

KIC 009397220

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})
009397220-01	OBS	No	425.641459	207.885948	53.9	11.175	8.1	2.5	1.21	5810	1.05	1.36
009397220-02	OBS	No	280.784729	243.195424	133.5	10.335	7.7	7.2	1.21	5810	1.59	2.36

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009397220-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—CENT_FEW_DIFFS
009397220-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_KIC_POS

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

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

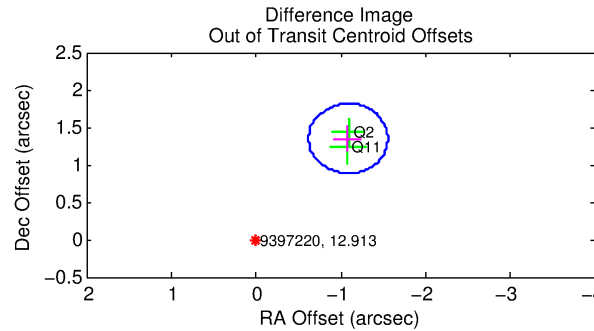
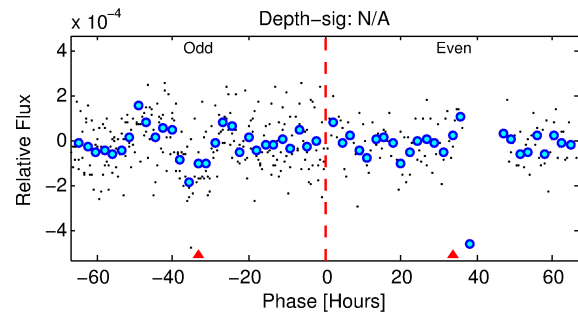
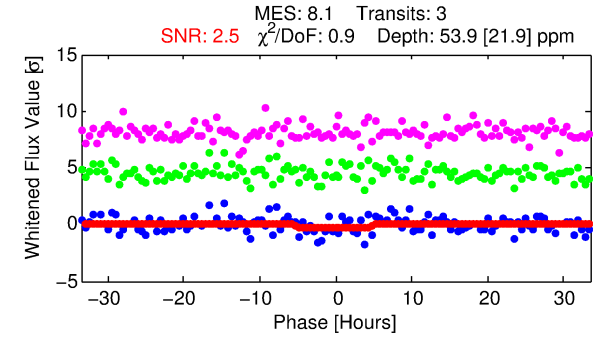
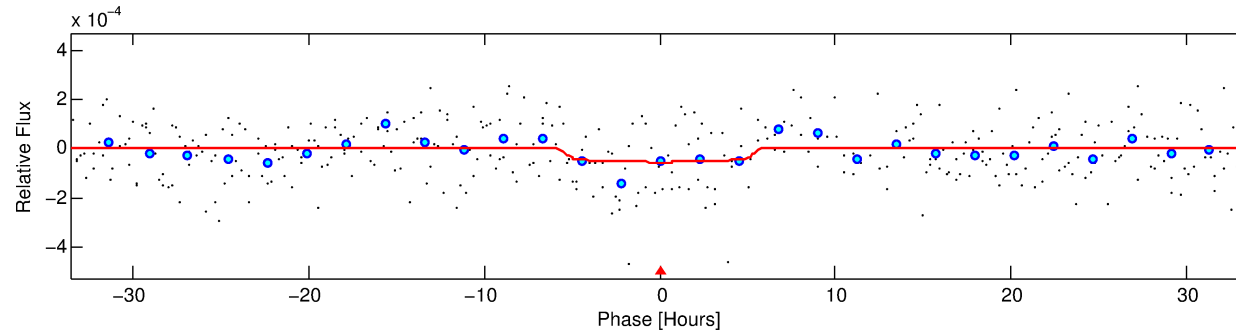
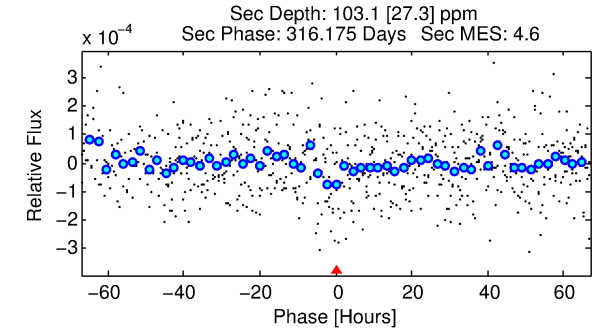
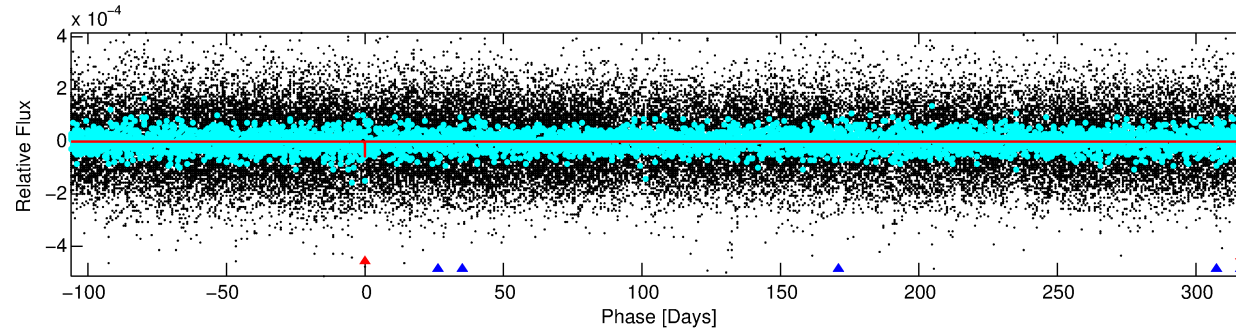
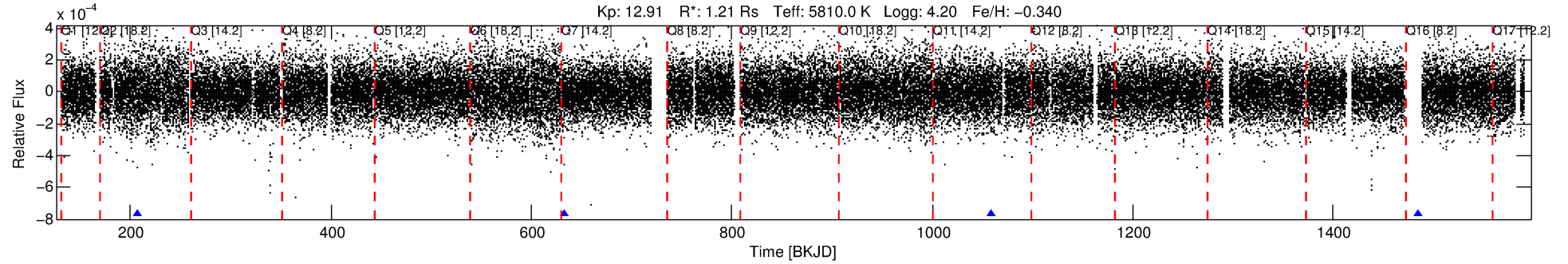
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009397220-01

No Significant Match Found

DV One-Page Summary

KIC: 9397220 Candidate: 1 of 2 Period: 425.641 d



DV Fit Results:

Period = 425.64146 [0.04006] d
Epoch = 207.8859 [0.0577] BKJD
Rp/R* = 0.0080 [0.0059]
a/R* = 131.80 [473.57]
b = 0.90 [0.77]
Seff = 1.36 [0.59]
Teq = 275 [30] K
Rp = 1.05 [0.83] Re
a = 1.0533 [0.2731] AU
Ag = 56706.89 [88701.73] [0.64σ]
Teff = 6565 [2478] K [2.54σ]

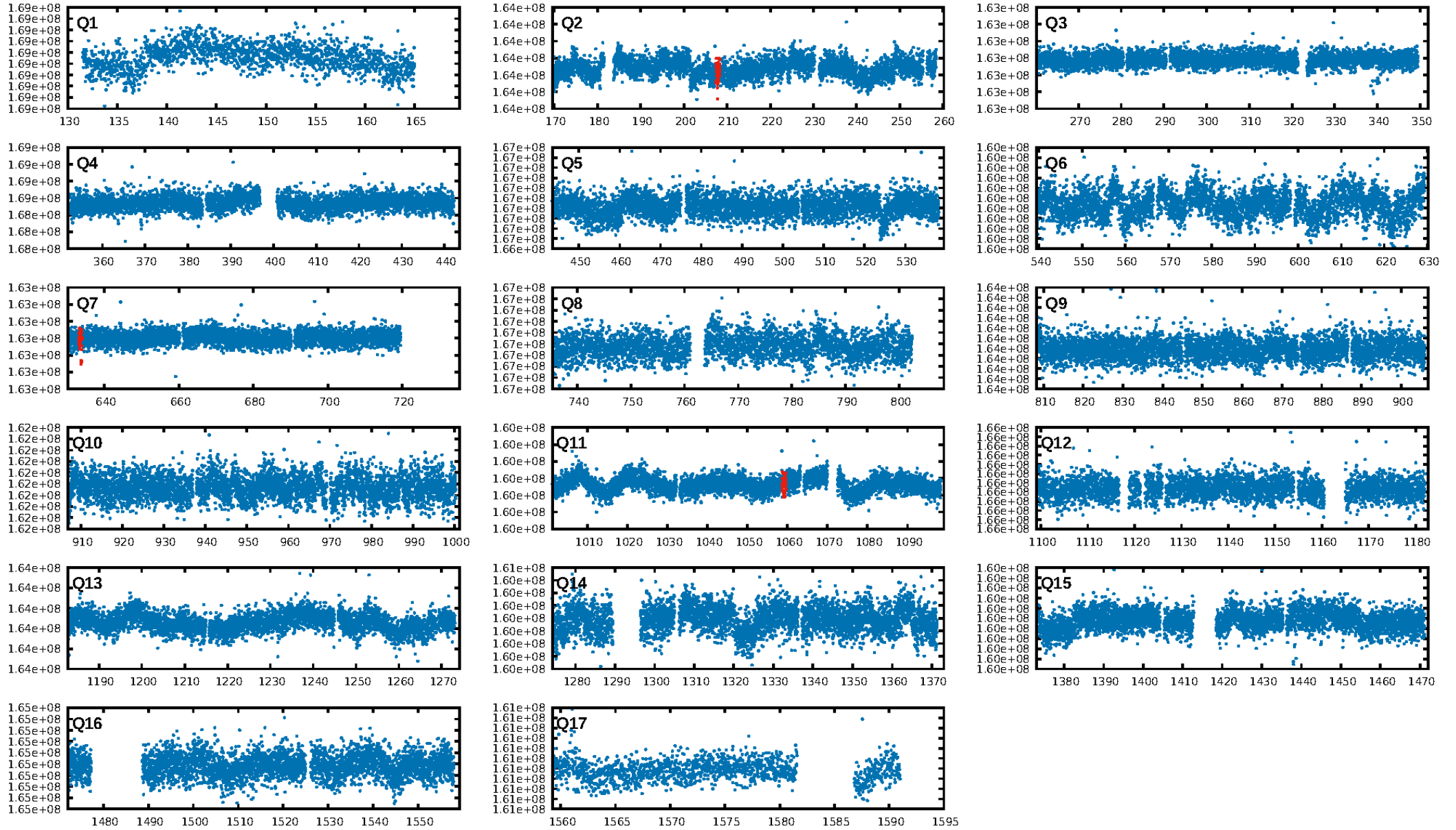
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [228.40σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 0.6%
ModelChiSquareGof-sig: 97.4%
Bootstrap-pfa: 3.33e-14
RollingBand-fgt: 1.00 [3/3]
GhostDiagnostic-chr: 8.69
Centroid-sig: 15.8%
Centroid-so: 5.778 arcsec [1.52σ]
OotOffset-rm: 1.732 arcsec [11.15σ]
KicOffset-rm: 2.095 arcsec [13.50σ]
OotOffset-st: 1/1/0/0 [2]
KicOffset-st: 1/1/0/0 [2]
DiffImageQuality-fgm: 1.00 [2/2]
DiffImageOverlap-fno: 1.00 [2/2]

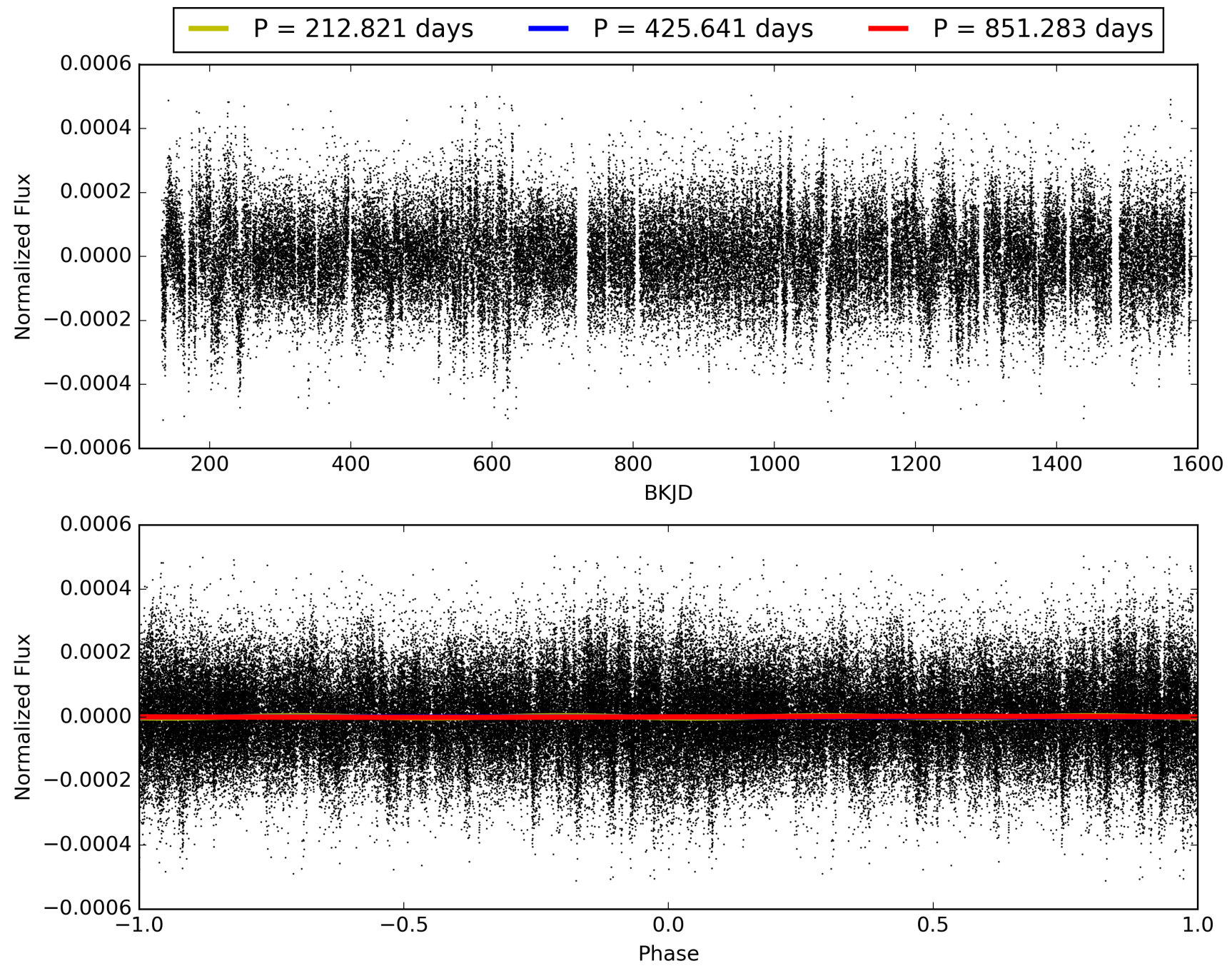
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 00:16:09 Z

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

TCE 009397220-01, PDC Light Curves

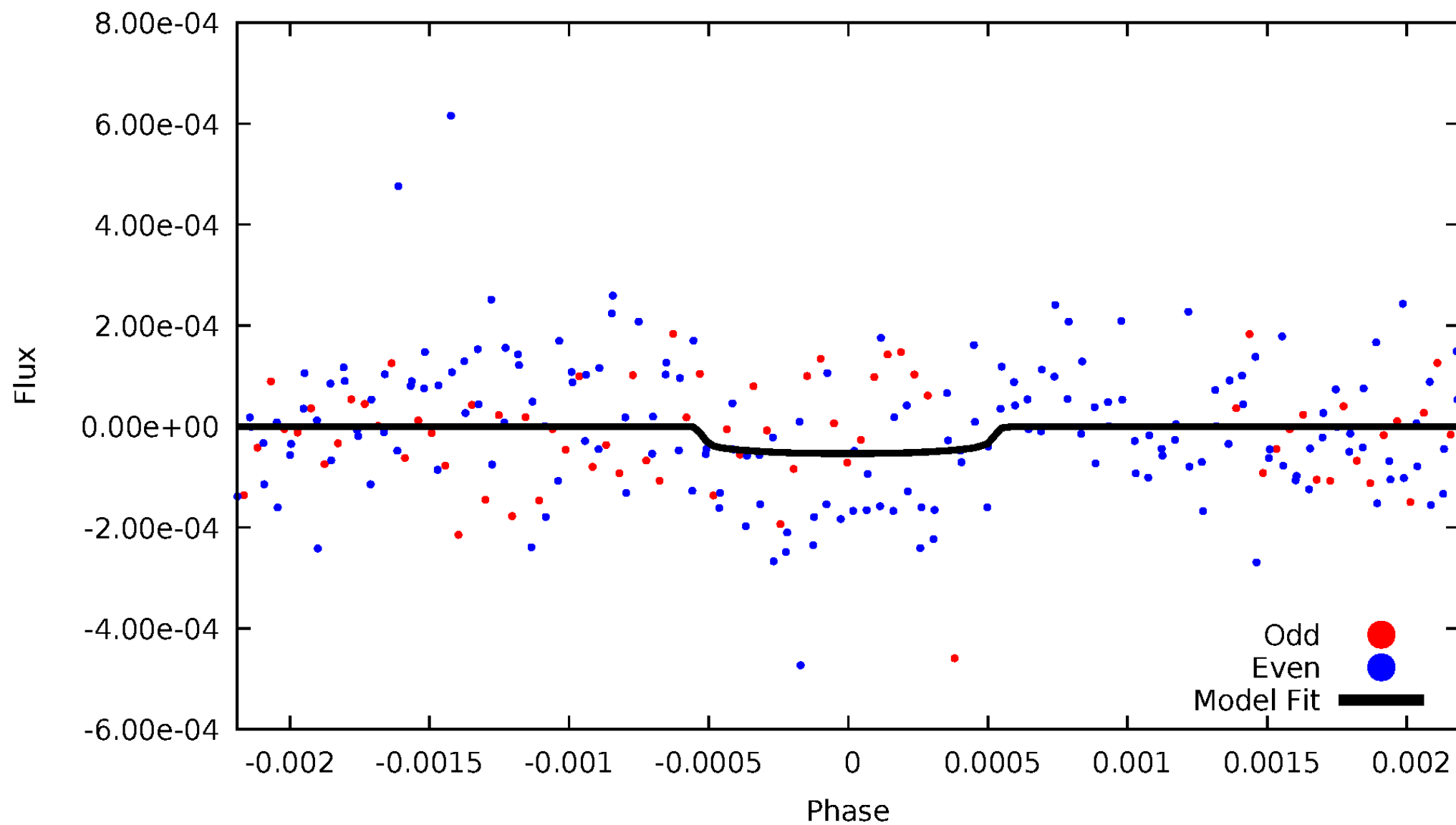


TCE 009397220-01



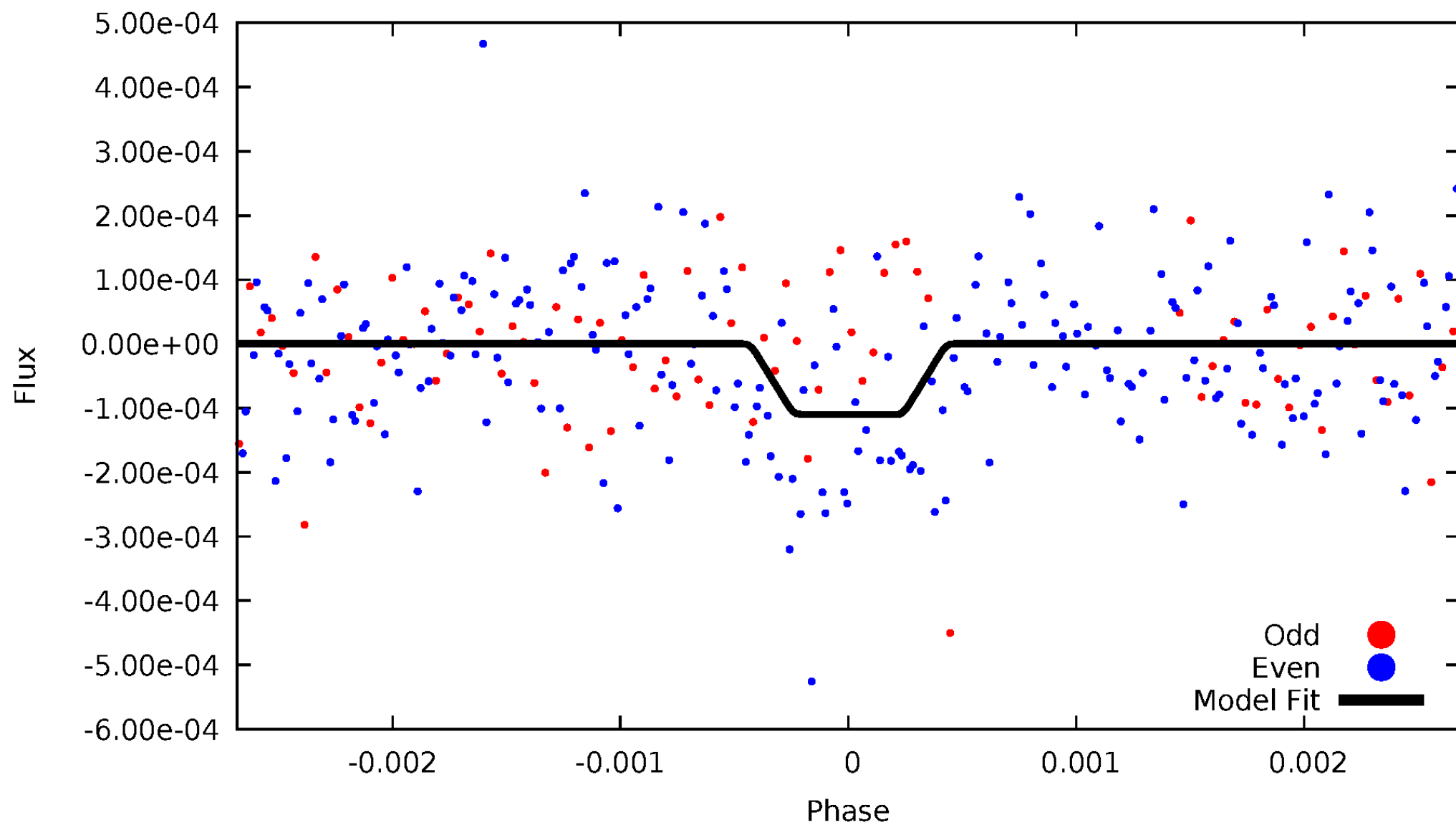
DV Odd/Even

TCE 009397220-01

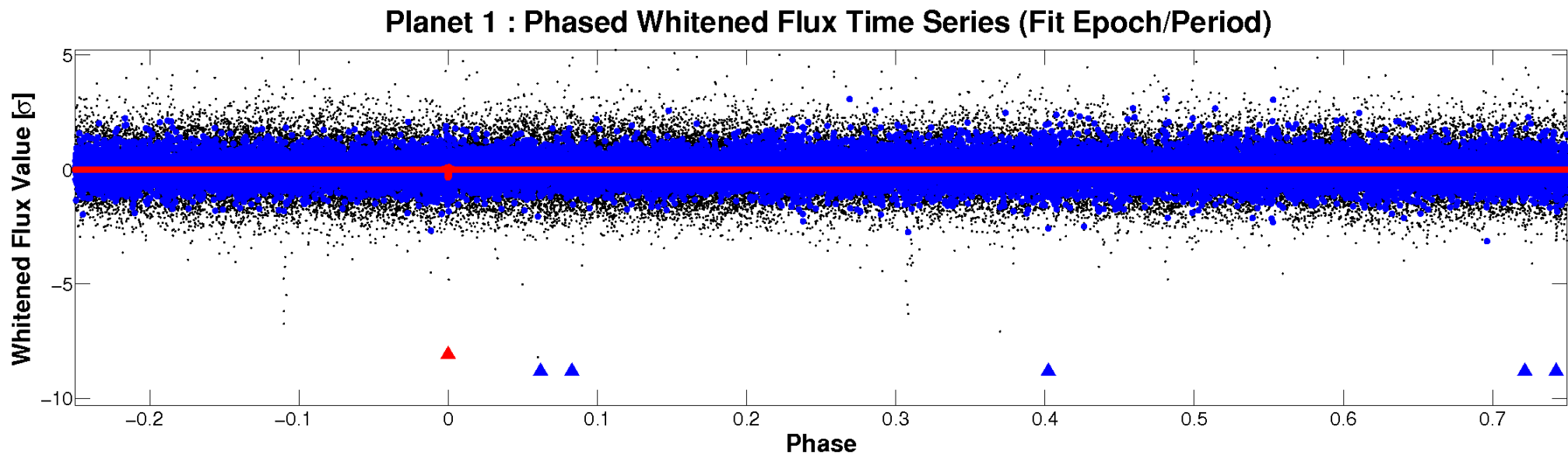
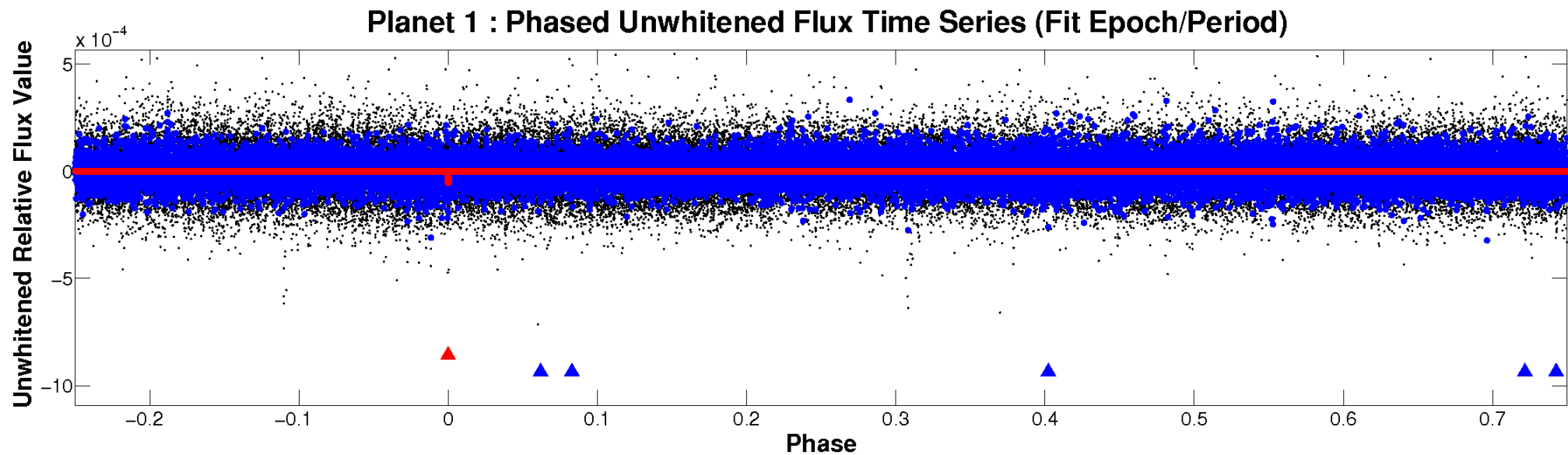


ALT Odd/Even

TCE 009397220-01

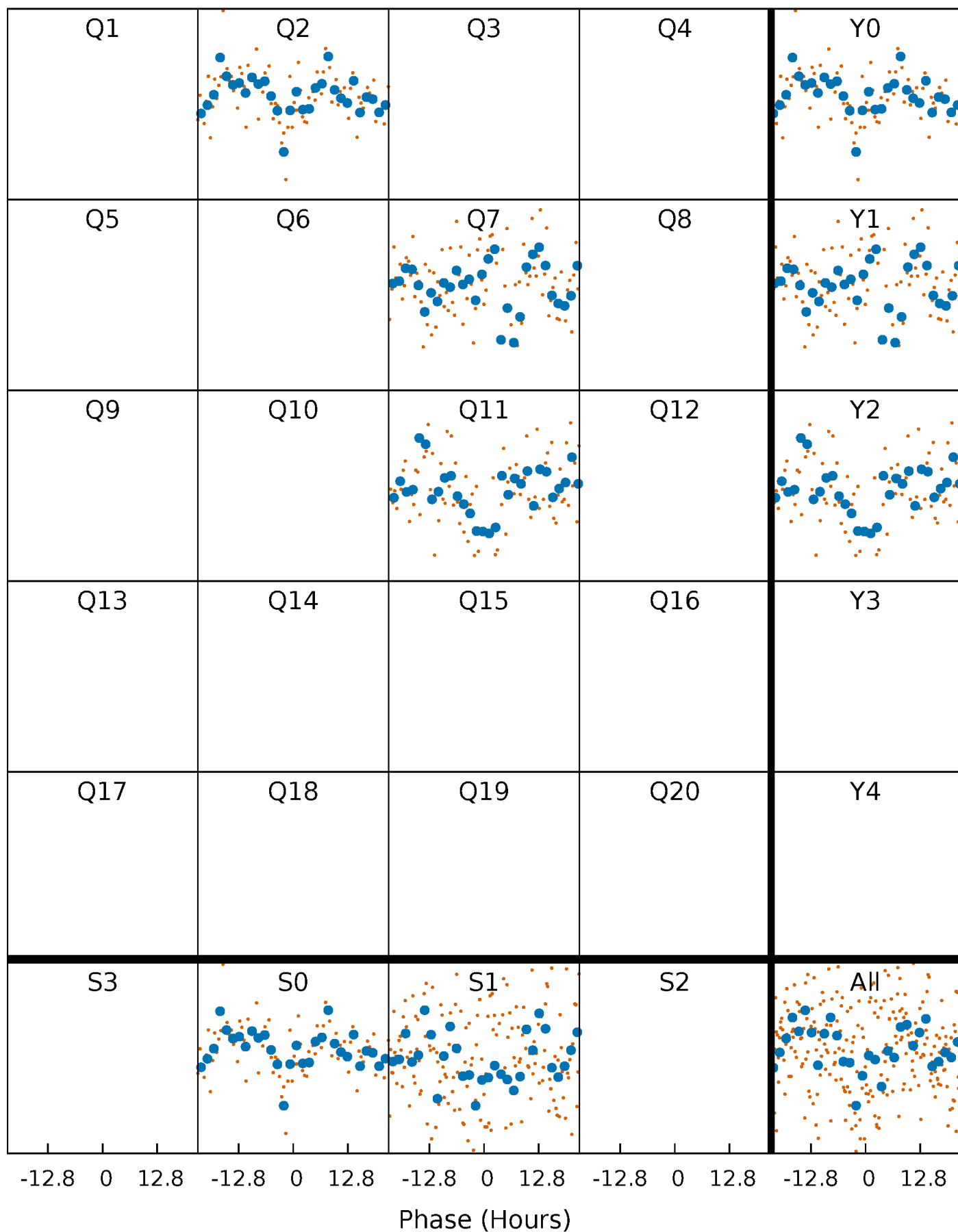


Non-Whitened Vs. Whitened Light Curve



PDC Quarter-Phased Transit Curves

TCE 009397220-01 P=425.641459 Days $T_0=207.885949$ (BKJD)



DV Quarter-Phased Transit Curves

TCE 009397220-01 $P=425.641459$ Days $T_0=207.885949$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

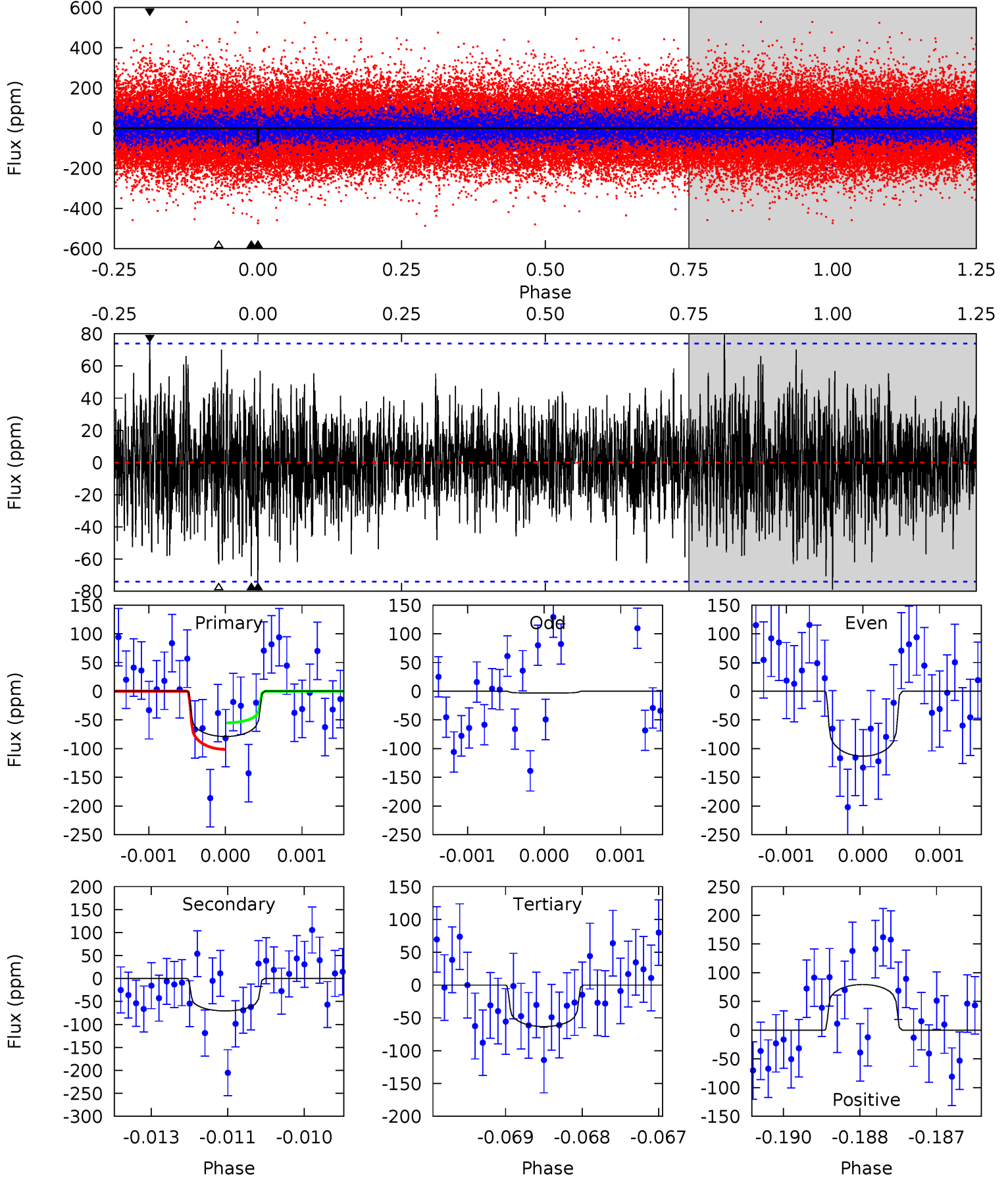
TCE 009397220-01 P=425.617432 Days $T_0=207.882013$ (BKJD)



DV Model-Shift Uniqueness Test

009397220-01, P = 425.641459 Days, E = 207.885949 Days

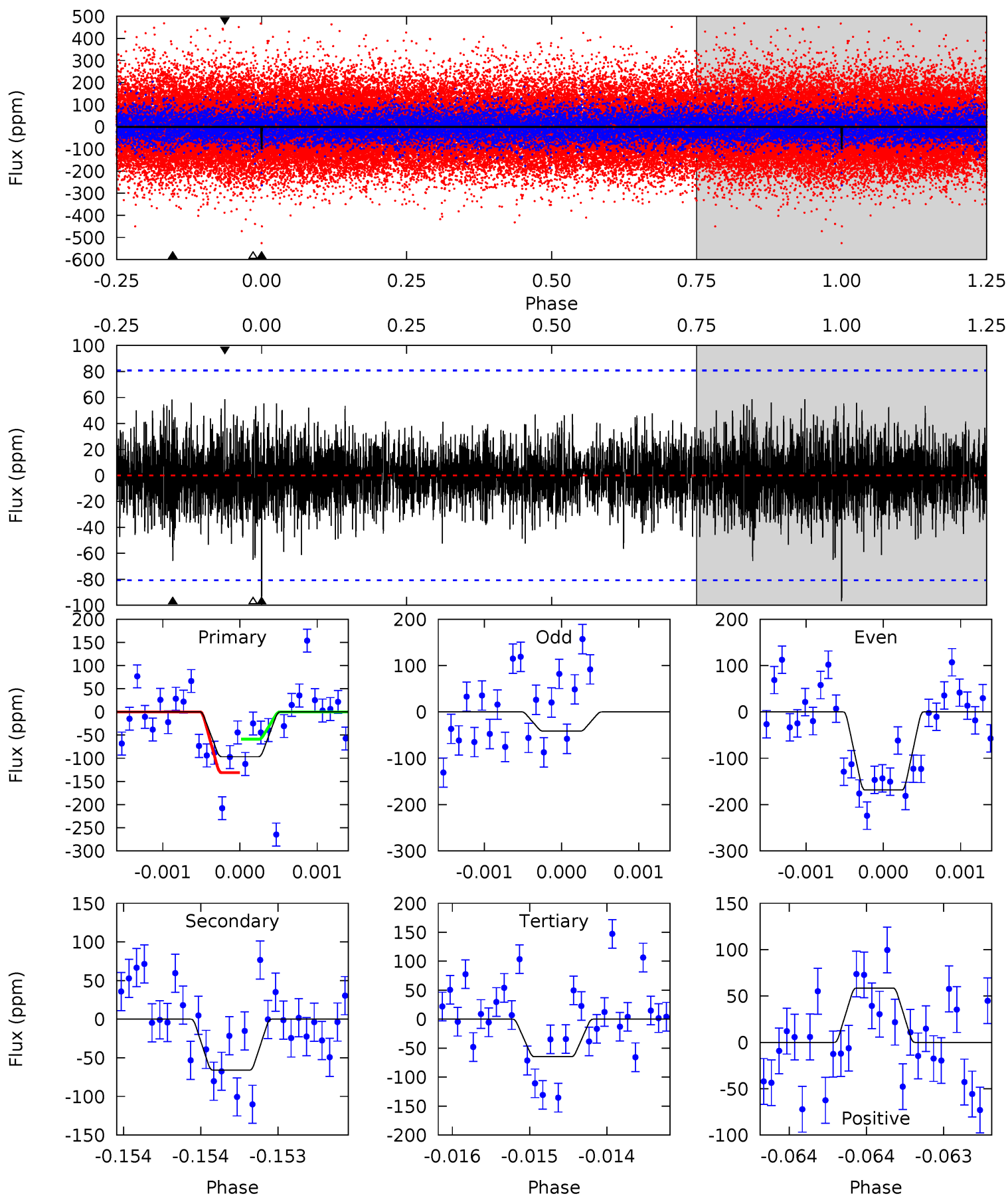
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.79	5.18	4.64	5.83	5.43	3.25	1.39	1.15	-0.04	0.54	-0.65	3.70	0.69	0.50	1.69



Alt Model-Shift Uniqueness Test

009397220-01, P = 425.617432 Days, E = 207.882013 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.56	4.47	4.40	3.97	5.47	3.33	1.16	2.16	2.59	0.07	0.50	4.05	0.63	0.38	2.45



Stellar Parameters For KIC 009397220

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	M (M_{\odot})	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	5810^{+159}_{-130}	$4.204^{+0.253}_{-0.136}$	$-0.340^{+0.350}_{-0.200}$	$1.214^{+0.256}_{-0.313}$	$0.860^{+0.132}_{-0.061}$	$0.677^{+0.962}_{-0.257}$
	+3%/-2%	+6%/-3%	+103%/-59%	+21%/-26%	+15%/-7%	+142%/-38%
Source	PHO1	FLK73	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 009397220-01 / KOI

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-71 ± 14	$1.08^{+0.79}_{-0.65}$	384^{+21}_{-28}	5806^{+4025}_{-1188}	$36508^{+204293}_{-24076}$
Alt.	-66 ± 15	$1.42^{+0.73}_{-0.75}$	382^{+25}_{-30}	5067^{+2091}_{-803}	19590^{+67387}_{-11054}

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 $A_{obs} \gg 1.0$

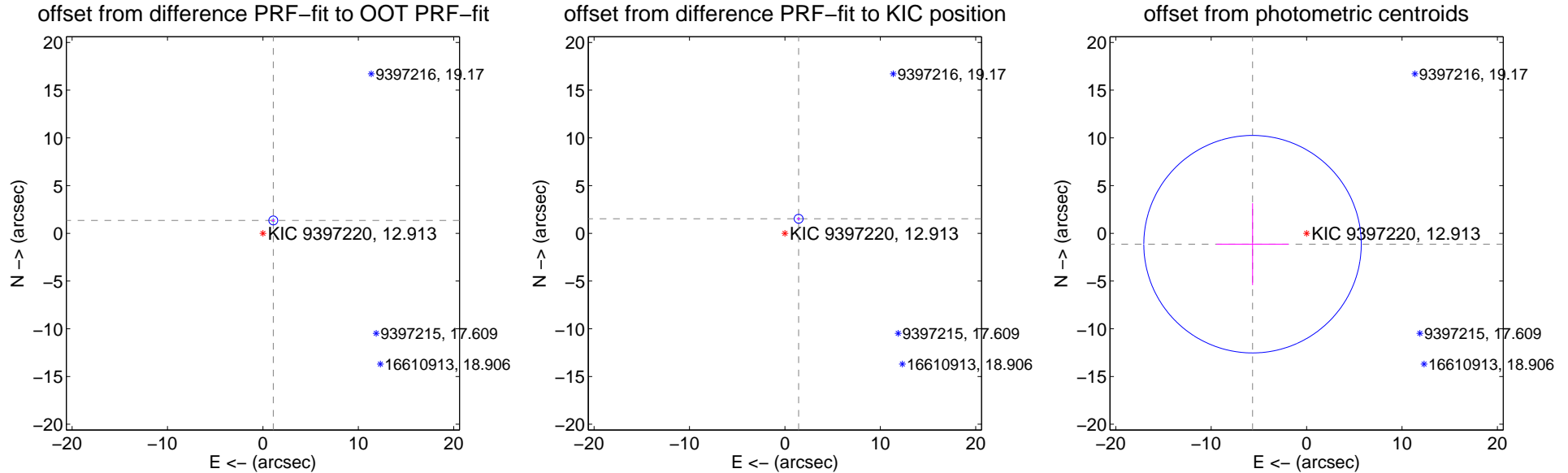
DV Centroid Data

Supplemental centroid analysis for 009397220-01. Kepler magnitude: 12.91. Transit SNR 2.48

There are 2 quarters with good PRF difference image offsets

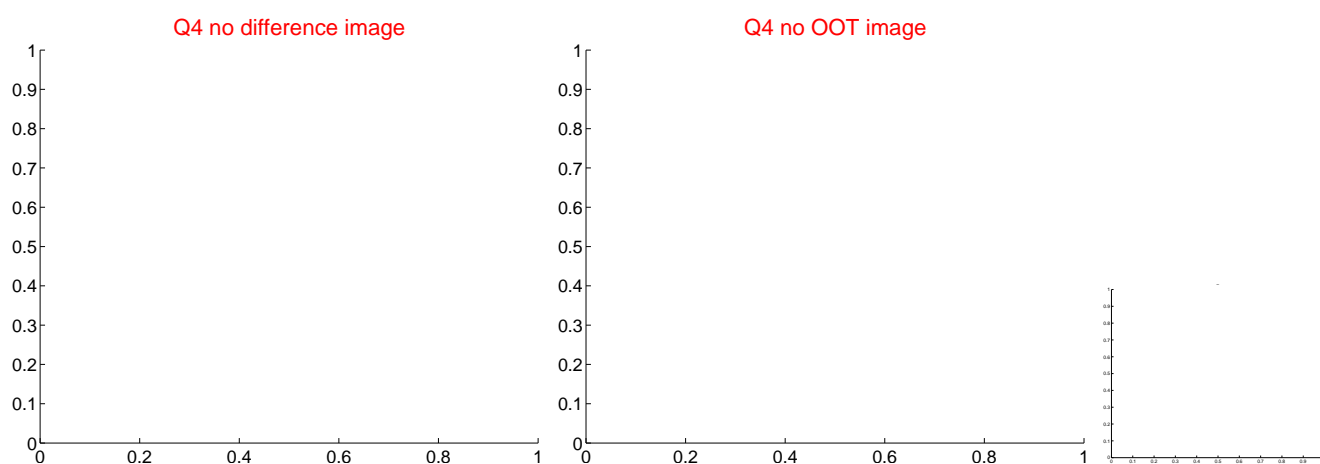
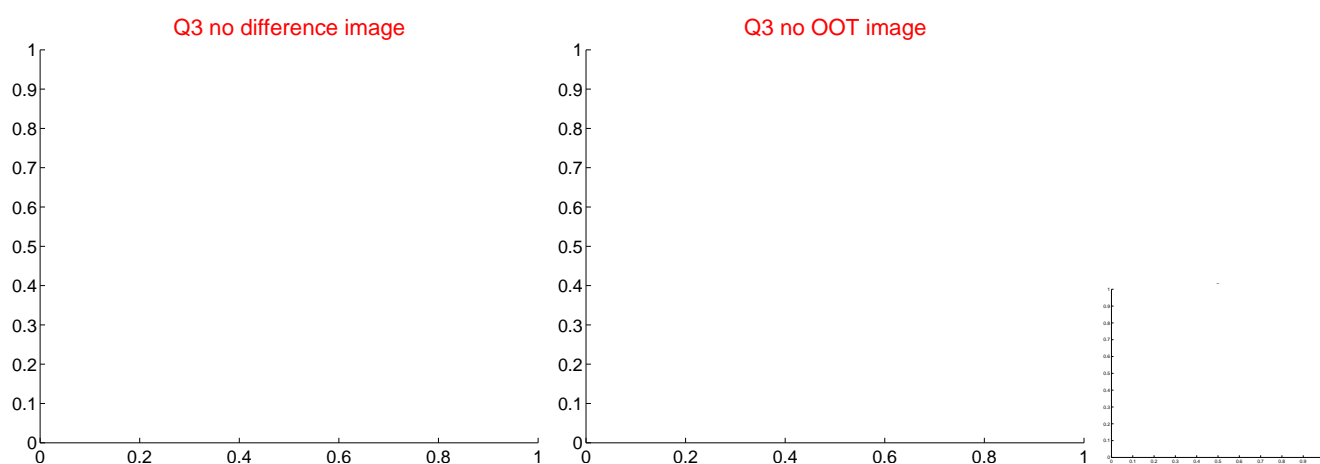
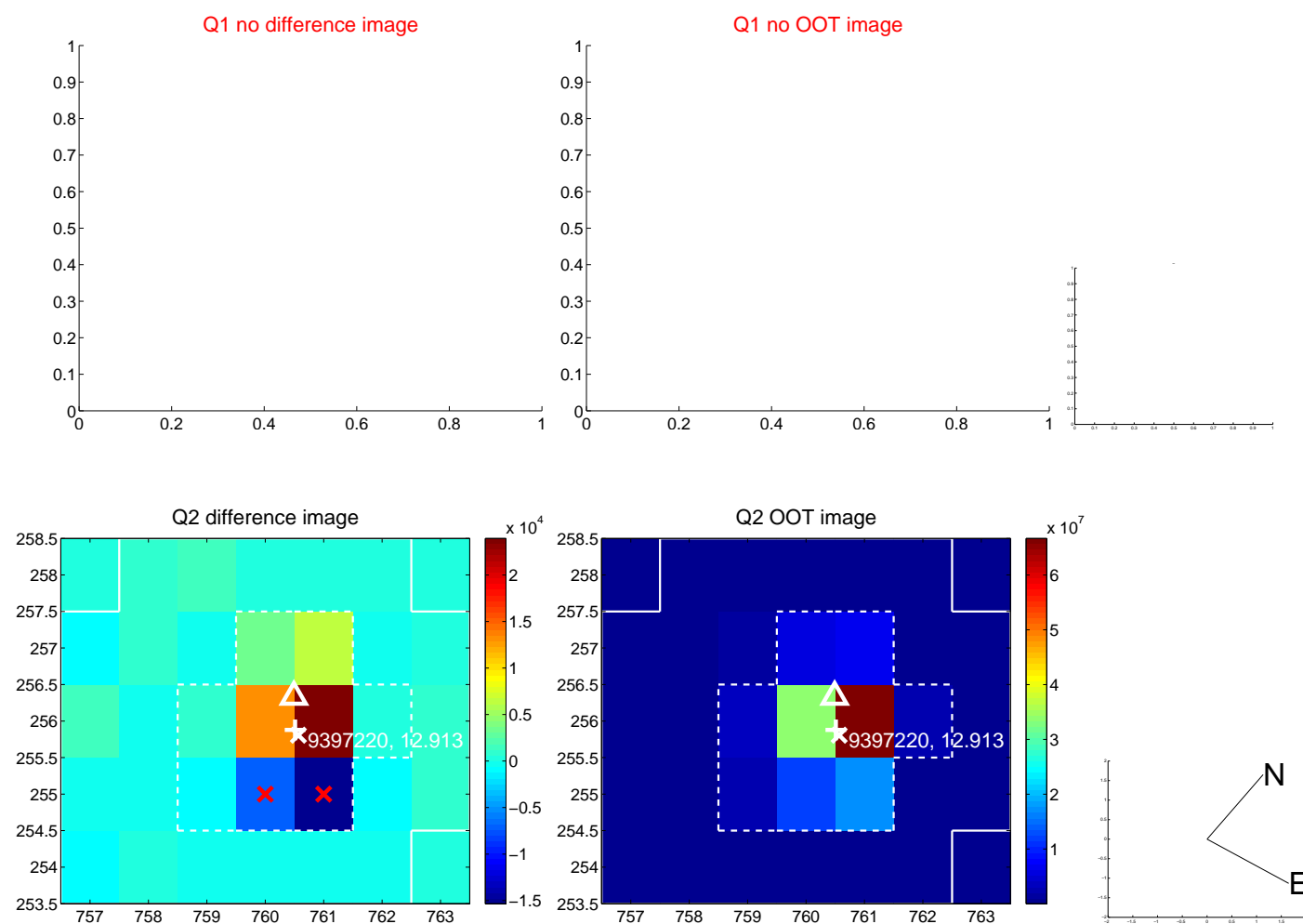
The direct PRF centroid is offset from the target star catalog position by about 0.44 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	1.732 ± 0.155	11.15	-1.087 ± 0.154	1.349 ± 0.156
PRF-fit source offset from KIC position	2.095 ± 0.155	13.50	-1.439 ± 0.154	1.523 ± 0.156
photometric centroid source offset	5.78 ± 3.80	1.52	5.67 ± 3.78	-1.14 ± 4.29



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

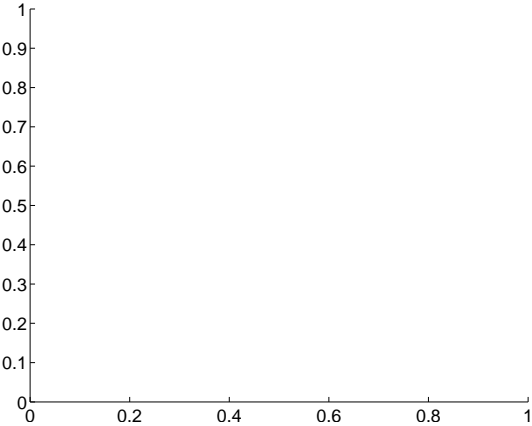


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.

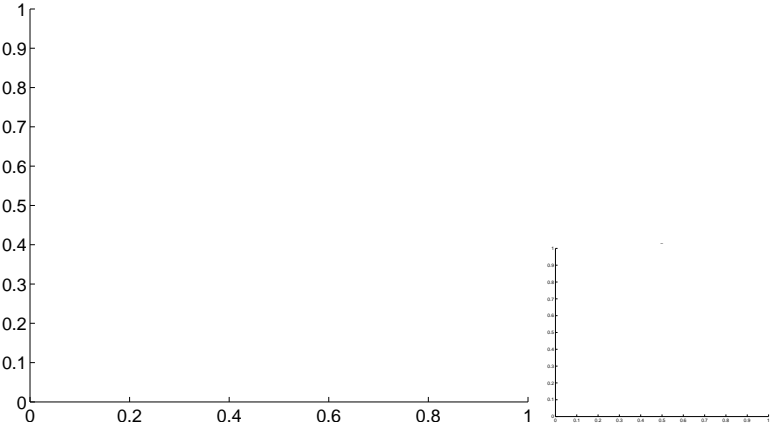


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.

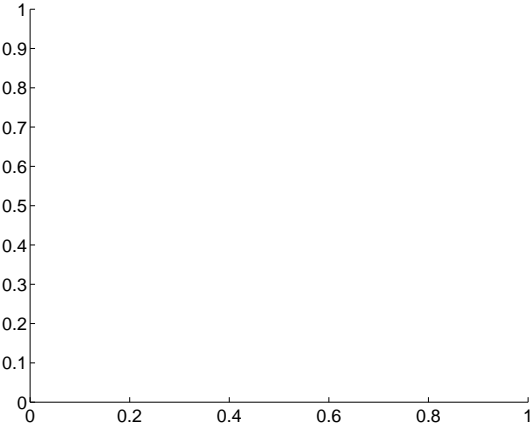
Q9 no difference image



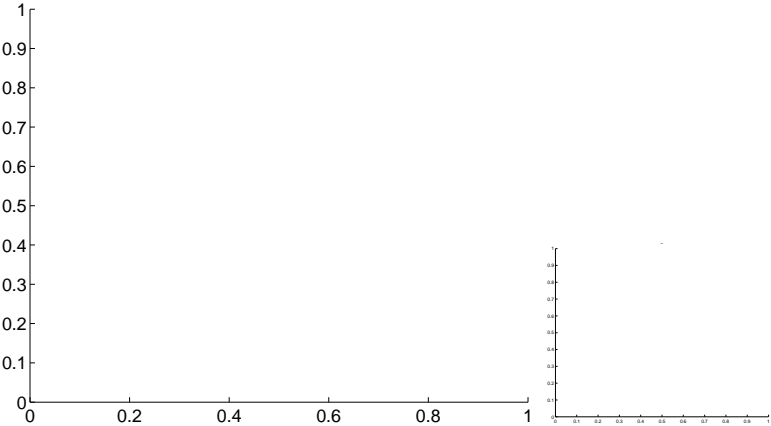
Q9 no OOT image



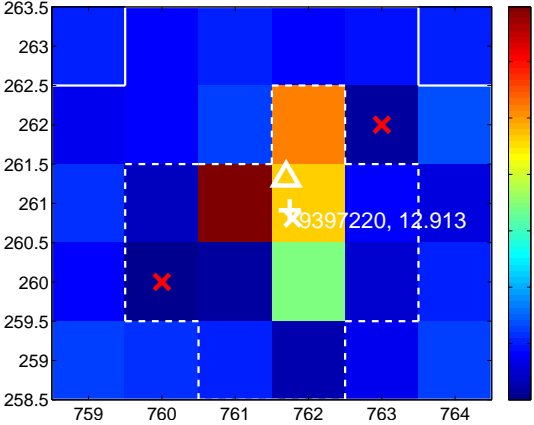
Q10 no difference image



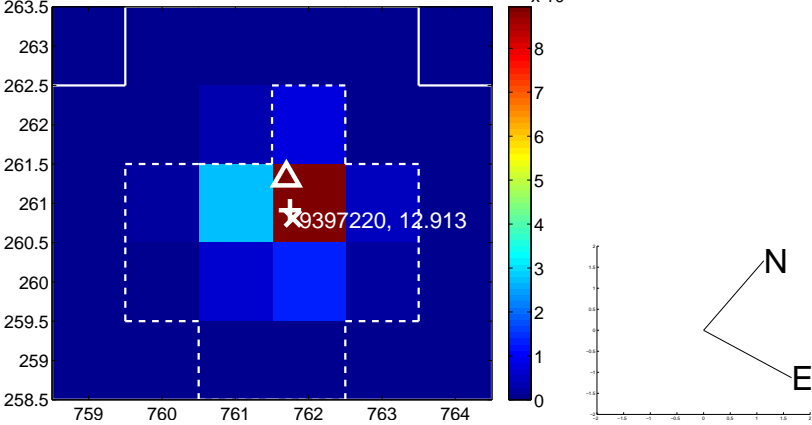
Q10 no OOT image



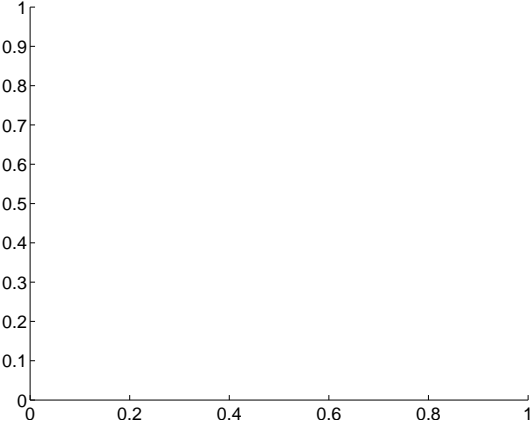
Q11 difference image



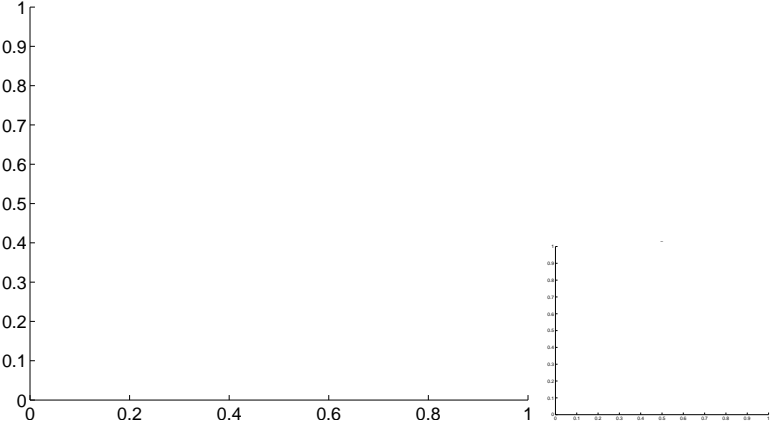
Q11 OOT image



Q12 no difference image



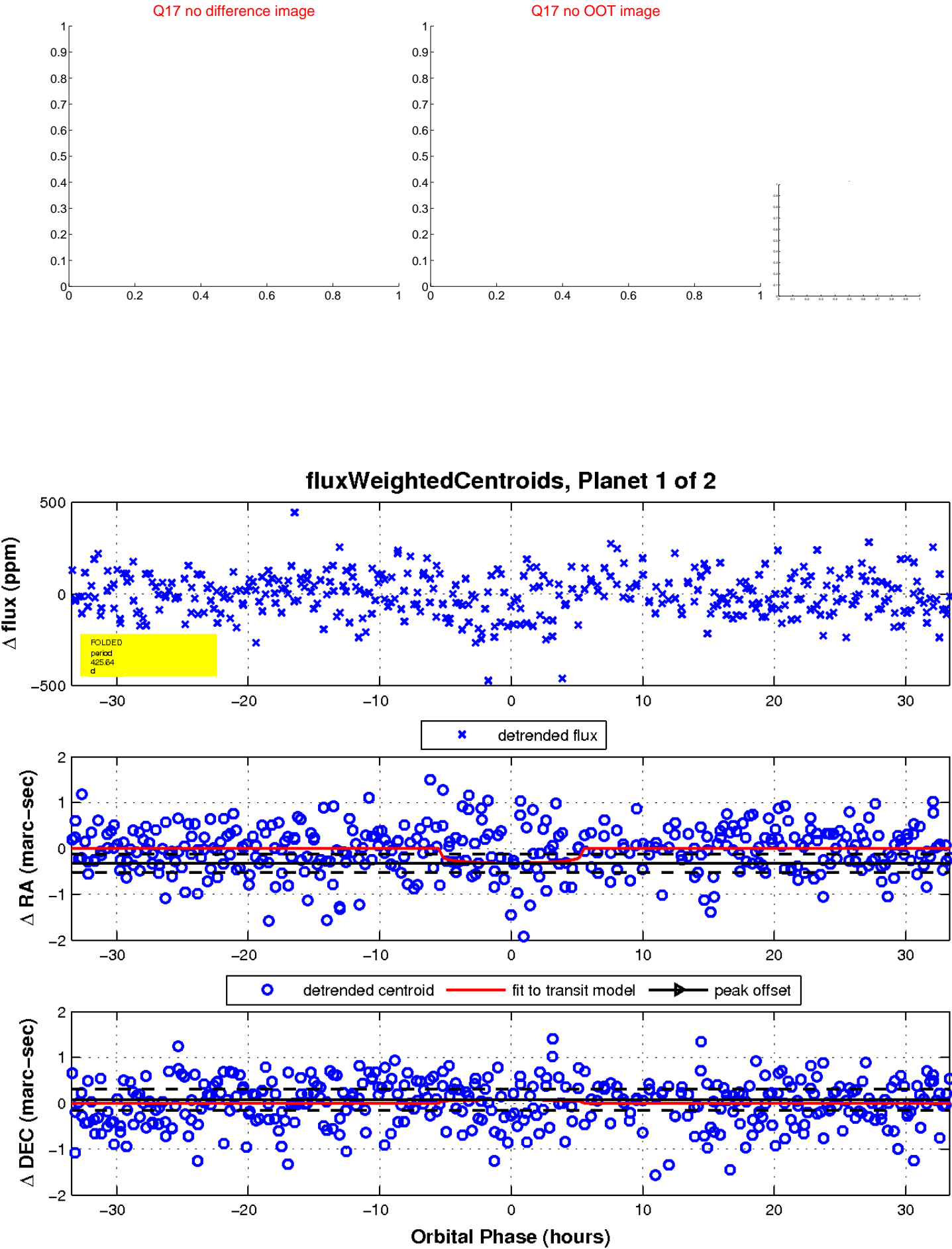
Q12 no OOT image



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

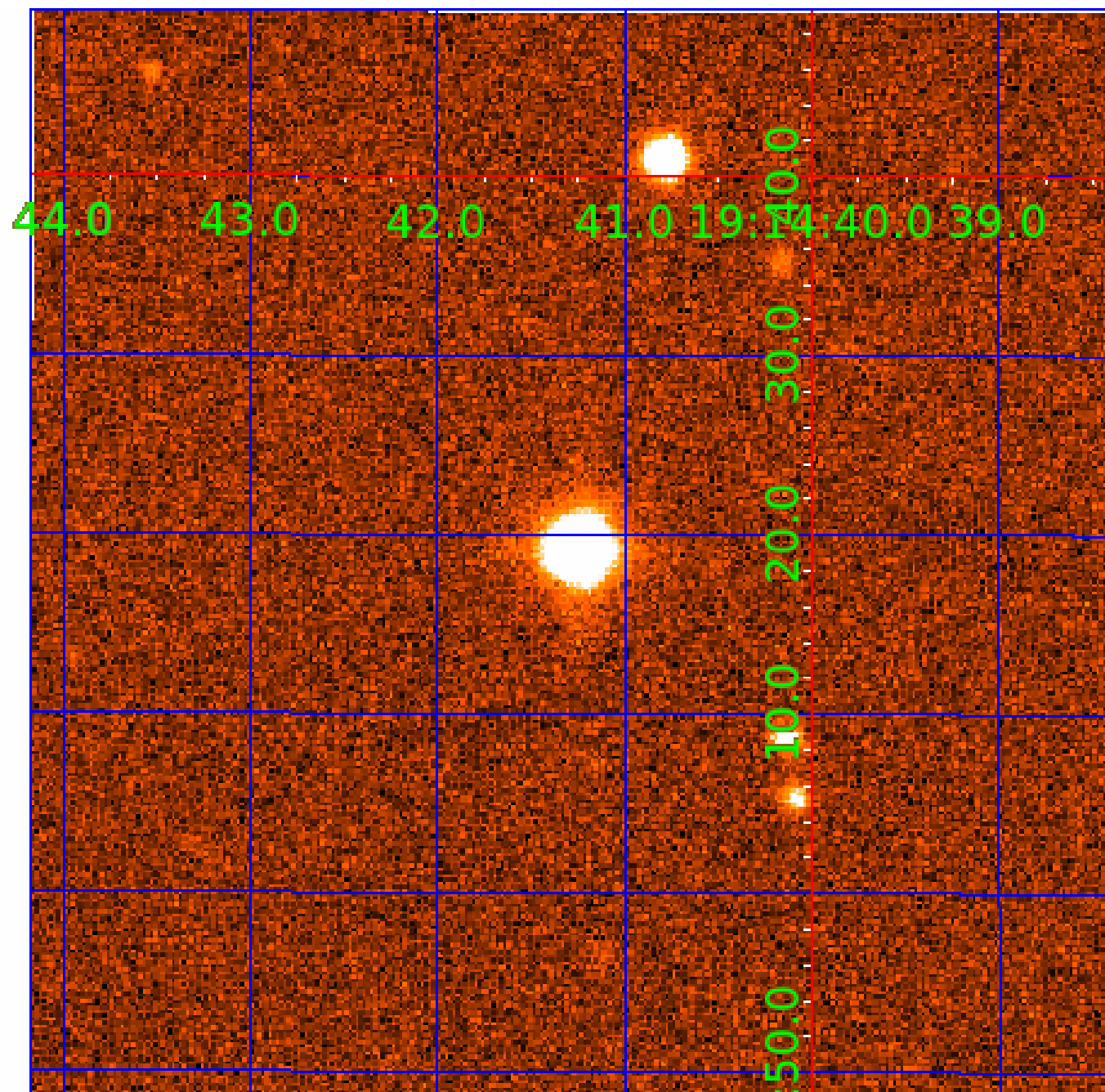


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 009397220

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})
009397220-01	OBS	No	425.641459	207.885948	53.9	11.175	8.1	2.5	1.21	5810	1.05	1.36
009397220-02	OBS	No	280.784729	243.195424	133.5	10.335	7.7	7.2	1.21	5810	1.59	2.36

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009397220-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—CENT_FEW_DIFFS
009397220-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_KIC_POS

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

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

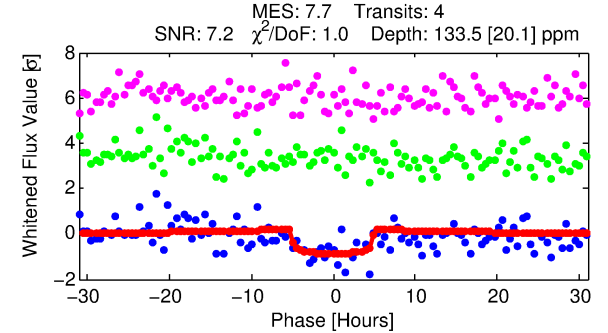
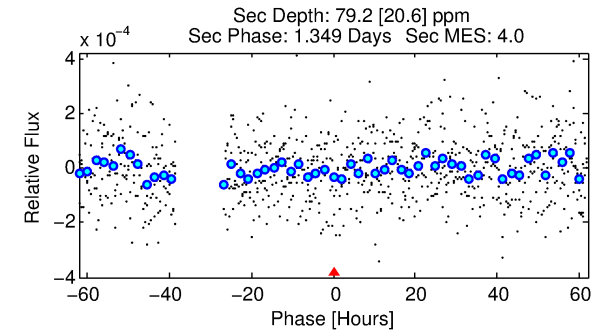
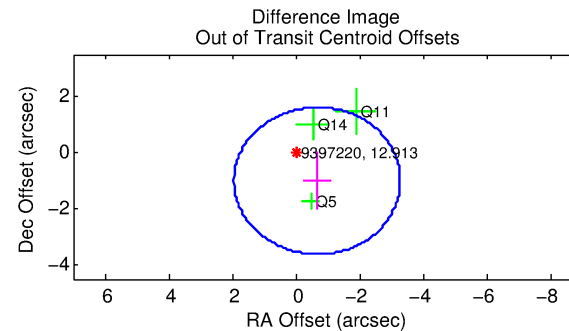
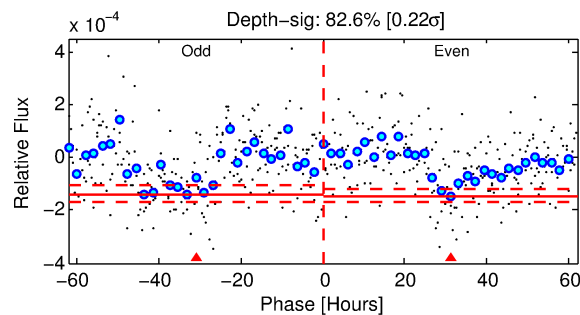
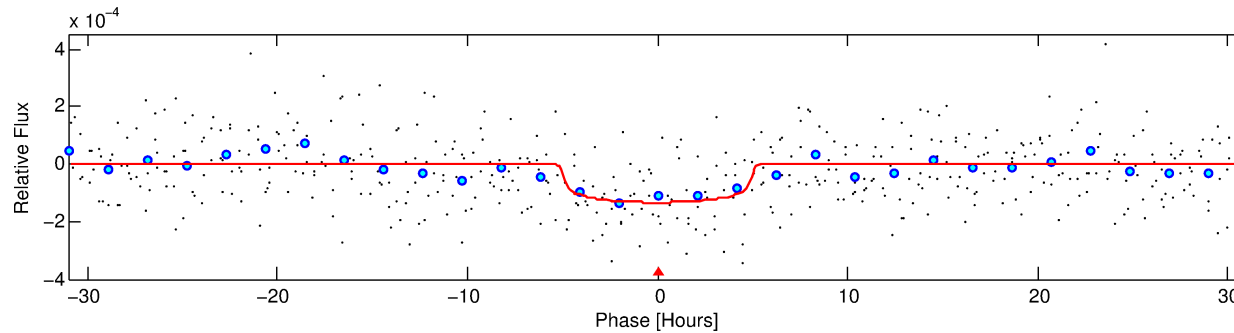
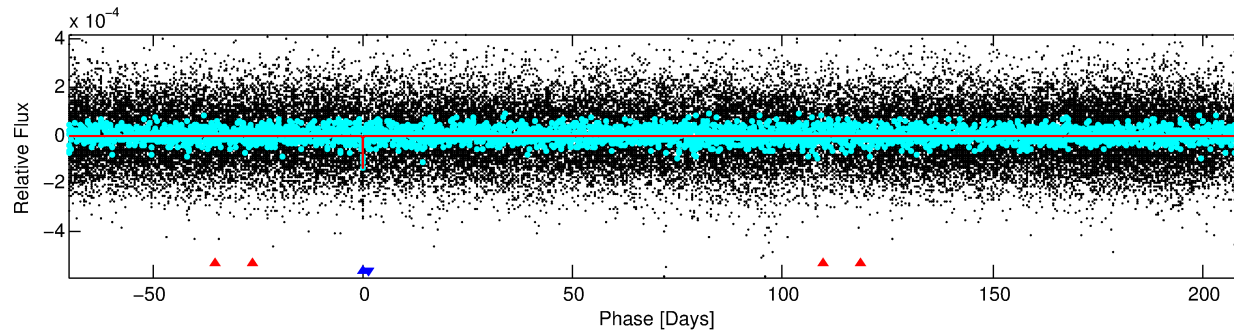
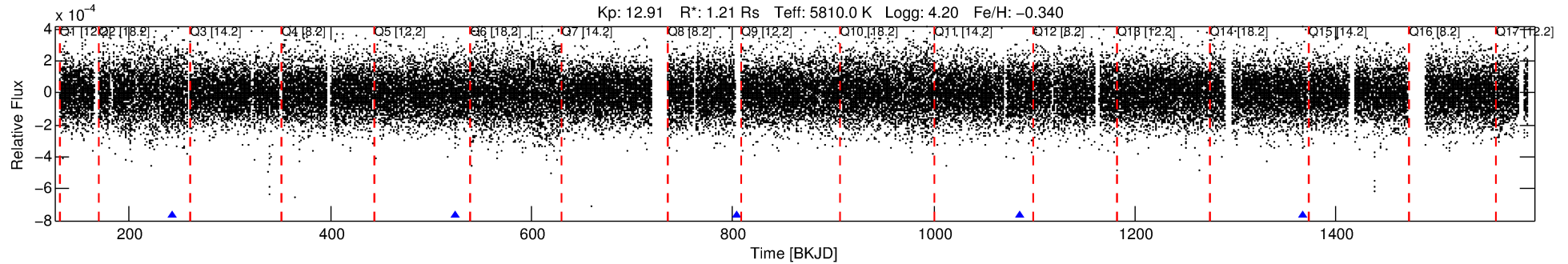
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009397220-02

No Significant Match Found

DV One-Page Summary

KIC: 9397220 Candidate: 2 of 2 Period: 280.785 d



DV Fit Results:

Period = 280.78473 [0.00703] d
Epoch = 243.1954 [0.0194] BKJD
Rp/R* = 0.0120 [0.0060]
a/R* = 116.34 [284.30]
b = 0.84 [0.85]
Seff = 2.36 [1.04]
Teq = 316 [35] K
Rp = 1.59 [0.89] Re
a = 0.7982 [0.2070] AU
Ag = 11007.47 [12304.25] [0.89 σ]
Teffp = 5006 [1301] K [3.60 σ]

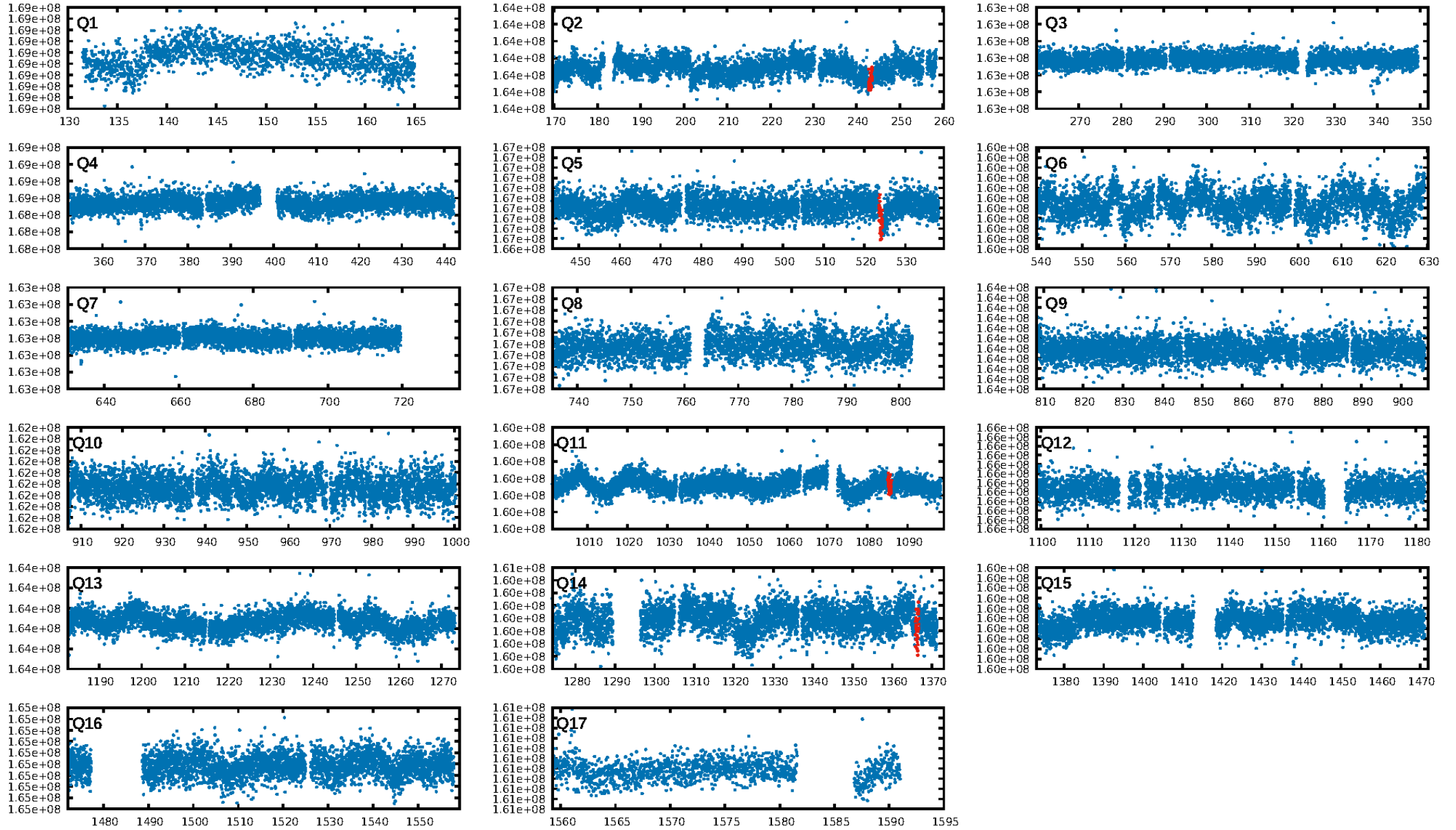
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 100.0% [228.40 σ]
ModelChiSquare2-sig: 13.9%
ModelChiSquareGof-sig: 99.0%
Bootstrap-pfa: 1.28e-12
RollingBand-fgt: 1.00 [4/4]
GhostDiagnostic-chr: 3.225
Centroid-sig: 4.8%
Centroid-so: 3.293 arcsec [1.87 σ]
OotOffset-rm: 1.210 arcsec [1.39 σ]
OotOffset-st: 1/1/0/1 [3]
KicOffset-rm: 1.263 arcsec [1.90 σ]
KicOffset-st: 1/1/0/1 [3]
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DiffImageOverlap-fno: 1.00 [4/4]

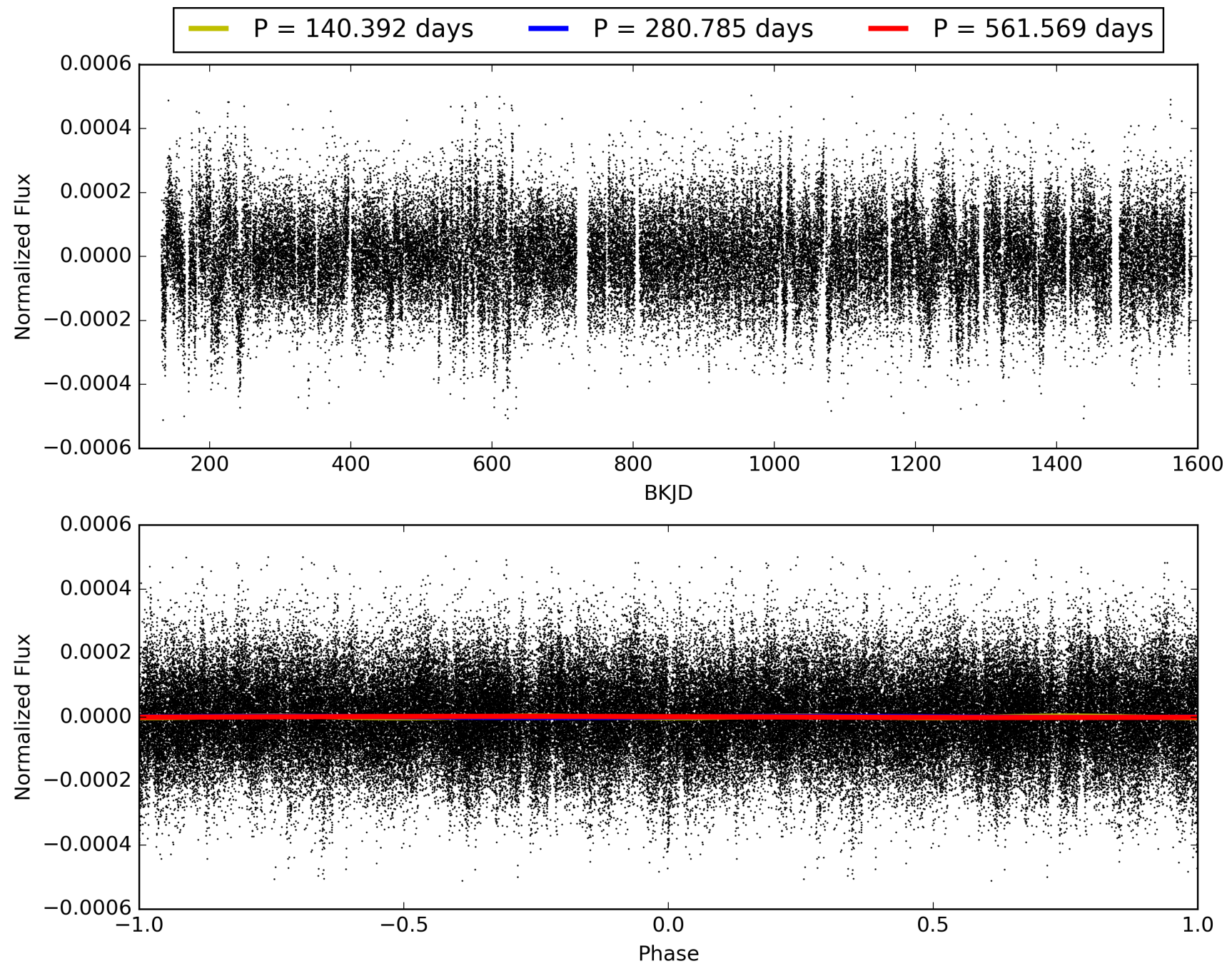
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 00:16:17 Z

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

TCE 009397220-02, PDC Light Curves

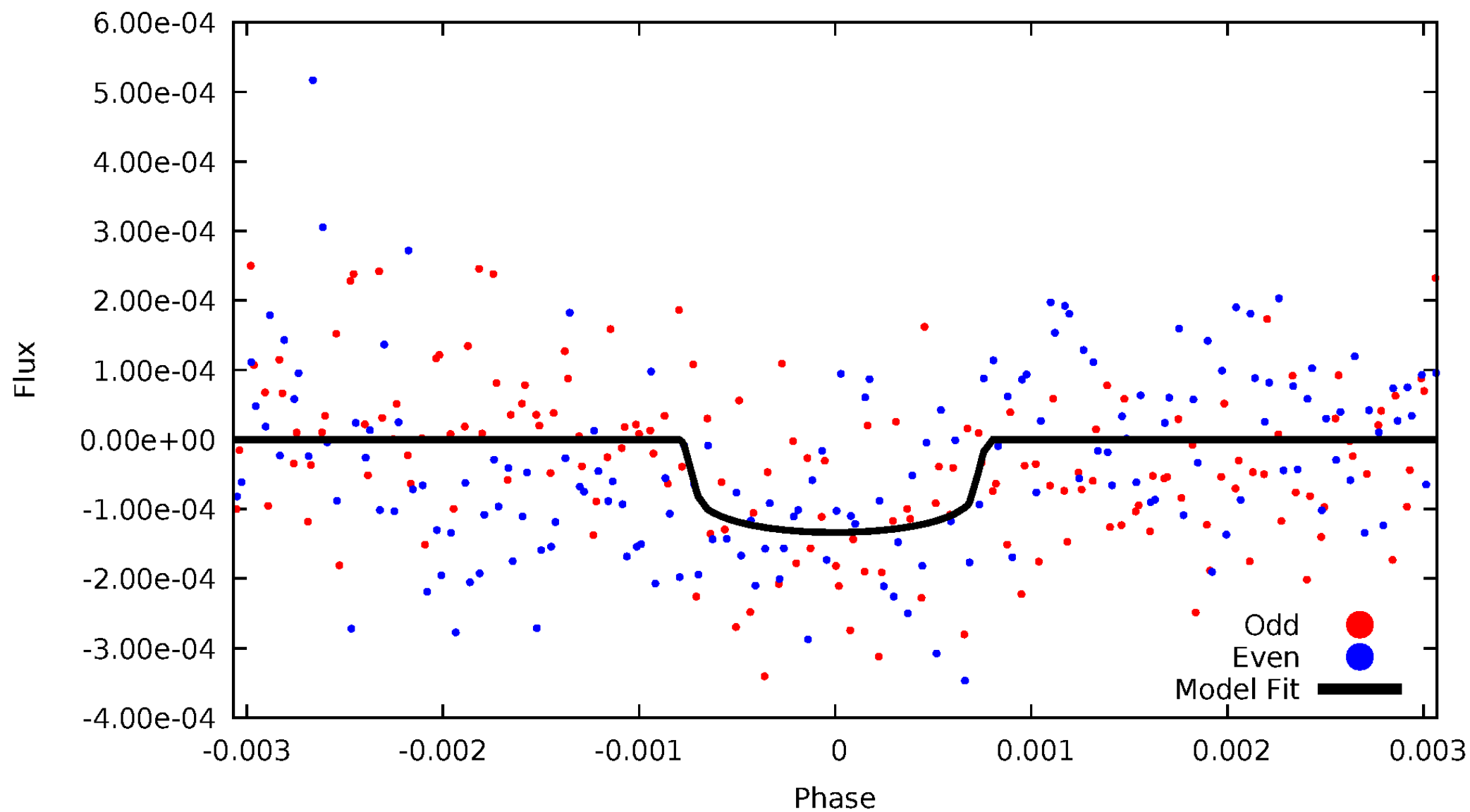


TCE 009397220-02



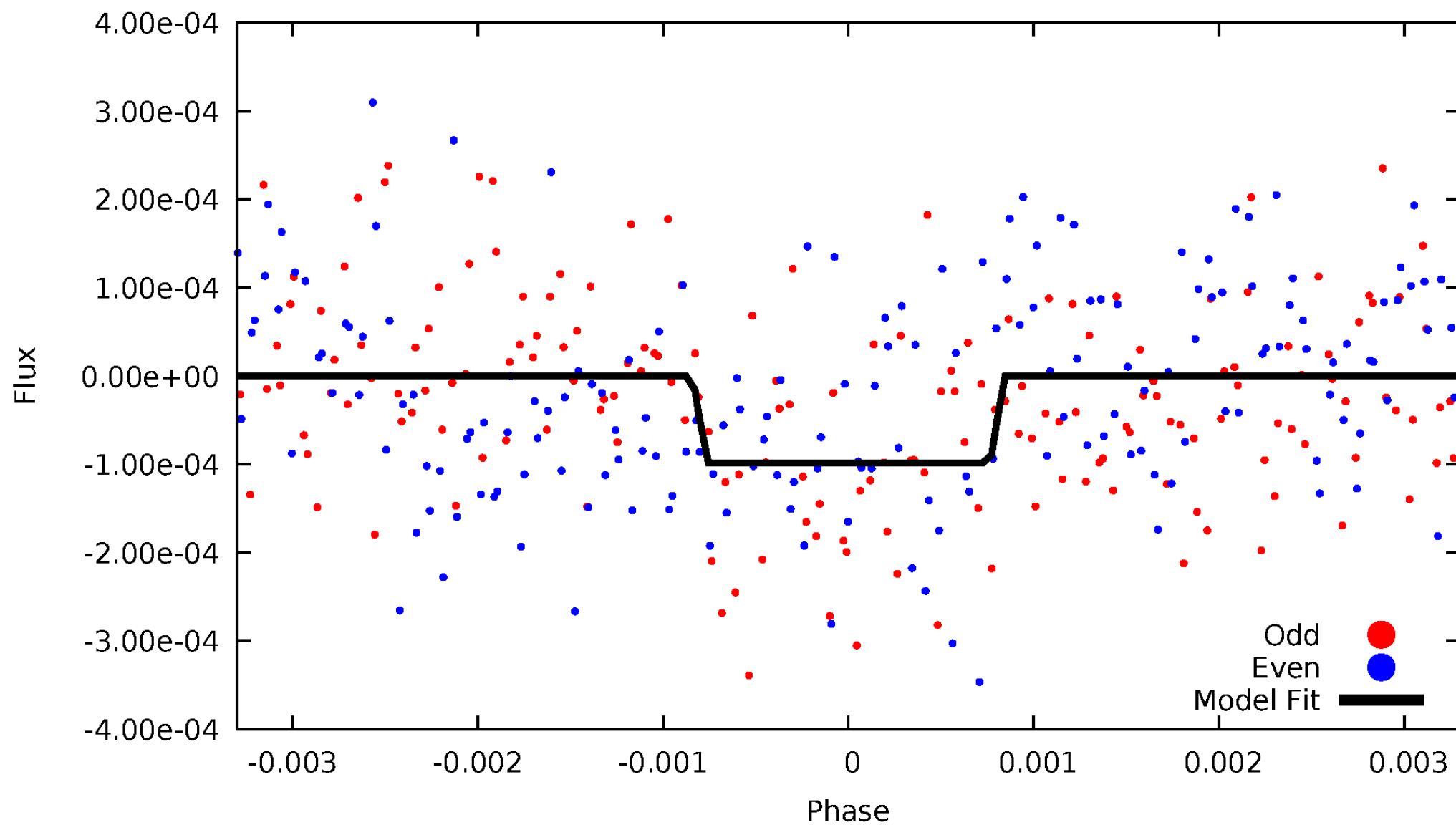
DV Odd/Even

TCE 009397220-02



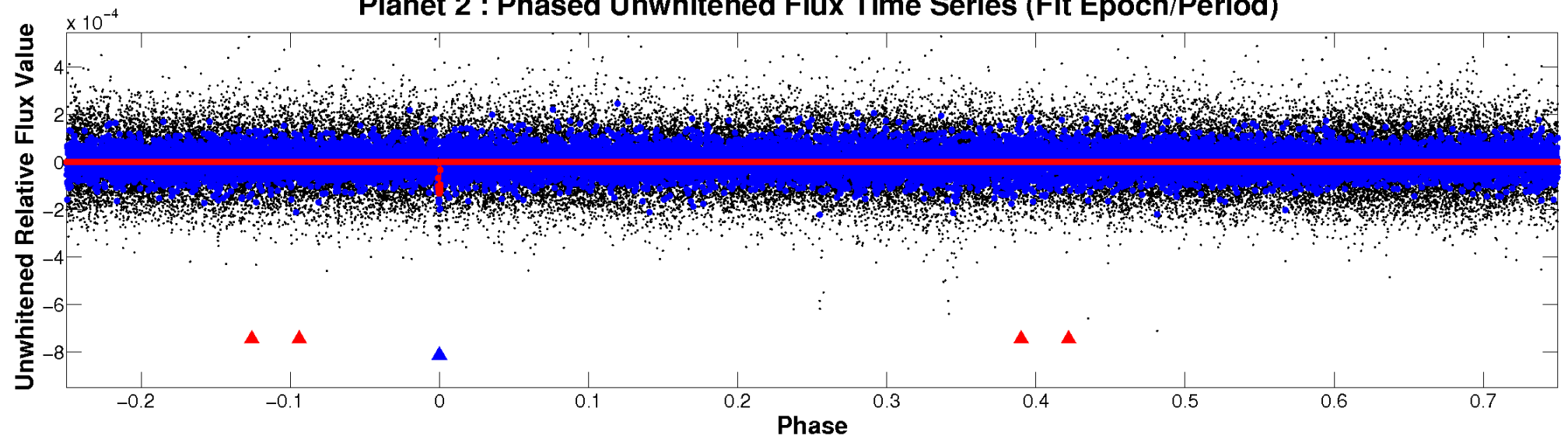
ALT Odd/Even

TCE 009397220-02

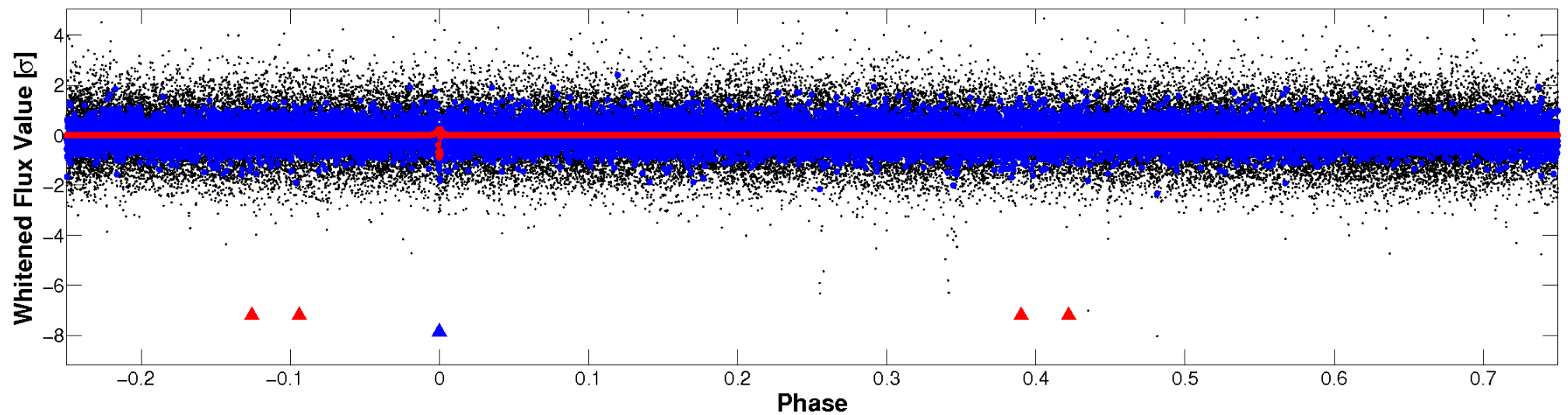


Non-Whitened Vs. Whitened Light Curve

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



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



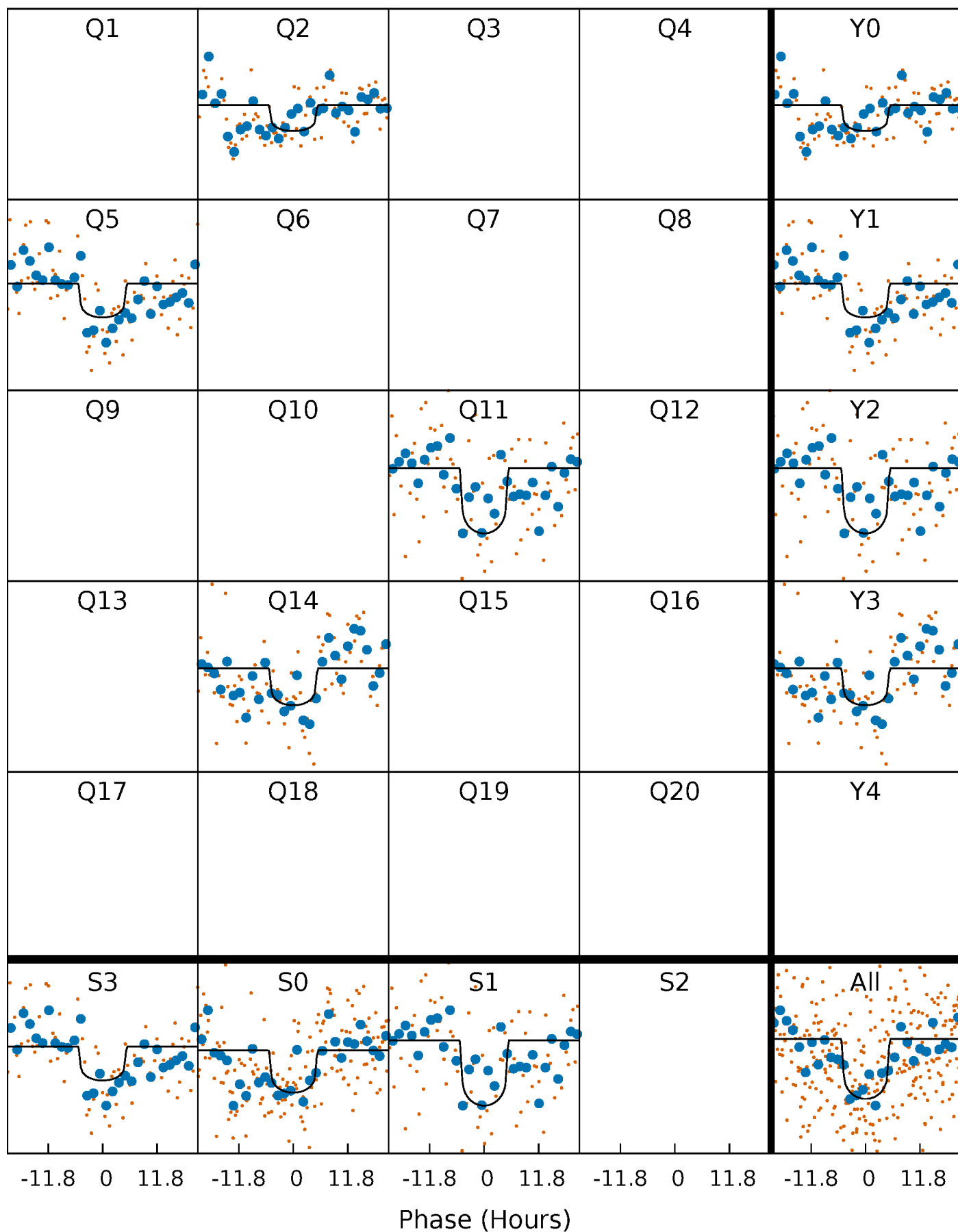
PDC Quarter-Phased Transit Curves

TCE 009397220-02 $P=280.784729$ Days $T_0=243.195424$ (BKJD)



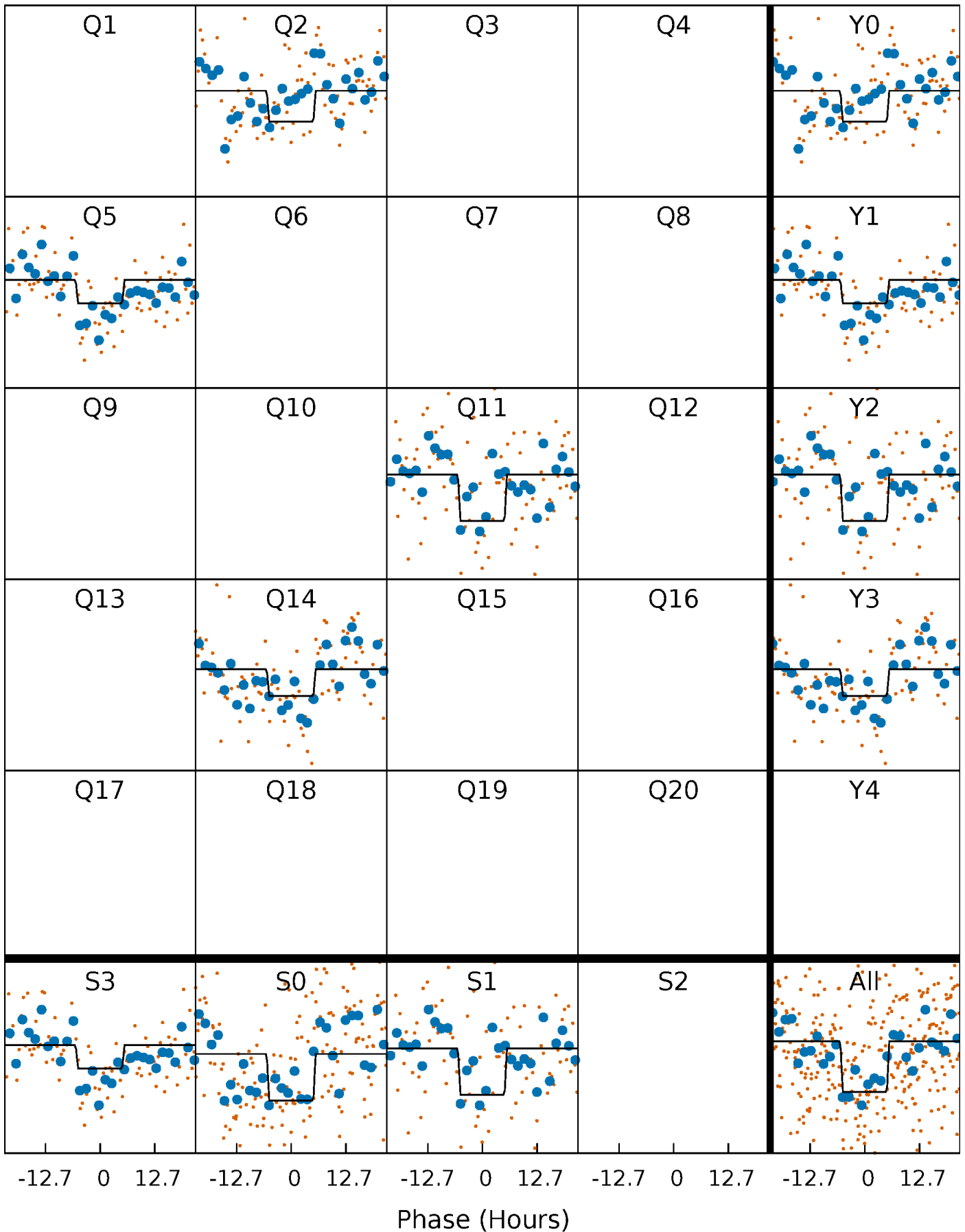
DV Quarter-Phased Transit Curves

TCE 009397220-02 $P=280.784729$ Days $T_0=243.195424$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

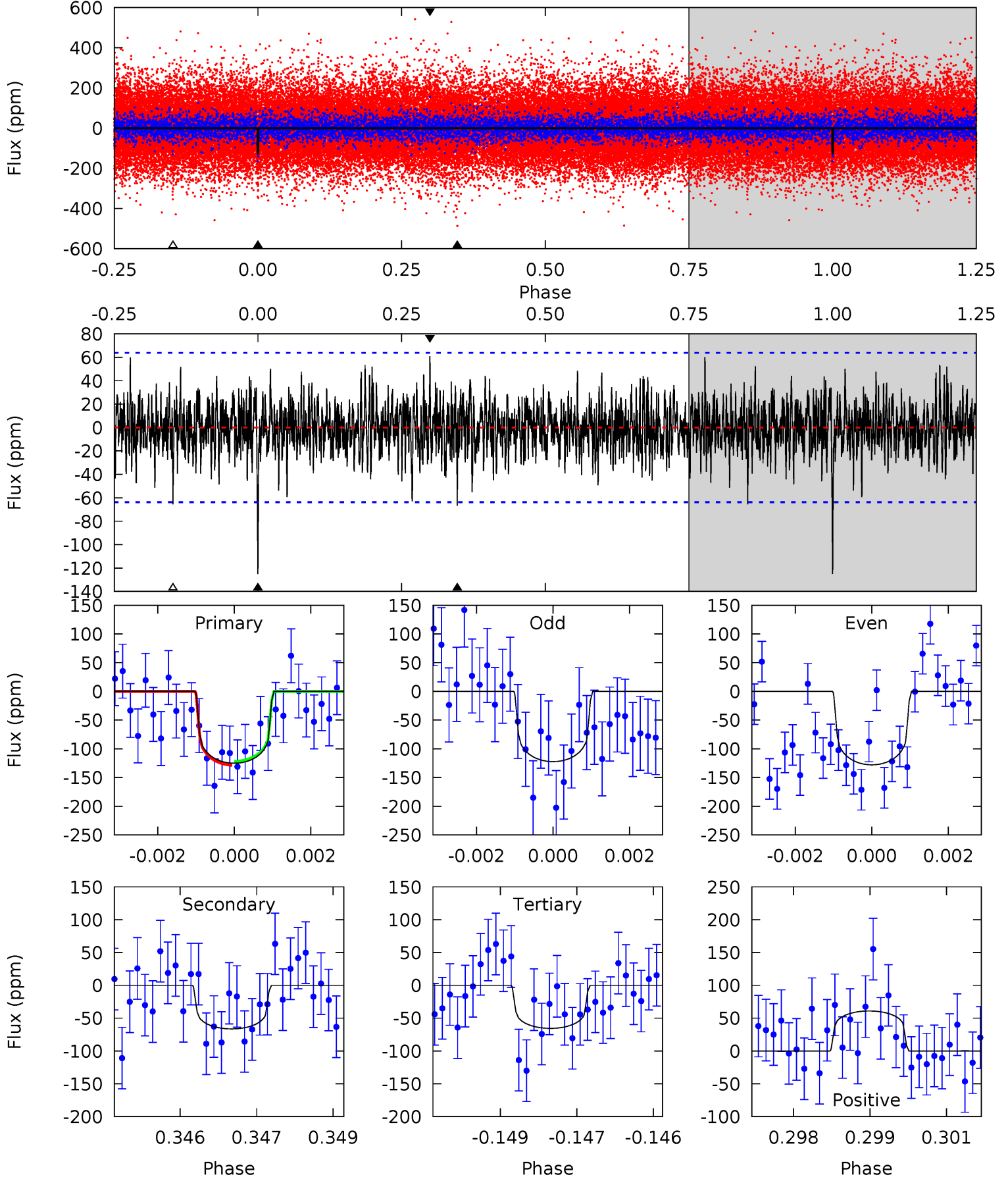
TCE 009397220-02 P=280.763926 Days $T_0=243.265777$ (BKJD)



DV Model-Shift Uniqueness Test

009397220-02, P = 280.784729 Days, E = 243.195424 Days

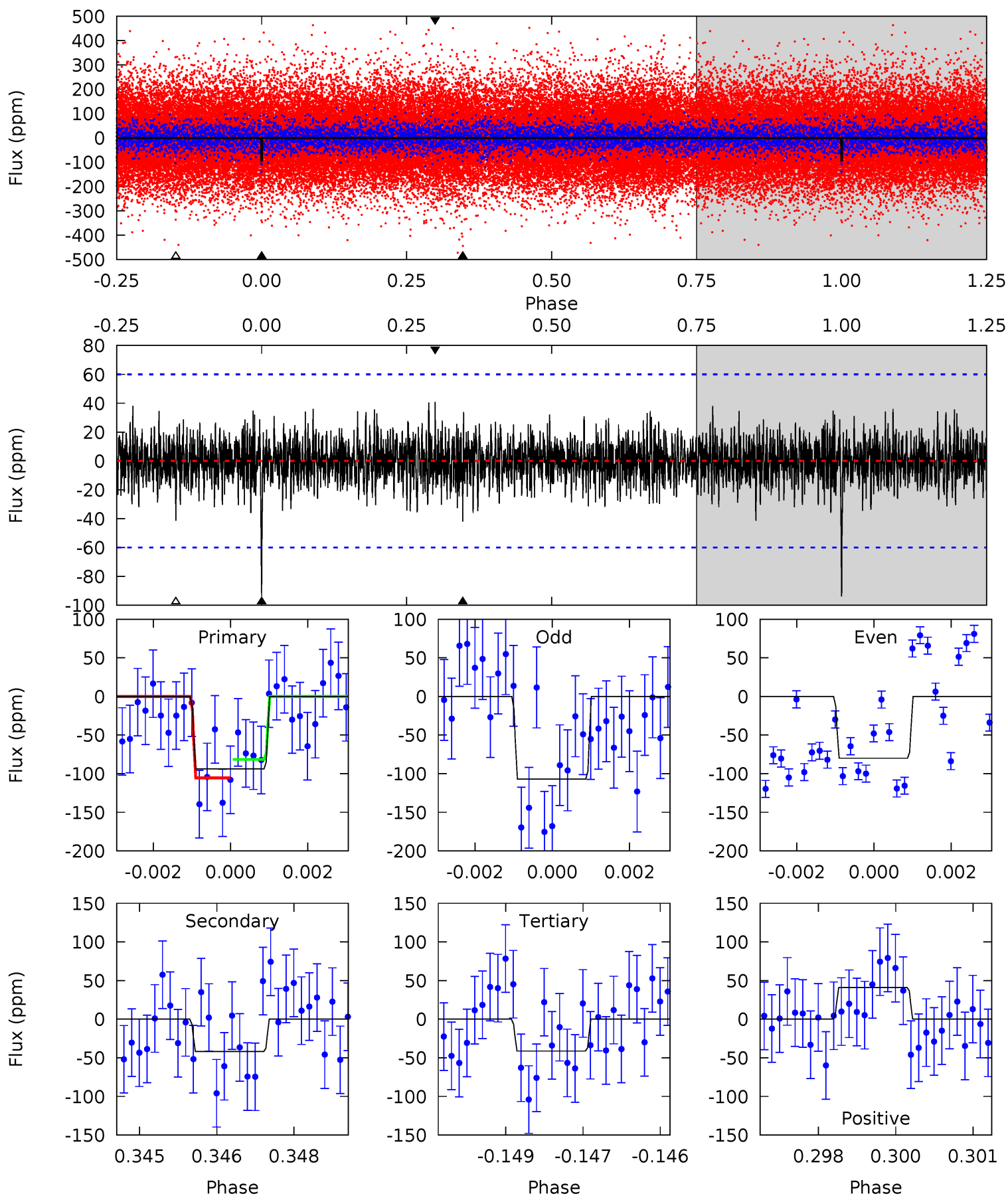
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.5	5.60	5.53	5.13	5.37	3.17	1.43	5.02	5.41	0.07	0.46	0.24	0.98	0.33	0.29



Alt Model-Shift Uniqueness Test

009397220-02, P = 280.763926 Days, E = 243.265777 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.37	3.74	3.68	3.66	5.36	3.14	1.00	4.68	4.71	0.06	0.09	1.21	0.99	0.30	1.07



Stellar Parameters For KIC 009397220

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	$M(M_{\odot})$	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	5810^{+159}_{-130}	$4.204^{+0.253}_{-0.136}$	$-0.340^{+0.350}_{-0.200}$	$1.214^{+0.256}_{-0.313}$	$0.860^{+0.132}_{-0.061}$	$0.677^{+0.962}_{-0.257}$
	+3%/-2%	+6%/-3%	+103%/-59%	+21%/-26%	+15%/-7%	+142%/-38%
Source	PHO1	FLK73	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 009397220-02 / KOI

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-66 ± 12	$1.58^{+0.91}_{-0.67}$	439^{+28}_{-35}	4838^{+1355}_{-730}	9351^{+21271}_{-5665}
Alt.	-42 ± 11	$1.31^{+0.79}_{-0.69}$	438^{+29}_{-33}	4734^{+2063}_{-740}	8583^{+31835}_{-5376}

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

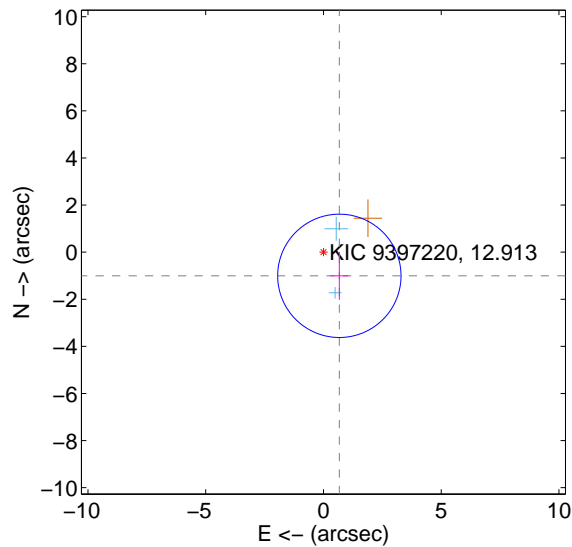
Supplemental centroid analysis for 009397220-02. Kepler magnitude: 12.91. Transit SNR 7.19

There are 2 quarters with good PRF difference image offsets

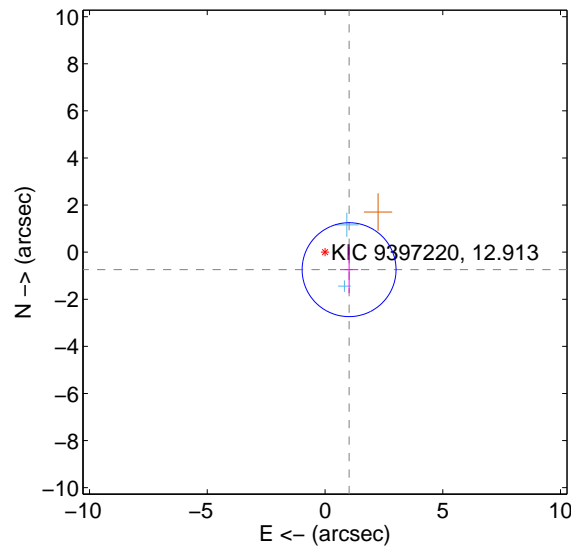
The direct PRF centroid is offset from the target star catalog position by about 0.42 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	1.210 ± 0.873	1.39	-0.674 ± 0.387	-1.005 ± 1.018
PRF-fit source offset from KIC position	1.263 ± 0.665	1.90	-1.022 ± 0.389	-0.743 ± 0.996
photometric centroid source offset	3.29 ± 1.76	1.87	-2.93 ± 1.72	1.50 ± 1.87

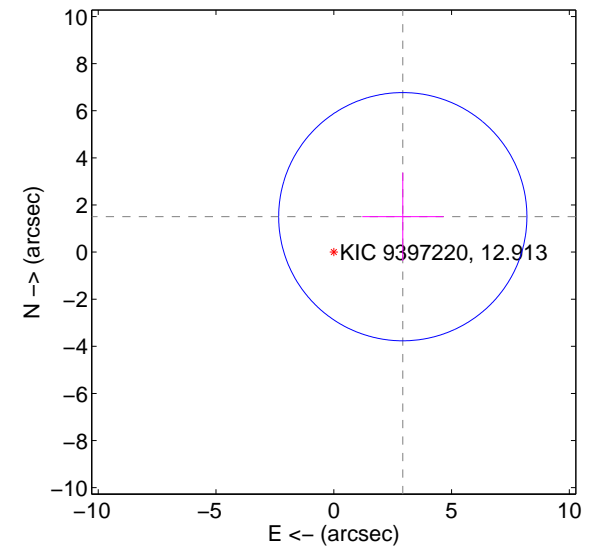
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

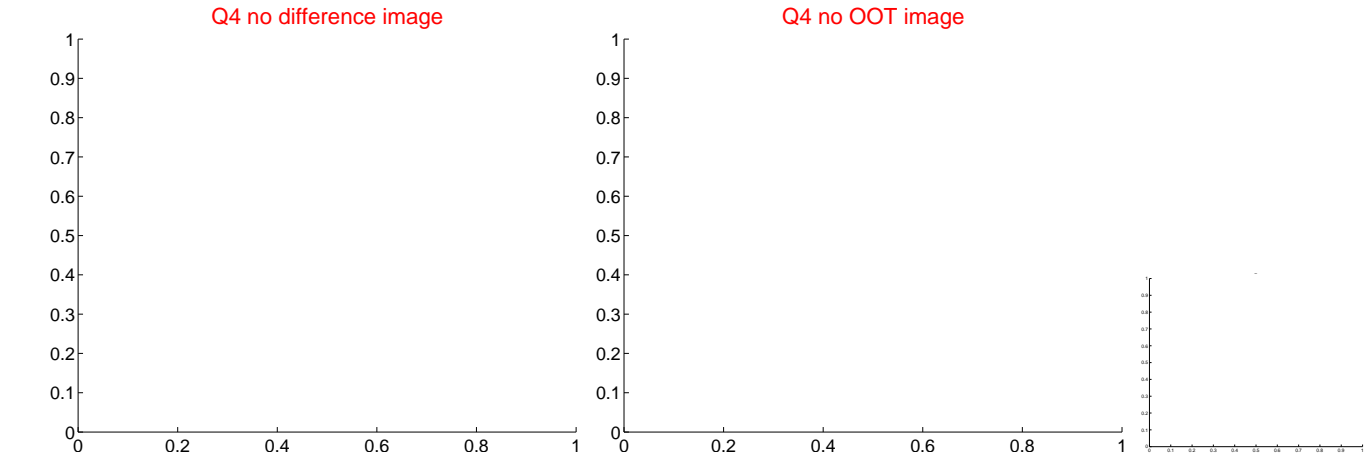
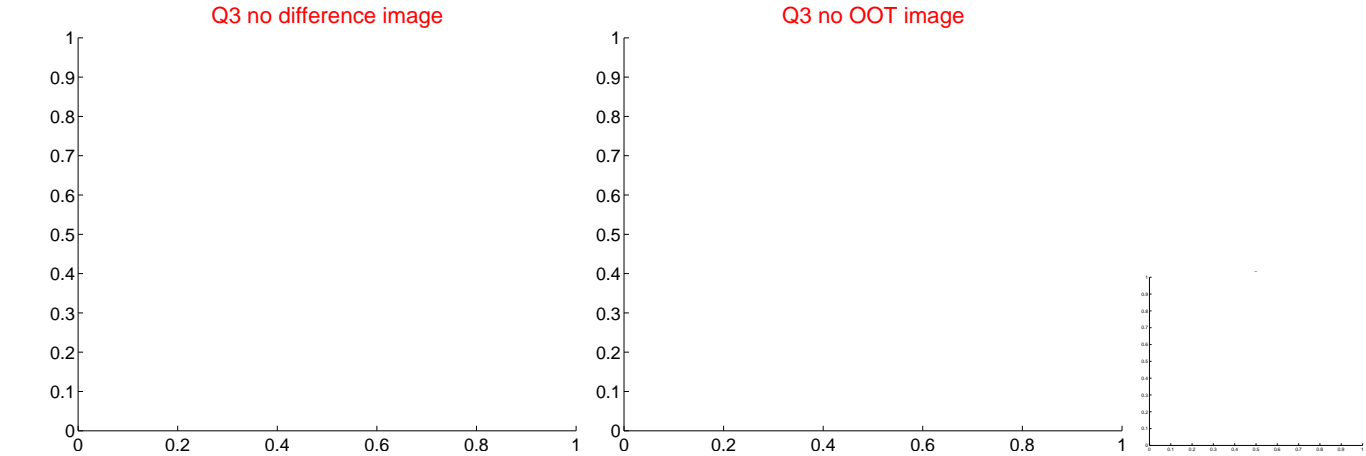
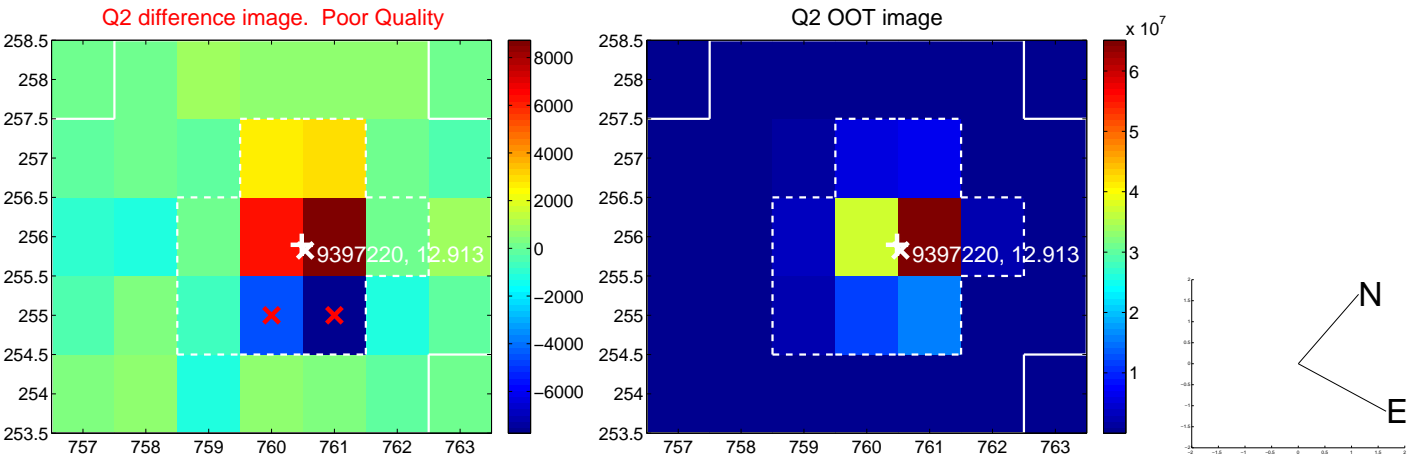
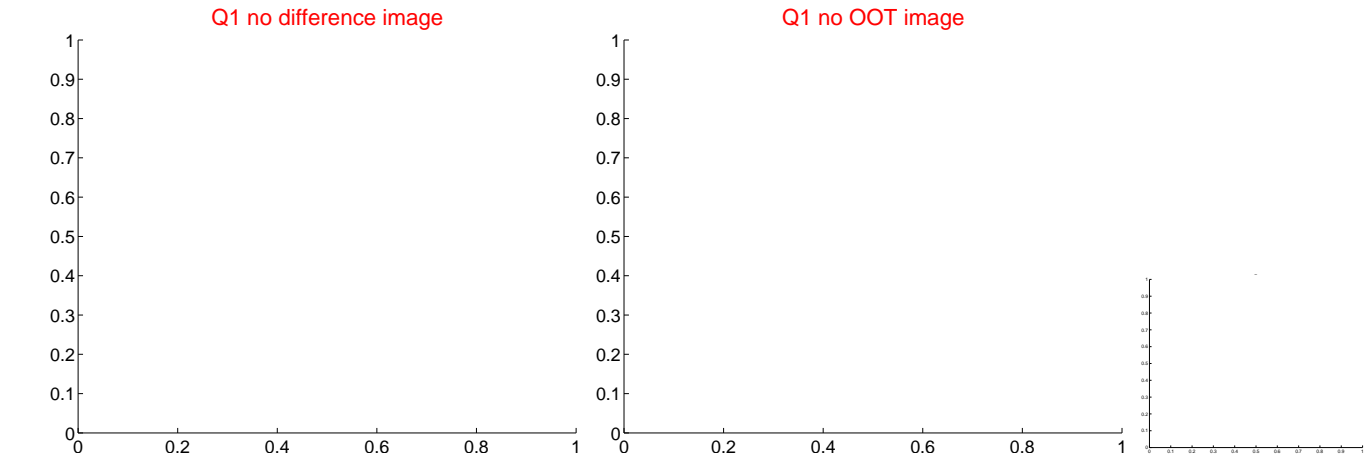


offset from photometric centroids

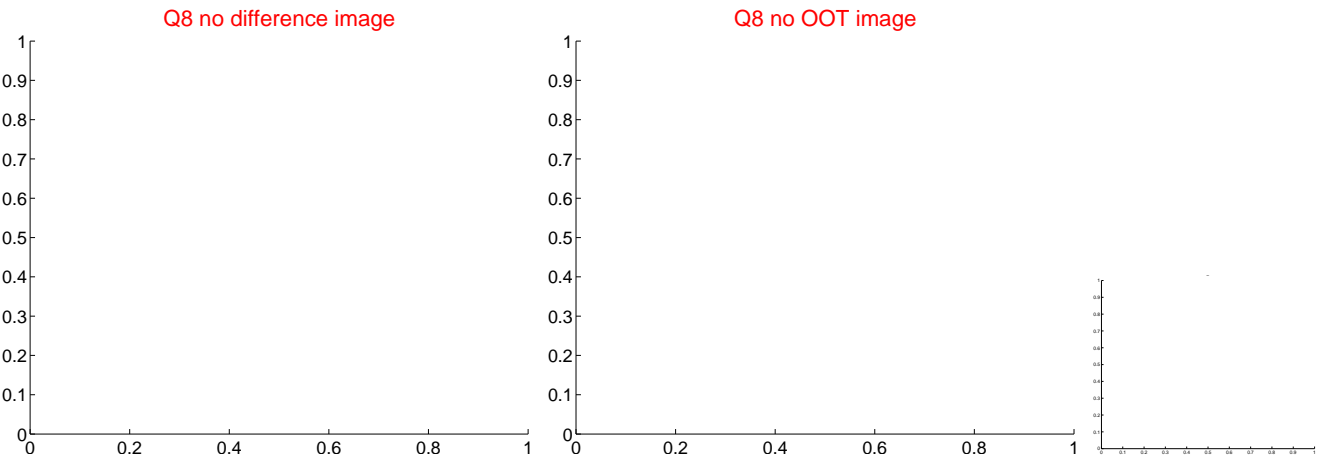
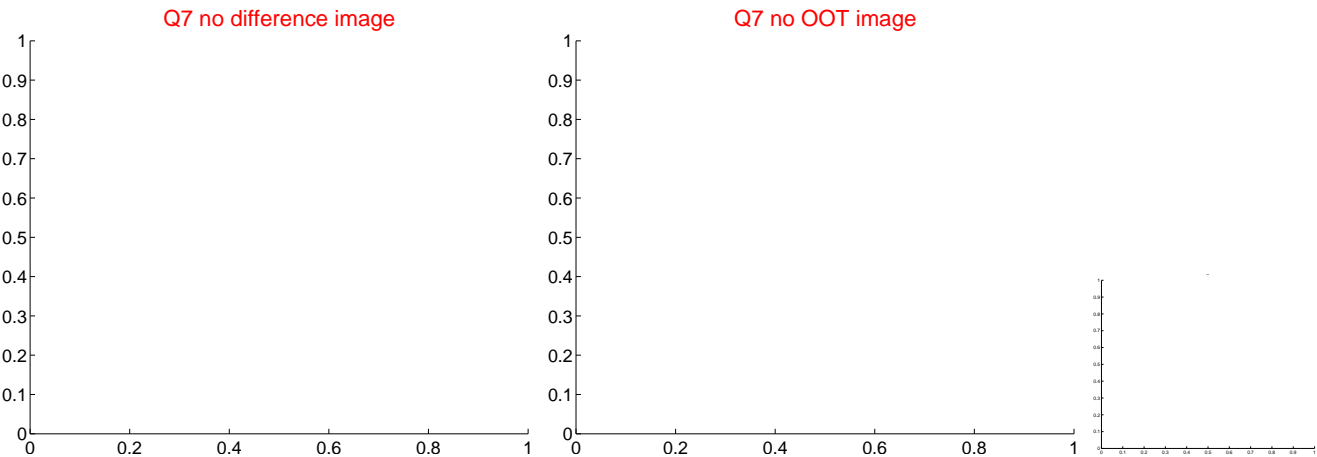
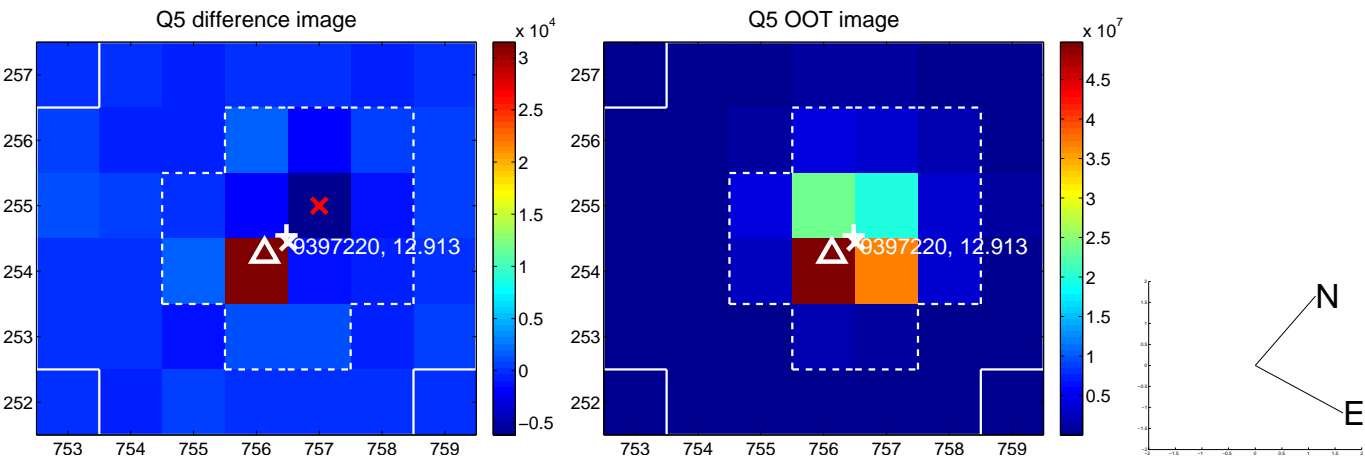


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

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



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



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

Q9 no difference image



Q9 no OOT image



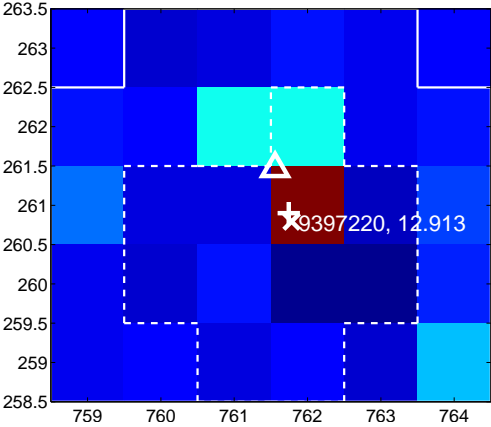
Q10 no difference image



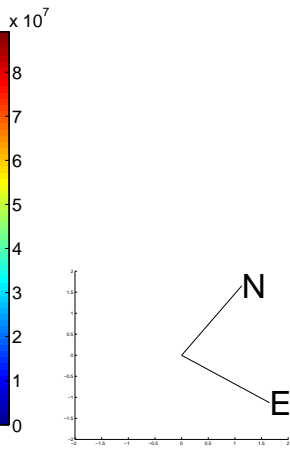
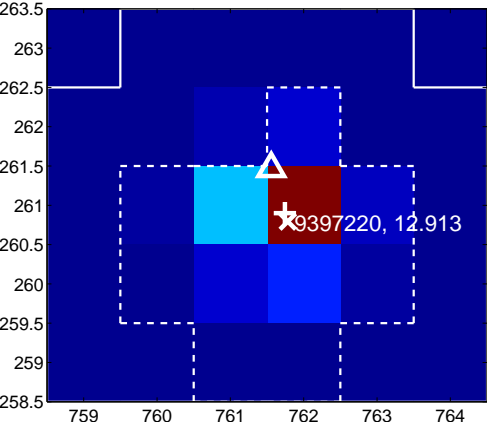
Q10 no OOT image



Q11 difference image. Poor Quality



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.

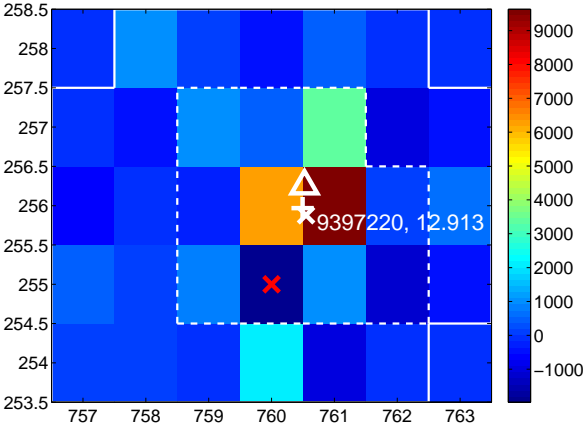
Q13 no difference image



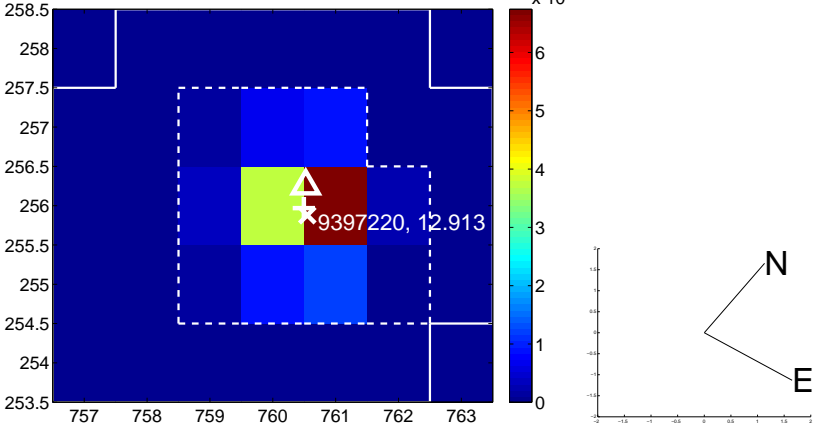
Q13 no OOT image



Q14 difference image



Q14 OOT image



Q15 no difference image



Q15 no OOT image



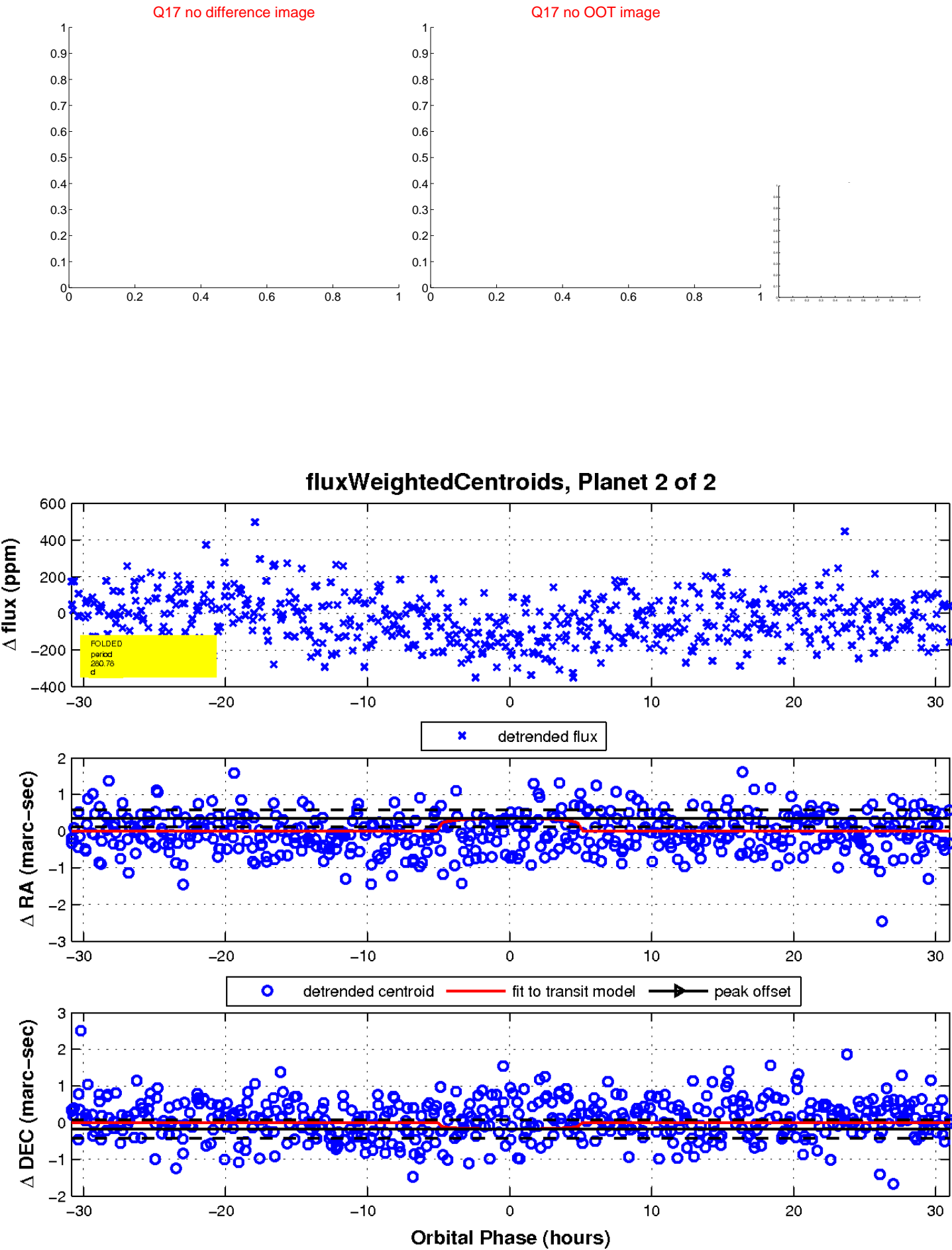
Q16 no difference image



Q16 no OOT image



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



UKIRT Image

Declination

