

KIC 009406050

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})
009406050-01	OBS	No	503.622547	162.929903	390.2	11.138	7.2	7.4	0.97	6091	2.01	0.73
009406050-02	OBS	No	492.842645	185.682217	255.9	25.060	7.3	7.8	0.97	6091	1.63	0.75

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009406050-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009406050-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—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.

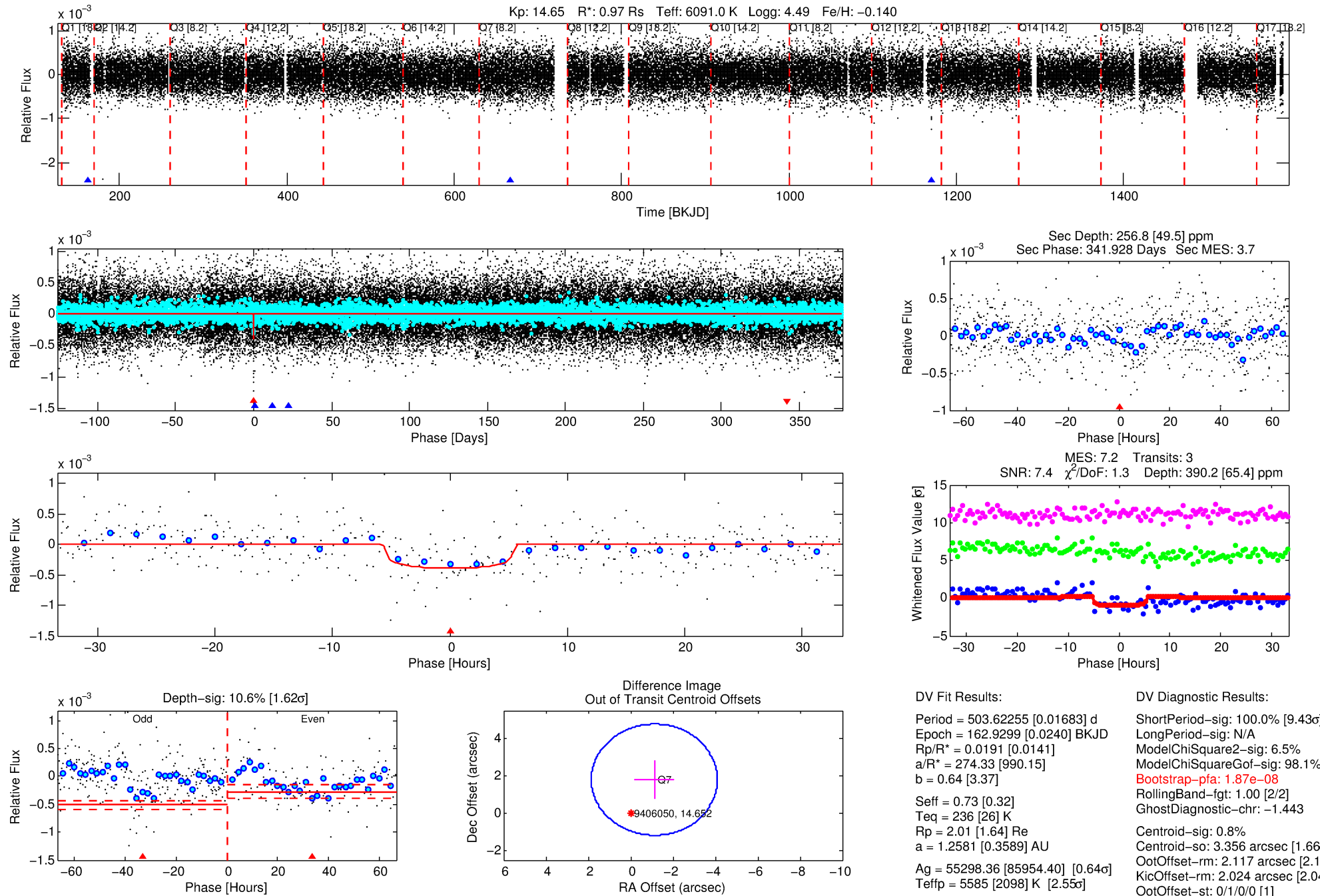
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009406050-01

No Significant Match Found

DV One-Page Summary

KIC: 9406050 Candidate: 1 of 2 Period: 503.623 d



DV Fit Results:

Period = 503.62255 [0.01683] d
Epoch = 162.9299 [0.0240] BKJD
Rp/R* = 0.0191 [0.0141]
a/R* = 274.33 [990.15]
b = 0.64 [3.37]
Seff = 0.73 [0.32]
Teq = 236 [26] K
Rp = 2.01 [1.64] Re
a = 1.2581 [0.3589] AU
Ag = 55298.36 [85954.40] [0.64 σ]
Teffp = 5585 [2098] K [2.55 σ]

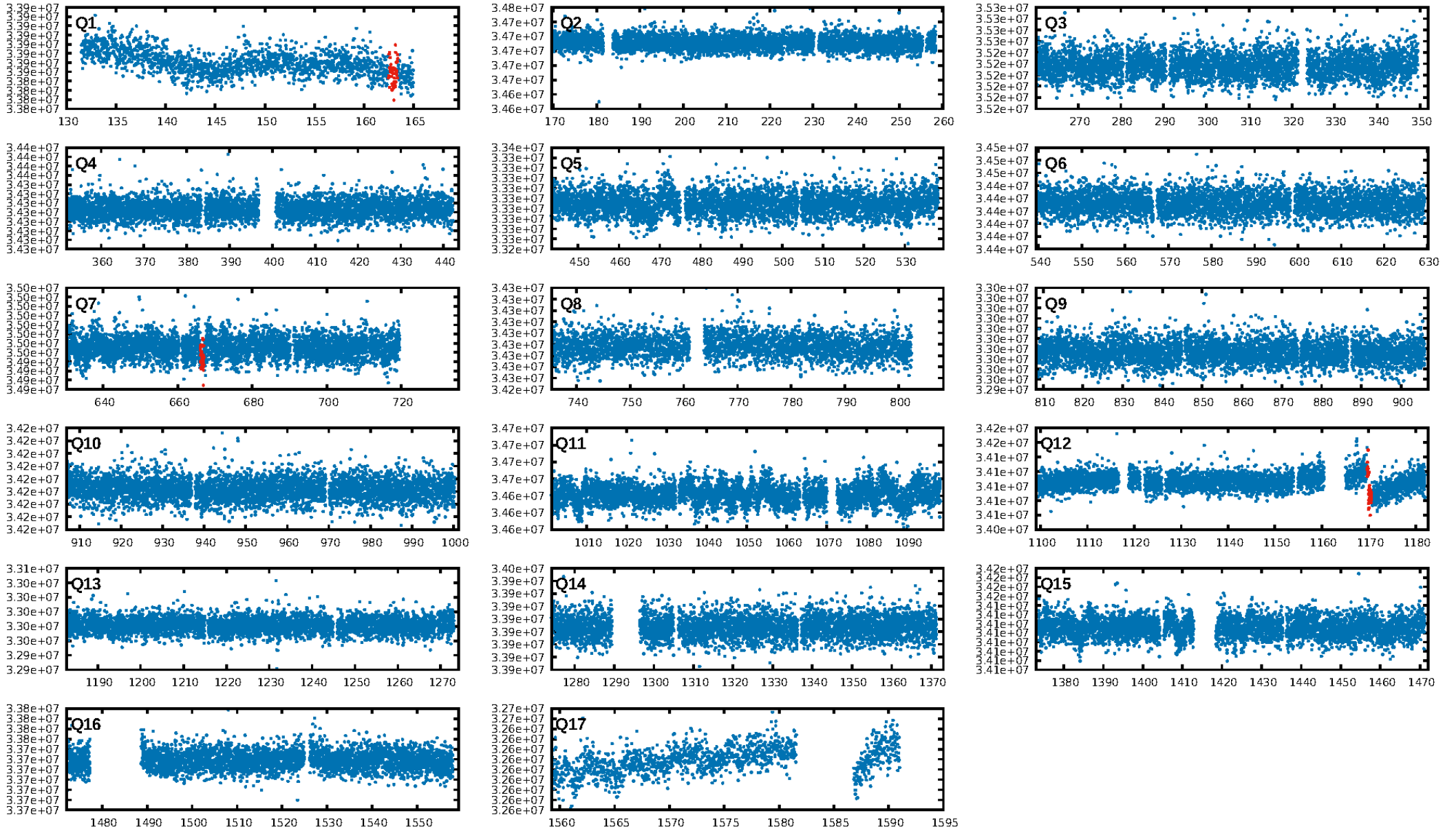
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [9.43 σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 6.5%
ModelChiSquareGof-sig: 98.1%
Bootstrap-pfa: 1.87e-08
RollingBand-fgt: 1.00 [2/2]
GhostDiagnostic-chr: -1.443
Centroid-sig: 0.8%
Centroid-so: 3.356 arcsec [1.66 σ]
OotOffset-rm: 2.117 arcsec [2.13 σ]
KicOffset-rm: 2.024 arcsec [2.04 σ]
OotOffset-st: 0/1/0/0 [1]
KicOffset-st: 0/1/0/0 [1]
DiffImageQuality-fgm: 0.00 [0/1]
DiffImageOverlap-fno: 0.67 [2/3]

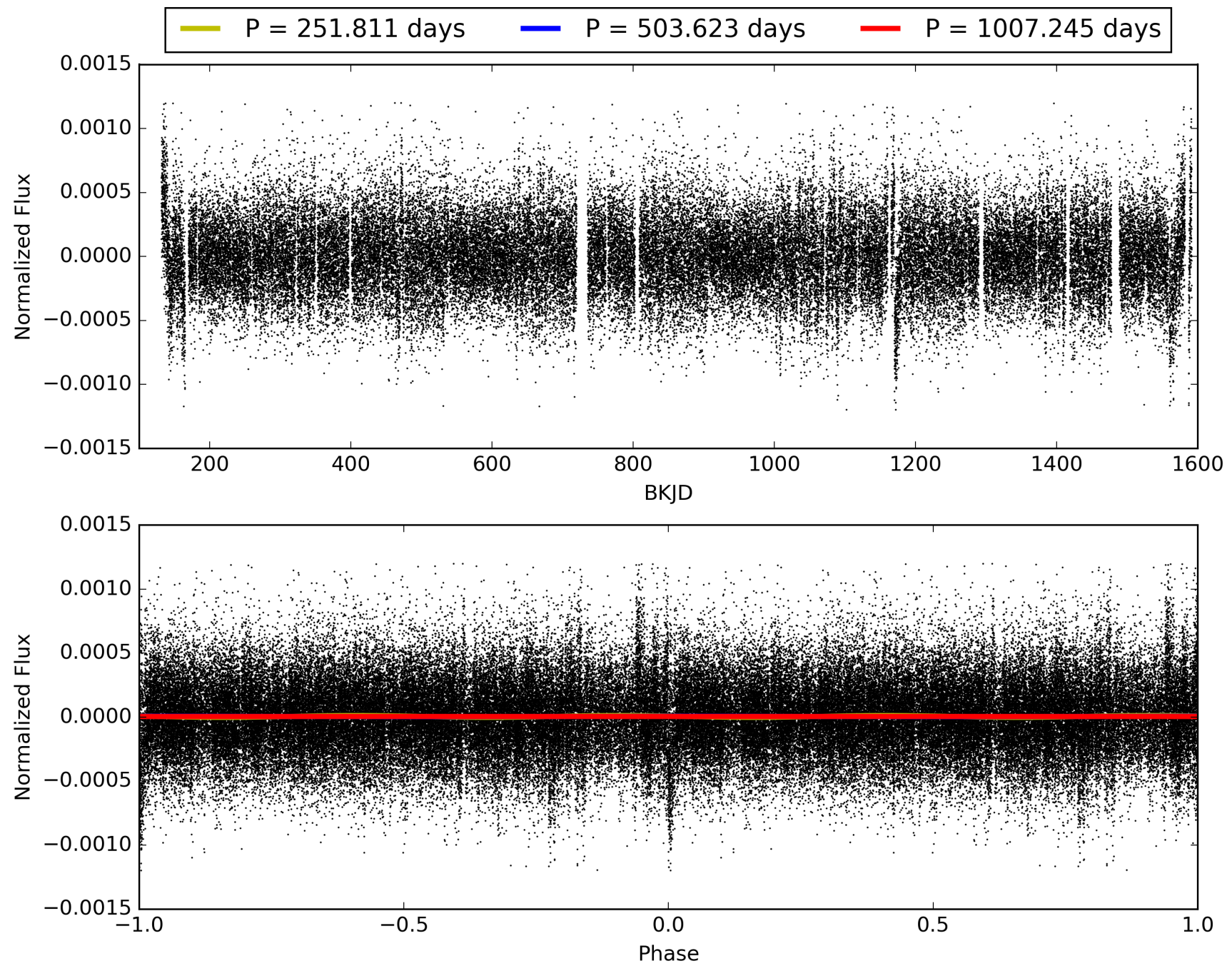
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 17:04:25 Z

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

TCE 009406050-01, PDC Light Curves

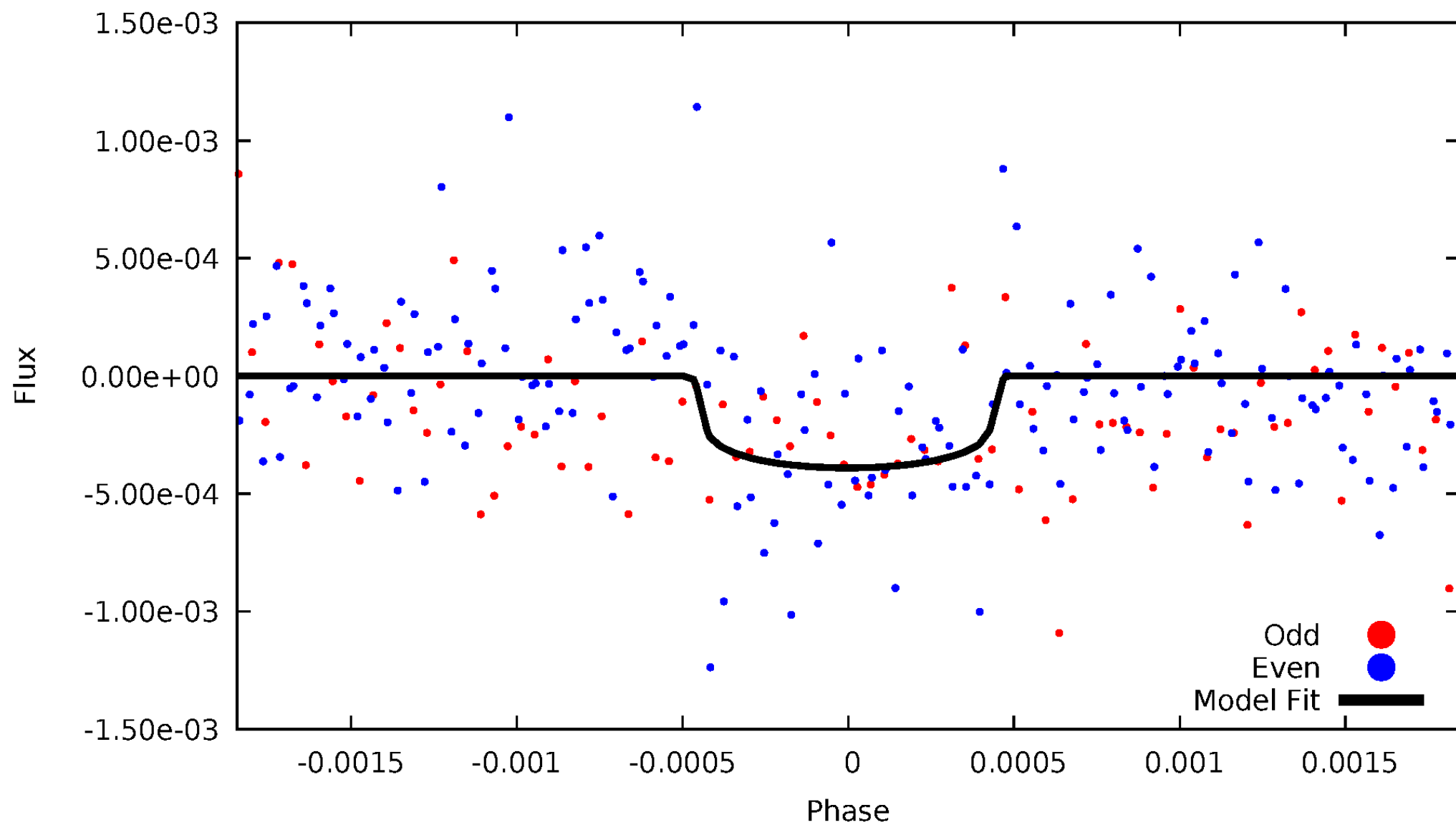


TCE 009406050-01



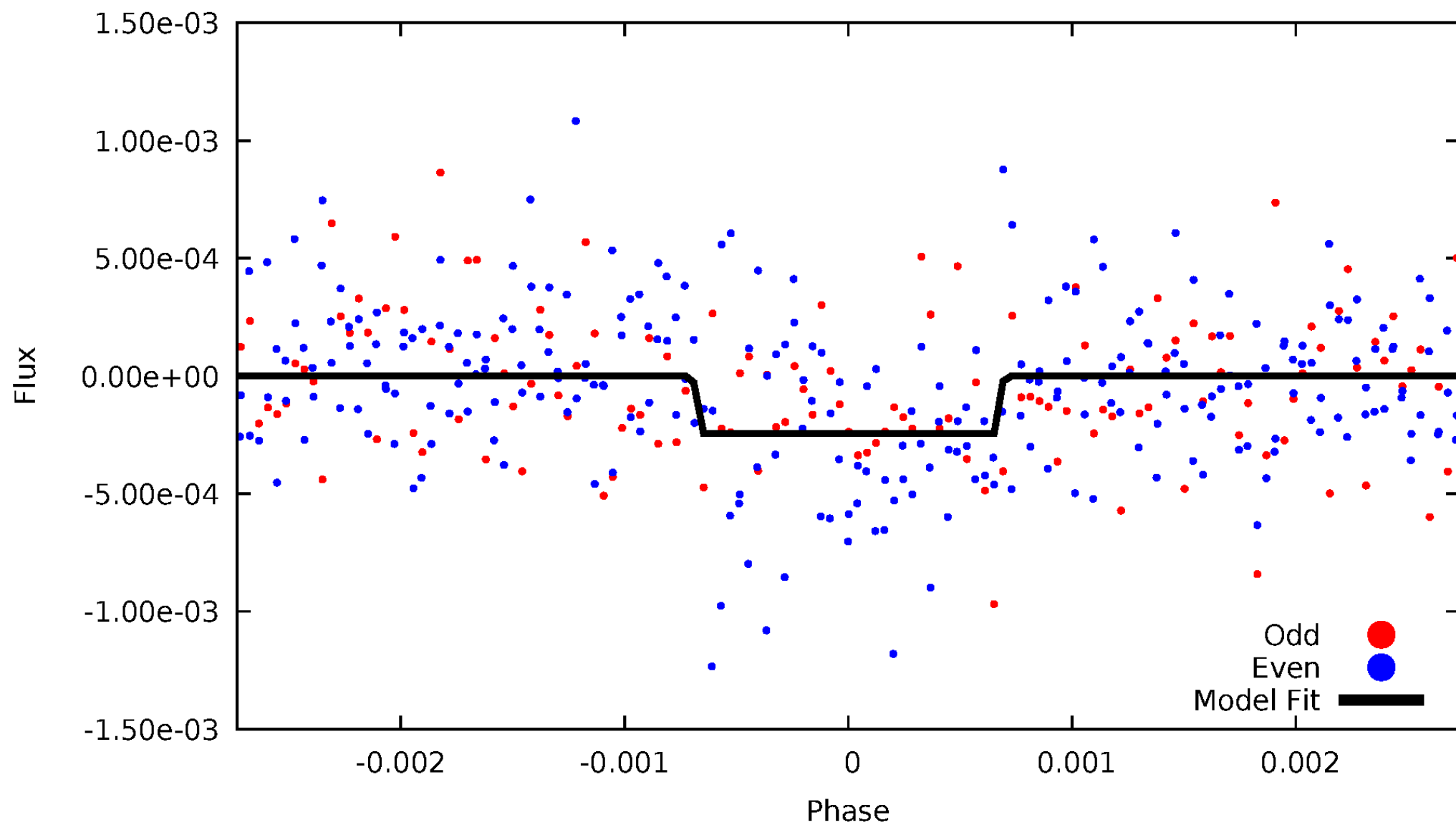
DV Odd/Even

TCE 009406050-01



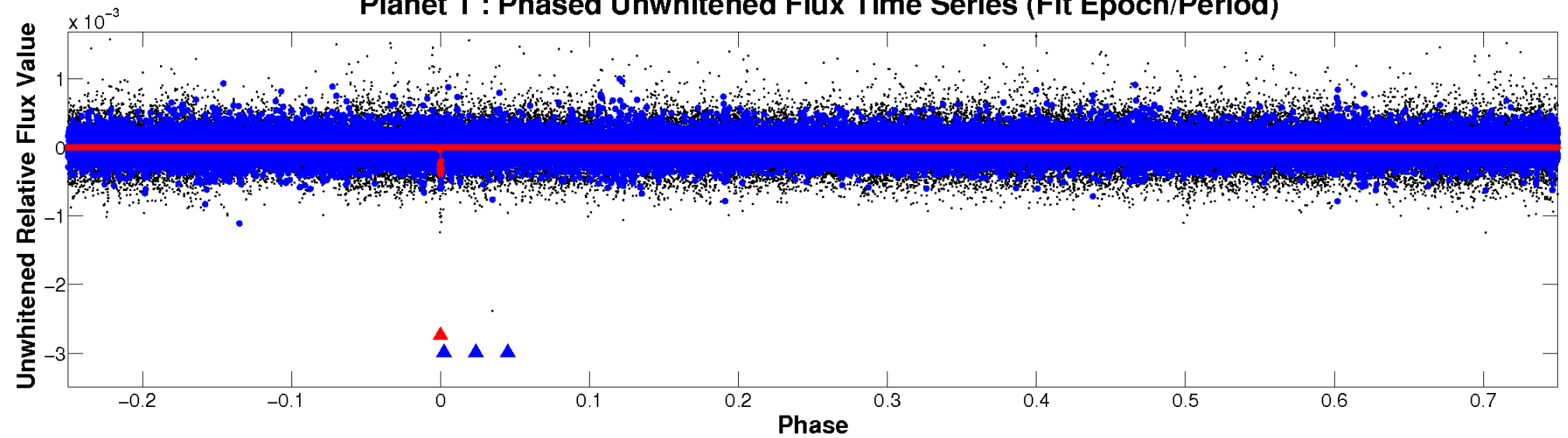
ALT Odd/Even

TCE 009406050-01

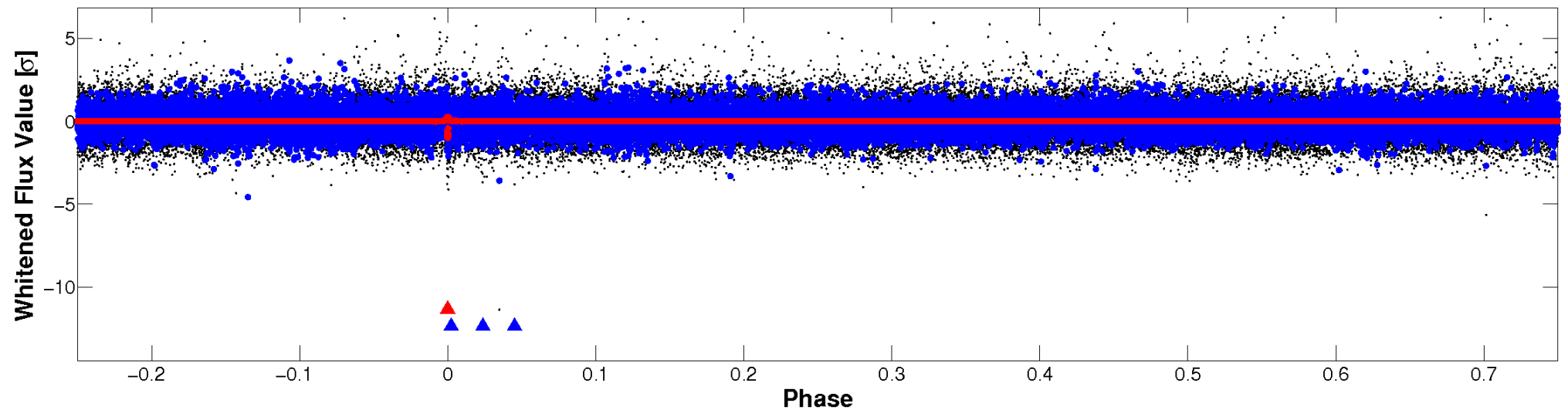


Non-Whitened Vs. Whitened Light Curve

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



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



PDC Quarter-Phased Transit Curves

TCE 009406050-01 P=503.622547 Days $T_0=162.929903$ (BKJD)



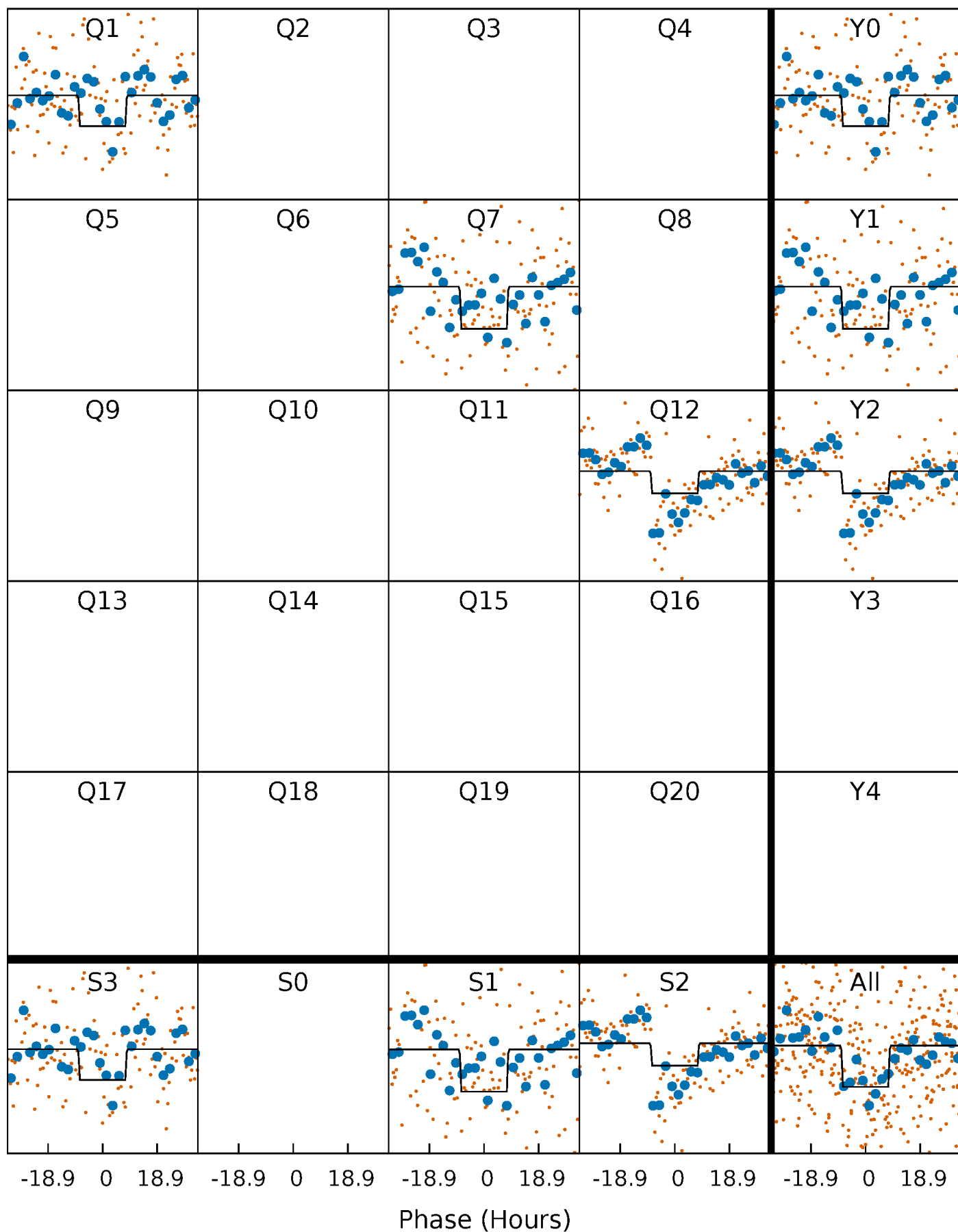
DV Quarter-Phased Transit Curves

TCE 009406050-01 P=503.622547 Days $T_0=162.929903$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

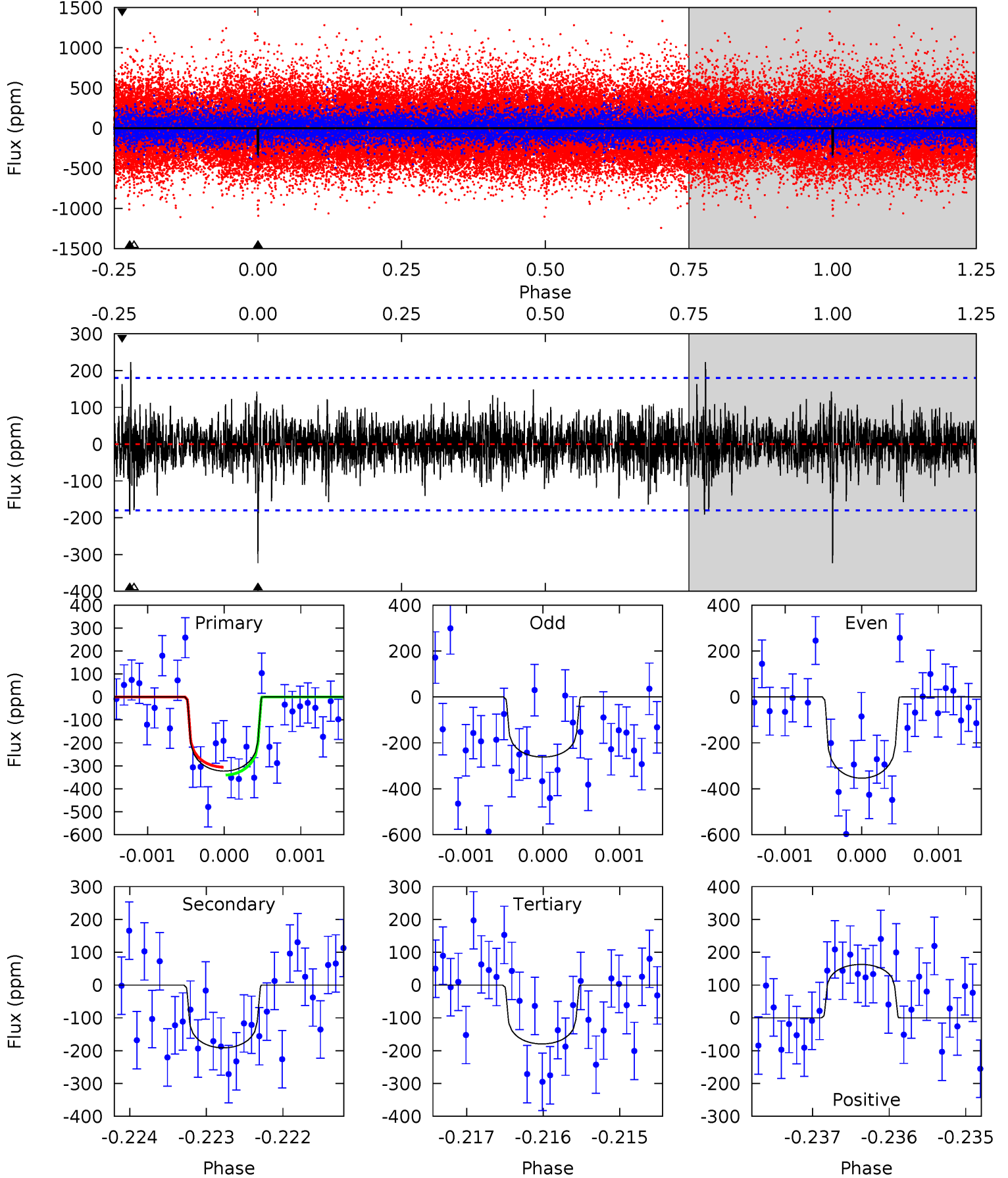
TCE 009406050-01 P=503.728121 Days $T_0=162.816437$ (BKJD)



DV Model-Shift Uniqueness Test

009406050-01, P = 503.622547 Days, E = 162.929903 Days

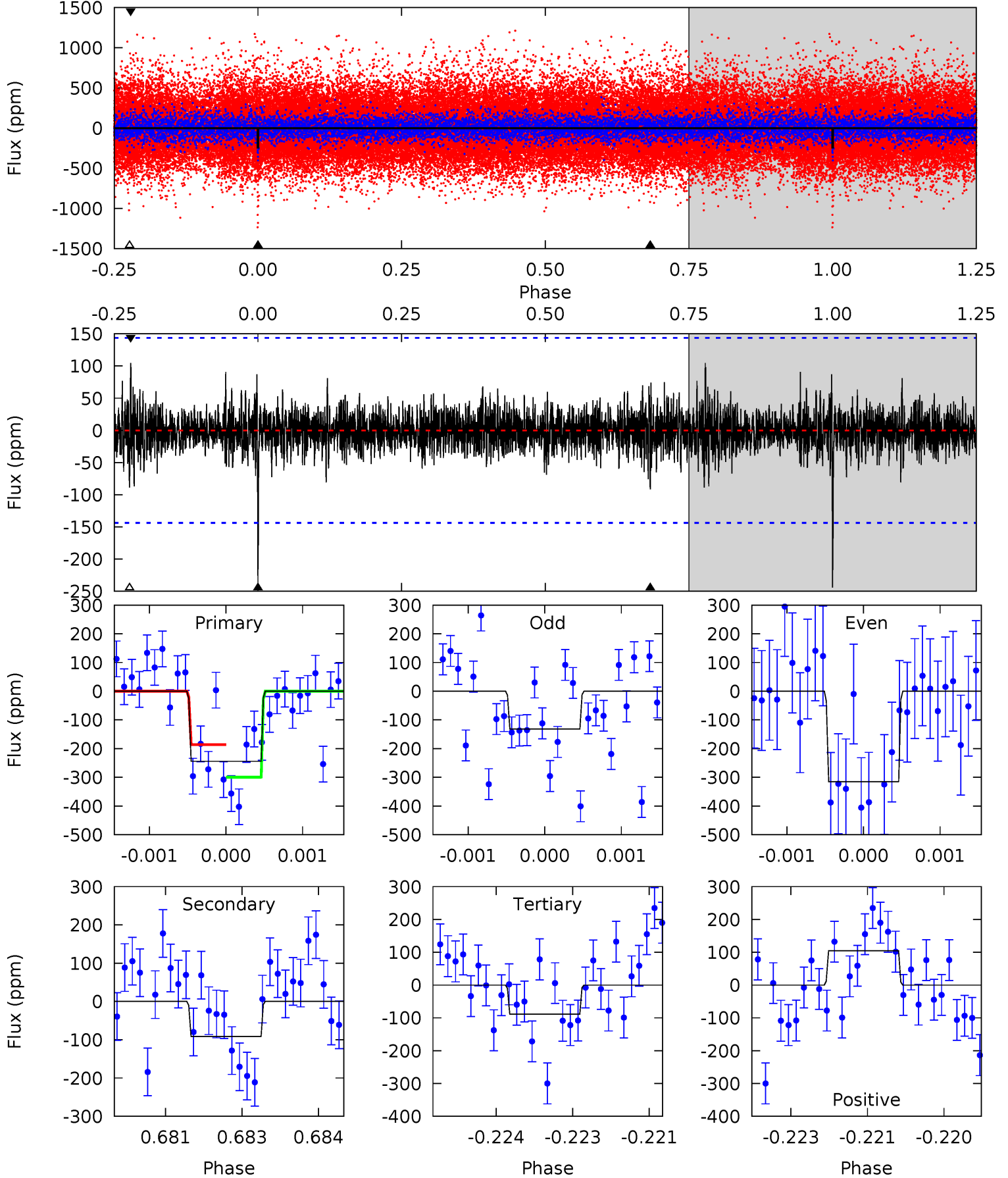
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.80	5.81	5.45	4.94	5.46	3.30	1.28	4.35	4.86	0.36	0.86	1.31	1.18	0.41	0.52



Alt Model-Shift Uniqueness Test

009406050-01, P = 503.728121 Days, E = 162.816437 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.16	3.43	3.33	3.92	5.39	3.19	0.81	5.83	5.24	0.09	-0.49	3.22	1.87	0.30	2.13



Stellar Parameters For KIC 009406050

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	6091^{+181}_{-199}	$4.487^{+0.054}_{-0.230}$	$-0.140^{+0.300}_{-0.300}$	$0.967^{+0.325}_{-0.101}$	$1.045^{+0.140}_{-0.140}$	$1.627^{+0.465}_{-0.859}$
	+3%/-3%	+1%/-5%	+214%/-214%	+34%/-10%	+13%/-13%	+29%/-53%
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 009406050-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	-191 ± 33	$2.29^{+1.46}_{-1.36}$	336^{+25}_{-17}	5013^{+2836}_{-874}	$30149^{+157518}_{-18876}$
Alt.	-91 ± 27	$1.92^{+1.61}_{-1.20}$	338^{+26}_{-17}	4713^{+2870}_{-986}	$22209^{+129788}_{-16355}$

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

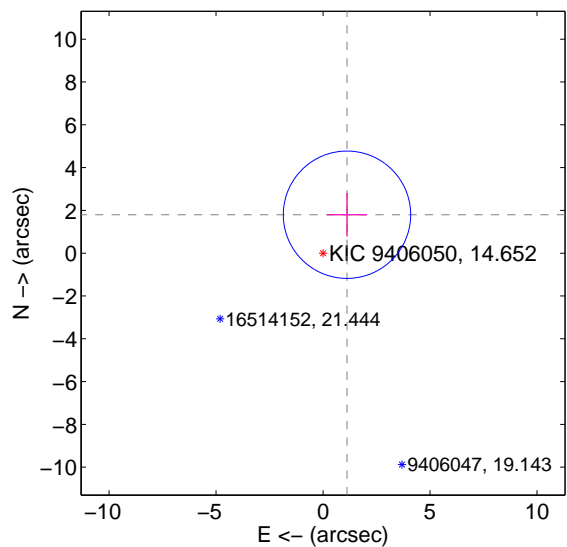
Supplemental centroid analysis for 009406050-01. Kepler magnitude: 14.65. Transit SNR 7.45

There are 0 quarters with good PRF difference image offsets

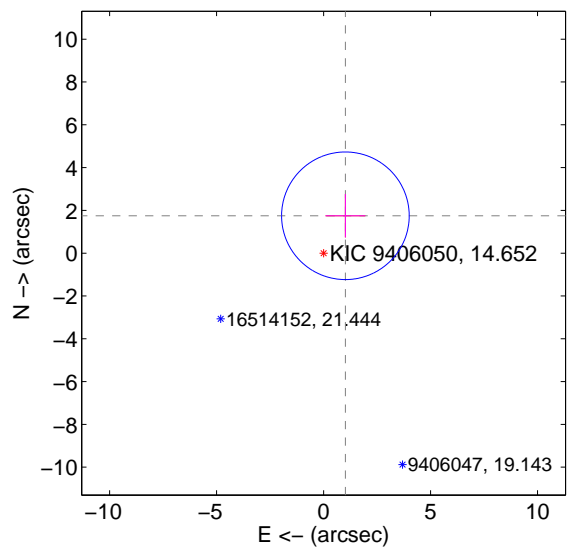
The direct PRF centroid is offset from the target star catalog position by about 0.11 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	2.117 ± 0.992	2.13	-1.119 ± 0.931	1.797 ± 1.015
PRF-fit source offset from KIC position	2.024 ± 0.994	2.04	-1.020 ± 0.931	1.748 ± 1.015
photometric centroid source offset	3.36 ± 2.02	1.66	1.60 ± 1.69	-2.95 ± 2.11

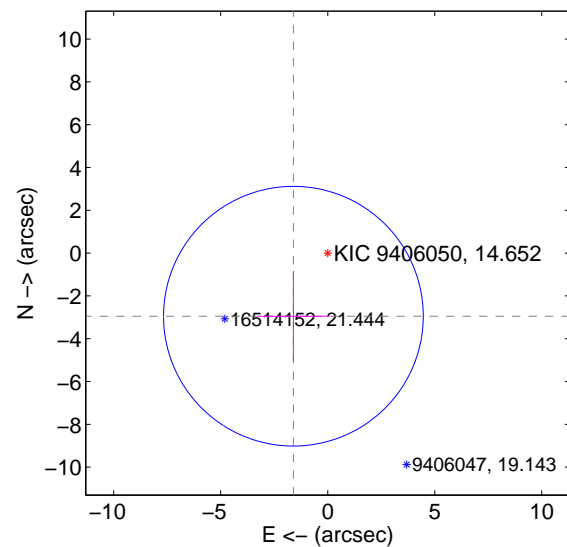
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

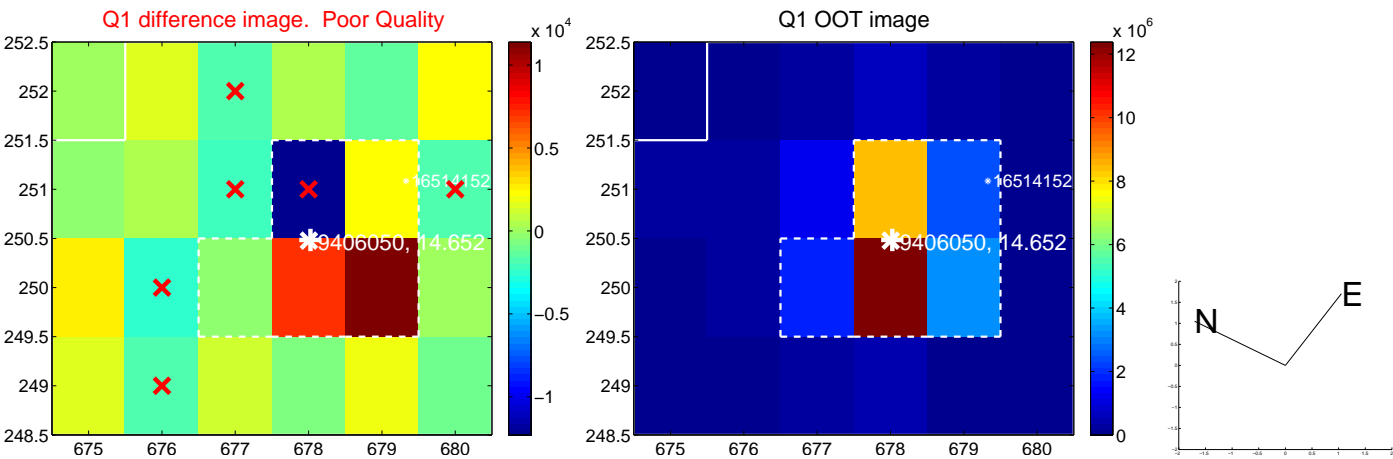


offset from photometric centroids



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.

Q5 no difference image



Q5 no OOT image



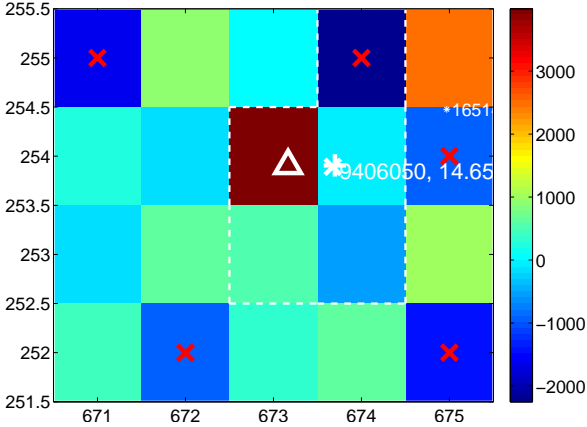
Q6 no difference image



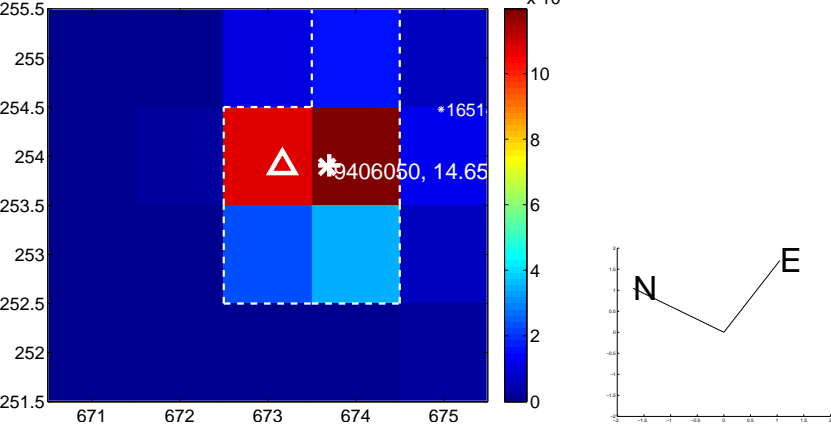
Q6 no OOT image



Q7 difference image. Poor Quality



Q7 OOT image



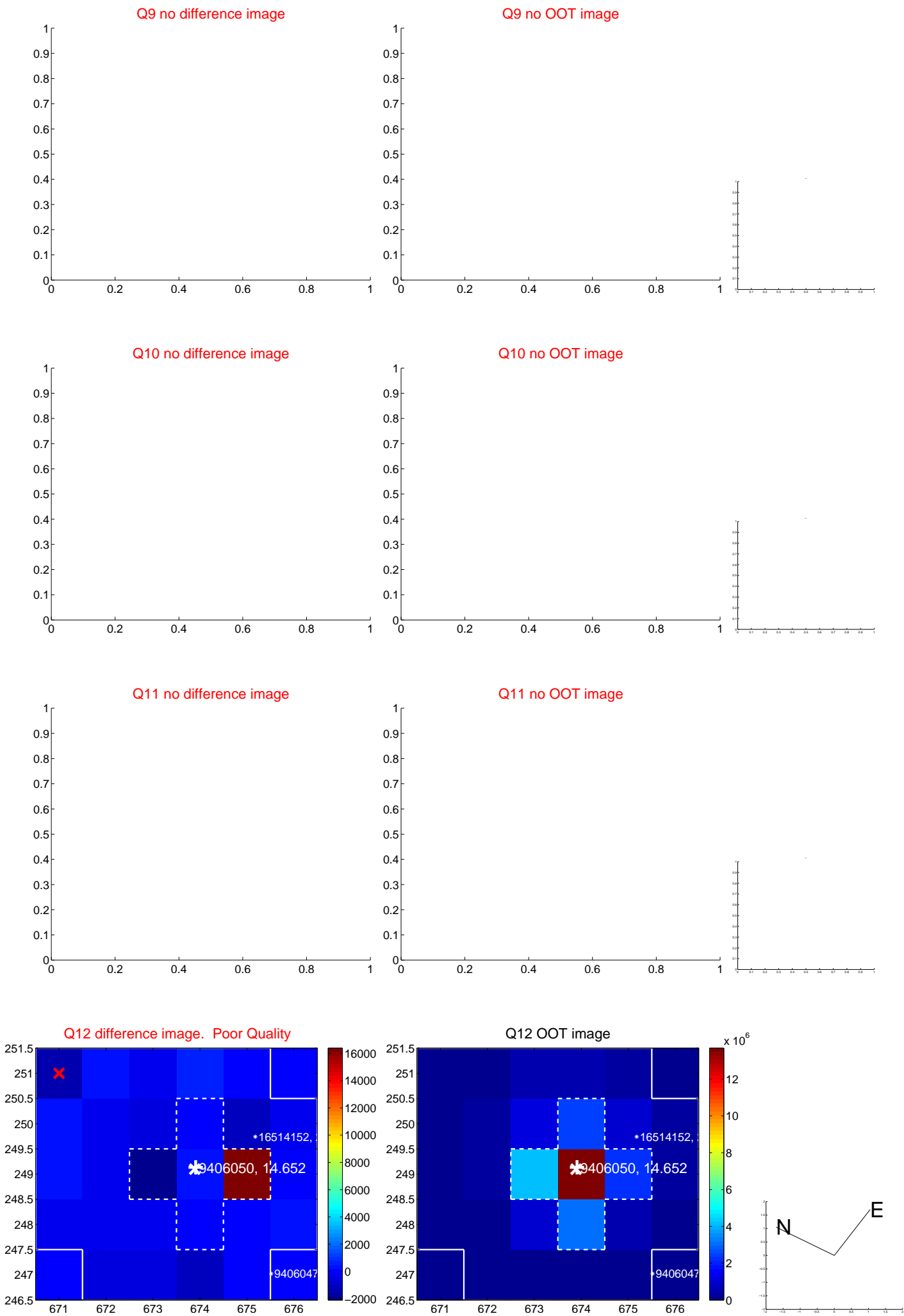
Q8 no difference image



Q8 no OOT image



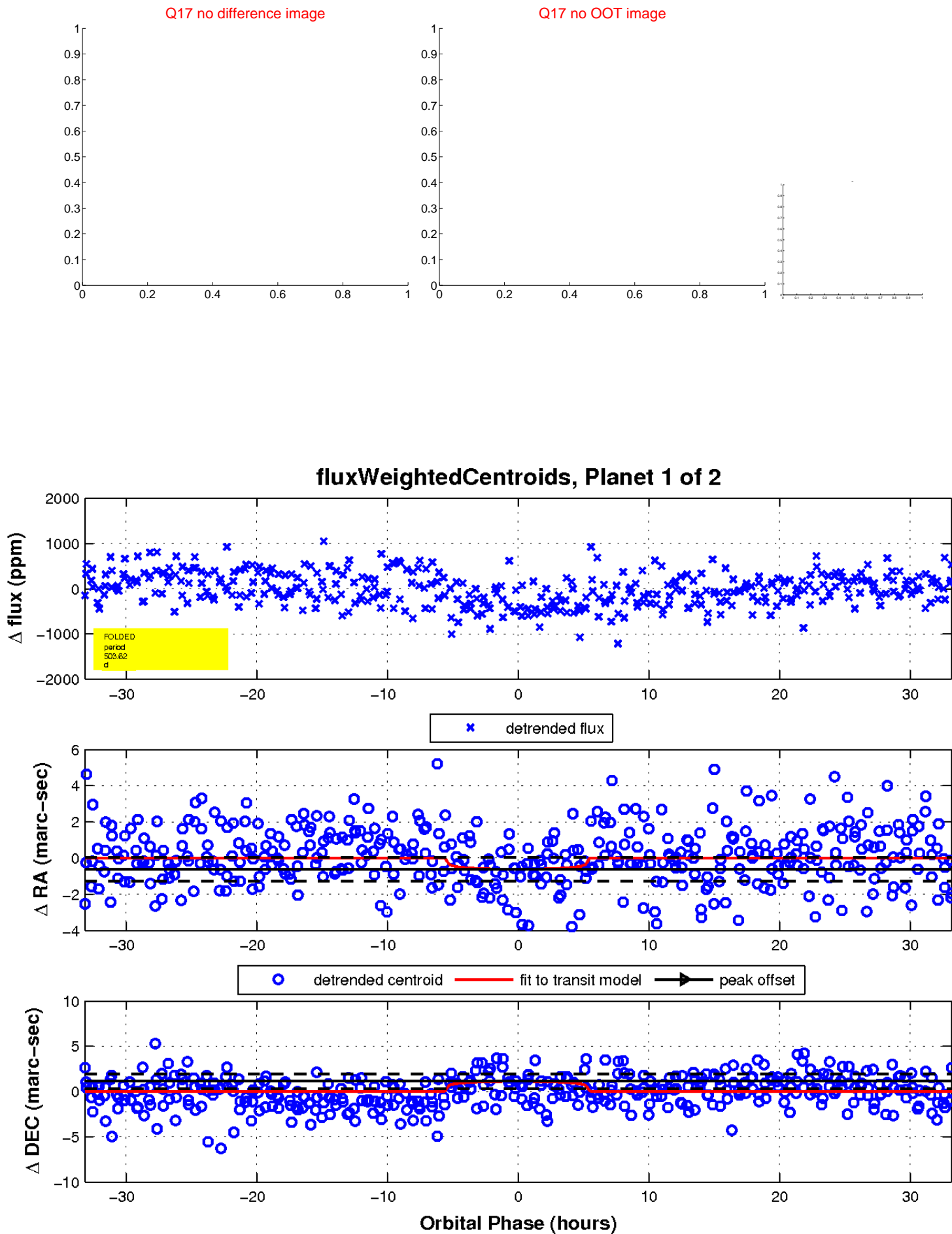
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



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

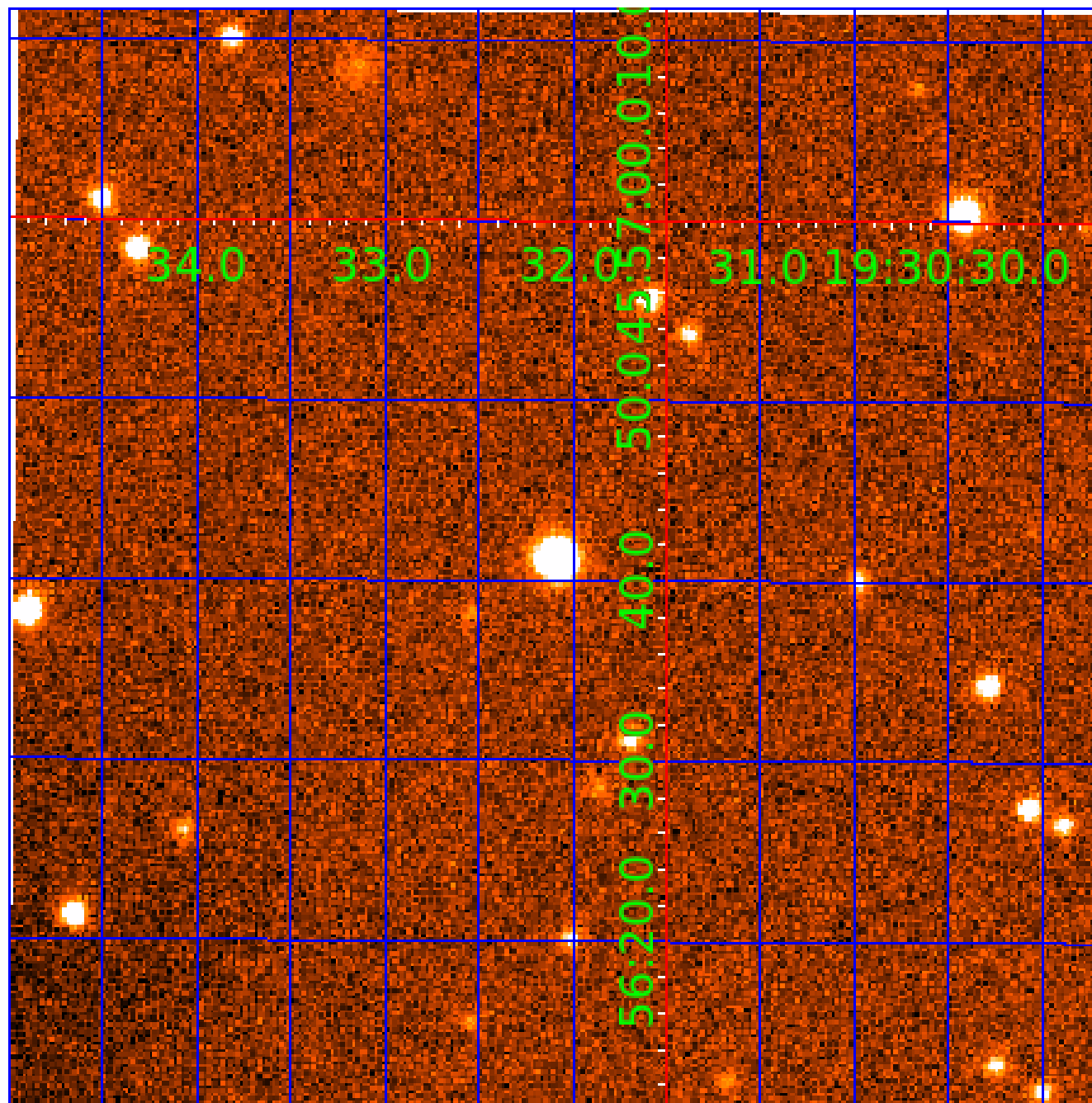


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 009406050

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})
009406050-01	OBS	No	503.622547	162.929903	390.2	11.138	7.2	7.4	0.97	6091	2.01	0.73
009406050-02	OBS	No	492.842645	185.682217	255.9	25.060	7.3	7.8	0.97	6091	1.63	0.75

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009406050-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009406050-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—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.

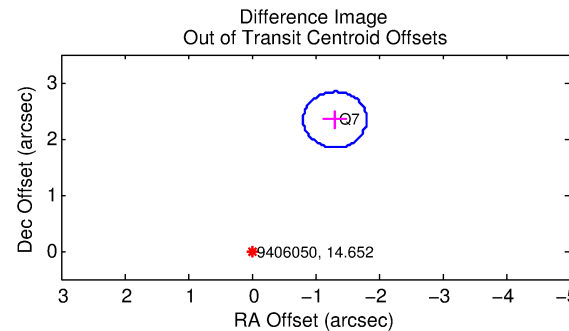
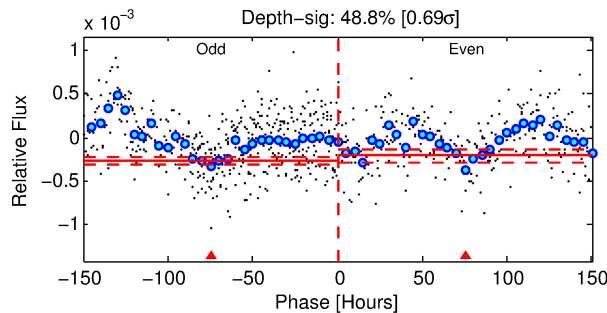
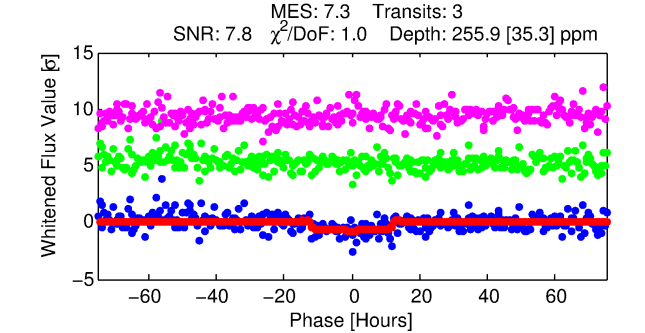
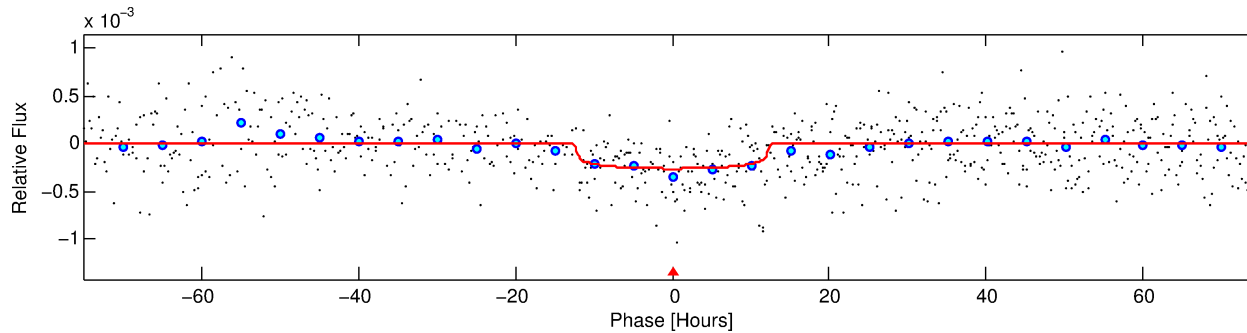
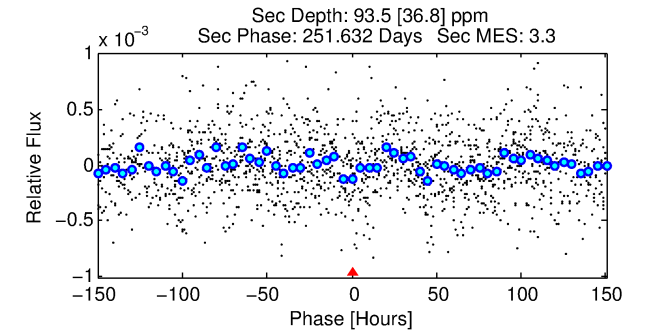
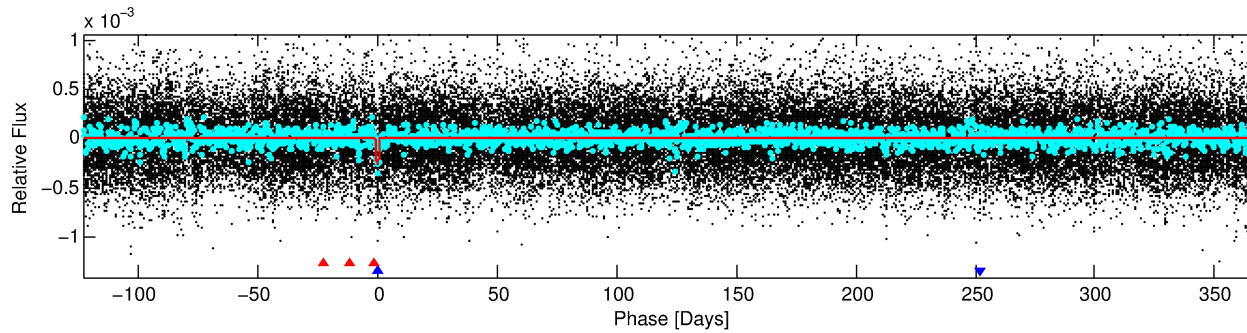
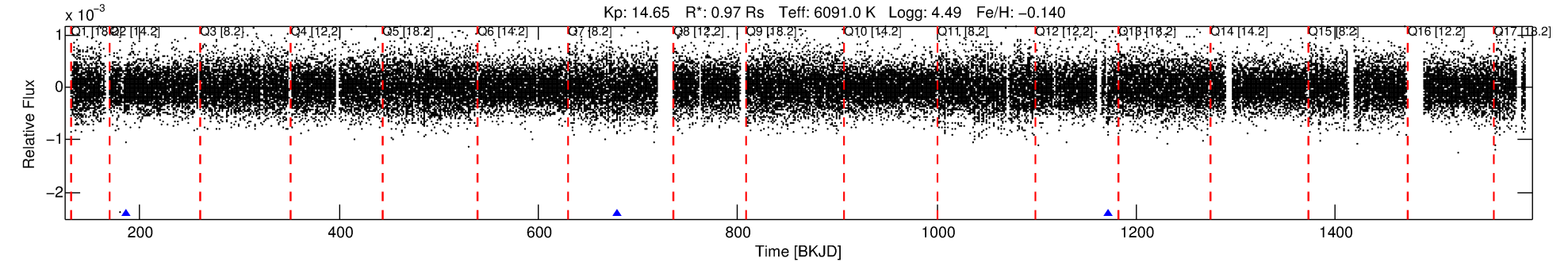
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009406050-02

No Significant Match Found

DV One-Page Summary

KIC: 9406050 Candidate: 2 of 2 Period: 492.843 d



DV Fit Results:

Period = 492.84265 [0.03052] d
Epoch = 185.6822 [0.0292] BKJD
Rp/R* = 0.0155 [0.0056]
a/R* = 116.64 [203.47]
b = 0.65 [1.54]
Seff = 0.75 [0.33]
Teq = 237 [26] K
Rp = 1.63 [0.81] Re
a = 1.2401 [0.3537] AU
Ag = 29607.28 [27403.41] [1.08σ]
Teffp = 4812 [1006] K [4.55σ]

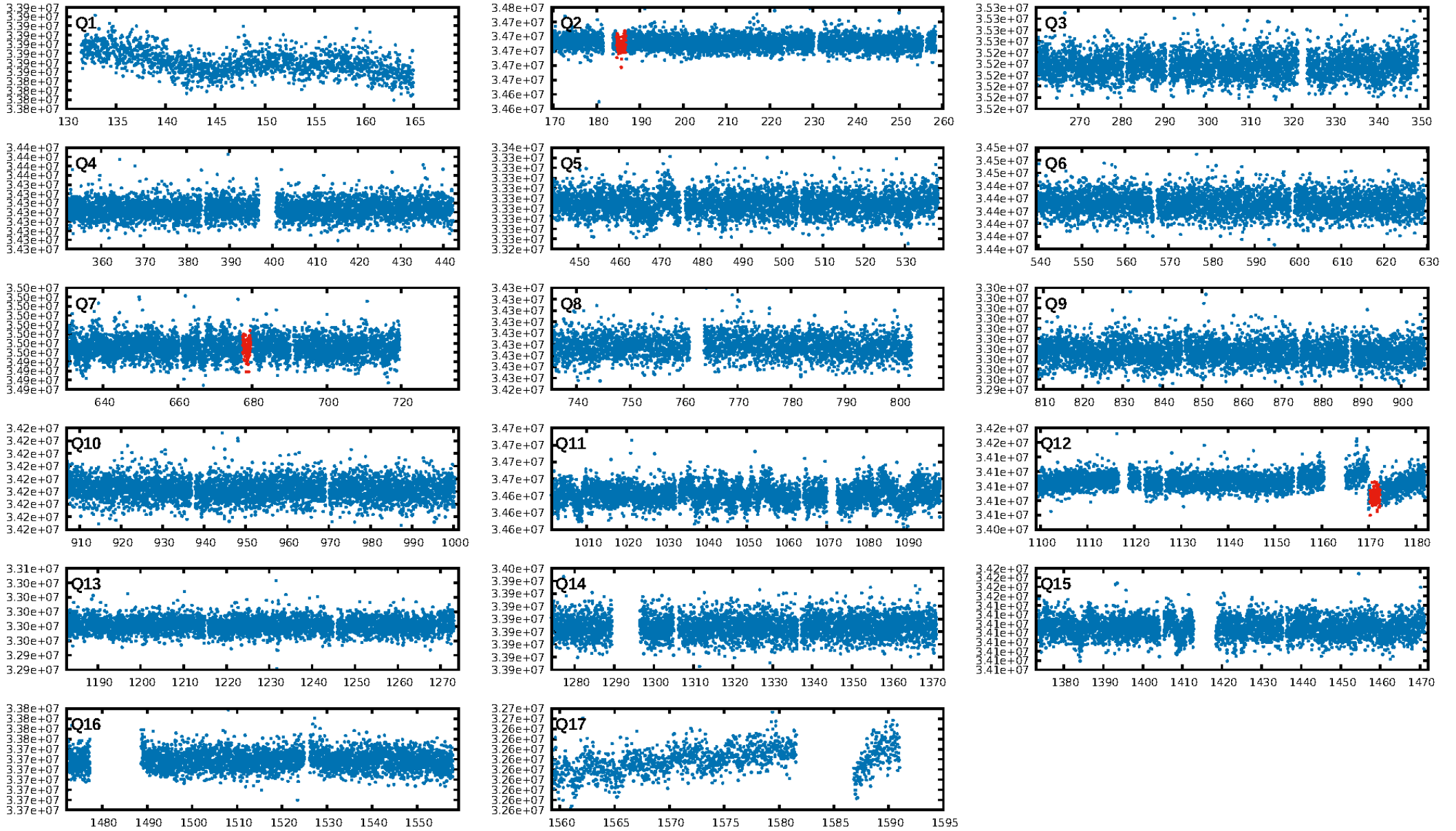
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 100.0% [9.43σ]
ModelChiSquare2-sig: 0.8%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 8.26e-11
RollingBand-fgt: 1.00 [3/3]
GhostDiagnostic-chr: 6.961
Centroid-sig: 1.7%
Centroid-so: 3.848 arcsec [2.43σ]
OotOffset-rm: 2.678 arcsec [16.13σ]
KicOffset-rm: 2.587 arcsec [15.61σ]
OotOffset-st: 0/1/0/0 [1]
KicOffset-st: 0/1/0/0 [1]
DiffImageQuality-fgm: 0.00 [0/1]
DiffImageOverlap-fno: 1.00 [1/1]

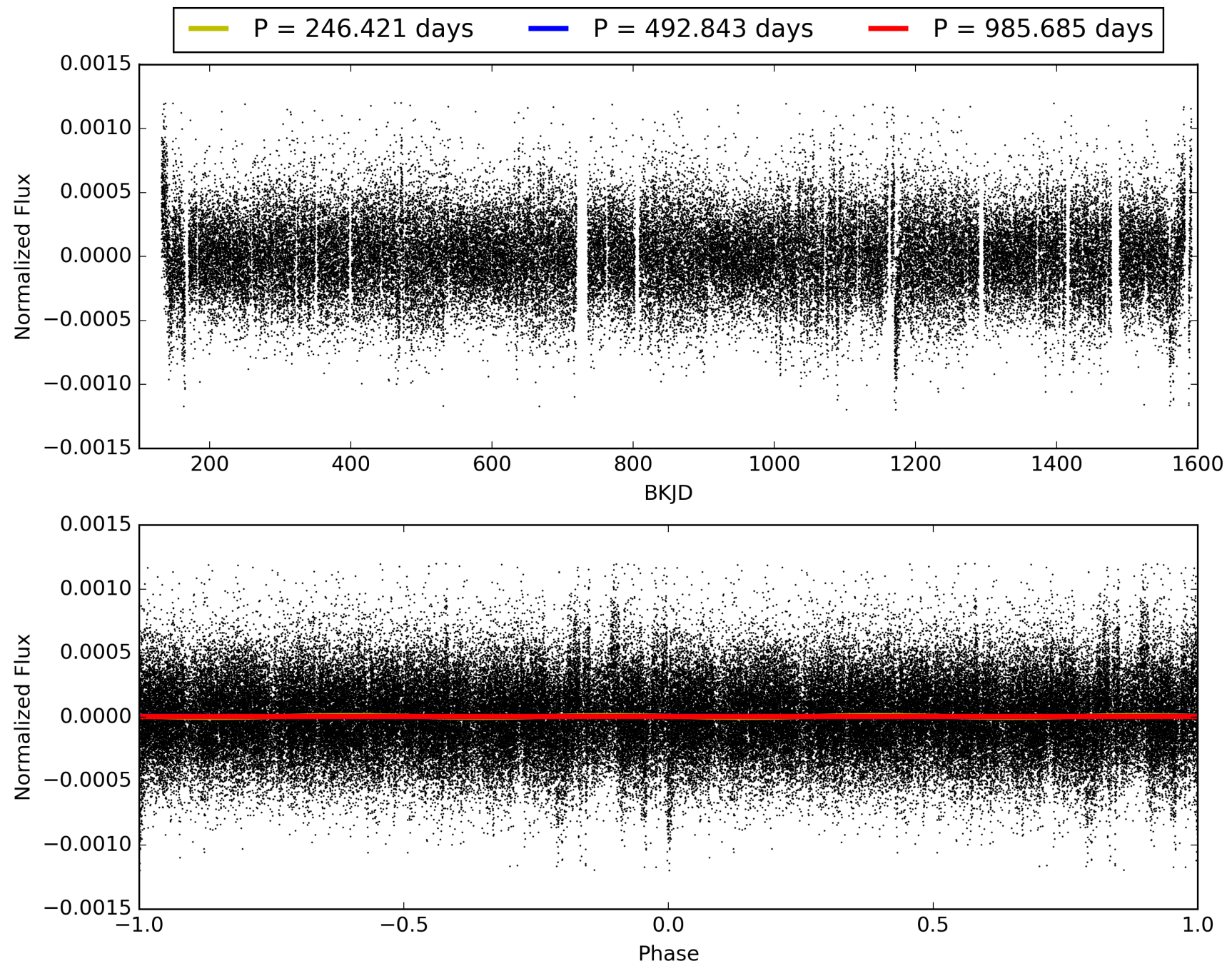
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 17:04:40 Z

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

TCE 009406050-02, PDC Light Curves

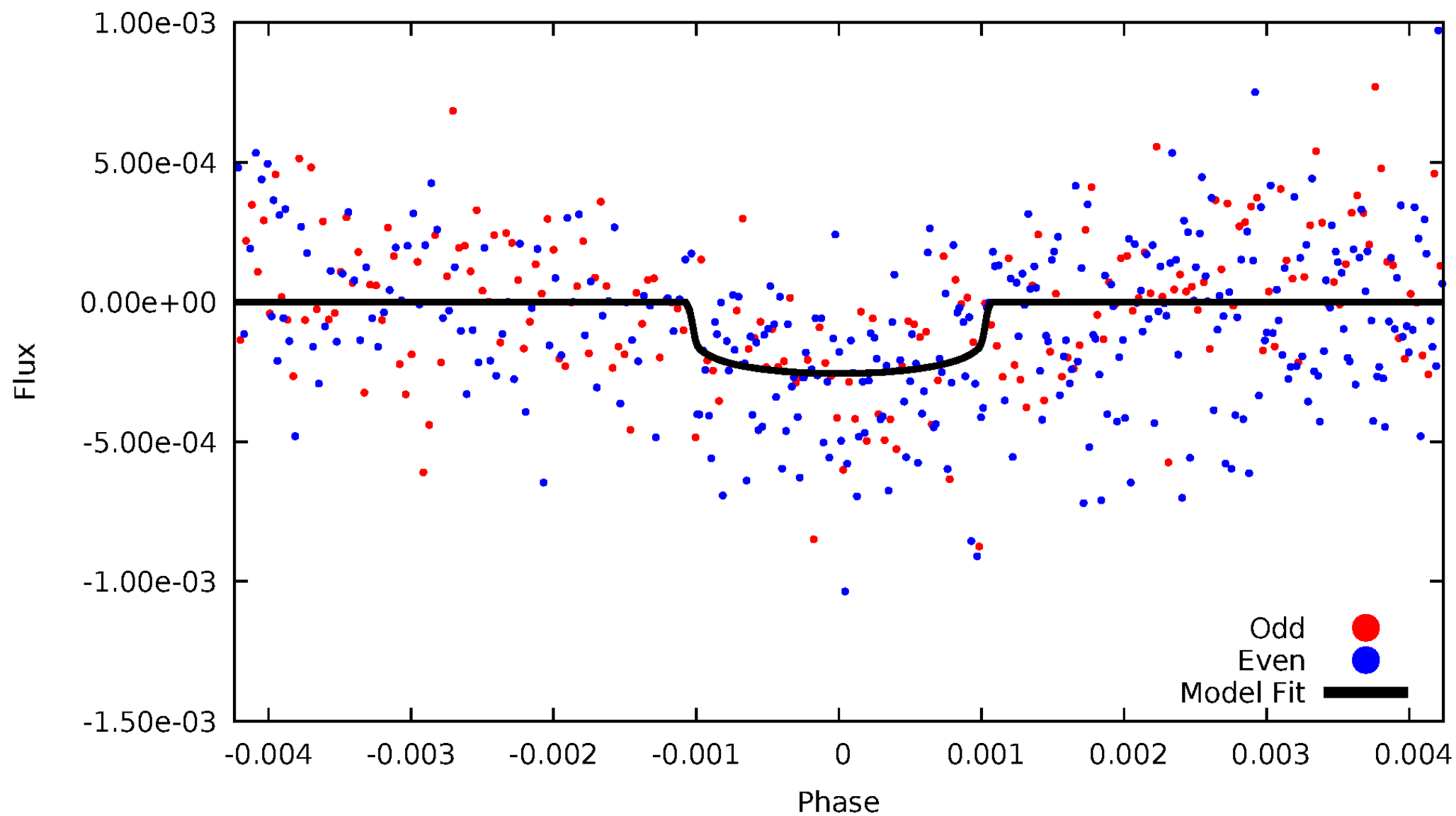


TCE 009406050-02



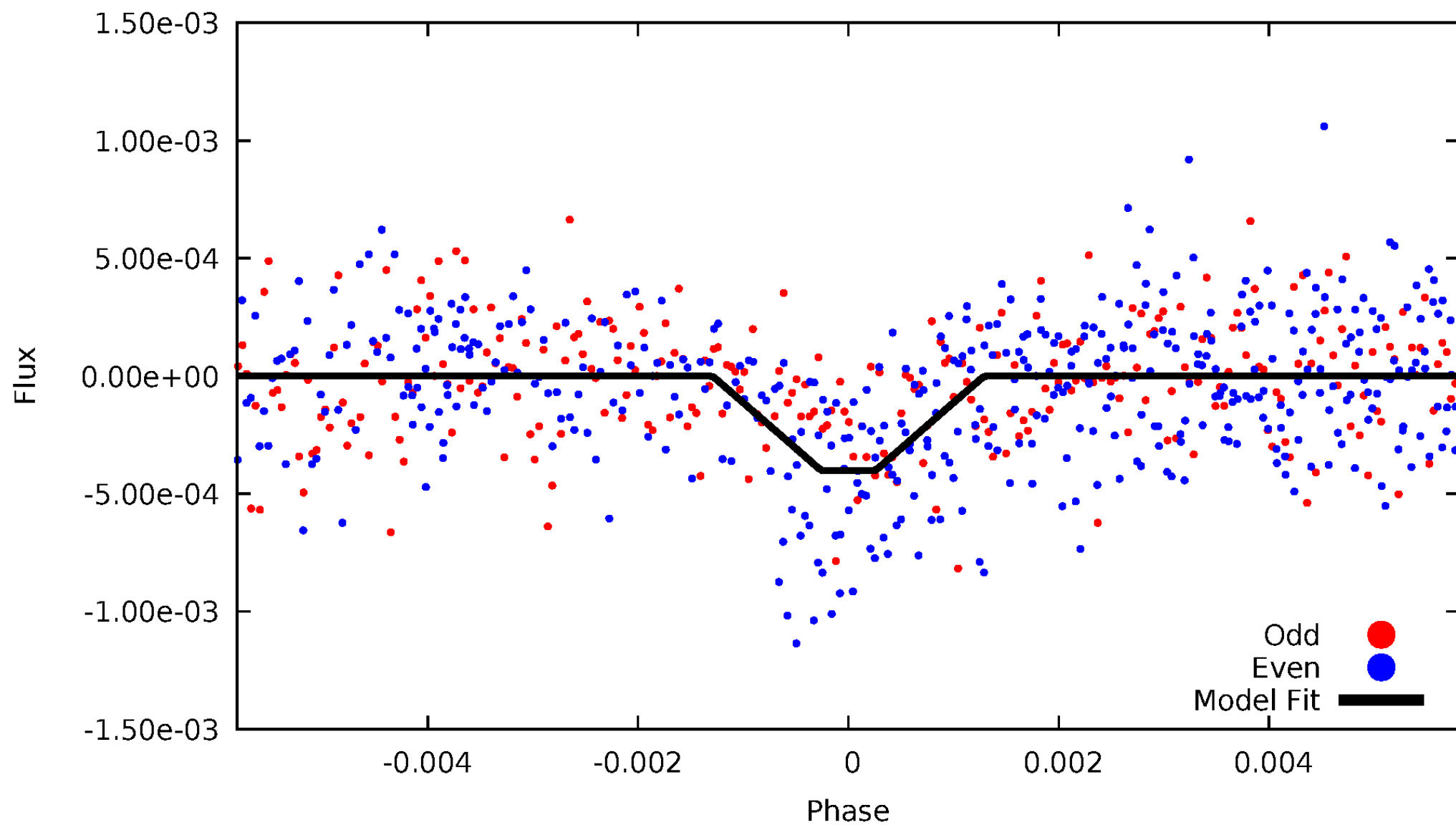
DV Odd/Even

TCE 009406050-02



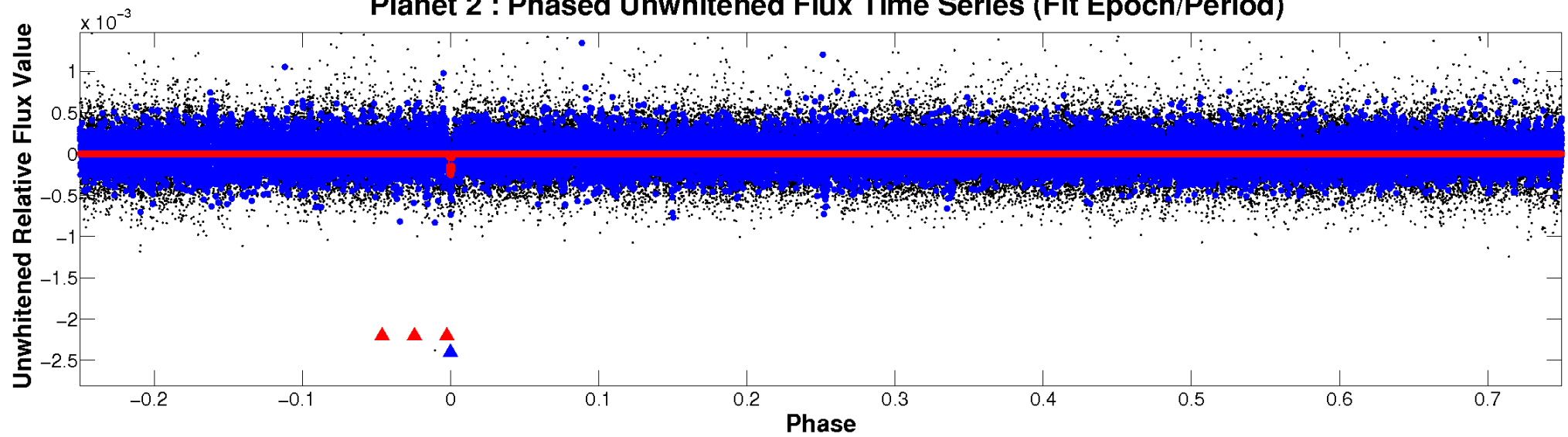
ALT Odd/Even

TCE 009406050-02

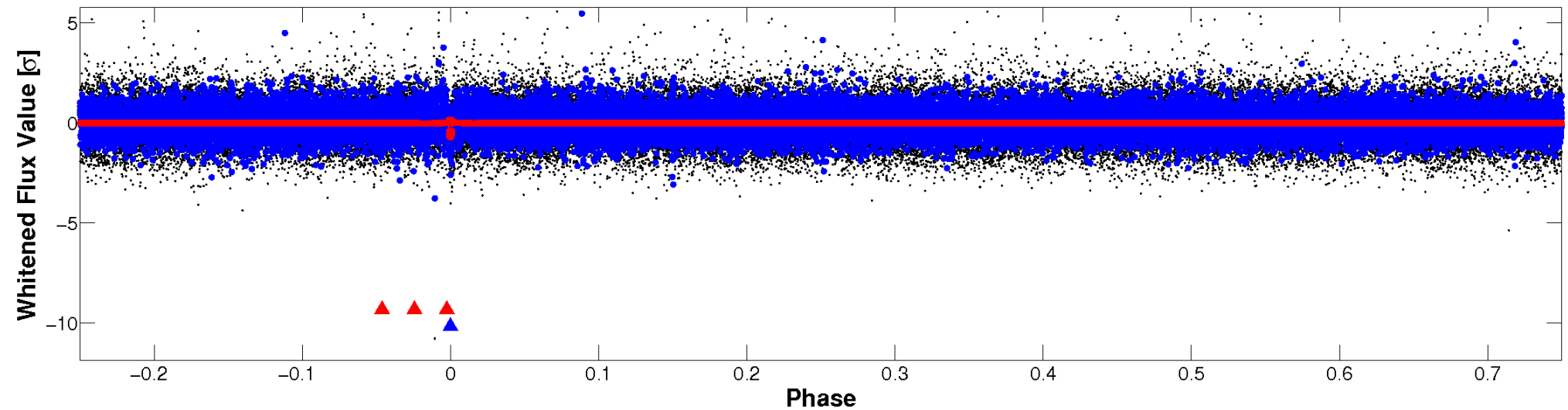


Non-Whitened Vs. Whitened Light Curve

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



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



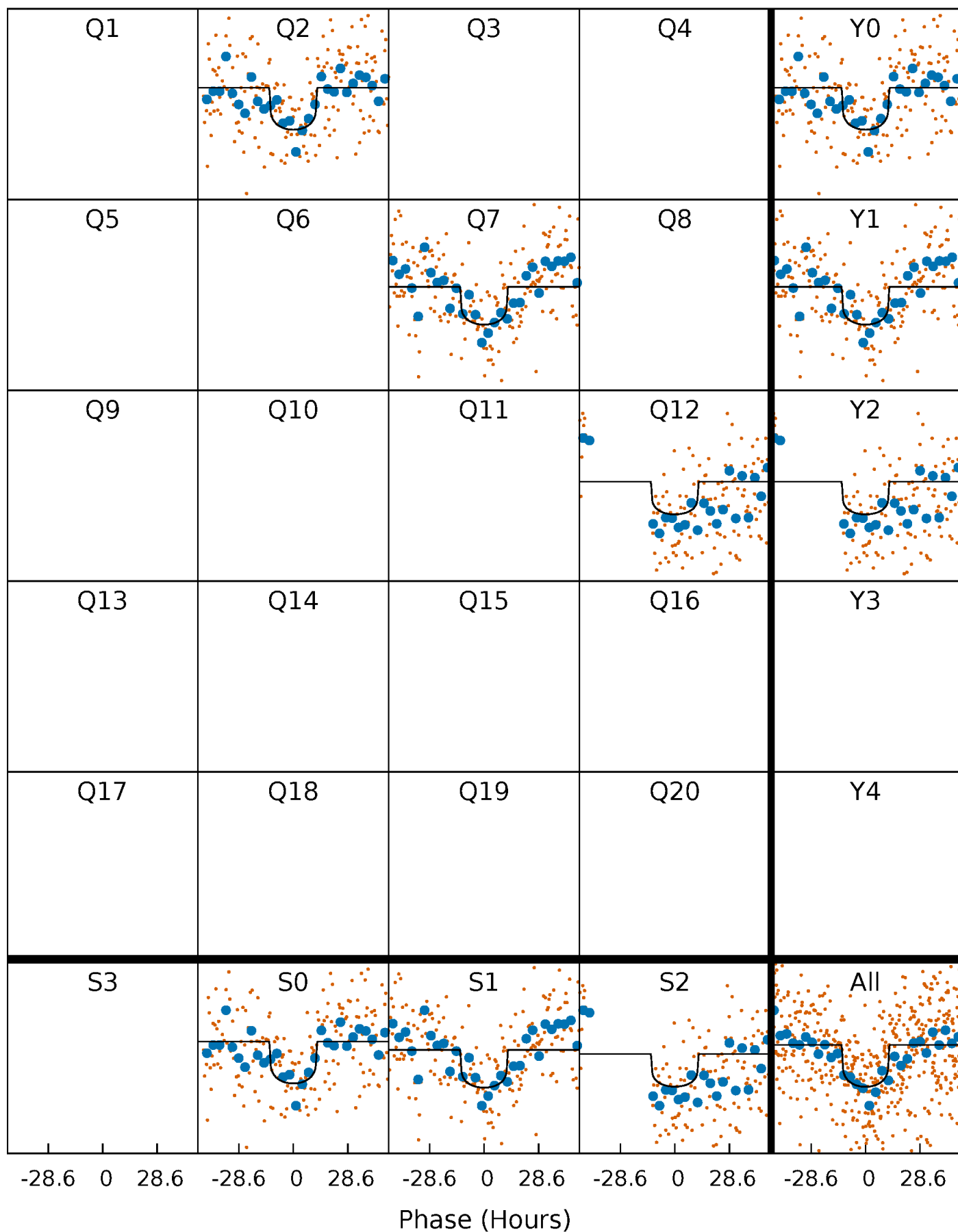
PDC Quarter-Phased Transit Curves

TCE 009406050-02 P=492.842645 Days $T_0=185.682217$ (BKJD)



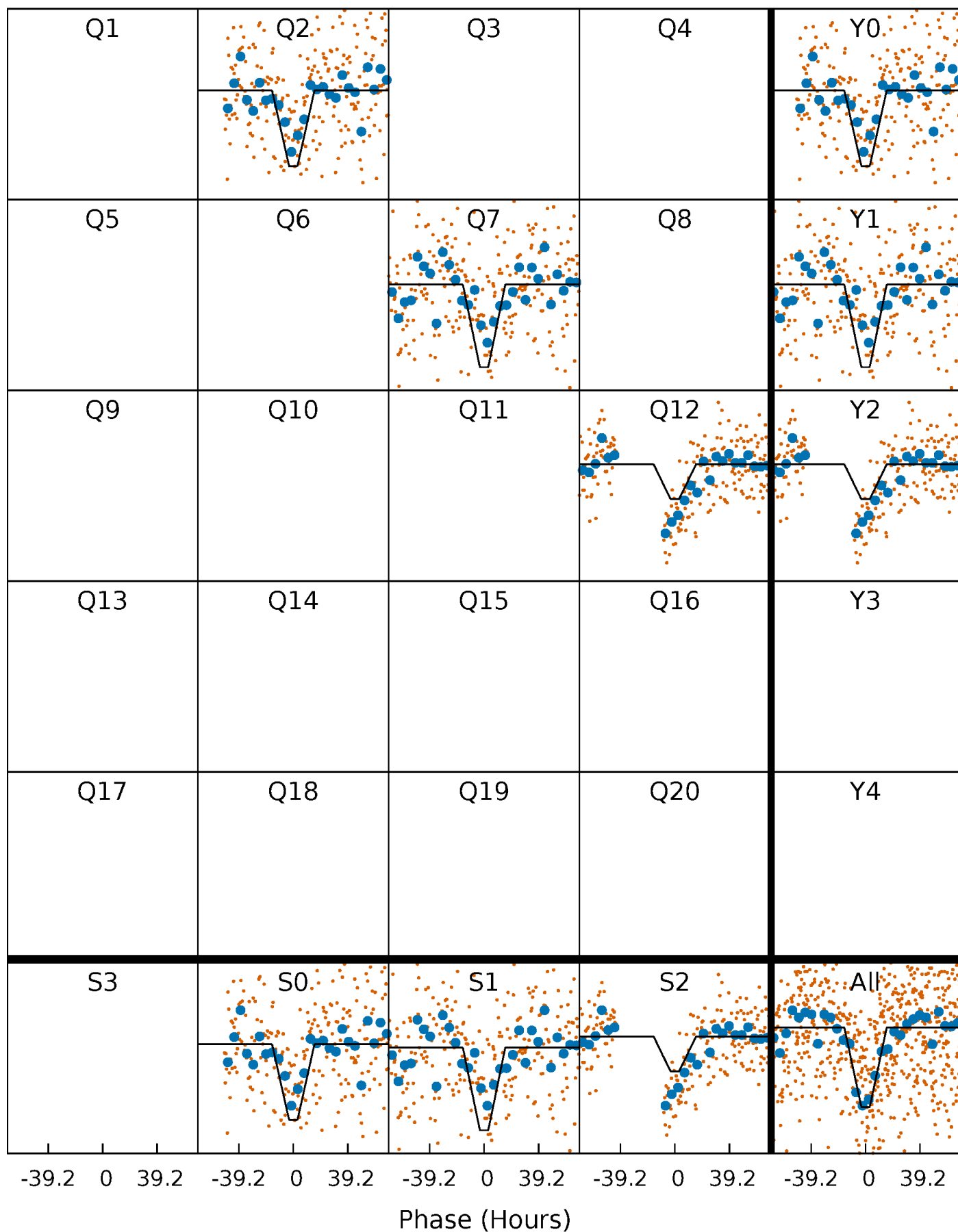
DV Quarter-Phased Transit Curves

TCE 009406050-02 P=492.842645 Days $T_0=185.682217$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

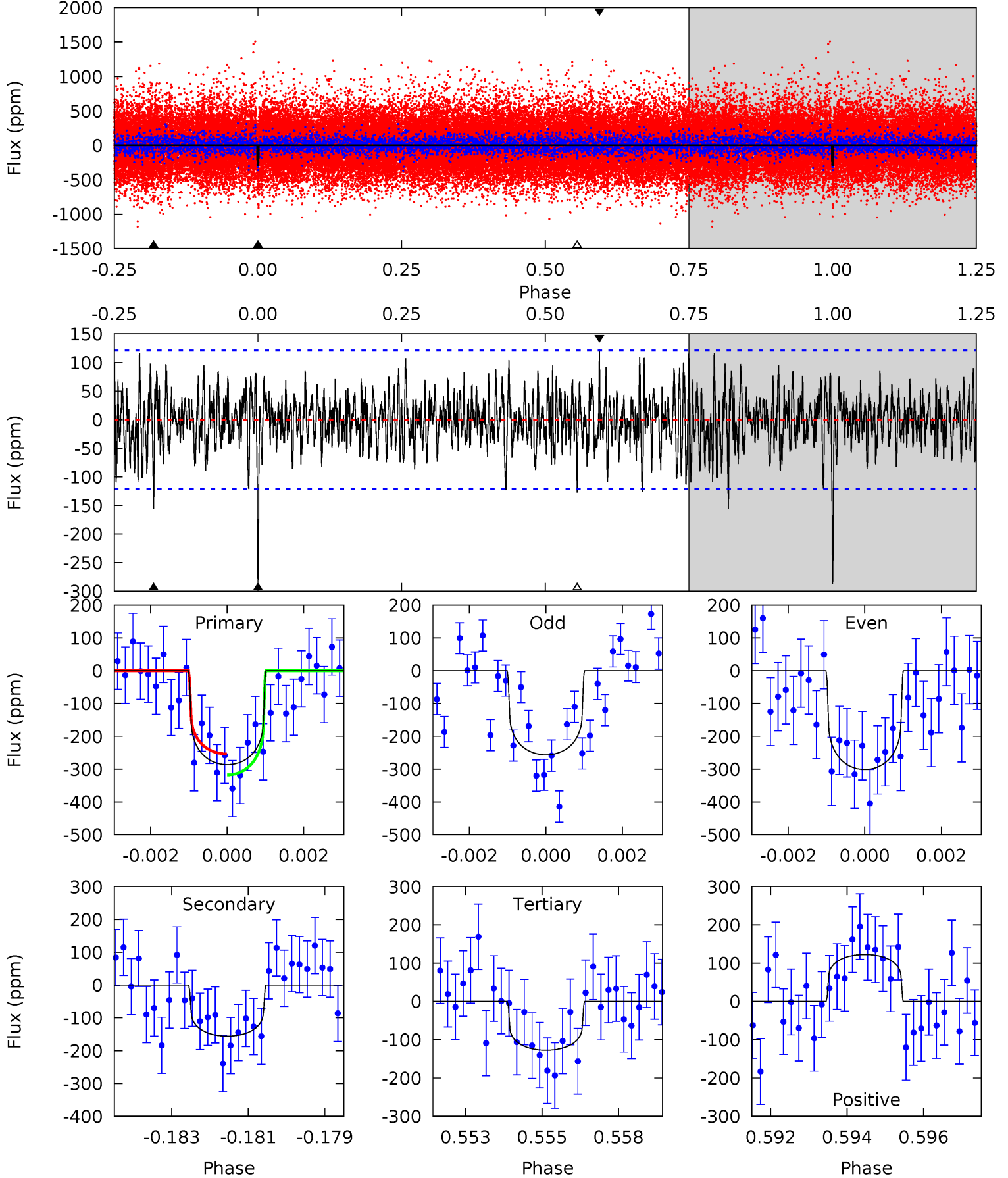
TCE 009406050-02 P=492.714432 Days $T_0=185.781635$ (BKJD)



DV Model-Shift Uniqueness Test

009406050-02, P = 492.842645 Days, E = 185.682217 Days

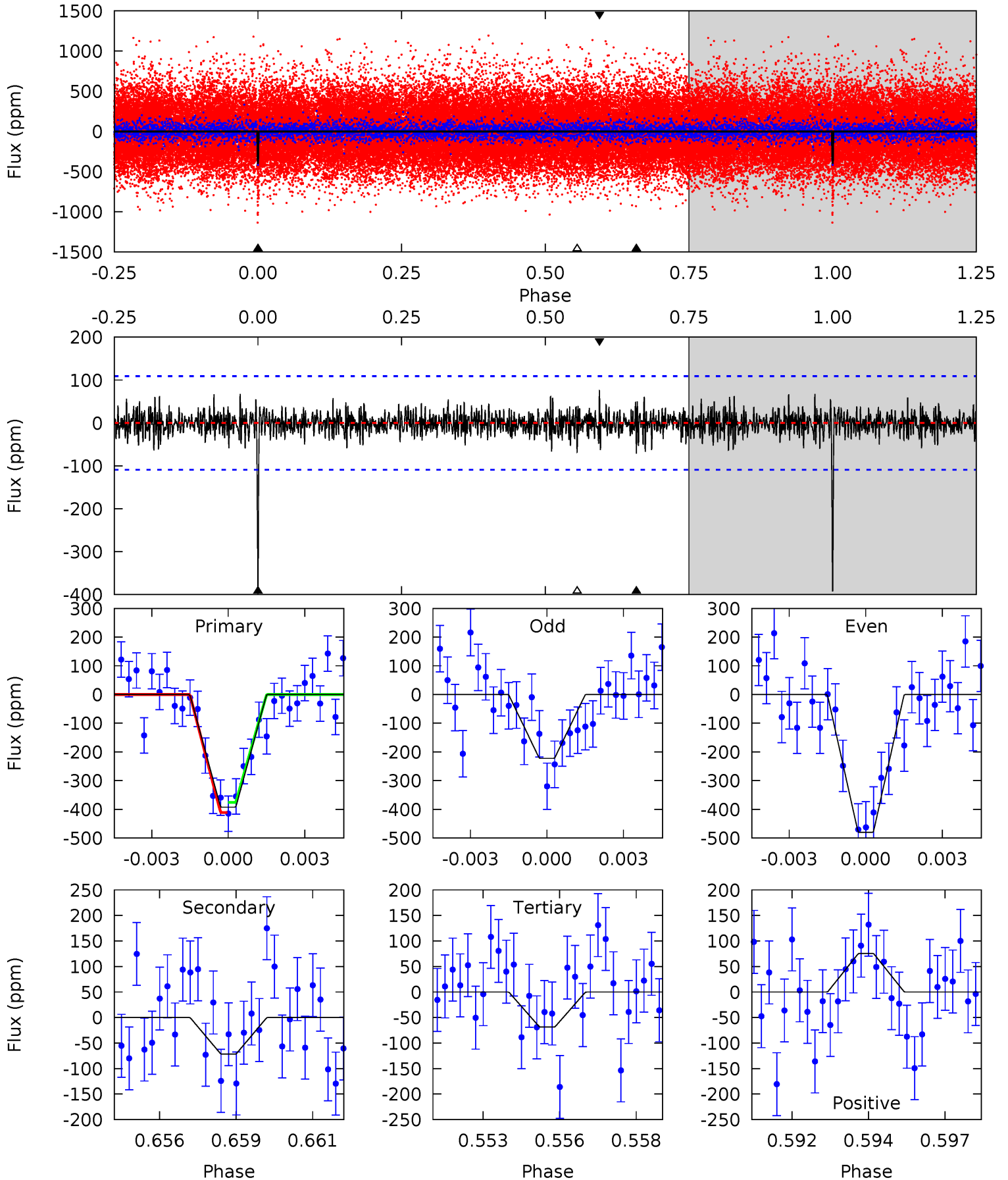
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.6	6.85	5.60	5.40	5.32	3.07	1.70	7.00	7.21	1.25	1.46	0.93	1.12	0.30	1.40



Alt Model-Shift Uniqueness Test

009406050-02, P = 492.714432 Days, E = 185.781635 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
19.0	3.47	3.33	3.65	5.28	3.01	0.95	15.7	15.4	0.14	-0.19	5.97	1.51	0.16	0.85



Stellar Parameters For KIC 009406050

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	6091^{+181}_{-199}	$4.487^{+0.054}_{-0.230}$	$-0.140^{+0.300}_{-0.300}$	$0.967^{+0.325}_{-0.101}$	$1.045^{+0.140}_{-0.140}$	$1.627^{+0.465}_{-0.859}$
	+3%/-3%	+1%/-5%	+214%/-214%	+34%/-10%	+13%/-13%	+29%/-53%
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 009406050-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	A_{obs}
DV	-156 ± 23	$1.77^{+0.70}_{-0.67}$	340^{+27}_{-17}	5411^{+1312}_{-678}	40194^{+63272}_{-19253}
Alt.	-72 ± 21	$2.25^{+0.78}_{-0.65}$	342^{+25}_{-17}	4201^{+578}_{-430}	11243^{+12211}_{-5421}

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

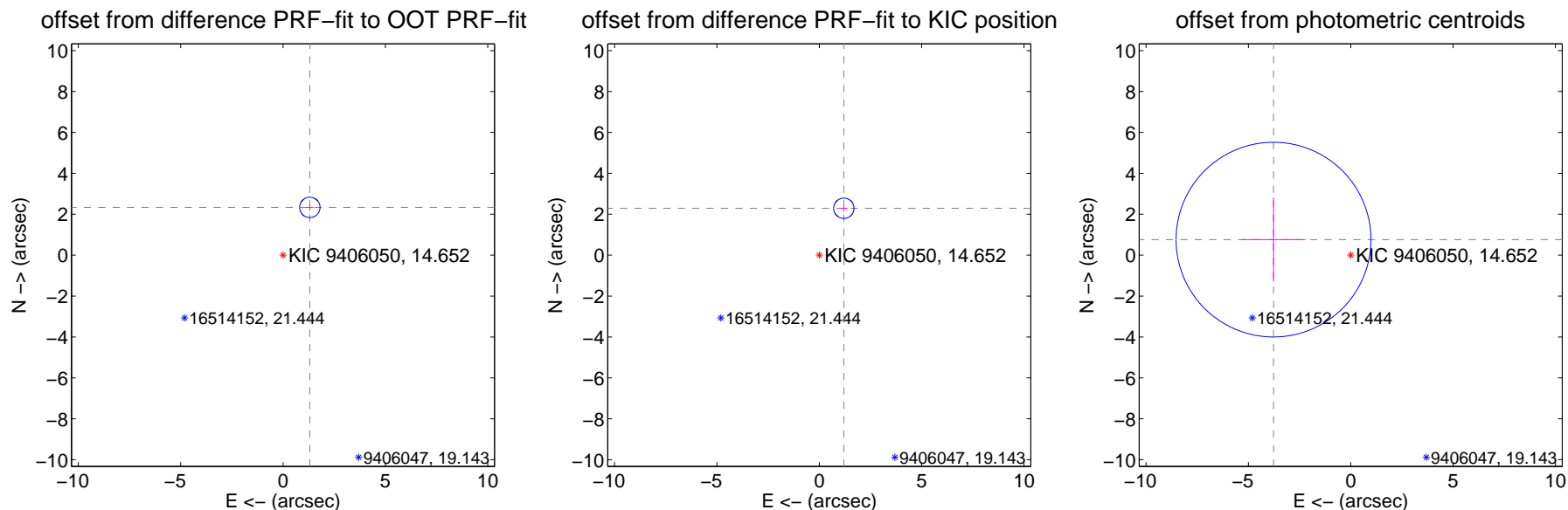
DV Centroid Data

Supplemental centroid analysis for 009406050-02. Kepler magnitude: 14.65. Transit SNR 7.79

There are 0 quarters with good PRF difference image offsets

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

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	2.678 ± 0.166	16.13	-1.309 ± 0.174	2.336 ± 0.163
PRF-fit source offset from KIC position	2.587 ± 0.166	15.61	-1.199 ± 0.174	2.292 ± 0.163
photometric centroid source offset	3.85 ± 1.59	2.43	3.77 ± 1.56	0.76 ± 2.06



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

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



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

Q5 no difference image



Q5 no OOT image



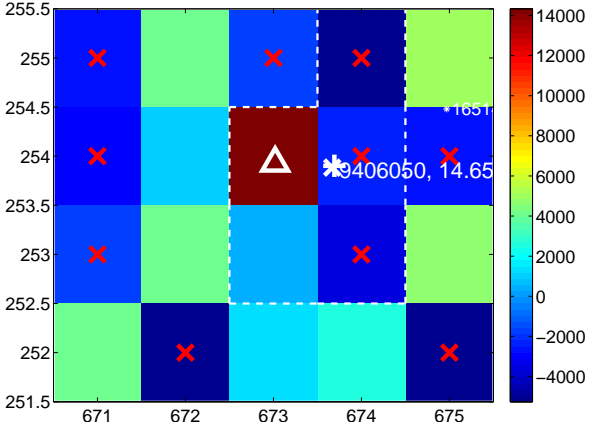
Q6 no difference image



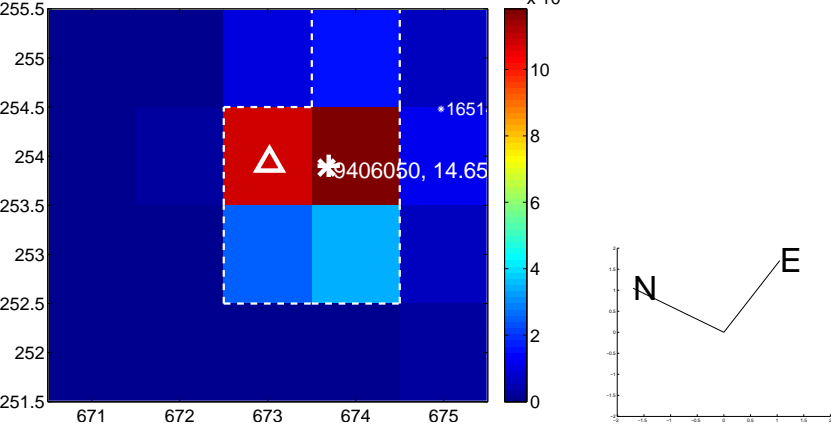
Q6 no OOT image



Q7 difference image. Poor Quality



Q7 OOT image



Q8 no difference image



Q8 no OOT image



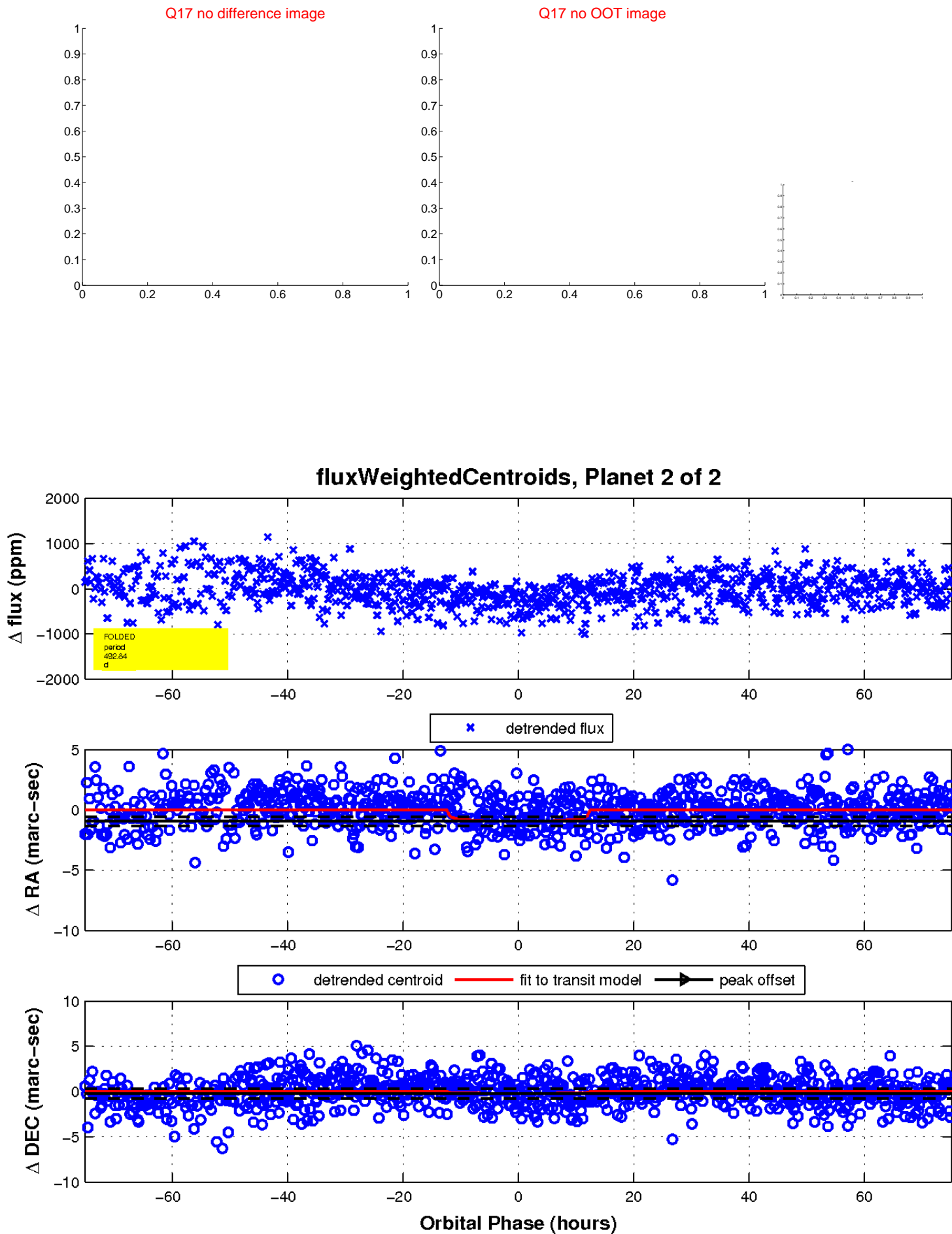
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



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



UKIRT Image

Declination

