

KIC 009661869

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})
009661869-01	OBS	3647.01	20.427216	135.863482	117588.2	3.555	823.7	564.2	1.12	6167	42.94	74.36
009661869-02	OBS	No	20.426602	147.420273	1444.3	2.890	9.3	9.8	1.12	6167	8.07	74.36

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009661869-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—MOD_ODDEVEN_DV—DEEP_V_SHAPED—HAS_SEC_TCE—CENT_KIC_POS
009661869-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE—CENT_KIC_POS

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

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

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

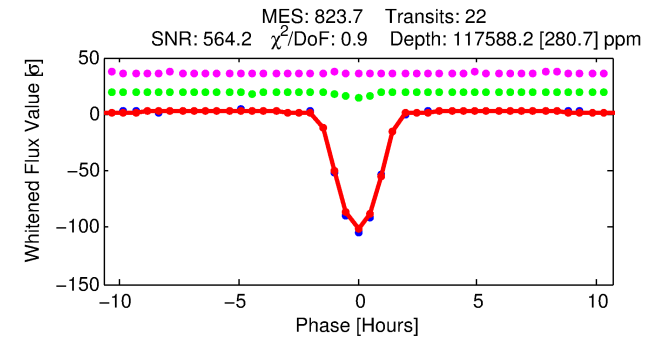
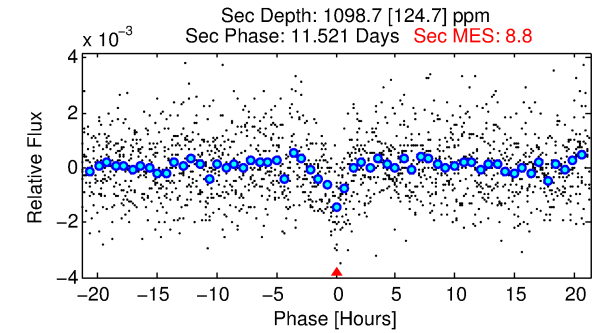
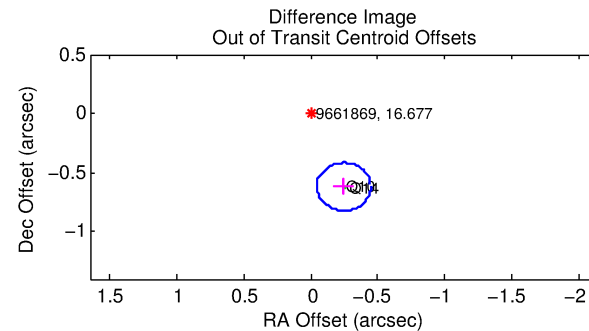
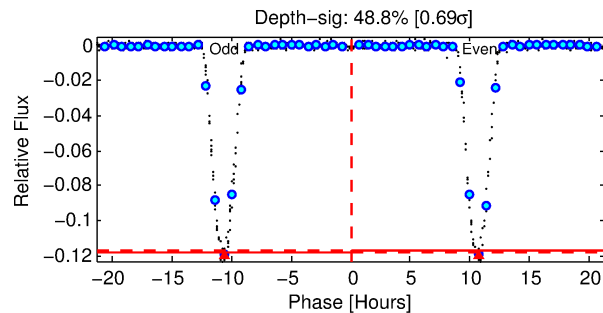
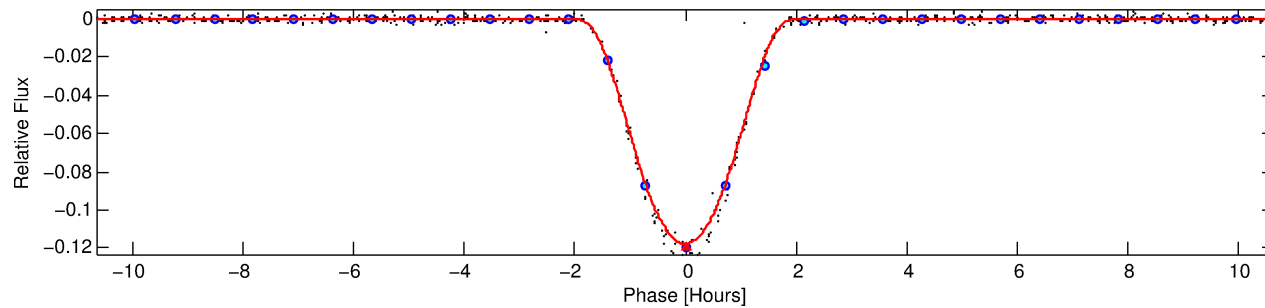
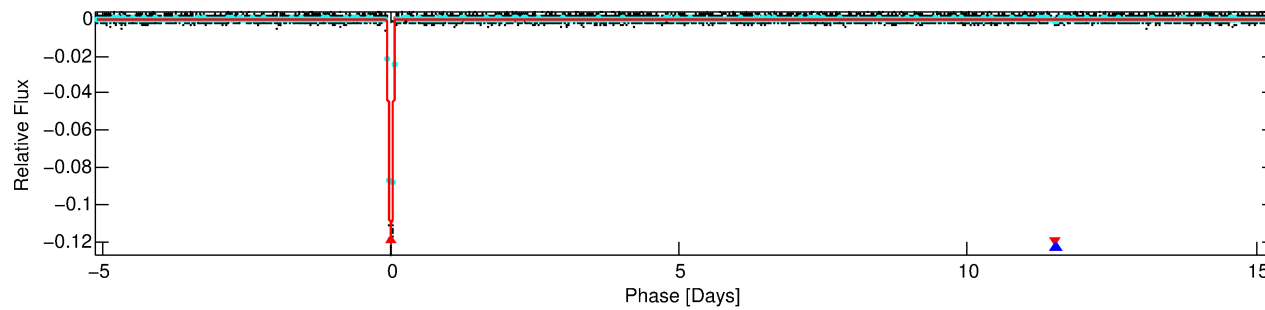
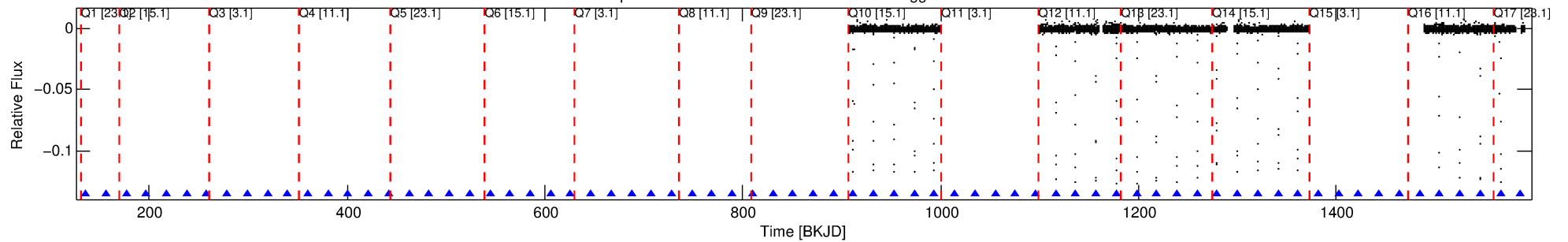
Ephemeris Match Information For 009661869-01

No Significant Match Found

DV One-Page Summary

KIC: 9661869 Candidate: 1 of 2 Period: 20.427 d
KOI: K03647.01 Corr: 0.998

Kp: 16.68 R*: 1.12 Rs Teff: 6167.0 K Logg: 4.35 Fe/H: -0.120



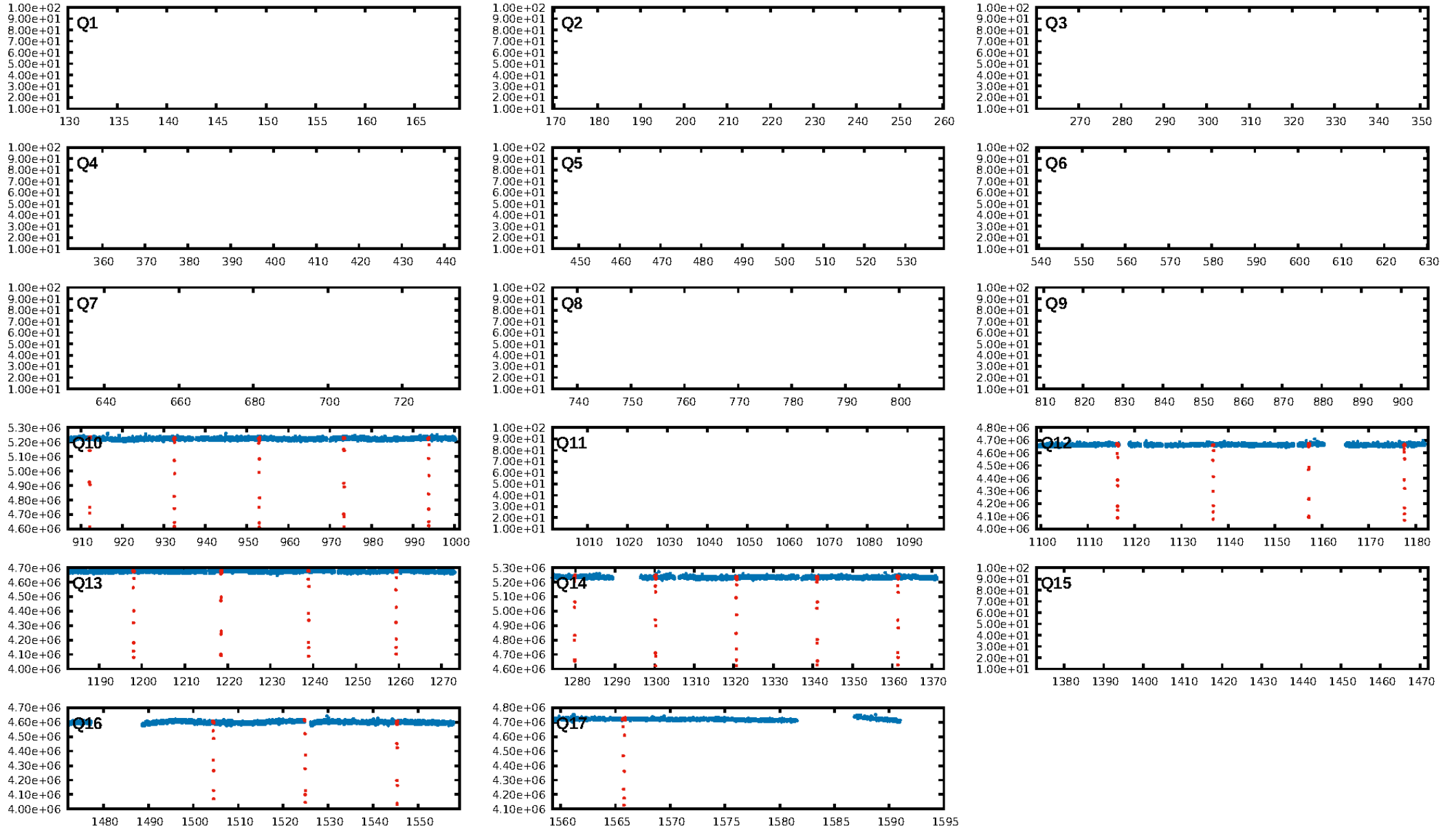
DV Fit Results:

Period = 20.42722 [0.00001] d
Epoch = 135.8635 [0.0004] BKJD
Rp/R* = 0.3510 [0.0033]
a/R* = 50.83 [0.17]
b = 0.70 [0.01]
Seff = 74.36 [30.04]
Teff = 749 [76] K
Rp = 42.94 [13.60] Re
a = 0.1480 [0.0387] AU
Ag = 7.18 [2.81] [2.20σ]
Teffp = 1895 [91] K [9.71σ]

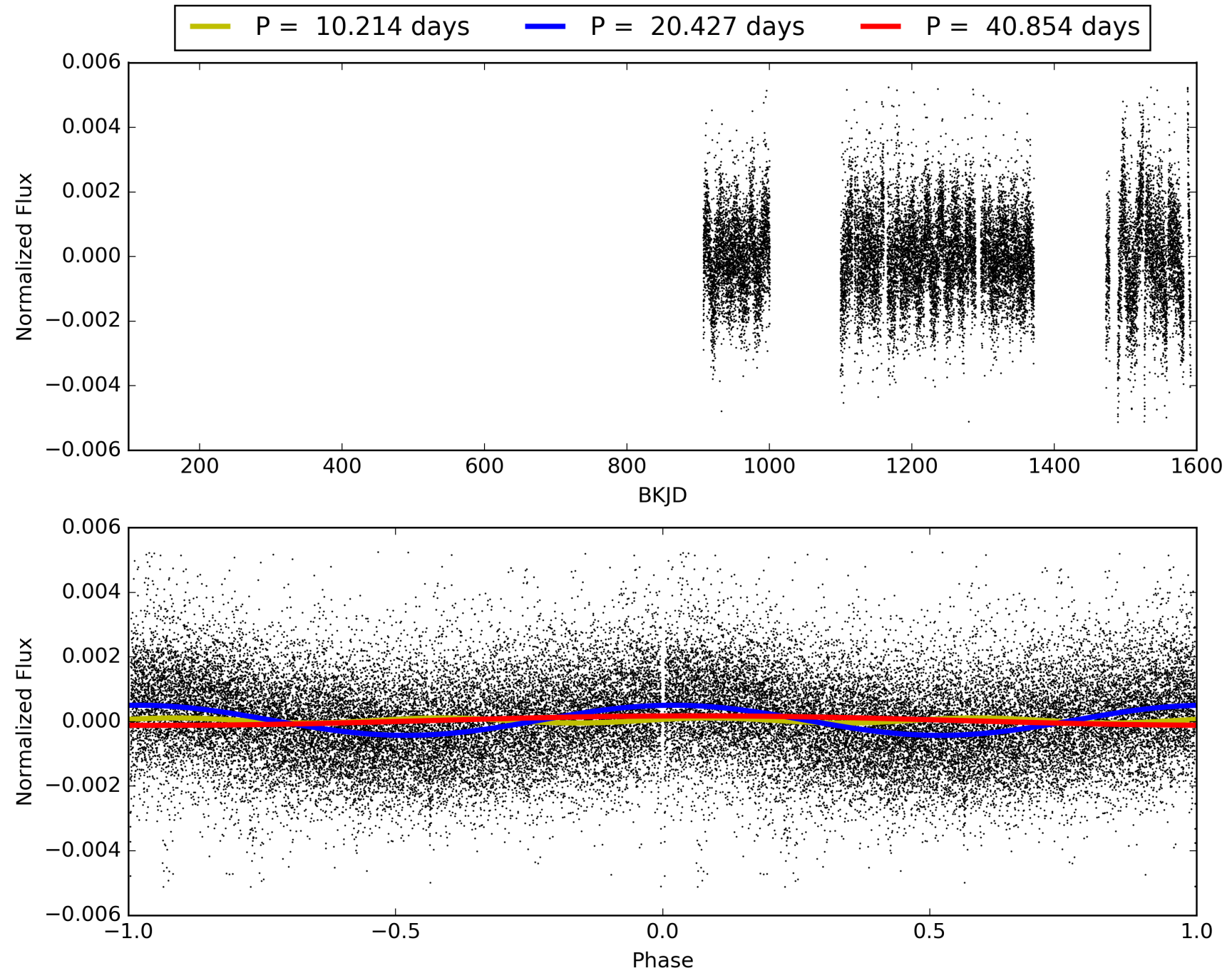
DV Diagnostic Results:

ShortPeriod-sig: 0.3% [0.00σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 0.0%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 0.00e+00
RollingBand-fgt: 1.00 [21/21]
GhostDiagnostic-chr: 5.594
Centroid-sig: 0.0%
Centroid-so: 1.225 arcsec [144.07σ]
OotOffset-rm: 0.666 arcsec [9.91σ]
KicOffset-rm: 0.199 arcsec [2.86σ]
OotOffset-st: 2/0/0/0 [2]
KicOffset-st: 2/0/2/2 [6]
DiffImageQuality-fgm: 1.00 [6/6]
DiffImageOverlap-fno: 1.00 [6/6]

TCE 009661869-01, PDC Light Curves

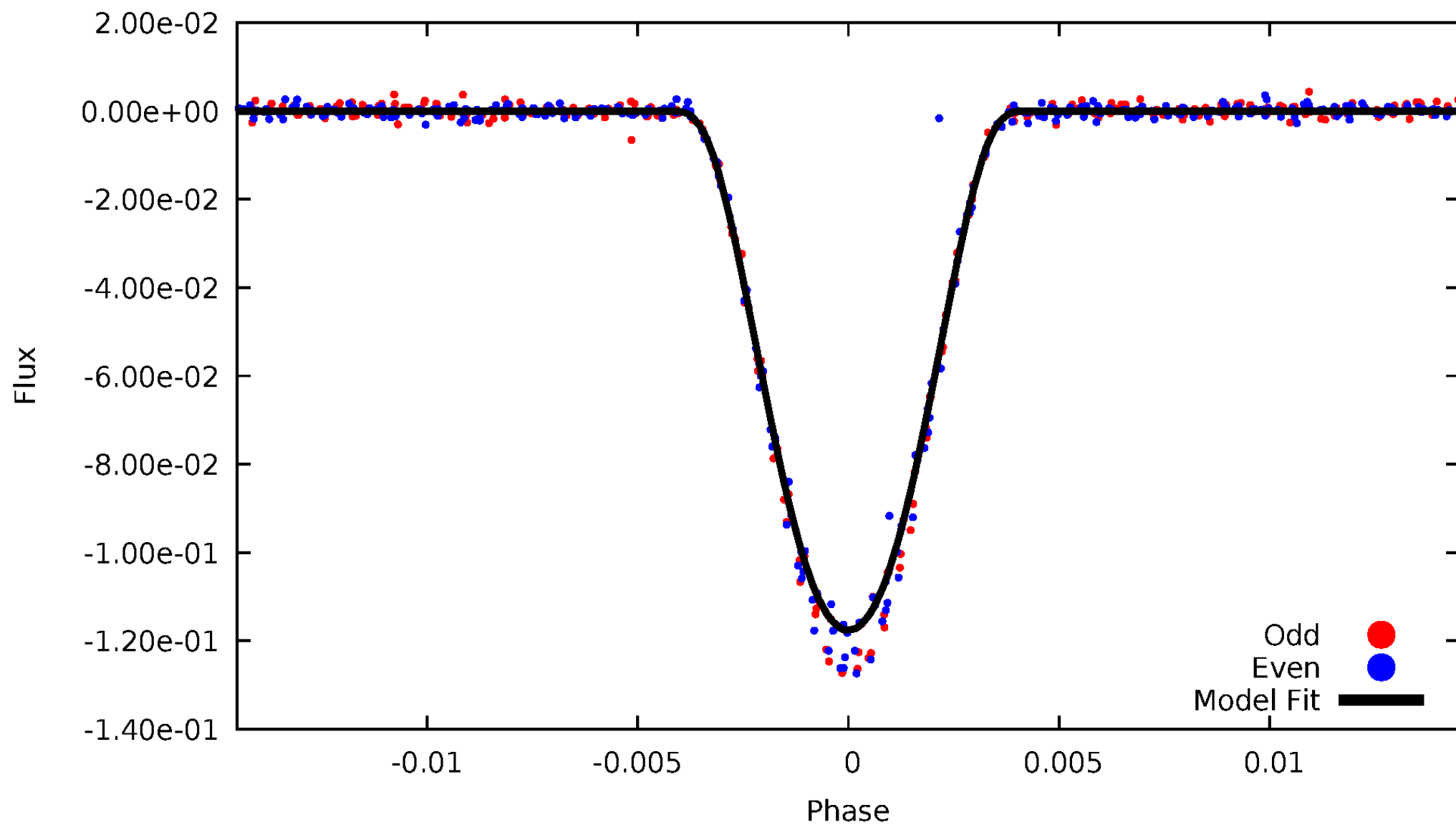


TCE 009661869-01



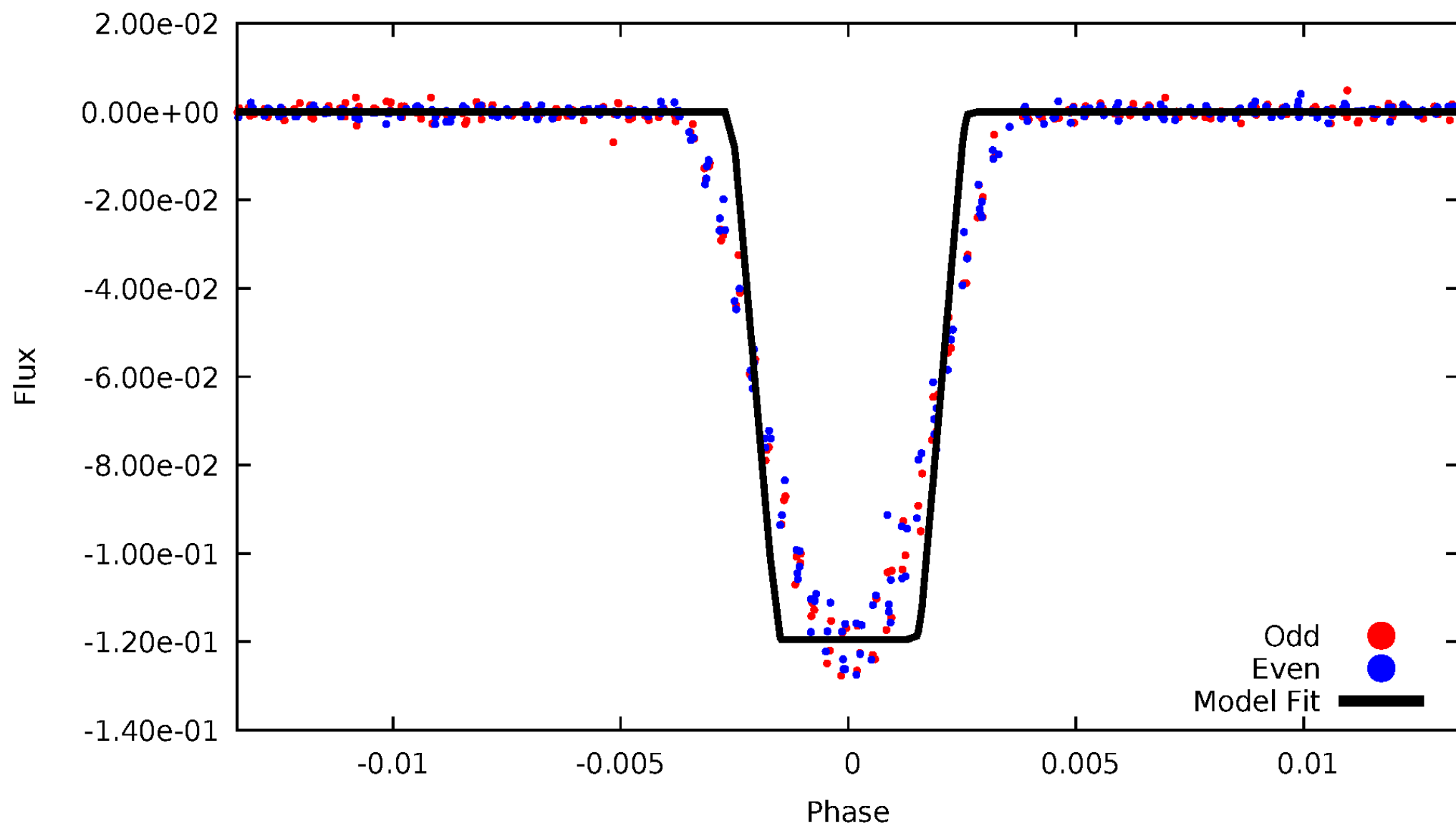
DV Odd/Even

TCE 009661869-01



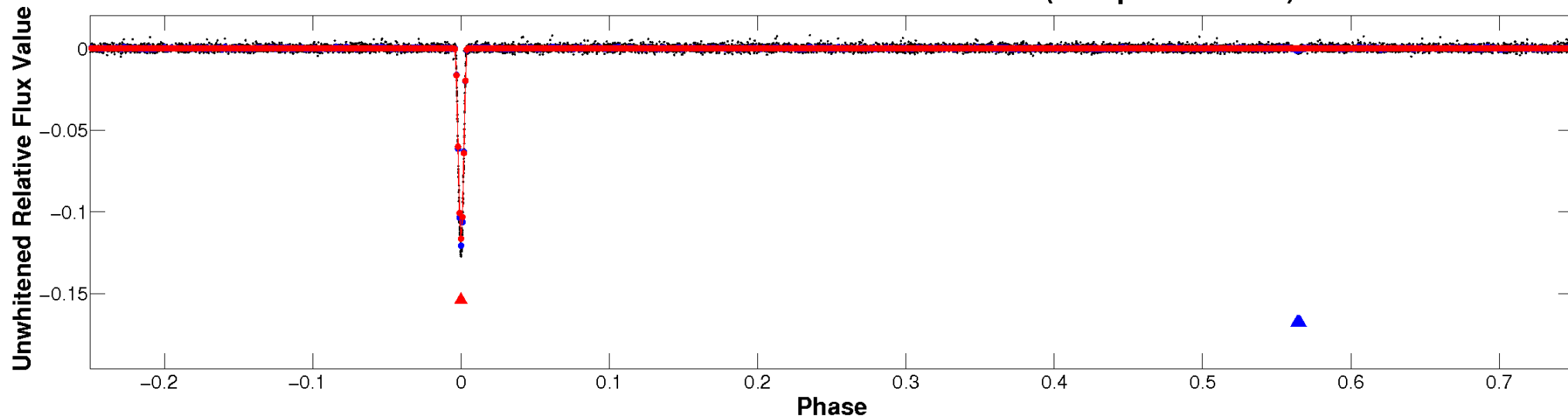
ALT Odd/Even

TCE 009661869-01

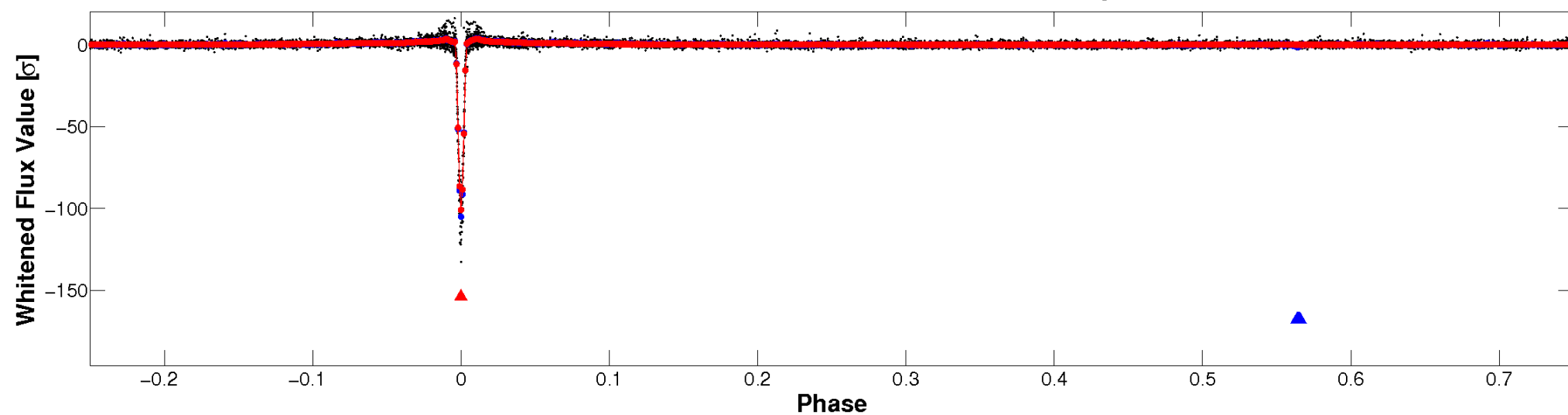


Non-Whitened Vs. Whitened Light Curve

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

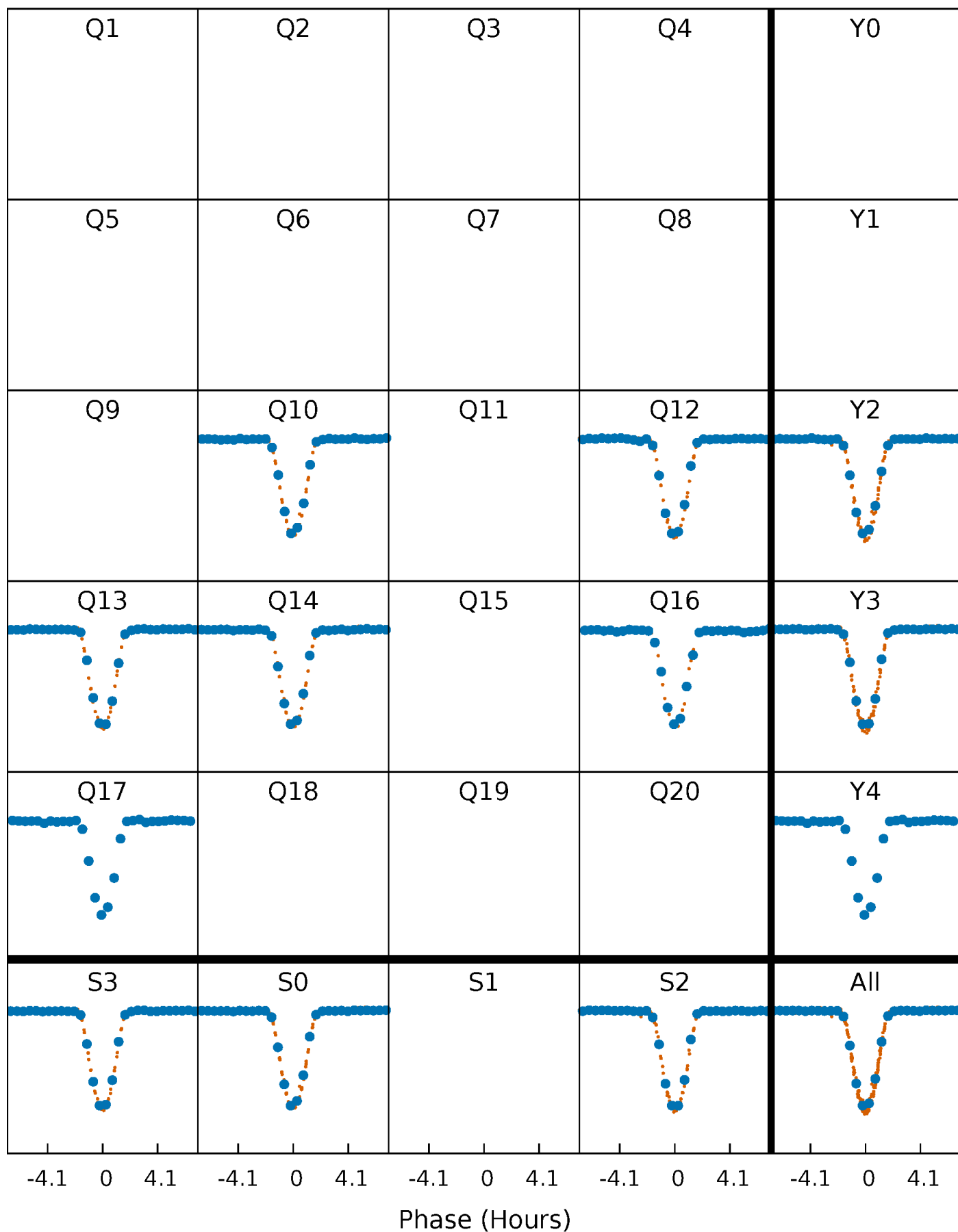


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



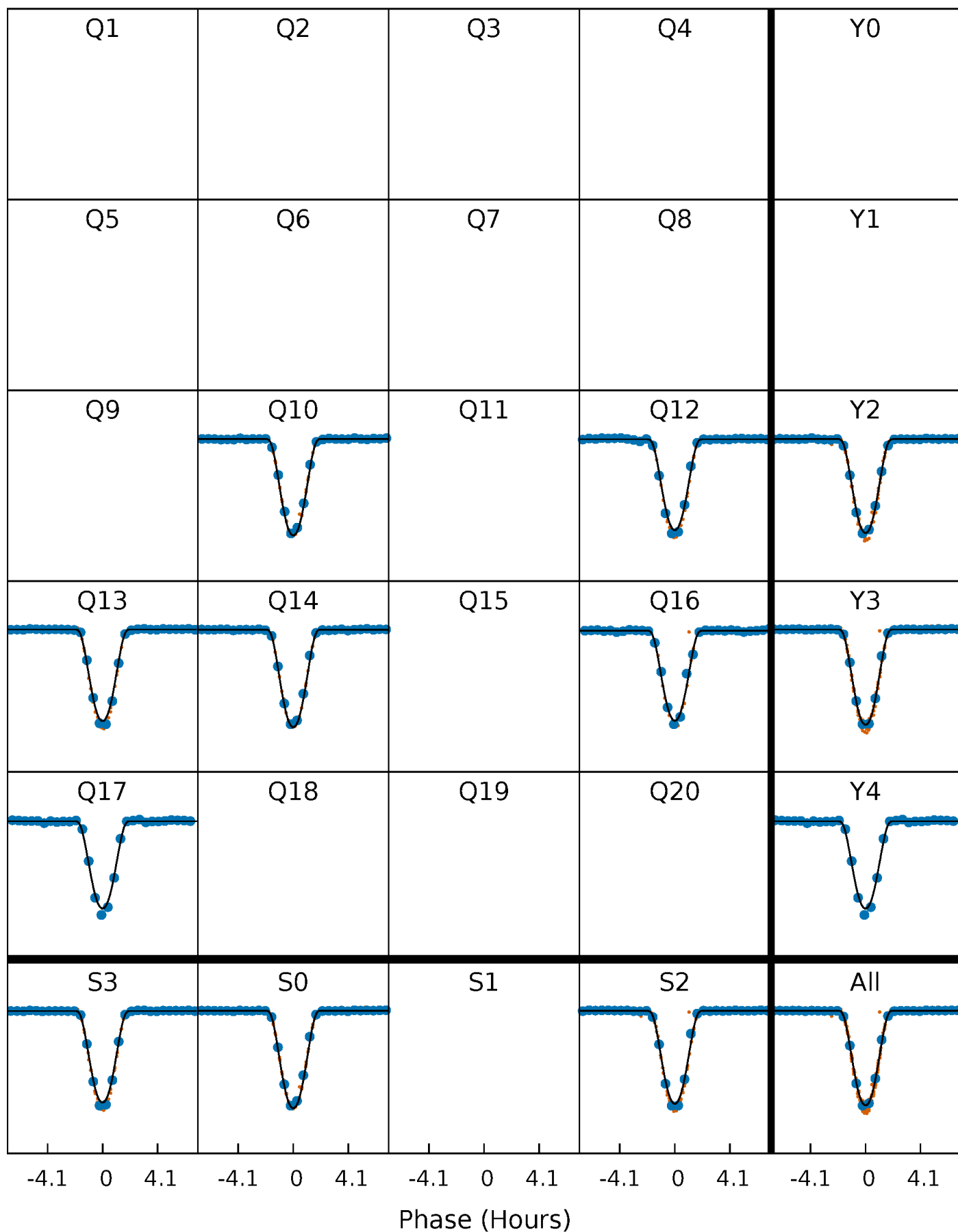
PDC Quarter-Phased Transit Curves

TCE 009661869-01 P= 20.427216 Days $T_0=135.863482$ (BKJD)



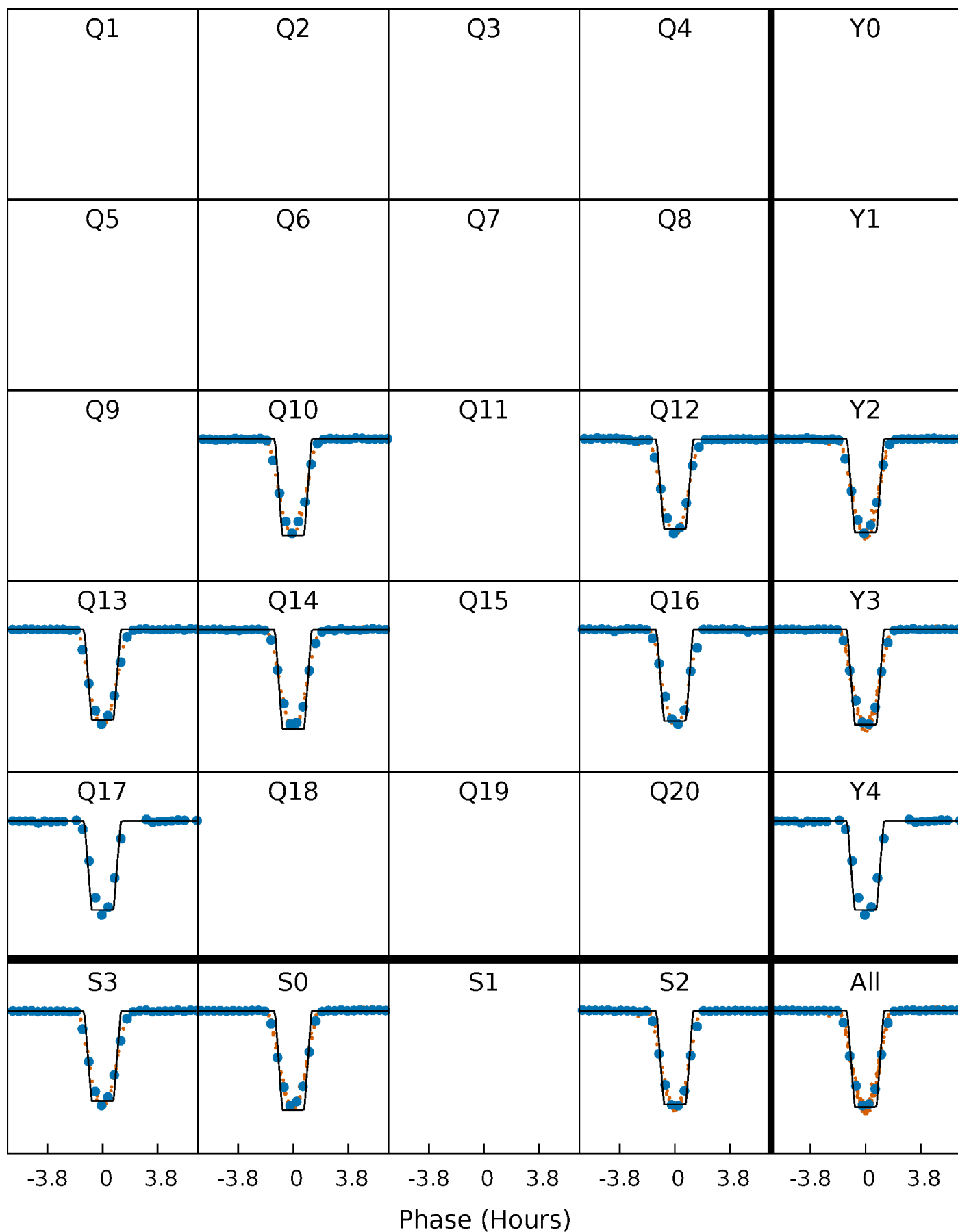
DV Quarter-Phased Transit Curves

TCE 009661869-01 P= 20.427216 Days $T_0=135.863482$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

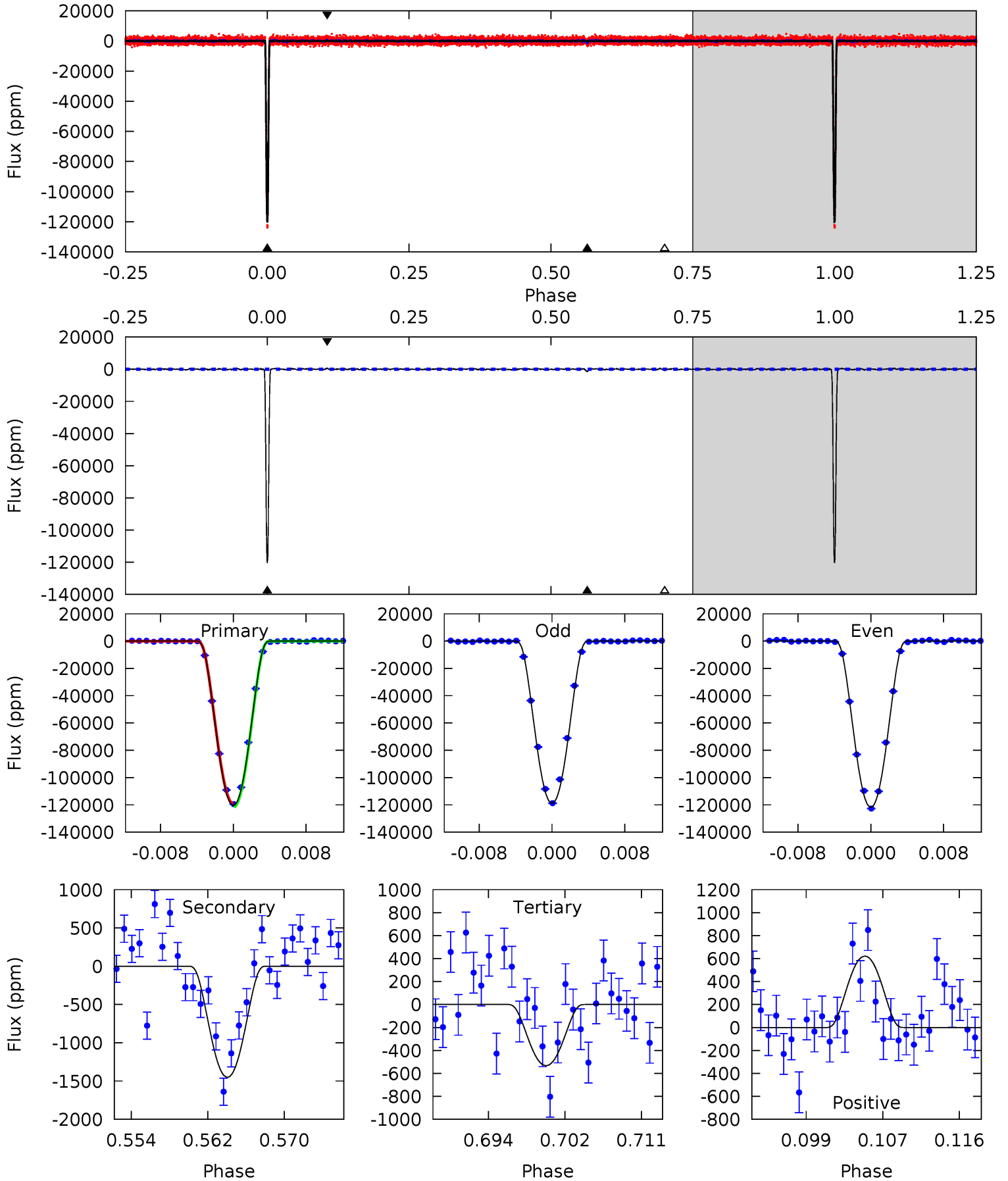
TCE 009661869-01 P= 20.427064 Days $T_0=135.871613$ (BKJD)



DV Model-Shift Uniqueness Test

009661869-01, P = 20.427216 Days, E = 135.863482 Days

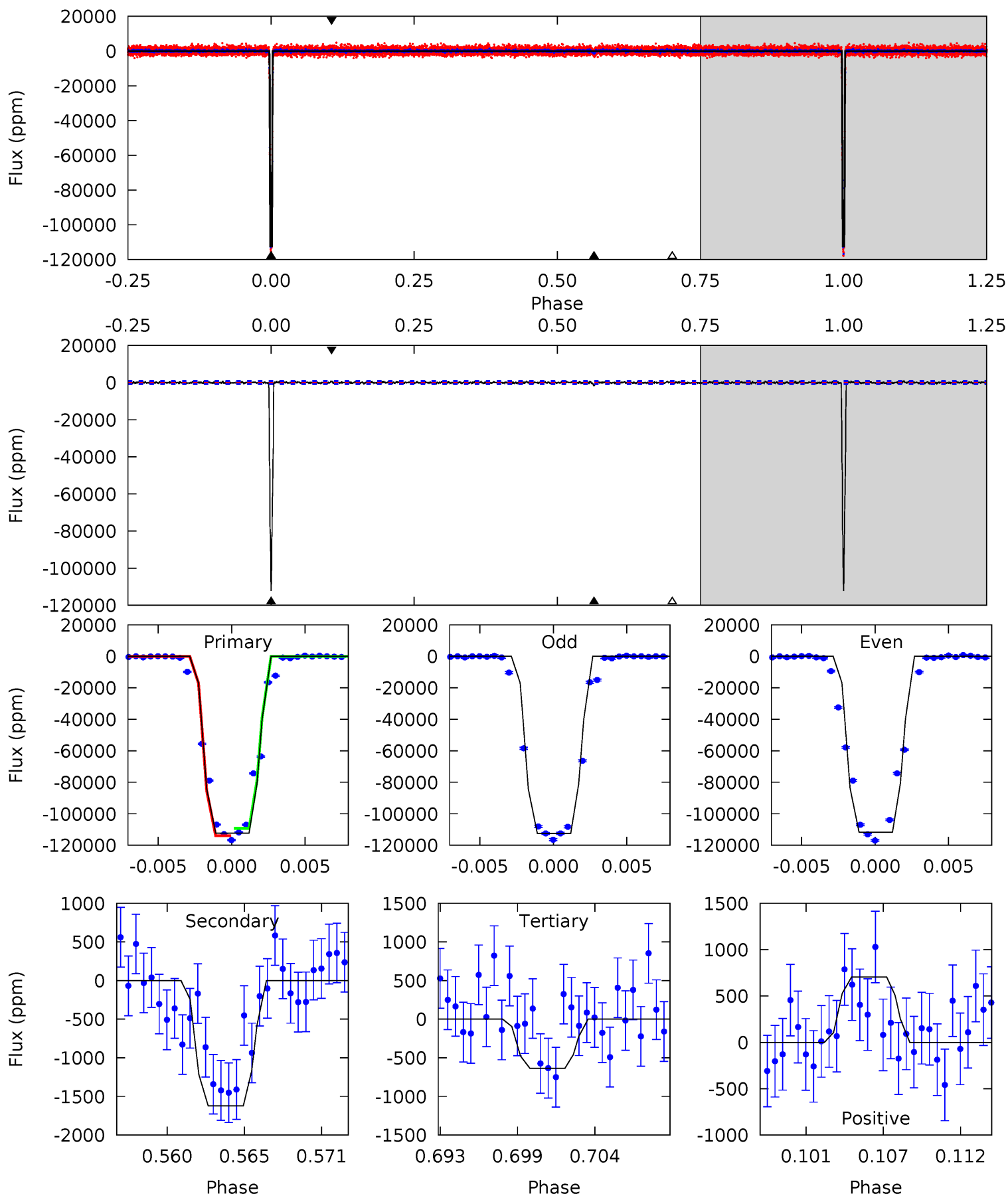
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
1314	15.8	5.81	6.78	5.06	2.64	1.73	1308	1307	10.0	9.05	15.8	1.00	0.01	13.5



Alt Model-Shift Uniqueness Test

009661869-01, P = 20.427064 Days, E = 135.871613 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
675.2	9.76	3.82	4.24	5.15	2.79	1.17	671.4	671.0	5.93	5.52	2.22	1.00	0.01	13.0



Stellar Parameters For KIC 009661869

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	6167^{+193}_{-236}	$4.354^{+0.108}_{-0.201}$	$-0.120^{+0.250}_{-0.300}$	$1.121^{+0.355}_{-0.164}$	$1.032^{+0.181}_{-0.120}$	$1.032^{+0.591}_{-0.532}$
	+3%/-4%	+2%/-5%	+208%/-250%	+32%/-15%	+18%/-12%	+57%/-52%
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 009661869-01 / KOI 3647.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	-1451 ± 92	$43.25^{+7.62}_{-3.87}$	1053^{+81}_{-61}	2769^{+55}_{-60}	$9.083^{+2.117}_{-2.110}$
Alt.	-1622 ± 166	$42.92^{+7.45}_{-4.09}$	1054^{+88}_{-60}	2820^{+69}_{-67}	10^{+3}_{-3}

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 $A_{obs} \gg 1.0$

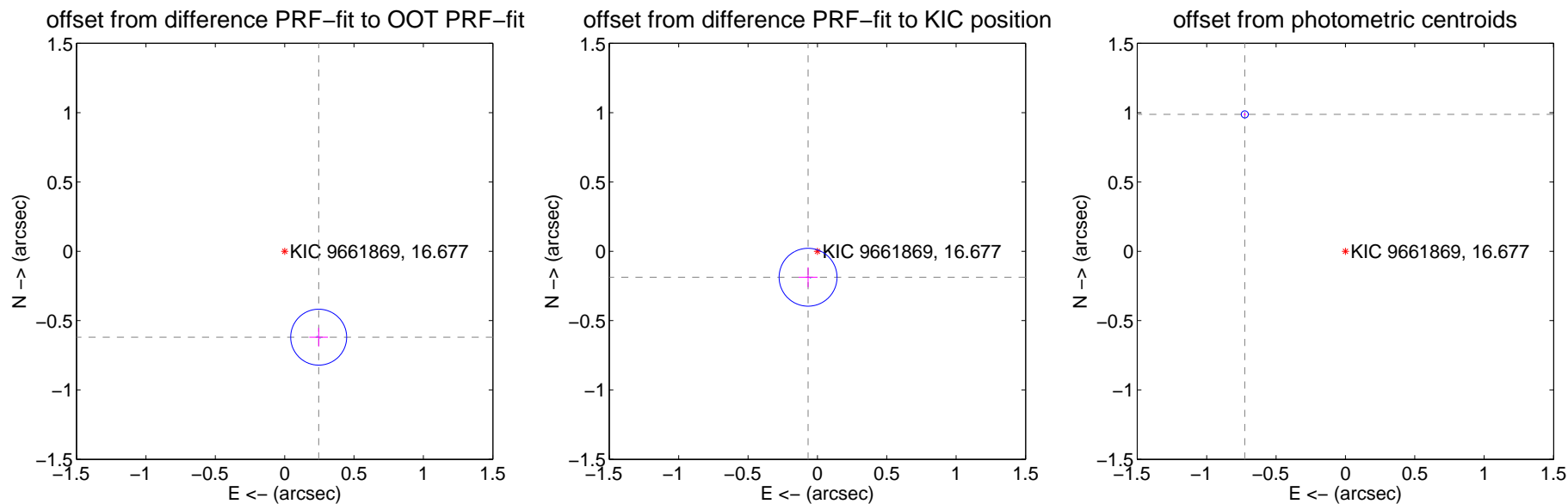
DV Centroid Data

Supplemental centroid analysis for 009661869-01. Kepler magnitude: 16.68. Transit SNR 564.20

There are 6 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.53 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.666 ± 0.067	9.91	-0.245 ± 0.067	-0.619 ± 0.067
PRF-fit source offset from KIC position	0.199 ± 0.070	2.86	0.067 ± 0.068	-0.187 ± 0.071
photometric centroid source offset	1.23 ± 0.01	144.07	0.73 ± 0.01	0.99 ± 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.

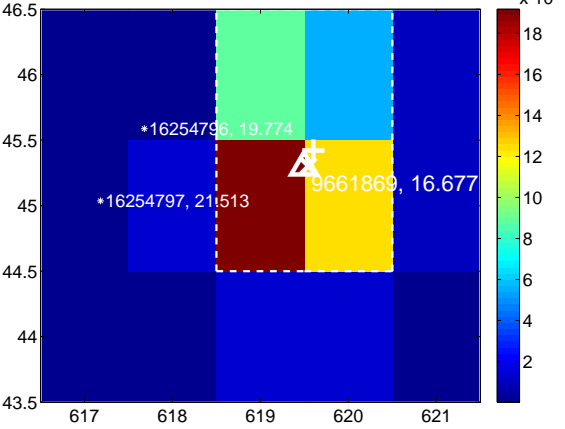
Q9 no difference image



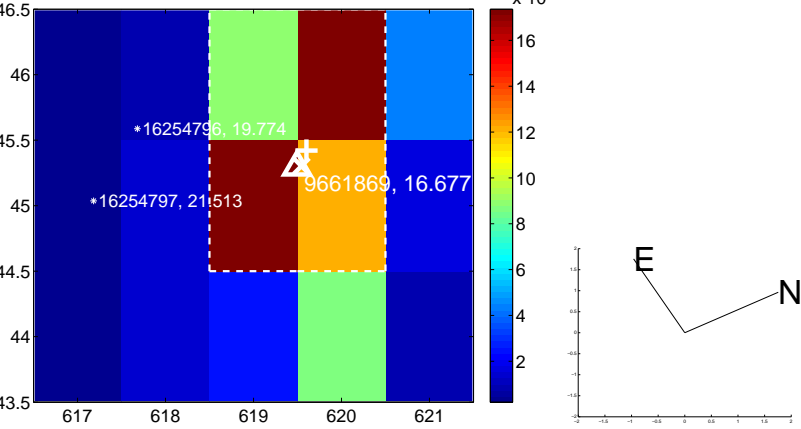
Q9 no OOT image



Q10 difference image



Q10 OOT image



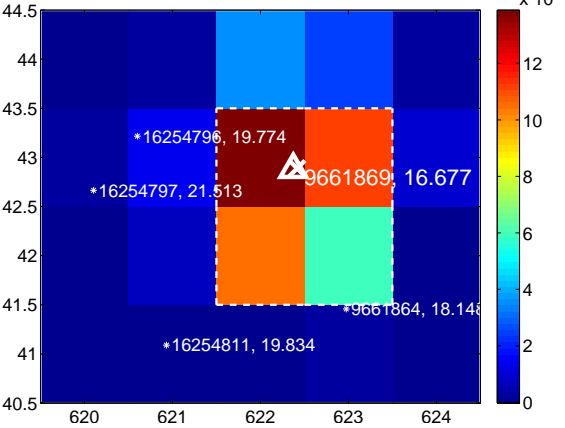
Q11 no difference image



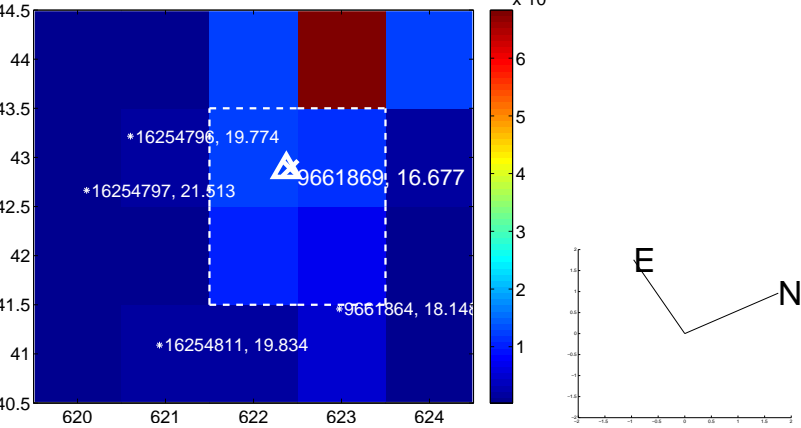
Q11 no OOT image



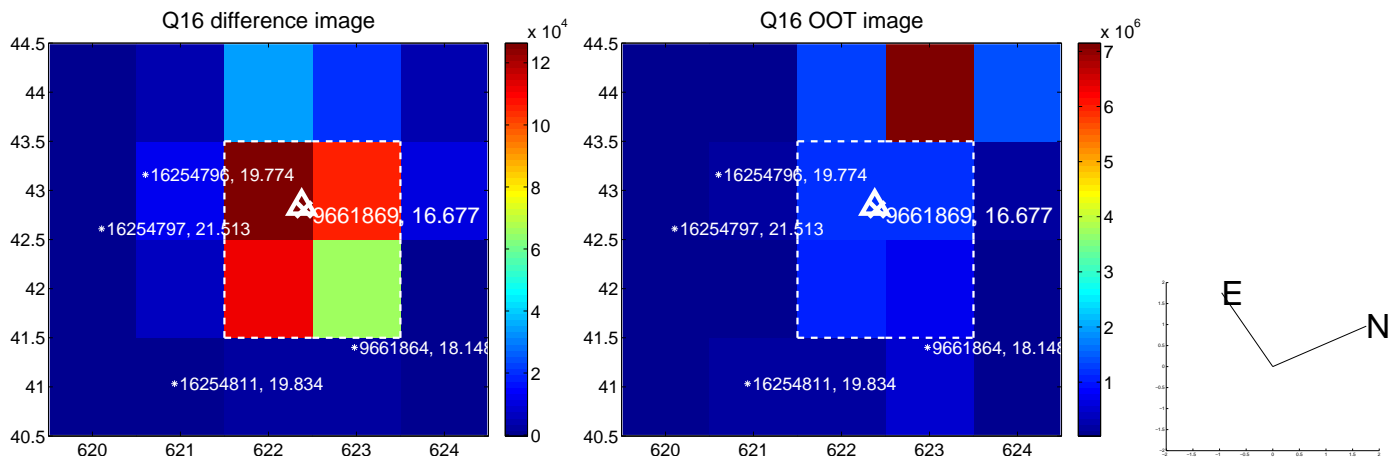
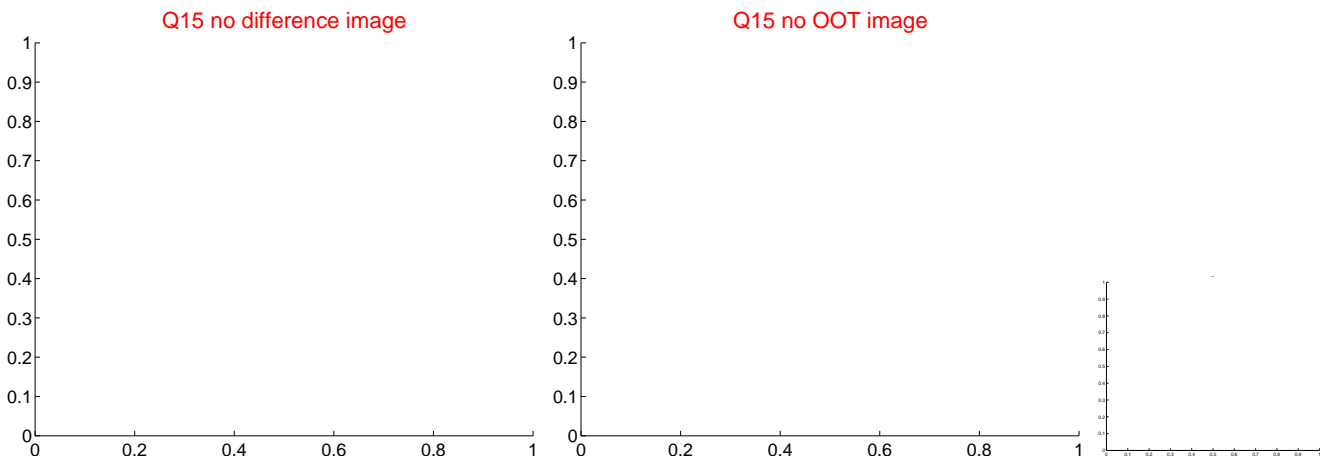
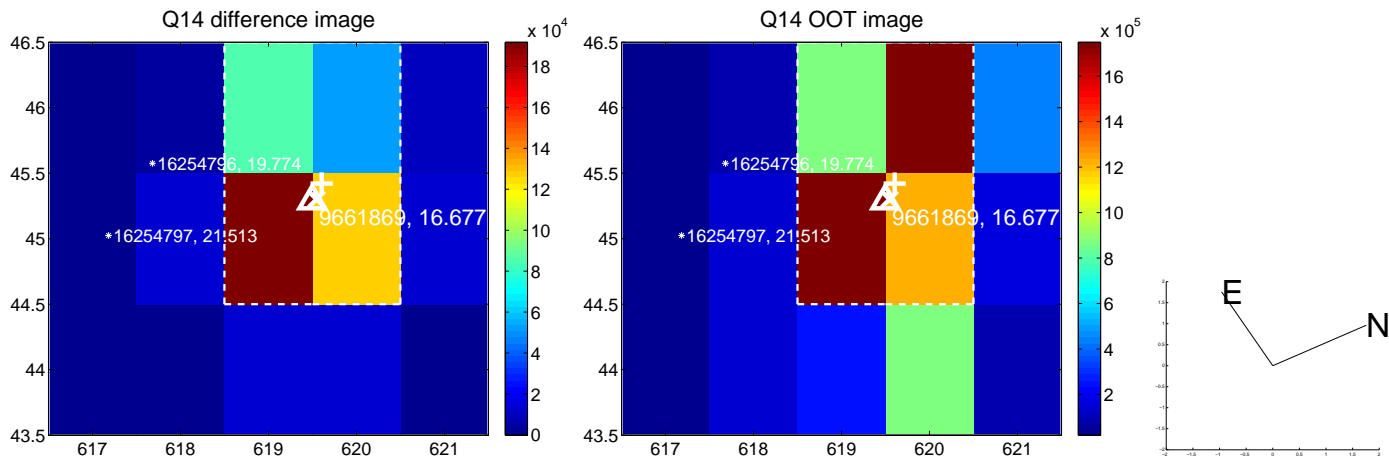
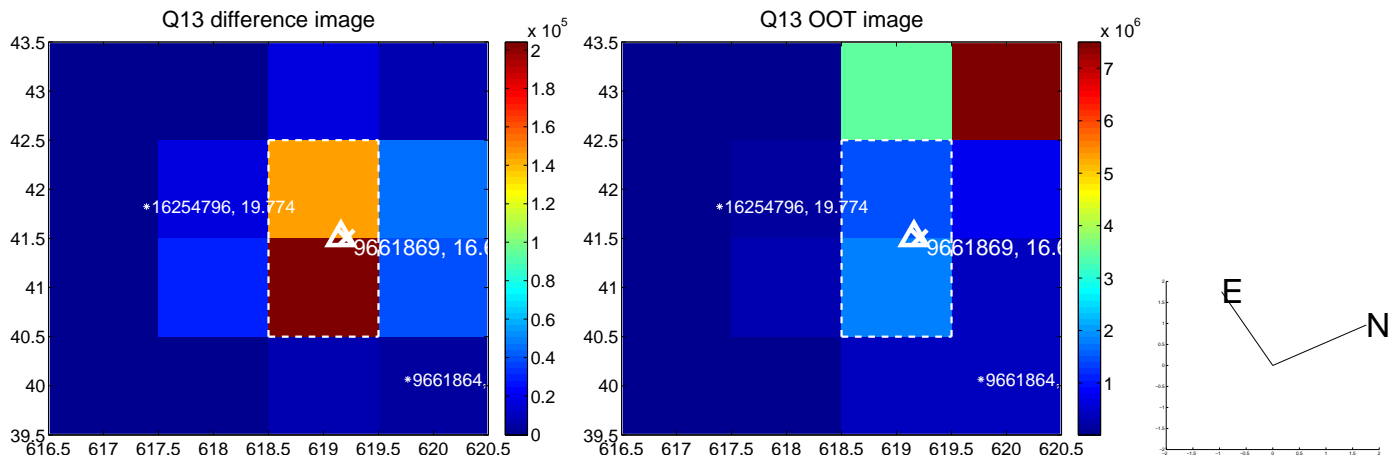
Q12 difference image



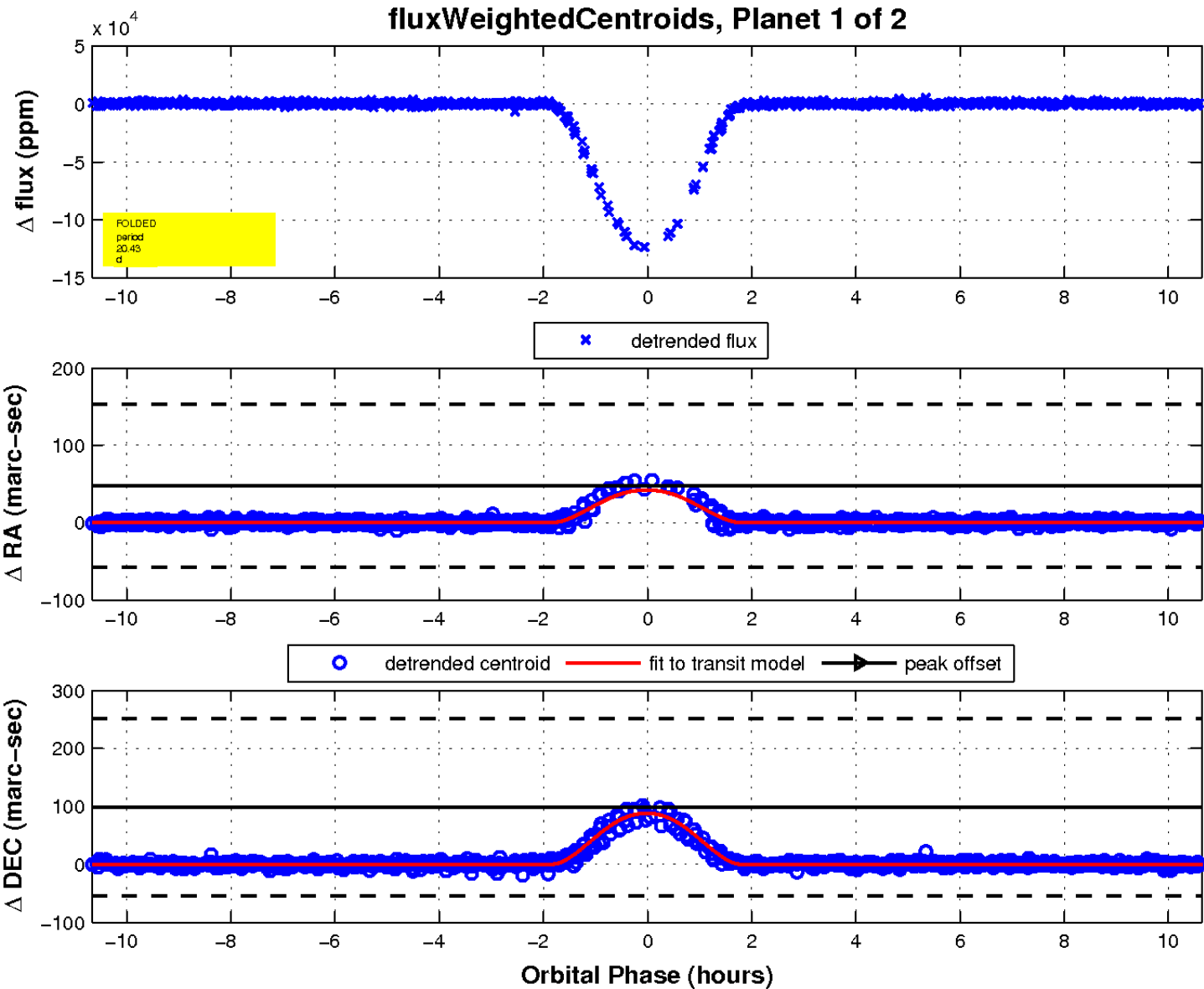
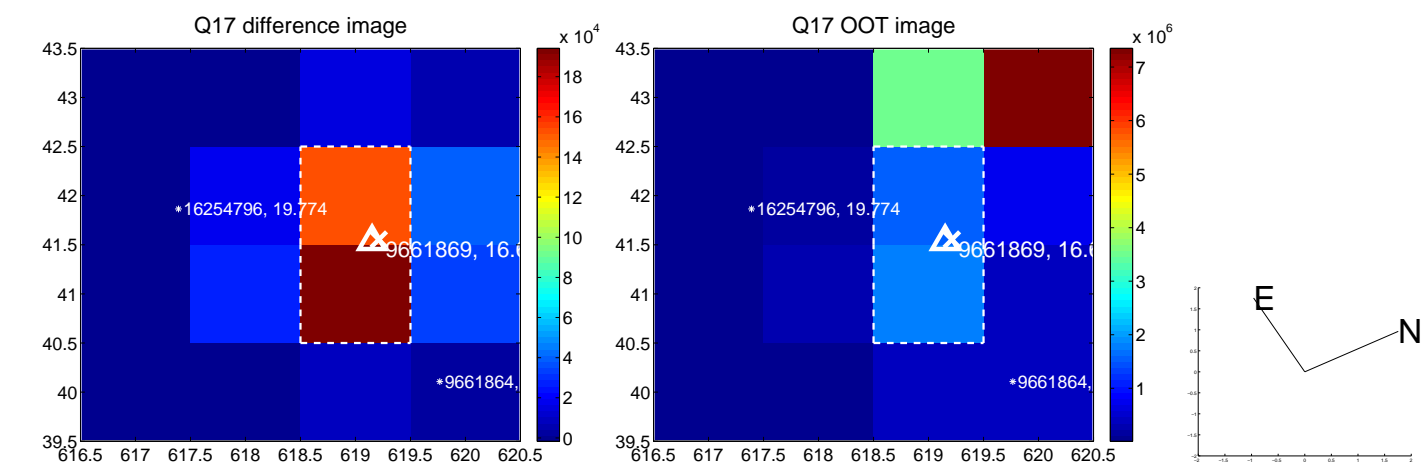
Q12 OOT image



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

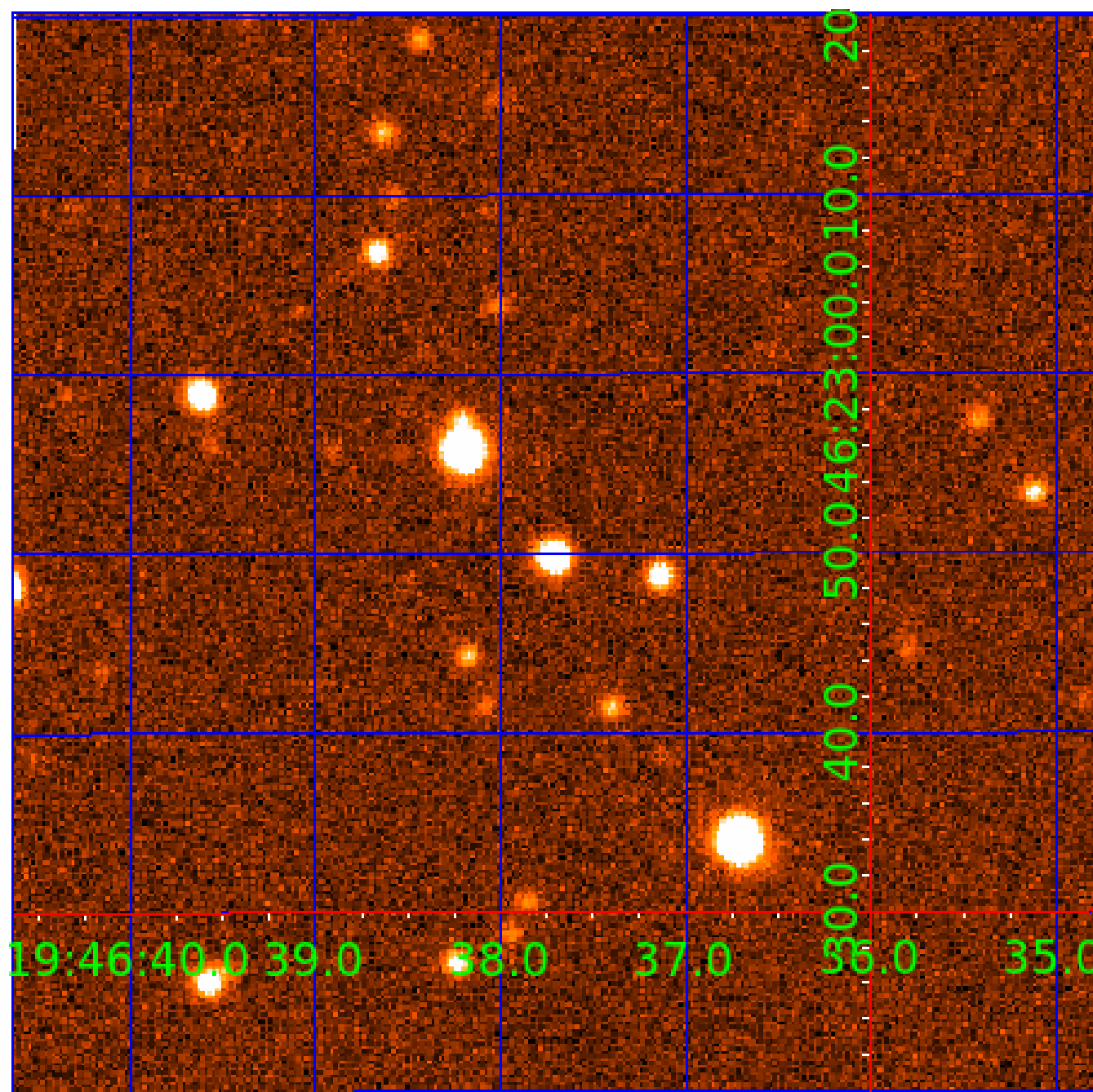


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 009661869

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})
009661869-01	OBS	3647.01	20.427216	135.863482	117588.2	3.555	823.7	564.2	1.12	6167	42.94	74.36
009661869-02	OBS	No	20.426602	147.420273	1444.3	2.890	9.3	9.8	1.12	6167	8.07	74.36

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009661869-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—MOD_ODDEVEN_DV—DEEP_V_SHAPED—HAS_SEC_TCE—CENT_KIC_POS
009661869-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE—CENT_KIC_POS

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

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

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

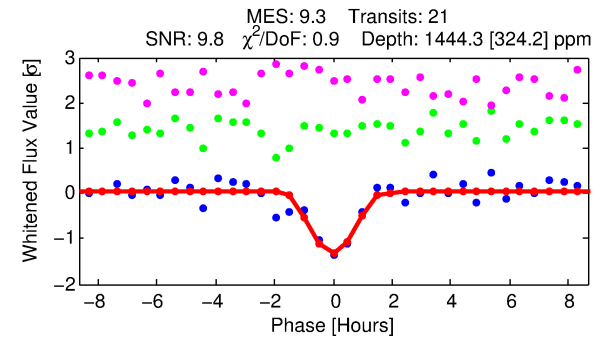
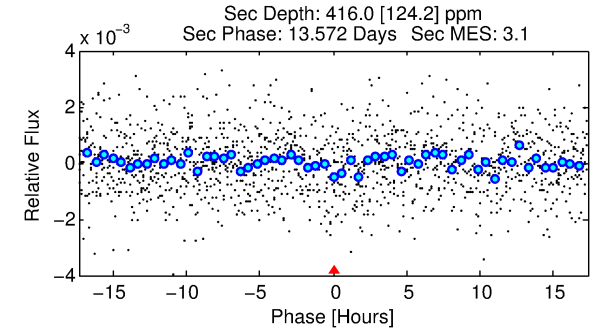
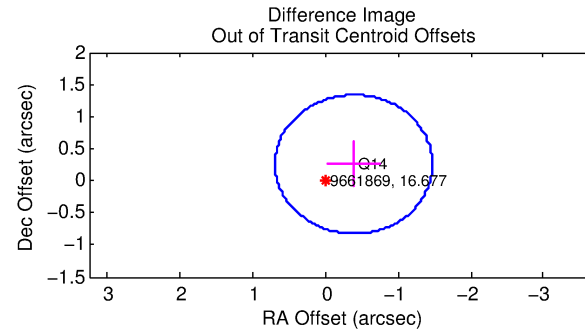
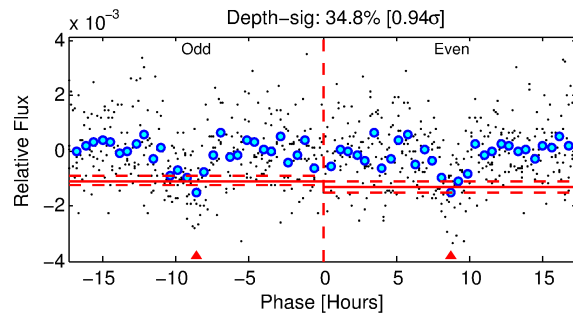
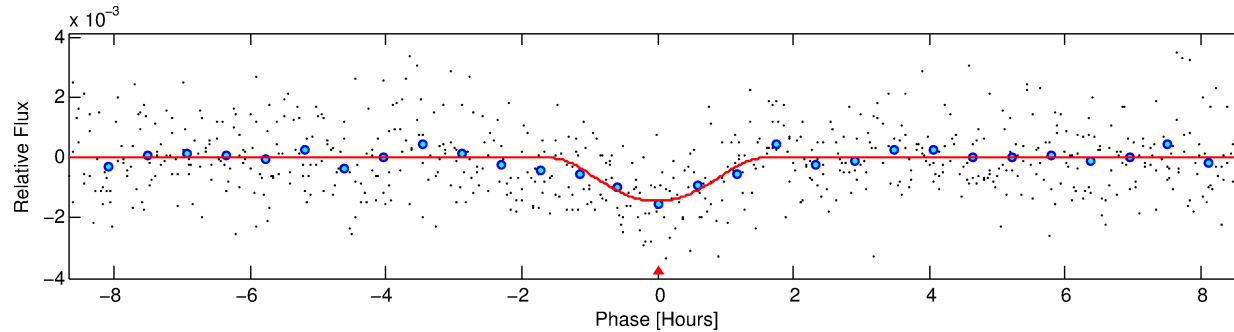
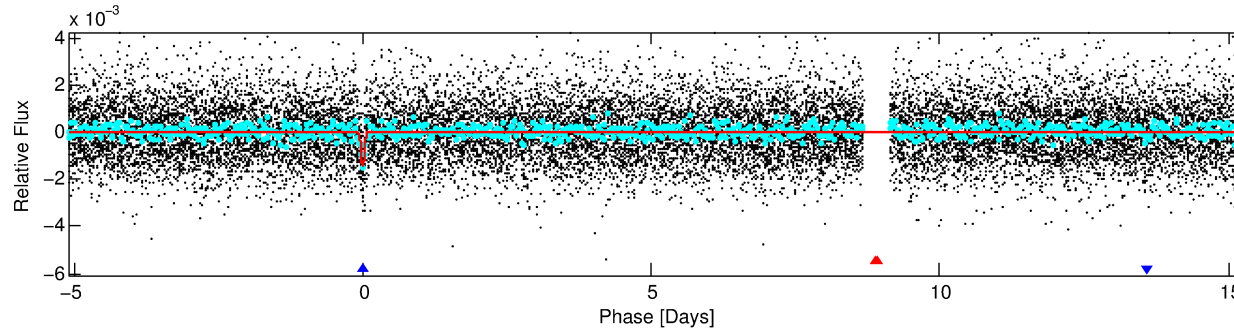
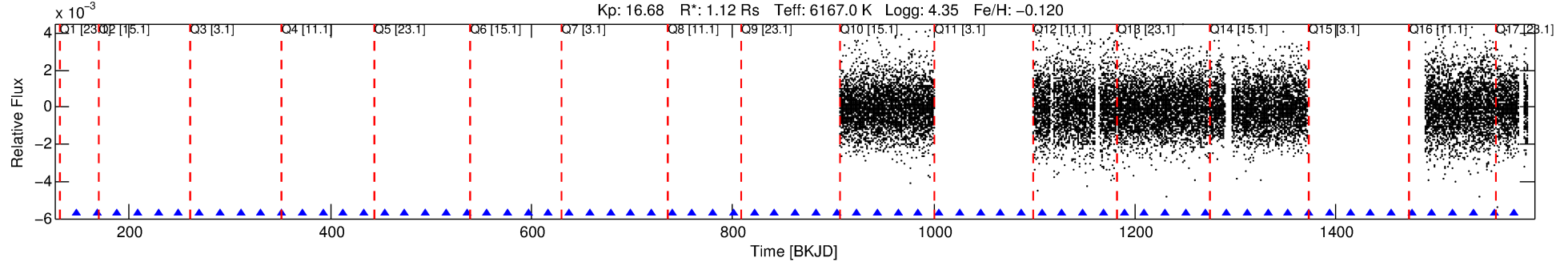
Ephemeris Match Information For 009661869-02

No Significant Match Found

DV One-Page Summary

KIC: 9661869 Candidate: 2 of 2 Period: 20.427 d
KOI: K03647 Corr: No Ephemeris Match

Kp: 16.68 R*: 1.12 Rs Teff: 6167.0 K Logg: 4.35 Fe/H: -0.120



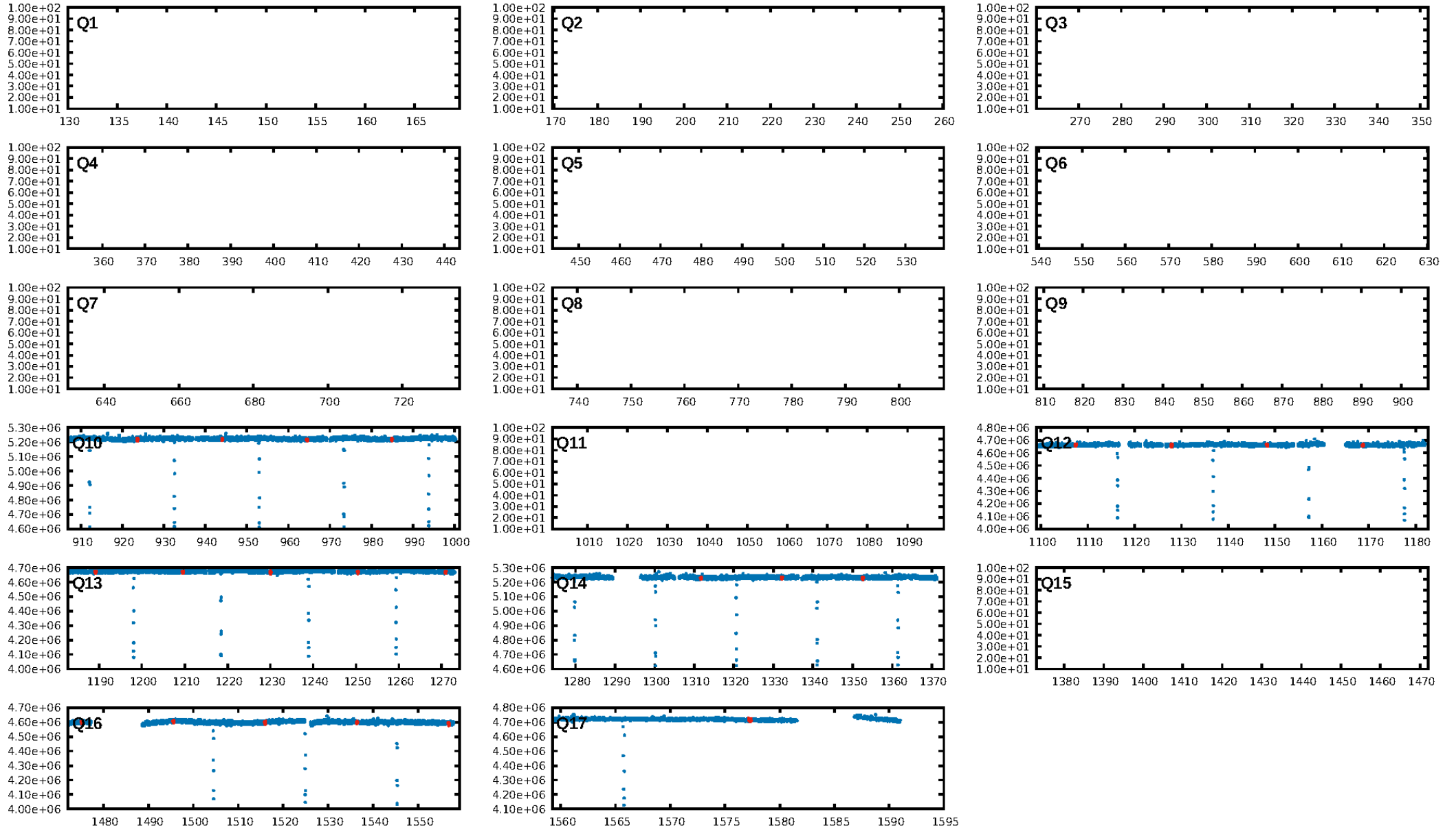
DV Fit Results:

Period = 20.42660 [0.00039] d
Epoch = 147.4203 [0.0211] BKJD
Rp/R* = 0.0660 [0.3410]
a/R* = 20.01 [23.97]
b = 1.00 [0.48]
Seff = 74.36 [30.04]
Teq = 749 [76] K
Rp = 8.07 [41.80] Re
a = 0.1480 [0.0387] AU
Ag = 76.89 [795.50] [0.10σ]
Teffp = 3428 [8862] K [0.30σ]

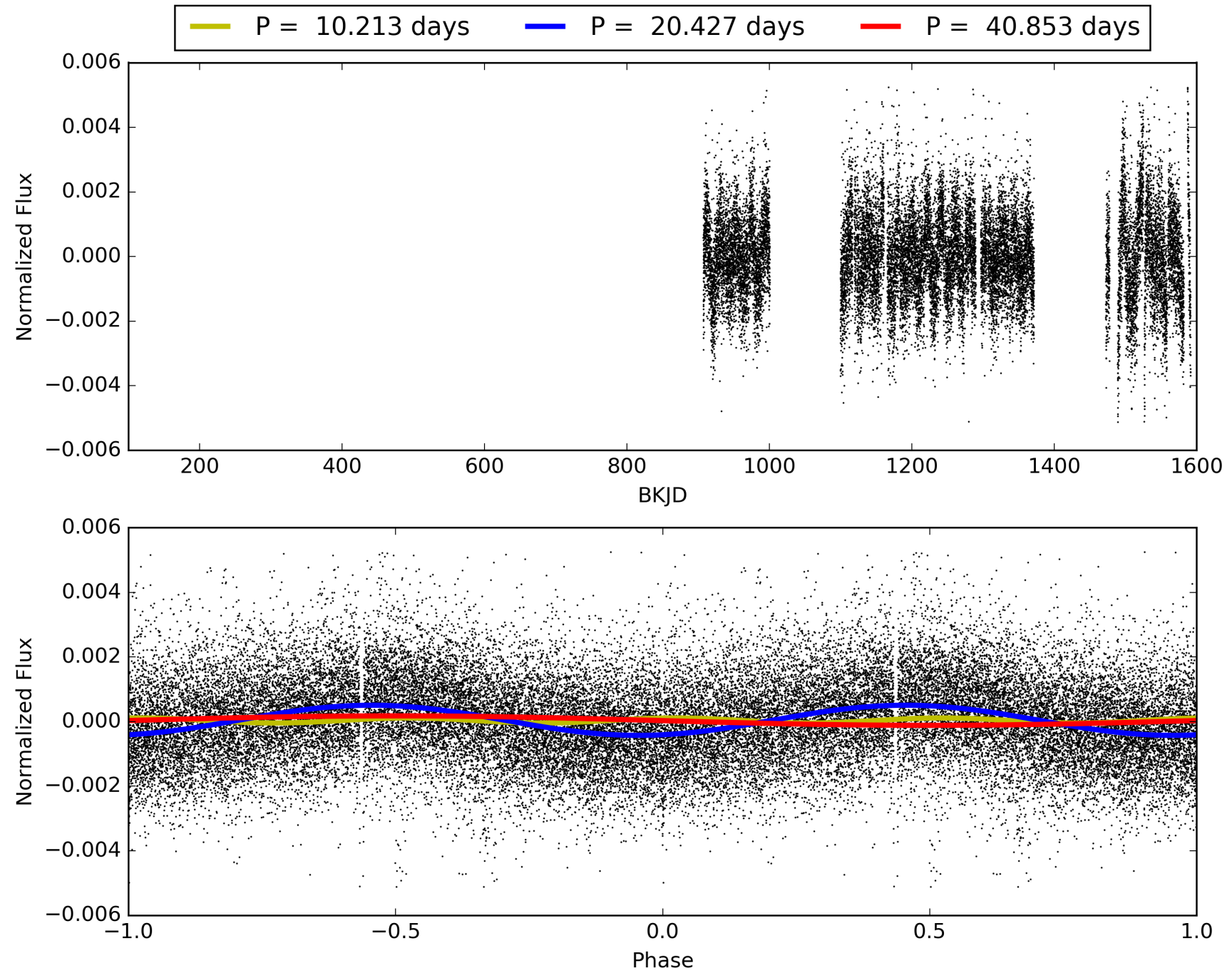
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 0.3% [0.00σ]
ModelChiSquare2-sig: 98.2%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 4.46e-20
RollingBand-fgt: 1.00 [20/20]
GhostDiagnostic-chr: 73
Centroid-sig: 2.5%
Centroid-so: 1.584 arcsec [2.32σ]
OotOffset-rm: 0.466 arcsec [1.29σ]
KicOffset-rm: 0.245 arcsec [0.60σ]
OotOffset-st: 1/0/0/0 [1]
KicOffset-st: 1/0/2/1 [4]
DiffImageQuality-fgm: 0.50 [2/4]
DiffImageOverlap-fno: 1.00 [6/6]

TCE 009661869-02, PDC Light Curves

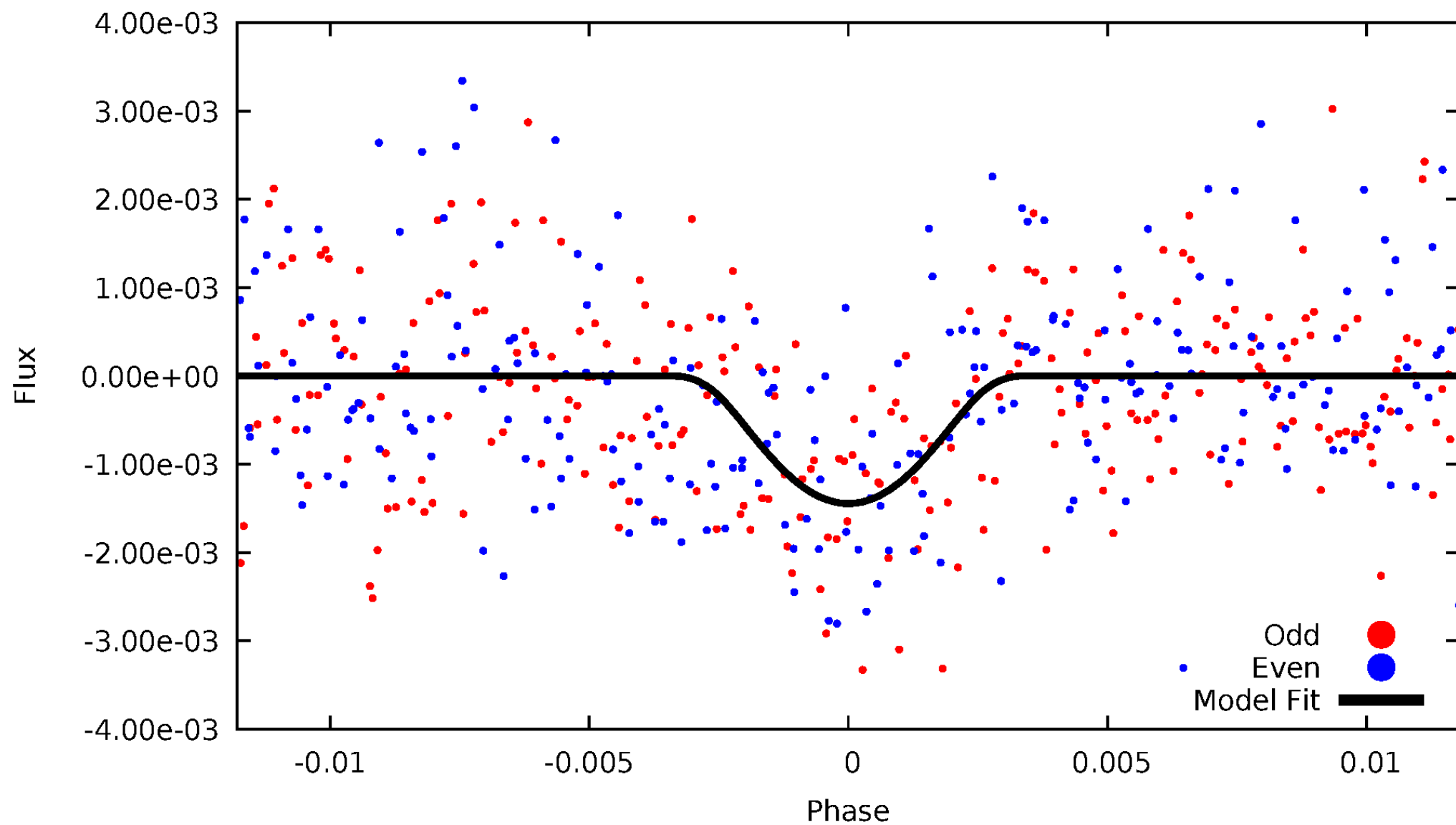


TCE 009661869-02



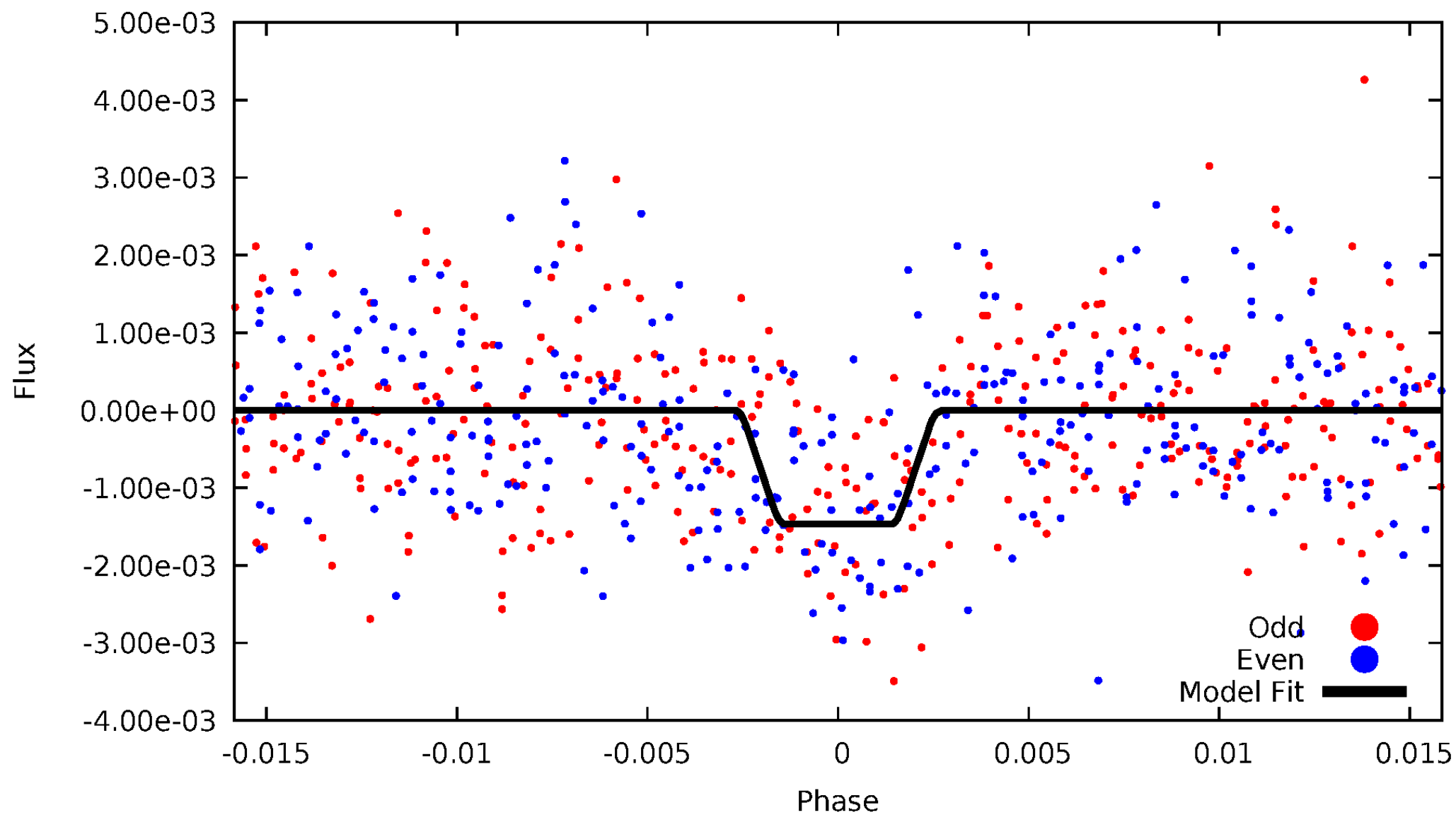
DV Odd/Even

TCE 009661869-02



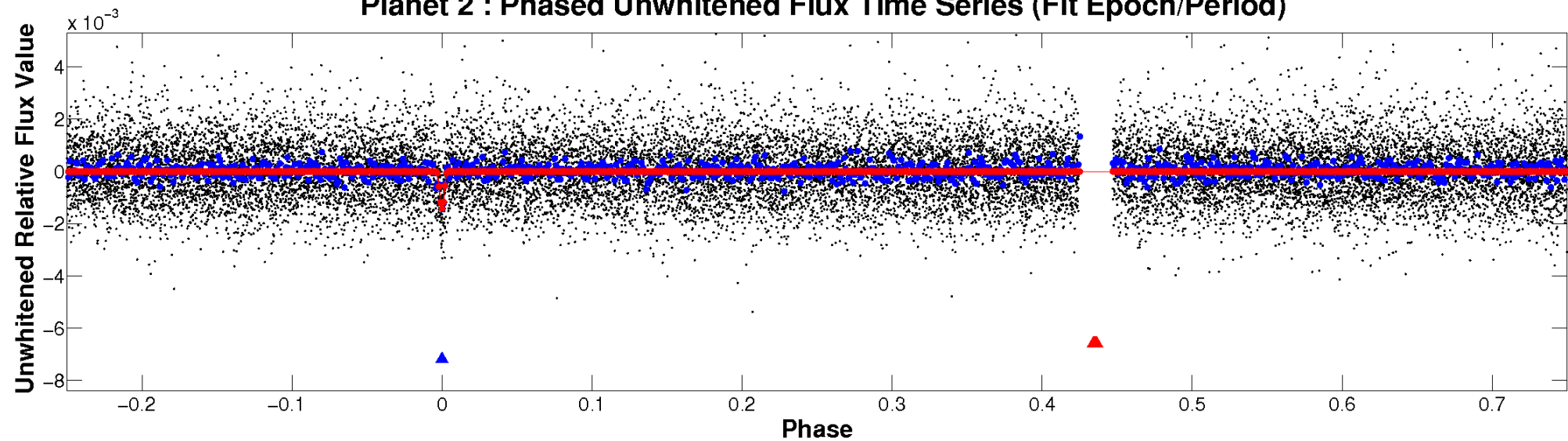
ALT Odd/Even

TCE 009661869-02

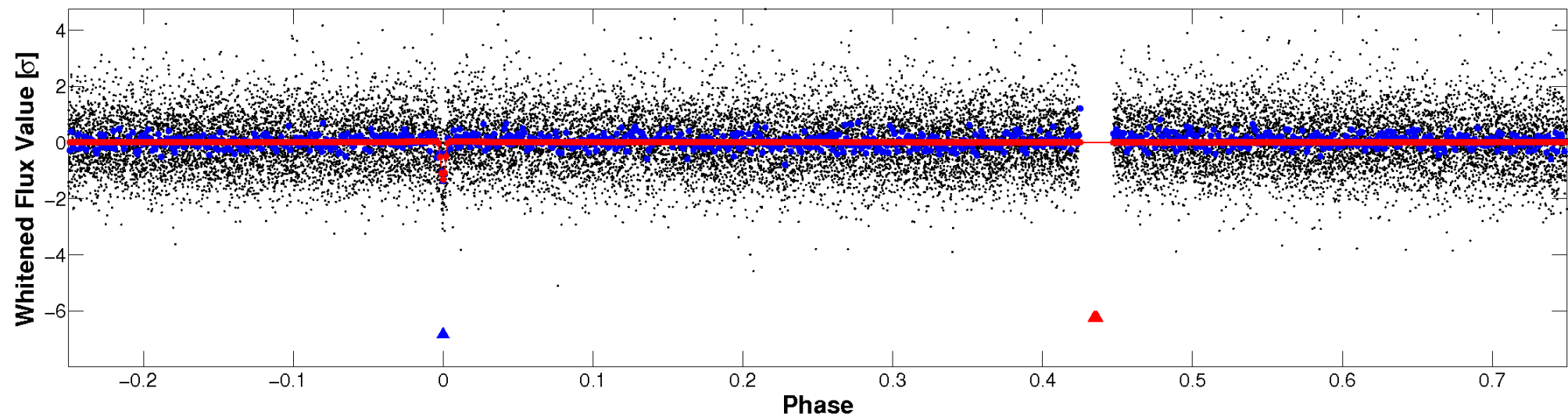


Non-Whitened Vs. Whitened Light Curve

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

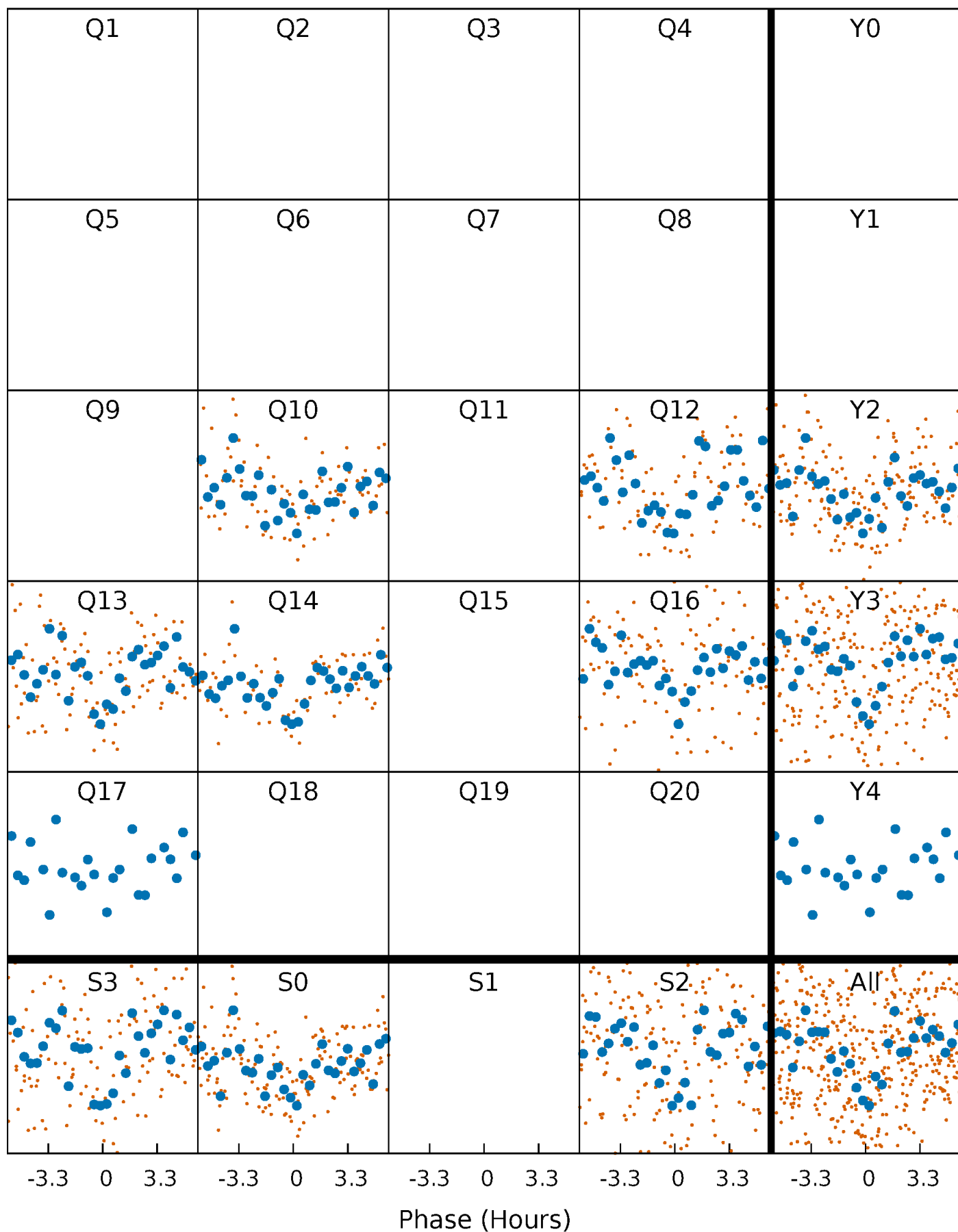


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



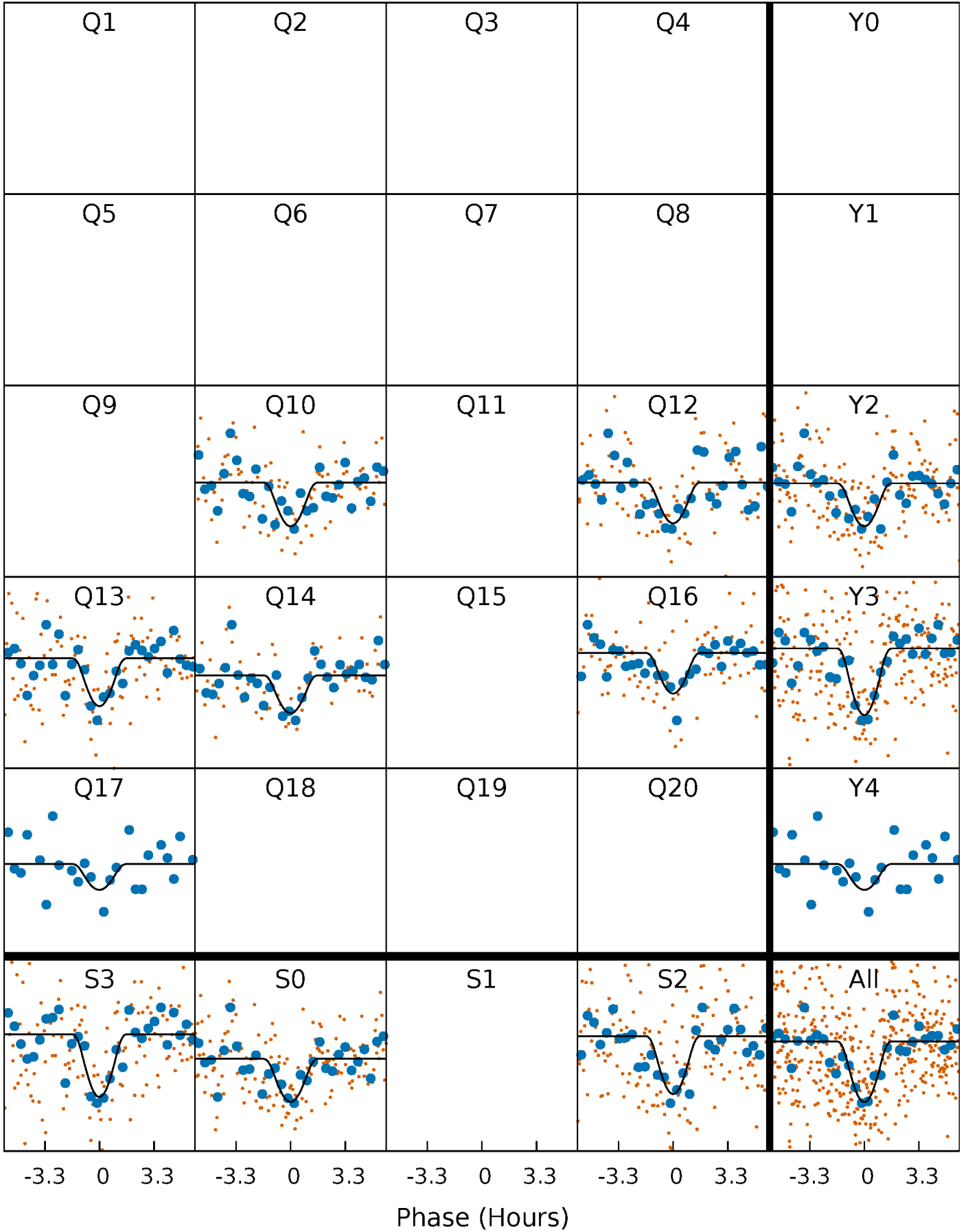
PDC Quarter-Phased Transit Curves

TCE 009661869-02 P= 20.426602 Days $T_0=147.420273$ (BKJD)



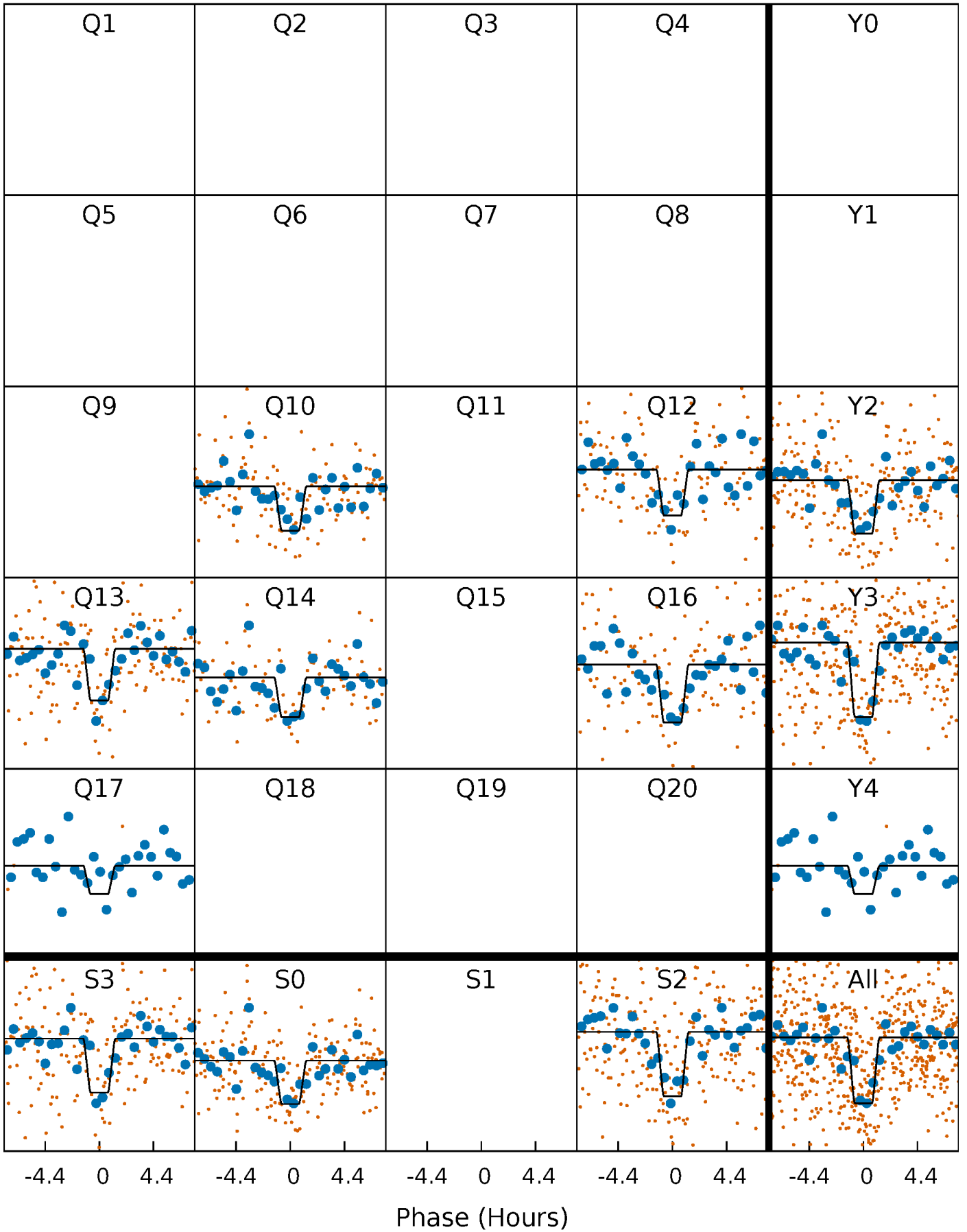
DV Quarter-Phased Transit Curves

TCE 009661869-02 P= 20.426602 Days $T_0=147.420273$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

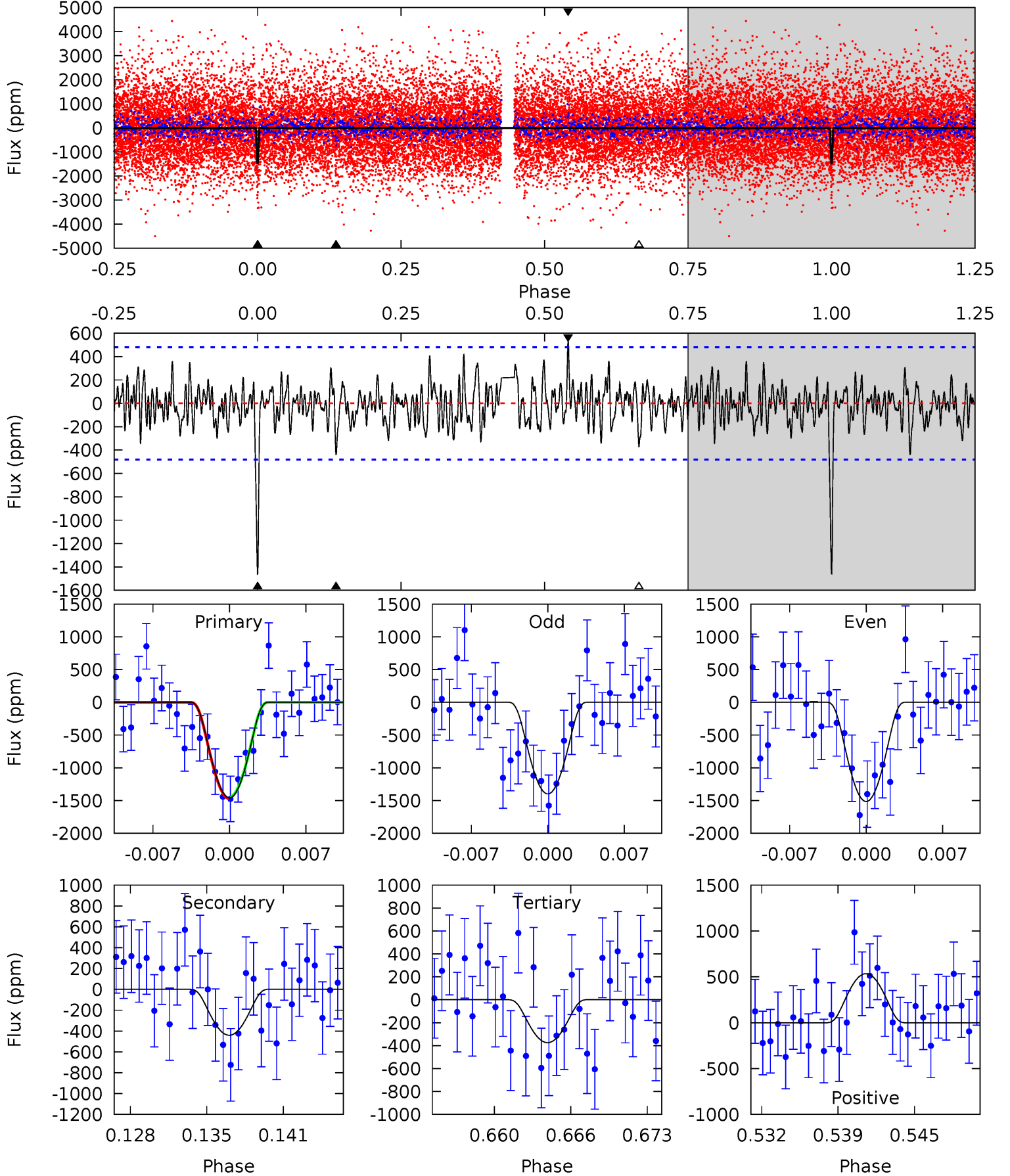
TCE 009661869-02 P= 20.426472 Days $T_0=147.419384$ (BKJD)



DV Model-Shift Uniqueness Test

009661869-02, P = 20.426602 Days, E = 147.420273 Days

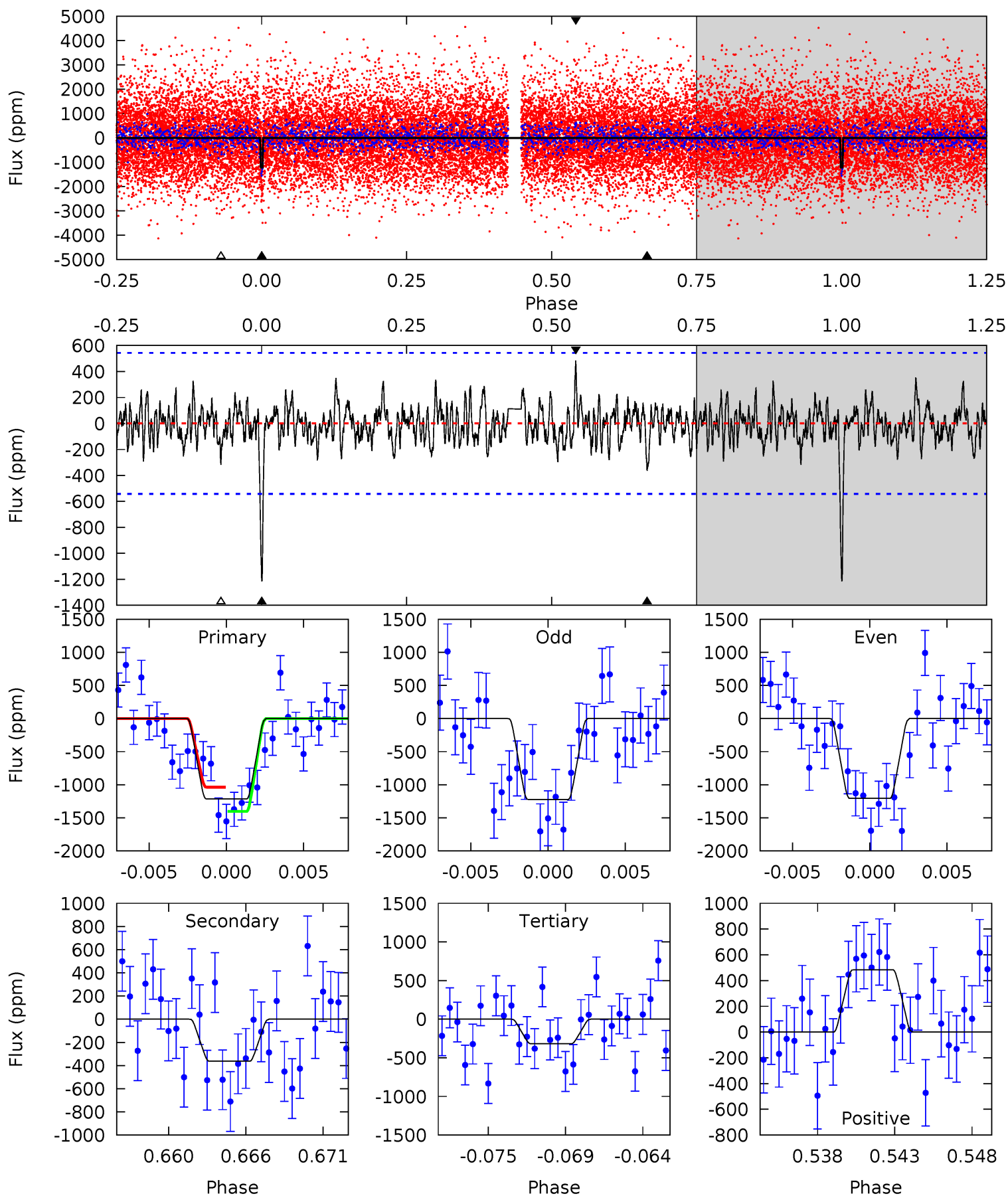
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
15.5	4.67	3.97	5.67	5.10	2.71	1.47	11.5	9.83	0.70	-1.00	0.62	0.98	0.27	0.14



Alt Model-Shift Uniqueness Test

009661869-02, $P = 20.426472$ Days, $E = 147.419384$ Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.5	3.44	3.01	4.58	5.15	2.79	1.11	8.50	6.94	0.42	-1.14	0.08	0.94	0.28	1.73



Stellar Parameters For KIC 009661869

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	6167^{+193}_{-236}	$4.354^{+0.108}_{-0.201}$	$-0.120^{+0.250}_{-0.300}$	$1.121^{+0.355}_{-0.164}$	$1.032^{+0.181}_{-0.120}$	$1.032^{+0.591}_{-0.532}$
	+3%/-4%	+2%/-5%	+208%/-250%	+32%/-15%	+18%/-12%	+57%/-52%
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 009661869-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	A_{obs}
DV	-440 ± 94	$34.94^{+33.99}_{-24.15}$	1060^{+83}_{-66}	2532^{+1025}_{-442}	$4.531^{+46.106}_{-3.469}$
Alt.	-363 ± 106	$29.75^{+31.63}_{-21.22}$	1054^{+81}_{-64}	2531^{+1117}_{-462}	$4.684^{+52.784}_{-3.678}$

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

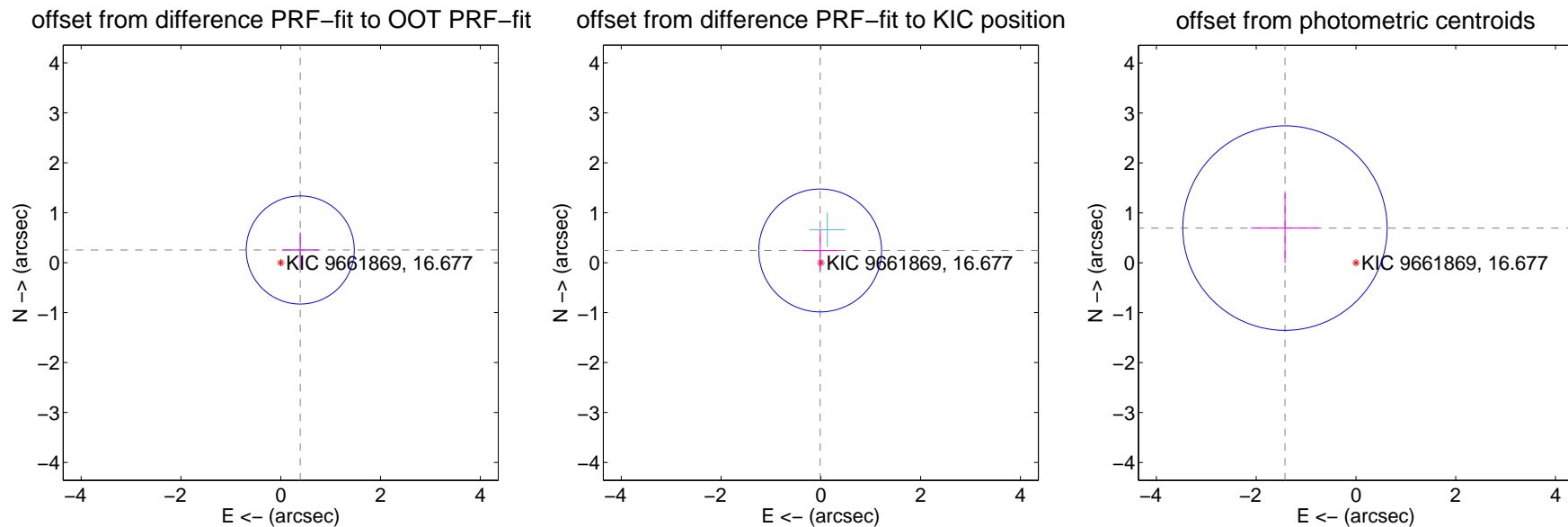
DV Centroid Data

Supplemental centroid analysis for 009661869-02. Kepler magnitude: 16.68. Transit SNR 9.82

There are 2 quarters with good PRF difference image offsets

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

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.466 ± 0.361	1.29	-0.391 ± 0.365	0.255 ± 0.351
PRF-fit source offset from KIC position	0.245 ± 0.410	0.60	0.014 ± 0.364	0.245 ± 0.410
photometric centroid source offset	1.58 ± 0.68	2.32	1.42 ± 0.68	0.69 ± 0.70



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.

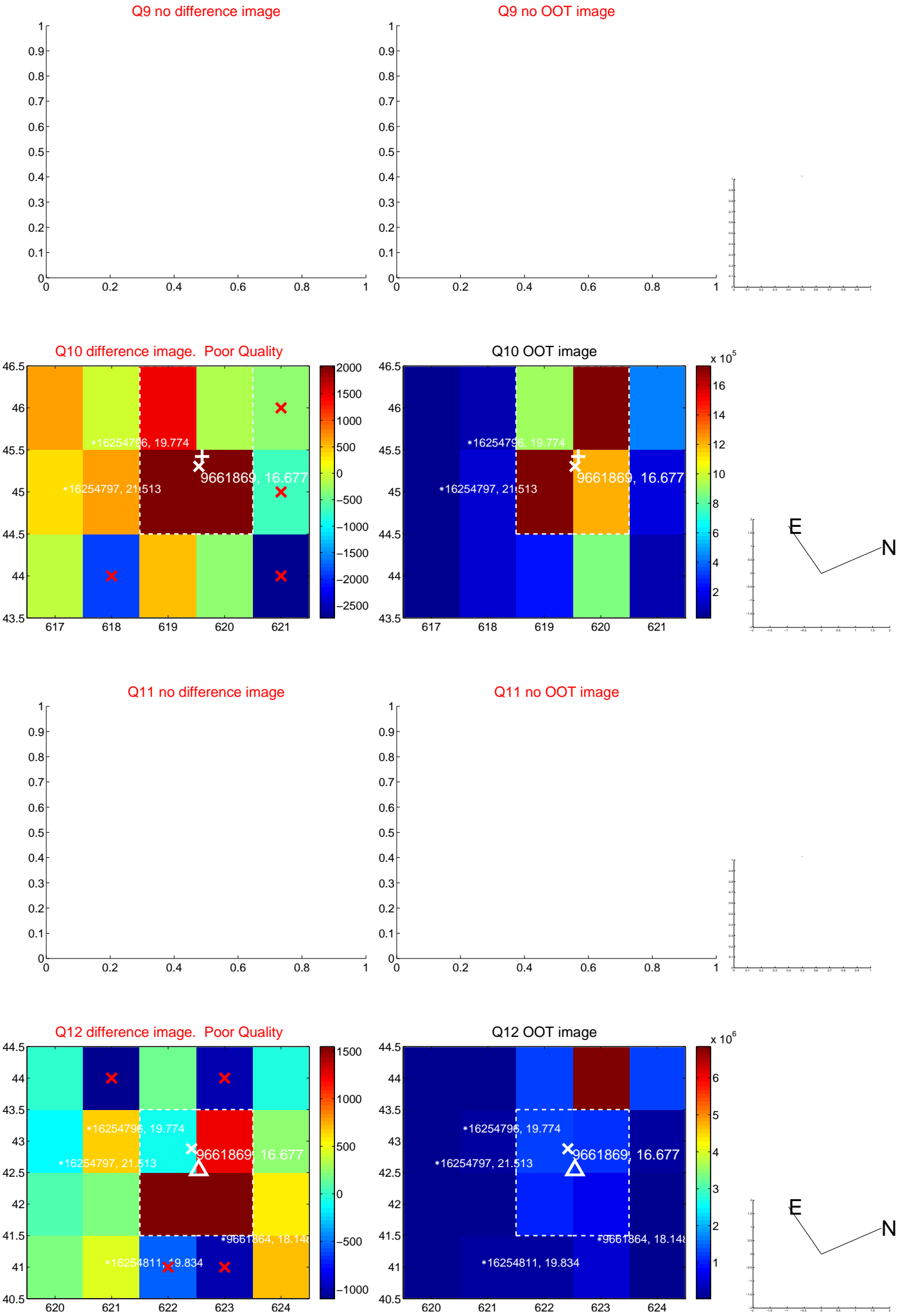
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



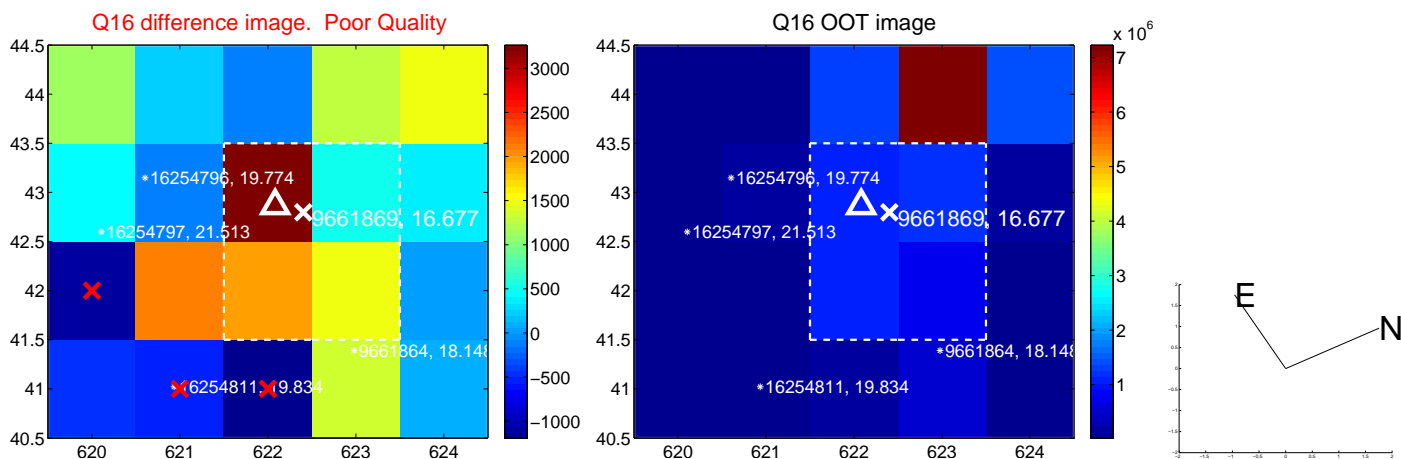
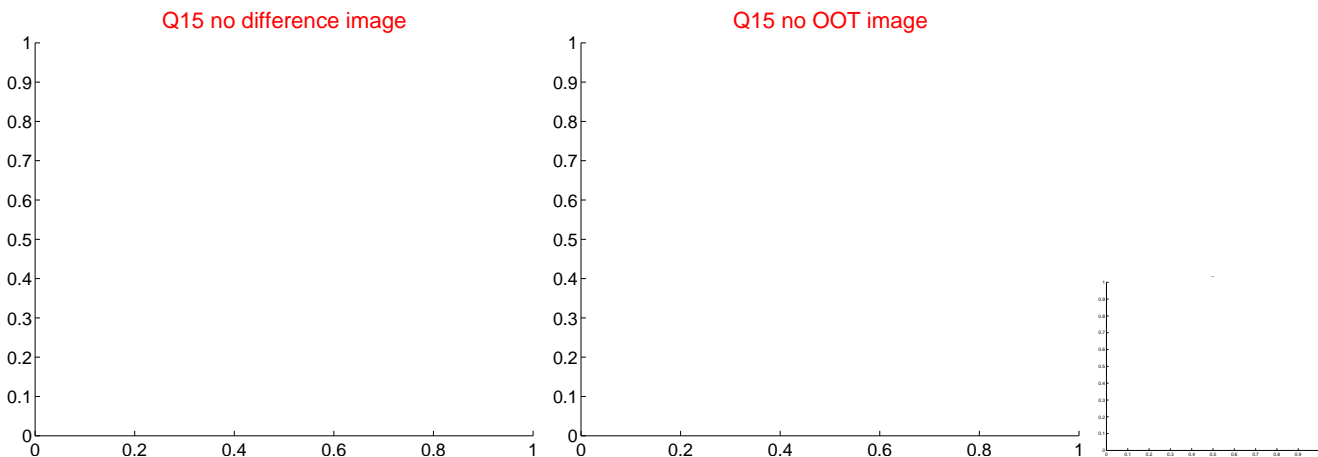
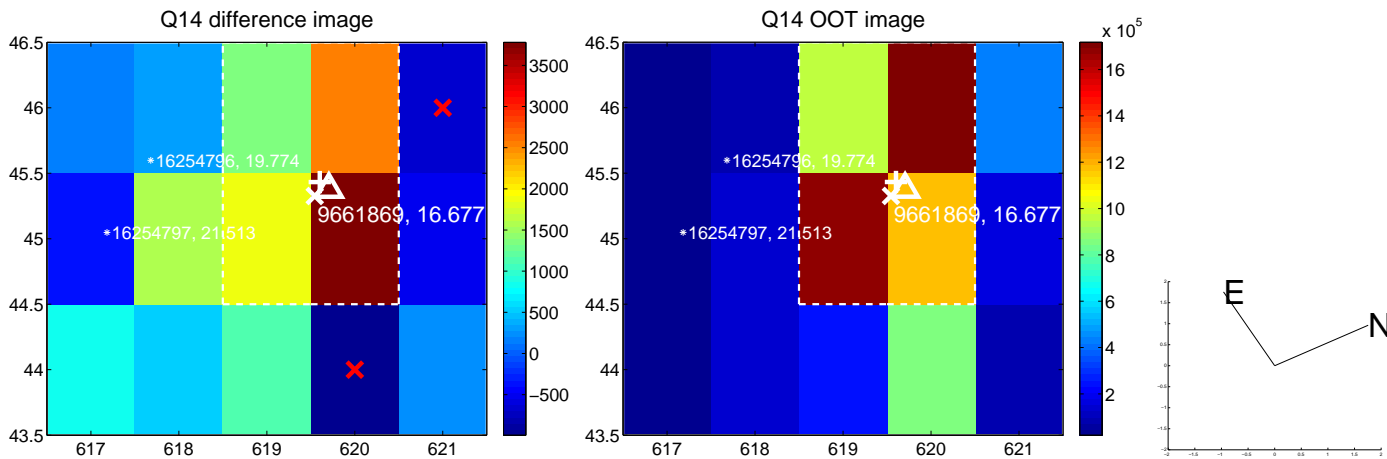
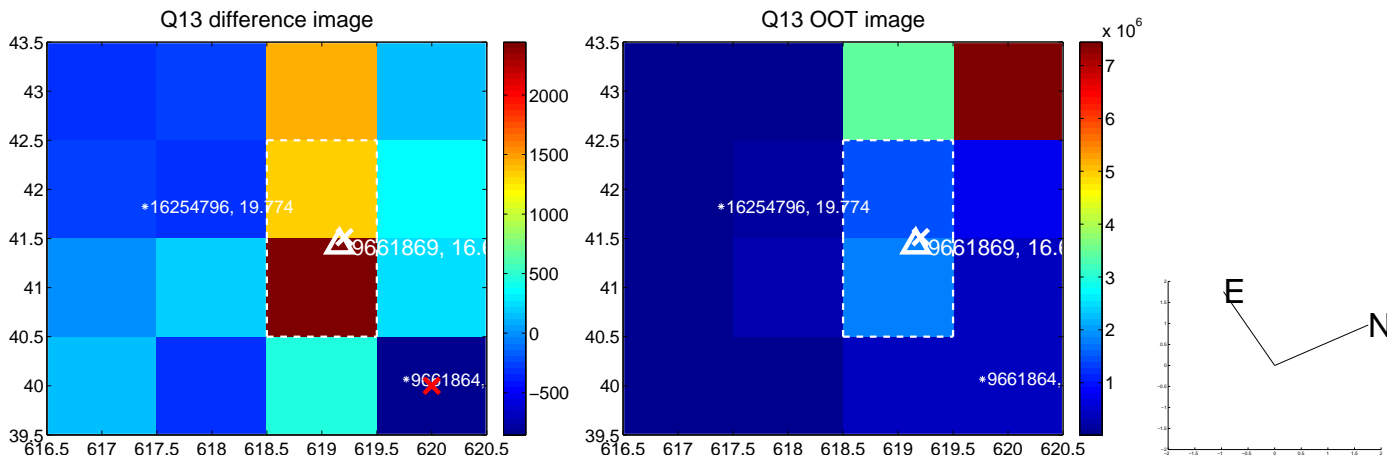
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



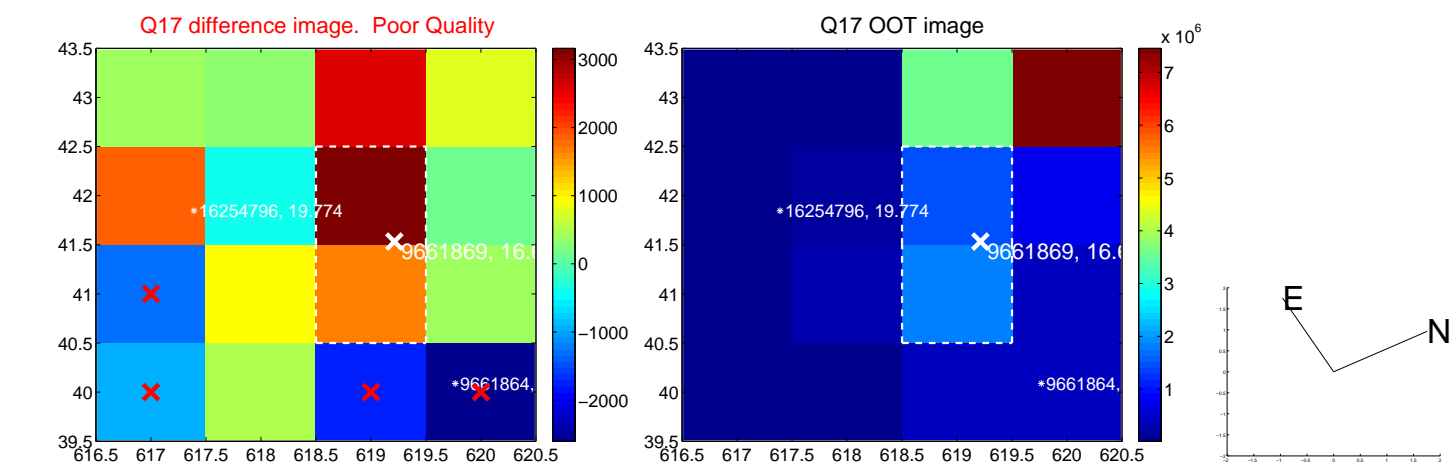
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



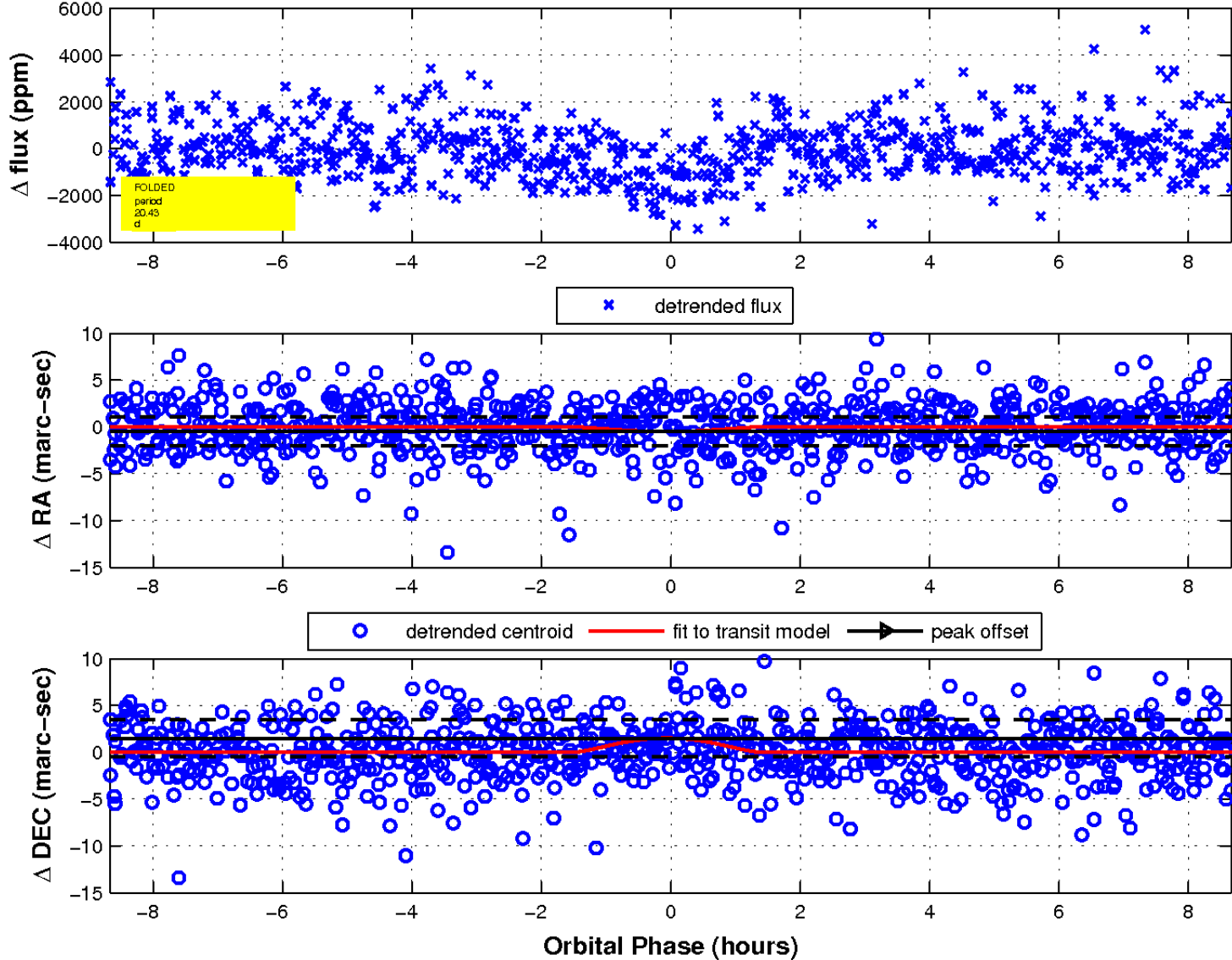
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

Declination

