

KIC 007877496

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})
007877496-01	OBS	0202.01	1.720857	133.022761	10092.2	2.031	1733.6	1572.1	1.22	5742	13.22	1742.63
007877496-02	OBS	No	1.720896	132.140413	51.1	1.581	8.1	8.6	1.22	5742	1.04	1742.58

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007877496-01	OBS	PC	1.00	0	1	0	0	MOD_SEC_DV—PLANET_OCCULT_DV—HAS_SEC_TCE
007877496-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE

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

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

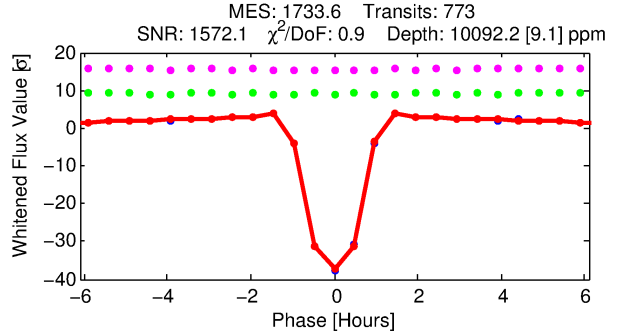
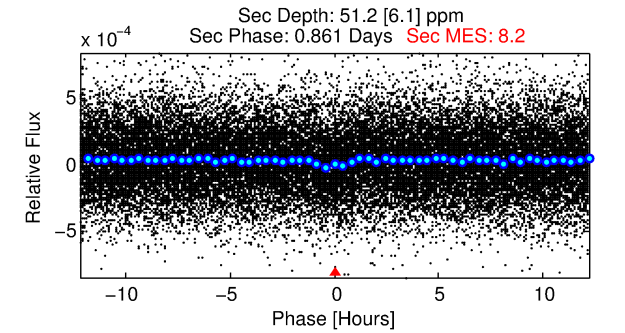
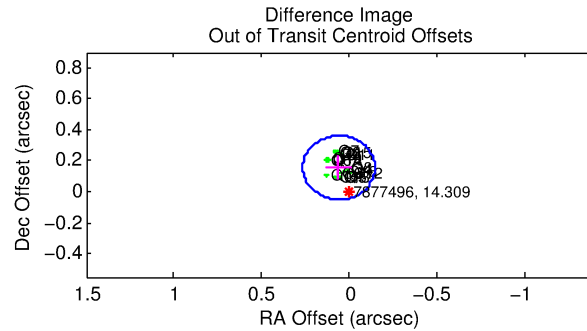
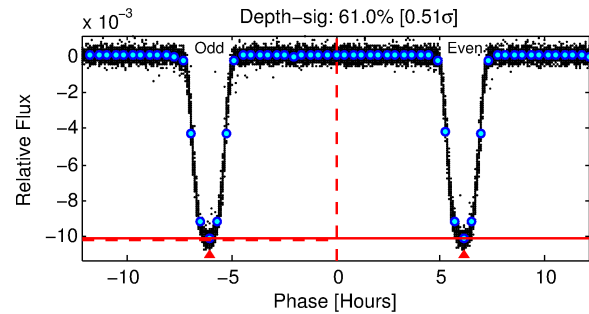
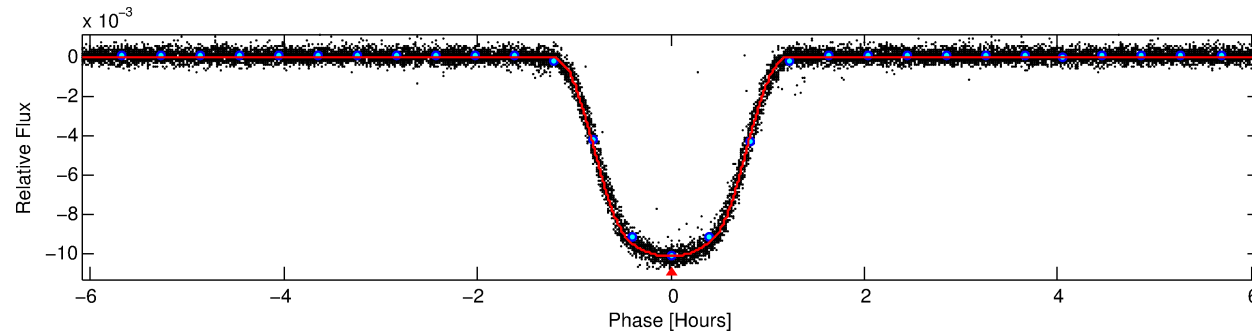
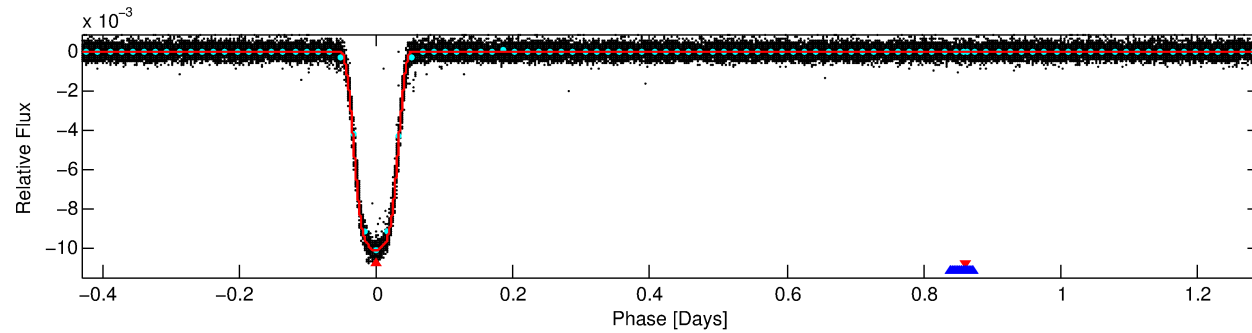
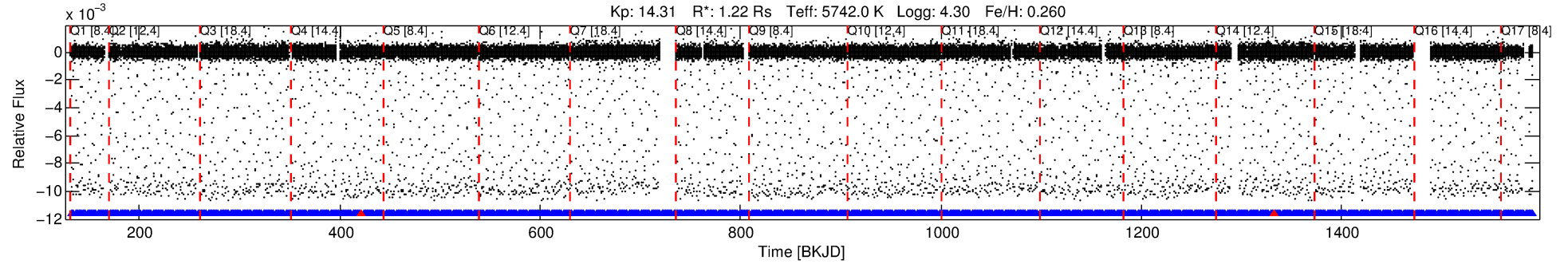
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 007877496-01

No Significant Match Found

DV One-Page Summary

KIC: 7877496 Candidate: 1 of 2 Period: 1.721 d
KOI: K00202.01 Name: Kepler-412b Corr: 0.989



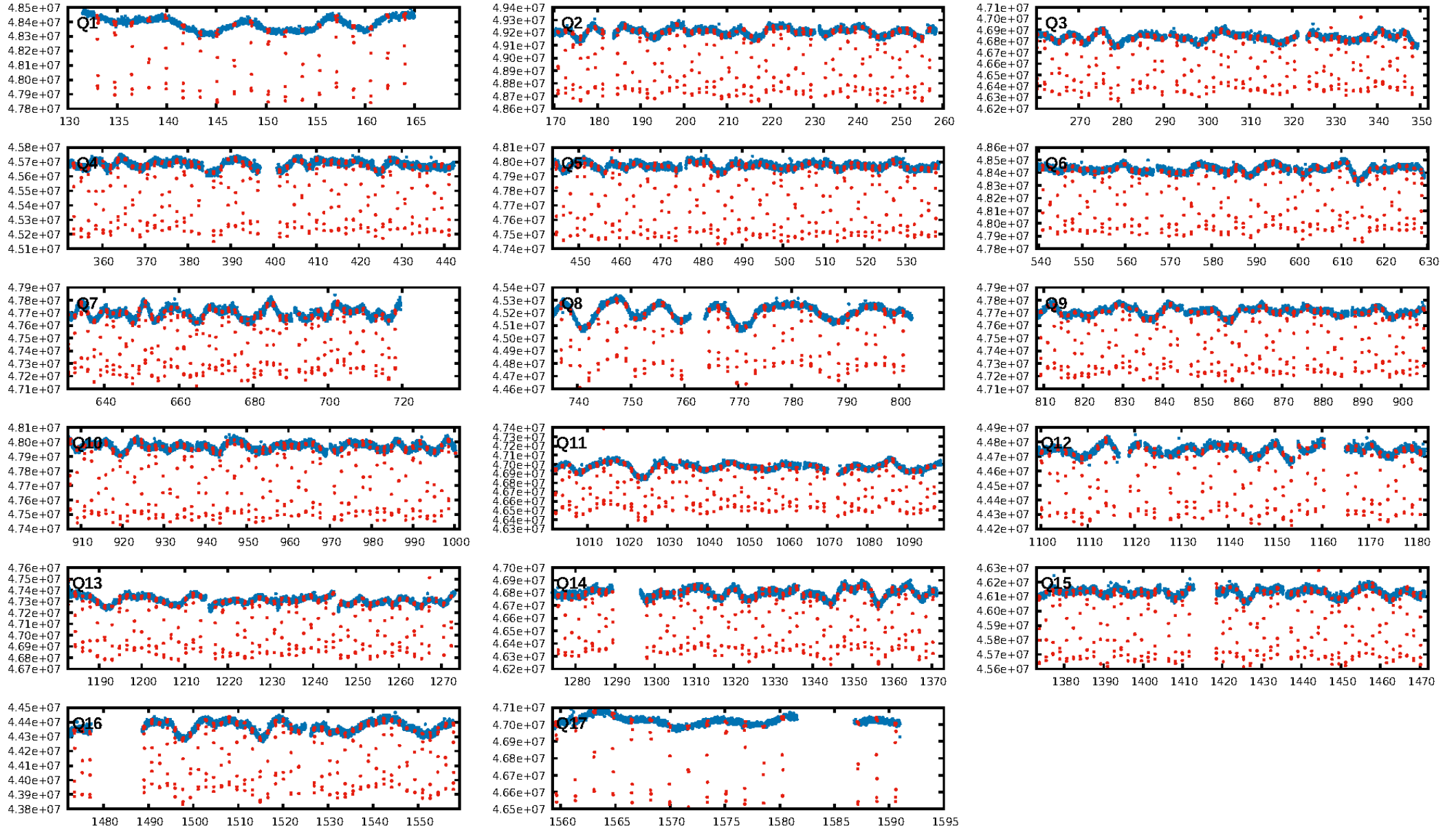
DV Fit Results:

Period = 1.72086 [0.00000] d
Epoch = 133.0228 [0.0000] BKJD
Rp/R* = 0.0997 [0.0002]
a/R* = 5.41 [0.03]
b = 0.73 [0.00]
Seff = 1742.63 [222.62]
Teq = 1648 [53] K
Rp = 13.22 [1.04] Re
a = 0.0287 [0.0019] AU
Ag = 0.13 [0.02] [-42.12 σ]
Teffp = 1538 [55] K [-1.44 σ]

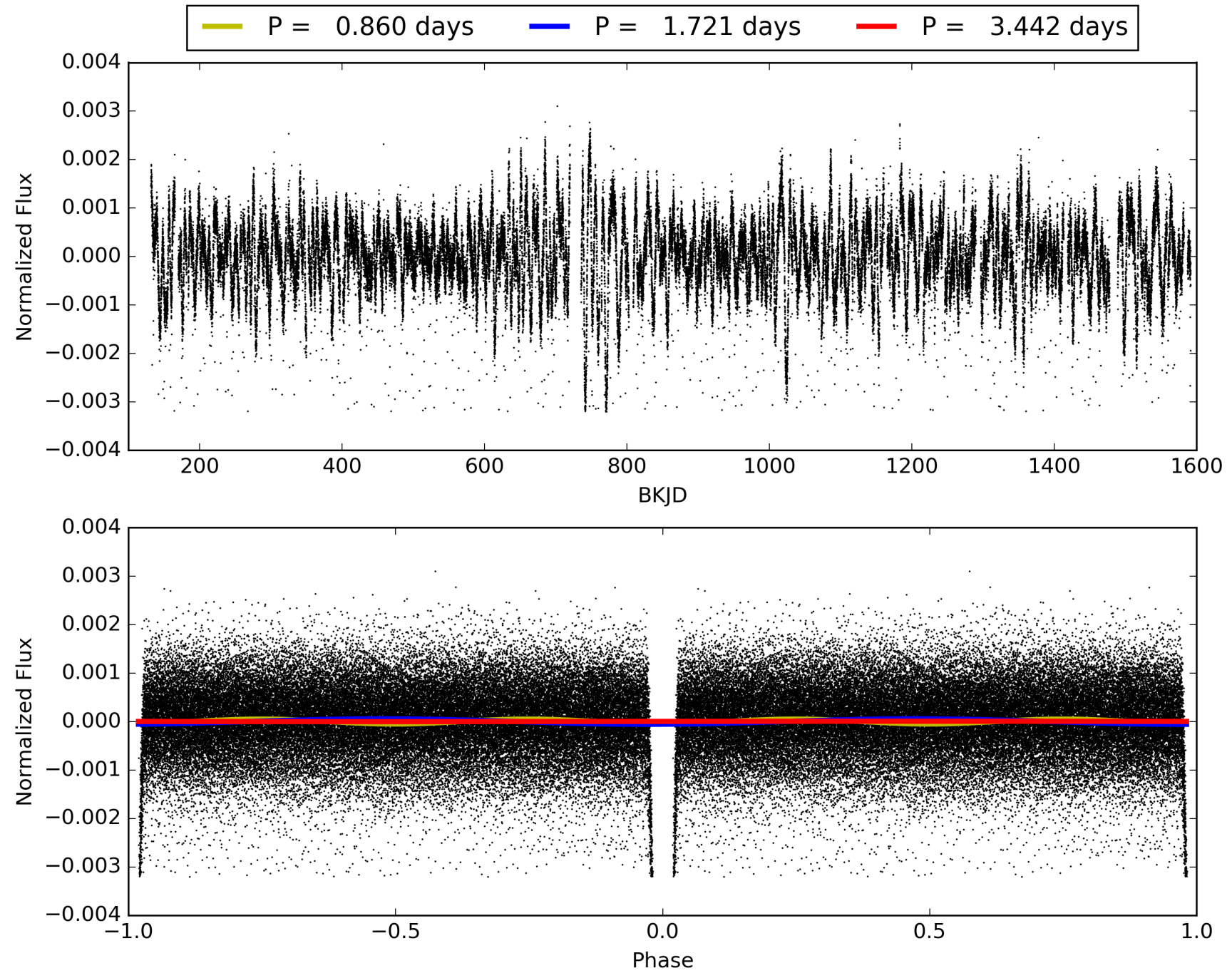
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 0.0% [0.00 σ]
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: 0.00e+00
RollingBand-fgt: 1.00 [736/738]
GhostDiagnostic-chr: 6.339
Centroid-sig: 0.0%
Centroid-so: 0.062 arcsec [8.74 σ]
OotOffset-rm: 0.167 arcsec [2.44 σ]
KicOffset-rm: 0.045 arcsec [0.67 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 007877496-01, PDC Light Curves

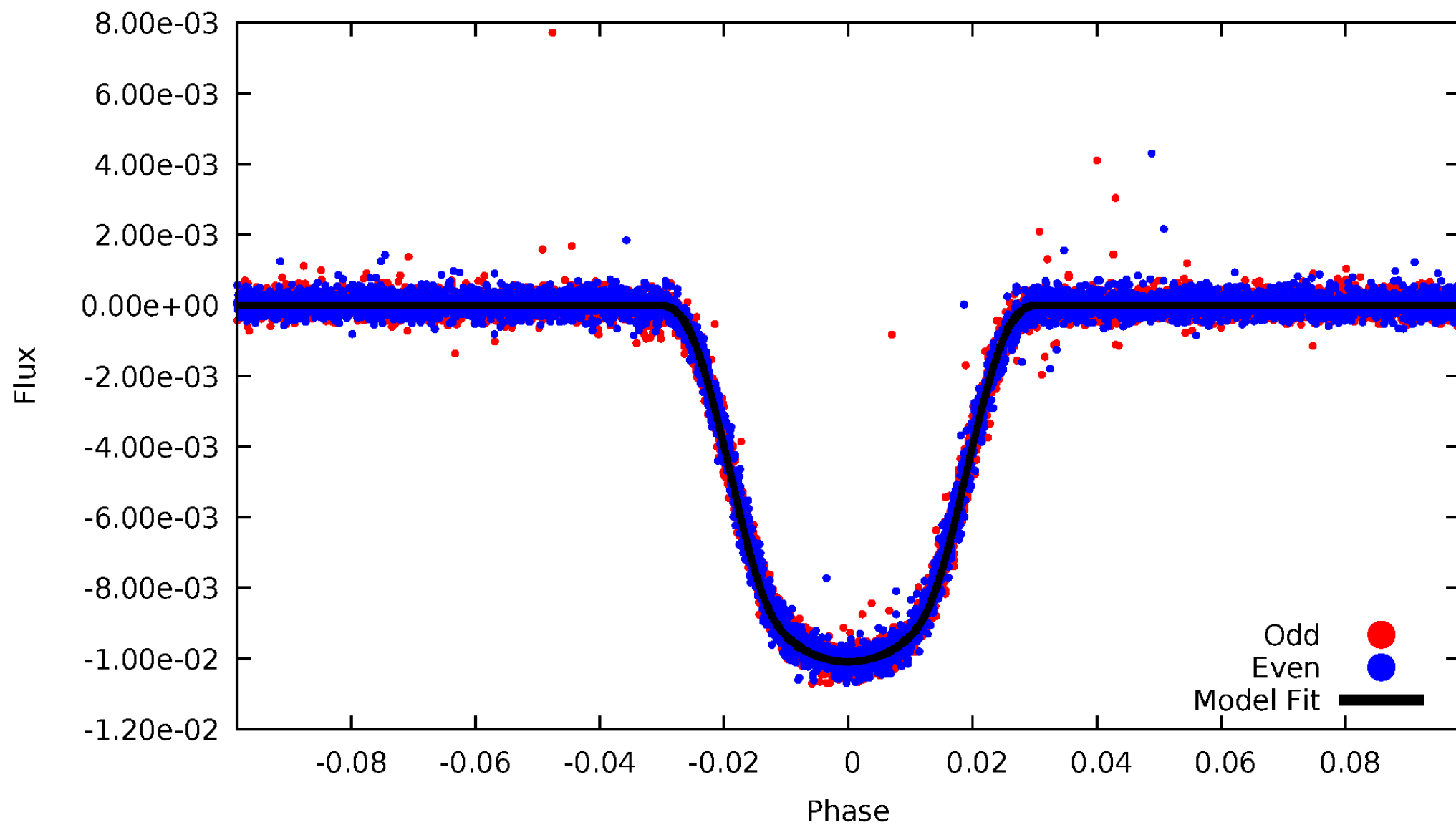


TCE 007877496-01



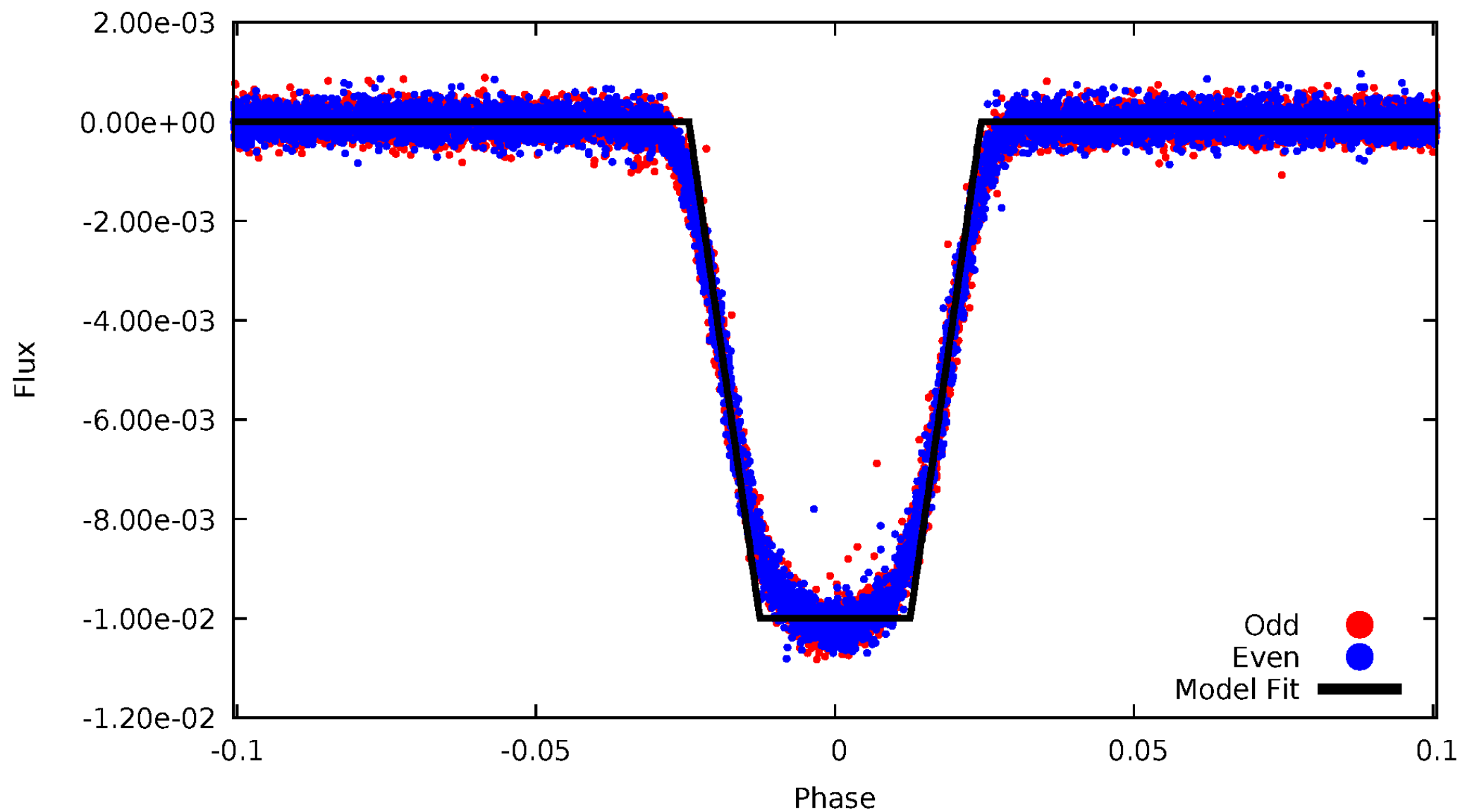
DV Odd/Even

TCE 007877496-01



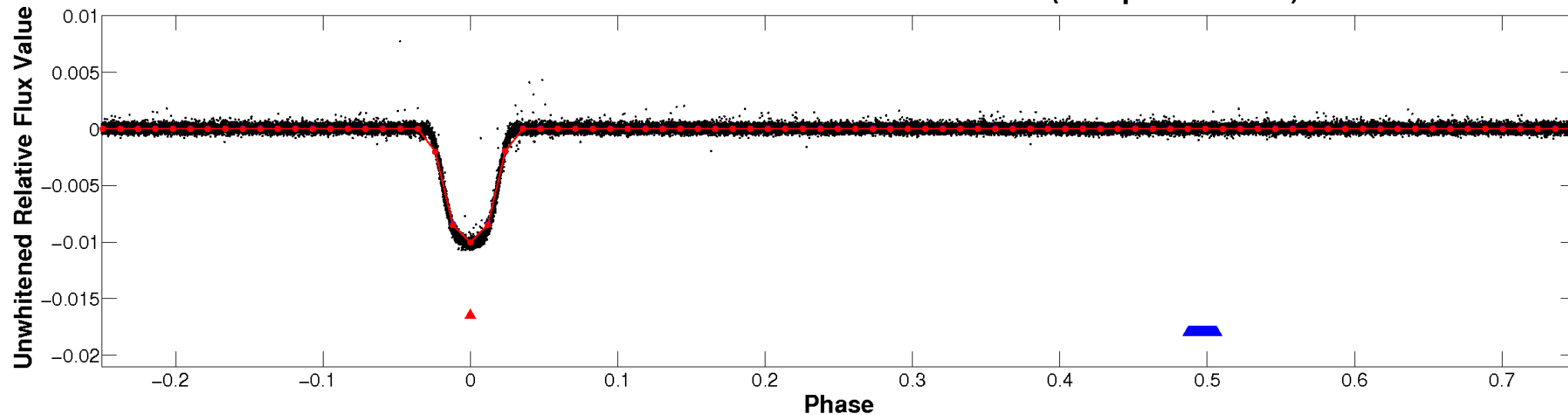
ALT Odd/Even

TCE 007877496-01

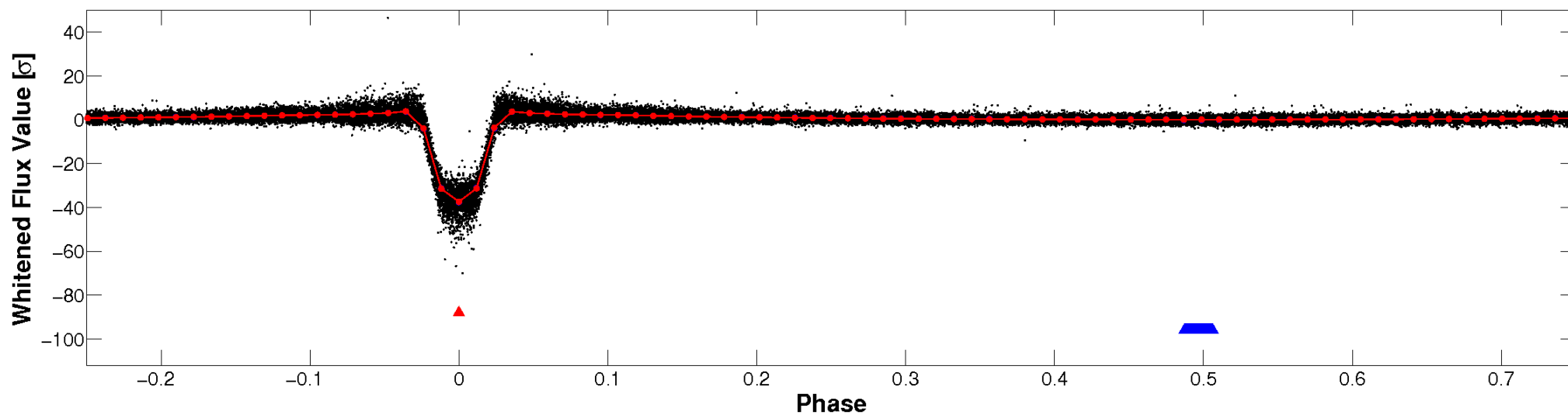


Non-Whitened Vs. Whitened Light Curve

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

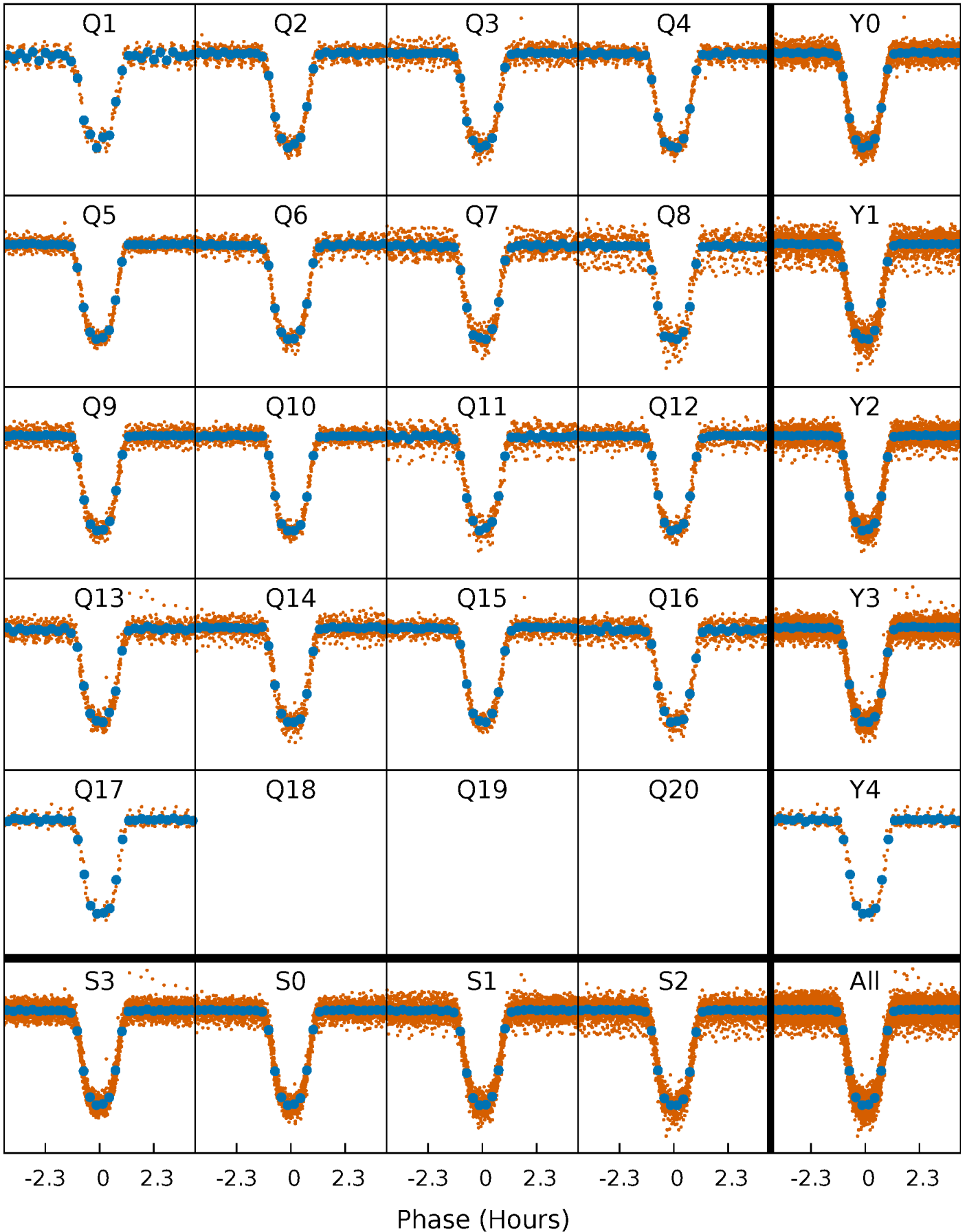


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



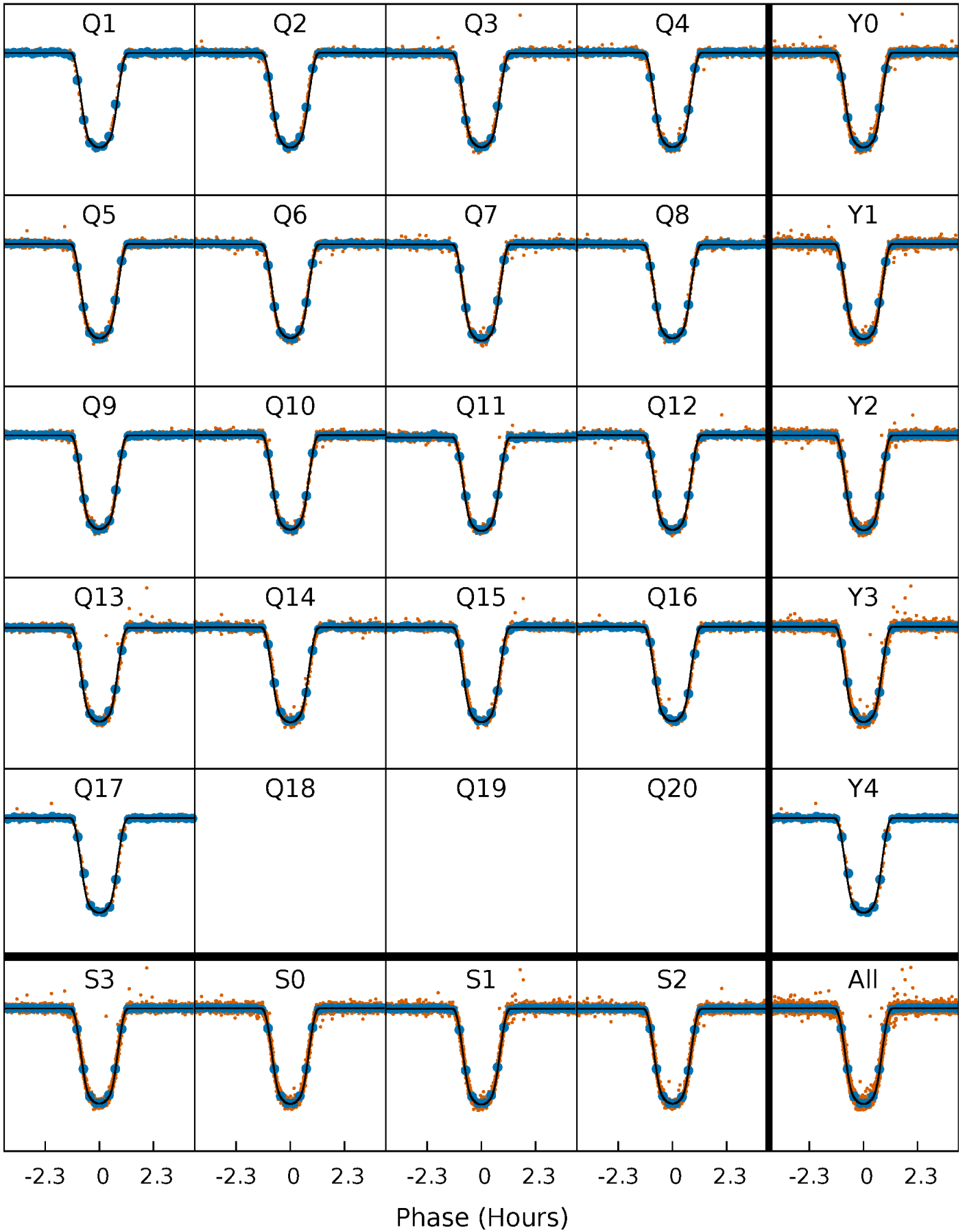
PDC Quarter-Phased Transit Curves

TCE 007877496-01 P= 1.720857 Days $T_0=133.022761$ (BKJD)



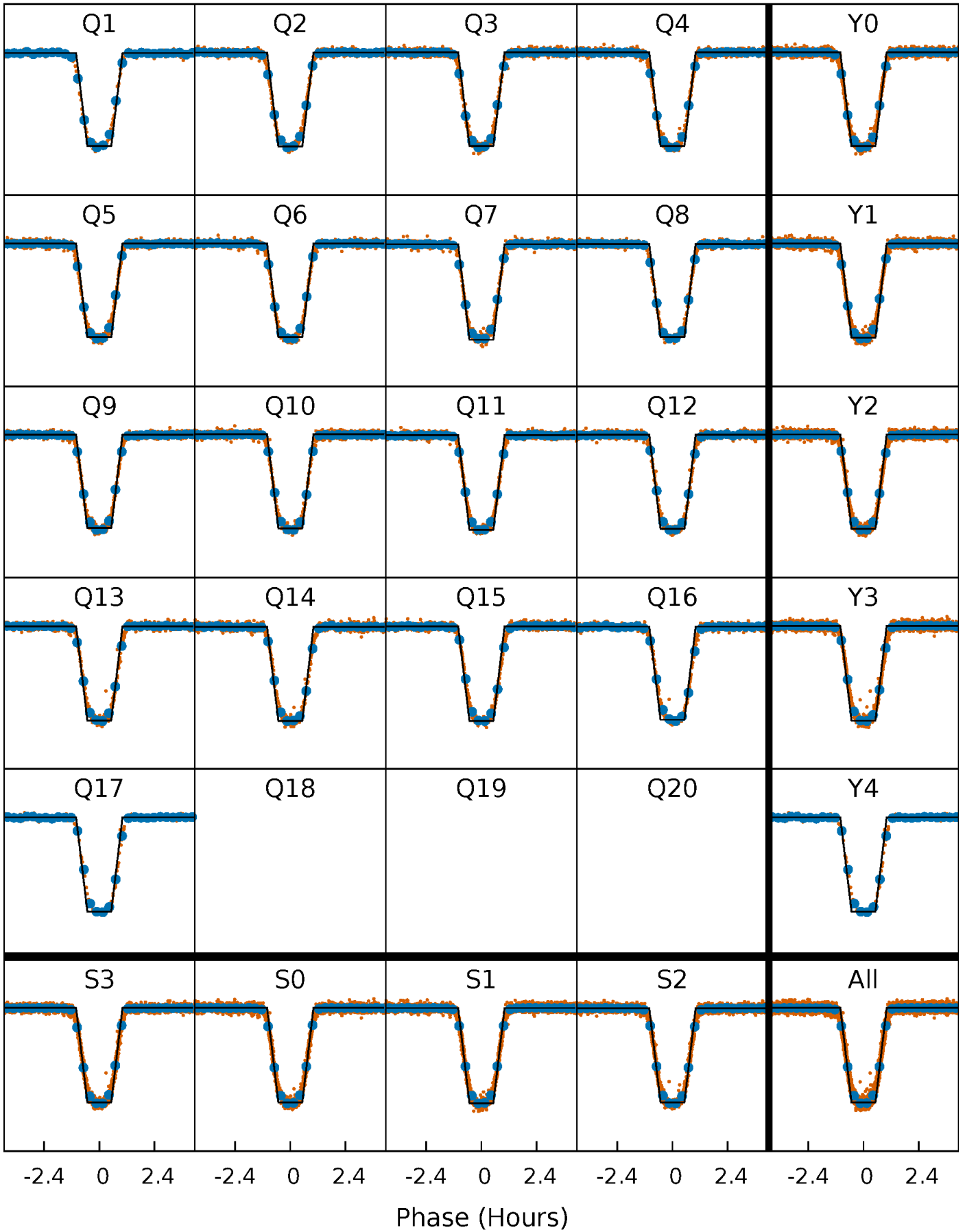
DV Quarter-Phased Transit Curves

TCE 007877496-01 P= 1.720857 Days $T_0=133.022761$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

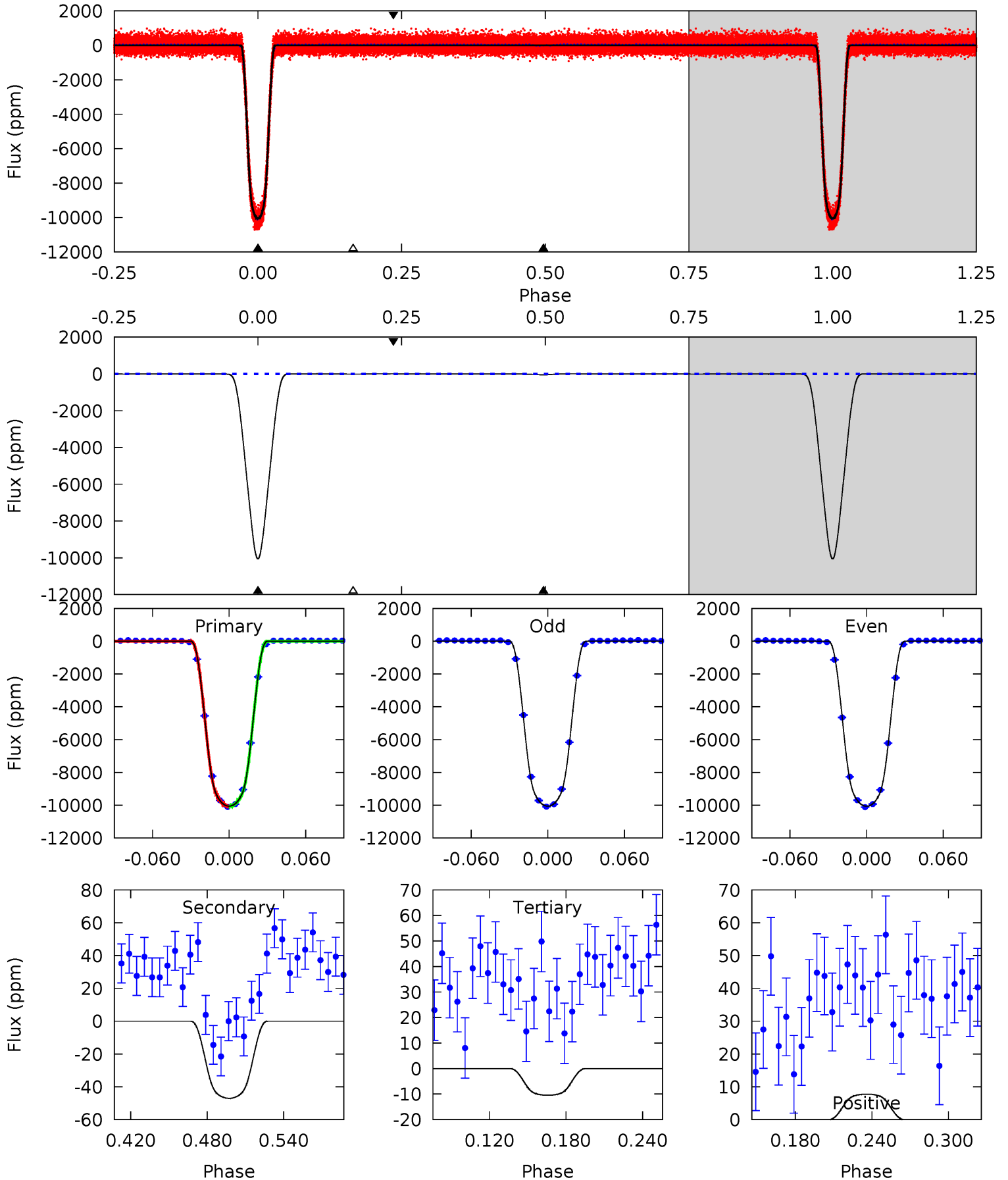
TCE 007877496-01 P= 1.720857 Days $T_0=133.022871$ (BKJD)



DV Model-Shift Uniqueness Test

007877496-01, P = 1.720857 Days, E = 131.301904 Days

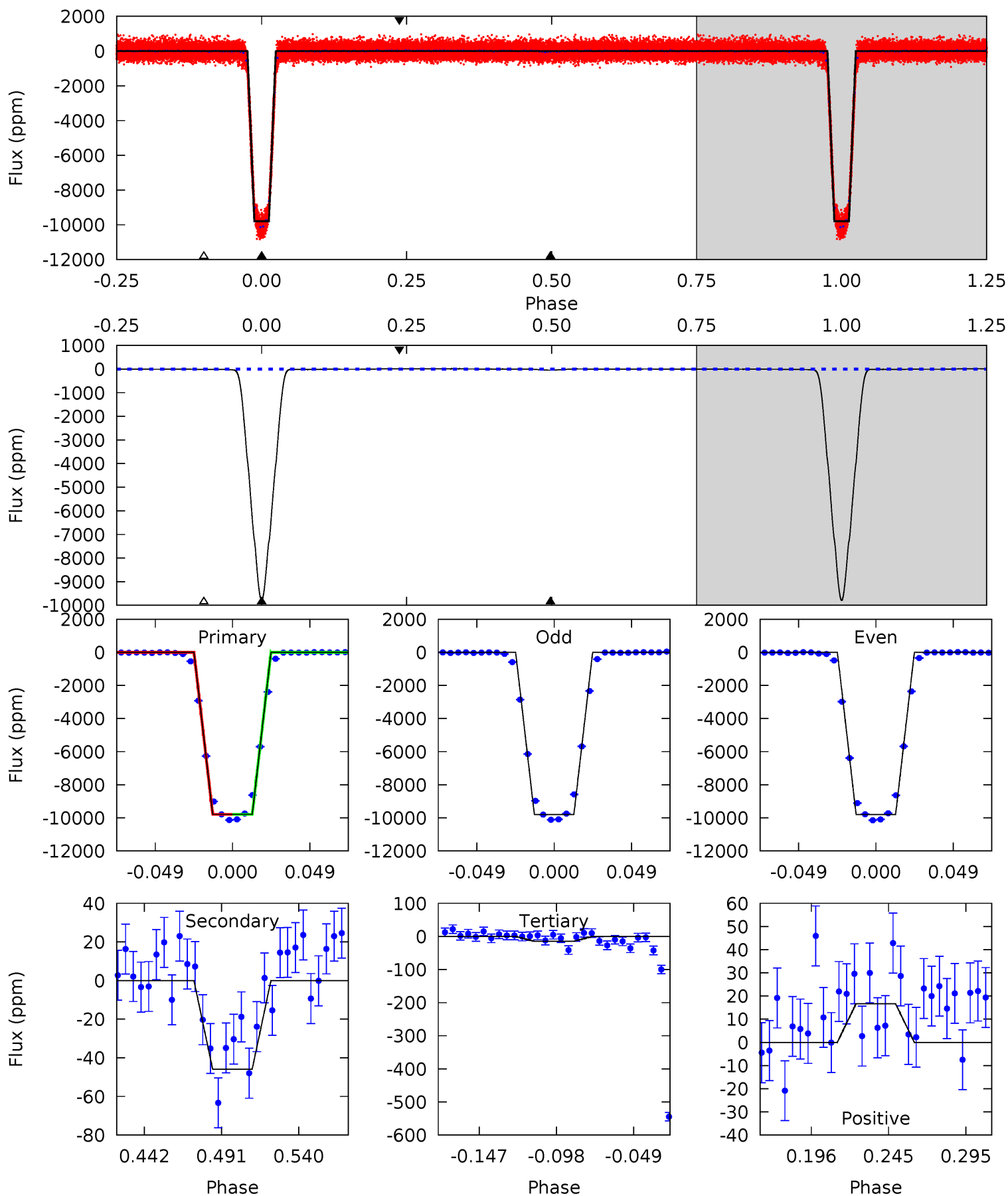
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
2691	12.6	2.80	2.08	4.67	1.88	1.10	2688	2689	9.78	10.5	0.74	1.00	0.00	1.59



Alt Model-Shift Uniqueness Test

007877496-01, P = 1.720857 Days, E = 131.302014 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
2259	10.6	3.36	3.84	4.71	1.97	2.07	2255	2255	7.23	6.75	0.43	1.00	0.00	0.12



Stellar Parameters For KIC 007877496

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	$M(M_{\odot})$	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	5742^{+115}_{-115}	$4.297^{+0.055}_{-0.045}$	$0.260^{+0.150}_{-0.150}$	$1.215^{+0.078}_{-0.096}$	$1.068^{+0.070}_{-0.078}$	$0.838^{+0.192}_{-0.120}$
	+2%/-2%	+1%/-1%	+58%/-58%	+6%/-8%	+7%/-7%	+23%/-14%
Source	SPE66	TRA66	SPE66	DSEP		

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

Secondary Eclipse Parameters for KIC 007877496-01 / KOI 0202.01

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-47 ± 4	$13.24^{+0.48}_{-0.61}$	2295^{+64}_{-58}	-2502^{+48}_{-47}	$0.122^{+0.014}_{-0.012}$
Alt.	-46 ± 4	$13.30^{+0.50}_{-0.63}$	2300^{+62}_{-63}	-2511^{+50}_{-49}	$0.118^{+0.014}_{-0.014}$

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

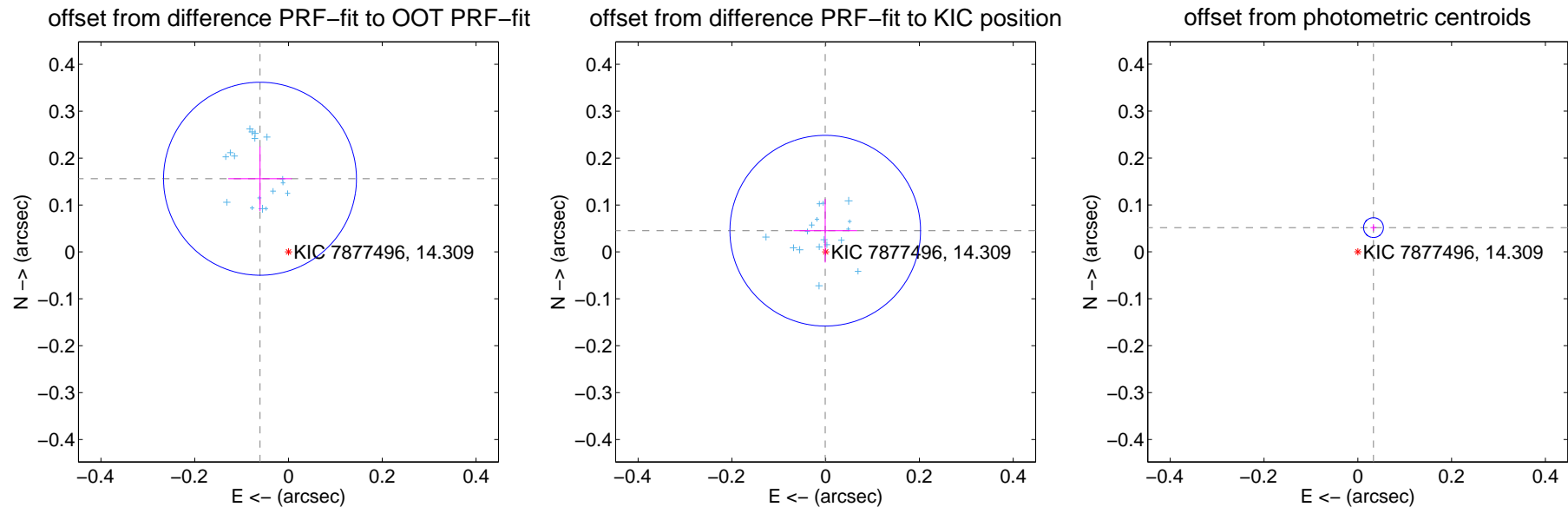
DV Centroid Data

Supplemental centroid analysis for 007877496-01. Kepler magnitude: 14.31. Transit SNR 1572.08

There are 17 quarters with good PRF difference image offsets

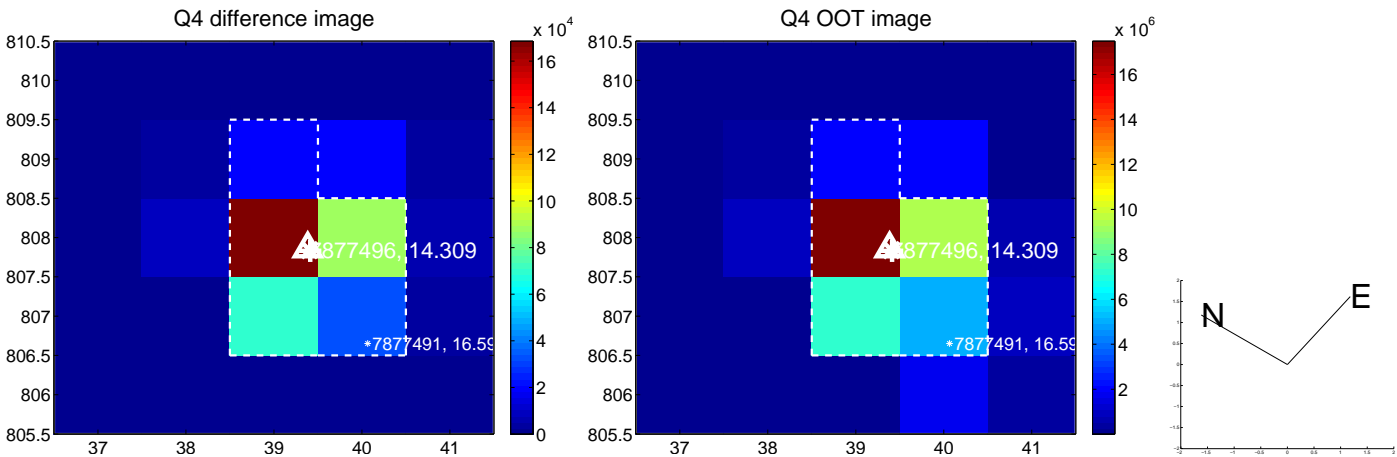
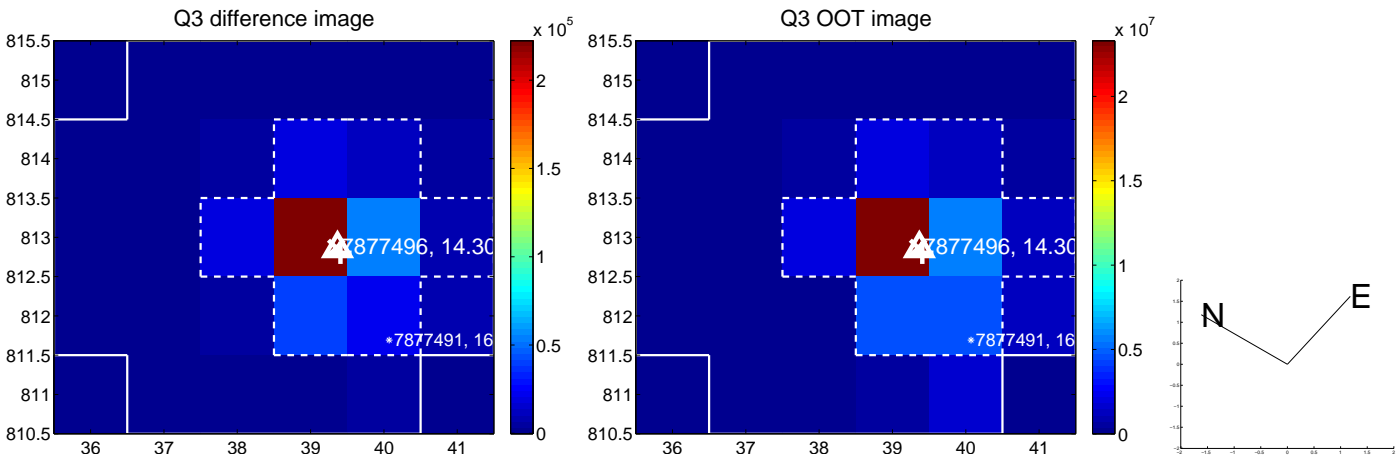
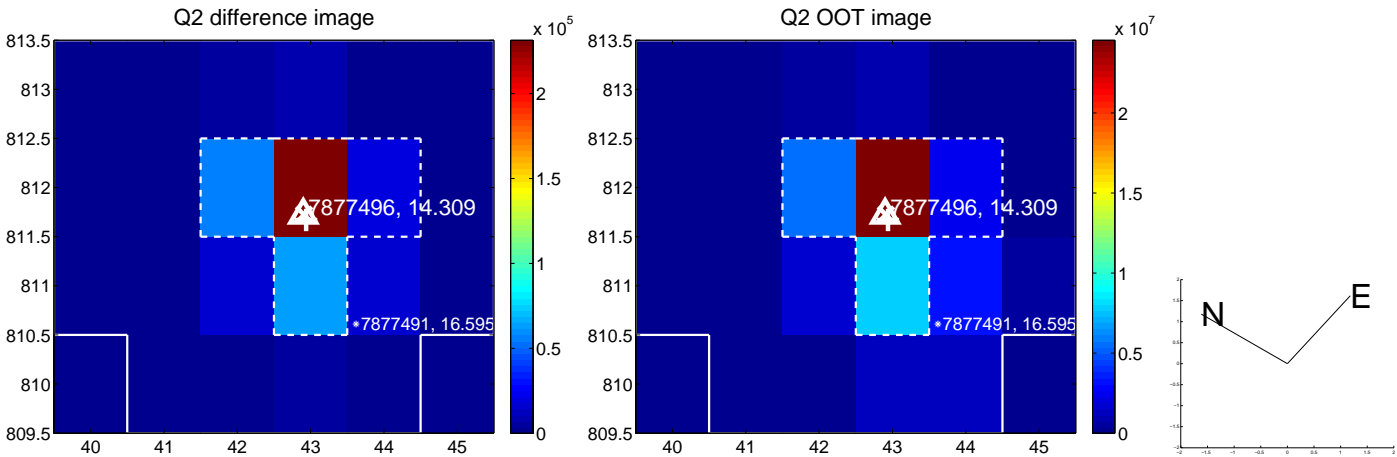
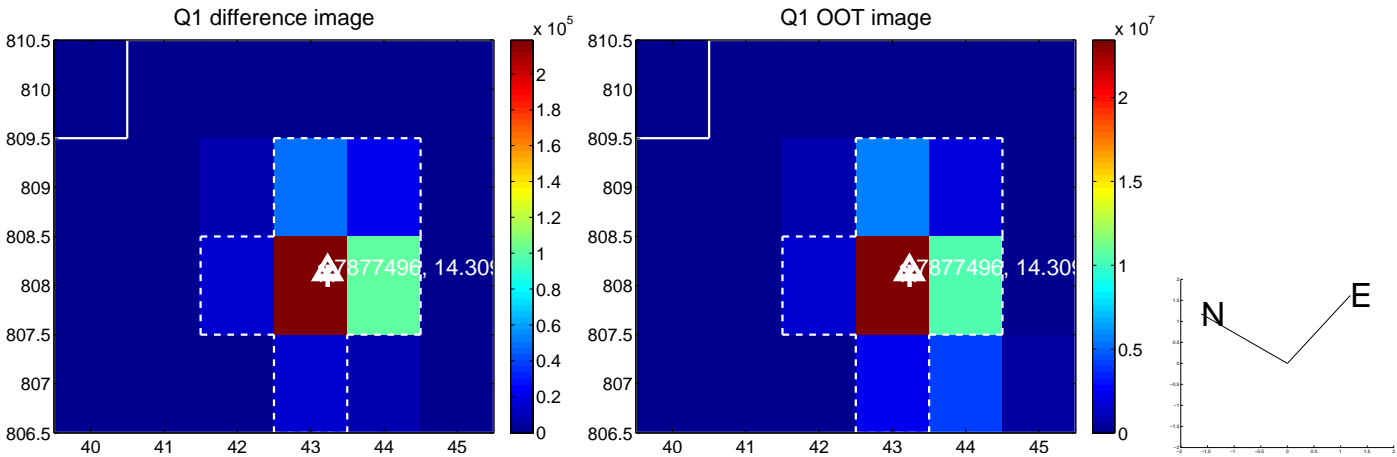
The direct PRF centroid is offset from the target star catalog position by about 0.11 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.167 ± 0.069	2.44	0.061 ± 0.068	0.156 ± 0.069
PRF-fit source offset from KIC position	0.045 ± 0.068	0.67	0.001 ± 0.068	0.045 ± 0.068
photometric centroid source offset	0.06 ± 0.01	8.74	-0.03 ± 0.01	0.05 ± 0.01

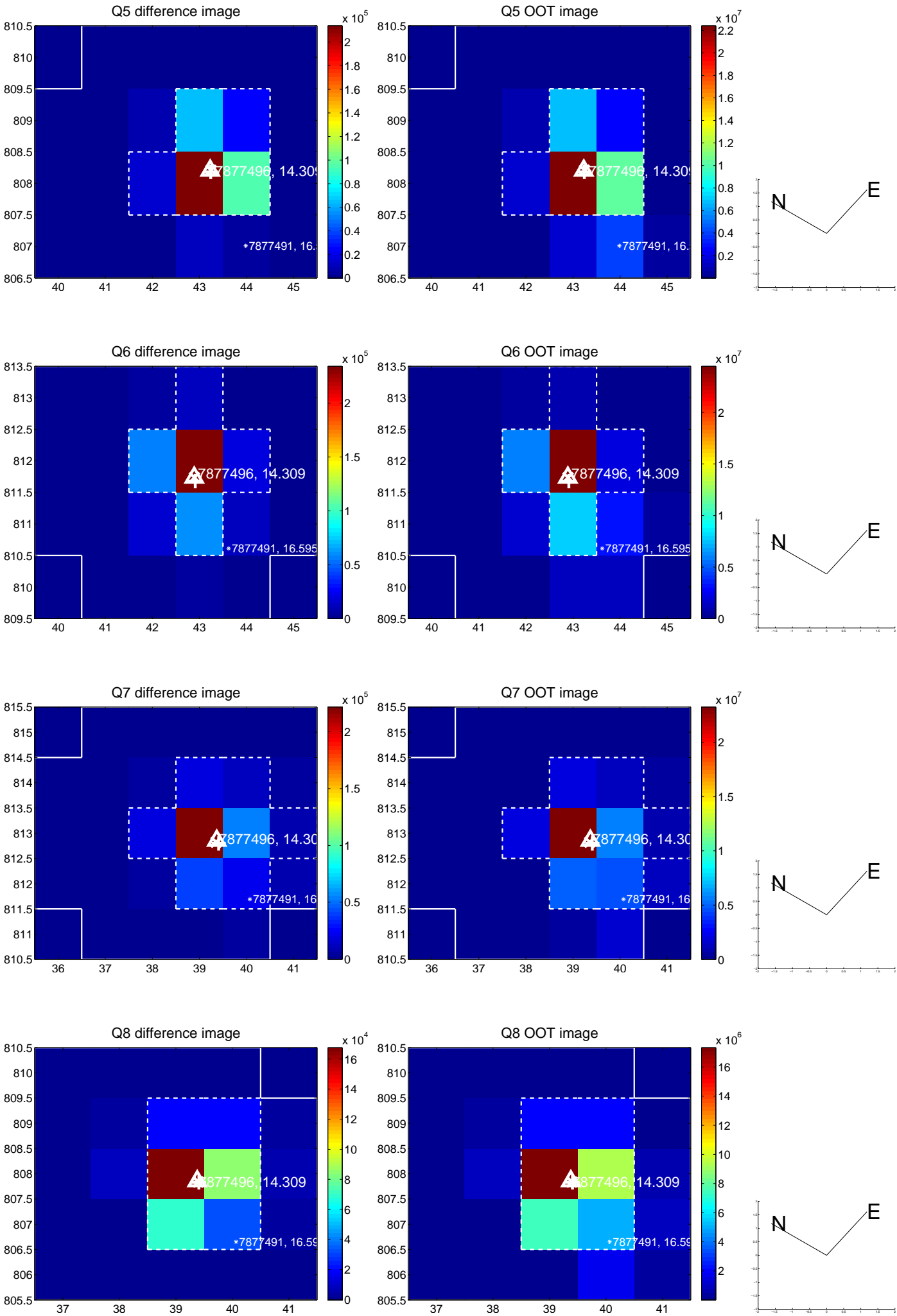


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

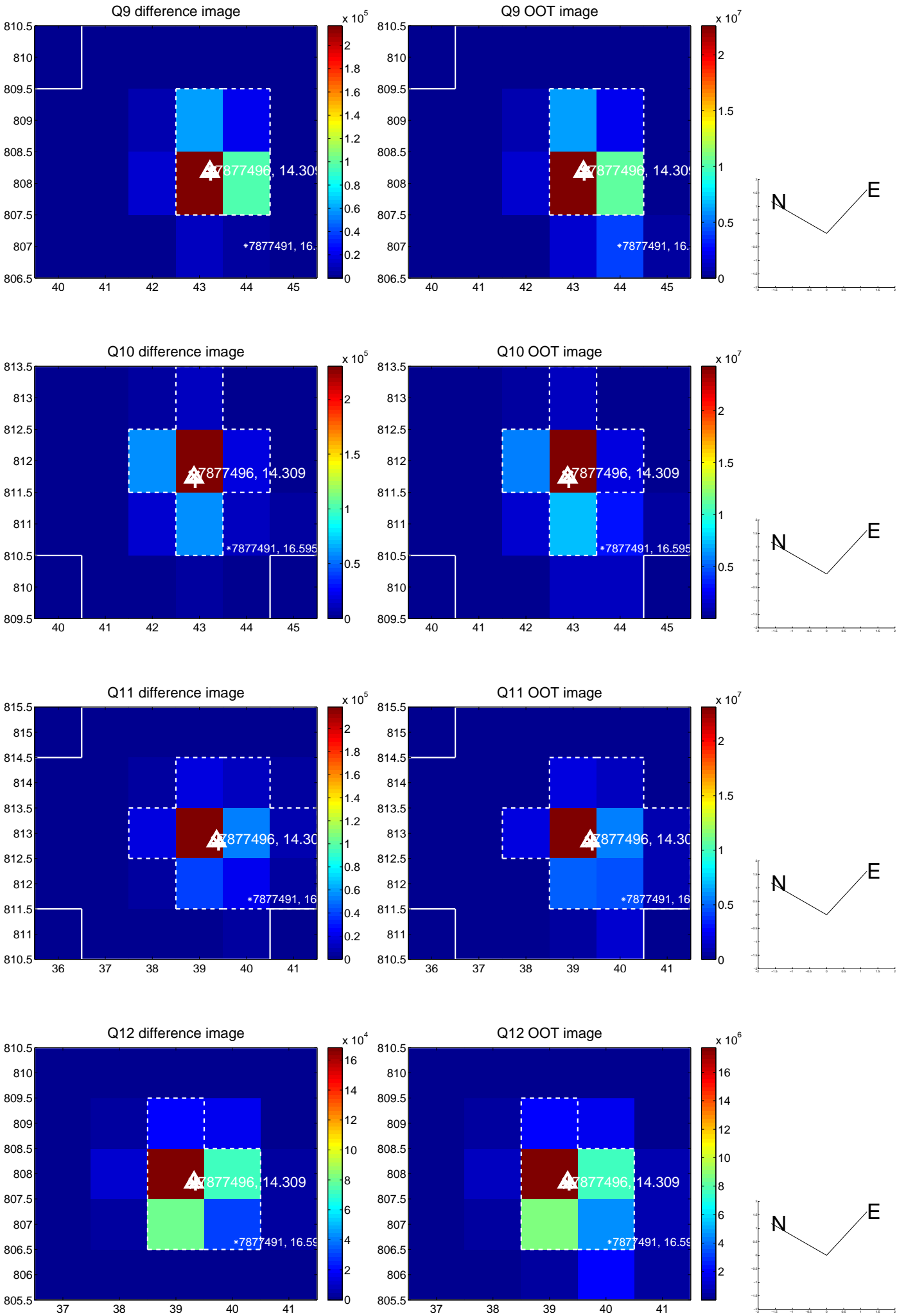
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



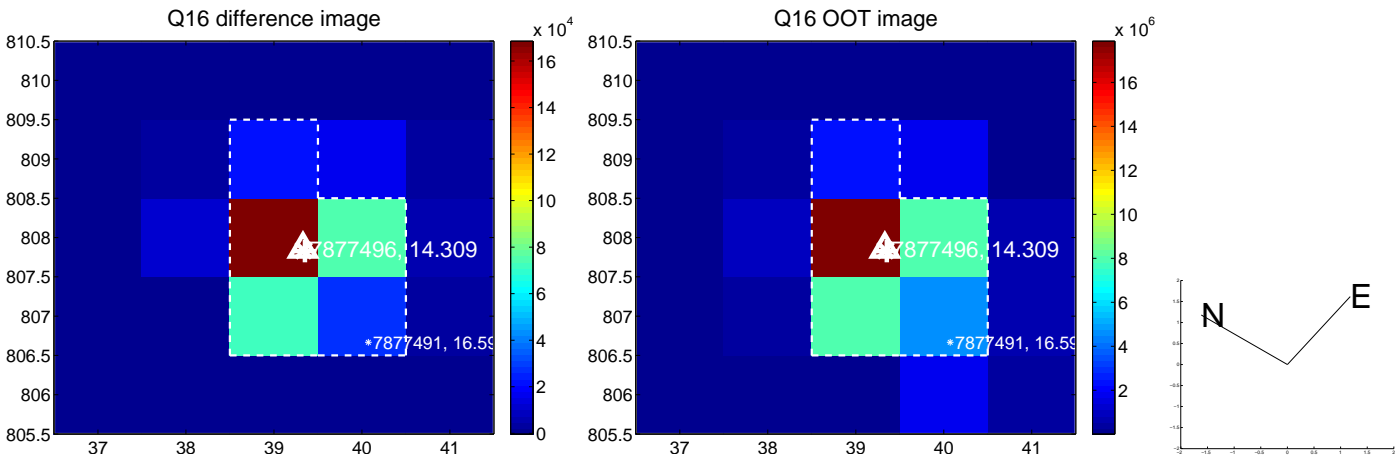
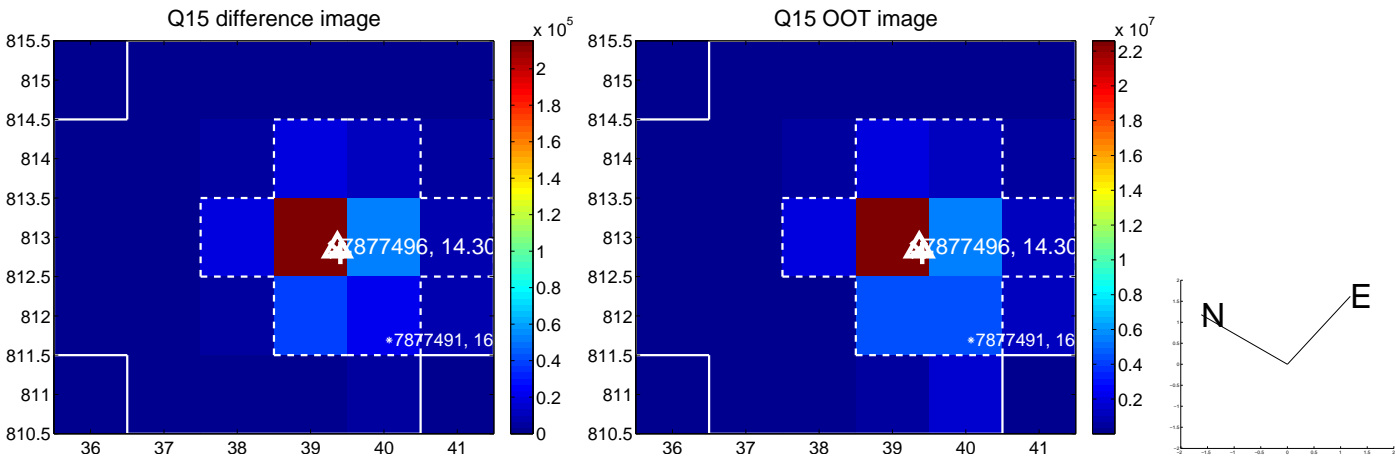
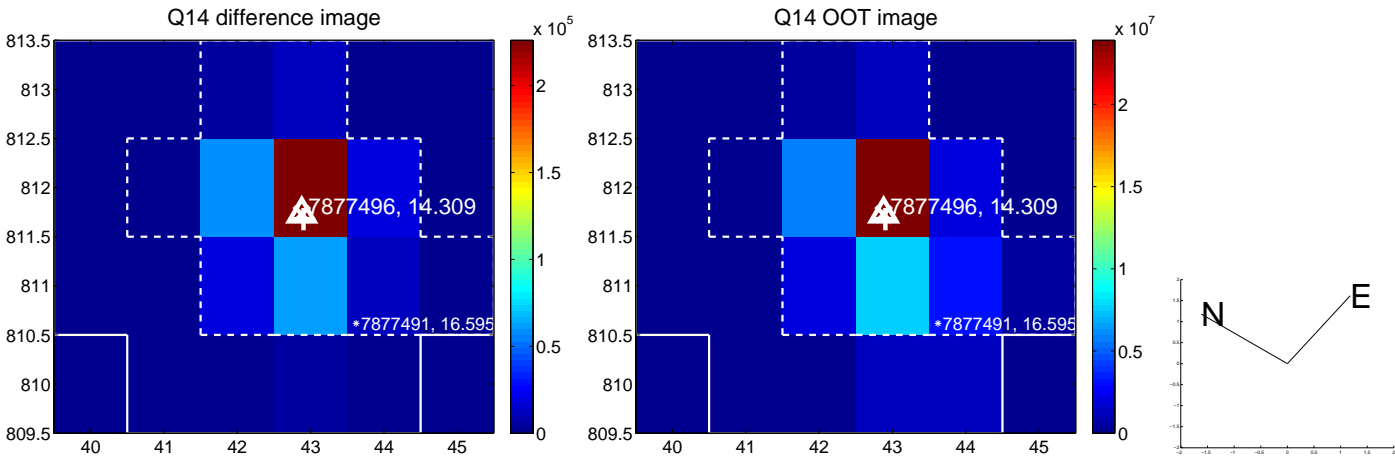
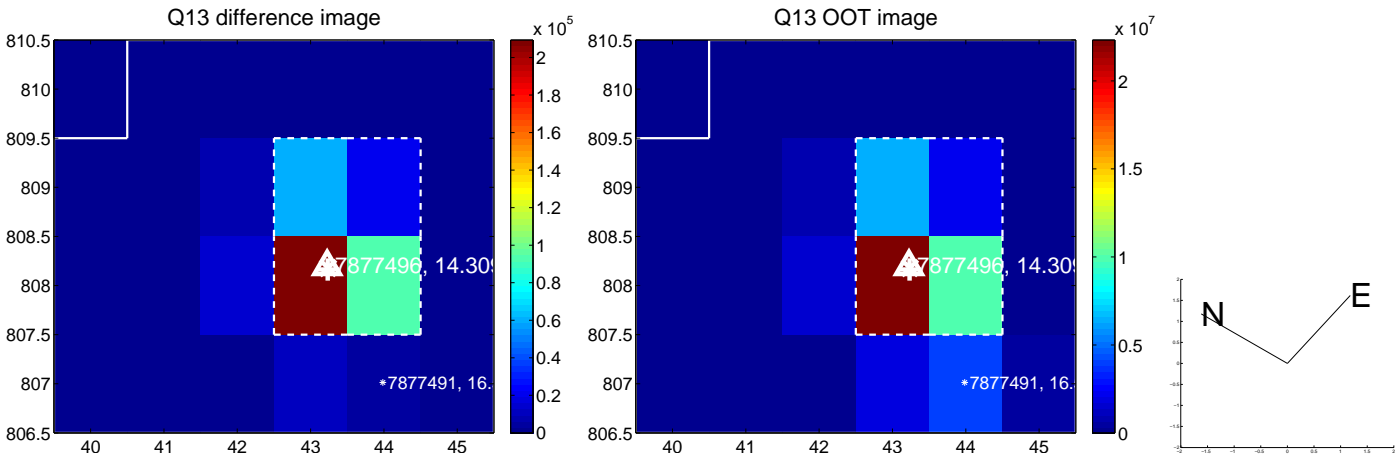
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



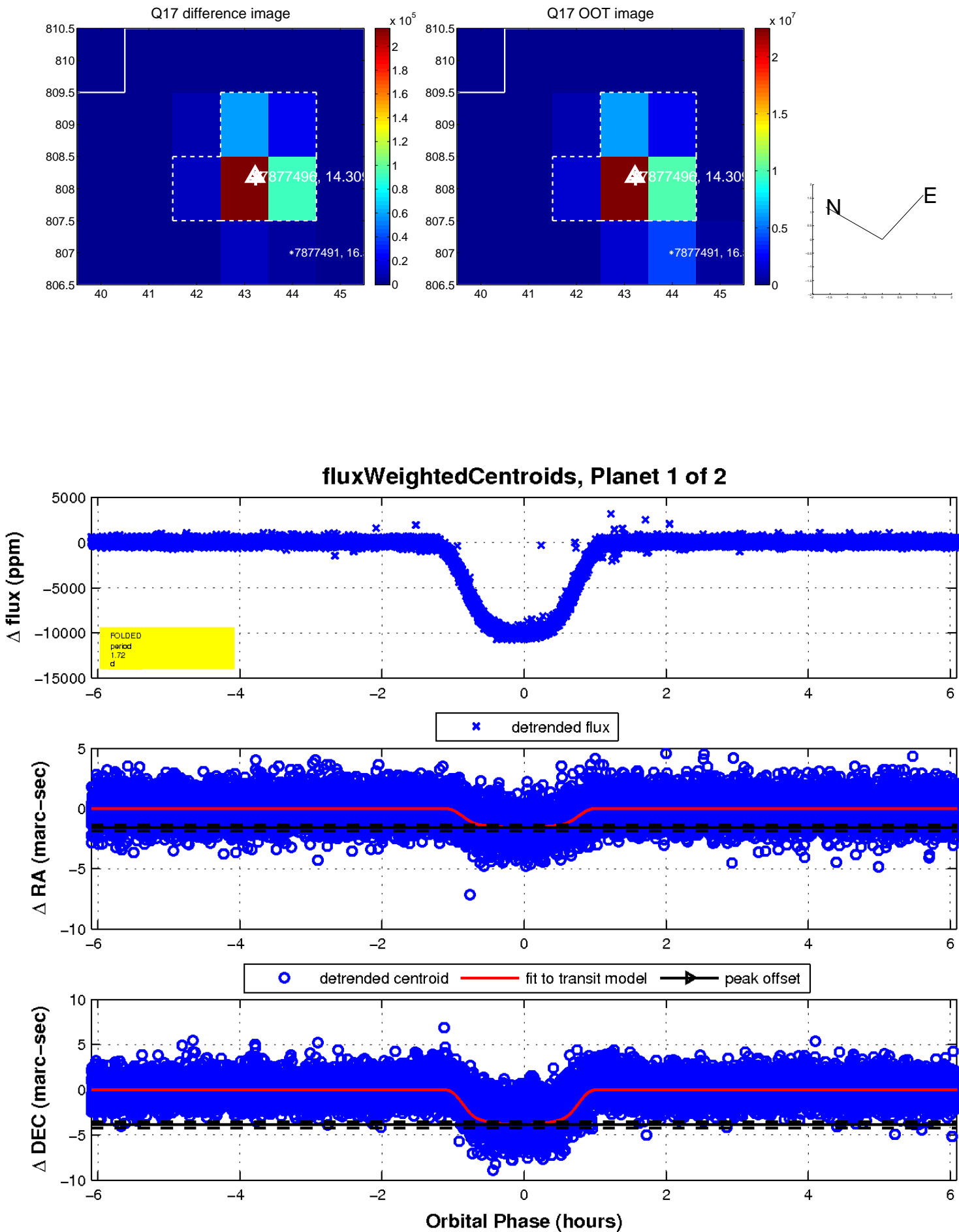
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

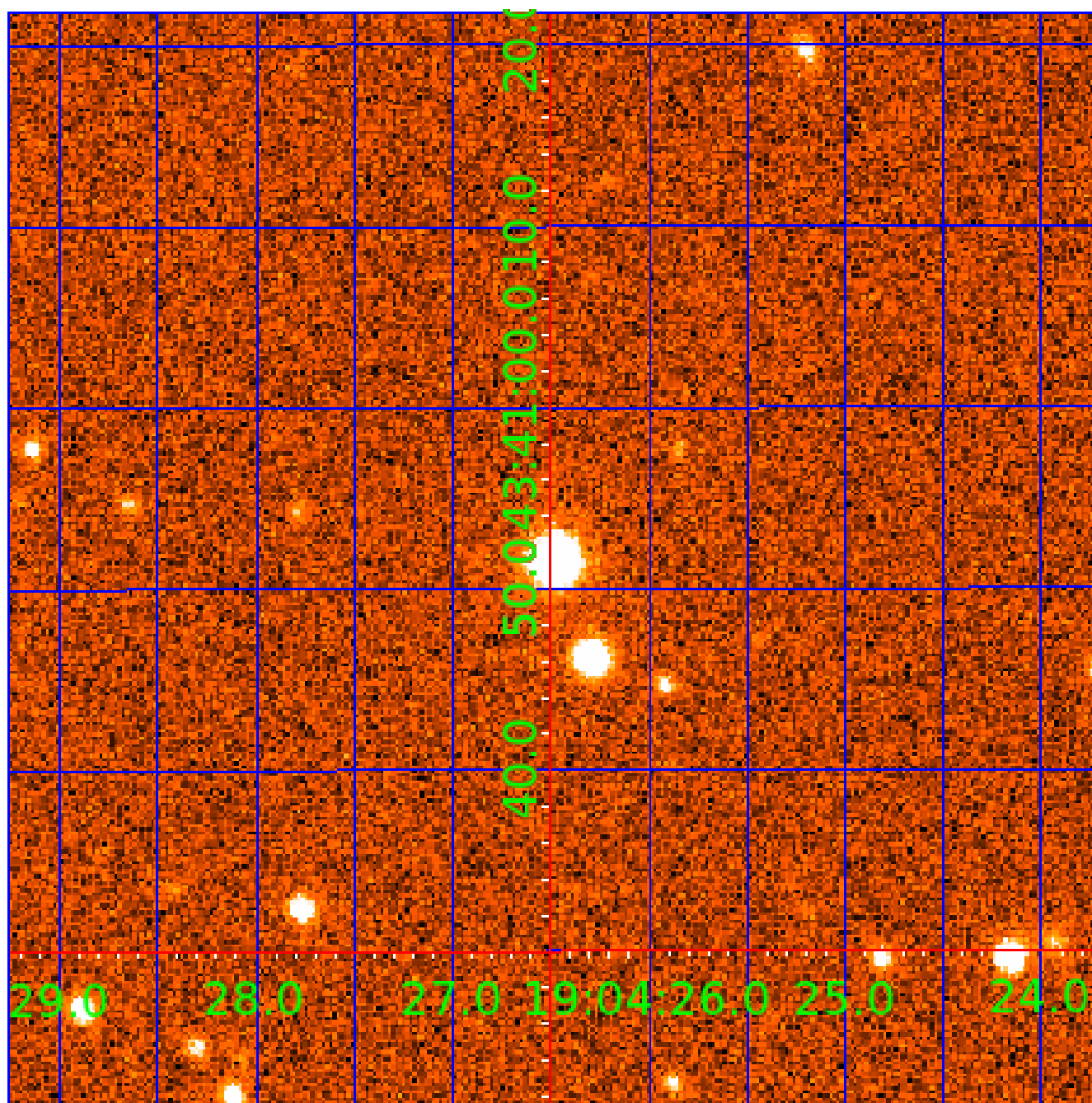


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 007877496

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})
007877496-01	OBS	0202.01	1.720857	133.022761	10092.2	2.031	1733.6	1572.1	1.22	5742	13.22	1742.63
007877496-02	OBS	No	1.720896	132.140413	51.1	1.581	8.1	8.6	1.22	5742	1.04	1742.58

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007877496-01	OBS	PC	1.00	0	1	0	0	MOD_SEC_DV—PLANET_OCCULT_DV—HAS_SEC_TCE
007877496-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE

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

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

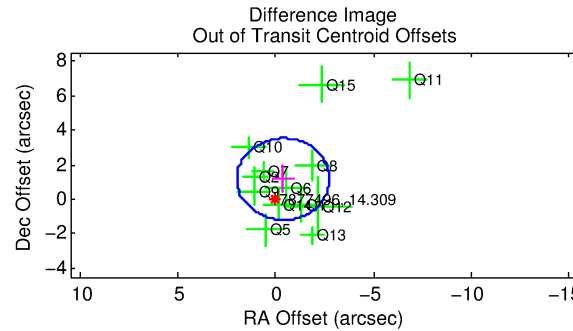
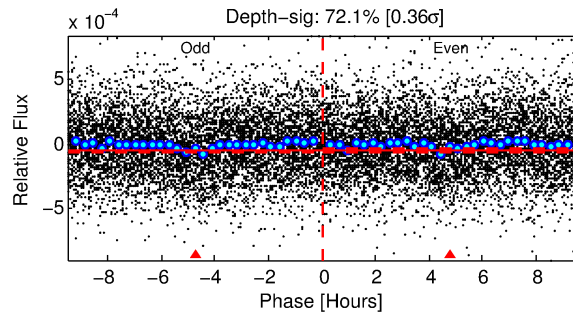
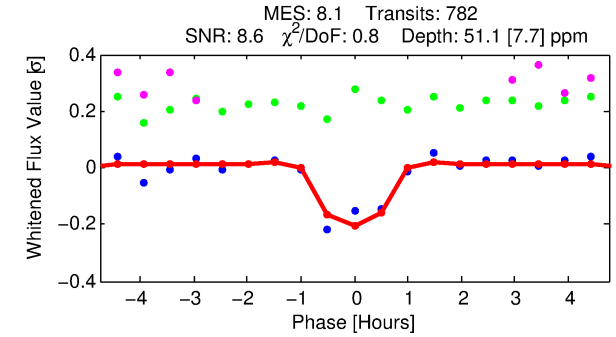
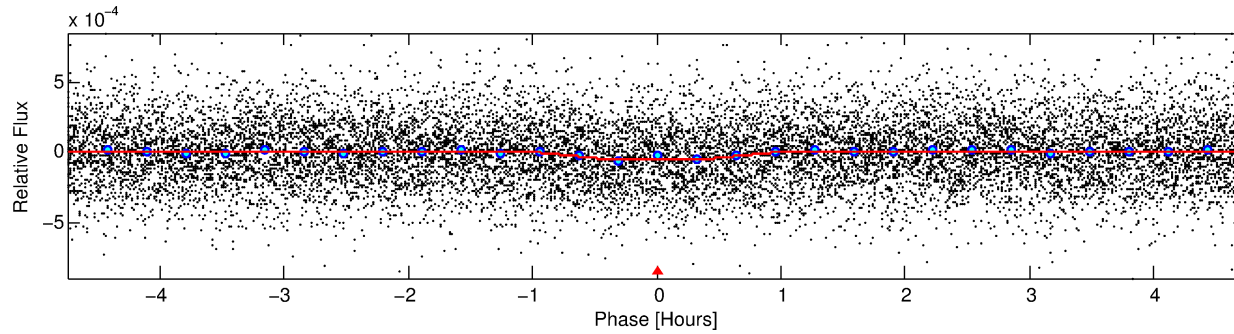
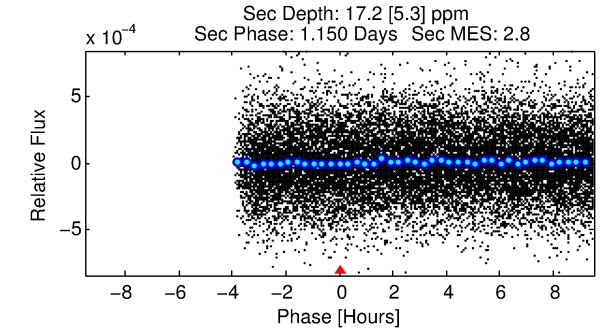
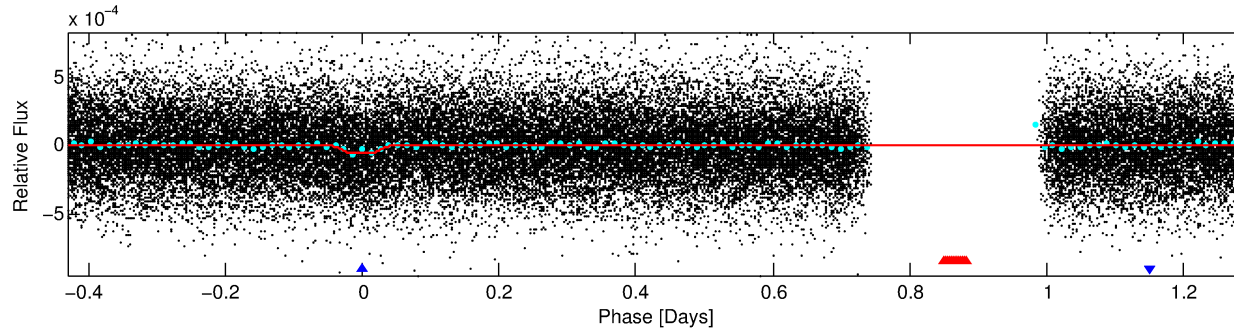
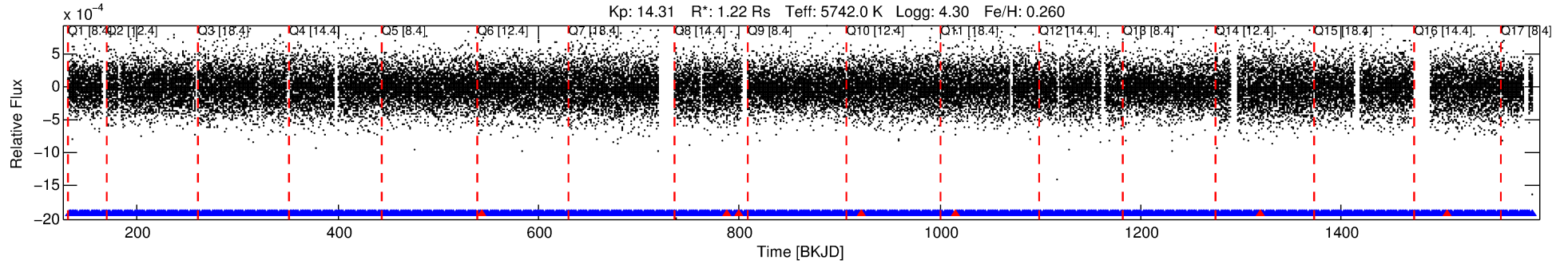
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 007877496-02

No Significant Match Found

DV One-Page Summary

KIC: 7877496 Candidate: 2 of 2 Period: 1.721 d
KOI: K00202 Name: Kepler-412 Corr: No Ephemeris Match



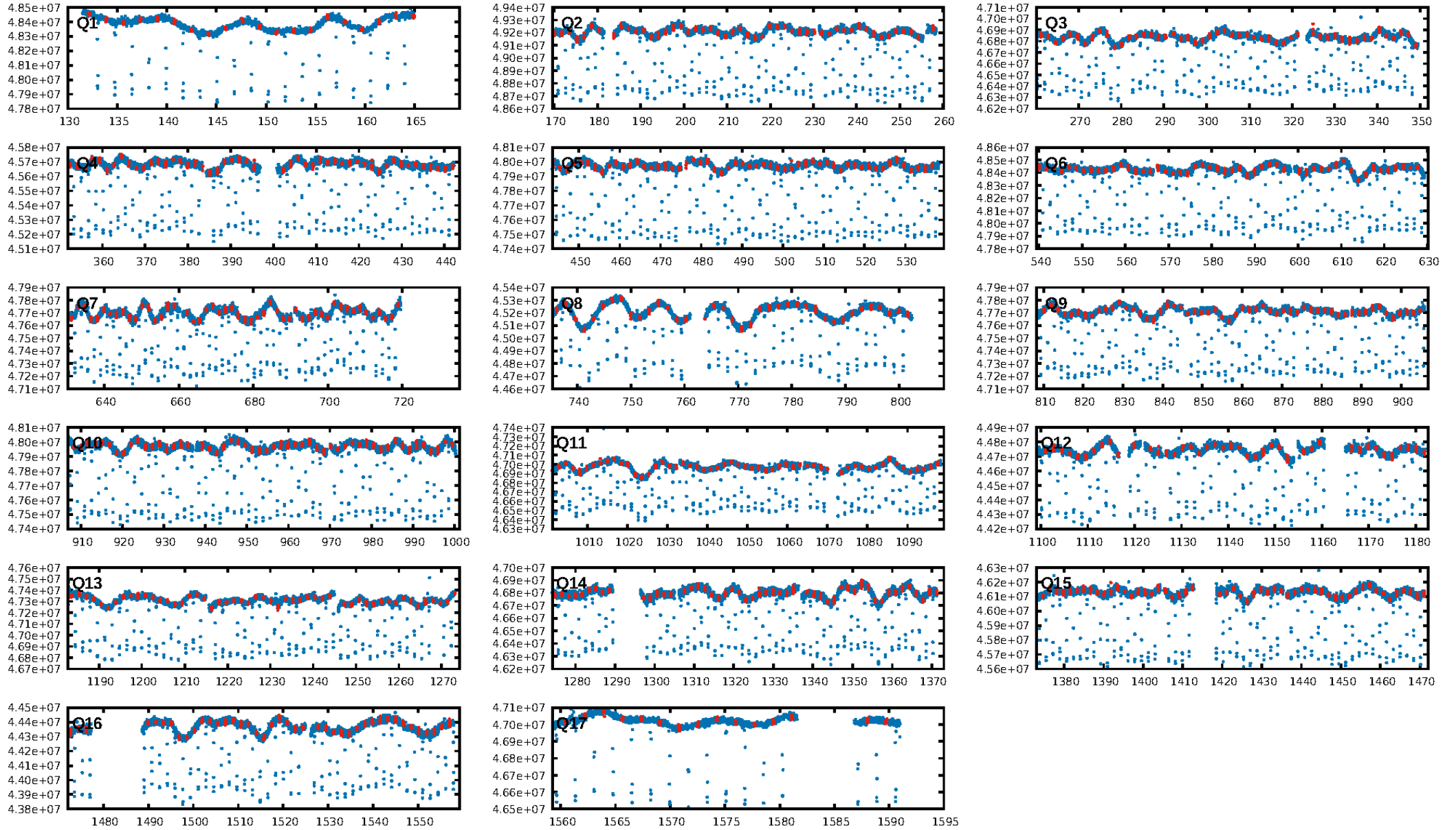
DV Fit Results:

Period = 1.72090 [0.00001] d
Epoch = 132.1404 [0.0027] BKJD
Rp/R* = 0.0079 [0.0059]
a/R* = 3.88 [12.72]
b = 0.90 [0.76]
Seff = 1742.58 [222.62]
Teff = 1647 [53] K
Rp = 1.04 [0.79] Re
a = 0.0287 [0.0019] AU
Ag = 7.22 [11.19] [0.56σ]
Teffp = 4176 [1616] K [1.56σ]

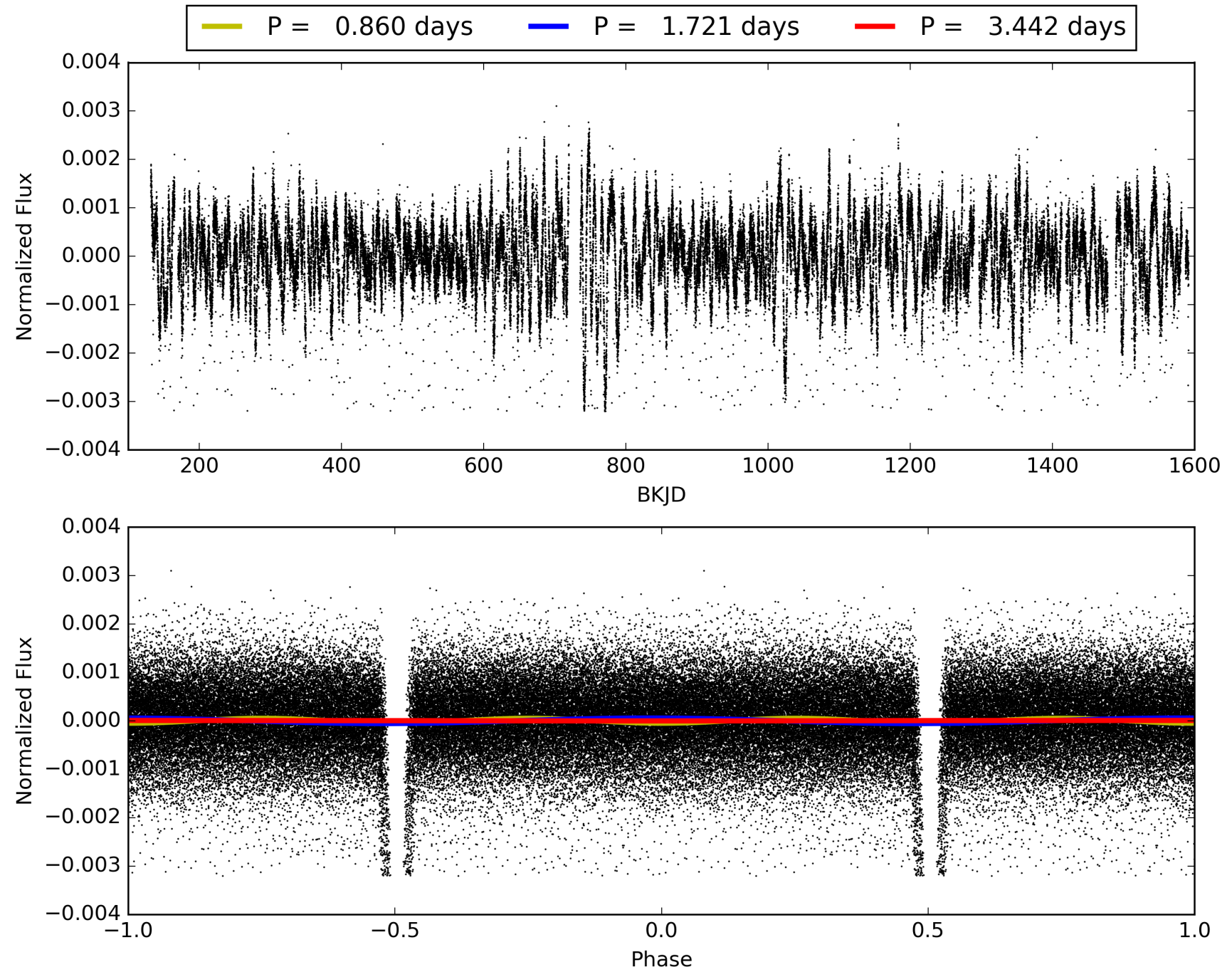
DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: 3.34e-16
RollingBand-fgt: 0.99 [740/747]
GhostDiagnostic-chr: -39.55
Centroid-sig: 50.9%
Centroid-so: 0.638 arcsec [0.47σ]
OotOffset-rm: 1.220 arcsec [1.55σ]
KicOffset-rm: 1.070 arcsec [1.29σ]
OotOffset-st: 4/3/2/4 [13]
KicOffset-st: 4/3/2/4 [13]
DiffImageQuality-fgm: 0.46 [6/13]
DiffImageOverlap-fno: 1.00 [17/17]

TCE 007877496-02, PDC Light Curves

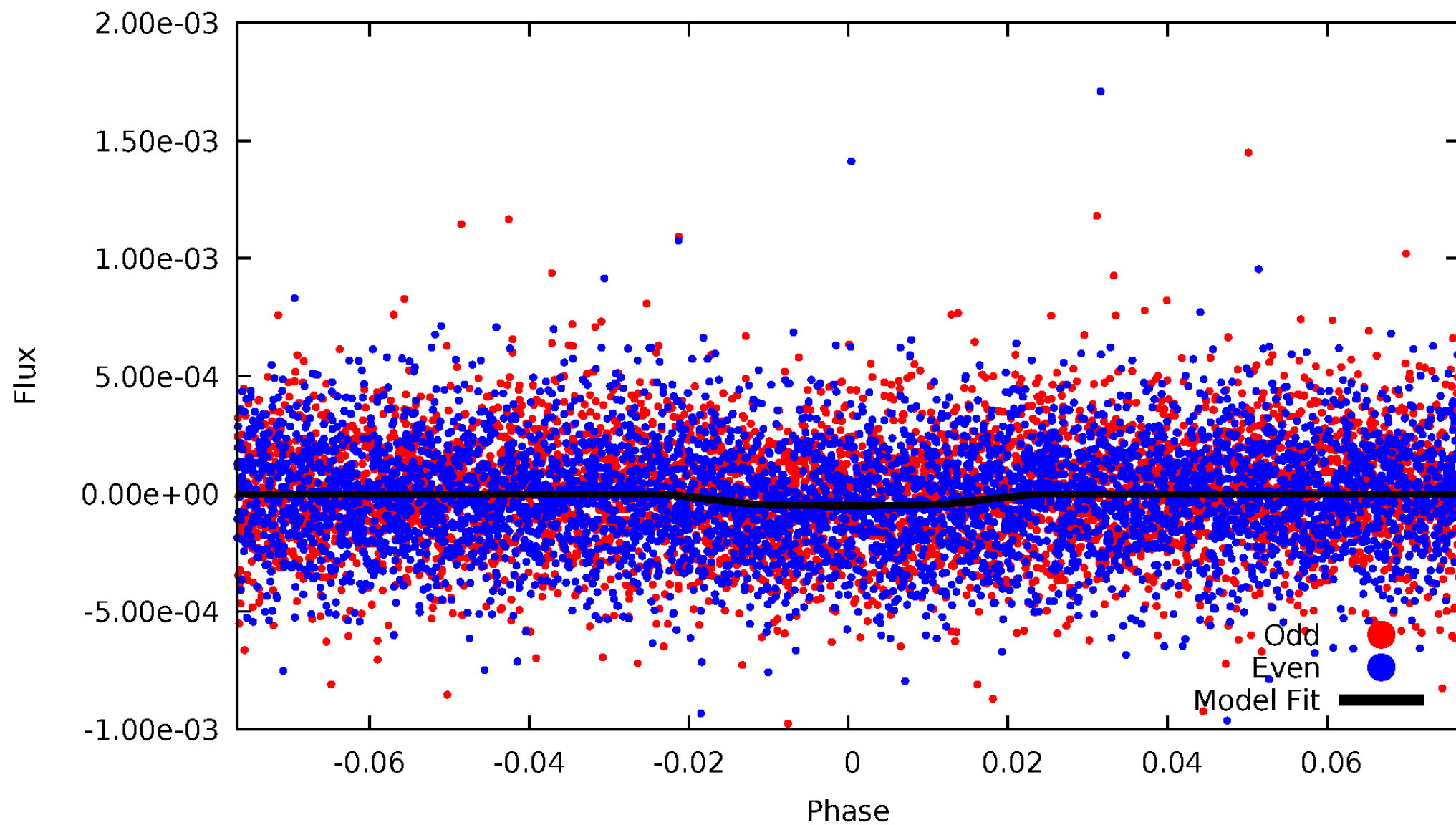


TCE 007877496-02



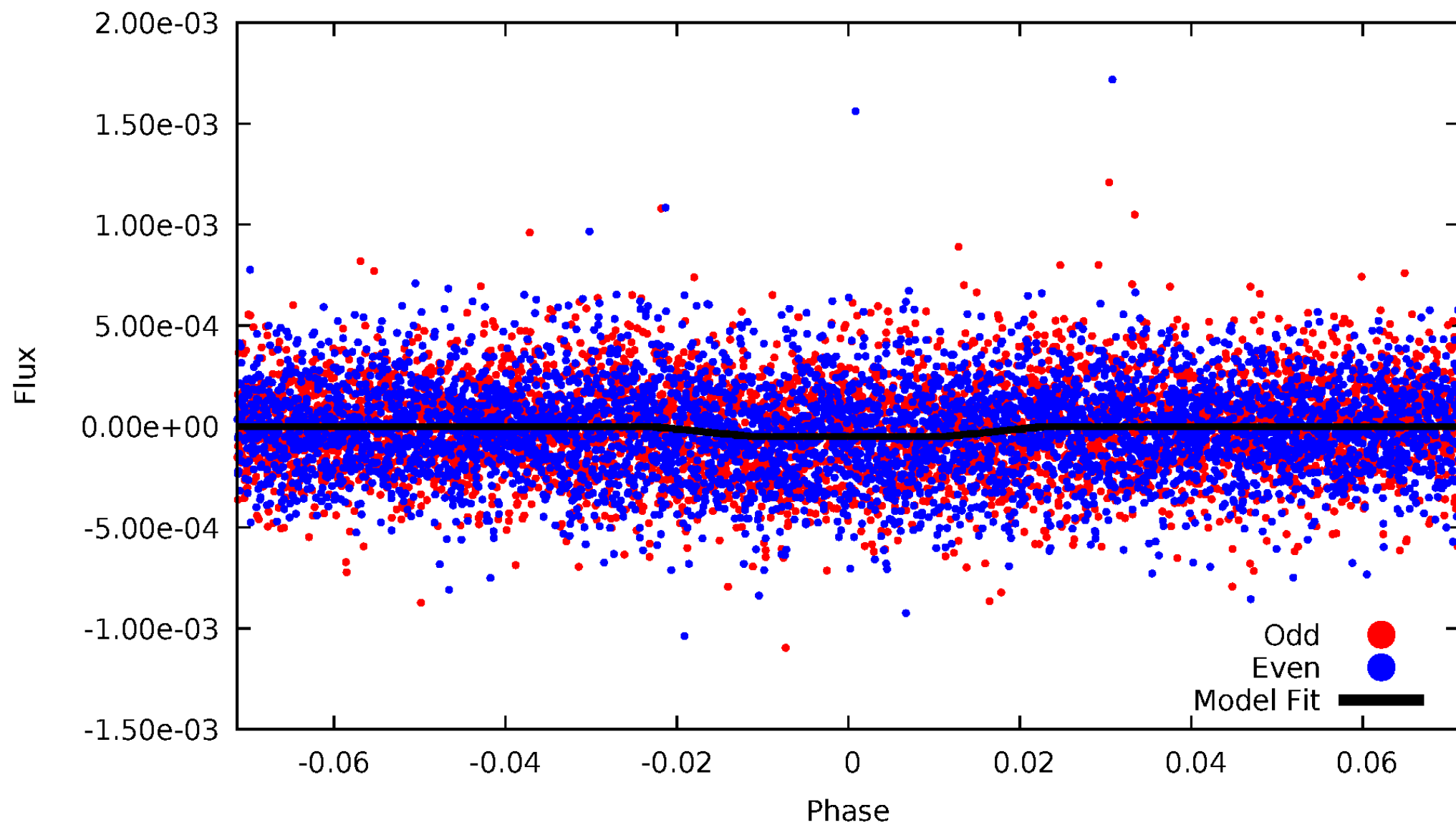
DV Odd/Even

TCE 007877496-02



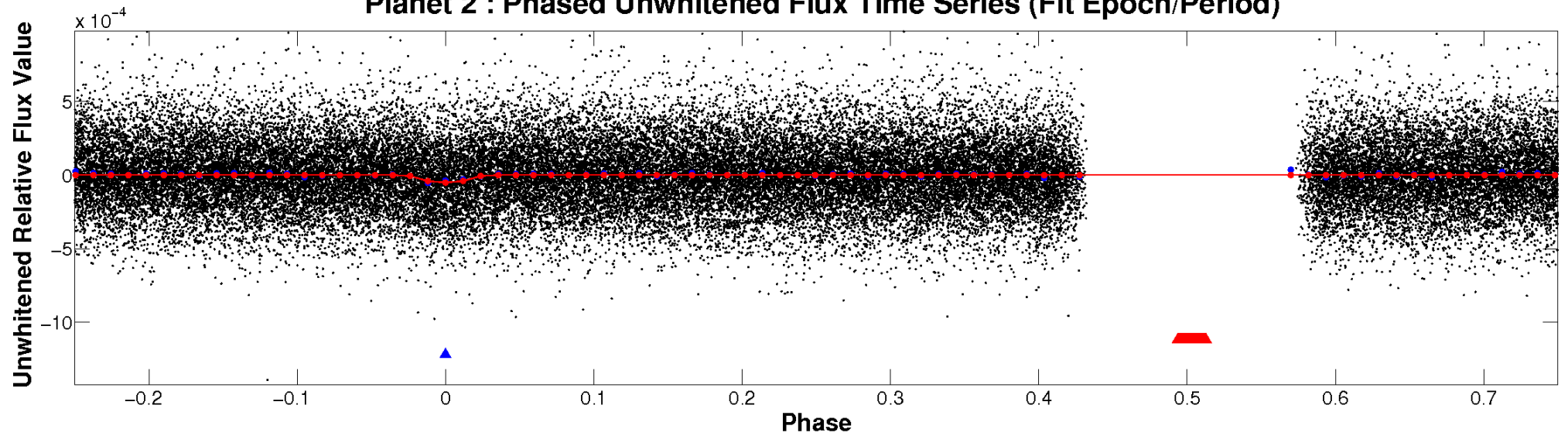
ALT Odd/Even

TCE 007877496-02

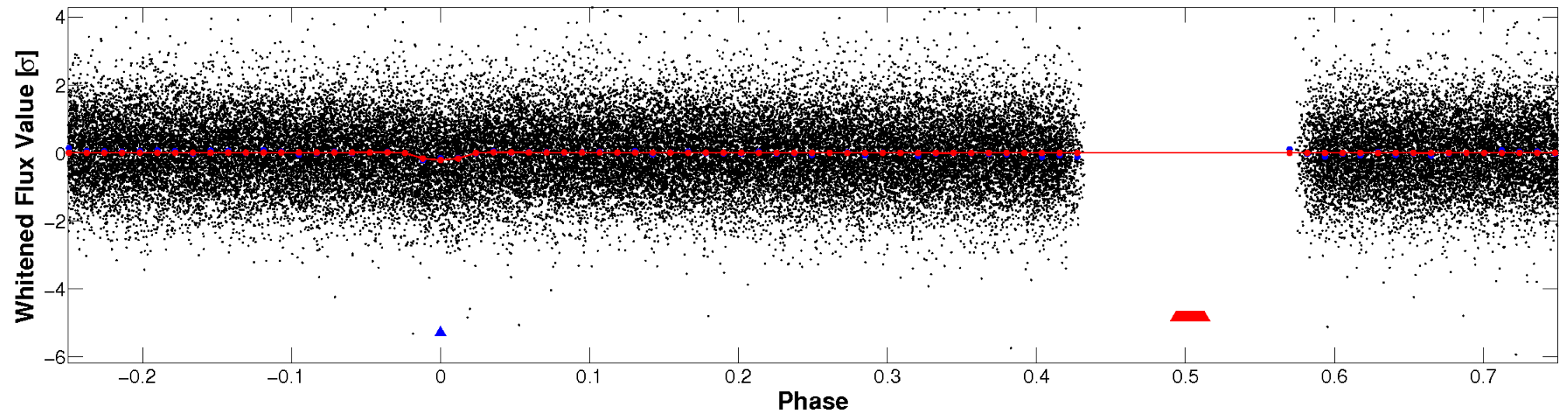


Non-Whitened Vs. Whitened Light Curve

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

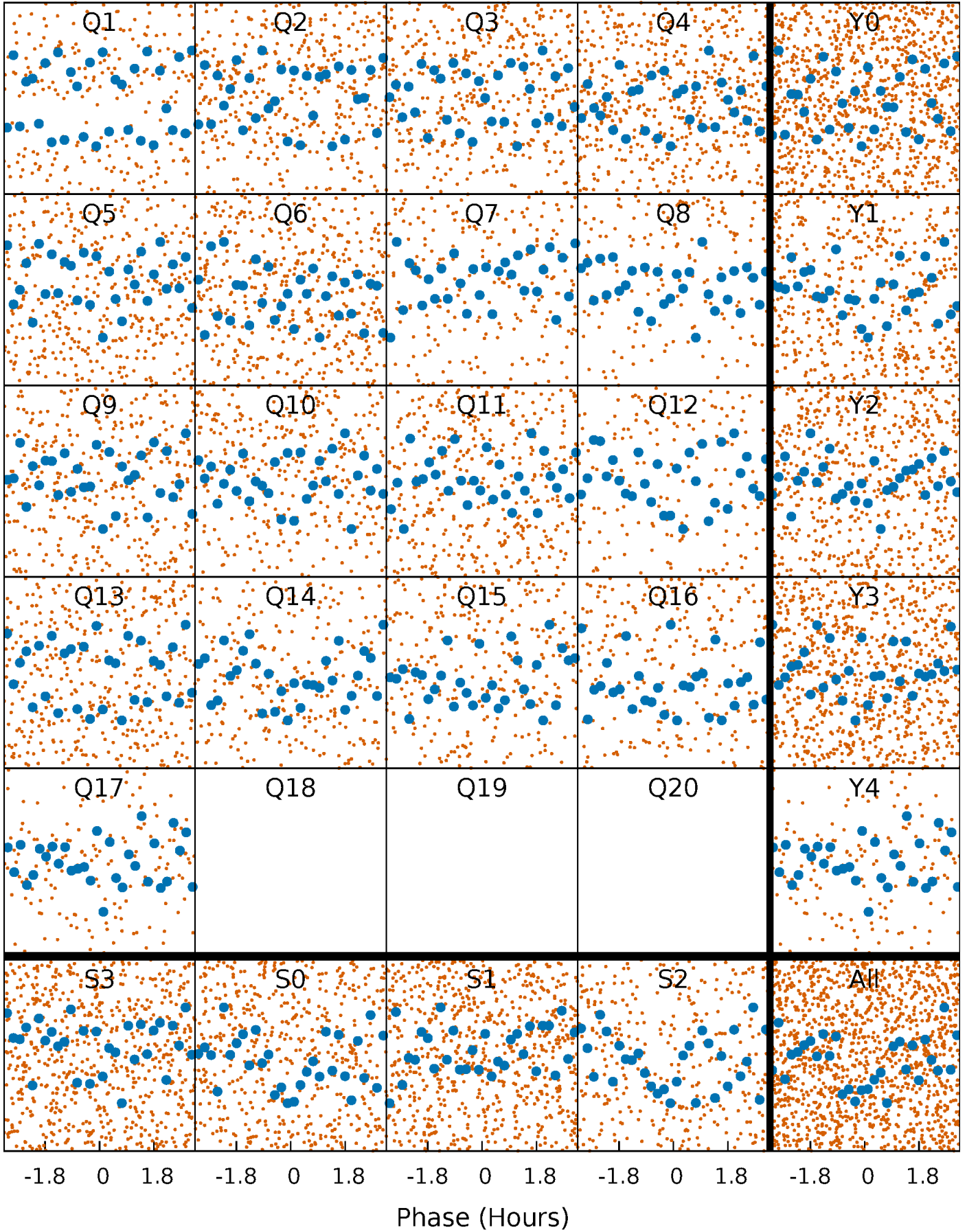


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



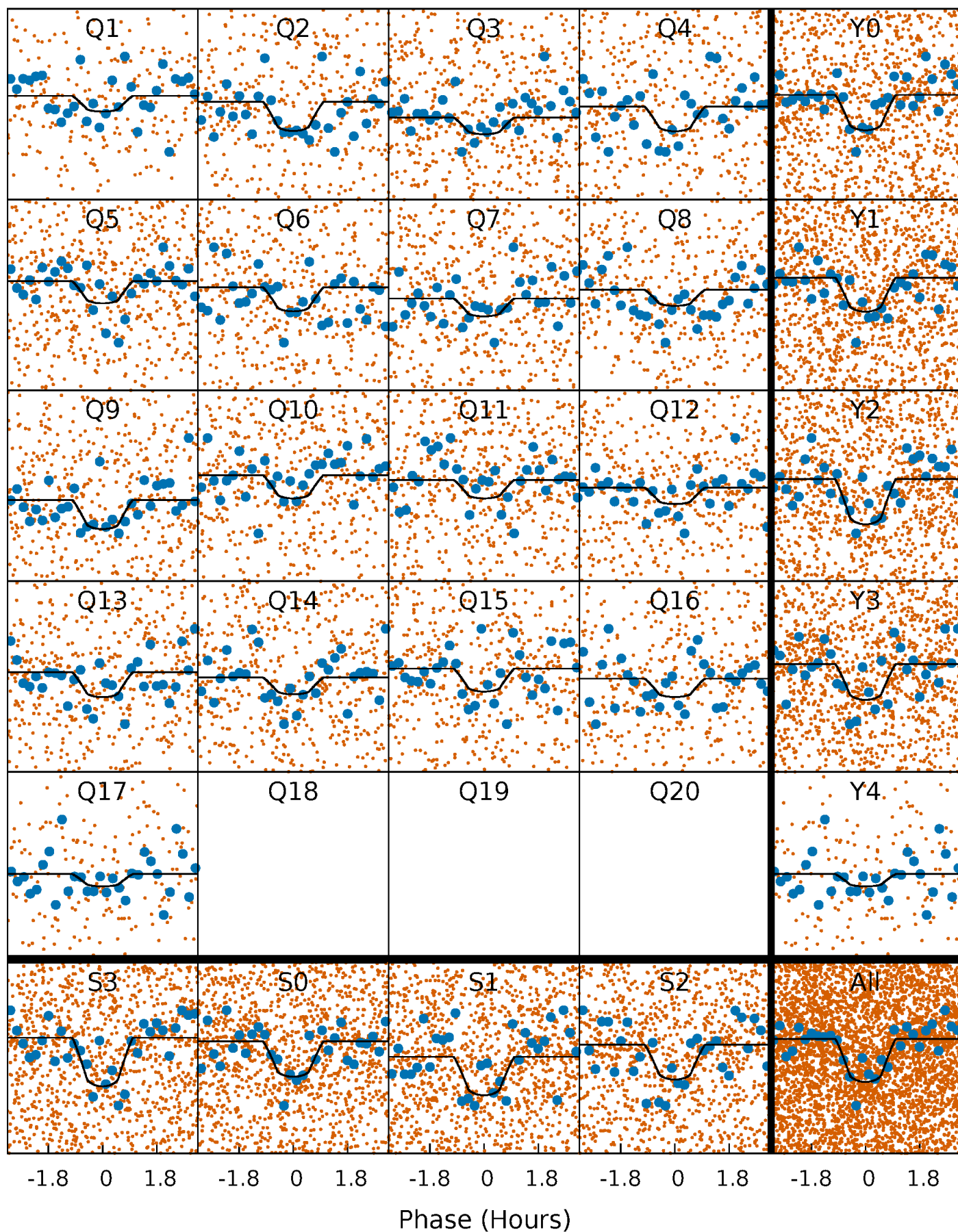
PDC Quarter-Phased Transit Curves

TCE 007877496-02 P= 1.720896 Days $T_0=132.140413$ (BKJD)



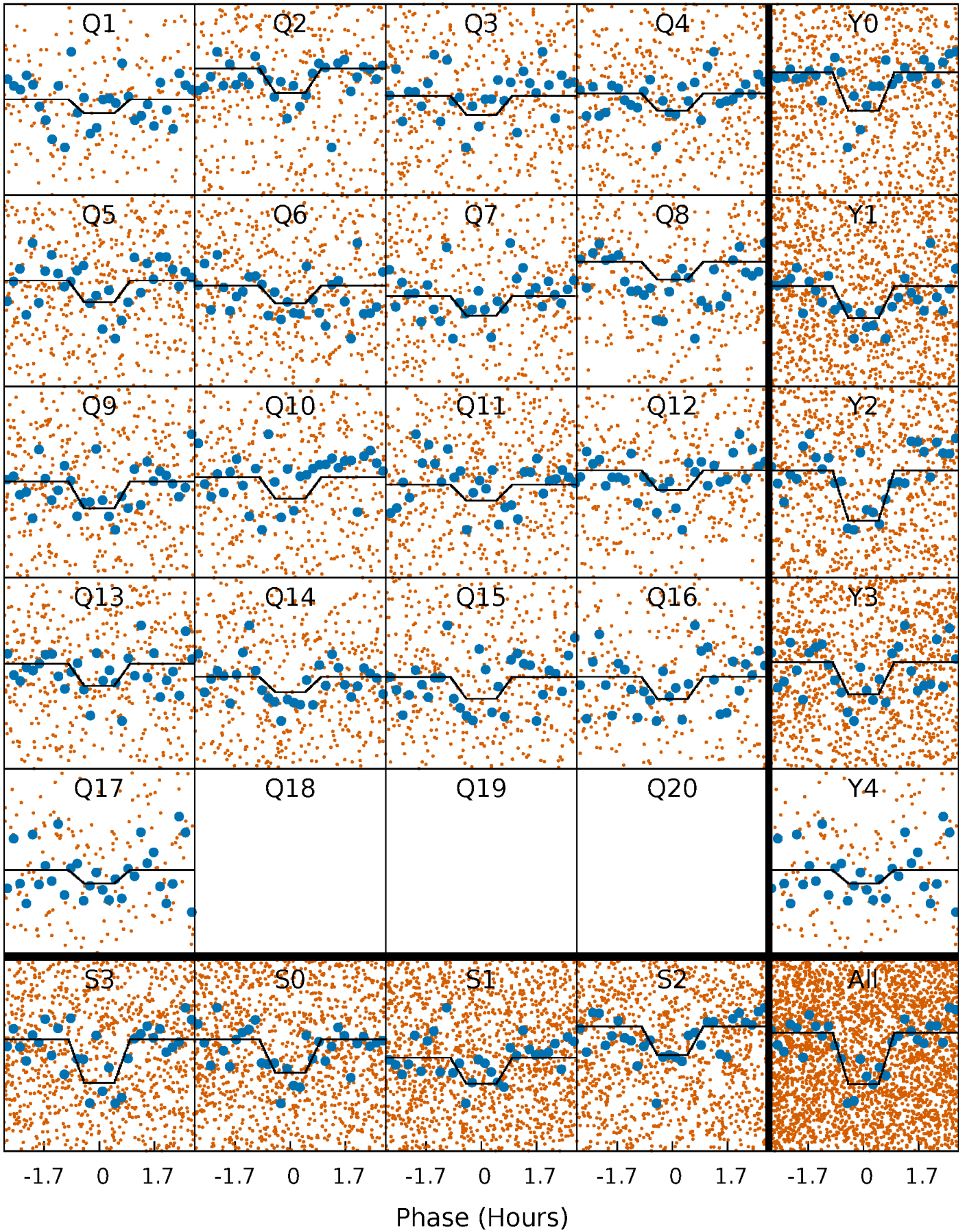
DV Quarter-Phased Transit Curves

TCE 007877496-02 P= 1.720896 Days $T_0=132.140413$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

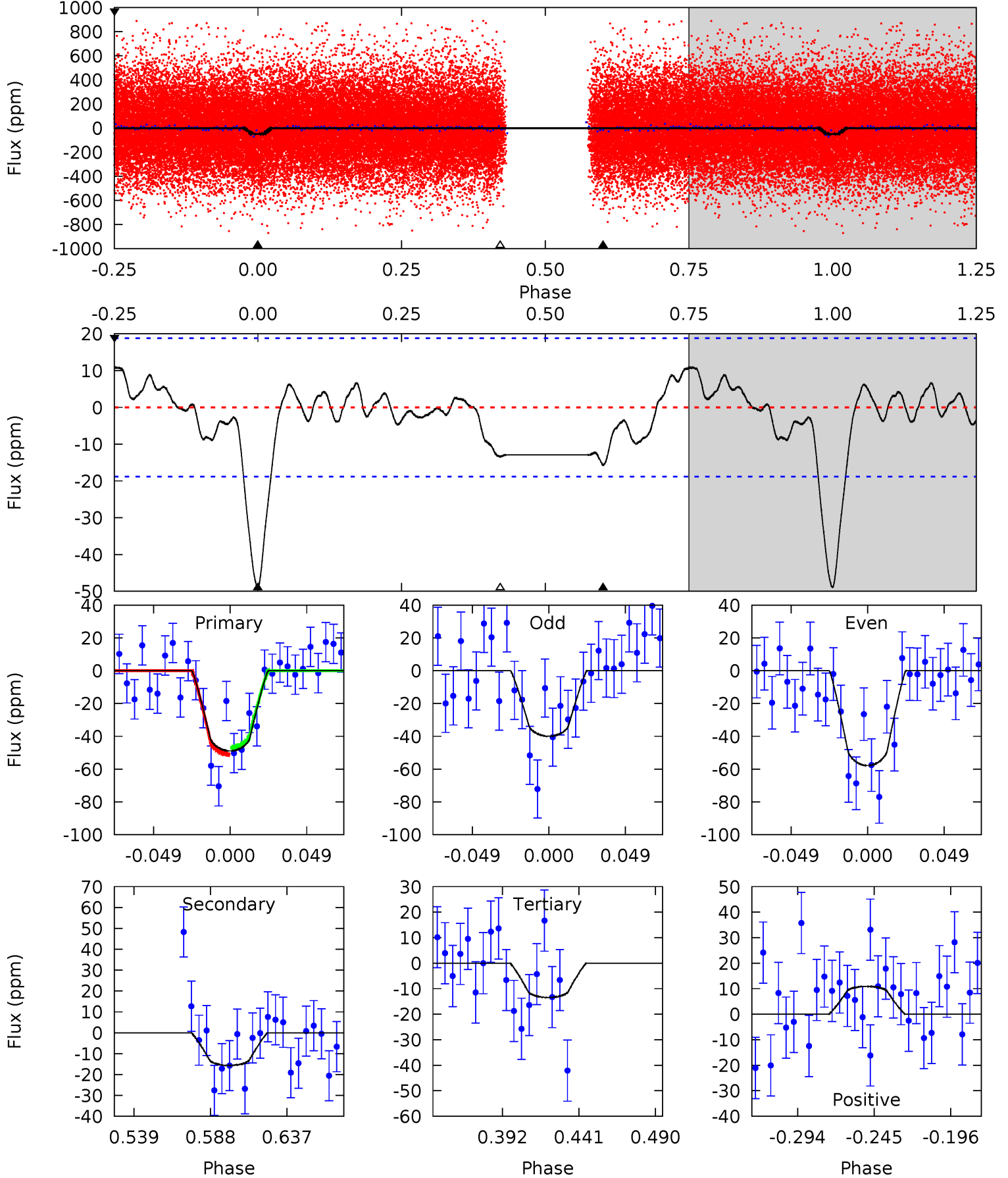
TCE 007877496-02 P= 1.720892 Days $T_0=132.142208$ (BKJD)



DV Model-Shift Uniqueness Test

007877496-02, P = 1.720896 Days, E = 130.419517 Days

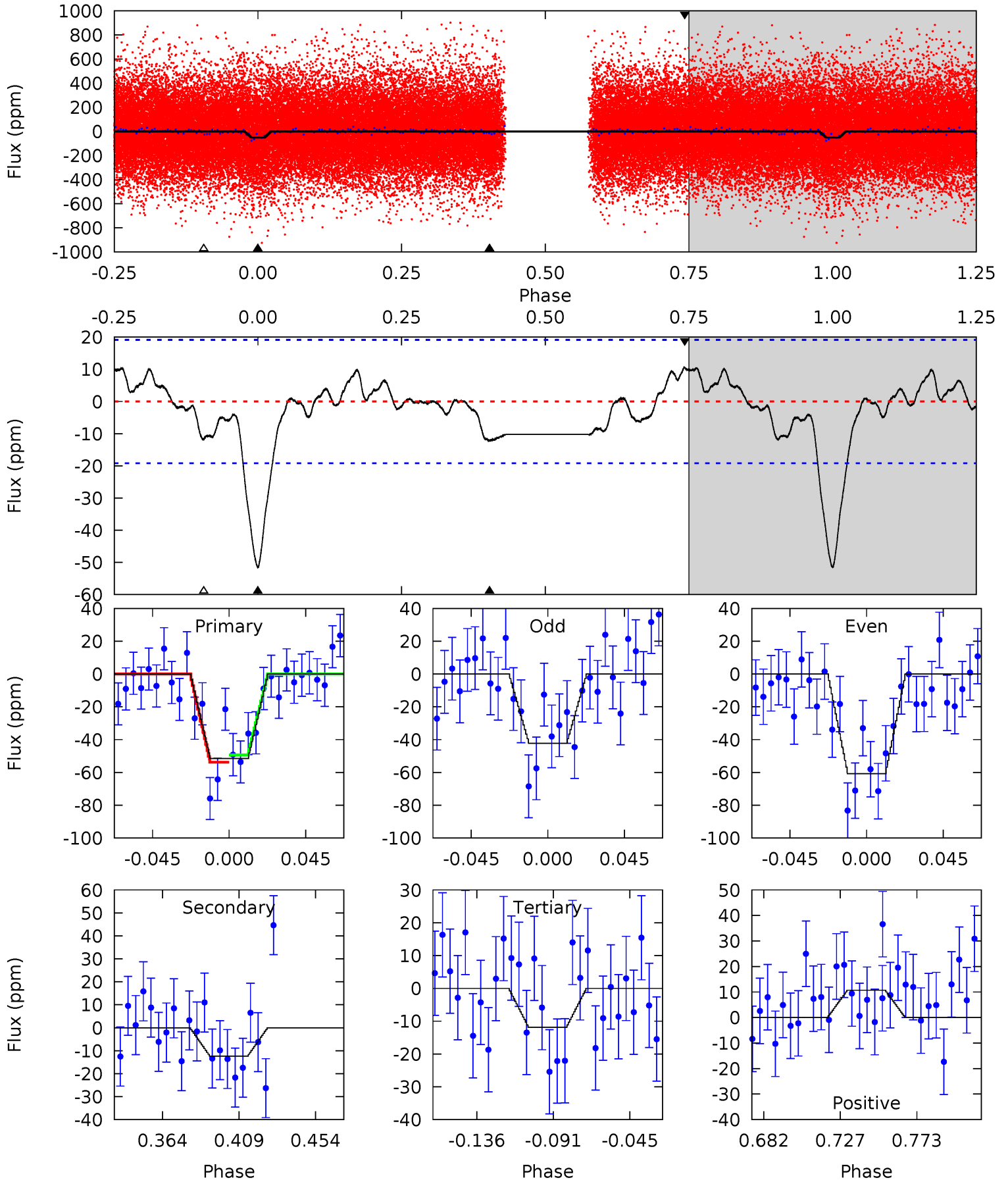
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.2	3.92	3.36	2.73	4.71	1.97	1.34	8.88	9.51	0.56	1.19	2.24	0.95	0.18	0.48



Alt Model-Shift Uniqueness Test

007877496-02, P = 1.720892 Days, E = 130.421316 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.7	3.05	2.93	2.64	4.73	2.00	1.29	9.78	10.1	0.12	0.41	2.28	0.87	0.17	0.55



Stellar Parameters For KIC 007877496

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	$M(M_{\odot})$	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	5742^{+115}_{-115}	$4.297^{+0.055}_{-0.045}$	$0.260^{+0.150}_{-0.150}$	$1.215^{+0.078}_{-0.096}$	$1.068^{+0.070}_{-0.078}$	$0.838^{+0.192}_{-0.120}$
	+2%/-2%	+1%/-1%	+58%/-58%	+6%/-8%	+7%/-7%	+23%/-14%
Source	SPE66	TRA66	SPE66	DSEP		

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

Secondary Eclipse Parameters for KIC 007877496-02 / KOI

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-16 ± 4	$1.07^{+0.81}_{-0.64}$	2303^{+61}_{-68}	4184^{+2017}_{-783}	$5.958^{+29.079}_{-4.022}$
Alt.	-12 ± 4	$1.02^{+0.72}_{-0.60}$	2299^{+62}_{-62}	4099^{+1842}_{-820}	$5.323^{+26.008}_{-3.691}$

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

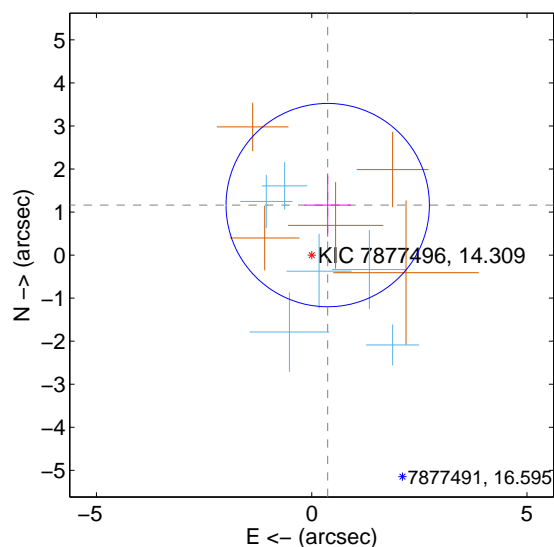
Supplemental centroid analysis for 007877496-02. Kepler magnitude: 14.31. Transit SNR 8.60

There are 6 quarters with good PRF difference image offsets

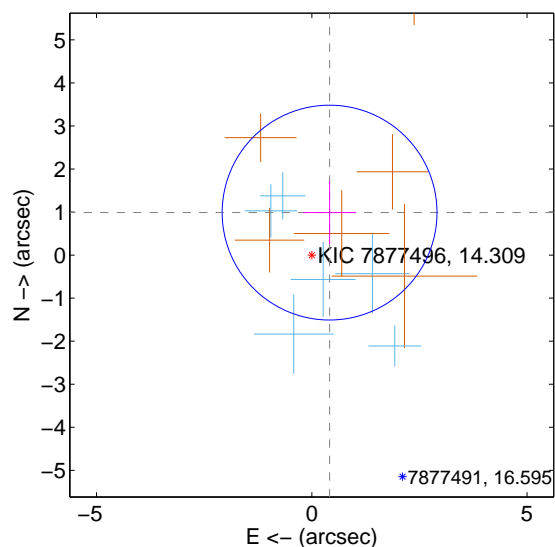
The direct PRF centroid is offset from the target star catalog position by about 0.25 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	1.220 ± 0.787	1.55	-0.372 ± 0.538	1.162 ± 0.733
PRF-fit source offset from KIC position	1.070 ± 0.832	1.29	-0.413 ± 0.612	0.987 ± 0.731
photometric centroid source offset	0.64 ± 1.35	0.47	0.55 ± 1.30	0.33 ± 1.48

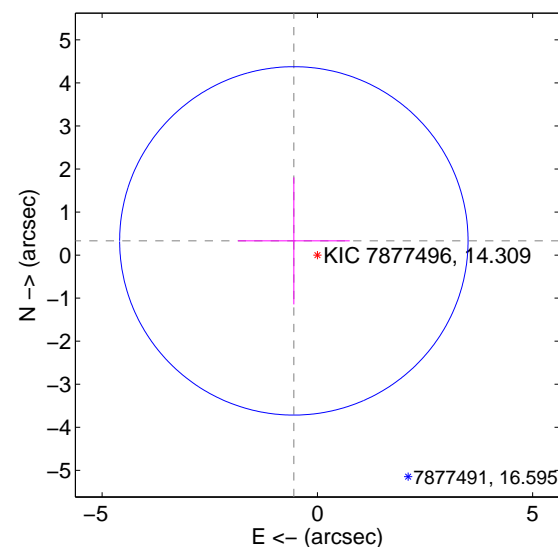
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

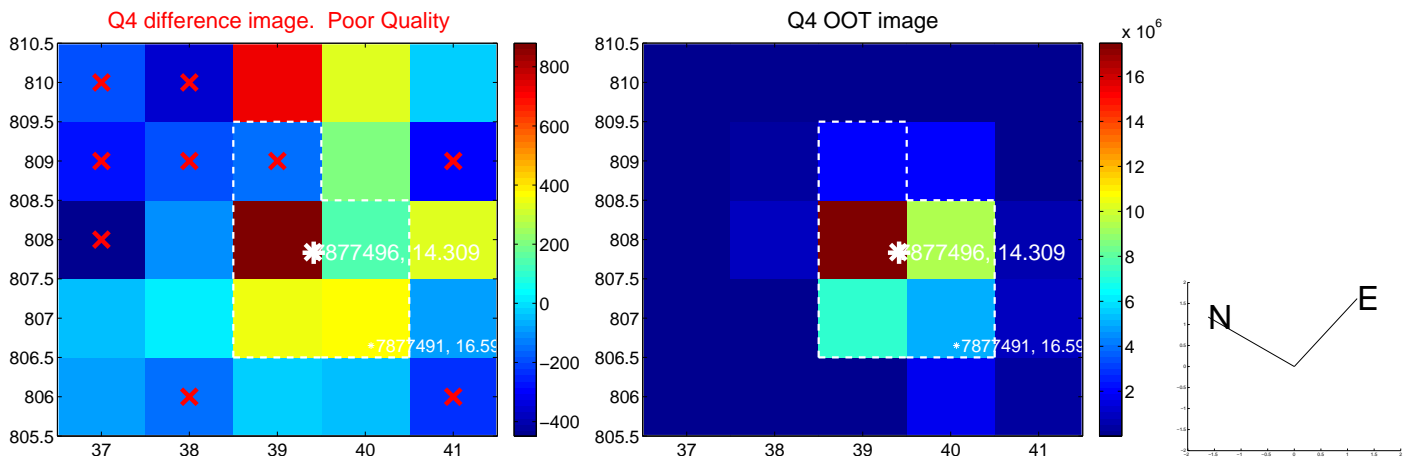
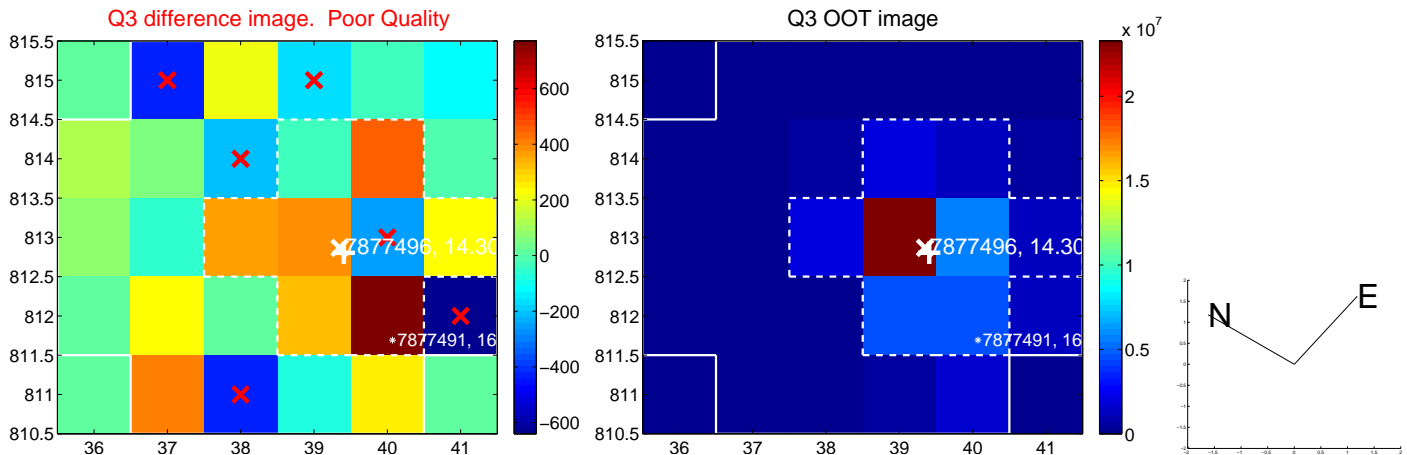
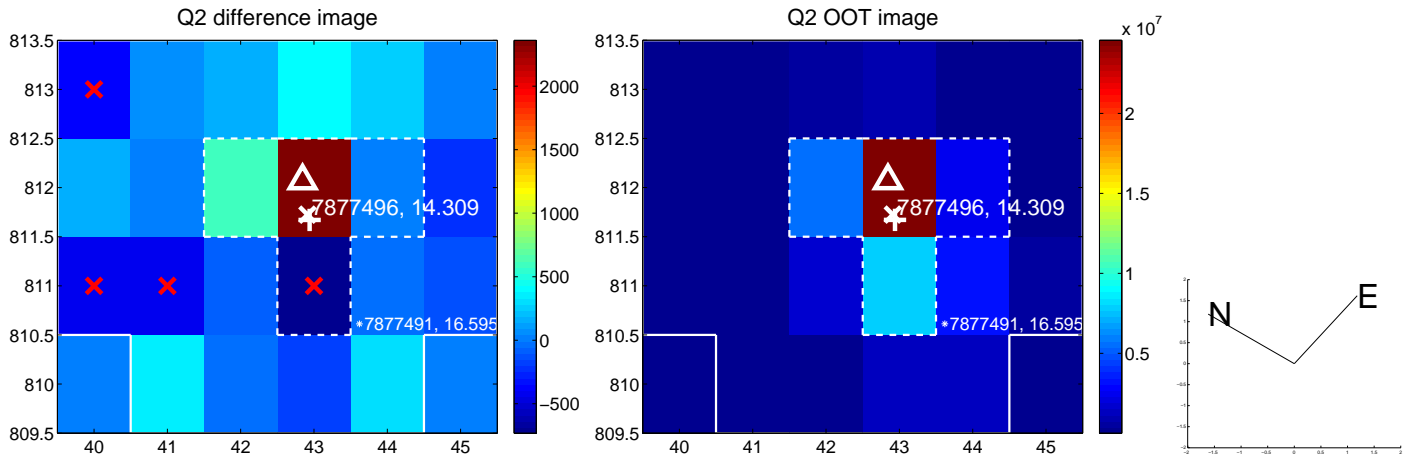
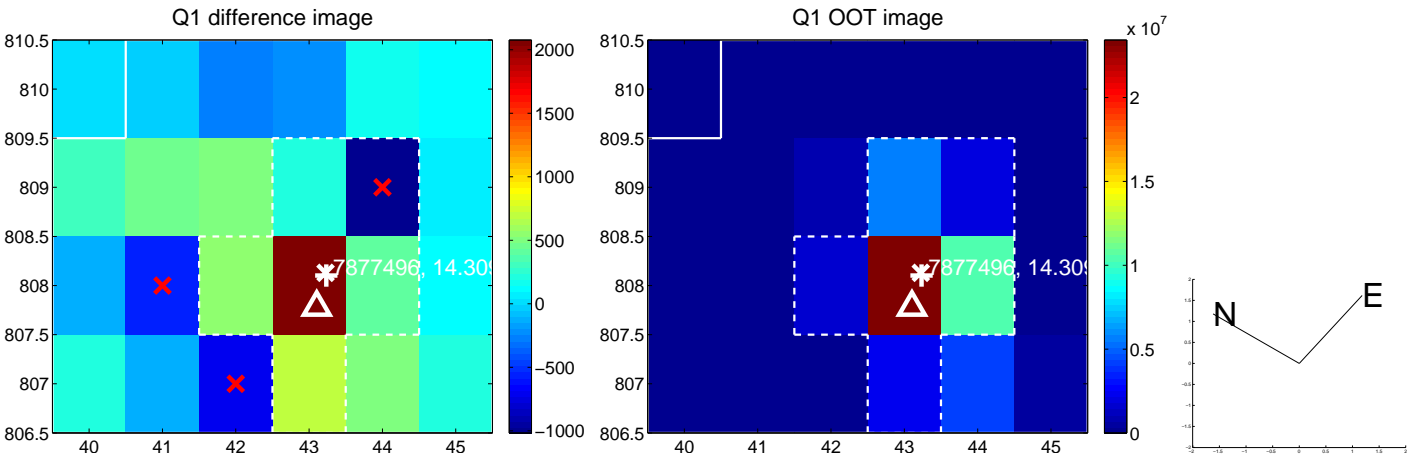


offset from photometric centroids

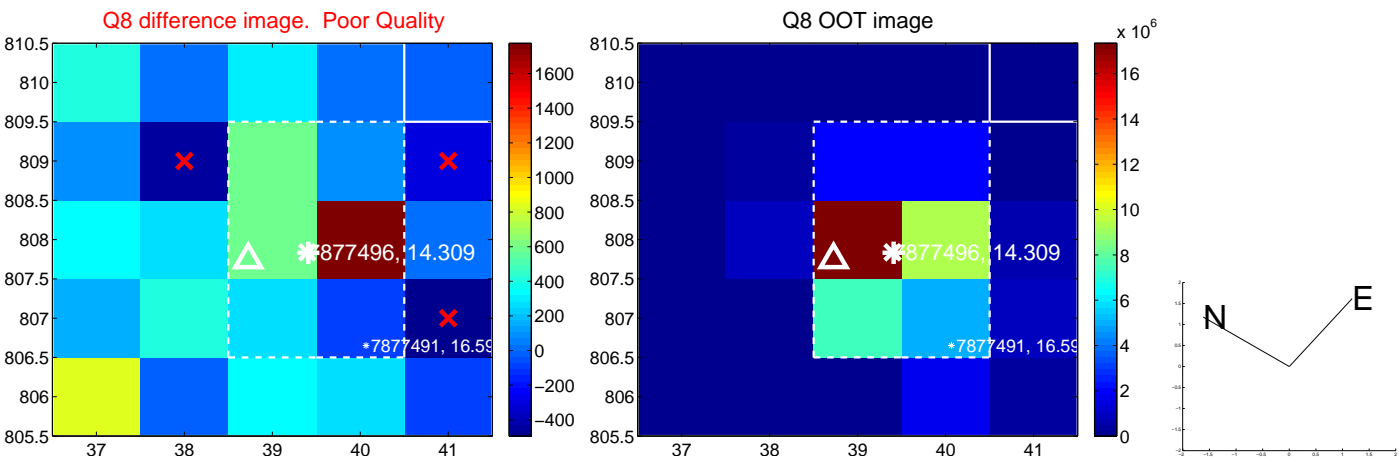
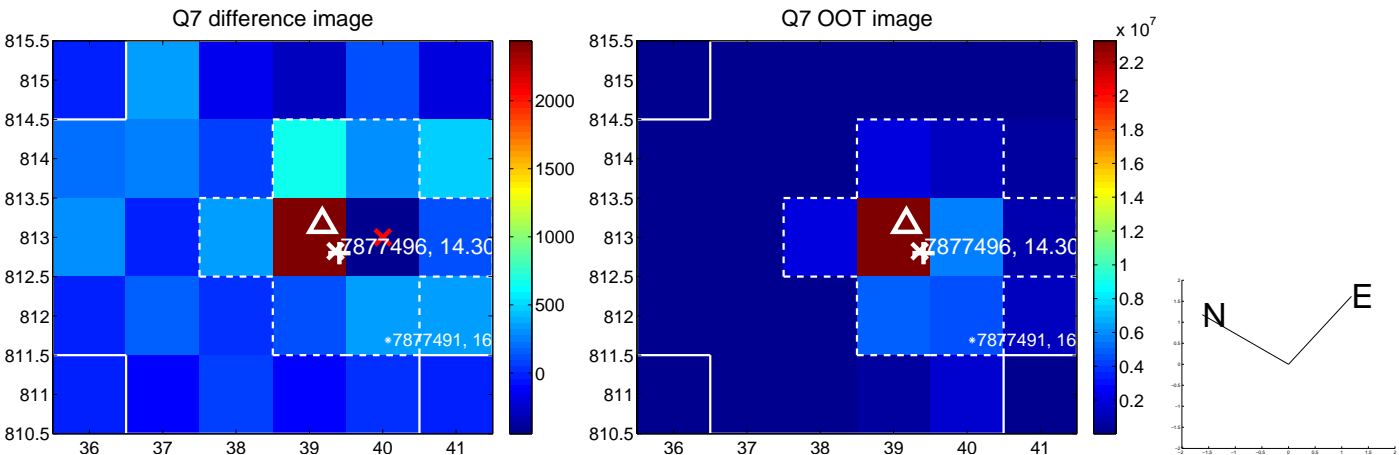
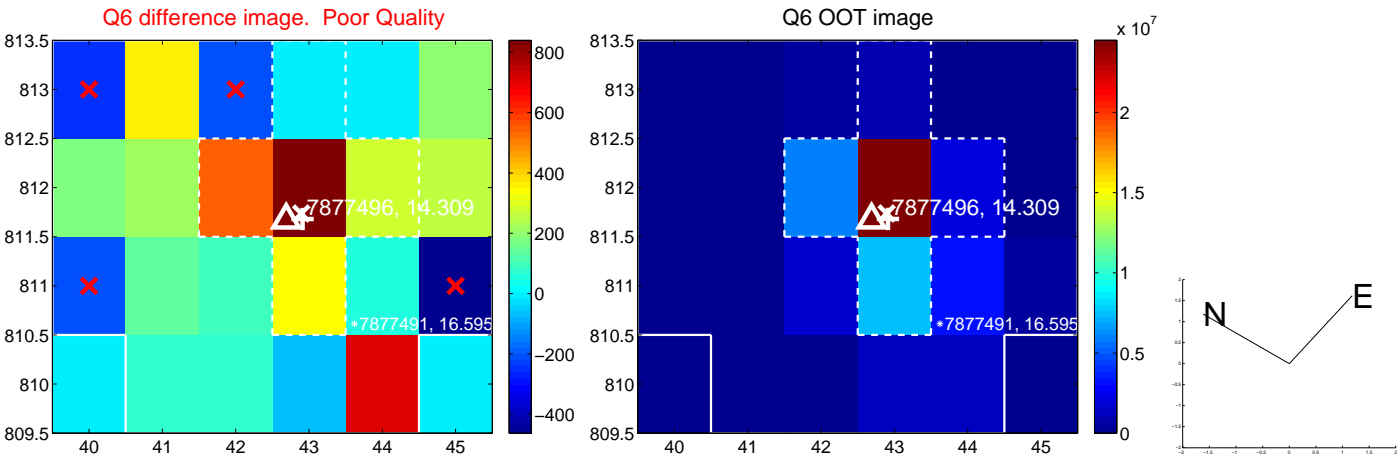
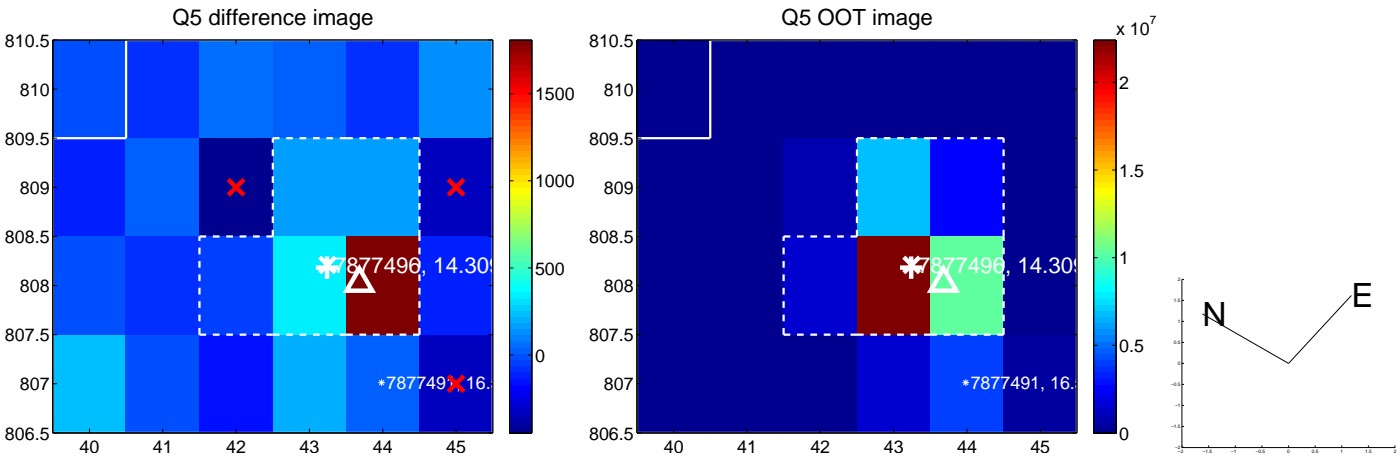


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

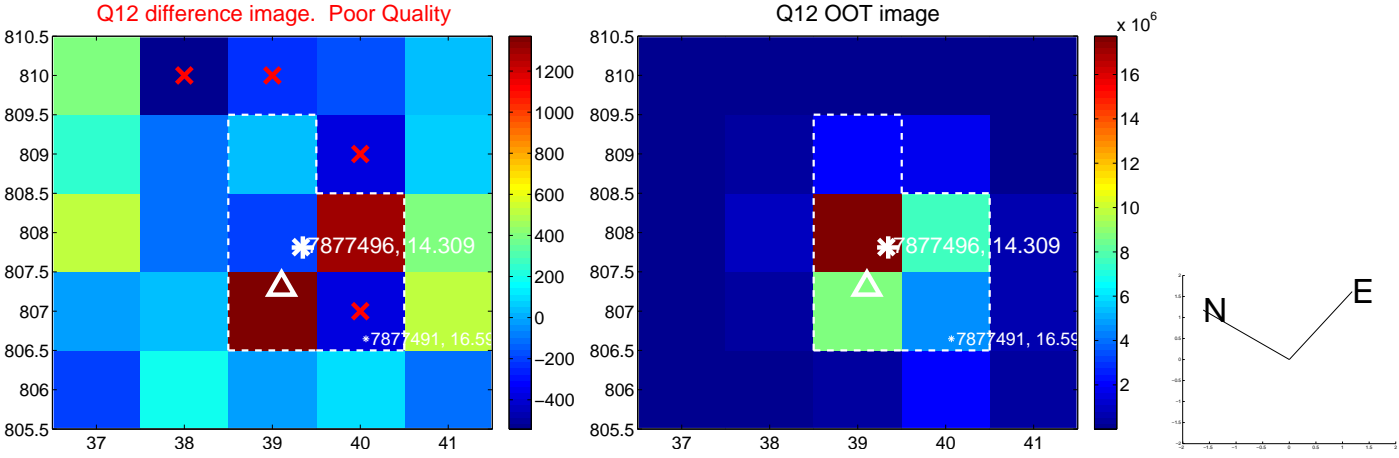
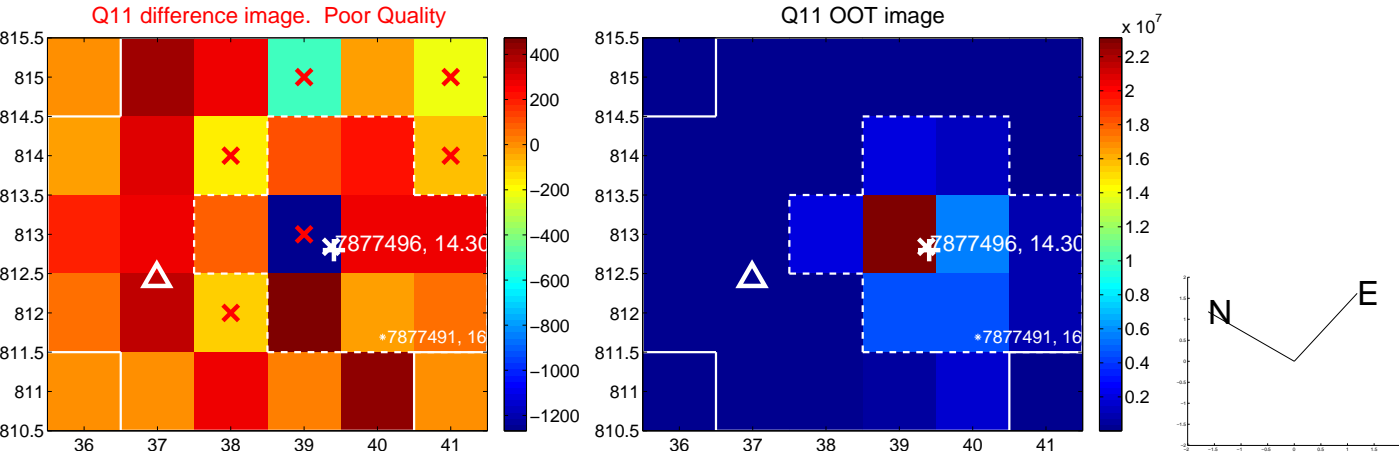
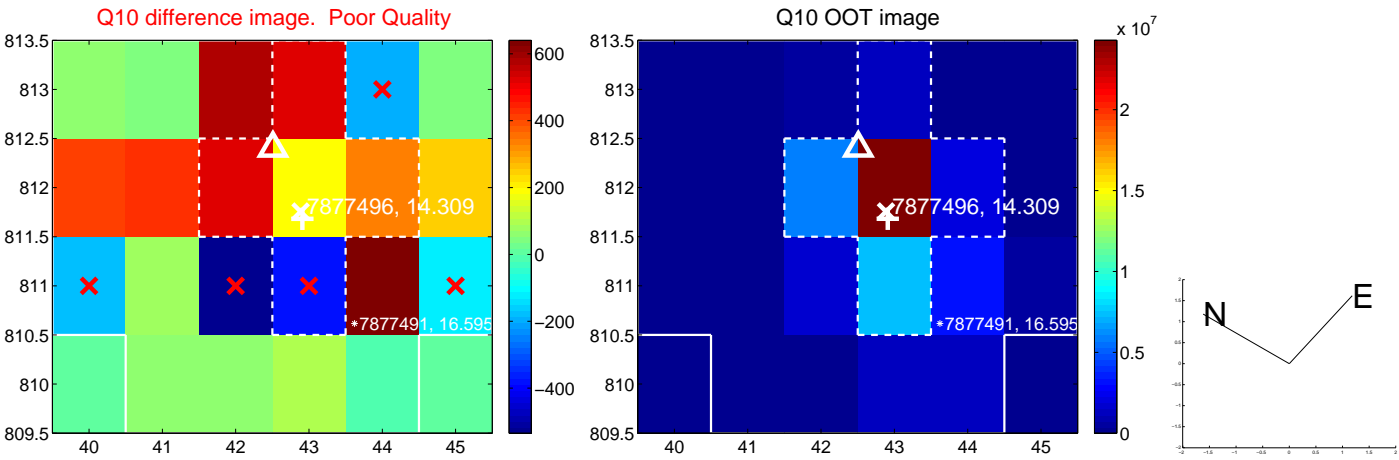
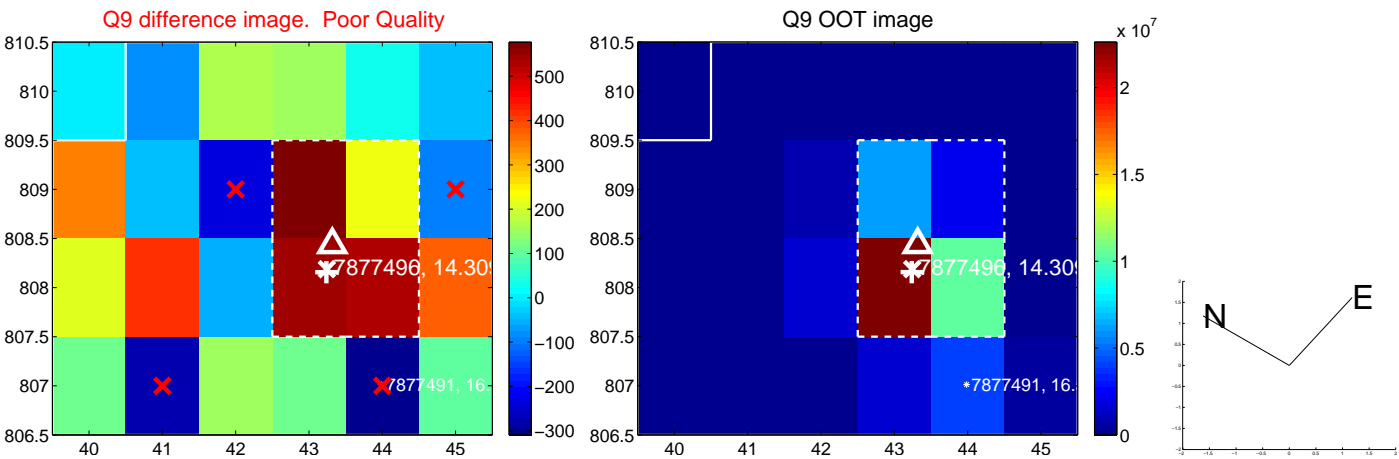
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



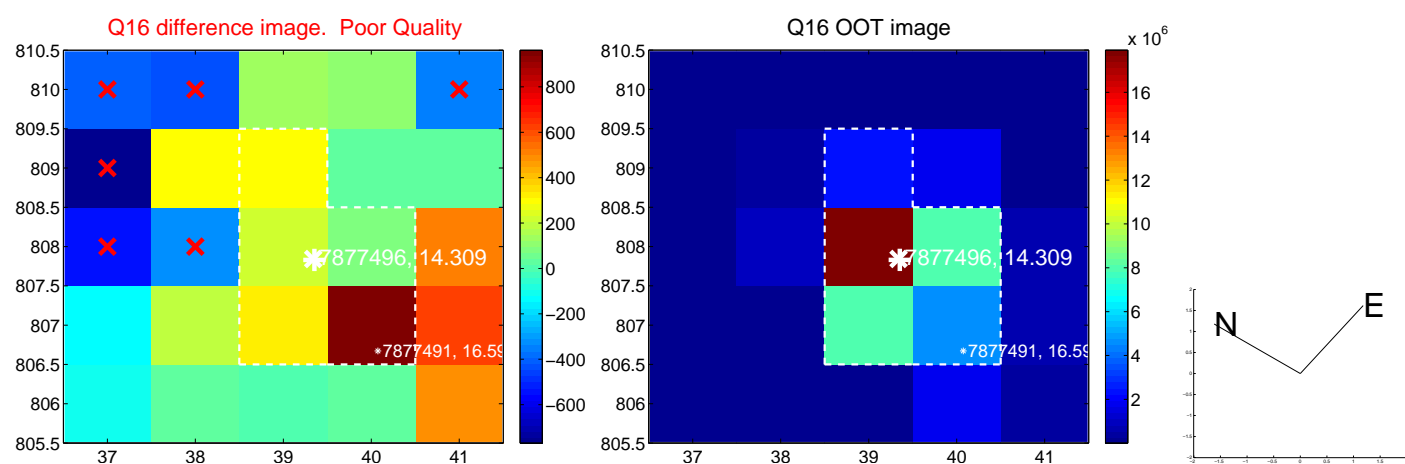
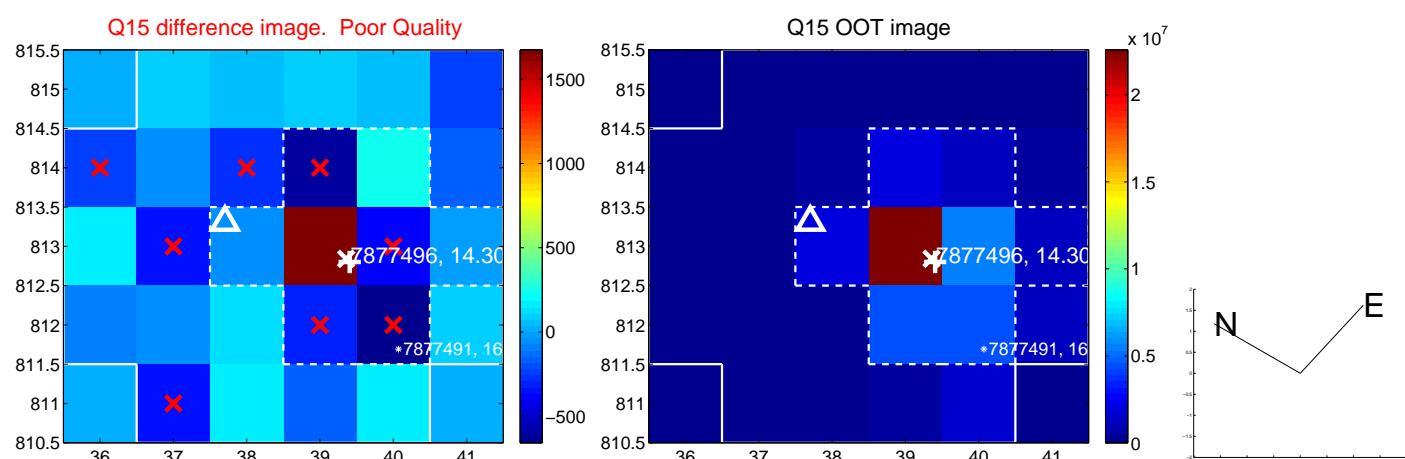
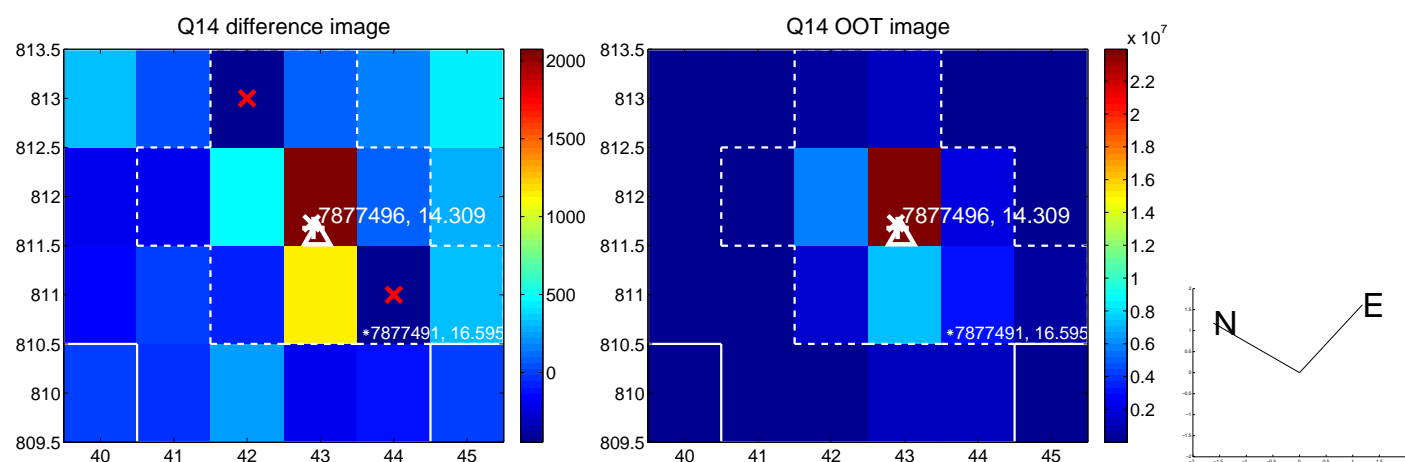
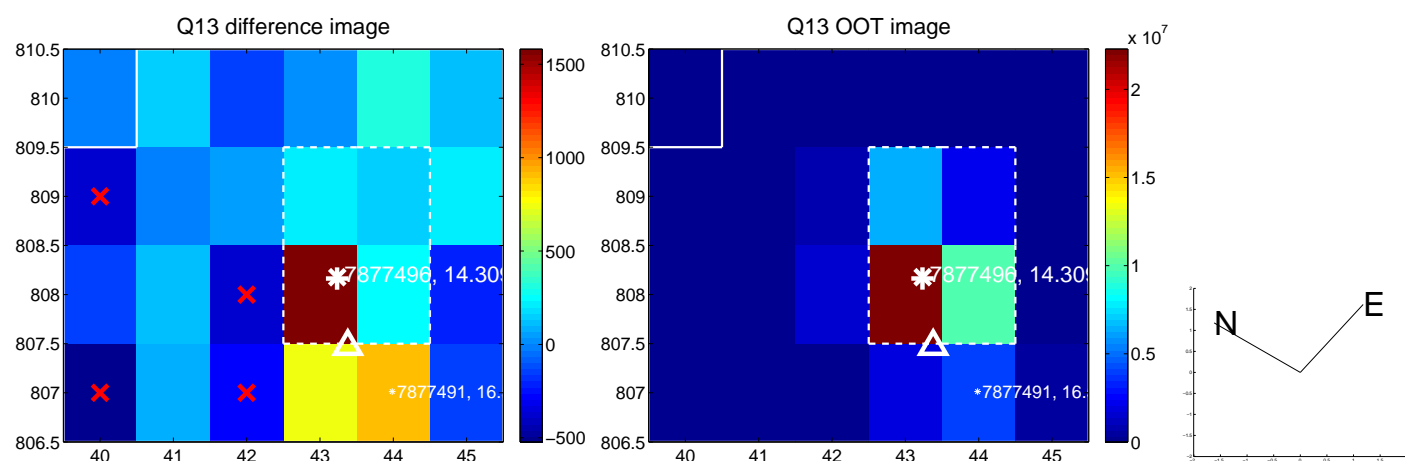
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



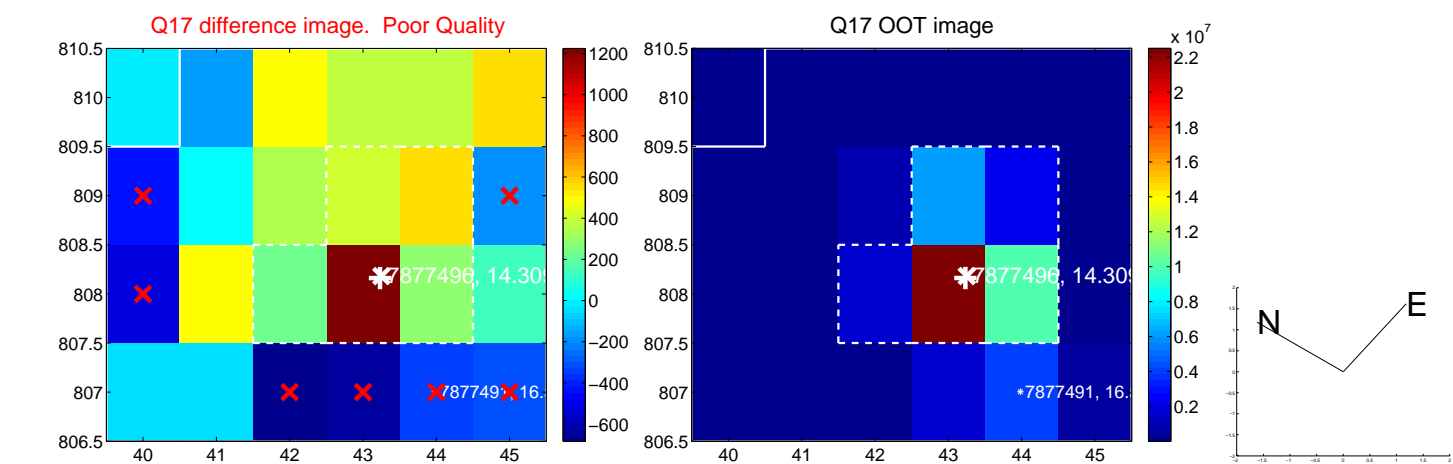
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



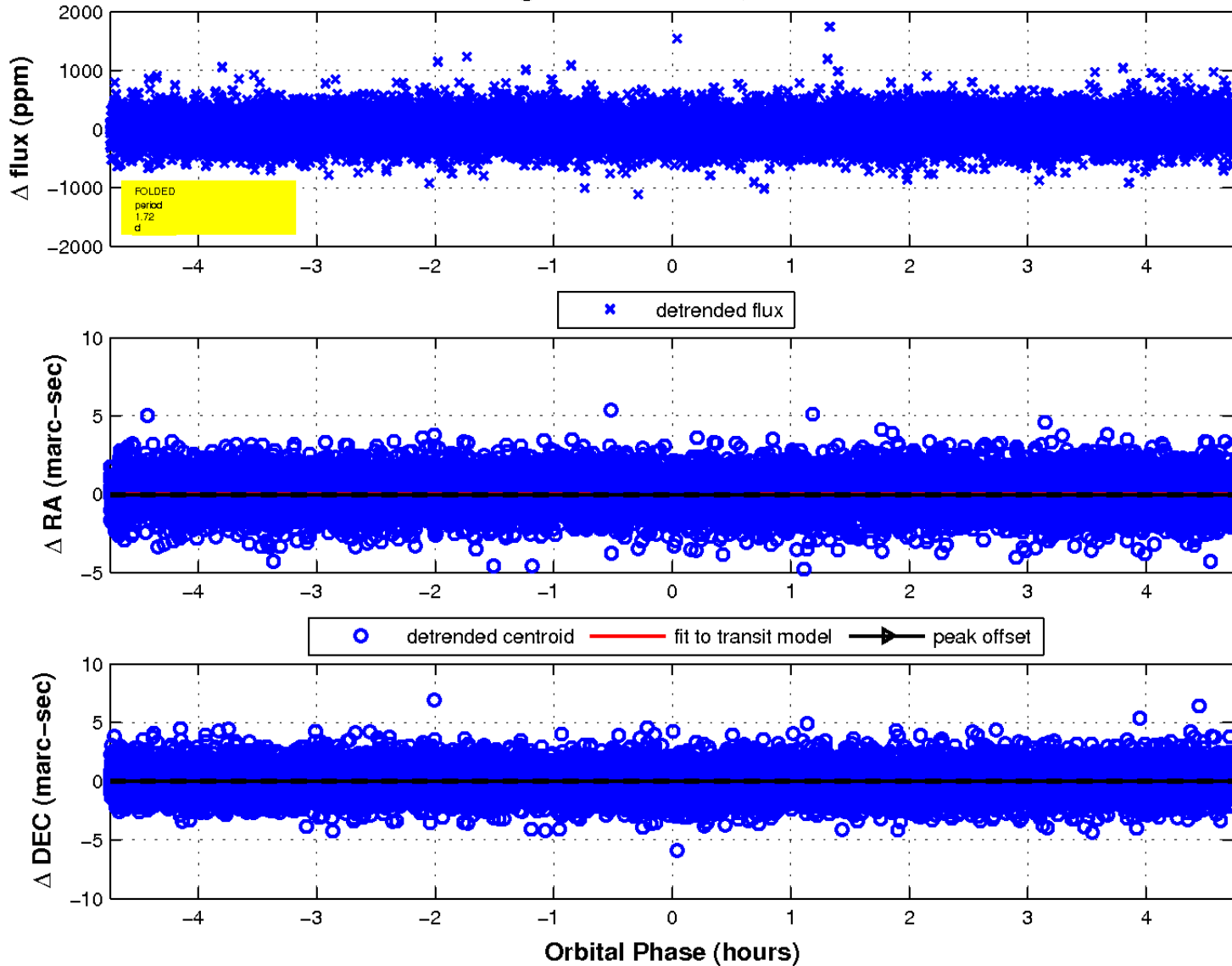
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

Declination

