

KIC 009011963

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})
009011963-01	OBS	No	476.971558	551.200912	1488.8	3.857	13.1	4.4	0.73	4457	2.82	0.16
009011963-02	OBS	No	626.409587	242.904701	2438.8	3.275	13.2	8.4	0.73	4457	3.43	0.11
009011963-03	OBS	No	233.879027	233.716135	2400.8	20.986	10.2	6.0	0.73	4457	4.66	0.42
009011963-04	OBS	No	356.426643	483.014731	2160.4	6.297	10.2	7.5	0.73	4457	4.23	0.24

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009011963-01	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
009011963-02	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
009011963-03	OBS	FP	0.00	1	0	0	0	LPP_DV—INCONSISTENT_TRANS
009011963-04	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—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.

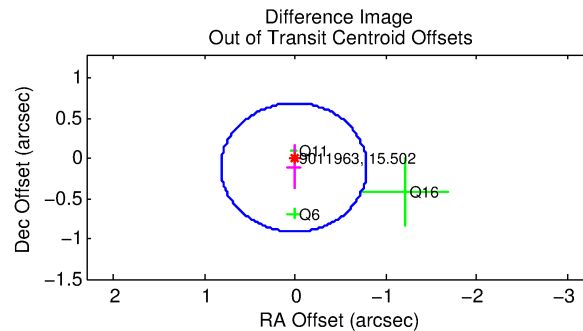
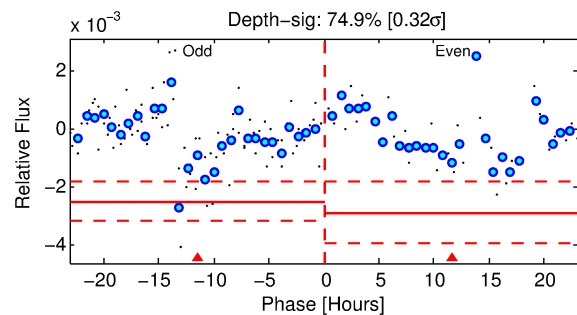
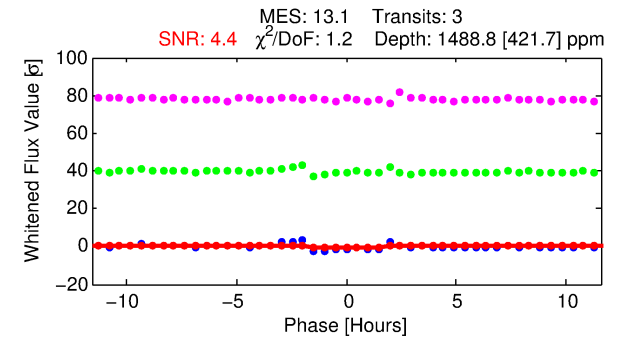
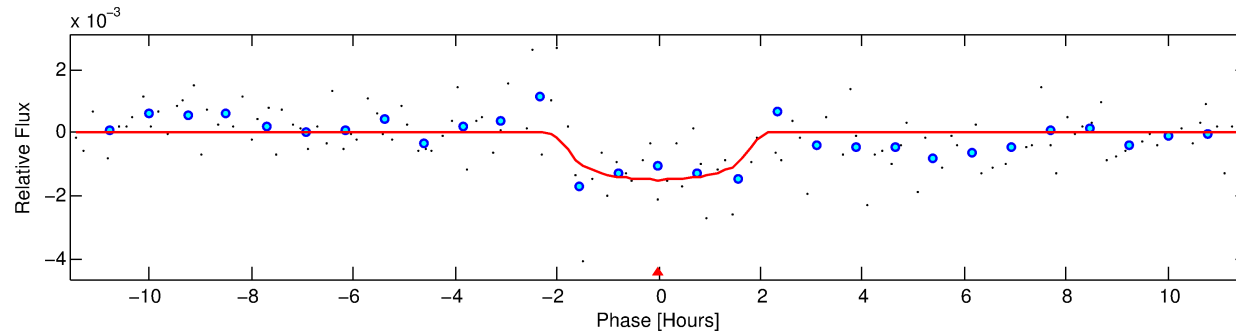
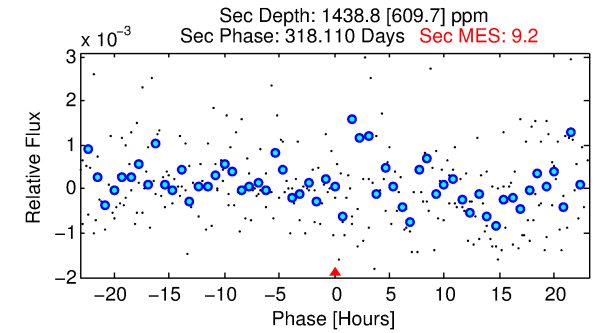
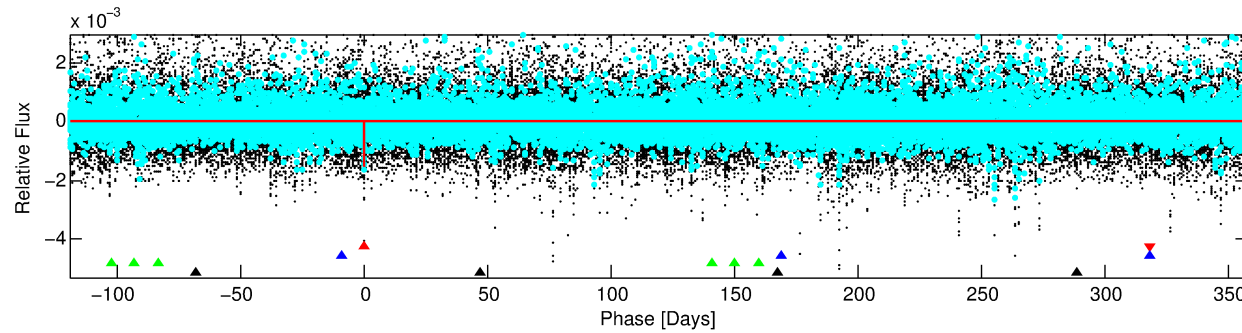
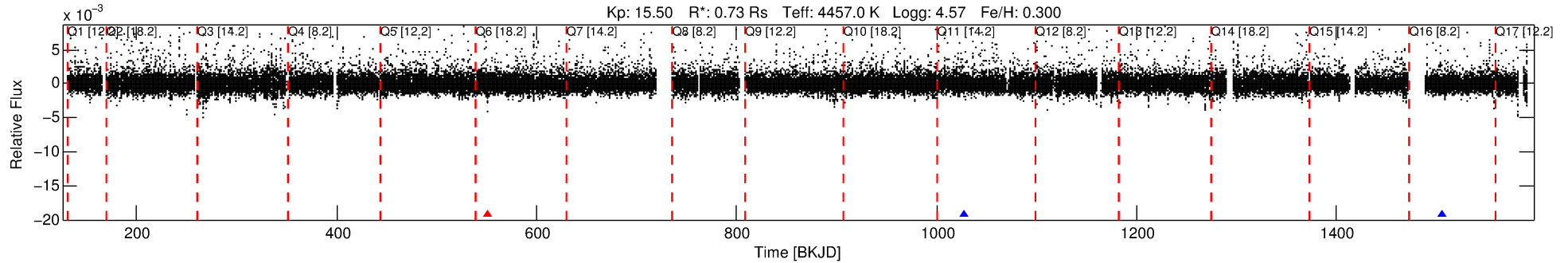
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009011963-01

No Significant Match Found

DV One-Page Summary

KIC: 9011963 Candidate: 1 of 4 Period: 476.972 d



DV Fit Results:

Period = 476.97156 [0.01063] d
Epoch = 551.2009 [0.0142] BKJD
Rp/R* = 0.0354 [0.0714]
a/R* = 856.24 [4893.31]
b = 0.50 [8.84]
Seff = 0.16 [0.03]
Teq = 162 [7] K
Rp = 2.82 [5.70] Re
a = 1.0738 [0.0771] AU
Ag = 115051.71 [467706.16] [0.25 σ]
Teffp = 4616 [4693] K [0.95 σ]

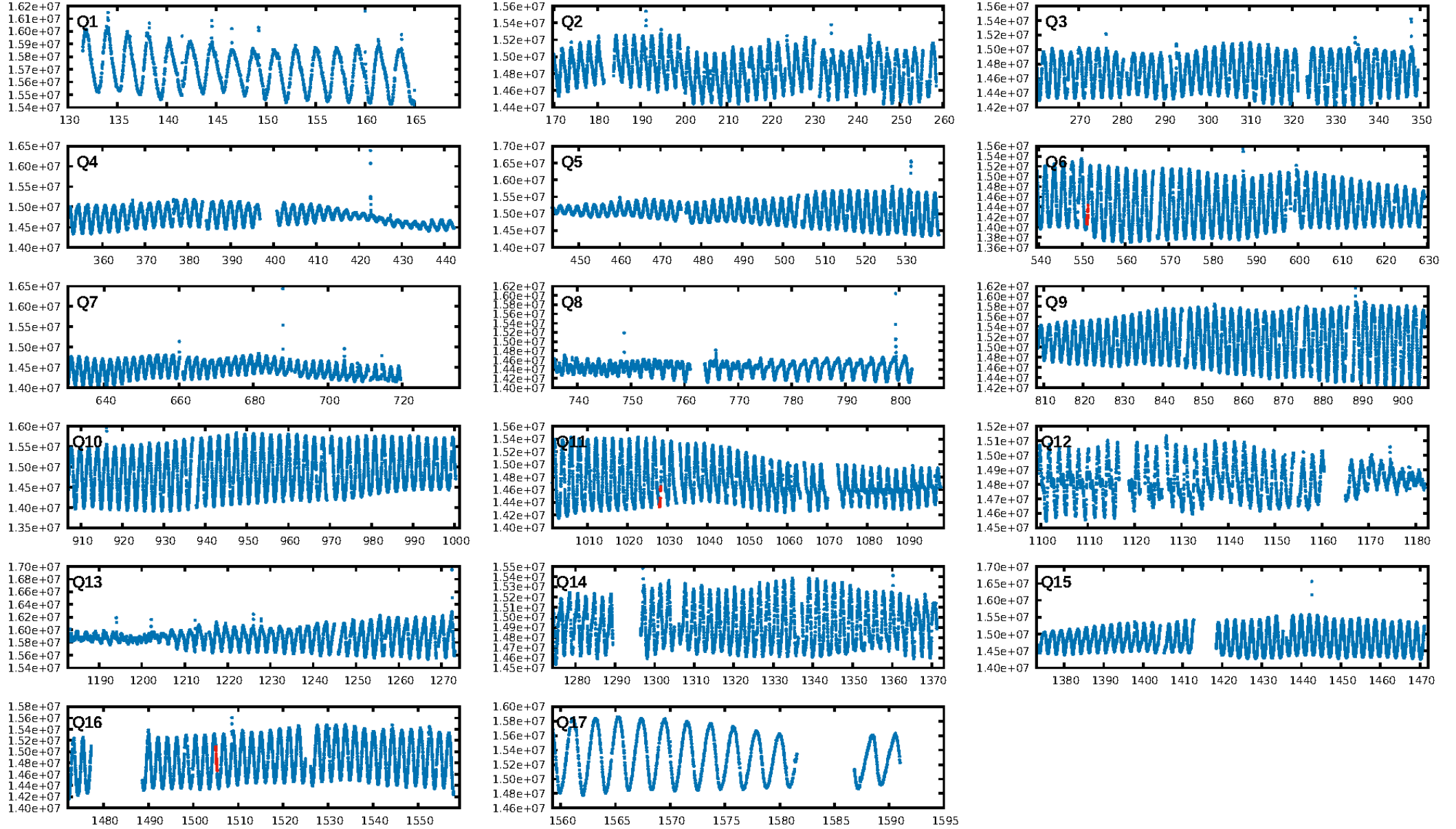
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [391.79 σ]
LongPeriod-sig: 100.0% [708.80 σ]
ModelChiSquare2-sig: 0.1%
ModelChiSquareGof-sig: 74.4%
Bootstrap-pfa: 4.50e-11
RollingBand-fgt: 0.67 [2/3]
GhostDiagnostic-chr: 3.141
Centroid-sig: 37.8%
Centroid-so: 1.505 arcsec [1.07 σ]
OotOffset-rm: 0.110 arcsec [0.41 σ]
OotOffset-st: 1/1/1/0 [3]
KicOffset-rm: 0.159 arcsec [0.95 σ]
KicOffset-st: 1/1/1/0 [3]
DiffImageQuality-fgm: 0.67 [2/3]
DiffImageOverlap-fno: 1.00 [3/3]

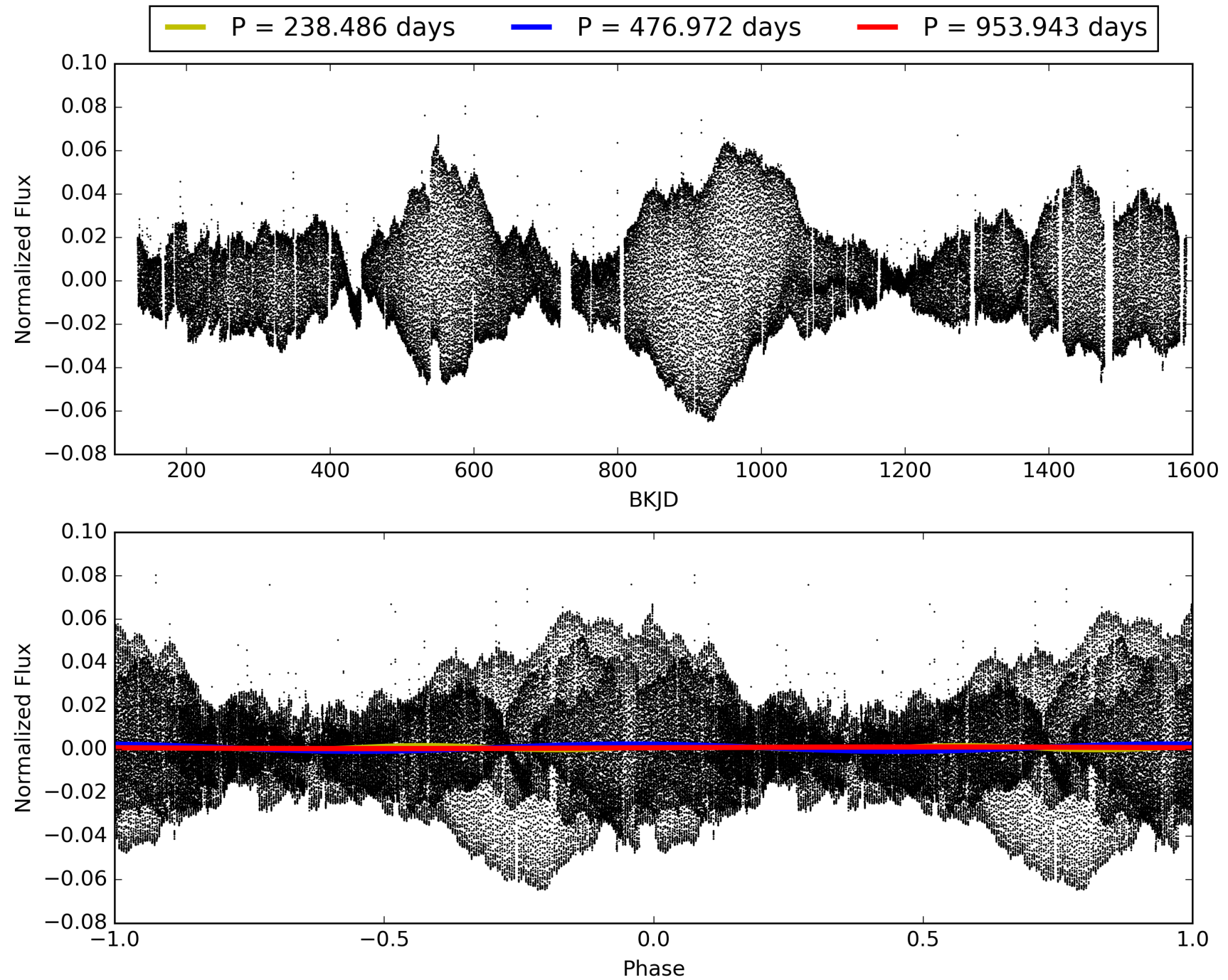
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 14:15:29 Z

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

TCE 009011963-01, PDC Light Curves

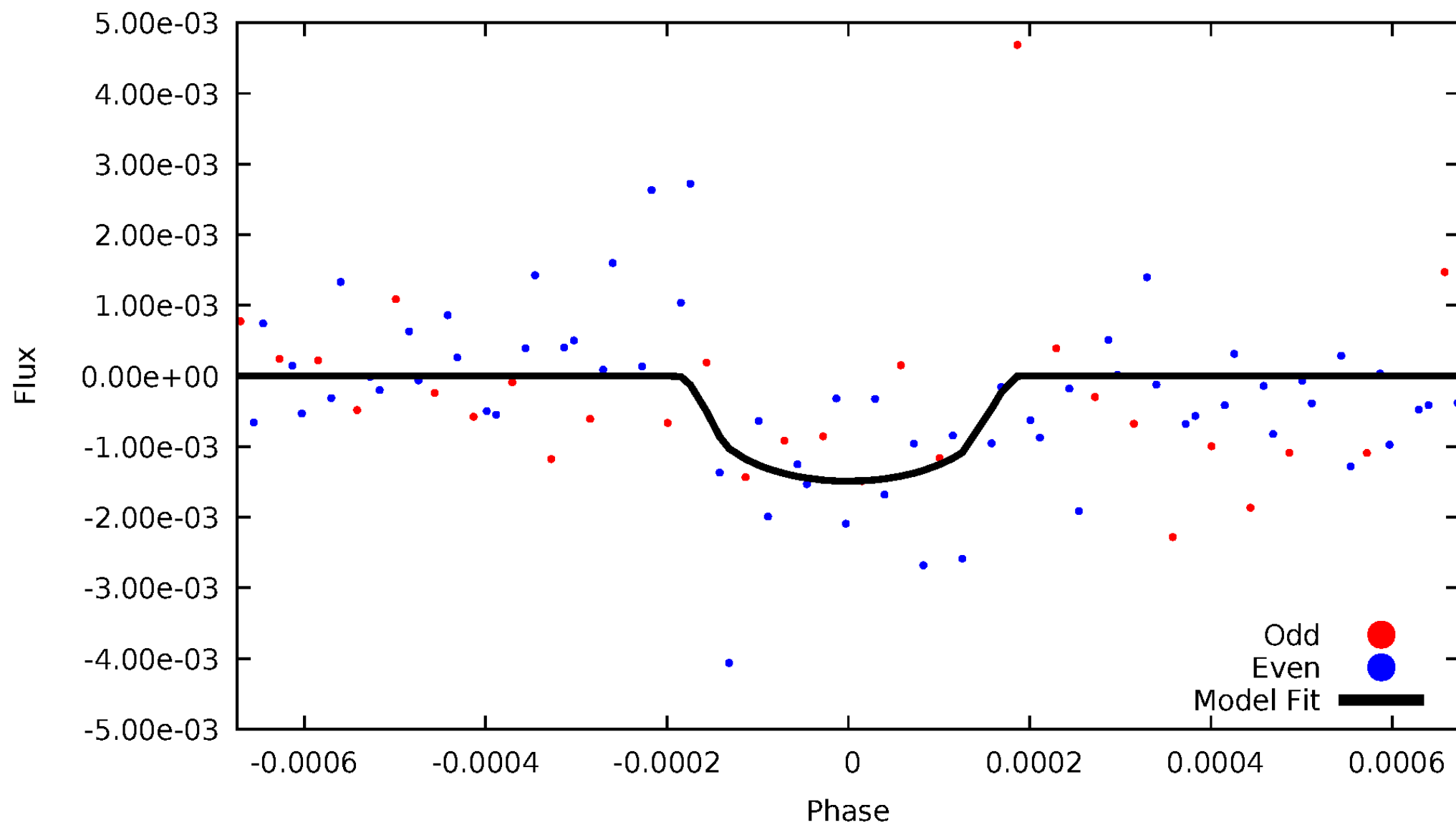


TCE 009011963-01



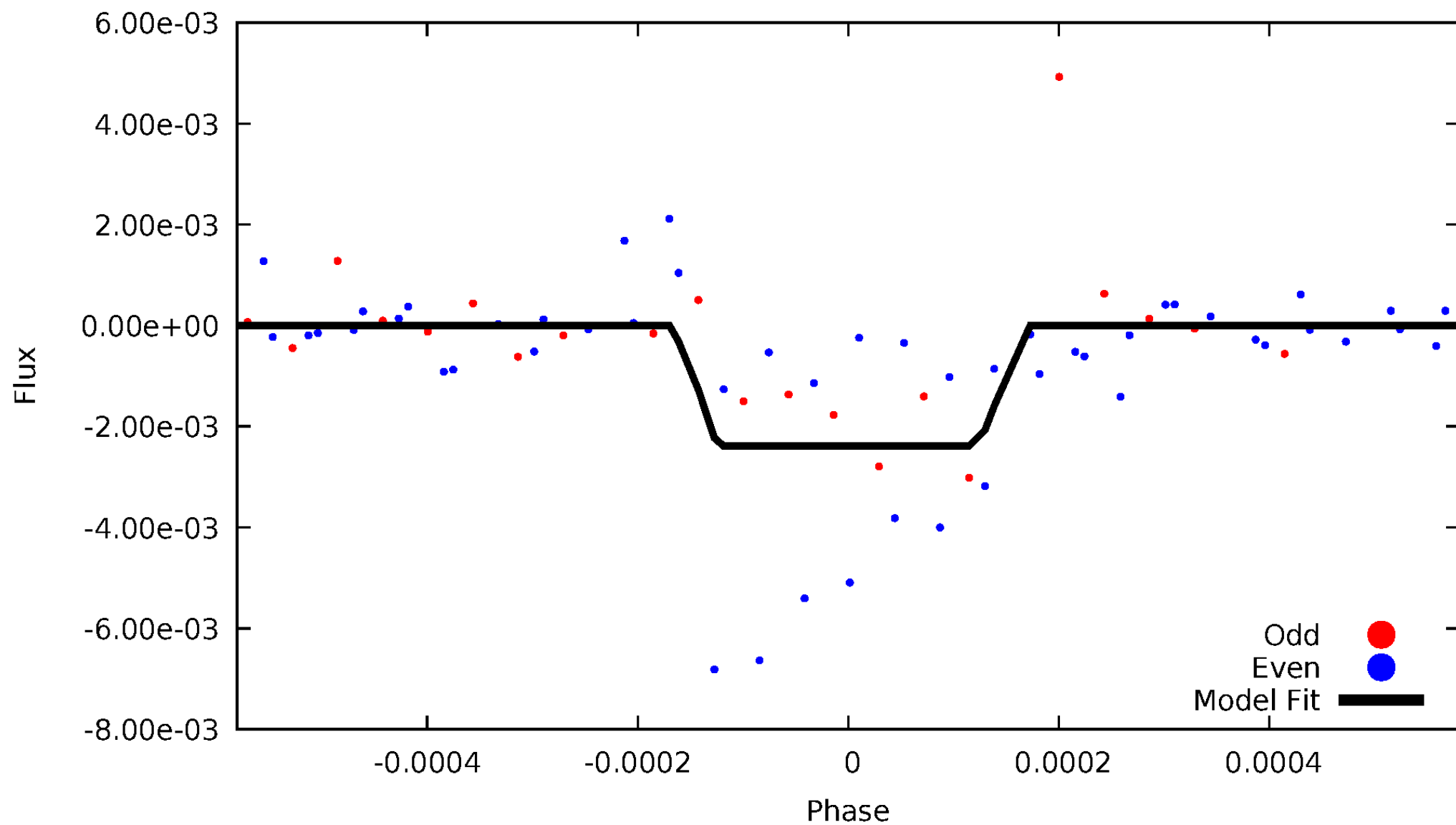
DV Odd/Even

TCE 009011963-01



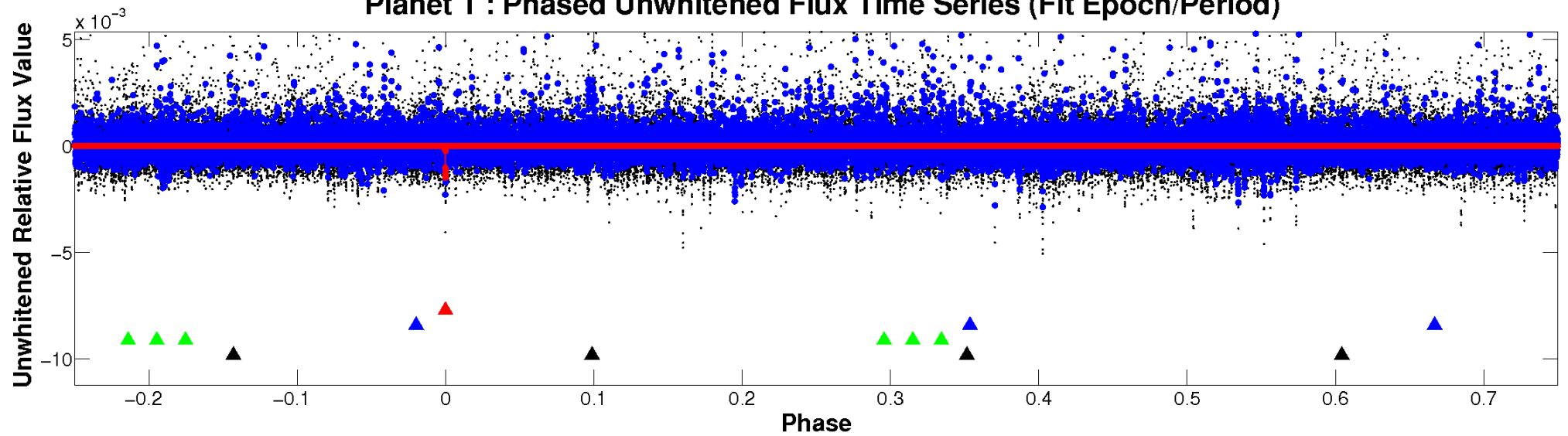
ALT Odd/Even

TCE 009011963-01

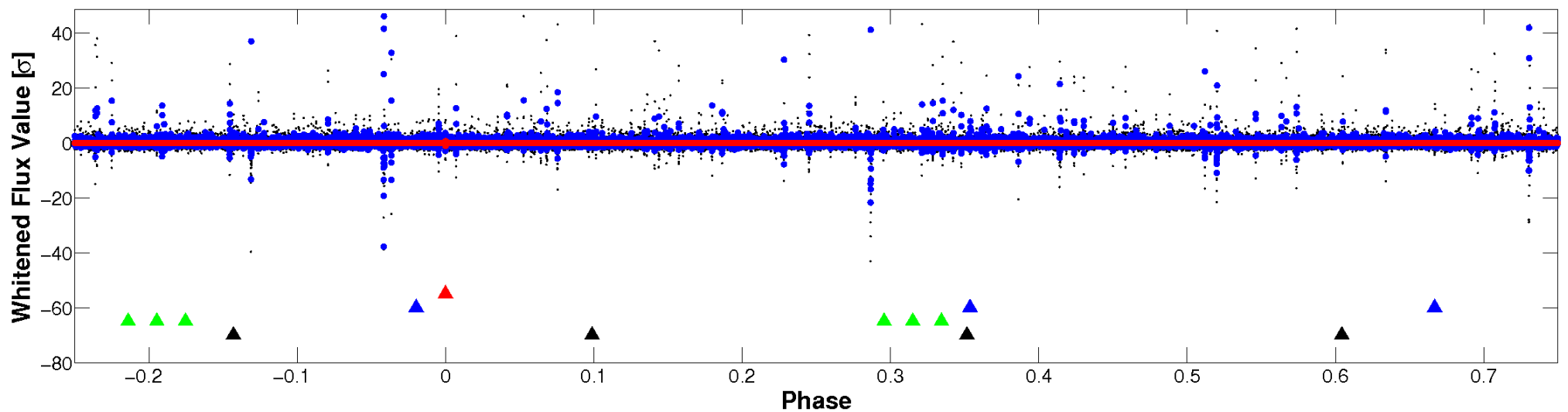


Non-Whitened Vs. Whitened Light Curve

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

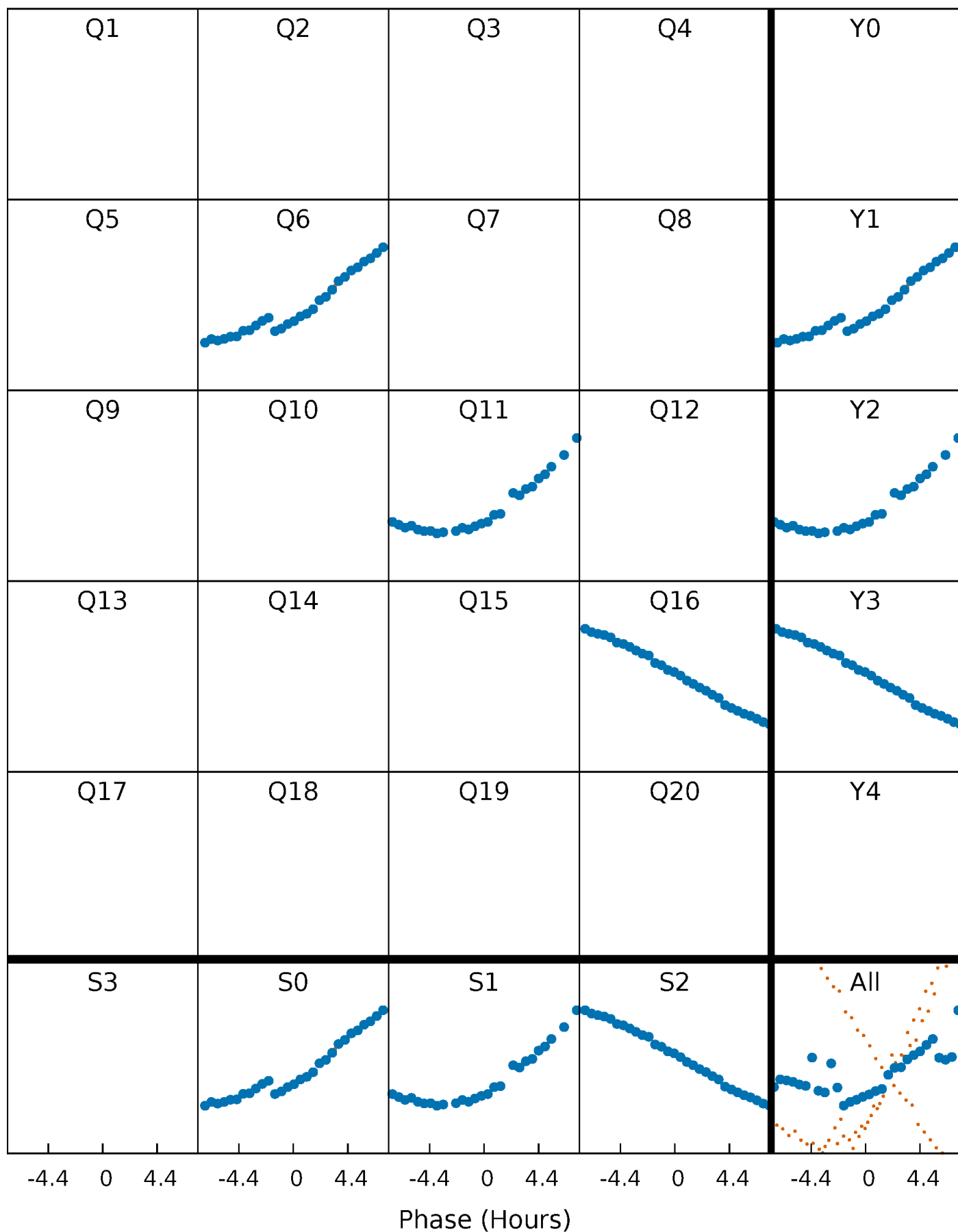


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



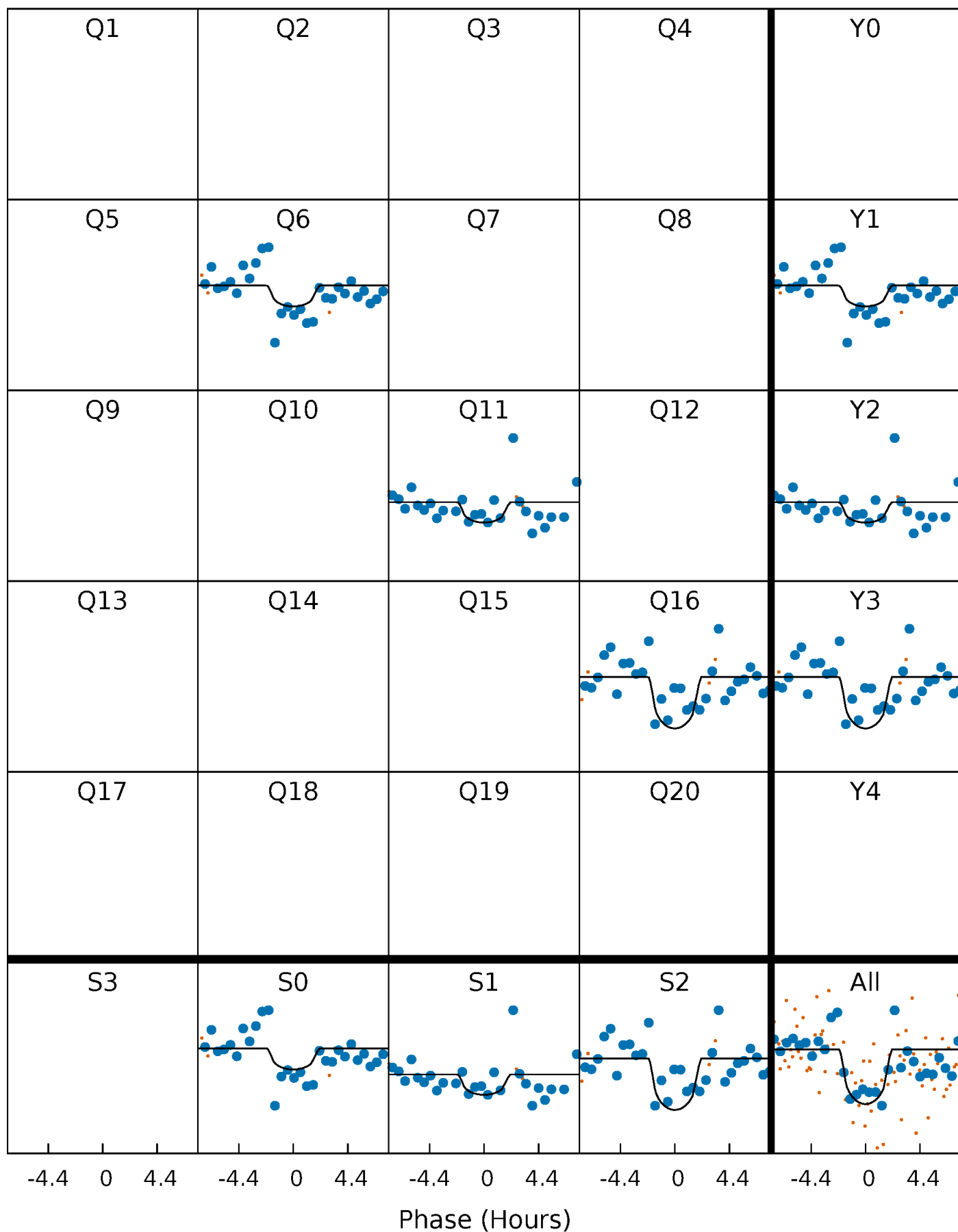
PDC Quarter-Phased Transit Curves

TCE 009011963-01 P=476.971558 Days $T_0=551.200912$ (BKJD)



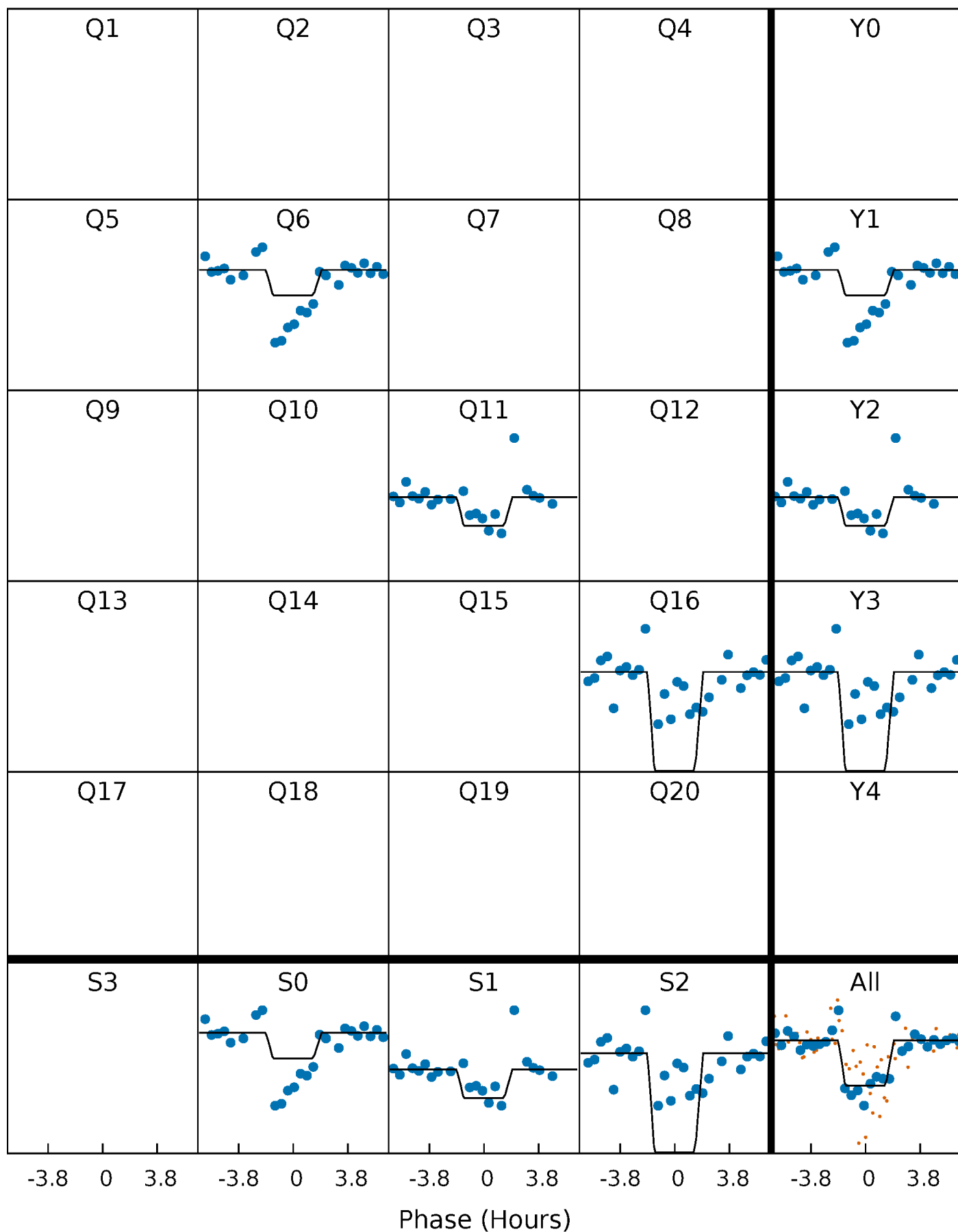
DV Quarter-Phased Transit Curves

TCE 009011963-01 P=476.971558 Days $T_0=551.200912$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

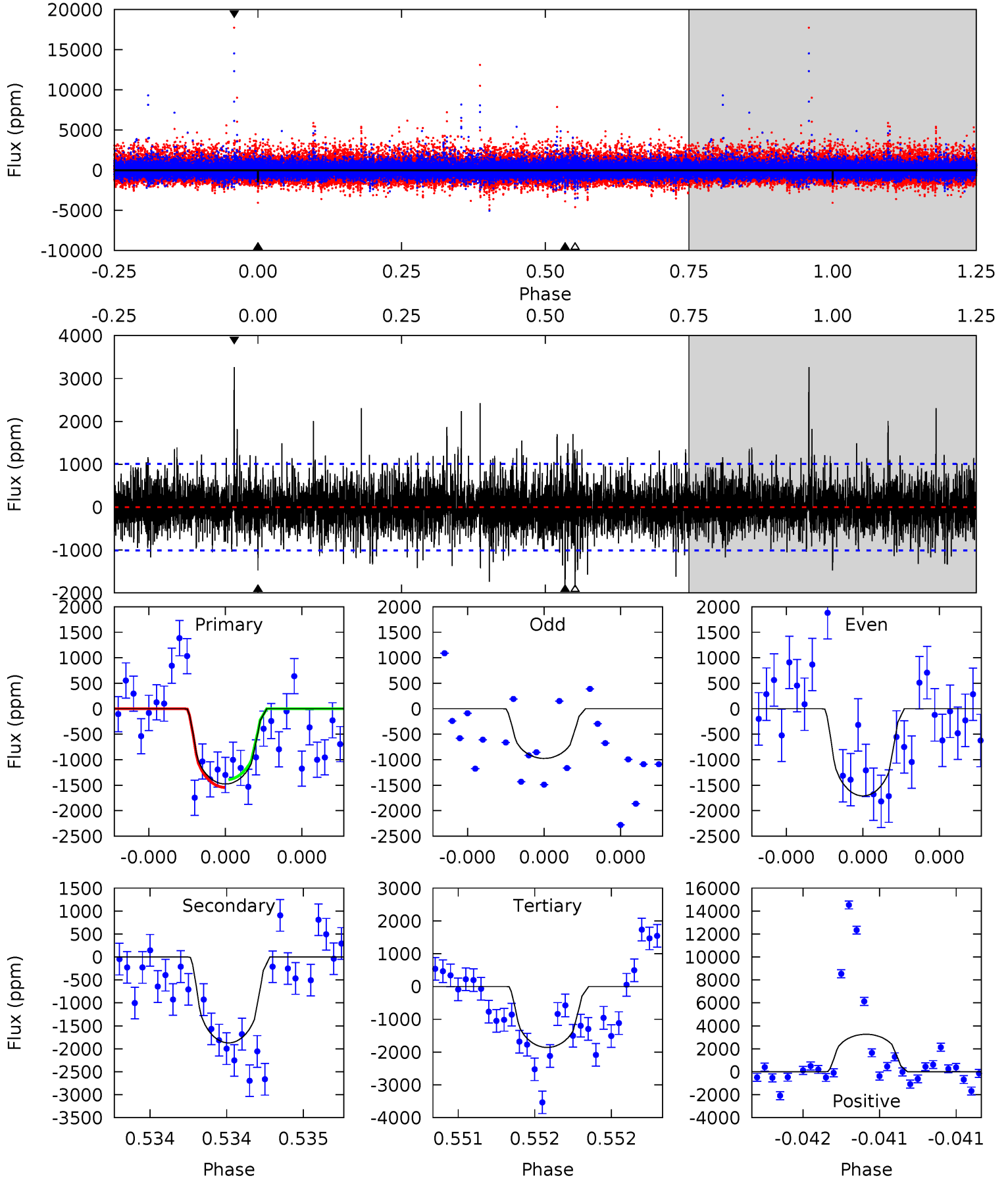
TCE 009011963-01 P=476.966969 Days $T_0=551.198893$ (BKJD)



DV Model-Shift Uniqueness Test

009011963-01, $P = 476.971558$ Days, $E = 74.229354$ Days

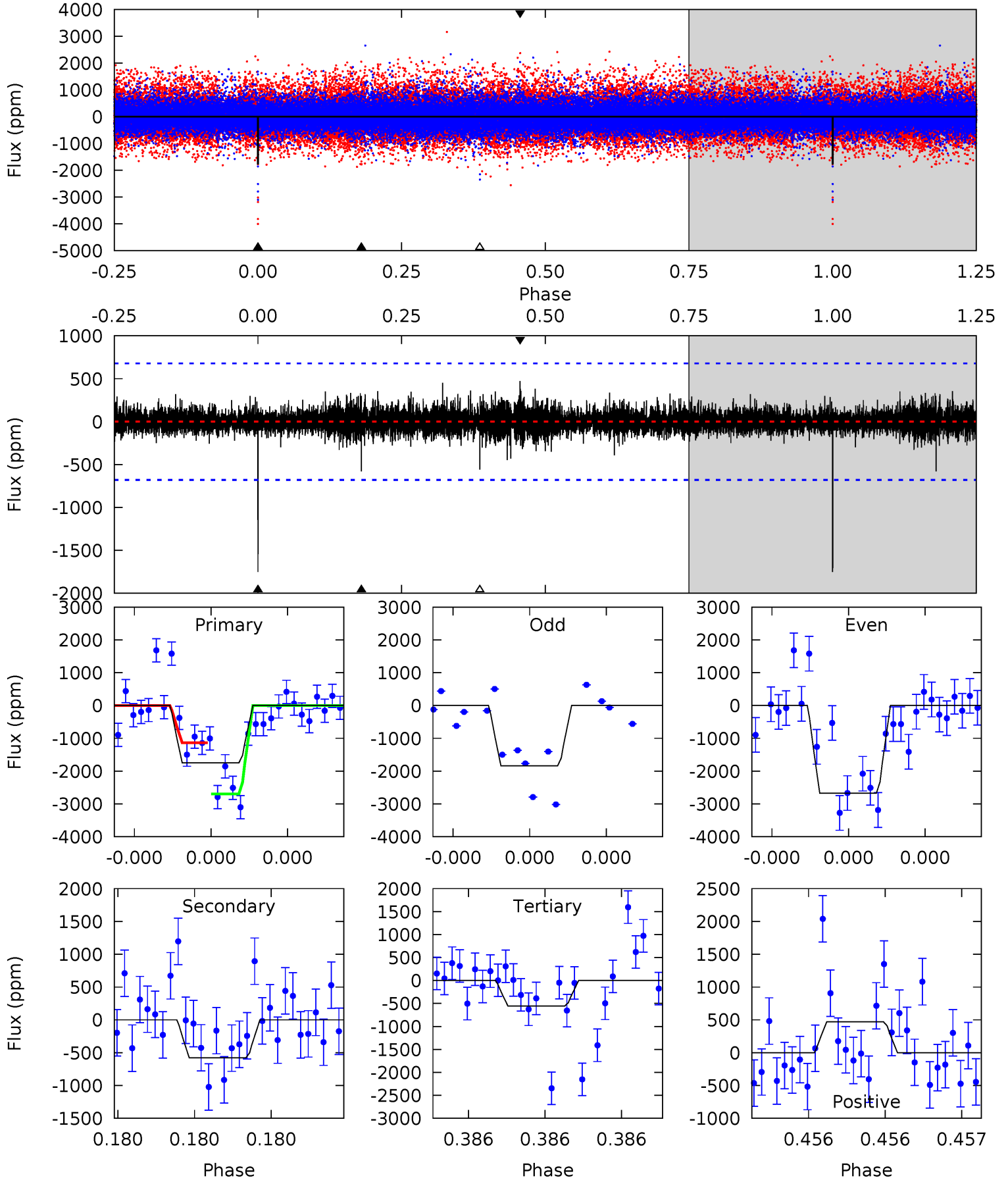
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.23	10.4	10.4	18.2	5.62	3.56	2.23	-2.13	-9.96	0.08	-7.75	1.30	1.50	0.64	0.42



Alt Model-Shift Uniqueness Test

009011963-01, P = 476.966969 Days, E = 74.231924 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
14.6	4.83	4.65	3.93	5.65	3.60	0.67	9.94	10.7	0.18	0.89	3.38	1.40	0.21	6.39



Stellar Parameters For KIC 009011963

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	4457^{+145}_{-145}	$4.572^{+0.056}_{-0.020}$	$0.300^{+0.150}_{-0.300}$	$0.730^{+0.025}_{-0.063}$	$0.725^{+0.041}_{-0.050}$	$2.628^{+0.647}_{-0.175}$
	+3%/-3%	+1%/-0%	+50%/-100%	+3%/-9%	+6%/-7%	+25%/-7%
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 009011963-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	-1873 ± 180	$4.96^{+4.56}_{-3.22}$	225^{+7}_{-8}	3882^{+2140}_{-726}	$49116^{+338035}_{-35766}$
Alt.	-579 ± 120	$5.61^{+4.67}_{-3.67}$	225^{+8}_{-9}	3106^{+1290}_{-495}	11899^{+89126}_{-8590}

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 $A_{obs} \gg 1.0$

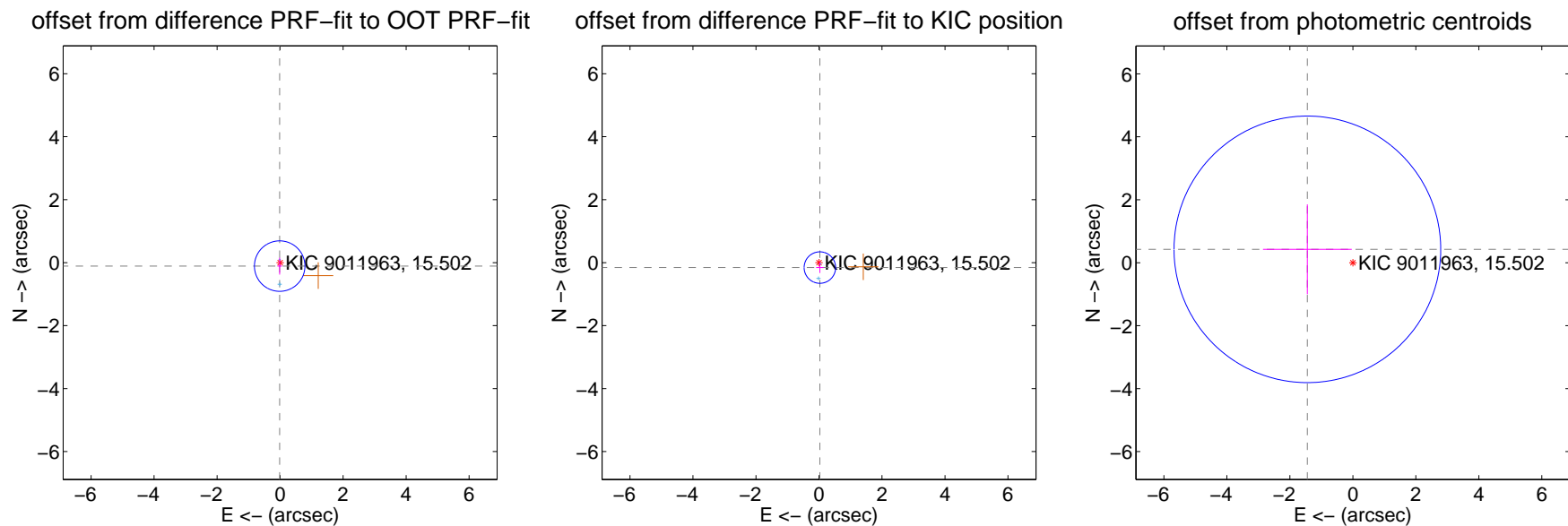
DV Centroid Data

Supplemental centroid analysis for 009011963-01. Kepler magnitude: 15.50. Transit SNR 4.42

There are 2 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.34 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.110 ± 0.267	0.41	0.013 ± 0.072	-0.110 ± 0.269
PRF-fit source offset from KIC position	0.159 ± 0.167	0.95	-0.028 ± 0.117	-0.156 ± 0.168
photometric centroid source offset	1.51 ± 1.41	1.07	1.44 ± 1.41	0.42 ± 1.43

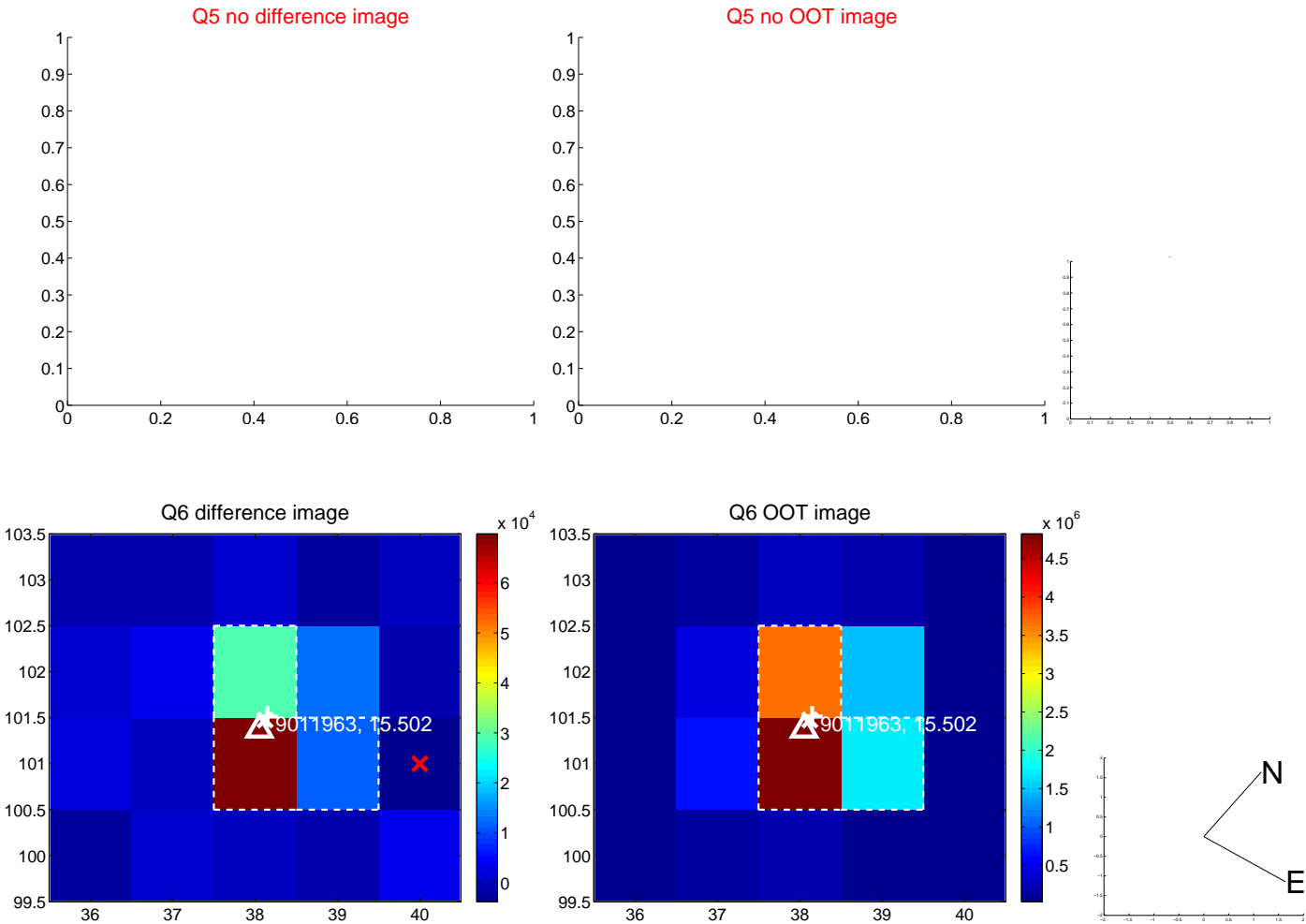


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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



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

Q9 no difference image



Q9 no OOT image



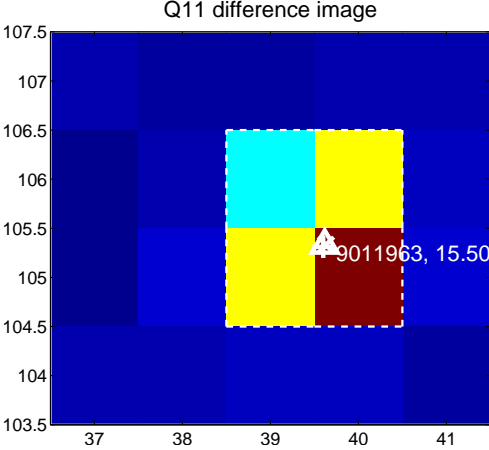
Q10 no difference image



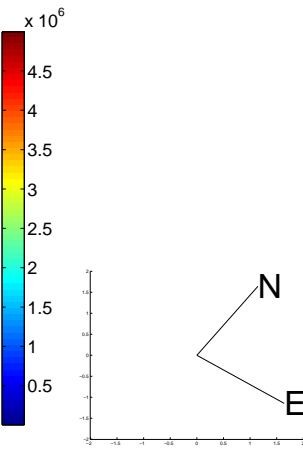
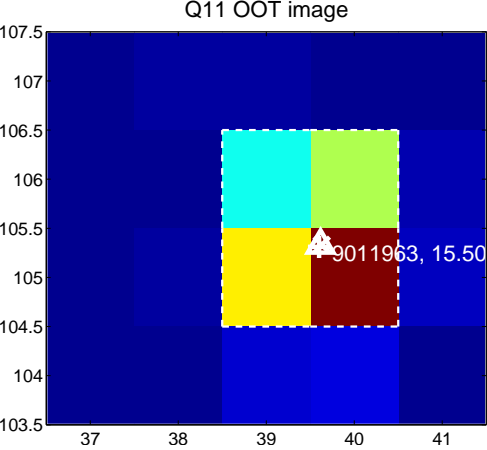
Q10 no OOT image



Q11 difference image



Q11 OOT image



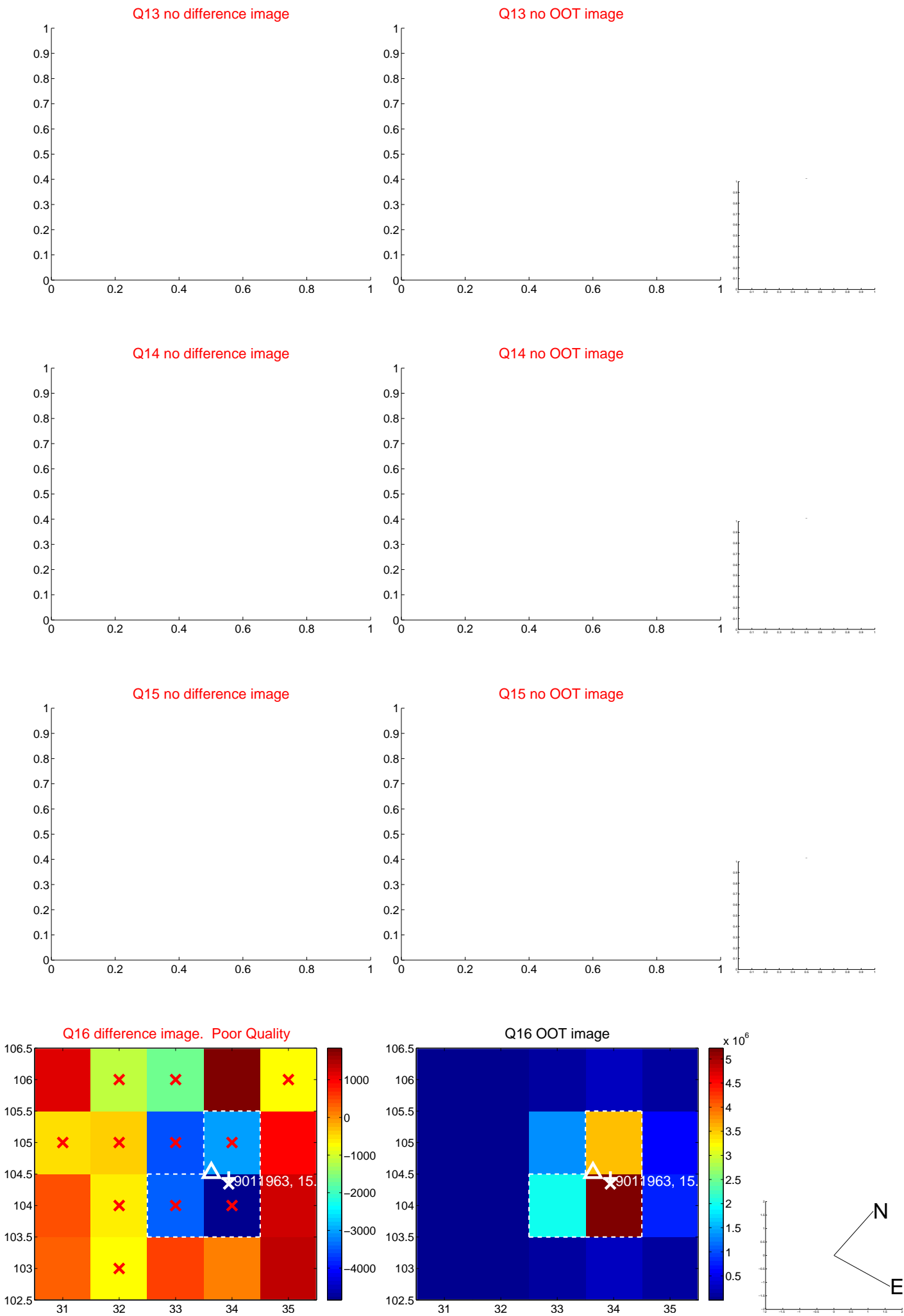
Q12 no difference image



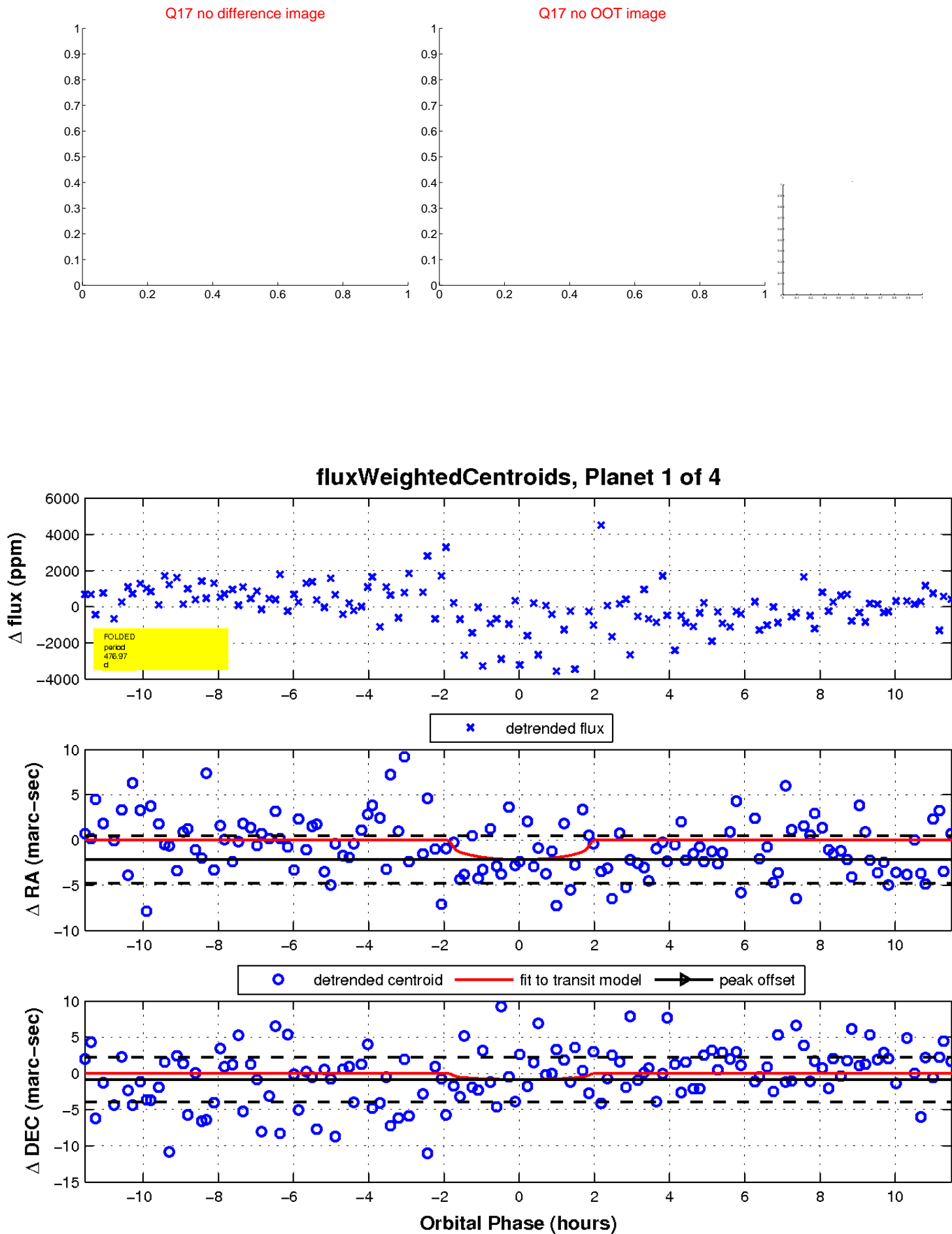
Q12 no OOT image



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

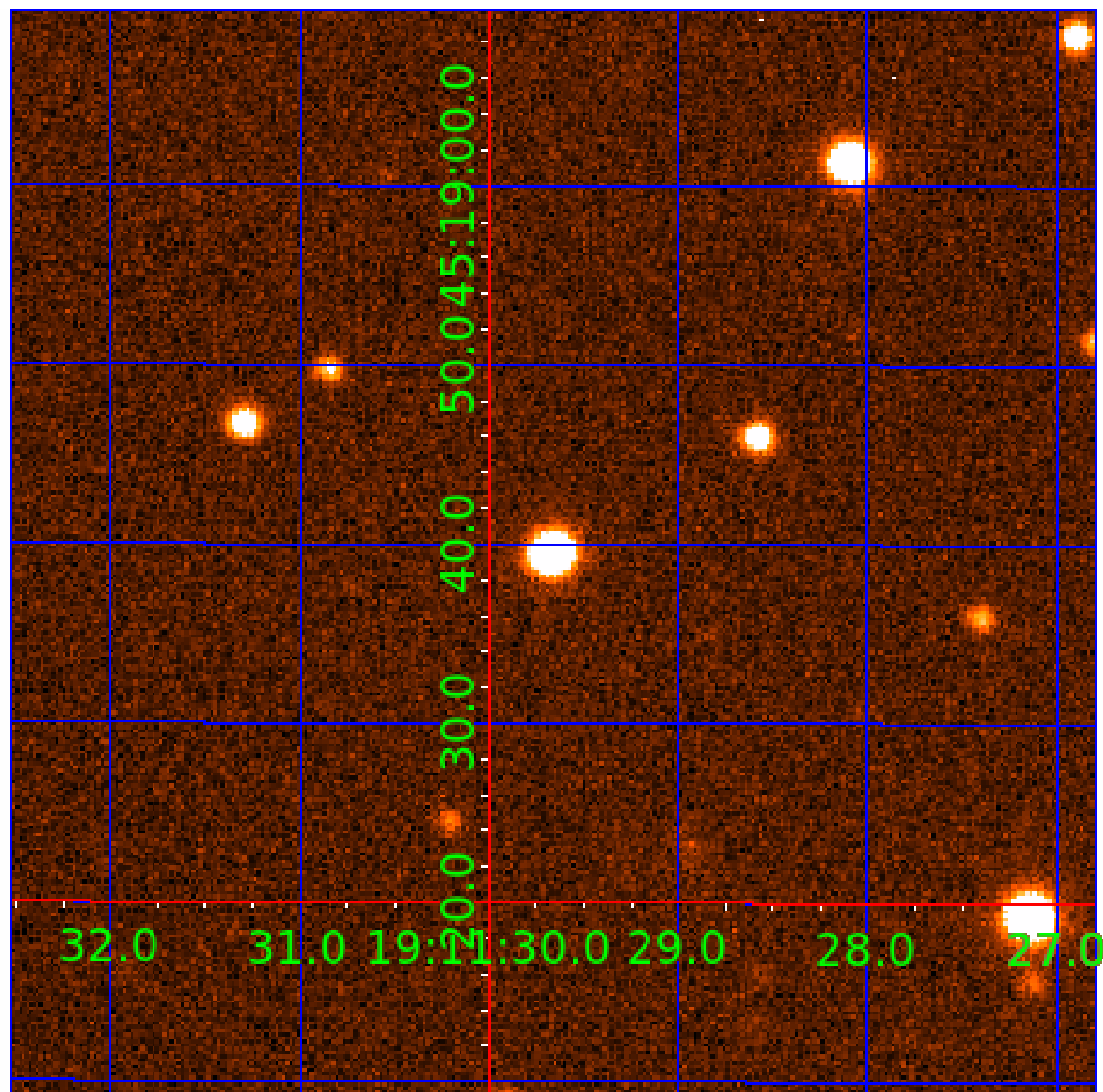


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 009011963

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})
009011963-01	OBS	No	476.971558	551.200912	1488.8	3.857	13.1	4.4	0.73	4457	2.82	0.16
009011963-02	OBS	No	626.409587	242.904701	2438.8	3.275	13.2	8.4	0.73	4457	3.43	0.11
009011963-03	OBS	No	233.879027	233.716135	2400.8	20.986	10.2	6.0	0.73	4457	4.66	0.42
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Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
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009011963-02	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
009011963-03	OBS	FP	0.00	1	0	0	0	LPP_DV—INCONSISTENT_TRANS
009011963-04	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—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.

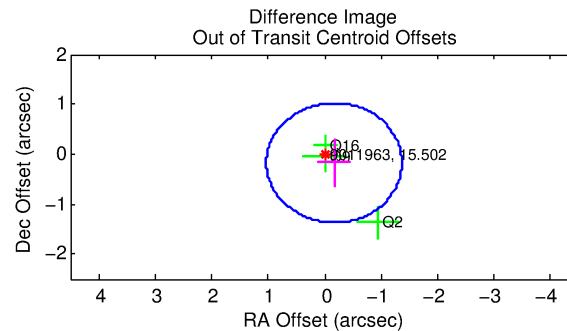
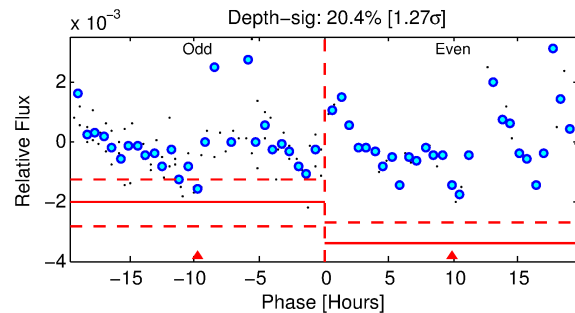
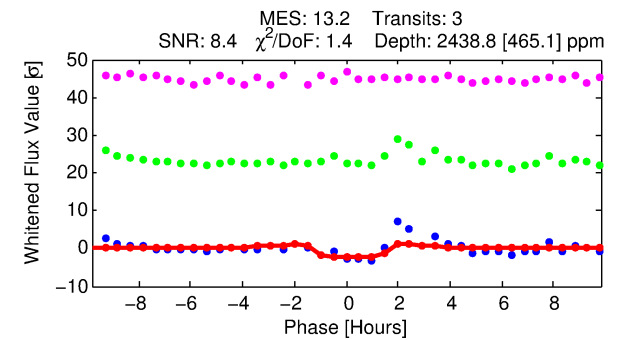
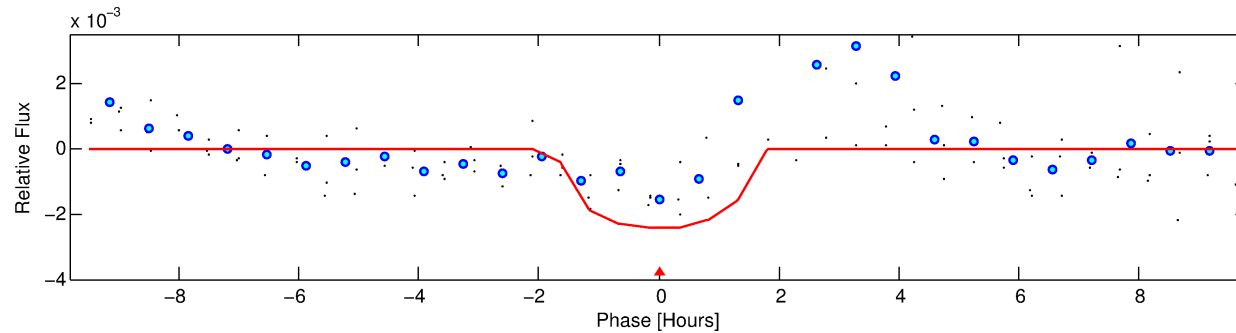
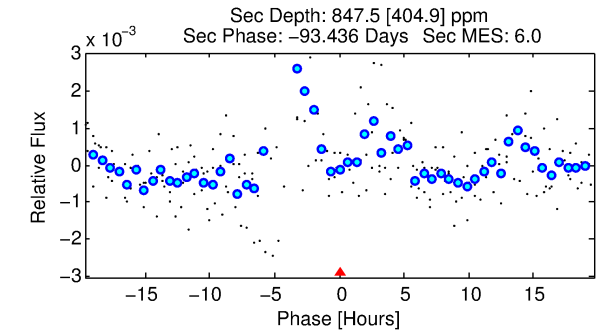
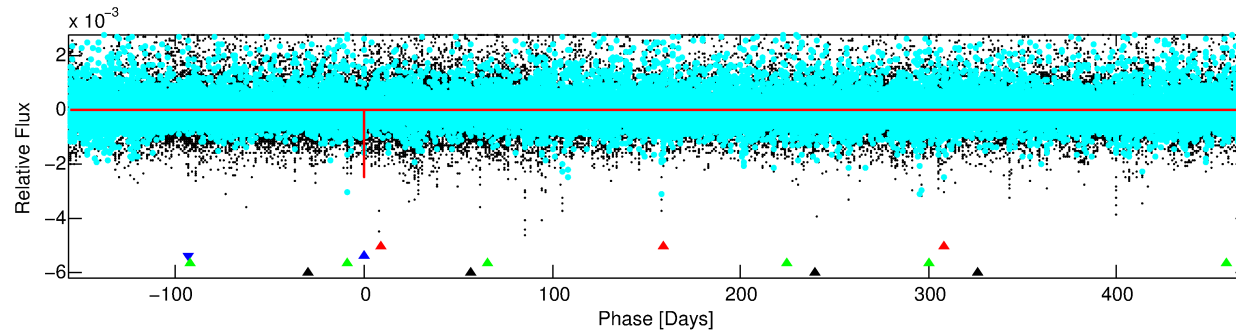
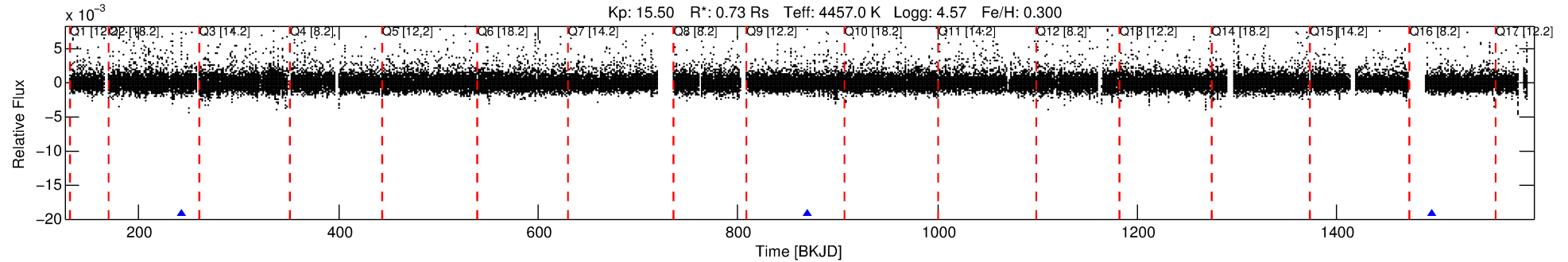
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009011963-02

No Significant Match Found

DV One-Page Summary

KIC: 9011963 Candidate: 2 of 4 Period: 626.410 d



DV Fit Results:

Period = 626.40959 [0.00647] d
Epoch = 242.9047 [0.0089] BKJD
Rp/R* = 0.0431 [0.1065]
a/R* = 1524.25 [10311.47]
b = 0.01 [1133.42]
Seff = 0.11 [0.02]
Teq = 148 [6] K
Rp = 3.43 [8.49] Re
a = 1.2877 [0.0925] AU
Ag = 65651.33 [326176.64] [0.20 σ]
Teffp = 3664 [4551] K [0.77 σ]

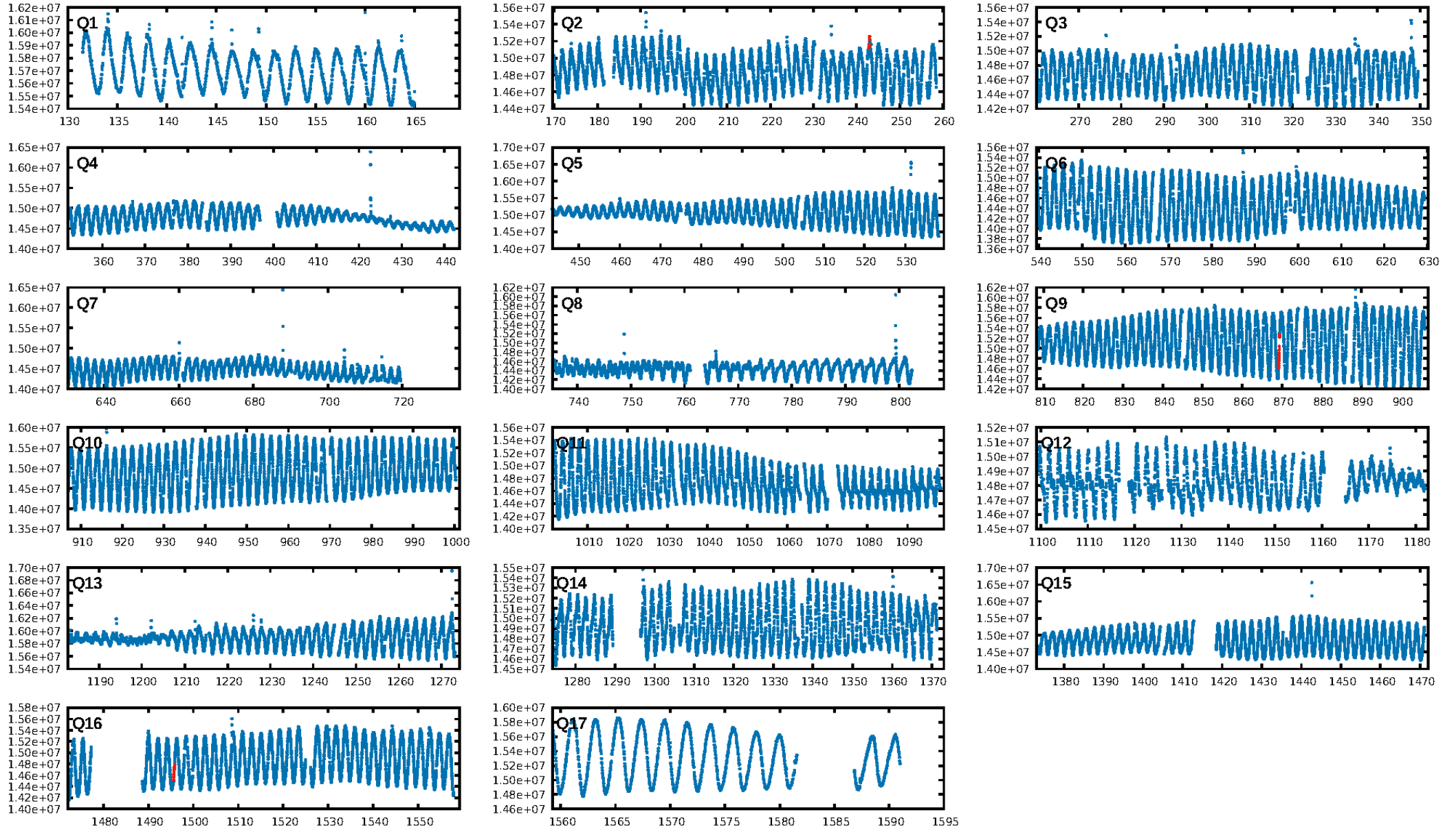
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [708.80 σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 5.3%
ModelChiSquareGof-sig: 70.5%
Bootstrap-pfa: 3.82e-11
RollingBand-fgt: 1.00 [3/3]
GhostDiagnostic-chr: 0.7454
Centroid-sig: 52.4%
Centroid-so: 0.778 arcsec [0.76 σ]
OotOffset-rm: 0.241 arcsec [0.60 σ]
OotOffset-st: 1/0/1/1 [3]
KicOffset-rm: 0.279 arcsec [0.91 σ]
KicOffset-st: 1/0/1/1 [3]
DiffImageQuality-fgm: 0.67 [2/3]
DiffImageOverlap-fno: 1.00 [3/3]

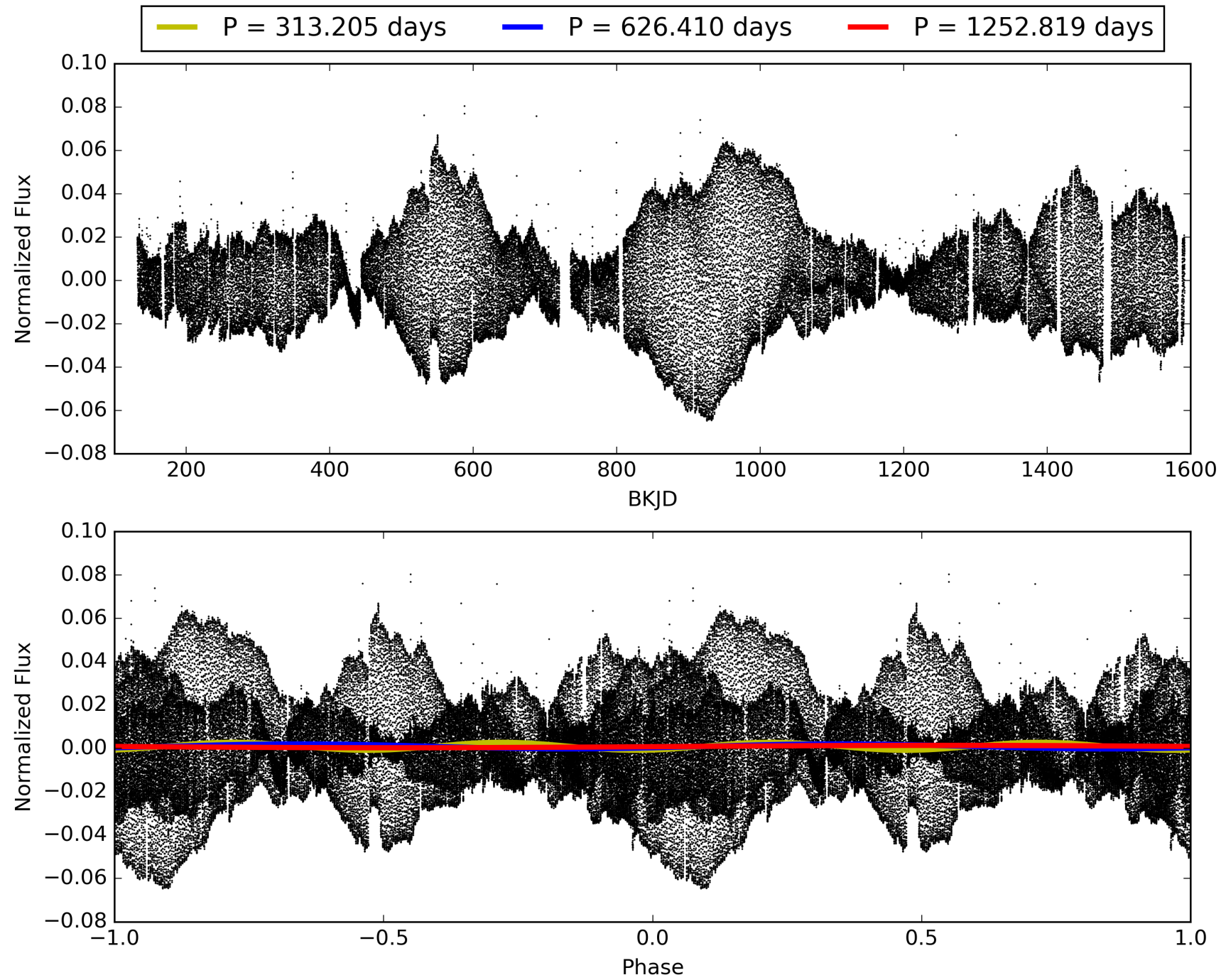
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 14:15:54 Z

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

TCE 009011963-02, PDC Light Curves

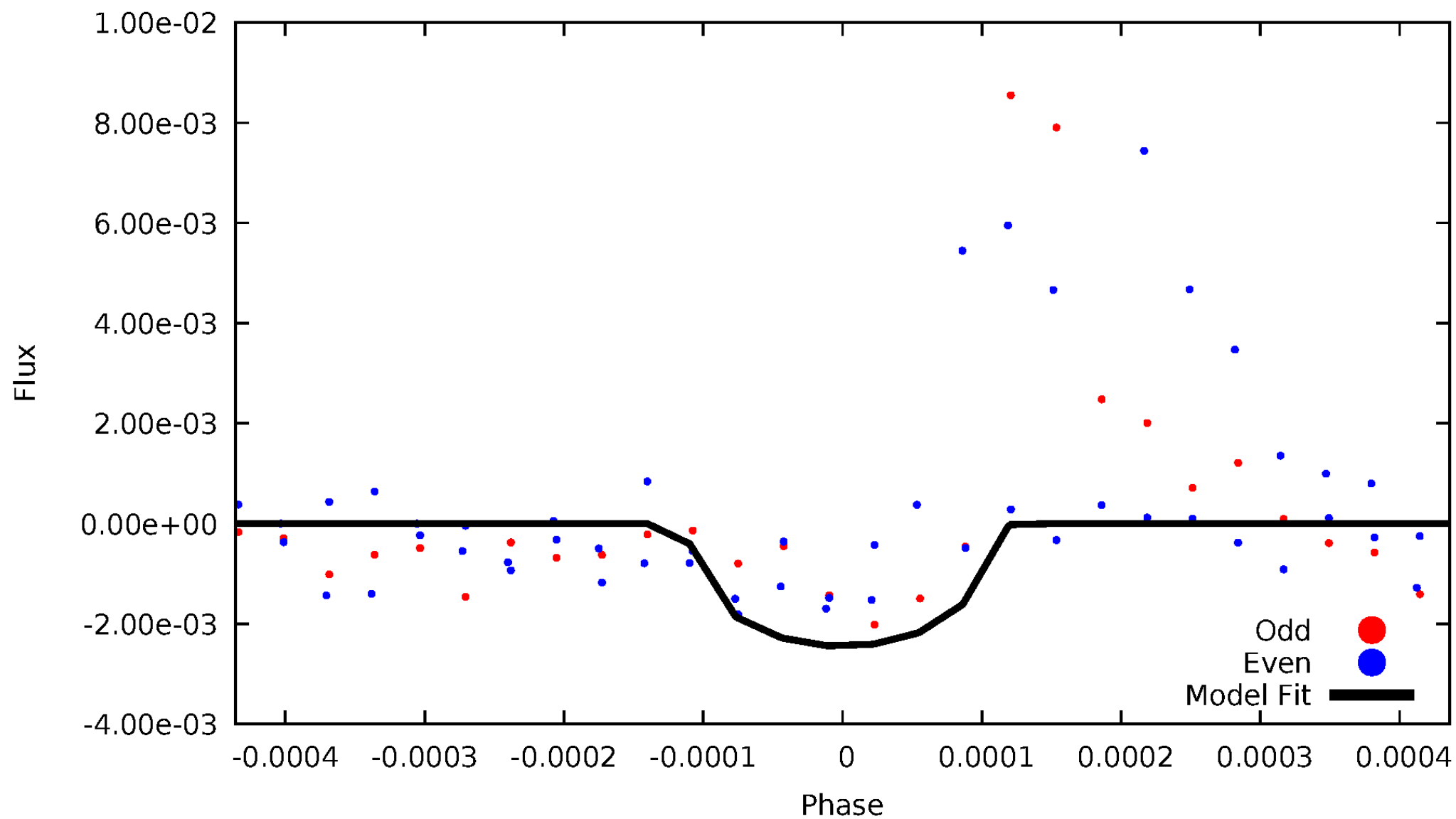


TCE 009011963-02



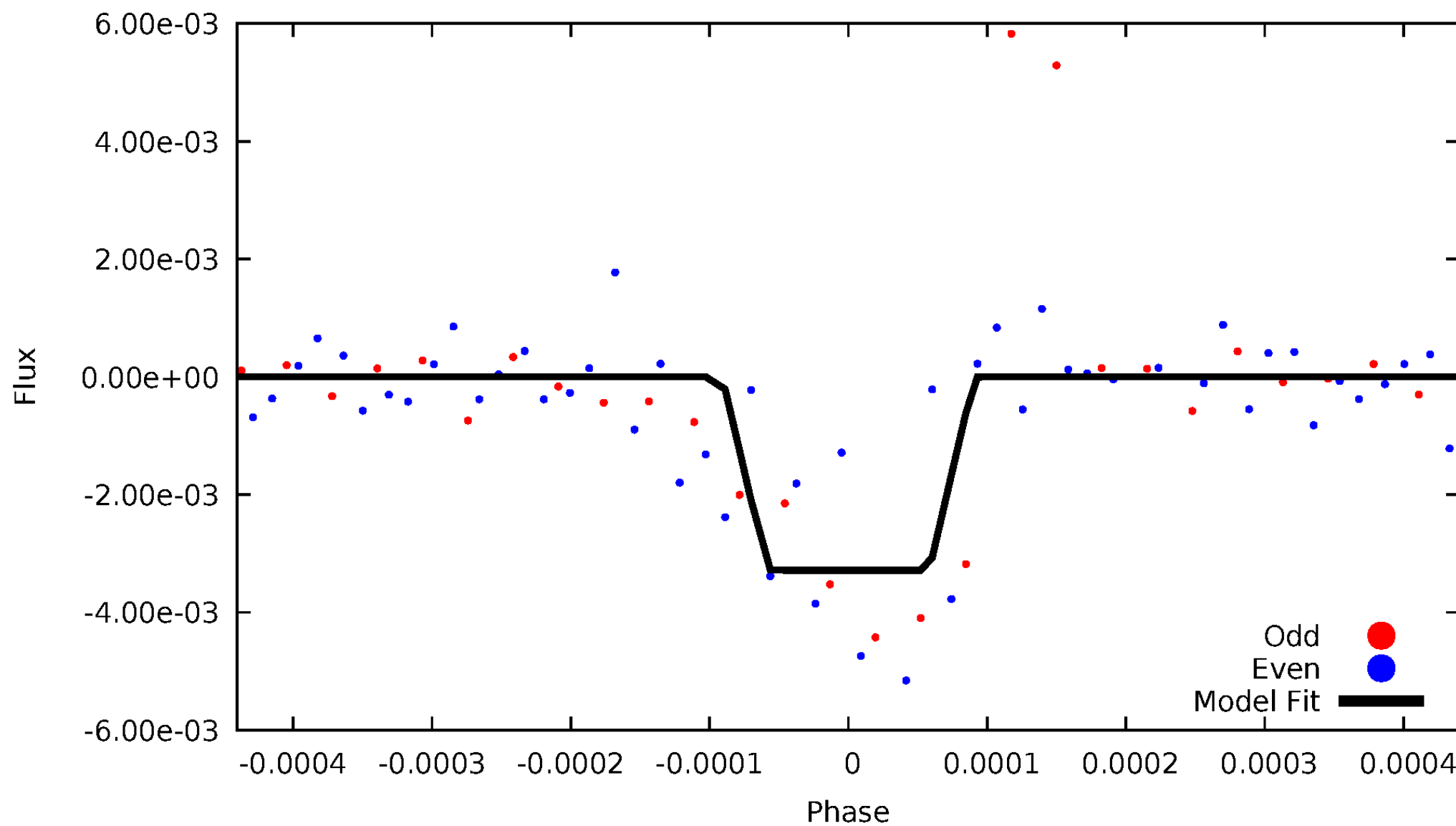
DV Odd/Even

TCE 009011963-02



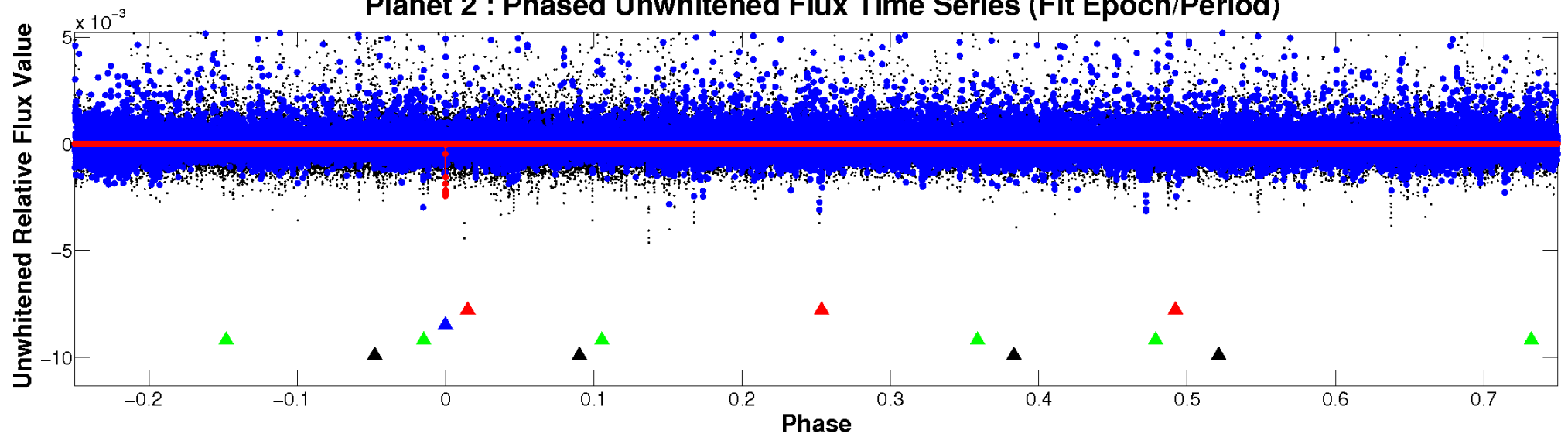
ALT Odd/Even

TCE 009011963-02

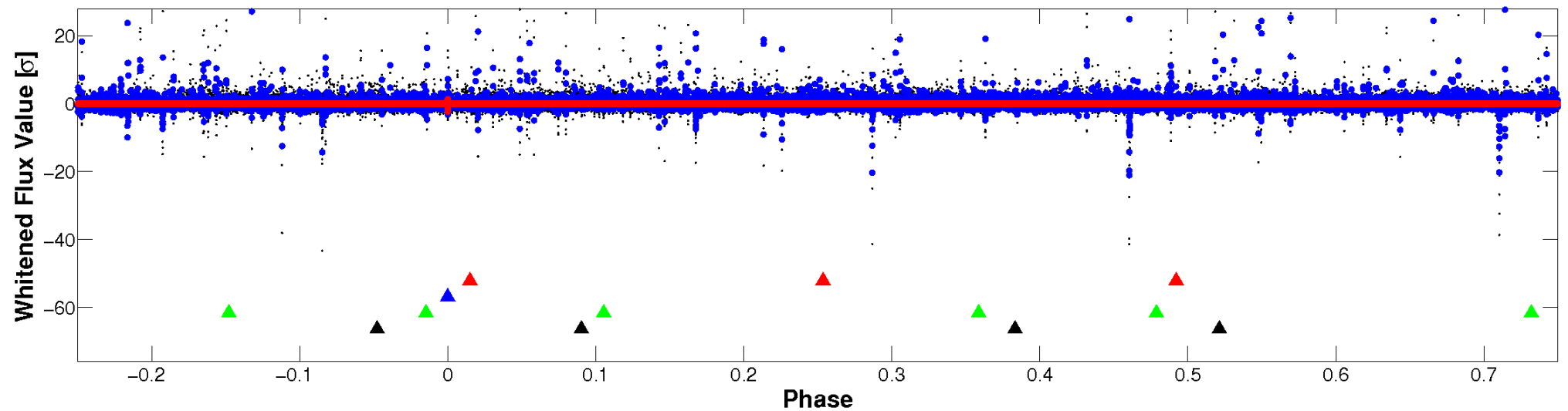


Non-Whitened Vs. Whitened Light Curve

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

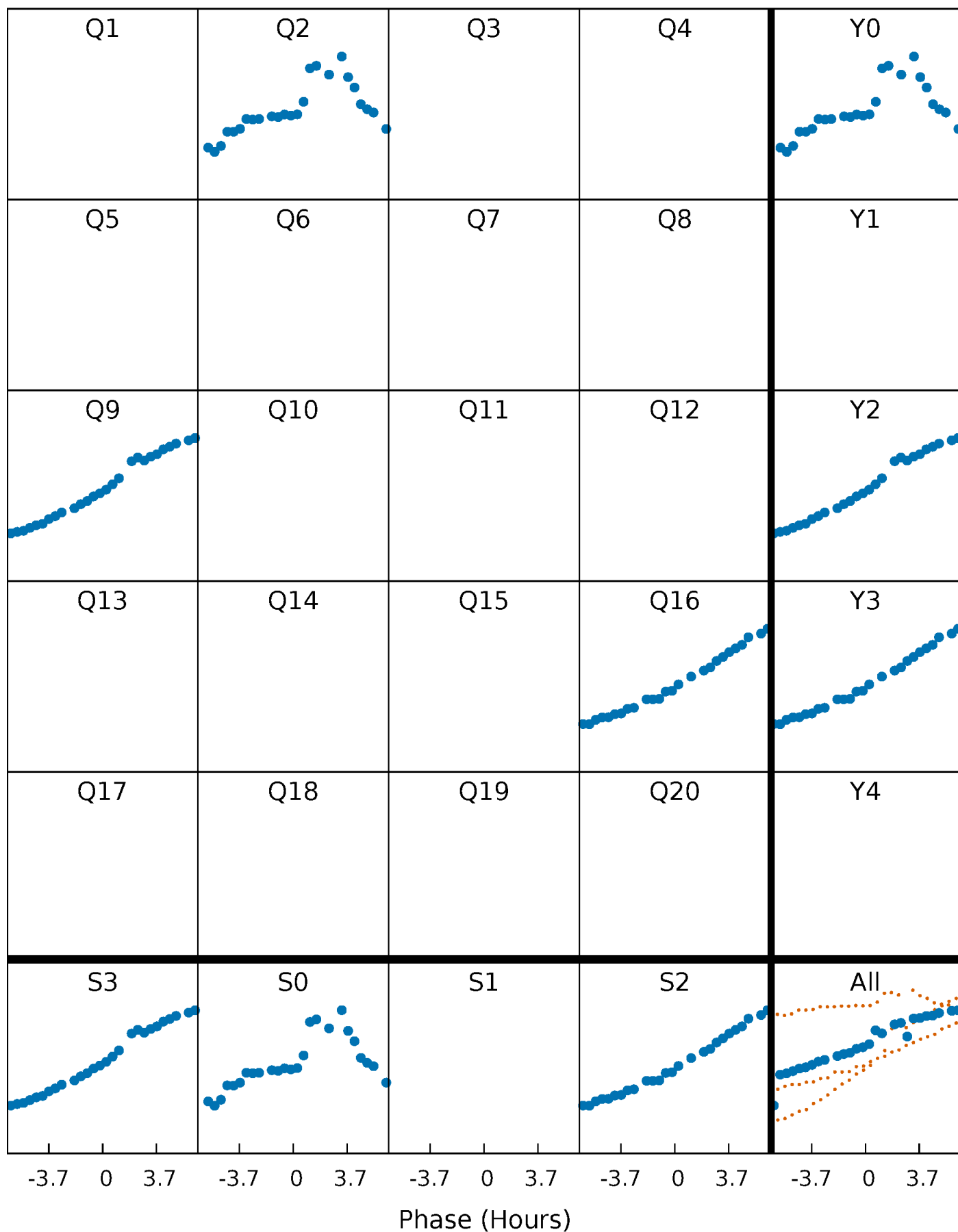


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



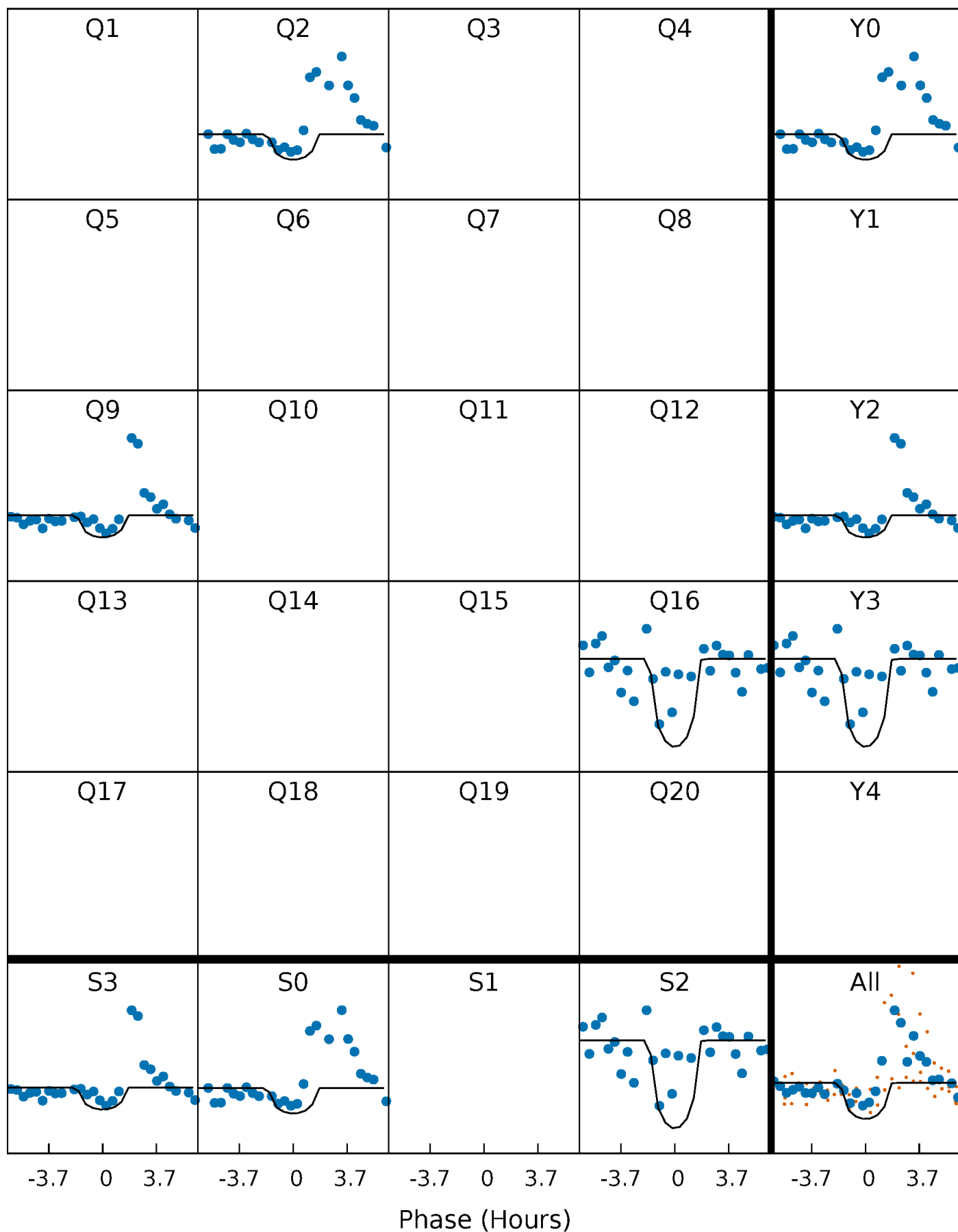
PDC Quarter-Phased Transit Curves

TCE 009011963-02 P=626.409587 Days $T_0=242.904701$ (BKJD)



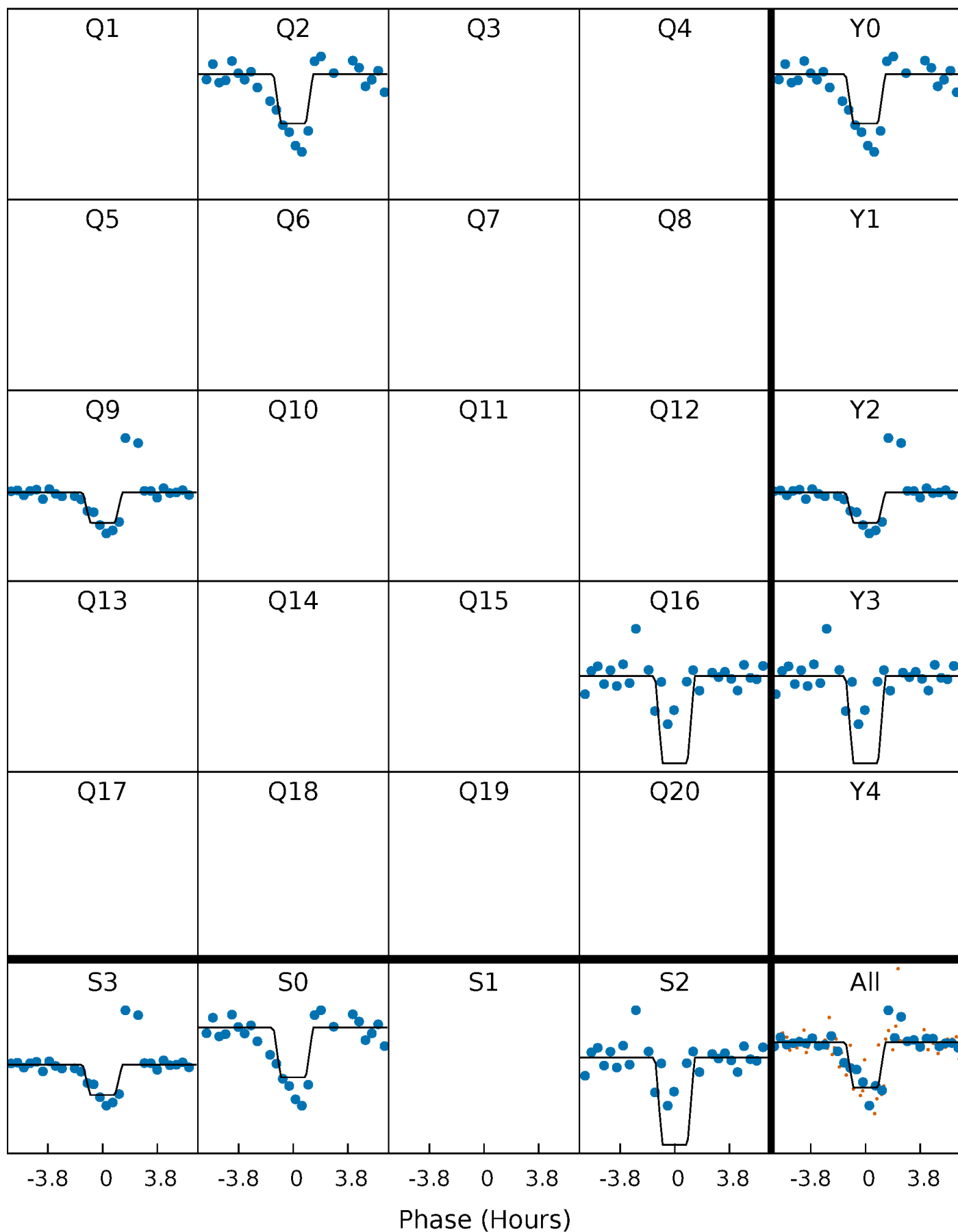
DV Quarter-Phased Transit Curves

TCE 009011963-02 P=626.409587 Days $T_0=242.904701$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

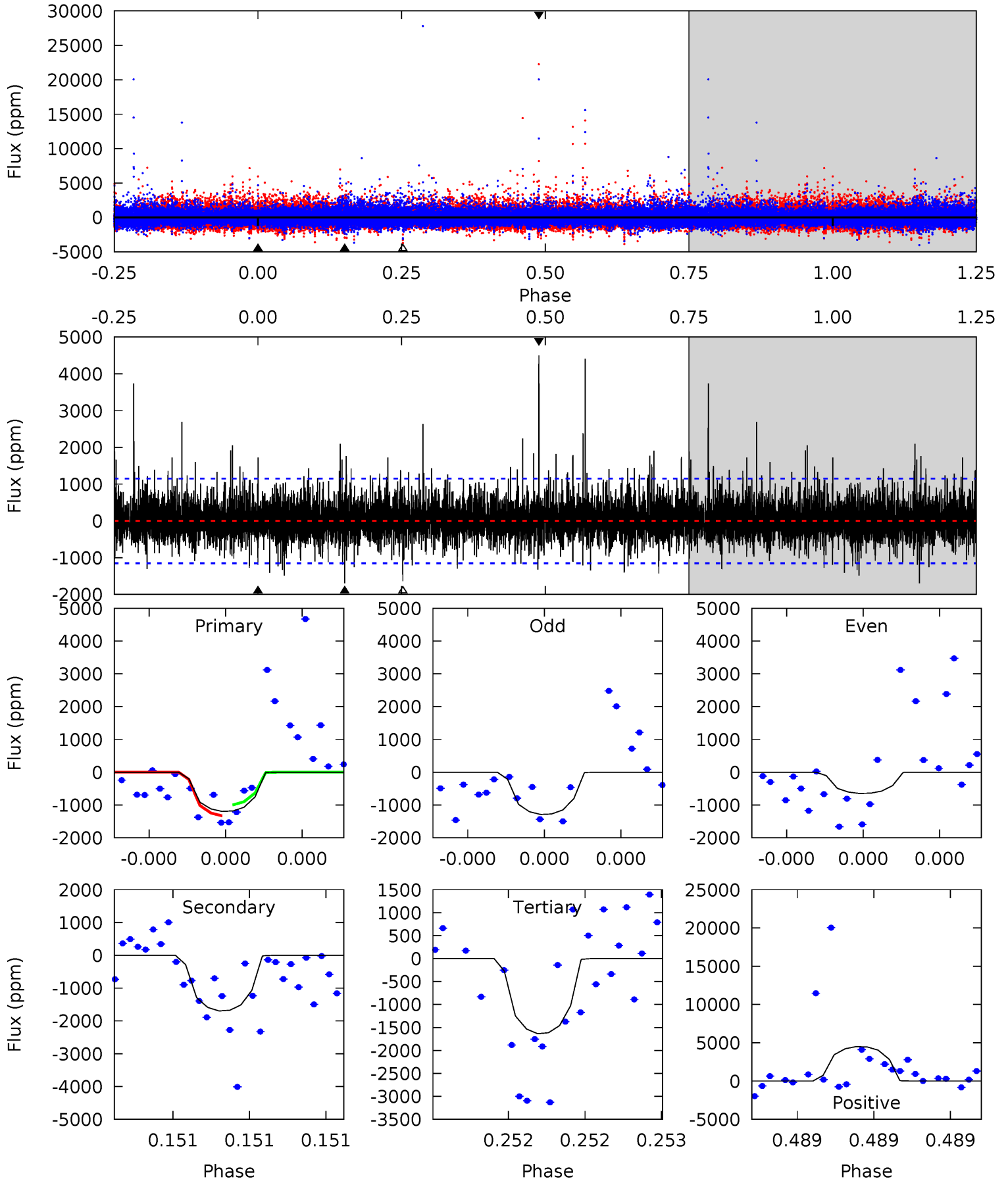
TCE 009011963-02 P=626.424838 Days $T_0=242.891628$ (BKJD)



DV Model-Shift Uniqueness Test

009011963-02, P = 626.409587 Days, E = 242.904701 Days

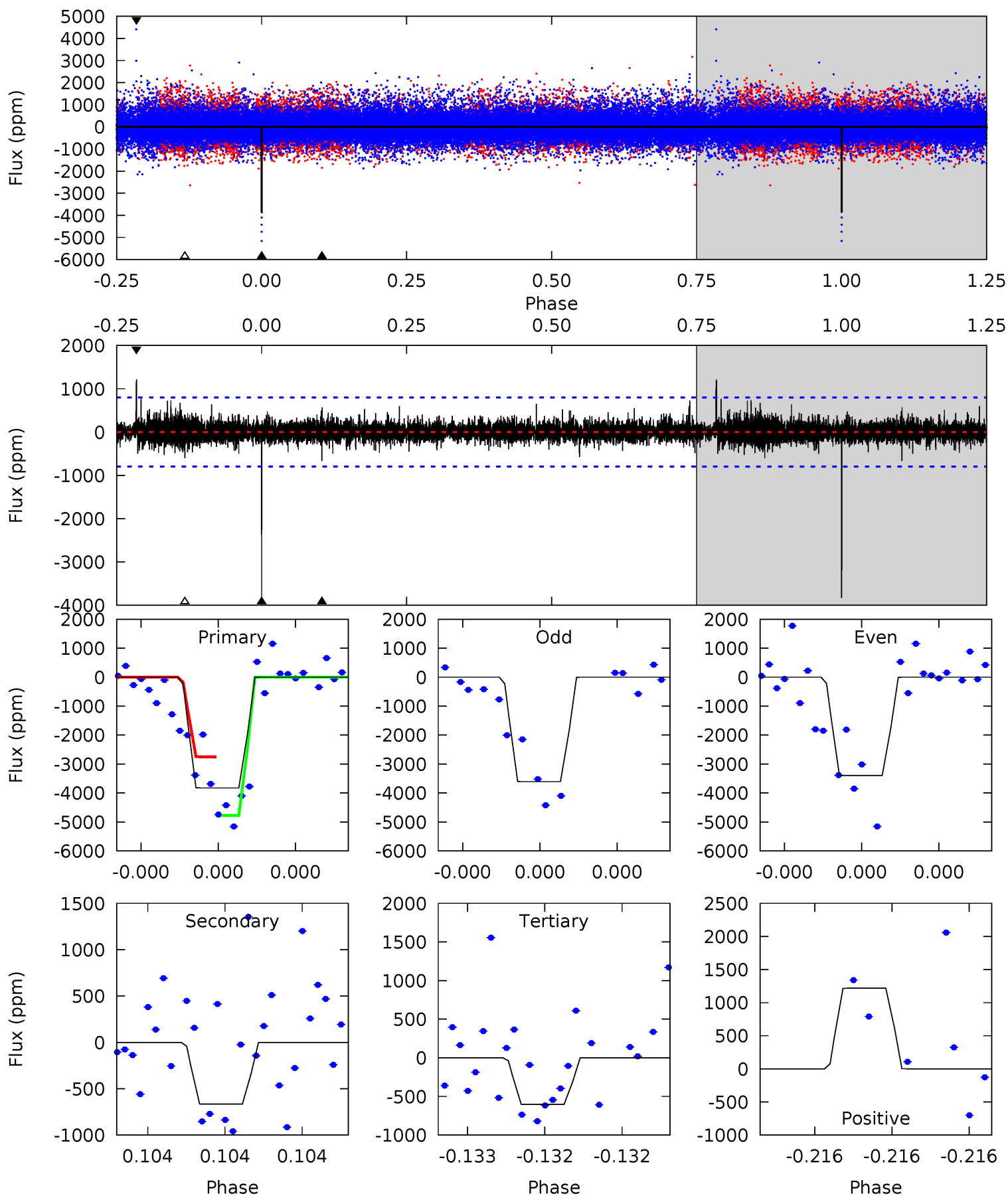
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.94	8.42	8.12	22.4	5.71	3.69	2.00	-2.18	-16.4	0.30	-13.9	1.00	0.85	0.73	0.83



Alt Model-Shift Uniqueness Test

009011963-02, P = 626.424838 Days, E = 242.891628 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
27.5	4.78	4.34	8.74	5.73	3.72	0.84	23.1	18.7	0.44	-3.96	0.74	0.83	0.24	7.59



Stellar Parameters For KIC 009011963

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	4457^{+145}_{-145}	$4.572^{+0.056}_{-0.020}$	$0.300^{+0.150}_{-0.300}$	$0.730^{+0.025}_{-0.063}$	$0.725^{+0.041}_{-0.050}$	$2.628^{+0.647}_{-0.175}$
	+3%/-3%	+1%/-0%	+50%/-100%	+3%/-9%	+6%/-7%	+25%/-7%
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 009011963-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	-1695 ± 201	$7.57^{+6.92}_{-5.17}$	206^{+7}_{-7}	3361^{+1693}_{-604}	$26993^{+258932}_{-19539}$
Alt.	-666 ± 139	$7.35^{+7.73}_{-4.94}$	205^{+8}_{-7}	2937^{+1219}_{-512}	11465^{+98073}_{-8840}

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 $A_{obs} \gg 1.0$

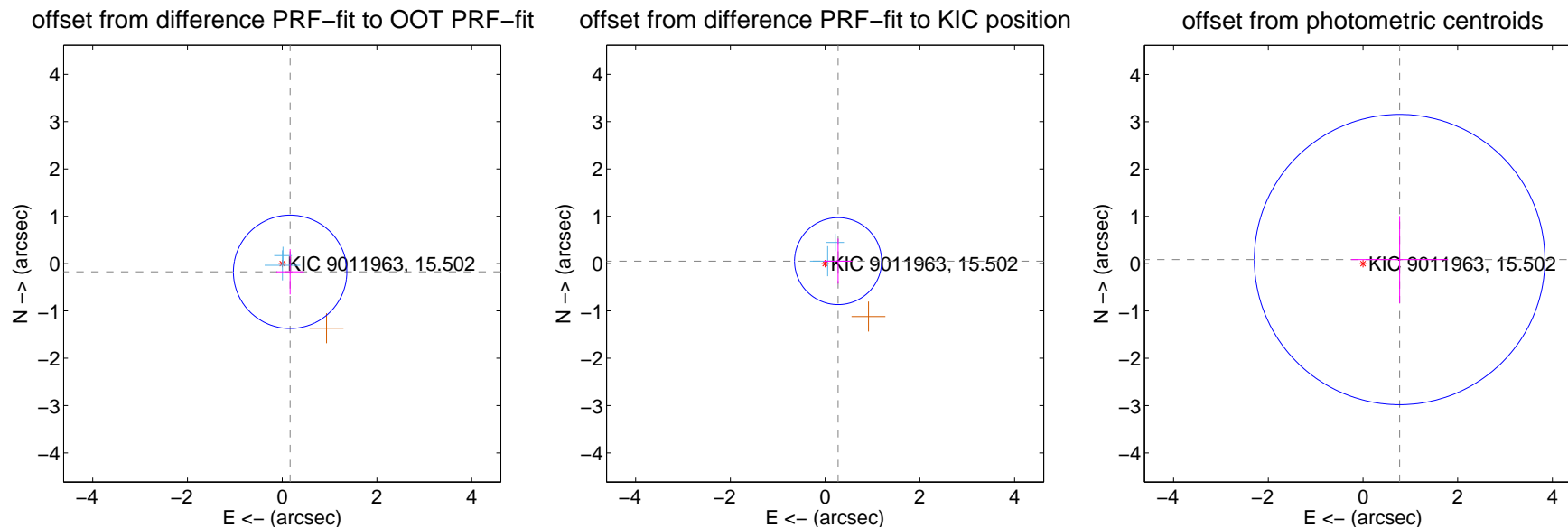
DV Centroid Data

Supplemental centroid analysis for 009011963-02. Kepler magnitude: 15.50. Transit SNR 8.38

There are 2 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.34 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.241 ± 0.399	0.60	-0.167 ± 0.291	-0.174 ± 0.478
PRF-fit source offset from KIC position	0.279 ± 0.306	0.91	-0.274 ± 0.298	0.052 ± 0.476
photometric centroid source offset	0.78 ± 1.02	0.76	-0.77 ± 1.02	0.09 ± 0.92



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.

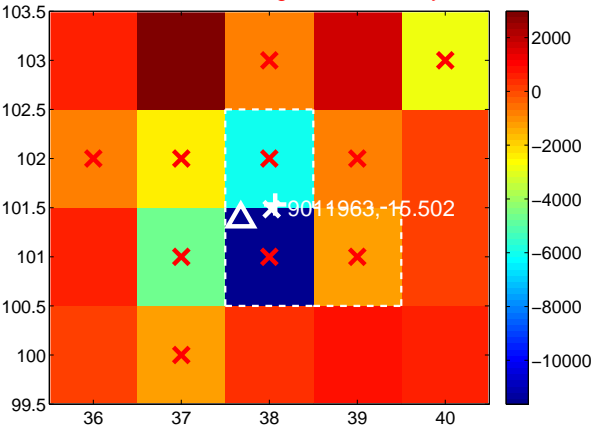
Q1 no difference image



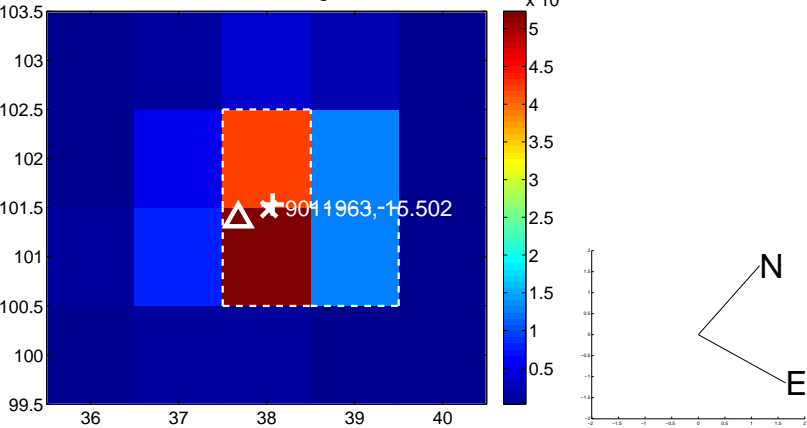
Q1 no OOT image



Q2 difference image. Poor Quality



Q2 OOT image



Q3 no difference image



Q3 no OOT image



Q4 no difference image



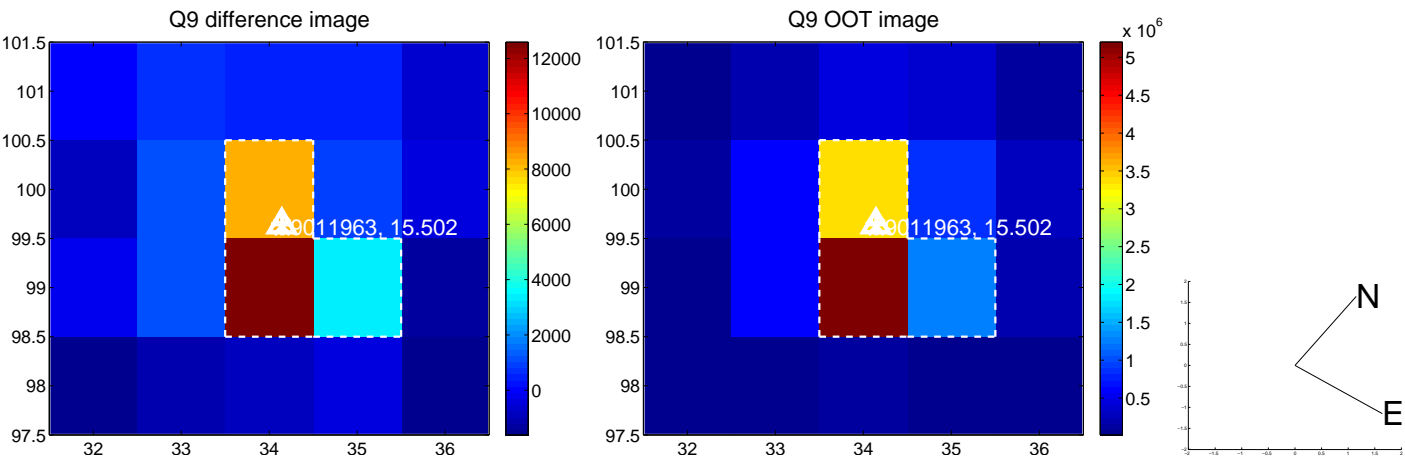
Q4 no OOT image



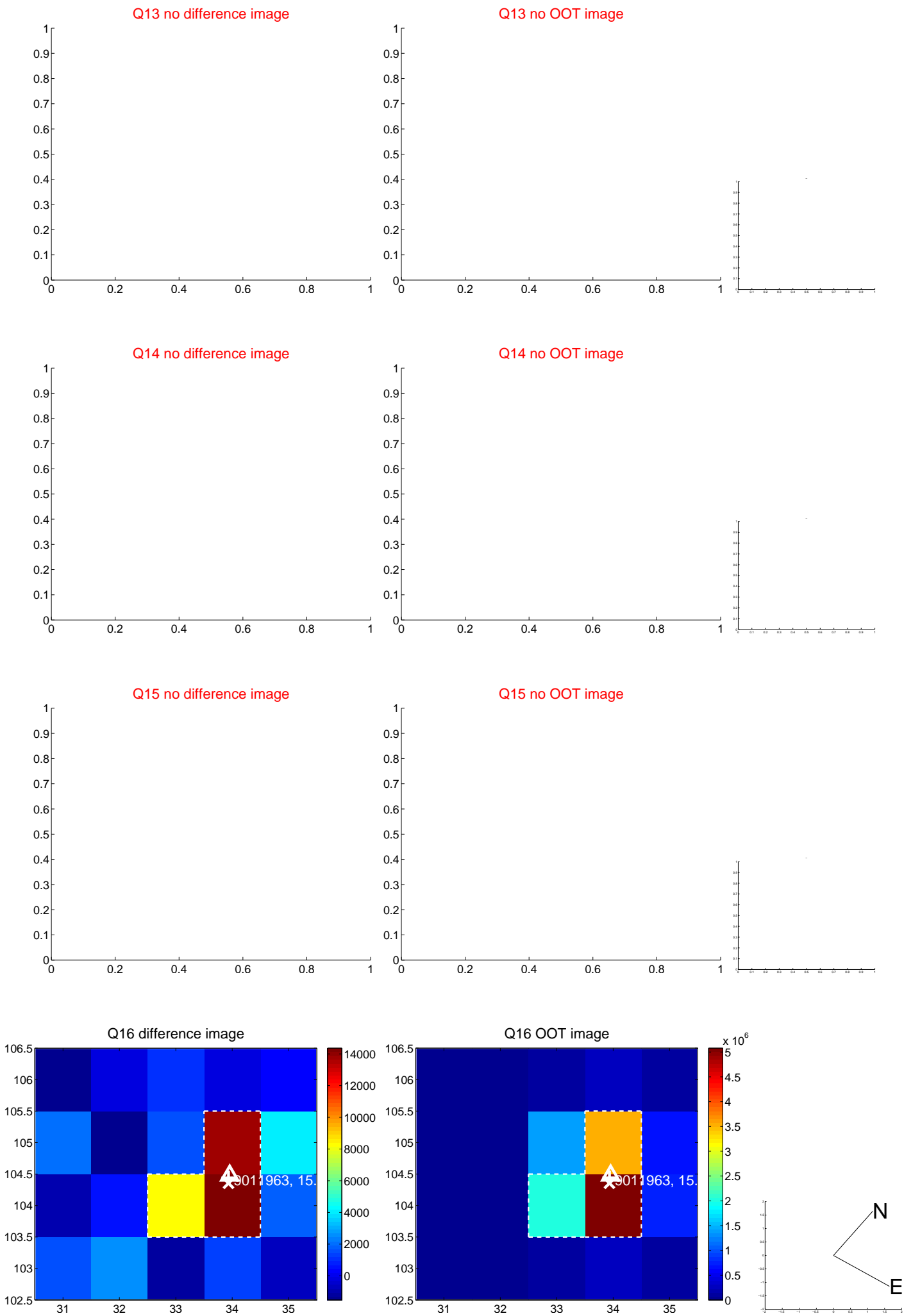
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



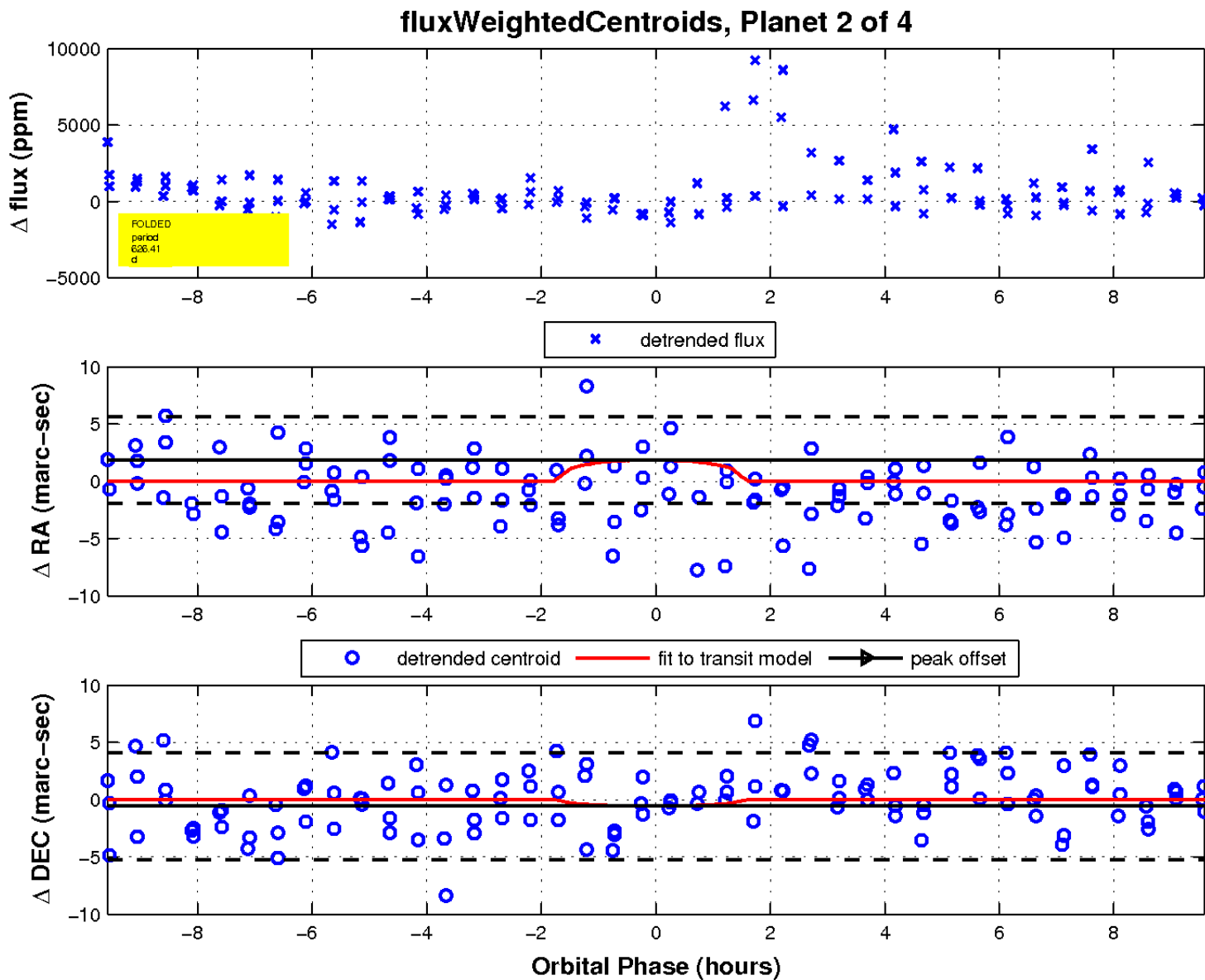
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

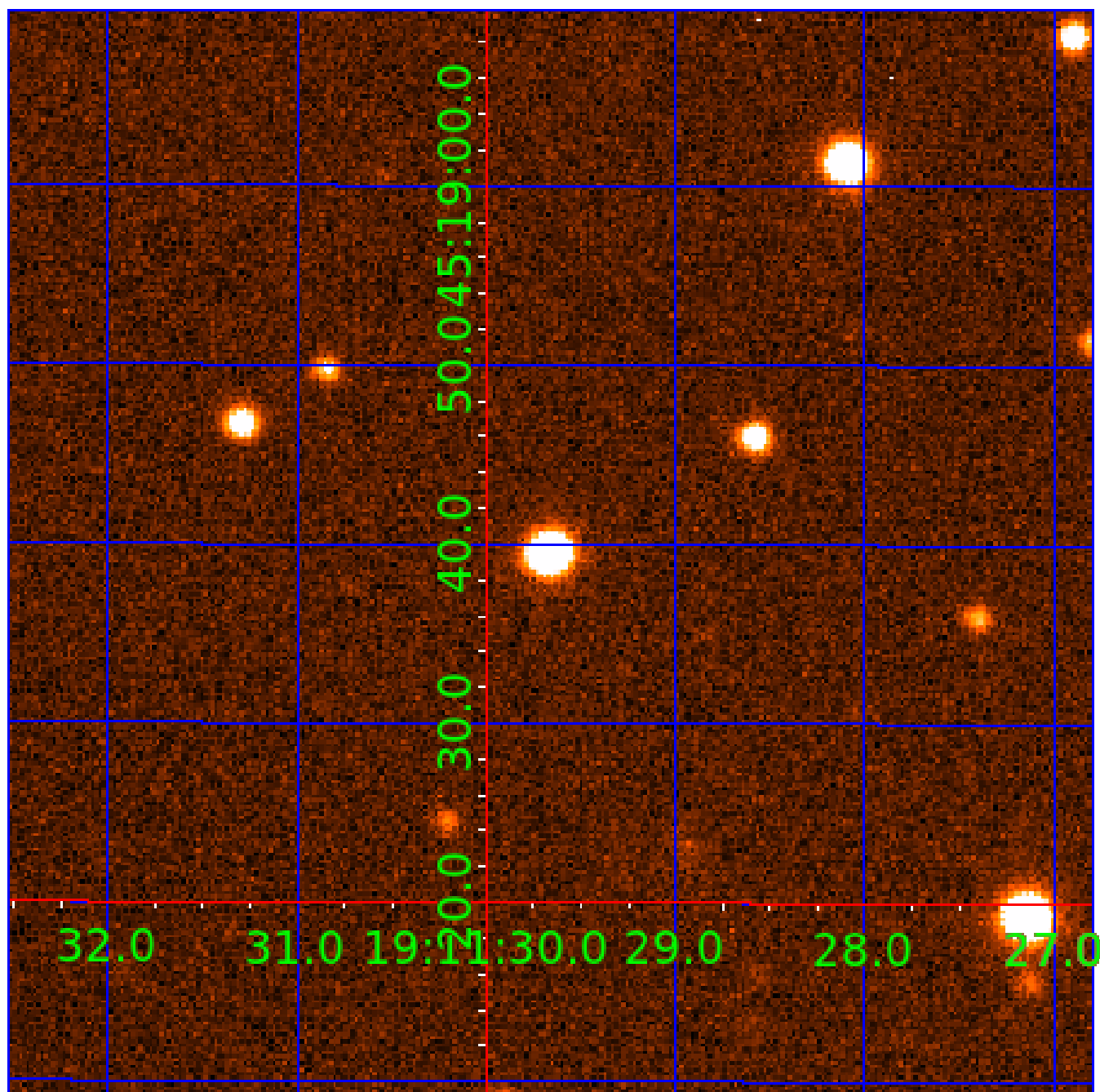


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 009011963

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})
009011963-01	OBS	No	476.971558	551.200912	1488.8	3.857	13.1	4.4	0.73	4457	2.82	0.16
009011963-02	OBS	No	626.409587	242.904701	2438.8	3.275	13.2	8.4	0.73	4457	3.43	0.11
009011963-03	OBS	No	233.879027	233.716135	2400.8	20.986	10.2	6.0	0.73	4457	4.66	0.42
009011963-04	OBS	No	356.426643	483.014731	2160.4	6.297	10.2	7.5	0.73	4457	4.23	0.24

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009011963-01	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
009011963-02	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
009011963-03	OBS	FP	0.00	1	0	0	0	LPP_DV—INCONSISTENT_TRANS
009011963-04	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—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.

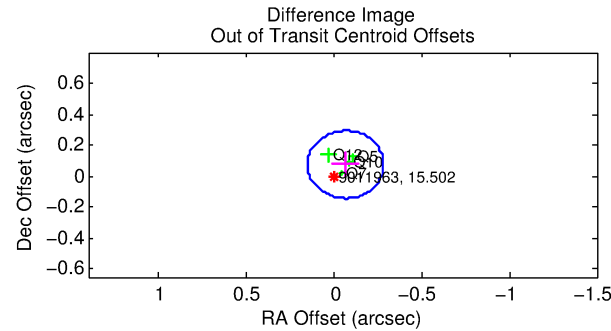
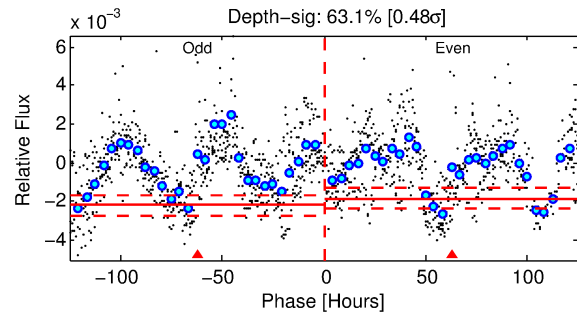
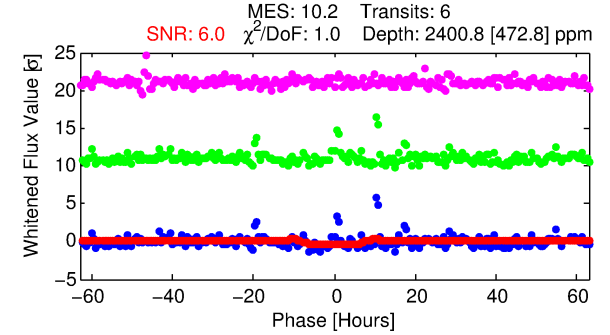
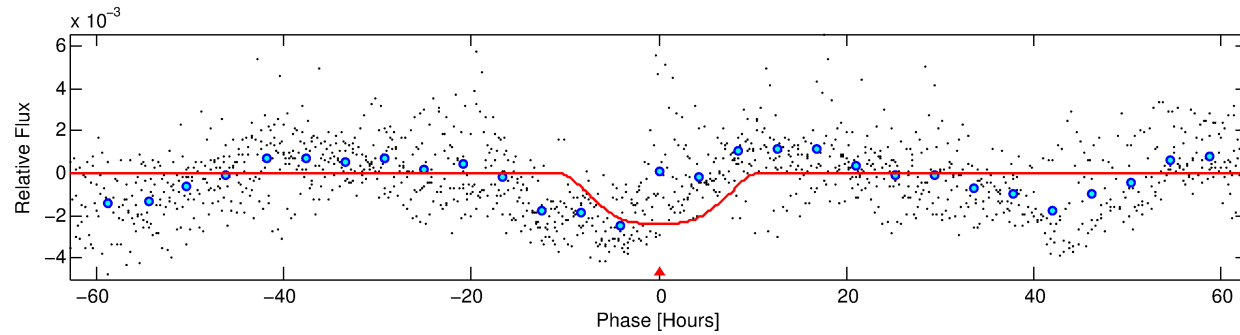
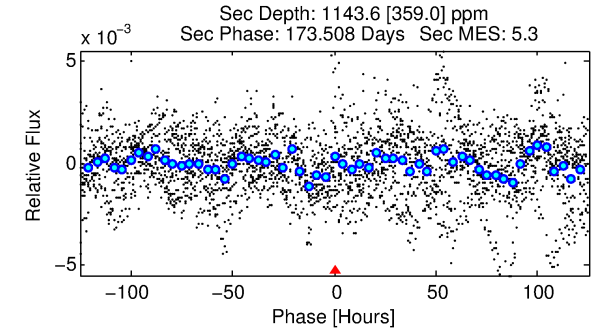
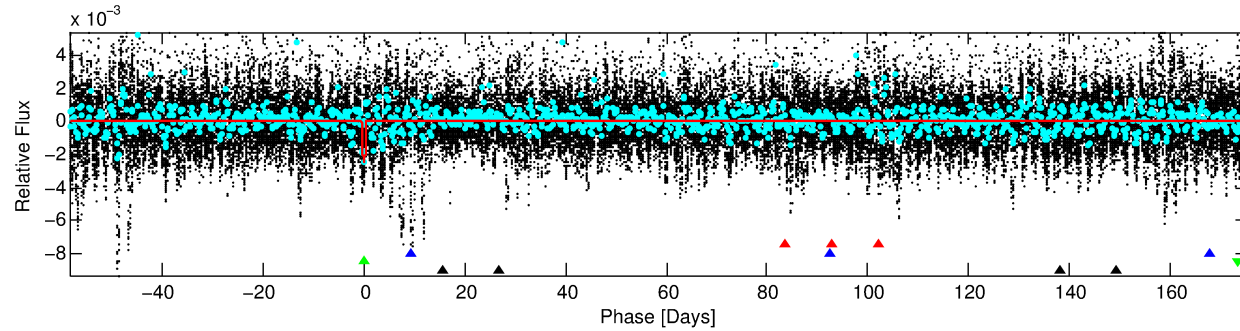
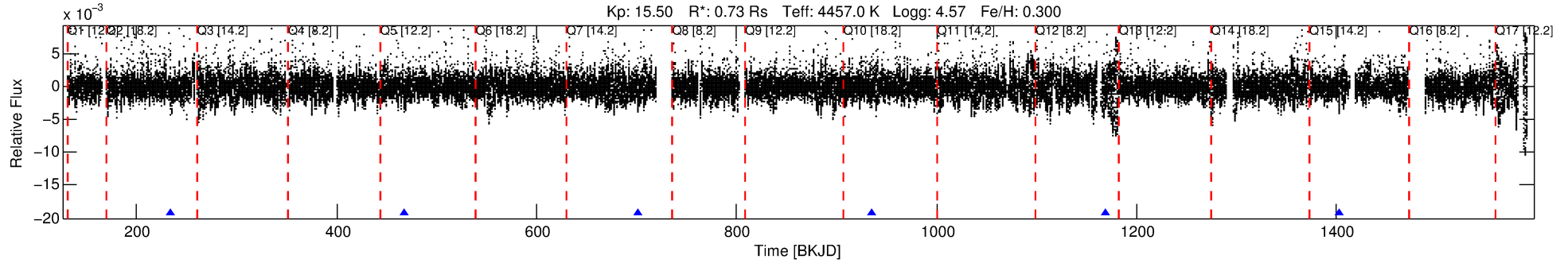
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009011963-03

No Significant Match Found

DV One-Page Summary

KIC: 9011963 Candidate: 3 of 4 Period: 233.879 d



DV Fit Results:

Period = 233.87903 [0.01322] d
Epoch = 233.7161 [0.0392] BKJD
Rp/R* = 0.0585 [0.0066]
a/R* = 43.22 [4.71]
b = 0.93 [0.02]
Seff = 0.42 [0.07]
Teq = 206 [9] K
Rp = 4.66 [0.66] Re
a = 0.6677 [0.0480] AU
Ag = 12928.43 [5164.63] [2.50σ]
Teffp = 3390 [345] K [9.22σ]

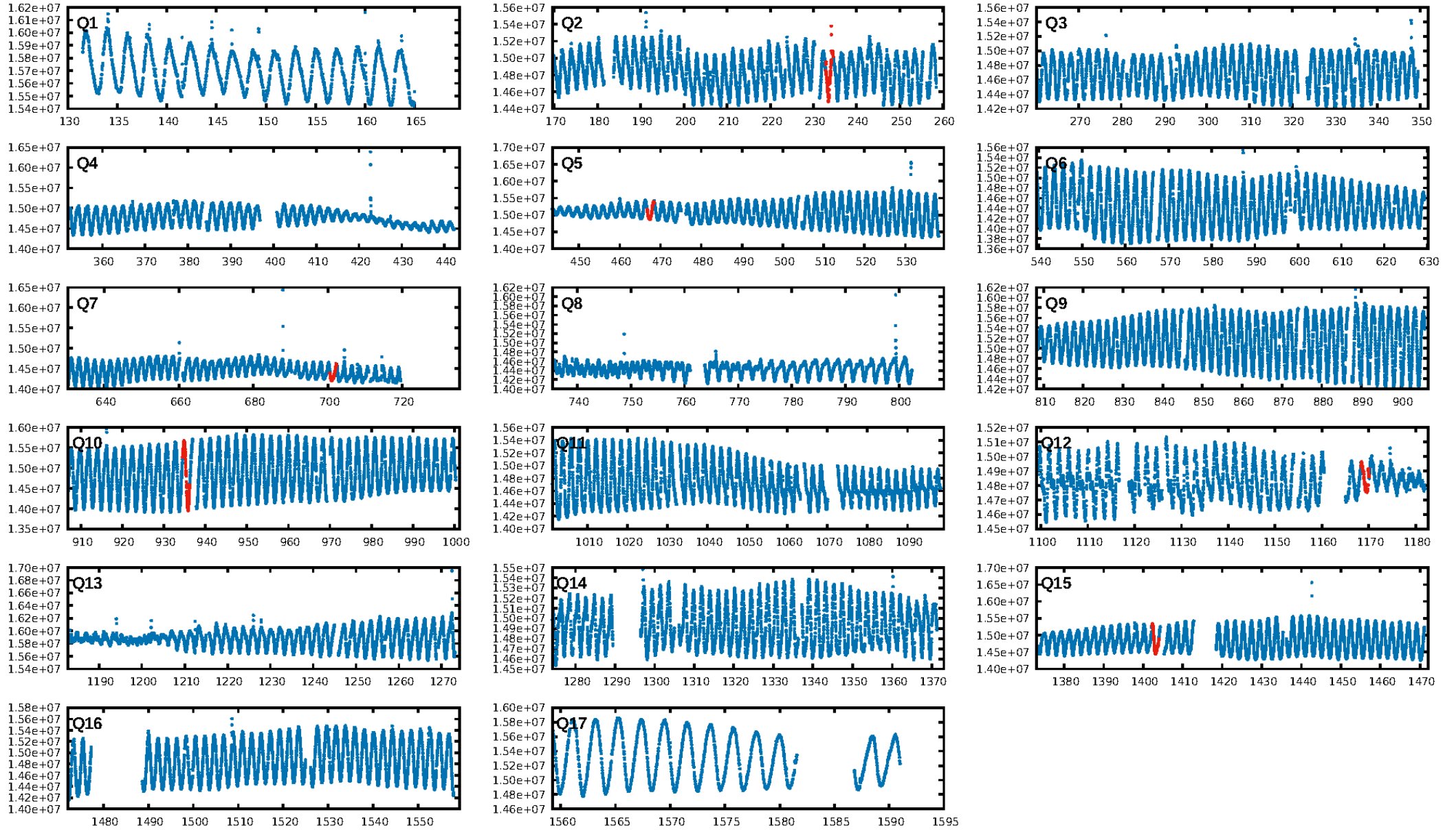
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 100.0% [134.24σ]
ModelChiSquare2-sig: 37.1%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 2.79e-10
RollingBand-fgt: 1.00 [6/6]
GhostDiagnostic-chr: -0.8432
Centroid-sig: 0.1%
Centroid-so: 0.992 arcsec [2.48σ]
OotOffset-rm: 0.100 arcsec [1.38σ]
KicOffset-rm: 0.194 arcsec [2.69σ]
OotOffset-st: 1/1/1/1 [4]
KicOffset-st: 1/1/1/1 [4]
DiffImageQuality-fgm: 1.00 [4/4]
DiffImageOverlap-fno: 1.00 [4/4]

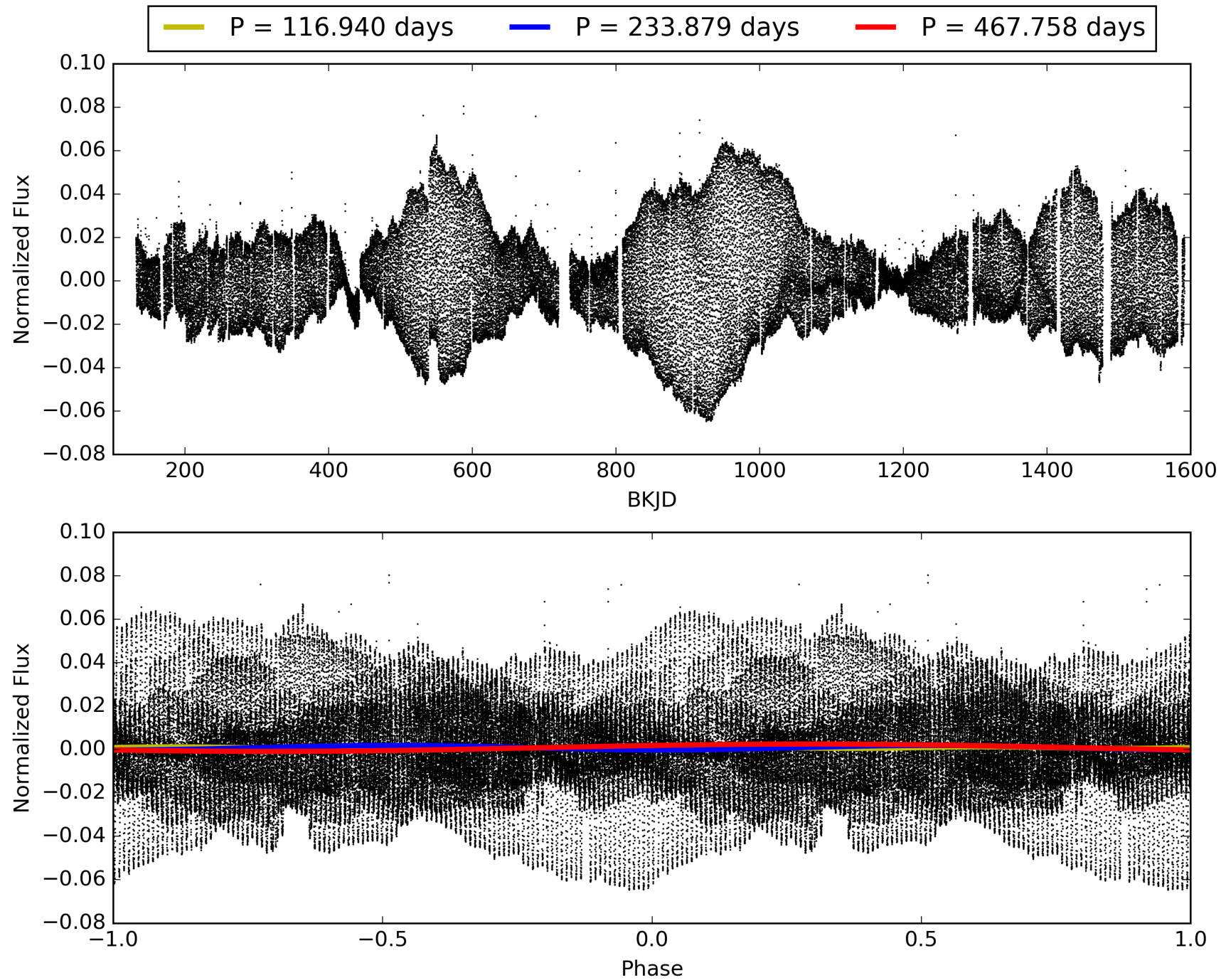
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 14:16:02 Z

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

TCE 009011963-03, PDC Light Curves

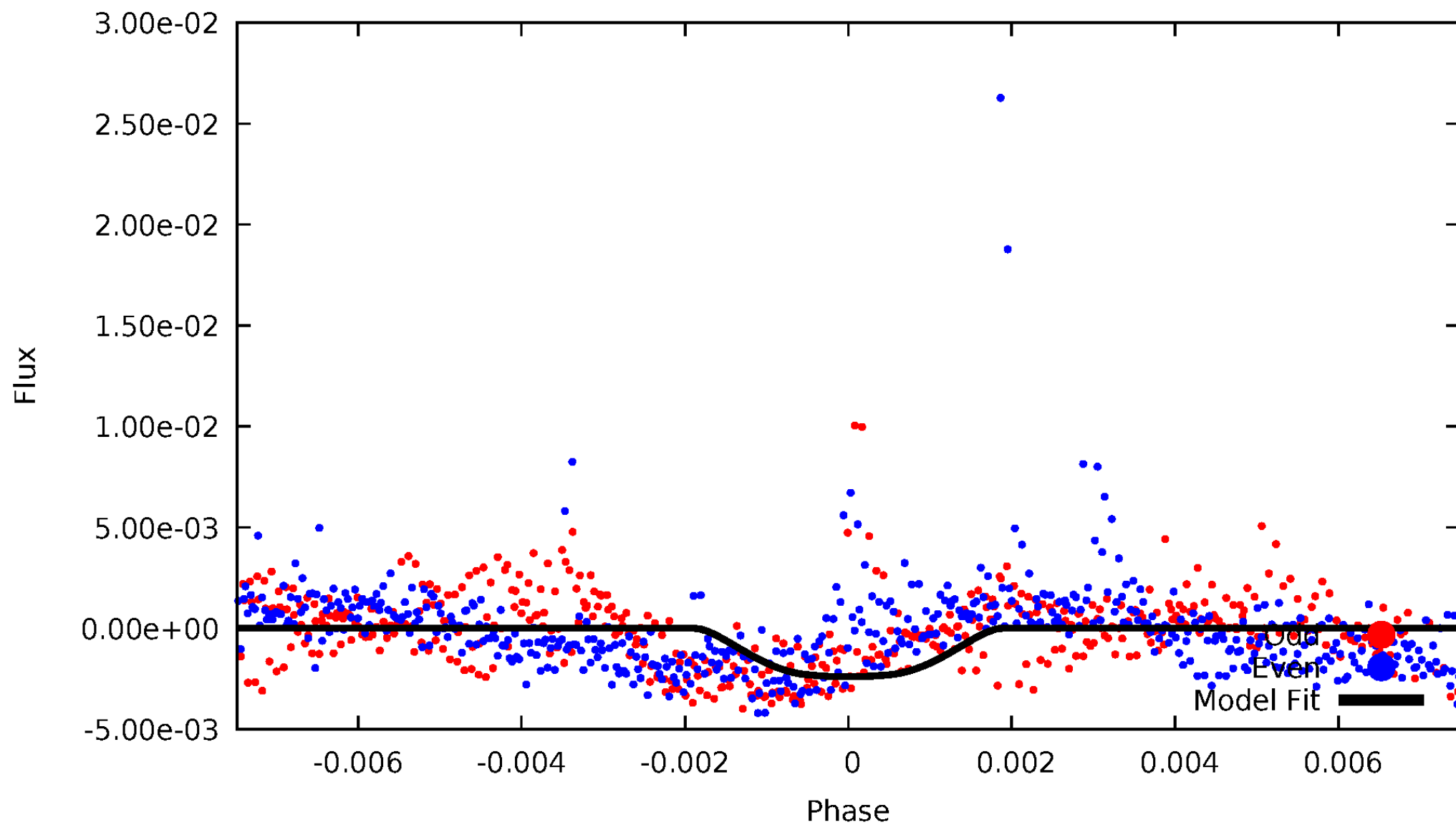


TCE 009011963-03



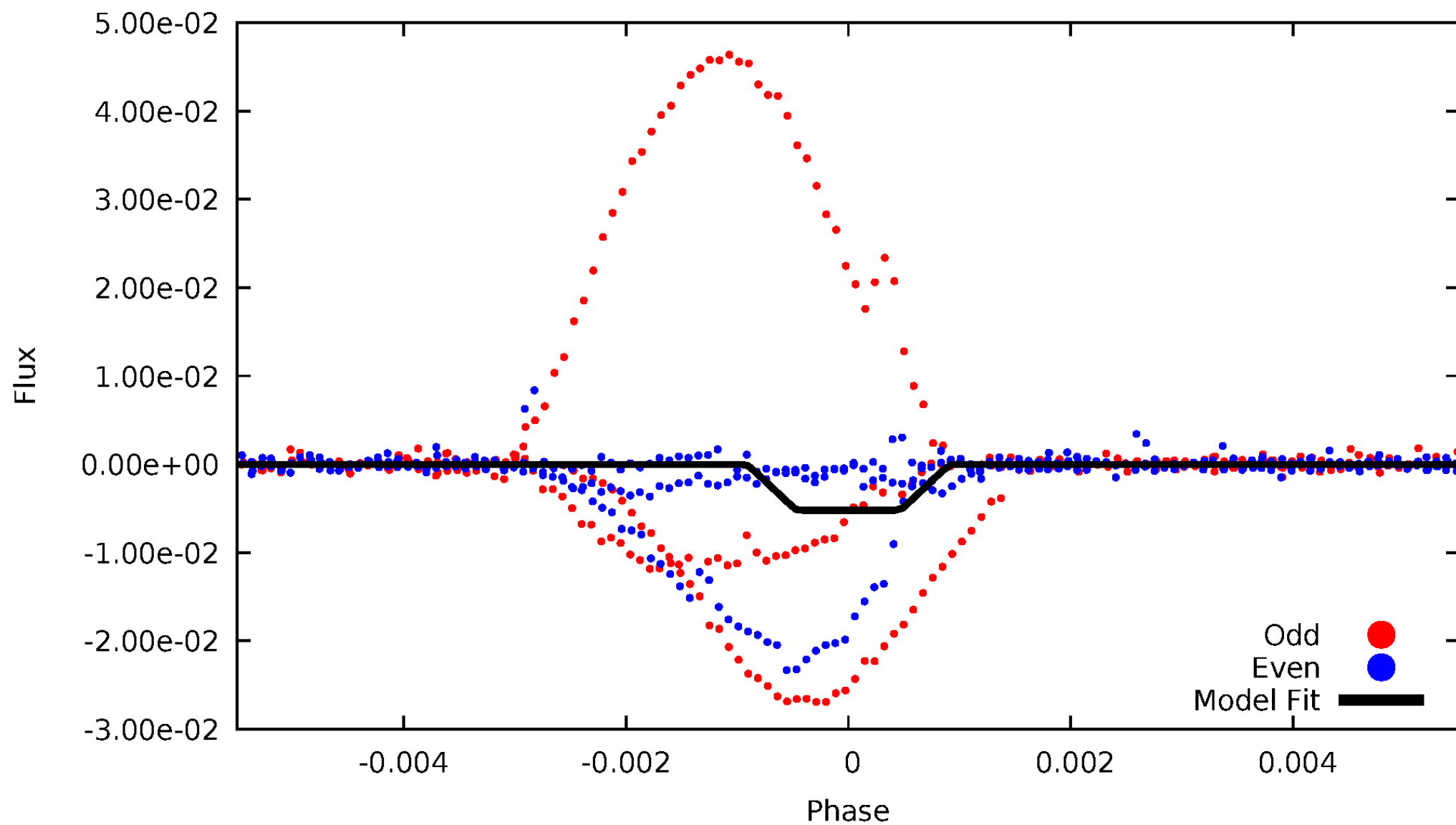
DV Odd/Even

TCE 009011963-03

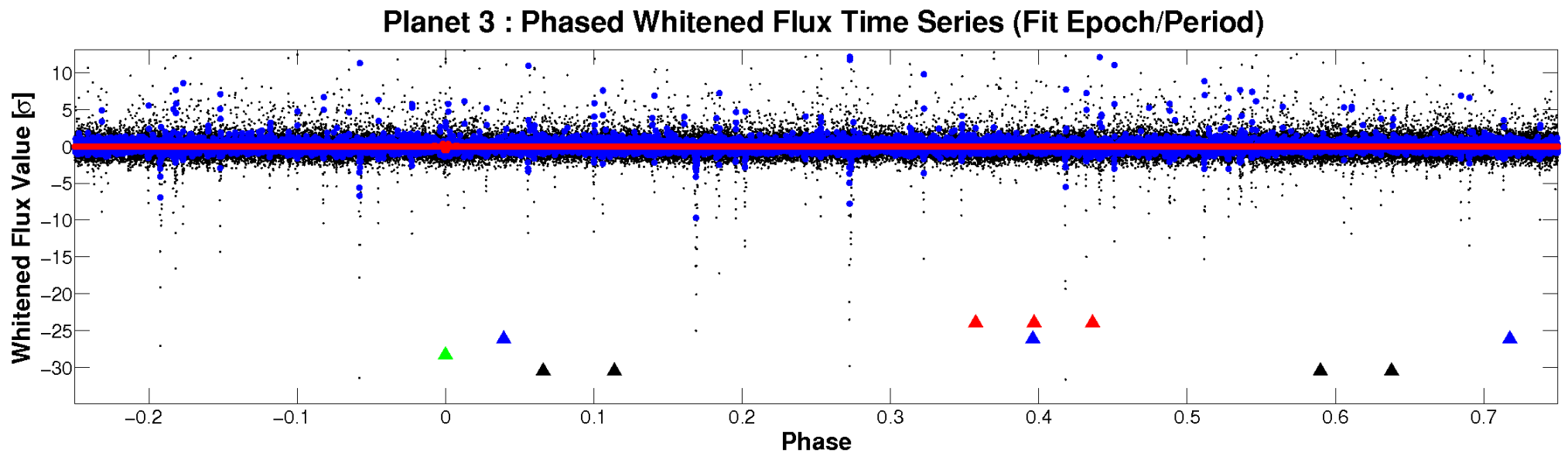
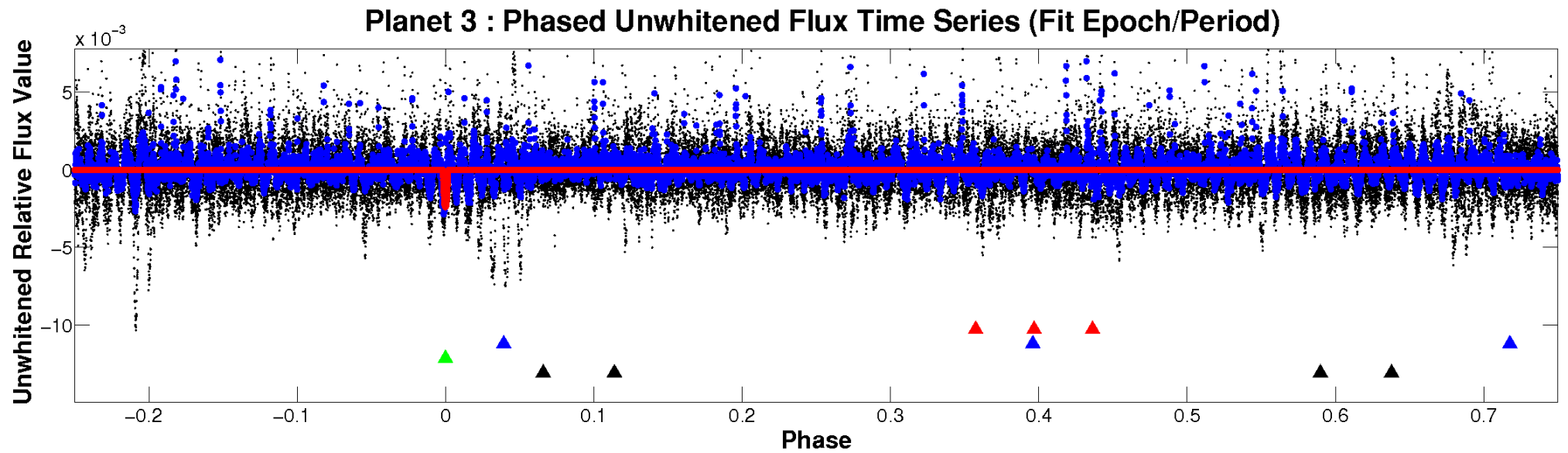


ALT Odd/Even

TCE 009011963-03

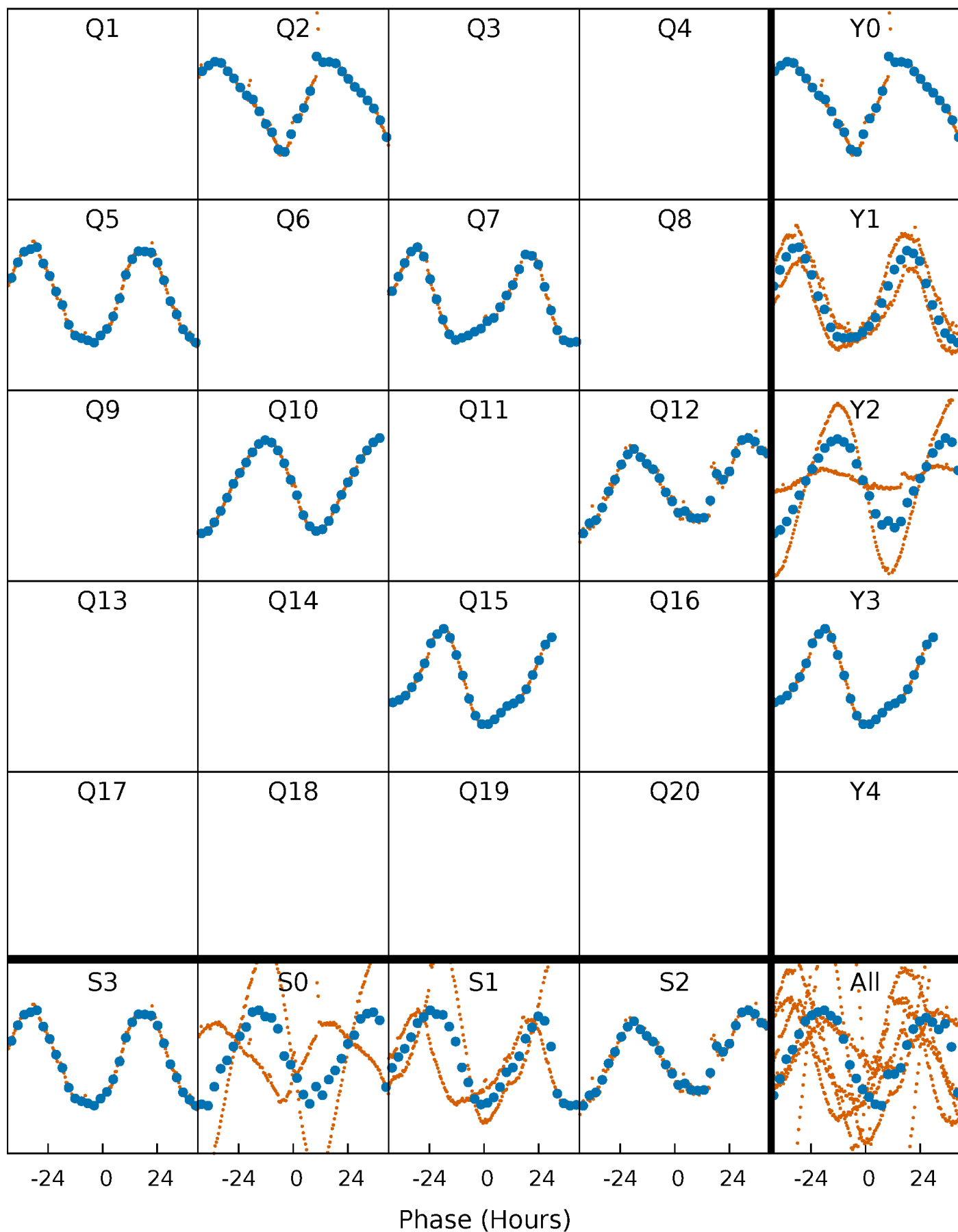


Non-Whitened Vs. Whitened Light Curve



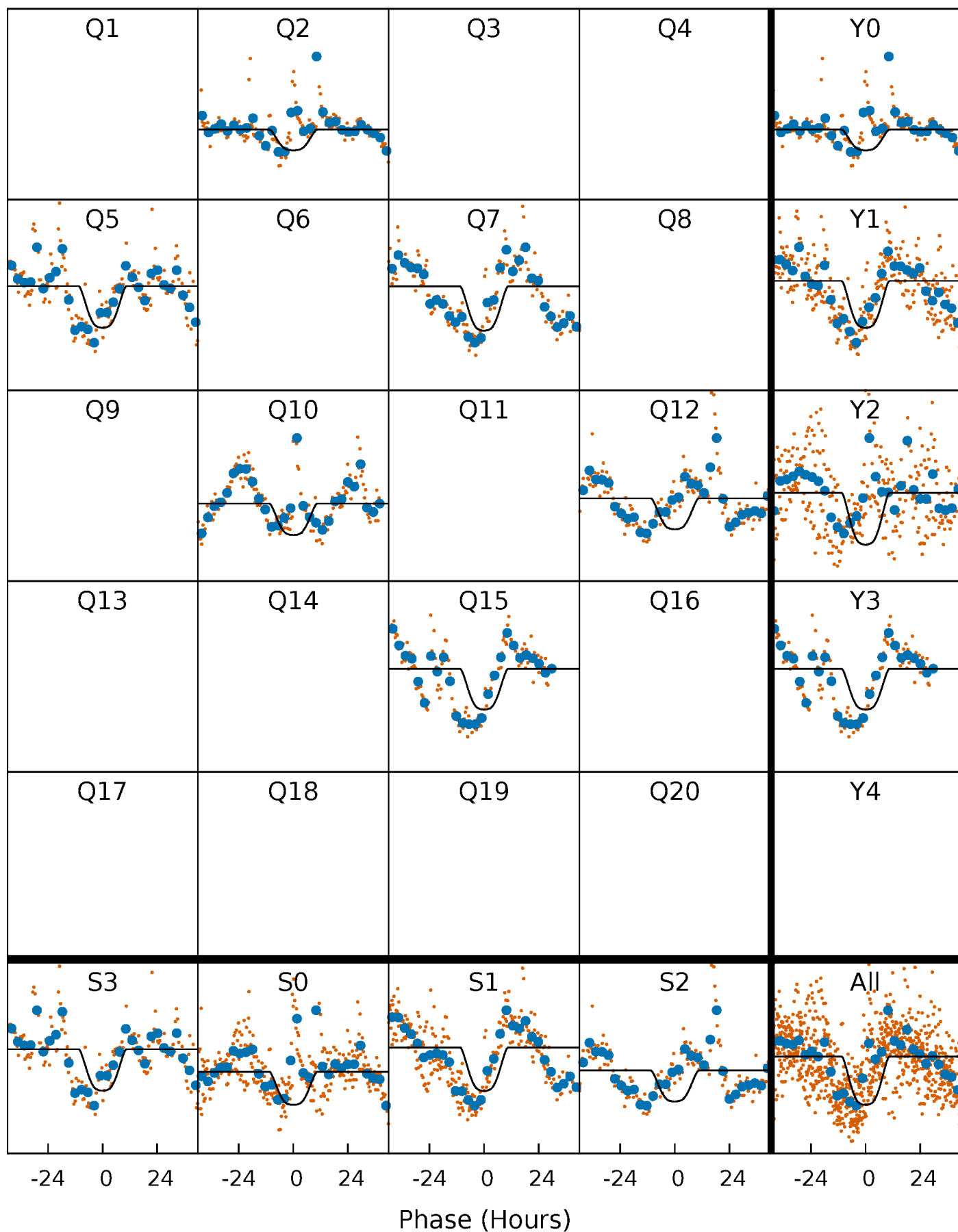
PDC Quarter-Phased Transit Curves

TCE 009011963-03 P=233.879027 Days $T_0=233.716135$ (BKJD)



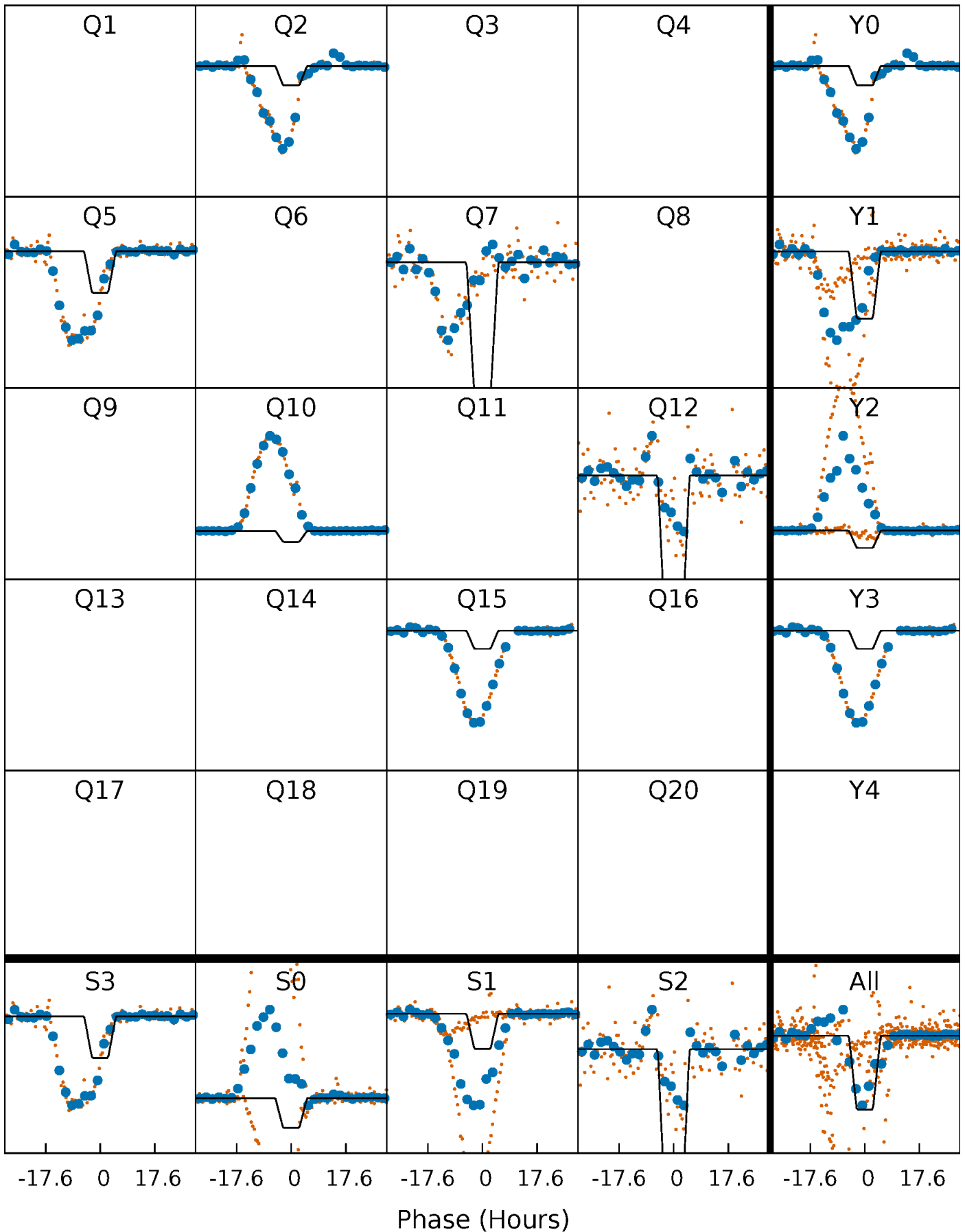
DV Quarter-Phased Transit Curves

TCE 009011963-03 $P=233.879027$ Days $T_0=233.716135$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

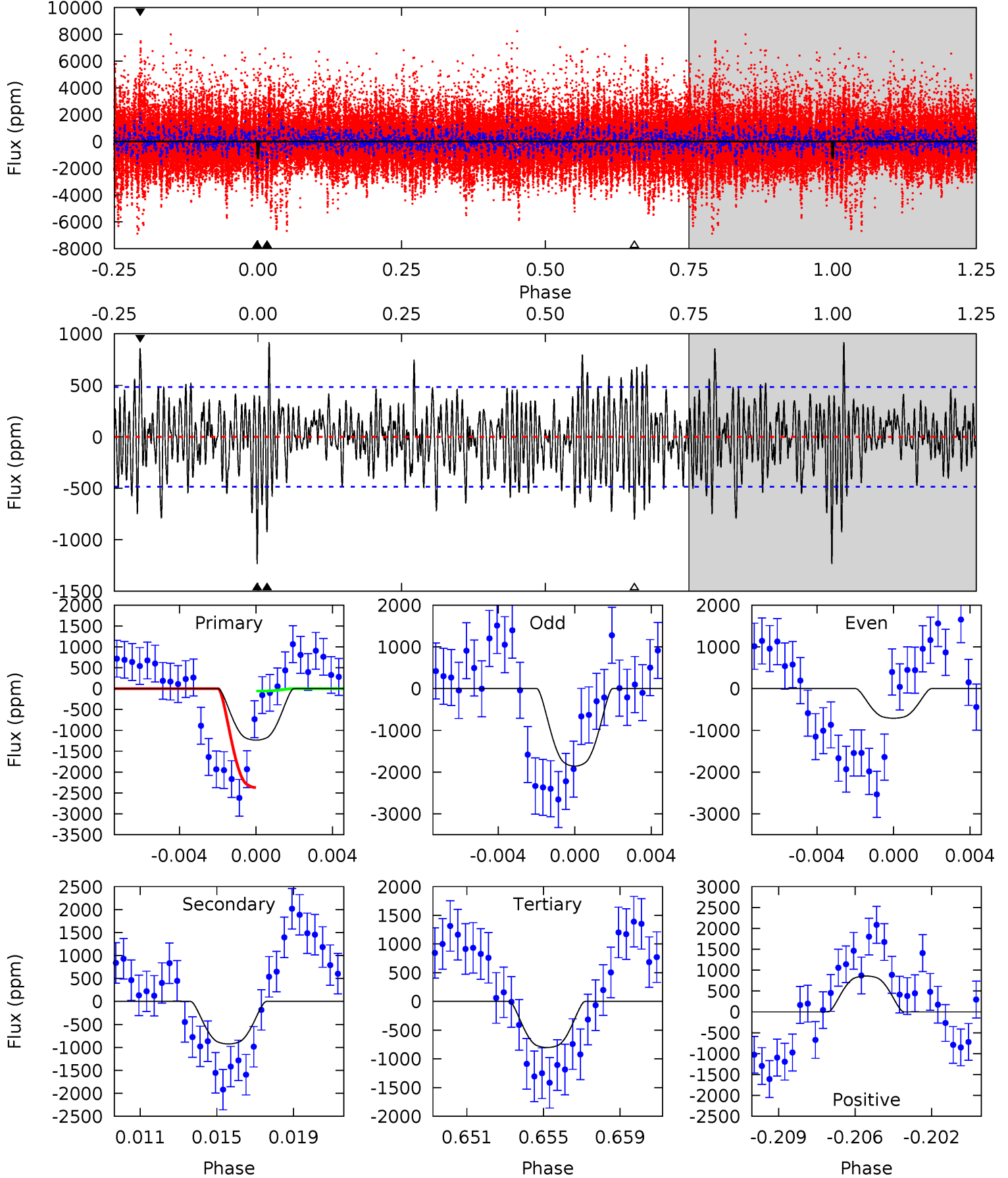
TCE 009011963-03 P=233.902961 Days $T_0=233.586593$ (BKJD)



DV Model-Shift Uniqueness Test

009011963-03, P = 233.879027 Days, E = 233.716135 Days

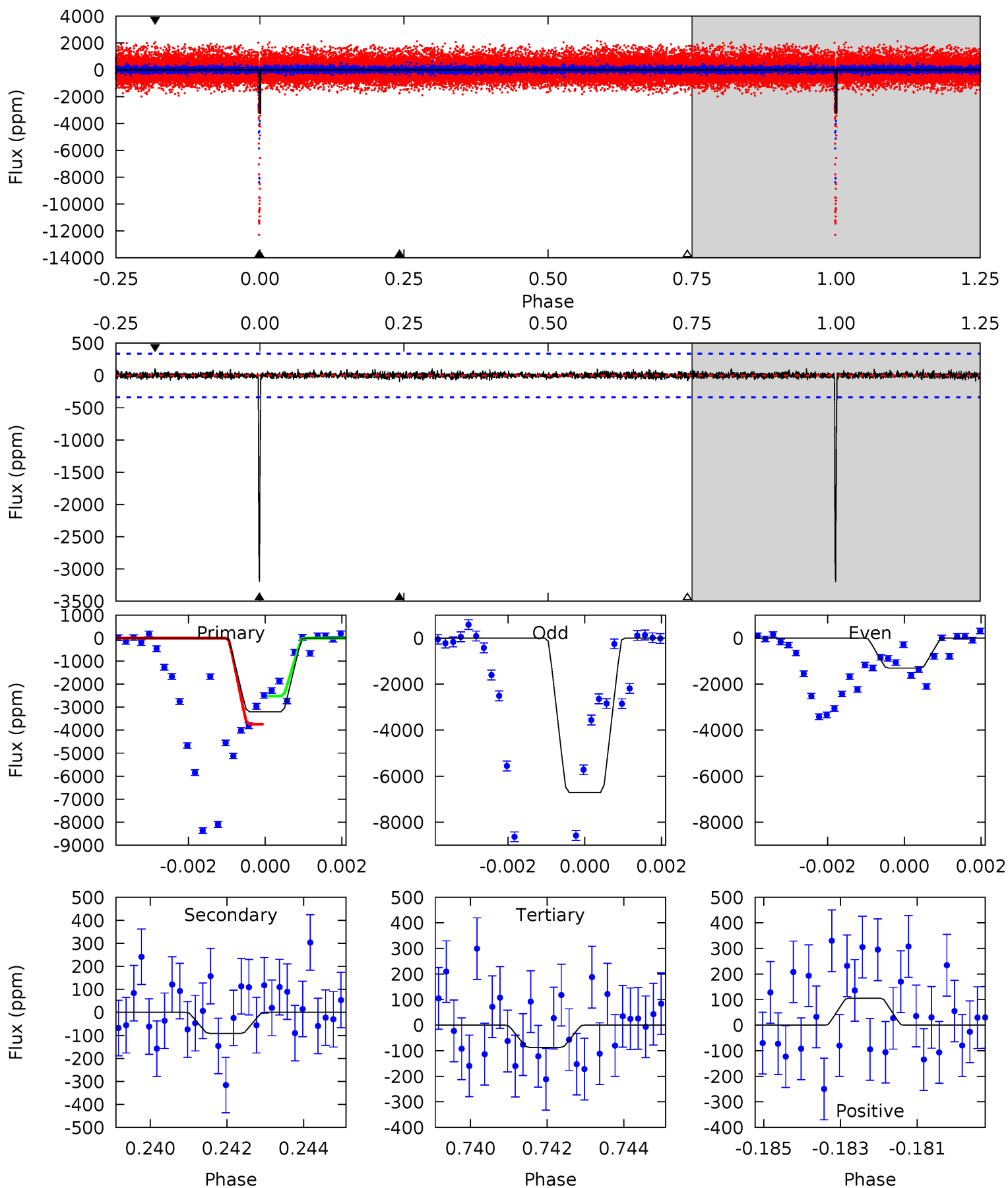
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
13.3	9.94	8.63	9.24	5.21	2.89	2.93	4.66	4.05	1.32	0.70	6.05	1.02	0.43	12.5



Alt Model-Shift Uniqueness Test

009011963-03, P = 233.902961 Days, E = 233.586593 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
50.7	1.44	1.37	1.67	5.33	3.10	0.39	49.3	49.0	0.07	-0.22	42.7	0.97	0.03	0



Stellar Parameters For KIC 009011963

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	4457^{+145}_{-145}	$4.572^{+0.056}_{-0.020}$	$0.300^{+0.150}_{-0.300}$	$0.730^{+0.025}_{-0.063}$	$0.725^{+0.041}_{-0.050}$	$2.628^{+0.647}_{-0.175}$
	+3%/-3%	+1%/-0%	+50%/-100%	+3%/-9%	+6%/-7%	+25%/-7%
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 009011963-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	A_{obs}
DV	-924 ± 93	$4.59^{+0.62}_{-0.52}$	285^{+11}_{-10}	3539^{+188}_{-171}	10813^{+3135}_{-2505}
Alt.	-91 ± 63	$5.69^{+0.59}_{-0.52}$	285^{+10}_{-10}	2421^{+179}_{-290}	672^{+528}_{-463}

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

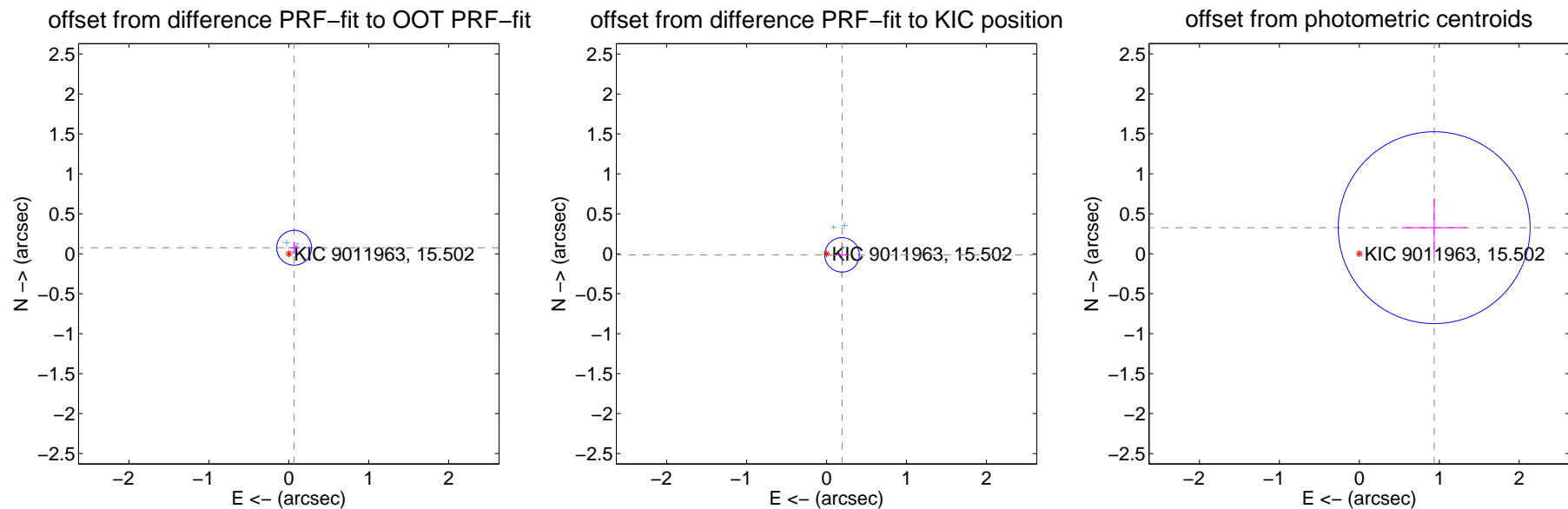
DV Centroid Data

Supplemental centroid analysis for 009011963-03. Kepler magnitude: 15.50. Transit SNR 5.98

There are 4 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.33 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.100 ± 0.073	1.38	-0.066 ± 0.070	0.075 ± 0.075
PRF-fit source offset from KIC position	0.194 ± 0.072	2.69	-0.193 ± 0.070	-0.013 ± 0.131
photometric centroid source offset	0.99 ± 0.40	2.48	-0.94 ± 0.40	0.33 ± 0.36

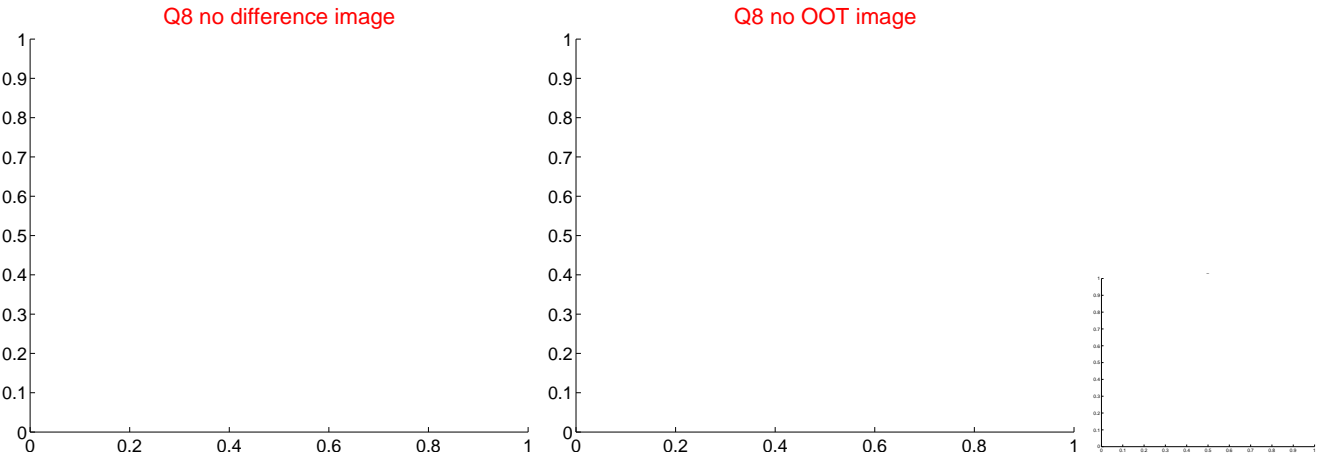
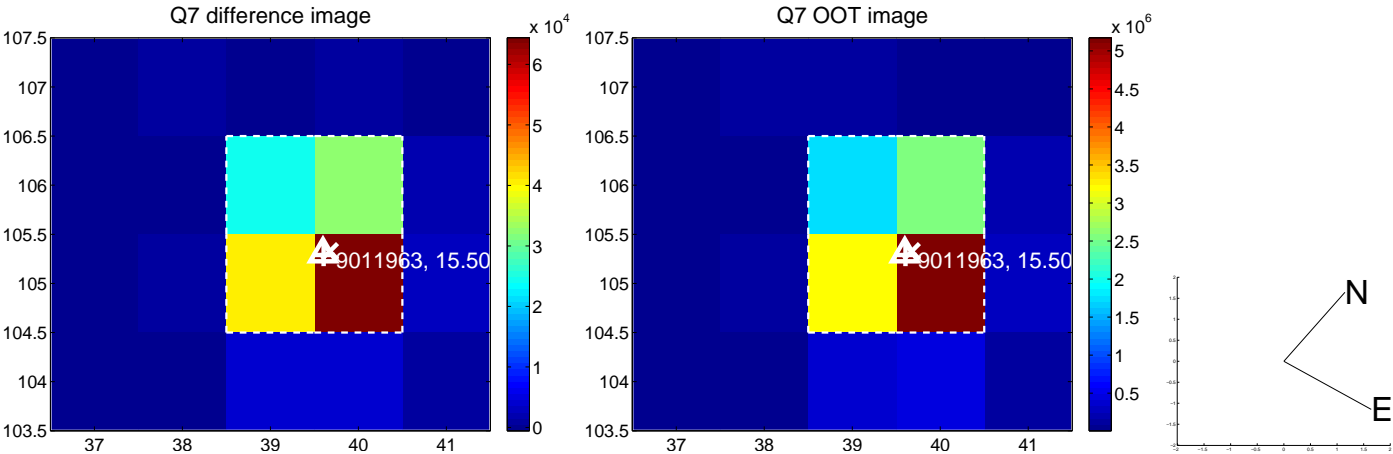
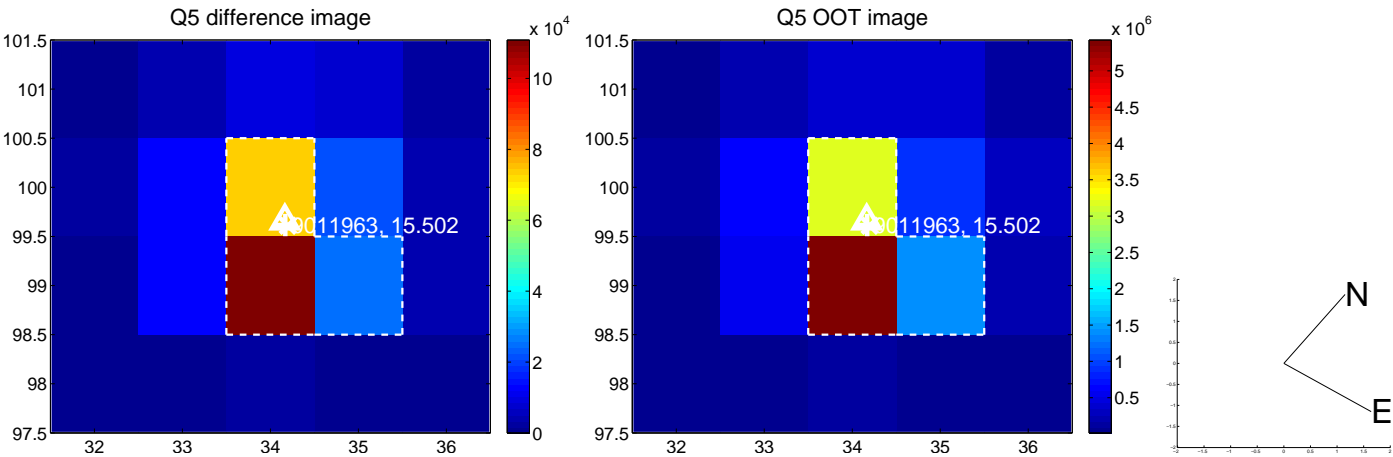


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

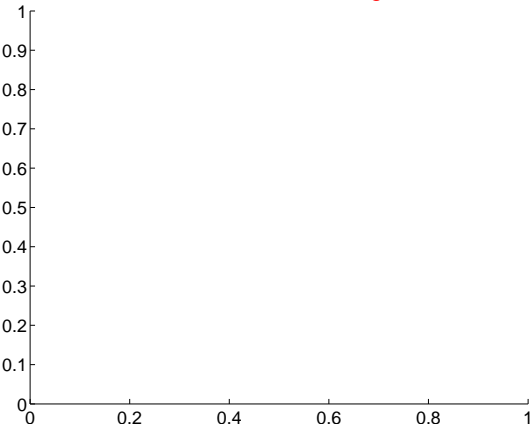


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.

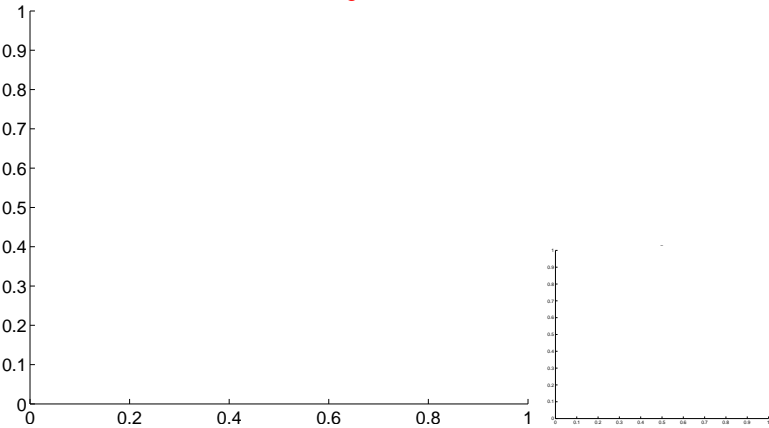


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.

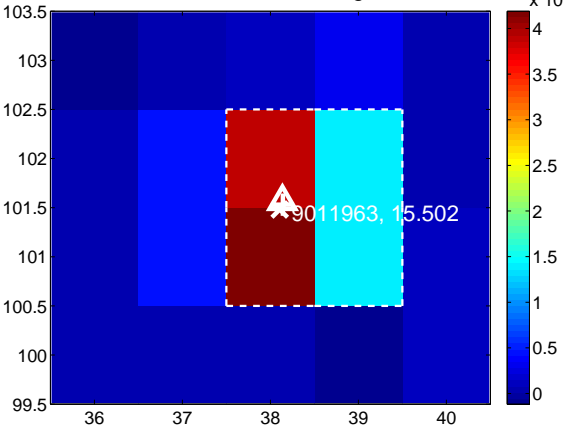
Q9 no difference image



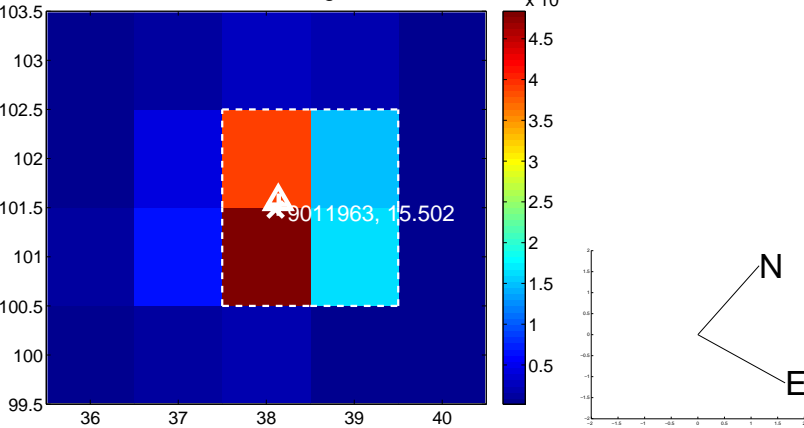
Q9 no OOT image



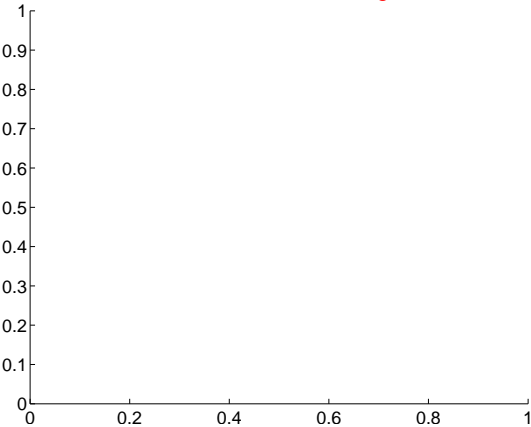
Q10 difference image



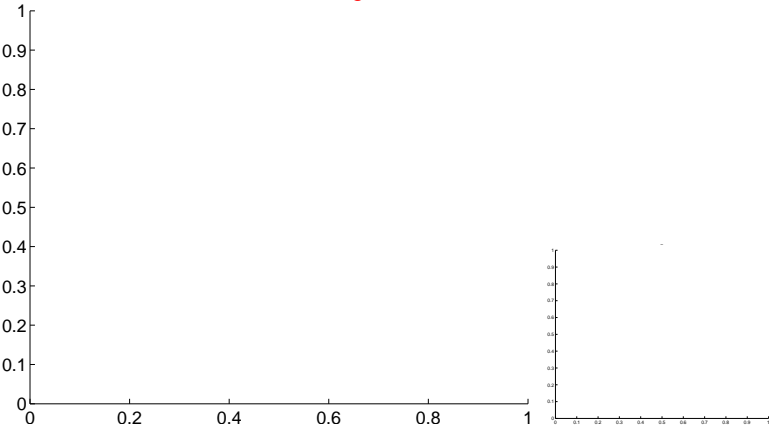
Q10 OOT image



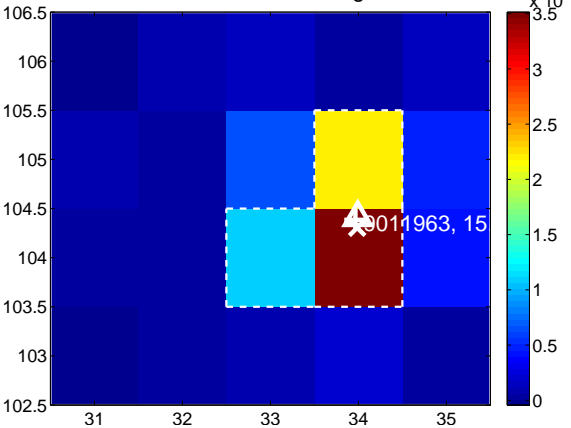
Q11 no difference image



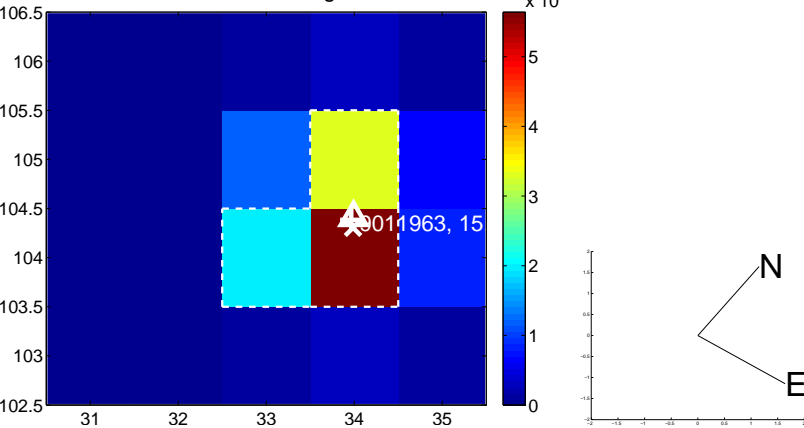
Q11 no OOT image



Q12 difference image



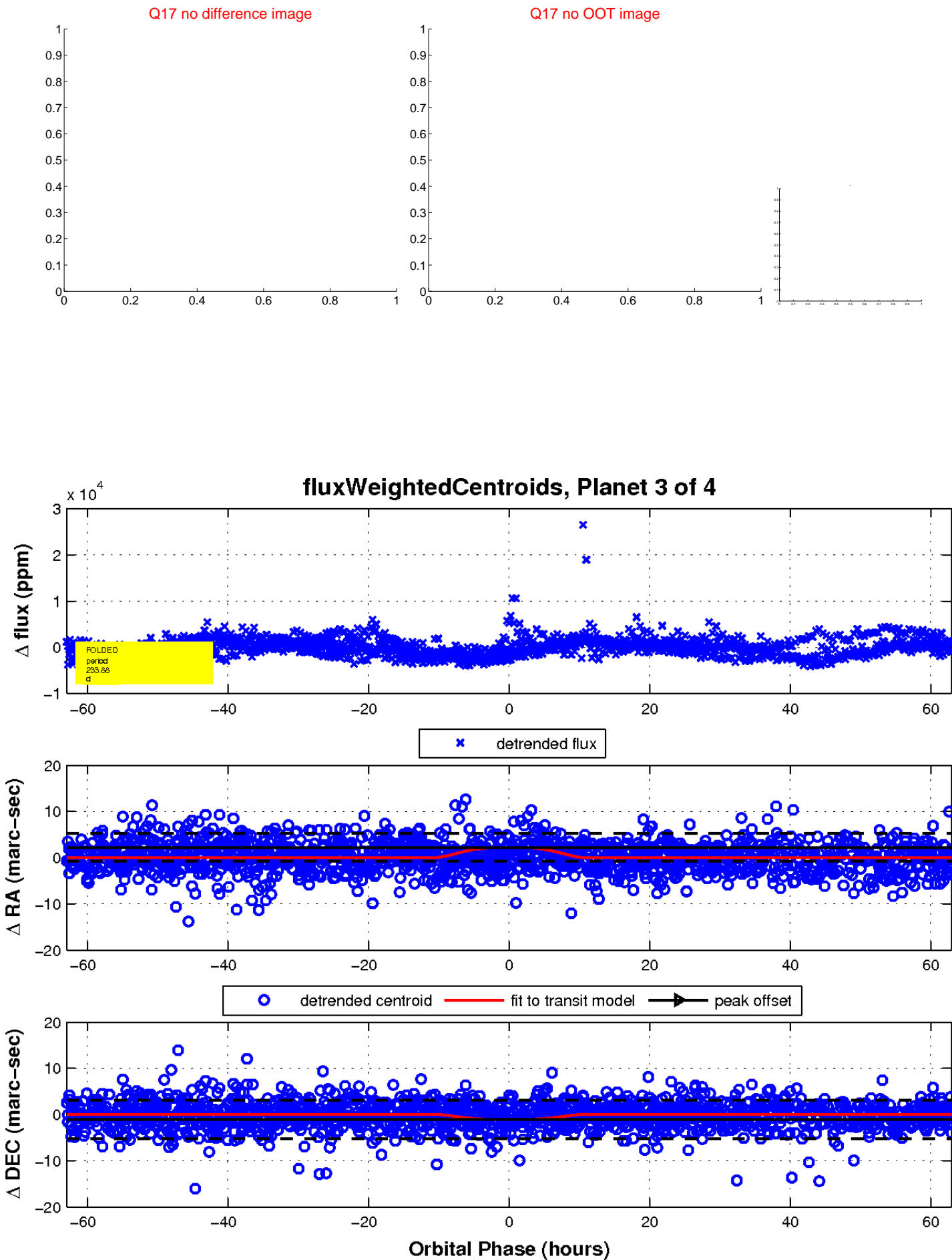
Q12 OOT image



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

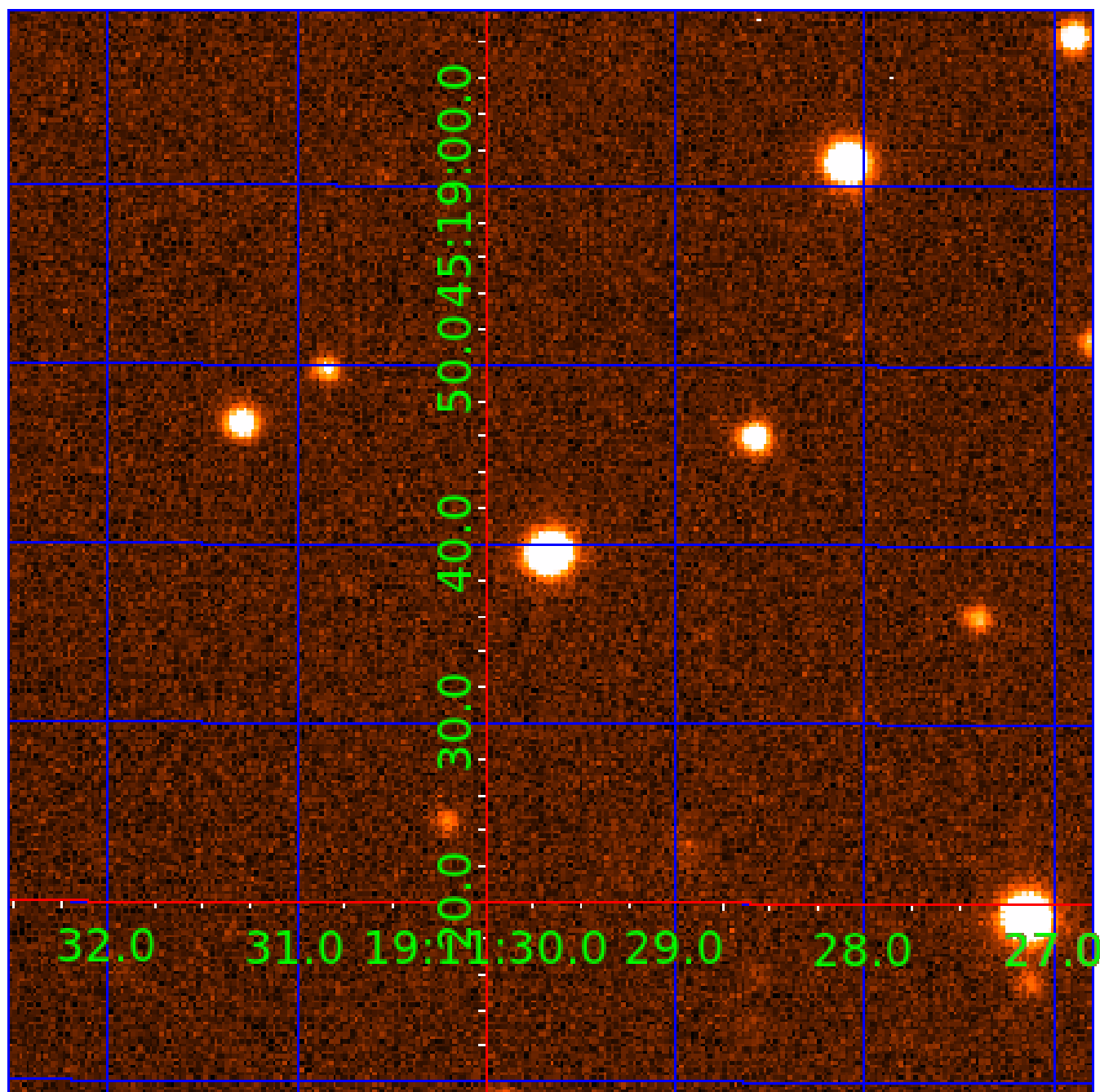


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 009011963

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})
009011963-01	OBS	No	476.971558	551.200912	1488.8	3.857	13.1	4.4	0.73	4457	2.82	0.16
009011963-02	OBS	No	626.409587	242.904701	2438.8	3.275	13.2	8.4	0.73	4457	3.43	0.11
009011963-03	OBS	No	233.879027	233.716135	2400.8	20.986	10.2	6.0	0.73	4457	4.66	0.42
009011963-04	OBS	No	356.426643	483.014731	2160.4	6.297	10.2	7.5	0.73	4457	4.23	0.24

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009011963-01	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
009011963-02	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
009011963-03	OBS	FP	0.00	1	0	0	0	LPP_DV—INCONSISTENT_TRANS
009011963-04	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—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.

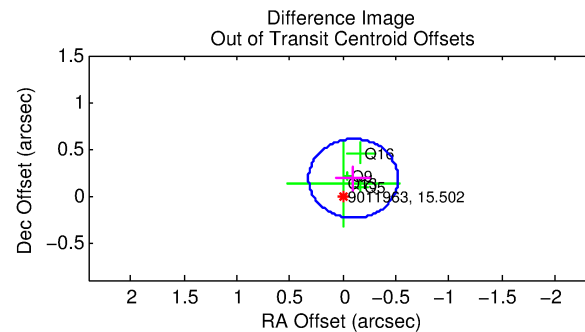
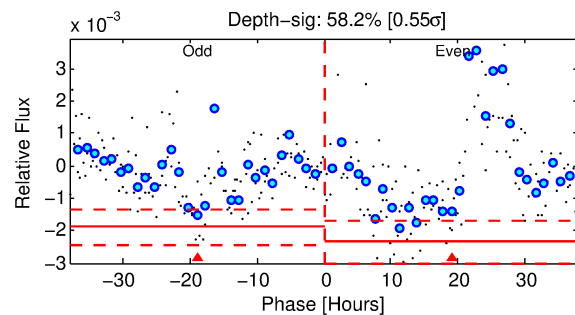
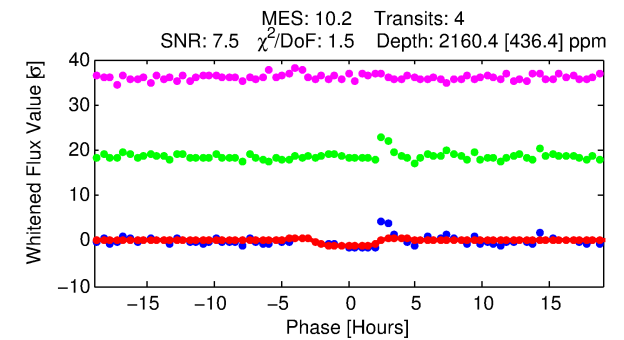
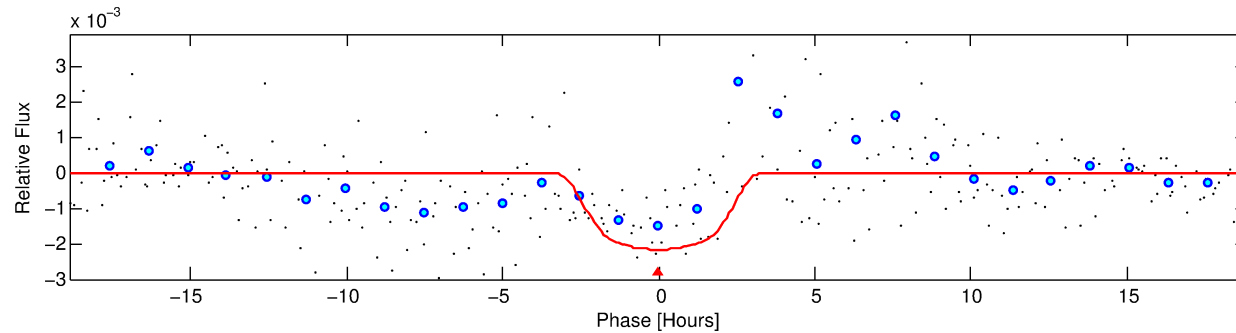
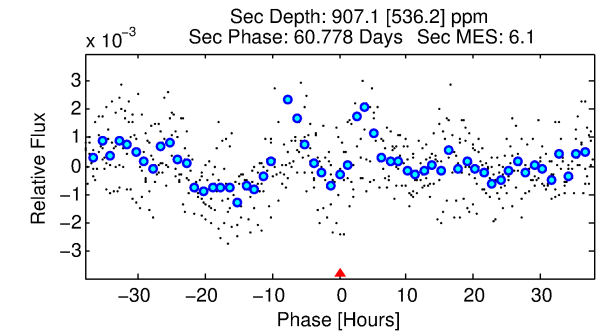
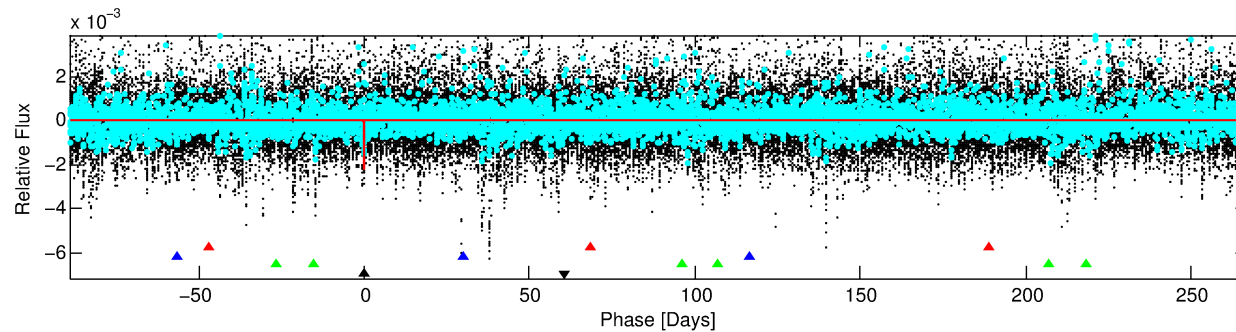
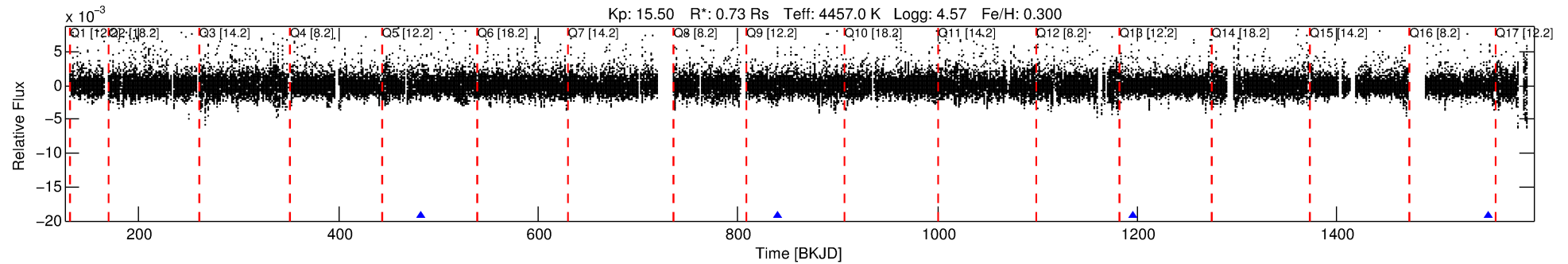
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009011963-04

No Significant Match Found

DV One-Page Summary

KIC: 9011963 Candidate: 4 of 4 Period: 356.427 d



DV Fit Results:

Period = 356.42664 [0.00757] d
Epoch = 483.0147 [0.0134] BKJD
Rp/R* = 0.0531 [0.0079]
a/R* = 235.27 [68.64]
b = 0.90 [0.06]
Seff = 0.24 [0.04]
Teq = 179 [7] K
Rp = 4.23 [0.73] Re
a = 0.8842 [0.0635] AU
Ag = 21823.71 [14615.93] [1.49 σ]
Teffp = 3357 [566] K [5.62 σ]

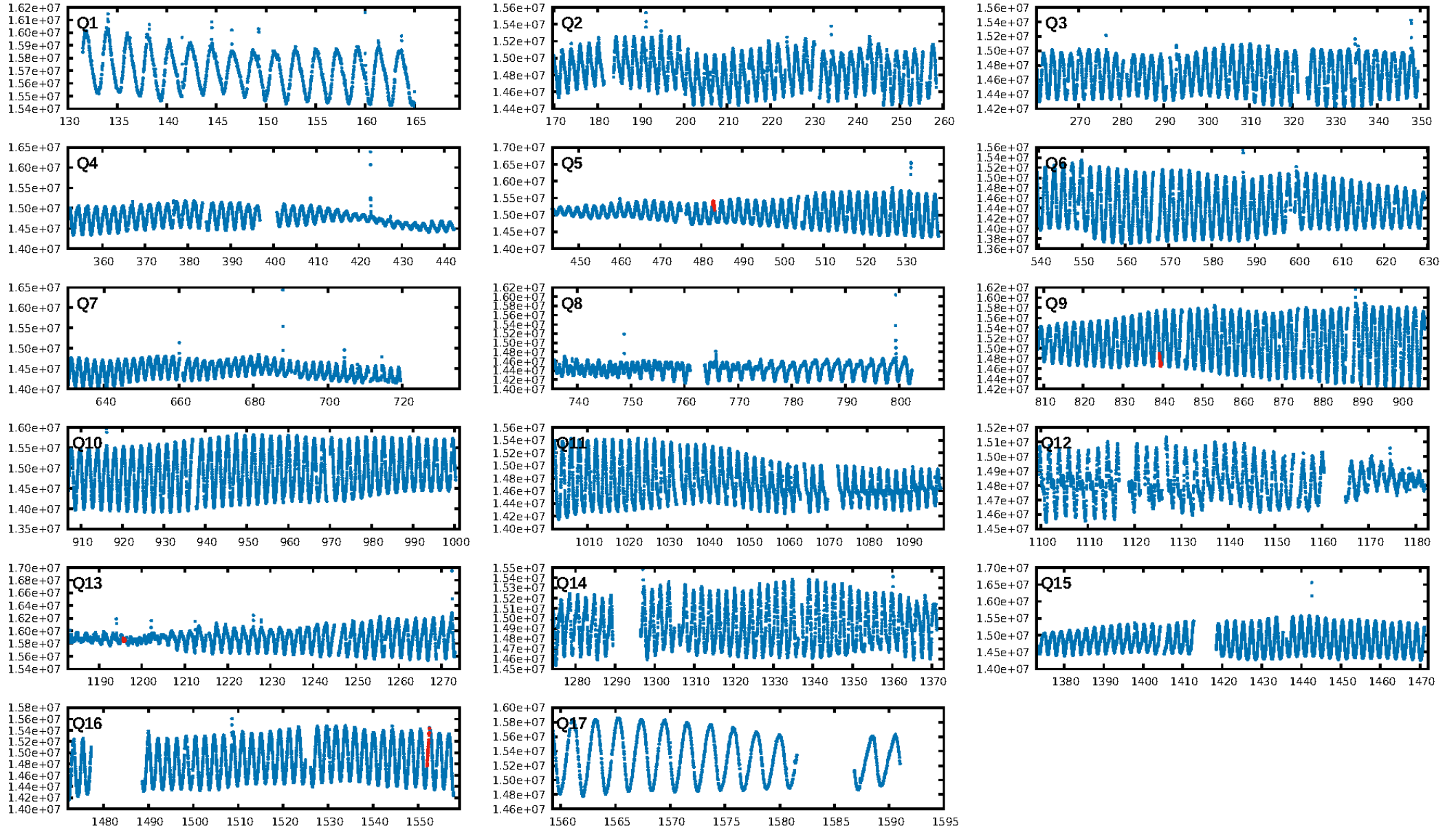
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [134.24 σ]
LongPeriod-sig: 100.0% [391.79 σ]
ModelChiSquare2-sig: 0.5%
ModelChiSquareGof-sig: 89.3%
Bootstrap-pfa: 4.90e-09
RollingBand-fgt: 1.00 [4/4]
GhostDiagnostic-chr: 0.4682
Centroid-sig: 0.7%
Centroid-so: 1.509 arcsec [2.17 σ]
OotOffset-rm: 0.209 arcsec [1.48 σ]
OotOffset-st: 0/0/1/3 [4]
KicOffset-rm: 0.278 arcsec [1.69 σ]
KicOffset-st: 0/0/1/3 [4]
DiffImageQuality-fgm: 0.50 [2/4]
DiffImageOverlap-fno: 1.00 [4/4]

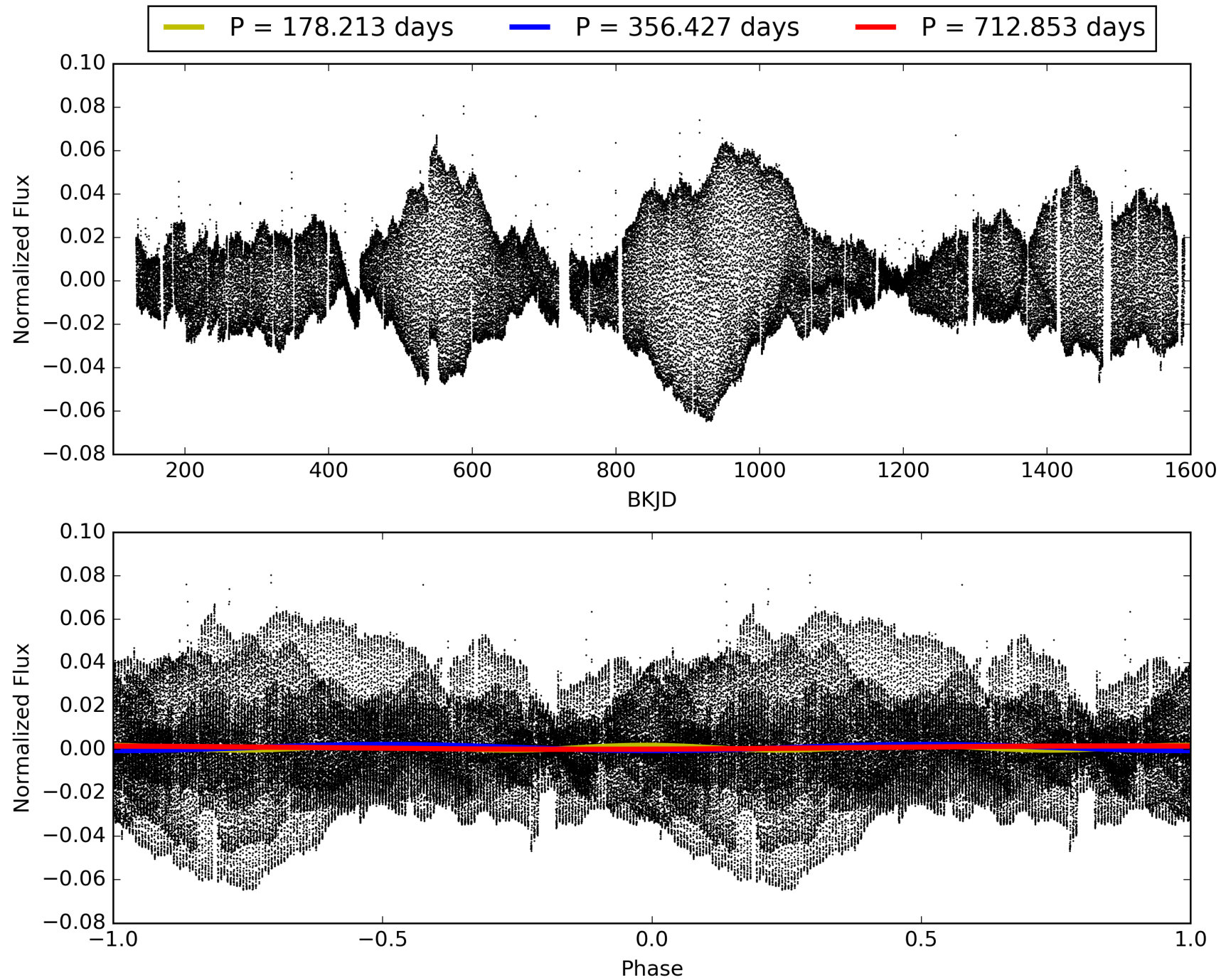
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 14:16:13 Z

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

TCE 009011963-04, PDC Light Curves

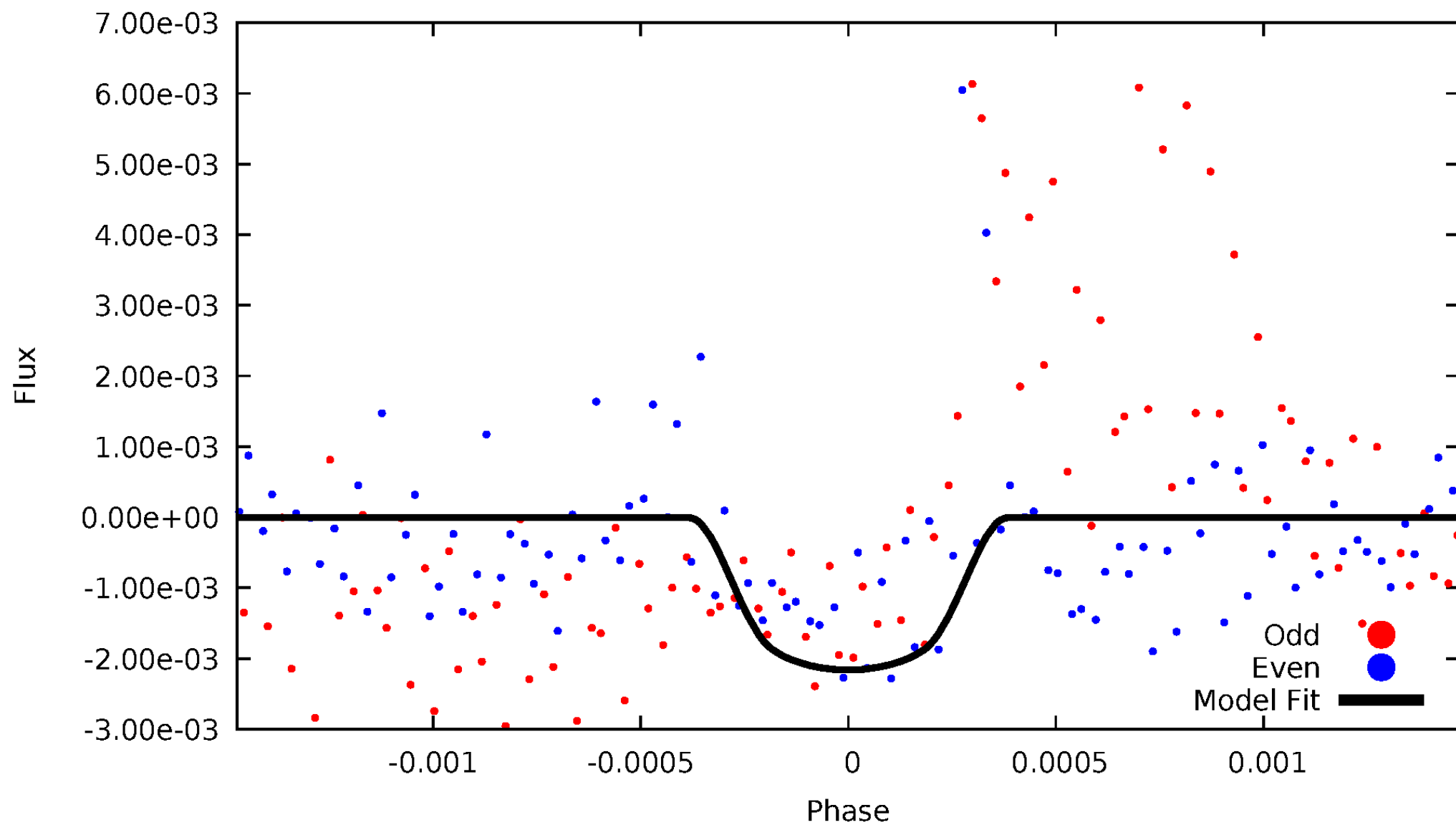


TCE 009011963-04



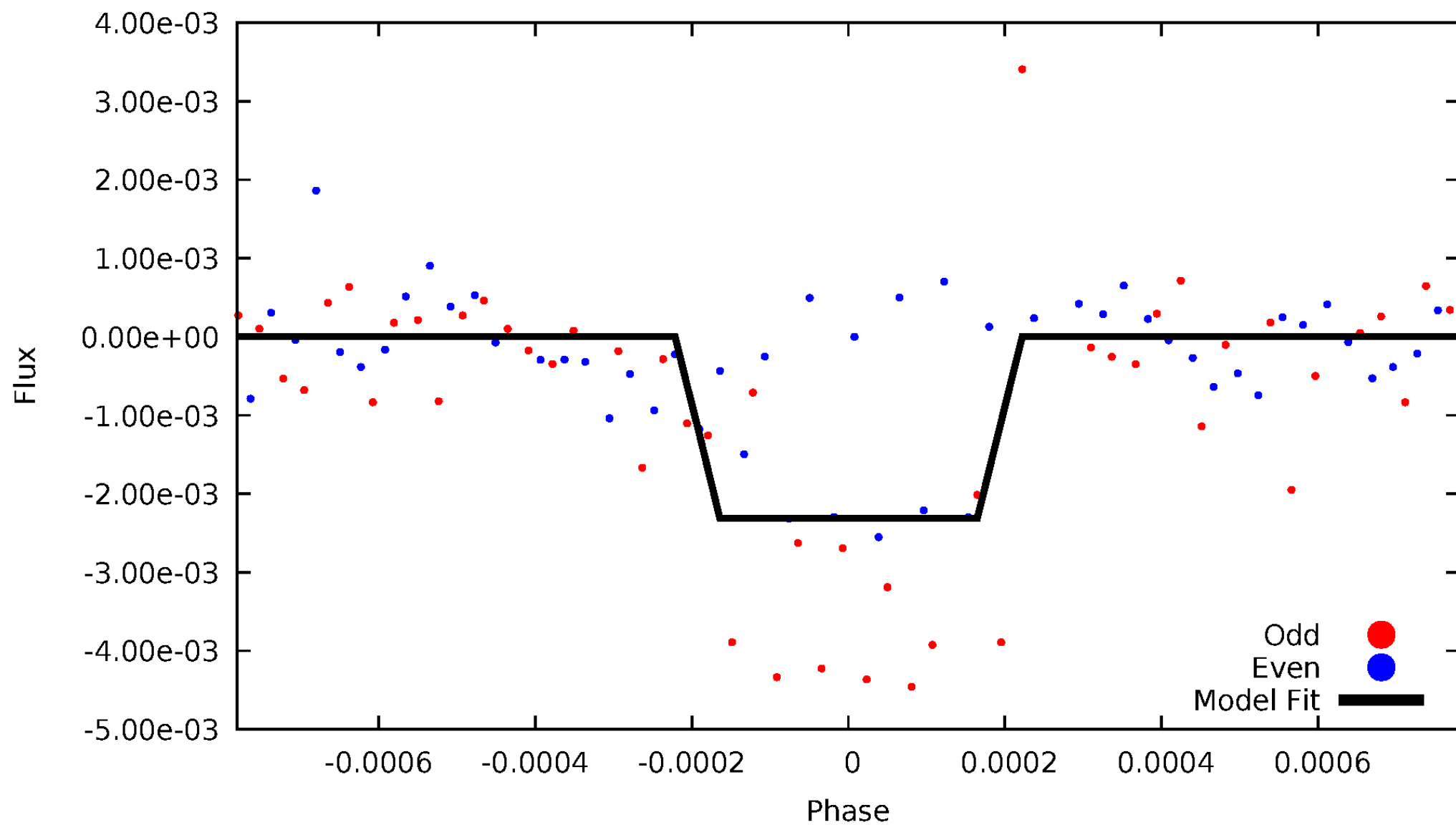
DV Odd/Even

TCE 009011963-04



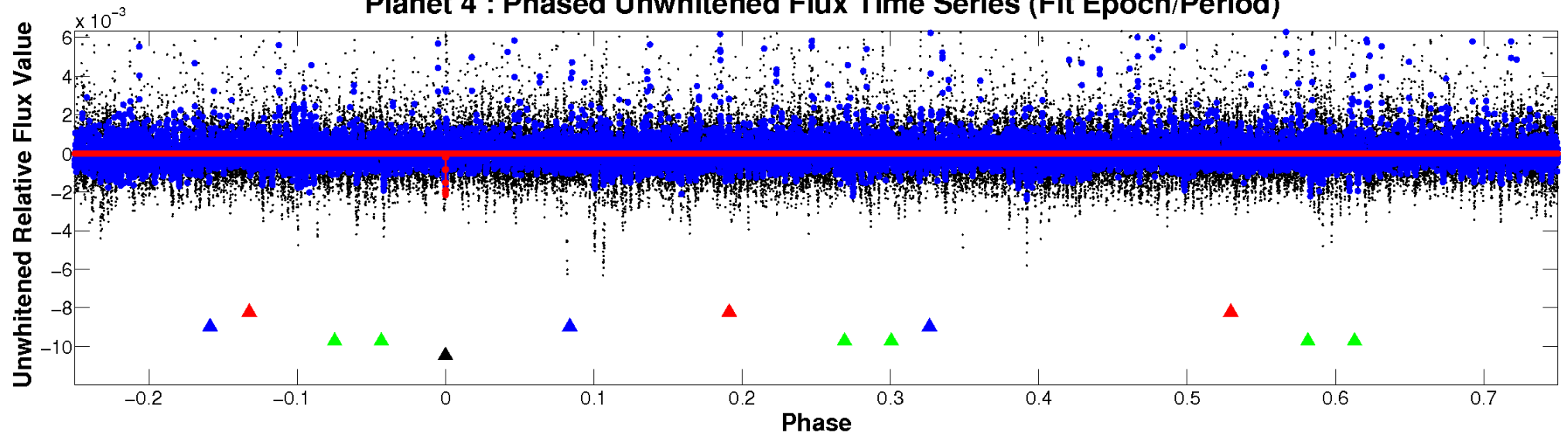
ALT Odd/Even

TCE 009011963-04

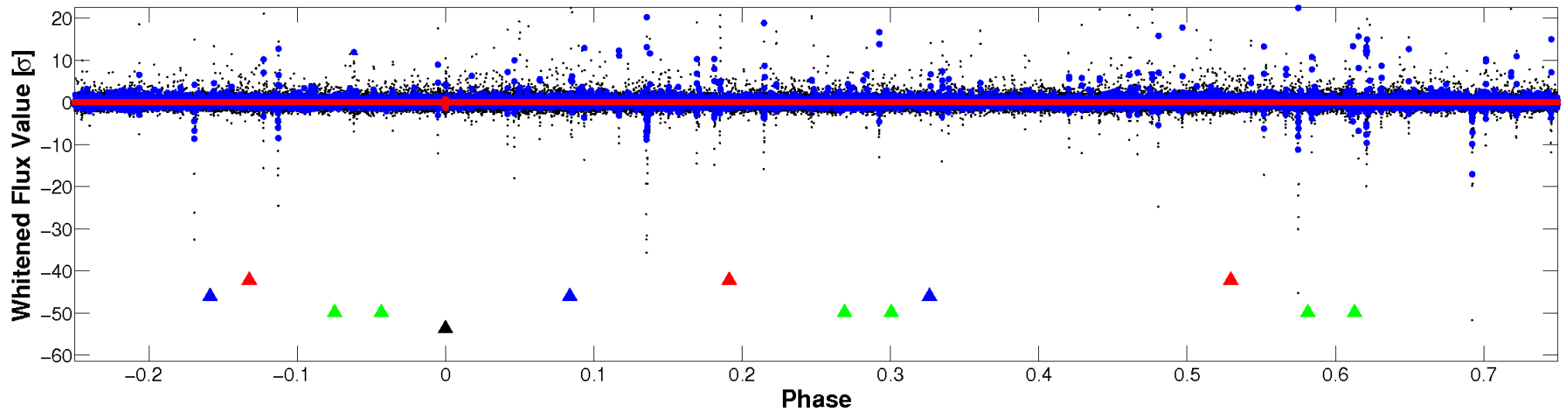


Non-Whitened Vs. Whitened Light Curve

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

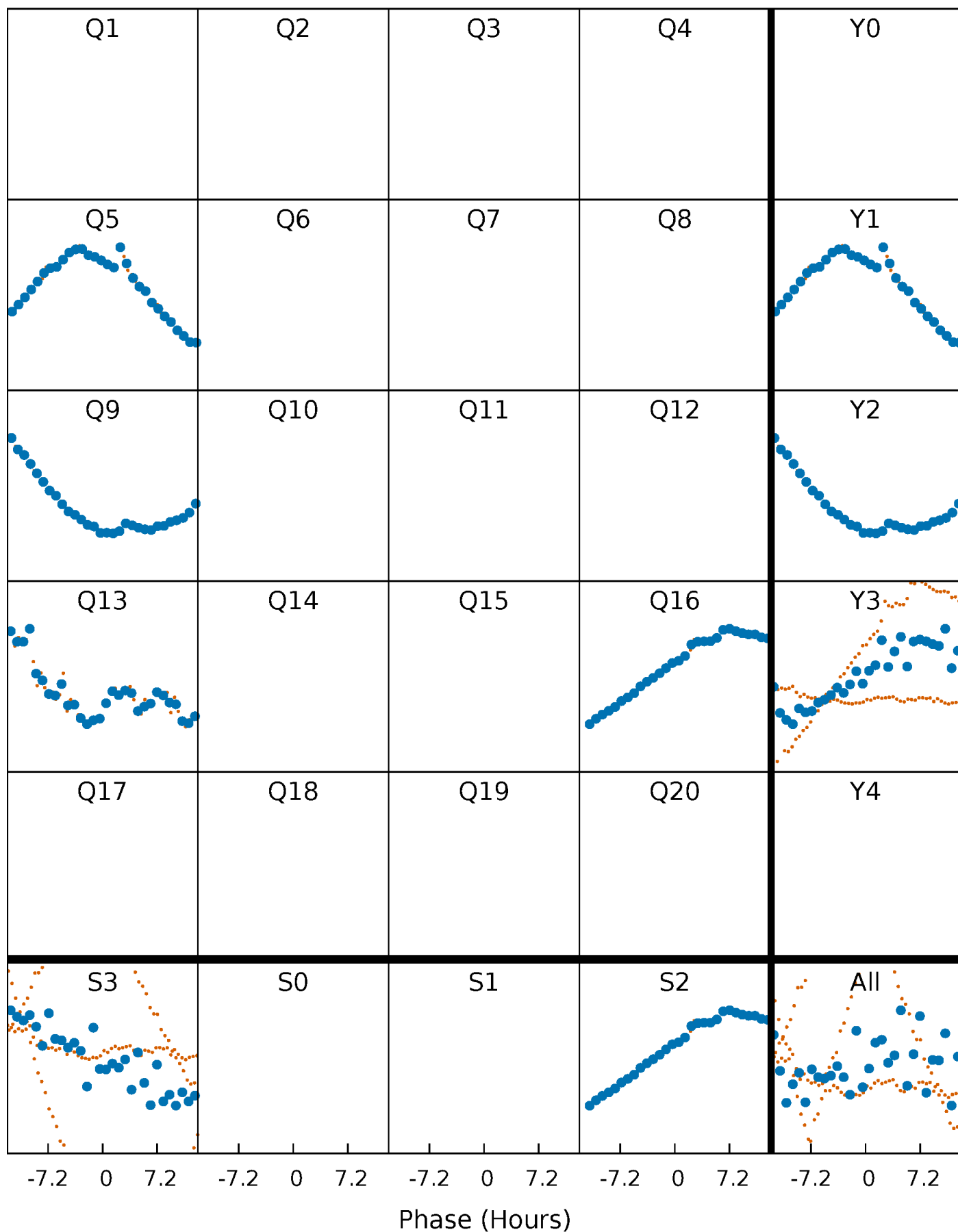


Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



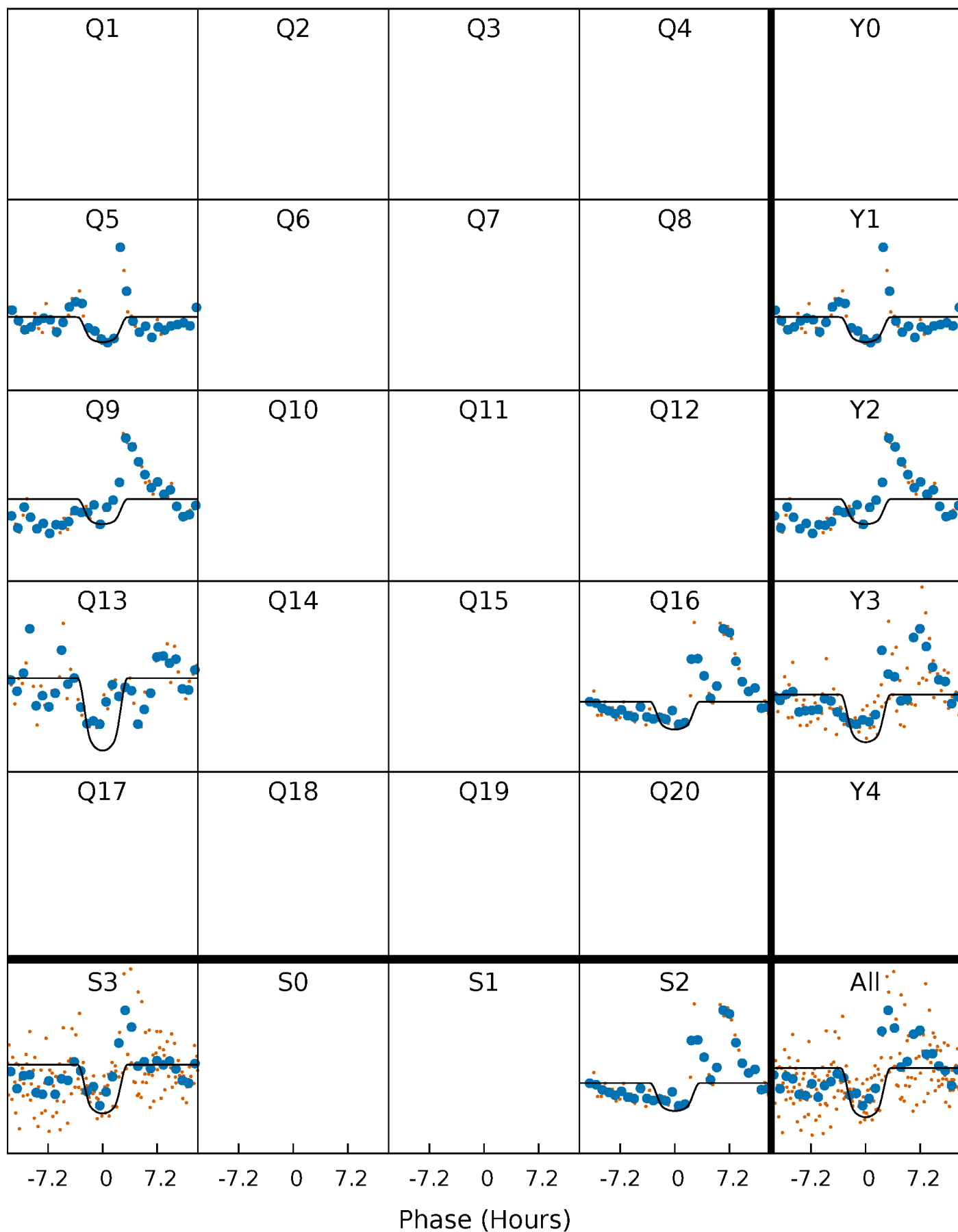
PDC Quarter-Phased Transit Curves

TCE 009011963-04 $P=356.426643$ Days $T_0=483.014731$ (BKJD)



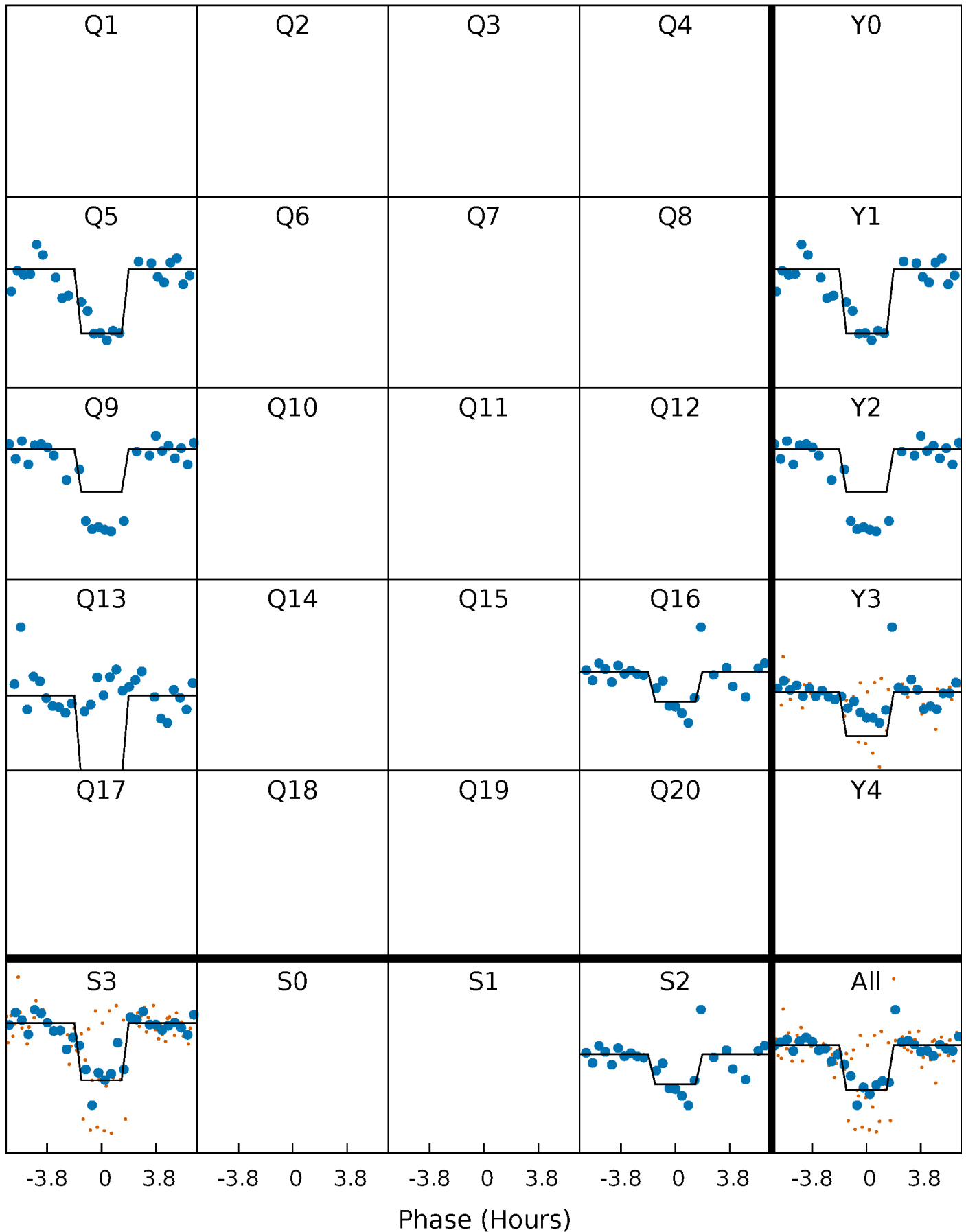
DV Quarter-Phased Transit Curves

TCE 009011963-04 $P=356.426643$ Days $T_0=483.014731$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

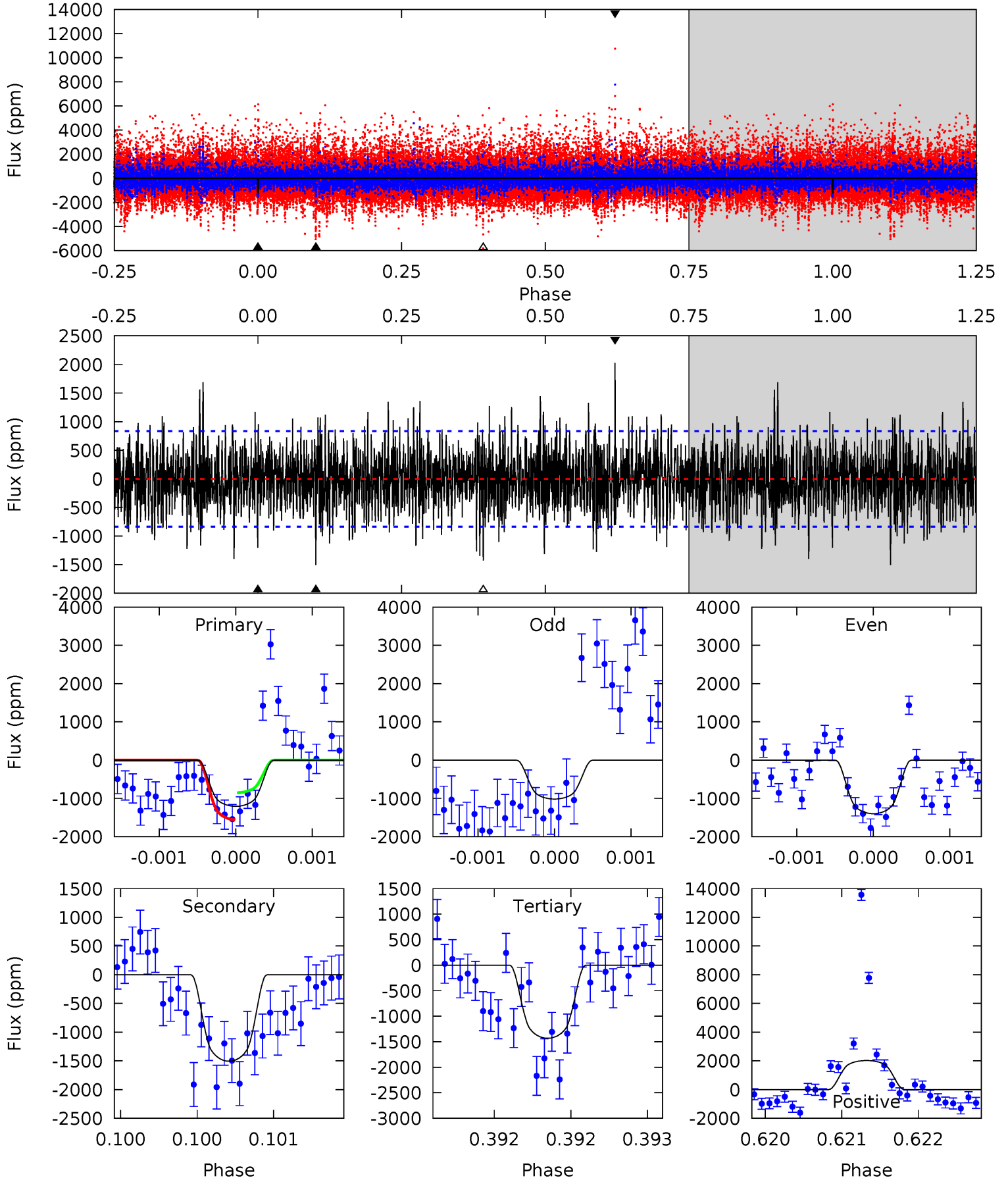
TCE 009011963-04 P=356.428185 Days $T_0=483.037539$ (BKJD)



DV Model-Shift Uniqueness Test

009011963-04, P = 356.426643 Days, E = 126.588088 Days

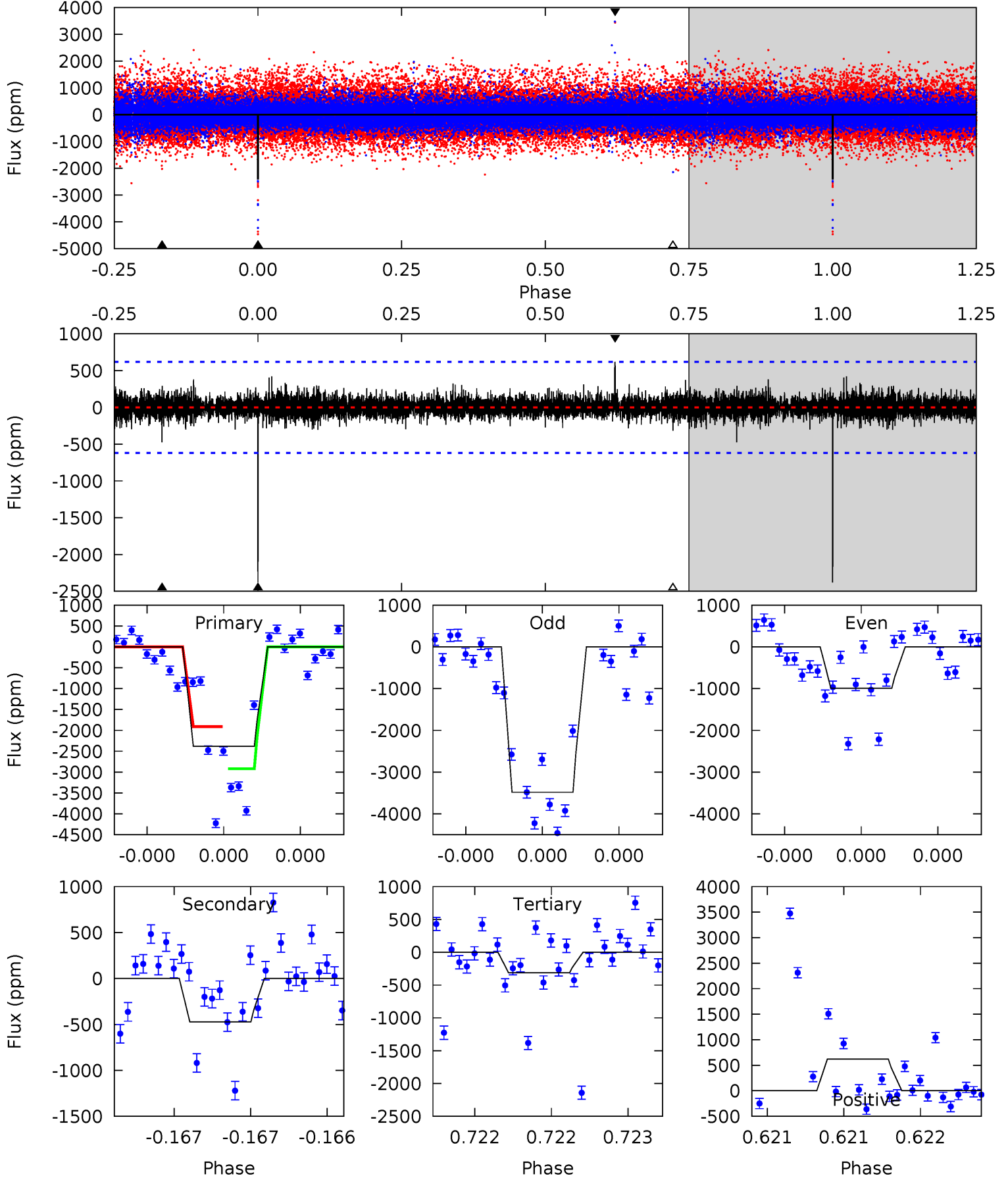
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.93	9.90	9.42	13.3	5.50	3.36	2.70	-1.48	-5.37	0.49	-3.40	1.11	0.99	0.57	2.33



Alt Model-Shift Uniqueness Test

009011963-04, P = 356.428185 Days, E = 126.609354 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
21.5	4.28	2.85	5.60	5.61	3.53	0.71	18.7	15.9	1.44	-1.32	12.5	0.96	0.21	4.59



Stellar Parameters For KIC 009011963

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	4457^{+145}_{-145}	$4.572^{+0.056}_{-0.020}$	$0.300^{+0.150}_{-0.300}$	$0.730^{+0.025}_{-0.063}$	$0.725^{+0.041}_{-0.050}$	$2.628^{+0.647}_{-0.175}$
	+3%/-3%	+1%/-0%	+50%/-100%	+3%/-9%	+6%/-7%	+25%/-7%
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 009011963-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	-1505 ± 152	$4.21^{+0.64}_{-0.72}$	248^{+9}_{-9}	3973^{+287}_{-250}	36779^{+16666}_{-9689}
Alt.	-473 ± 111	$3.80^{+0.67}_{-0.65}$	248^{+8}_{-8}	3370^{+256}_{-213}	13898^{+6981}_{-4630}

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 $A_{obs} \gg 1.0$

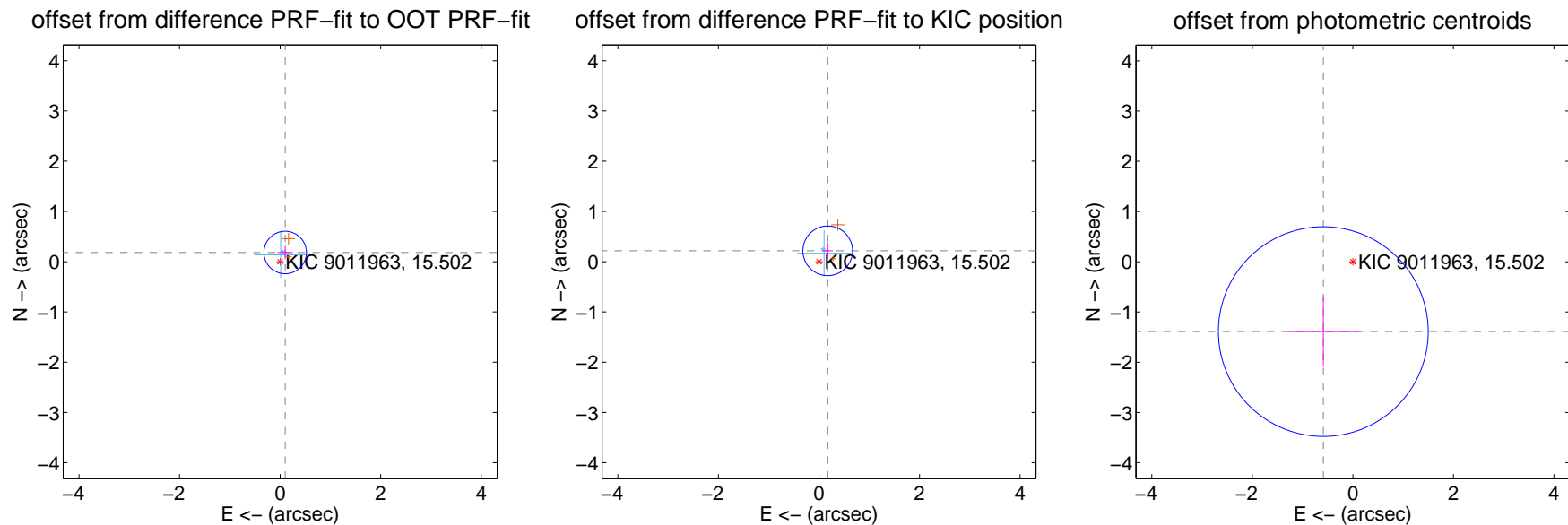
DV Centroid Data

Supplemental centroid analysis for 009011963-04. Kepler magnitude: 15.50. Transit SNR 7.53

There are 2 quarters with good PRF difference image offsets

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

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.209 ± 0.141	1.48	-0.100 ± 0.154	0.183 ± 0.137
PRF-fit source offset from KIC position	0.278 ± 0.165	1.69	-0.174 ± 0.103	0.217 ± 0.157
photometric centroid source offset	1.51 ± 0.70	2.17	0.59 ± 0.69	-1.39 ± 0.70

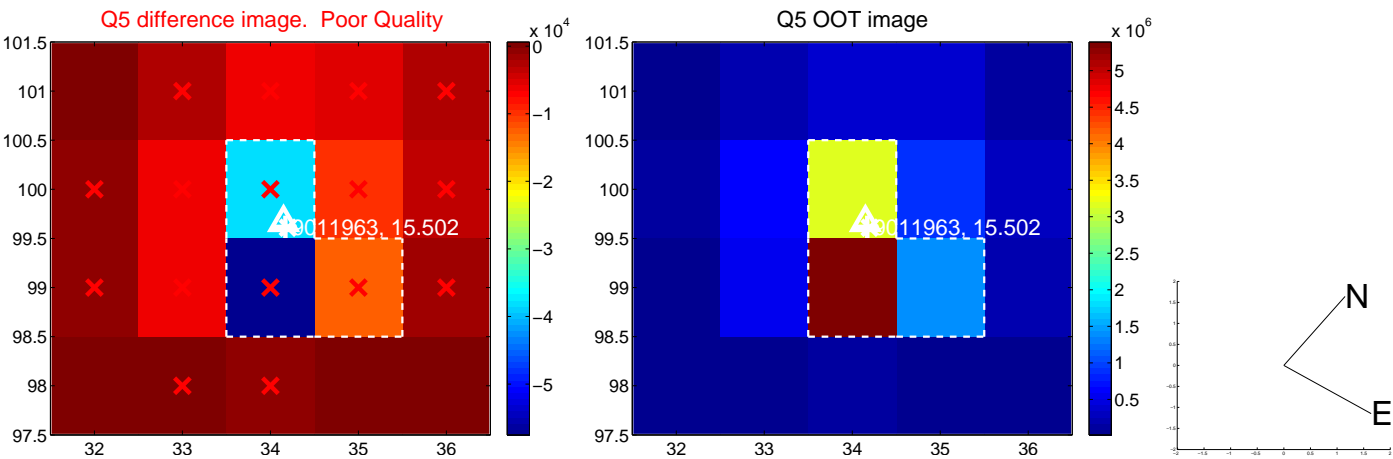


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

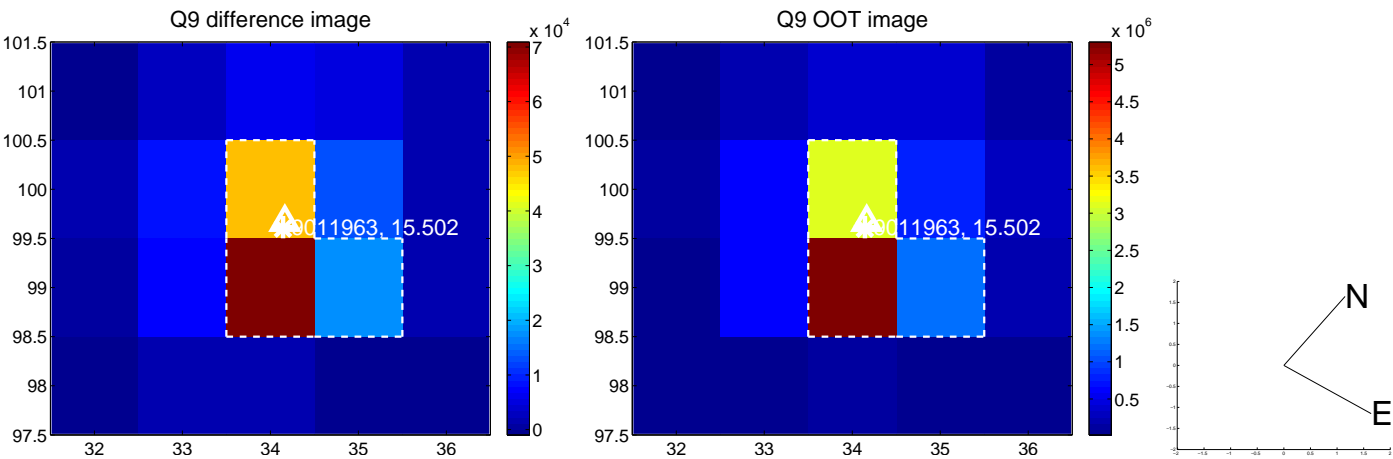
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



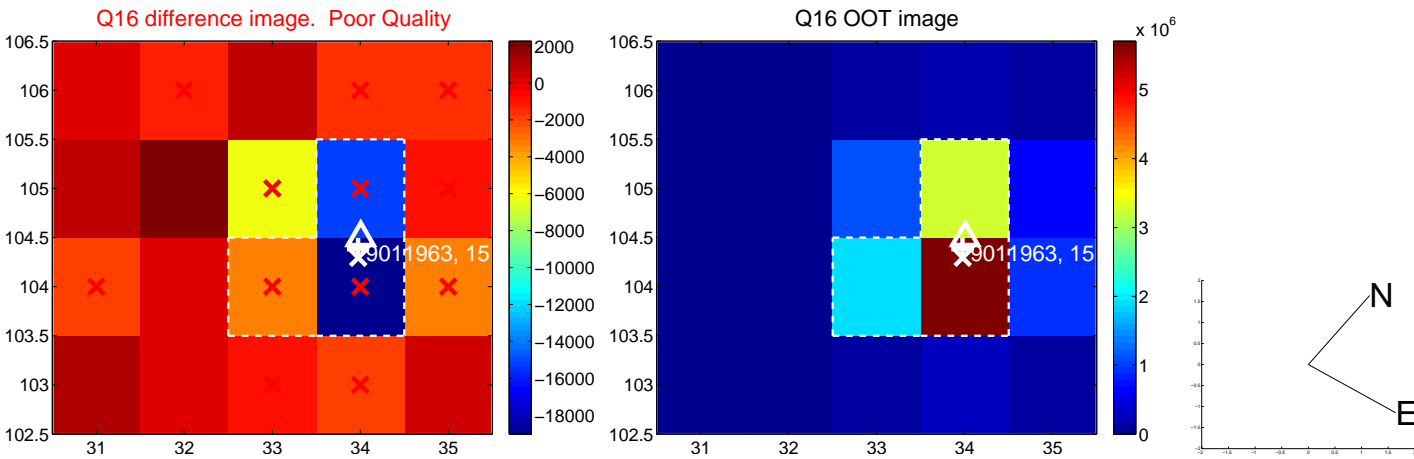
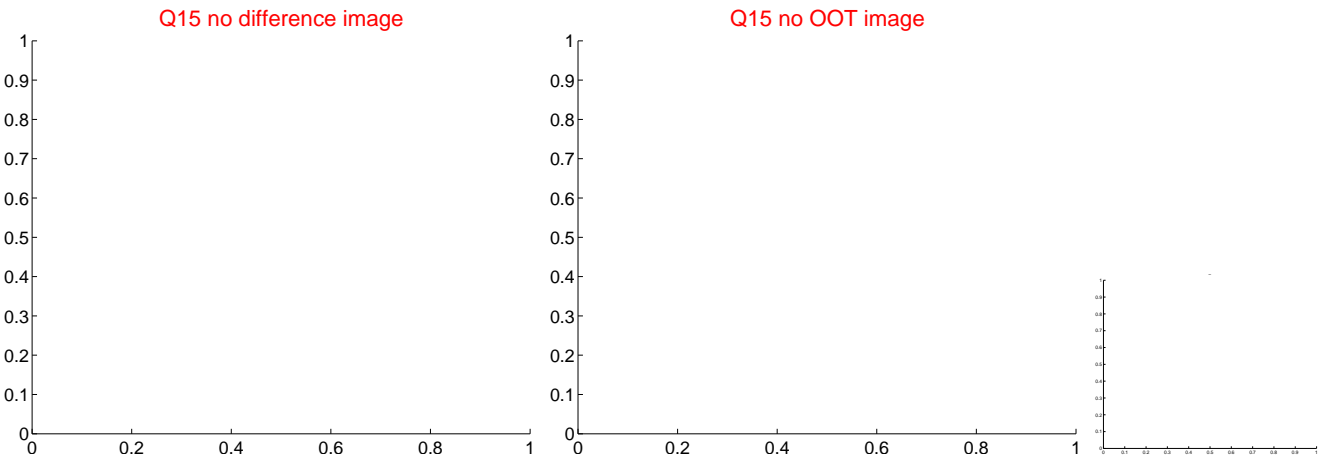
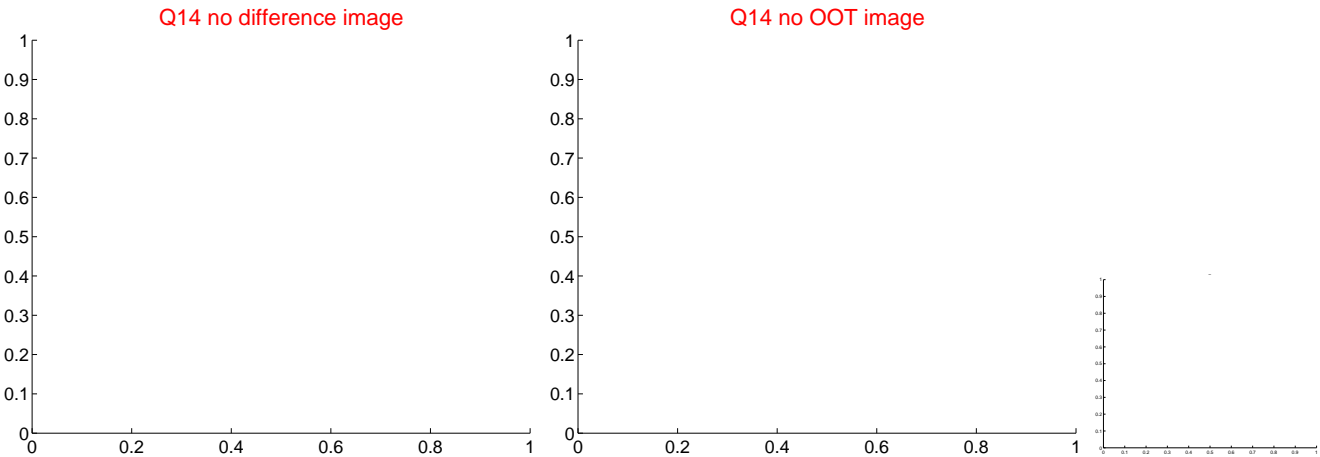
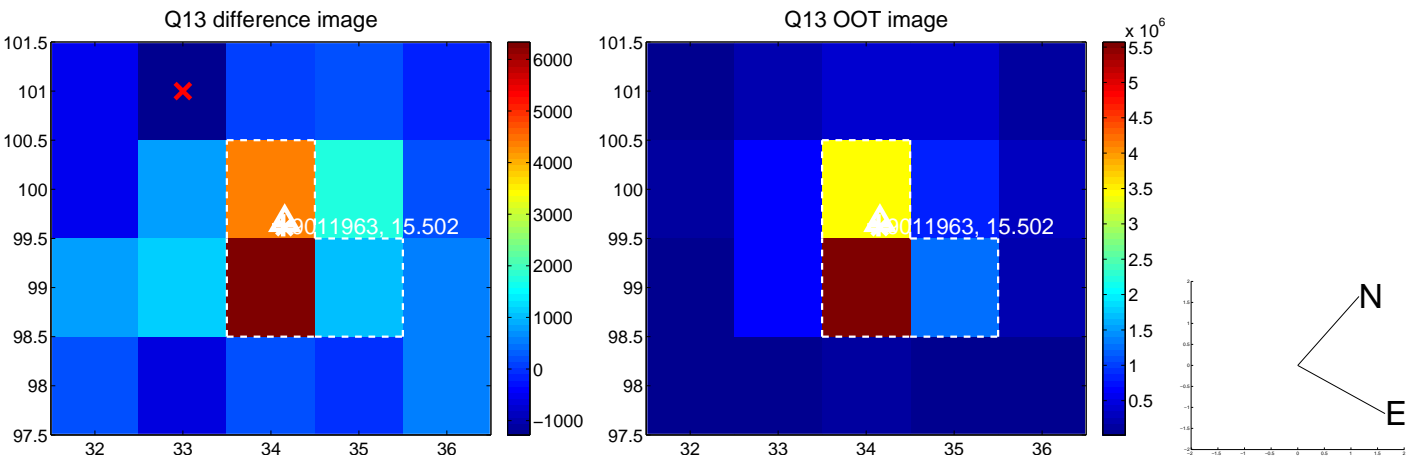
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



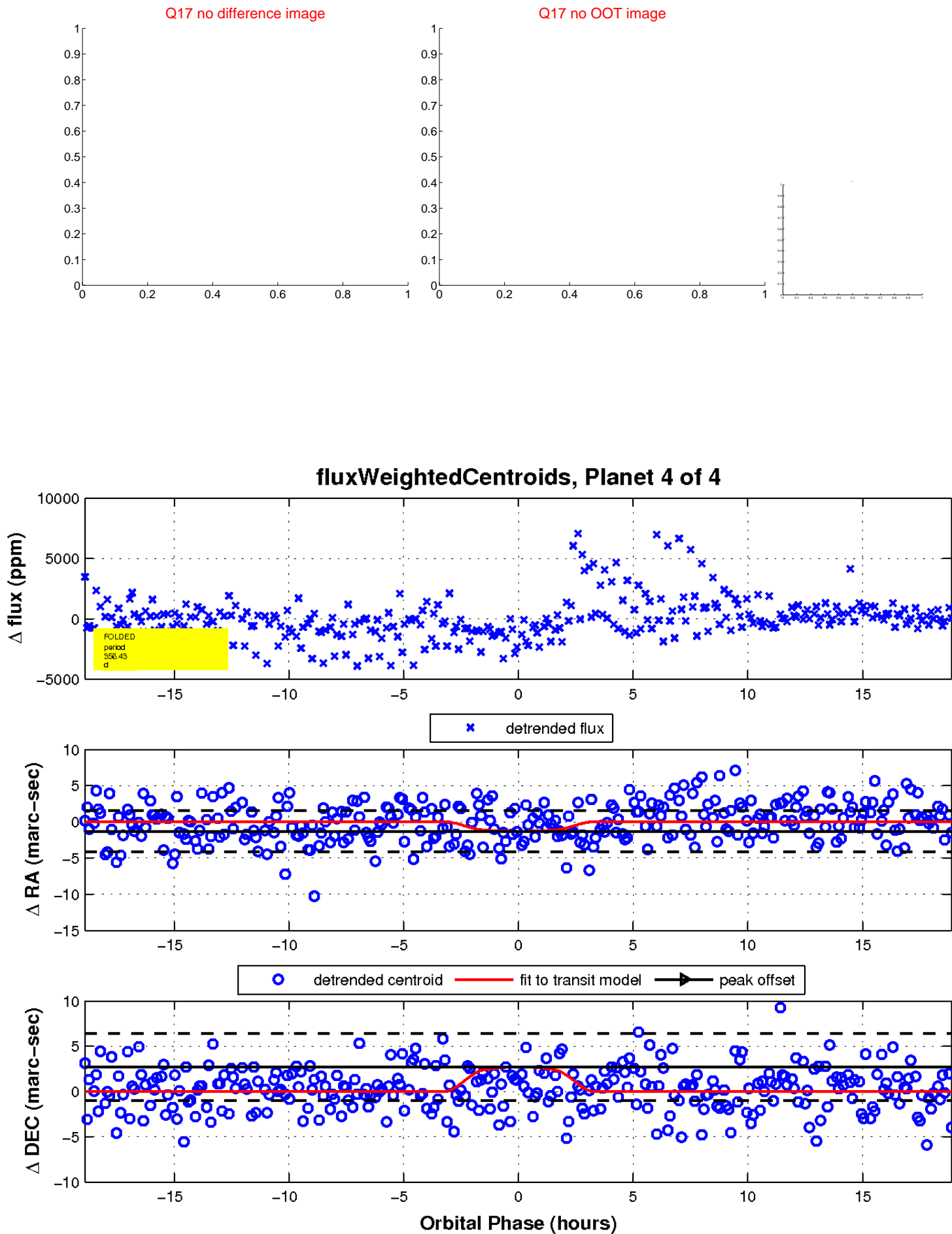
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

