

KIC 004150496

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})
004150496-01	OBS	4046.01	8.653181	136.647806	410.0	2.684	18.9	20.1	0.89	5880	2.13	127.67
004150496-02	OBS	No	8.653184	134.293634	403.1	4.309	18.1	19.7	0.89	5880	3.36	127.66
004150496-03	OBS	4046.02	94.224298	196.161764	433.9	24.684	13.5	16.0	0.89	5880	2.21	5.29

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004150496-01	OBS	FP	0.00	0	1	1	1	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE—HALO_GHOST—EPHEM_MATCH
004150496-02	OBS	FP	0.00	1	1	1	1	IS_SEC_TCE—HALO_GHOST—EPHEM_MATCH
004150496-03	OBS	FP	0.00	1	0	1	1	INDIV_TRANS_RUBBLE_SKYE—CENT_KIC_POS—HALO_GHOST—EPHEM_MATCH

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 004150496-01

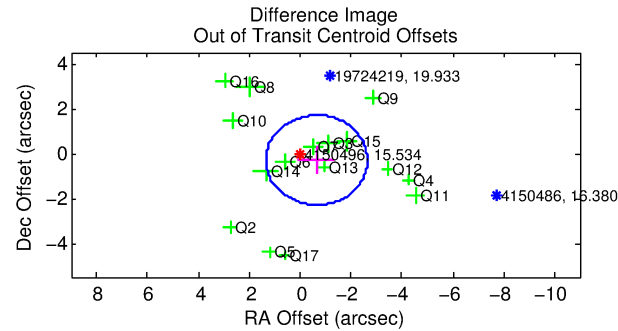
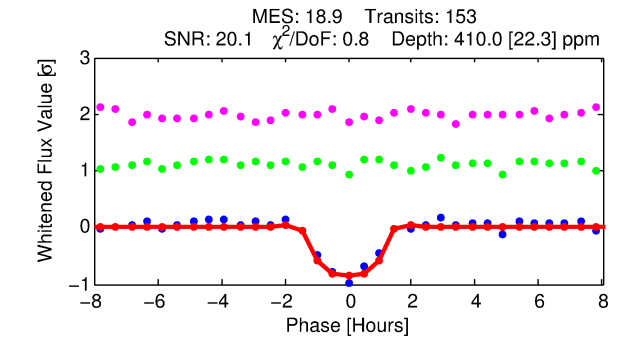
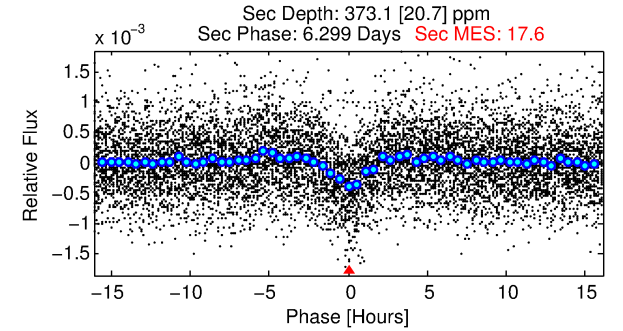
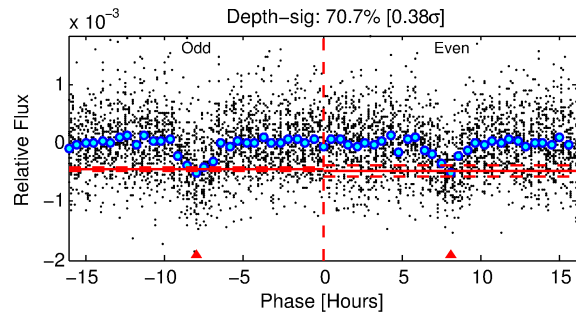
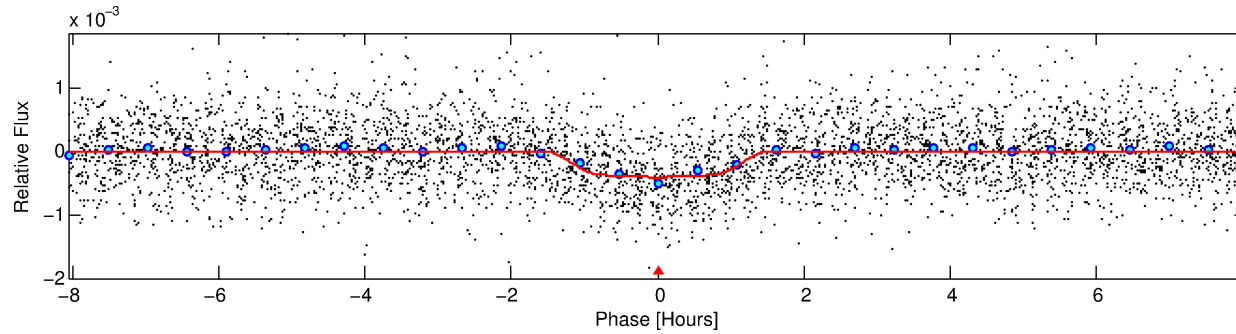
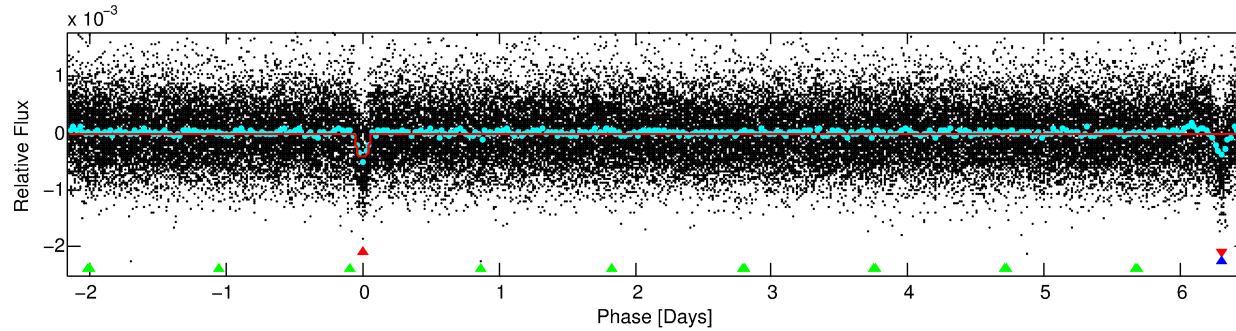
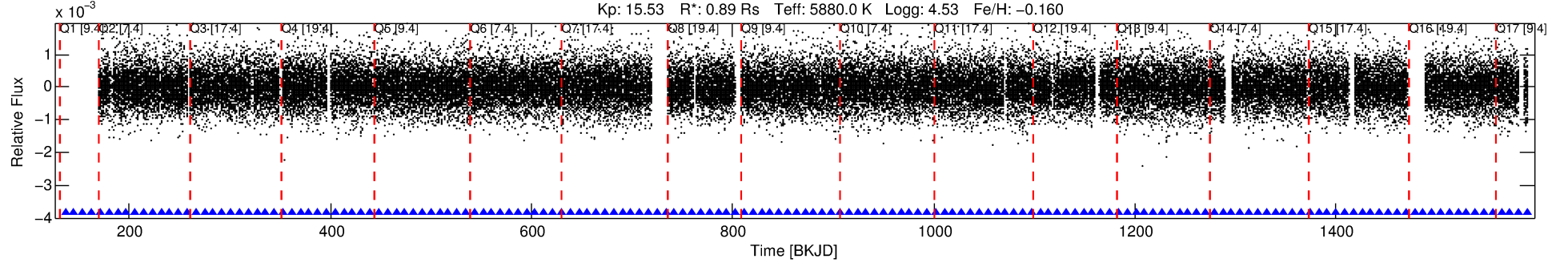
TCE (1)	KIC	Parent (2)	Parent KIC	P ₁ :P ₂	Dist (μ)	Δ Row	Δ Col	m ₂	m ₁	D ₂ /D ₁	Mechanism	Flag	σ_P	σ_T
004150496-01	4150496	004150611-01	4150611	1:1	98.0	24	-7	7.90	15.54	141.64	Direct-PRF	0	0.22	0.25

Notes: P₁:P₂ is the period ratio. Dist is the distance in arcseconds. Δ Row and Δ Col are the number of pixels apart in row and column. m₂ and m₁ are the magnitudes of the parent and child. D₂/D₁ is the parent's transit depth divided by the child's. σ_P and σ_T are the significance of the match in period and epoch. For a match to be considered significant $\sigma_P < 5.0$ and $\sigma_T < 5.0$. Matches which have σ_P and σ_T very close to this cutoff should receive extra scrutiny, especially if the period ratio is very large.

DV One-Page Summary

KIC: 4150496 Candidate: 1 of 3 Period: 8.653 d
KOI: K04046.01 Corr: 0.969

Kp: 15.53 R*: 0.89 Rs Teff: 5880.0 K Logg: 4.53 Fe/H: -0.160



DV Fit Results:

Period = 8.65318 [0.00003] d
Epoch = 136.6478 [0.0030] BKJD
Rp/R* = 0.0219 [0.0043]
a/R* = 12.13 [11.41]
b = 0.90 [0.21]
Seff = 127.66 [51.26]
Teq = 857 [86] K
Rp = 2.13 [0.78] Re
a = 0.0818 [0.0212] AU
Ag = 301.46 [165.08] [1.82σ]
Teff = 5522 [575] K [8.02σ]

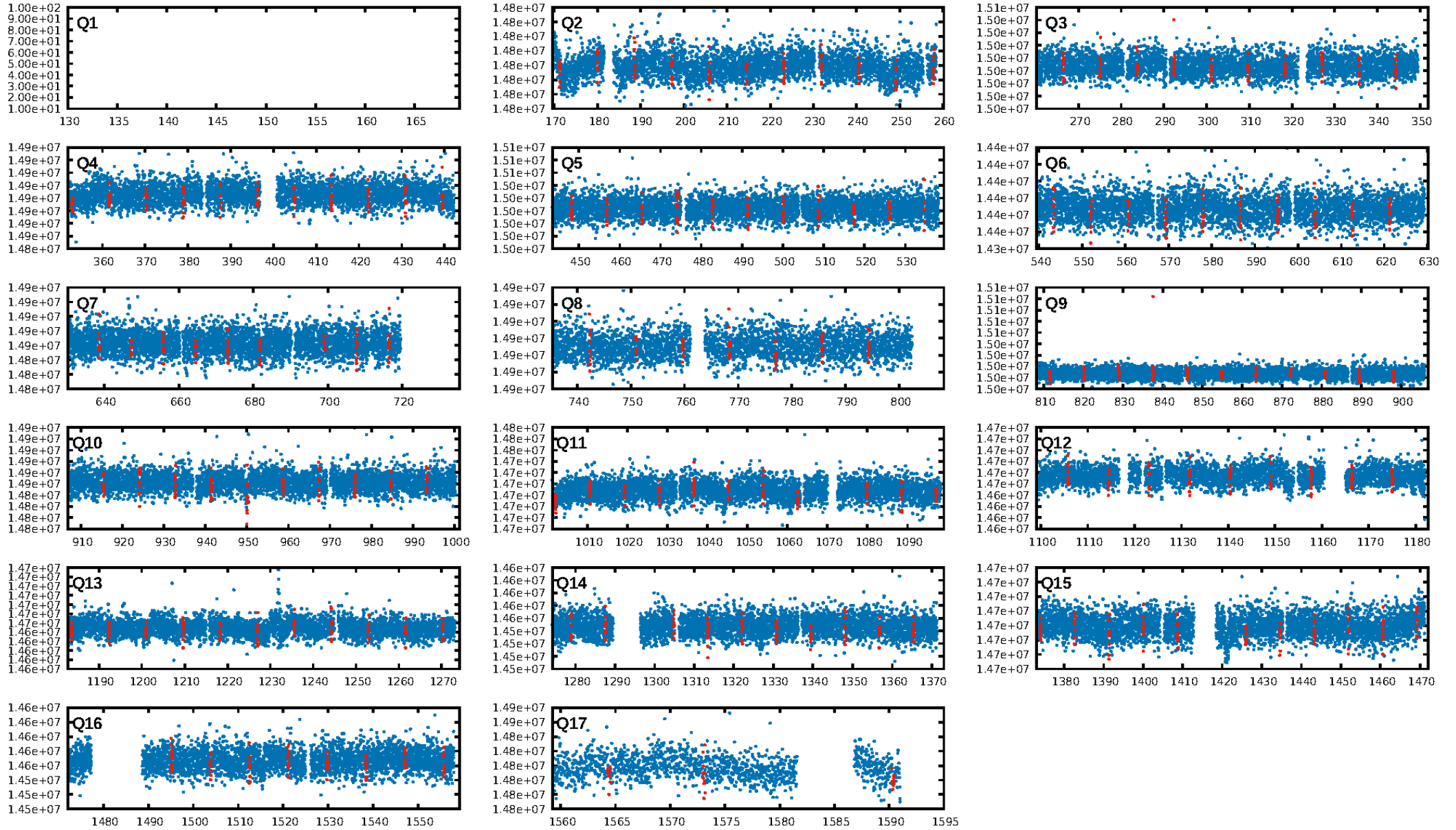
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 0.0% [0.00σ]
ModelChiSquare2-sig: 100.0%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 9.90e-80
RollingBand-fgt: 1.00 [150/150]
GhostDiagnostic-chr: -0.07035
Centroid-sig: 0.0%
Centroid-so: 2.168 arcsec [3.57σ]
OotOffset-rm: 0.711 arcsec [1.07σ]
KicOffset-rm: 0.998 arcsec [1.49σ]
OotOffset-st: 4/4/4/4 [16]
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DiffImageQuality-fgm: 0.12 [2/16]
DiffImageOverlap-fno: 1.00 [16/16]

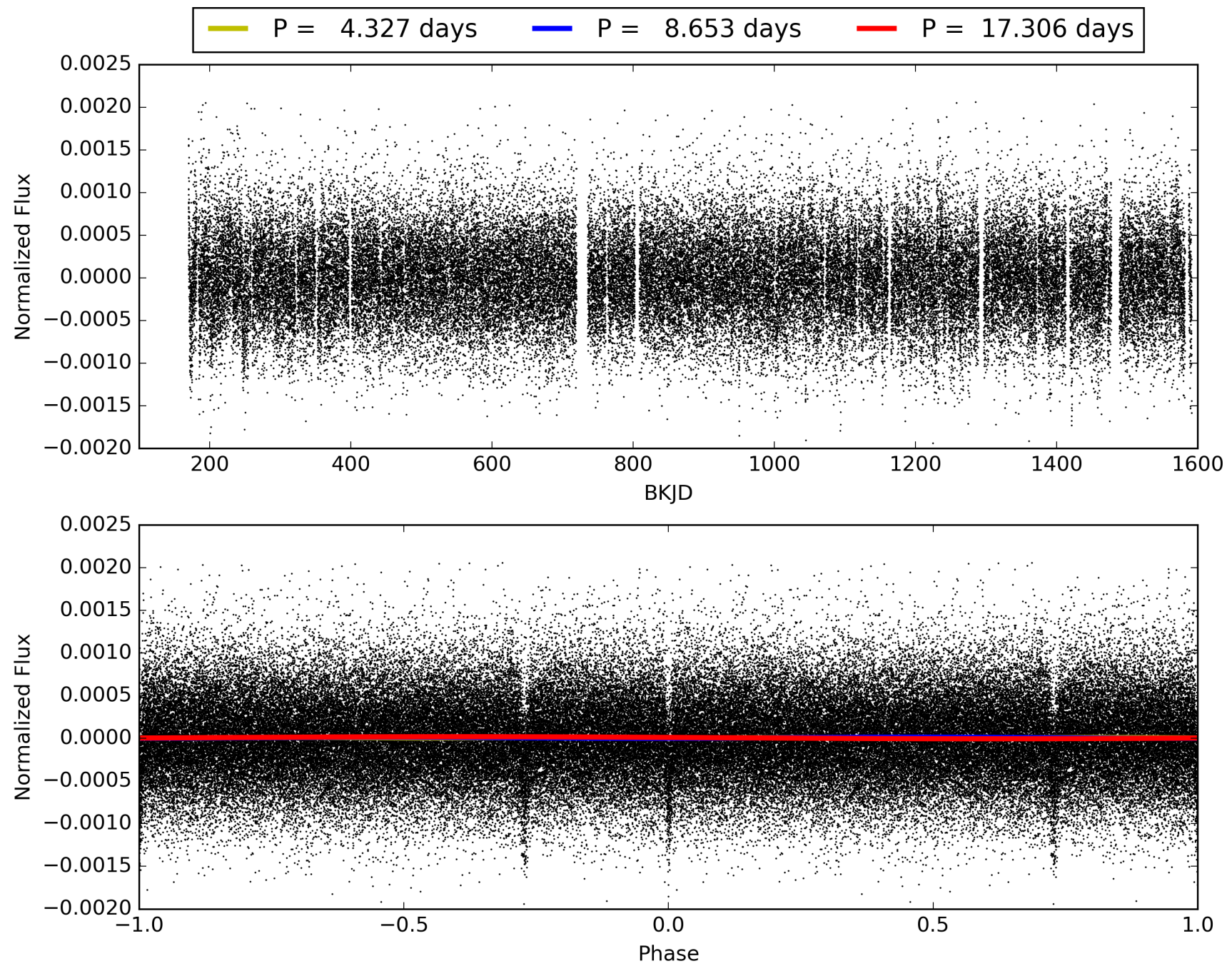
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This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

TCE 004150496-01, PDC Light Curves

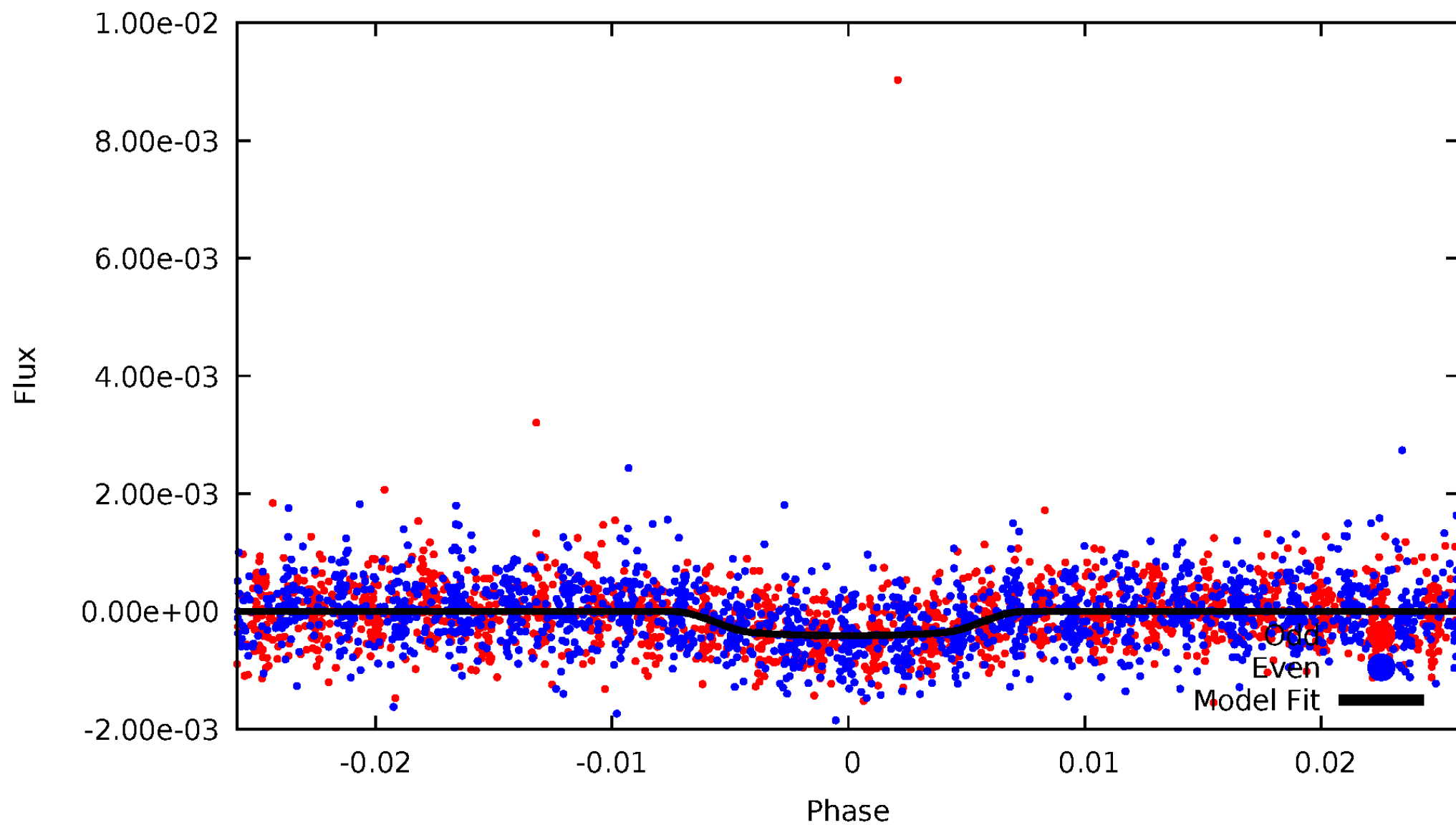


TCE 004150496-01



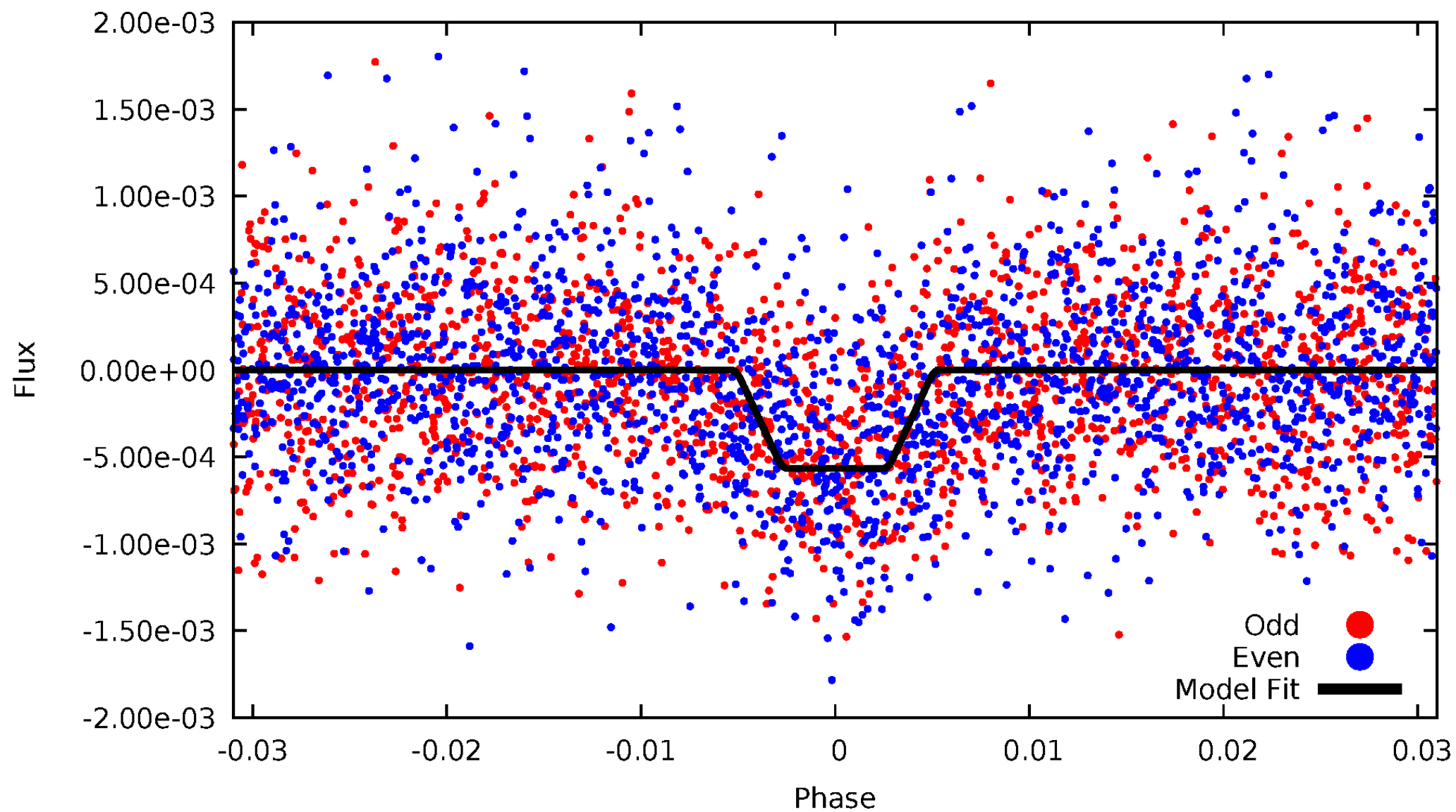
DV Odd/Even

TCE 004150496-01

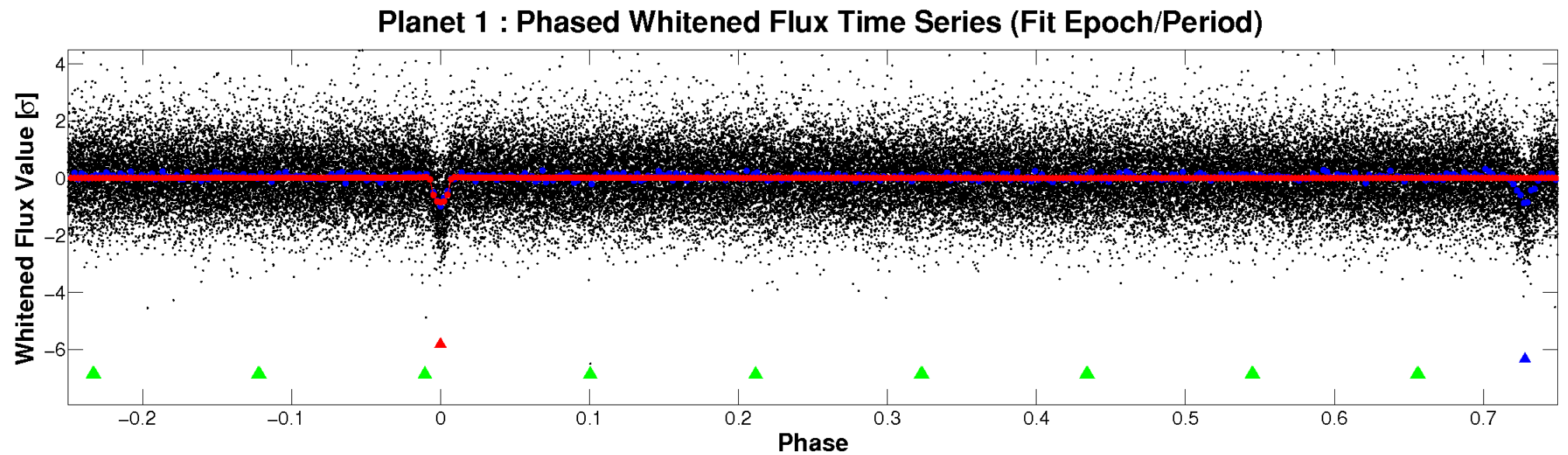
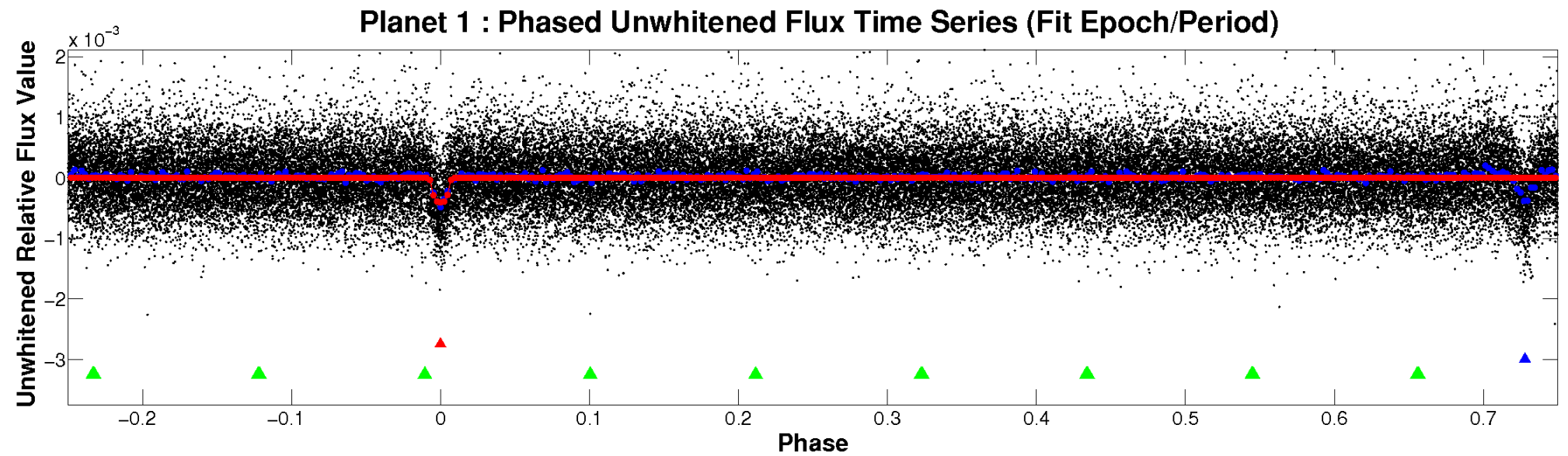


ALT Odd/Even

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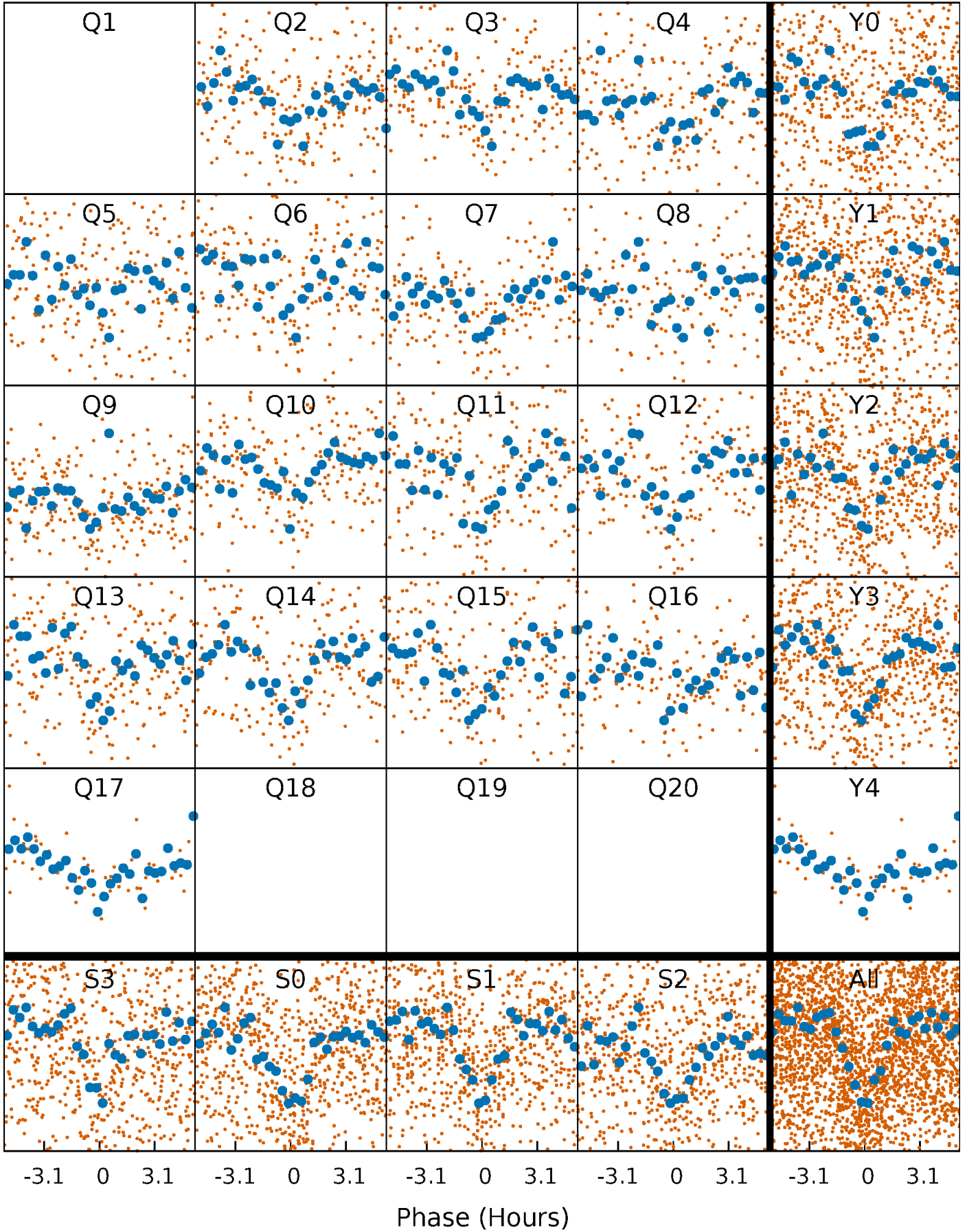


Non-Whitened Vs. Whitened Light Curve



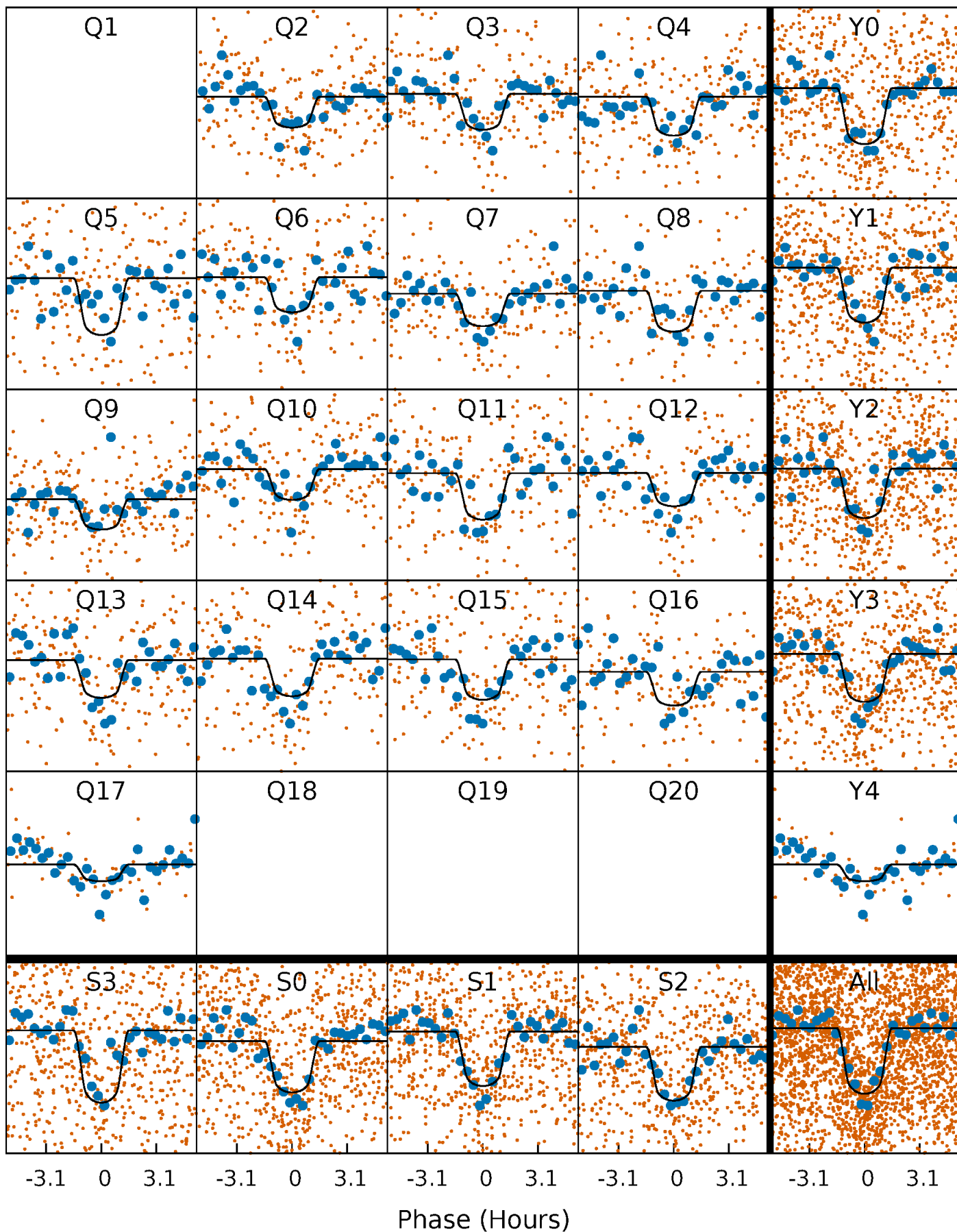
PDC Quarter-Phased Transit Curves

TCE 004150496-01 P= 8.653181 Days $T_0=136.647806$ (BKJD)



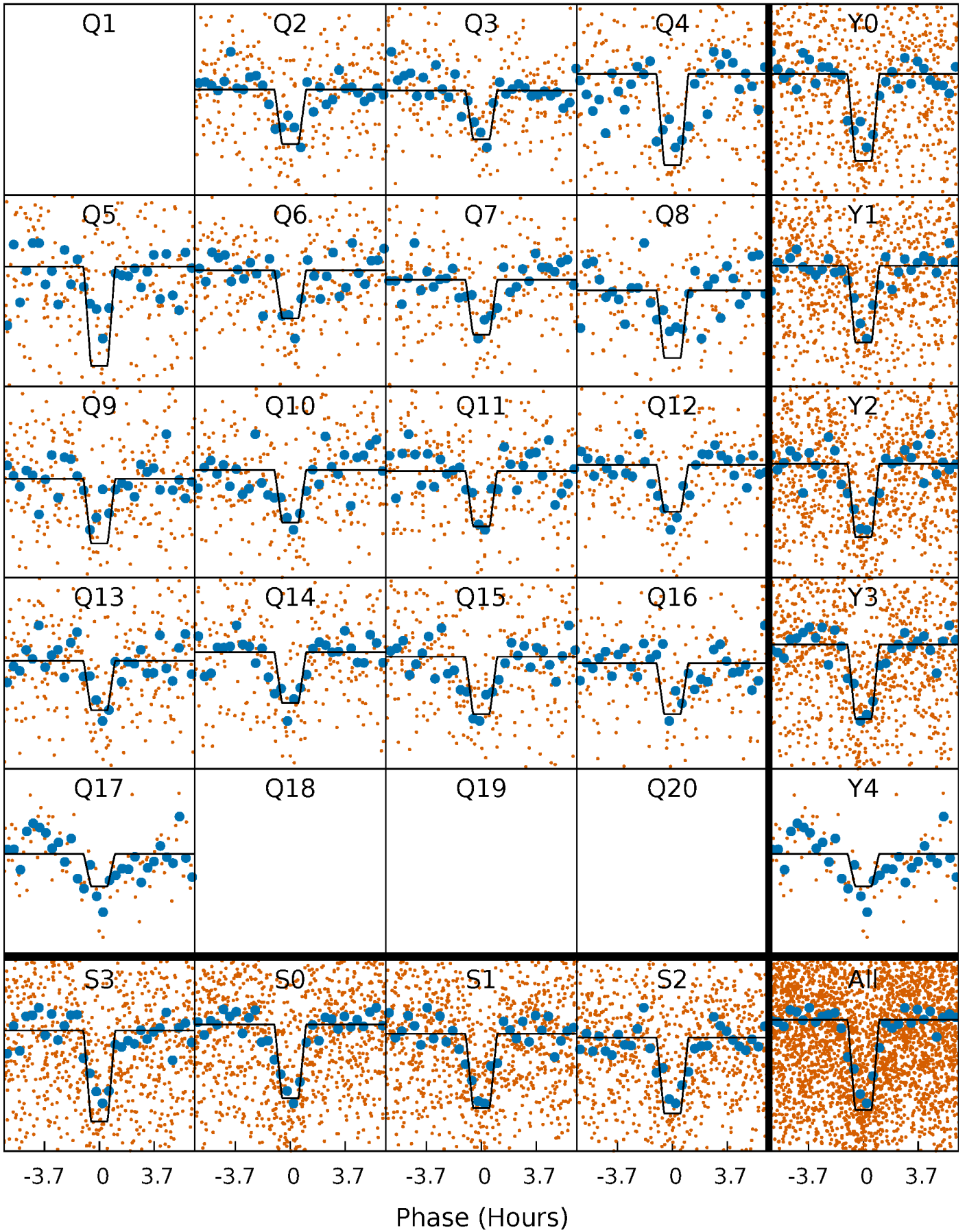
DV Quarter-Phased Transit Curves

TCE 004150496-01 P= 8.653181 Days $T_0=136.647806$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

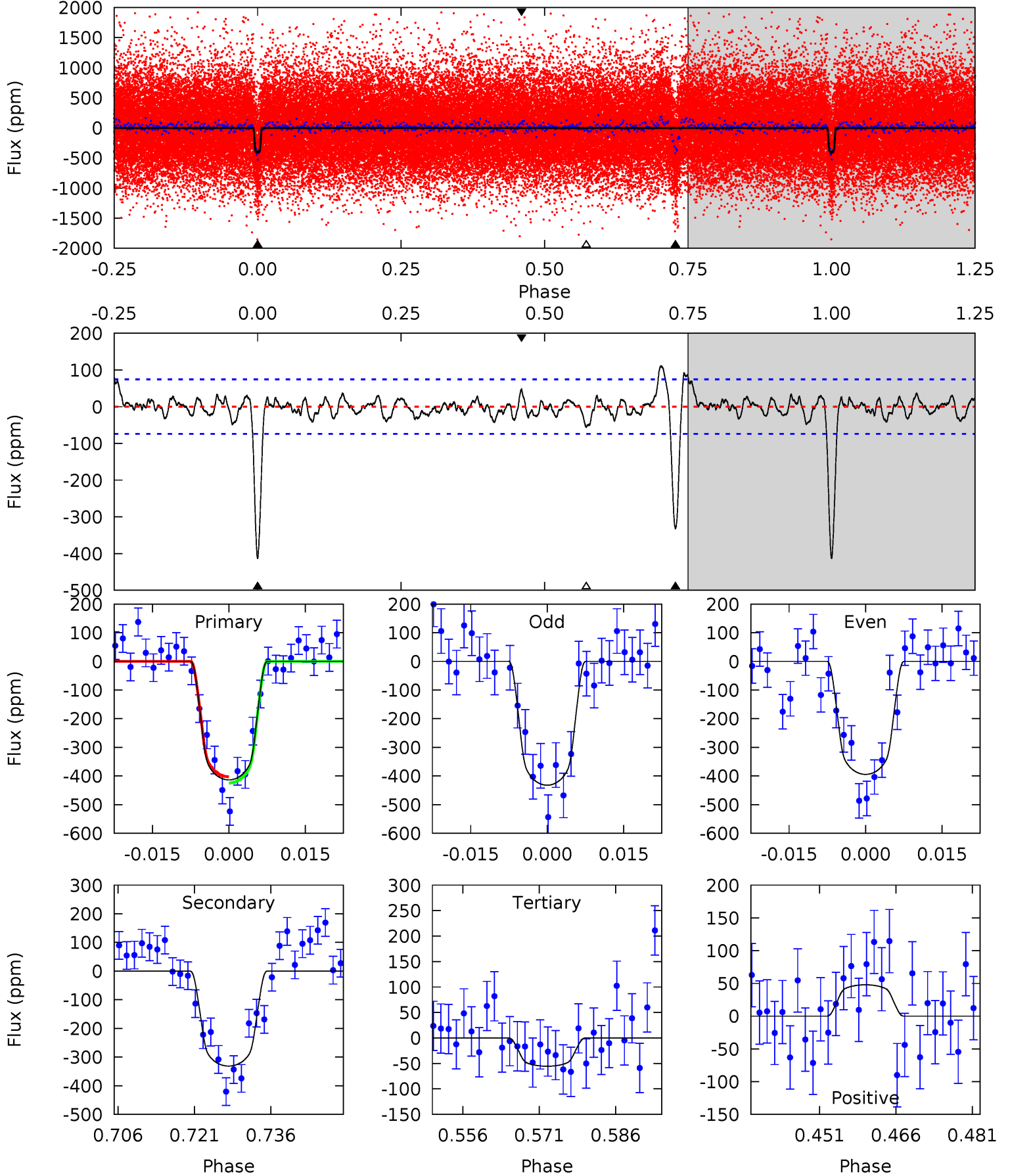
TCE 004150496-01 P= 8.653096 Days $T_0=136.656115$ (BKJD)



DV Model-Shift Uniqueness Test

004150496-01, P = 8.653181 Days, E = 136.647806 Days

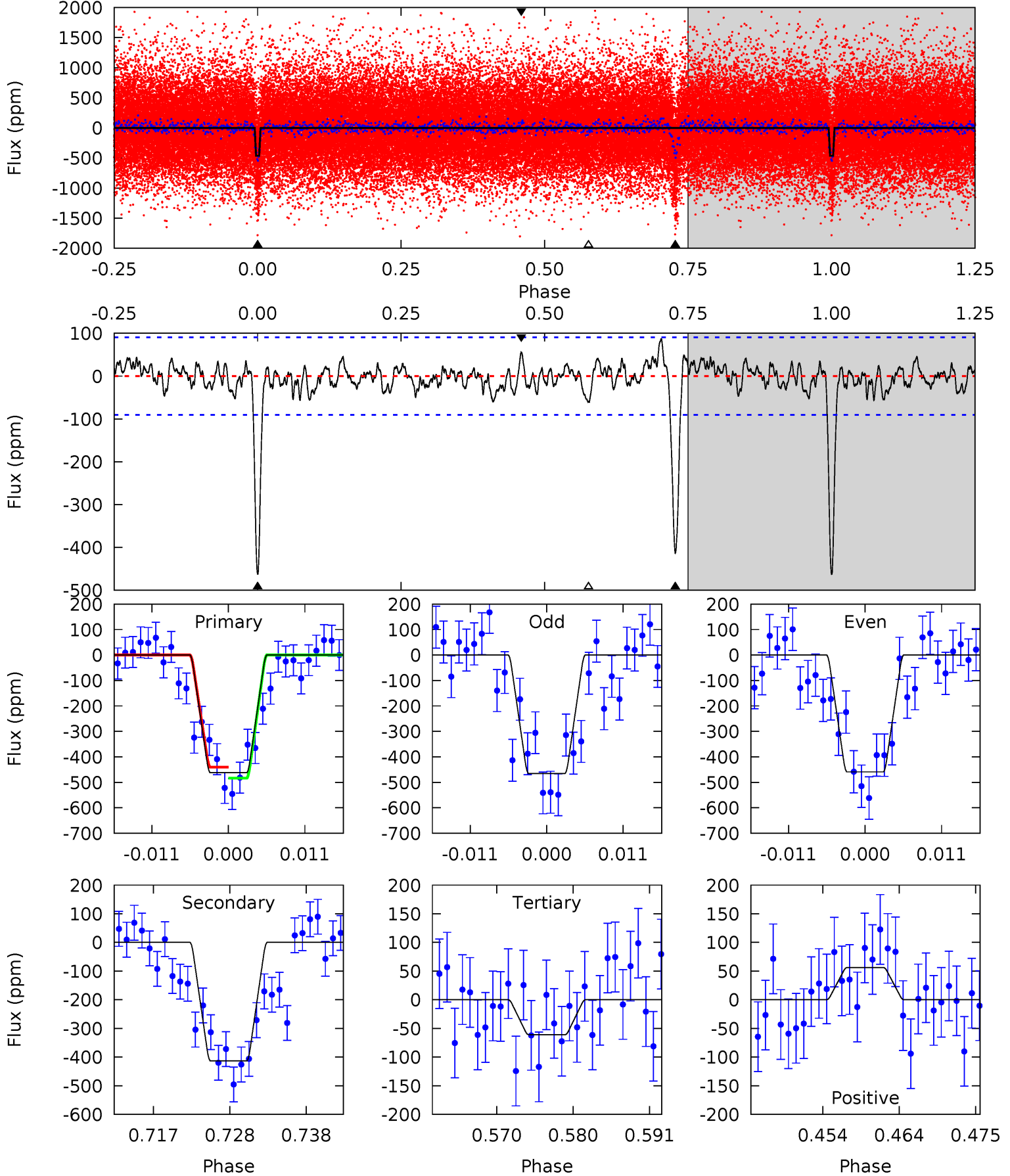
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
27.5	22.1	3.69	3.18	4.95	2.43	1.59	23.9	24.4	18.4	18.9	1.26	0.94	0.21	0.73



Alt Model-Shift Uniqueness Test

004150496-01, P = 8.653096 Days, E = 136.656115 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
25.6	22.9	3.38	3.12	5.02	2.56	1.32	22.2	22.5	19.5	19.8	0.18	0.99	0.16	1.21



Stellar Parameters For KIC 004150496

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	5880^{+159}_{-194}	$4.525^{+0.039}_{-0.208}$	$-0.160^{+0.300}_{-0.300}$	$0.893^{+0.274}_{-0.091}$	$0.974^{+0.120}_{-0.120}$	$1.927^{+0.404}_{-1.031}$
	+3%/-3%	+1%/-5%	+188%/-188%	+31%/-10%	+12%/-12%	+21%/-54%
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 004150496-01 / KOI 4046.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	-331 ± 15	$2.27^{+0.54}_{-0.48}$	1225^{+89}_{-57}	5359^{+598}_{-429}	233^{+142}_{-79}
Alt.	-413 ± 18	$2.45^{+0.59}_{-0.51}$	1227^{+83}_{-58}	5441^{+550}_{-400}	243^{+146}_{-79}

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 $A_{obs} \gg 1.0$

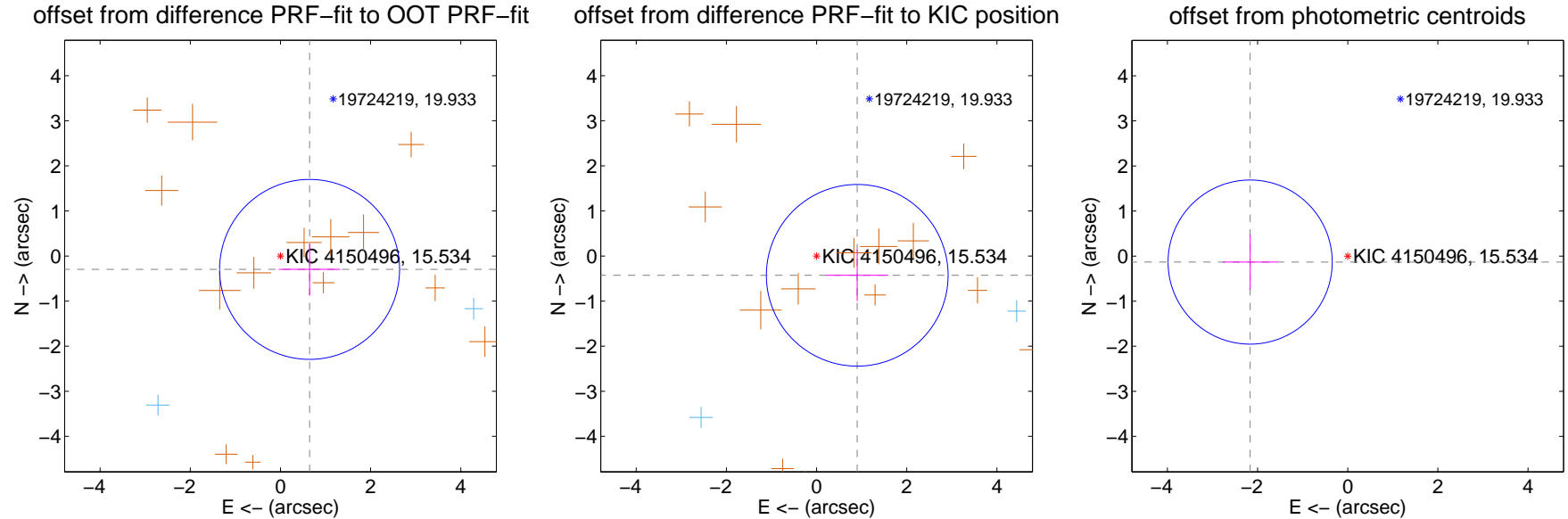
DV Centroid Data

Supplemental centroid analysis for 004150496-01. Kepler magnitude: 15.53. Transit SNR 20.13

There are 2 quarters with good PRF difference image offsets

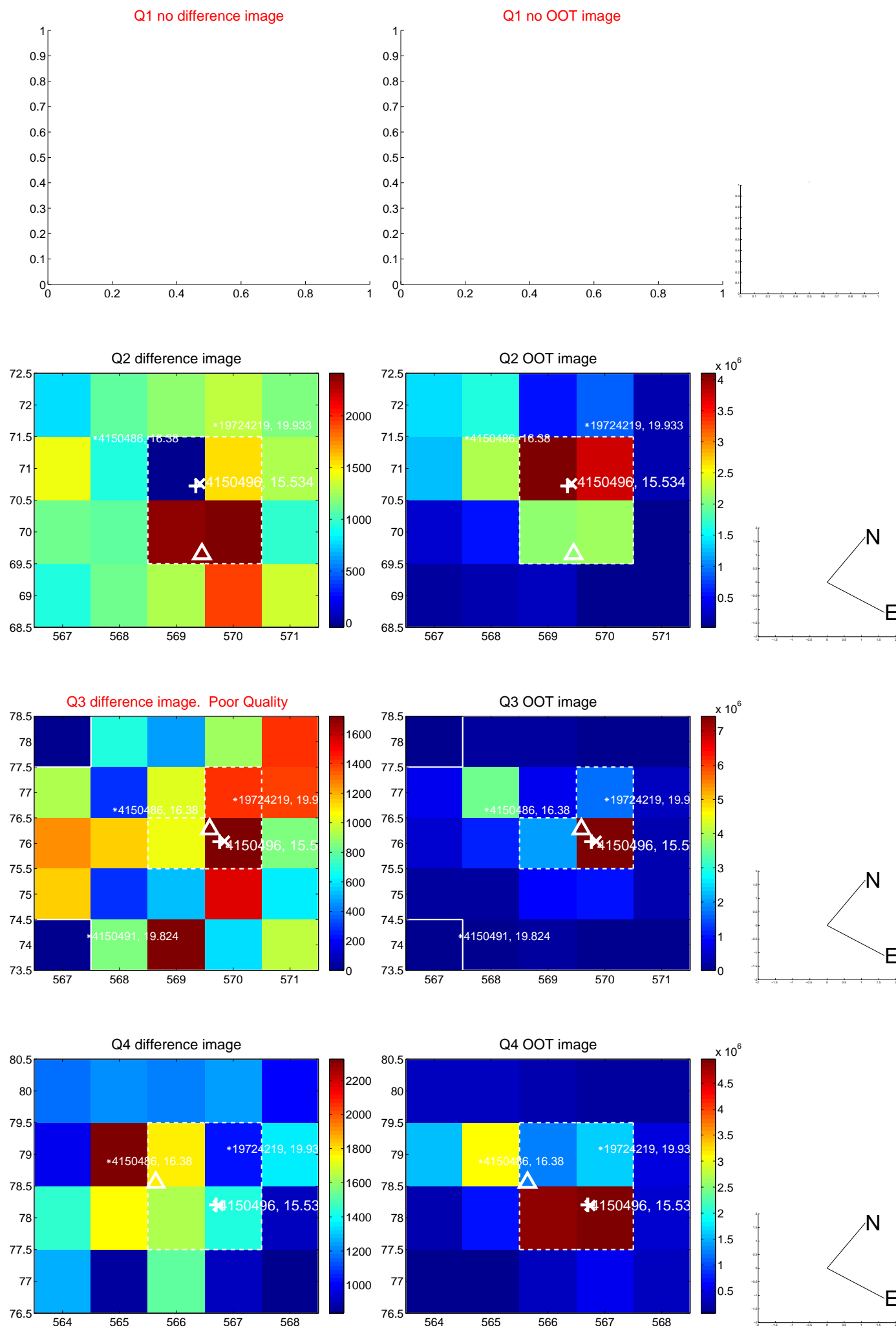
The direct PRF centroid is offset from the target star catalog position by about 0.50 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.711 ± 0.665	1.07	-0.646 ± 0.682	-0.297 ± 0.577
PRF-fit source offset from KIC position	0.998 ± 0.671	1.49	-0.901 ± 0.692	-0.428 ± 0.571
photometric centroid source offset	2.17 ± 0.61	3.57	2.16 ± 0.61	-0.13 ± 0.61

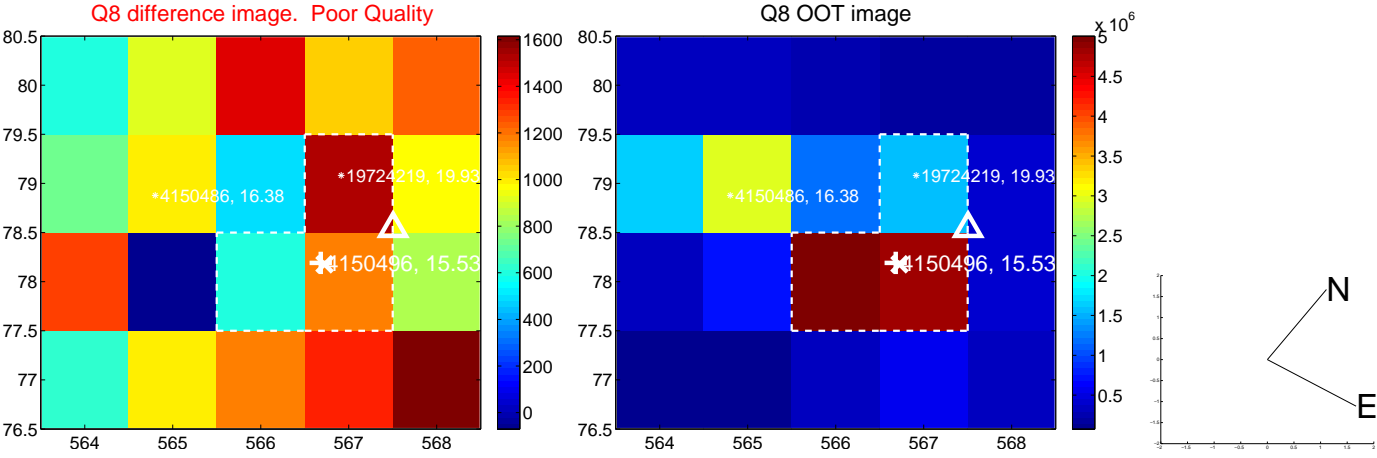
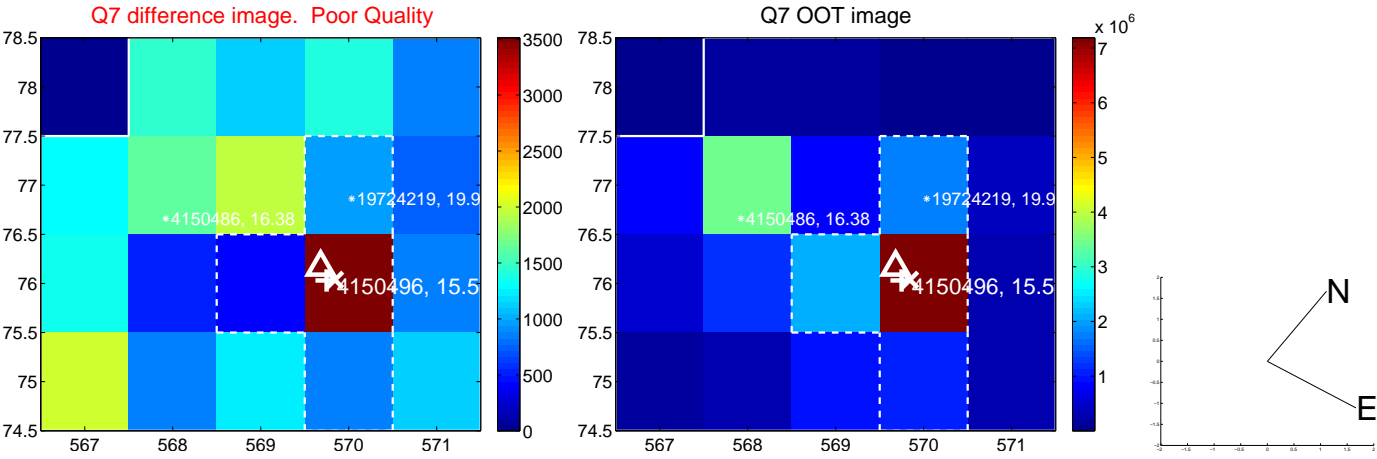
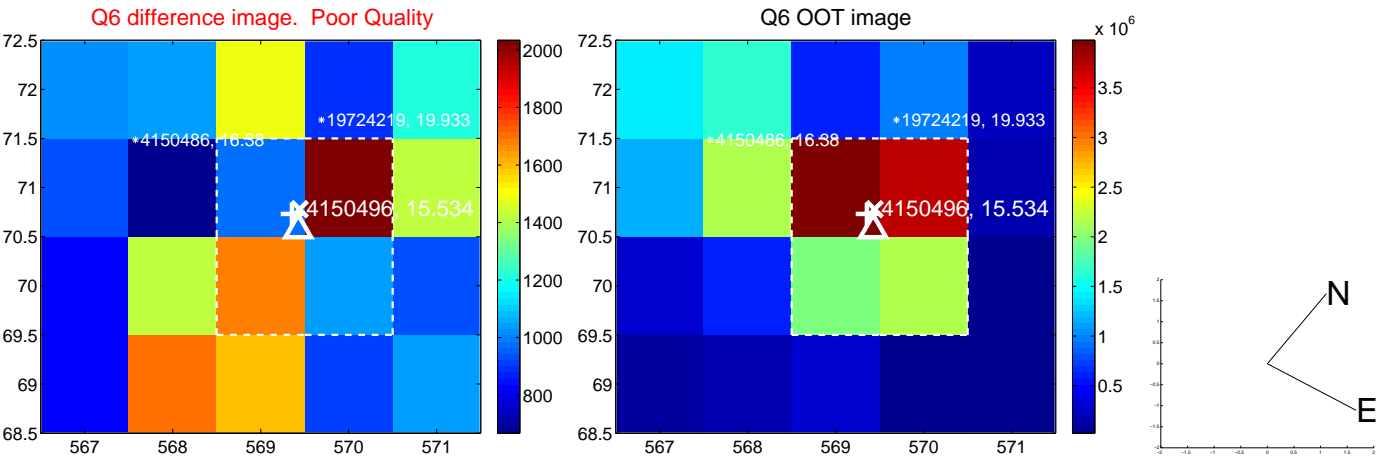
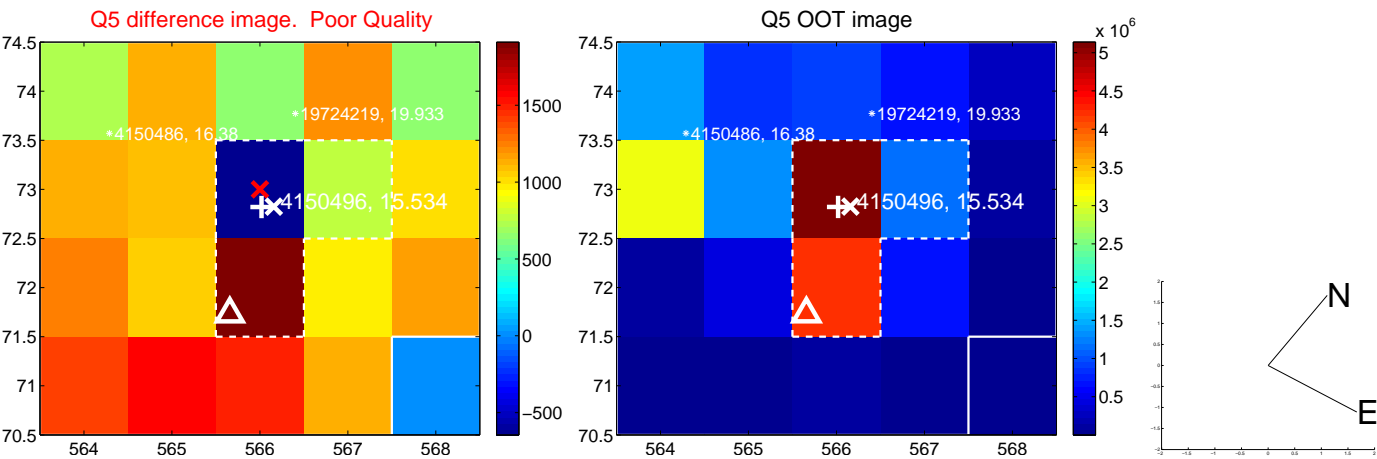


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

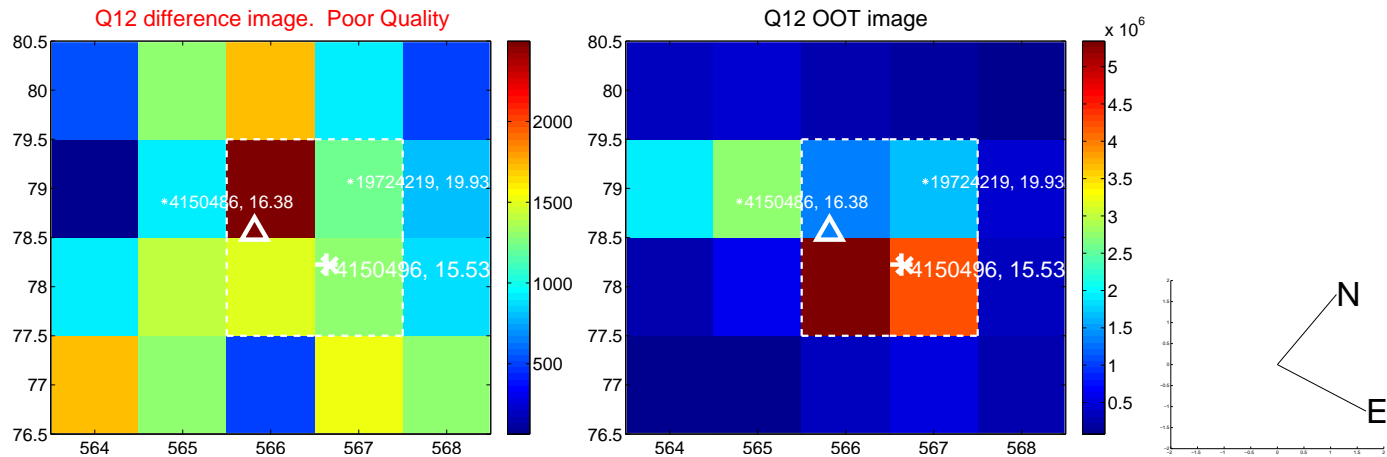
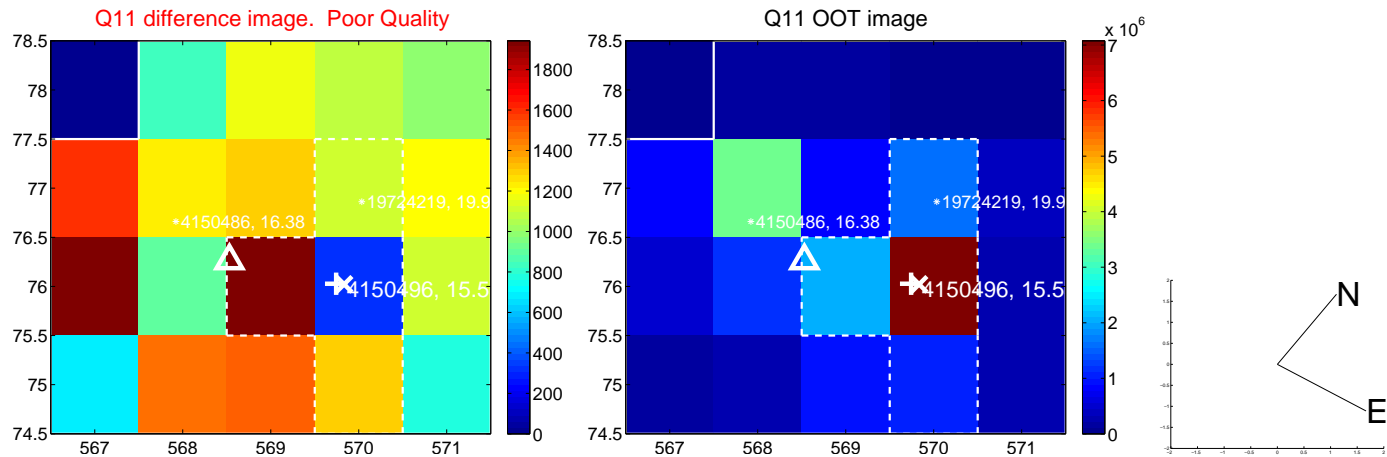
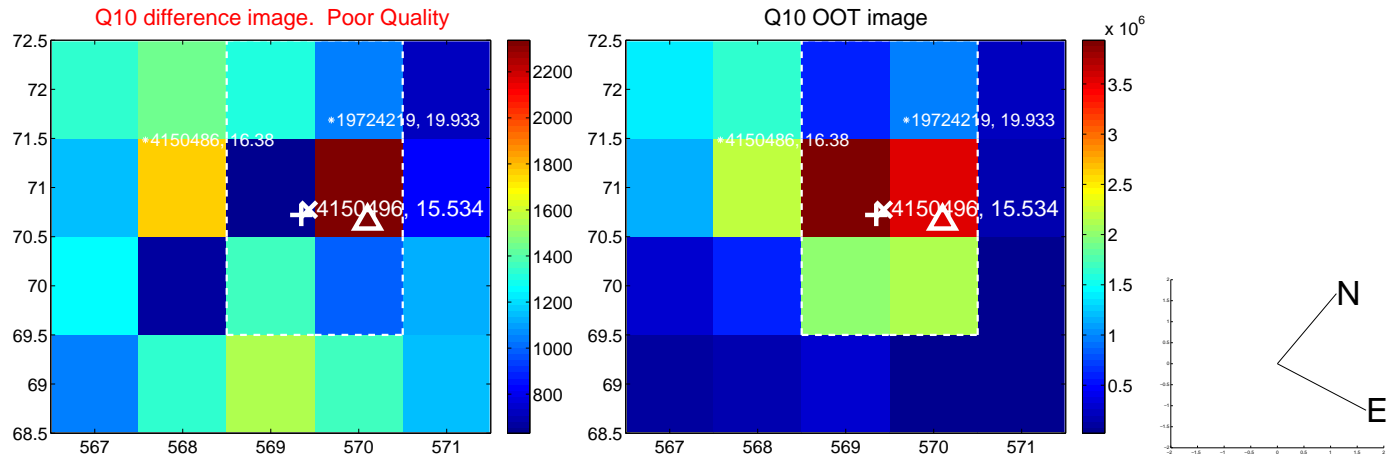
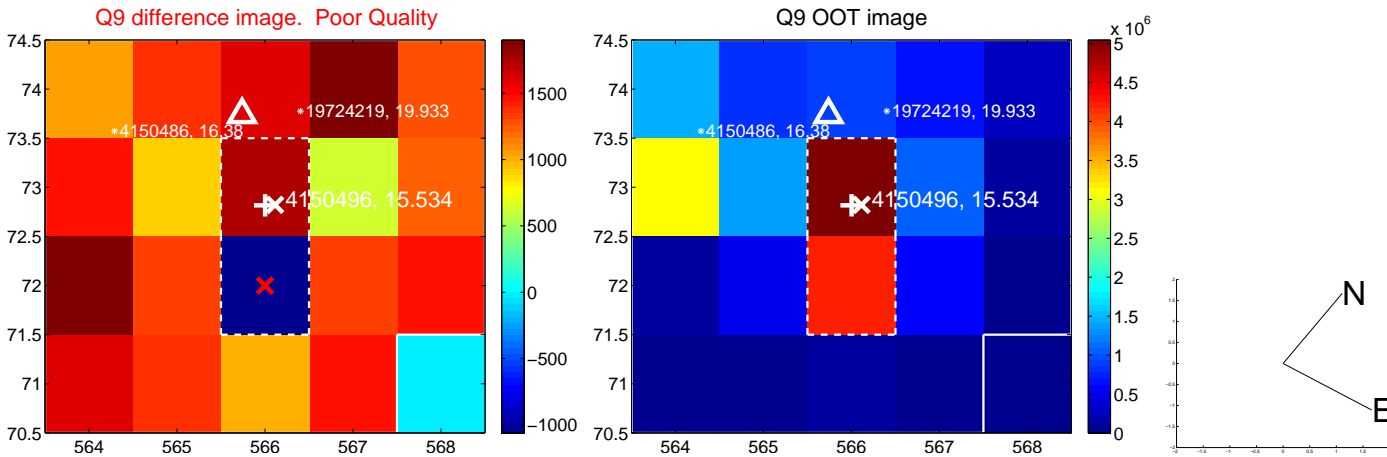
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value



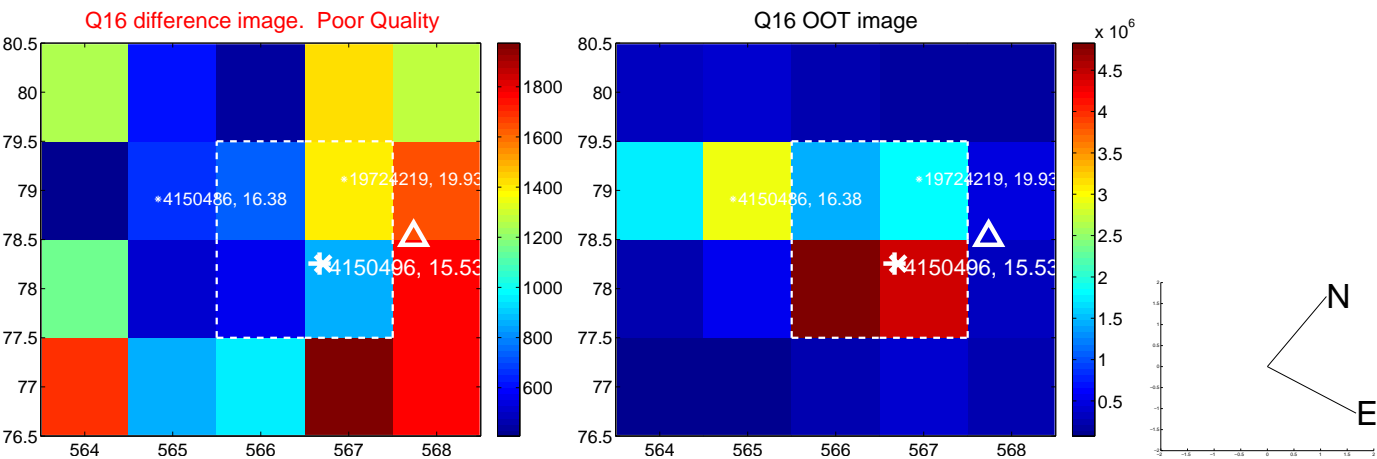
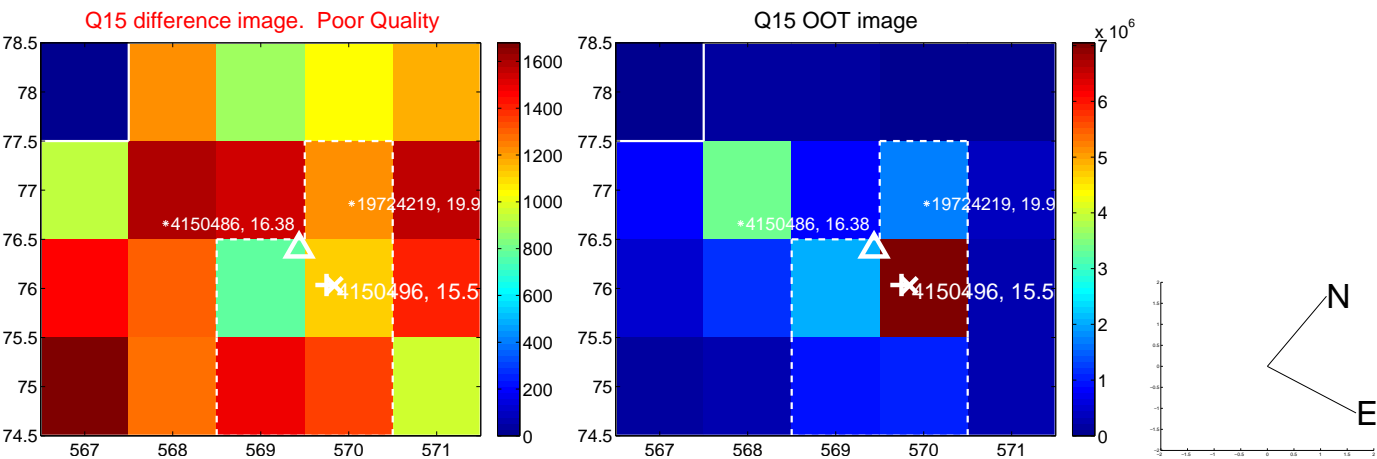
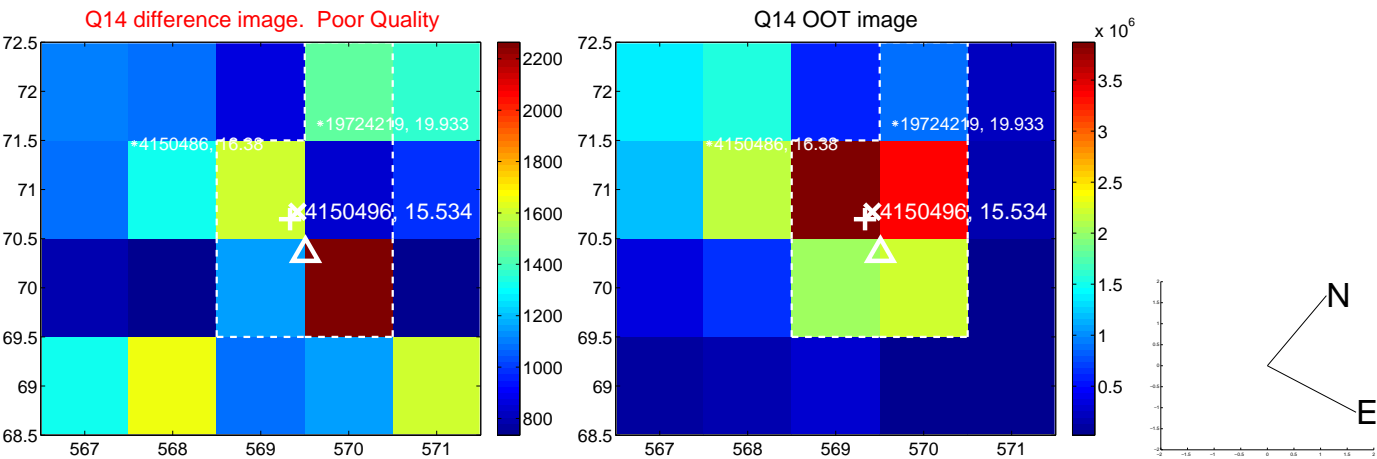
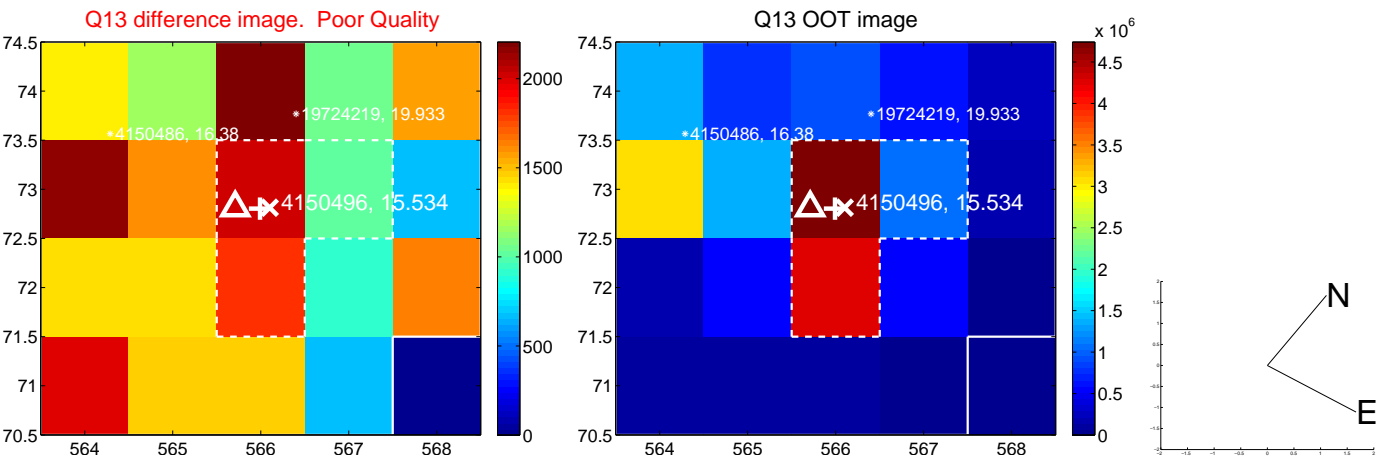
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



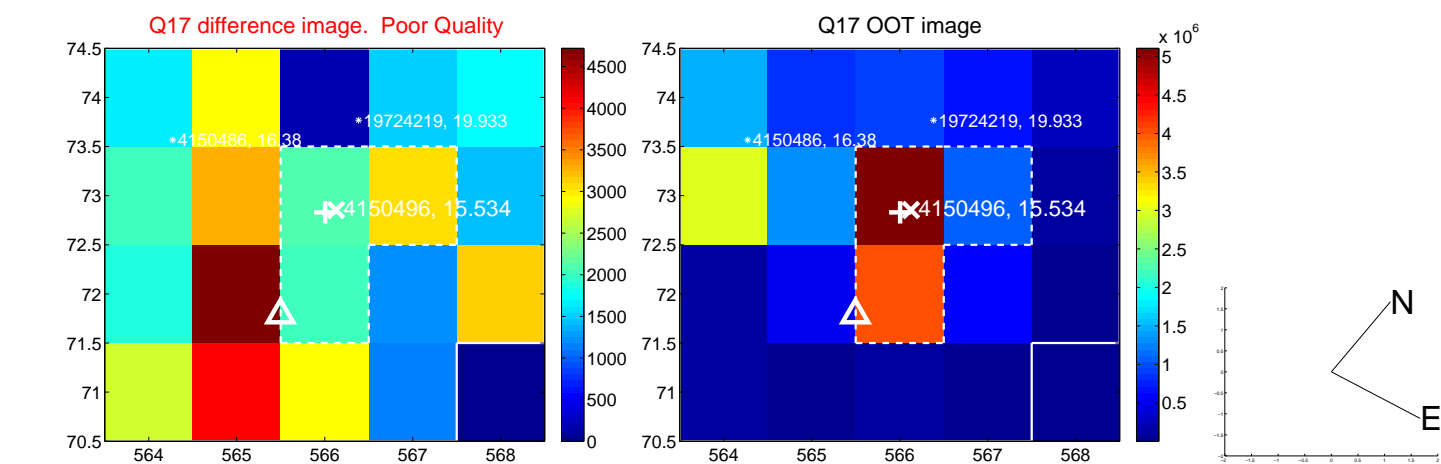
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



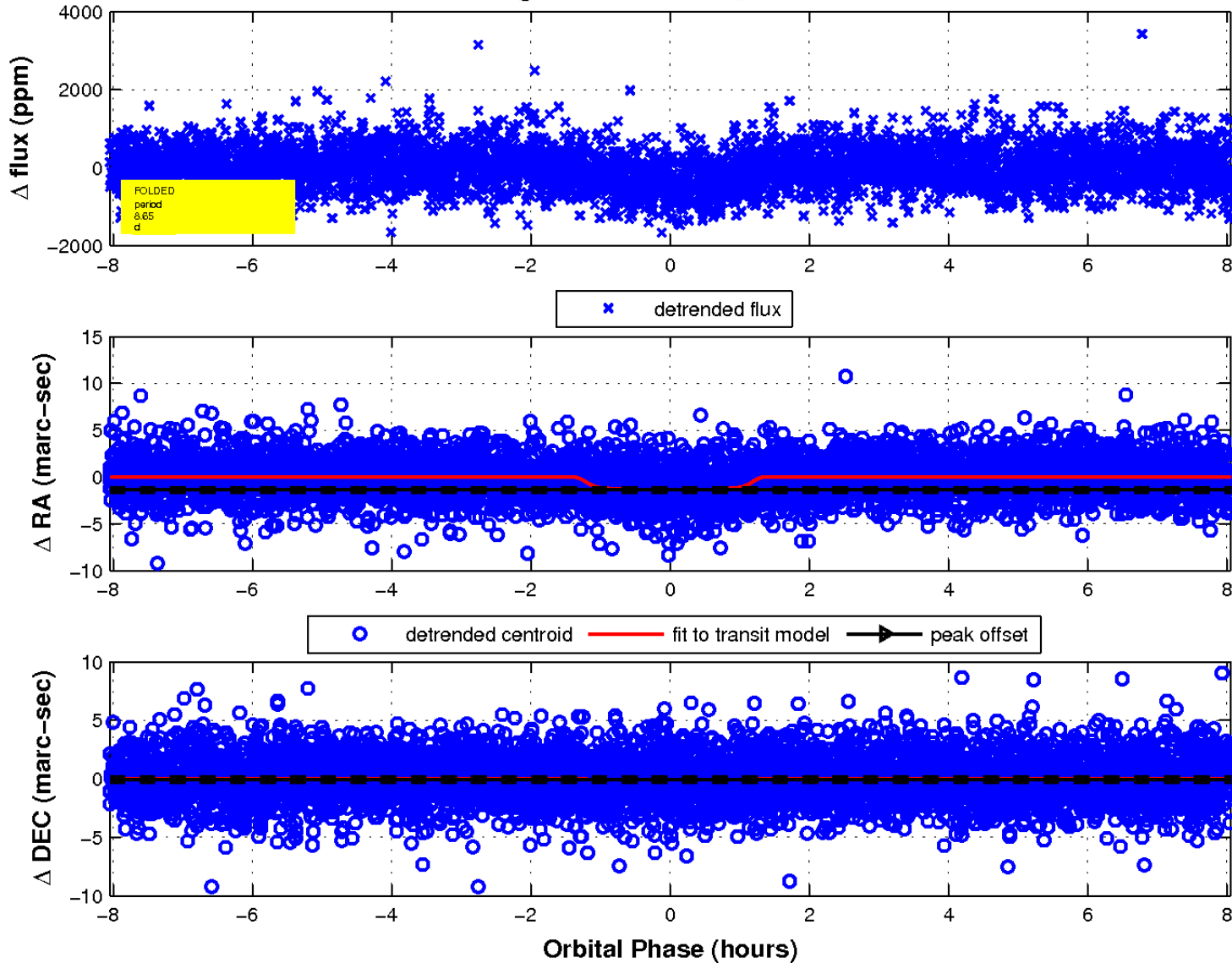
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

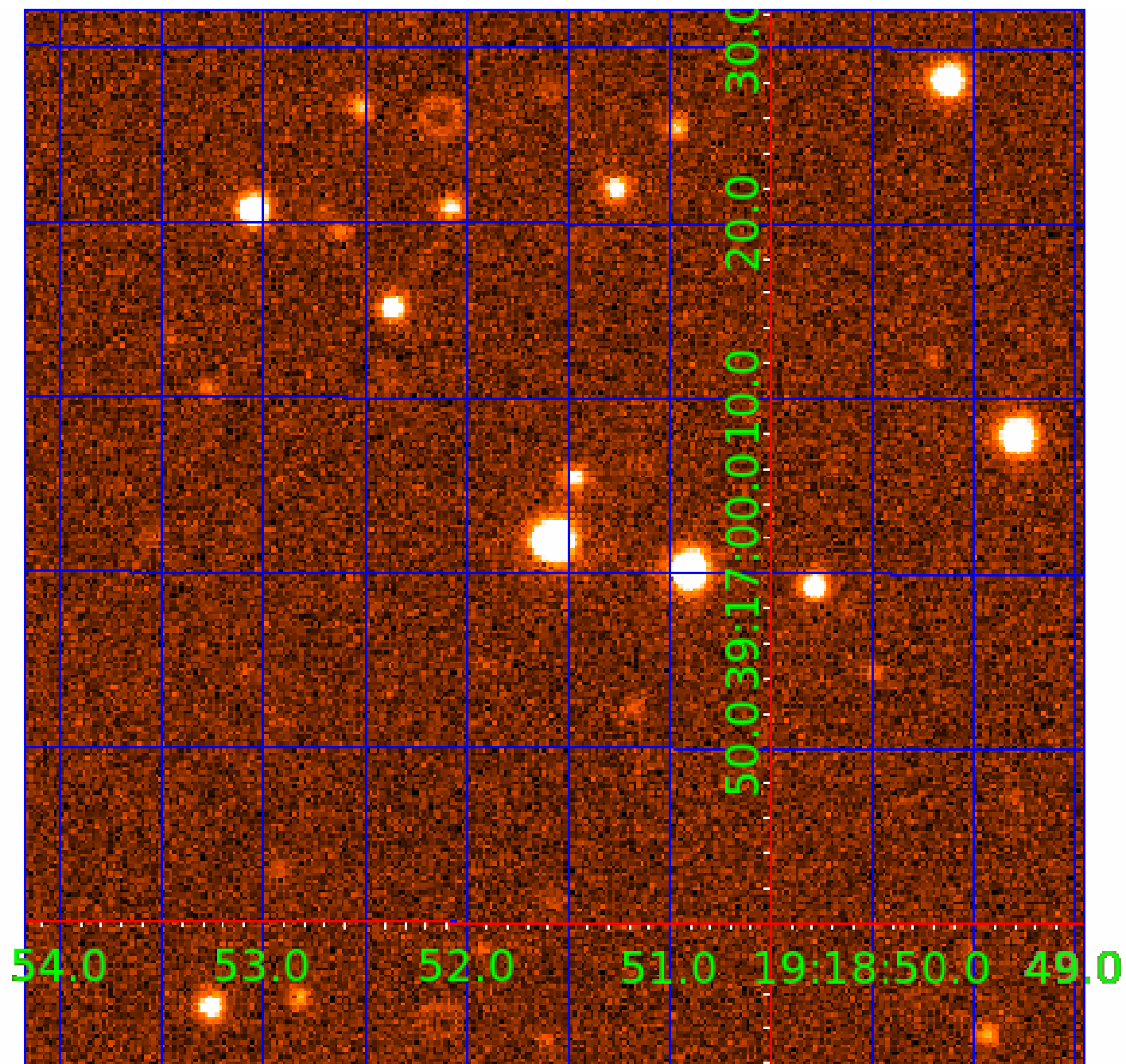


fluxWeightedCentroids, Planet 1 of 3



UKIRT Image

Declination



KIC 004150496

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})
004150496-01	OBS	4046.01	8.653181	136.647806	410.0	2.684	18.9	20.1	0.89	5880	2.13	127.67
004150496-02	OBS	No	8.653184	134.293634	403.1	4.309	18.1	19.7	0.89	5880	3.36	127.66
004150496-03	OBS	4046.02	94.224298	196.161764	433.9	24.684	13.5	16.0	0.89	5880	2.21	5.29

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004150496-01	OBS	FP	0.00	0	1	1	1	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE—HALO_GHOST—EPHEM_MATCH
004150496-02	OBS	FP	0.00	1	1	1	1	IS_SEC_TCE—HALO_GHOST—EPHEM_MATCH
004150496-03	OBS	FP	0.00	1	0	1	1	INDIV_TRANS_RUBBLE_SKYE—CENT_KIC_POS—HALO_GHOST—EPHEM_MATCH

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 004150496-02

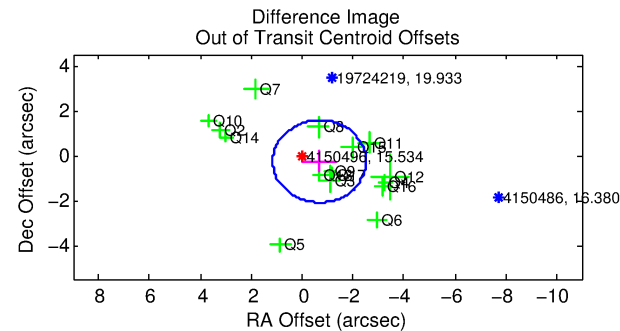
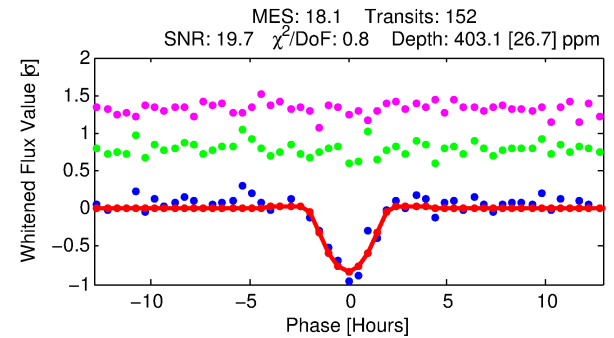
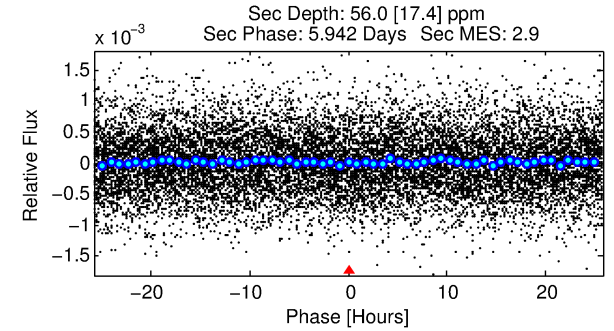
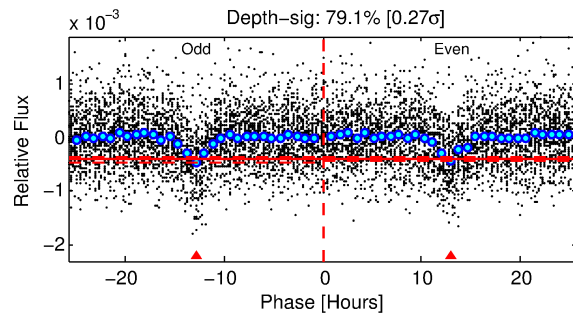
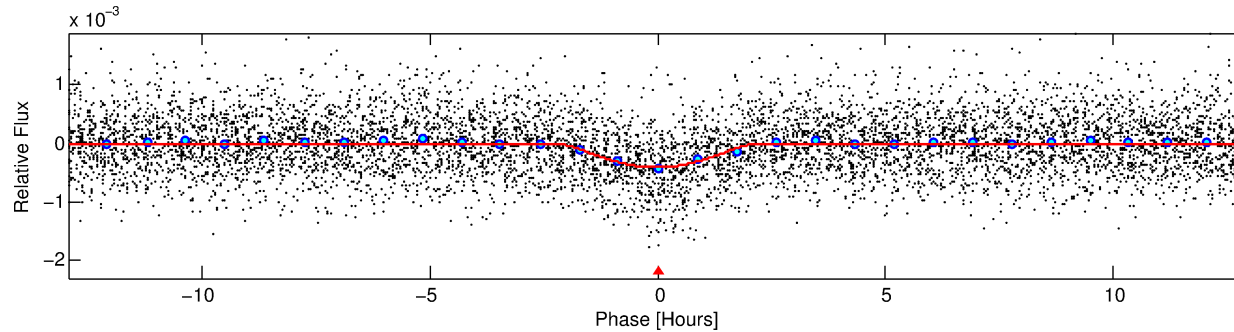
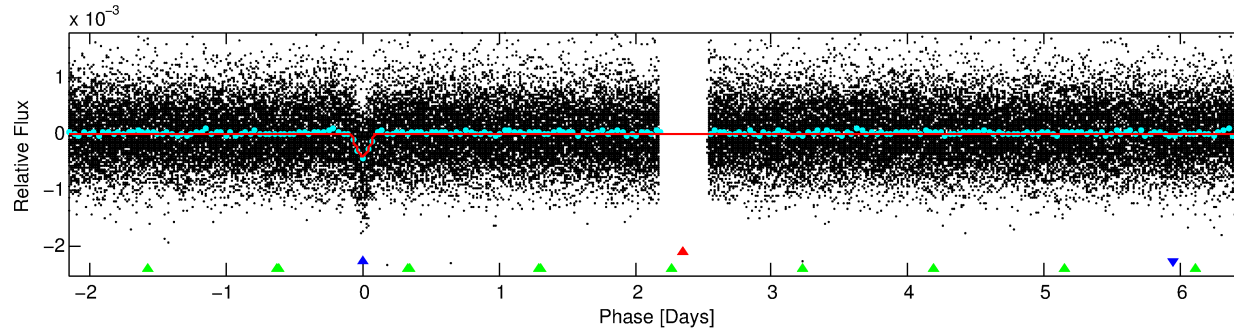
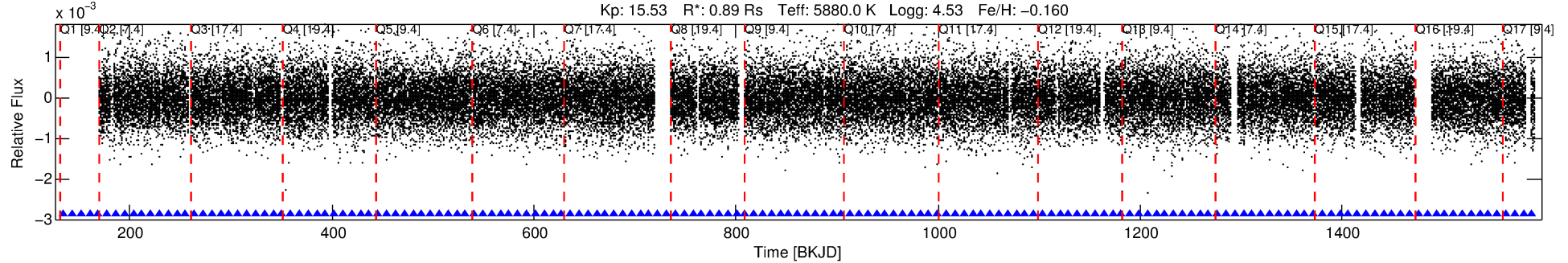
TCE (1)	KIC	Parent (2)	Parent KIC	$P_1:P_2$	Dist ($''$)	Δ Row	Δ Col	m_2	m_1	D_2/D_1	Mechanism	Flag	σ_P	σ_T
004150496-02	4150496	004150611-02	4150611	1:1	98.0	24	-7	7.90	15.54	134.36	Direct-PRF	0	0.35	0.30

Notes: $P_1:P_2$ is the period ratio. Dist is the distance in arcseconds. Δ Row and Δ Col are the number of pixels apart in row and column. m_2 and m_1 are the magnitudes of the parent and child. D_2/D_1 is the parent's transit depth divided by the child's. σ_P and σ_T are the significance of the match in period and epoch. For a match to be considered significant $\sigma_P < 5.0$ and $\sigma_T < 5.0$. Matches which have σ_P and σ_T very close to this cutoff should receive extra scrutiny, especially if the period ratio is very large.

DV One-Page Summary

KIC: 4150496 Candidate: 2 of 3 Period: 8.653 d
KOI: K04046 Corr: No Ephemeris Match

Kp: 15.53 R*: 0.89 Rs Teff: 5880.0 K Logg: 4.53 Fe/H: -0.160



DV Fit Results:

Period = 8.65318 [0.00006] d
Epoch = 134.2936 [0.0055] BKJD
Rp/R* = 0.0345 [0.0596]
a/R* = 4.37 [1.99]
b = 1.00 [0.09]
Seff = 127.66 [51.26]
Teq = 857 [86] K
Rp = 3.36 [5.90] Re
a = 0.0818 [0.0212] AU
Ag = 18.25 [63.74] [0.27σ]
Teffp = 2739 [2379] K [0.79σ]

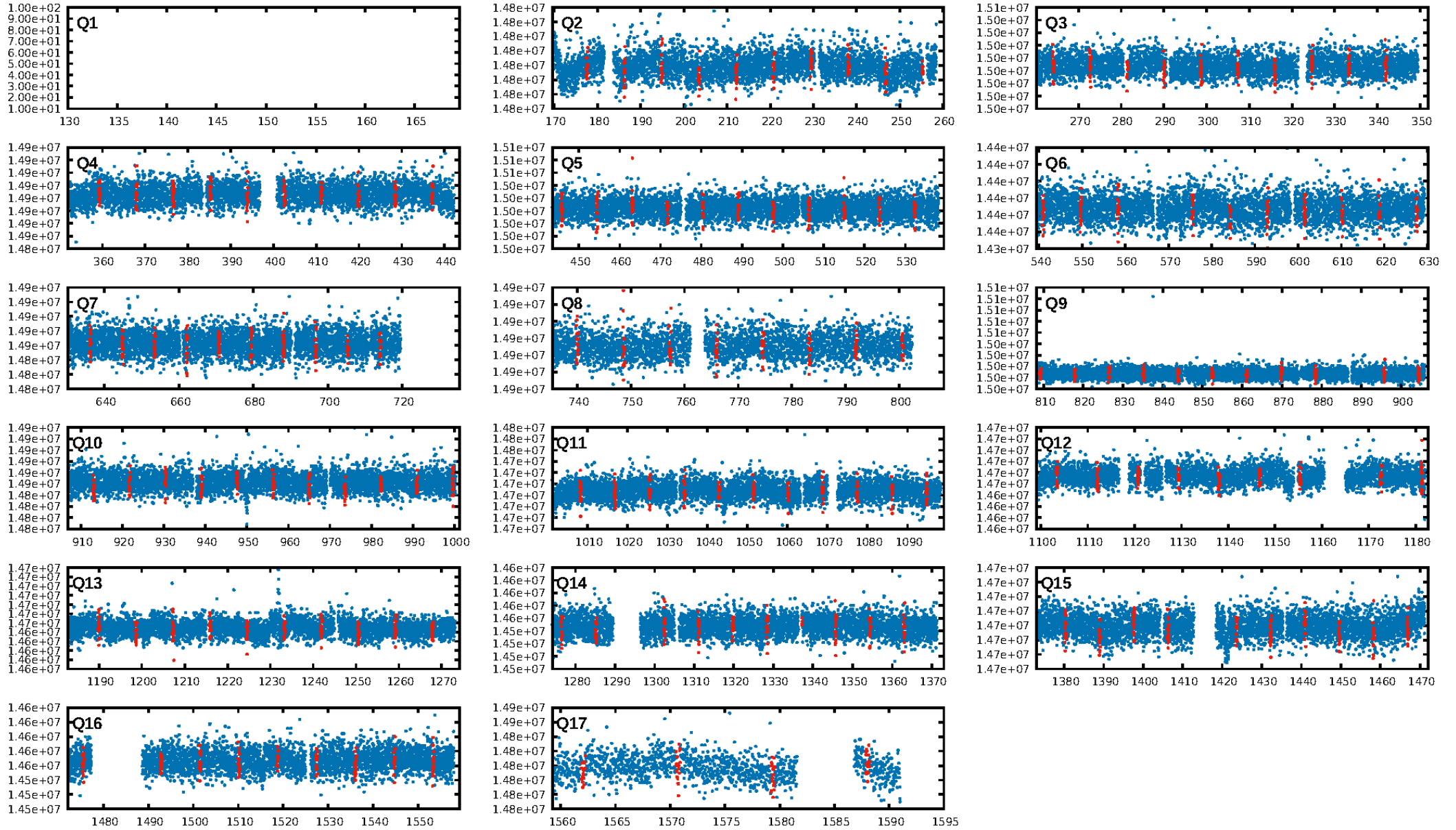
DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]
LongPeriod-sig: 100.0% [81.96σ]
ModelChiSquare2-sig: 99.1%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 4.34e-73
RollingBand-fgt: 1.00 [148/148]
GhostDiagnostic-chr: -0.06422
Centroid-sig: 0.0%
Centroid-so: 1.398 arcsec [2.25σ]
OotOffset-rm: 0.727 arcsec [1.19σ]
KicOffset-rm: 1.152 arcsec [1.70σ]
OotOffset-st: 4/4/4/4 [16]
KicOffset-st: 4/4/4/4 [16]
DiffImageQuality-fgm: 0.06 [1/16]
DiffImageOverlap-fno: 1.00 [16/16]

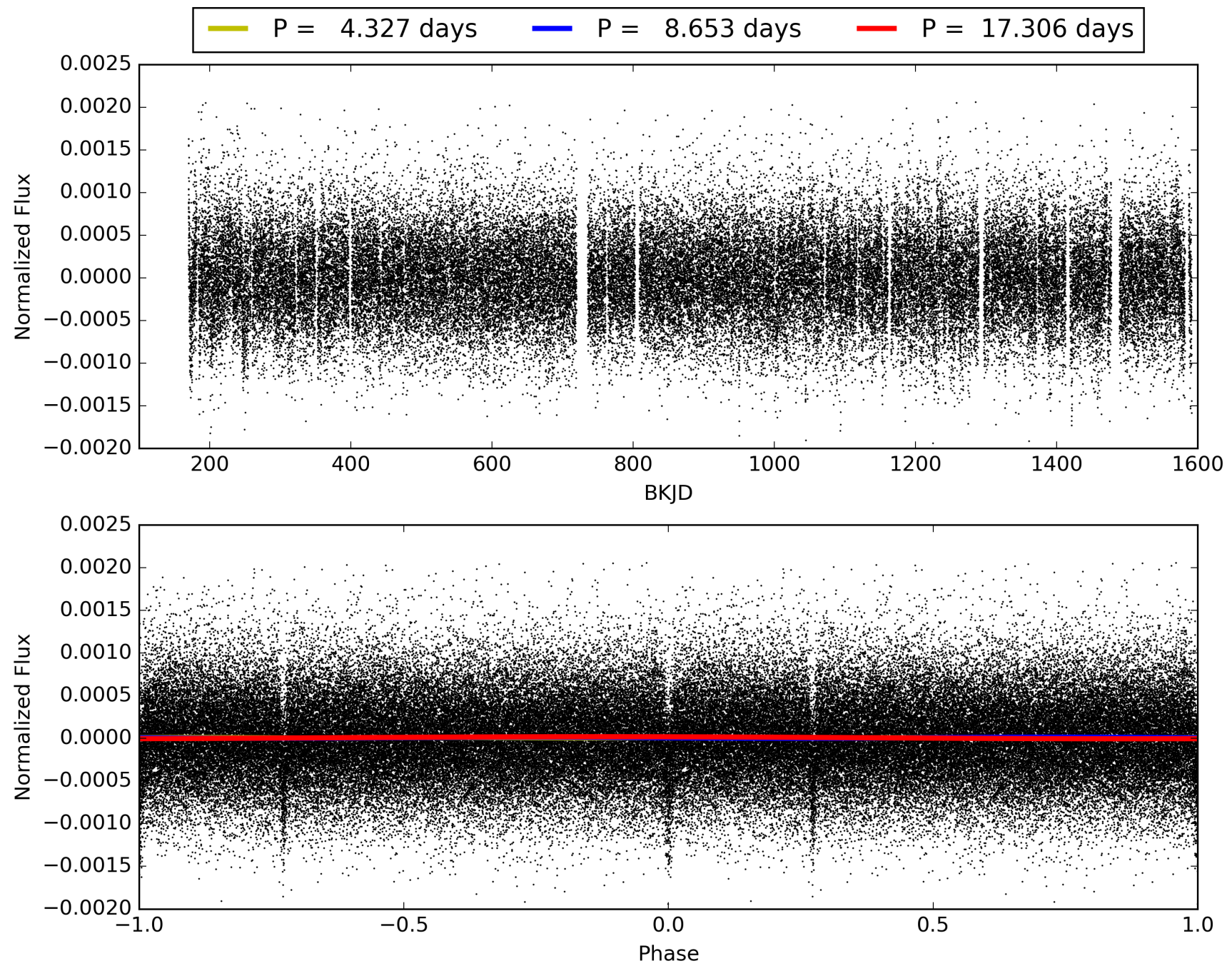
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This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

TCE 004150496-02, PDC Light Curves

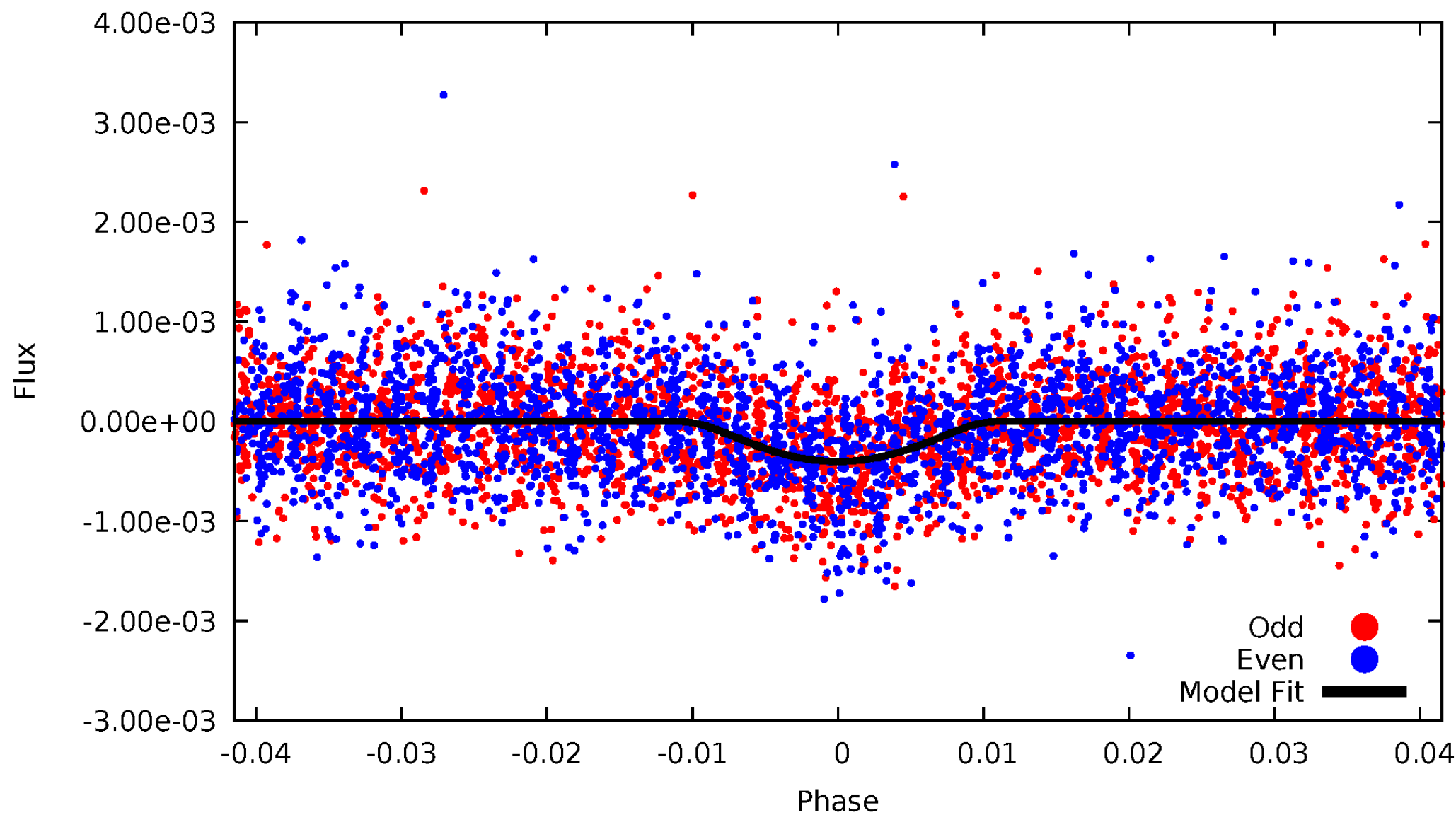


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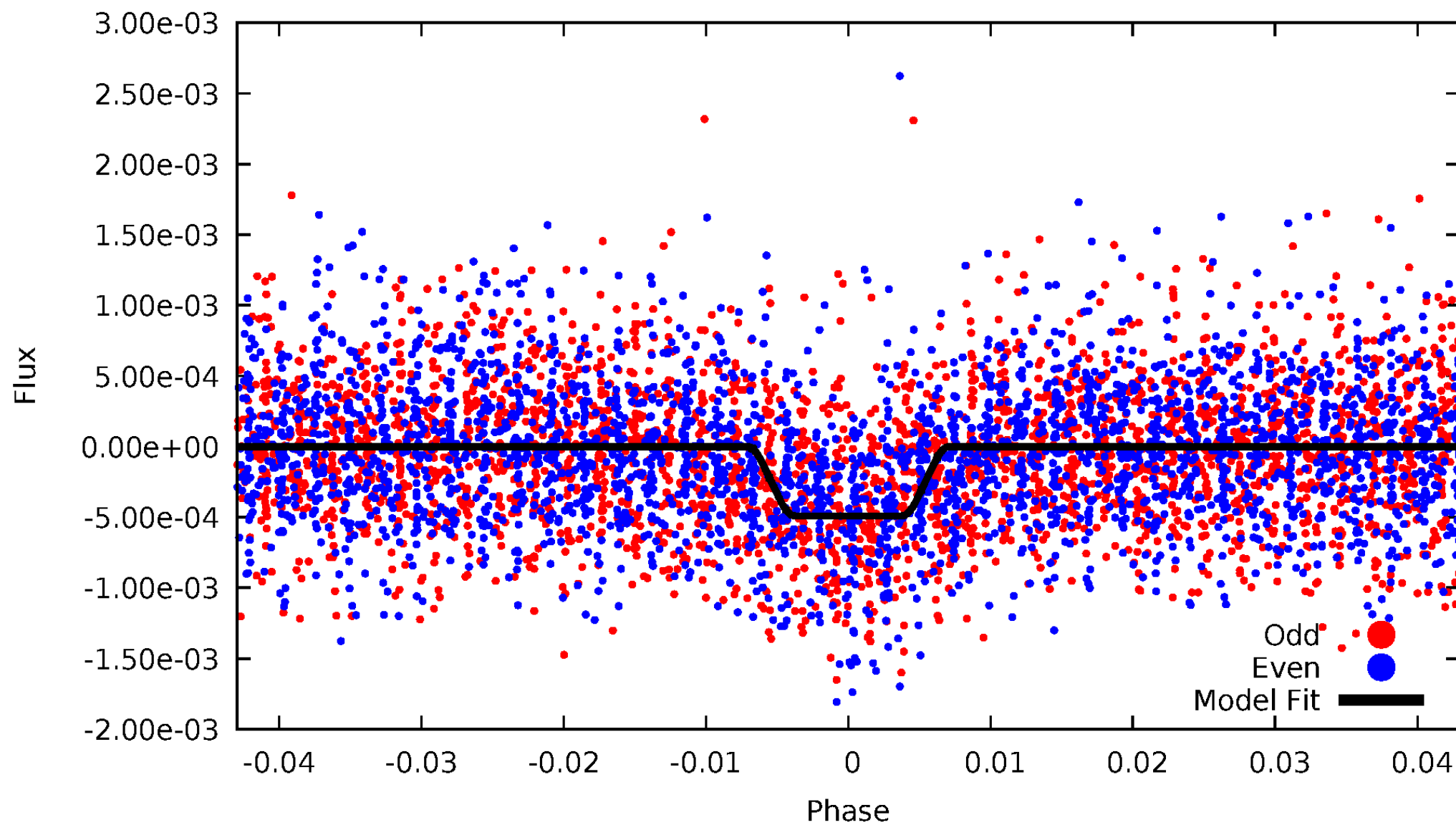
DV Odd/Even

TCE 004150496-02



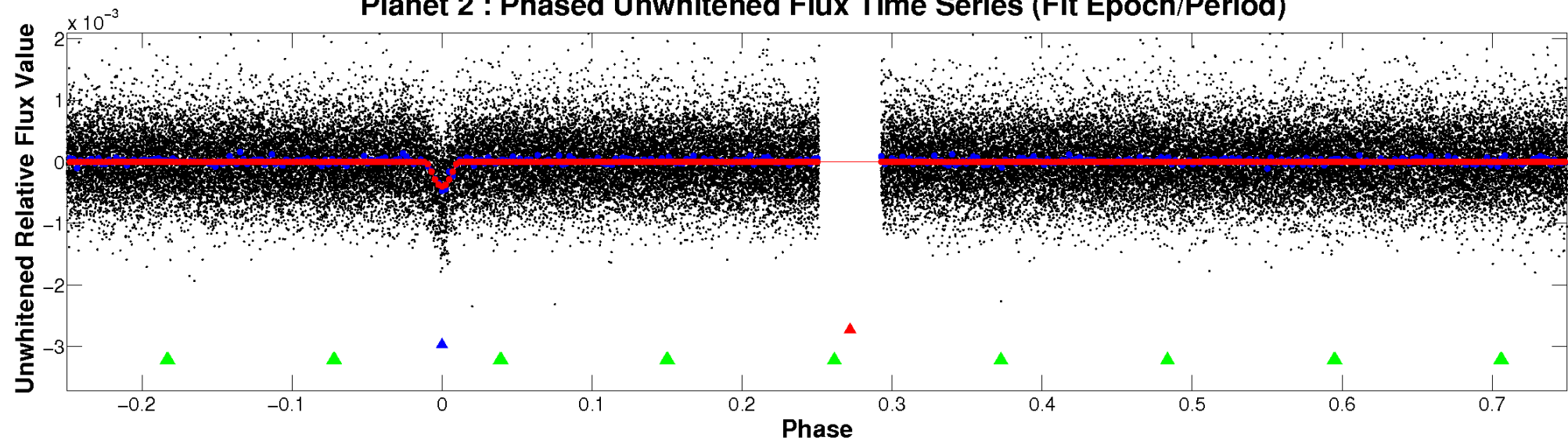
ALT Odd/Even

TCE 004150496-02

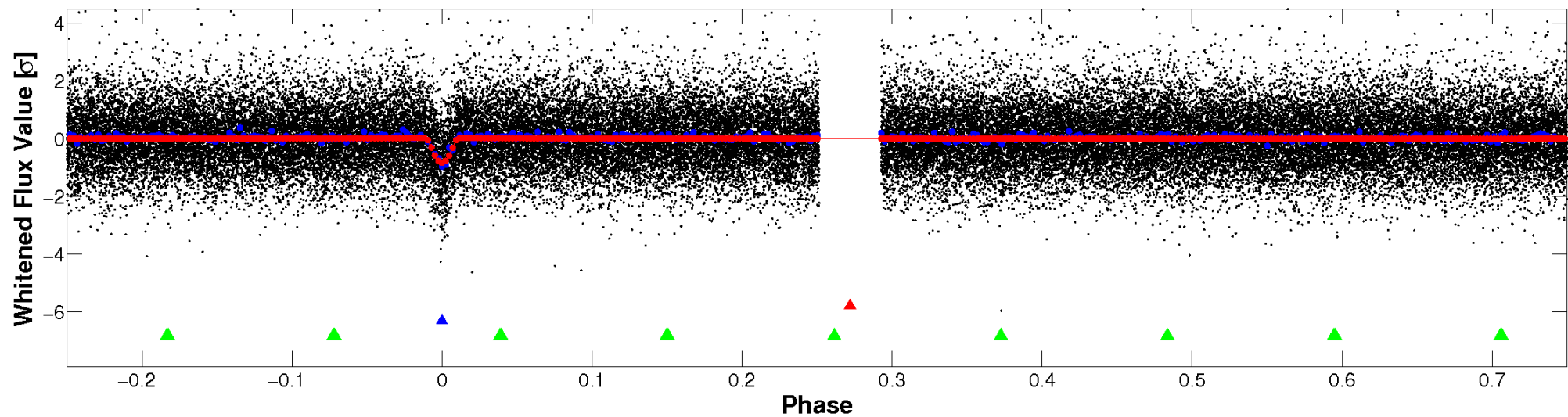


Non-Whitened Vs. Whitened Light Curve

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

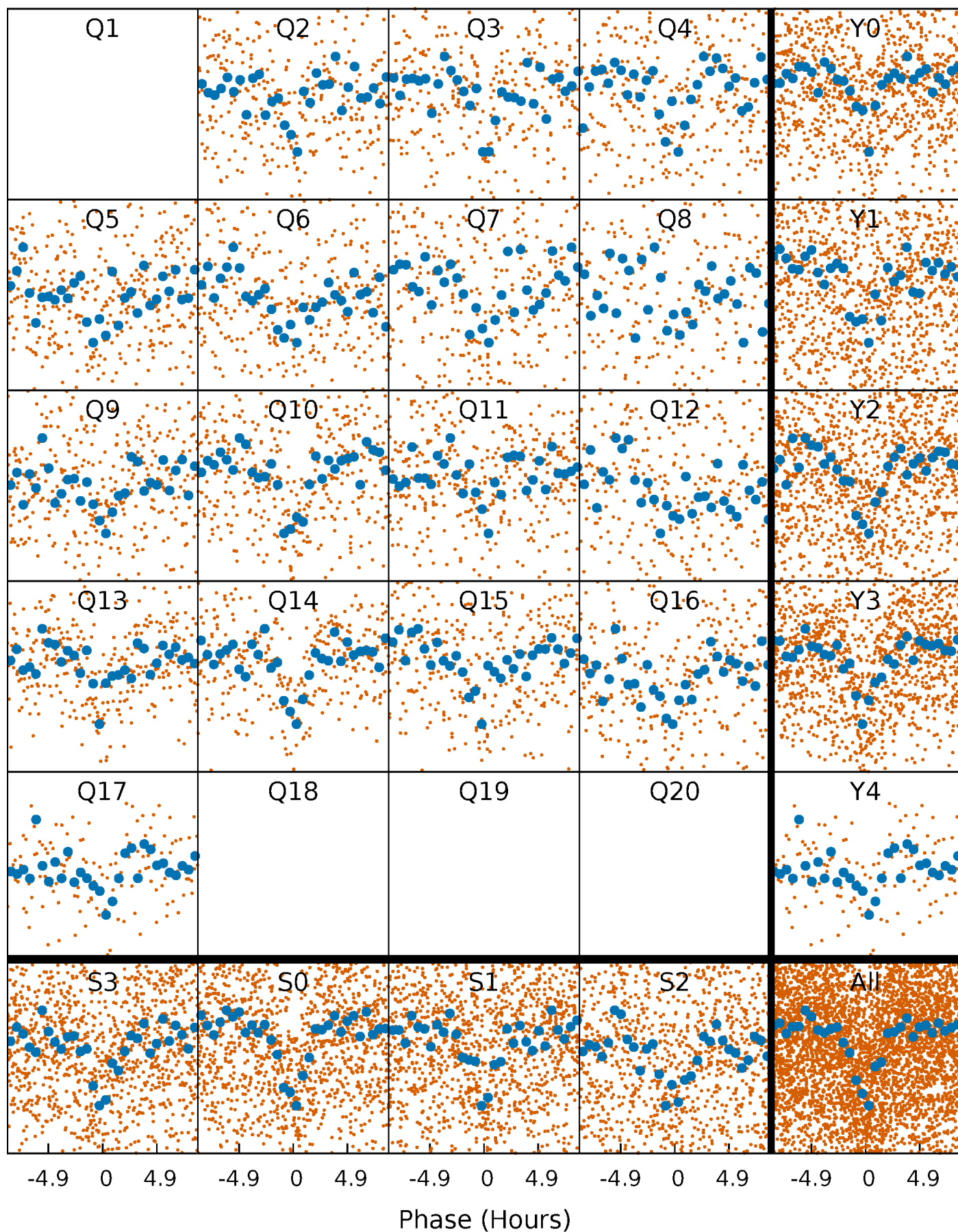


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



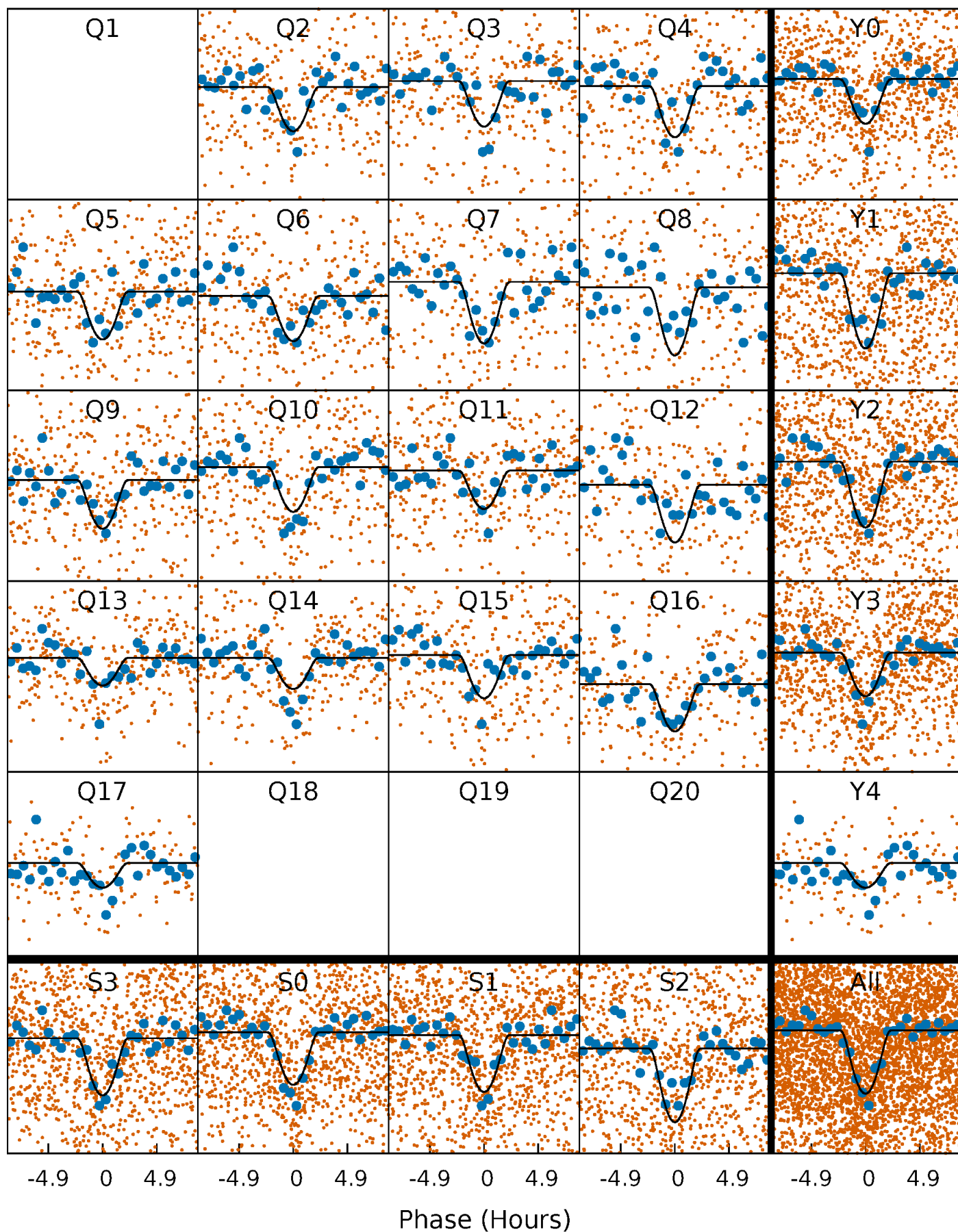
PDC Quarter-Phased Transit Curves

TCE 004150496-02 P= 8.653184 Days $T_0=134.293634$ (BKJD)



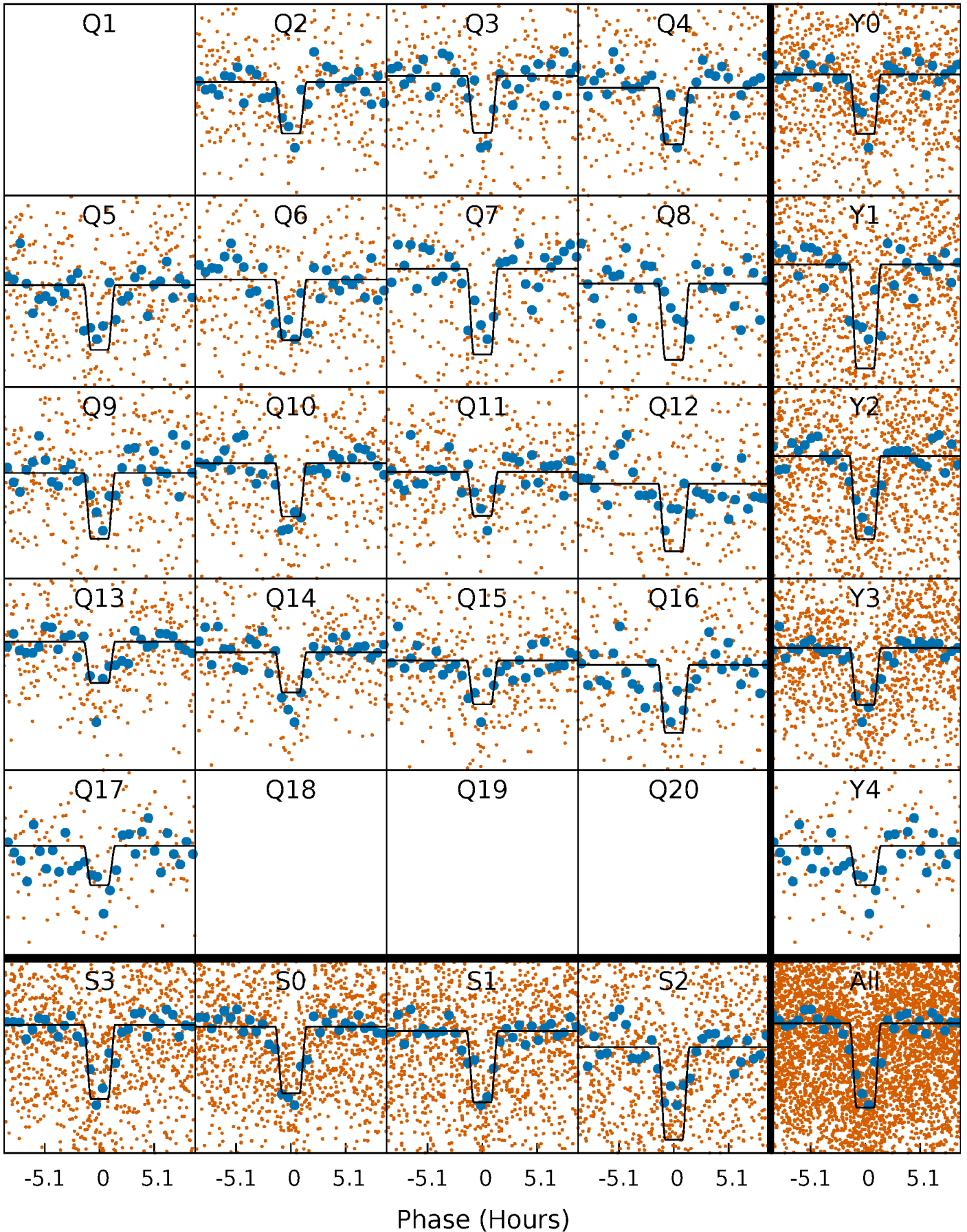
DV Quarter-Phased Transit Curves

TCE 004150496-02 P= 8.653184 Days $T_0=134.293634$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

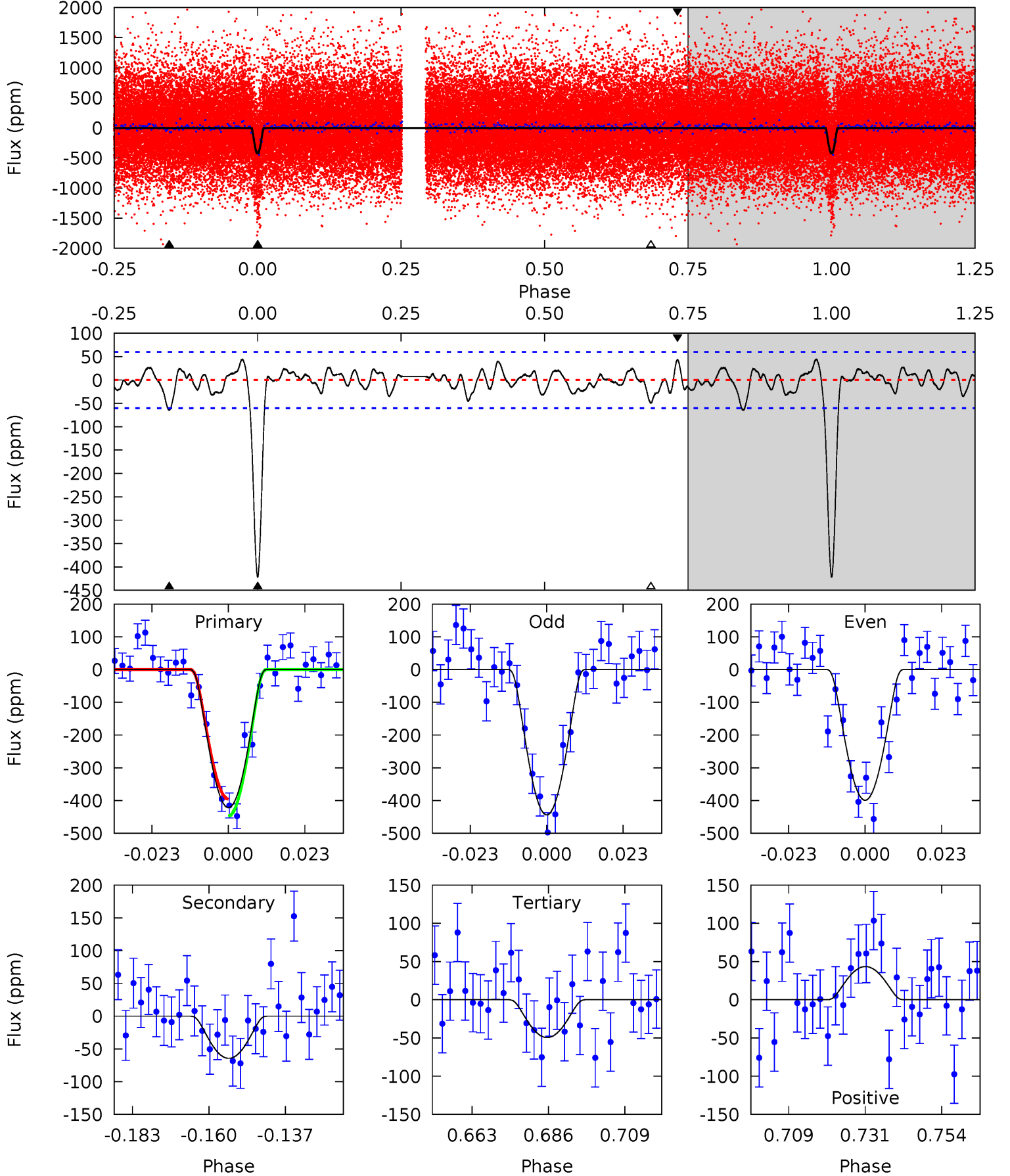
TCE 004150496-02 $P = 8.653147$ Days $T_0 = 134.297188$ (BKJD)



DV Model-Shift Uniqueness Test

004150496-02, P = 8.653184 Days, E = 134.293634 Days

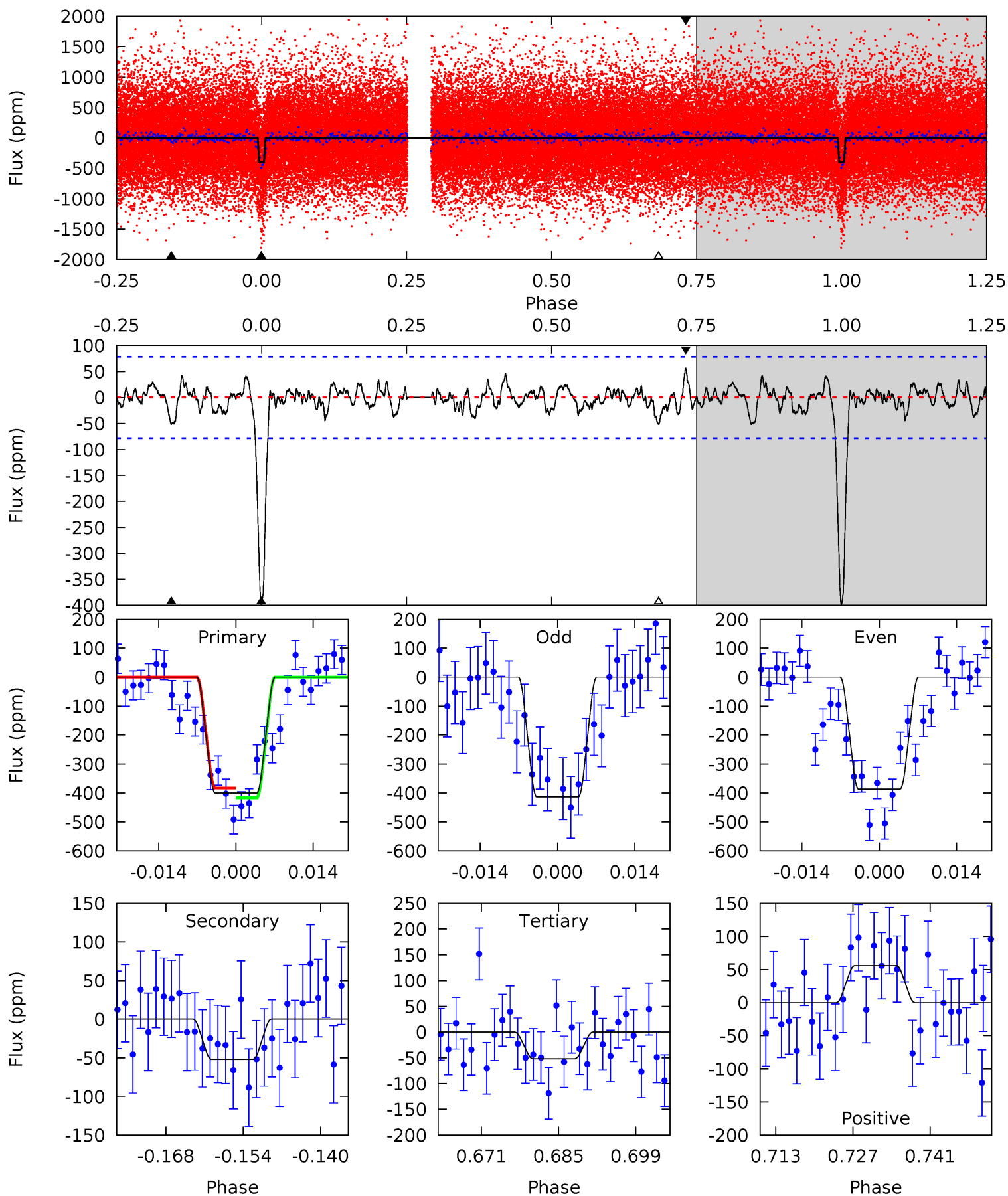
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
34.1	5.21	3.99	3.51	4.87	2.28	1.40	30.1	30.6	1.22	1.70	1.81	0.97	0.09	2.10



Alt Model-Shift Uniqueness Test

004150496-02, P = 8.653147 Days, E = 134.297188 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
25.3	3.28	3.27	3.55	4.96	2.46	1.09	22.0	21.8	0.01	-0.27	0.86	0.97	0.12	1.05



Stellar Parameters For KIC 004150496

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	5880^{+159}_{-194}	$4.525^{+0.039}_{-0.208}$	$-0.160^{+0.300}_{-0.300}$	$0.893^{+0.274}_{-0.091}$	$0.974^{+0.120}_{-0.120}$	$1.927^{+0.404}_{-1.031}$
	+3%/-3%	+1%/-5%	+188%/-188%	+31%/-10%	+12%/-12%	+21%/-54%
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 004150496-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	-64 ± 12	$5.86^{+5.23}_{-3.96}$	1228^{+88}_{-57}	2880^{+1250}_{-450}	$6.824^{+56.867}_{-4.962}$
Alt.	-52 ± 16	$5.15^{+4.87}_{-3.69}$	1230^{+78}_{-57}	2901^{+1490}_{-515}	$6.846^{+80.636}_{-5.103}$

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 $A_{obs} \gg 1.0$

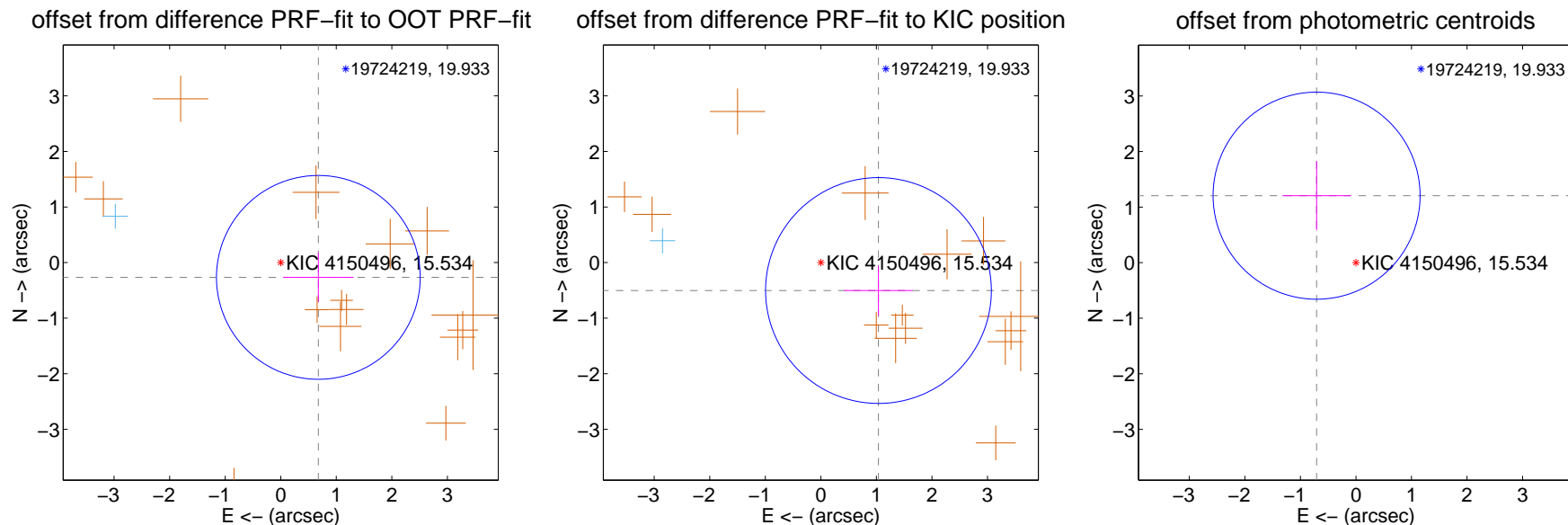
DV Centroid Data

Supplemental centroid analysis for 004150496-02. Kepler magnitude: 15.53. Transit SNR 19.68

There are 1 quarters with good PRF difference image offsets

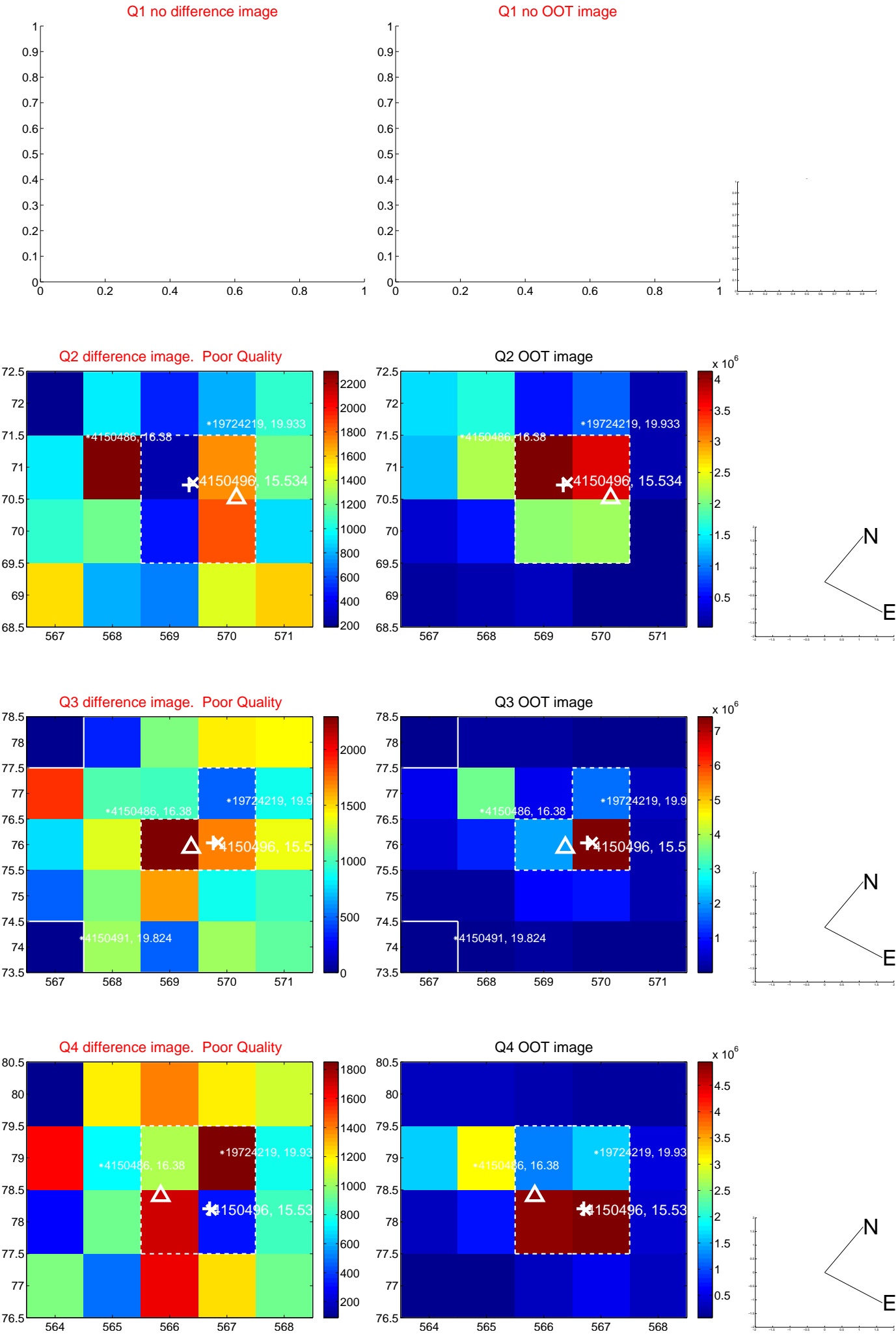
The direct PRF centroid is offset from the target star catalog position by about 0.48 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.727 ± 0.611	1.19	-0.676 ± 0.633	-0.266 ± 0.443
PRF-fit source offset from KIC position	1.152 ± 0.677	1.70	-1.037 ± 0.615	-0.502 ± 0.449
photometric centroid source offset	1.40 ± 0.62	2.25	0.71 ± 0.62	1.21 ± 0.62

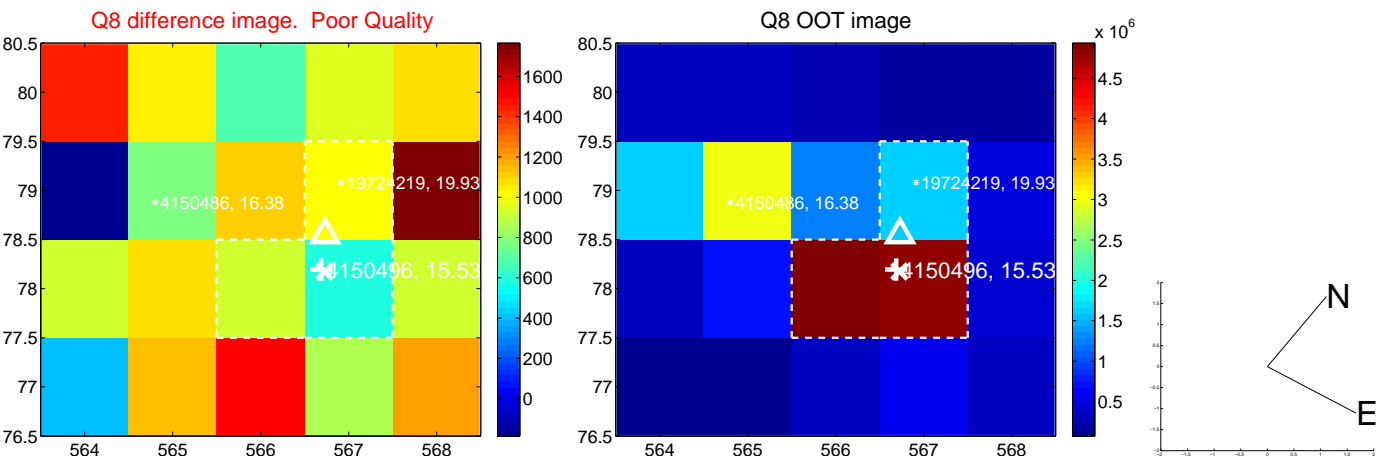
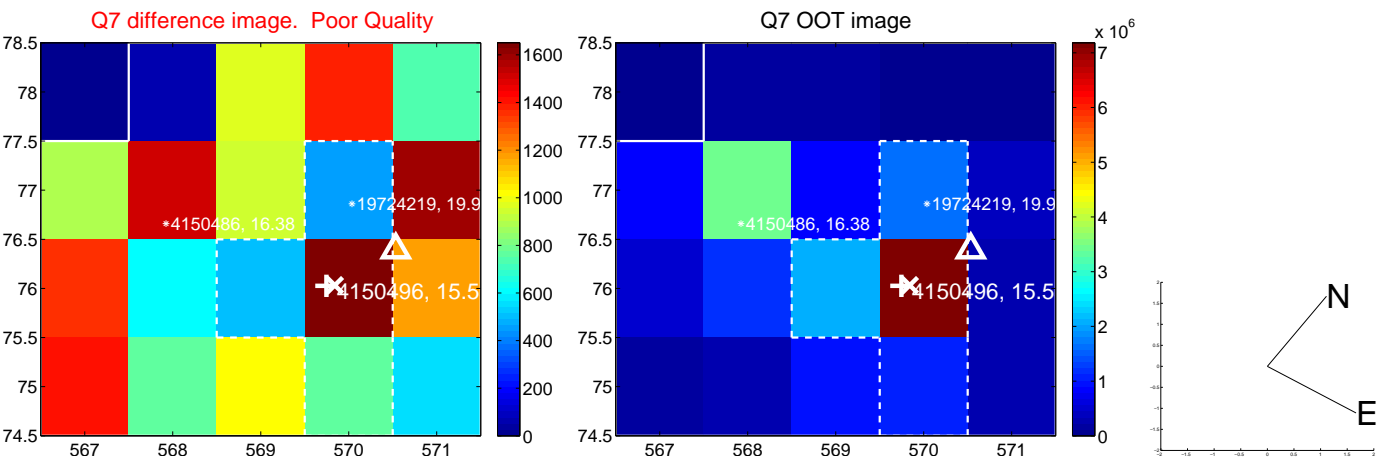
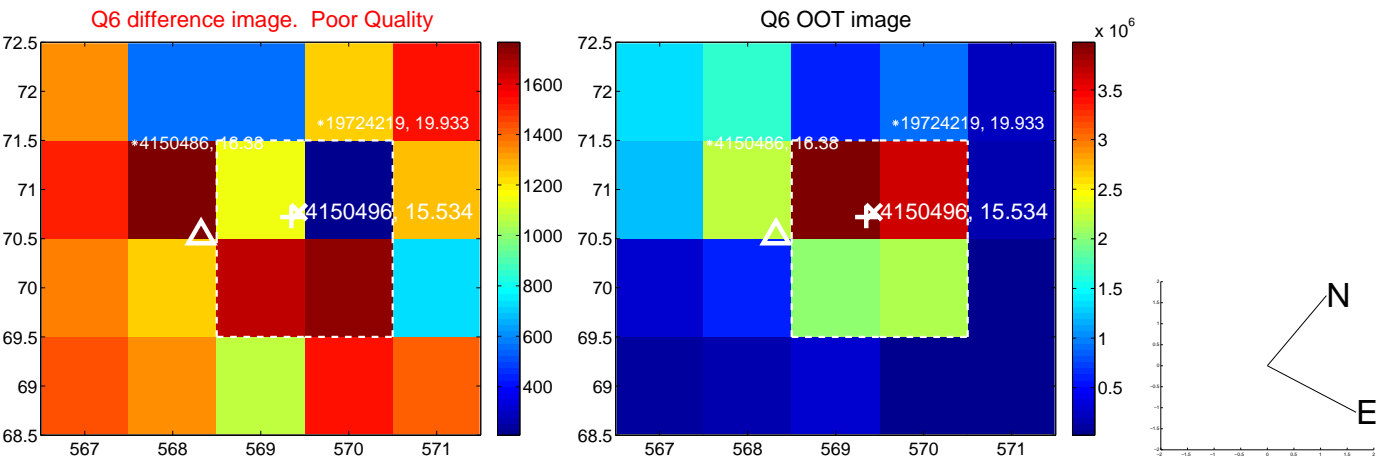
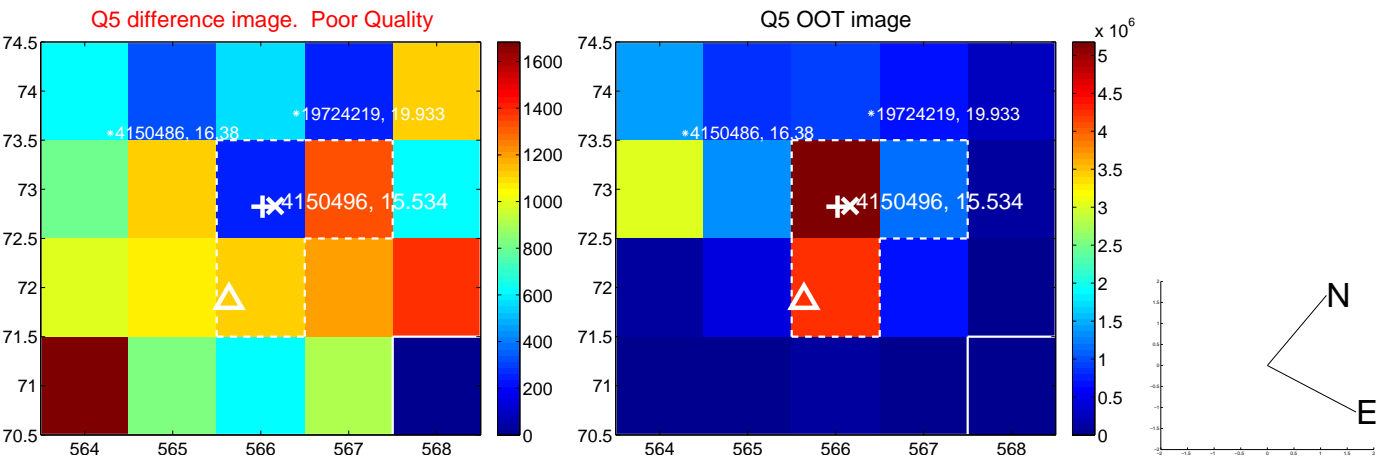


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

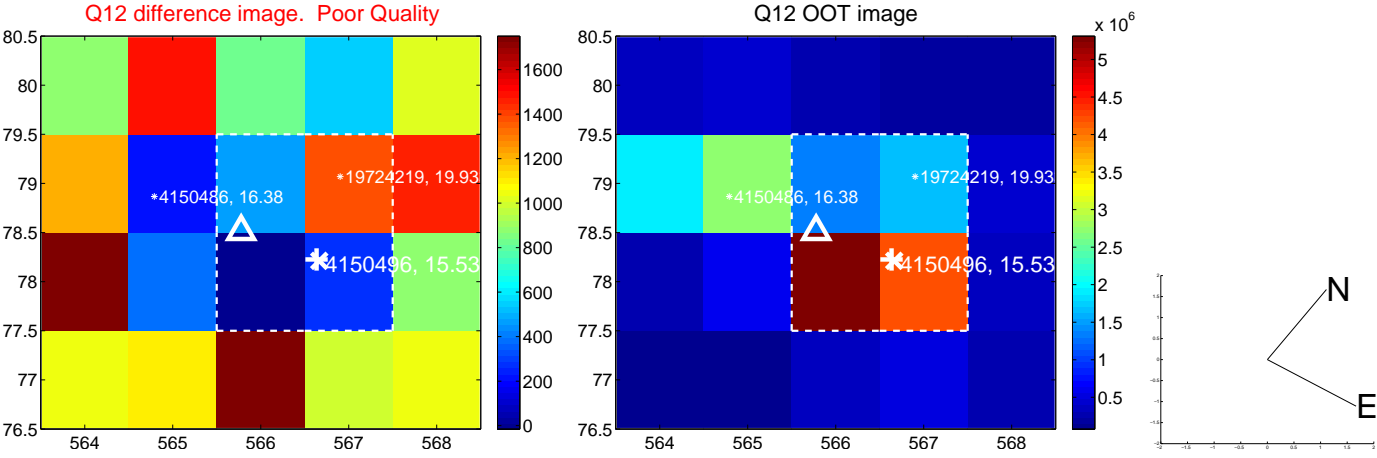
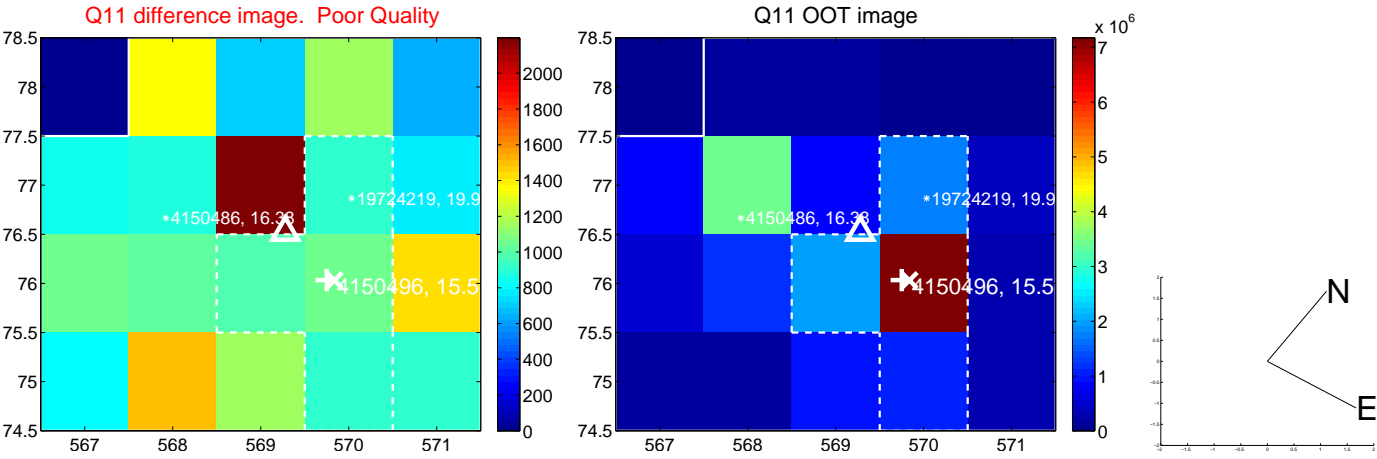
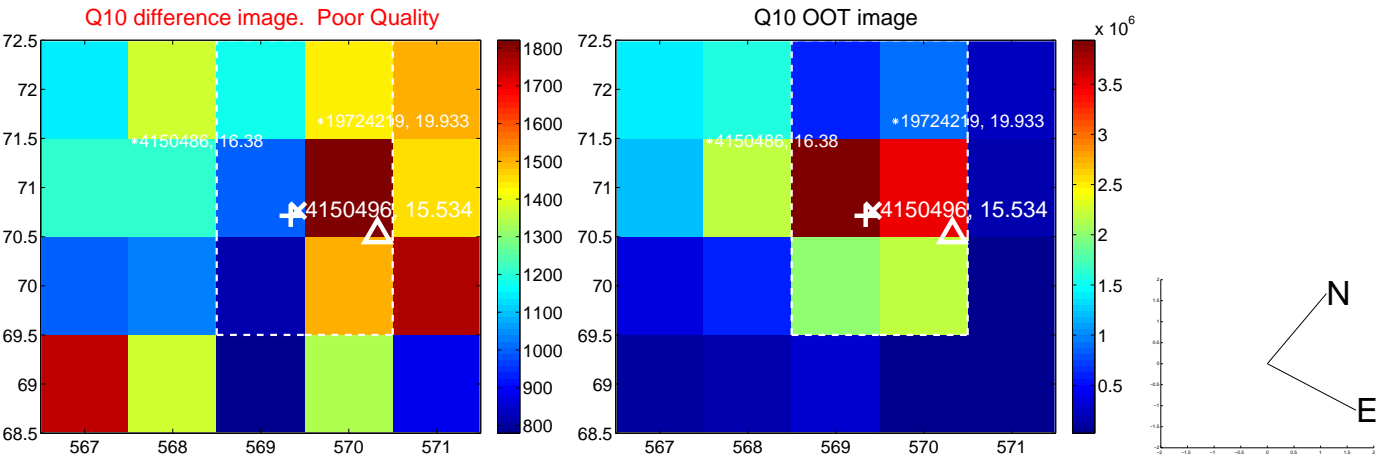
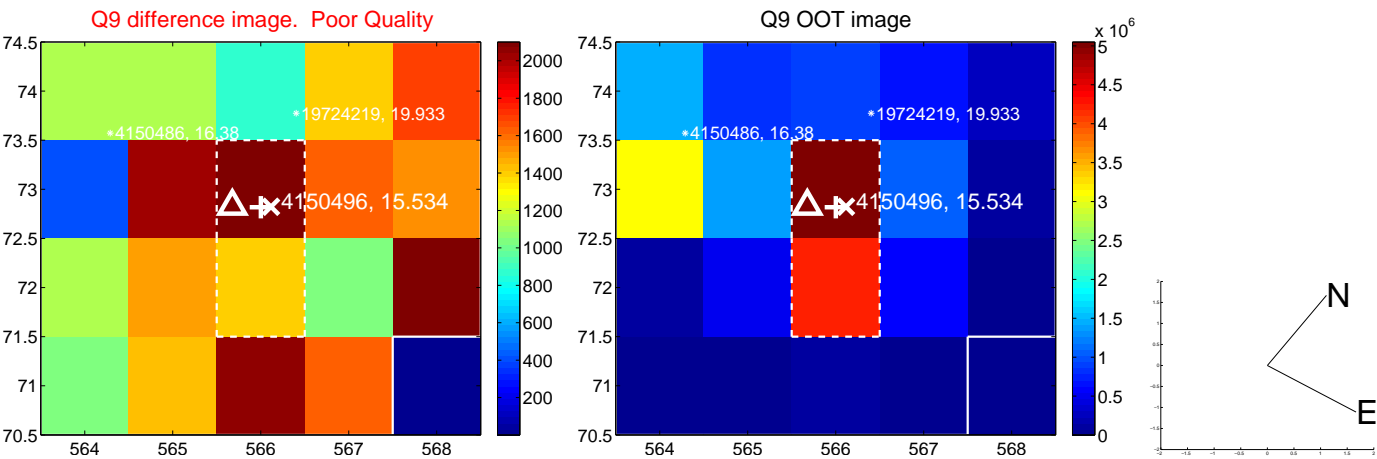
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



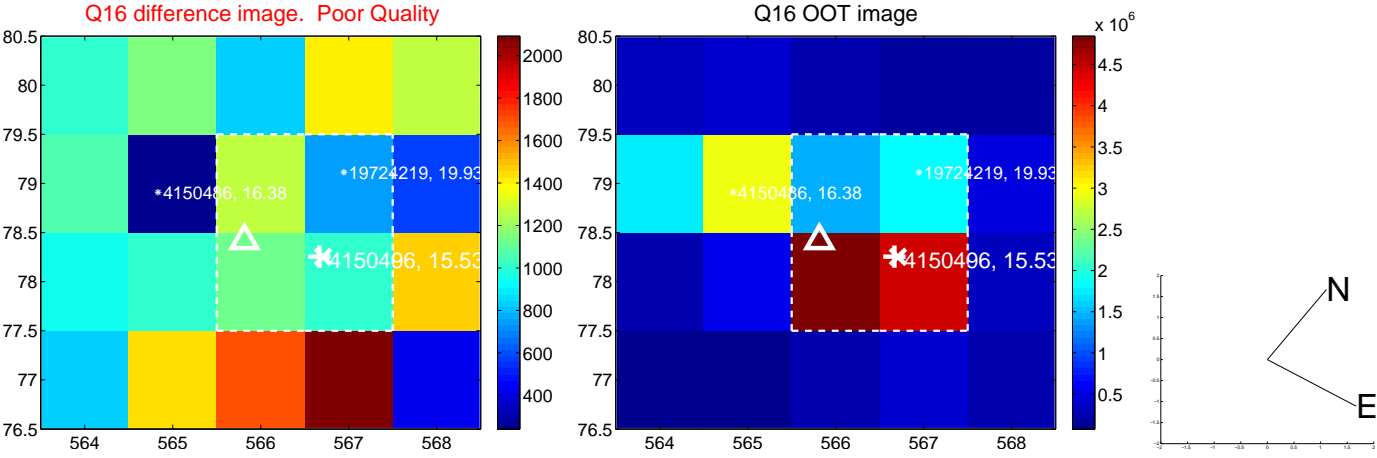
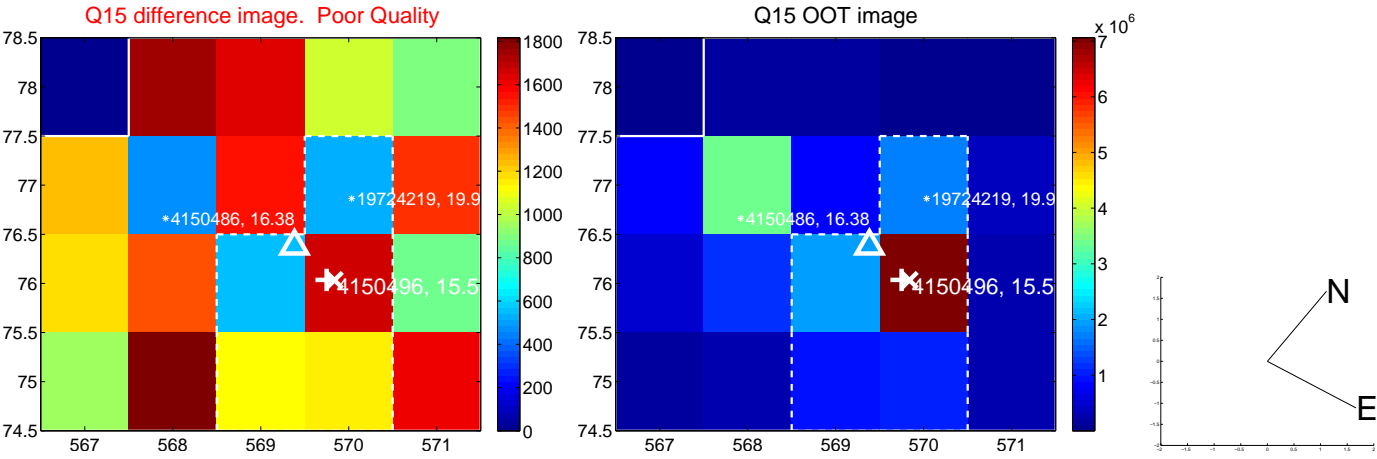
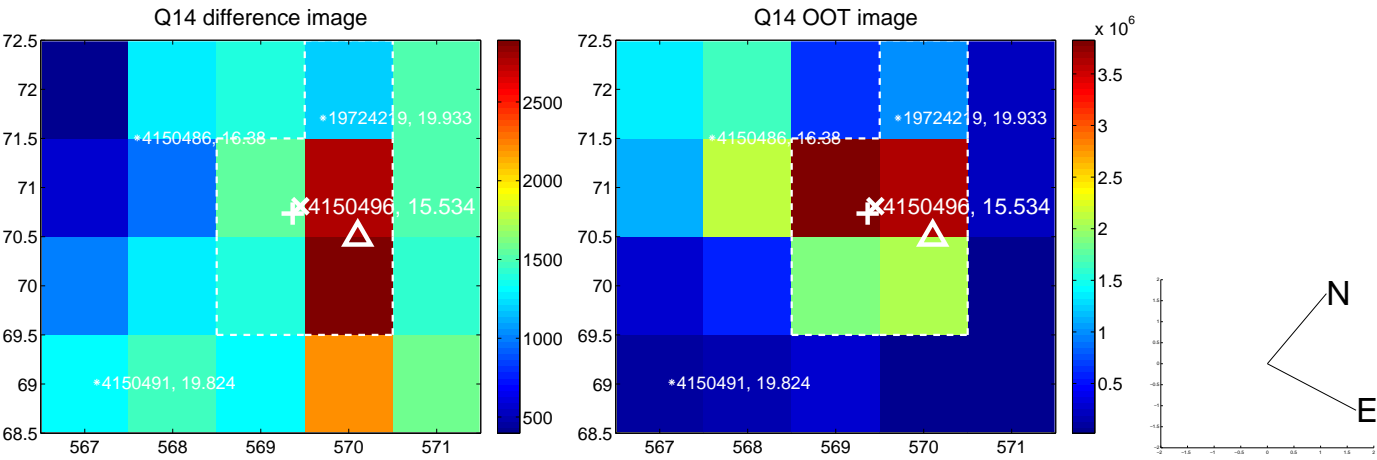
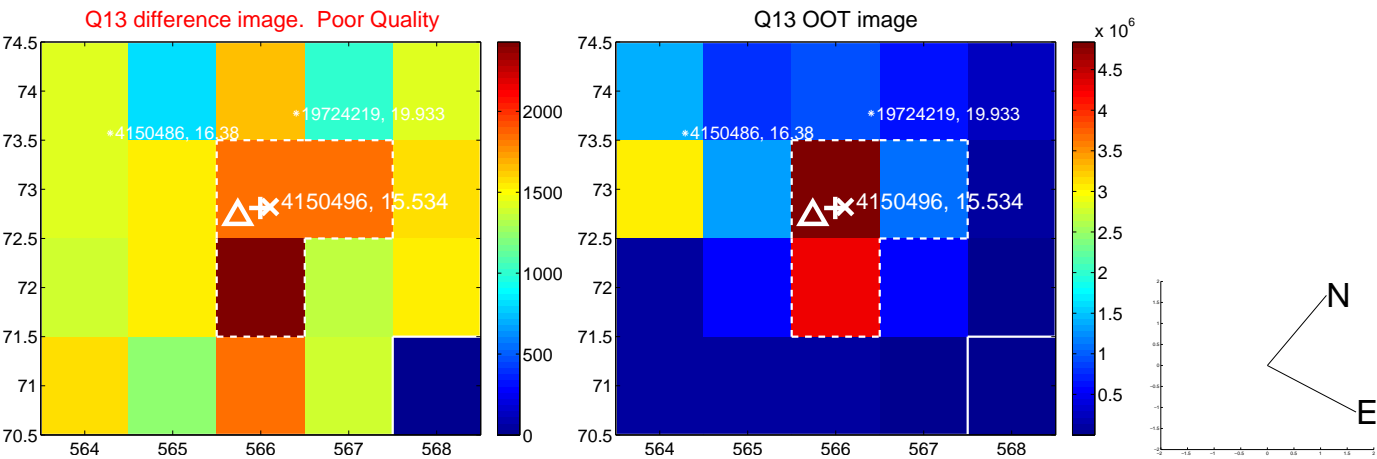
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



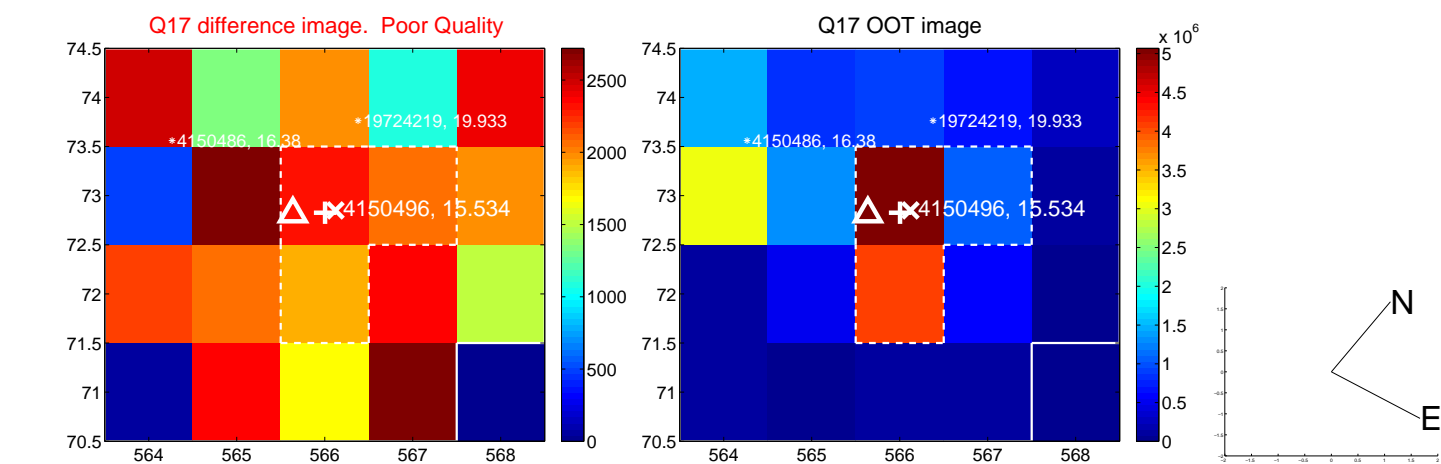
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



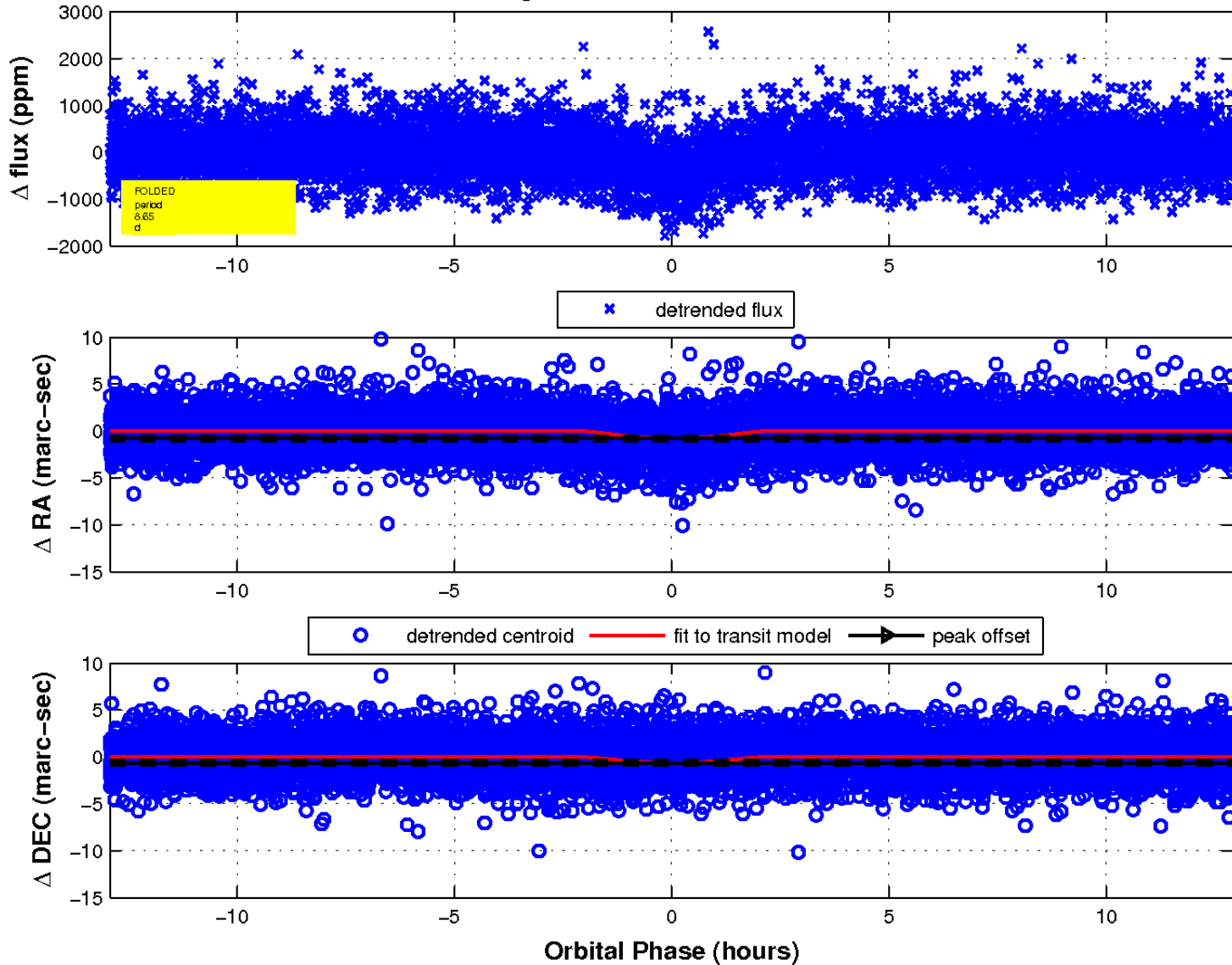
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

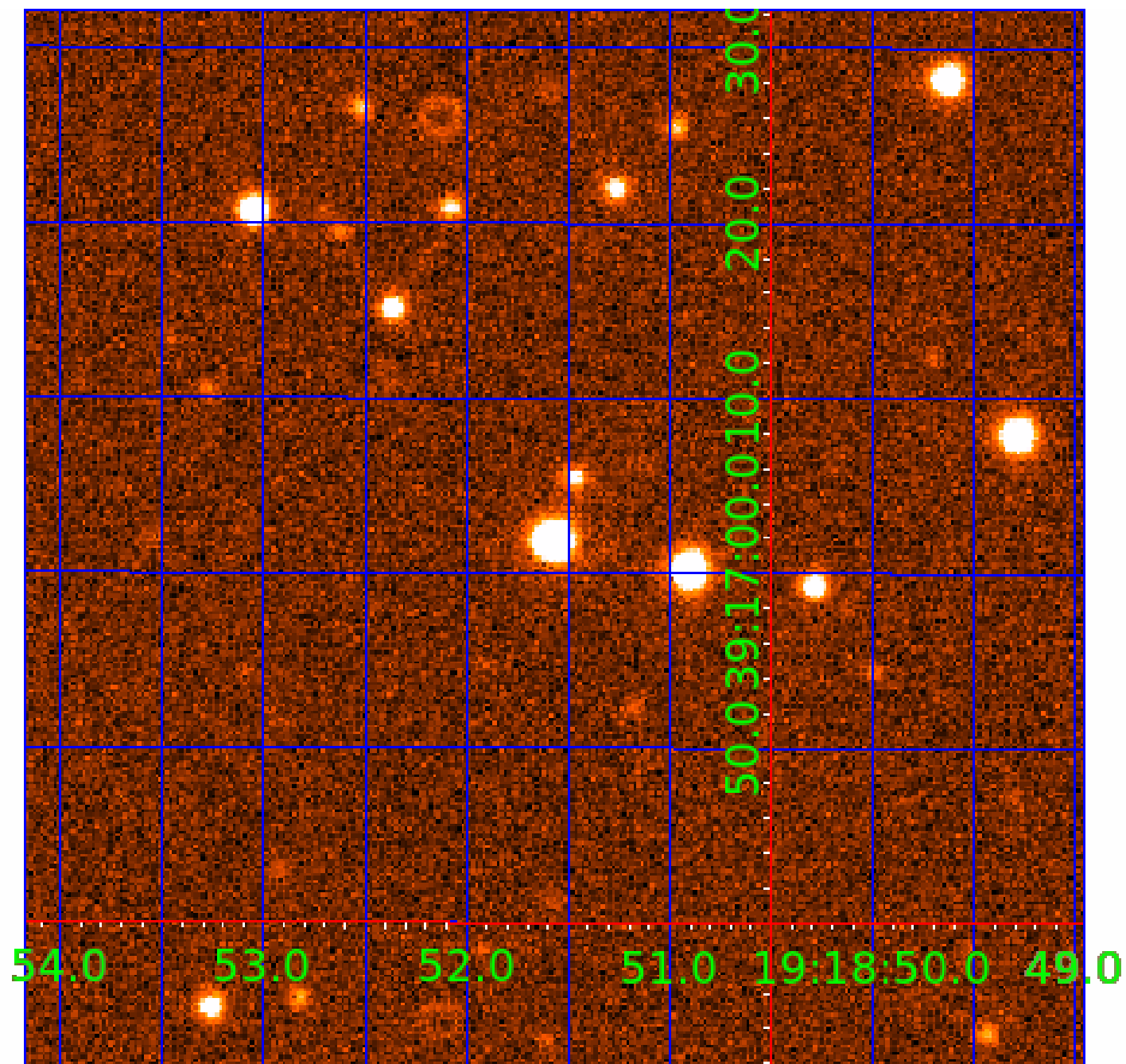


fluxWeightedCentroids, Planet 2 of 3



UKIRT Image

Declination



KIC 004150496

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})
004150496-01	OBS	4046.01	8.653181	136.647806	410.0	2.684	18.9	20.1	0.89	5880	2.13	127.67
004150496-02	OBS	No	8.653184	134.293634	403.1	4.309	18.1	19.7	0.89	5880	3.36	127.66
004150496-03	OBS	4046.02	94.224298	196.161764	433.9	24.684	13.5	16.0	0.89	5880	2.21	5.29

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004150496-01	OBS	FP	0.00	0	1	1	1	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE—HALO_GHOST—EPHEM_MATCH
004150496-02	OBS	FP	0.00	1	1	1	1	IS_SEC_TCE—HALO_GHOST—EPHEM_MATCH
004150496-03	OBS	FP	0.00	1	0	1	1	INDIV_TRANS_RUBBLE_SKYE—CENT_KIC_POS—HALO_GHOST—EPHEM_MATCH

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.

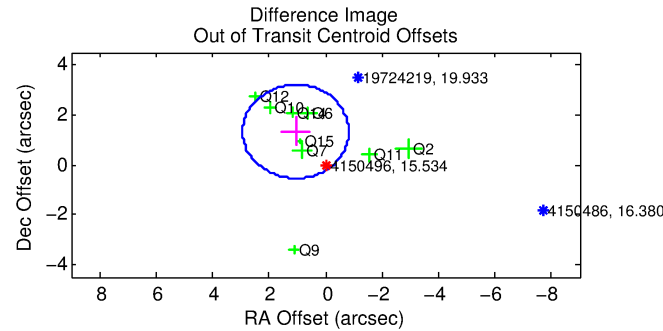
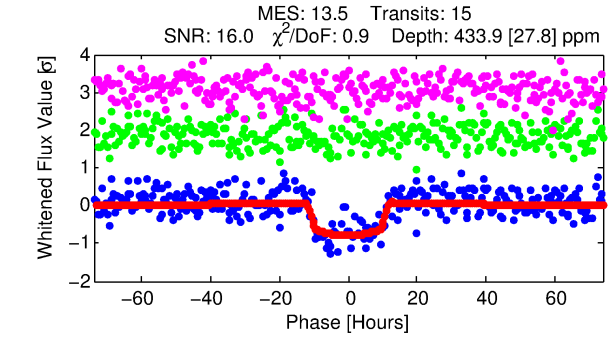
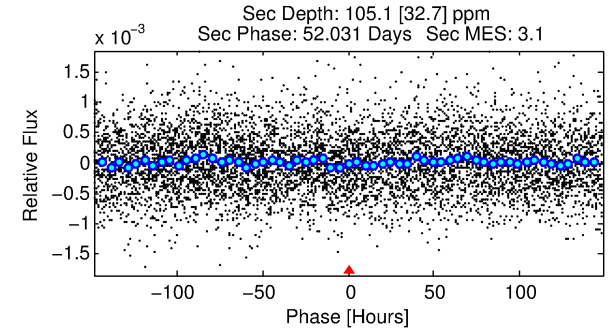
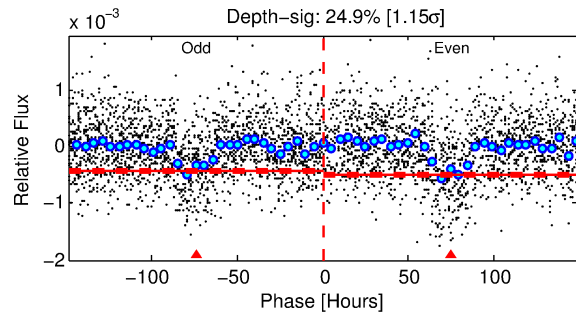
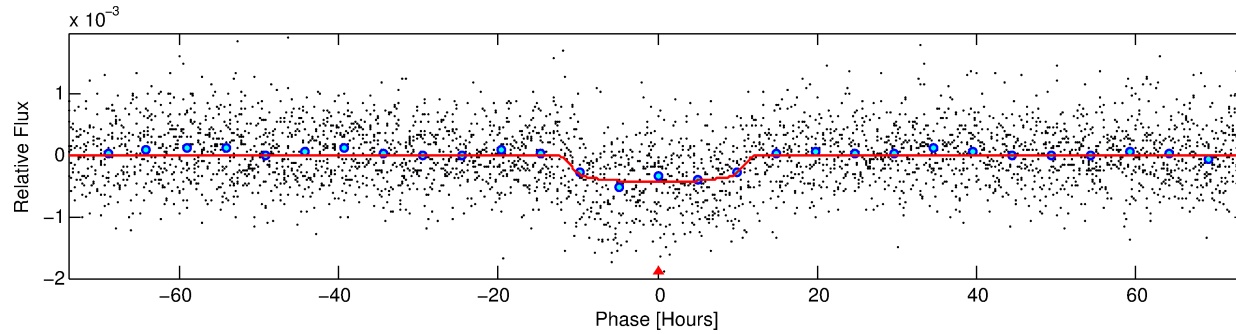
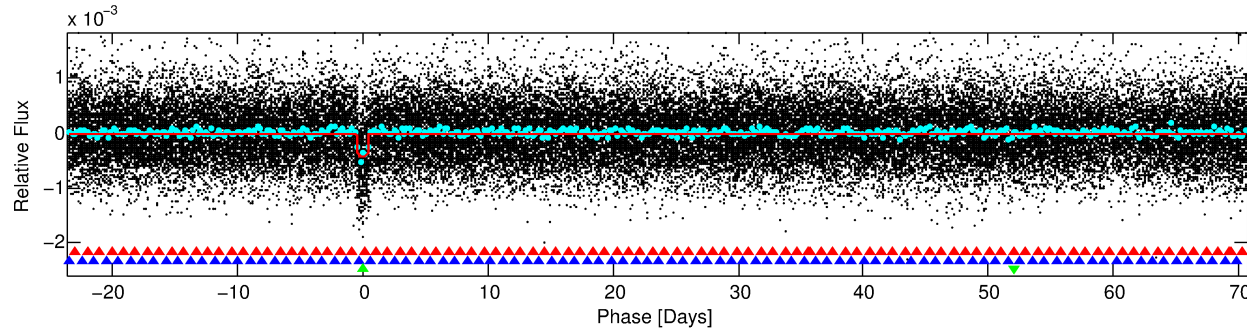
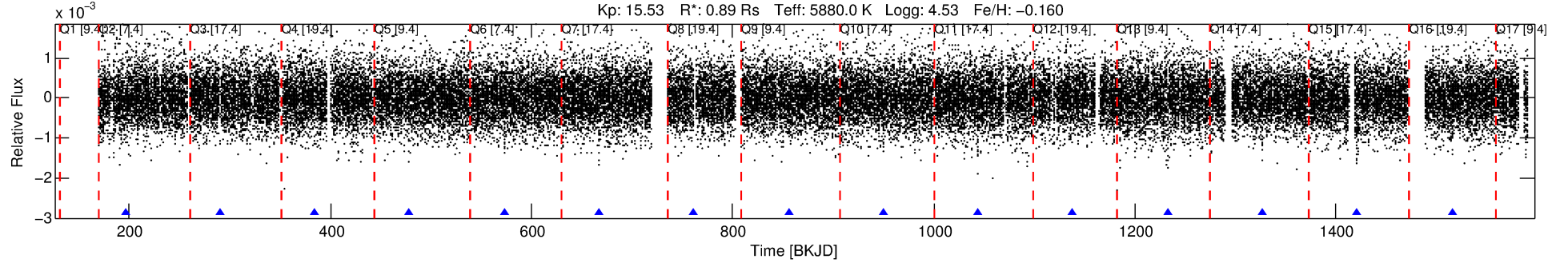
Ephemeris Match Information For 004150496-03

TCE (1)	KIC	Parent (2)	Parent KIC	P ₁ :P ₂	Dist (μ)	Δ Row	Δ Col	m ₂	m ₁	D ₂ /D ₁	Mechanism	Flag	σ_P	σ_T
004150496-03	4150496	3156.04	4150611	1:1	98.0	24	-7	7.90	15.54	112.58	Direct-PRF	0	0.04	0.17

Notes: P₁:P₂ is the period ratio. Dist is the distance in arcseconds. Δ Row and Δ Col are the number of pixels apart in row and column. m₂ and m₁ are the magnitudes of the parent and child. D₂/D₁ is the parent's transit depth divided by the child's. σ_P and σ_T are the significance of the match in period and epoch. For a match to be considered significant $\sigma_P < 5.0$ and $\sigma_T < 5.0$. Matches which have σ_P and σ_T very close to this cutoff should receive extra scrutiny, especially if the period ratio is very large.

DV One-Page Summary

KIC: 4150496 Candidate: 3 of 3 Period: 94.224 d
KOI: K04046.02 Corr: 0.970



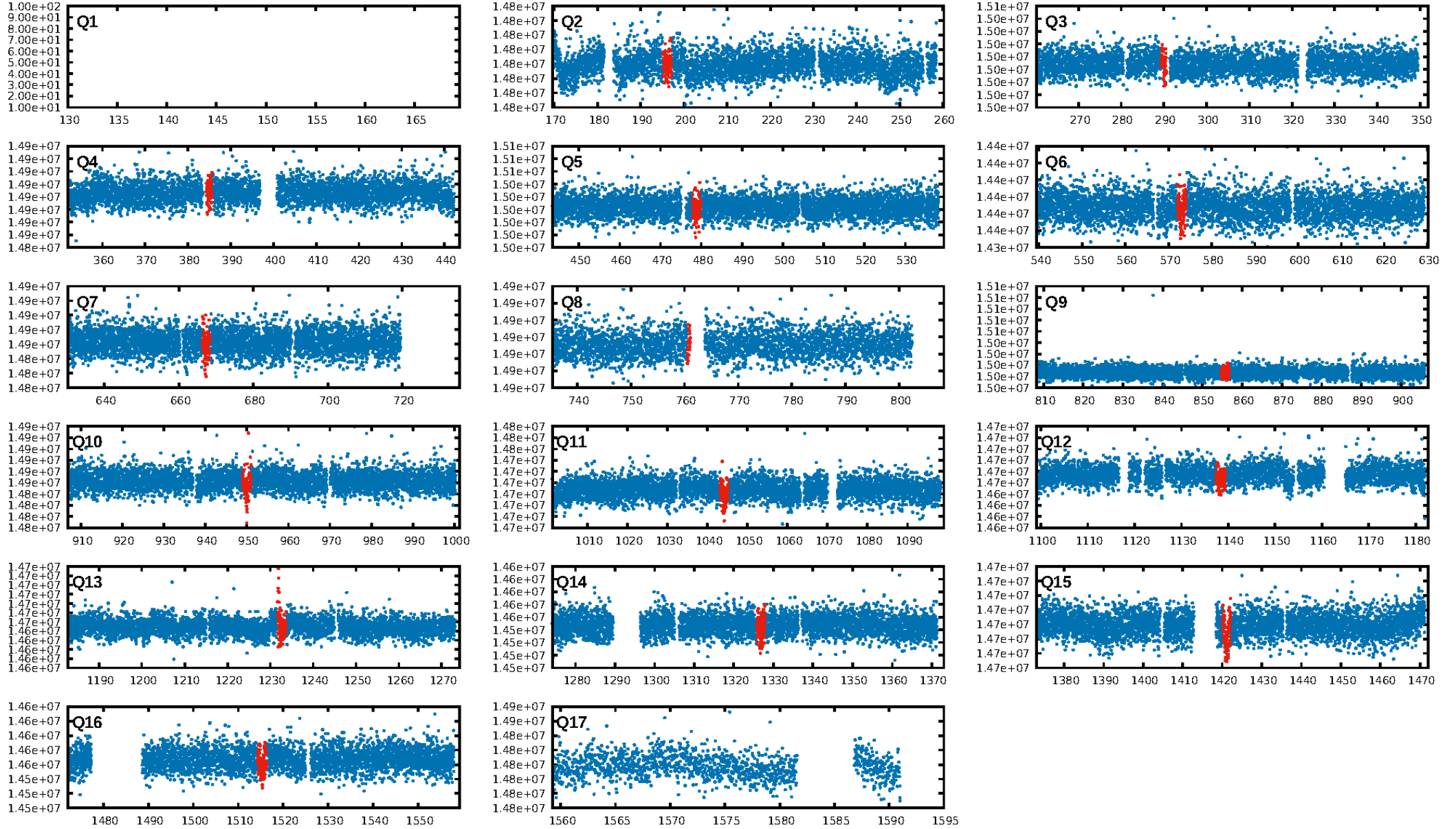
DV Fit Results:

Period = 94.22430 [0.00355] d
Epoch = 196.1618 [0.0312] BKJD
Rp/R* = 0.0227 [0.0016]
a/R* = 13.88 [4.18]
b = 0.91 [0.06]
Seff = 5.29 [2.12]
Teq = 387 [39] K
Rp = 2.21 [0.70] Re
a = 0.4018 [0.1043] AU
Ag = 1906.95 [973.70] [1.96 σ]
Teffp = 3951 [362] K [9.79 σ]

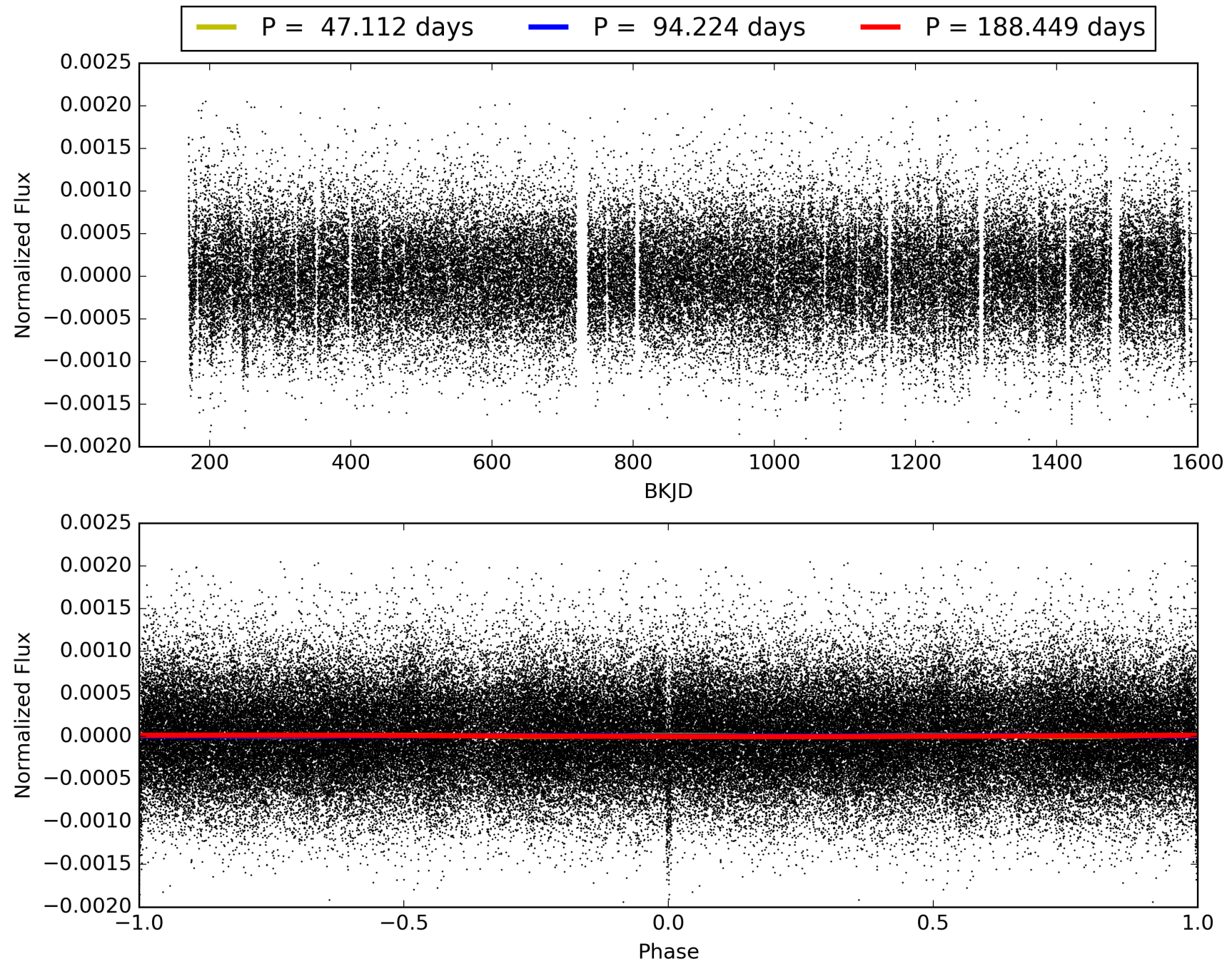
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [81.96 σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 0.0%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 1.05e-40
RollingBand-fgt: 1.00 [15/15]
GhostDiagnostic-chr: -0.113
Centroid-sig: 0.0%
Centroid-so: 1.219 arcsec [1.80 σ]
OotOffset-rm: 1.696 arcsec [2.71 σ]
KicOffset-rm: 1.365 arcsec [2.10 σ]
OotOffset-st: 4/3/1/1 [9]
KicOffset-st: 4/3/1/1 [9]
DiffImageQuality-fgm: 0.44 [4/9]
DiffImageOverlap-fno: 0.33 [3/9]

TCE 004150496-03, PDC Light Curves

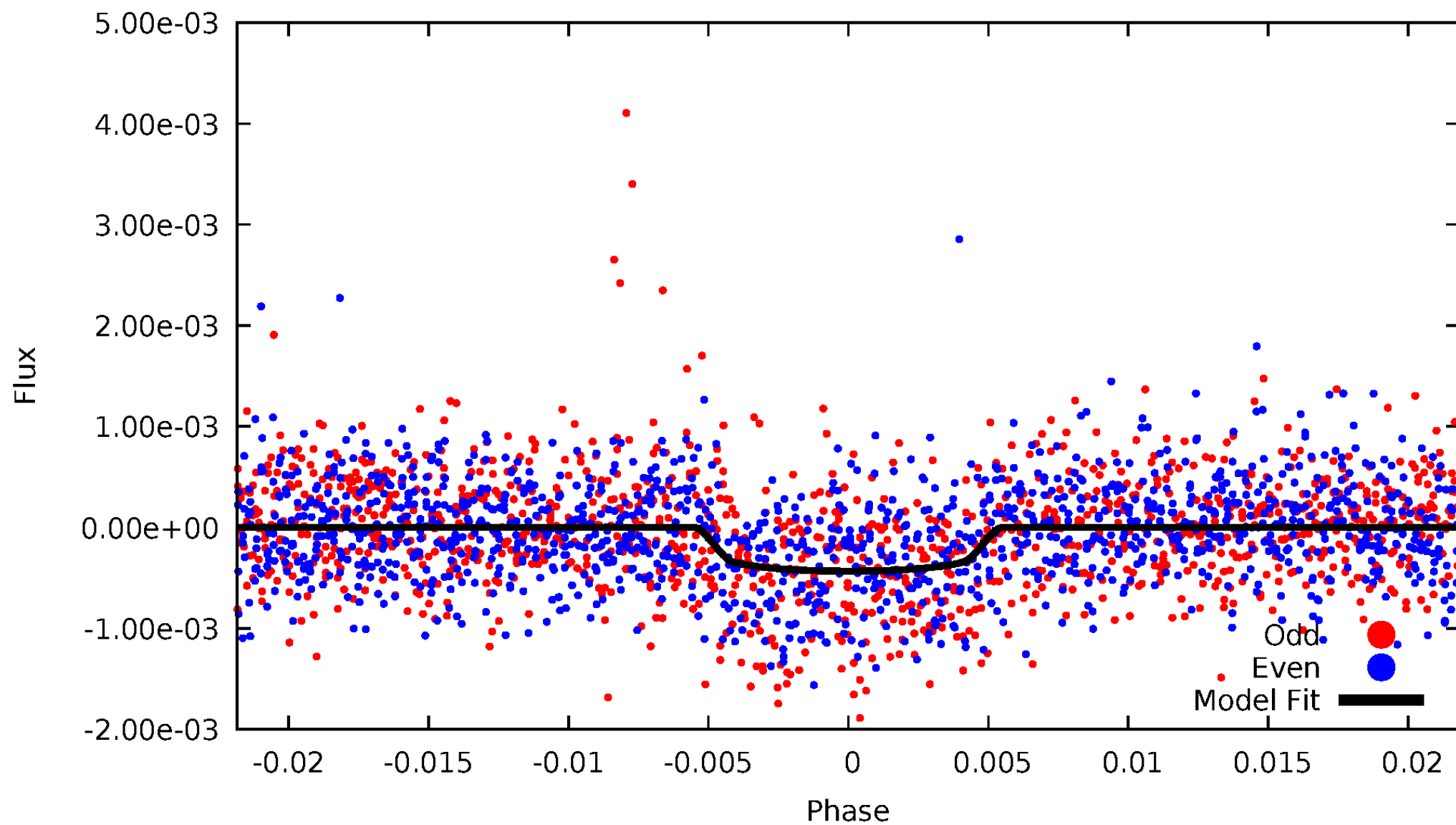


TCE 004150496-03



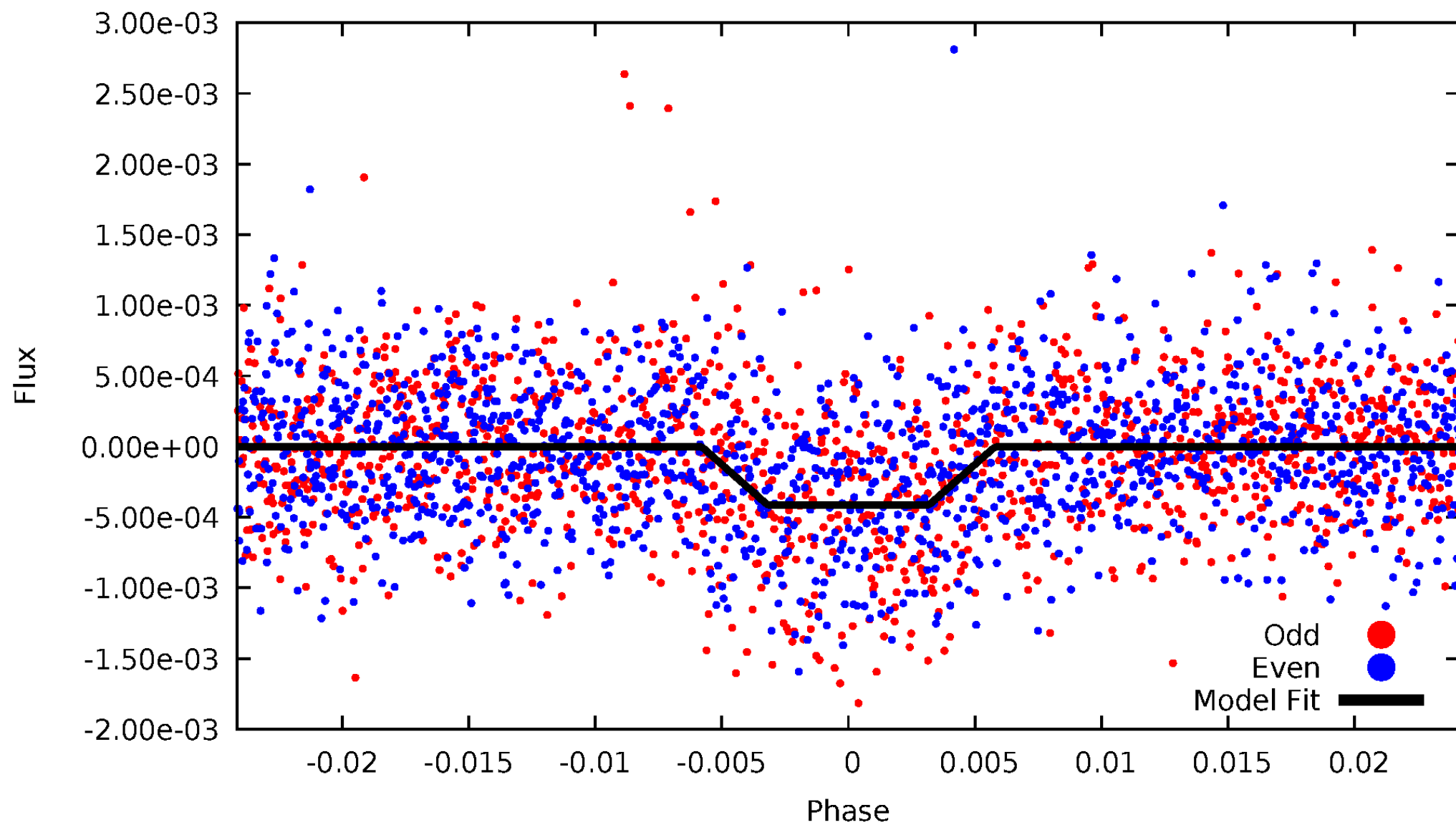
DV Odd/Even

TCE 004150496-03



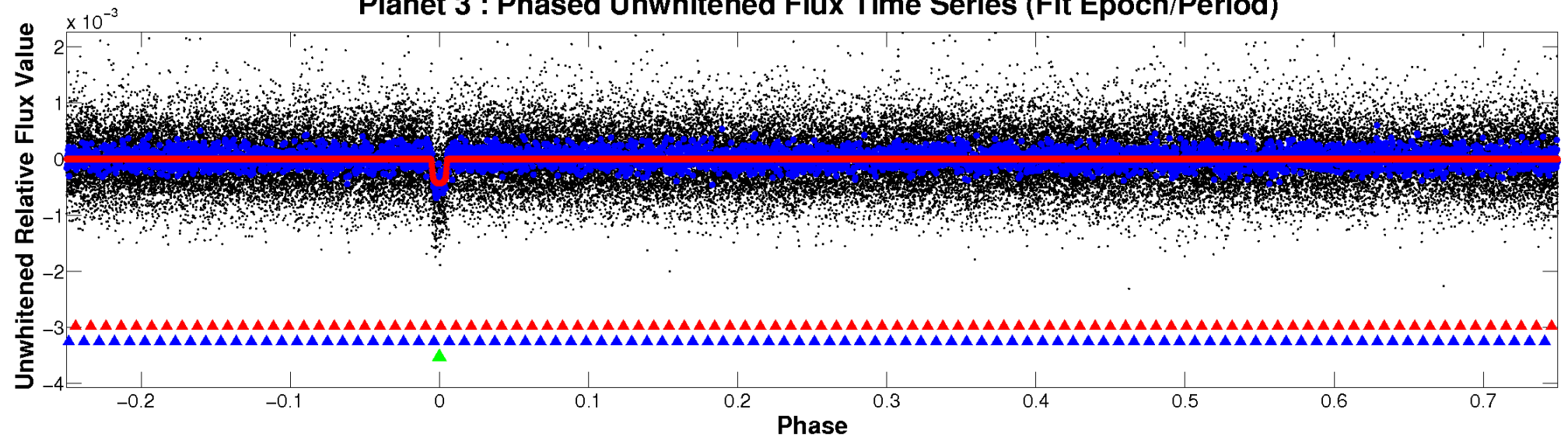
ALT Odd/Even

TCE 004150496-03

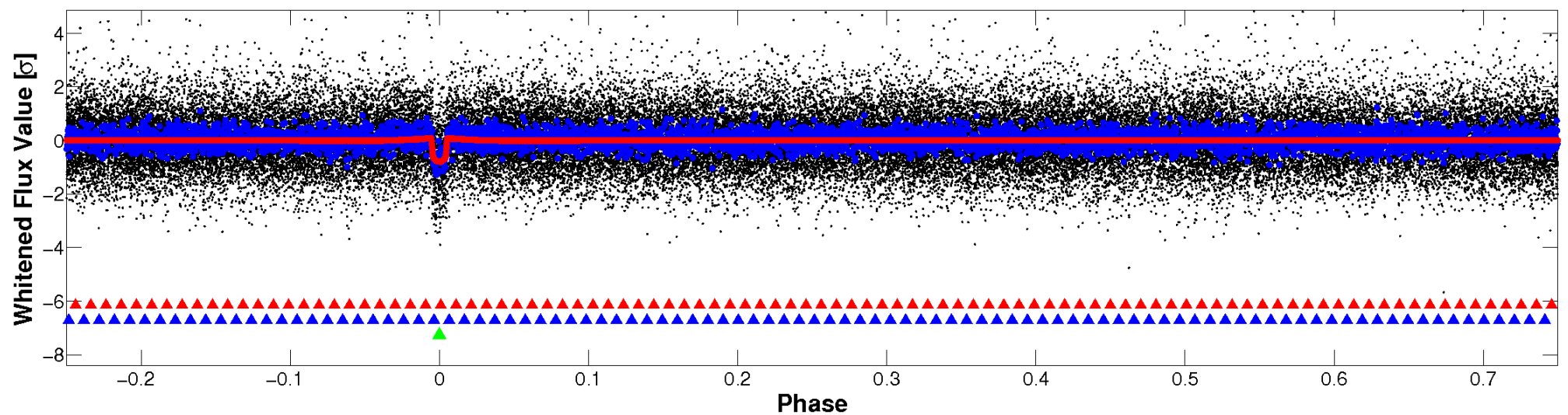


Non-Whitened Vs. Whitened Light Curve

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

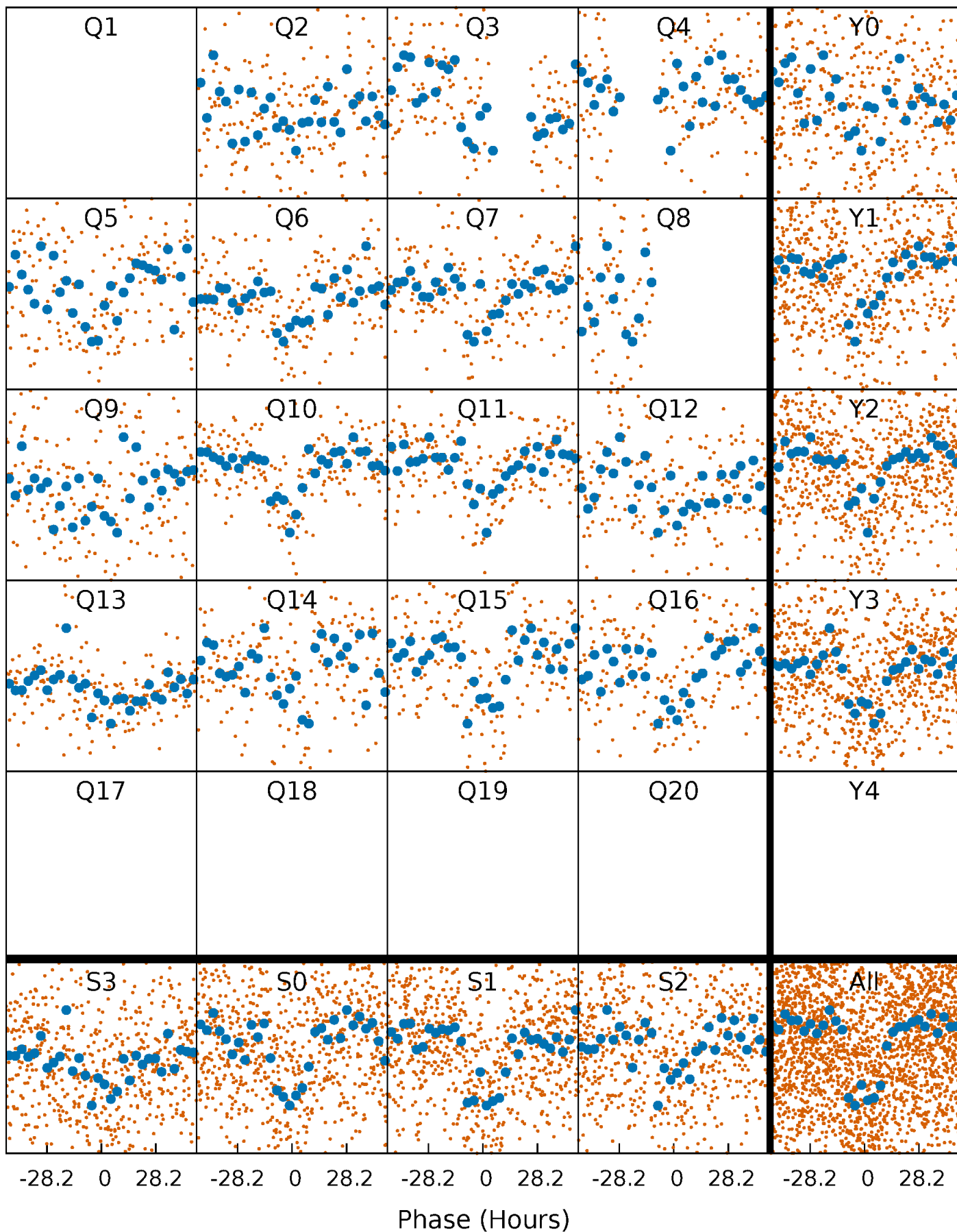


Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



PDC Quarter-Phased Transit Curves

TCE 004150496-03 $P = 94.224298$ Days $T_0 = 196.161764$ (BKJD)



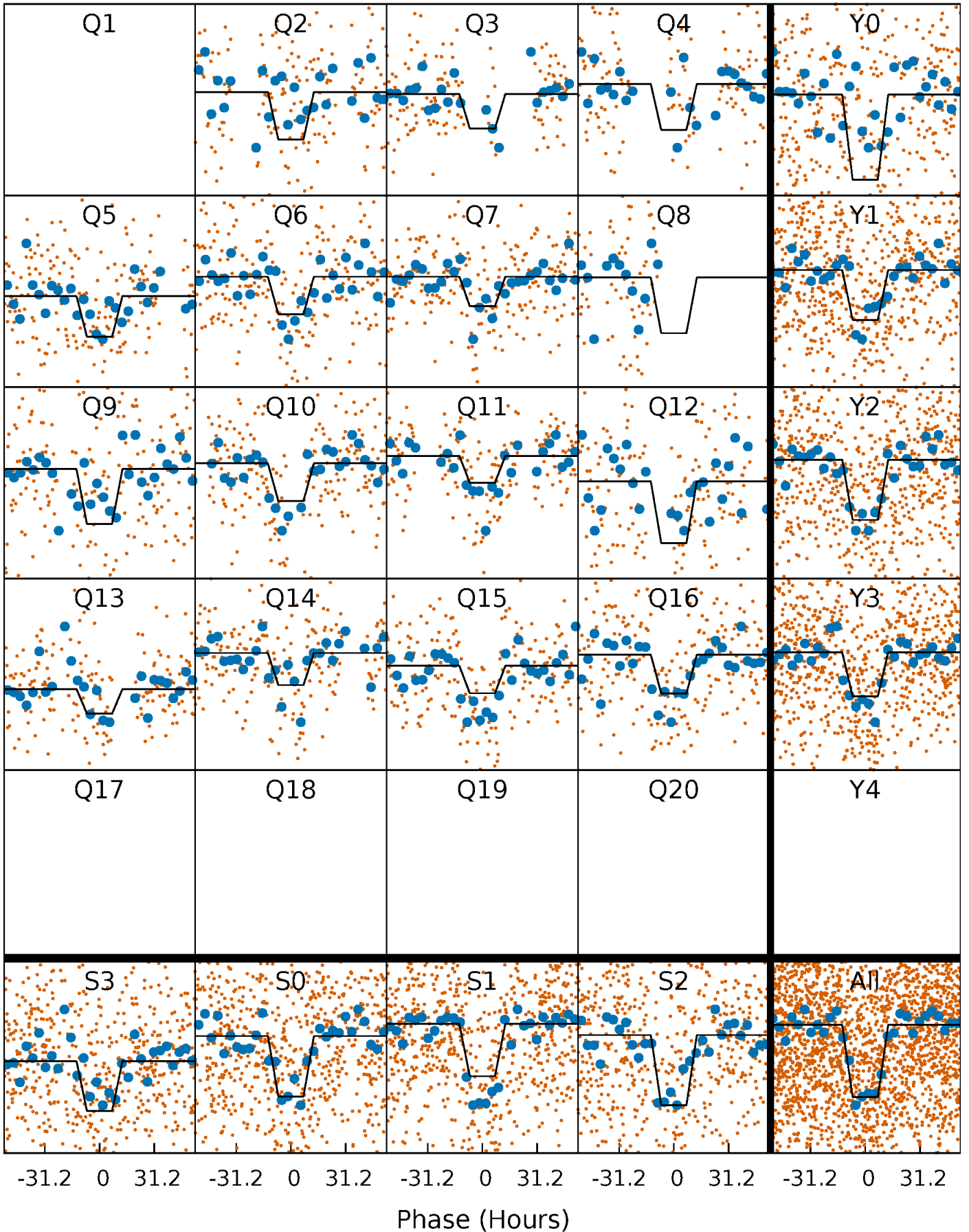
DV Quarter-Phased Transit Curves

TCE 004150496-03 P= 94.224298 Days $T_0=196.161764$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

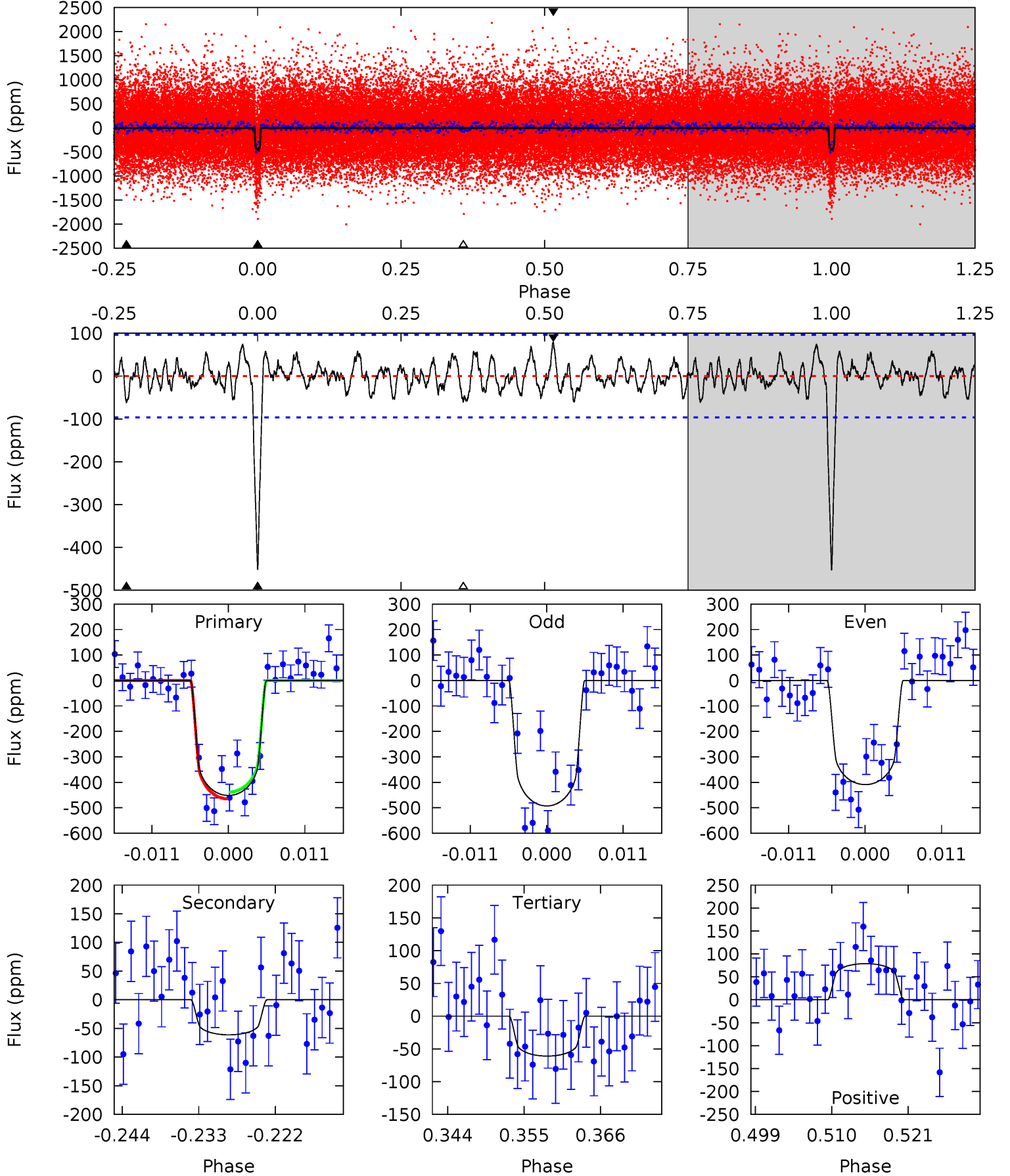
TCE 004150496-03 P= 94.246390 Days $T_0=195.964662$ (BKJD)



DV Model-Shift Uniqueness Test

004150496-03, P = 94.224298 Days, E = 101.937466 Days

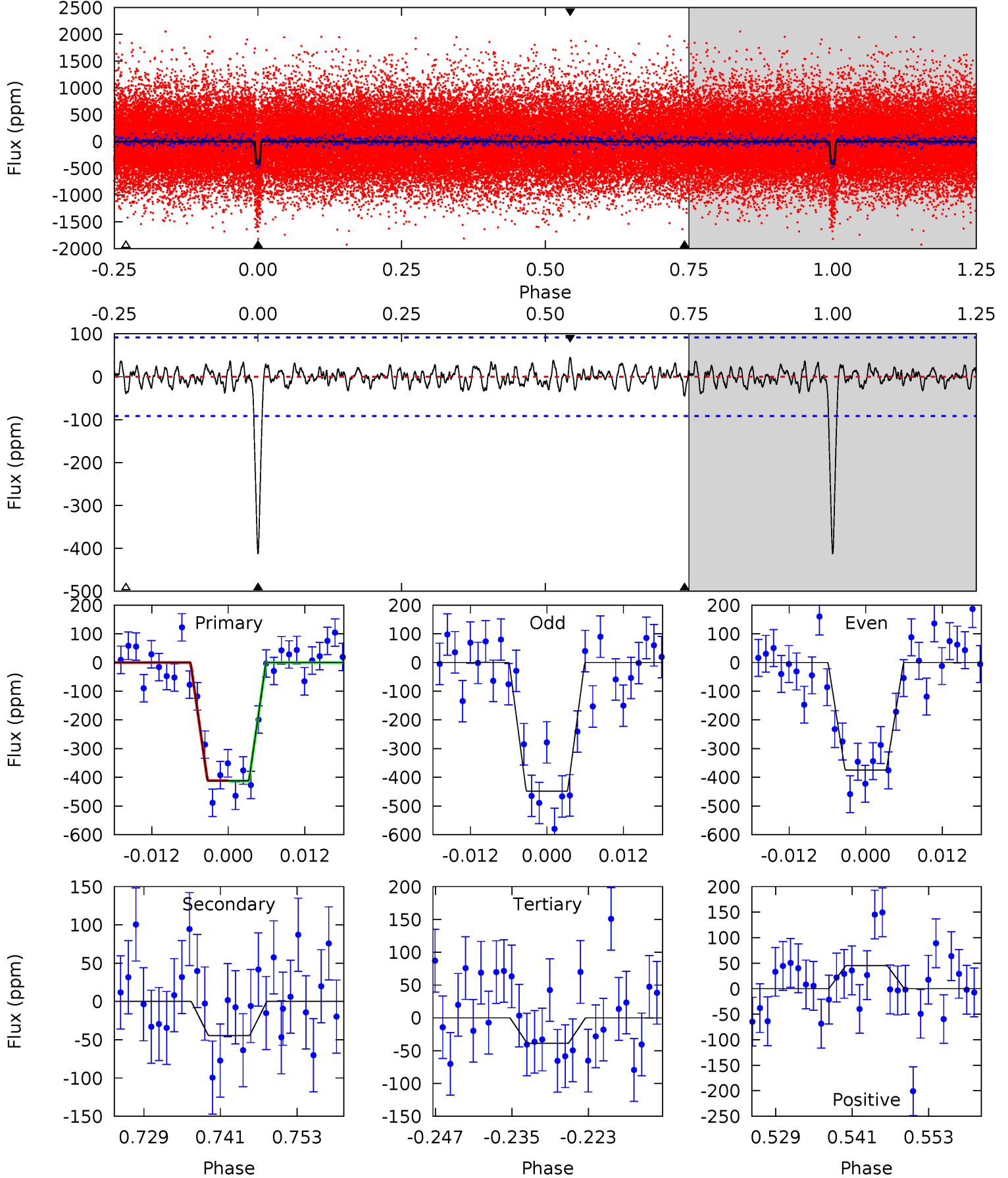
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
23.5	3.18	3.17	4.09	5.01	2.54	1.38	20.3	19.4	0.01	-0.91	2.18	0.86	0.15	0.70



Alt Model-Shift Uniqueness Test

004150496-03, P = 94.246390 Days, E = 101.718272 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
22.5	2.43	2.11	2.46	5.00	2.52	0.85	20.4	20.0	0.32	-0.04	2.02	0.89	0.10	0.04



Stellar Parameters For KIC 004150496

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	5880^{+159}_{-194}	$4.525^{+0.039}_{-0.208}$	$-0.160^{+0.300}_{-0.300}$	$0.893^{+0.274}_{-0.091}$	$0.974^{+0.120}_{-0.120}$	$1.927^{+0.404}_{-1.031}$
	+3%/-3%	+1%/-5%	+188%/-188%	+31%/-10%	+12%/-12%	+21%/-54%
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 004150496-03 / KOI 4046.02

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	A_{obs}
DV	-61 ± 19	$2.32^{+0.43}_{-0.26}$	553^{+41}_{-25}	3815^{+225}_{-261}	957^{+444}_{-350}
Alt.	-45 ± 18	$2.07^{+0.37}_{-0.23}$	553^{+40}_{-27}	3736^{+257}_{-311}	851^{+463}_{-388}

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

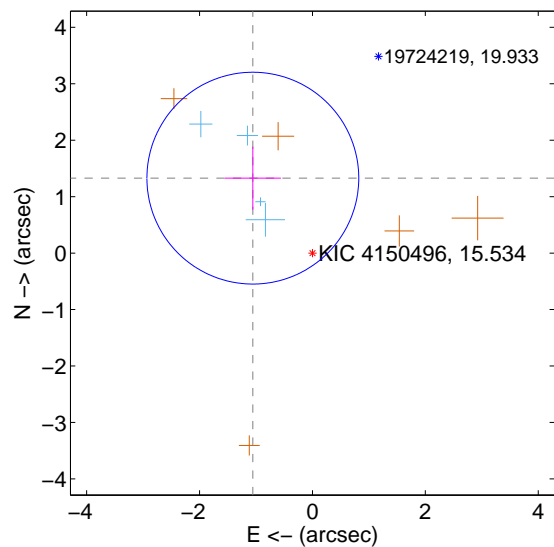
Supplemental centroid analysis for 004150496-03. Kepler magnitude: 15.53. Transit SNR 15.95

There are 4 quarters with good PRF difference image offsets

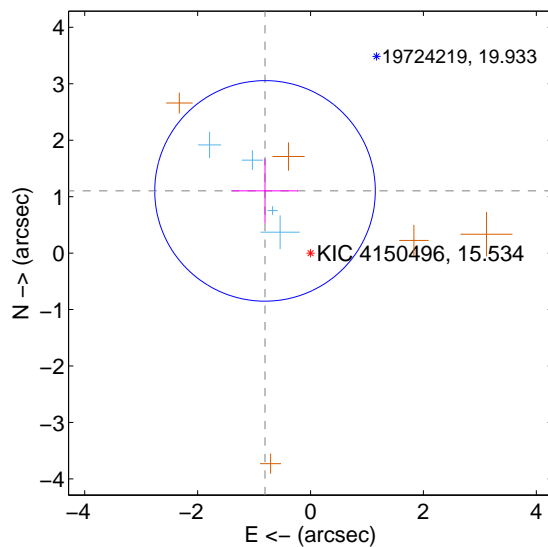
The direct PRF centroid is offset from the target star catalog position by about 0.29 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	1.696 ± 0.625	2.71	1.056 ± 0.497	1.327 ± 0.558
PRF-fit source offset from KIC position	1.365 ± 0.651	2.10	0.806 ± 0.583	1.101 ± 0.569
photometric centroid source offset	1.22 ± 0.68	1.80	0.82 ± 0.69	-0.90 ± 0.67

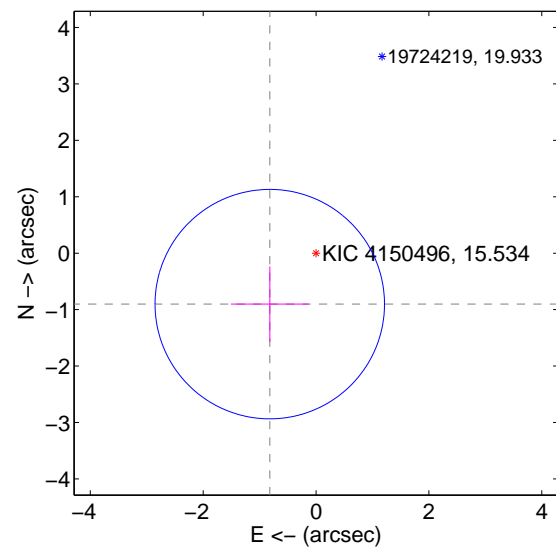
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

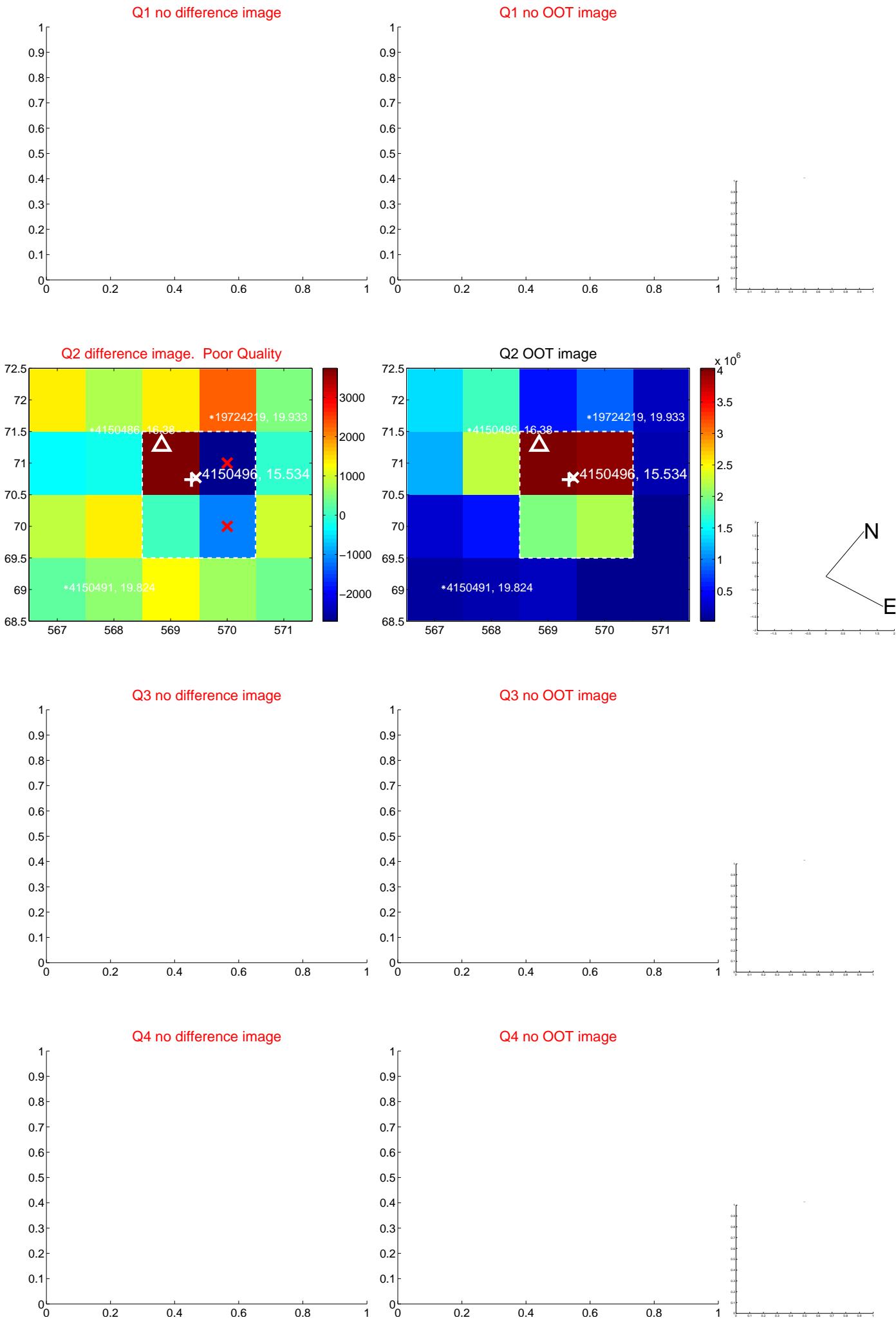


offset from photometric centroids

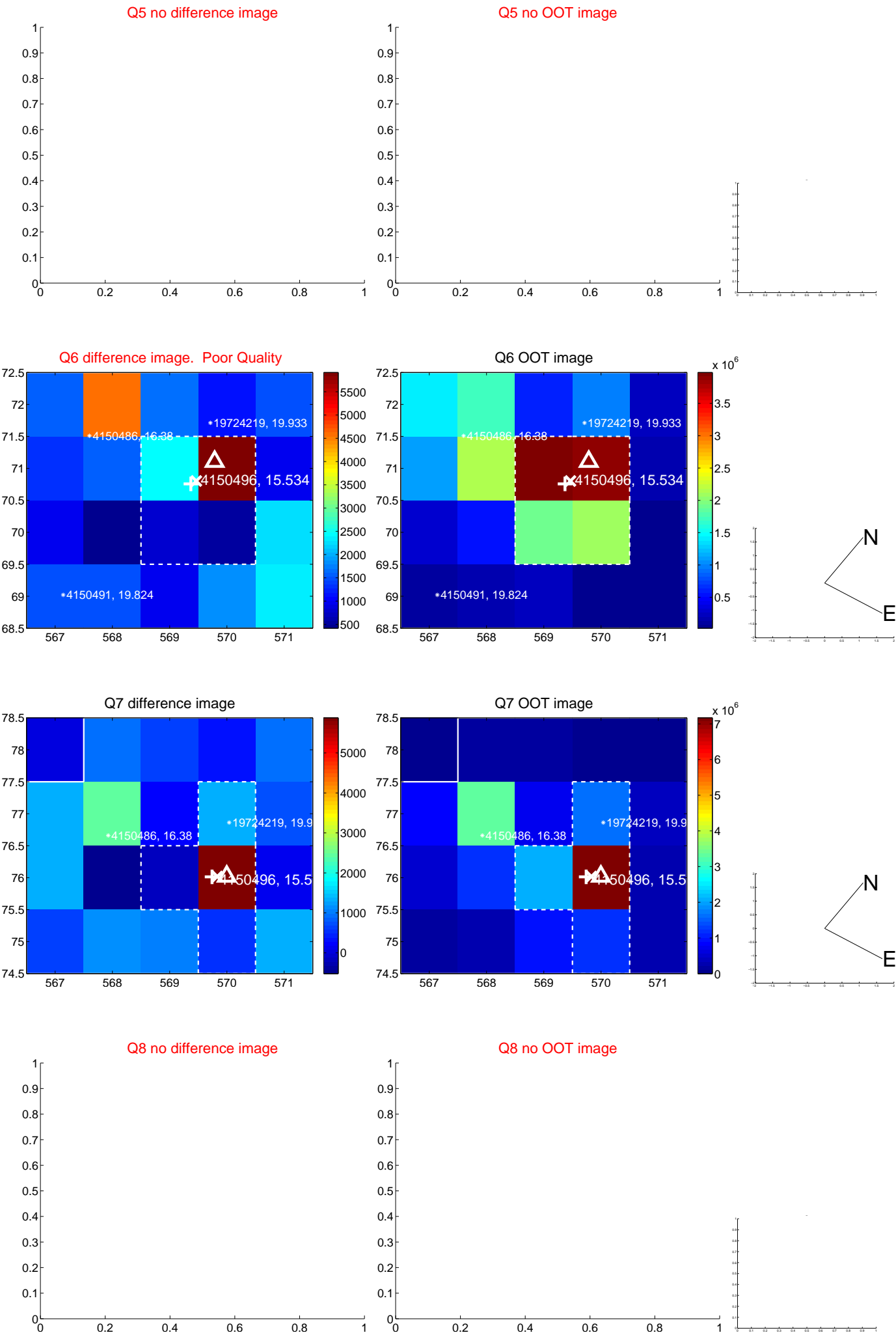


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

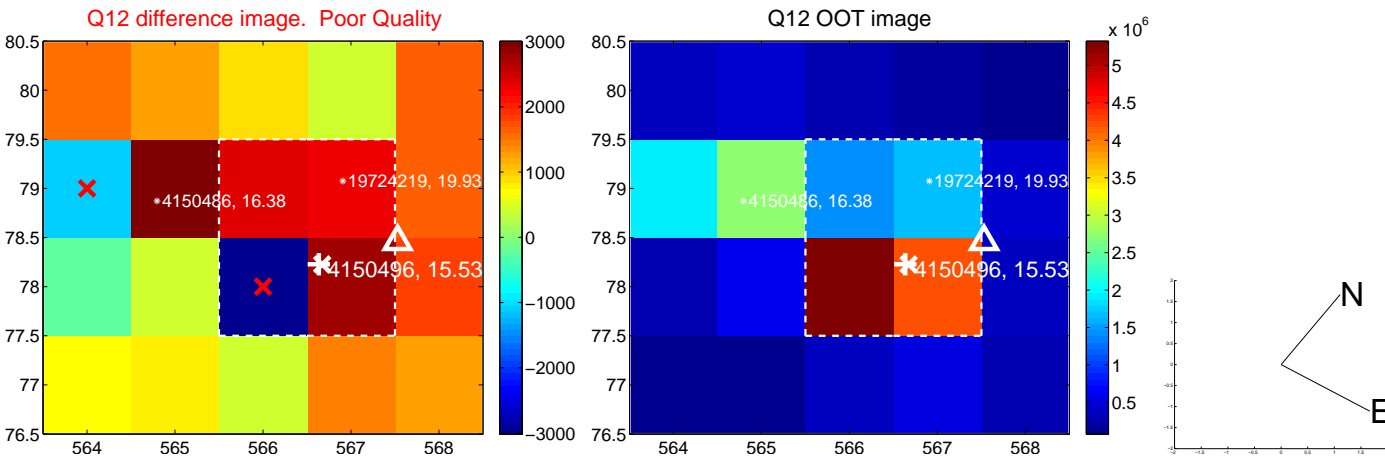
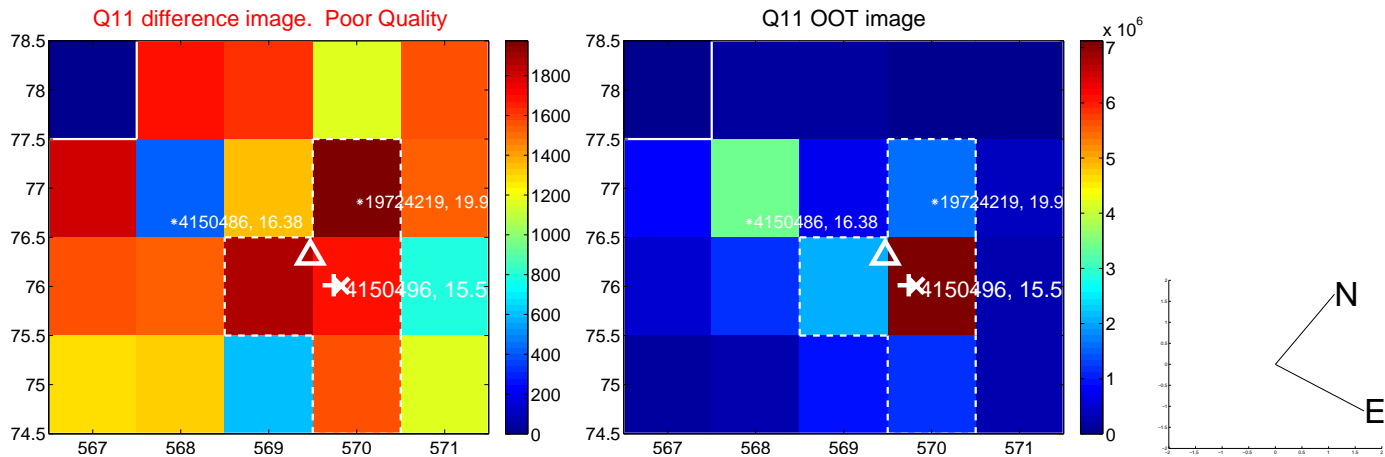
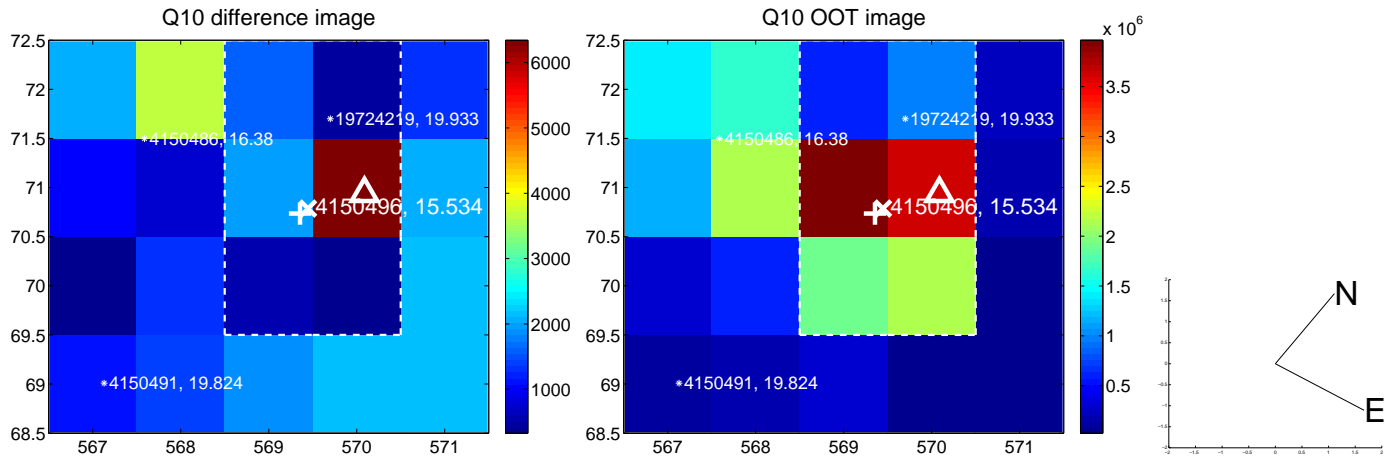
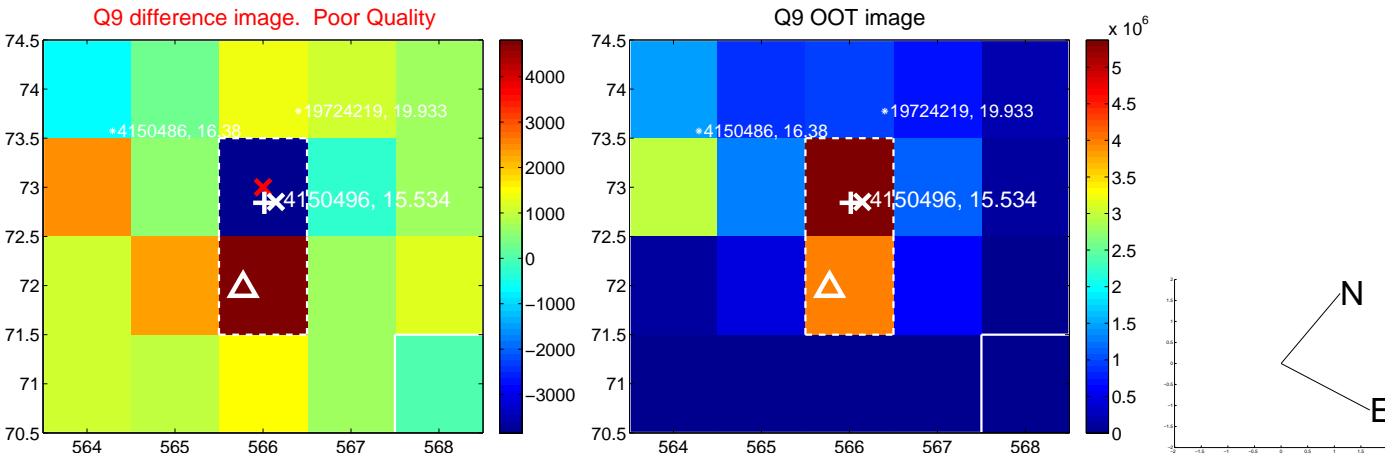
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

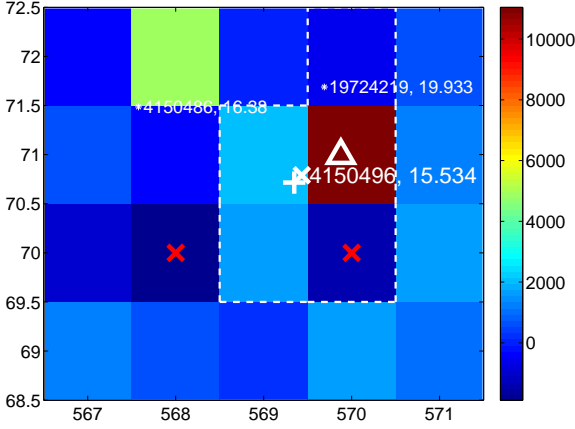
Q13 no difference image



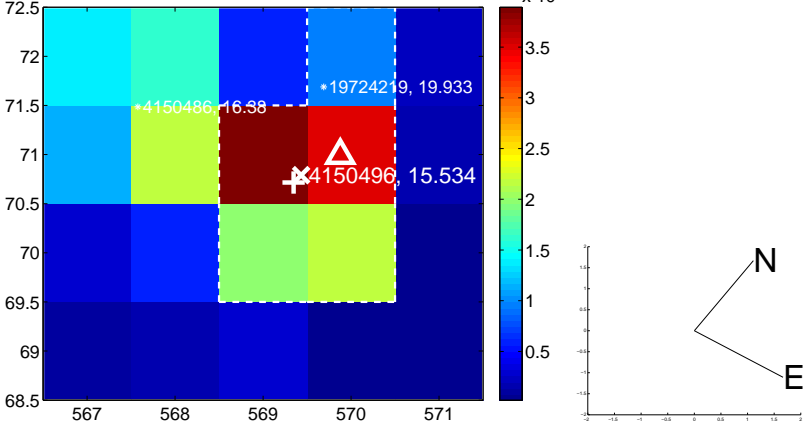
Q13 no OOT image



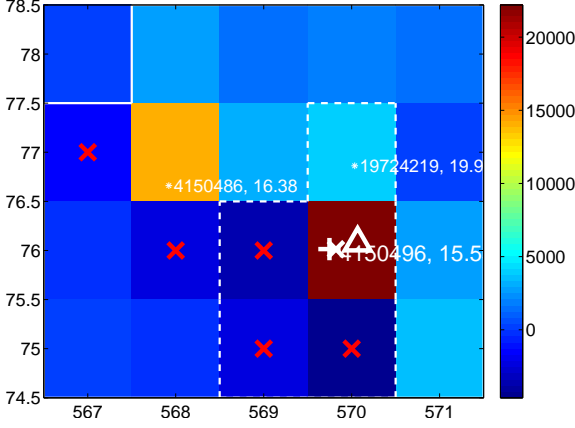
Q14 difference image



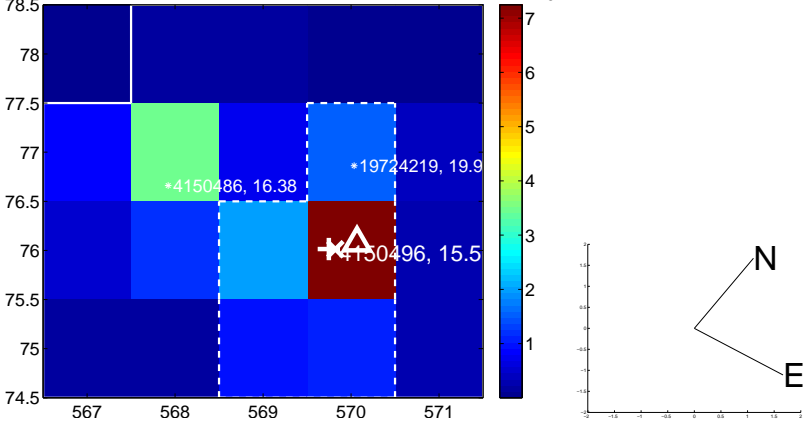
Q14 OOT image



Q15 difference image



Q15 OOT image



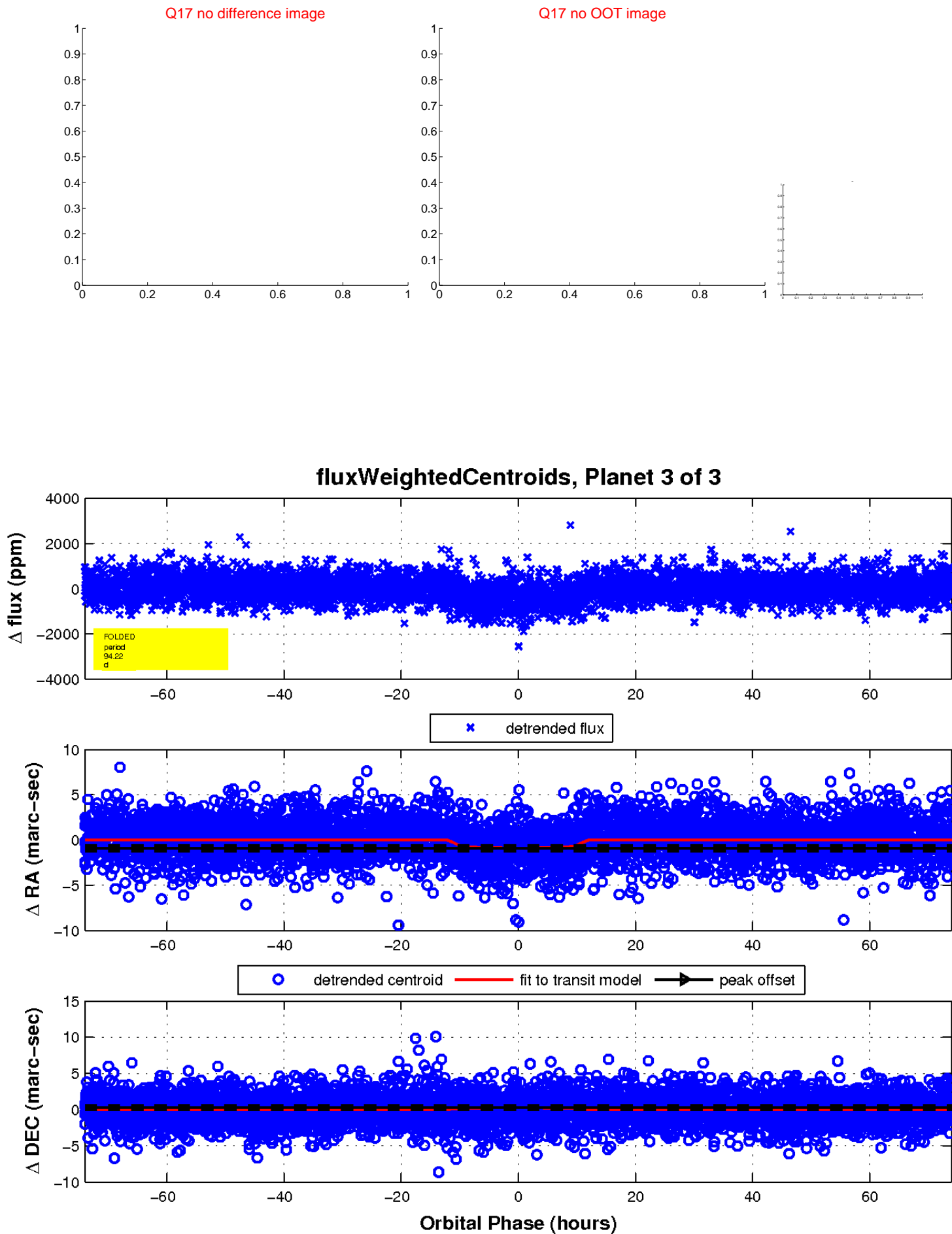
Q16 no difference image



Q16 no OOT image



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



UKIRT Image

Declination

