

KIC 009958962

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})
009958962-01	OBS	0593.01	9.997619	131.796795	628.3	3.485	35.7	38.3	0.98	6004	2.85	129.44
009958962-02	OBS	0593.02	90.412010	208.503416	1172.3	6.841	23.0	24.7	0.98	6004	3.63	6.87
009958962-03	OBS	0593.03	51.067350	147.611588	623.3	4.438	15.2	17.8	0.98	6004	2.65	14.71
009958962-04	OBS	0593.04	240.190262	168.314523	810.0	10.991	11.1	11.5	0.98	6004	3.25	1.87

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009958962-01	OBS	PC	1.00	0	0	0	0	CENT_KIC_POS
009958962-02	OBS	PC	1.00	0	0	0	0	CENT_KIC_POS
009958962-03	OBS	PC	1.00	0	0	0	0	CENT_KIC_POS
009958962-04	OBS	PC	0.74	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.

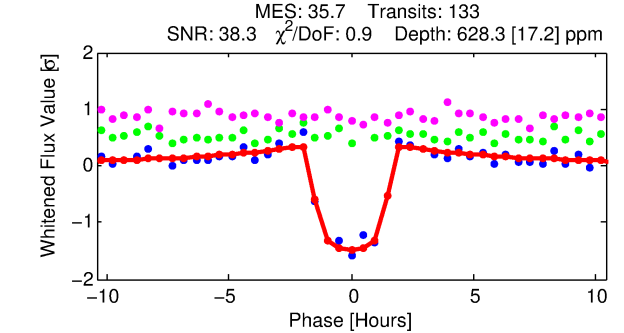
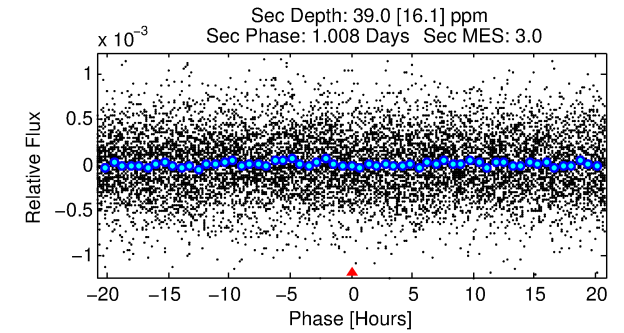
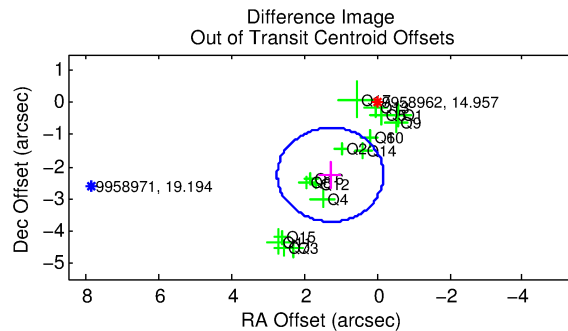
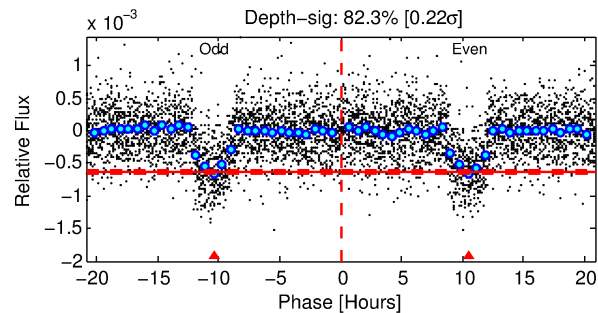
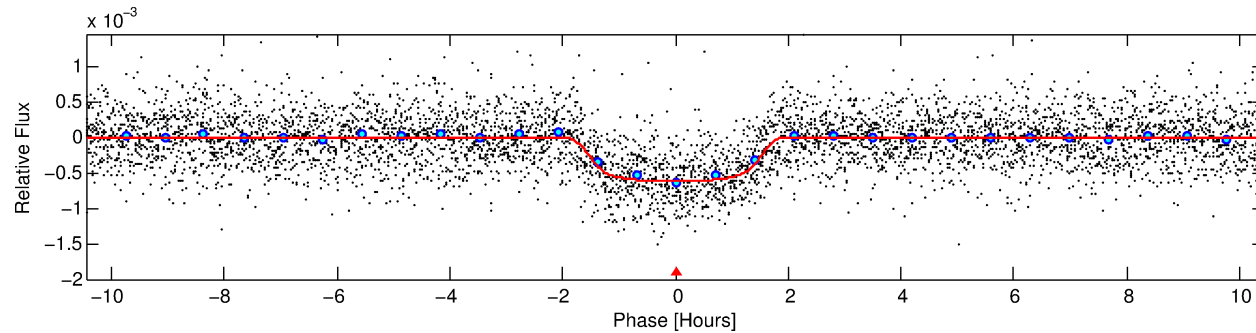
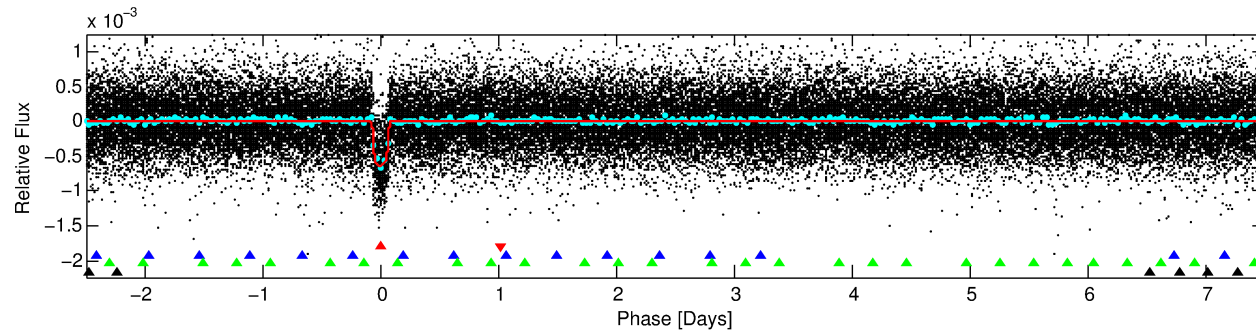
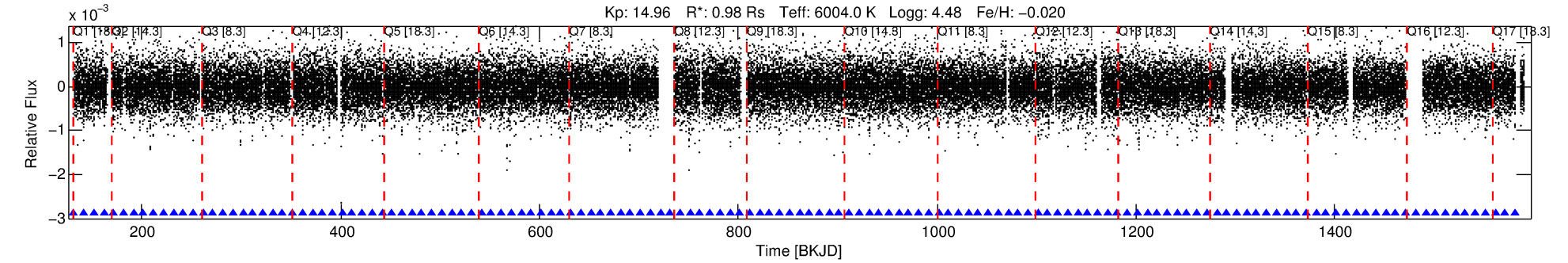
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009958962-01

No Significant Match Found

DV One-Page Summary

KIC: 9958962 Candidate: 1 of 4 Period: 9.998 d
KOI: K00593.01 Corr: 0.965



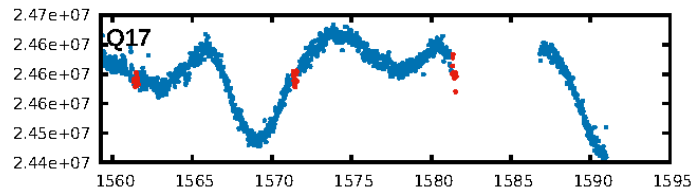
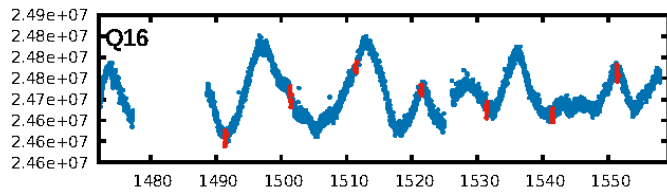
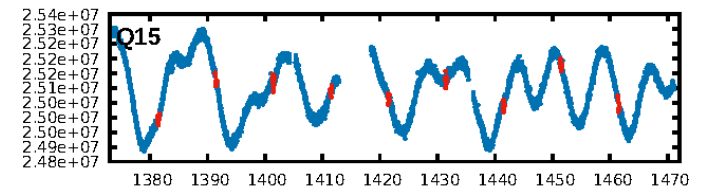
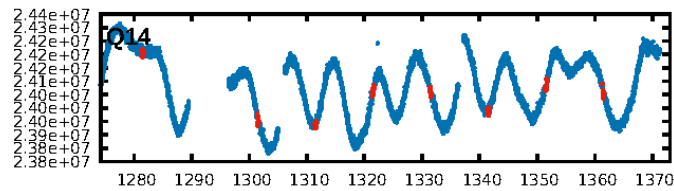
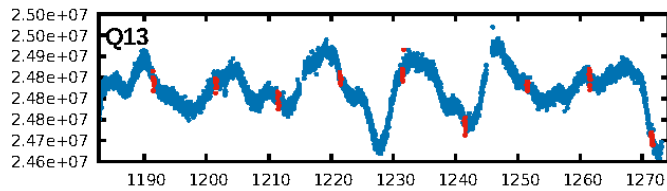
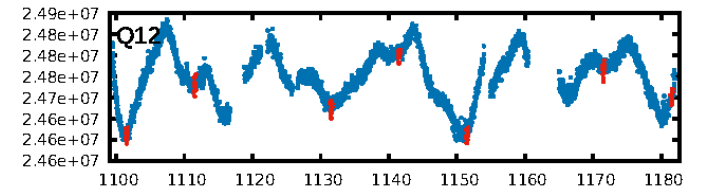
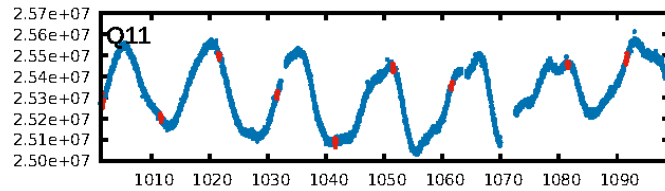
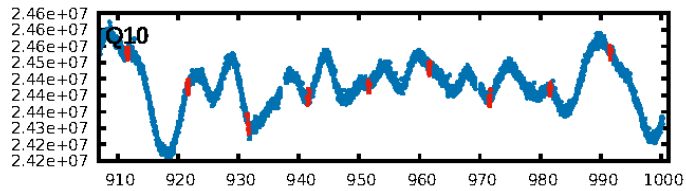
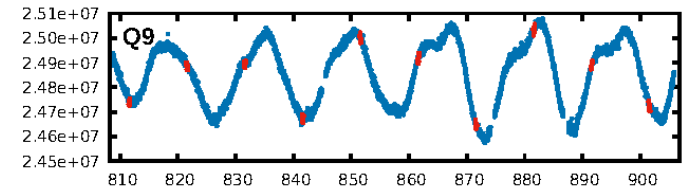
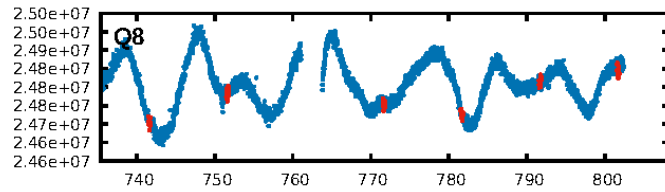
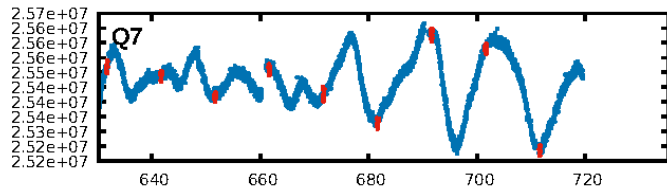
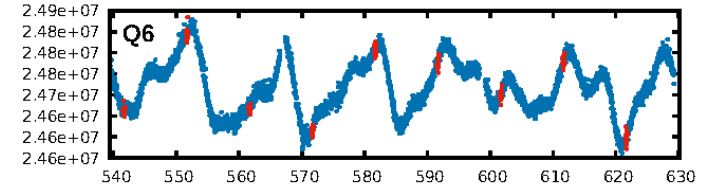
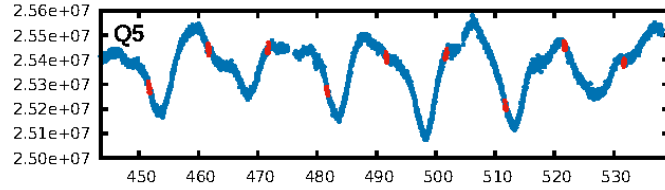
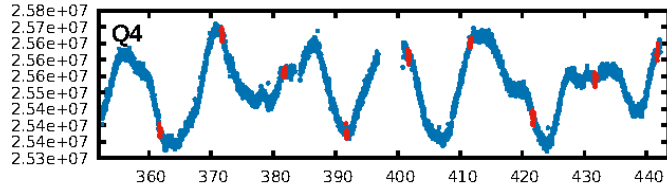
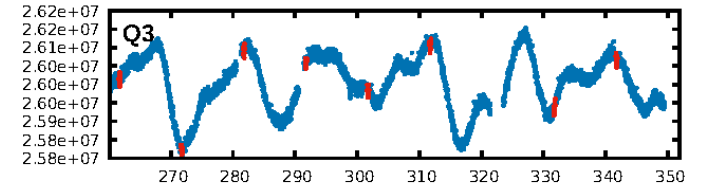
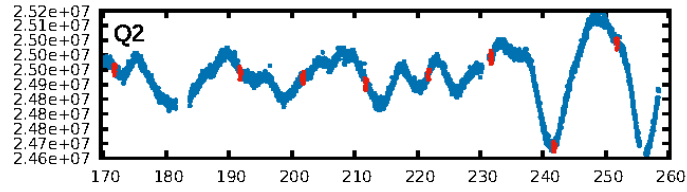
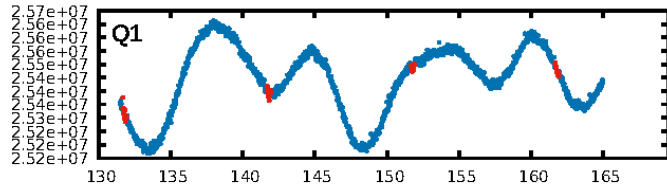
DV Fit Results:

Period = 9.99762 [0.00002] d
Epoch = 131.7968 [0.0017] BKJD
Rp/R* = 0.0267 [0.0018]
a/R* = 11.59 [3.66]
b = 0.88 [0.08]
Seff = 129.44 [52.10]
Teff = 860 [87] K
Rp = 2.85 [0.90] Re
a = 0.0927 [0.0242] AU
Ag = 22.66 [13.08] [1.66 σ]
Teffp = 2901 [329] K [5.99 σ]

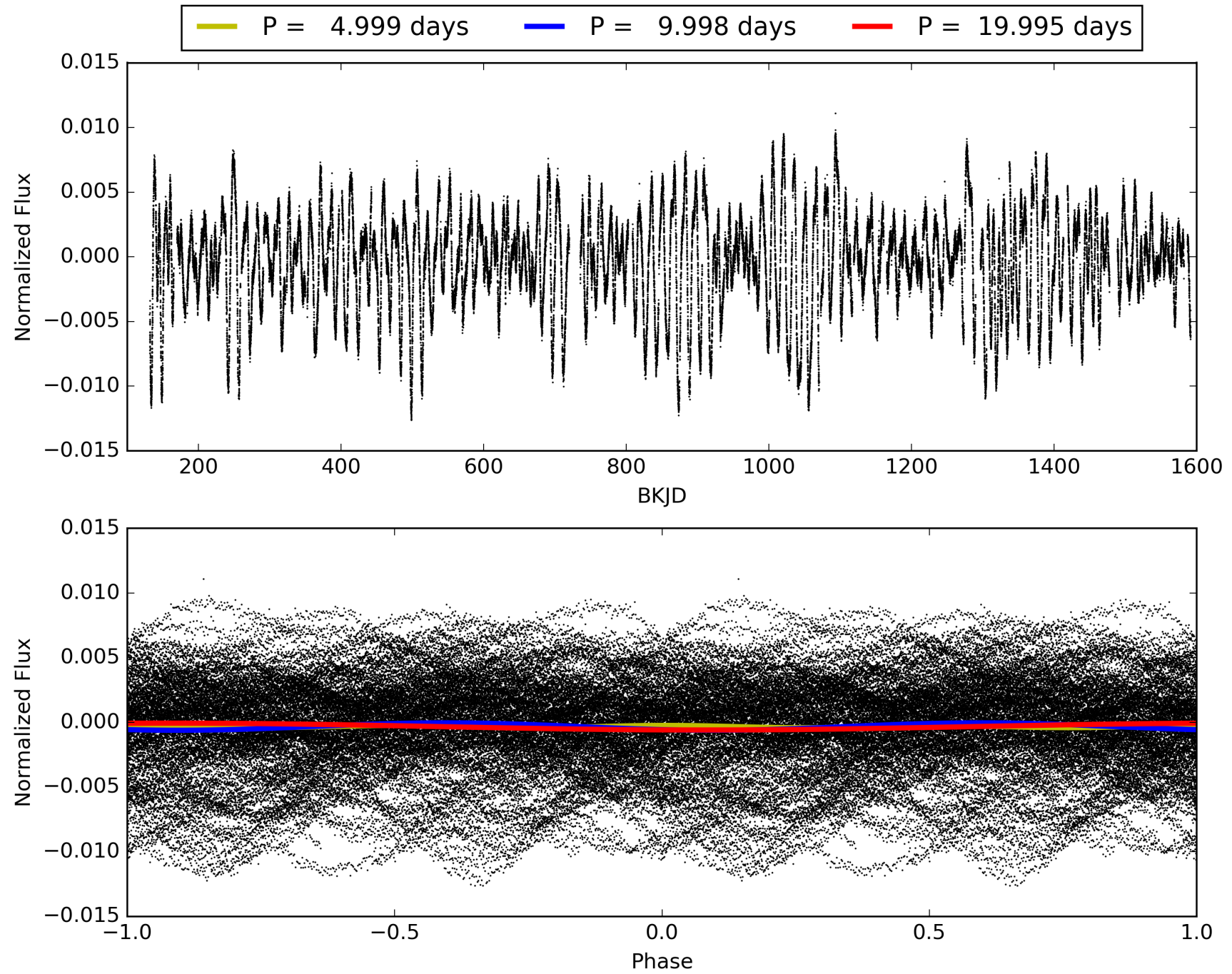
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 100.0% [174.69 σ]
ModelChiSquare2-sig: 99.9%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 6.95e-262
RollingBand-fgt: 1.00 [126/126]
GhostDiagnostic-chr: 4.075
Centroid-sig: 0.0%
Centroid-so: 0.334 arcsec [1.26 σ]
OOTOffset-rm: 2.590 arcsec [5.31 σ]
KicOffset-rm: 0.113 arcsec [1.06 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 009958962-01, PDC Light Curves

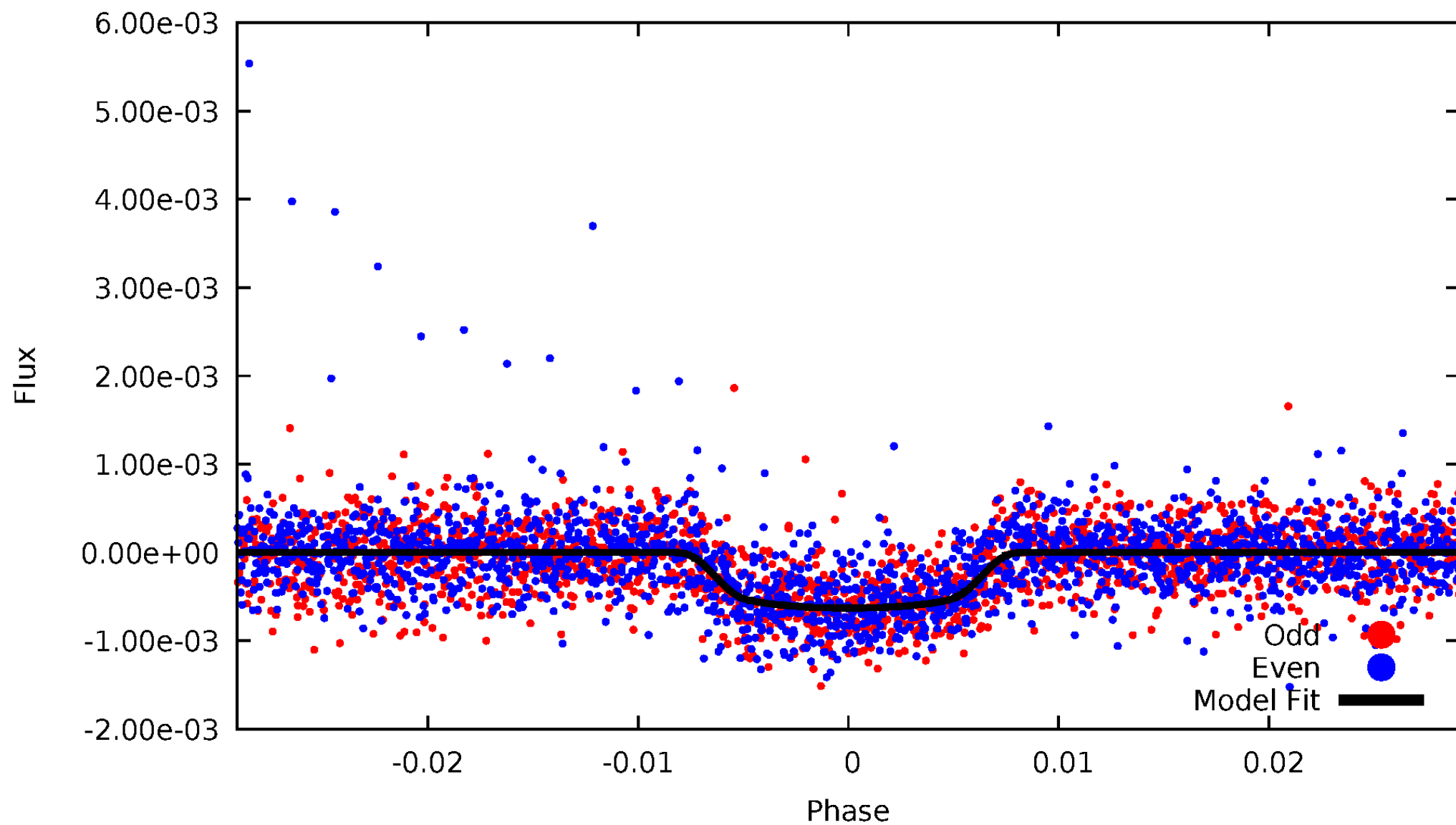


TCE 009958962-01



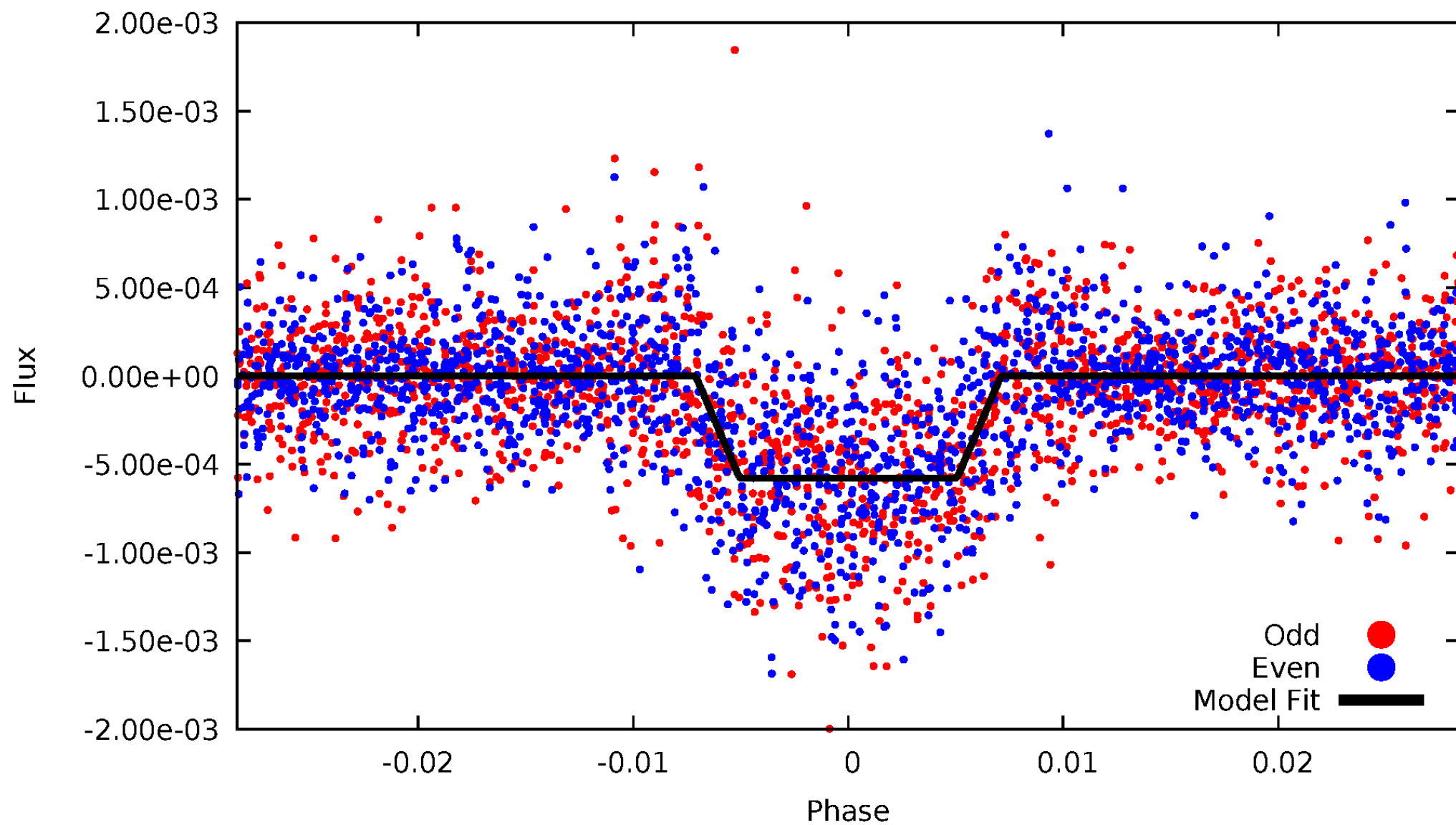
DV Odd/Even

TCE 009958962-01



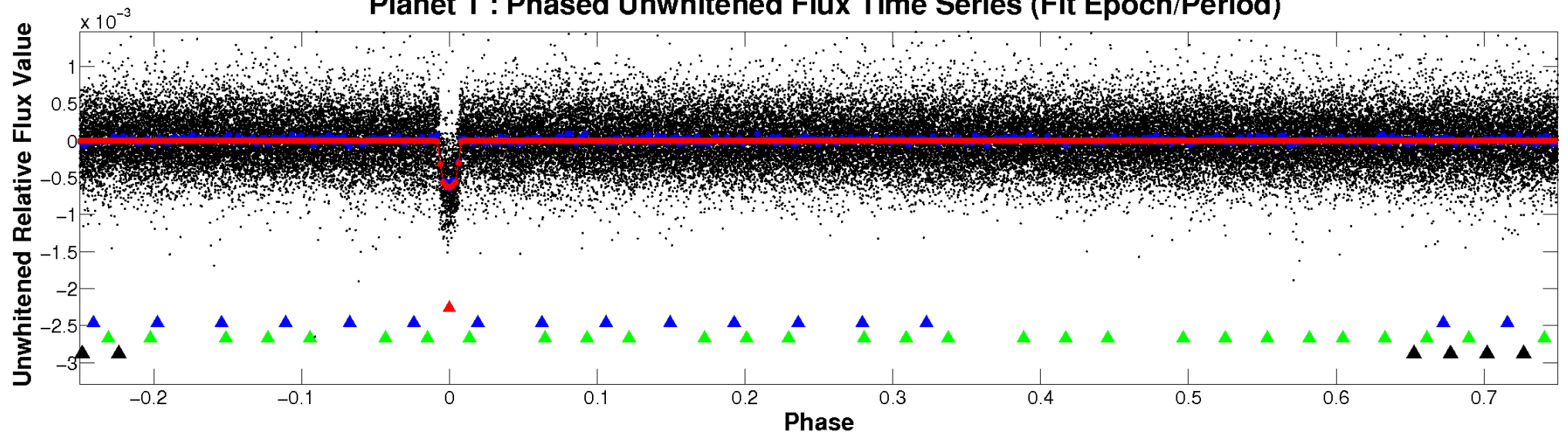
ALT Odd/Even

TCE 009958962-01

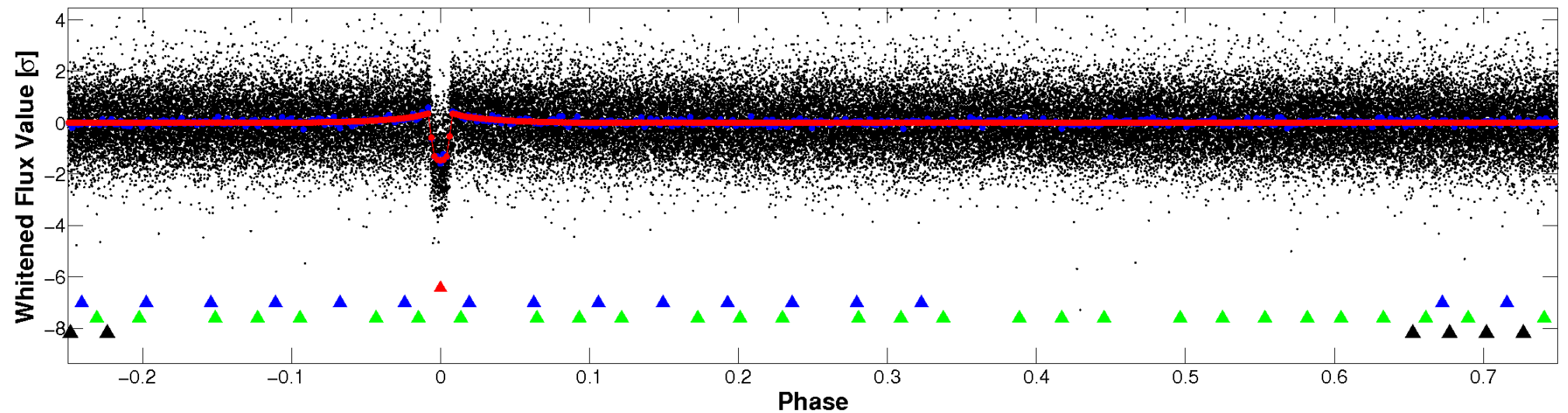


Non-Whitened Vs. Whitened Light Curve

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

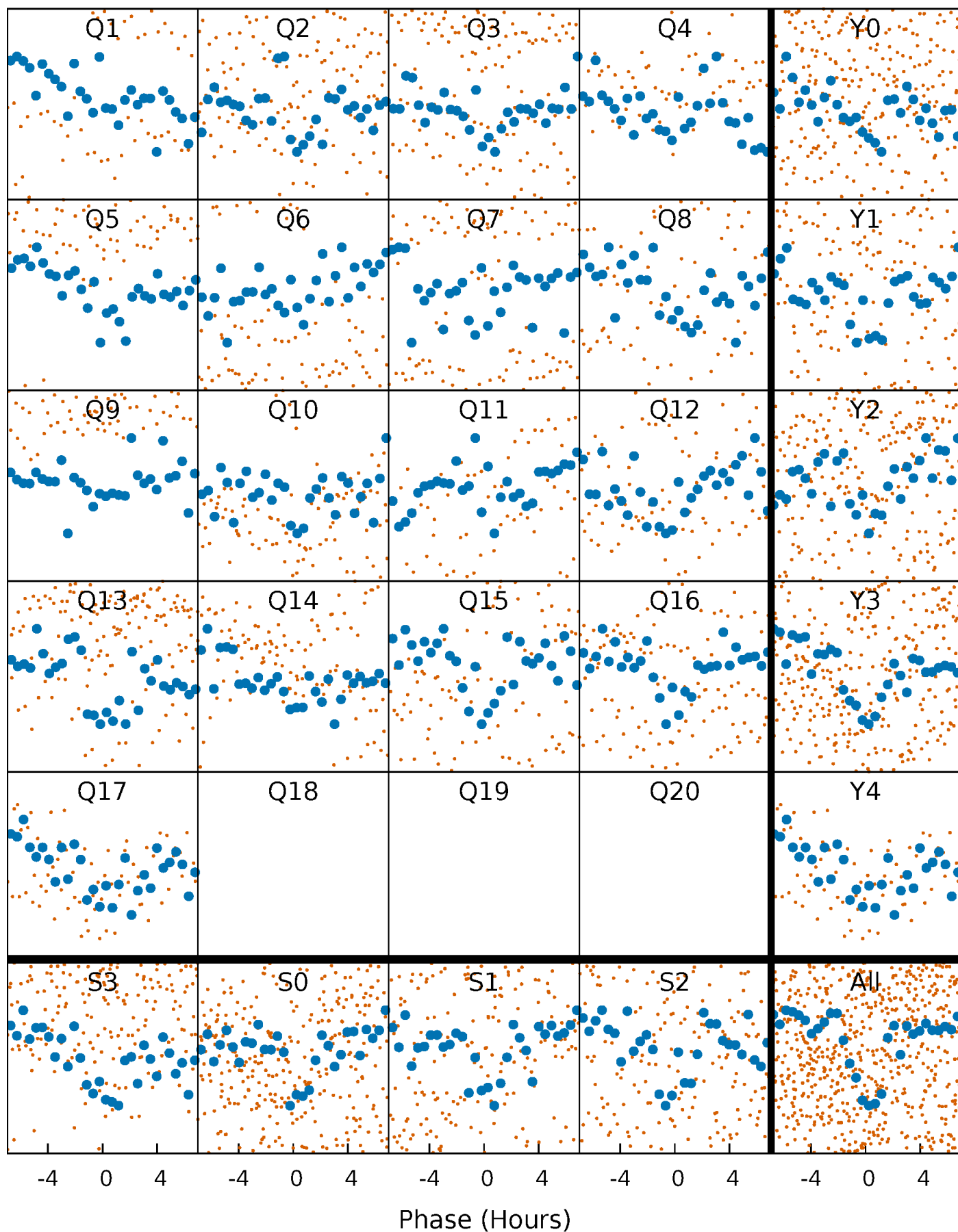


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



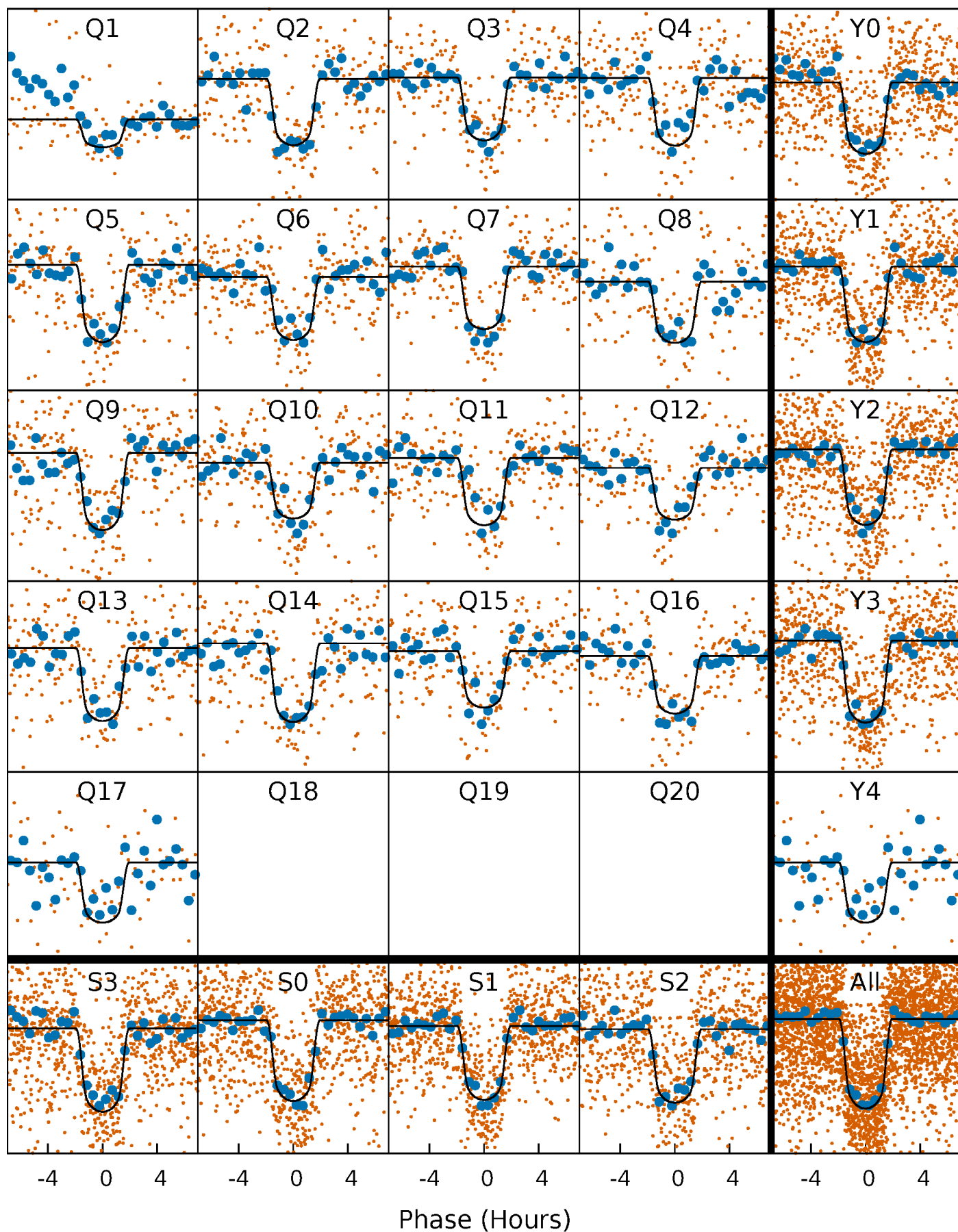
PDC Quarter-Phased Transit Curves

TCE 009958962-01 P= 9.997619 Days $T_0=131.796795$ (BKJD)



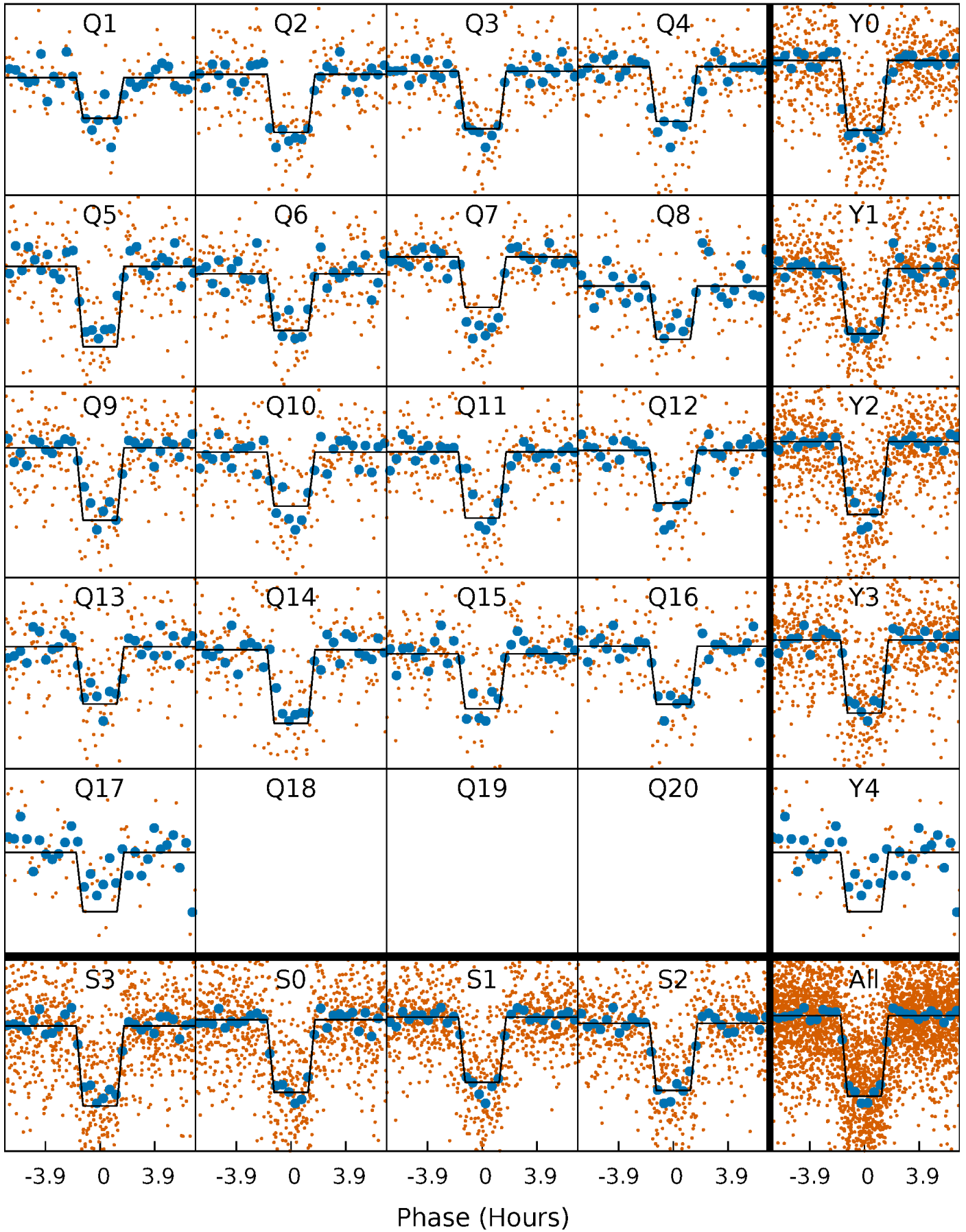
DV Quarter-Phased Transit Curves

TCE 009958962-01 P= 9.997619 Days $T_0=131.796795$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

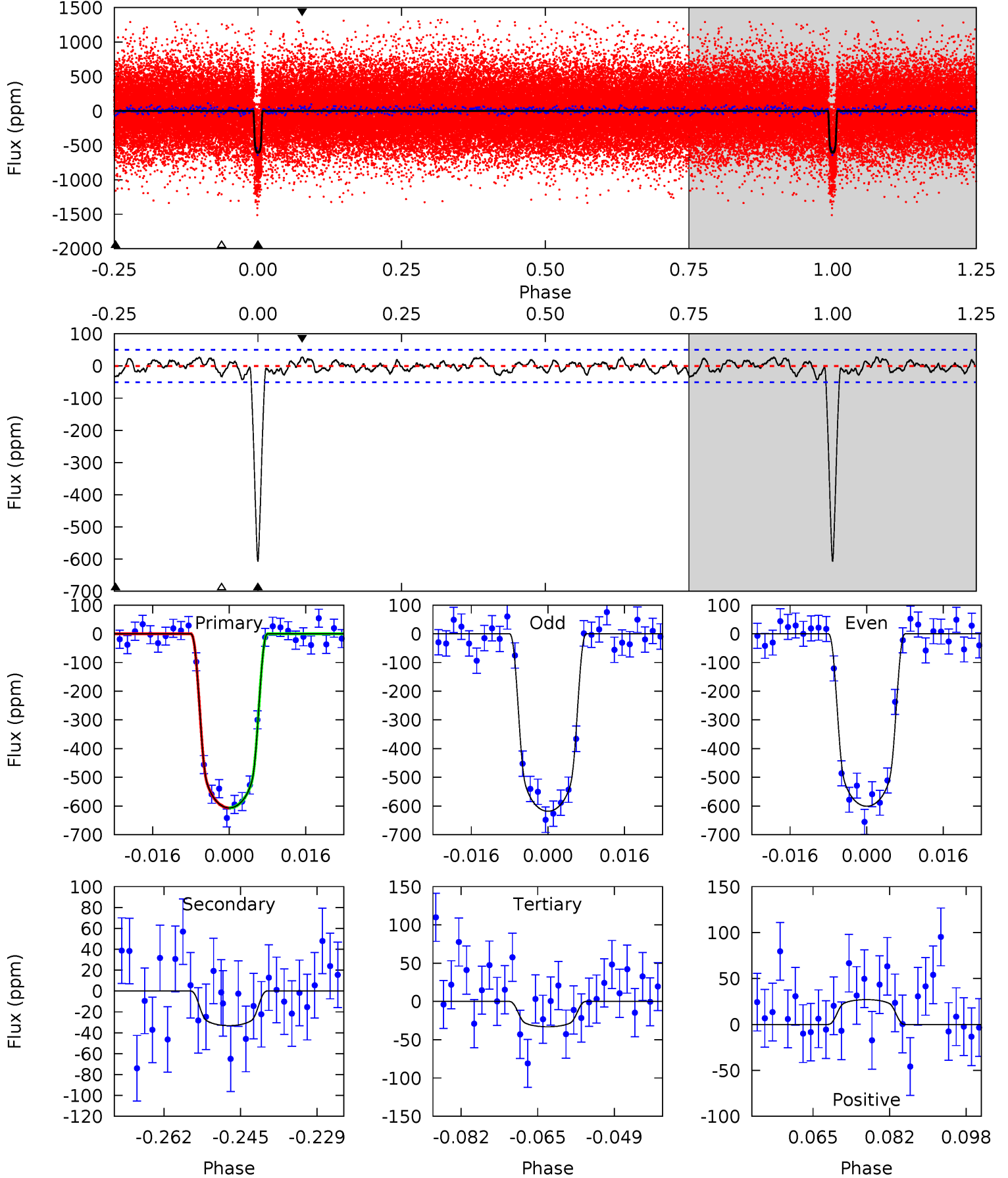
TCE 009958962-01 P= 9.997548 Days $T_0=131.801650$ (BKJD)



DV Model-Shift Uniqueness Test

009958962-01, P = 9.997619 Days, E = 121.799176 Days

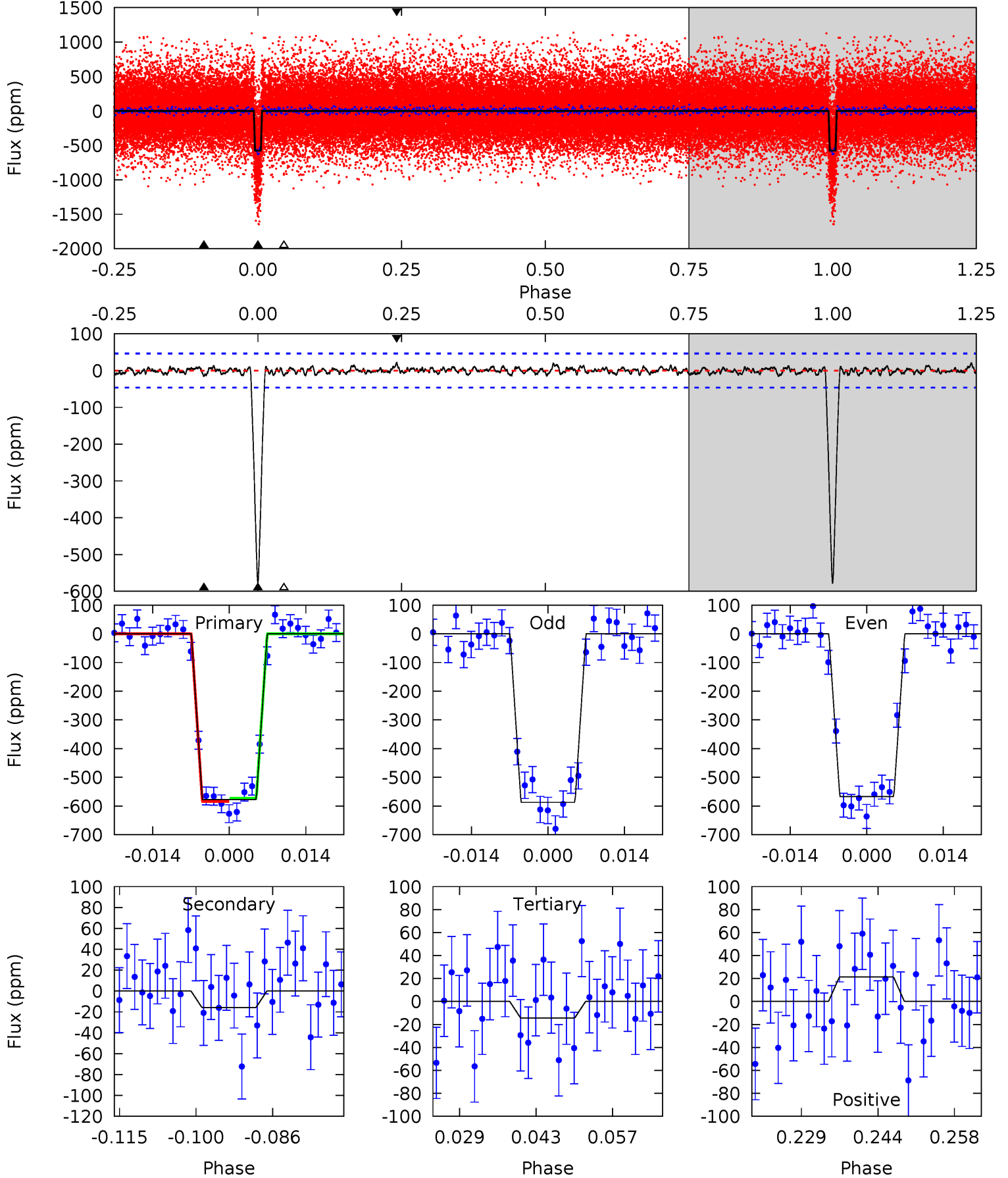
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
59.5	3.25	3.24	2.65	4.93	2.40	1.29	56.2	56.8	0.01	0.60	0.86	1.00	0.04	0.00



Alt Model-Shift Uniqueness Test

009958962-01, P = 9.997548 Days, E = 121.804102 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	1.70	1.55	2.30	4.96	2.45	0.65	60.4	59.6	0.15	-0.60	1.08	1.02	0.04	0.56



Stellar Parameters For KIC 009958962

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	$M(M_{\odot})$	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	6004^{+181}_{-199}	$4.484^{+0.052}_{-0.208}$	$-0.020^{+0.250}_{-0.300}$	$0.977^{+0.302}_{-0.101}$	$1.061^{+0.134}_{-0.134}$	$1.603^{+0.431}_{-0.813}$
	+3%/-3%	+1%/-5%	+1250%/-1500%	+31%/-10%	+13%/-13%	+27%/-51%
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 009958962-01 / KOI 0593.01

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-33 ± 10	$2.95^{+0.52}_{-0.33}$	1228^{+90}_{-62}	3309^{+186}_{-204}	17^{+8}_{-6}
Alt.	-16 ± 9	$2.67^{+0.48}_{-0.32}$	1230^{+89}_{-62}	3059^{+253}_{-377}	$9.403^{+8.146}_{-5.680}$

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

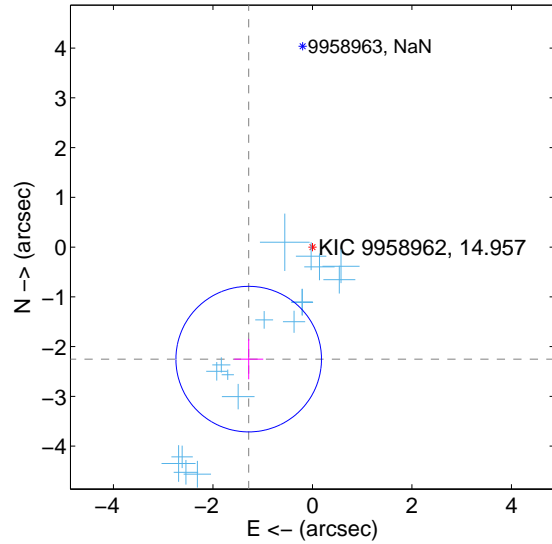
Supplemental centroid analysis for 009958962-01. Kepler magnitude: 14.96. Transit SNR 38.32

There are 17 quarters with good PRF difference image offsets

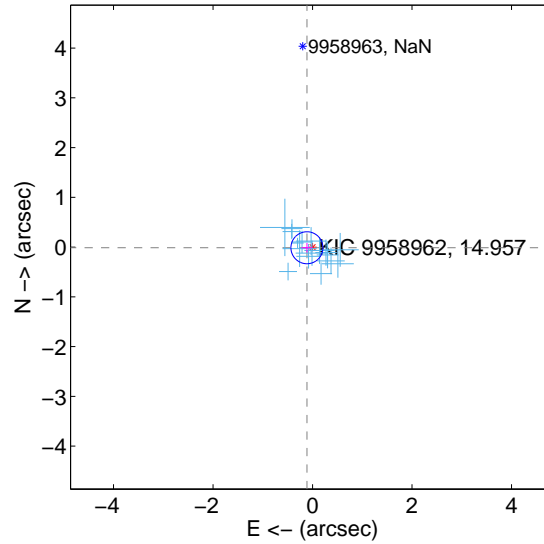
The direct PRF centroid is offset from the target star catalog position by about 0.30 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	2.590 \pm 0.488	5.31	1.281 \pm 0.291	-2.251 \pm 0.407
PRF-fit source offset from KIC position	0.113 \pm 0.107	1.06	0.113 \pm 0.107	-0.013 \pm 0.097
photometric centroid source offset	0.33 \pm 0.27	1.26	-0.29 \pm 0.25	0.17 \pm 0.30

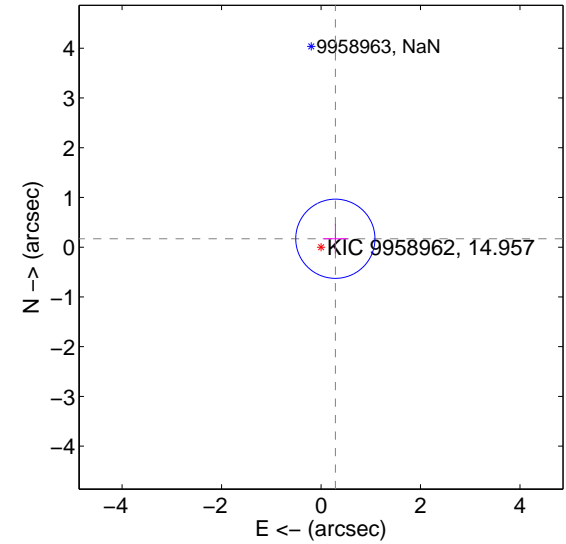
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

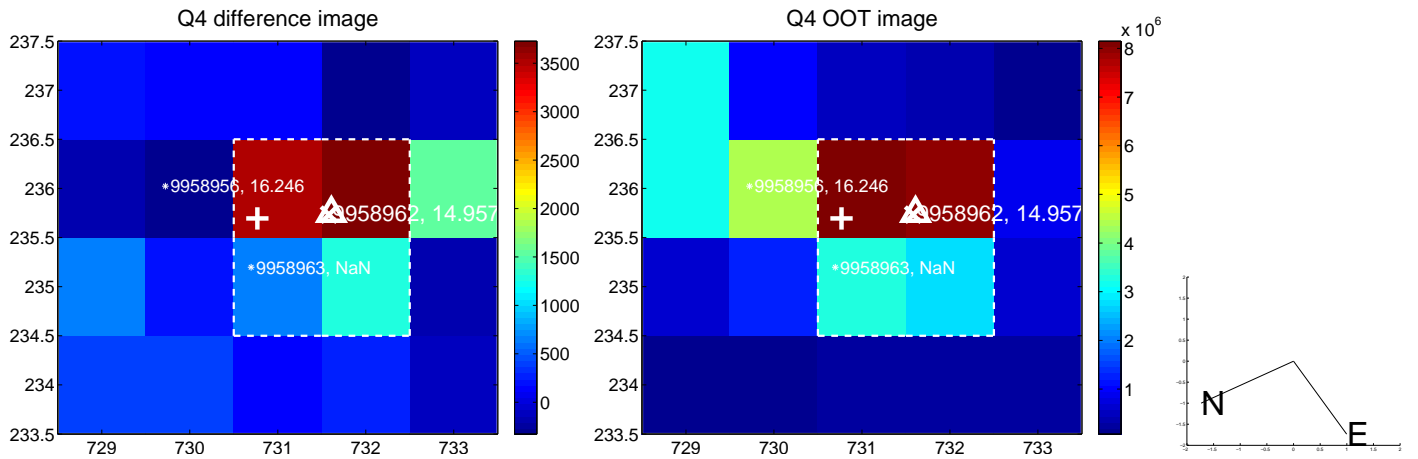
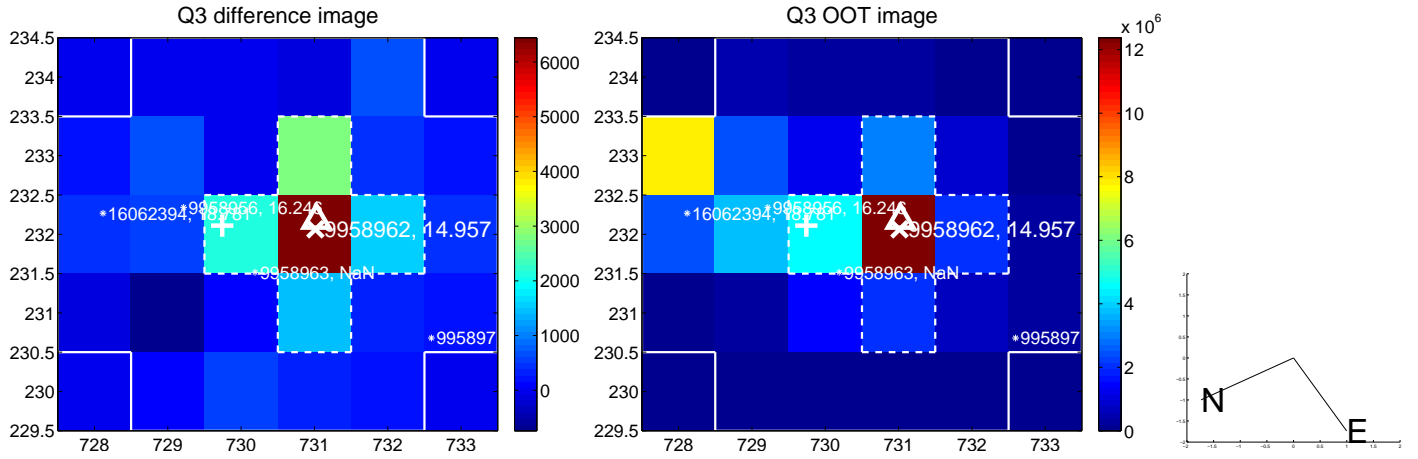
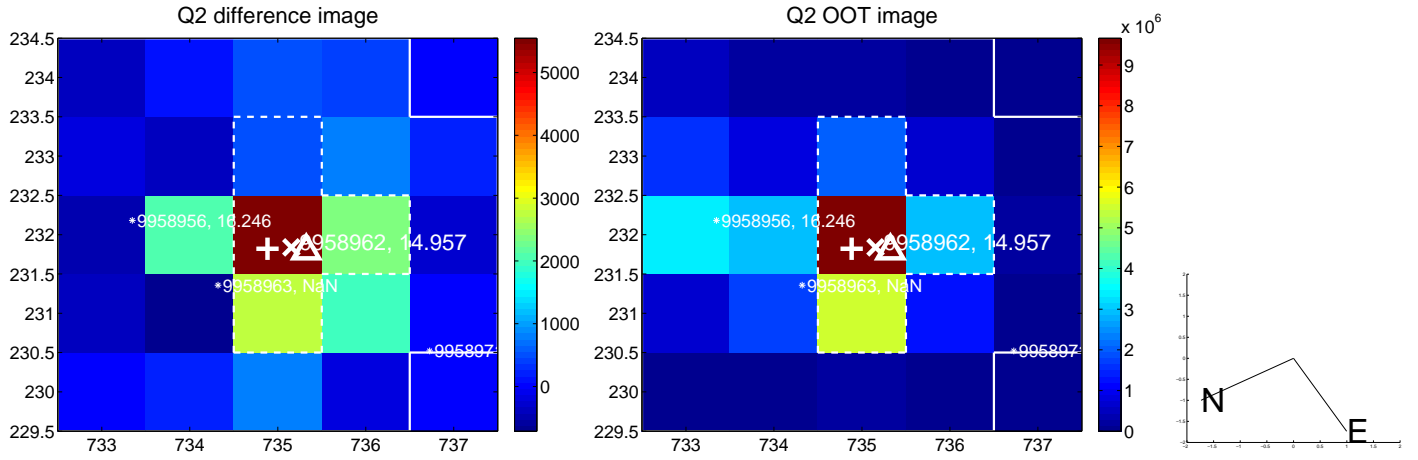
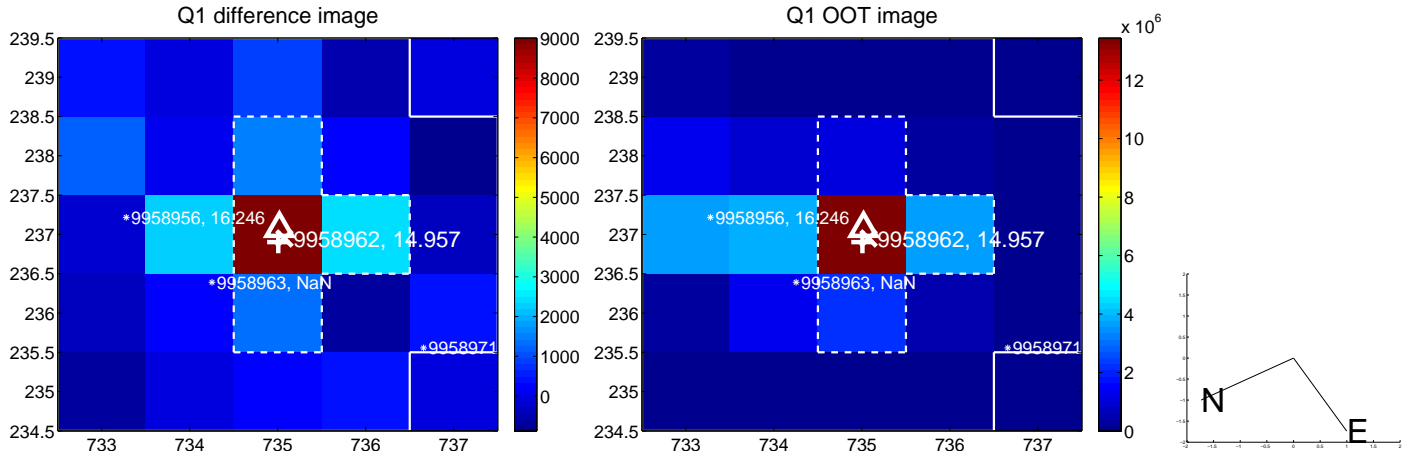


offset from photometric centroids

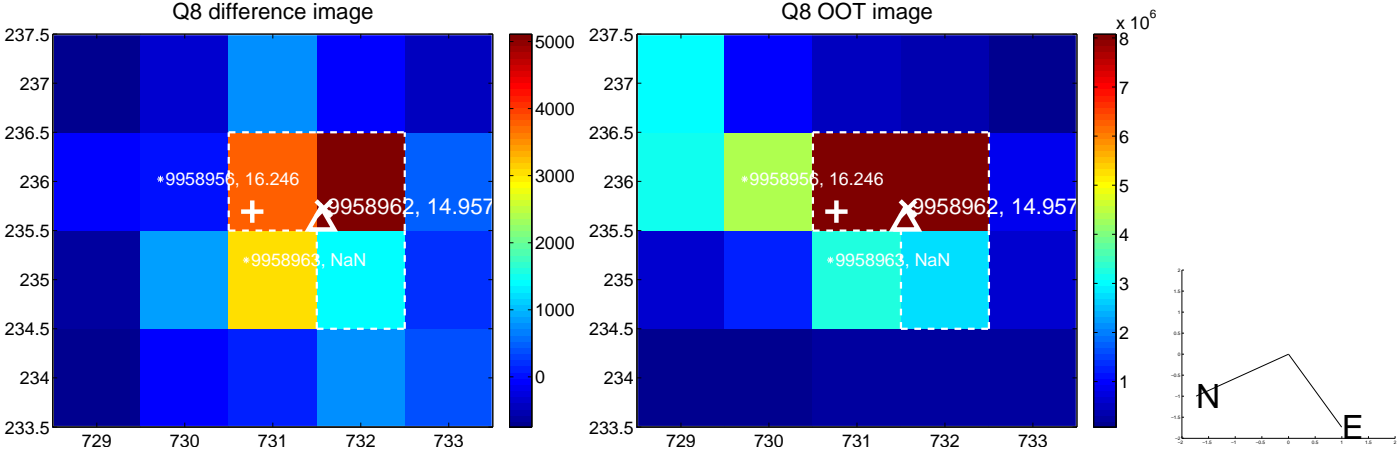
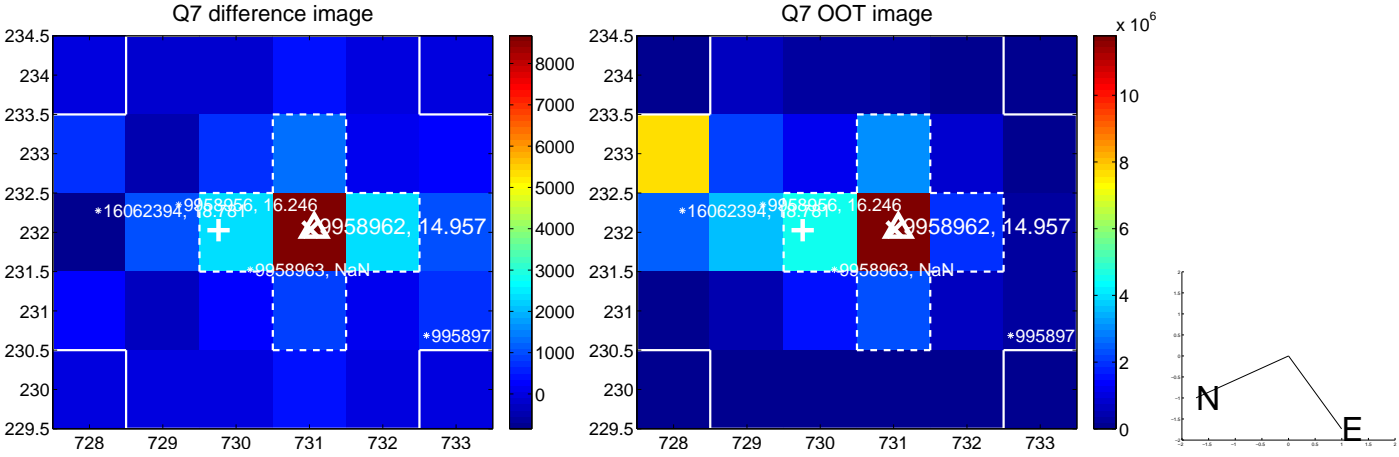
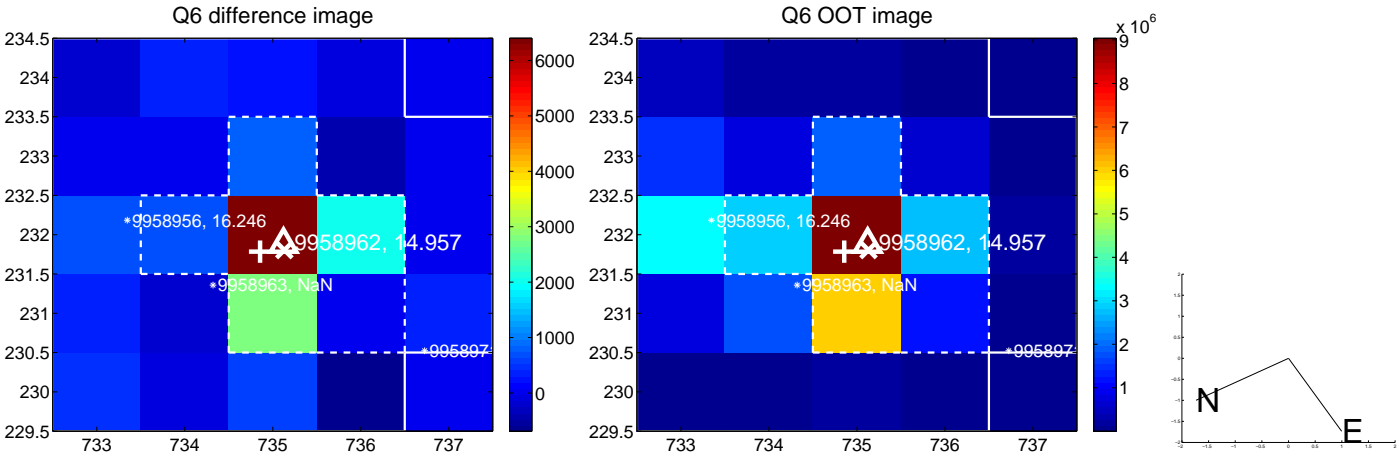
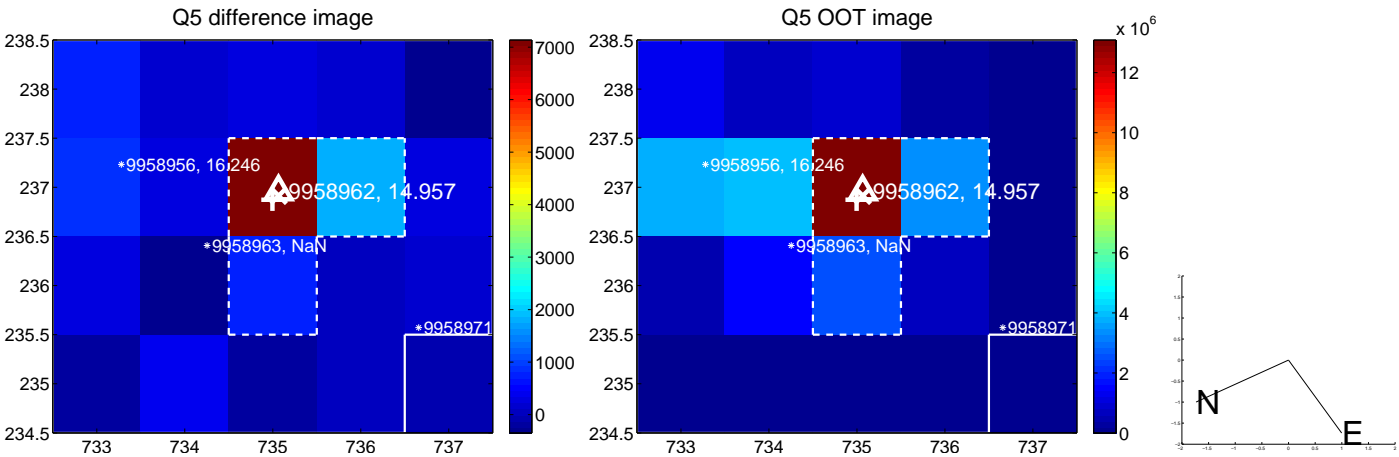


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

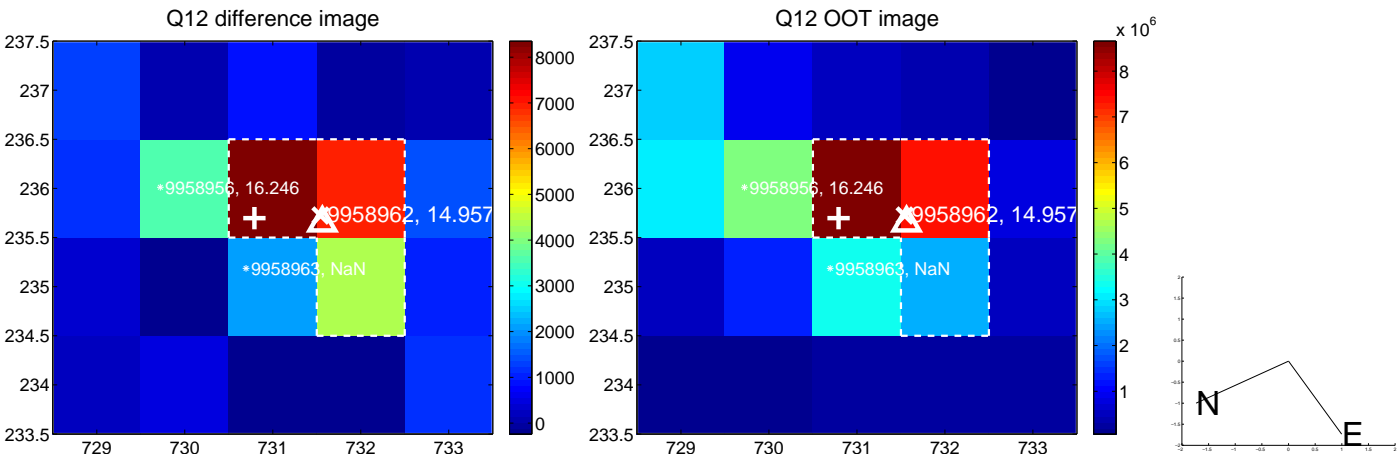
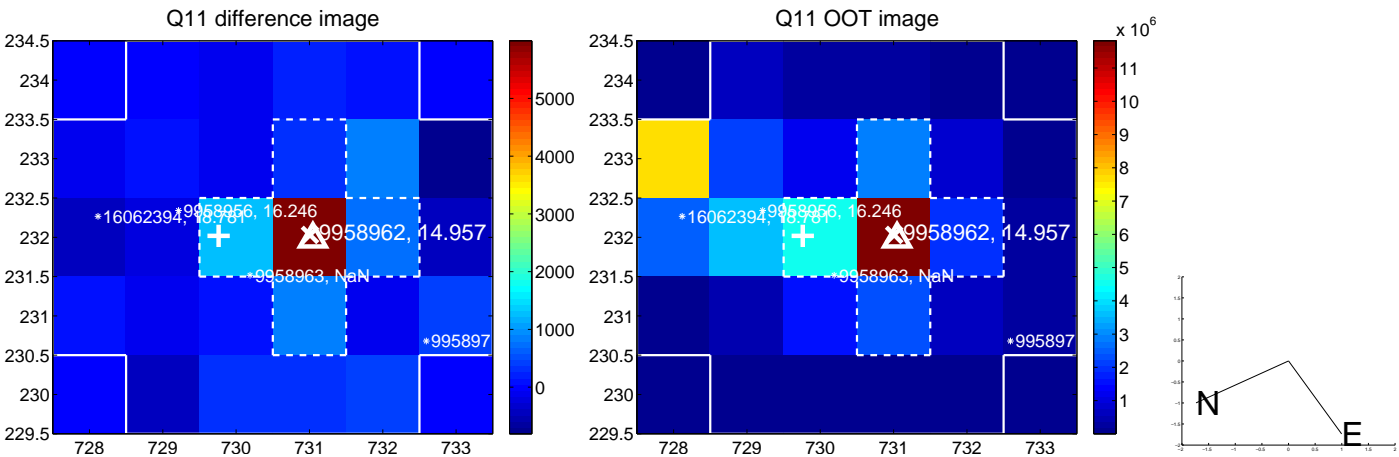
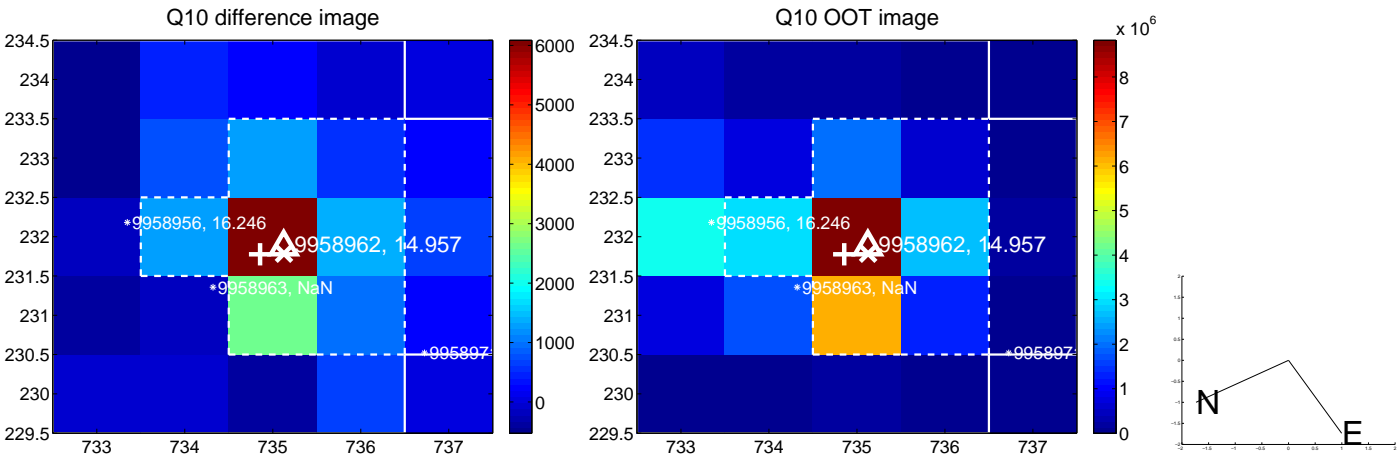
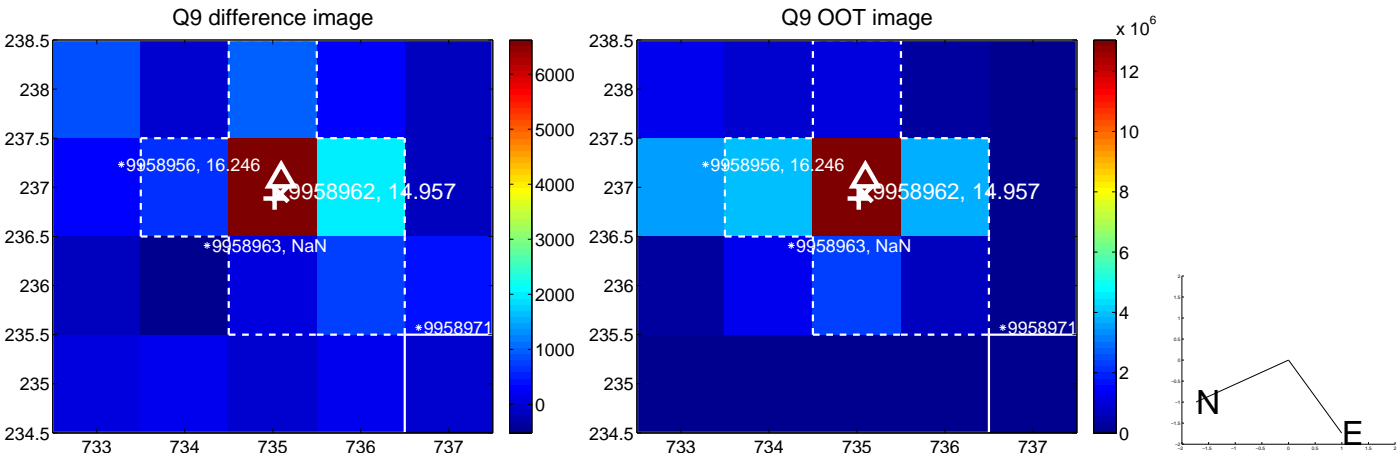
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



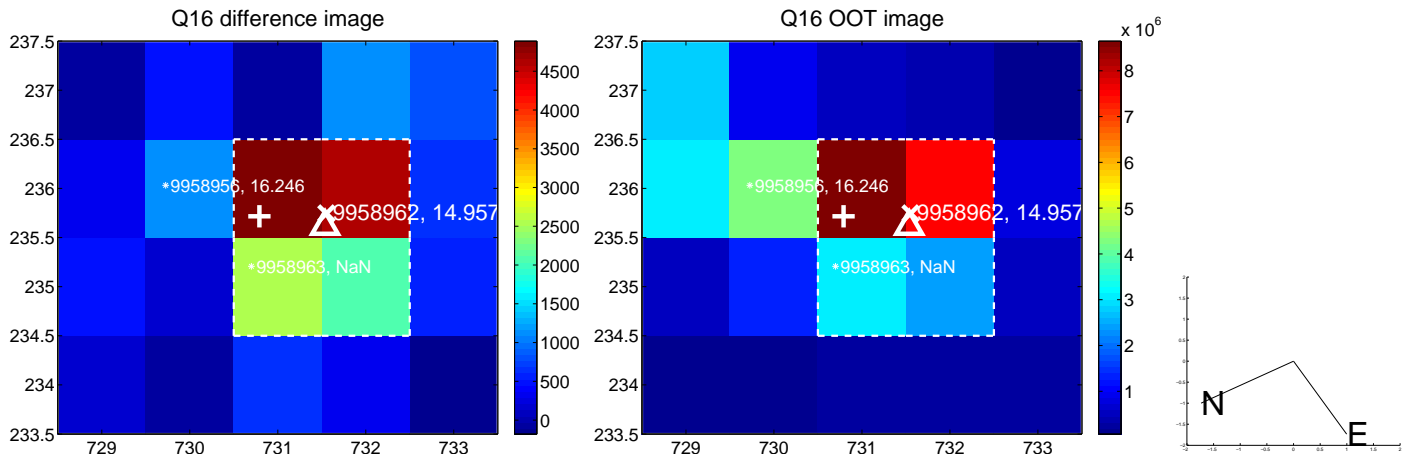
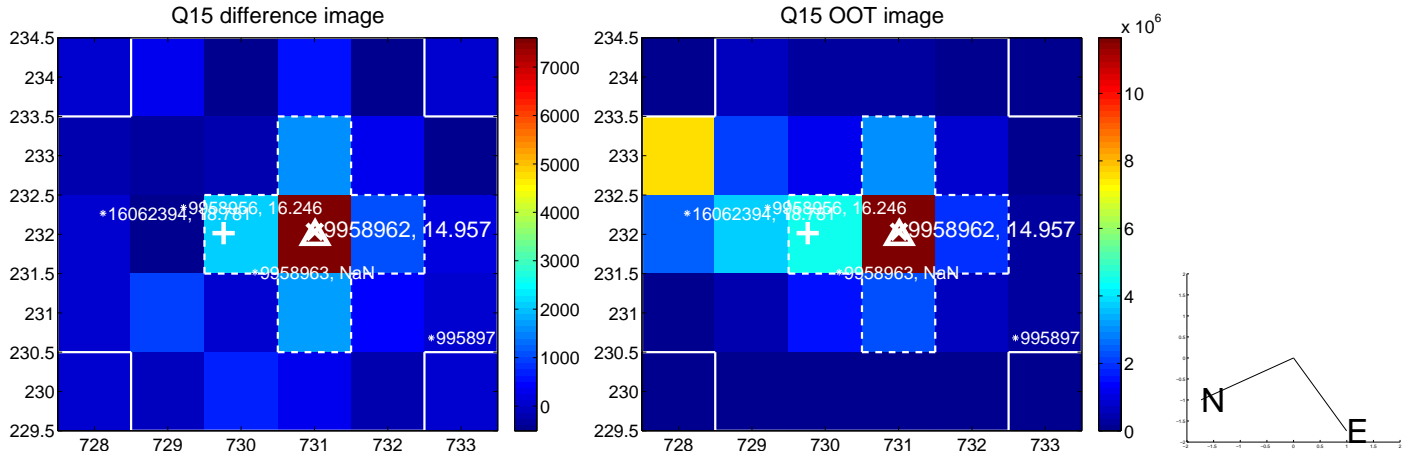
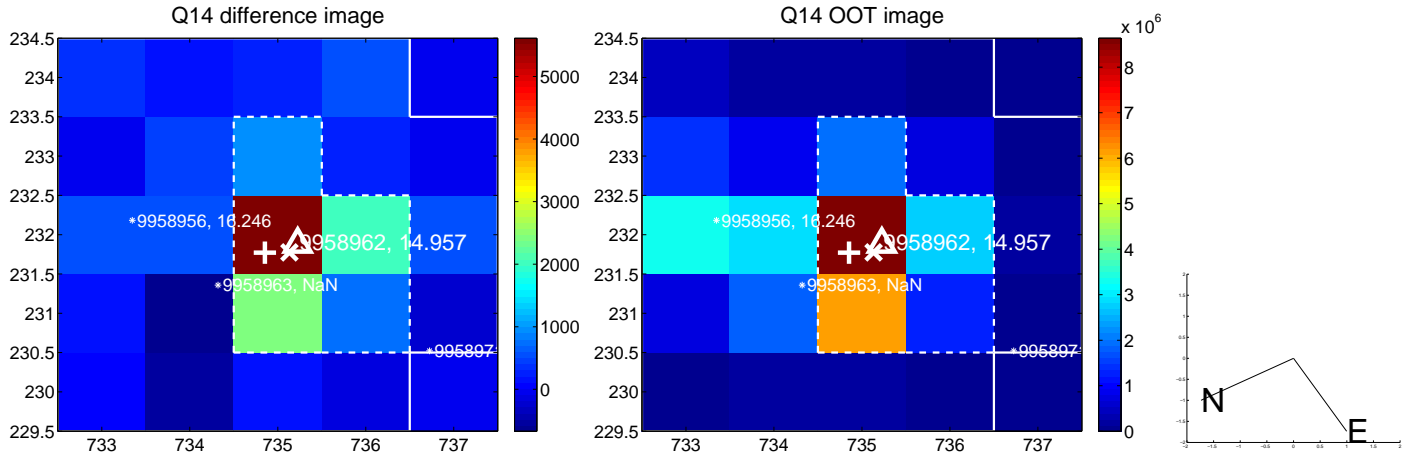
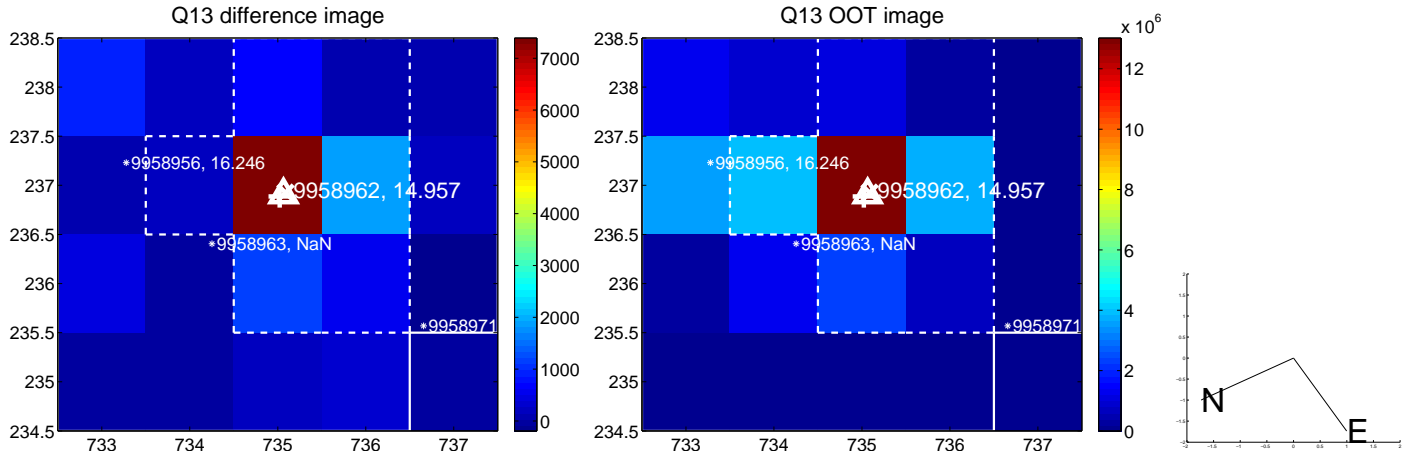
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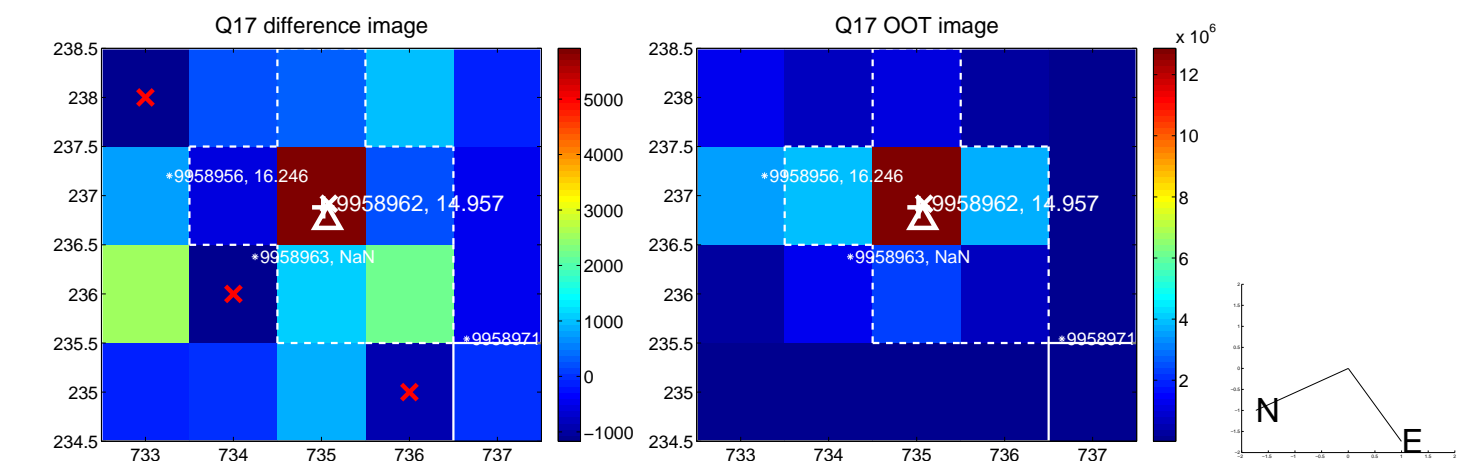
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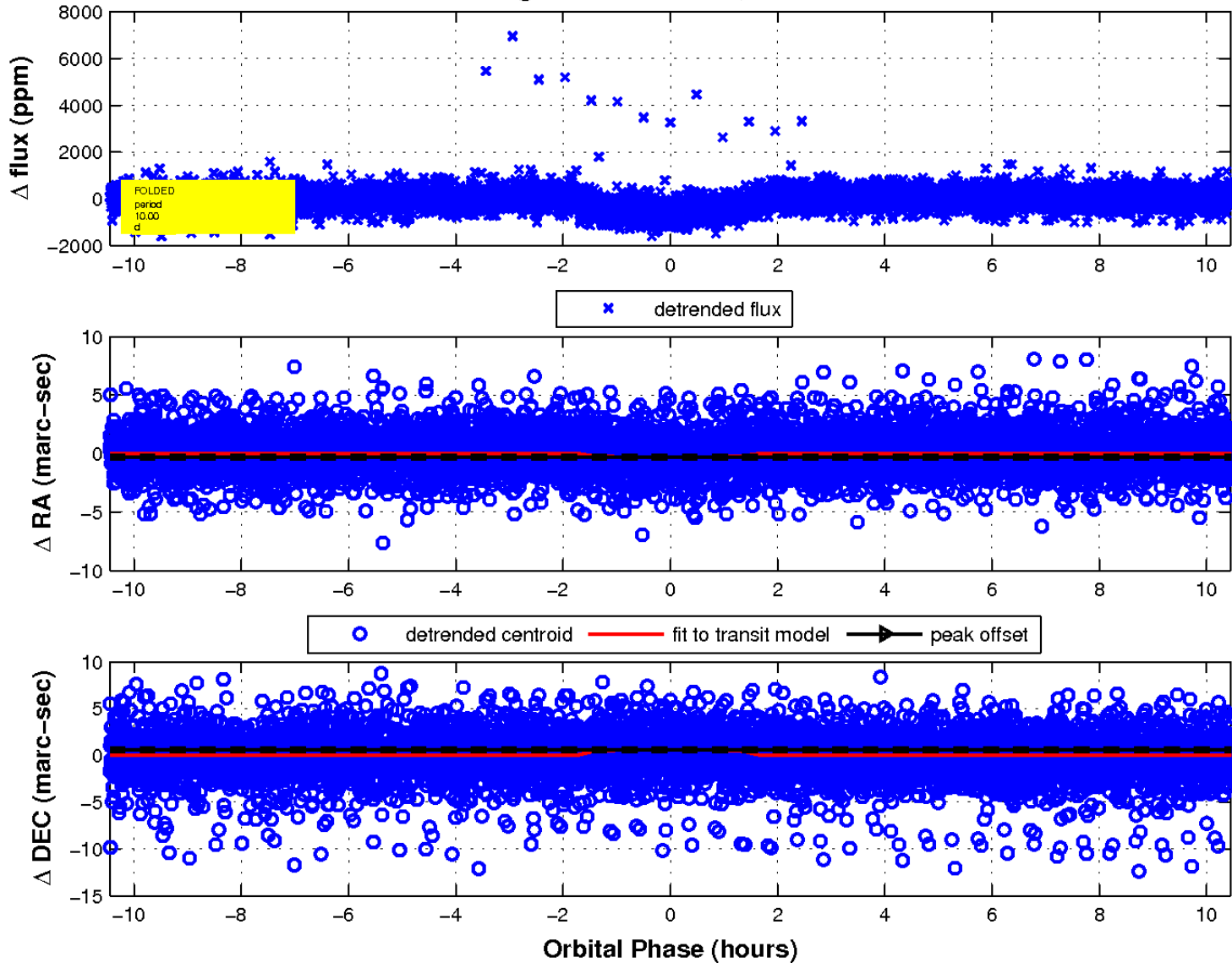
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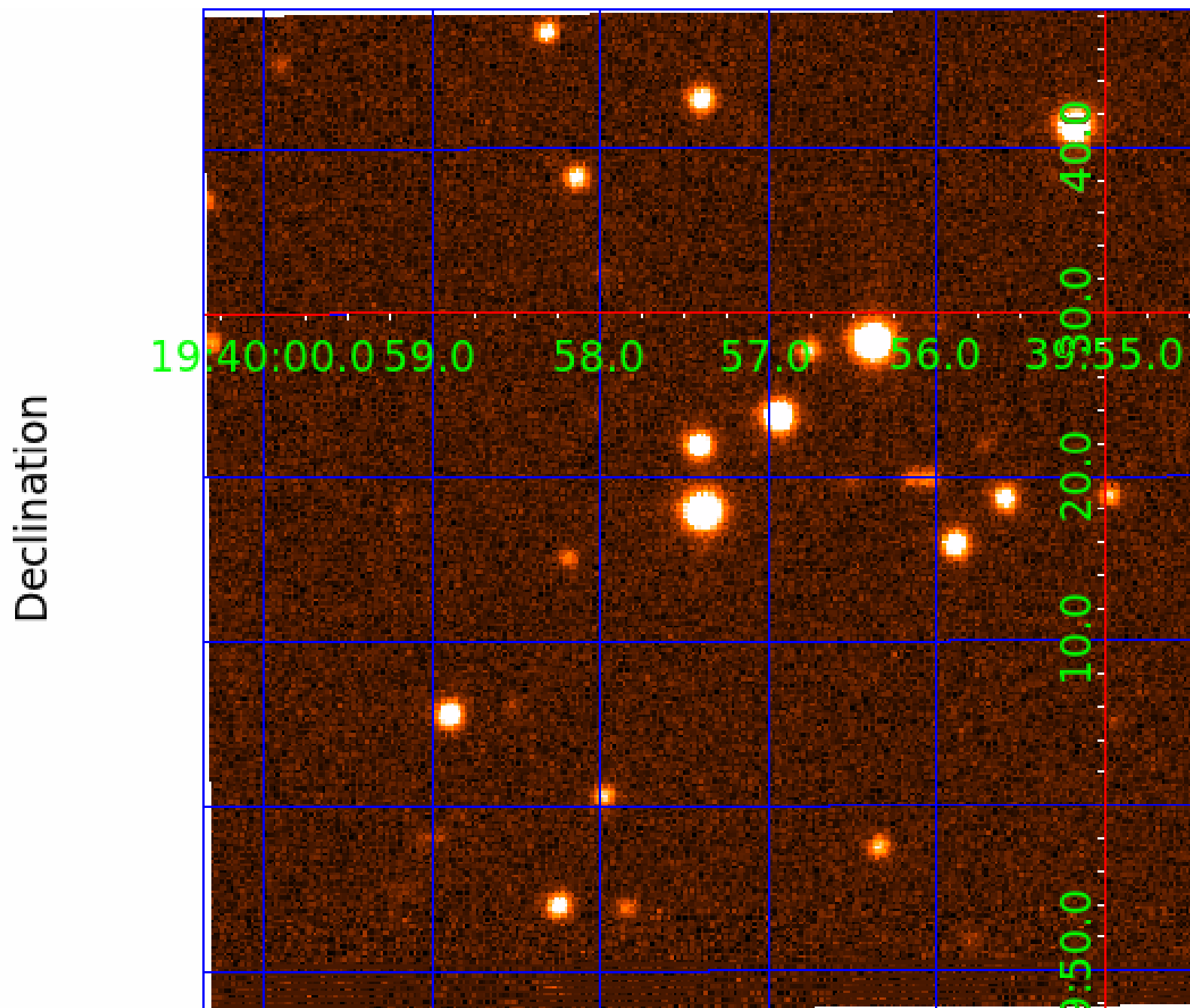
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fluxWeightedCentroids, Planet 1 of 4



UKIRT Image



KIC 009958962

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

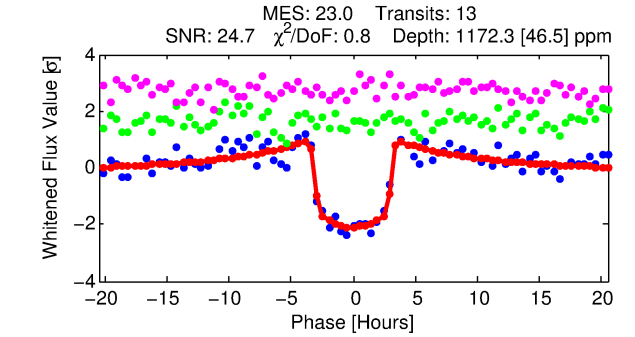
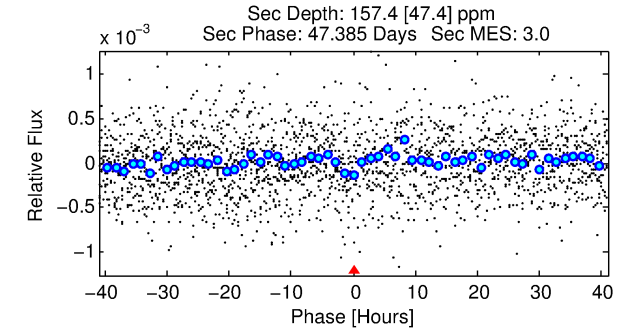
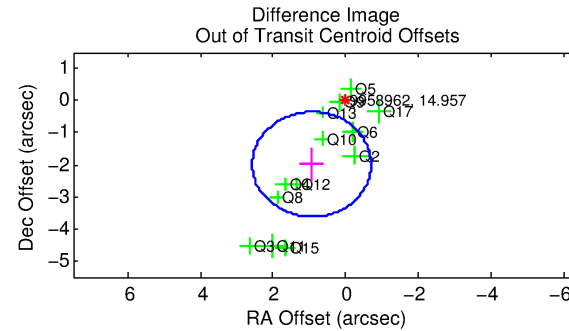
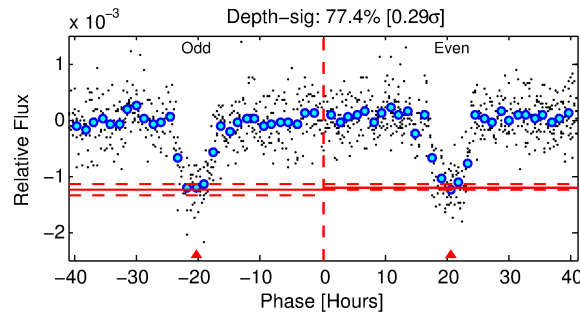
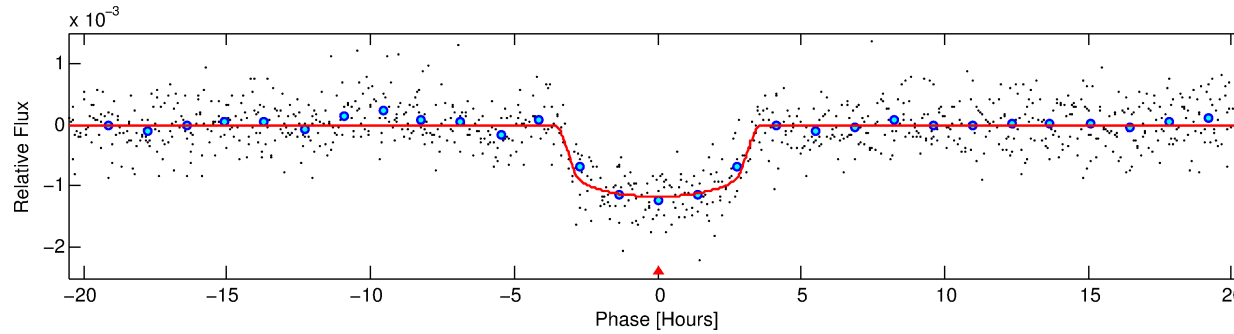
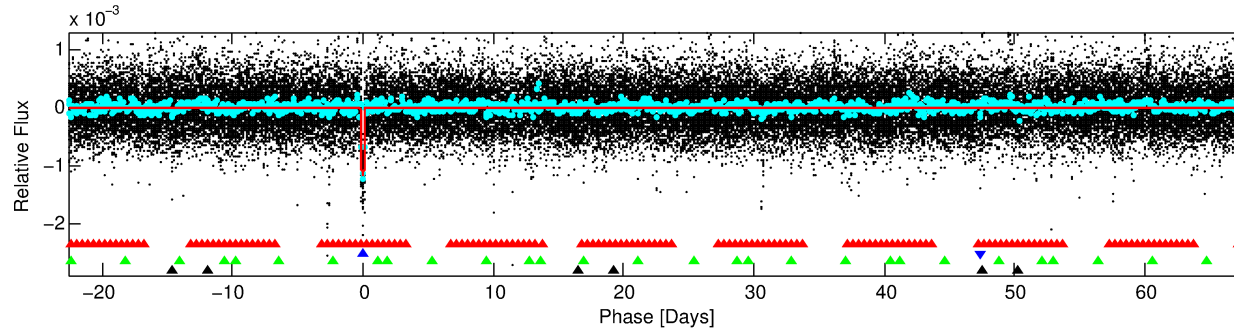
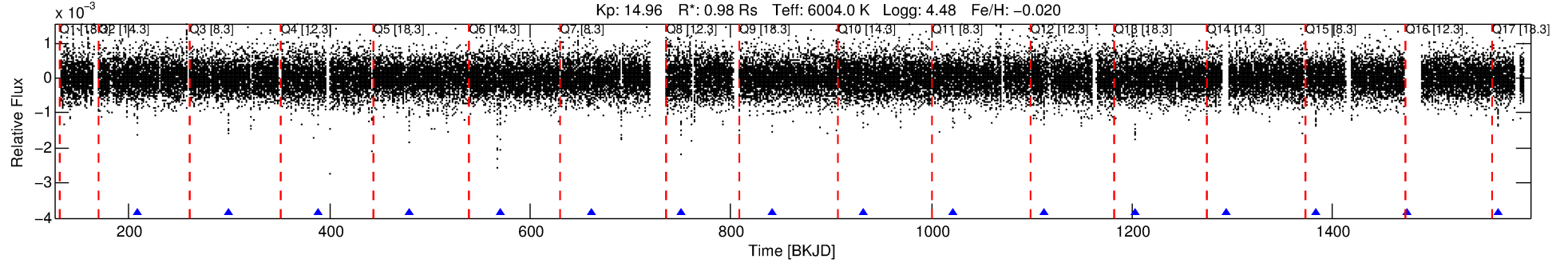
Ephemeris Match Information For 009958962-02

No Significant Match Found

DV One-Page Summary

KIC: 9958962 Candidate: 2 of 4 Period: 90.412 d
KOI: K00593.02 Corr: 0.975

Kp: 14.96 R*: 0.98 Rs Teff: 6004.0 K Logg: 4.48 Fe/H: -0.020



DV Fit Results:

Period = 90.41201 [0.00039] d
Epoch = 208.5034 [0.0033] BKJD
Rp/R* = 0.0341 [0.0031]
a/R* = 72.00 [29.32]
b = 0.75 [0.24]
Seff = 6.87 [2.77]
Teq = 413 [42] K
Rp = 3.63 [1.17] Re
a = 0.4022 [0.1048] AU
Ag = 1062.45 [550.24] [1.93 σ]
Teffp = 3644 [343] K [9.36 σ]

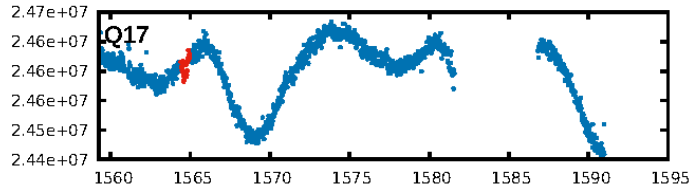
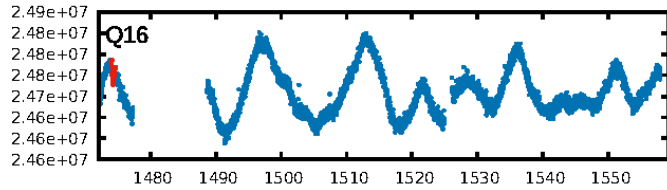
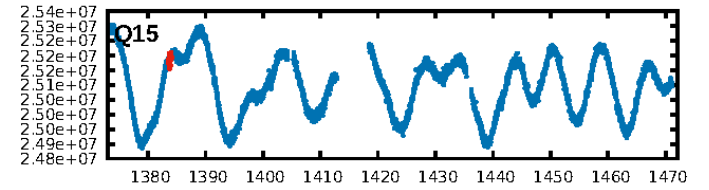
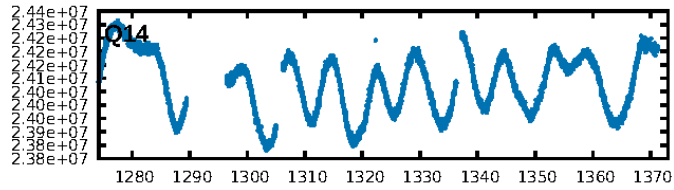
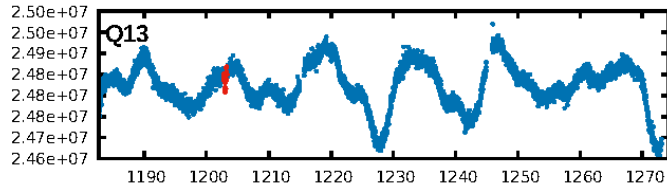
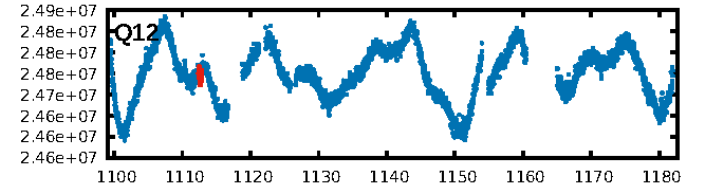
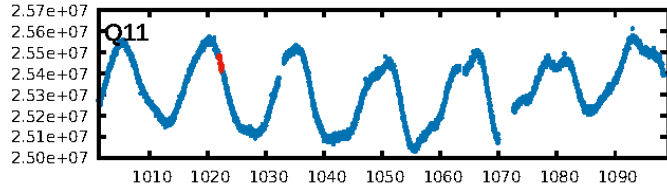
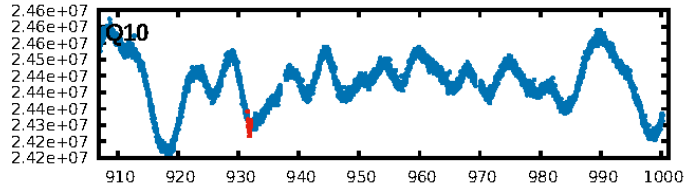
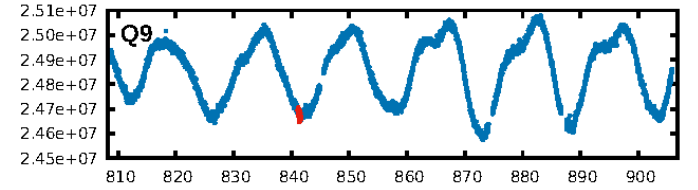
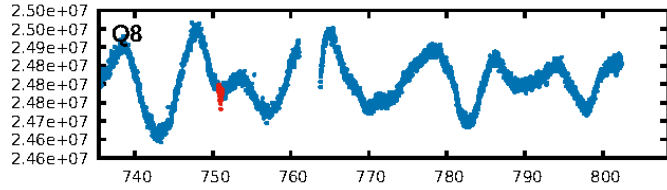
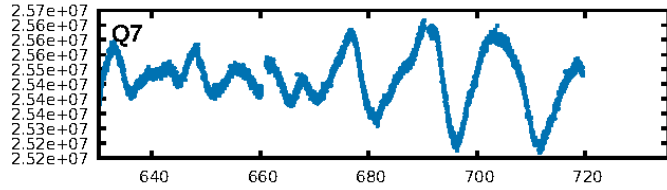
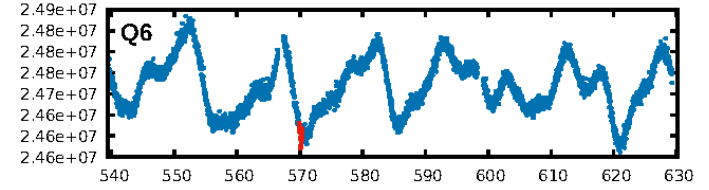
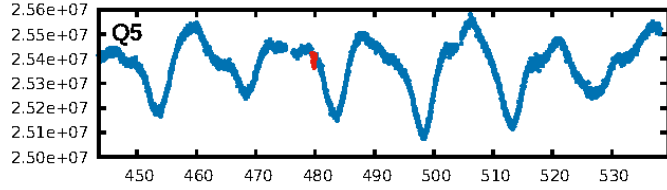
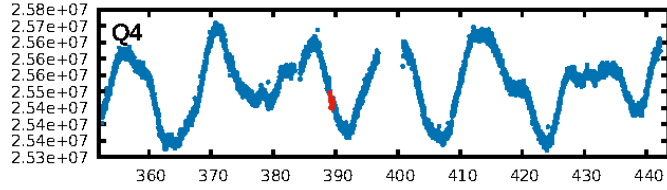
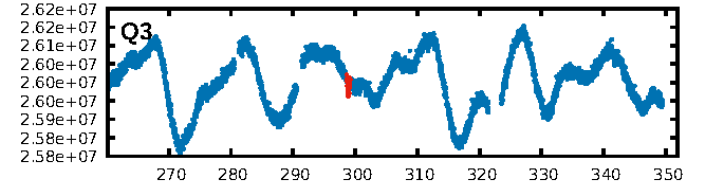
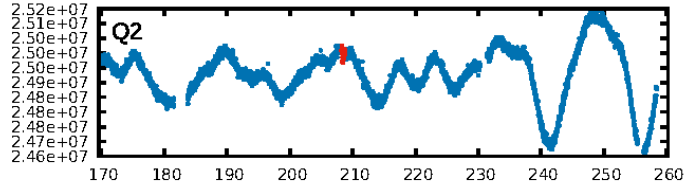
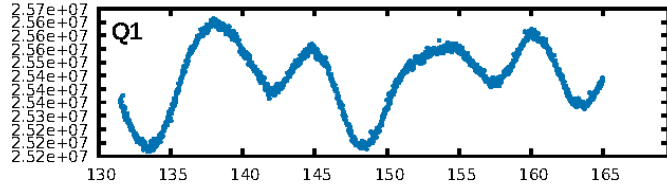
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [115.80 σ]
LongPeriod-sig: 100.0% [277.67 σ]
ModelChiSquare2-sig: 80.9%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 5.56e-87
RollingBand-fgt: 1.00 [12/12]
GhostDiagnostic-chr: 7.423
Centroid-sig: 3.4%
Centroid-so: 0.899 arcsec [2.39 σ]
OotOffset-rm: 2.199 arcsec [4.03 σ]
KicOffset-rm: 0.086 arcsec [0.75 σ]
OotOffset-st: 3/3/3/4 [13]
KicOffset-st: 3/3/3/4 [13]
DiffImageQuality-fgm: 1.00 [13/13]
DiffImageOverlap-fno: 0.77 [10/13]

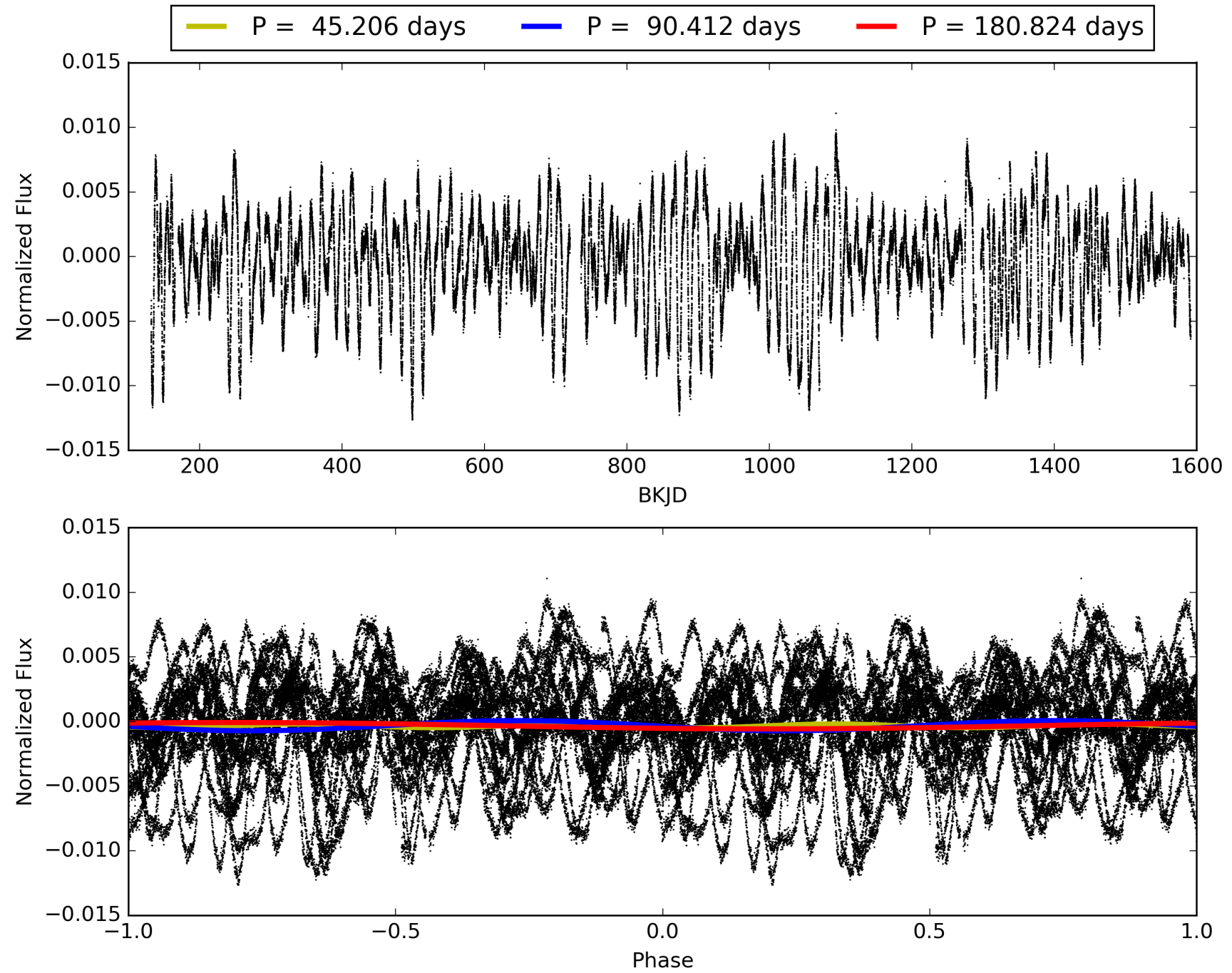
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 05:17:37 Z

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

TCE 009958962-02, PDC Light Curves

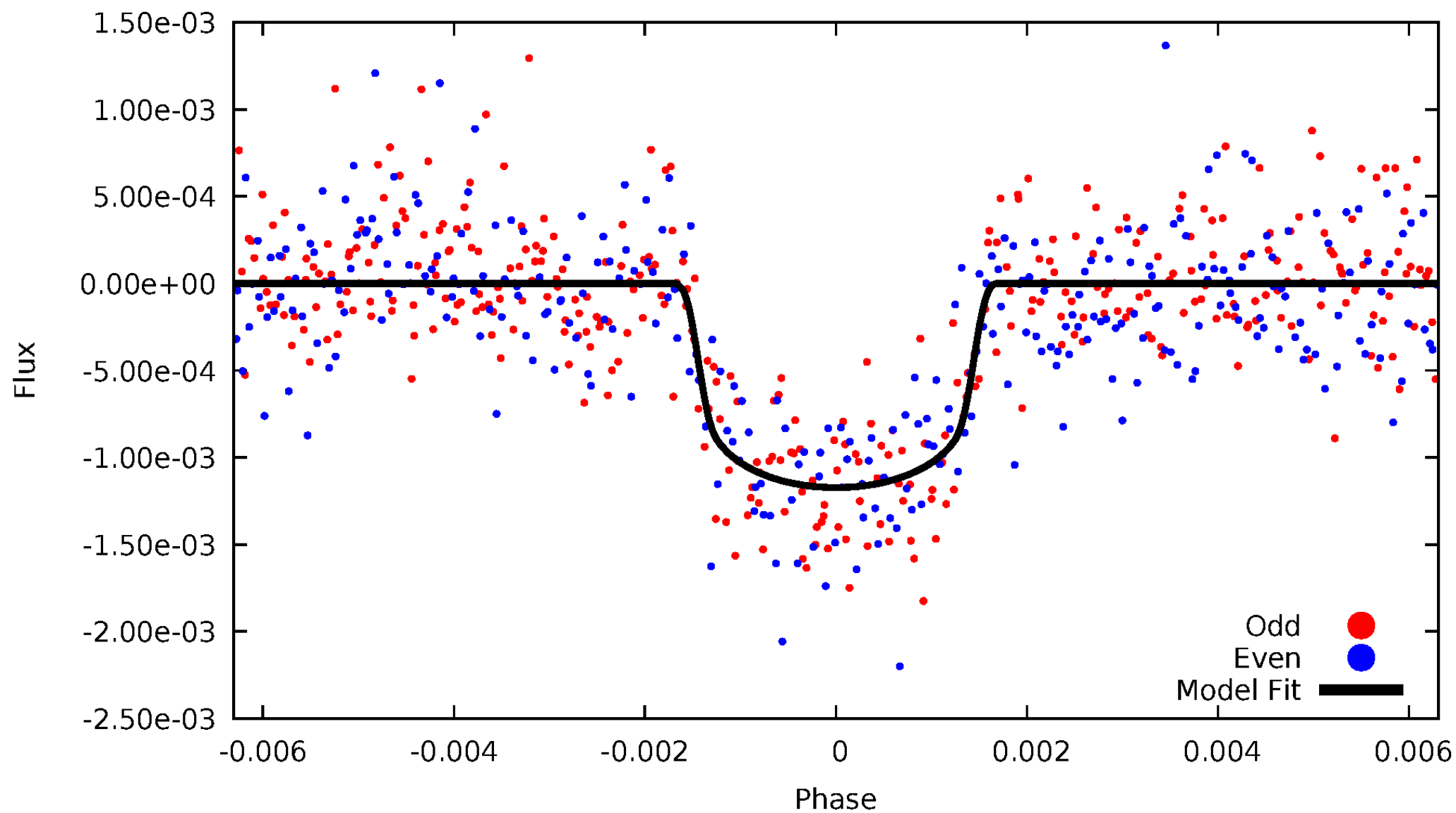


TCE 009958962-02



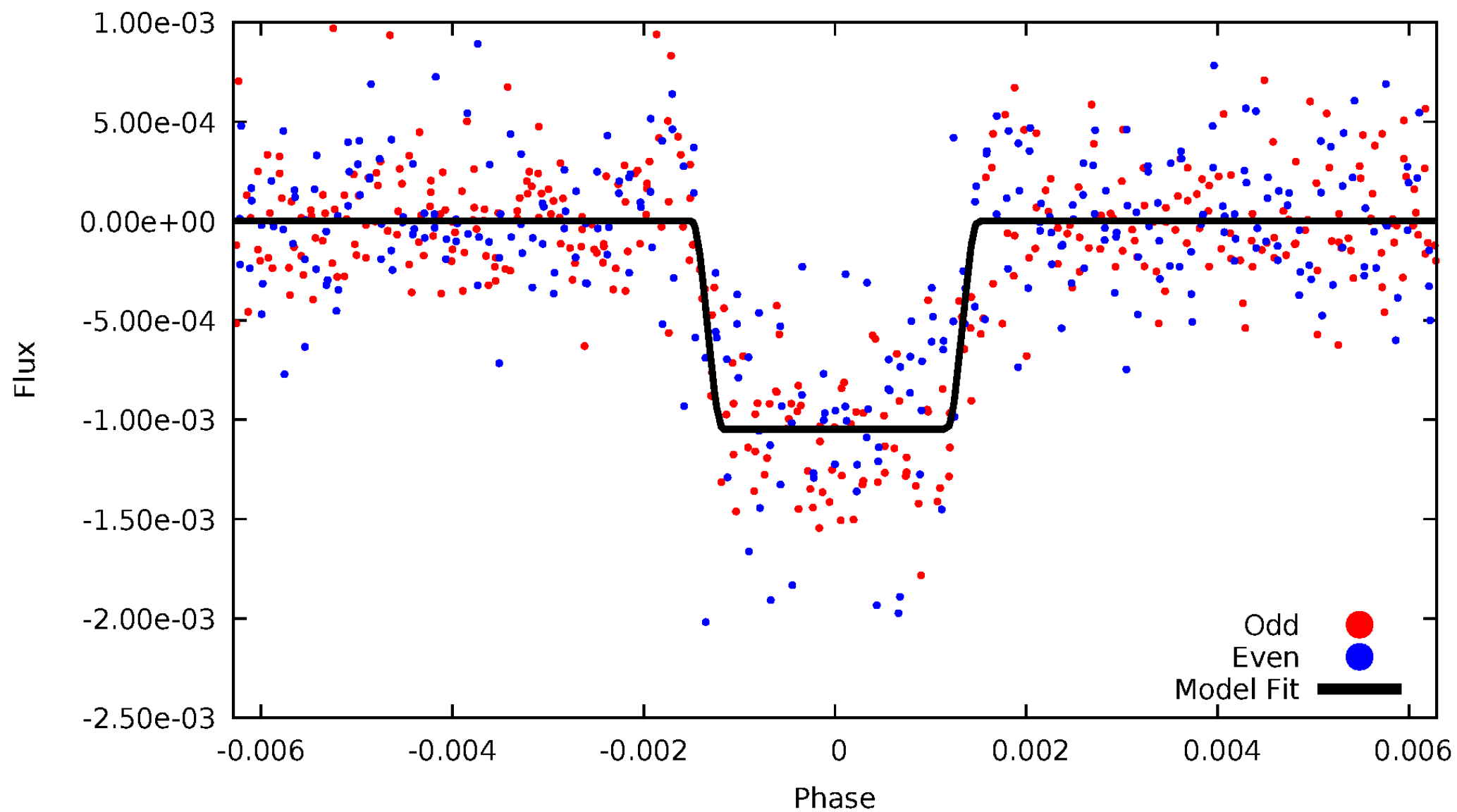
DV Odd/Even

TCE 009958962-02



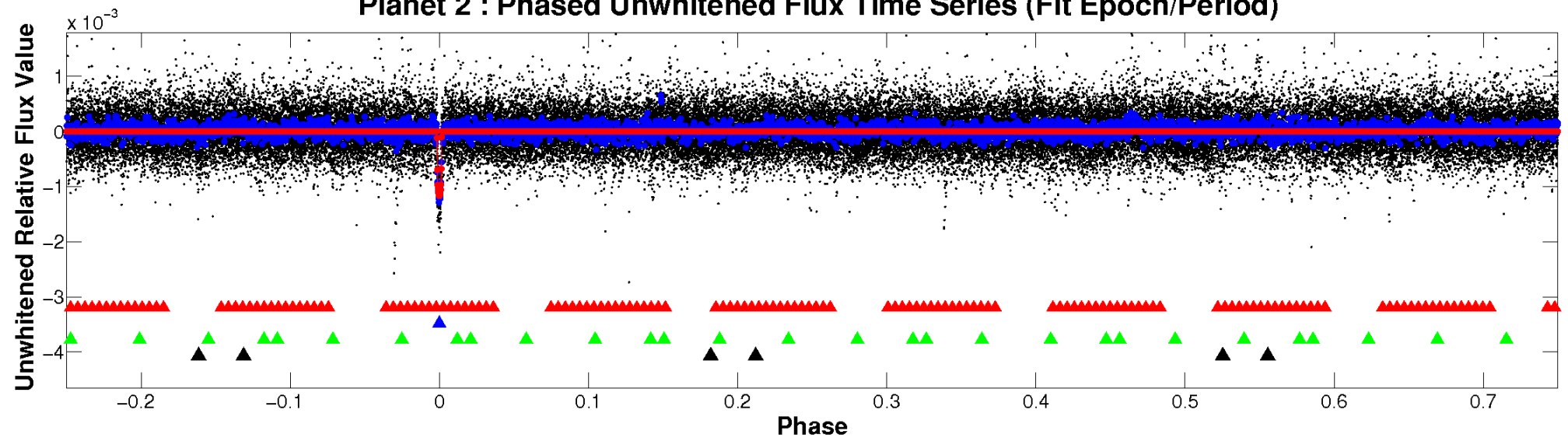
ALT Odd/Even

TCE 009958962-02

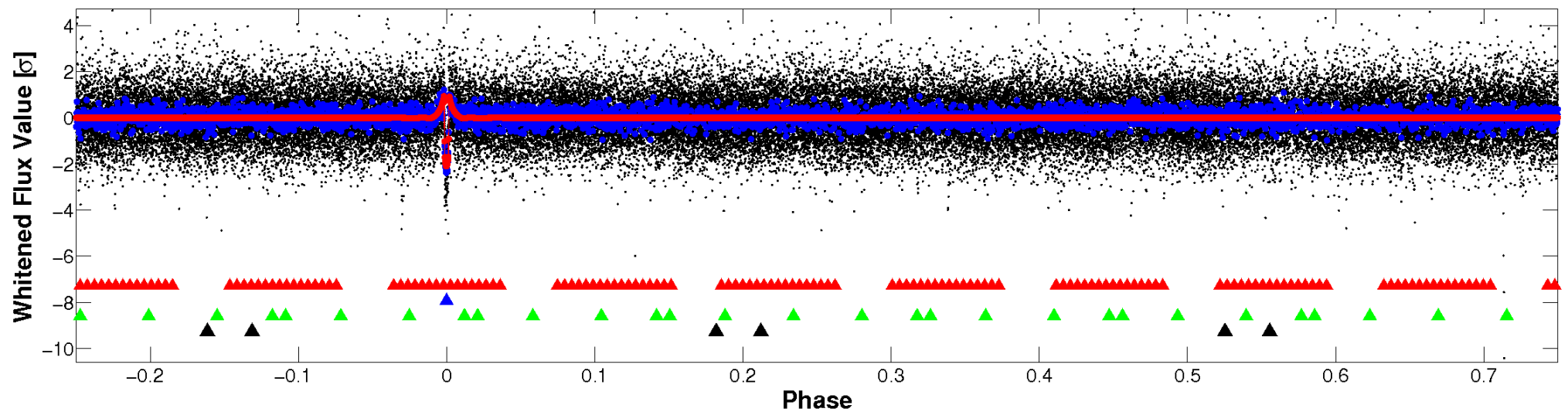


Non-Whitened Vs. Whitened Light Curve

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

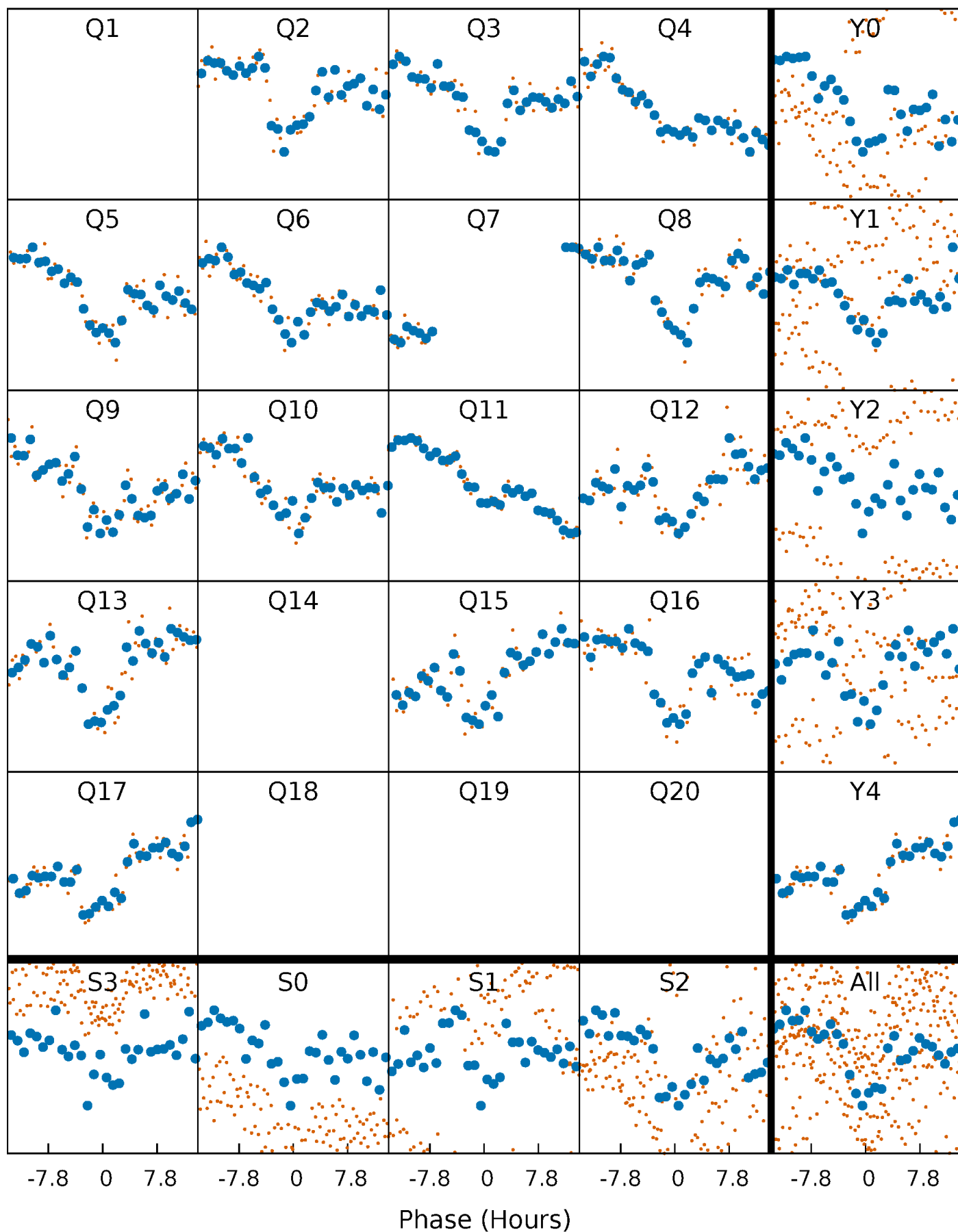


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



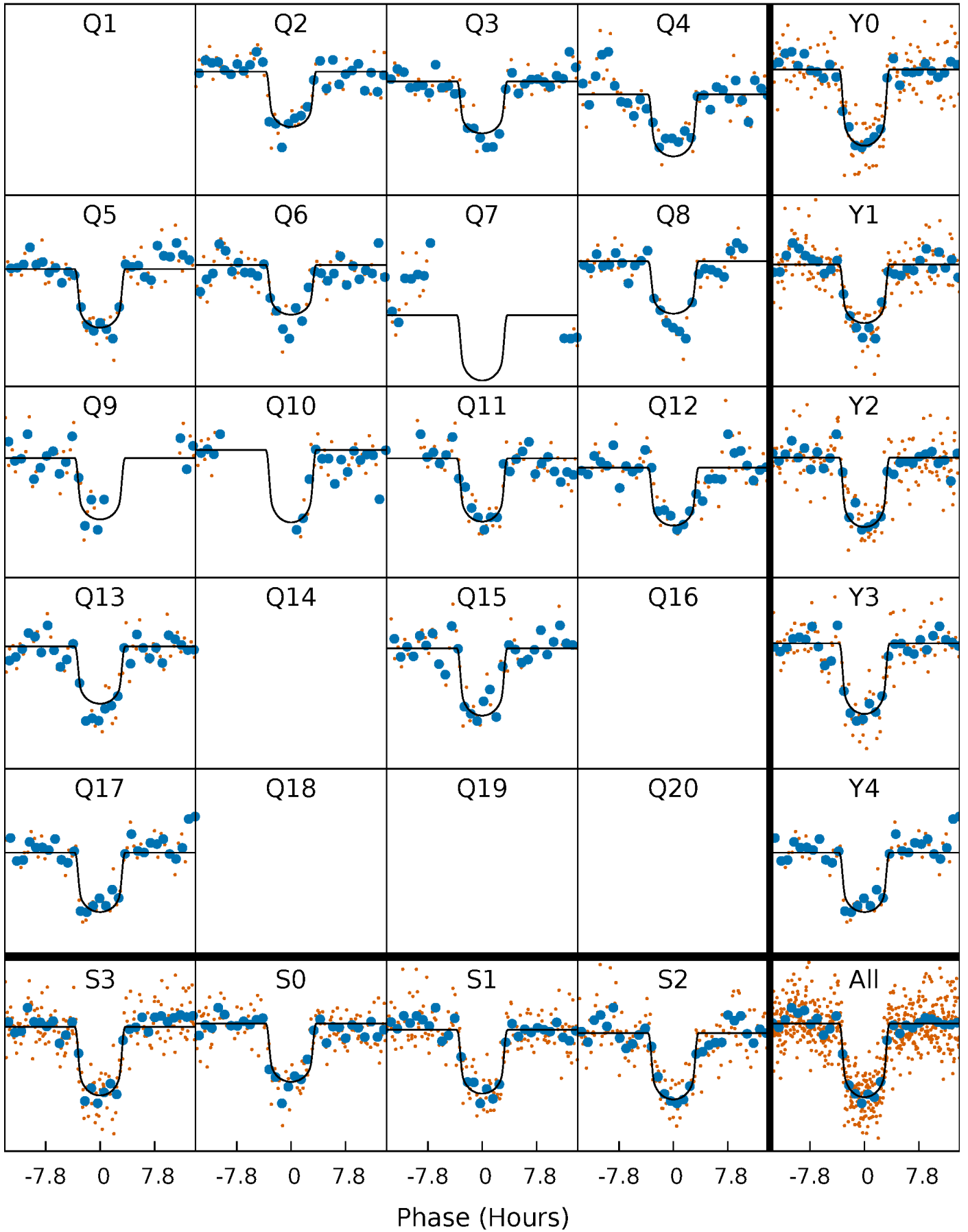
PDC Quarter-Phased Transit Curves

TCE 009958962-02 P= 90.412010 Days $T_0=208.503416$ (BKJD)



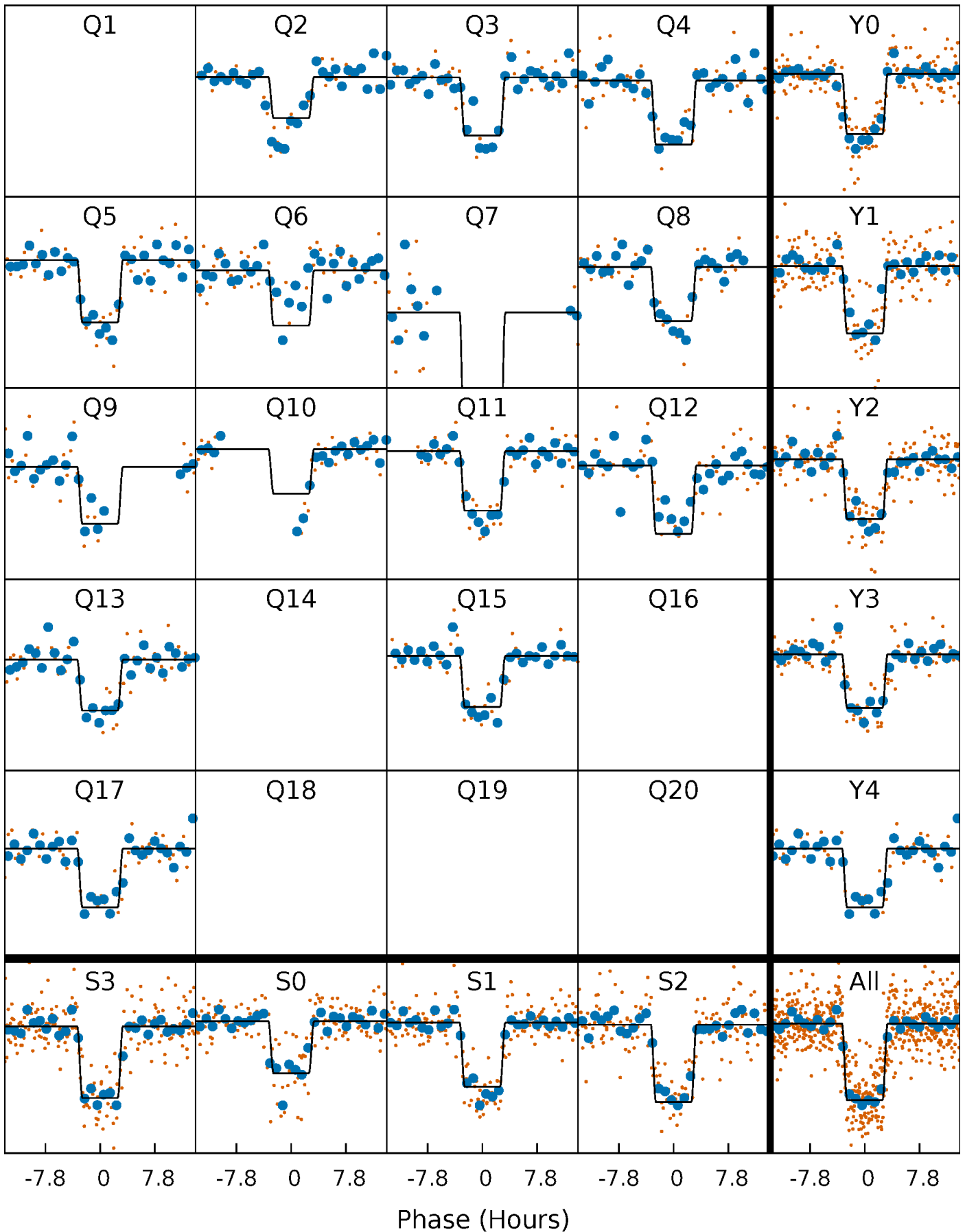
DV Quarter-Phased Transit Curves

TCE 009958962-02 P= 90.412010 Days $T_0=208.503416$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

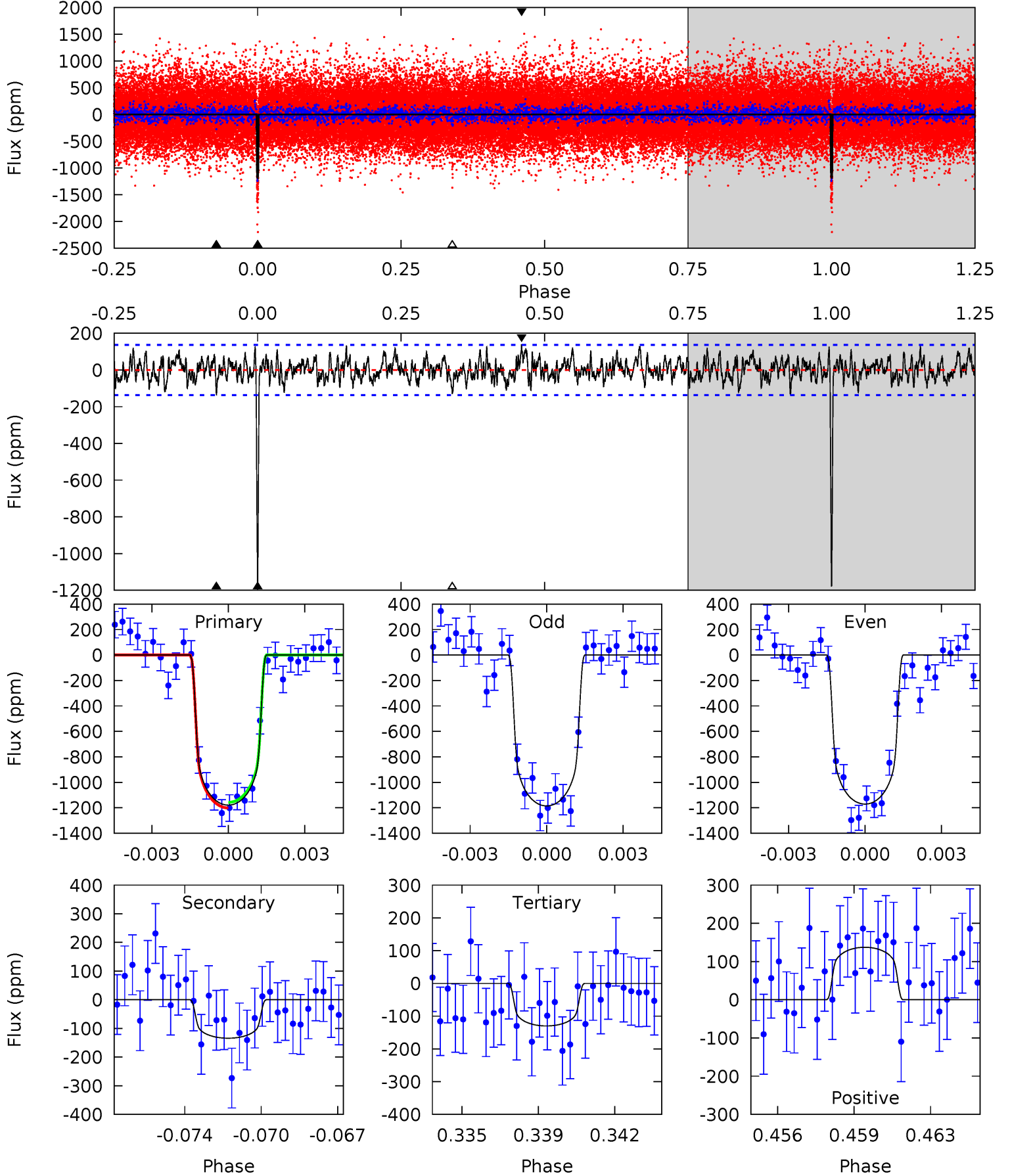
TCE 009958962-02 P= 90.411209 Days $T_0=208.507295$ (BKJD)



DV Model-Shift Uniqueness Test

009958962-02, P = 90.412010 Days, E = 118.091406 Days

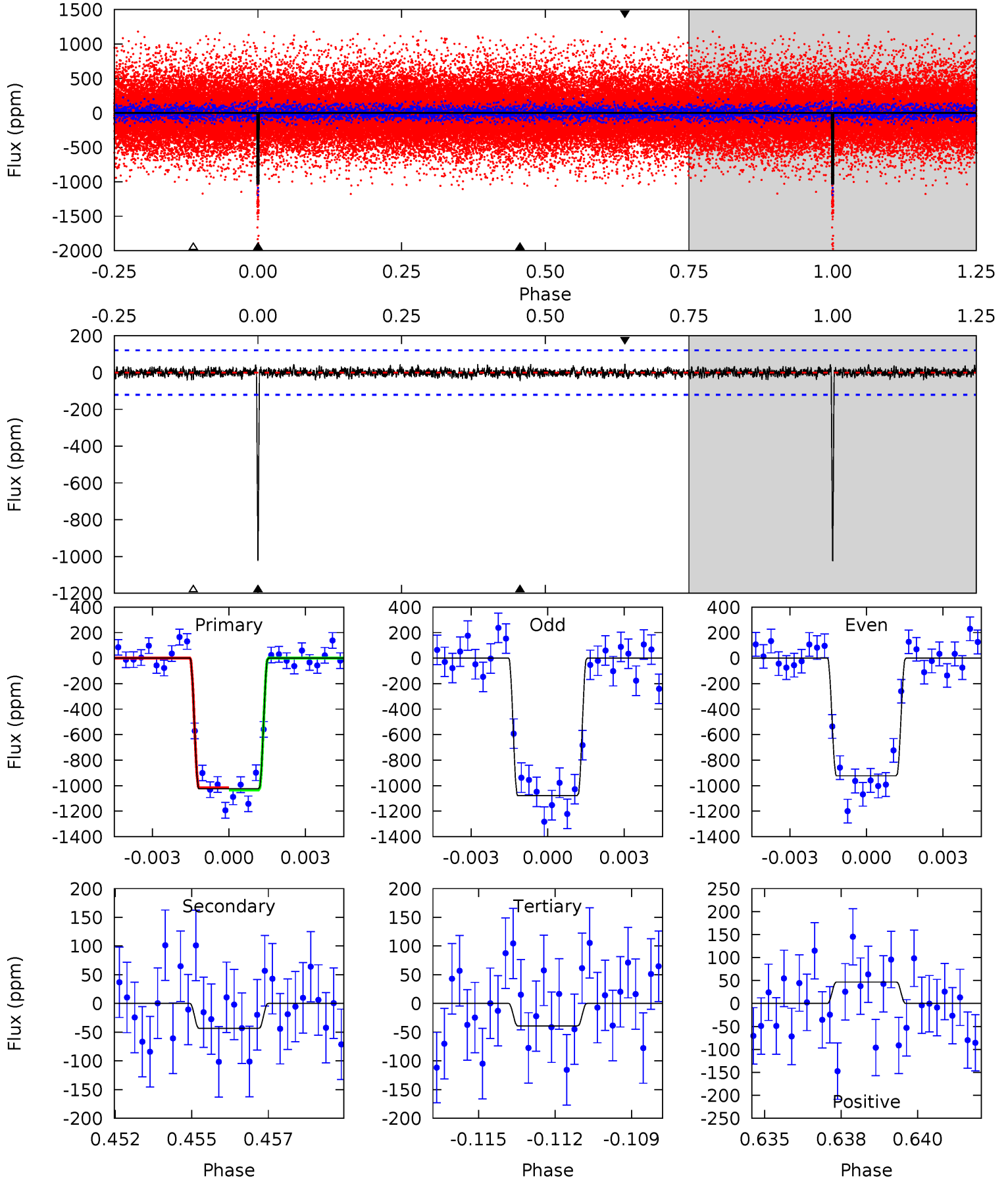
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
45.1	5.13	4.97	5.26	5.23	2.93	1.74	40.1	39.9	0.16	-0.12	0.28	1.05	0.10	0.84



Alt Model-Shift Uniqueness Test

009958962-02, $P = 90.411209$ Days, $E = 118.096086$ Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
44.6	1.88	1.70	2.03	5.26	2.97	0.53	42.9	42.6	0.18	-0.15	3.38	0.98	0.04	0.38



Stellar Parameters For KIC 009958962

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	6004^{+181}_{-199}	$4.484^{+0.052}_{-0.208}$	$-0.020^{+0.250}_{-0.300}$	$0.977^{+0.302}_{-0.101}$	$1.061^{+0.134}_{-0.134}$	$1.603^{+0.431}_{-0.813}$
	+3%/-3%	+1%/-5%	+1250%/-1500%	+31%/-10%	+13%/-13%	+27%/-51%
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 009958962-02 / KOI 0593.02

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	A_{obs}
DV	-134 ± 26	$3.80^{+0.69}_{-0.50}$	592^{+42}_{-32}	3850^{+191}_{-185}	798^{+301}_{-254}
Alt.	-43 ± 23	$3.57^{+0.59}_{-0.46}$	587^{+44}_{-28}	3264^{+264}_{-333}	276^{+192}_{-144}

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

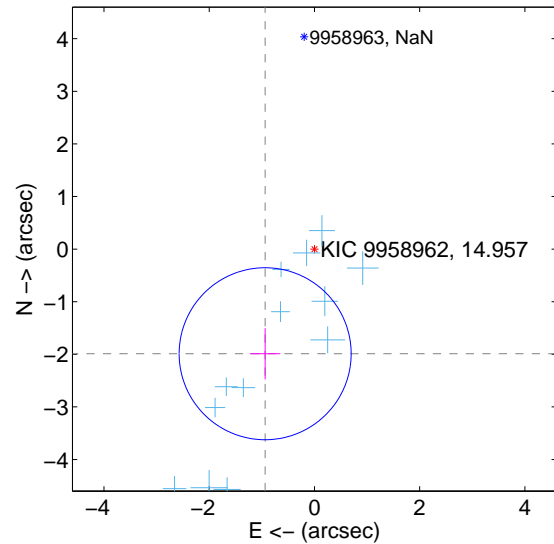
Supplemental centroid analysis for 009958962-02. Kepler magnitude: 14.96. Transit SNR 24.72

There are 13 quarters with good PRF difference image offsets

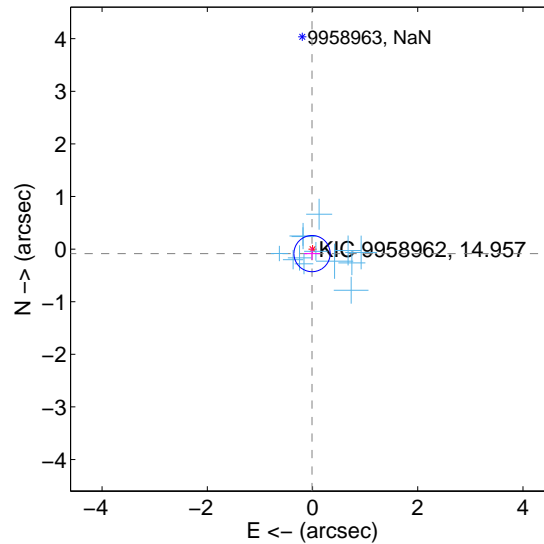
The direct PRF centroid is offset from the target star catalog position by about 0.30 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	2.199 ± 0.545	4.03	0.937 ± 0.290	-1.989 ± 0.487
PRF-fit source offset from KIC position	0.086 ± 0.115	0.75	0.009 ± 0.152	-0.085 ± 0.120
photometric centroid source offset	0.90 ± 0.38	2.39	-0.69 ± 0.34	0.57 ± 0.43

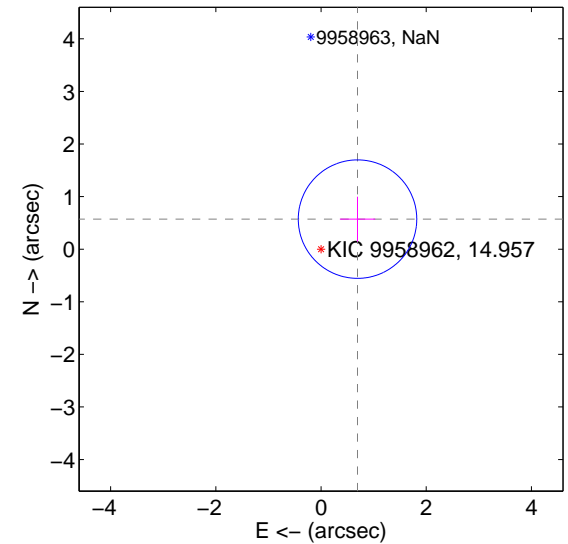
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

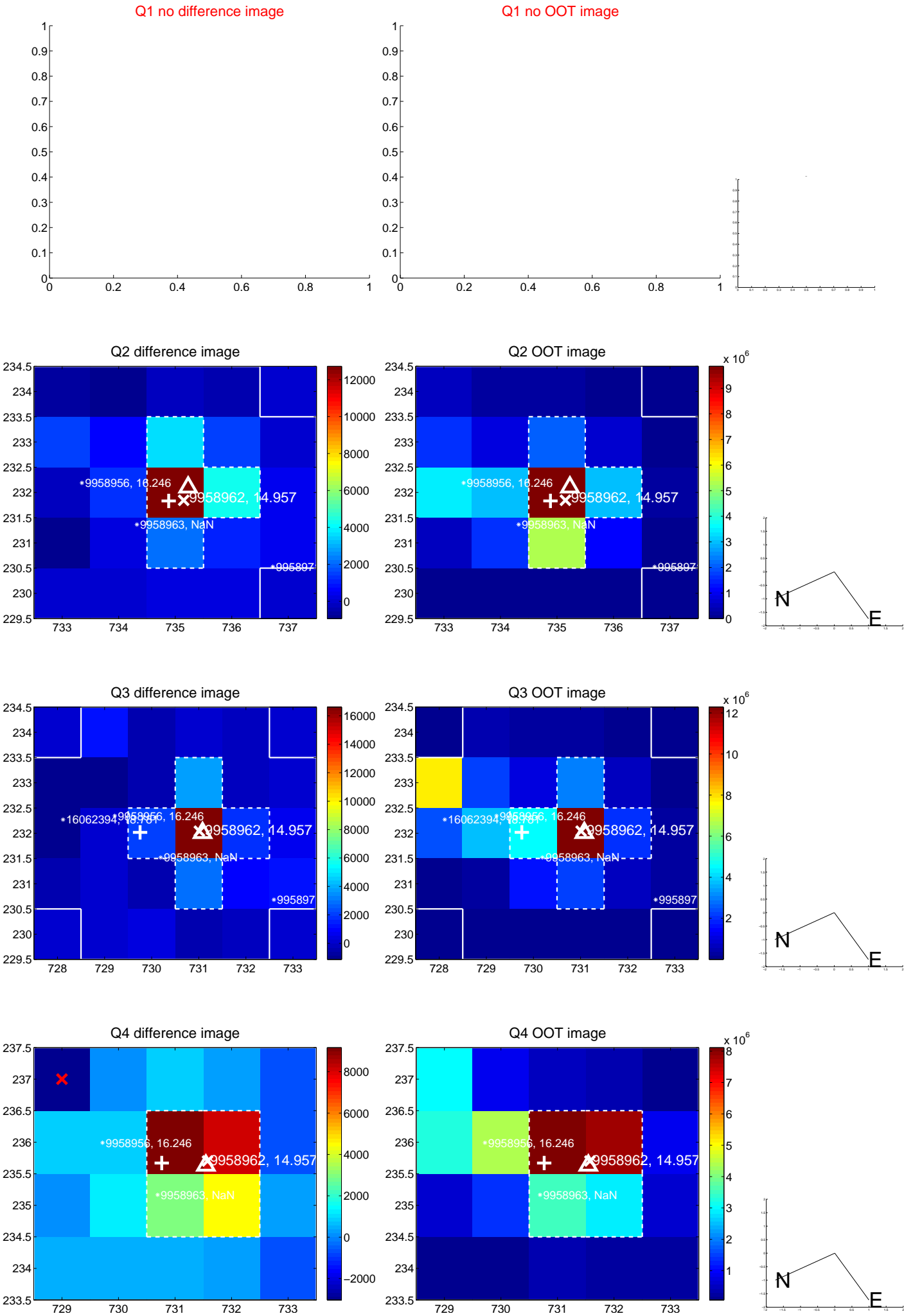


offset from photometric centroids

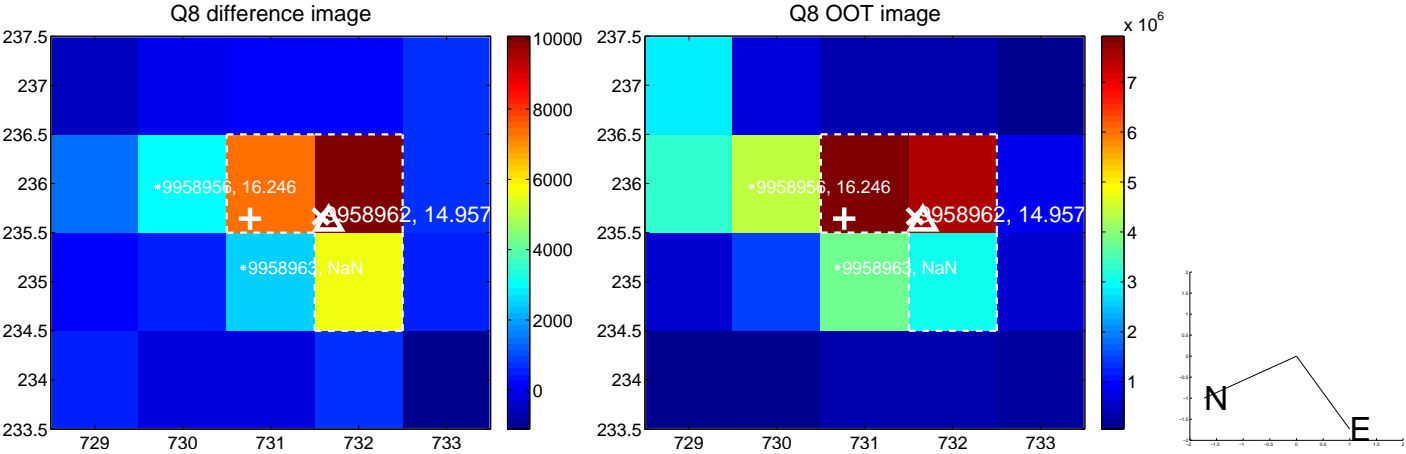
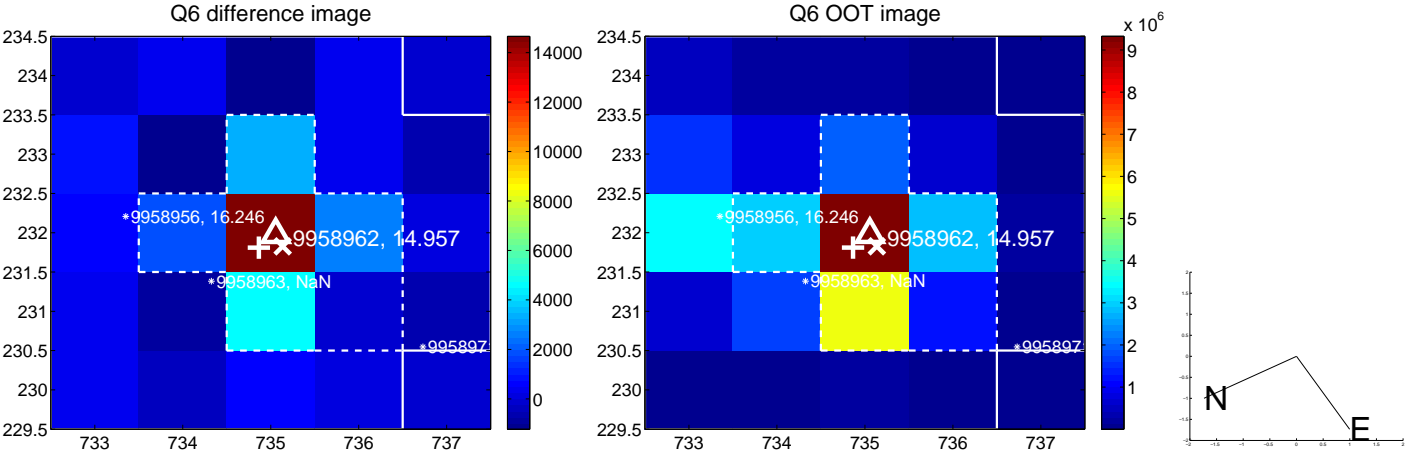
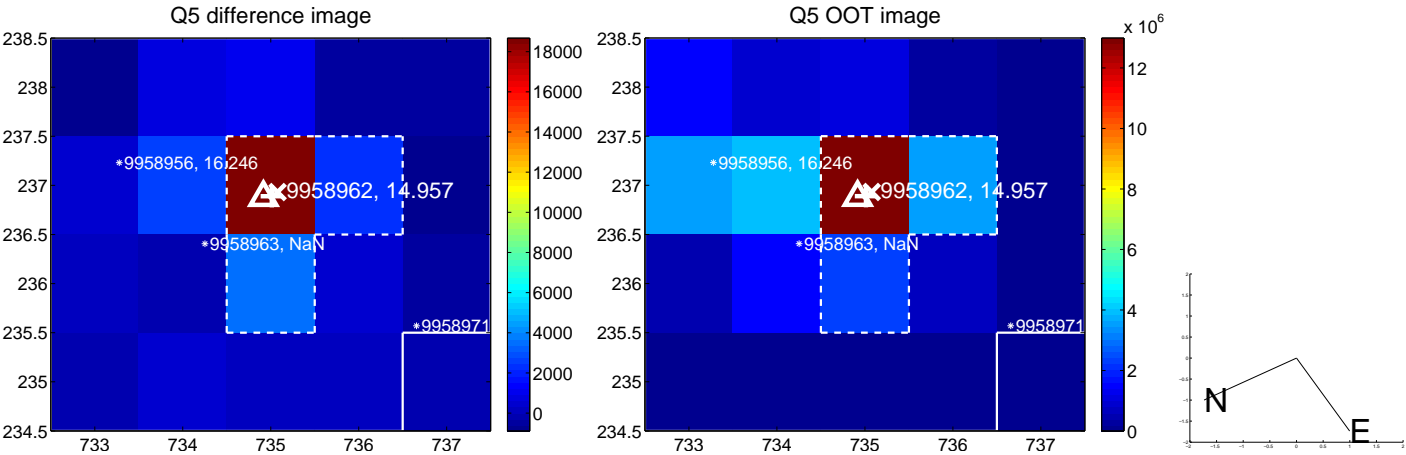


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

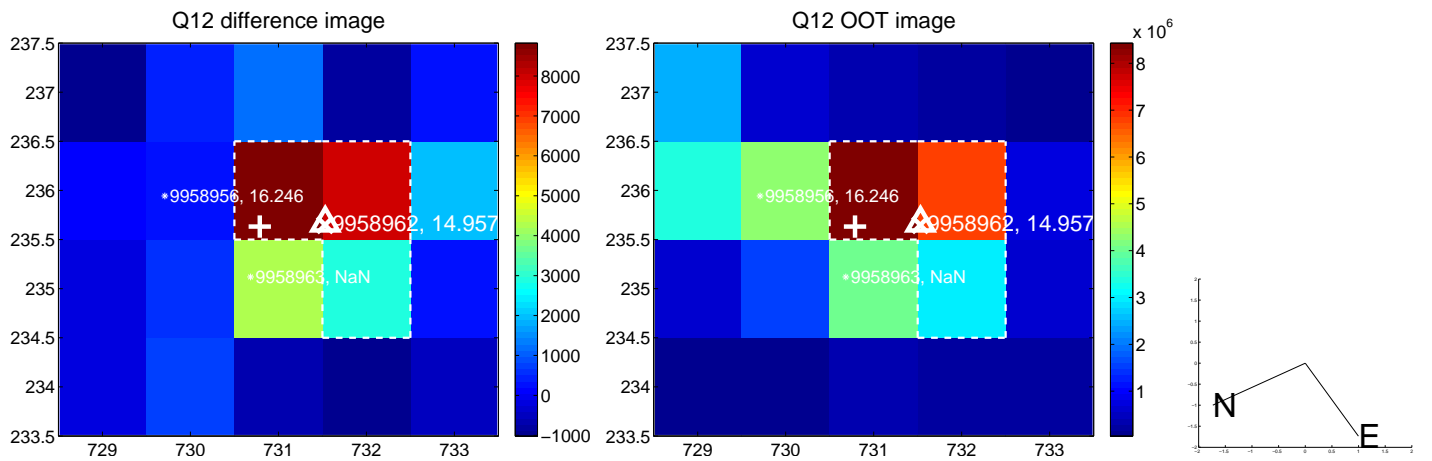
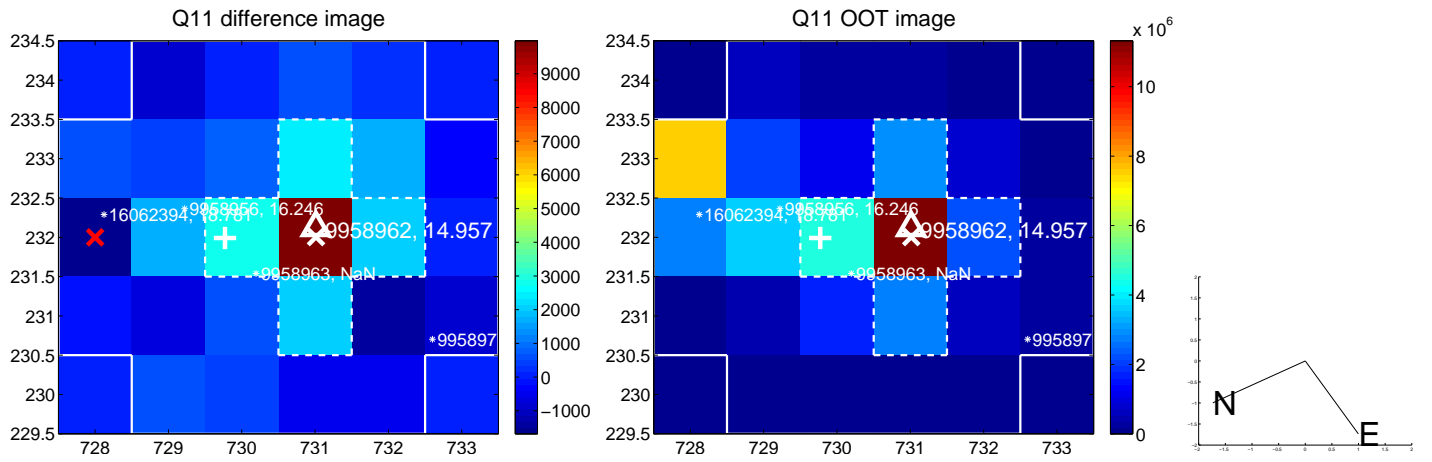
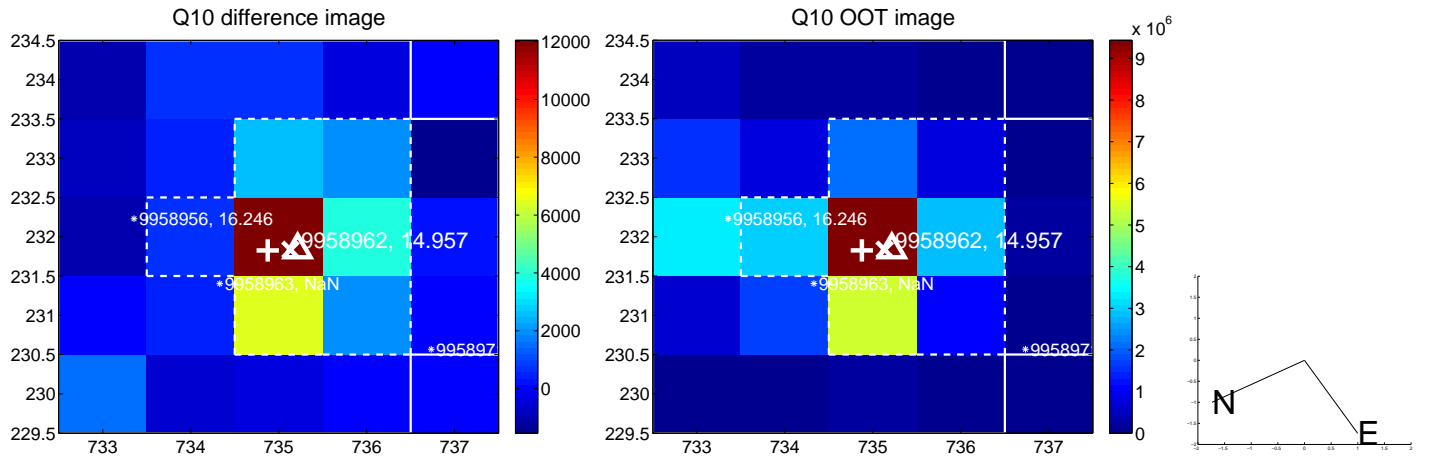
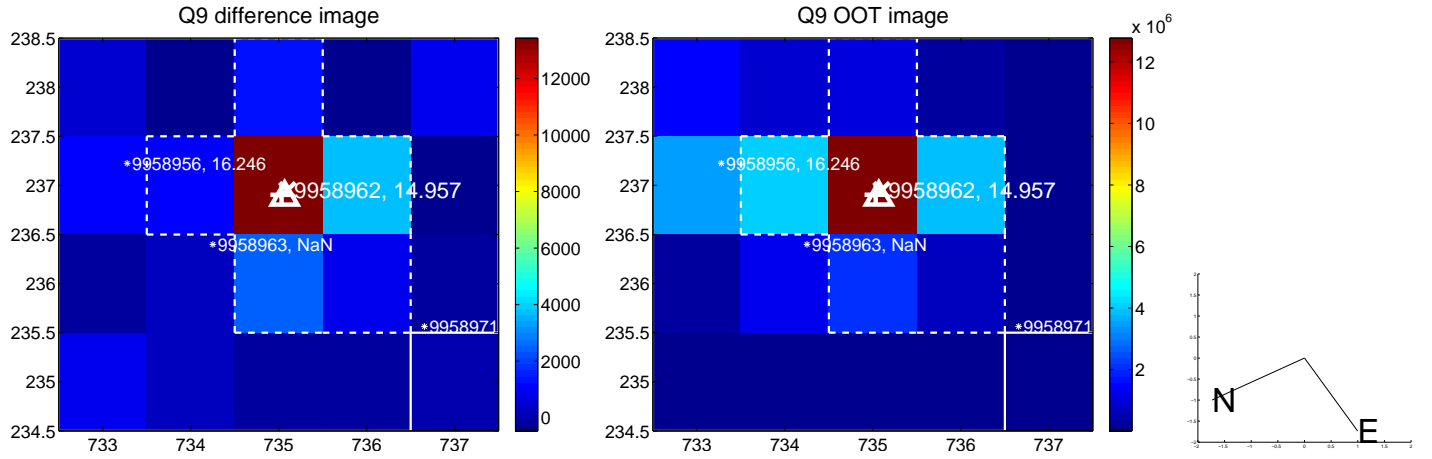
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



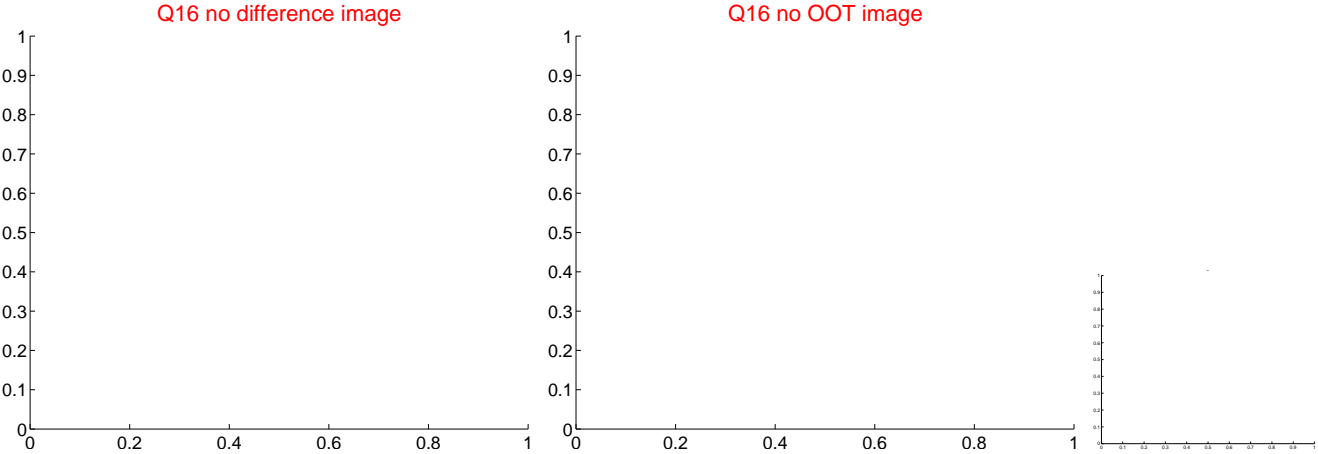
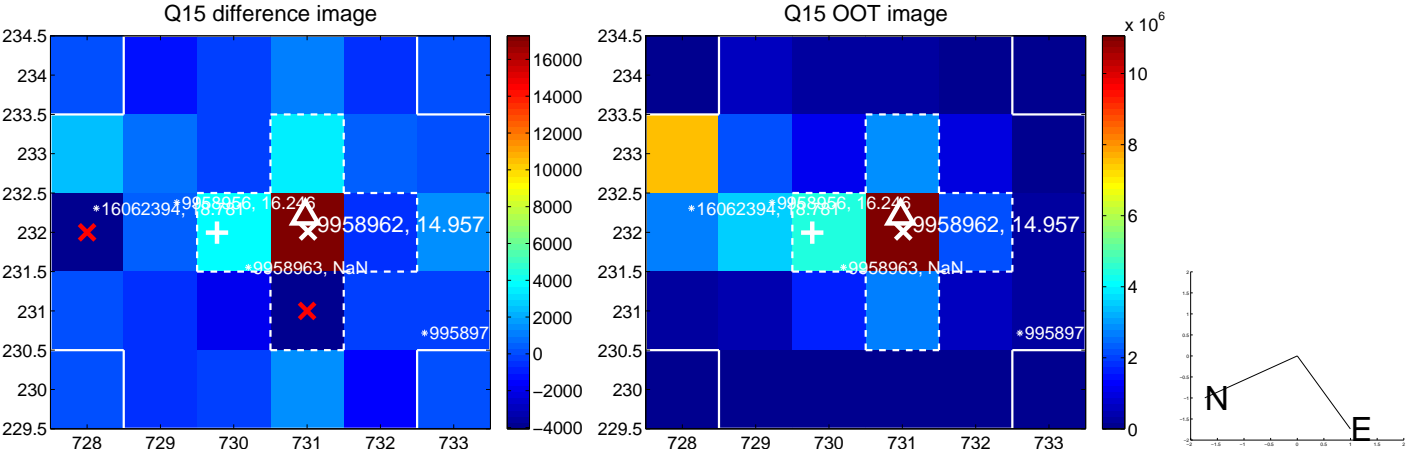
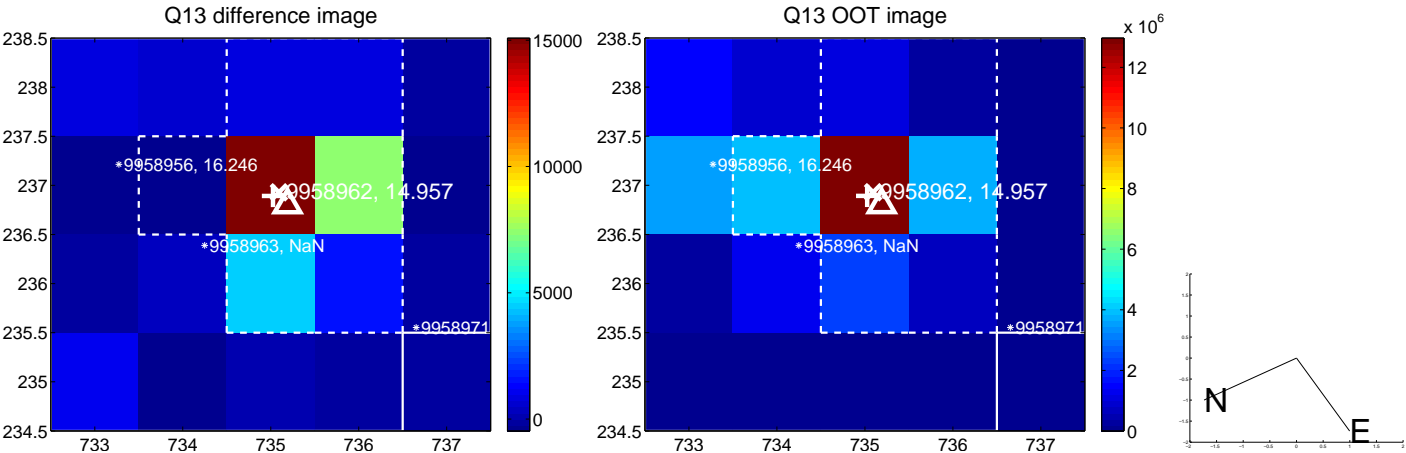
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



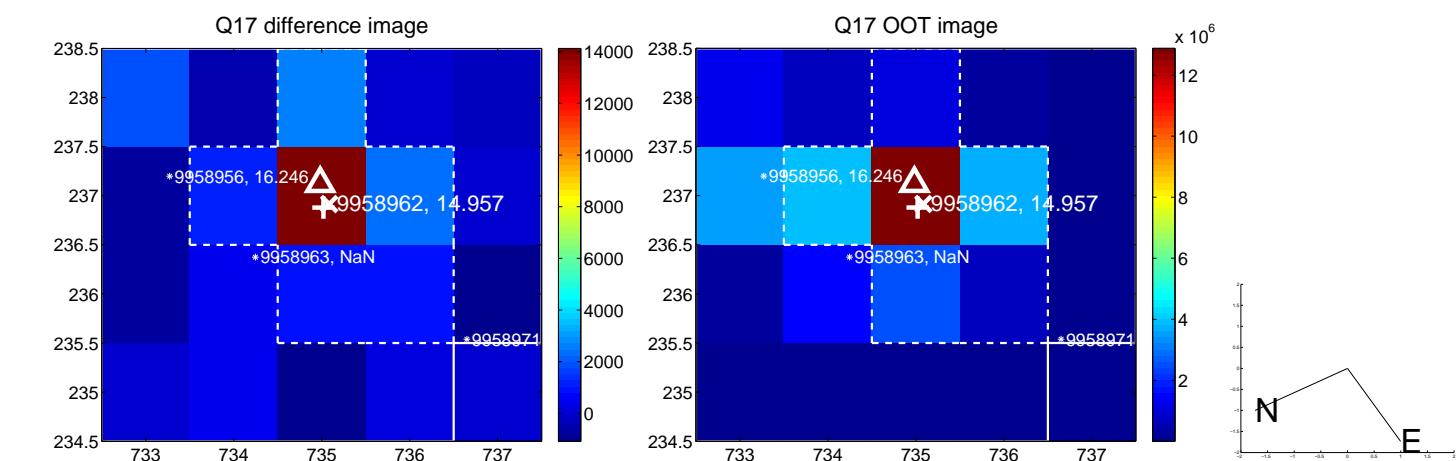
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



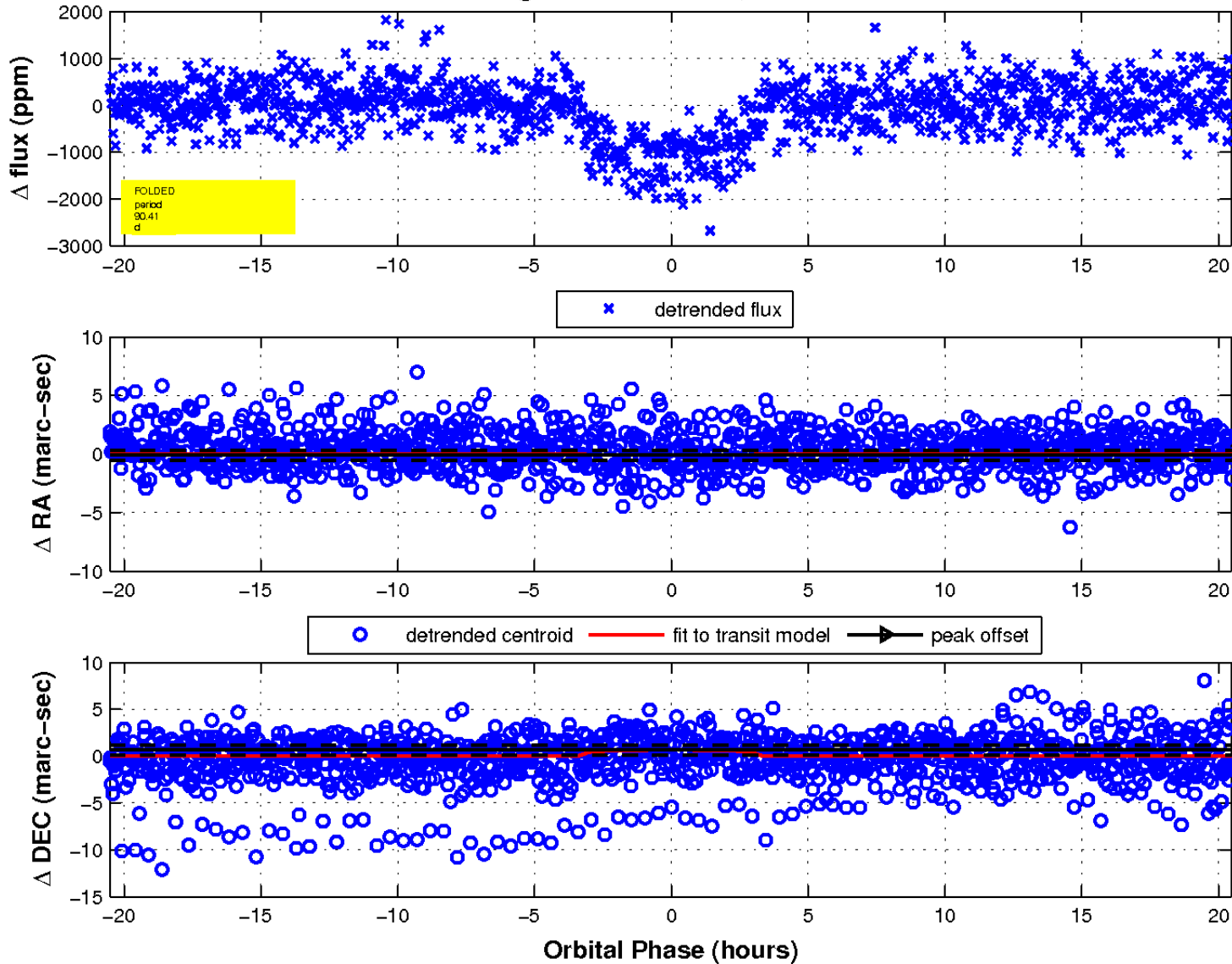
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



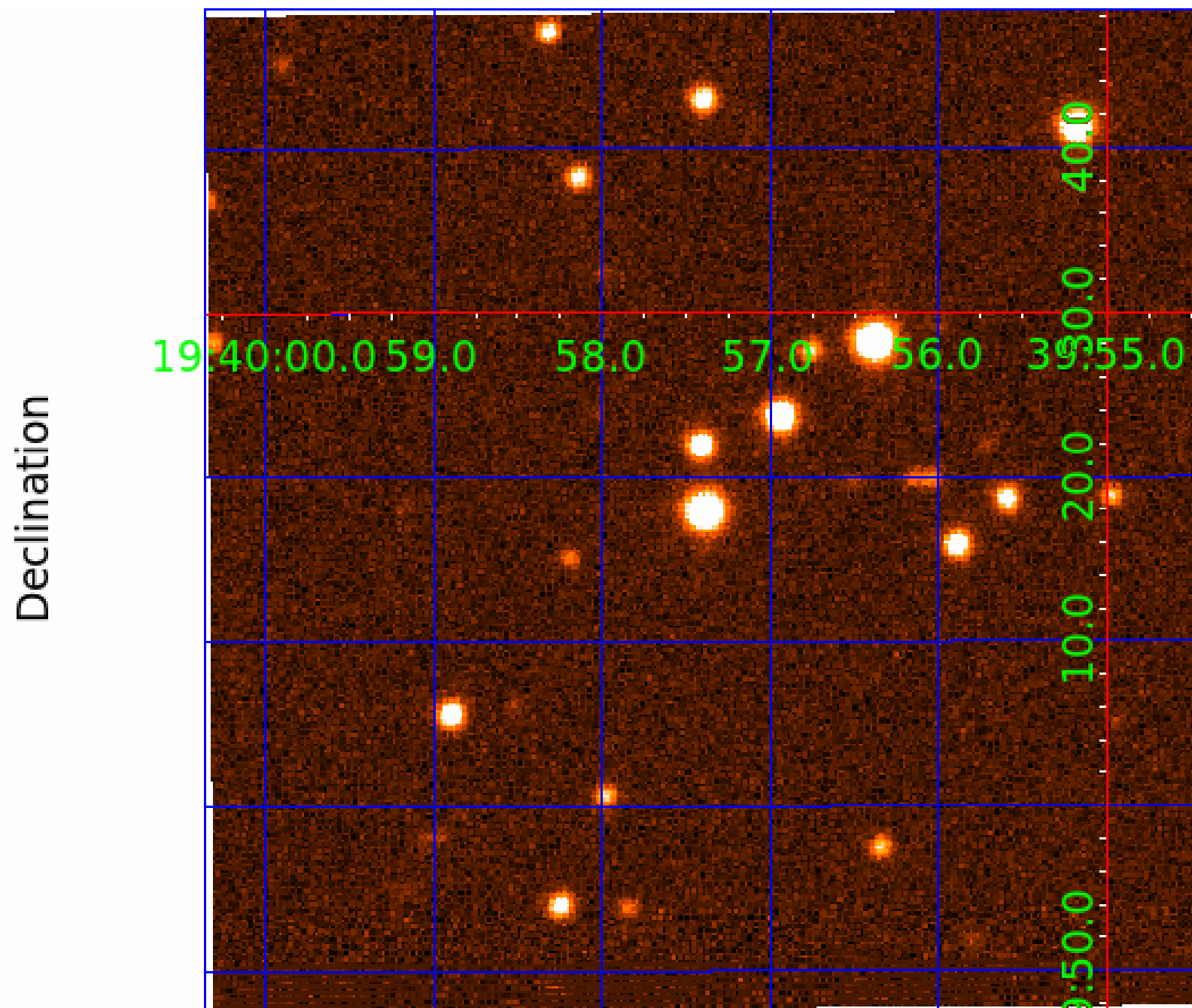
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



fluxWeightedCentroids, Planet 2 of 4



UKIRT Image



KIC 009958962

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})
009958962-01	OBS	0593.01	9.997619	131.796795	628.3	3.485	35.7	38.3	0.98	6004	2.85	129.44
009958962-02	OBS	0593.02	90.412010	208.503416	1172.3	6.841	23.0	24.7	0.98	6004	3.63	6.87
009958962-03	OBS	0593.03	51.067350	147.611588	623.3	4.438	15.2	17.8	0.98	6004	2.65	14.71
009958962-04	OBS	0593.04	240.190262	168.314523	810.0	10.991	11.1	11.5	0.98	6004	3.25	1.87

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009958962-01	OBS	PC	1.00	0	0	0	0	CENT_KIC_POS
009958962-02	OBS	PC	1.00	0	0	0	0	CENT_KIC_POS
009958962-03	OBS	PC	1.00	0	0	0	0	CENT_KIC_POS
009958962-04	OBS	PC	0.74	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.

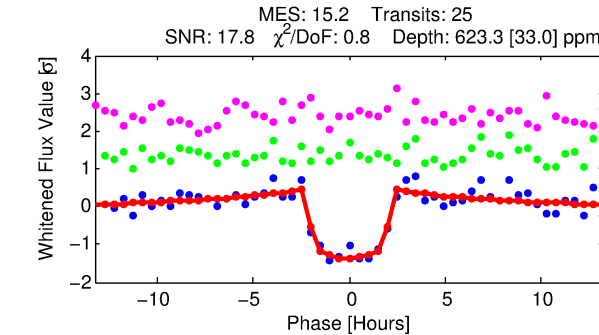
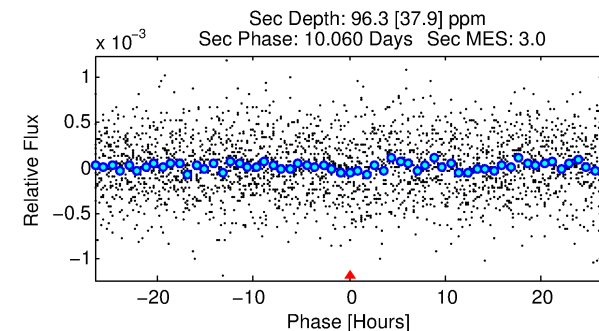
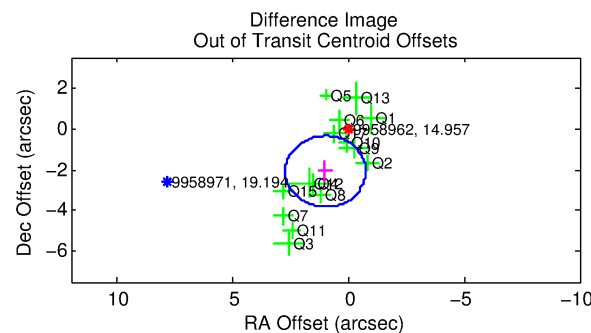
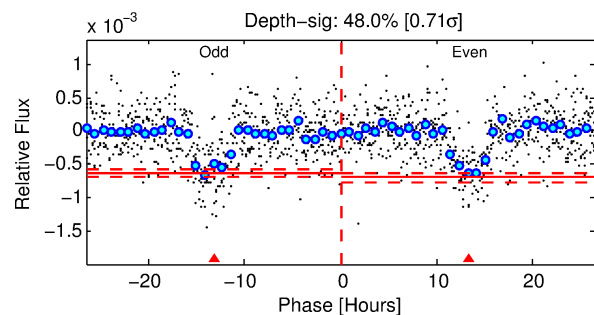
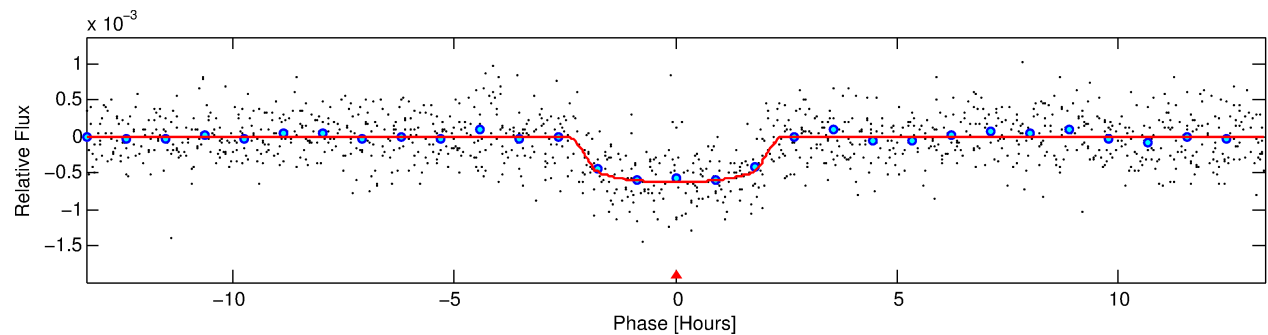
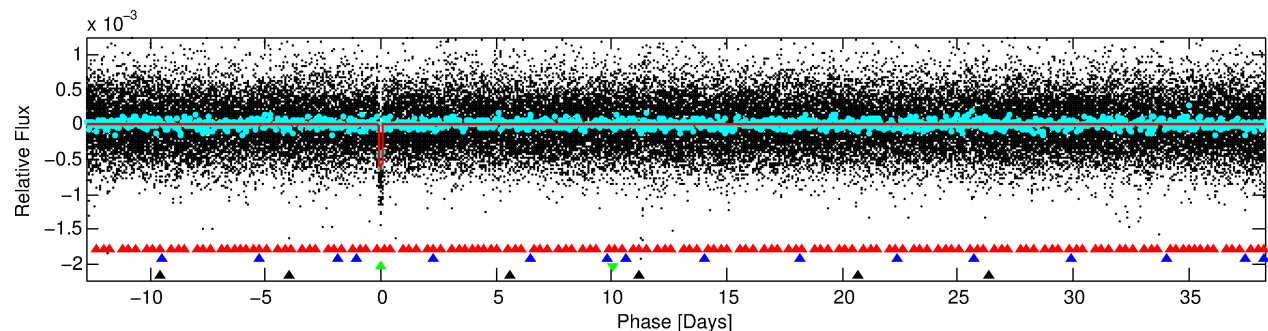
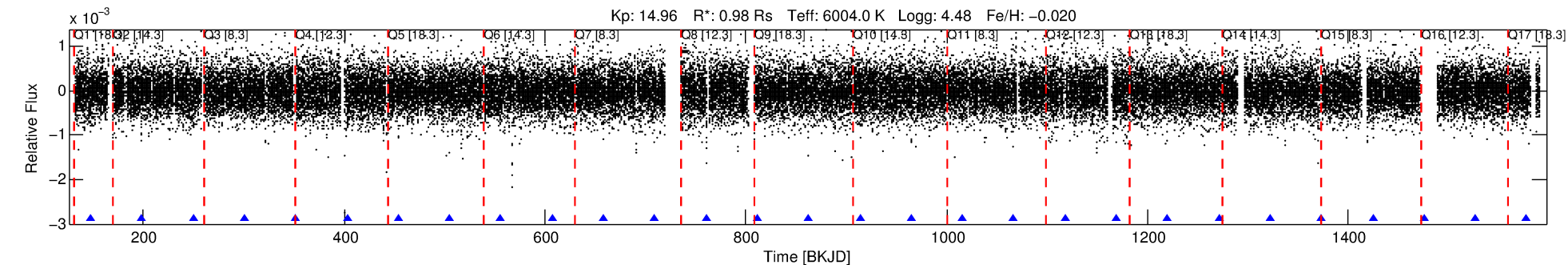
Ephemeris Match Information For 009958962-03

No Significant Match Found

DV One-Page Summary

KIC: 9958962 Candidate: 3 of 4 Period: 51.067 d

KOI: K00593.03 Corr: 0.995



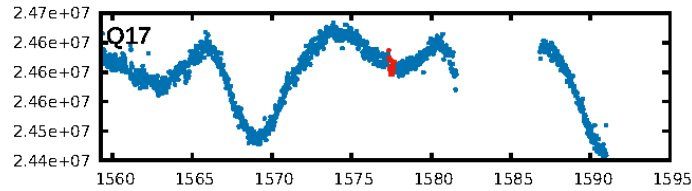
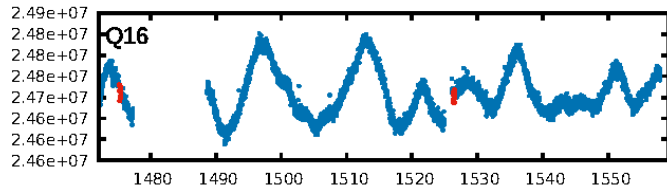
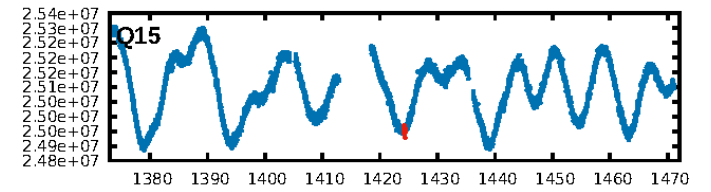
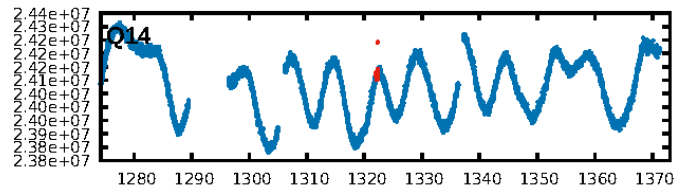
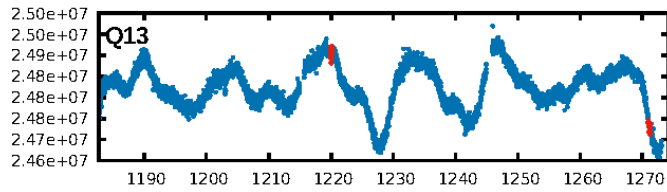
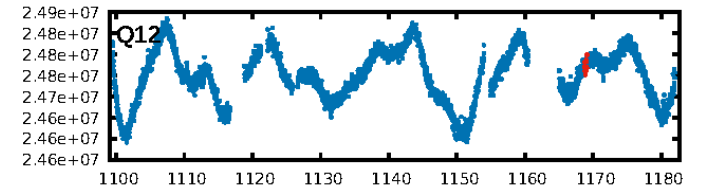
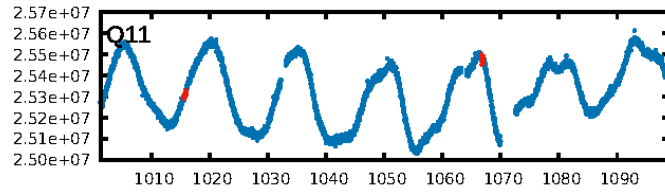
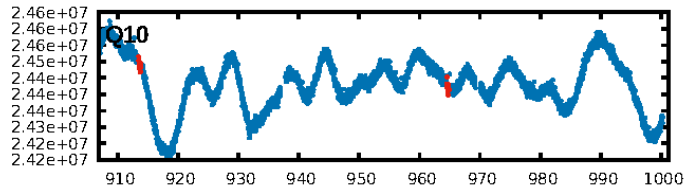
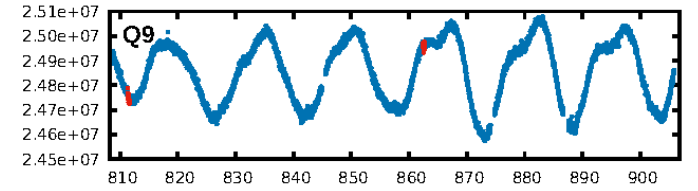
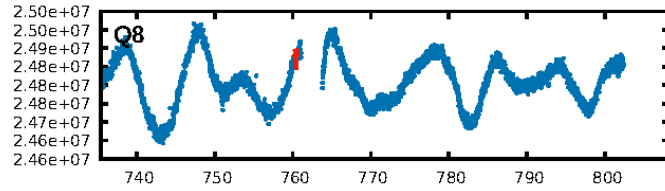
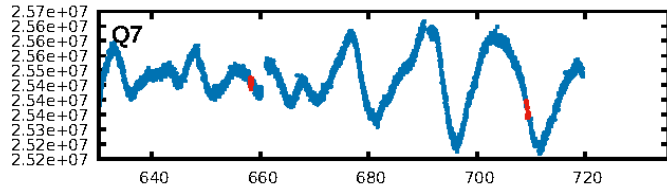
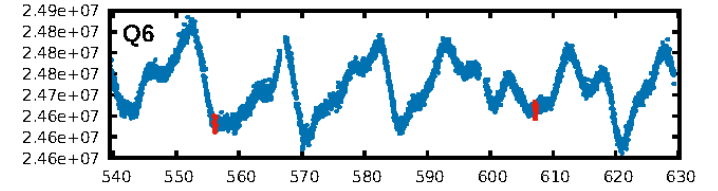
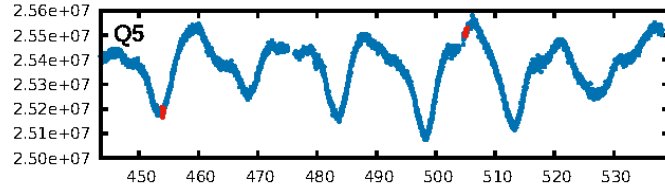
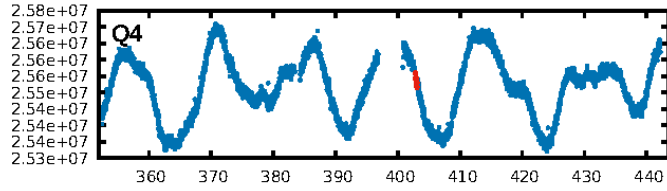
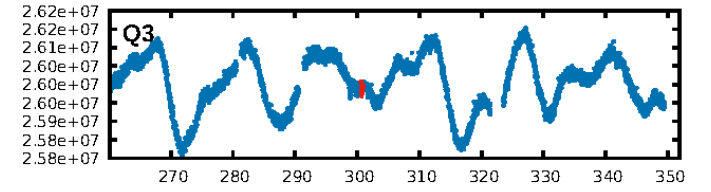
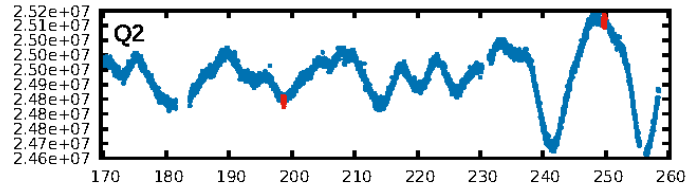
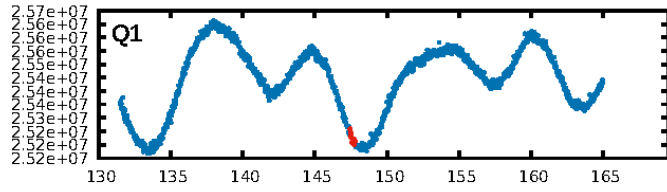
DV Fit Results:

Period = 51.06735 [0.00024] d
Epoch = 147.6116 [0.0036] BKJD
Rp/R* = 0.0249 [0.0075]
a/R* = 61.00 [87.21]
b = 0.75 [0.83]
Seff = 14.71 [5.92]
Teff = 499 [50] K
Rp = 2.65 [1.15] Re
a = 0.2748 [0.0716] AU
Ag = 568.45 [464.06] [1.22 σ]
Teffp = 3770 [692] K [4.71 σ]

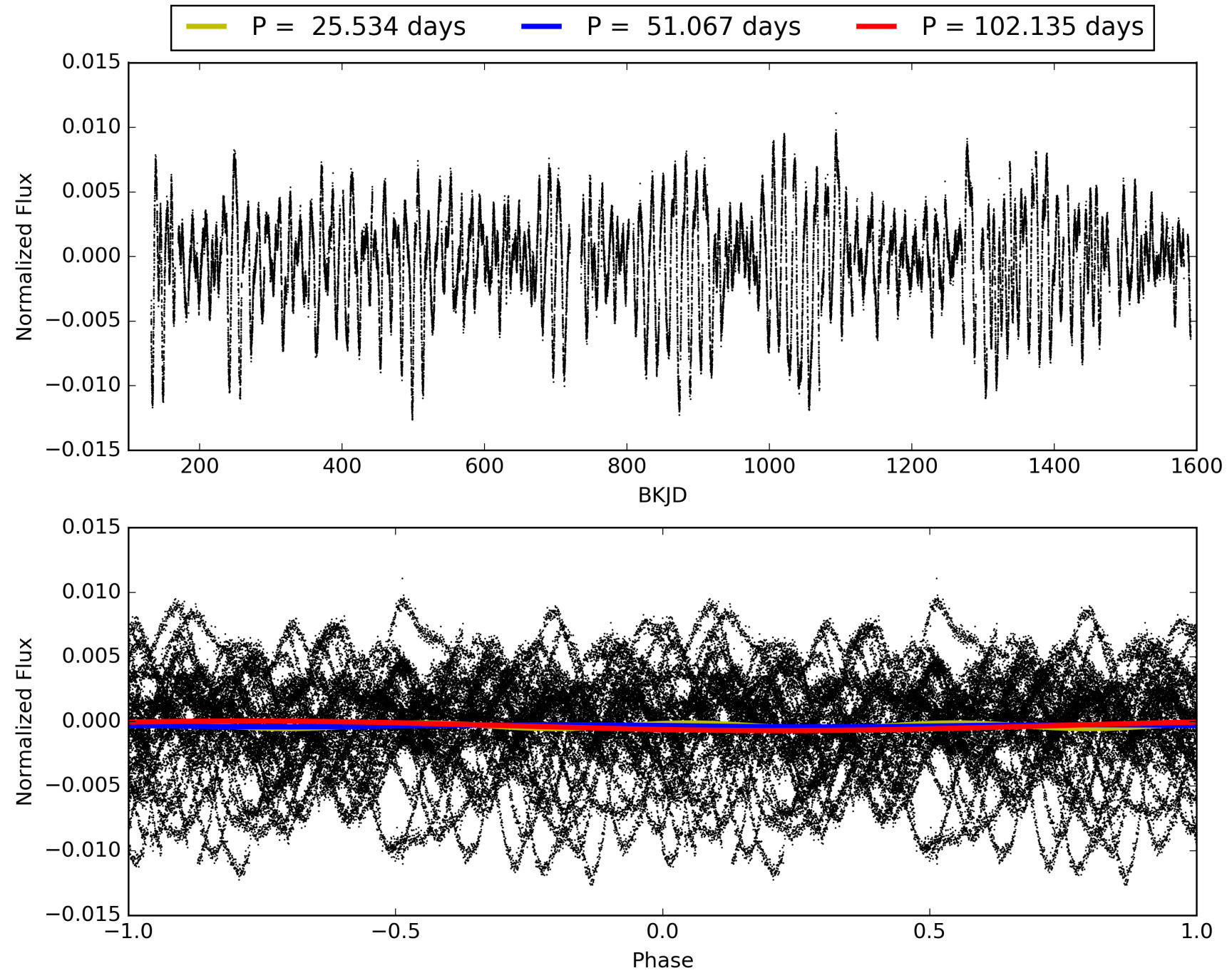
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [174.69 σ]
LongPeriod-sig: 100.0% [115.80 σ]
ModelChiSquare2-sig: 99.1%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 3.92e-34
RollingBand-fgt: 1.00 [23/23]
GhostDiagnostic-chr: 5.295
Centroid-sig: 0.6%
Centroid-so: 1.566 arcsec [2.46 σ]
OotOffset-rm: 2.315 arcsec [3.99 σ]
KicOffset-rm: 0.017 arcsec [0.11 σ]
OotOffset-st: 3/4/3/5 [15]
KicOffset-st: 3/4/3/5 [15]
DiffImageQuality-fgm: 1.00 [15/15]
DiffImageOverlap-fno: 1.00 [16/16]

TCE 009958962-03, PDC Light Curves

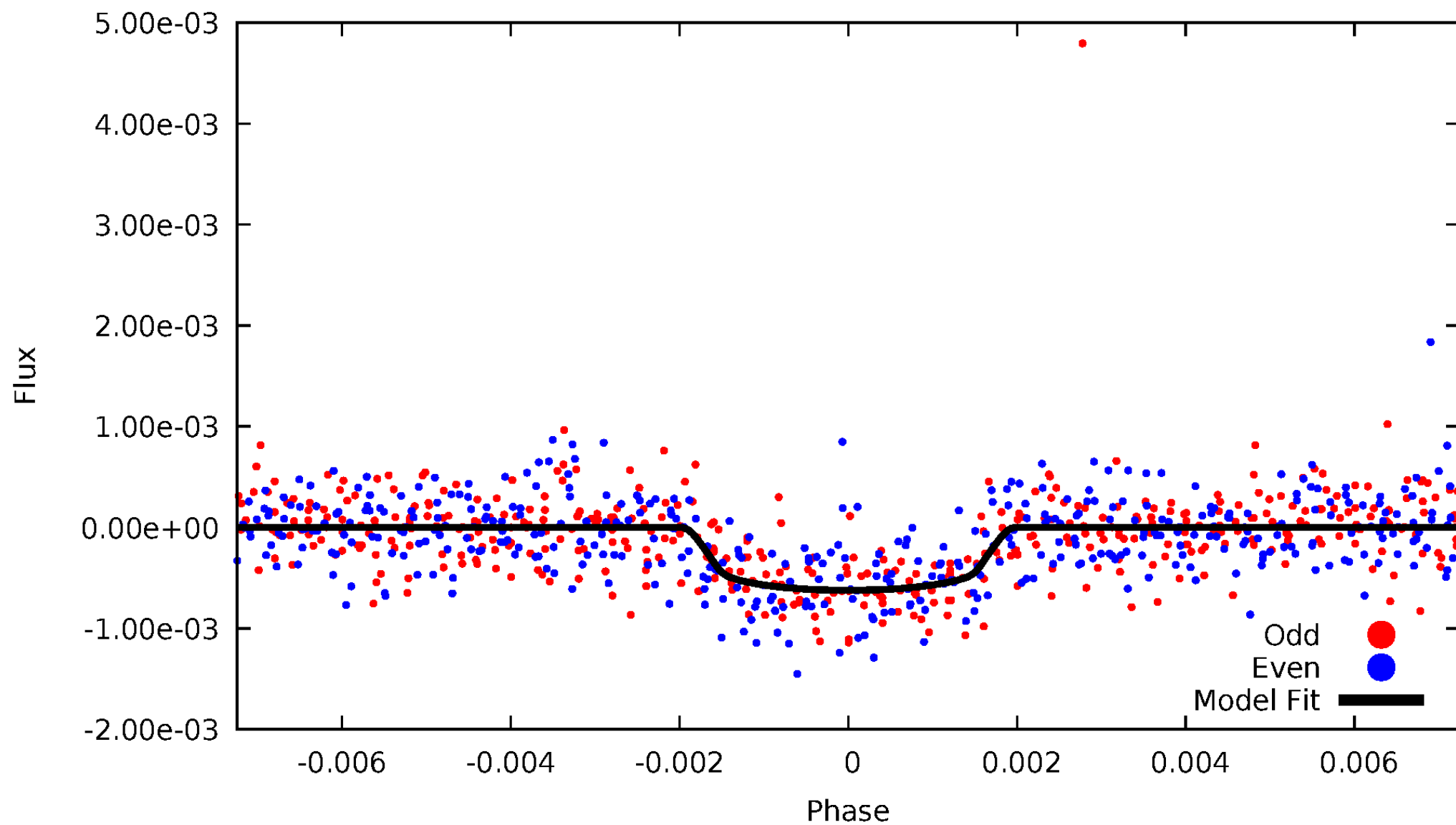


TCE 009958962-03



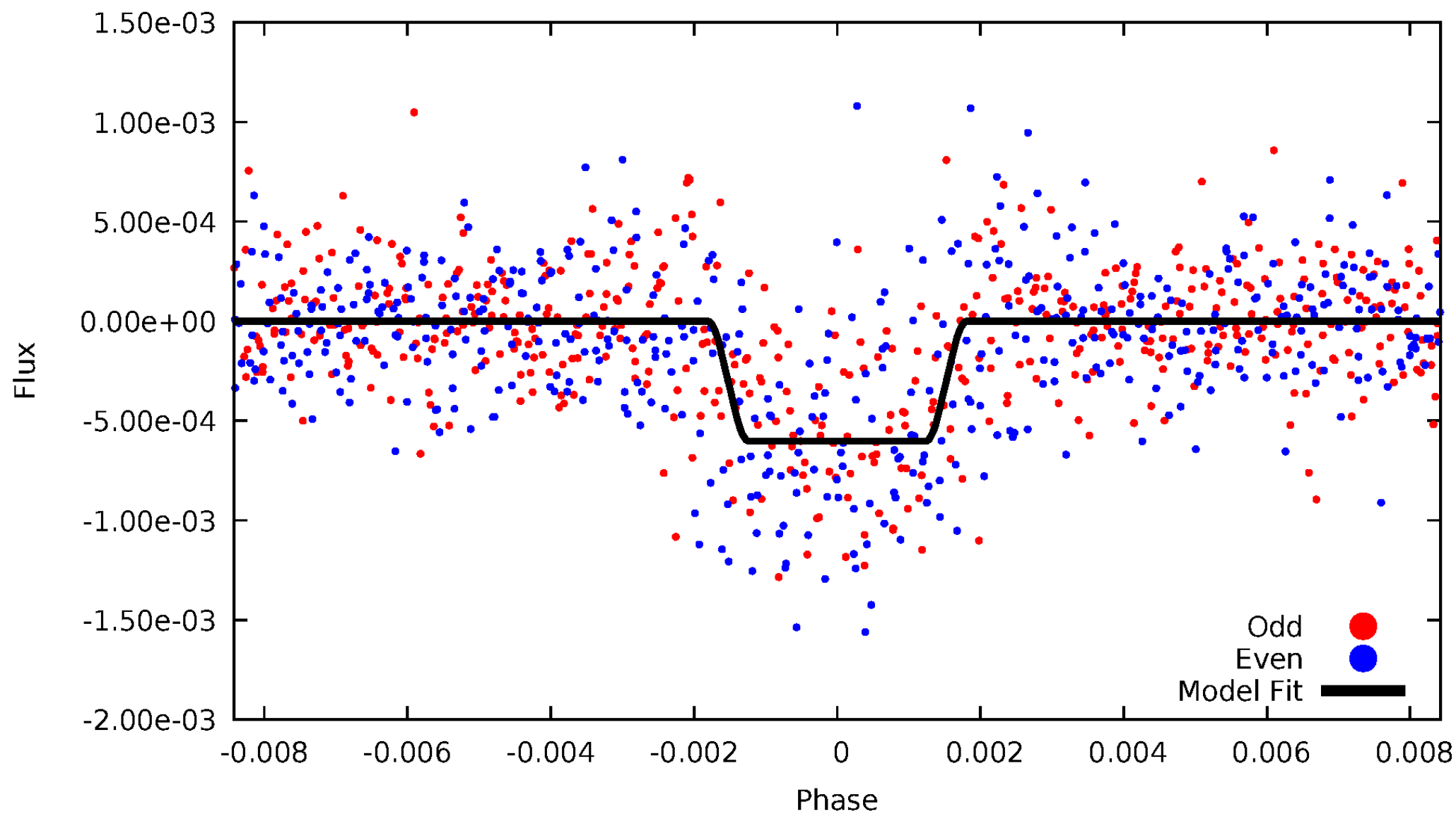
DV Odd/Even

TCE 009958962-03



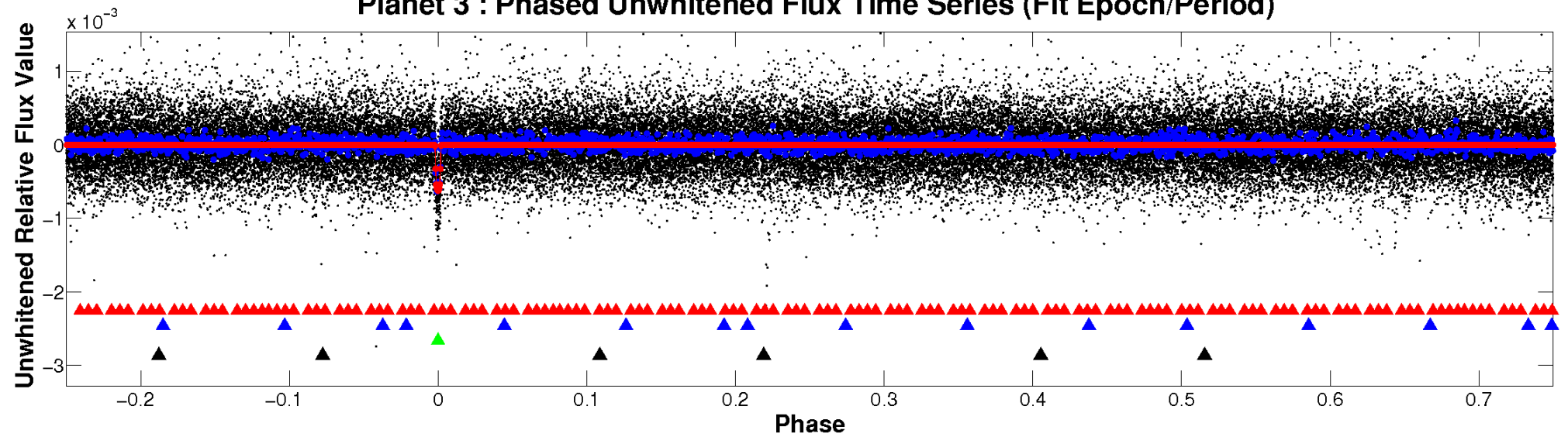
ALT Odd/Even

TCE 009958962-03

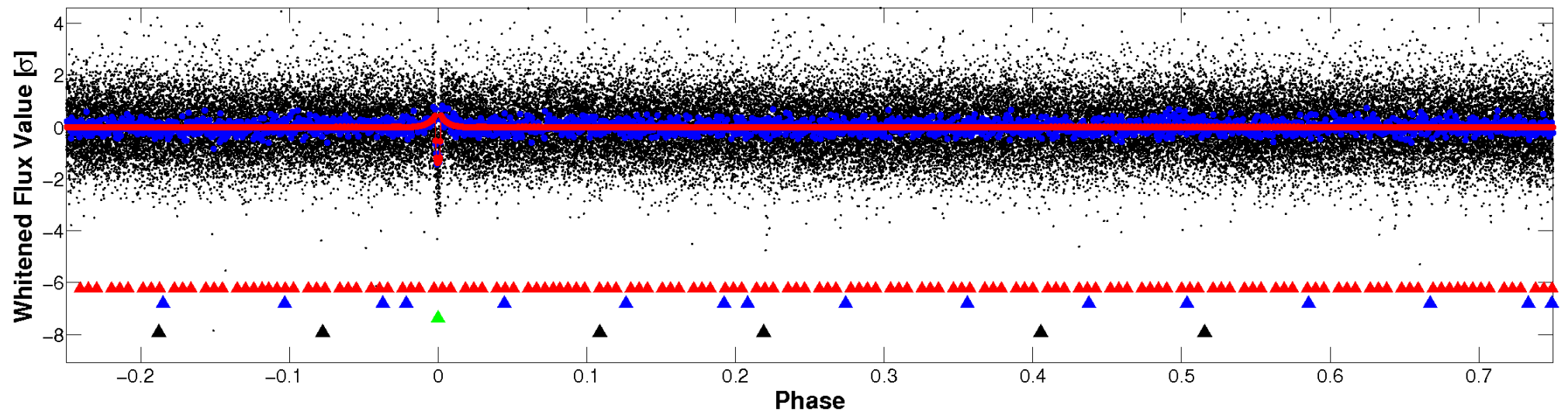


Non-Whitened Vs. Whitened Light Curve

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

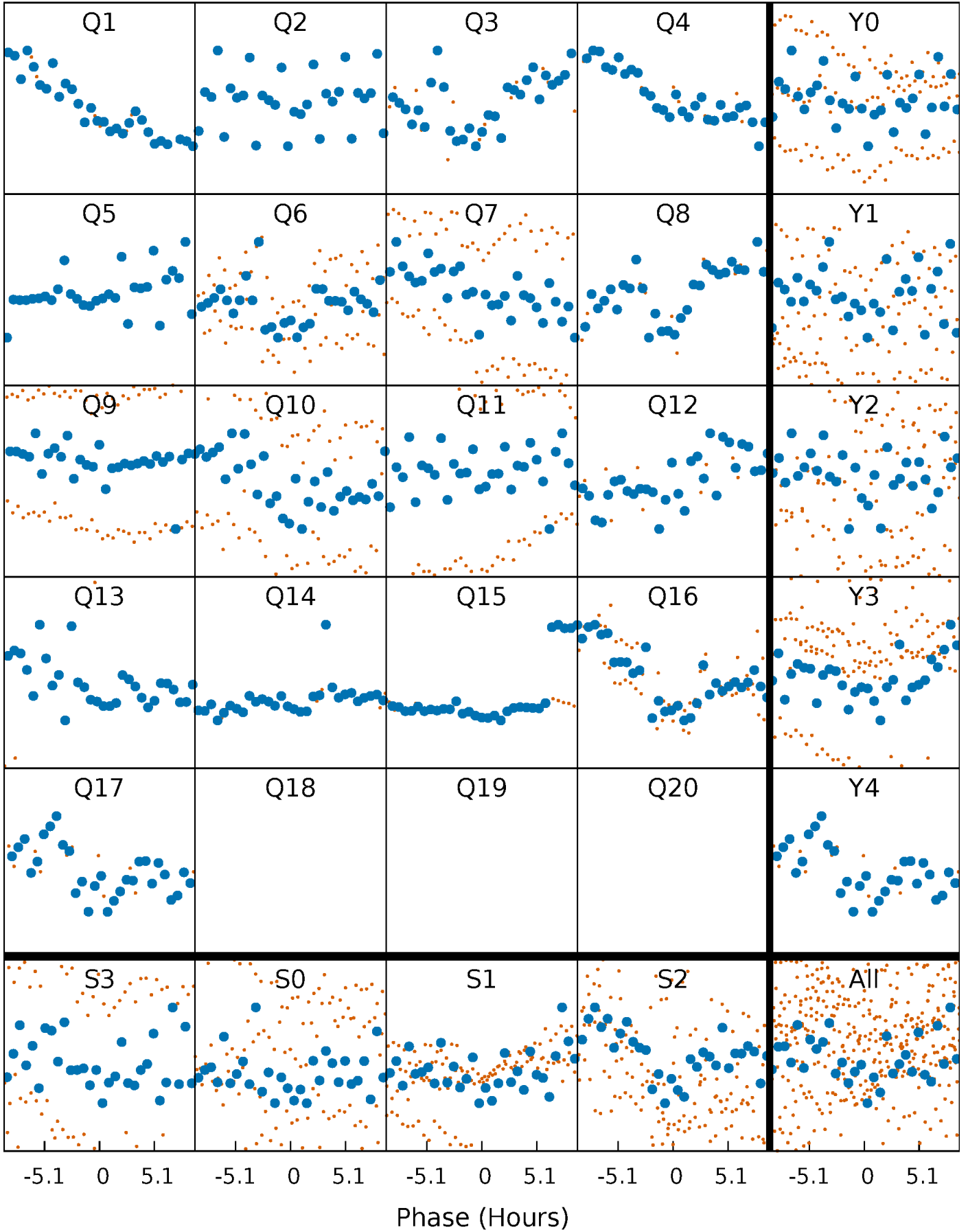


Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



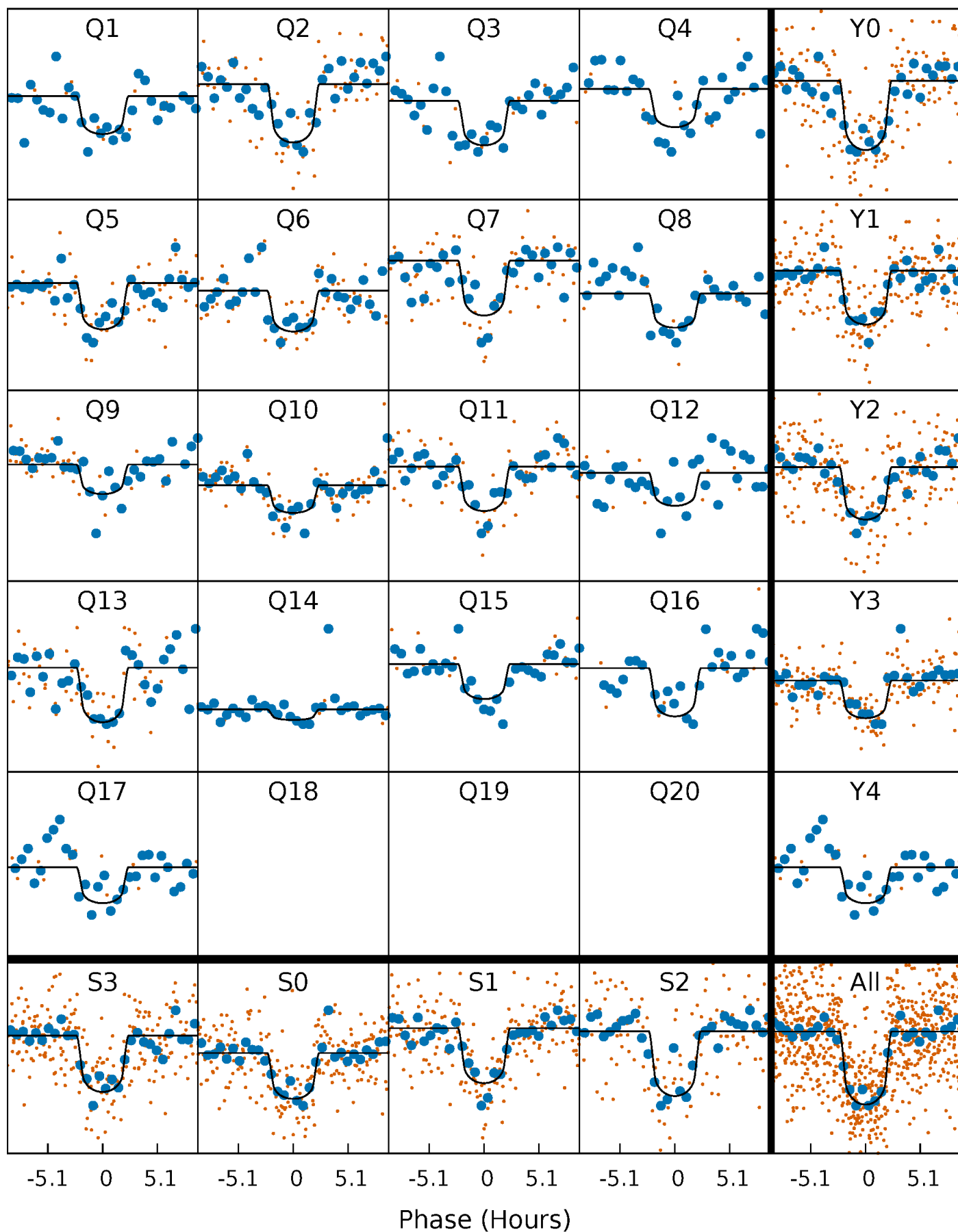
PDC Quarter-Phased Transit Curves

TCE 009958962-03 $P = 51.067350$ Days $T_0 = 147.611588$ (BKJD)



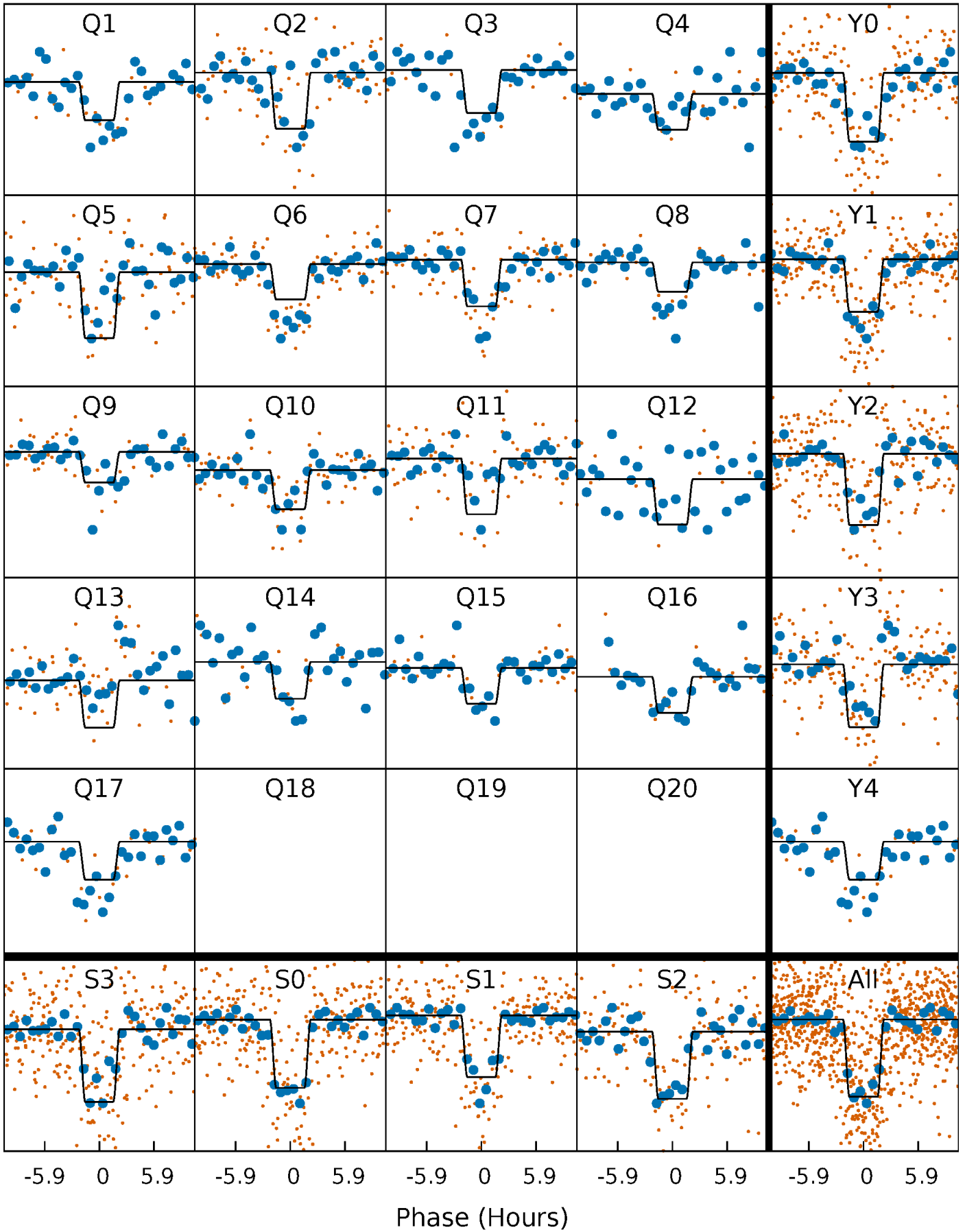
DV Quarter-Phased Transit Curves

TCE 009958962-03 P= 51.067350 Days $T_0=147.611588$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

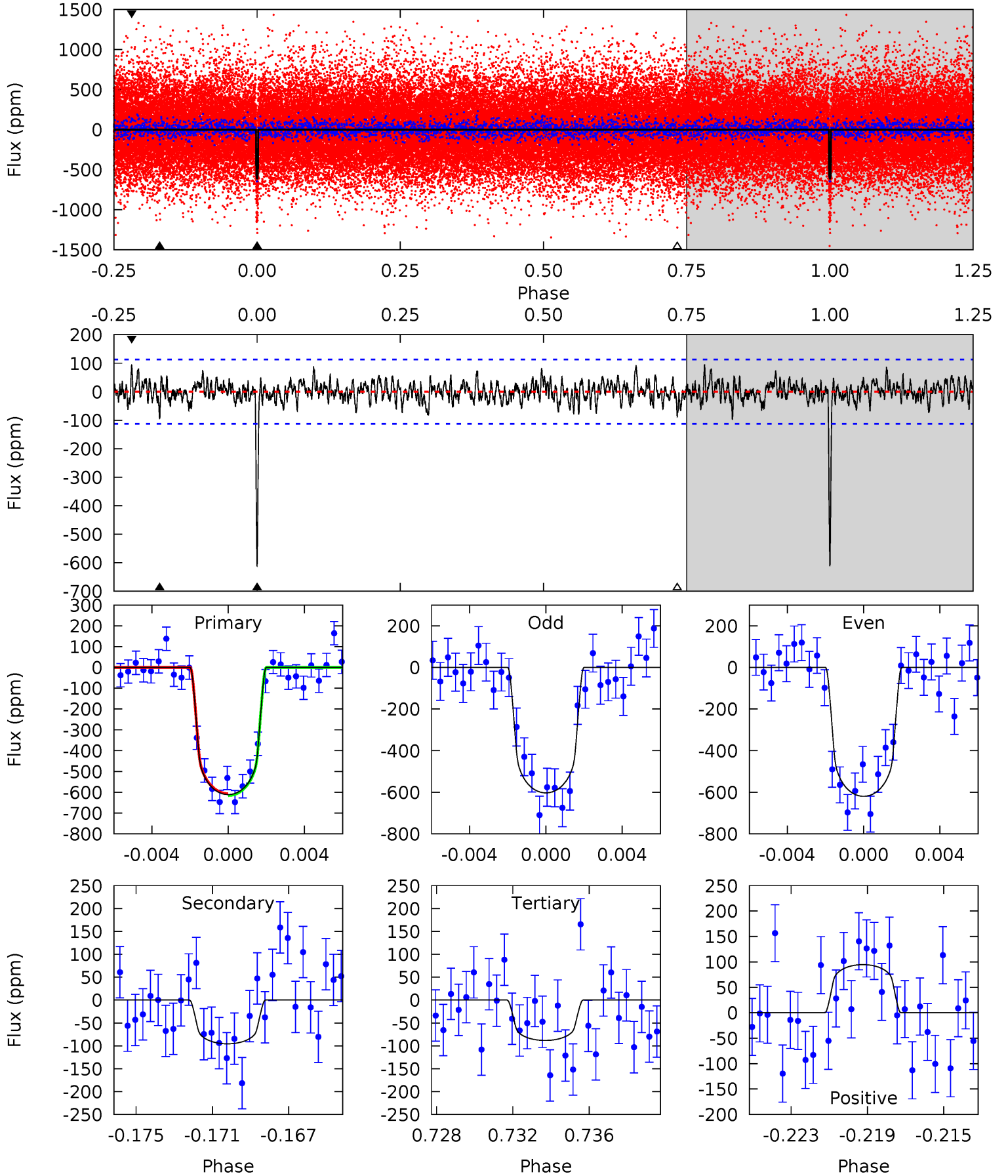
TCE 009958962-03 P= 51.068663 Days $T_0=147.591202$ (BKJD)



DV Model-Shift Uniqueness Test

009958962-03, P = 51.067350 Days, E = 96.544238 Days

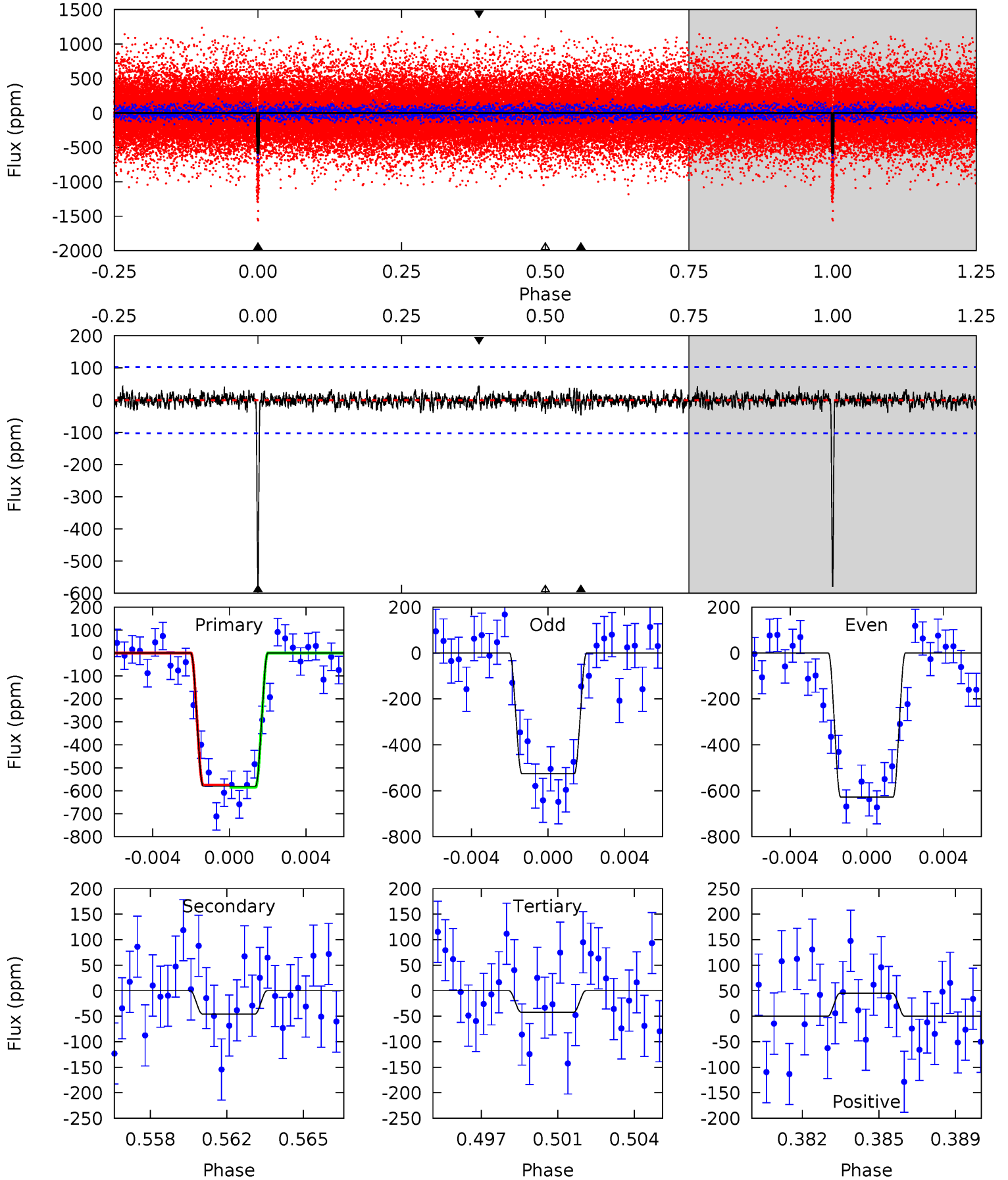
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
28.1	4.40	4.06	4.35	5.20	2.88	1.30	24.1	23.8	0.34	0.05	0.38	1.00	0.13	0.20



Alt Model-Shift Uniqueness Test

009958962-03, P = 51.068663 Days, E = 96.522539 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
29.3	2.31	2.13	2.28	5.22	2.91	0.64	27.2	27.1	0.18	0.03	2.59	0.96	0.07	0.24



Stellar Parameters For KIC 009958962

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	$M(M_{\odot})$	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	6004^{+181}_{-199}	$4.484^{+0.052}_{-0.208}$	$-0.020^{+0.250}_{-0.300}$	$0.977^{+0.302}_{-0.101}$	$1.061^{+0.134}_{-0.134}$	$1.603^{+0.431}_{-0.813}$
	+3%/-3%	+1%/-5%	+1250%/-1500%	+31%/-10%	+13%/-13%	+27%/-51%
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 009958962-03 / KOI 0593.03

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-96 ± 22	$2.76^{+1.04}_{-0.89}$	713^{+52}_{-36}	4069^{+650}_{-438}	502^{+668}_{-251}
Alt.	-46 ± 20	$2.74^{+0.99}_{-0.92}$	711^{+57}_{-34}	3604^{+575}_{-418}	254^{+328}_{-147}

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

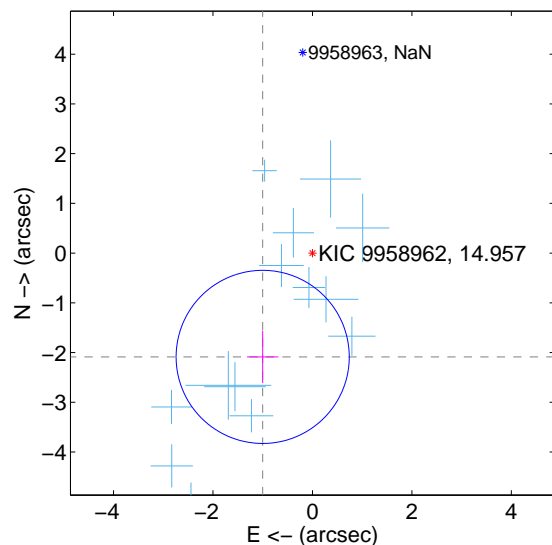
Supplemental centroid analysis for 009958962-03. Kepler magnitude: 14.96. Transit SNR 17.78

There are 15 quarters with good PRF difference image offsets

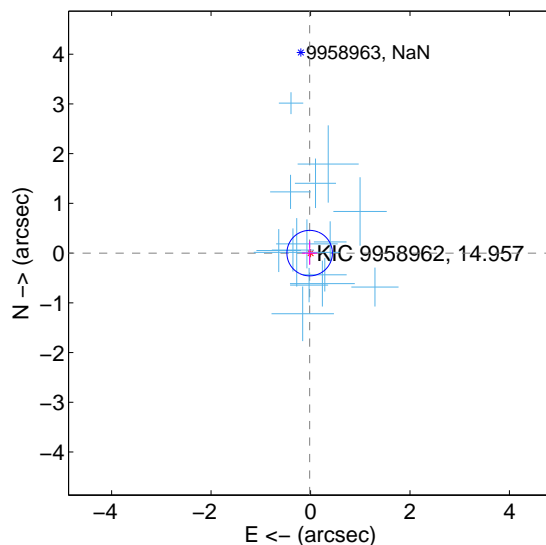
The direct PRF centroid is offset from the target star catalog position by about 0.30 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	2.315 ± 0.580	3.99	1.001 ± 0.315	-2.088 ± 0.525
PRF-fit source offset from KIC position	0.017 ± 0.153	0.11	0.017 ± 0.152	-0.000 ± 0.236
photometric centroid source offset	1.57 ± 0.64	2.46	0.57 ± 0.53	1.46 ± 0.65

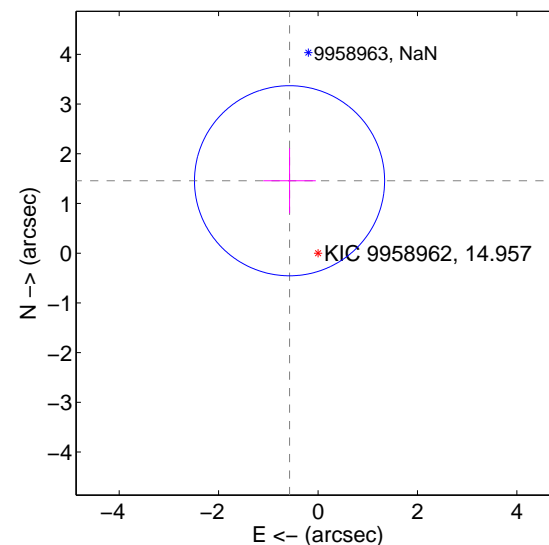
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

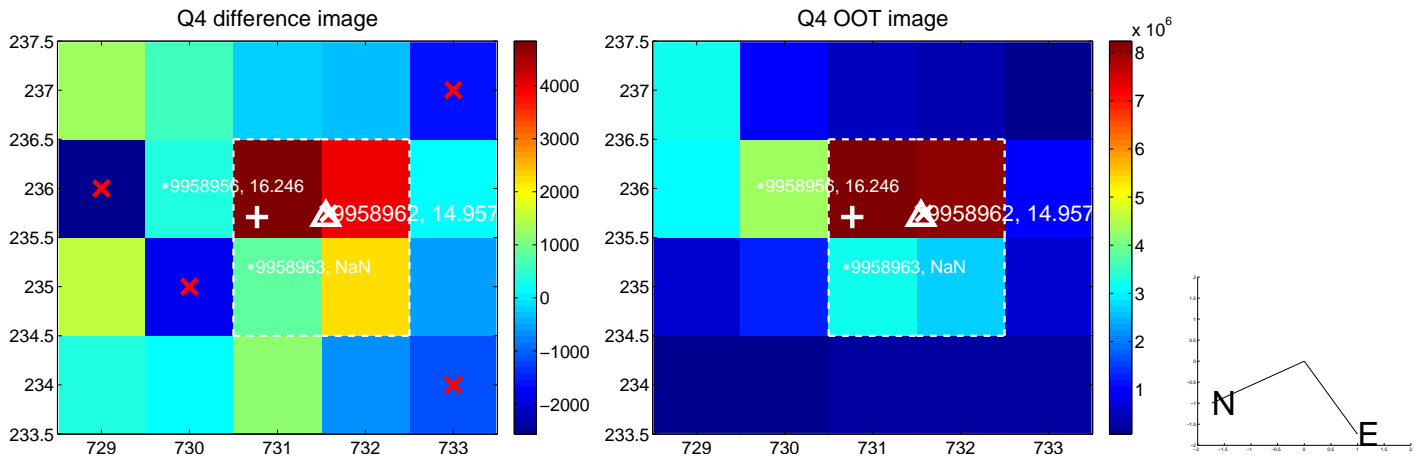
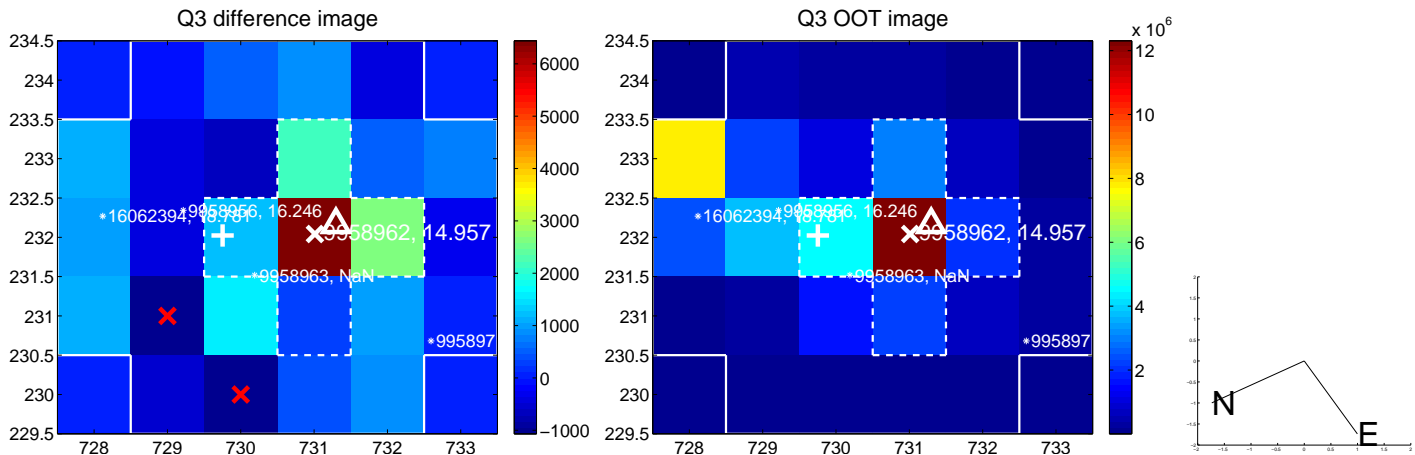
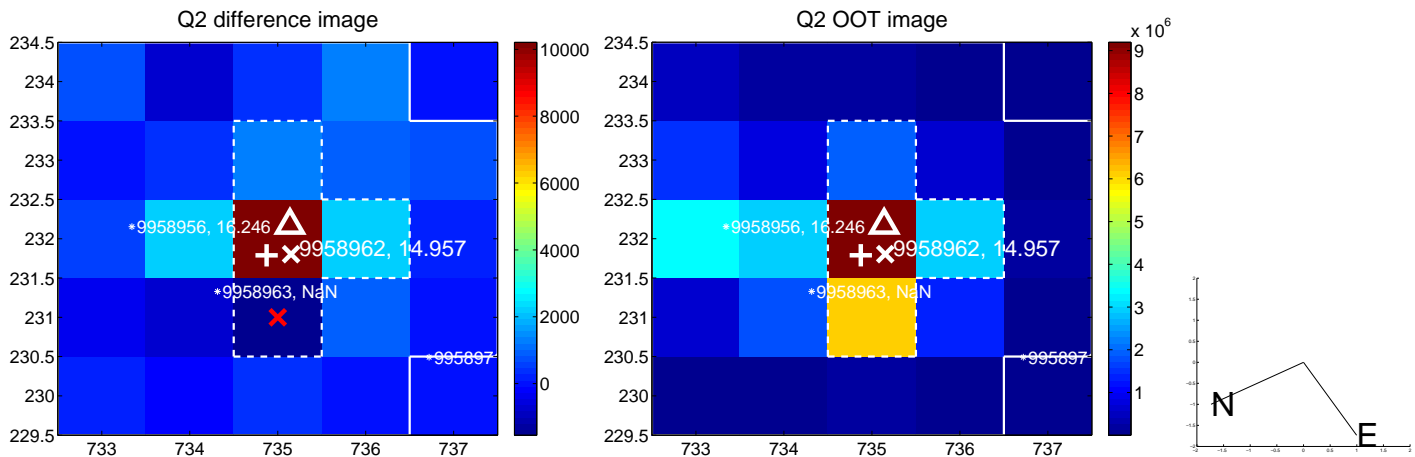
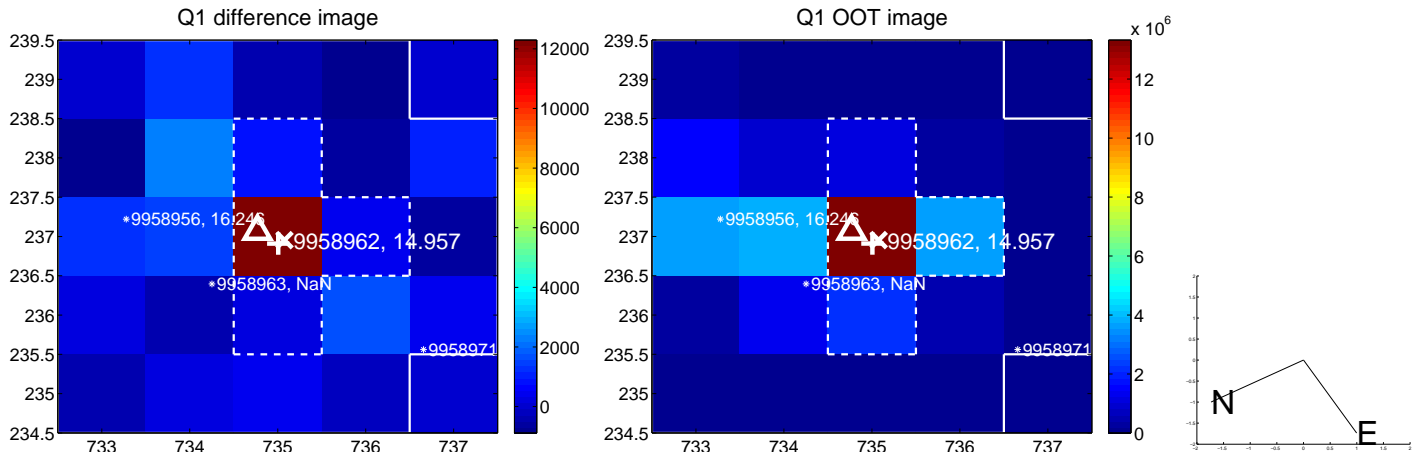


offset from photometric centroids

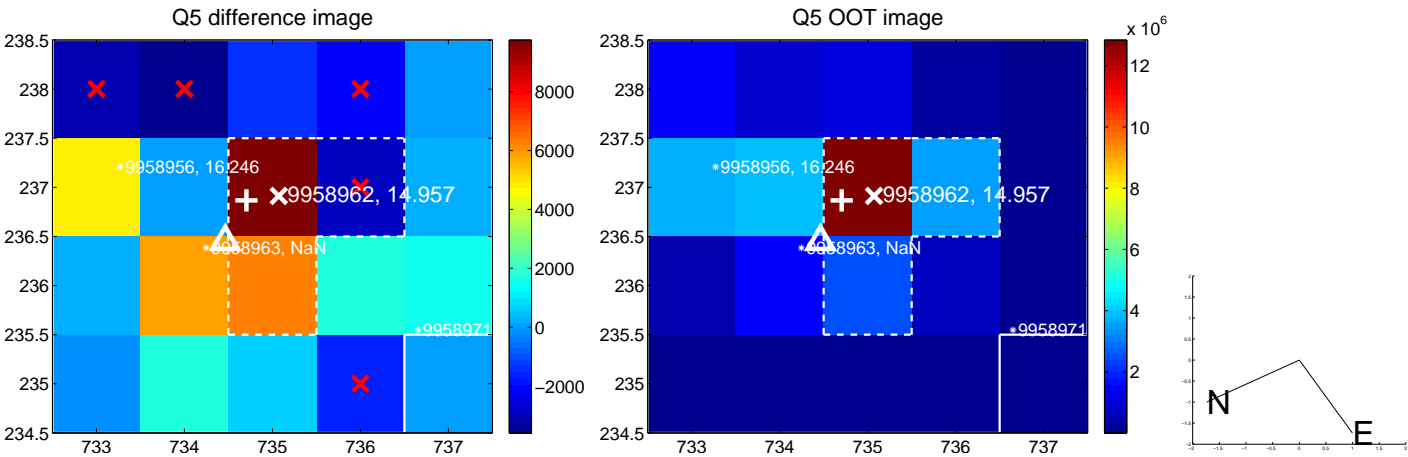


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

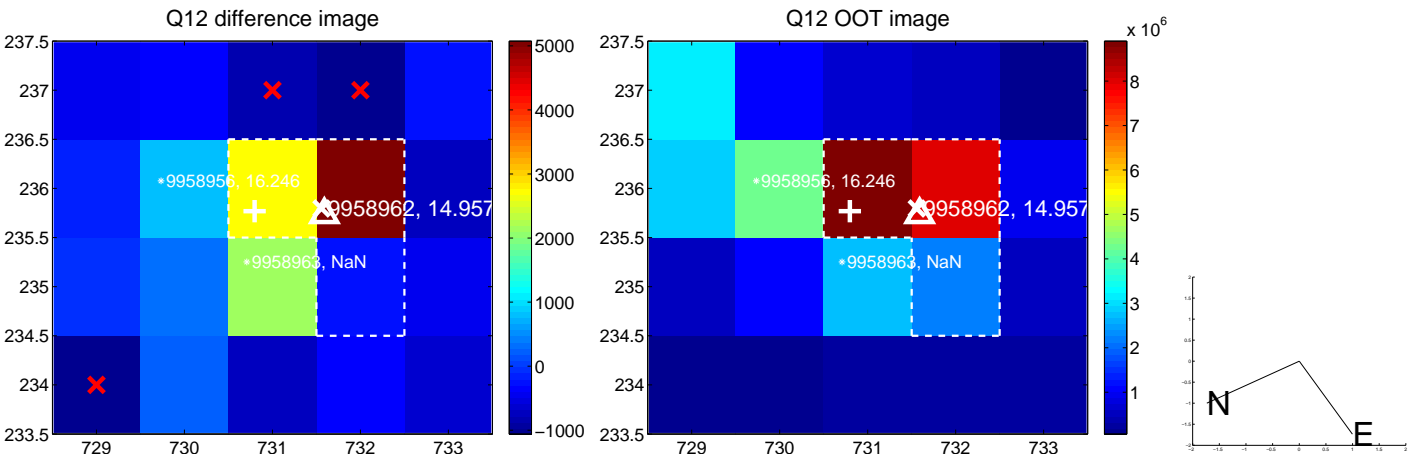
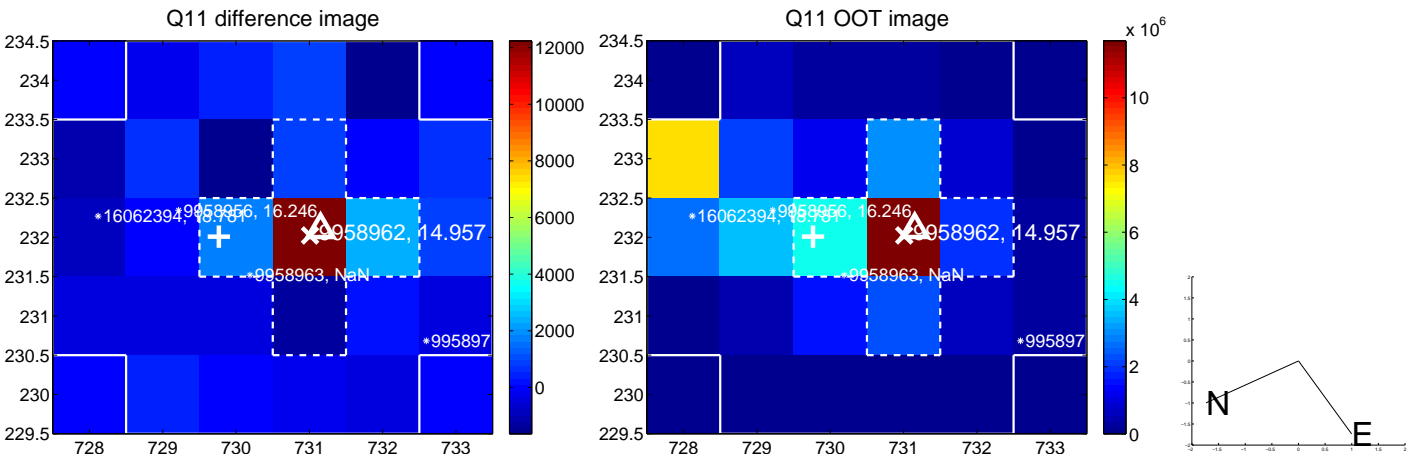
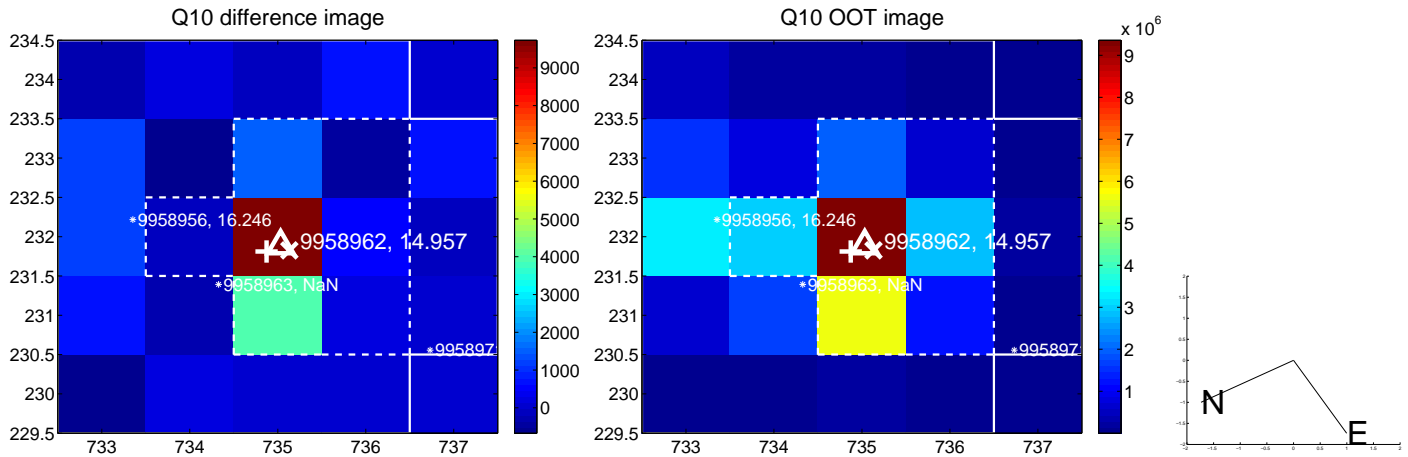
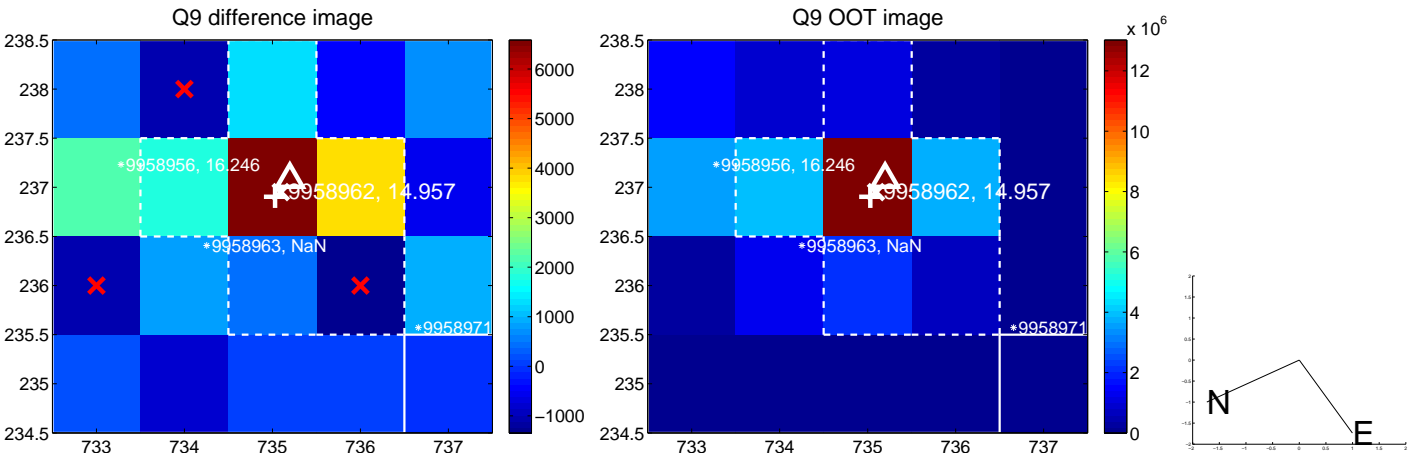
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



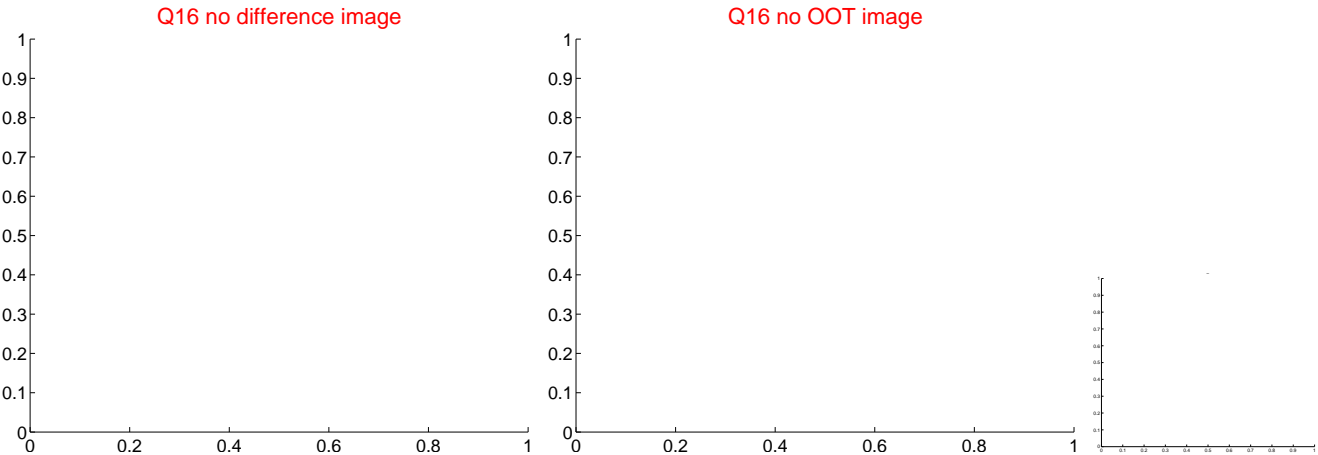
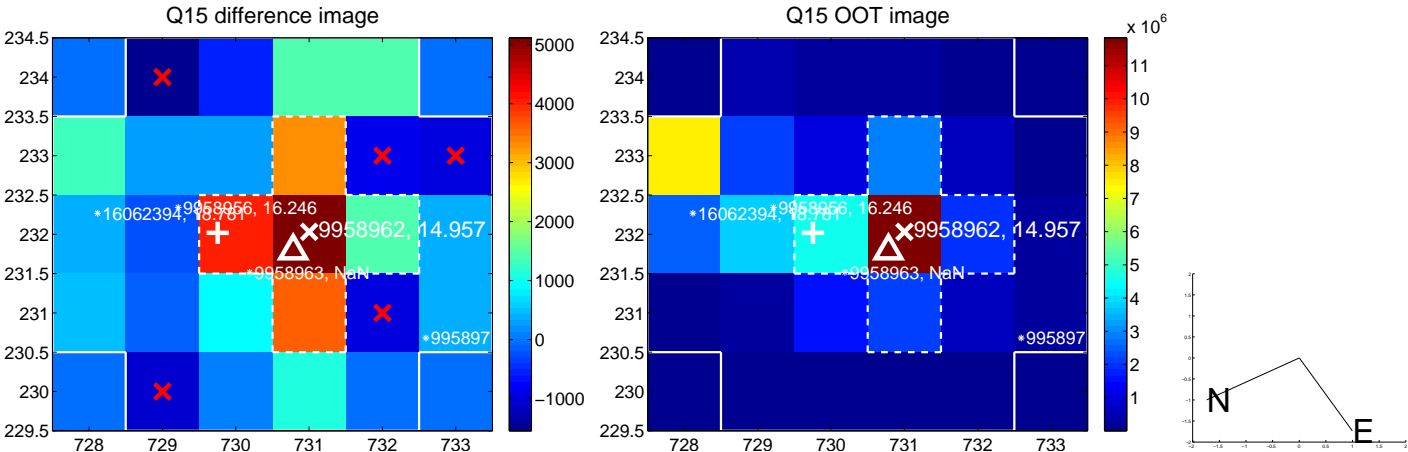
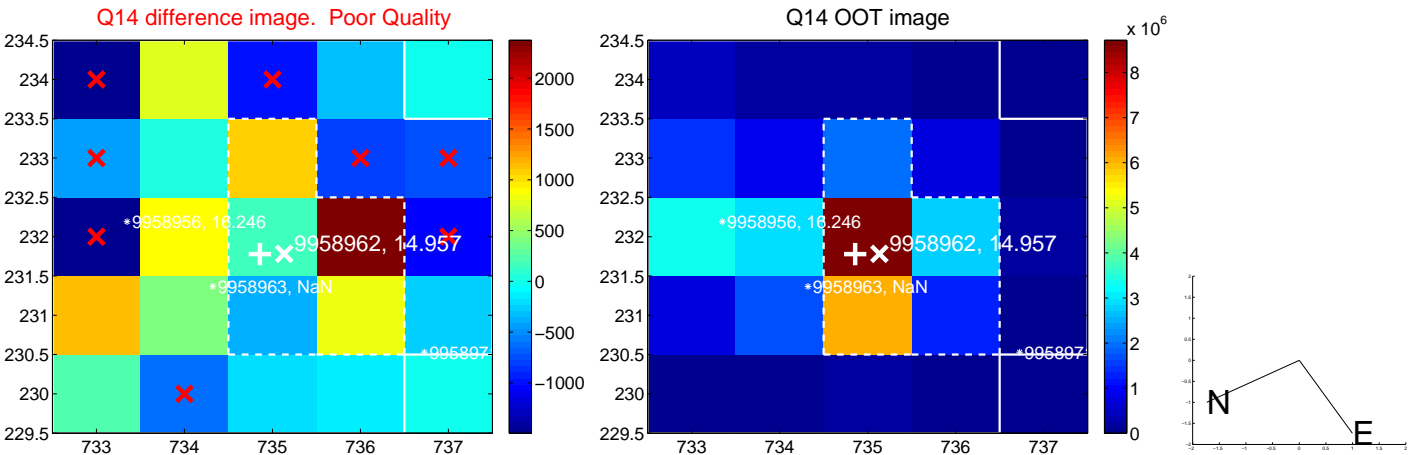
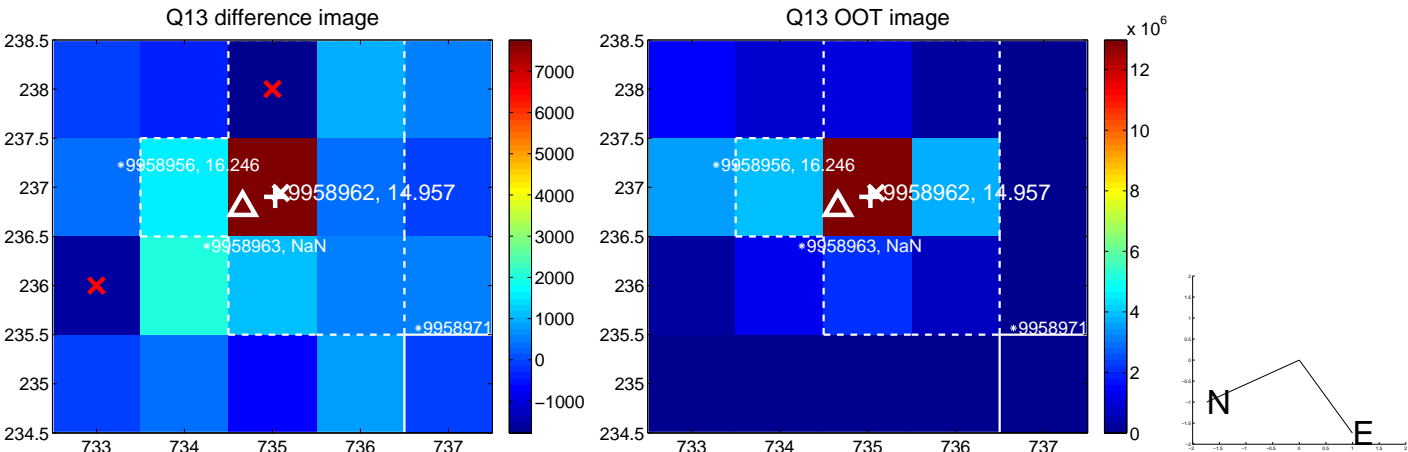
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



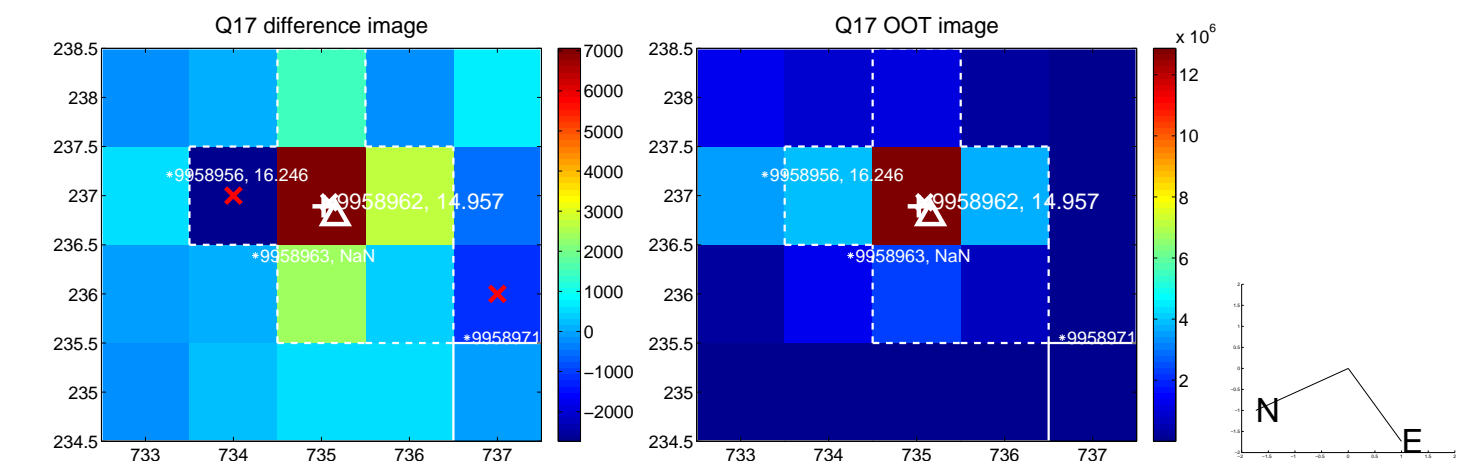
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



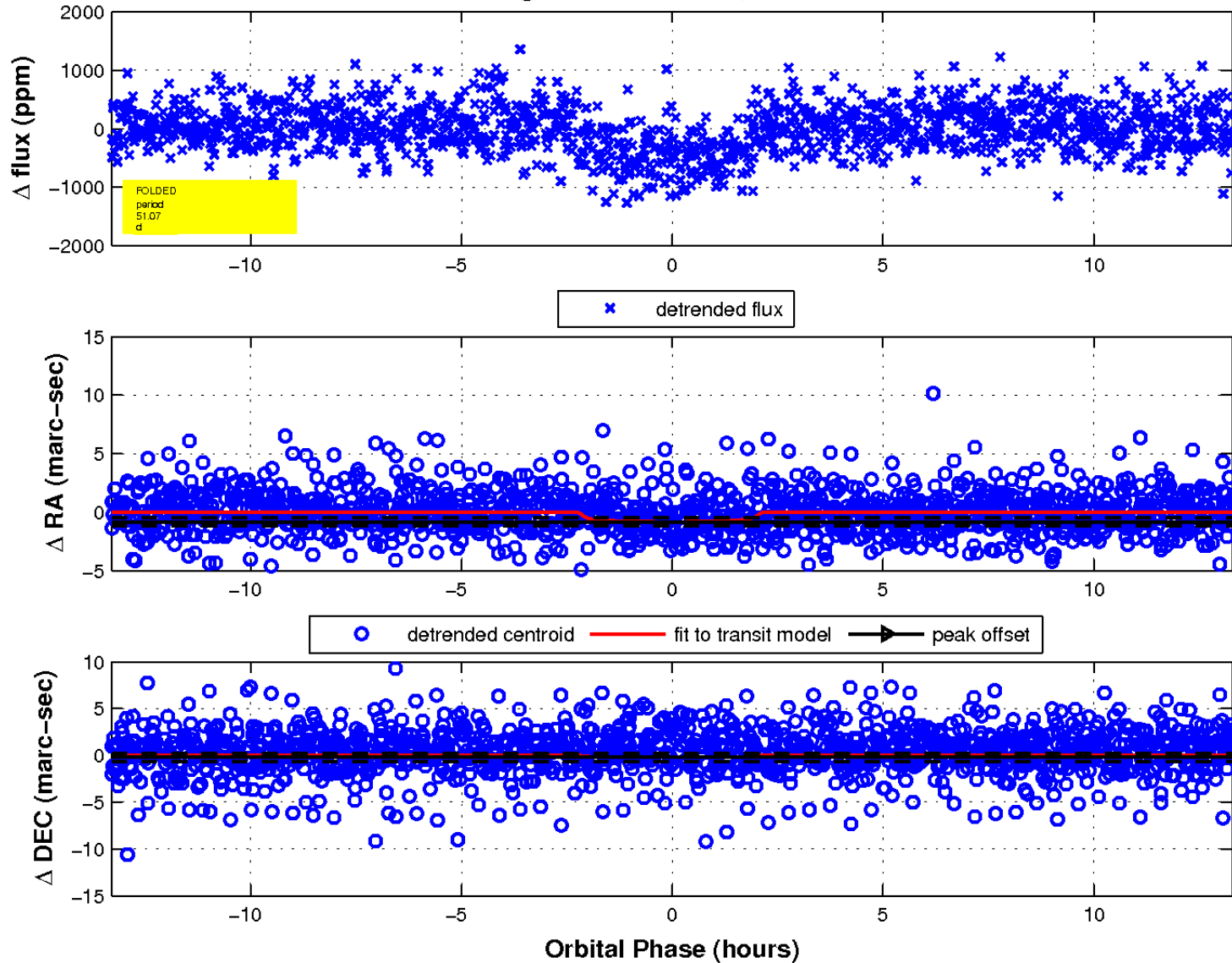
white \times : KIC target position; $+$: OOT centroid; Δ : difference centroid. red \times : large negative pixel value.



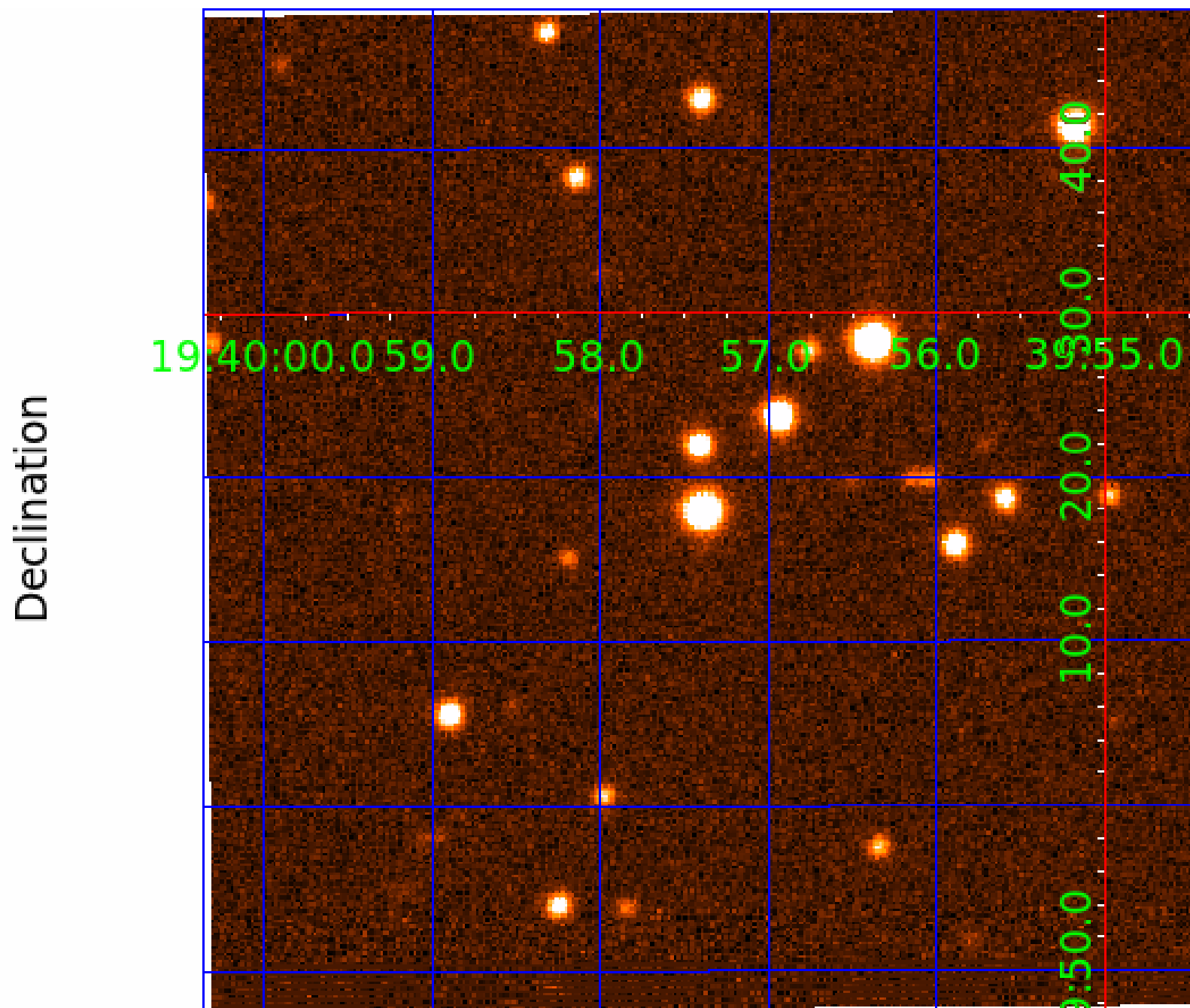
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



fluxWeightedCentroids, Planet 3 of 4



UKIRT Image



KIC 009958962

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})
009958962-01	OBS	0593.01	9.997619	131.796795	628.3	3.485	35.7	38.3	0.98	6004	2.85	129.44
009958962-02	OBS	0593.02	90.412010	208.503416	1172.3	6.841	23.0	24.7	0.98	6004	3.63	6.87
009958962-03	OBS	0593.03	51.067350	147.611588	623.3	4.438	15.2	17.8	0.98	6004	2.65	14.71
009958962-04	OBS	0593.04	240.190262	168.314523	810.0	10.991	11.1	11.5	0.98	6004	3.25	1.87

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009958962-01	OBS	PC	1.00	0	0	0	0	CENT_KIC_POS
009958962-02	OBS	PC	1.00	0	0	0	0	CENT_KIC_POS
009958962-03	OBS	PC	1.00	0	0	0	0	CENT_KIC_POS
009958962-04	OBS	PC	0.74	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 009958962-04

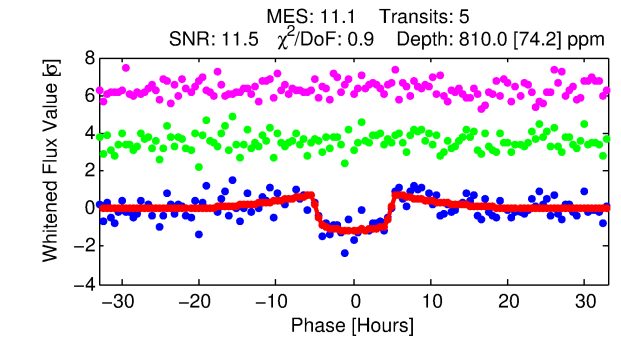
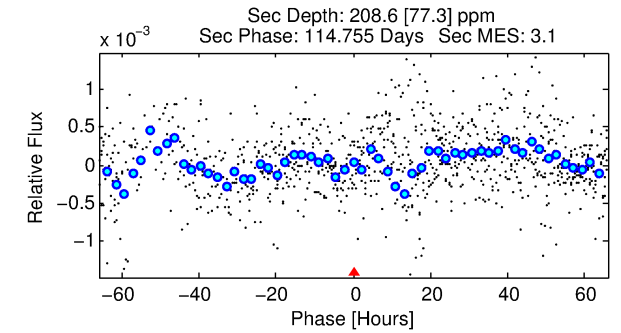
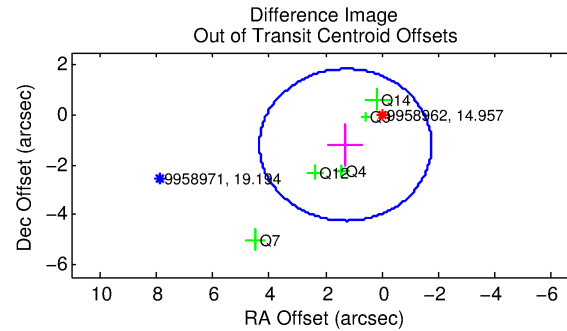
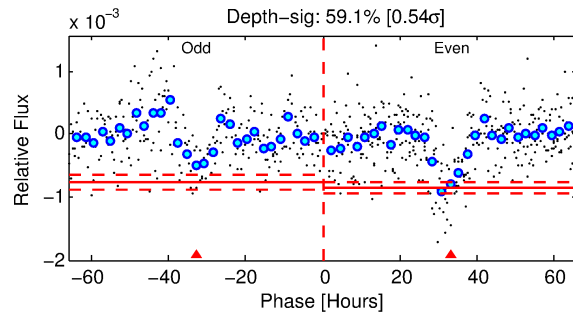
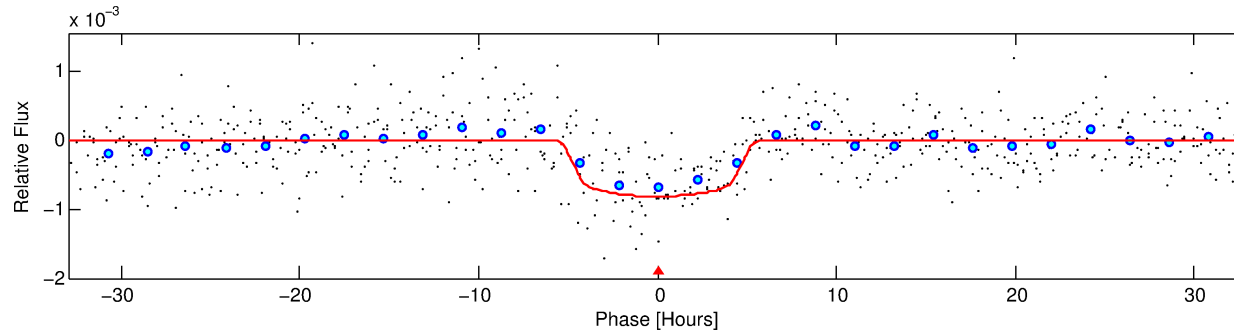
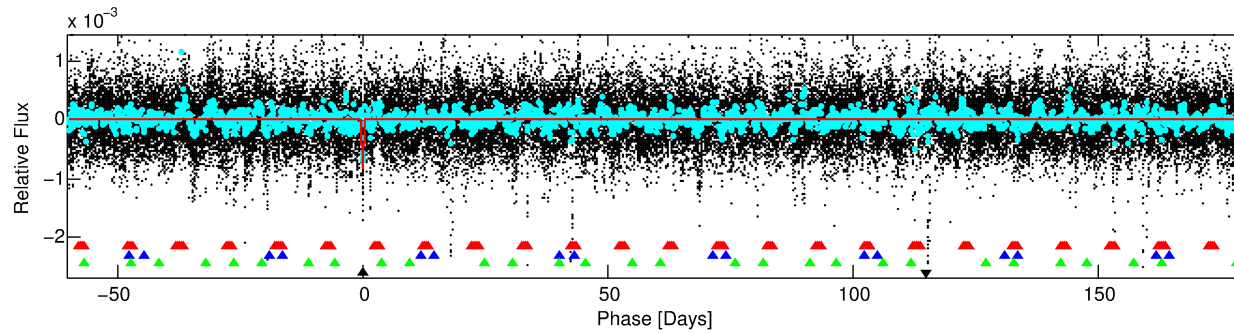
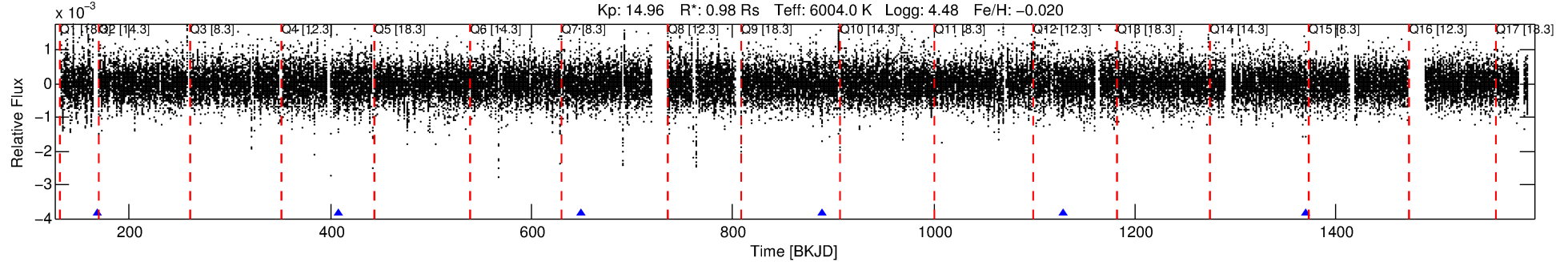
No Significant Match Found

DV One-Page Summary

KIC: 9958962 Candidate: 4 of 4 Period: 240.190 d

KOI: K00593.04 Corr: 0.948

Kp: 14.96 R*: 0.98 Rs Teff: 6004.0 K Logg: 4.48 Fe/H: -0.020



DV Fit Results:

Period = 240.19026 [0.00483] d
Epoch = 168.3145 [0.0162] BKJD
Rp/R* = 0.0305 [0.0024]
a/R* = 87.28 [24.49]
b = 0.89 [0.07]
Seff = 1.87 [0.75]
Teq = 298 [30] K
Rp = 3.25 [1.04] Re
a = 0.7715 [0.2011] AU
Ag = 6460.81 [3576.08] [1.81σ]
Teffp = 4132 [438] K [8.74σ]

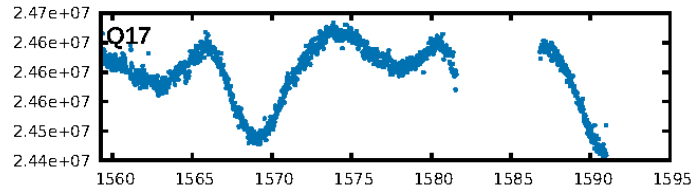
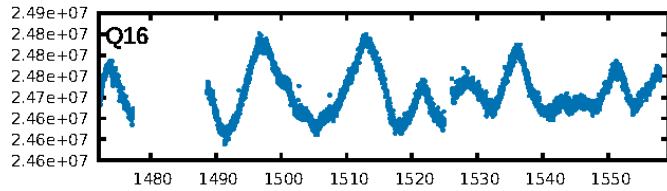
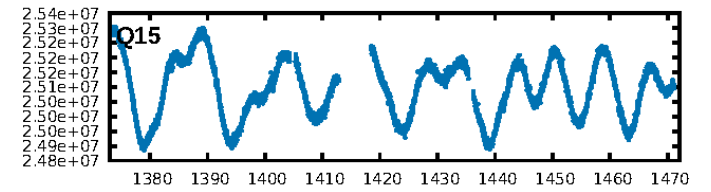
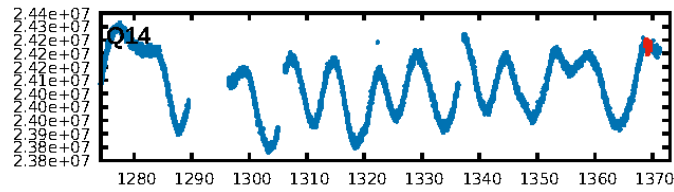
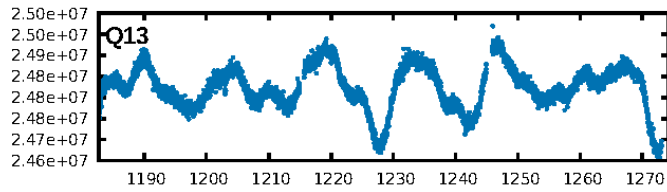
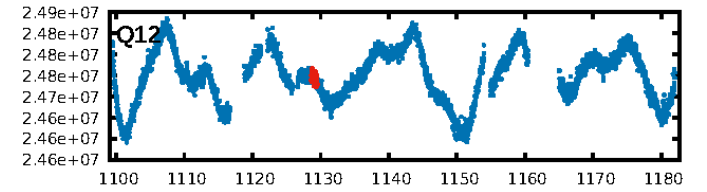
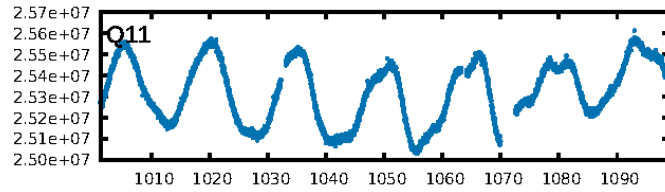
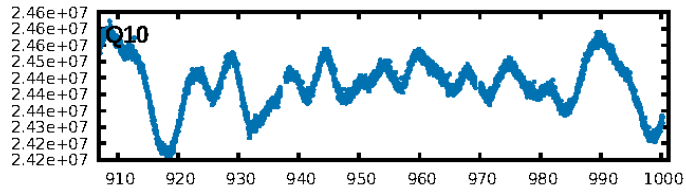
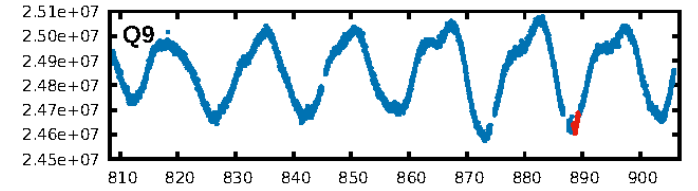
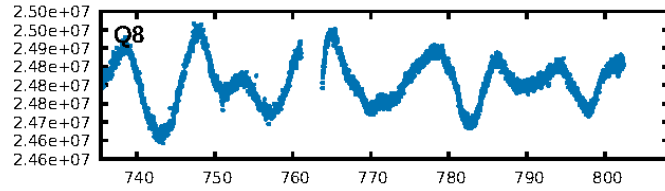
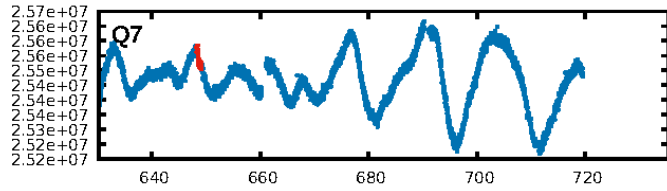
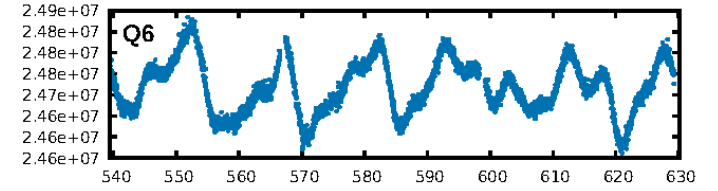
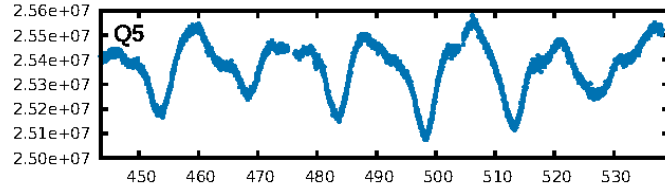
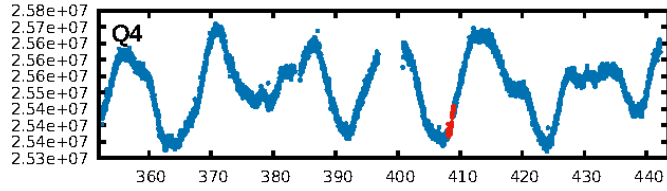
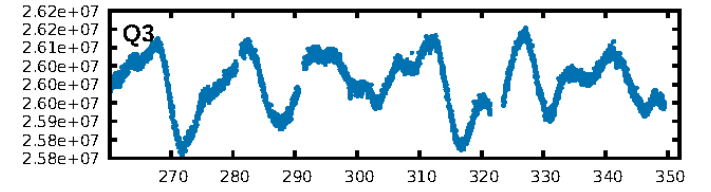
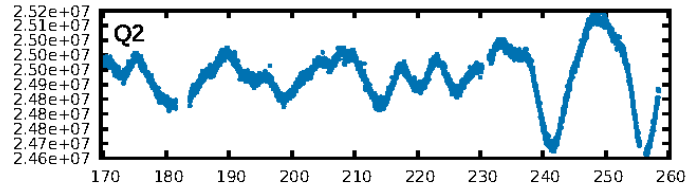
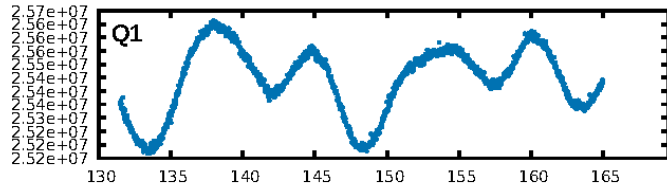
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [277.67σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 73.6%
ModelChiSquareGof-sig: 99.9%
Bootstrap-pfa: 6.00e-17
RollingBand-fgt: 1.00 [5/5]
GhostDiagnostic-chr: -28.91
Centroid-sig: 11.2%
Centroid-so: 0.402 arcsec [0.43σ]
OotOffset-rm: 1.770 arcsec [1.75σ]
KicOffset-rm: 0.719 arcsec [2.32σ]
OotOffset-st: 1/1/2/1 [5]
KicOffset-st: 1/1/2/1 [5]
DiffImageQuality-fgm: 1.00 [5/5]
DiffImageOverlap-fno: 1.00 [5/5]

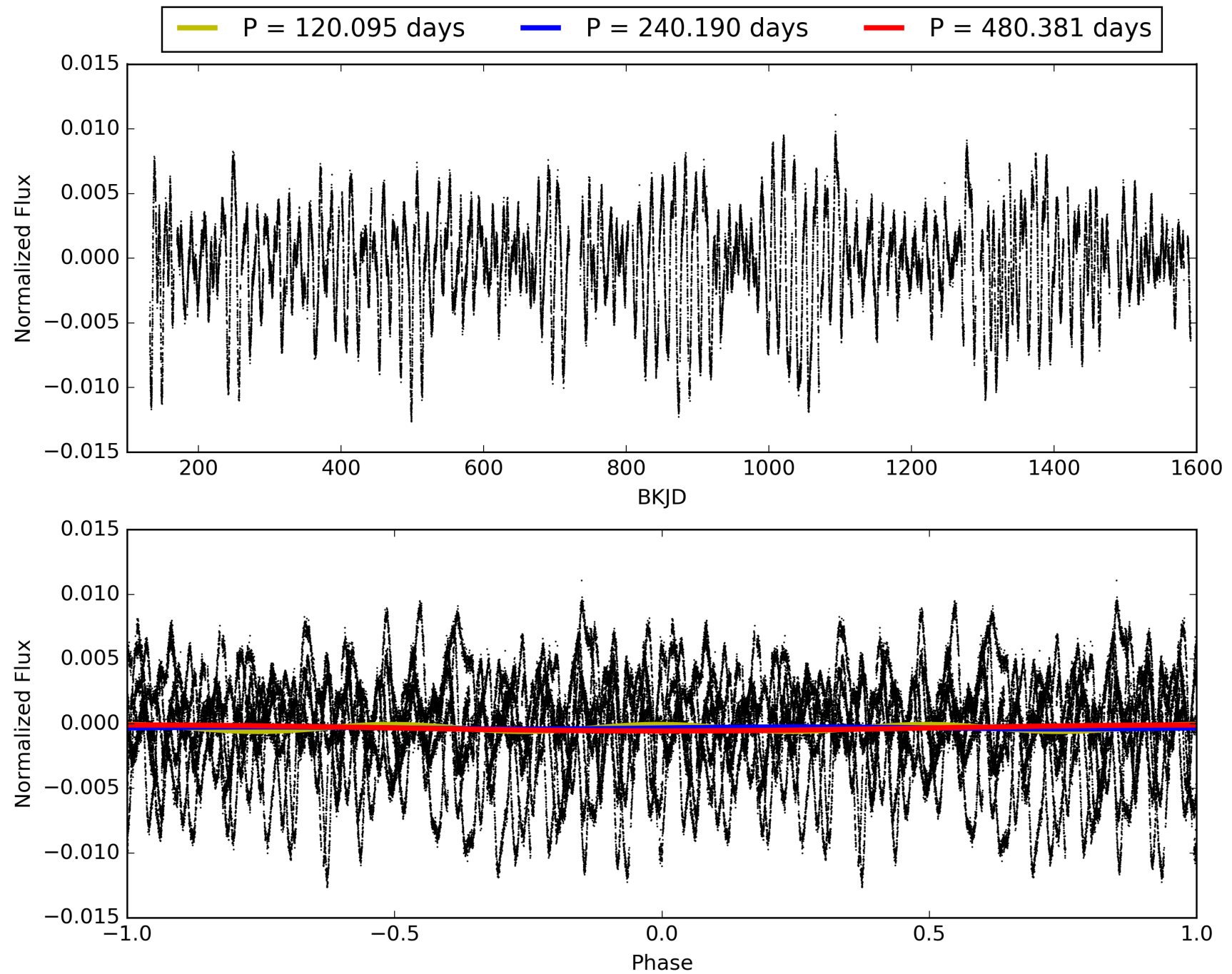
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 05:17:51 Z

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

TCE 009958962-04, PDC Light Curves

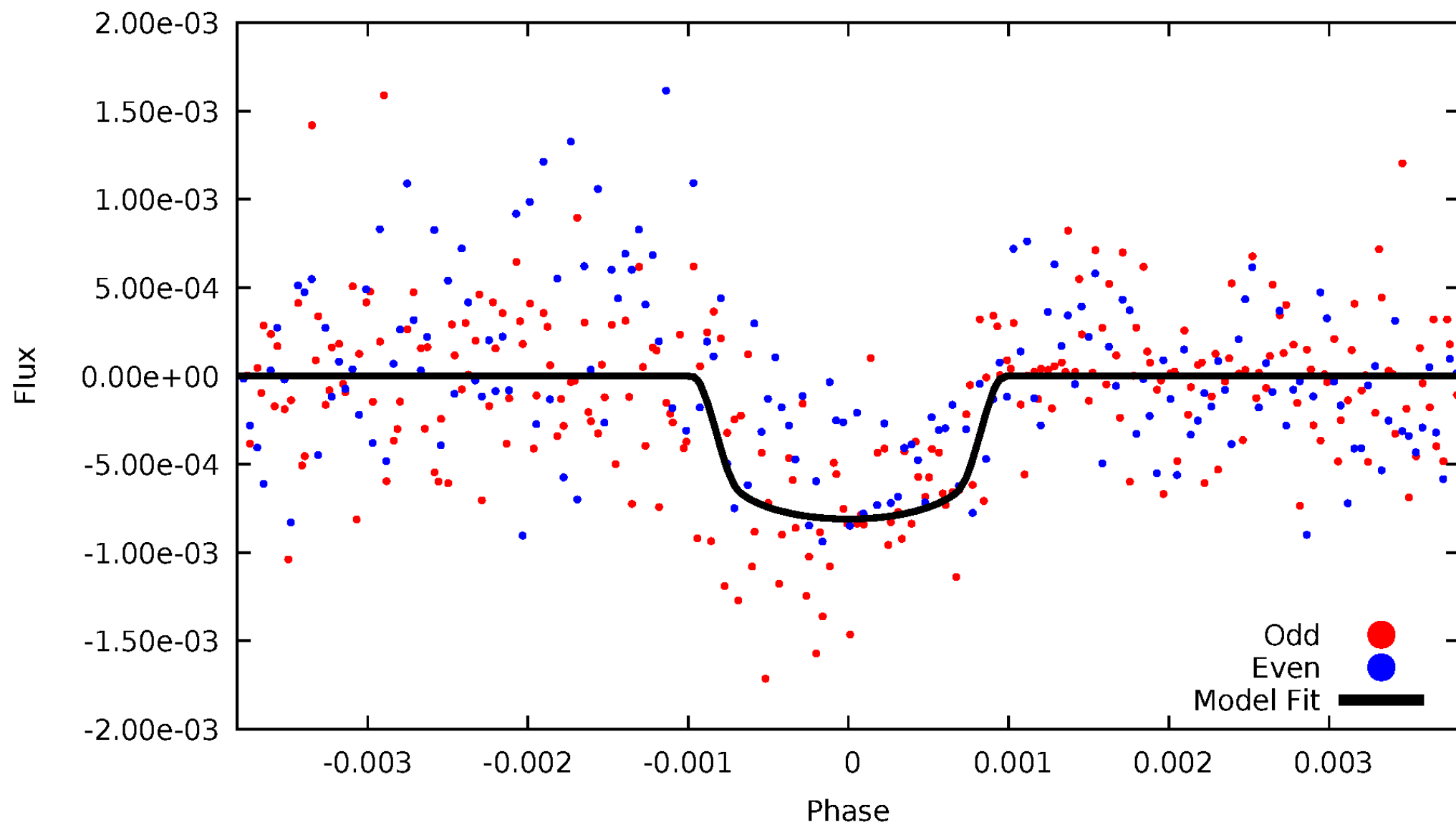


TCE 009958962-04



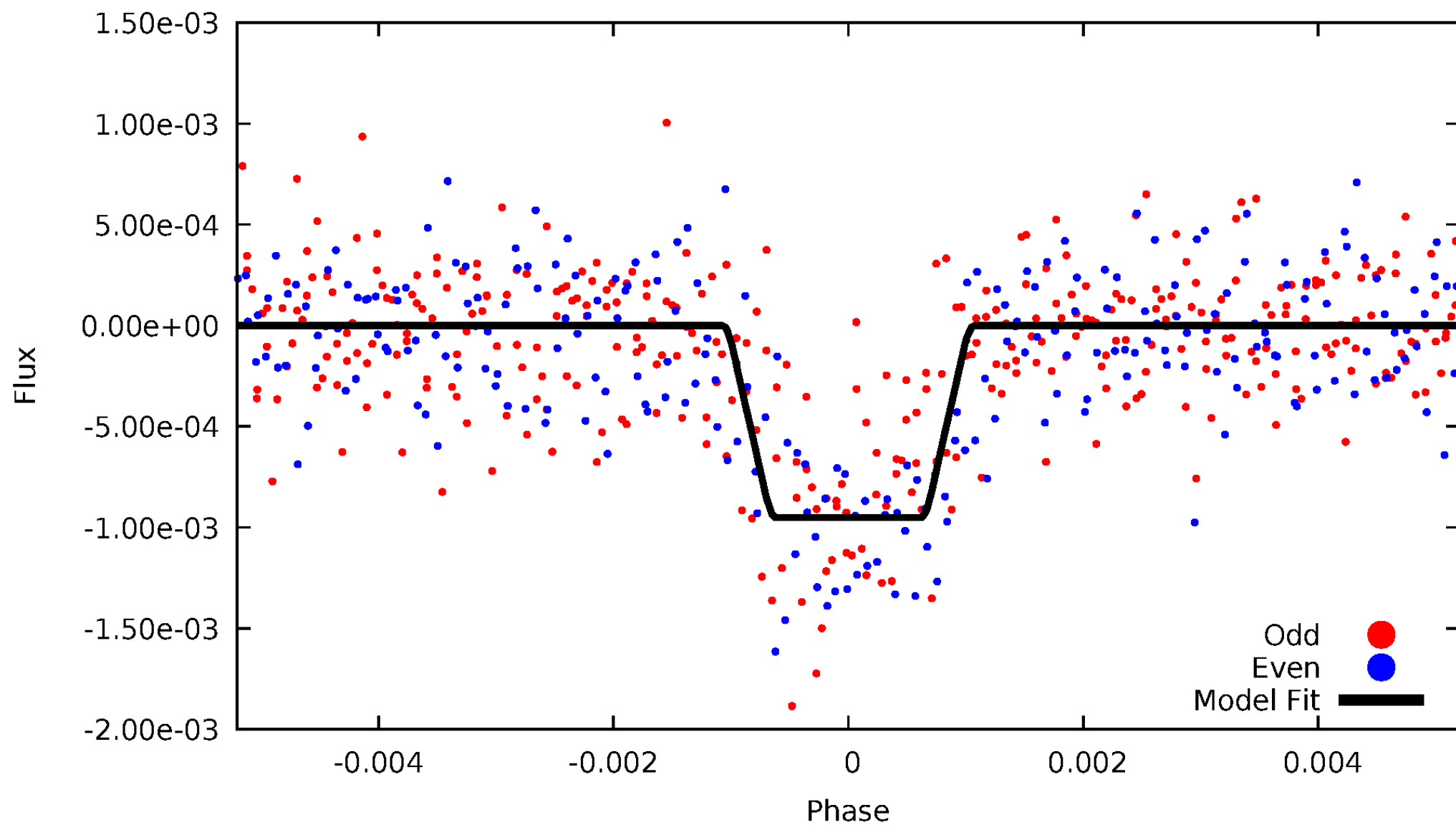
DV Odd/Even

TCE 009958962-04



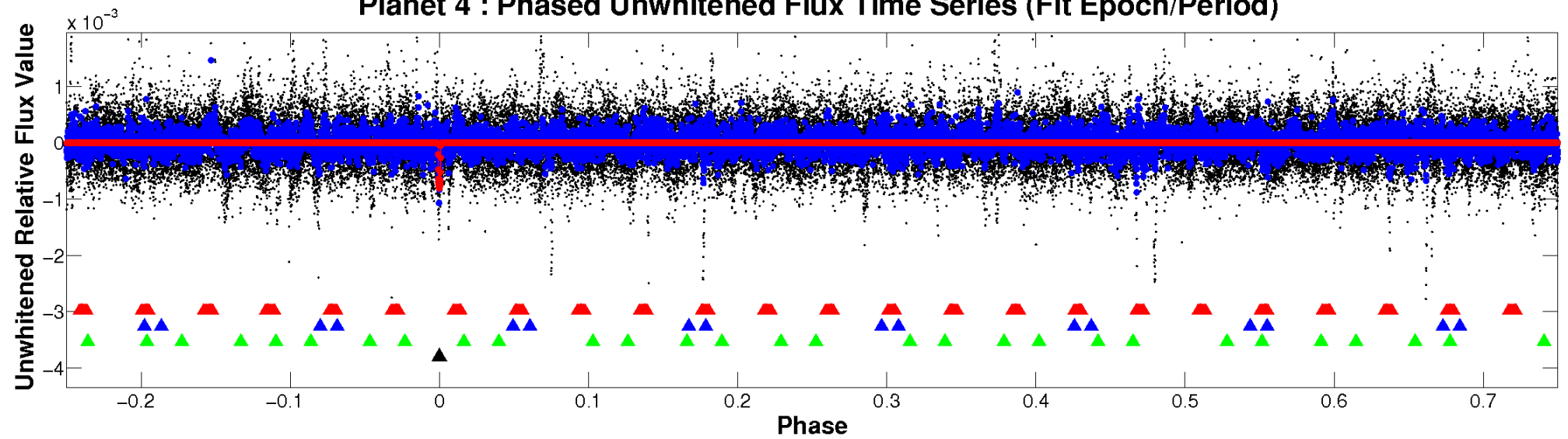
ALT Odd/Even

TCE 009958962-04

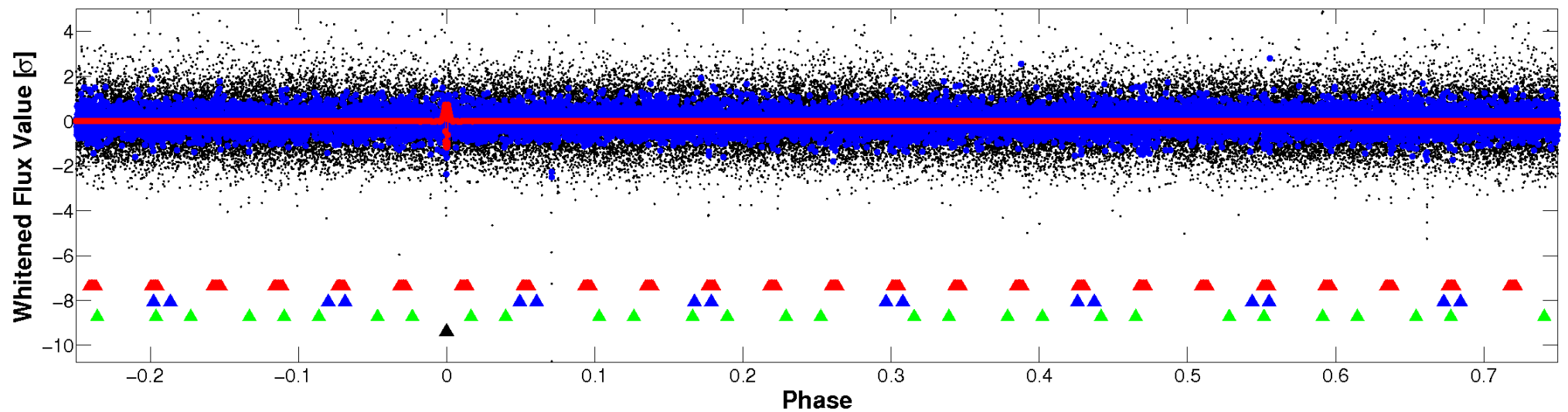


Non-Whitened Vs. Whitened Light Curve

Planet 4 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

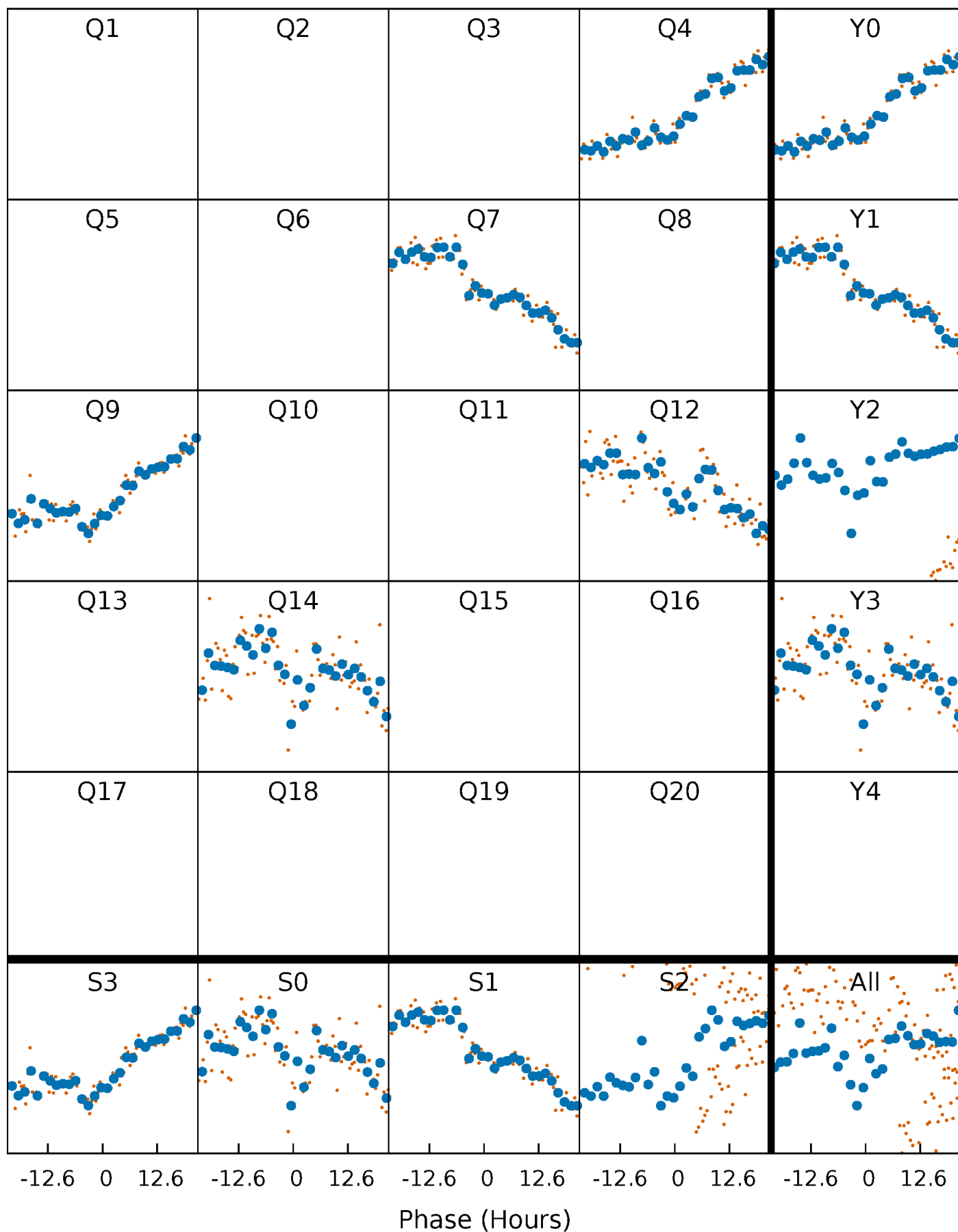


Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



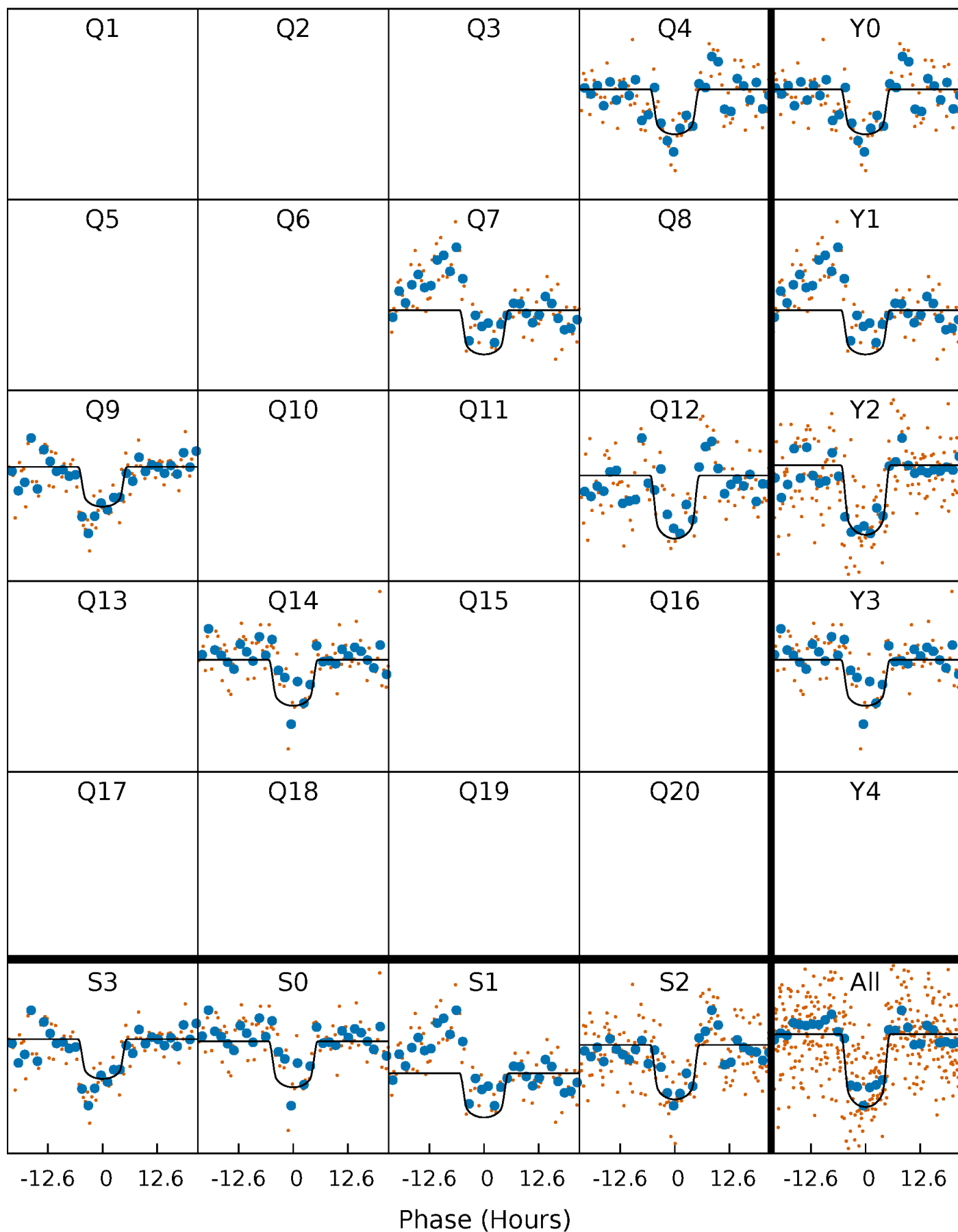
PDC Quarter-Phased Transit Curves

TCE 009958962-04 P=240.190262 Days $T_0=168.314523$ (BKJD)



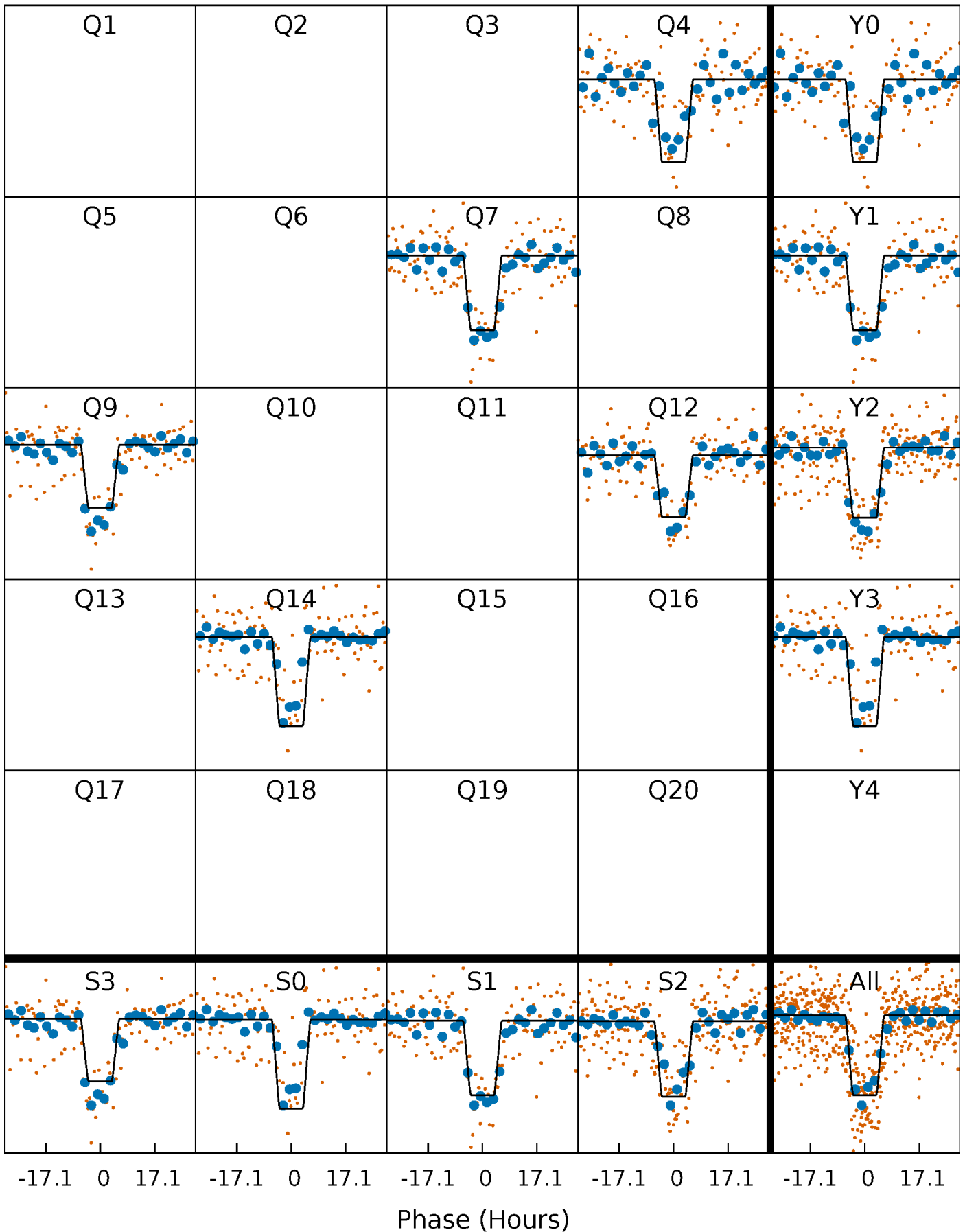
DV Quarter-Phased Transit Curves

TCE 009958962-04 $P=240.190262$ Days $T_0=168.314523$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

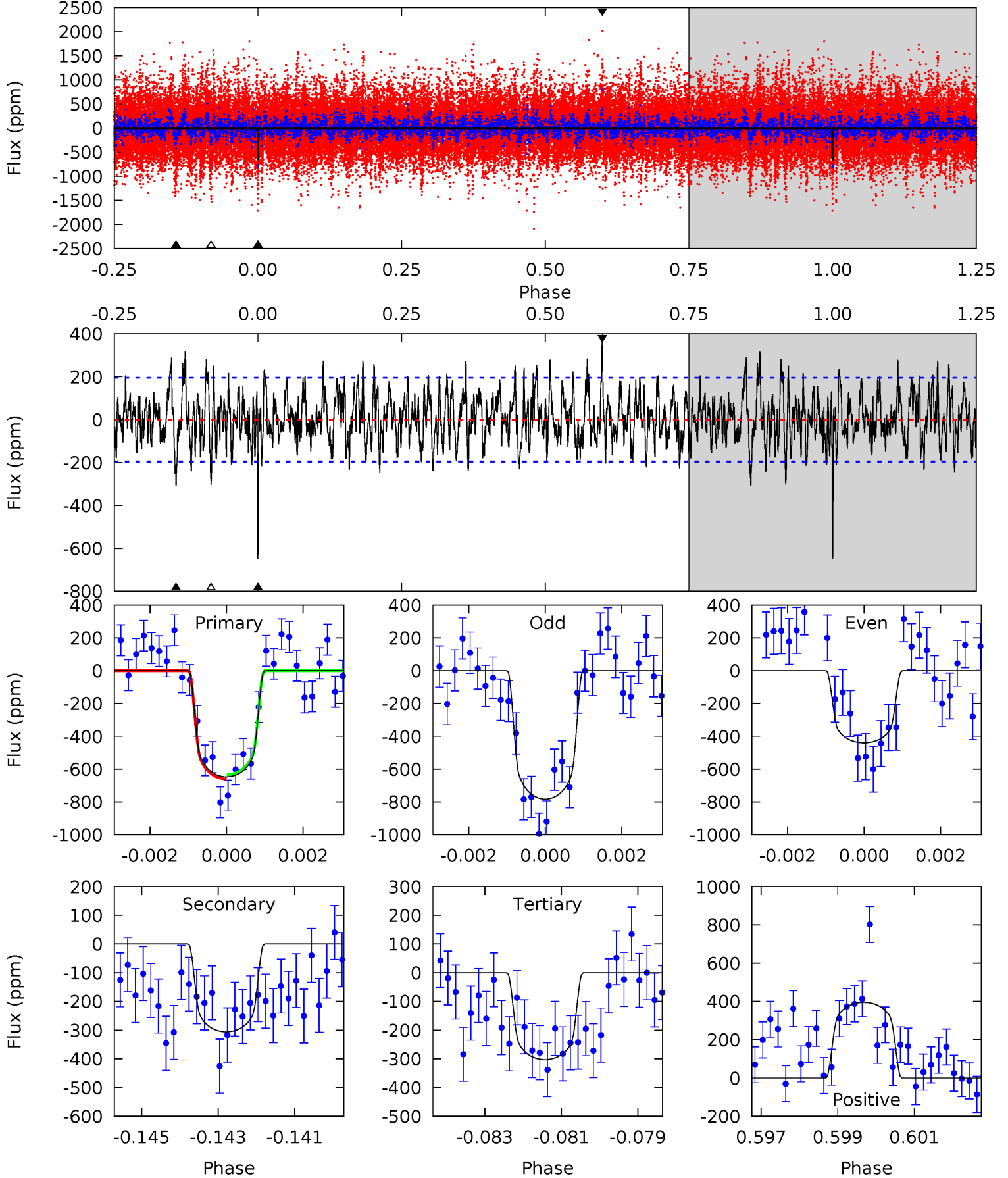
TCE 009958962-04 P=240.203309 Days $T_0=168.266777$ (BKJD)



DV Model-Shift Uniqueness Test

009958962-04, P = 240.190262 Days, E = 168.314523 Days

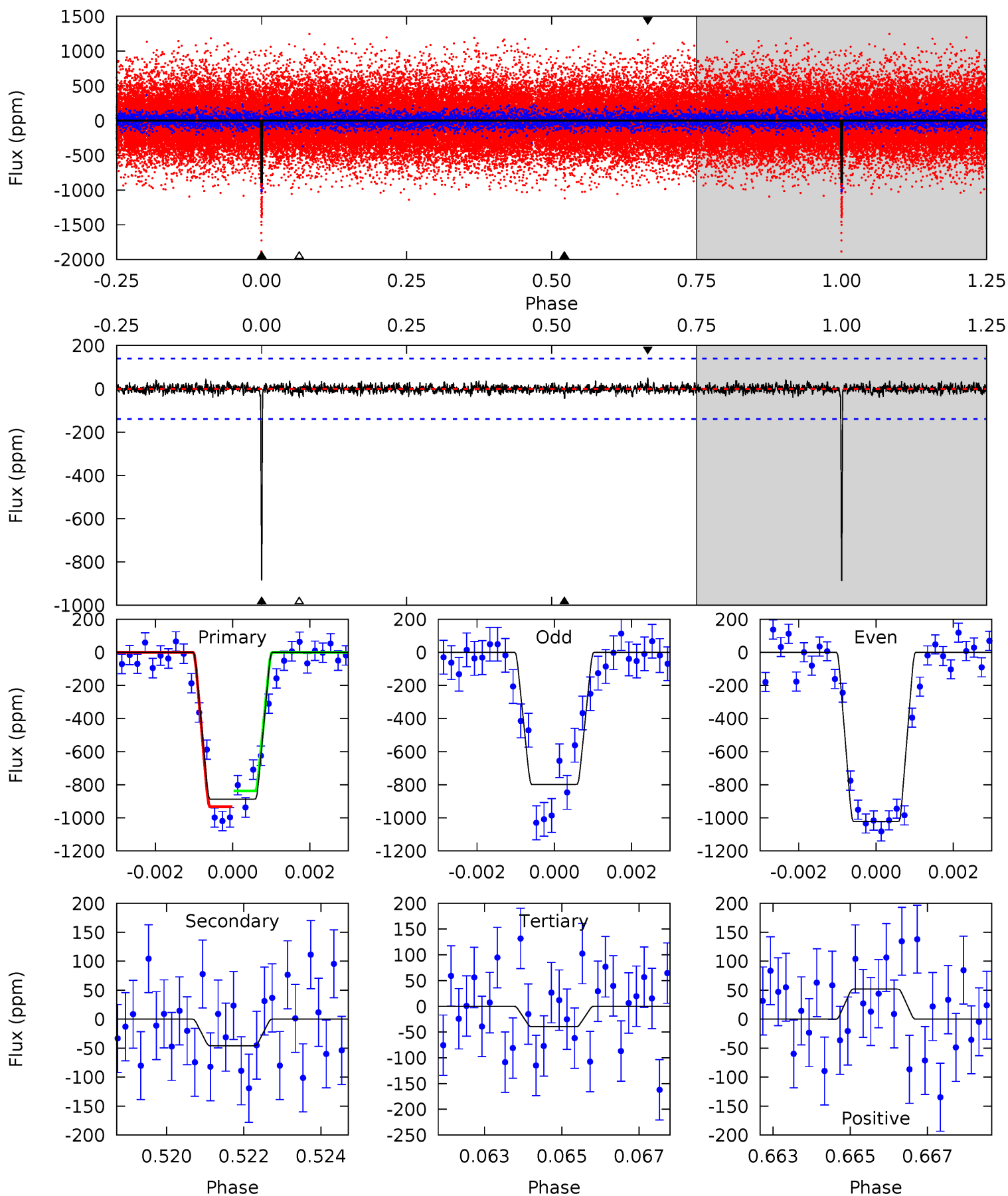
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
17.7	8.35	8.26	10.8	5.33	3.09	2.75	9.41	6.88	0.10	-2.44	4.53	1.14	0.38	0.34



Alt Model-Shift Uniqueness Test

009958962-04, $P = 240.203309$ Days, $E = 168.266777$ Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
33.8	1.75	1.51	1.98	5.32	3.08	0.44	32.3	31.9	0.23	-0.23	4.17	0.90	0.06	1.81



Stellar Parameters For KIC 009958962

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	$M(M_{\odot})$	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	6004^{+181}_{-199}	$4.484^{+0.052}_{-0.208}$	$-0.020^{+0.250}_{-0.300}$	$0.977^{+0.302}_{-0.101}$	$1.061^{+0.134}_{-0.134}$	$1.603^{+0.431}_{-0.813}$
	+3%/-3%	+1%/-5%	+1250%/-1500%	+31%/-10%	+13%/-13%	+27%/-51%
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 009958962-04 / KOI 0593.04

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-306 ± 37	$3.36^{+0.59}_{-0.40}$	424^{+31}_{-20}	4687^{+233}_{-208}	8616^{+2689}_{-2274}
Alt.	-46 ± 26	$3.41^{+0.56}_{-0.40}$	425^{+30}_{-20}	3357^{+271}_{-393}	1212^{+872}_{-694}

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 $A_{obs} \gg 1.0$

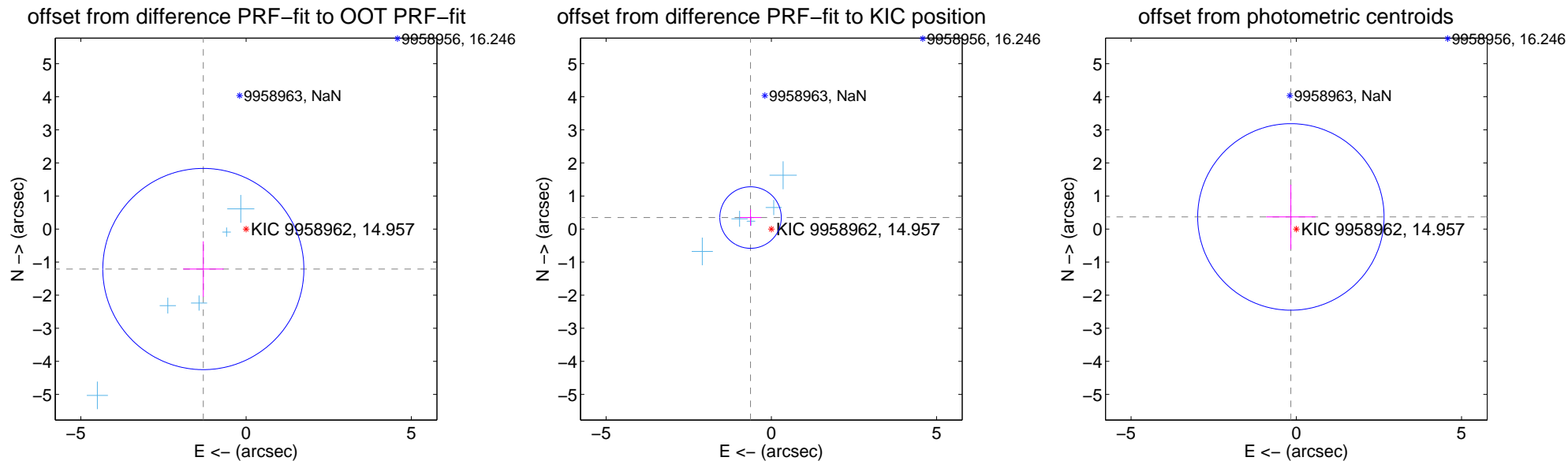
DV Centroid Data

Supplemental centroid analysis for 009958962-04. Kepler magnitude: 14.96. Transit SNR 11.50

There are 5 quarters with good PRF difference image offsets

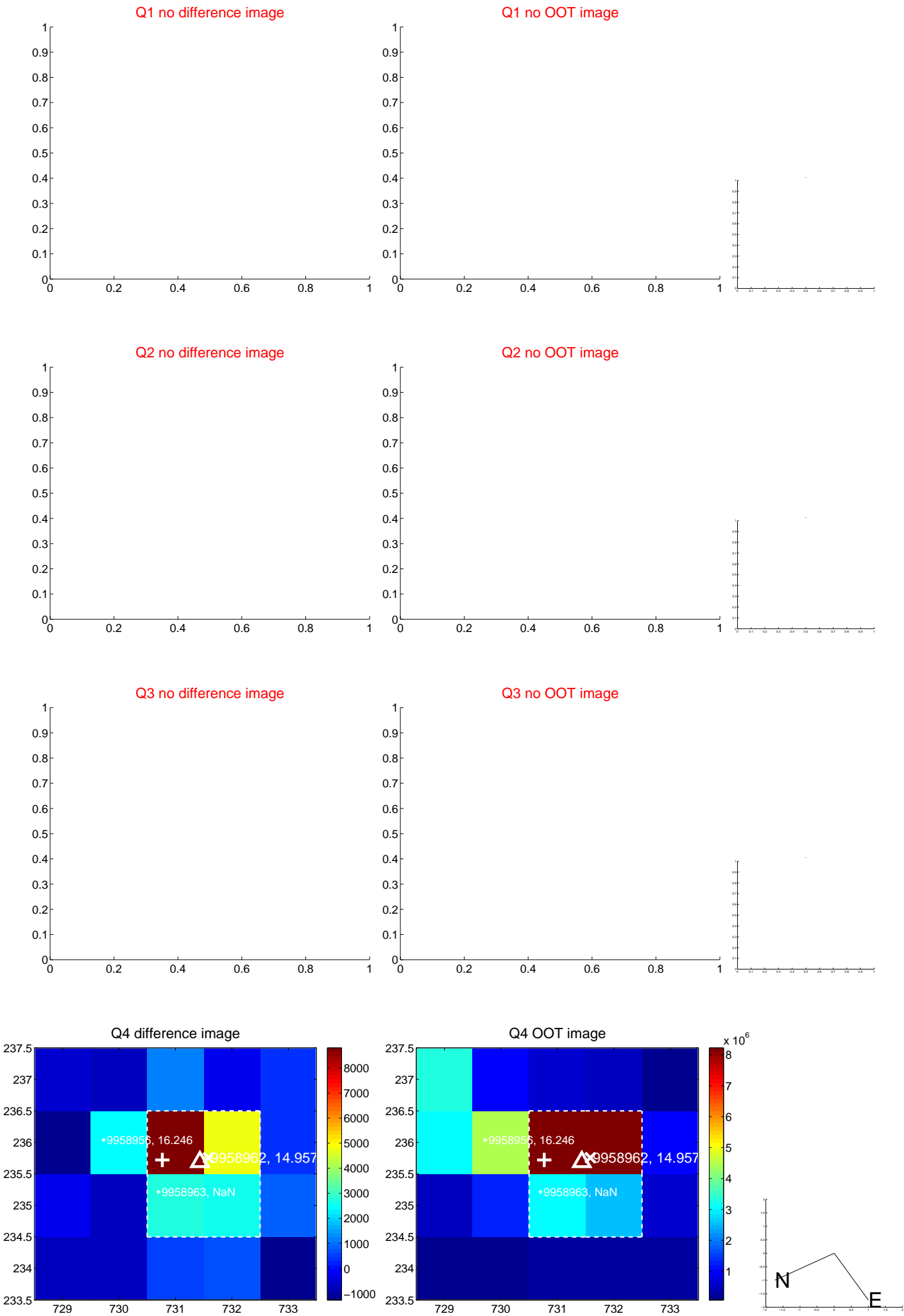
The direct PRF centroid is offset from the target star catalog position by about 1.14 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	1.770 ± 1.014	1.75	1.293 ± 0.614	-1.208 ± 0.839
PRF-fit source offset from KIC position	0.719 ± 0.310	2.32	0.629 ± 0.326	0.348 ± 0.252
photometric centroid source offset	0.40 ± 0.94	0.43	0.16 ± 0.74	0.37 ± 0.97

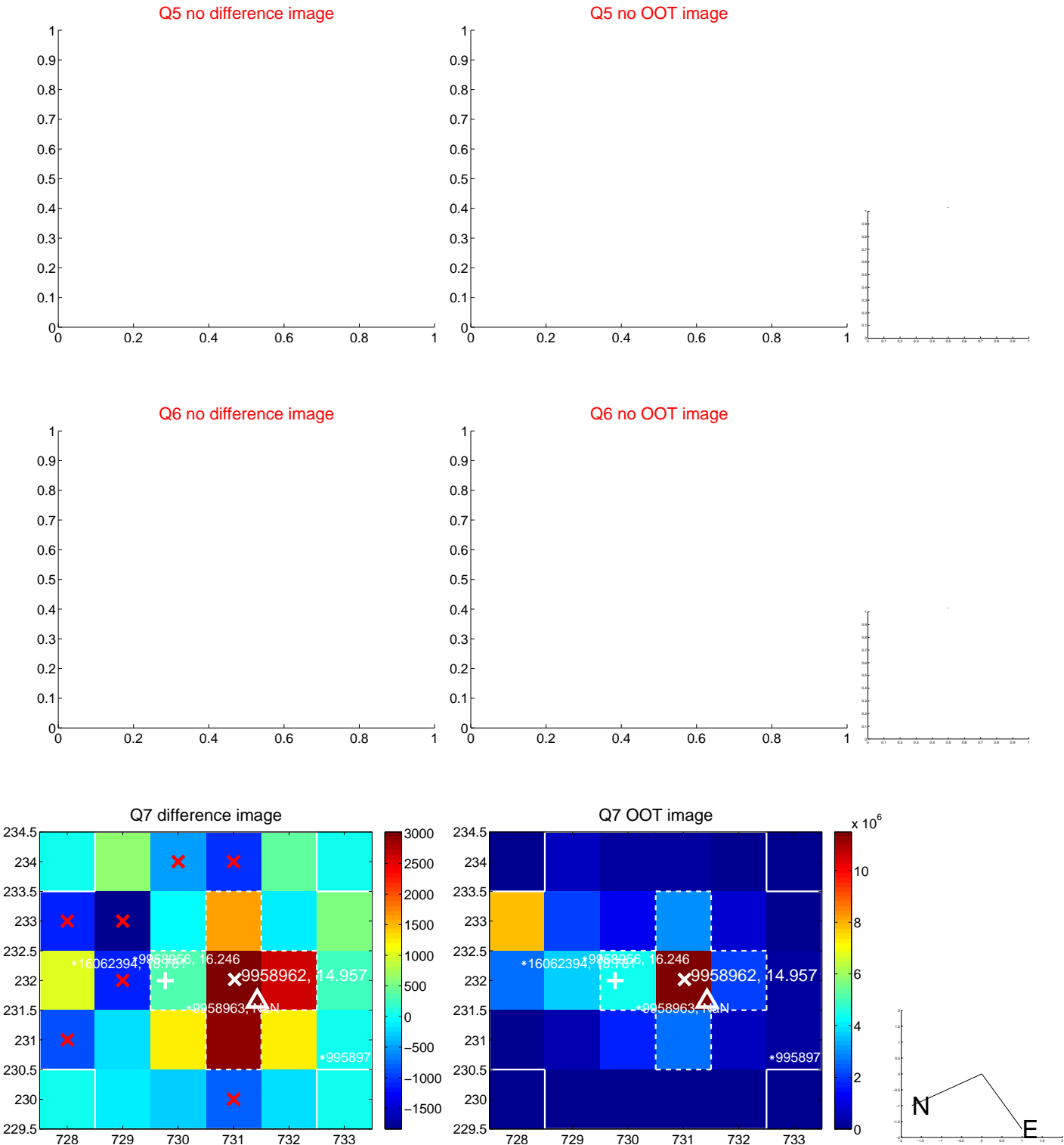


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

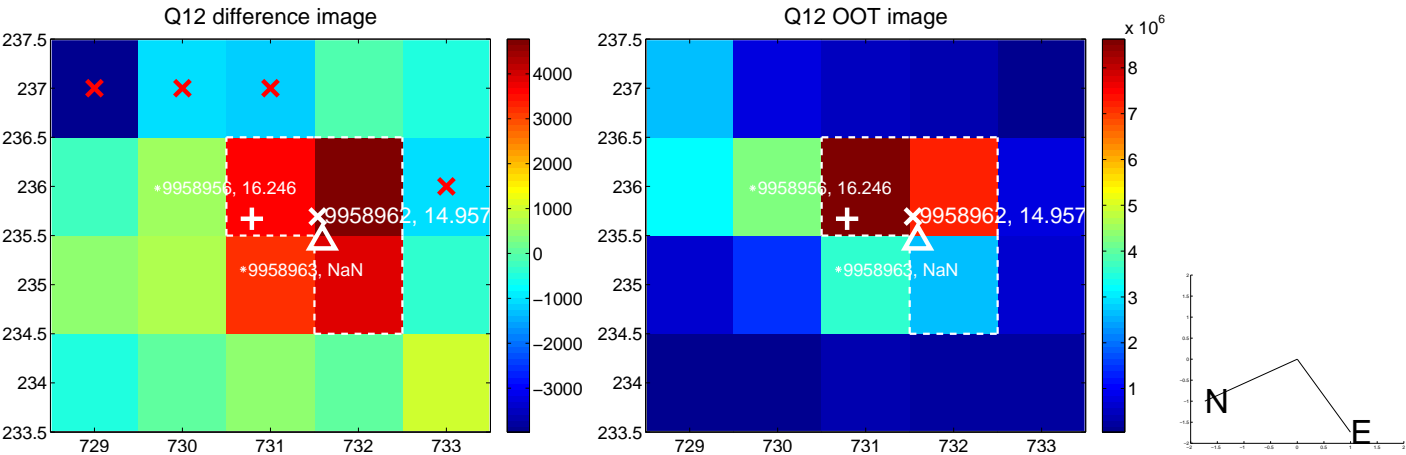
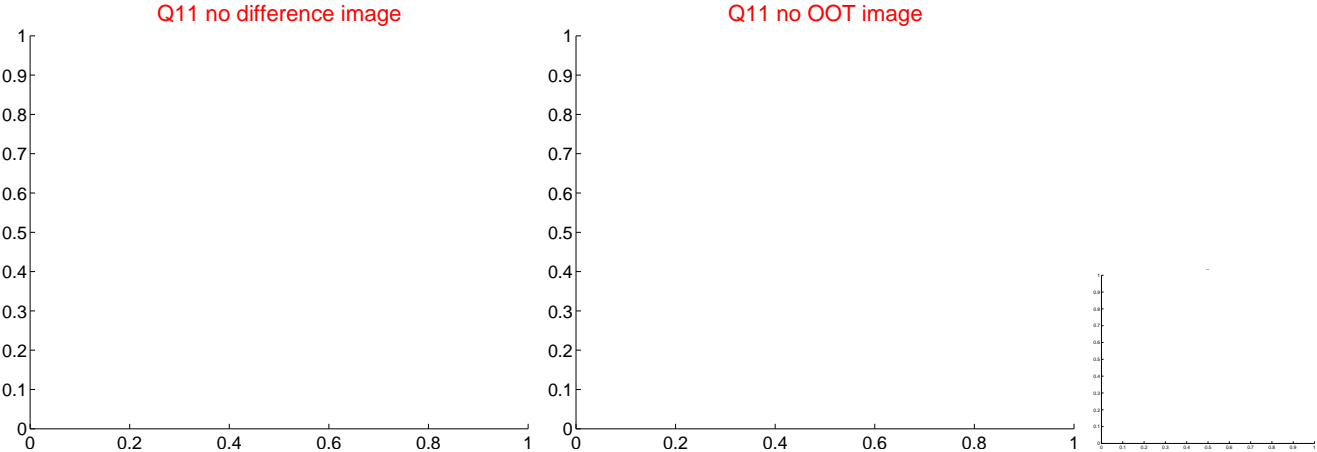
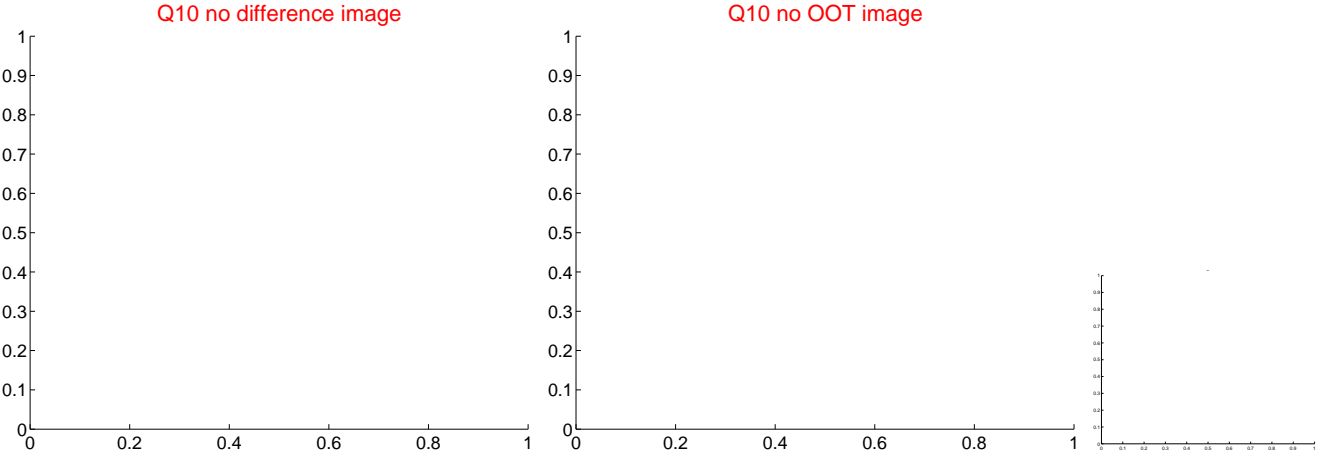
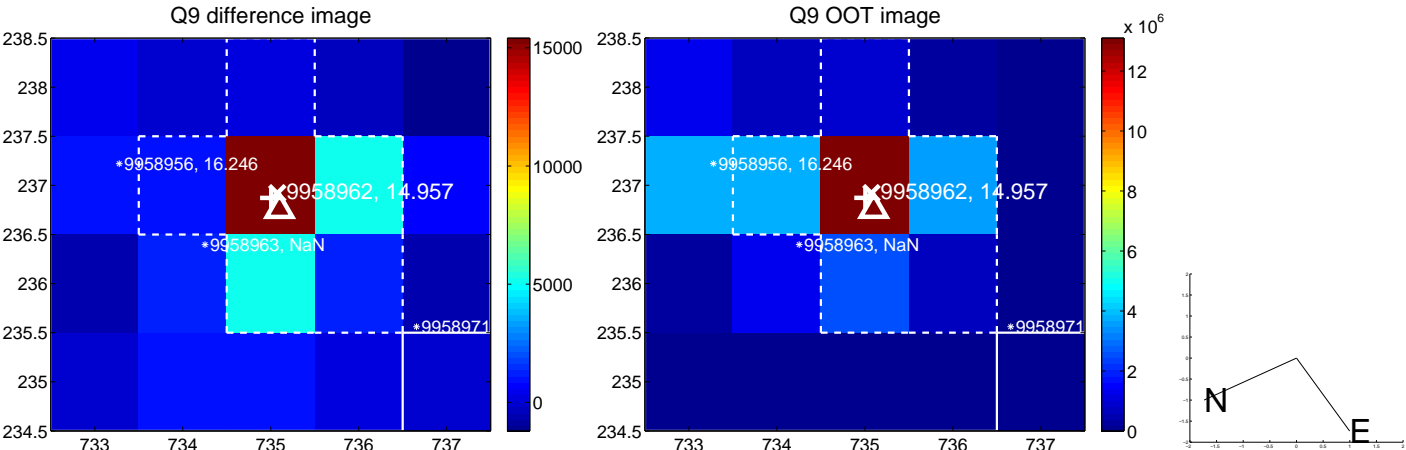
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



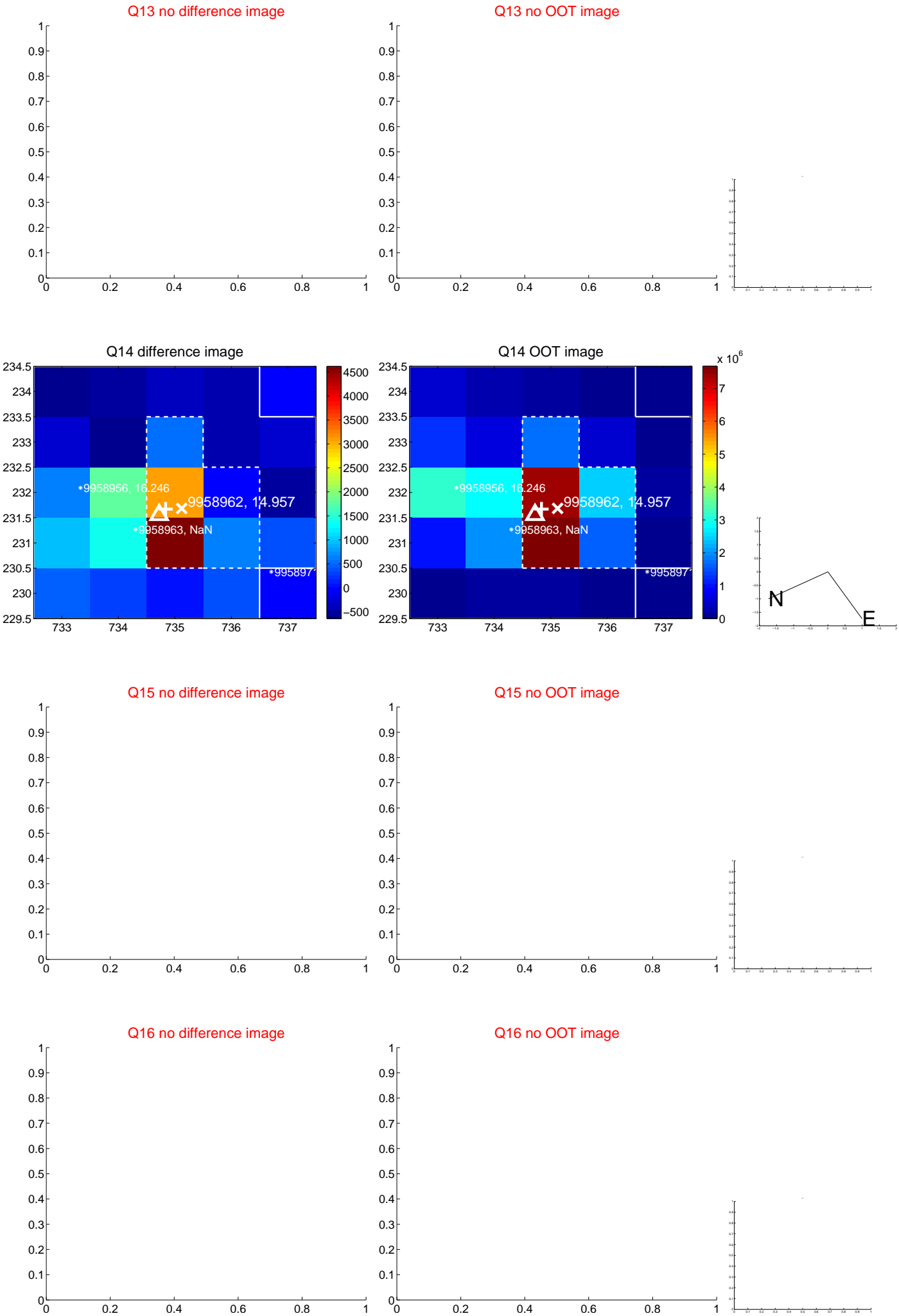
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



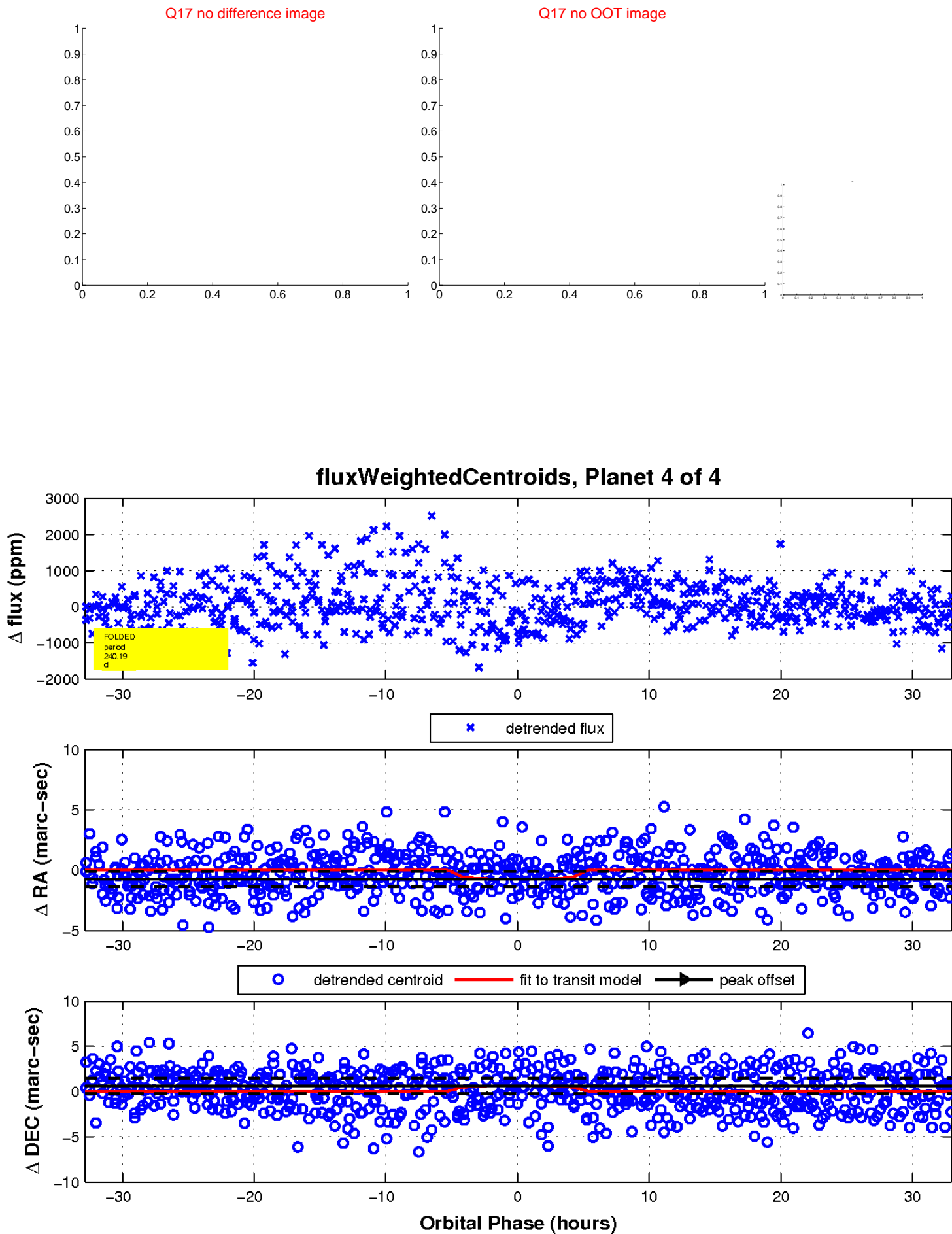
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

