

KIC 004940438

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})
004940438-01	OBS	1561.01	9.085914	136.651718	2225.9	2.136	50.5	52.9	0.87	5931	6.59	130.19
004940438-02	OBS	No	9.085820	136.609733	437.4	21.990	9.8	14.0	0.87	5931	3.50	130.20

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004940438-01	OBS	FP	0.00	0	1	0	0	DEEP_V_SHAPED
004940438-02	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—RESIDUAL_TCE

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

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

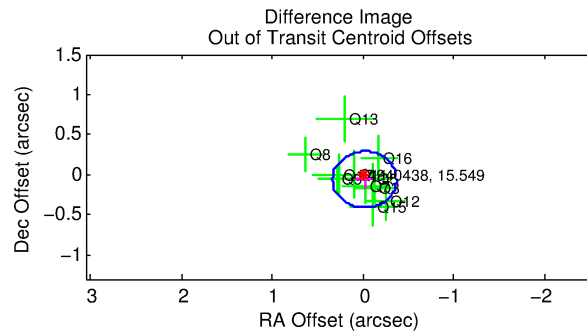
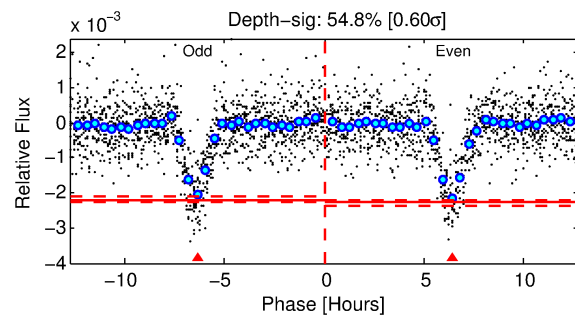
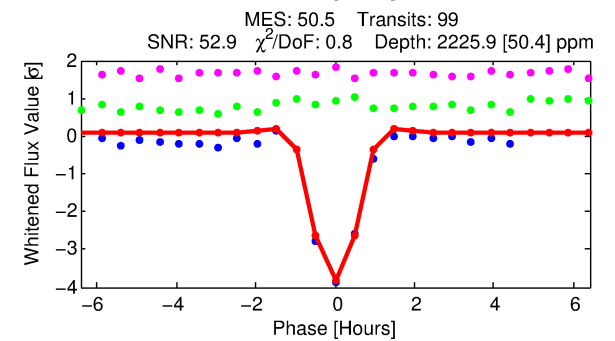
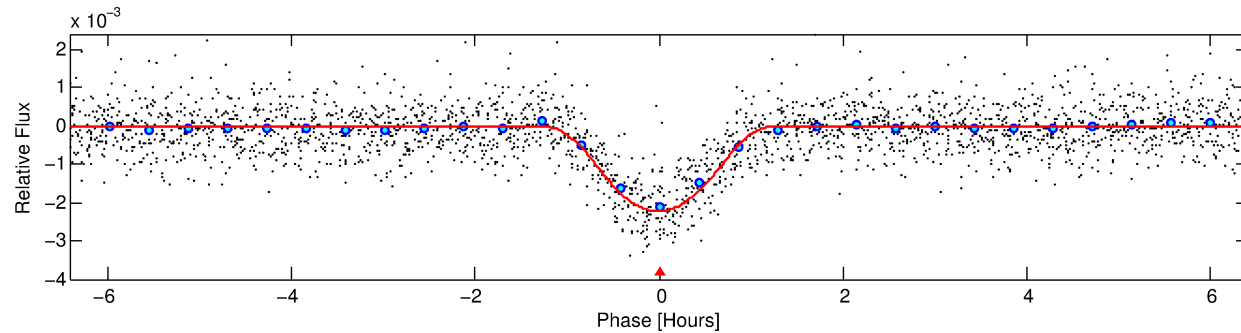
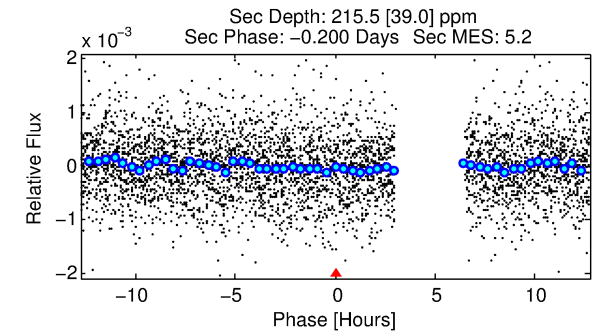
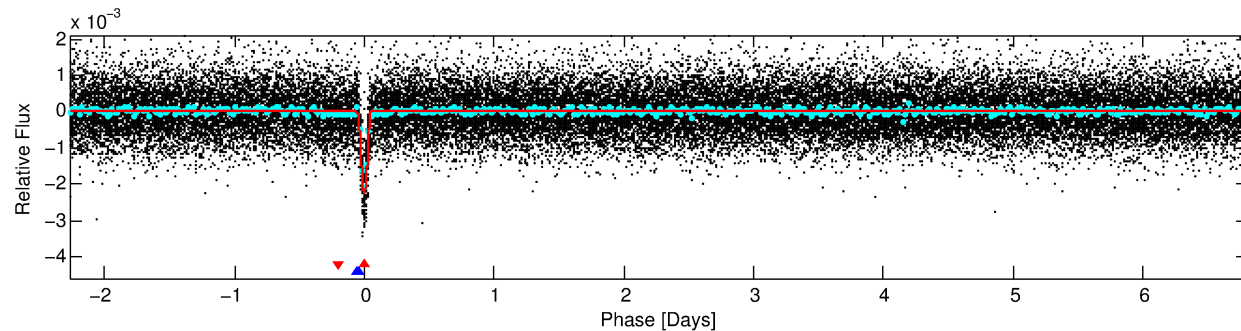
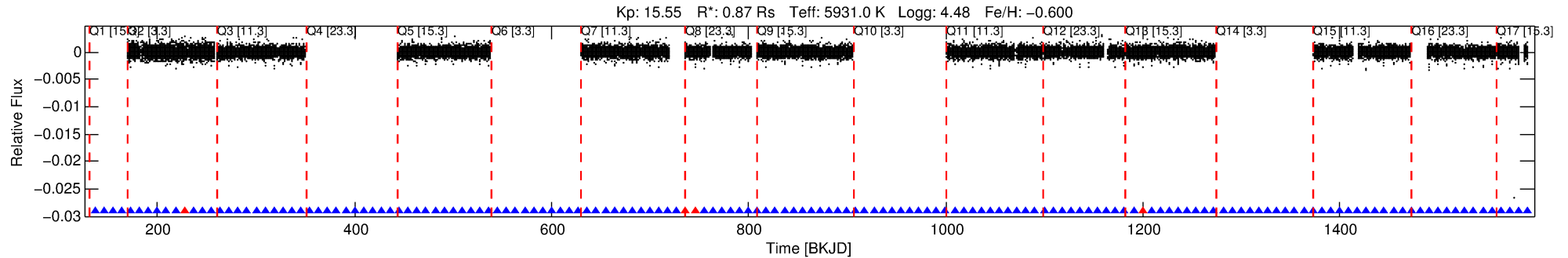
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 004940438-01

No Significant Match Found

DV One-Page Summary

KIC: 4940438 Candidate: 1 of 2 Period: 9.086 d
KOI: K01561.01 Corr: 0.952



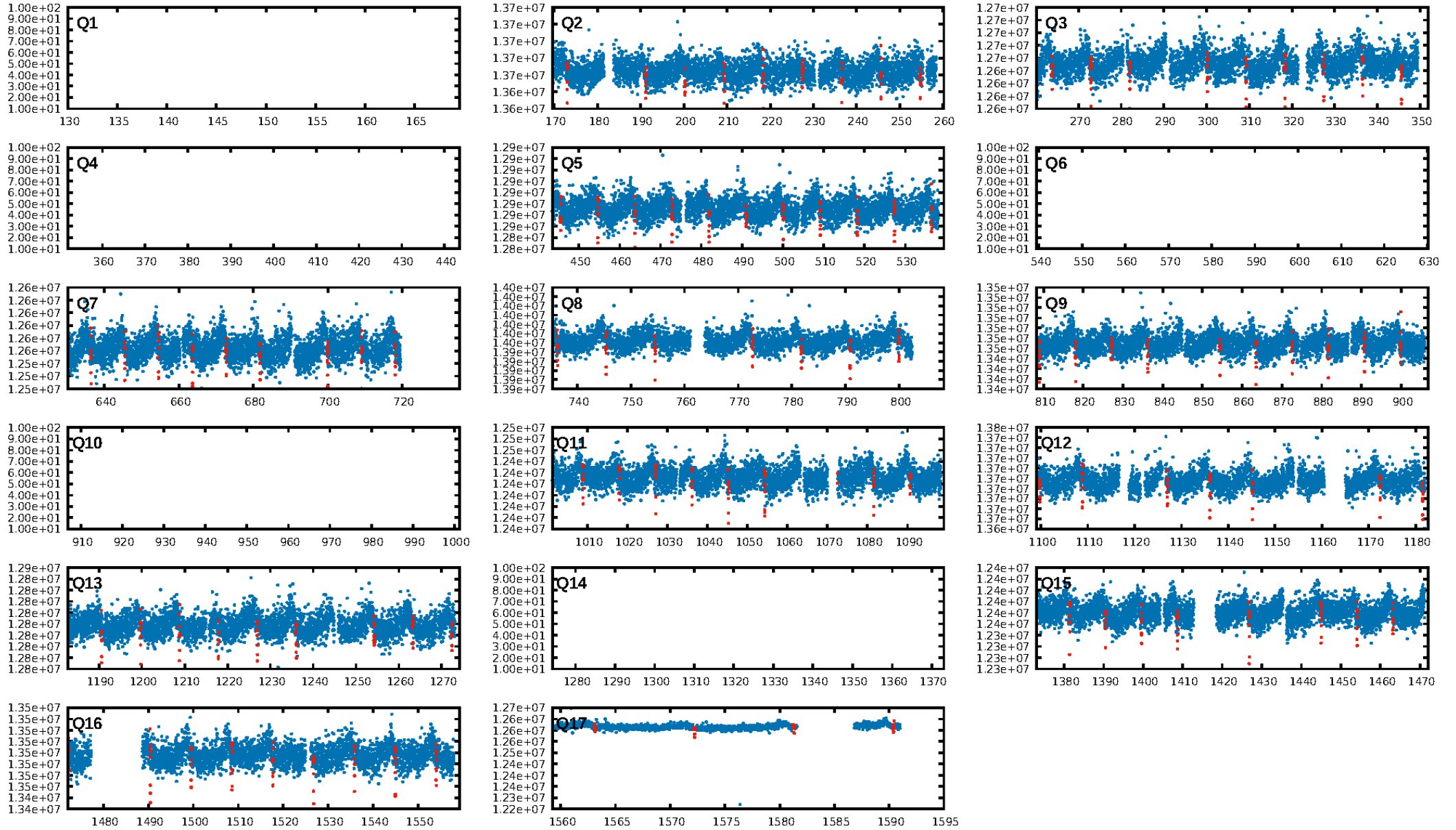
DV Fit Results:

Period = 9.08591 [0.00001] d
Epoch = 136.6517 [0.0010] BKJD
Rp/R* = 0.0698 [0.0444]
a/R* = 13.85 [2.59]
b = 0.98 [0.07]
Seff = 130.19 [43.32]
Teq = 861 [72] K
Rp = 6.60 [4.49] Re
a = 0.0799 [0.0166] AU
Ag = 17.41 [23.02] [0.71σ]
Teff = 2720 [879] K [2.11σ]

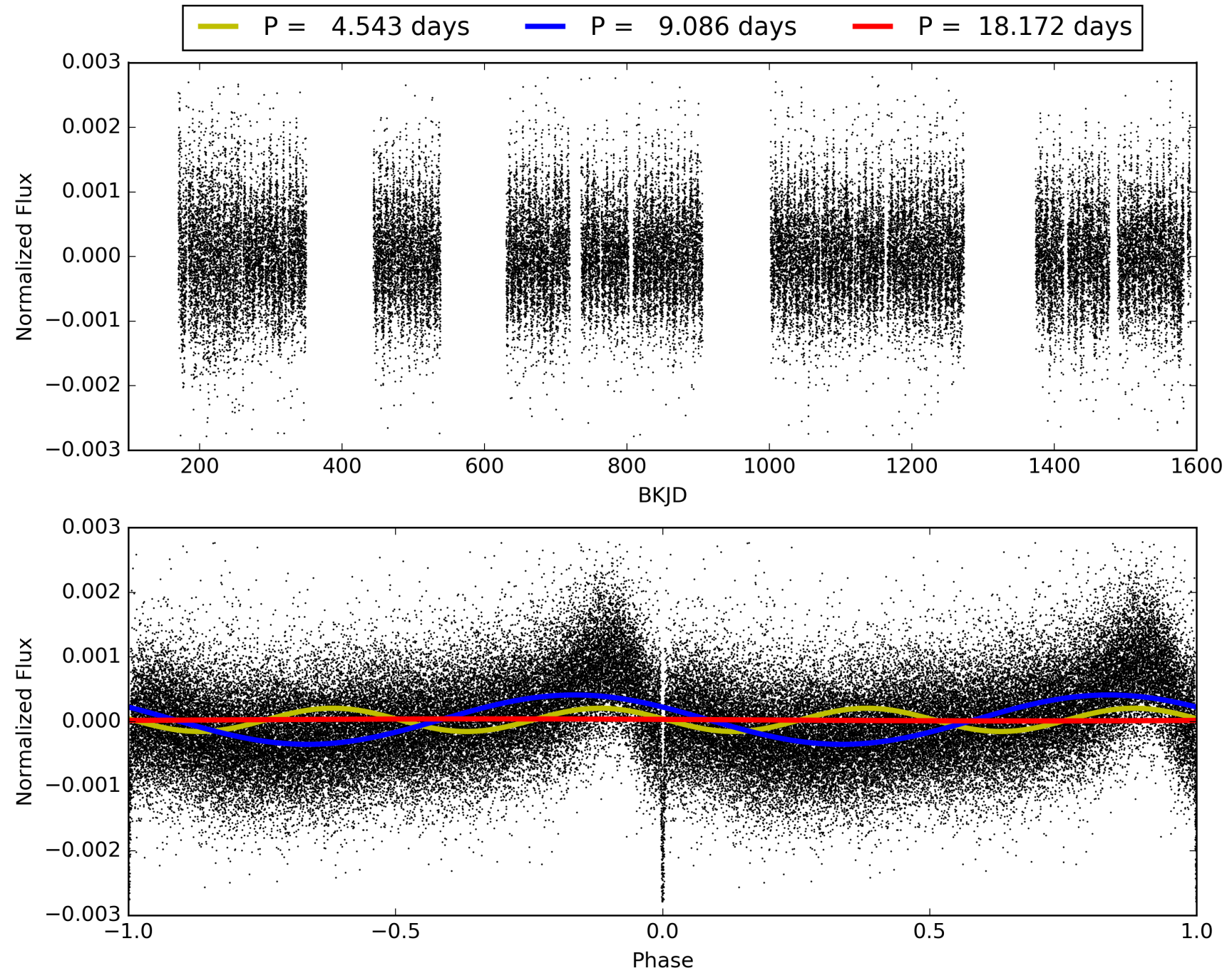
DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 76.7%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 0.00e+00
RollingBand-fgt: 0.96 [91/95]
GhostDiagnostic-chr: 2.24
Centroid-sig: 4.1%
Centroid-so: 0.537 arcsec [1.73σ]
OotOffset-rm: 0.064 arcsec [0.54σ]
KicOffset-rm: 0.086 arcsec [0.80σ]
OotOffset-st: 0.4/3/4 [11]
KicOffset-st: 0.4/3/4 [11]
DiffImageQuality-fgm: 1.00 [11/11]
DiffImageOverlap-fno: 0.00 [0/12]

TCE 004940438-01, PDC Light Curves

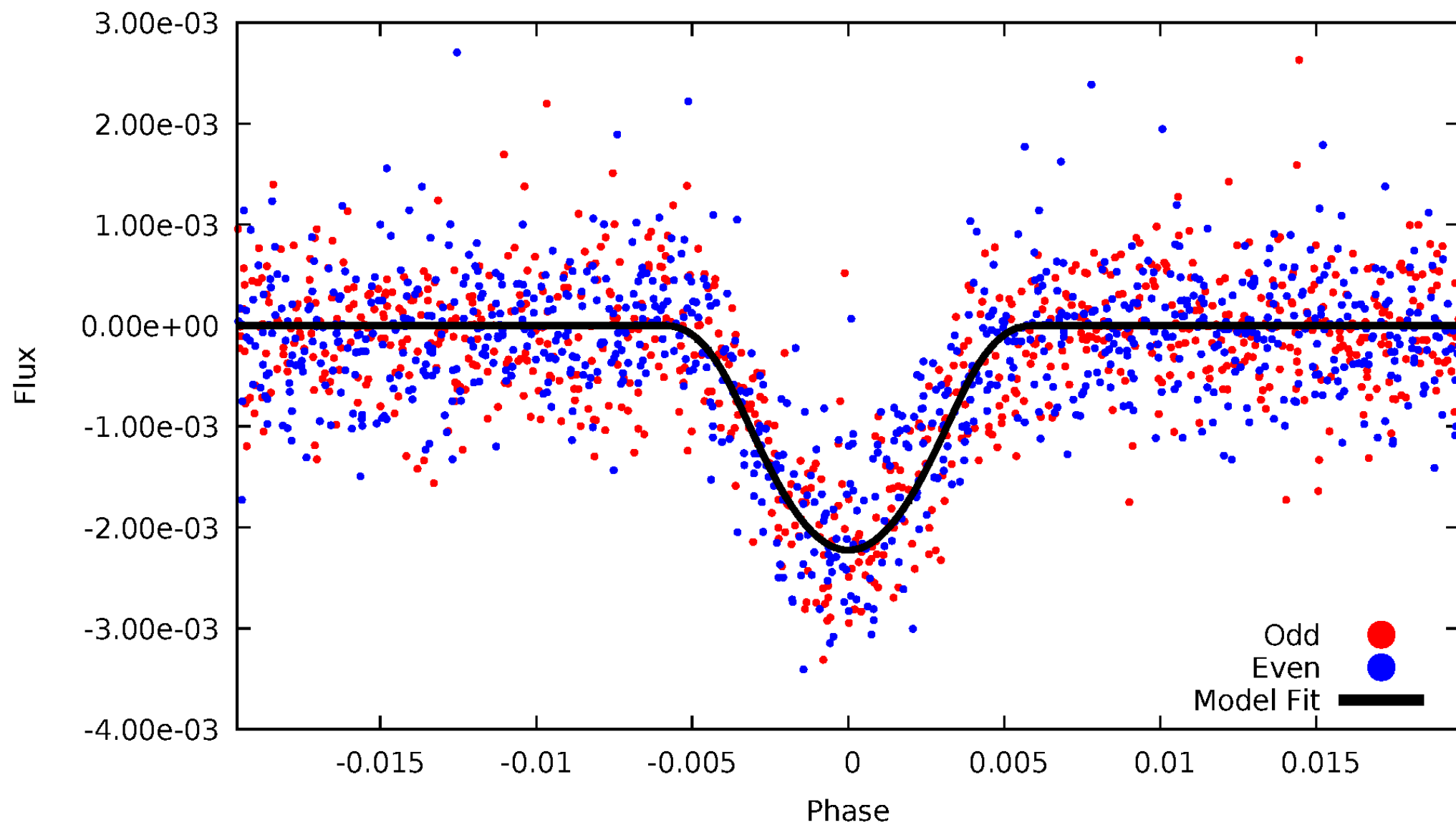


TCE 004940438-01



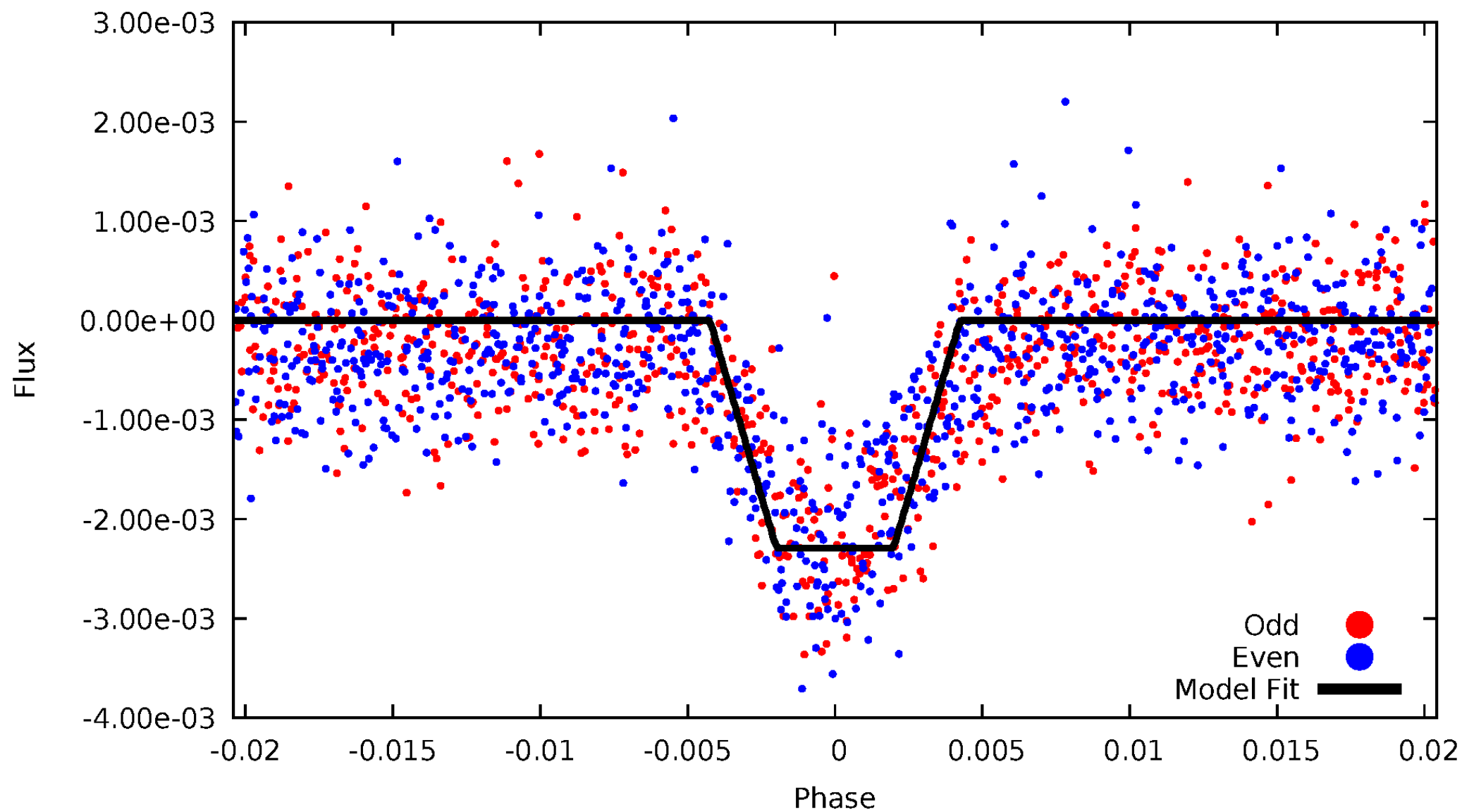
DV Odd/Even

TCE 004940438-01



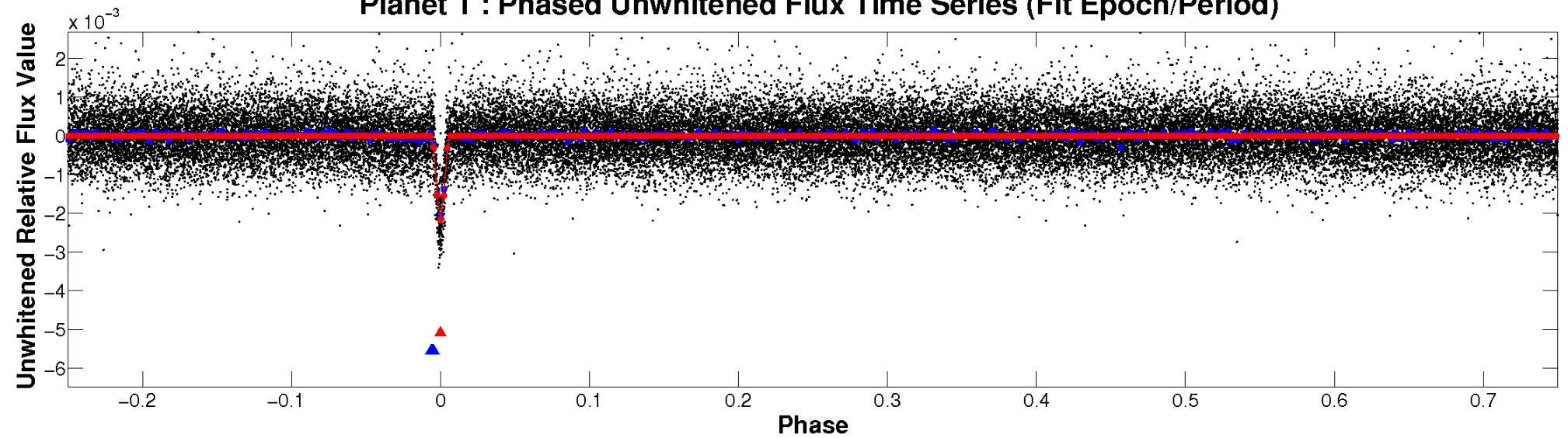
ALT Odd/Even

TCE 004940438-01

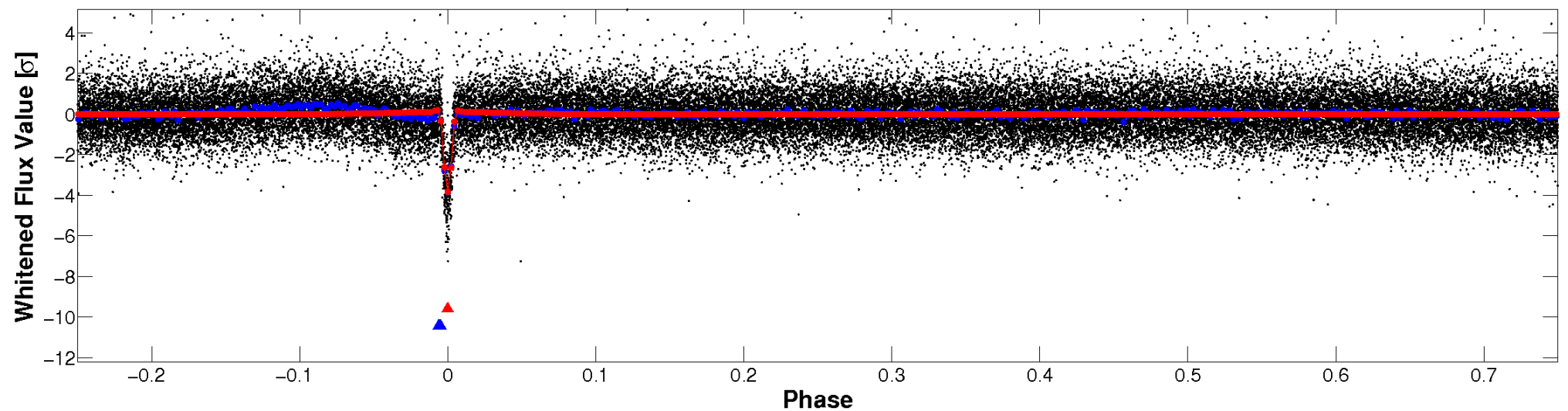


Non-Whitened Vs. Whitened Light Curve

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

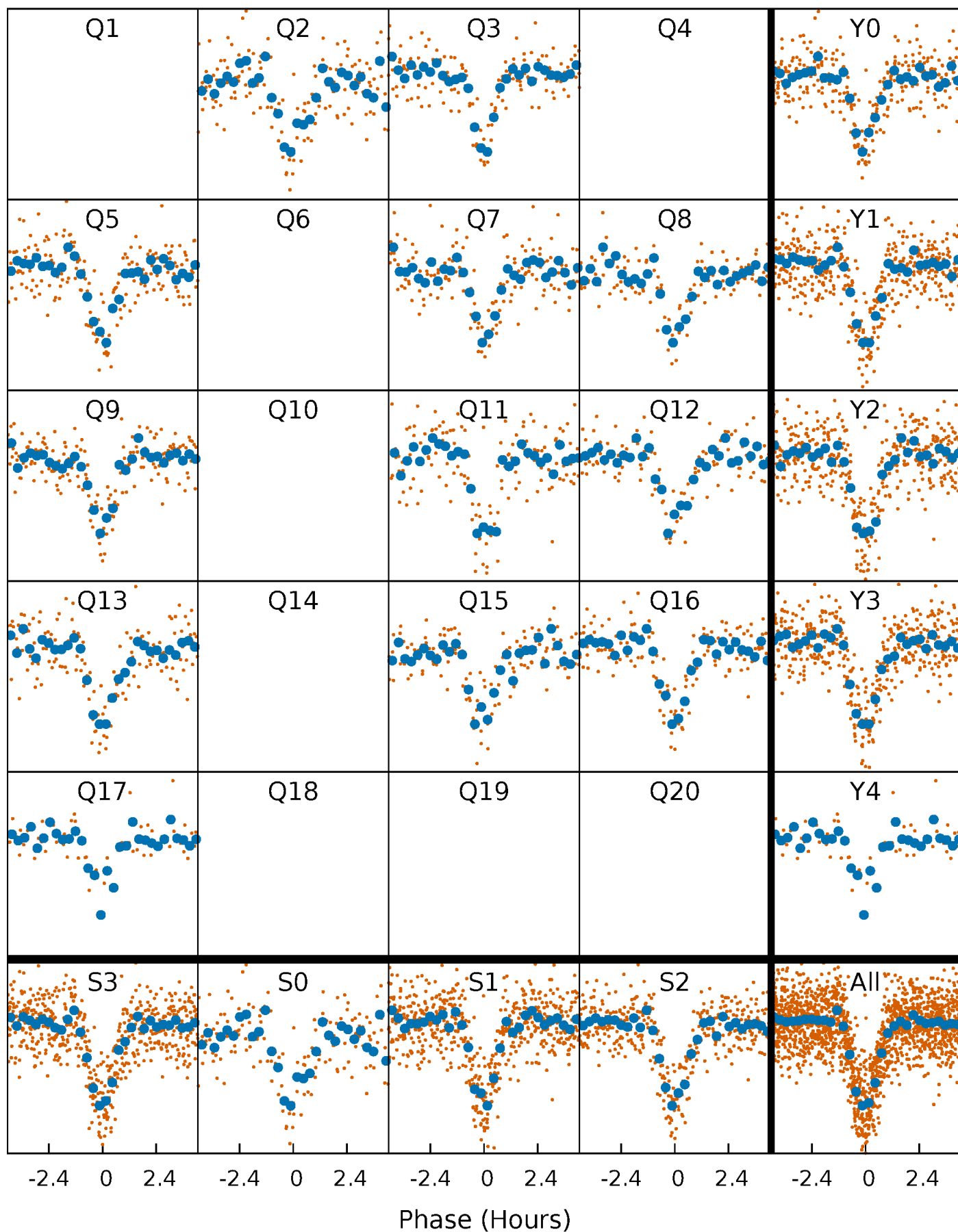


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



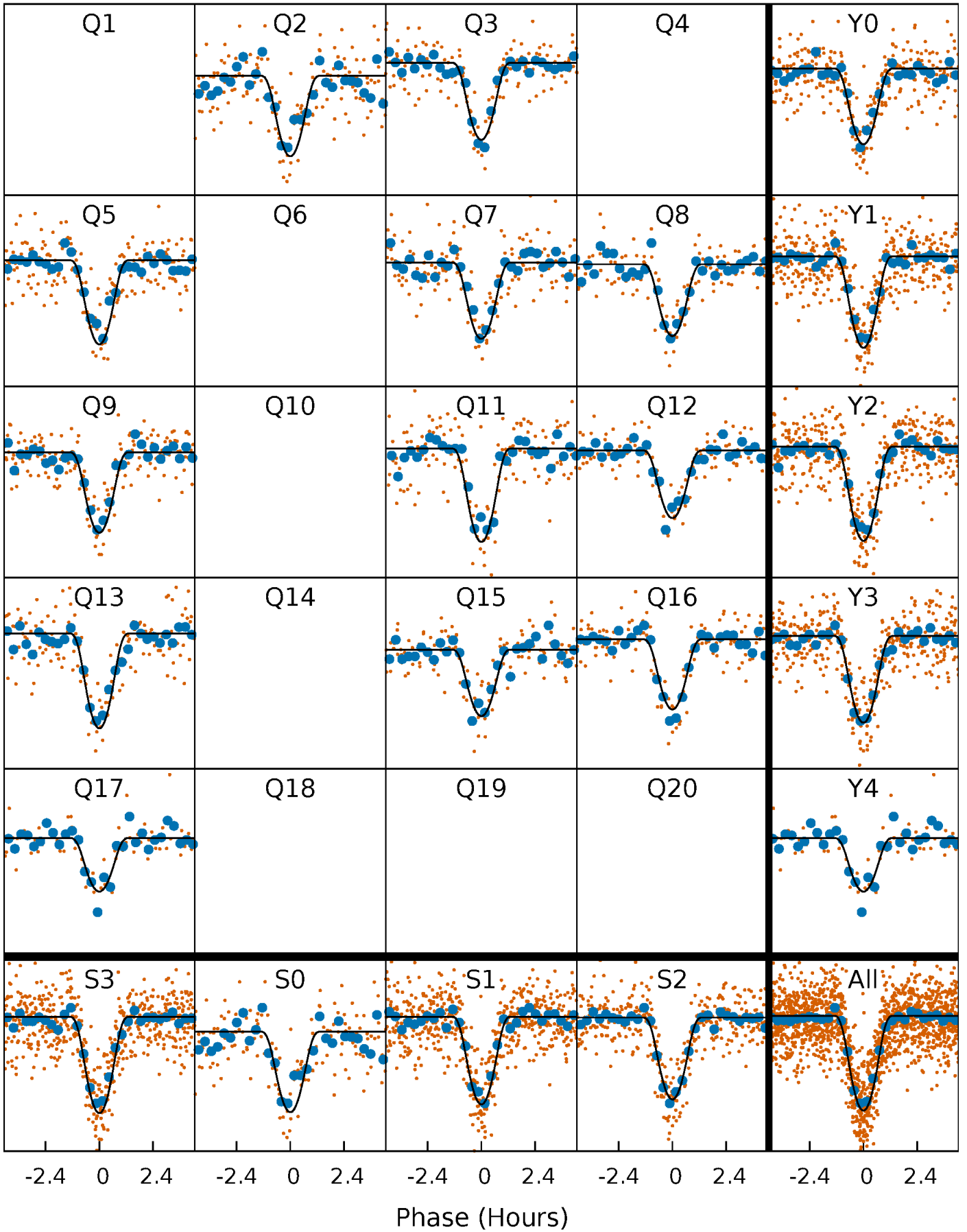
PDC Quarter-Phased Transit Curves

TCE 004940438-01 P= 9.085914 Days $T_0=136.651718$ (BKJD)



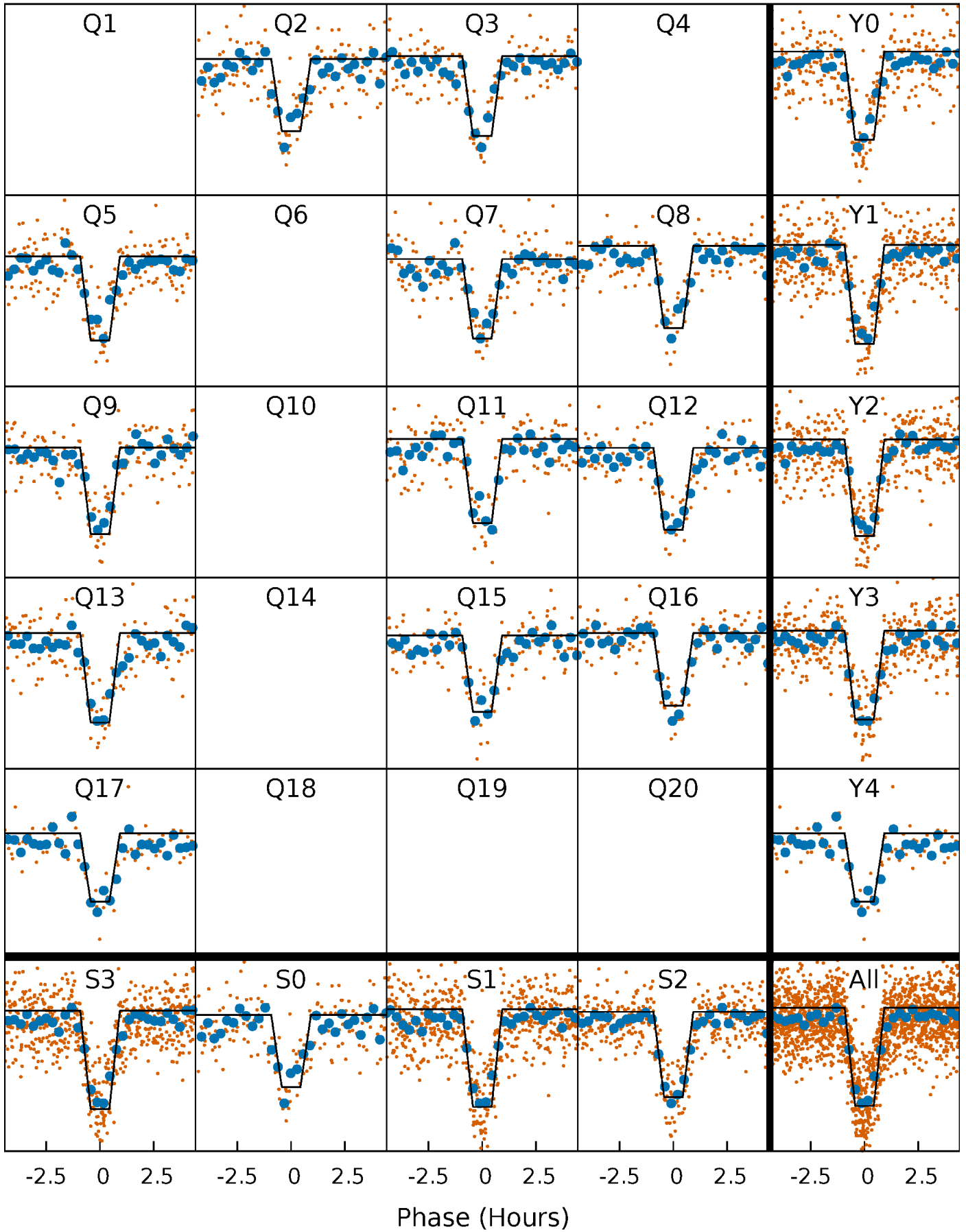
DV Quarter-Phased Transit Curves

TCE 004940438-01 P= 9.085914 Days $T_0=136.651718$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

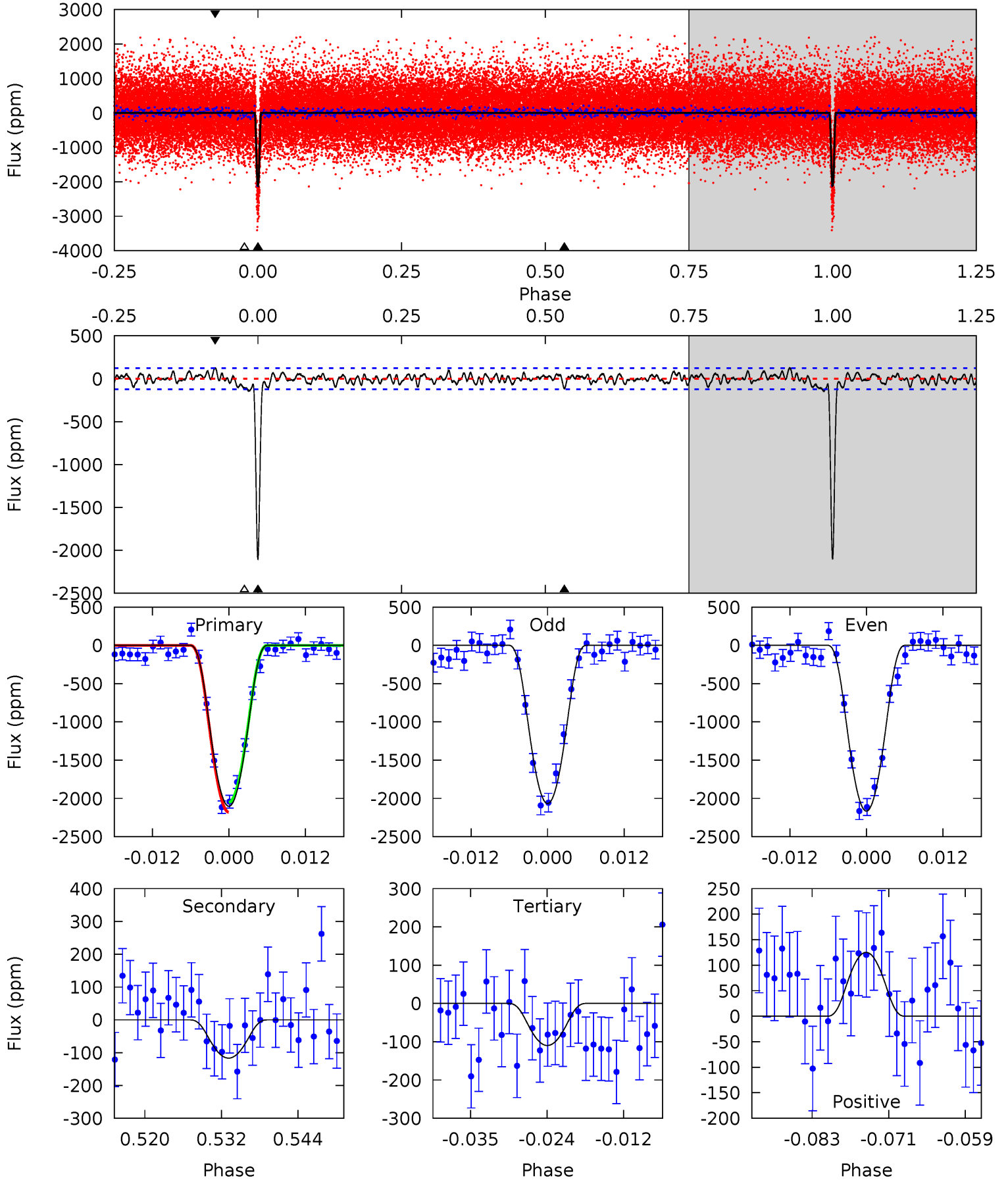
TCE 004940438-01 P= 9.085867 Days $T_0=136.655474$ (BKJD)



DV Model-Shift Uniqueness Test

004940438-01, P = 9.085914 Days, E = 136.651718 Days

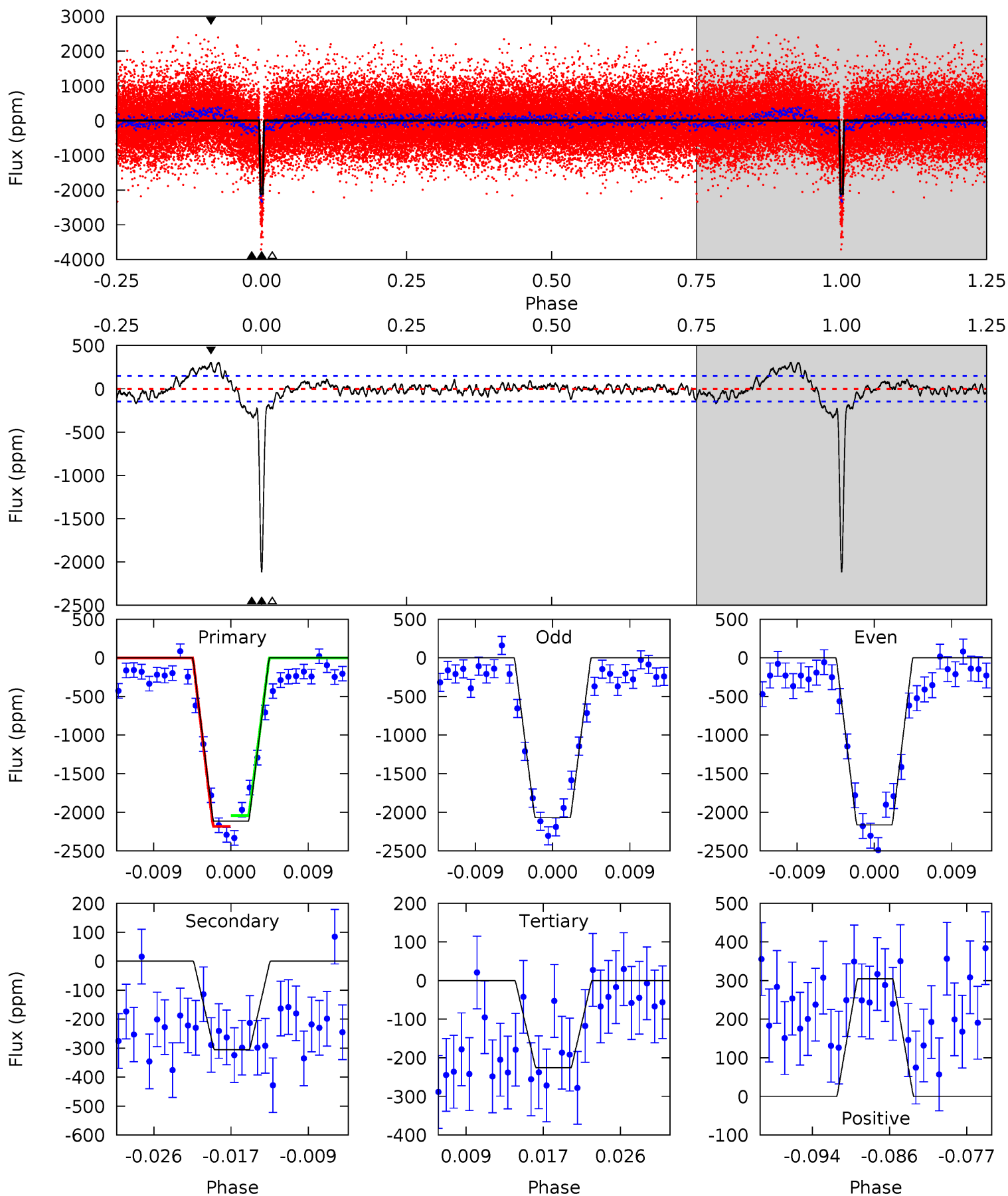
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
85.1	4.72	4.44	5.06	4.99	2.52	1.68	80.6	80.0	0.27	-0.34	2.00	0.97	0.06	2.63



Alt Model-Shift Uniqueness Test

004940438-01, P = 9.085867 Days, E = 136.655474 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
72.7	10.5	7.76	10.5	5.06	2.63	2.78	64.9	62.2	2.73	0.02	1.59	0.97	0.13	0



Stellar Parameters For KIC 004940438

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	$M(M_{\odot})$	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	5931^{+177}_{-195}	$4.479^{+0.091}_{-0.169}$	$-0.600^{+0.300}_{-0.300}$	$0.866^{+0.210}_{-0.113}$	$0.825^{+0.103}_{-0.063}$	$1.789^{+0.833}_{-0.823}$
	+3%/-3%	+2%/-4%	+50%/-50%	+24%/-13%	+12%/-8%	+47%/-46%
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 004940438-01 / KOI 1561.01

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-117 ± 25	$7.11^{+4.04}_{-3.81}$	1215^{+81}_{-63}	2959^{+774}_{-388}	$8.254^{+29.010}_{-5.118}$
Alt.	-305 ± 29	$5.30^{+4.43}_{-3.36}$	1216^{+75}_{-61}	3736^{+1838}_{-634}	38^{+245}_{-26}

T_{max} = Theoretical Maximum Planetary Temperature

T_{obs} = Observed Planetary Temperature (Assuming $A=0.3$)

A_{obs} = Observed Albedo (Assuming $T=0$)

If a secondary eclipse is present, the system is likely an EB if $T_{\text{obs}} \gg T_{\text{max}}$ AND $A_{\text{obs}} \gg 1.0$

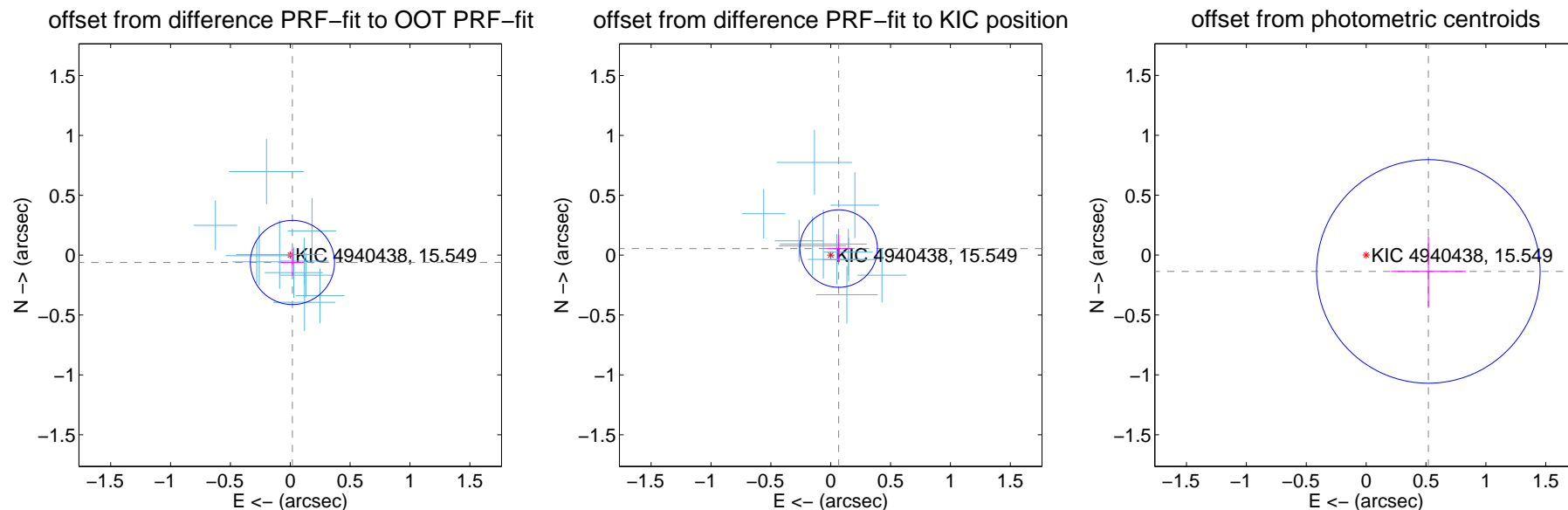
DV Centroid Data

Supplemental centroid analysis for 004940438-01. Kepler magnitude: 15.55. Transit SNR 52.93

There are 11 quarters with good PRF difference image offsets

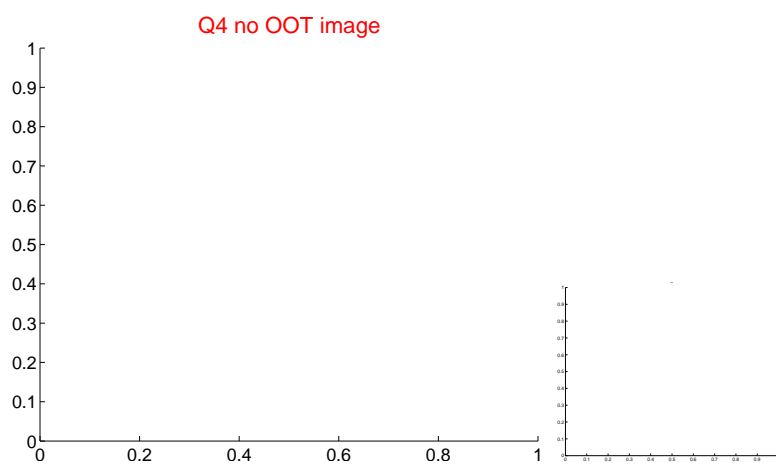
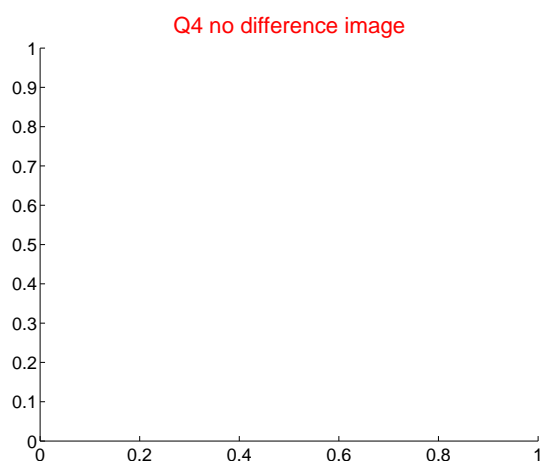
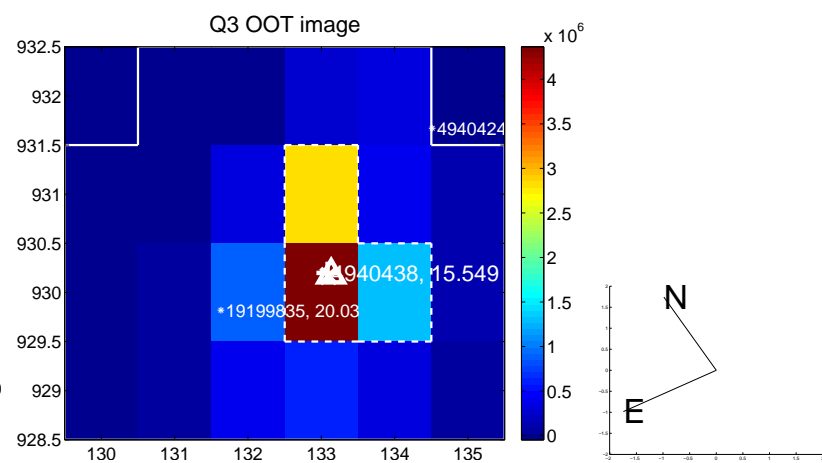
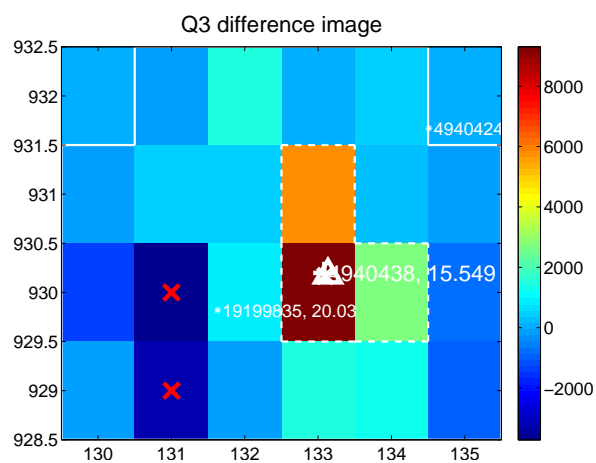
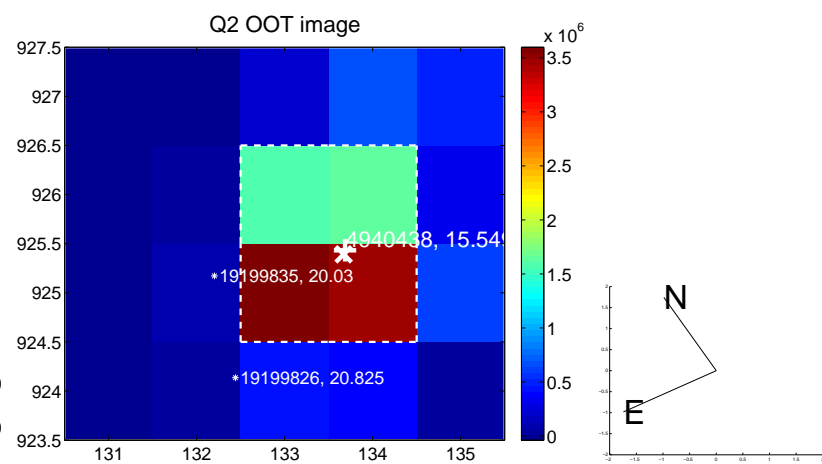
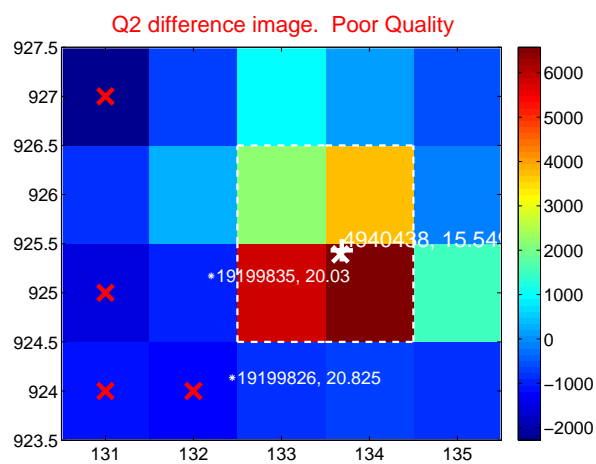
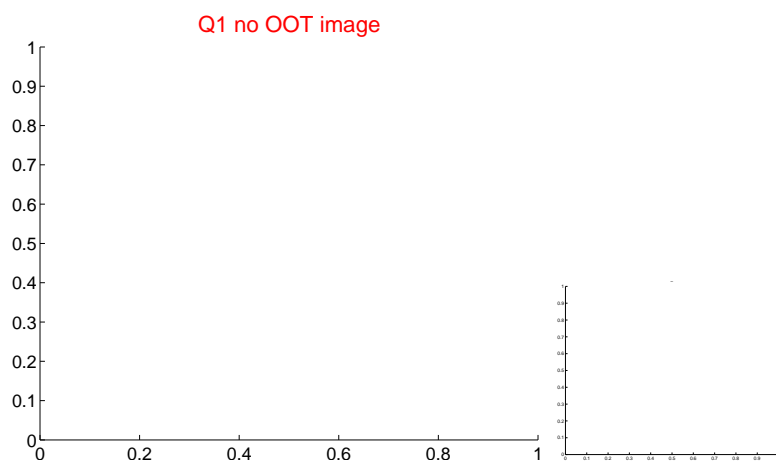
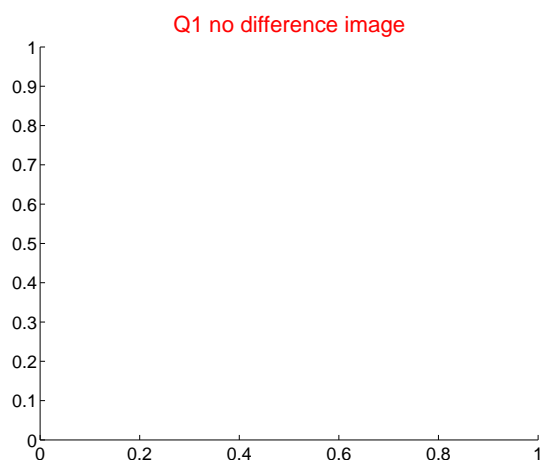
The direct PRF centroid is offset from the target star catalog position by about 0.13 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.064 ± 0.117	0.54	-0.018 ± 0.097	-0.061 ± 0.111
PRF-fit source offset from KIC position	0.086 ± 0.108	0.80	-0.066 ± 0.105	0.055 ± 0.112
photometric centroid source offset	0.54 ± 0.31	1.73	-0.52 ± 0.31	-0.14 ± 0.29

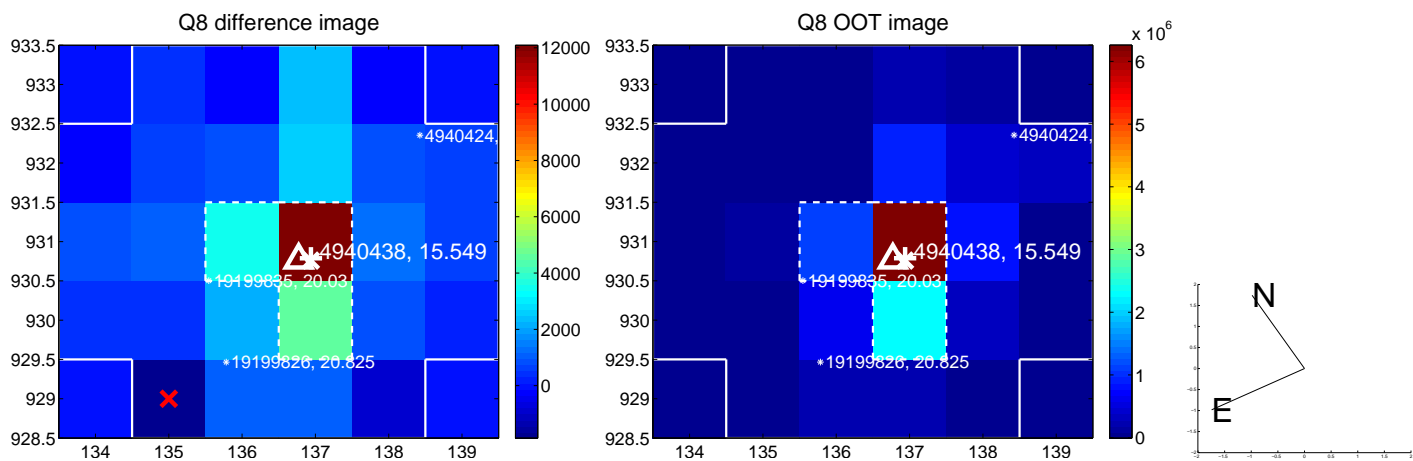
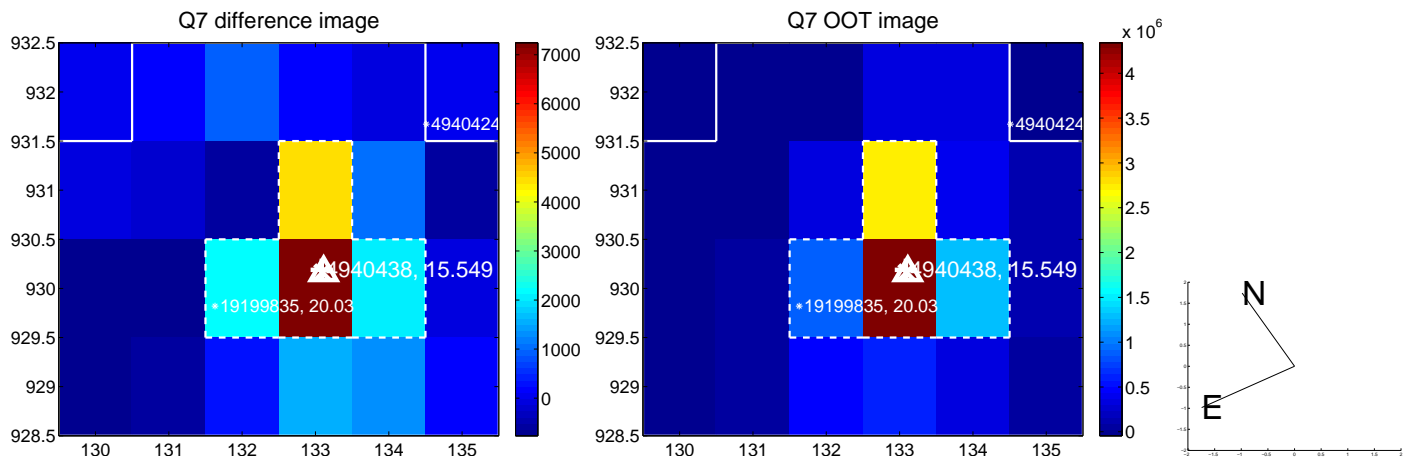
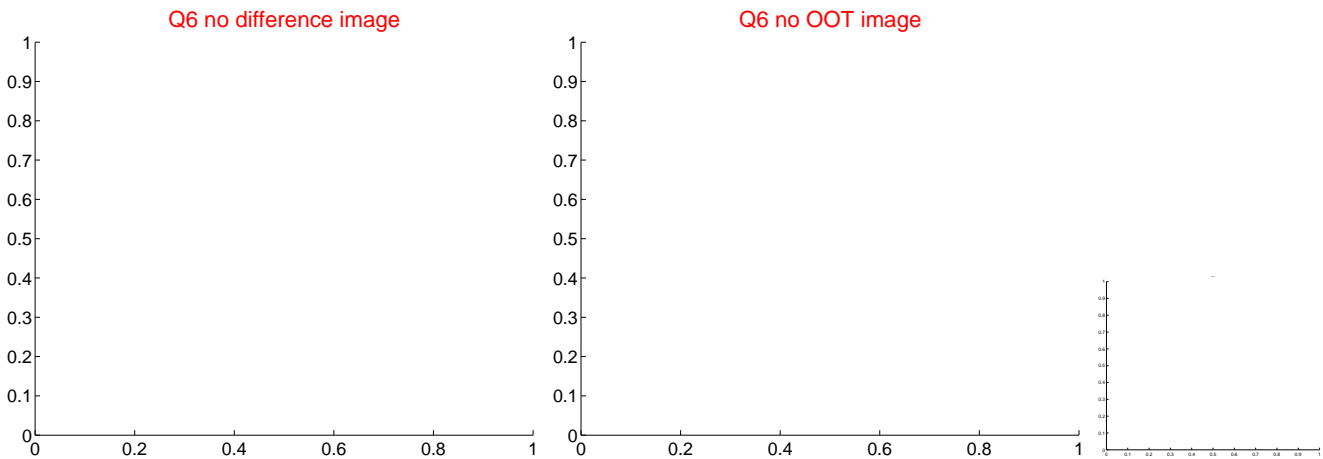
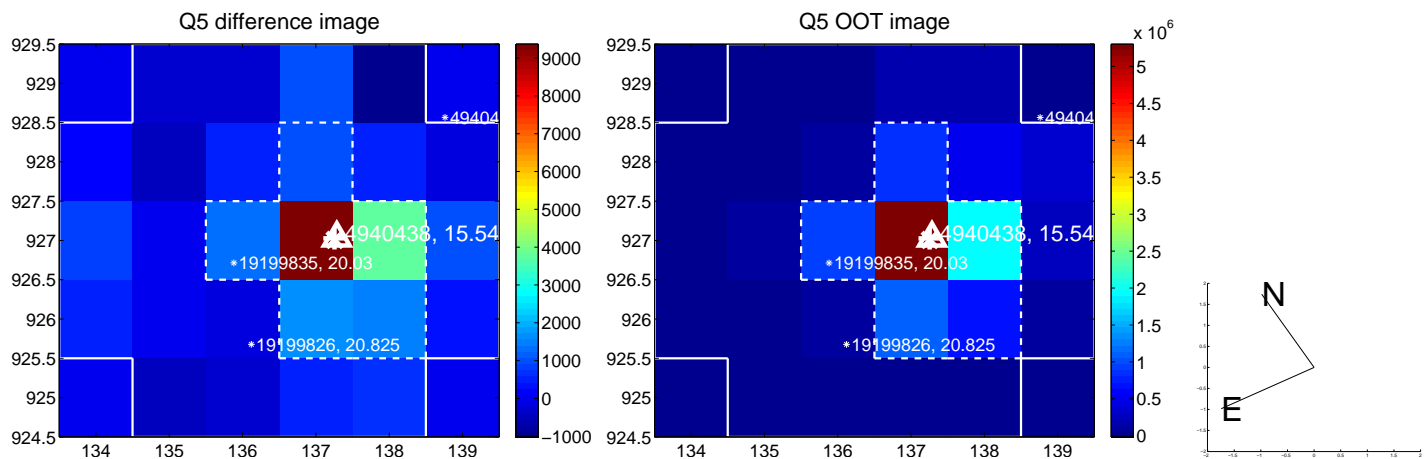


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

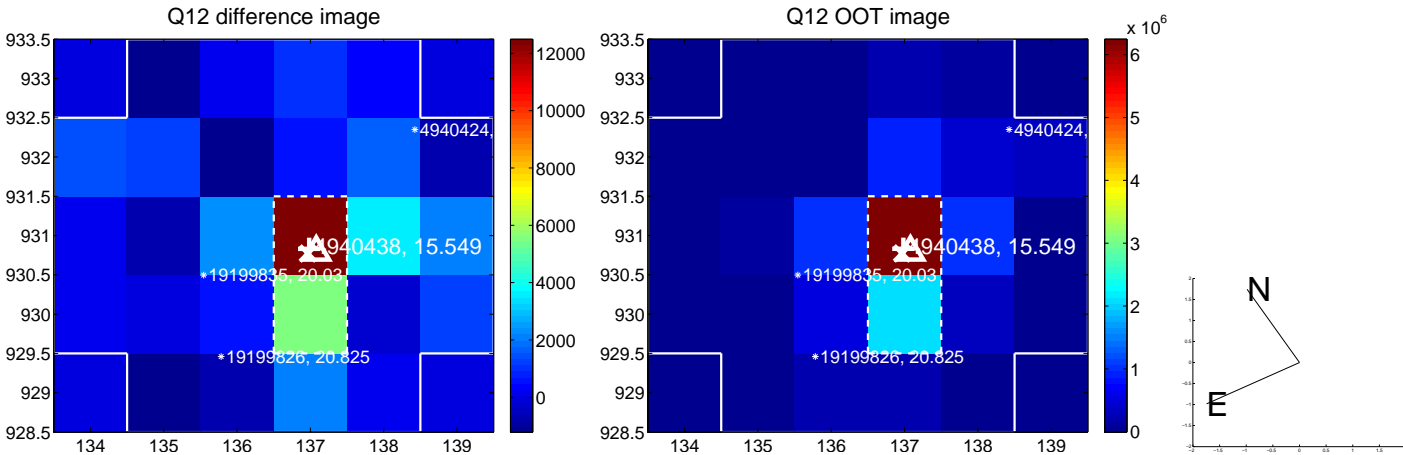
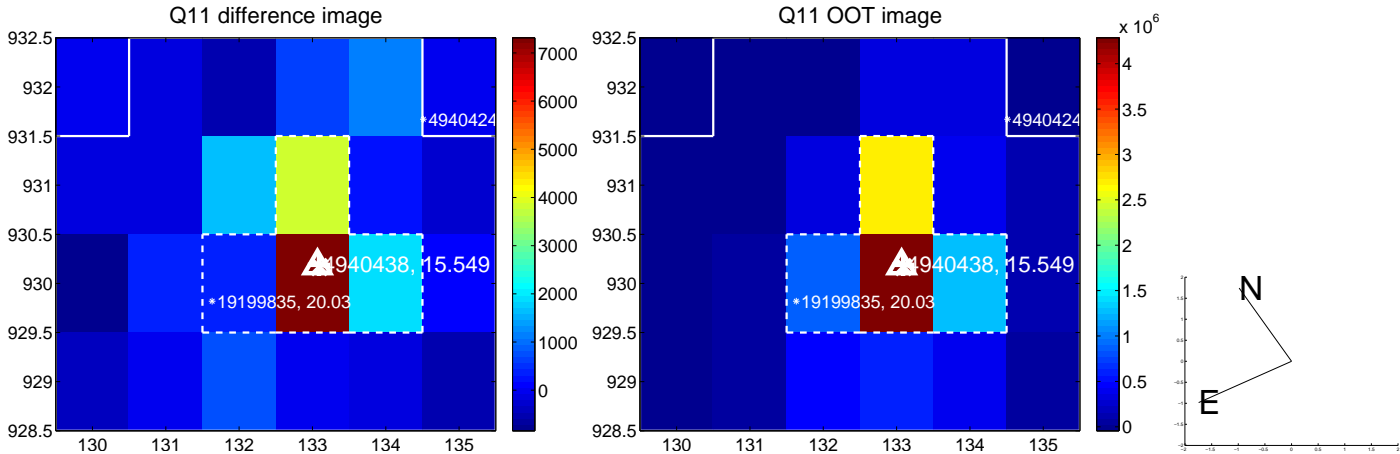
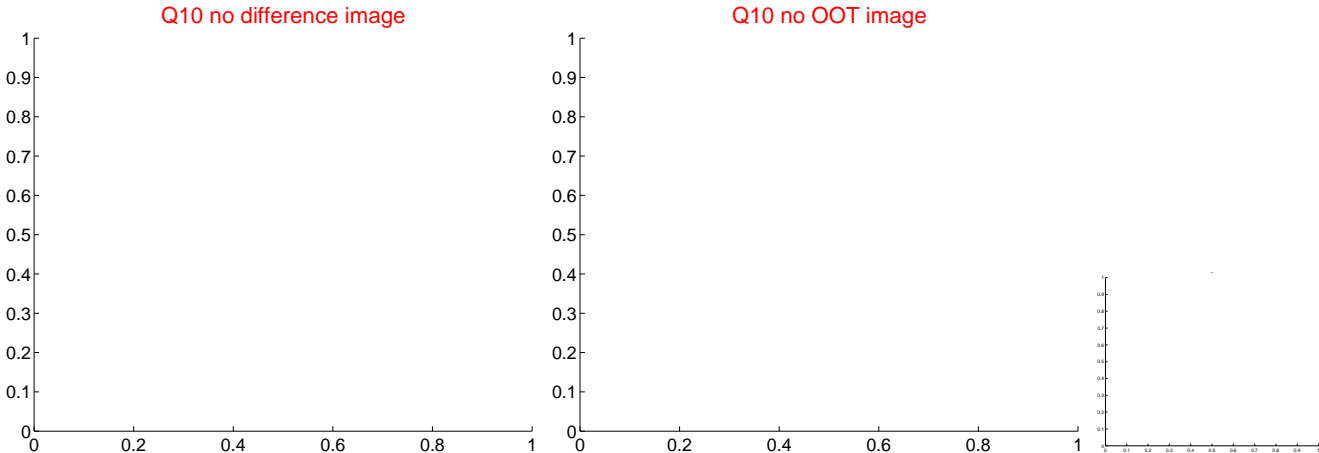
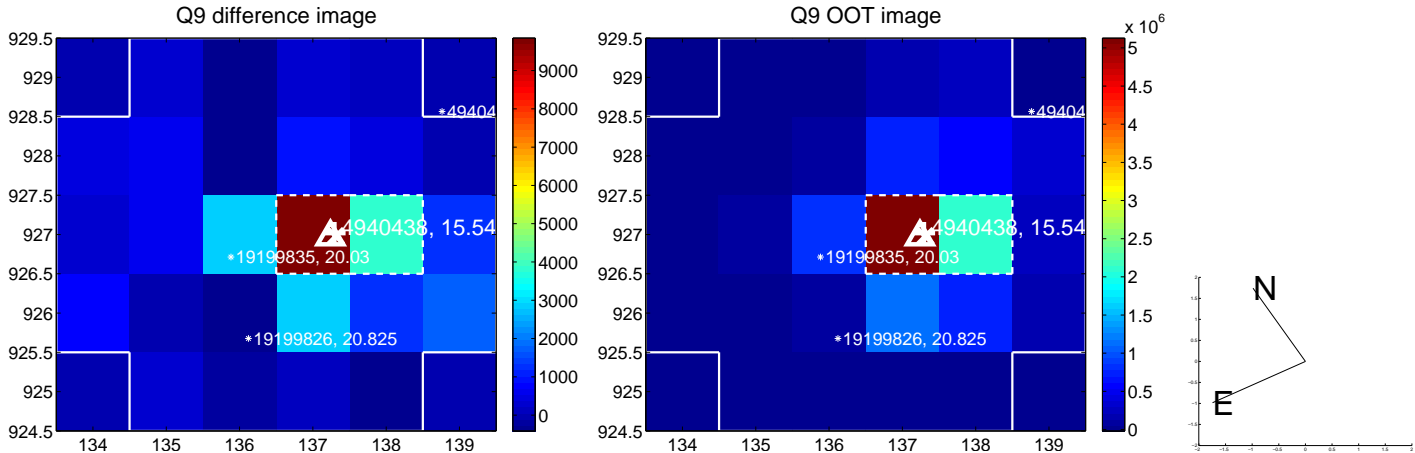
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value



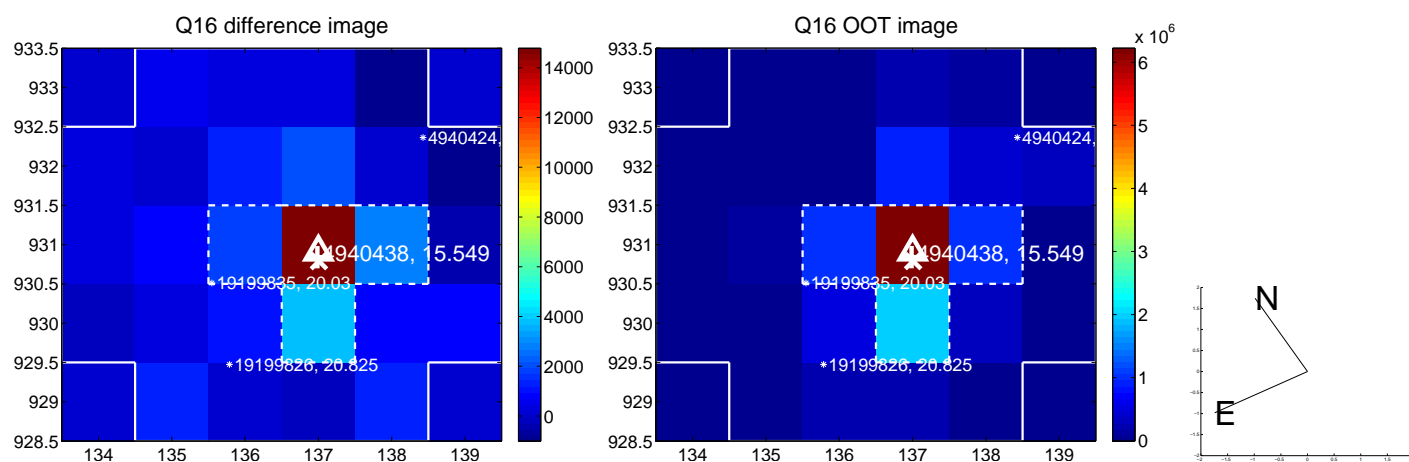
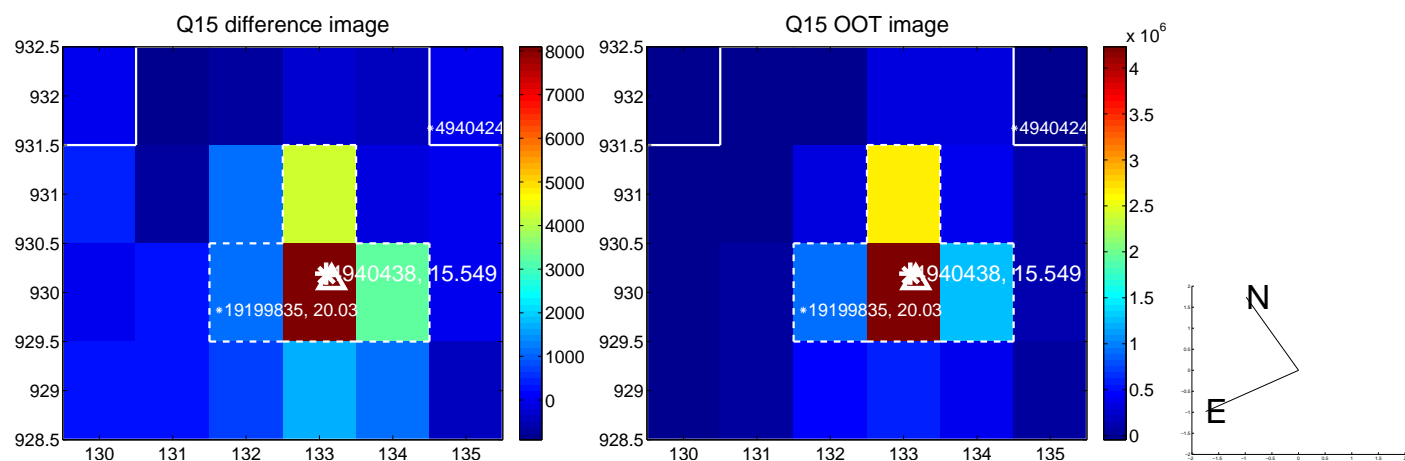
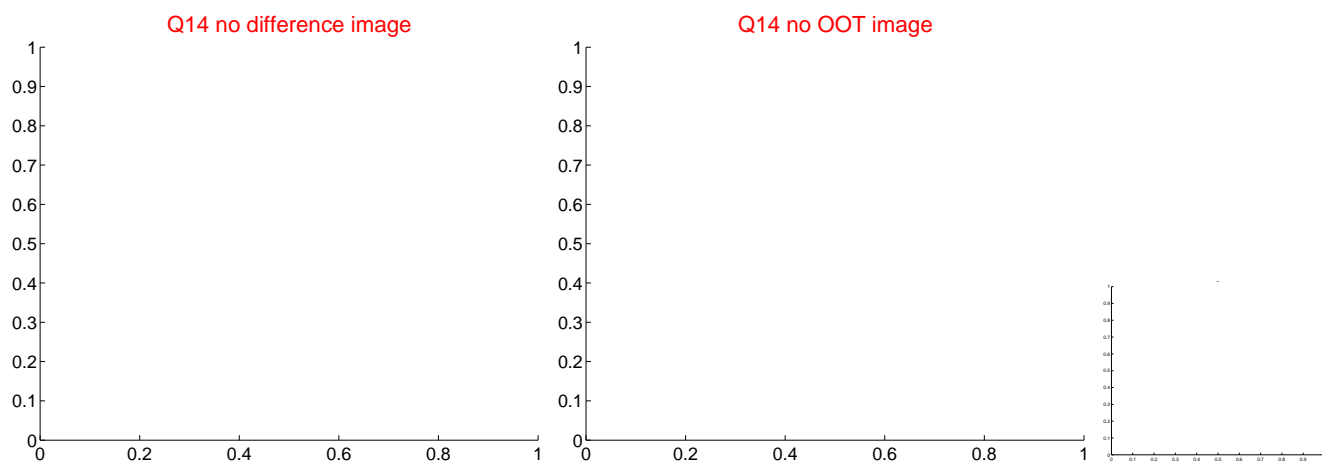
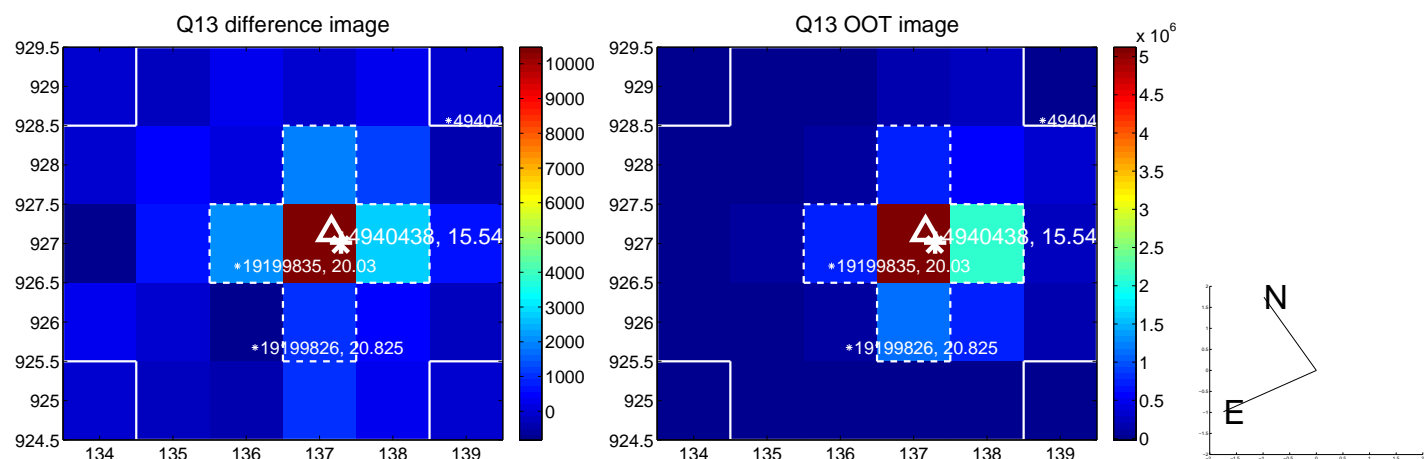
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



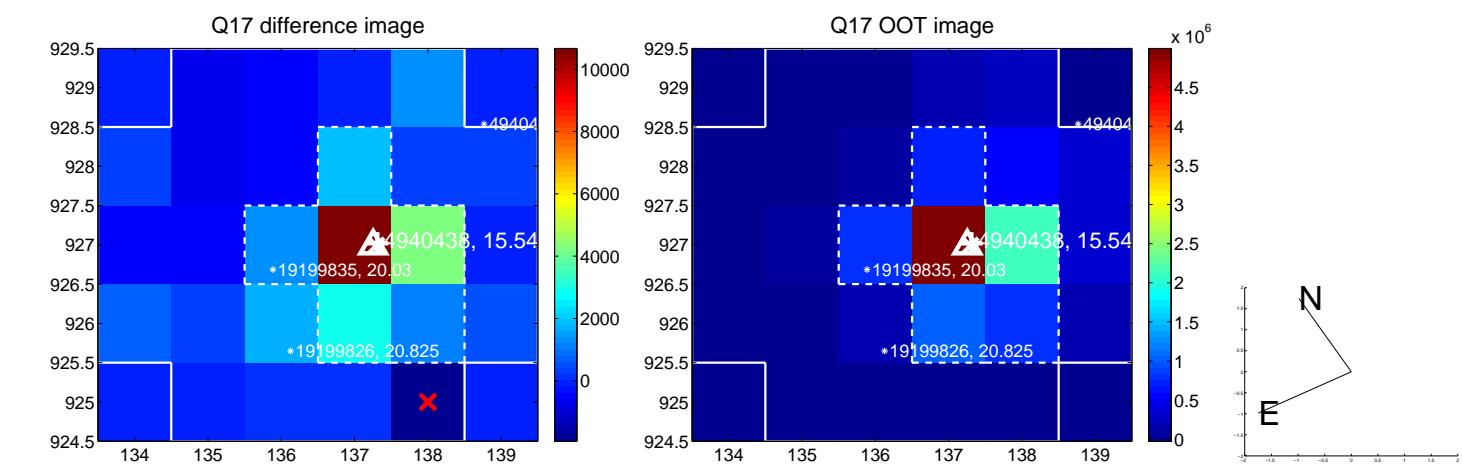
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value



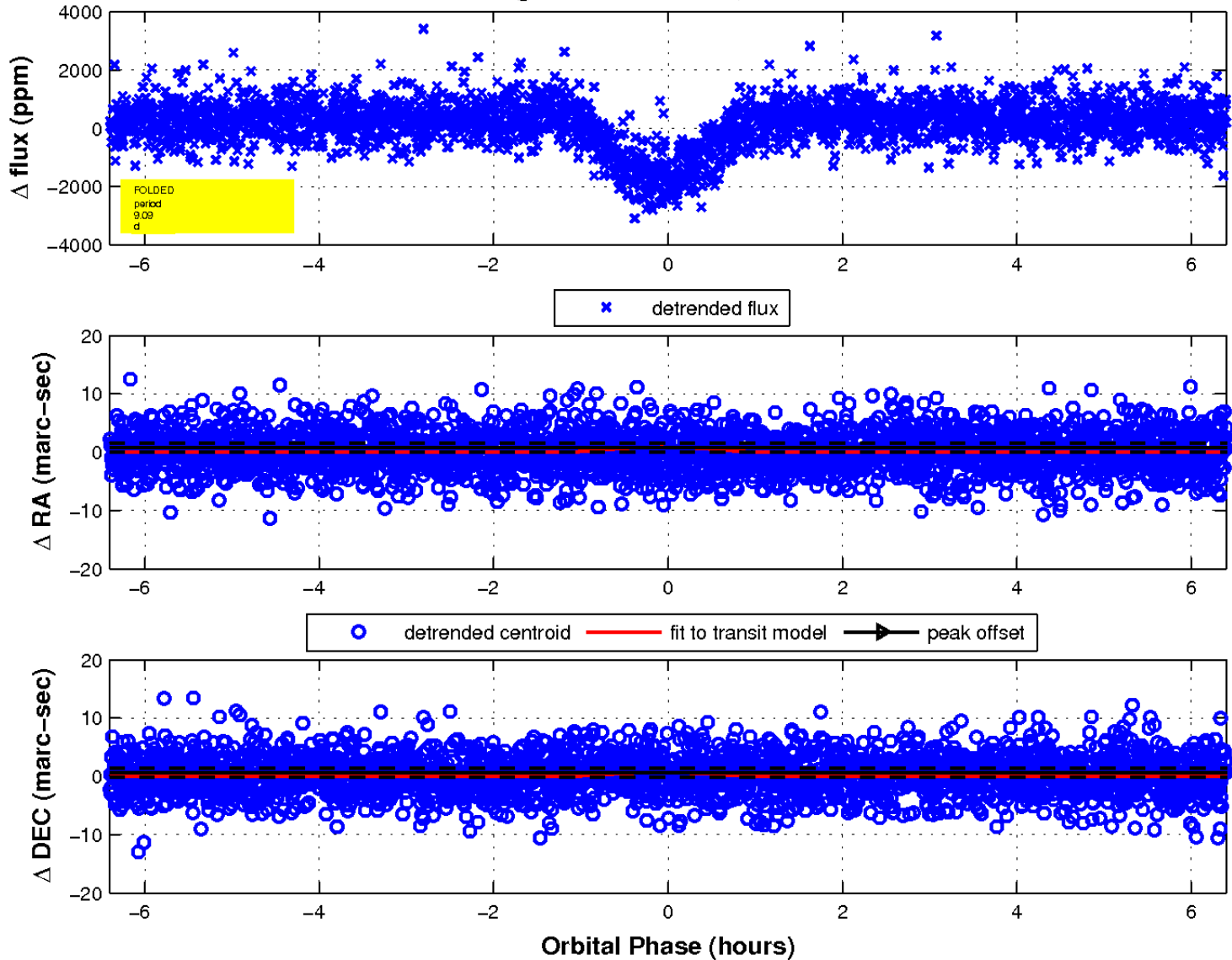
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value



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

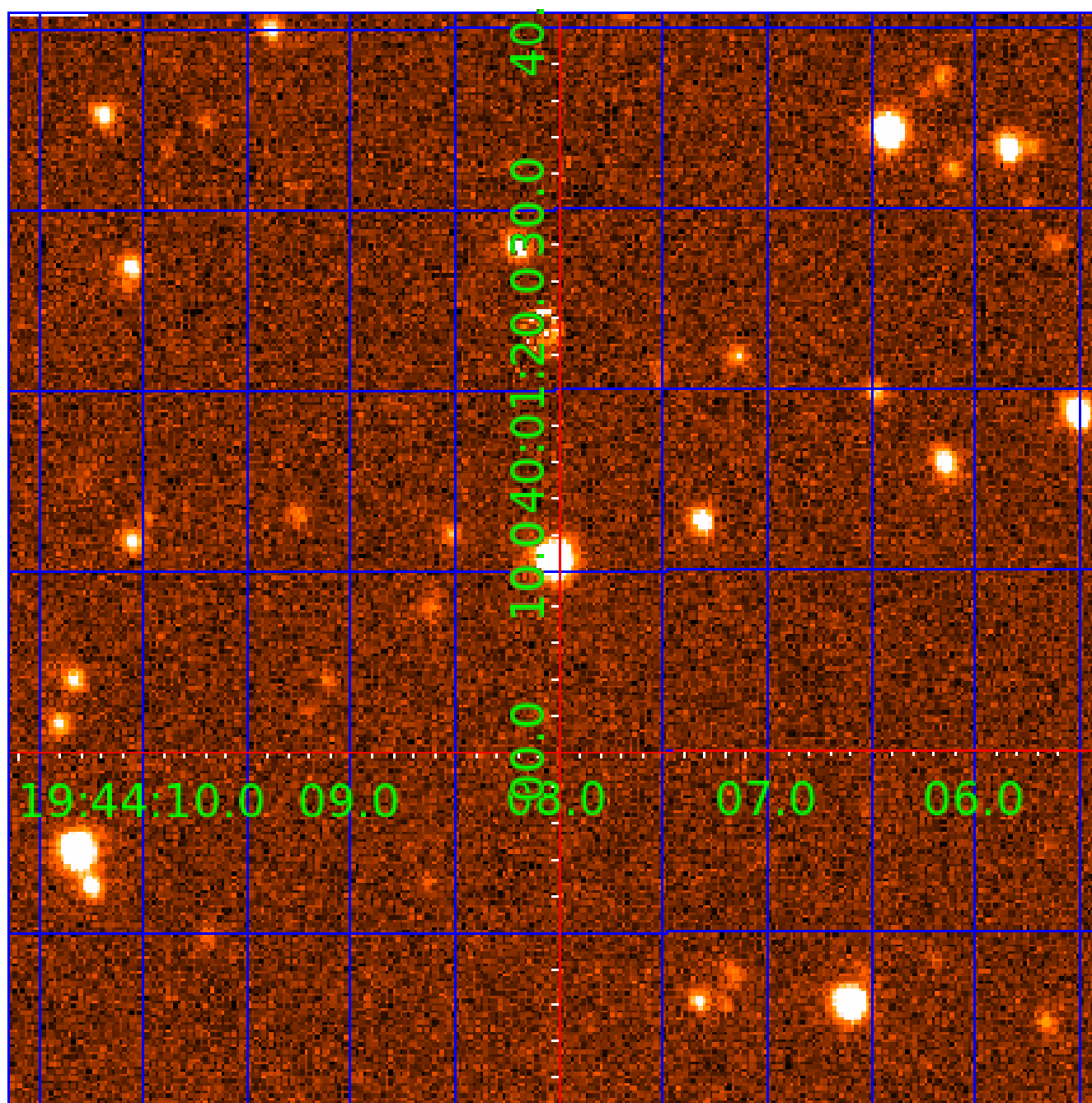


fluxWeightedCentroids, Planet 1 of 2



UKIRT Image

Declination



KIC 004940438

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})
004940438-01	OBS	1561.01	9.085914	136.651718	2225.9	2.136	50.5	52.9	0.87	5931	6.59	130.19
004940438-02	OBS	No	9.085820	136.609733	437.4	21.990	9.8	14.0	0.87	5931	3.50	130.20

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004940438-01	OBS	FP	0.00	0	1	0	0	DEEP_V_SHAPED
004940438-02	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—RESIDUAL_TCE

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 004940438-02

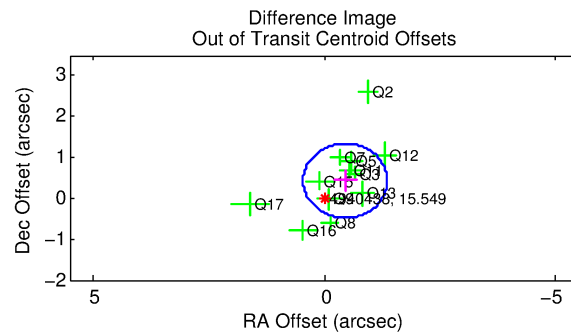
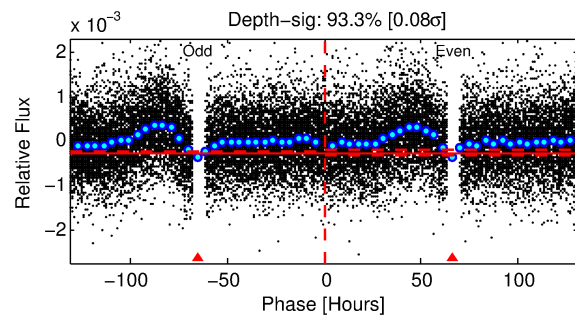
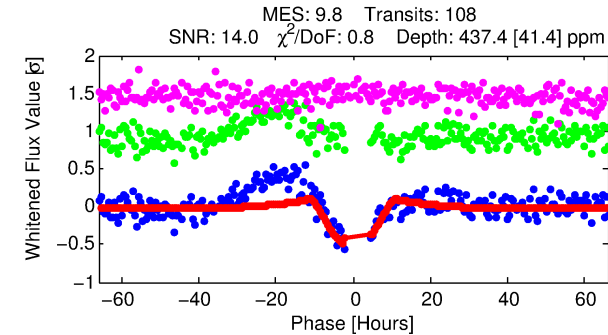
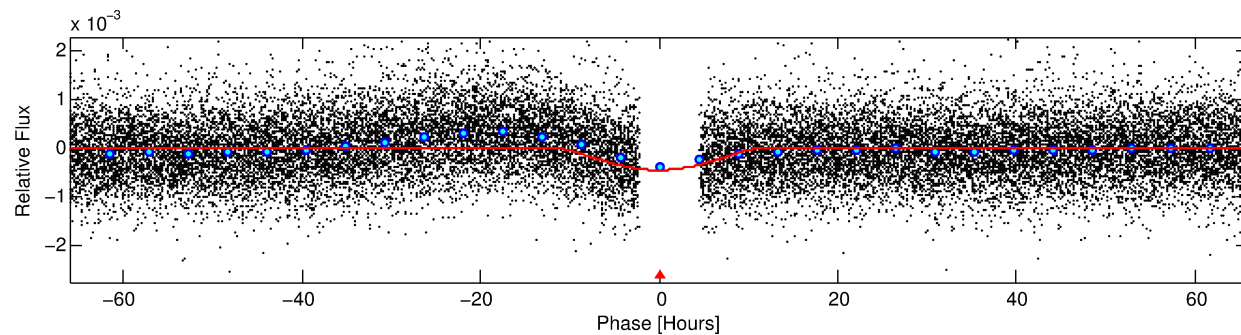
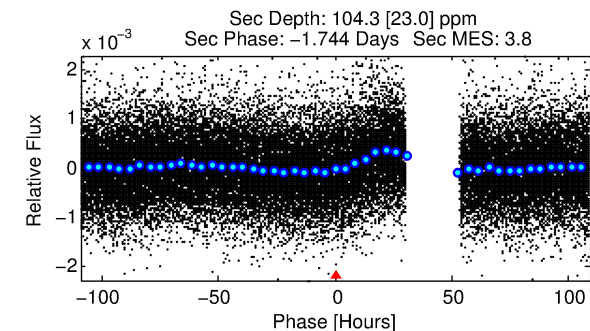
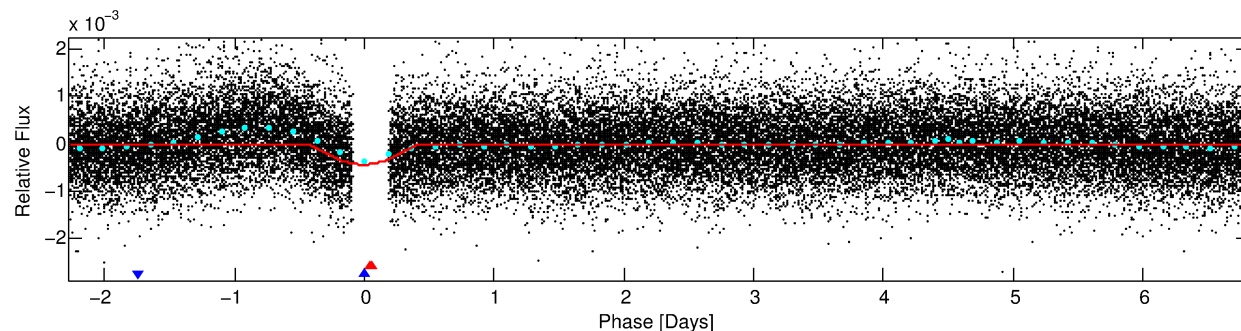
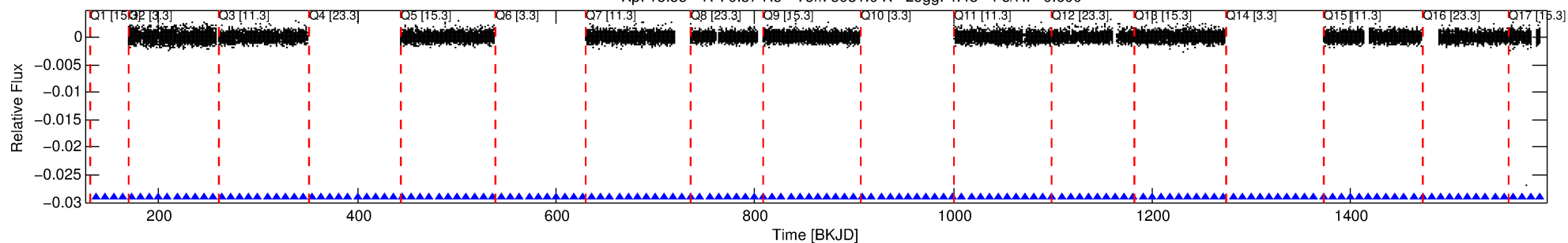
No Significant Match Found

DV One-Page Summary

KIC: 4940438 Candidate: 2 of 2 Period: 9.086 d

KOI: K01561 Corr: No Ephemeris Match

Kp: 15.55 R*: 0.87 Rs Teff: 5931.0 K Logg: 4.48 Fe/H: -0.600



DV Fit Results:

Period = 9.08582 [0.00022] d
Epoch = 136.6097 [0.0211] BKJD
Rp/R* = 0.0371 [0.0626]
a/R* = 1.34 [0.17]
b = 1.00 [0.09]
Seff = 130.20 [43.32]
Teq = 861 [72] K
Rp = 3.50 [5.97] Re
a = 0.0799 [0.0166] AU
Ag = 29.85 [101.36] [0.28σ]
Teff = 3113 [2634] K [0.85σ]

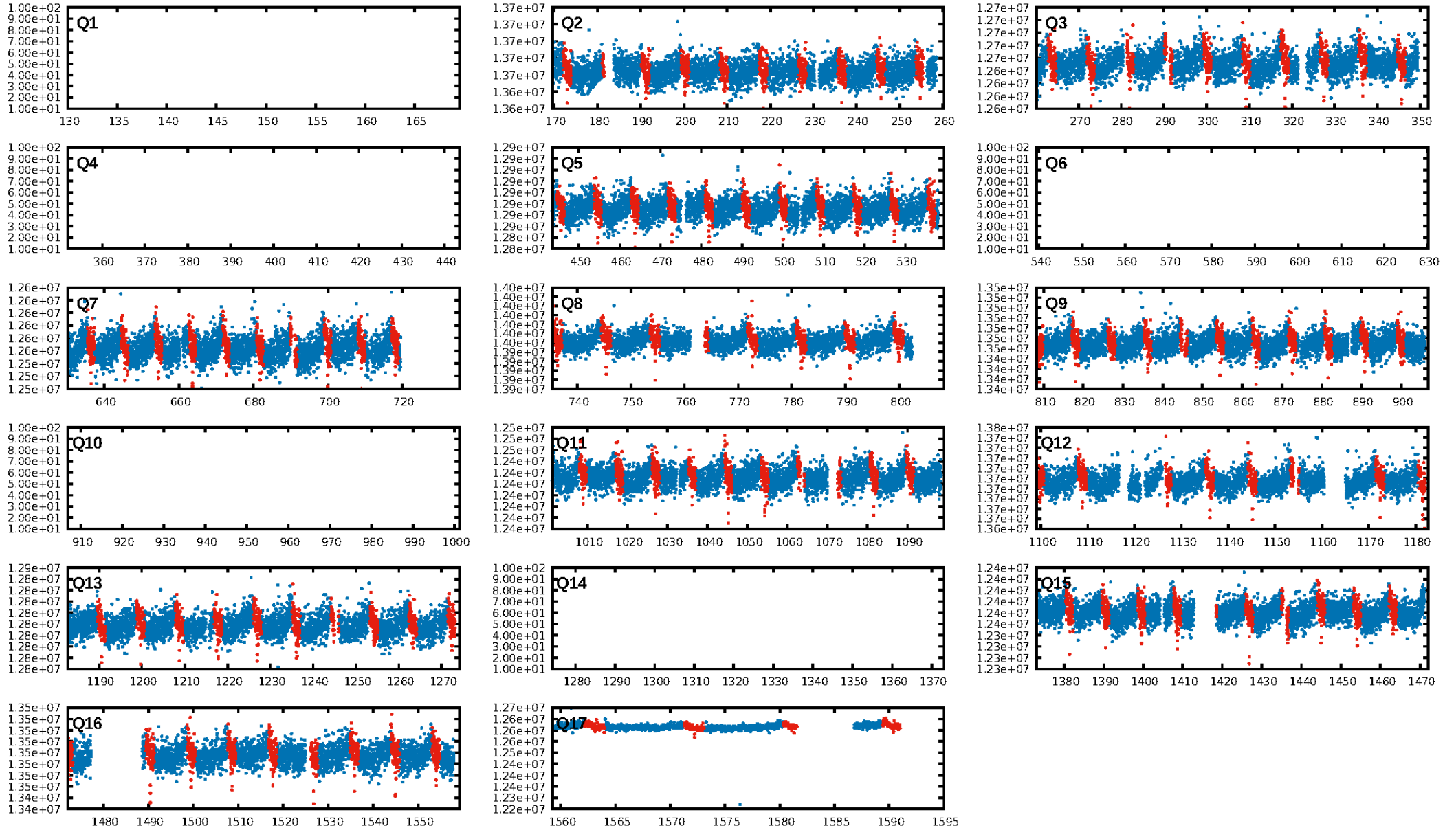
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 0.0% [0.00σ]
ModelChiSquare2-sig: 99.9%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 3.44e-22
RollingBand-fgt: 1.00 [104/104]
GhostDiagnostic-chr: -5.394
Centroid-sig: 0.2%
Centroid-so: 1.165 arcsec [2.14σ]
OotOffset-rm: 0.625 arcsec [2.06σ]
KicOffset-rm: 0.741 arcsec [2.64σ]
OotOffset-st: 1/4/3/4 [12]
KicOffset-st: 1/4/3/4 [12]
DiffImageQuality-fgm: 1.00 [12/12]
DiffImageOverlap-fno: 0.00 [0/12]

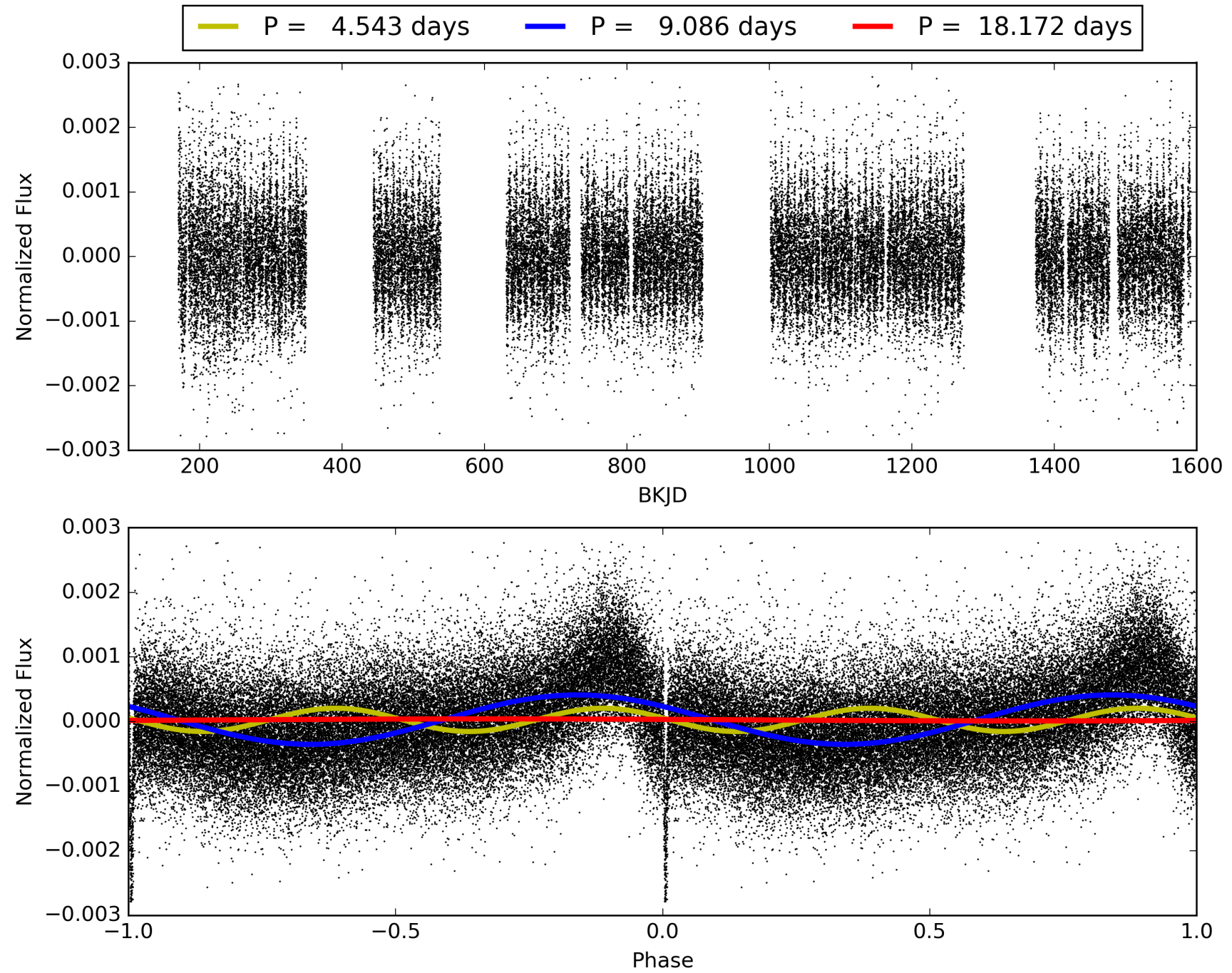
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This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

TCE 004940438-02, PDC Light Curves

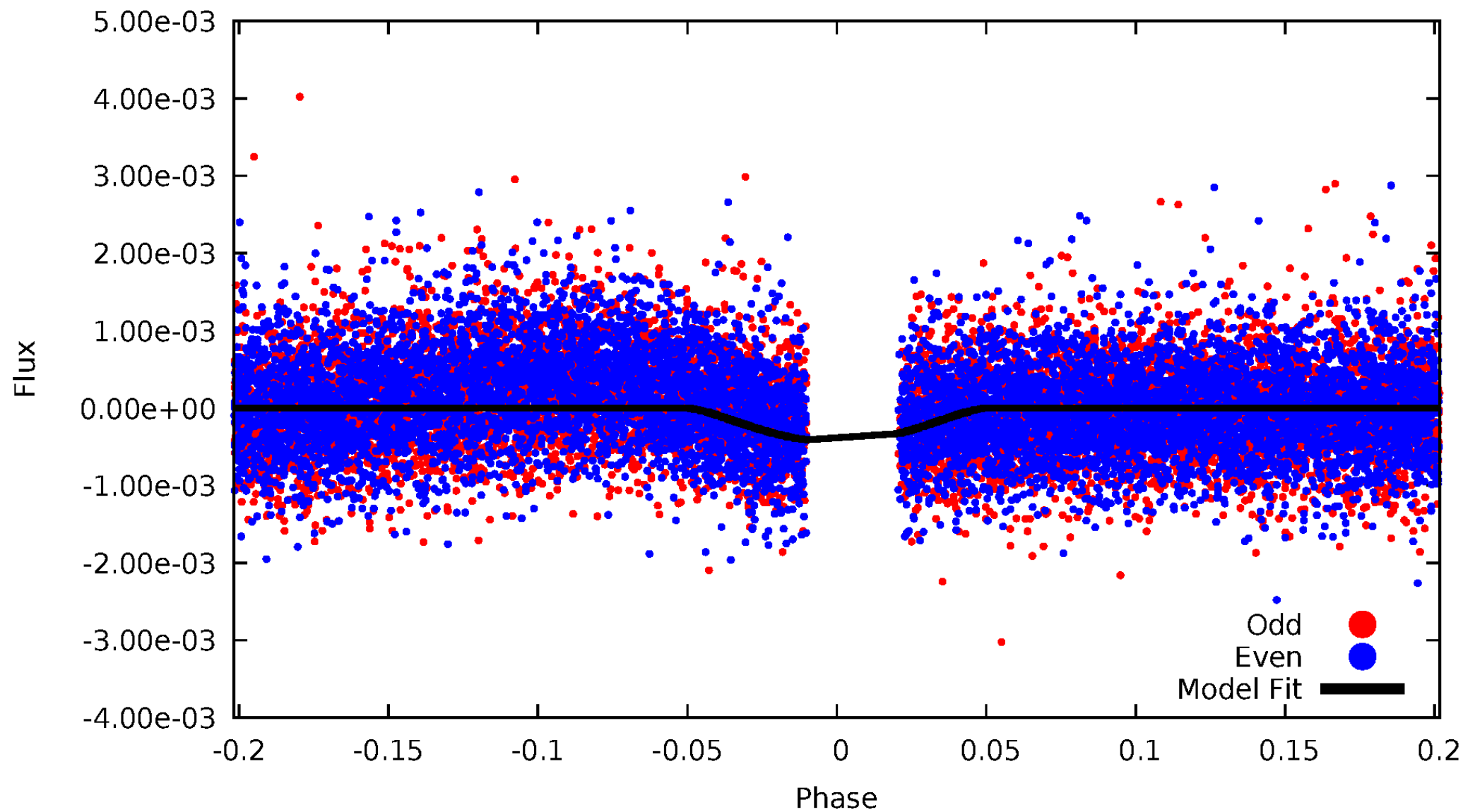


TCE 004940438-02



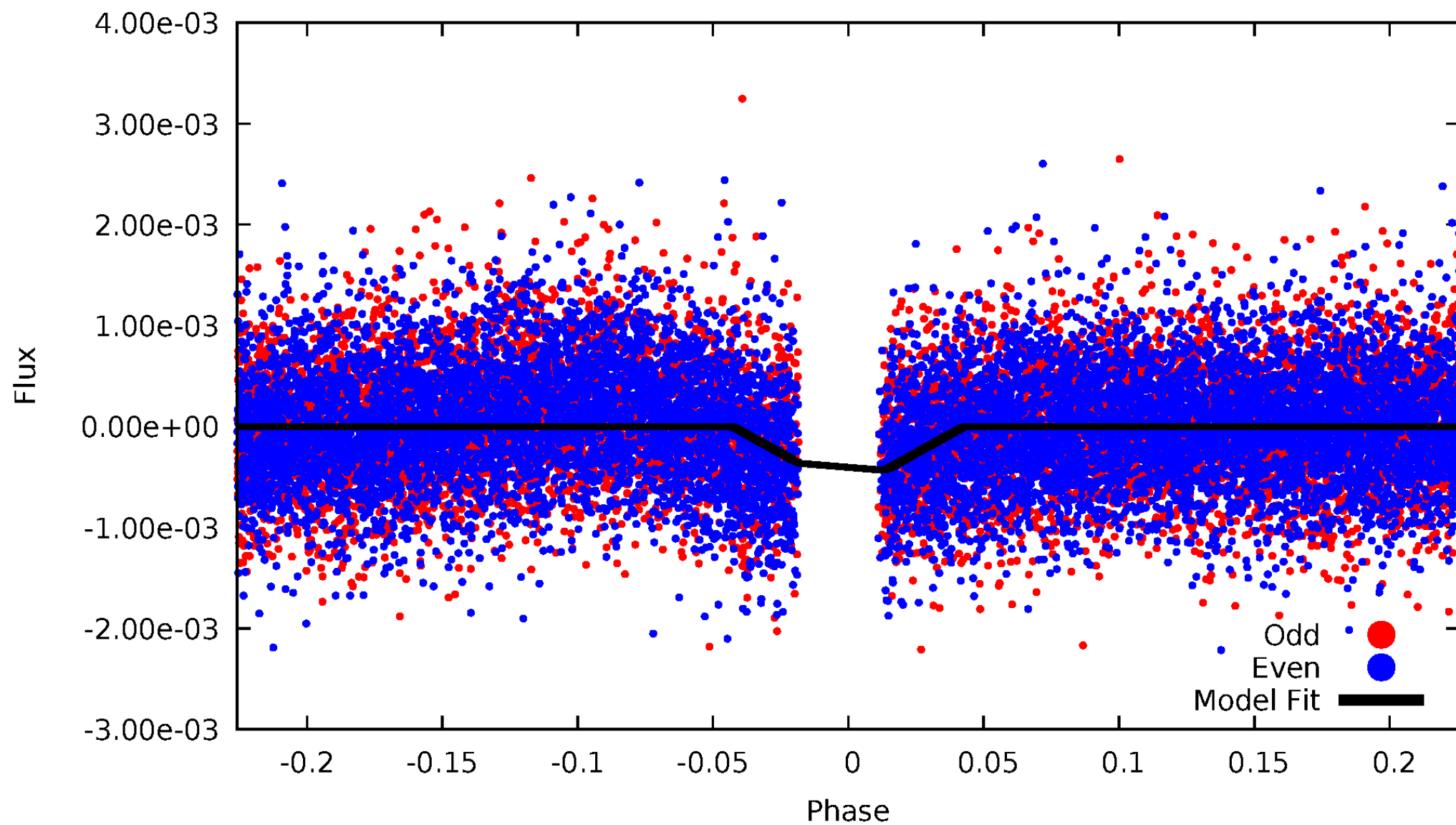
DV Odd/Even

TCE 004940438-02



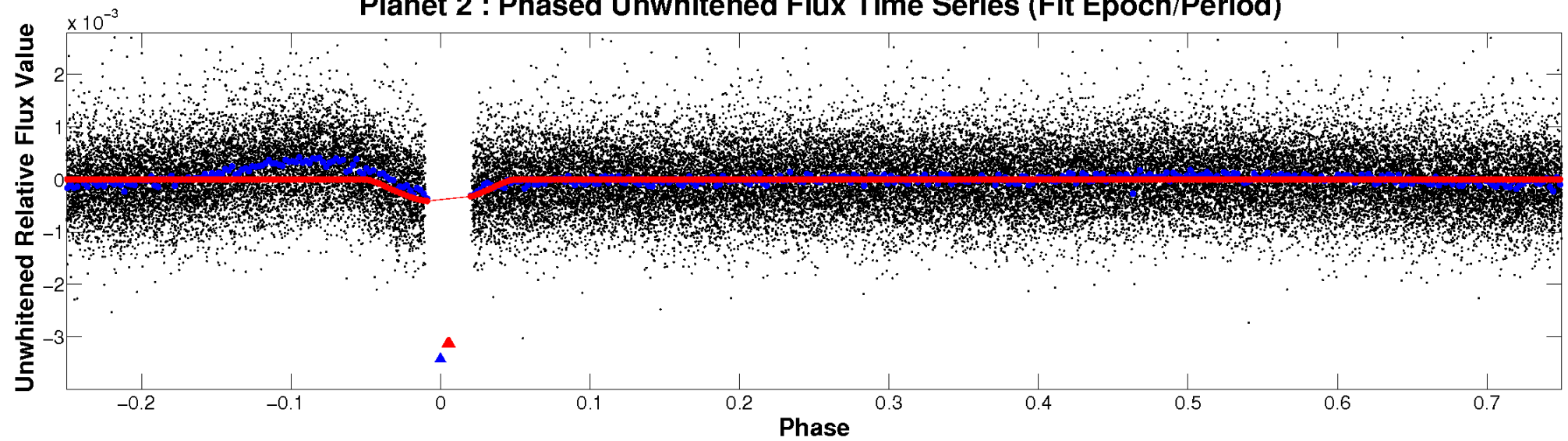
ALT Odd/Even

TCE 004940438-02

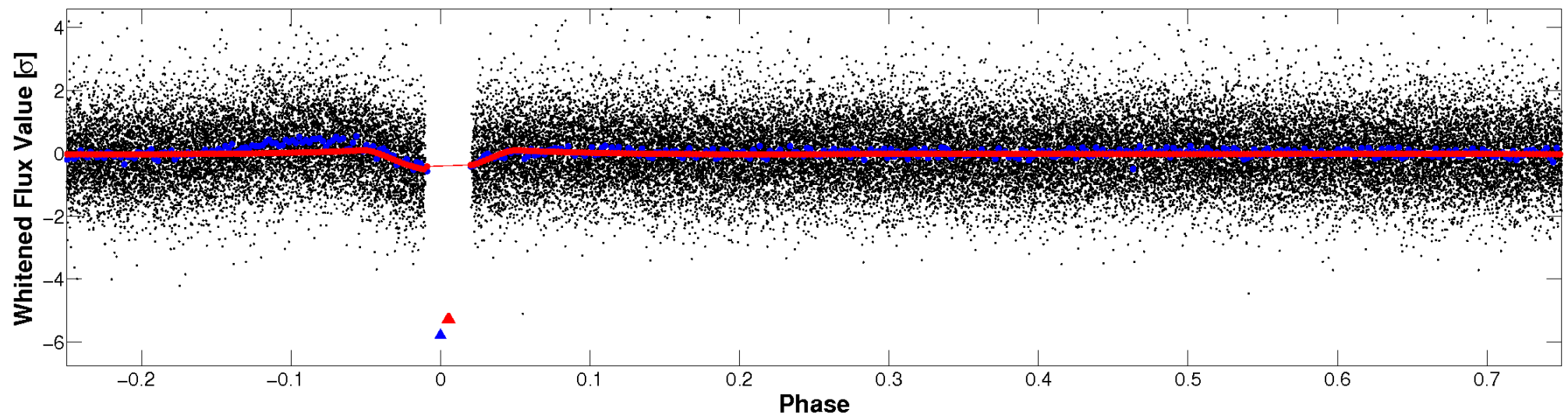


Non-Whitened Vs. Whitened Light Curve

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

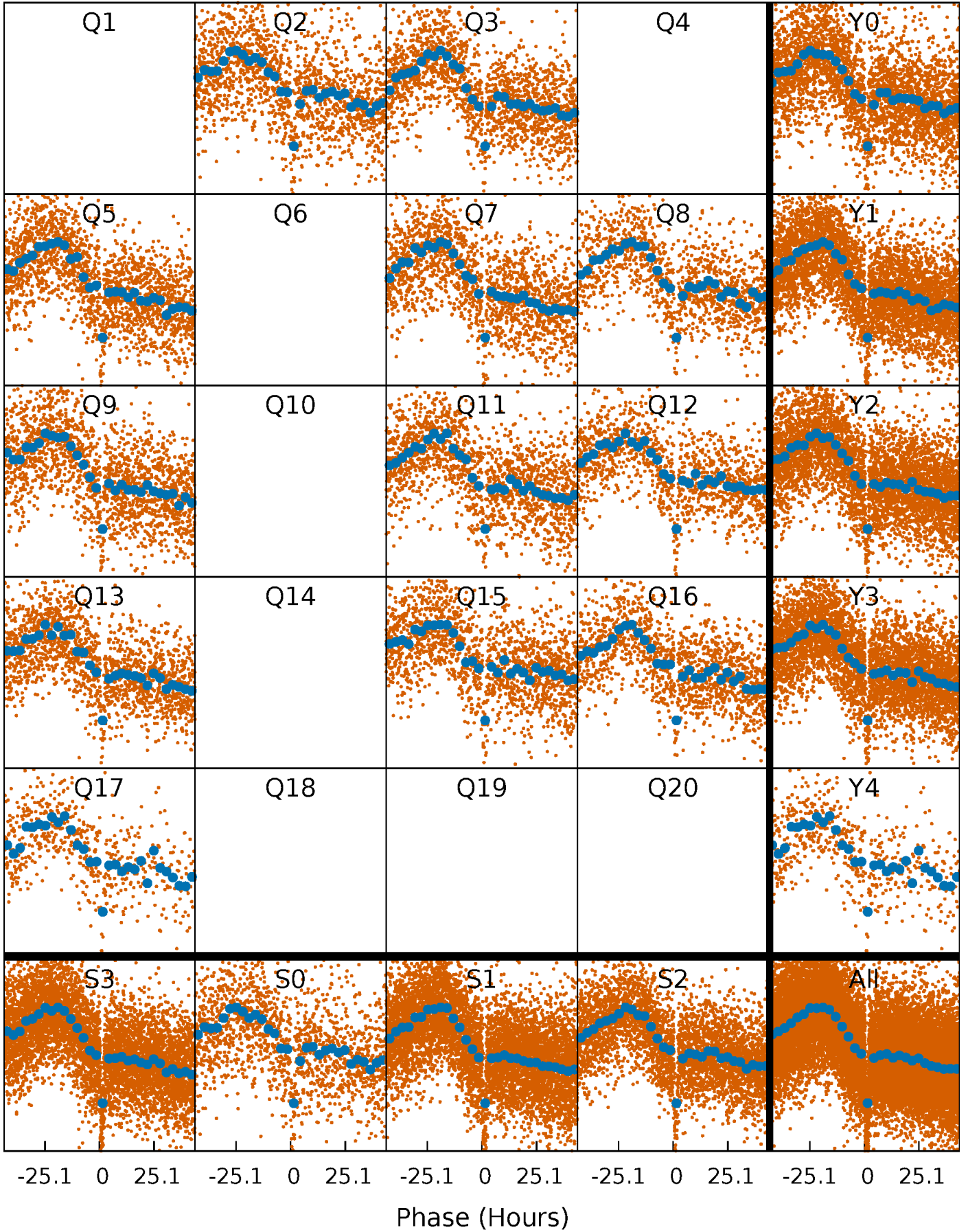


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



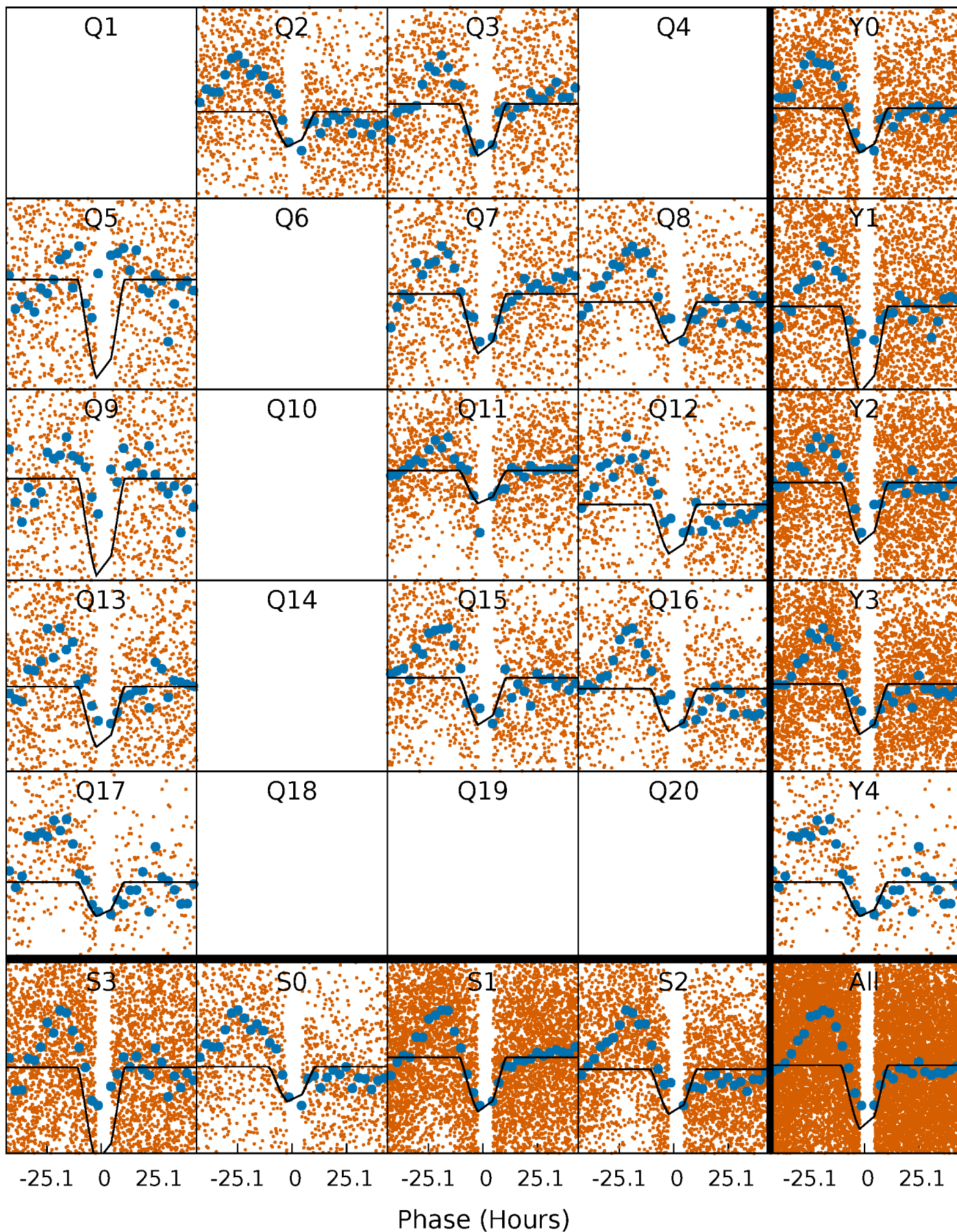
PDC Quarter-Phased Transit Curves

TCE 004940438-02 P= 9.085820 Days $T_0=136.609733$ (BKJD)



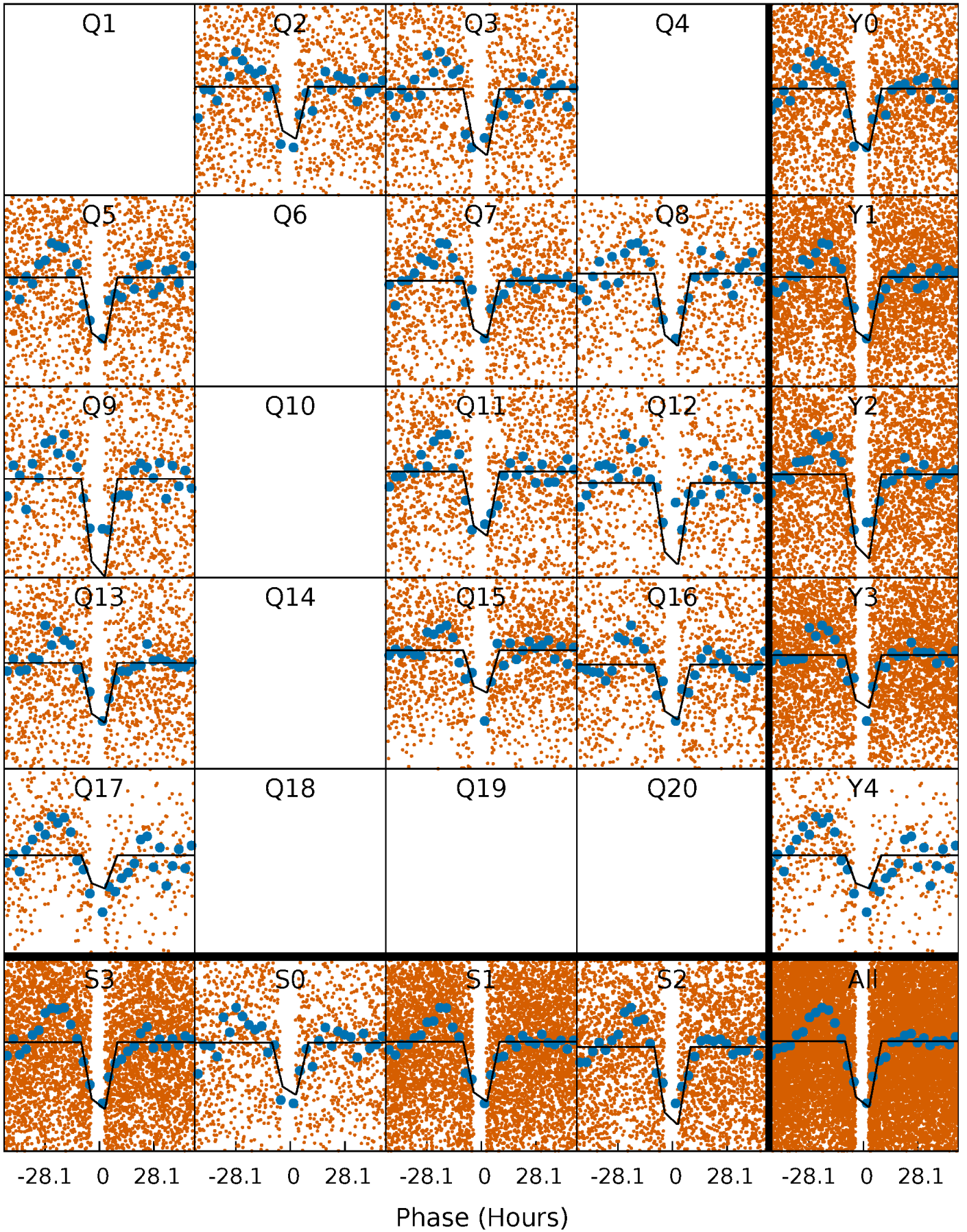
DV Quarter-Phased Transit Curves

TCE 004940438-02 P= 9.085820 Days $T_0=136.609733$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

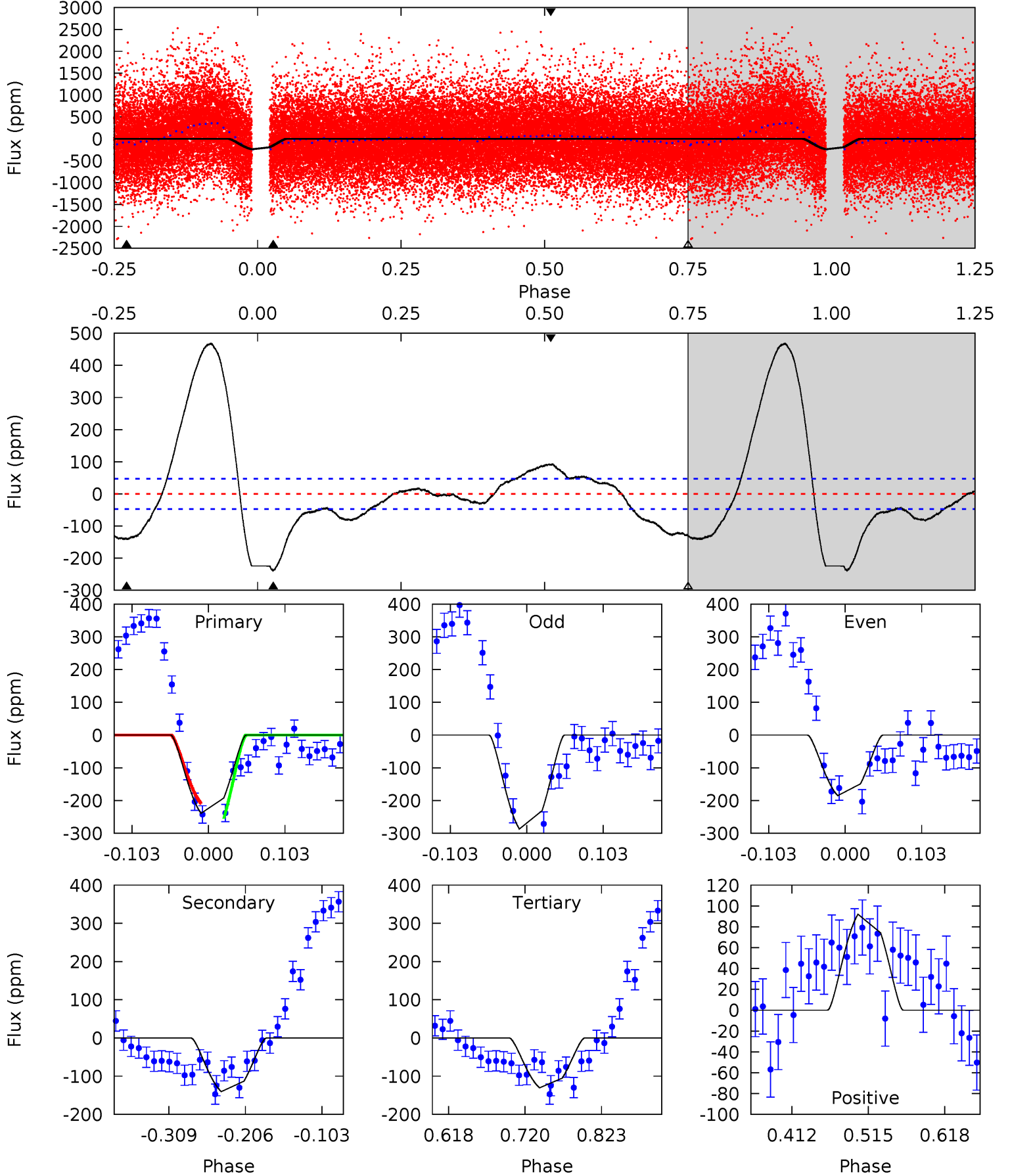
TCE 004940438-02 P= 9.085744 Days $T_0=136.696206$ (BKJD)



DV Model-Shift Uniqueness Test

004940438-02, P = 9.085820 Days, E = 136.609733 Days

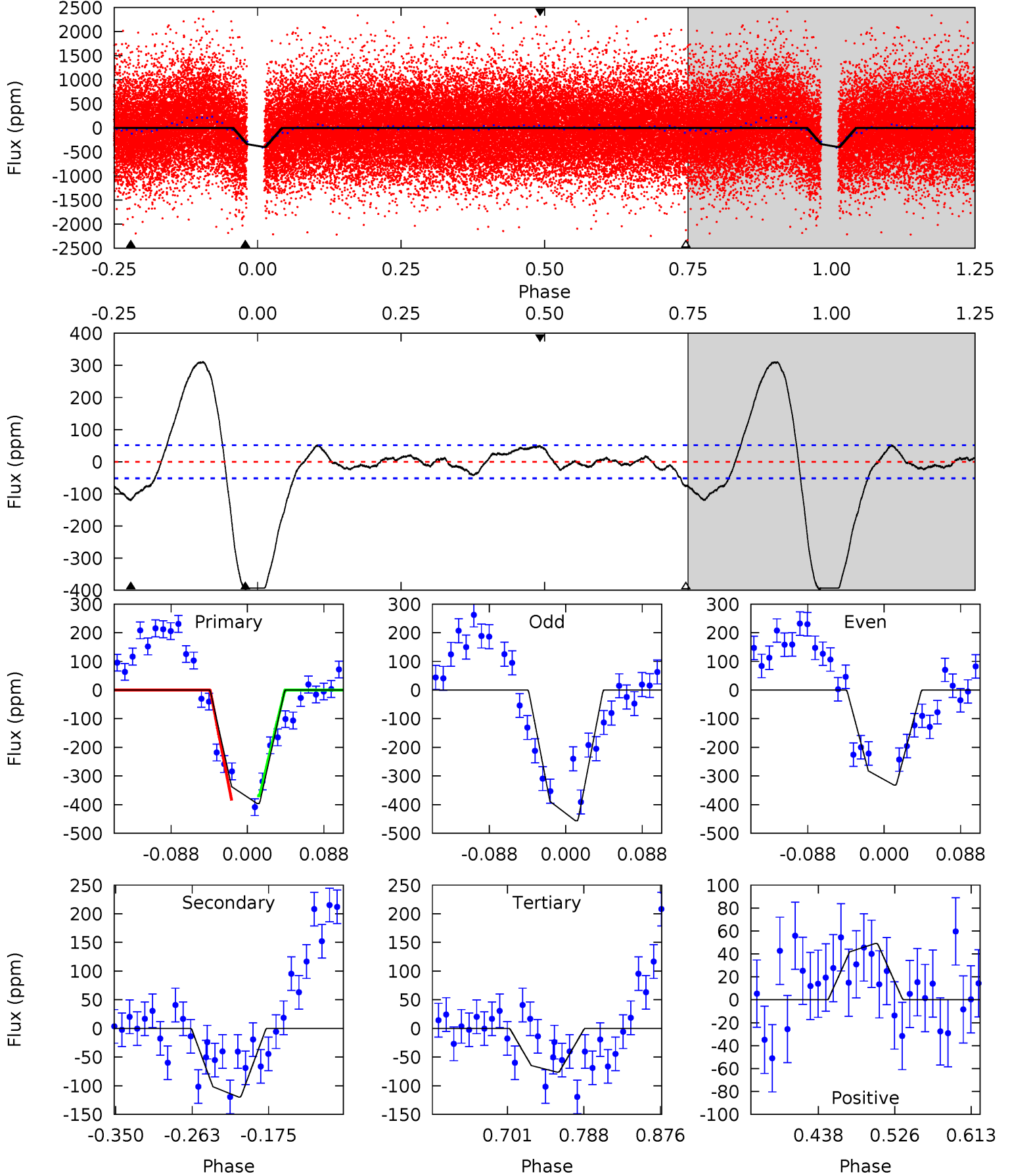
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
23.1	13.5	12.6	8.89	4.56	1.63	11.7	10.5	14.2	0.96	4.66	4.91	0.92	0.66	2.21



Alt Model-Shift Uniqueness Test

004940438-02, P = 9.085744 Days, E = 136.696206 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
35.3	10.6	6.78	4.37	4.59	1.71	4.52	28.5	30.9	3.87	6.28	5.57	1.15	0.44	0.68



Stellar Parameters For KIC 004940438

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	5931^{+177}_{-195}	$4.479^{+0.091}_{-0.169}$	$-0.600^{+0.300}_{-0.300}$	$0.866^{+0.210}_{-0.113}$	$0.825^{+0.103}_{-0.063}$	$1.789^{+0.833}_{-0.823}$
	+3%/-3%	+2%/-4%	+50%/-50%	+24%/-13%	+12%/-8%	+47%/-46%
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 004940438-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	A_{obs}
DV	-140 ± 10	$5.75^{+5.47}_{-3.81}$	1211^{+77}_{-62}	3241^{+1520}_{-565}	16^{+120}_{-11}
Alt.	-120 ± 11	$5.11^{+5.32}_{-3.63}$	1213^{+83}_{-62}	3280^{+1879}_{-622}	16^{+174}_{-12}

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

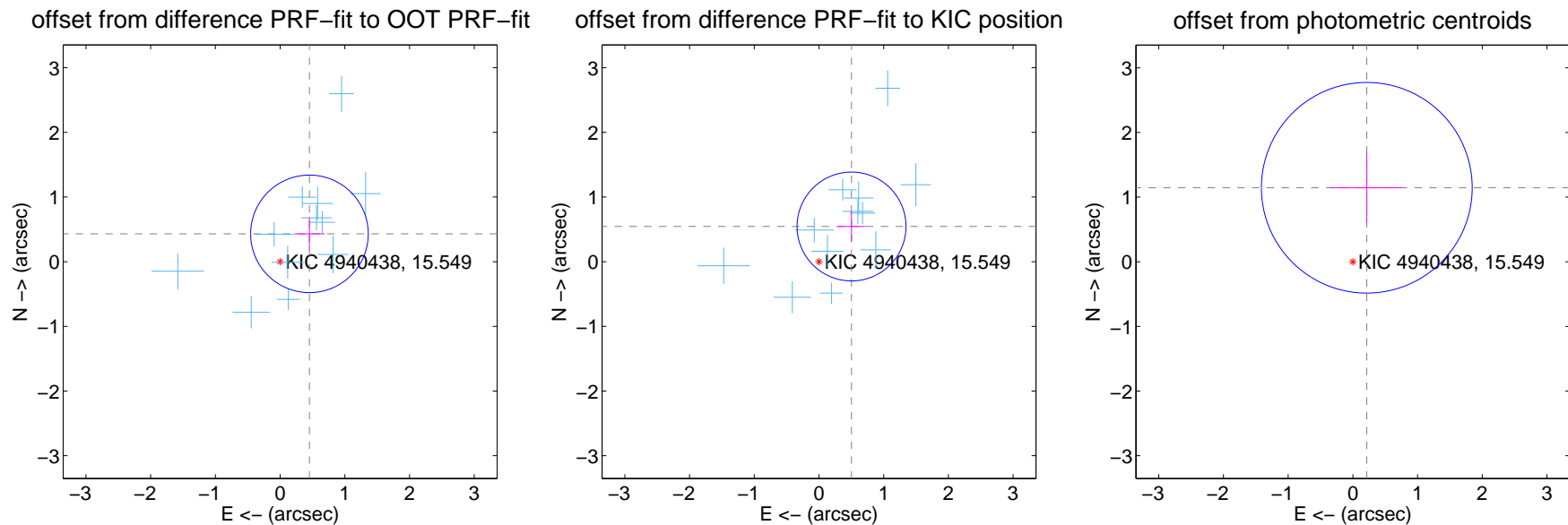
DV Centroid Data

Supplemental centroid analysis for 004940438-02. Kepler magnitude: 15.55. Transit SNR 14.05

There are 12 quarters with good PRF difference image offsets

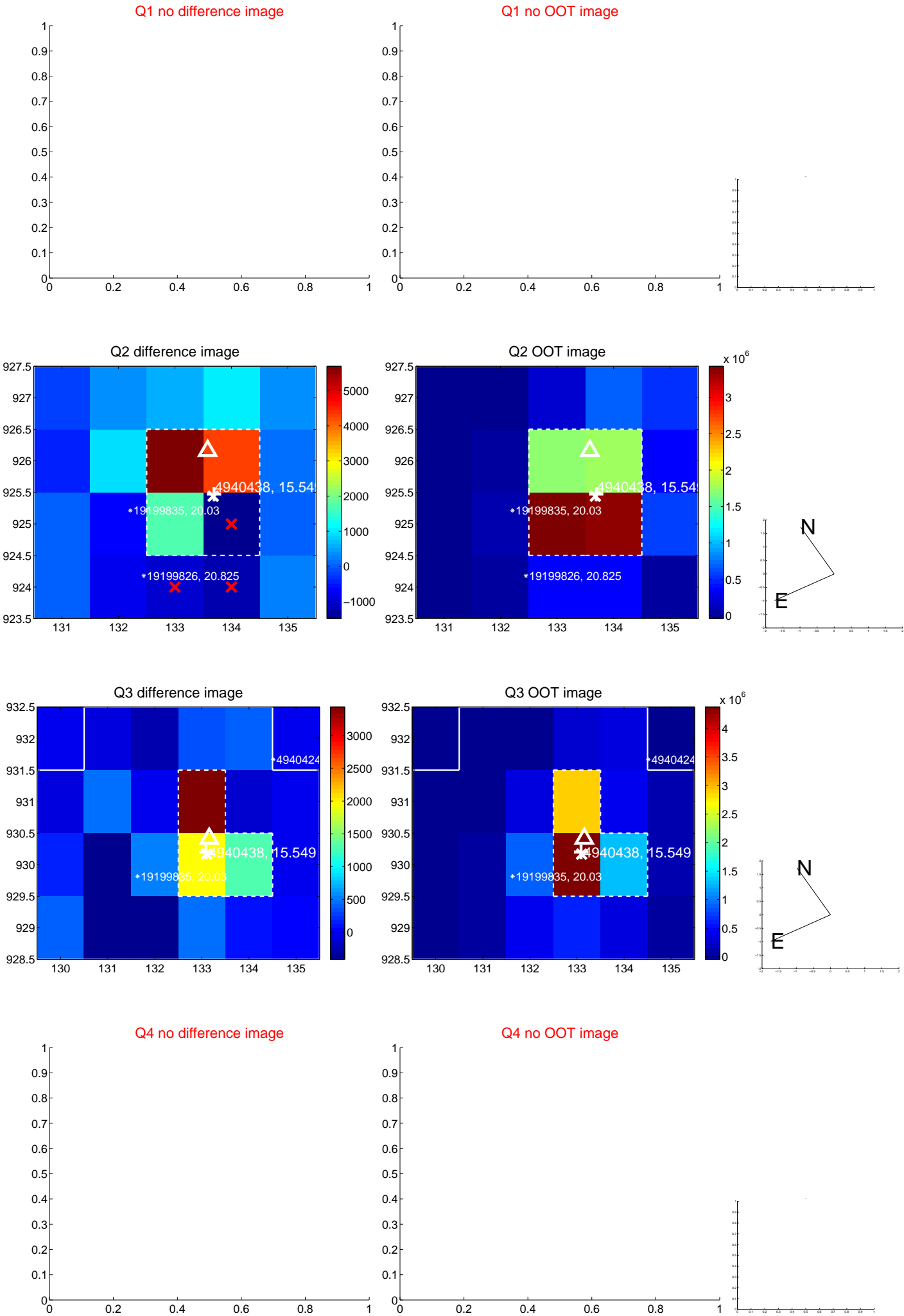
The direct PRF centroid is offset from the target star catalog position by about 0.14 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.625 ± 0.303	2.06	-0.453 ± 0.235	0.430 ± 0.257
PRF-fit source offset from KIC position	0.741 ± 0.281	2.64	-0.503 ± 0.215	0.544 ± 0.231
photometric centroid source offset	1.16 ± 0.54	2.14	-0.22 ± 0.55	1.14 ± 0.54

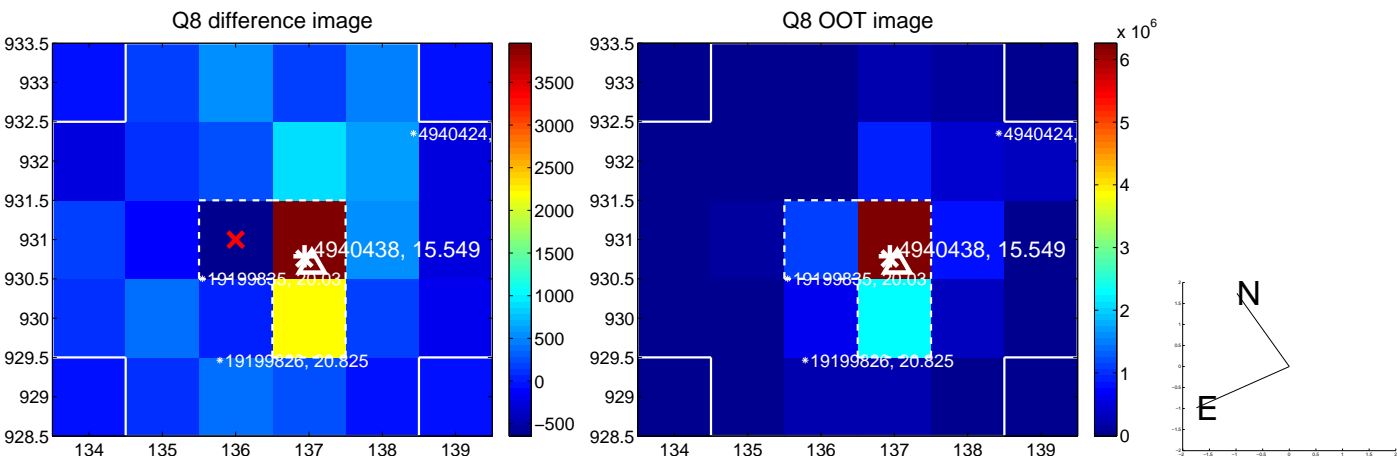
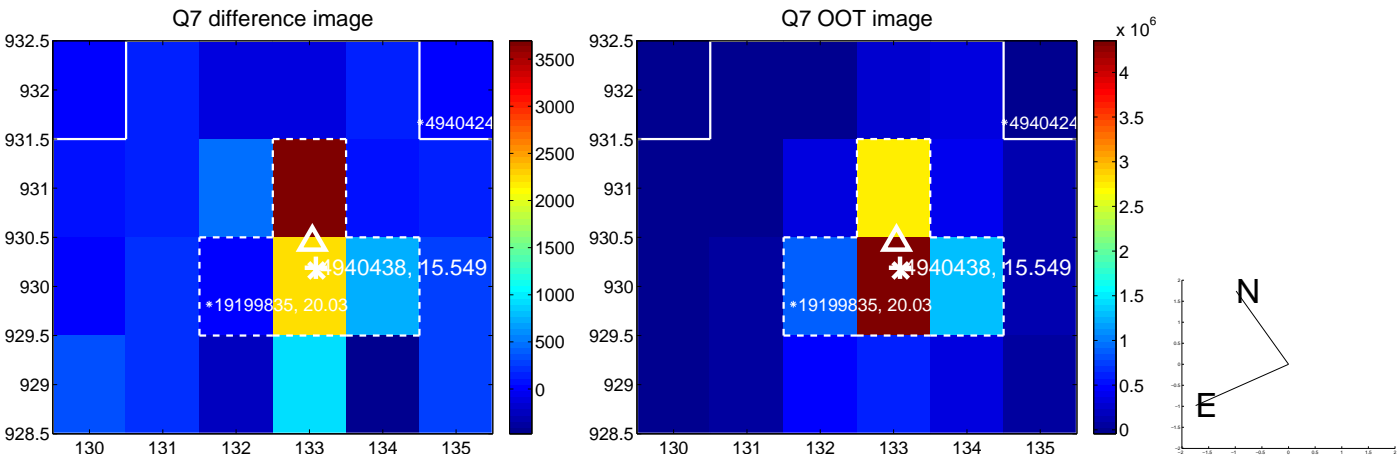
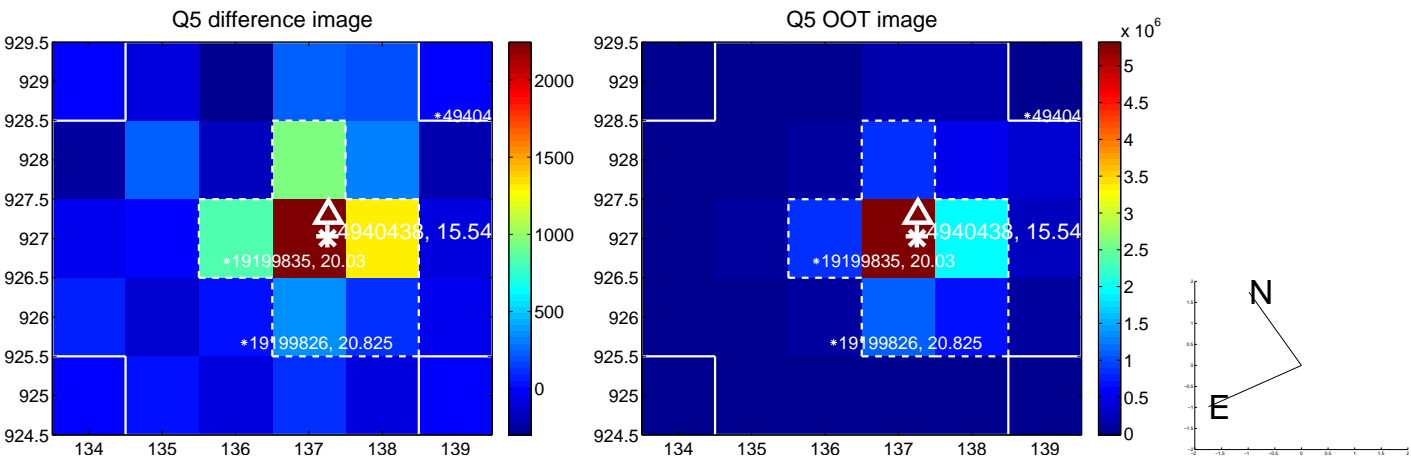


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

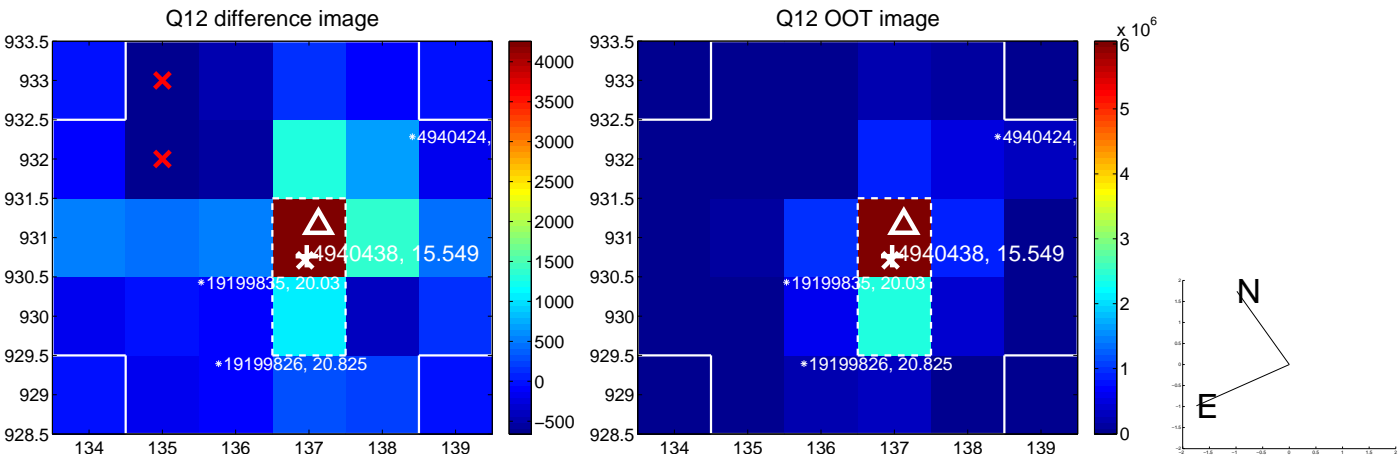
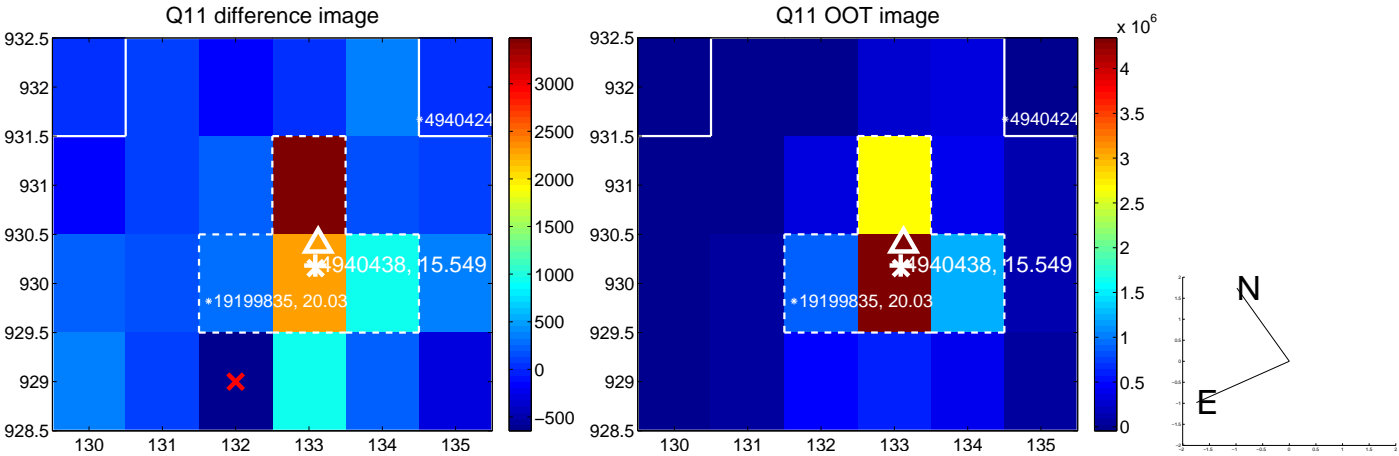
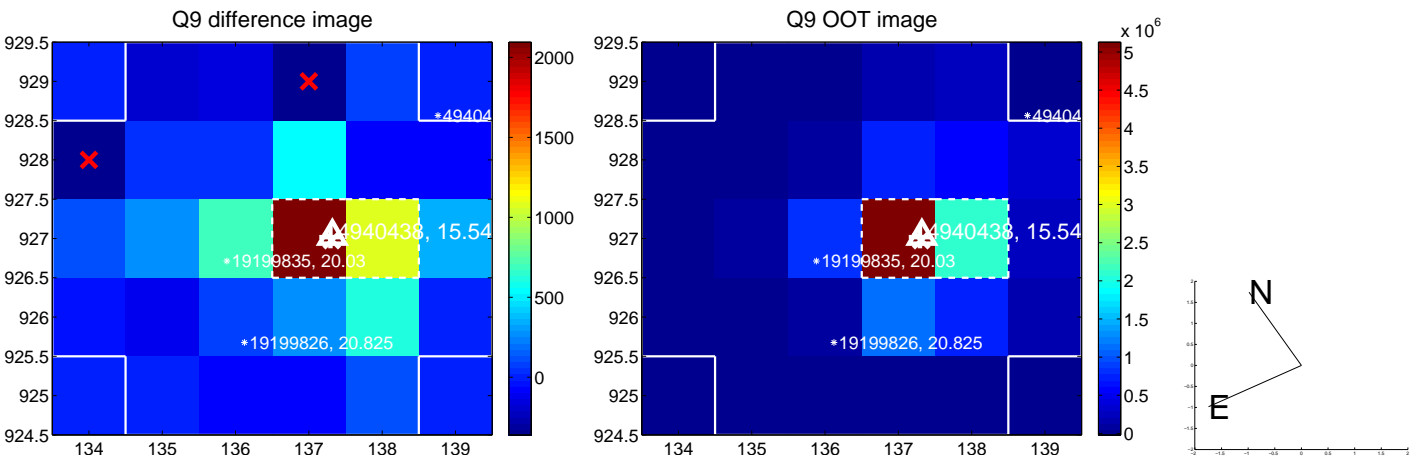
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



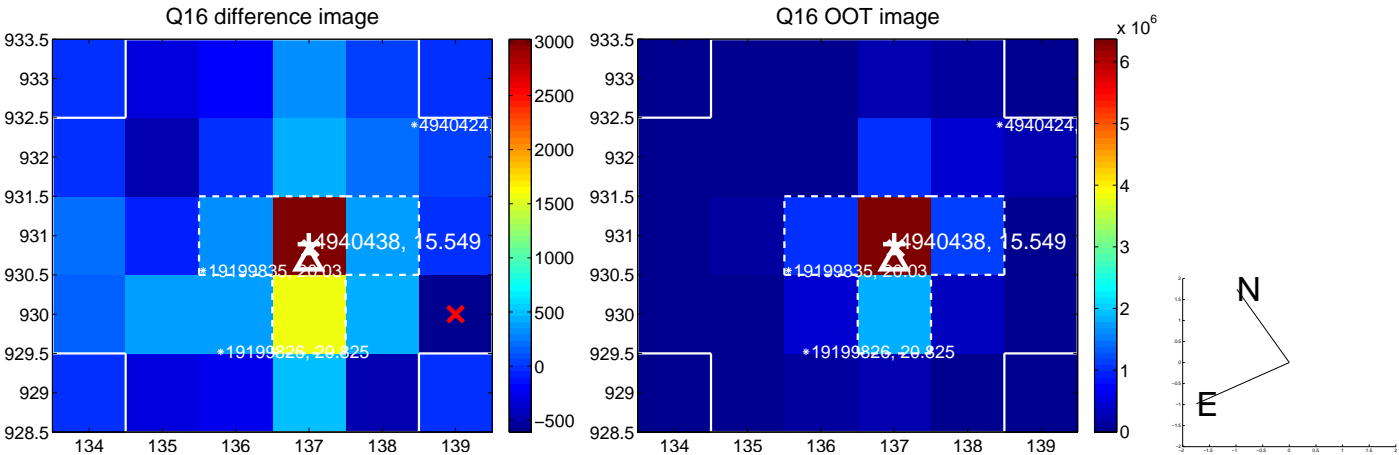
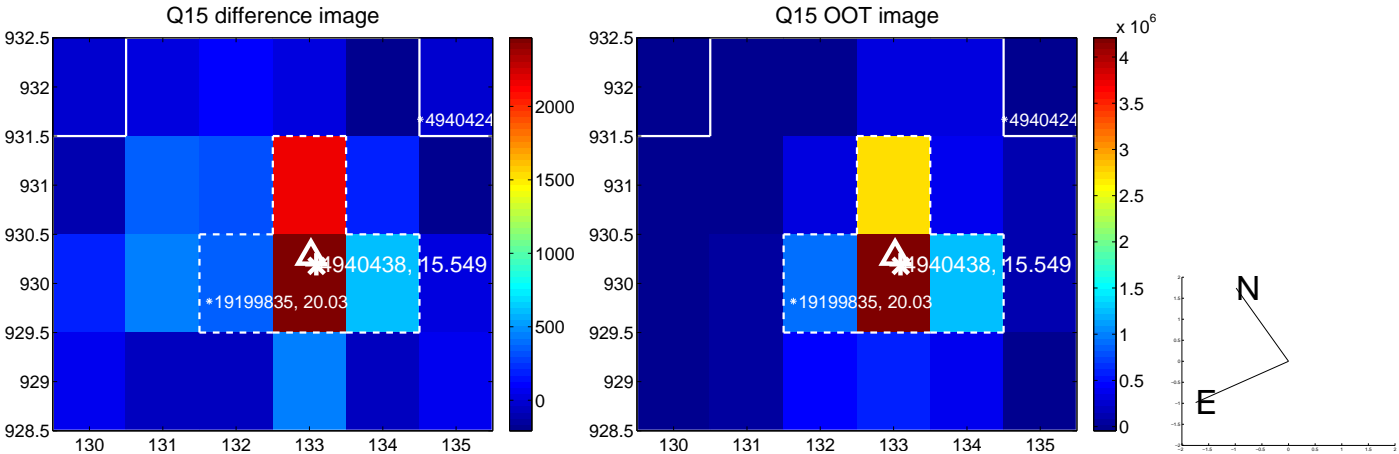
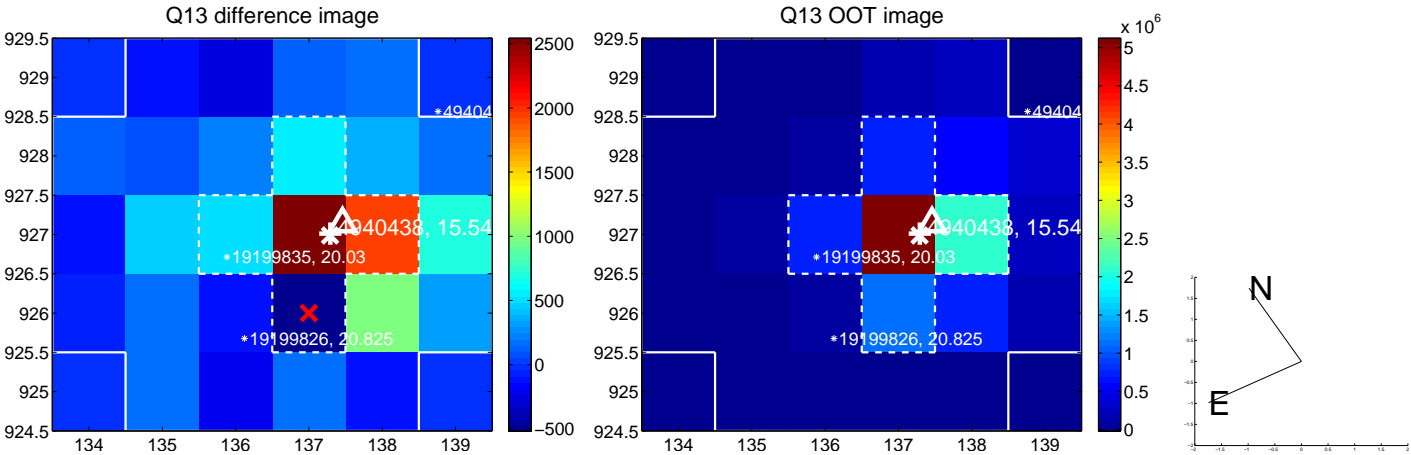
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



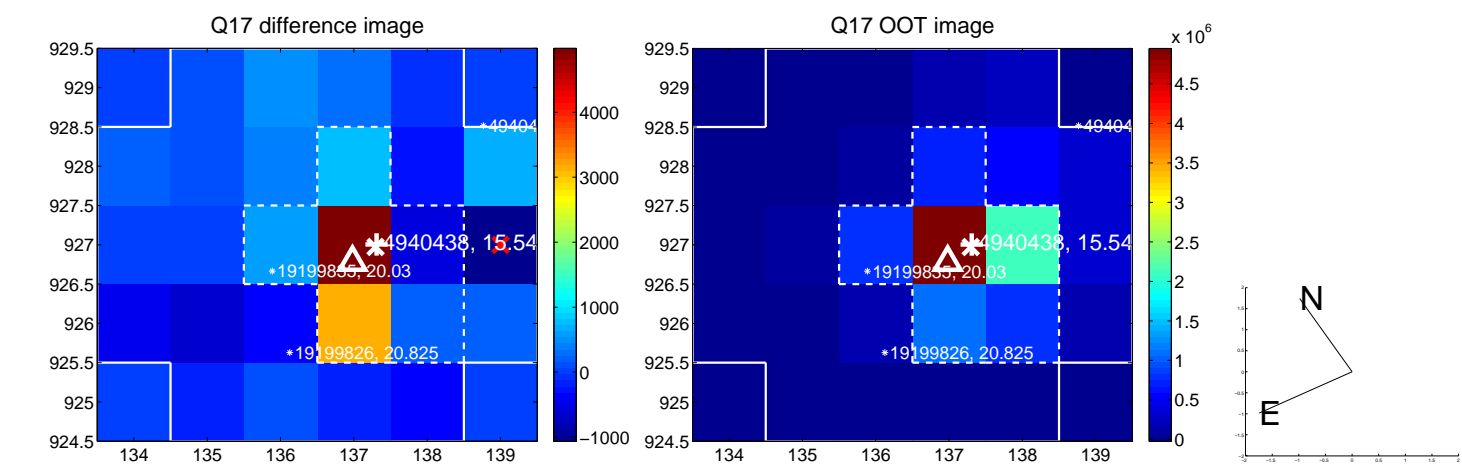
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



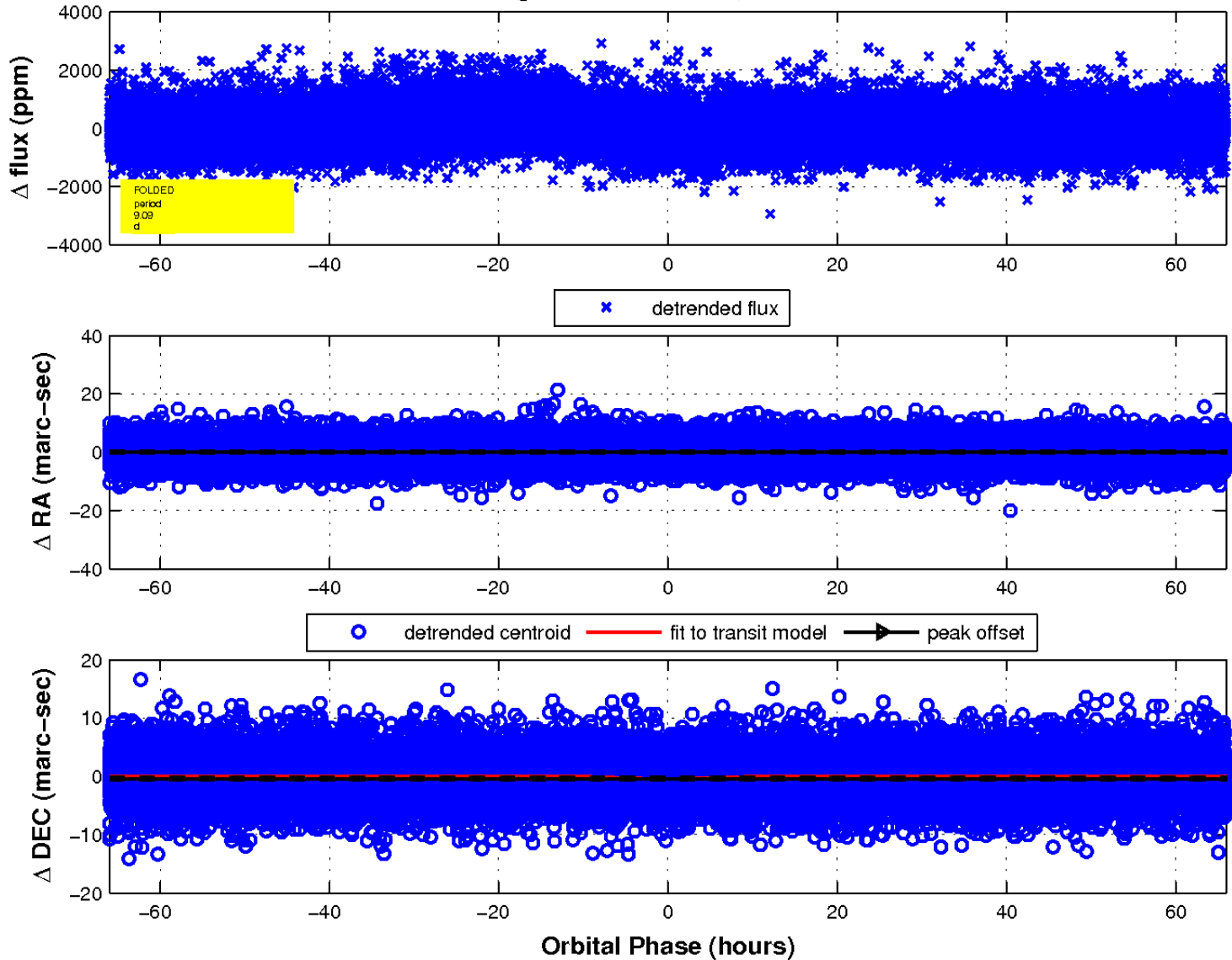
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

Declination

