

KIC 009941859

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})
009941859-01	OBS	0528.01	9.576664	138.376937	726.4	3.569	66.1	74.3	1.08	5386	3.36	121.40
009941859-02	OBS	0528.02	96.677853	140.186979	914.4	5.775	37.8	38.4	1.08	5386	3.52	5.56
009941859-03	OBS	0528.03	20.552786	145.028726	689.3	2.330	33.8	37.8	1.08	5386	3.25	43.85

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009941859-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
009941859-02	OBS	PC	1.00	0	0	0	0	NO_COMMENT
009941859-03	OBS	PC	1.00	0	0	0	0	NO_COMMENT

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

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

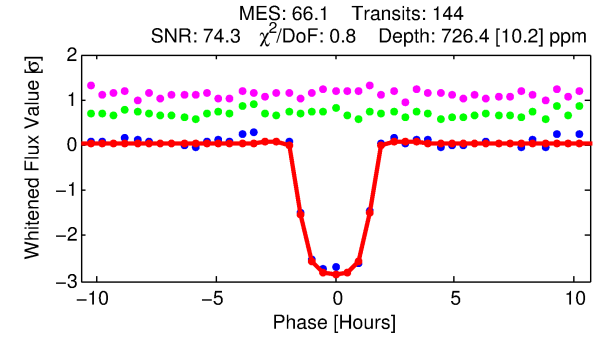
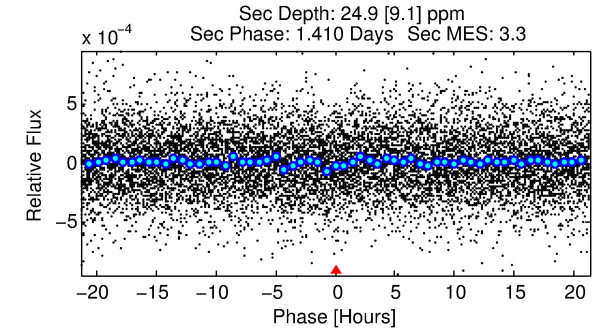
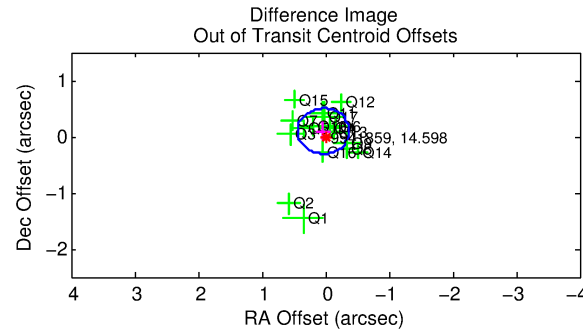
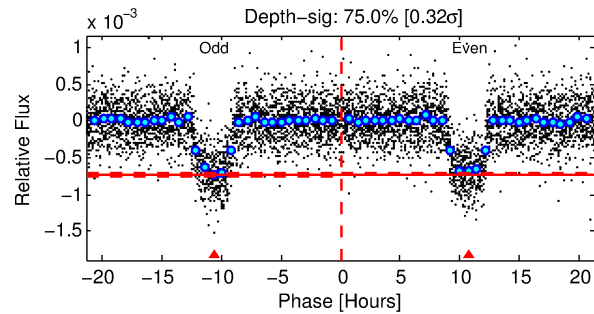
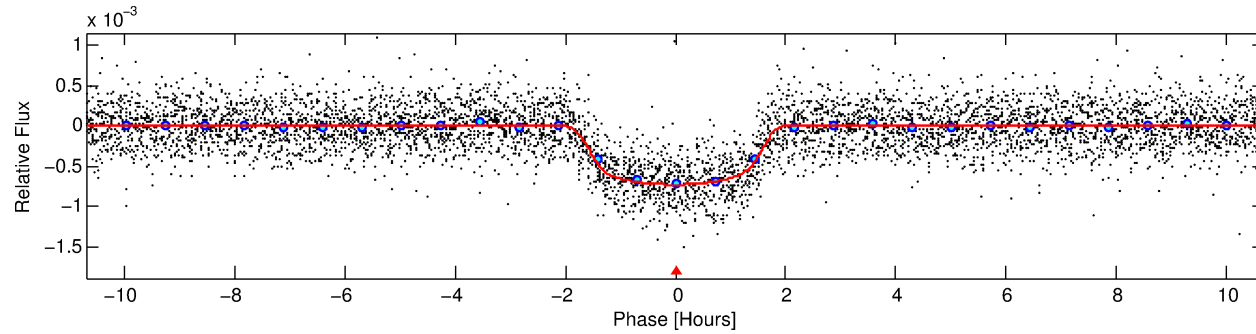
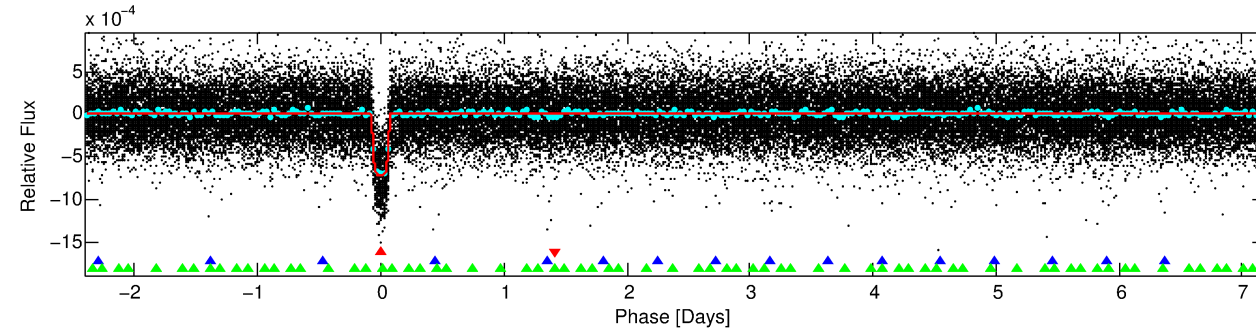
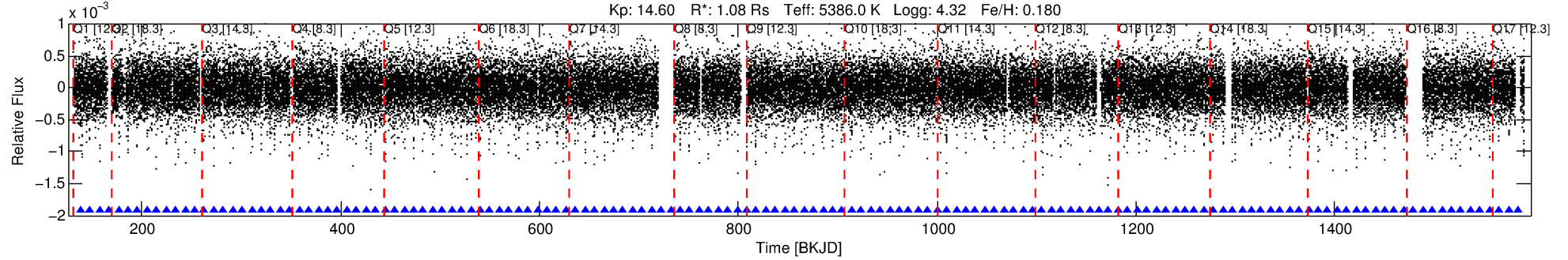
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009941859-01

No Significant Match Found

DV One-Page Summary

KIC: 9941859 Candidate: 1 of 3 Period: 9.577 d
KOI: K00528.01 Name: Kepler-178b Corr: 0.968



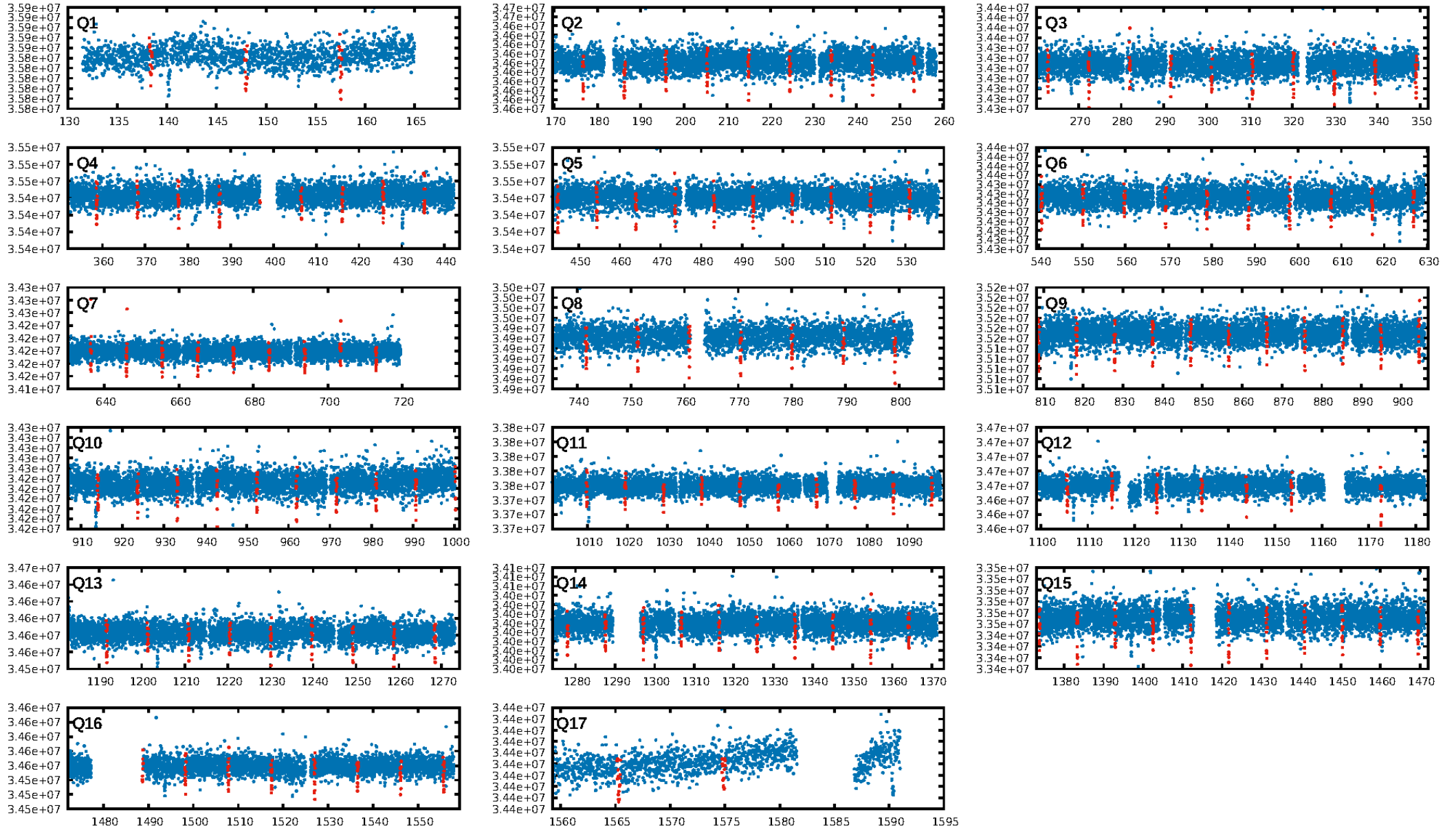
DV Fit Results:

Period = 9.57666 [0.00001] d
Epoch = 138.3769 [0.0011] BKJD
Rp/R* = 0.0286 [0.0018]
a/R* = 11.68 [2.88]
b = 0.86 [0.08]
Seff = 121.40 [33.71]
Teff = 846 [59] K
Rp = 3.36 [0.63] Re
a = 0.0848 [0.0144] AU
Ag = 8.72 [4.10] [1.88σ]
Teffp = 2249 [219] K [6.19σ]

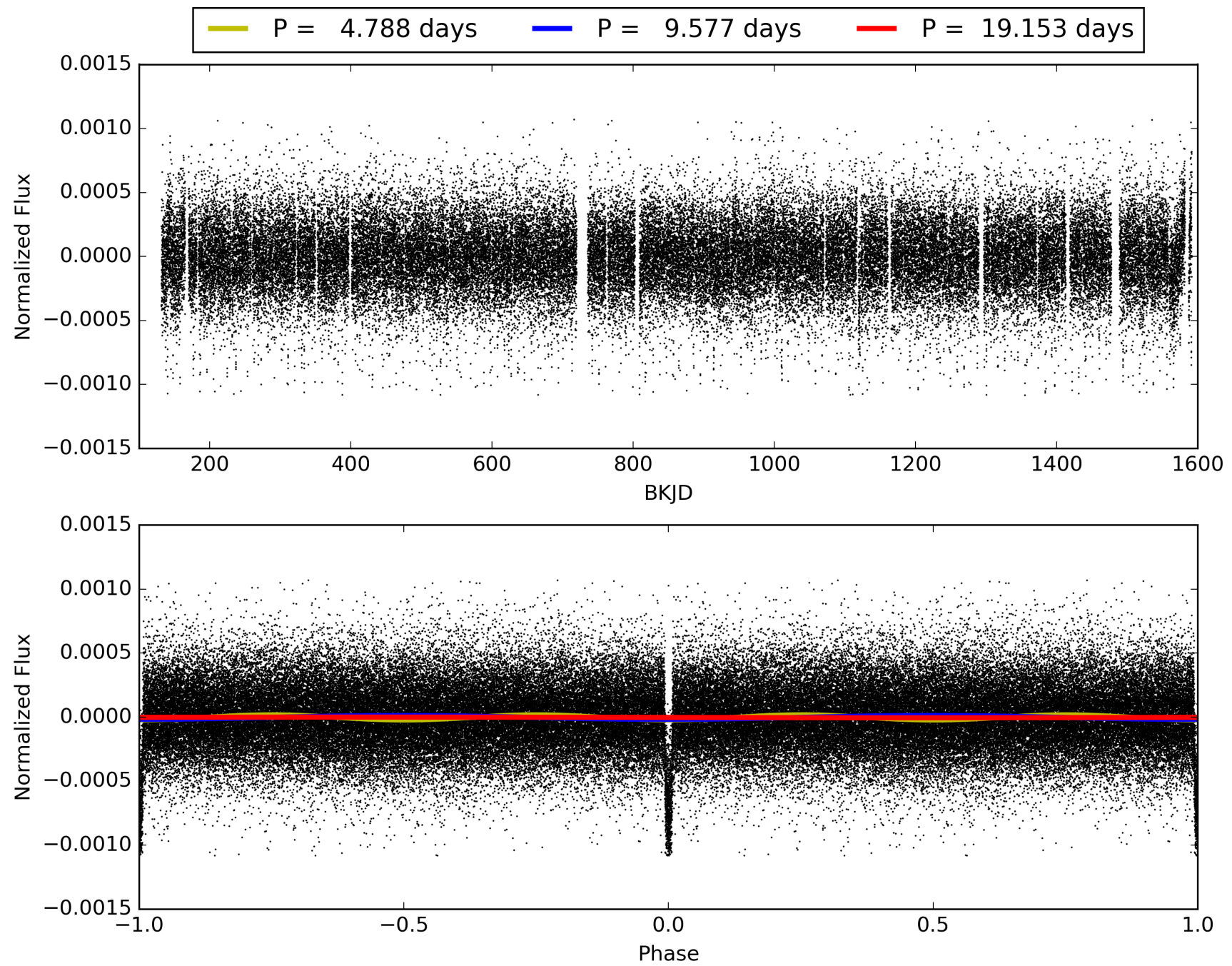
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 100.0% [61.80σ]
ModelChiSquare2-sig: 96.5%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 0.00e+00
RollingBand-fgt: 1.00 [139/139]
GhostDiagnostic-chr: 5.036
Centroid-sig: 23.9%
Centroid-so: 0.367 arcsec [2.05σ]
OotOffset-rm: 0.103 arcsec [0.76σ]
KicOffset-rm: 0.106 arcsec [0.81σ]
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 009941859-01, PDC Light Curves

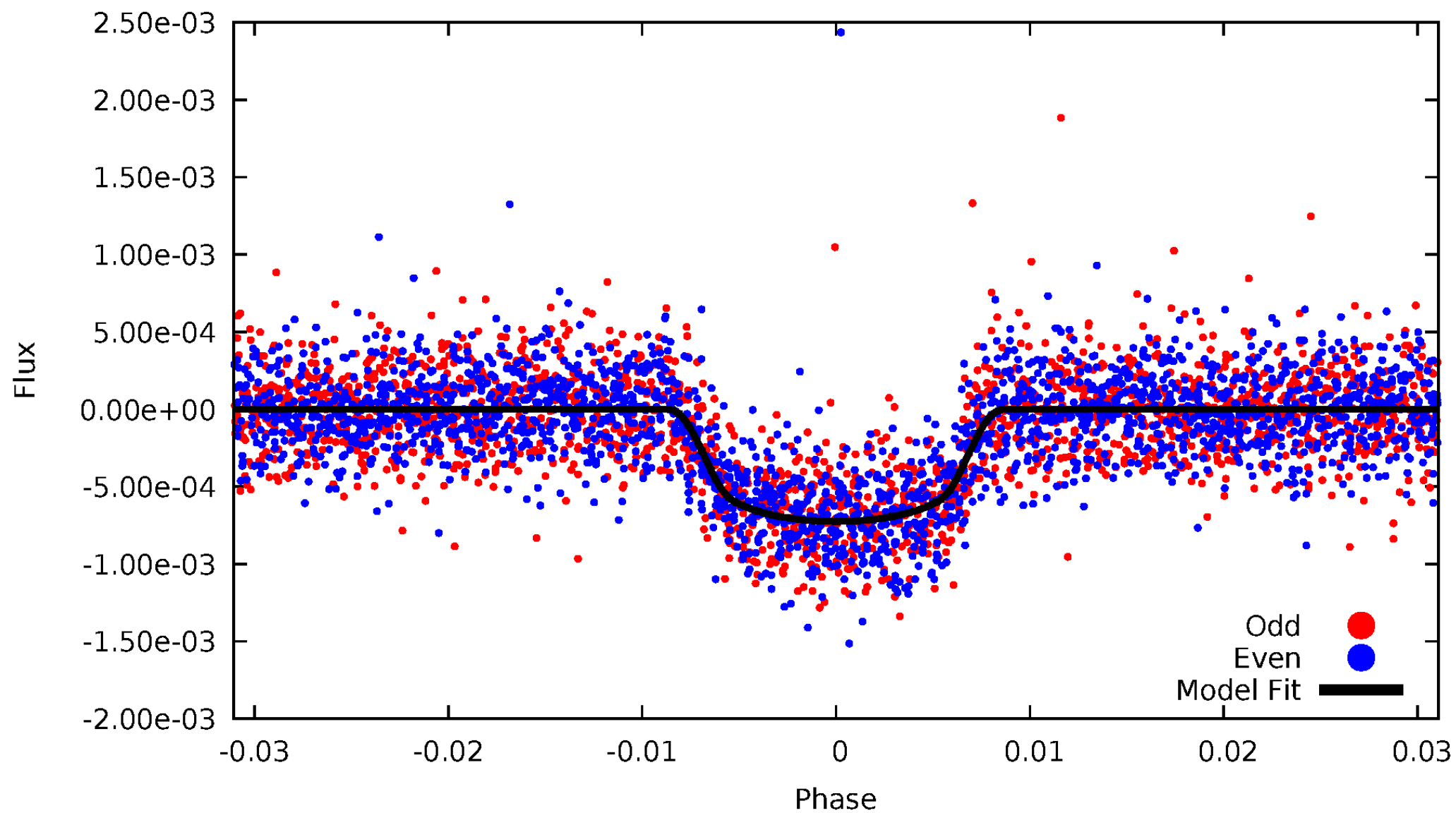


TCE 009941859-01



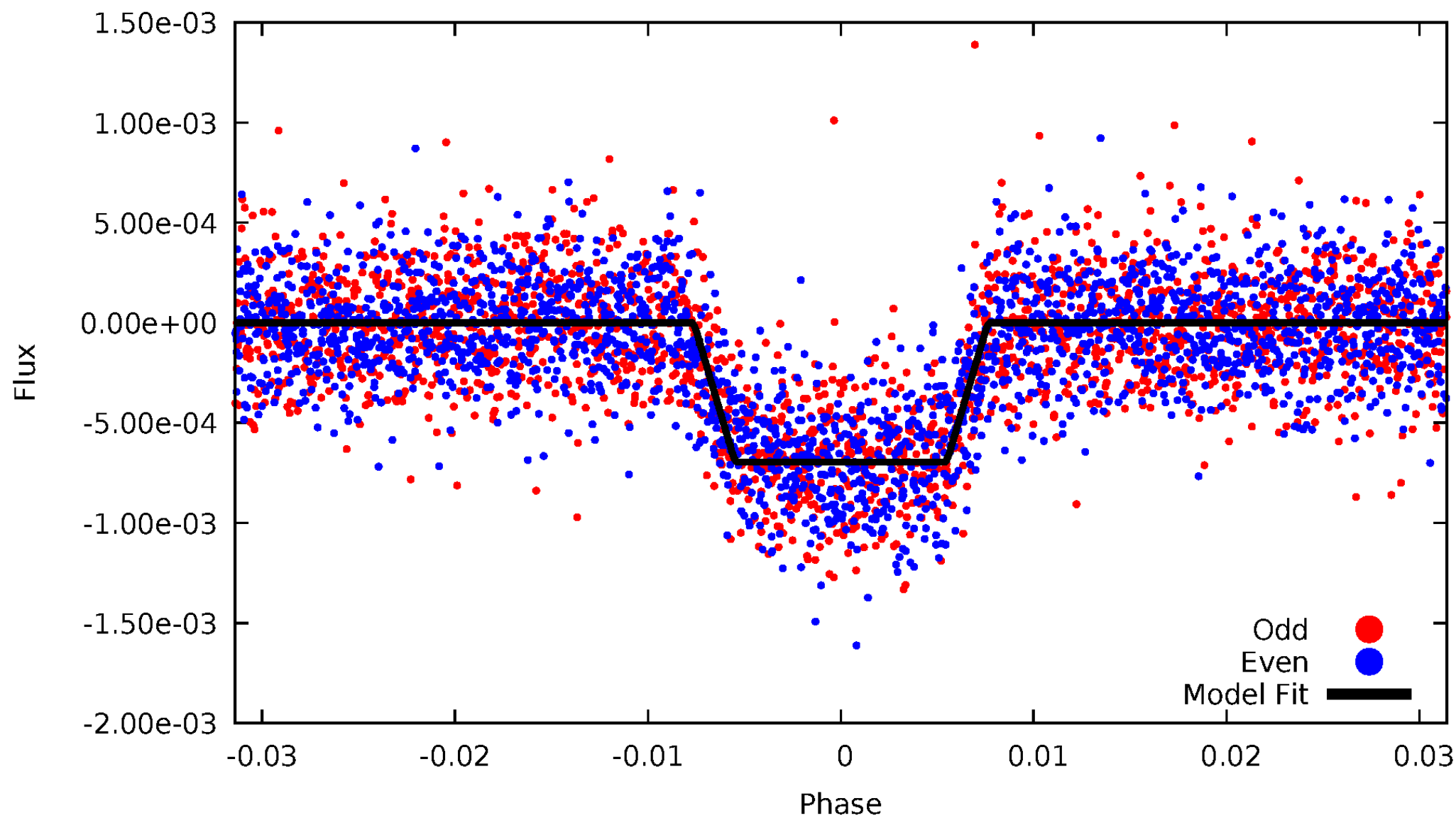
DV Odd/Even

TCE 009941859-01



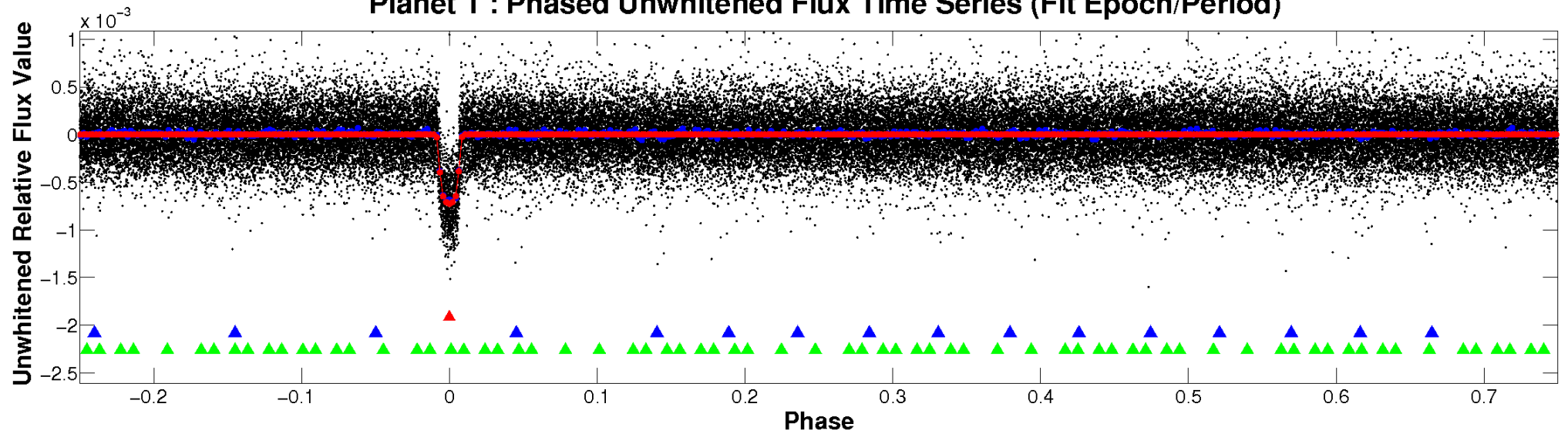
ALT Odd/Even

TCE 009941859-01

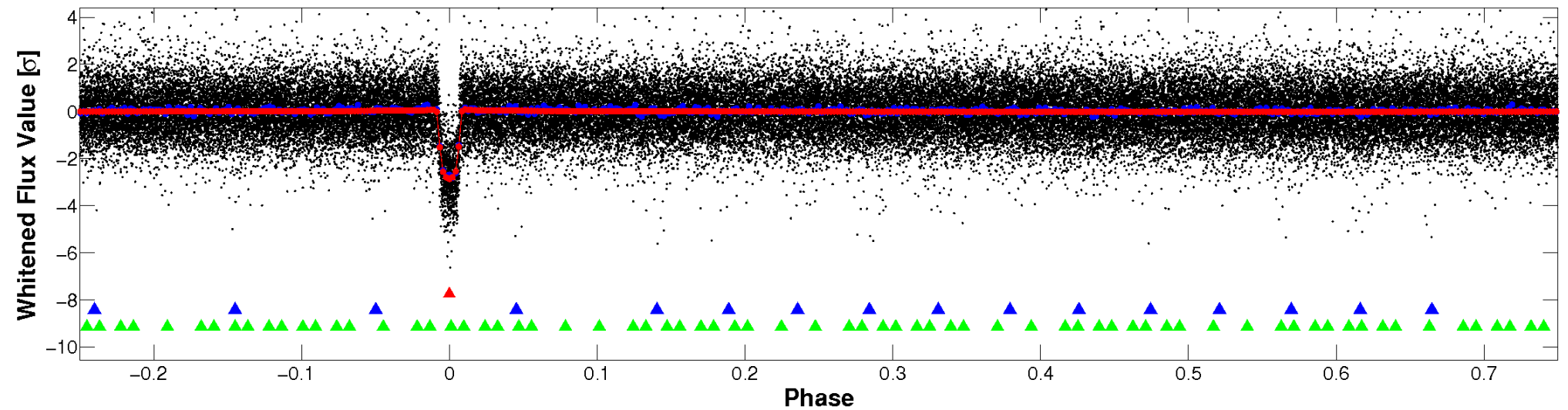


Non-Whitened Vs. Whitened Light Curve

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

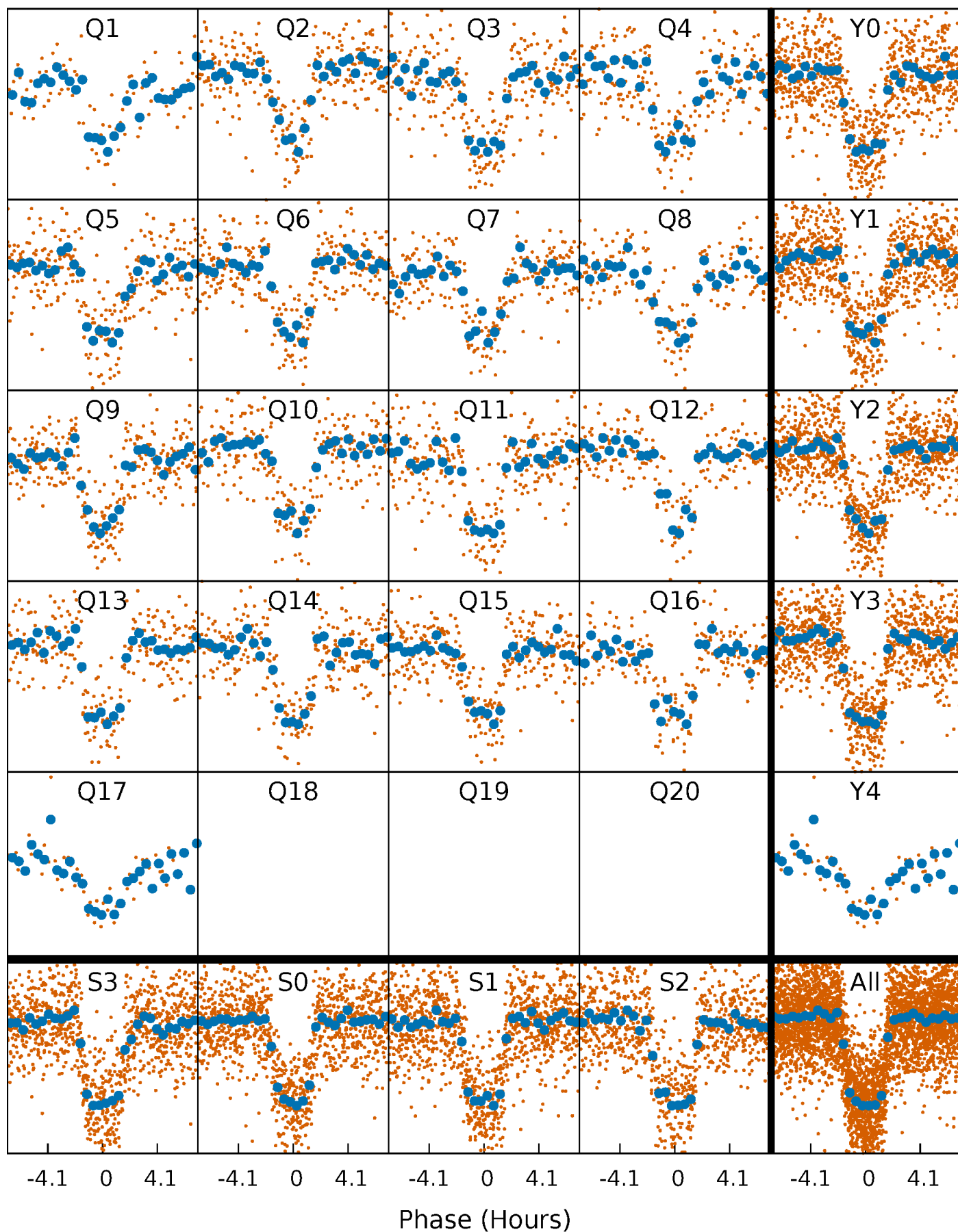


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



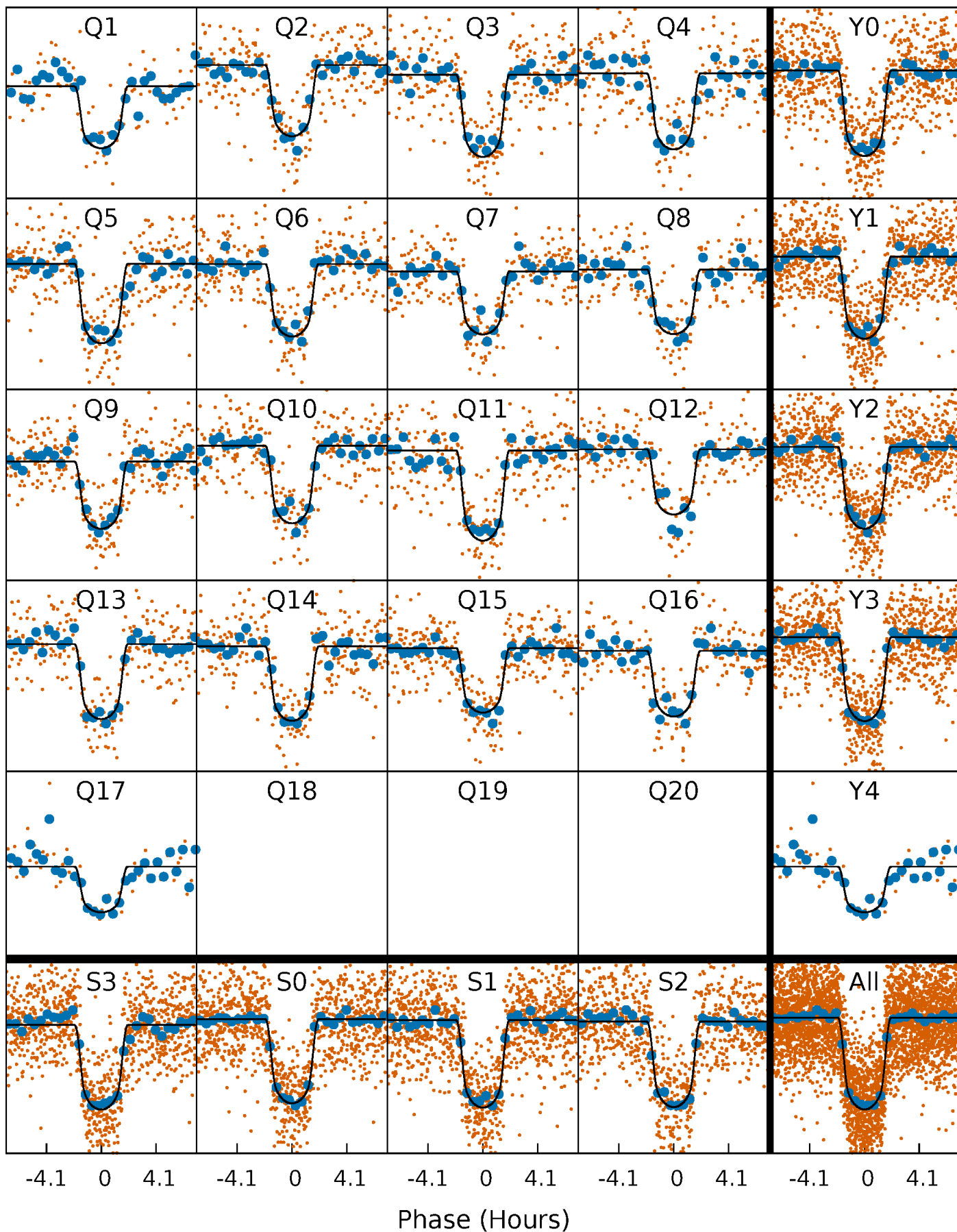
PDC Quarter-Phased Transit Curves

TCE 009941859-01 P= 9.576664 Days $T_0=138.376937$ (BKJD)



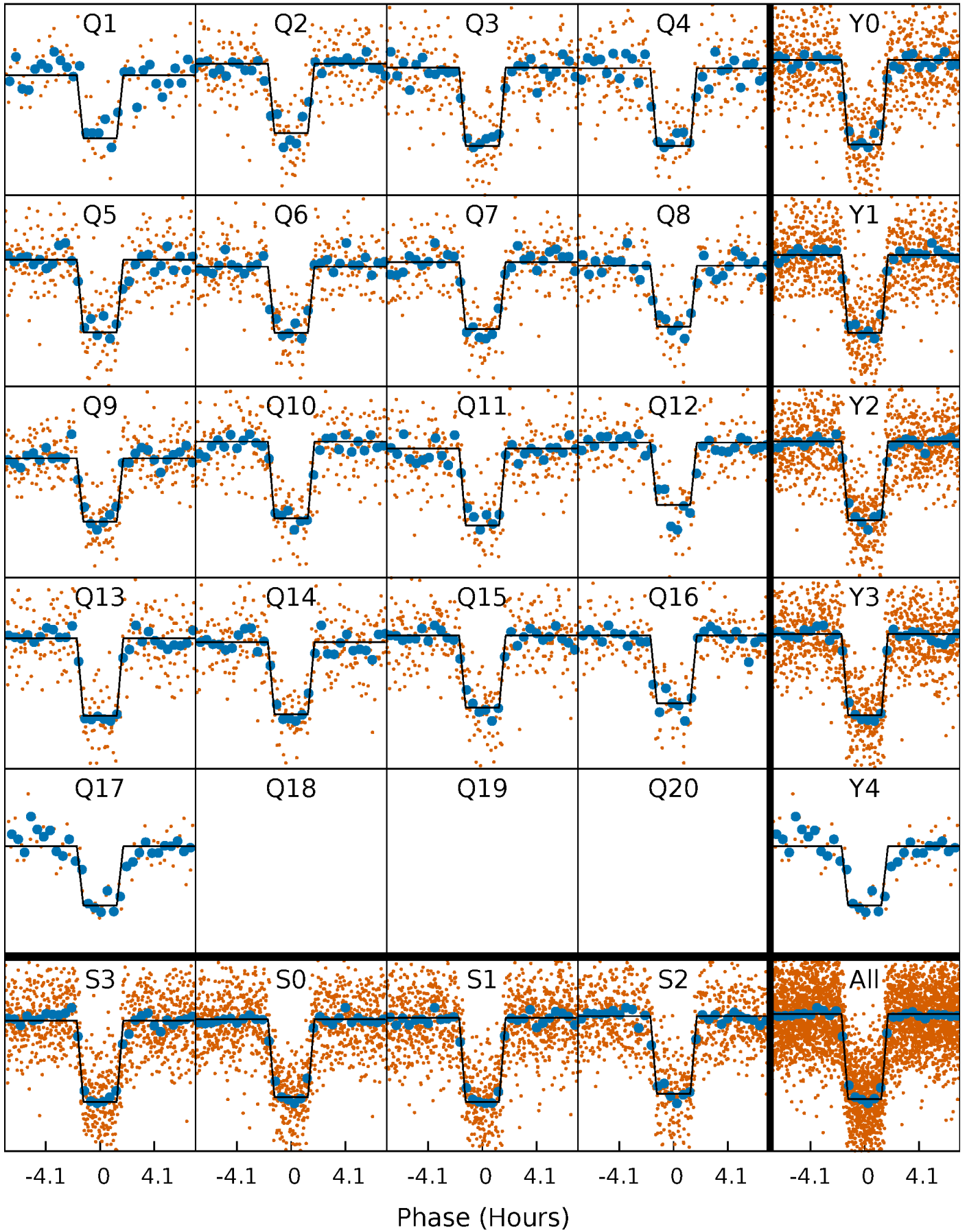
DV Quarter-Phased Transit Curves

TCE 009941859-01 P= 9.576664 Days $T_0=138.376937$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

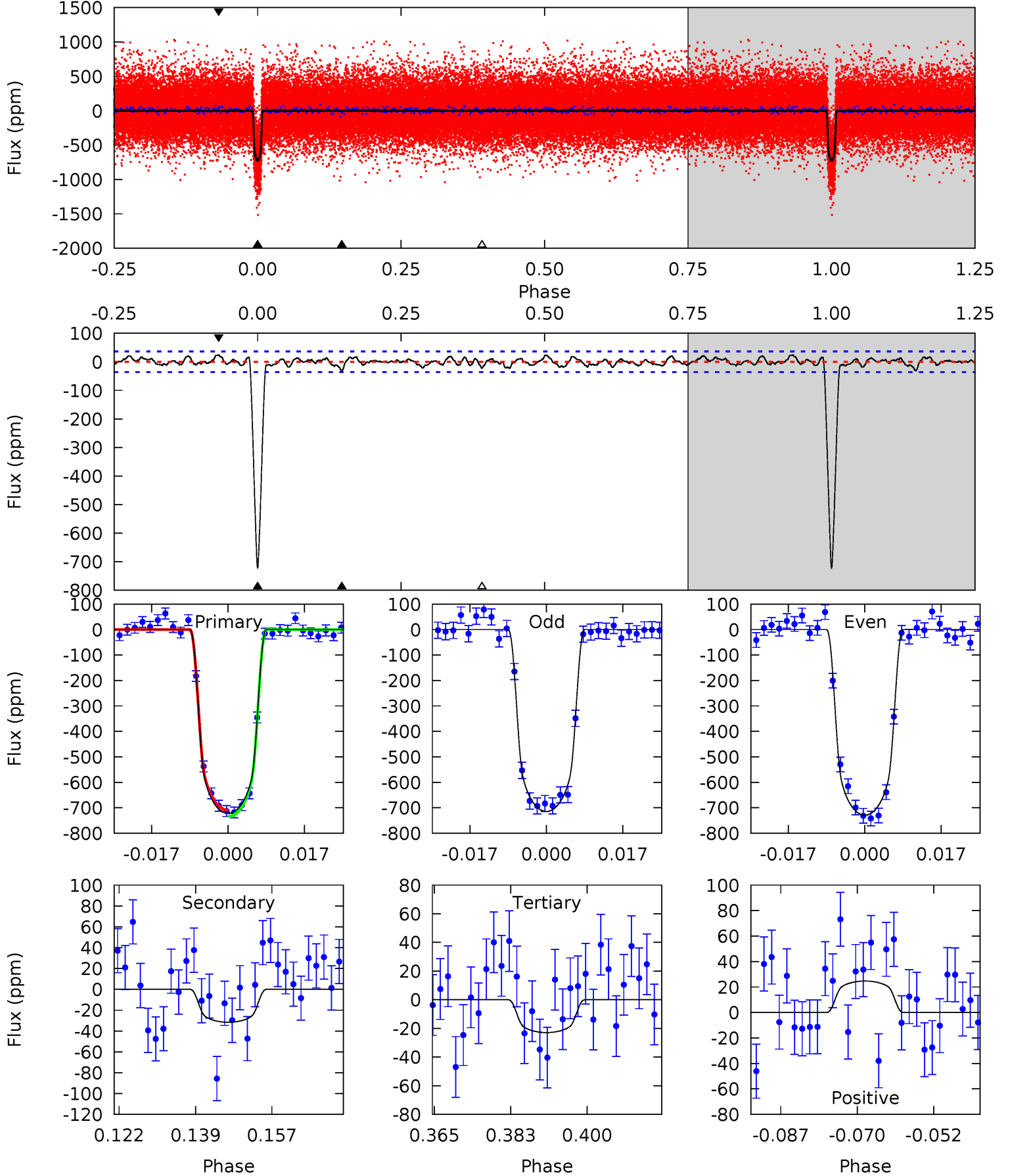
TCE 009941859-01 P= 9.576619 Days $T_0=138.380588$ (BKJD)



DV Model-Shift Uniqueness Test

009941859-01, P = 9.576664 Days, E = 128.800273 Days

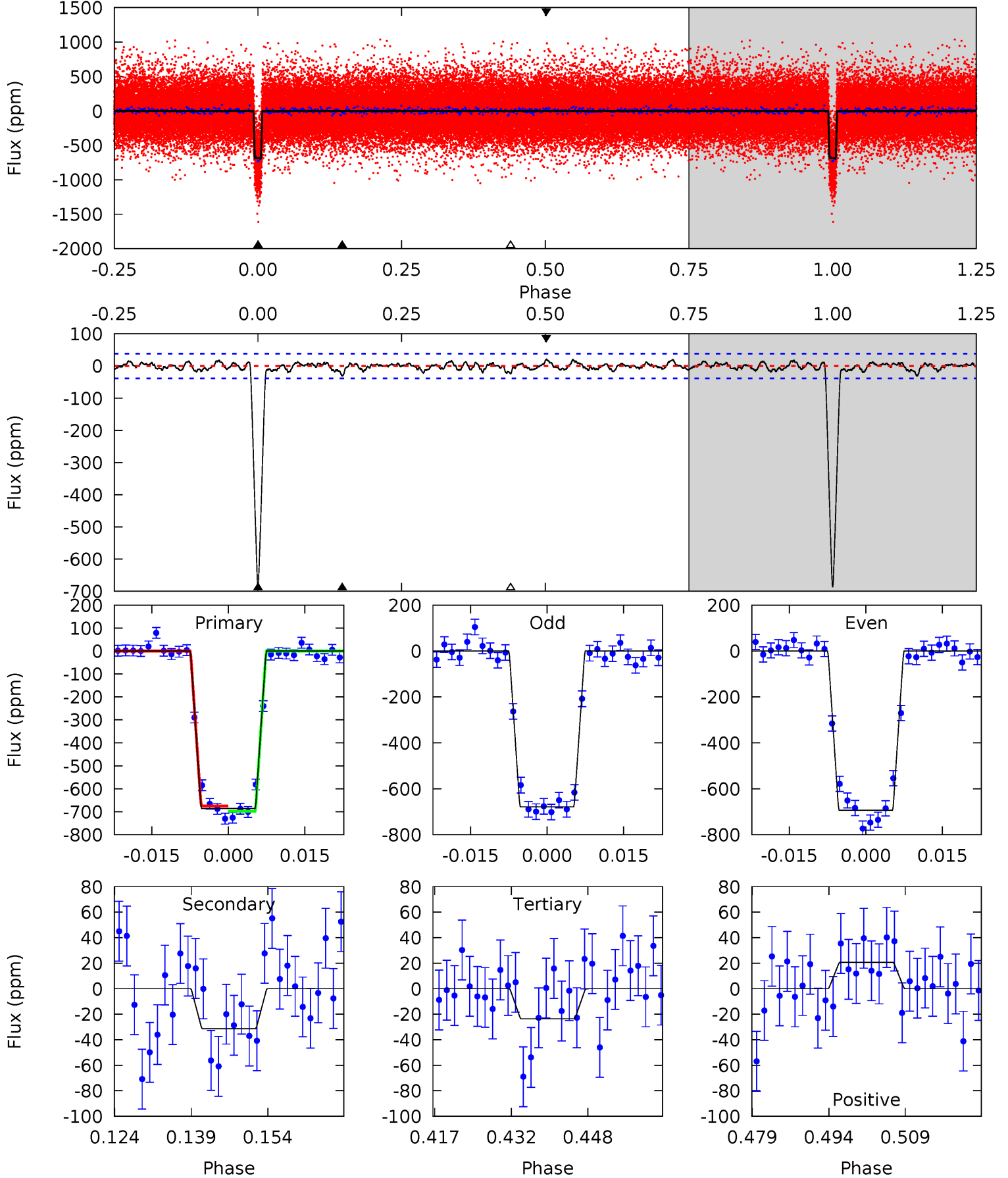
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
98.4	4.31	3.12	3.37	4.92	2.38	1.30	95.3	95.0	1.19	0.94	1.01	0.99	0.03	1.67



Alt Model-Shift Uniqueness Test

009941859-01, P = 9.576619 Days, E = 128.803969 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
88.4	4.03	3.03	2.66	4.94	2.42	1.08	85.4	85.8	1.00	1.37	0.98	1.01	0.03	1.46



Stellar Parameters For KIC 009941859

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	$M(M_{\odot})$	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	5386^{+80}_{-72}	$4.322^{+0.159}_{-0.130}$	$0.180^{+0.150}_{-0.100}$	$1.076^{+0.191}_{-0.173}$	$0.886^{+0.063}_{-0.037}$	$1.002^{+0.741}_{-0.368}$
	+1%/-1%	+4%/-3%	+83%/-56%	+18%/-16%	+7%/-4%	+74%/-37%
Source	SPE90	SPE90	SPE90	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

Secondary Eclipse Parameters for KIC 009941859-01 / KOI 0528.01

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-32 ± 7	$3.35^{+0.41}_{-0.38}$	1180^{+60}_{-58}	3018^{+116}_{-125}	11^{+4}_{-3}
Alt.	-31 ± 8	$3.07^{+0.38}_{-0.36}$	1178^{+59}_{-59}	3092^{+119}_{-149}	13^{+5}_{-4}

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

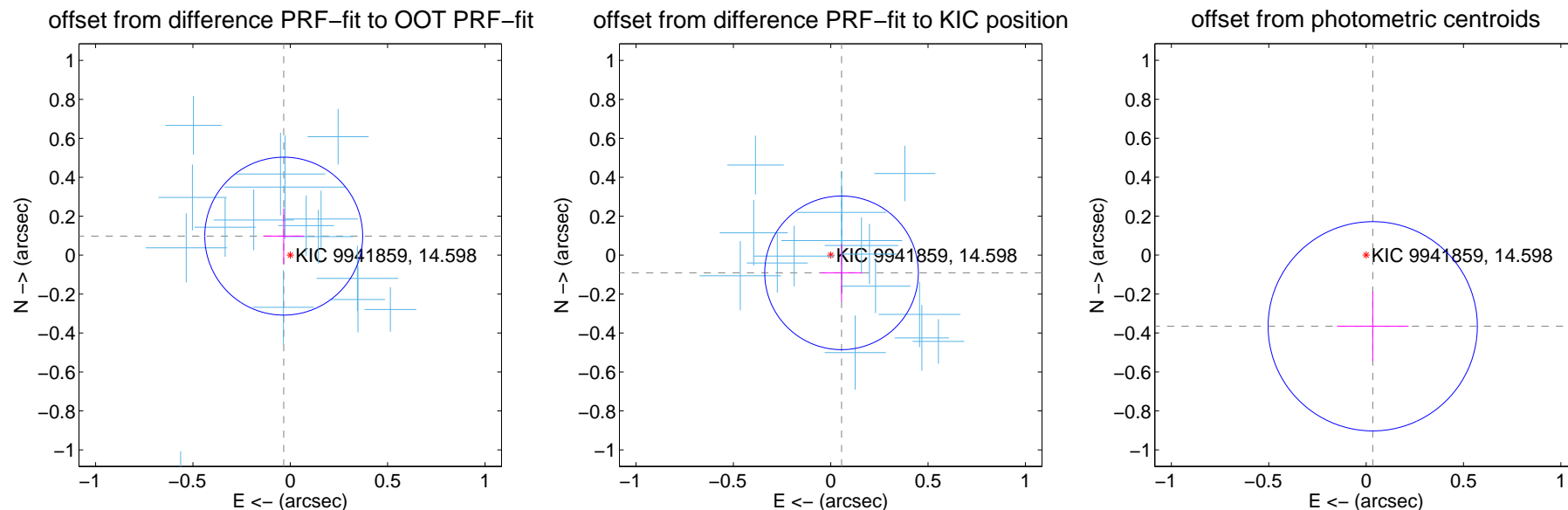
DV Centroid Data

Supplemental centroid analysis for 009941859-01. Kepler magnitude: 14.60. Transit SNR 74.30

There are 17 quarters with good PRF difference image offsets

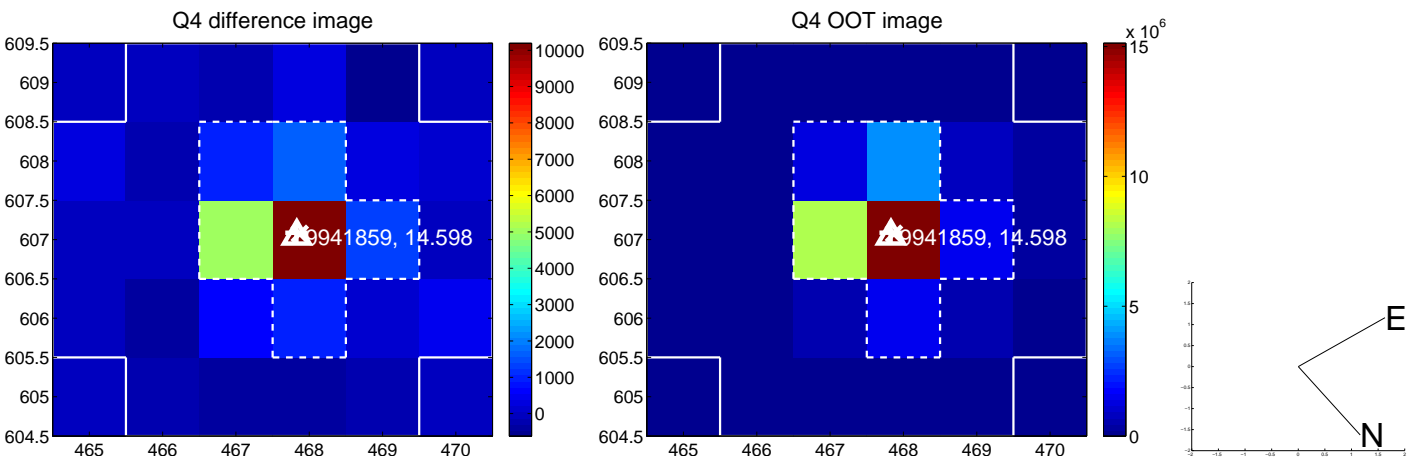
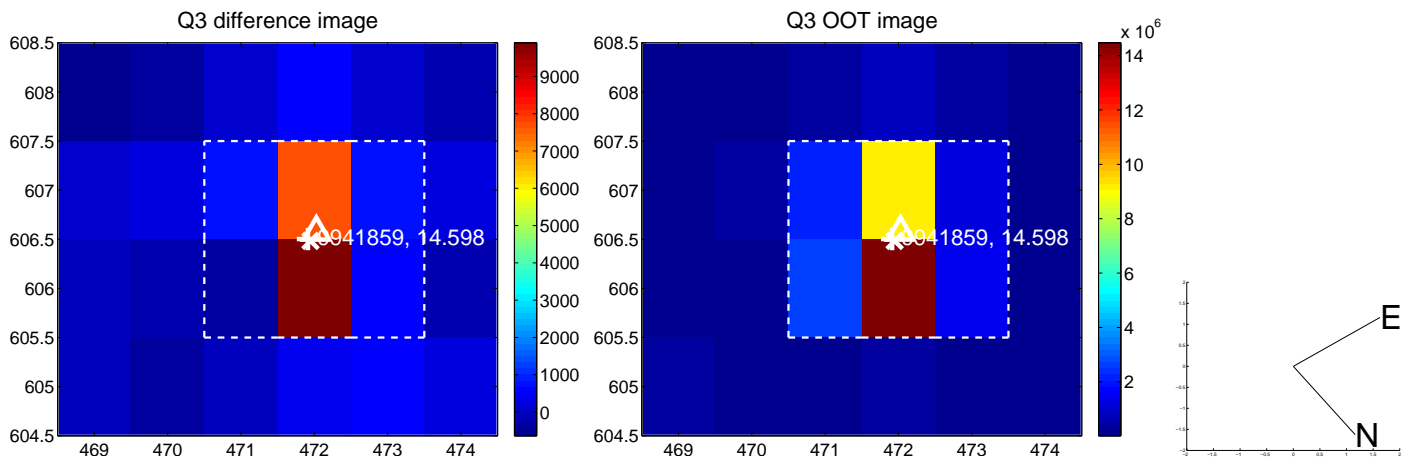
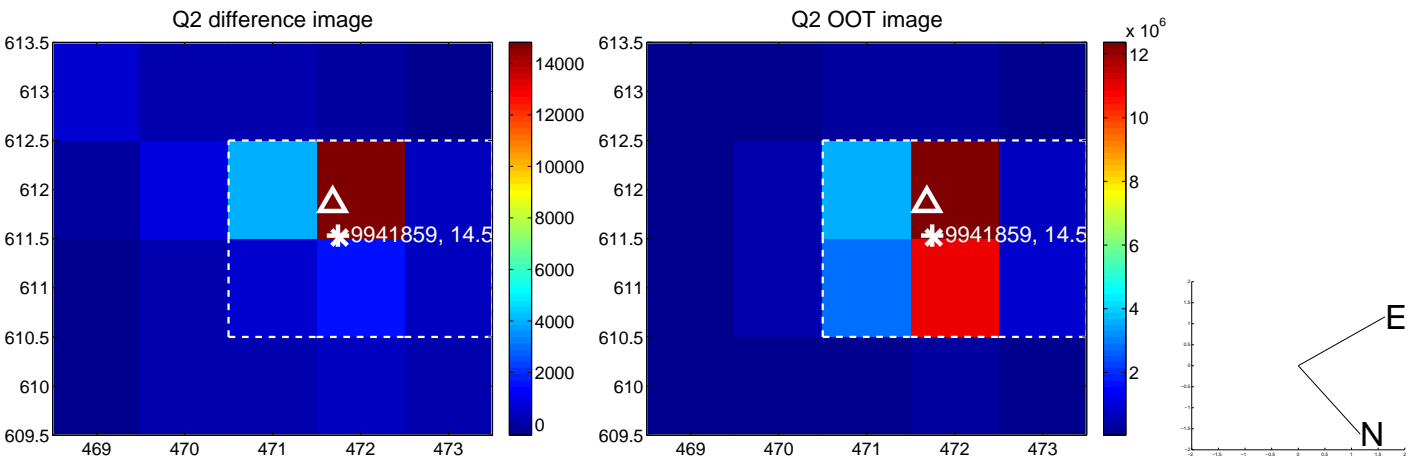
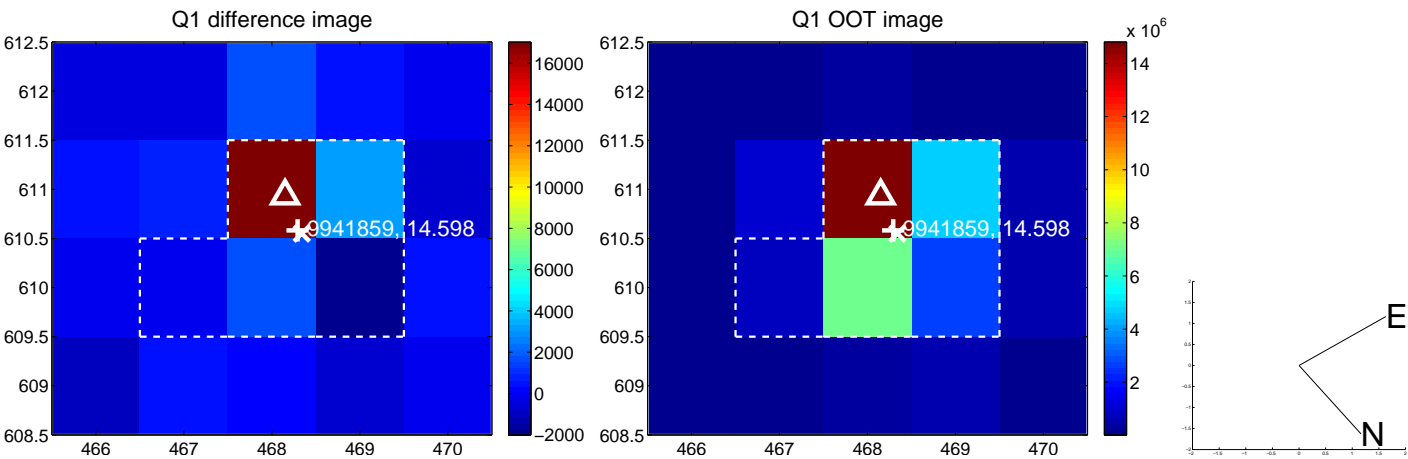
The direct PRF centroid is offset from the target star catalog position by about 0.29 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.103 ± 0.135	0.76	0.034 ± 0.105	0.098 ± 0.142
PRF-fit source offset from KIC position	0.106 ± 0.132	0.81	-0.056 ± 0.106	-0.091 ± 0.146
photometric centroid source offset	0.37 ± 0.18	2.05	-0.03 ± 0.18	-0.37 ± 0.18

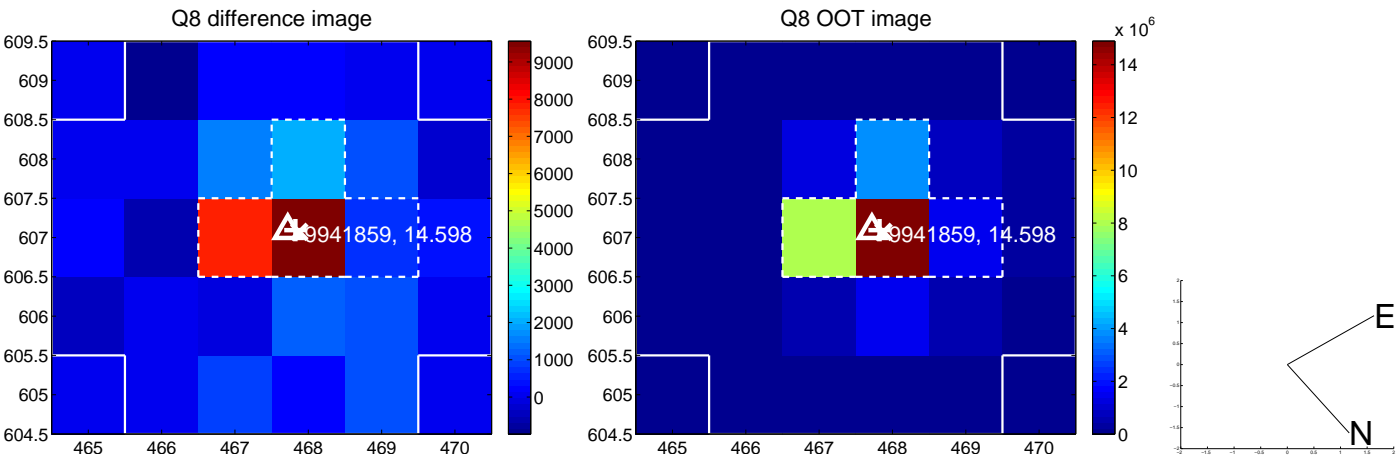
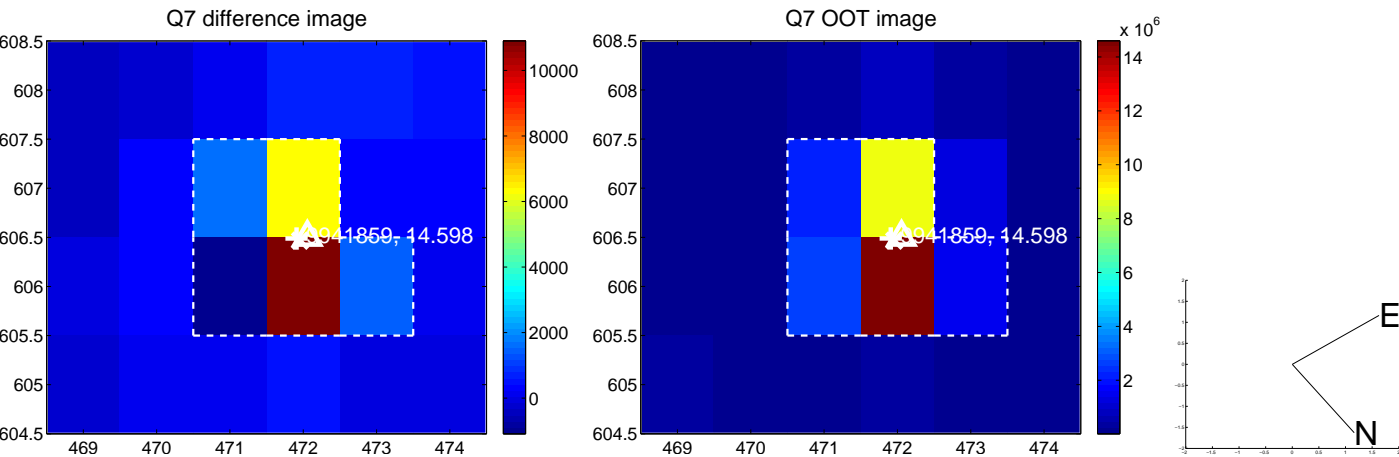
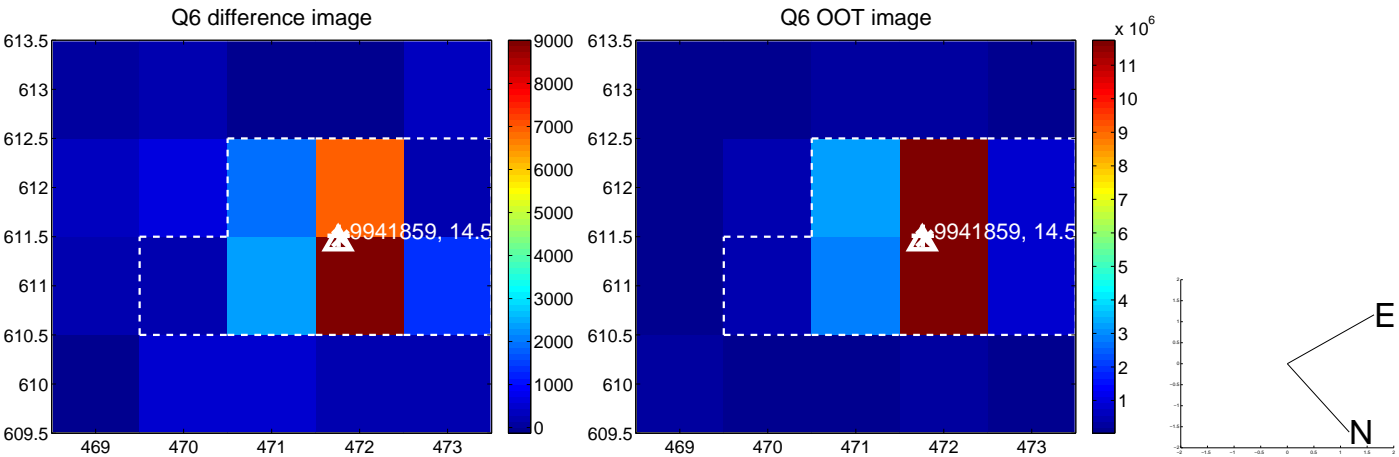
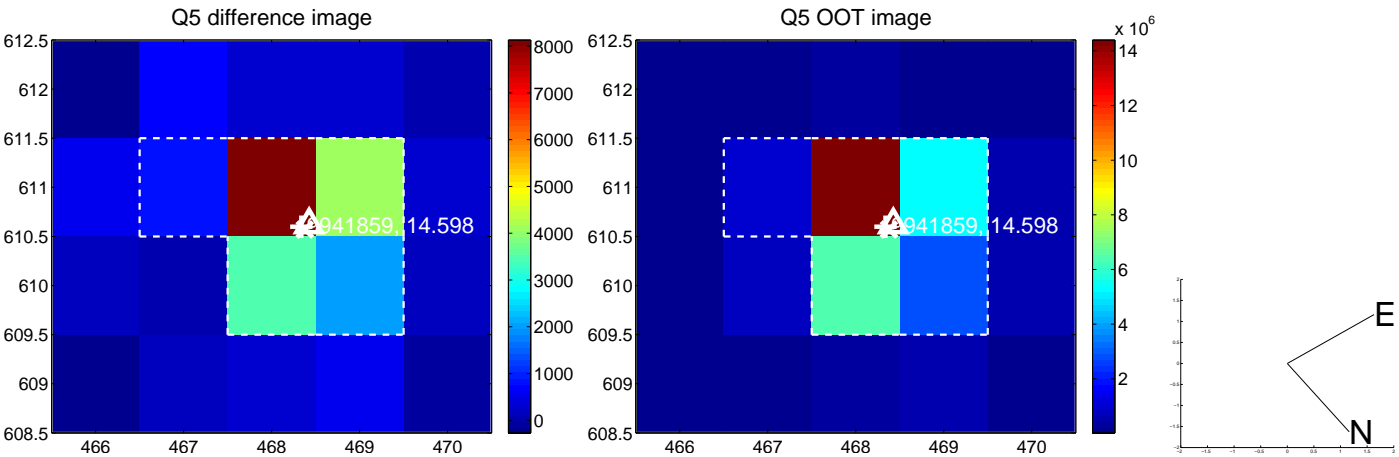


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

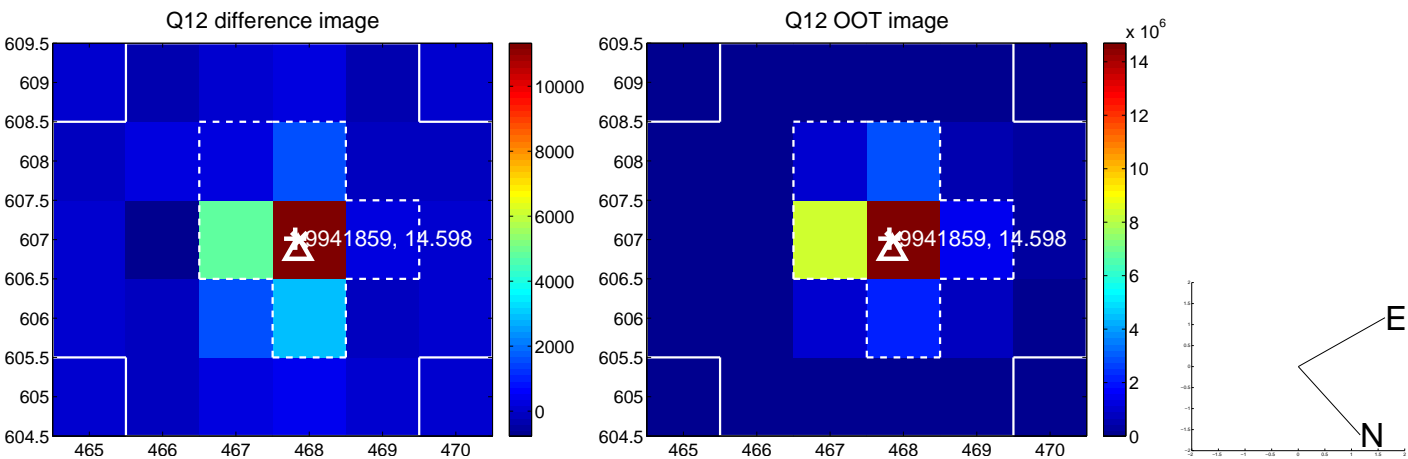
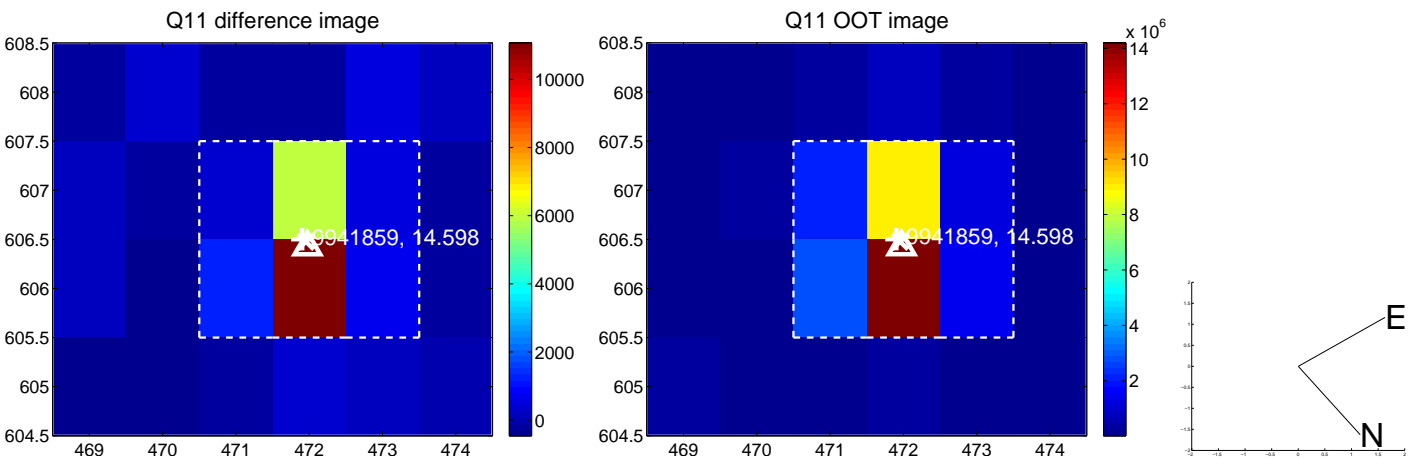
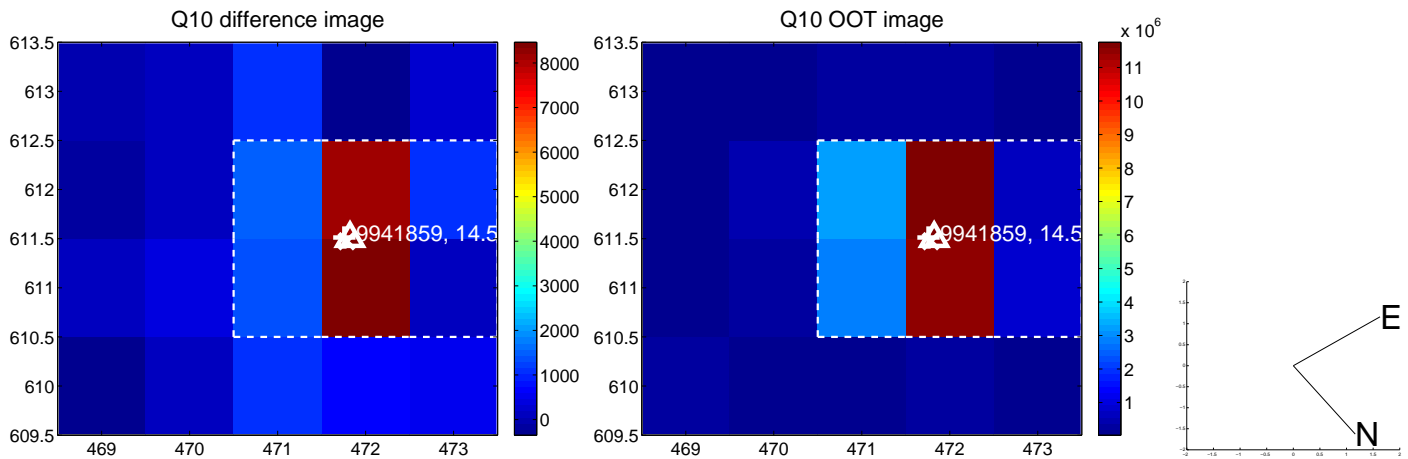
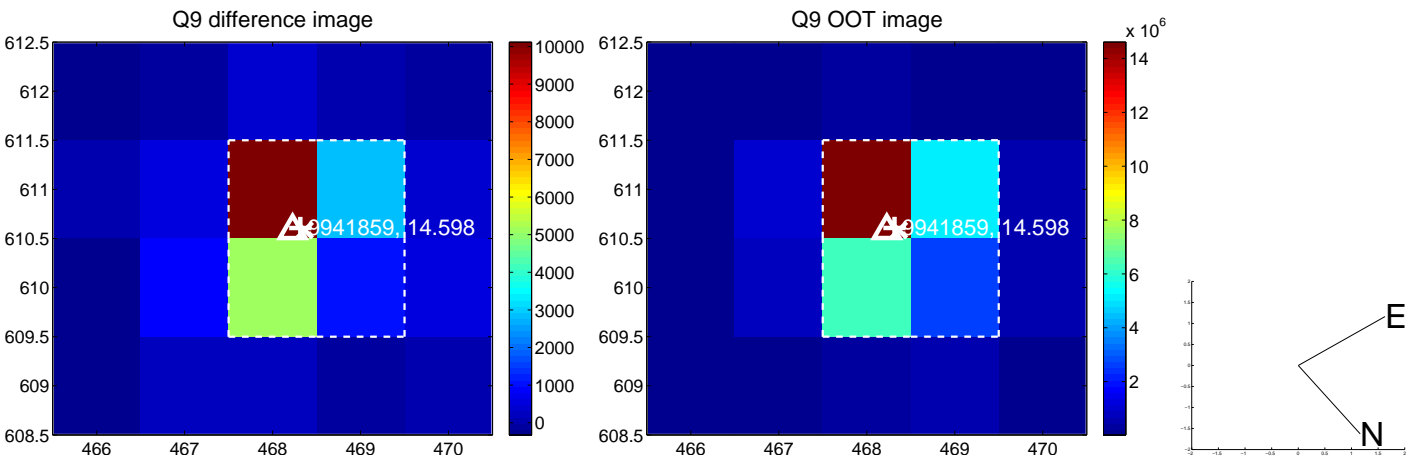
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



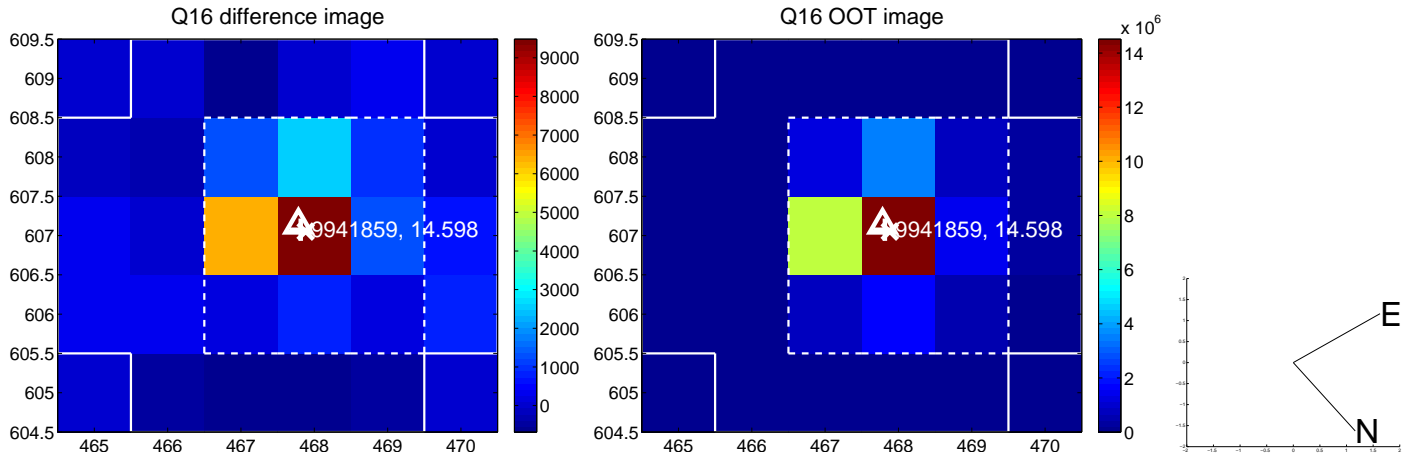
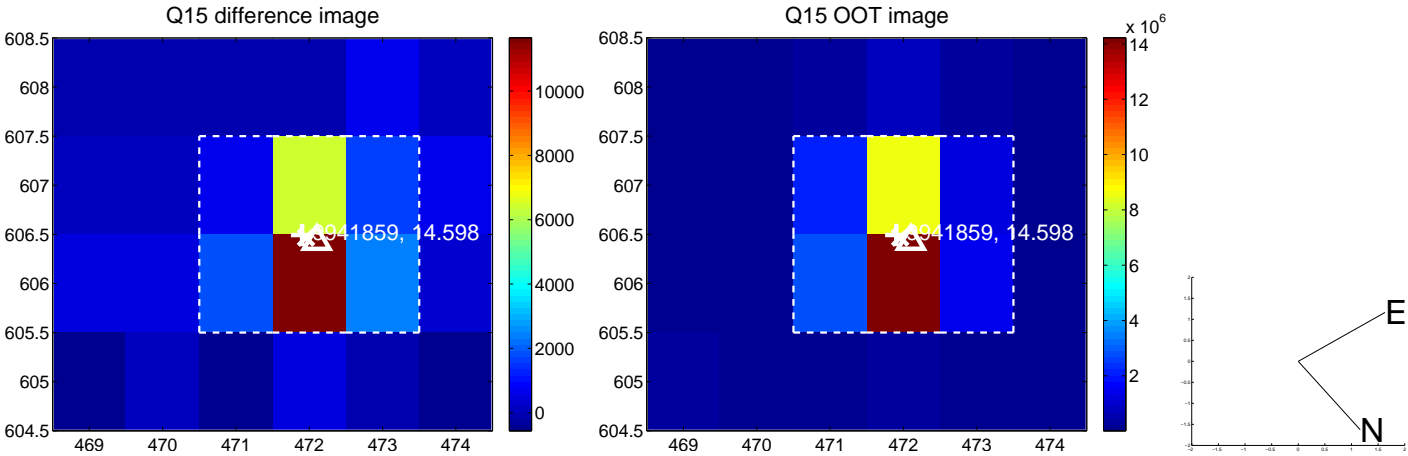
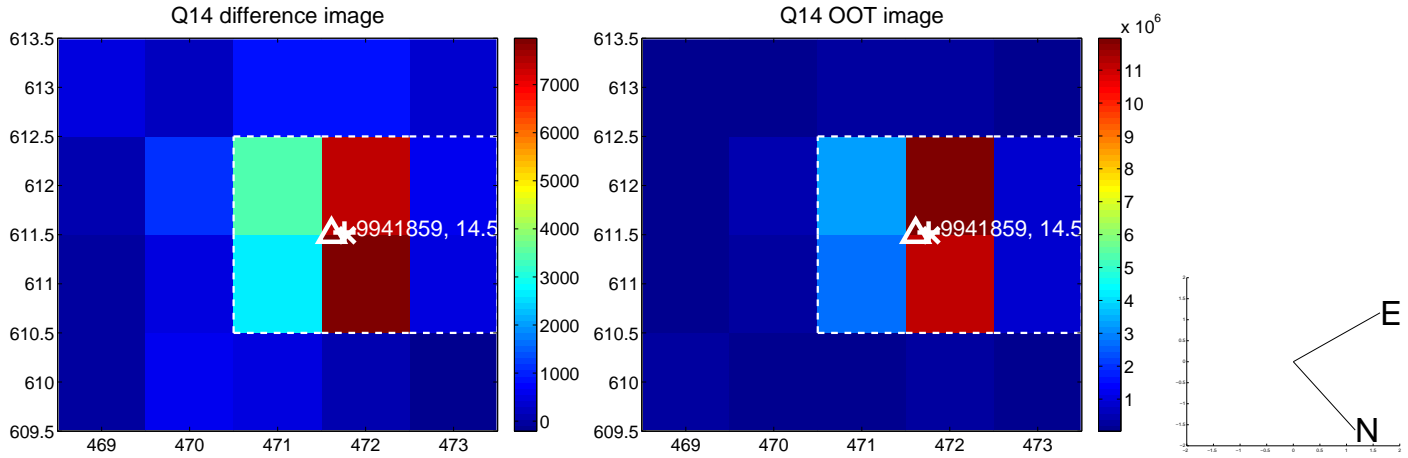
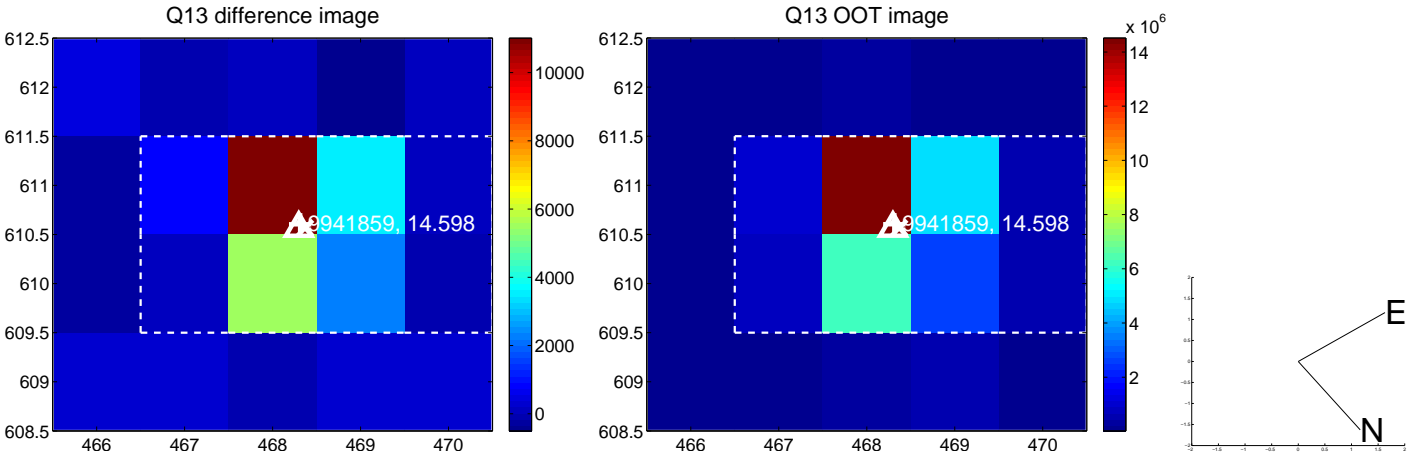
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



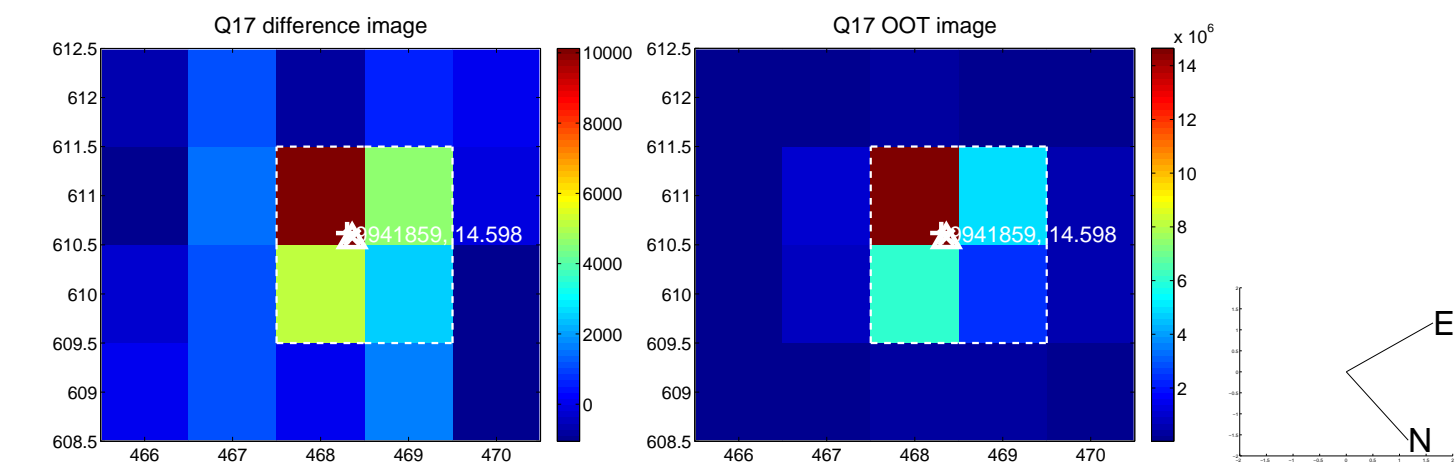
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



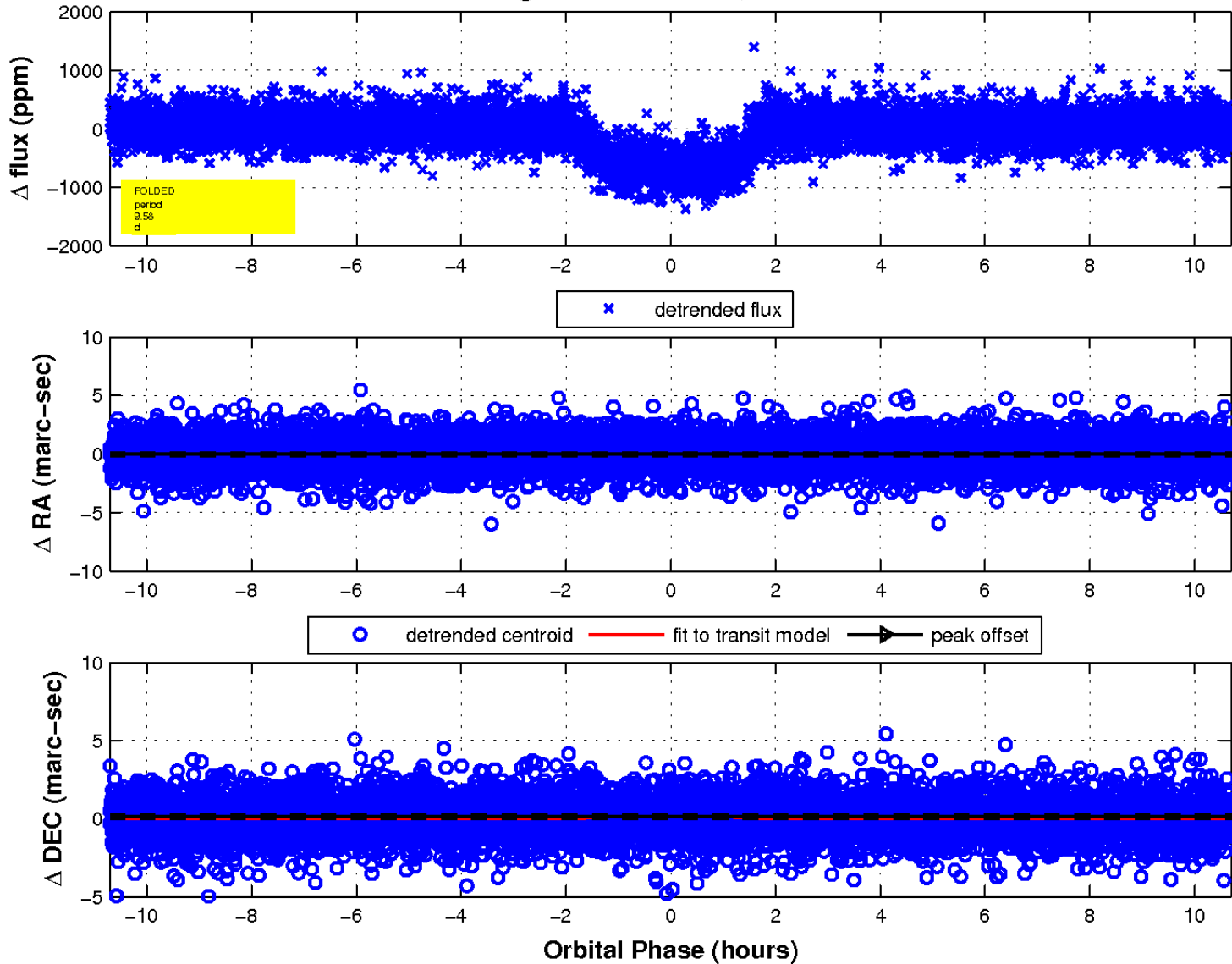
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

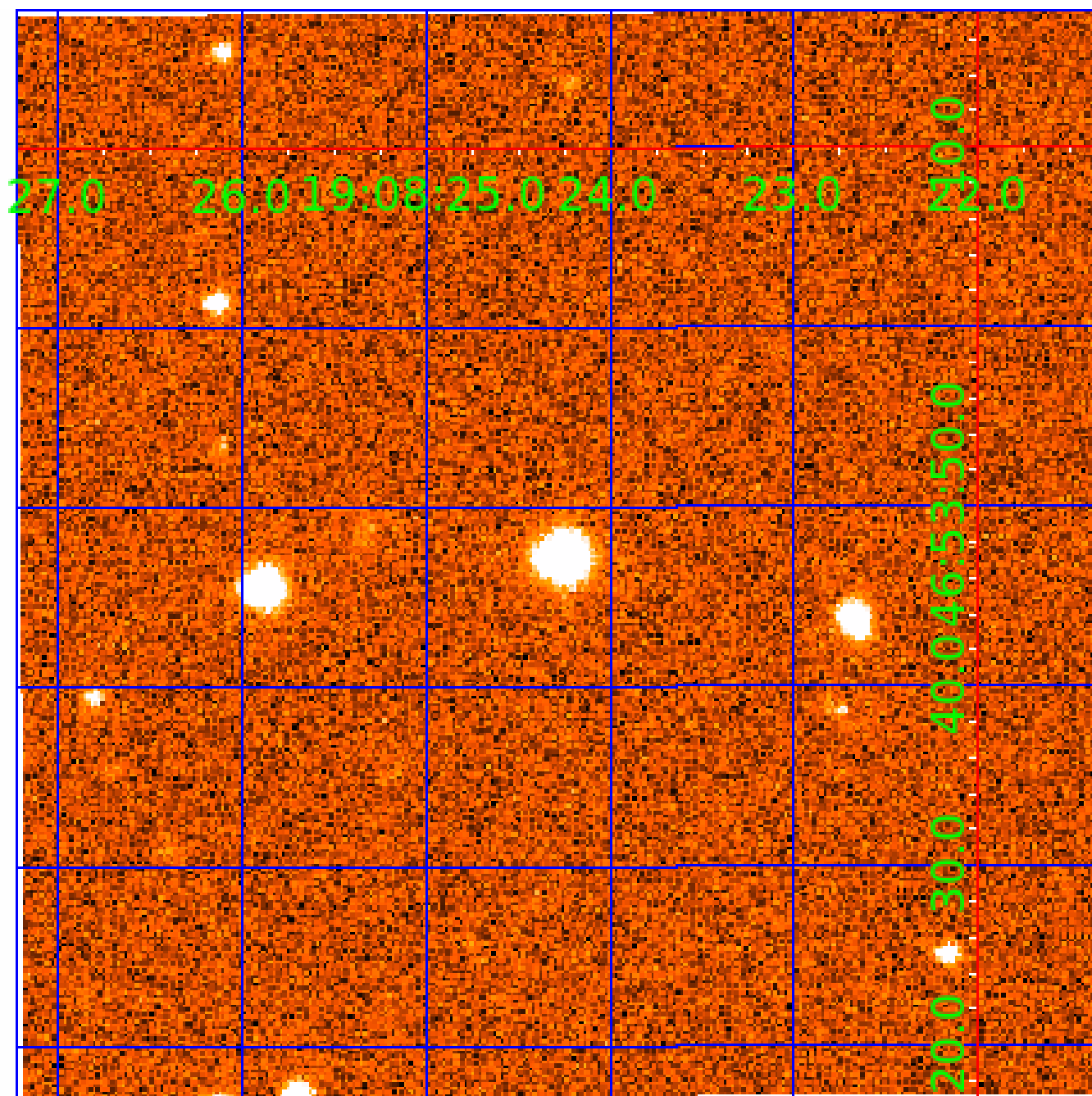


fluxWeightedCentroids, Planet 1 of 3



UKIRT Image

Declination



KIC 009941859

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})
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Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009941859-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
009941859-02	OBS	PC	1.00	0	0	0	0	NO_COMMENT
009941859-03	OBS	PC	1.00	0	0	0	0	NO_COMMENT

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.

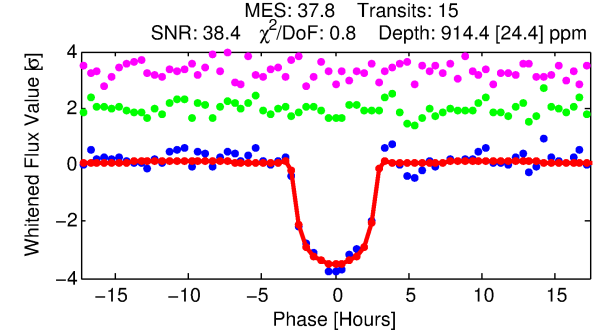
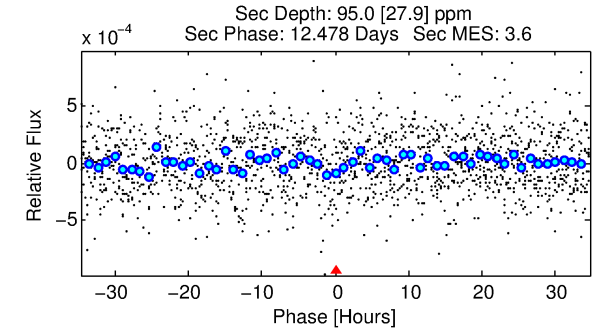
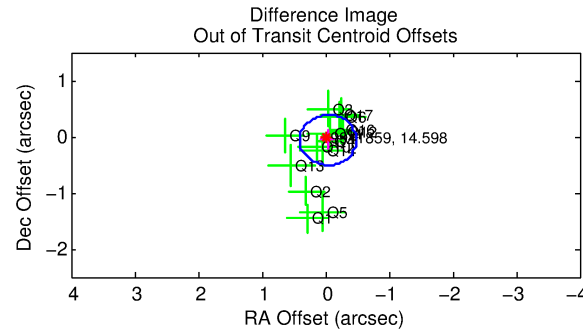
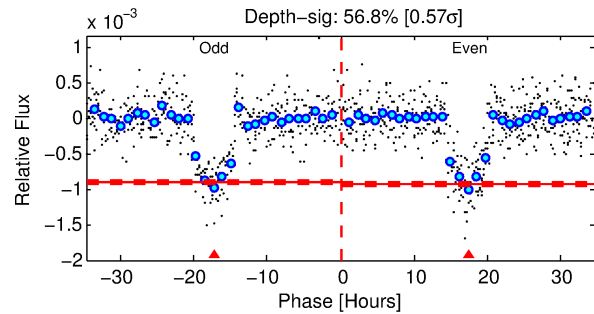
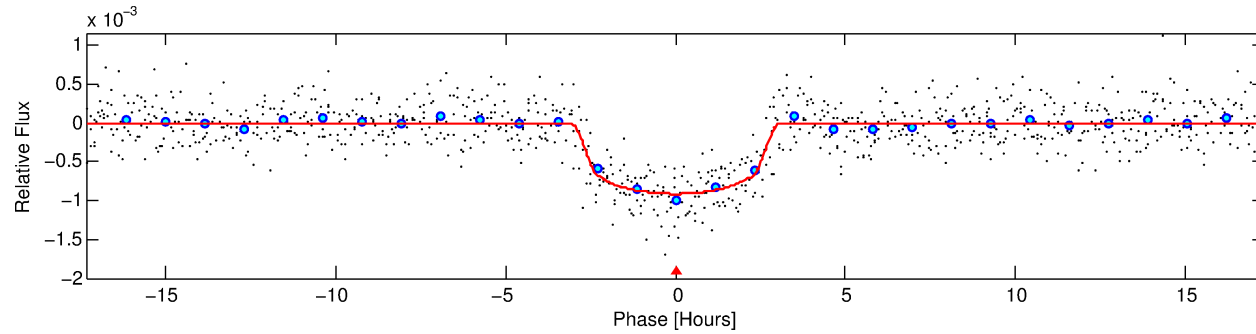
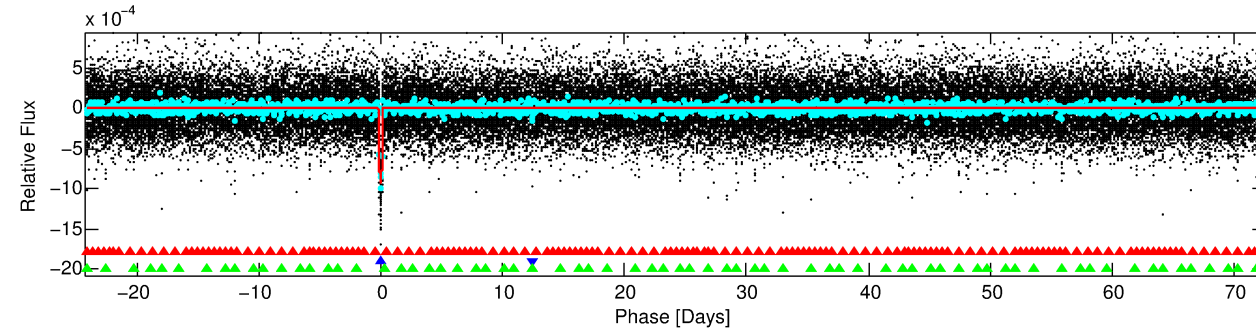
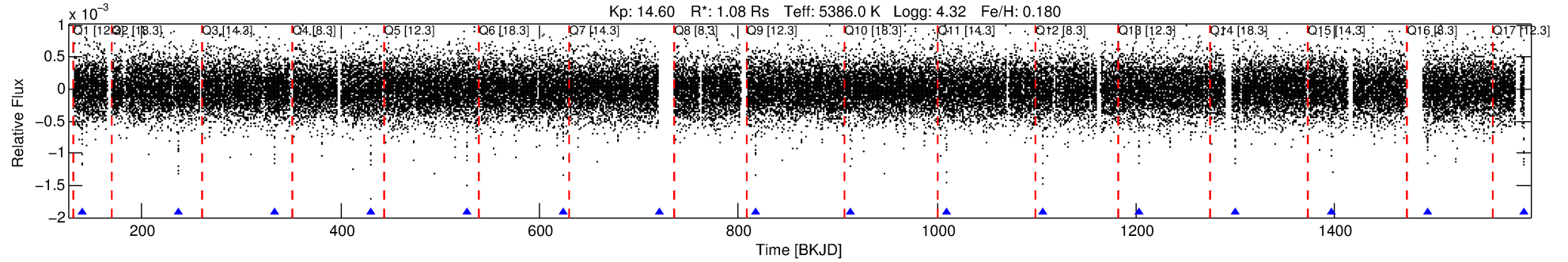
Ephemeris Match Information For 009941859-02

No Significant Match Found

DV One-Page Summary

KIC: 9941859 Candidate: 2 of 3 Period: 96.678 d
KOI: K00528.02 Name: Kepler-178d Corr: 0.994

Kp: 14.60 R*: 1.08 Rs Teff: 5386.0 K Logg: 4.32 Fe/H: 0.180



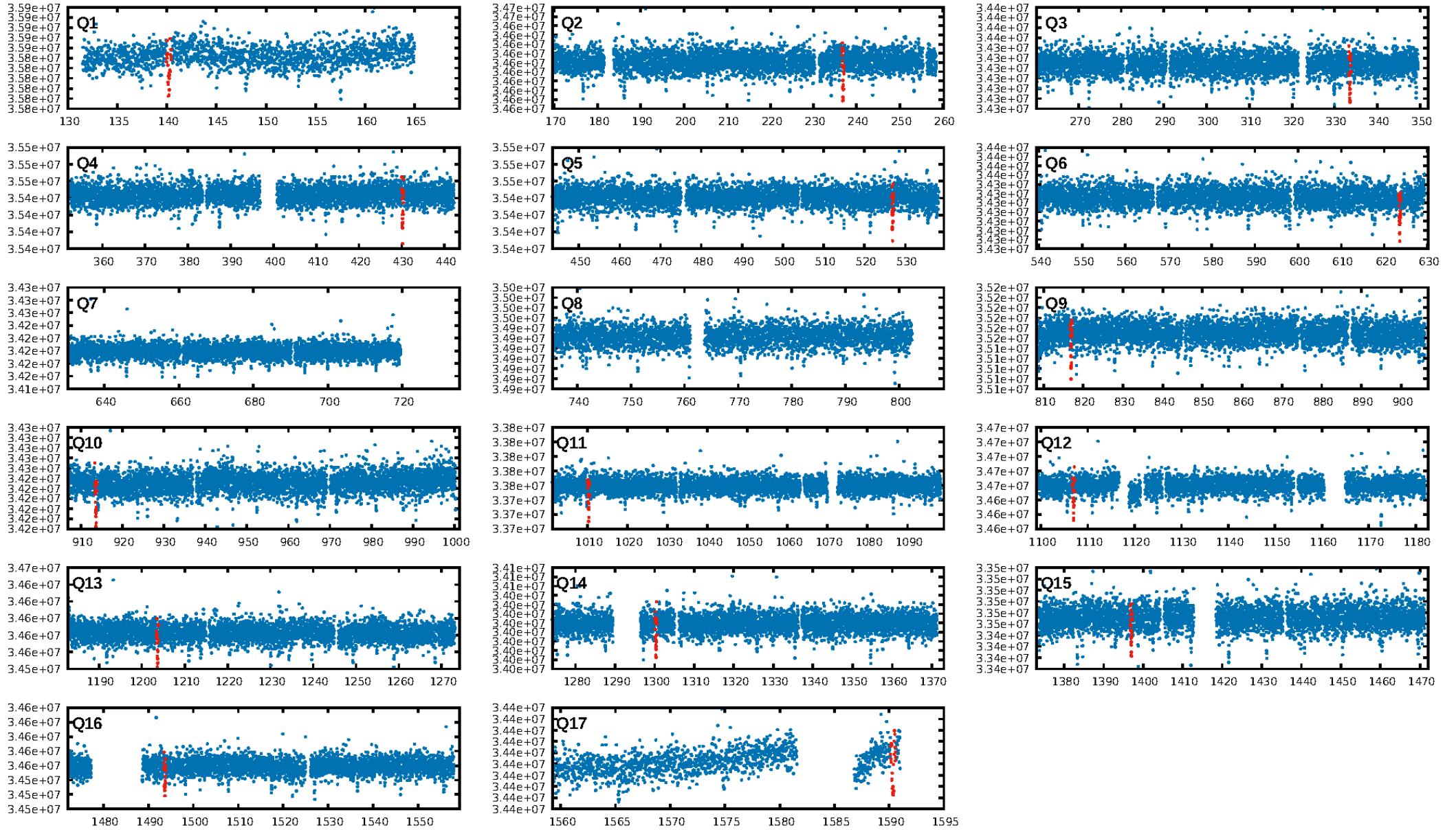
DV Fit Results:

Period = 96.67785 [0.00033] d
Epoch = 140.1870 [0.0030] BKJD
Rp/R* = 0.0300 [0.0046]
a/R* = 91.82 [53.88]
b = 0.74 [0.37]
Seff = 5.56 [1.55]
Teff = 392 [27] K
Rp = 3.52 [0.83] Re
a = 0.3961 [0.0673] AU
Ag = 660.61 [332.75] [1.98σ]
Teffp = 3070 [329] K [8.11σ]

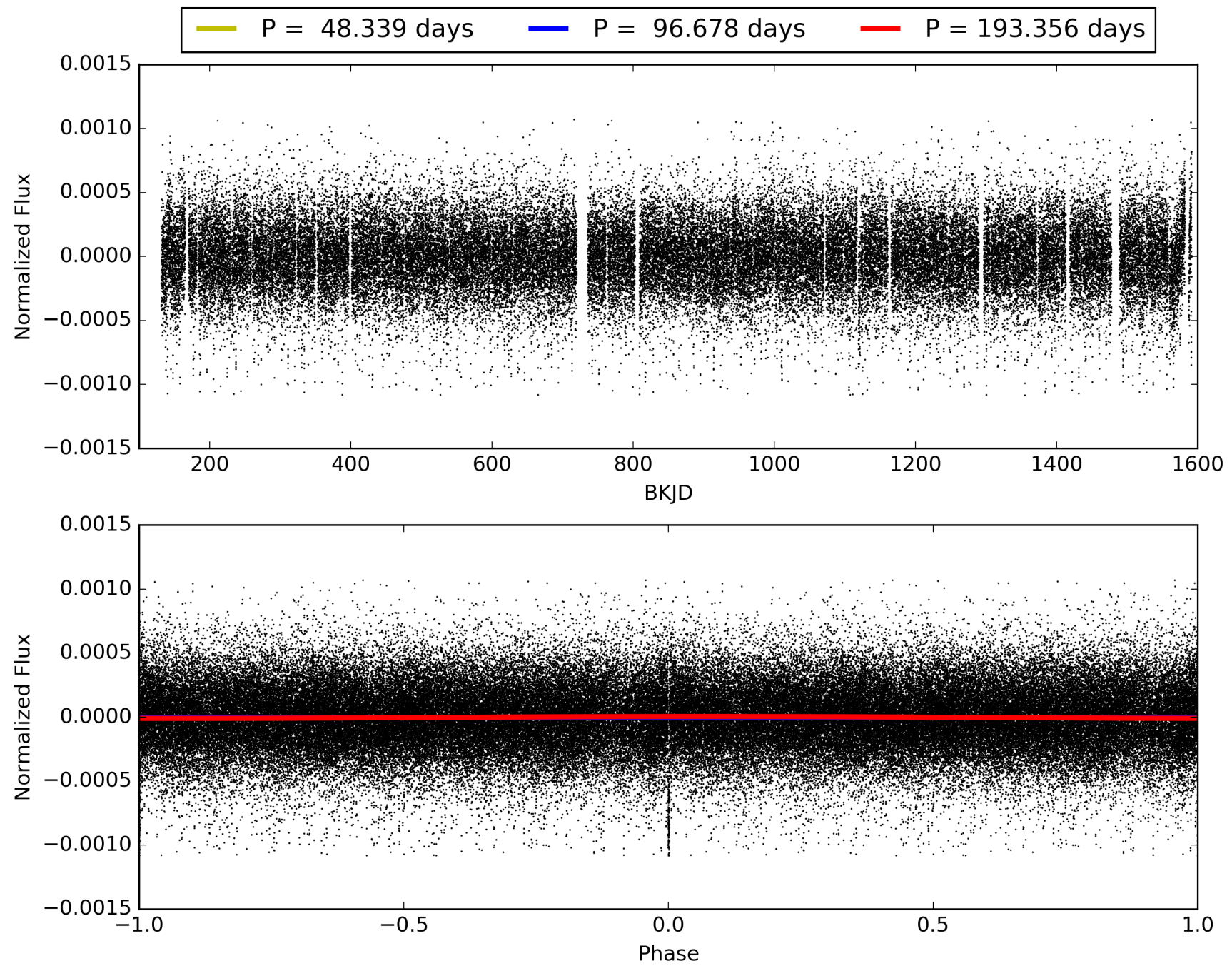
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [293.39σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 88.6%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 7.71e-299
RollingBand-fgt: 1.00 [13/13]
GhostDiagnostic-chr: 19.84
Centroid-sig: 0.2%
Centroid-so: 0.569 arcsec [1.65σ]
OotOffset-rm: 0.074 arcsec [0.50σ]
KicOffset-rm: 0.274 arcsec [1.78σ]
OotOffset-st: 4/2/3/5 [14]
KicOffset-st: 4/2/3/5 [14]
DiffImageQuality-fgm: 1.00 [14/14]
DiffImageOverlap-fno: 0.86 [12/14]

TCE 009941859-02, PDC Light Curves

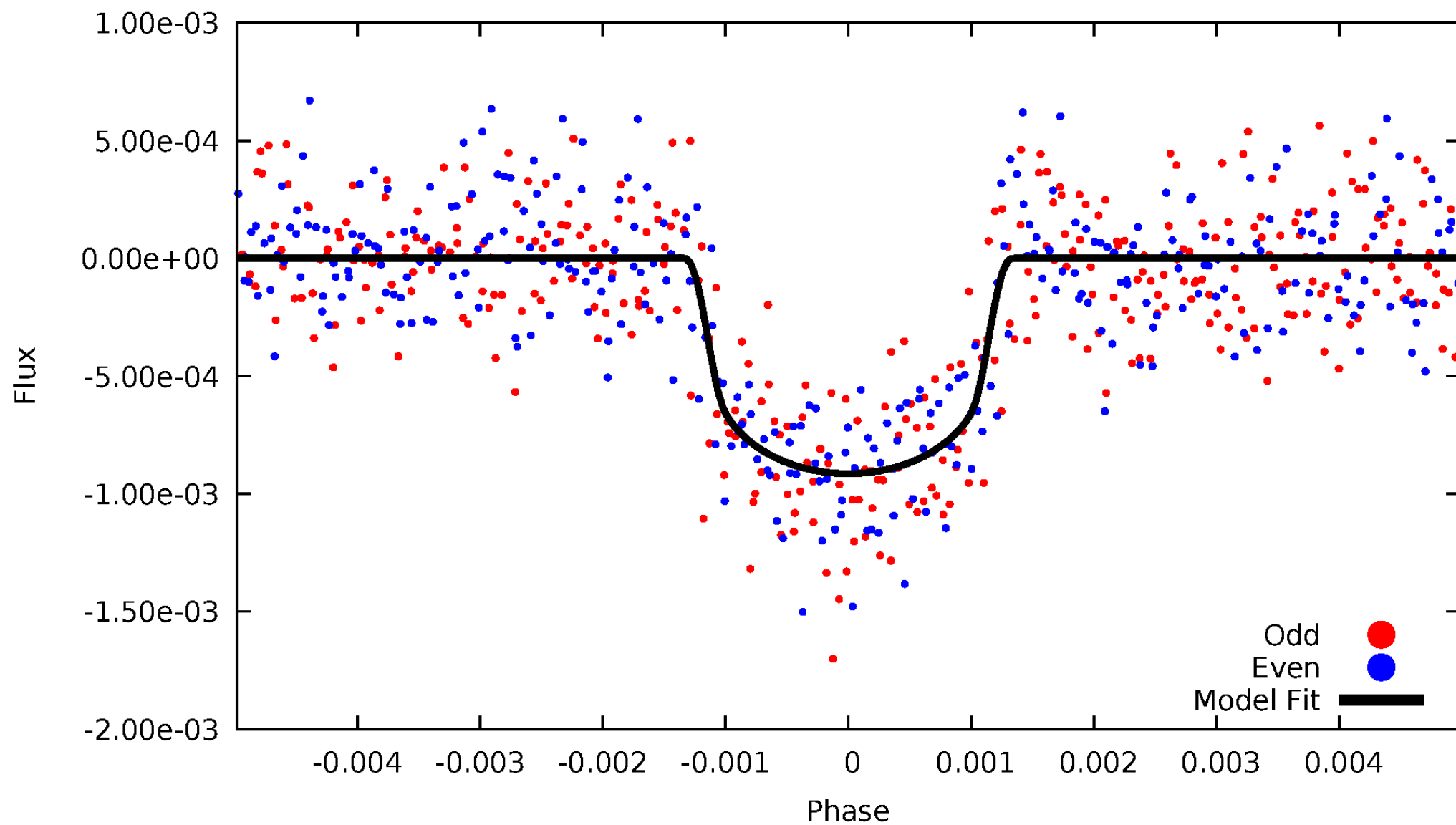


TCE 009941859-02



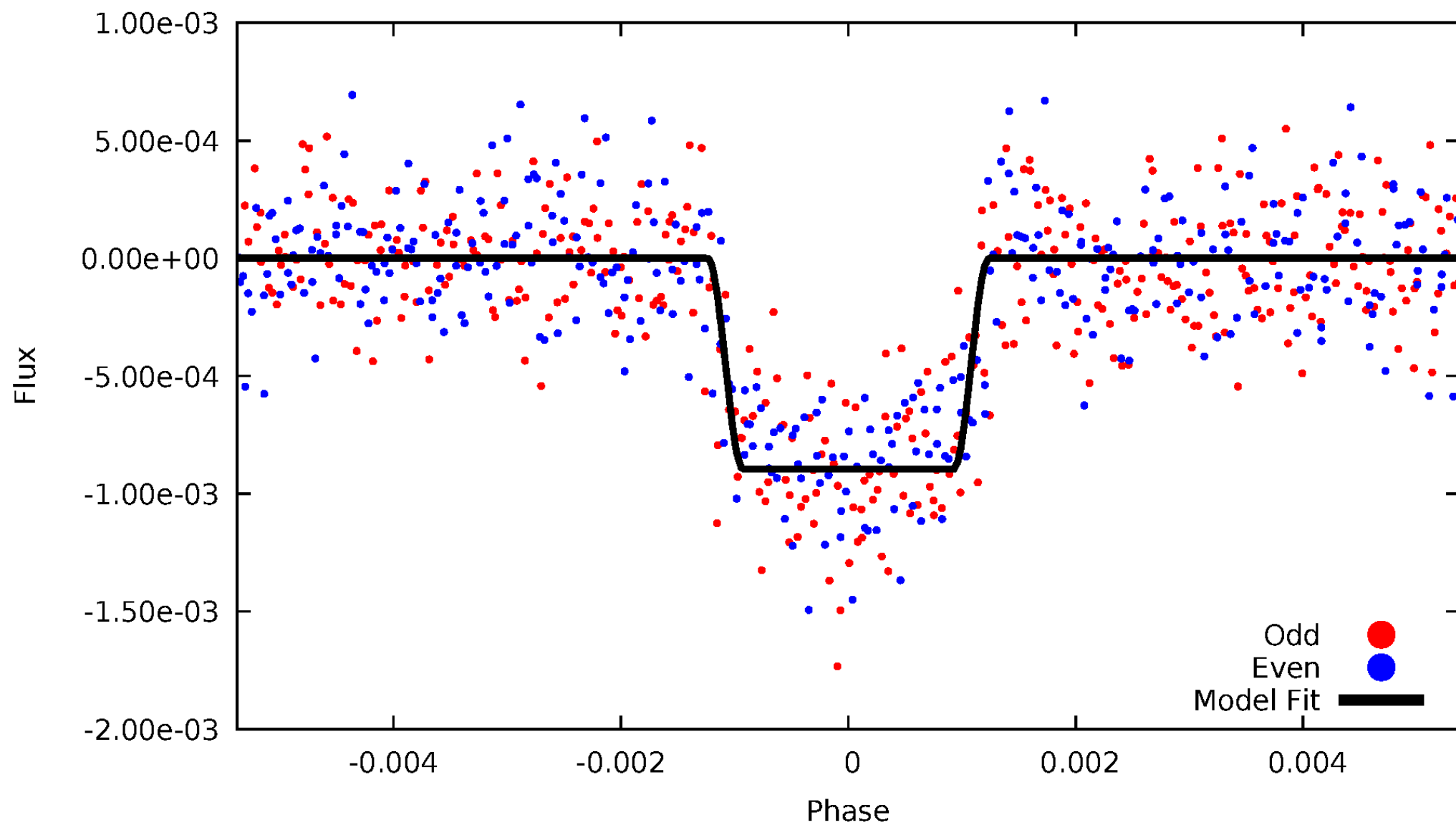
DV Odd/Even

TCE 009941859-02



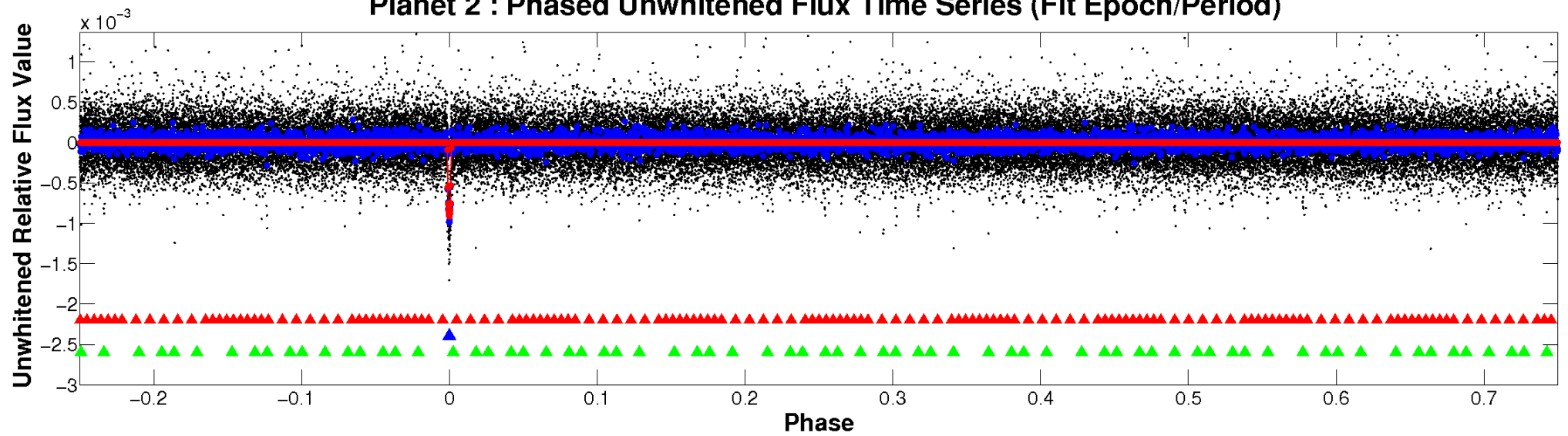
ALT Odd/Even

TCE 009941859-02

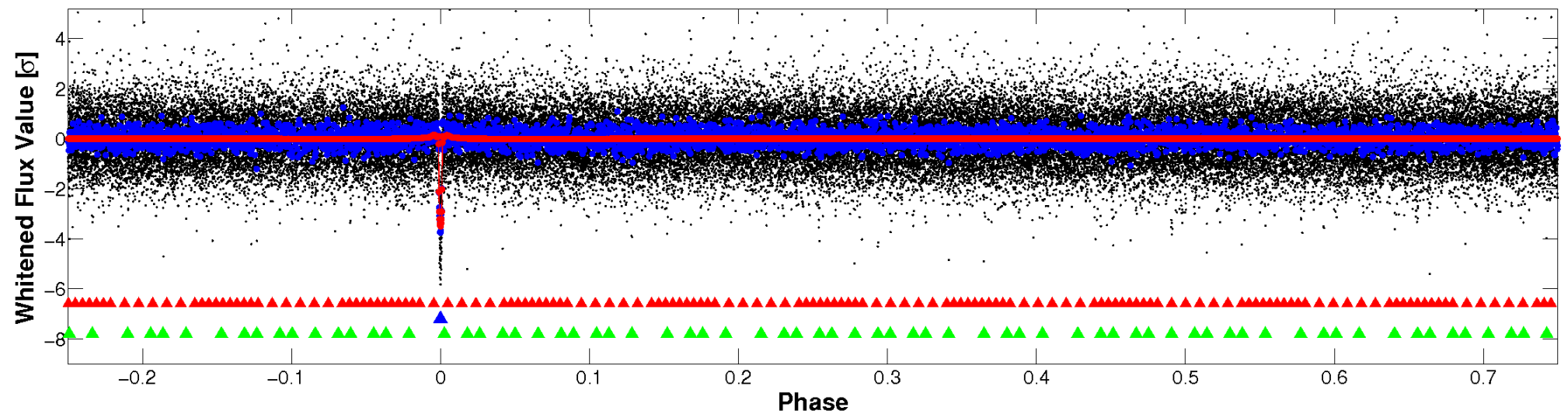


Non-Whitened Vs. Whitened Light Curve

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

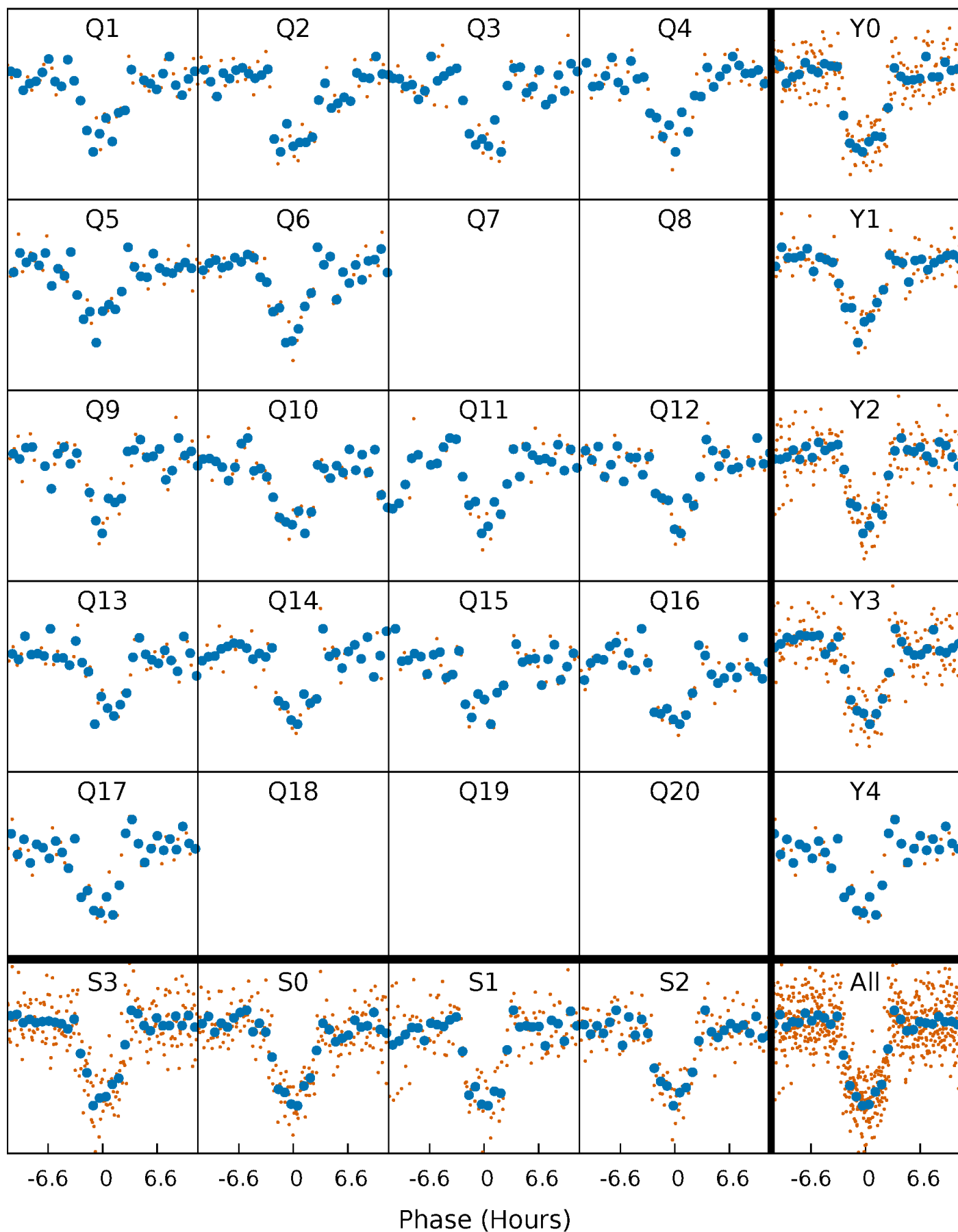


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



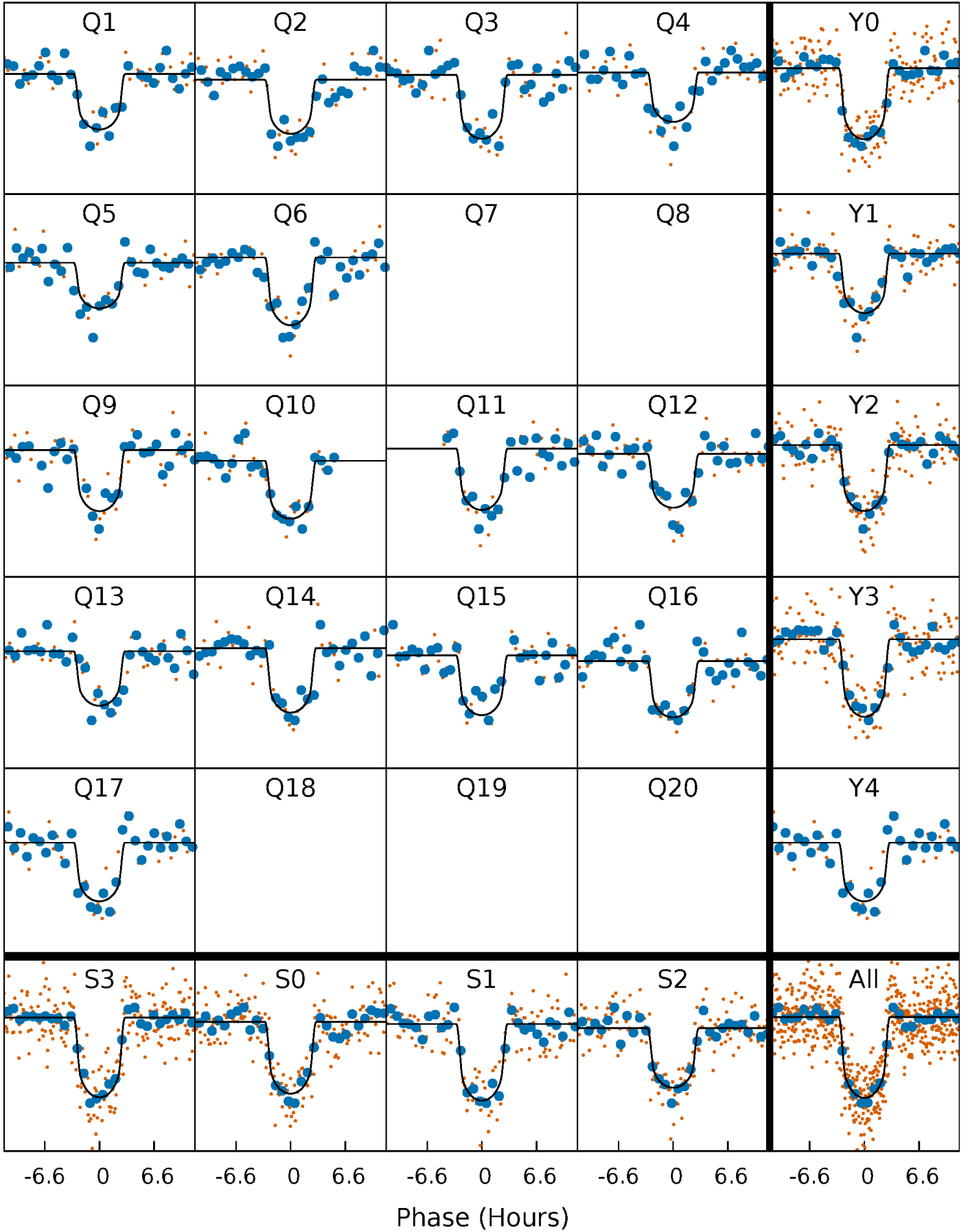
PDC Quarter-Phased Transit Curves

TCE 009941859-02 P= 96.677853 Days $T_0=140.186979$ (BKJD)



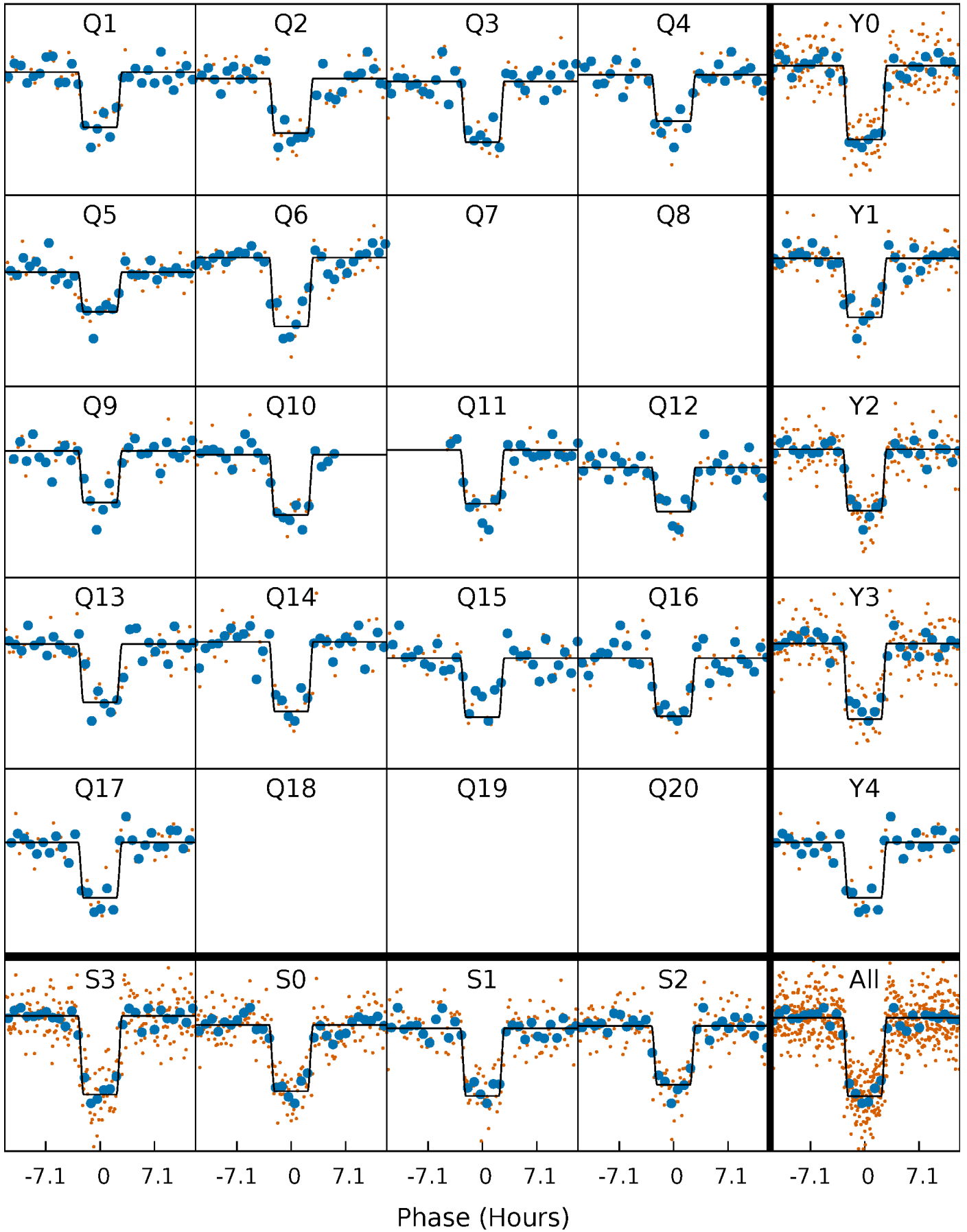
DV Quarter-Phased Transit Curves

TCE 009941859-02 P= 96.677853 Days $T_0=140.186979$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

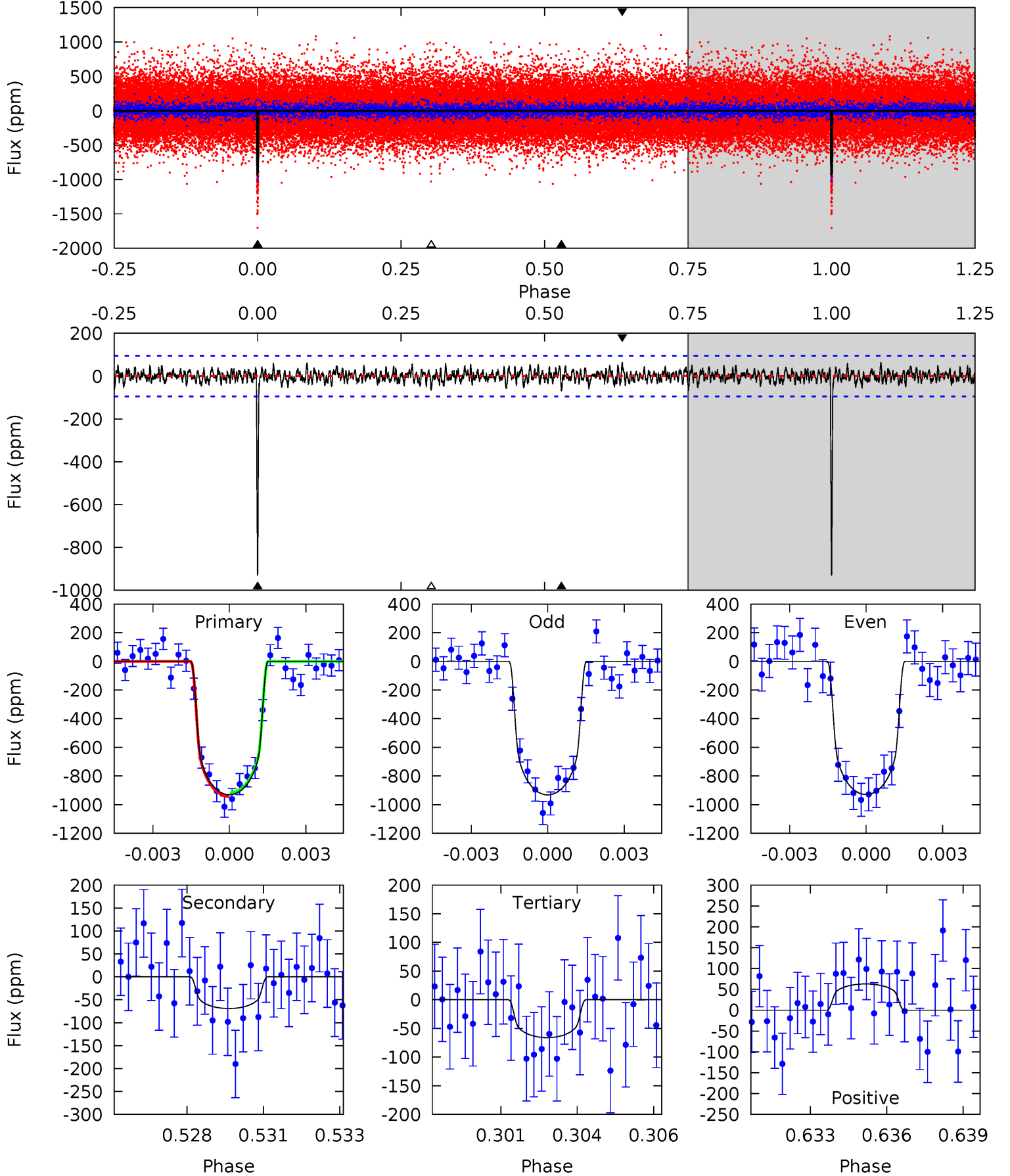
TCE 009941859-02 P= 96.678237 Days $T_0=140.183076$ (BKJD)



DV Model-Shift Uniqueness Test

009941859-02, P = 96.677853 Days, E = 43.509126 Days

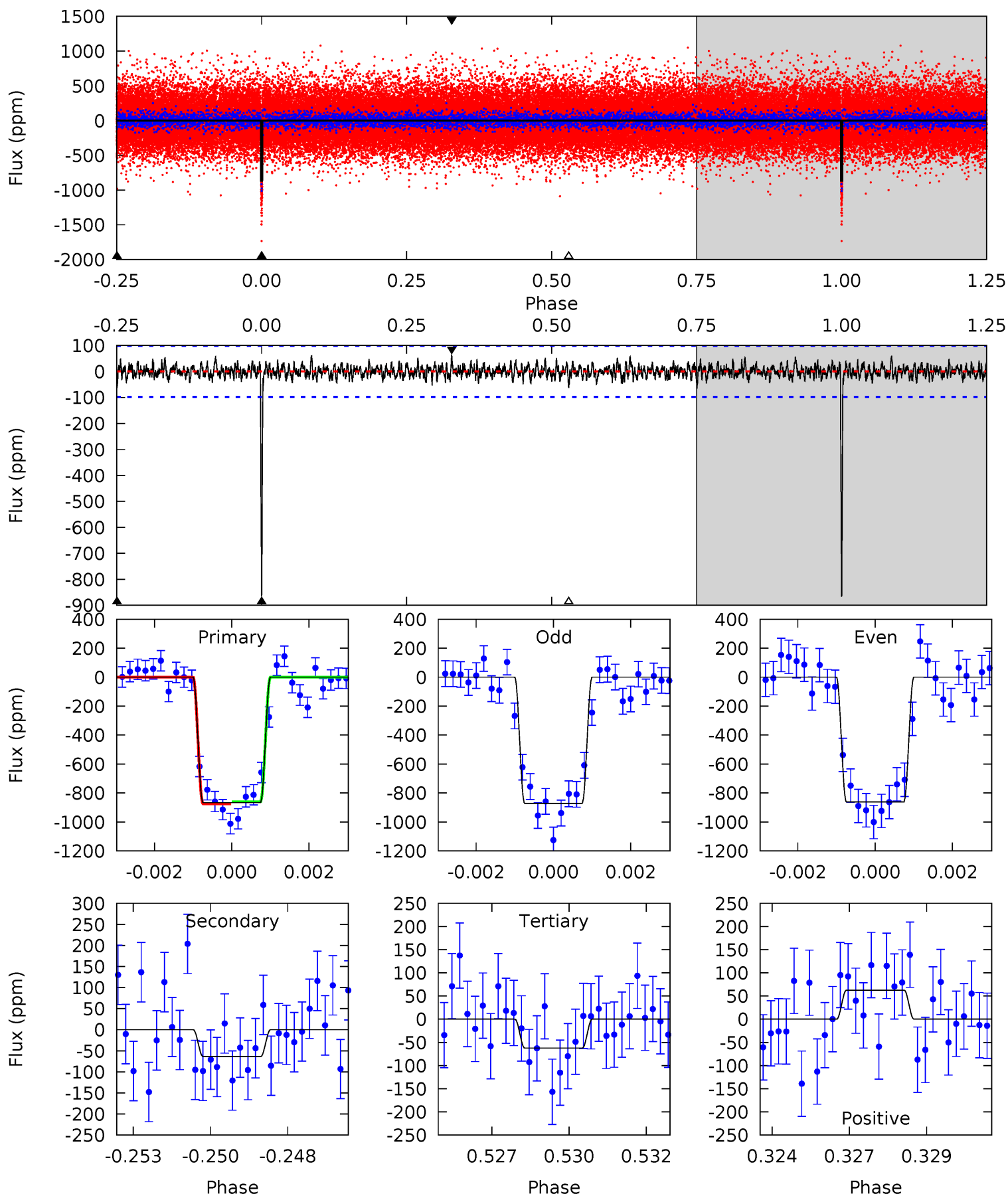
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
51.5	3.83	3.66	3.48	5.28	3.01	1.12	47.9	48.1	0.17	0.35	0.08	1.01	0.06	0.75



Alt Model-Shift Uniqueness Test

009941859-02, P = 96.678237 Days, E = 43.504839 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
46.7	3.44	3.35	3.37	5.29	3.03	0.98	43.3	43.3	0.08	0.07	0.27	1.01	0.07	0.37



Stellar Parameters For KIC 009941859

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	$M(M_{\odot})$	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	5386^{+80}_{-72}	$4.322^{+0.159}_{-0.130}$	$0.180^{+0.150}_{-0.100}$	$1.076^{+0.191}_{-0.173}$	$0.886^{+0.063}_{-0.037}$	$1.002^{+0.741}_{-0.368}$
	+1%/-1%	+4%/-3%	+83%/-56%	+18%/-16%	+7%/-4%	+74%/-37%
Source	SPE90	SPE90	SPE90	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

Secondary Eclipse Parameters for KIC 009941859-02 / KOI 0528.02

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-69 ± 18	$3.51^{+0.62}_{-0.64}$	546^{+28}_{-27}	3343^{+234}_{-189}	478^{+319}_{-173}
Alt.	-64 ± 19	$3.48^{+0.70}_{-0.59}$	547^{+28}_{-28}	3322^{+228}_{-209}	450^{+272}_{-171}

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 $A_{obs} \gg 1.0$

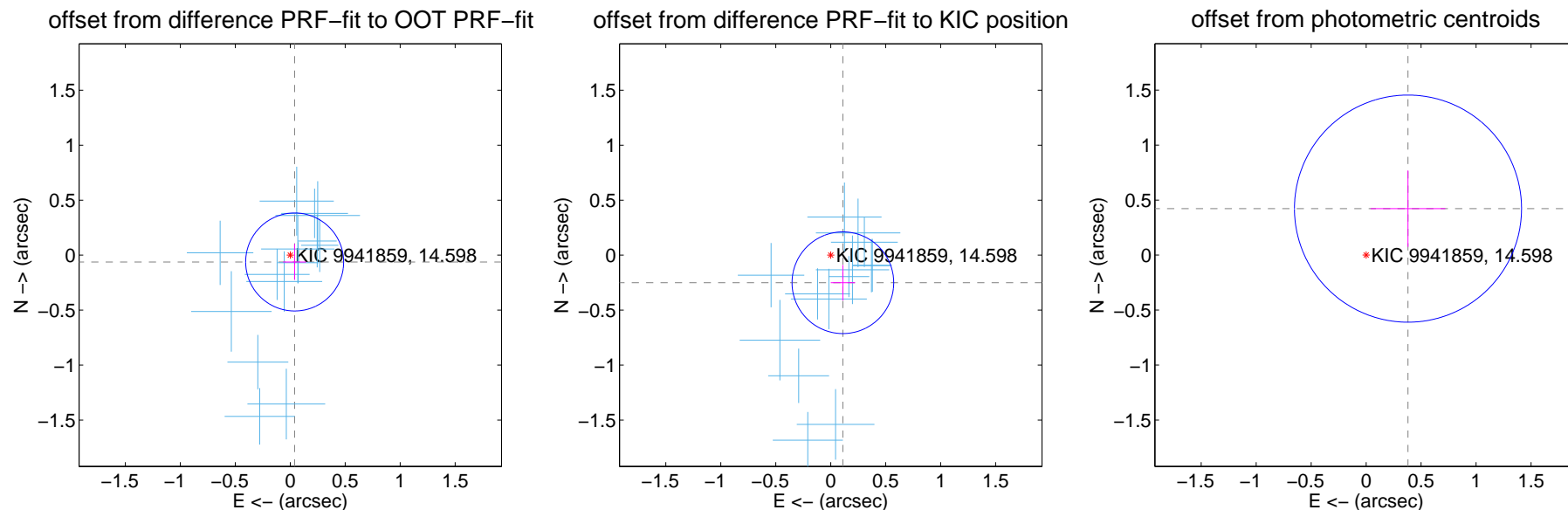
DV Centroid Data

Supplemental centroid analysis for 009941859-02. Kepler magnitude: 14.60. Transit SNR 38.42

There are 14 quarters with good PRF difference image offsets

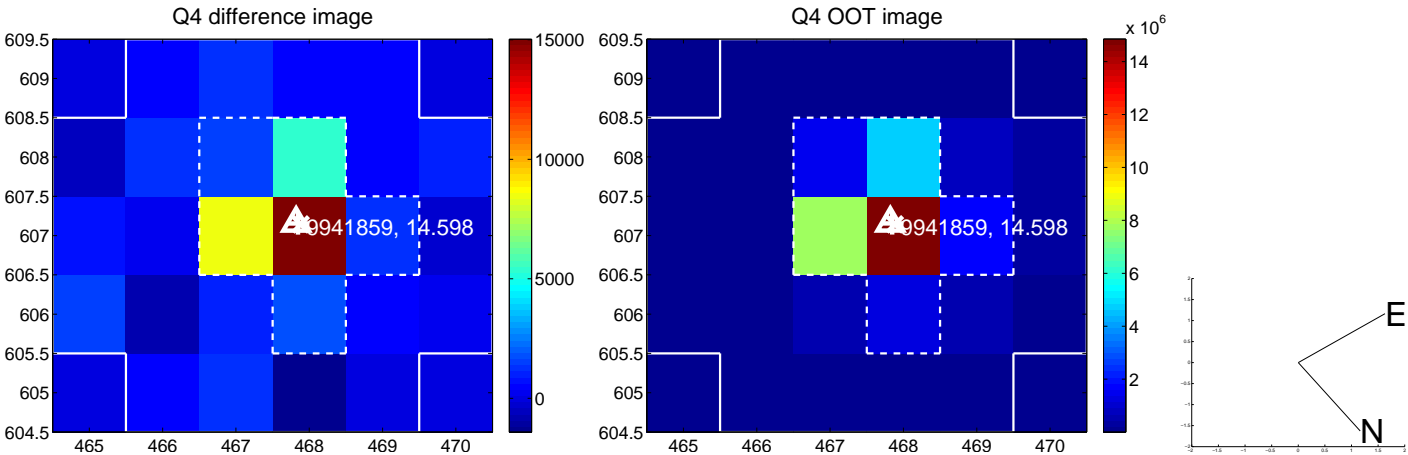
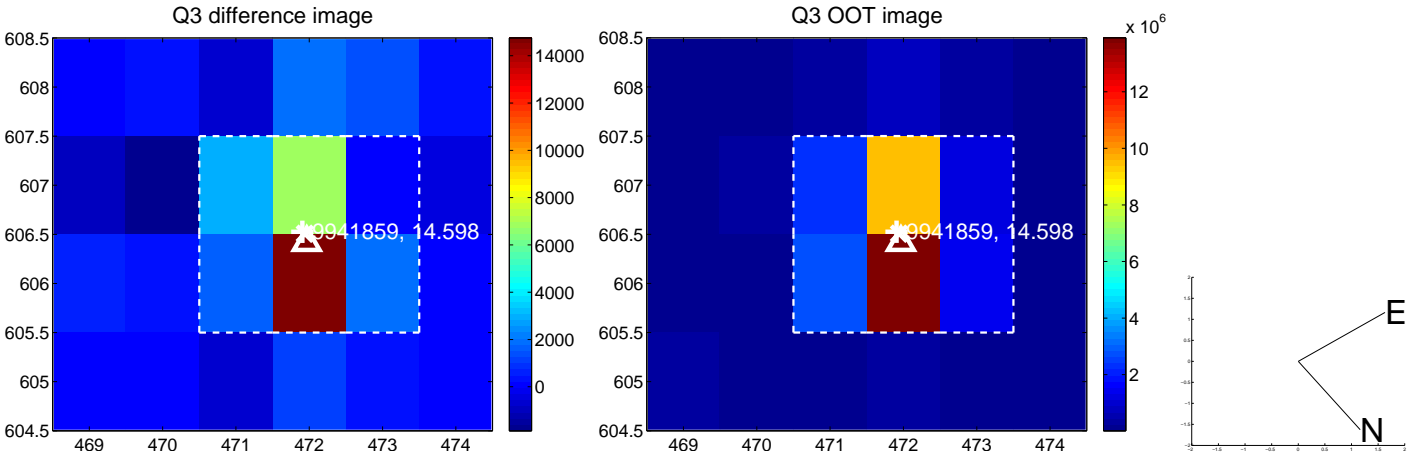
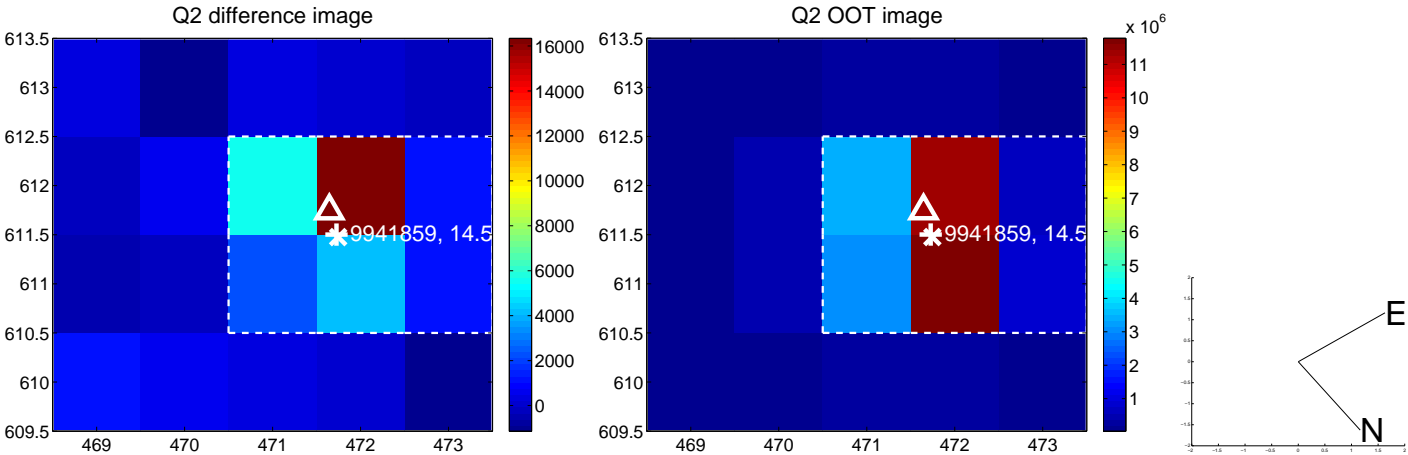
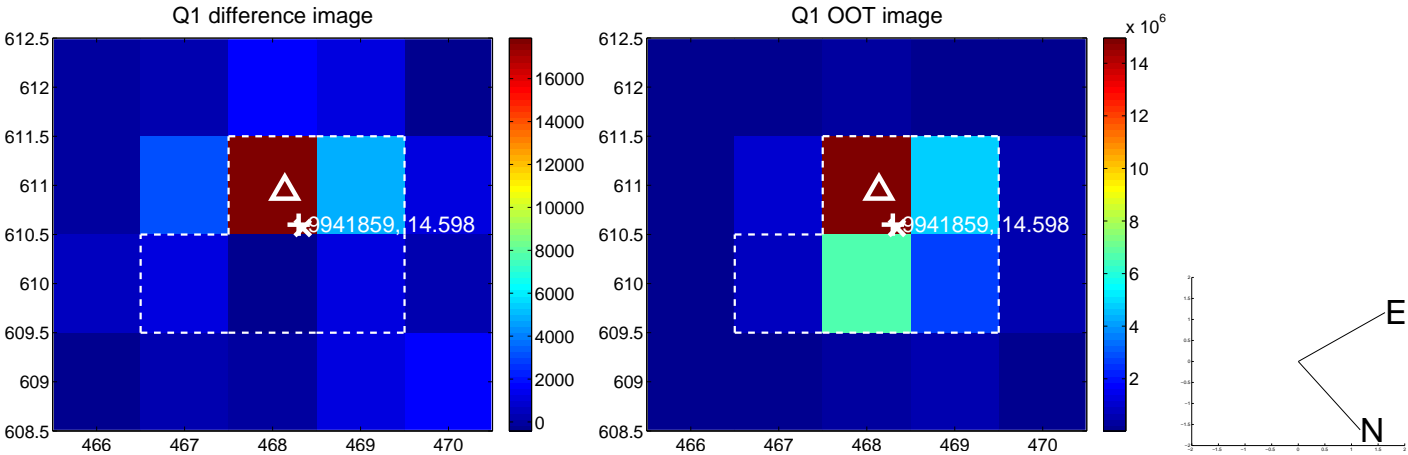
The direct PRF centroid is offset from the target star catalog position by about 0.28 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.074 ± 0.149	0.50	-0.040 ± 0.105	-0.062 ± 0.163
PRF-fit source offset from KIC position	0.274 ± 0.154	1.78	-0.111 ± 0.111	-0.251 ± 0.161
photometric centroid source offset	0.57 ± 0.34	1.65	-0.38 ± 0.34	0.42 ± 0.35

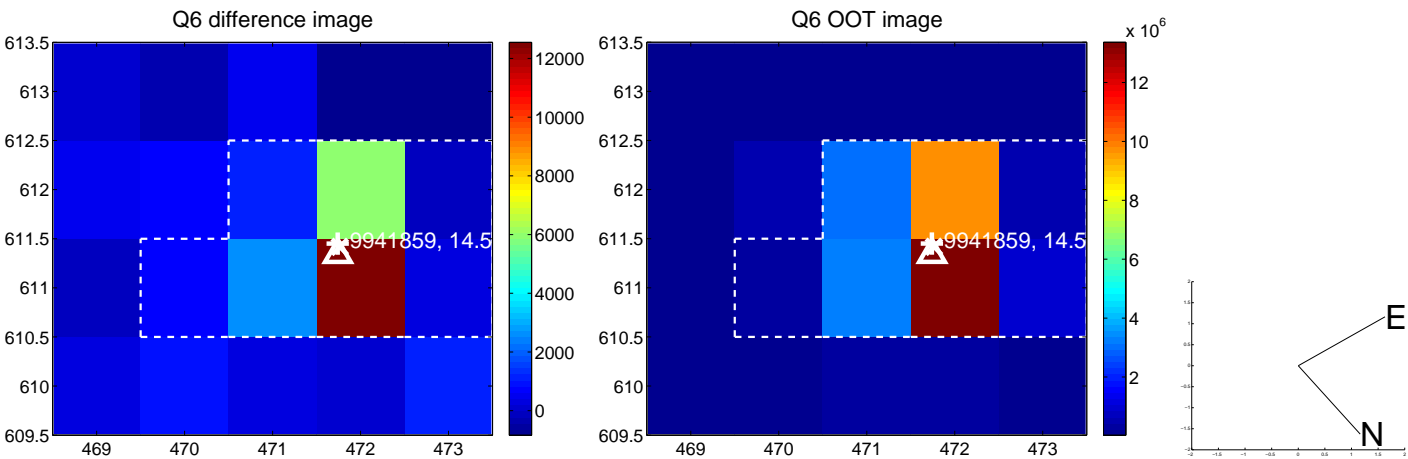
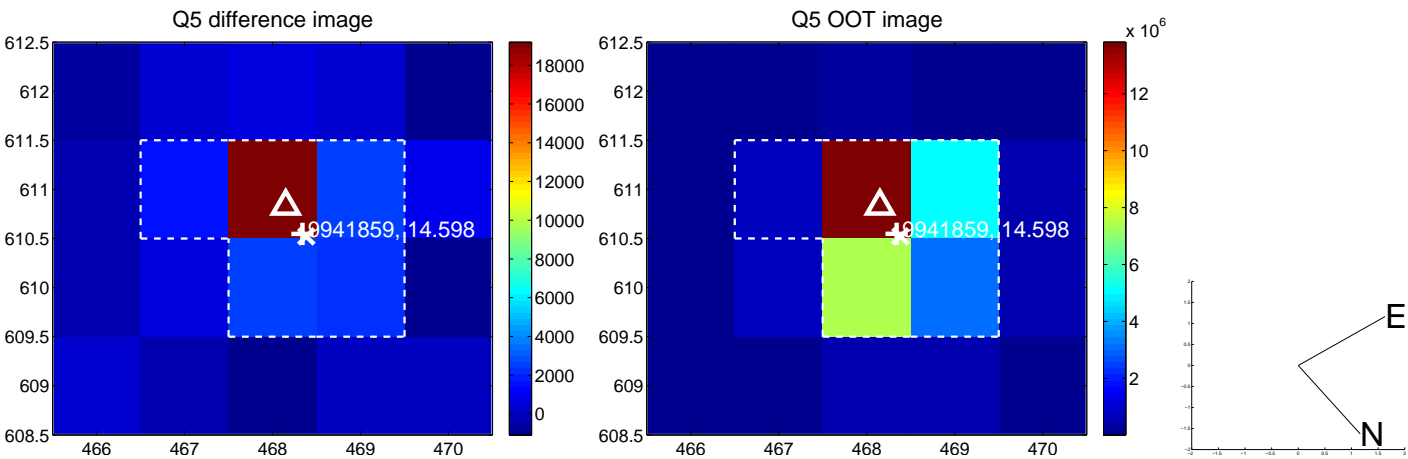


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

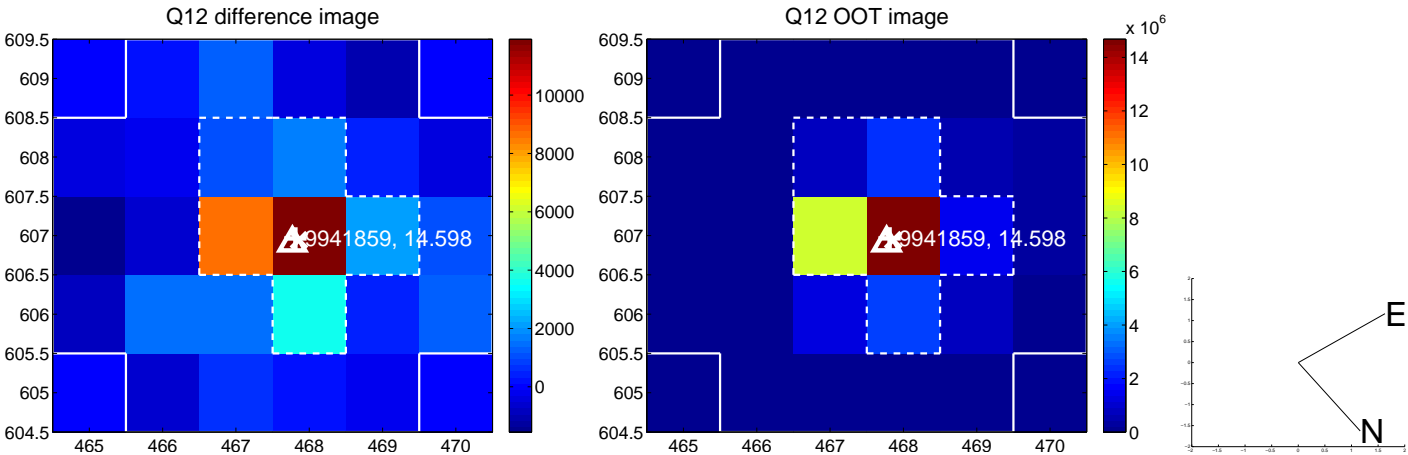
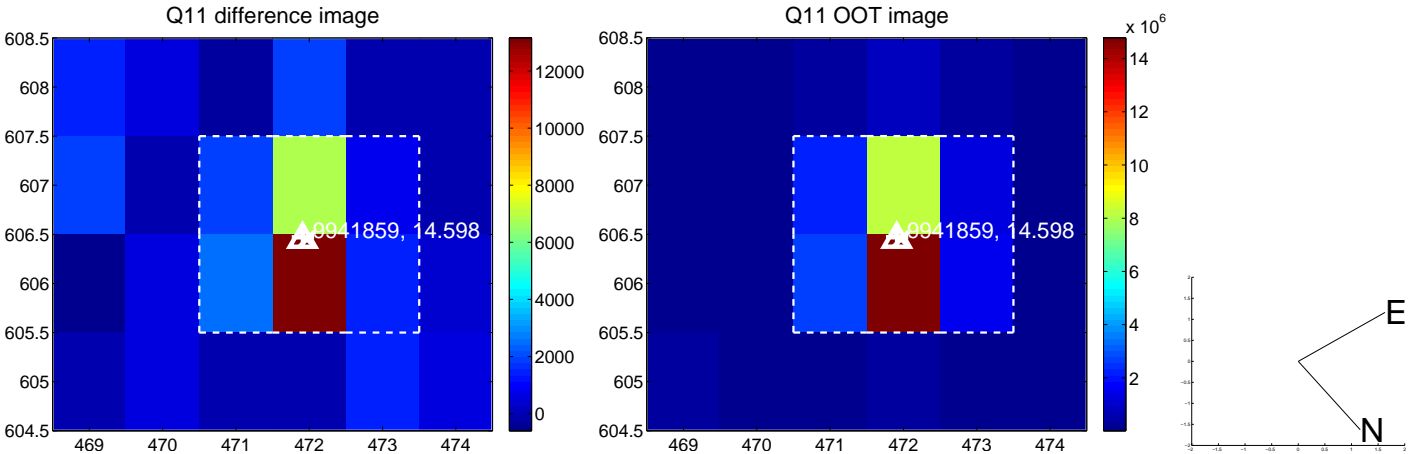
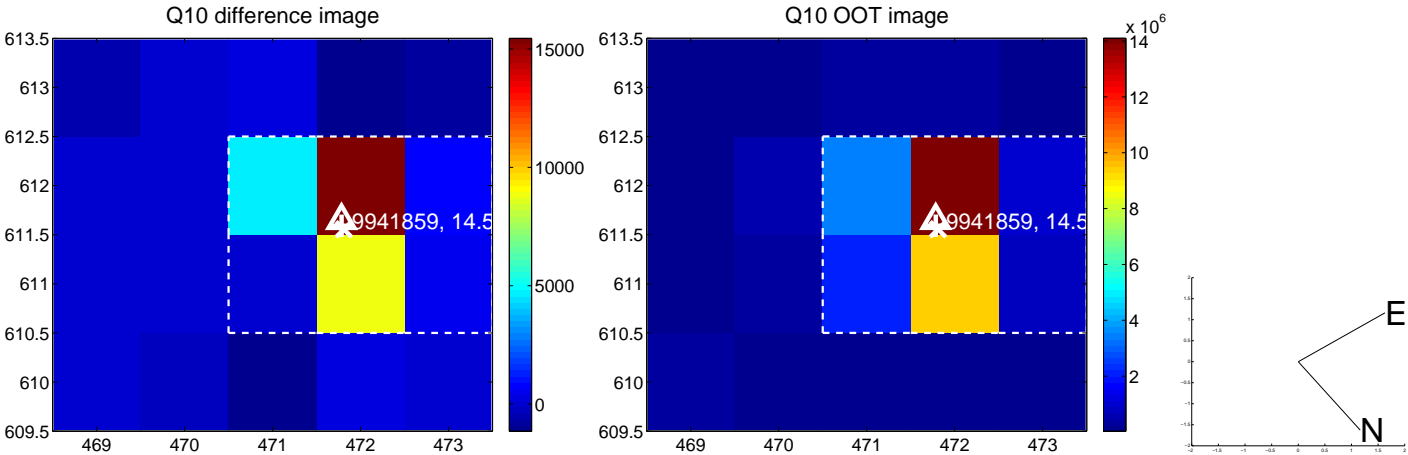
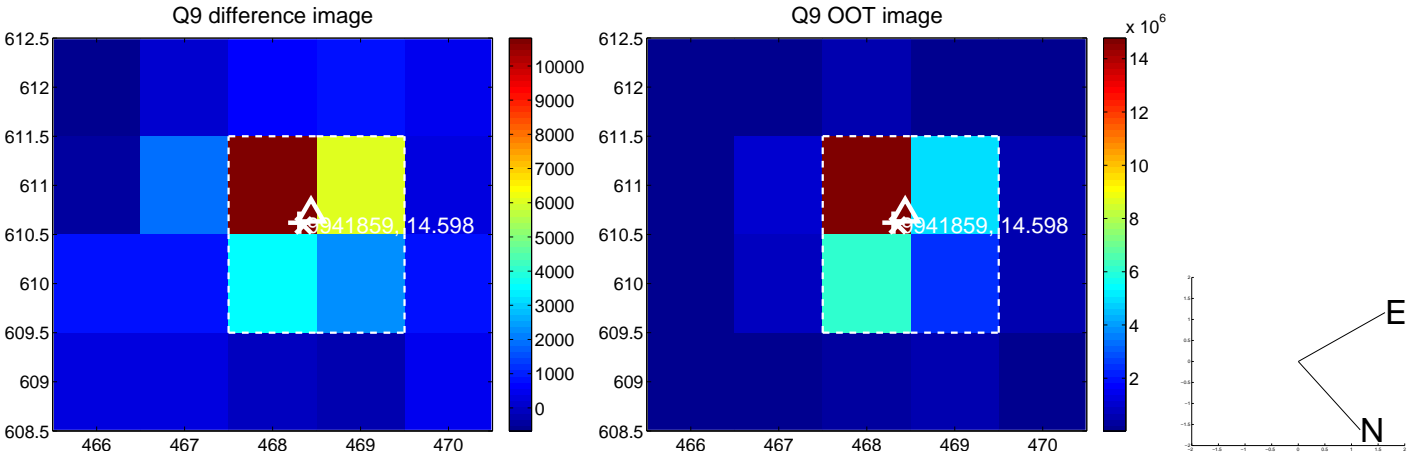
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



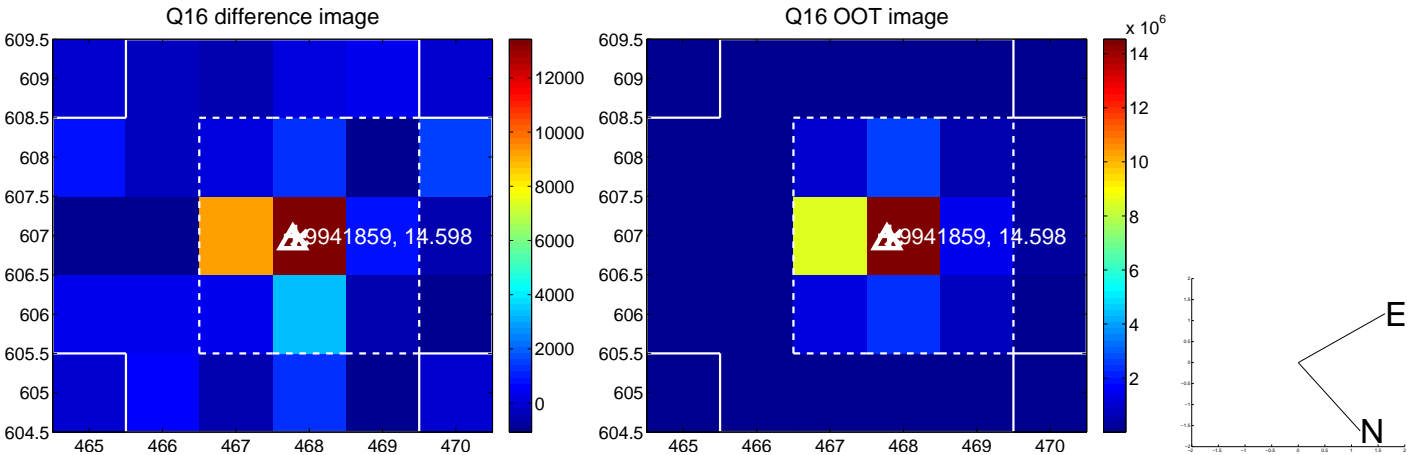
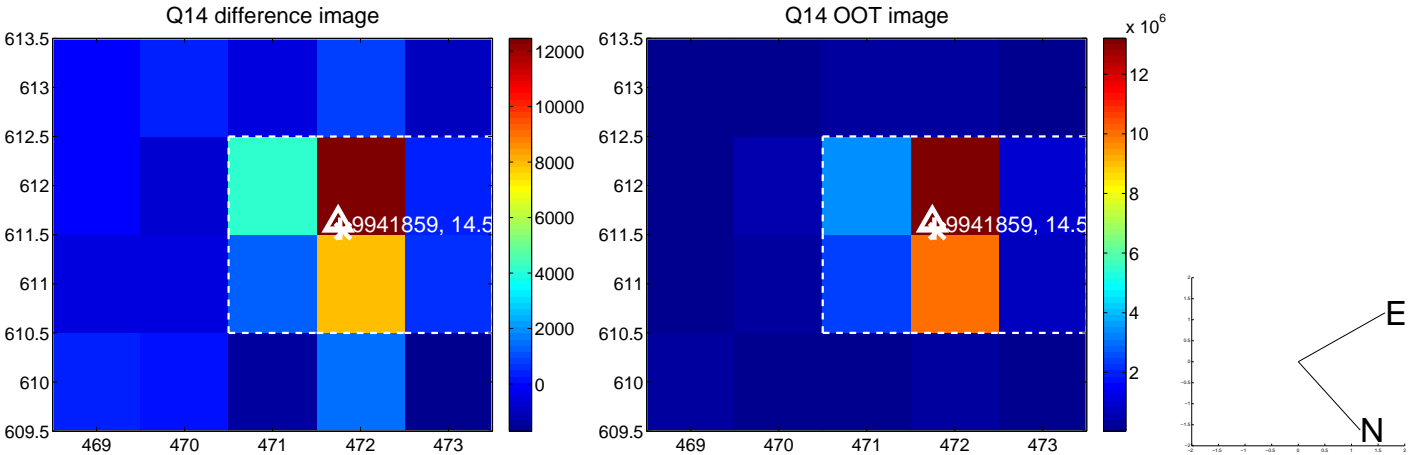
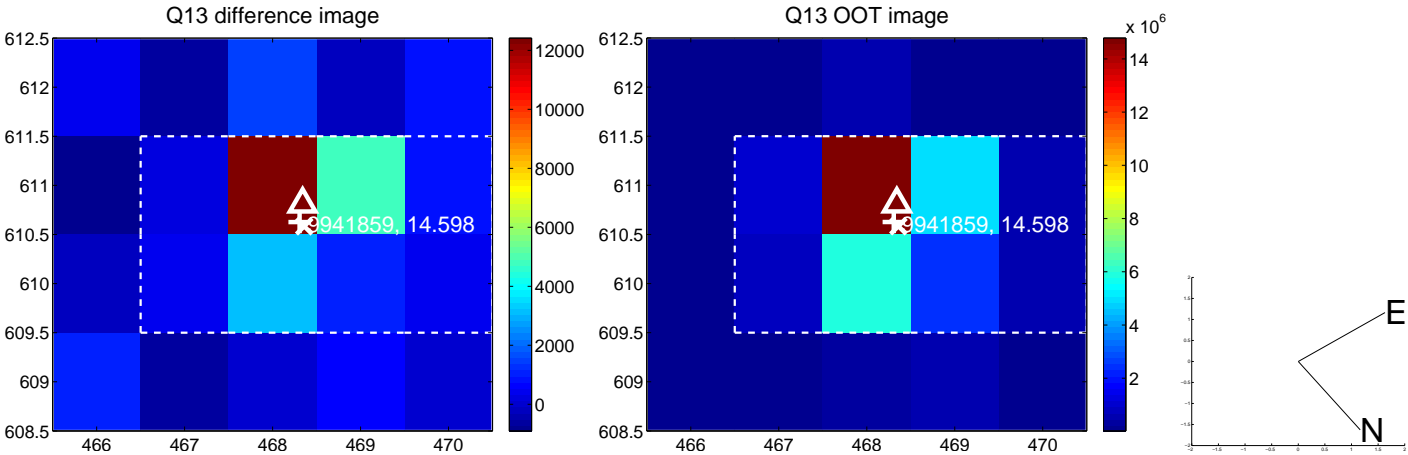
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



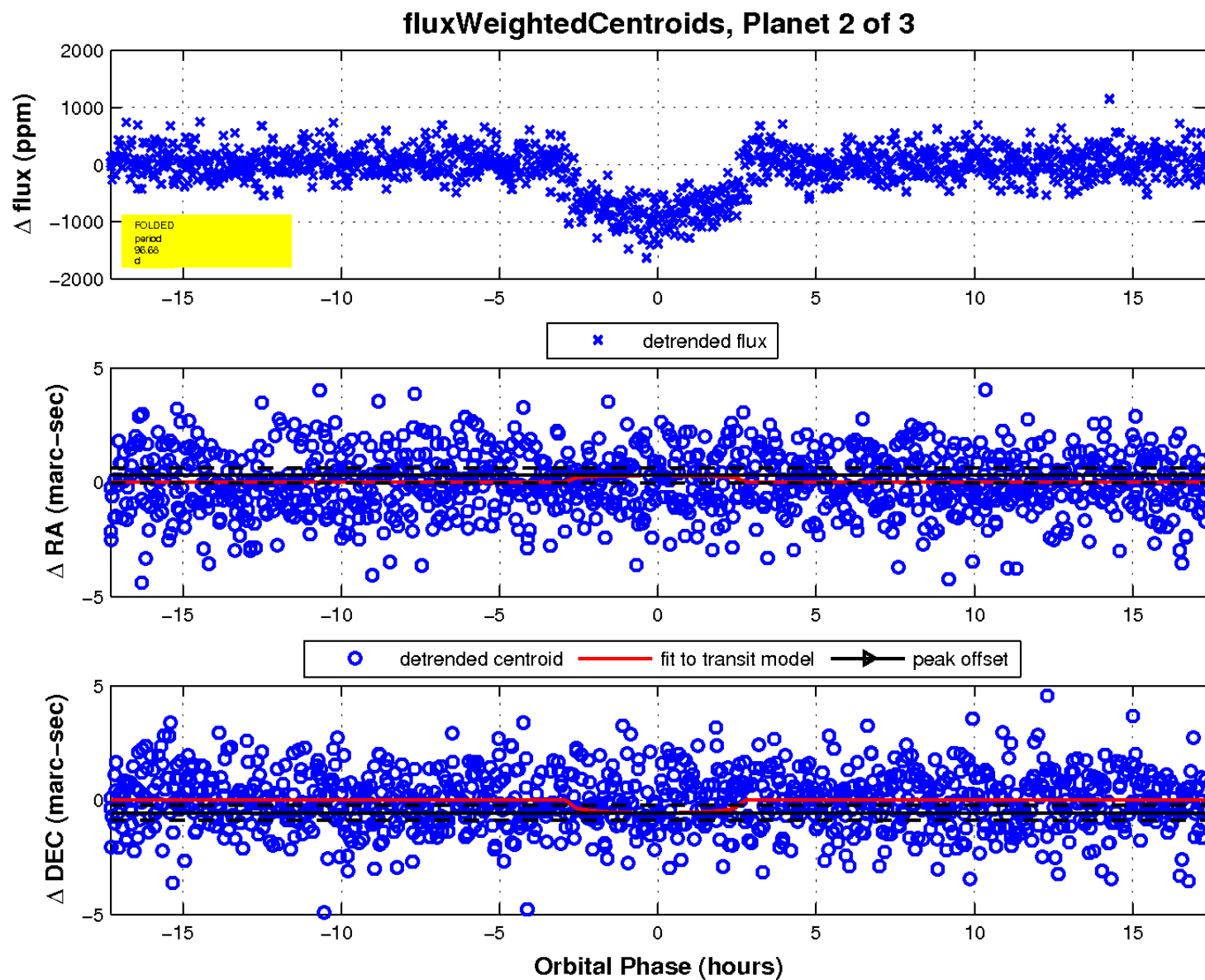
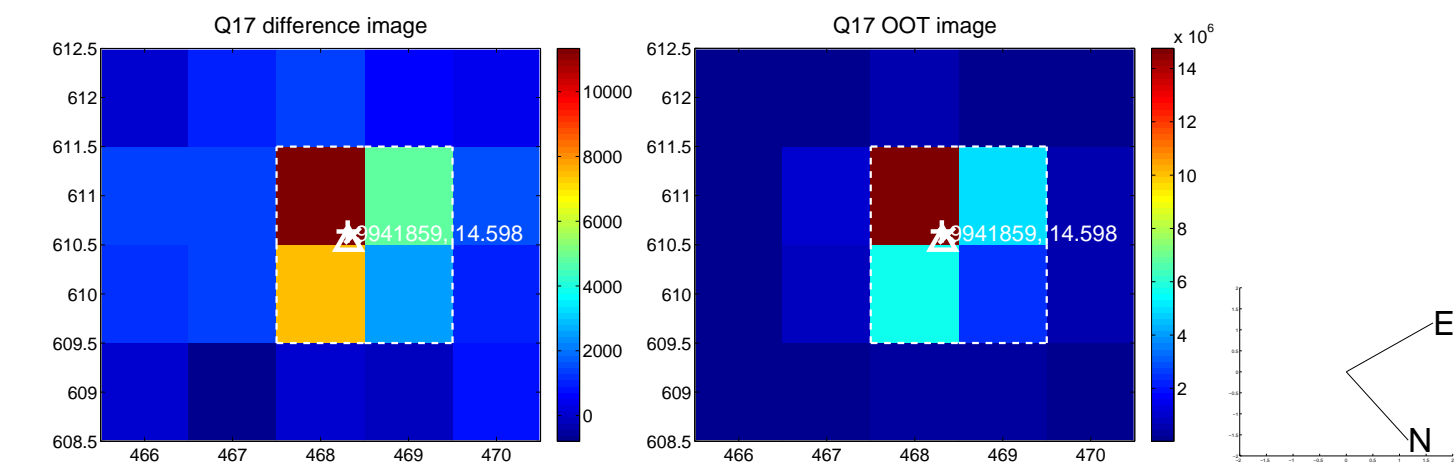
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

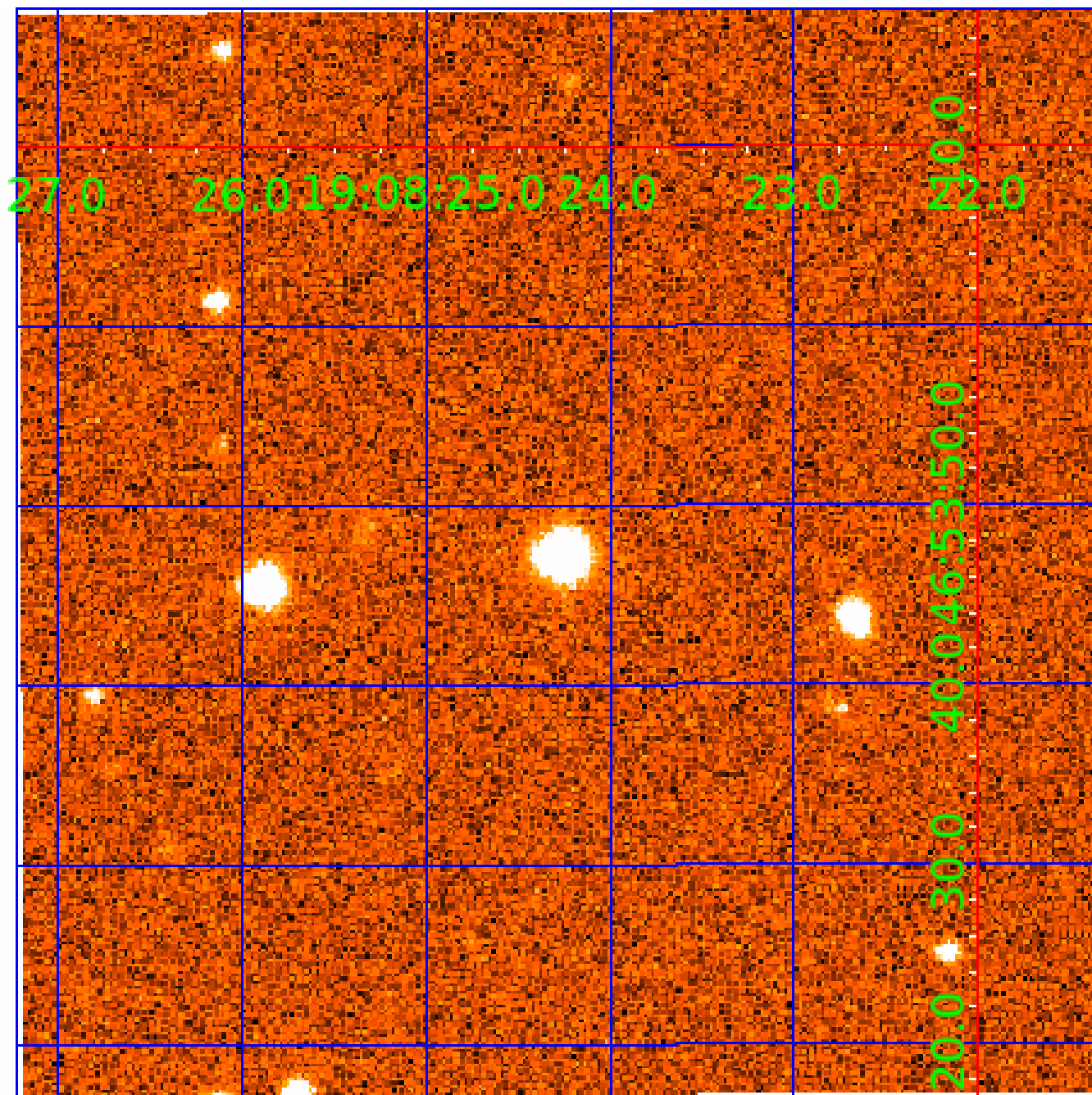


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 009941859

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})
009941859-01	OBS	0528.01	9.576664	138.376937	726.4	3.569	66.1	74.3	1.08	5386	3.36	121.40
009941859-02	OBS	0528.02	96.677853	140.186979	914.4	5.775	37.8	38.4	1.08	5386	3.52	5.56
009941859-03	OBS	0528.03	20.552786	145.028726	689.3	2.330	33.8	37.8	1.08	5386	3.25	43.85

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009941859-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
009941859-02	OBS	PC	1.00	0	0	0	0	NO_COMMENT
009941859-03	OBS	PC	1.00	0	0	0	0	NO_COMMENT

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

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

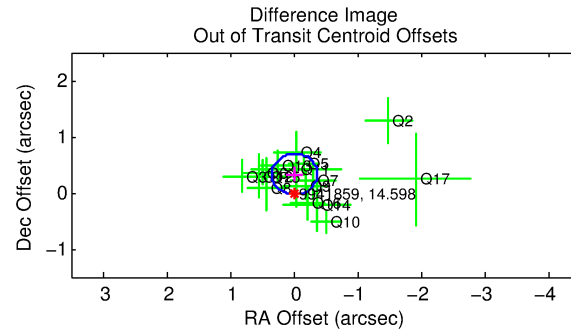
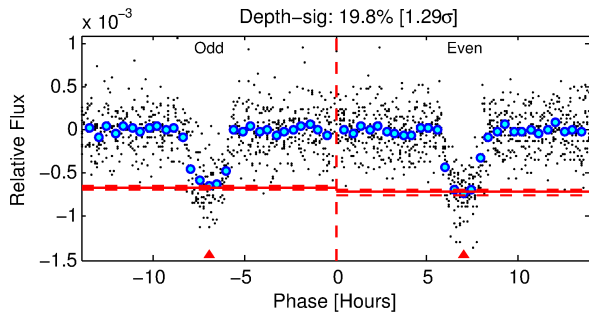
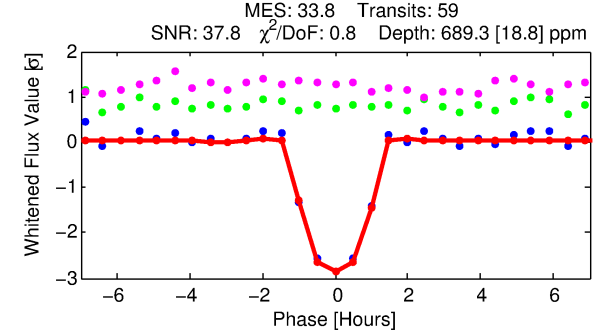
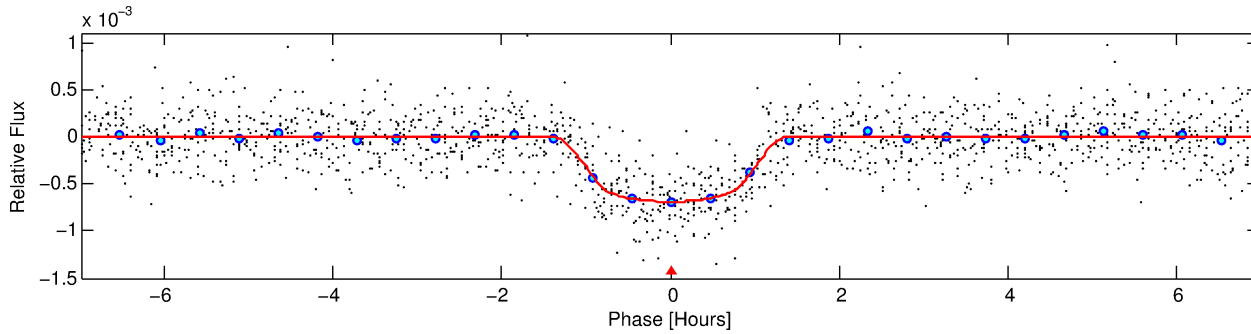
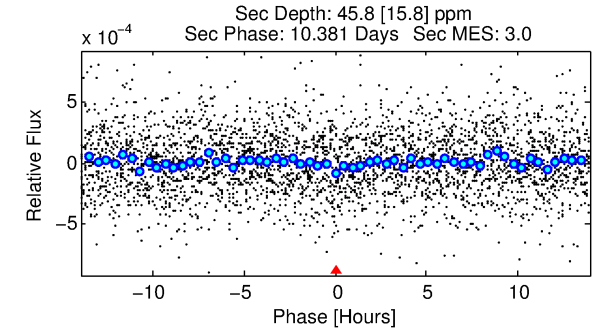
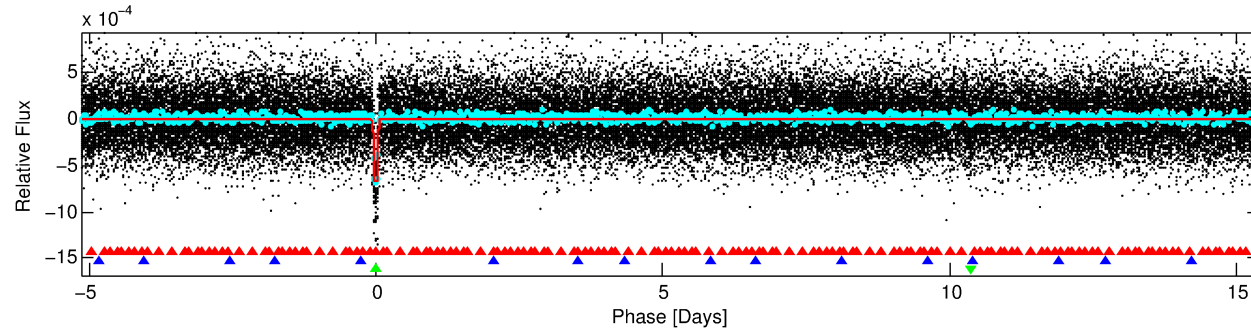
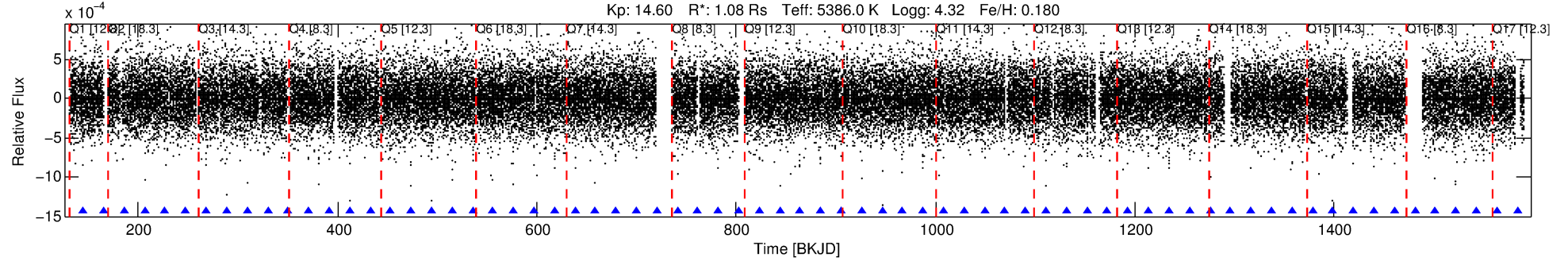
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009941859-03

No Significant Match Found

DV One-Page Summary

KIC: 9941859 Candidate: 3 of 3 Period: 20.553 d
KOI: K00528.03 Name: Kepler-178c Corr: 0.972



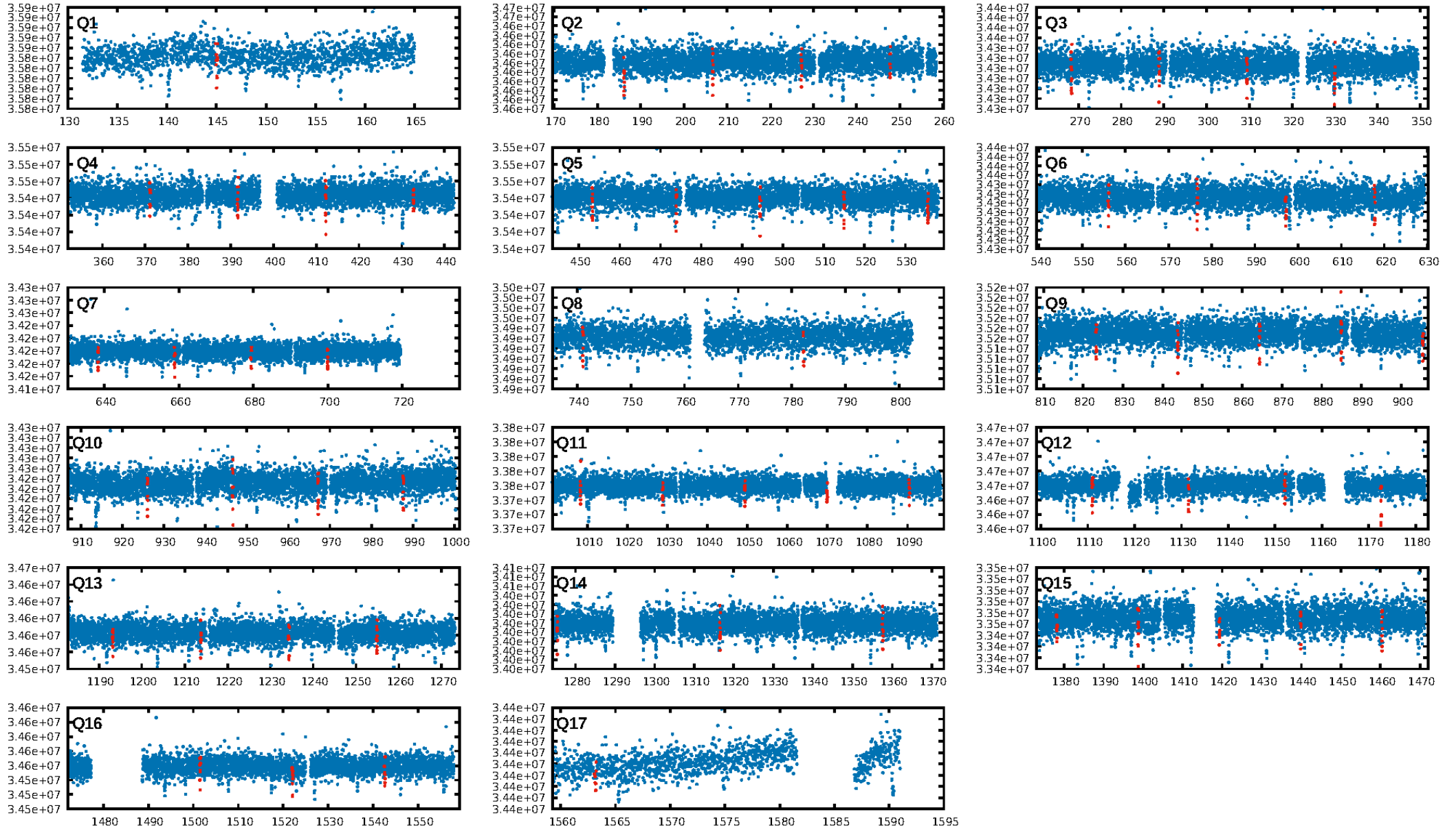
DV Fit Results:

Period = 20.55279 [0.00004] d
Epoch = 145.0287 [0.0017] BKJD
Rp/R* = 0.0277 [0.0065]
a/R* = 39.51 [36.75]
b = 0.84 [0.33]
Seff = 43.85 [12.18]
T_{eq} = 656 [46] K
Rp = 3.25 [0.95] Re
a = 0.1411 [0.0240] AU
Ag = 47.55 [30.55] [1.52σ]
T_{eff} = 2664 [390] K [5.12σ]

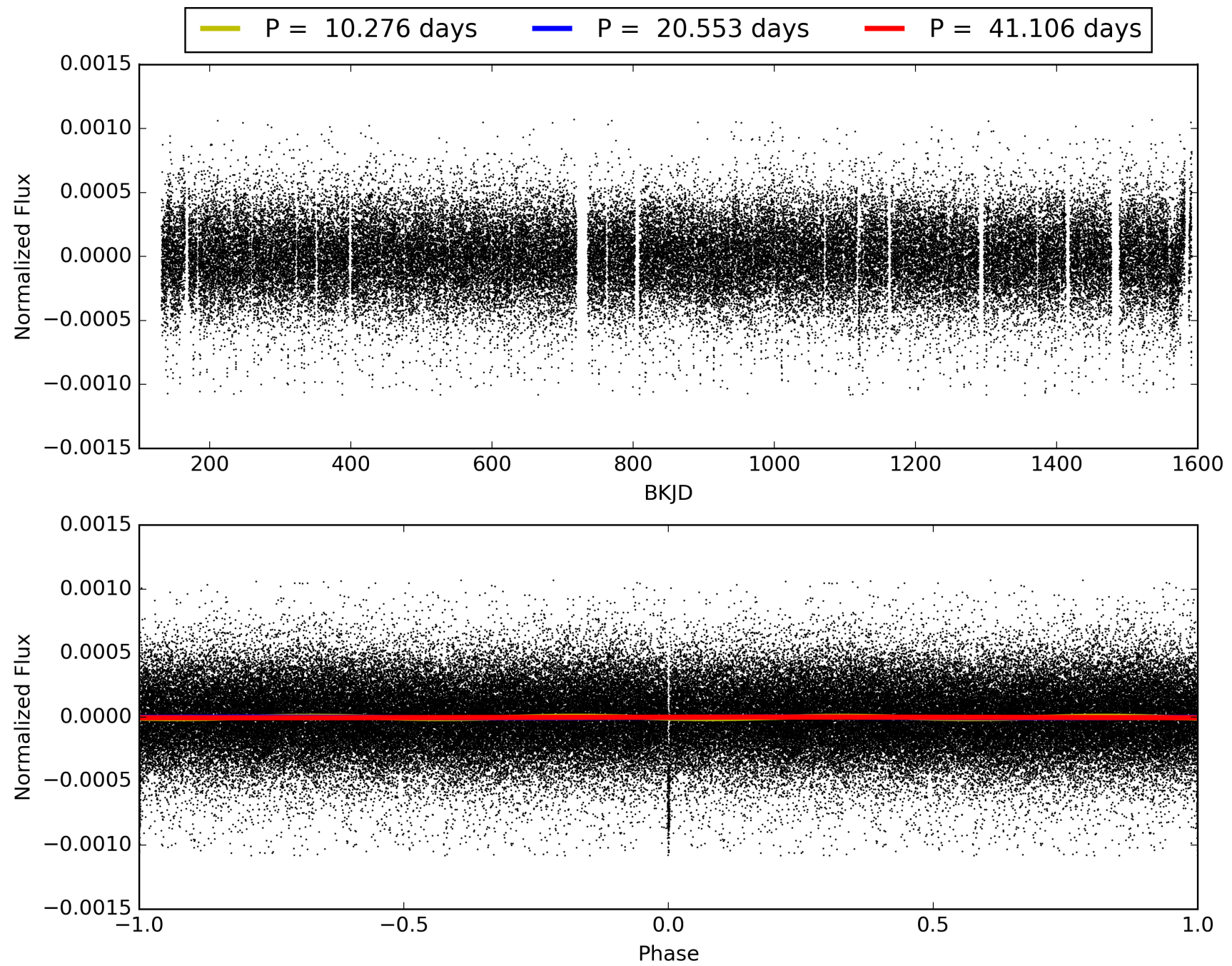
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [61.80σ]
LongPeriod-sig: 100.0% [293.39σ]
ModelChiSquare2-sig: 99.8%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 3.93e-245
RollingBand-fgt: 1.00 [57/57]
GhostDiagnostic-chr: 71.58
Centroid-sig: 7.6%
Centroid-so: 0.650 arcsec [1.78σ]
OotOffset-rm: 0.329 arcsec [2.73σ]
KicOffset-rm: 0.170 arcsec [1.13σ]
OotOffset-st: 4/4/4/4 [16]
KicOffset-st: 4/4/4/4 [16]
DiffImageQuality-fgm: 1.00 [16/16]
DiffImageOverlap-fno: 1.00 [17/17]

TCE 009941859-03, PDC Light Curves

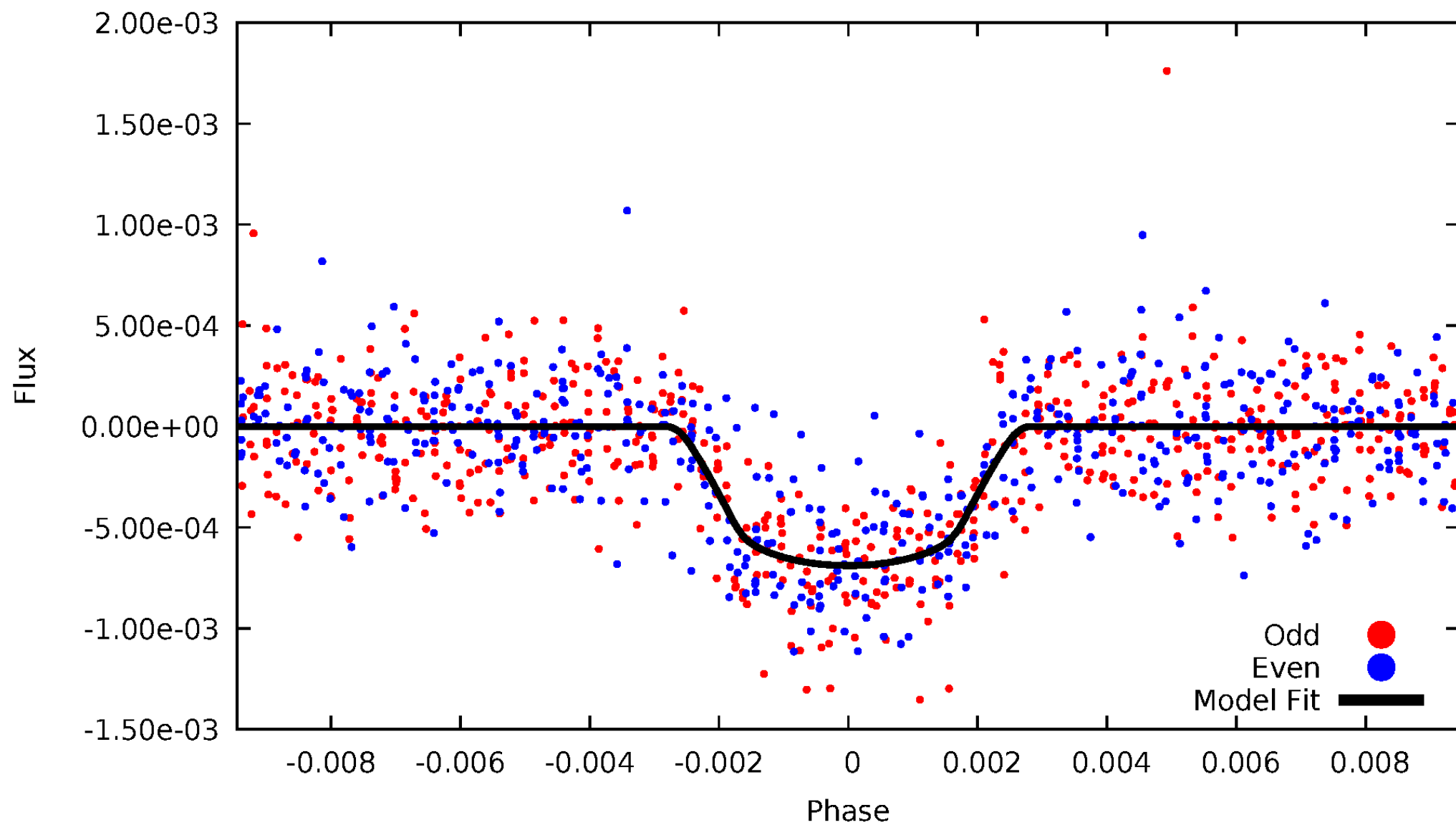


TCE 009941859-03



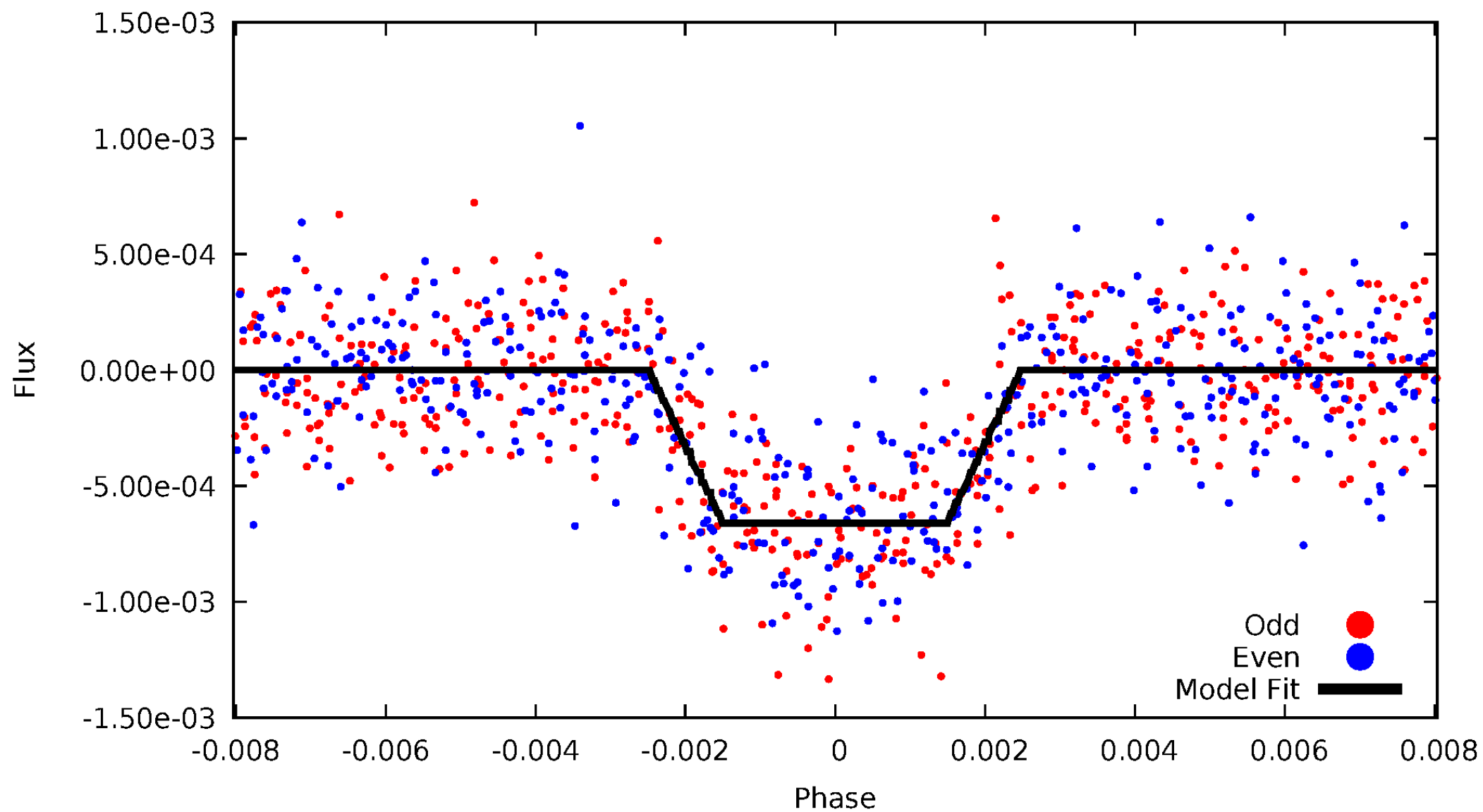
DV Odd/Even

TCE 009941859-03



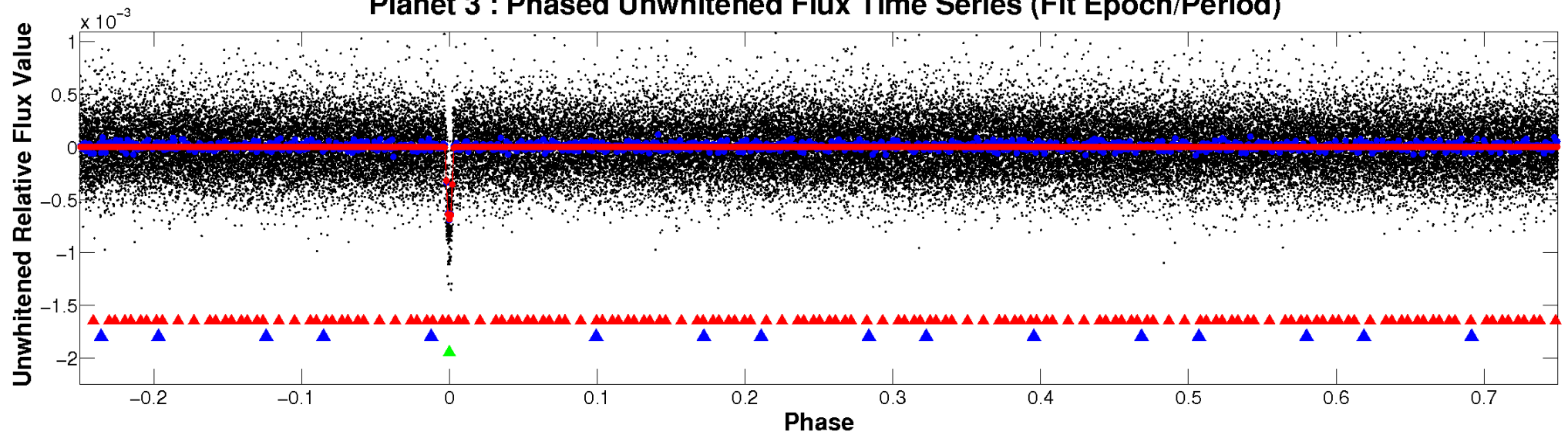
ALT Odd/Even

TCE 009941859-03

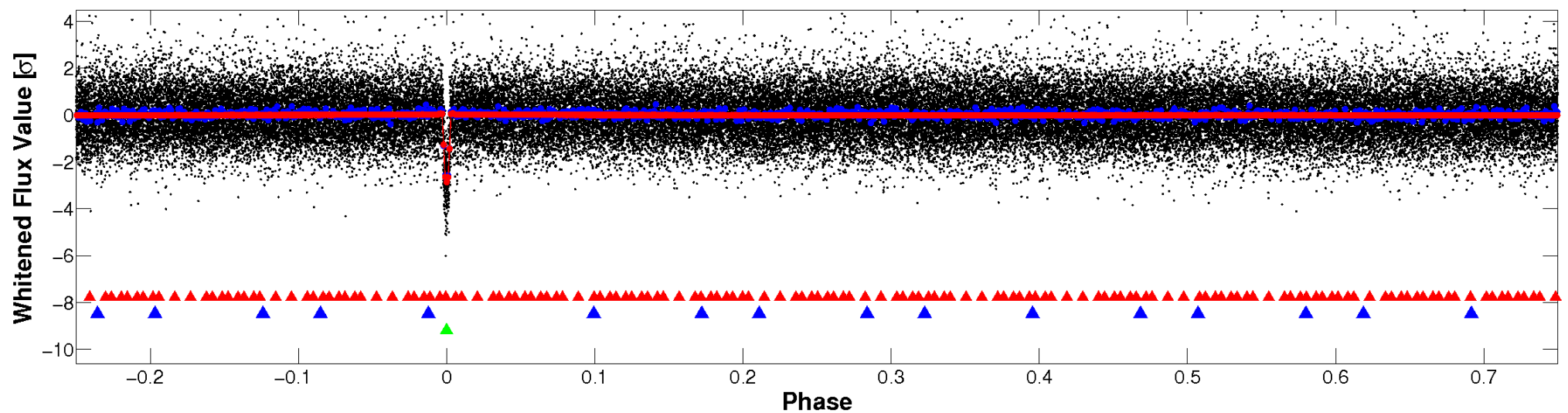


Non-Whitened Vs. Whitened Light Curve

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

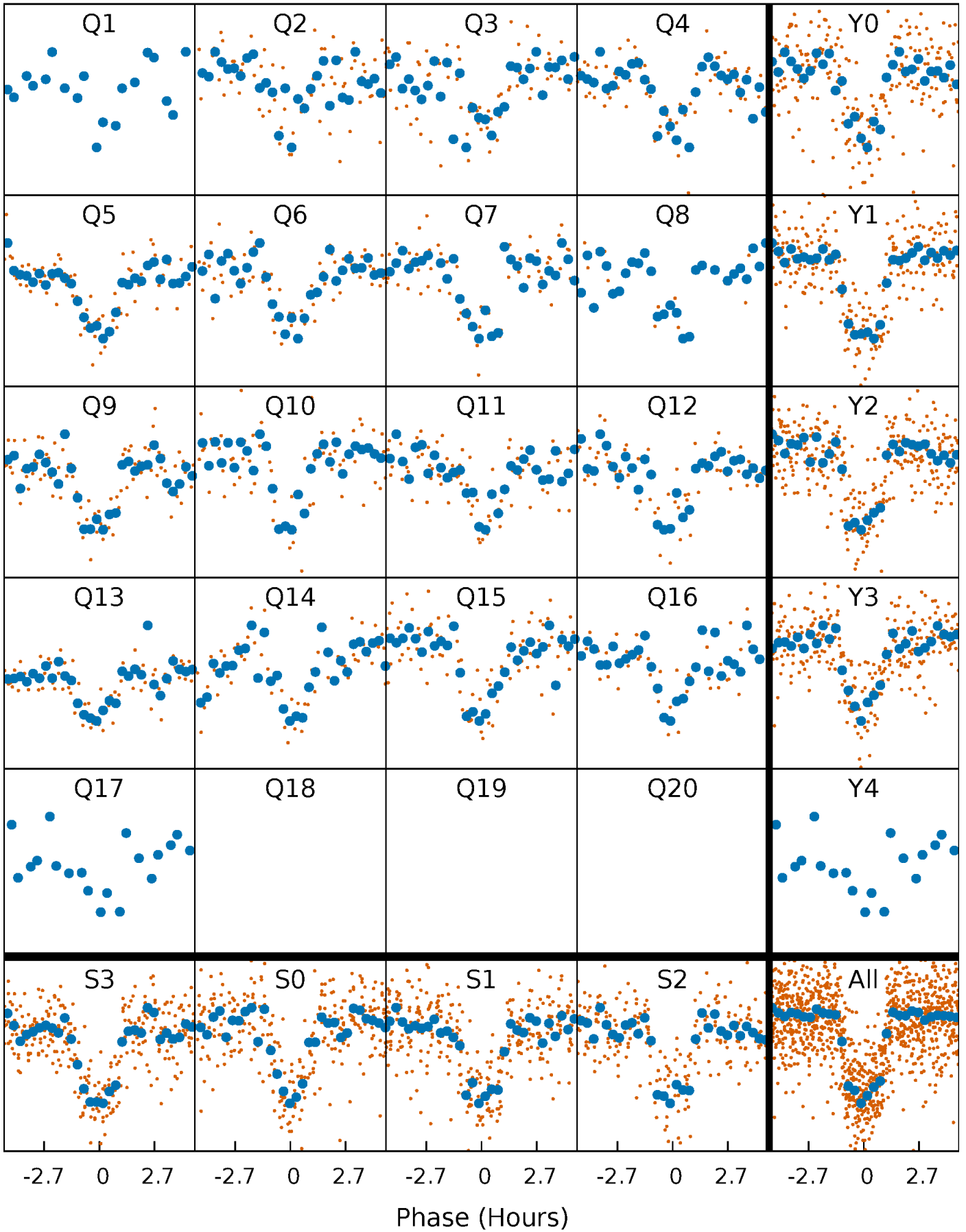


Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



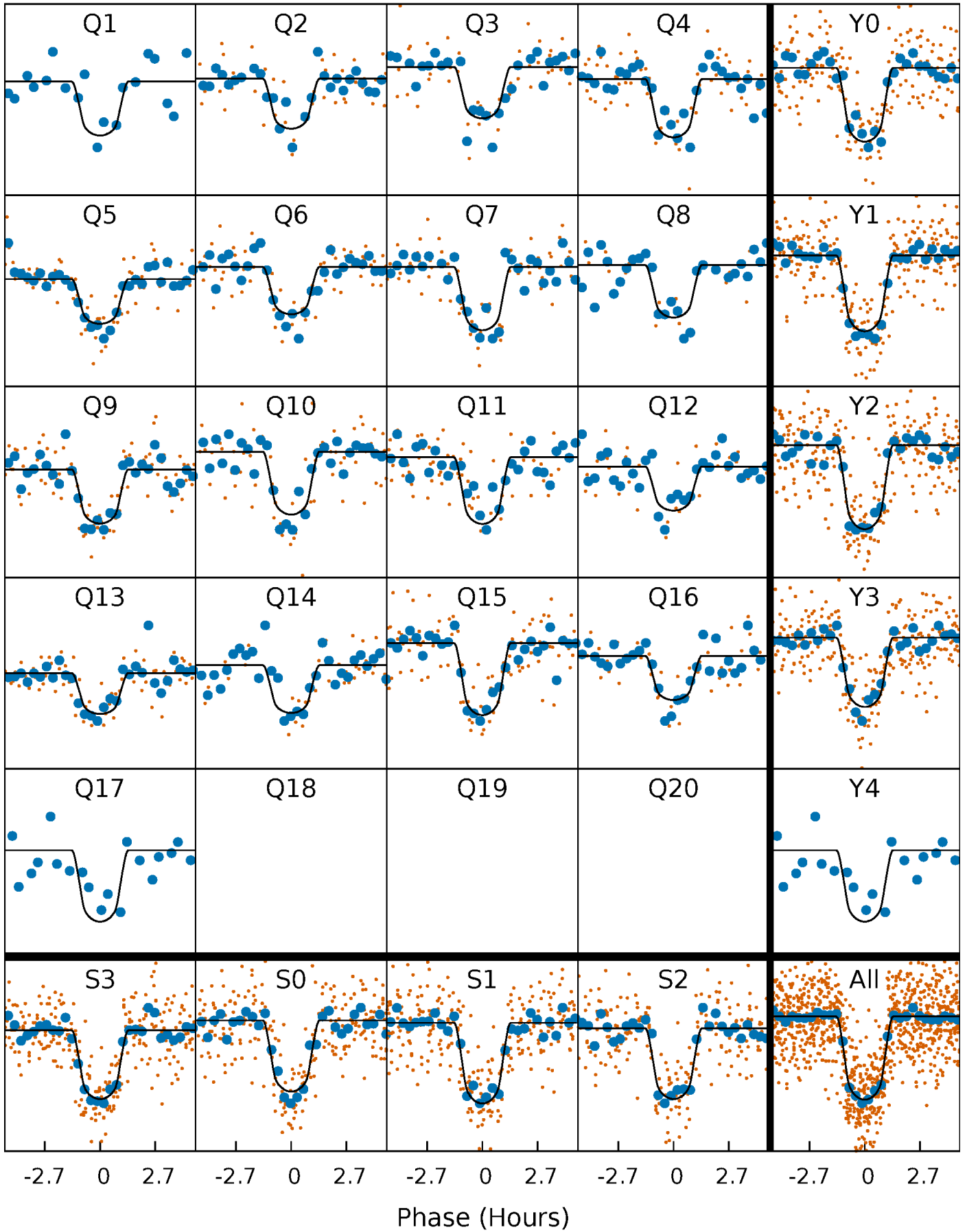
PDC Quarter-Phased Transit Curves

TCE 009941859-03 P= 20.552786 Days $T_0=145.028726$ (BKJD)



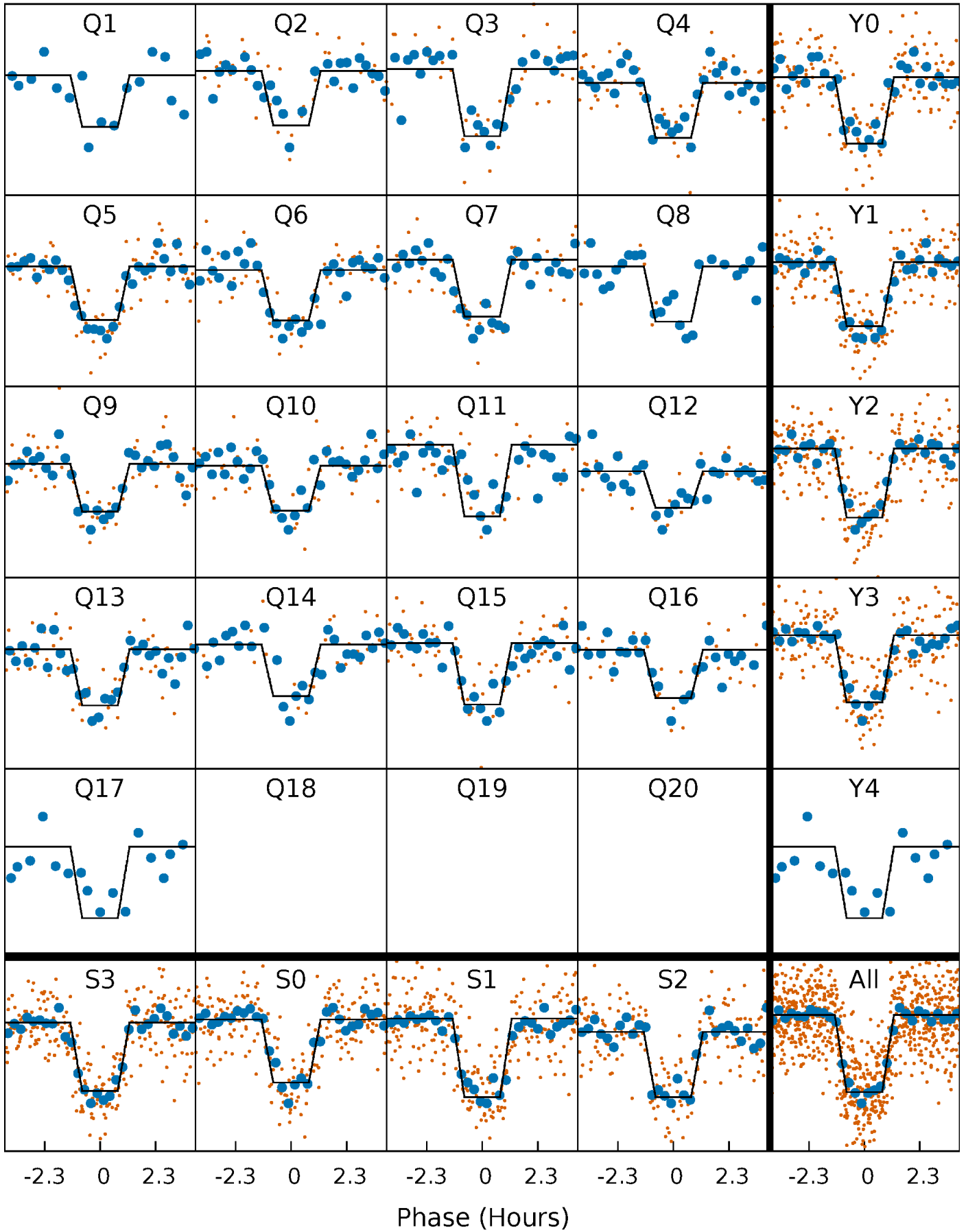
DV Quarter-Phased Transit Curves

TCE 009941859-03 P= 20.552786 Days $T_0=145.028726$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

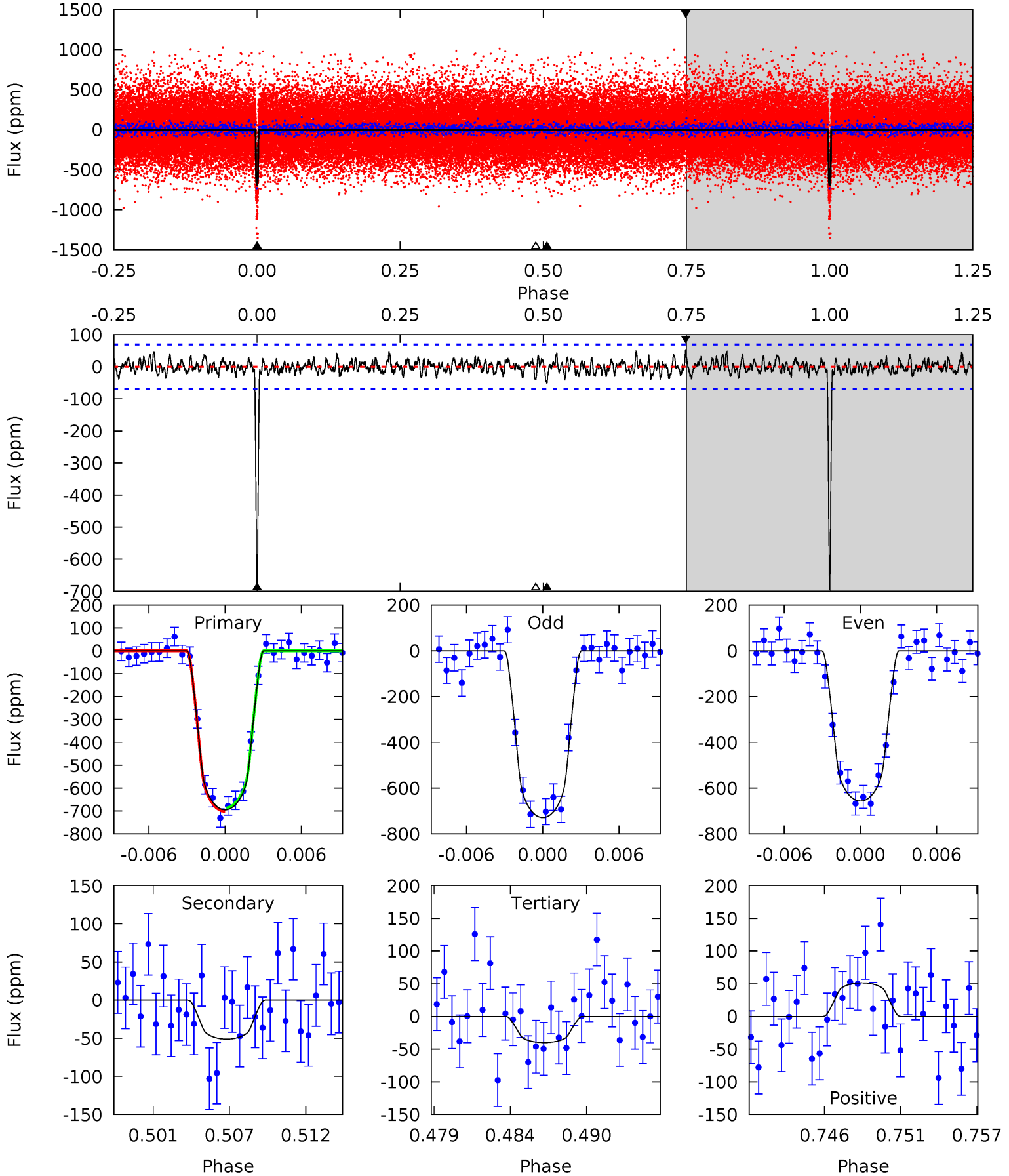
TCE 009941859-03 P= 20.552643 Days $T_0=145.033579$ (BKJD)



DV Model-Shift Uniqueness Test

009941859-03, P = 20.552786 Days, E = 124.475940 Days

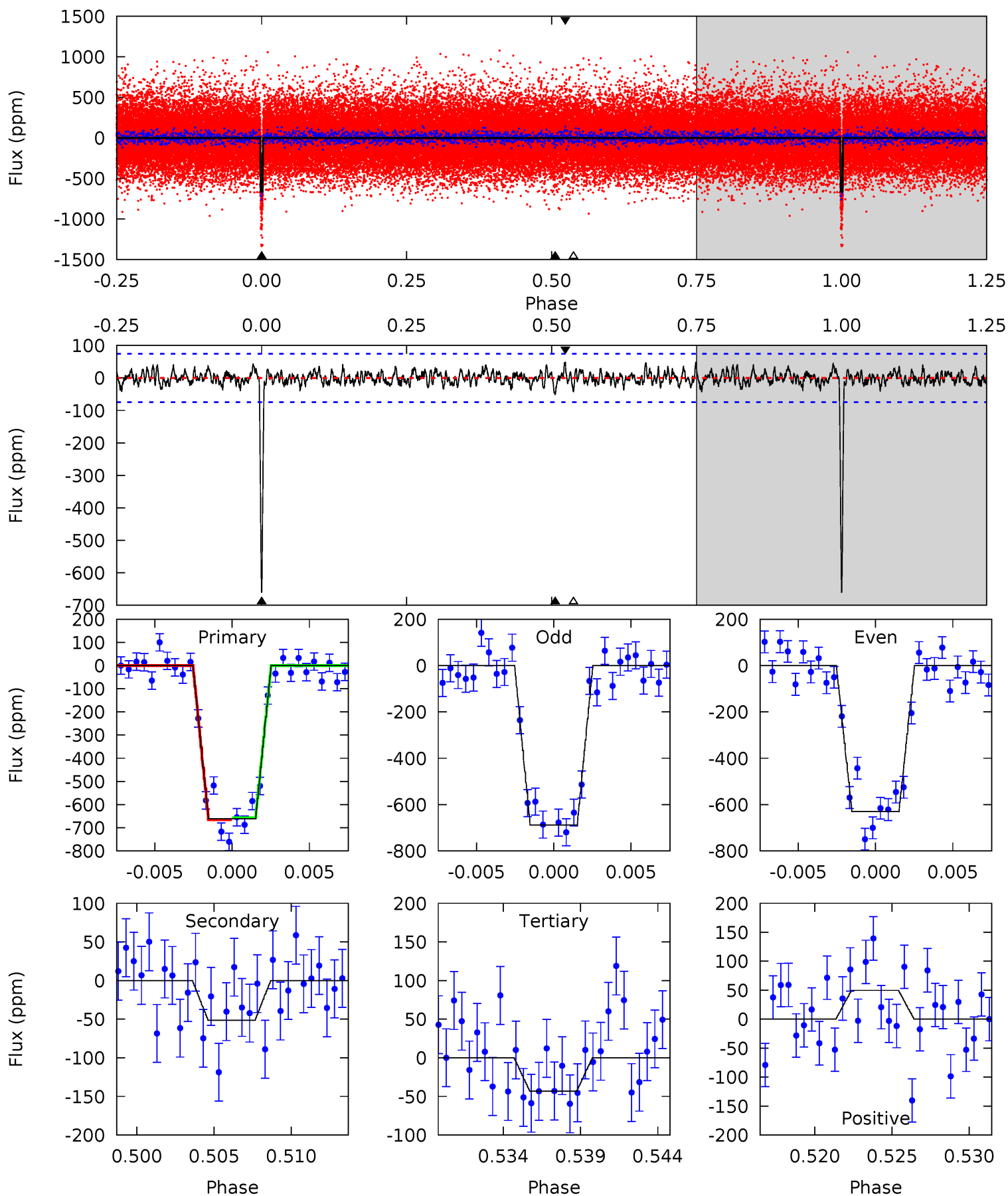
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
51.5	3.80	2.97	3.80	5.14	2.77	1.16	48.5	47.7	0.82	-0.01	2.68	0.98	0.07	0.57



Alt Model-Shift Uniqueness Test

009941859-03, P = 20.552643 Days, E = 124.480936 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
45.7	3.55	2.98	3.44	5.16	2.81	1.08	42.7	42.3	0.57	0.11	2.03	1.01	0.07	0.31



Stellar Parameters For KIC 009941859

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	$M(M_{\odot})$	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	5386^{+80}_{-72}	$4.322^{+0.159}_{-0.130}$	$0.180^{+0.150}_{-0.100}$	$1.076^{+0.191}_{-0.173}$	$0.886^{+0.063}_{-0.037}$	$1.002^{+0.741}_{-0.368}$
	+1%/-1%	+4%/-3%	+83%/-56%	+18%/-16%	+7%/-4%	+74%/-37%
Source	SPE90	SPE90	SPE90	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

Secondary Eclipse Parameters for KIC 009941859-03 / KOI 0528.03

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-51 ± 13	$3.25^{+0.86}_{-0.76}$	916^{+43}_{-50}	3258^{+295}_{-218}	53^{+38}_{-23}
Alt.	-51 ± 14	$3.03^{+0.81}_{-0.79}$	913^{+50}_{-44}	3334^{+379}_{-260}	59^{+58}_{-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 $T_{obs} \gg T_{max}$ AND $A_{obs} \gg 1.0$

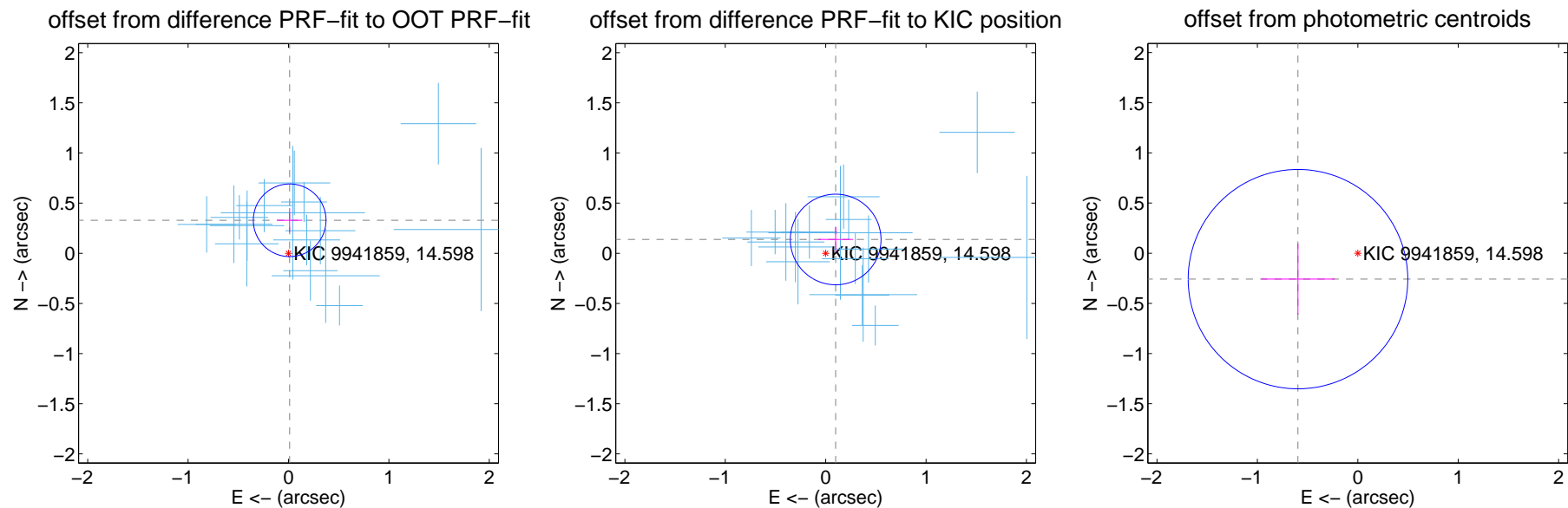
DV Centroid Data

Supplemental centroid analysis for 009941859-03. Kepler magnitude: 14.60. Transit SNR 37.77

There are 16 quarters with good PRF difference image offsets

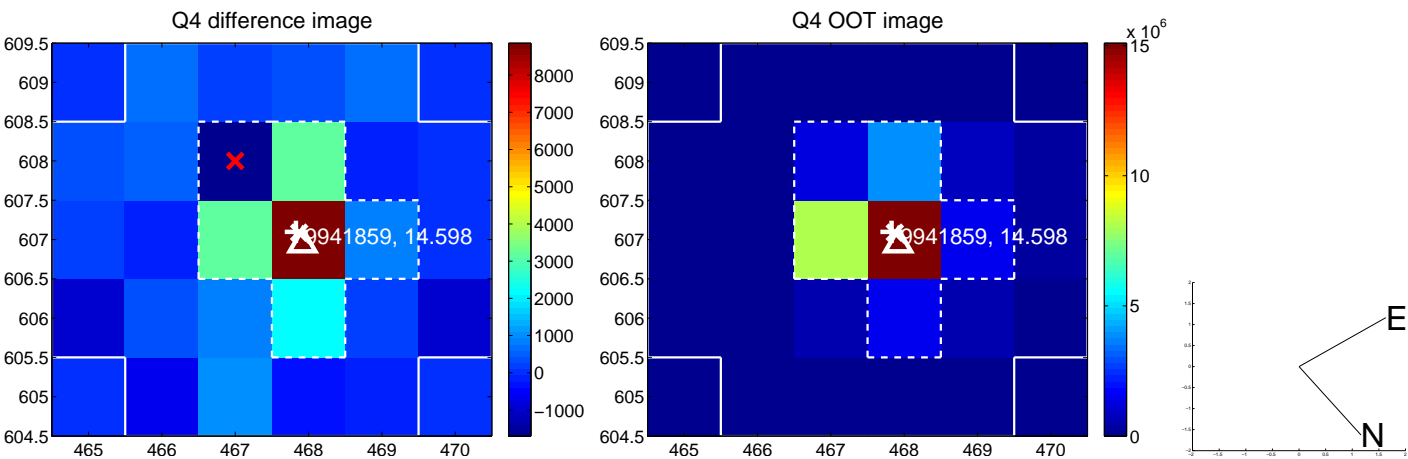
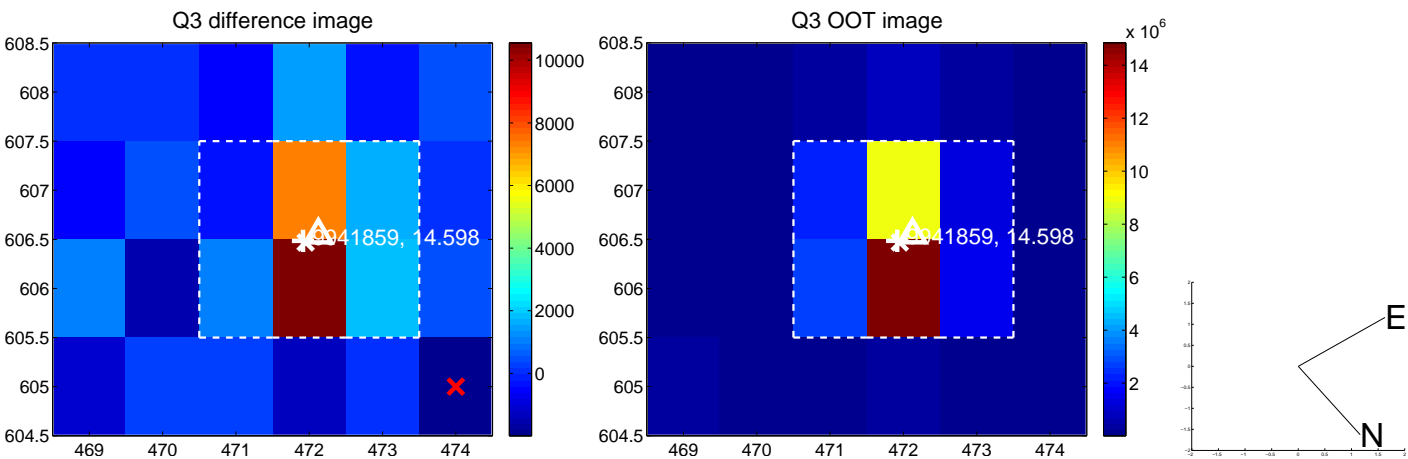
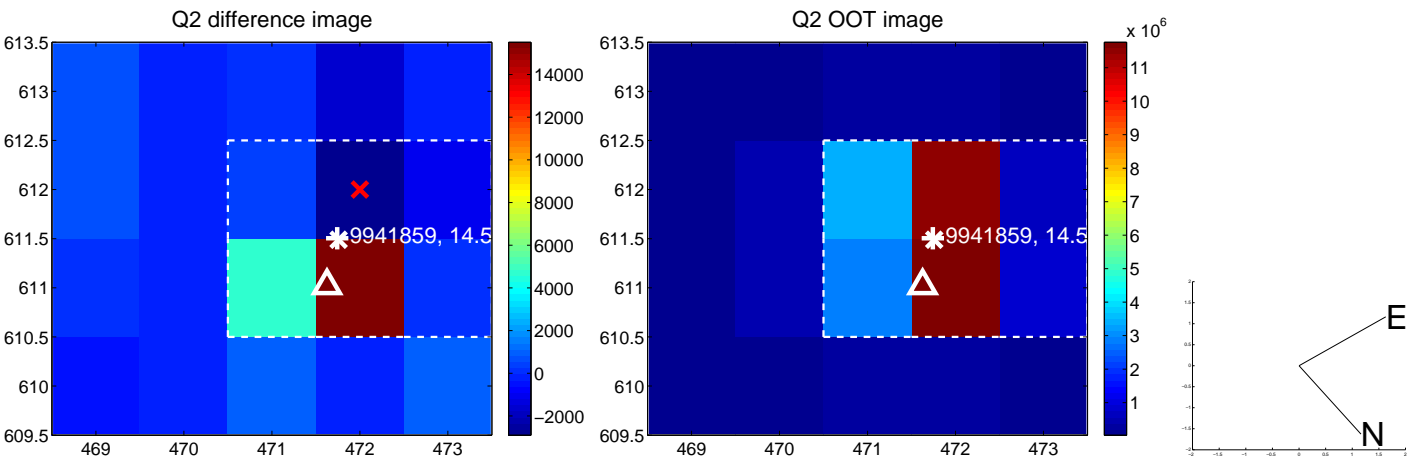
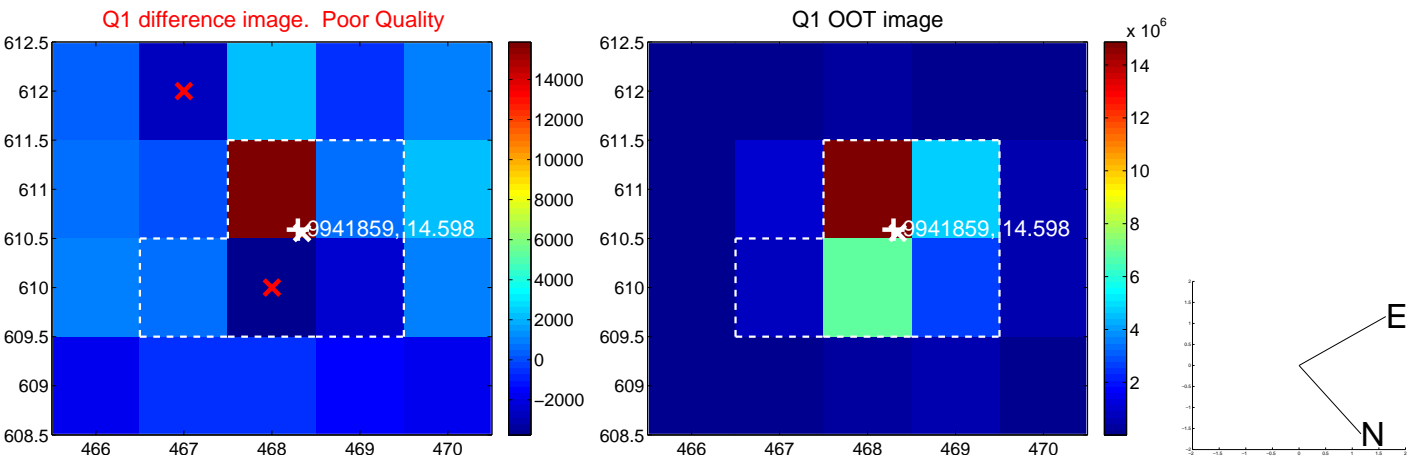
The direct PRF centroid is offset from the target star catalog position by about 0.29 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.329 ± 0.121	2.73	-0.012 ± 0.125	0.329 ± 0.121
PRF-fit source offset from KIC position	0.170 ± 0.151	1.13	-0.100 ± 0.174	0.138 ± 0.127
photometric centroid source offset	0.65 ± 0.36	1.78	0.60 ± 0.37	-0.26 ± 0.35

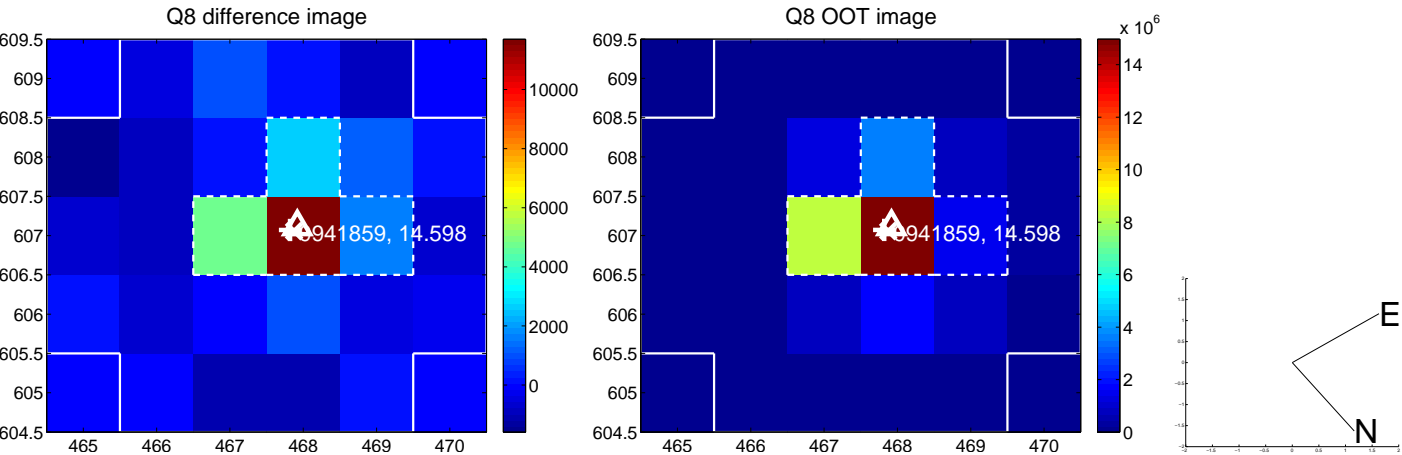
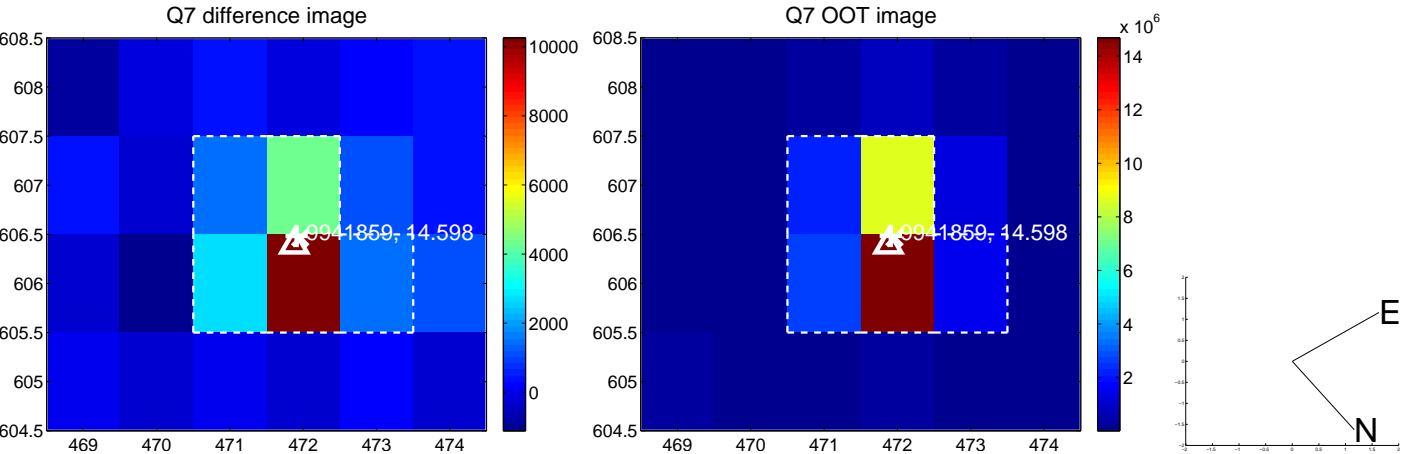
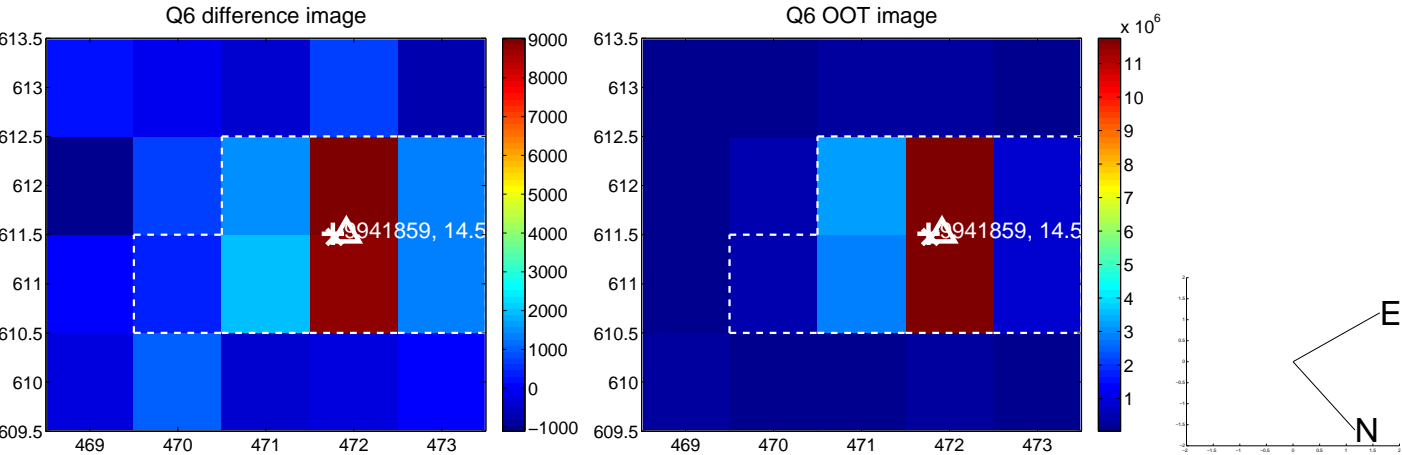
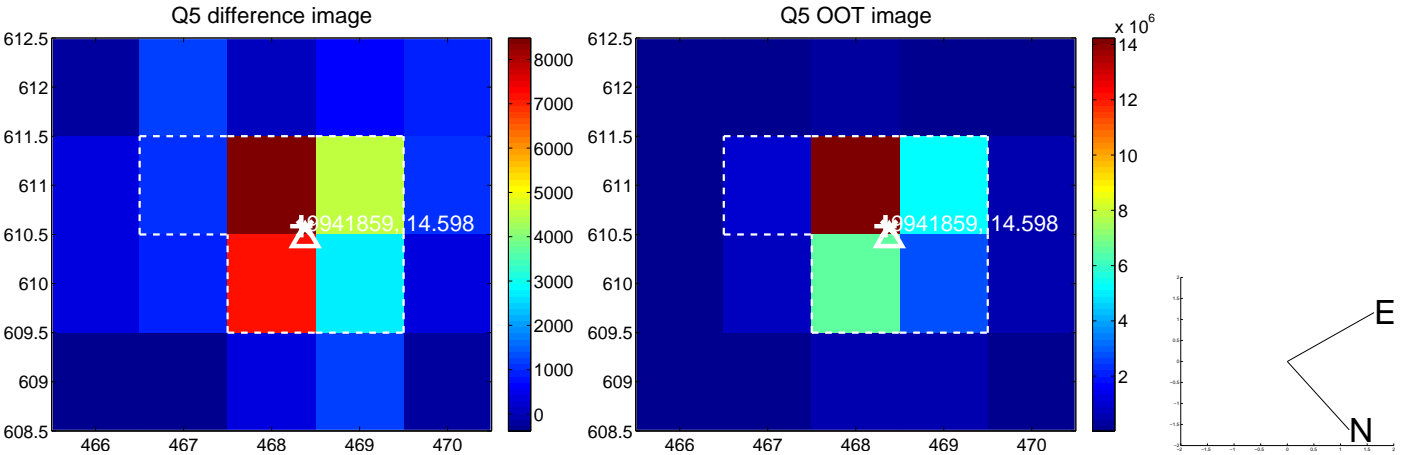


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

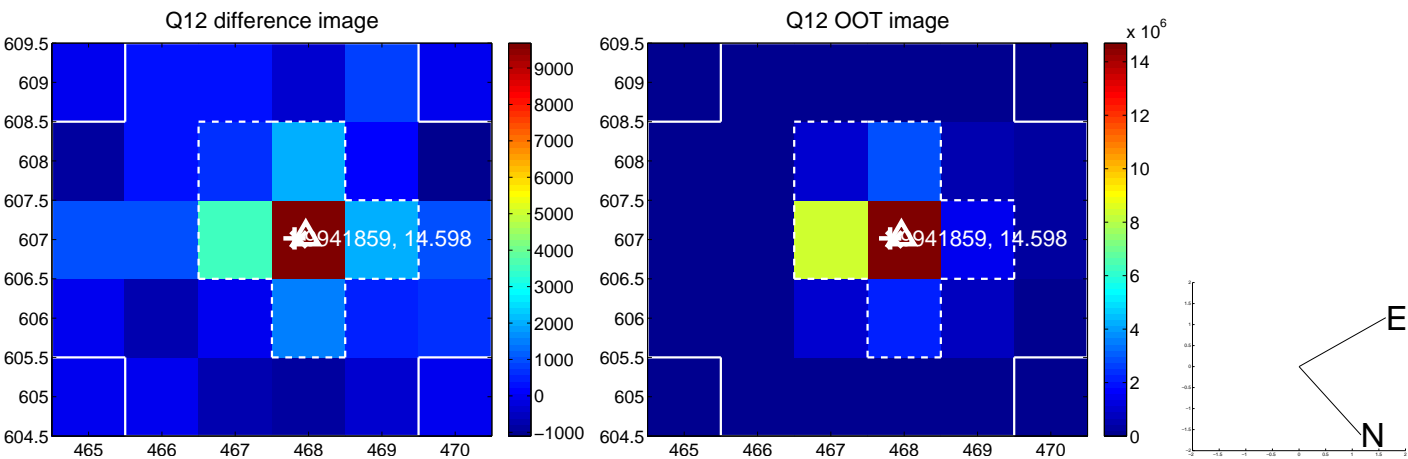
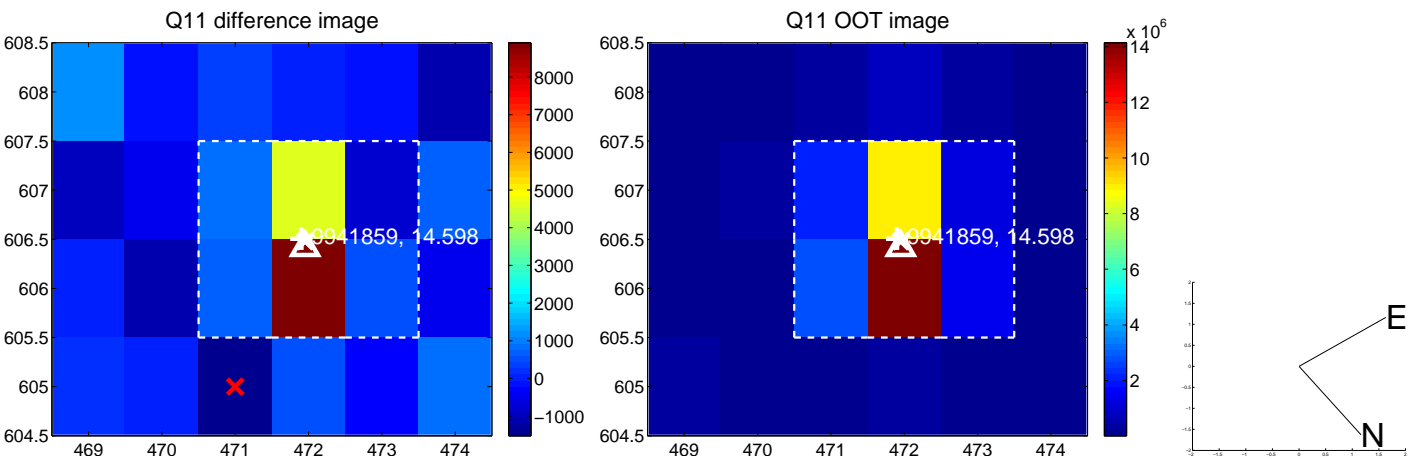
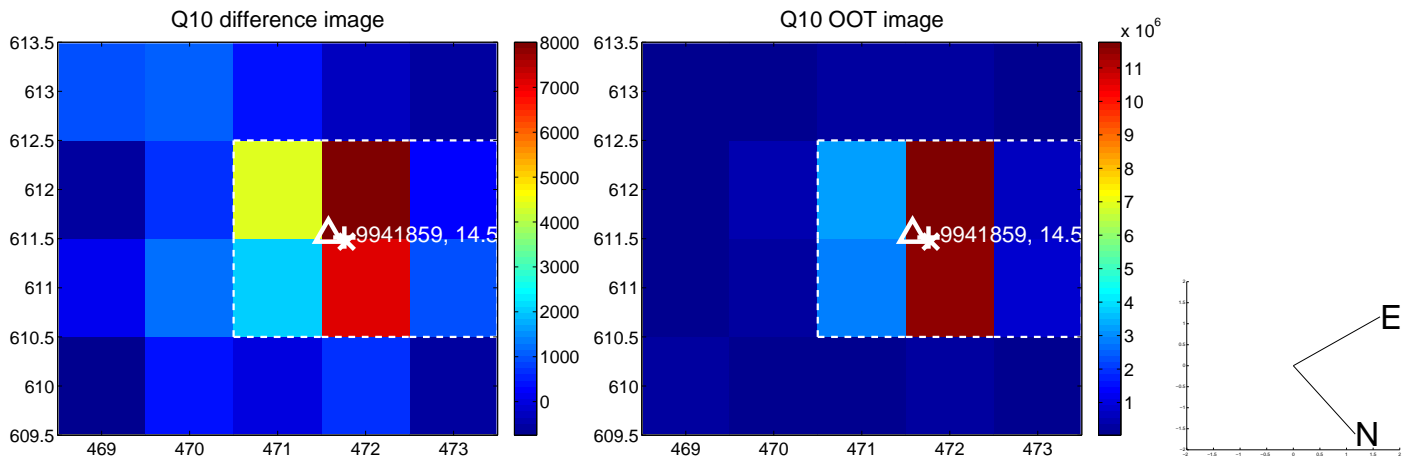
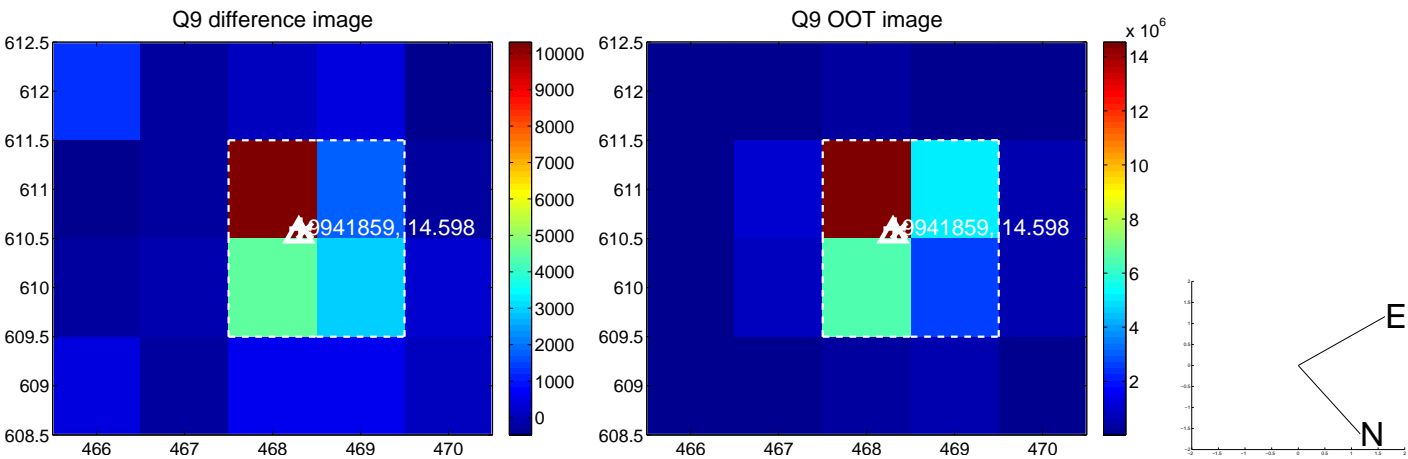
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



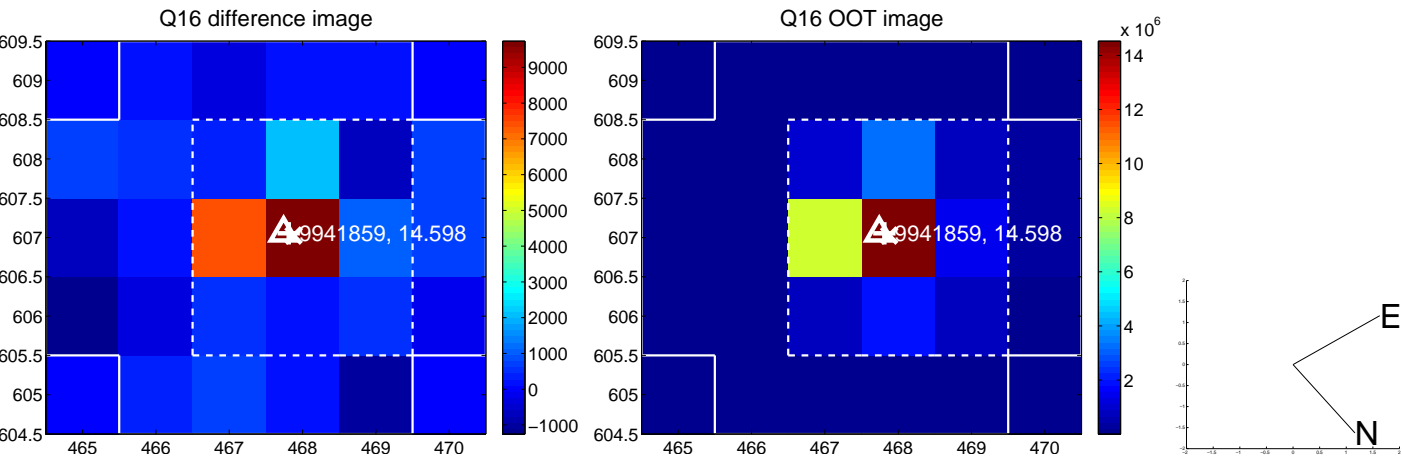
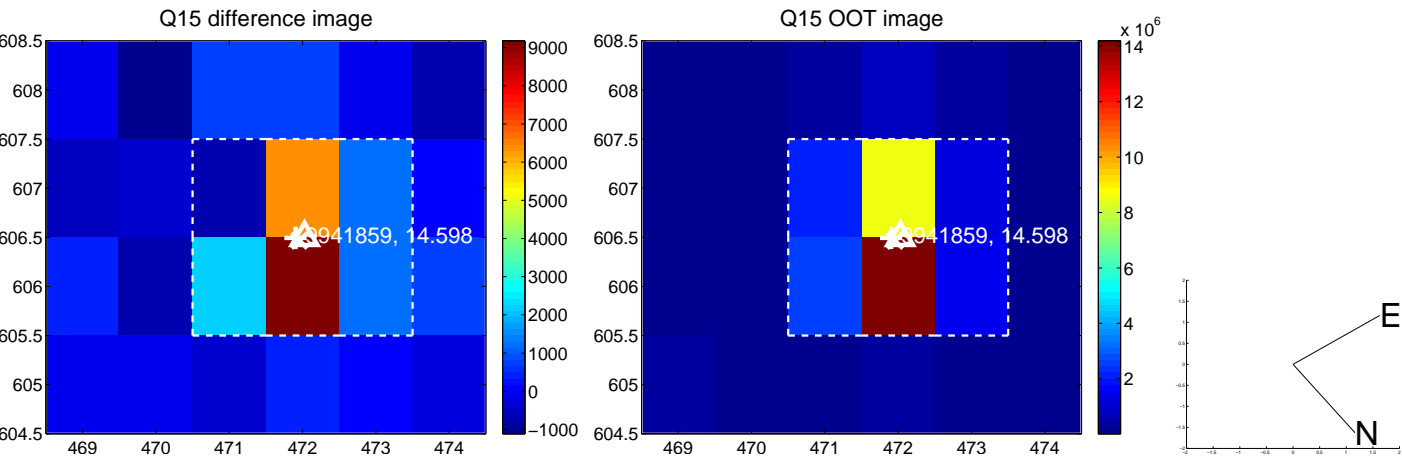
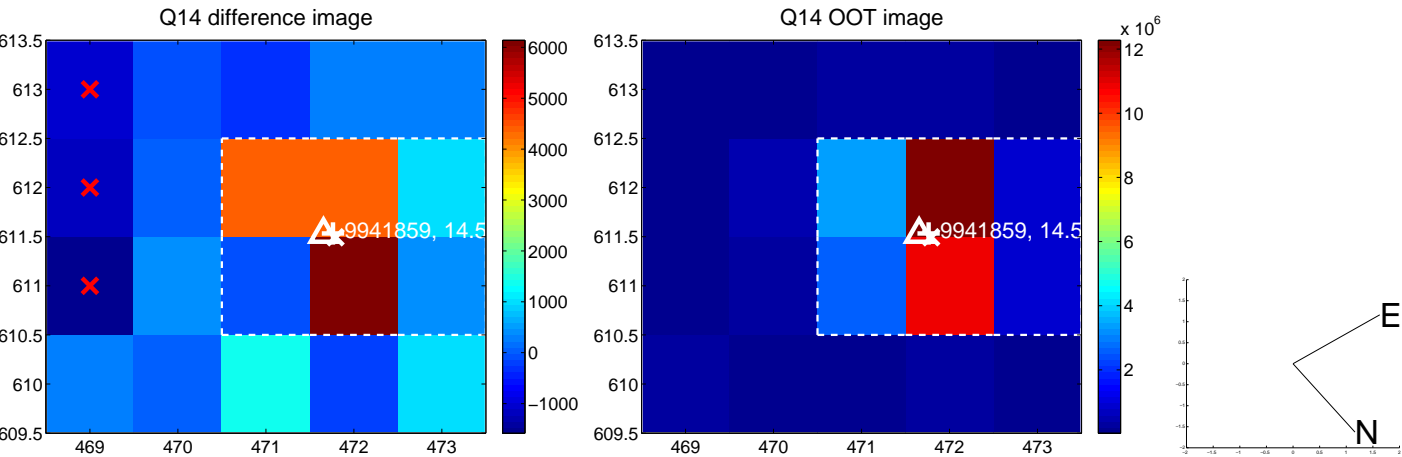
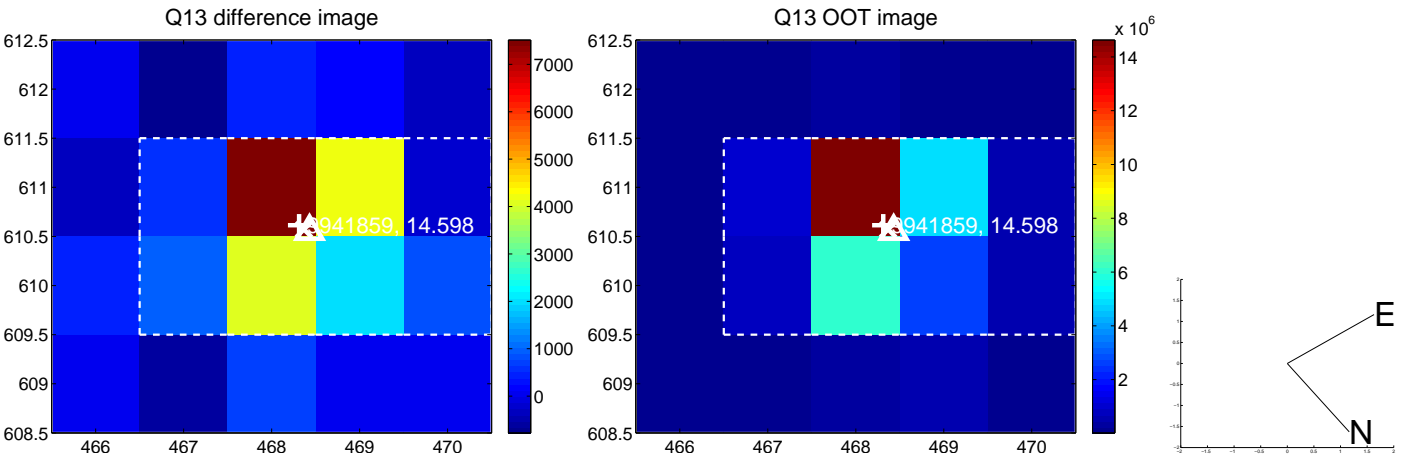
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



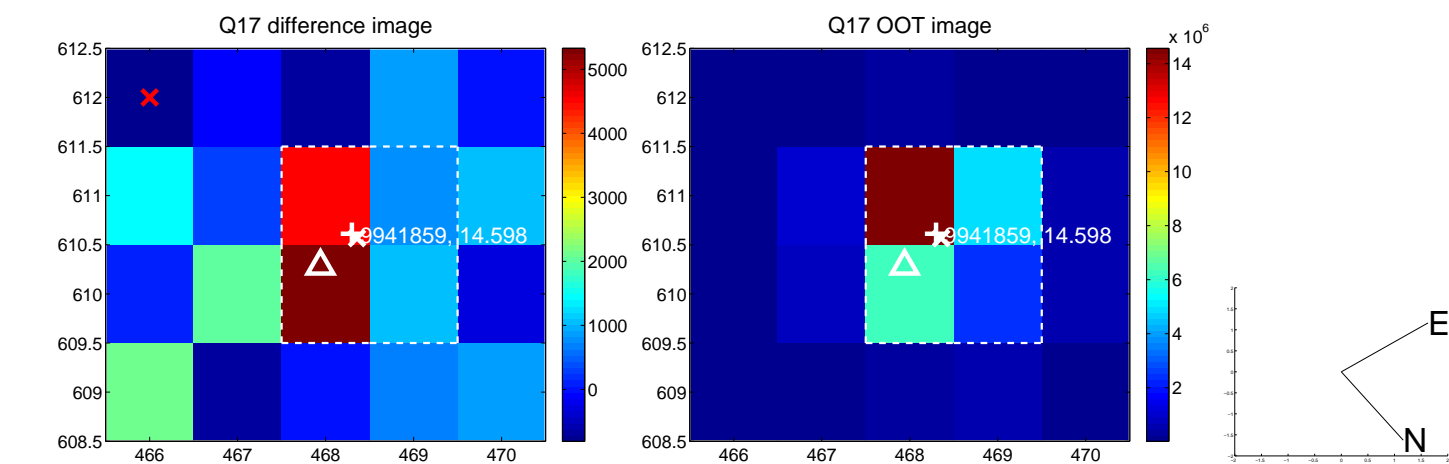
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



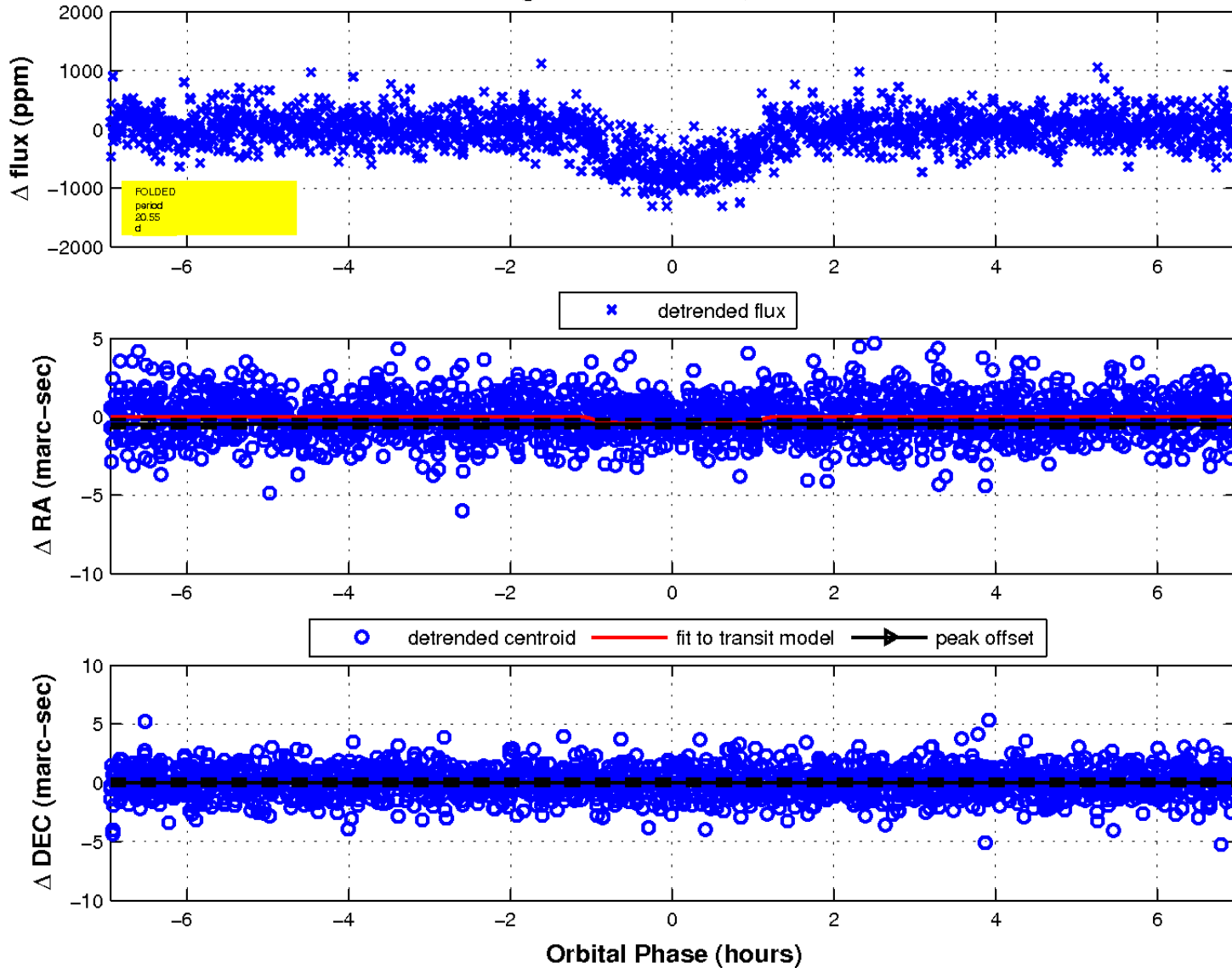
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



fluxWeightedCentroids, Planet 3 of 3



UKIRT Image

Declination

