

KIC 009178502

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})
009178502-01	OBS	No	2.709993	131.568889	95.3	9.000	11.5	-1.0	2.43	7416	2.40	7542.98
009178502-02	OBS	No	0.721352	131.944554	158.2	2.291	10.6	10.8	2.43	7416	3.50	44052.55
009178502-03	OBS	No	21.603550	133.779463	816.5	2.120	9.4	9.7	2.43	7416	7.04	473.66
009178502-04	OBS	No	46.180358	154.710750	1083.9	4.473	8.9	8.3	2.43	7416	8.88	172.01

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009178502-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—CENT_NOFITS
009178502-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
009178502-03	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_ALT—MOD_POS_ALT
009178502-04	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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.

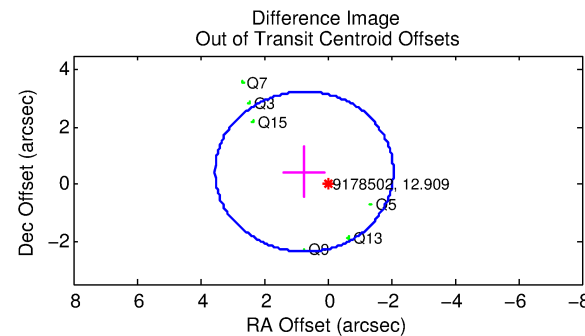
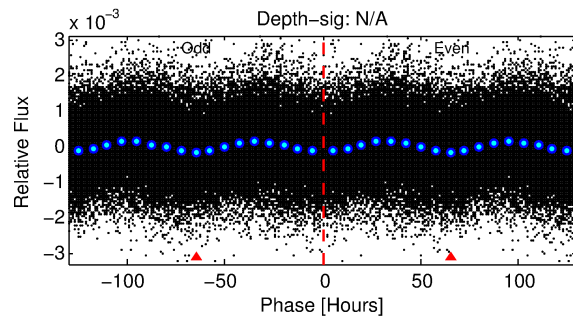
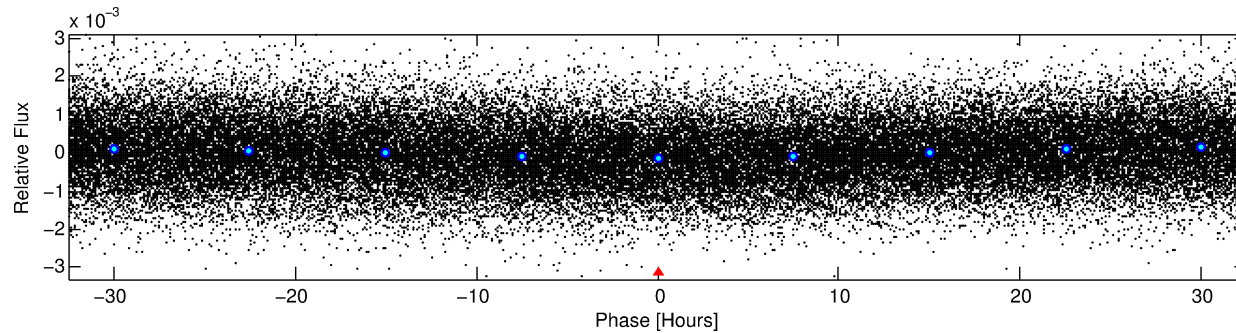
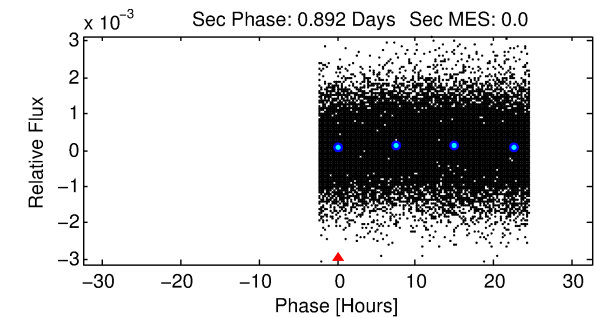
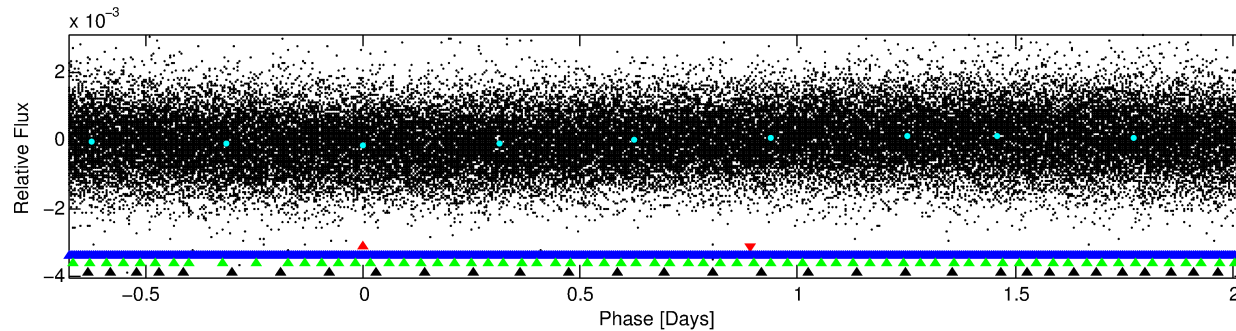
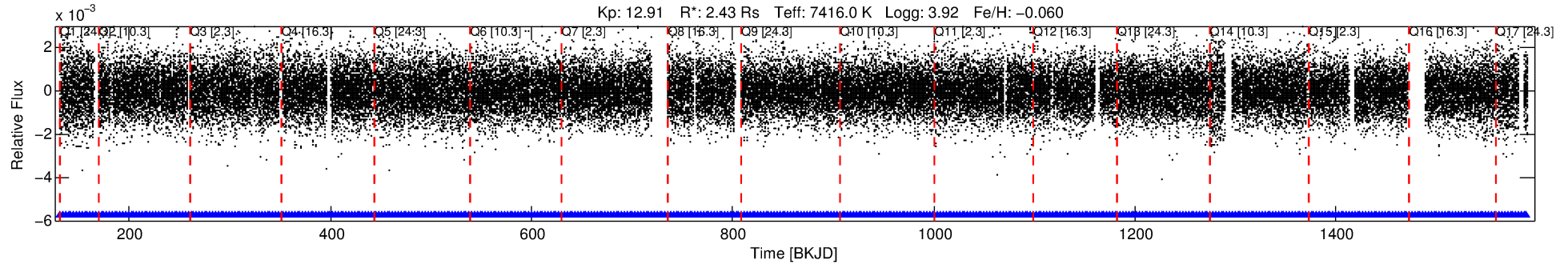
Ephemeris Match Information For 009178502-01

No Significant Match Found

DV One-Page Summary

KIC: 9178502 Candidate: 1 of 4 Period: 2.710 d
KOI: K05634 Corr: No Ephemeris Match

Kp: 12.91 R*: 2.43 Rs Teff: 7416.0 K Logg: 3.92 Fe/H: -0.060



TPS TCE Results:

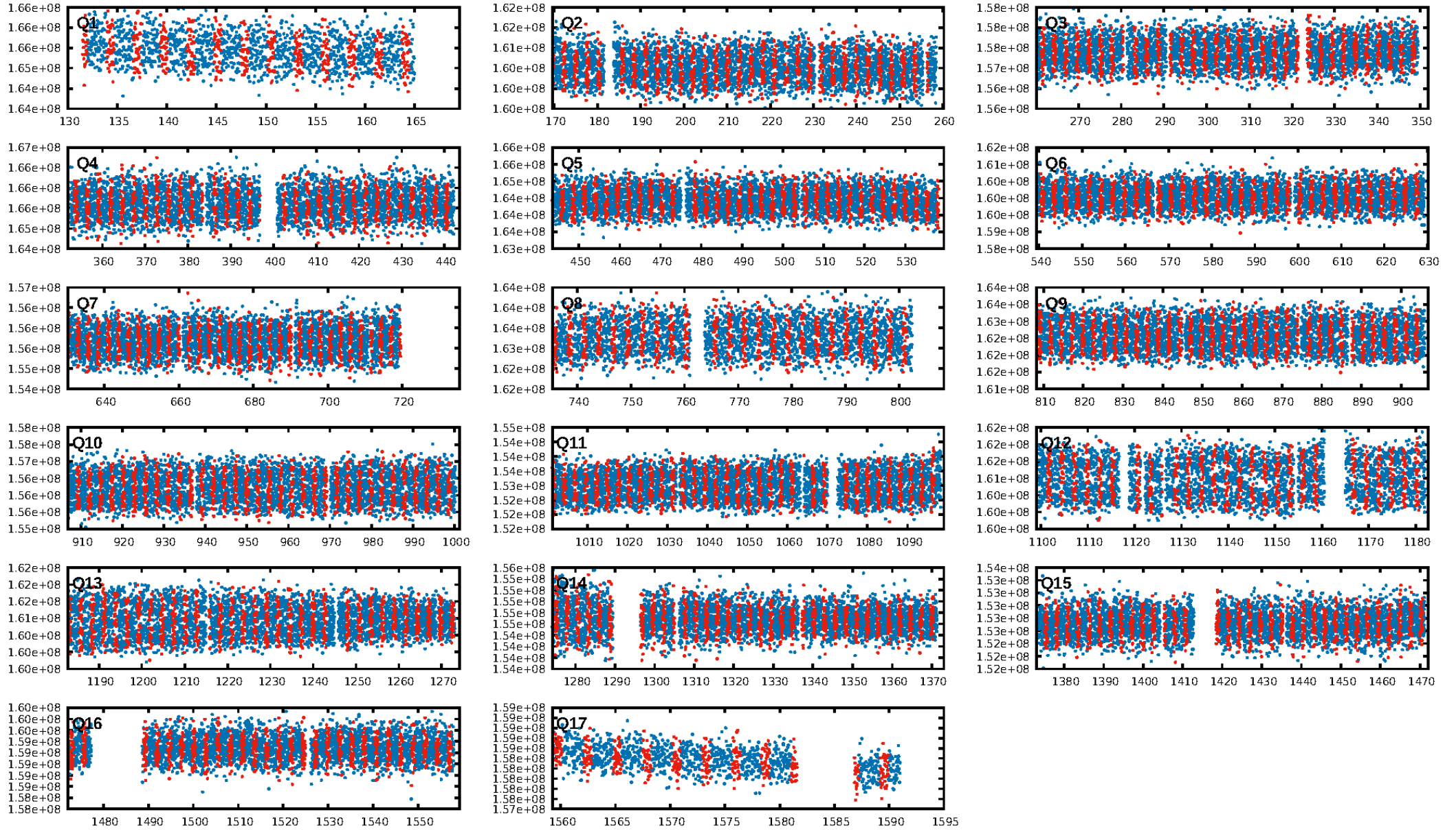
Period = 2.70999 d
Epoch = 131.5689 BKJD

DV fit results are unavailable

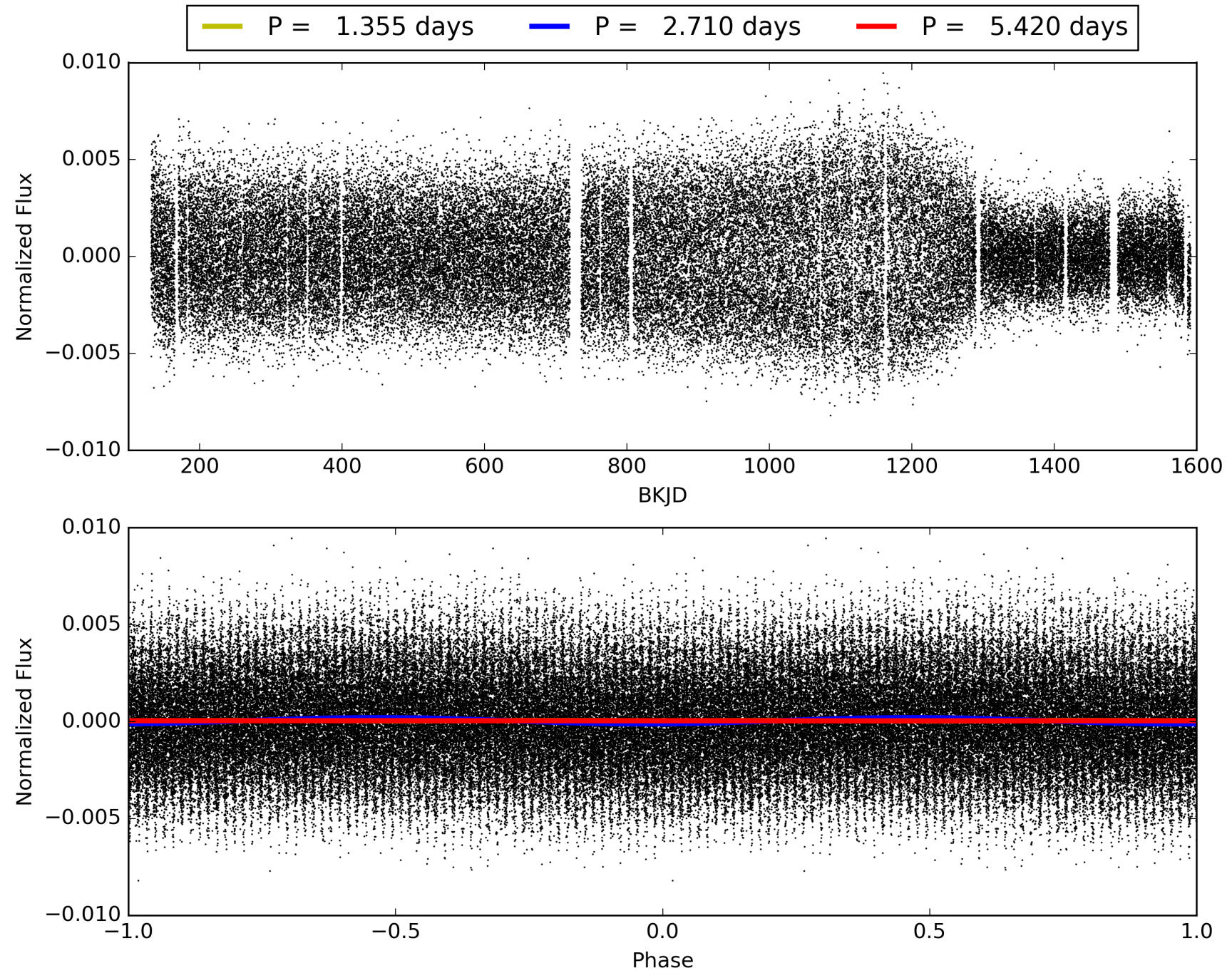
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [5.14 σ]
LongPeriod-sig: 100.0% [49.04 σ]
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: 2.96e-29
RollingBand-fgt: 1.00 [487/487]
GhostDiagnostic-chr: N/A
Centroid-sig: N/A
Centroid-so: N/A
OotOffset-rm: 0.850 arcsec [0.91 σ]
KicOffset-rm: 0.782 arcsec [0.67 σ]
OotOffset-st: 0/3/0/3 [6]
KicOffset-st: 0/3/0/3 [6]
DiffImageQuality-fgm: 0.50 [3/6]
DiffImageOverlap-fno: 0.00 [0/17]

TCE 009178502-01, PDC Light Curves

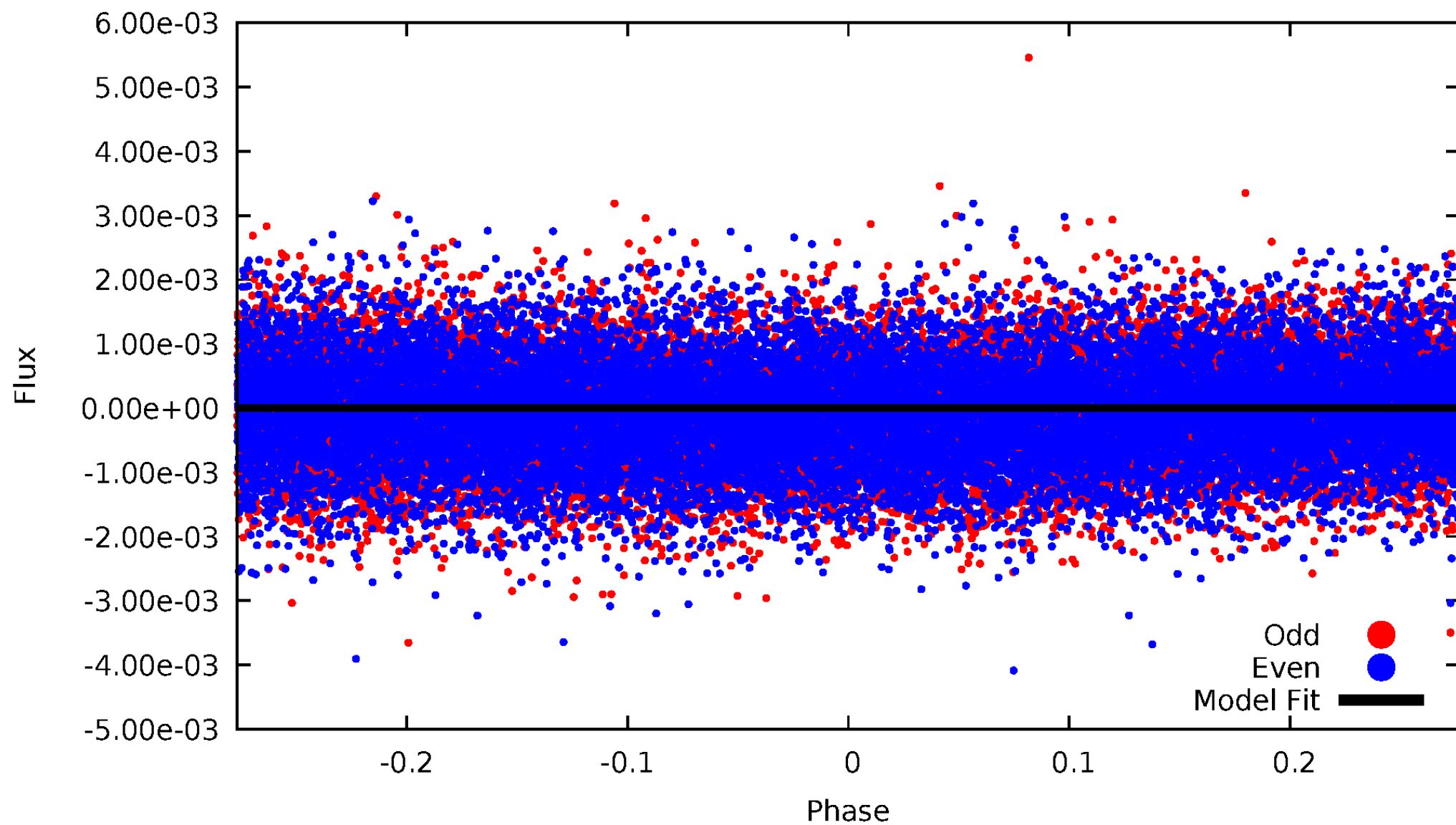


TCE 009178502-01



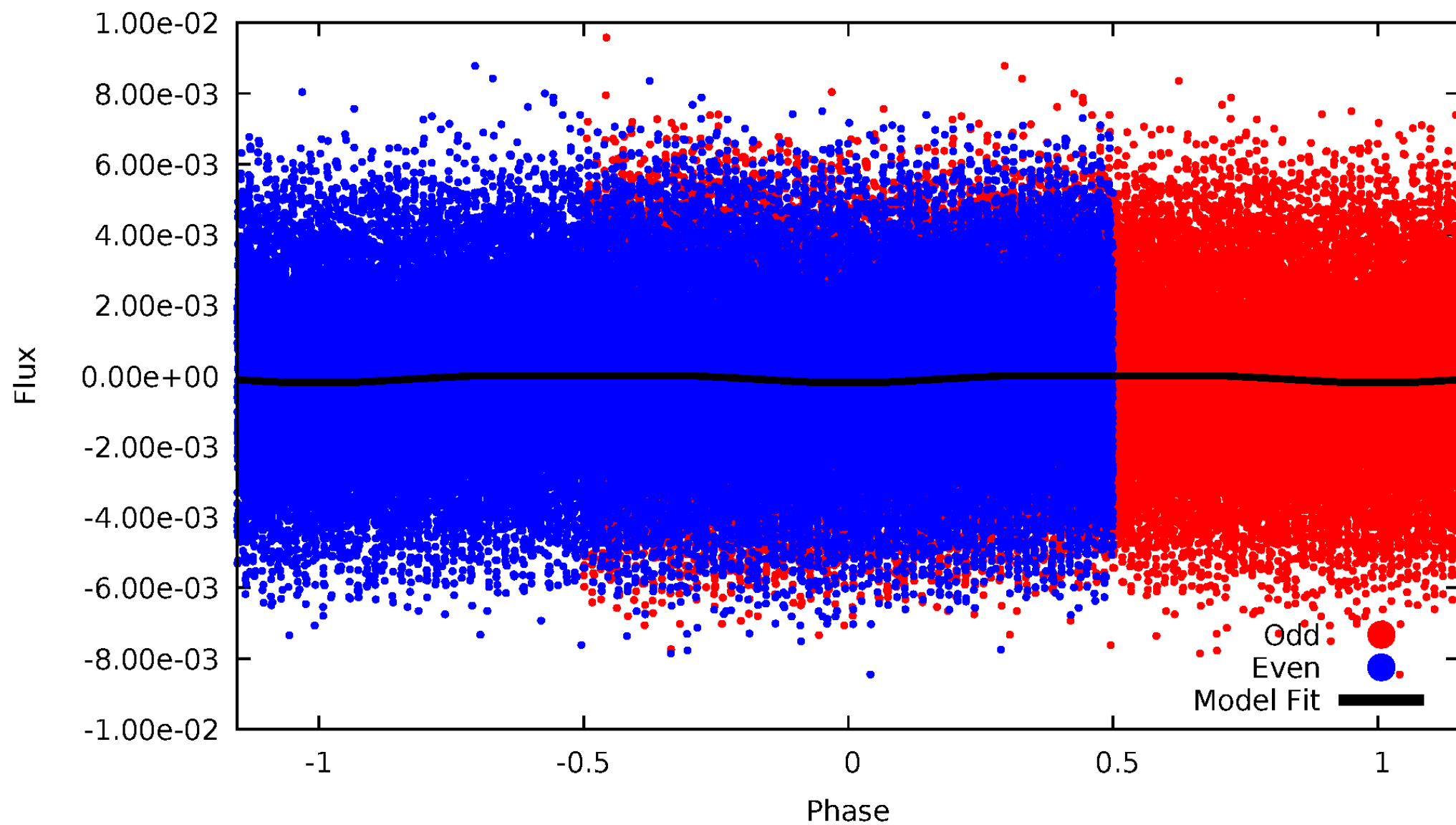
DV Odd/Even

TCE 009178502-01



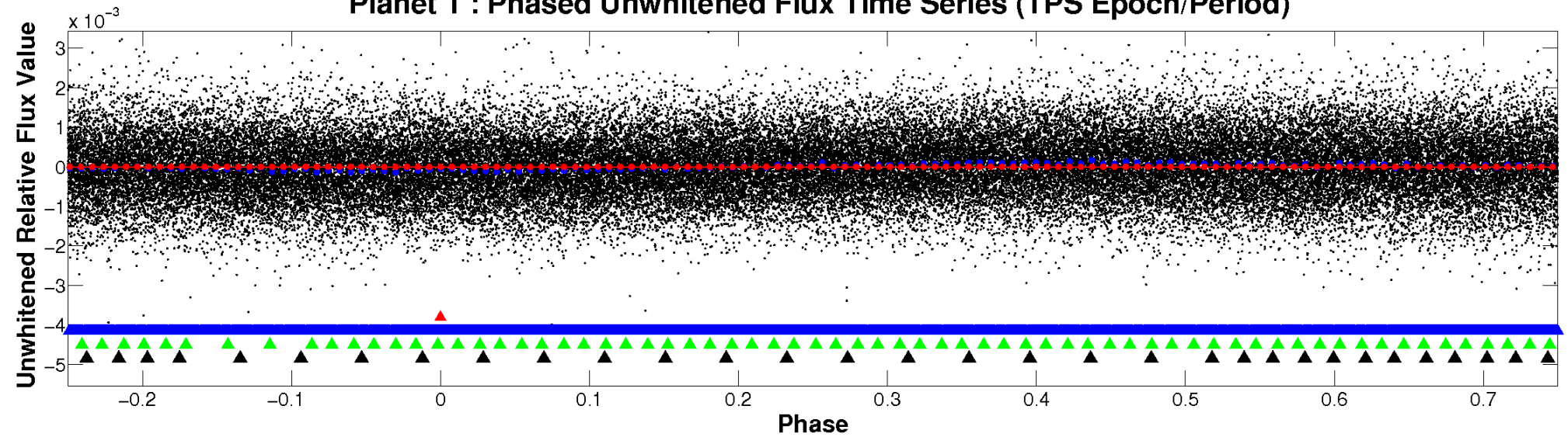
ALT Odd/Even

TCE 009178502-01



Non-Whitened Vs. Whitened Light Curve

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

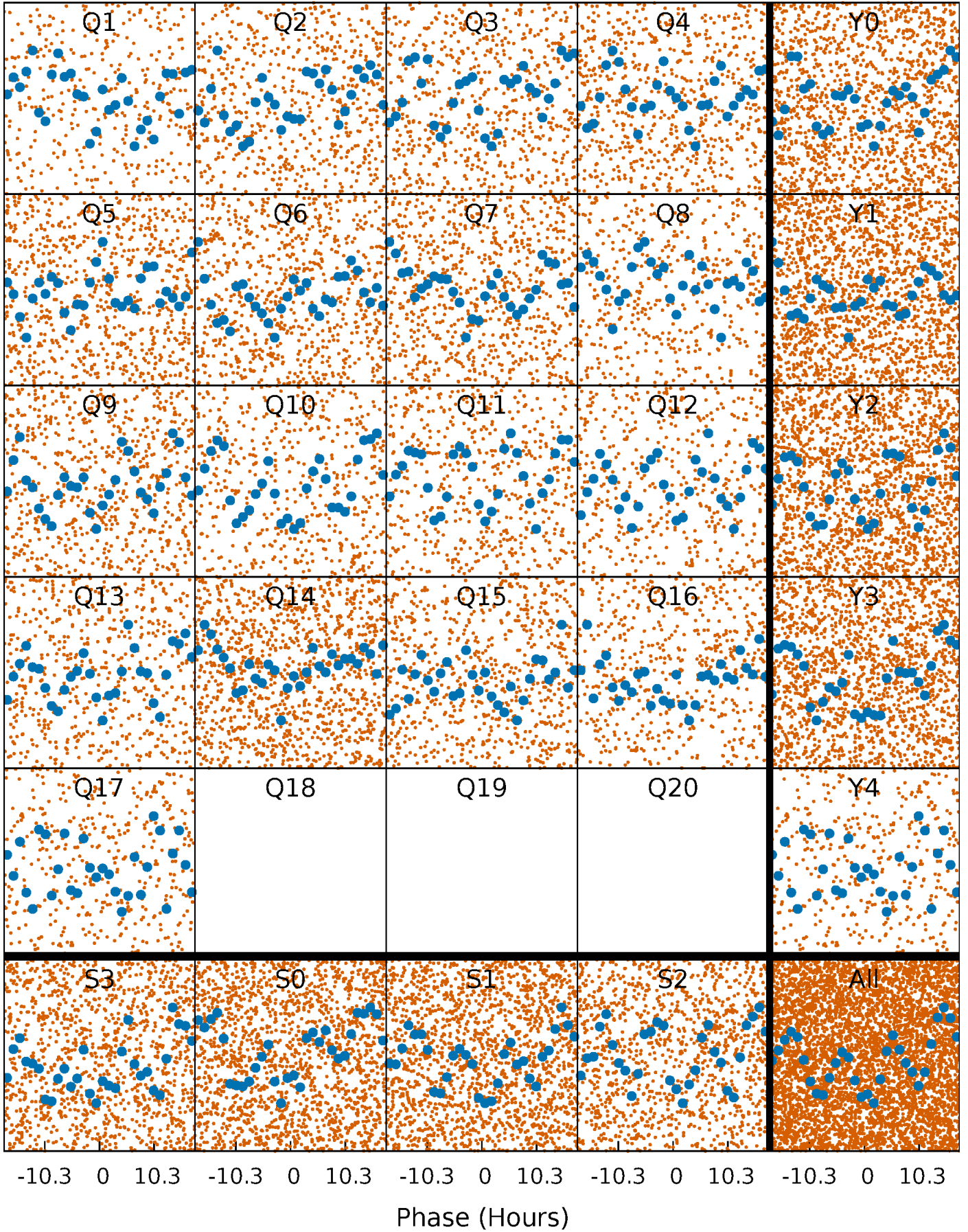


Planet 1 : Phased Whitened Flux Time Series (TPS Epoch/Period)



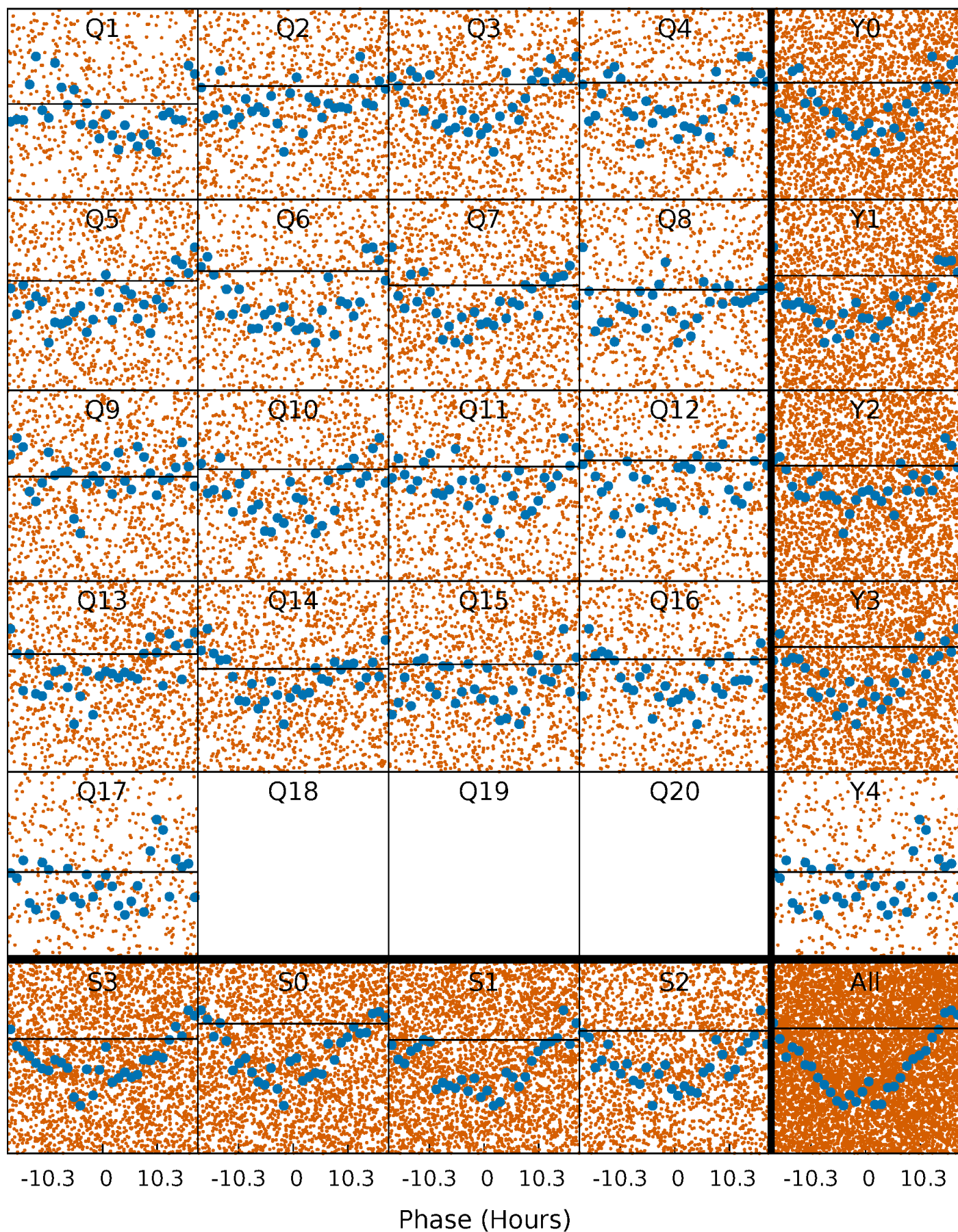
PDC Quarter-Phased Transit Curves

TCE 009178502-01 P= 2.709993 Days $T_0=131.568889$ (BKJD)



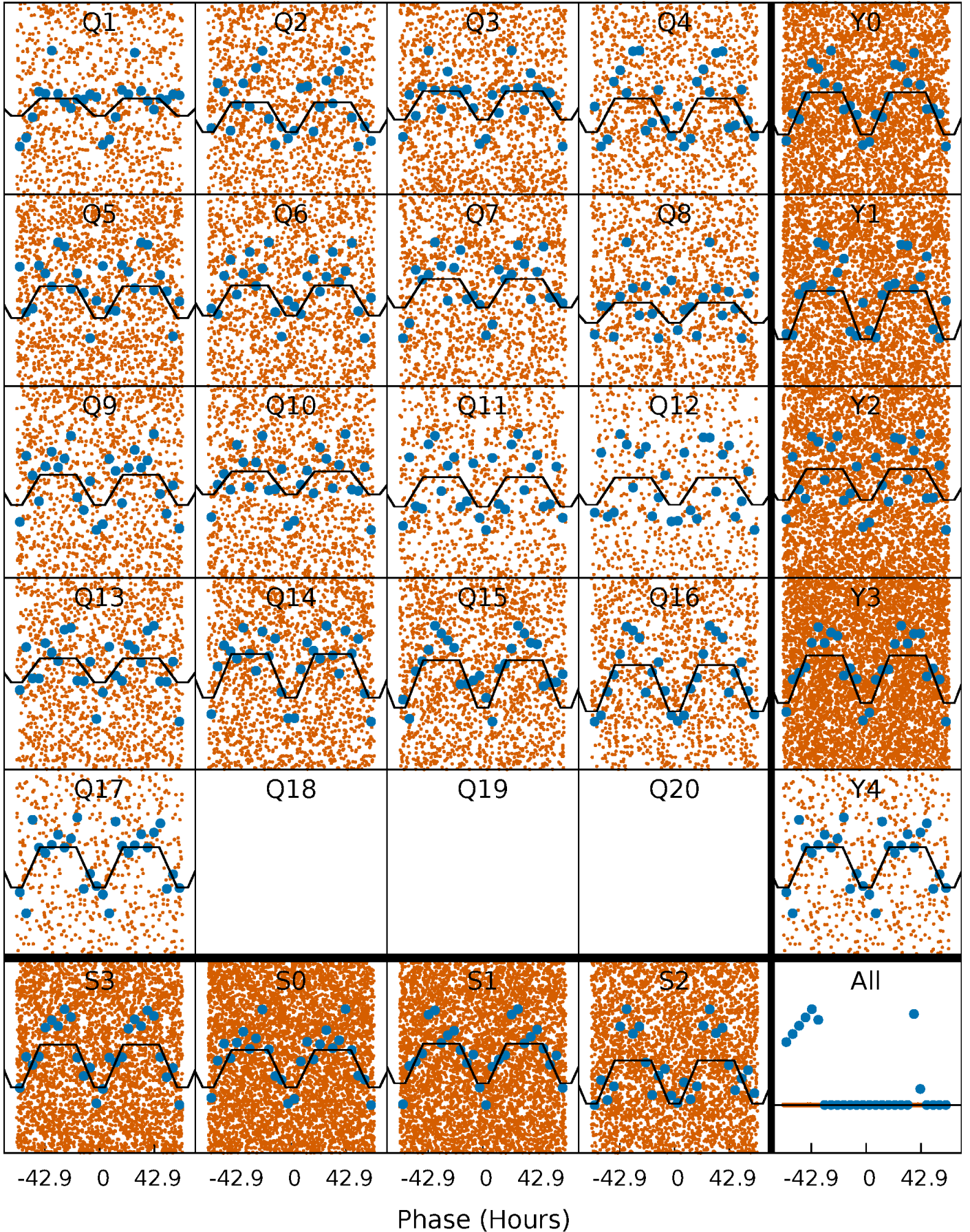
DV Quarter-Phased Transit Curves

TCE 009178502-01 P= 2.709993 Days $T_0=131.568889$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

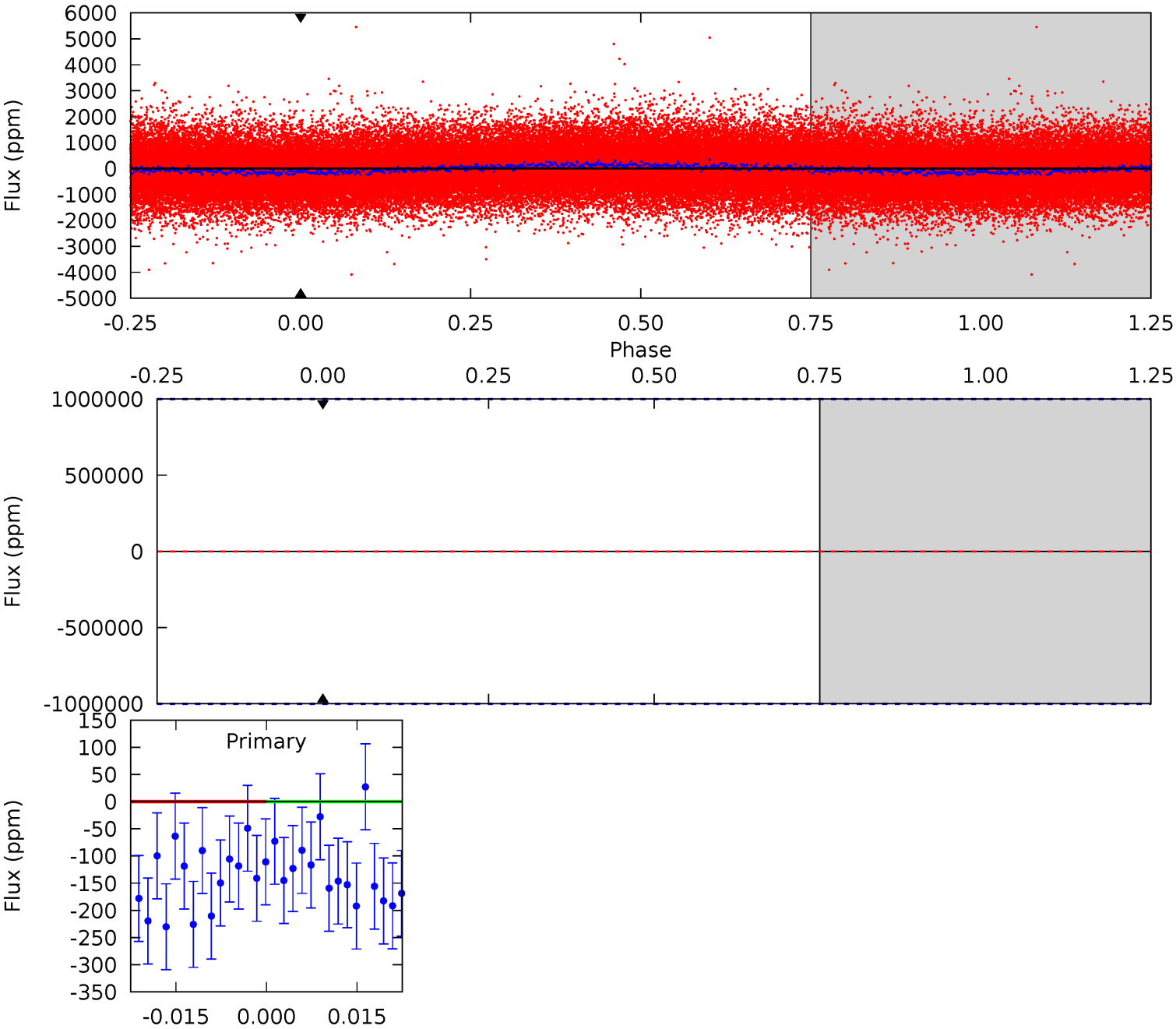
TCE 009178502-01 P= 2.709993 Days $T_0=131.505097$ (BKJD)



DV Model-Shift Uniqueness Test

009178502-01, P = 2.709993 Days, E = 128.858896 Days

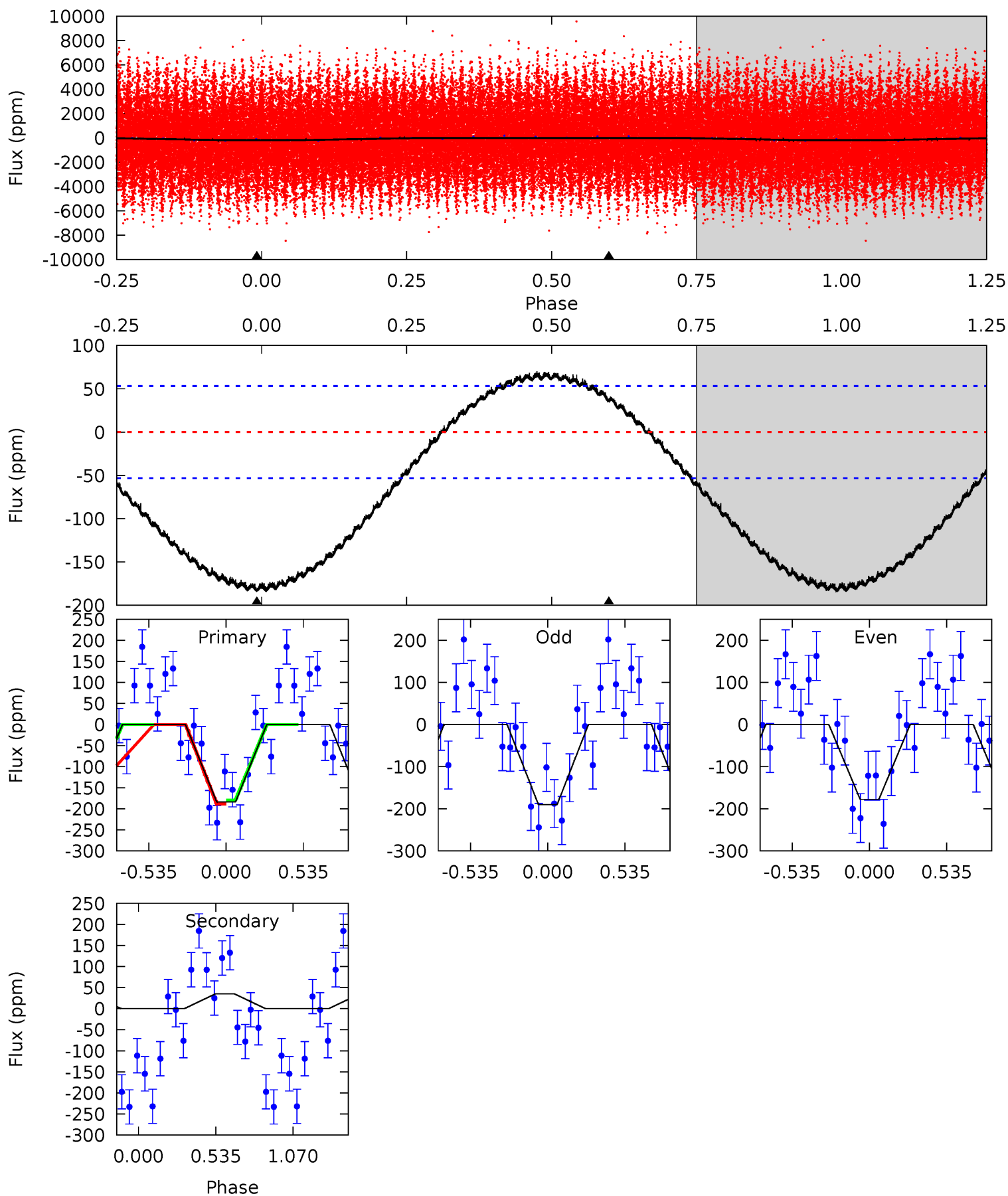
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



Alt Model-Shift Uniqueness Test

009178502-01, P = 2.709993 Days, E = 131.505097 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
14.5	-2.78	0	0	4.20	0.62	1.63	14.5	14.5	-2.78	-2.78	0.49	1.05	0.28	0.37



Stellar Parameters For KIC 009178502

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	7416^{+205}_{-333}	$3.915^{+0.266}_{-0.143}$	$-0.060^{+0.200}_{-0.350}$	$2.426^{+0.477}_{-0.818}$	$1.765^{+0.193}_{-0.386}$	$0.174^{+0.352}_{-0.065}$
	+3%/-4%	+7%/-4%	+333%/-583%	+20%/-34%	+11%/-22%	+202%/-38%
Source	KIC0	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 009178502-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	A_{obs}
DV	0 ± 1000000	$18.40^{+19.40}_{-12.93}$	3280^{+248}_{-303}	5498^{+45183}_{-43095}	$6.094^{+781.477}_{-526.364}$
Alt.	35 ± 13	$18.25^{+21.10}_{-13.04}$	3275^{+243}_{-283}	-3435^{+222}_{-877}	$-0.113^{+0.092}_{-1.164}$

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

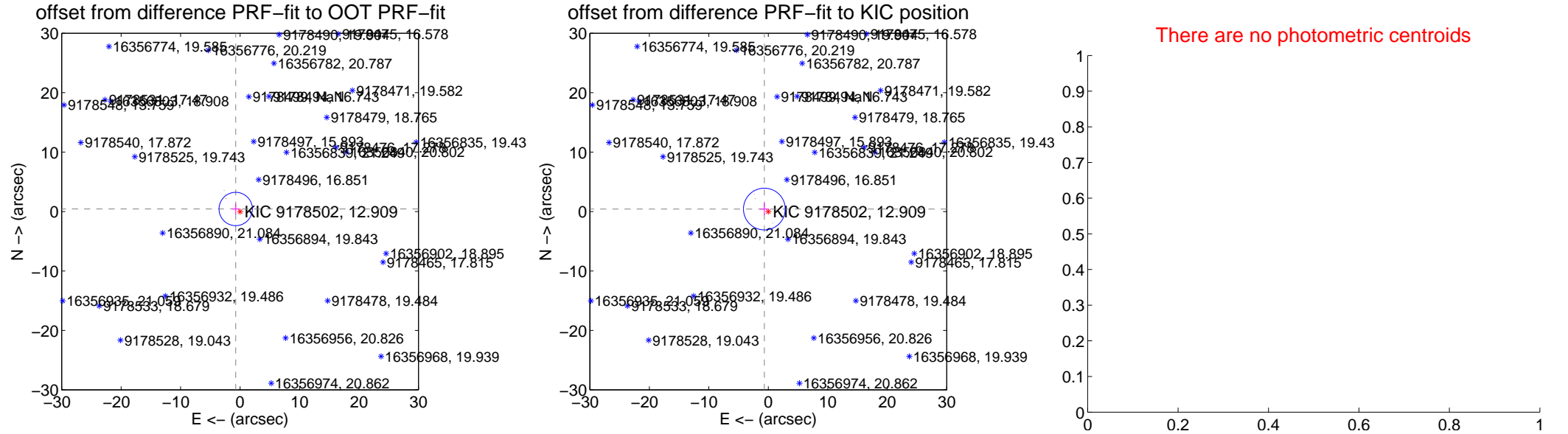
DV Centroid Data

Supplemental centroid analysis for 009178502-01. Kepler magnitude: 12.91. Transit SNR -1.00

There are 3 quarters with good PRF difference image offsets

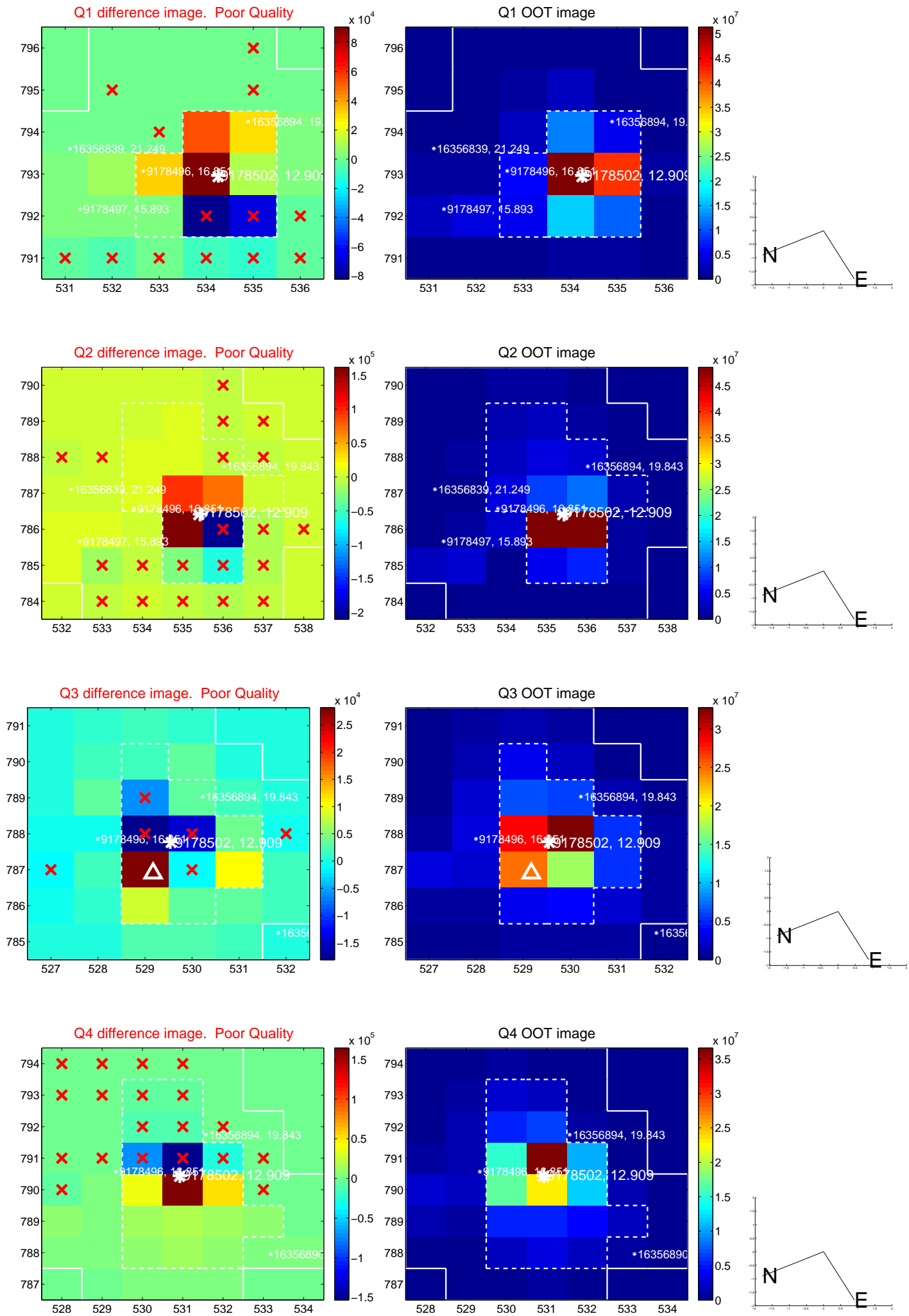
The direct PRF centroid is offset from the target star catalog position by about 0.13 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.850 ± 0.934	0.91	0.733 ± 0.628	0.432 ± 0.866
PRF-fit source offset from KIC position	0.782 ± 1.170	0.67	0.659 ± 0.769	0.421 ± 1.036
photometric centroid source offset	—	—	—	—

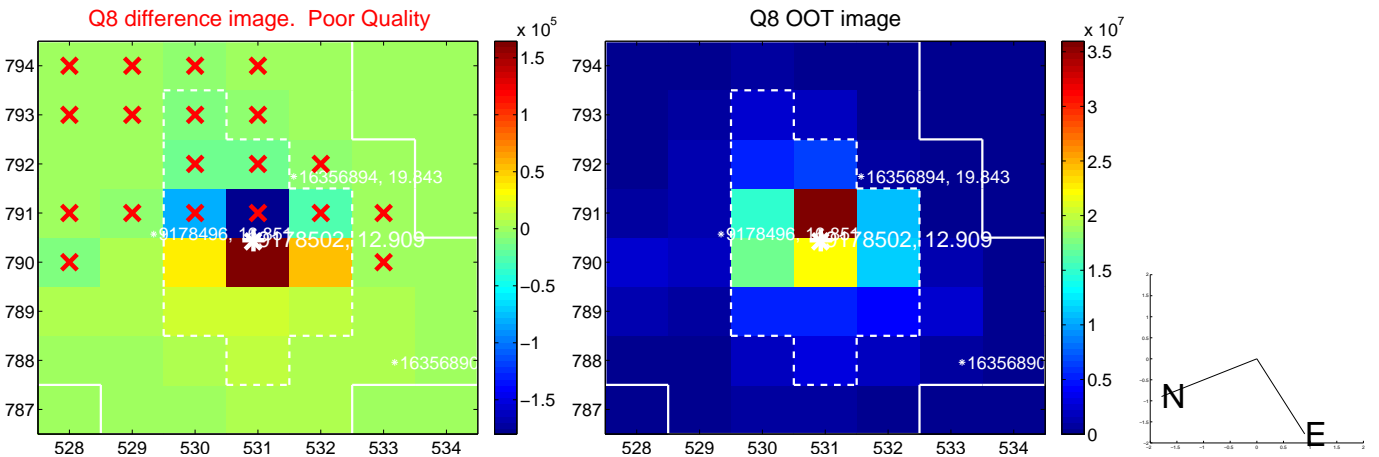
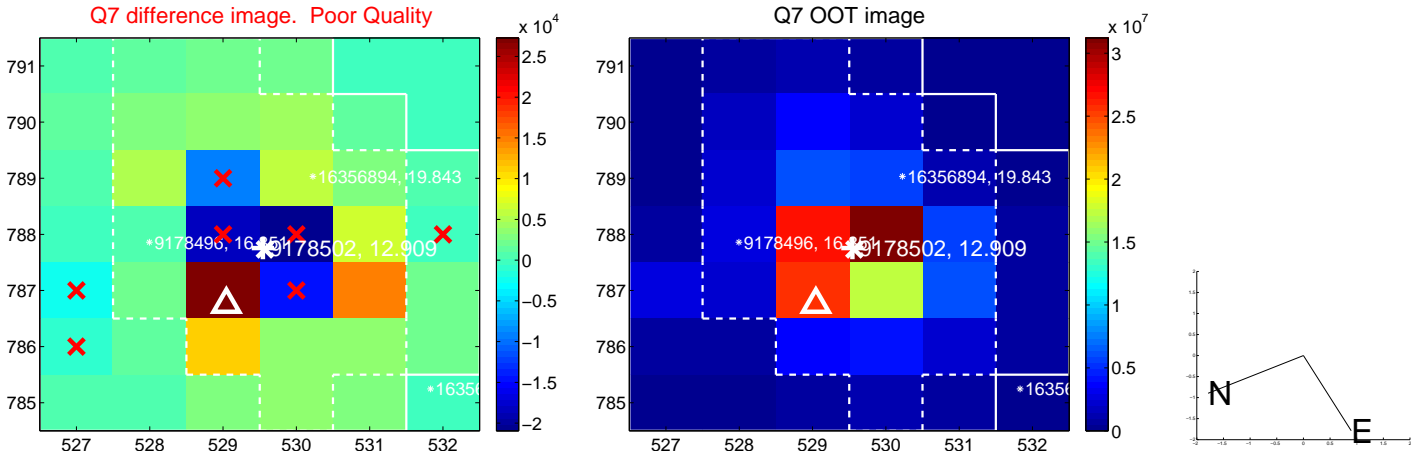
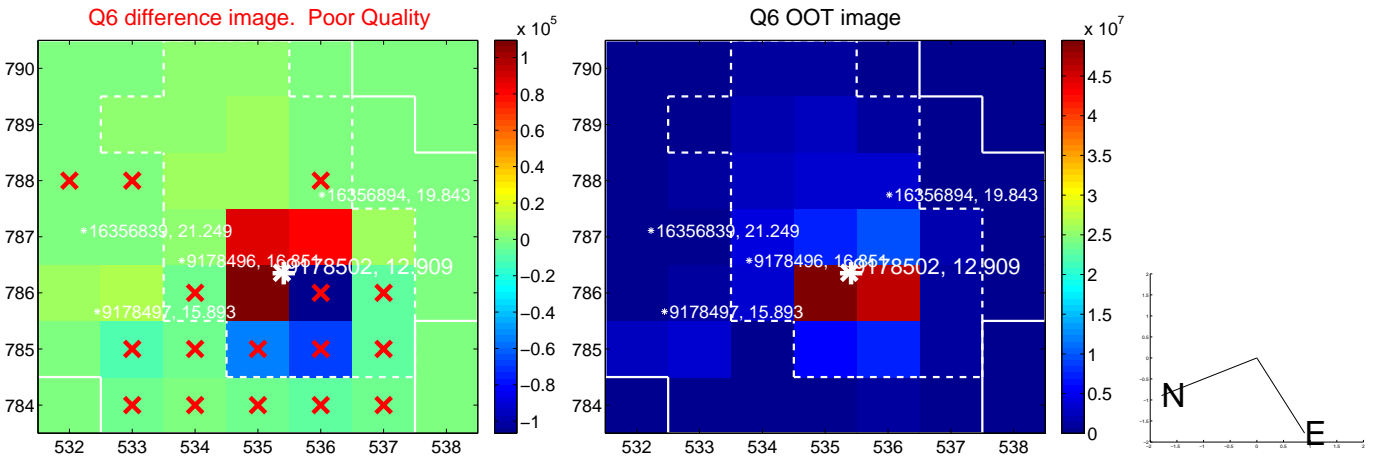
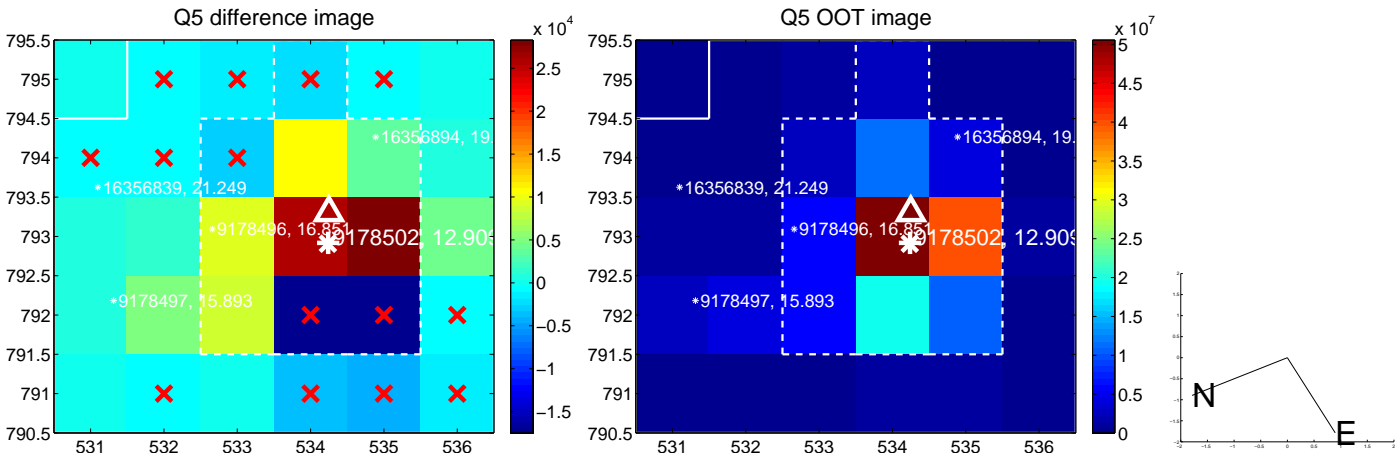


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

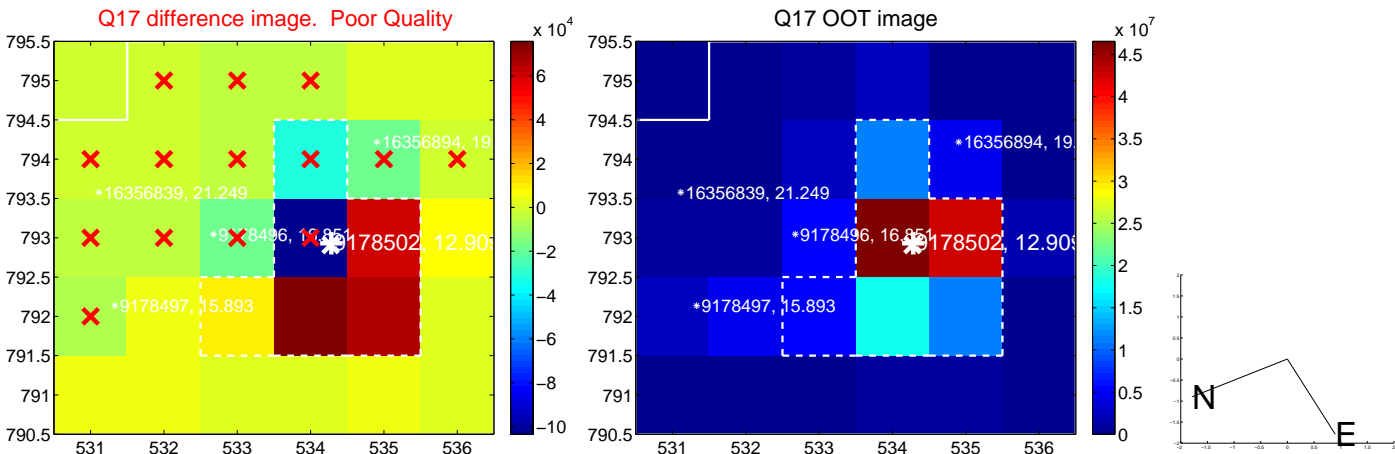
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

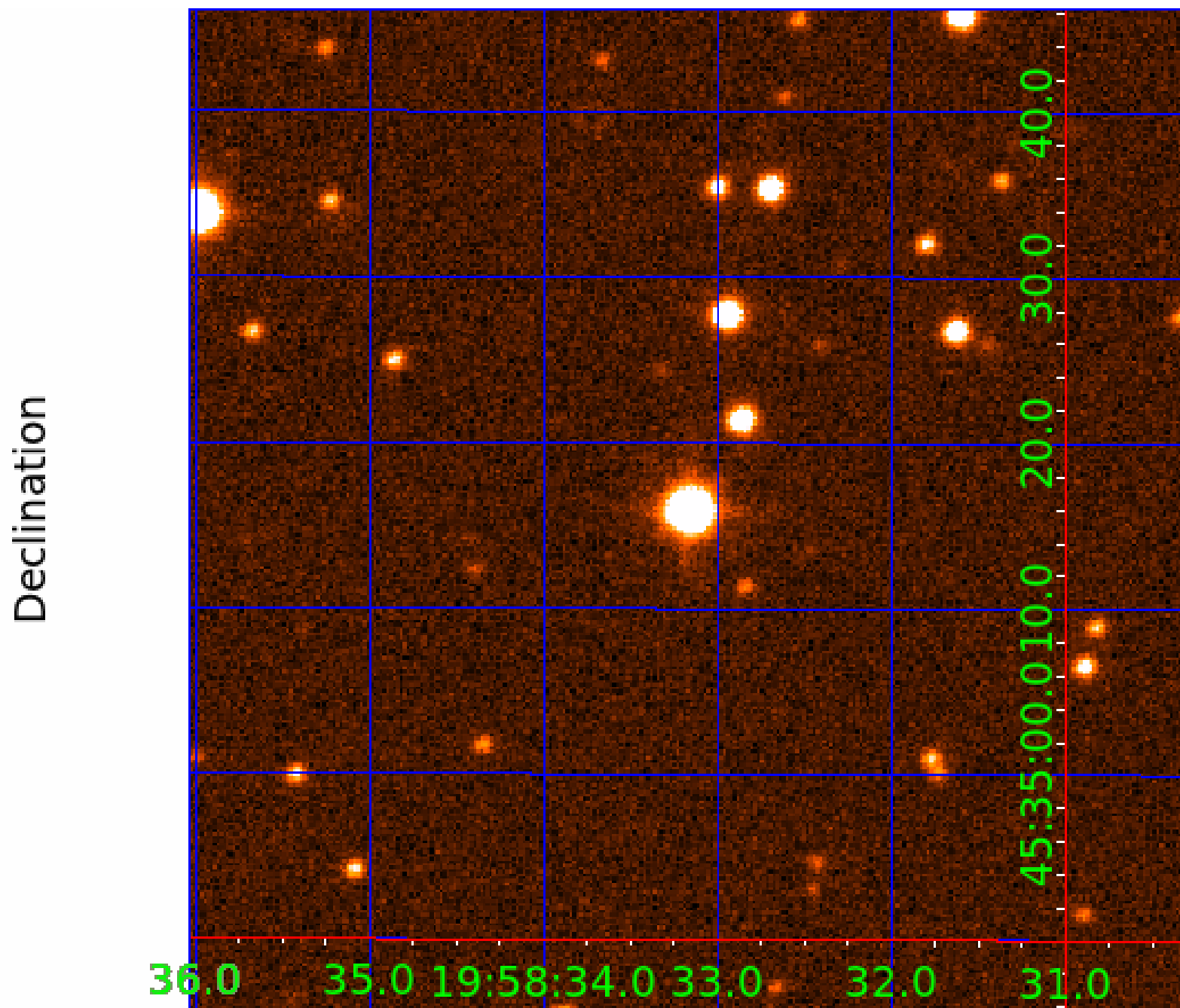


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



folded centroid time series figure for this object.

UKIRT Image



KIC 009178502

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})
009178502-01	OBS	No	2.709993	131.568889	95.3	9.000	11.5	-1.0	2.43	7416	2.40	7542.98
009178502-02	OBS	No	0.721352	131.944554	158.2	2.291	10.6	10.8	2.43	7416	3.50	44052.55
009178502-03	OBS	No	21.603550	133.779463	816.5	2.120	9.4	9.7	2.43	7416	7.04	473.66
009178502-04	OBS	No	46.180358	154.710750	1083.9	4.473	8.9	8.3	2.43	7416	8.88	172.01

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009178502-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—CENT_NOFITS
009178502-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
009178502-03	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_ALT—MOD_POS_ALT
009178502-04	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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.

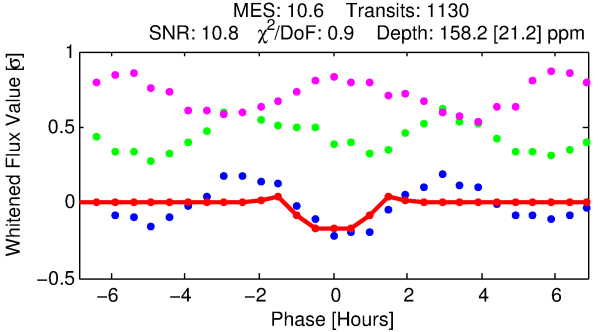
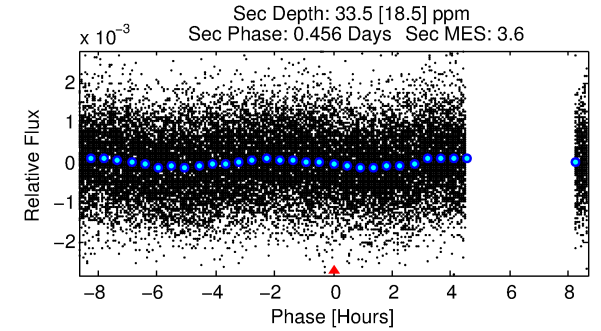
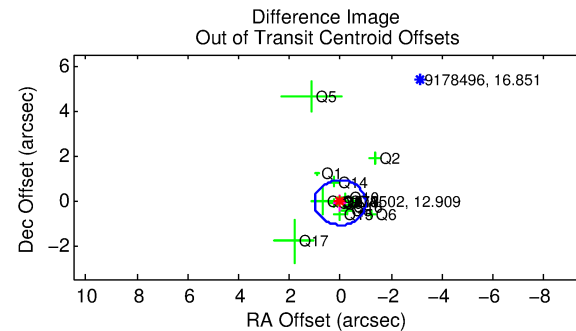
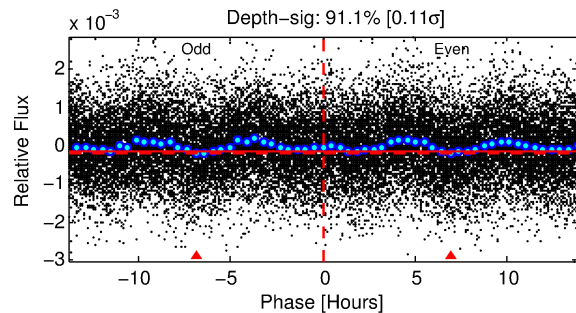
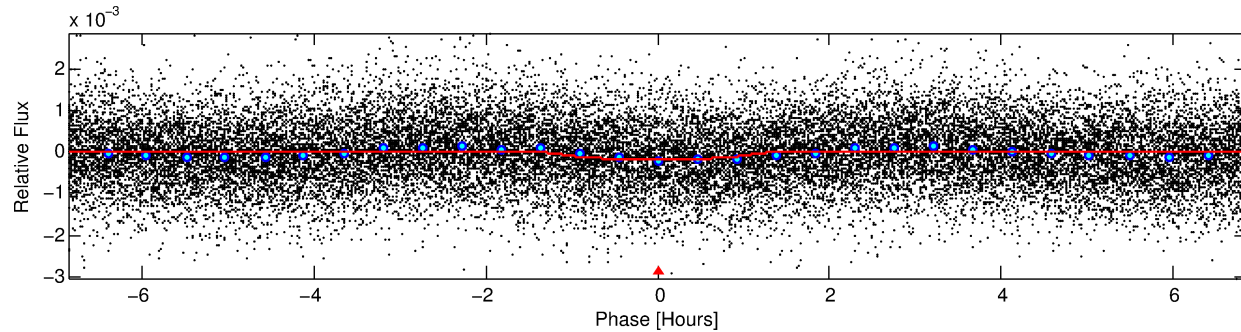
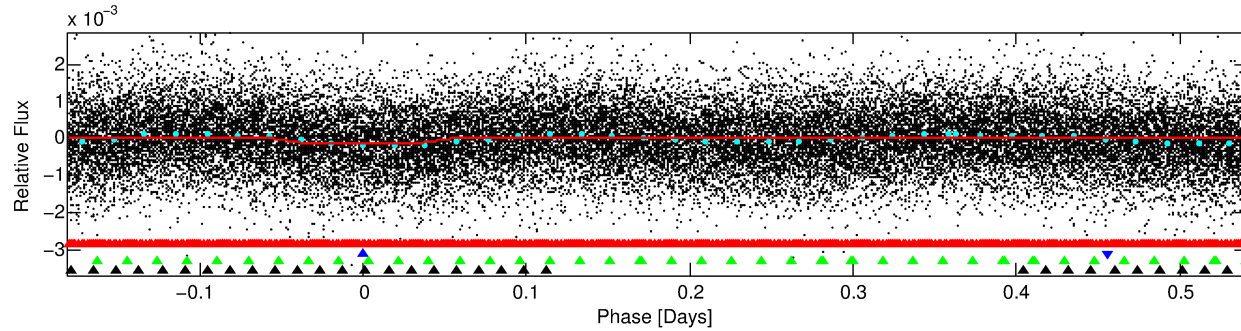
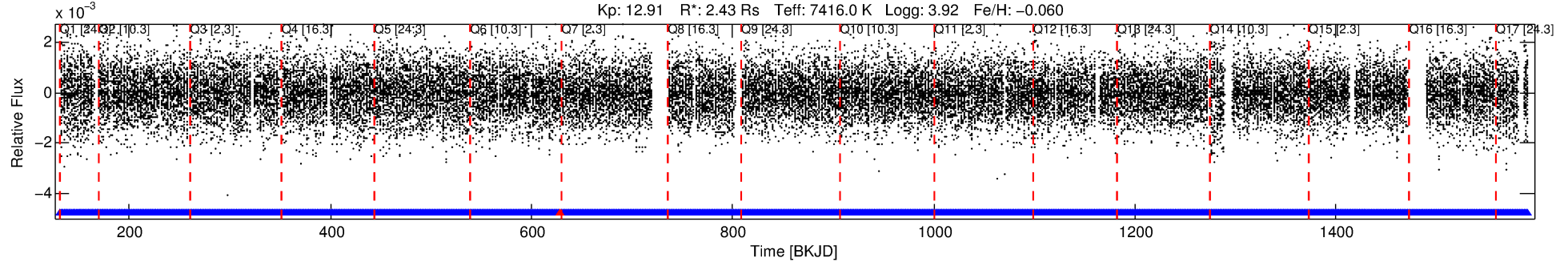
Ephemeris Match Information For 009178502-02

No Significant Match Found

DV One-Page Summary

KIC: 9178502 Candidate: 2 of 4 Period: 0.721 d
KOI: K05634 Corr: No Ephemeris Match

Kp: 12.91 R*: 2.43 Rs Teff: 7416.0 K Logg: 3.92 Fe/H: -0.060



DV Fit Results:

Period = 0.72135 [0.00001] d
Epoch = 131.9446 [0.0024] BKJD
Rp/R* = 0.0132 [0.0055]
a/R* = 1.50 [2.19]
b = 0.89 [0.64]
Seff = 44052.55 [22005.07]
Teq = 3694 [461] K
Rp = 3.50 [1.87] Re
a = 0.0190 [0.0058] AU
Ag = 0.54 [0.60] [-0.77σ]
Teffp = 4904 [1238] K [0.92σ]

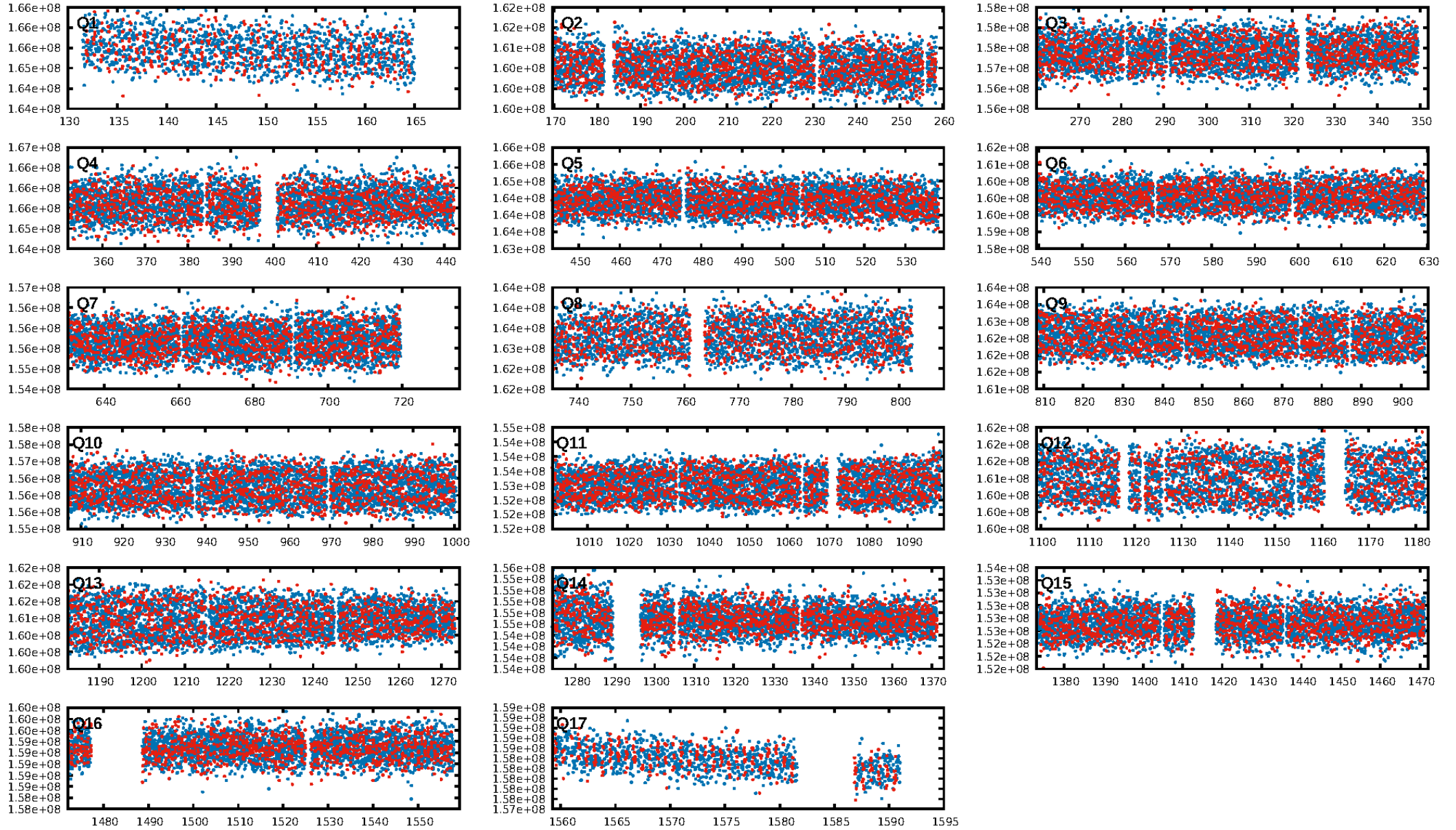
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 100.0% [5.14σ]
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: 4.91e-16
RollingBand-fgt: 1.00 [1079/1080]
GhostDiagnostic-chr: 2.444
Centroid-sig: 0.0%
Centroid-so: 0.252 arcsec [1.52σ]
OotOffset-rm: 0.100 arcsec [0.30σ]
KicOffset-rm: 0.168 arcsec [0.52σ]
OotOffset-st: 4/4/3/5 [16]
KicOffset-st: 4/4/3/5 [16]
DiffImageQuality-fgm: 0.88 [14/16]
DiffImageOverlap-fno: 1.00 [17/17]

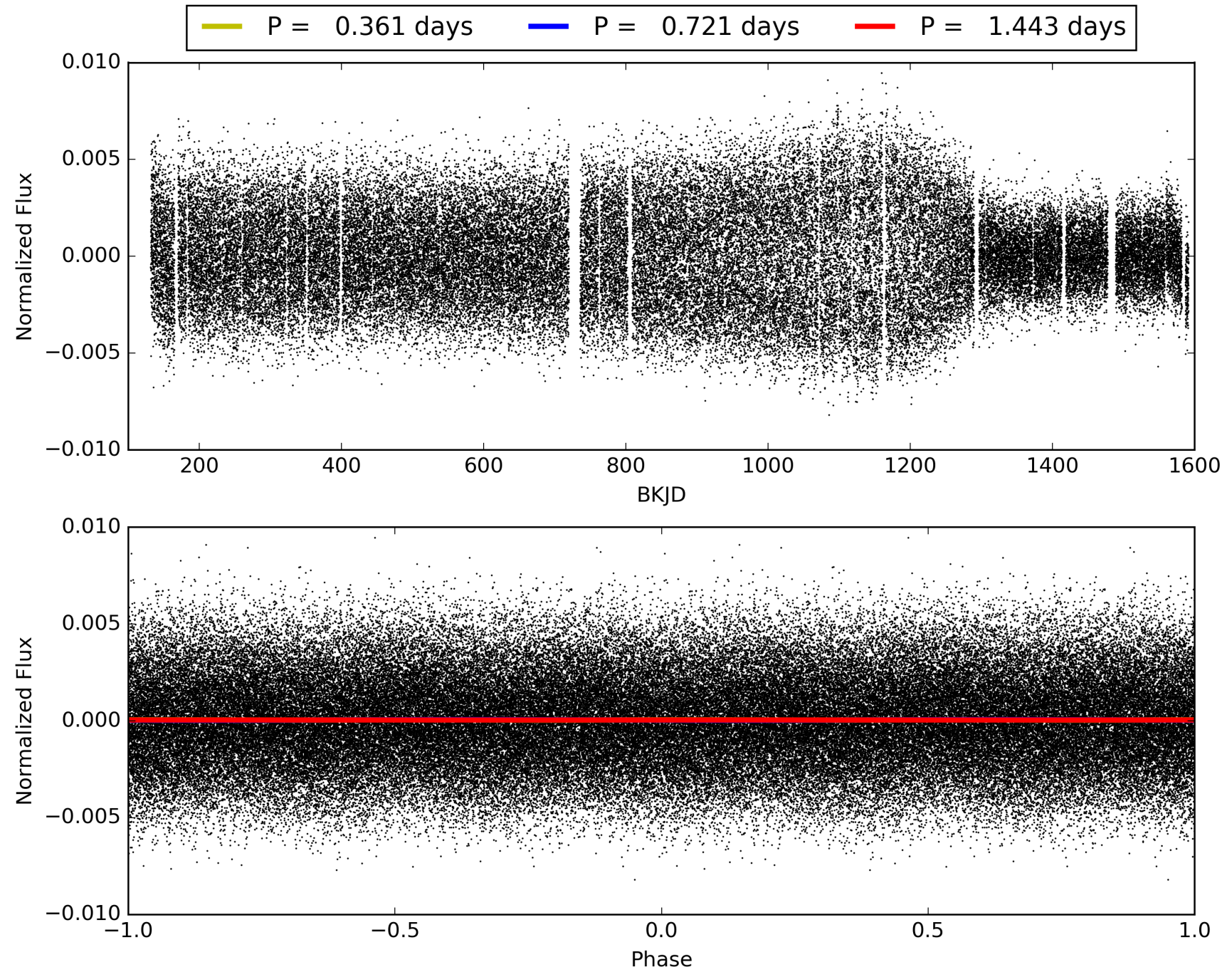
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 10:41:50 Z

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

TCE 009178502-02, PDC Light Curves

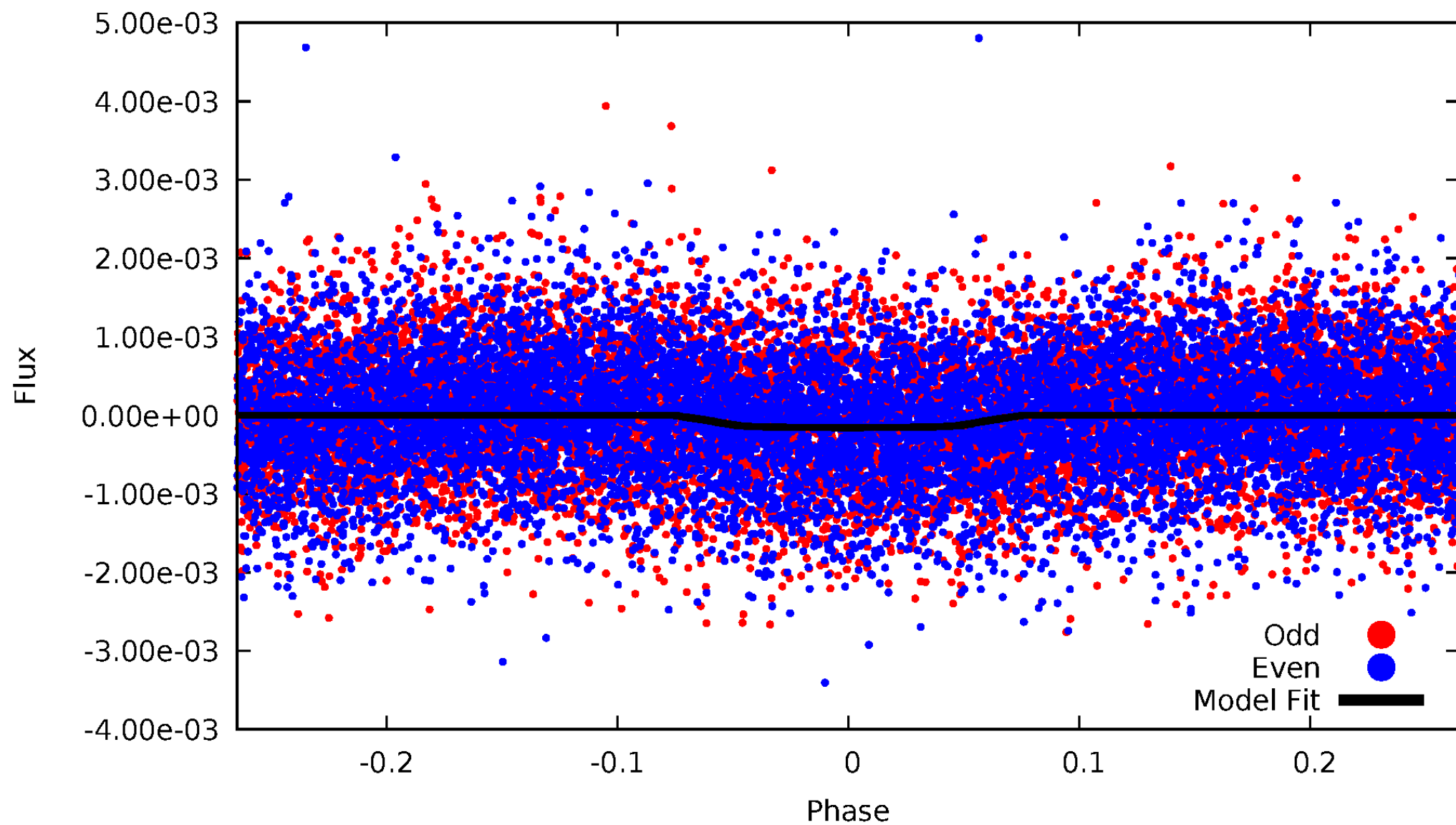


TCE 009178502-02



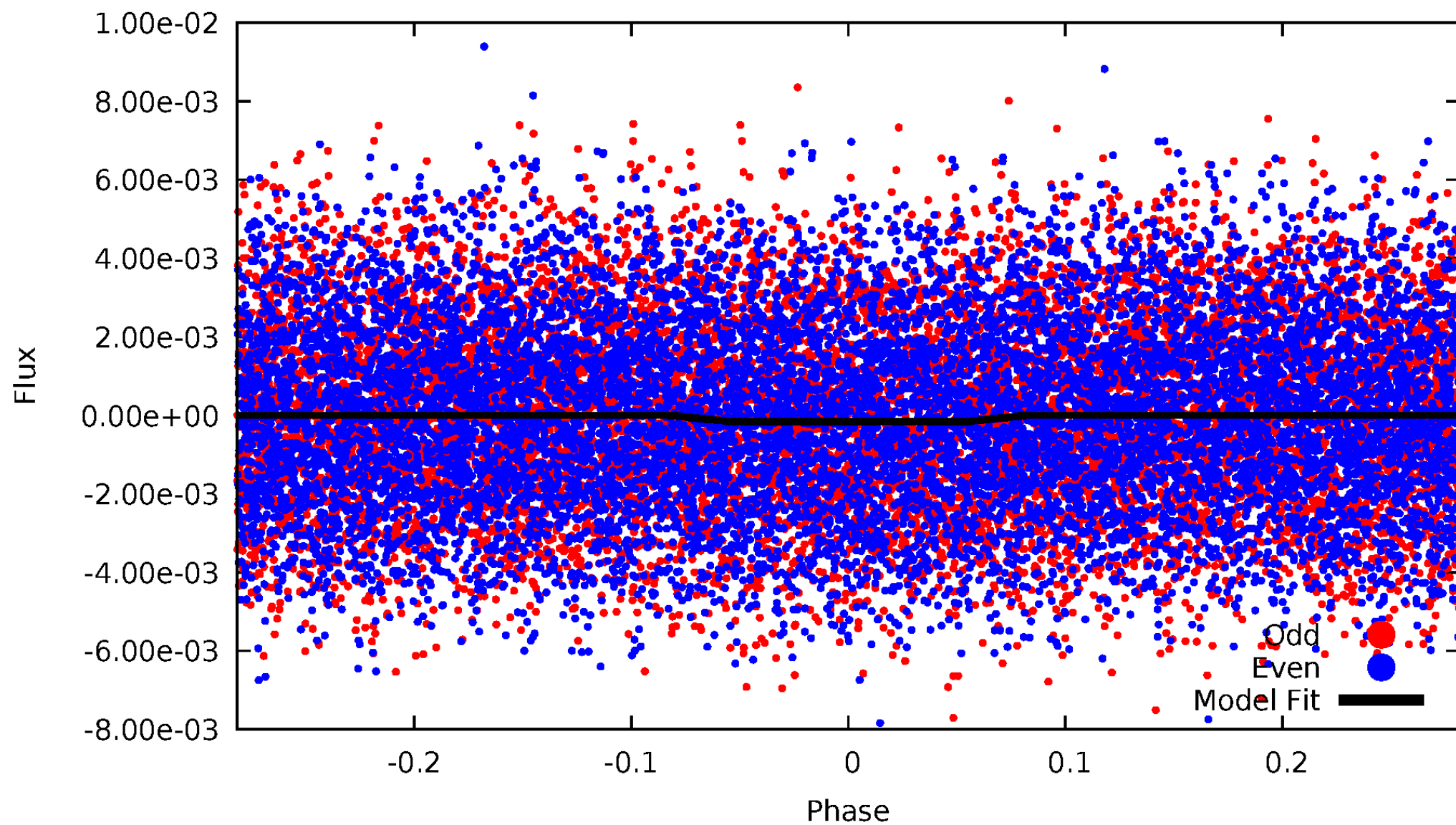
DV Odd/Even

TCE 009178502-02



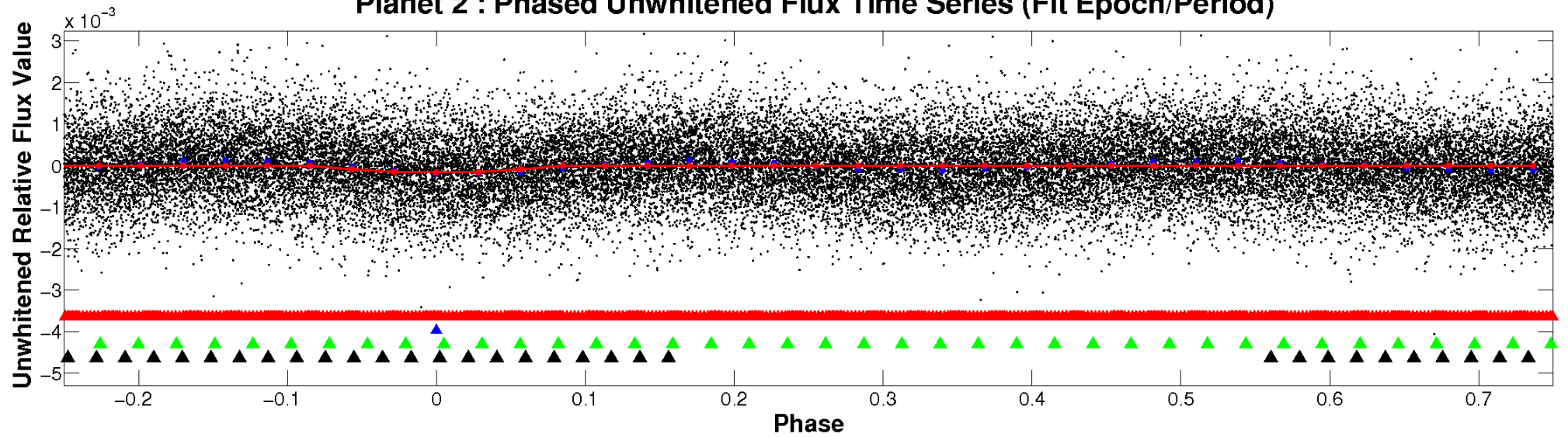
ALT Odd/Even

TCE 009178502-02

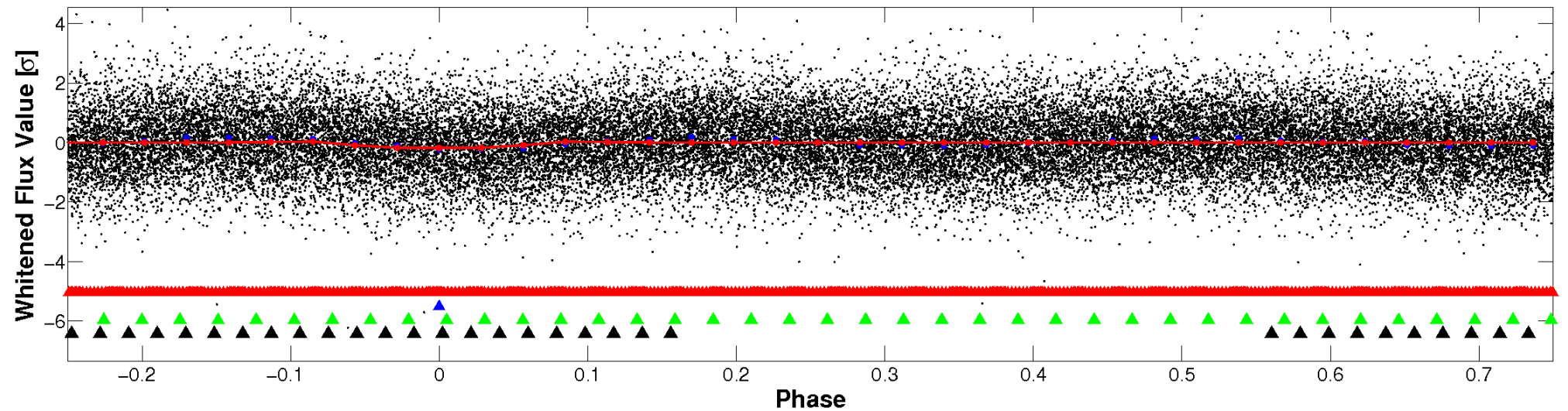


Non-Whitened Vs. Whitened Light Curve

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

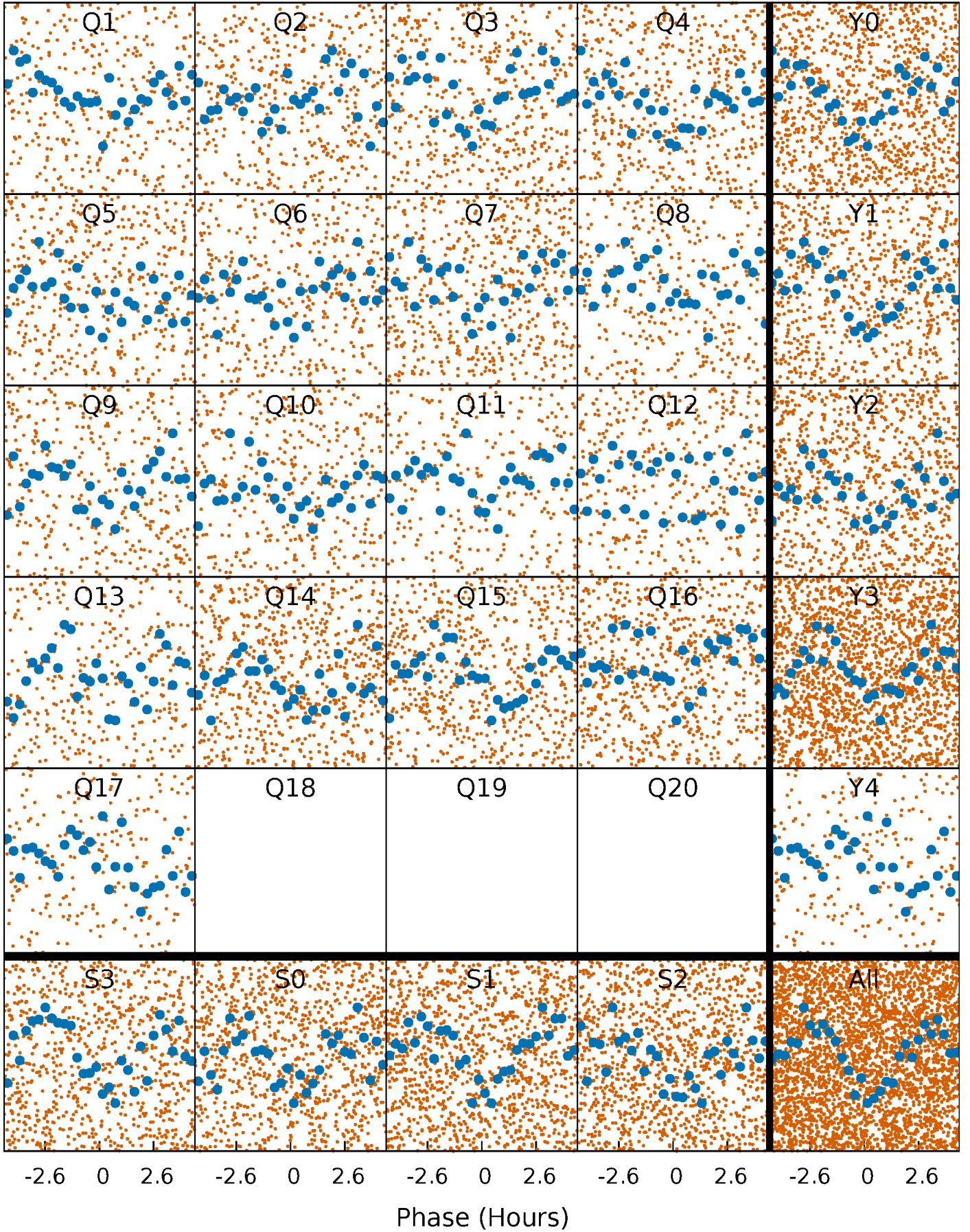


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



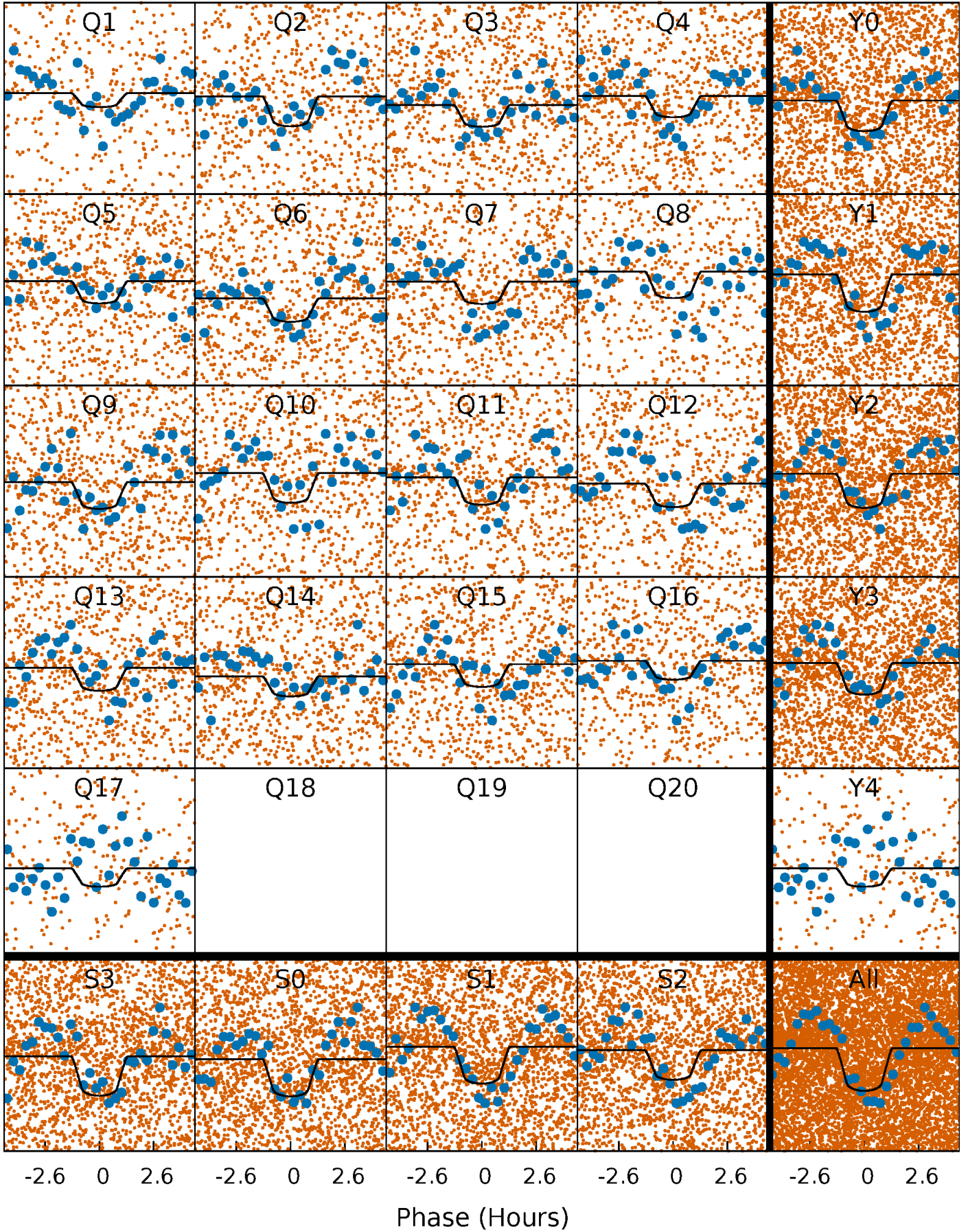
PDC Quarter-Phased Transit Curves

TCE 009178502-02 P= 0.721352 Days $T_0=131.944554$ (BKJD)



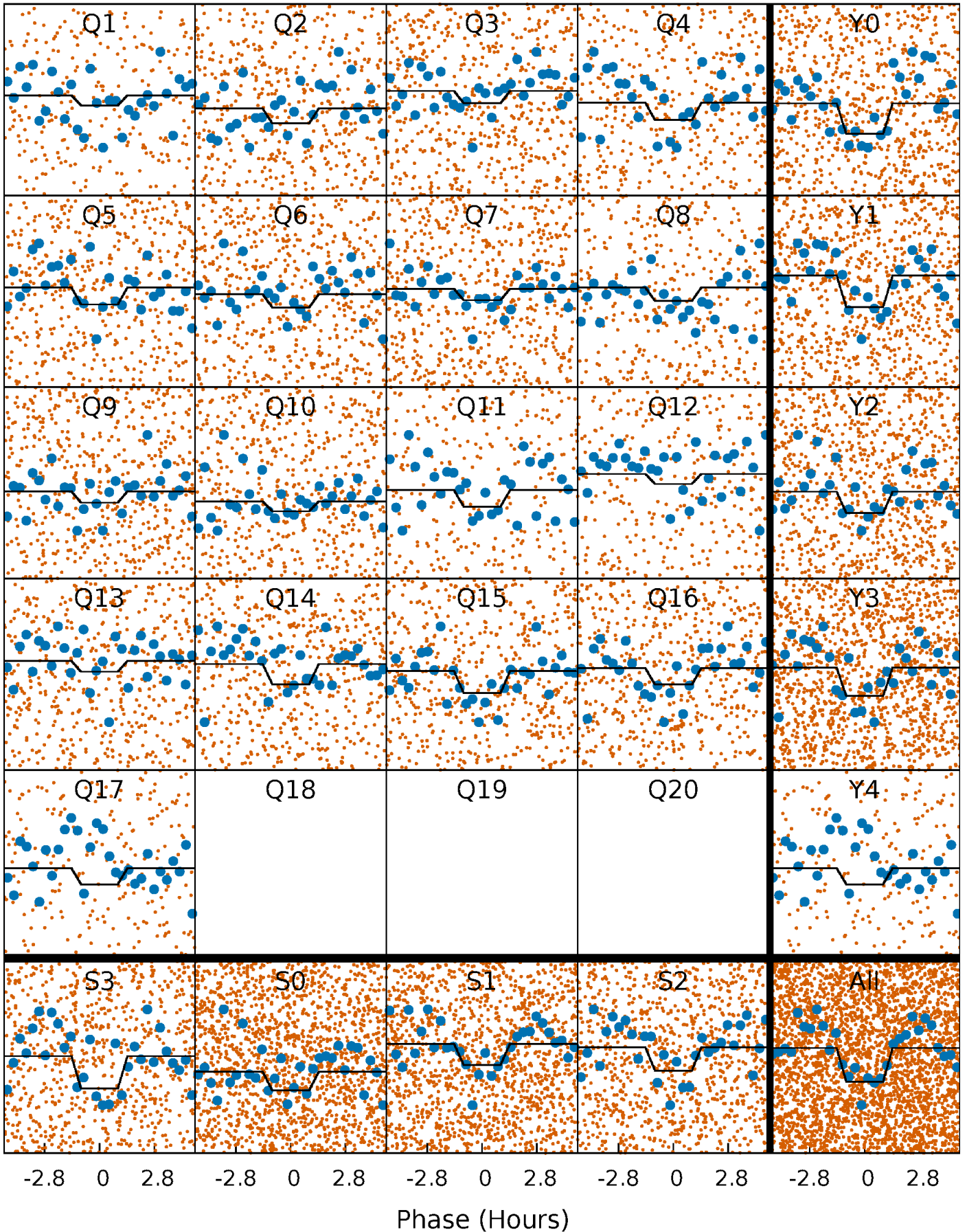
DV Quarter-Phased Transit Curves

TCE 009178502-02 P= 0.721352 Days $T_0=131.944554$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

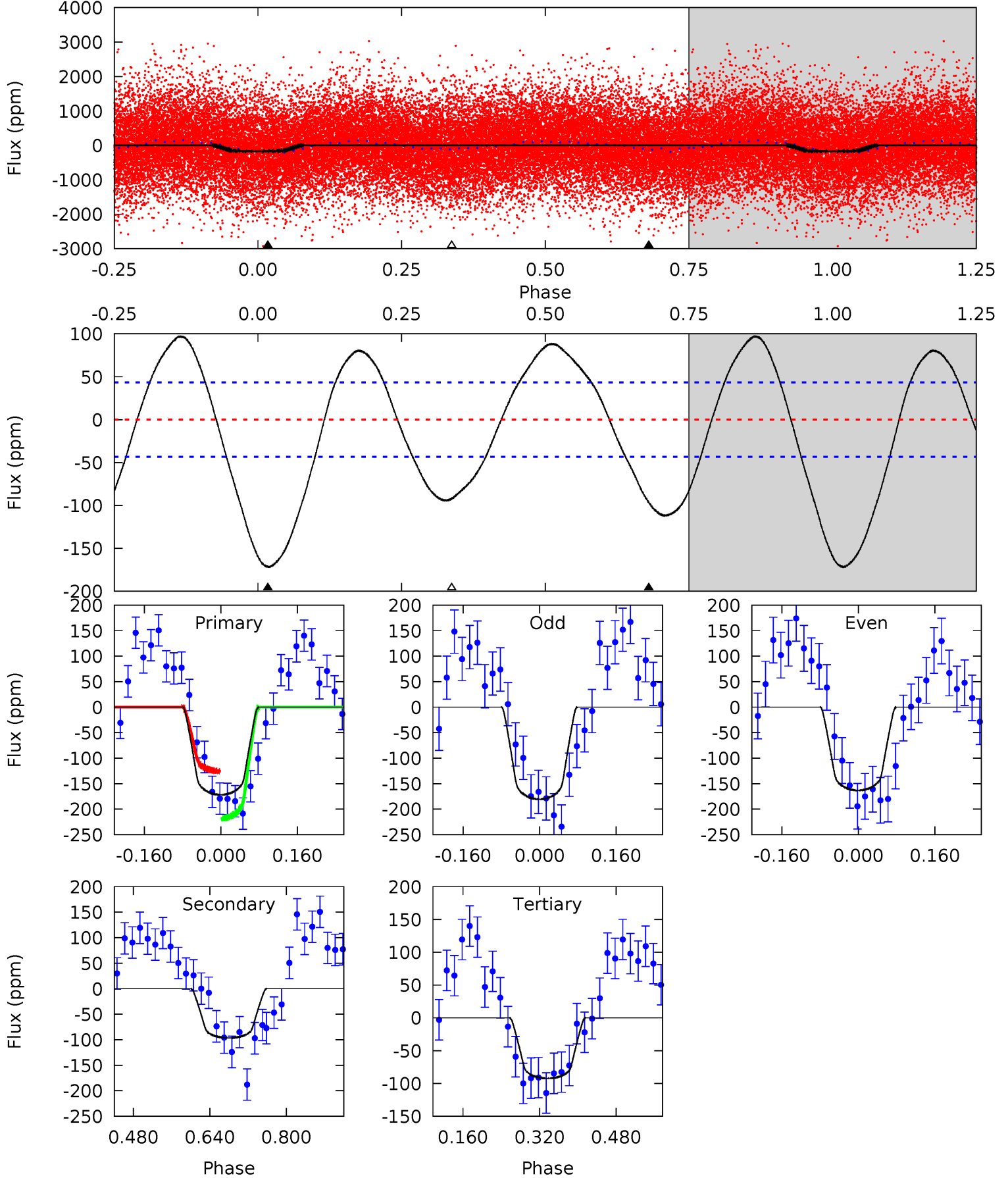
TCE 009178502-02 P= 0.721370 Days $T_0=131.940331$ (BKJD)



DV Model-Shift Uniqueness Test

009178502-02, P = 0.721352 Days, E = 131.944554 Days

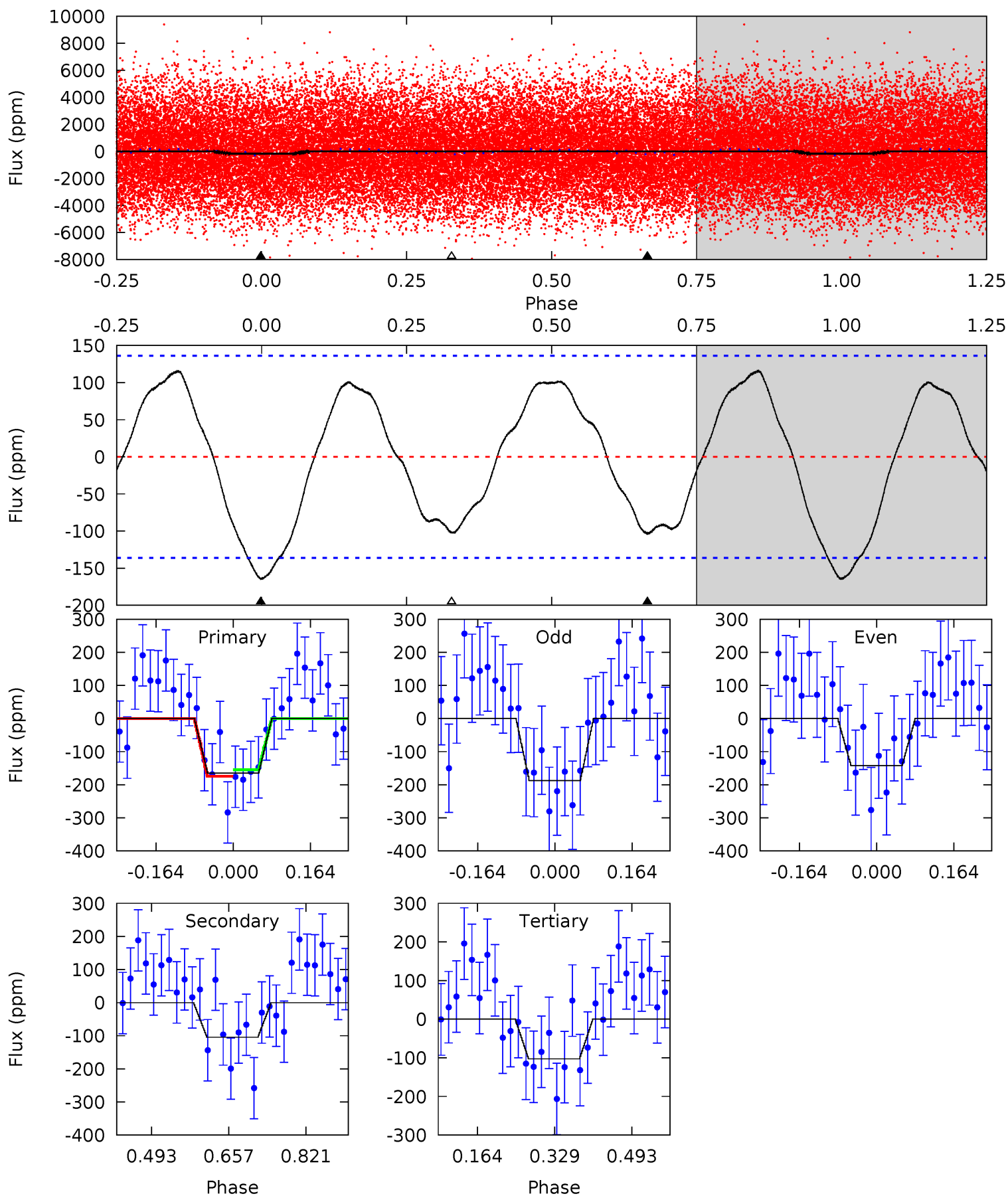
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
17.7	9.93	9.49	0	4.47	1.41	6.68	8.20	17.7	0.44	9.93	0.88	1.00	0.36	4.67



Alt Model-Shift Uniqueness Test

009178502-02, P = 0.721370 Days, E = 131.940331 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.40	3.42	3.37	0	4.46	1.39	2.30	2.04	5.40	0.05	3.42	0.75	0.96	0.41	0.32



Stellar Parameters For KIC 009178502

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$
	7416^{+205}_{-333}	$3.915^{+0.266}_{-0.143}$	$-0.060^{+0.200}_{-0.350}$	$2.426^{+0.477}_{-0.818}$	$1.765^{+0.193}_{-0.386}$	$0.174^{+0.352}_{-0.065}$
	+3%/-4%	+7%/-4%	+333%/-583%	+20%/-34%	+11%/-22%	+202%/-38%
Source	KIC0	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 009178502-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	A_{obs}
DV	-96 ± 10	$3.32^{+1.62}_{-1.47}$	5083^{+388}_{-442}	5867^{+2615}_{-1028}	$1.674^{+3.619}_{-0.890}$
Alt.	-104 ± 31	$3.19^{+1.60}_{-1.32}$	5103^{+347}_{-447}	6198^{+2683}_{-1322}	$1.943^{+3.748}_{-1.135}$

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

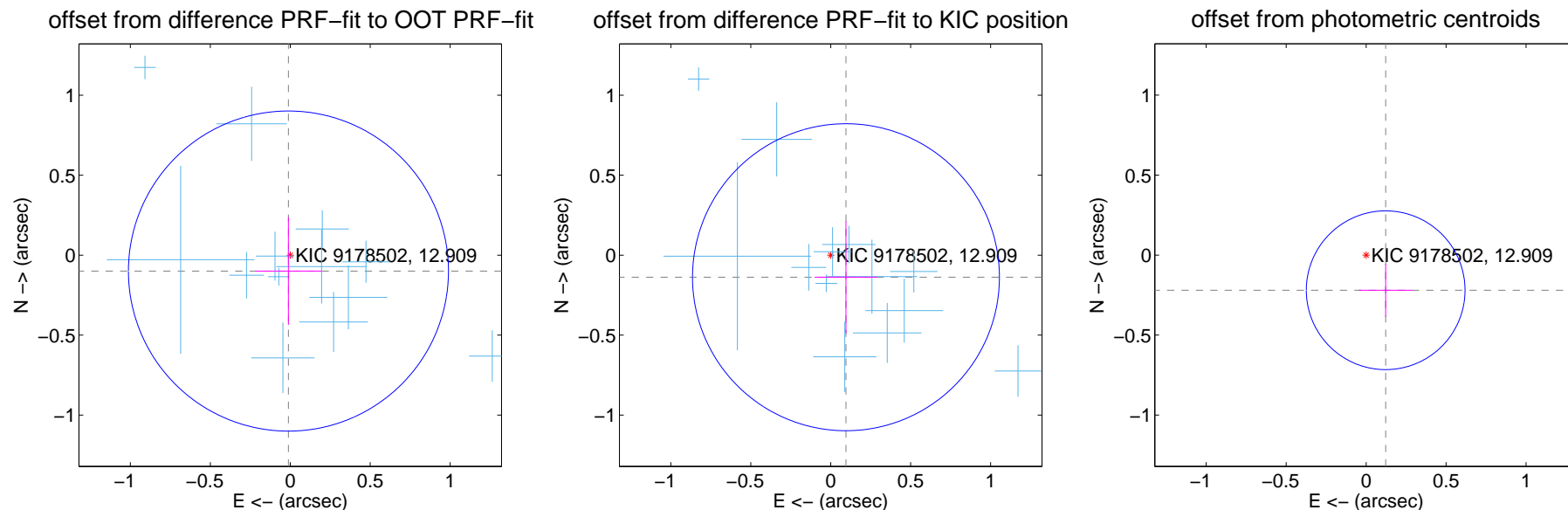
DV Centroid Data

Supplemental centroid analysis for 009178502-02. Kepler magnitude: 12.91. Transit SNR 10.78

There are 14 quarters with good PRF difference image offsets

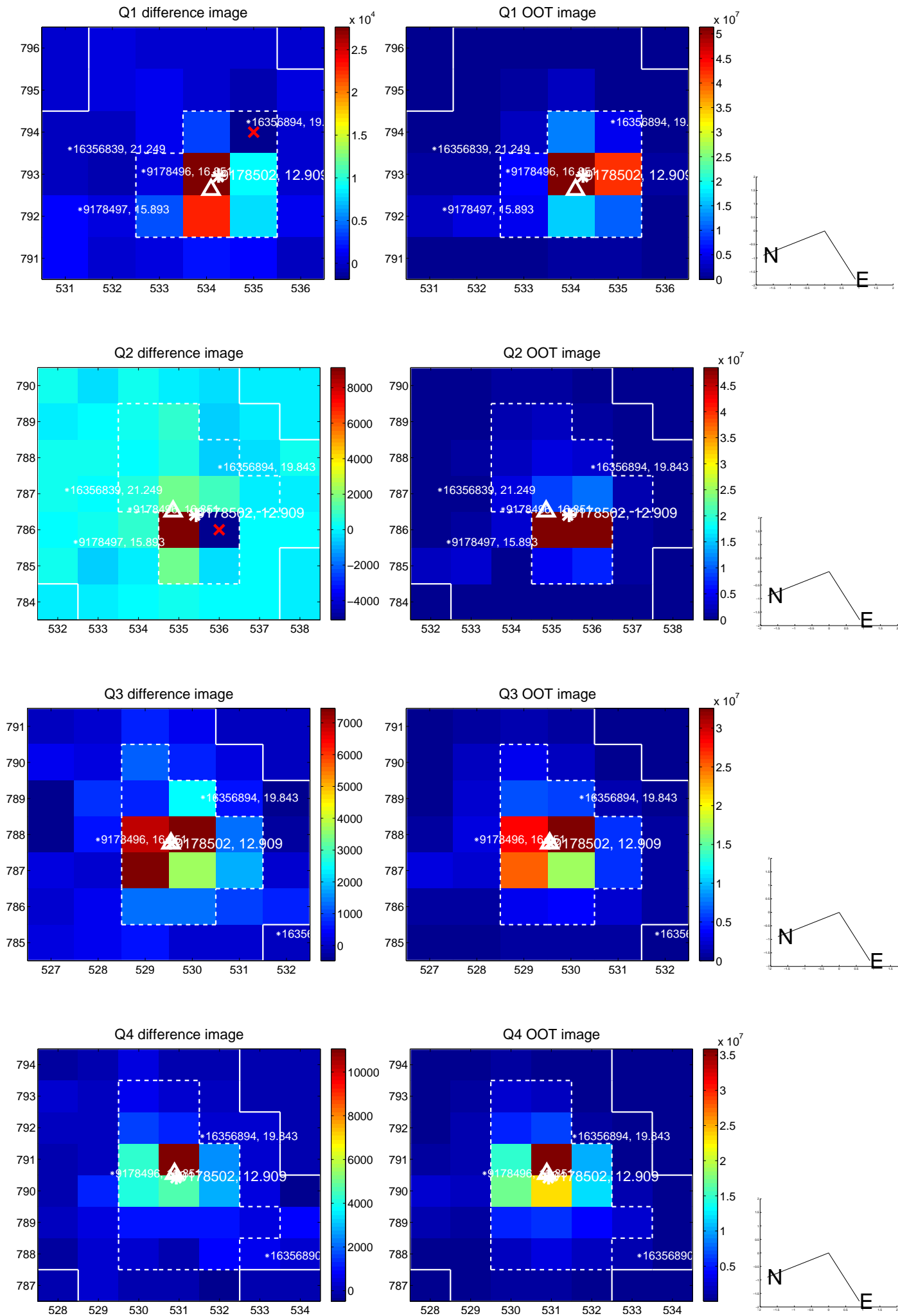
The direct PRF centroid is offset from the target star catalog position by about 0.10 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.100 ± 0.334	0.30	0.011 ± 0.207	-0.100 ± 0.337
PRF-fit source offset from KIC position	0.168 ± 0.320	0.52	-0.095 ± 0.196	-0.138 ± 0.350
photometric centroid source offset	0.25 ± 0.17	1.52	-0.12 ± 0.17	-0.22 ± 0.17

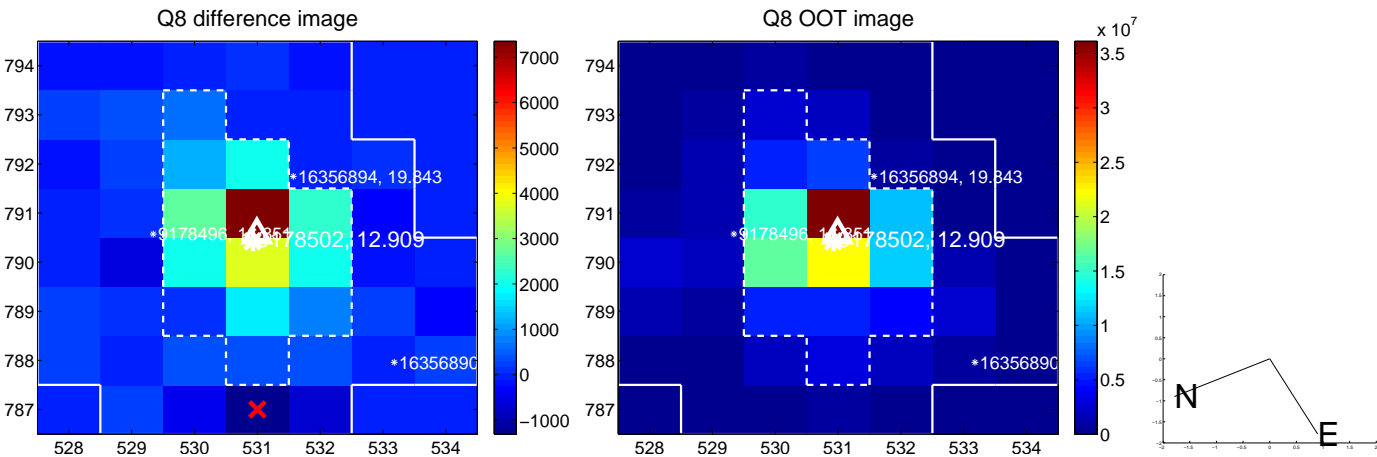
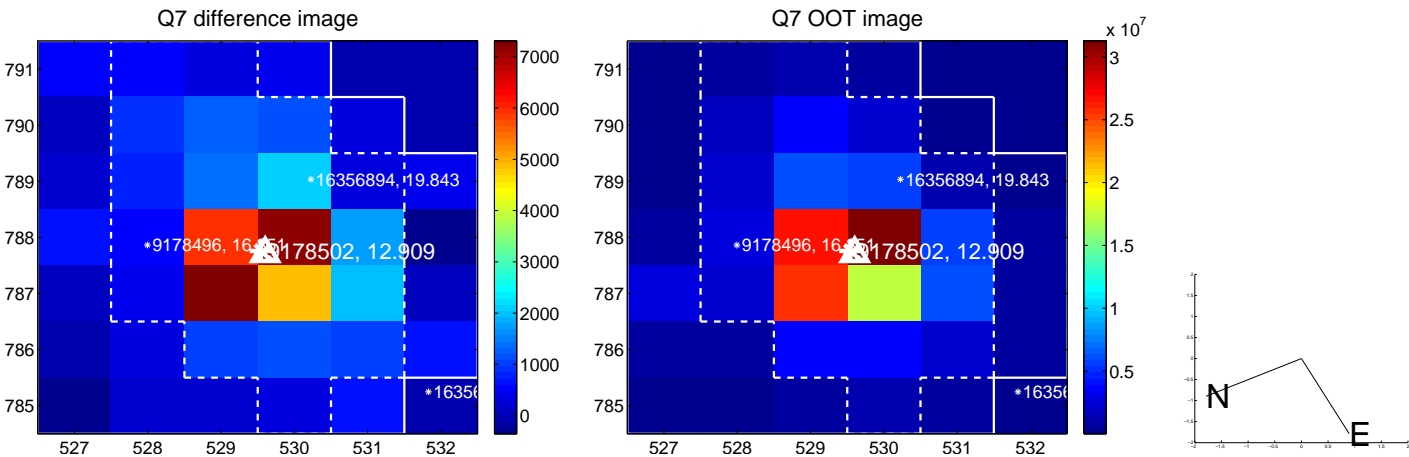
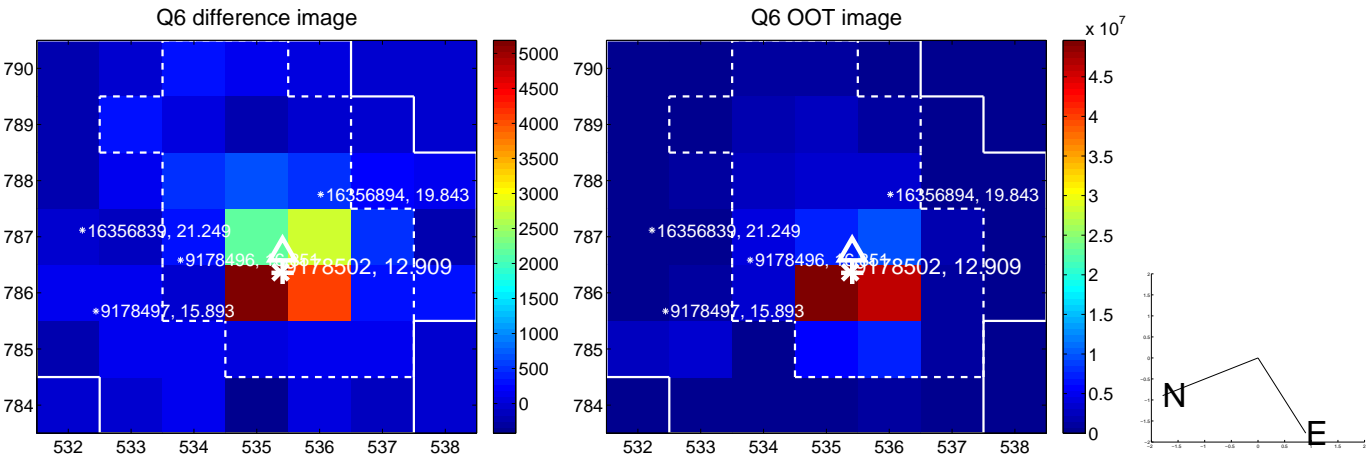
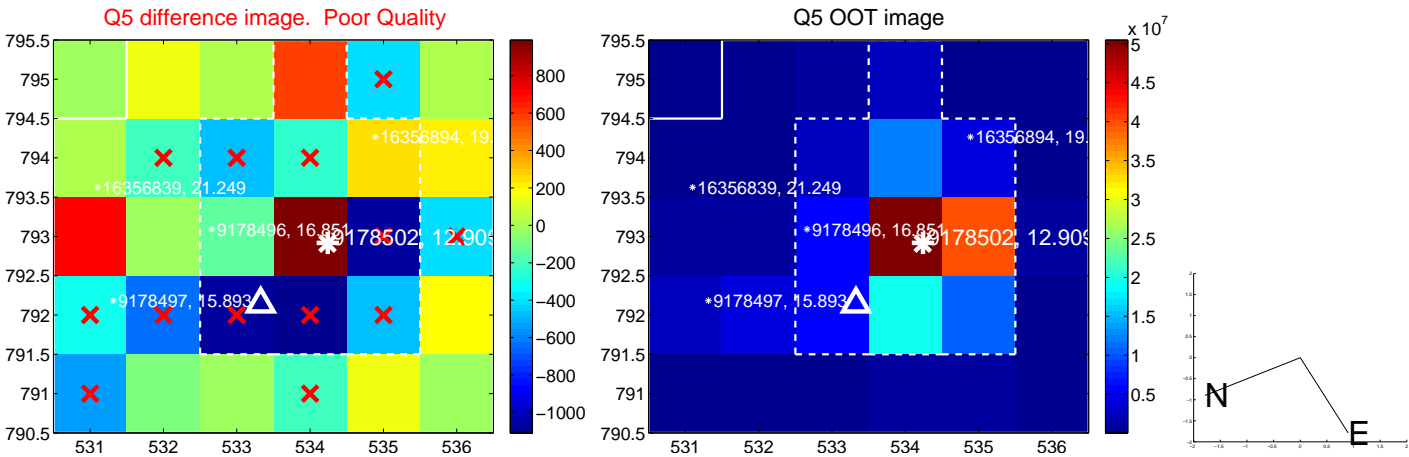


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

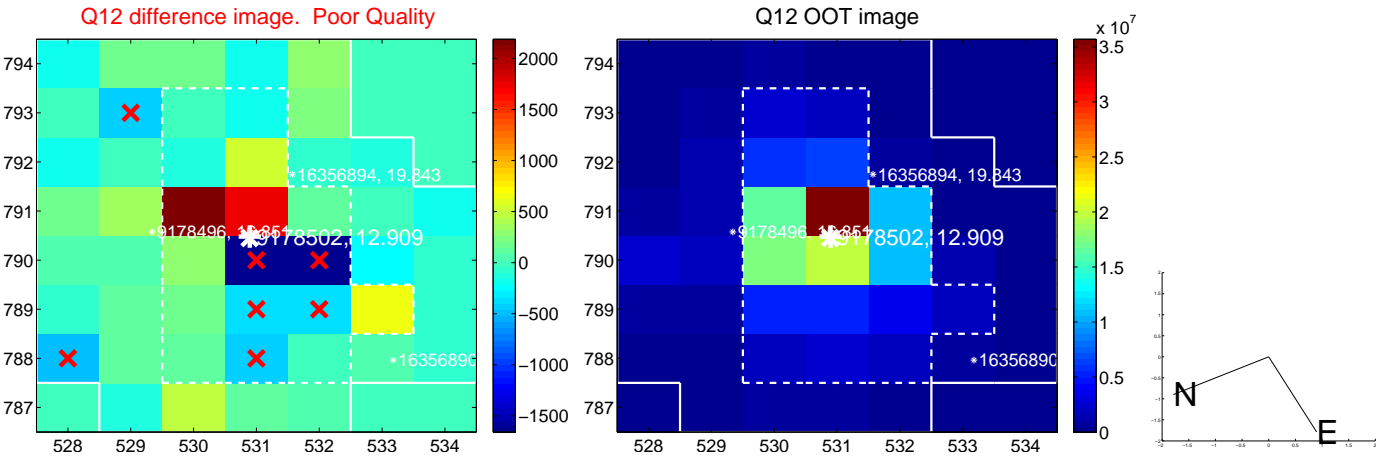
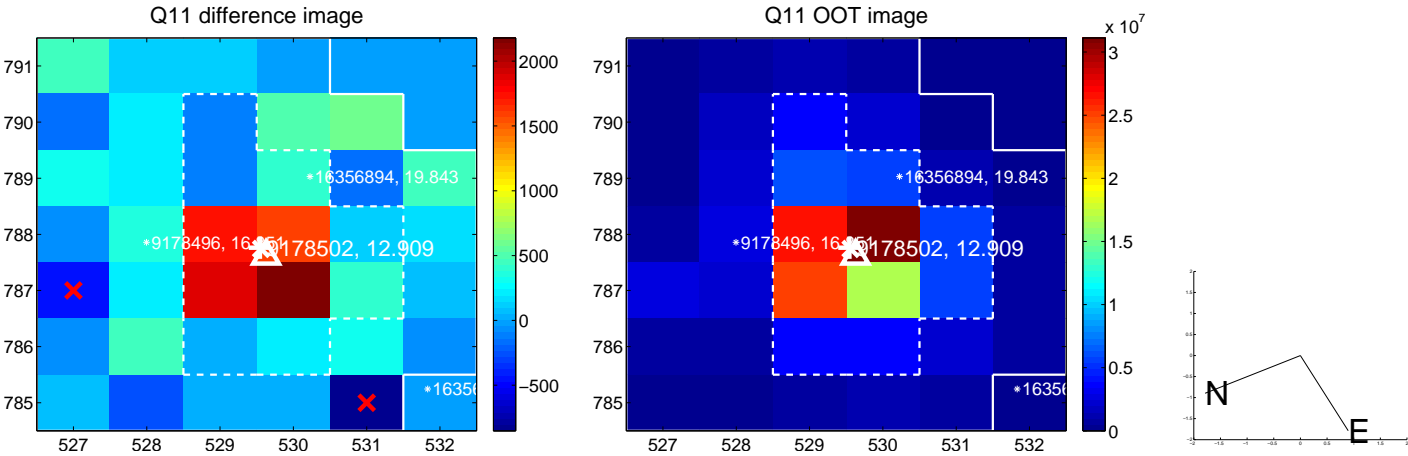
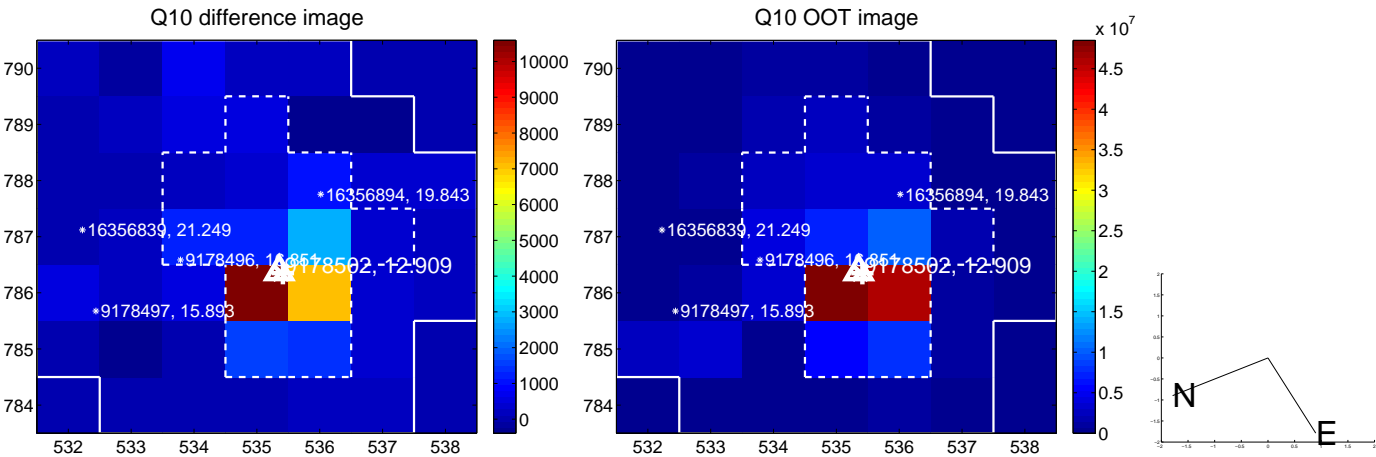
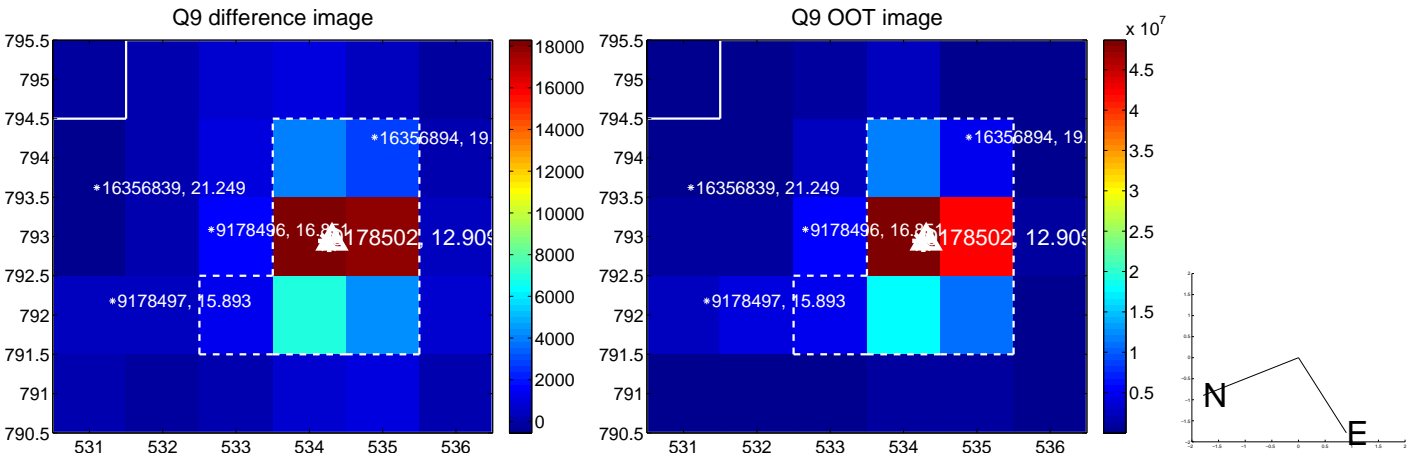
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



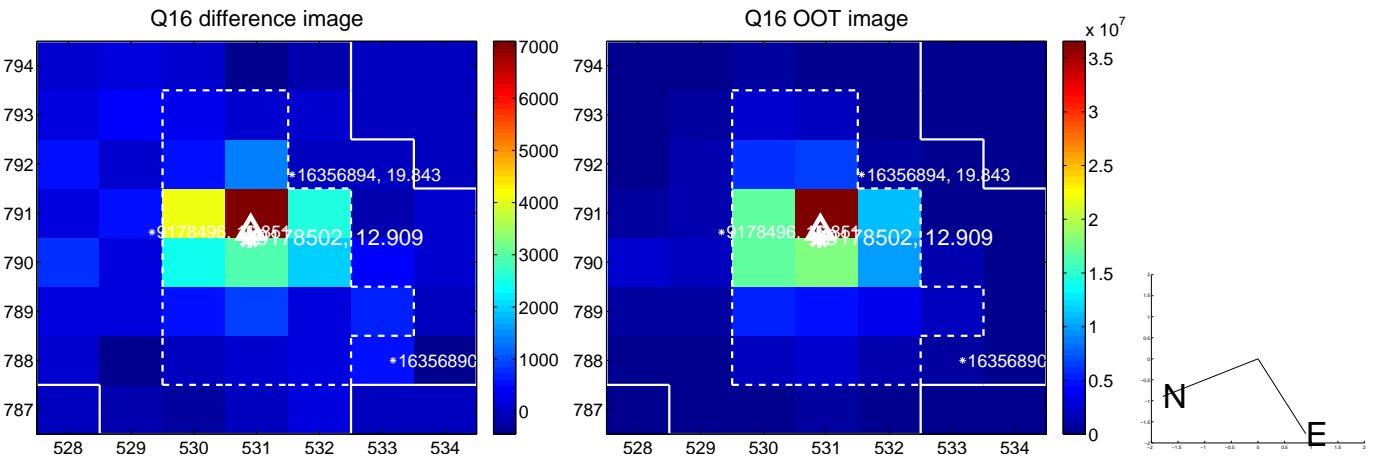
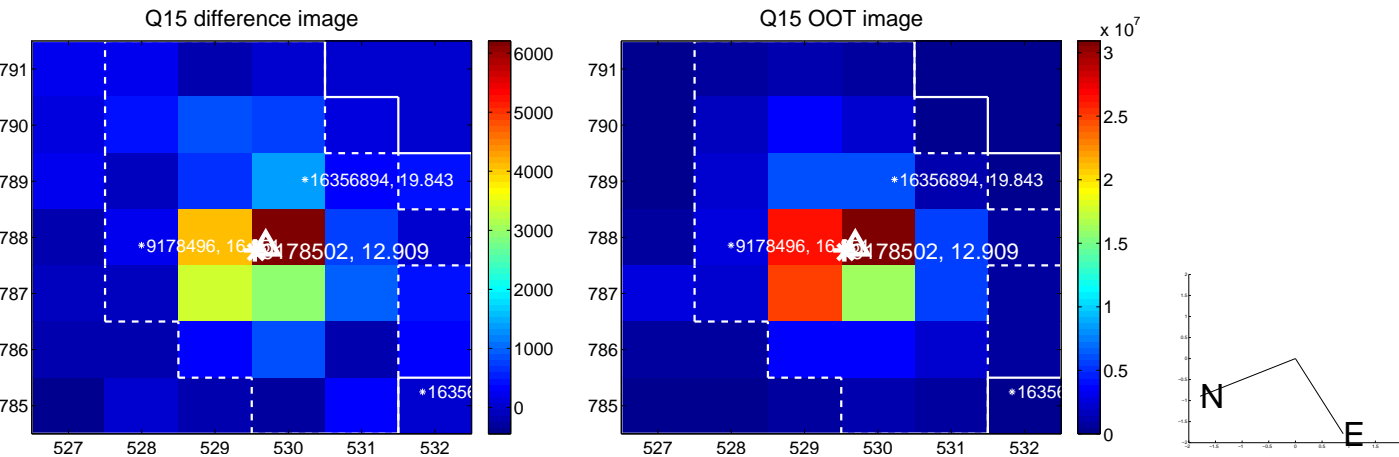
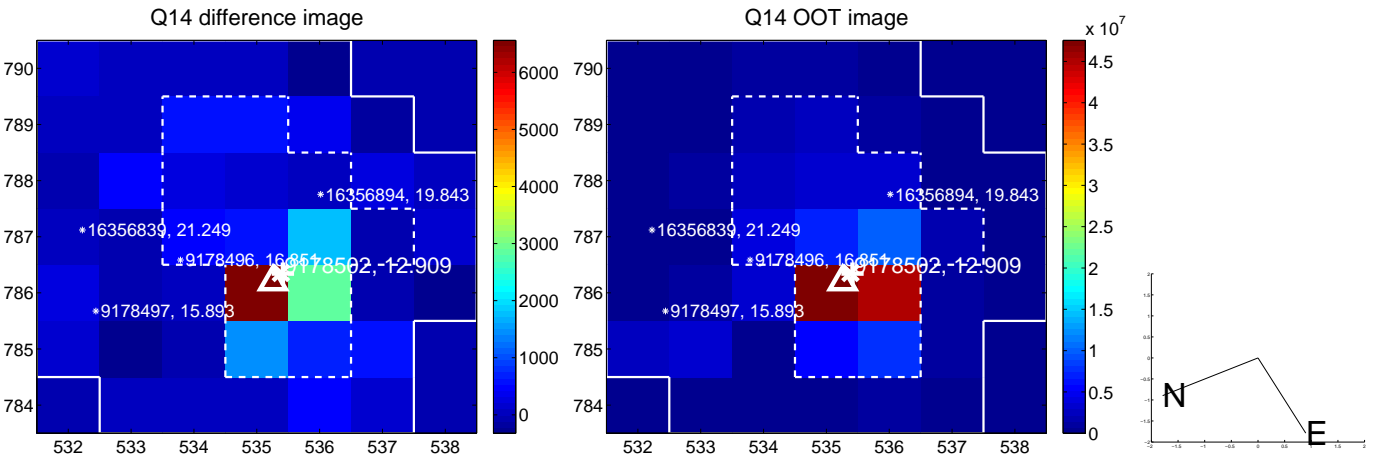
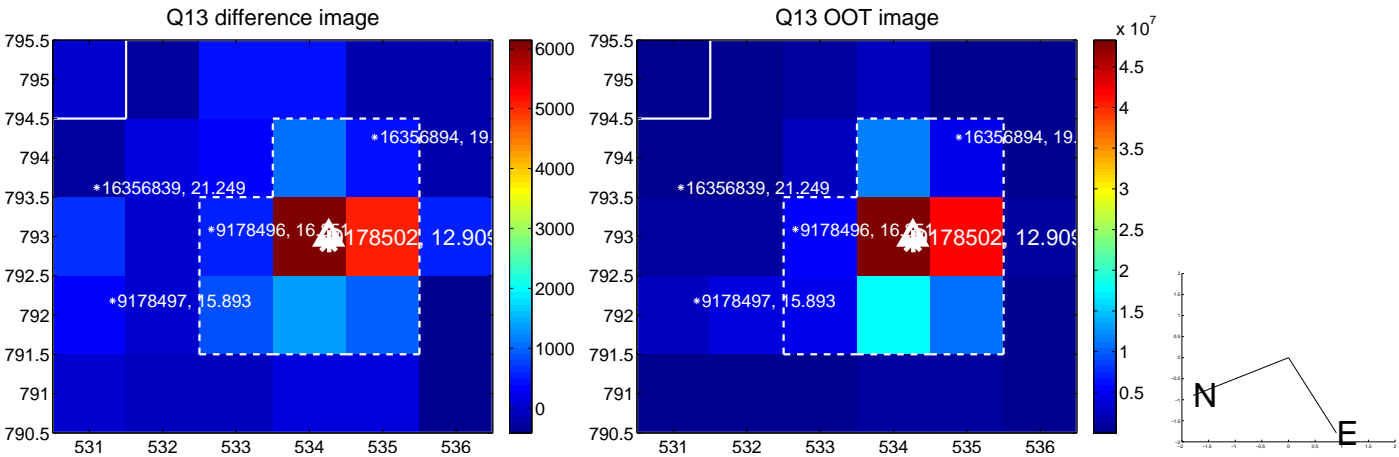
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



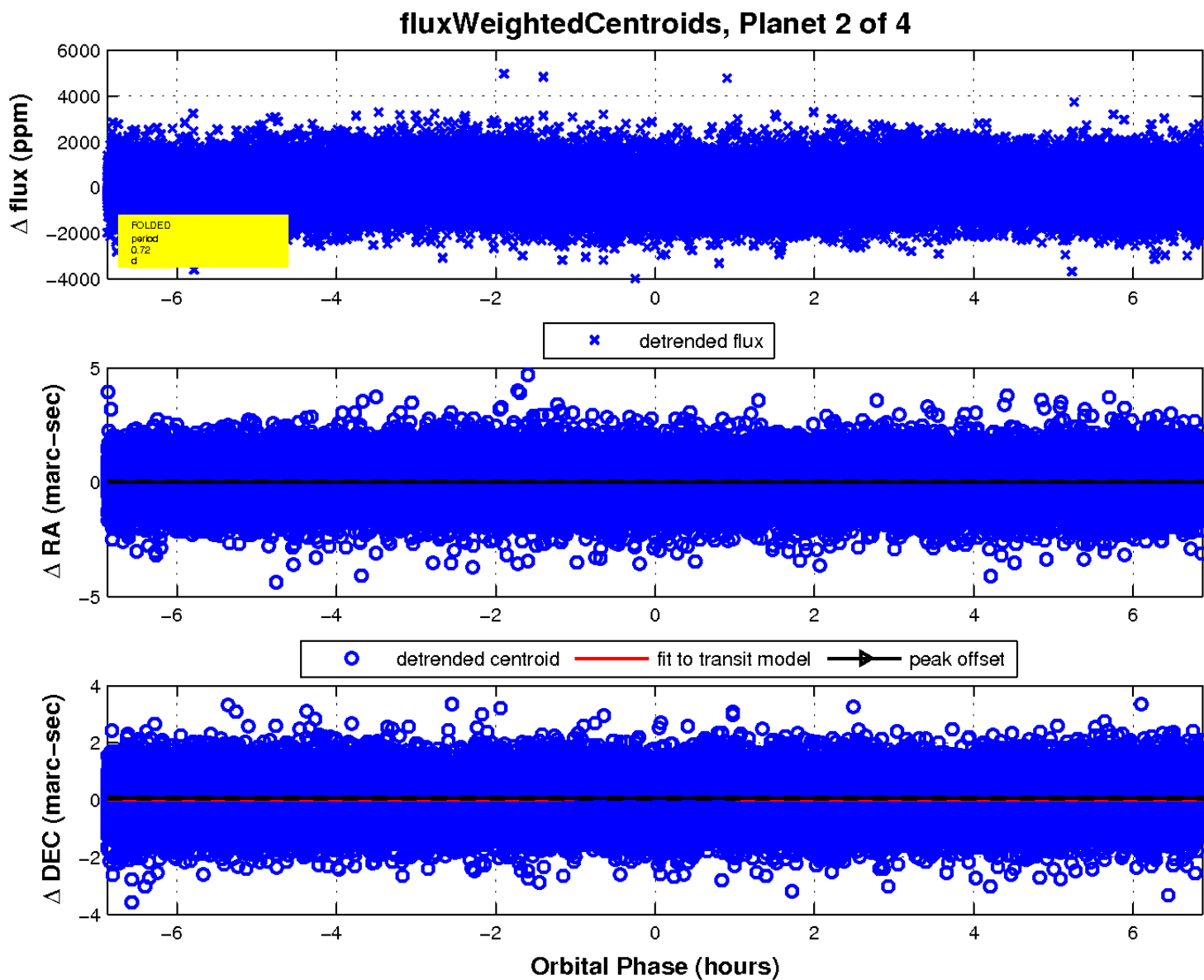
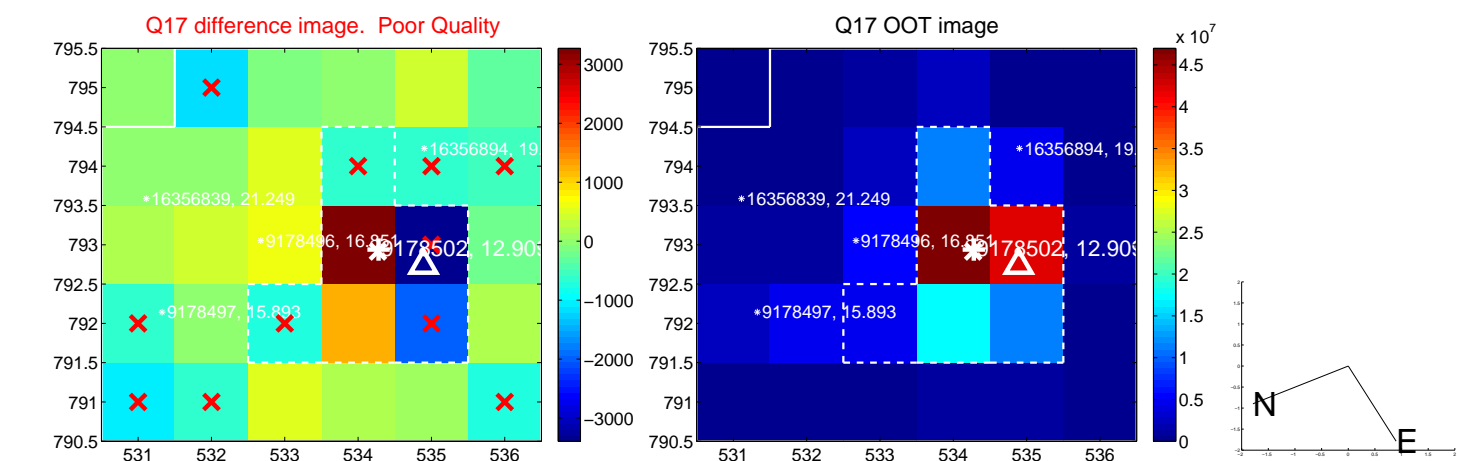
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



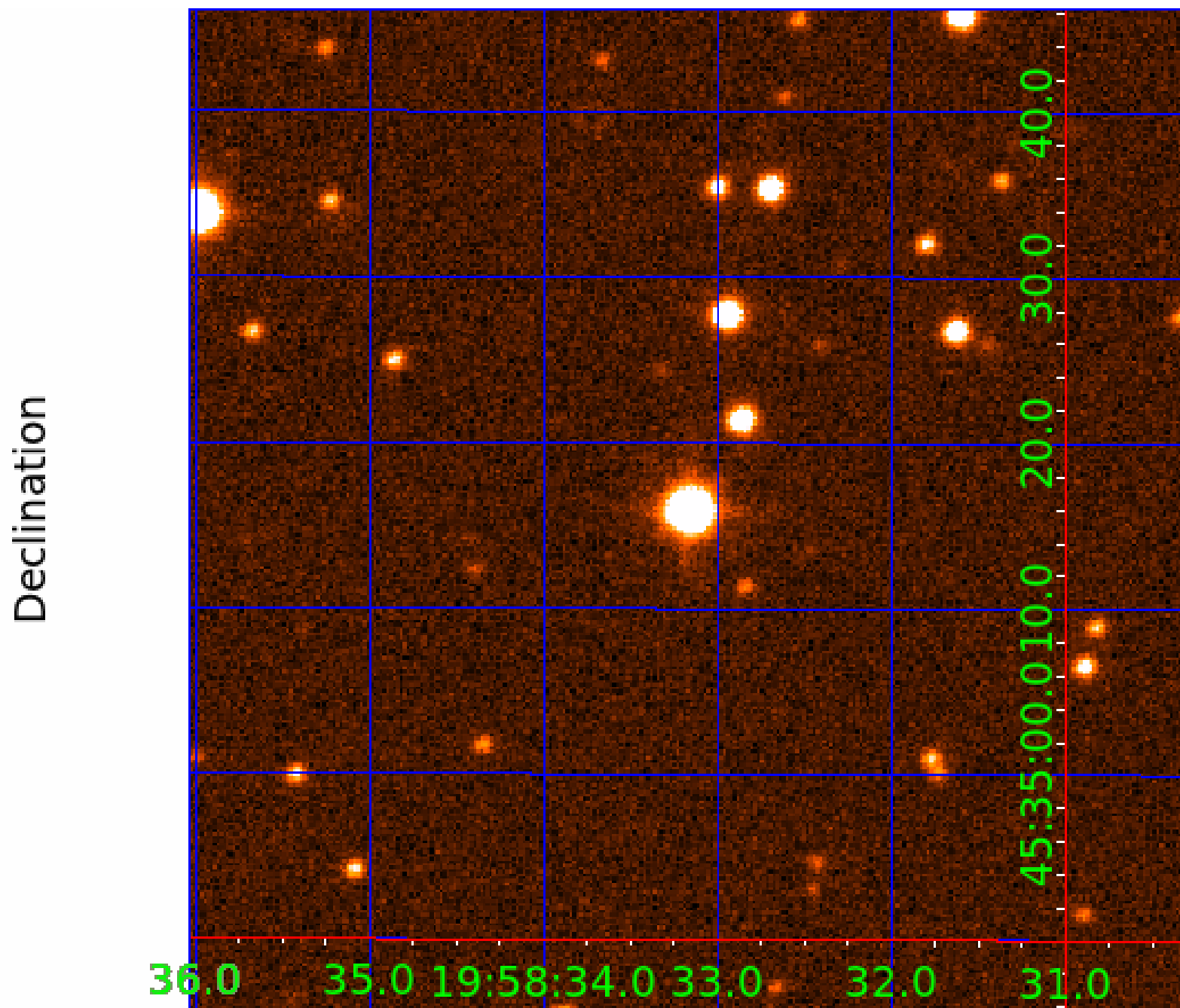
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



UKIRT Image



KIC 009178502

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})
009178502-01	OBS	No	2.709993	131.568889	95.3	9.000	11.5	-1.0	2.43	7416	2.40	7542.98
009178502-02	OBS	No	0.721352	131.944554	158.2	2.291	10.6	10.8	2.43	7416	3.50	44052.55
009178502-03	OBS	No	21.603550	133.779463	816.5	2.120	9.4	9.7	2.43	7416	7.04	473.66
009178502-04	OBS	No	46.180358	154.710750	1083.9	4.473	8.9	8.3	2.43	7416	8.88	172.01

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009178502-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—CENT_NOFITS
009178502-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
009178502-03	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_ALT—MOD_POS_ALT
009178502-04	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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.

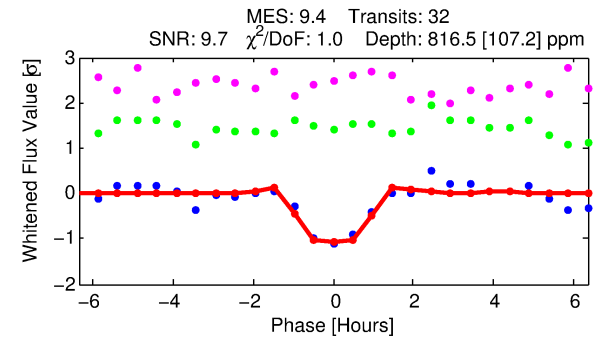
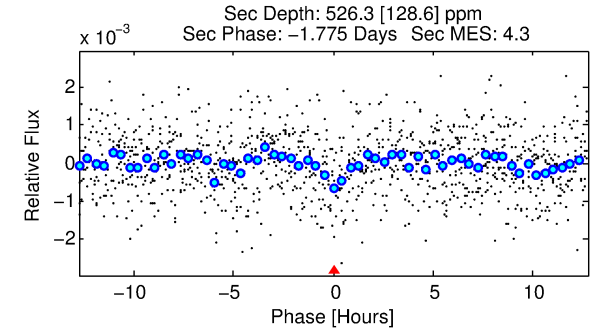
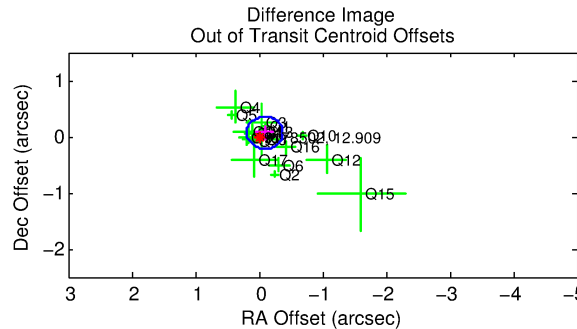
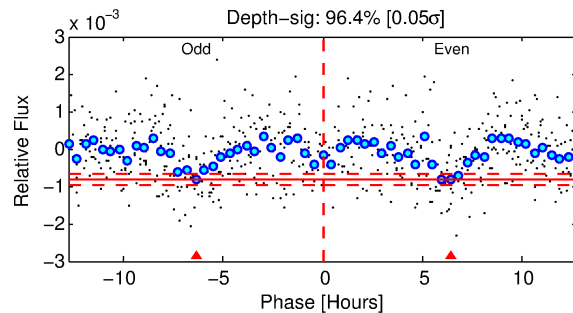
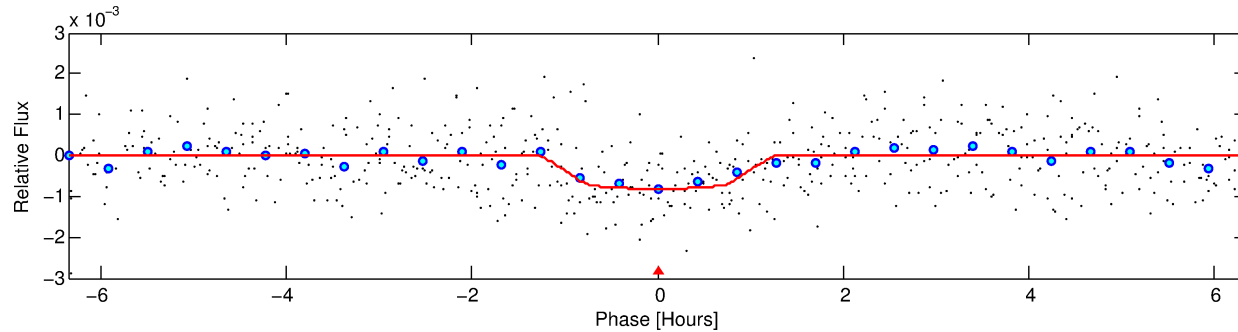
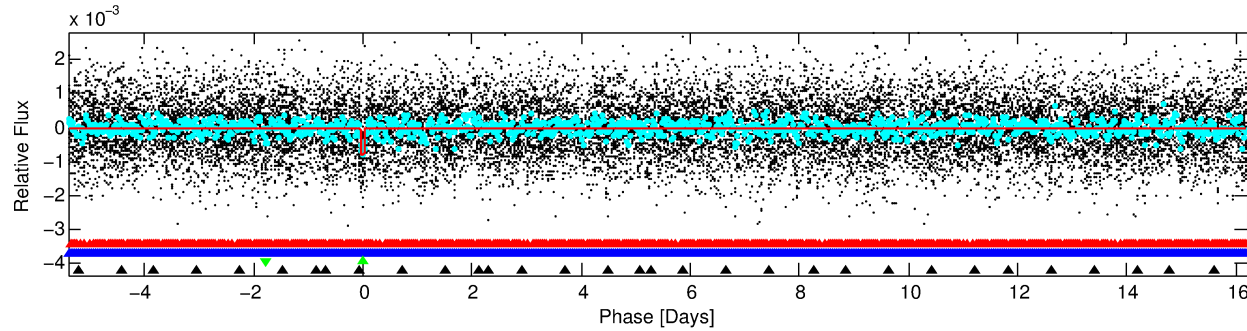
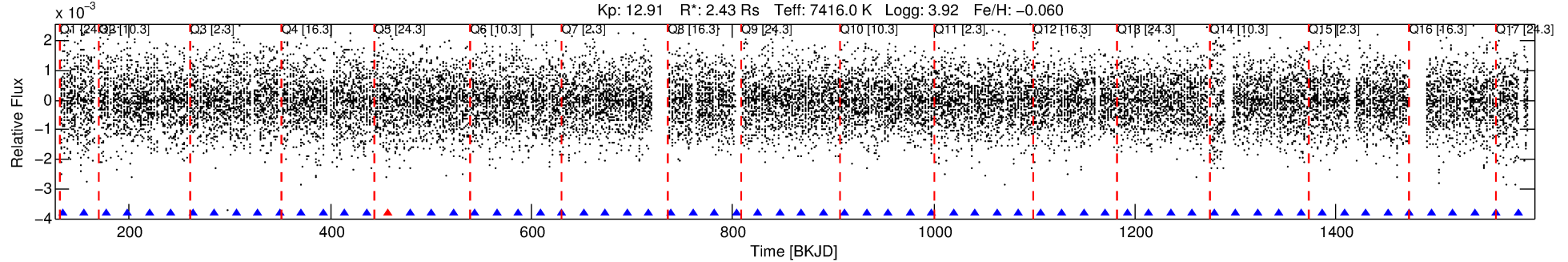
Ephemeris Match Information For 009178502-03

No Significant Match Found

DV One-Page Summary

KIC: 9178502 Candidate: 3 of 4 Period: 21.604 d
KOI: K05634 Corr: No Ephemeris Match

Kp: 12.91 R*: 2.43 Rs Teff: 7416.0 K Logg: 3.92 Fe/H: -0.060



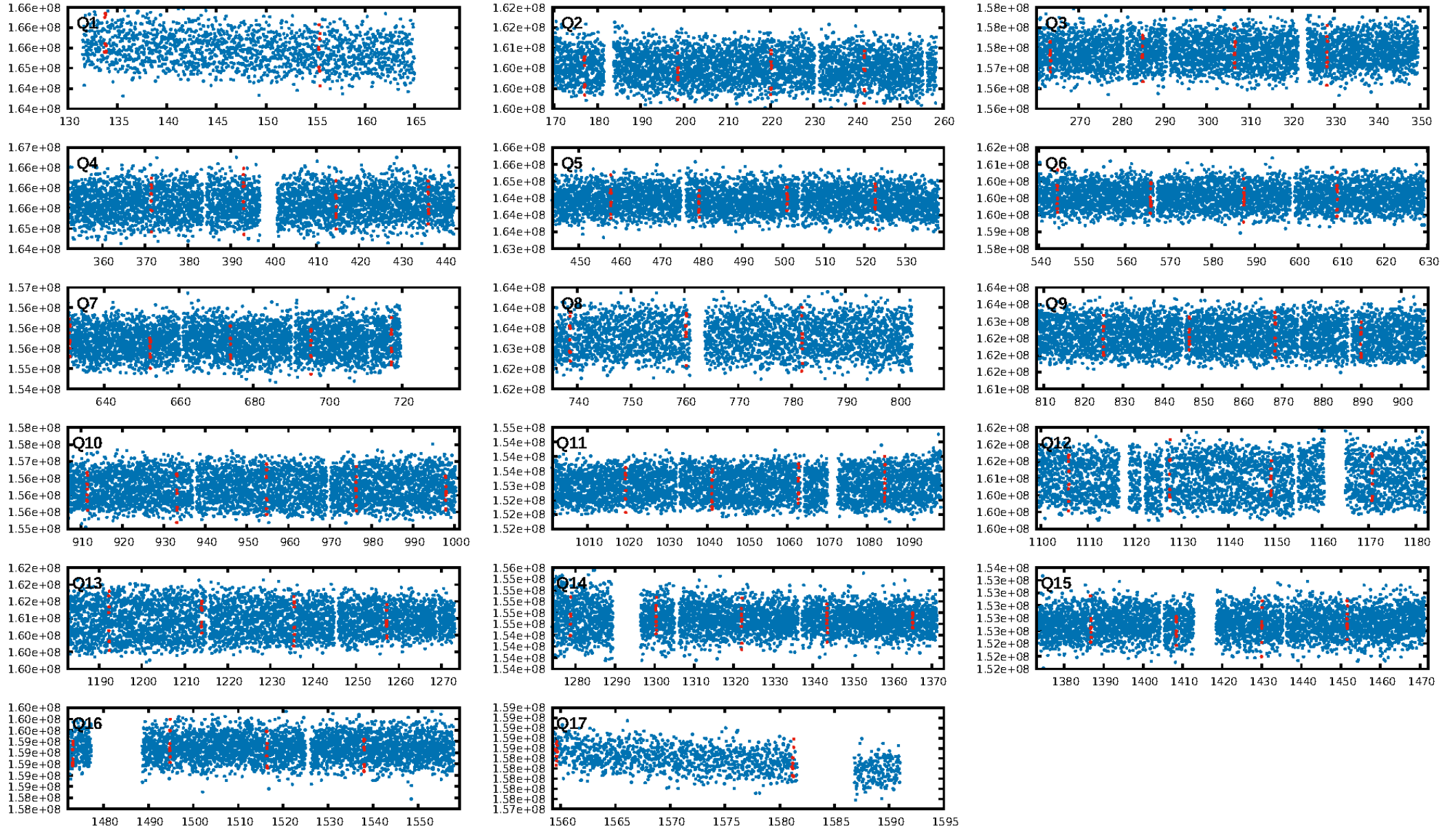
DV Fit Results:

Period = 21.60355 [0.00016] d
Epoch = 133.7795 [0.0051] BKJD
Rp/R* = 0.0266 [0.0254]
a/R* = 79.90 [447.08]
b = 0.00 [4247.37]
Seff = 473.66 [236.60]
Teq = 1190 [149] K
Rp = 7.04 [7.13] Re
a = 0.1835 [0.0557] AU
Ag = 196.82 [390.20] [0.50σ]
Teffp = 6889 [3333] K [1.71σ]

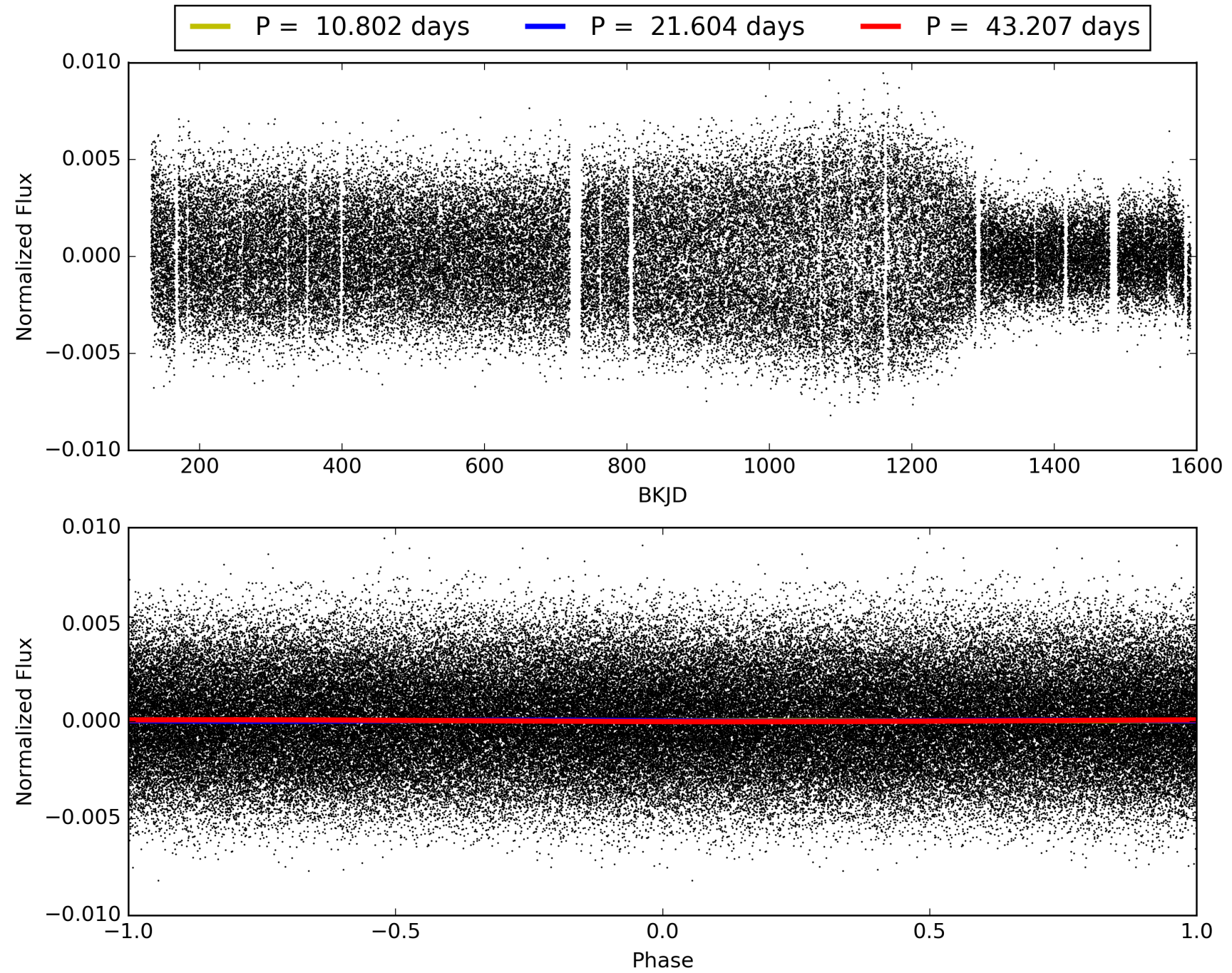
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [49.04σ]
LongPeriod-sig: 100.0% [119.16σ]
ModelChiSquare2-sig: 63.8%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 6.86e-15
RollingBand-fgt: 0.97 [30/31]
GhostDiagnostic-chr: 1.744
Centroid-sig: 4.7%
Centroid-so: 0.223 arcsec [1.25σ]
OotOffset-rm: 0.114 arcsec [1.19σ]
KicOffset-rm: 0.154 arcsec [1.16σ]
OotOffset-st: 4/4/4/5 [17]
KicOffset-st: 4/4/4/5 [17]
DiffImageQuality-fgm: 0.65 [11/17]
DiffImageOverlap-fno: 0.06 [1/17]

TCE 009178502-03, PDC Light Curves

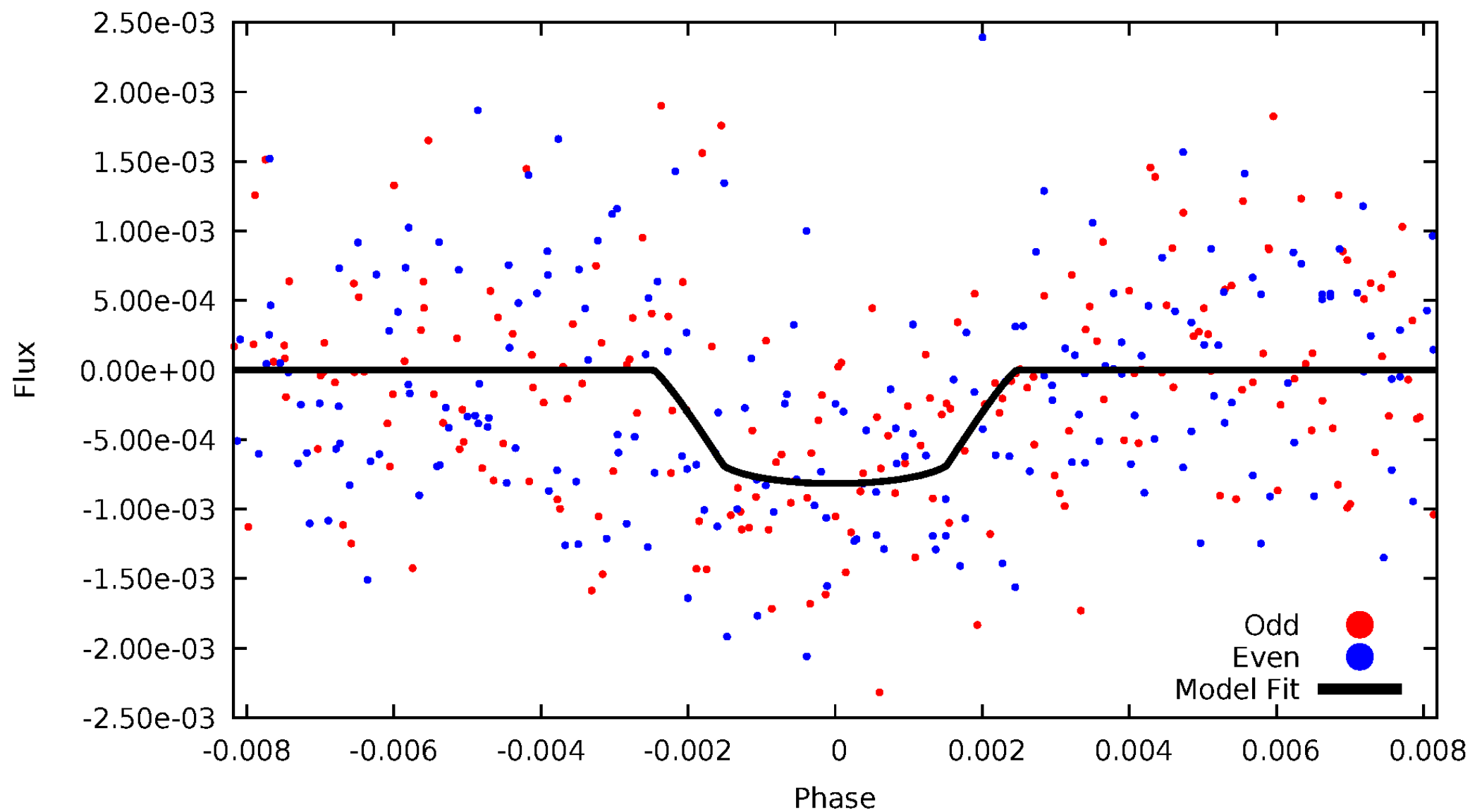


TCE 009178502-03



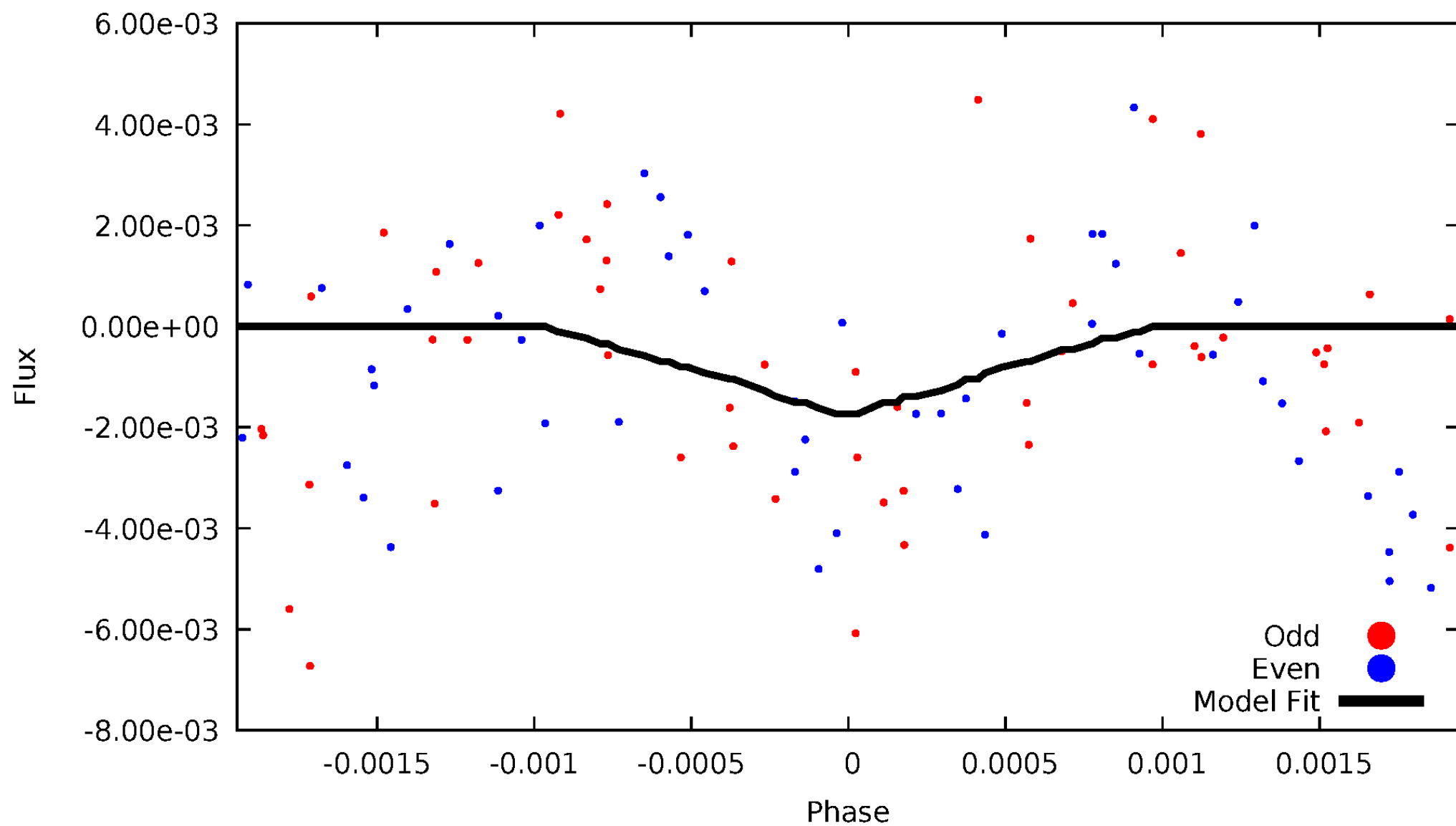
DV Odd/Even

TCE 009178502-03

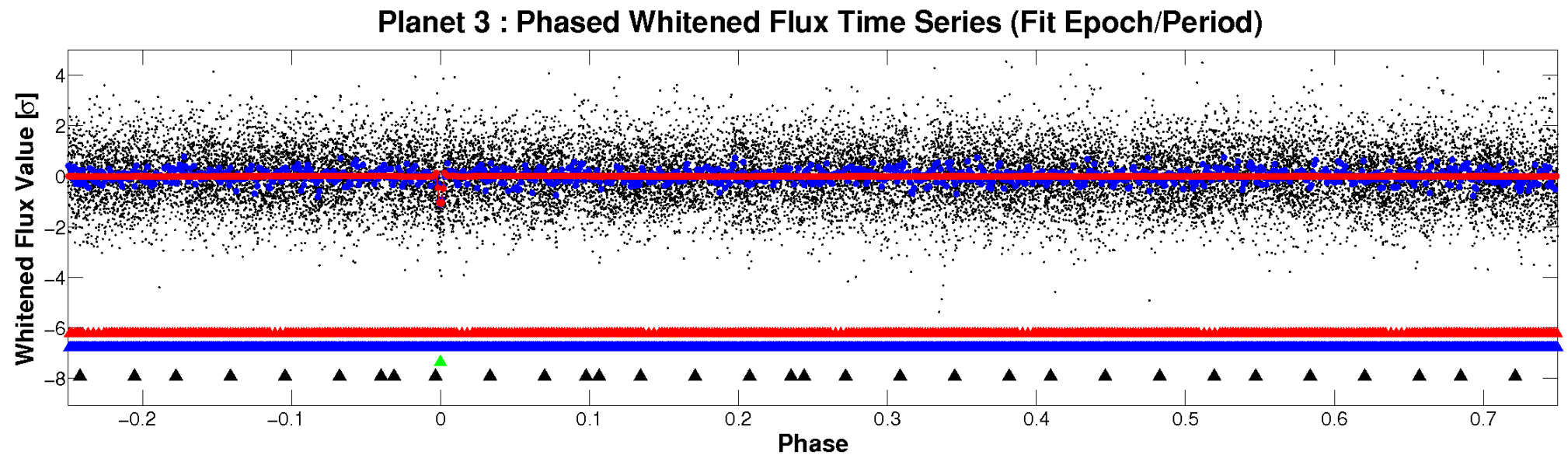
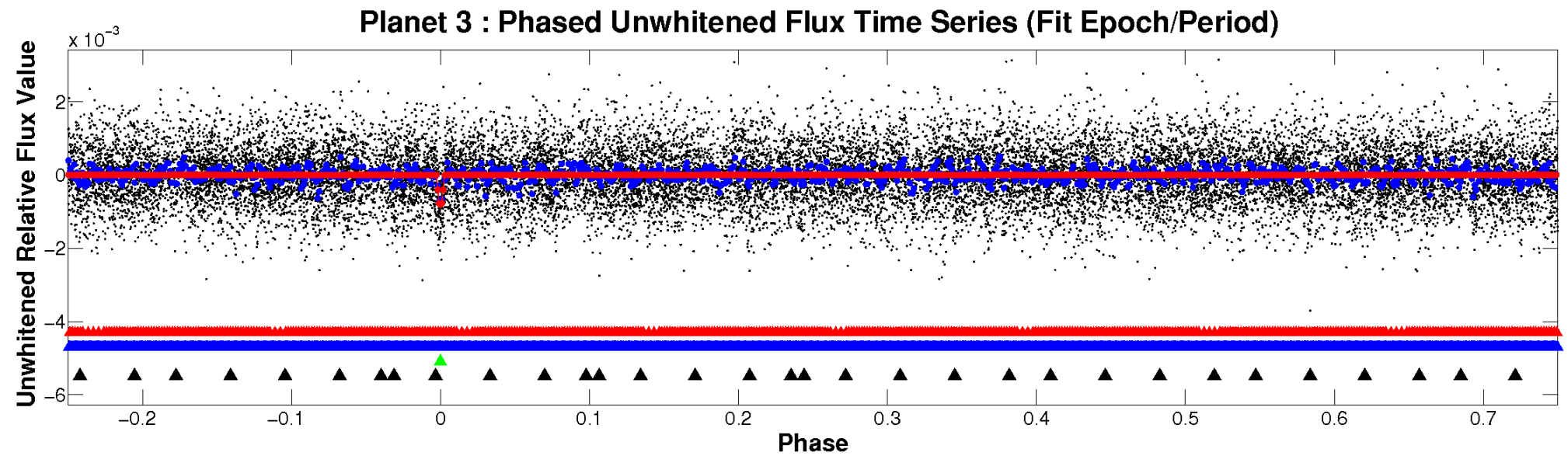


ALT Odd/Even

TCE 009178502-03

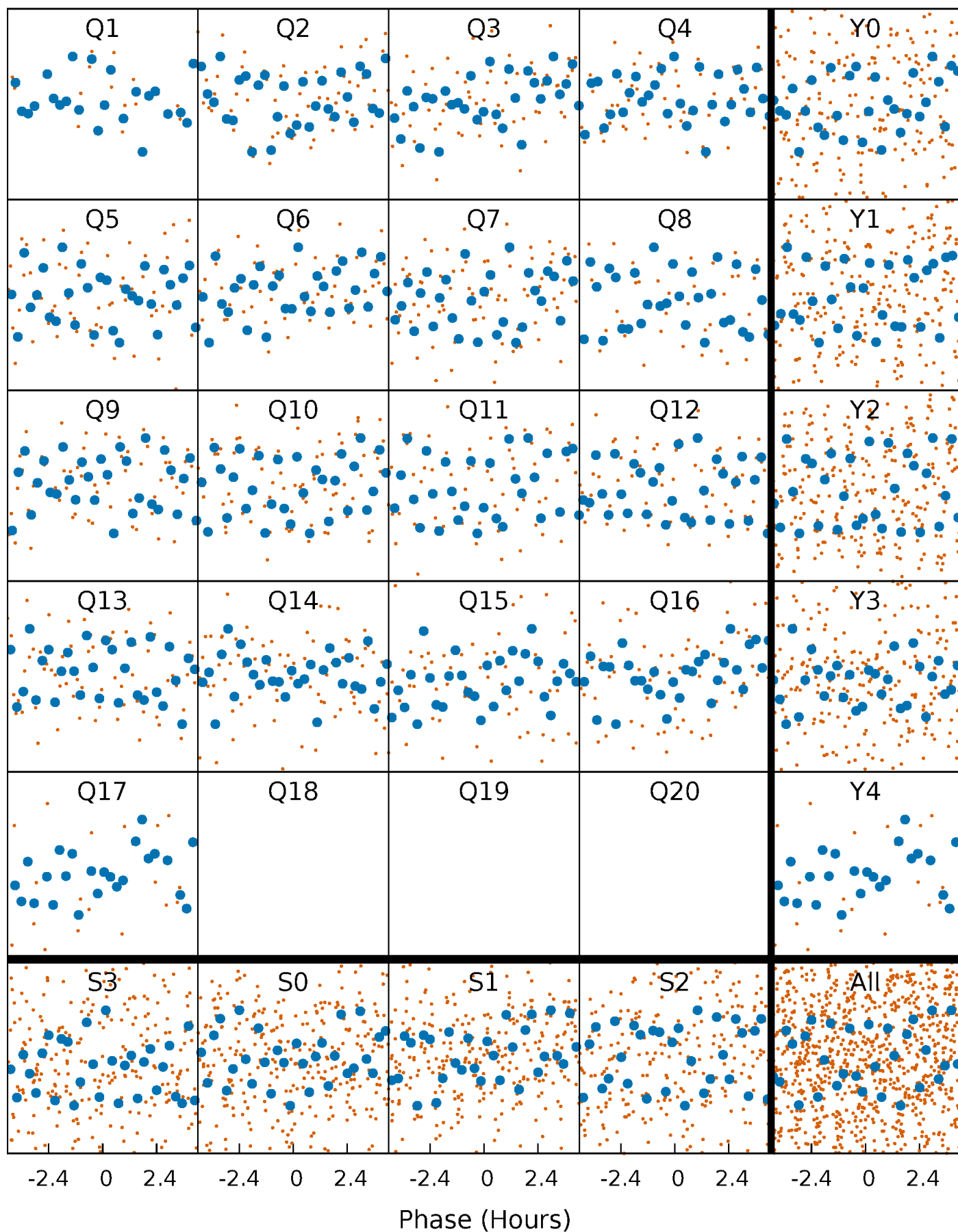


Non-Whitened Vs. Whitened Light Curve



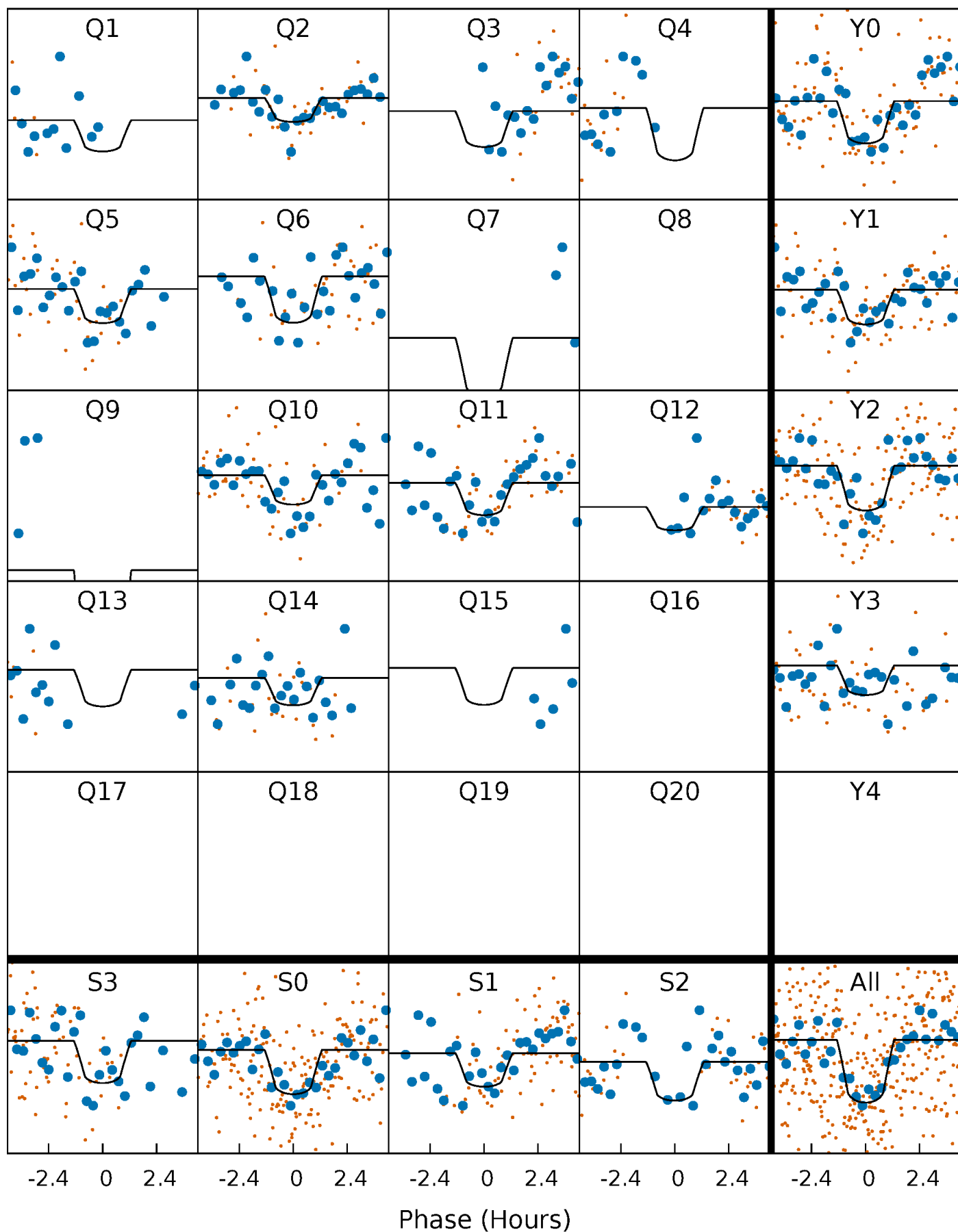
PDC Quarter-Phased Transit Curves

TCE 009178502-03 P= 21.603550 Days $T_0=133.779463$ (BKJD)



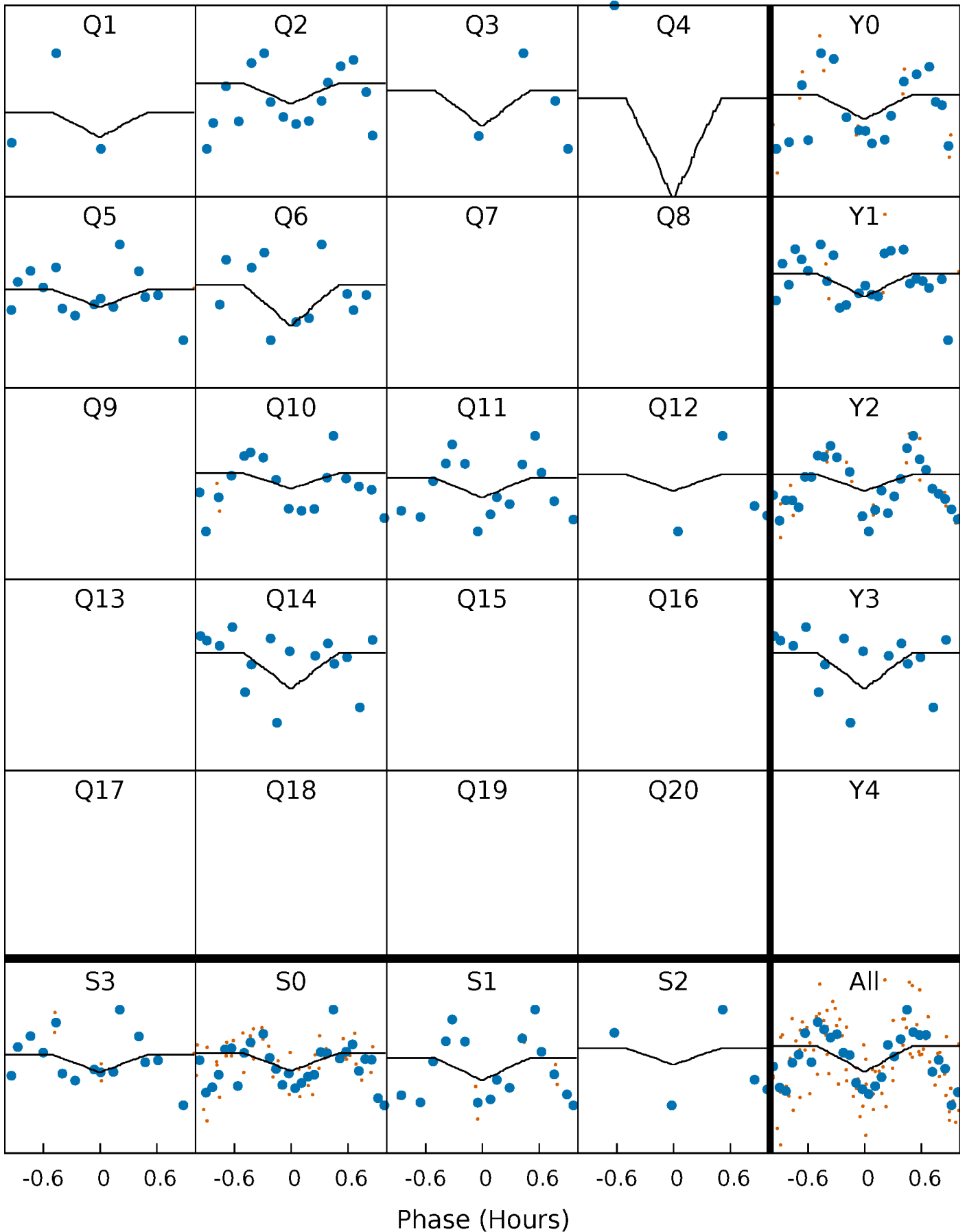
DV Quarter-Phased Transit Curves

TCE 009178502-03 P= 21.603550 Days $T_0=133.779463$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

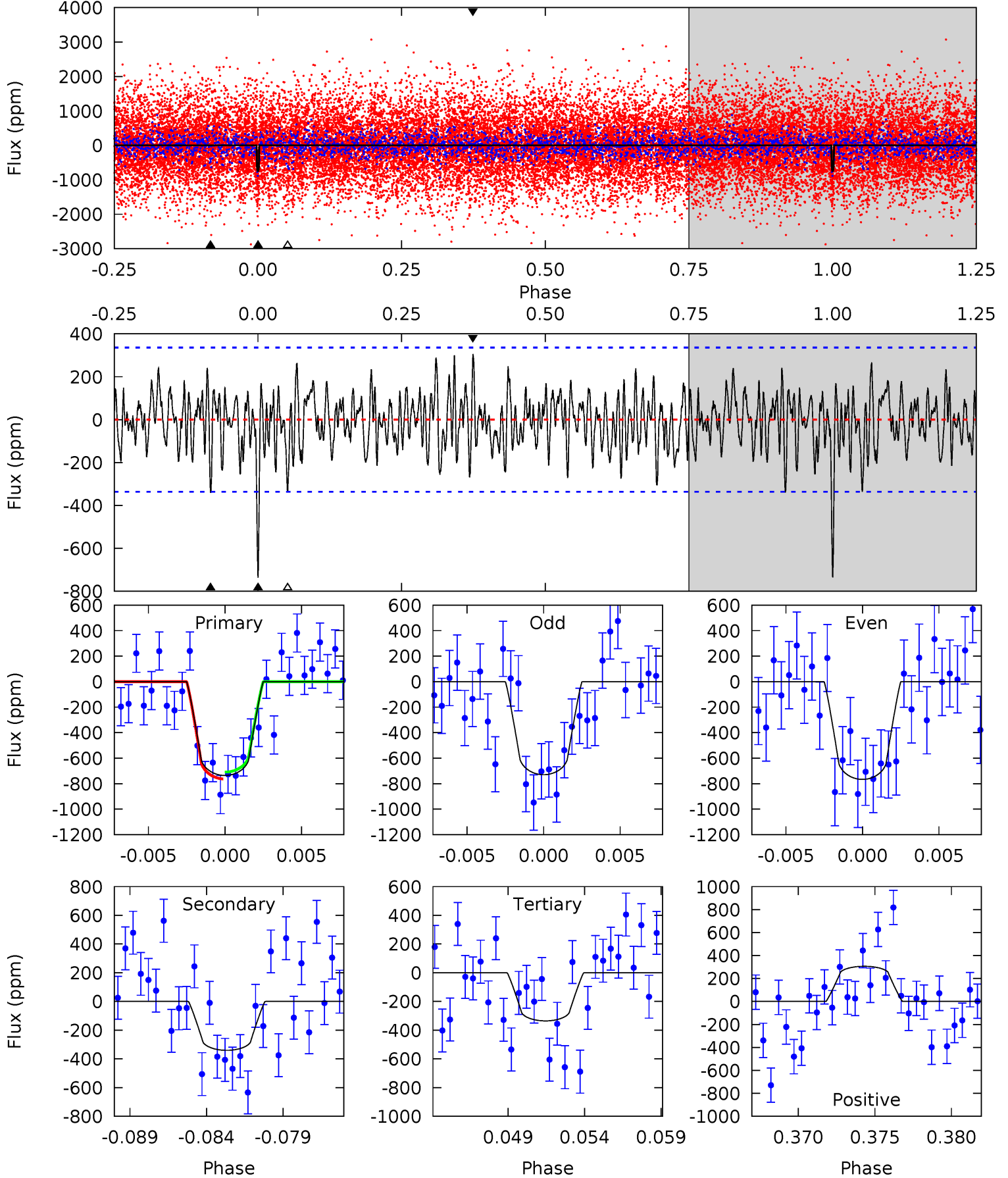
TCE 009178502-03 P= 21.603365 Days $T_0=133.775150$ (BKJD)



DV Model-Shift Uniqueness Test

009178502-03, $P = 21.603550$ Days, $E = 112.175913$ Days

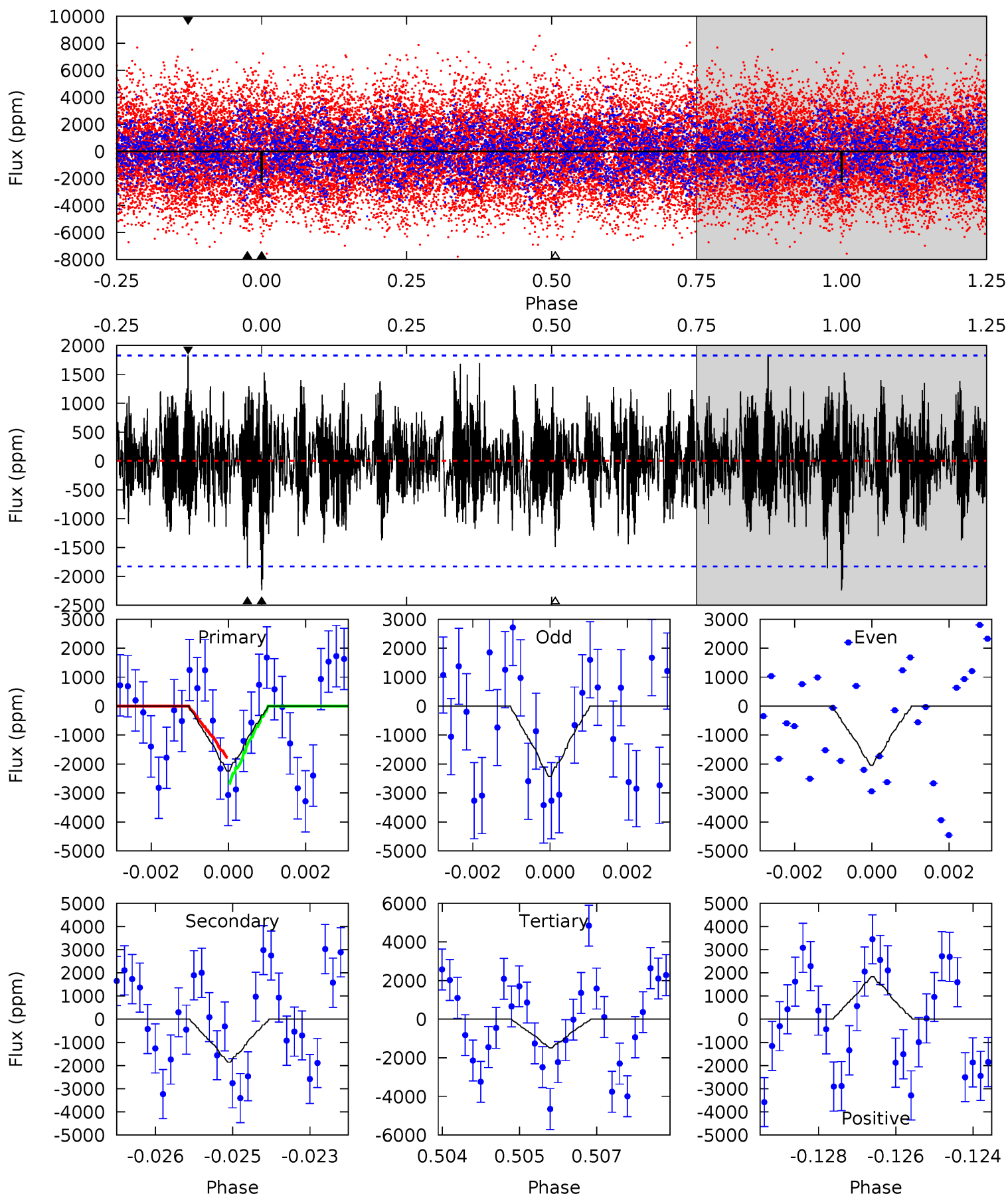
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.3	5.23	5.15	4.70	5.16	2.81	1.66	6.15	6.60	0.08	0.53	0.28	0.88	0.29	0.41



Alt Model-Shift Uniqueness Test

009178502-03, P = 21.603365 Days, E = 112.171785 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.55	5.42	4.33	5.36	5.34	3.11	1.43	2.22	1.19	1.09	0.06	0.57	0.94	0.45	1.32



Stellar Parameters For KIC 009178502

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	7416^{+205}_{-333}	$3.915^{+0.266}_{-0.143}$	$-0.060^{+0.200}_{-0.350}$	$2.426^{+0.477}_{-0.818}$	$1.765^{+0.193}_{-0.386}$	$0.174^{+0.352}_{-0.065}$
	+3%/-4%	+7%/-4%	+333%/-583%	+20%/-34%	+11%/-22%	+202%/-38%
Source	KIC0	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 009178502-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	A_{obs}
DV	-340 ± 65	$8.20^{+5.66}_{-5.14}$	1628^{+128}_{-142}	5543^{+3898}_{-1161}	90^{+509}_{-59}
Alt.	-1855 ± 342	$11.32^{+6.90}_{-6.20}$	1637^{+125}_{-142}	7231^{+5079}_{-1576}	263^{+1030}_{-165}

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

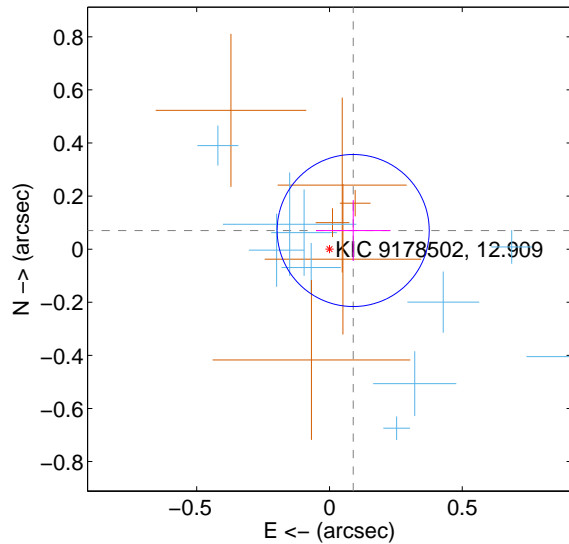
Supplemental centroid analysis for 009178502-03. Kepler magnitude: 12.91. Transit SNR 9.69

There are 11 quarters with good PRF difference image offsets

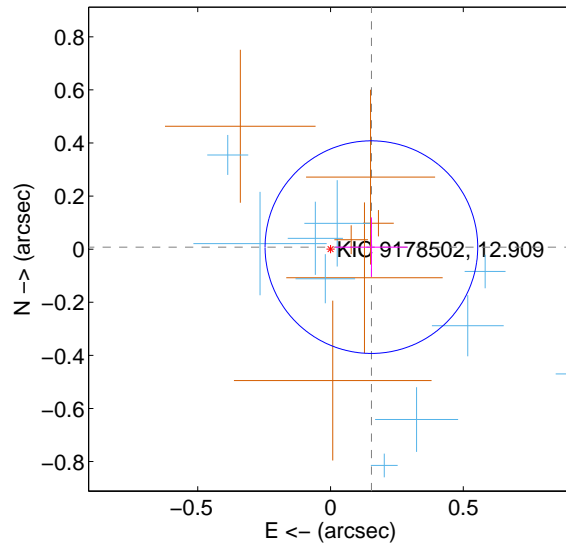
The direct PRF centroid is offset from the target star catalog position by about 0.11 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.114 ± 0.095	1.19	-0.089 ± 0.140	0.070 ± 0.115
PRF-fit source offset from KIC position	0.154 ± 0.133	1.16	-0.154 ± 0.136	0.008 ± 0.112
photometric centroid source offset	0.22 ± 0.18	1.25	-0.22 ± 0.18	-0.05 ± 0.18

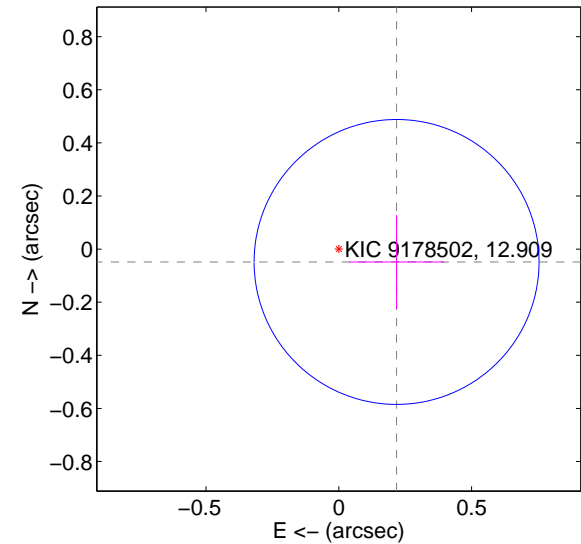
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

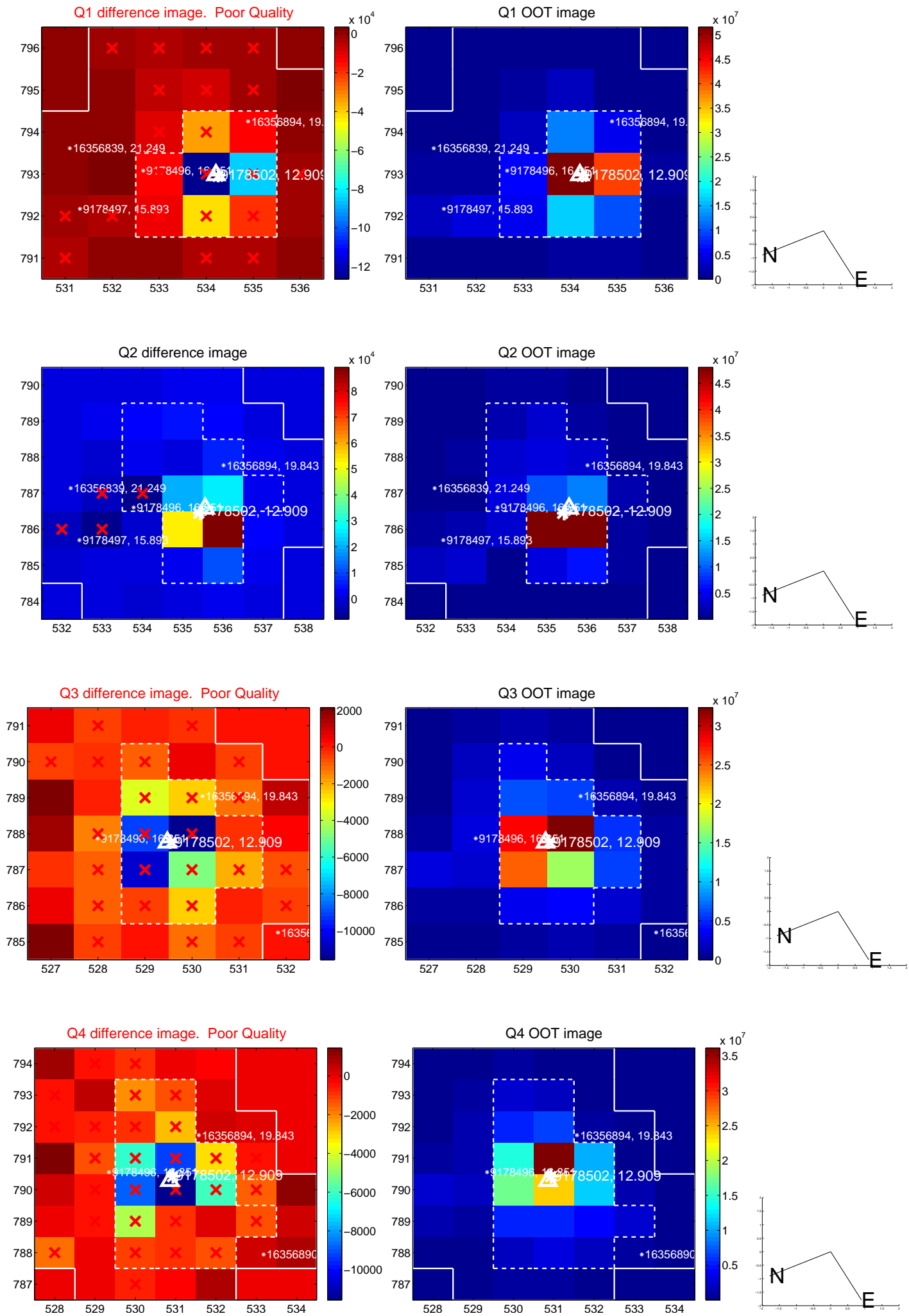


offset from photometric centroids

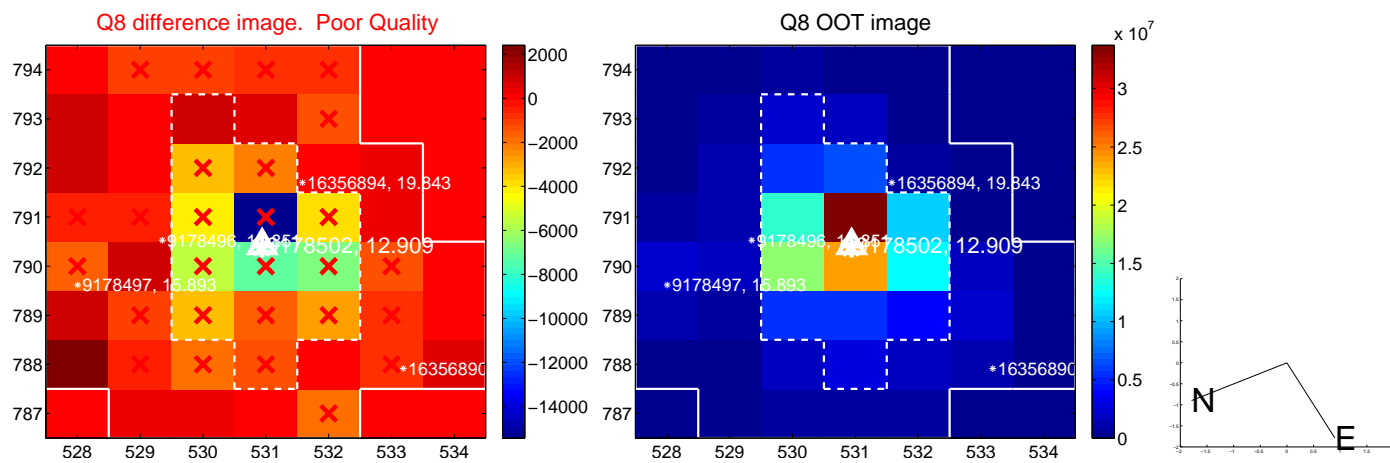
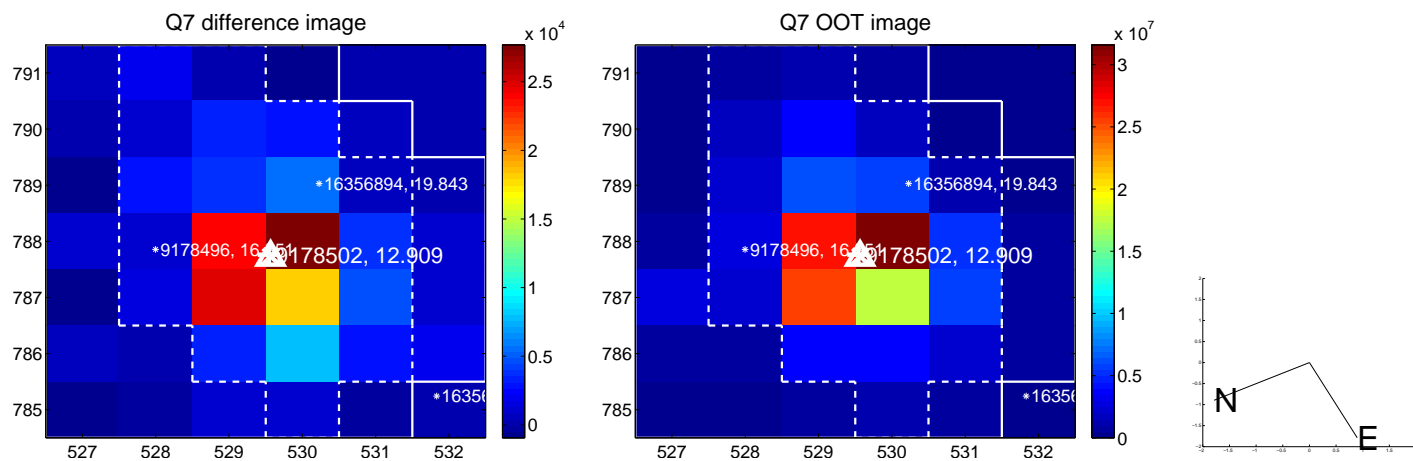
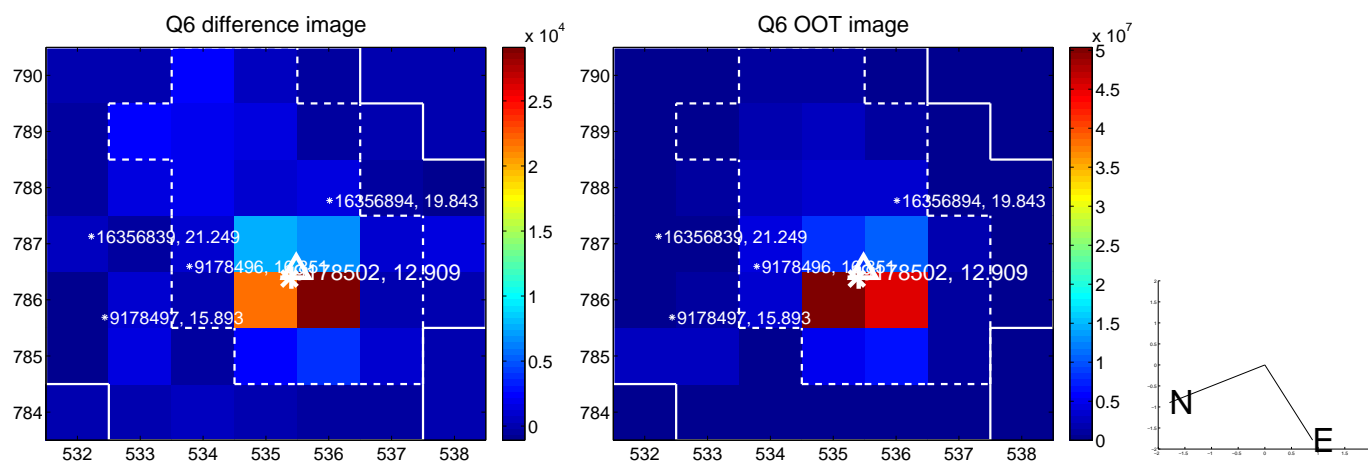
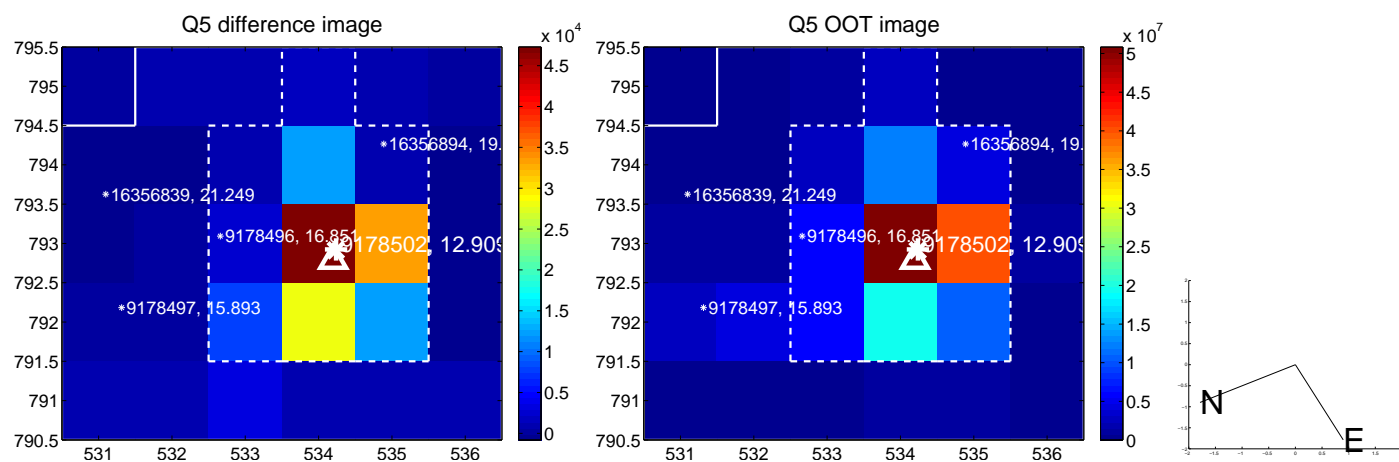


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

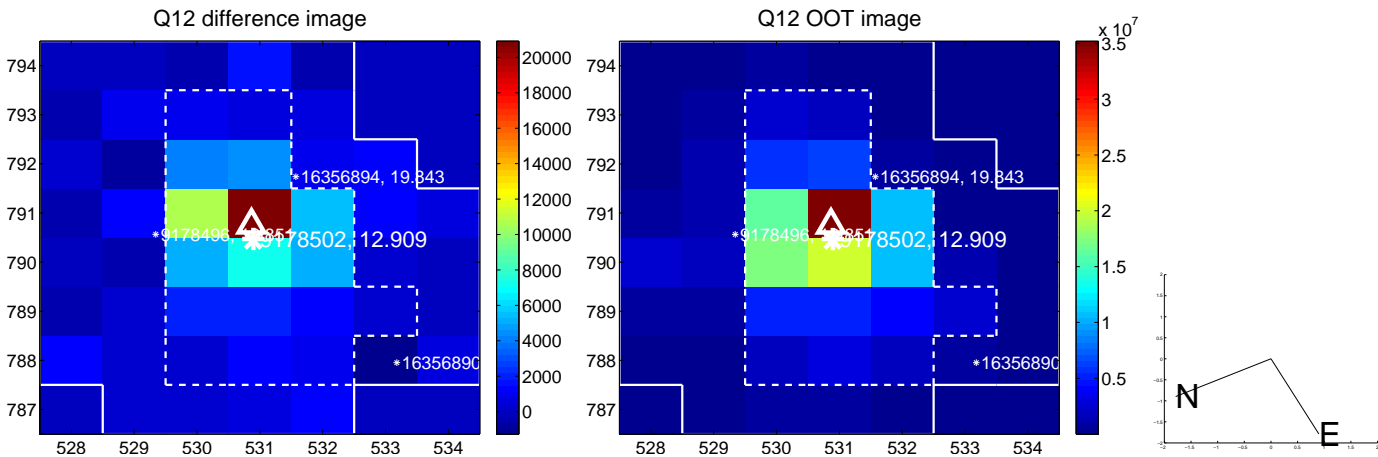
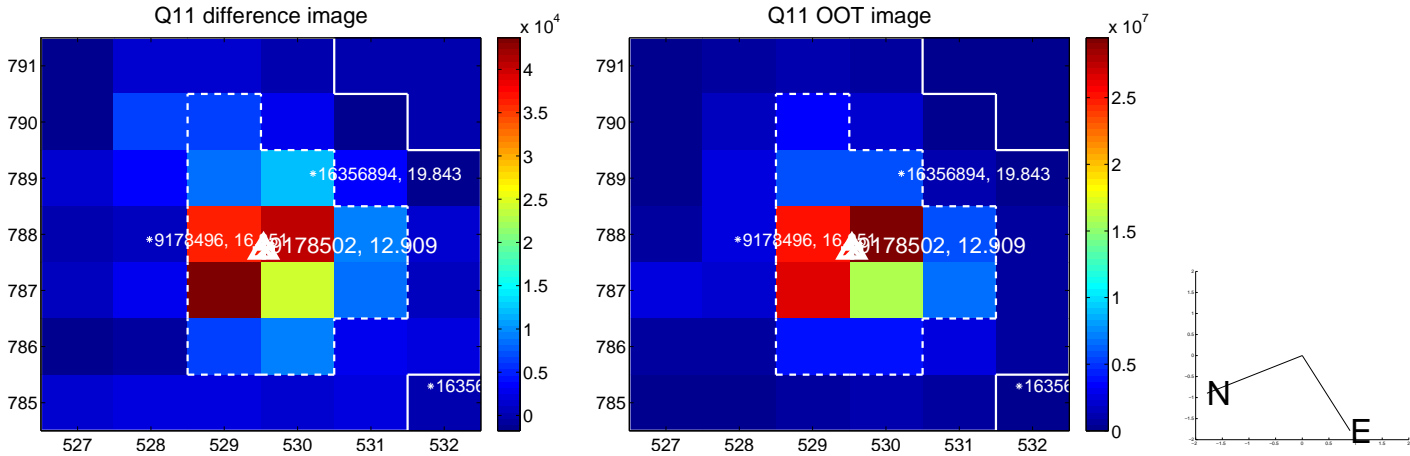
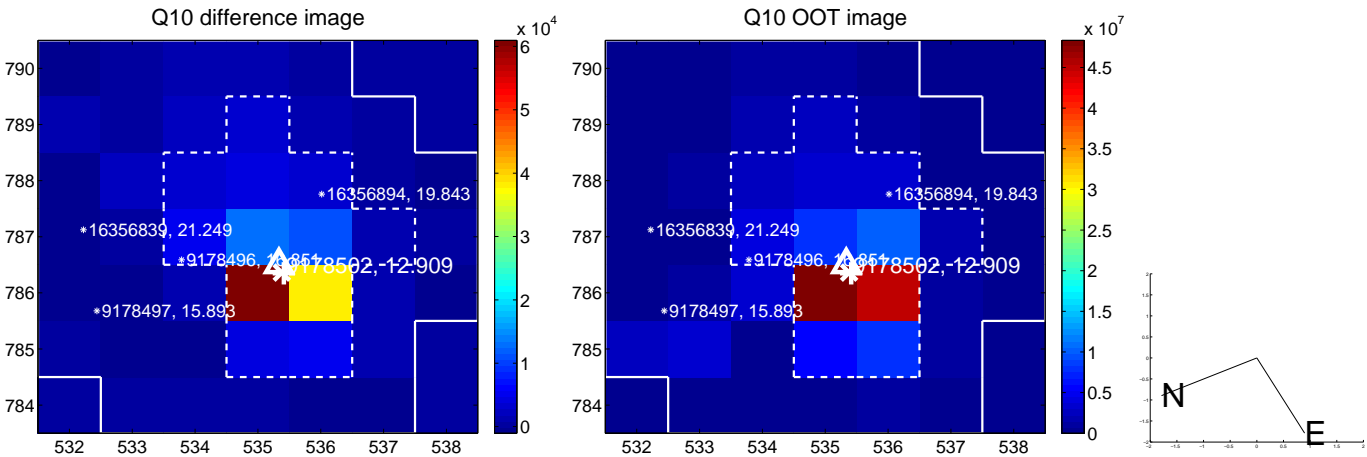
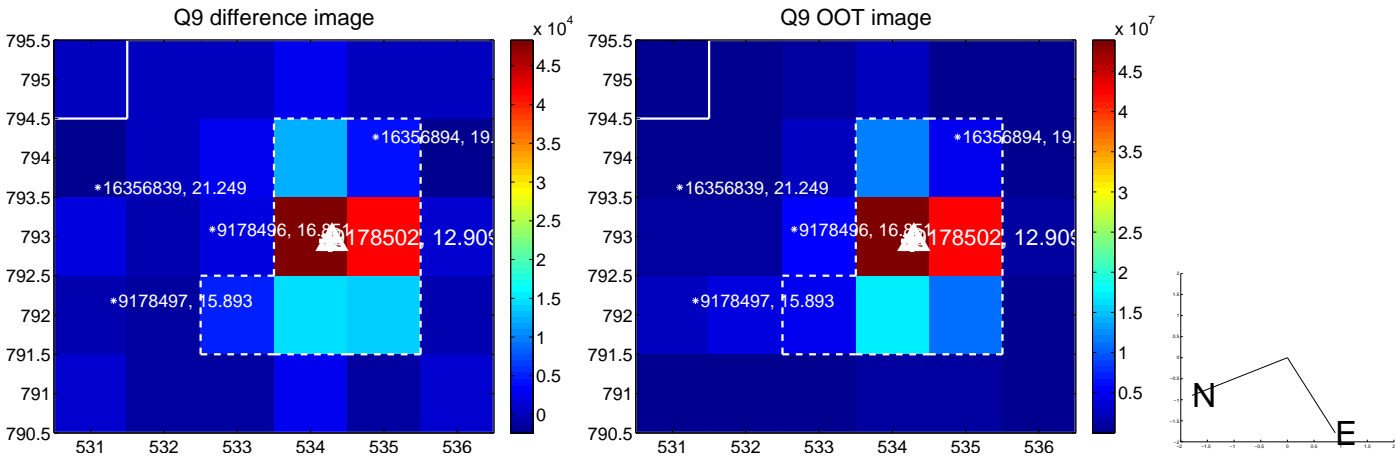
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



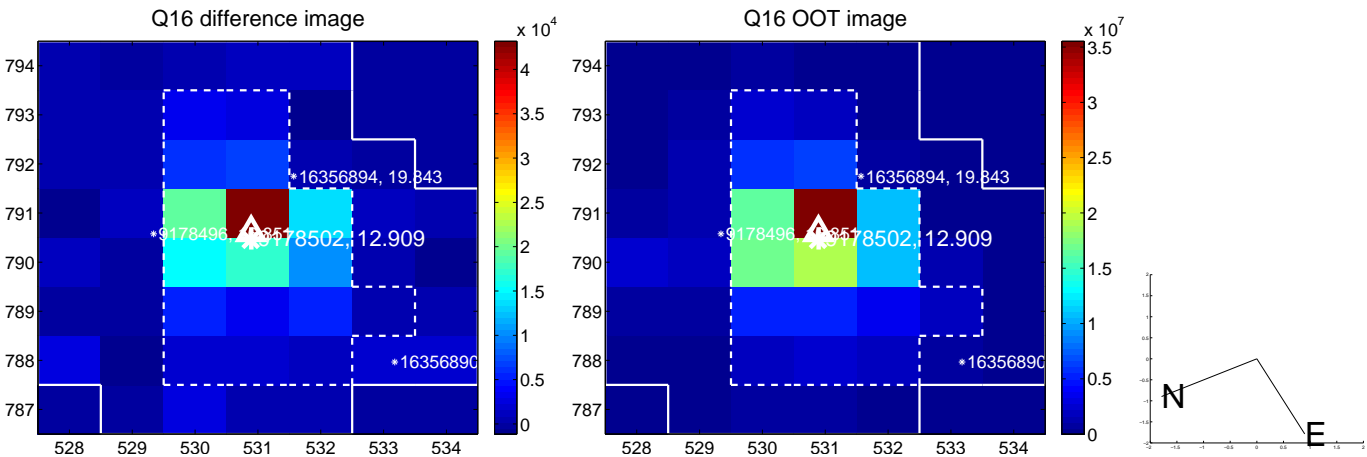
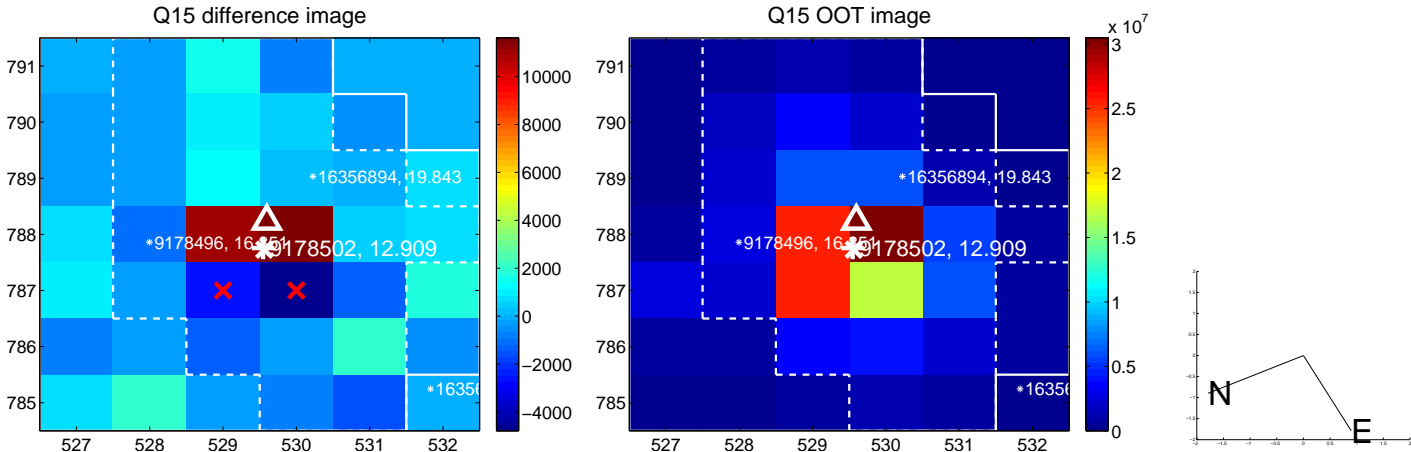
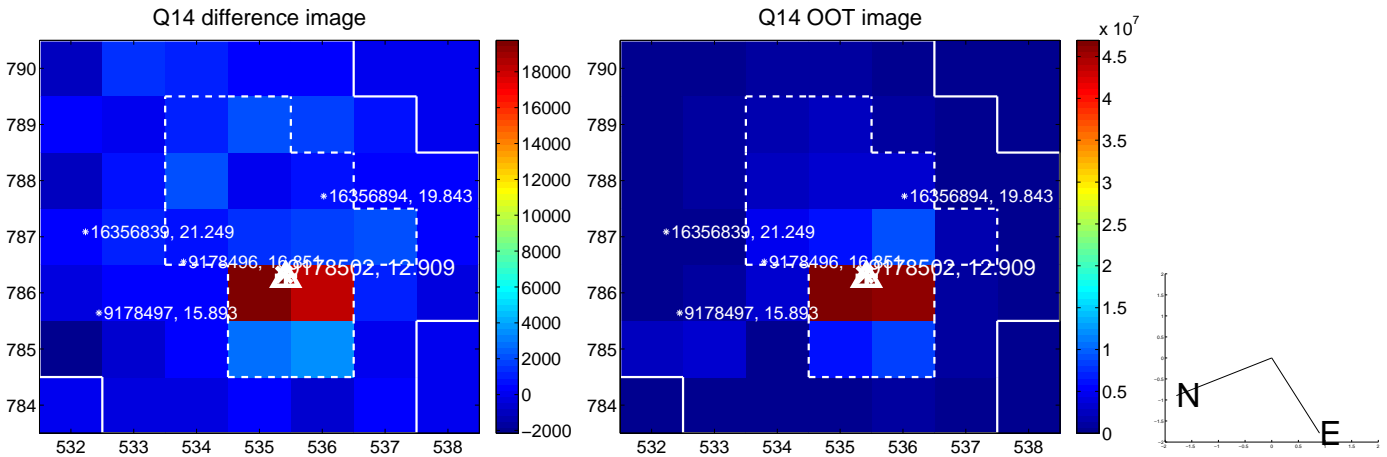
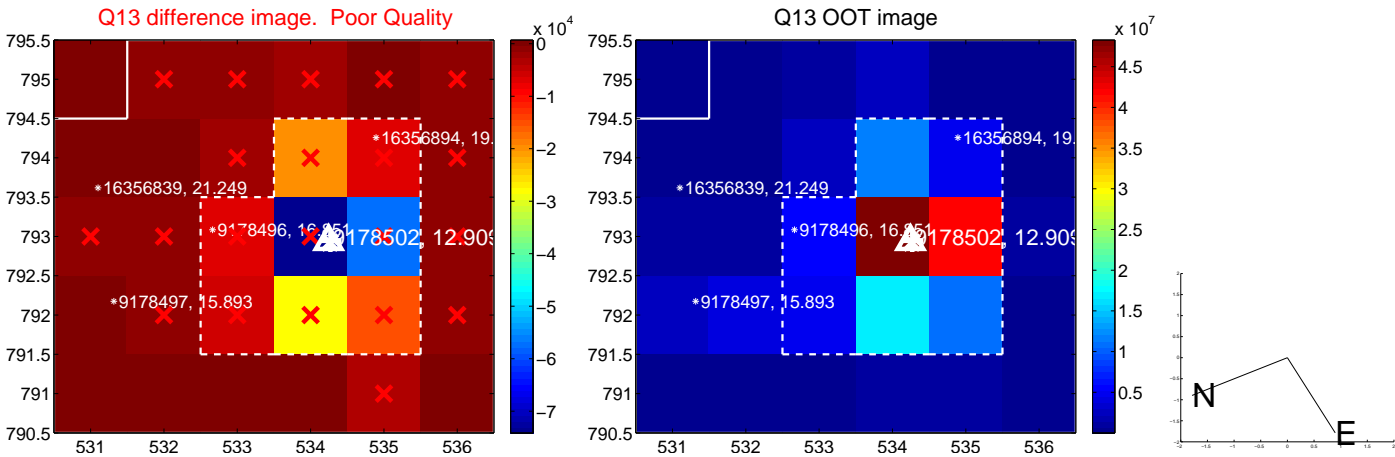
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



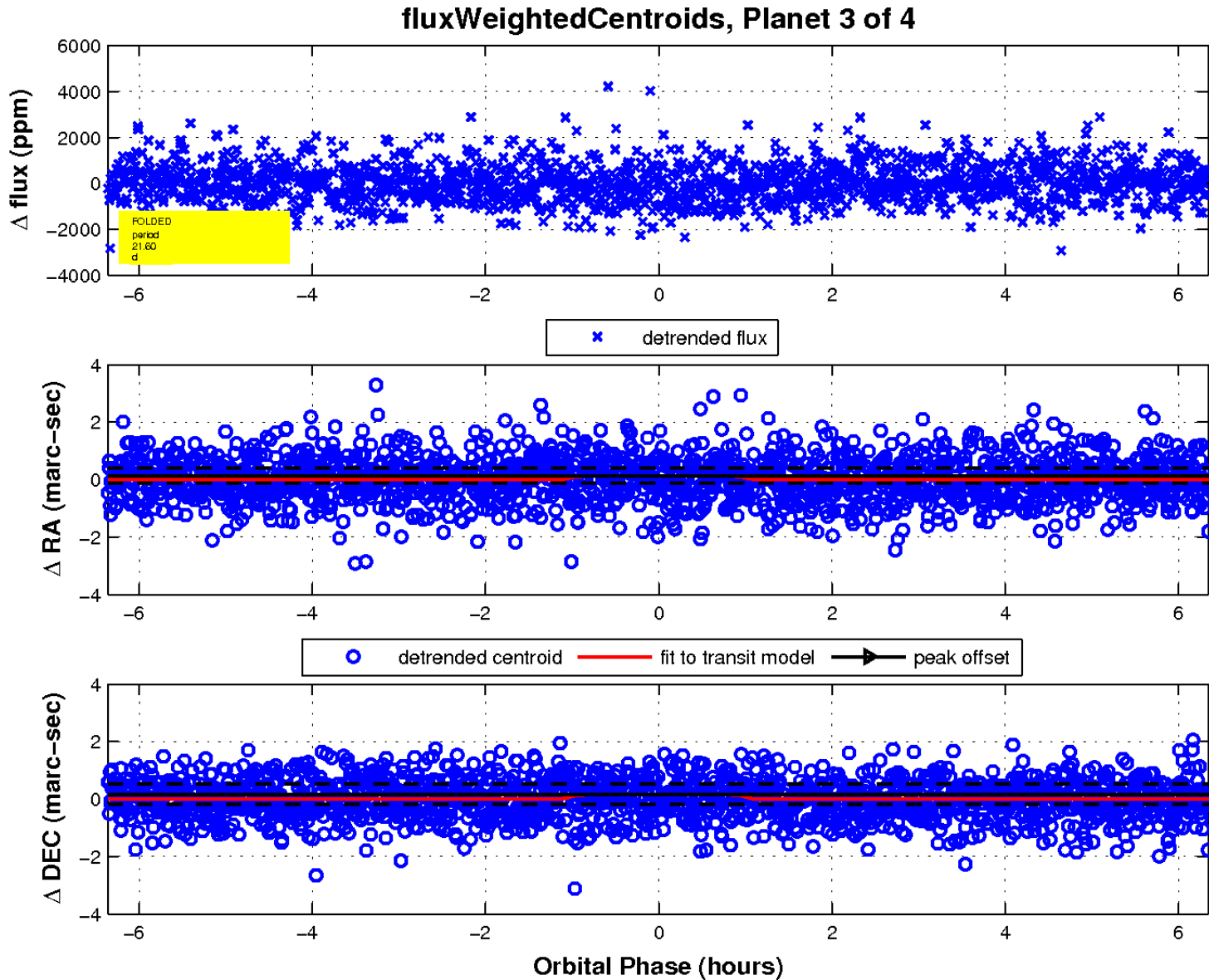
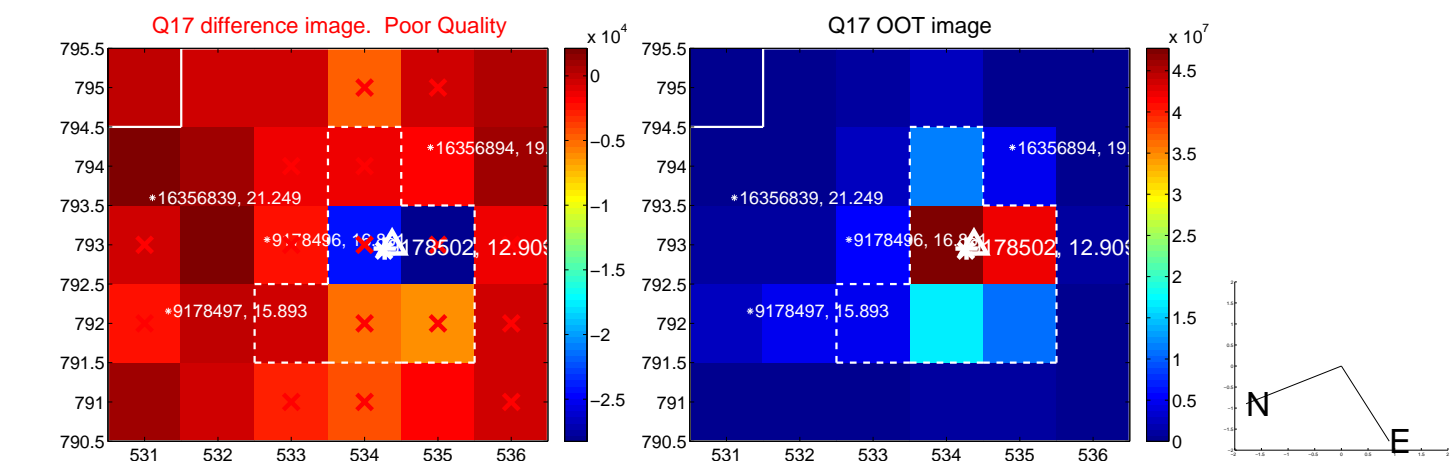
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



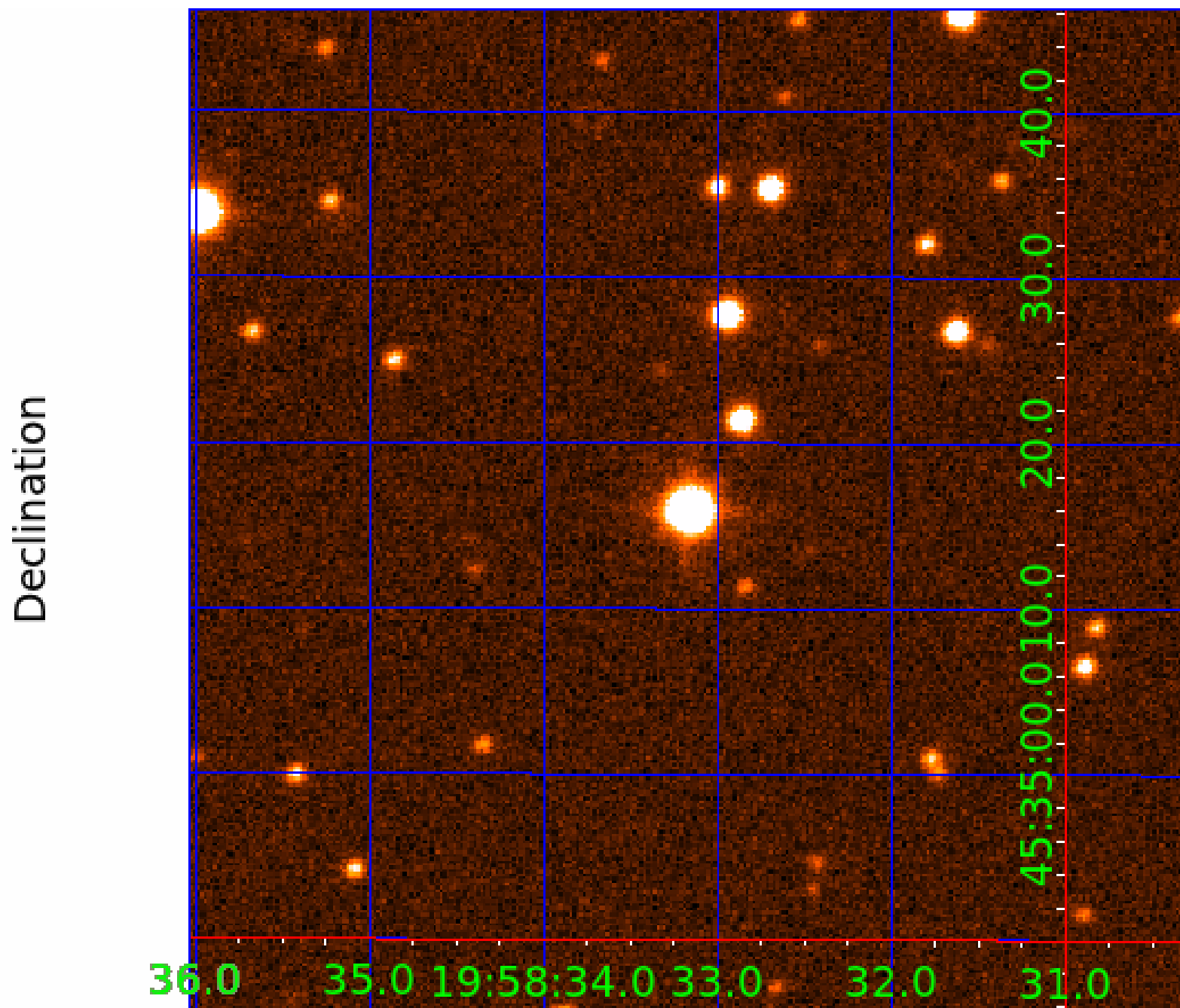
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



UKIRT Image



KIC 009178502

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})
009178502-01	OBS	No	2.709993	131.568889	95.3	9.000	11.5	-1.0	2.43	7416	2.40	7542.98
009178502-02	OBS	No	0.721352	131.944554	158.2	2.291	10.6	10.8	2.43	7416	3.50	44052.55
009178502-03	OBS	No	21.603550	133.779463	816.5	2.120	9.4	9.7	2.43	7416	7.04	473.66
009178502-04	OBS	No	46.180358	154.710750	1083.9	4.473	8.9	8.3	2.43	7416	8.88	172.01

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009178502-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—CENT_NOFITS
009178502-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
009178502-03	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_ALT—MOD_POS_ALT
009178502-04	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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.

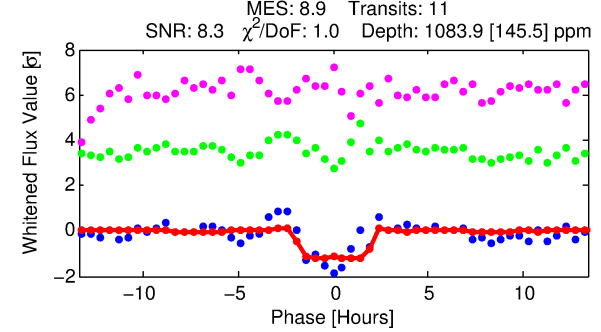
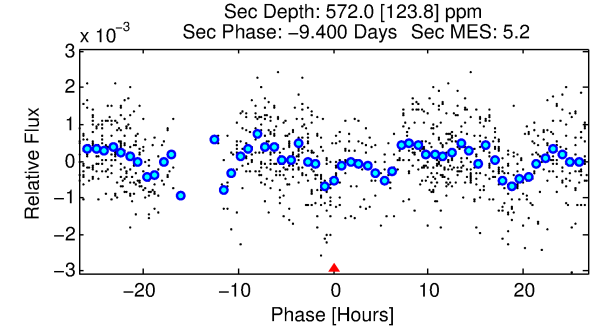
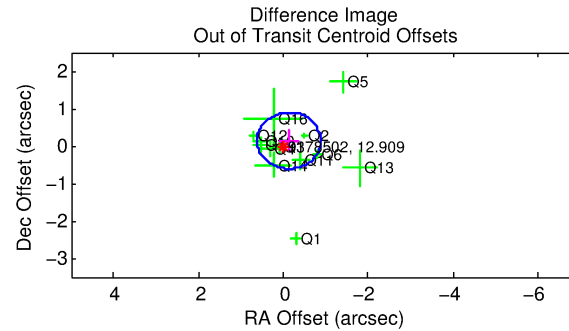
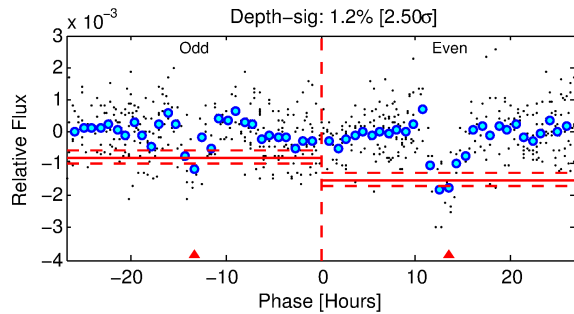
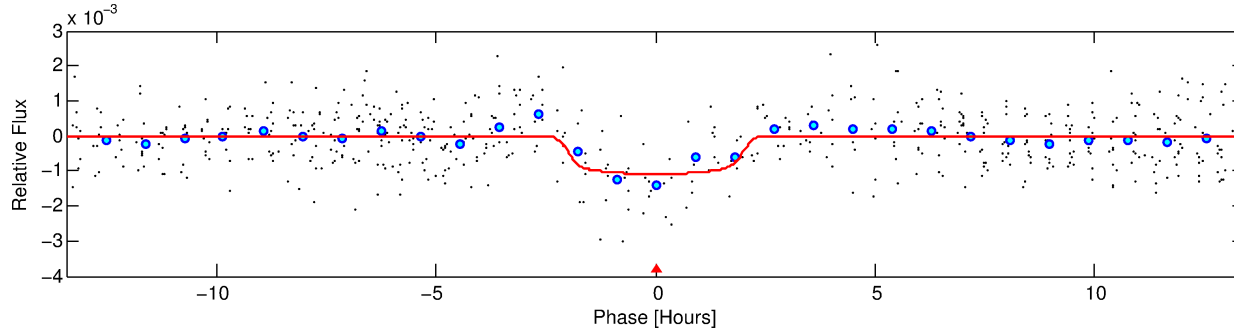
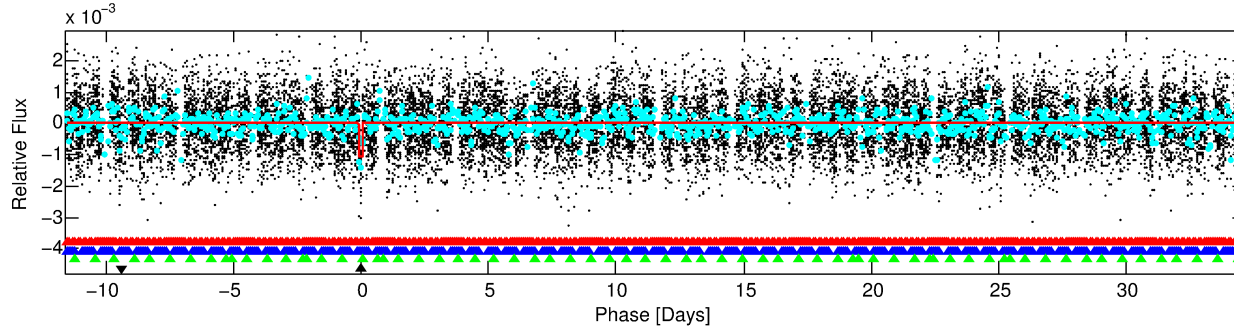
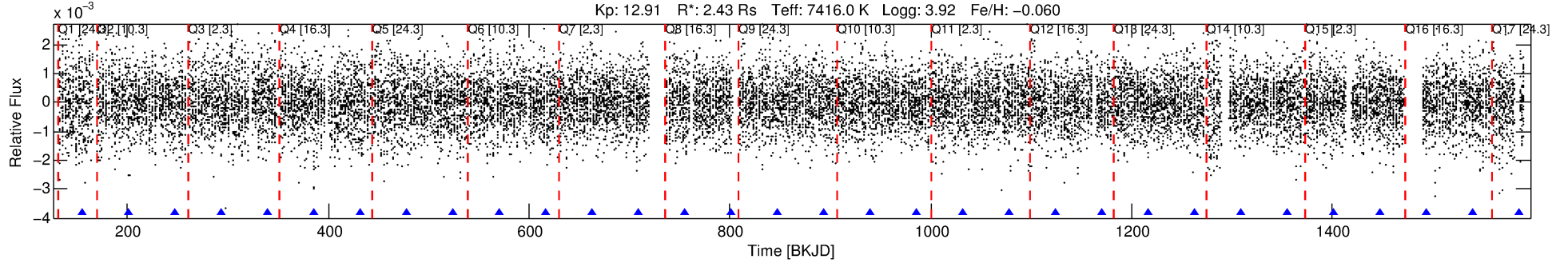
Ephemeris Match Information For 009178502-04

No Significant Match Found

DV One-Page Summary

KIC: 9178502 Candidate: 4 of 4 Period: 46.180 d
KOI: K05634 Corr: No Ephemeris Match

Kp: 12.91 R*: 2.43 Rs Teff: 7416.0 K Logg: 3.92 Fe/H: -0.060



DV Fit Results:

Period = 46.18036 [0.00055] d
Epoch = 154.7107 [0.0067] BKJD
Rp/R* = 0.0336 [0.0064]
a/R* = 49.20 [50.51]
b = 0.82 [0.40]
Seff = 172.01 [85.92]
Teq = 923 [115] K
Rp = 8.88 [3.44] Re
a = 0.3045 [0.0925] AU
Ag = 369.69 [236.61] [1.56σ]
Teffp = 6261 [742] K [7.11σ]

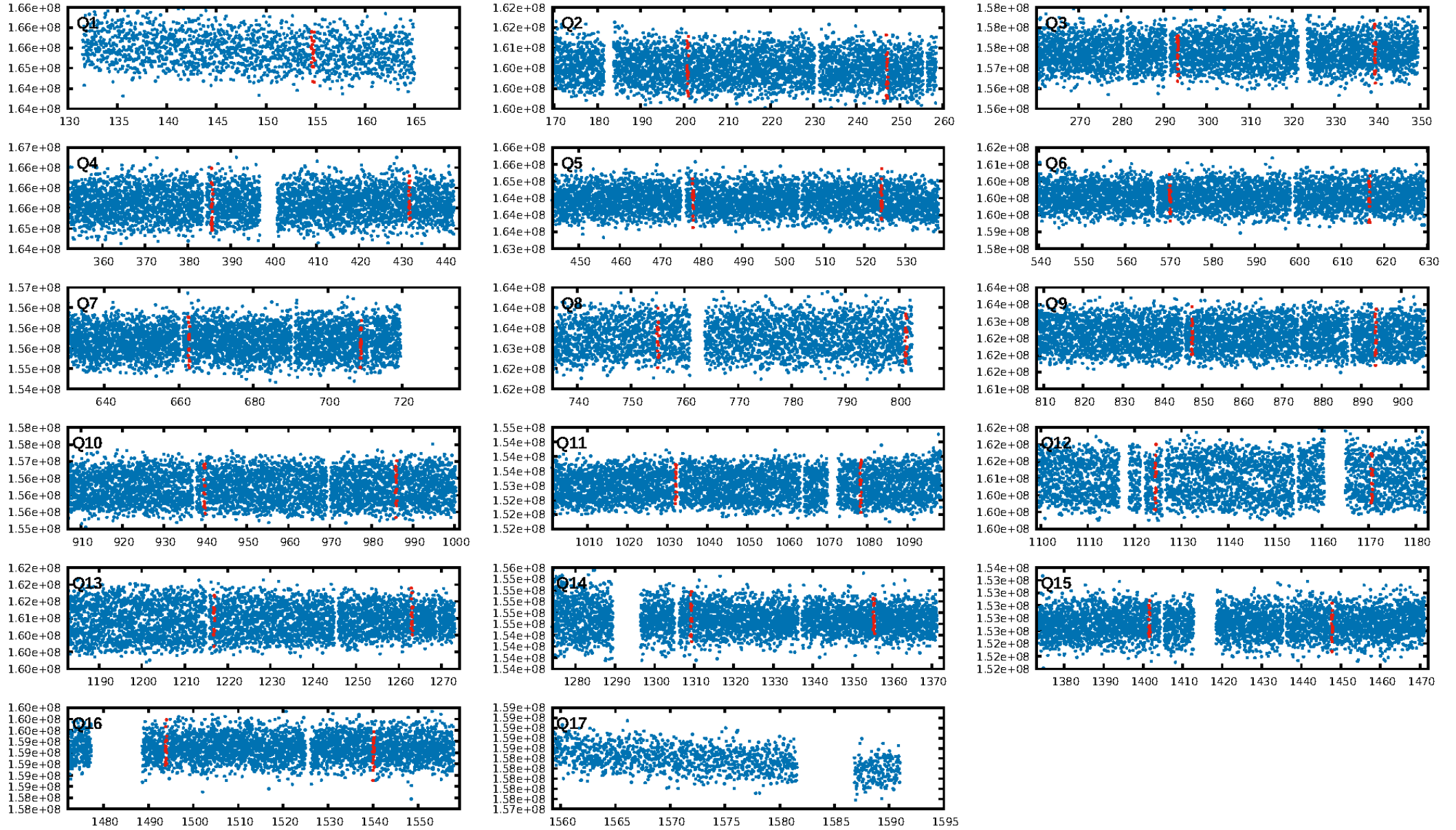
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [119.16σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 22.7%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 1.59e-11
RollingBand-fgt: 1.00 [10/10]
GhostDiagnostic-chr: -0.5545
Centroid-sig: 15.1%
Centroid-so: 0.051 arcsec [0.35σ]
OotOffset-rm: 0.197 arcsec [0.79σ]
KicOffset-rm: 0.163 arcsec [0.67σ]
OotOffset-st: 4/3/3/3 [13]
KicOffset-st: 4/3/3/3 [13]
DiffImageQuality-fgm: 0.54 [7/13]
DiffImageOverlap-fno: 0.00 [0/16]

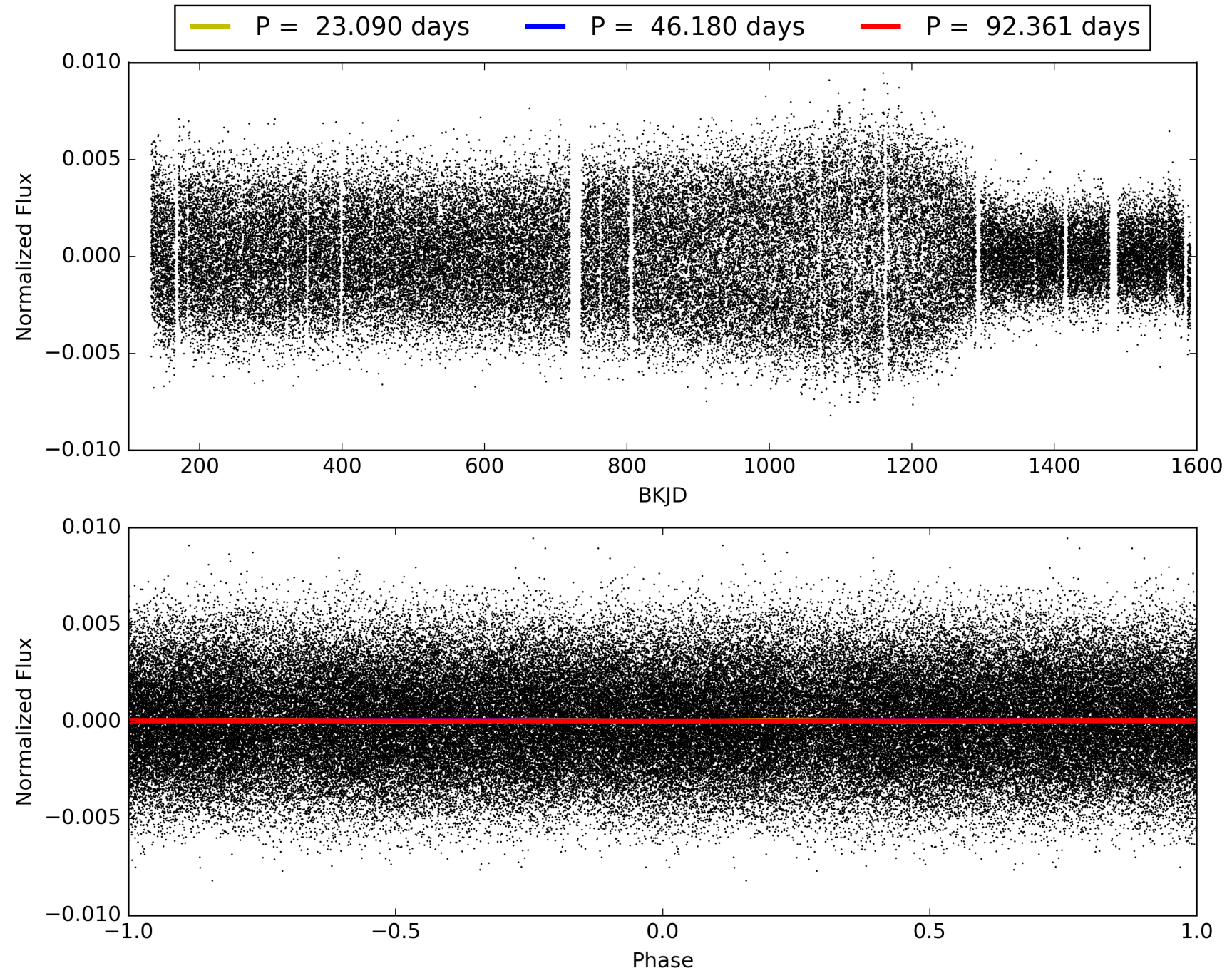
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 10:42:02 Z

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

TCE 009178502-04, PDC Light Curves

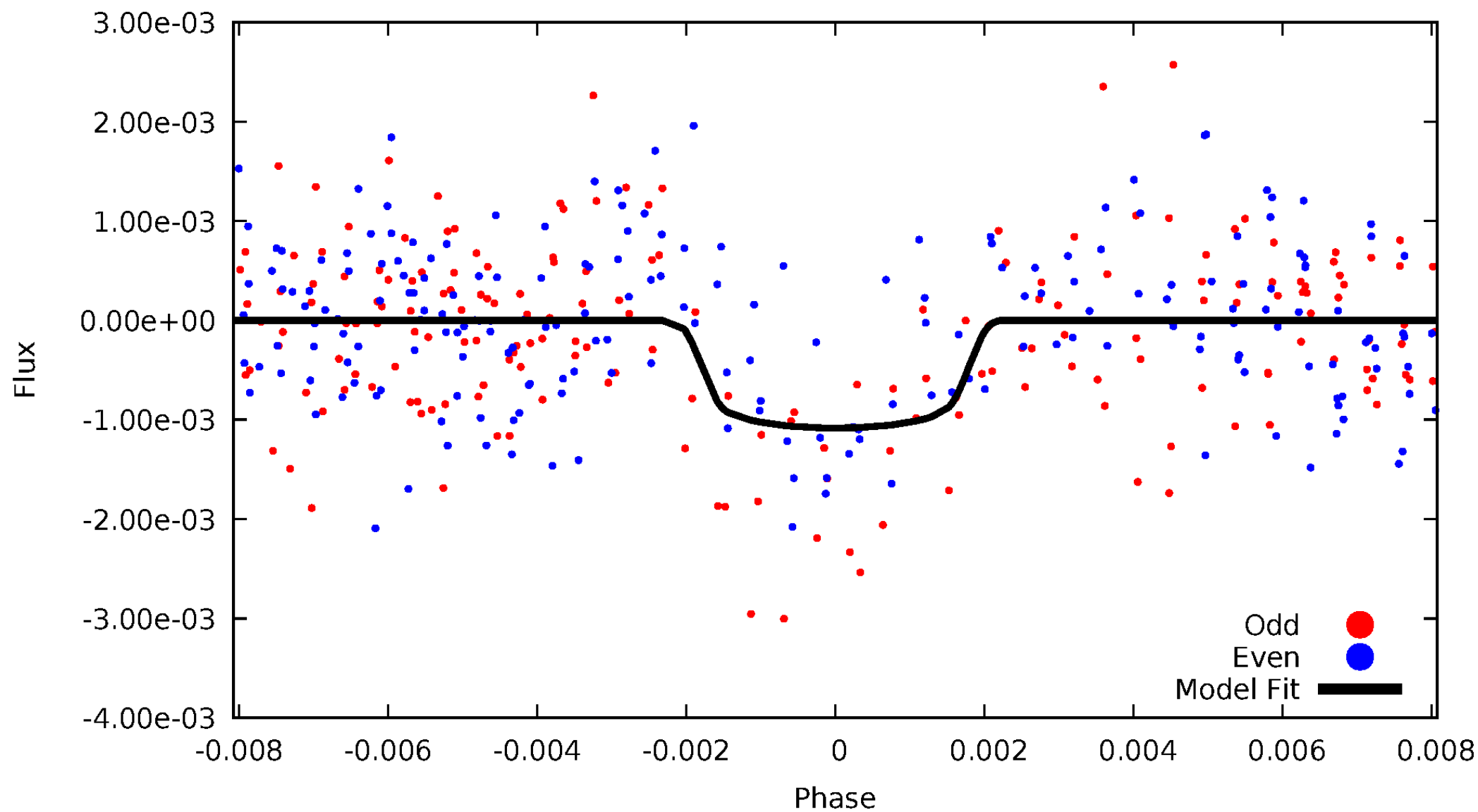


TCE 009178502-04



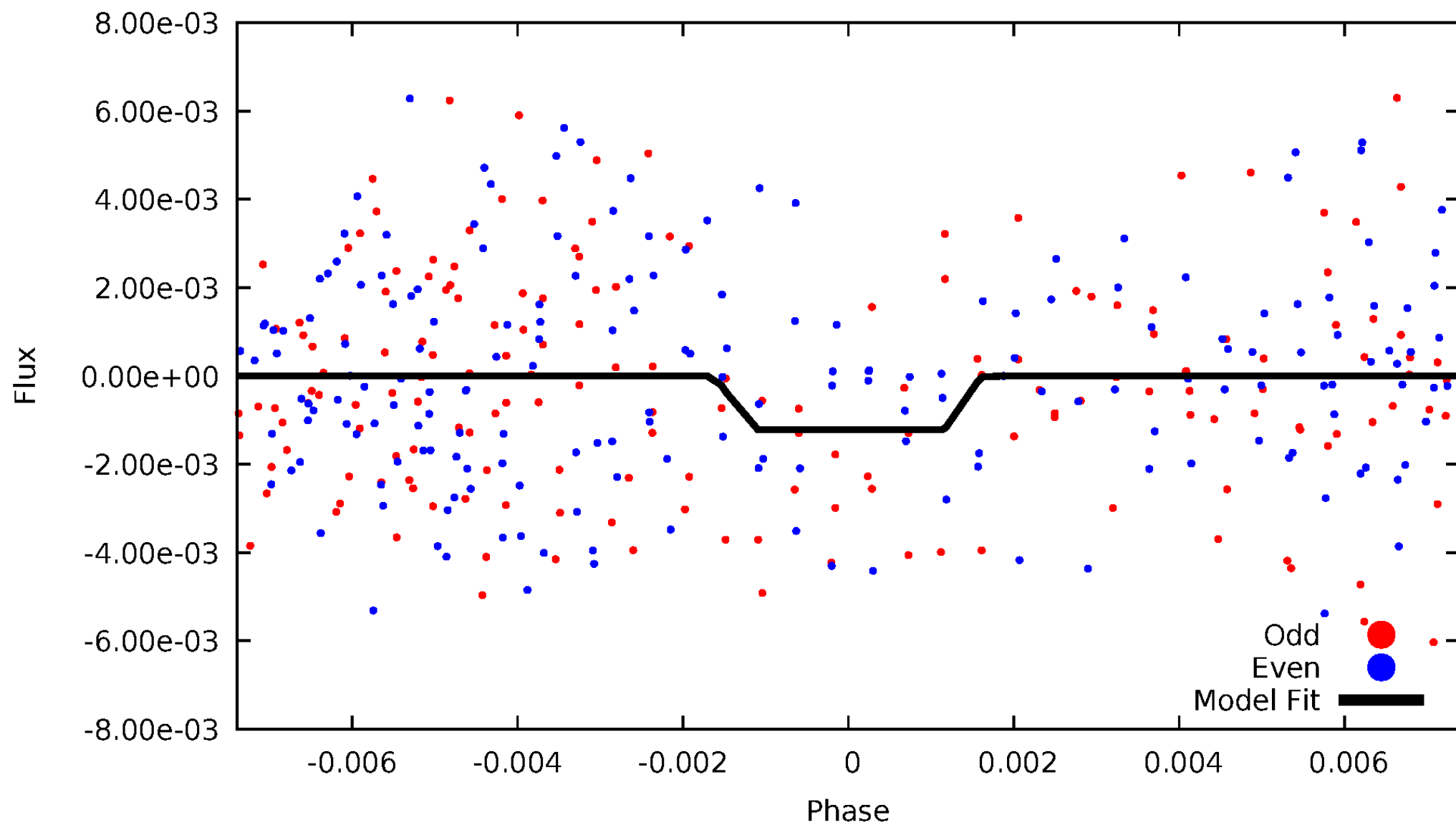
DV Odd/Even

TCE 009178502-04



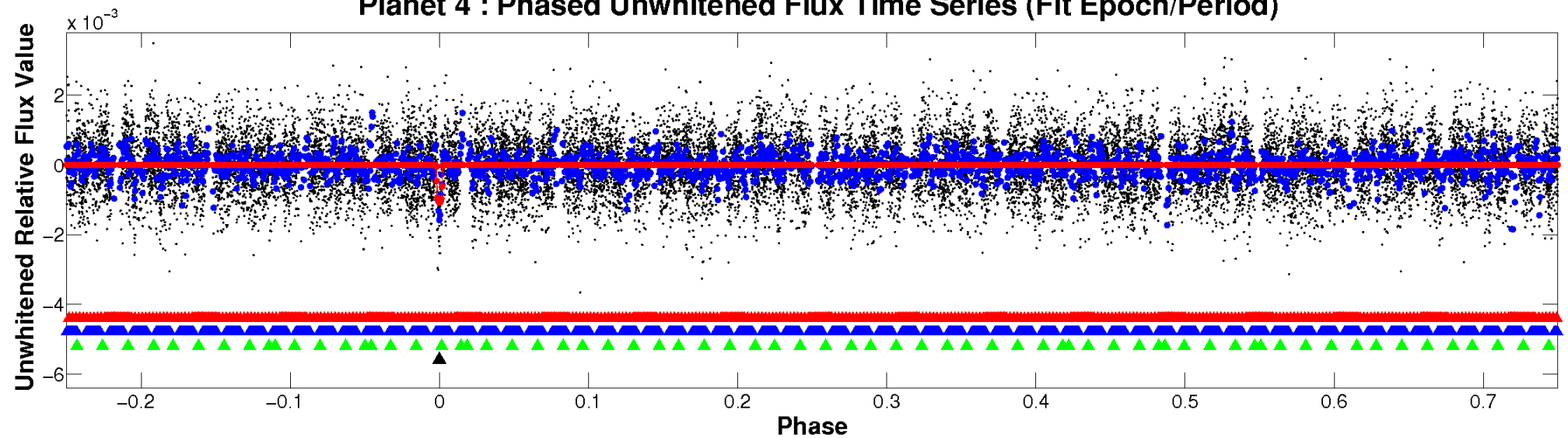
ALT Odd/Even

TCE 009178502-04

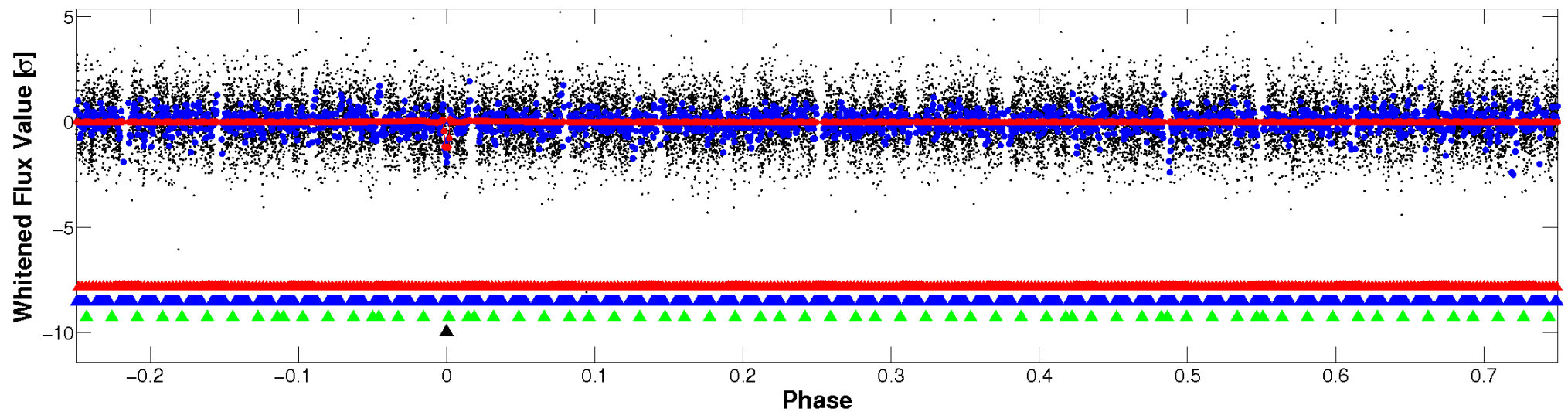


Non-Whitened Vs. Whitened Light Curve

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

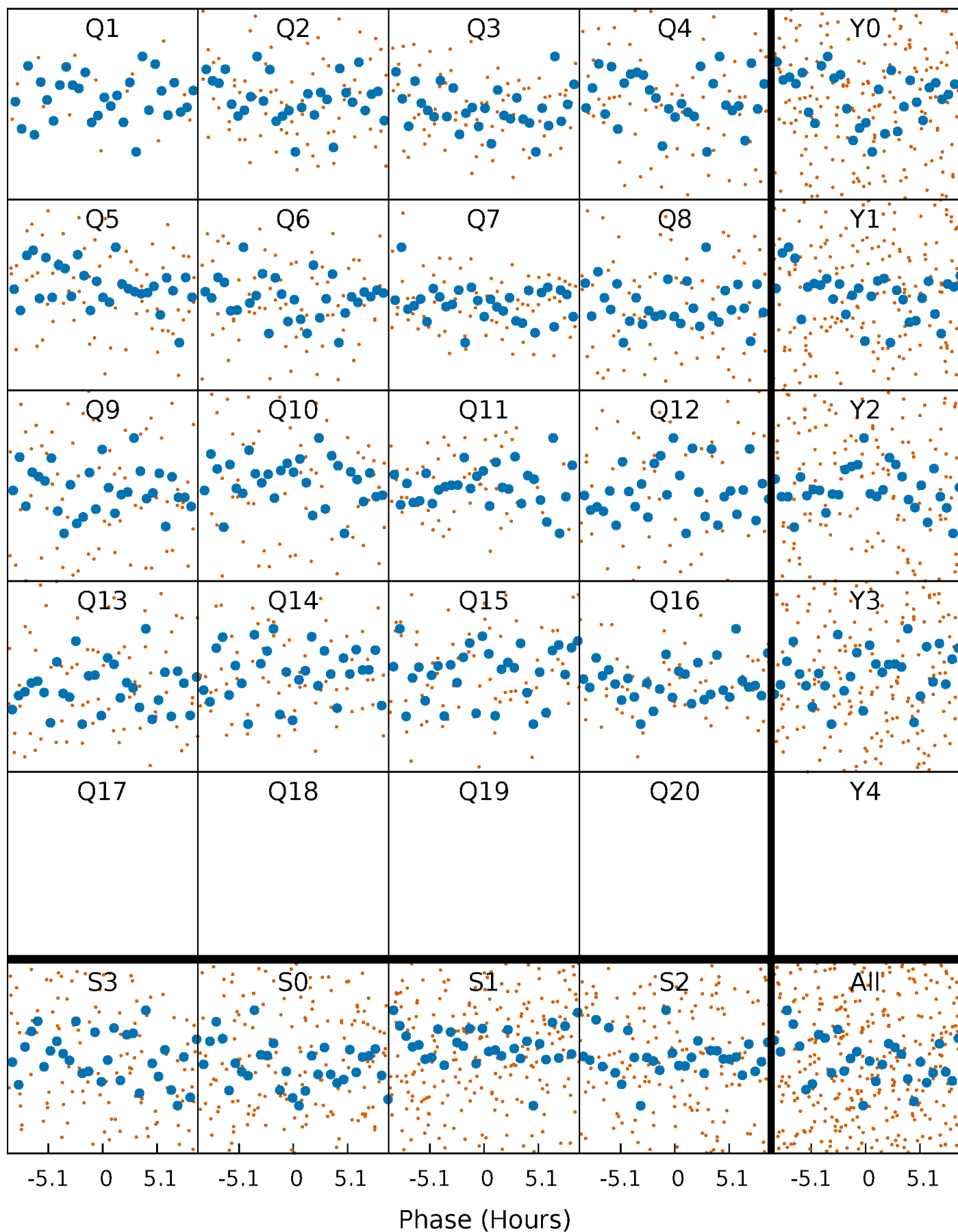


Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



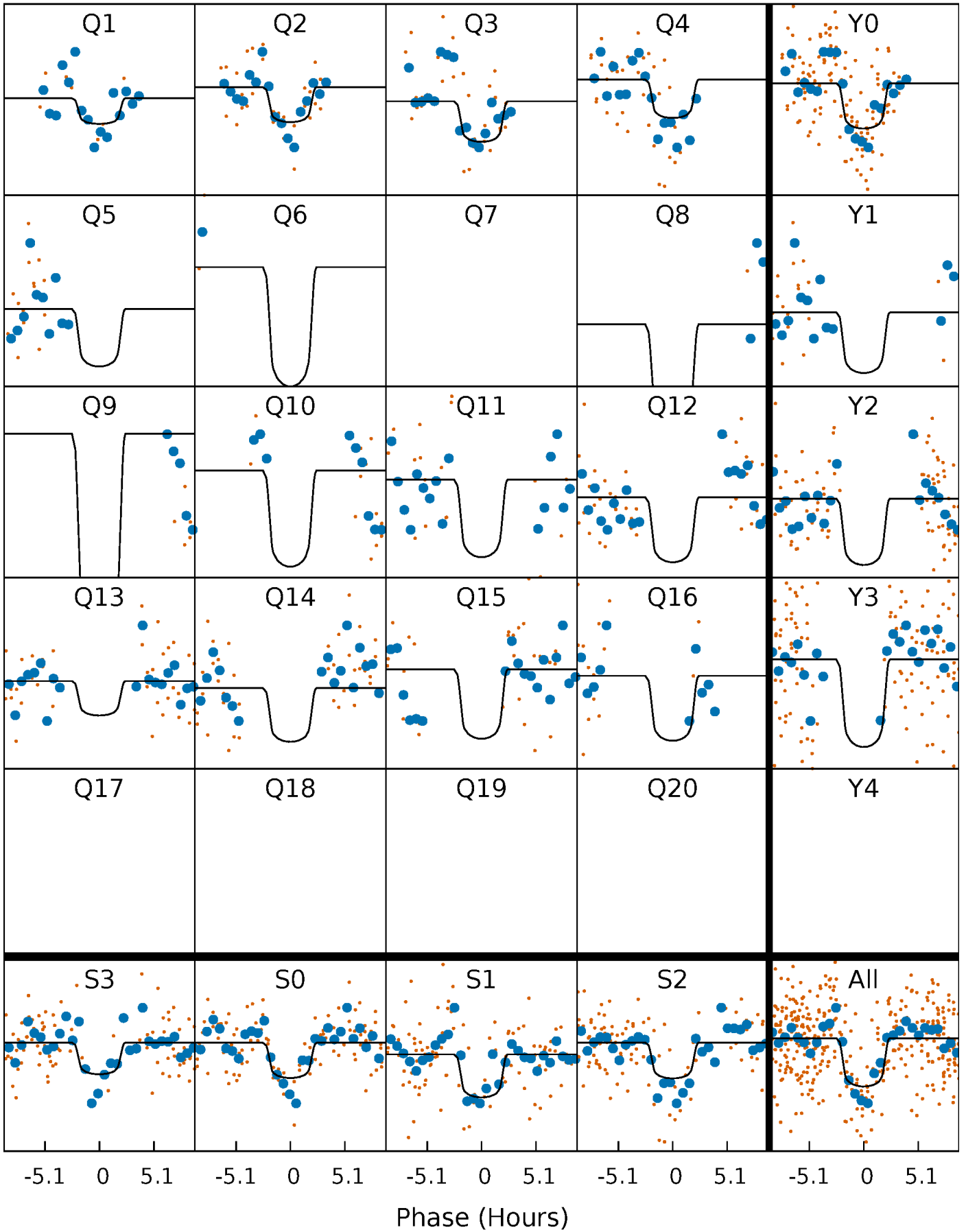
PDC Quarter-Phased Transit Curves

TCE 009178502-04 P= 46.180358 Days $T_0=154.710750$ (BKJD)



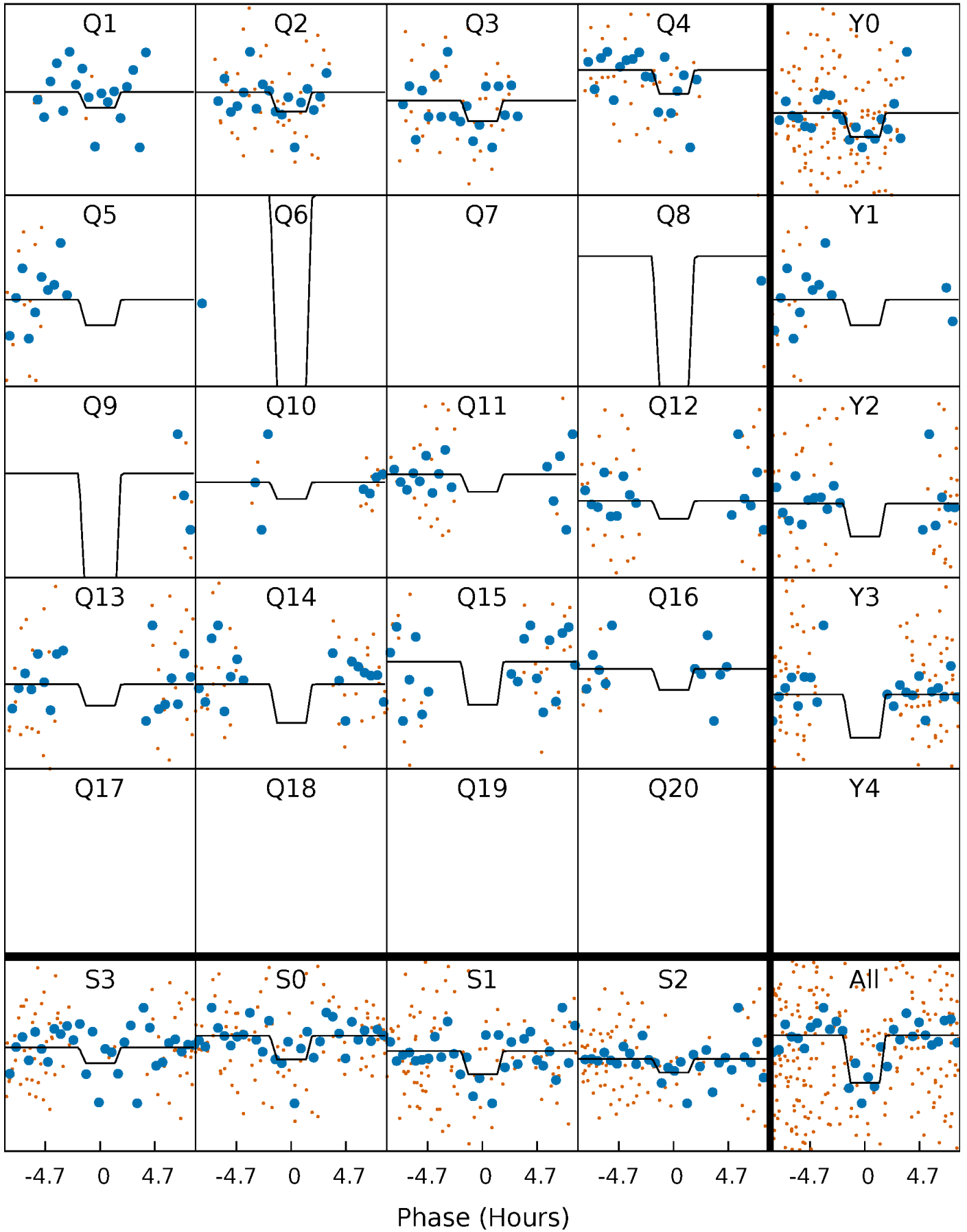
DV Quarter-Phased Transit Curves

TCE 009178502-04 P= 46.180358 Days $T_0=154.710750$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

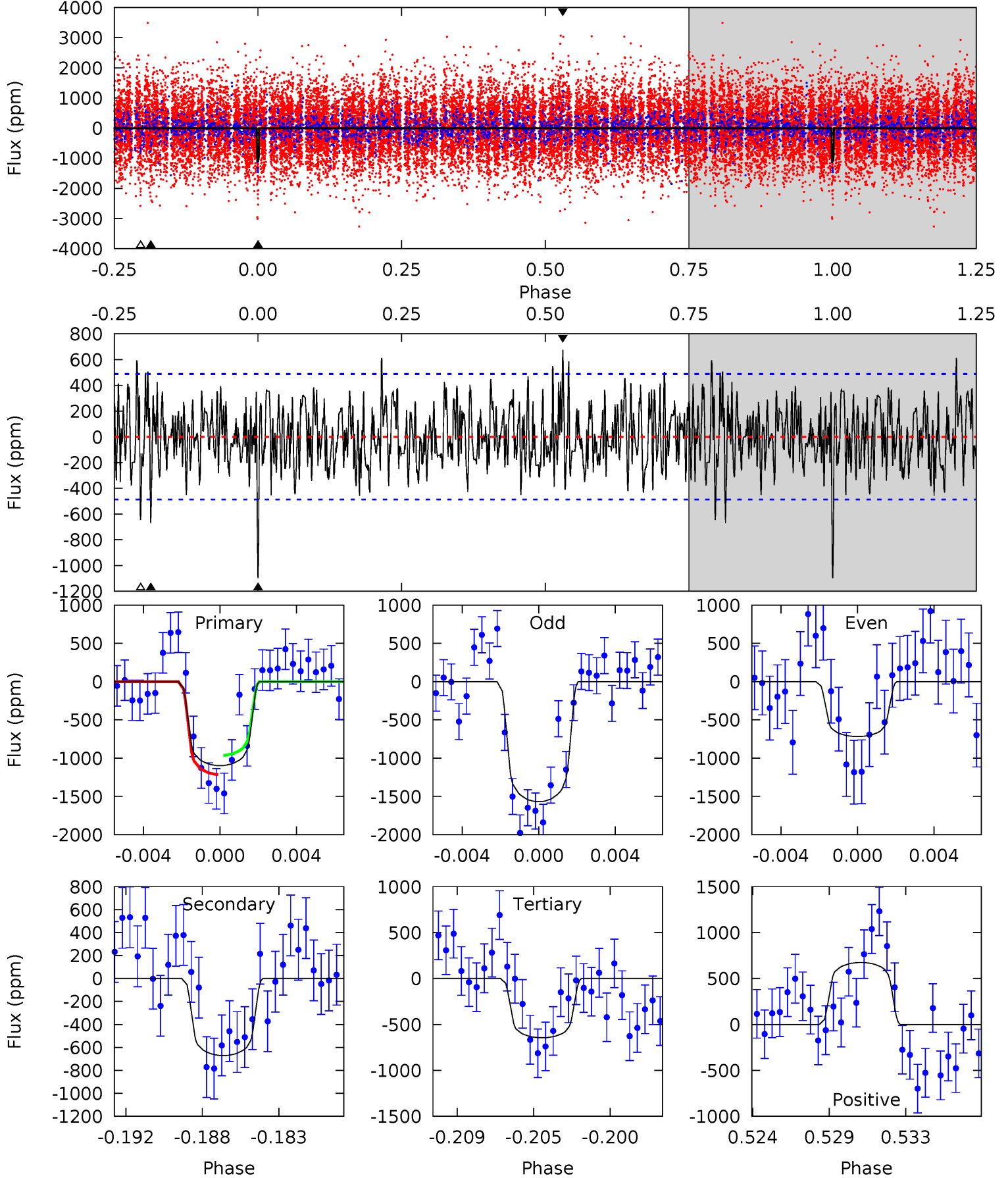
TCE 009178502-04 P= 46.179343 Days $T_0=154.714081$ (BKJD)



DV Model-Shift Uniqueness Test

009178502-04, P = 46.180358 Days, E = 108.530392 Days

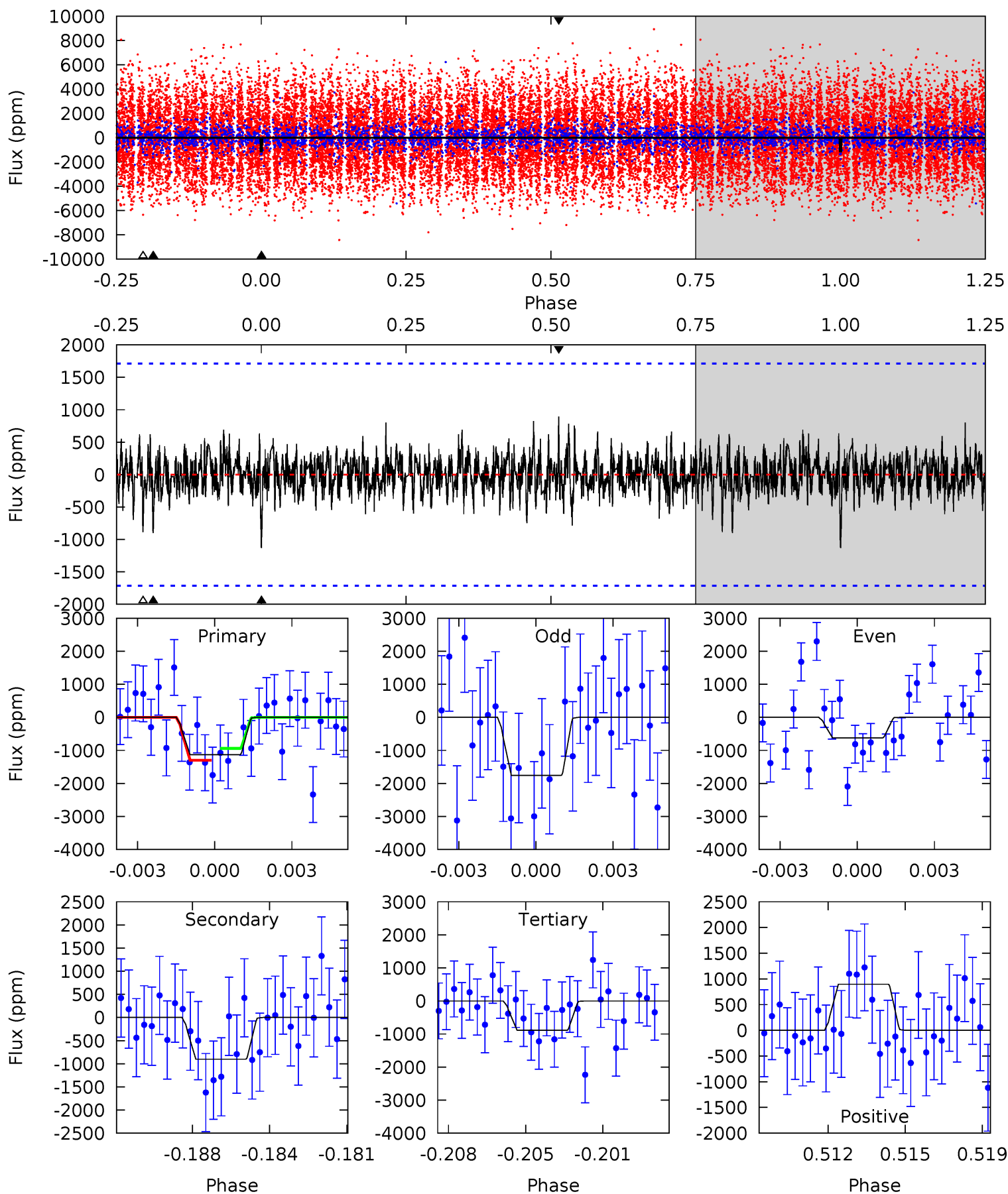
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.7	7.14	6.87	7.18	5.19	2.86	2.07	4.81	4.50	0.27	-0.03	4.58	0.88	0.38	1.33



Alt Model-Shift Uniqueness Test

009178502-04, P = 46.179343 Days, E = 108.534738 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
3.45	2.75	2.70	2.73	5.23	2.93	0.67	0.75	0.72	0.05	0.02	1.72	1.08	0.44	0.54



Stellar Parameters For KIC 009178502

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	7416^{+205}_{-333}	$3.915^{+0.266}_{-0.143}$	$-0.060^{+0.200}_{-0.350}$	$2.426^{+0.477}_{-0.818}$	$1.765^{+0.193}_{-0.386}$	$0.174^{+0.352}_{-0.065}$
	+3%/-4%	+7%/-4%	+333%/-583%	+20%/-34%	+11%/-22%	+202%/-38%
Source	KIC0	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 009178502-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	A_{obs}
DV	-671 ± 94	$8.55^{+2.29}_{-2.06}$	1271^{+84}_{-107}	6373^{+779}_{-593}	462^{+310}_{-169}
Alt.	-902 ± 328	$8.95^{+2.37}_{-2.27}$	1268^{+100}_{-112}	6740^{+1105}_{-920}	556^{+503}_{-258}

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

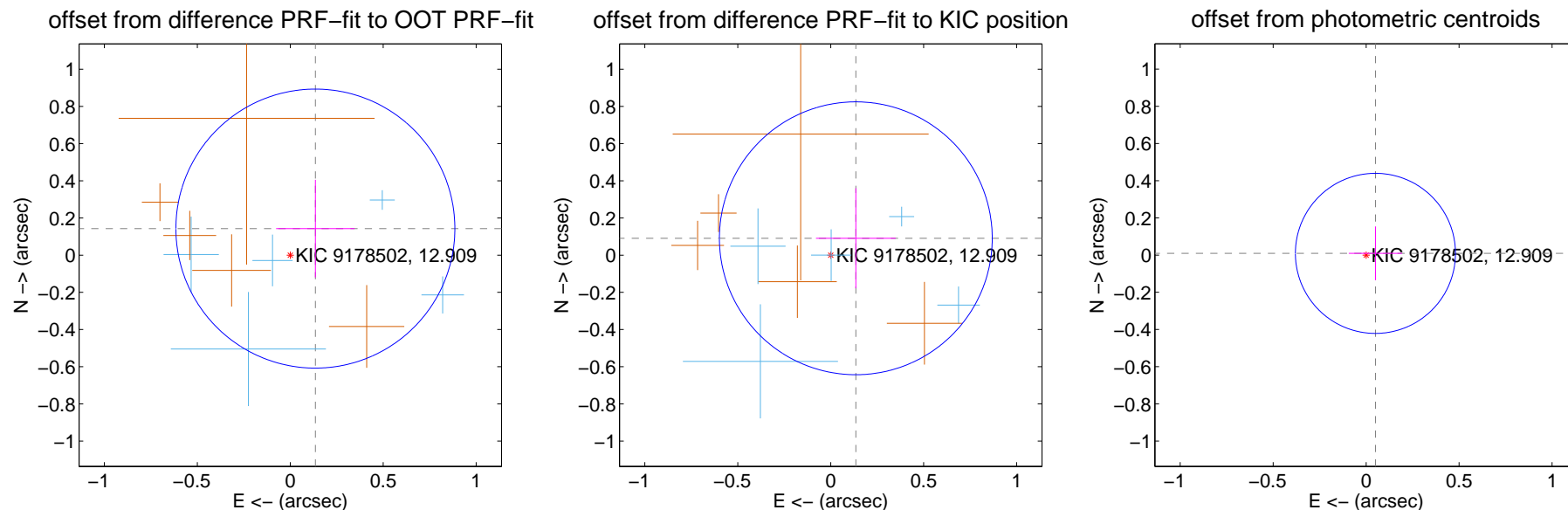
DV Centroid Data

Supplemental centroid analysis for 009178502-04. Kepler magnitude: 12.91. Transit SNR 8.33

There are 7 quarters with good PRF difference image offsets

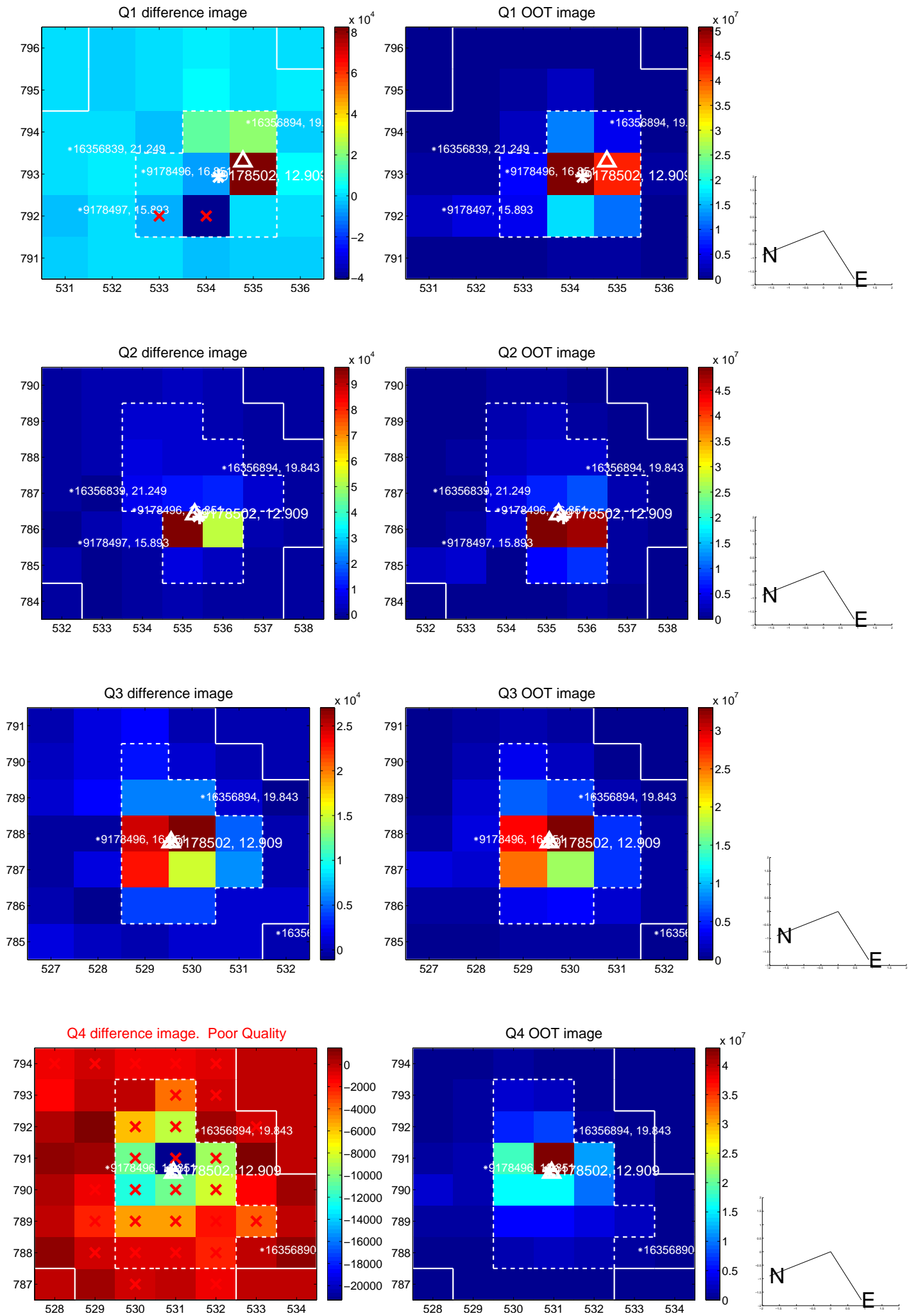
The direct PRF centroid is offset from the target star catalog position by about 0.11 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.197 ± 0.250	0.79	-0.135 ± 0.211	0.143 ± 0.262
PRF-fit source offset from KIC position	0.163 ± 0.245	0.67	-0.135 ± 0.215	0.091 ± 0.269
photometric centroid source offset	0.05 ± 0.14	0.35	-0.05 ± 0.14	0.01 ± 0.14

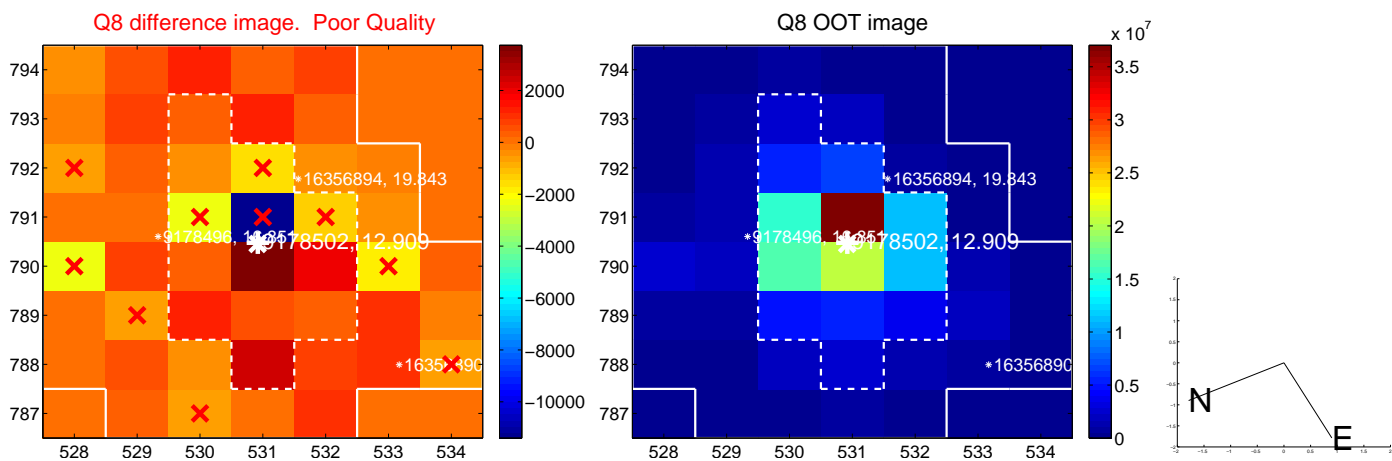
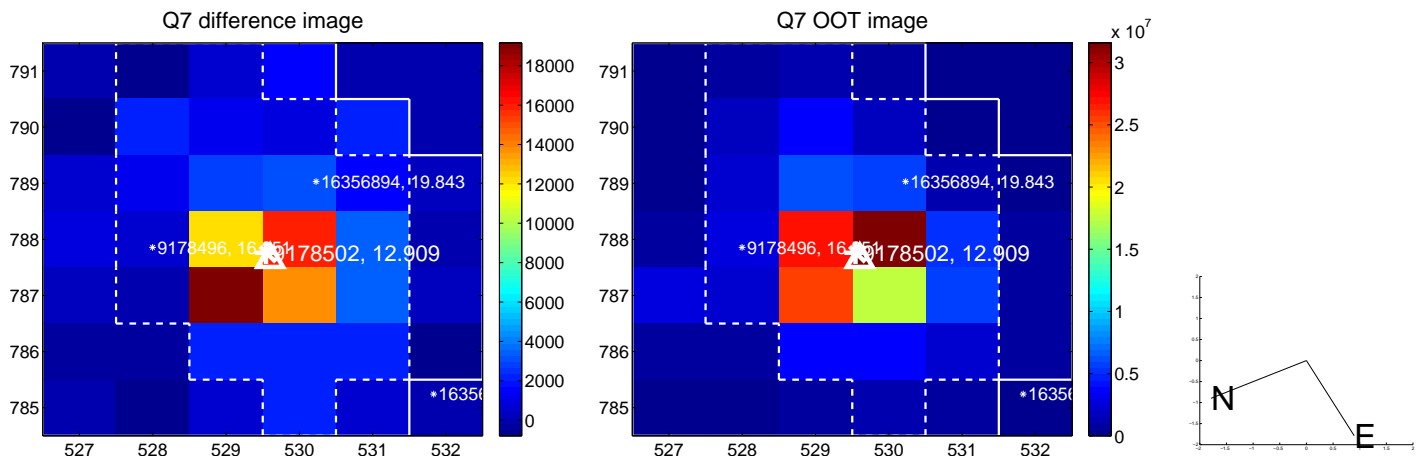
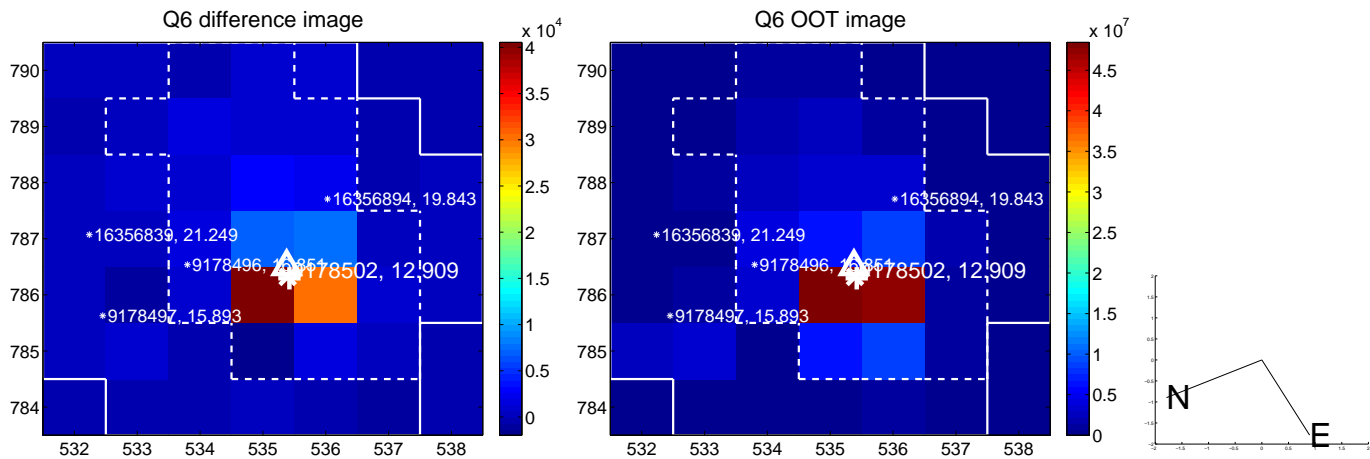
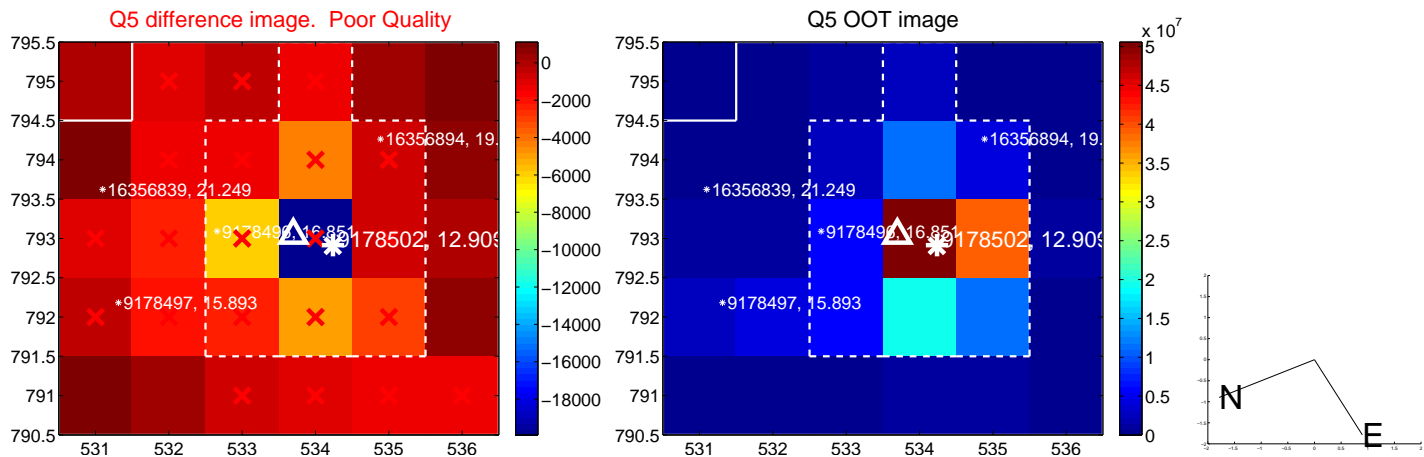


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

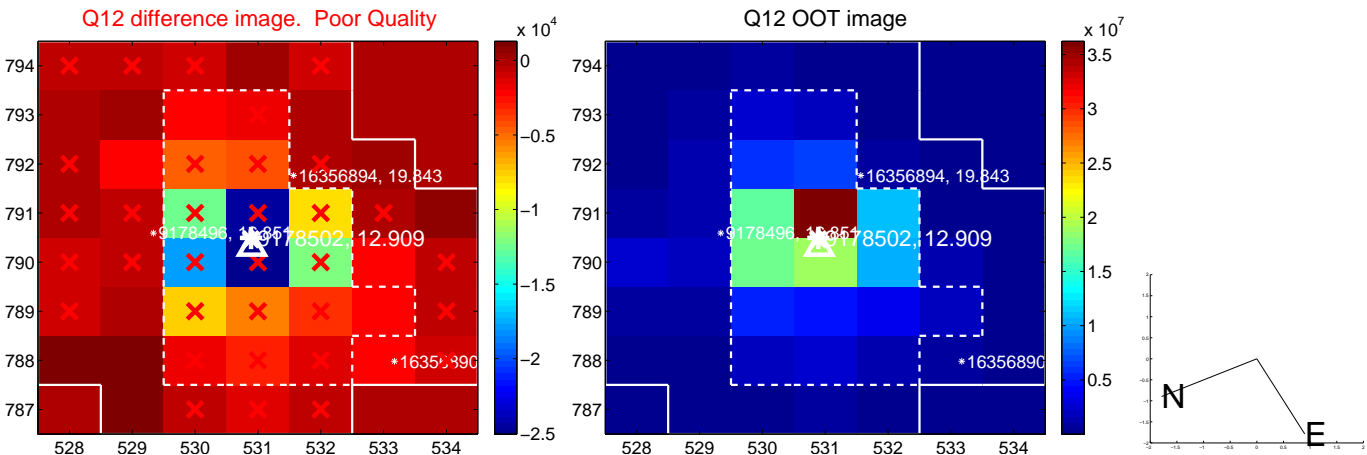
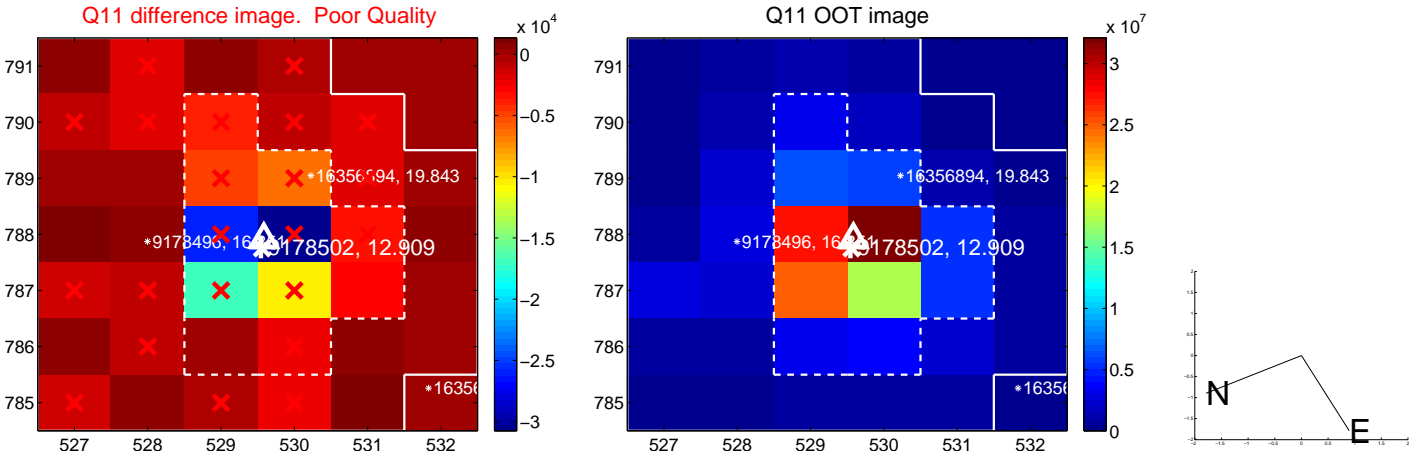
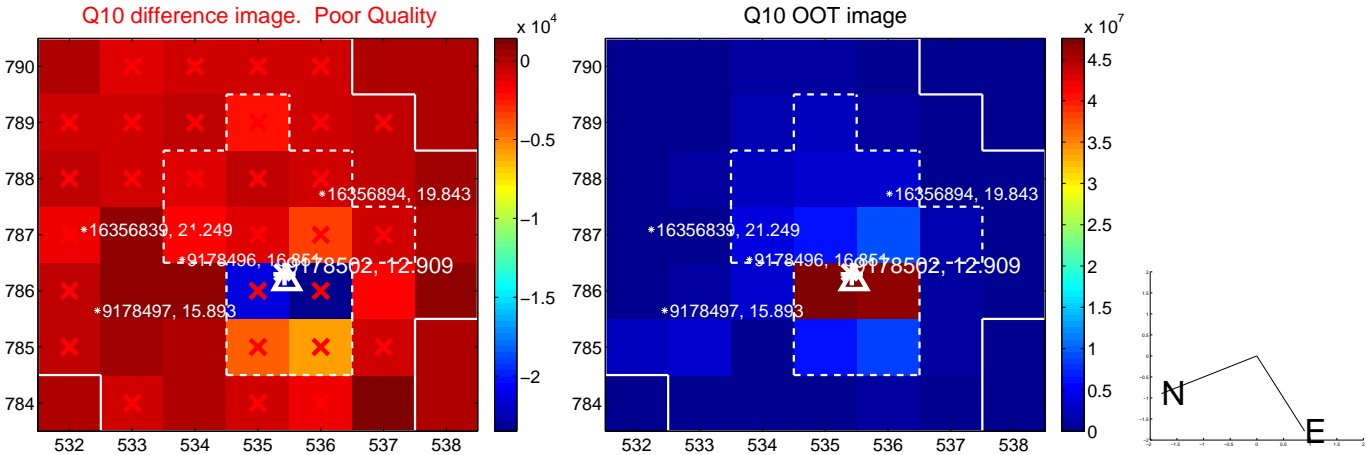
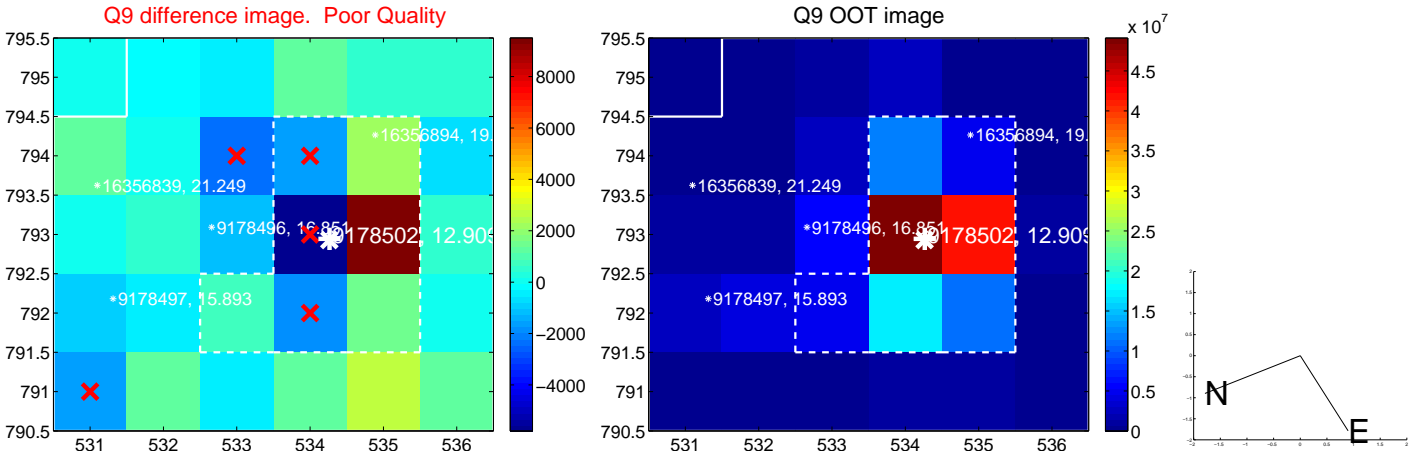
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



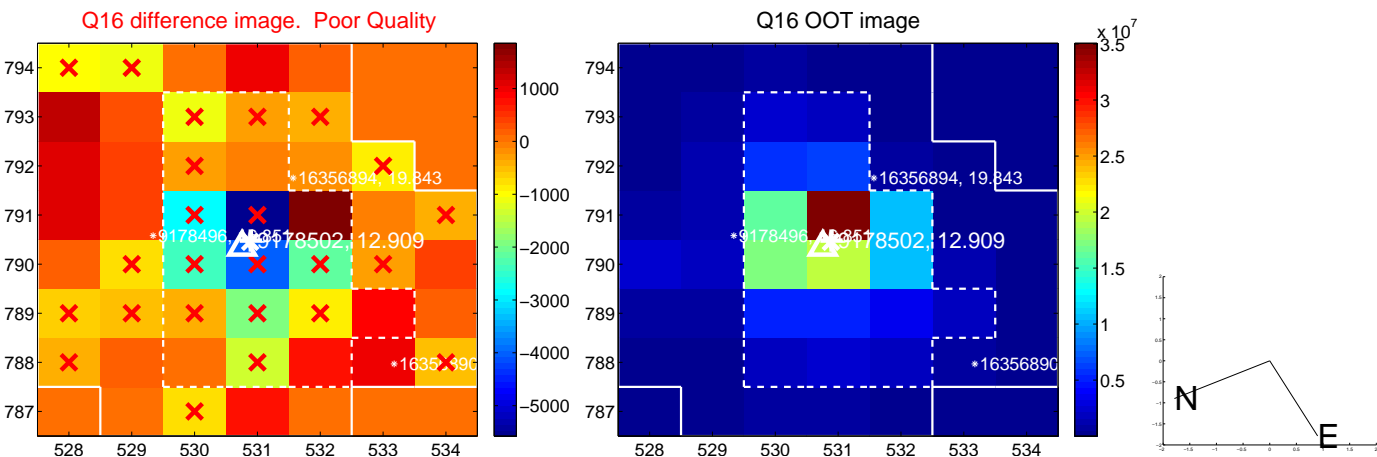
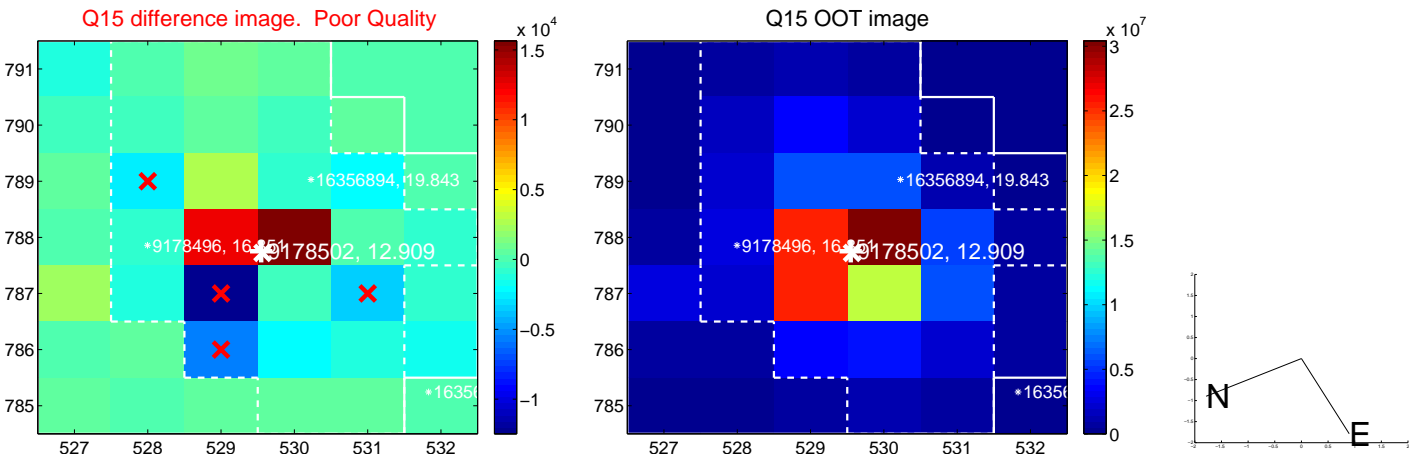
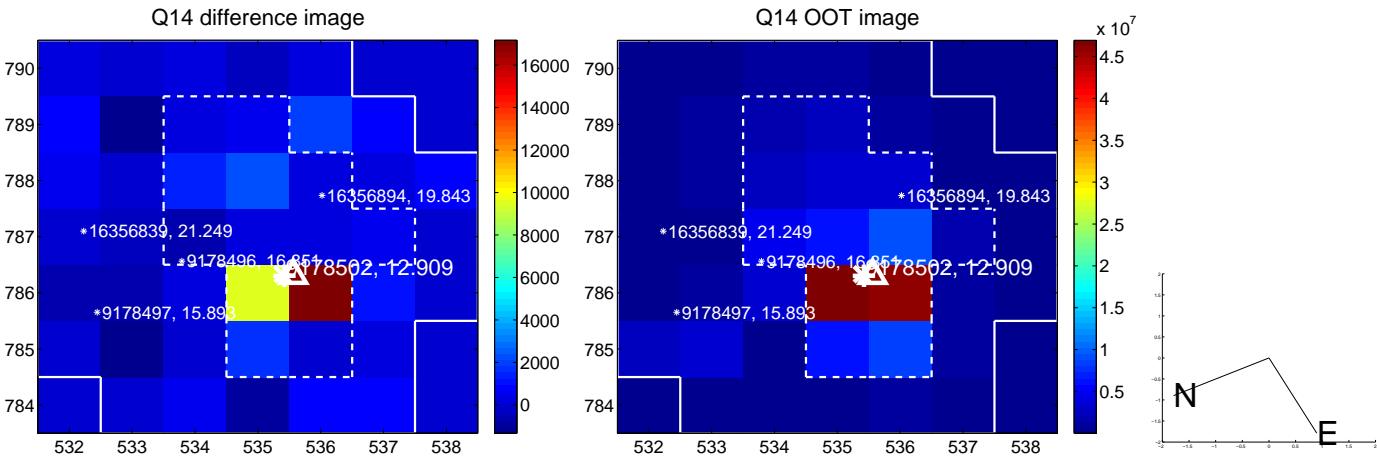
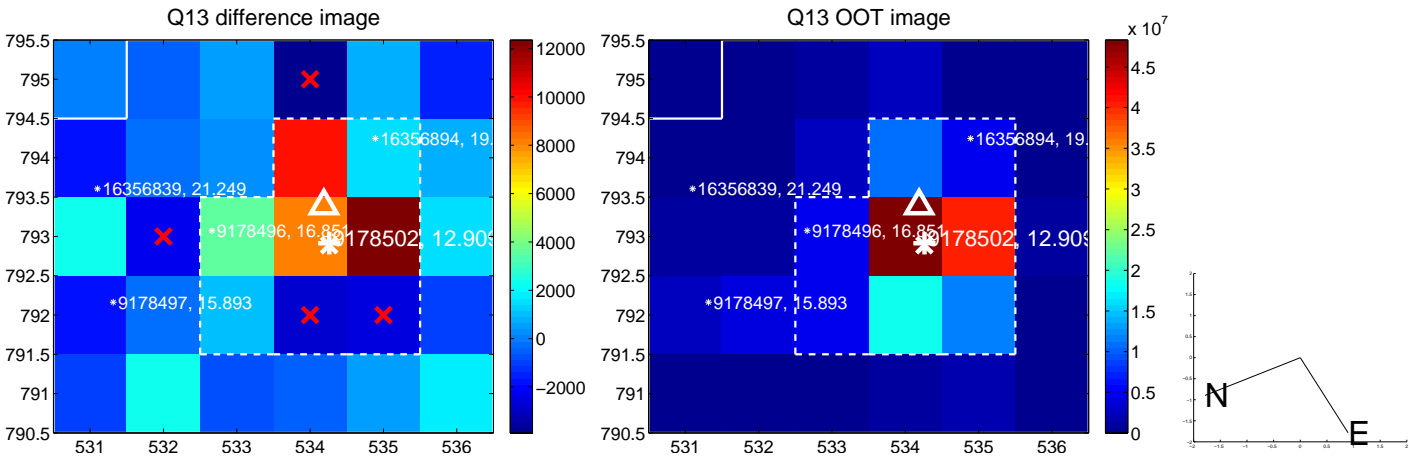
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



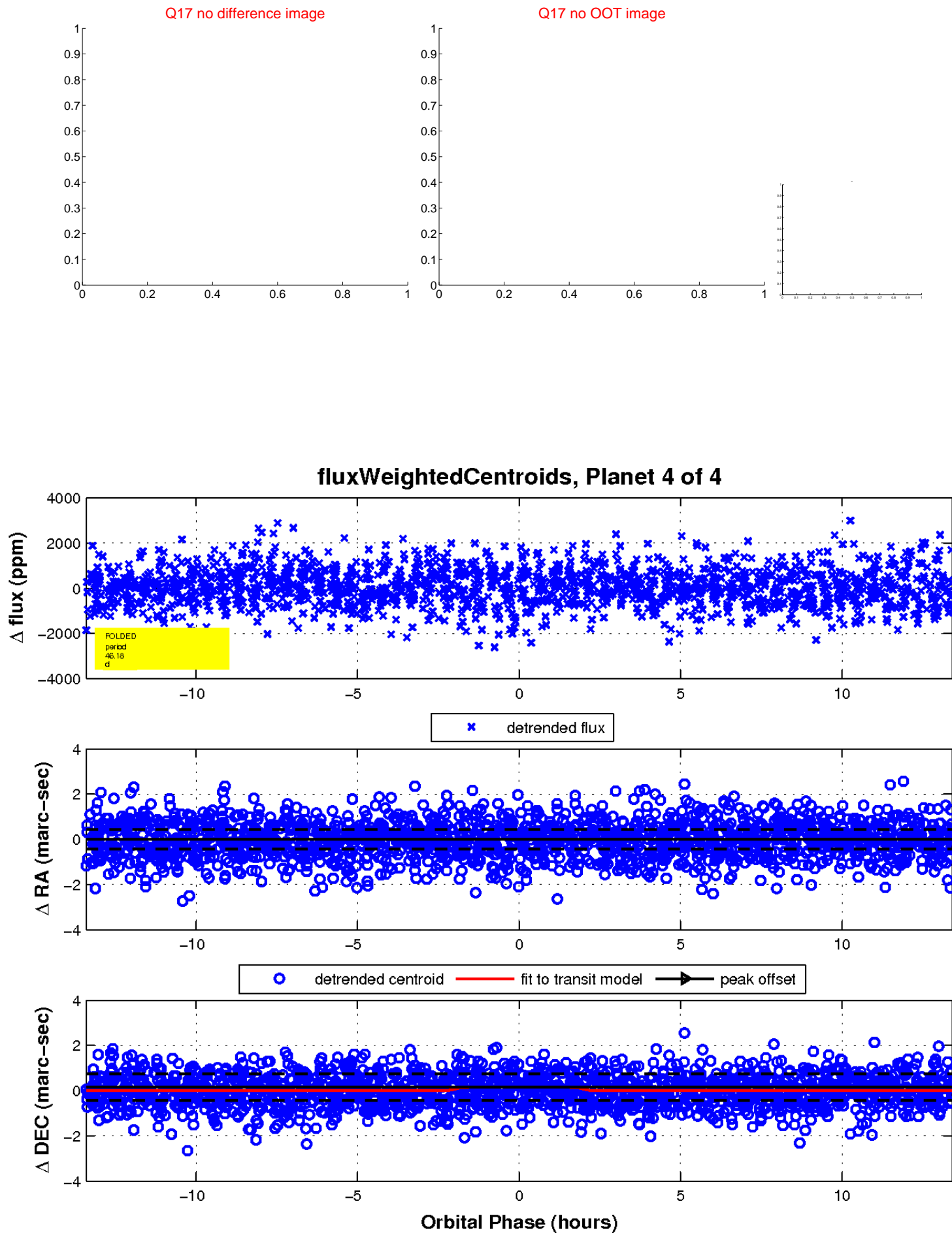
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

