

KIC 002307415

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})
002307415-01	OBS	2053.02	4.612651	132.780511	129.8	3.202	28.7	31.1	1.28	6140	1.70	664.40
002307415-02	OBS	2053.01	13.121623	133.395193	196.6	3.762	27.2	28.9	1.28	6140	2.11	164.83

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
002307415-01	OBS	PC	0.98	0	0	0	0	NO_COMMENT
002307415-02	OBS	PC	0.98	0	0	0	0	NO_COMMENT

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

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

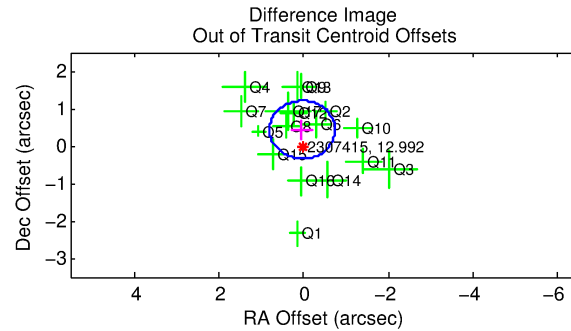
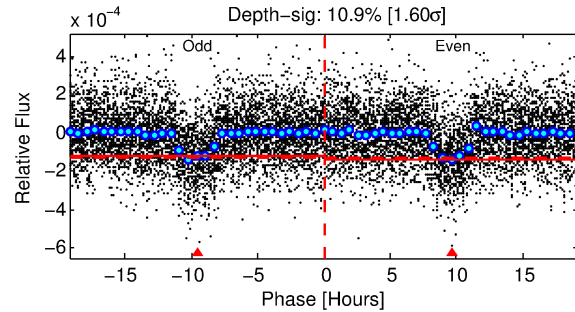
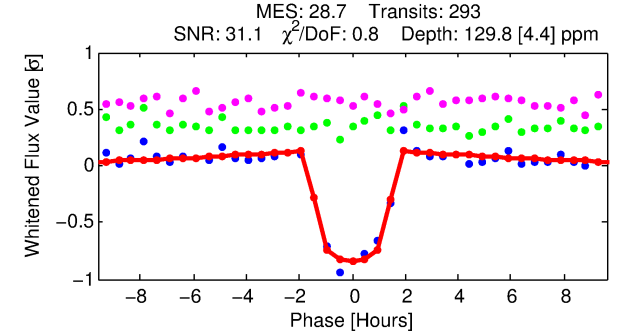
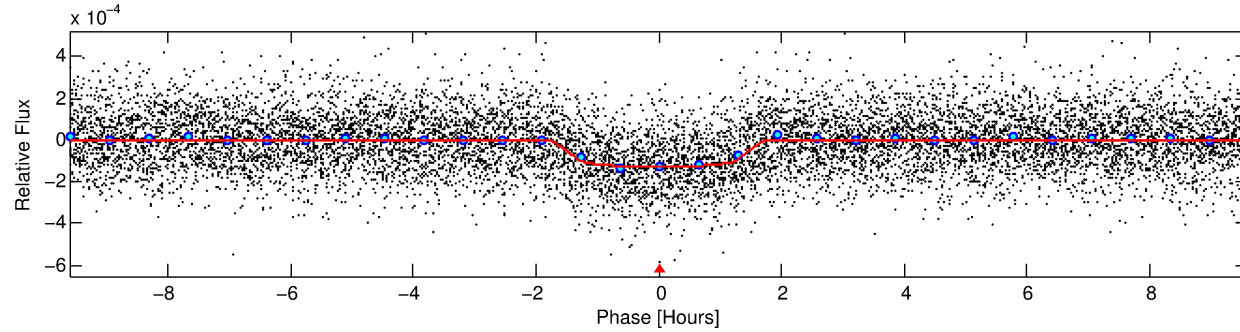
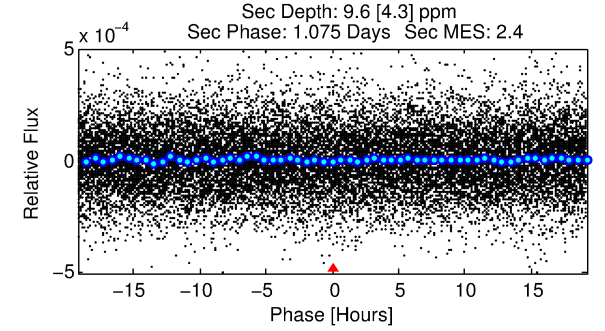
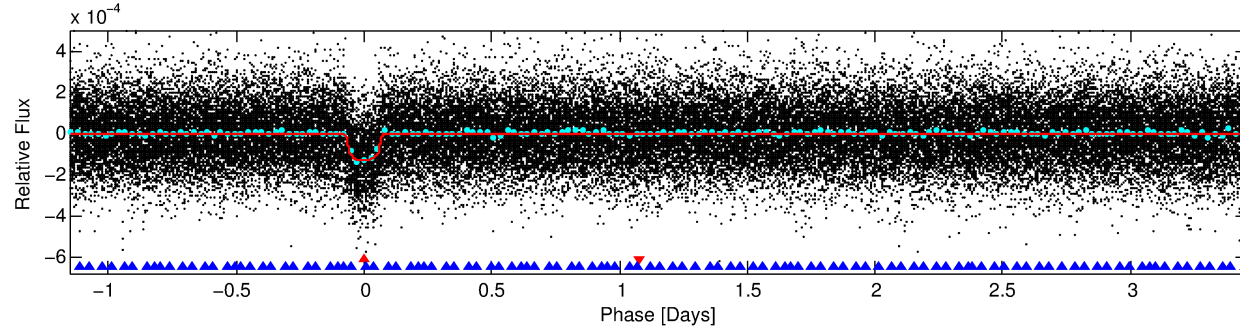
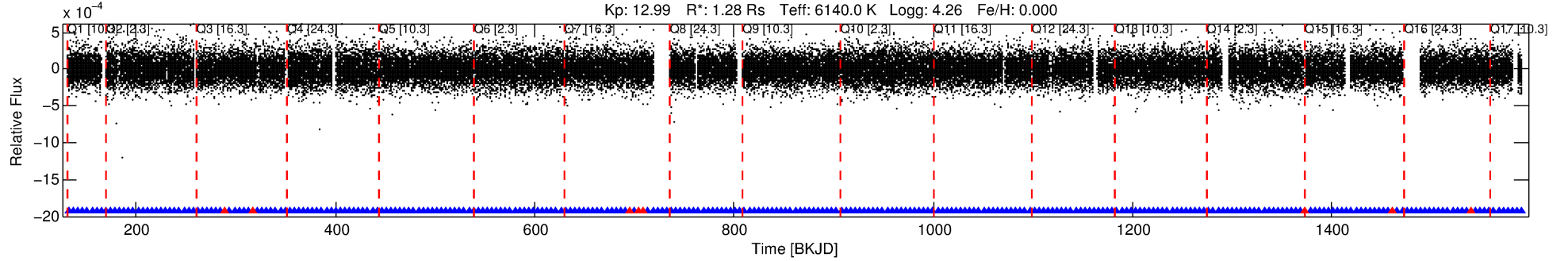
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 002307415-01

No Significant Match Found

DV One-Page Summary

KIC: 2307415 Candidate: 1 of 2 Period: 4.613 d
KOI: K02053.02 Name: Kepler-356b Corr: 0.967



DV Fit Results:

Period = 4.61265 [0.00001] d
Epoch = 132.7805 [0.0016] BKJD
Rp/R* = 0.0122 [0.0021]
a/R* = 5.36 [4.73]
b = 0.89 [0.21]
Seff = 664.40 [161.34]
Teq = 1295 [79] K
Rp = 1.70 [0.43] Re
a = 0.0559 [0.0086] AU
Ag = 5.71 [3.47] [1.36σ]
Teffp = 3094 [442] K [4.01σ]

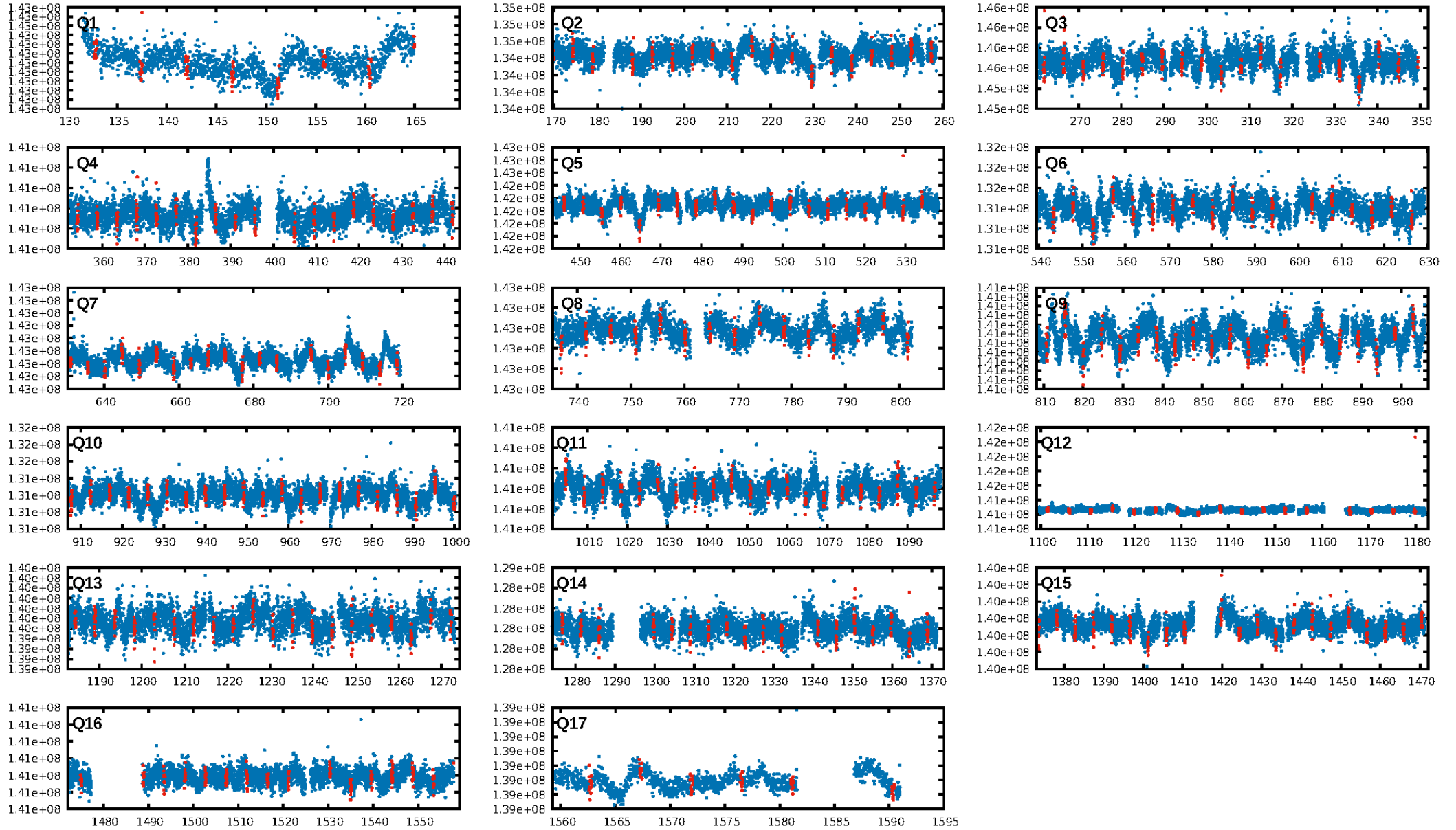
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 100.0% [41.34σ]
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: 6.24e-180
RollingBand-fgt: 0.97 [272/280]
GhostDiagnostic-chr: 2.171
Centroid-sig: 3.7%
Centroid-so: 0.472 arcsec [1.11σ]
OotOffset-rm: 0.435 arcsec [1.68σ]
KicOffset-rm: 0.440 arcsec [1.66σ]
OotOffset-st: 4/4/4/5 [17]
KicOffset-st: 4/4/4/5 [17]
DiffImageQuality-fgm: 0.88 [15/17]
DiffImageOverlap-fno: 1.00 [17/17]

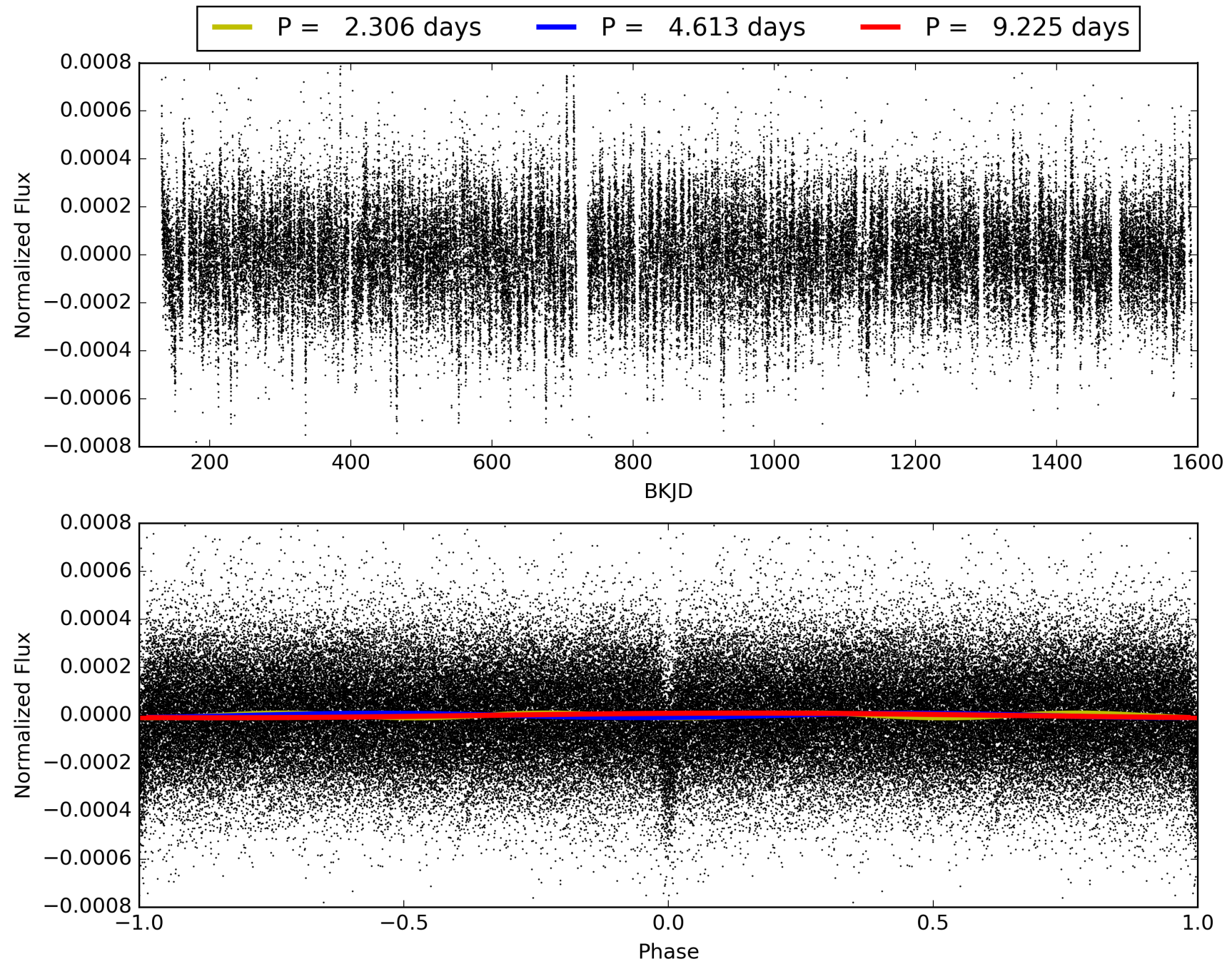
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 05:35:05 Z

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

TCE 002307415-01, PDC Light Curves

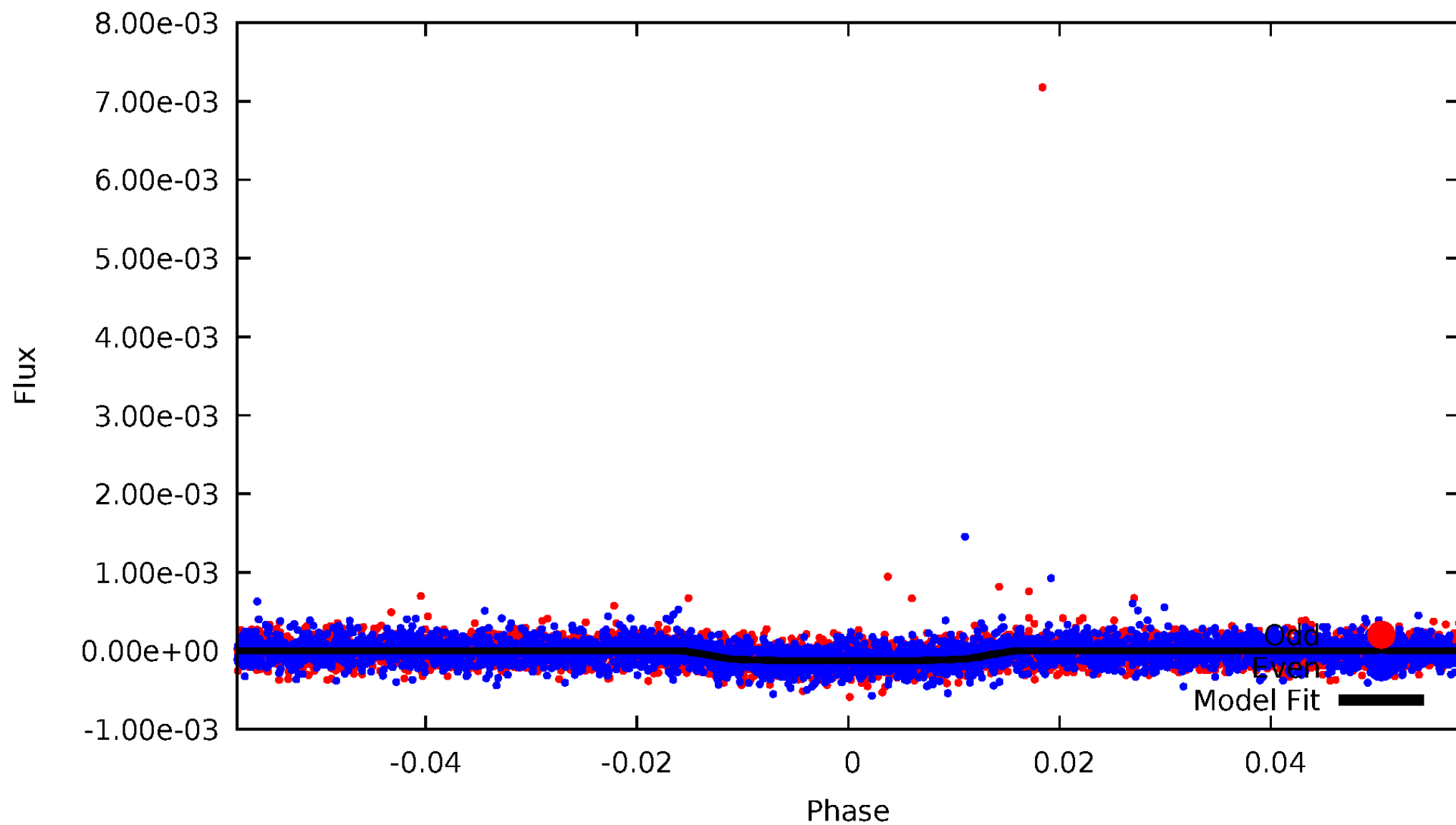


TCE 002307415-01



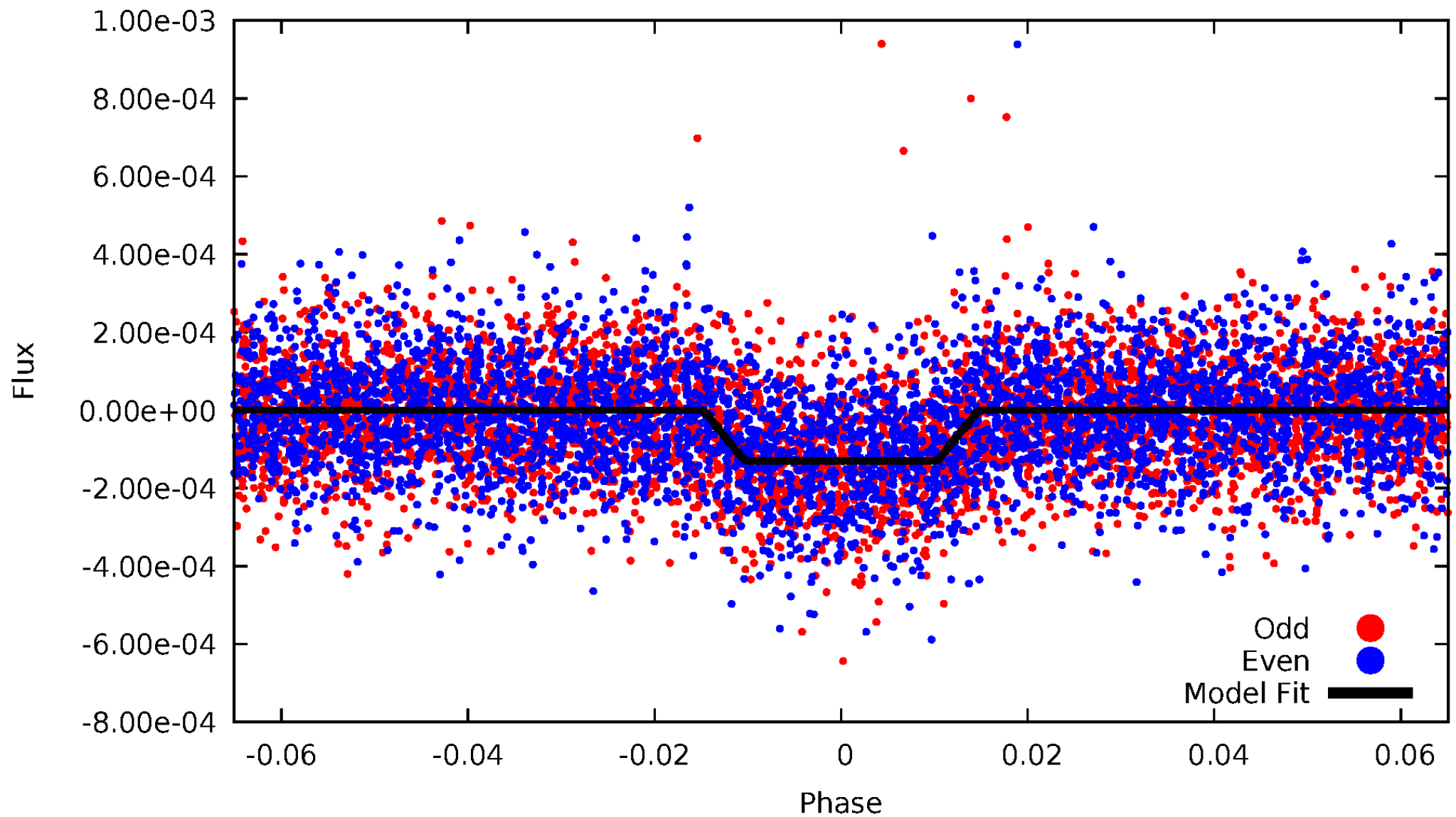
DV Odd/Even

TCE 002307415-01



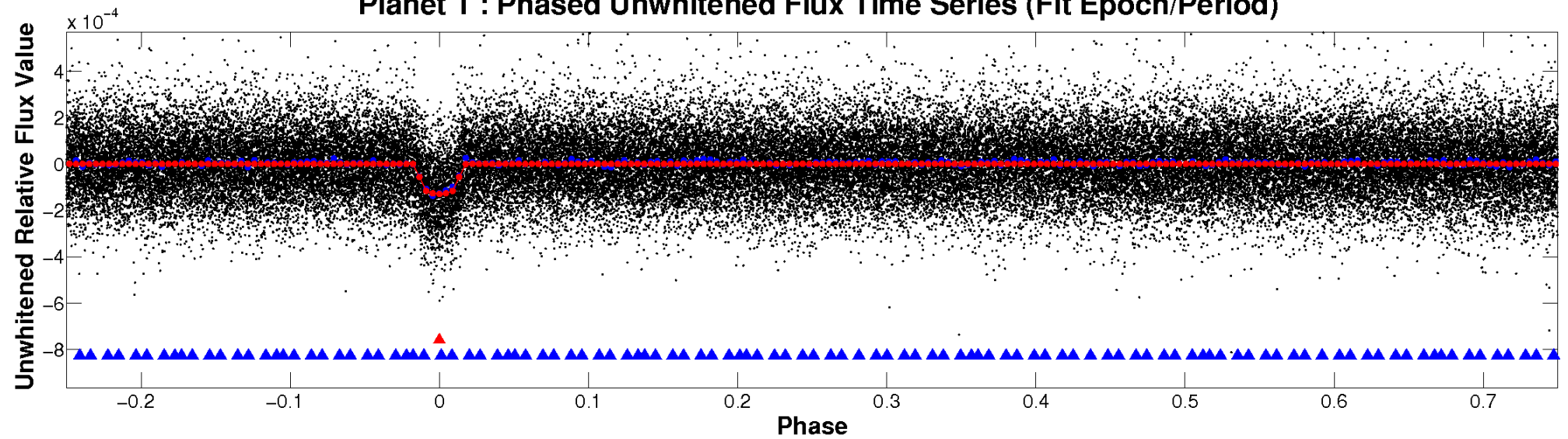
ALT Odd/Even

TCE 002307415-01

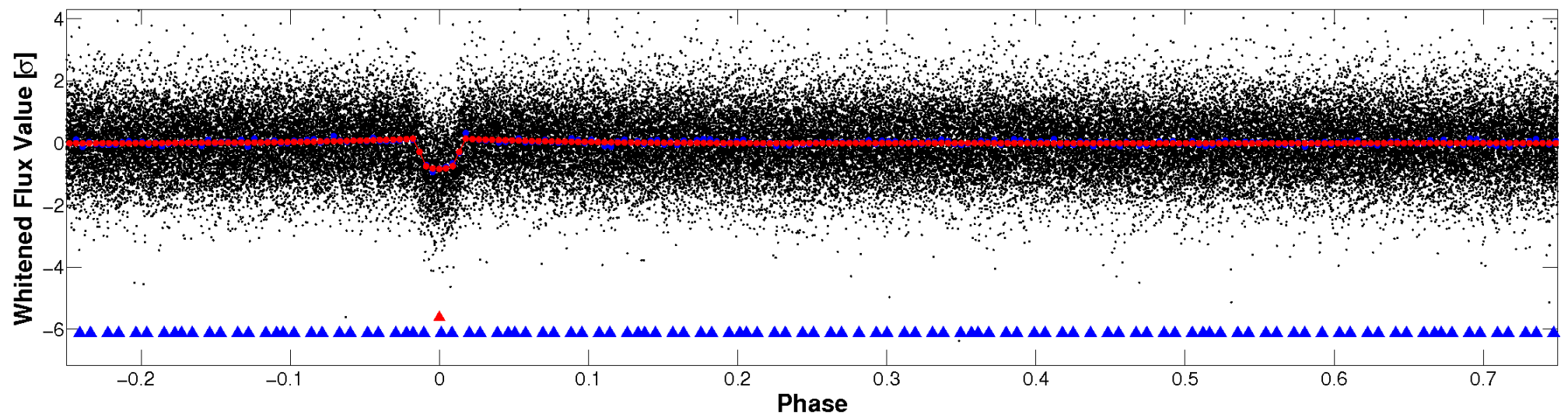


Non-Whitened Vs. Whitened Light Curve

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

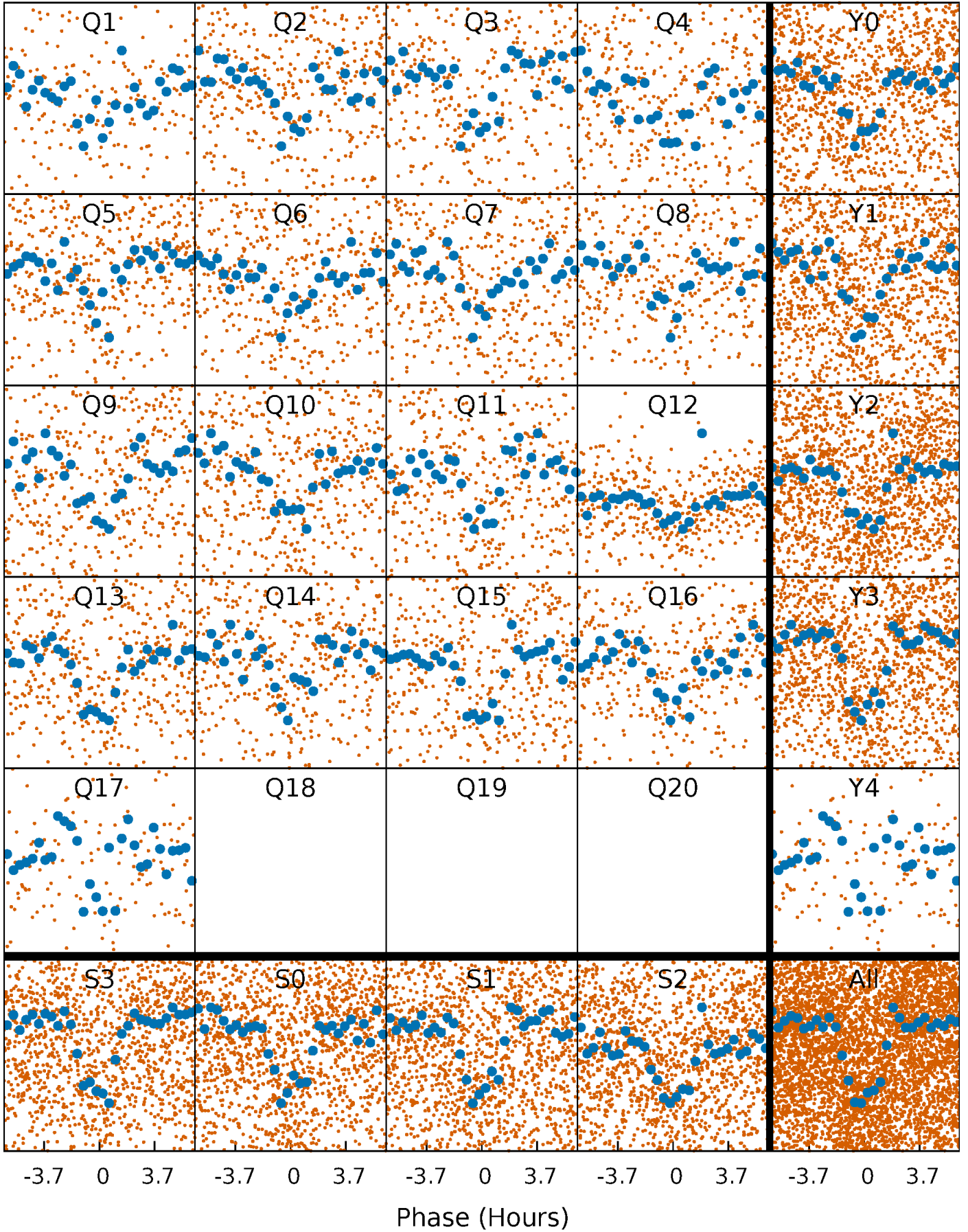


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



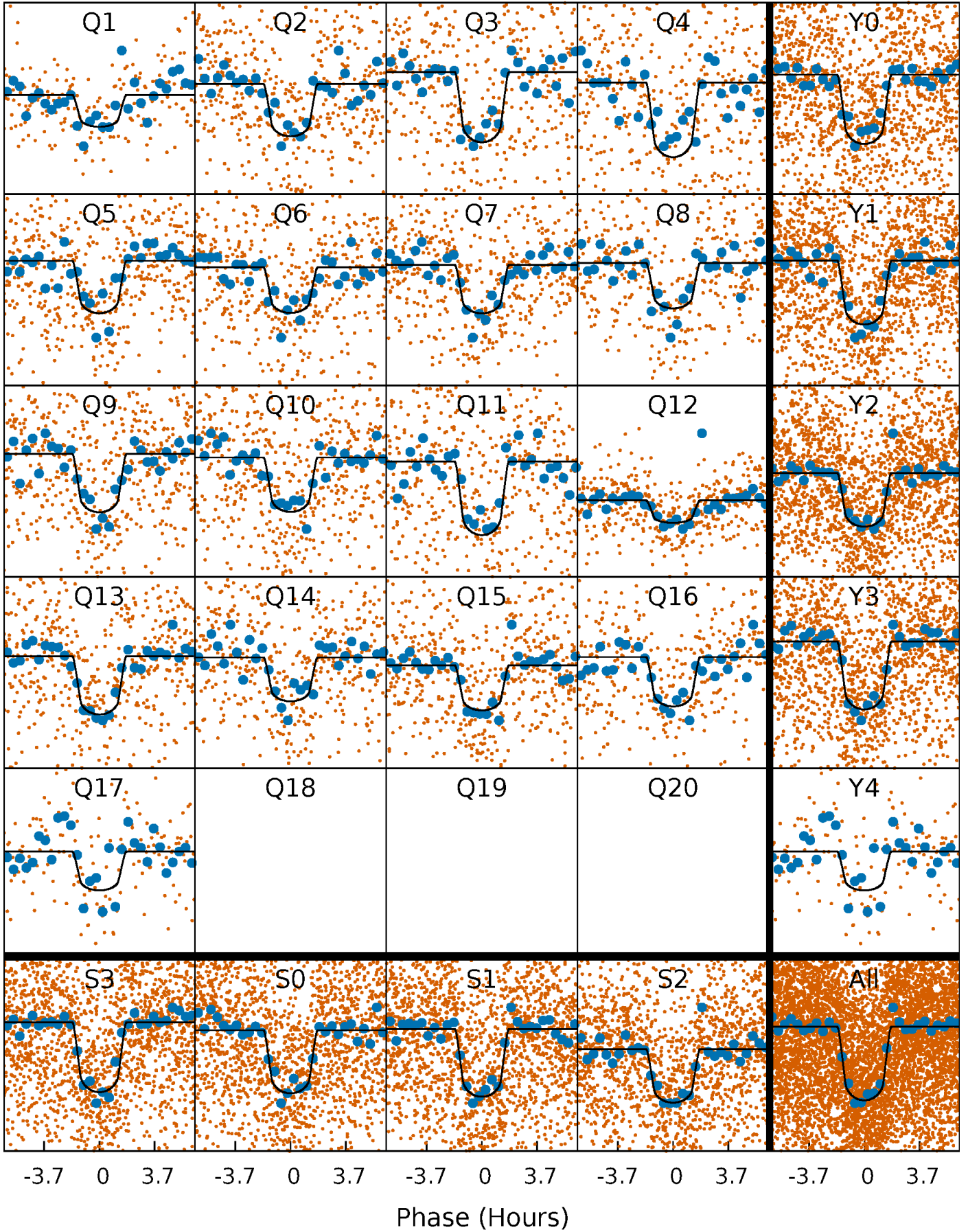
PDC Quarter-Phased Transit Curves

TCE 002307415-01 P= 4.612651 Days $T_0=132.780511$ (BKJD)



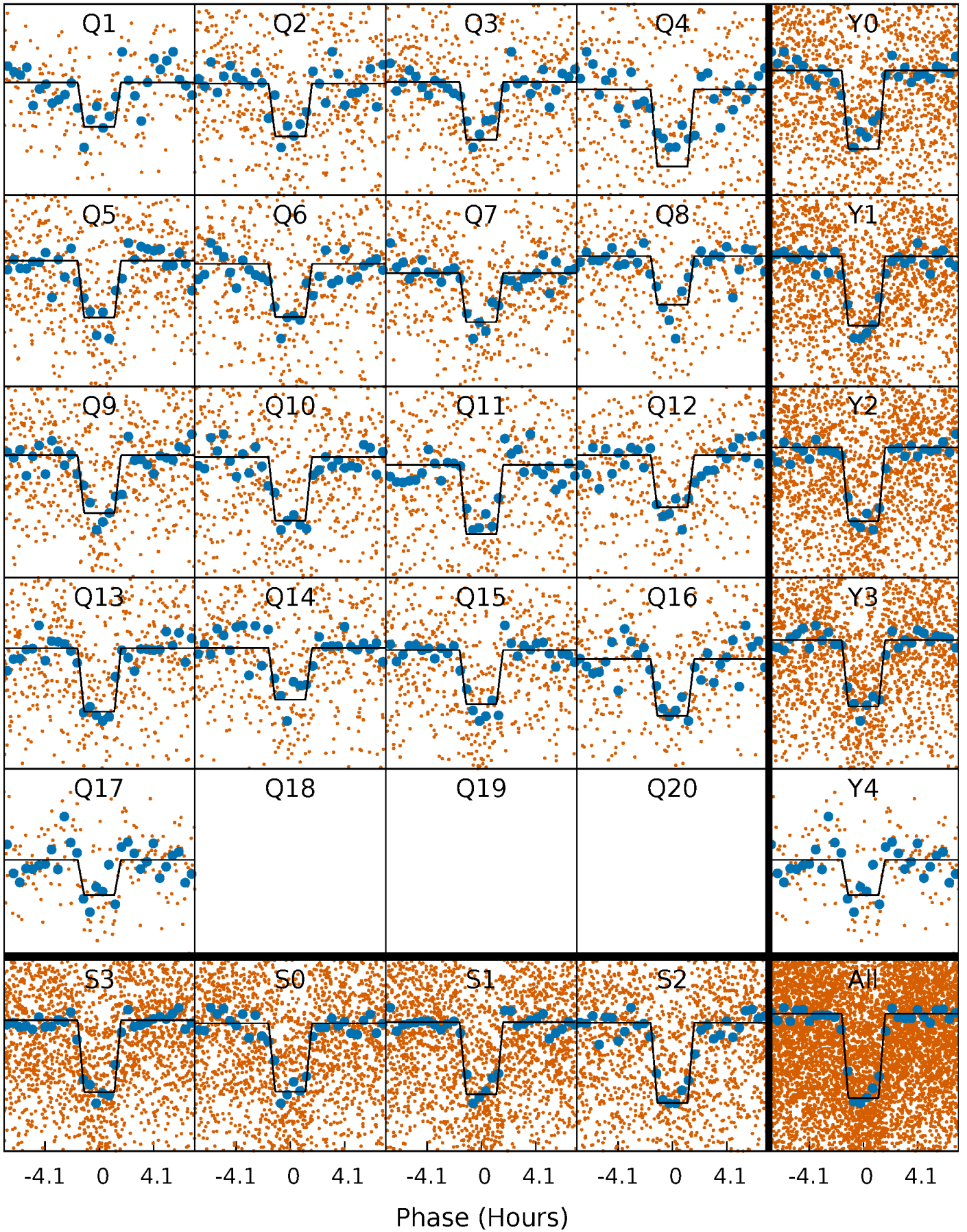
DV Quarter-Phased Transit Curves

TCE 002307415-01 P= 4.612651 Days $T_0=132.780511$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

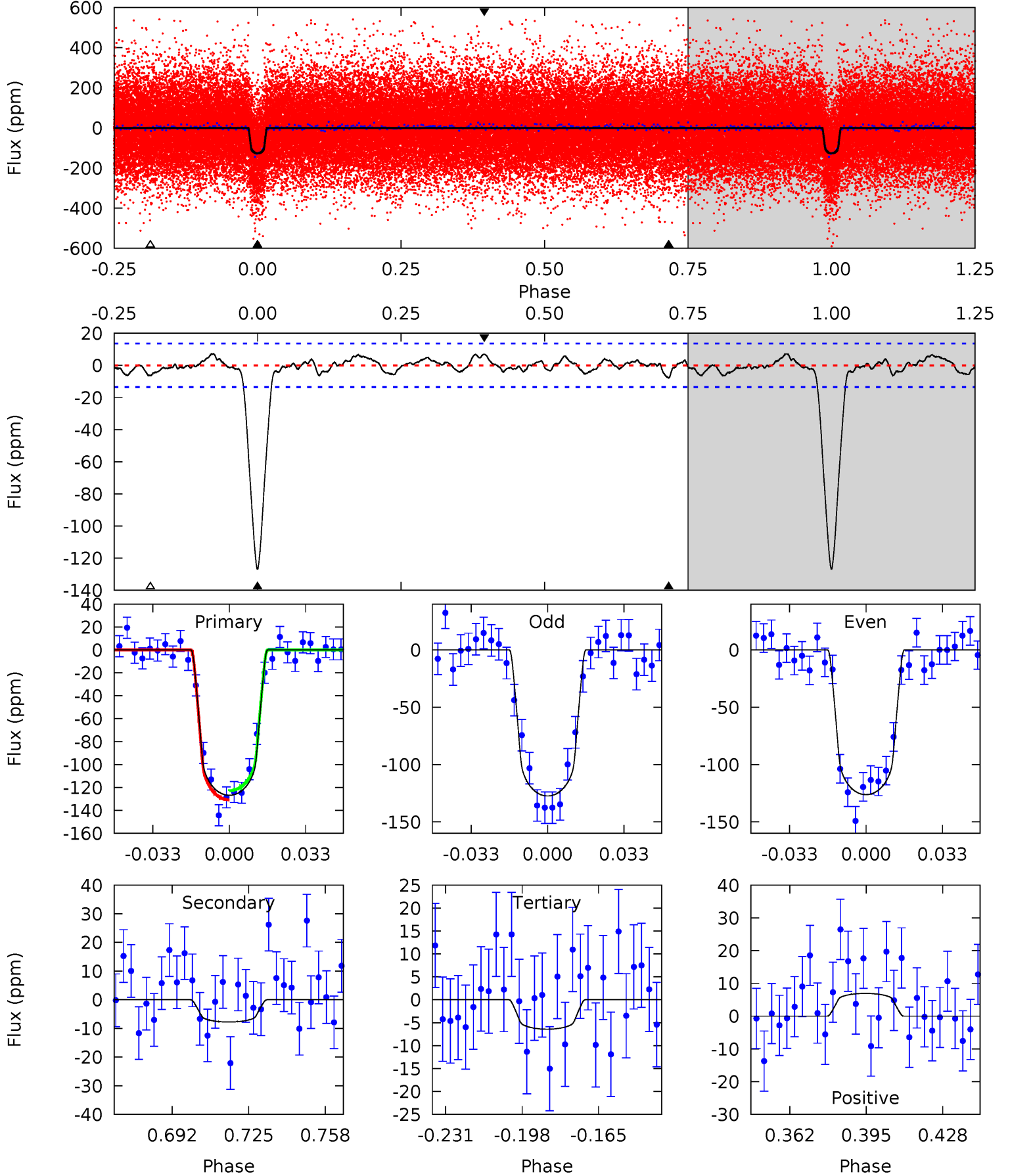
TCE 002307415-01 P= 4.612634 Days $T_0=132.782259$ (BKJD)



DV Model-Shift Uniqueness Test

002307415-01, P = 4.612651 Days, E = 128.167860 Days

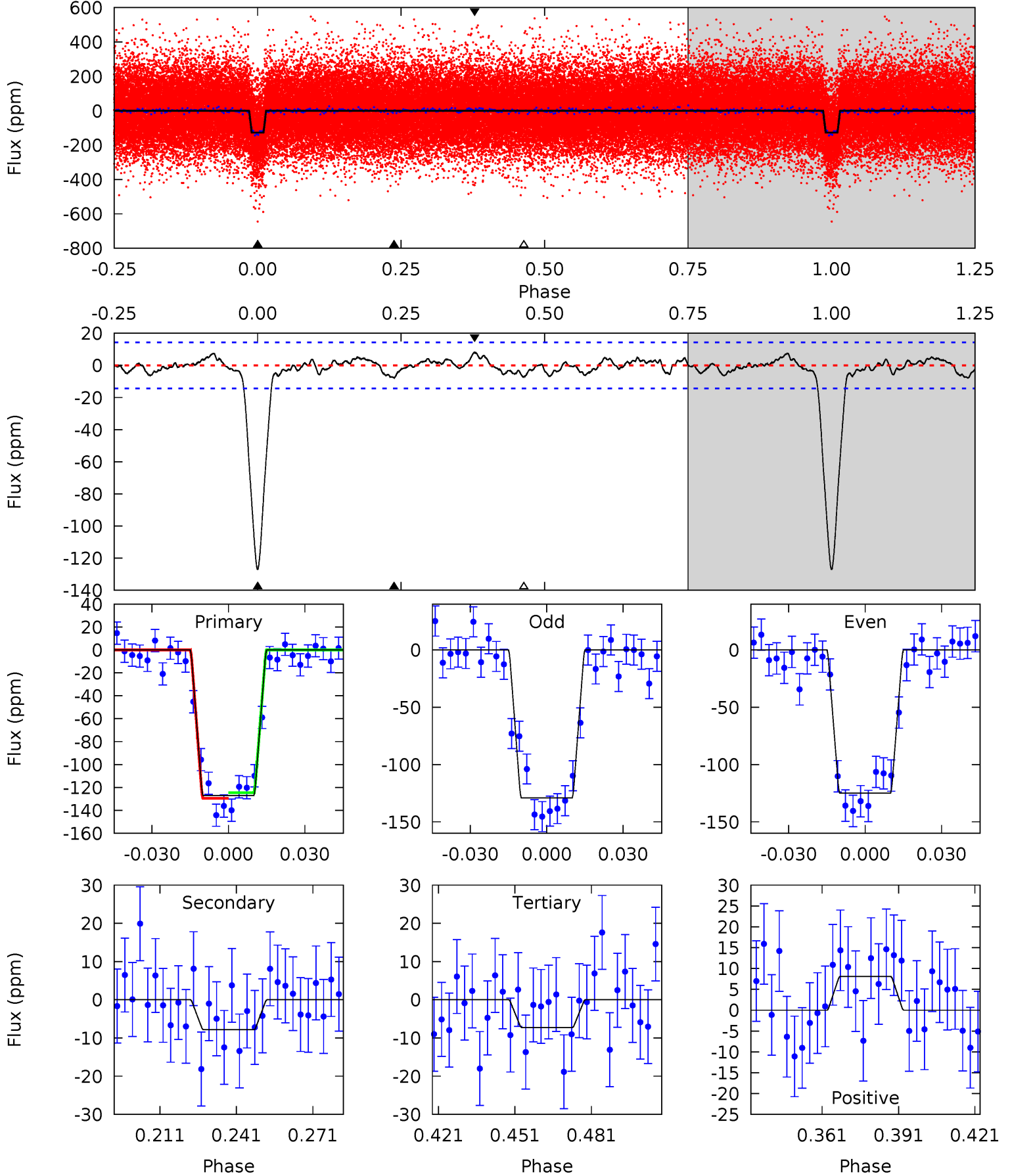
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
44.8	2.75	2.27	2.45	4.79	2.13	1.08	42.6	42.4	0.48	0.30	0.20	1.01	0.05	1.42



Alt Model-Shift Uniqueness Test

002307415-01, P = 4.612634 Days, E = 128.169625 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
42.7	2.64	2.44	2.71	4.81	2.17	1.08	40.3	40.0	0.20	-0.07	0.71	1.00	0.06	0.82



Stellar Parameters For KIC 002307415

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	6140^{+123}_{-135}	$4.265^{+0.125}_{-0.125}$	$0.000^{+0.150}_{-0.150}$	$1.277^{+0.230}_{-0.188}$	$1.094^{+0.103}_{-0.075}$	$0.741^{+0.412}_{-0.266}$
	+2%/-2%	+3%/-3%	+inf%/-inf%	+18%/-15%	+9%/-7%	+56%/-36%
Source	SPE58	SPE58	SPE58	DSEP		

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

Secondary Eclipse Parameters for KIC 002307415-01 / KOI 2053.02

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	A_{obs}
DV	-8 ± 3	$1.71^{+0.35}_{-0.33}$	1807^{+88}_{-83}	3392^{+305}_{-311}	$4.508^{+3.329}_{-2.069}$
Alt.	-8 ± 3	$1.59^{+0.33}_{-0.33}$	1804^{+93}_{-82}	3472^{+336}_{-331}	$5.118^{+4.222}_{-2.394}$

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

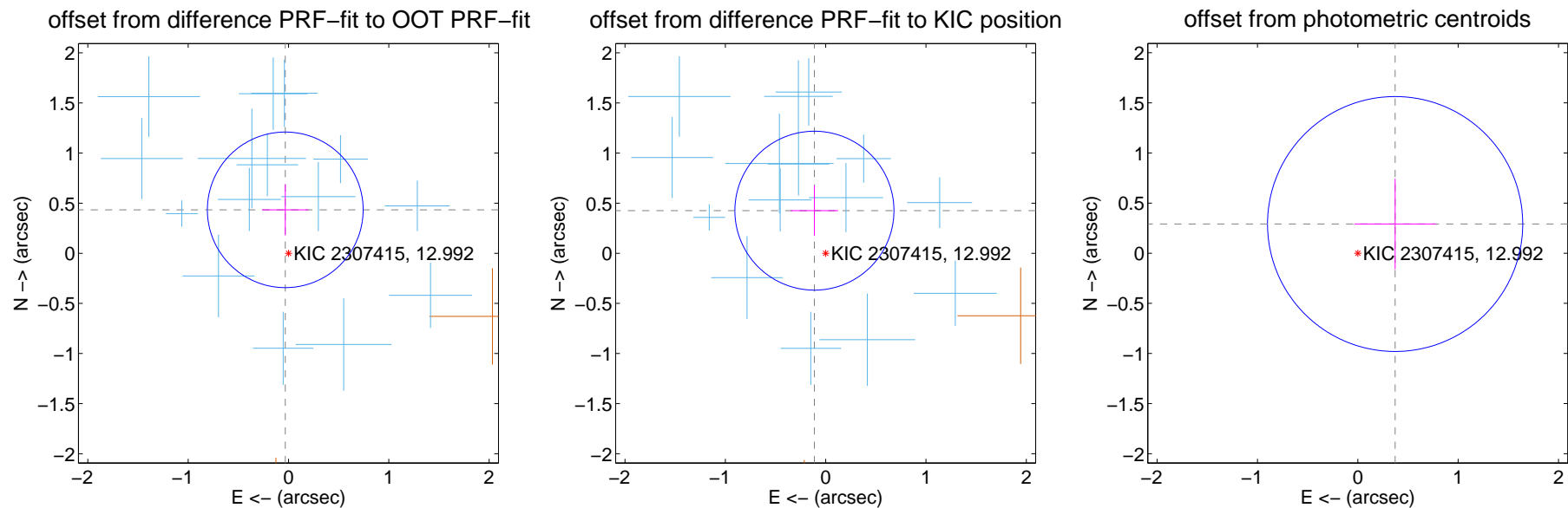
DV Centroid Data

Supplemental centroid analysis for 002307415-01. Kepler magnitude: 12.99. Transit SNR 31.13

There are 15 quarters with good PRF difference image offsets

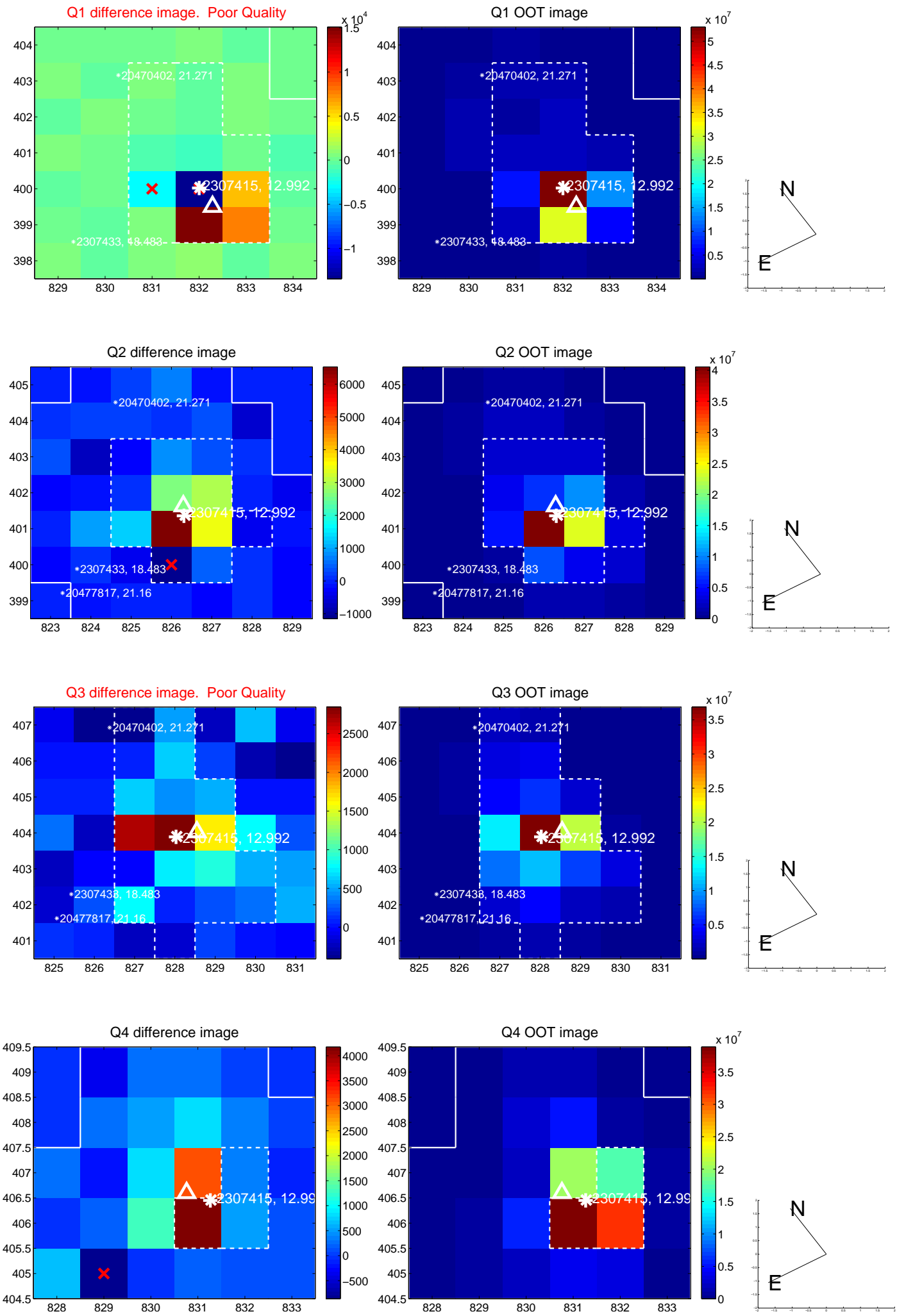
The direct PRF centroid is offset from the target star catalog position by about 0.11 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.435 ± 0.259	1.68	0.032 ± 0.231	0.434 ± 0.256
PRF-fit source offset from KIC position	0.440 ± 0.264	1.66	0.112 ± 0.236	0.425 ± 0.251
photometric centroid source offset	0.47 ± 0.42	1.11	-0.37 ± 0.41	0.29 ± 0.45

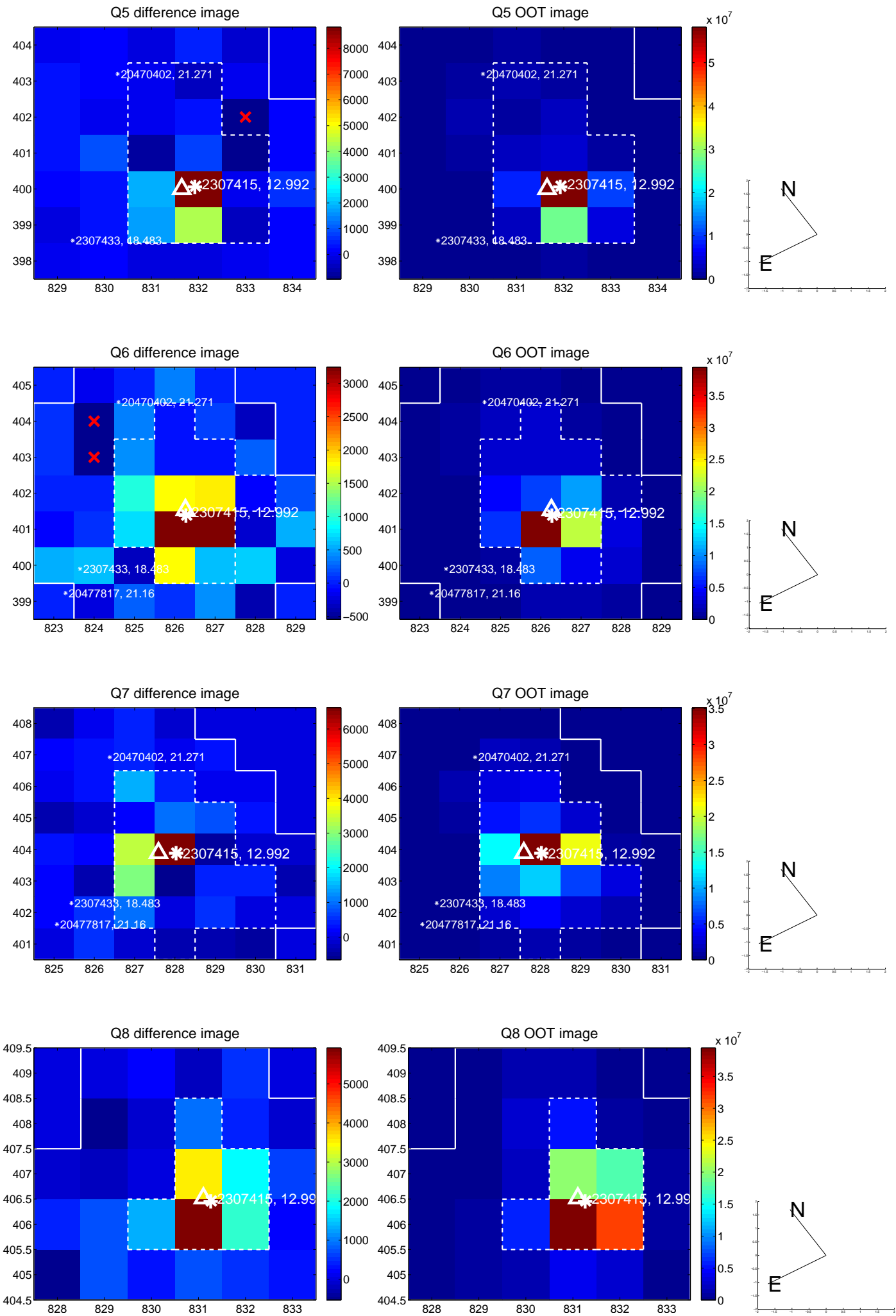


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

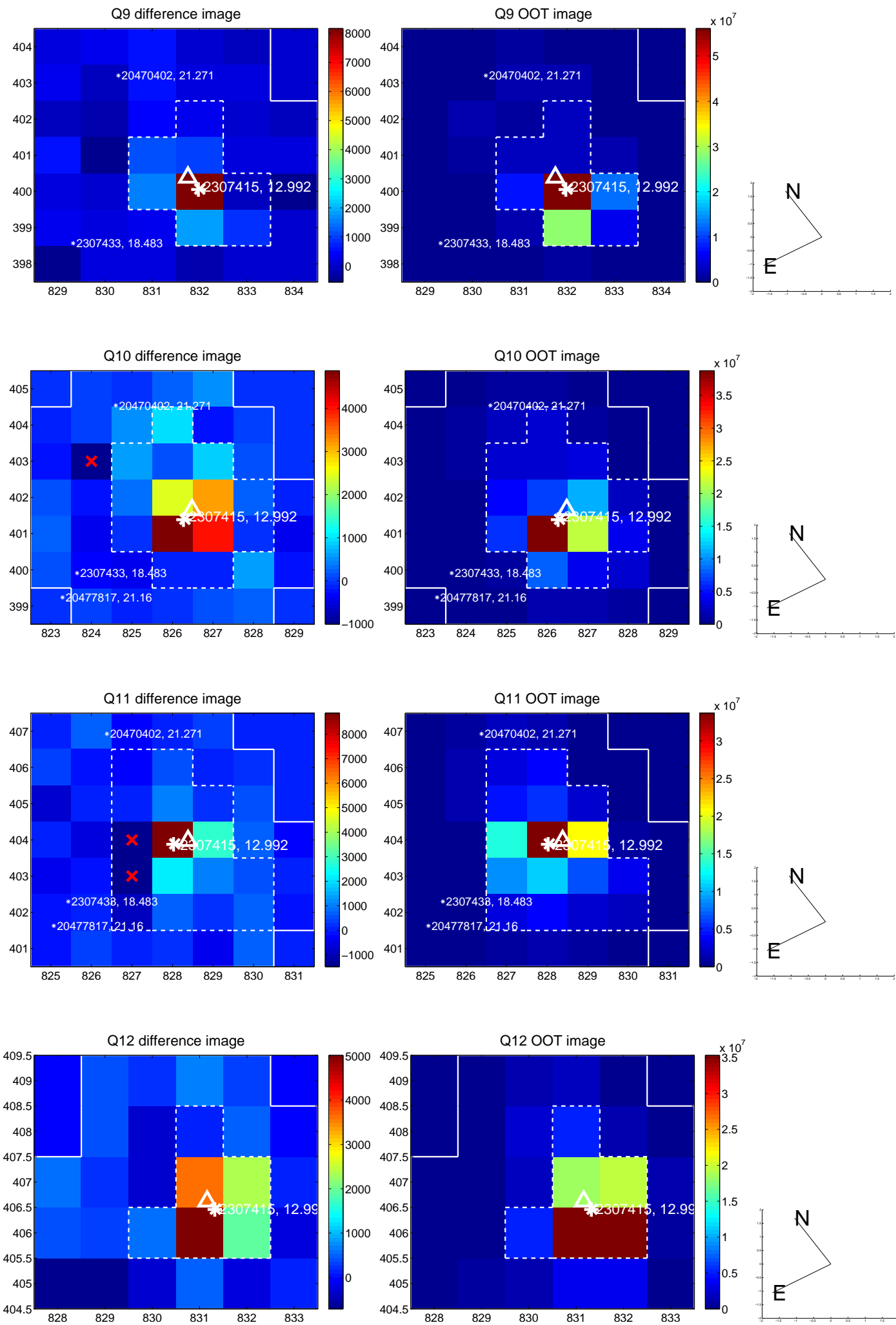
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



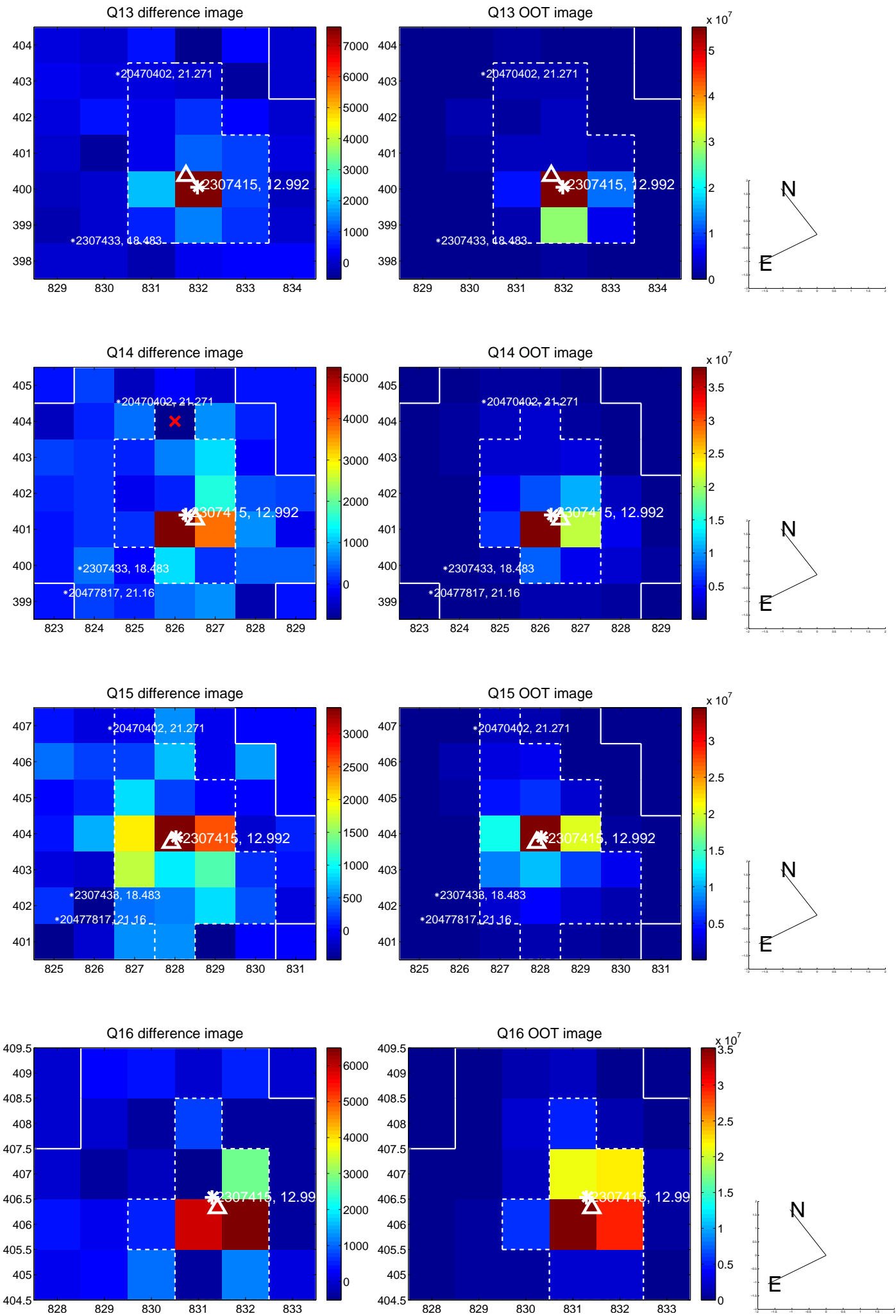
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



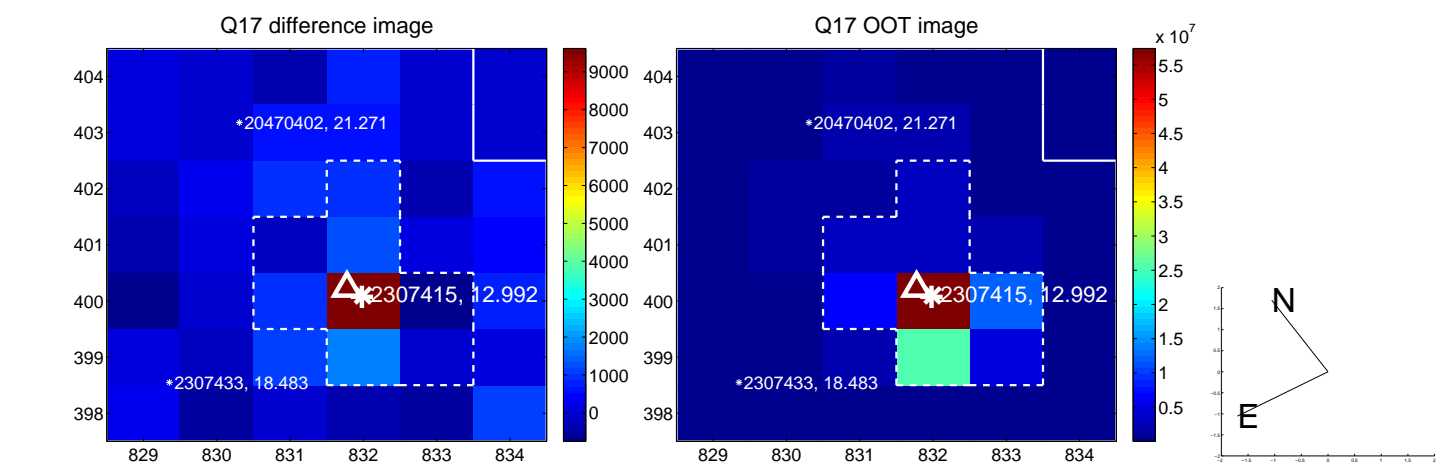
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



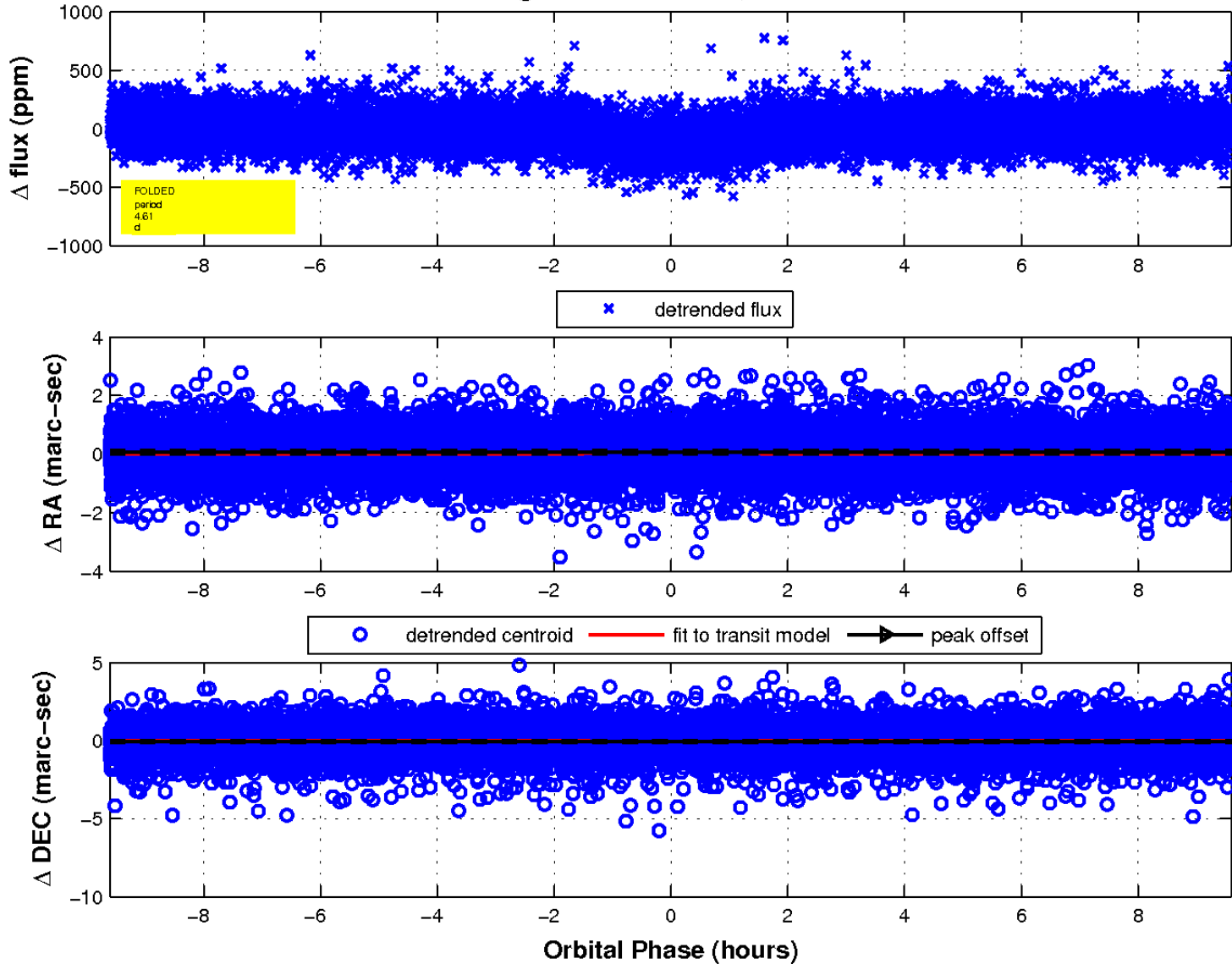
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

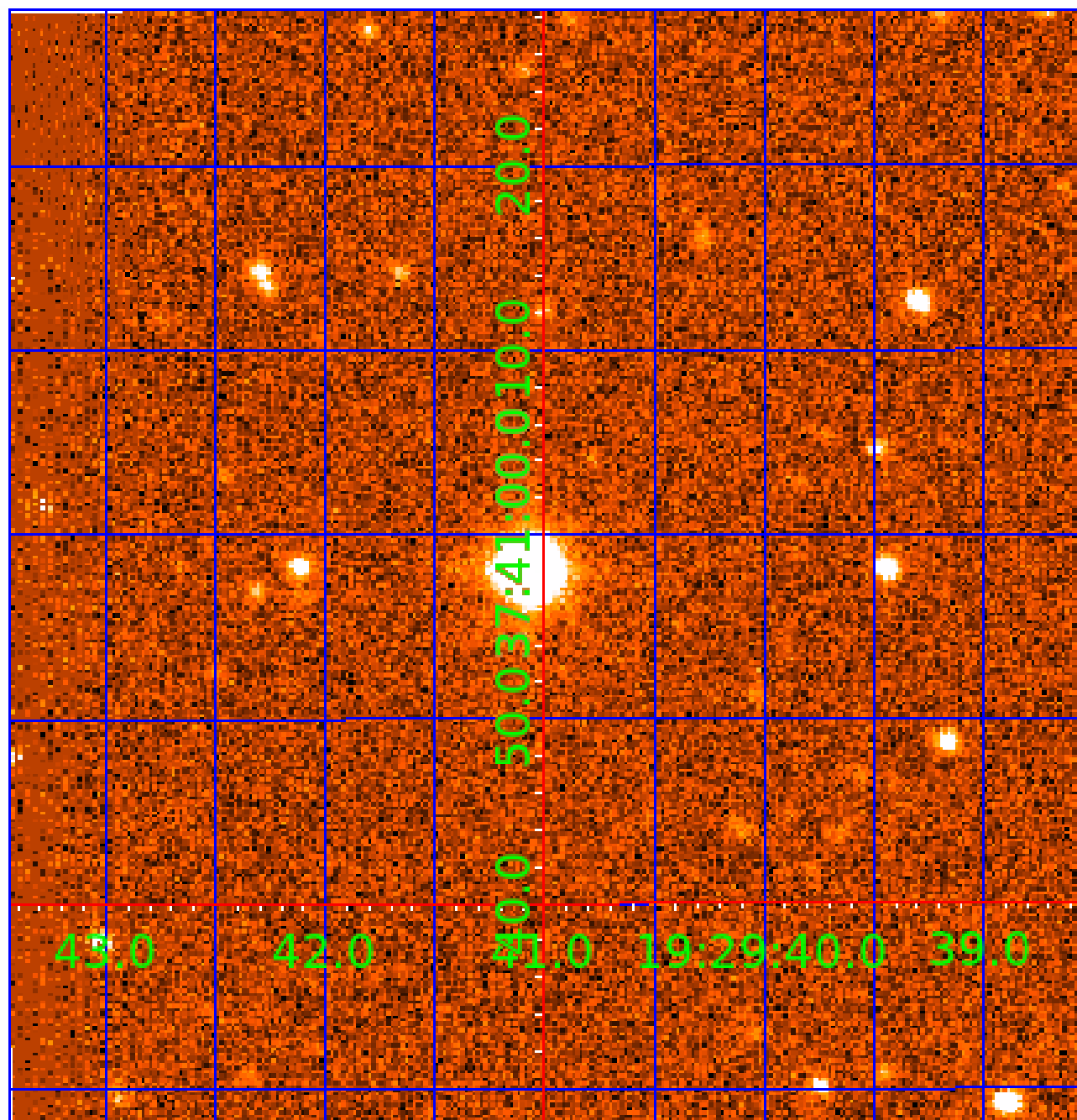


fluxWeightedCentroids, Planet 1 of 2



UKIRT Image

Declination



KIC 002307415

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})
002307415-01	OBS	2053.02	4.612651	132.780511	129.8	3.202	28.7	31.1	1.28	6140	1.70	664.40
002307415-02	OBS	2053.01	13.121623	133.395193	196.6	3.762	27.2	28.9	1.28	6140	2.11	164.83

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
002307415-01	OBS	PC	0.98	0	0	0	0	NO_COMMENT
002307415-02	OBS	PC	0.98	0	0	0	0	NO_COMMENT

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

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

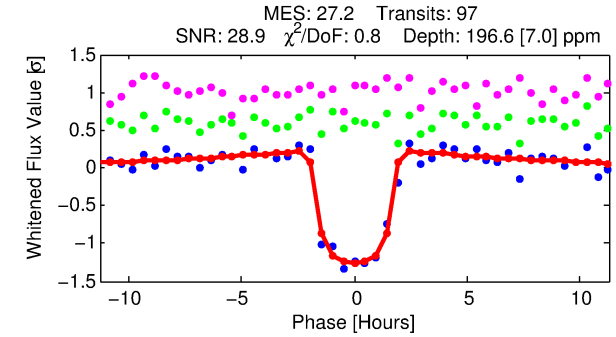
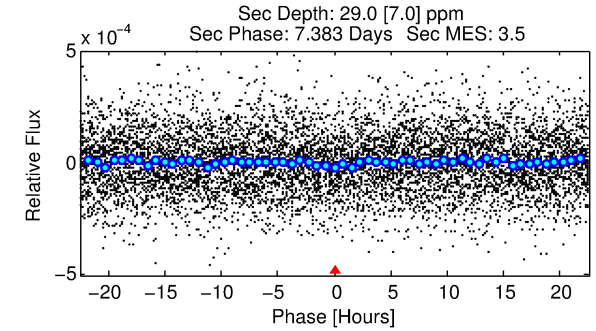
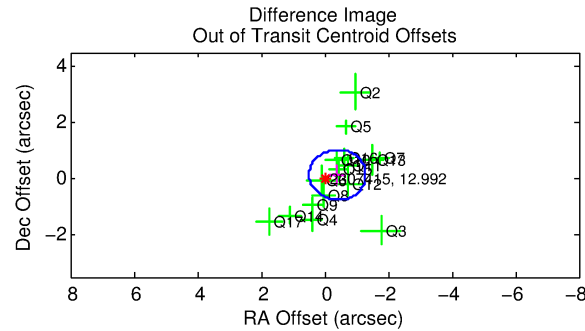
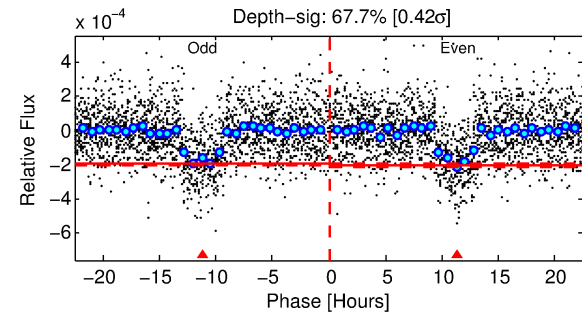
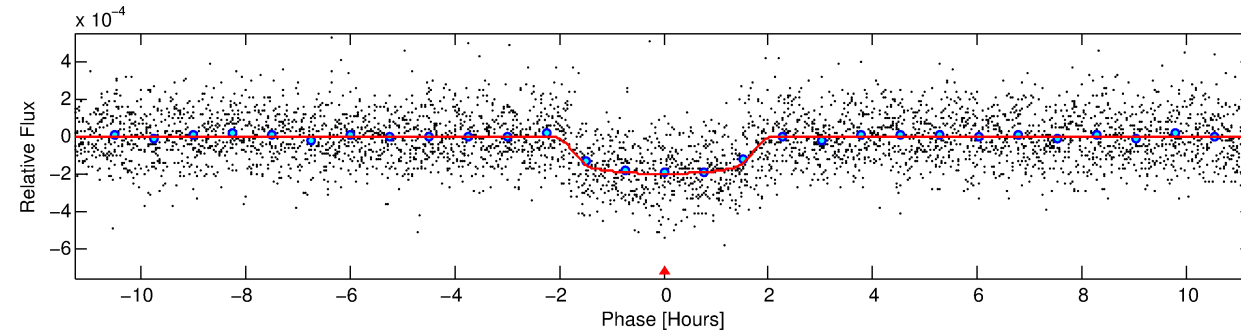
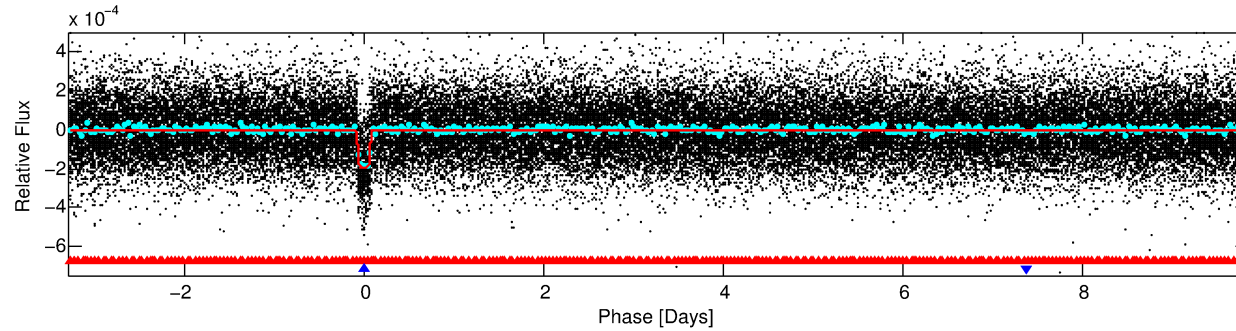
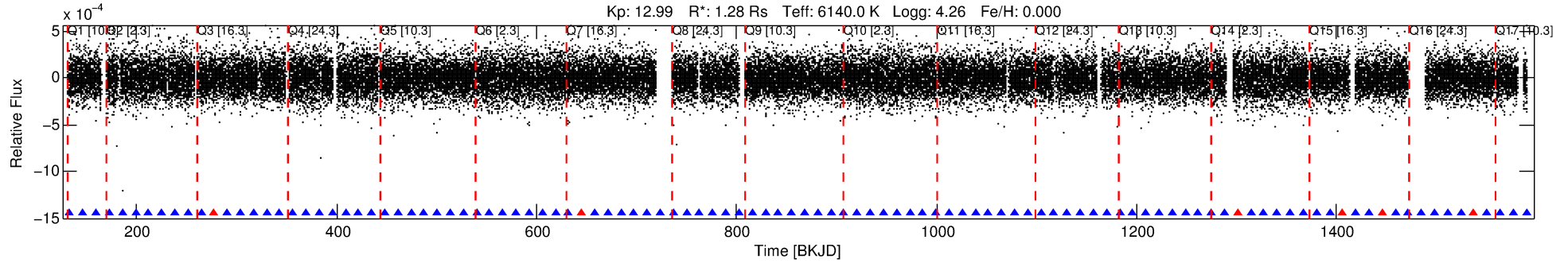
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 002307415-02

No Significant Match Found

DV One-Page Summary

KIC: 2307415 Candidate: 2 of 2 Period: 13.122 d
KOI: K02053.01 Name: Kepler-356c Corr: 0.965



DV Fit Results:

Period = 13.12162 [0.00004] d
Epoch = 133.3952 [0.0026] BKJD
Rp/R* = 0.0151 [0.0019]
a/R* = 12.54 [7.87]
b = 0.90 [0.14]
Seff = 164.83 [40.03]
Teq = 914 [55] K
Rp = 2.11 [0.46] Re
a = 0.1122 [0.0173] AU
Ag = 45.26 [18.66] [2.37 σ]
Teffp = 3664 [326] K [8.32 σ]

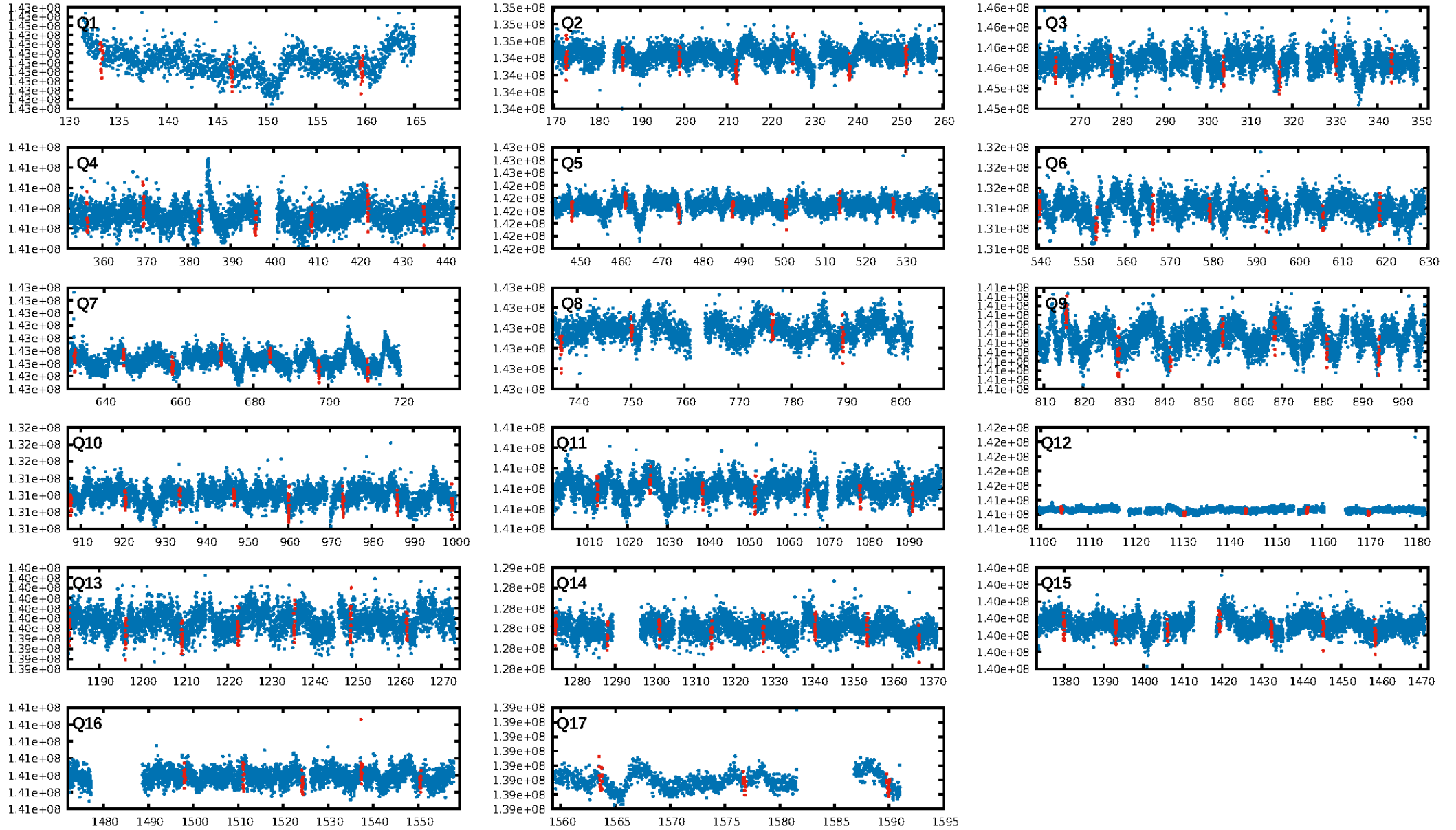
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [41.34 σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 99.7%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 2.68e-161
RollingBand-fgt: 0.93 [86/92]
GhostDiagnostic-chr: 2.21
Centroid-sig: 0.6%
Centroid-so: 1.023 arcsec [2.25 σ]
OotOffset-rm: 0.421 arcsec [1.41 σ]
KicOffset-rm: 0.340 arcsec [1.08 σ]
OotOffset-st: 4/4/4/4 [16]
KicOffset-st: 4/4/4/4 [16]
DiffImageQuality-fgm: 0.88 [14/16]
DiffImageOverlap-fno: 1.00 [17/17]

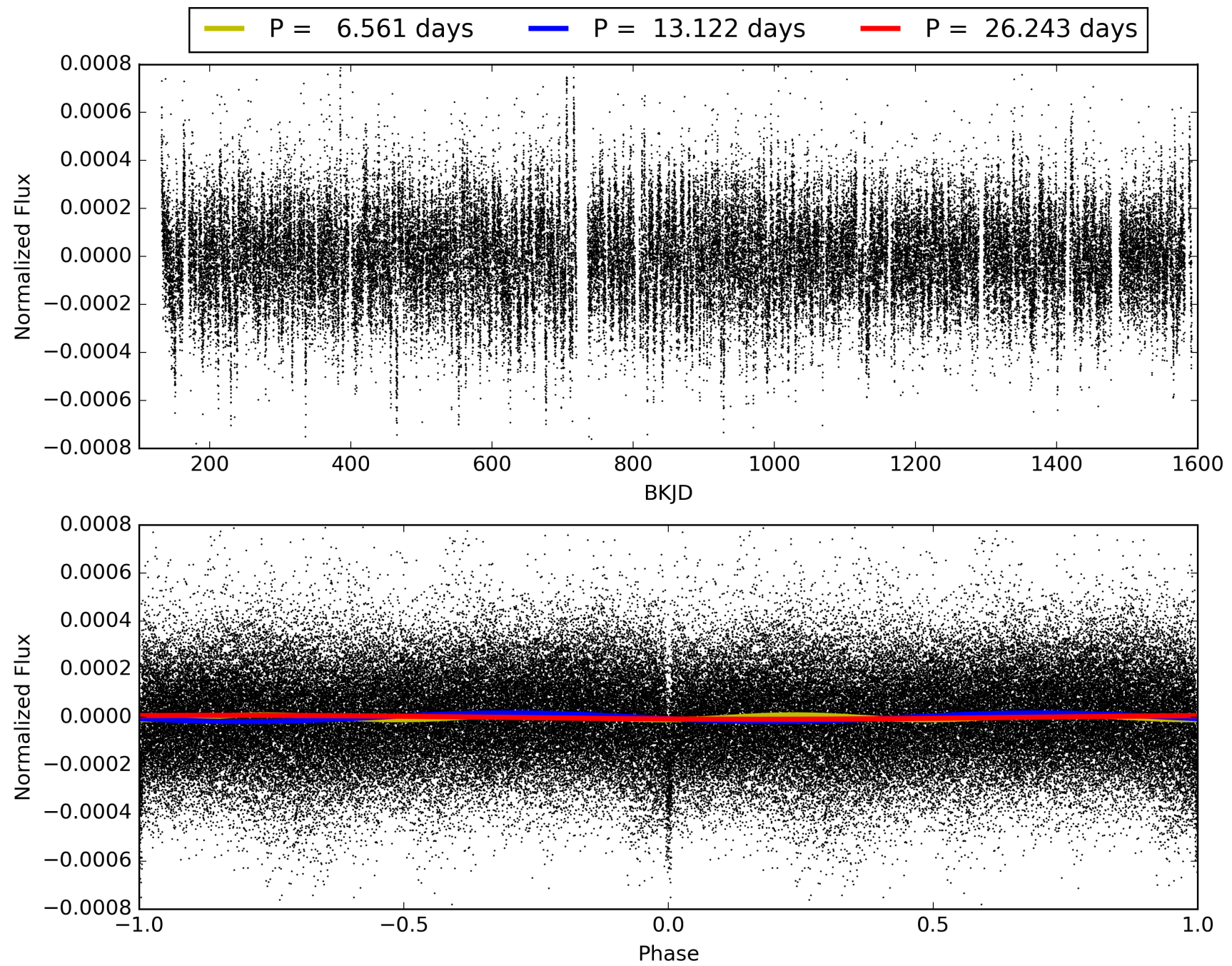
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 05:35:13 Z

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

TCE 002307415-02, PDC Light Curves

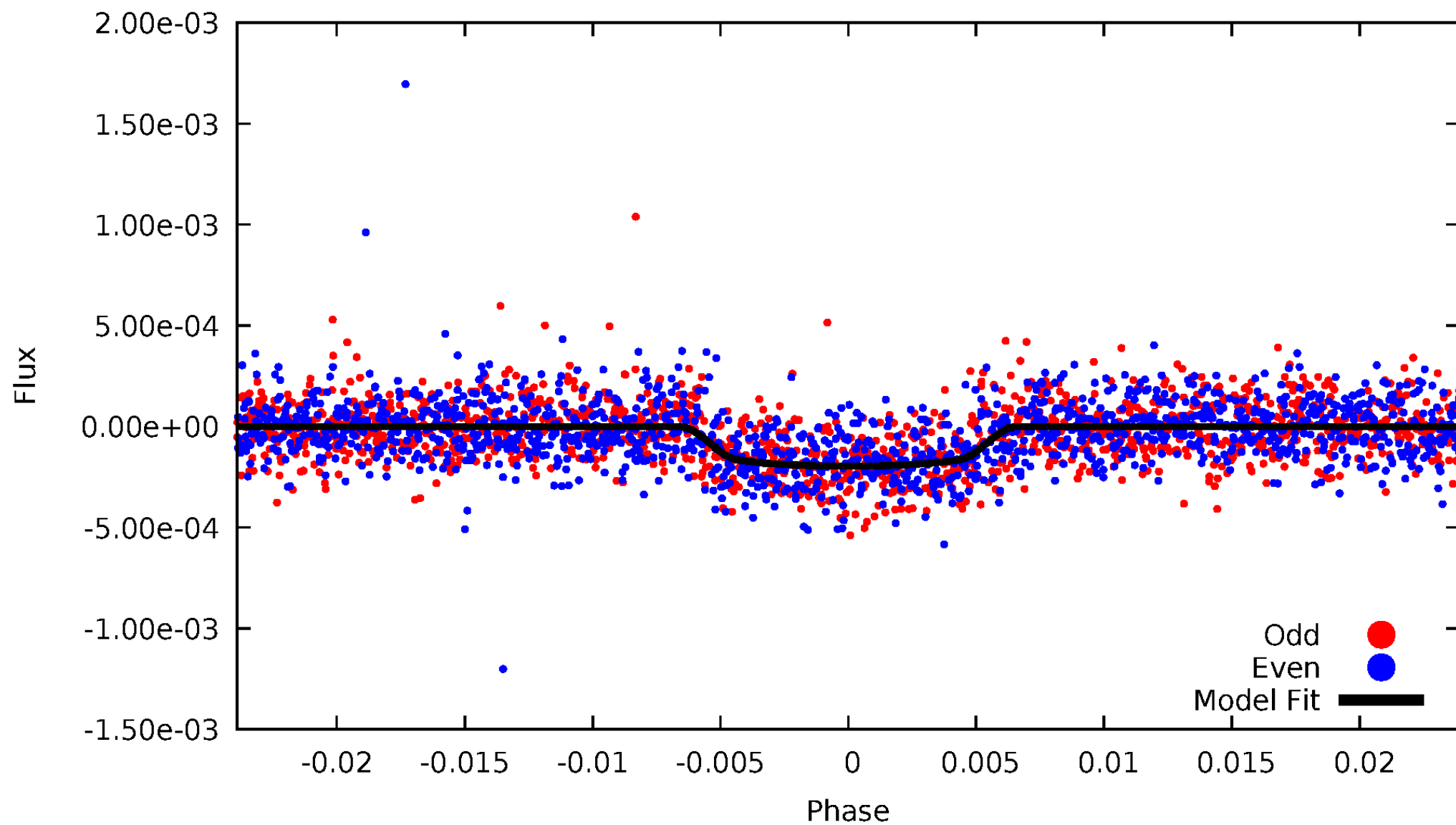


TCE 002307415-02



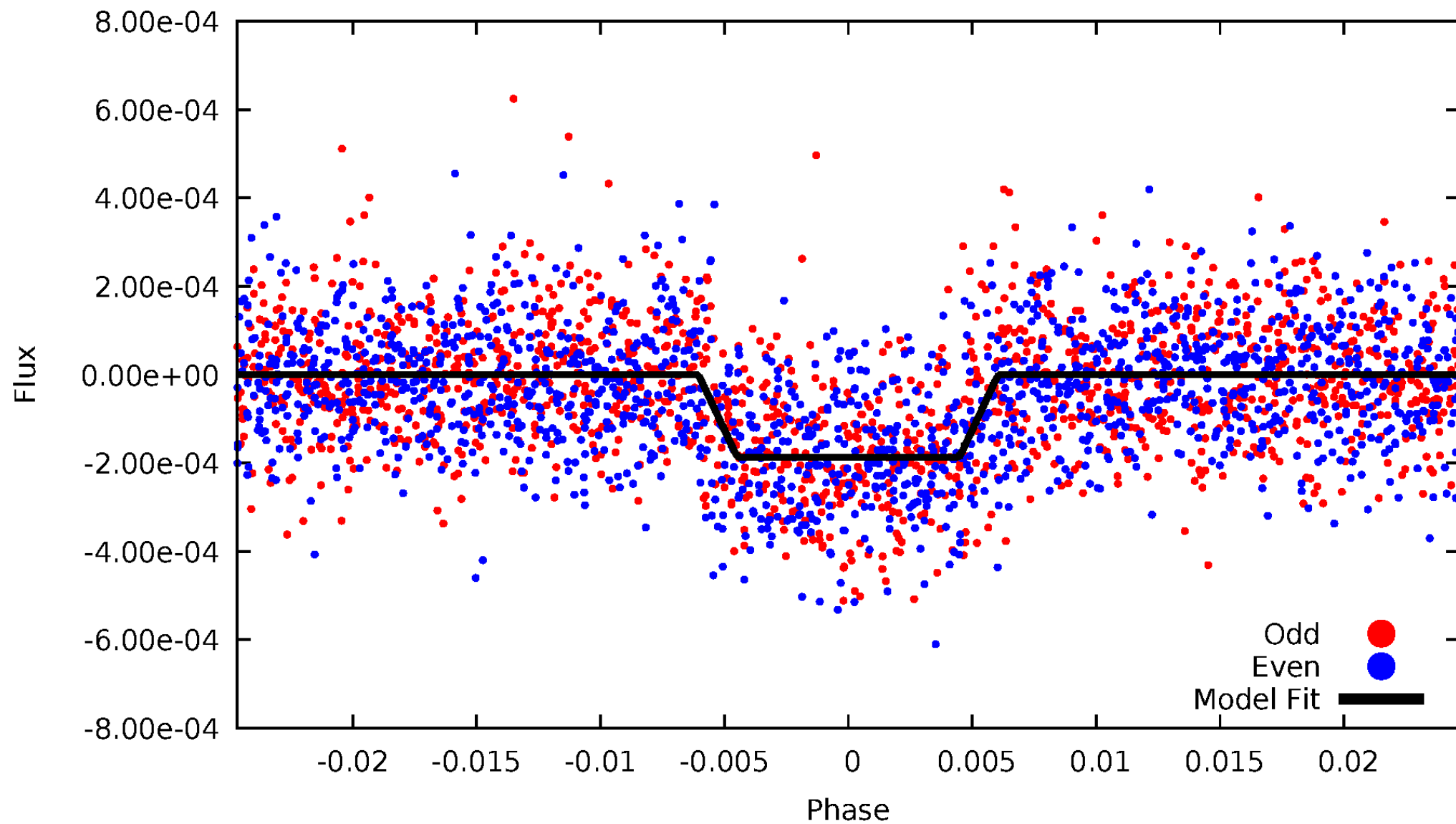
DV Odd/Even

TCE 002307415-02



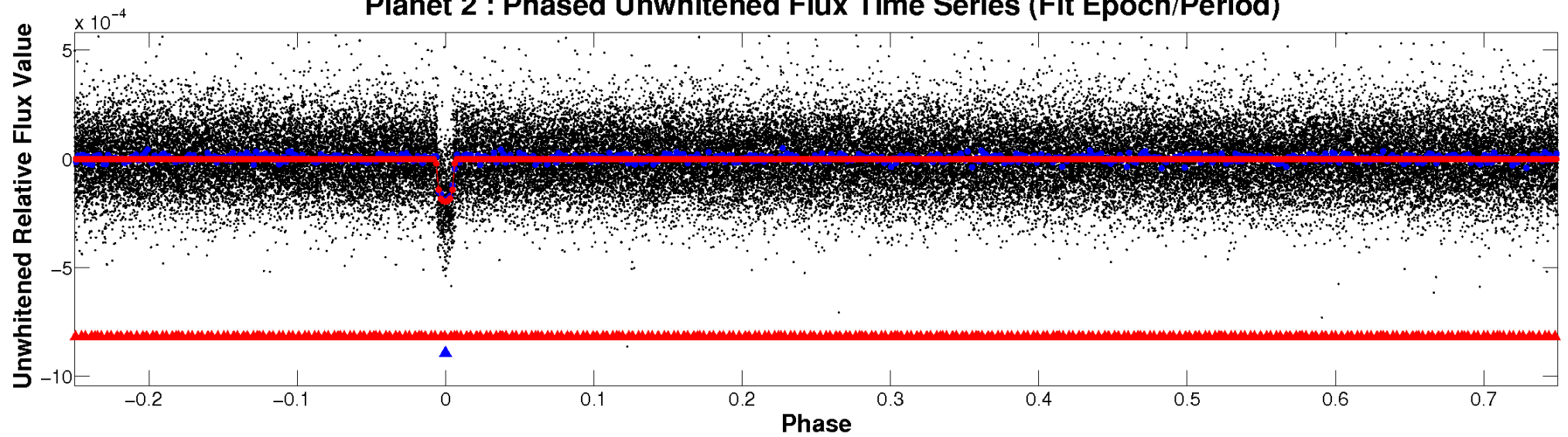
ALT Odd/Even

TCE 002307415-02

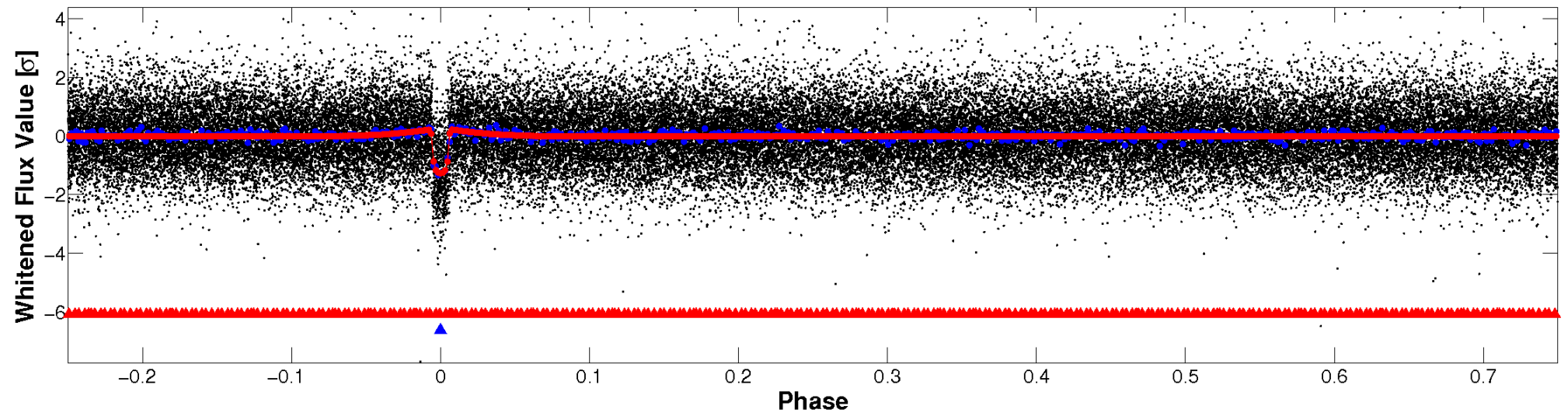


Non-Whitened Vs. Whitened Light Curve

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

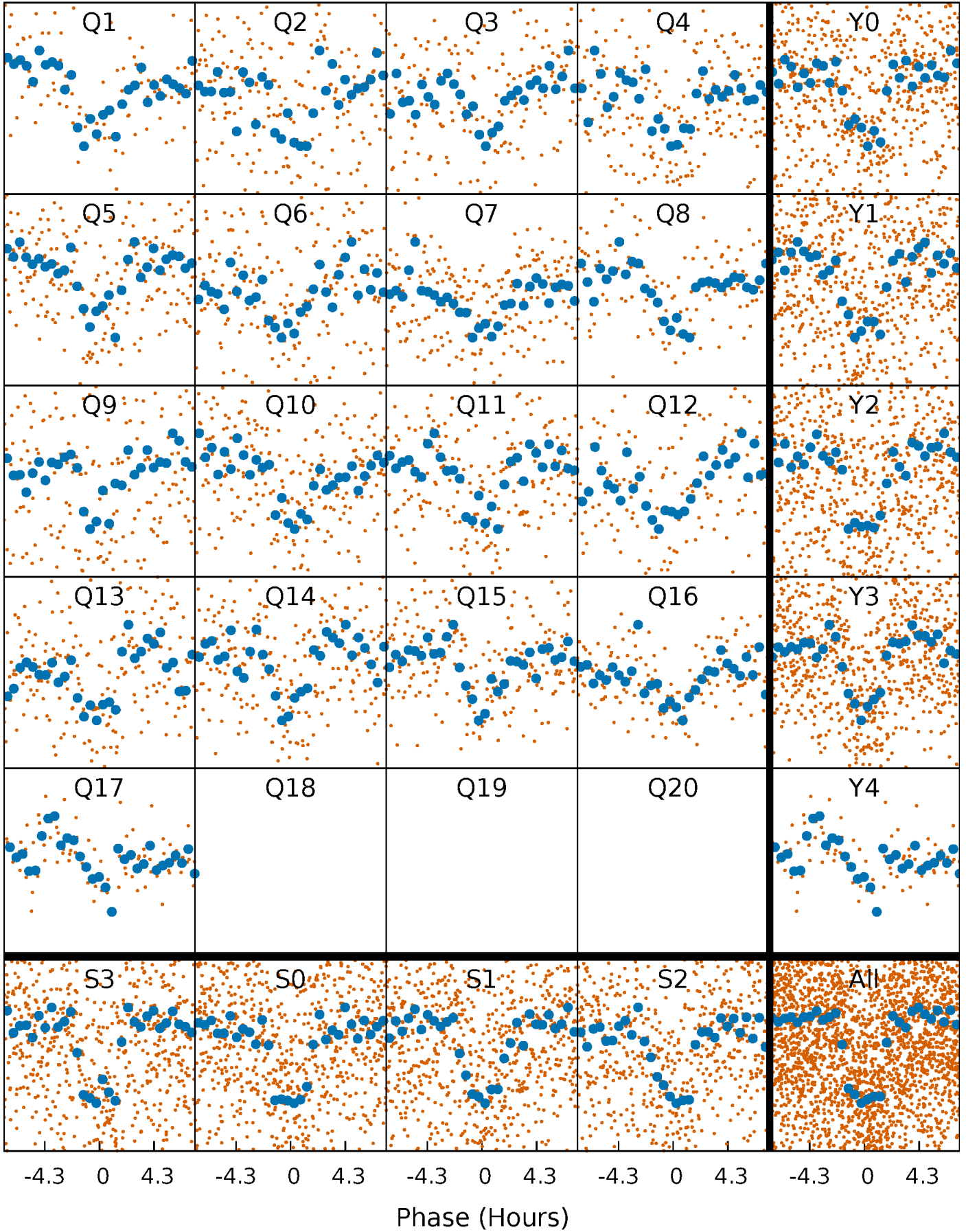


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



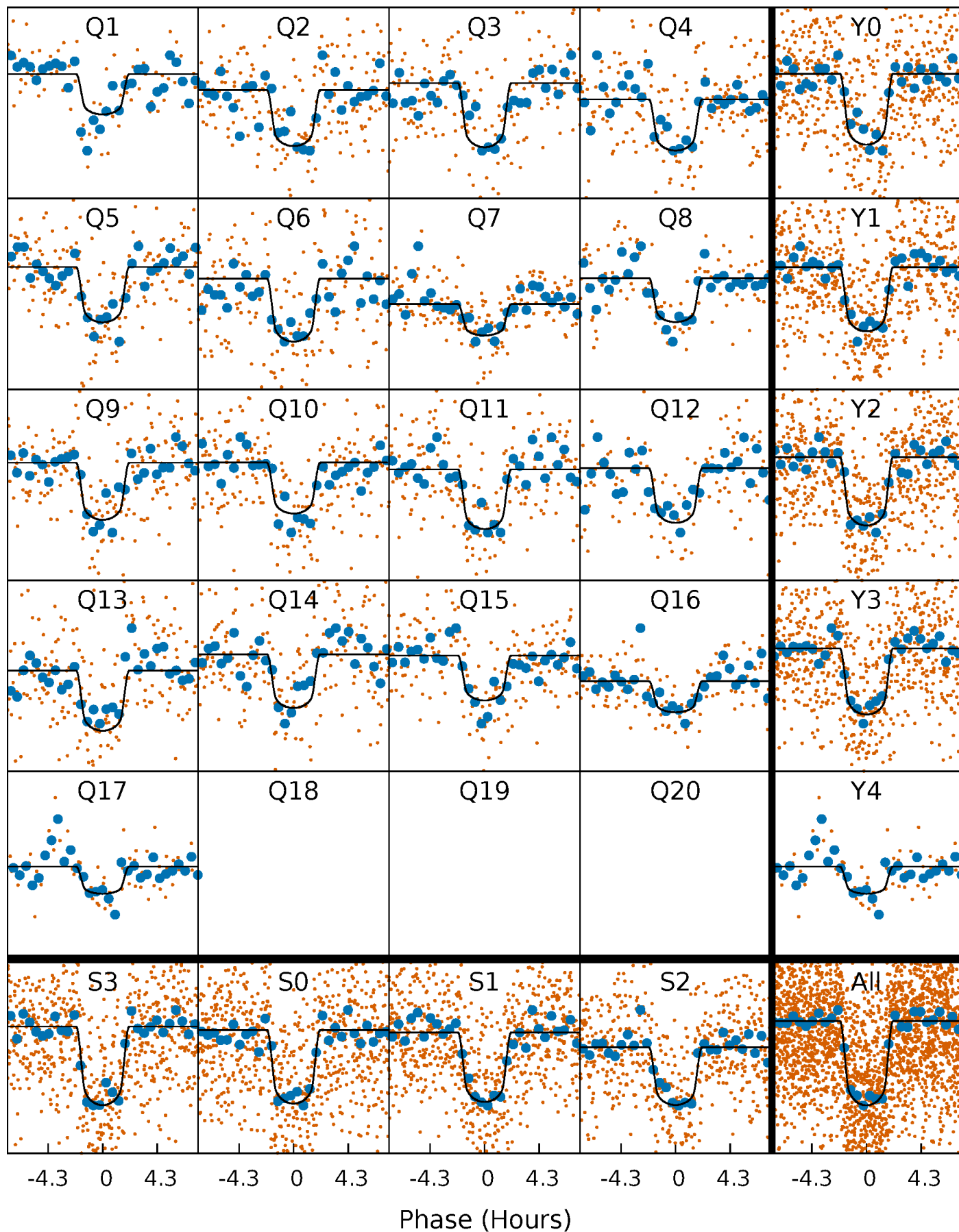
PDC Quarter-Phased Transit Curves

TCE 002307415-02 P= 13.121623 Days $T_0=133.395193$ (BKJD)



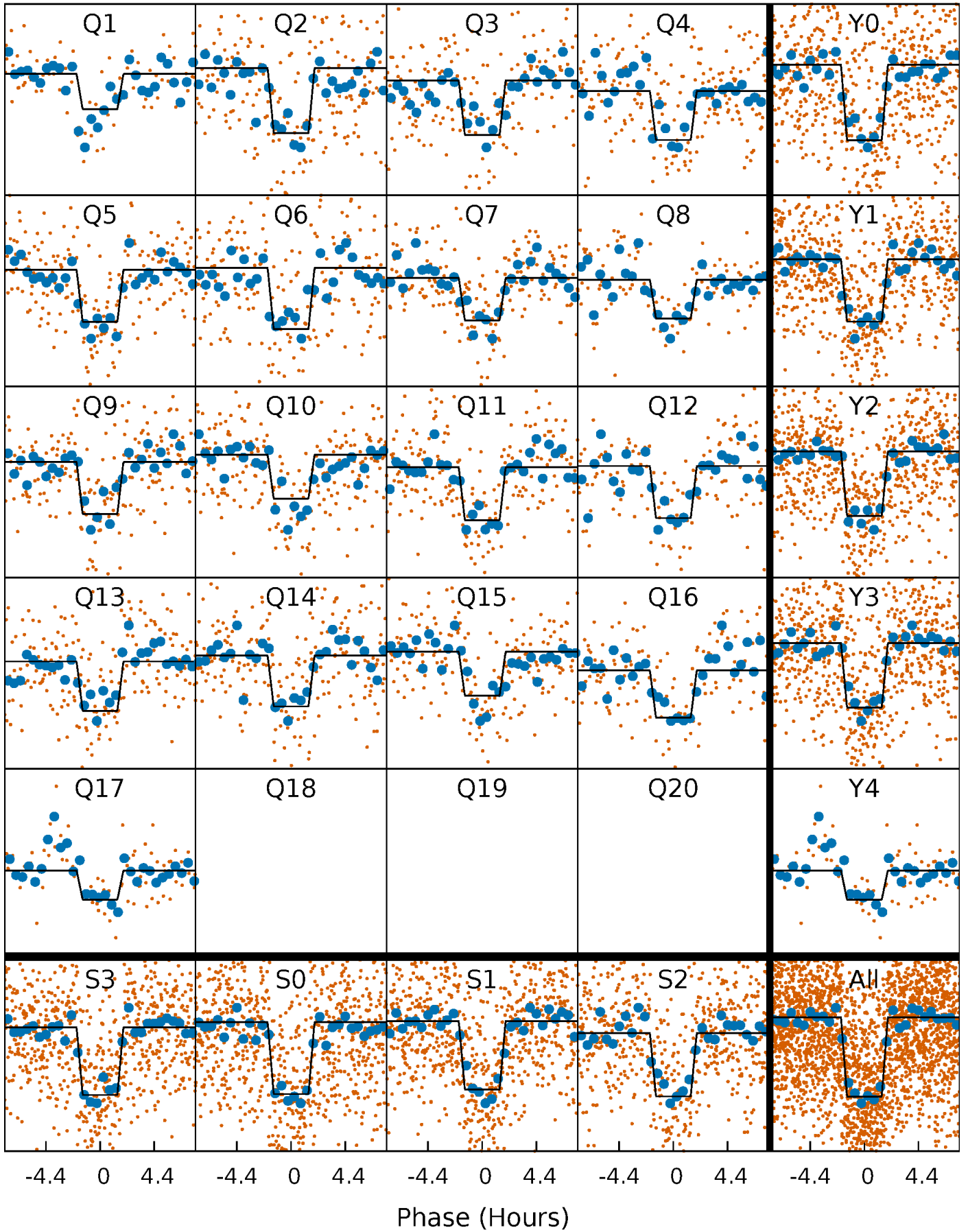
DV Quarter-Phased Transit Curves

TCE 002307415-02 P= 13.121623 Days $T_0=133.395193$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

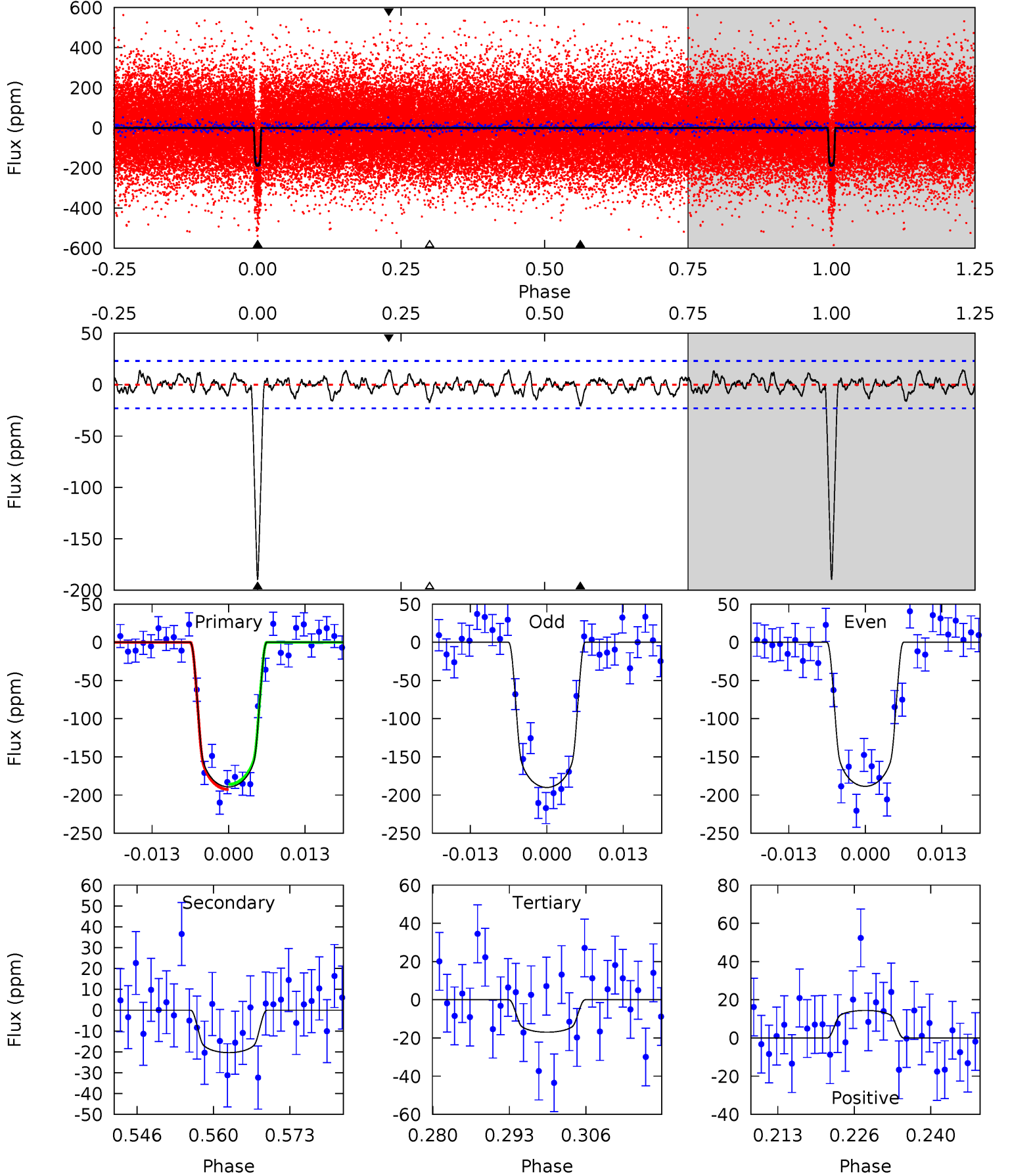
TCE 002307415-02 P= 13.121494 Days $T_0=133.401744$ (BKJD)



DV Model-Shift Uniqueness Test

002307415-02, P = 13.121623 Days, E = 120.273570 Days

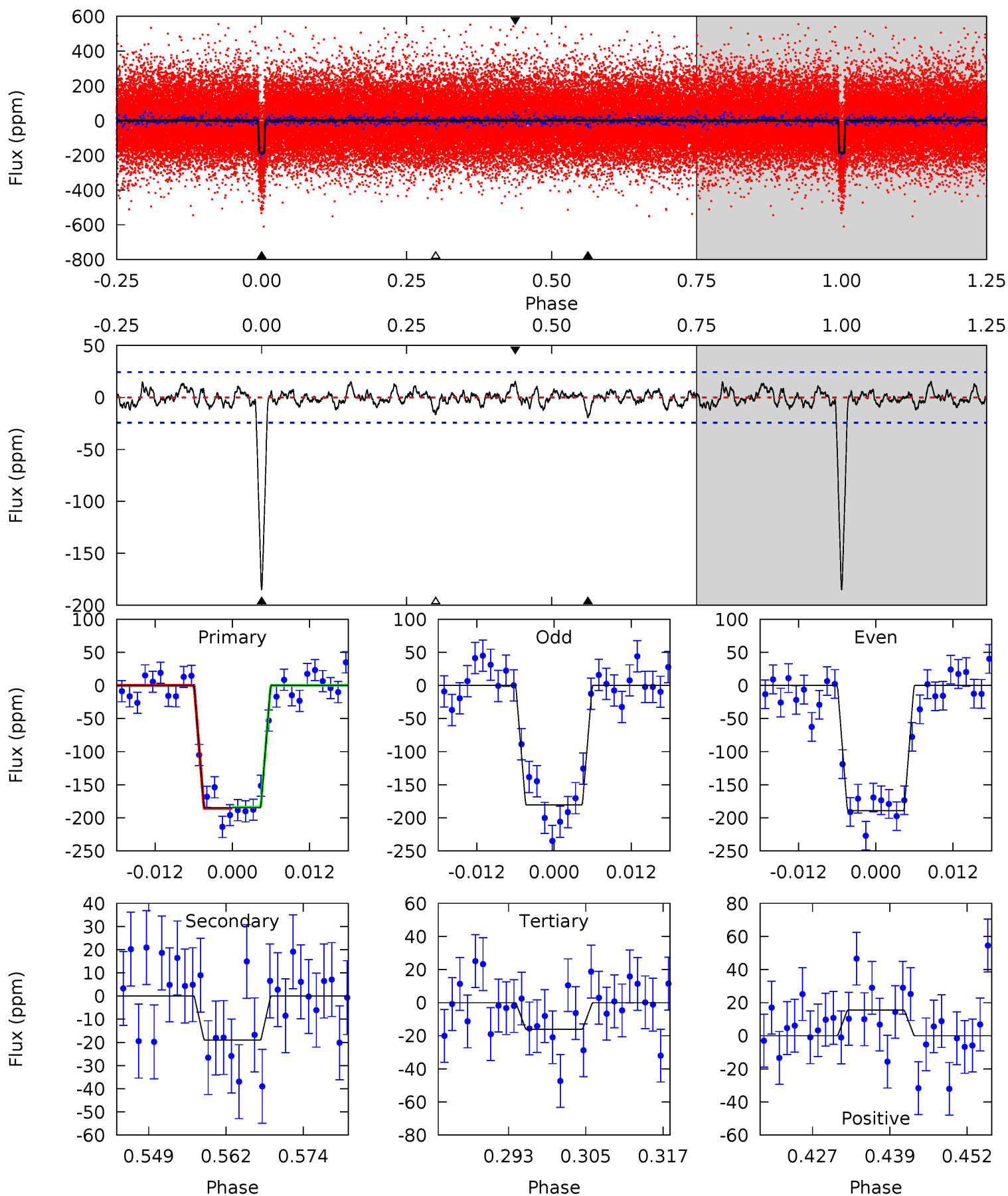
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
40.8	4.39	3.66	3.10	4.97	2.48	1.23	37.1	37.7	0.73	1.29	0.16	0.98	0.07	0.72



Alt Model-Shift Uniqueness Test

002307415-02, P = 13.121494 Days, E = 120.280250 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
37.9	3.90	3.30	3.18	4.99	2.51	1.11	34.6	34.7	0.60	0.72	0.91	1.03	0.08	0.18



Stellar Parameters For KIC 002307415

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	6140^{+123}_{-135}	$4.265^{+0.125}_{-0.125}$	$0.000^{+0.150}_{-0.150}$	$1.277^{+0.230}_{-0.188}$	$1.094^{+0.103}_{-0.075}$	$0.741^{+0.412}_{-0.266}$
	+2%/-2%	+3%/-3%	+inf%/-inf%	+18%/-15%	+9%/-7%	+56%/-36%
Source	SPE58	SPE58	SPE58	DSEP		

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

Secondary Eclipse Parameters for KIC 002307415-02 / KOI 2053.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	-20 ± 5	$2.14^{+0.32}_{-0.32}$	1279^{+66}_{-57}	3749^{+244}_{-212}	31^{+16}_{-9}
Alt.	-19 ± 5	$1.89^{+0.33}_{-0.30}$	1275^{+67}_{-62}	3840^{+261}_{-256}	37^{+18}_{-13}

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 $A_{obs} \gg 1.0$

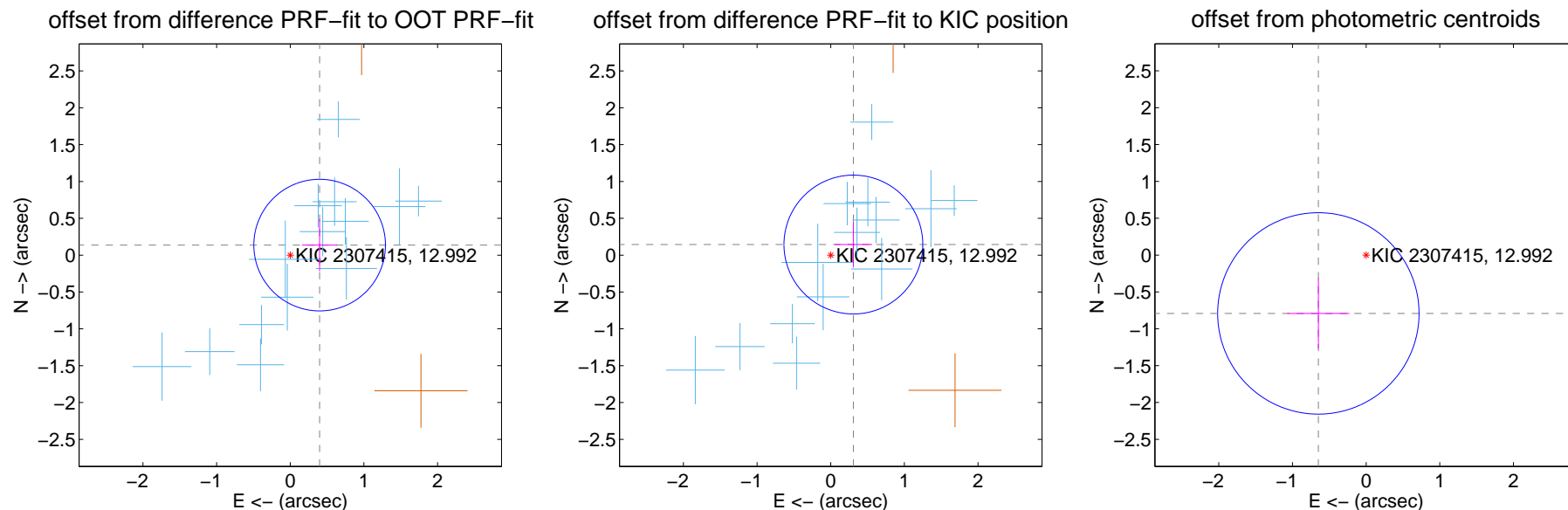
DV Centroid Data

Supplemental centroid analysis for 002307415-02. Kepler magnitude: 12.99. Transit SNR 28.90

There are 14 quarters with good PRF difference image offsets

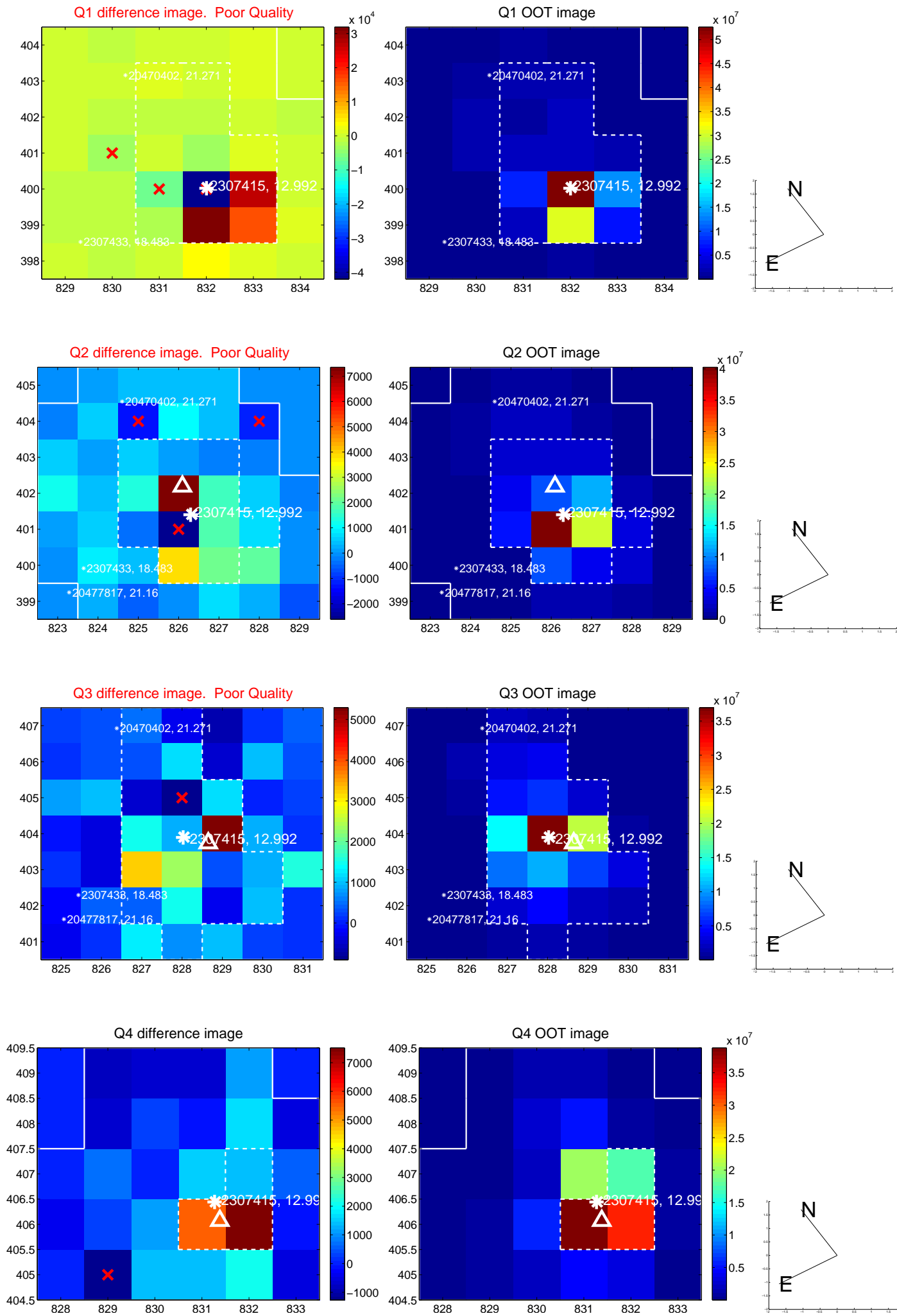
The direct PRF centroid is offset from the target star catalog position by about 0.11 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.421 ± 0.298	1.41	-0.399 ± 0.241	0.136 ± 0.354
PRF-fit source offset from KIC position	0.340 ± 0.314	1.08	-0.308 ± 0.256	0.144 ± 0.310
photometric centroid source offset	1.02 ± 0.46	2.25	0.65 ± 0.42	-0.79 ± 0.48

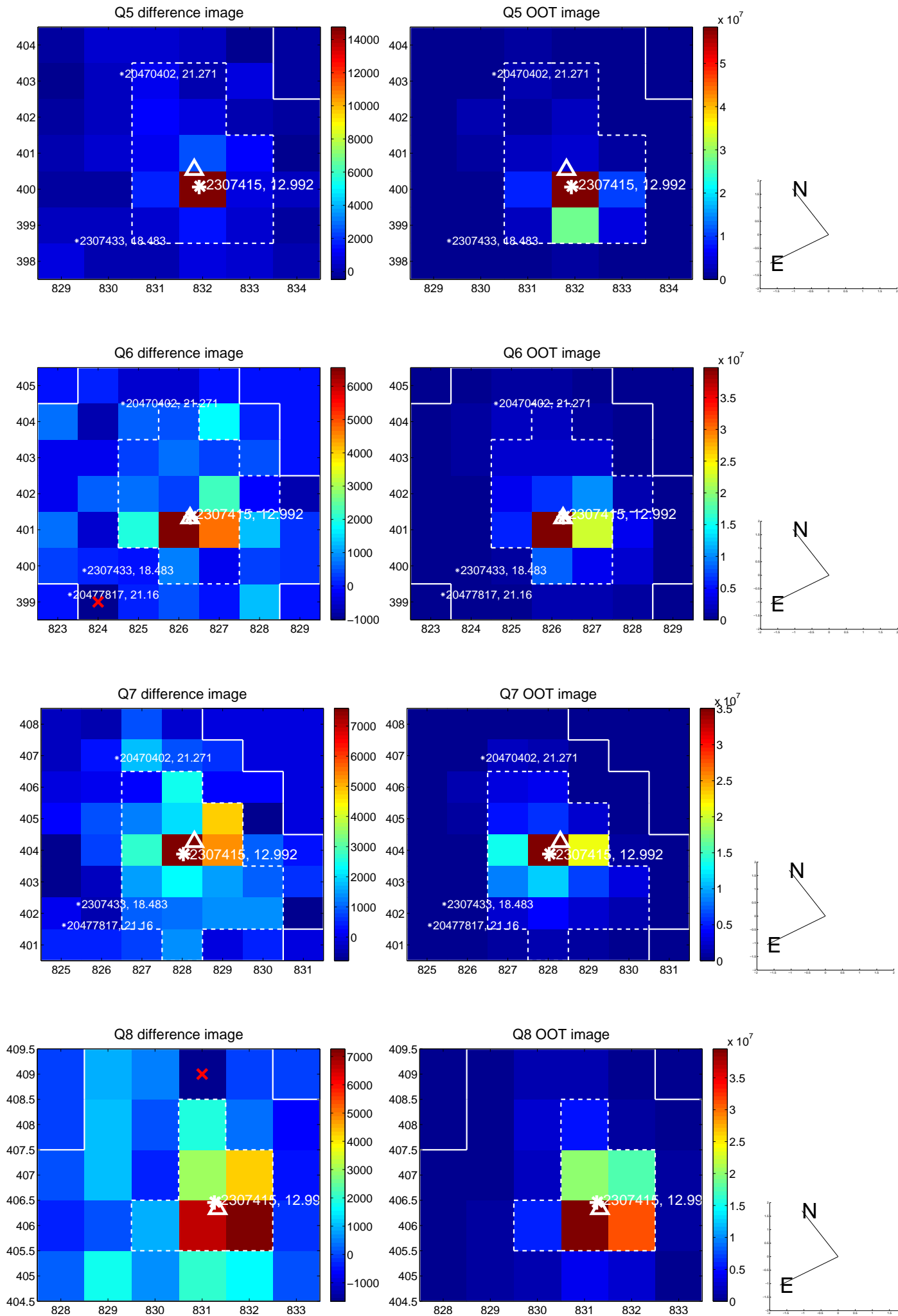


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

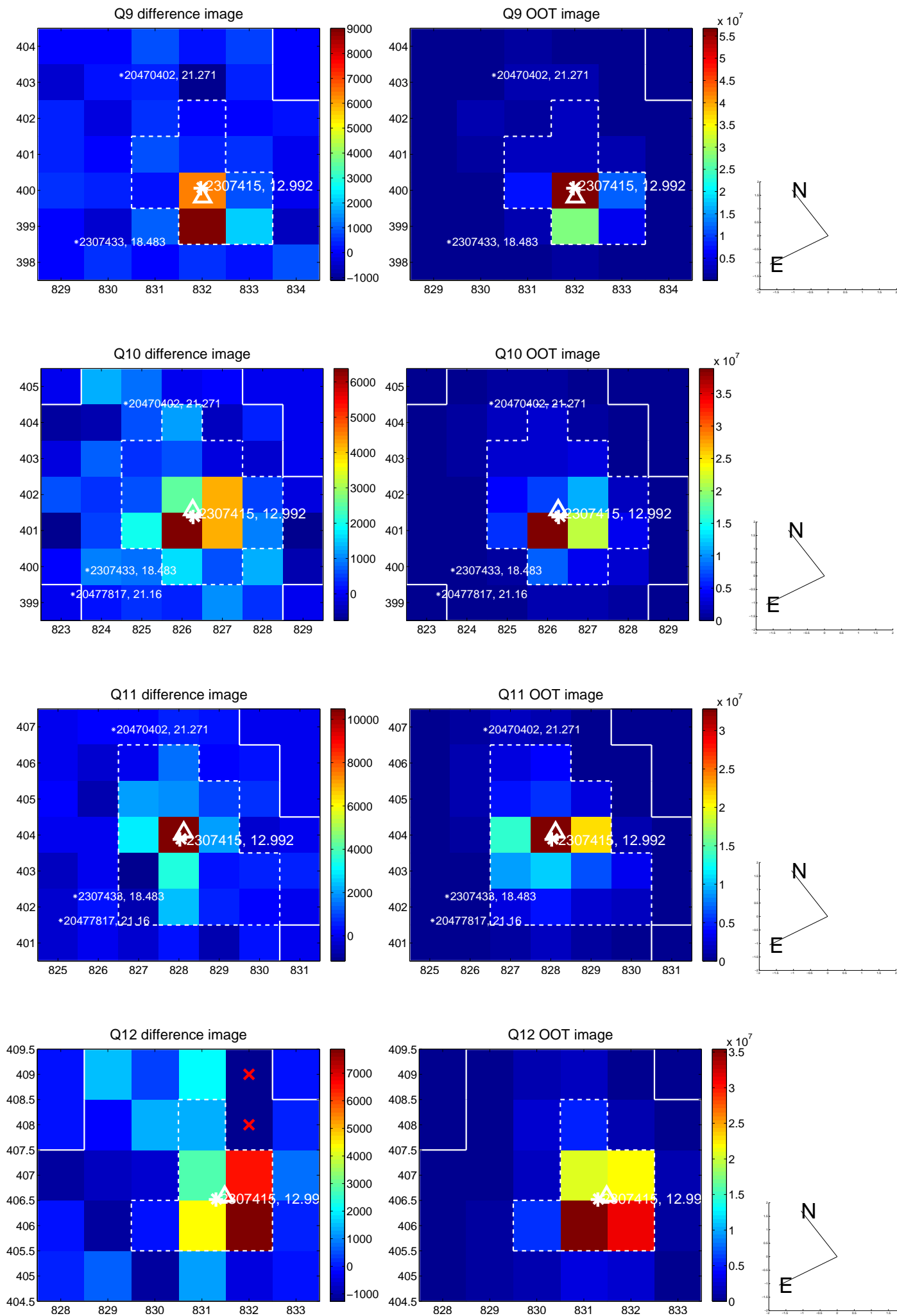
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



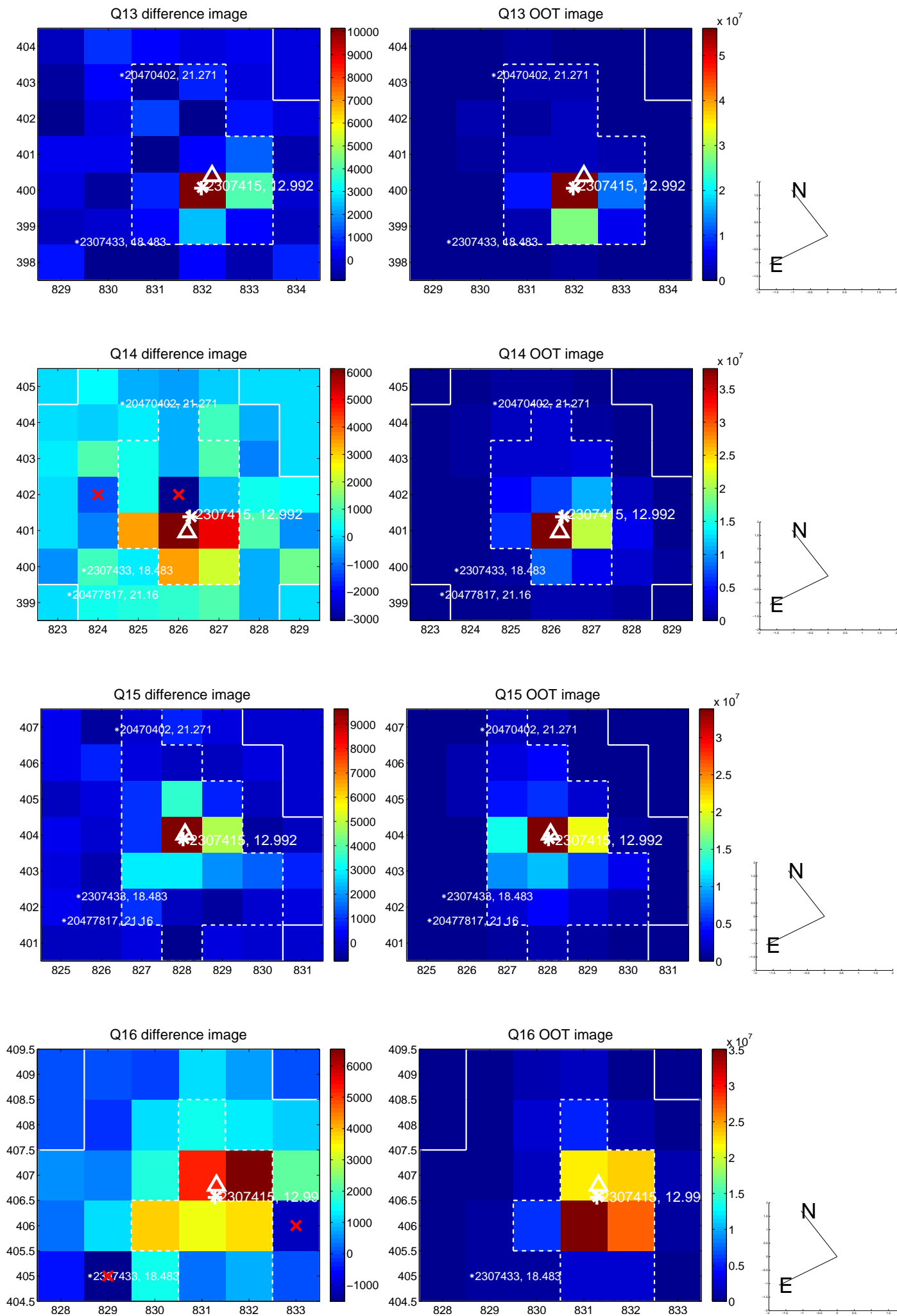
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



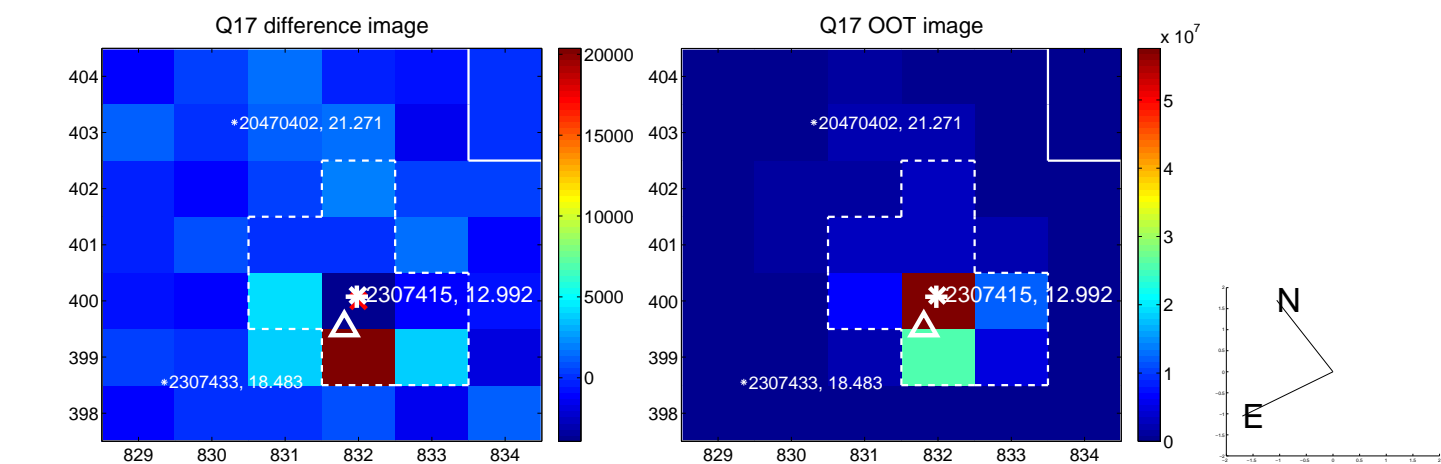
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



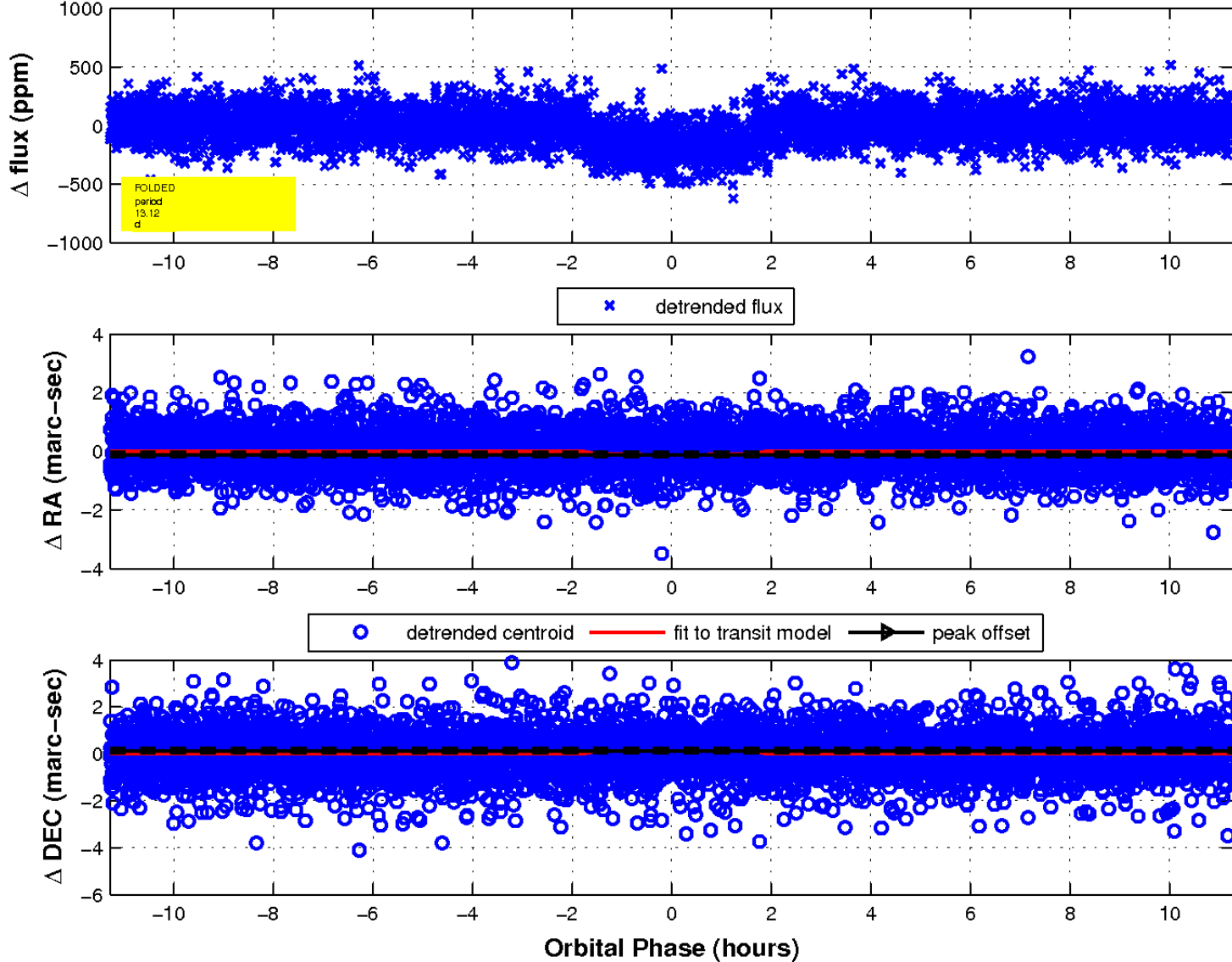
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

Declination

