

KIC 009777090

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})
009777090-01	OBS	3672.01	5.508267	134.315770	218460.7	3.772	577.5	429.1	0.64	5051	44.96	82.60
009777090-02	OBS	No	5.508217	131.541924	65883.4	3.683	194.9	182.3	0.64	5051	26.07	82.60

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009777090-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—DEEP_V_SHAPED—HAS_SEC_TCE—CENT_FEW_DIFFS
009777090-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE—CENT_FEW_DIFFS

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

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

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

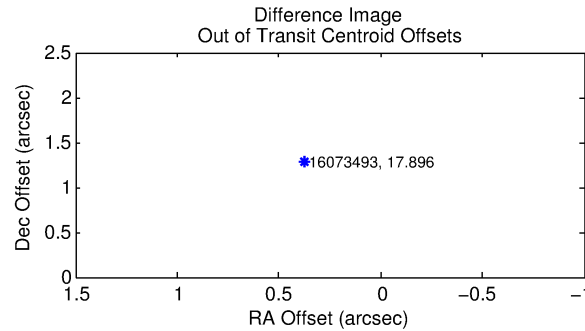
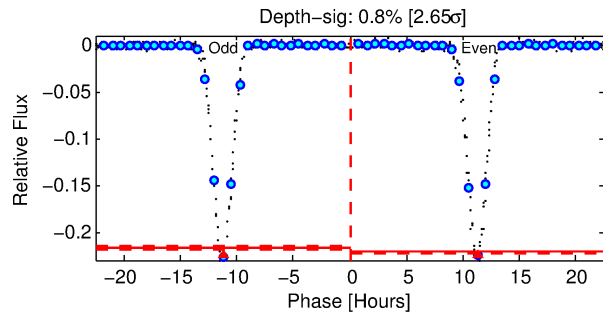
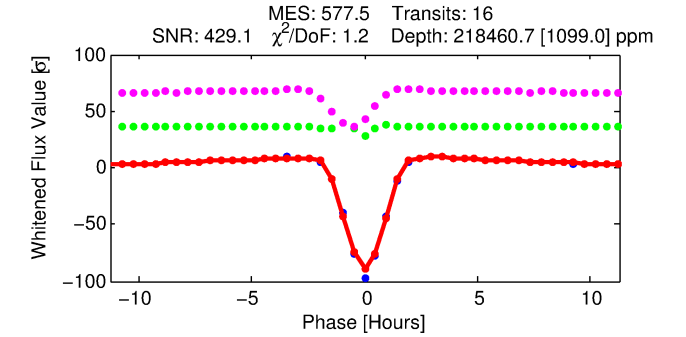
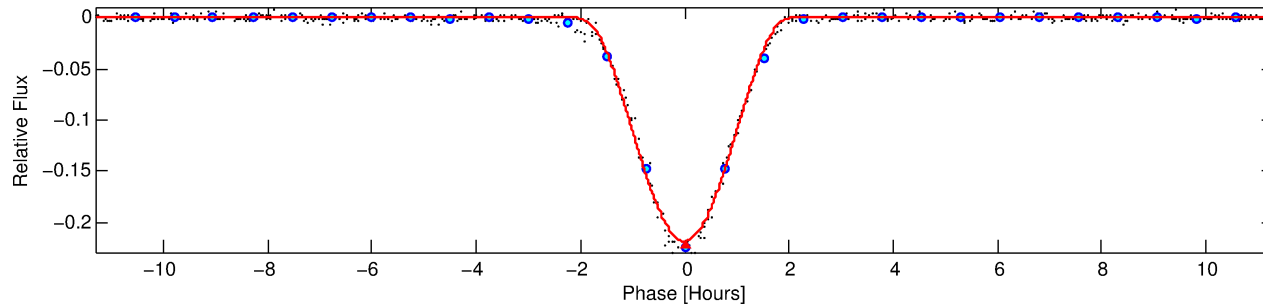
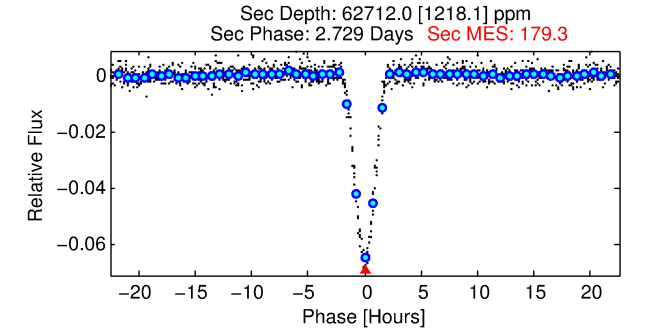
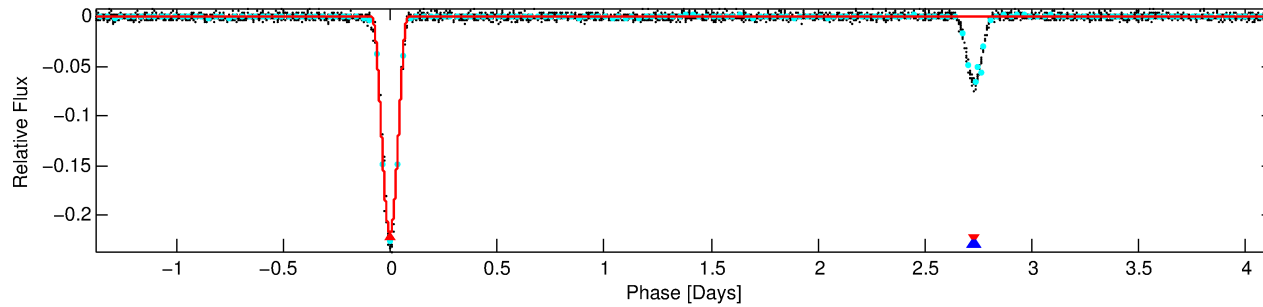
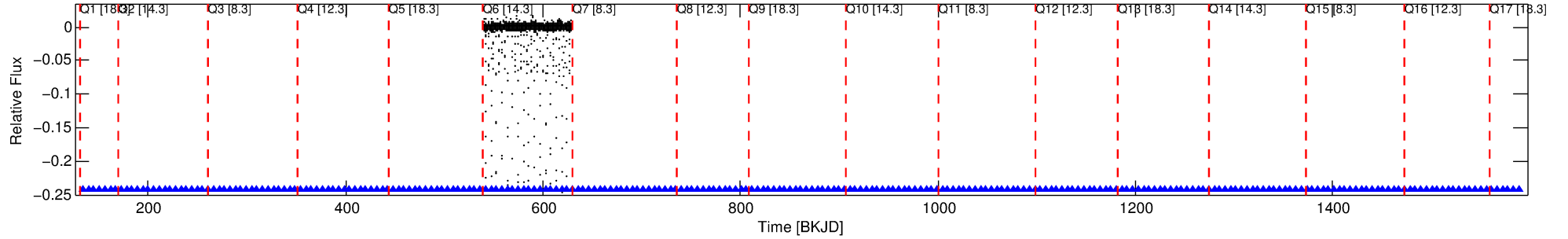
Ephemeris Match Information For 009777090-01

No Significant Match Found

DV One-Page Summary

KIC: 9777090 Candidate: 1 of 2 Period: 5.508 d
KOI: K03672.01 Corr: 0.948

Kp: 17.78 R*: 0.64 Rs Teff: 5051.0 K Logg: 4.66 Fe/H: -0.540



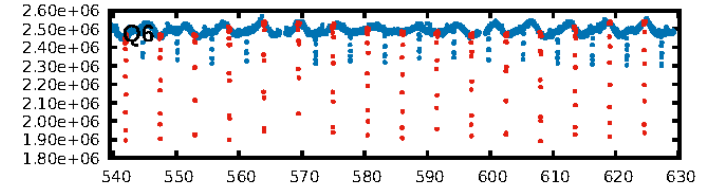
DV Fit Results:

Period = 5.50827 [0.00002] d
Epoch = 134.3158 [0.0015] BKJD
Rp/R* = 0.6397 [0.1349]
a/R* = 15.49 [0.61]
b = 0.88 [0.18]
Seff = 82.60 [16.42]
Teq = 769 [38] K
Rp = 44.96 [11.07] Re
a = 0.0541 [0.0054] AU
Ag = 49.98 [22.18] [2.21σ]
Teffp = 3160 [352] K [6.75σ]

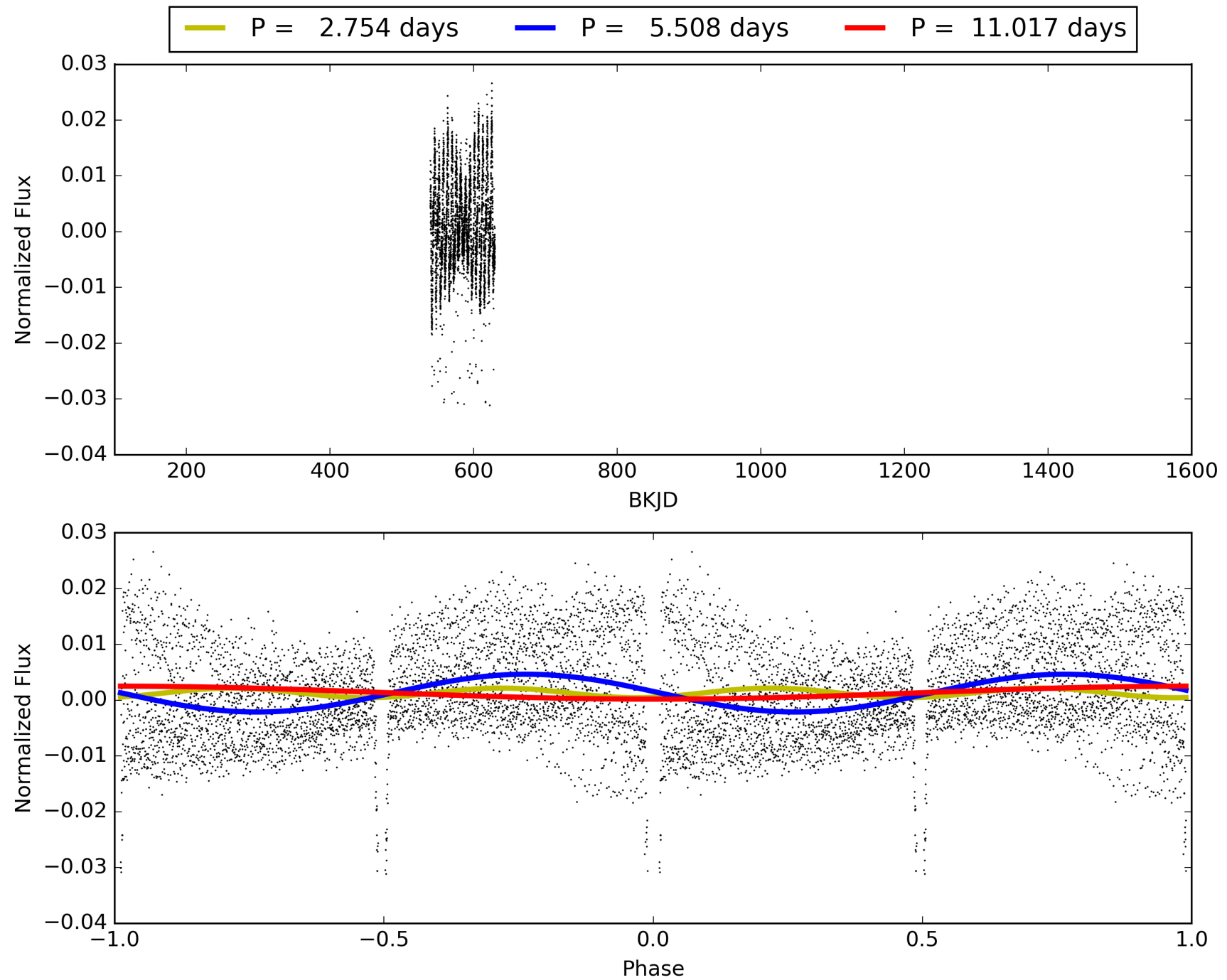
DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 76.5%
ModelChiSquareGoF-sig: 92.9%
Bootstrap-pfa: 0.00e+00
RollingBand-fgt: 1.00 [16/16]
GhostDiagnostic-chr: 2.117
Centroid-sig: 0.0%
Centroid-so: 0.904 arcsec [78.51σ]
OotOffset-rm: N/A
OotOffset-st: 0/0/0/0 [0]
KicOffset-rm: 0.794 arcsec [11.89σ]
KicOffset-st: 1/0/0/0 [1]
DiffImageQuality-fgm: 1.00 [1/1]
DiffImageOverlap-fno: 1.00 [1/1]

TCE 009777090-01, PDC Light Curves

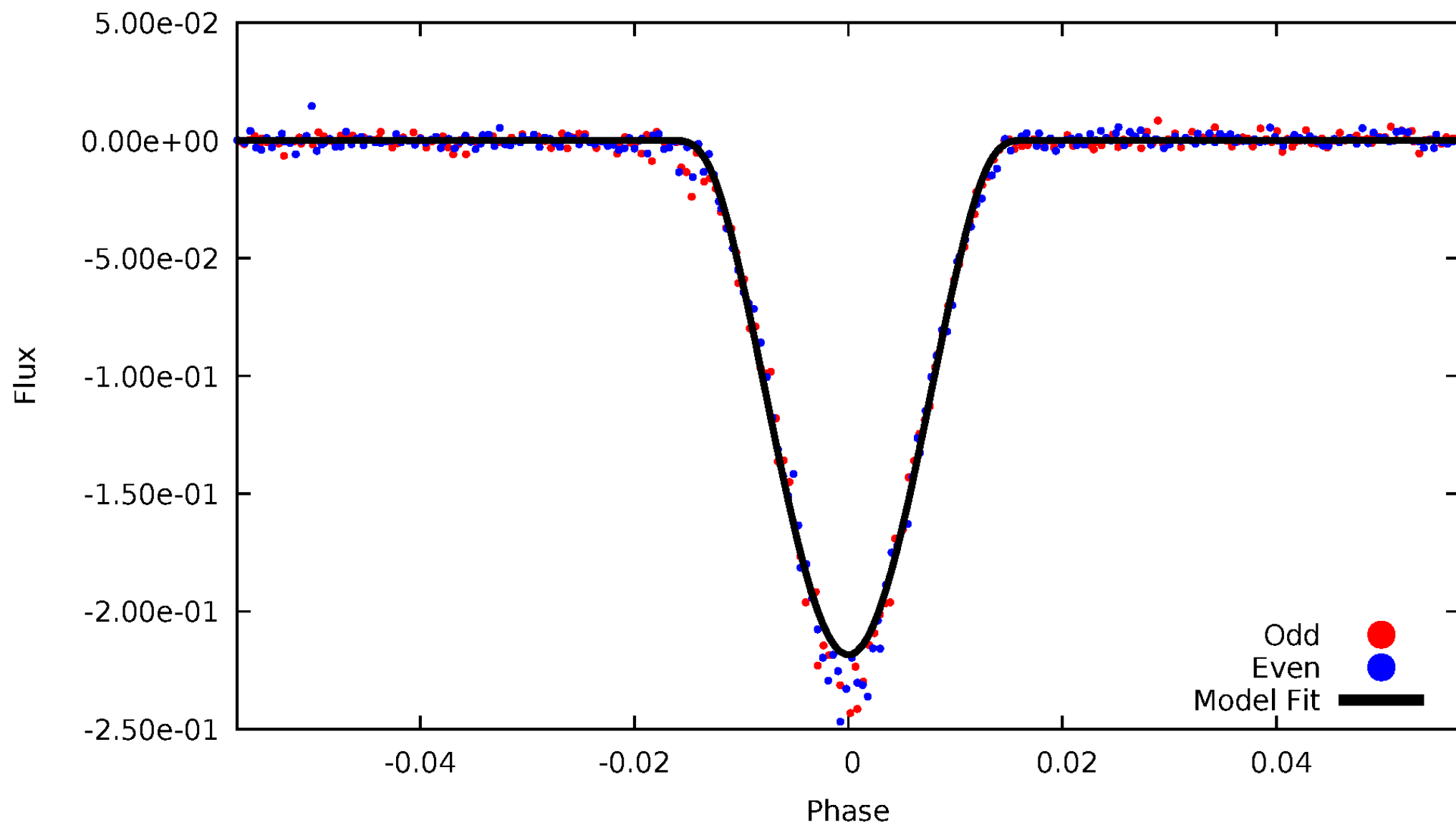


TCE 009777090-01



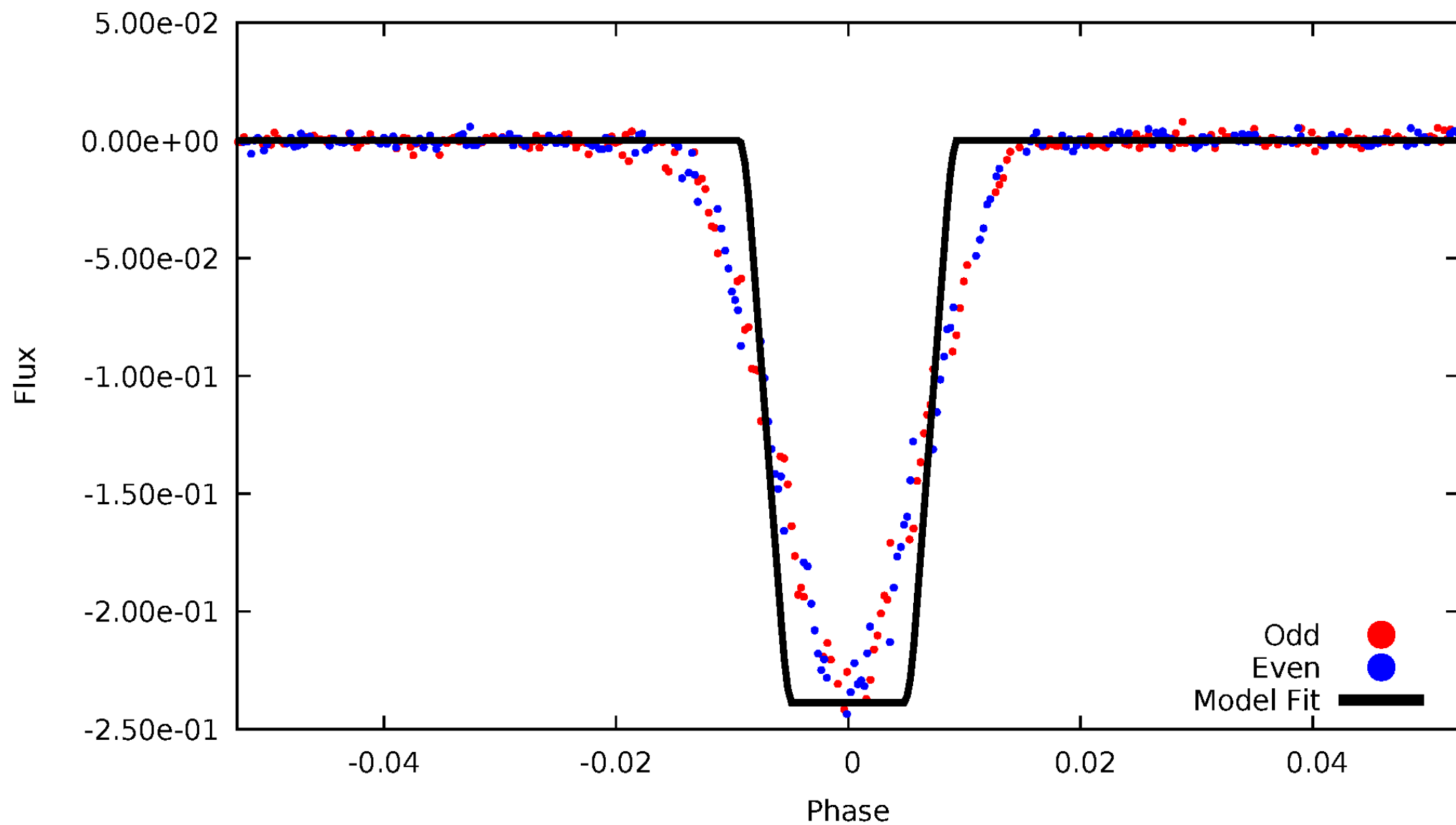
DV Odd/Even

TCE 009777090-01



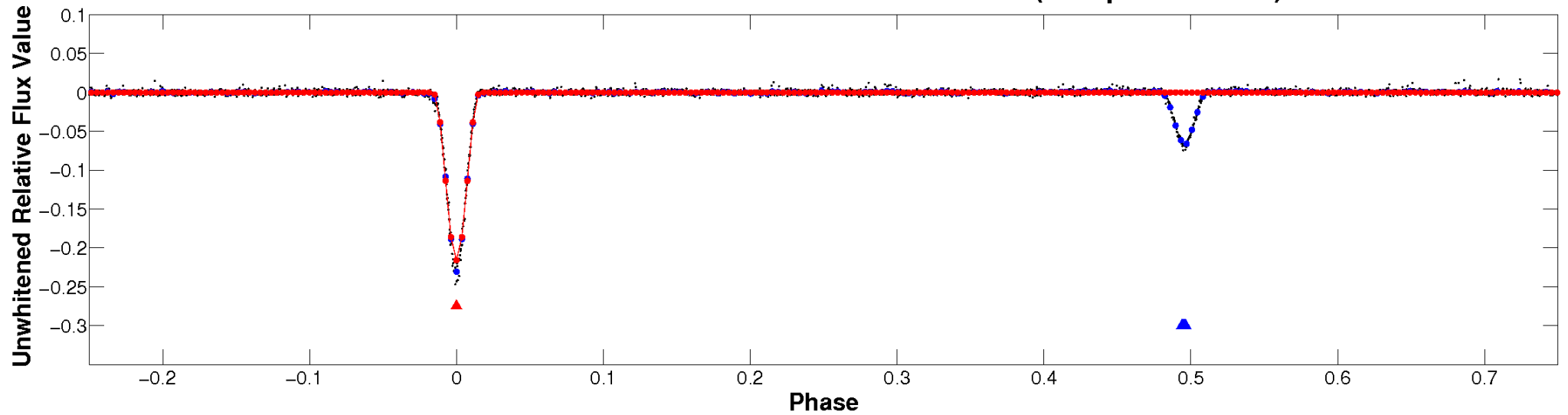
ALT Odd/Even

TCE 009777090-01

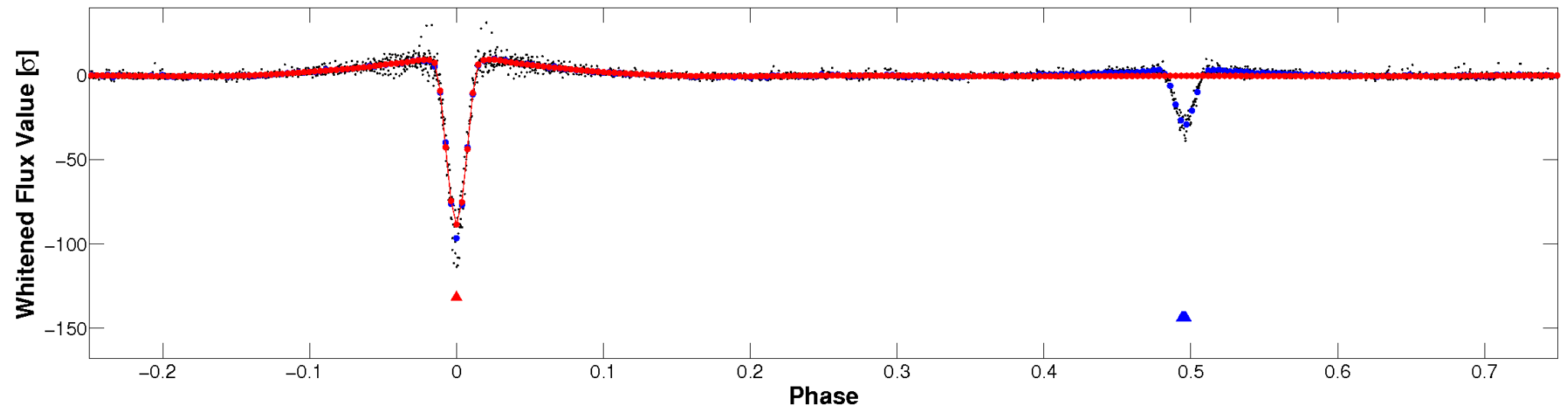


Non-Whitened Vs. Whitened Light Curve

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

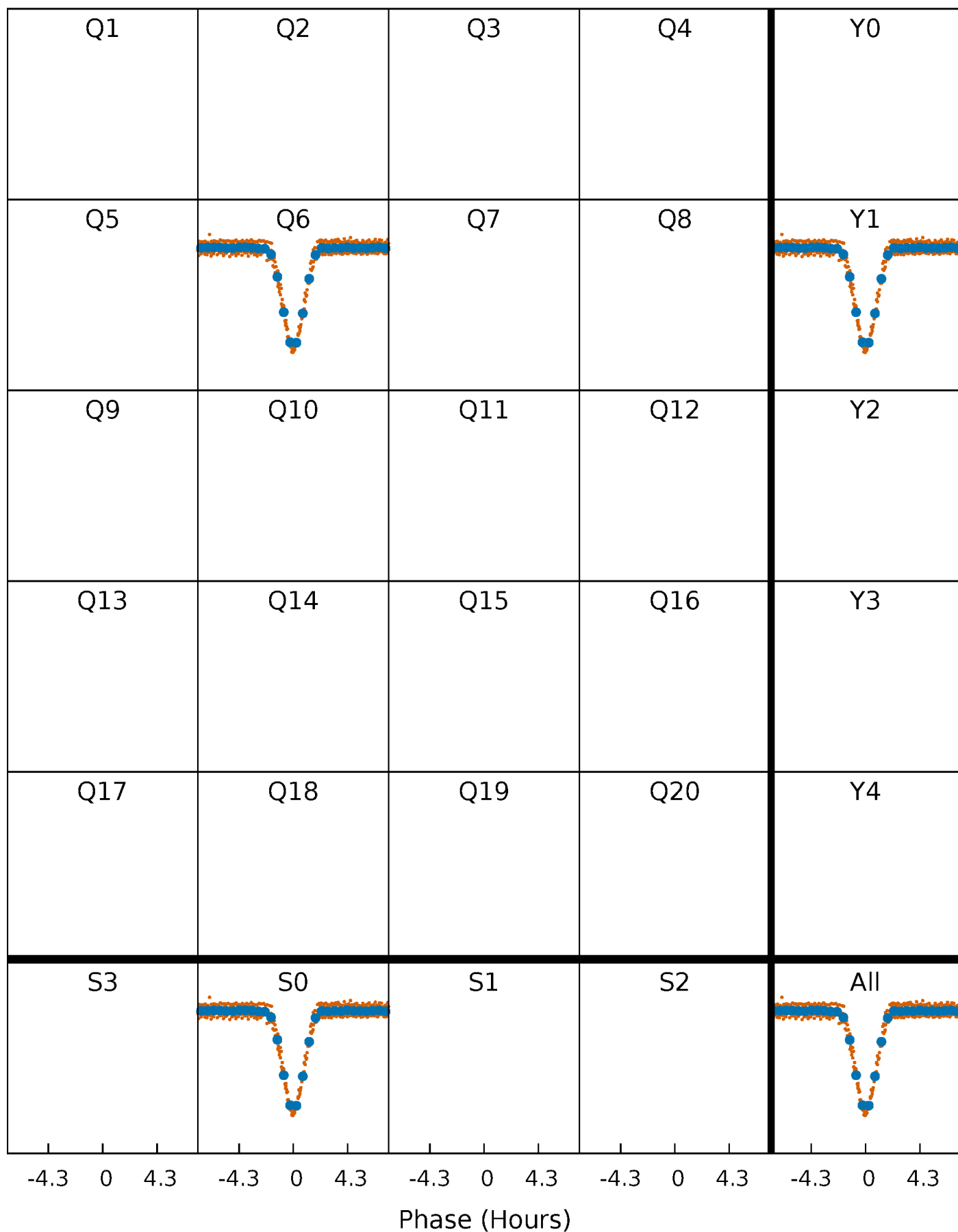


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



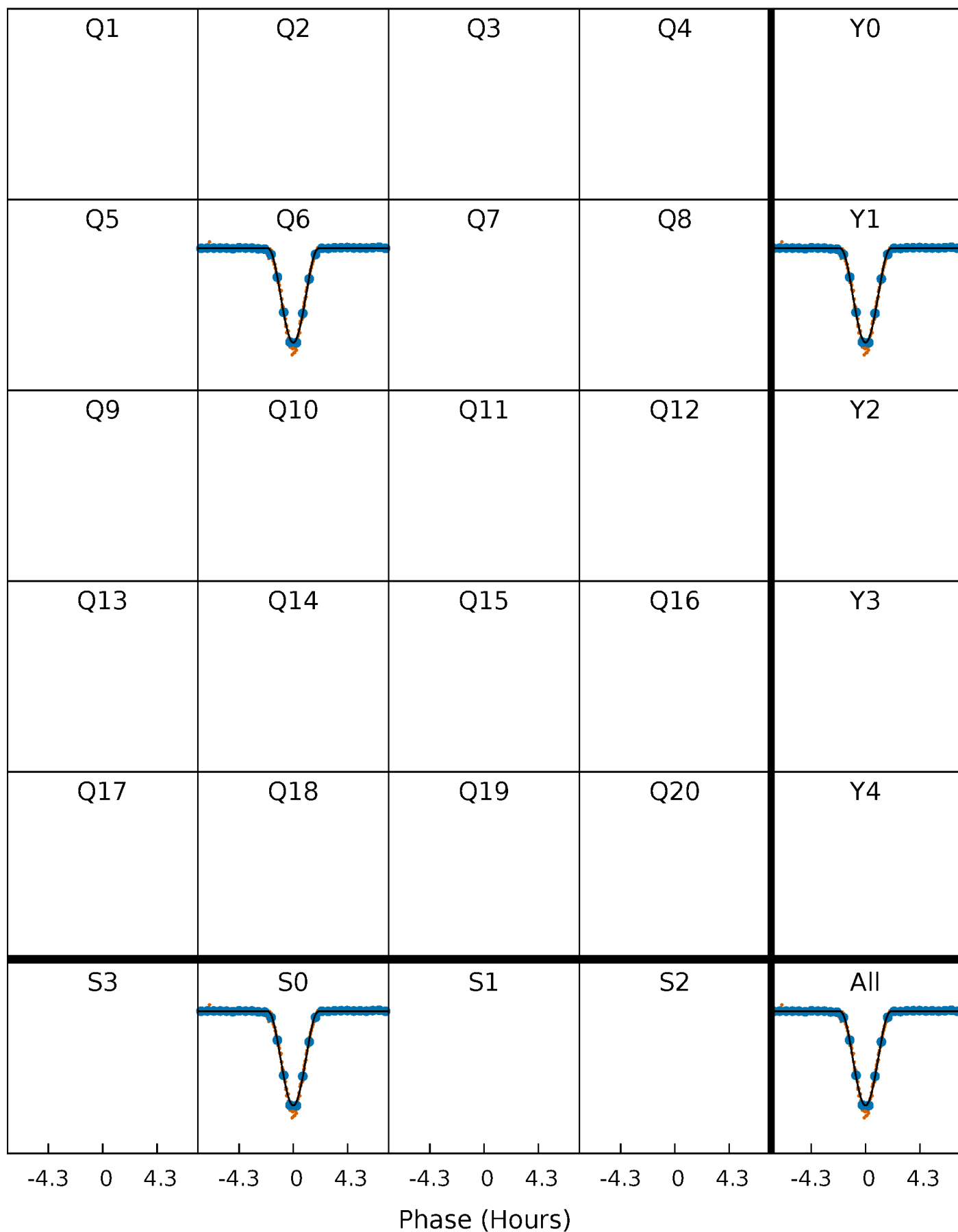
PDC Quarter-Phased Transit Curves

TCE 009777090-01 P= 5.508267 Days $T_0=134.315770$ (BKJD)



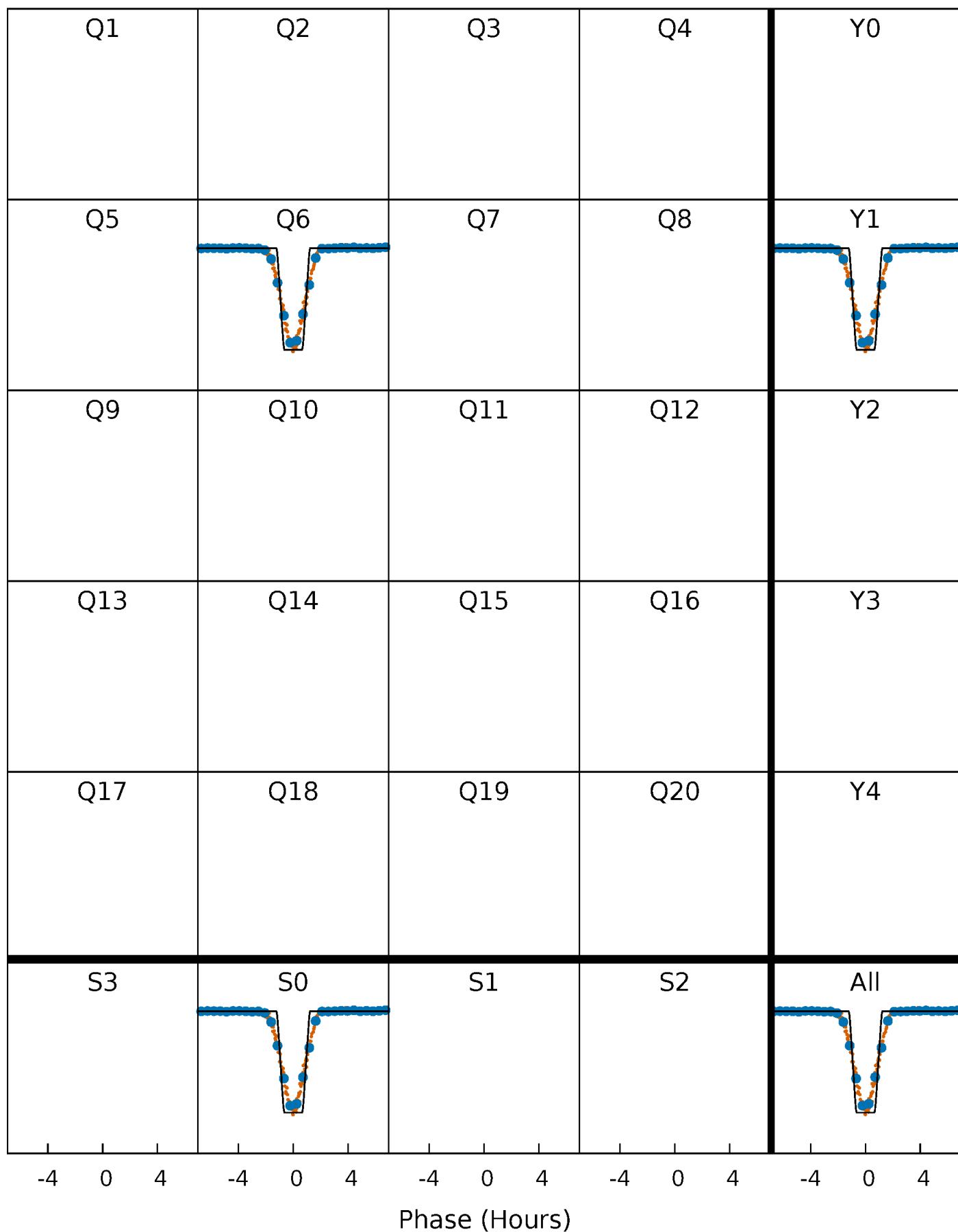
DV Quarter-Phased Transit Curves

TCE 009777090-01 P= 5.508267 Days $T_0=134.315770$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

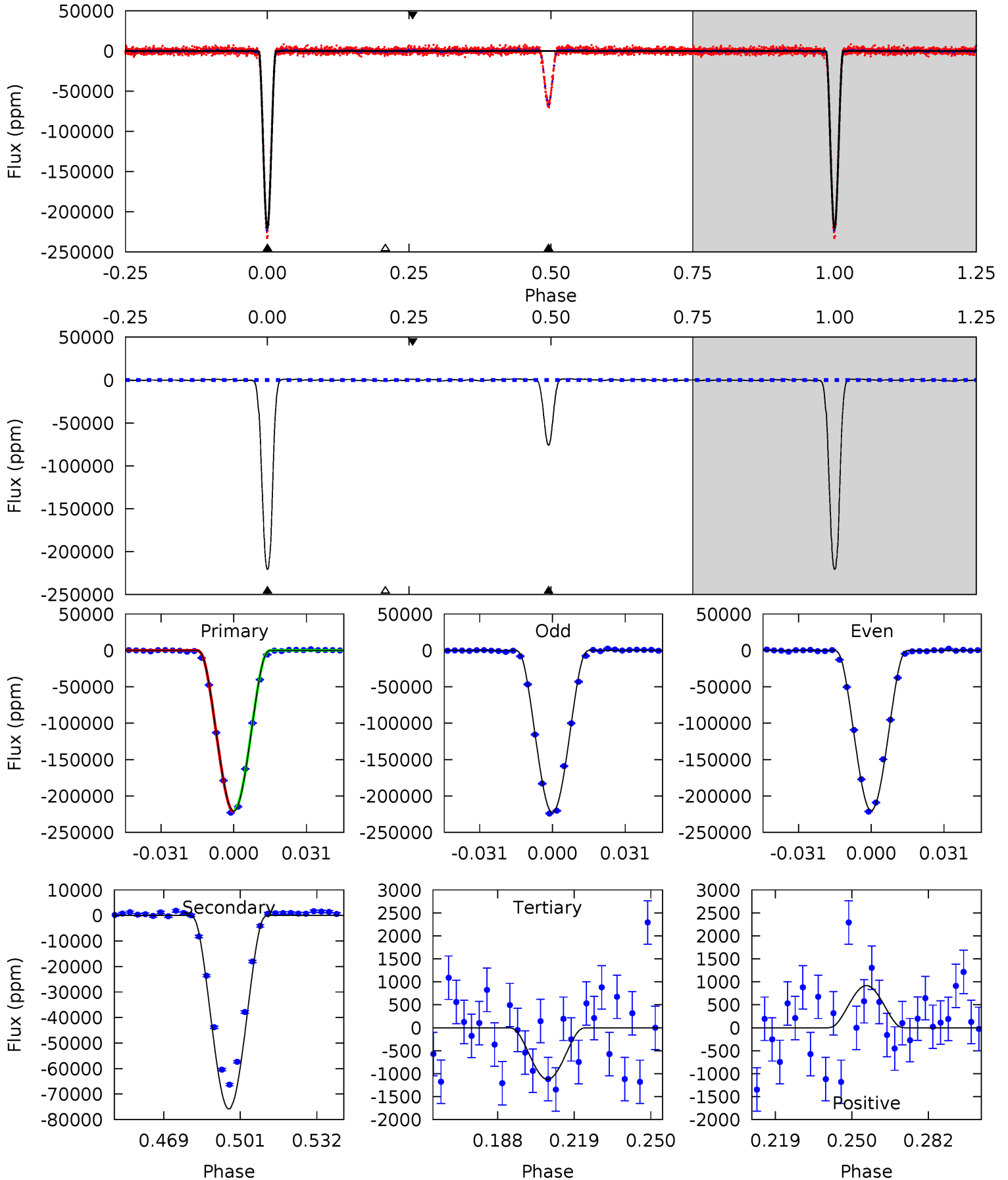
TCE 009777090-01 P= 5.507678 Days $T_0=134.364179$ (BKJD)



DV Model-Shift Uniqueness Test

009777090-01, P = 5.508267 Days, E = 134.315770 Days

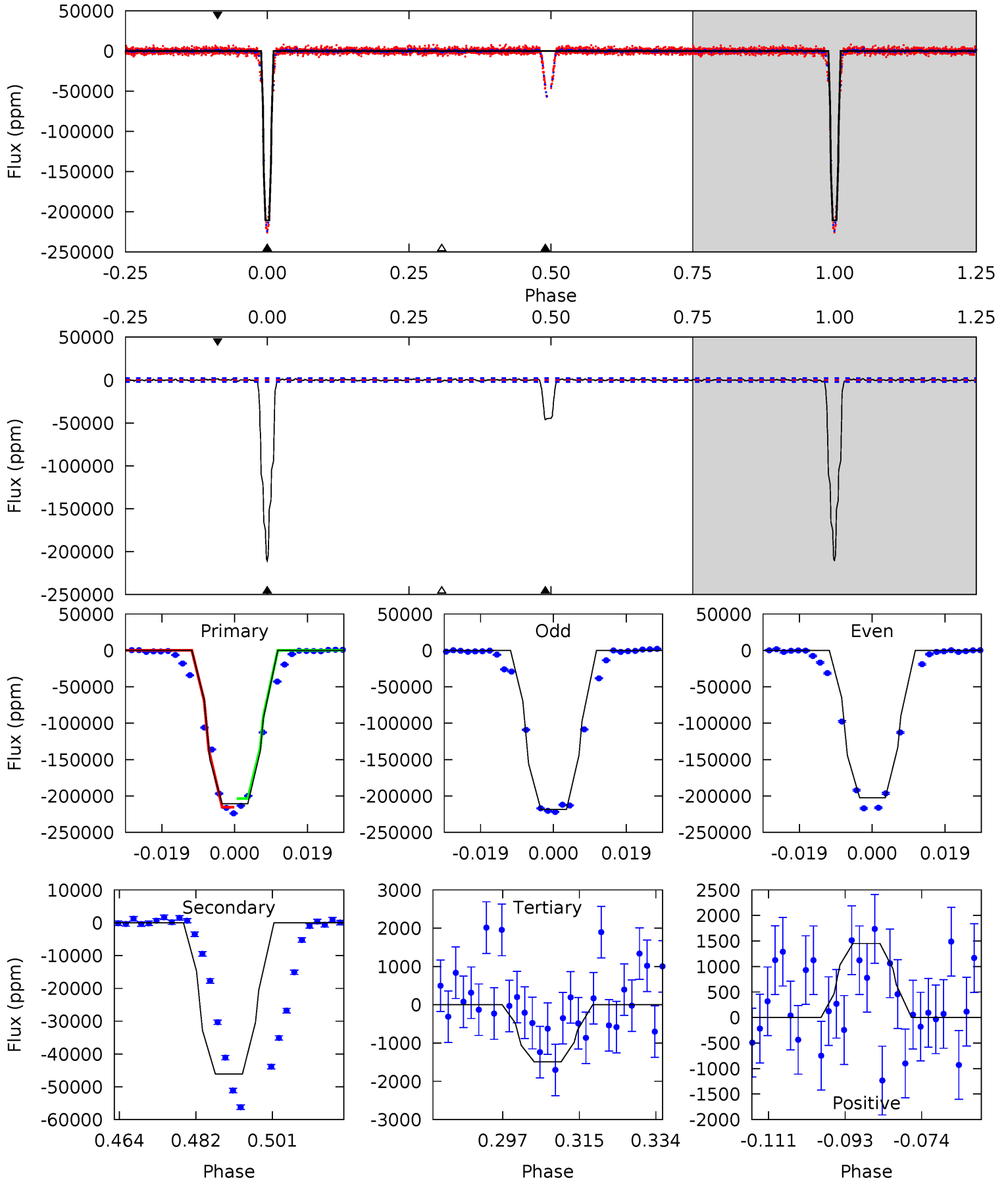
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
1044	358.6	5.31	4.34	4.80	2.15	2.32	1039	1040	353.3	354.3	6.20	1.00	0.01	5.27



Alt Model-Shift Uniqueness Test

009777090-01, P = 5.507678 Days, E = 134.364179 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
480.7	105.2	3.40	3.31	4.91	2.35	1.22	477.3	477.4	101.8	101.9	19.1	0.99	0.01	11.5



Stellar Parameters For KIC 009777090

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	M (M_{\odot})	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	5051^{+182}_{-182}	$4.663^{+0.030}_{-0.070}$	$-0.540^{+0.300}_{-0.300}$	$0.644^{+0.082}_{-0.047}$	$0.696^{+0.068}_{-0.061}$	$3.676^{+0.575}_{-0.869}$
	+4%/-4%	+1%/-2%	+56%/-56%	+13%/-7%	+10%/-9%	+16%/-24%
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 009777090-01 / KOI 3672.01

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-75759 ± 211	$45.12^{+11.03}_{-10.24}$	1082^{+49}_{-43}	3739^{+349}_{-262}	64^{+43}_{-22}
Alt.	-46103 ± 438	$34.68^{+10.04}_{-9.68}$	1084^{+45}_{-46}	3746^{+473}_{-308}	65^{+56}_{-26}

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 $A_{\text{obs}} \gg 1.0$

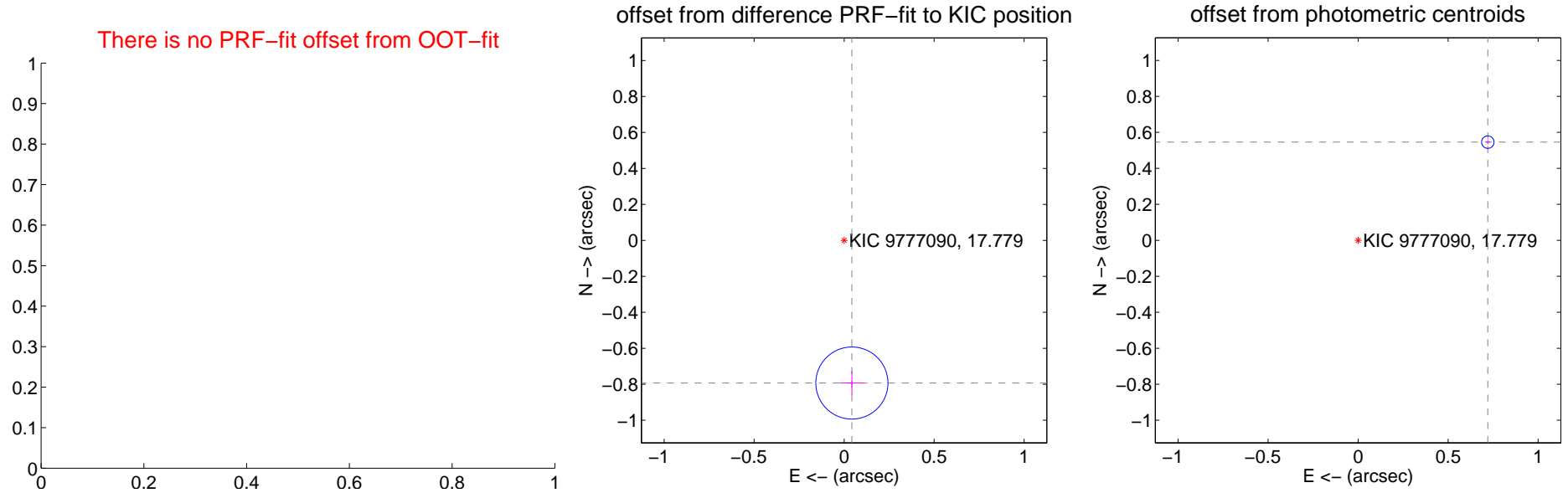
DV Centroid Data

Supplemental centroid analysis for 009777090-01. Kepler magnitude: 17.78. Transit SNR 429.06

There are 1 quarters with good PRF difference image offsets

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

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	—	—	—	—
PRF-fit source offset from KIC position	0.794 ± 0.067	11.89	-0.043 ± 0.067	-0.793 ± 0.067
photometric centroid source offset	0.90 ± 0.01	78.51	-0.72 ± 0.01	0.55 ± 0.01



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.

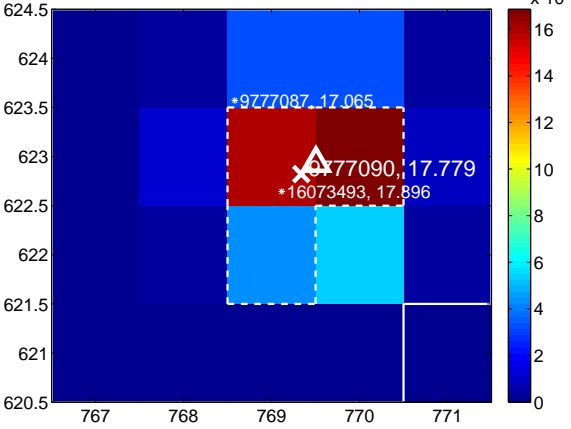
Q5 no difference image



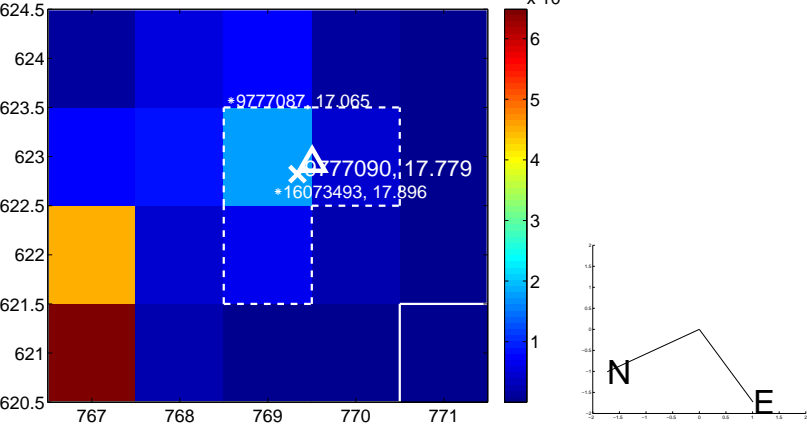
Q5 no OOT image



Q6 difference image



Q6 OOT image



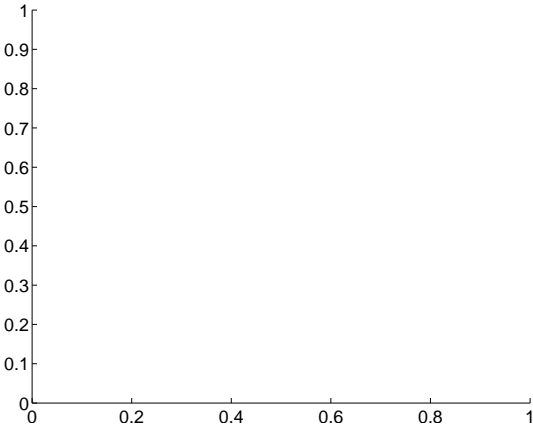
Q7 no difference image



Q7 no OOT image



Q8 no difference image



Q8 no OOT image



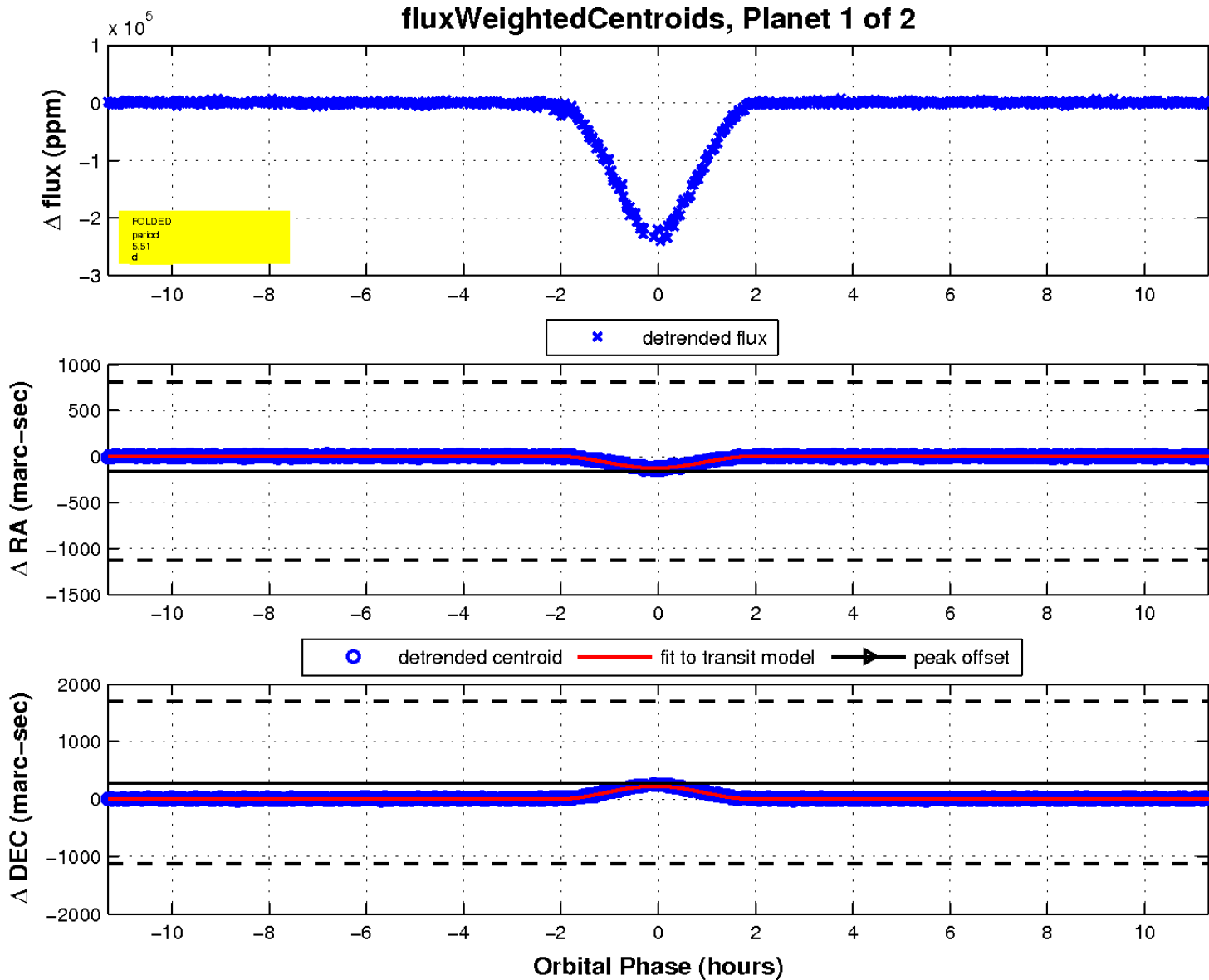
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



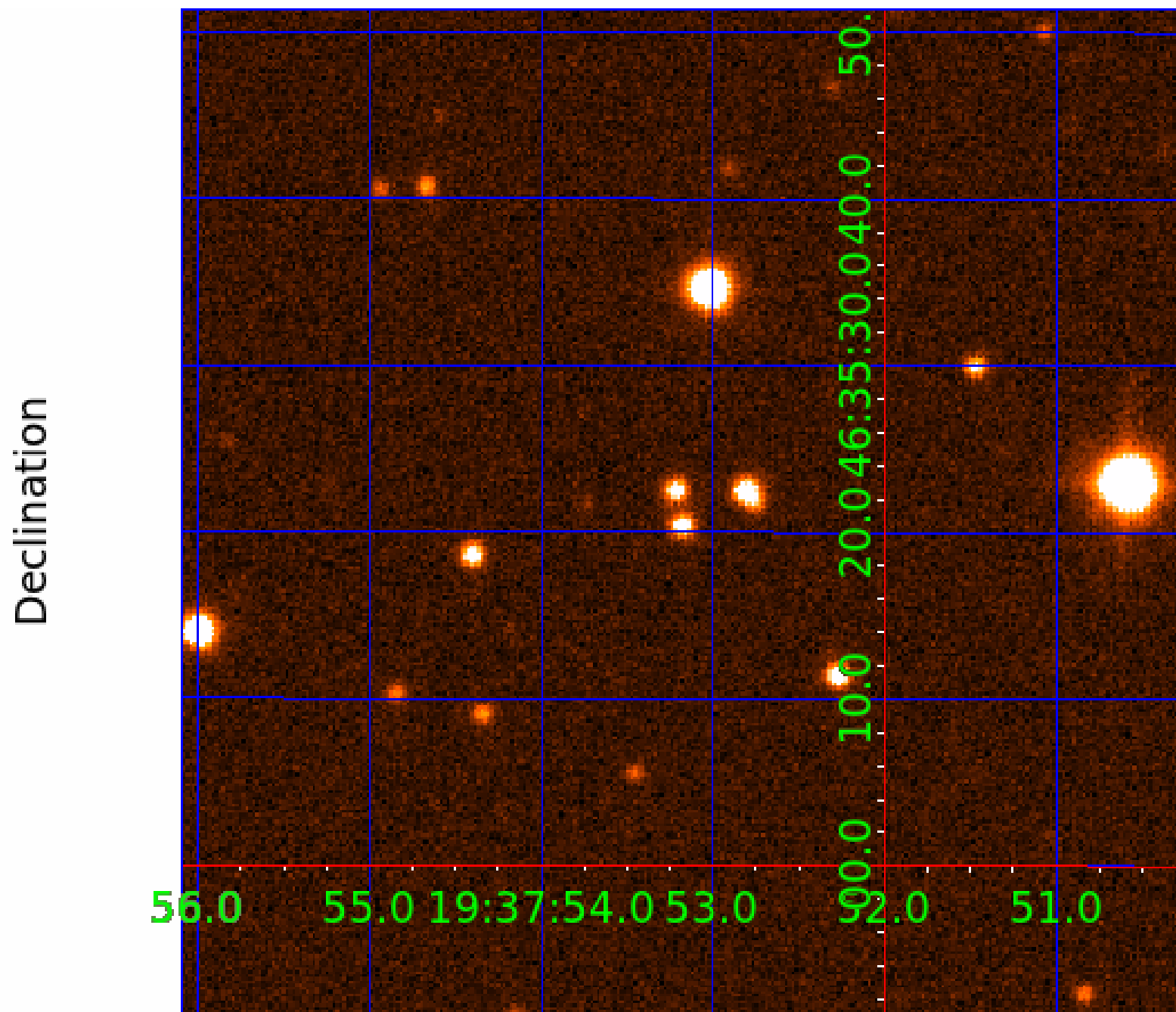
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



UKIRT Image



KIC 009777090

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})
009777090-01	OBS	3672.01	5.508267	134.315770	218460.7	3.772	577.5	429.1	0.64	5051	44.96	82.60
009777090-02	OBS	No	5.508217	131.541924	65883.4	3.683	194.9	182.3	0.64	5051	26.07	82.60

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009777090-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—DEEP_V_SHAPED—HAS_SEC_TCE—CENT_FEW_DIFFS
009777090-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE—CENT_FEW_DIFFS

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

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

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

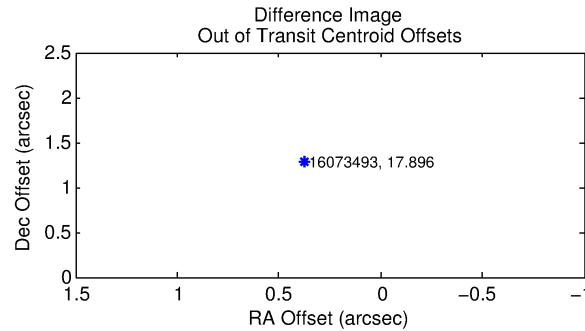
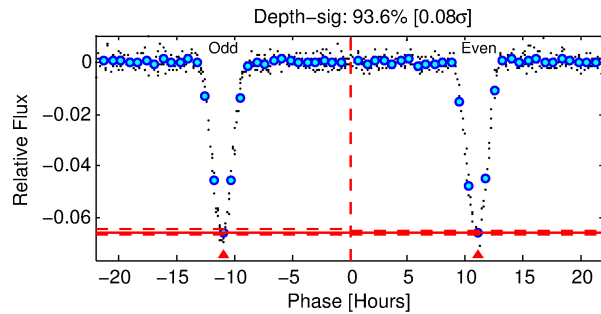
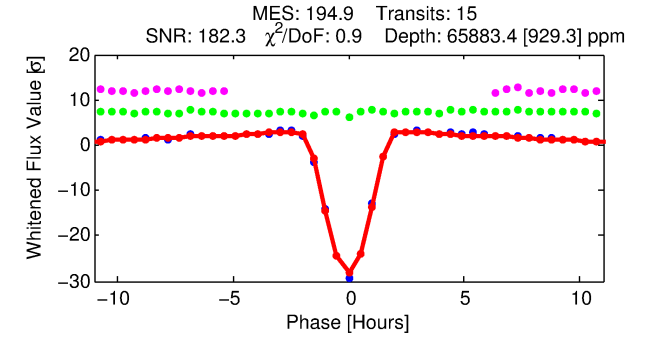
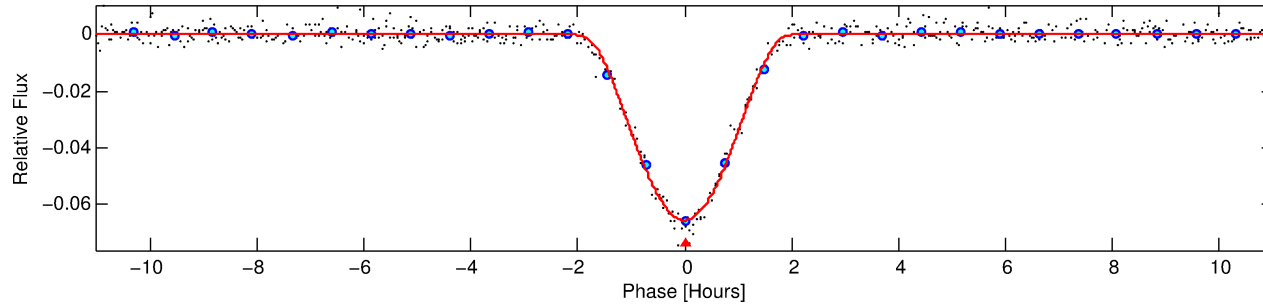
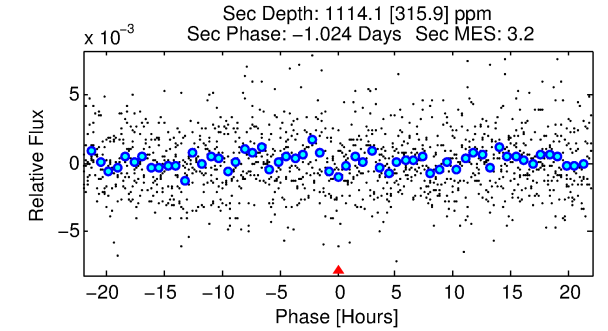
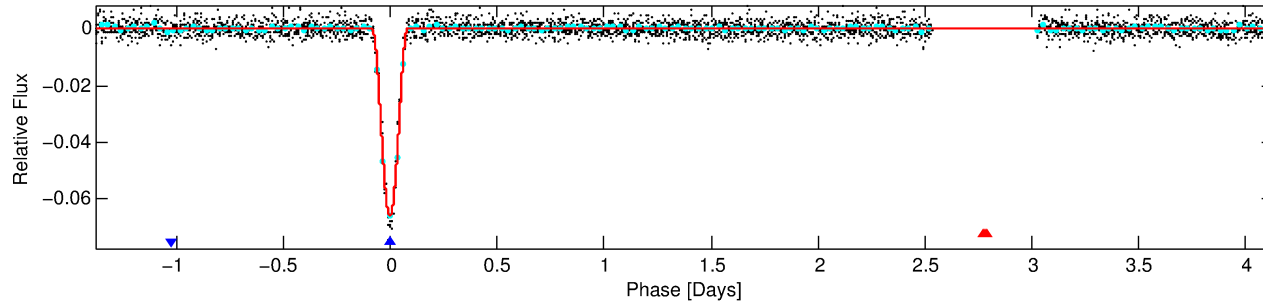
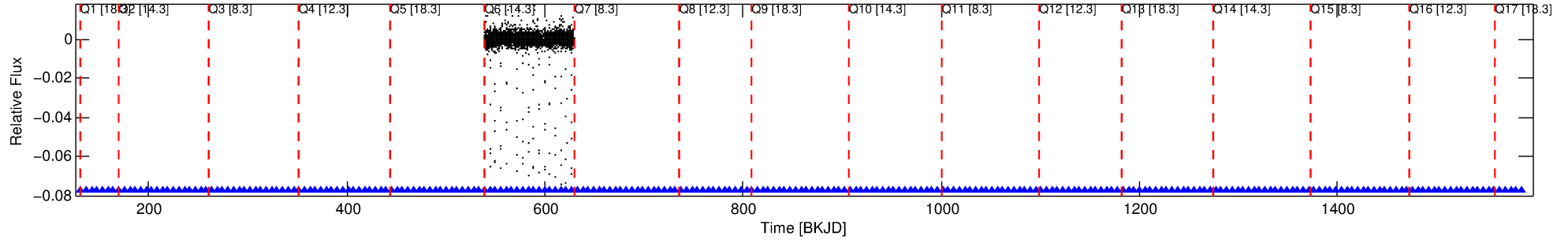
Ephemeris Match Information For 009777090-02

No Significant Match Found

DV One-Page Summary

KIC: 9777090 Candidate: 2 of 2 Period: 5.508 d
KOI: K03672 Corr: No Ephemeris Match

Kp: 17.78 R*: 0.64 Rs Teff: 5051.0 K Logg: 4.66 Fe/H: -0.540



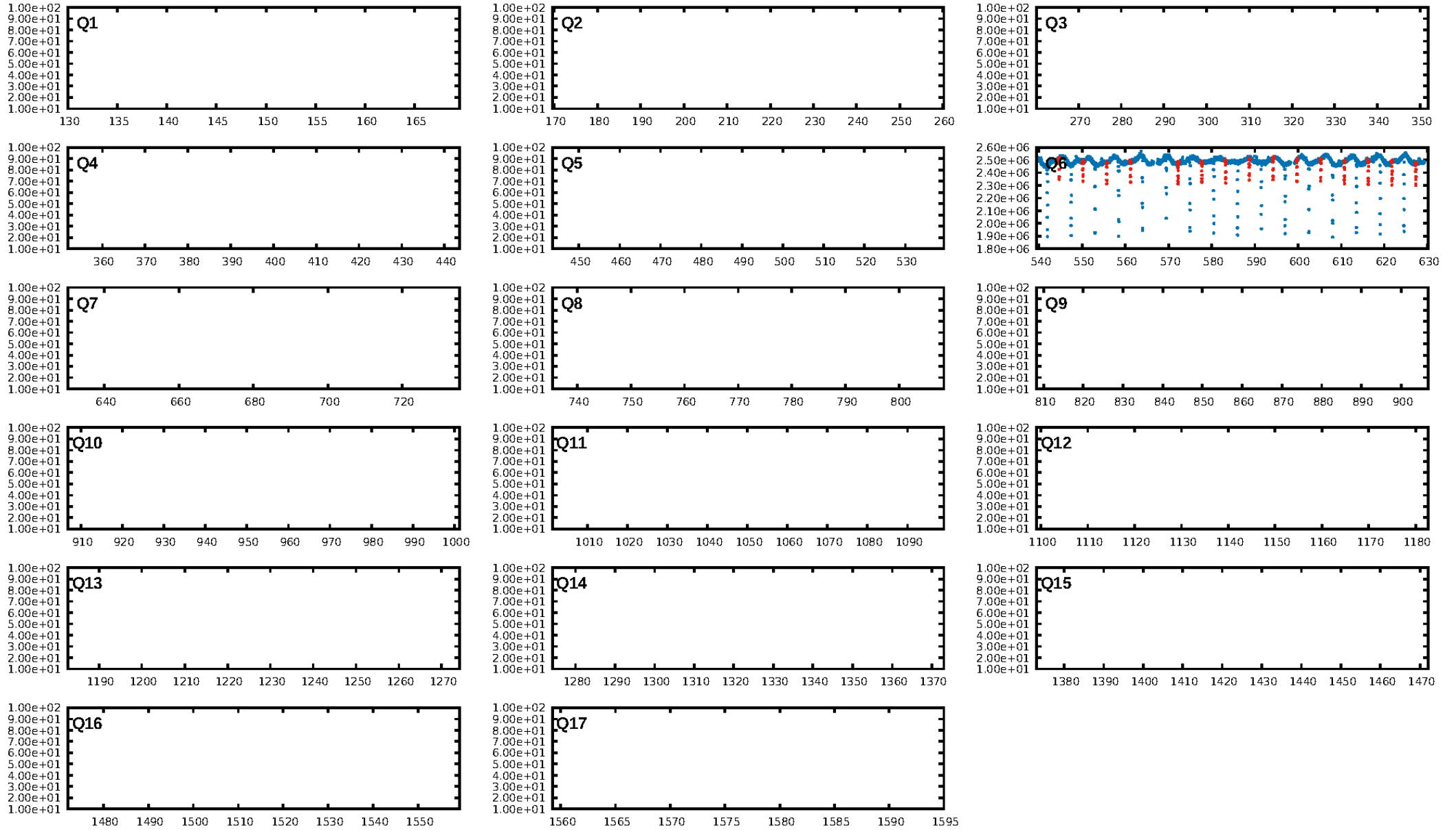
DV Fit Results:

Period = 5.50822 [0.00005] d
Epoch = 131.5419 [0.0037] BKJD
Rp/R* = 0.3710 [0.2566]
a/R* = 11.36 [0.11]
b = 0.95 [0.36]
Seff = 82.60 [16.42]
Teq = 769 [38] K
Rp = 26.07 [18.33] Re
a = 0.0541 [0.0054] AU
Ag = 2.64 [3.75] [0.44σ]
Teffp = 1515 [538] K [1.38σ]

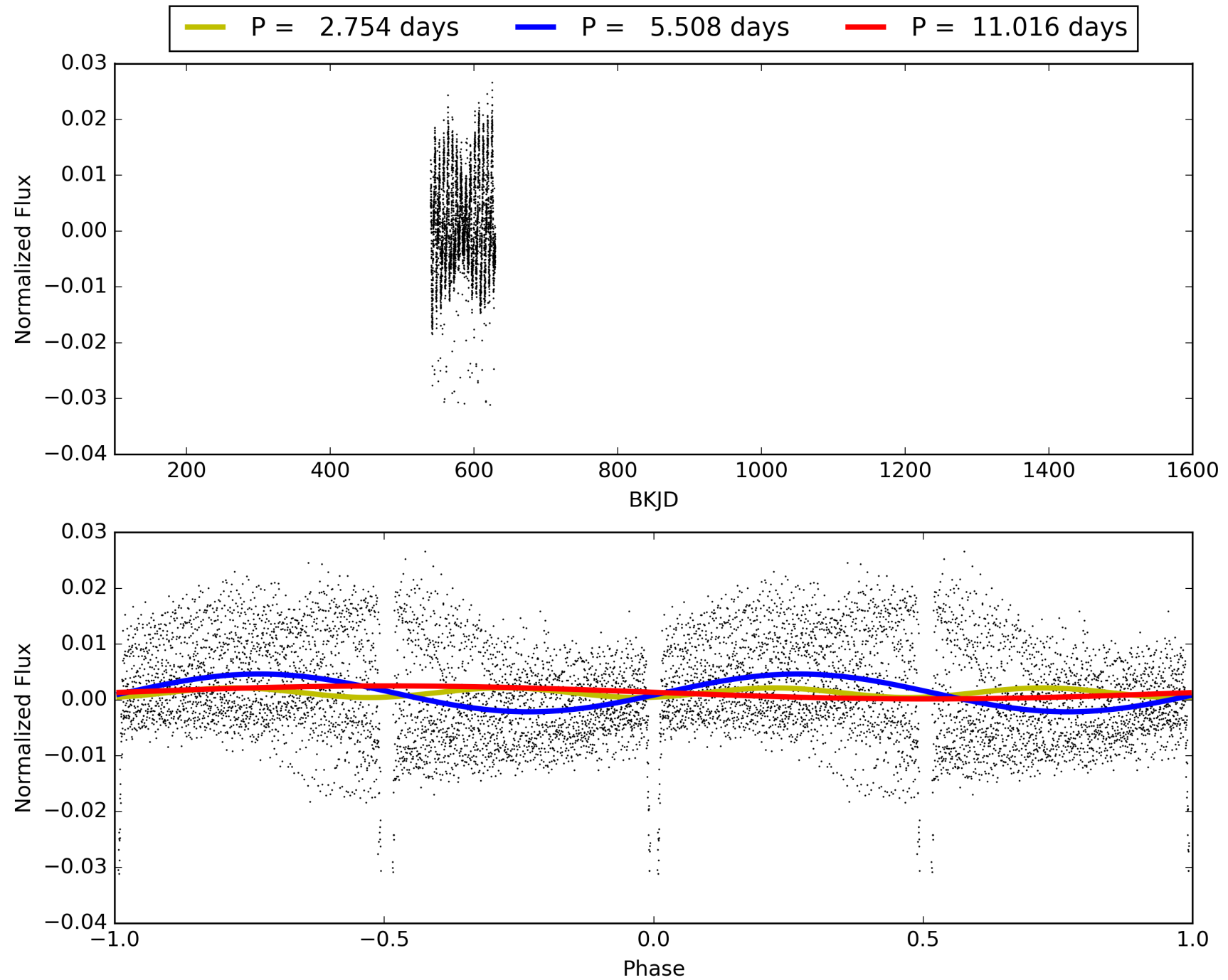
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 0.0% [0.00σ]
ModelChiSquare2-sig: 28.9%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 0.00e+00
RollingBand-fgt: 1.00 [15/15]
GhostDiagnostic-chr: 3.1
Centroid-sig: 0.0%
Centroid-so: 0.901 arcsec [23.93σ]
OotOffset-rm: N/A
OotOffset-st: 0/0/0 [0]
KicOffset-rm: 0.779 arcsec [11.53σ]
KicOffset-st: 1/0/0 [1]
DiffImageQuality-fgm: 1.00 [1/1]
DiffImageOverlap-fno: 1.00 [1/1]

TCE 009777090-02, PDC Light Curves

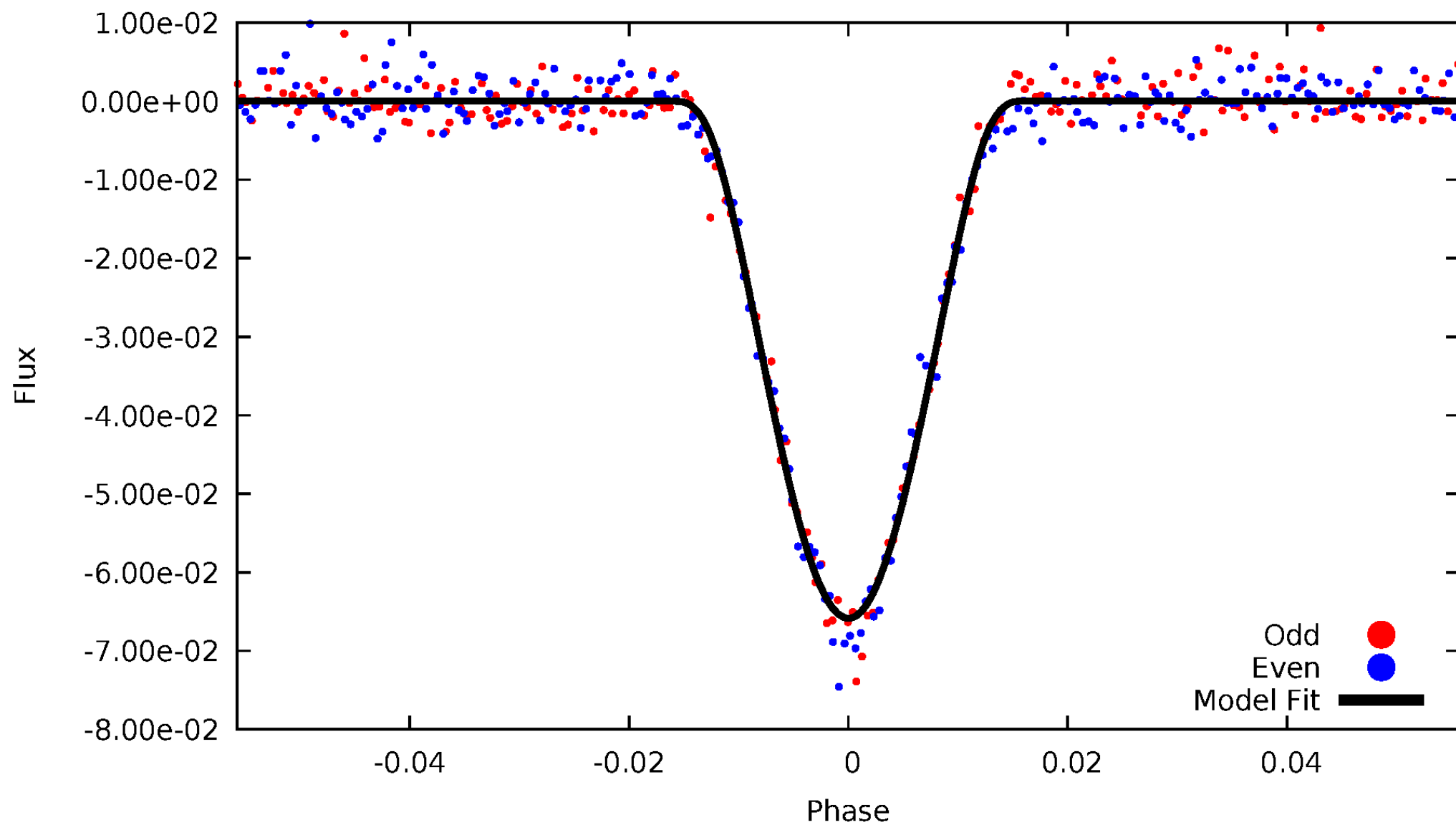


TCE 009777090-02



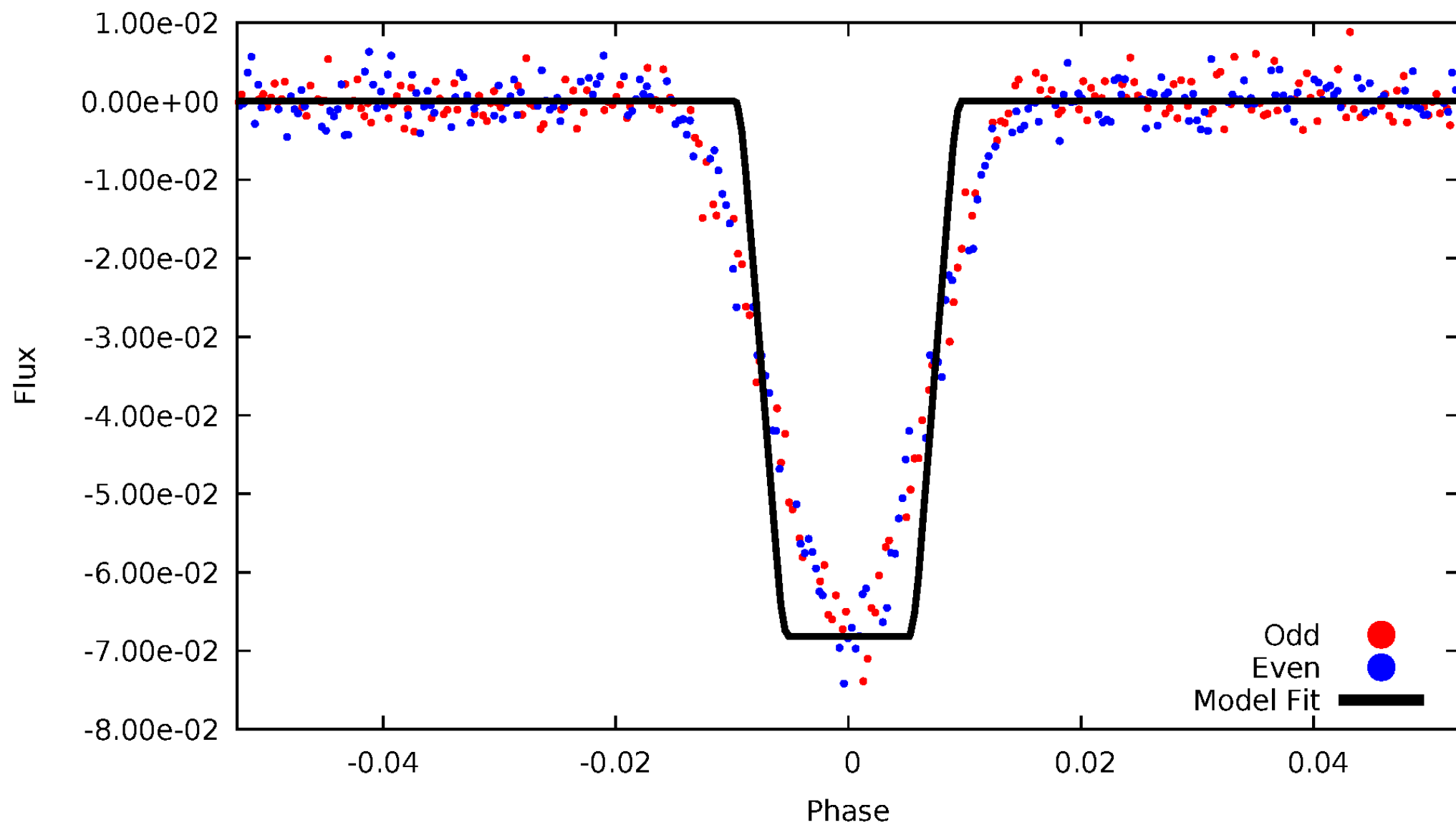
DV Odd/Even

TCE 009777090-02



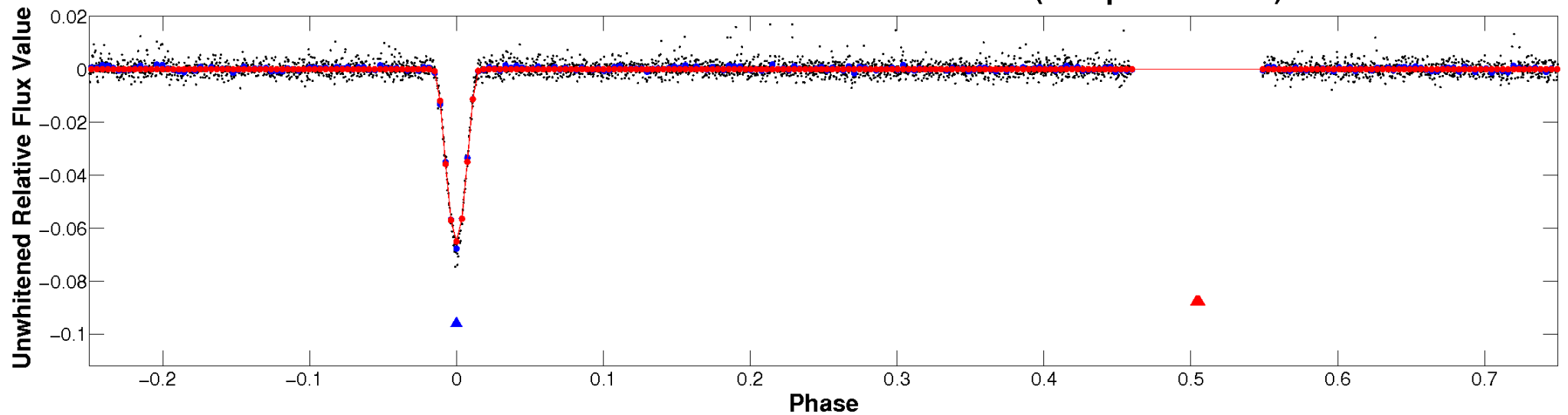
ALT Odd/Even

TCE 009777090-02

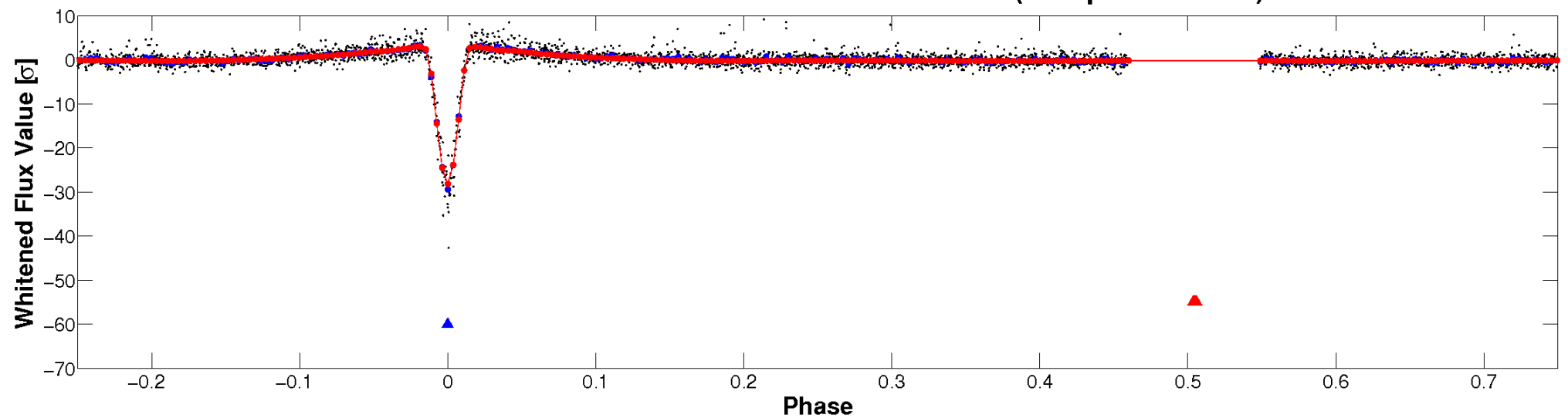


Non-Whitened Vs. Whitened Light Curve

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

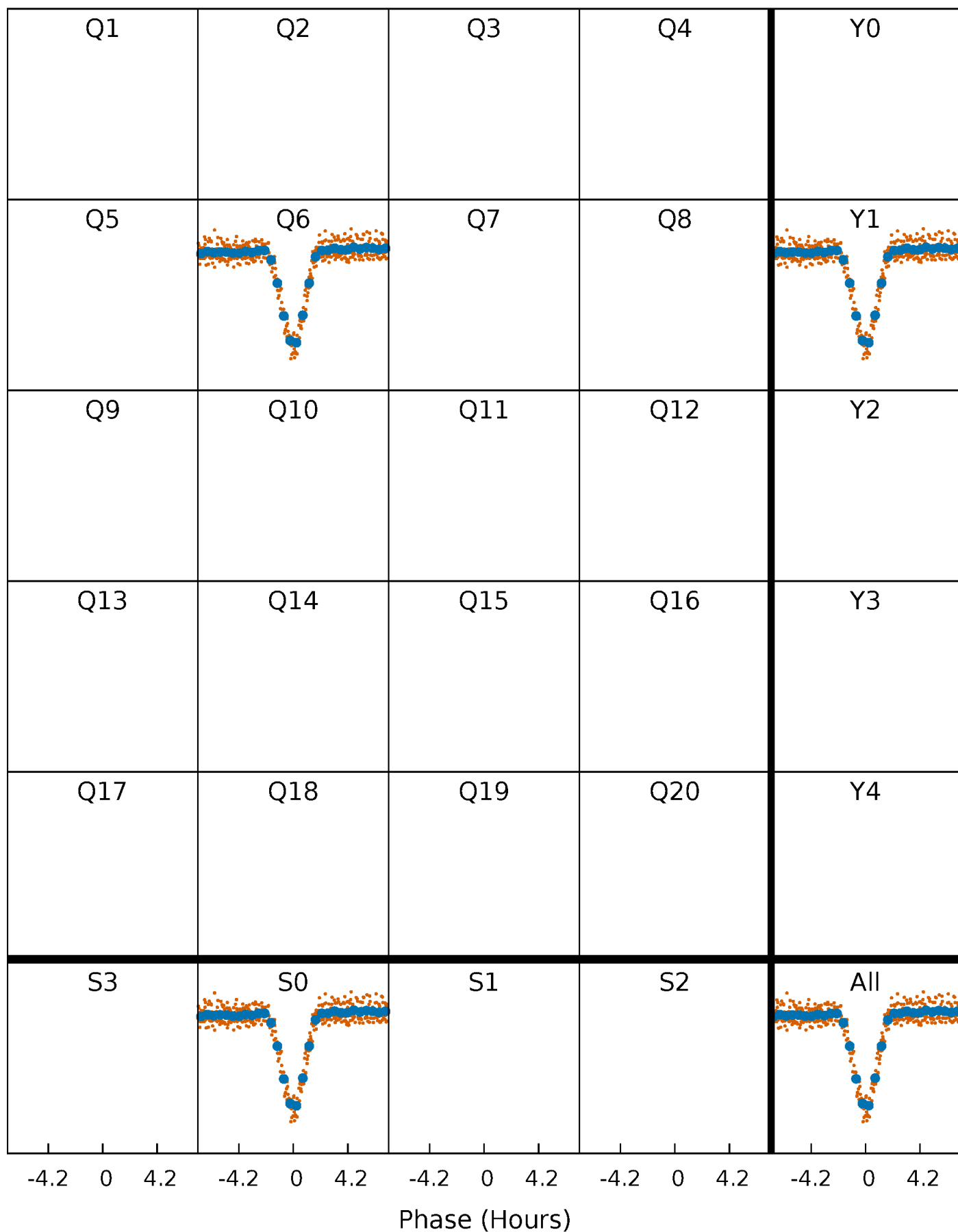


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



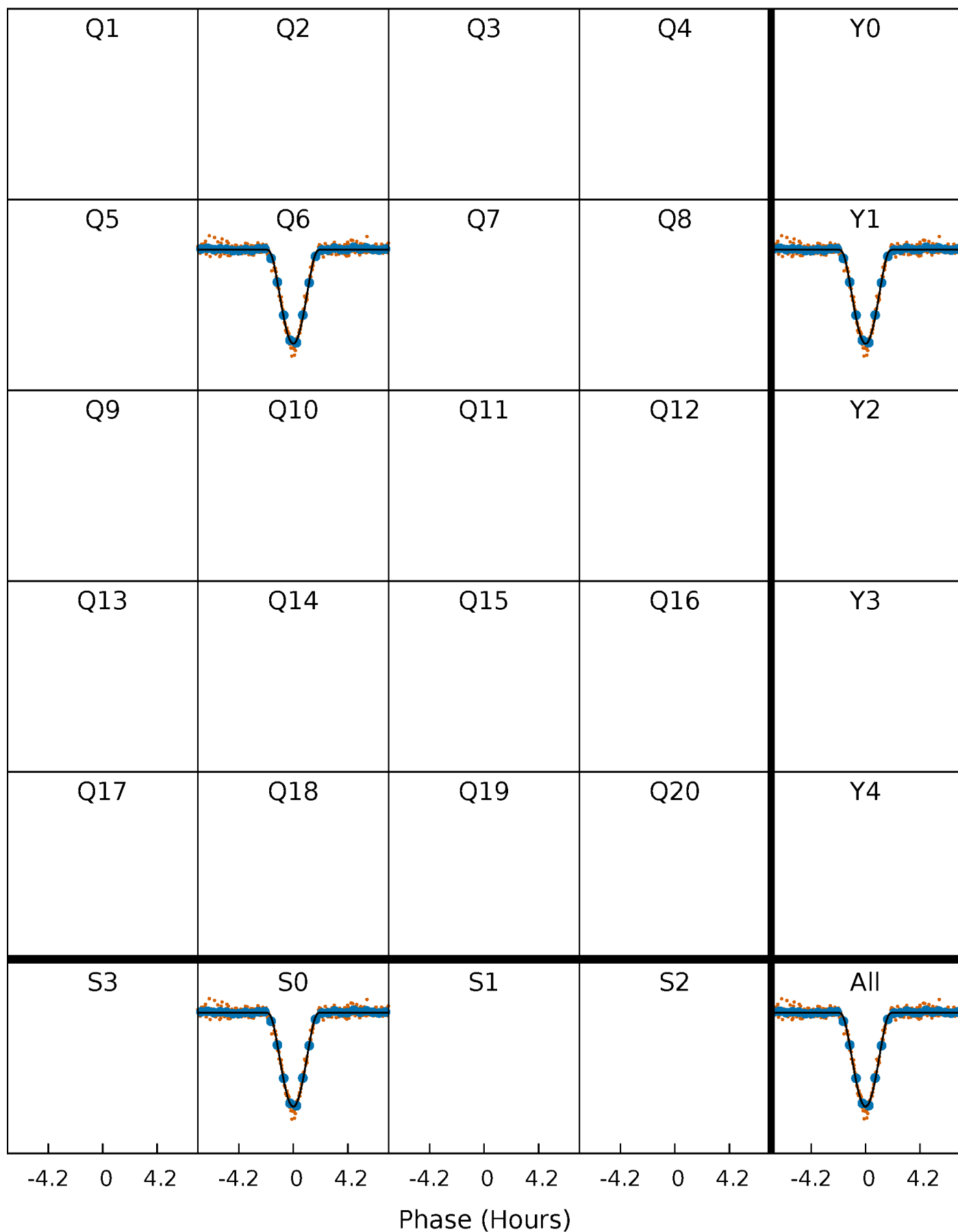
PDC Quarter-Phased Transit Curves

TCE 009777090-02 P= 5.508217 Days $T_0=131.541924$ (BKJD)



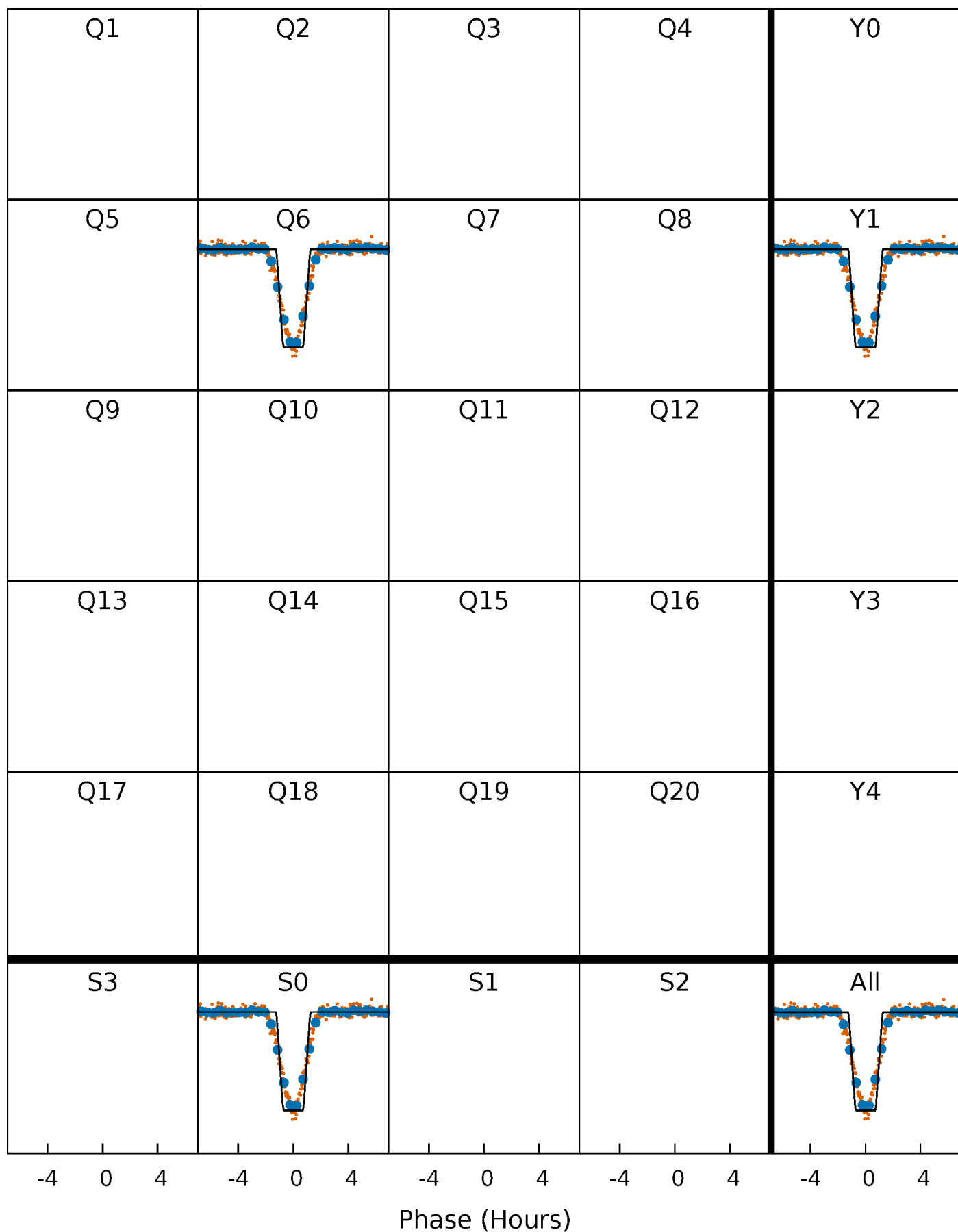
DV Quarter-Phased Transit Curves

TCE 009777090-02 P= 5.508217 Days $T_0=131.541924$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

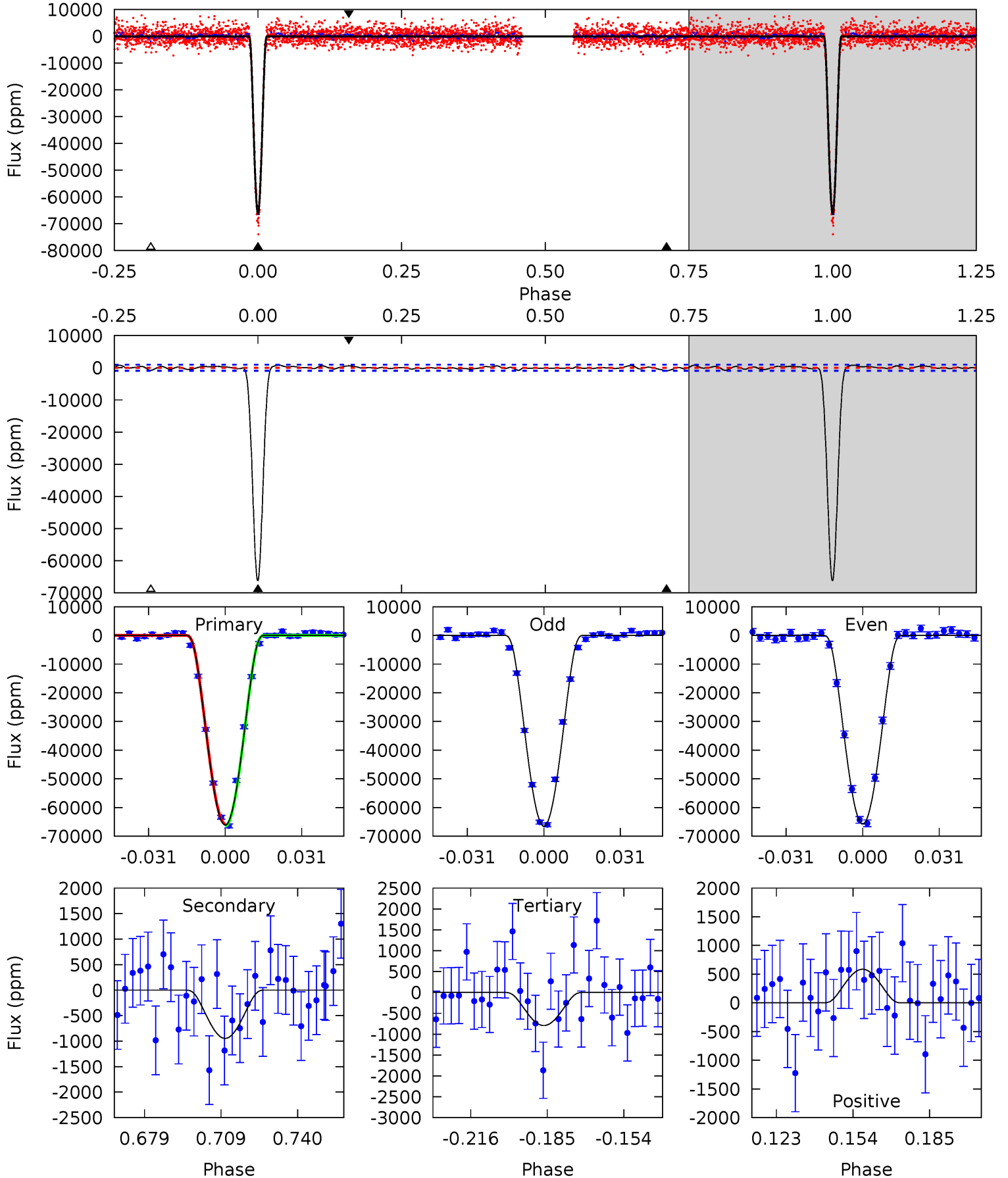
TCE 009777090-02 P= 5.507756 Days $T_0=131.579833$ (BKJD)



DV Model-Shift Uniqueness Test

009777090-02, P = 5.508217 Days, E = 131.541924 Days

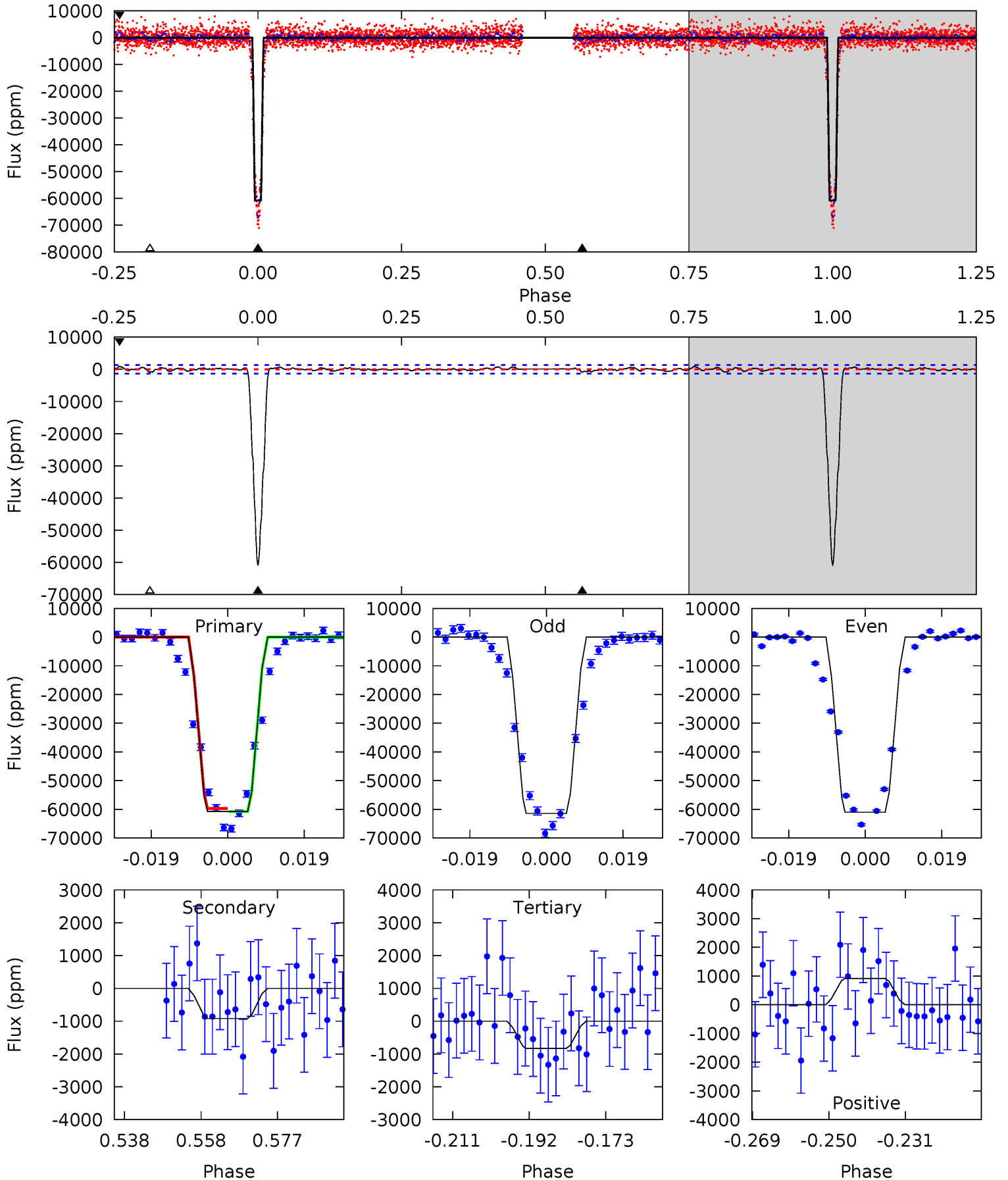
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
334.1	4.78	4.01	2.96	4.81	2.16	1.55	330.1	331.1	0.77	1.82	1.87	1.00	0.01	2.15



Alt Model-Shift Uniqueness Test

009777090-02, P = 5.507756 Days, E = 131.579833 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
221.3	3.34	3.02	3.35	4.90	2.34	1.08	218.3	218.0	0.32	-0.01	0.79	0.99	0.01	1.99



Stellar Parameters For KIC 009777090

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	$M(M_{\odot})$	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	5051^{+182}_{-182}	$4.663^{+0.030}_{-0.070}$	$-0.540^{+0.300}_{-0.300}$	$0.644^{+0.082}_{-0.047}$	$0.696^{+0.068}_{-0.061}$	$3.676^{+0.575}_{-0.869}$
	+4%/-4%	+1%/-2%	+56%/-56%	+13%/-7%	+10%/-9%	+16%/-24%
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 009777090-02 / KOI

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-947 ± 198	$27.95^{+16.86}_{-16.83}$	1082^{+51}_{-46}	2273^{+641}_{-313}	$1.960^{+10.271}_{-1.236}$
Alt.	-917 ± 275	$21.24^{+16.32}_{-13.48}$	1085^{+48}_{-46}	2416^{+751}_{-386}	$3.132^{+18.409}_{-2.215}$

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 $A_{obs} \gg 1.0$

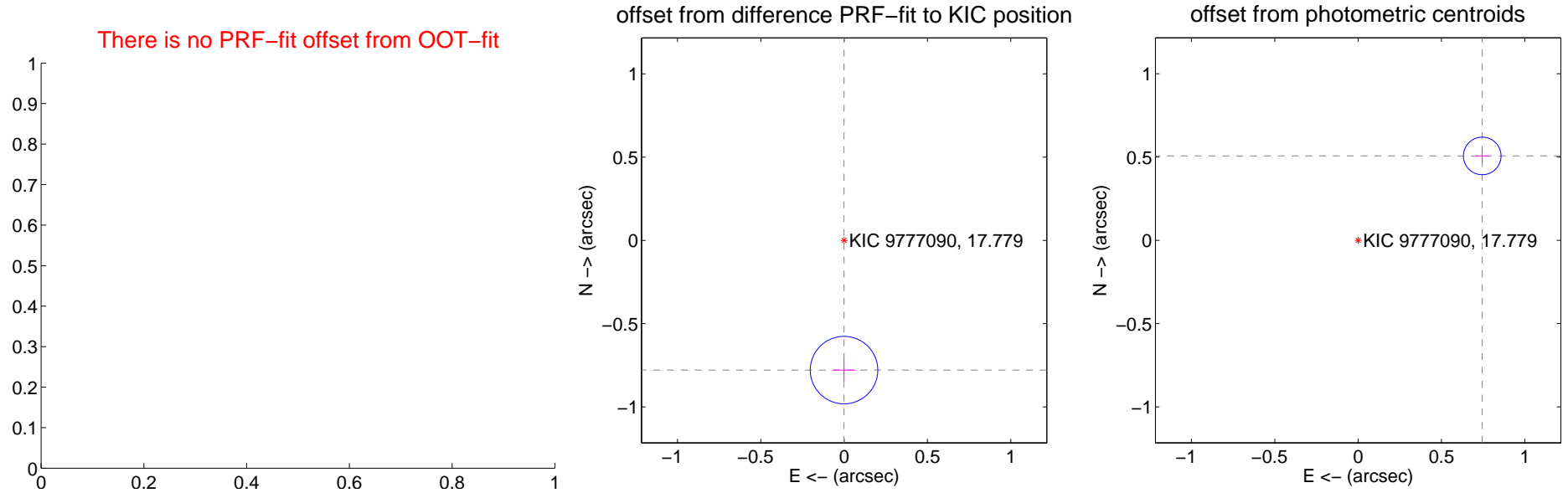
DV Centroid Data

Supplemental centroid analysis for 009777090-02. Kepler magnitude: 17.78. Transit SNR 182.34

There are 1 quarters with good PRF difference image offsets

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

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	—	—	—	—
PRF-fit source offset from KIC position	0.779 ± 0.068	11.53	0.001 ± 0.068	-0.779 ± 0.068
photometric centroid source offset	0.90 ± 0.04	23.93	-0.74 ± 0.04	0.51 ± 0.04



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.

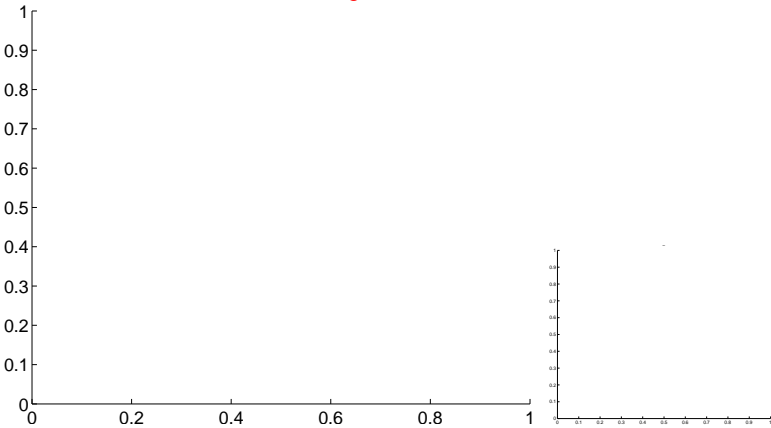


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.

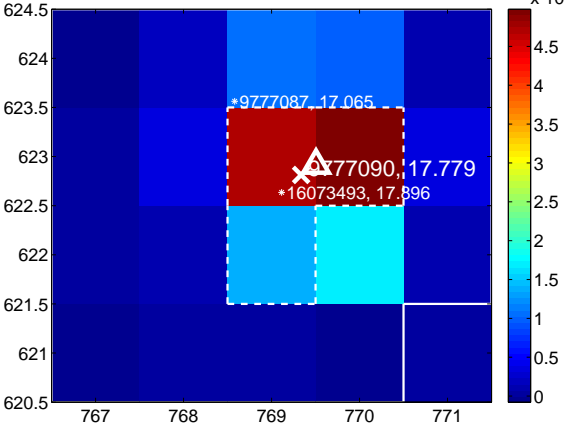
Q5 no difference image



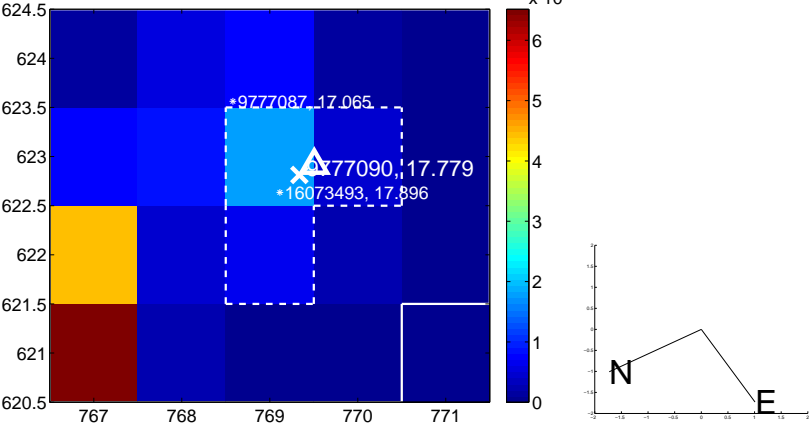
Q5 no OOT image



Q6 difference image



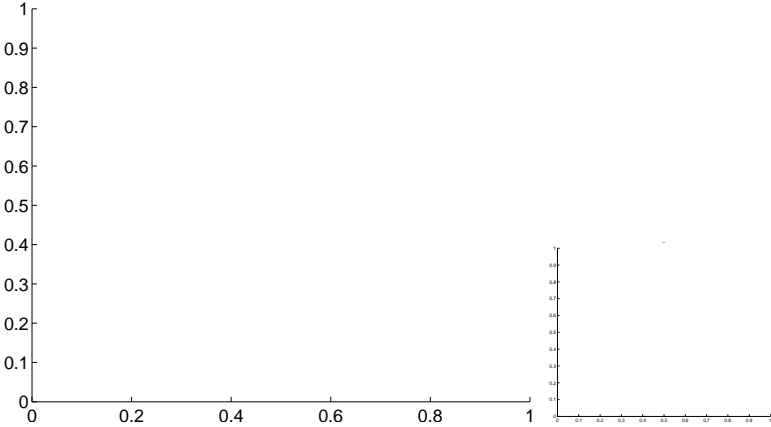
Q6 OOT image



Q7 no difference image



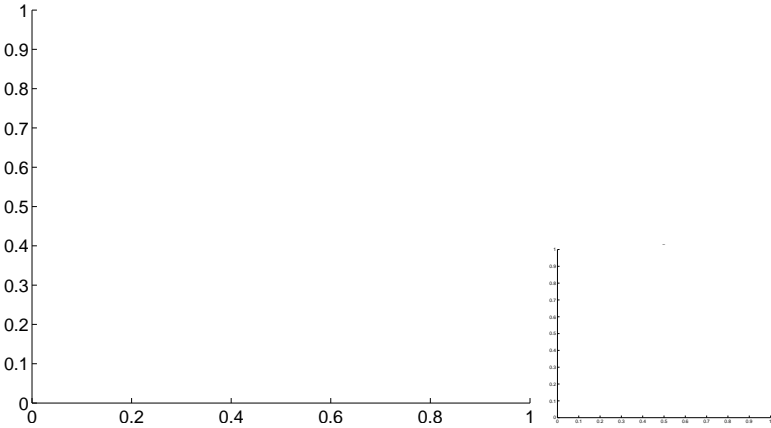
Q7 no OOT image



Q8 no difference image



Q8 no OOT image



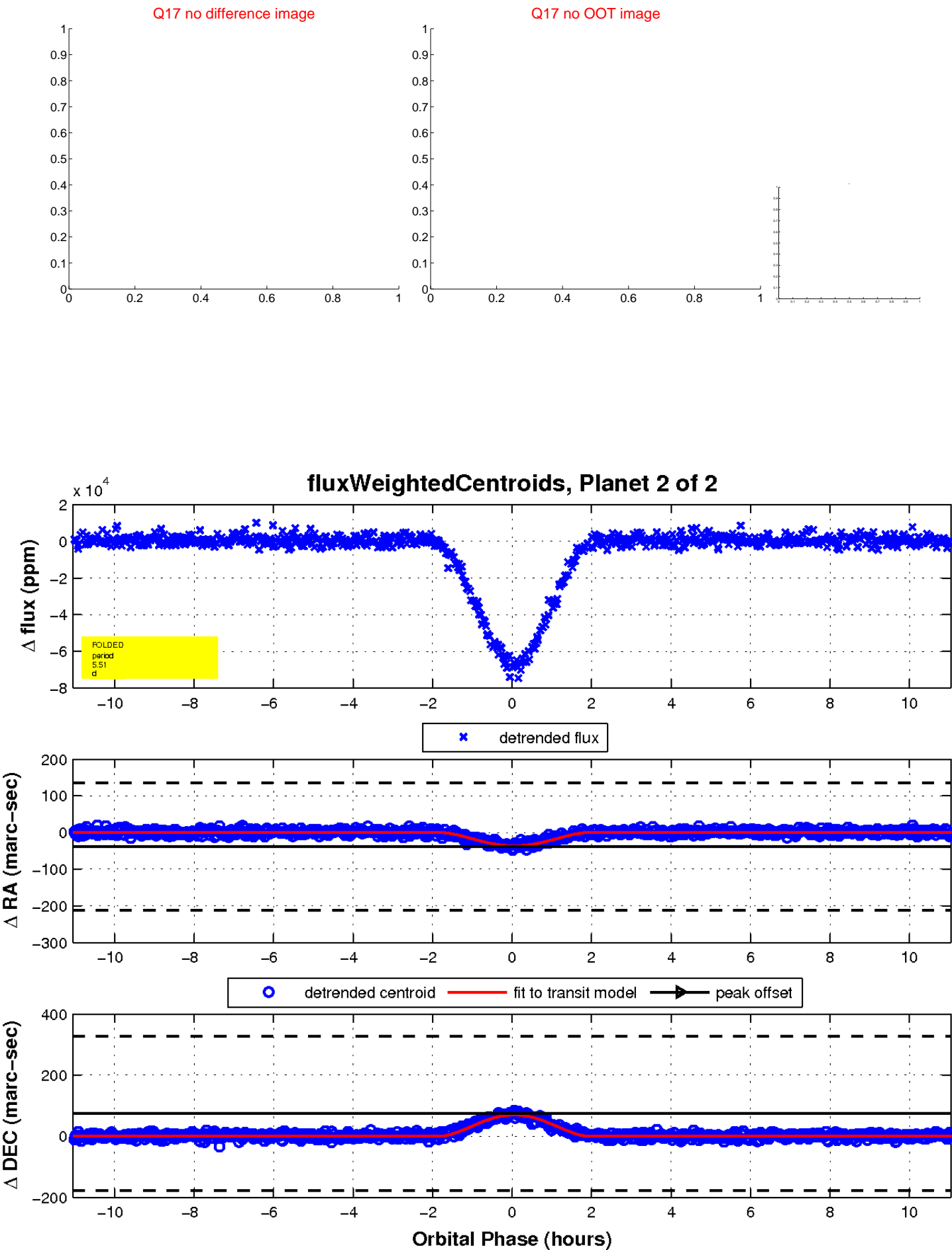
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

