

KIC 009048161

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})
009048161-01	OBS	0146.01	8.667817	137.342264	2298.6	4.865	379.7	226.0	1.89	6266	16.76	682.02
009048161-02	OBS	No	8.667796	133.018723	60.1	3.789	11.6	11.8	1.89	6266	1.71	682.02

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009048161-01	OBS	FP	0.00	0	1	1	1	MOD_SEC_DV—MOD_SEC_ALT—DEEP_V_SHAPED—HAS_SEC_TCE—CENT_RESOLVED_OFFSET—EPHEM_MATCH
009048161-02	OBS	FP	0.00	1	1	1	1	IS_SEC_TCE—CENT_RESOLVED_OFFSET—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 009048161-01

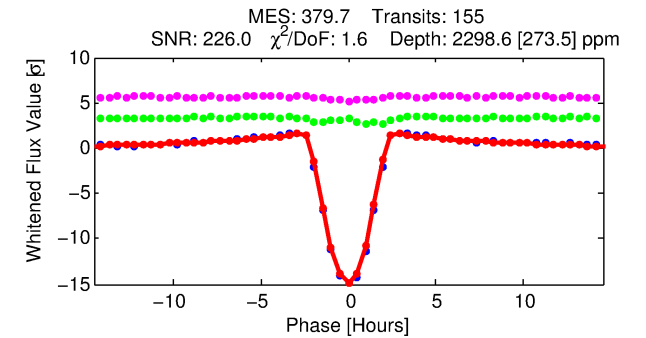
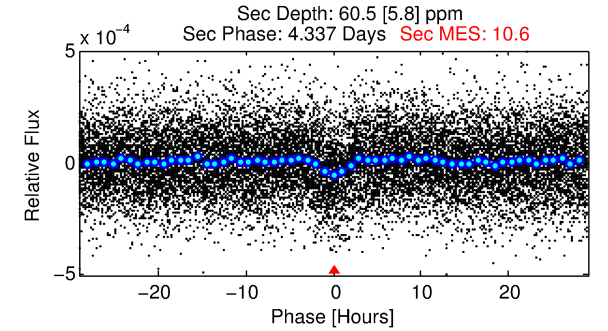
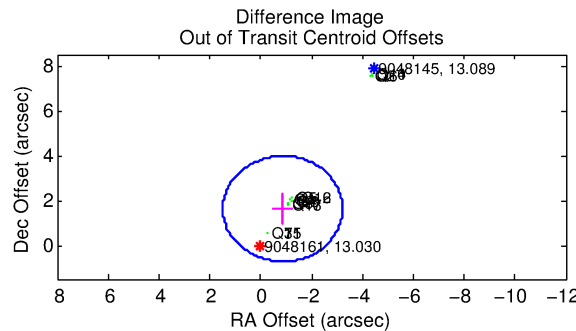
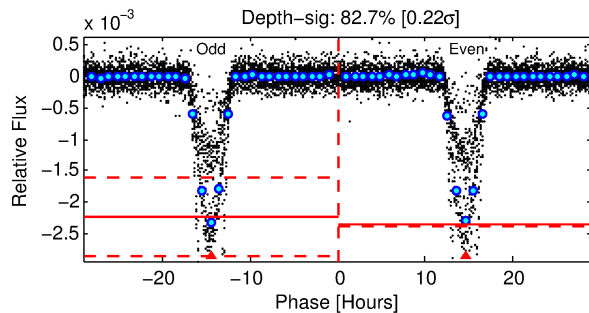
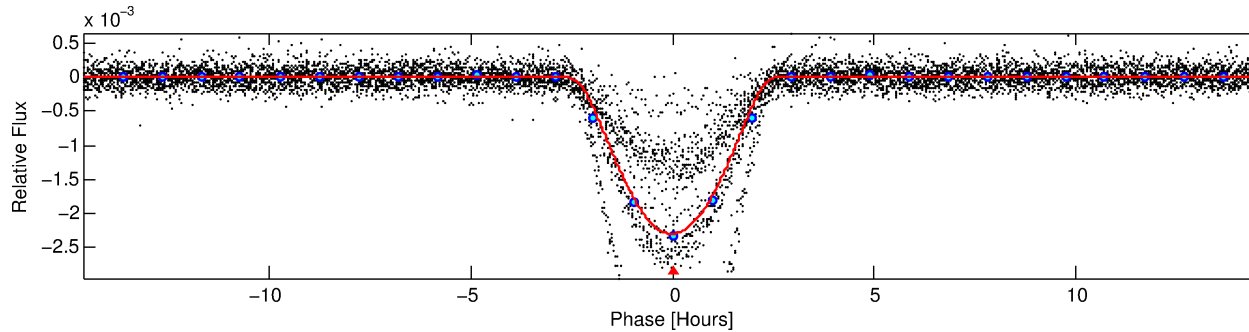
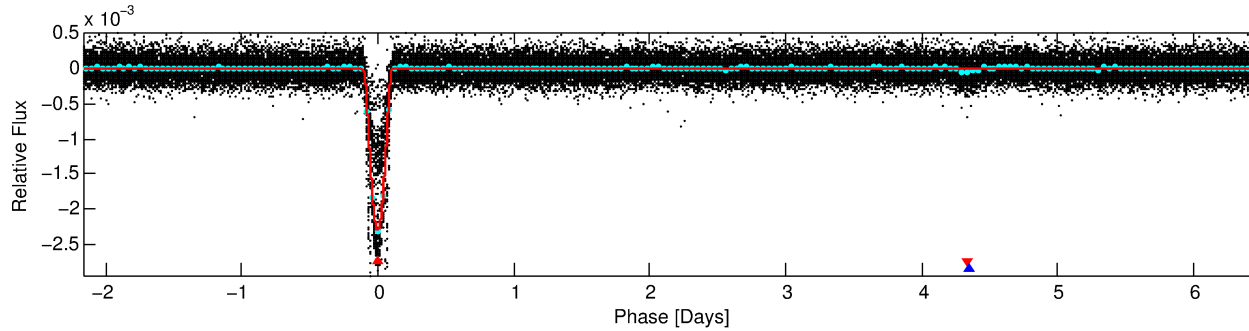
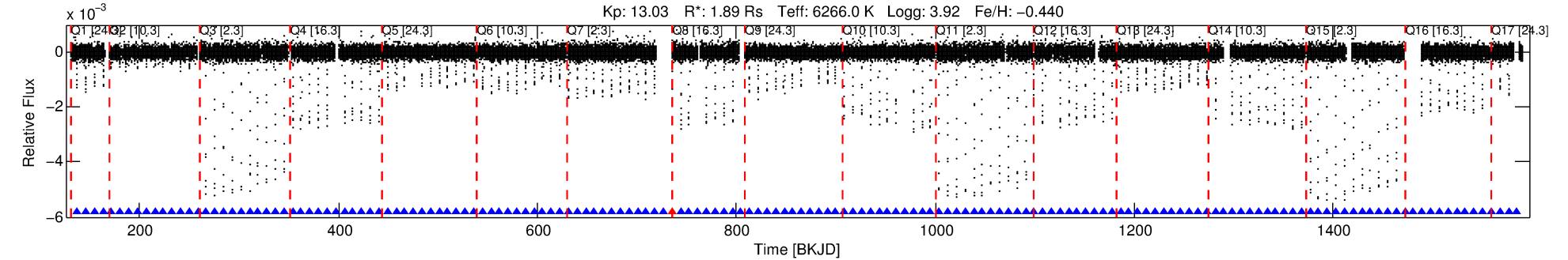
TCE (1)	KIC	Parent (2)	Parent KIC	$P_1:P_2$	Dist ($''$)	Δ Row	Δ Col	m_2	m_1	D_2/D_1	Mechanism	Flag	σ_P	σ_T
009048161-01	9048161	6063.01	9048145	1:1	9.0	0	2	13.09	13.03	19.35	Direct-PRF	0	0.05	0.03

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: 9048161 Candidate: 1 of 2 Period: 8.668 d
KOI: K00146.01 Corr: 0.974

Kp: 13.03 R*: 1.89 Rs Teff: 6266.0 K Logg: 3.92 Fe/H: -0.440



DV Fit Results:

Period = 8.66782 [0.00000] d
Epoch = 137.3423 [0.0004] BKJD
Rp/R* = 0.0813 [0.0121]
a/R* = 5.69 [0.18]
b = 1.00 [0.01]
Seff = 682.02 [515.25]
Teq = 1303 [246] K
Rp = 16.76 [7.97] Re
a = 0.0850 [0.0386] AU
Ag = 0.86 [0.69] [-0.21σ]
Teff = 1938 [164] K [2.15σ]

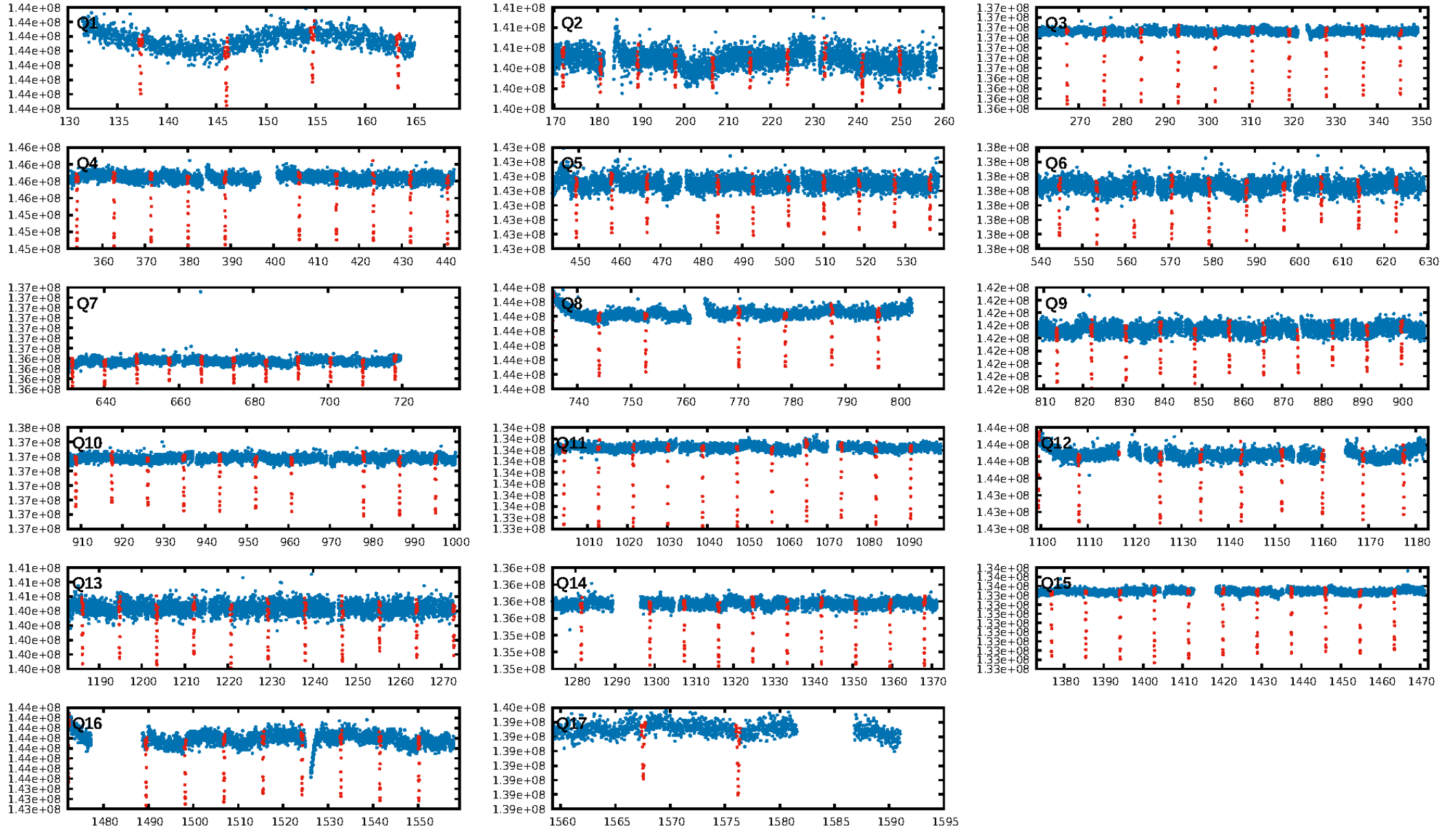
DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 0.0%
ModelChiSquareGof-sig: 1.3%
Bootstrap-pfa: 0.00e+00
RollingBand-fgt: 0.99 [148/149]
GhostDiagnostic-chr: -0.3151
Centroid-sig: 0.0%
Centroid-so: 31.818 arcsec [1006.80σ]
OotOffset-rm: 1.838 arcsec [2.35σ]
KicOffset-rm: 9.132 arcsec [125.90σ]
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]

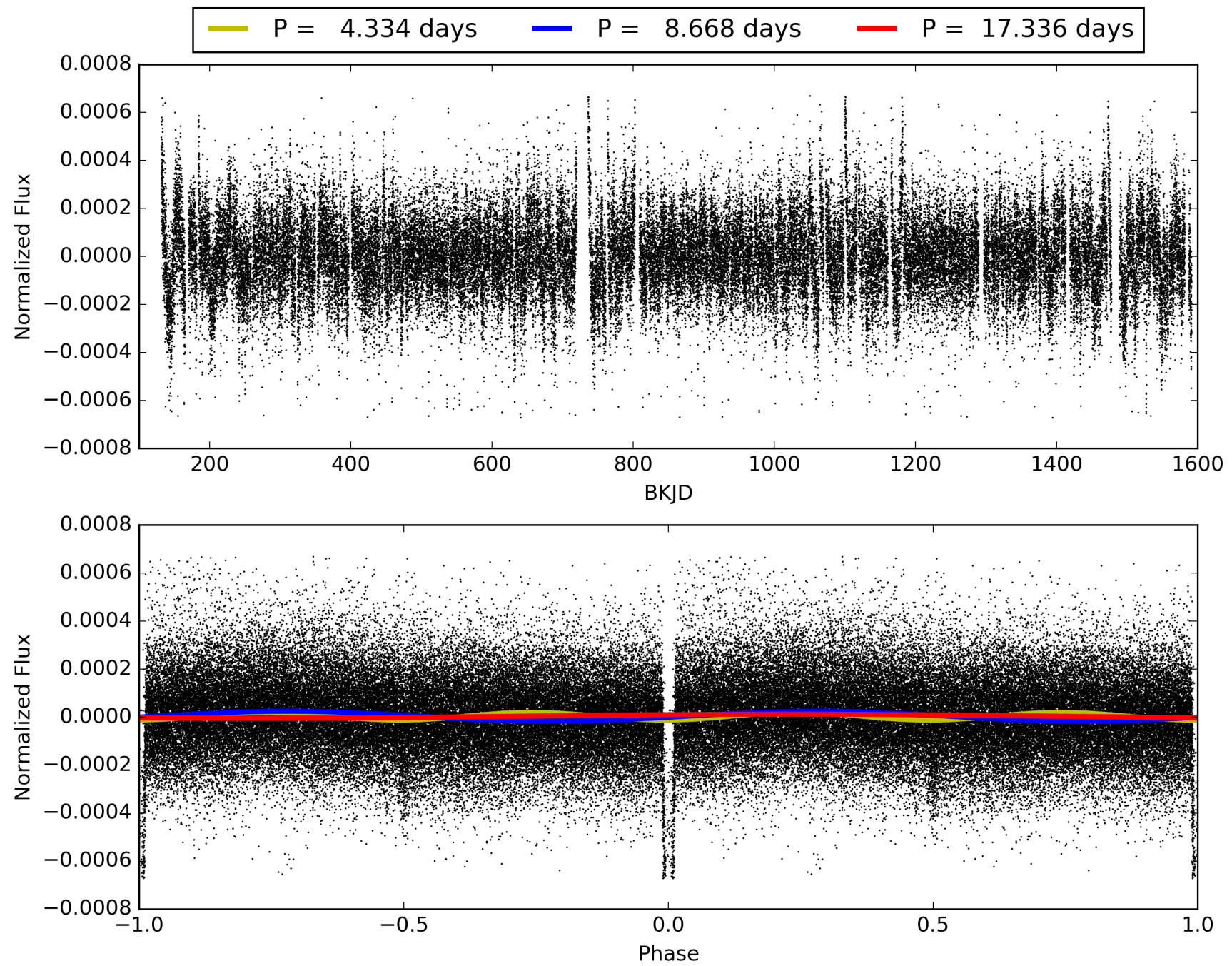
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 10:49:42 Z

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

TCE 009048161-01, PDC Light Curves

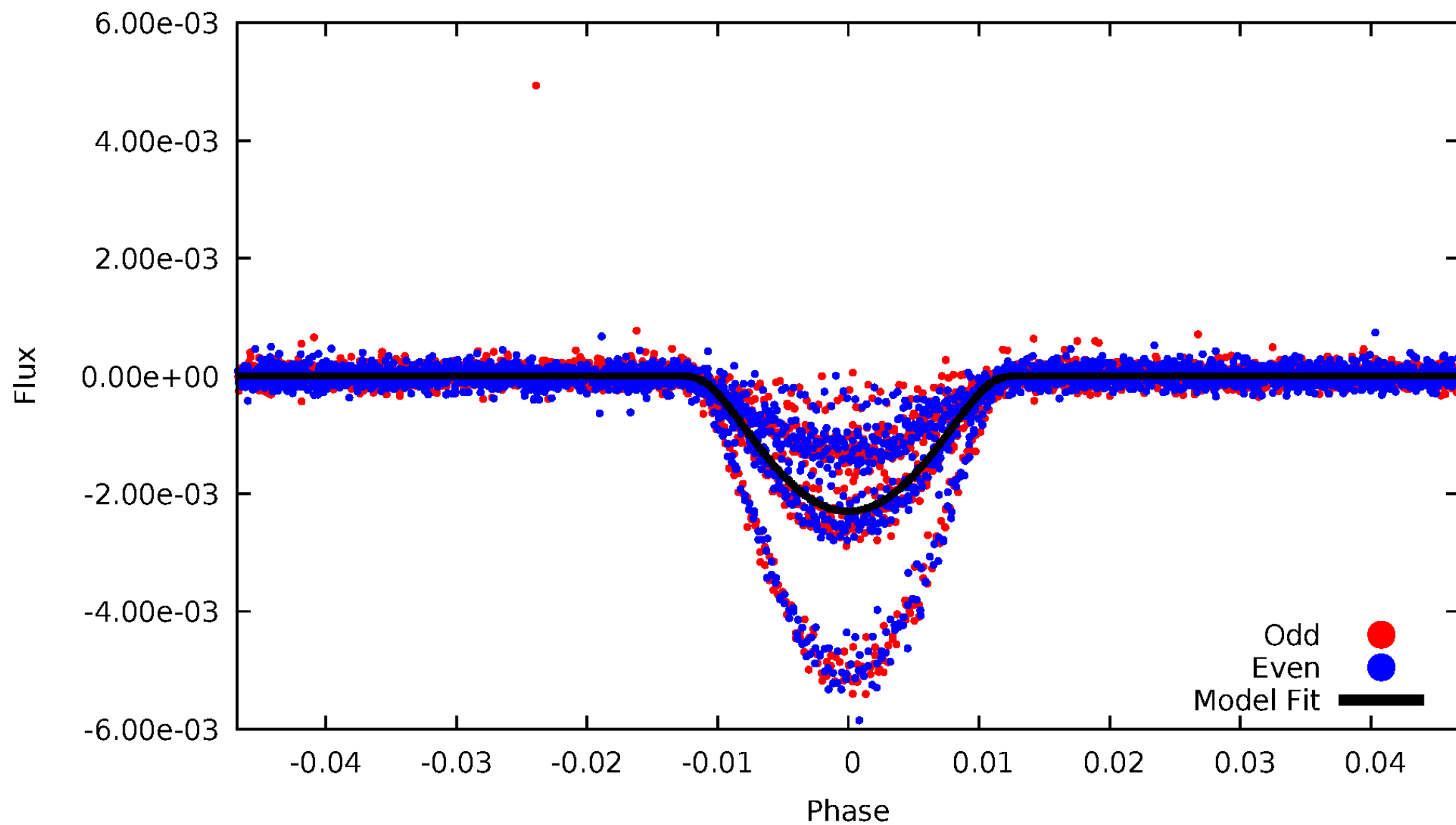


TCE 009048161-01



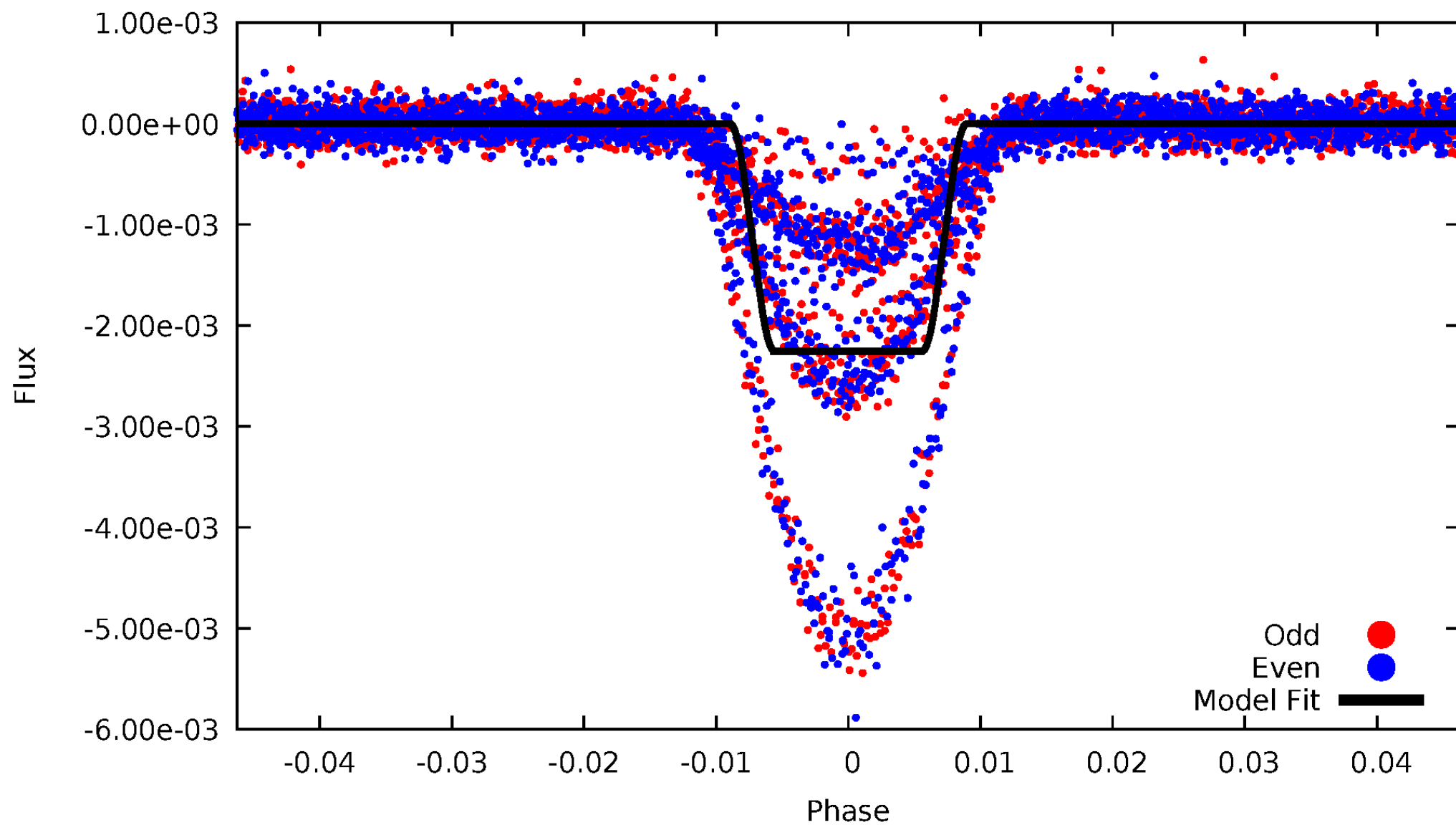
DV Odd/Even

TCE 009048161-01



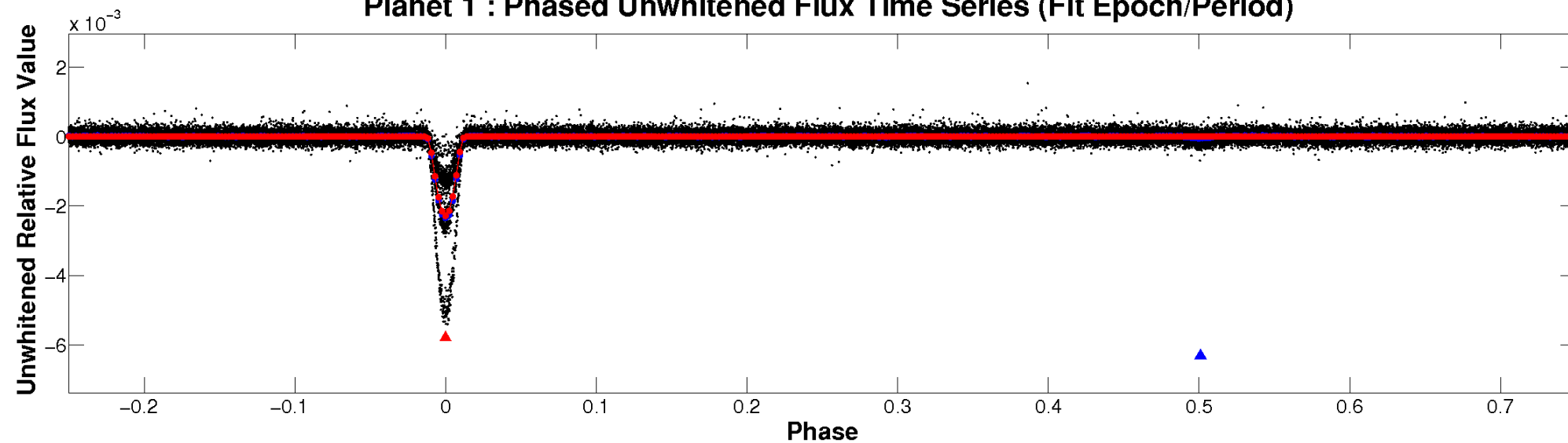
ALT Odd/Even

TCE 009048161-01

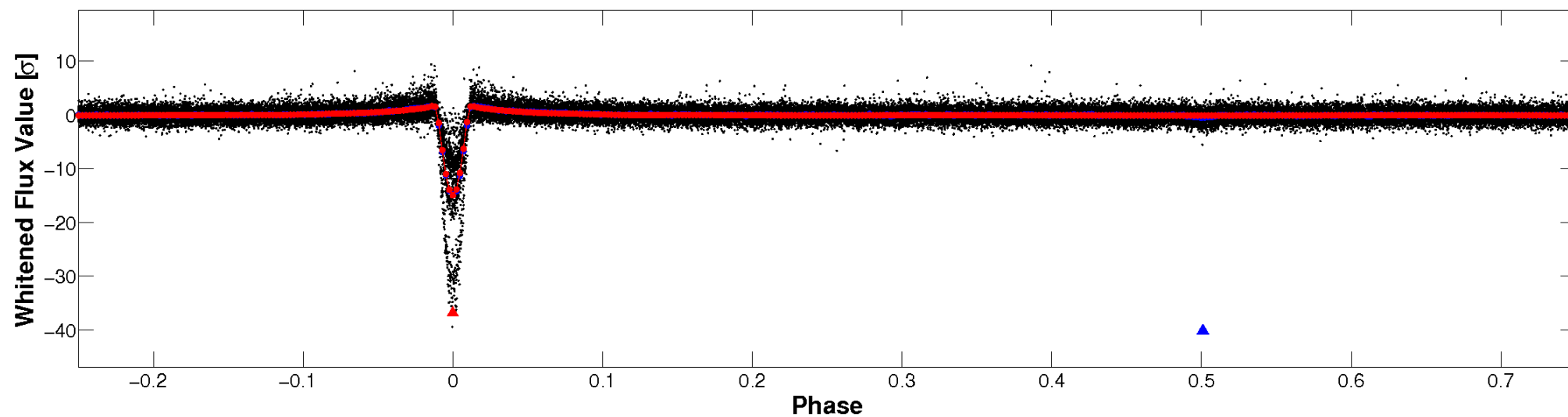


Non-Whitened Vs. Whitened Light Curve

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

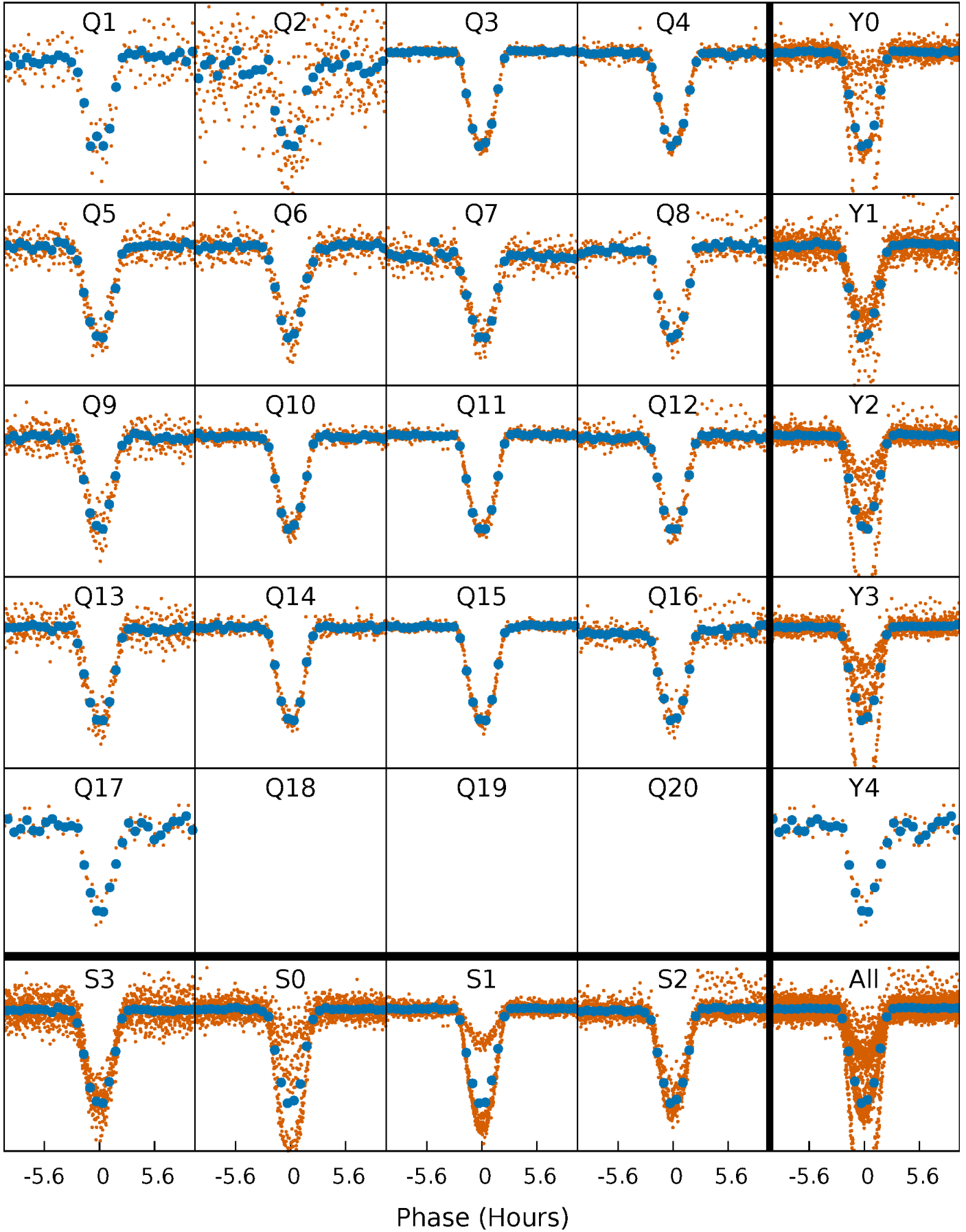


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



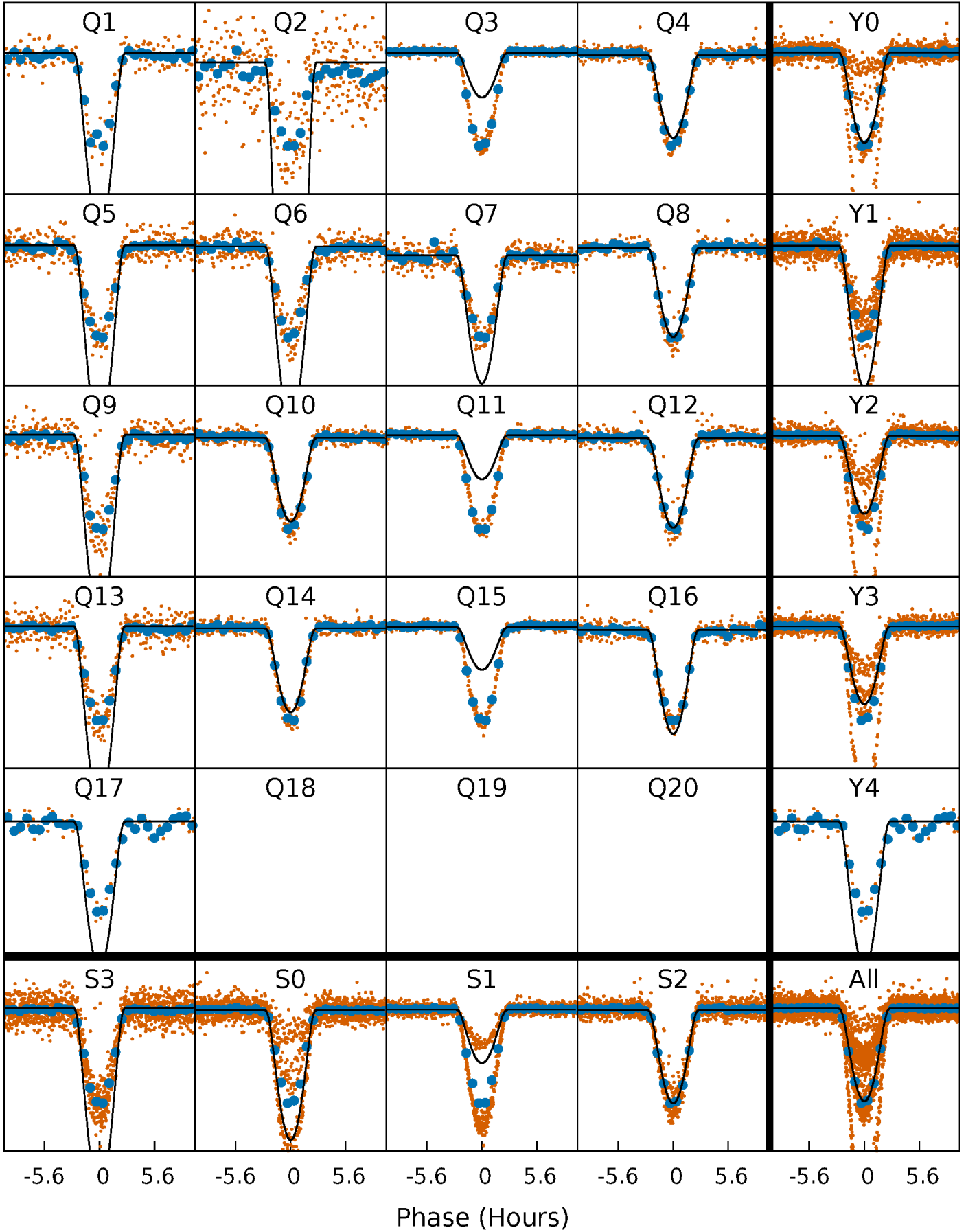
PDC Quarter-Phased Transit Curves

TCE 009048161-01 P= 8.667817 Days $T_0=137.342264$ (BKJD)



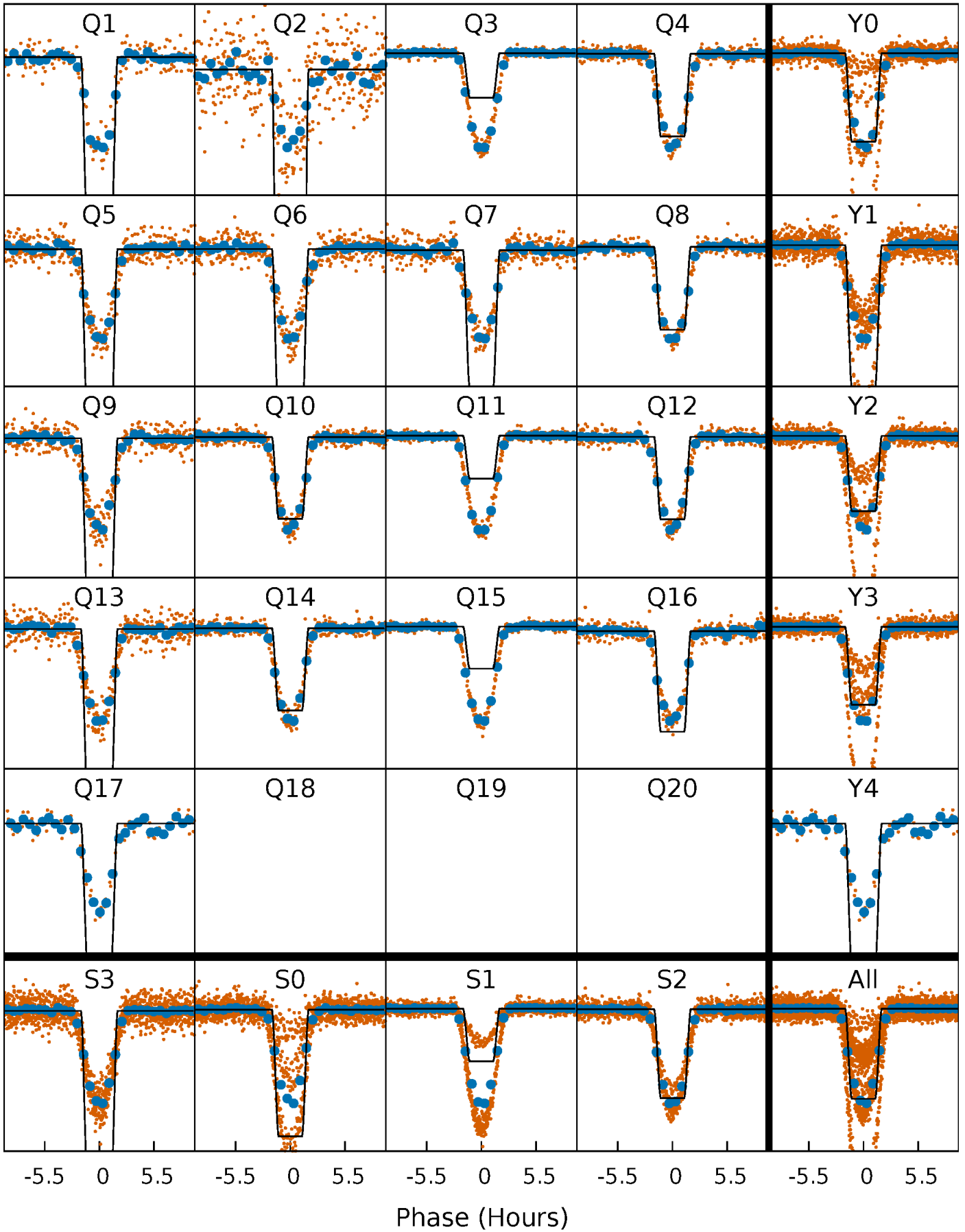
DV Quarter-Phased Transit Curves

TCE 009048161-01 P= 8.667817 Days $T_0=137.342264$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

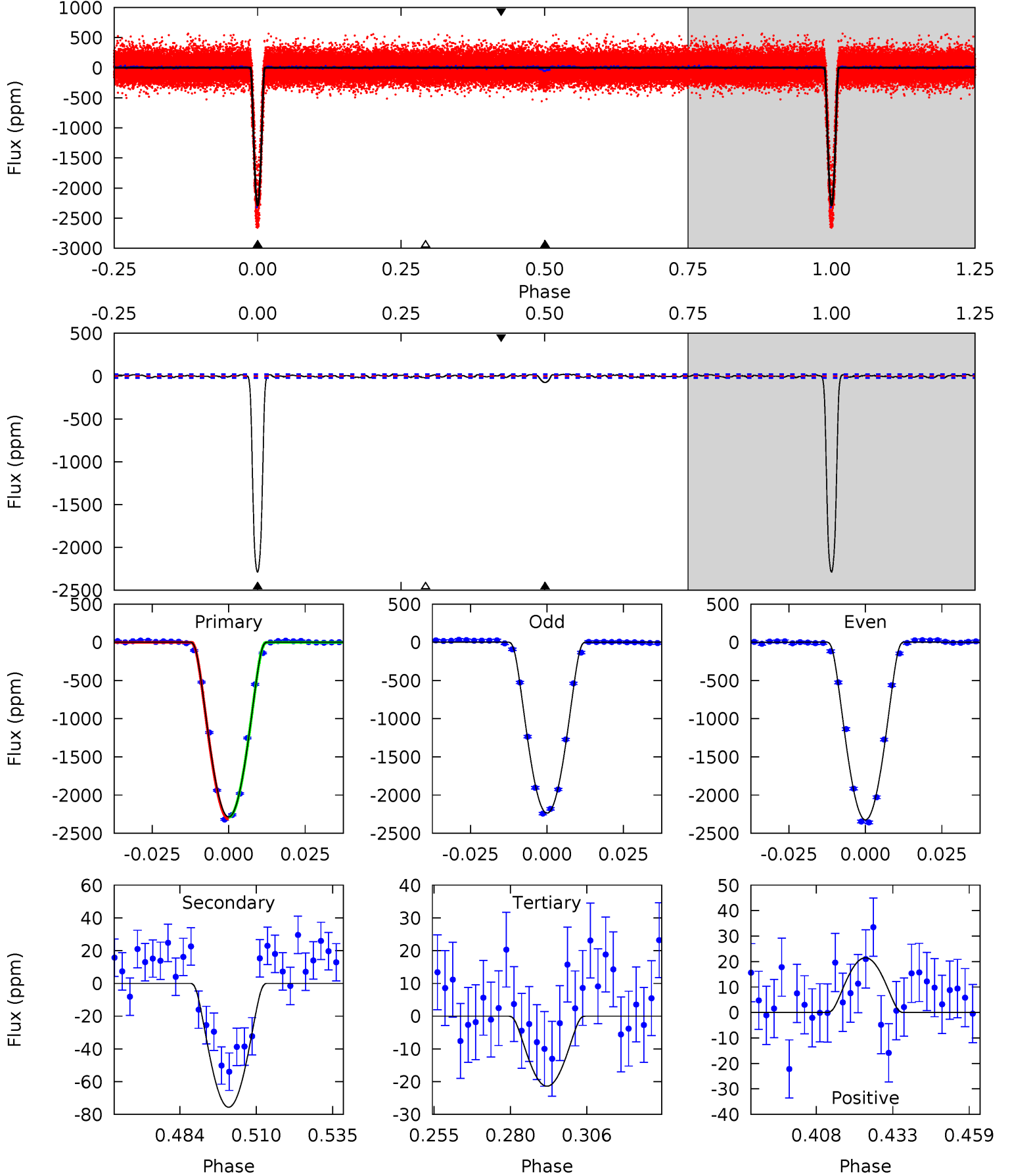
TCE 009048161-01 P= 8.667861 Days $T_0=137.338113$ (BKJD)



DV Model-Shift Uniqueness Test

009048161-01, P = 8.667817 Days, E = 128.674447 Days

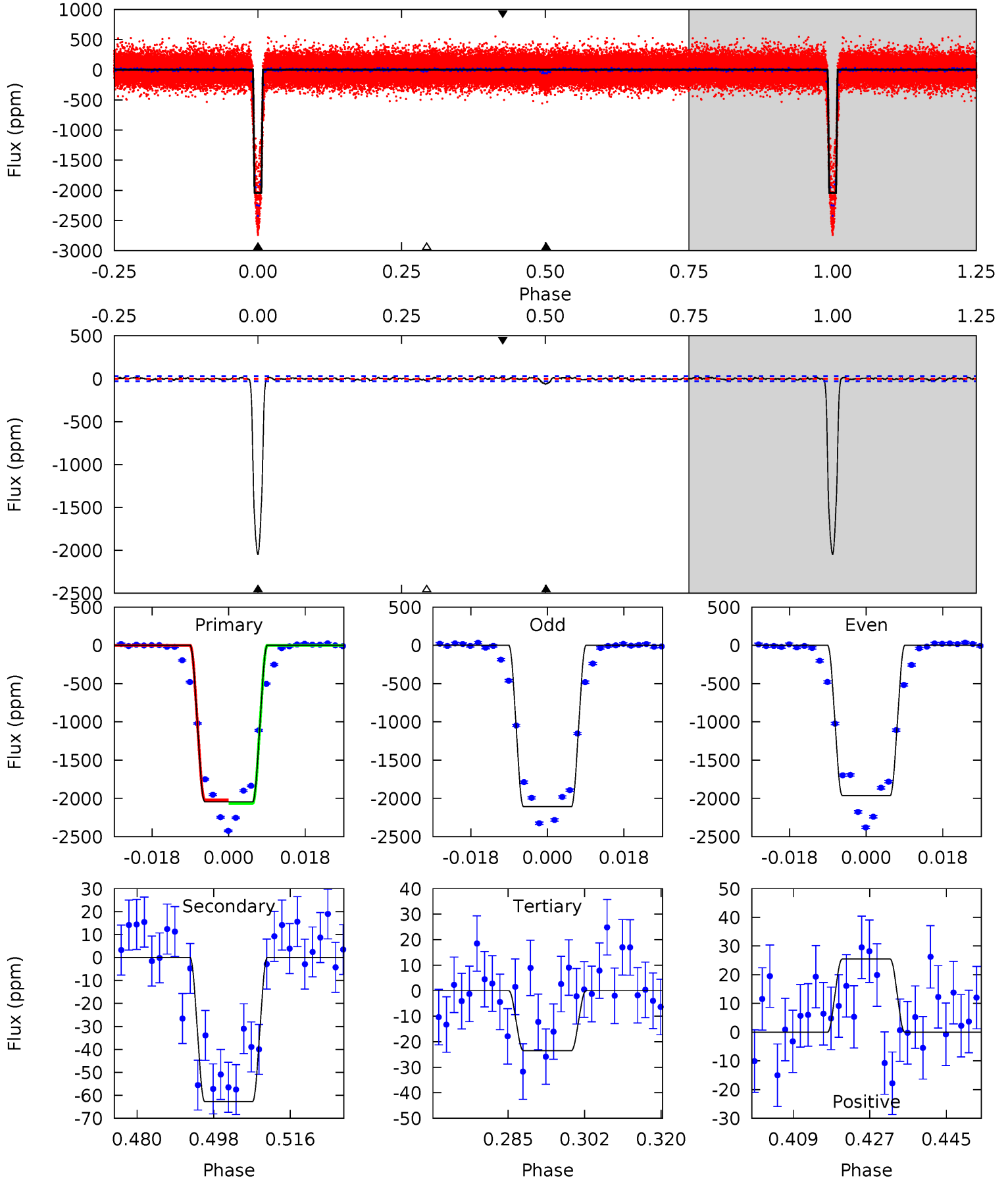
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
553.9	18.3	5.18	5.20	4.84	2.23	2.06	548.7	548.7	13.1	13.1	10.5	1.12	0.01	2.96



Alt Model-Shift Uniqueness Test

009048161-01, P = 8.667861 Days, E = 128.670252 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
340.4	10.4	3.92	4.24	4.91	2.37	1.25	336.5	336.2	6.53	6.20	11.9	1.06	0.01	3.49



Stellar Parameters For KIC 009048161

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	6266^{+189}_{-207}	$3.923^{+0.443}_{-0.148}$	$-0.440^{+0.300}_{-0.300}$	$1.889^{+0.460}_{-0.854}$	$1.089^{+0.156}_{-0.191}$	$0.228^{+1.006}_{-0.090}$
	+3%/-3%	+11%/-4%	+68%/-68%	+24%/-45%	+14%/-18%	+442%/-40%
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 009048161-01 / KOI 0146.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	A_{obs}
DV	-76 ± 4	$15.83^{+4.01}_{-4.20}$	1782^{+148}_{-220}	2696^{+159}_{-158}	$1.229^{+0.957}_{-0.458}$
Alt.	-63 ± 6	$9.07^{+3.32}_{-2.93}$	1782^{+150}_{-207}	3128^{+280}_{-249}	$3.025^{+3.377}_{-1.383}$

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

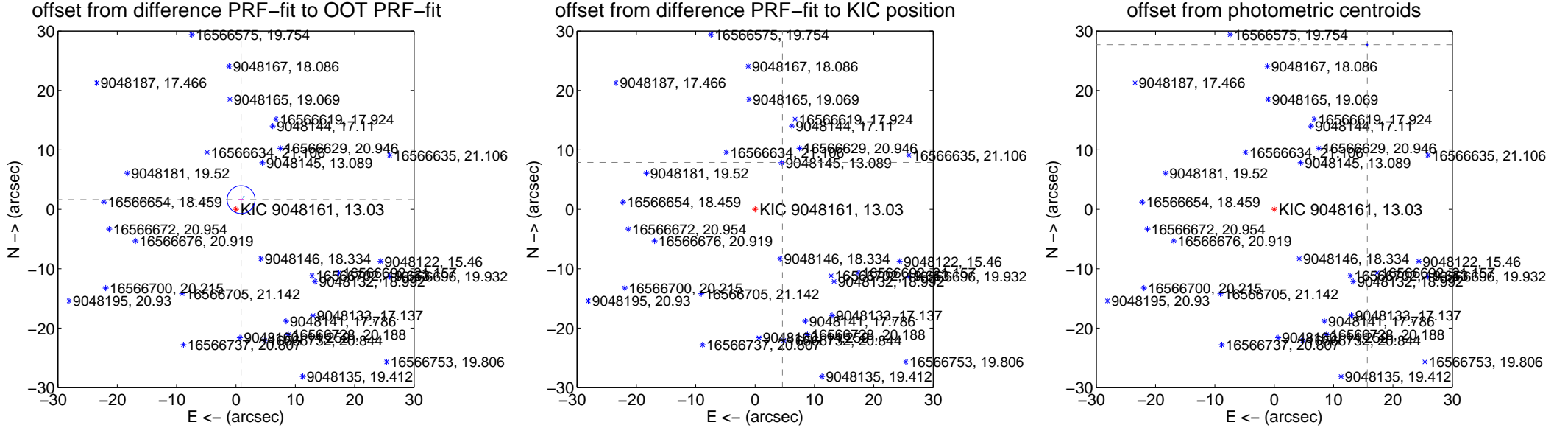
DV Centroid Data

Supplemental centroid analysis for 009048161-01. Kepler magnitude: 13.03. Transit SNR 226.01

There are 17 quarters with good PRF difference image offsets

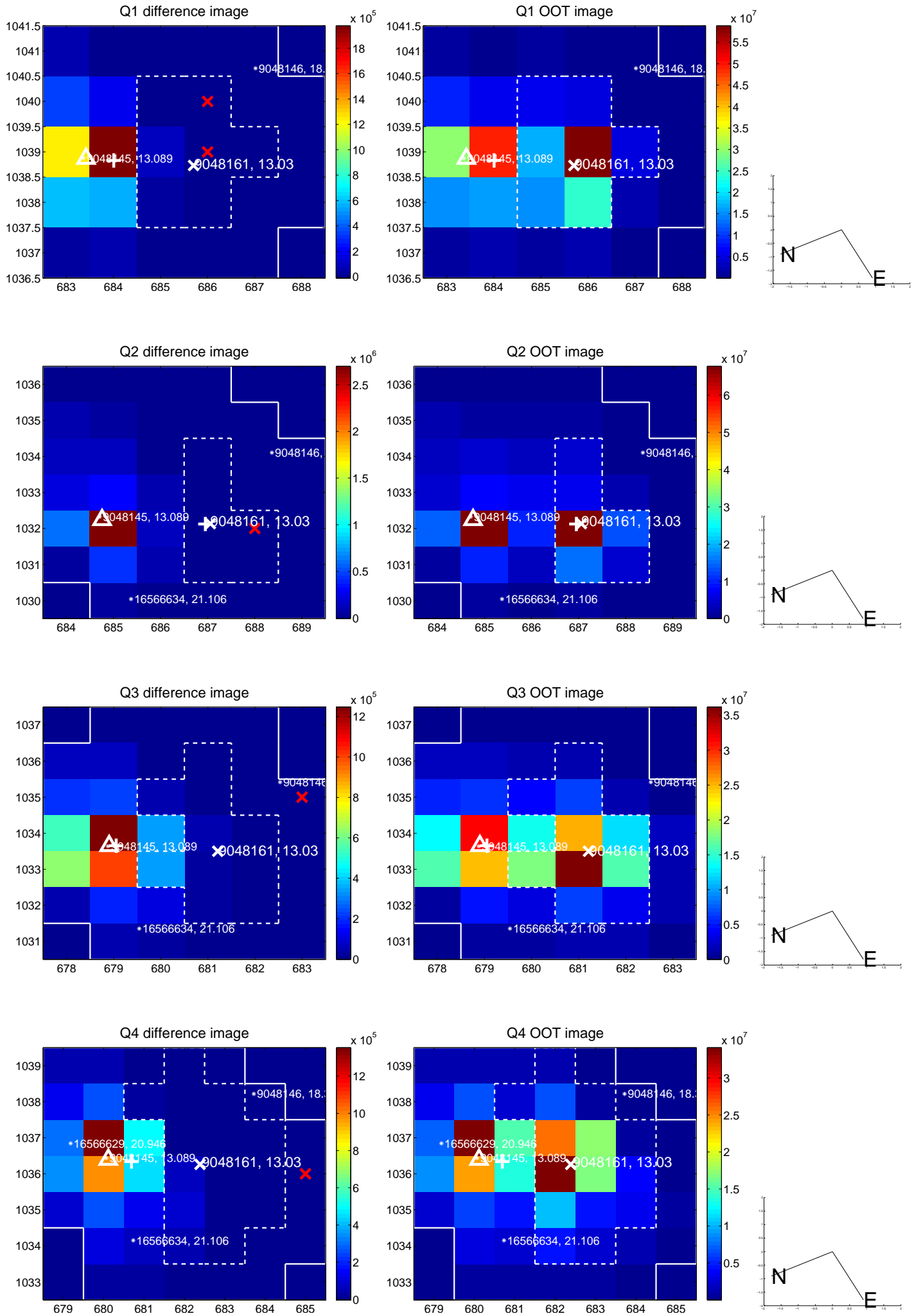
The OOT PRF centroid is offset from the target star catalog position by about 7.05 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	1.838 ± 0.782	2.35	-0.863 ± 0.395	1.623 ± 0.679
PRF-fit source offset from KIC position	9.132 ± 0.073	125.90	-4.611 ± 0.069	7.883 ± 0.074
photometric centroid source offset	31.82 ± 0.03	1006.79	-15.68 ± 0.03	27.69 ± 0.03

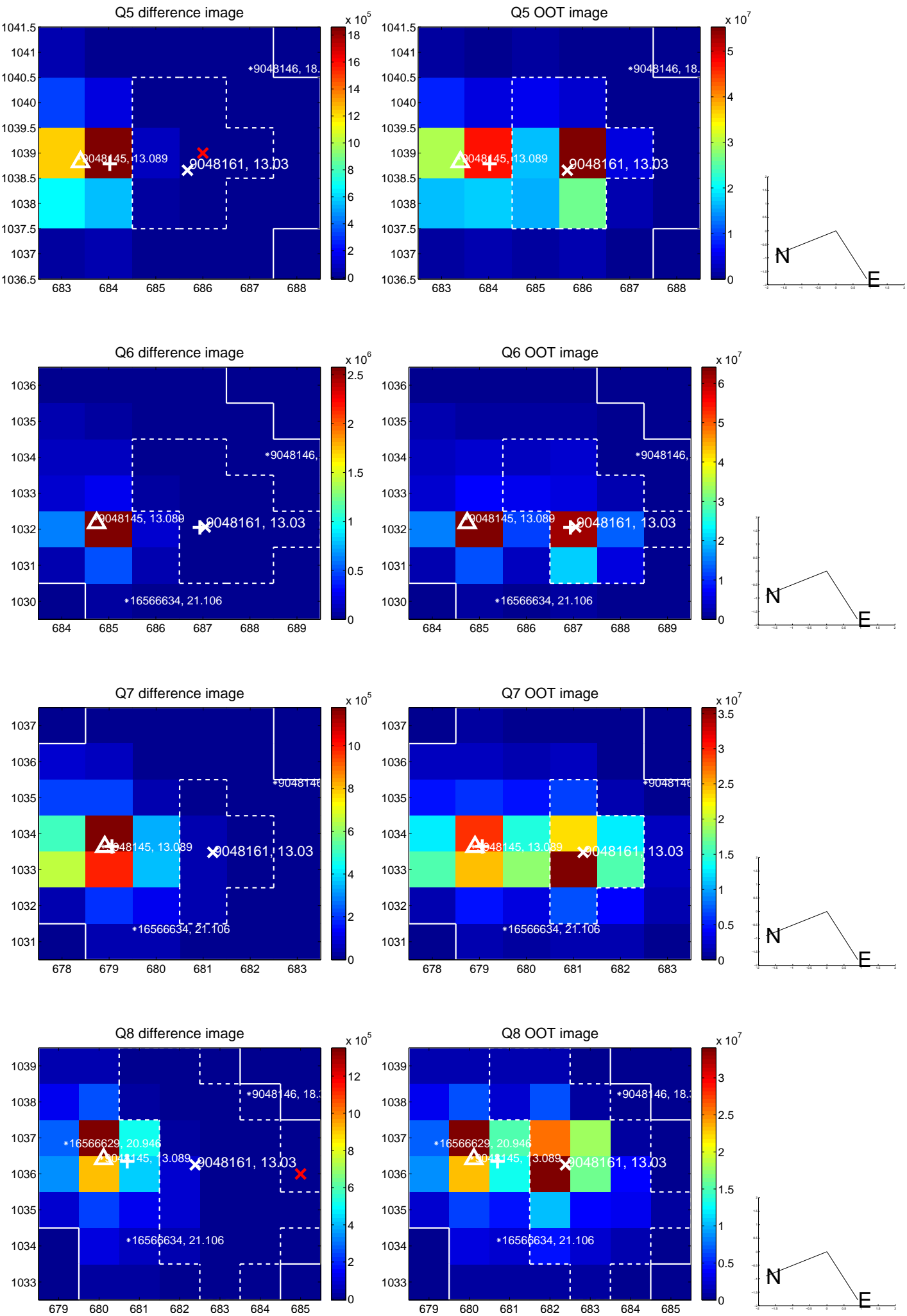


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

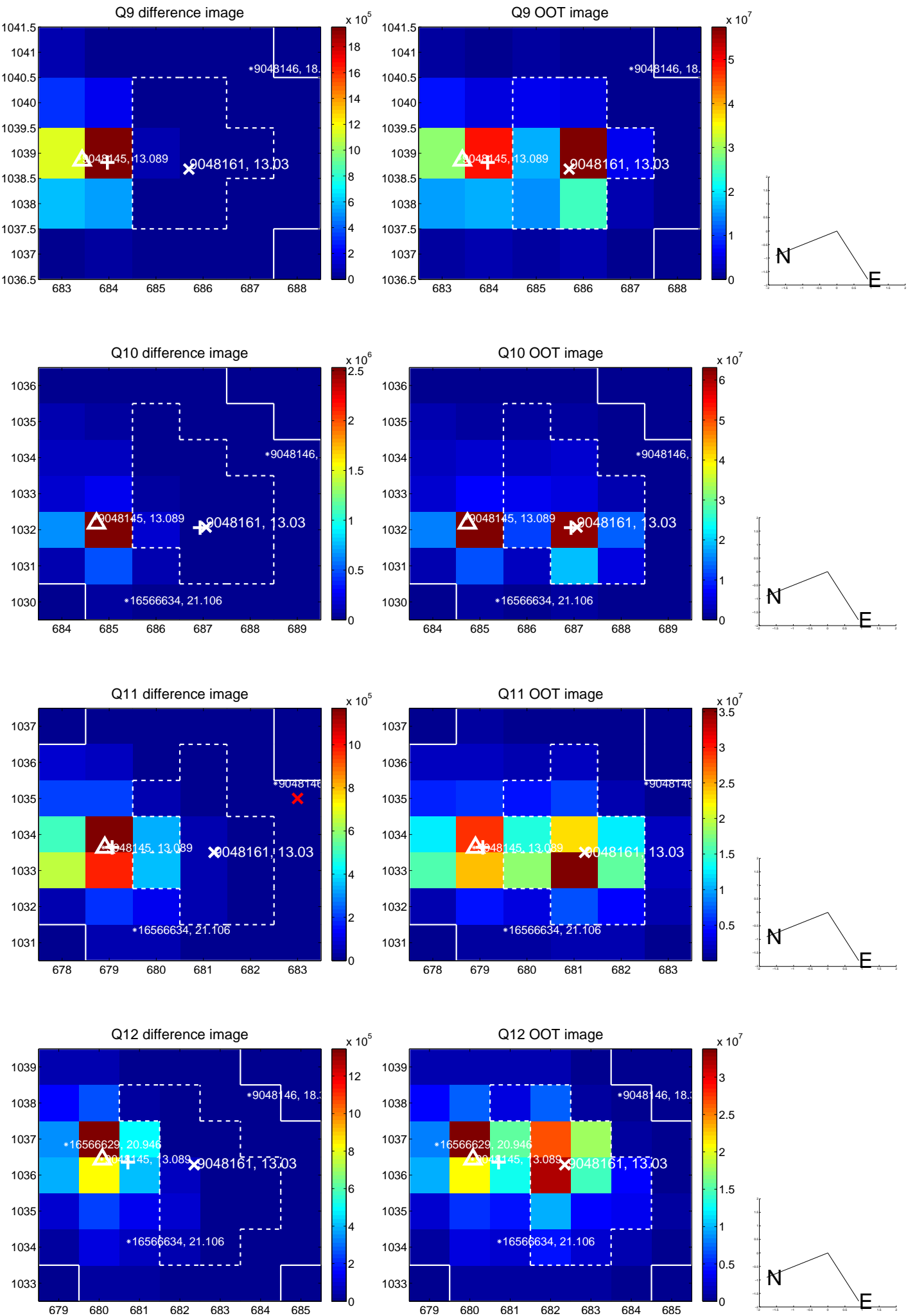
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



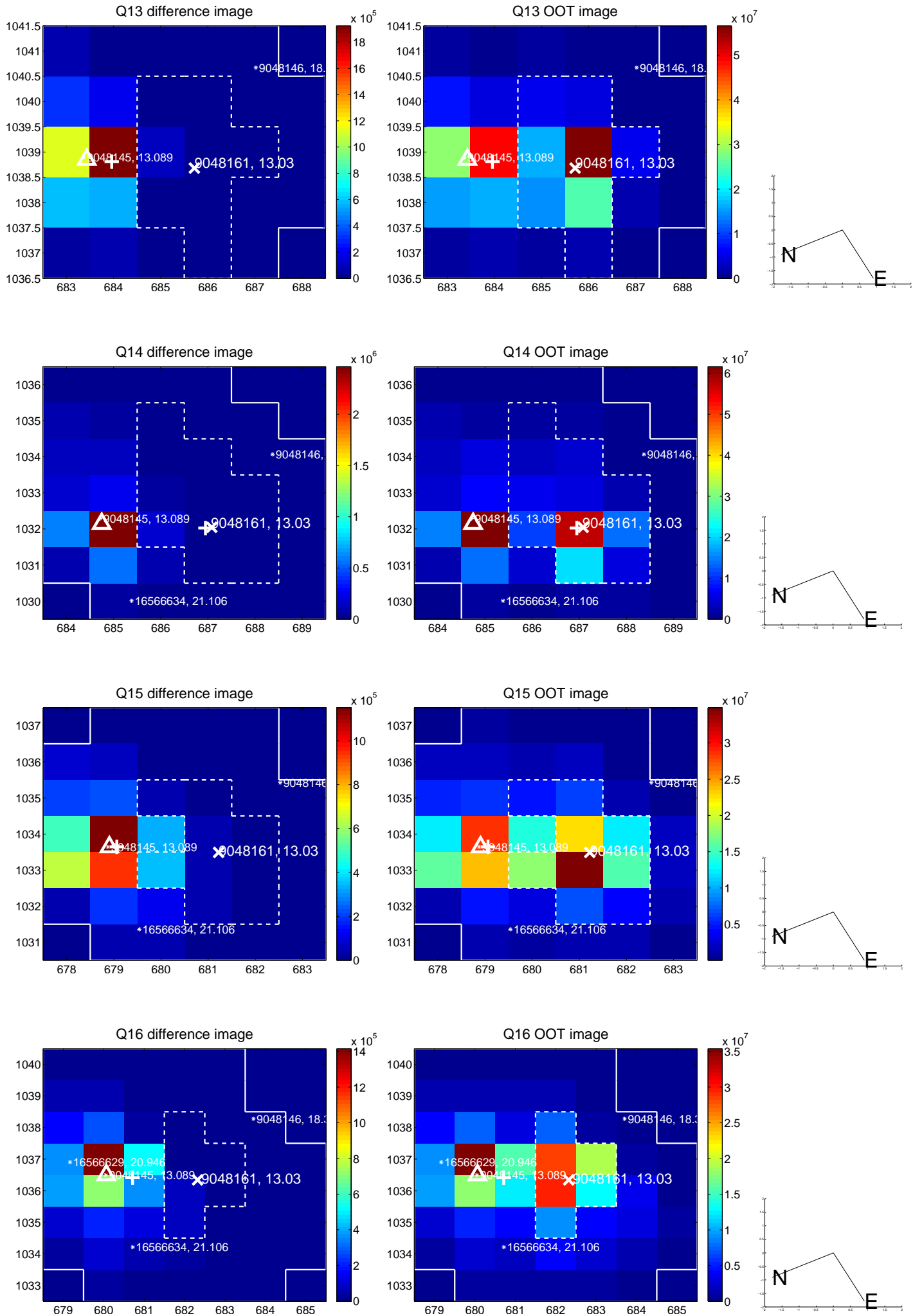
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



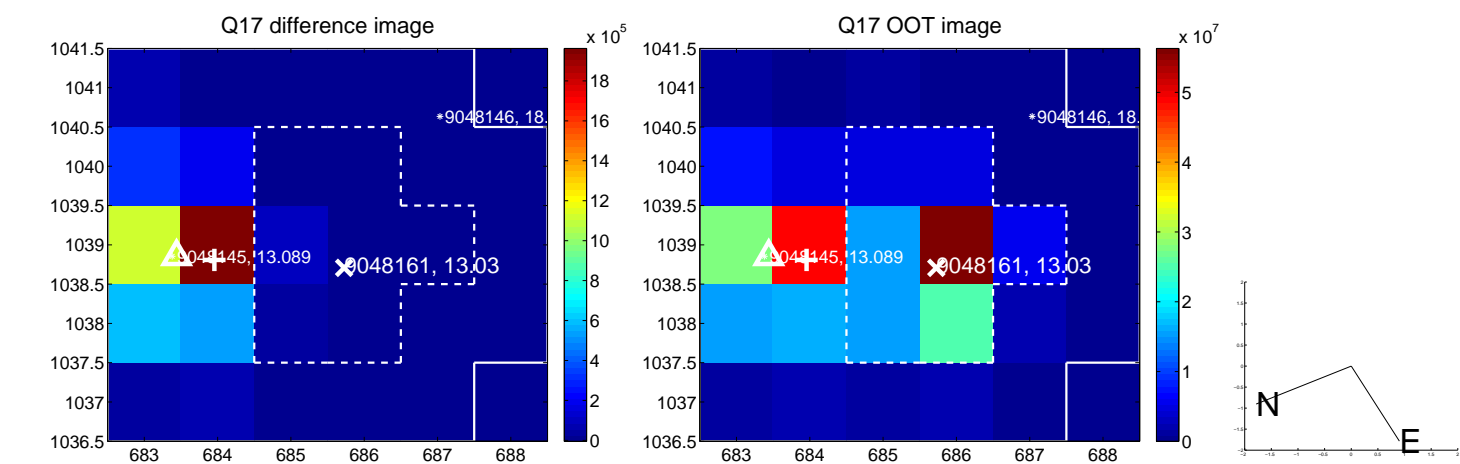
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



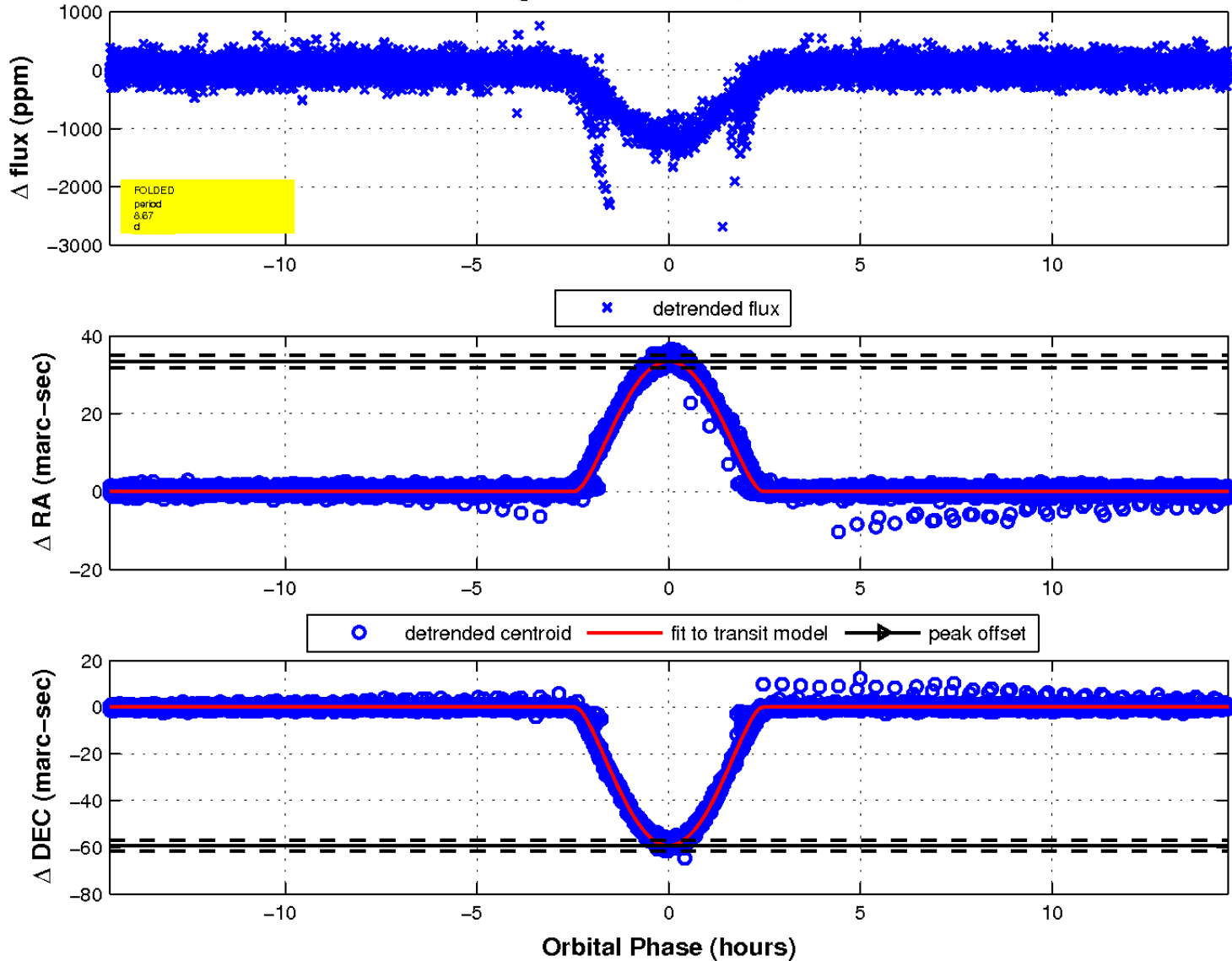
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

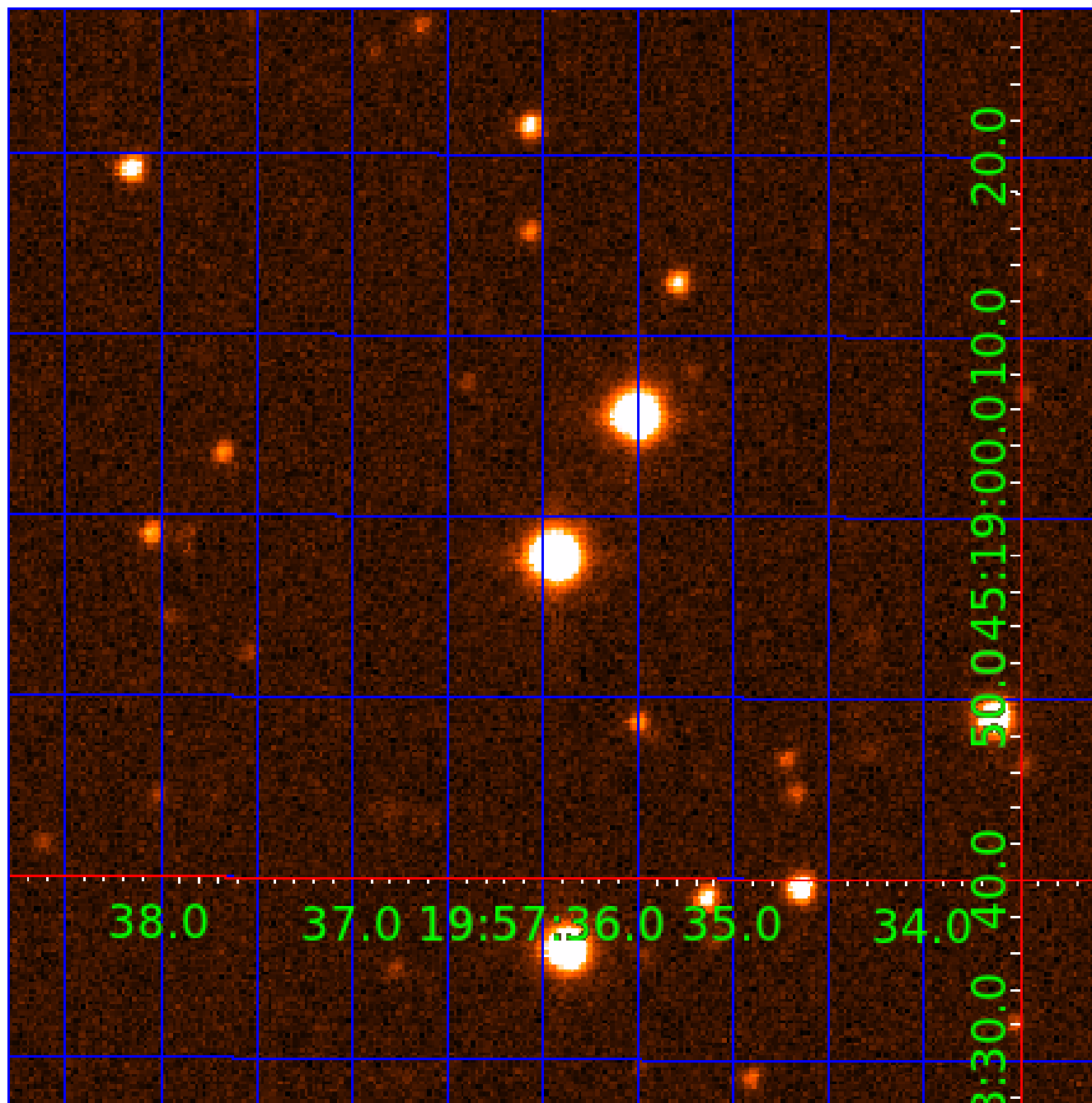


fluxWeightedCentroids, Planet 1 of 2



UKIRT Image

Declination



KIC 009048161

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})
009048161-01	OBS	0146.01	8.667817	137.342264	2298.6	4.865	379.7	226.0	1.89	6266	16.76	682.02
009048161-02	OBS	No	8.667796	133.018723	60.1	3.789	11.6	11.8	1.89	6266	1.71	682.02

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009048161-01	OBS	FP	0.00	0	1	1	1	MOD_SEC_DV—MOD_SEC_ALT—DEEP_V_SHAPED—HAS_SEC_TCE—CENT_RESOLVED_OFFSET—EPHEM_MATCH
009048161-02	OBS	FP	0.00	1	1	1	1	IS_SEC_TCE—CENT_RESOLVED_OFFSET—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 009048161-02

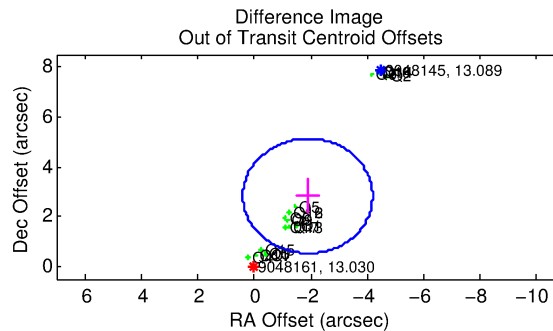
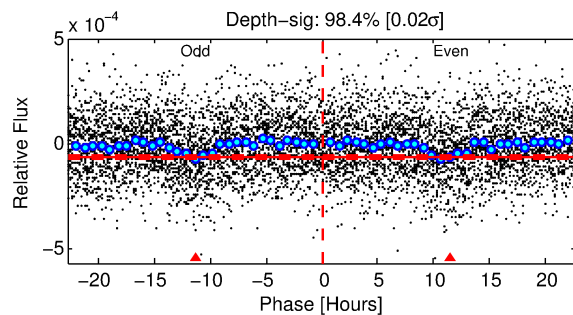
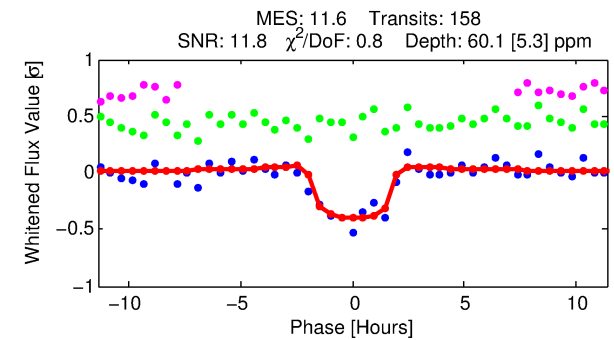
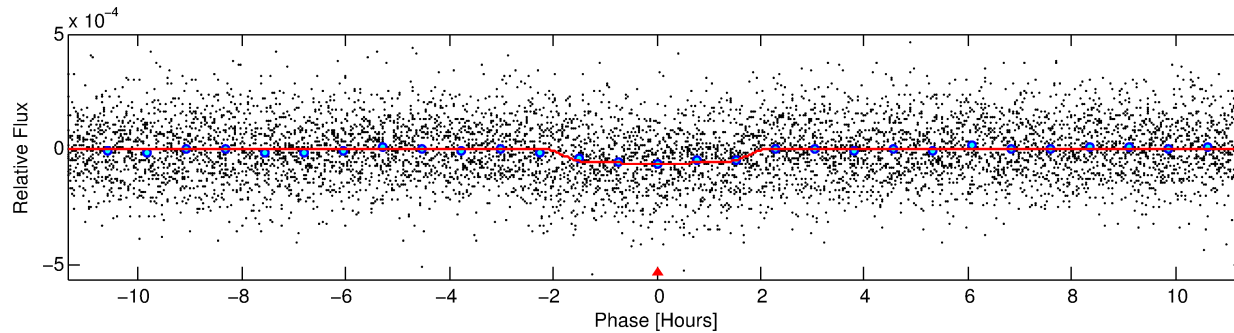
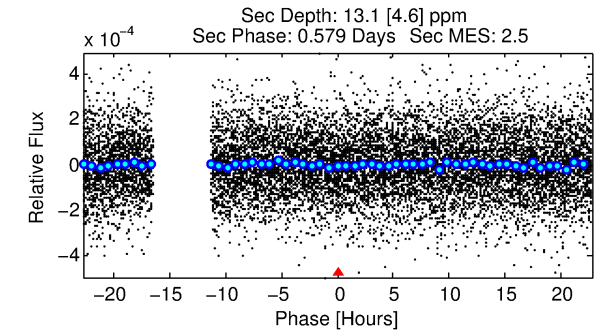
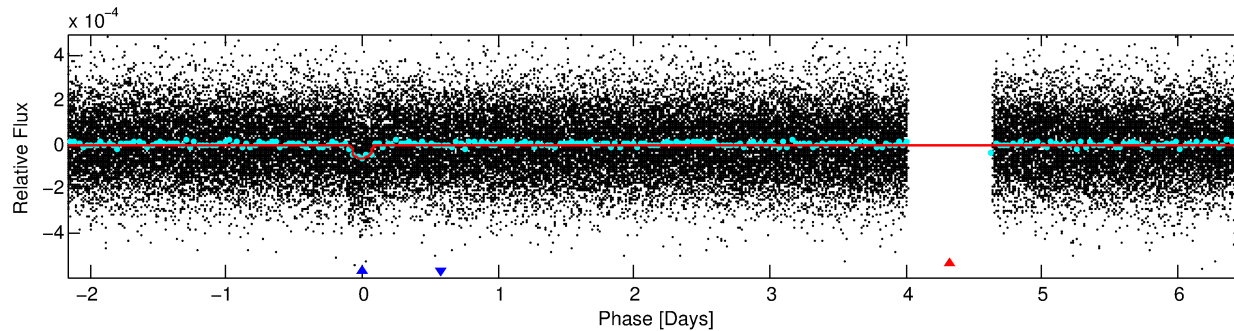
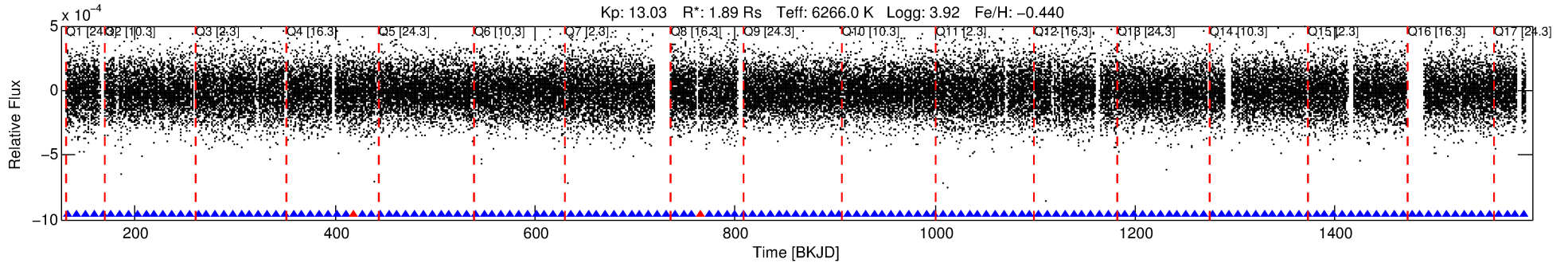
TCE (1)	KIC	Parent (2)	Parent KIC	$P_1:P_2$	Dist ($''$)	Δ Row	Δ Col	m_2	m_1	D_2/D_1	Mechanism	Flag	σ_P	σ_T
009048161-02	9048161	009048145-sec	9048145	1:1	9.0	0	2	13.09	13.03	23.33	Direct-PRF	0	0.14	0.48

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: 9048161 Candidate: 2 of 2 Period: 8.668 d
KOI: K00146 Corr: No Ephemeris Match

Kp: 13.03 R*: 1.89 Rs Teff: 6266.0 K Logg: 3.92 Fe/H: -0.440



DV Fit Results:

Period = 8.66780 [0.00006] d
Epoch = 133.0187 [0.0057] BKJD
Rp/R* = 0.0083 [0.0031]
a/R* = 8.00 [16.62]
b = 0.90 [0.45]
Seff = 682.02 [515.25]
Teq = 1303 [246] K
Rp = 1.71 [1.00] Re
a = 0.0850 [0.0386] AU
Ag = 17.67 [19.64] [0.85σ]
Teff = 4131 [864] K [3.15σ]

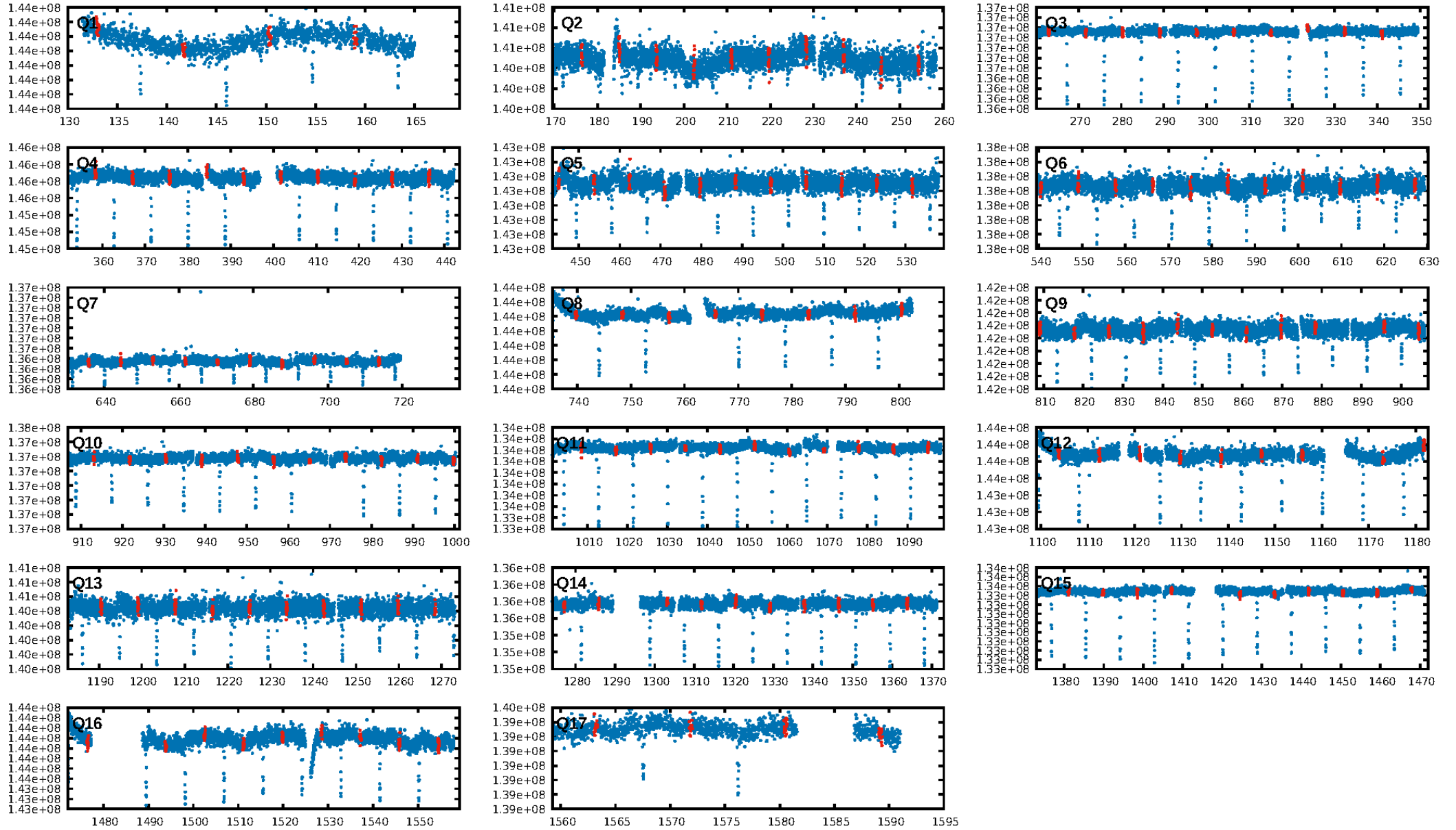
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 0.0% [0.00σ]
ModelChiSquare2-sig: 79.8%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 4.41e-30
RollingBand-fgt: 0.99 [148/150]
GhostDiagnostic-chr: -0.362
Centroid-sig: 0.0%
Centroid-so: 28.585 arcsec [27.97σ]
OotOffset-rm: 3.399 arcsec [4.44σ]
KicOffset-rm: 9.153 arcsec [102.47σ]
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]

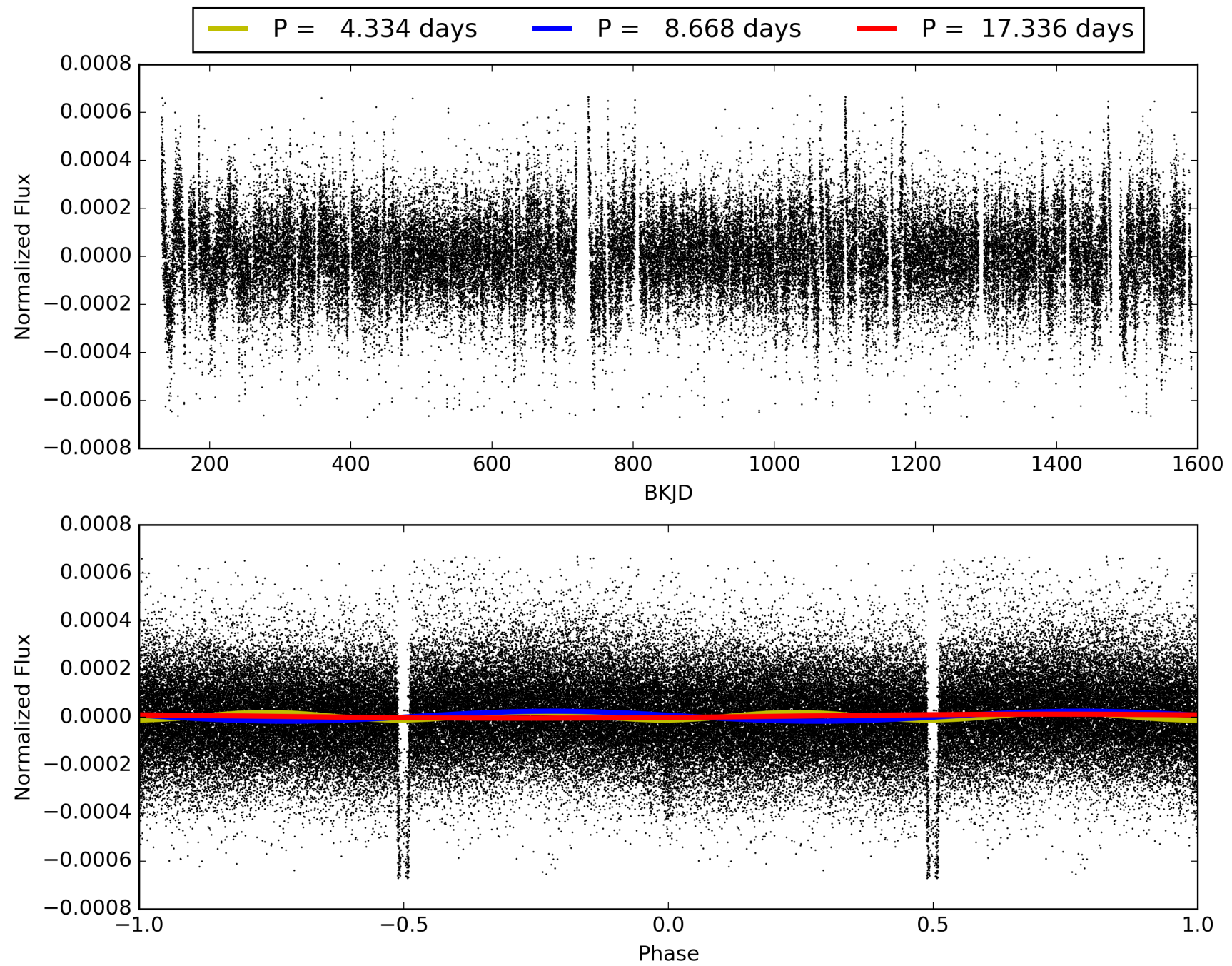
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 10:49:48 Z

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

TCE 009048161-02, PDC Light Curves

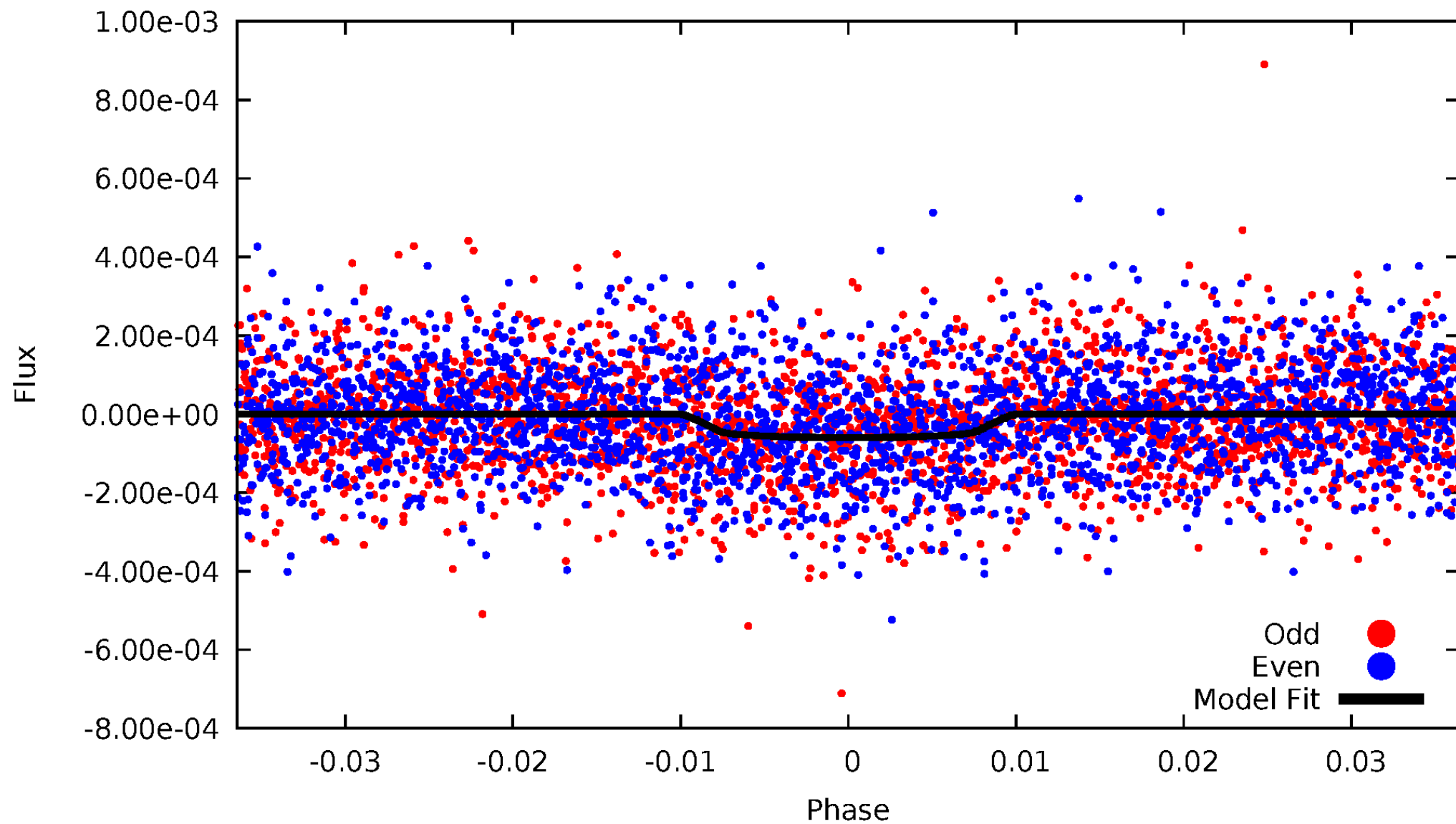


TCE 009048161-02



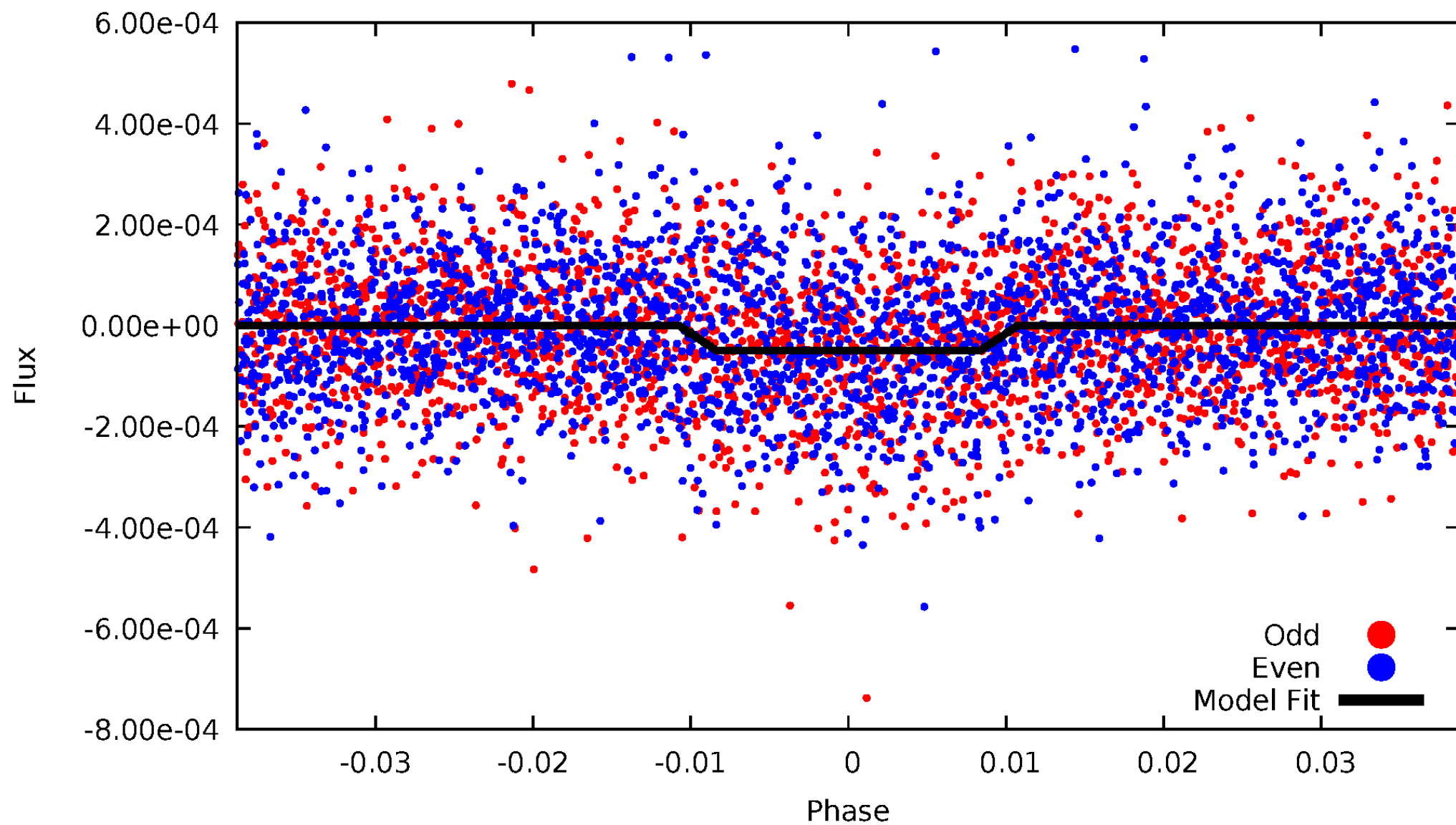
DV Odd/Even

TCE 009048161-02



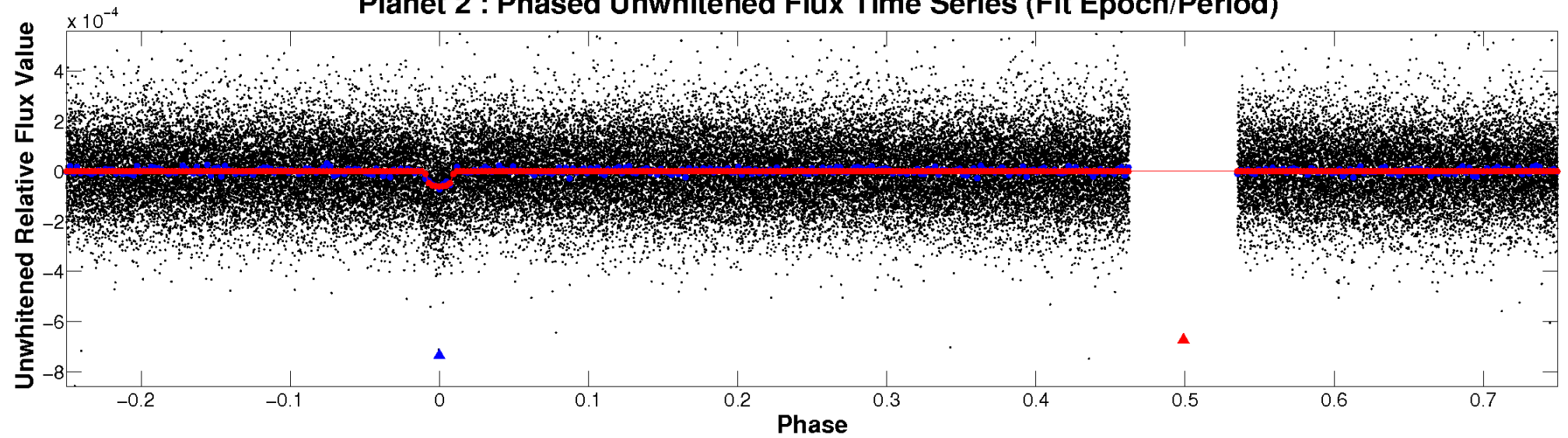
ALT Odd/Even

TCE 009048161-02

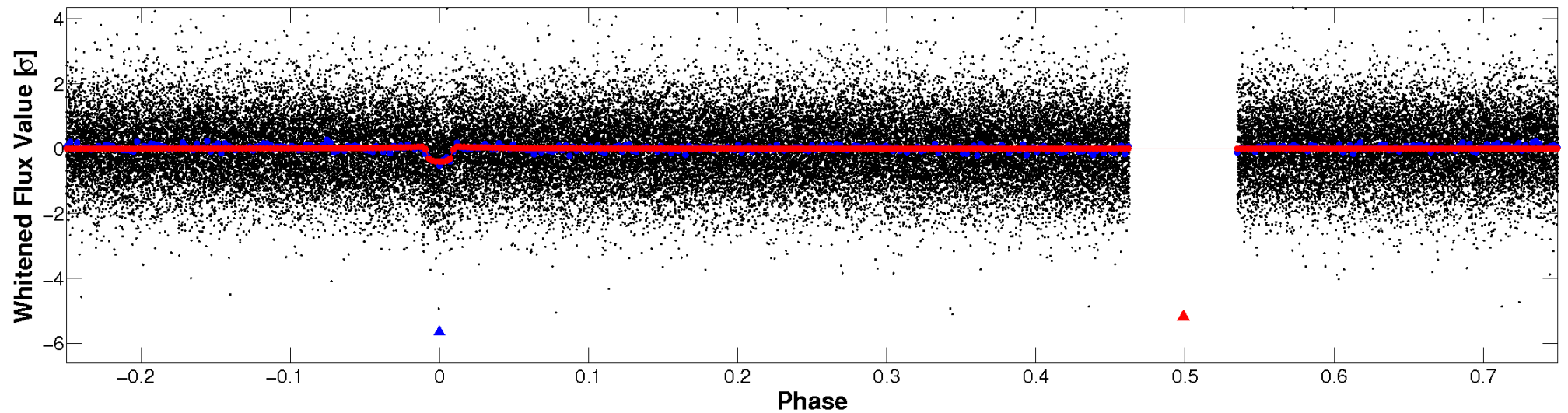


Non-Whitened Vs. Whitened Light Curve

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

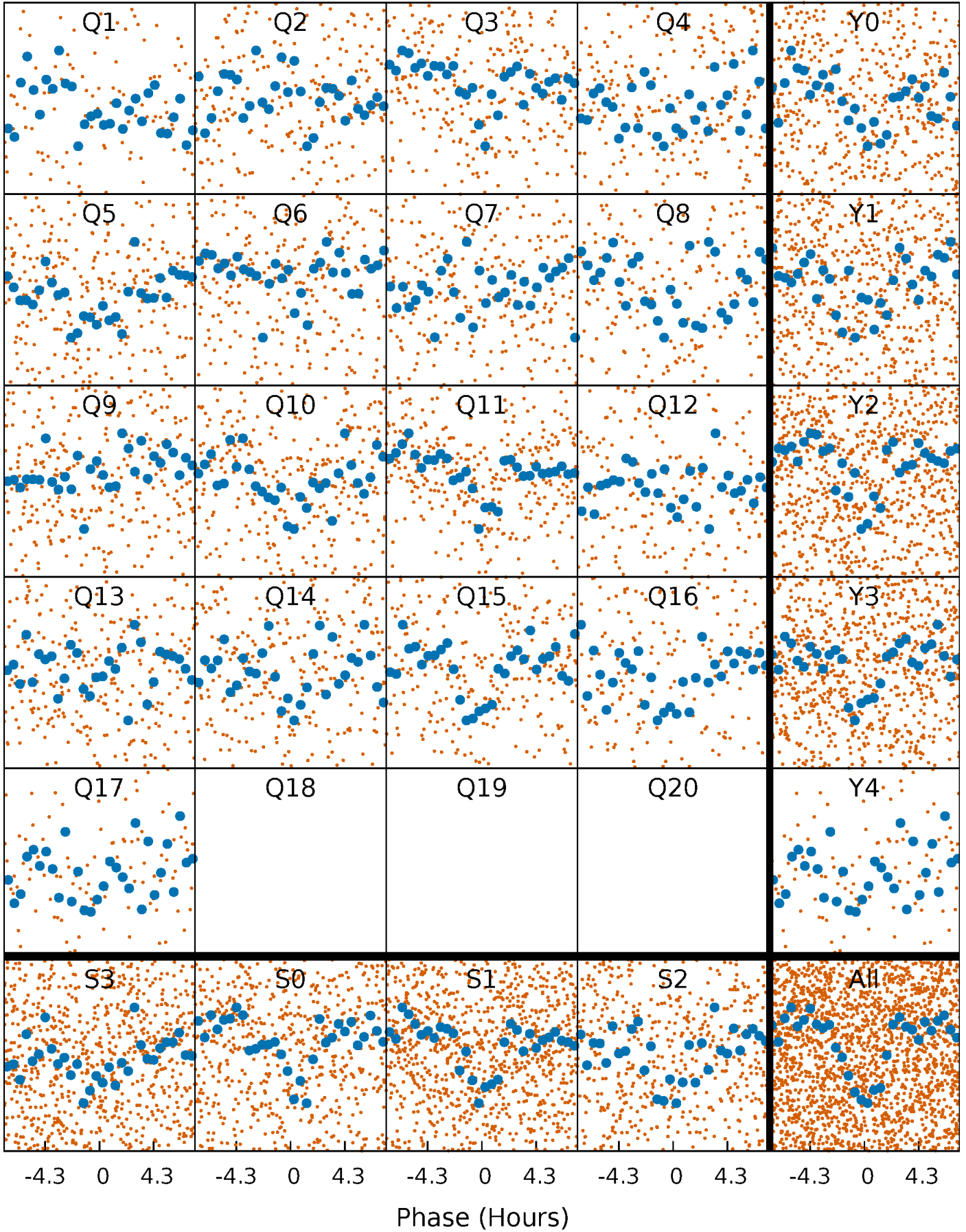


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



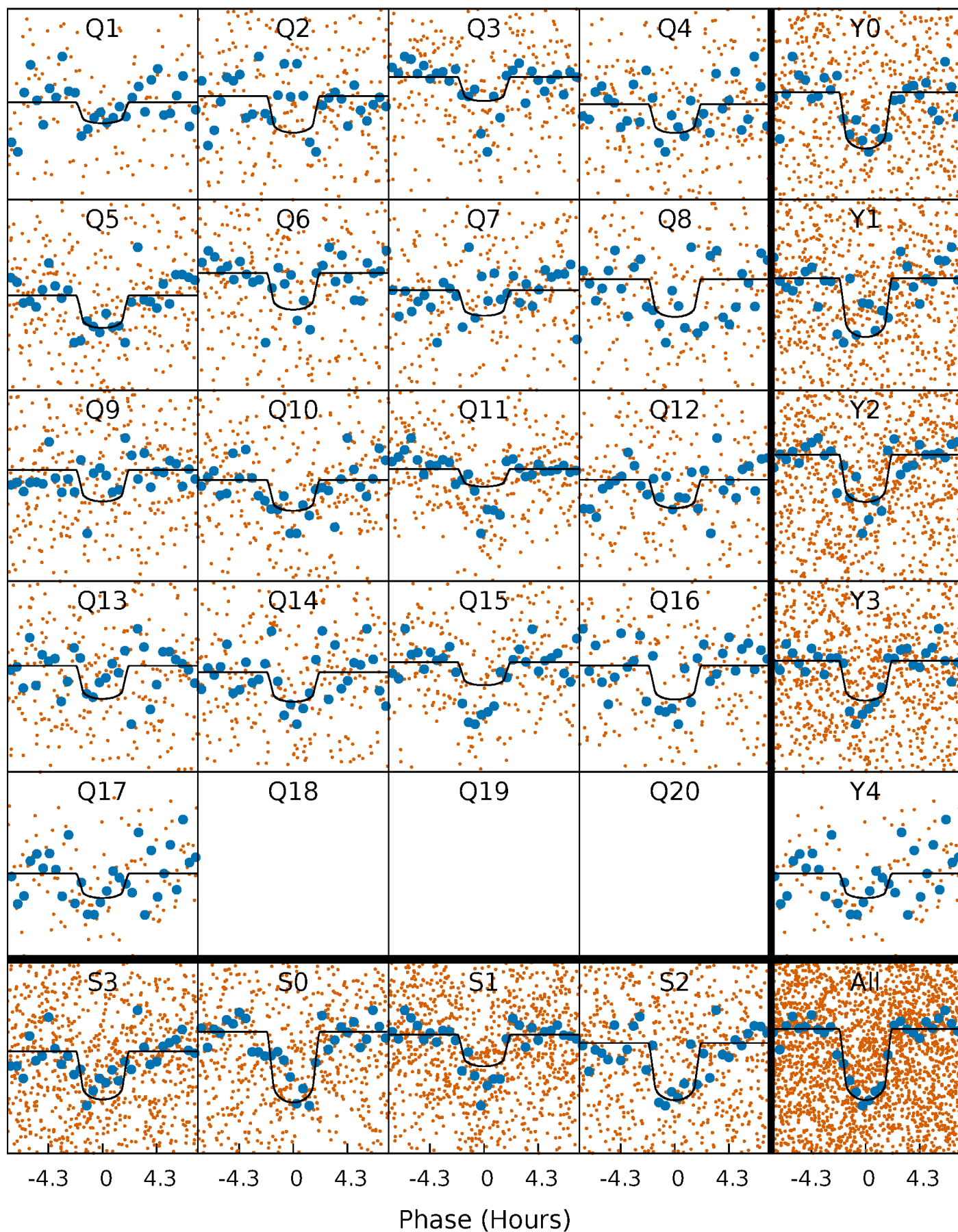
PDC Quarter-Phased Transit Curves

TCE 009048161-02 P= 8.667796 Days $T_0=133.018723$ (BKJD)



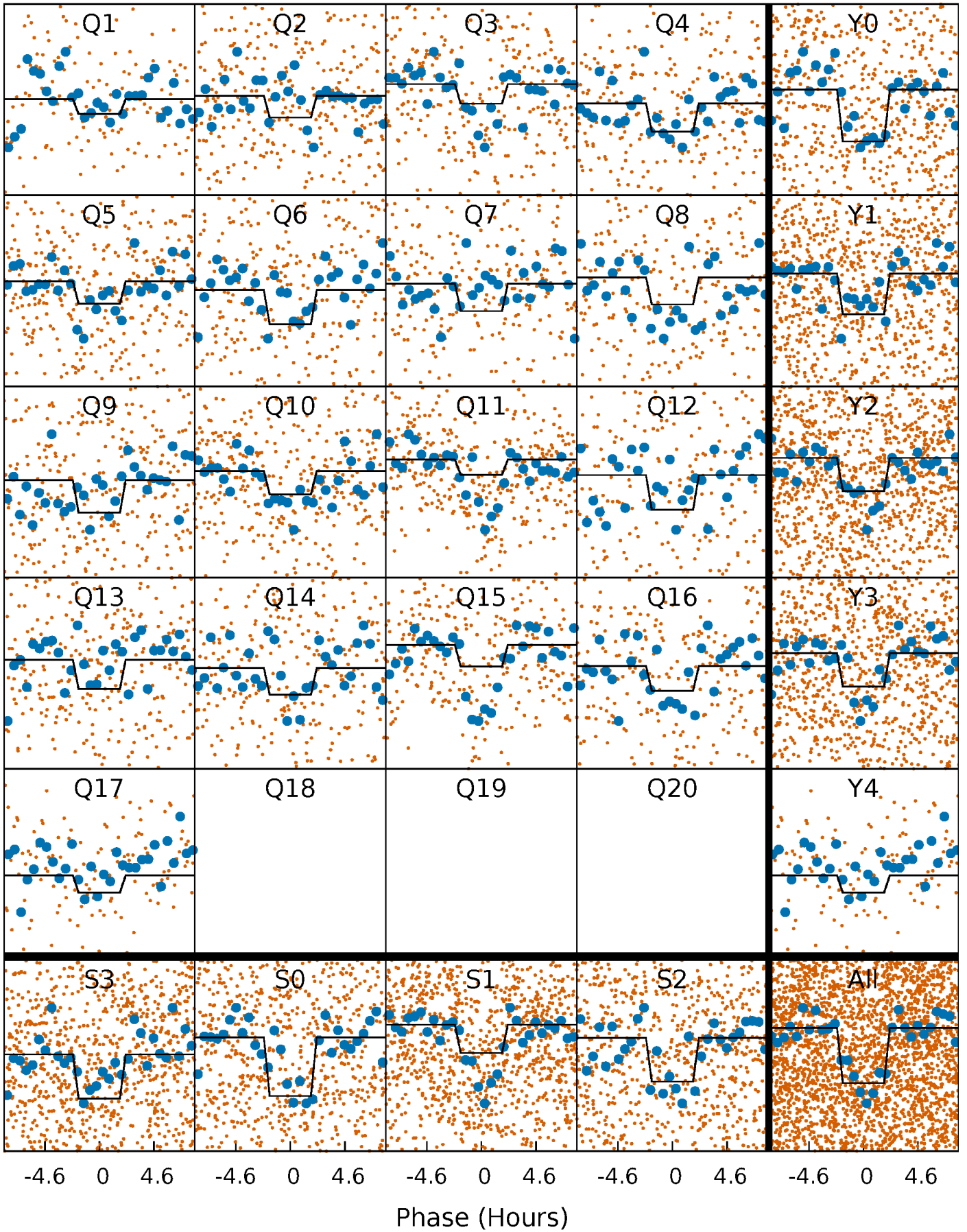
DV Quarter-Phased Transit Curves

TCE 009048161-02 P= 8.667796 Days $T_0=133.018723$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

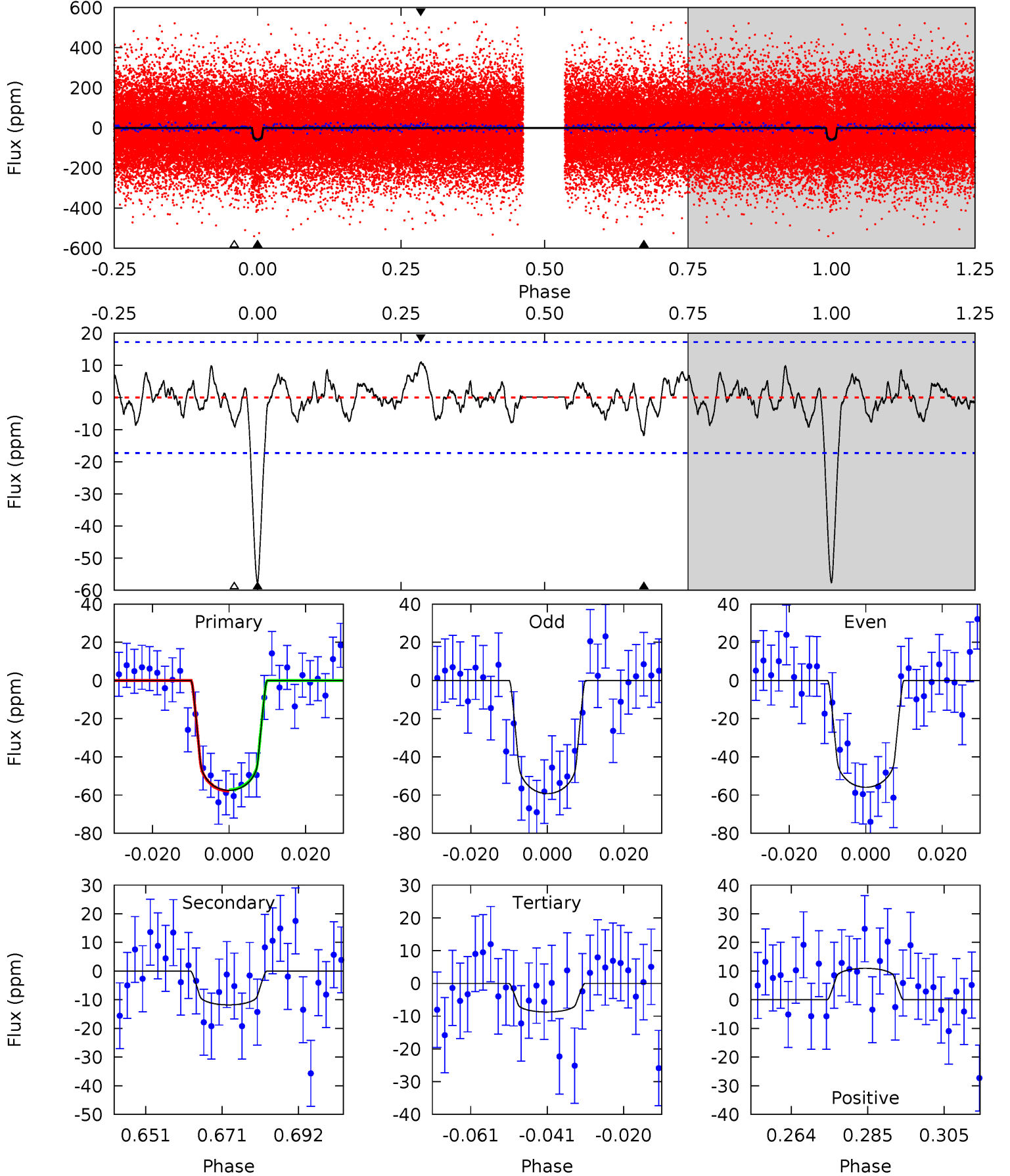
TCE 009048161-02 P= 8.667670 Days $T_0=133.017891$ (BKJD)



DV Model-Shift Uniqueness Test

009048161-02, P = 8.667796 Days, E = 124.350927 Days

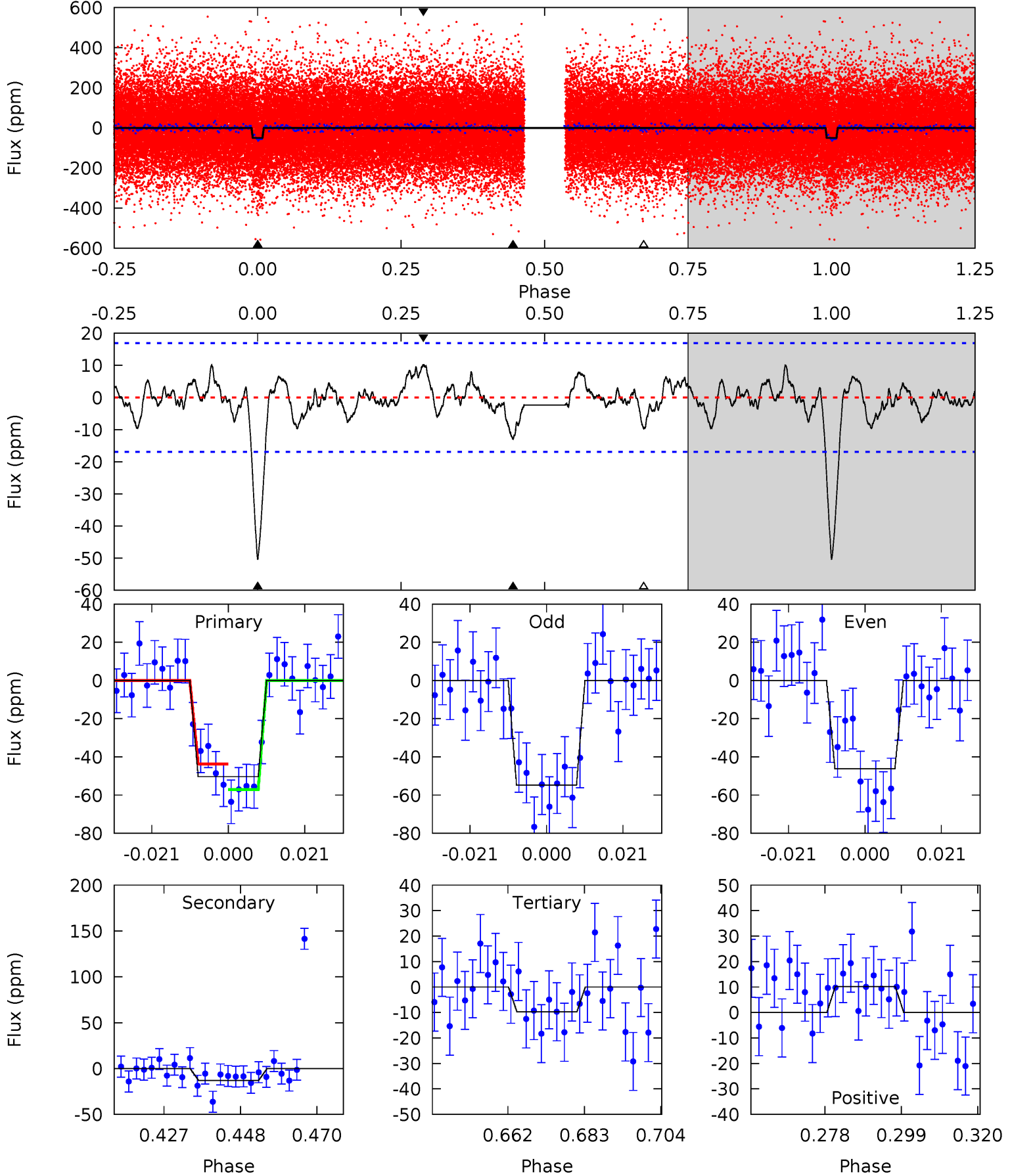
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
16.3	3.34	2.48	3.10	4.89	2.32	1.11	13.8	13.2	0.86	0.23	0.47	0.98	0.16	0.10



Alt Model-Shift Uniqueness Test

009048161-02, P = 8.667670 Days, E = 124.350221 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	3.74	2.80	2.94	4.88	2.30	1.15	11.7	11.6	0.95	0.80	1.23	1.00	0.17	1.93



Stellar Parameters For KIC 009048161

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	M (M_{\odot})	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	6266^{+189}_{-207}	$3.923^{+0.443}_{-0.148}$	$-0.440^{+0.300}_{-0.300}$	$1.889^{+0.460}_{-0.854}$	$1.089^{+0.156}_{-0.191}$	$0.228^{+1.006}_{-0.090}$
	+3%/-3%	+11%/-4%	+68%/-68%	+24%/-45%	+14%/-18%	+442%/-40%
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 009048161-02 / KOI

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-12 ± 4	$1.58^{+0.73}_{-0.65}$	1790^{+148}_{-217}	4224^{+896}_{-498}	19^{+29}_{-11}
Alt.	-13 ± 3	$1.33^{+0.74}_{-0.58}$	1787^{+145}_{-205}	4619^{+1167}_{-648}	29^{+63}_{-17}

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 $A_{obs} \gg 1.0$

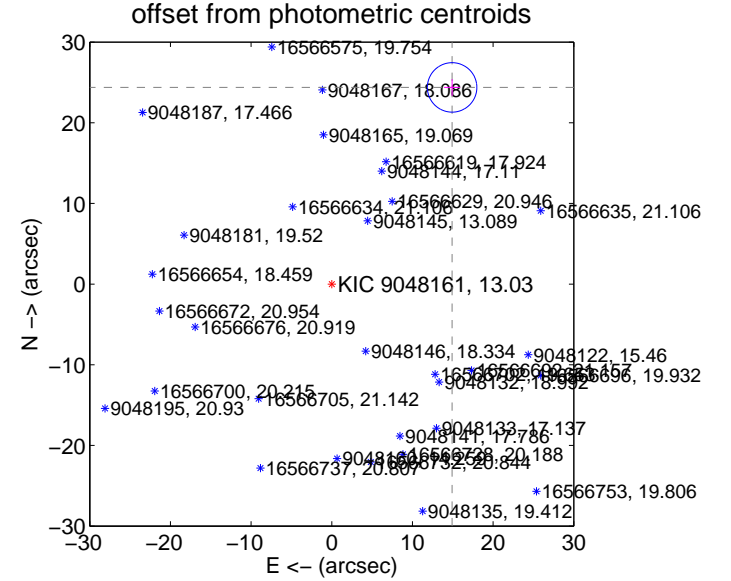
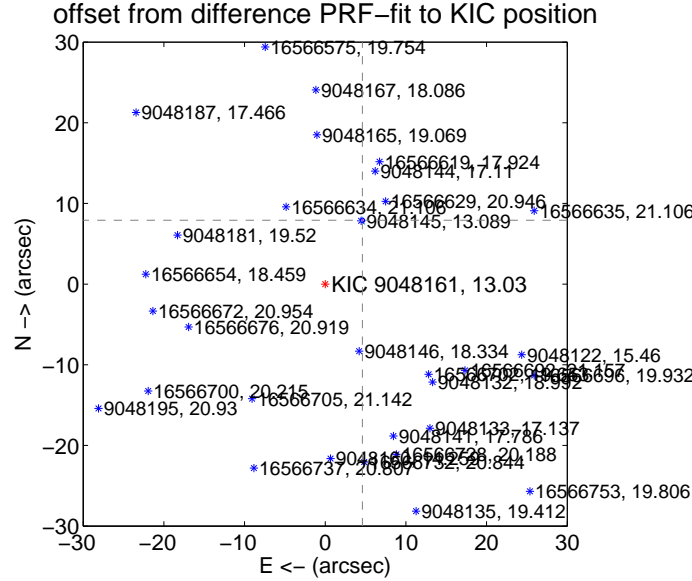
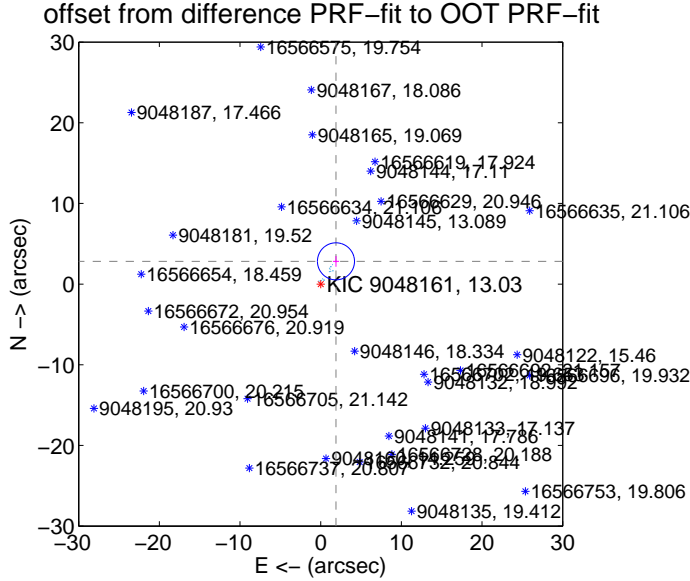
DV Centroid Data

Supplemental centroid analysis for 009048161-02. Kepler magnitude: 13.03. Transit SNR 11.84

There are 17 quarters with good PRF difference image offsets

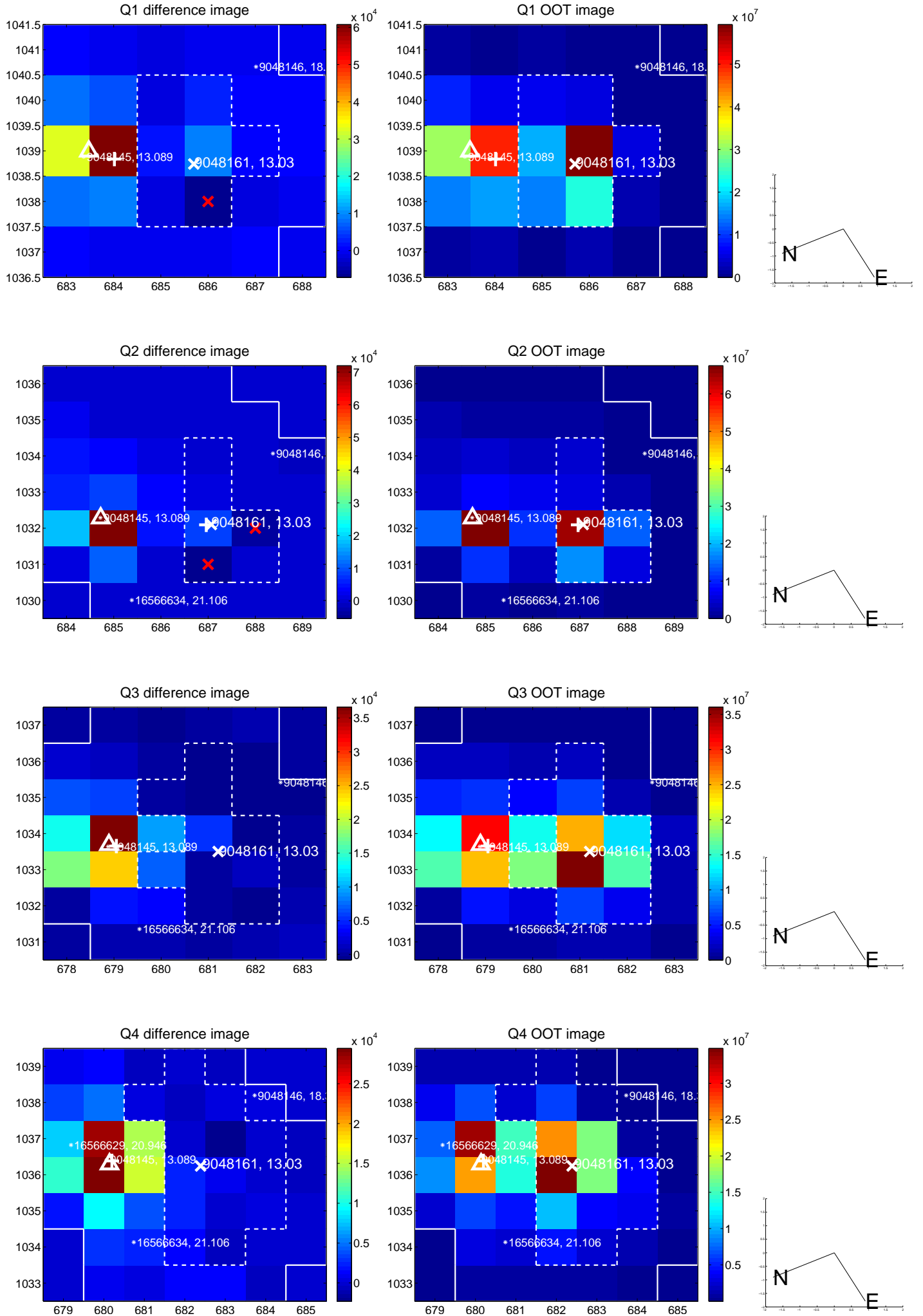
The OOT PRF centroid is offset from the target star catalog position by about 7.03 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	3.399 \pm 0.765	4.44	-1.895 \pm 0.388	2.822 \pm 0.667
PRF-fit source offset from KIC position	9.153 \pm 0.089	102.47	-4.606 \pm 0.085	7.909 \pm 0.091
photometric centroid source offset	28.58 \pm 1.02	27.97	-14.92 \pm 1.00	24.38 \pm 1.03

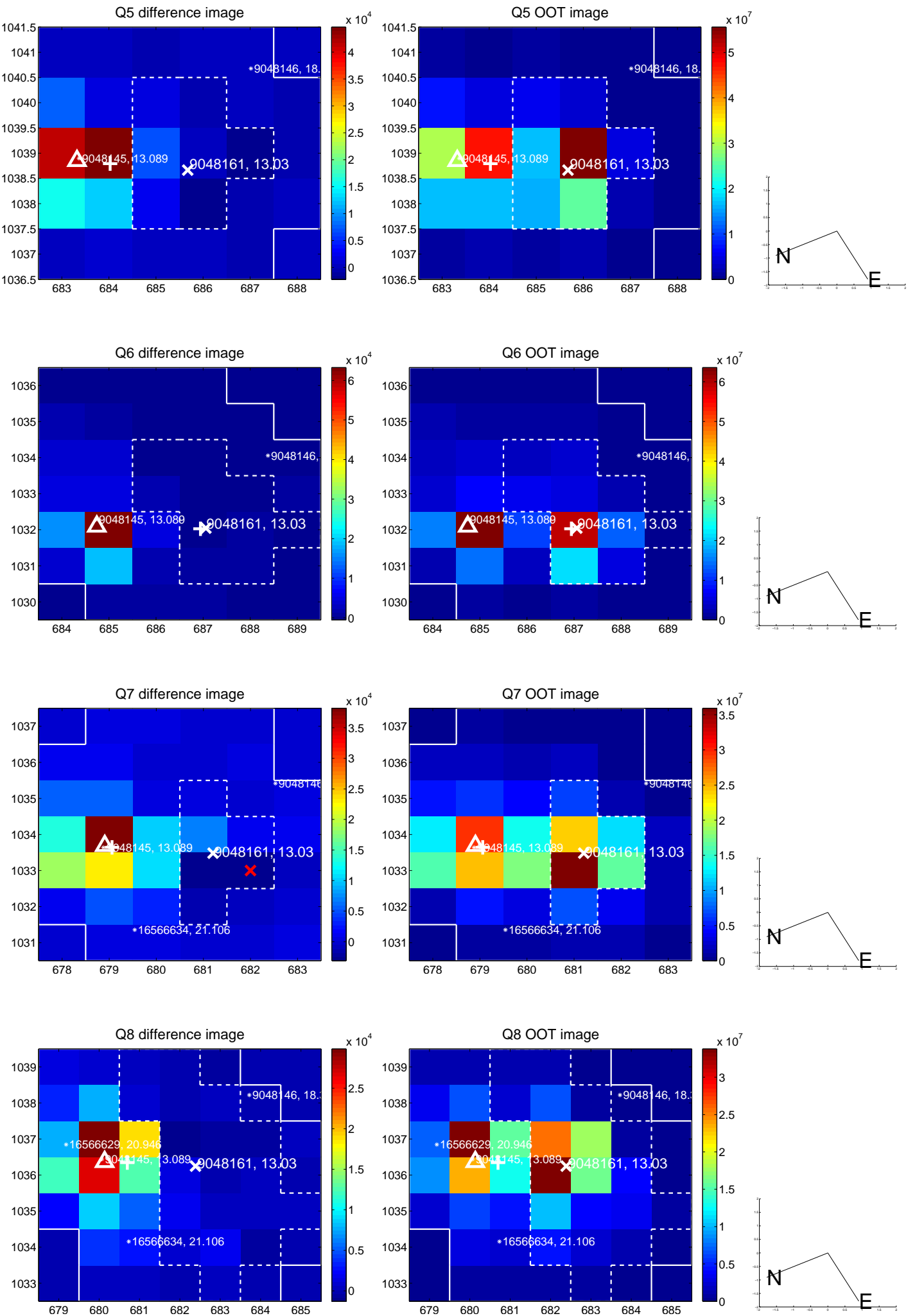


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

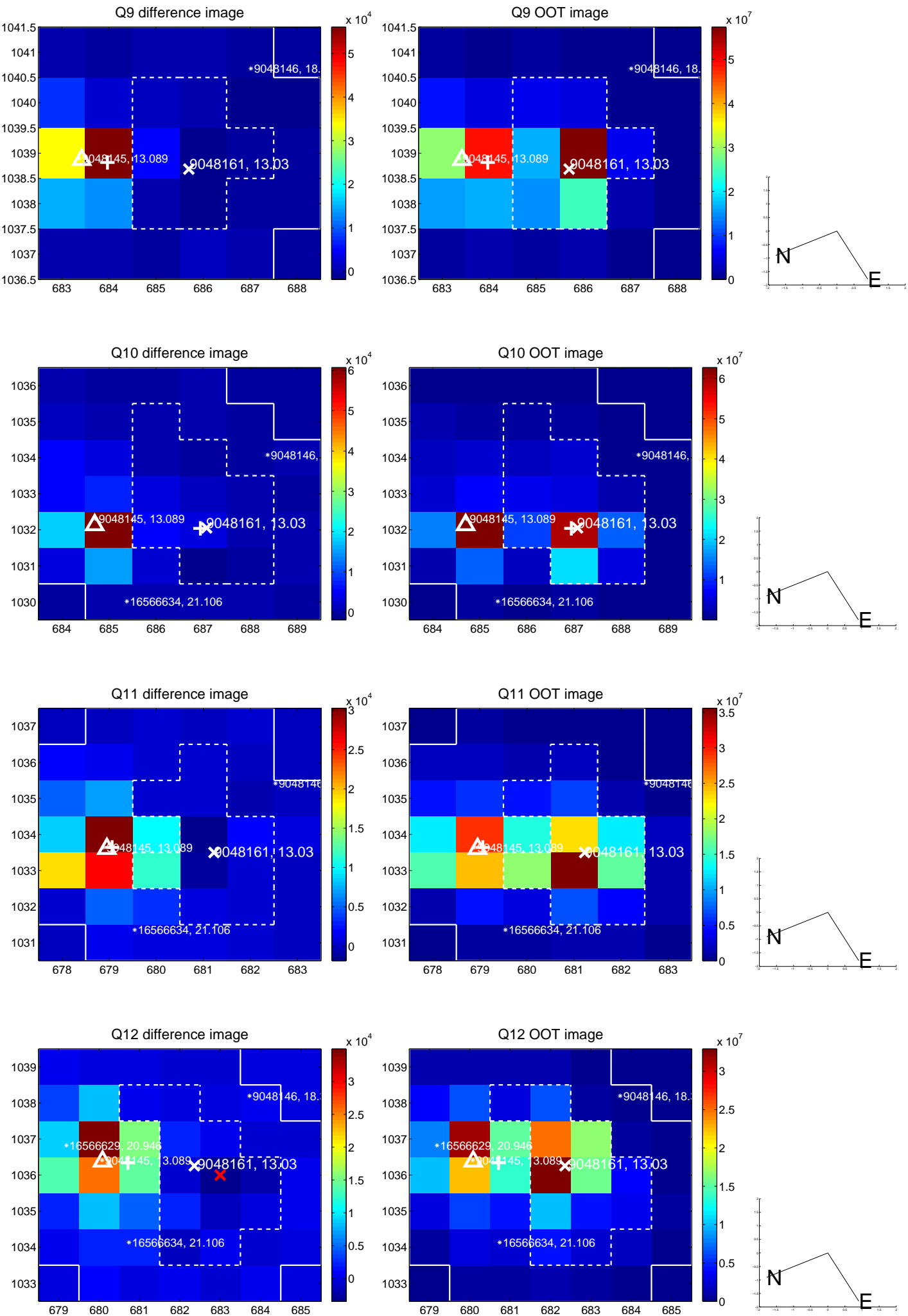
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



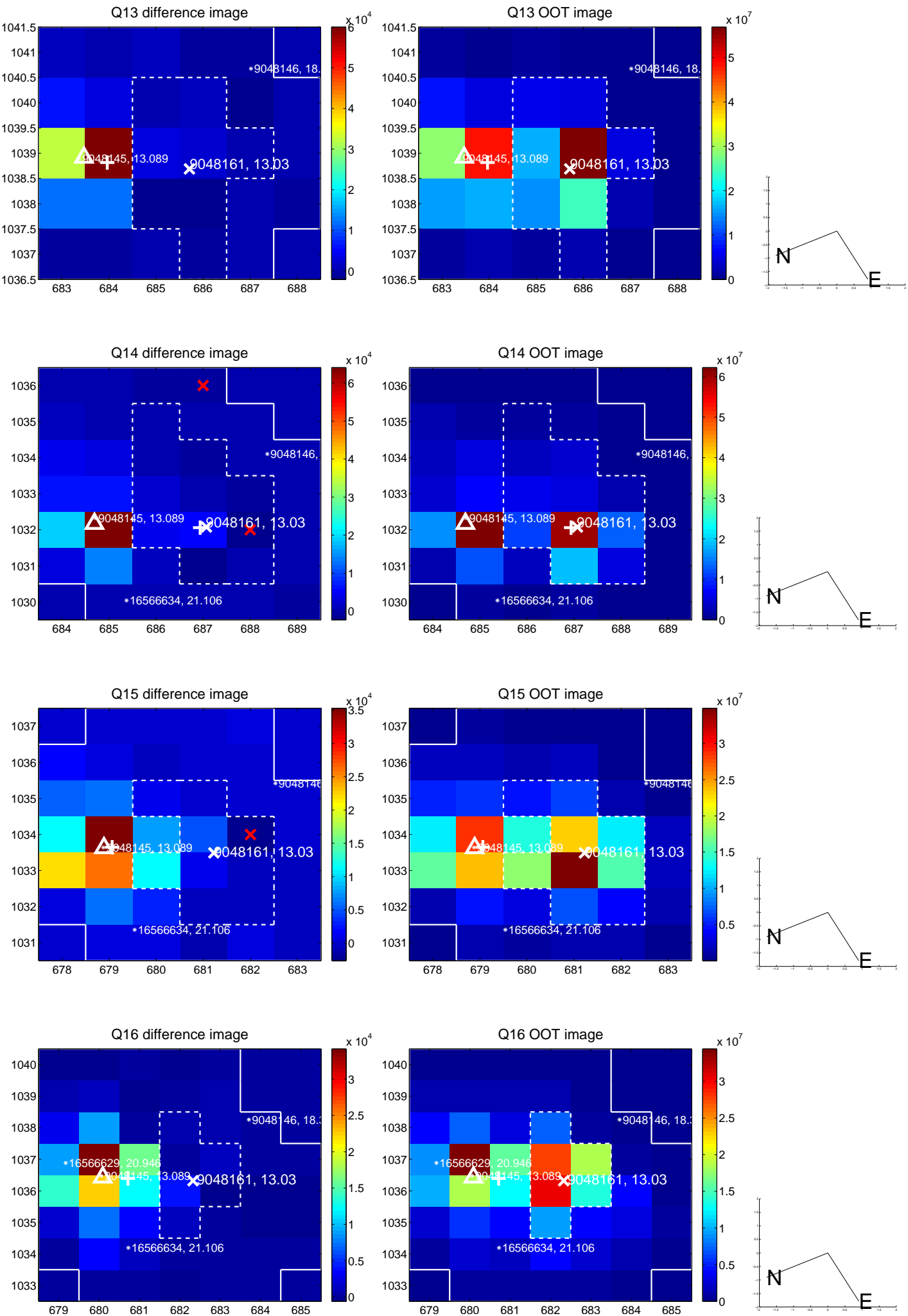
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



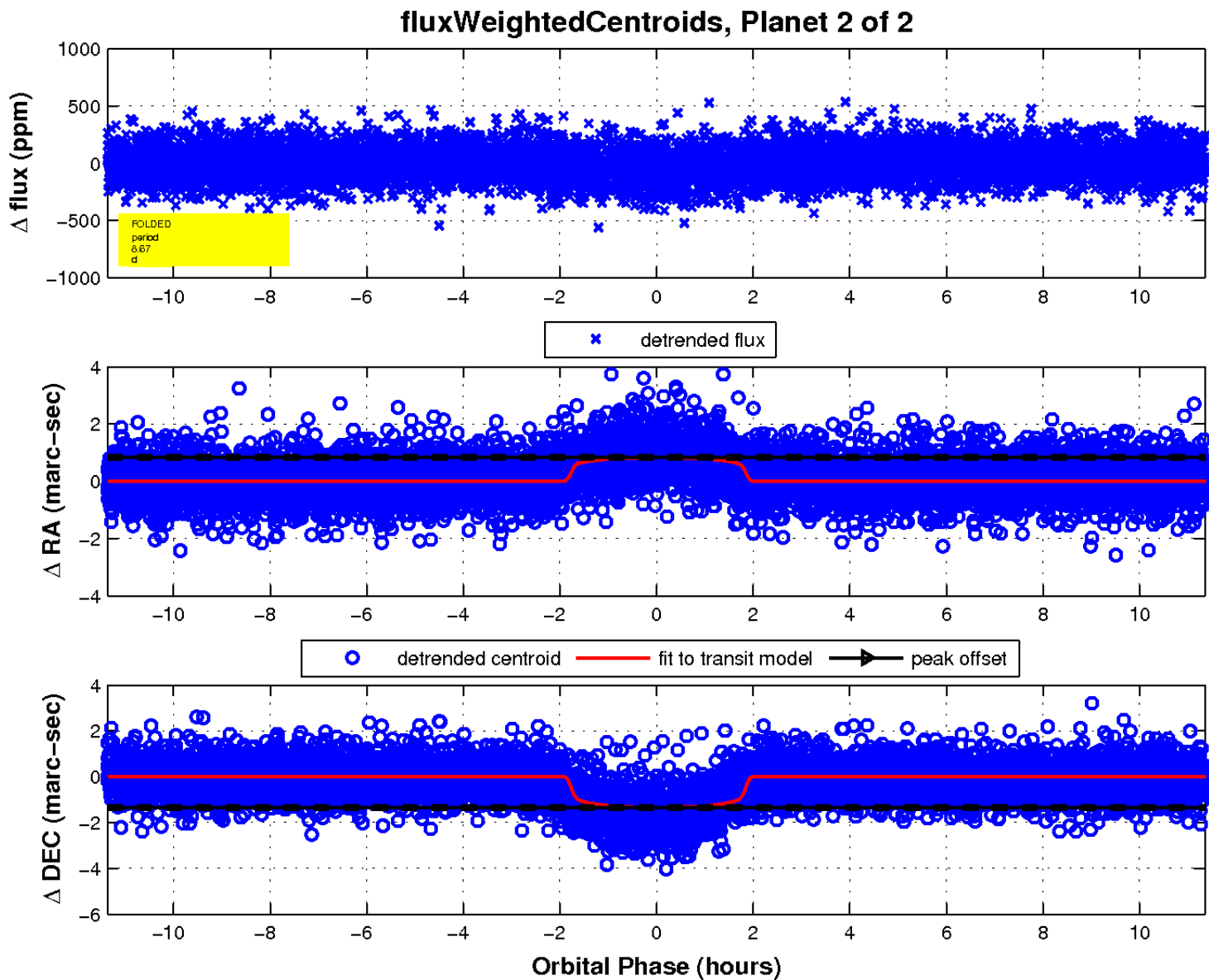
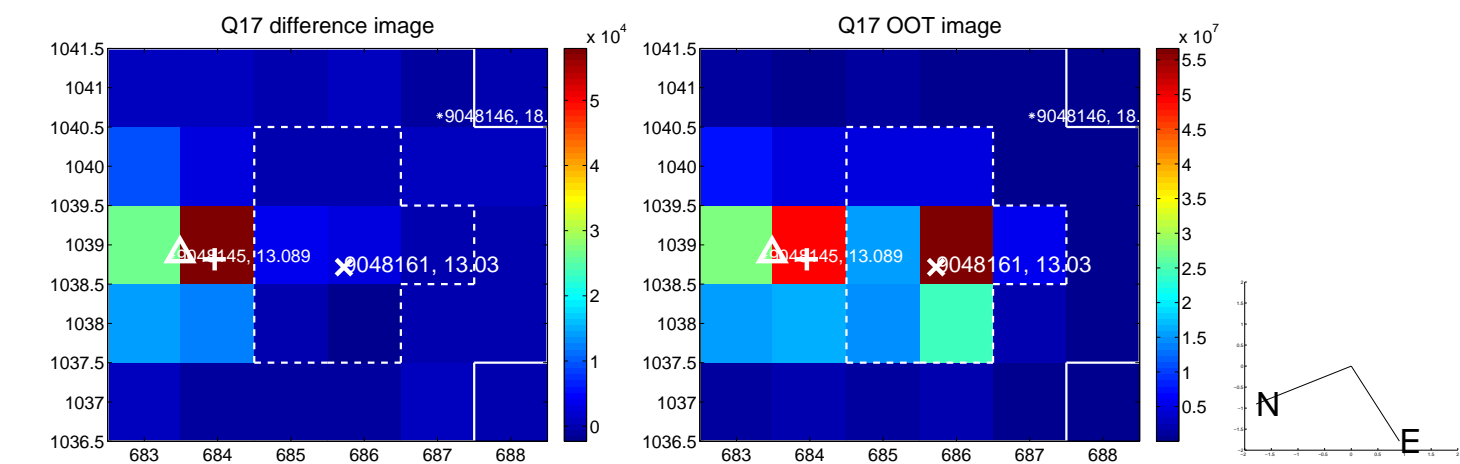
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

