

KIC 009775938

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})
009775938-01	OBS	0951.01	13.197215	131.953321	2142.2	3.541	103.3	102.7	0.89	4954	4.33	40.12
009775938-02	OBS	0951.02	33.652828	147.801890	1122.8	4.416	34.6	36.4	0.89	4954	3.64	11.52

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009775938-01	OBS	PC	1.00	0	0	0	0	CENT_KIC_POS
009775938-02	OBS	PC	0.98	0	0	0	0	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.

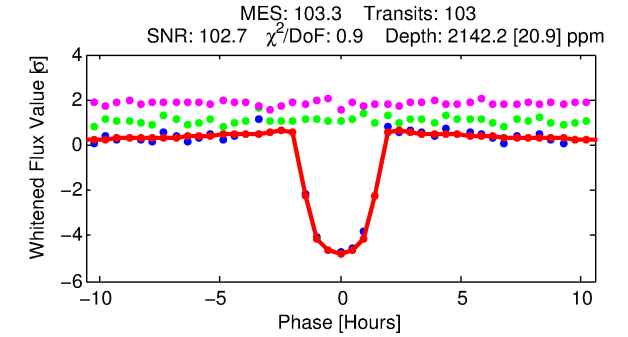
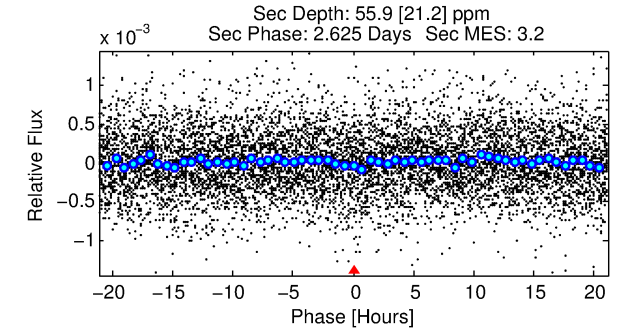
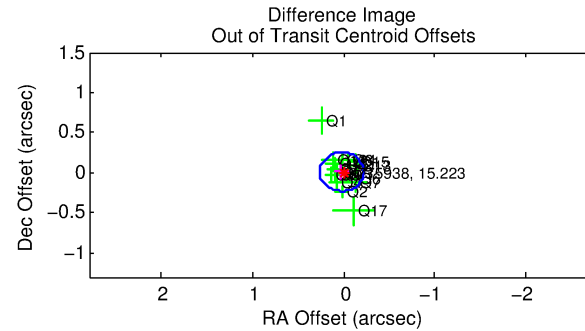
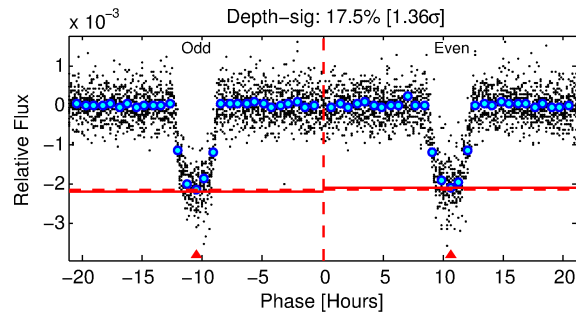
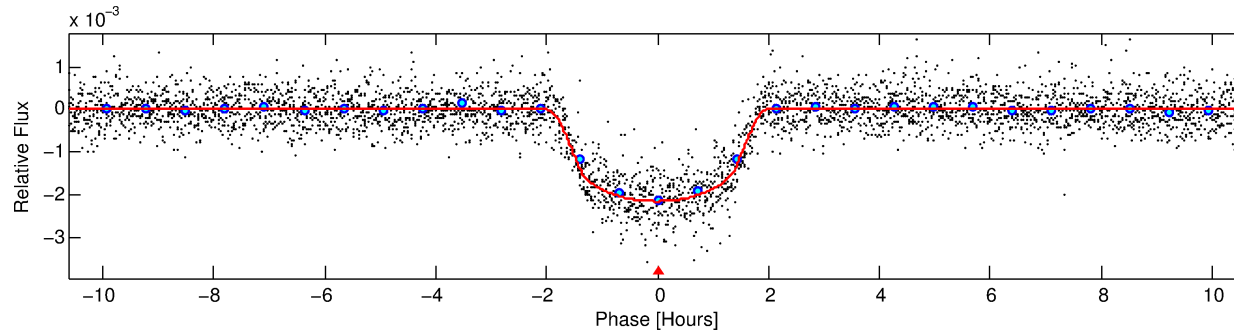
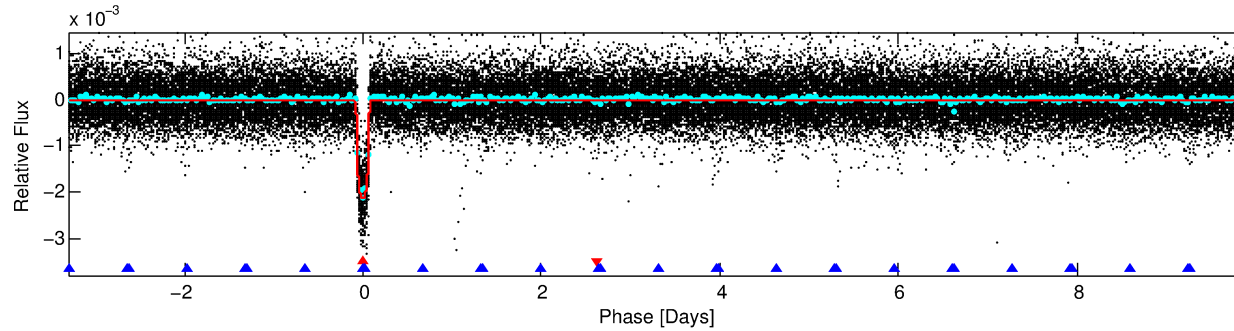
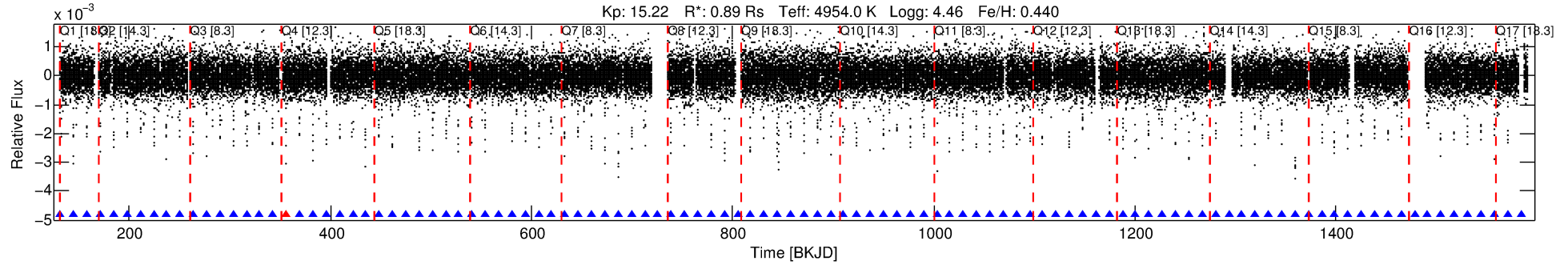
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009775938-01

No Significant Match Found

DV One-Page Summary

KIC: 9775938 Candidate: 1 of 2 Period: 13.197 d
KOI: K00951.01 Name: Kepler-258b Corr: 0.984



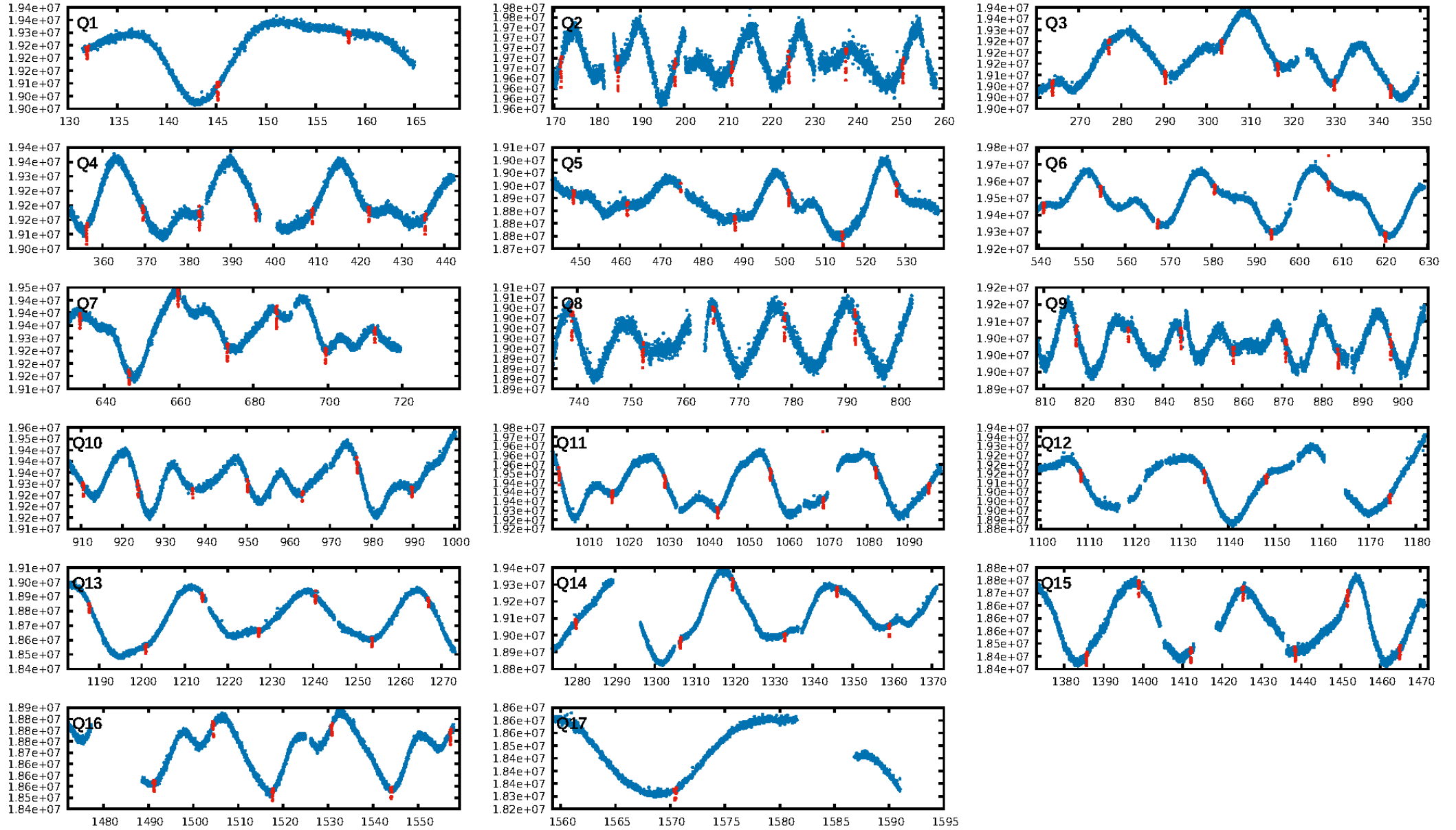
DV Fit Results:

Period = 13.19722 [0.00001] d
Epoch = 131.9533 [0.0007] BKJD
Rp/R* = 0.0448 [0.0039]
a/R* = 22.71 [6.40]
b = 0.68 [0.23]
Seff = 40.12 [47.31]
Teq = 642 [189] K
Rp = 4.33 [5.00] Re
a = 0.1026 [0.0910] AU
Ag = 17.26 [21.50] [0.76 σ]
Teffp = 2022 [220] K [4.76 σ]

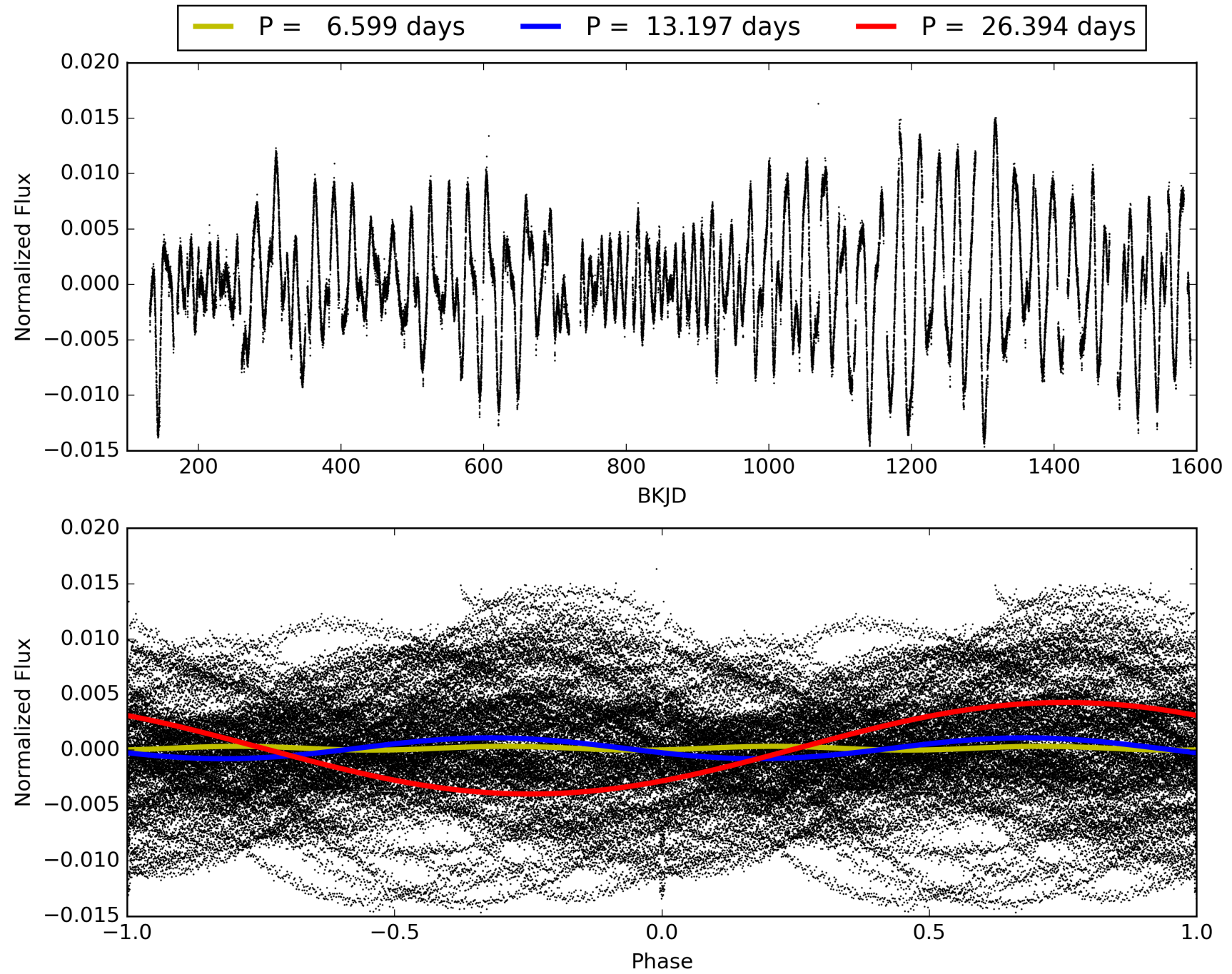
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 100.0% [86.73 σ]
ModelChiSquare2-sig: 1.2%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 0.00e+00
RollingBand-fgt: 0.99 [98/99]
GhostDiagnostic-chr: 2.788
Centroid-sig: 44.2%
Centroid-so: 0.563 arcsec [4.82 σ]
OotOffset-rm: 0.026 arcsec [0.32 σ]
KicOffset-rm: 0.525 arcsec [5.75 σ]
OotOffset-st: 4/4/4/5 [17]
KicOffset-st: 4/4/4/5 [17]
DiffImageQuality-fgm: 1.00 [17/17]
DiffImageOverlap-fno: 1.00 [17/17]

TCE 009775938-01, PDC Light Curves

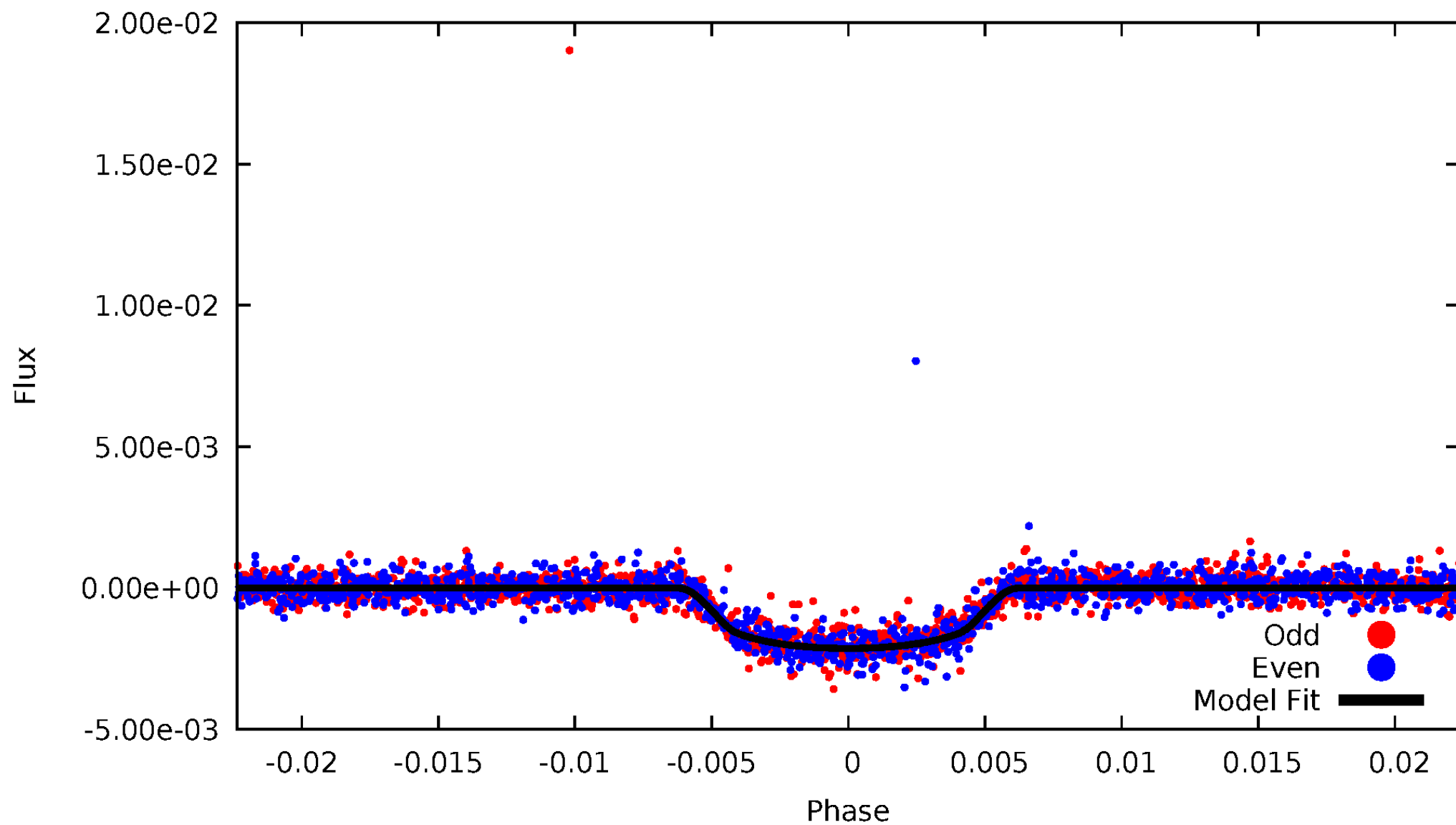


TCE 009775938-01



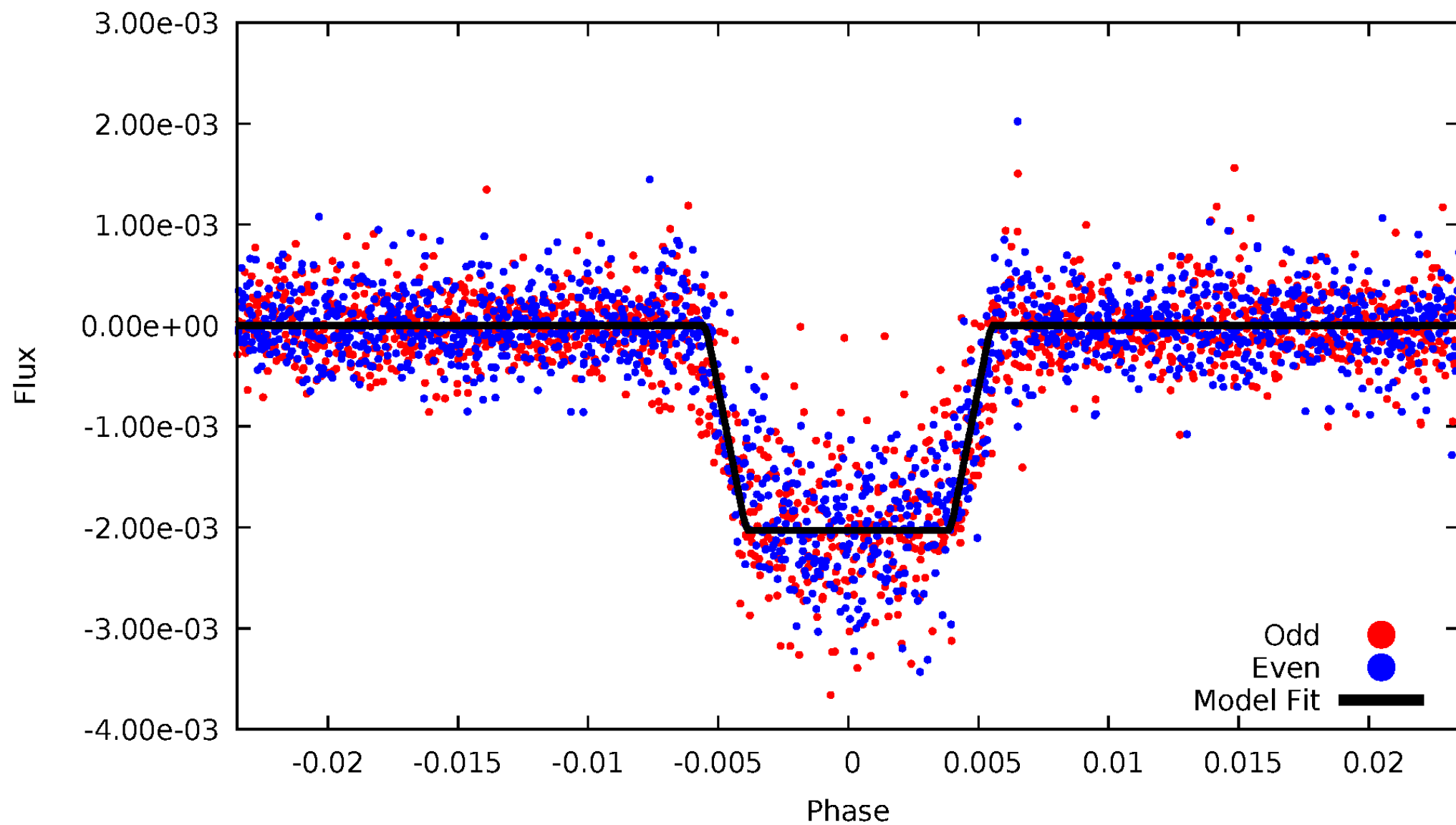
DV Odd/Even

TCE 009775938-01



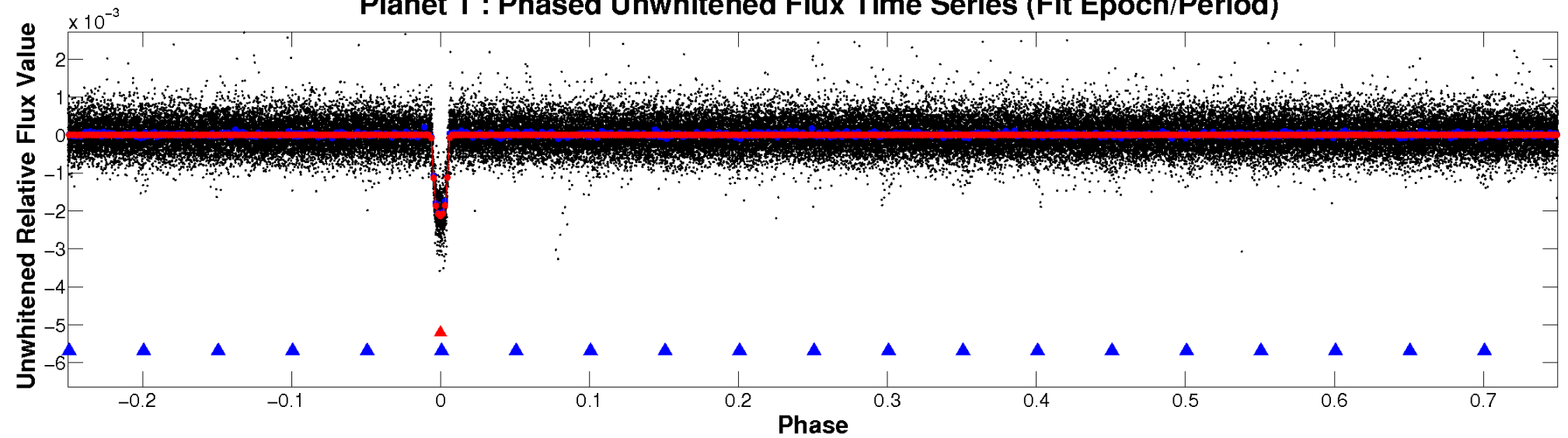
ALT Odd/Even

TCE 009775938-01

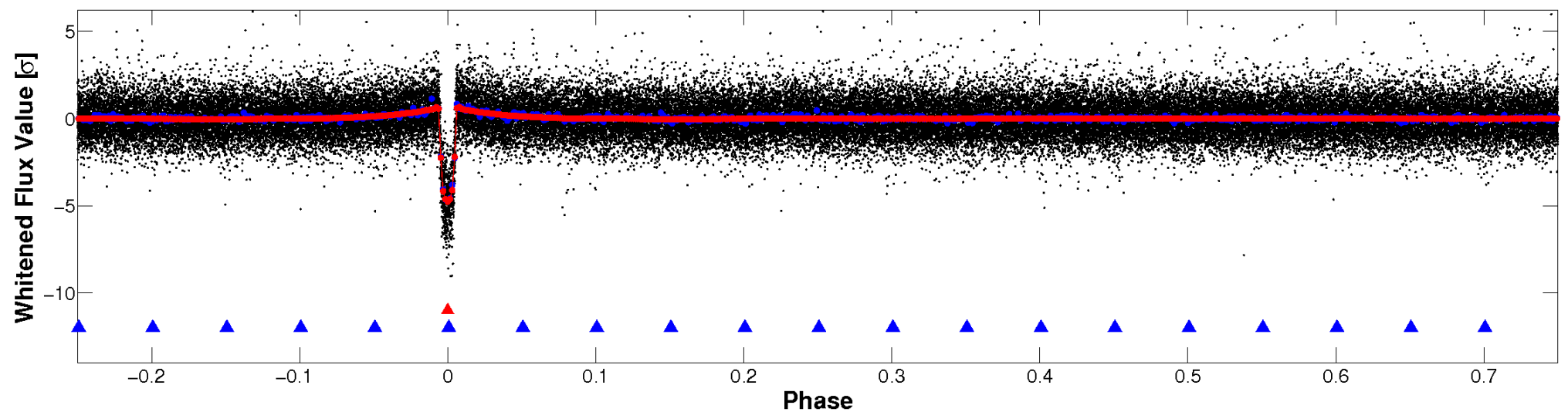


Non-Whitened Vs. Whitened Light Curve

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

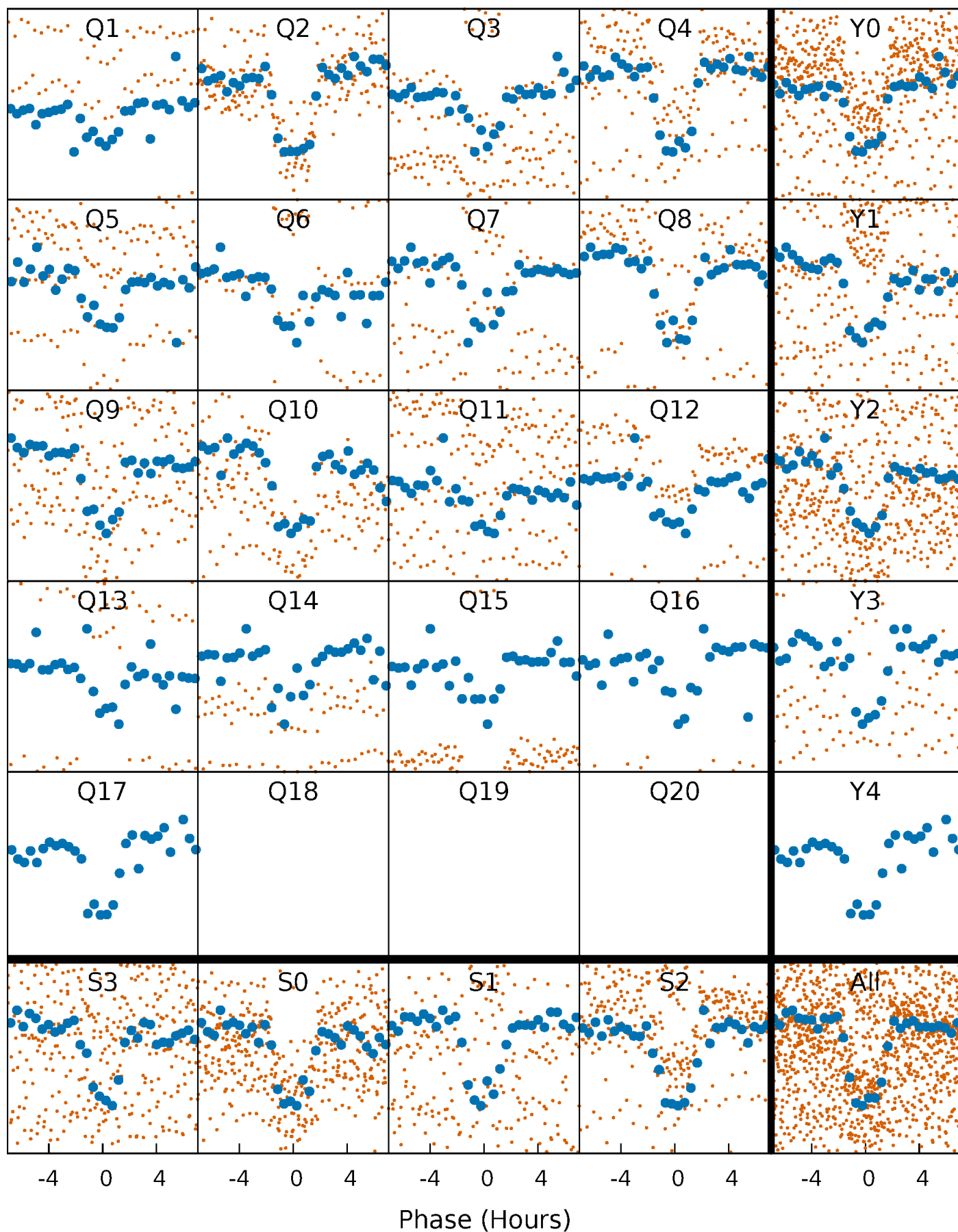


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



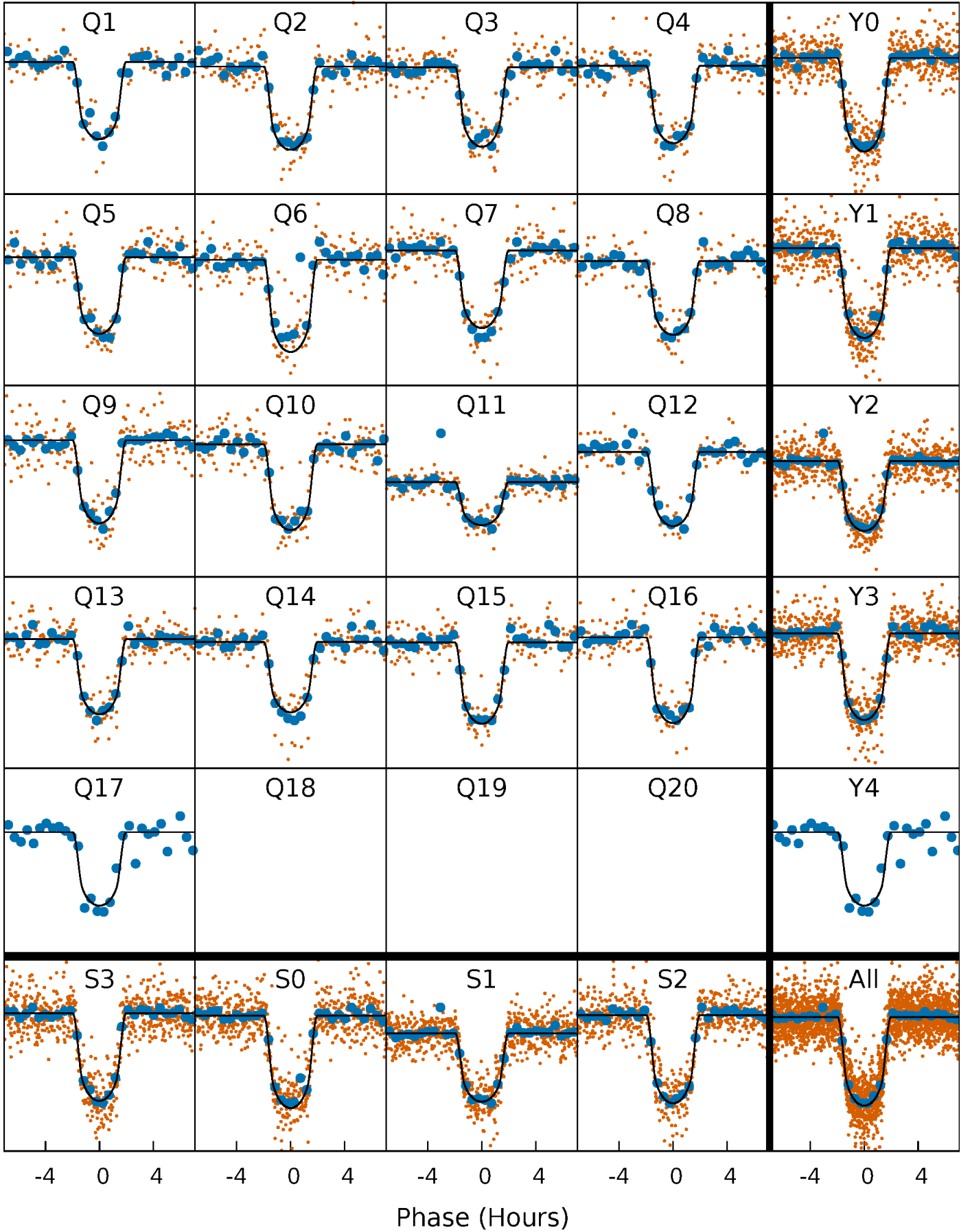
PDC Quarter-Phased Transit Curves

TCE 009775938-01 P= 13.197215 Days $T_0=131.953321$ (BKJD)



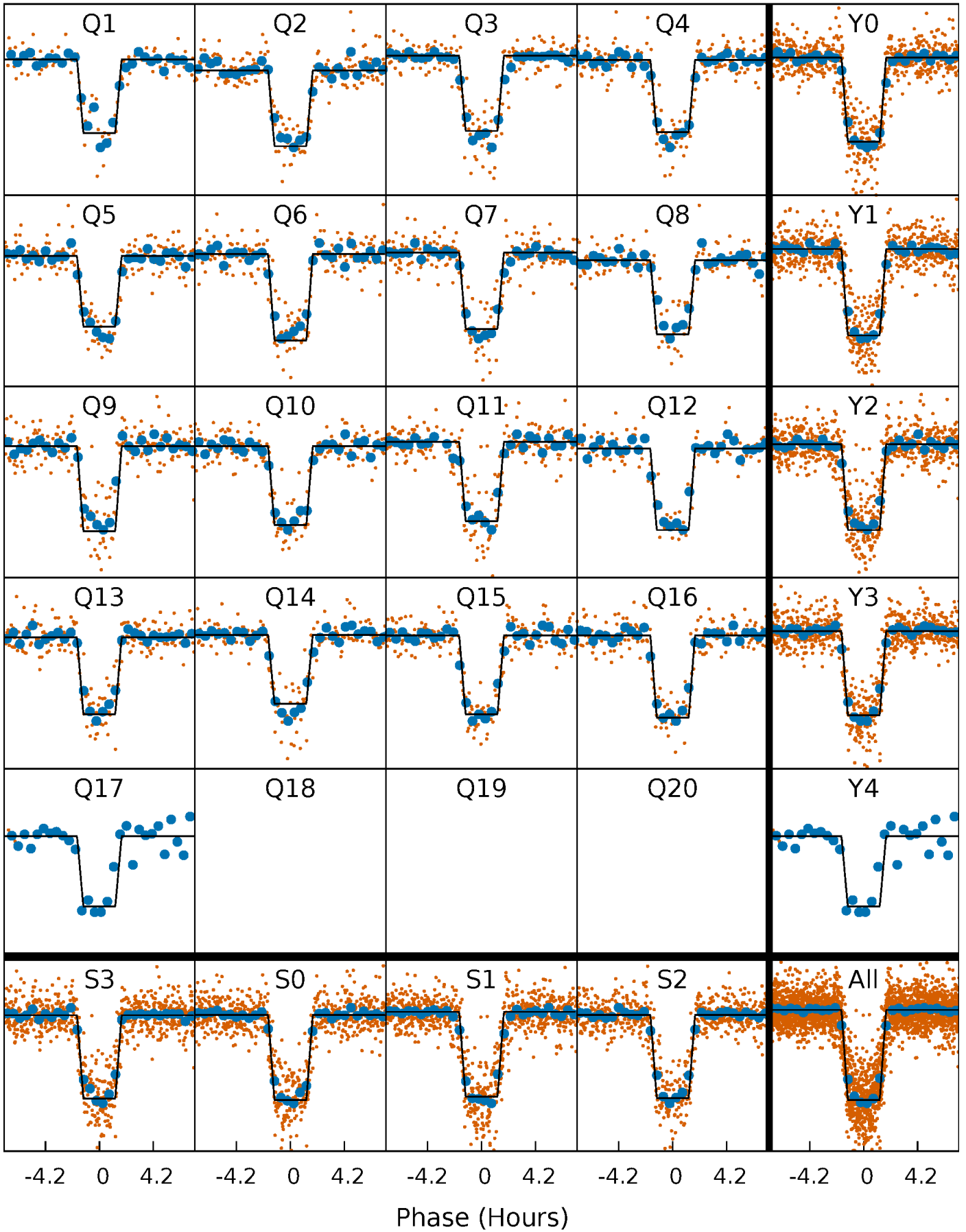
DV Quarter-Phased Transit Curves

TCE 009775938-01 P= 13.197215 Days $T_0=131.953321$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

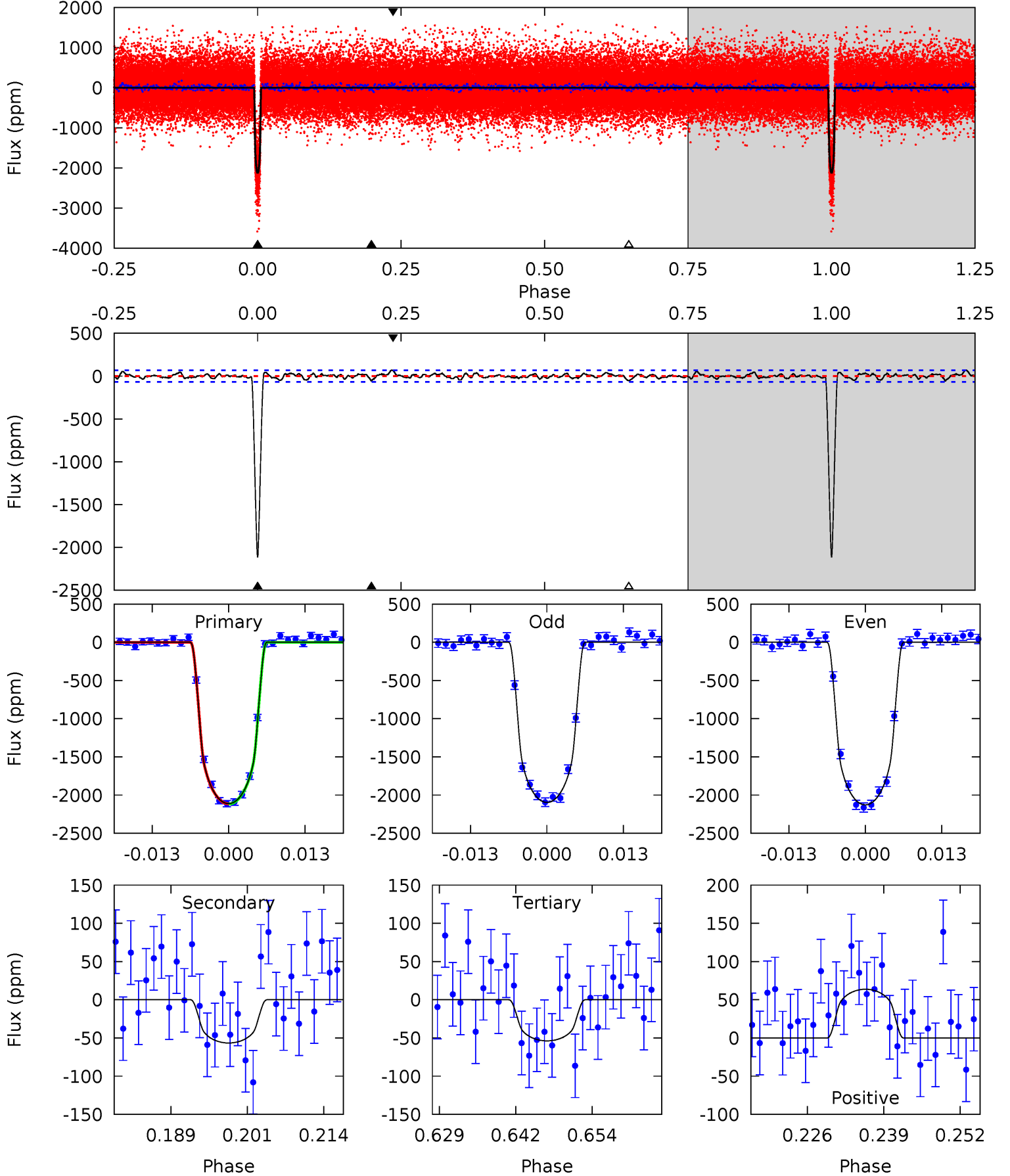
TCE 009775938-01 P= 13.197257 Days $T_0=131.951326$ (BKJD)



DV Model-Shift Uniqueness Test

009775938-01, $P = 13.197215$ Days, $E = 118.756106$ Days

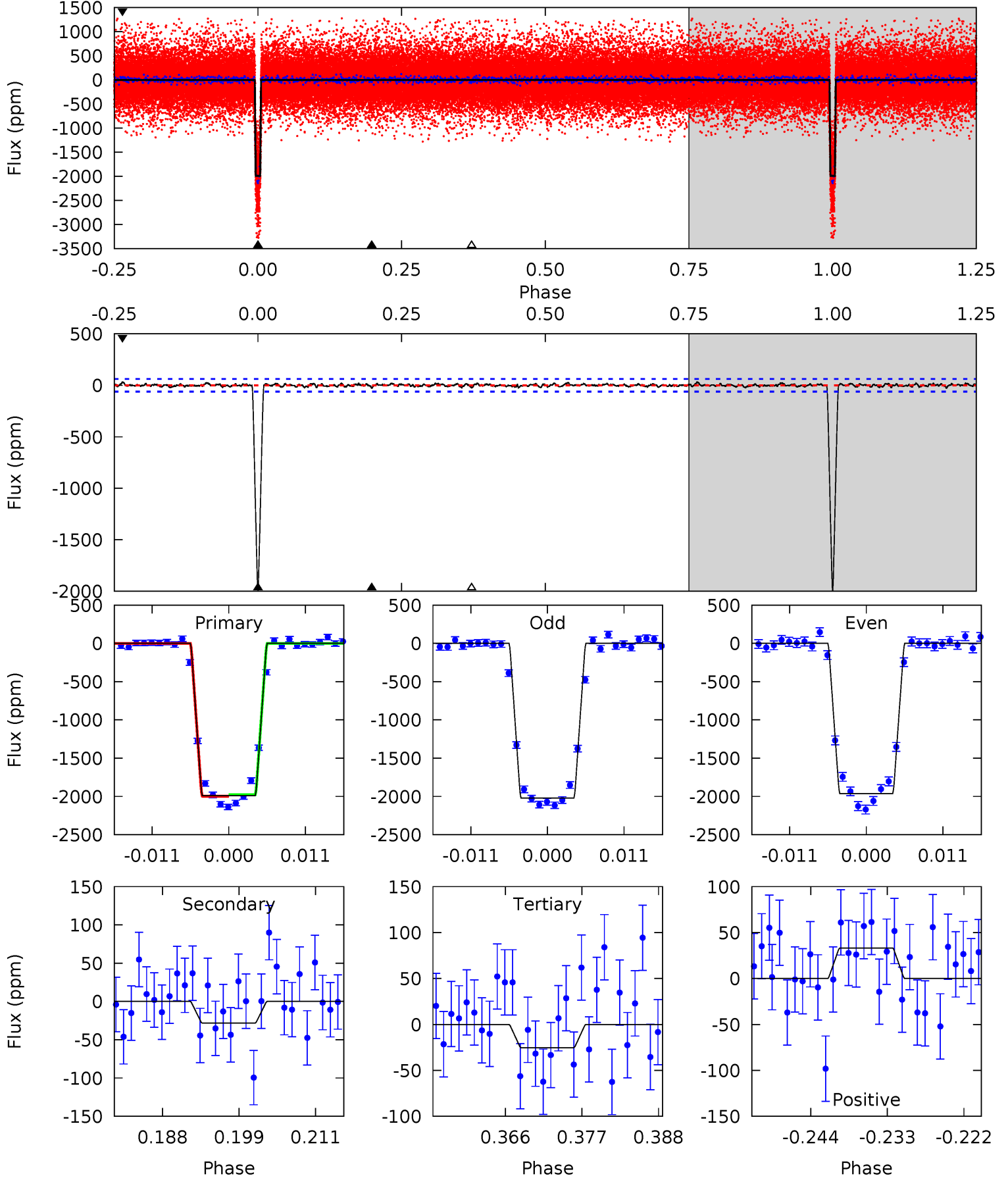
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
156.4	4.19	3.98	4.72	4.98	2.50	1.44	152.4	151.7	0.21	-0.53	1.18	1.00	0.03	0.08



Alt Model-Shift Uniqueness Test

009775938-01, $P = 13.197257$ Days, $E = 118.754069$ Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
162.2	2.30	2.06	2.70	5.01	2.54	0.72	160.2	159.5	0.24	-0.40	2.38	1.01	0.02	0.88



Stellar Parameters For KIC 009775938

	$T_{\text{eff}} (K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M (M_{\odot})$	$\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$
	4954^{+148}_{-148}	$4.462^{+0.102}_{-0.578}$	$0.440^{+0.050}_{-0.300}$	$0.885^{+1.019}_{-0.127}$	$0.827^{+0.057}_{-0.047}$	$1.681^{+0.971}_{-1.410}$
	+3%/-3%	+2%/-13%	+11%/-68%	+115%/-14%	+7%/-6%	+58%/-84%
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 009775938-01 / KOI 0951.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	A_{obs}
DV	-57 ± 14	$4.59^{+2.68}_{-0.66}$	922^{+247}_{-64}	2737^{+114}_{-131}	14^{+8}_{-8}
Alt.	-28 ± 12	$4.57^{+2.34}_{-0.68}$	918^{+200}_{-62}	2485^{+150}_{-196}	$6.428^{+5.727}_{-4.141}$

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

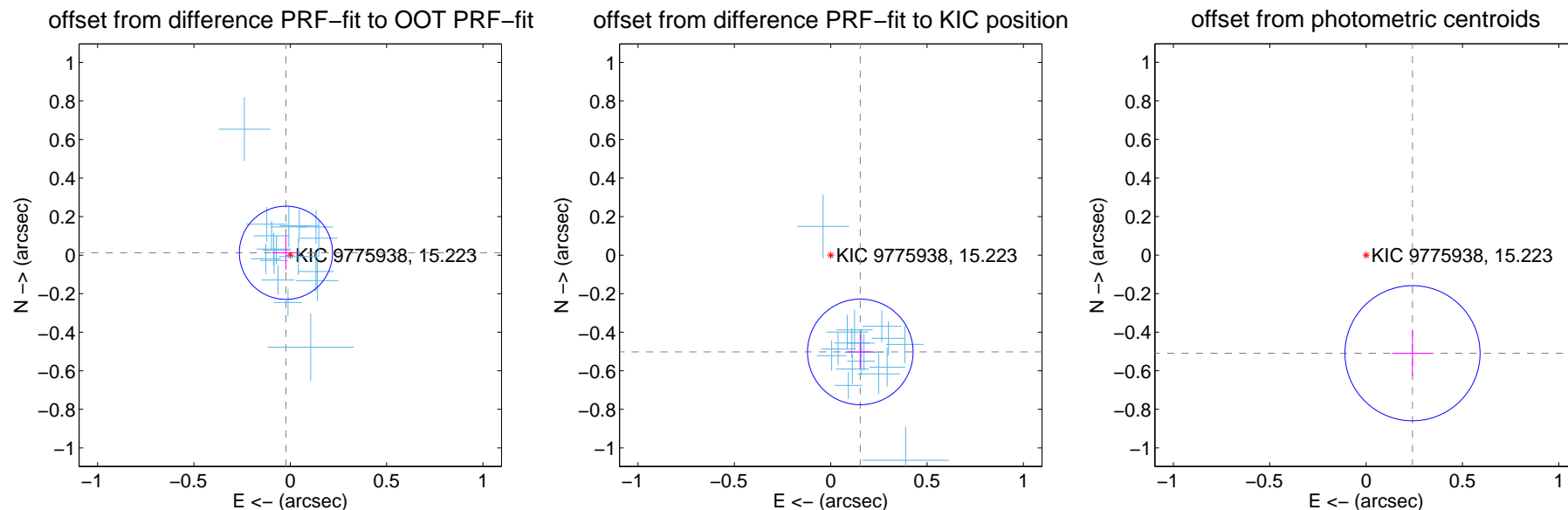
DV Centroid Data

Supplemental centroid analysis for 009775938-01. Kepler magnitude: 15.22. Transit SNR 102.73

There are 17 quarters with good PRF difference image offsets

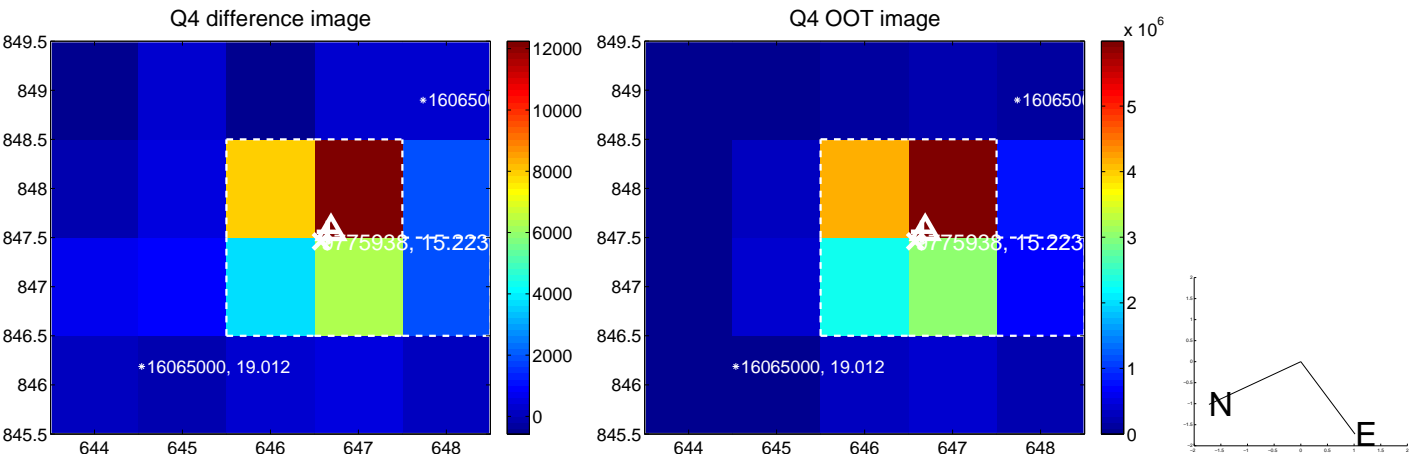
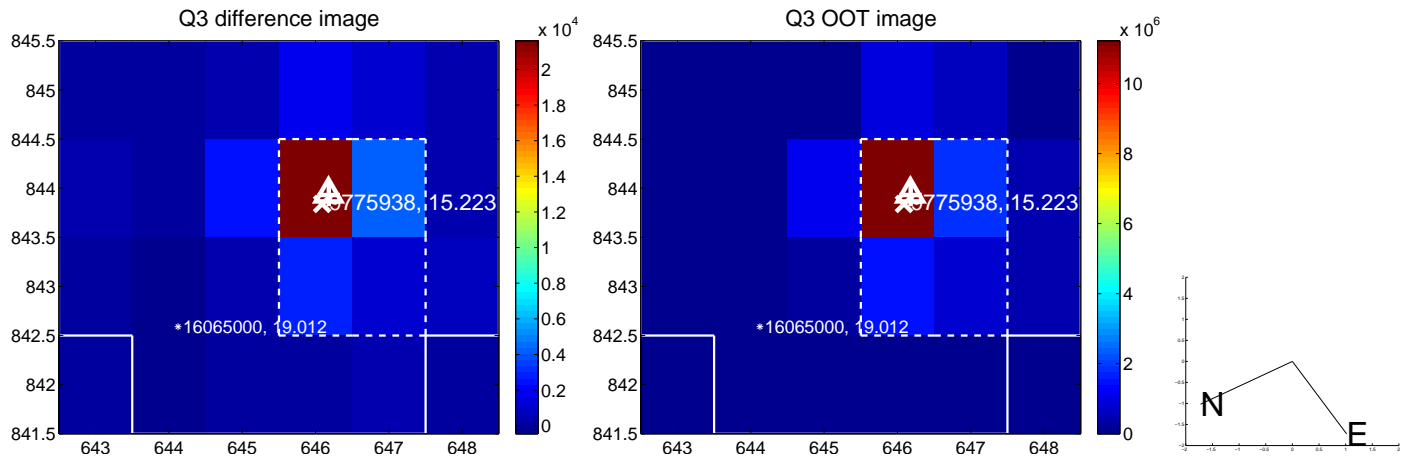
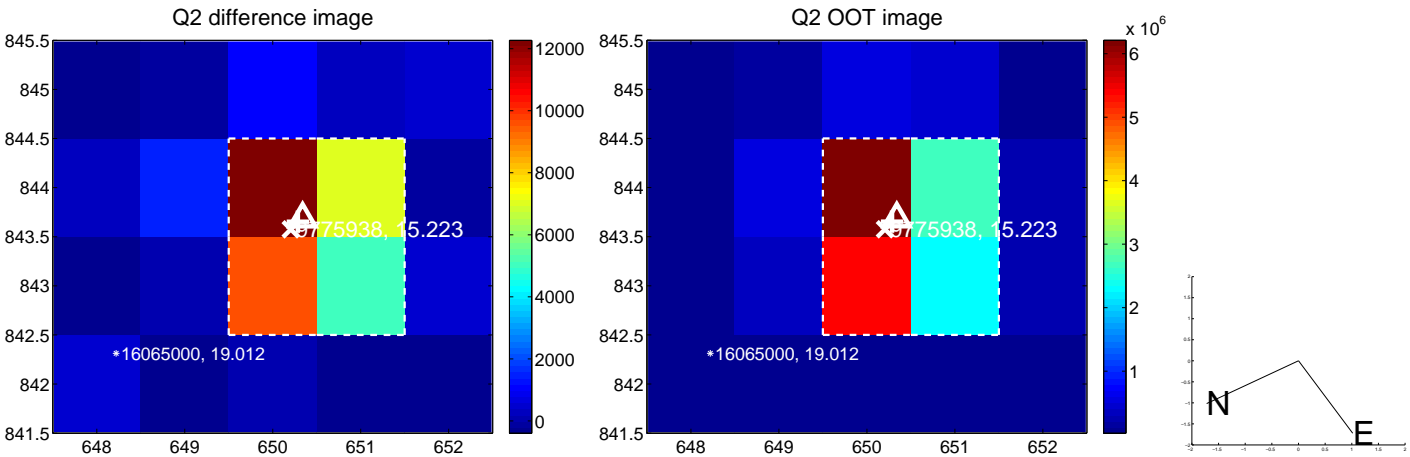
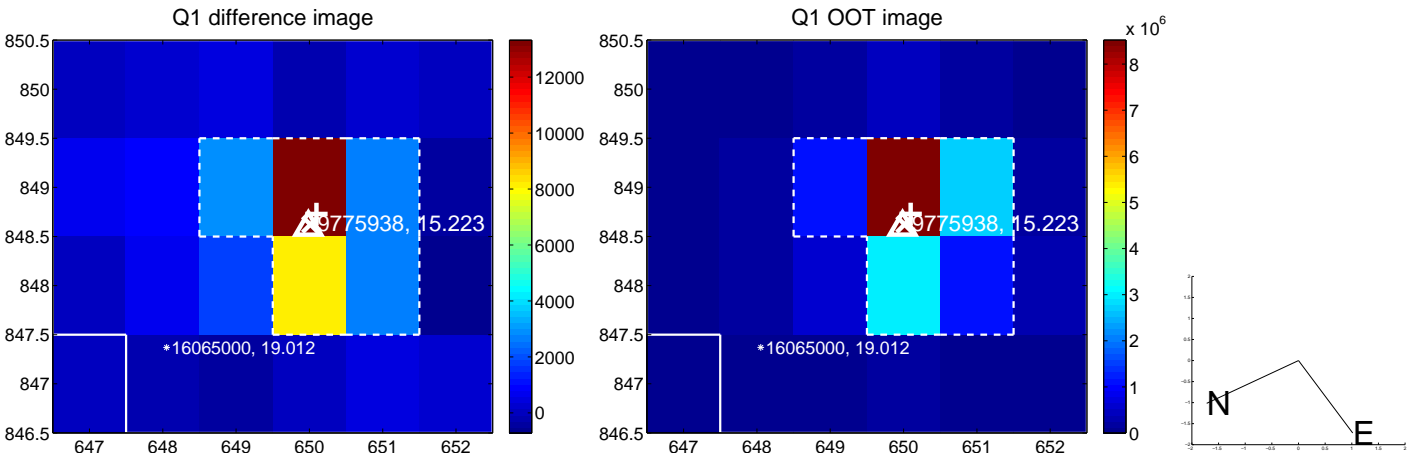
The direct PRF centroid is offset from the target star catalog position by about 0.65 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.026 ± 0.081	0.32	0.022 ± 0.072	0.012 ± 0.088
PRF-fit source offset from KIC position	0.525 ± 0.091	5.75	-0.154 ± 0.073	-0.502 ± 0.090
photometric centroid source offset	0.56 ± 0.12	4.82	-0.24 ± 0.10	-0.51 ± 0.12

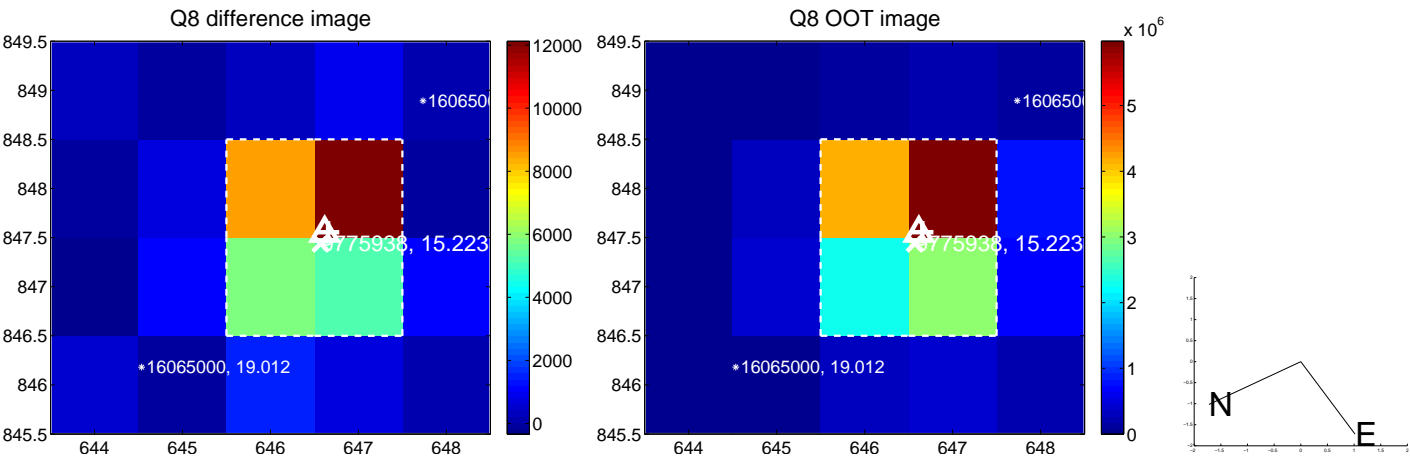
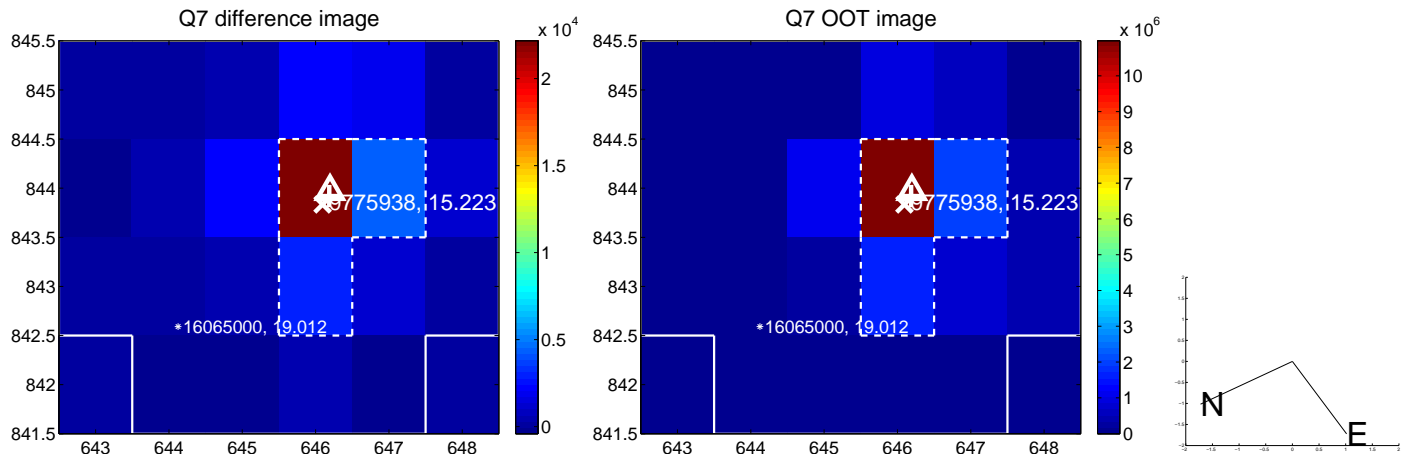
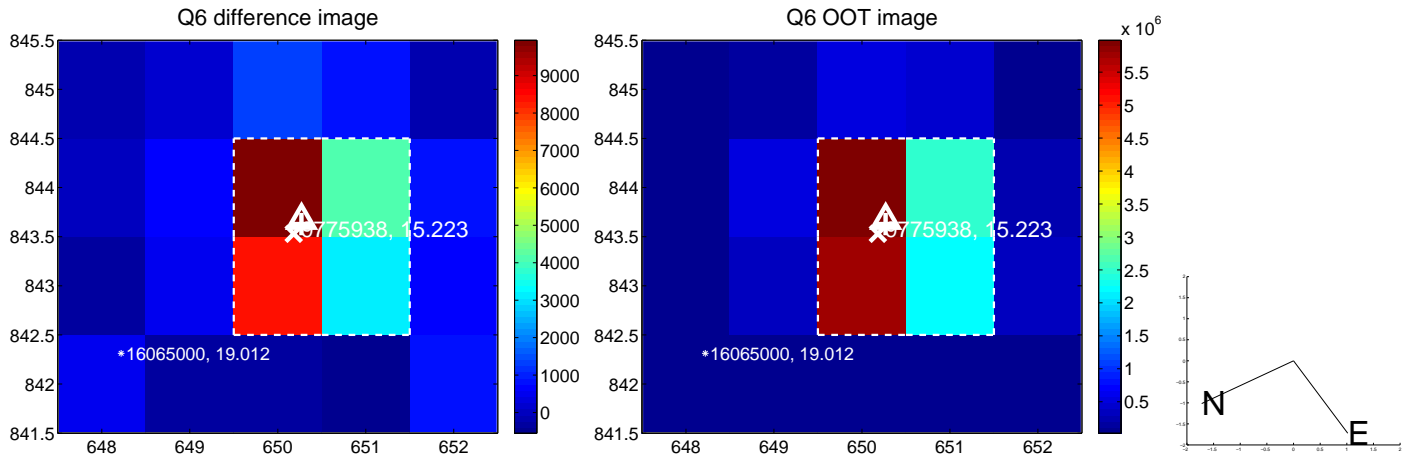
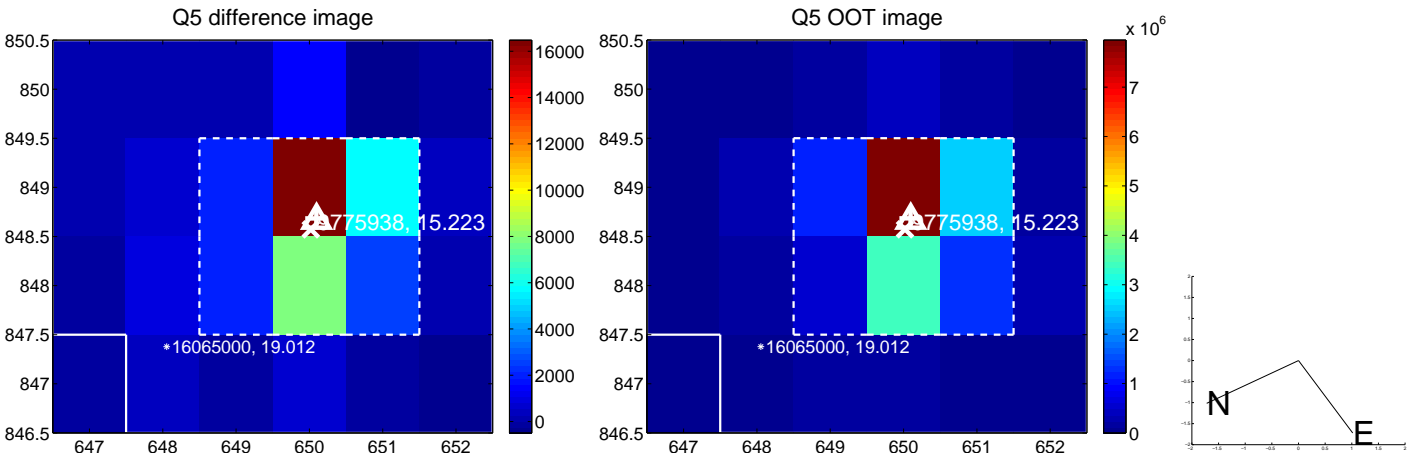


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

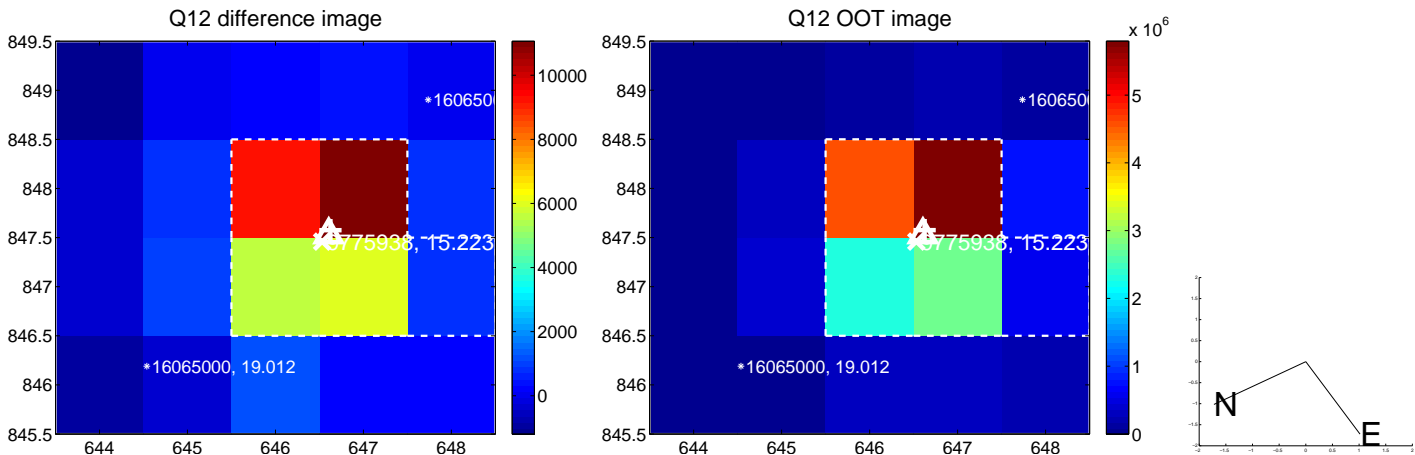
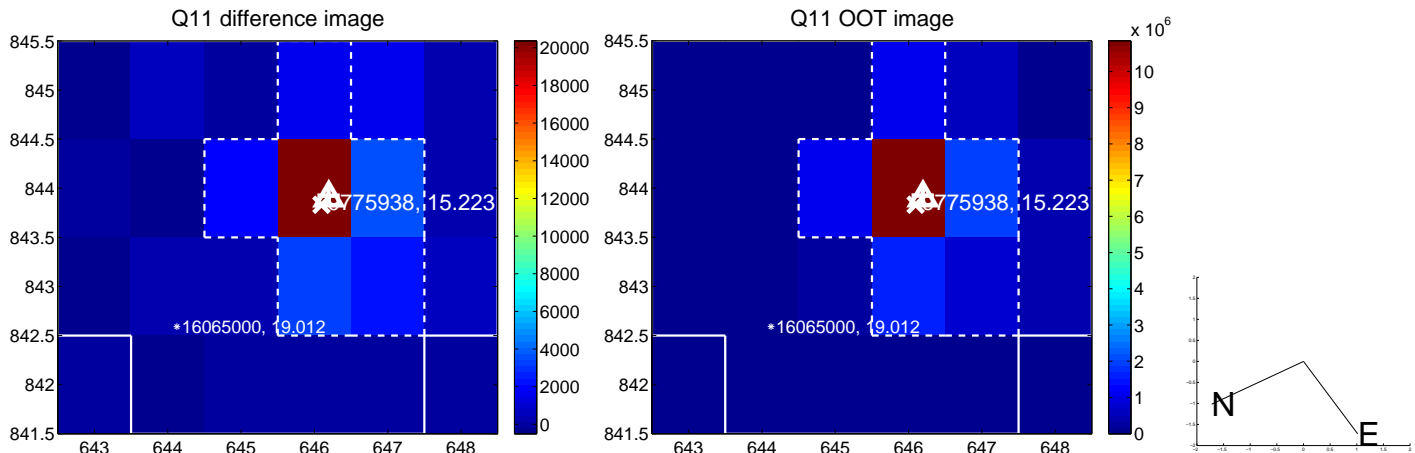
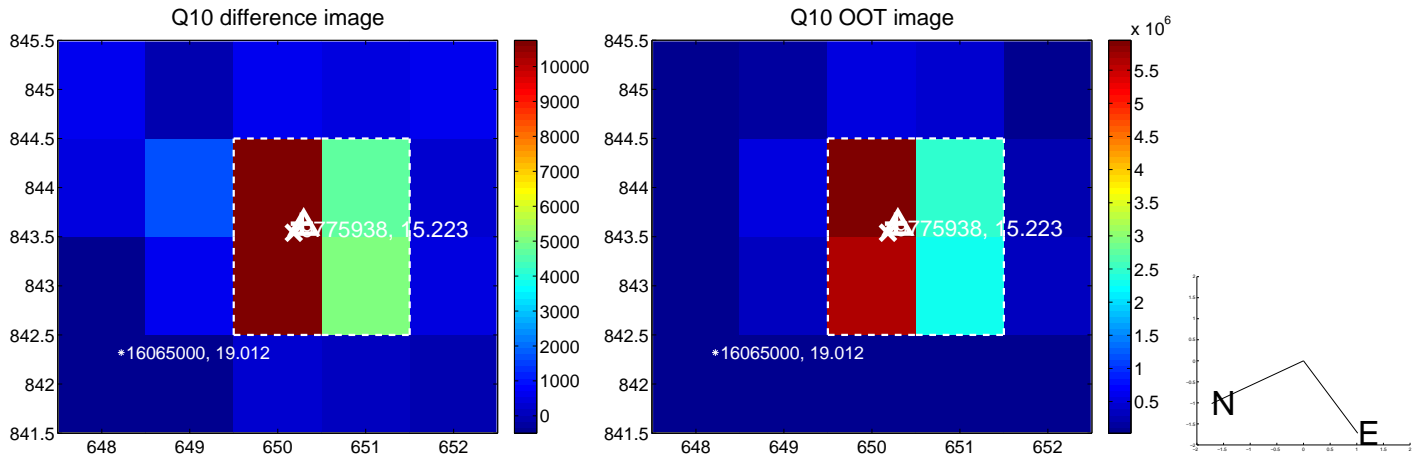
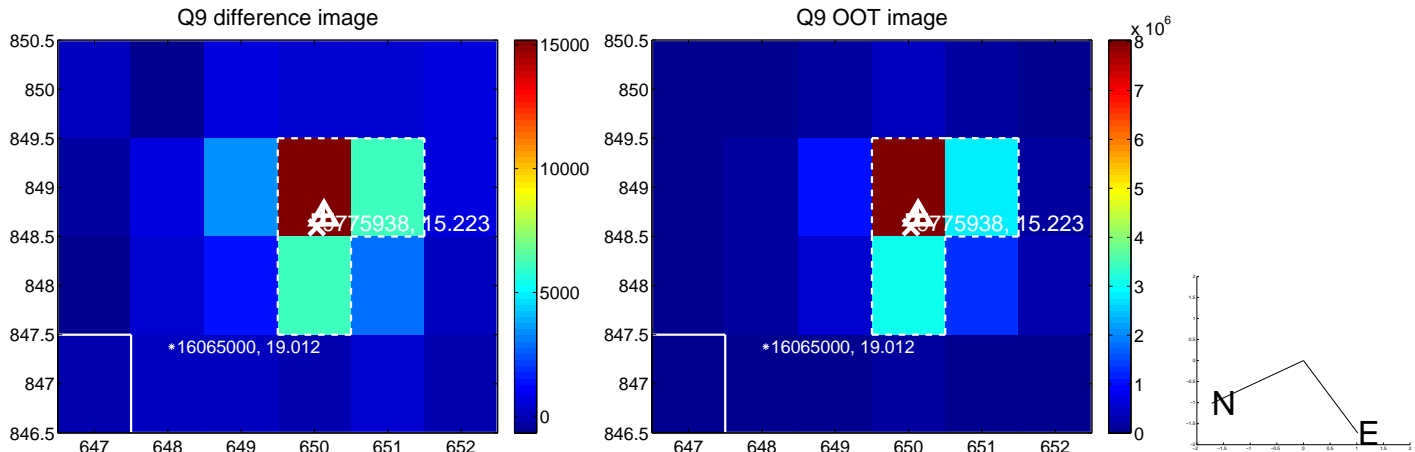
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



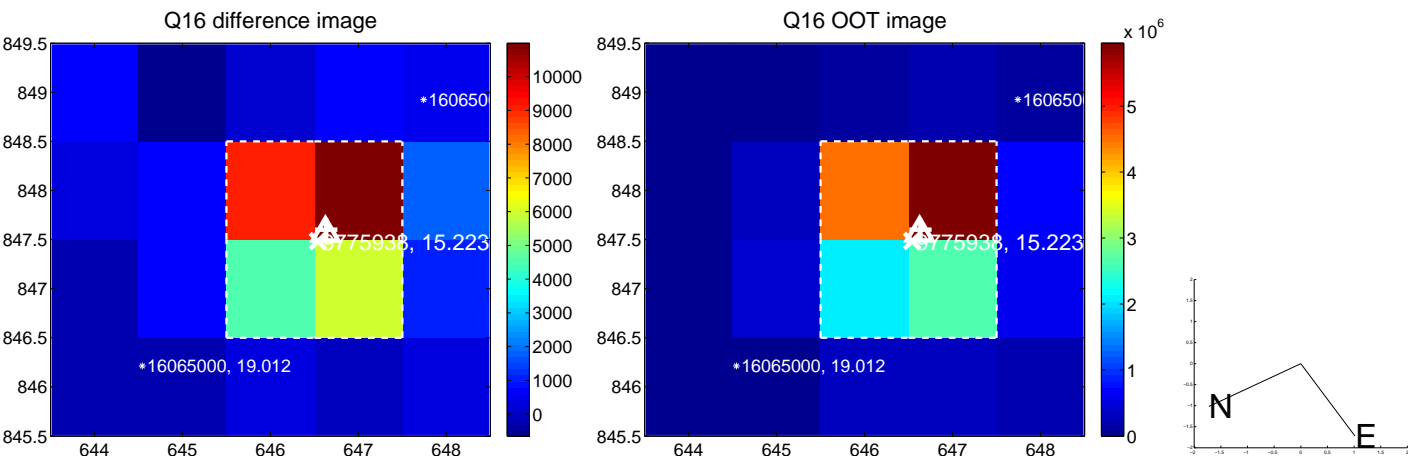
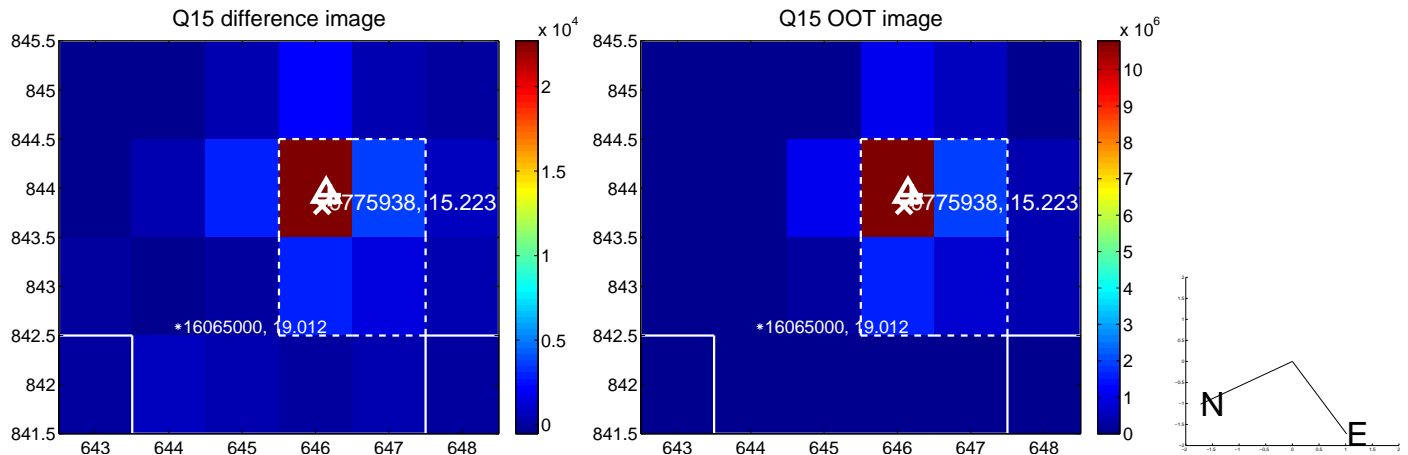
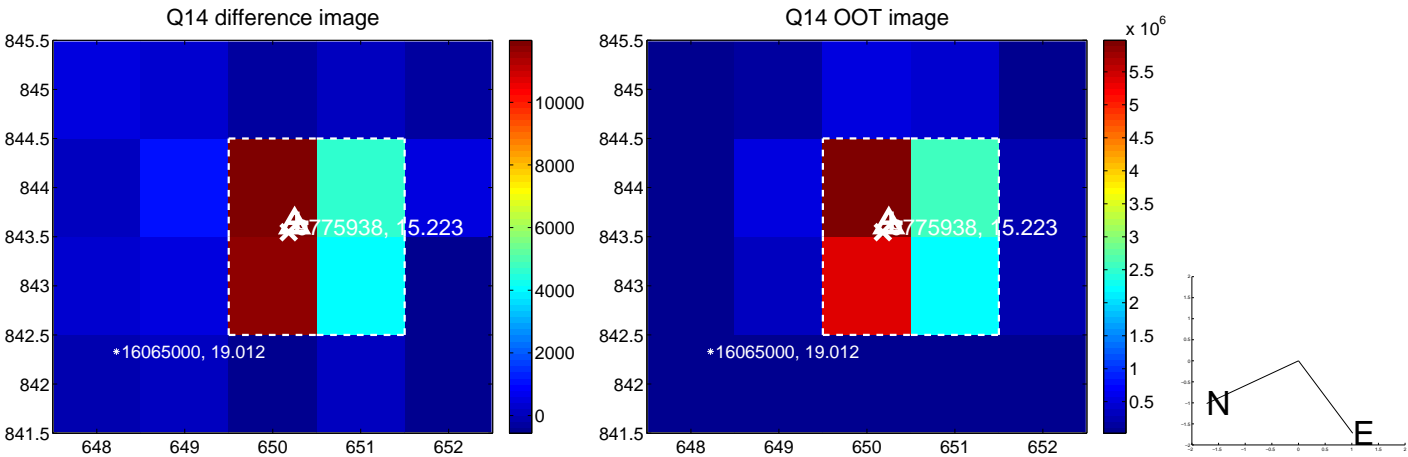
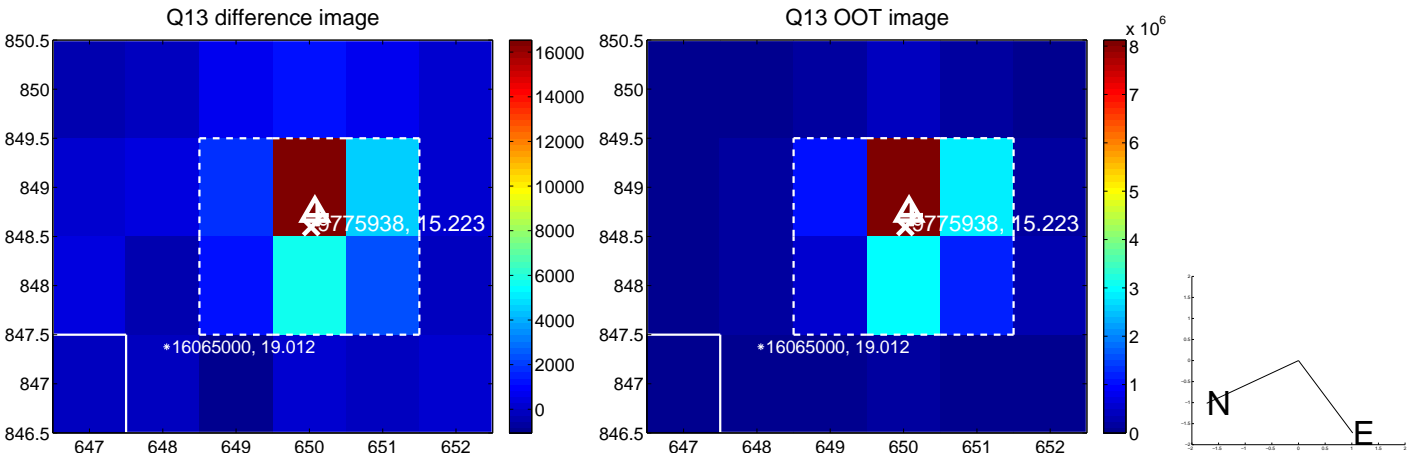
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



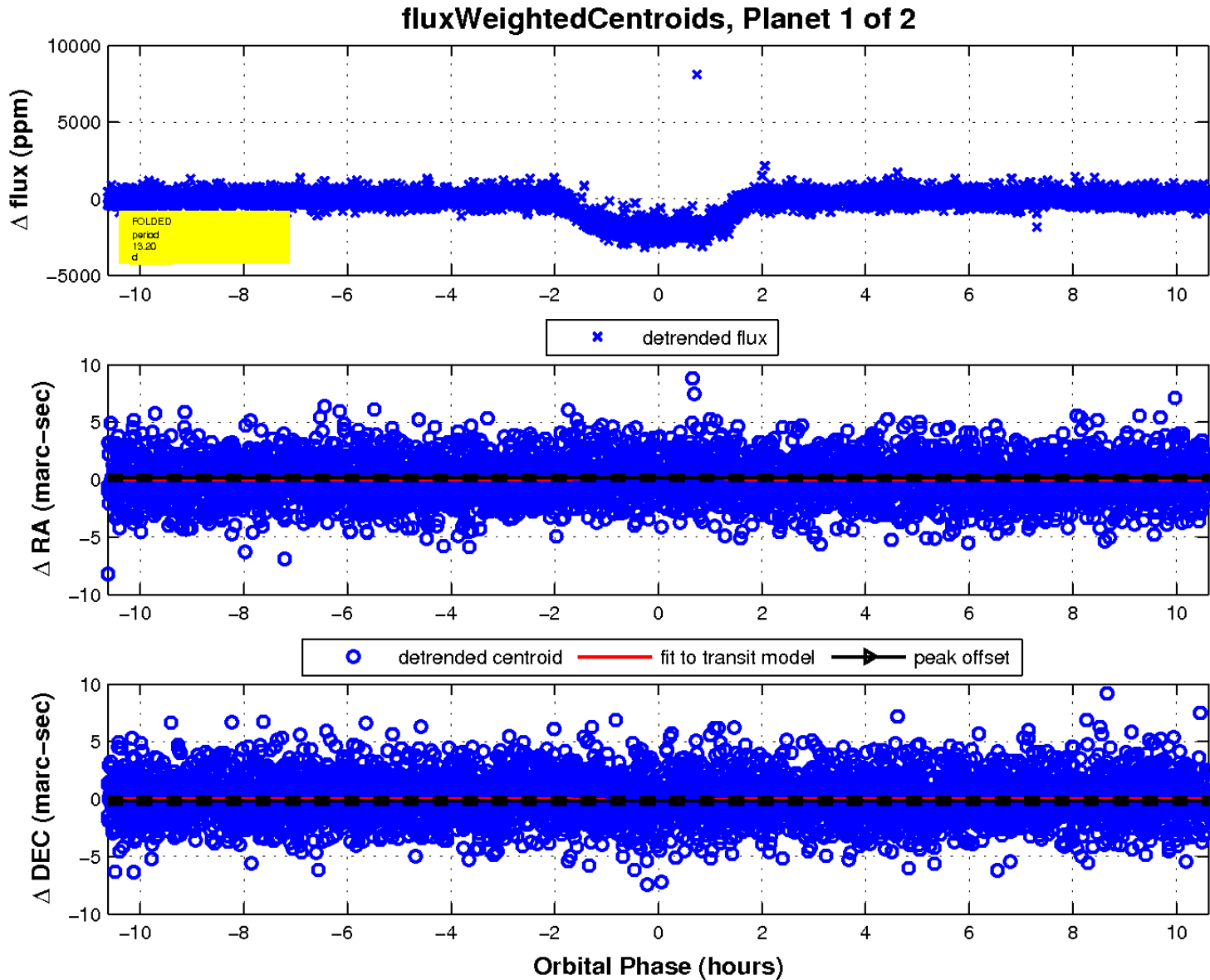
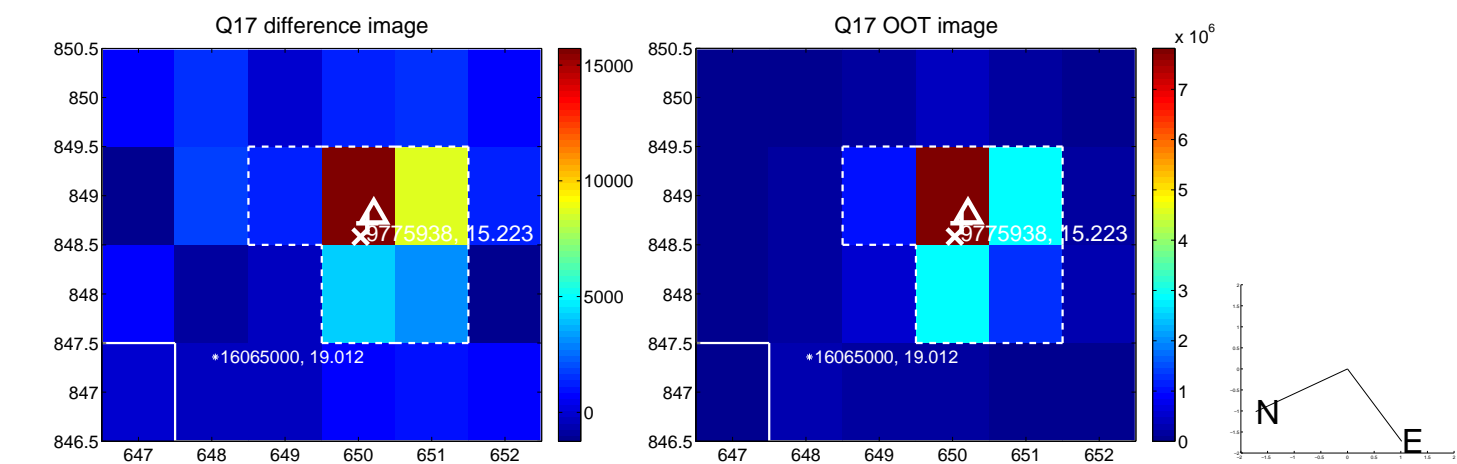
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

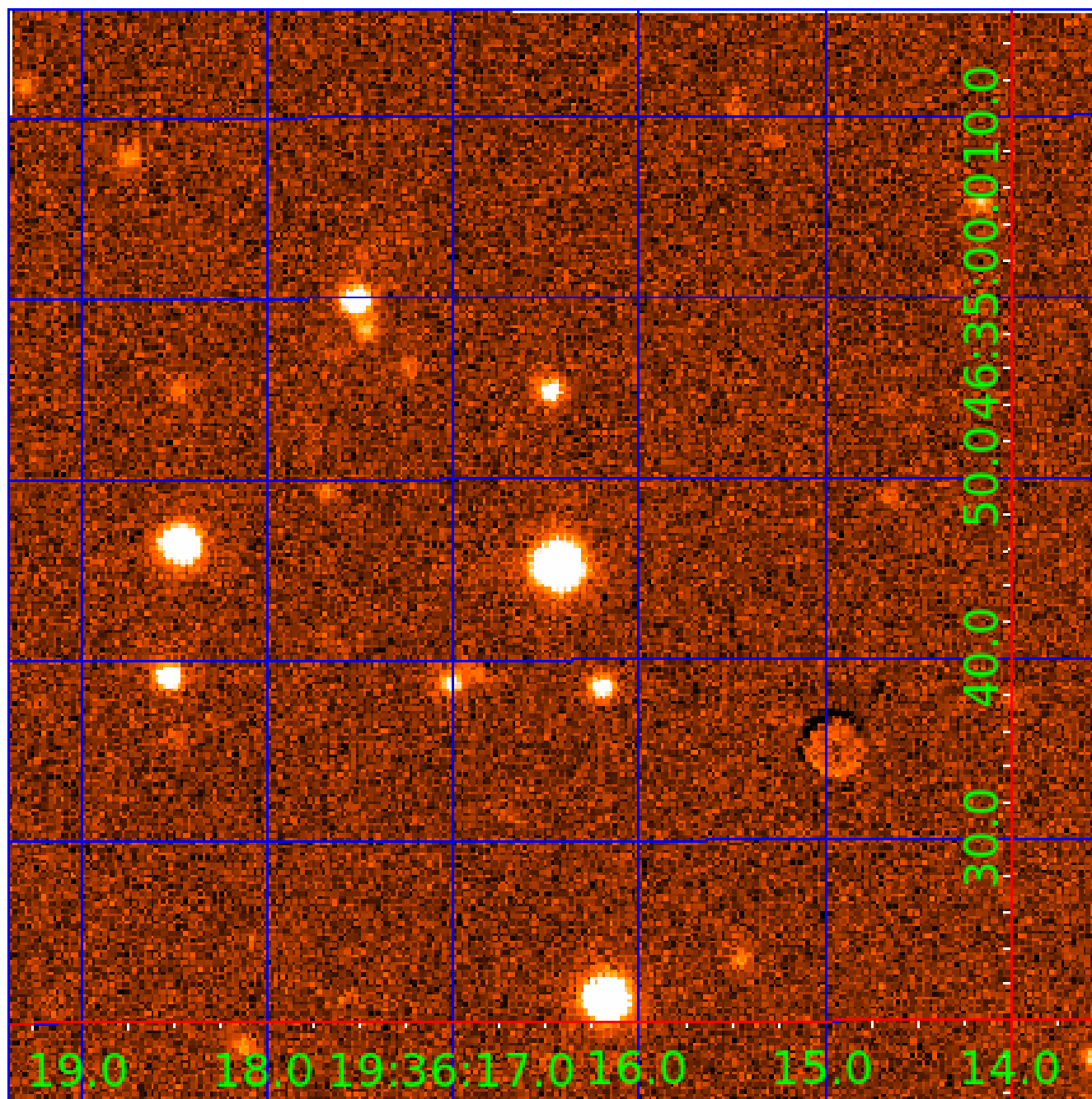


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 009775938

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})
009775938-01	OBS	0951.01	13.197215	131.953321	2142.2	3.541	103.3	102.7	0.89	4954	4.33	40.12
009775938-02	OBS	0951.02	33.652828	147.801890	1122.8	4.416	34.6	36.4	0.89	4954	3.64	11.52

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009775938-01	OBS	PC	1.00	0	0	0	0	CENT_KIC_POS
009775938-02	OBS	PC	0.98	0	0	0	0	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.

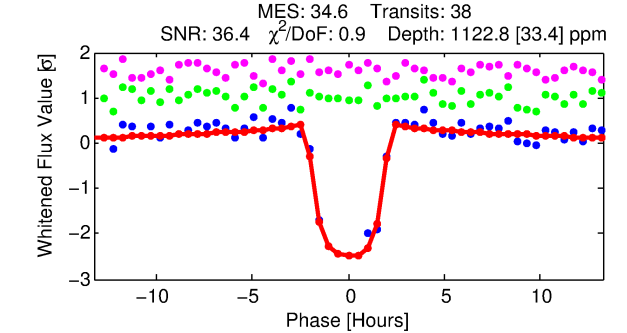
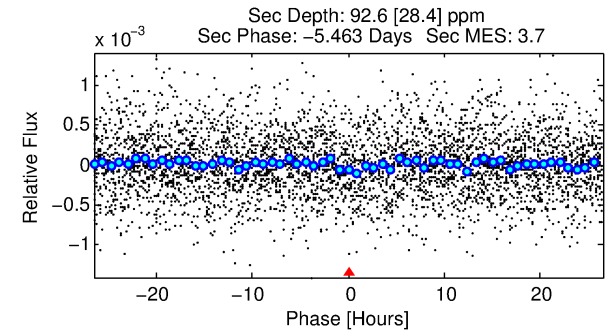
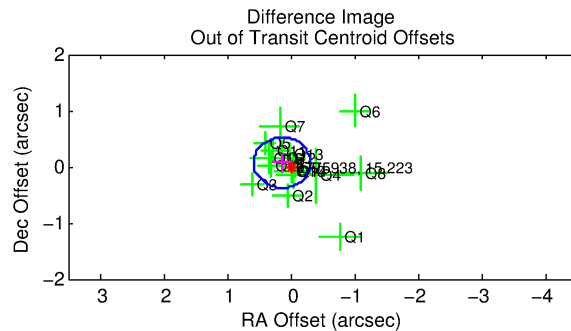
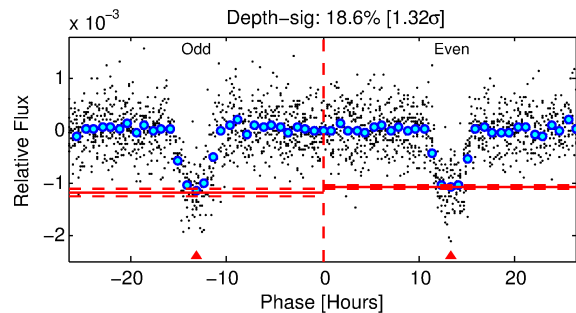
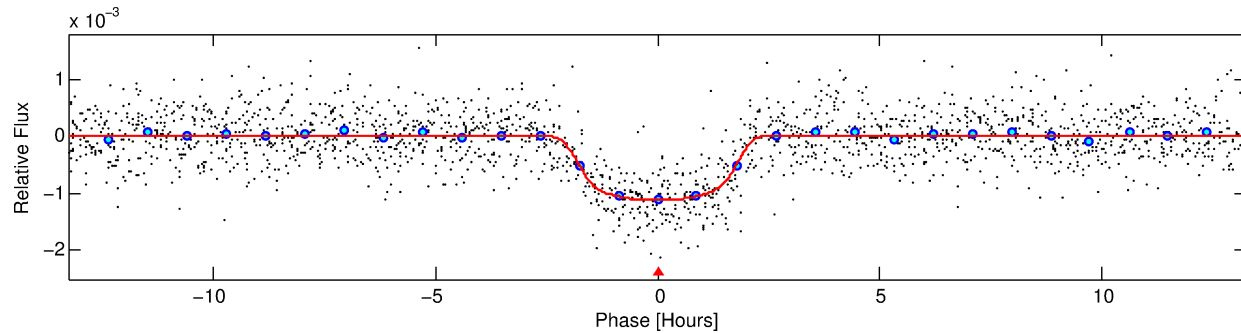
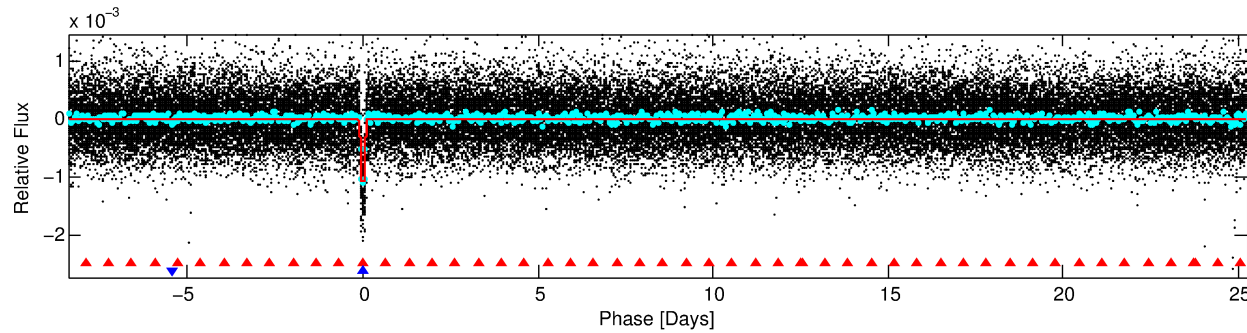
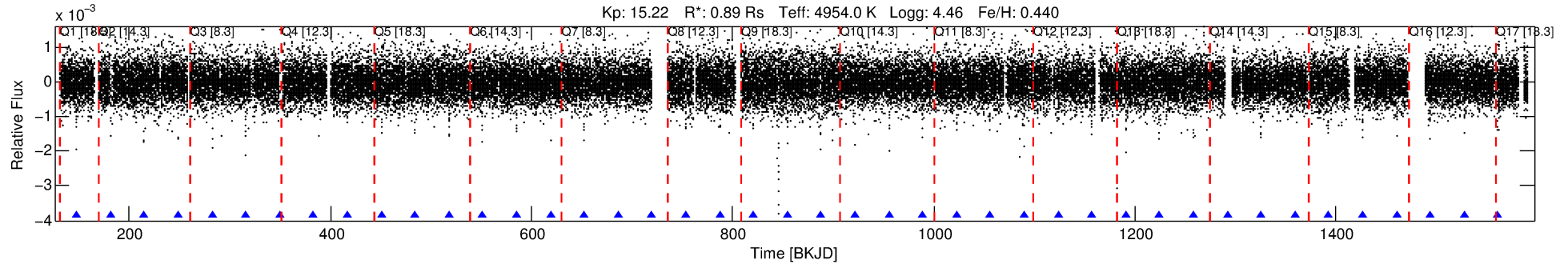
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009775938-02

No Significant Match Found

DV One-Page Summary

KIC: 9775938 Candidate: 2 of 2 Period: 33.653 d
KOI: K00951.02 Name: Kepler-258c Corr: 0.983



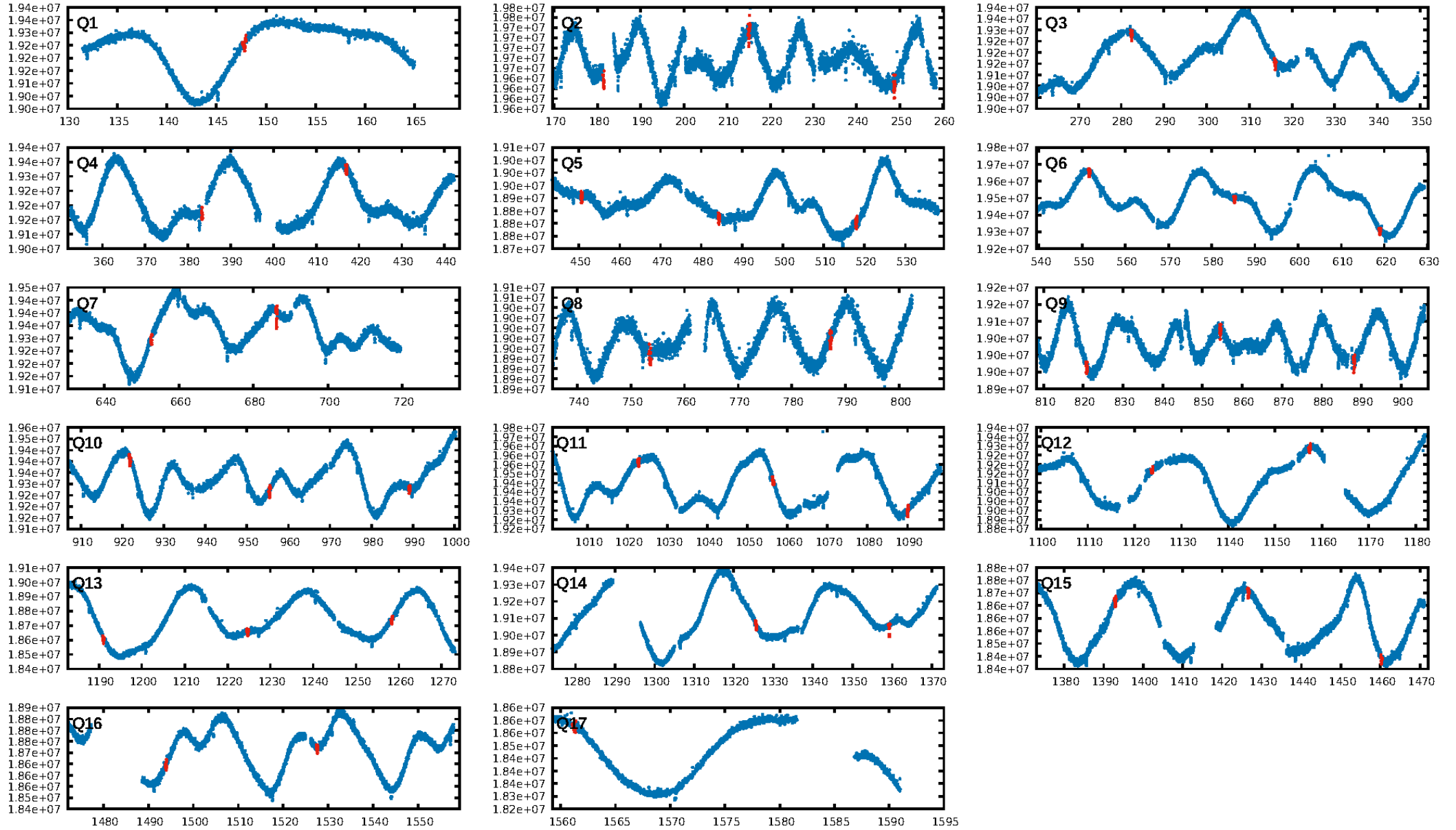
DV Fit Results:

Period = 33.65283 [0.00011] d
Epoch = 147.8019 [0.0027] BKJD
Rp/R* = 0.0377 [0.0018]
a/R* = 30.02 [4.64]
b = 0.90 [0.03]
Seff = 11.52 [13.58]
Teq = 470 [138] K
Rp = 3.64 [4.20] Re
a = 0.1916 [0.1698] AU
Ag = 141.12 [171.63] [0.82 σ]
Teffp = 2503 [214] K [7.98 σ]

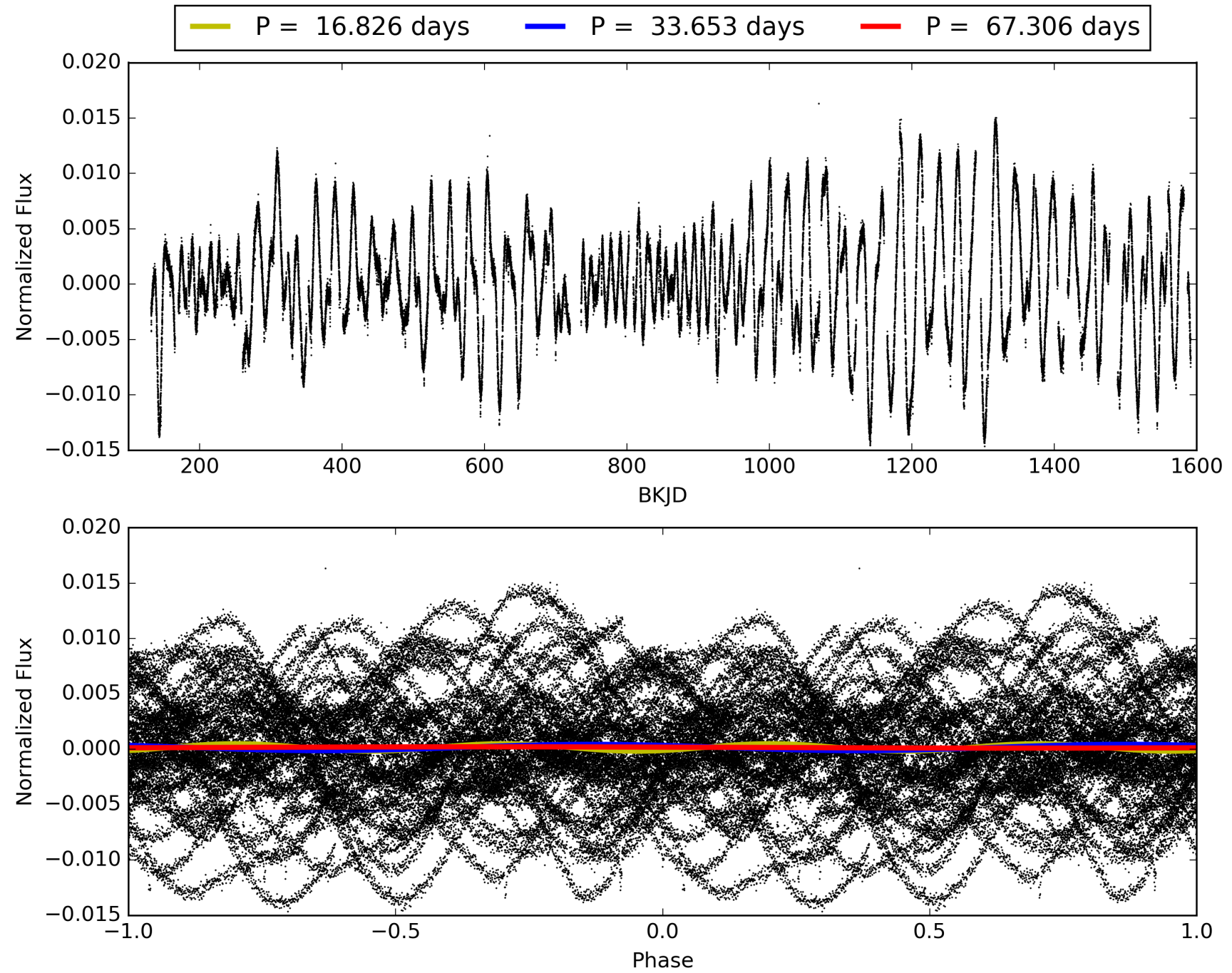
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [86.73 σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 85.7%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 2.03e-244
RollingBand-fgt: 1.00 [36/36]
GhostDiagnostic-chr: 2.49
Centroid-sig: 86.1%
Centroid-so: 0.518 arcsec [1.54 σ]
OotOffset-rm: 0.157 arcsec [1.05 σ]
OotOffset-st: 4/4/4/4 [16]
KicOffset-rm: 0.480 arcsec [3.45 σ]
KicOffset-st: 4/4/4/4 [16]
DiffImageQuality-fgm: 1.00 [16/16]
DiffImageOverlap-fno: 1.00 [16/16]

TCE 009775938-02, PDC Light Curves

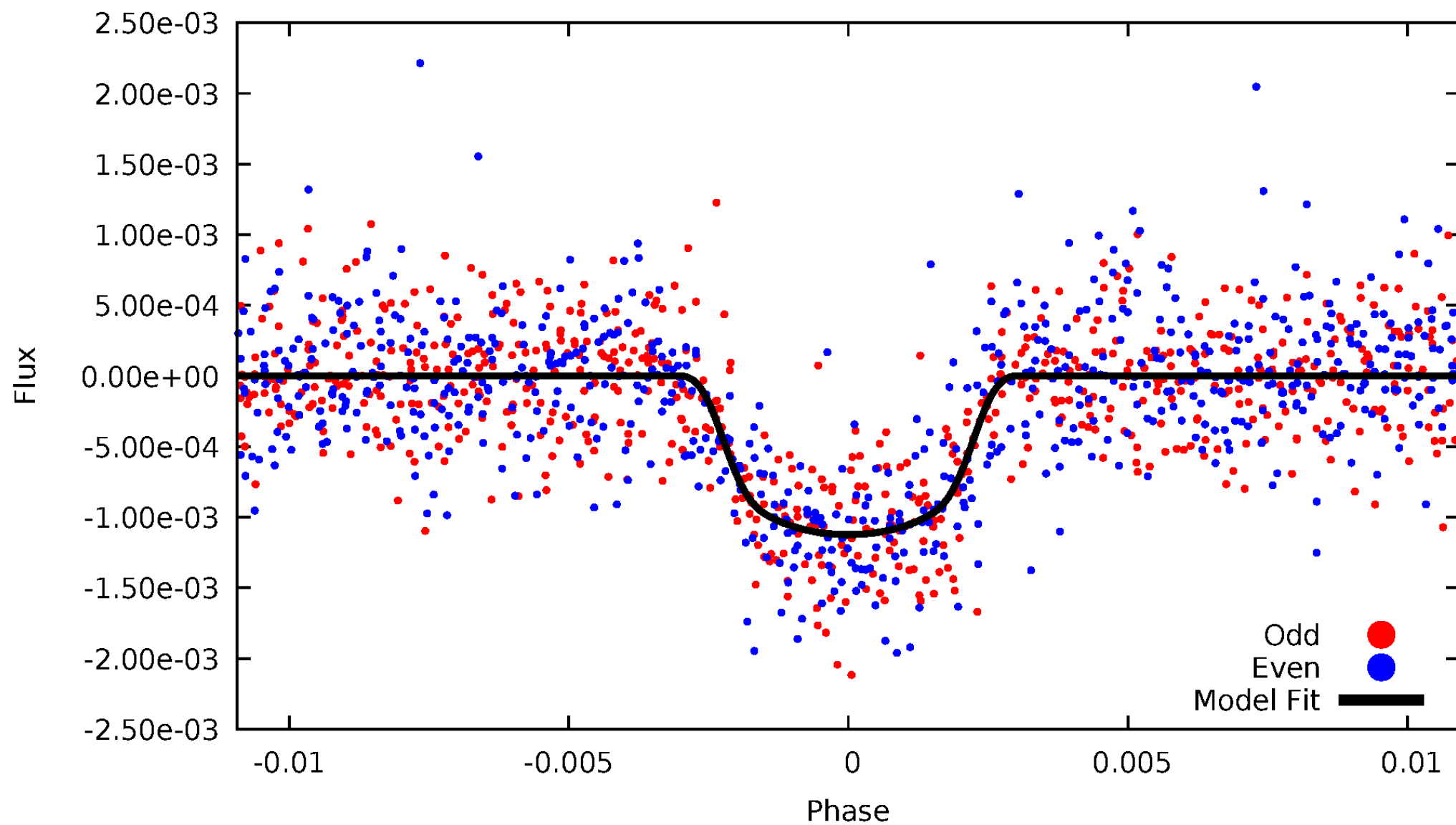


TCE 009775938-02



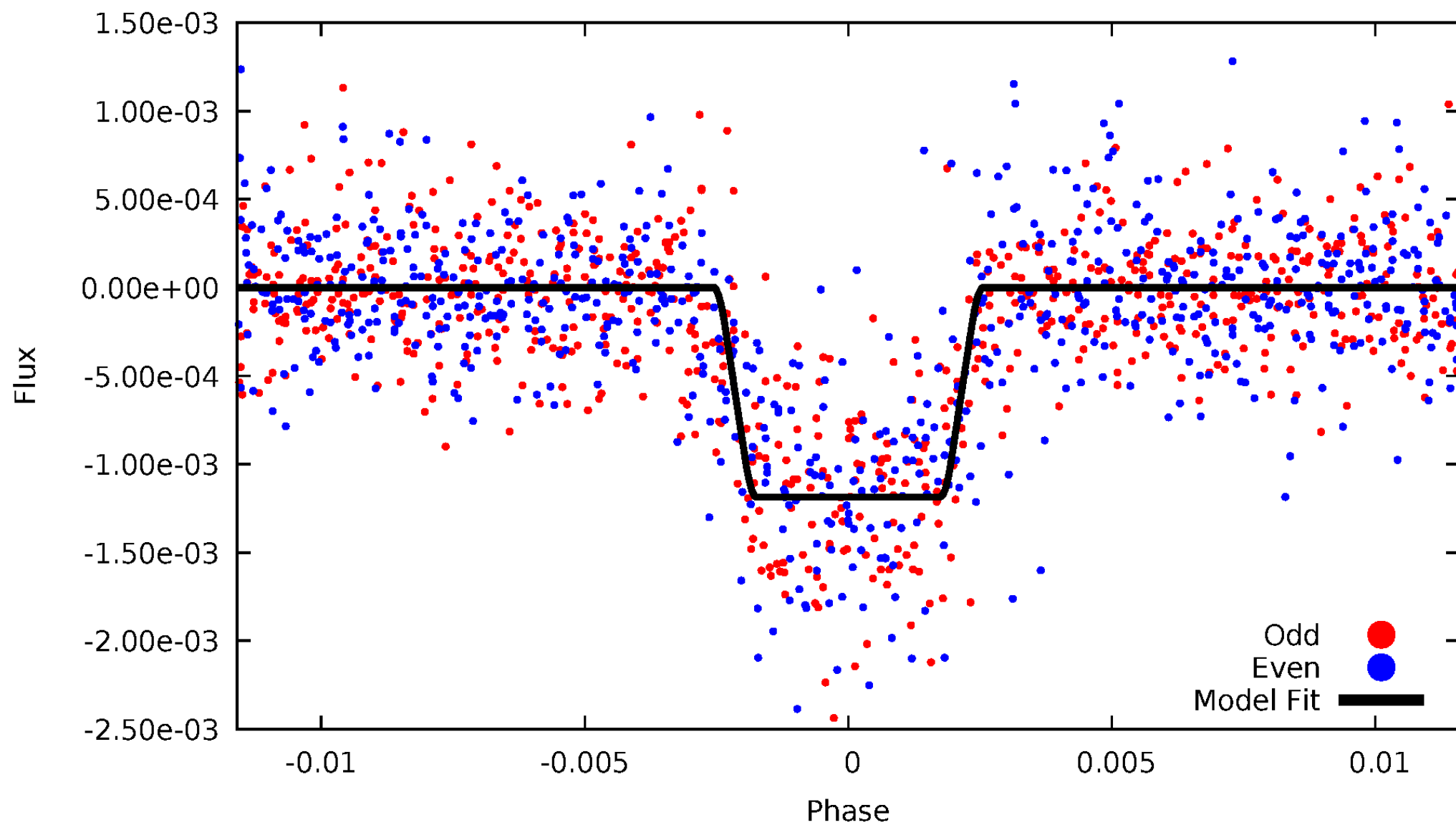
DV Odd/Even

TCE 009775938-02



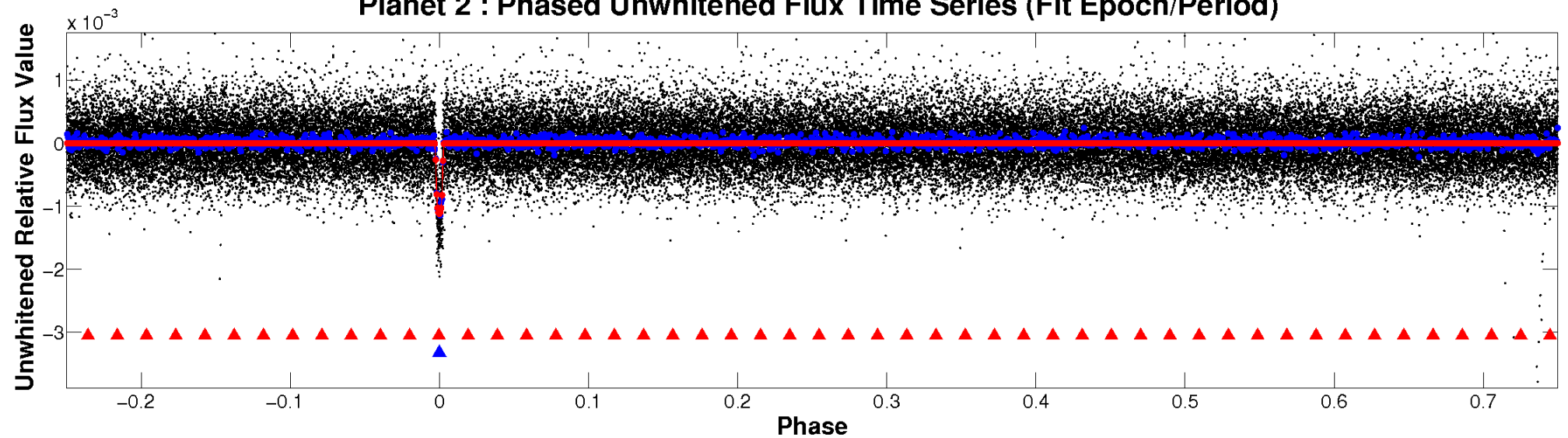
ALT Odd/Even

TCE 009775938-02

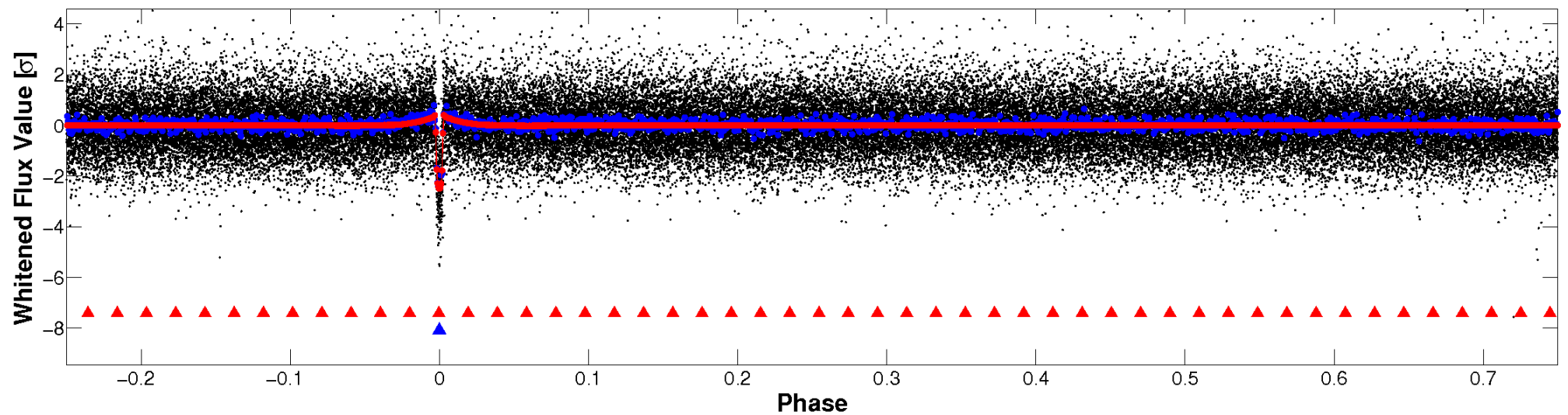


Non-Whitened Vs. Whitened Light Curve

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

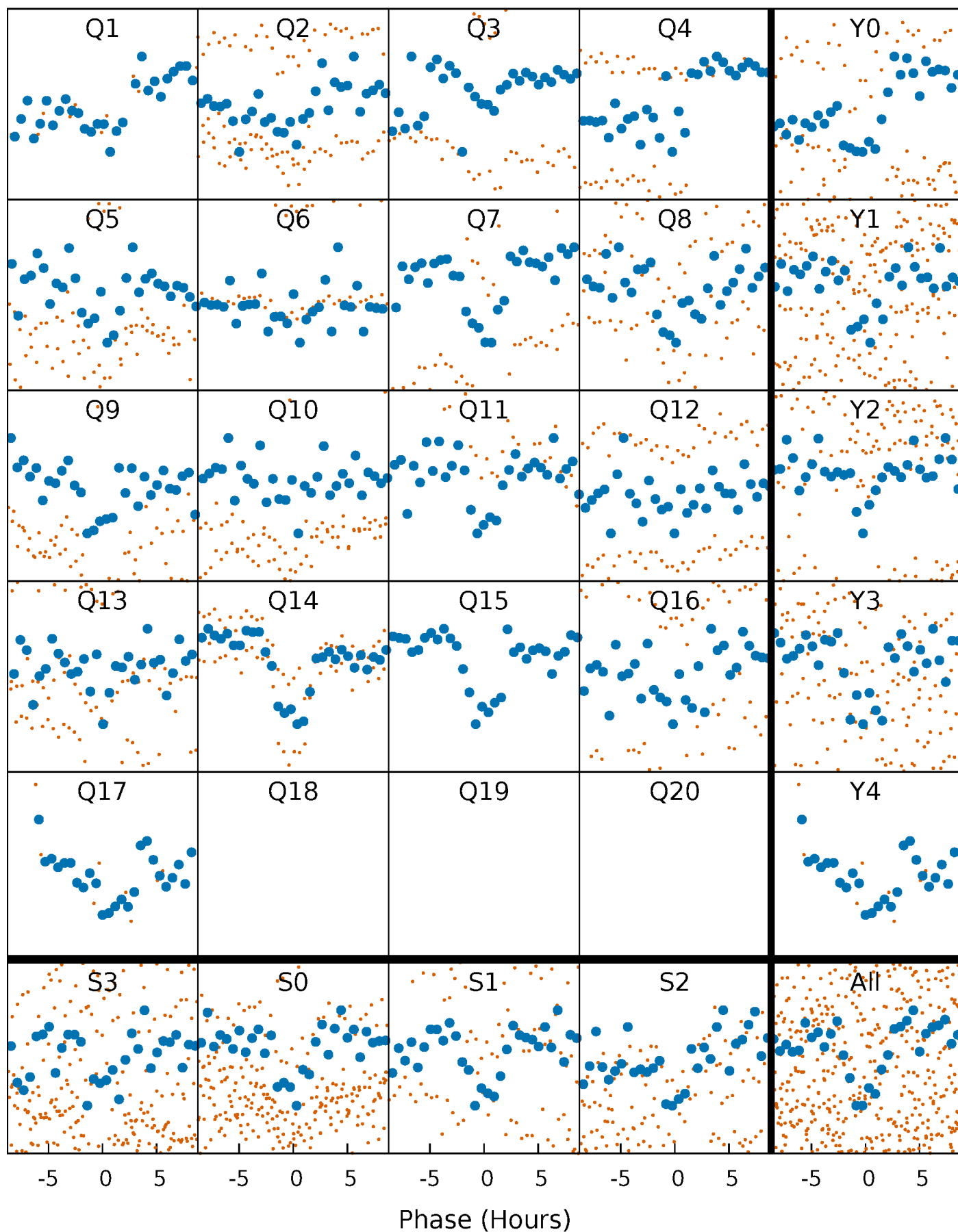


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



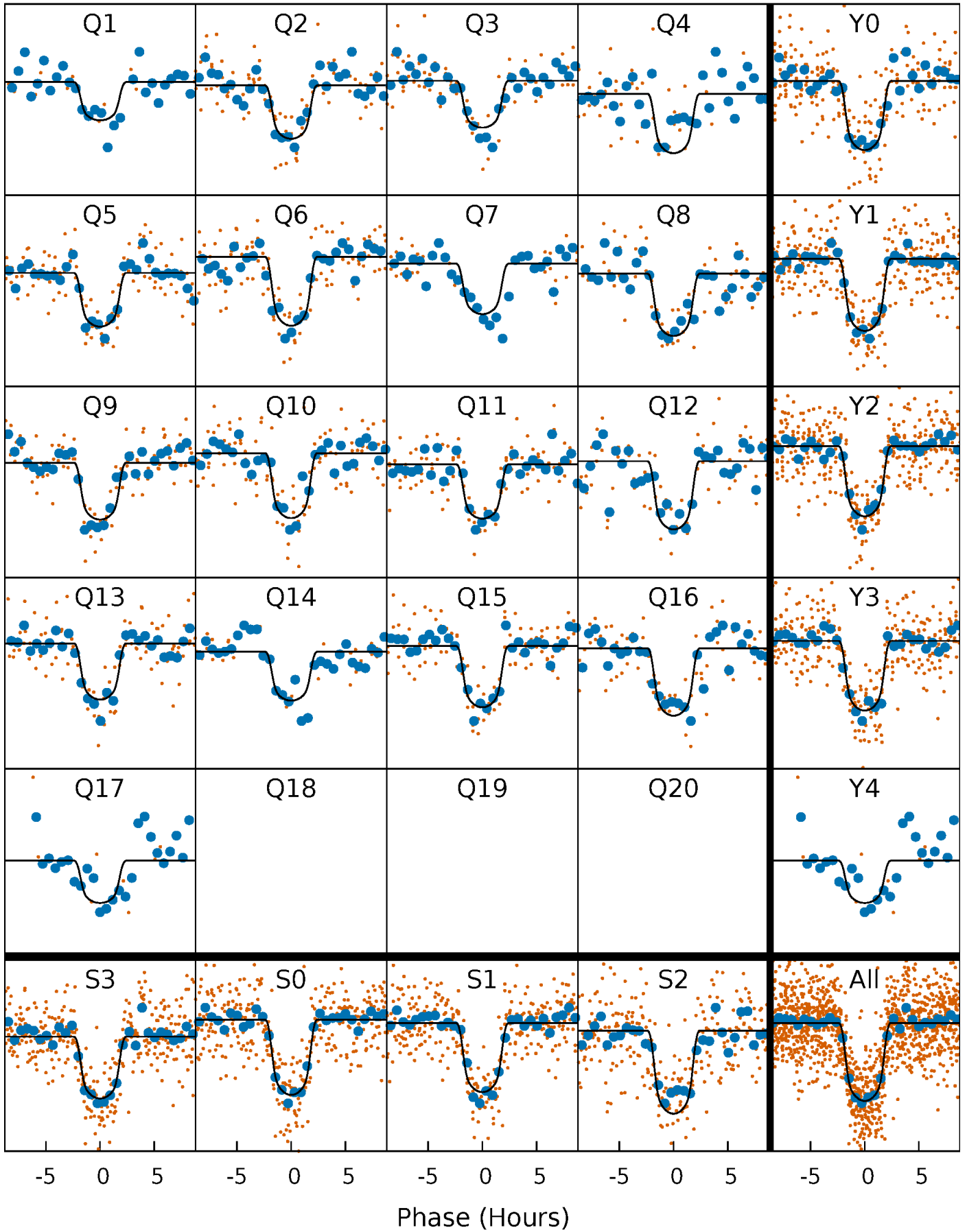
PDC Quarter-Phased Transit Curves

TCE 009775938-02 P= 33.652828 Days $T_0=147.801890$ (BKJD)



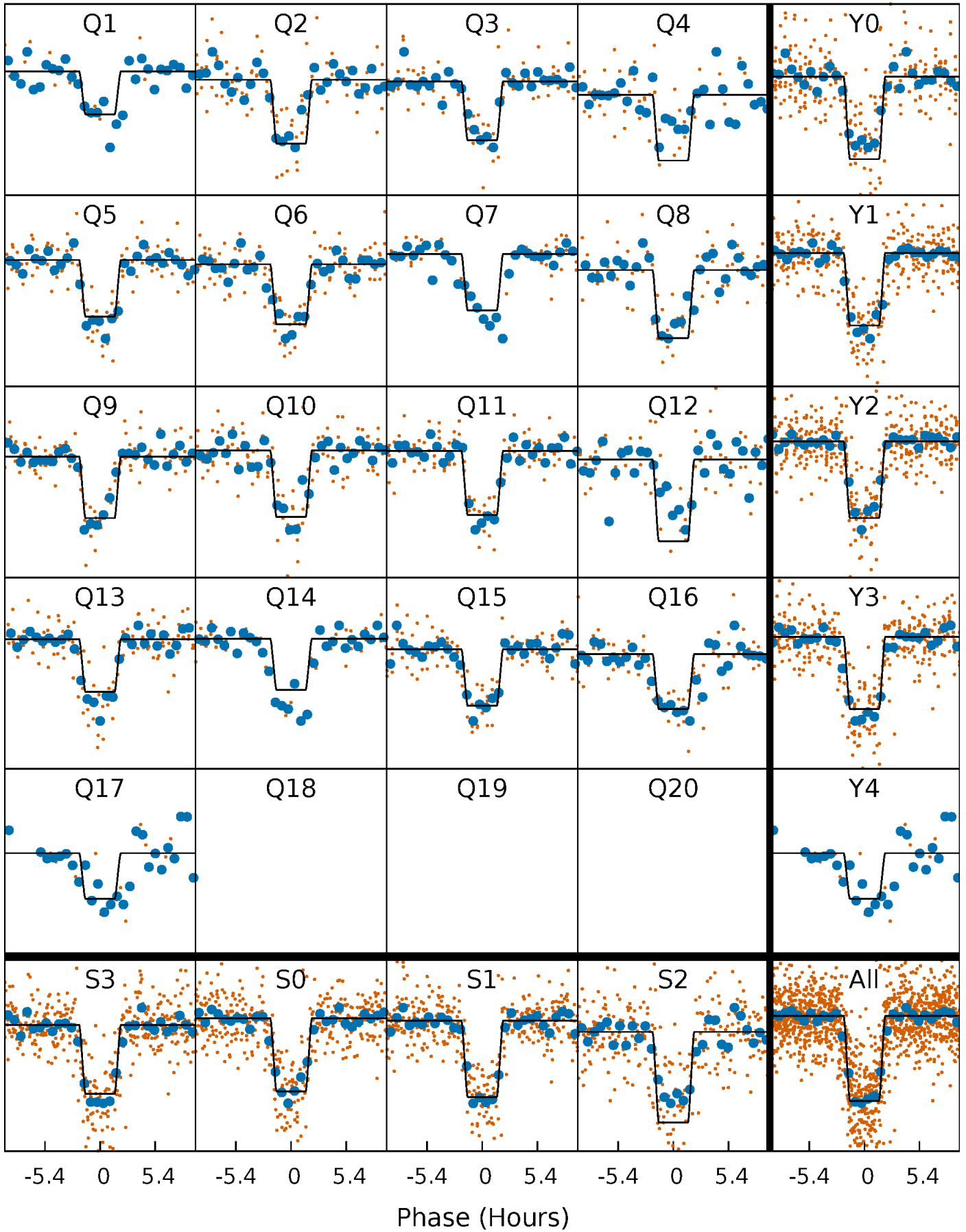
DV Quarter-Phased Transit Curves

TCE 009775938-02 P= 33.652828 Days $T_0=147.801890$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

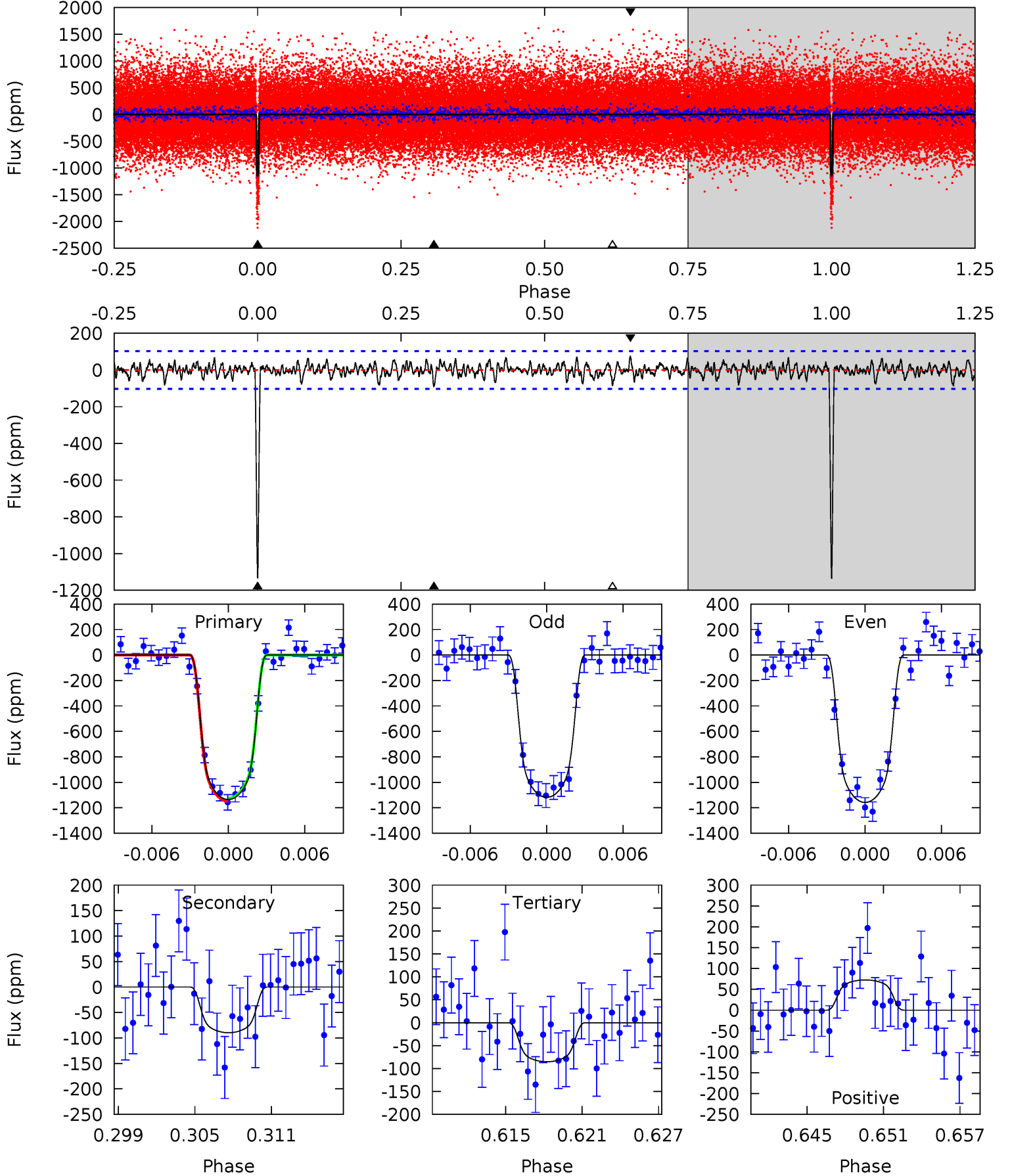
TCE 009775938-02 P= 33.653026 Days $T_0=147.798500$ (BKJD)



DV Model-Shift Uniqueness Test

009775938-02, $P = 33.652828$ Days, $E = 114.149062$ Days

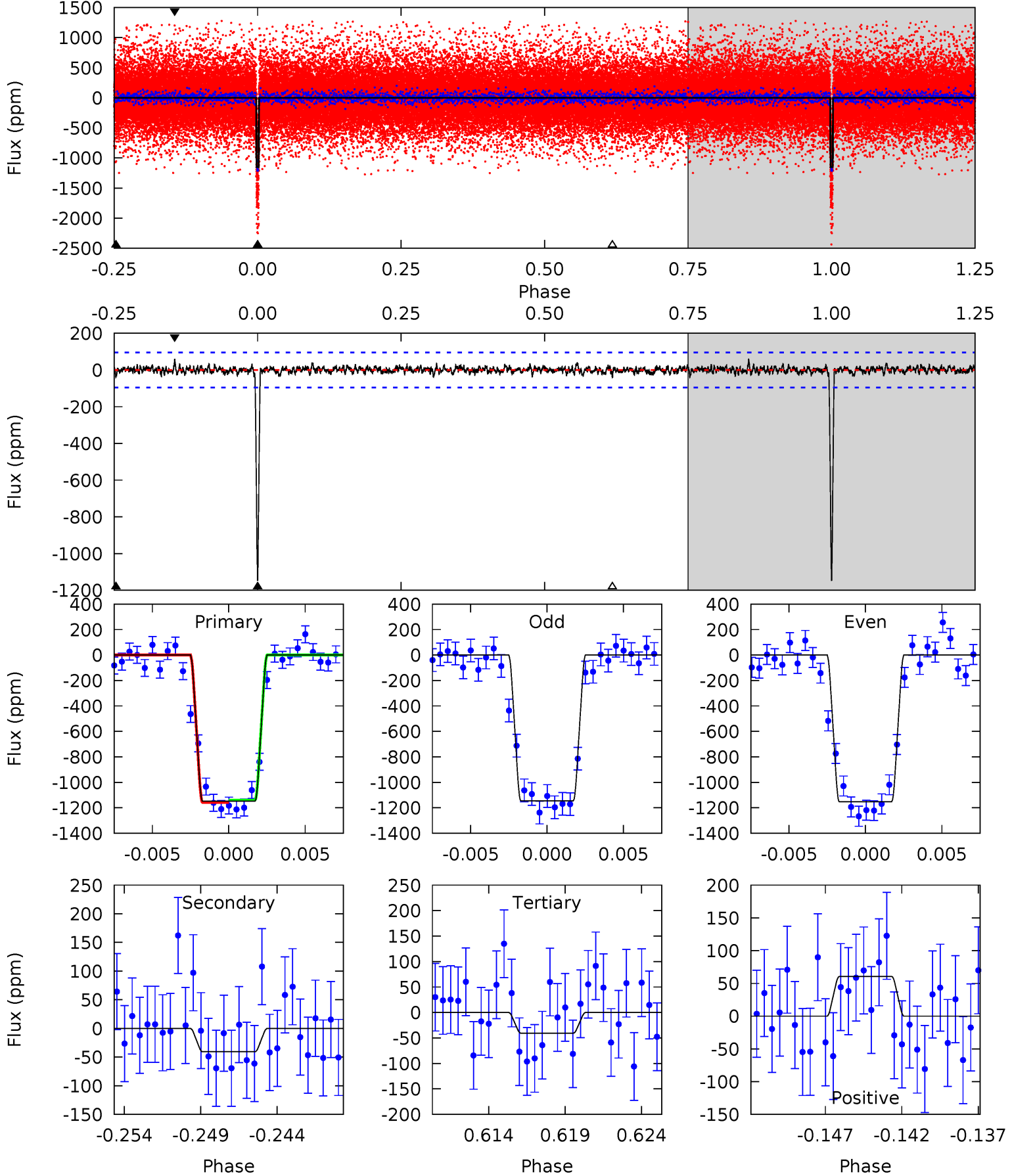
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
56.8	4.49	4.26	3.63	5.12	2.75	1.31	52.5	53.2	0.23	0.86	1.00	0.98	0.06	0.61



Alt Model-Shift Uniqueness Test

009775938-02, P = 33.653026 Days, E = 114.145474 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
61.9	2.19	2.19	3.26	5.15	2.80	0.65	59.7	58.6	0.01	-1.07	0.17	1.03	0.05	0.47



Stellar Parameters For KIC 009775938

	$T_{\text{eff}} (K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M (M_{\odot})$	$\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$
	4954^{+148}_{-148}	$4.462^{+0.102}_{-0.578}$	$0.440^{+0.050}_{-0.300}$	$0.885^{+1.019}_{-0.127}$	$0.827^{+0.057}_{-0.047}$	$1.681^{+0.971}_{-1.410}$
	+3%/-3%	+2%/-13%	+11%/-68%	+115%/-14%	+7%/-6%	+58%/-84%
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 009775938-02 / KOI 0951.02

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	A_{obs}
DV	-90 ± 20	$3.83^{+2.38}_{-0.50}$	676^{+180}_{-49}	3068^{+118}_{-122}	111^{+56}_{-66}
Alt.	-41 ± 19	$3.46^{+1.89}_{-0.43}$	672^{+158}_{-43}	2818^{+178}_{-252}	56^{+50}_{-37}

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

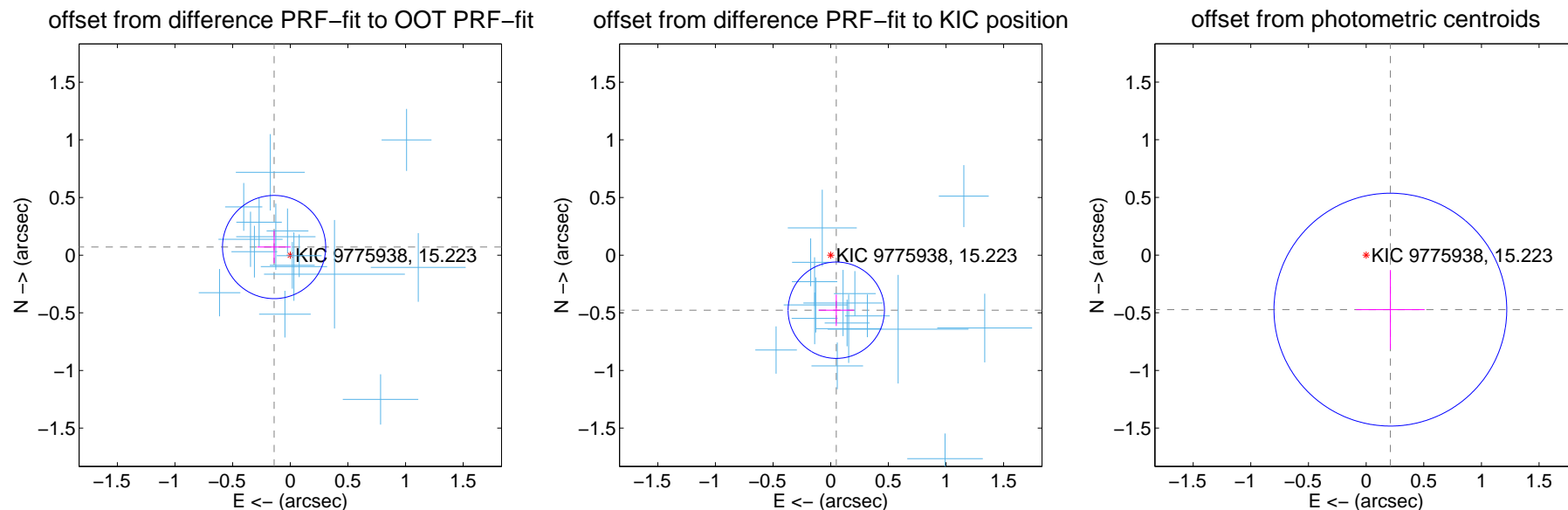
DV Centroid Data

Supplemental centroid analysis for 009775938-02. Kepler magnitude: 15.22. Transit SNR 36.40

There are 16 quarters with good PRF difference image offsets

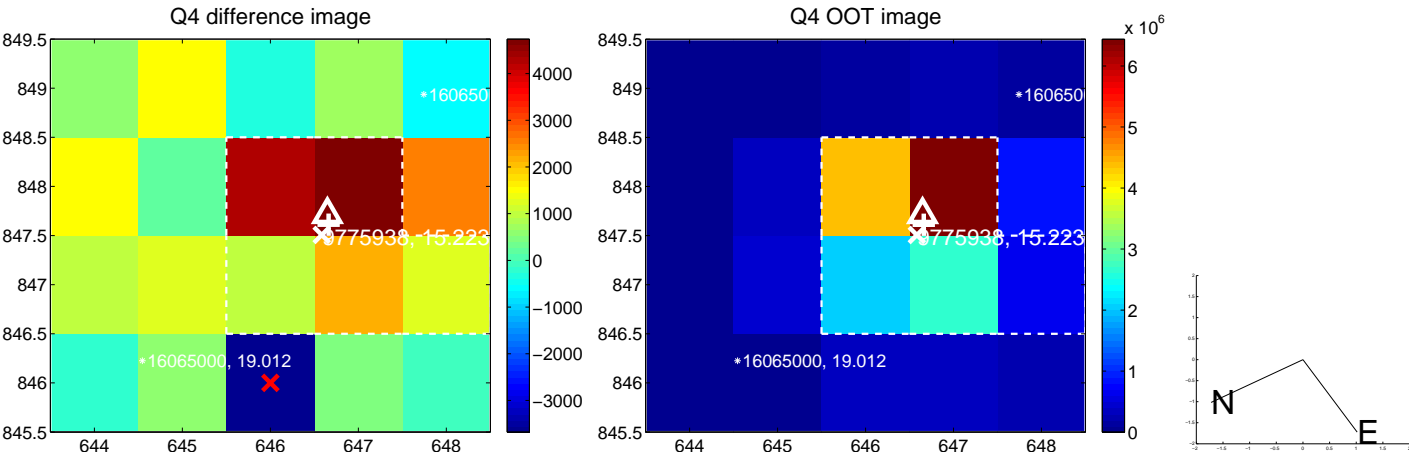
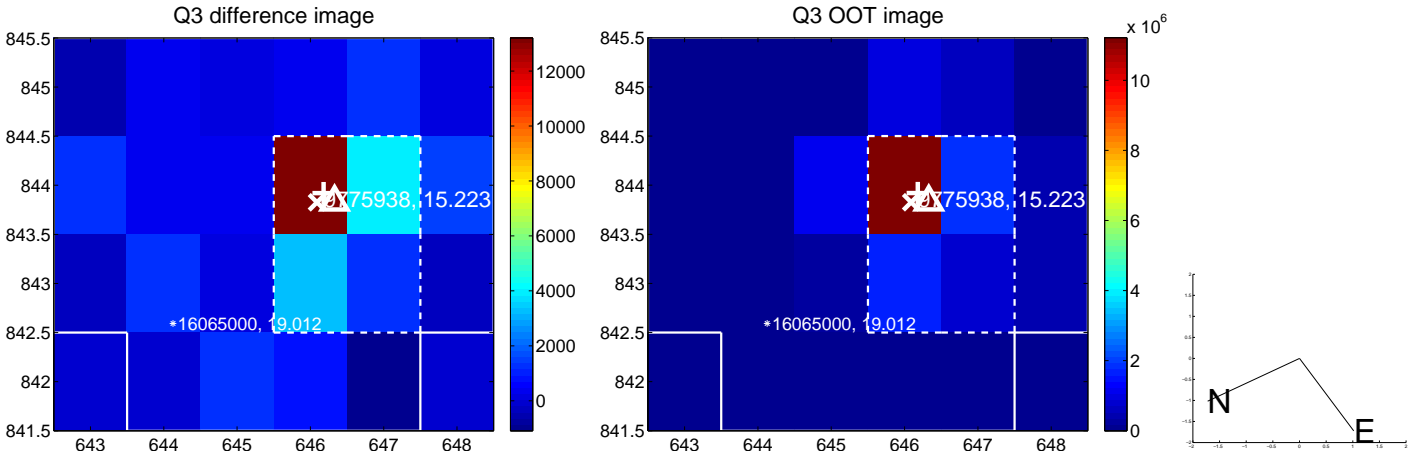
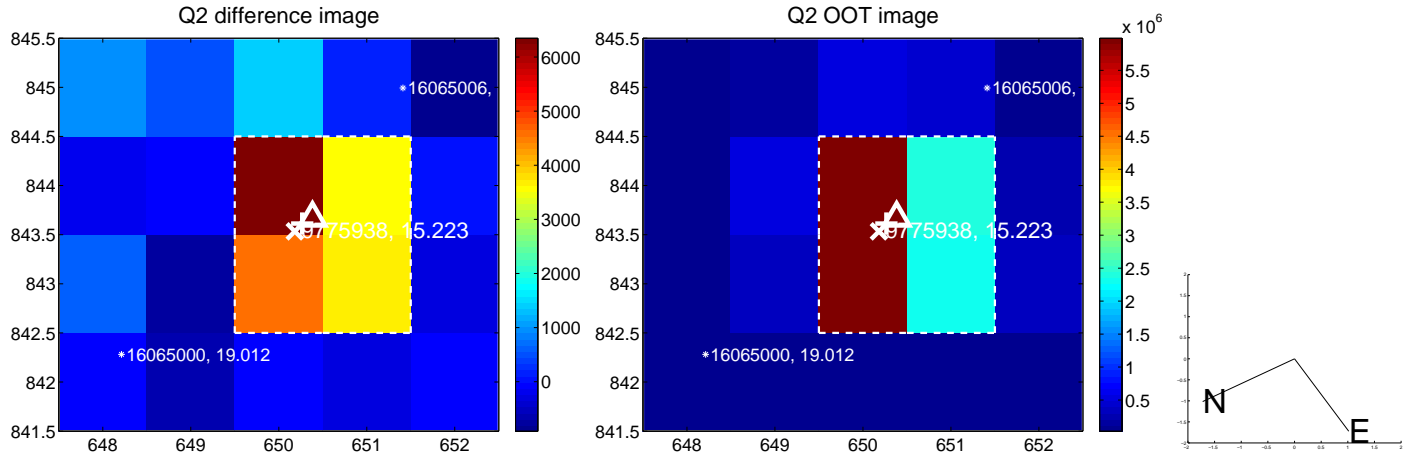
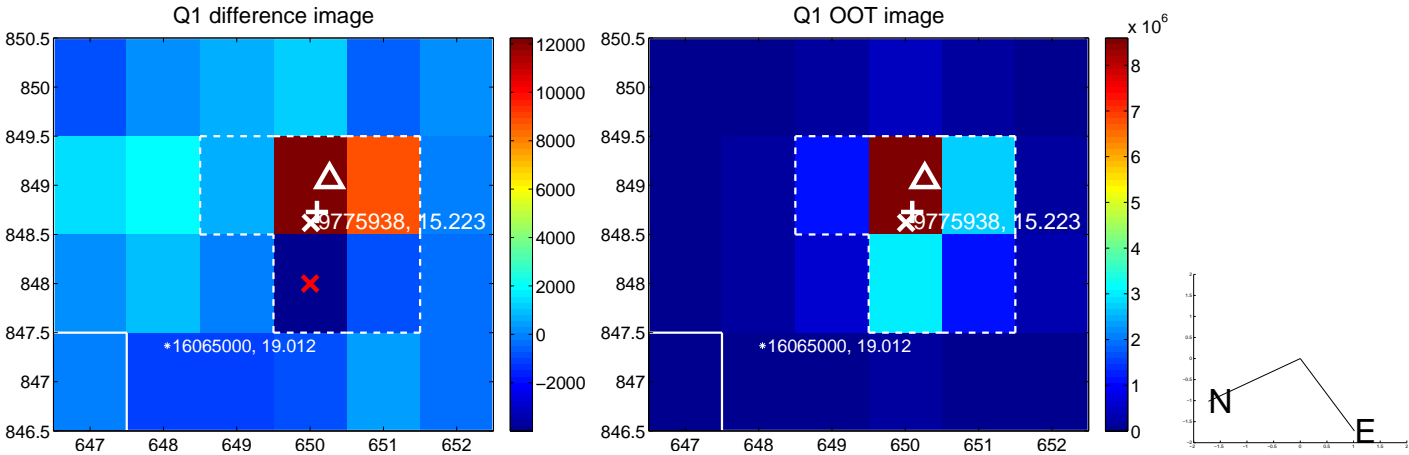
The direct PRF centroid is offset from the target star catalog position by about 0.61 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.157 ± 0.149	1.05	0.140 ± 0.145	0.070 ± 0.140
PRF-fit source offset from KIC position	0.480 ± 0.139	3.45	-0.048 ± 0.154	-0.477 ± 0.137
photometric centroid source offset	0.52 ± 0.34	1.54	-0.21 ± 0.30	-0.47 ± 0.34

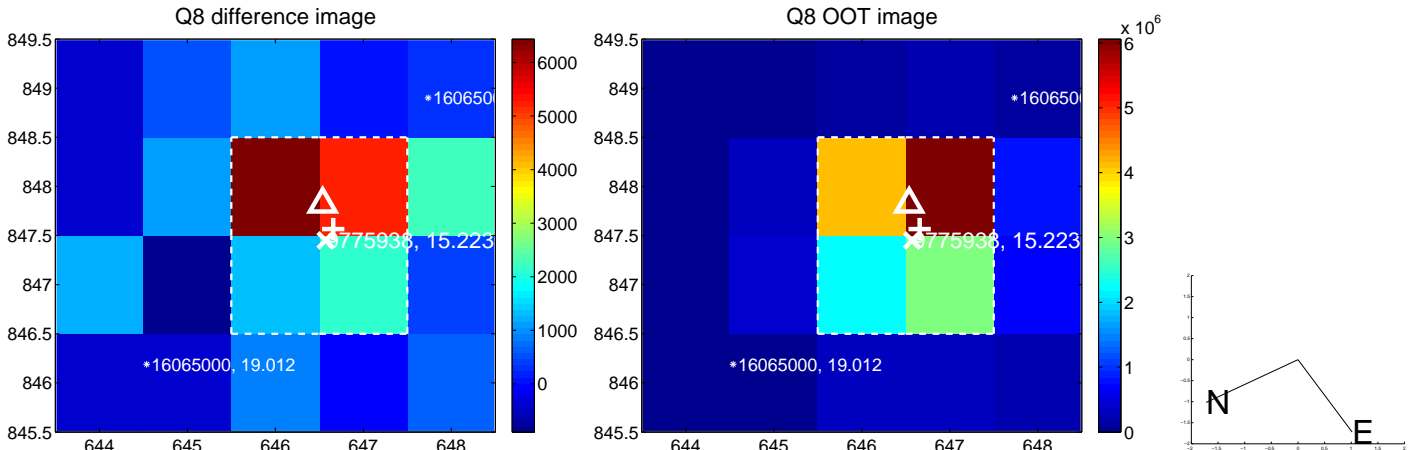
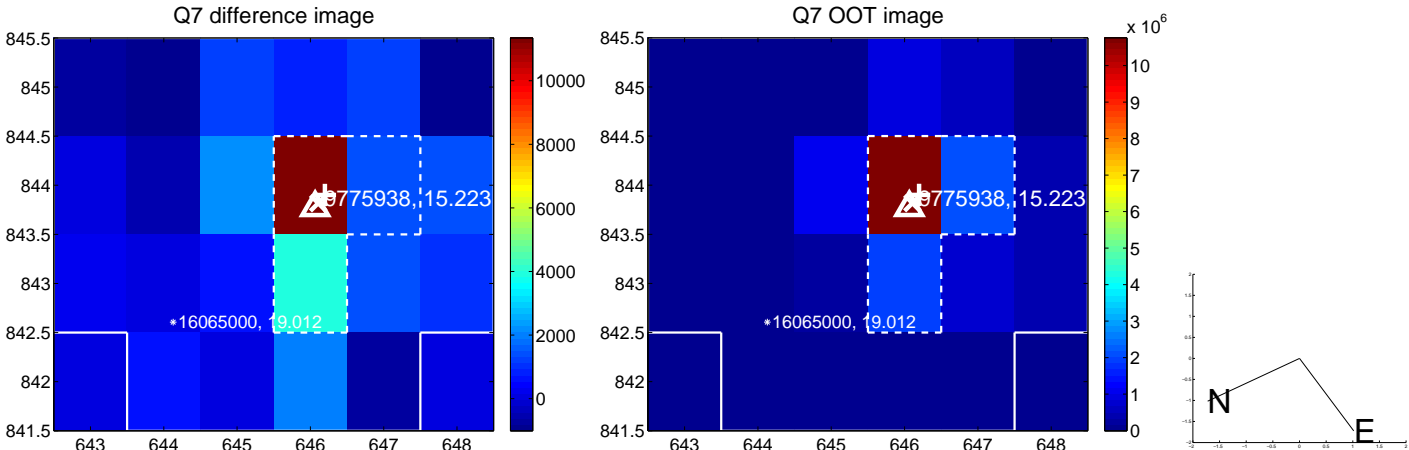
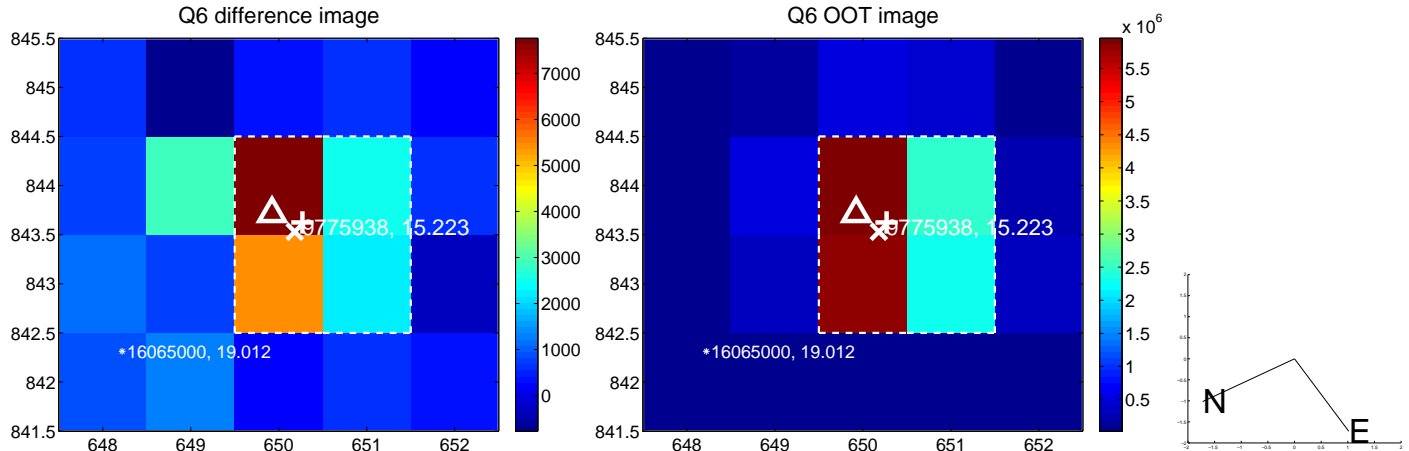
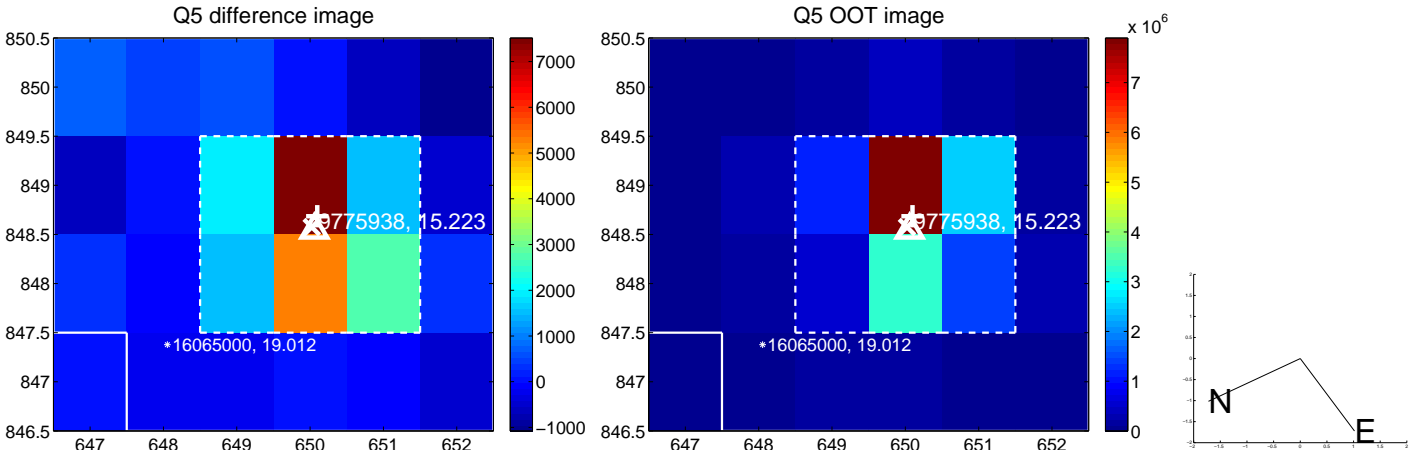


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

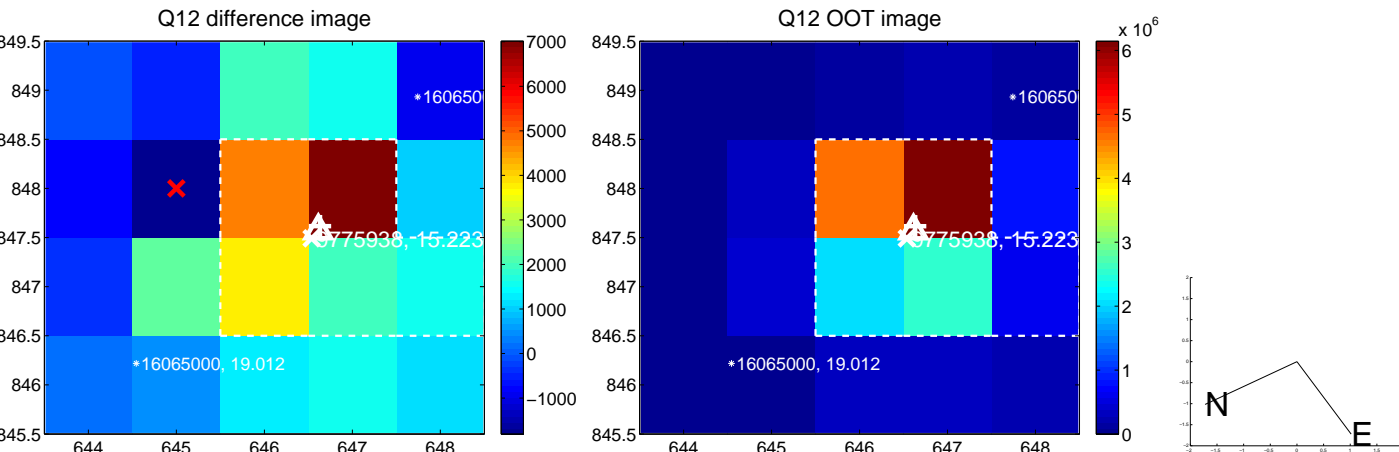
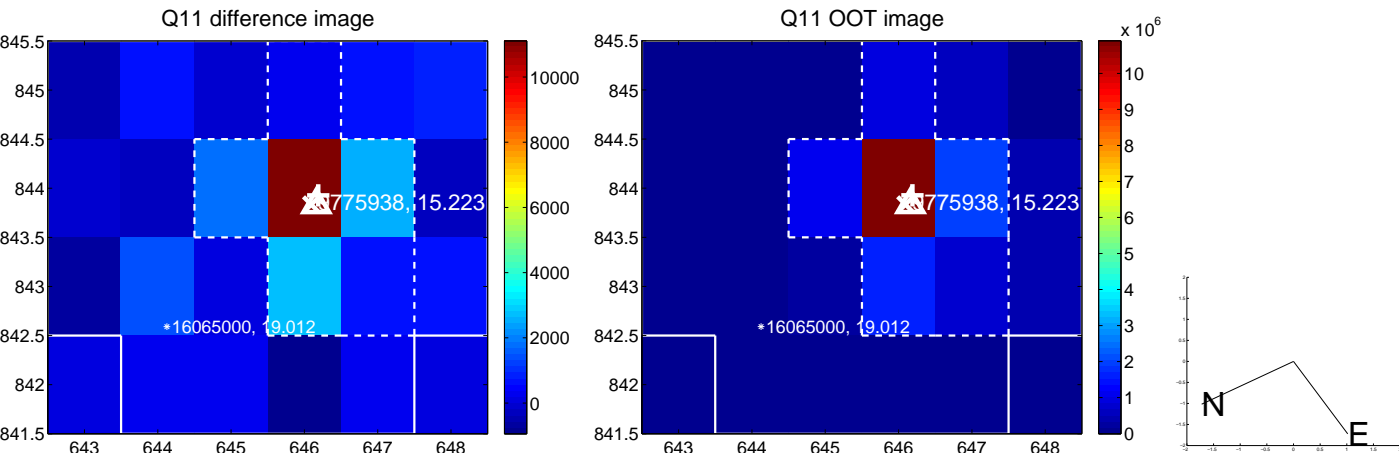
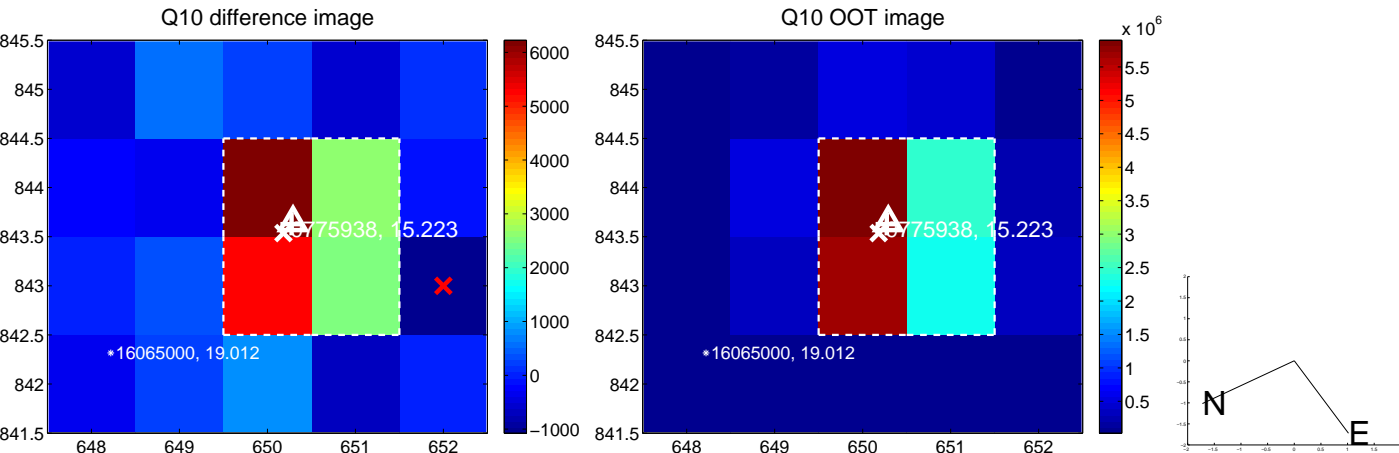
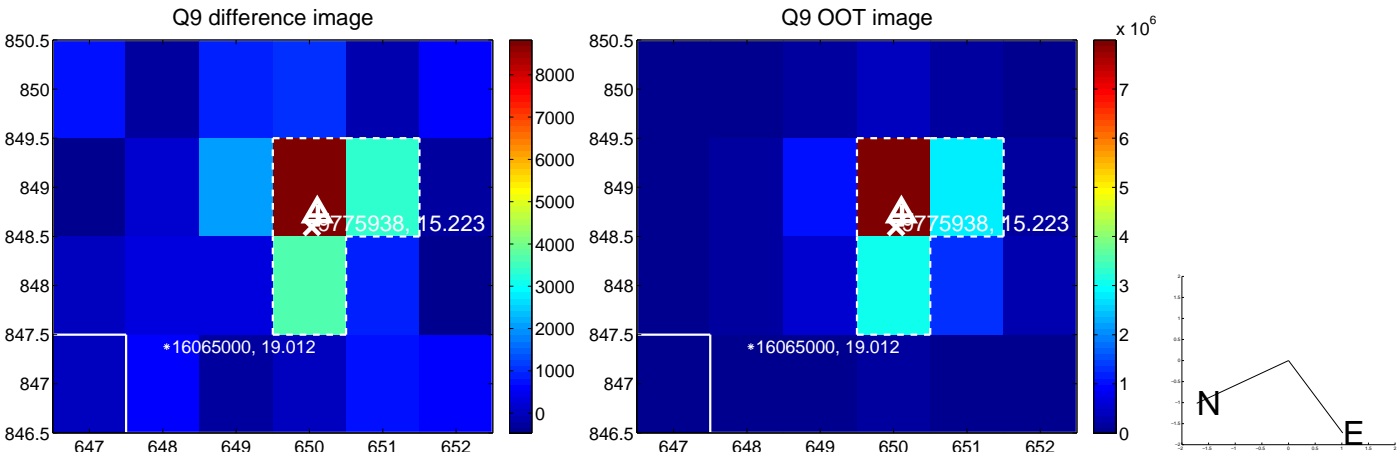
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



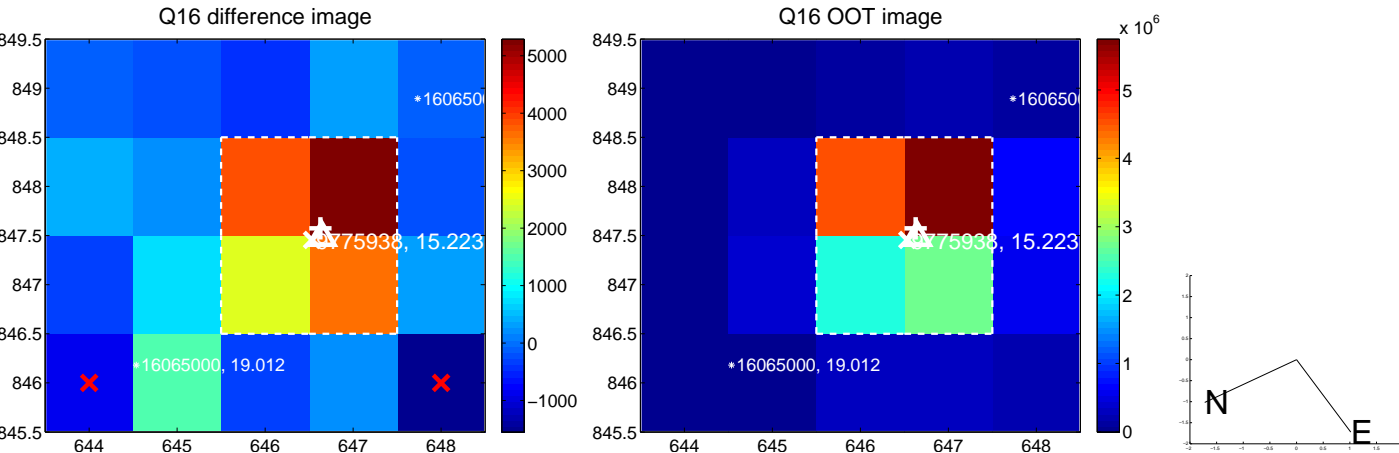
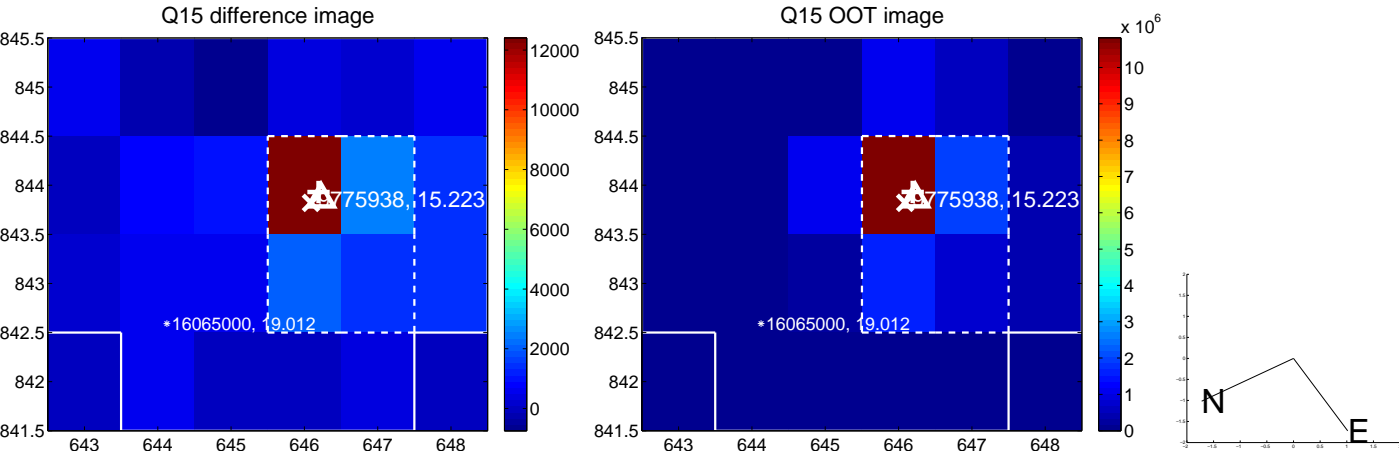
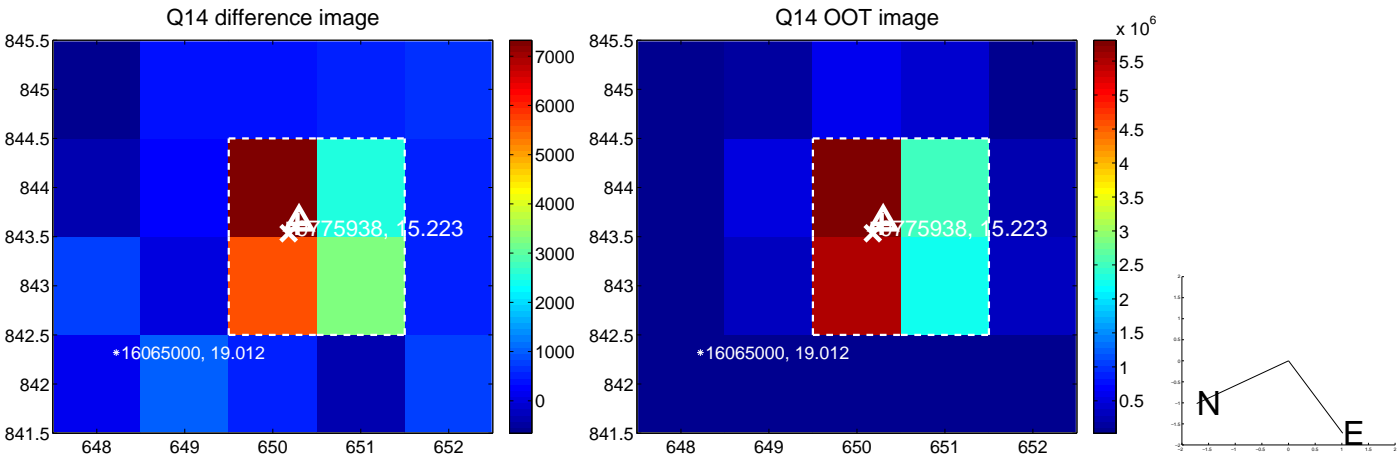
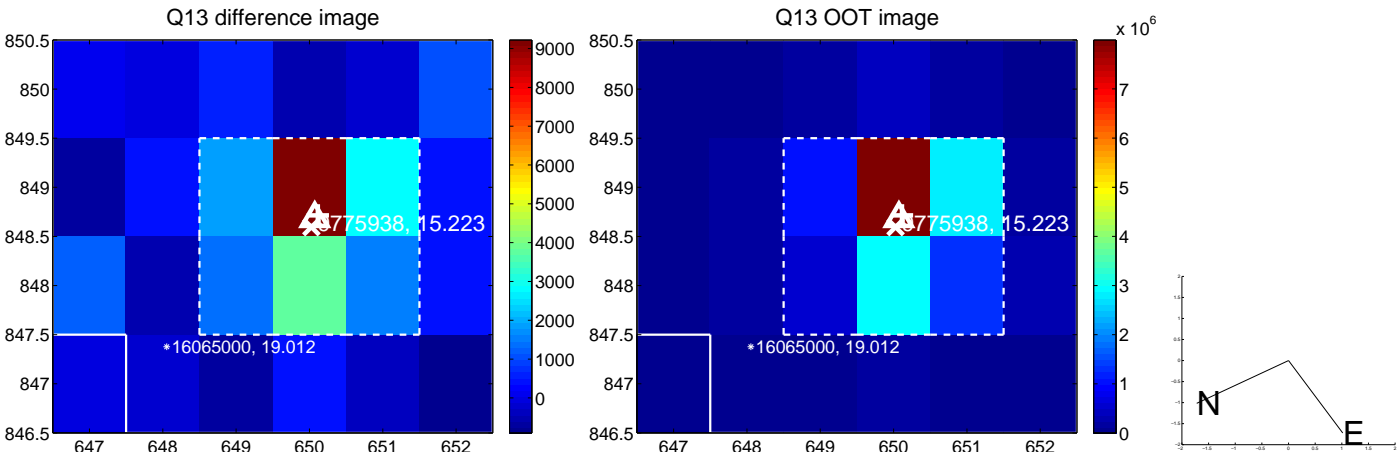
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



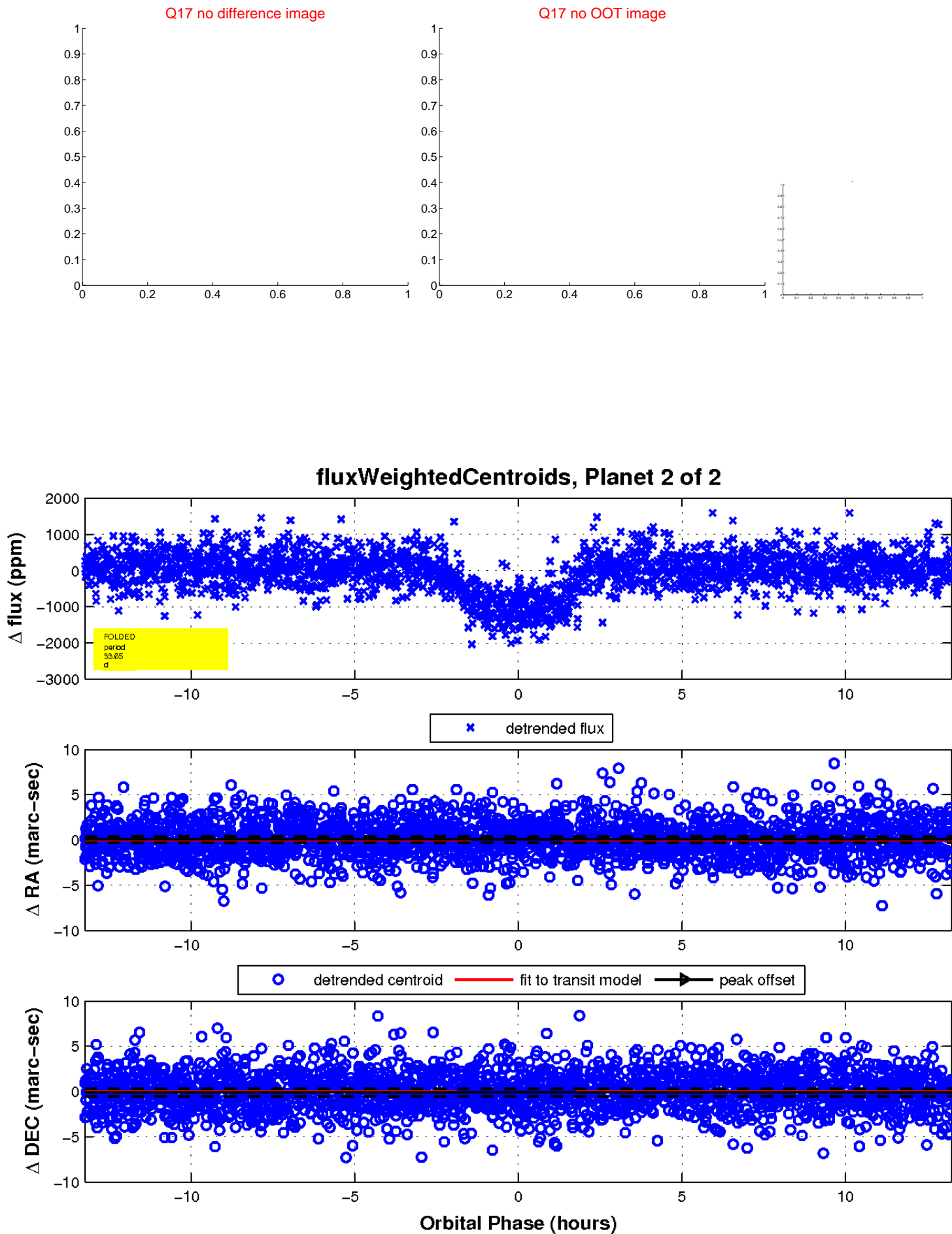
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



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



UKIRT Image

Declination

