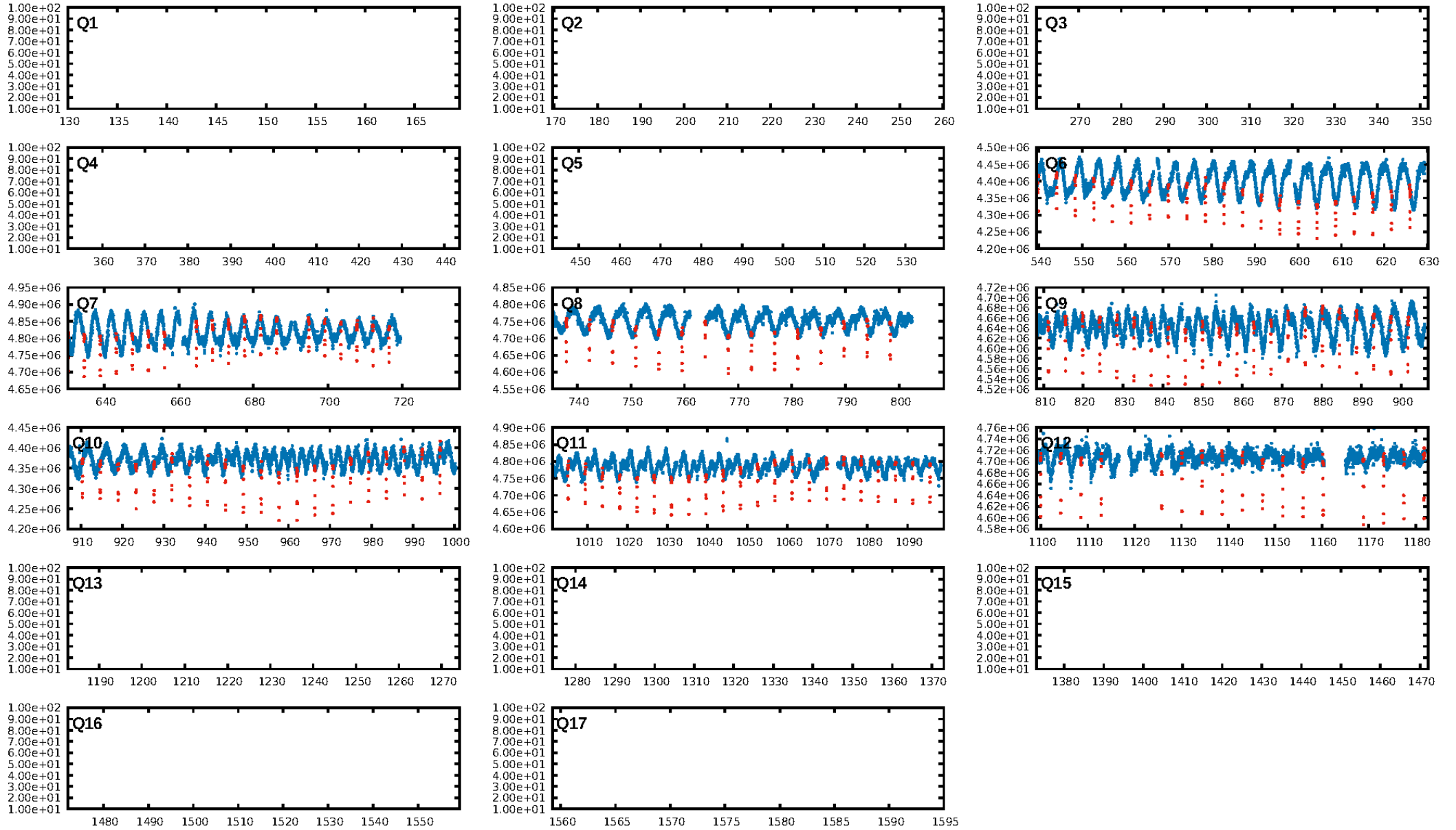
DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 0.1%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 0.00e+00
RollingBand-fgt: 1.00 [137/137]
GhostDiagnostic-chr: 1.562
Centroid-sig: 0.0%
Centroid-so: 3.191 arcsec [142.40σ]
OotOffset-rm: 6.091 arcsec [9.73σ]
KicOffset-rm: 0.144 arcsec [1.43σ]
OotOffset-st: 2/0/2/1 [5]
KicOffset-st: 2/2/2/1 [7]
DiffImageQuality-fgm: 1.00 [7/7]
DiffImageOverlap-fno: 1.00 [7/7]

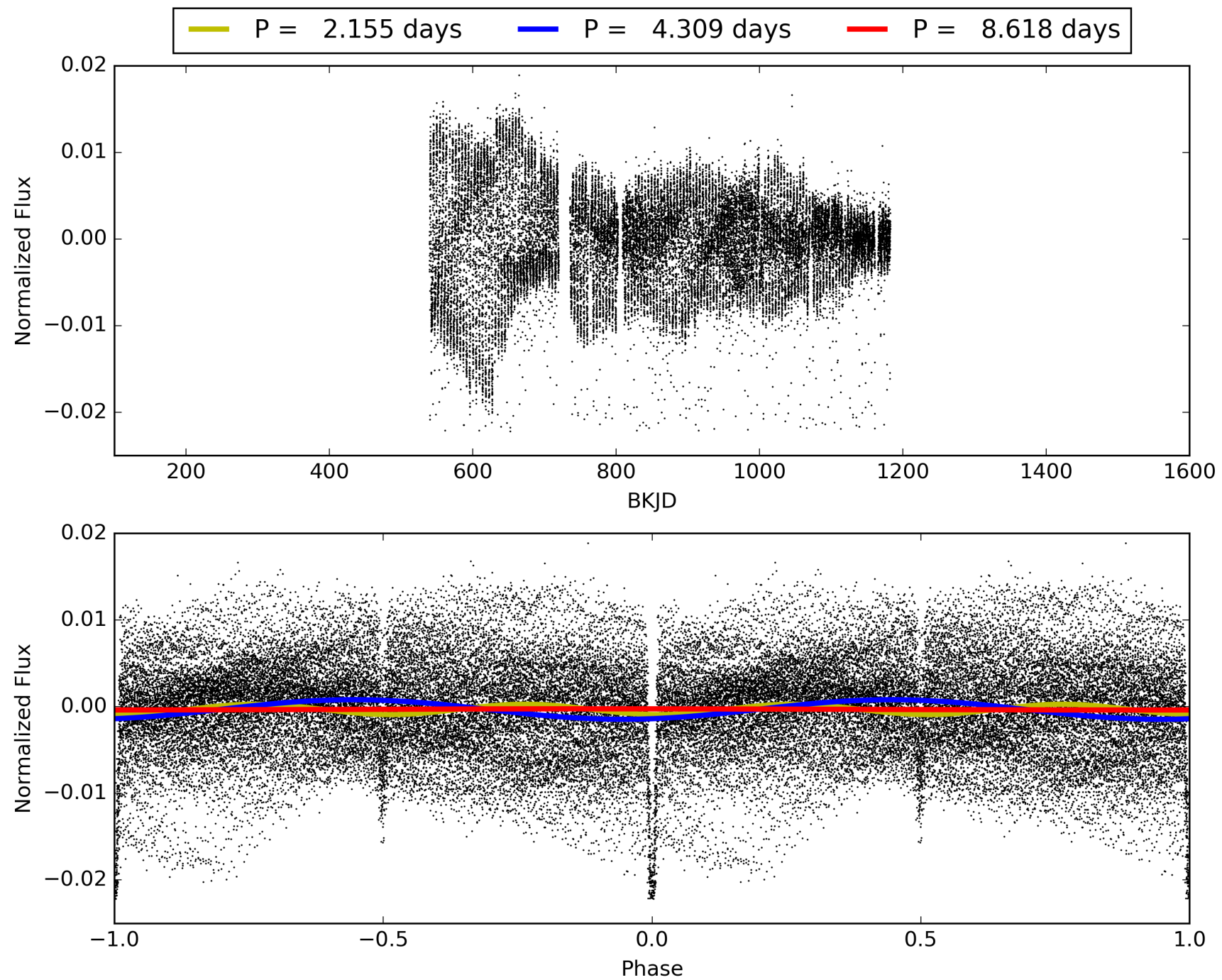
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 03:17:14 Z

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

TCE 009532421-01, PDC Light Curves

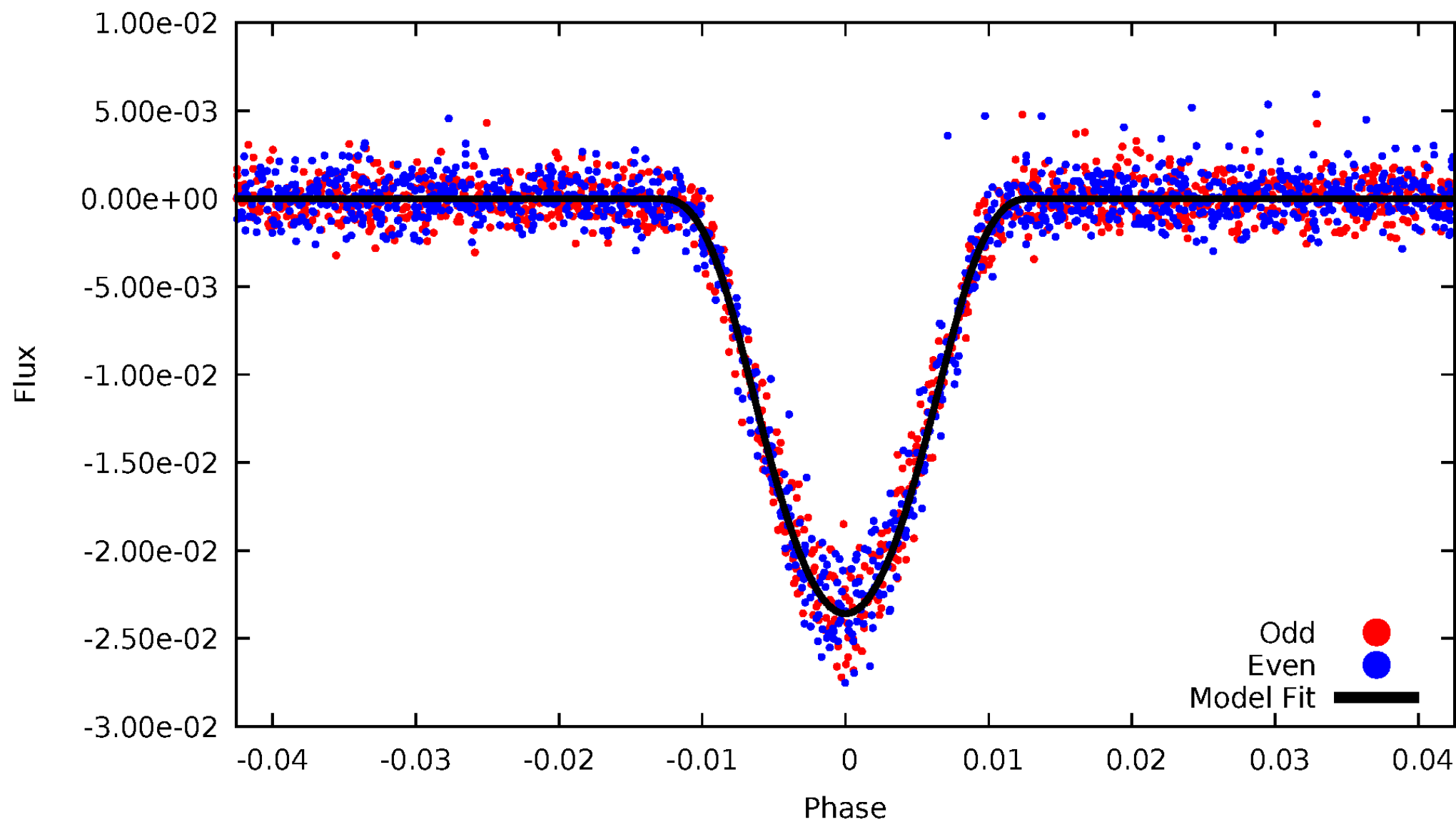


TCE 009532421-01



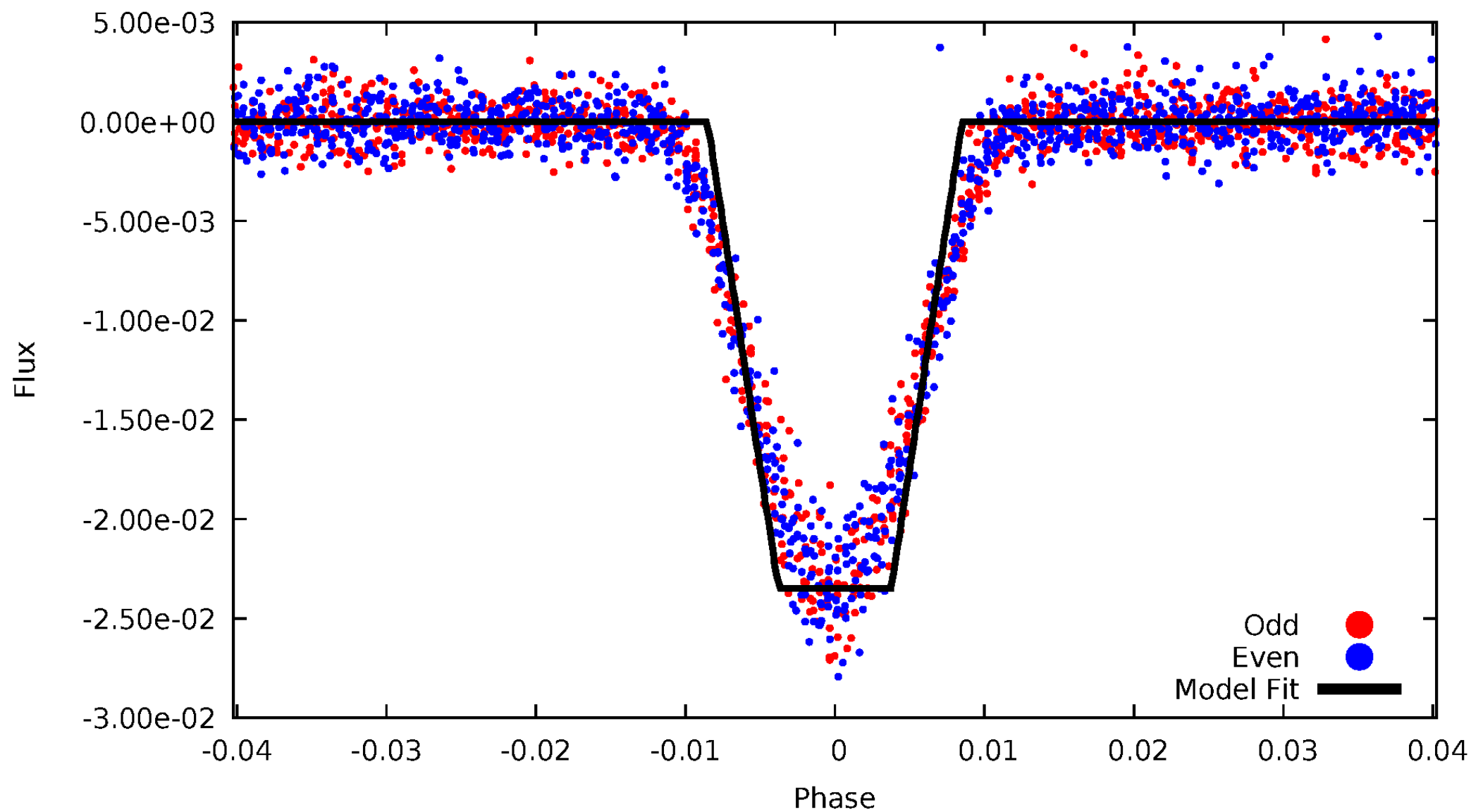
DV Odd/Even

TCE 009532421-01



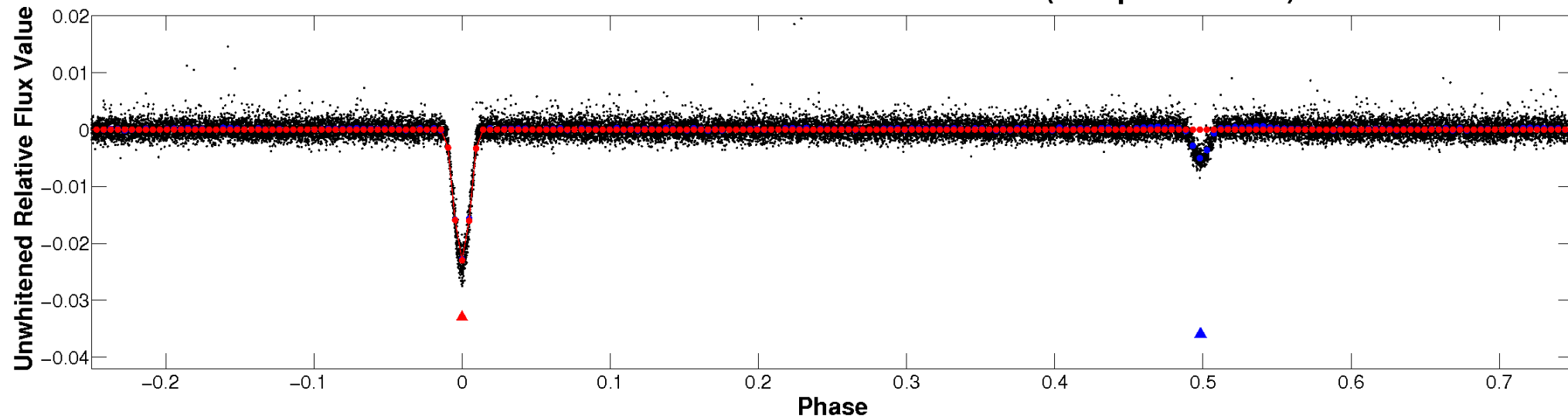
ALT Odd/Even

TCE 009532421-01

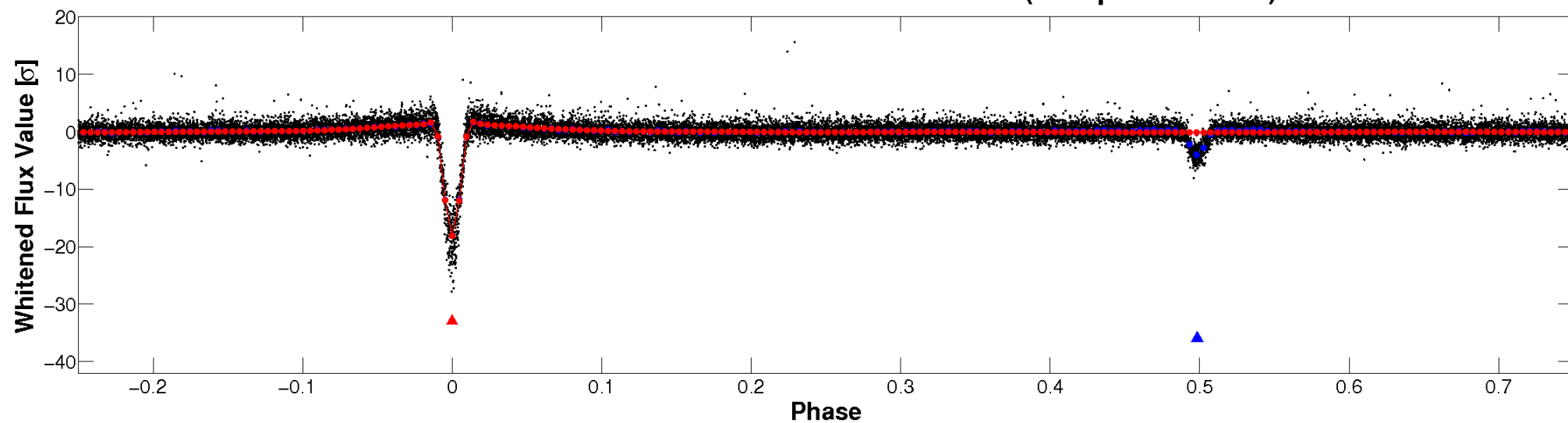


Non-Whitened Vs. Whitened Light Curve

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

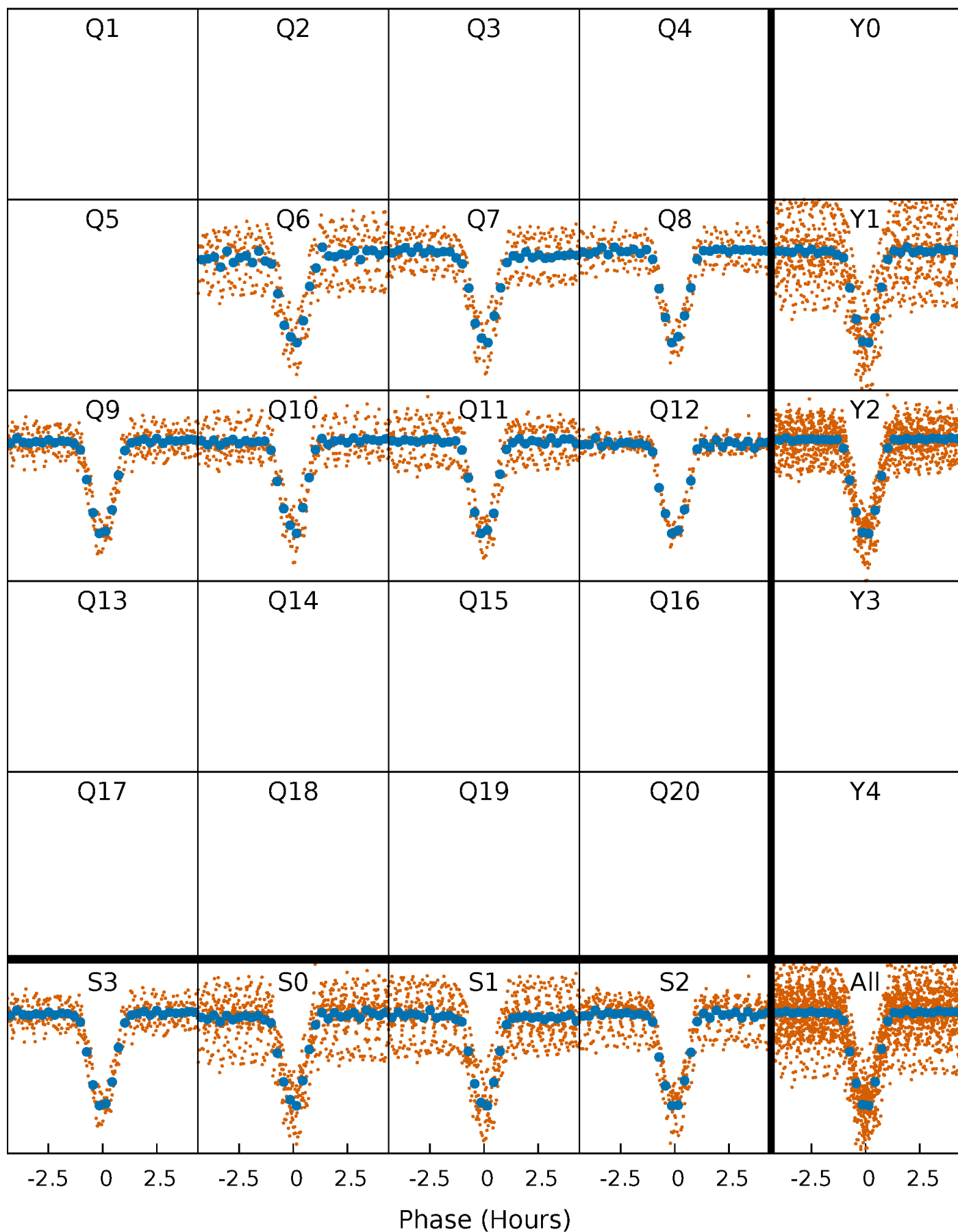


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



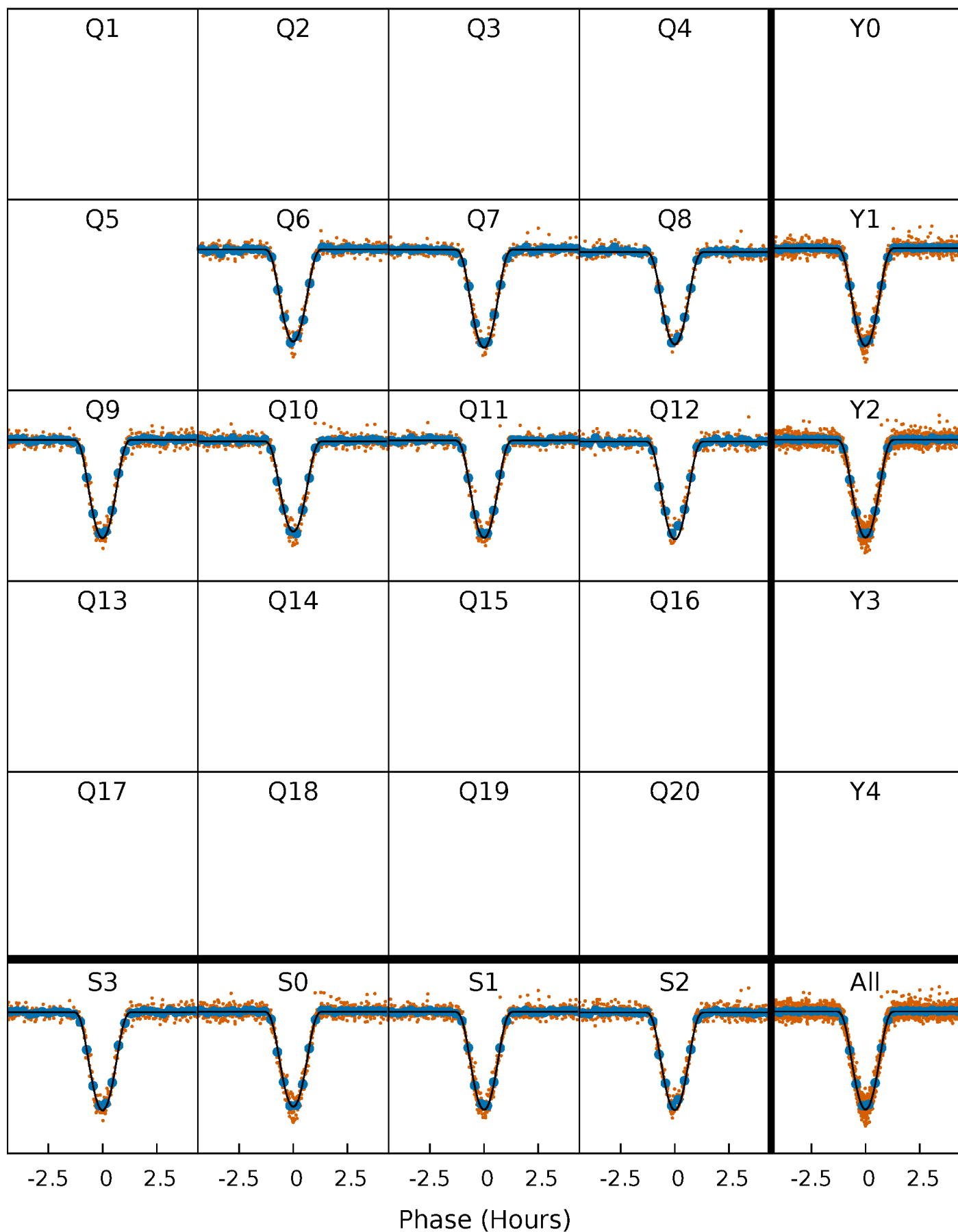
PDC Quarter-Phased Transit Curves

TCE 009532421-01 P= 4.309074 Days $T_0=134.713384$ (BKJD)



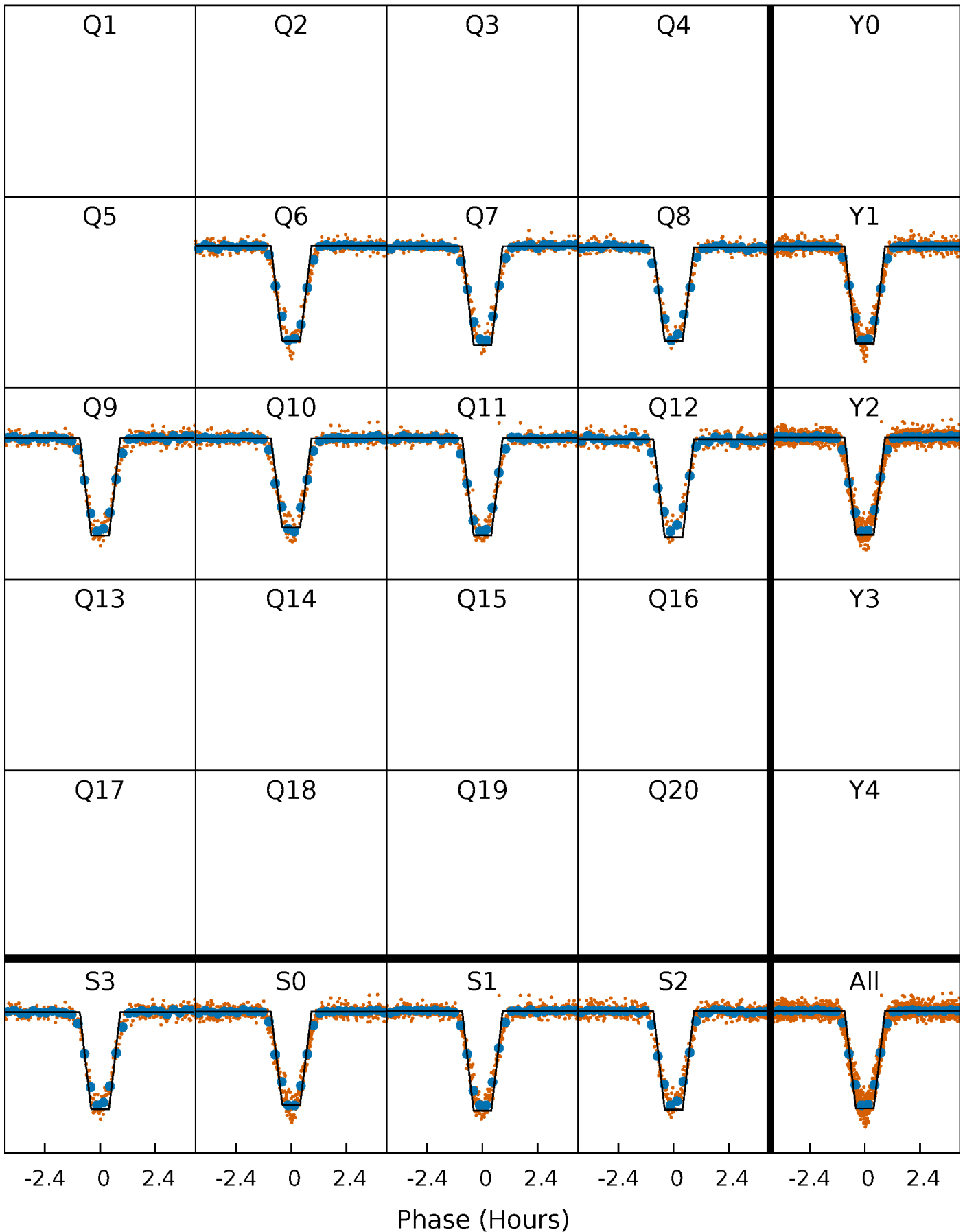
DV Quarter-Phased Transit Curves

TCE 009532421-01 P= 4.309074 Days $T_0=134.713384$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

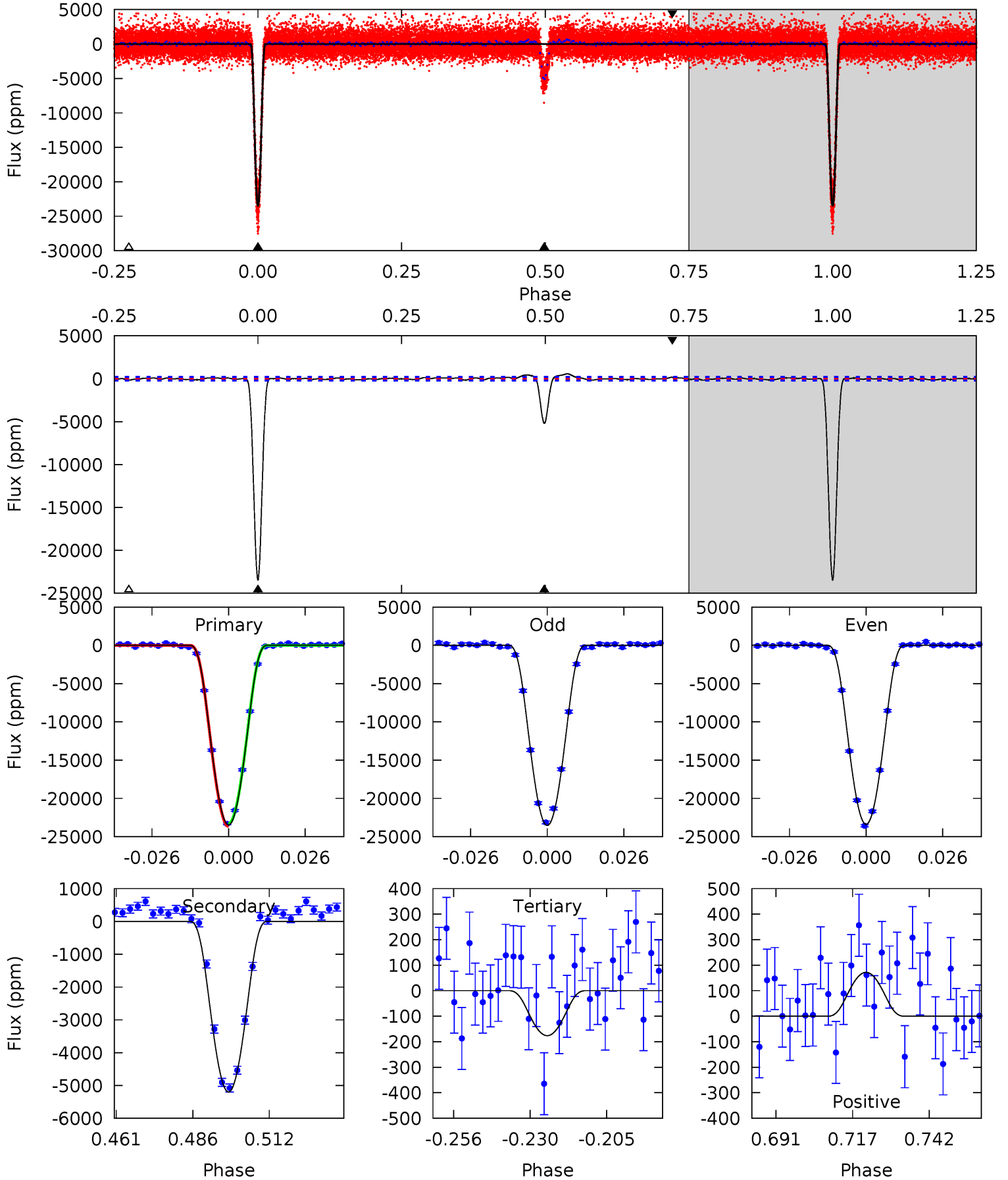
TCE 009532421-01 P= 4.309088 Days $T_0=134.710928$ (BKJD)



DV Model-Shift Uniqueness Test

009532421-01, P = 4.309074 Days, E = 134.713384 Days

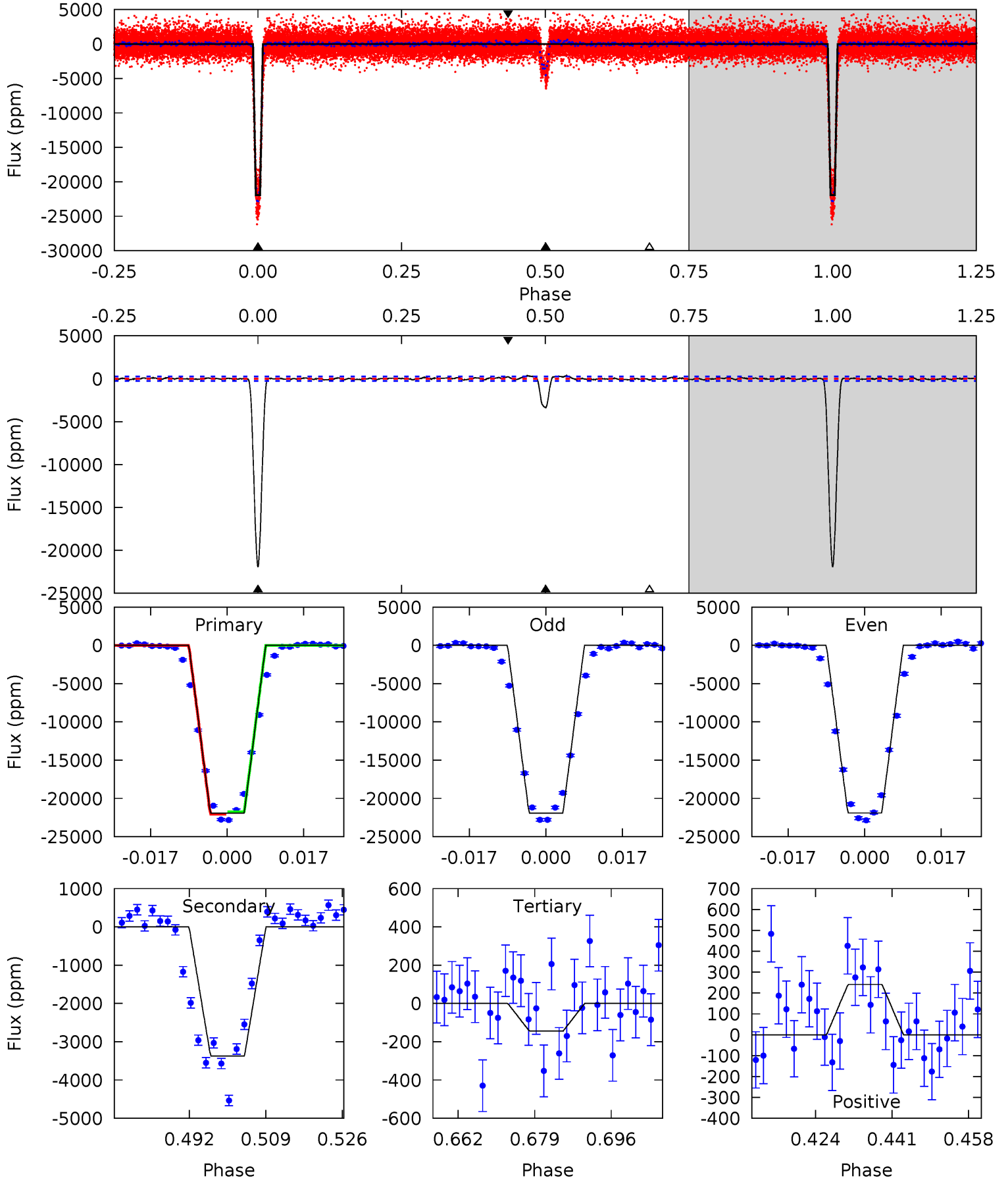
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
548.2	121.5	4.12	4.01	4.84	2.23	2.77	544.1	544.2	117.4	117.5	1.76	1.00	0.02	4.31



Alt Model-Shift Uniqueness Test

009532421-01, P = 4.309088 Days, E = 134.710928 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
415.2	63.9	2.72	4.57	4.92	2.39	1.70	412.5	410.6	61.2	59.3	0.16	1.00	0.02	2.75



Stellar Parameters For KIC 009532421

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	4897^{+169}_{-169}	$4.526^{+0.080}_{-0.096}$	$0.080^{+0.250}_{-0.300}$	$0.789^{+0.077}_{-0.077}$	$0.761^{+0.078}_{-0.062}$	$2.185^{+0.733}_{-0.504}$
	+3%/-3%	+2%/-2%	+312%/-375%	+10%/-10%	+10%/-8%	+34%/-23%
Source	KIC0	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 009532421-01 / KOI 3710.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	-5200 ± 43	$17.08^{+2.07}_{-1.94}$	1237^{+58}_{-56}	3417^{+142}_{-136}	22^{+6}_{-5}
Alt.	-3373 ± 53	$13.39^{+1.73}_{-1.88}$	1234^{+58}_{-50}	3451^{+164}_{-158}	24^{+8}_{-5}

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

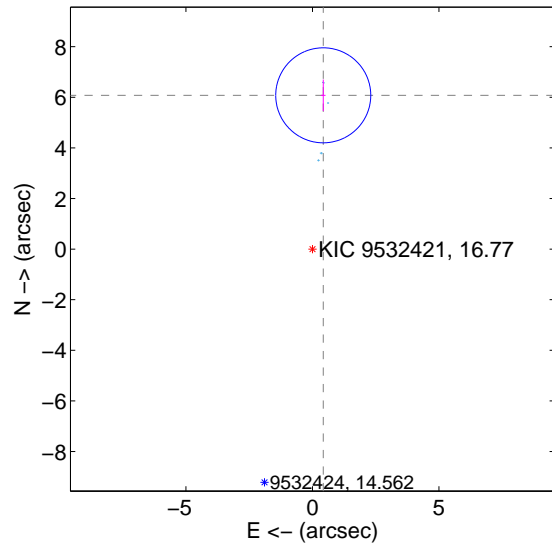
Supplemental centroid analysis for 009532421-01. Kepler magnitude: 16.77. Transit SNR 277.72

There are 7 quarters with good PRF difference image offsets

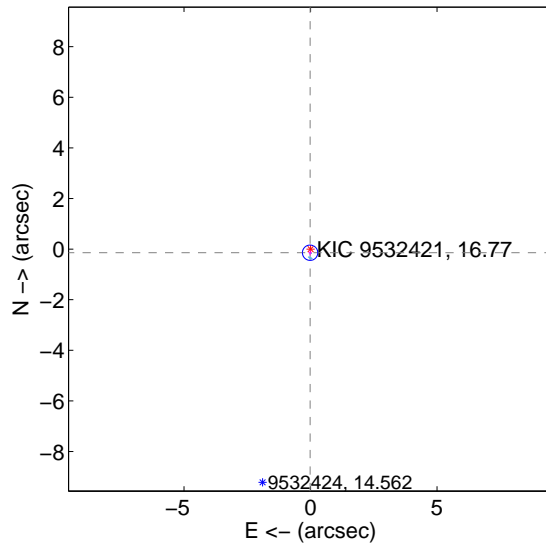
The OOT PRF centroid is offset from the target star catalog position by about 4.17 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	6.091 ± 0.626	9.73	-0.427 ± 0.091	6.076 ± 0.625
PRF-fit source offset from KIC position	0.144 ± 0.101	1.43	0.017 ± 0.068	-0.143 ± 0.101
photometric centroid source offset	3.19 ± 0.02	142.40	0.28 ± 0.01	-3.18 ± 0.02

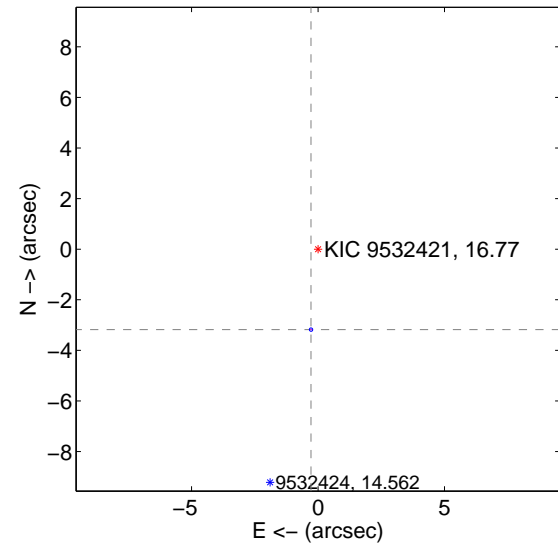
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



offset from photometric centroids

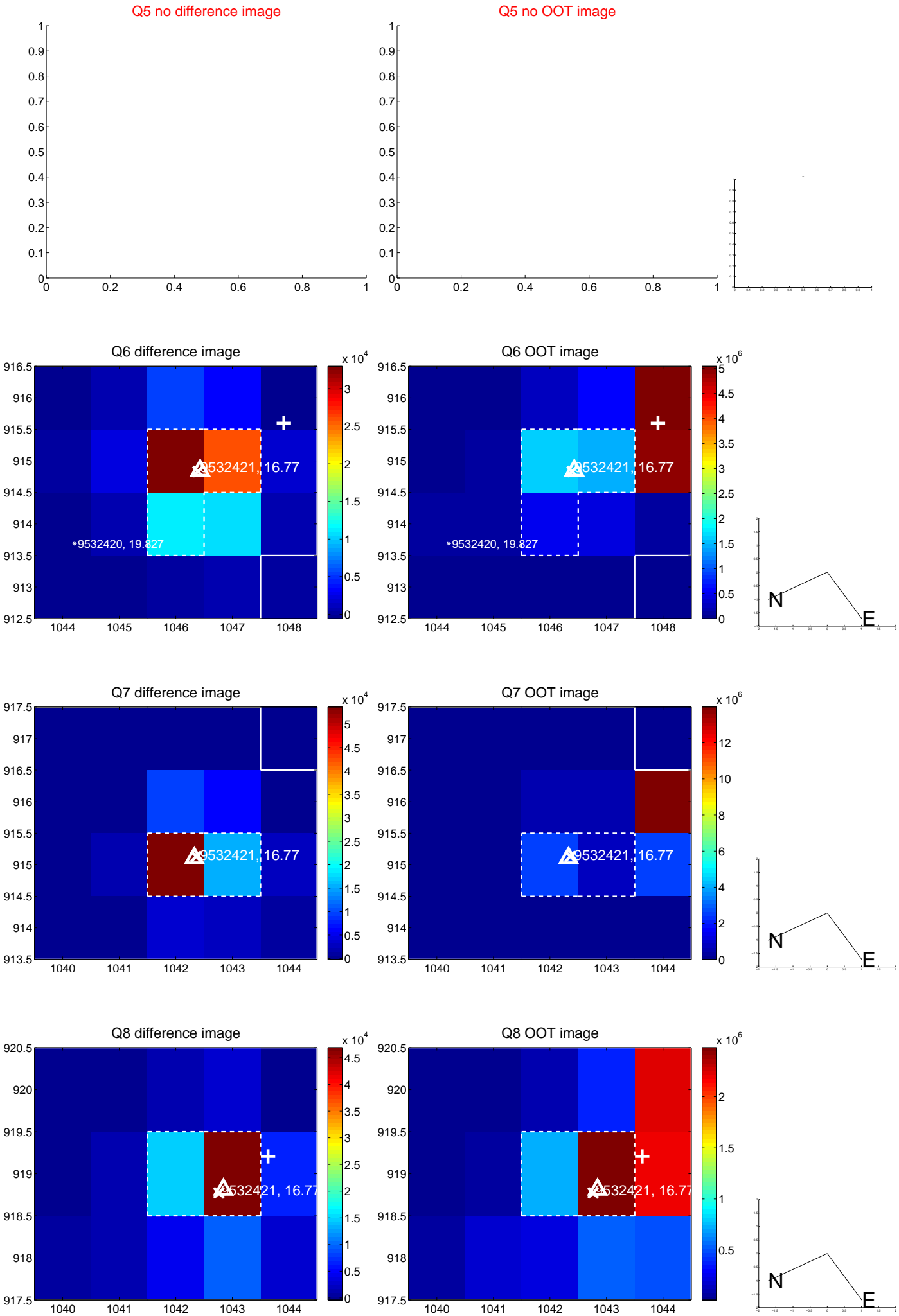


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

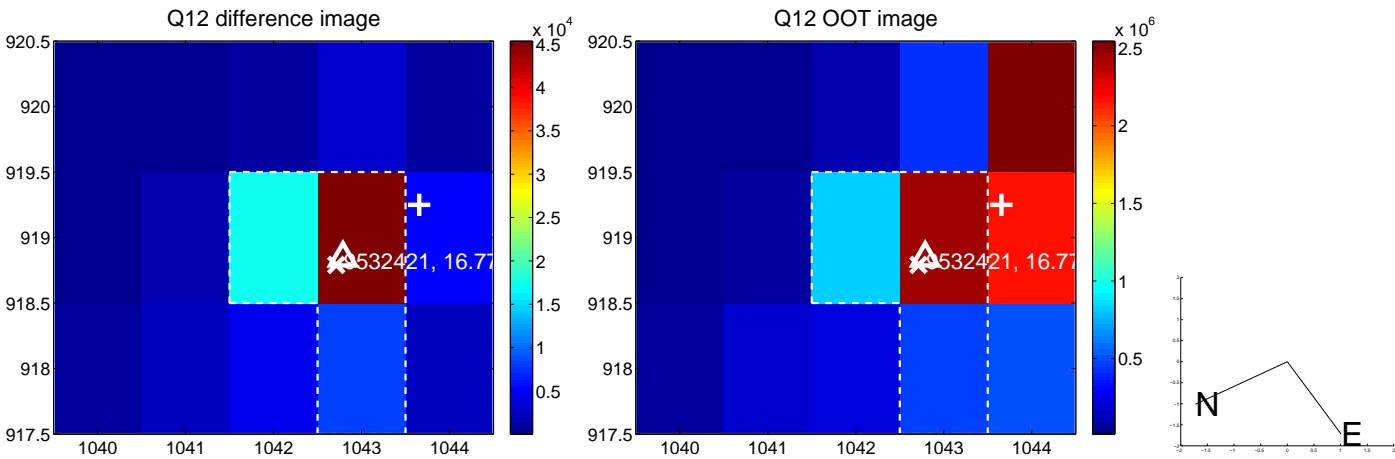
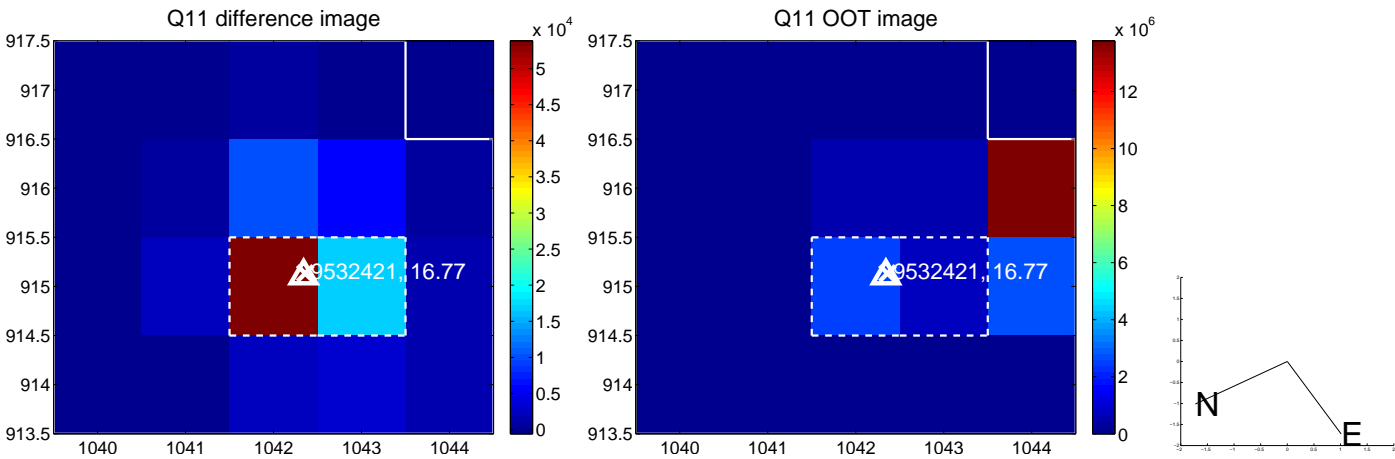
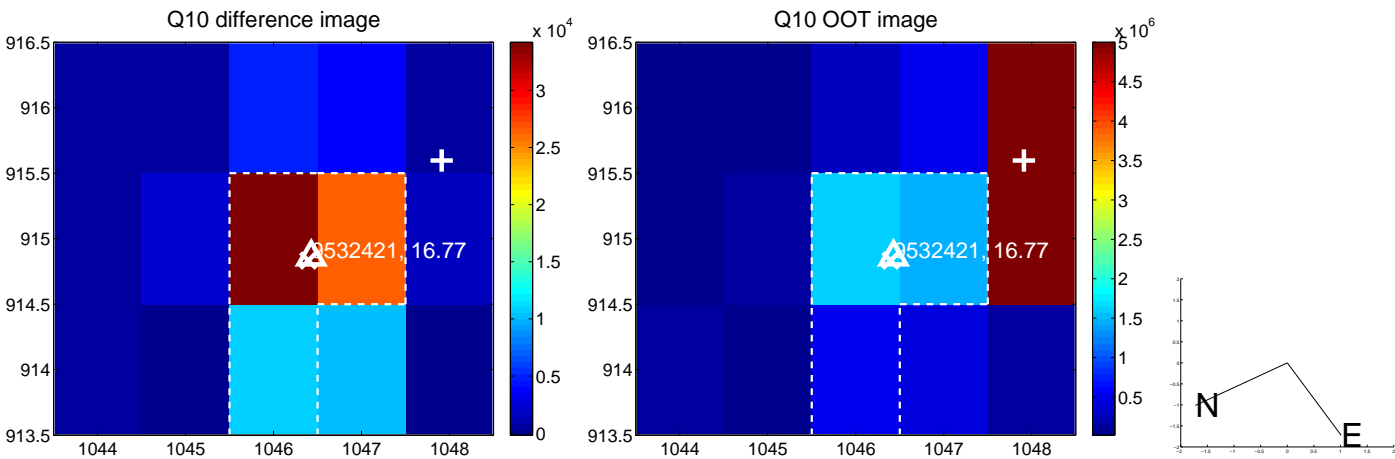
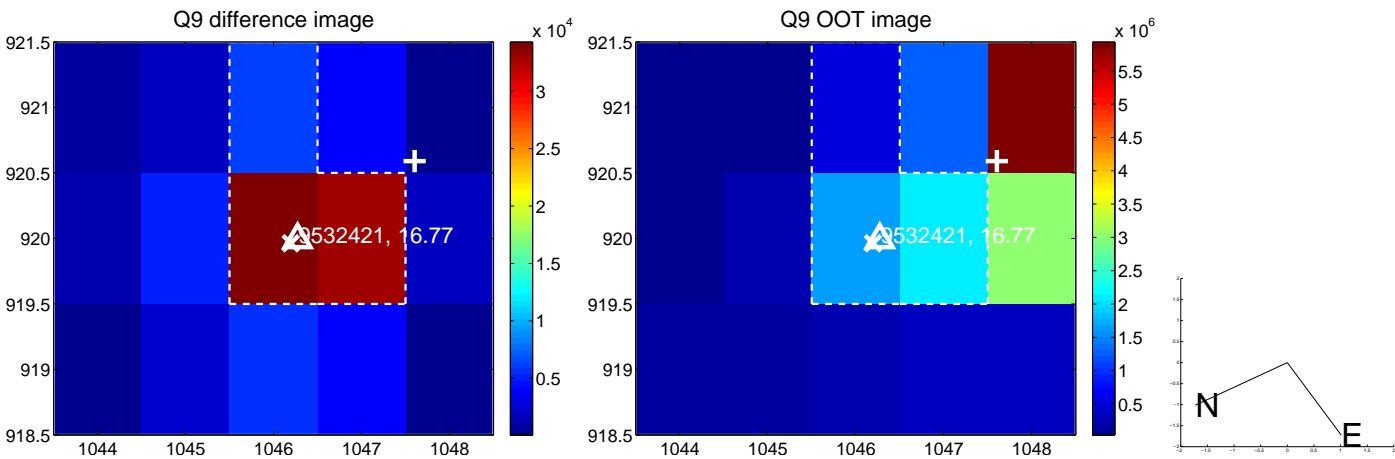
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



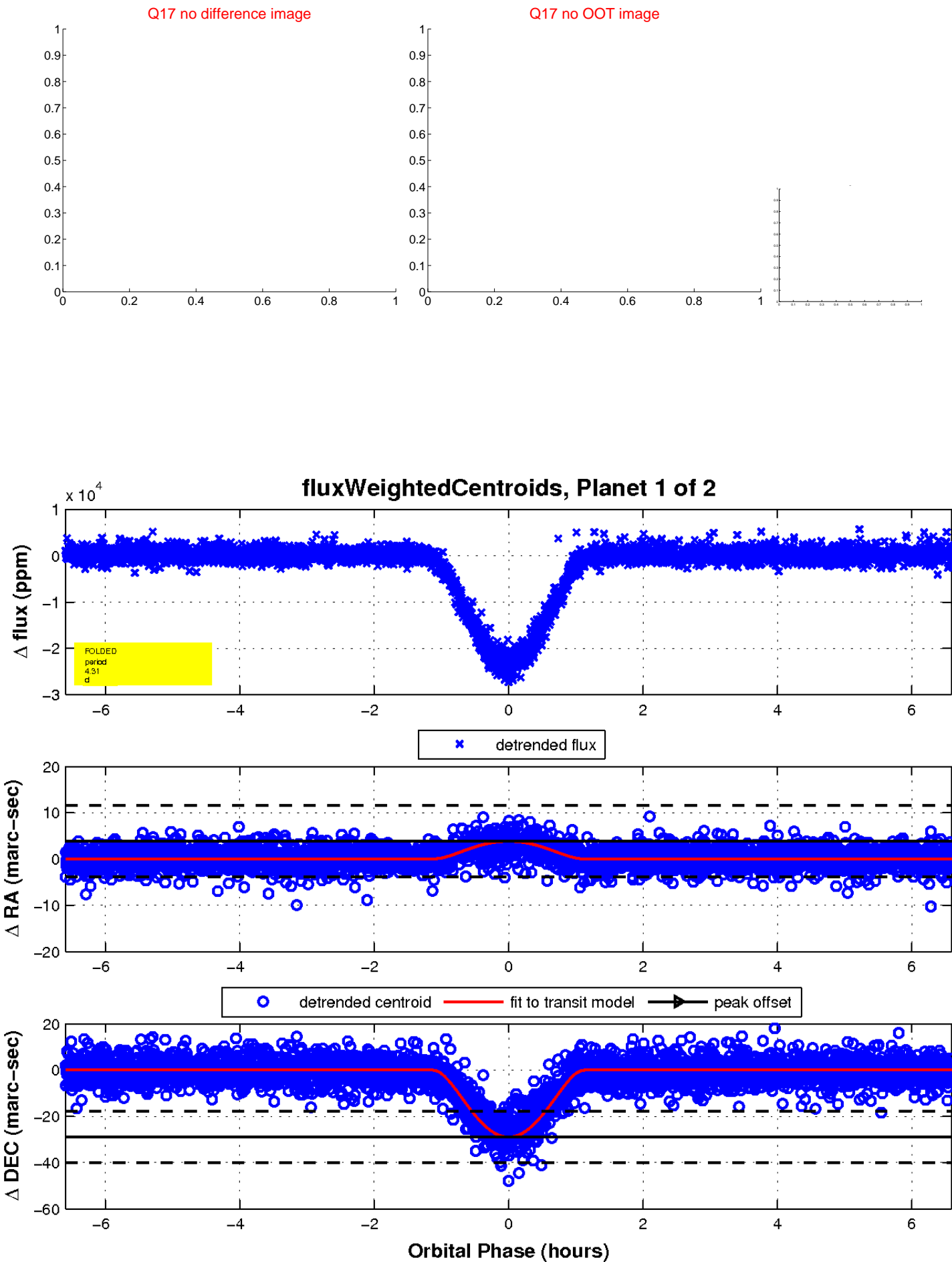
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

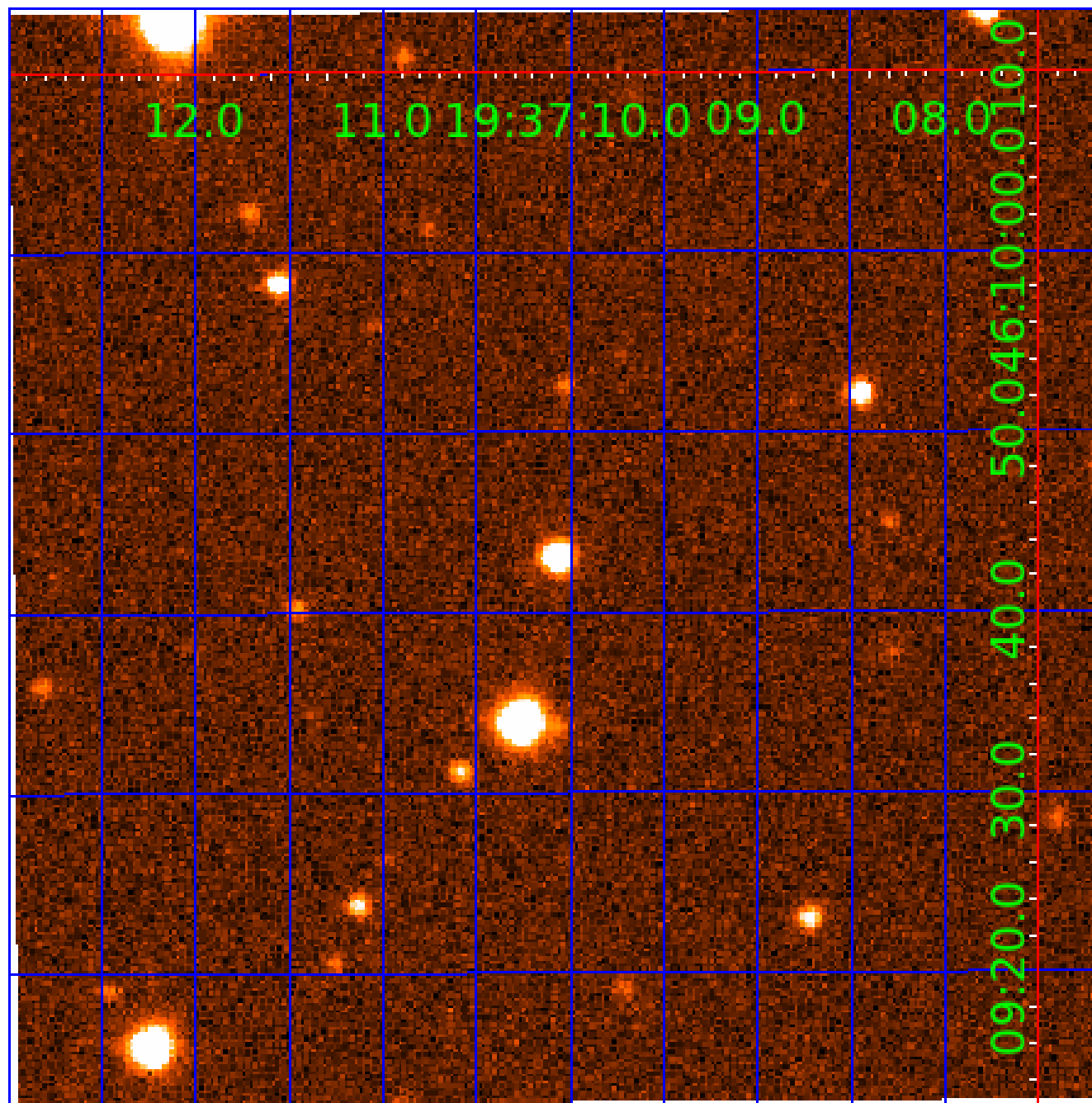


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 009532421

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})
009532421-01	OBS	3710.01	4.309074	134.713384	23584.0	2.199	295.9	277.7	0.79	4897	16.98	143.05
009532421-02	OBS	No	4.309068	132.553034	5521.1	2.068	64.6	71.3	0.79	4897	8.20	143.05

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009532421-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—DEEP_V_SHAPED—HAS_SEC_TCE—CENT_KIC_POS
009532421-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE—CENT_KIC_POS

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 009532421-02

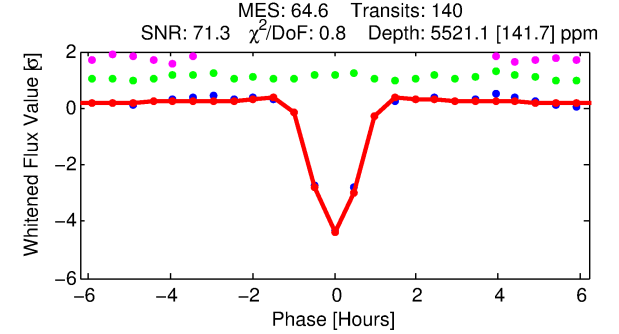
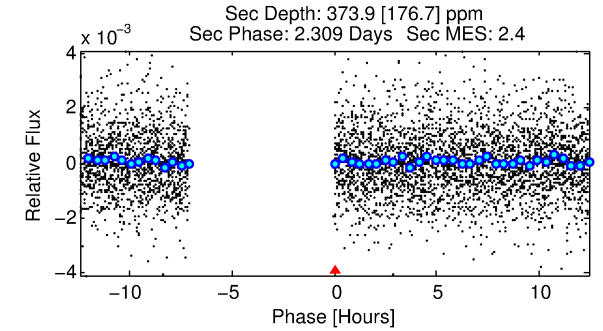
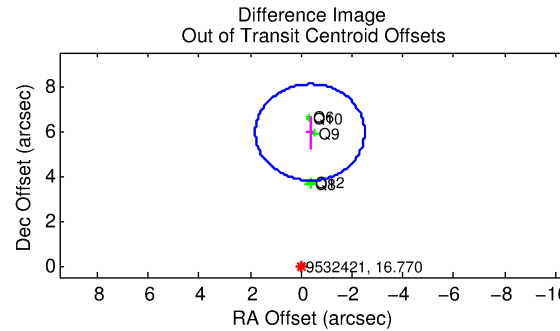
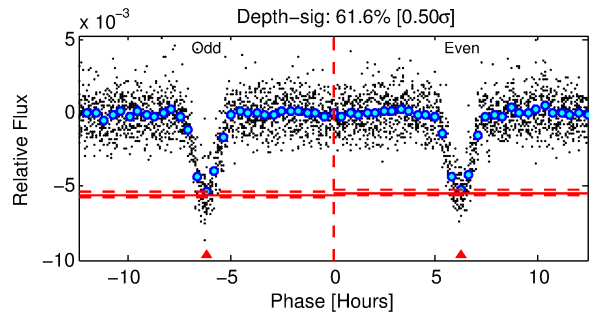
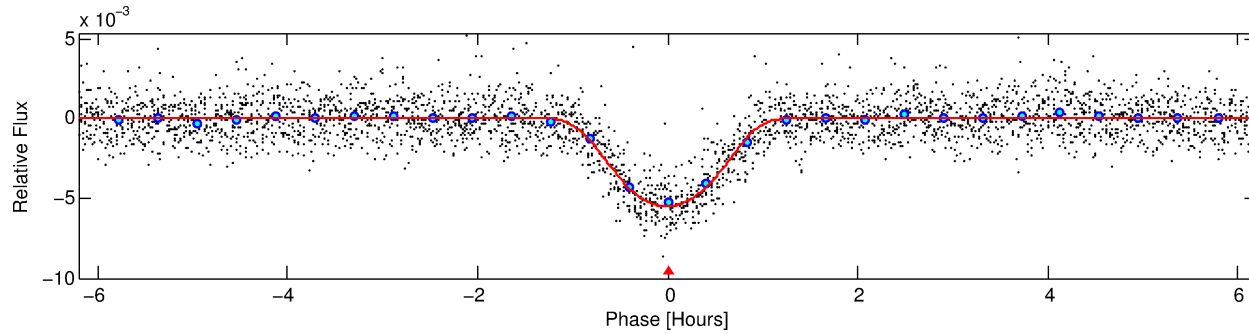
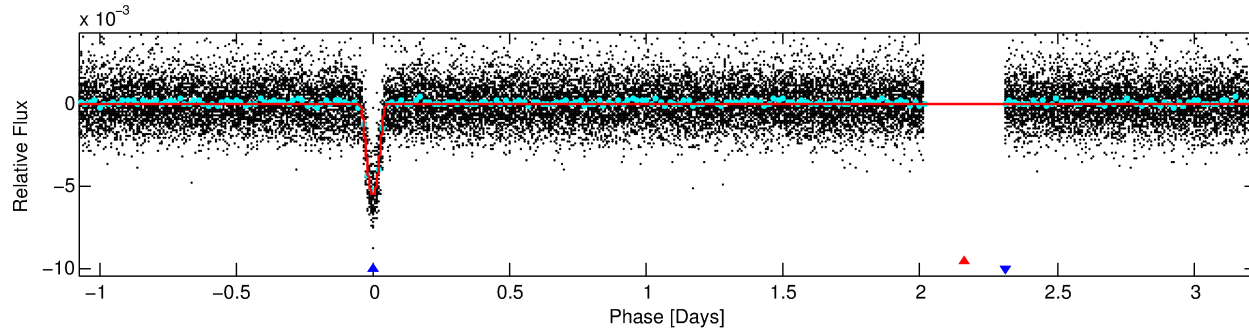
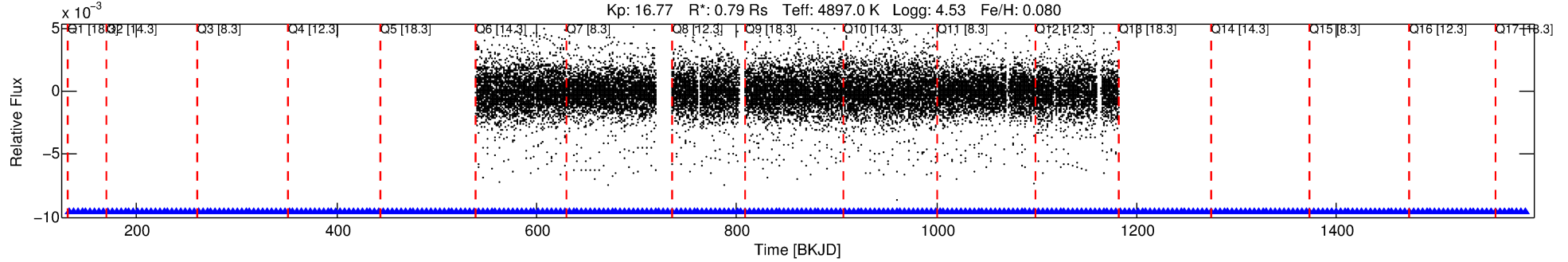
No Significant Match Found

DV One-Page Summary

KIC: 9532421 Candidate: 2 of 2 Period: 4.309 d

KOI: K03710 Corr: No Ephemeris Match

Kp: 16.77 R*: 0.79 Rs Teff: 4897.0 K Logg: 4.53 Fe/H: 0.080



DV Fit Results:

Period = 4.30907 [0.00001] d
Epoch = 132.5530 [0.0010] BKJD
Rp/R* = 0.0952 [0.0209]
a/R* = 9.04 [0.88]
b = 0.94 [0.05]
Seff = 143.05 [30.35]
Teff = 882 [47] K
Rp = 8.20 [1.97] Re
a = 0.0474 [0.0047] AU
Ag = 6.86 [4.56] [1.28σ]
Teffp = 2207 [364] K [3.61σ]

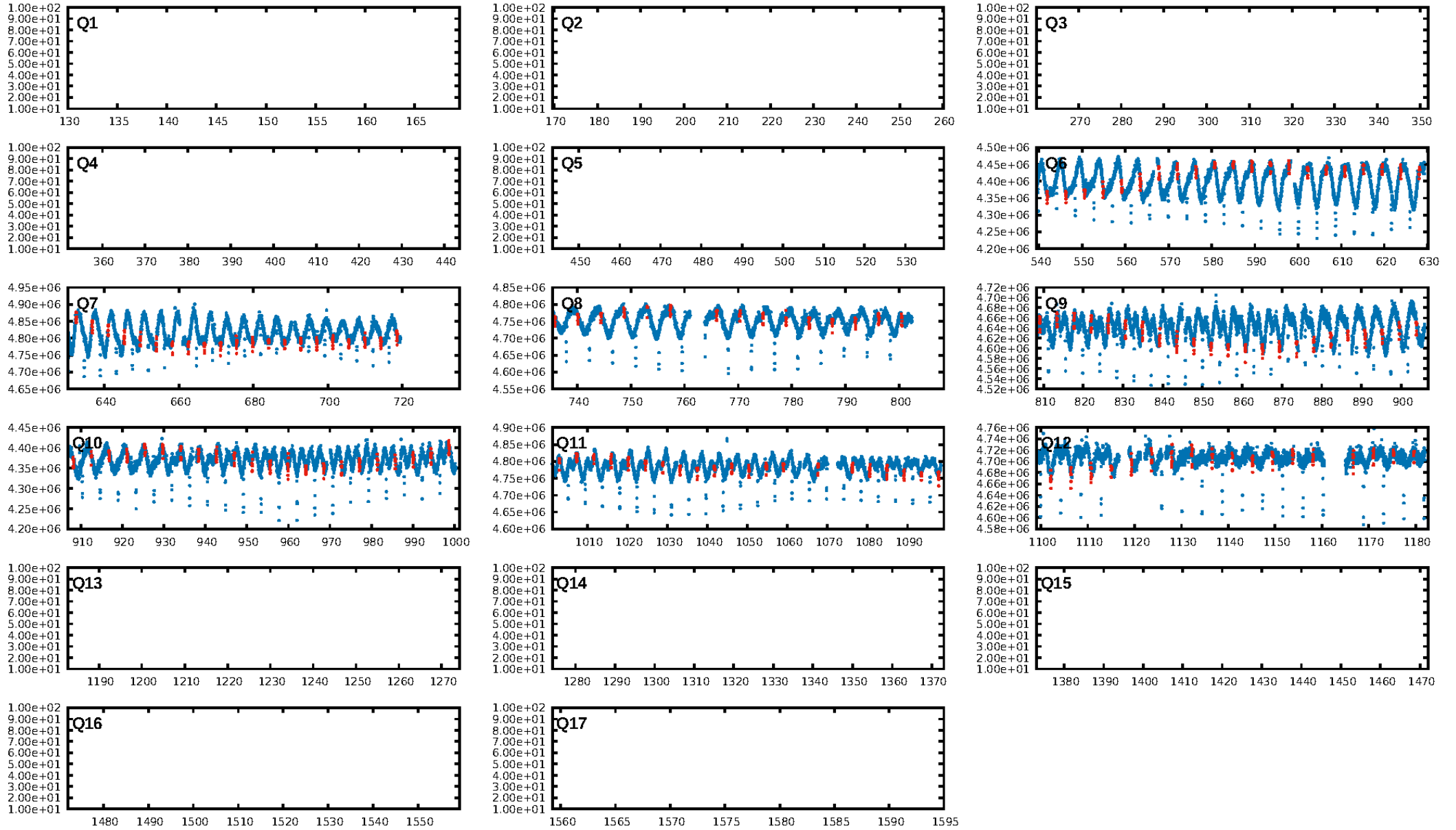
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 0.0% [0.00σ]
ModelChiSquare2-sig: 99.9%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 0.00e+00
RollingBand-fgt: 1.00 [140/140]
GhostDiagnostic-chr: 2.029
Centroid-sig: 0.0%
Centroid-so: 3.083 arcsec [32.60σ]
OotOffset-rm: 5.953 arcsec [8.32σ]
KicOffset-rm: 0.174 arcsec [1.51σ]
OotOffset-st: 2/0/2/1 [5]
KicOffset-st: 2/2/2/1 [7]
DiffImageQuality-fgm: 1.00 [7/7]
DiffImageOverlap-fno: 1.00 [7/7]

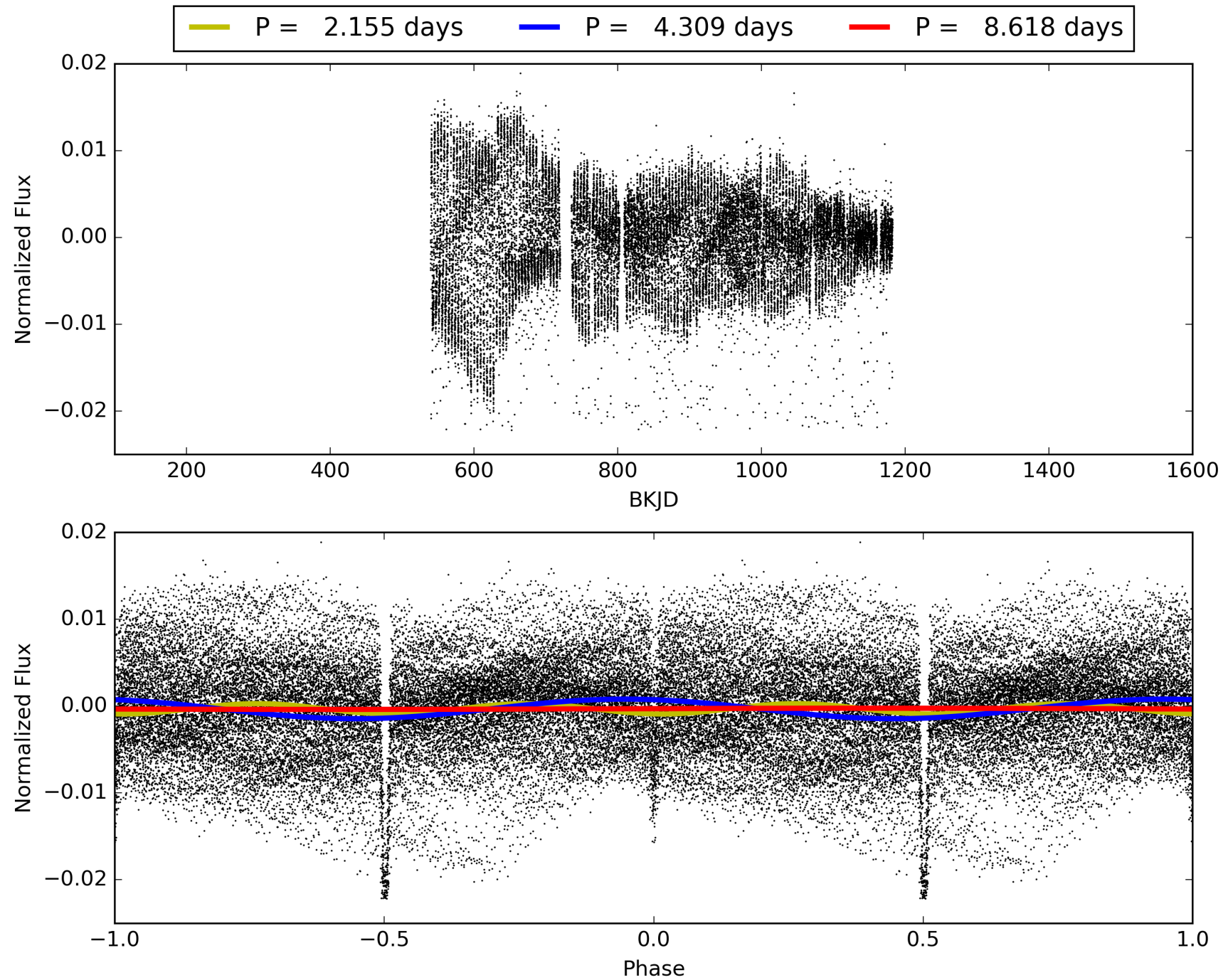
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 03:17:18 Z

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

TCE 009532421-02, PDC Light Curves

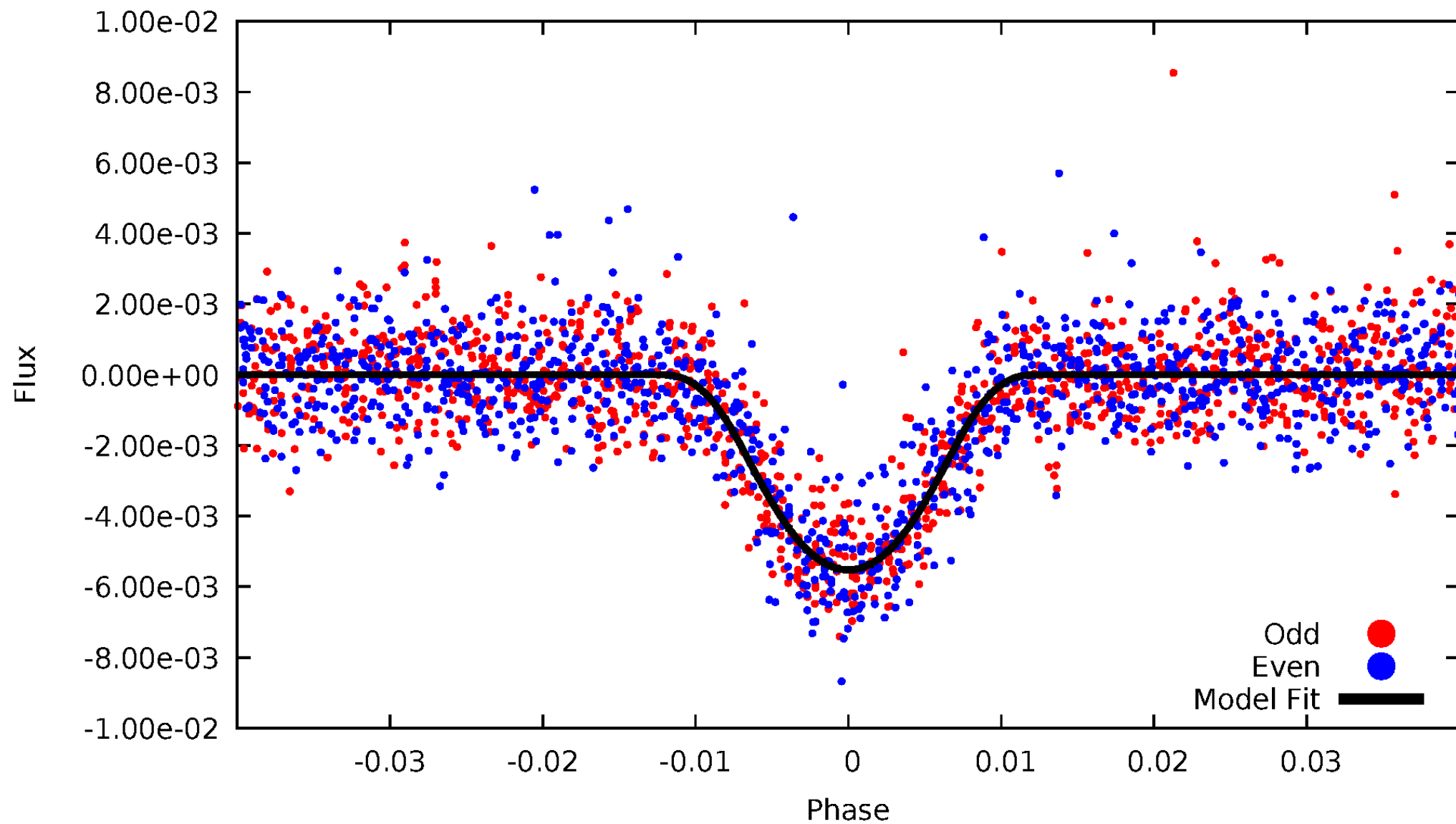


TCE 009532421-02



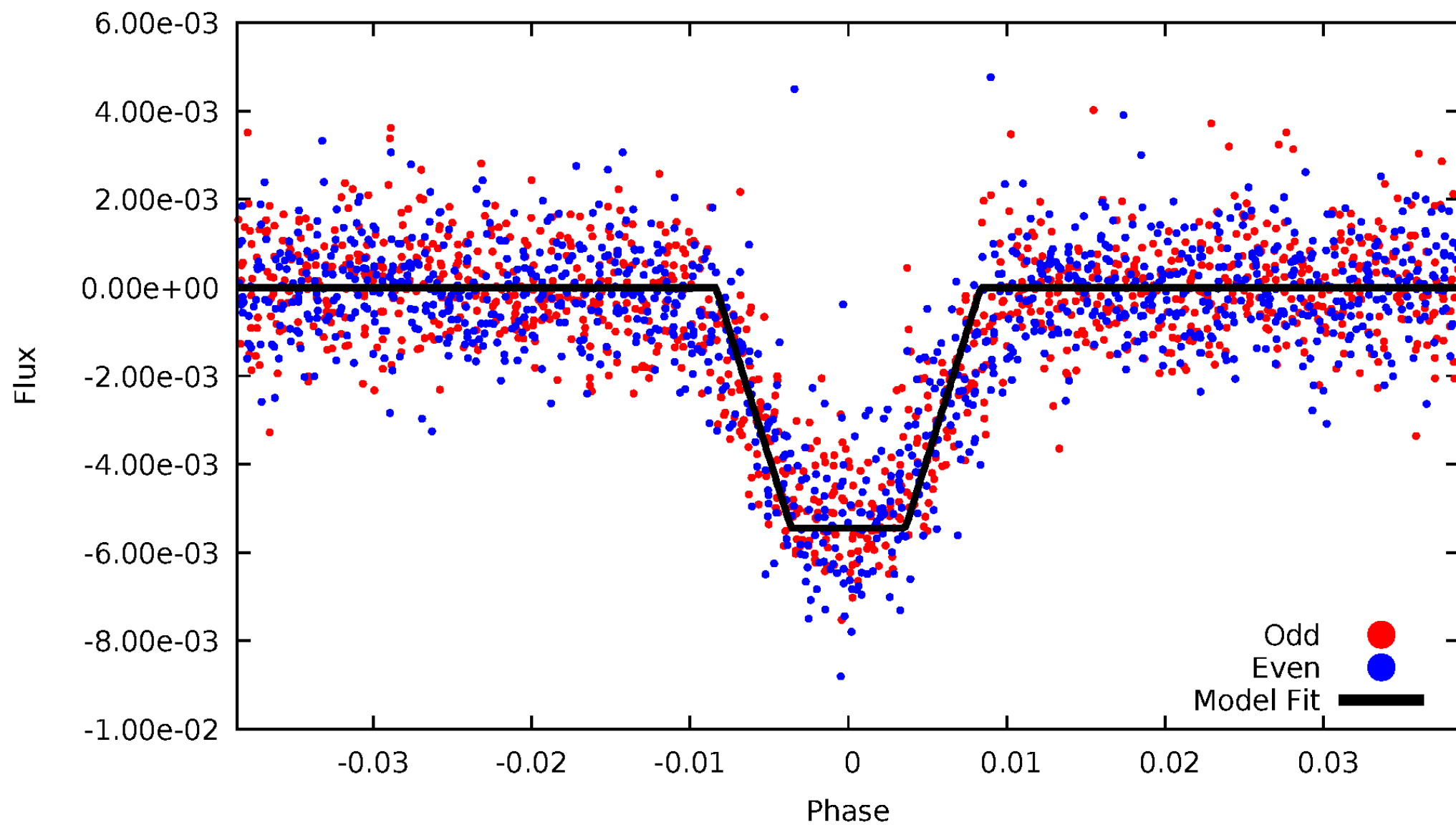
DV Odd/Even

TCE 009532421-02



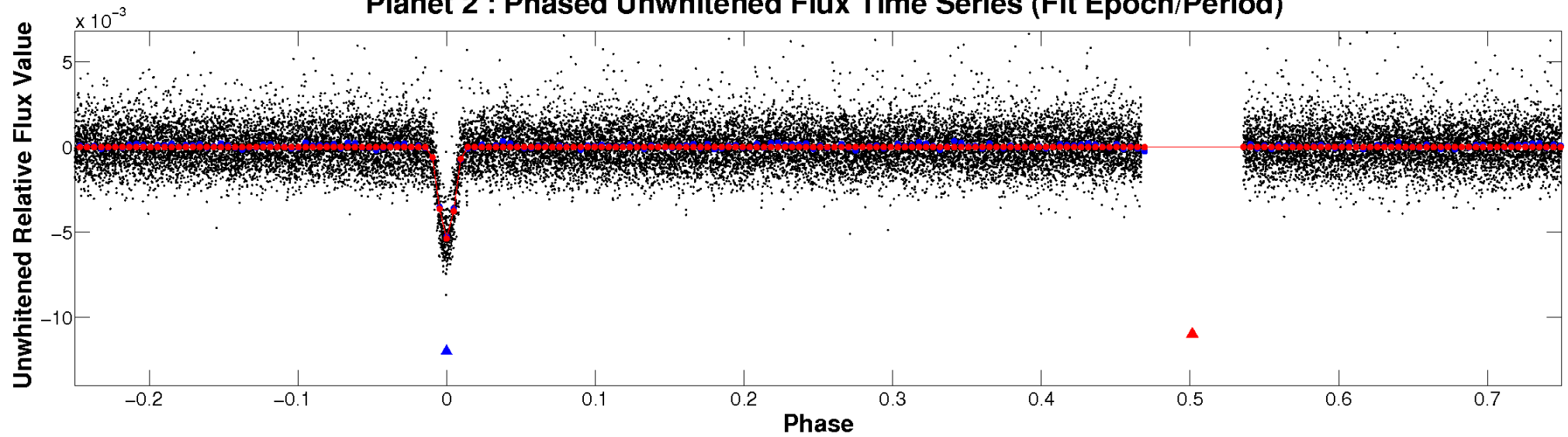
ALT Odd/Even

TCE 009532421-02

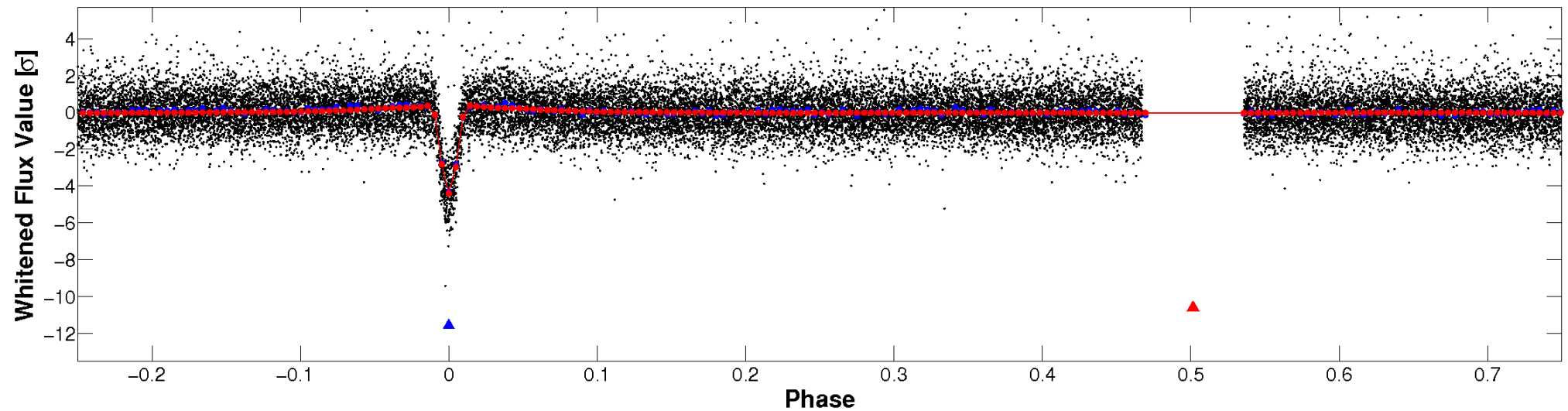


Non-Whitened Vs. Whitened Light Curve

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

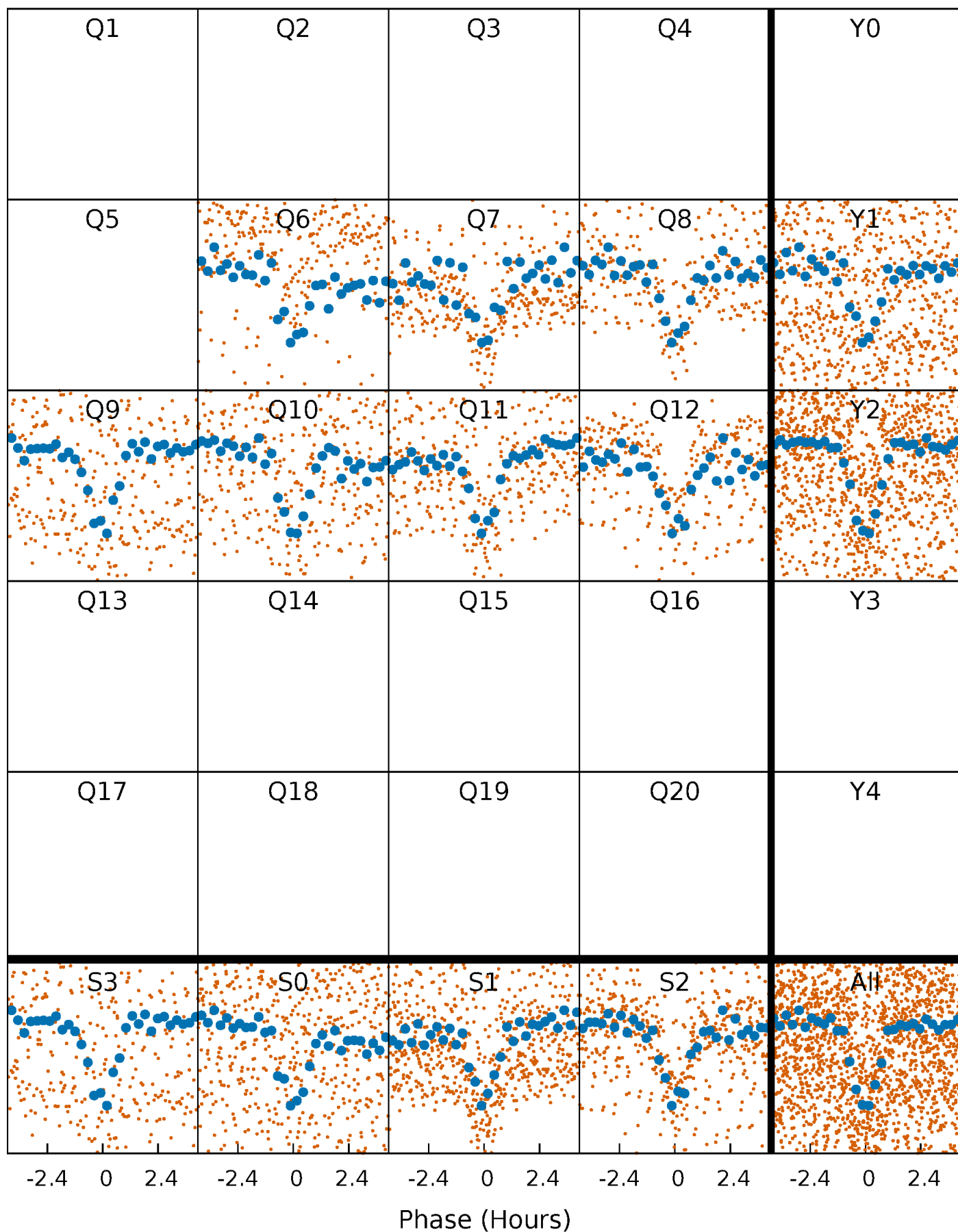


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



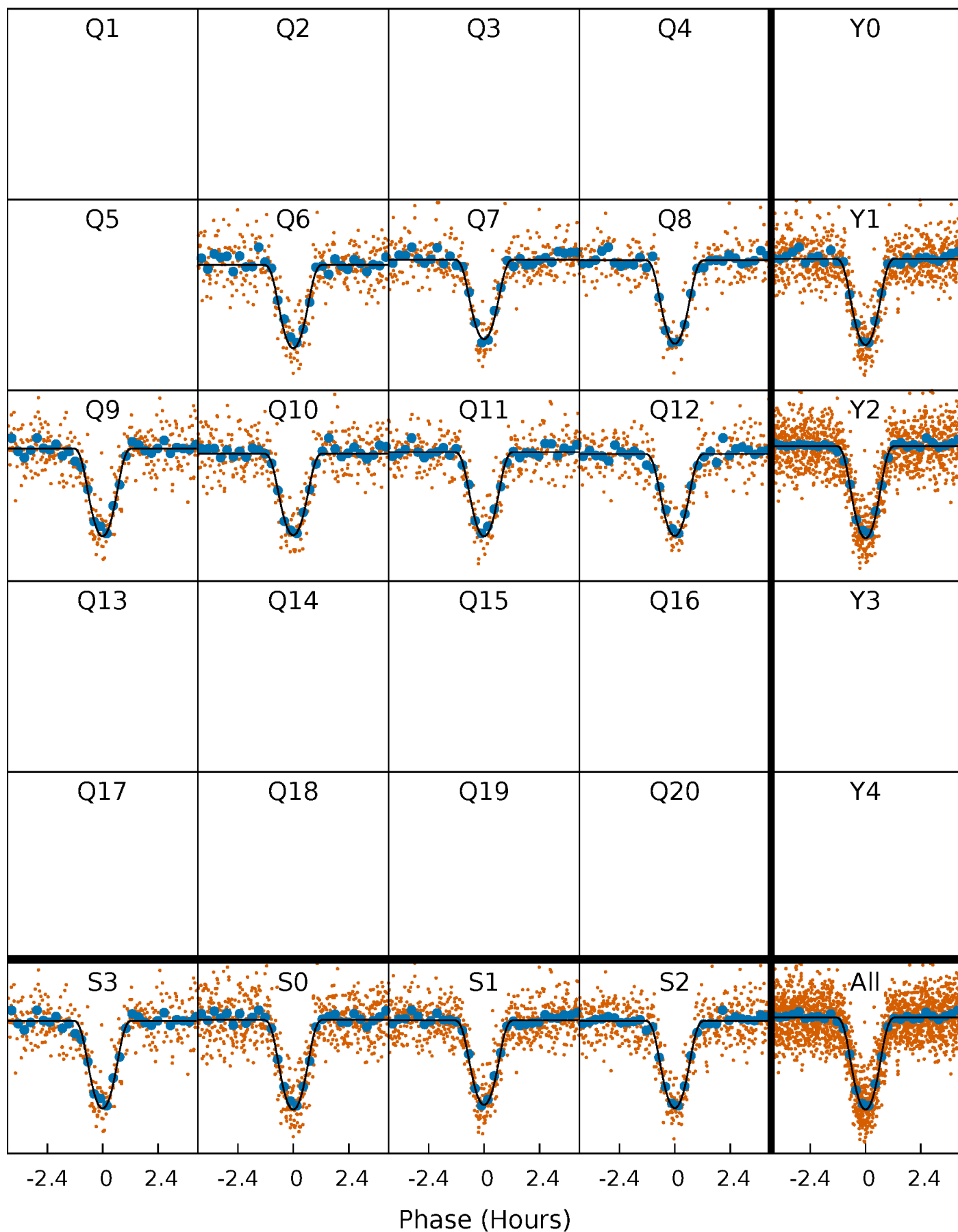
PDC Quarter-Phased Transit Curves

TCE 009532421-02 $P = 4.309068$ Days $T_0 = 132.553034$ (BKJD)



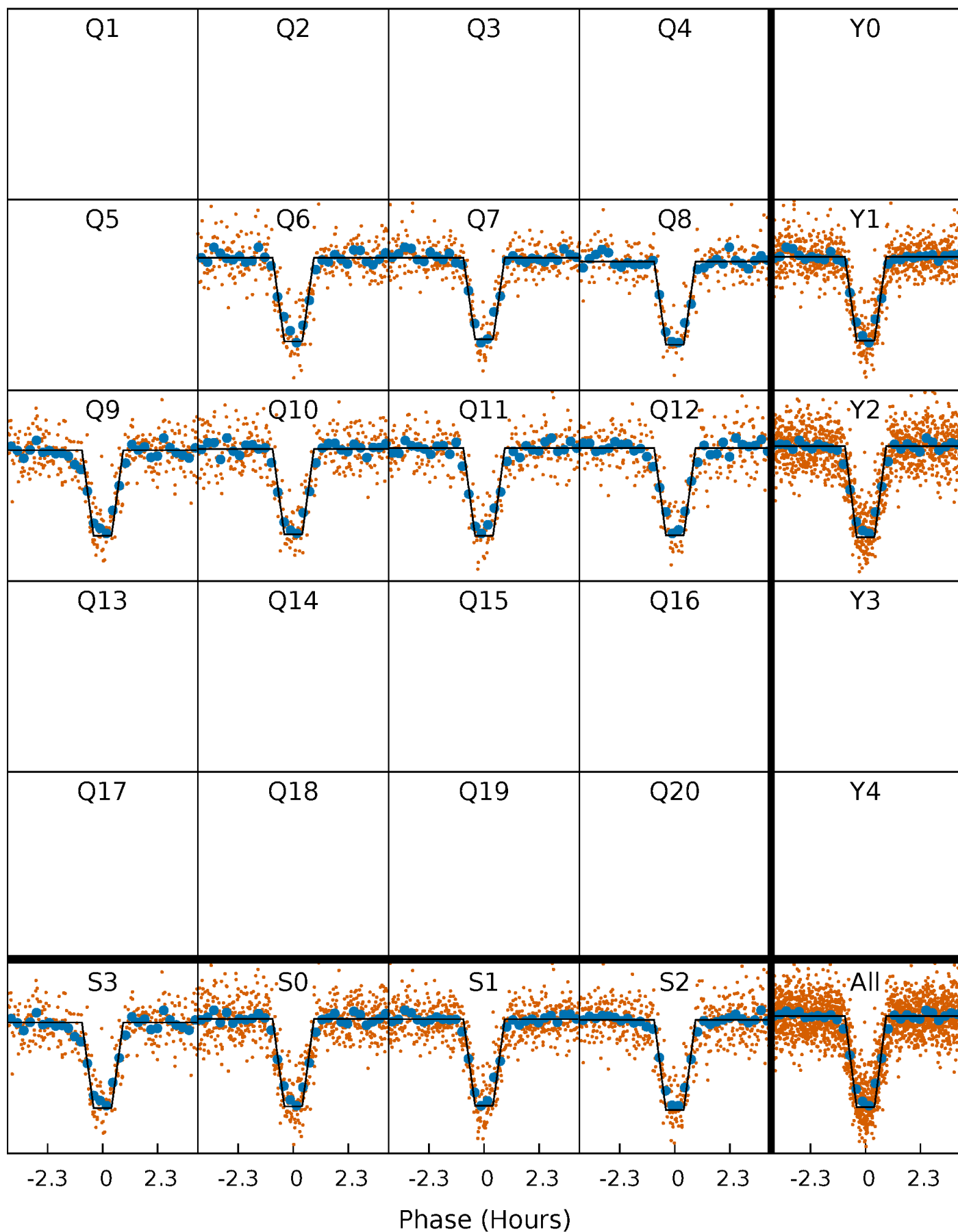
DV Quarter-Phased Transit Curves

TCE 009532421-02 $P = 4.309068$ Days $T_0 = 132.553034$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

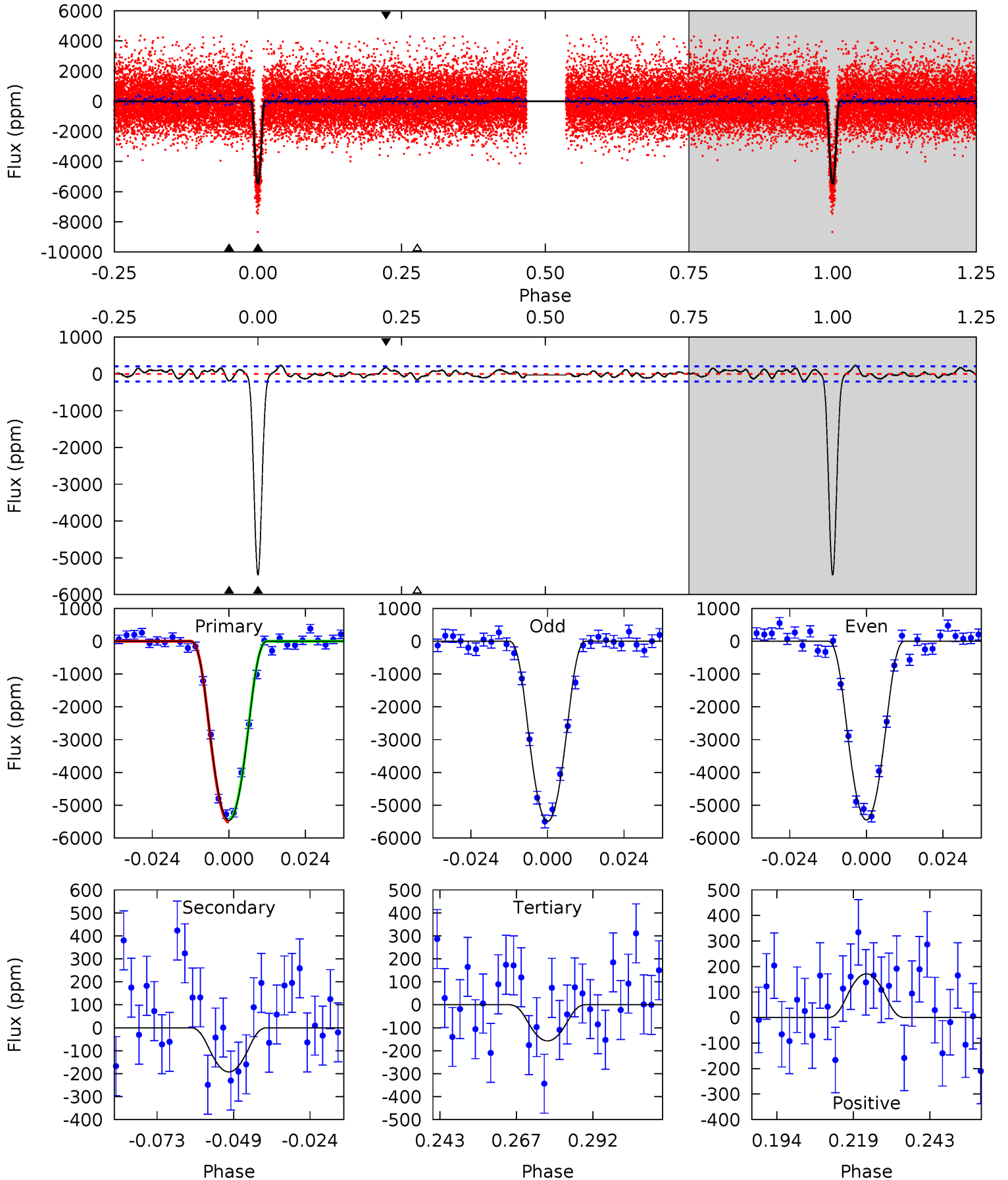
TCE 009532421-02 P= 4.309081 Days $T_0=132.550810$ (BKJD)



DV Model-Shift Uniqueness Test

009532421-02, P = 4.309068 Days, E = 132.553034 Days

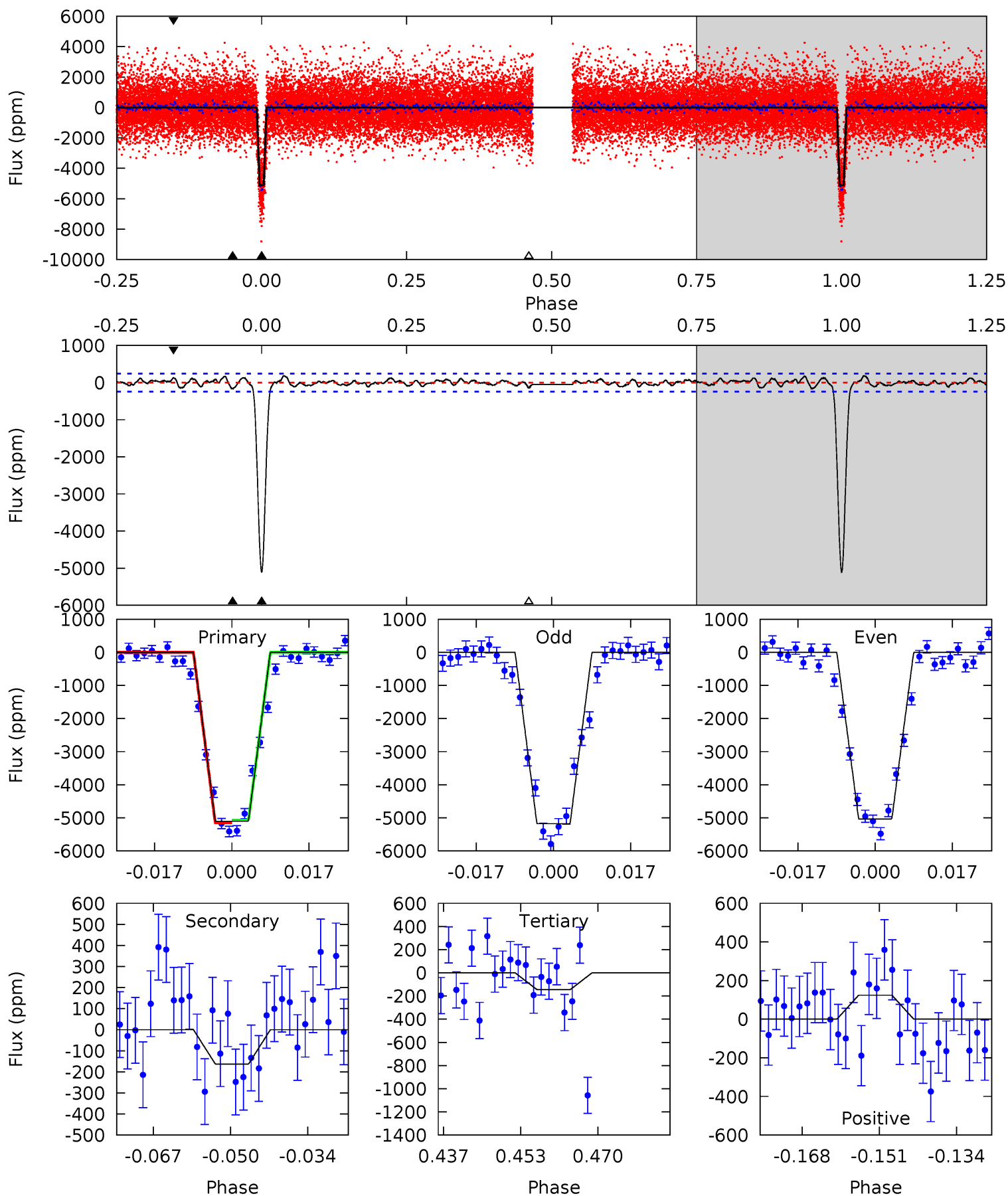
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
127.9	4.50	3.68	4.01	4.85	2.25	1.66	124.2	123.9	0.82	0.49	0.55	0.97	0.04	0.97



Alt Model-Shift Uniqueness Test

009532421-02, P = 4.309081 Days, E = 132.550810 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
103.8	3.31	2.95	2.53	4.93	2.39	1.18	100.8	101.2	0.36	0.78	1.45	0.97	0.03	0.80



Stellar Parameters For KIC 009532421

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	$M(M_{\odot})$	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	4897^{+169}_{-169}	$4.526^{+0.080}_{-0.096}$	$0.080^{+0.250}_{-0.300}$	$0.789^{+0.077}_{-0.077}$	$0.761^{+0.078}_{-0.062}$	$2.185^{+0.733}_{-0.504}$
	+3%/-3%	+2%/-2%	+312%/-375%	+10%/-10%	+10%/-8%	+34%/-23%
Source	KIC0	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 009532421-02 / KOI

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-192 ± 43	$8.34^{+1.90}_{-1.91}$	1239^{+60}_{-54}	2604^{+218}_{-183}	$3.421^{+2.550}_{-1.377}$
Alt.	-163 ± 49	$6.36^{+1.87}_{-1.69}$	1238^{+52}_{-57}	2728^{+285}_{-226}	$4.846^{+4.921}_{-2.160}$

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

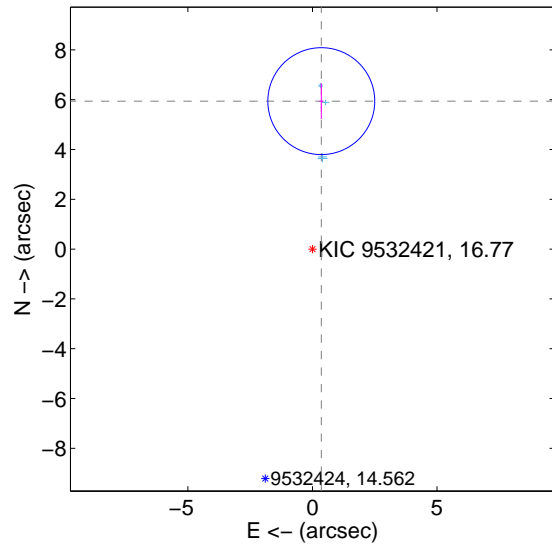
Supplemental centroid analysis for 009532421-02. Kepler magnitude: 16.77. Transit SNR 71.35

There are 7 quarters with good PRF difference image offsets

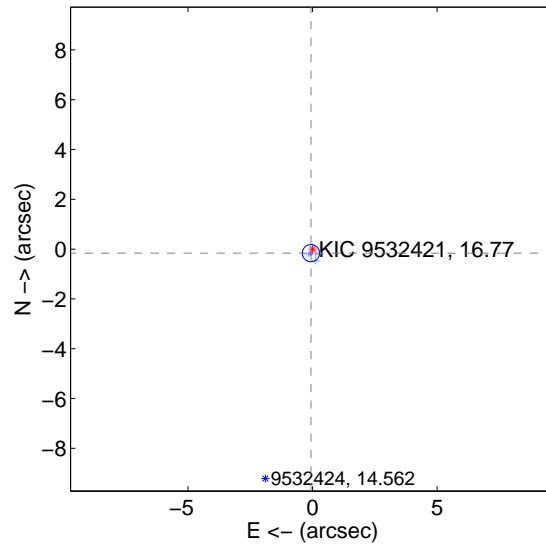
The OOT PRF centroid is offset from the target star catalog position by about 4.19 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	5.953 ± 0.715	8.32	-0.356 ± 0.076	5.942 ± 0.717
PRF-fit source offset from KIC position	0.174 ± 0.115	1.51	0.063 ± 0.076	-0.162 ± 0.120
photometric centroid source offset	3.08 ± 0.09	32.60	0.20 ± 0.05	-3.08 ± 0.09

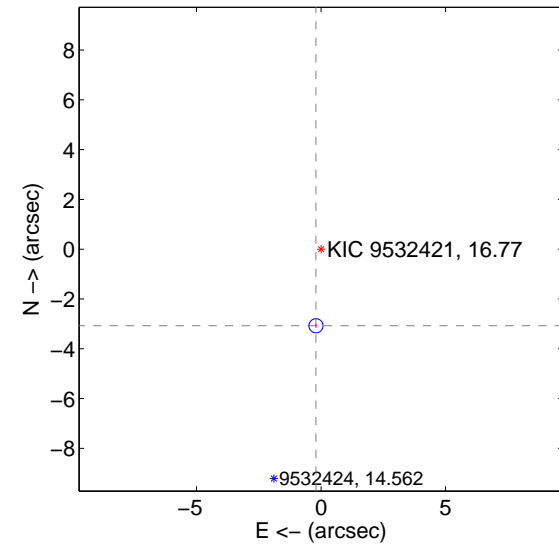
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



offset from photometric centroids

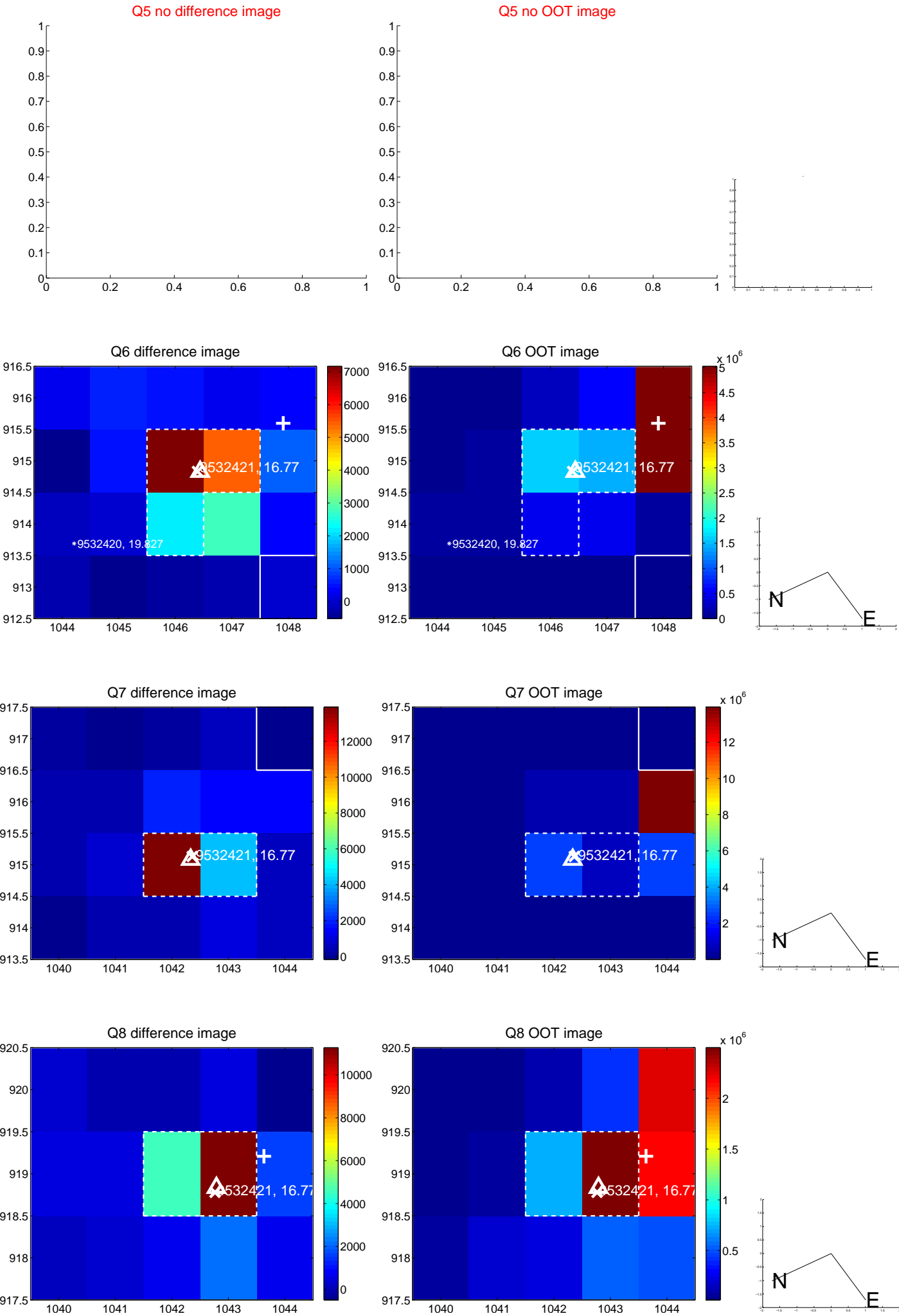


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

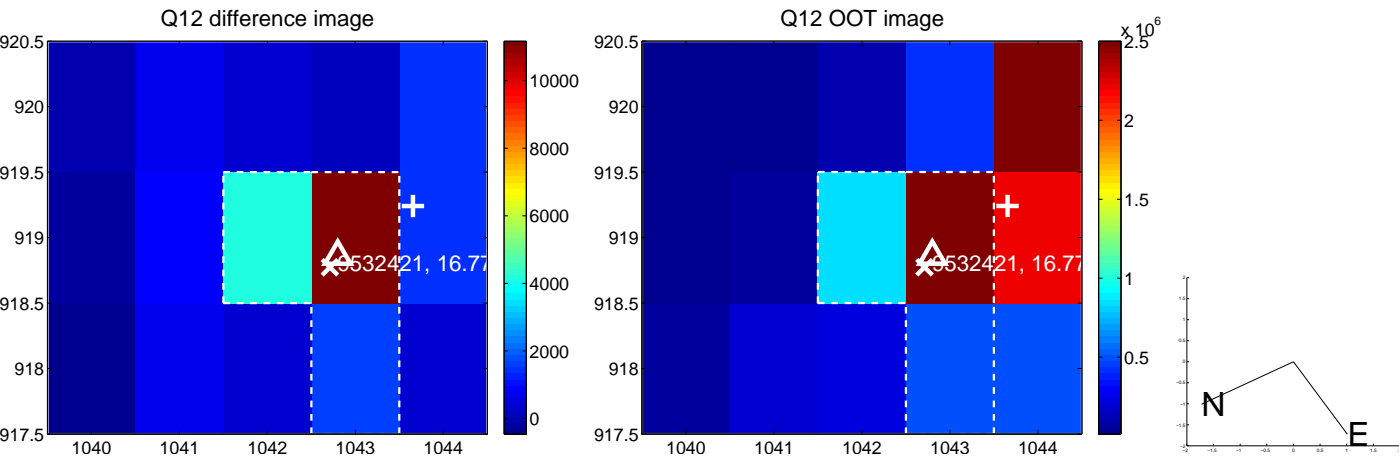
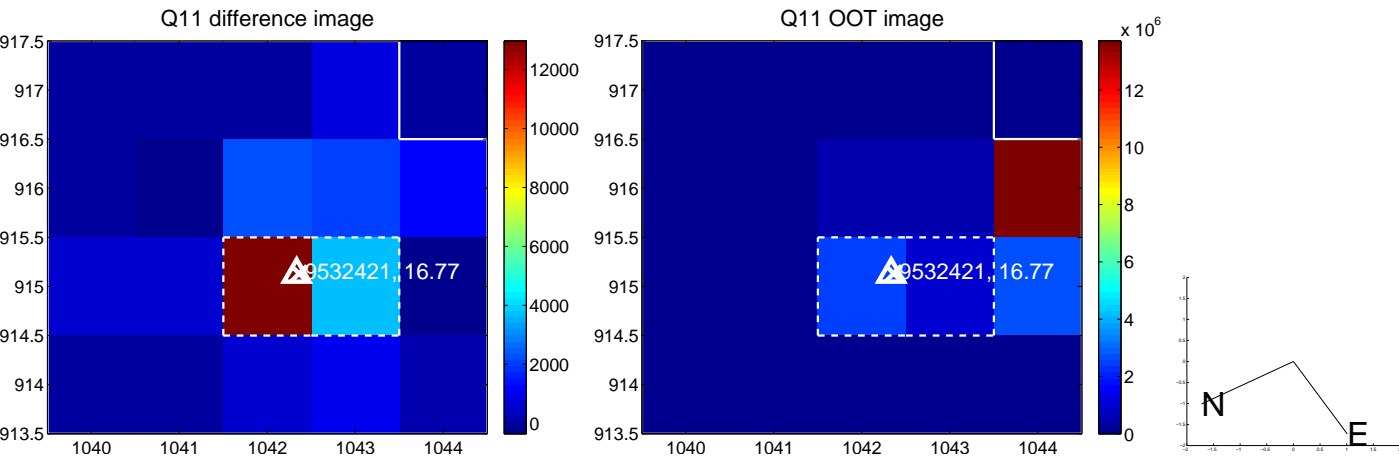
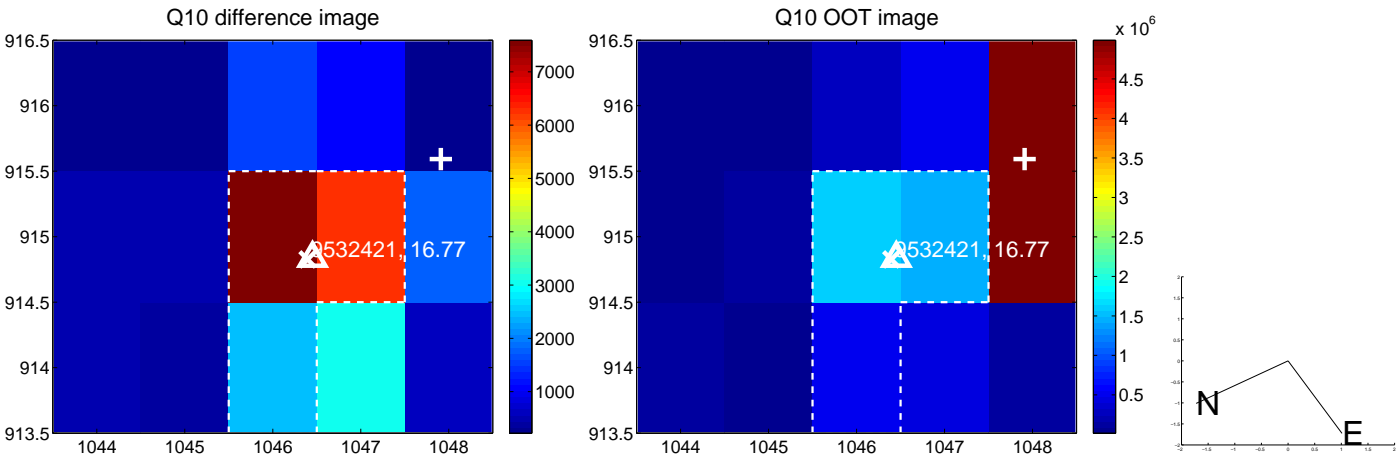
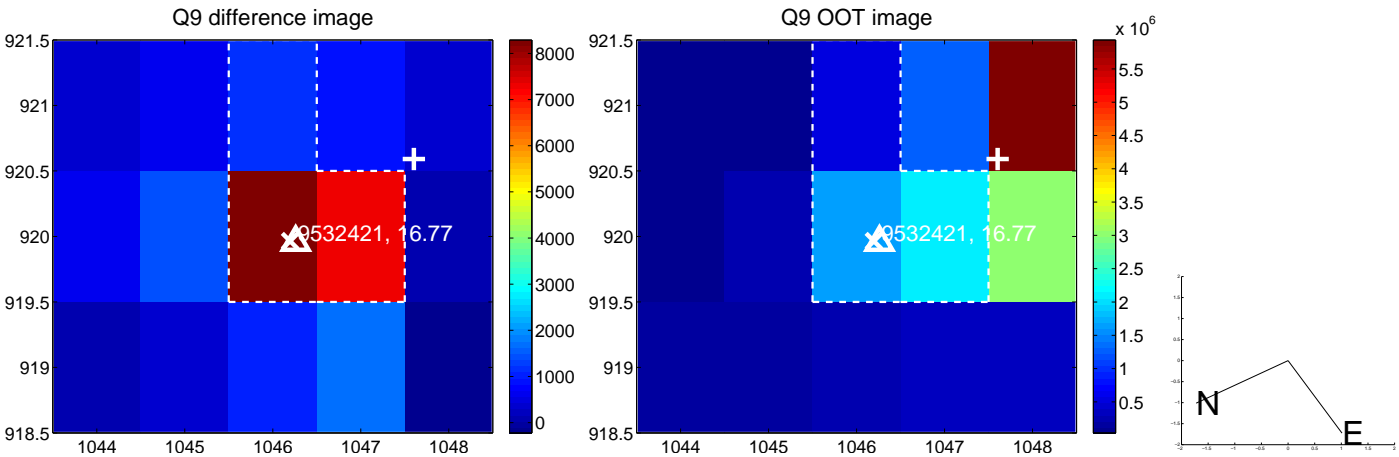
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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.



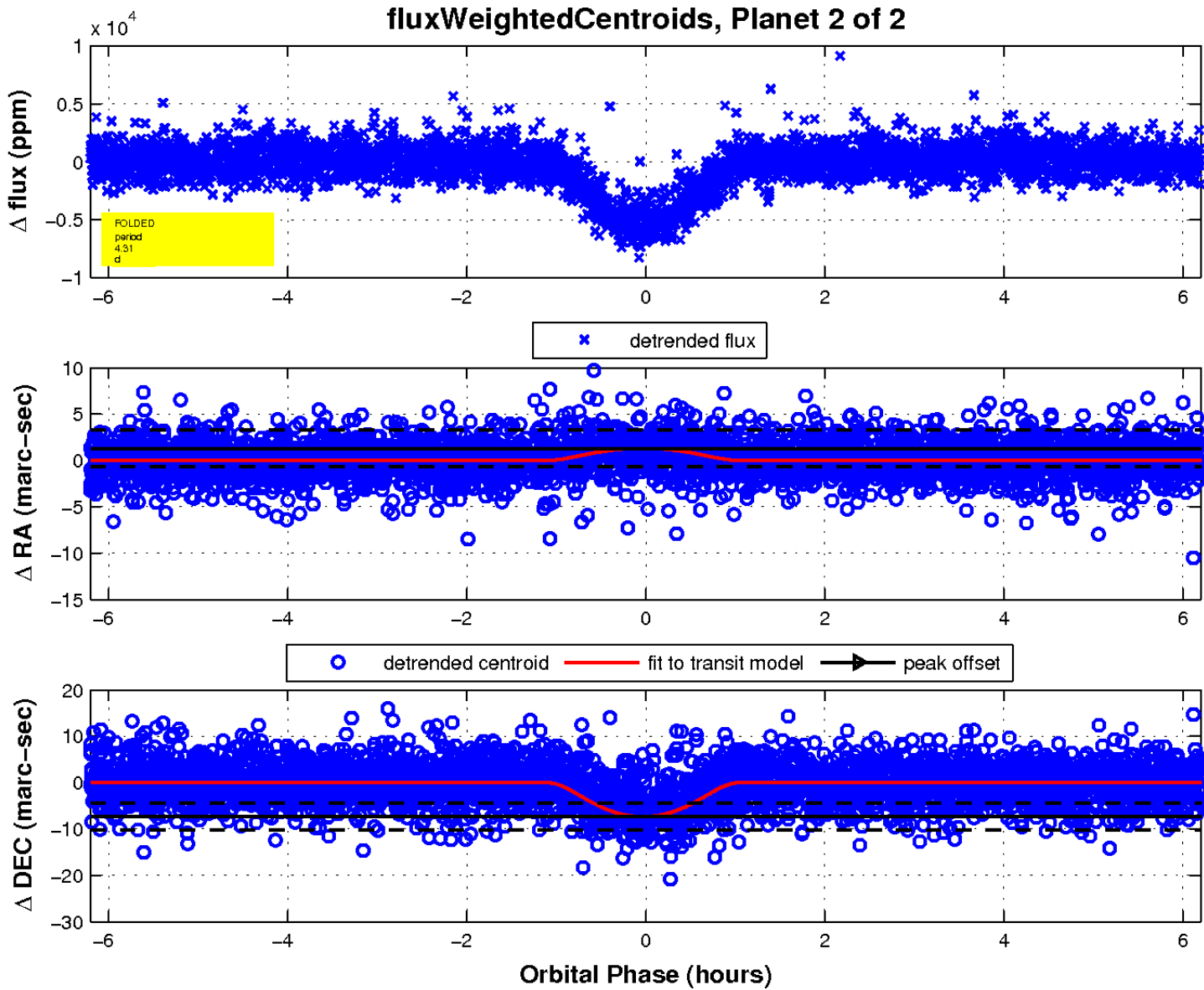
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

