

KIC 009163591

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})
009163591-02	OBS	No	339.116636	424.234634	2113.0	5.851	12.4	8.1	0.67	4523	3.21	0.24
009163591-03	OBS	No	506.024433	308.442643	2170.4	5.952	10.9	8.5	0.67	4523	4.10	0.14
009163591-04	OBS	No	507.941245	380.777665	2040.0	8.990	11.9	7.5	0.67	4523	3.14	0.14
009163591-06	OBS	No	597.296079	312.619376	1979.3	6.317	10.7	7.4	0.67	4523	3.12	0.12
009163591-07	OBS	No	569.558629	144.764329	1624.7	4.955	12.4	6.4	0.67	4523	2.97	0.12

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009163591-02	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
009163591-03	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
009163591-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009163591-06	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
009163591-07	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

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

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

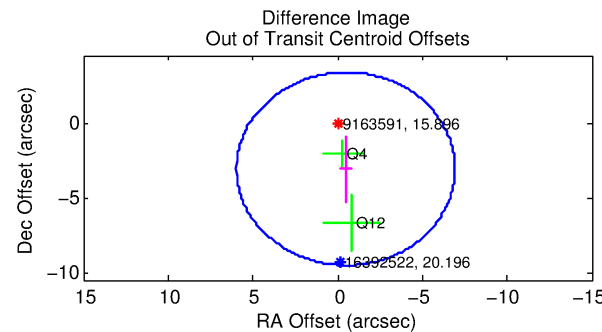
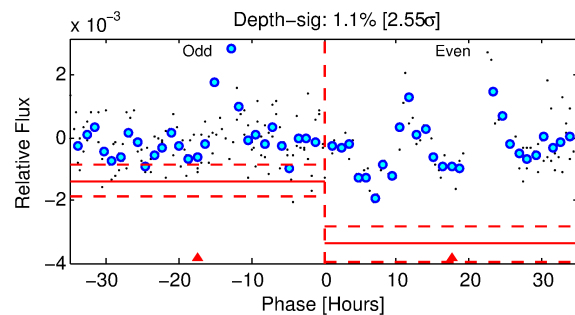
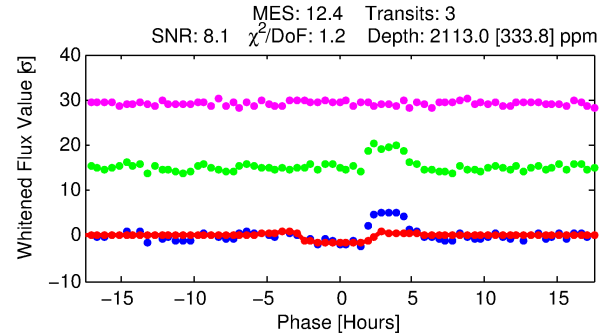
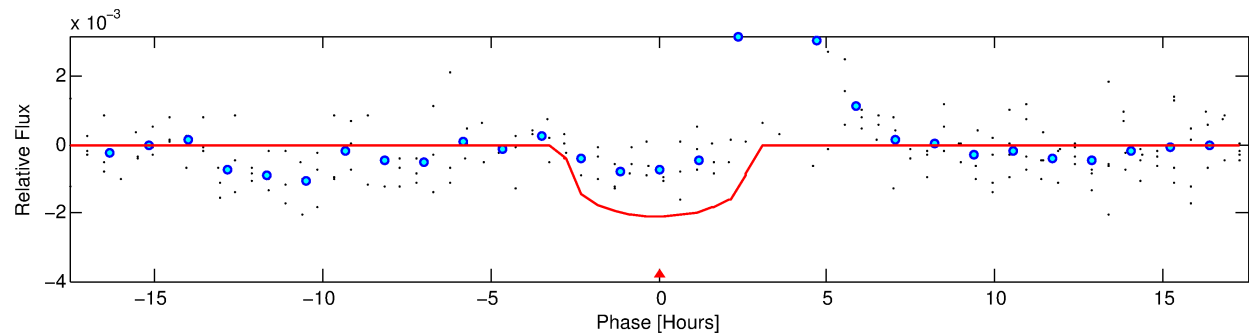
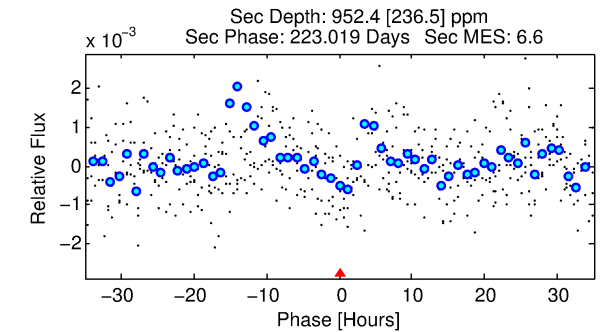
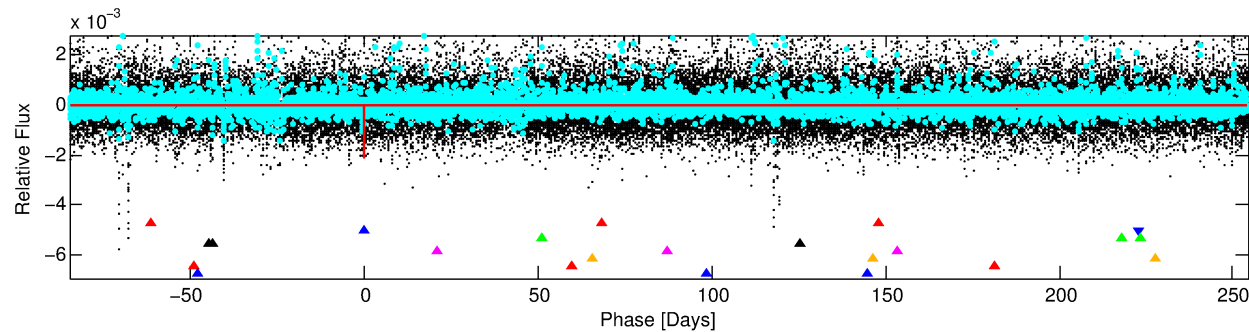
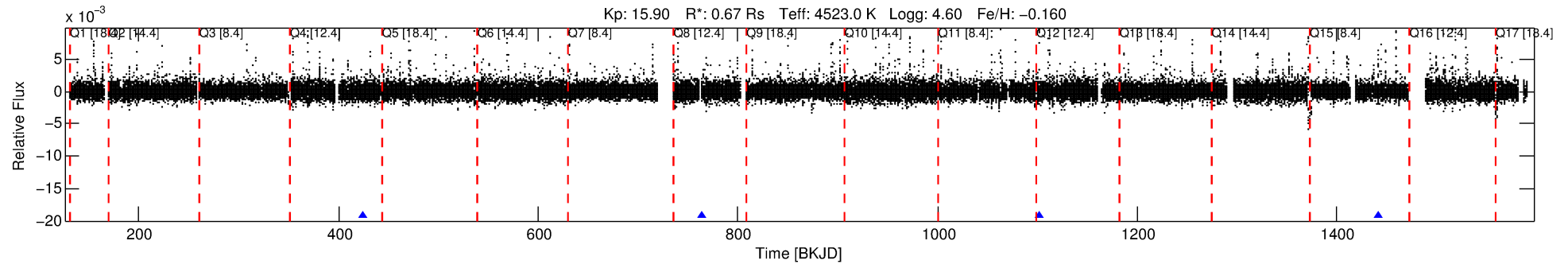
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009163591-02

No Significant Match Found

DV One-Page Summary

KIC: 9163591 Candidate: 2 of 8 Period: 339.117 d



DV Fit Results:

Period = 339.11664 [0.00436] d
Epoch = 424.2346 [0.0110] BKJD
Rp/R* = 0.0440 [0.0487]
a/R* = 362.67 [1226.18]
b = 0.65 [3.11]
Seff = 0.25 [0.04]
Teq = 179 [7] K
Rp = 3.22 [3.57] Re
a = 0.8271 [0.0602] AU
Ag = 34668.42 [77233.48] [0.45 σ]
Teffp = 3786 [2109] K [1.71 σ]

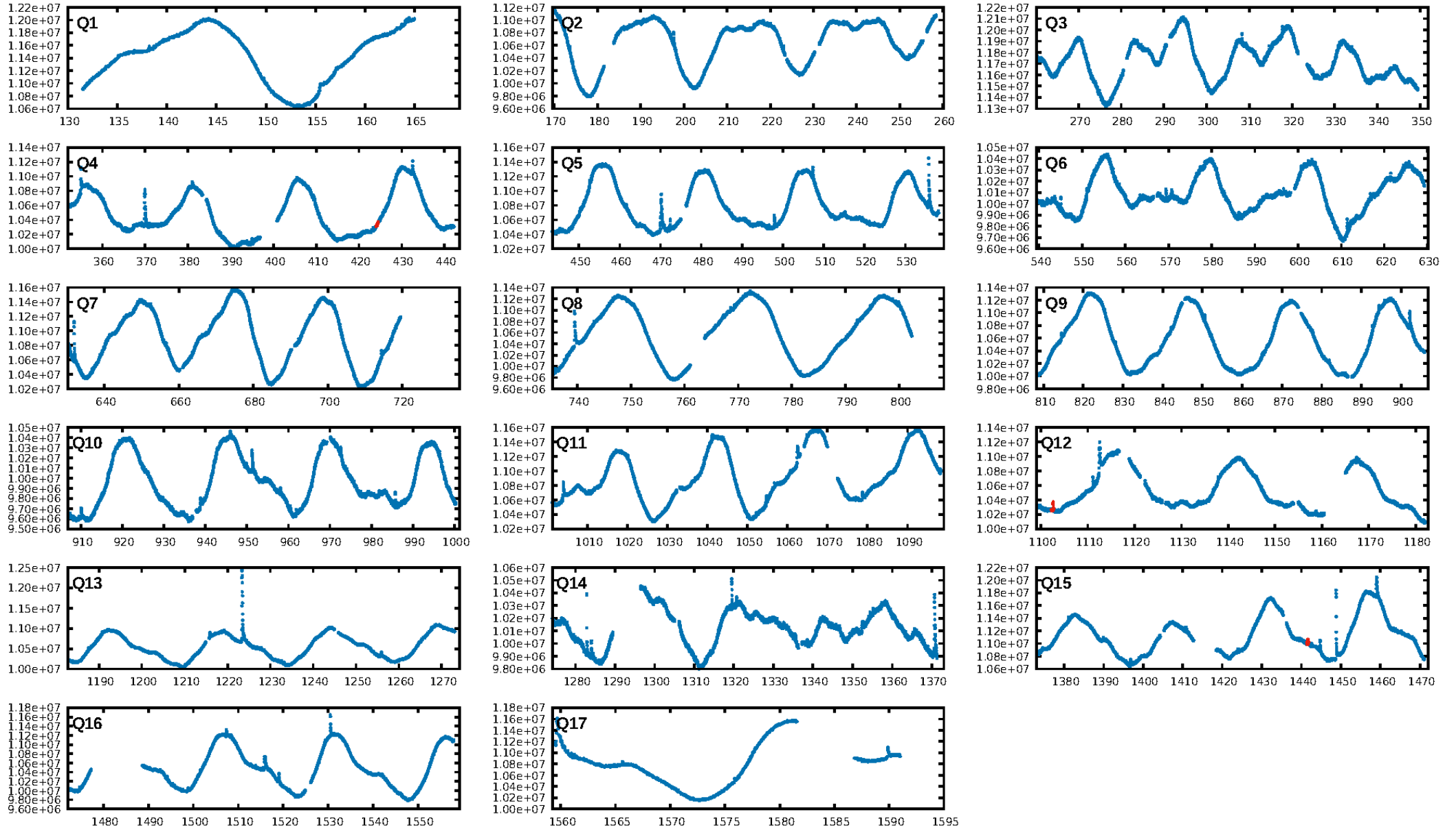
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 100.0% [129.65 σ]
ModelChiSquare2-sig: 0.2%
ModelChiSquareGof-sig: 85.8%
Bootstrap-pfa: N/A
RollingBand-fgt: 1.00 [3/3]
GhostDiagnostic-chr: 0.9787
Centroid-sig: 35.6%
Centroid-so: 0.599 arcsec [0.74 σ]
OotOffset-rm: 3.117 arcsec [1.45 σ]
OotOffset-st: 0/0/2/0 [2]
KicOffset-rm: 3.233 arcsec [1.53 σ]
KicOffset-st: 0/0/2/0 [2]
DiffImageQuality-fgm: 0.00 [0/2]
DiffImageOverlap-fno: 1.00 [3/3]

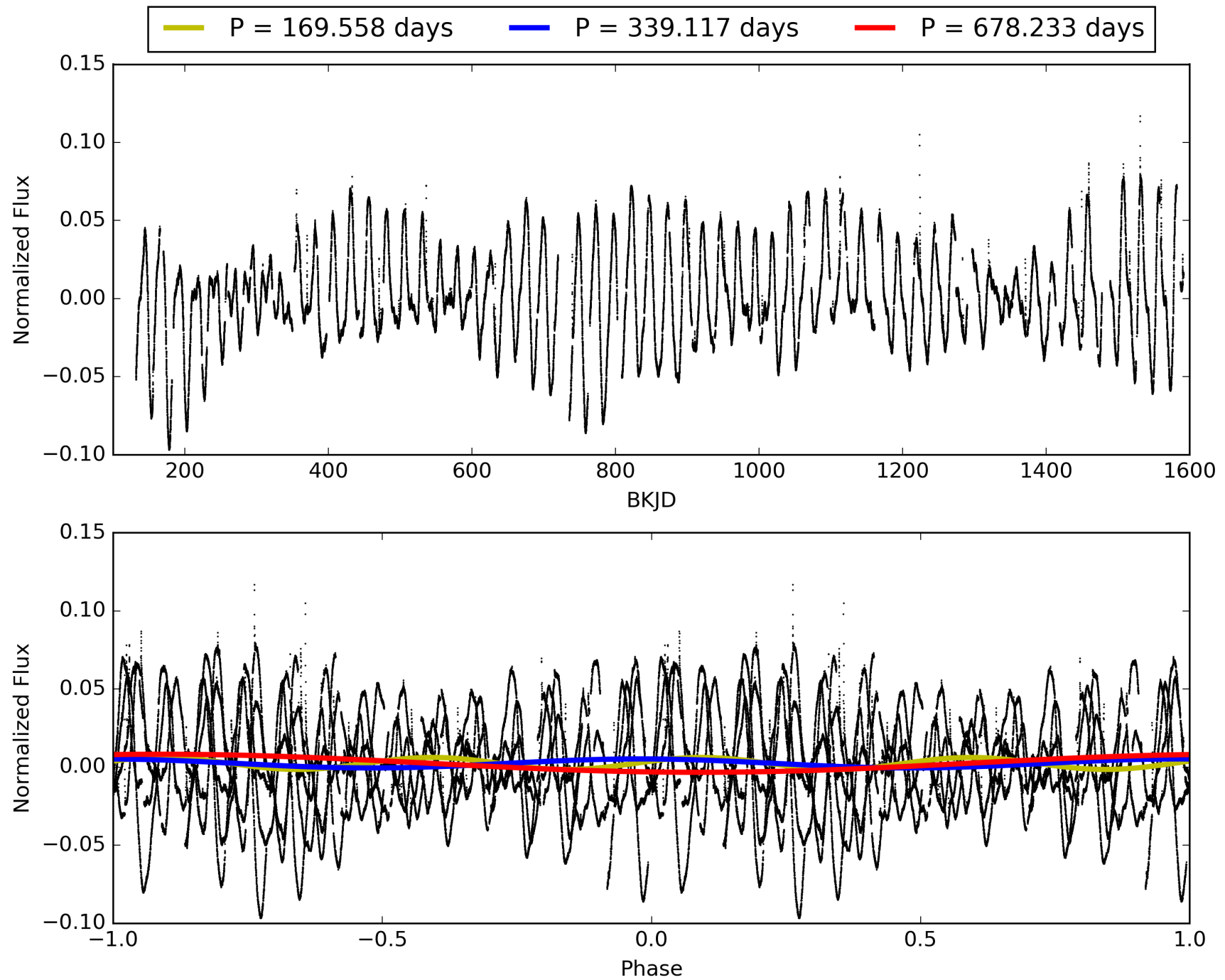
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 03-Feb-2016 08:00:33 Z

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

TCE 009163591-02, PDC Light Curves

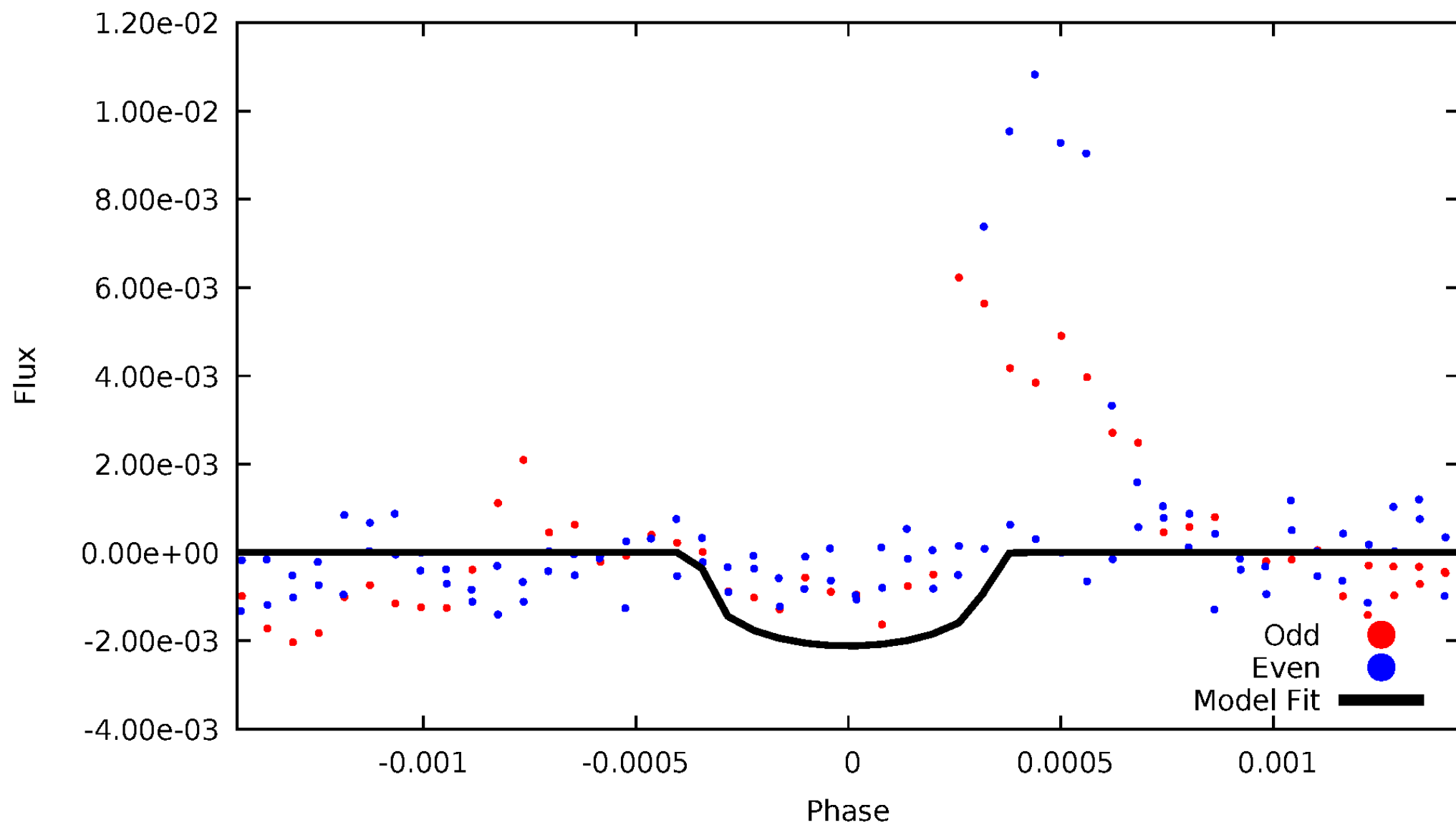


TCE 009163591-02



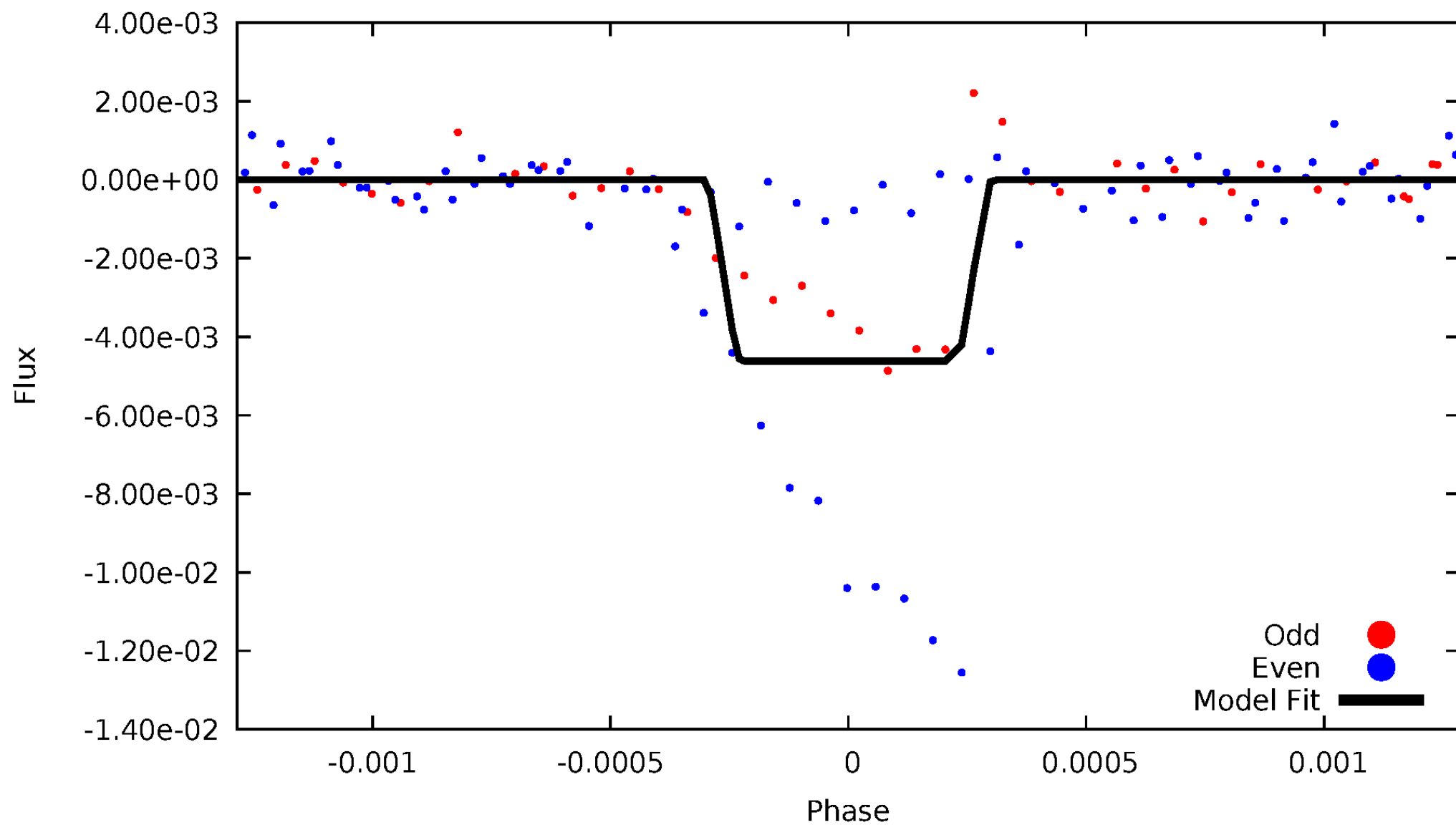
DV Odd/Even

TCE 009163591-02



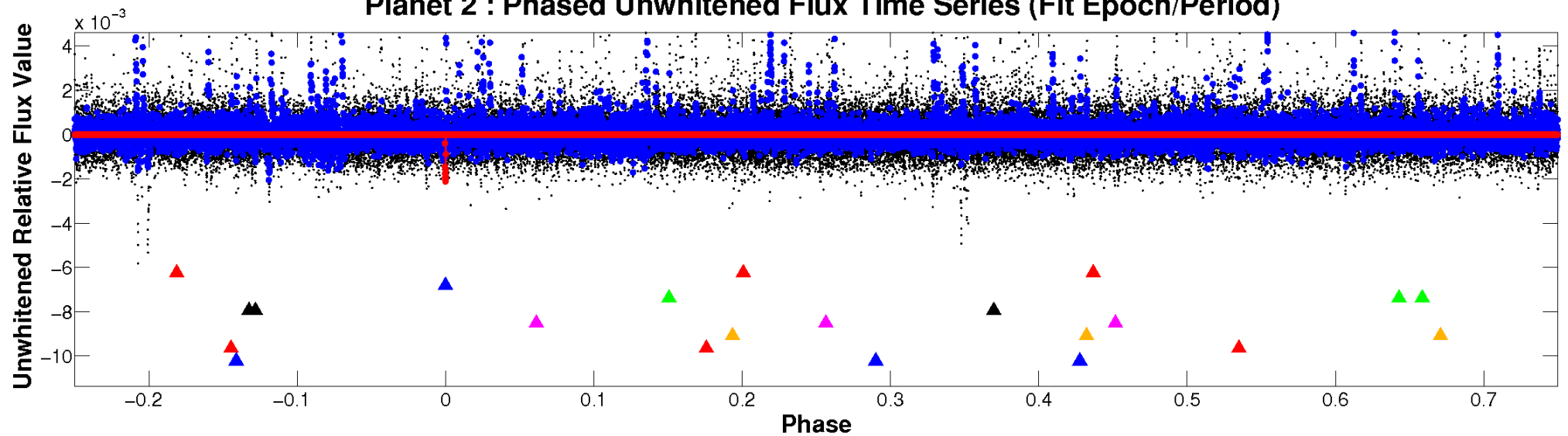
ALT Odd/Even

TCE 009163591-02

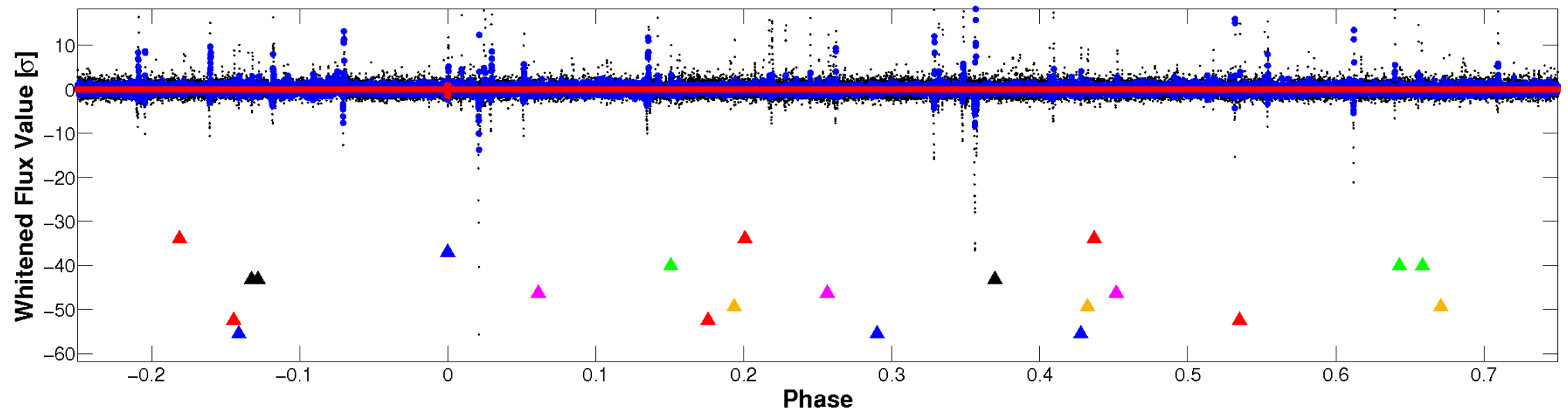


Non-Whitened Vs. Whitened Light Curve

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

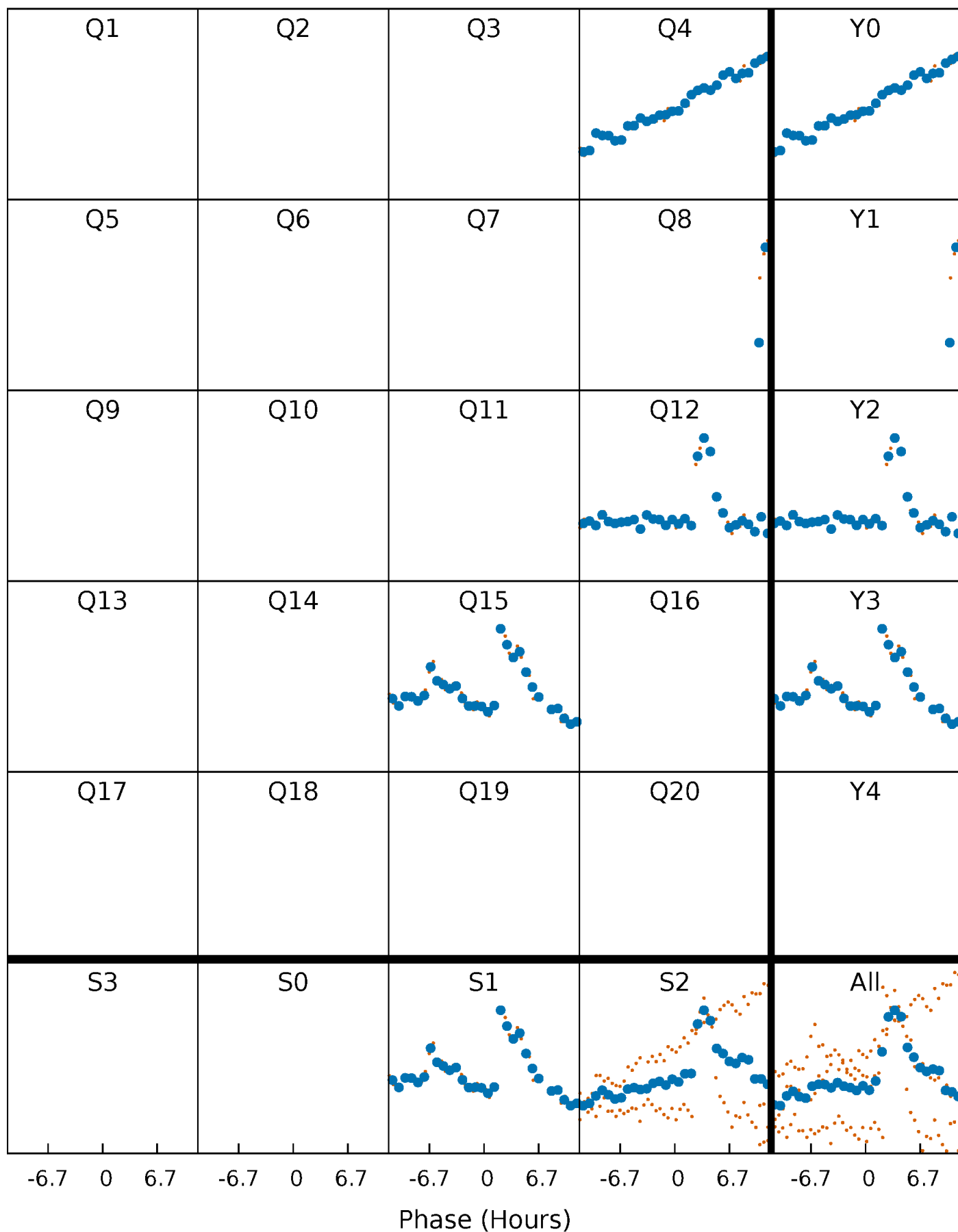


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



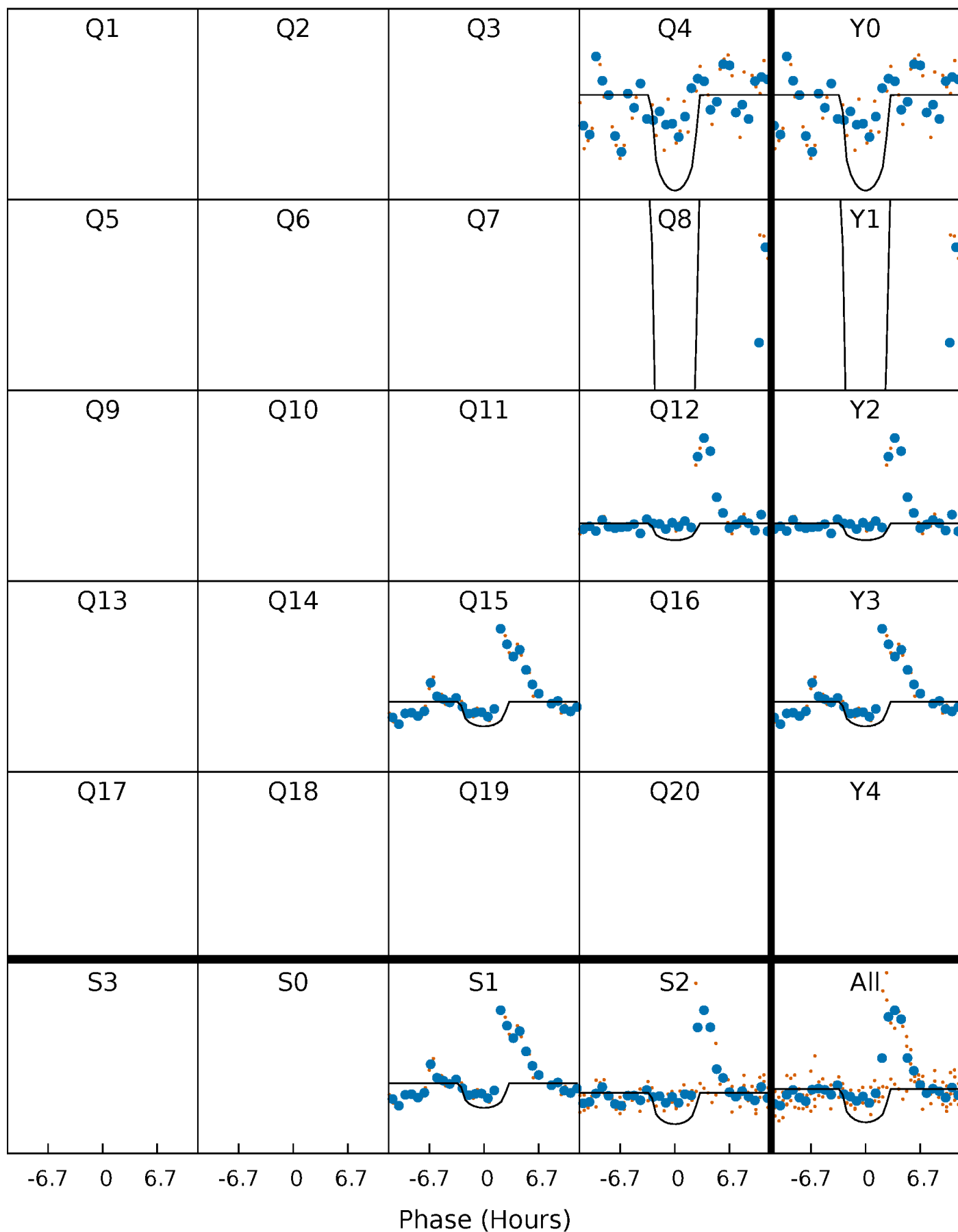
PDC Quarter-Phased Transit Curves

TCE 009163591-02 $P=339.116636$ Days $T_0=424.234634$ (BKJD)



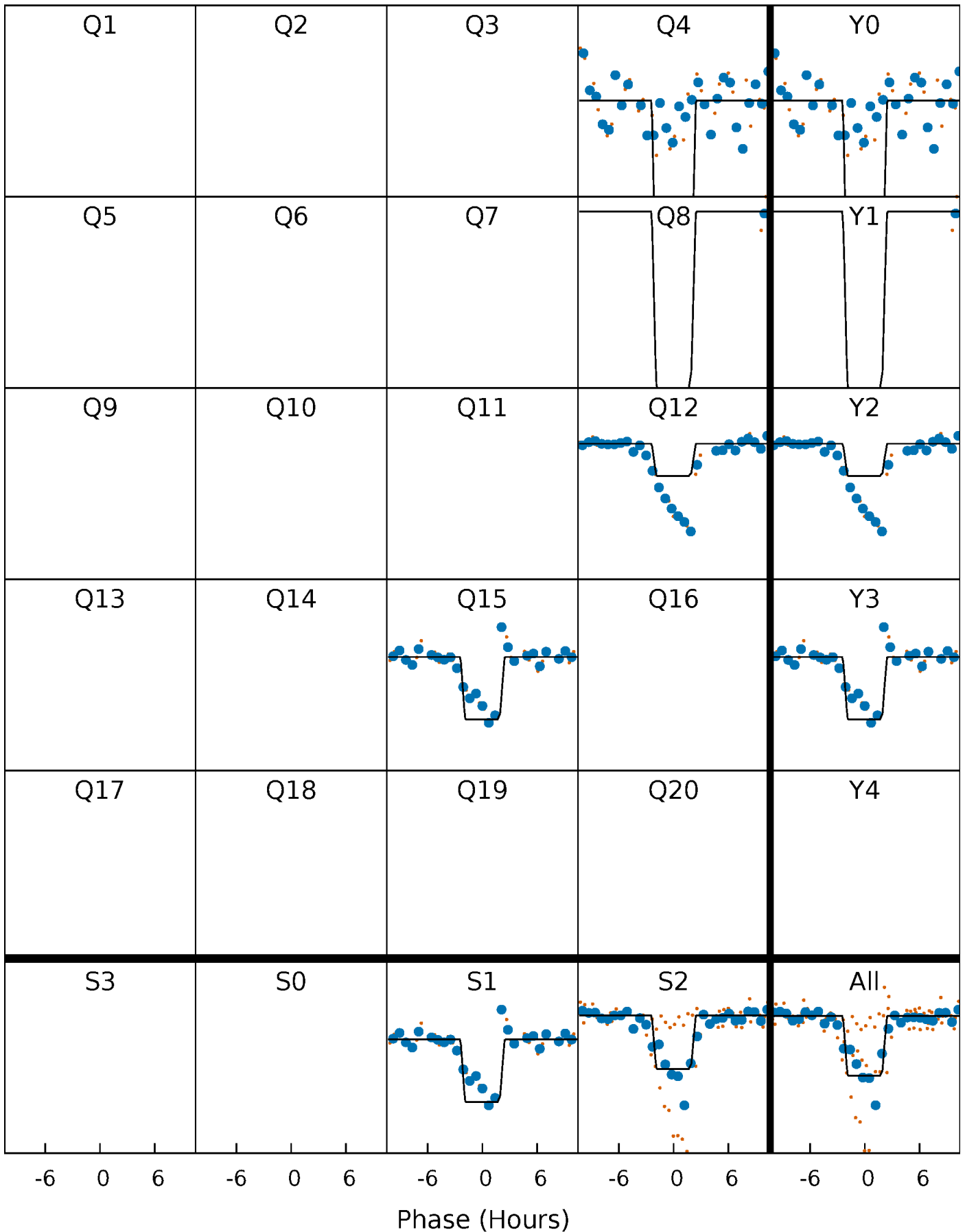
DV Quarter-Phased Transit Curves

TCE 009163591-02 P=339.116636 Days $T_0=424.234634$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

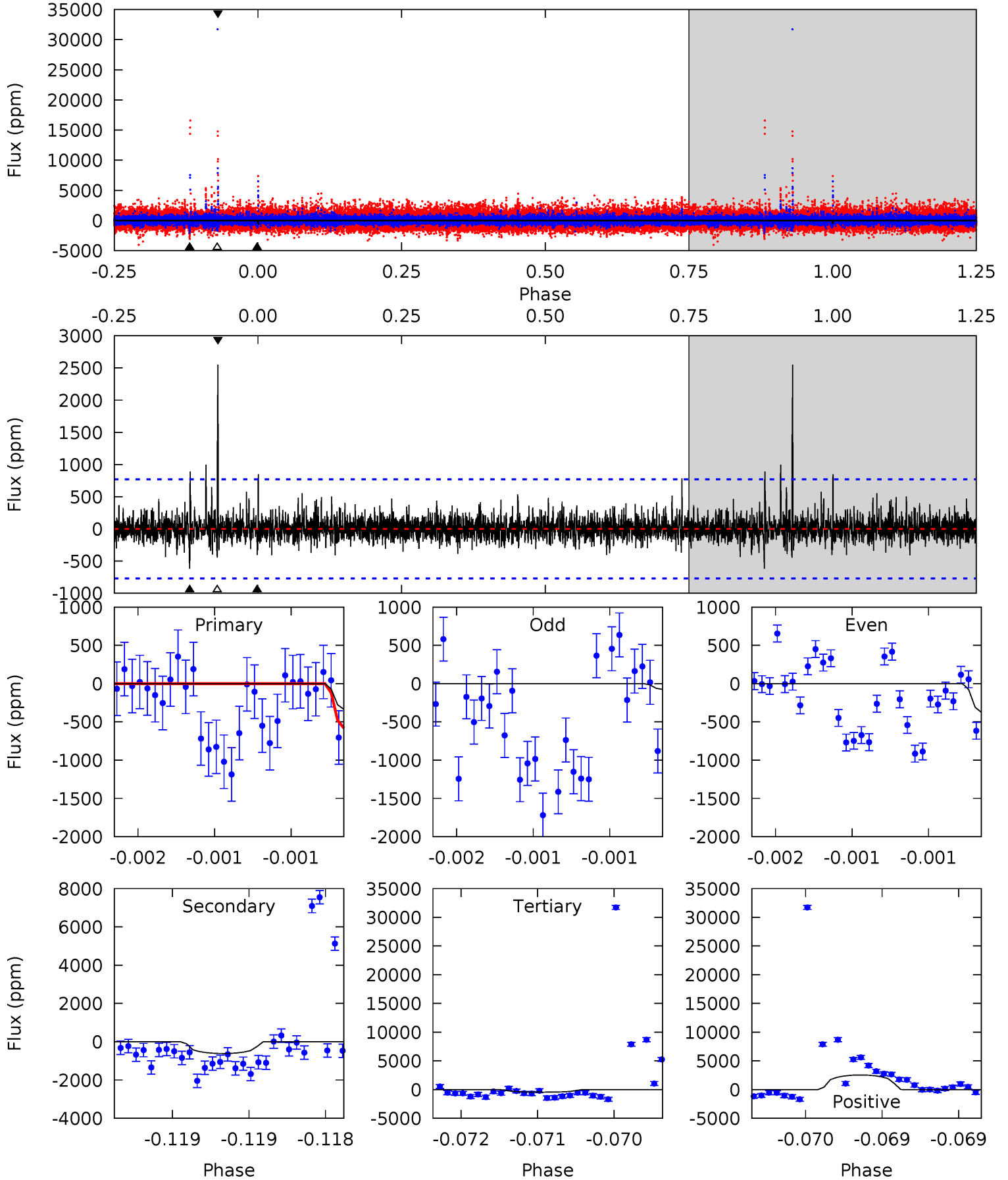
TCE 009163591-02 P=339.108551 Days $T_0=424.257611$ (BKJD)



DV Model-Shift Uniqueness Test

009163591-02, P = 339.116636 Days, E = 85.117998 Days

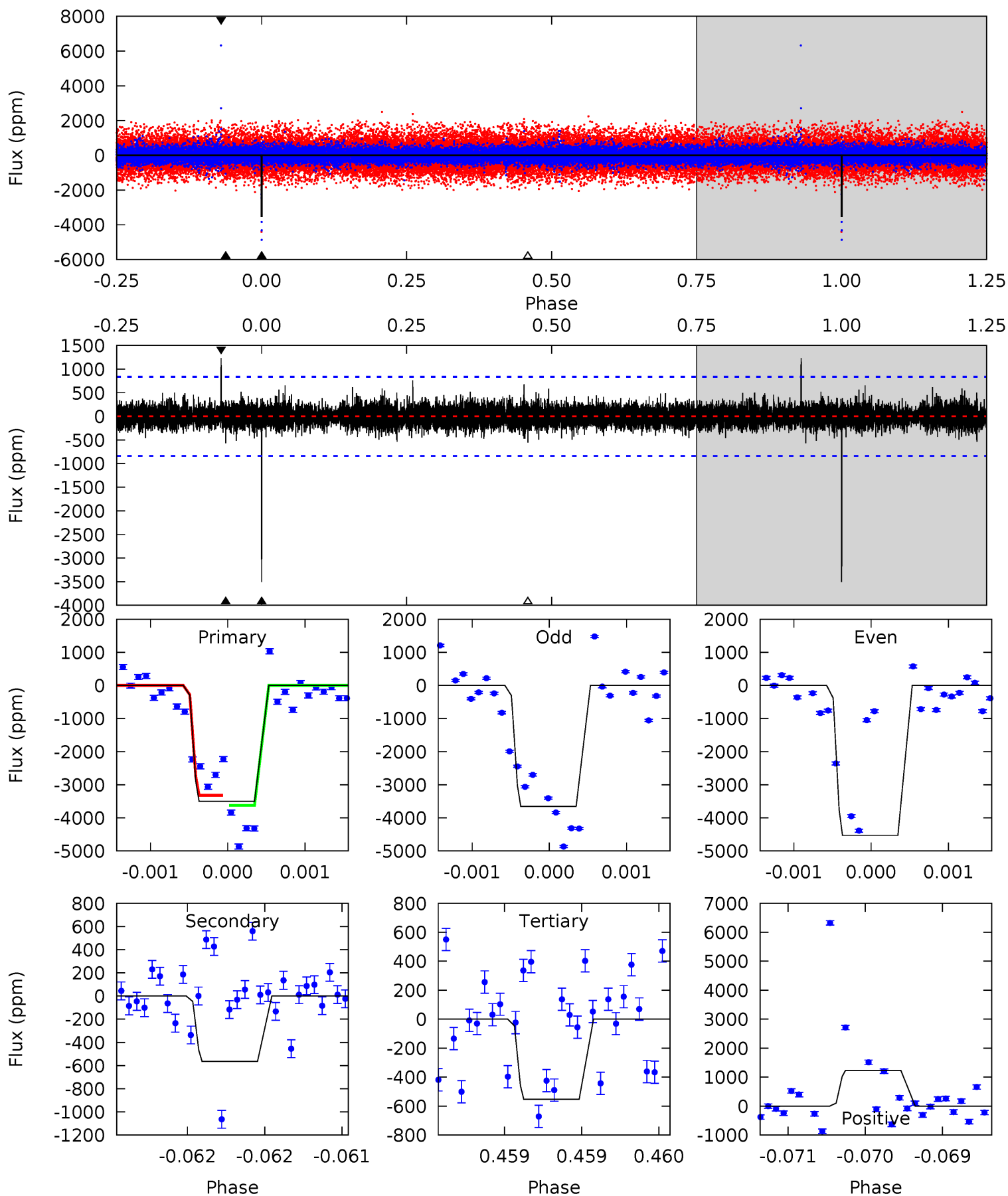
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
2.89	4.41	3.17	18.2	5.51	3.38	0.99	-0.28	-15.4	1.24	-13.8	0.90	2.22	0.81	2.10



Alt Model-Shift Uniqueness Test

009163591-02, P = 339.108551 Days, E = 85.149060 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
23.2	3.74	3.66	8.15	5.54	3.44	0.85	19.5	15.0	0.08	-4.42	4.14	1.31	0.26	0



Stellar Parameters For KIC 009163591

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (g \cdot \text{cm}^{-3})$
	4523^{+136}_{-136}	$4.604^{+0.056}_{-0.024}$	$-0.160^{+0.300}_{-0.300}$	$0.669^{+0.048}_{-0.059}$	$0.655^{+0.073}_{-0.049}$	$3.087^{+0.723}_{-0.331}$
	+3%/-3%	+1%/-1%	+188%/-188%	+7%/-9%	+11%/-7%	+23%/-11%
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 009163591-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	-616 ± 140	$3.91^{+3.45}_{-2.41}$	249^{+9}_{-9}	3428^{+1362}_{-571}	14850^{+81784}_{-10536}
Alt.	-565 ± 151	$5.43^{+3.26}_{-3.15}$	249^{+8}_{-9}	3101^{+953}_{-407}	7512^{+31387}_{-4882}

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 $A_{obs} \gg 1.0$

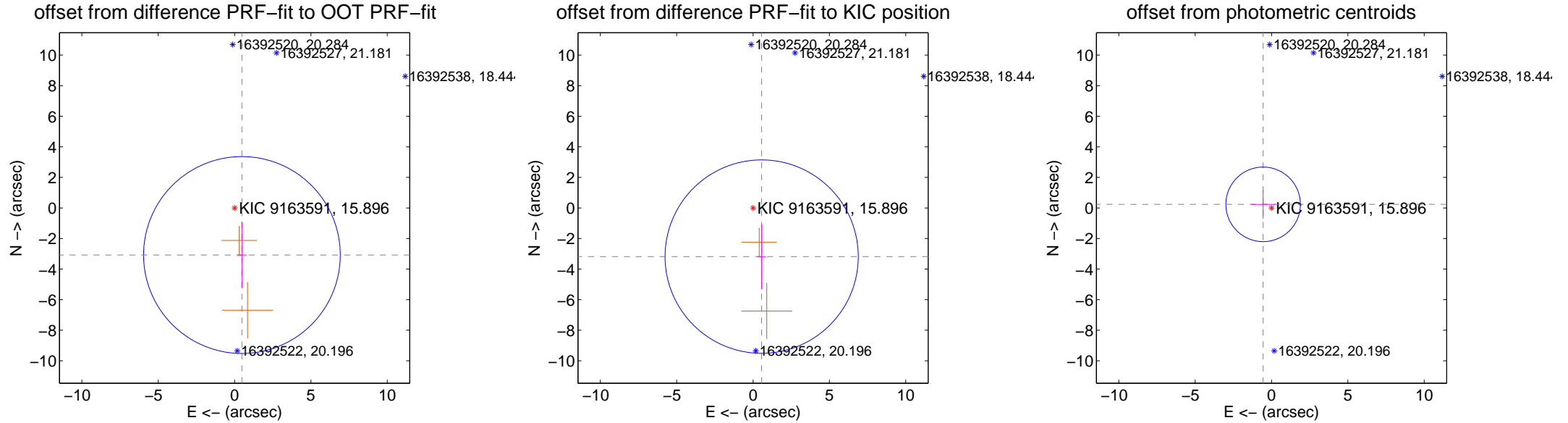
DV Centroid Data

Supplemental centroid analysis for 009163591-02. Kepler magnitude: 15.90. Transit SNR 8.15

There are 0 quarters with good PRF difference image offsets

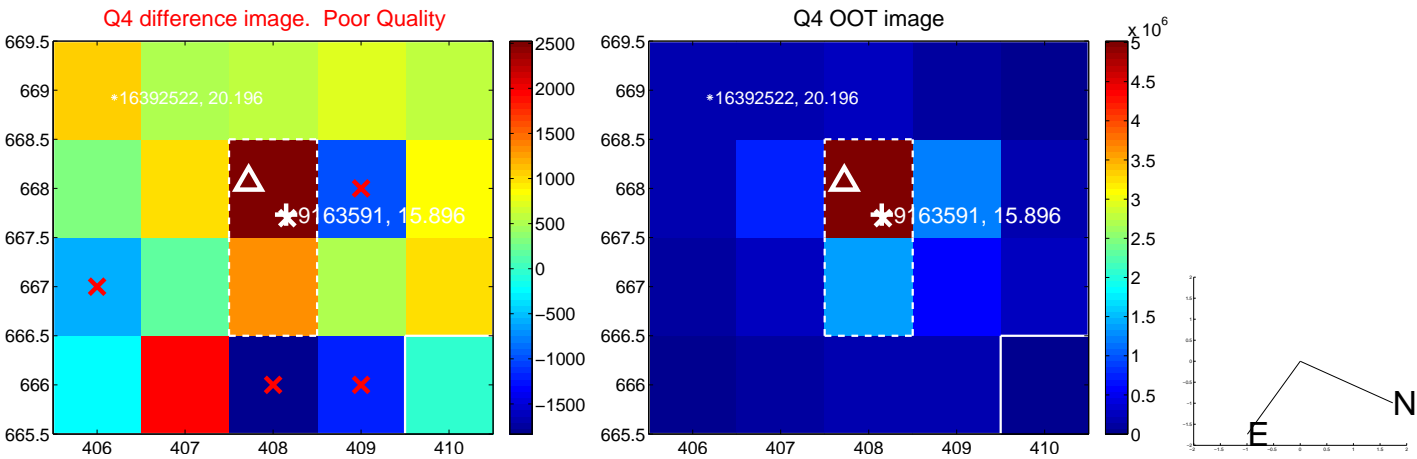
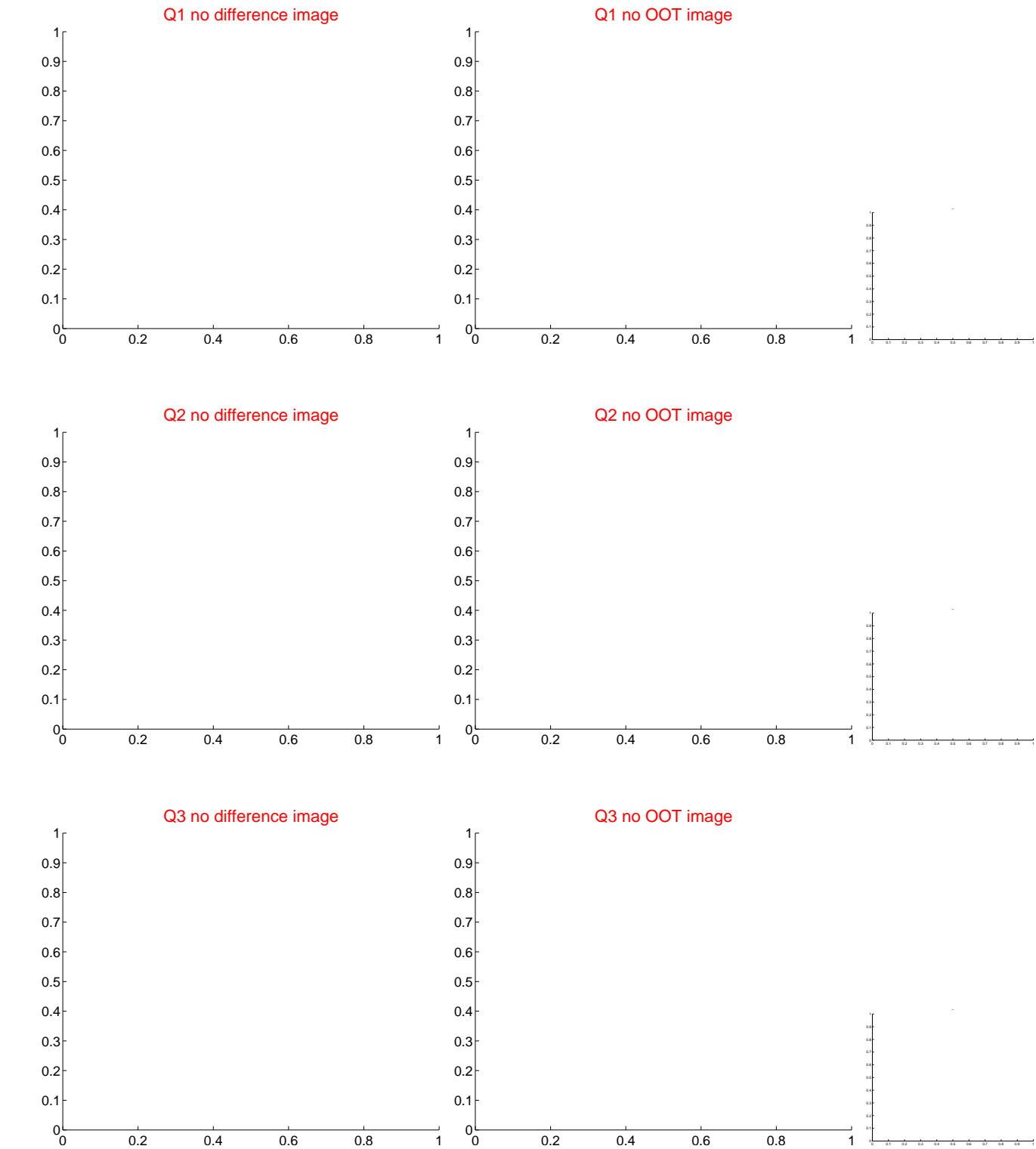
The direct PRF centroid is offset from the target star catalog position by about 0.07 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	3.117 ± 2.147	1.45	-0.481 ± 0.305	-3.080 ± 2.173
PRF-fit source offset from KIC position	3.233 ± 2.109	1.53	-0.563 ± 0.280	-3.184 ± 2.142
photometric centroid source offset	0.60 ± 0.81	0.74	0.55 ± 0.79	0.24 ± 0.93



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 ×: 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.



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

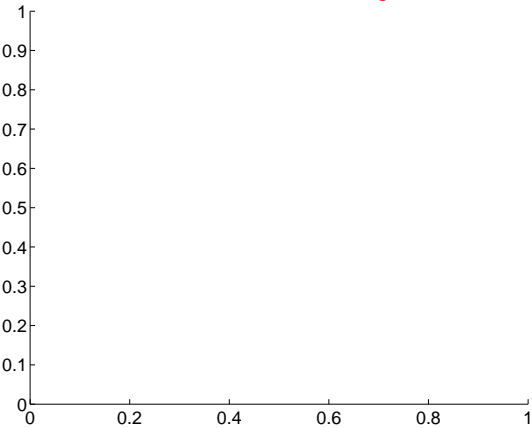
Q9 no difference image



Q9 no OOT image



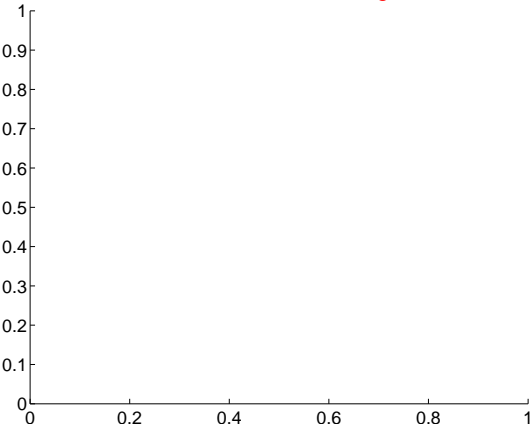
Q10 no difference image



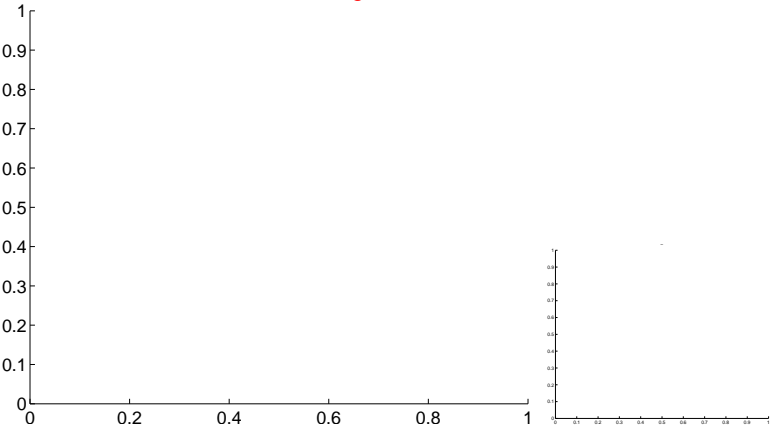
Q10 no OOT image



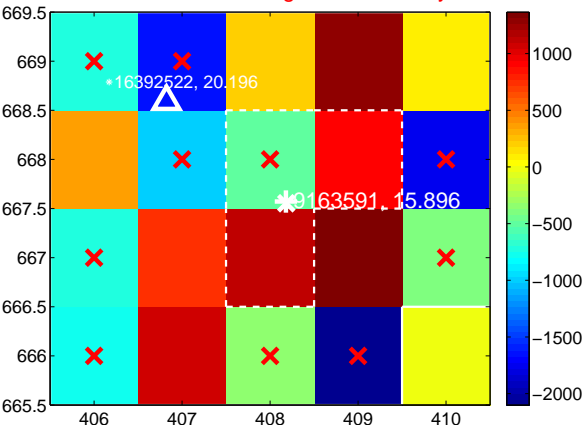
Q11 no difference image



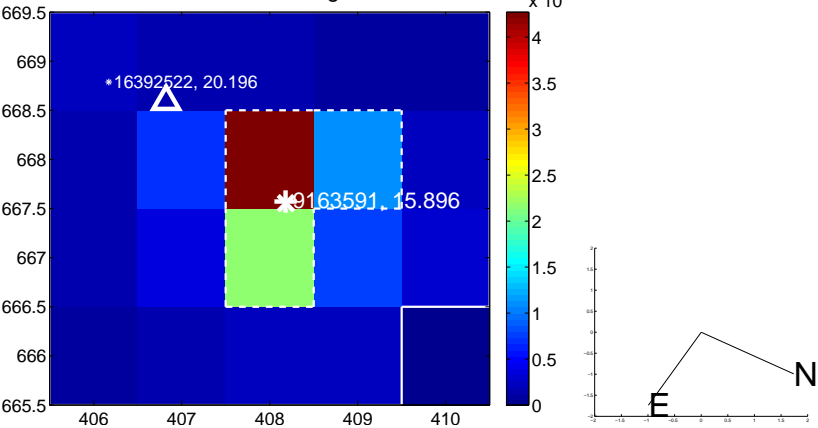
Q11 no OOT image



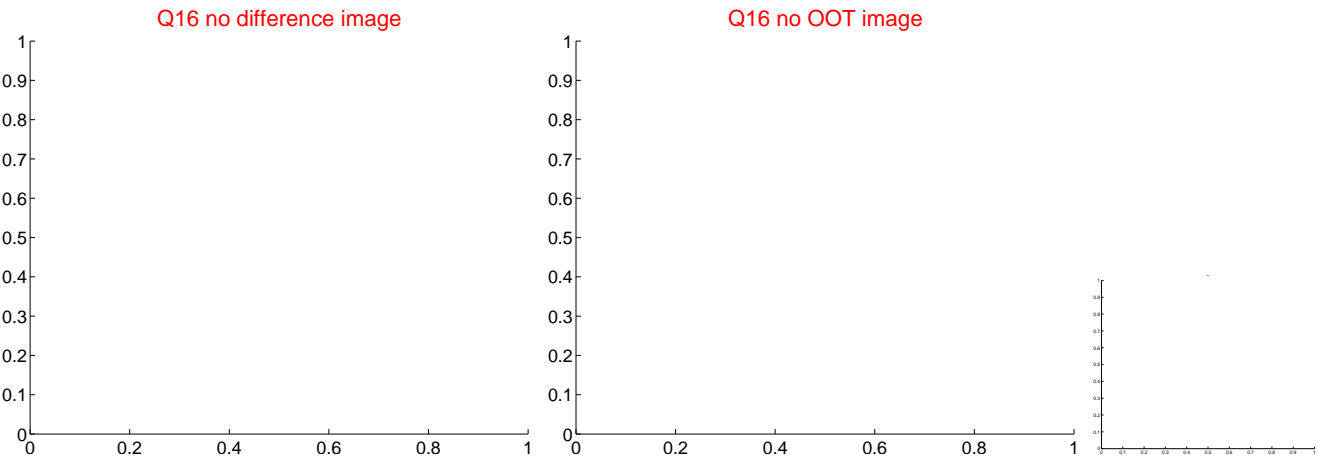
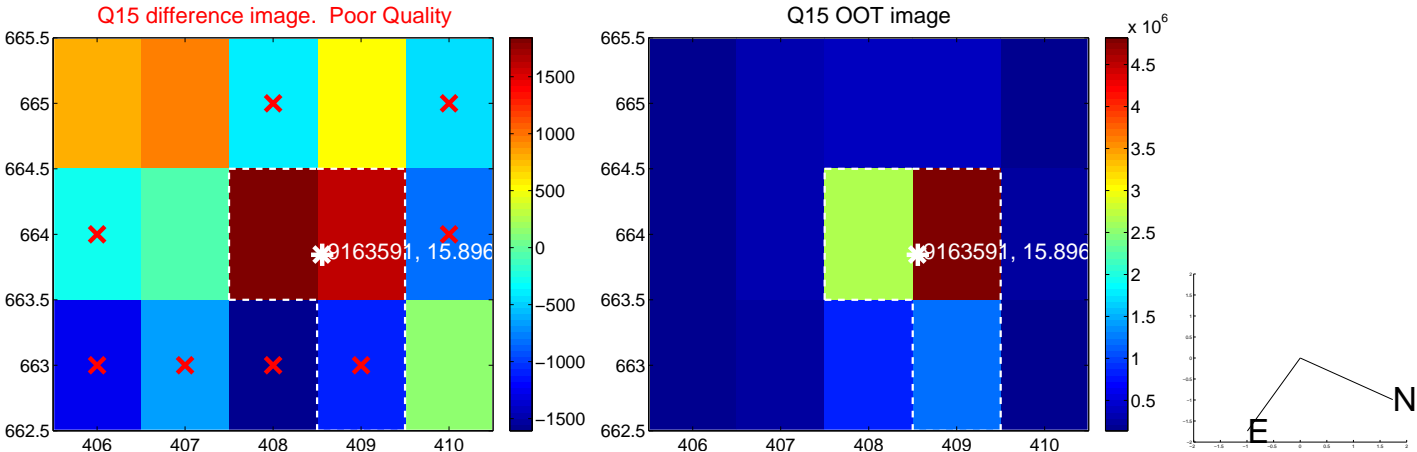
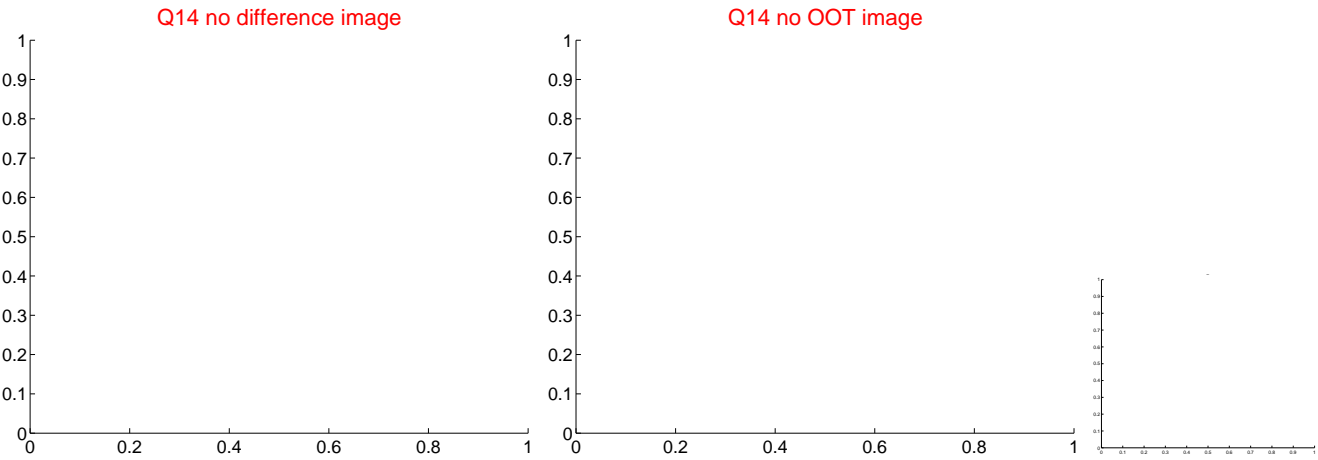
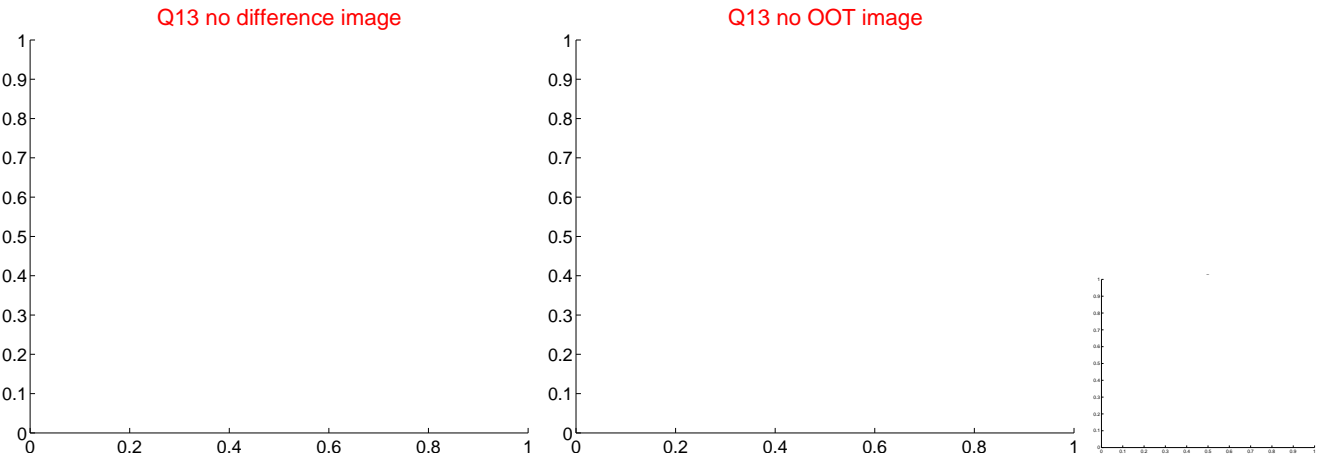
Q12 difference image. Poor Quality



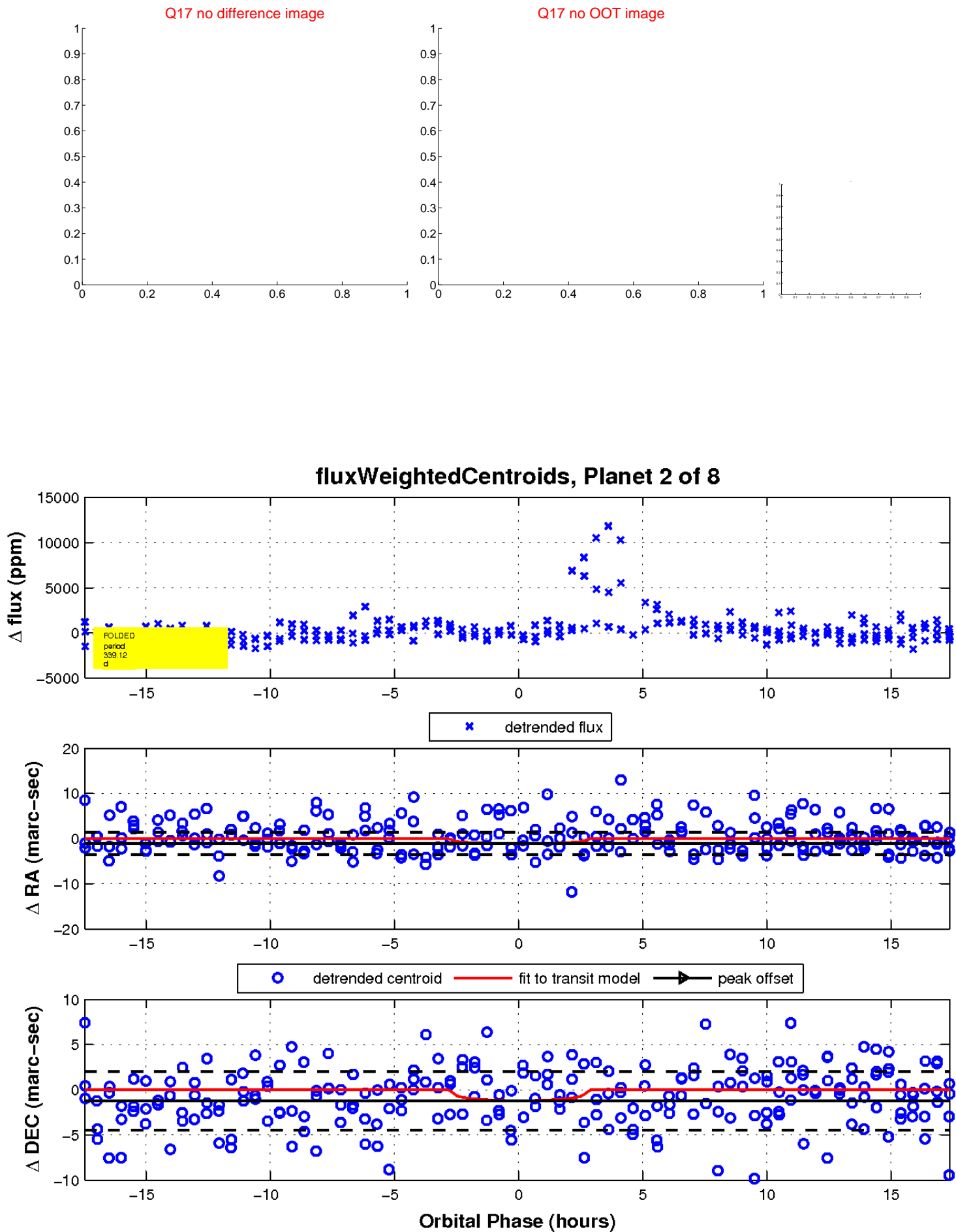
Q12 OOT image



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

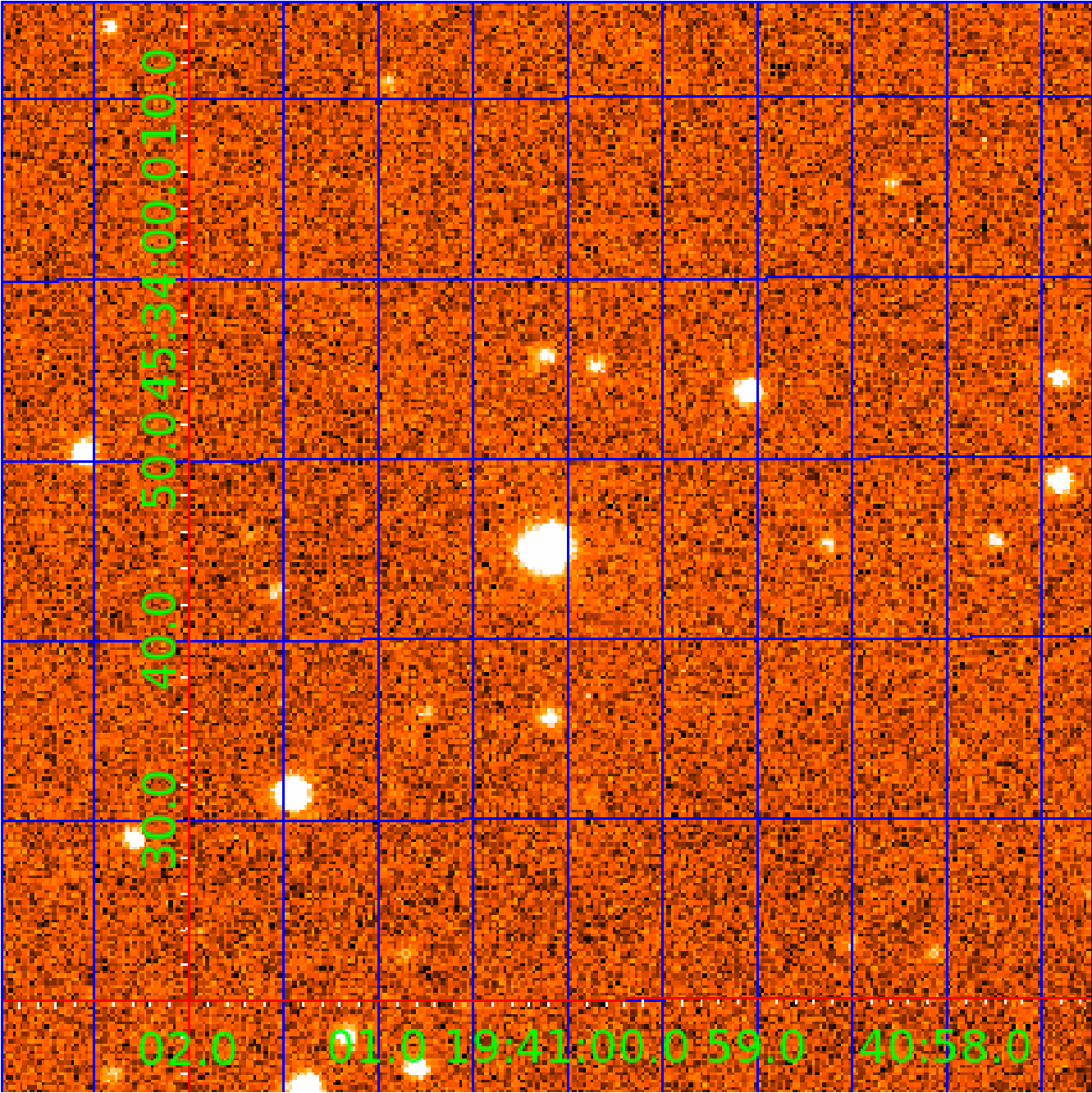


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 009163591

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})
009163591-02	OBS	No	339.116636	424.234634	2113.0	5.851	12.4	8.1	0.67	4523	3.21	0.24
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Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
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009163591-03	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
009163591-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009163591-06	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
009163591-07	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

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

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

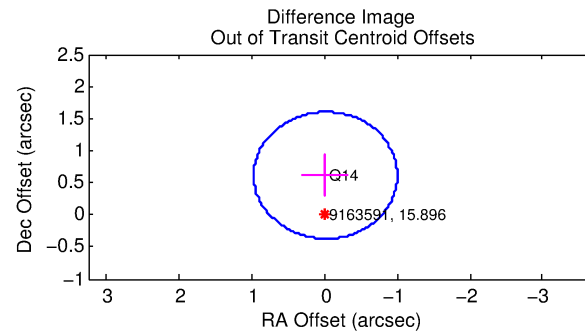
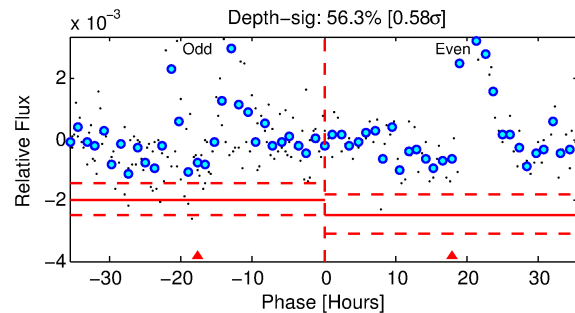
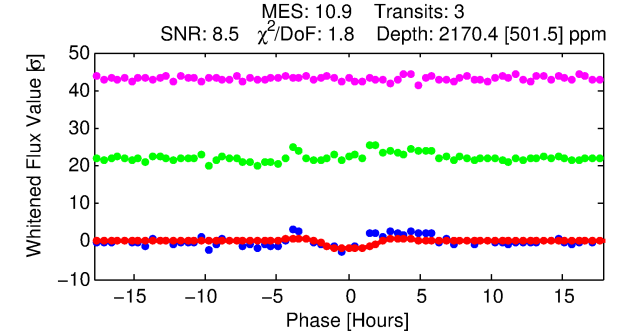
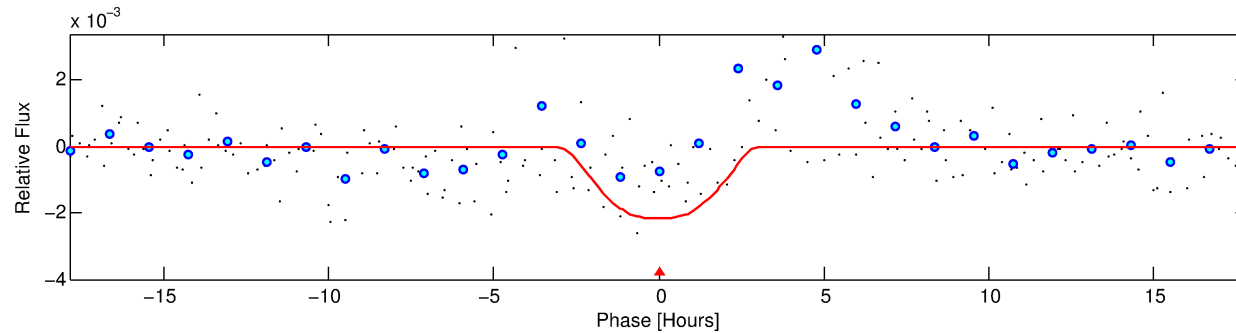
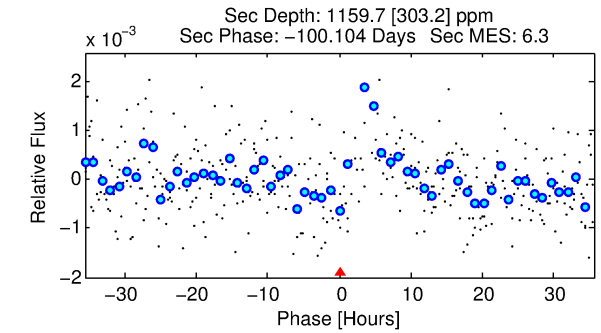
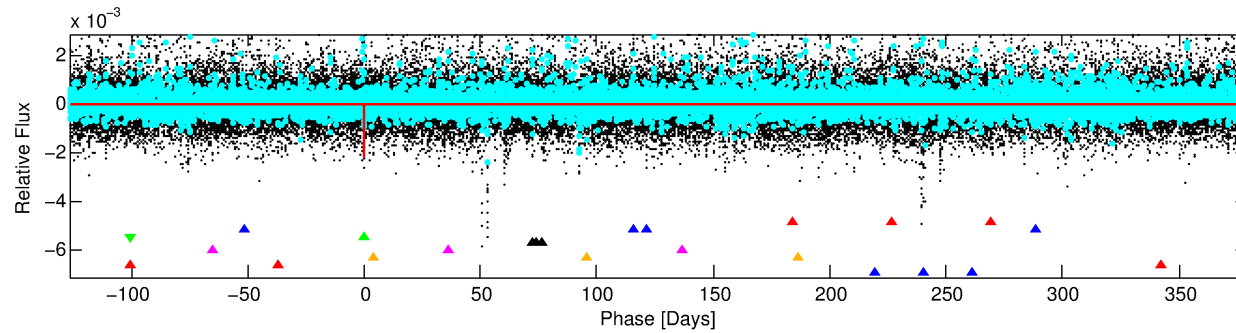
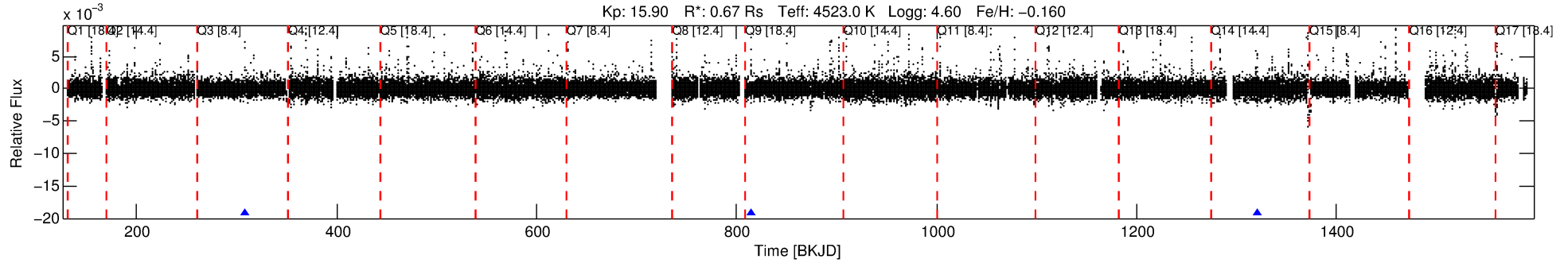
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009163591-03

No Significant Match Found

DV One-Page Summary

KIC: 9163591 Candidate: 3 of 8 Period: 506.024 d



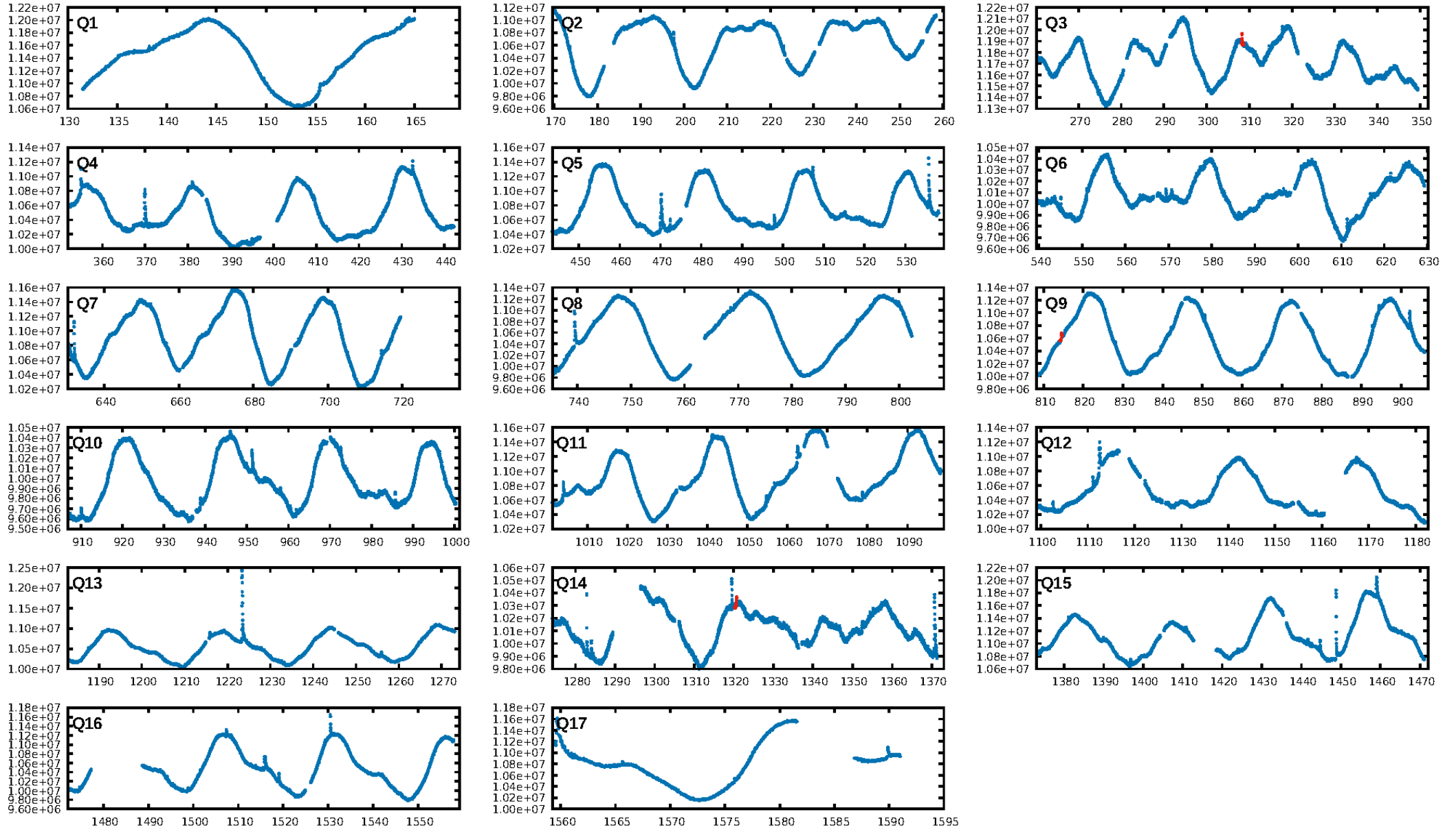
DV Fit Results:

Period = 506.02443 [0.01311] d
Epoch = 308.4426 [0.0150] BKJD
Rp/R* = 0.0562 [0.0110]
a/R* = 315.44 [94.45]
b = 0.94 [0.05]
Seff = 0.14 [0.02]
Teq = 157 [6] K
Rp = 4.10 [0.88] Re
a = 1.0800 [0.0787] AU
Ag = 44188.16 [21344.82] [2.07 σ]
Teffp = 3520 [428] K [7.85 σ]

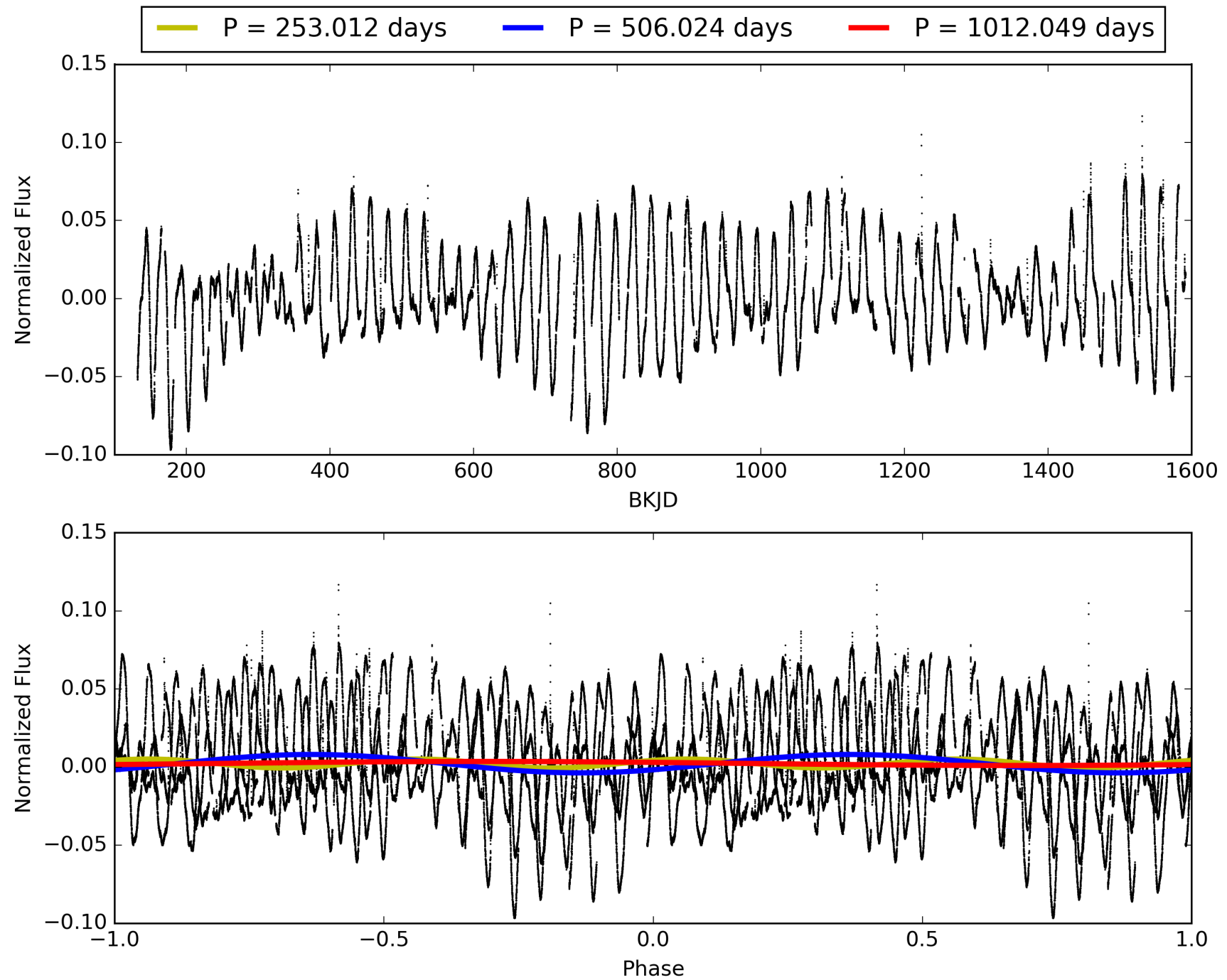
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [71.88 σ]
LongPeriod-sig: 100.0% [4.27 σ]
ModelChiSquare2-sig: 95.8%
ModelChiSquareGof-sig: 54.6%
Bootstrap-pfa: N/A
RollingBand-fgt: 1.00 [3/3]
GhostDiagnostic-chr: -0.2812
Centroid-sig: 88.6%
Centroid-so: 0.222 arcsec [0.24 σ]
OotOffset-rm: 0.614 arcsec [1.86 σ]
KicOffset-rm: 0.498 arcsec [1.51 σ]
OotOffset-st: 1/0/0/0 [1]
KicOffset-st: 1/0/0/0 [1]
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TCE 009163591-03, PDC Light Curves

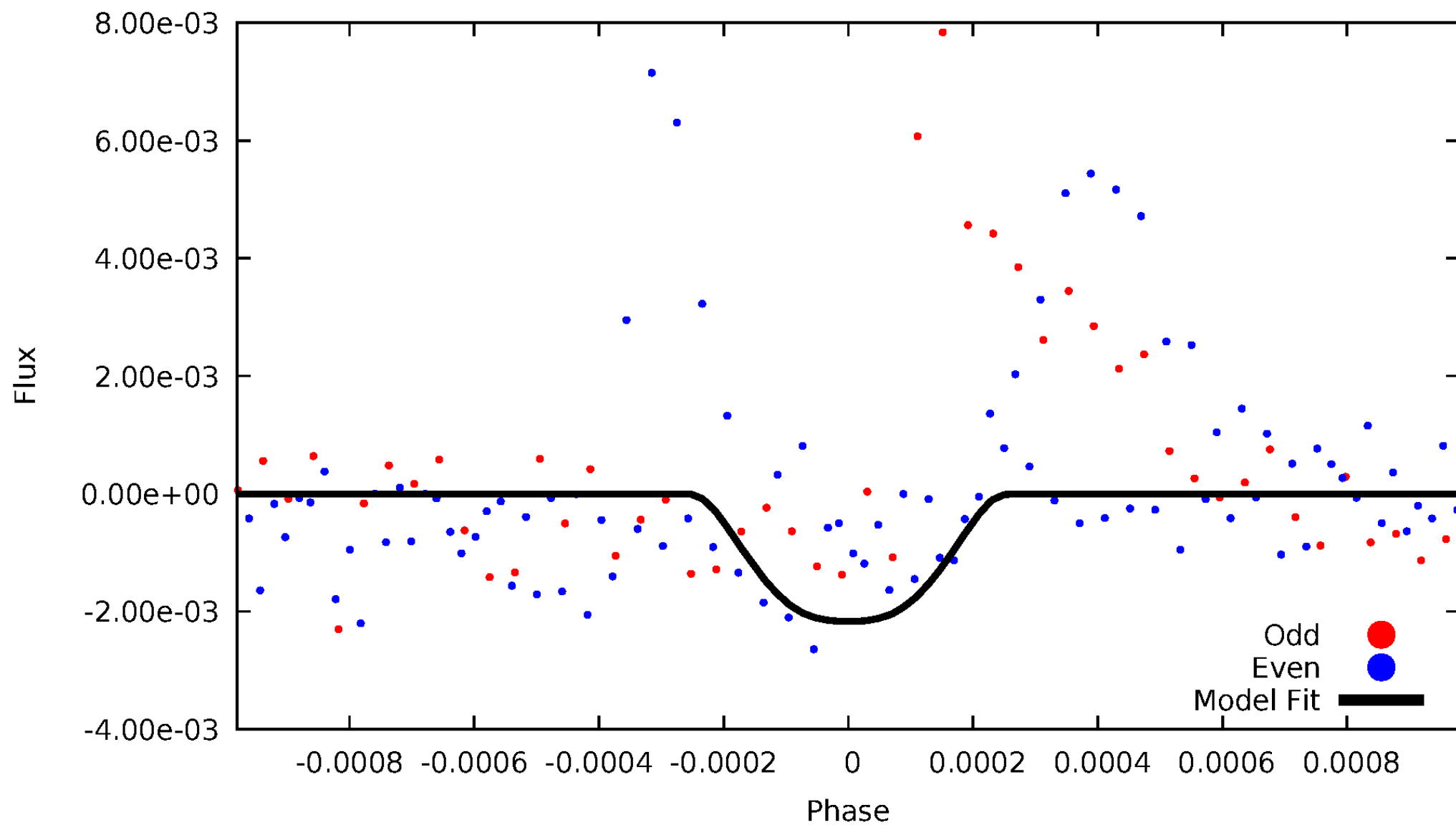


TCE 009163591-03



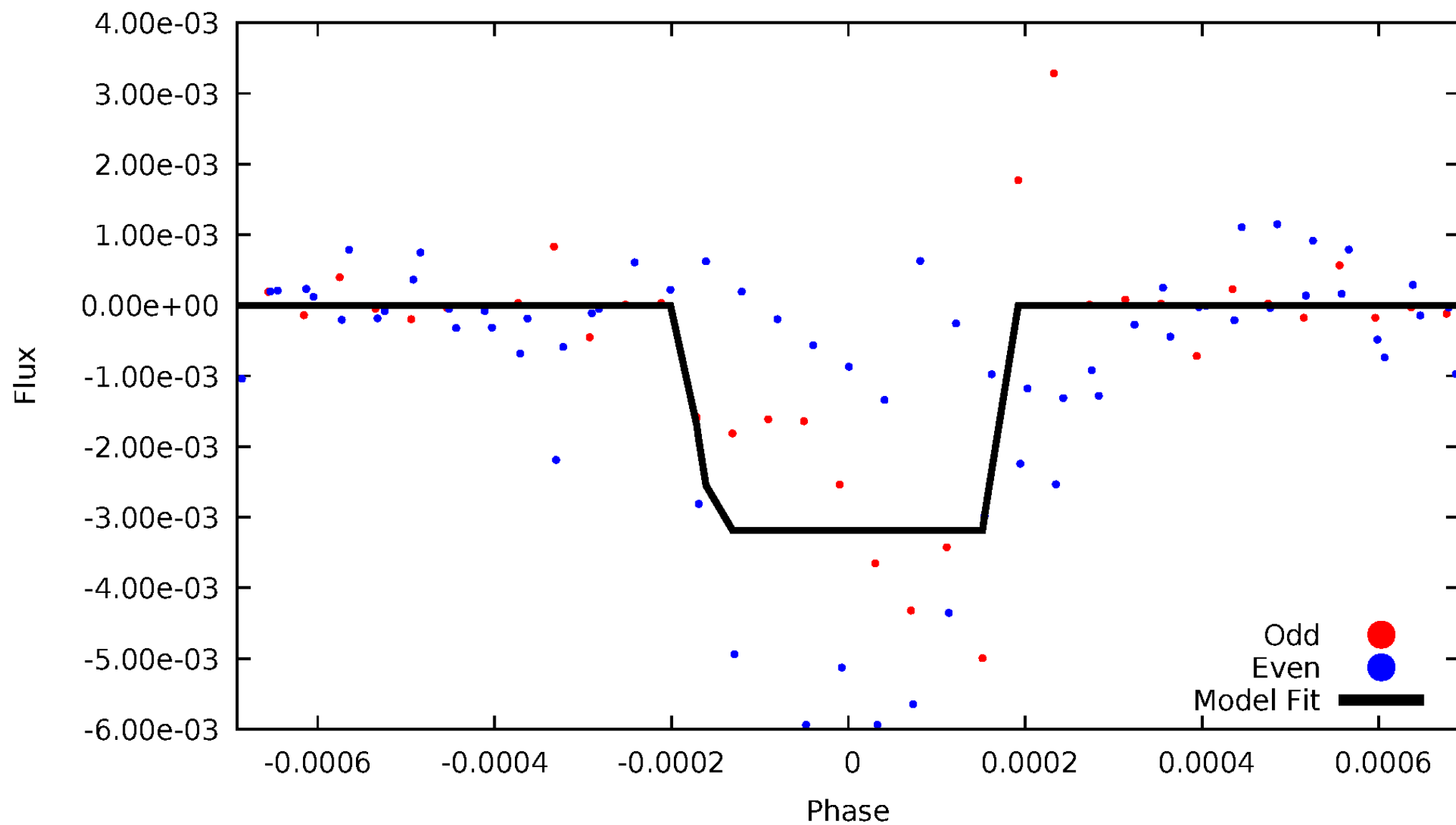
DV Odd/Even

TCE 009163591-03



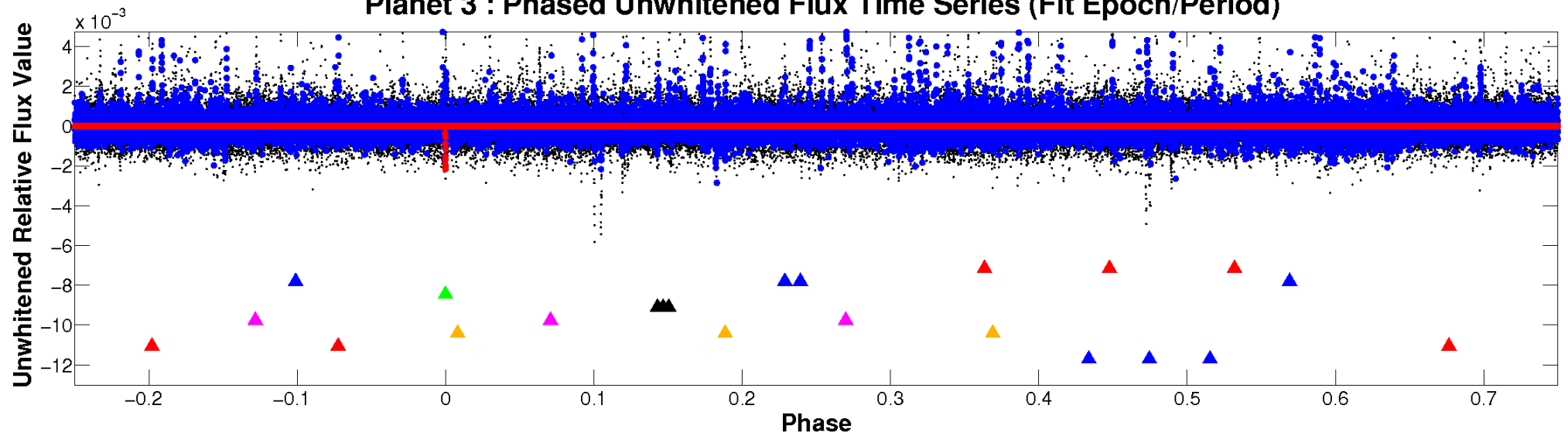
ALT Odd/Even

TCE 009163591-03

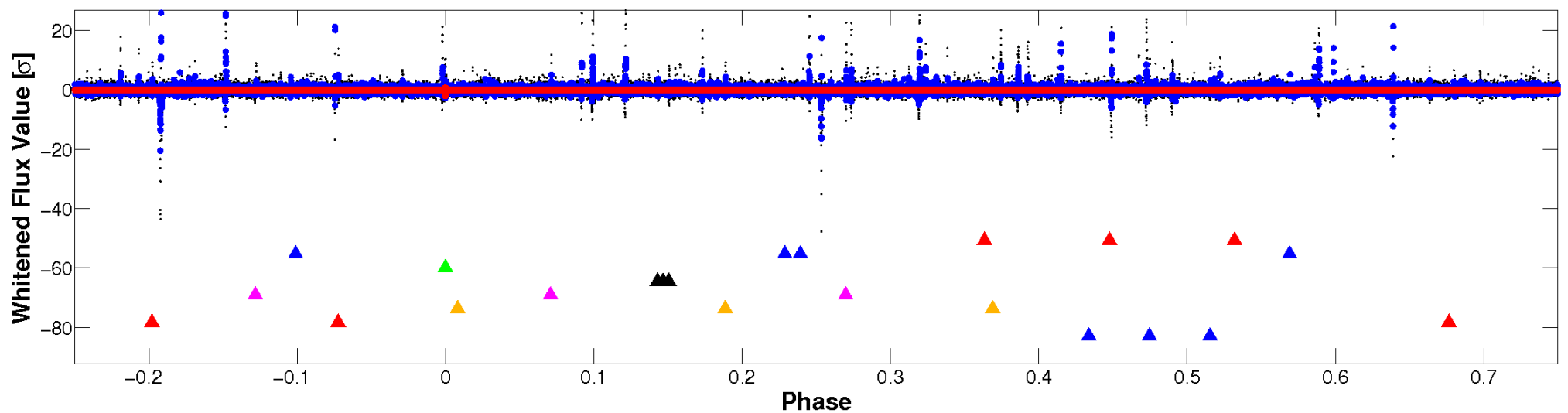


Non-Whitened Vs. Whitened Light Curve

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

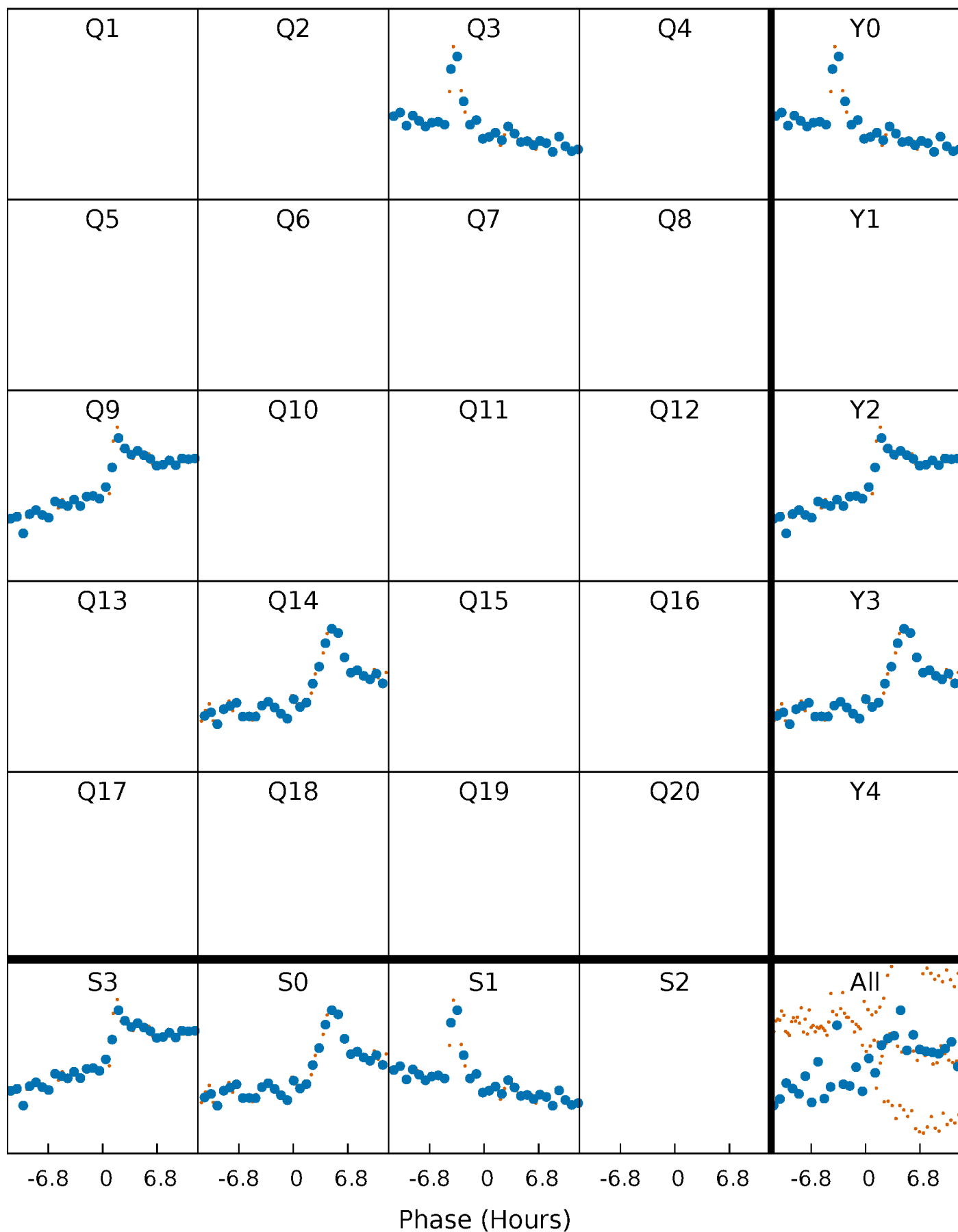


Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



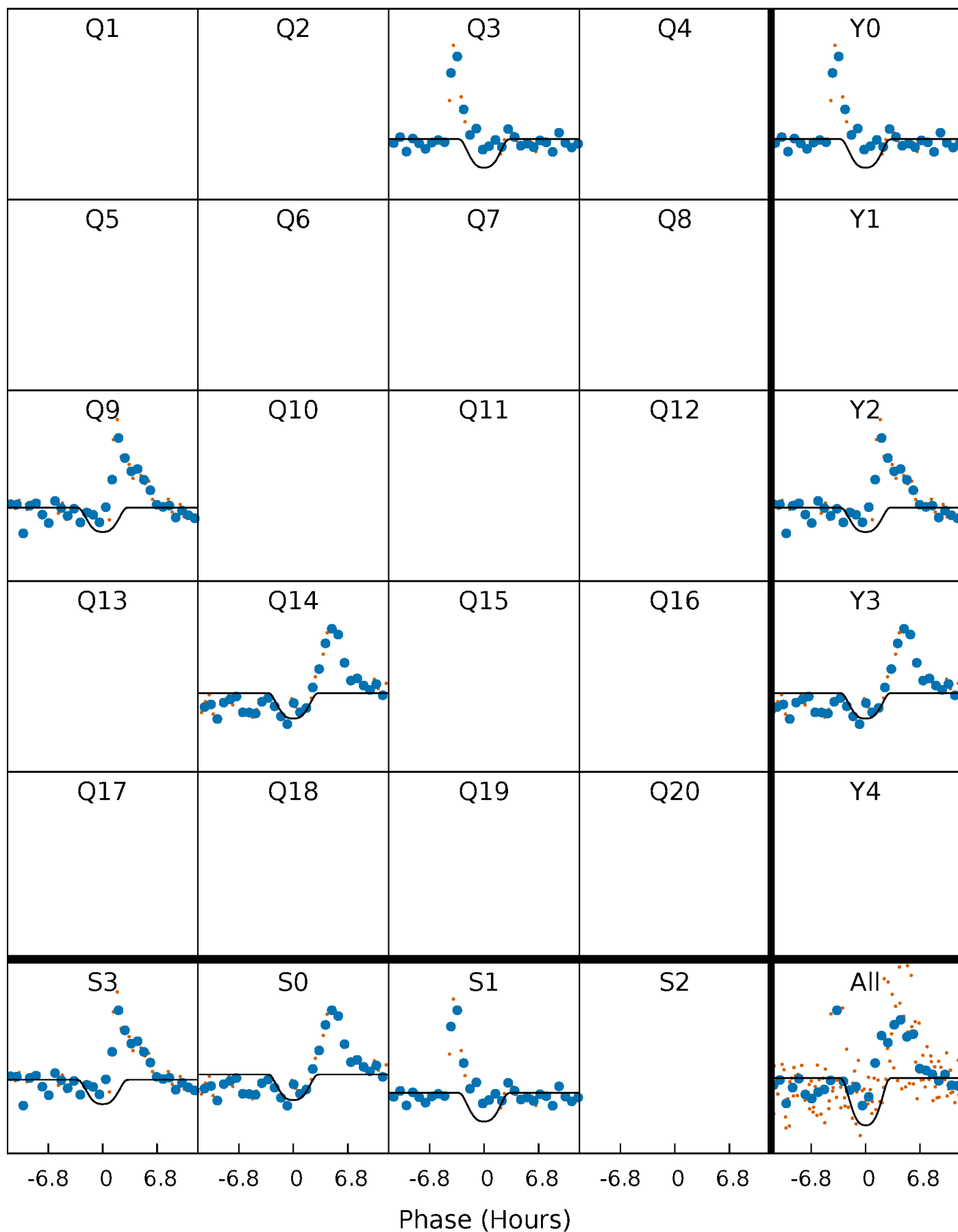
PDC Quarter-Phased Transit Curves

TCE 009163591-03 $P=506.024432$ Days $T_0=308.442643$ (BKJD)



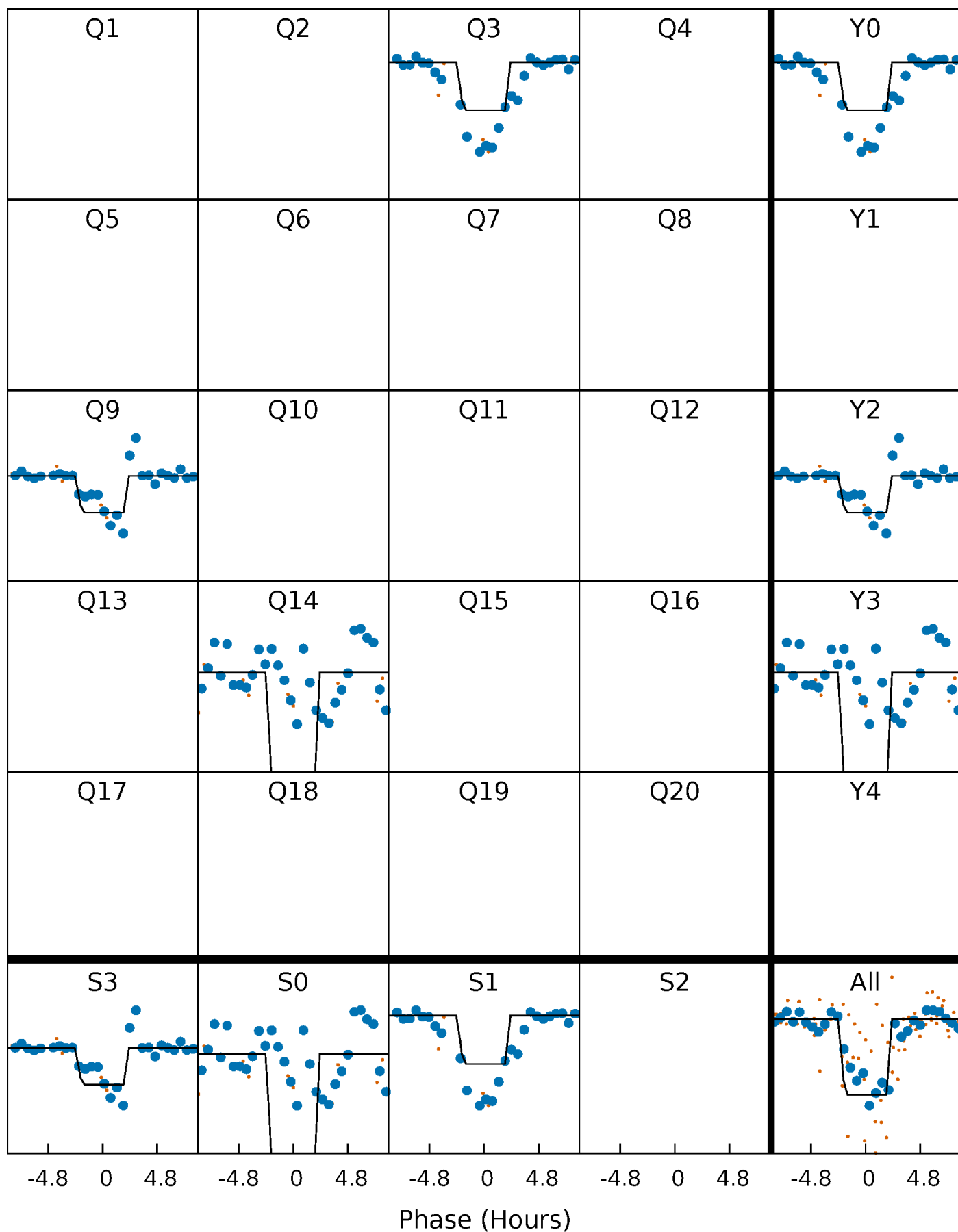
DV Quarter-Phased Transit Curves

TCE 009163591-03 $P=506.024432$ Days $T_0=308.442643$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

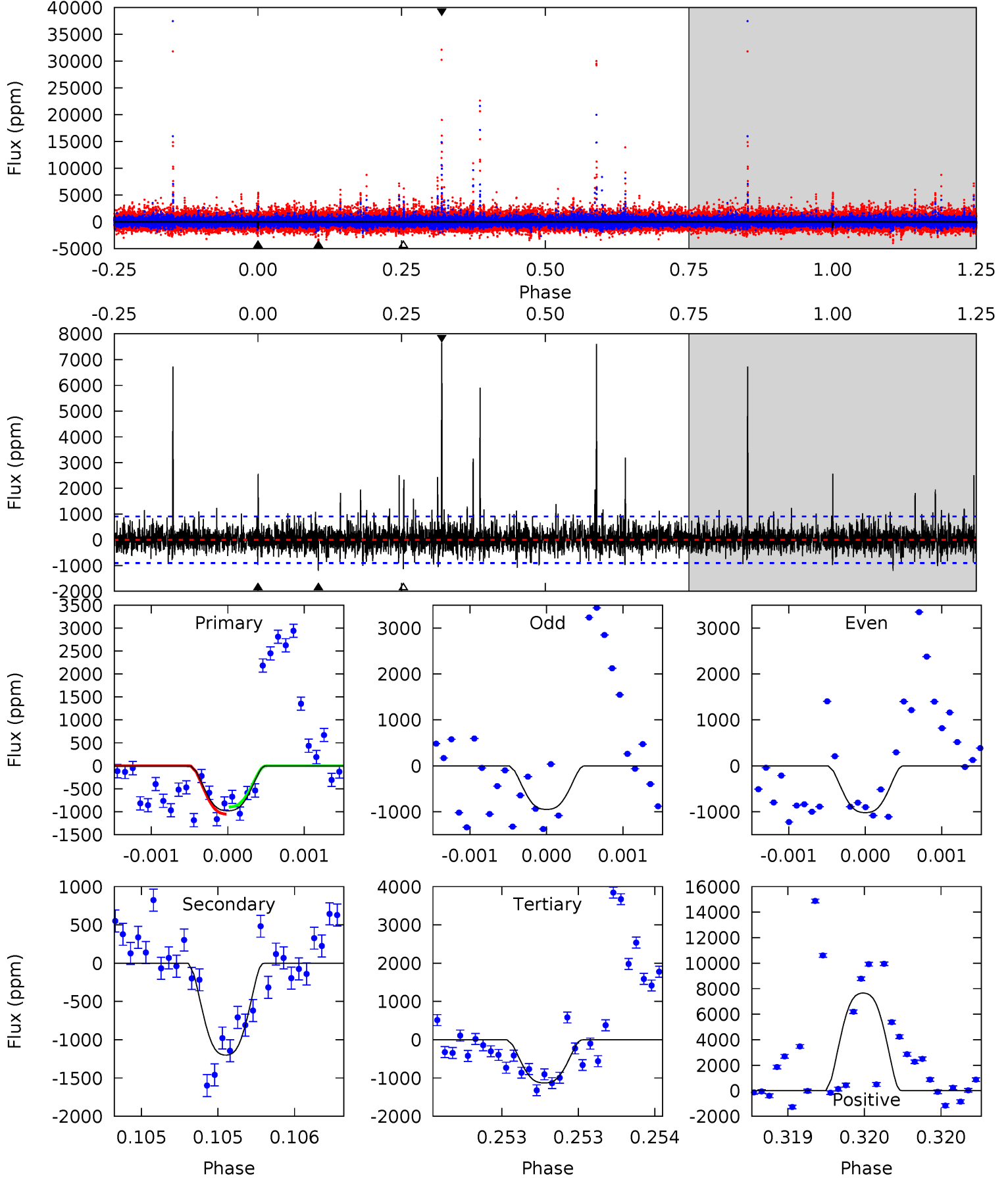
TCE 009163591-03 P=506.016680 Days $T_0=308.409438$ (BKJD)



DV Model-Shift Uniqueness Test

009163591-03, P = 506.024432 Days, E = 308.442643 Days

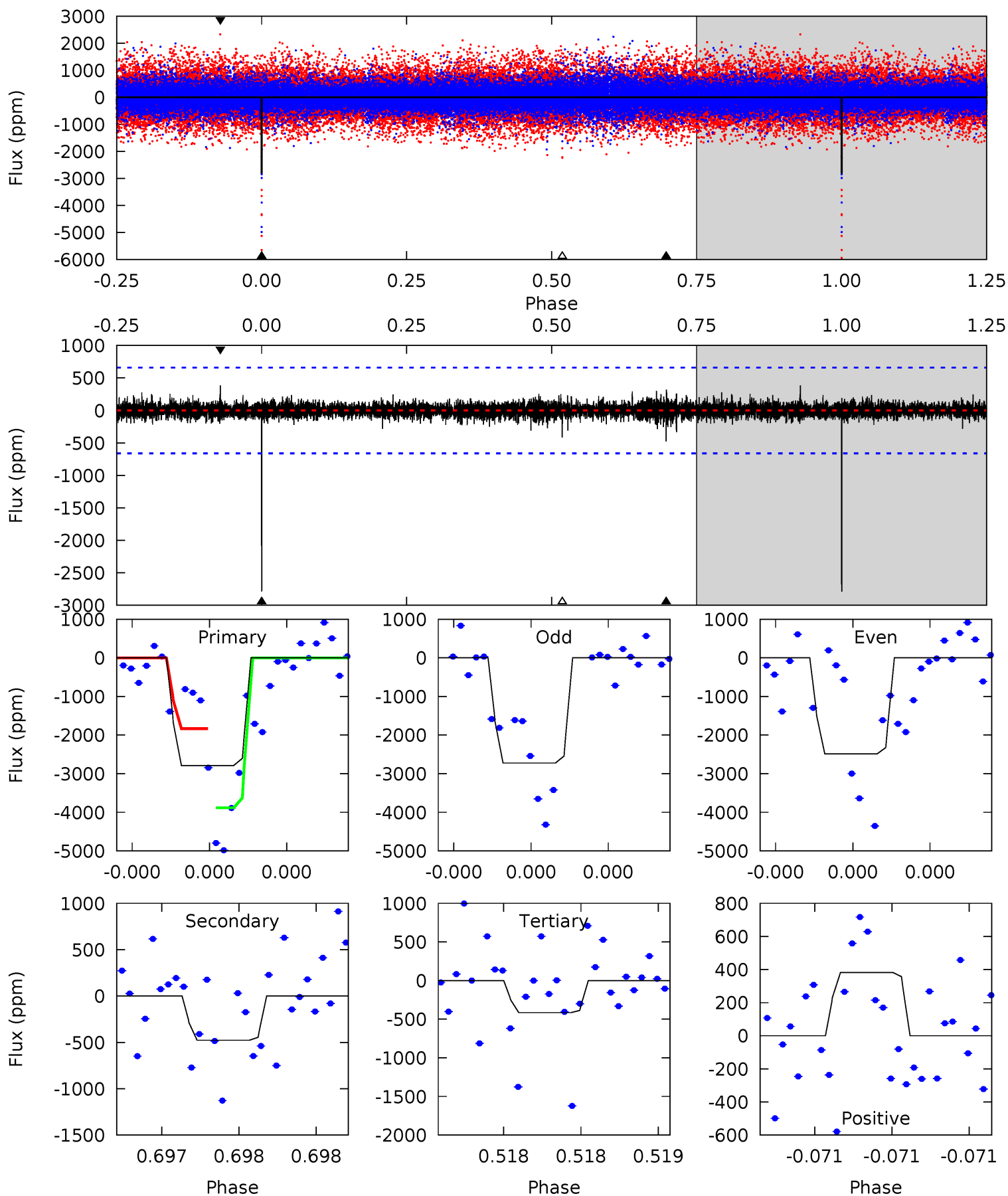
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.03	7.39	6.95	47.1	5.57	3.47	2.48	-0.92	-41.1	0.44	-39.7	0.16	1.76	0.86	0.48



Alt Model-Shift Uniqueness Test

009163591-03, P = 506.016680 Days, E = 308.409438 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
23.8	4.07	3.54	3.26	5.63	3.57	0.52	20.2	20.5	0.53	0.80	1.06	0.93	0.12	8.27



Stellar Parameters For KIC 009163591

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (g \cdot \text{cm}^{-3})$
	4523^{+136}_{-136}	$4.604^{+0.056}_{-0.024}$	$-0.160^{+0.300}_{-0.300}$	$0.669^{+0.048}_{-0.059}$	$0.655^{+0.073}_{-0.049}$	$3.087^{+0.723}_{-0.331}$
	+3%/-3%	+1%/-1%	+188%/-188%	+7%/-9%	+11%/-7%	+23%/-11%
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 009163591-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	-1201±163	$4.07^{+0.80}_{-0.78}$	218^{+7}_{-7}	3779^{+351}_{-246}	47123^{+26596}_{-14831}
Alt.	-477±117	$4.11^{+0.82}_{-0.90}$	218^{+8}_{-7}	3263^{+295}_{-223}	18527^{+12703}_{-7299}

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 $A_{obs} \gg 1.0$

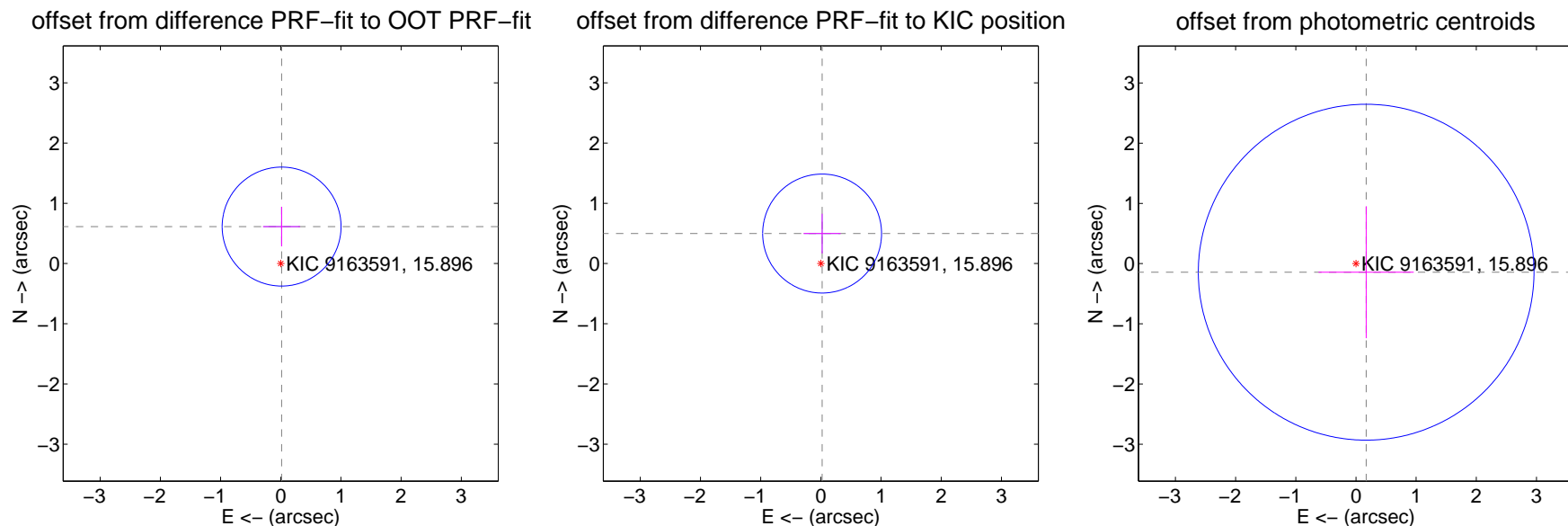
DV Centroid Data

Supplemental centroid analysis for 009163591-03. Kepler magnitude: 15.90. Transit SNR 8.47

There are 1 quarters with good PRF difference image offsets

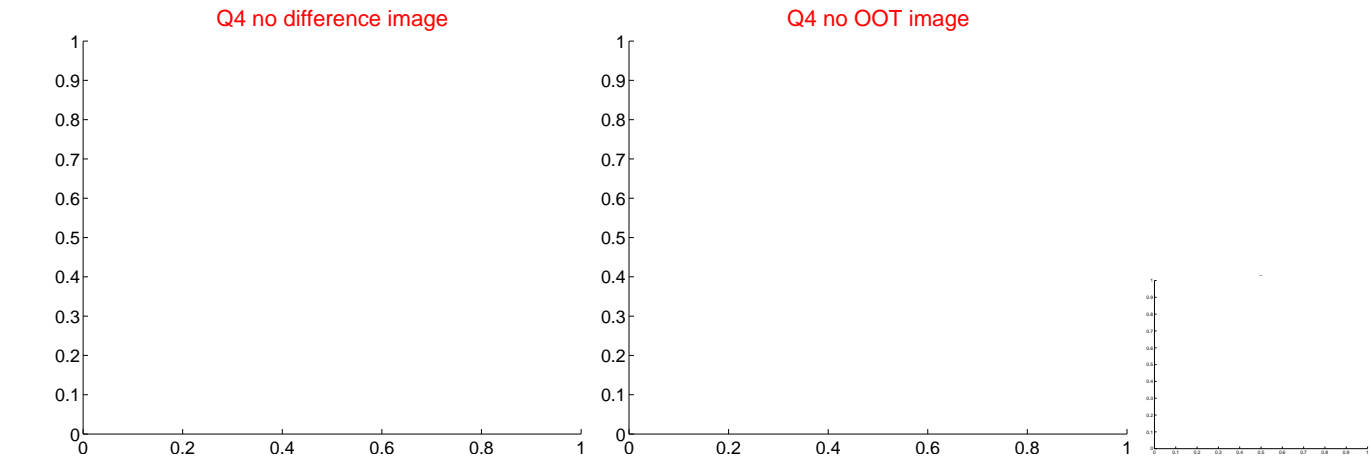
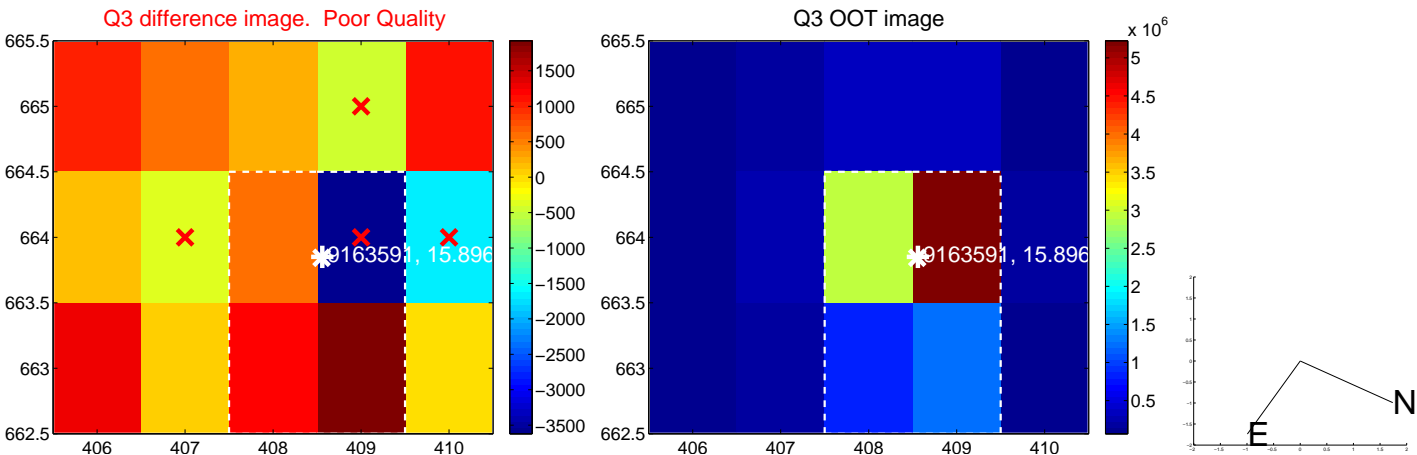
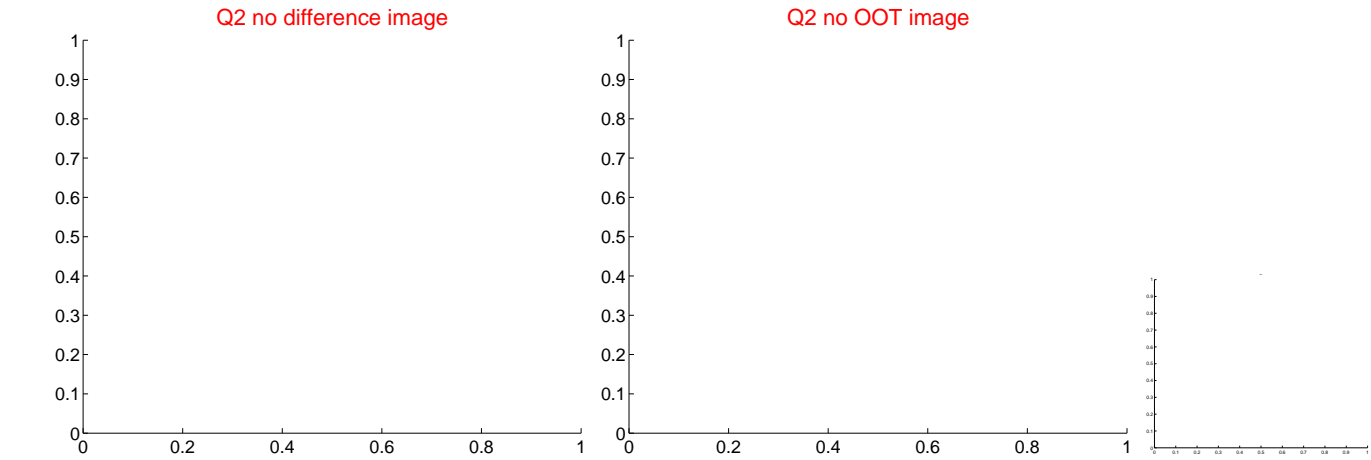
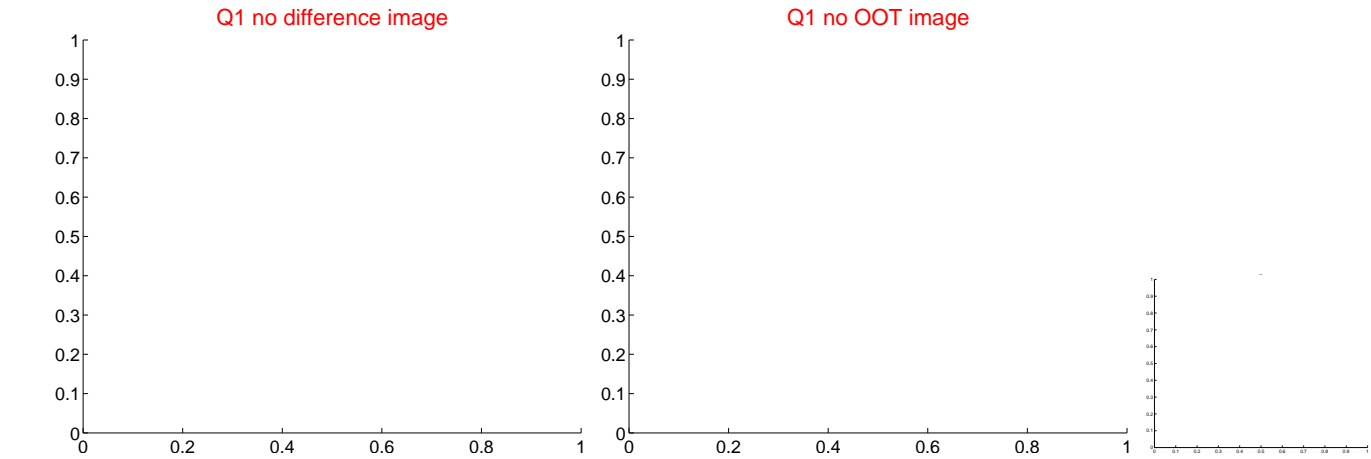
The direct PRF centroid is offset from the target star catalog position by about 0.12 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.614 ± 0.329	1.86	-0.014 ± 0.309	0.614 ± 0.329
PRF-fit source offset from KIC position	0.498 ± 0.329	1.51	-0.021 ± 0.309	0.498 ± 0.329
photometric centroid source offset	0.22 ± 0.93	0.24	-0.17 ± 0.79	-0.14 ± 1.10



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.

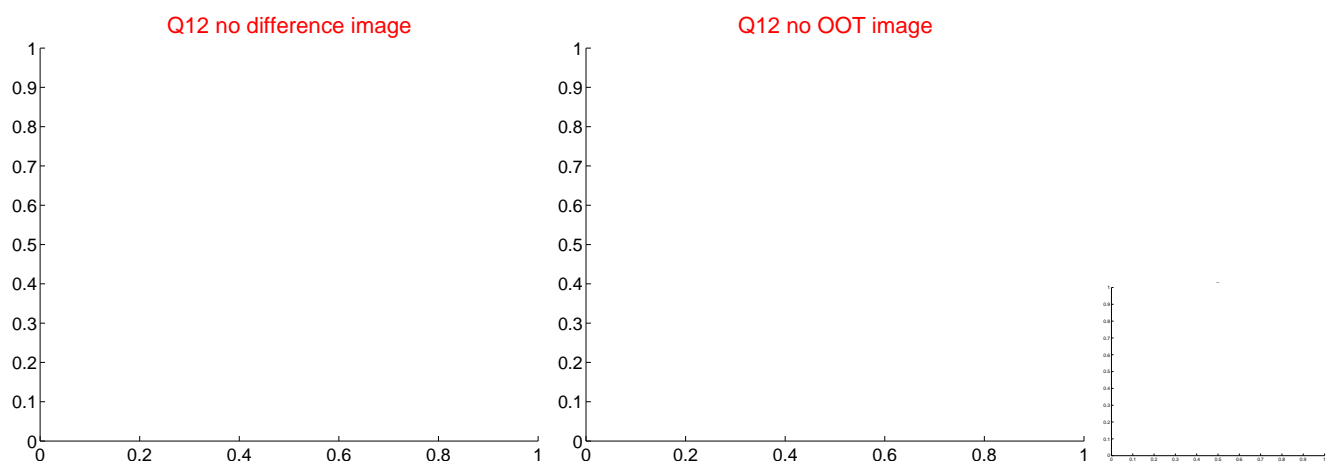
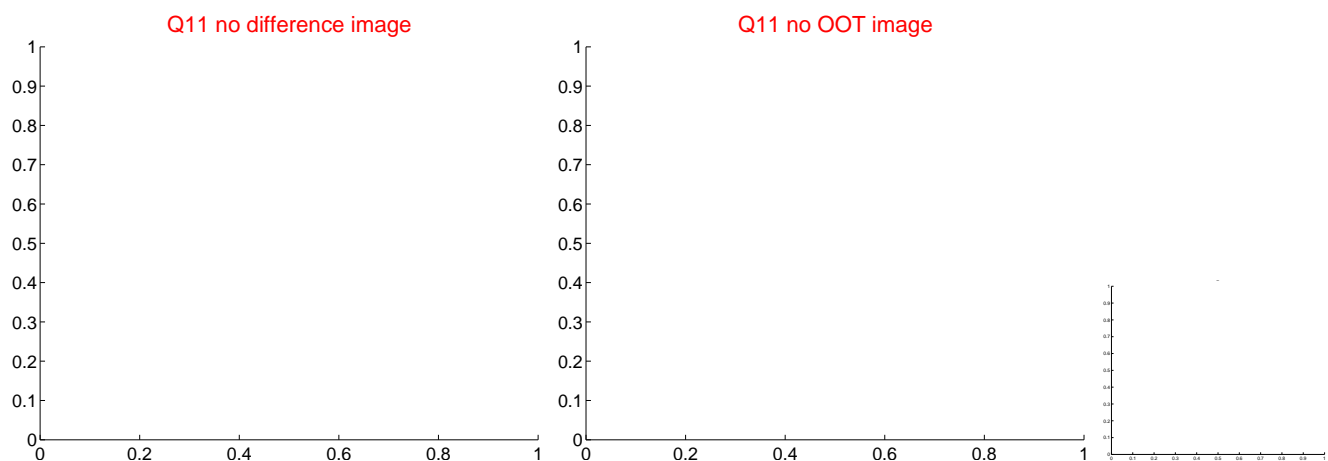
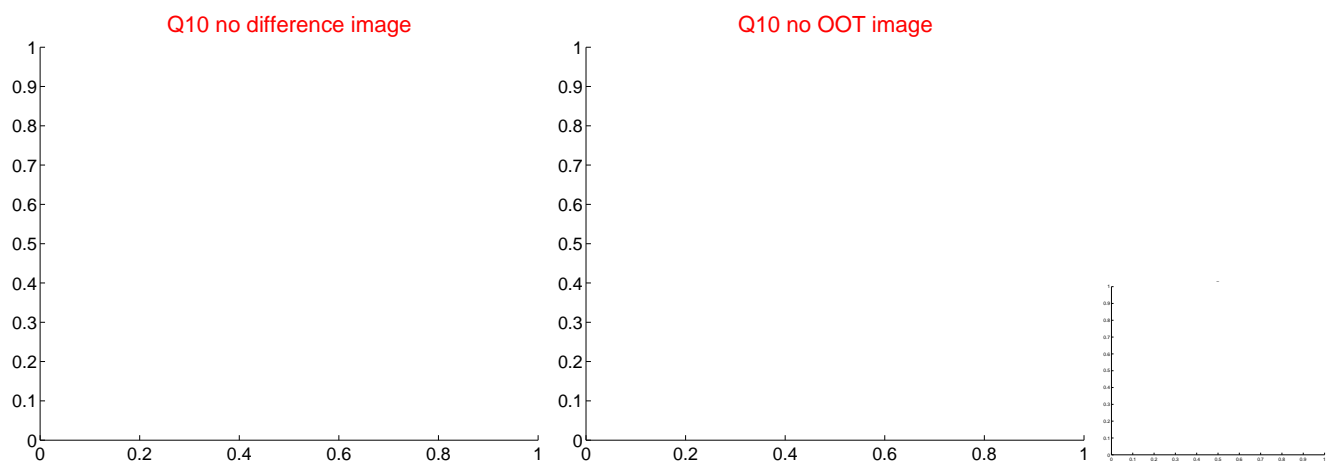
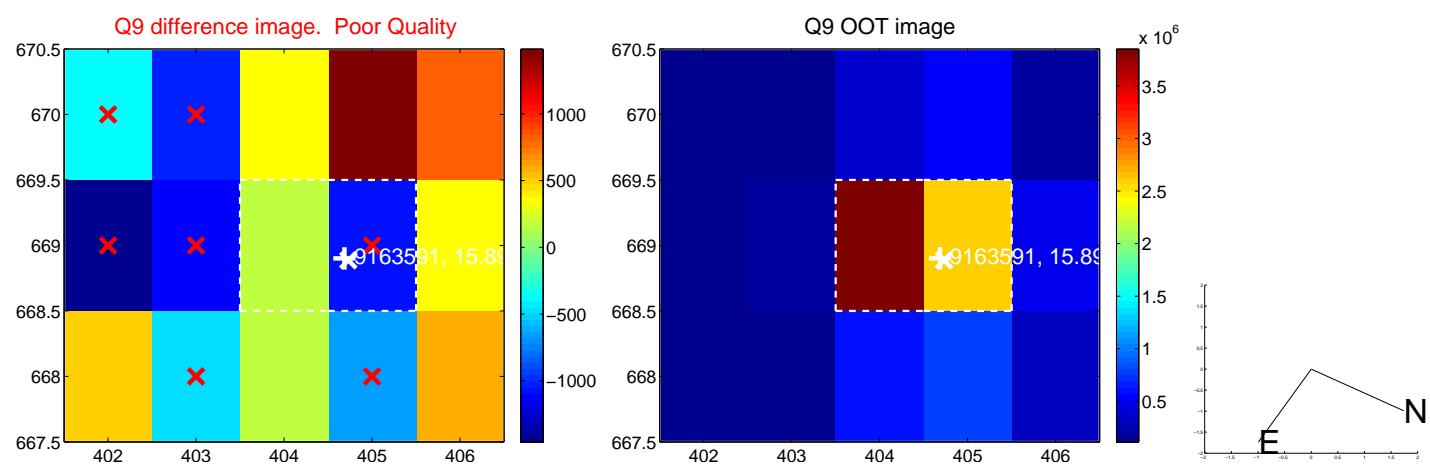
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



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

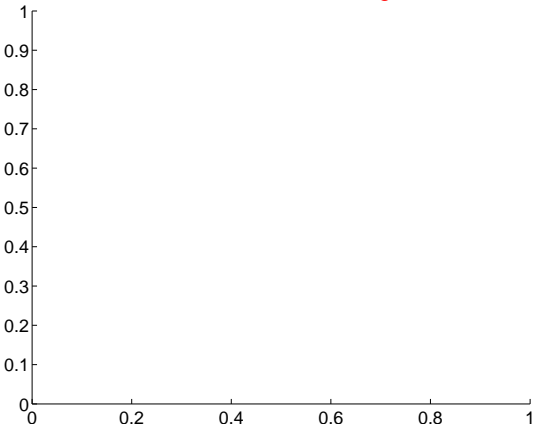


white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



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

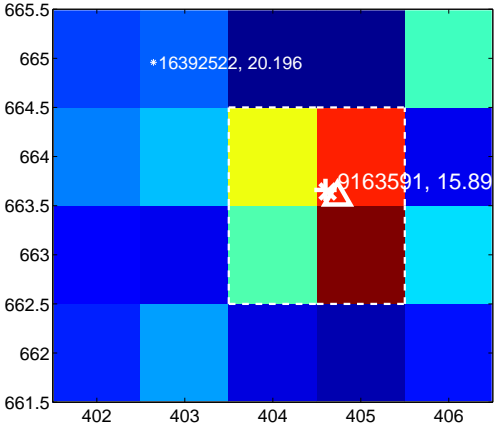
Q13 no difference image



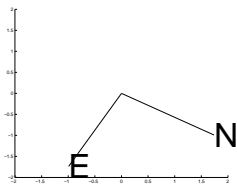
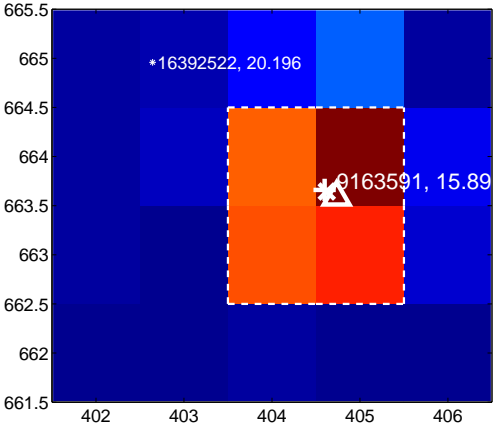
Q13 no OOT image



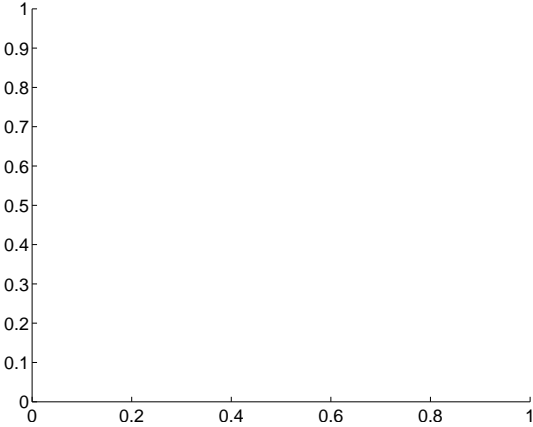
Q14 difference image



Q14 OOT image



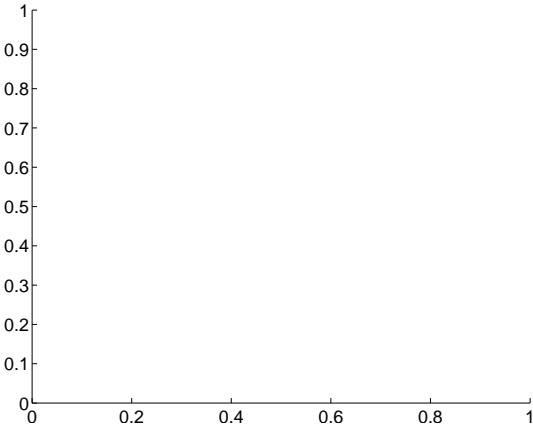
Q15 no difference image



Q15 no OOT image



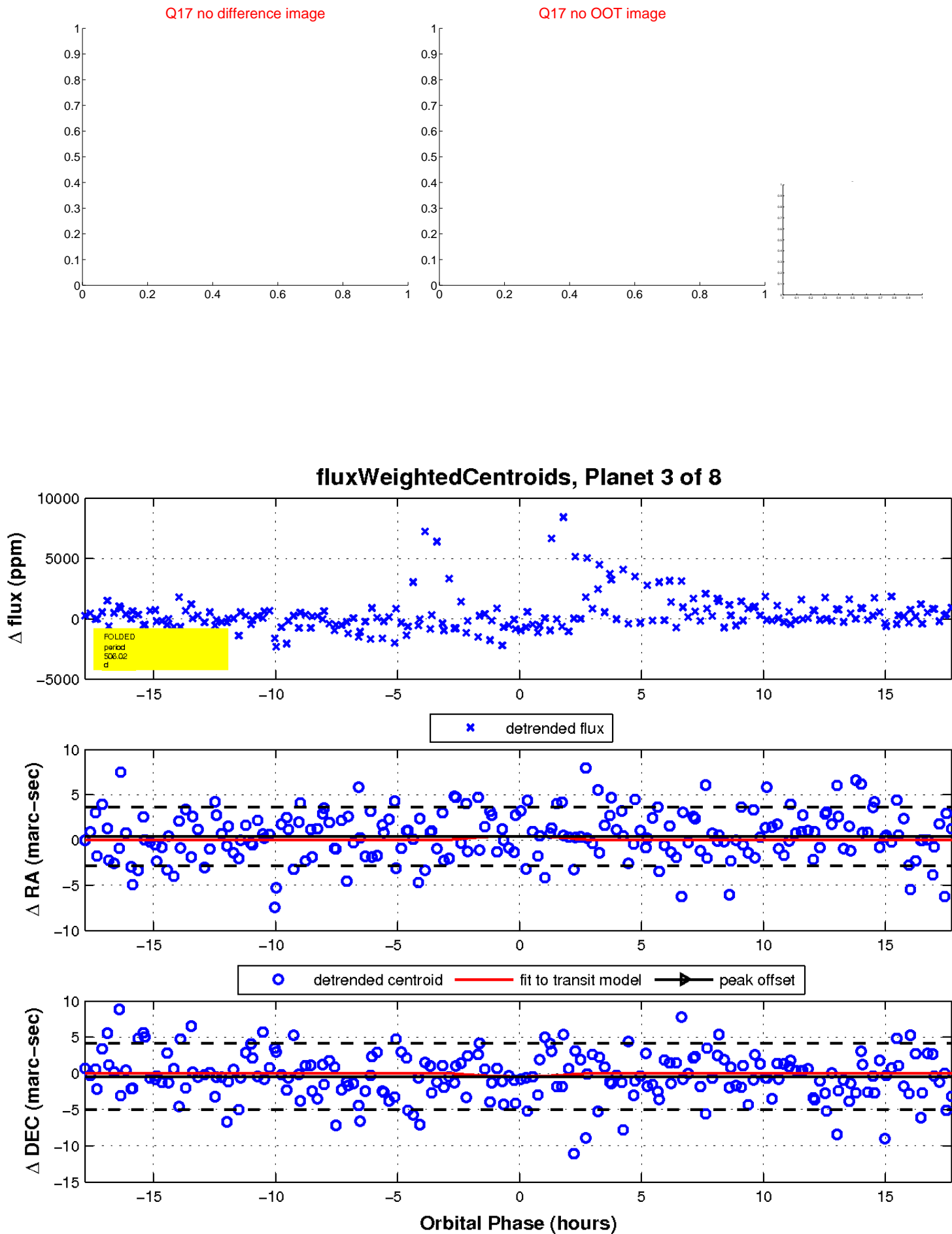
Q16 no difference image



Q16 no OOT image

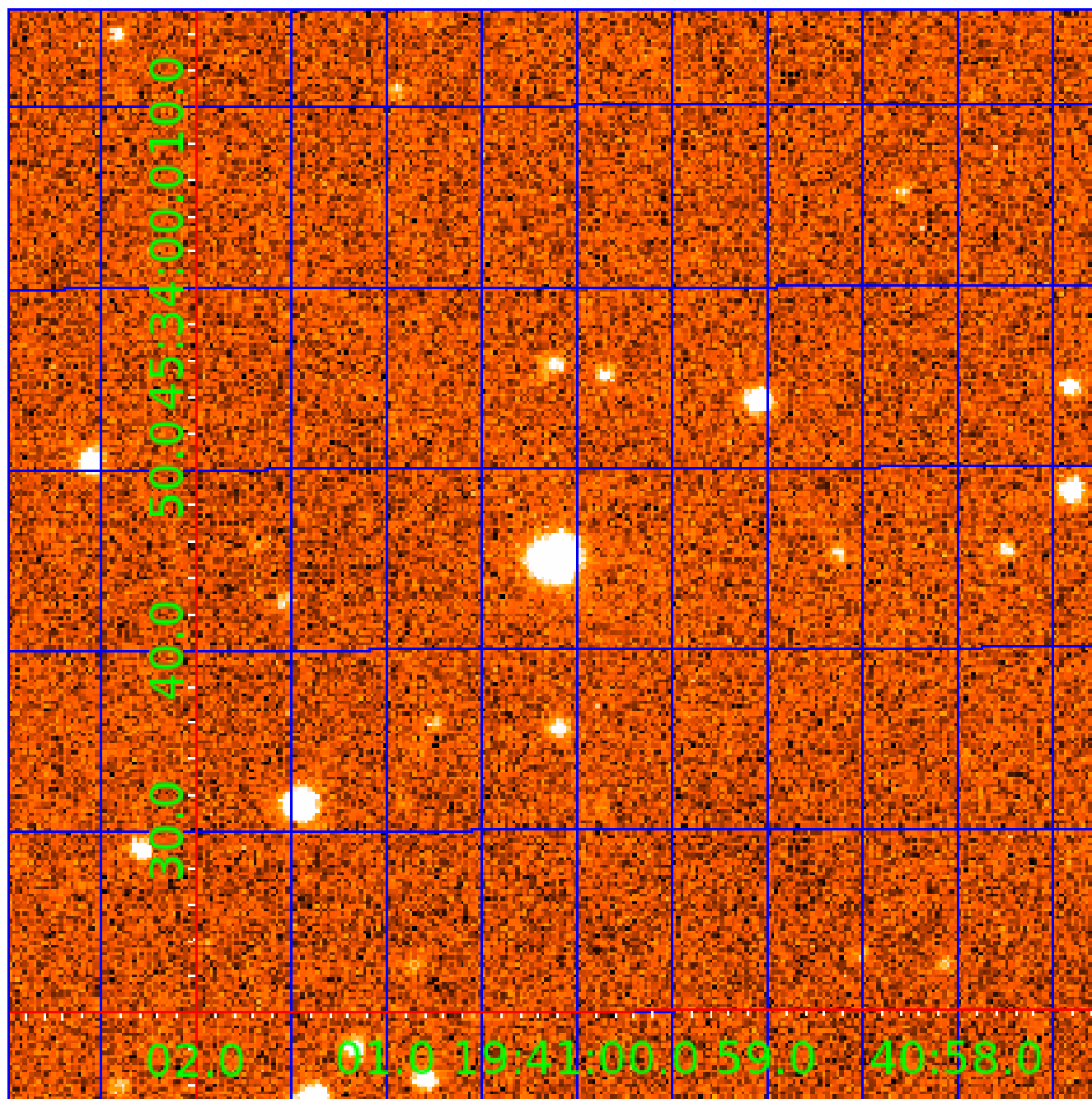


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 009163591

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})
009163591-02	OBS	No	339.116636	424.234634	2113.0	5.851	12.4	8.1	0.67	4523	3.21	0.24
009163591-03	OBS	No	506.024433	308.442643	2170.4	5.952	10.9	8.5	0.67	4523	4.10	0.14
009163591-04	OBS	No	507.941245	380.777665	2040.0	8.990	11.9	7.5	0.67	4523	3.14	0.14
009163591-06	OBS	No	597.296079	312.619376	1979.3	6.317	10.7	7.4	0.67	4523	3.12	0.12
009163591-07	OBS	No	569.558629	144.764329	1624.7	4.955	12.4	6.4	0.67	4523	2.97	0.12

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009163591-02	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
009163591-03	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
009163591-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009163591-06	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
009163591-07	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

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

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

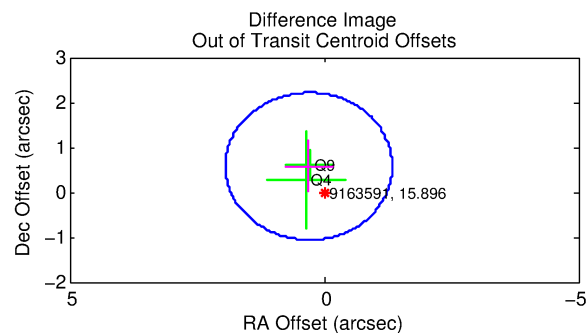
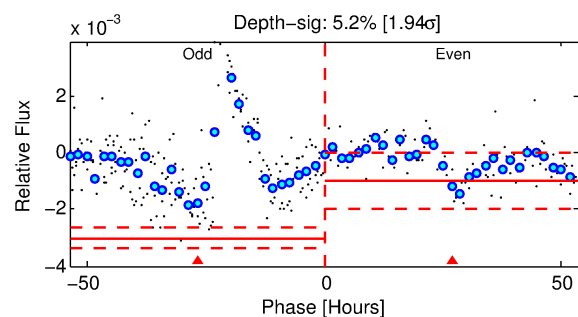
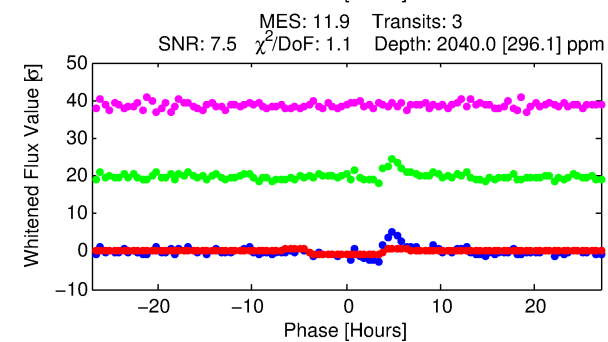
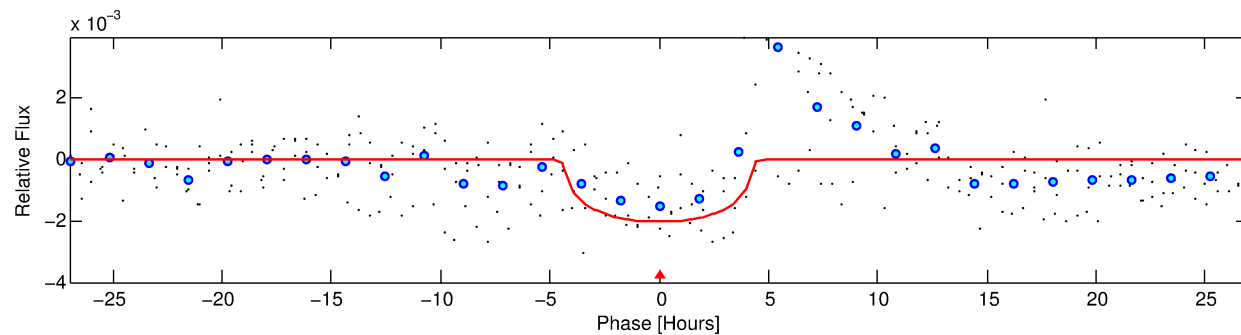
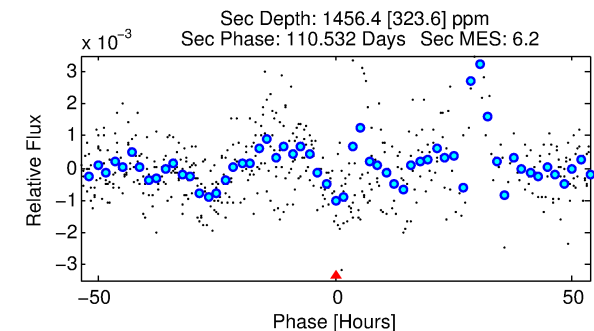
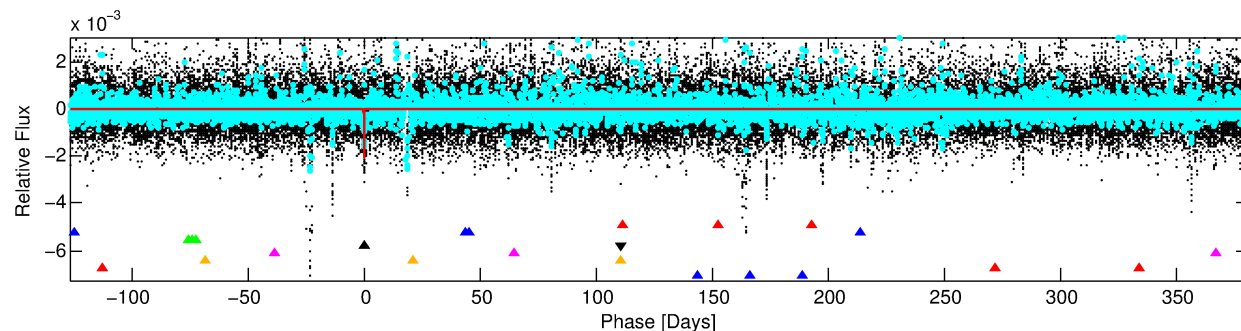
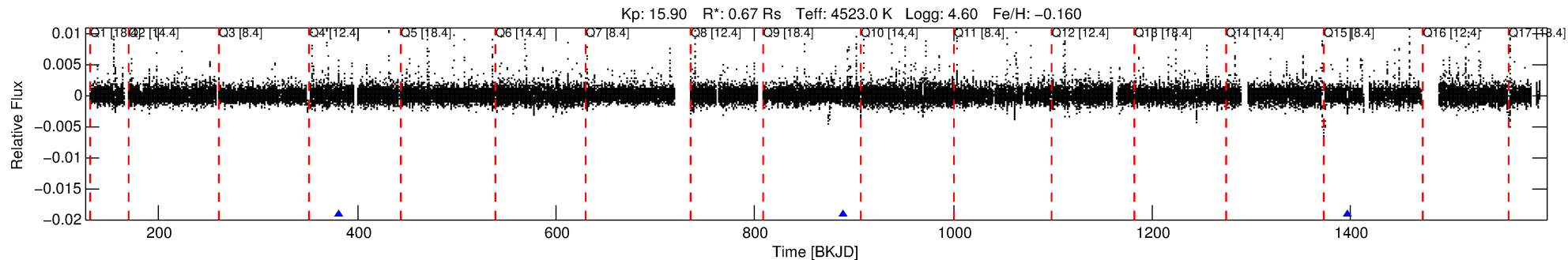
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009163591-04

No Significant Match Found

DV One-Page Summary

KIC: 9163591 Candidate: 4 of 8 Period: 507.941 d



DV Fit Results:

Period = 507.94125 [0.00903] d
Epoch = 380.7777 [0.0121] BKJD
Rp/R* = 0.0430 [0.0120]
a/R* = 358.24 [287.95]
b = 0.63 [0.78]
Seff = 0.14 [0.02]
Teq = 157 [6] K
Rp = 3.14 [0.92] Re
a = 1.0827 [0.0789] AU
Ag = 95280.39 [58102.74] [1.64σ]
Teffp = 4261 [653] K [6.29σ]

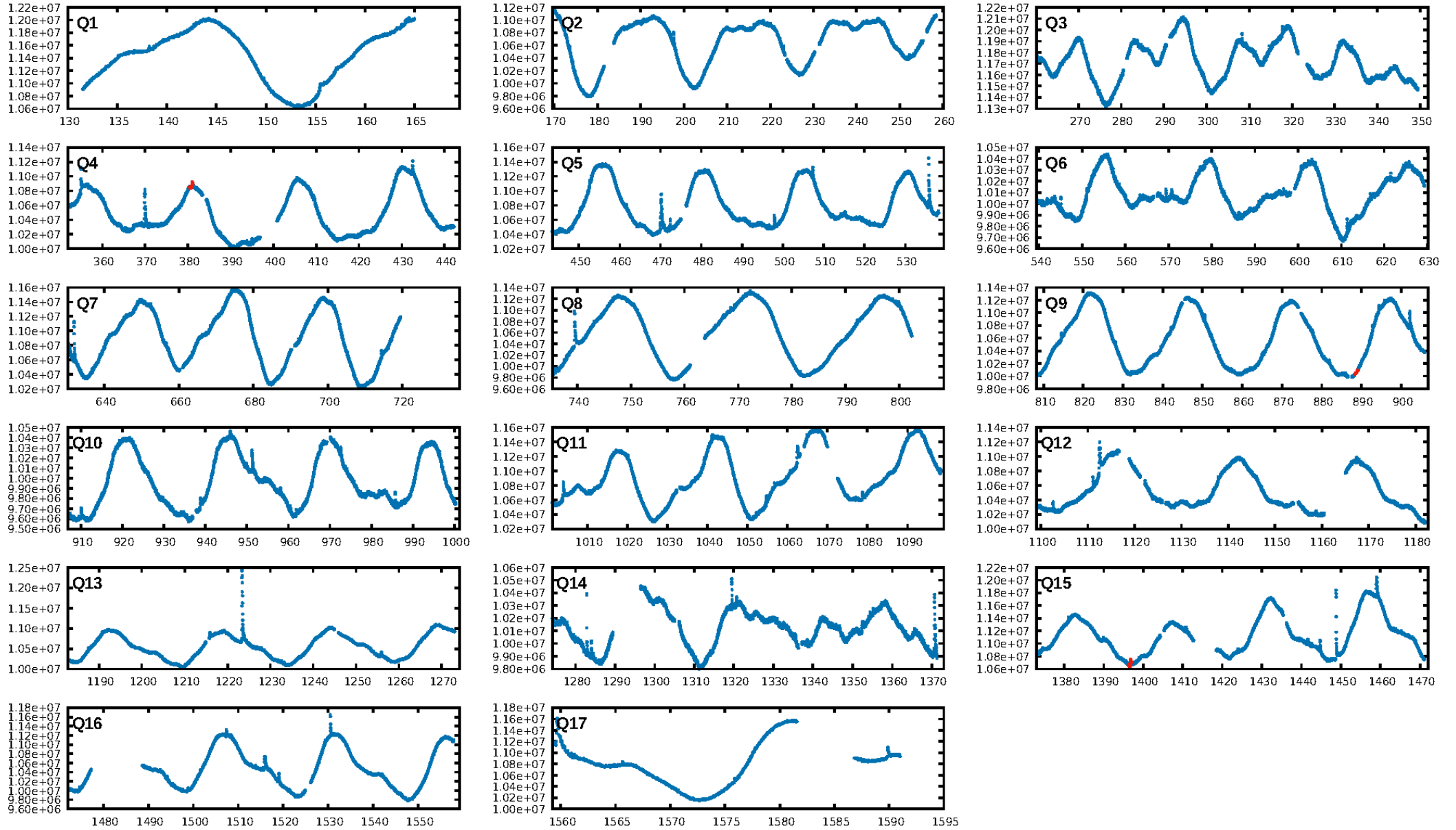
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [4.27σ]
LongPeriod-sig: 100.0% [72.85σ]
ModelChiSquare2-sig: 0.3%
ModelChiSquareGof-sig: 86.2%
Bootstrap-pfa: N/A
RollingBand-fgt: 1.00 [3/3]
GhostDiagnostic-chr: 0.8046
Centroid-sig: 19.1%
Centroid-so: 1.114 arcsec [1.47σ]
OotOffset-rm: 0.647 arcsec [1.18σ]
OotOffset-st: 0/0/1/1 [2]
KicOffset-rm: 0.511 arcsec [0.96σ]
KicOffset-st: 0/0/1/1 [2]
DiffImageQuality-fgm: 1.00 [2/2]
DiffImageOverlap-fno: 1.00 [2/2]

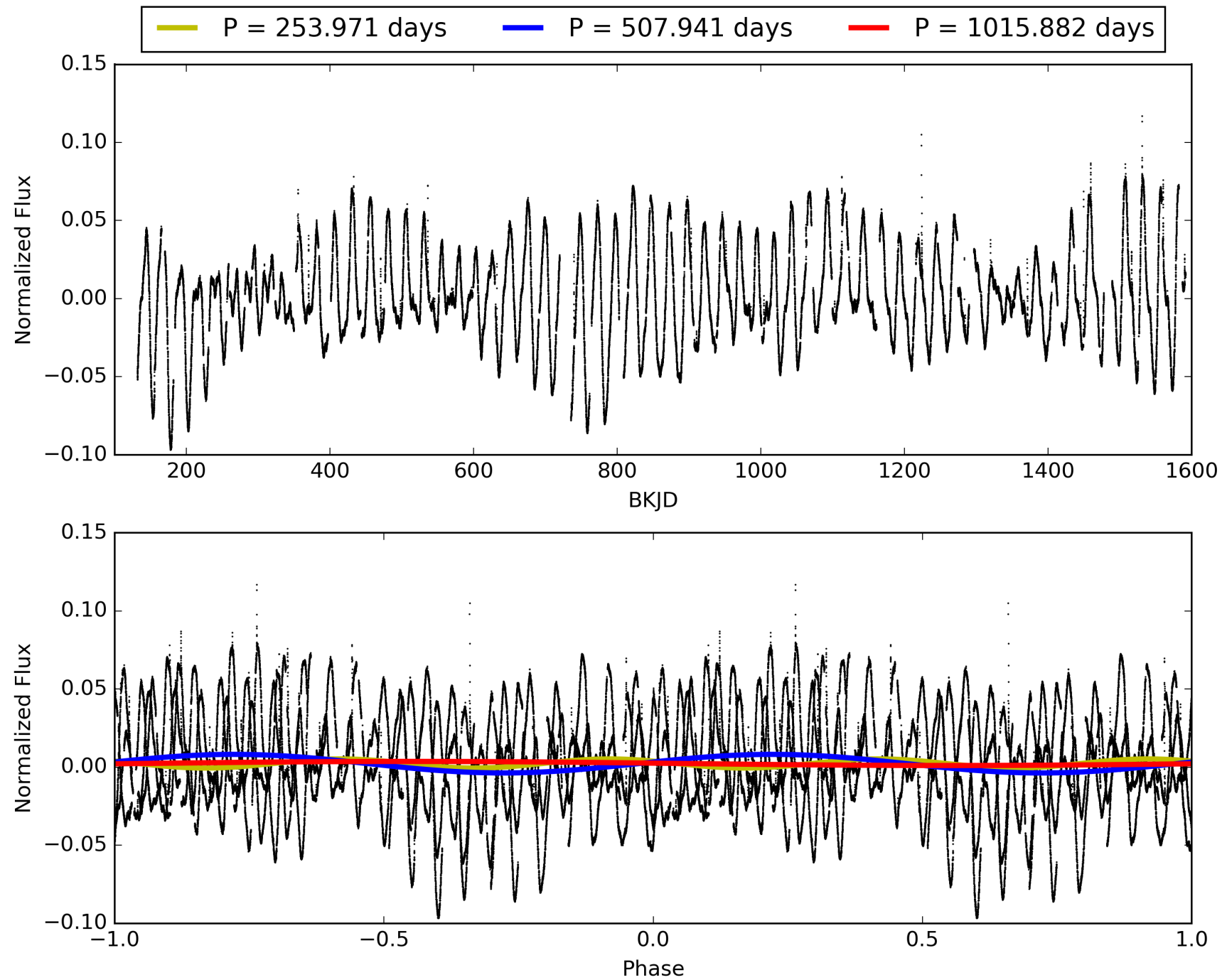
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 03-Feb-2016 08:00:59 Z

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

TCE 009163591-04, PDC Light Curves

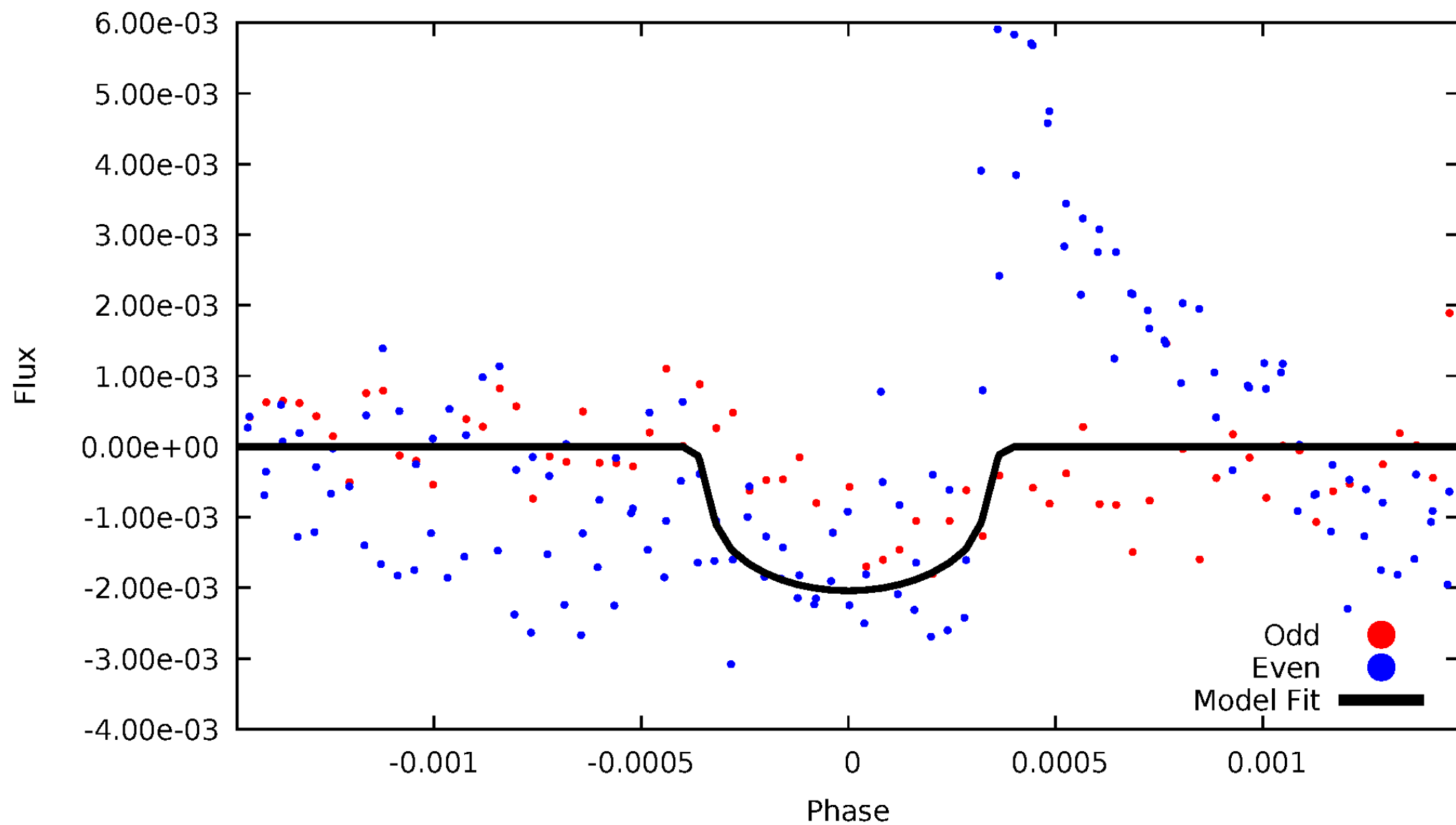


TCE 009163591-04



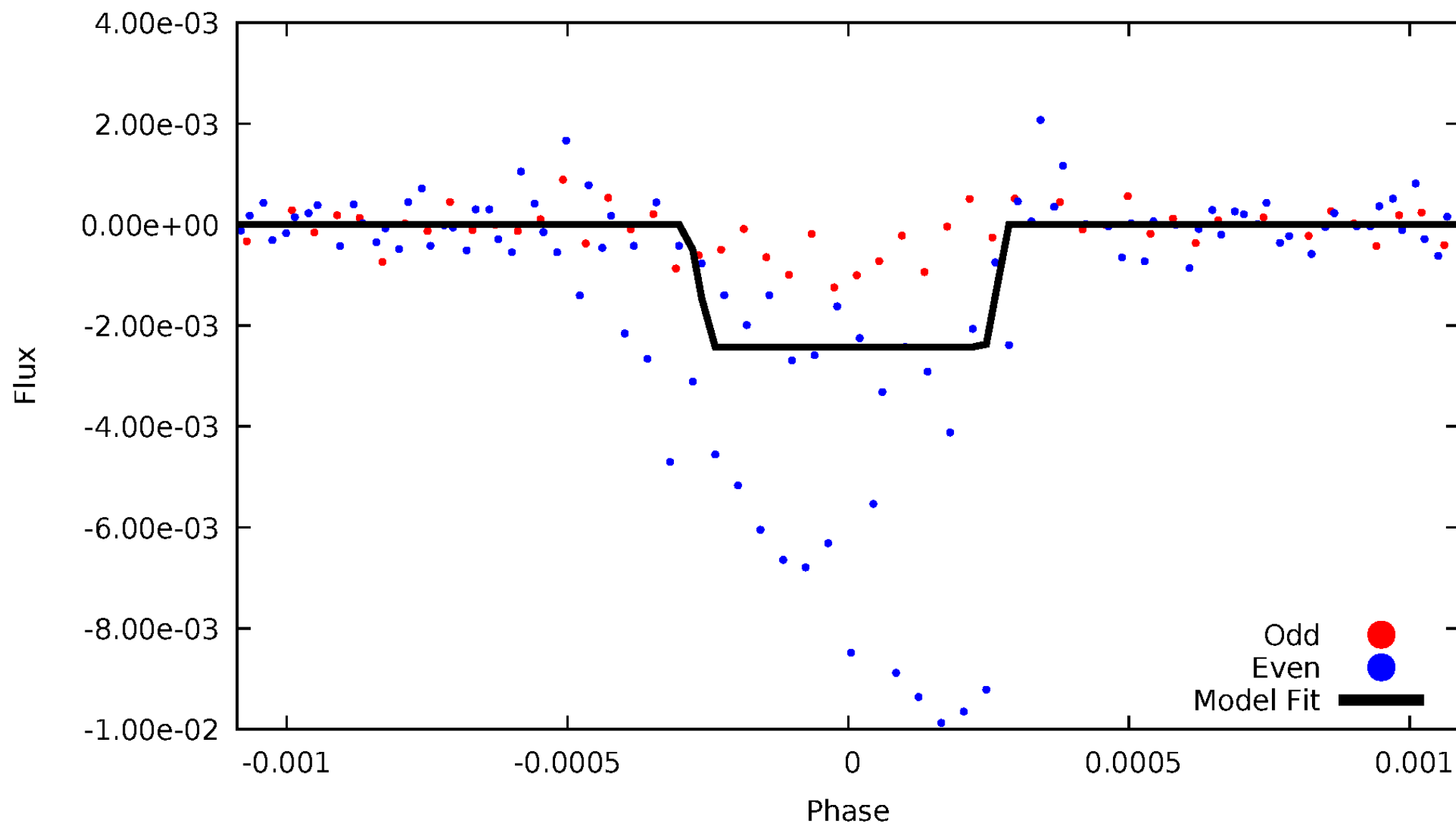
DV Odd/Even

TCE 009163591-04



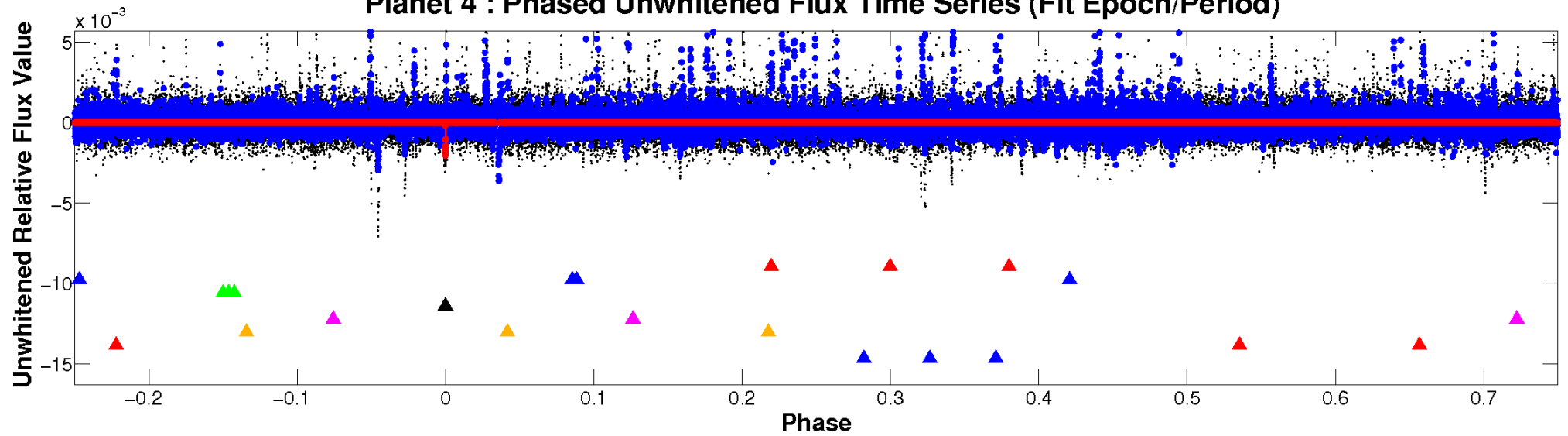
ALT Odd/Even

TCE 009163591-04

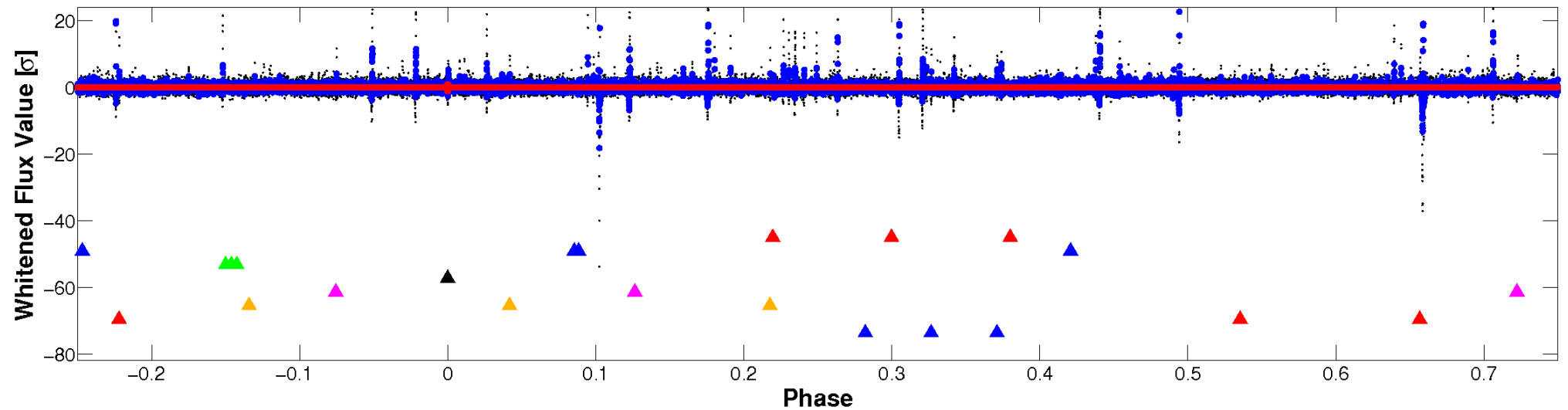


Non-Whitened Vs. Whitened Light Curve

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

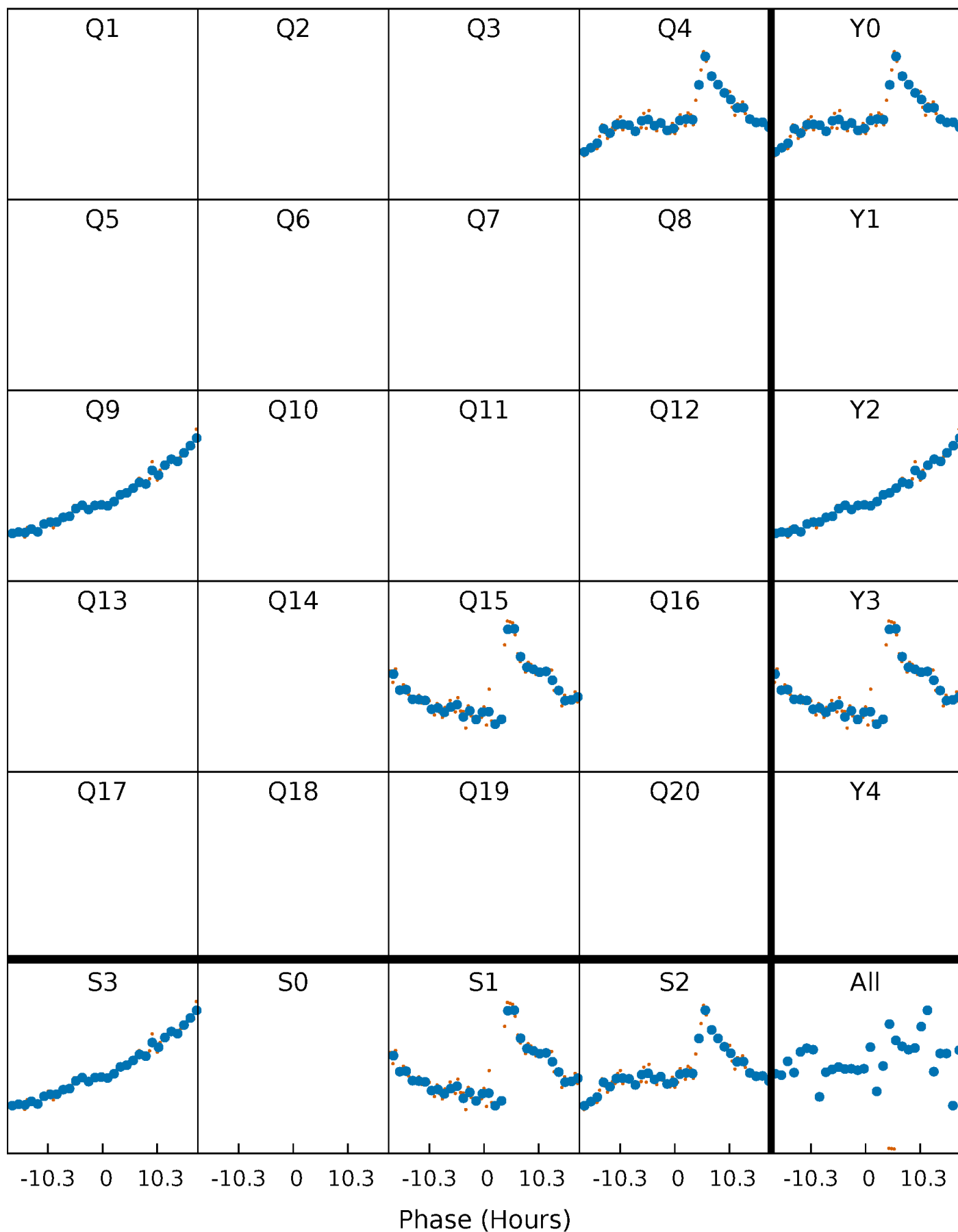


Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



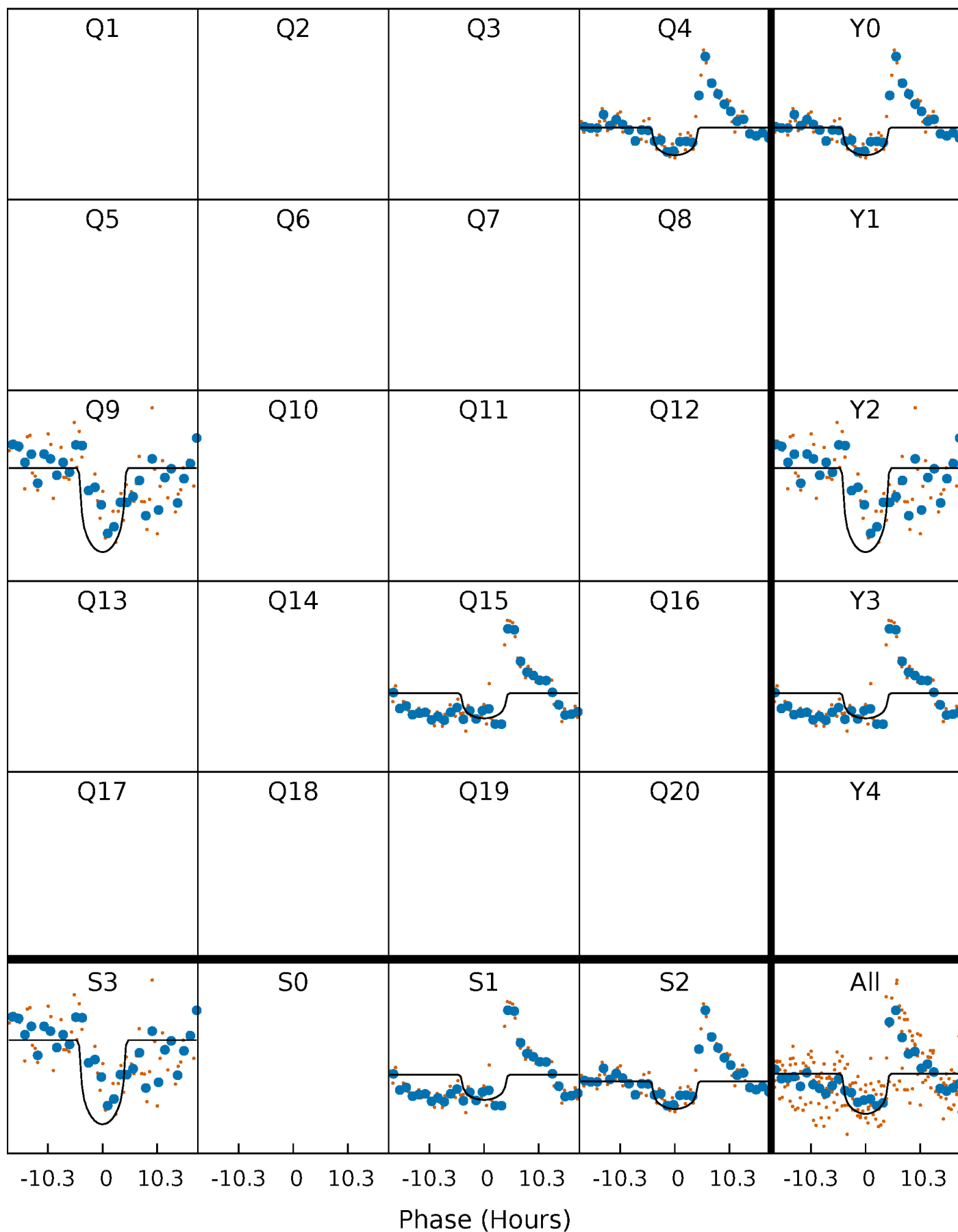
PDC Quarter-Phased Transit Curves

TCE 009163591-04 $P=507.941245$ Days $T_0=380.777665$ (BKJD)



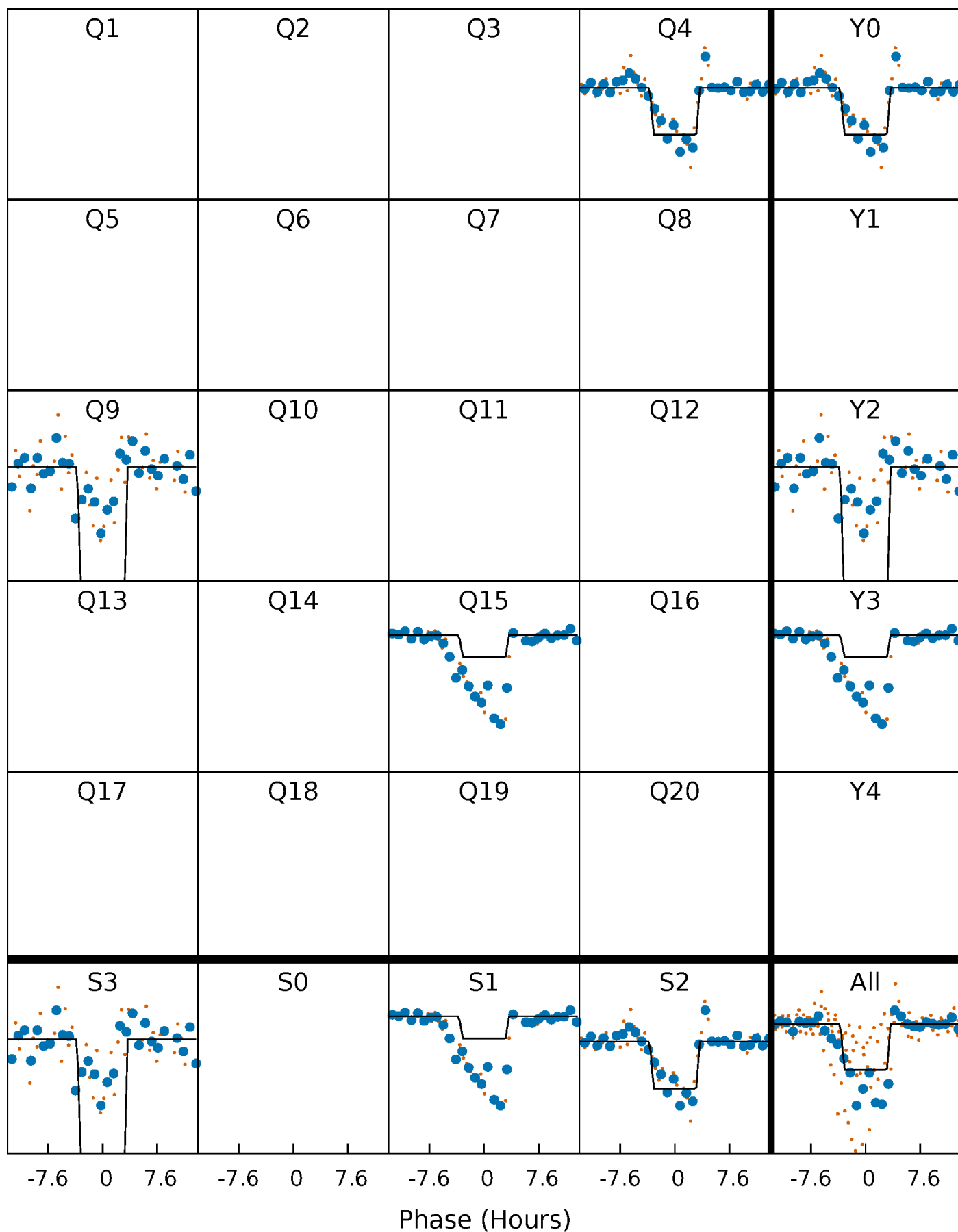
DV Quarter-Phased Transit Curves

TCE 009163591-04 $P=507.941245$ Days $T_0=380.777665$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

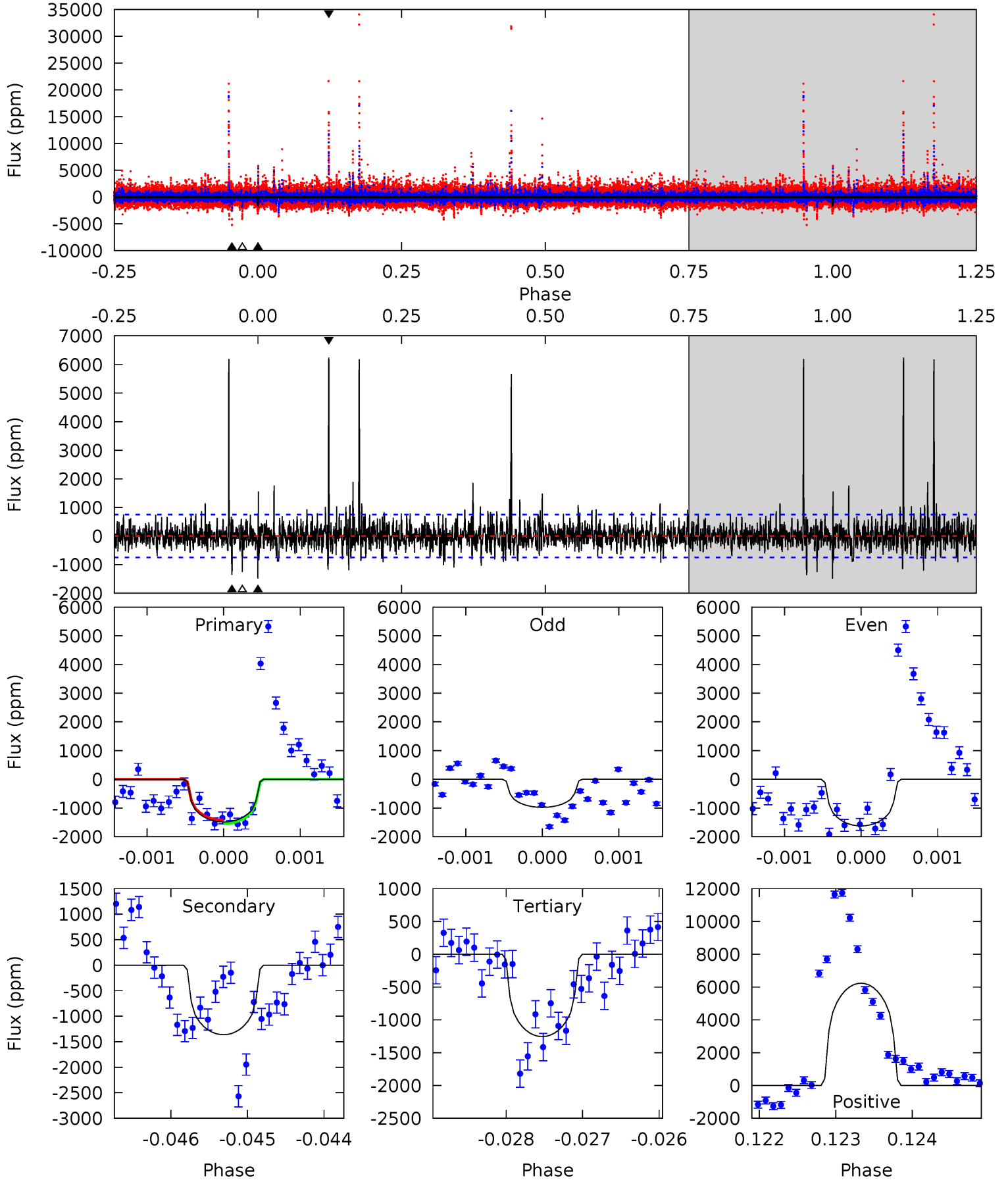
TCE 009163591-04 P=507.923812 Days $T_0=380.829916$ (BKJD)



DV Model-Shift Uniqueness Test

009163591-04, P = 507.941245 Days, E = 380.777665 Days

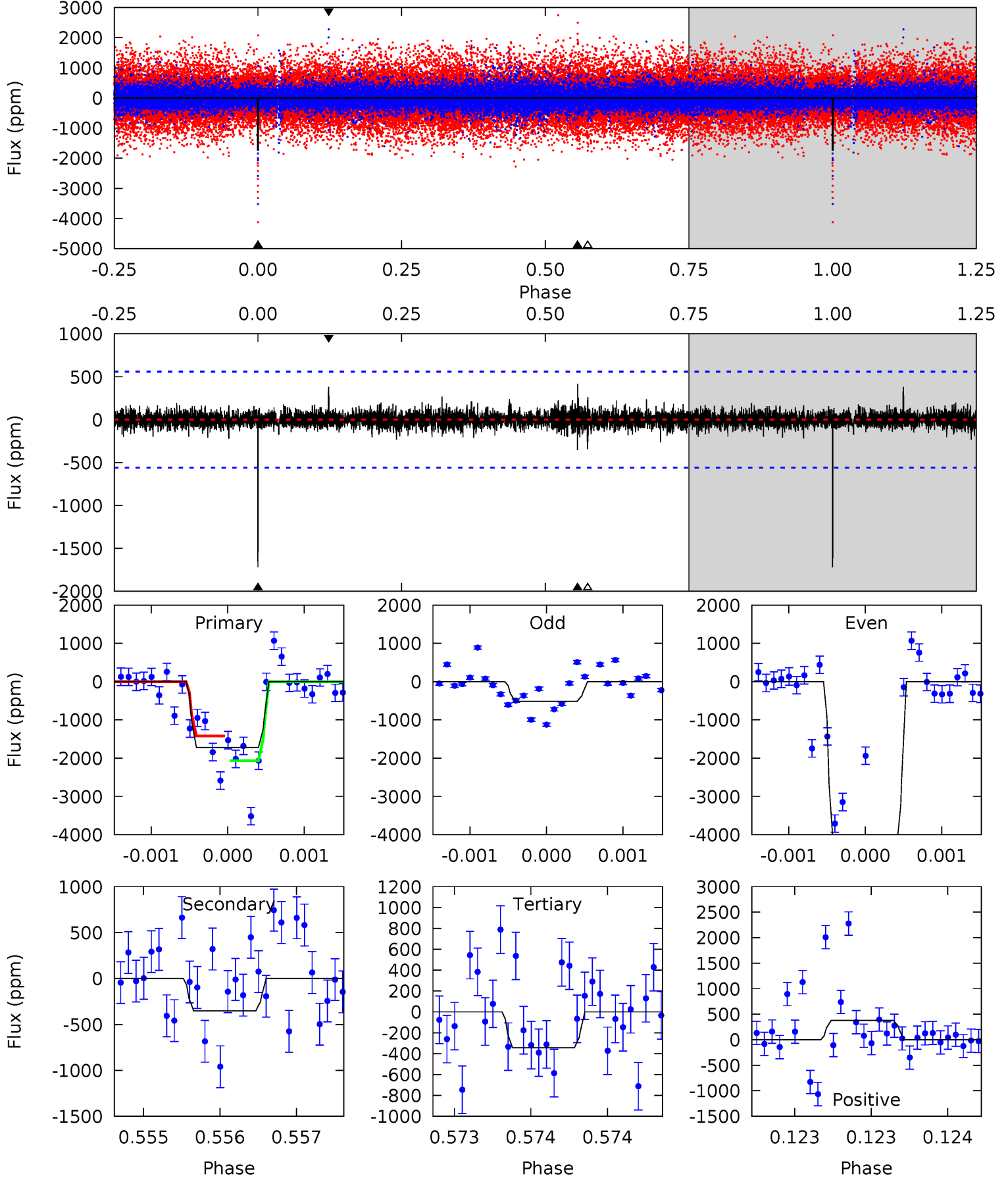
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.9	10.00	9.21	45.7	5.50	3.37	3.11	1.71	-34.8	0.79	-35.7	1.49	1.01	0.81	0.45



Alt Model-Shift Uniqueness Test

009163591-04, P = 507.923812 Days, E = 380.829916 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
17.1	3.51	3.41	3.79	5.56	3.45	0.52	13.7	13.3	0.10	-0.28	24.9	1.47	0.19	3.22



Stellar Parameters For KIC 009163591

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (g \cdot \text{cm}^{-3})$
	4523^{+136}_{-136}	$4.604^{+0.056}_{-0.024}$	$-0.160^{+0.300}_{-0.300}$	$0.669^{+0.048}_{-0.059}$	$0.655^{+0.073}_{-0.049}$	$3.087^{+0.723}_{-0.331}$
	+3%/-3%	+1%/-1%	+188%/-188%	+7%/-9%	+11%/-7%	+23%/-11%
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 009163591-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	-1363 ± 136	$3.10^{+0.84}_{-0.81}$	218^{+8}_{-7}	4268^{+581}_{-372}	93277^{+80365}_{-36727}
Alt.	-353 ± 101	$3.55^{+0.91}_{-0.84}$	218^{+7}_{-8}	3250^{+346}_{-261}	17933^{+15746}_{-7789}

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 $A_{obs} \gg 1.0$

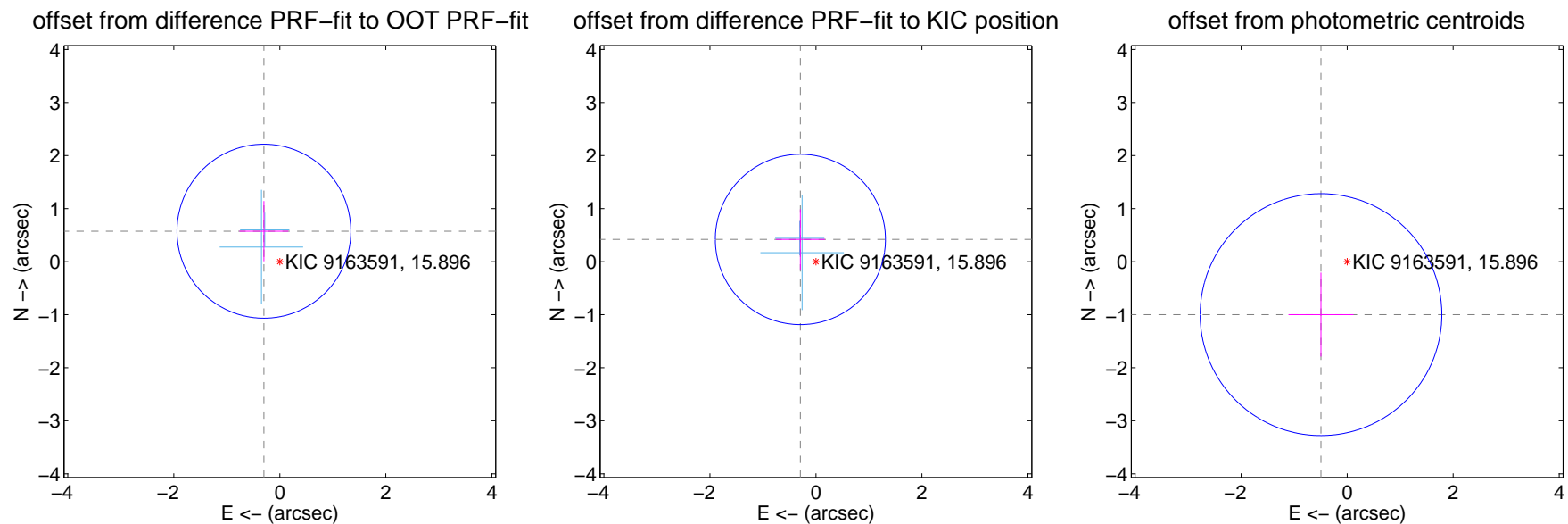
DV Centroid Data

Supplemental centroid analysis for 009163591-04. Kepler magnitude: 15.90. Transit SNR 7.48

There are 2 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.16 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.647 ± 0.547	1.18	0.300 ± 0.462	0.574 ± 0.568
PRF-fit source offset from KIC position	0.511 ± 0.535	0.96	0.293 ± 0.462	0.419 ± 0.568
photometric centroid source offset	1.11 ± 0.76	1.47	0.49 ± 0.61	-1.00 ± 0.79



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.

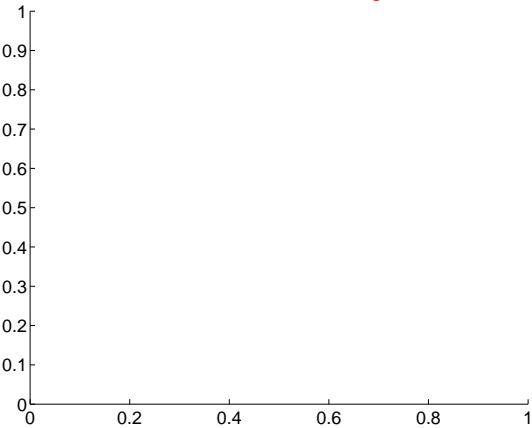
Q1 no difference image



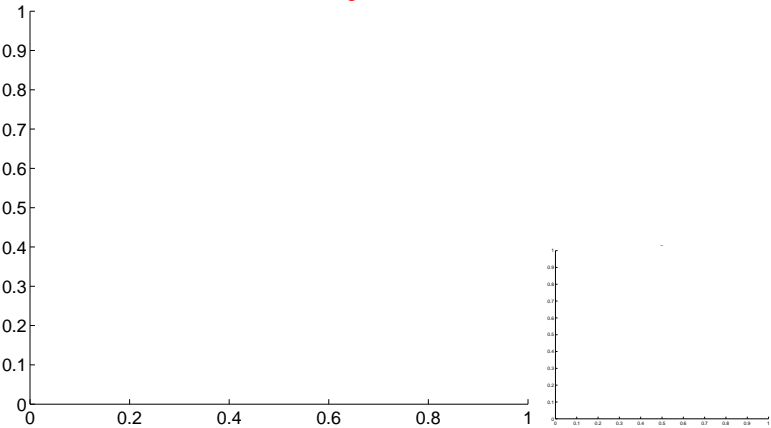
Q1 no OOT image



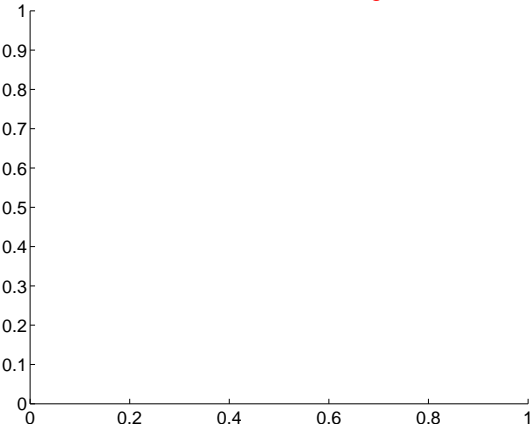
Q2 no difference image



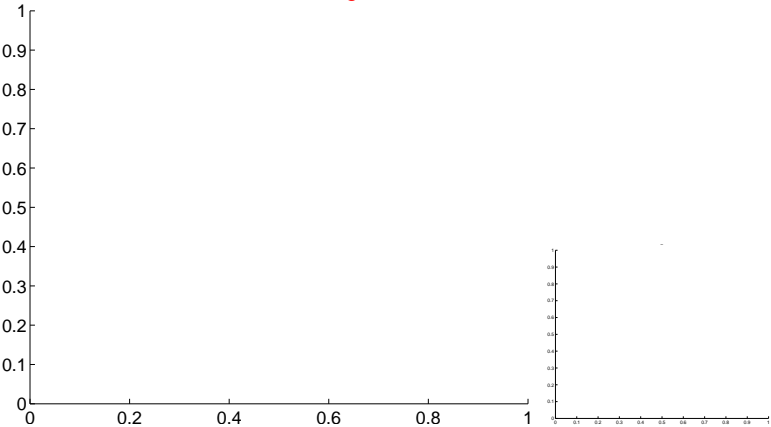
Q2 no OOT image



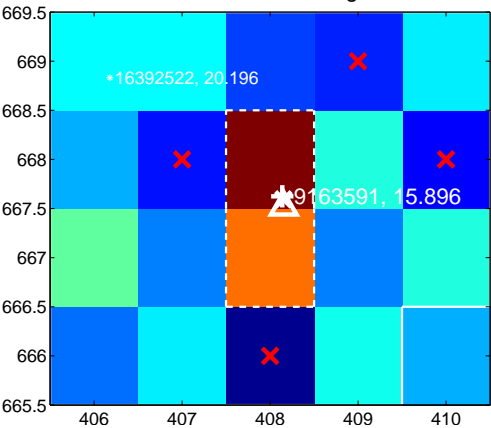
Q3 no difference image



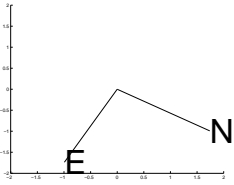
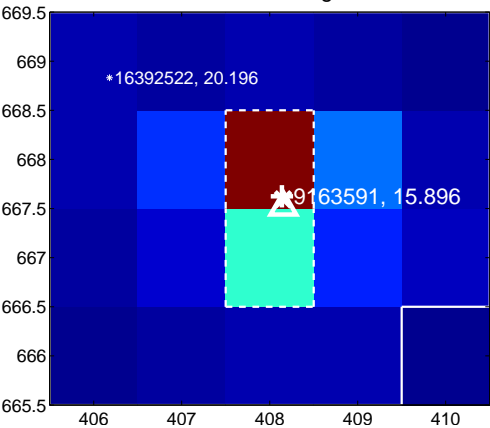
Q3 no OOT image



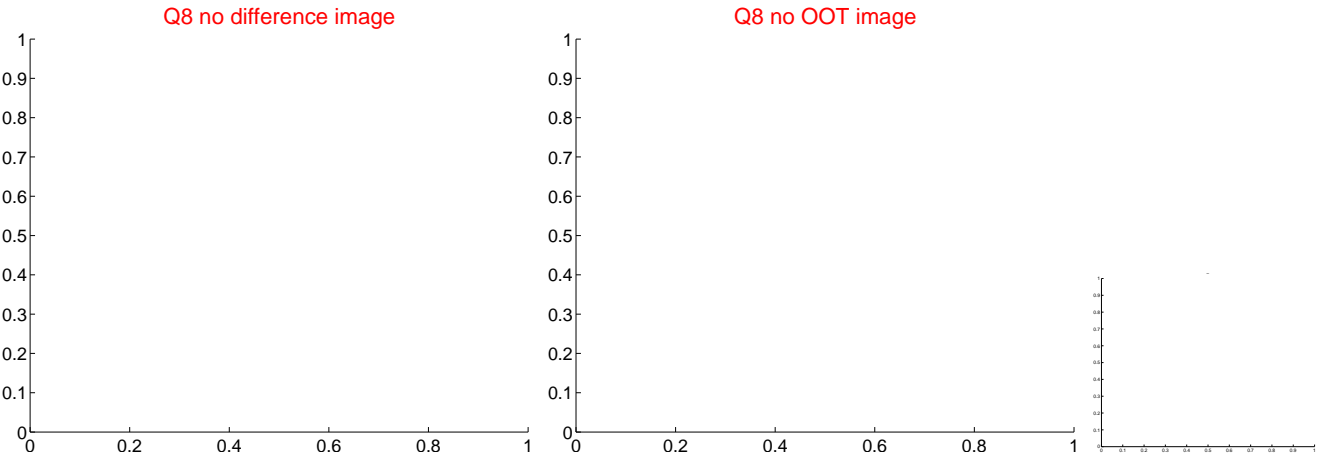
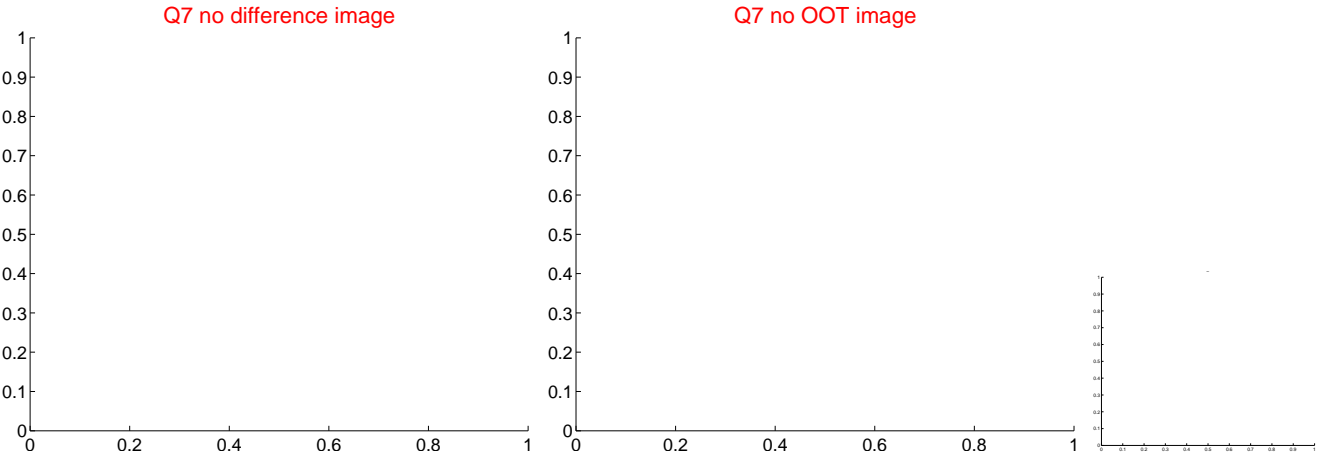
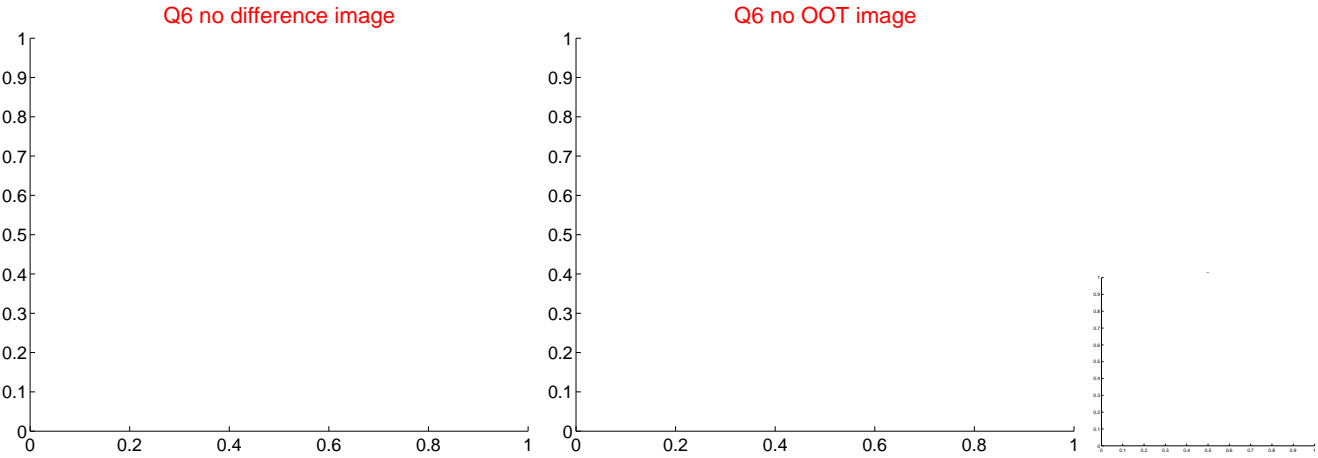
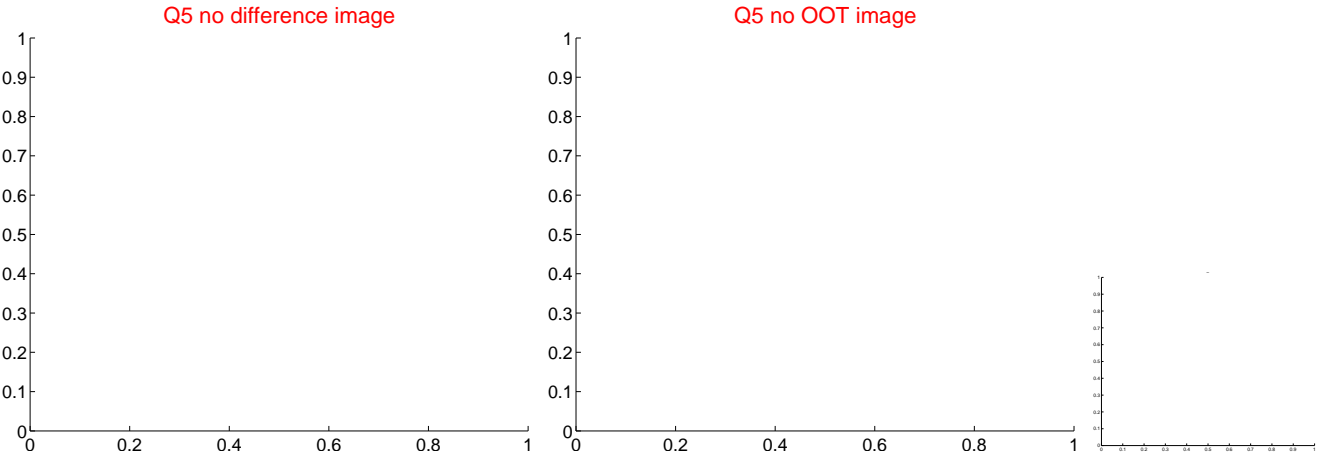
Q4 difference image



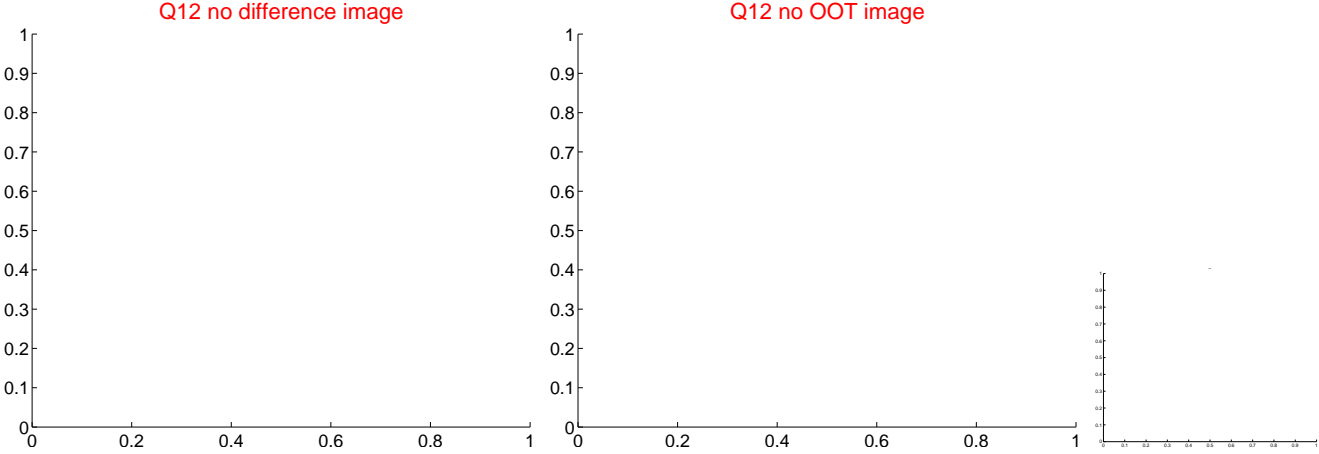
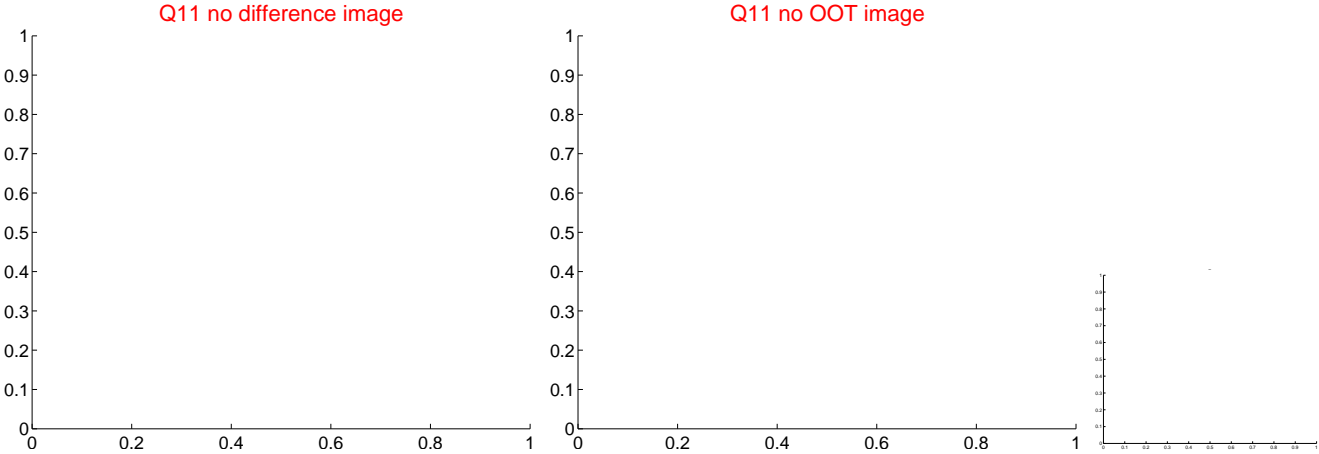
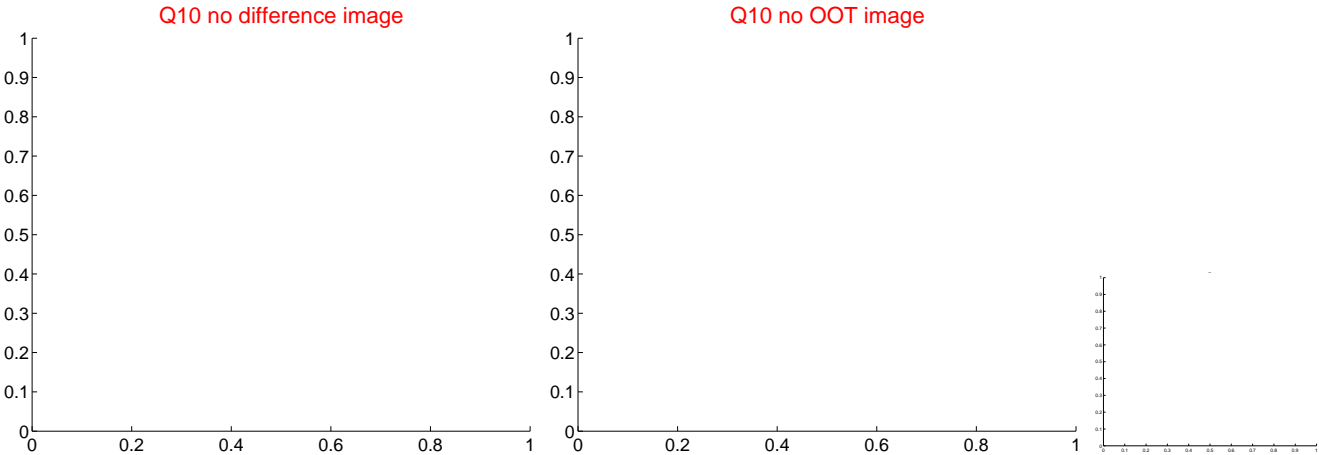
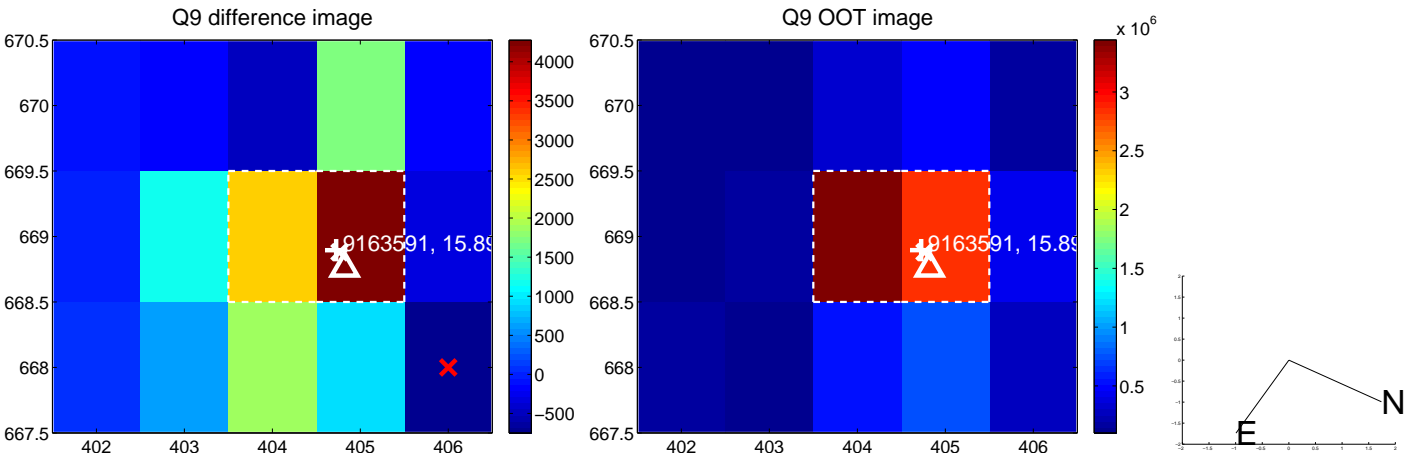
Q4 OOT image



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



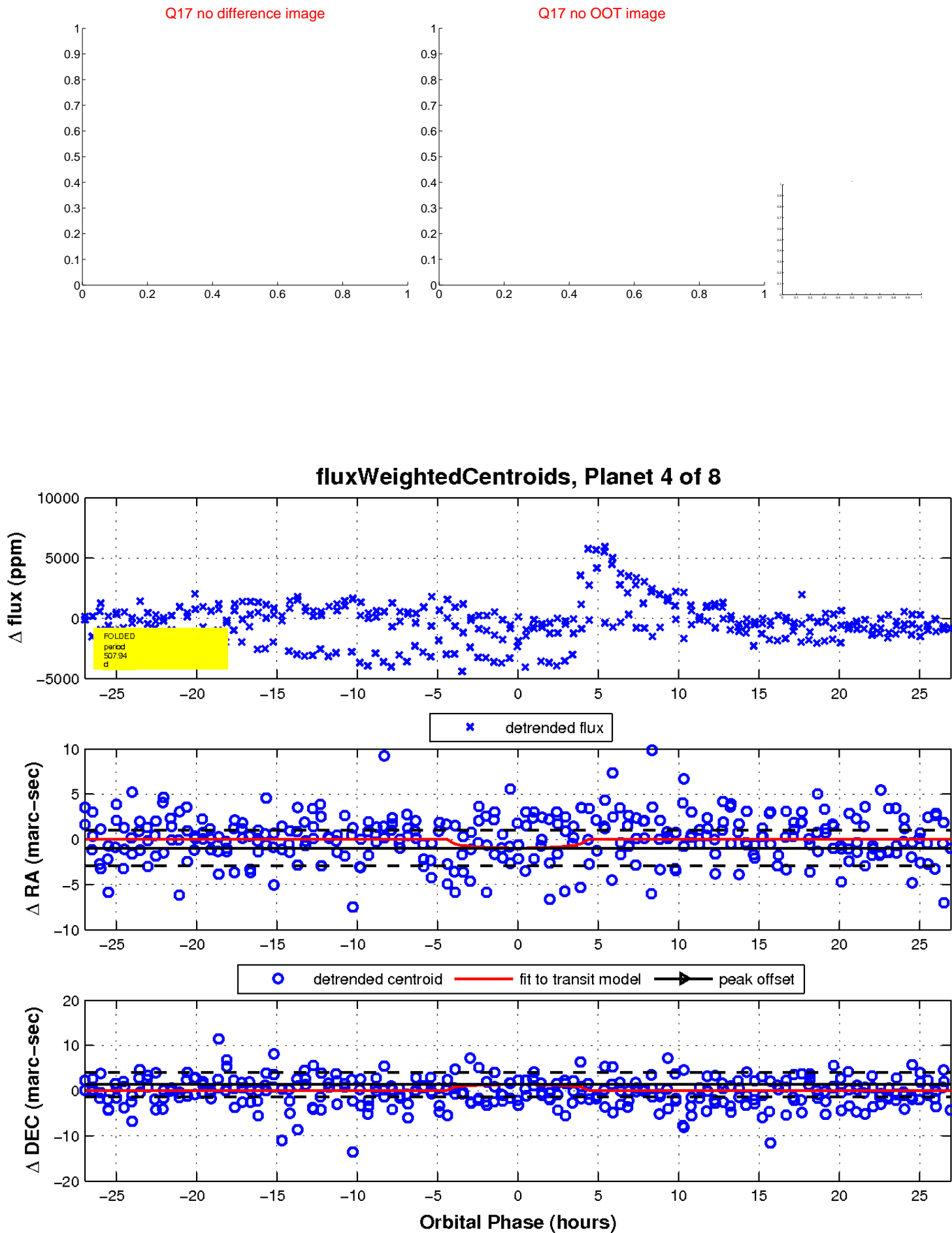
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

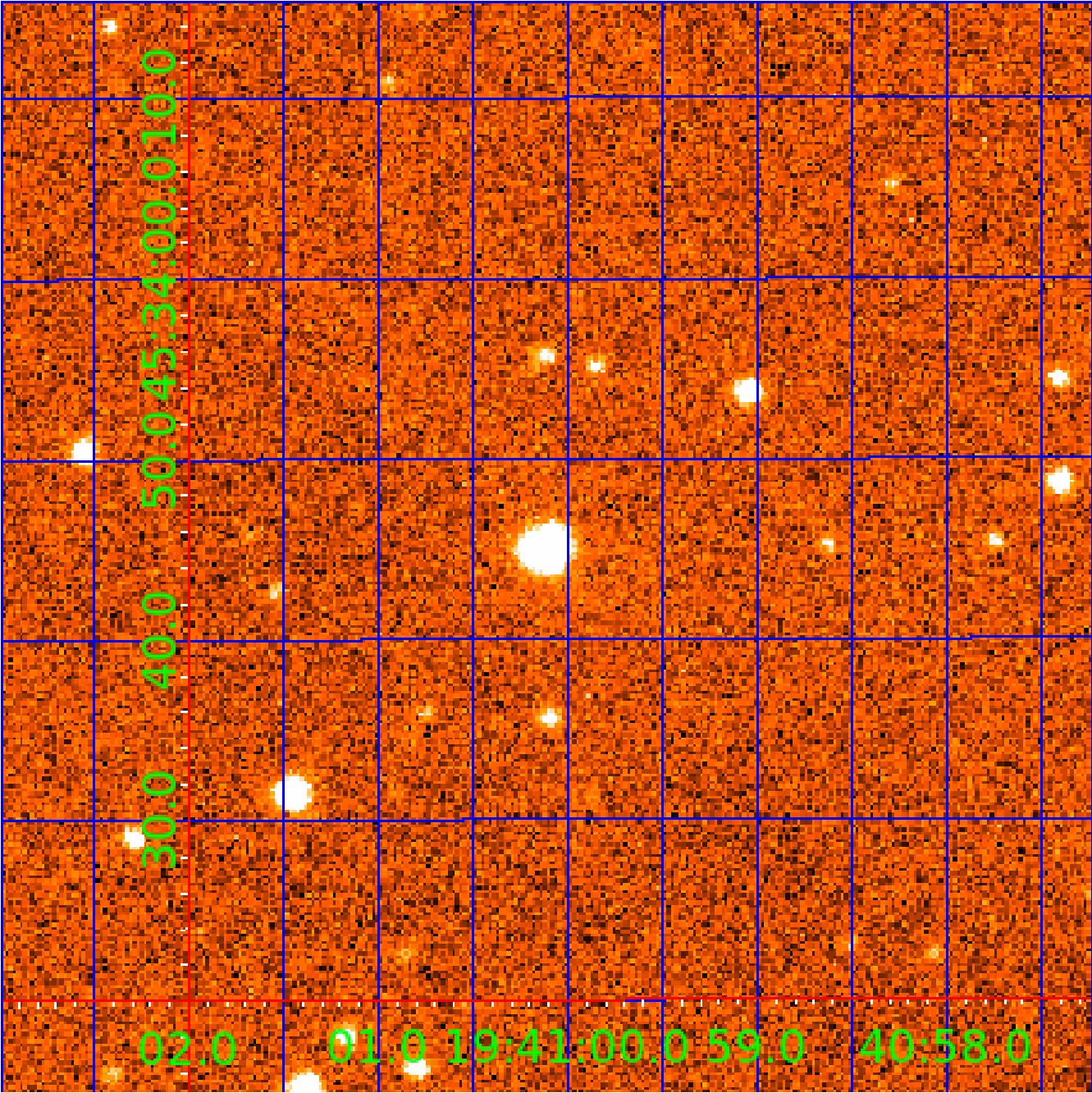


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 009163591

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})
009163591-02	OBS	No	339.116636	424.234634	2113.0	5.851	12.4	8.1	0.67	4523	3.21	0.24
009163591-03	OBS	No	506.024433	308.442643	2170.4	5.952	10.9	8.5	0.67	4523	4.10	0.14
009163591-04	OBS	No	507.941245	380.777665	2040.0	8.990	11.9	7.5	0.67	4523	3.14	0.14
009163591-06	OBS	No	597.296079	312.619376	1979.3	6.317	10.7	7.4	0.67	4523	3.12	0.12
009163591-07	OBS	No	569.558629	144.764329	1624.7	4.955	12.4	6.4	0.67	4523	2.97	0.12

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009163591-02	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
009163591-03	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
009163591-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009163591-06	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
009163591-07	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

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

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

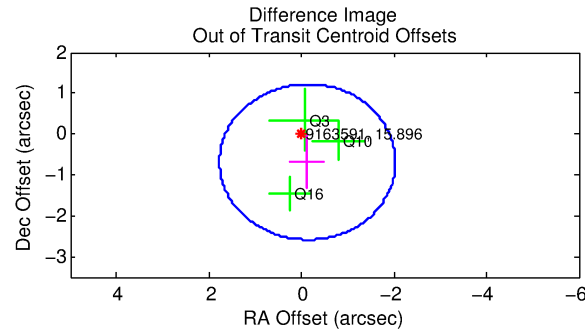
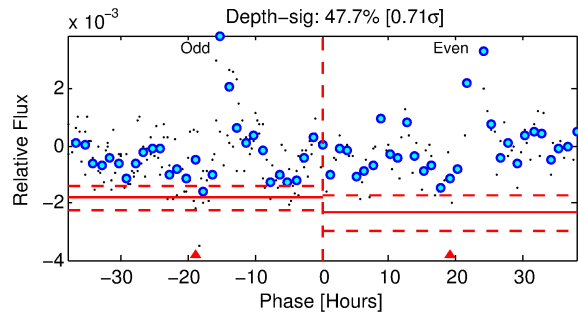
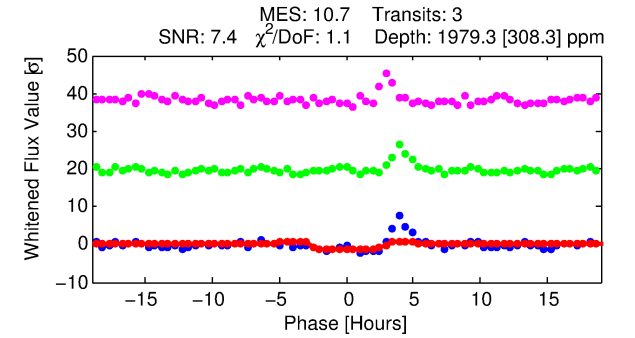
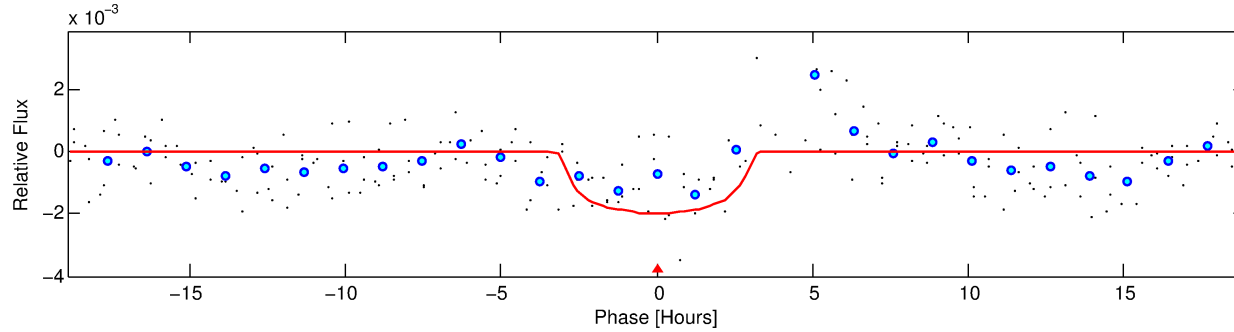
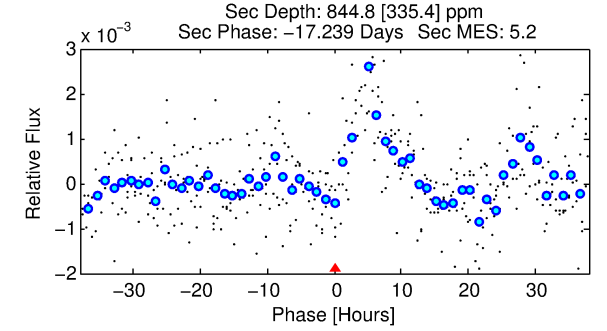
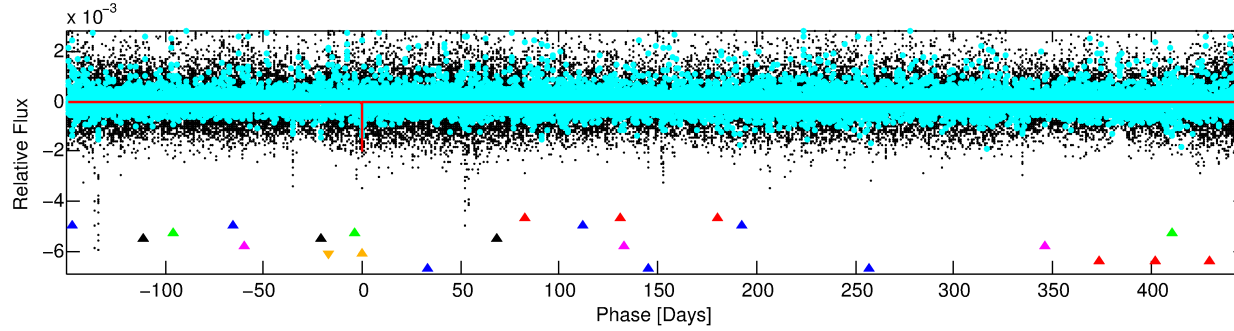
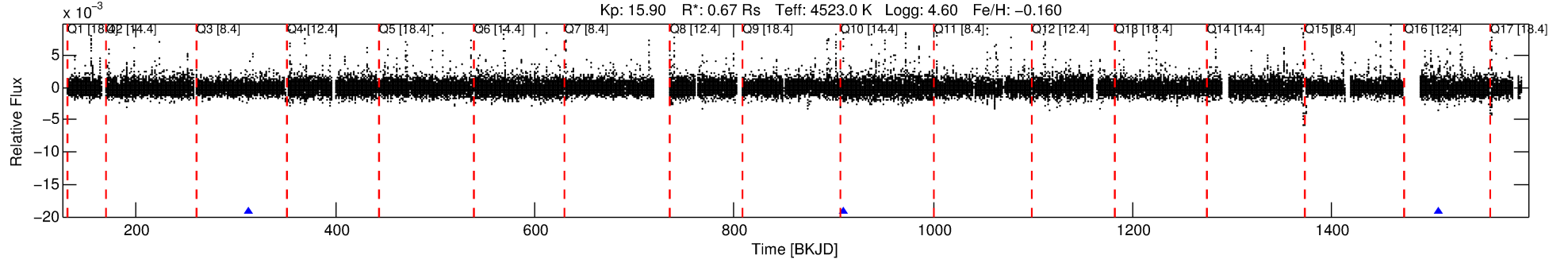
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009163591-06

No Significant Match Found

DV One-Page Summary

KIC: 9163591 Candidate: 6 of 8 Period: 597.296 d



DV Fit Results:

Period = 597.29608 [0.00904] d
Epoch = 312.6194 [0.0105] BKJD
Rp/R* = 0.0428 [0.0273]
a/R* = 584.04 [1116.90]
b = 0.66 [1.69]
Seff = 0.12 [0.02]
Teq = 149 [6] K
Rp = 3.12 [2.01] Re
a = 1.2063 [0.0879] AU
Ag = 69299.52 [92737.91] [0.75 σ]
Teffp = 3728 [1248] K [2.87 σ]

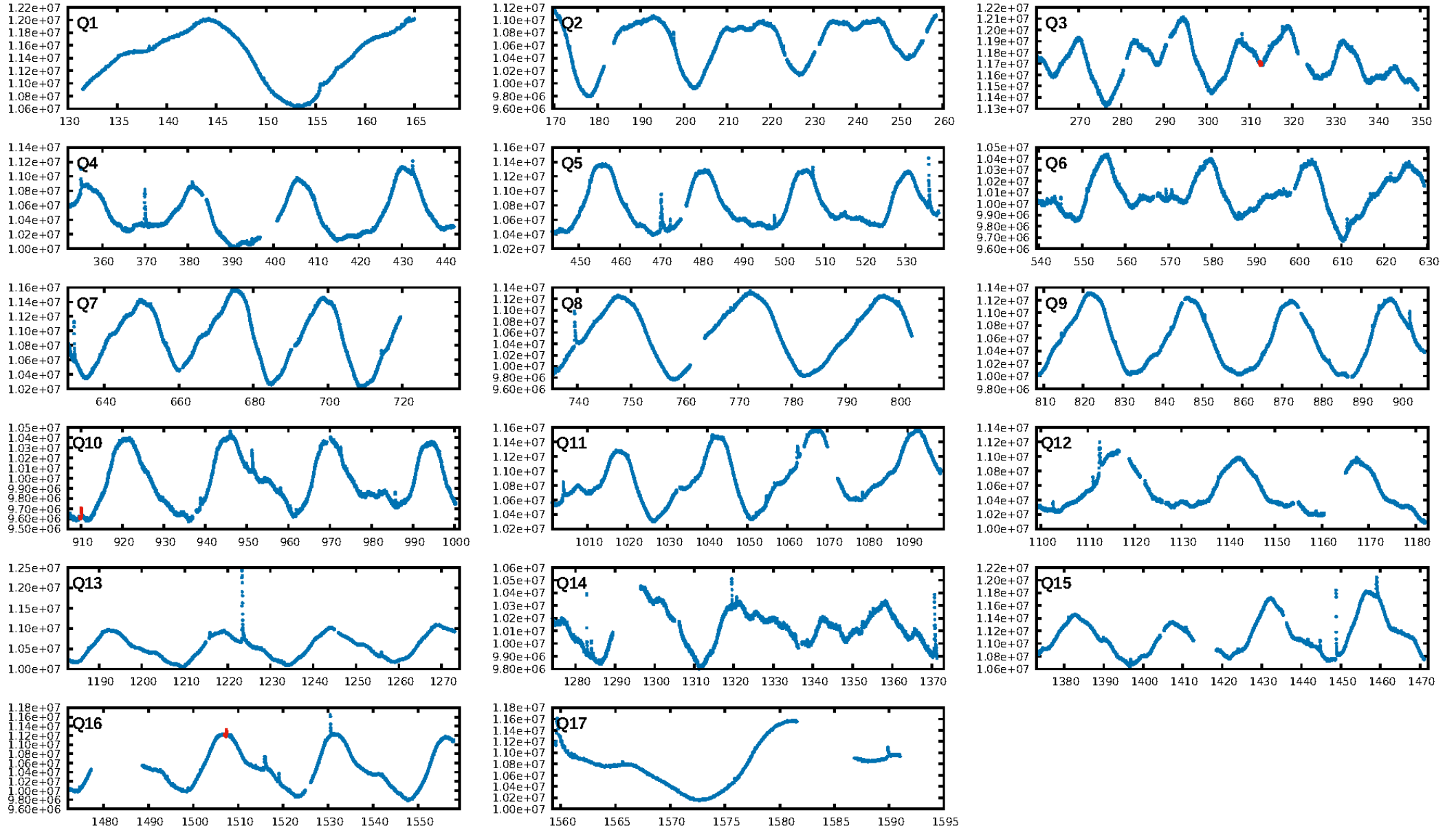
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [82.92 σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 6.1%
ModelChiSquareGof-sig: 94.5%
Bootstrap-pfa: N/A
RollingBand-fgt: 1.00 [3/3]
GhostDiagnostic-chr: 2.093
Centroid-sig: 93.8%
Centroid-so: 0.215 arcsec [0.23 σ]
OotOffset-rm: 0.697 arcsec [1.10 σ]
OotOffset-st: 1/1/1/0 [3]
KicOffset-rm: 0.786 arcsec [1.33 σ]
KicOffset-st: 1/1/1/0 [3]
DiffImageQuality-fgm: 1.00 [3/3]
DiffImageOverlap-fno: 1.00 [3/3]

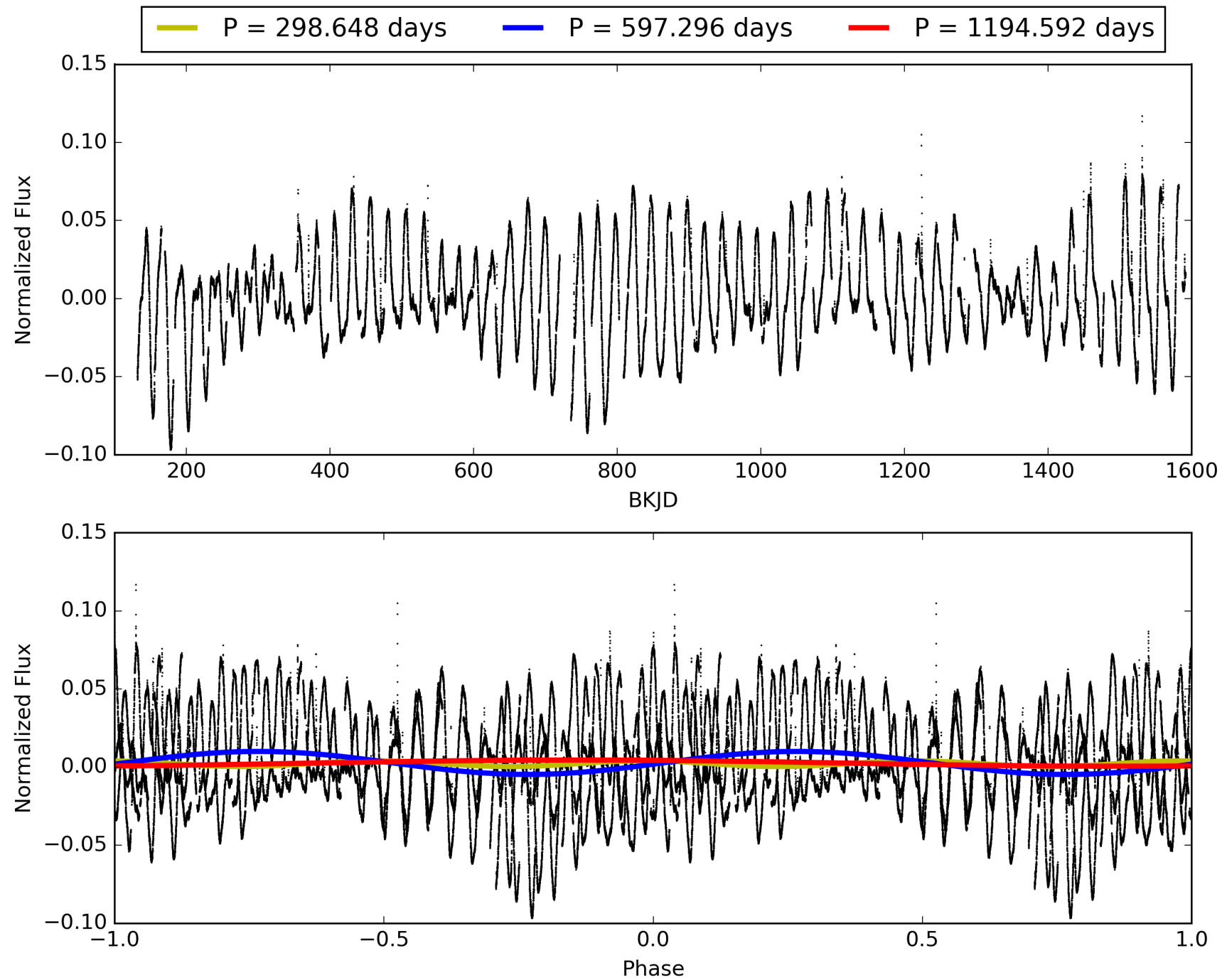
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 03-Feb-2016 08:01:23 Z

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

TCE 009163591-06, PDC Light Curves

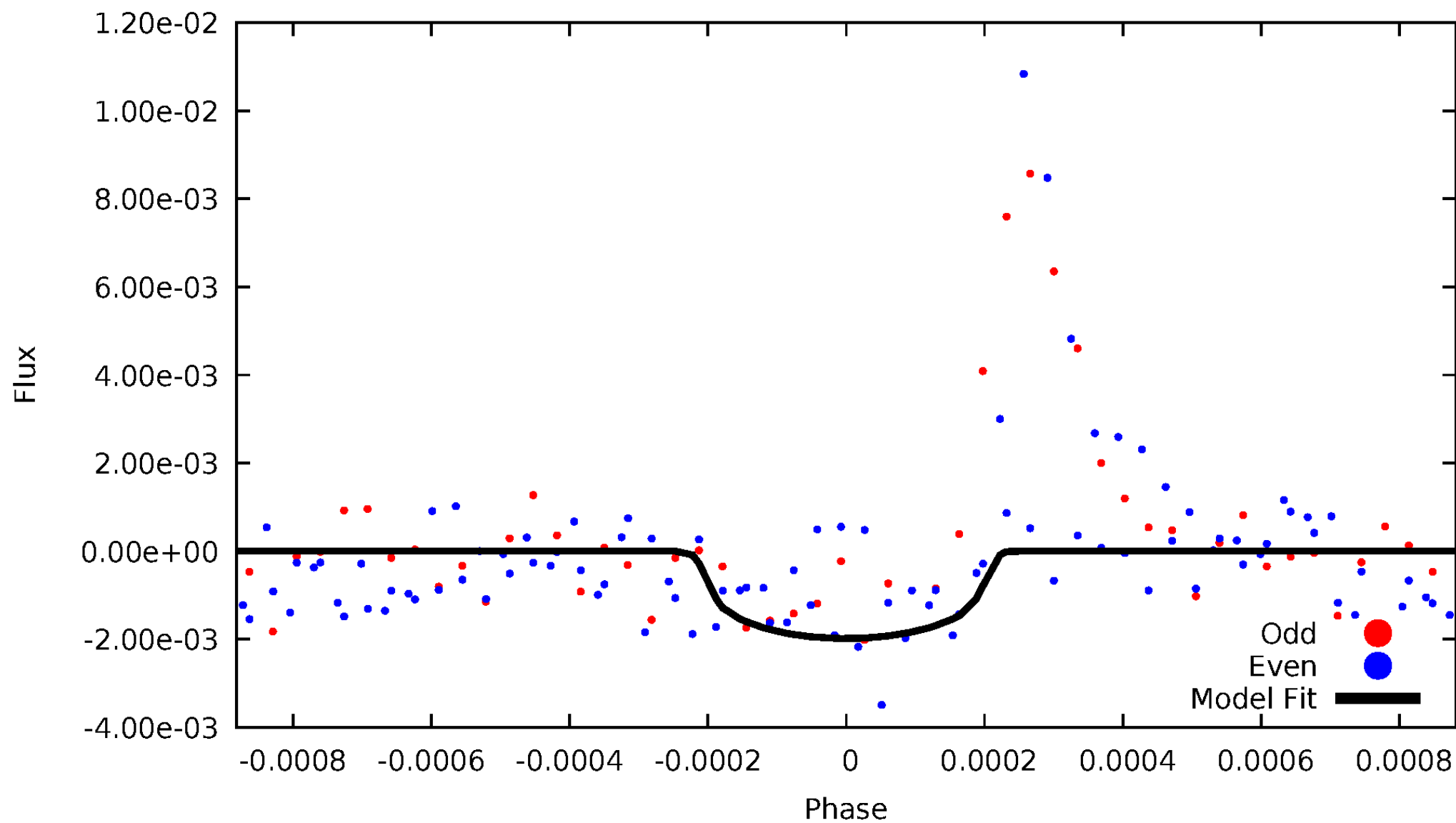


TCE 009163591-06



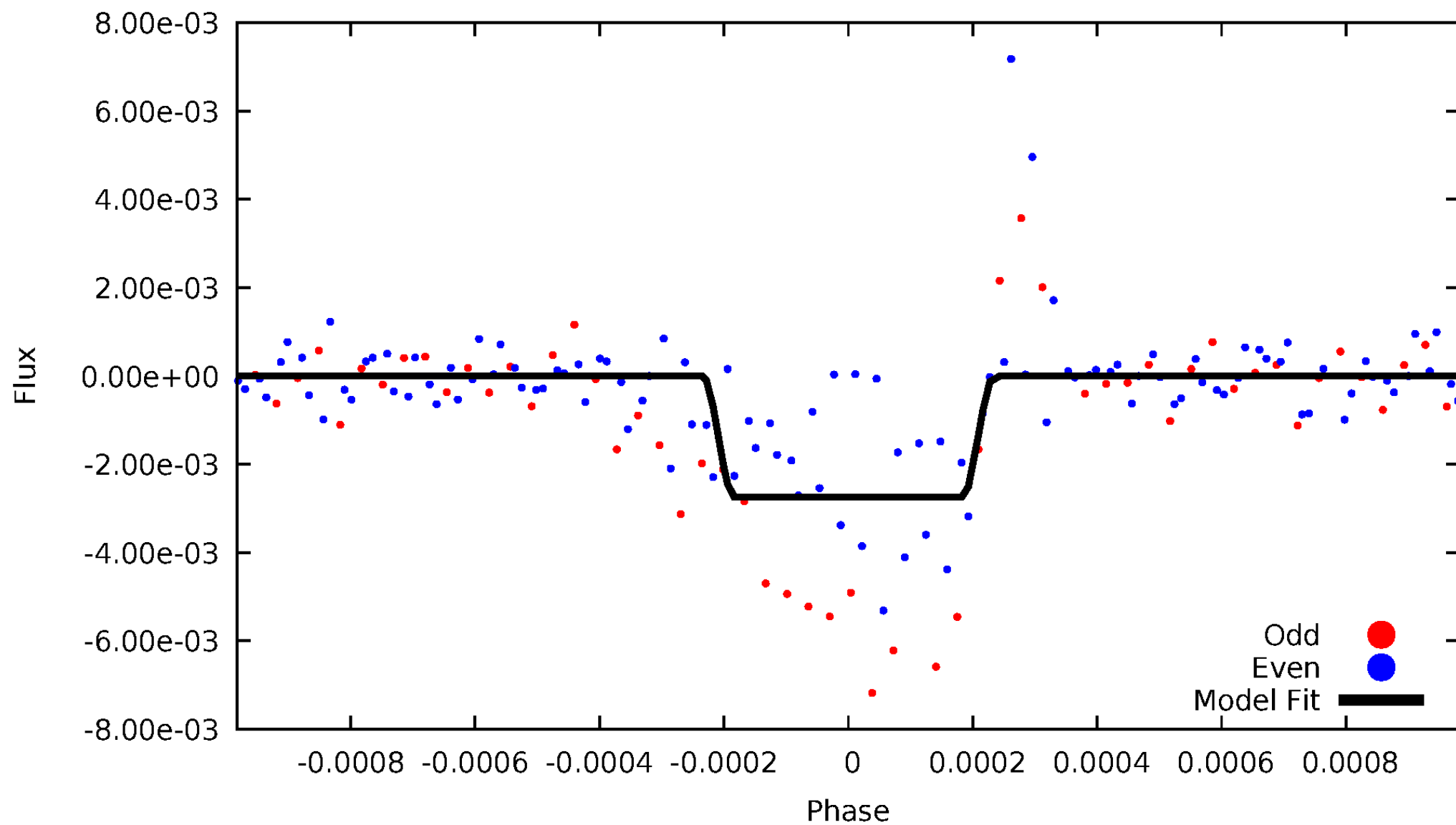
DV Odd/Even

TCE 009163591-06



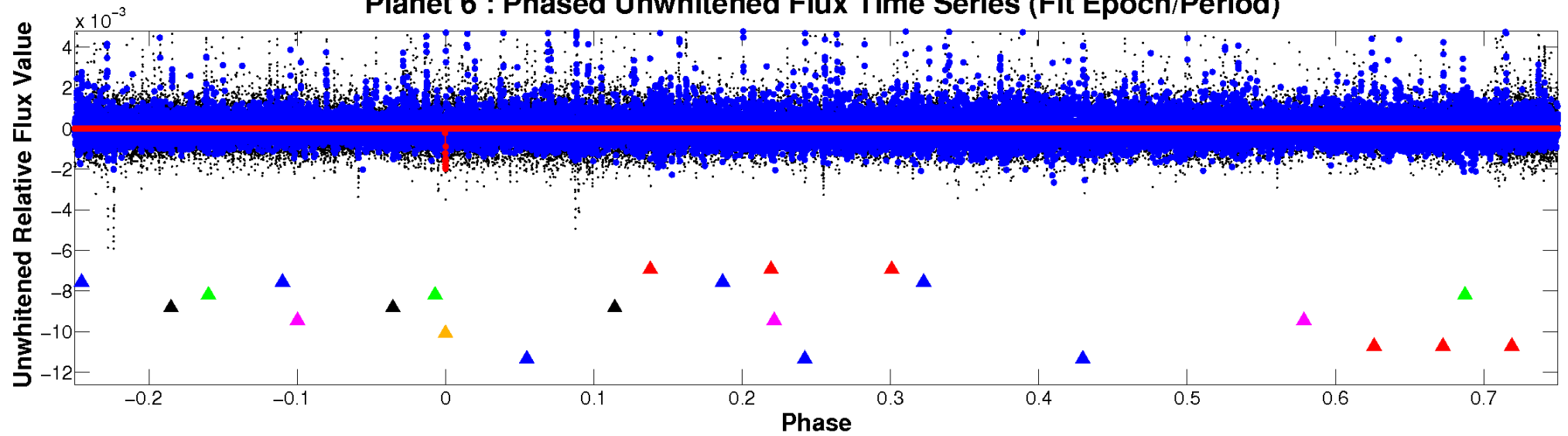
ALT Odd/Even

TCE 009163591-06

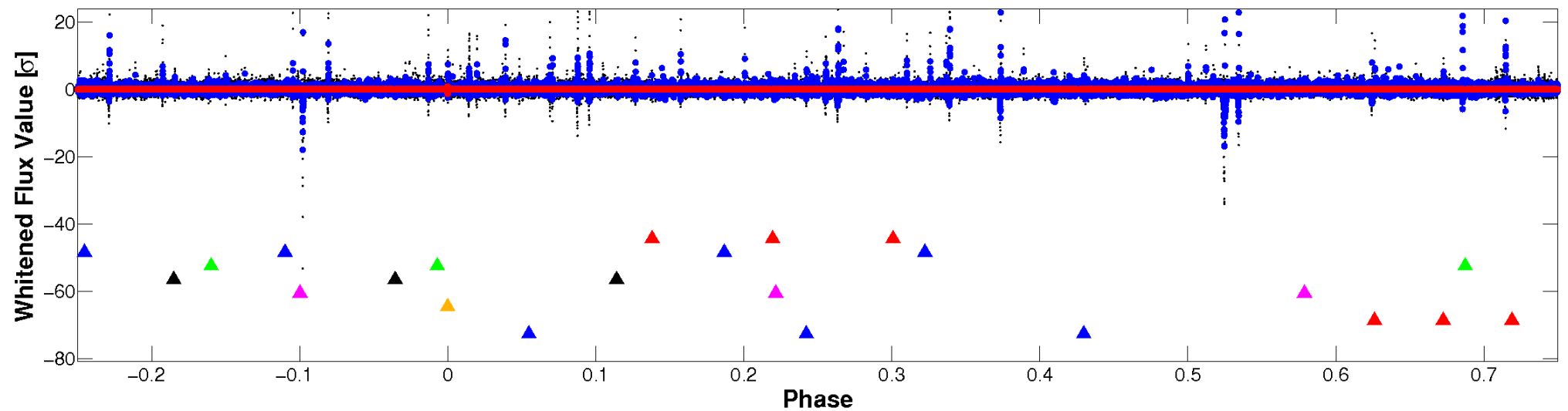


Non-Whitened Vs. Whitened Light Curve

Planet 6 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

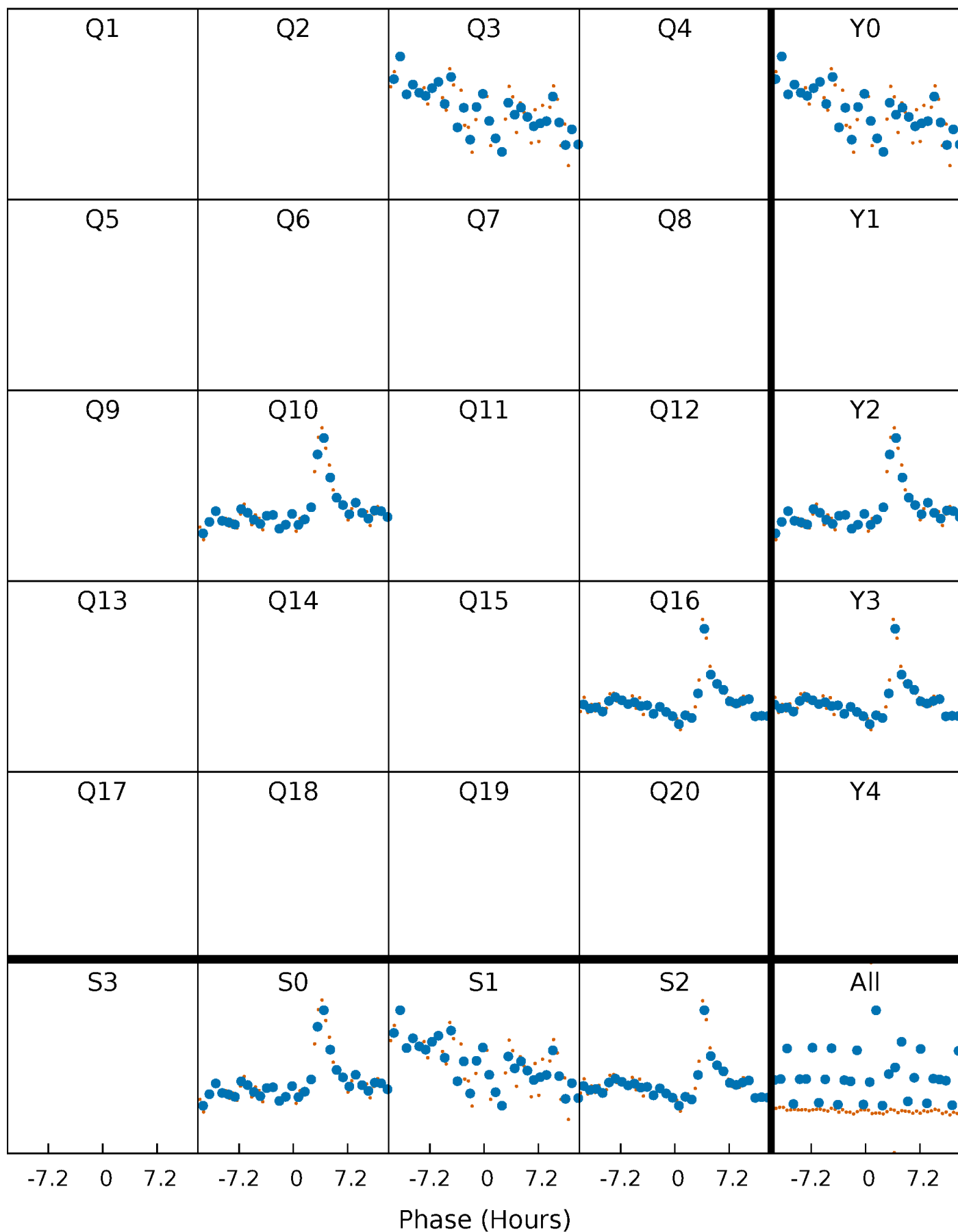


Planet 6 : Phased Whitened Flux Time Series (Fit Epoch/Period)



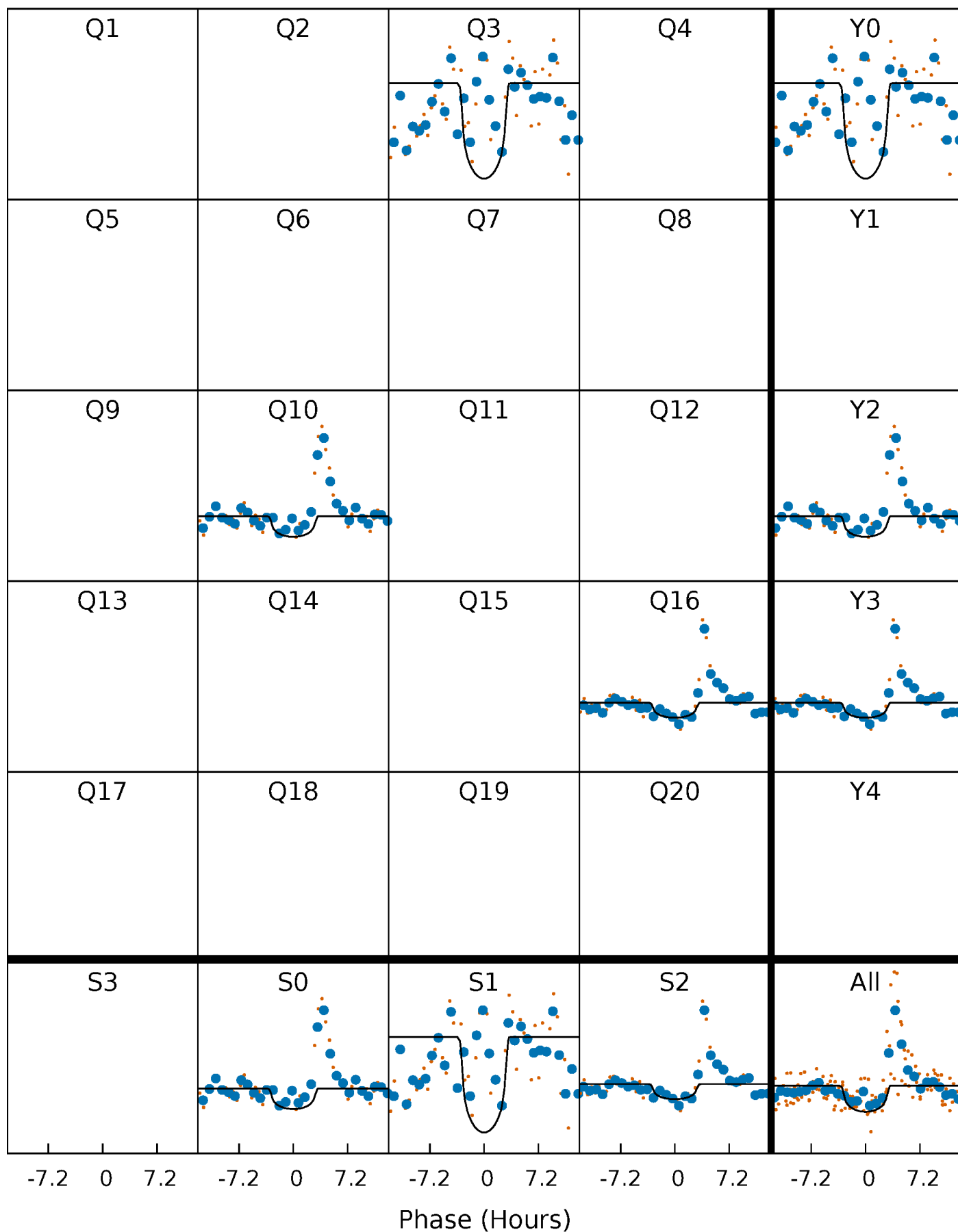
PDC Quarter-Phased Transit Curves

TCE 009163591-06 P=597.296079 Days $T_0=312.619376$ (BKJD)



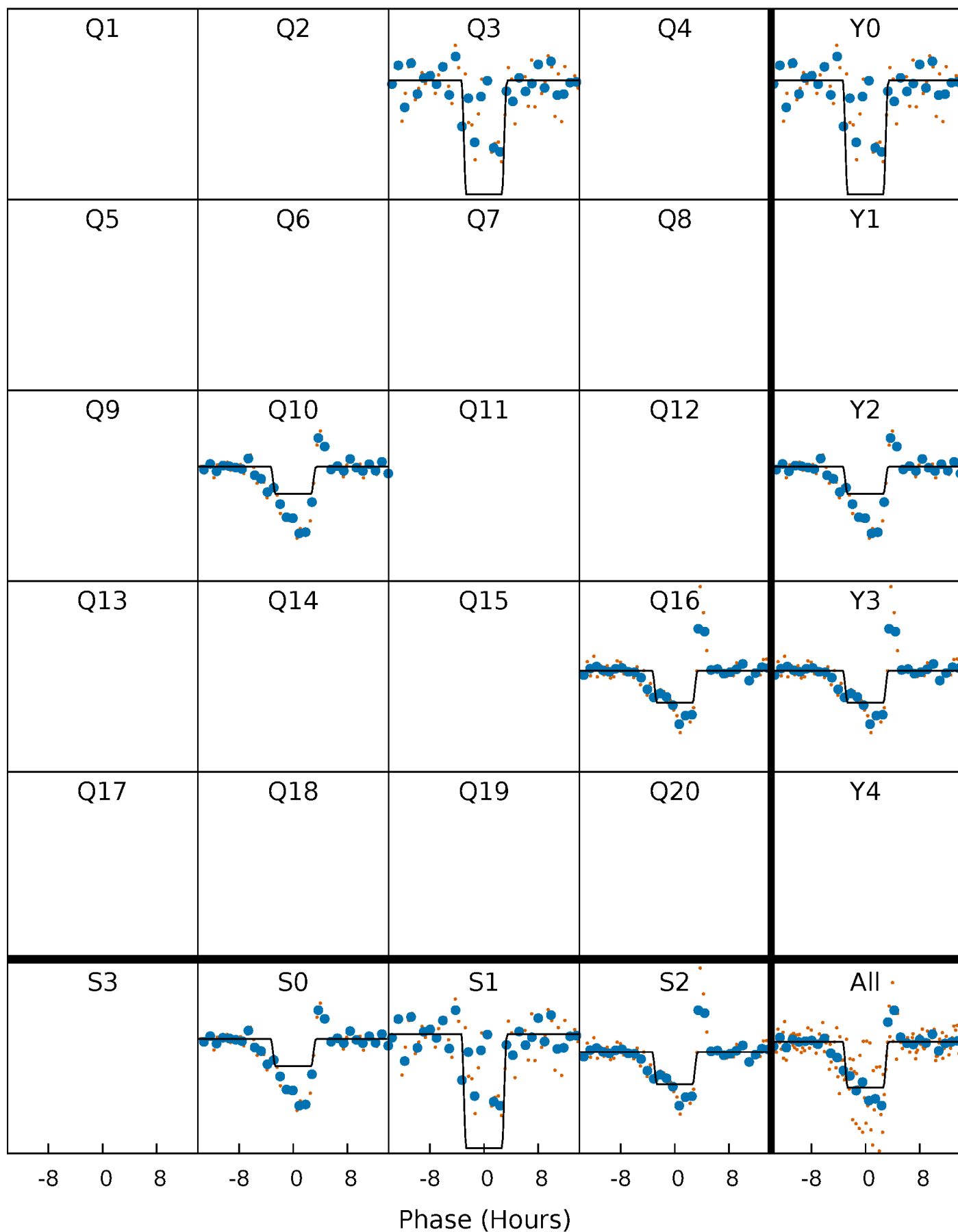
DV Quarter-Phased Transit Curves

TCE 009163591-06 P=597.296079 Days $T_0=312.619376$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

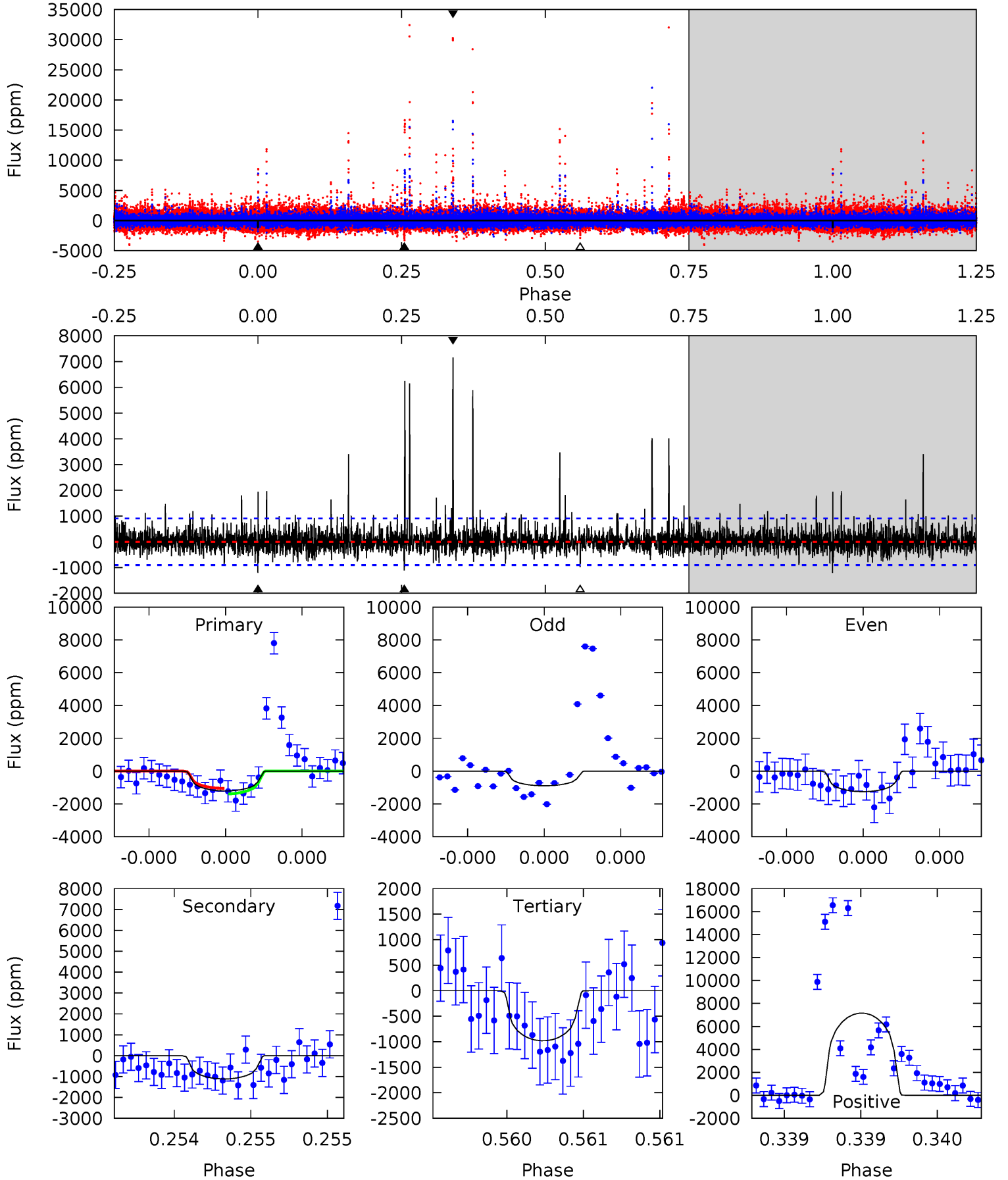
TCE 009163591-06 P=597.300203 Days $T_0=312.608182$ (BKJD)



DV Model-Shift Uniqueness Test

009163591-06, P = 597.296079 Days, E = 312.619376 Days

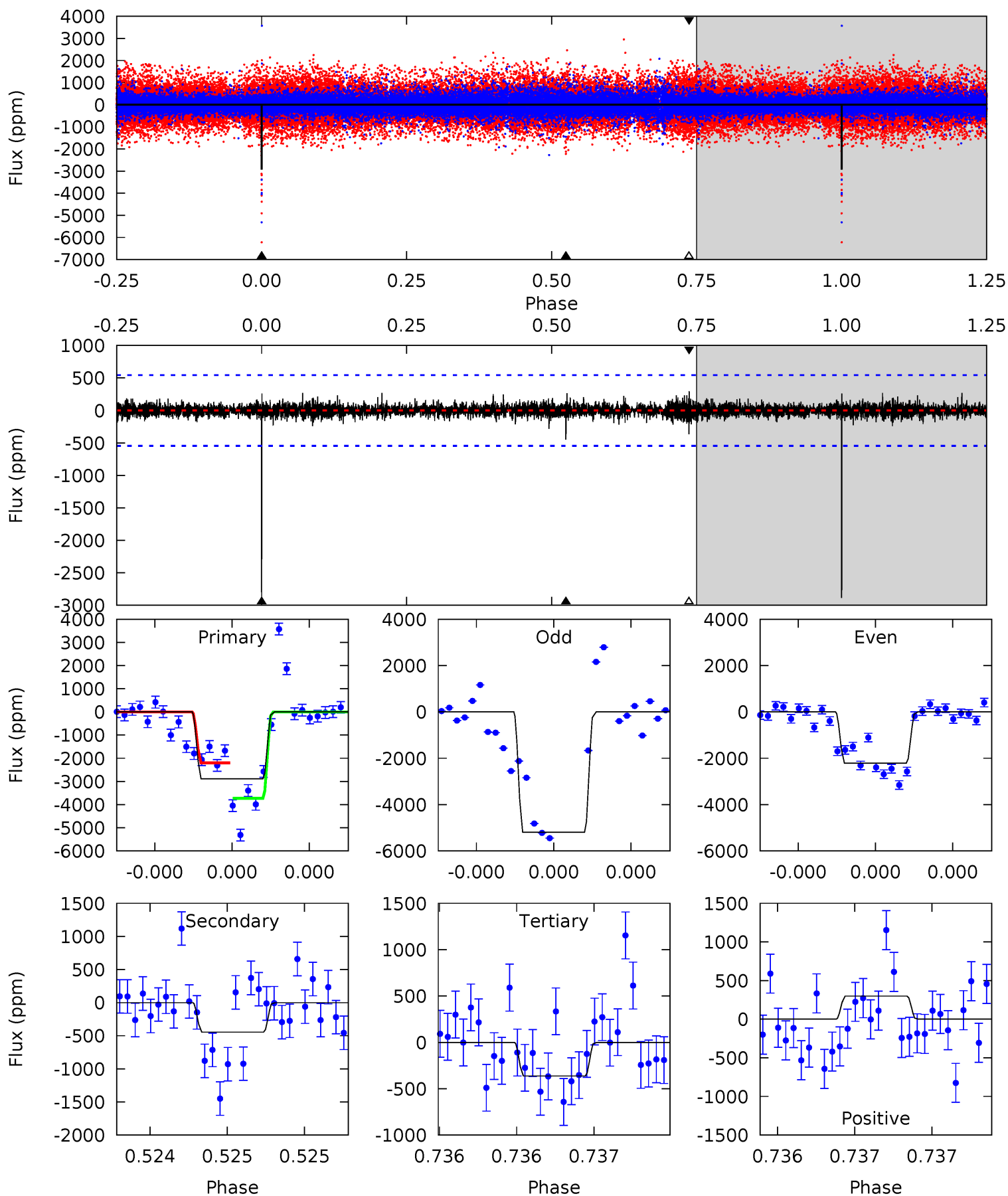
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.50	6.89	6.07	44.3	5.59	3.51	2.55	1.43	-36.8	0.83	-37.4	0.56	1.27	0.86	1.04



Alt Model-Shift Uniqueness Test

009163591-06, P = 597.300203 Days, E = 312.608182 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
29.7	4.58	3.72	3.07	5.59	3.51	0.52	25.9	26.6	0.86	1.51	18.0	0.96	0.09	7.72



Stellar Parameters For KIC 009163591

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (g \cdot \text{cm}^{-3})$
	4523^{+136}_{-136}	$4.604^{+0.056}_{-0.024}$	$-0.160^{+0.300}_{-0.300}$	$0.669^{+0.048}_{-0.059}$	$0.655^{+0.073}_{-0.049}$	$3.087^{+0.723}_{-0.331}$
	+3%/-3%	+1%/-1%	+188%/-188%	+7%/-9%	+11%/-7%	+23%/-11%
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 009163591-06 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	A_{obs}
DV	-1115 ± 162	$3.29^{+1.93}_{-1.82}$	206^{+7}_{-7}	4027^{+1503}_{-582}	$83858^{+312209}_{-52211}$
Alt.	-446 ± 97	$3.89^{+1.79}_{-1.77}$	206^{+7}_{-7}	3275^{+774}_{-362}	23347^{+60882}_{-13036}

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

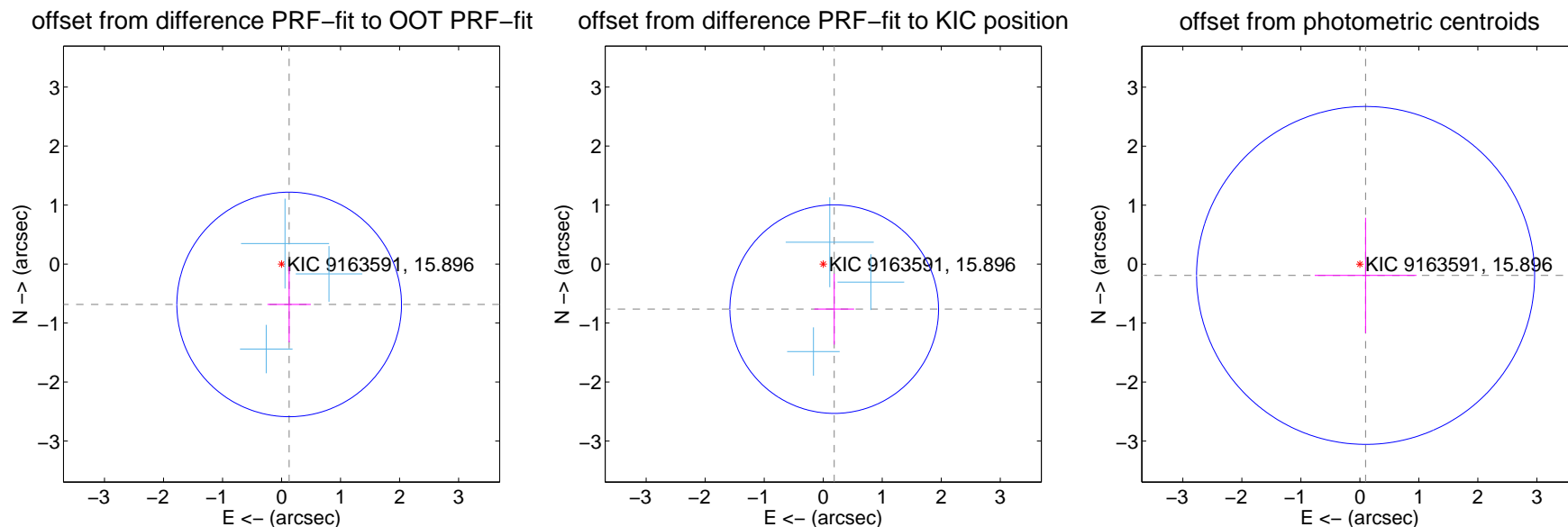
DV Centroid Data

Supplemental centroid analysis for 009163591-06. Kepler magnitude: 15.90. Transit SNR 7.41

There are 3 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.10 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.697 ± 0.634	1.10	-0.129 ± 0.367	-0.685 ± 0.642
PRF-fit source offset from KIC position	0.786 ± 0.589	1.33	-0.186 ± 0.338	-0.764 ± 0.601
photometric centroid source offset	0.22 ± 0.95	0.23	-0.10 ± 0.86	-0.19 ± 0.98



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.

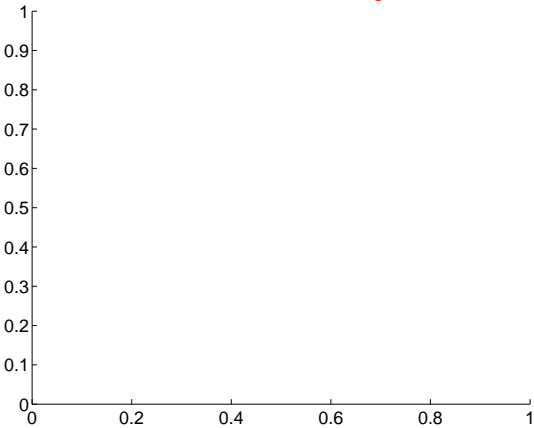
Q1 no difference image



Q1 no OOT image



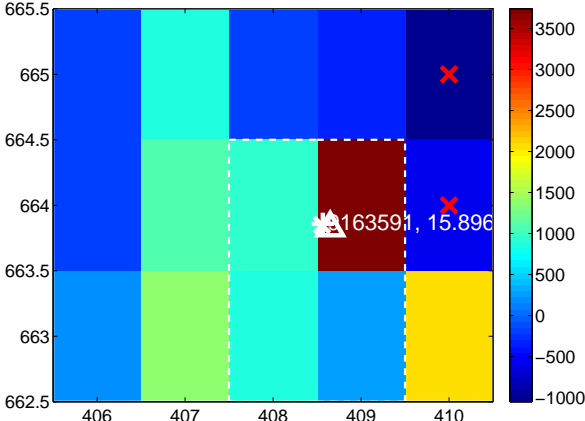
Q2 no difference image



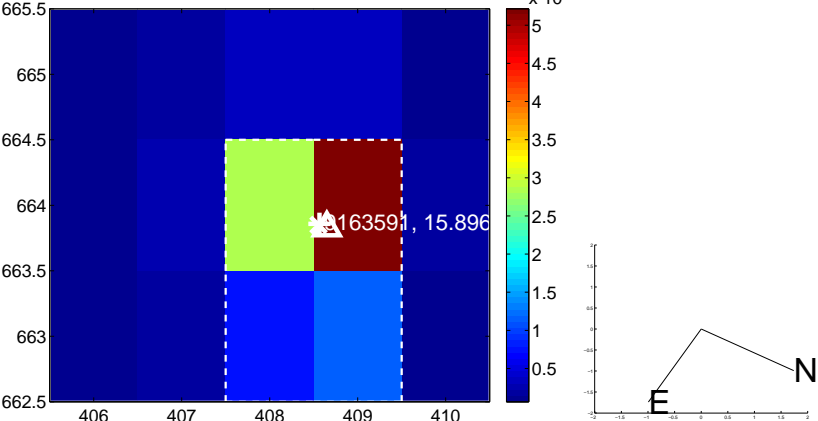
Q2 no OOT image



Q3 difference image



Q3 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.

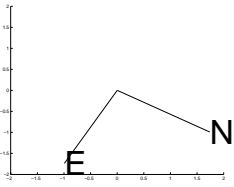
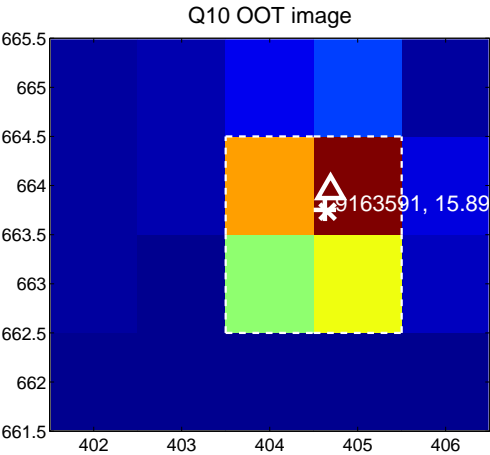
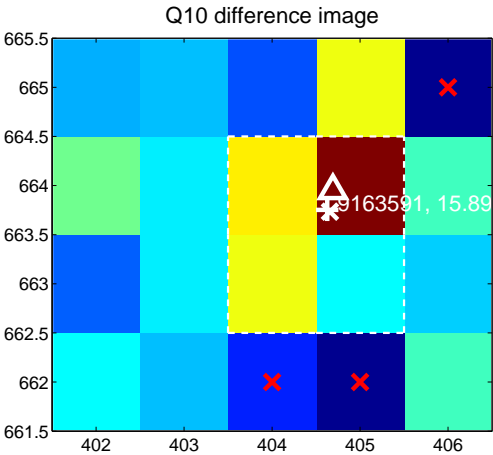


white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.

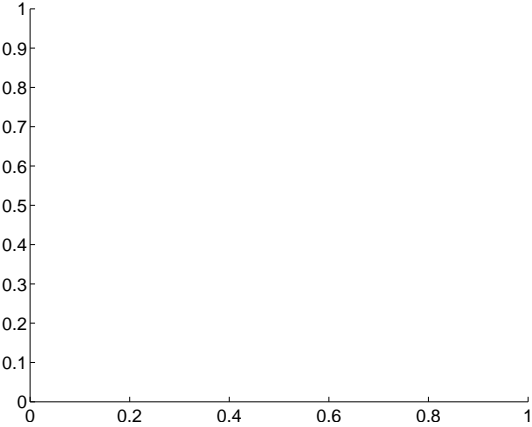
Q9 no difference image



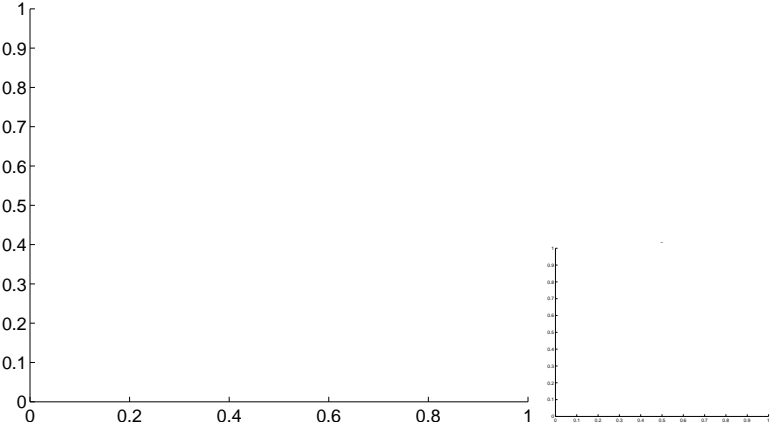
Q9 no OOT image



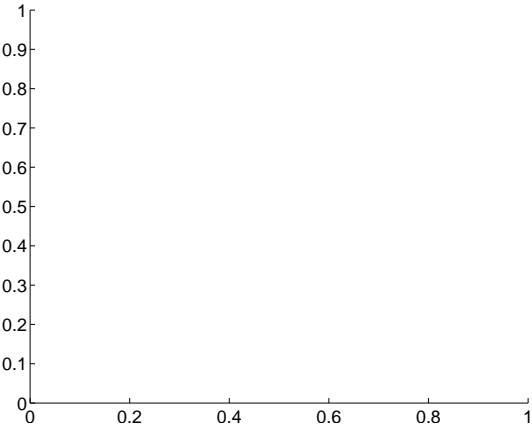
Q11 no difference image



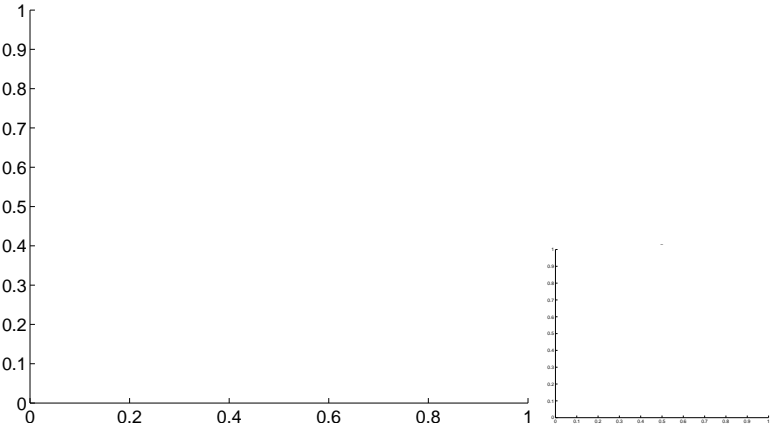
Q11 no OOT image



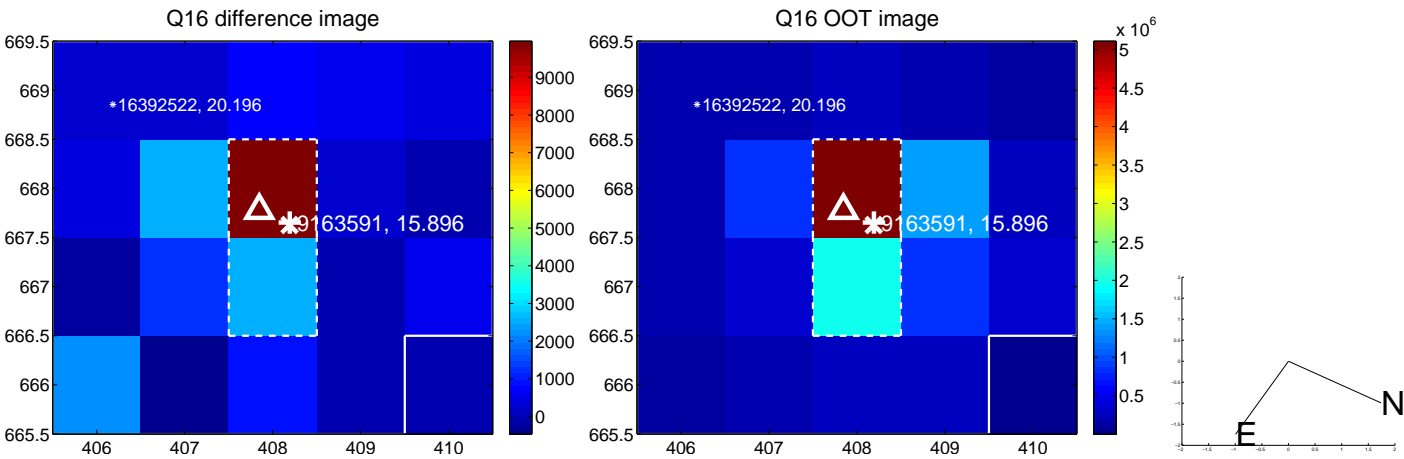
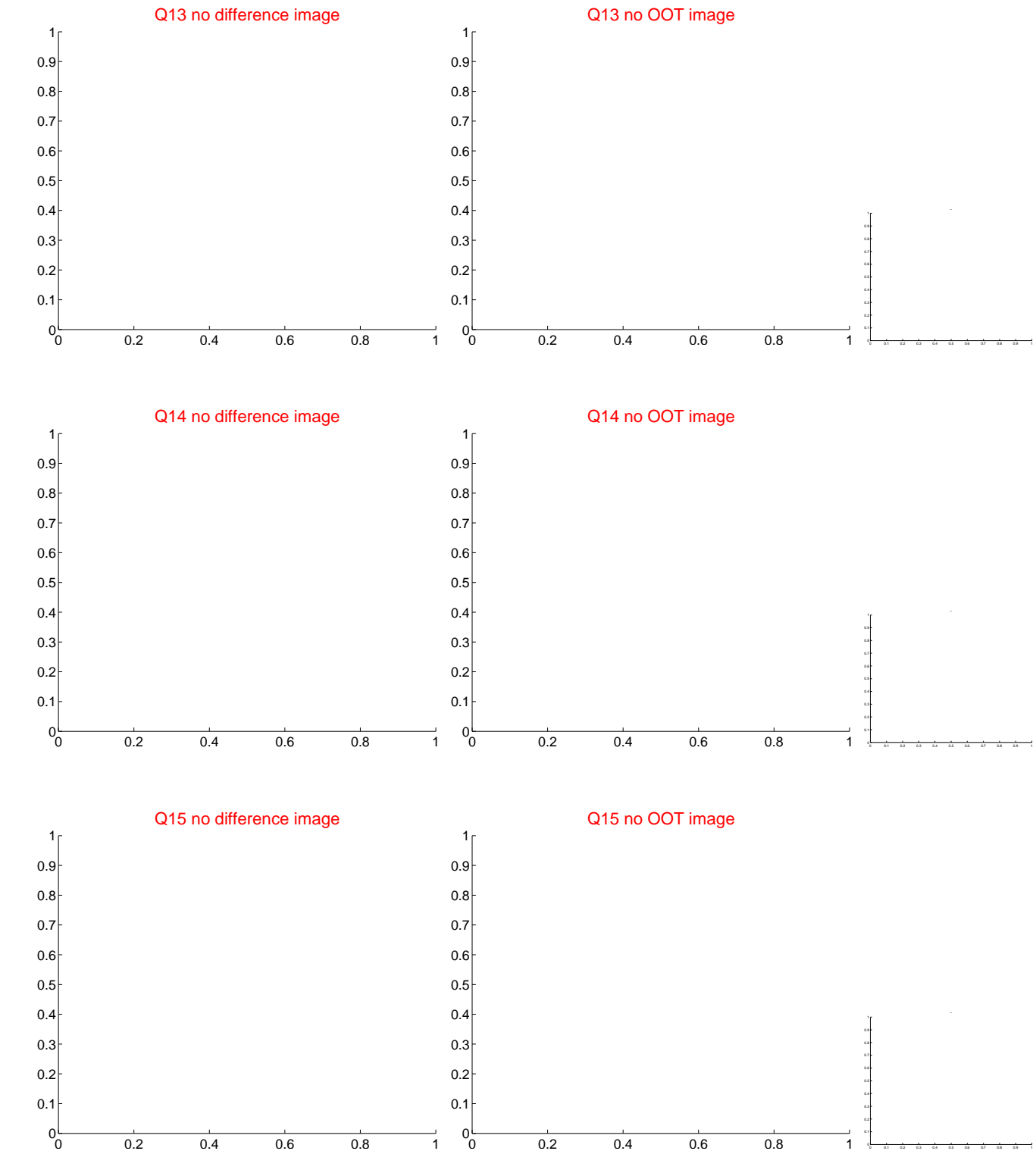
Q12 no difference image



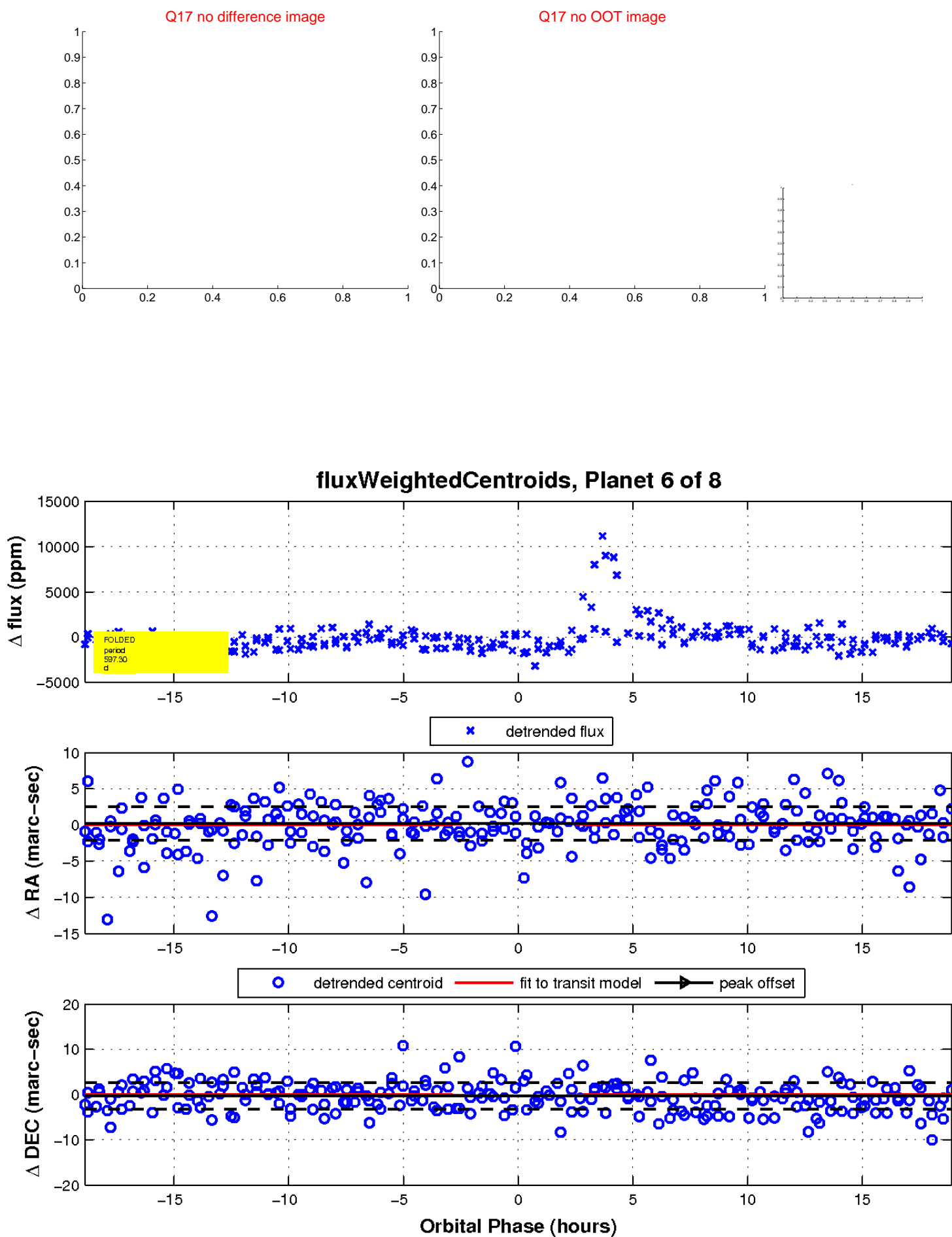
Q12 no OOT image



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

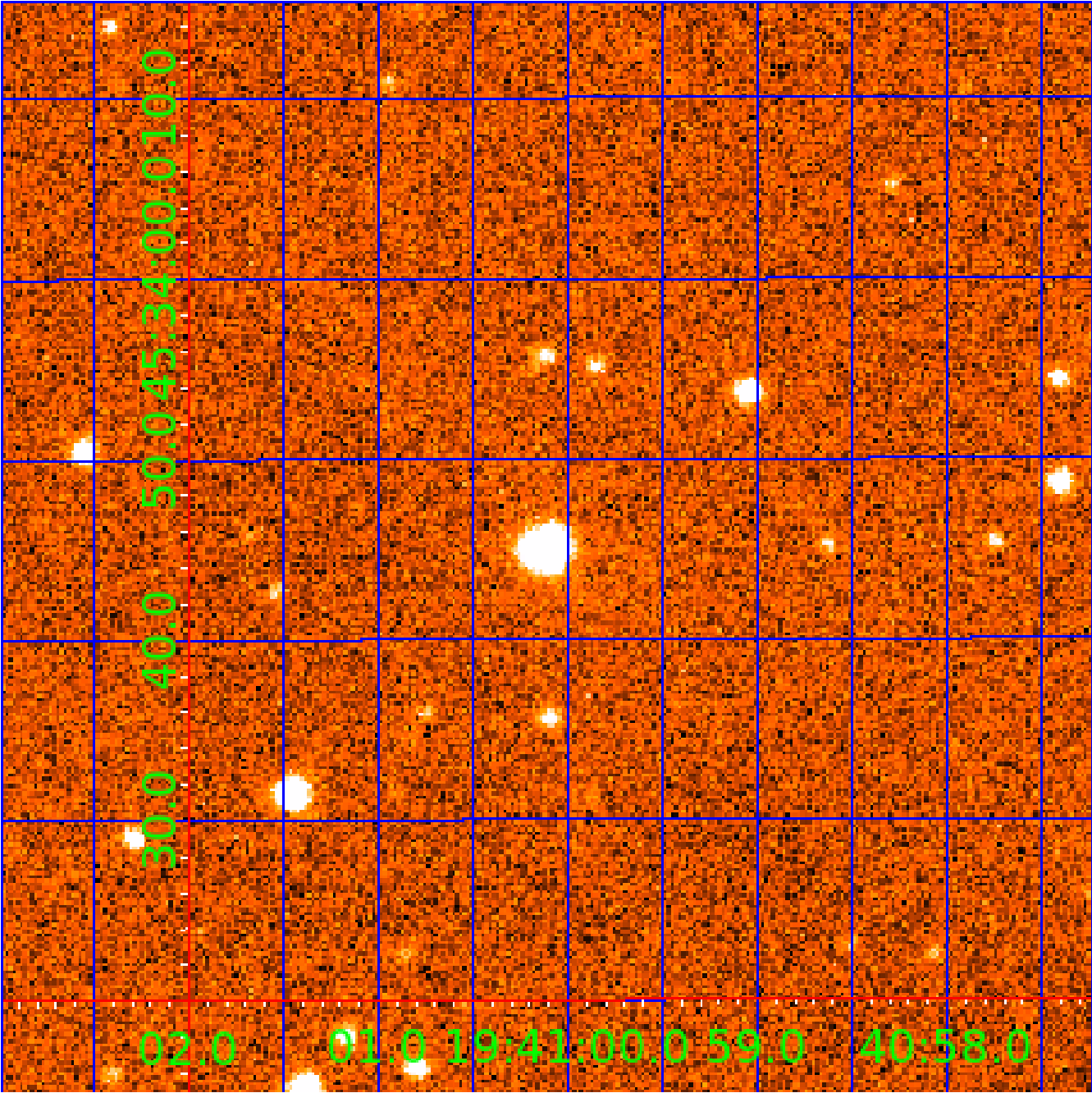


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 009163591

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})
009163591-02	OBS	No	339.116636	424.234634	2113.0	5.851	12.4	8.1	0.67	4523	3.21	0.24
009163591-03	OBS	No	506.024433	308.442643	2170.4	5.952	10.9	8.5	0.67	4523	4.10	0.14
009163591-04	OBS	No	507.941245	380.777665	2040.0	8.990	11.9	7.5	0.67	4523	3.14	0.14
009163591-06	OBS	No	597.296079	312.619376	1979.3	6.317	10.7	7.4	0.67	4523	3.12	0.12
009163591-07	OBS	No	569.558629	144.764329	1624.7	4.955	12.4	6.4	0.67	4523	2.97	0.12

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009163591-02	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
009163591-03	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
009163591-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009163591-06	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
009163591-07	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

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

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

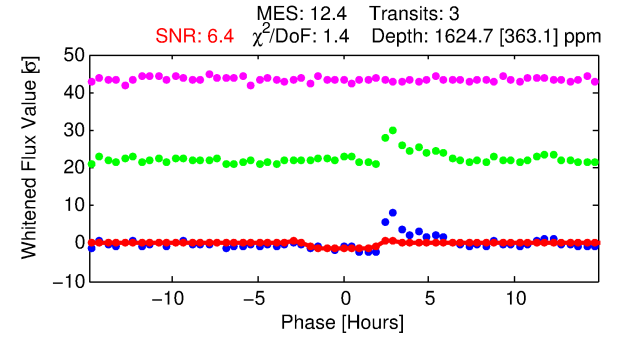
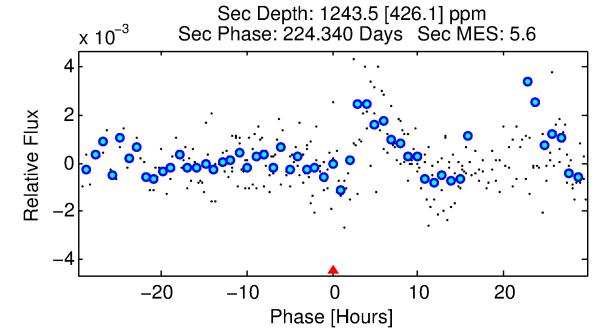
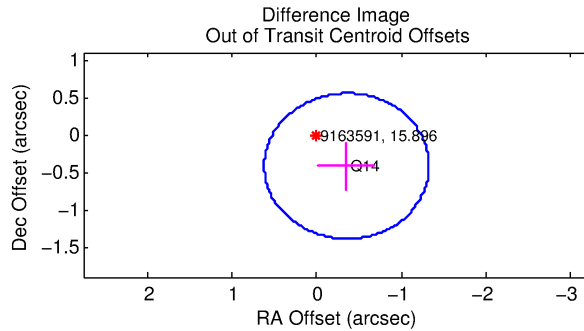
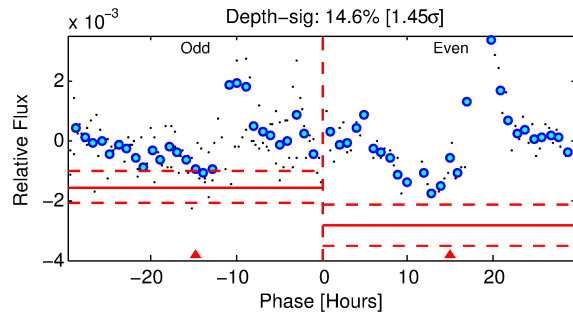
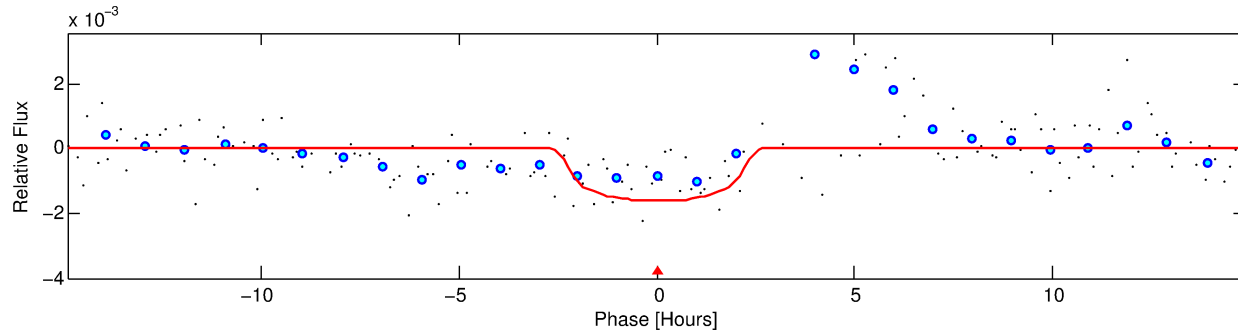
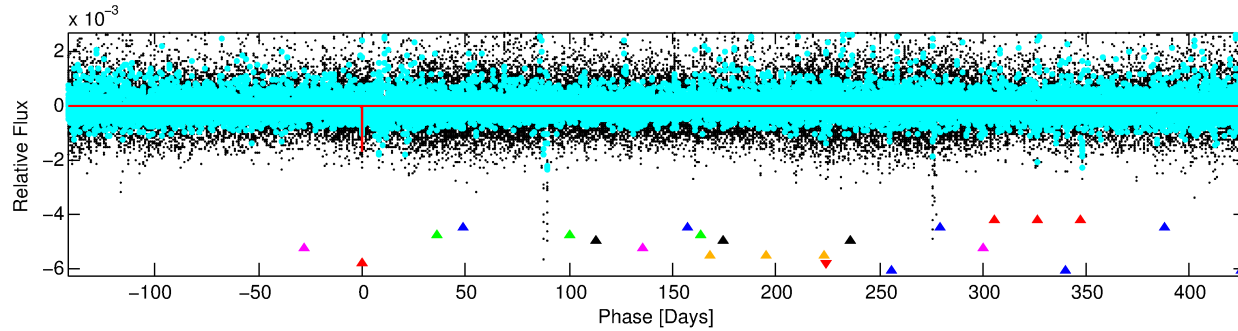
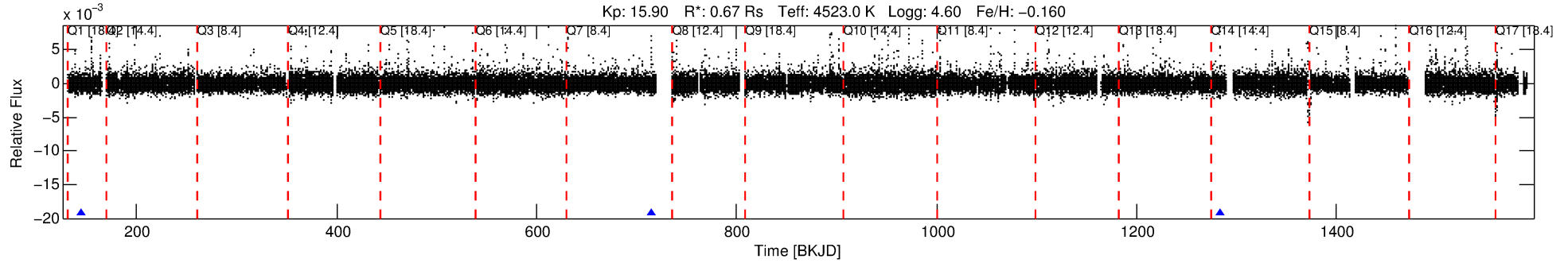
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009163591-07

No Significant Match Found

DV One-Page Summary

KIC: 9163591 Candidate: 7 of 8 Period: 569.559 d



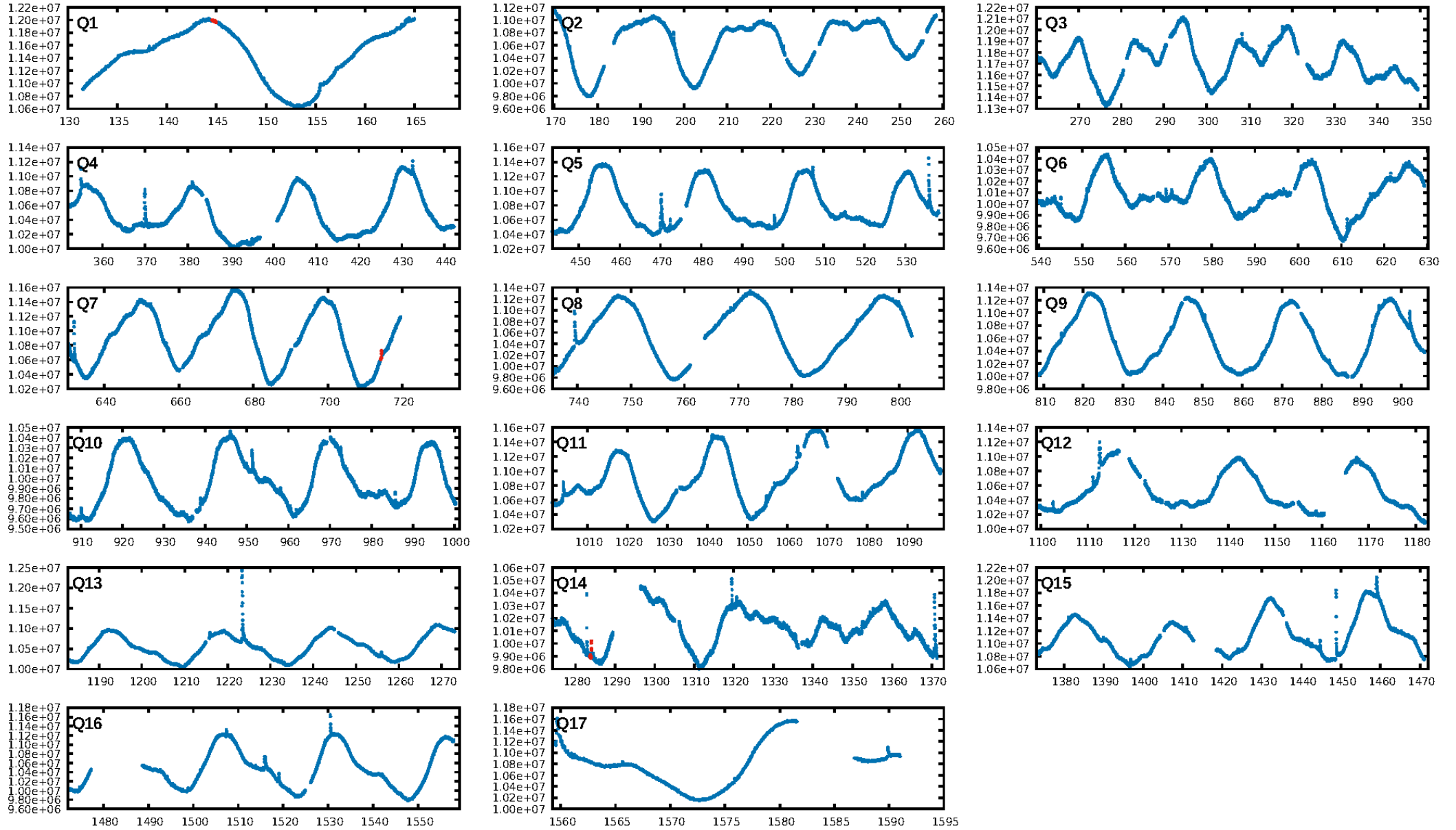
DV Fit Results:

Period = 569.55863 [0.01028] d
Epoch = 144.7643 [0.0124] BKJD
Rp/R* = 0.0407 [0.0441]
a/R* = 621.40 [2136.65]
b = 0.76 [1.93]
Seff = 0.12 [0.02]
Teq = 151 [6] K
Rp = 2.97 [3.23] Re
a = 1.1686 [0.0851] AU
Ag = 105858.23 [232587.09] [0.46 σ]
Teffp = 4210 [2314] K [1.75 σ]

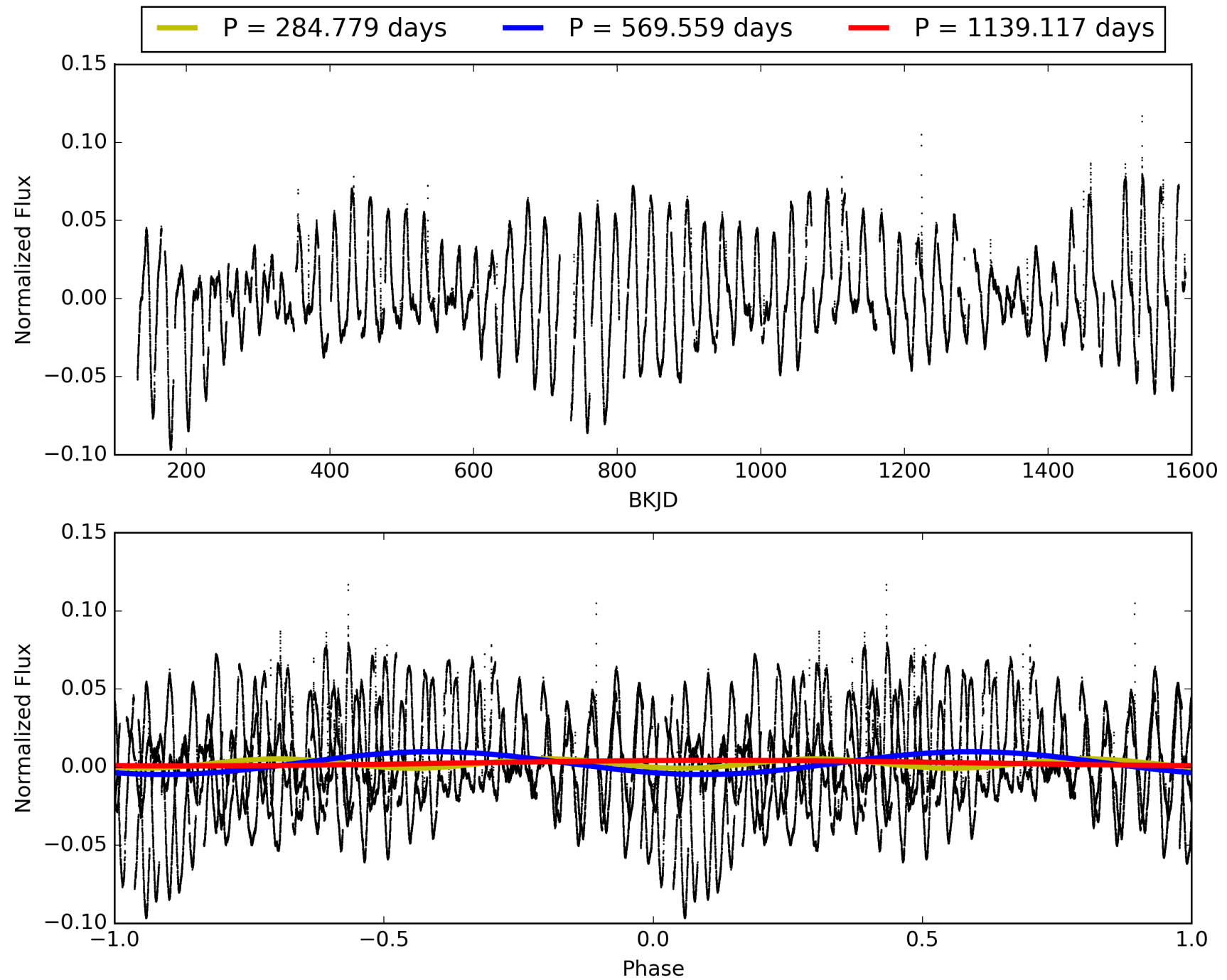
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [45.05 σ]
LongPeriod-sig: 100.0% [82.92 σ]
ModelChiSquare2-sig: 1.8%
ModelChiSquareGof-sig: 77.5%
Bootstrap-pfa: N/A
RollingBand-fgt: 1.00 [2/2]
GhostDiagnostic-chr: -5.983
Centroid-sig: 92.6%
Centroid-so: 0.551 arcsec [0.45 σ]
OotOffset-rm: 0.550 arcsec [1.70 σ]
OotOffset-st: 1/0/0/0 [1]
KicOffset-rm: 0.642 arcsec [1.99 σ]
KicOffset-st: 1/0/0/0 [1]
DiffImageQuality-fgm: 1.00 [1/1]
DiffImageOverlap-fno: 1.00 [2/2]

TCE 009163591-07, PDC Light Curves

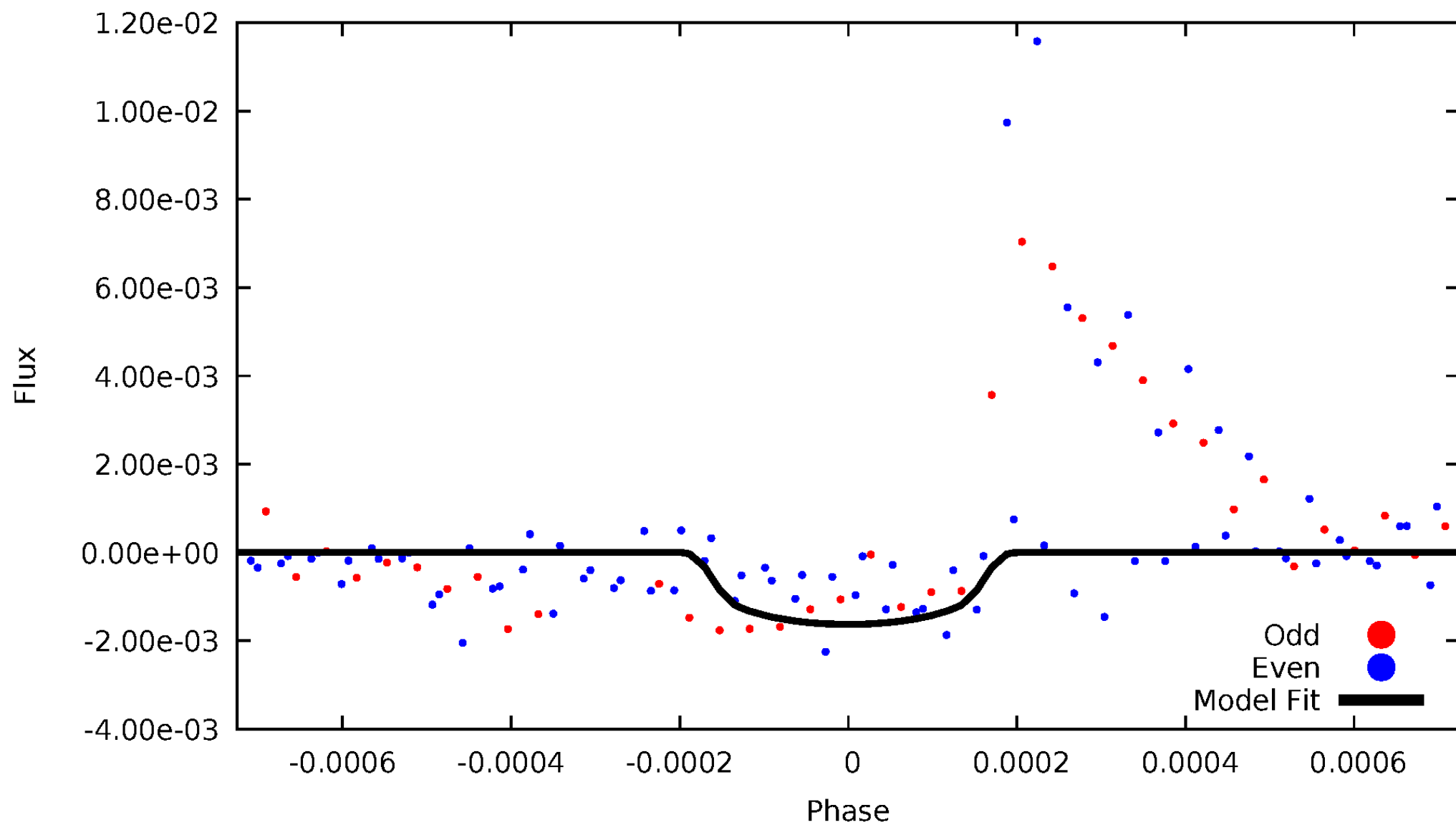


TCE 009163591-07



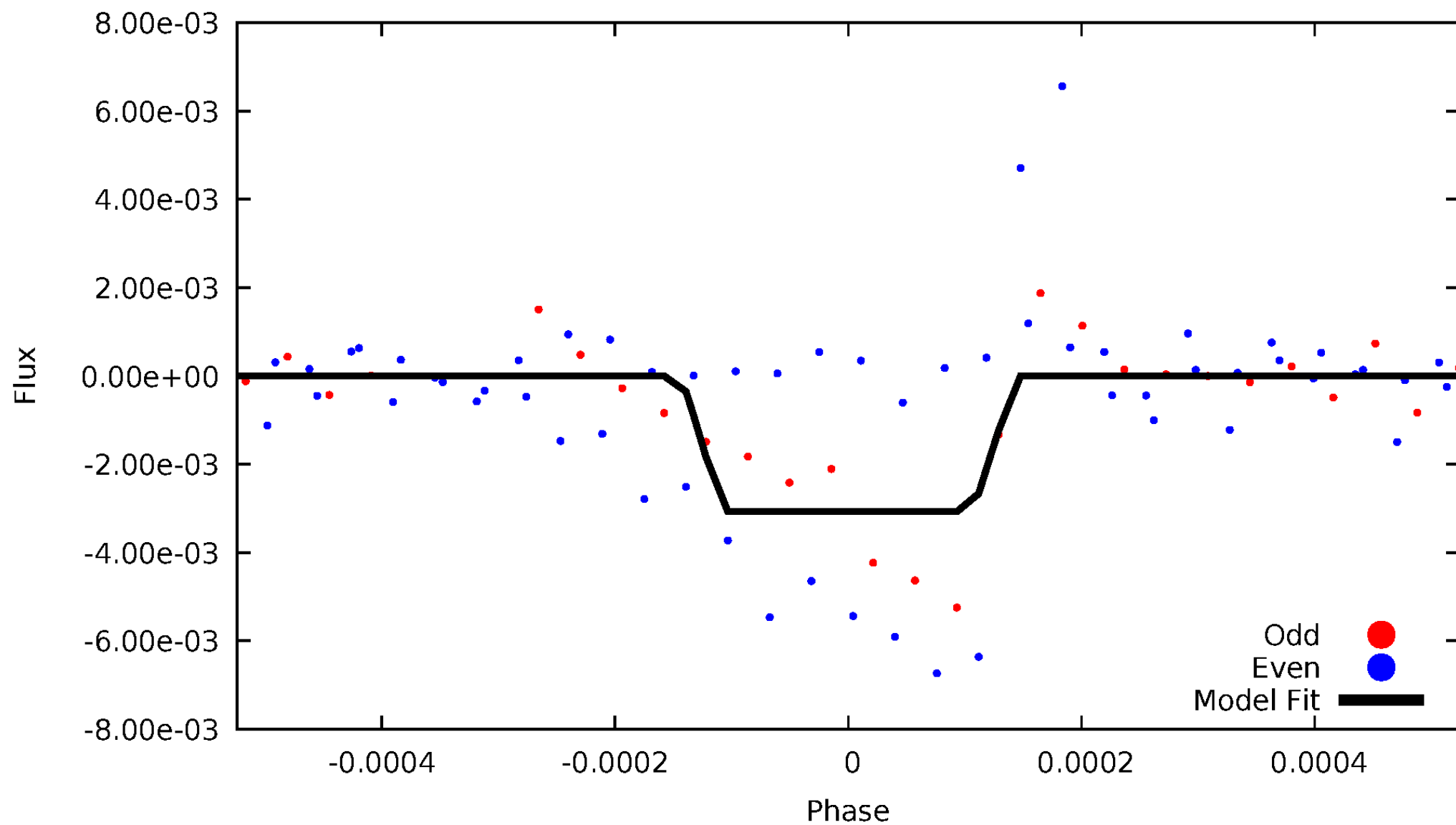
DV Odd/Even

TCE 009163591-07



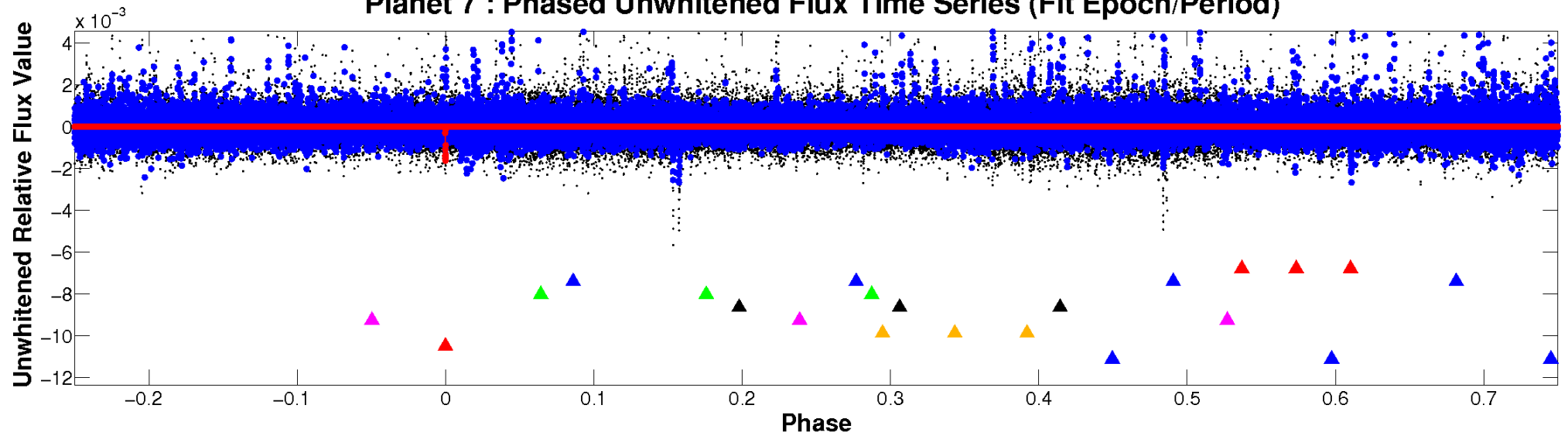
ALT Odd/Even

TCE 009163591-07

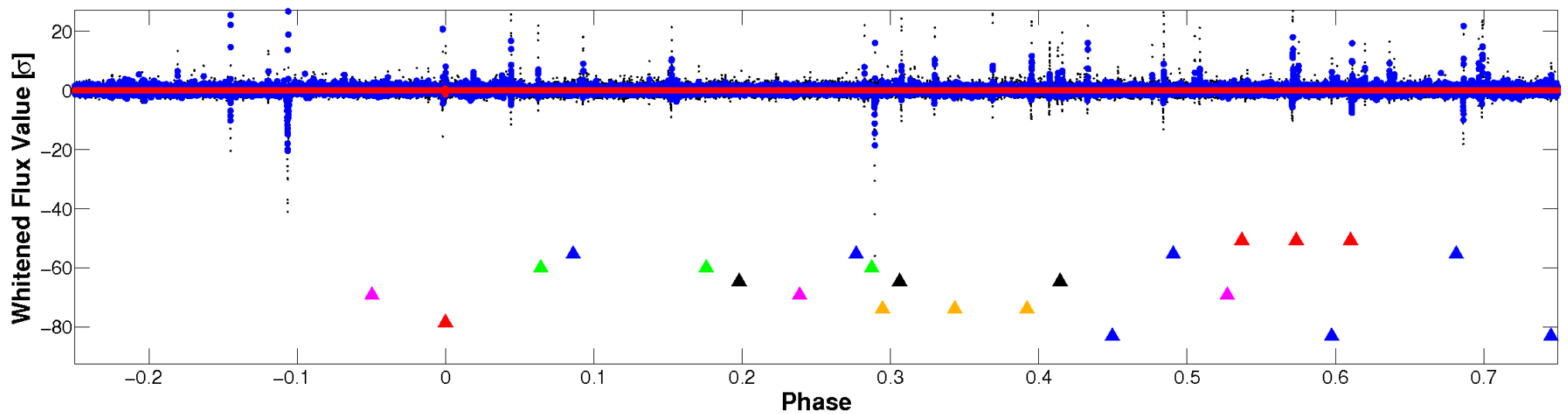


Non-Whitened Vs. Whitened Light Curve

Planet 7 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

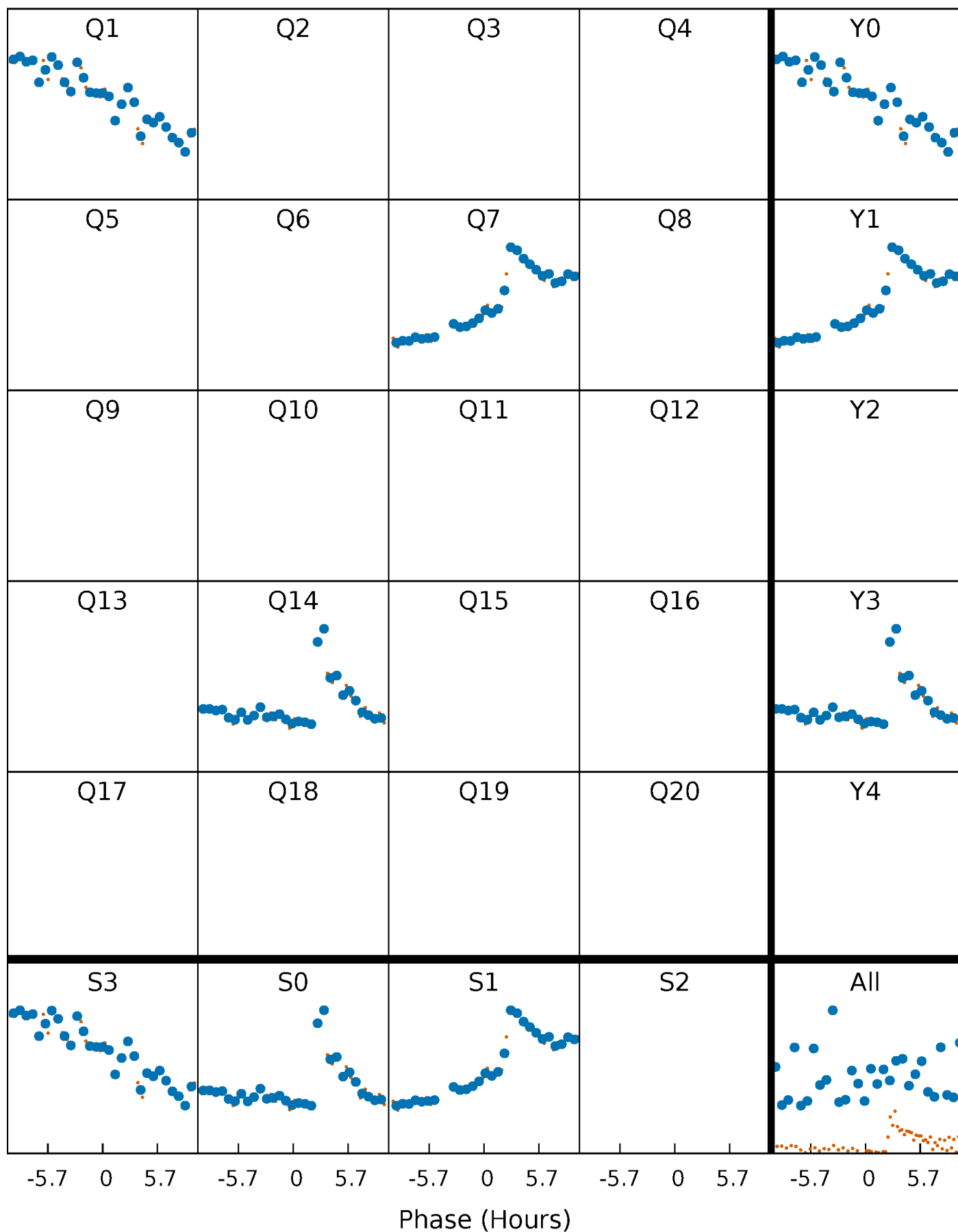


Planet 7 : Phased Whitened Flux Time Series (Fit Epoch/Period)



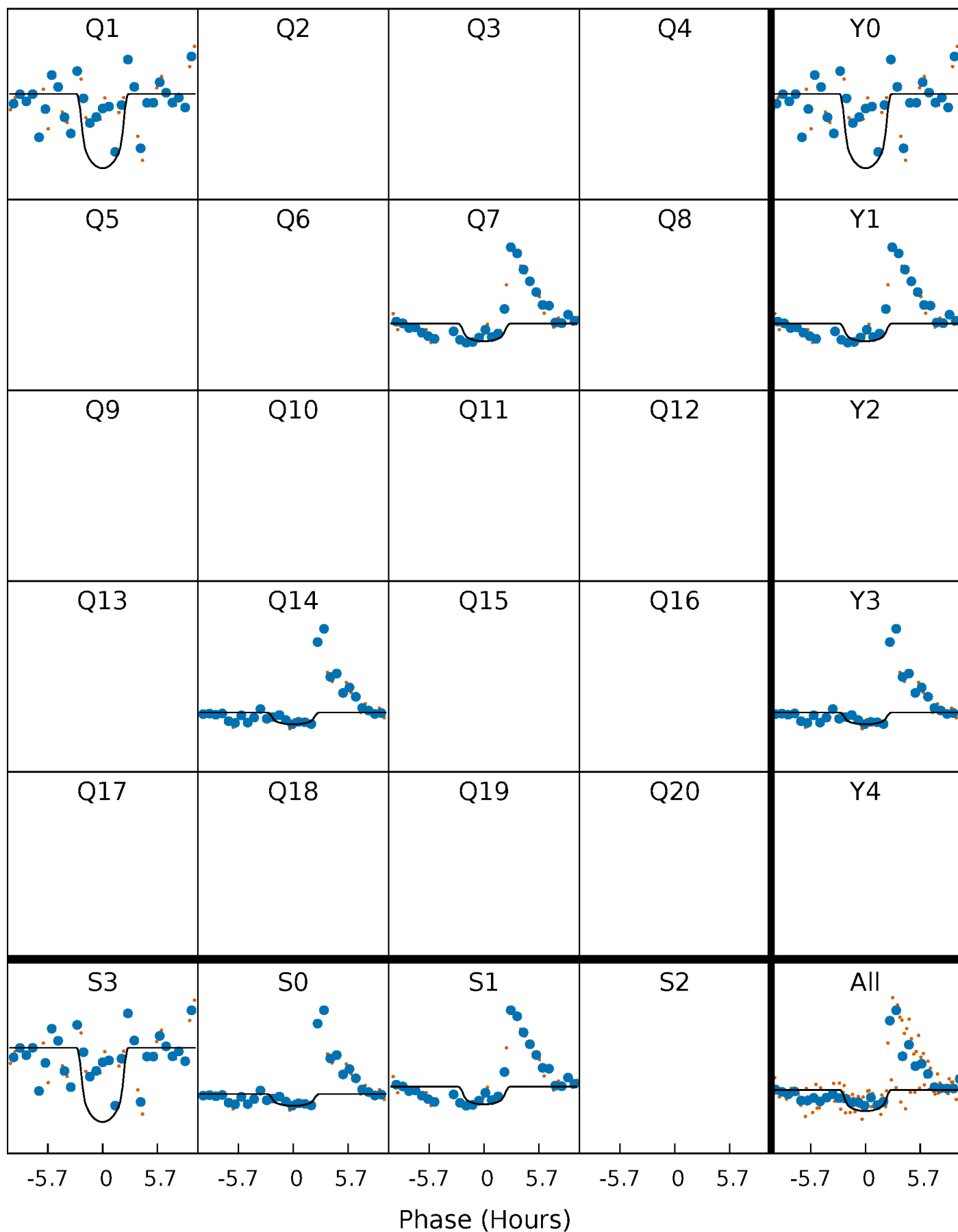
PDC Quarter-Phased Transit Curves

TCE 009163591-07 $P=569.558629$ Days $T_0=144.764329$ (BKJD)



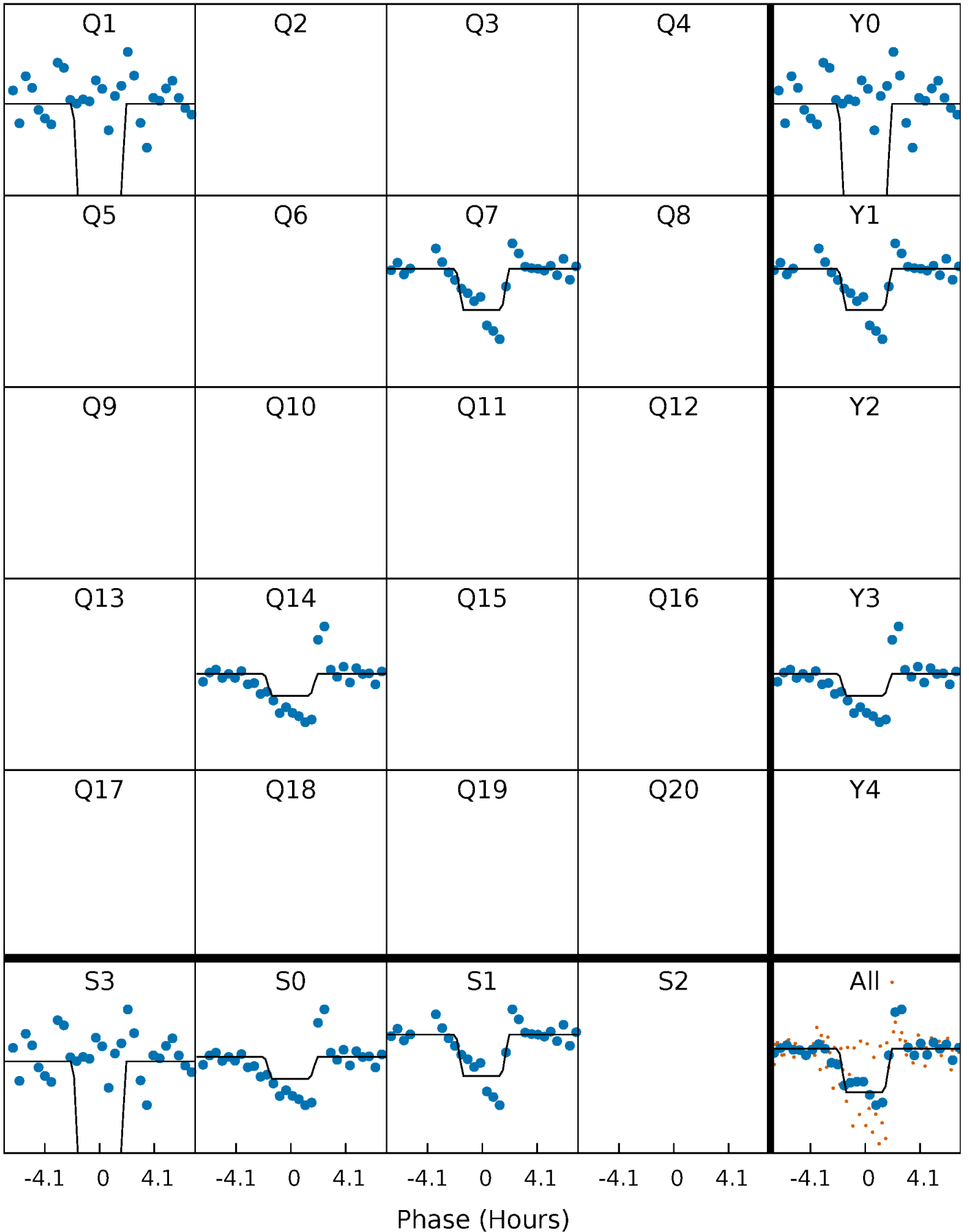
DV Quarter-Phased Transit Curves

TCE 009163591-07 $P=569.558629$ Days $T_0=144.764329$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

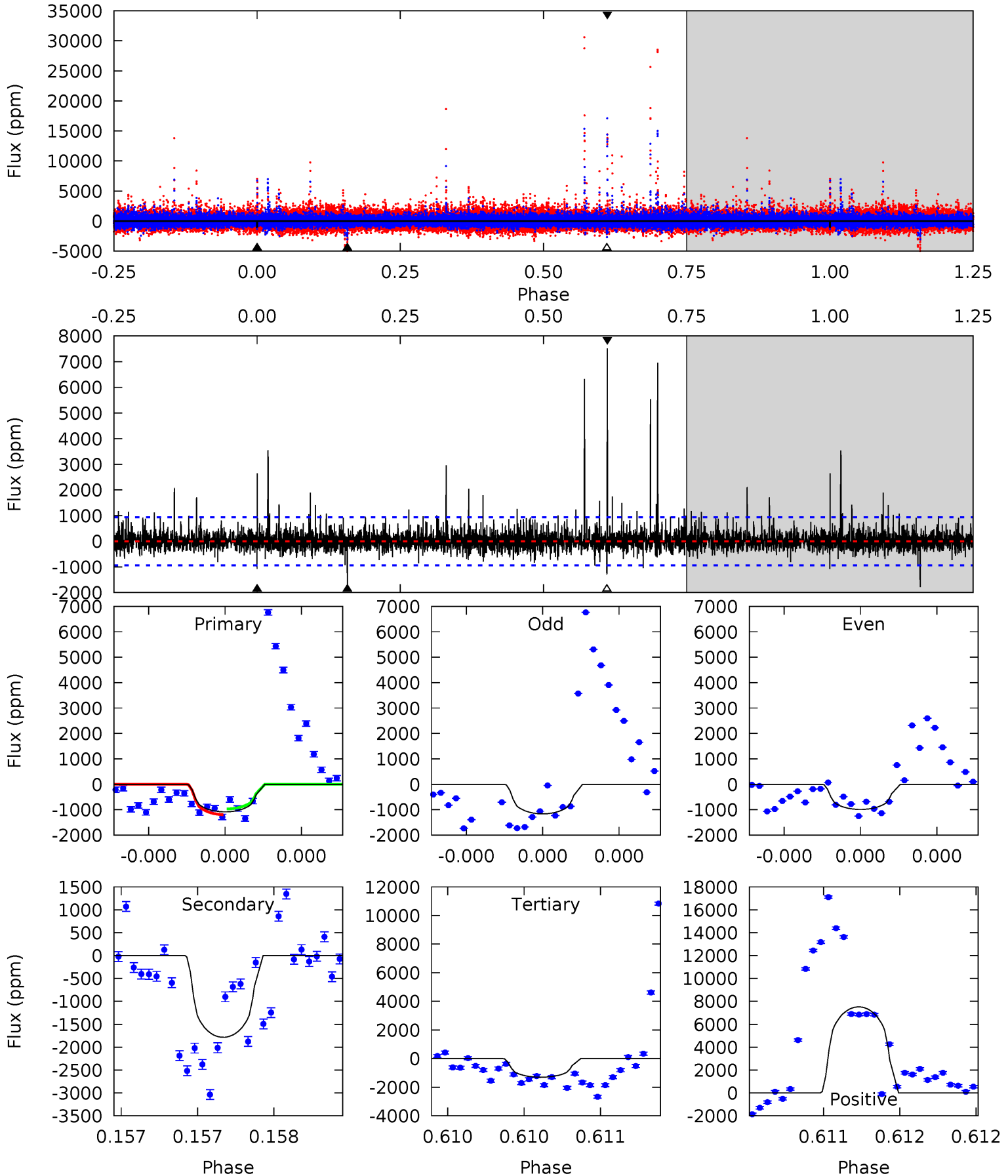
TCE 009163591-07 P=569.558240 Days $T_0=144.788158$ (BKJD)



DV Model-Shift Uniqueness Test

009163591-07, P = 569.558629 Days, E = 144.764329 Days

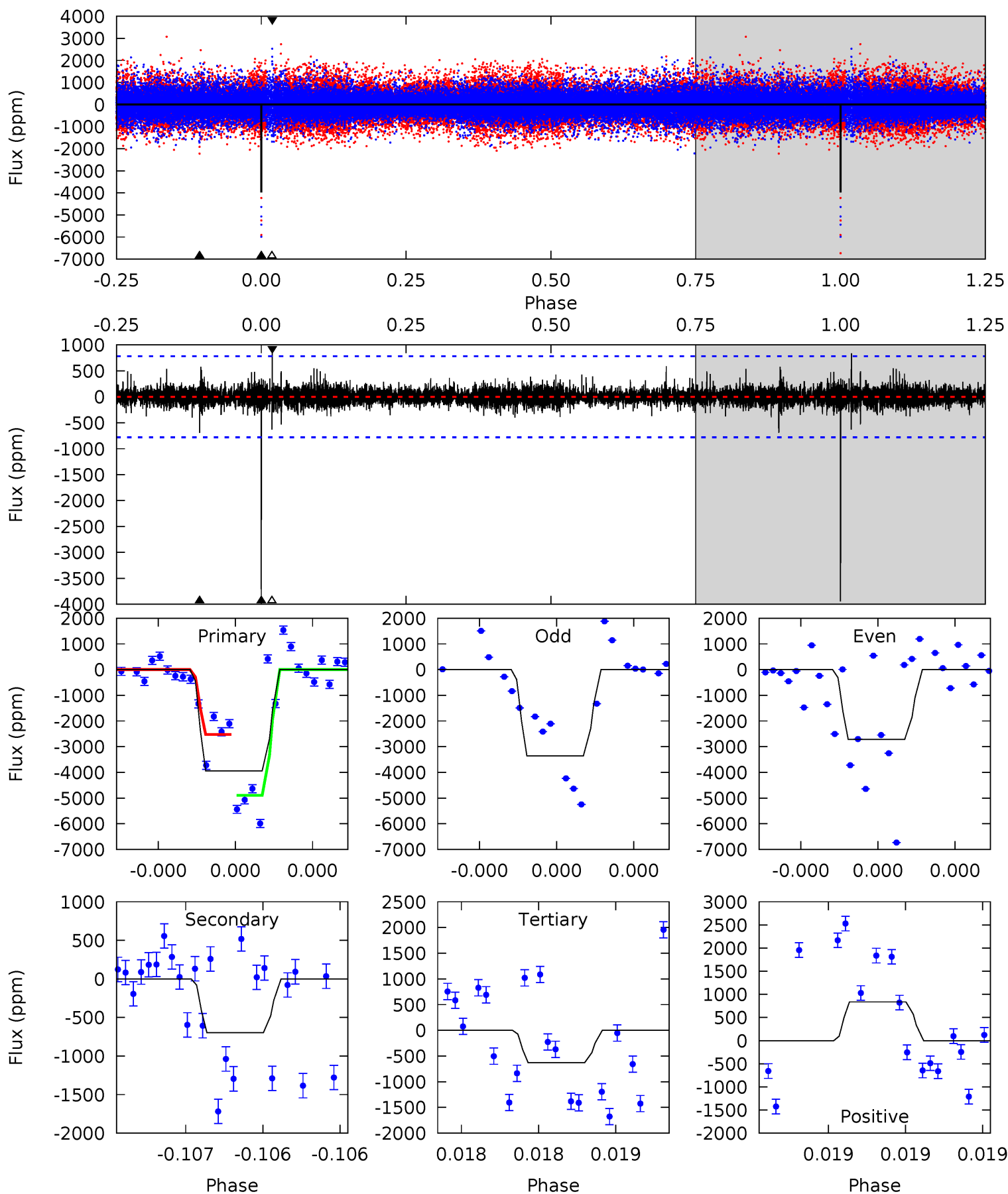
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.49	10.7	7.80	45.0	5.61	3.54	2.21	-1.31	-38.6	2.89	-34.4	0.25	0.89	0.81	0.68



Alt Model-Shift Uniqueness Test

009163591-07, P = 569.558240 Days, E = 144.788158 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
28.6	5.07	4.58	6.08	5.68	3.64	0.65	24.1	22.6	0.49	-1.01	2.54	0.87	0.18	8.61



Stellar Parameters For KIC 009163591

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (g \cdot \text{cm}^{-3})$
	4523^{+136}_{-136}	$4.604^{+0.056}_{-0.024}$	$-0.160^{+0.300}_{-0.300}$	$0.669^{+0.048}_{-0.059}$	$0.655^{+0.073}_{-0.049}$	$3.087^{+0.723}_{-0.331}$
	+3%/-3%	+1%/-1%	+188%/-188%	+7%/-9%	+11%/-7%	+23%/-11%
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 009163591-07 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	-1784 ± 167	$3.76^{+2.69}_{-2.25}$	210^{+7}_{-7}	4183^{+1974}_{-701}	$94747^{+499241}_{-61461}$
Alt.	-698 ± 138	$4.29^{+3.31}_{-2.38}$	209^{+7}_{-7}	3411^{+1153}_{-547}	$29229^{+121421}_{-20251}$

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

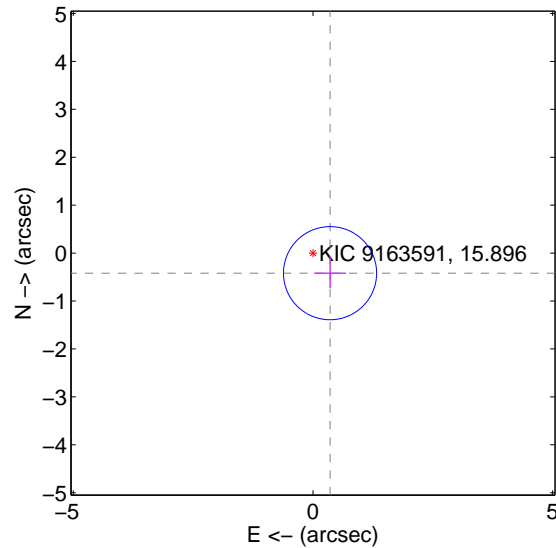
Supplemental centroid analysis for 009163591-07. Kepler magnitude: 15.90. Transit SNR 6.40

There are 1 quarters with good PRF difference image offsets

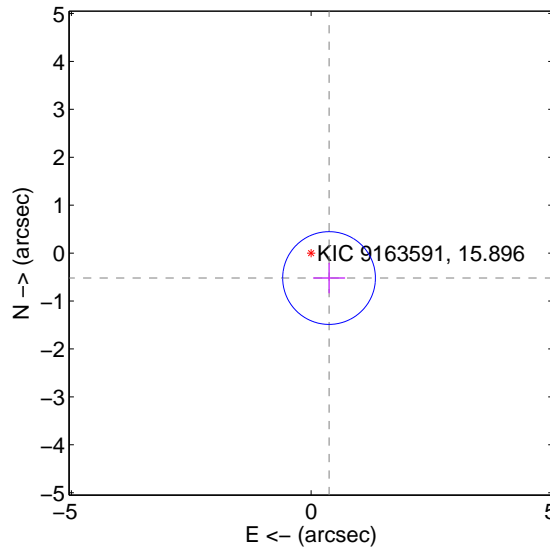
The direct PRF centroid is offset from the target star catalog position by about 0.10 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.550 ± 0.324	1.70	-0.356 ± 0.334	-0.419 ± 0.316
PRF-fit source offset from KIC position	0.642 ± 0.322	1.99	-0.375 ± 0.334	-0.520 ± 0.316
photometric centroid source offset	0.55 ± 1.22	0.45	0.21 ± 1.03	-0.51 ± 1.25

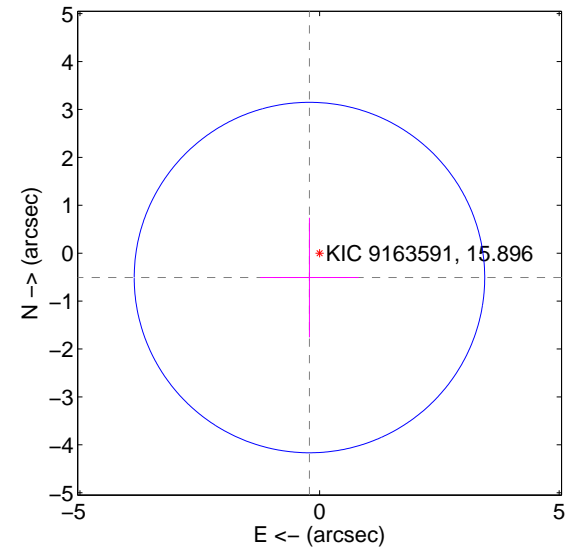
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

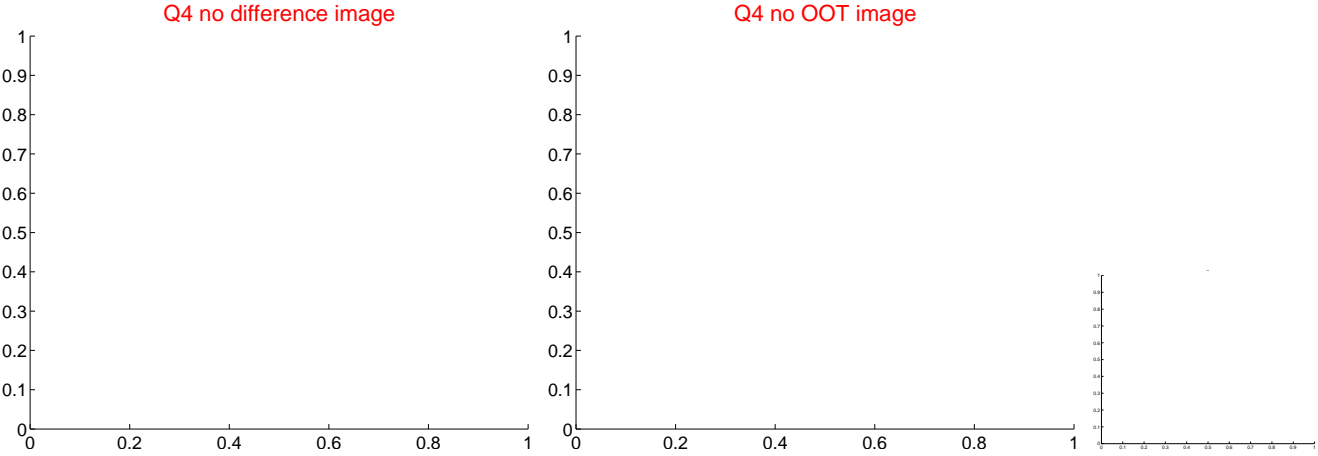
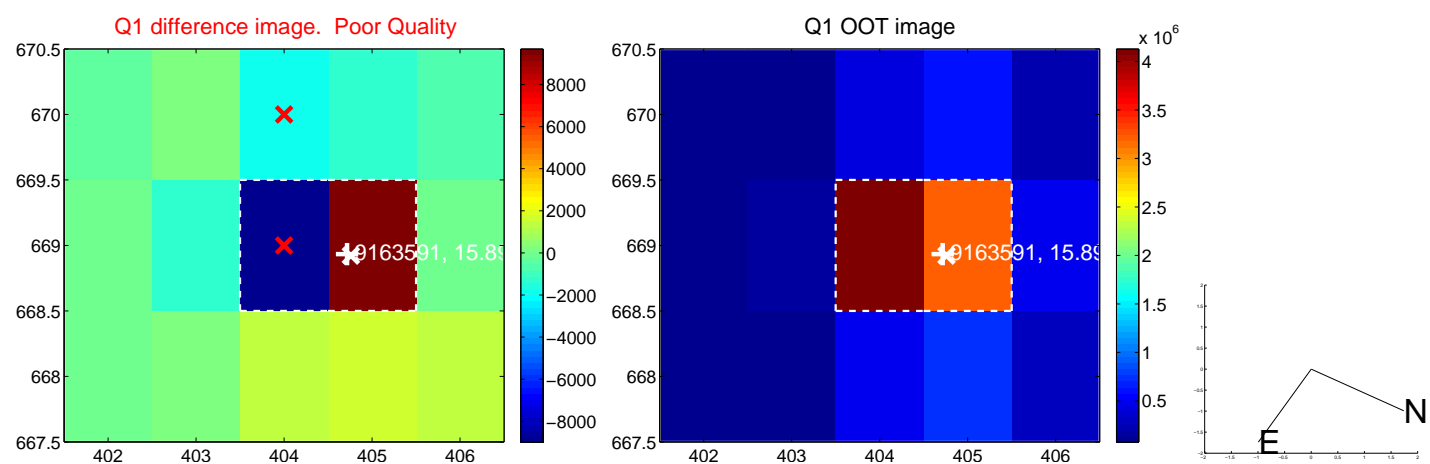


offset from photometric centroids



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.

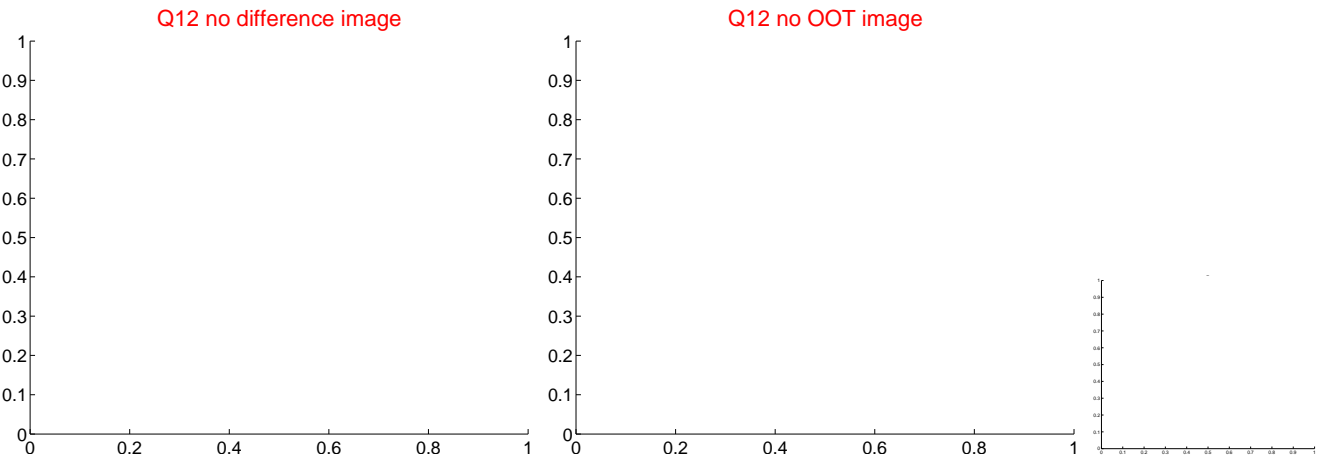
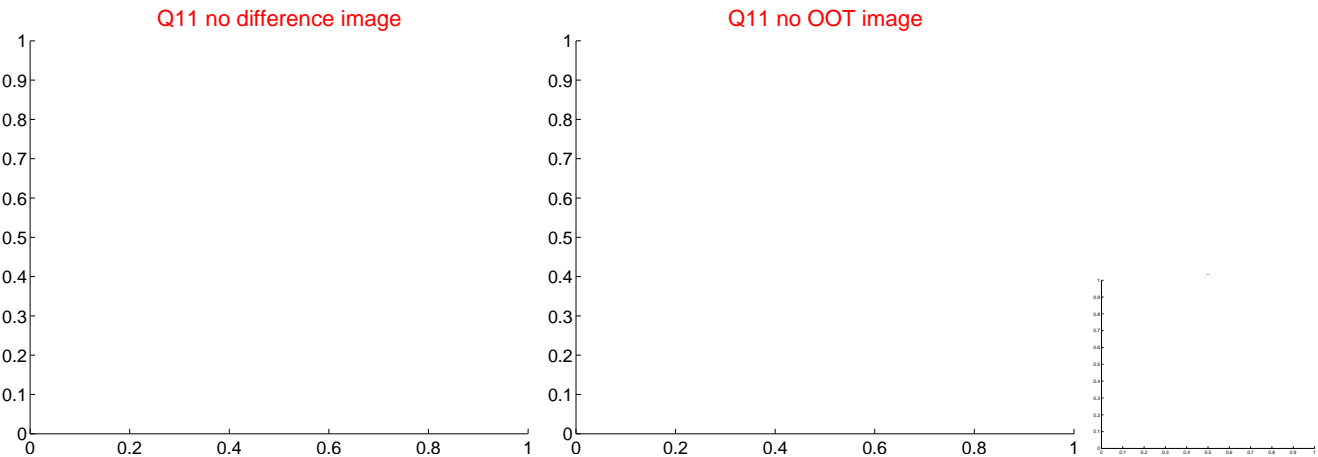
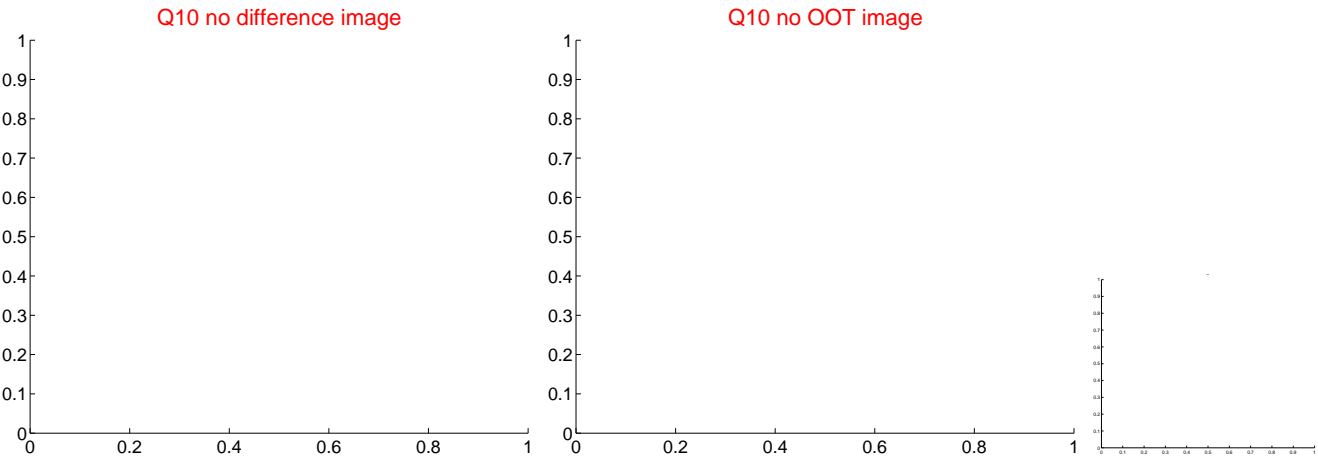
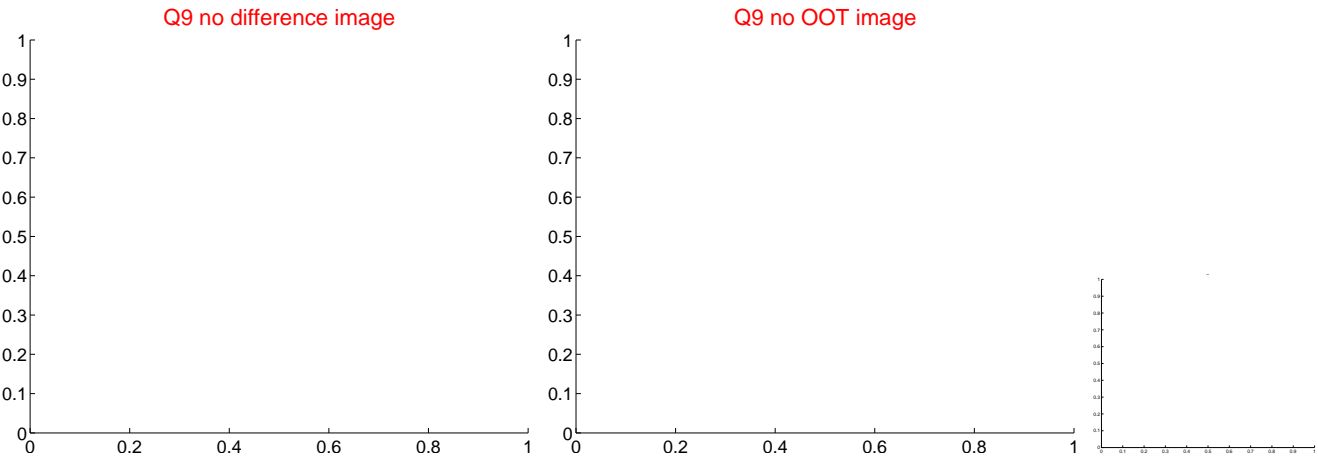
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



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

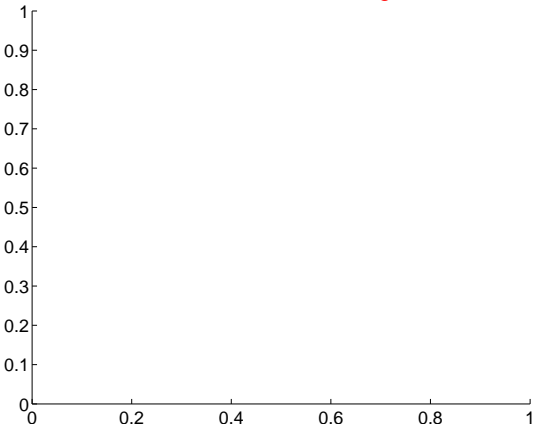


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.

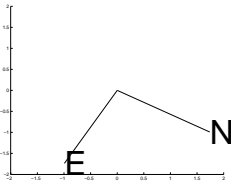
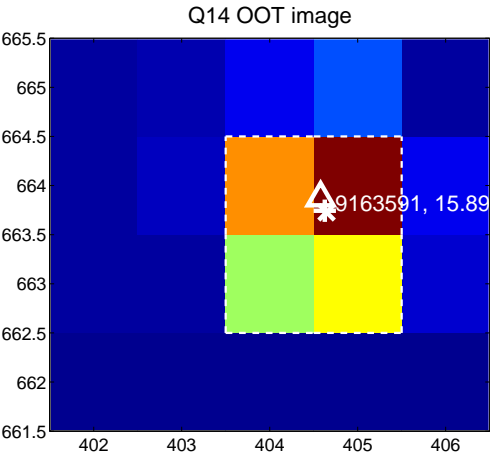
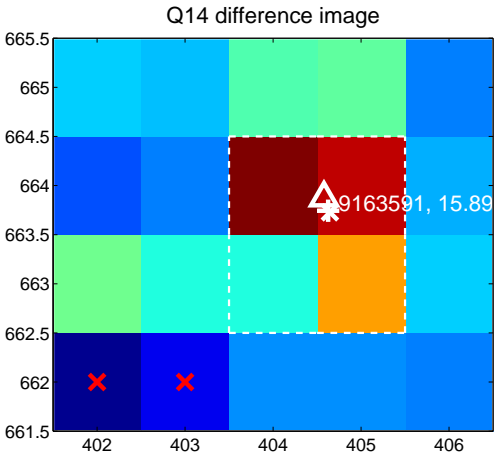


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.

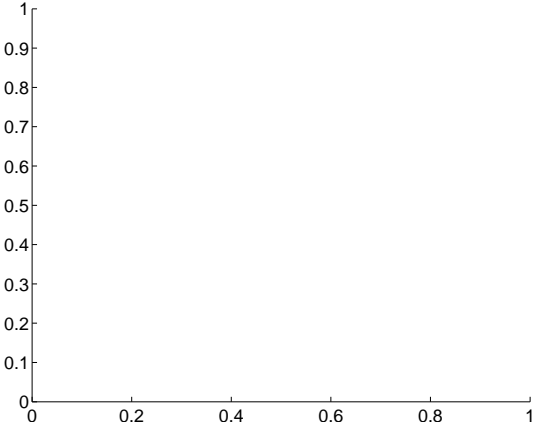
Q13 no difference image



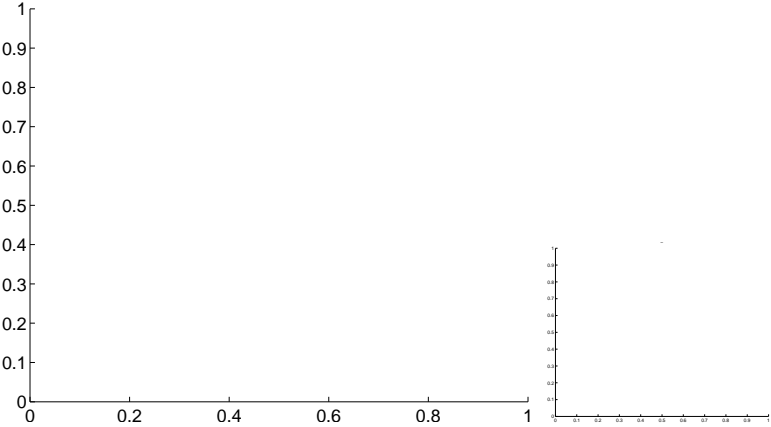
Q13 no OOT image



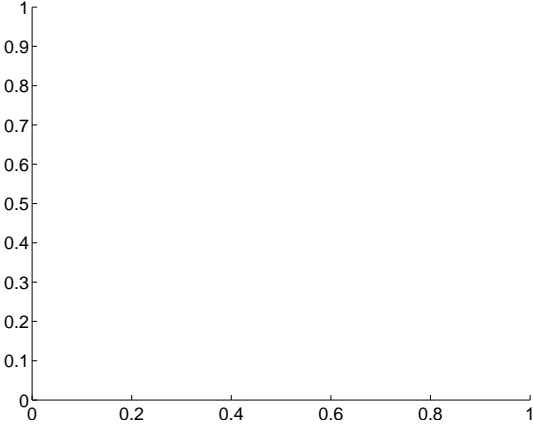
Q15 no difference image



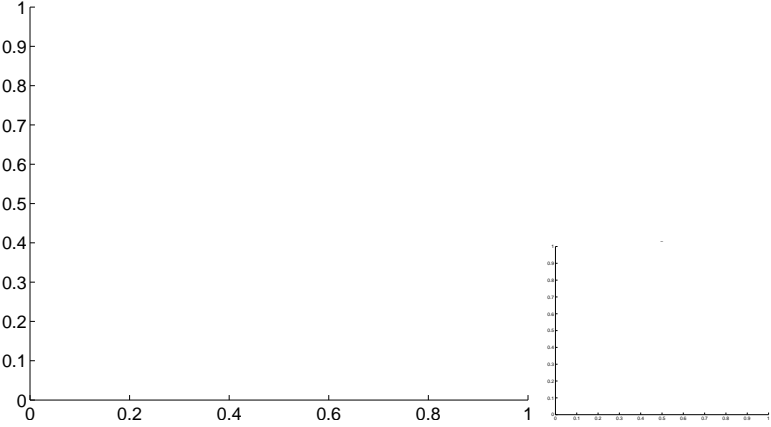
Q15 no OOT image



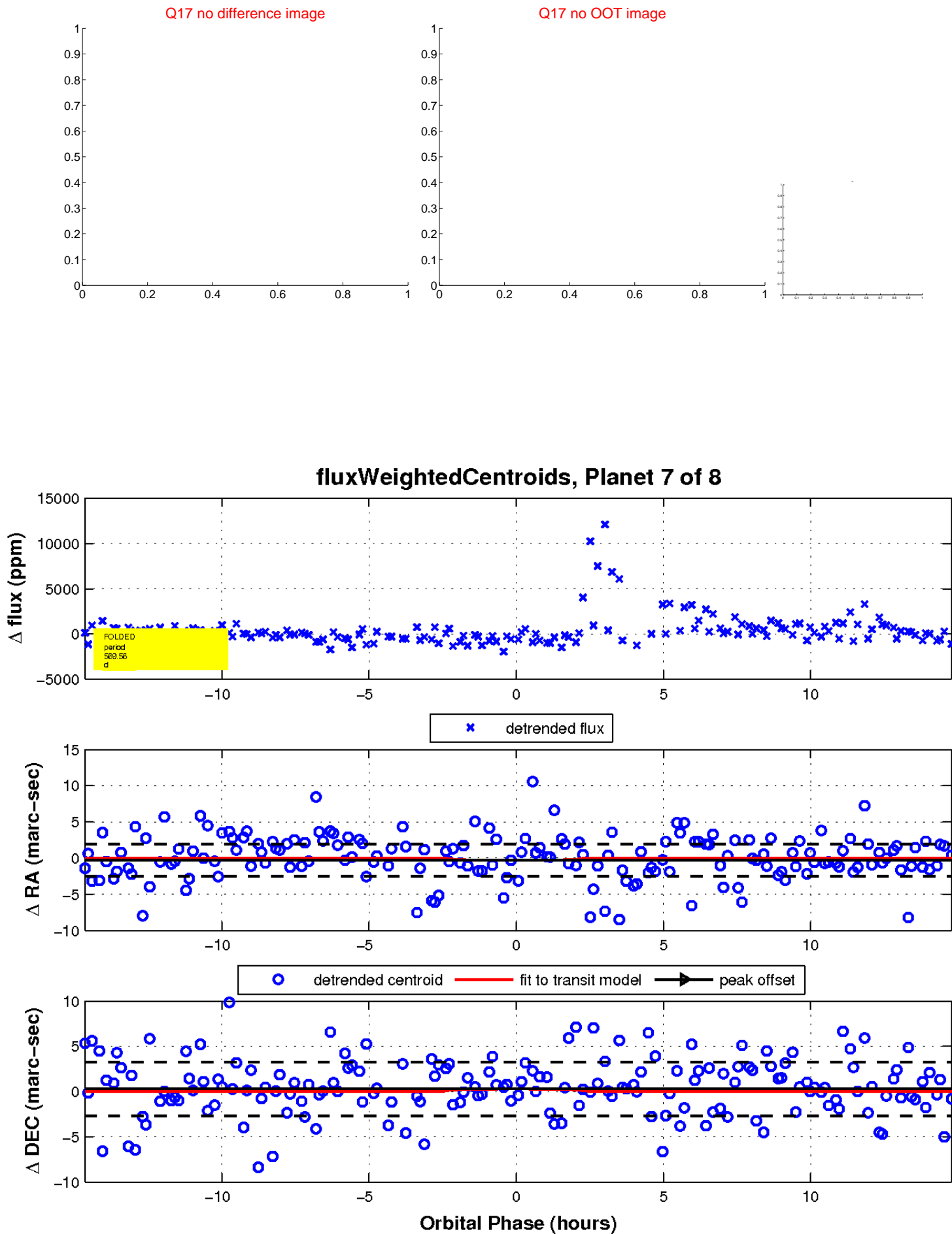
Q16 no difference image



Q16 no OOT image



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



UKIRT Image

Declination

