

KIC 009221398

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})
009221398-01	OBS	6066.01	13.787521	136.762116	12908.8	2.561	2201.5	2181.6	1.29	6399	24.73	170.42
009221398-02	OBS	No	13.786369	136.370839	117.7	57.980	10.4	20.6	1.29	6399	2.83	170.44

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009221398-01	OBS	FP	0.00	0	1	0	0	DEEP_V_SHAPED—HAS_SEC_TCE
009221398-02	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.

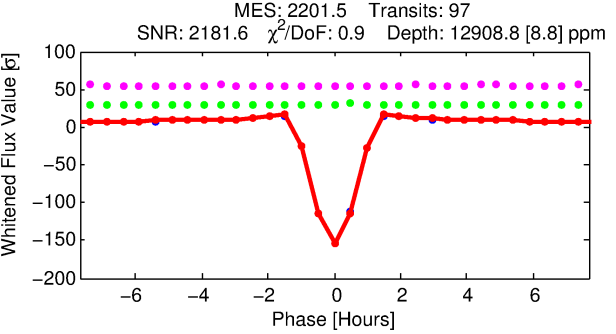
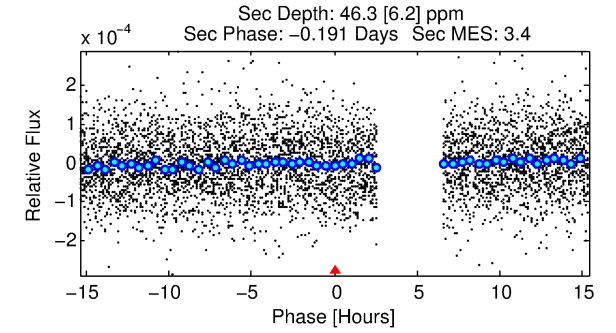
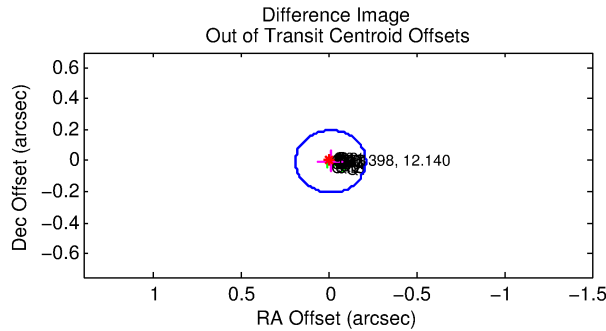
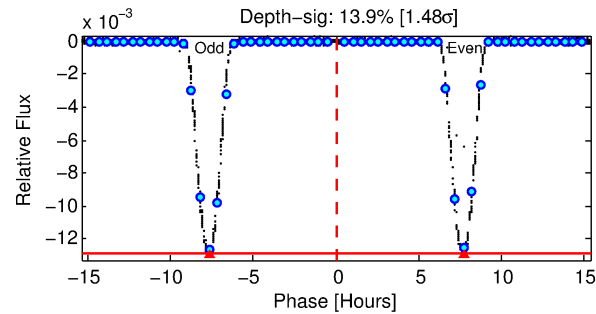
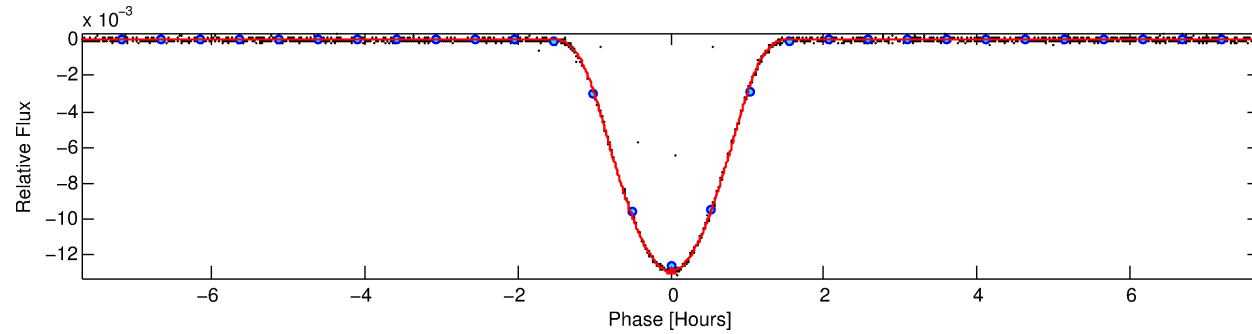
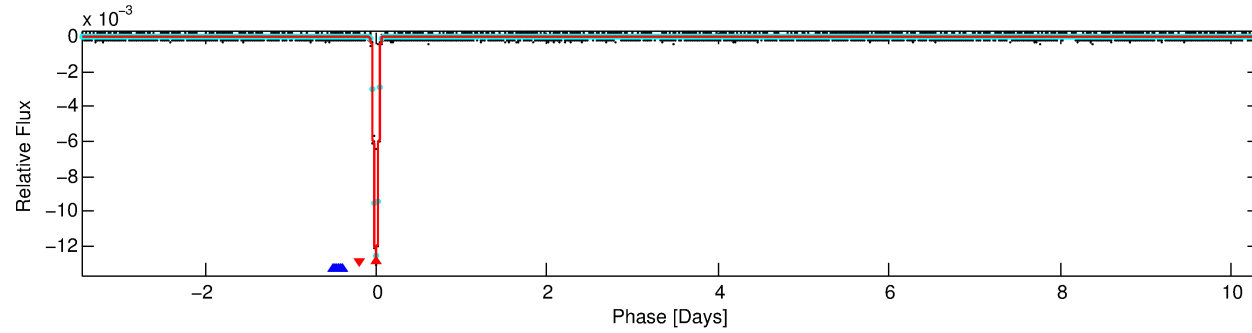
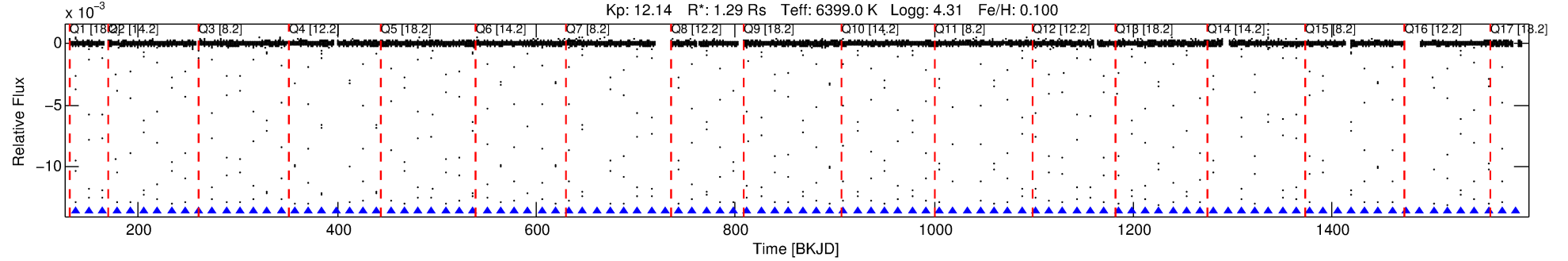
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009221398-01

No Significant Match Found

DV One-Page Summary

KIC: 9221398 Candidate: 1 of 2 Period: 13.788 d
KOI: K06066.01 Corr: 0.998



DV Fit Results:

Period = 13.78752 [0.00000] d
Epoch = 136.7621 [0.0000] BKJD
Rp/R* = 0.1758 [0.0044]
a/R* = 26.32 [0.10]
b = 0.99 [0.01]
Seff = 170.42 [36.25]
Teff = 921 [49] K
Rp = 24.73 [4.21] Re
a = 0.1210 [0.0171] AU
Ag = 0.61 [0.15] [-2.56σ]
Teffp = 1259 [48] K [4.91σ]

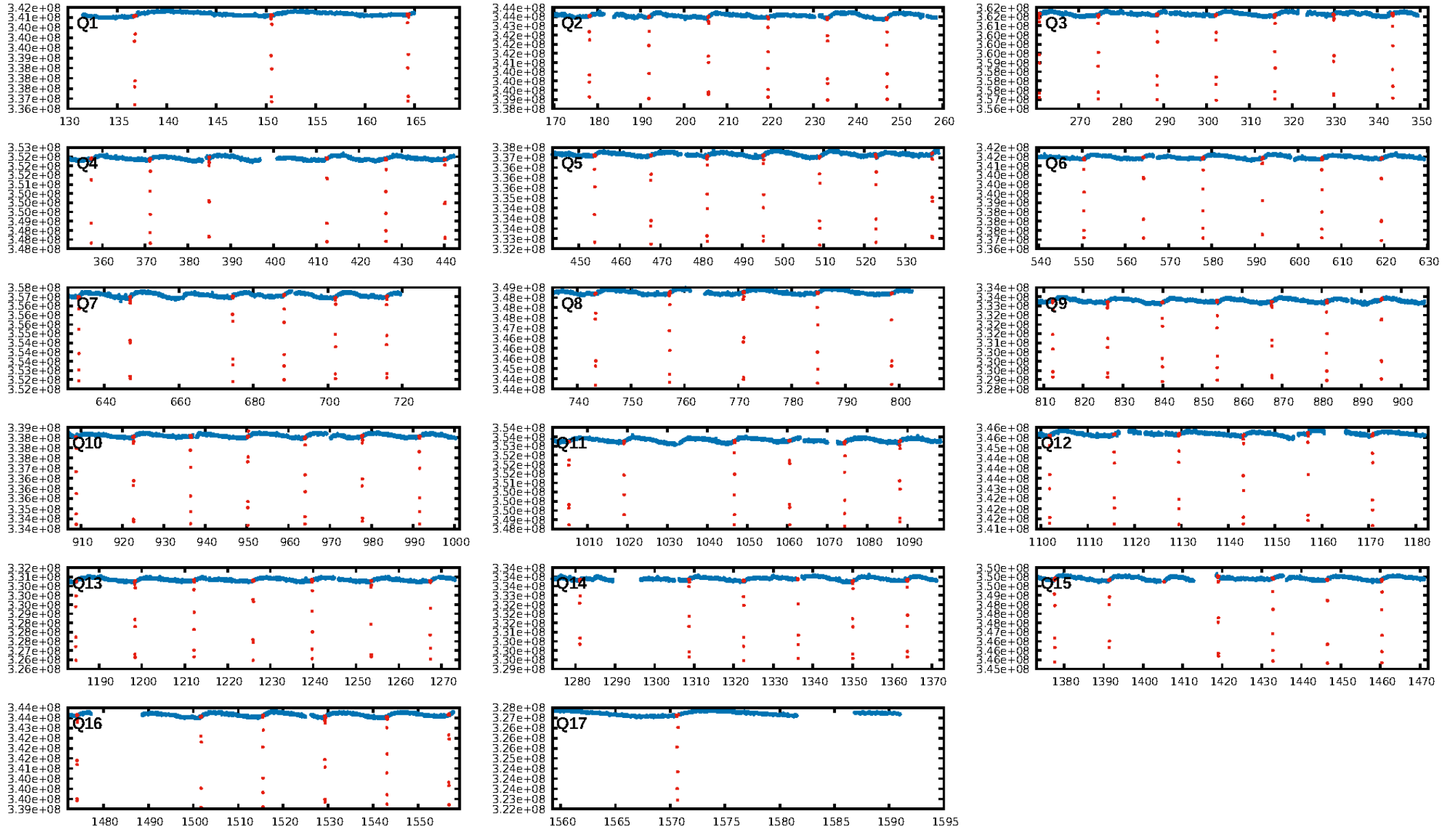
DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00e]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 70.6%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 0.00e+00
RollingBand-fgt: 1.00 [93/93]
GhostDiagnostic-chr: 11.82
Centroid-sig: 88.8%
Centroid-so: 0.035 arcsec [7.39σ]
OotOffset-rm: 0.011 arcsec [0.16σ]
KicOffset-rm: 0.065 arcsec [0.97σ]
OotOffset-st: 4/4/4/5 [17]
KicOffset-st: 4/4/4/5 [17]
DiffImageQuality-fgm: 1.00 [17/17]
DiffImageOverlap-fno: 0.00 [0/17]

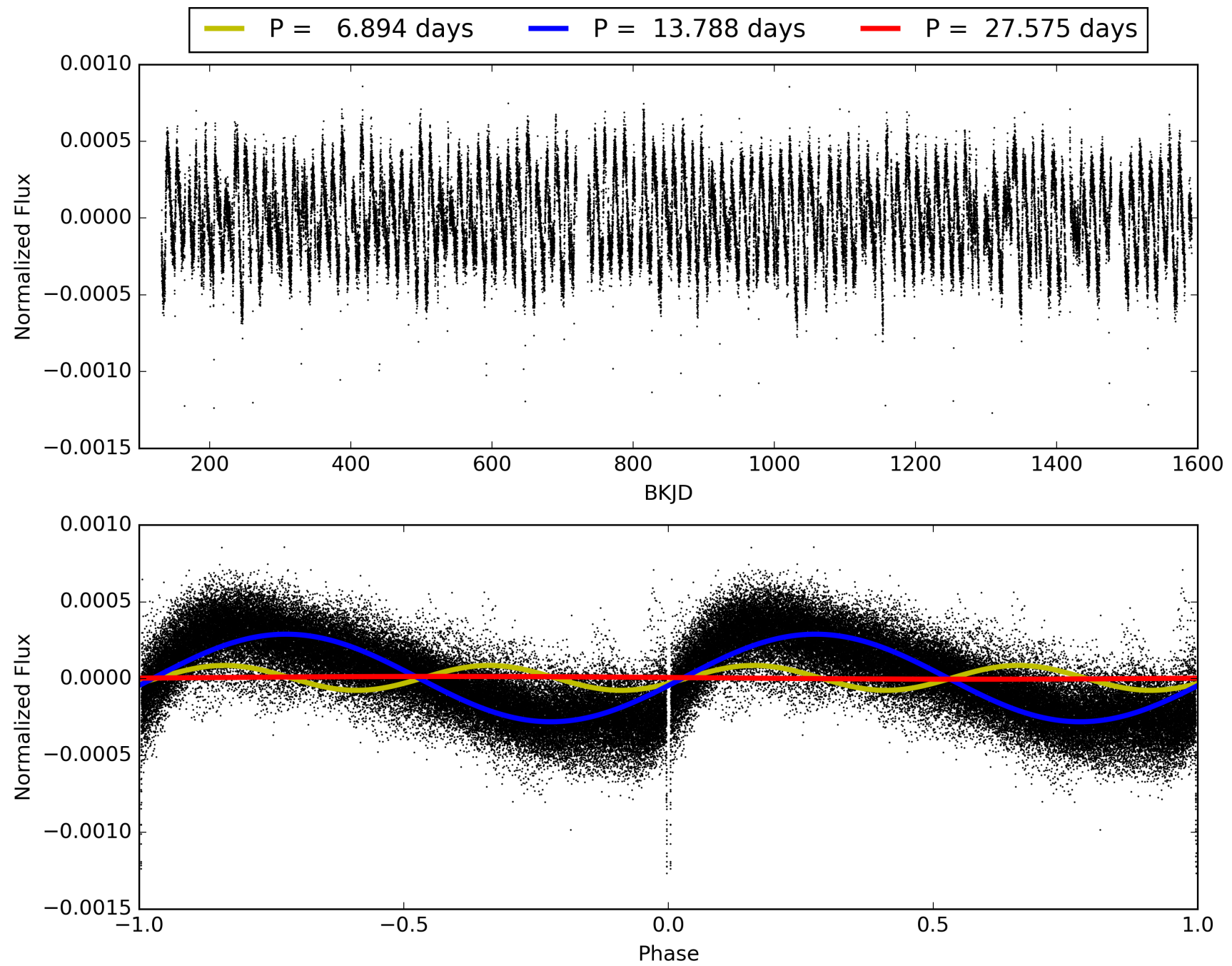
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 02:54:05 Z

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

TCE 009221398-01, PDC Light Curves

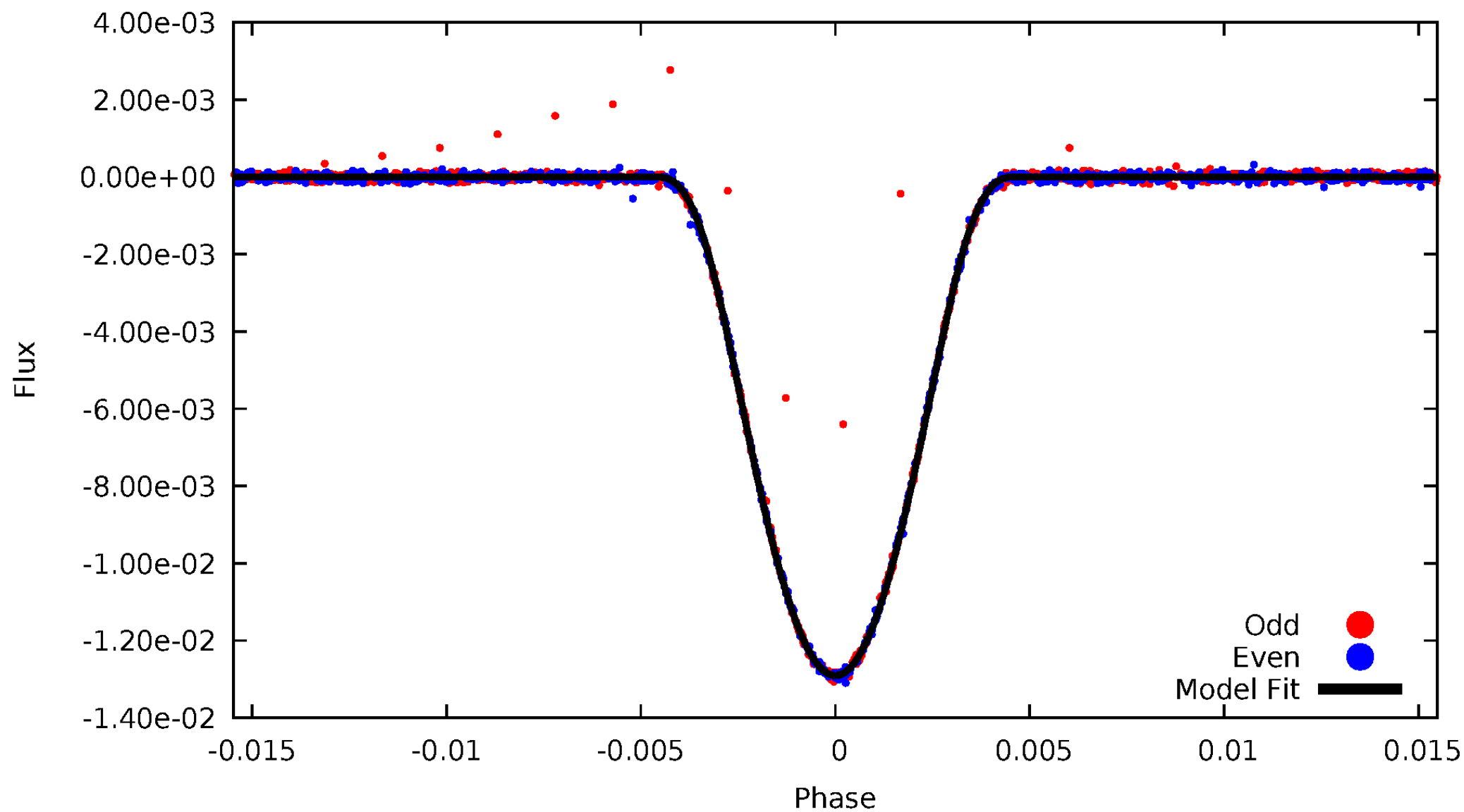


TCE 009221398-01



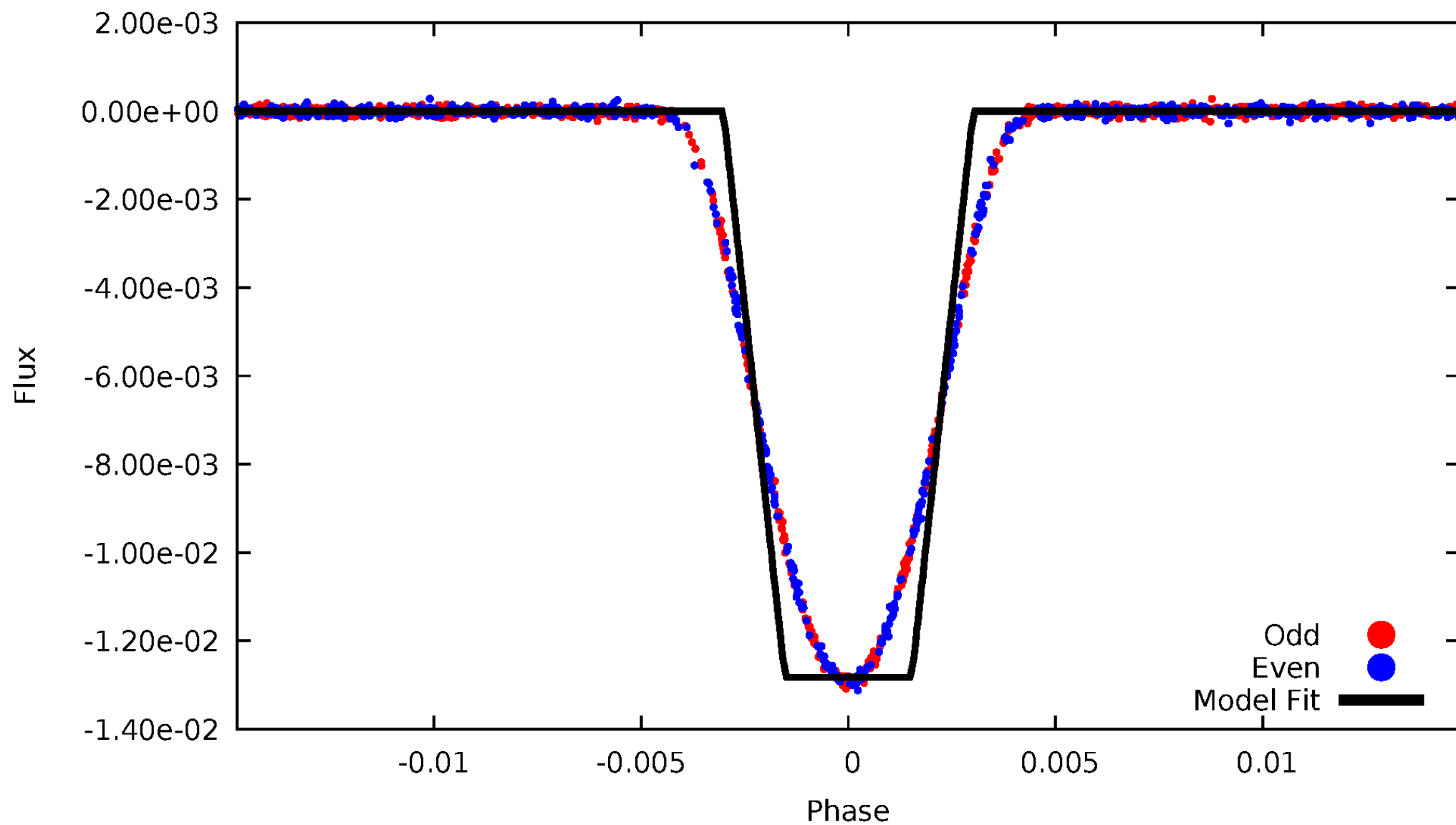
DV Odd/Even

TCE 009221398-01



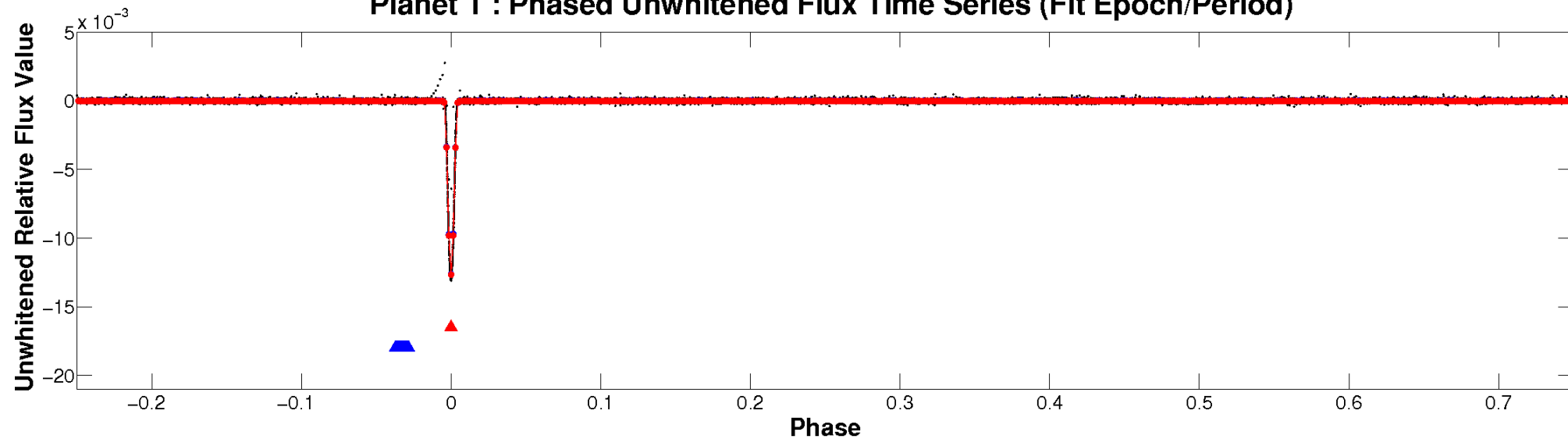
ALT Odd/Even

TCE 009221398-01

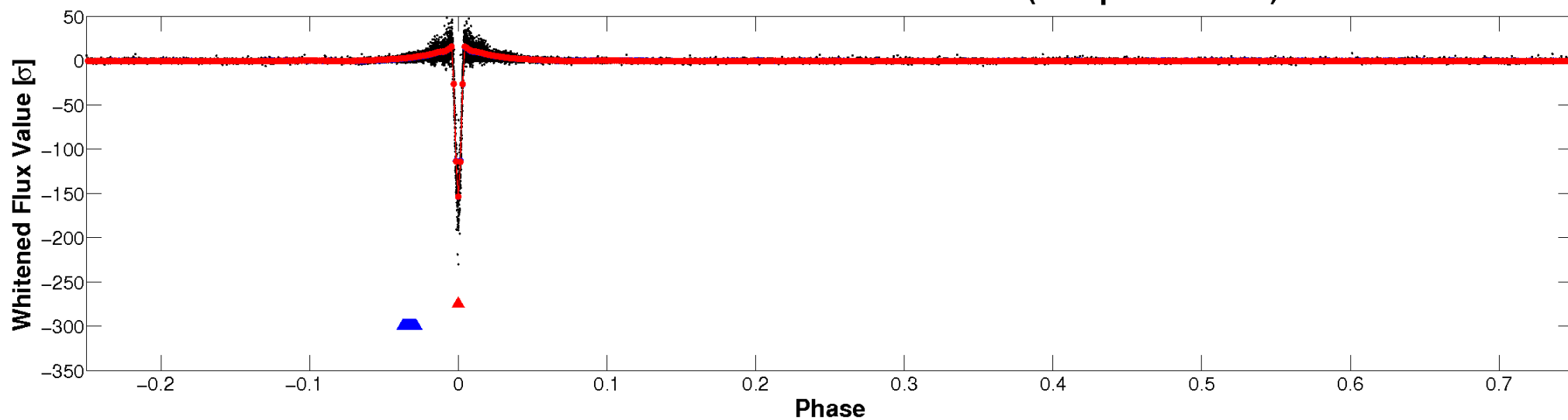


Non-Whitened Vs. Whitened Light Curve

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

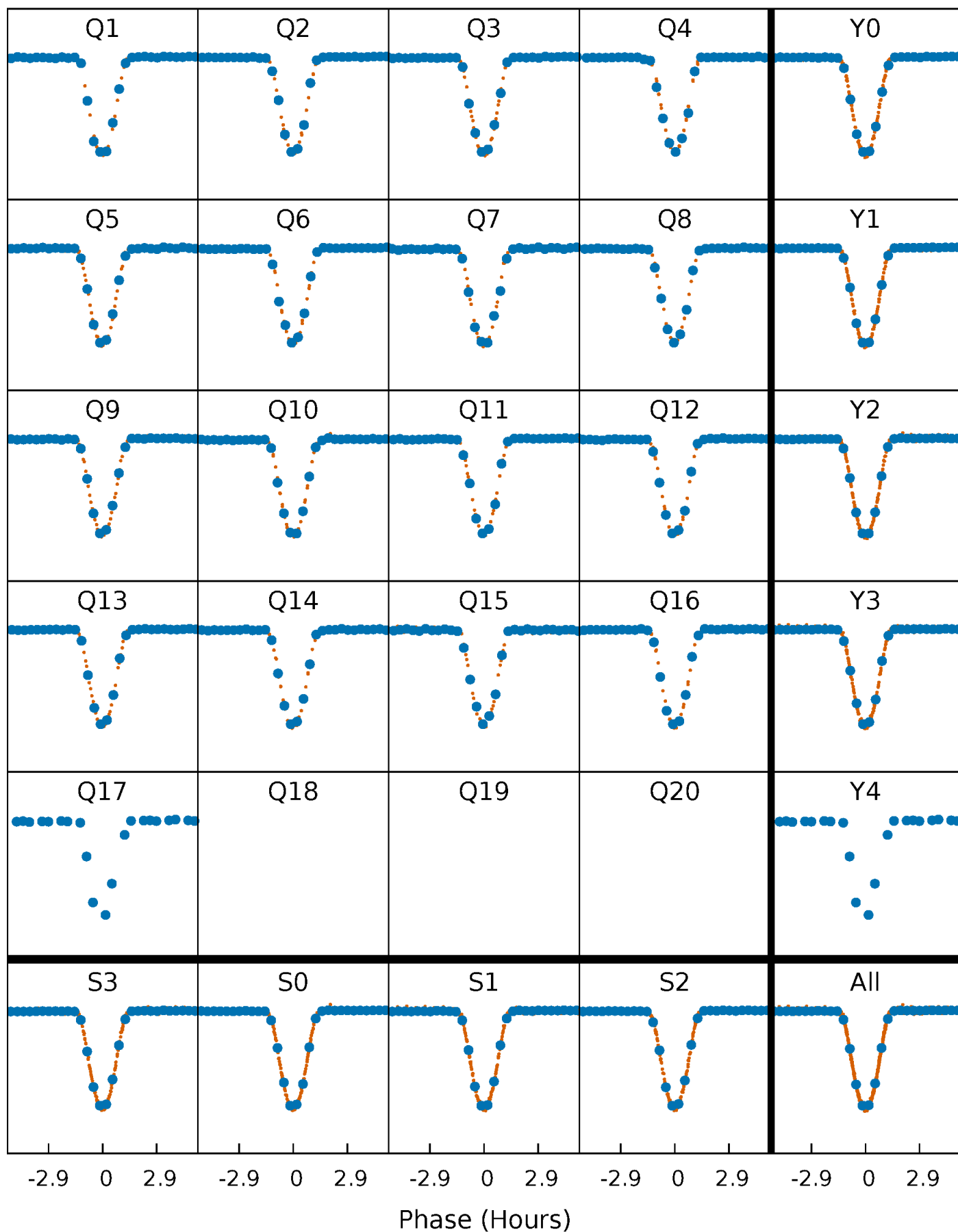


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



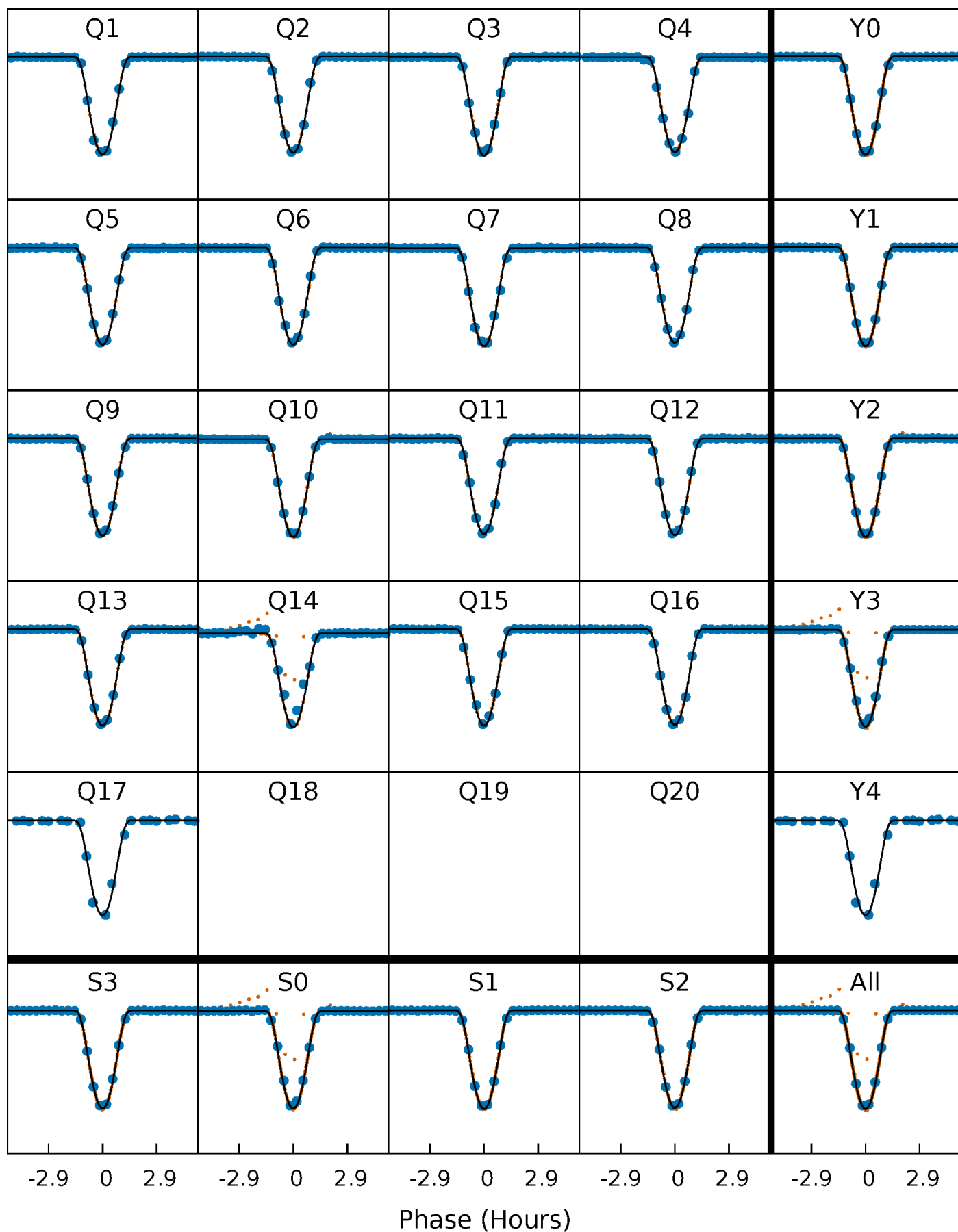
PDC Quarter-Phased Transit Curves

TCE 009221398-01 P= 13.787521 Days $T_0=136.762116$ (BKJD)



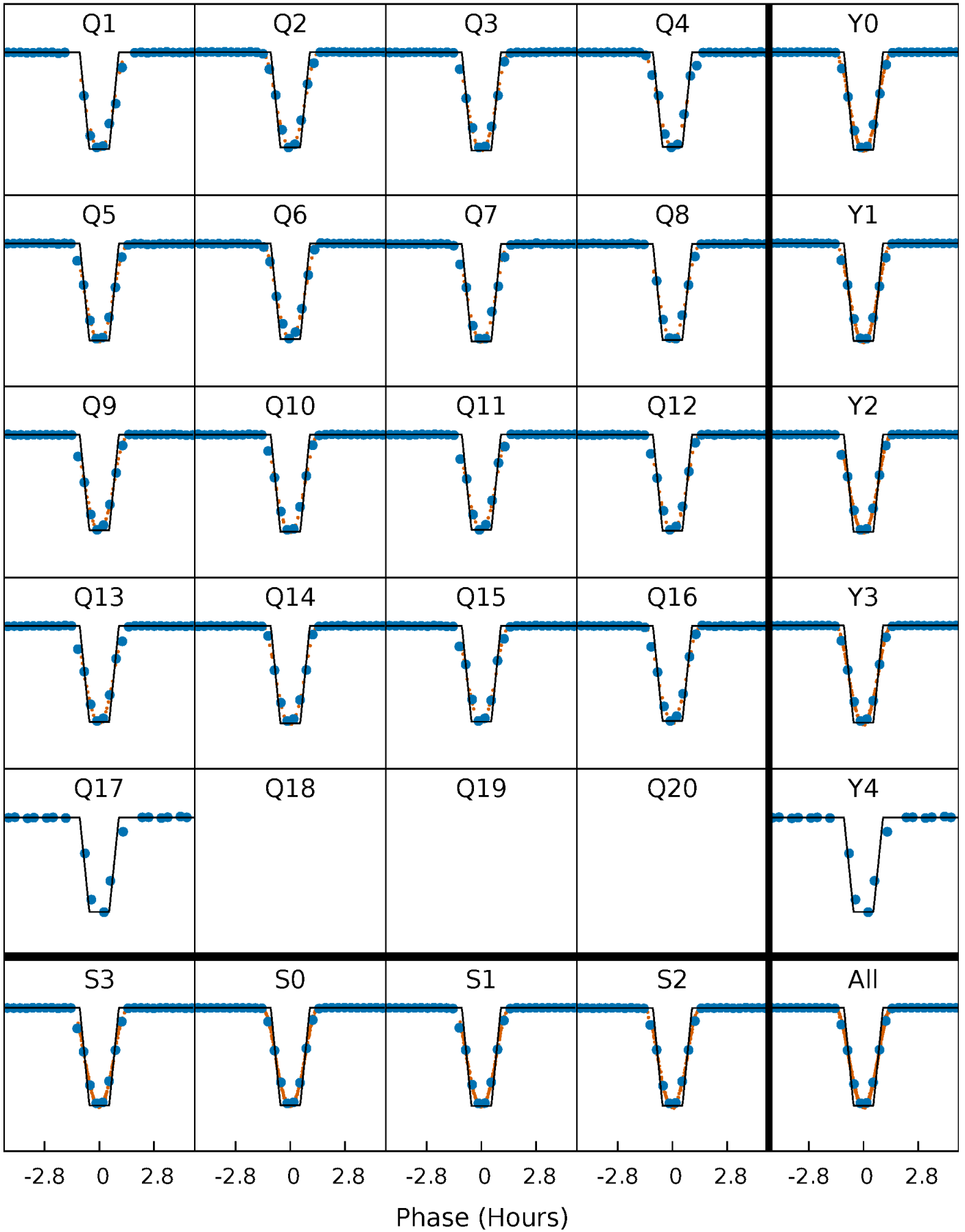
DV Quarter-Phased Transit Curves

TCE 009221398-01 P= 13.787521 Days $T_0=136.762116$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

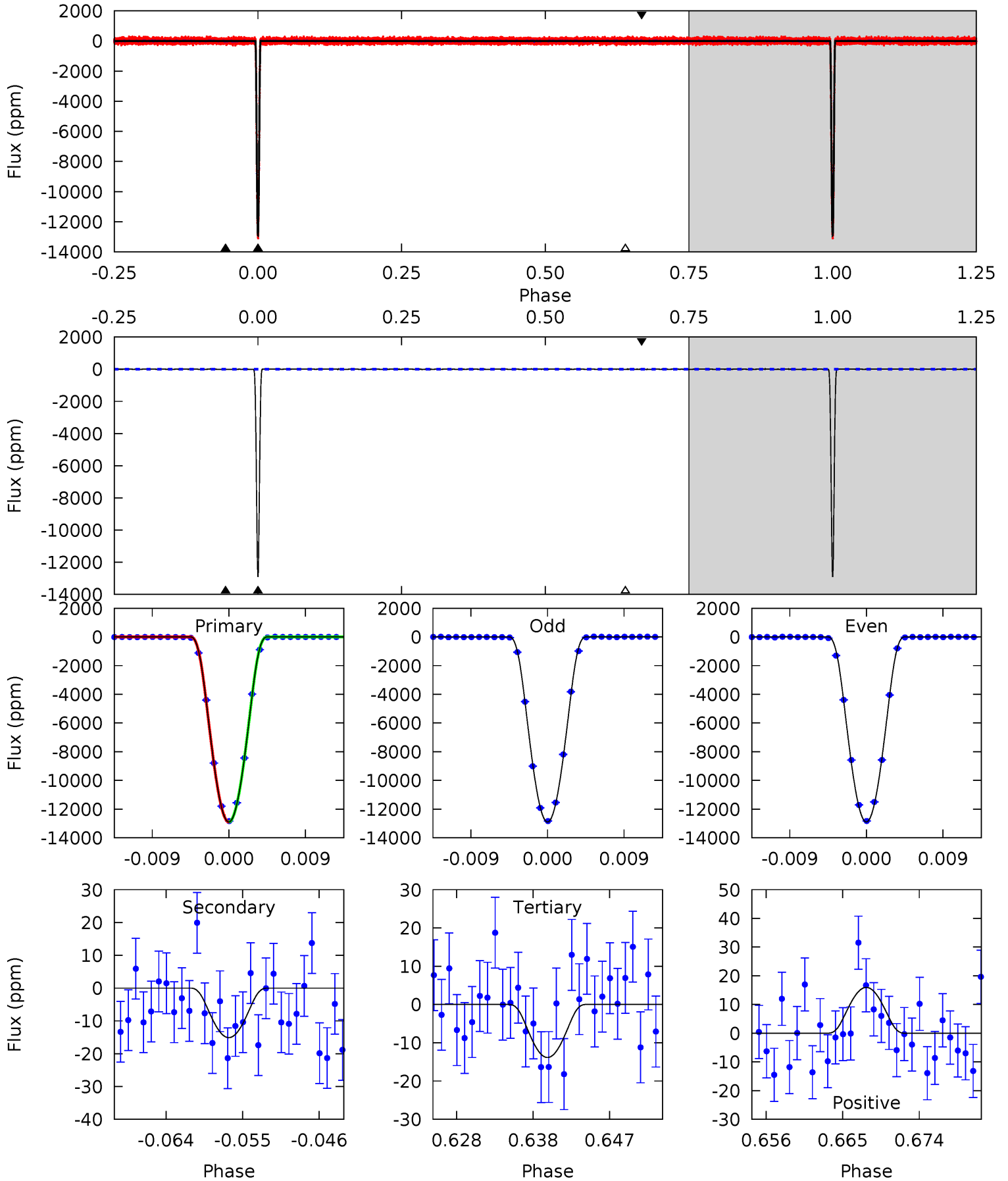
TCE 009221398-01 P= 13.787531 Days $T_0=136.761620$ (BKJD)



DV Model-Shift Uniqueness Test

009221398-01, P = 13.787521 Days, E = 122.974595 Days

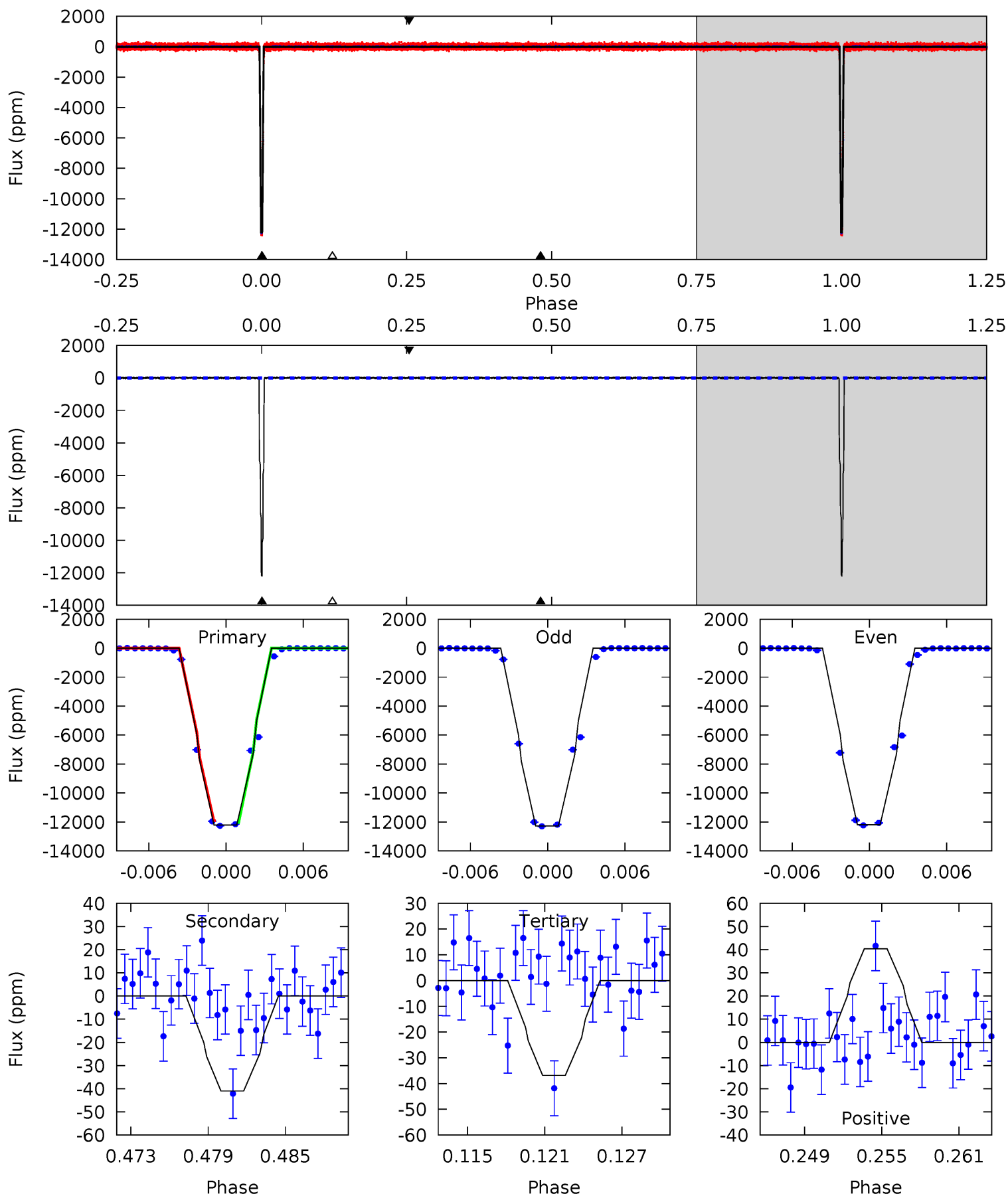
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
4215	4.93	4.53	5.21	5.04	2.61	1.71	4210	4210	0.41	-0.28	0.95	0.99	0.00	0.49



Alt Model-Shift Uniqueness Test

009221398-01, P = 13.787531 Days, E = 122.974089 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
1306	4.38	3.94	4.32	5.12	2.74	1.18	1302	1302	0.44	0.06	4.40	0.99	0.00	0



Stellar Parameters For KIC 009221398

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (g \cdot \text{cm}^{-3})$
	6399^{+70}_{-89}	$4.312^{+0.056}_{-0.112}$	$0.100^{+0.150}_{-0.200}$	$1.289^{+0.217}_{-0.117}$	$1.246^{+0.090}_{-0.099}$	$0.819^{+0.200}_{-0.273}$
	+1%/-1%	+1%/-3%	+150%/-200%	+17%/-9%	+7%/-8%	+24%/-33%
Source	SPE90	SPE90	SPE90	DSEP		

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

Secondary Eclipse Parameters for KIC 009221398-01 / KOI 6066.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	A_{obs}
DV	-15 ± 3	$25.05^{+2.26}_{-1.51}$	1296^{+52}_{-39}	-1857^{+111}_{-82}	$0.190^{+0.049}_{-0.045}$
Alt.	-41 ± 9	$16.08^{+1.44}_{-1.06}$	1294^{+52}_{-36}	2337^{+72}_{-98}	$1.275^{+0.340}_{-0.348}$

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

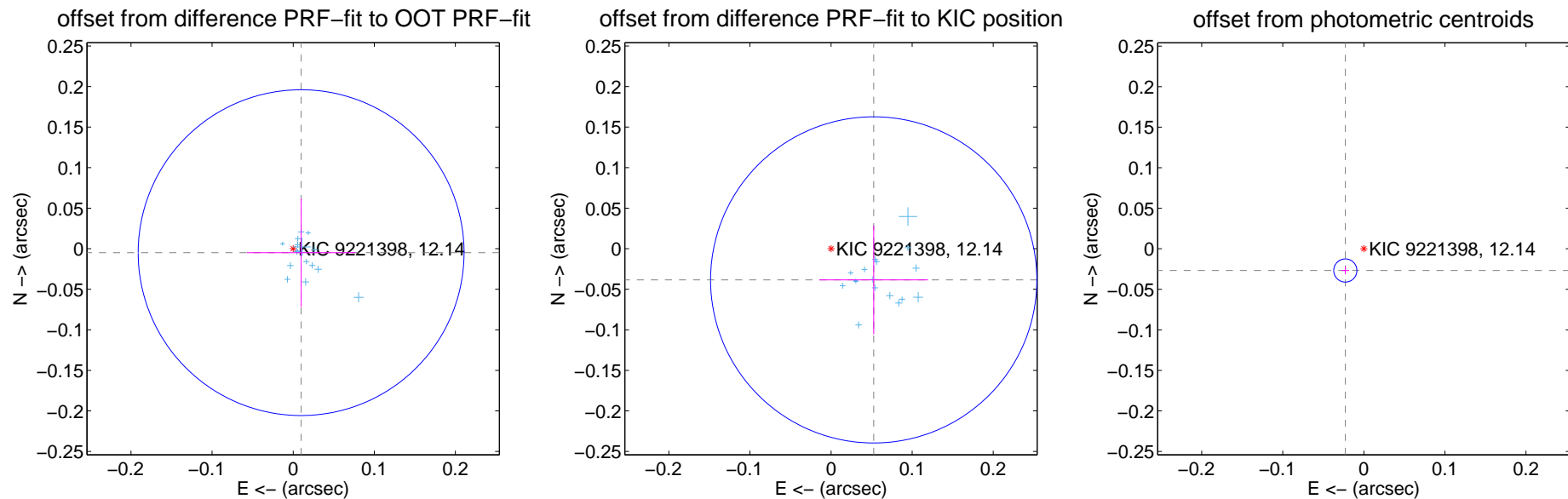
DV Centroid Data

Supplemental centroid analysis for 009221398-01. Kepler magnitude: 12.14. Transit SNR 2181.57

There are 17 quarters with good PRF difference image offsets

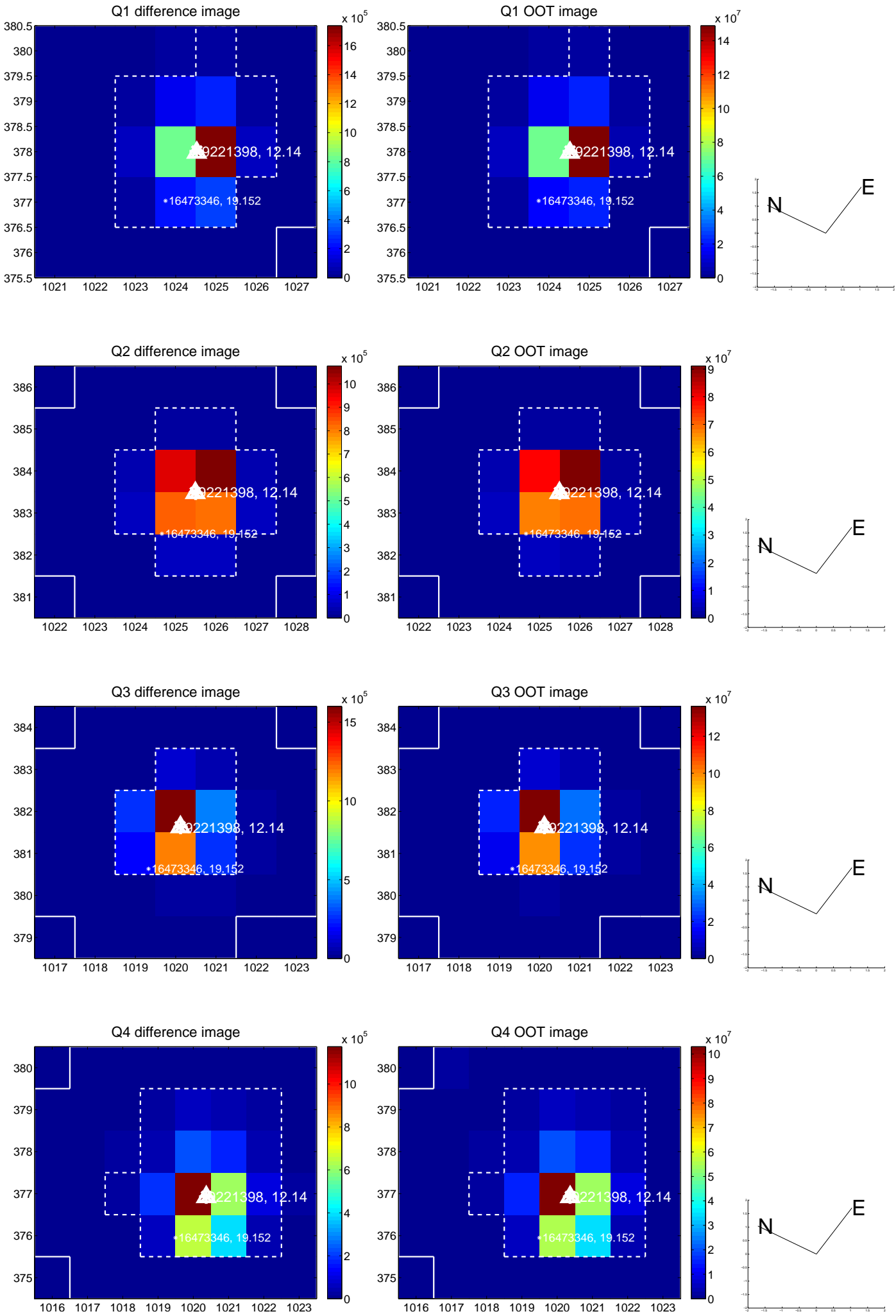
The direct PRF centroid is offset from the target star catalog position by about 0.09 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.011 ± 0.067	0.16	-0.010 ± 0.067	-0.005 ± 0.067
PRF-fit source offset from KIC position	0.065 ± 0.067	0.97	-0.053 ± 0.067	-0.038 ± 0.067
photometric centroid source offset	0.04 ± 0.00	7.39	0.02 ± 0.00	-0.03 ± 0.00

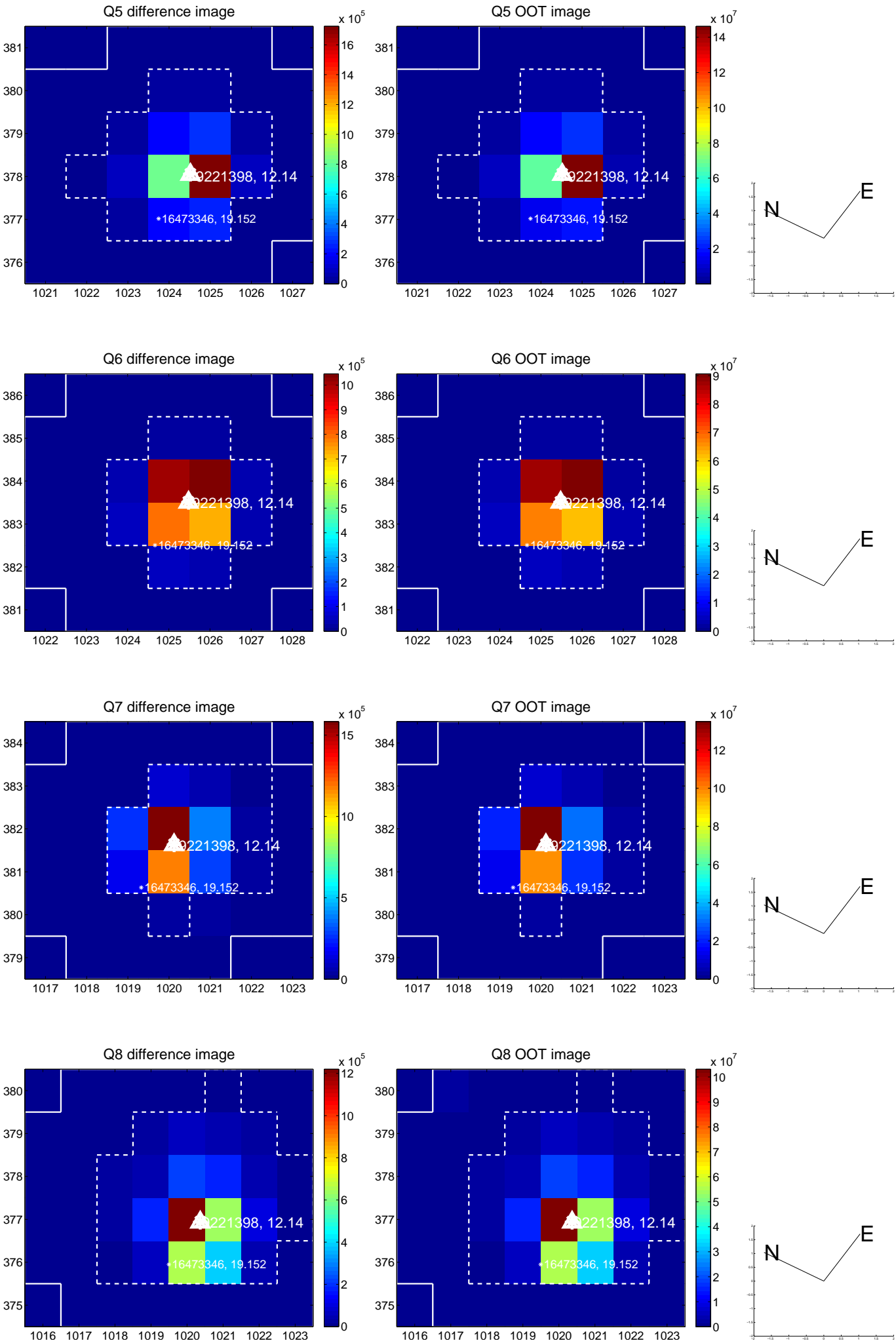


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

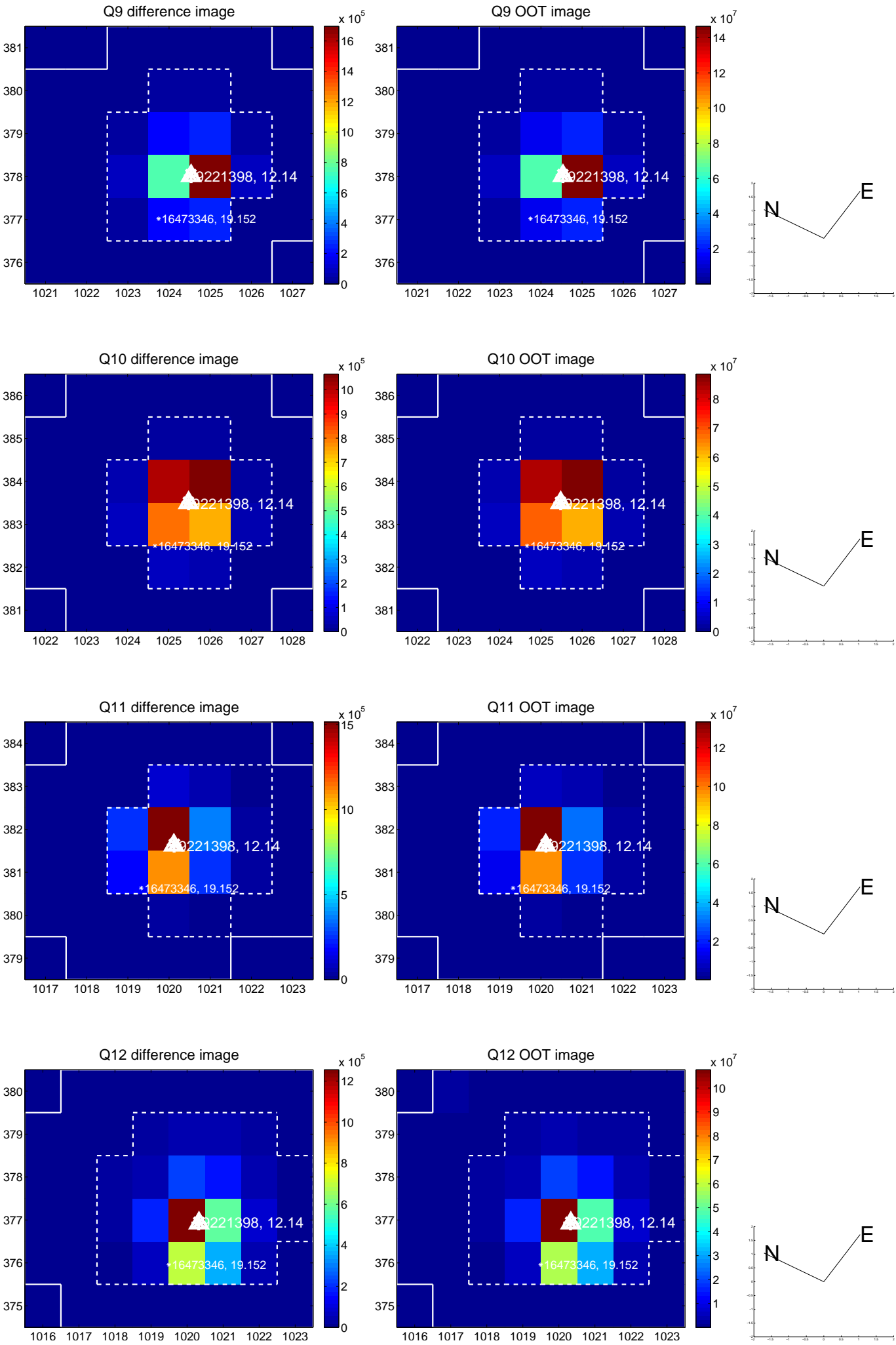
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



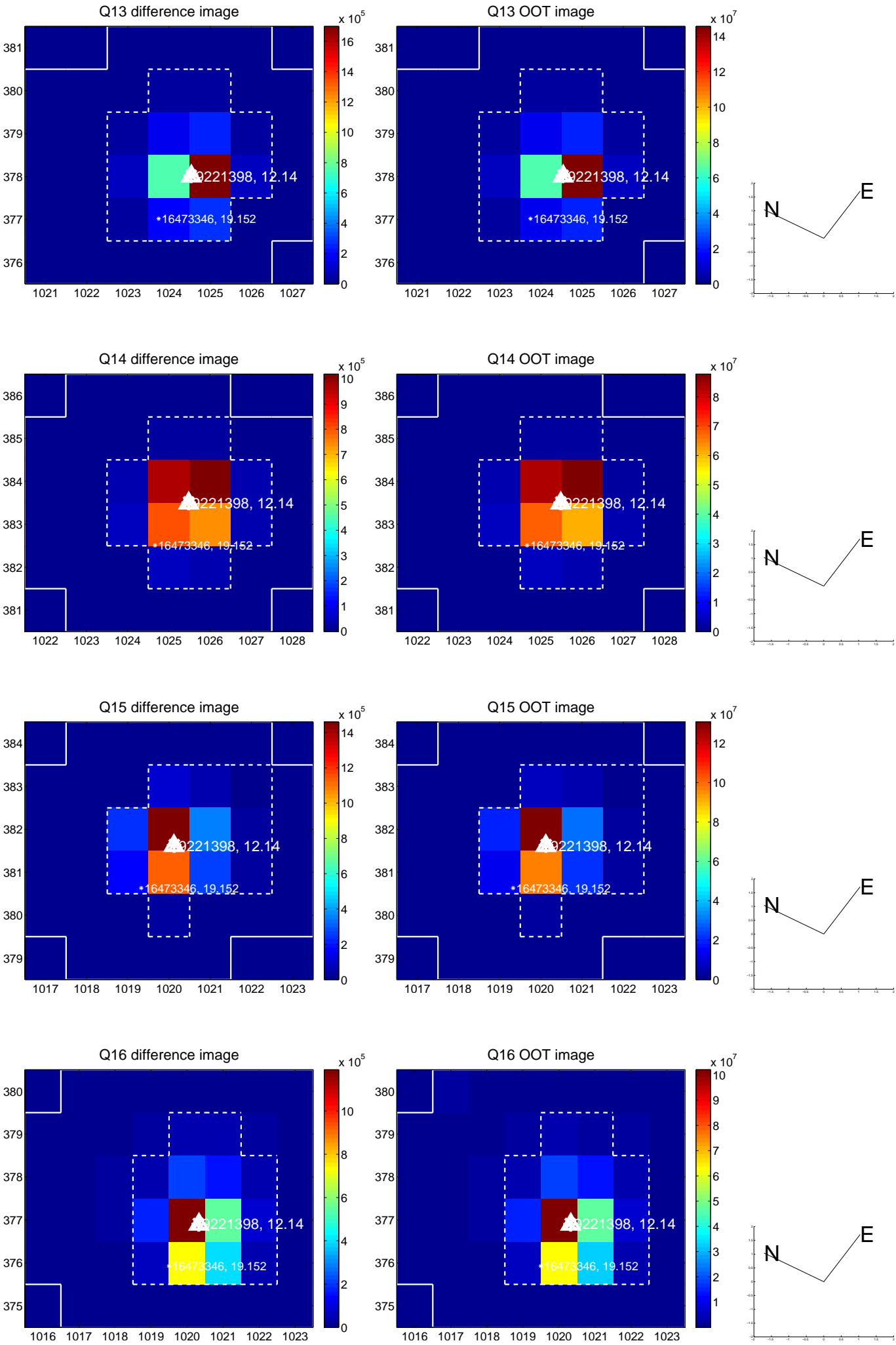
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



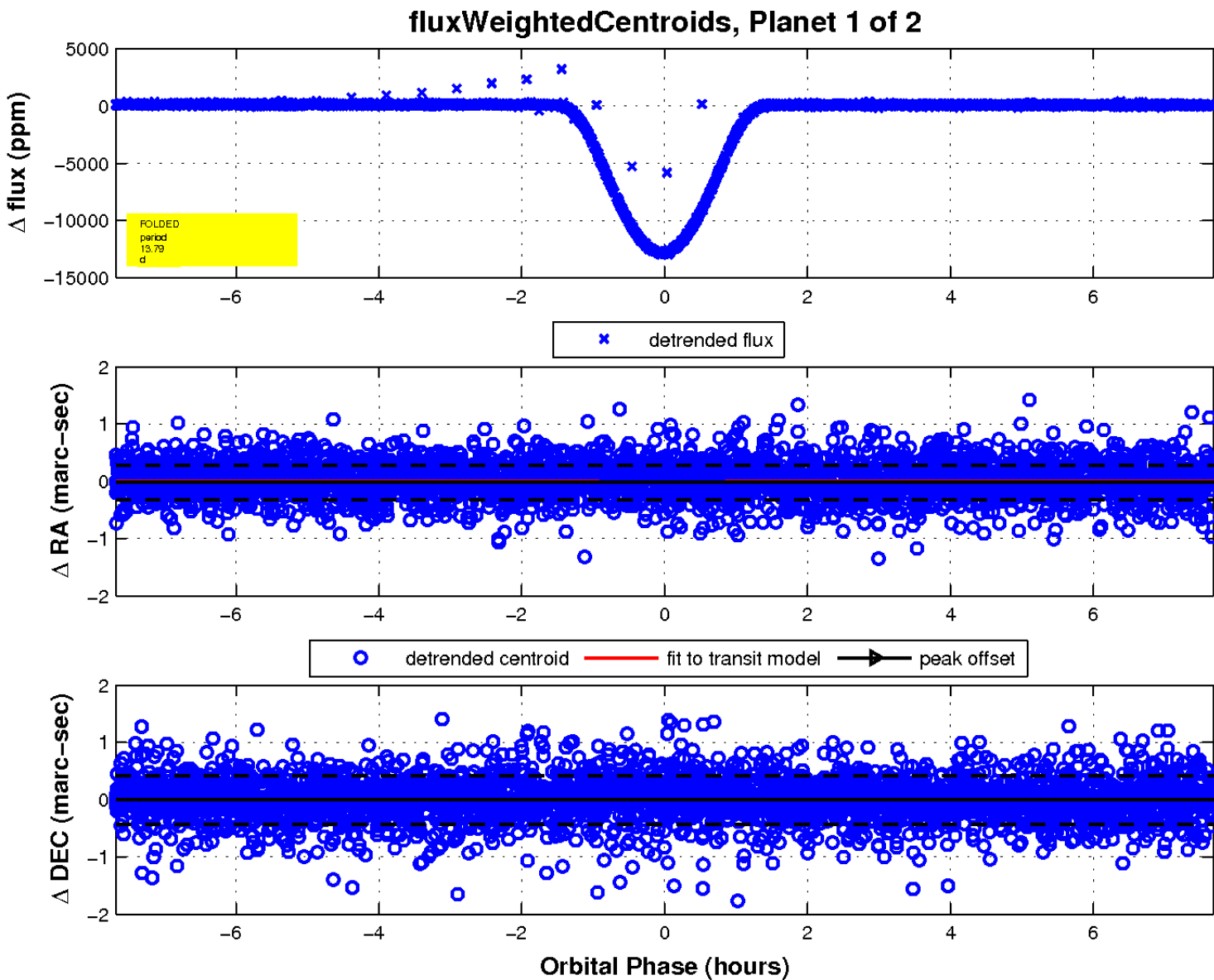
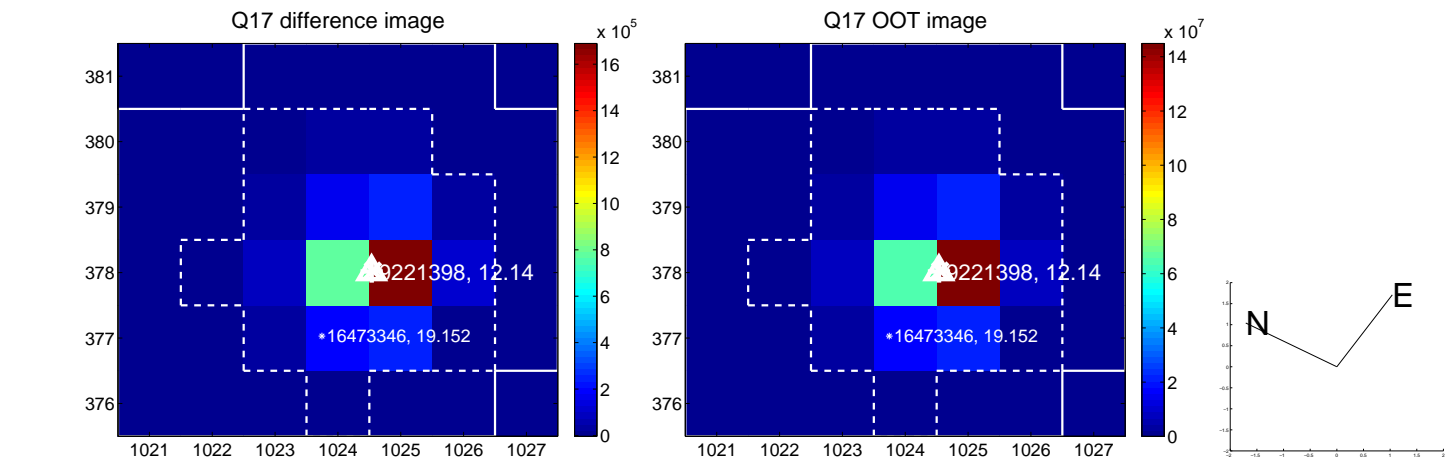
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

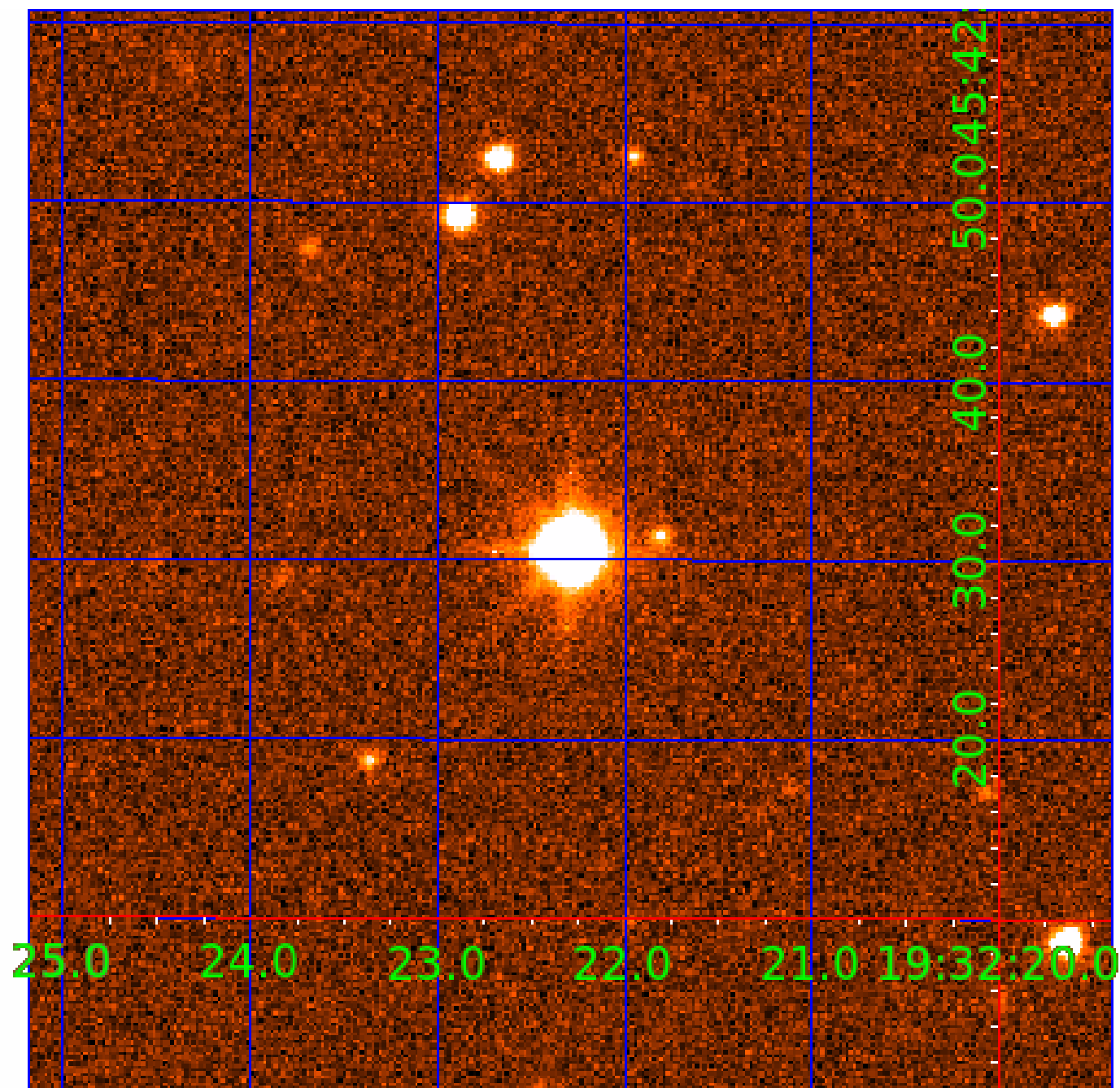


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 009221398

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})
009221398-01	OBS	6066.01	13.787521	136.762116	12908.8	2.561	2201.5	2181.6	1.29	6399	24.73	170.42
009221398-02	OBS	No	13.786369	136.370839	117.7	57.980	10.4	20.6	1.29	6399	2.83	170.44

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009221398-01	OBS	FP	0.00	0	1	0	0	DEEP_V_SHAPED—HAS_SEC_TCE
009221398-02	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 009221398-02

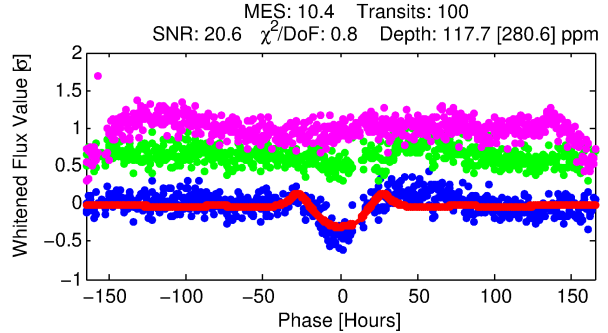
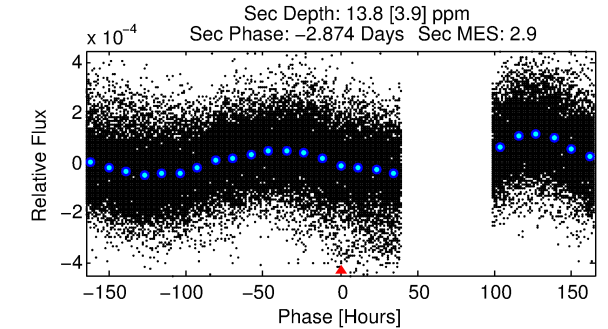
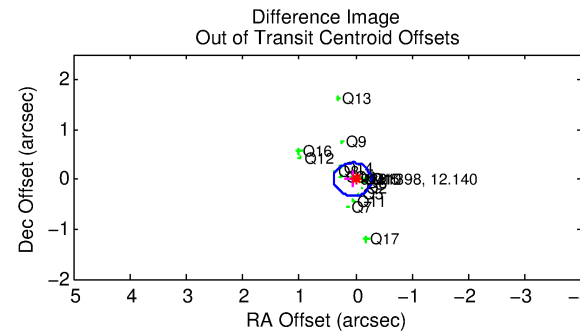
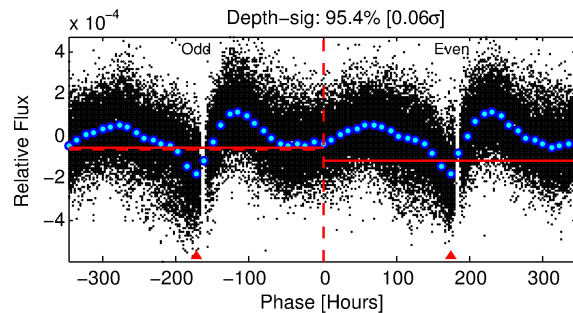
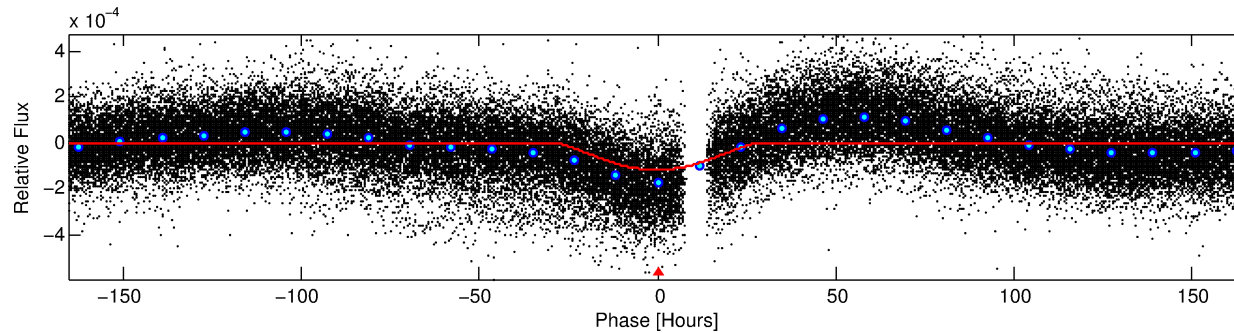
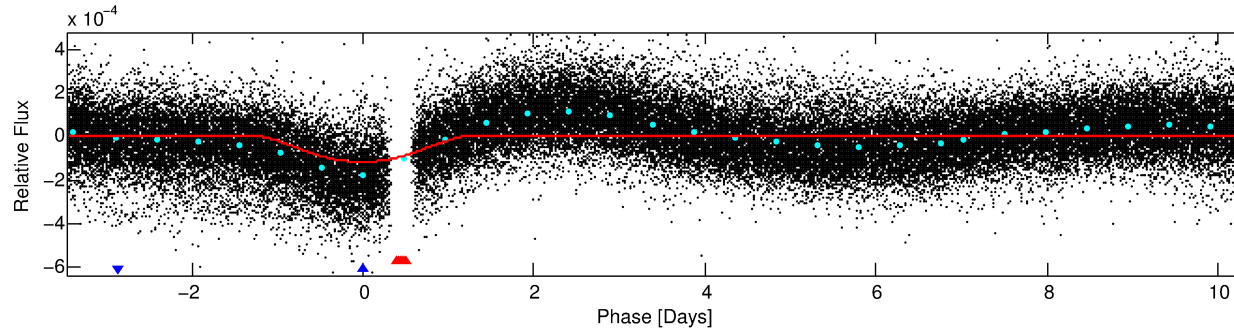
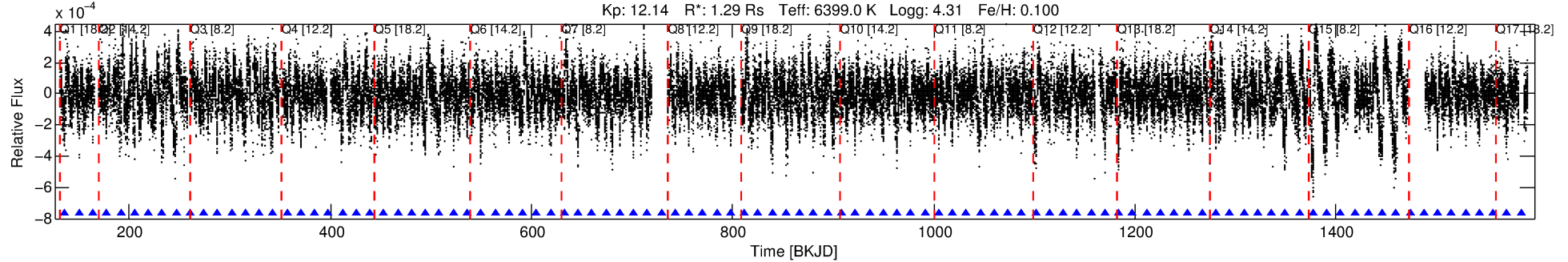
No Significant Match Found

DV One-Page Summary

KIC: 9221398 Candidate: 2 of 2 Period: 13.786 d

KOI: K06066 Corr: No Ephemeris Match

Kp: 12.14 R*: 1.29 Rs Teff: 6399.0 K Logg: 4.31 Fe/H: 0.100



DV Fit Results:

Period = 13.78637 [0.00068] d
Epoch = 136.3708 [0.0417] BKJD
Rp/R* = 0.0201 [0.0102]
a/R* = 1.07 [0.01]
b = 1.00 [0.02]
Seff = 170.44 [36.26]
Teq = 921 [49] K
Rp = 2.83 [1.51] Re
a = 0.1210 [0.0171] AU
Ag = 13.87 [14.80] [0.87σ]
Teffp = 2749 [721] K [2.53σ]

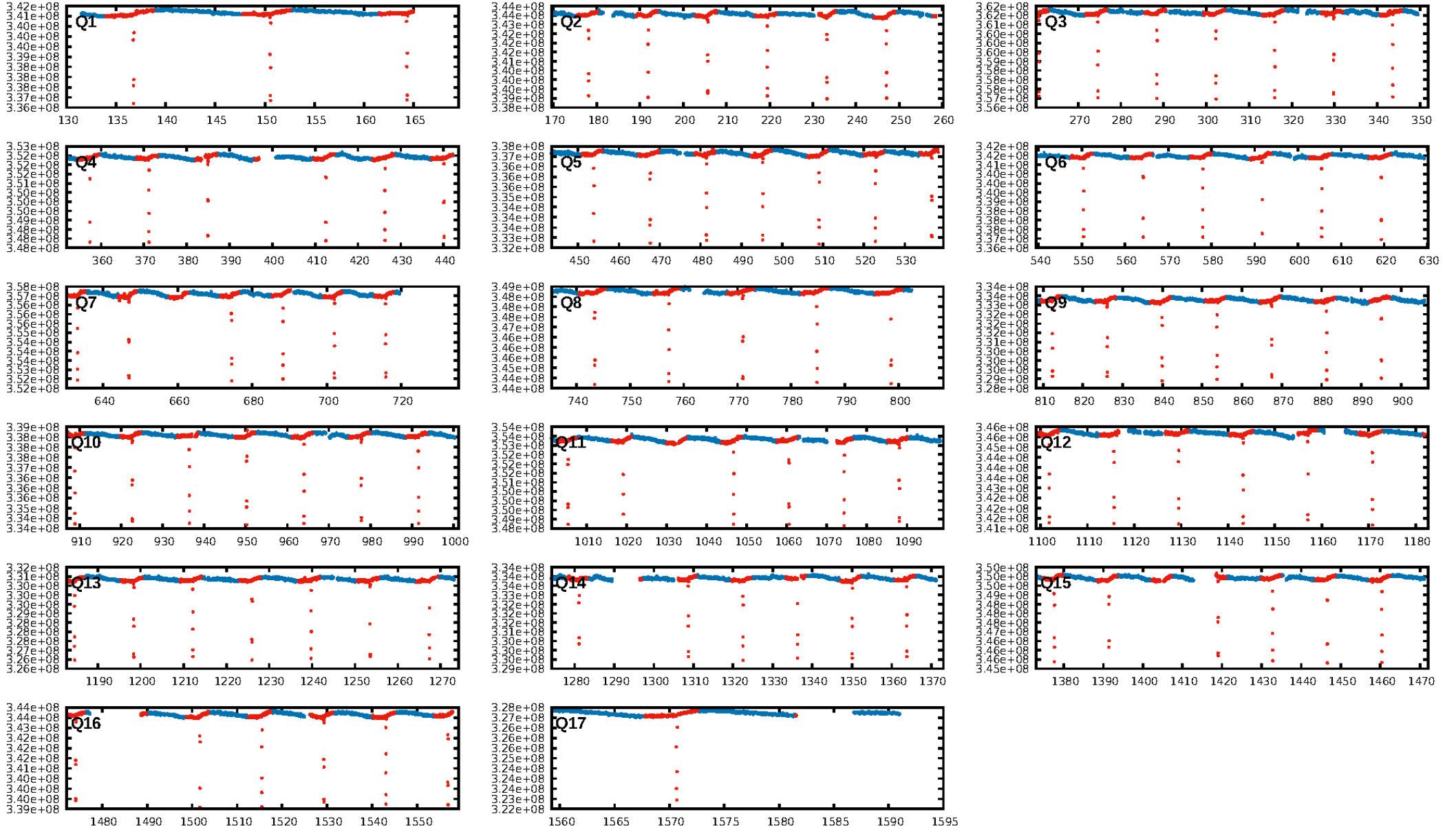
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 0.0% [0.00σ]
ModelChiSquare2-sig: 78.9%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 6.52e-26
RollingBand-fgt: 1.00 [96/96]
GhostDiagnostic-chr: 2.398
Centroid-sig: 73.2%
Centroid-so: 0.062 arcsec [0.35σ]
OotOffset-rm: 0.058 arcsec [0.52σ]
KicOffset-rm: 0.042 arcsec [0.36σ]
OotOffset-st: 4/4/4/5 [17]
KicOffset-st: 4/4/4/5 [17]
DiffImageQuality-fgm: 1.00 [17/17]
DiffImageOverlap-fno: 0.00 [0/17]

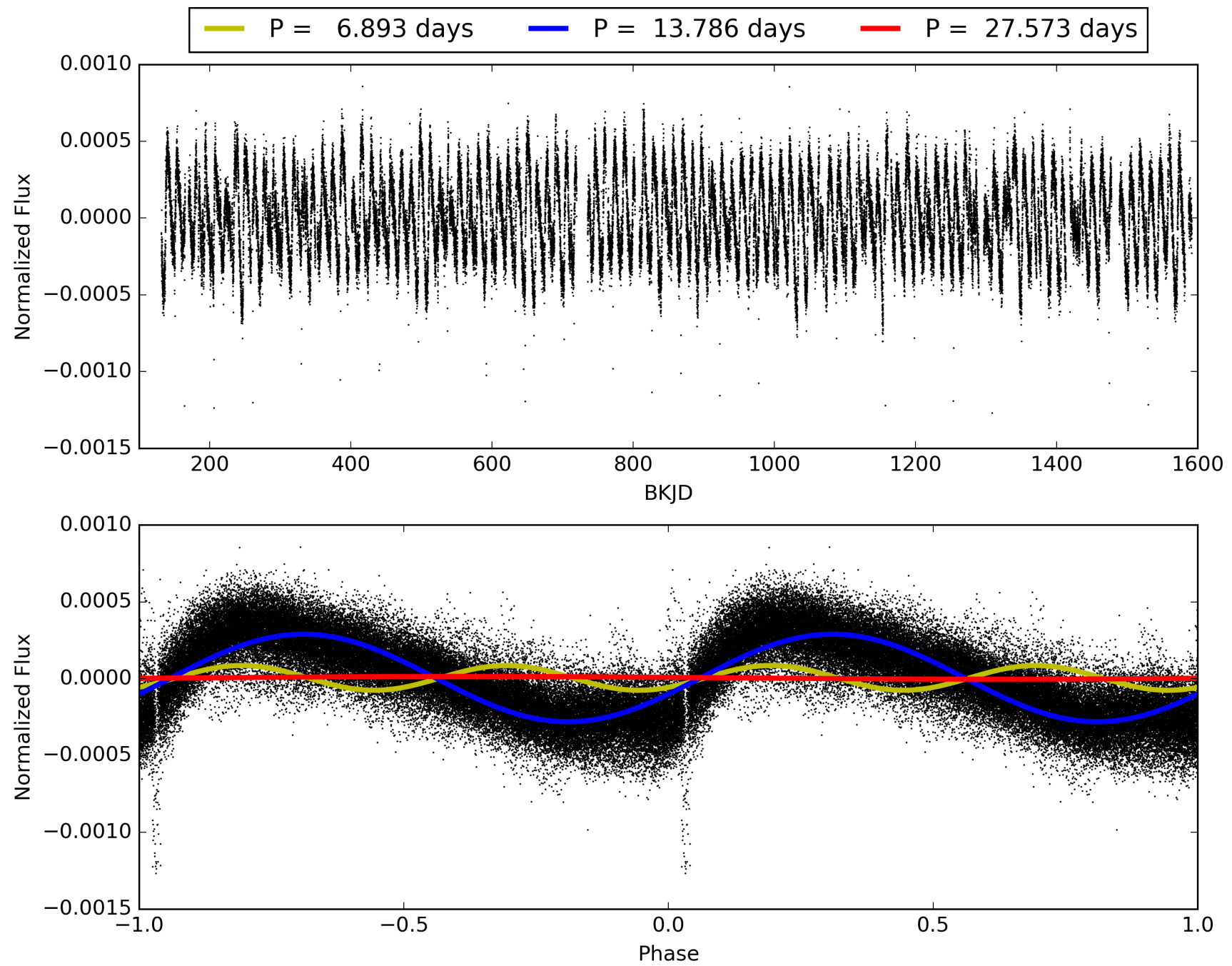
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 02:54:19 Z

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

TCE 009221398-02, PDC Light Curves

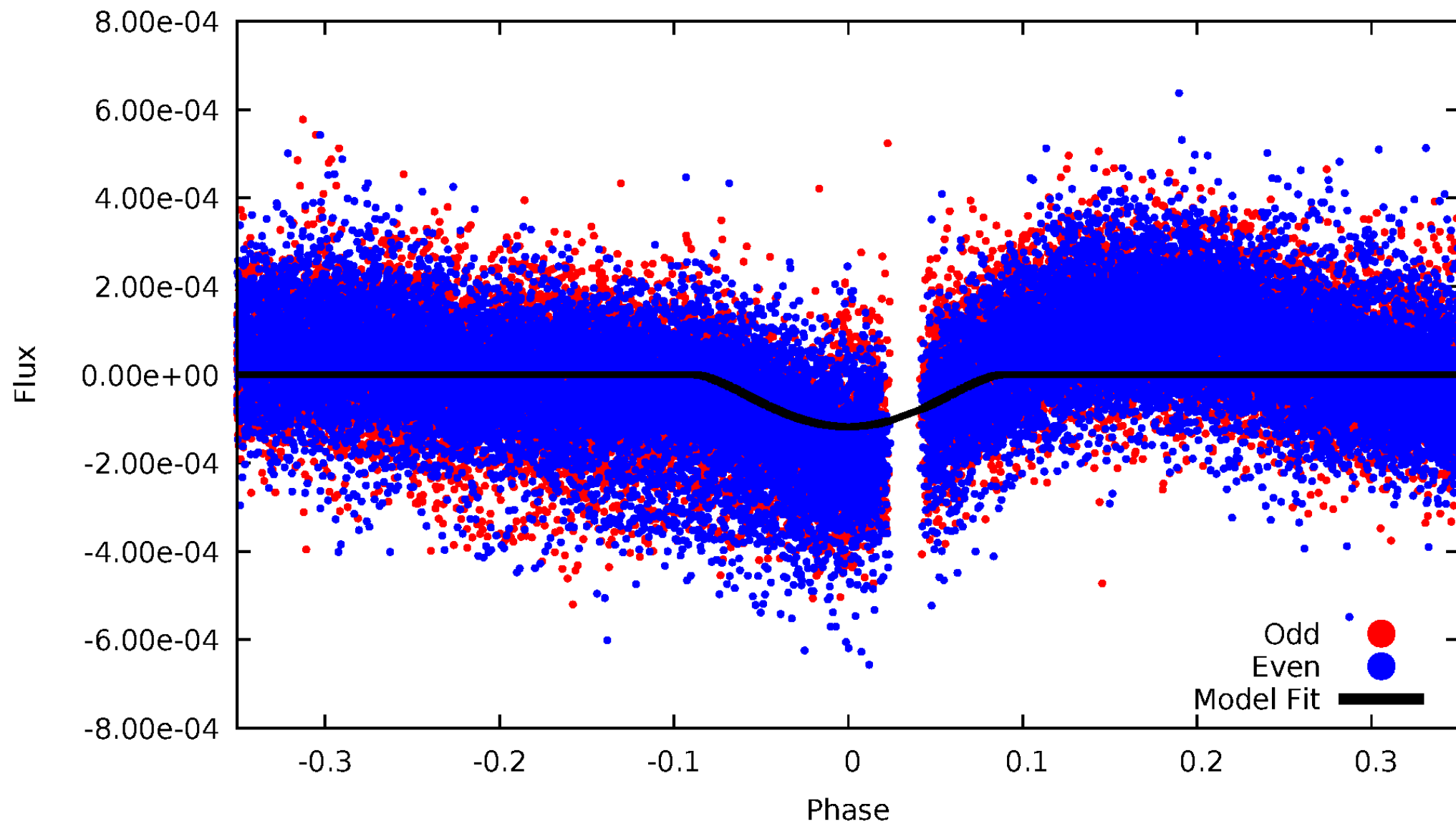


TCE 009221398-02



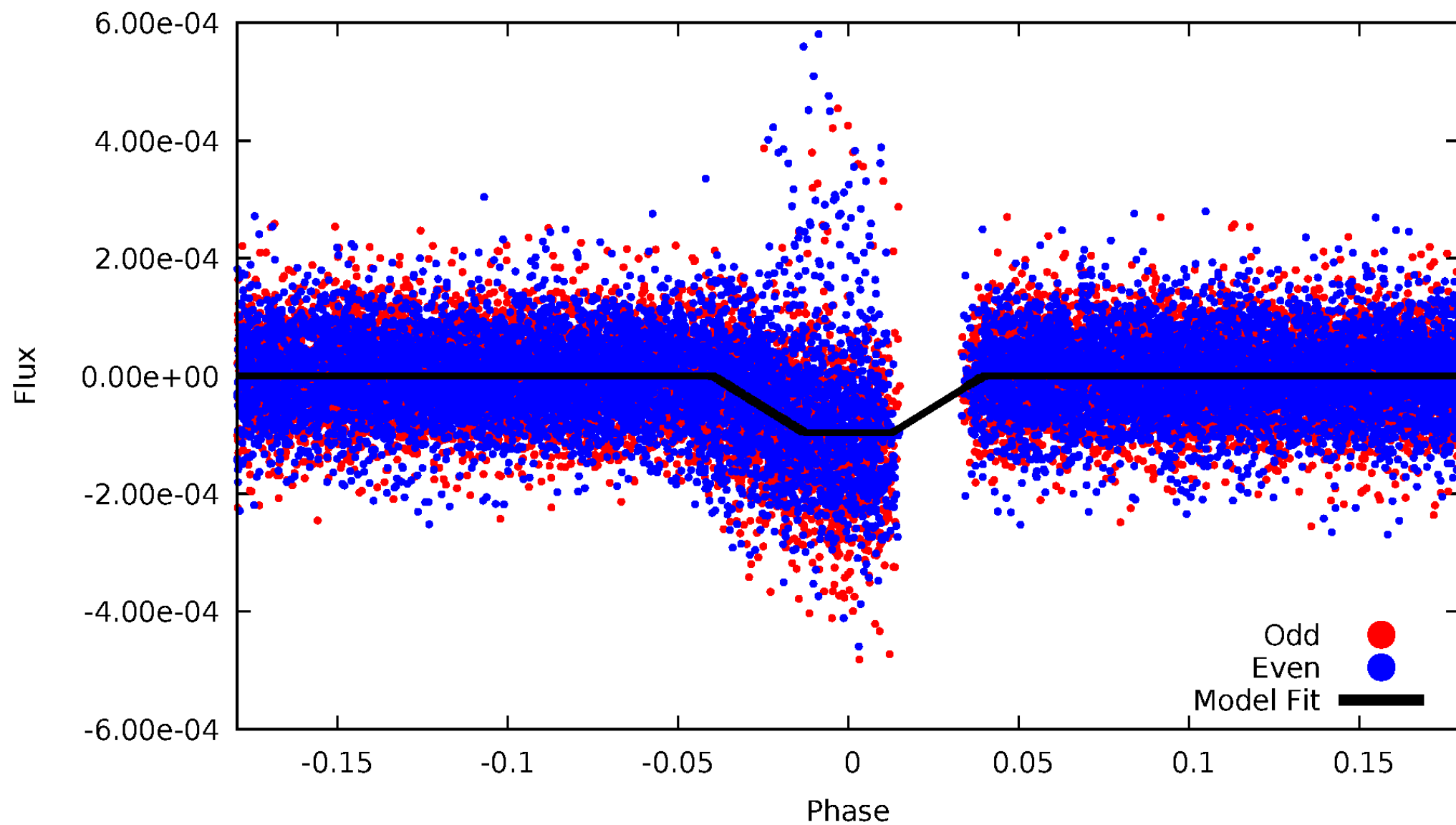
DV Odd/Even

TCE 009221398-02



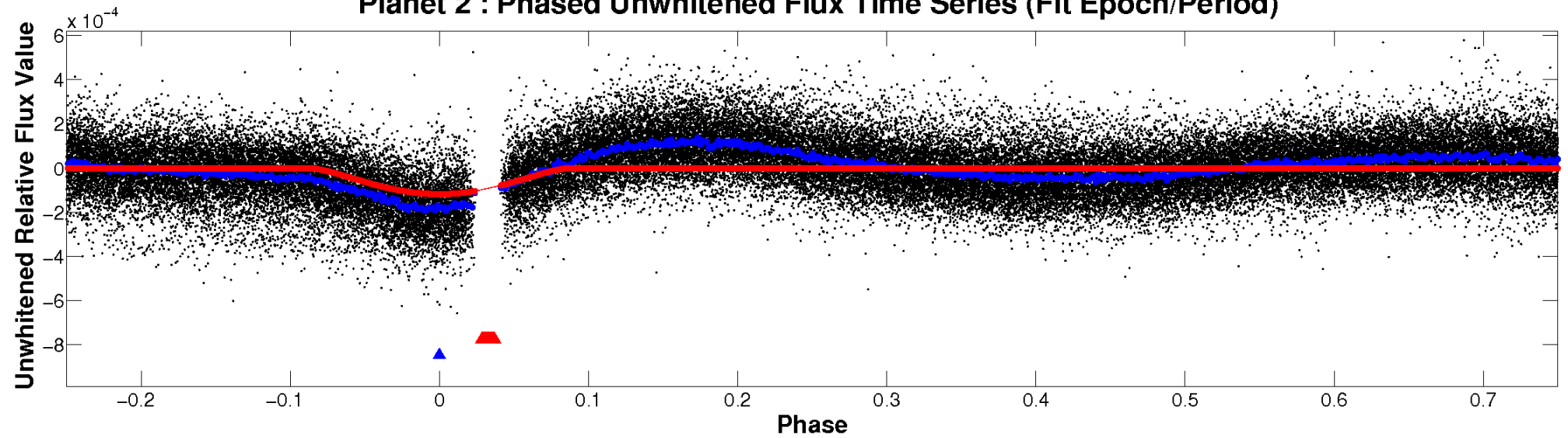
ALT Odd/Even

TCE 009221398-02

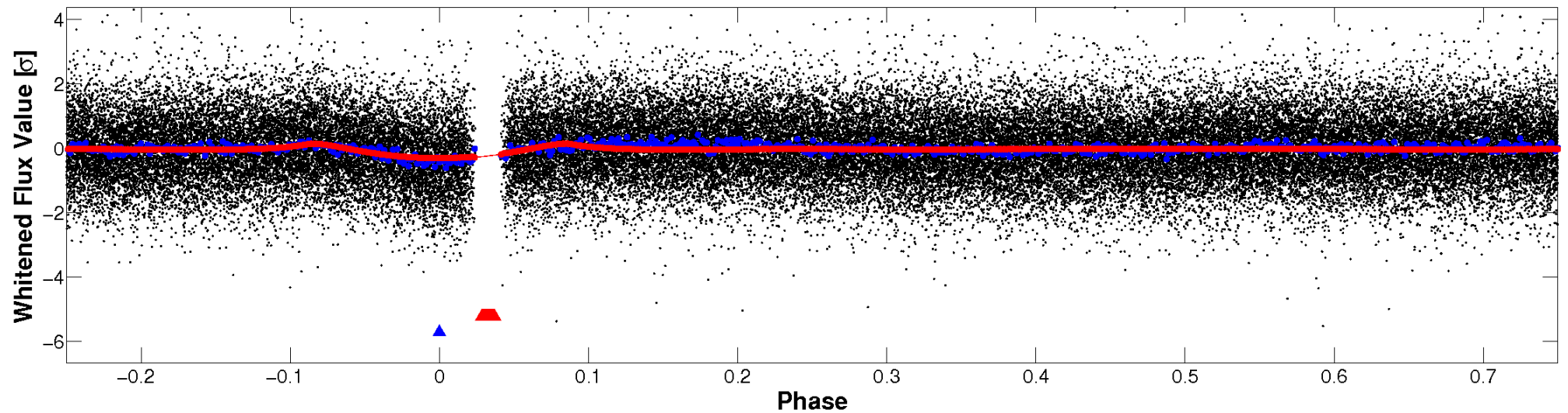


Non-Whitened Vs. Whitened Light Curve

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

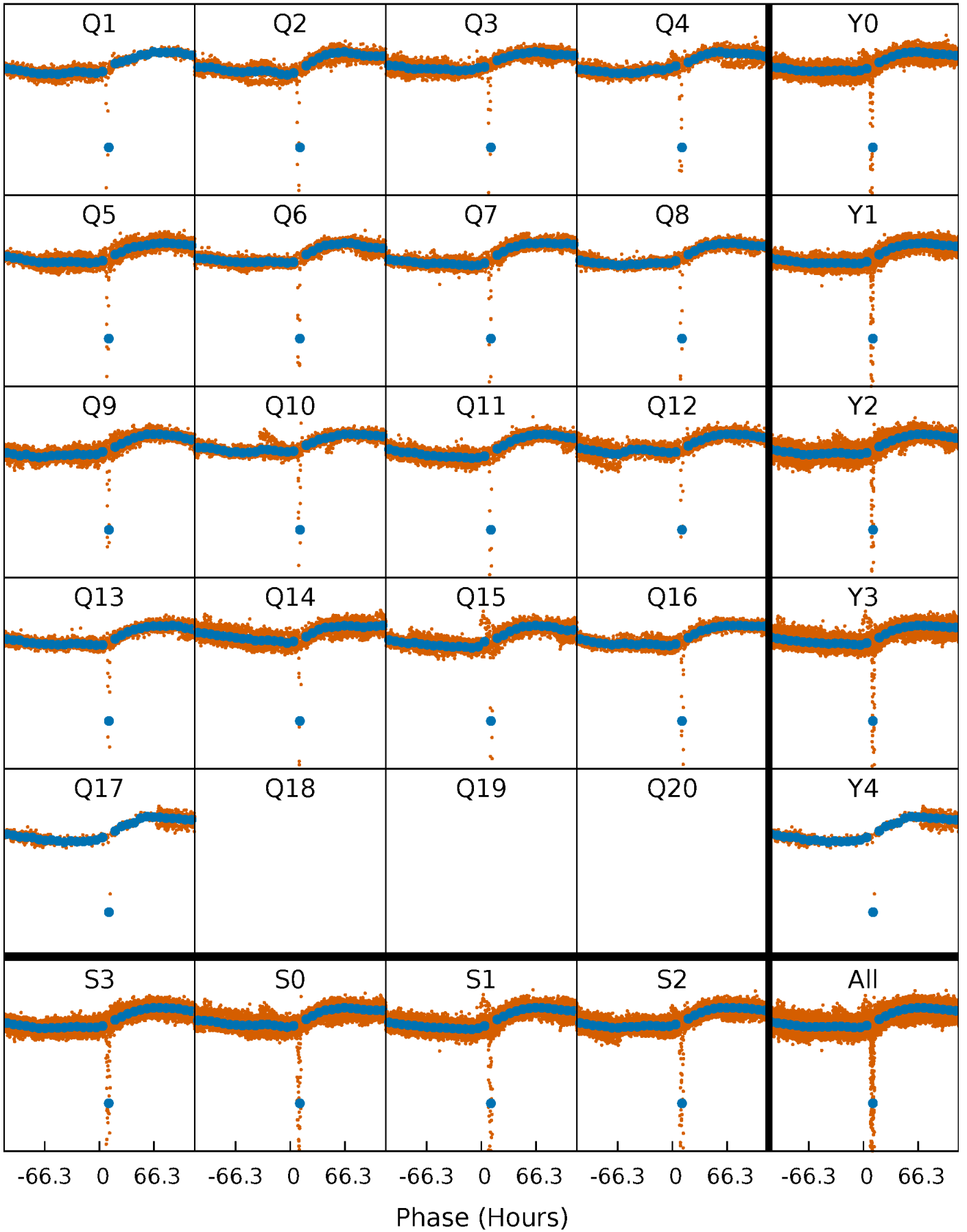


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



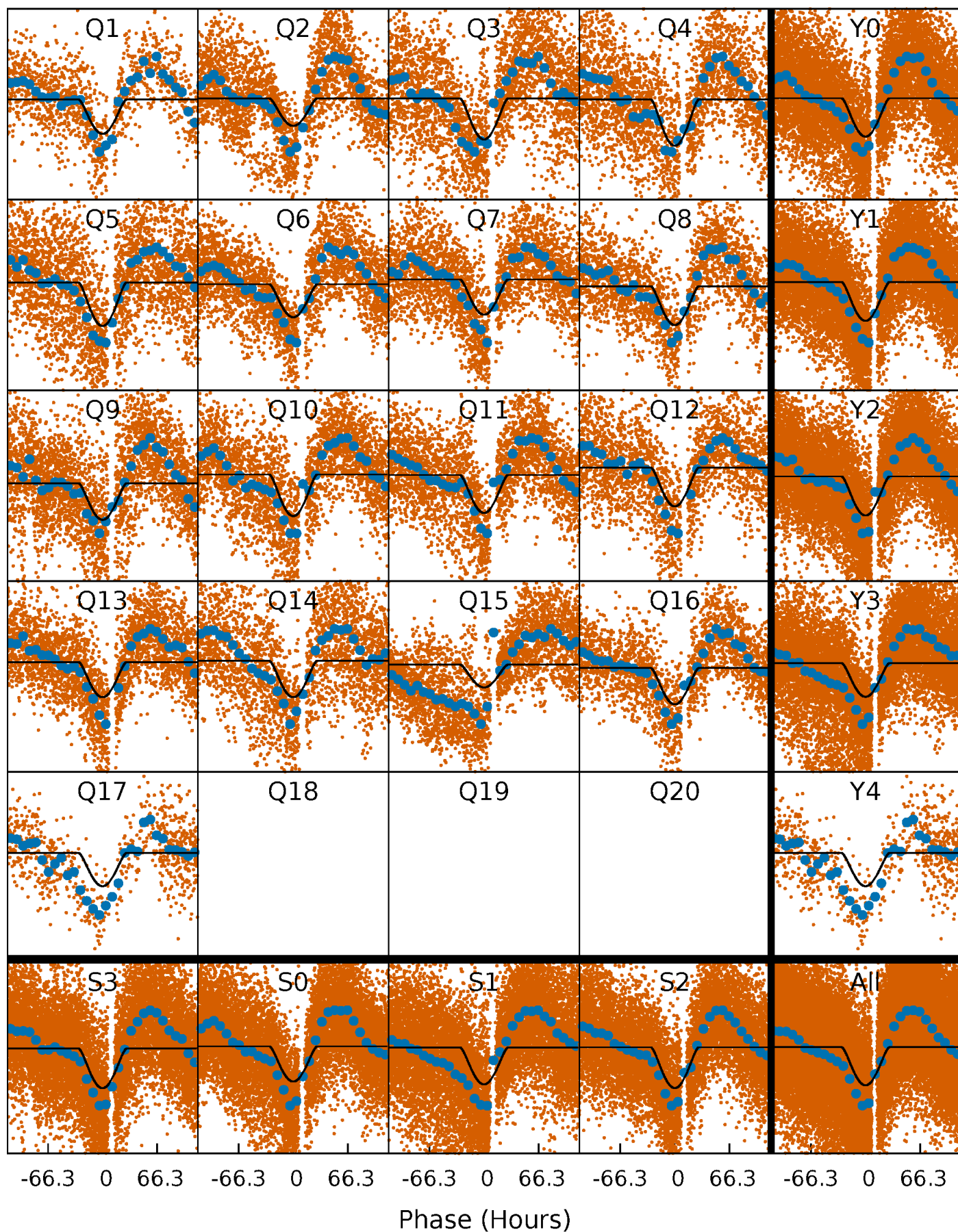
PDC Quarter-Phased Transit Curves

TCE 009221398-02 P= 13.786369 Days $T_0=136.370839$ (BKJD)



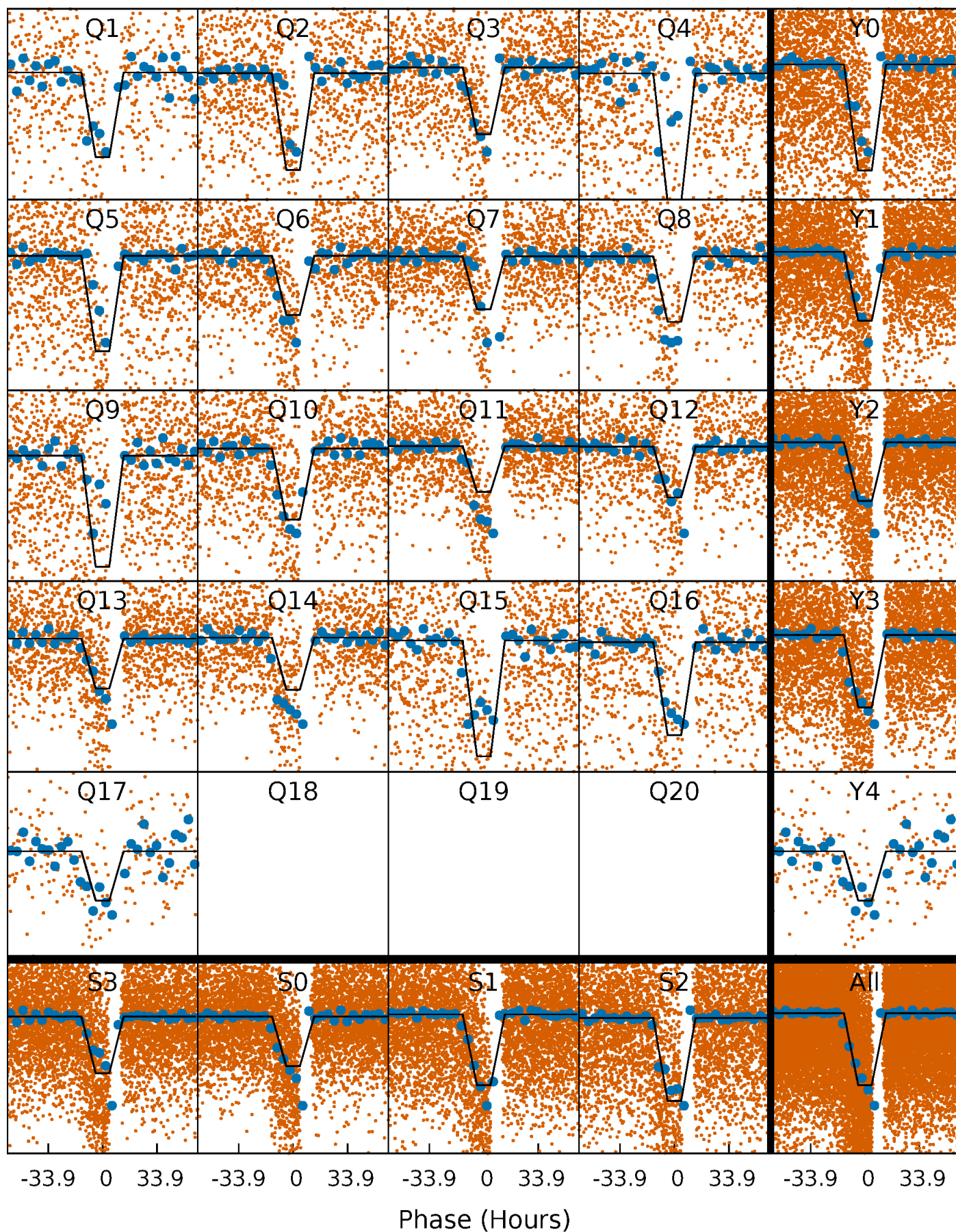
DV Quarter-Phased Transit Curves

TCE 009221398-02 P= 13.786369 Days $T_0=136.370839$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

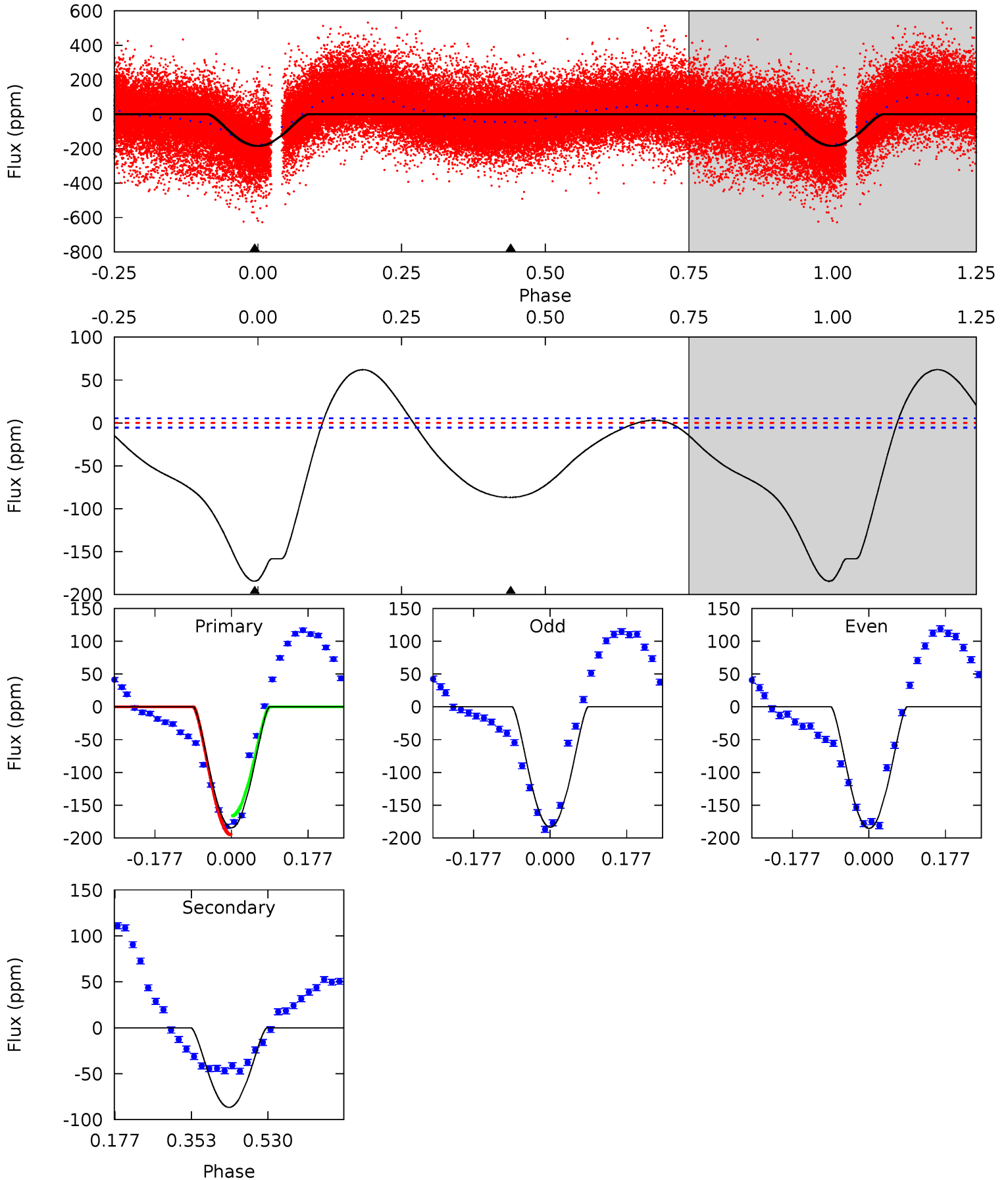
TCE 009221398-02 P= 13.786511 Days $T_0=136.480737$ (BKJD)



DV Model-Shift Uniqueness Test

009221398-02, P = 13.786369 Days, E = 122.584470 Days

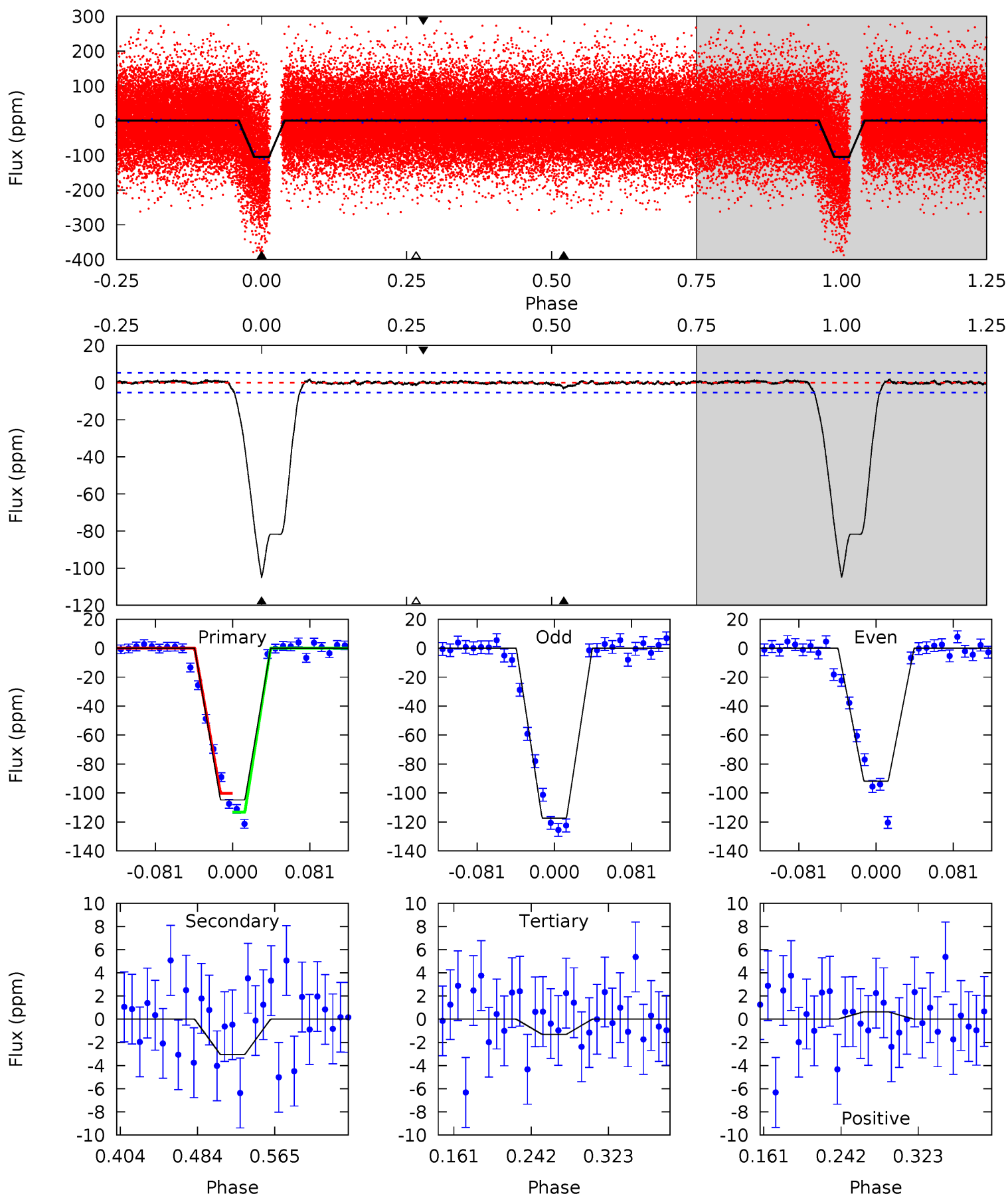
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
148.8	70.0	0	0	4.44	1.35	25.5	148.8	148.8	70.0	70.0	0.76	0.98	0.25	11.5



Alt Model-Shift Uniqueness Test

009221398-02, P = 13.786511 Days, E = 122.694226 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
90.3	2.63	1.13	0.55	4.61	1.75	0.41	89.2	89.8	1.50	2.08	11.0	0.93	0.02	4.98



Stellar Parameters For KIC 009221398

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (g \cdot \text{cm}^{-3})$
	6399^{+70}_{-89}	$4.312^{+0.056}_{-0.112}$	$0.100^{+0.150}_{-0.200}$	$1.289^{+0.217}_{-0.117}$	$1.246^{+0.090}_{-0.099}$	$0.819^{+0.200}_{-0.273}$
	+1%/-1%	+1%/-3%	+150%/-200%	+17%/-9%	+7%/-8%	+24%/-33%
Source	SPE90	SPE90	SPE90	DSEP		

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

Secondary Eclipse Parameters for KIC 009221398-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	A_{obs}
DV	-87 ± 1	$2.92^{+1.46}_{-1.43}$	1295^{+56}_{-39}	4483^{+1553}_{-613}	82^{+228}_{-45}
Alt.	-3 ± 1	$1.70^{+1.41}_{-1.10}$	1296^{+50}_{-38}	3023^{+1361}_{-504}	$7.515^{+62.661}_{-5.458}$

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

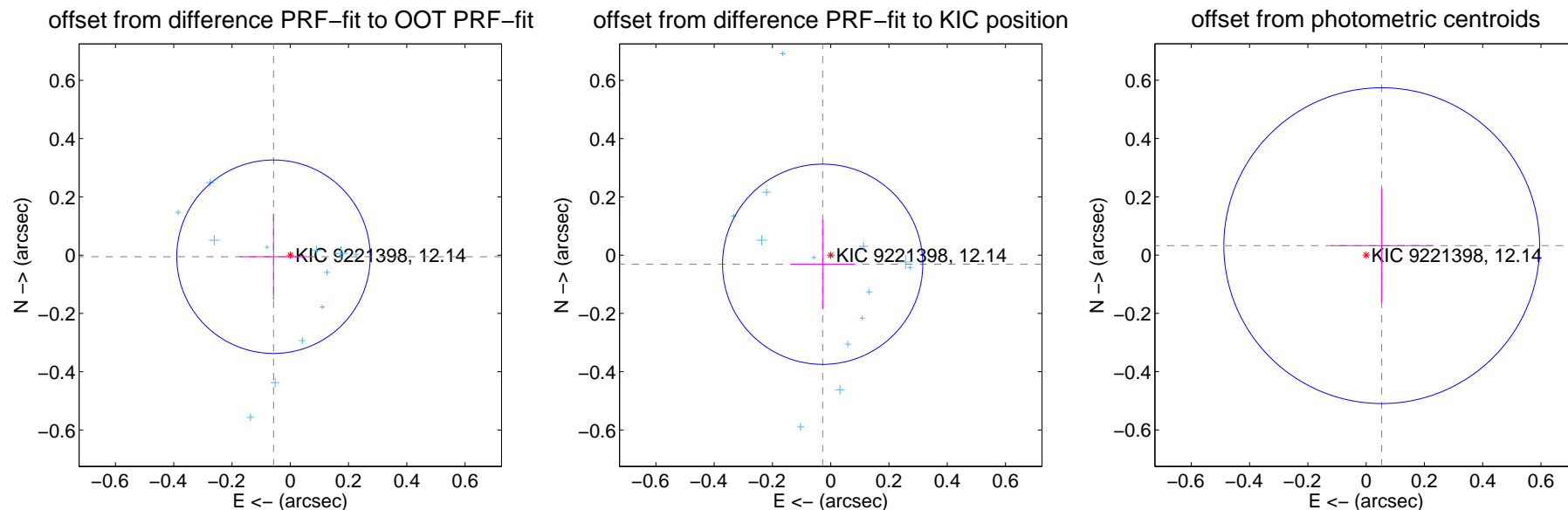
DV Centroid Data

Supplemental centroid analysis for 009221398-02. Kepler magnitude: 12.14. Transit SNR 20.58

There are 17 quarters with good PRF difference image offsets

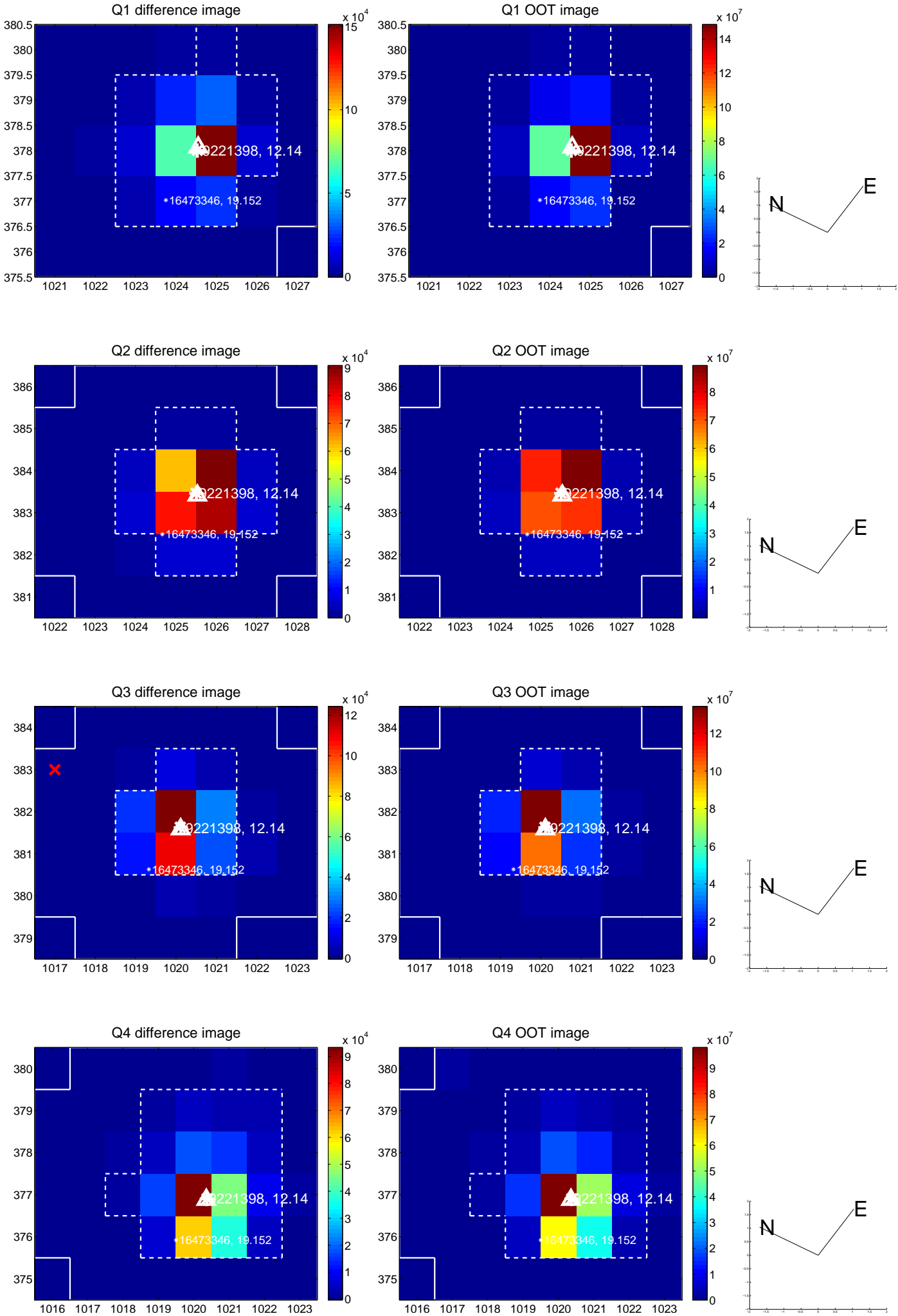
The direct PRF centroid is offset from the target star catalog position by about 0.09 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.058 ± 0.111	0.52	0.058 ± 0.115	-0.005 ± 0.148
PRF-fit source offset from KIC position	0.042 ± 0.115	0.36	0.028 ± 0.111	-0.031 ± 0.154
photometric centroid source offset	0.06 ± 0.18	0.35	-0.05 ± 0.17	0.03 ± 0.19

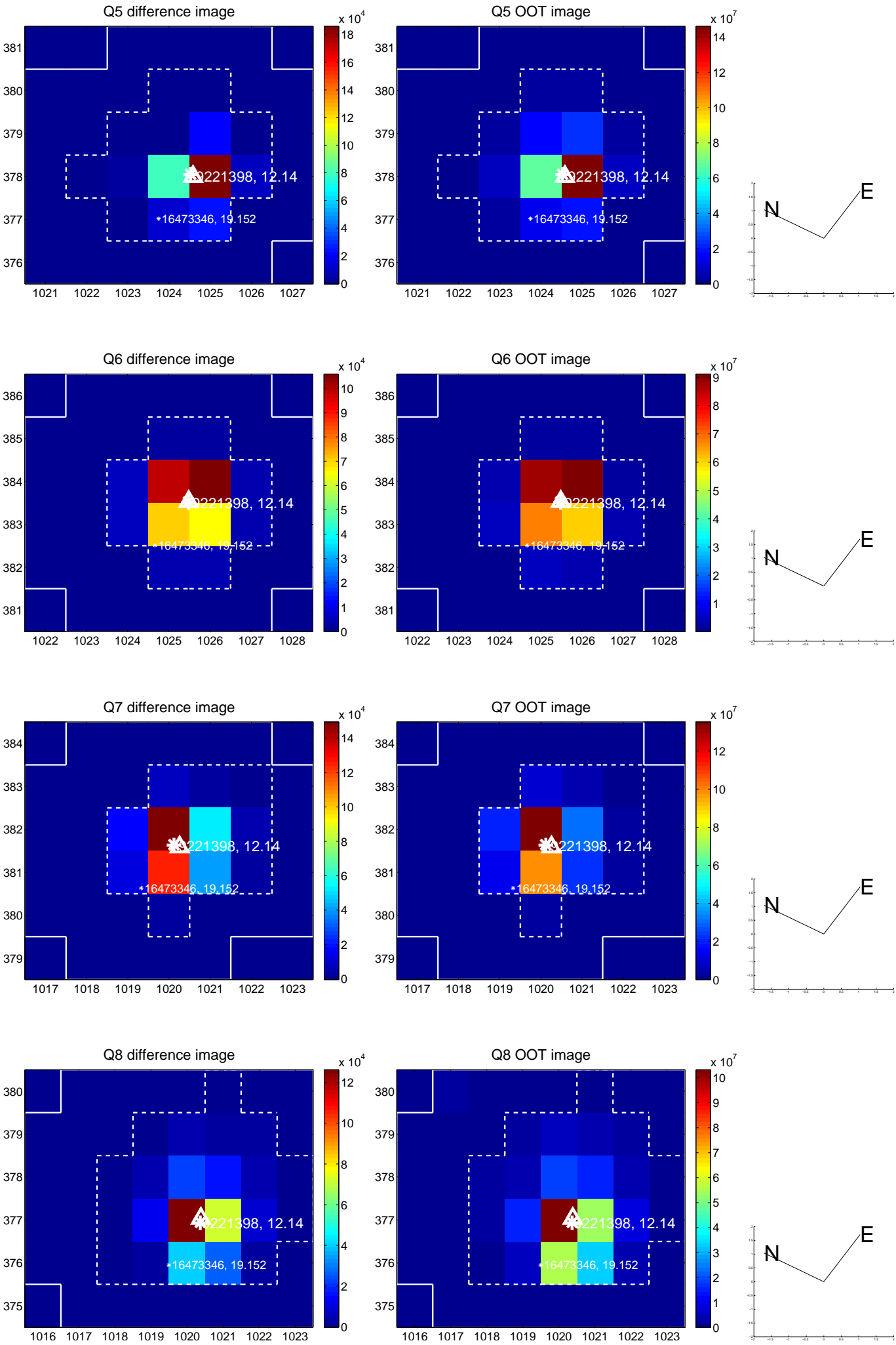


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

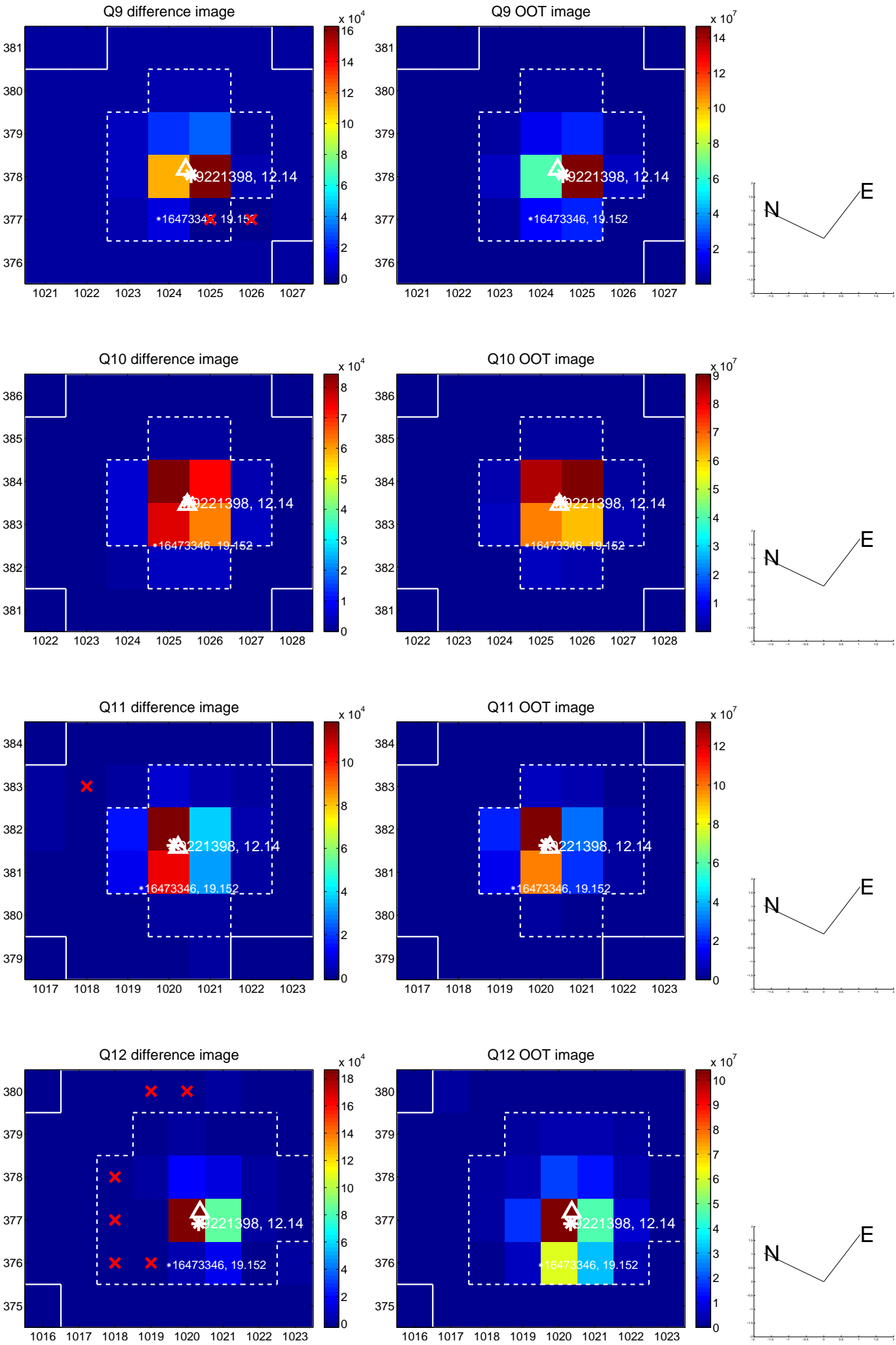
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



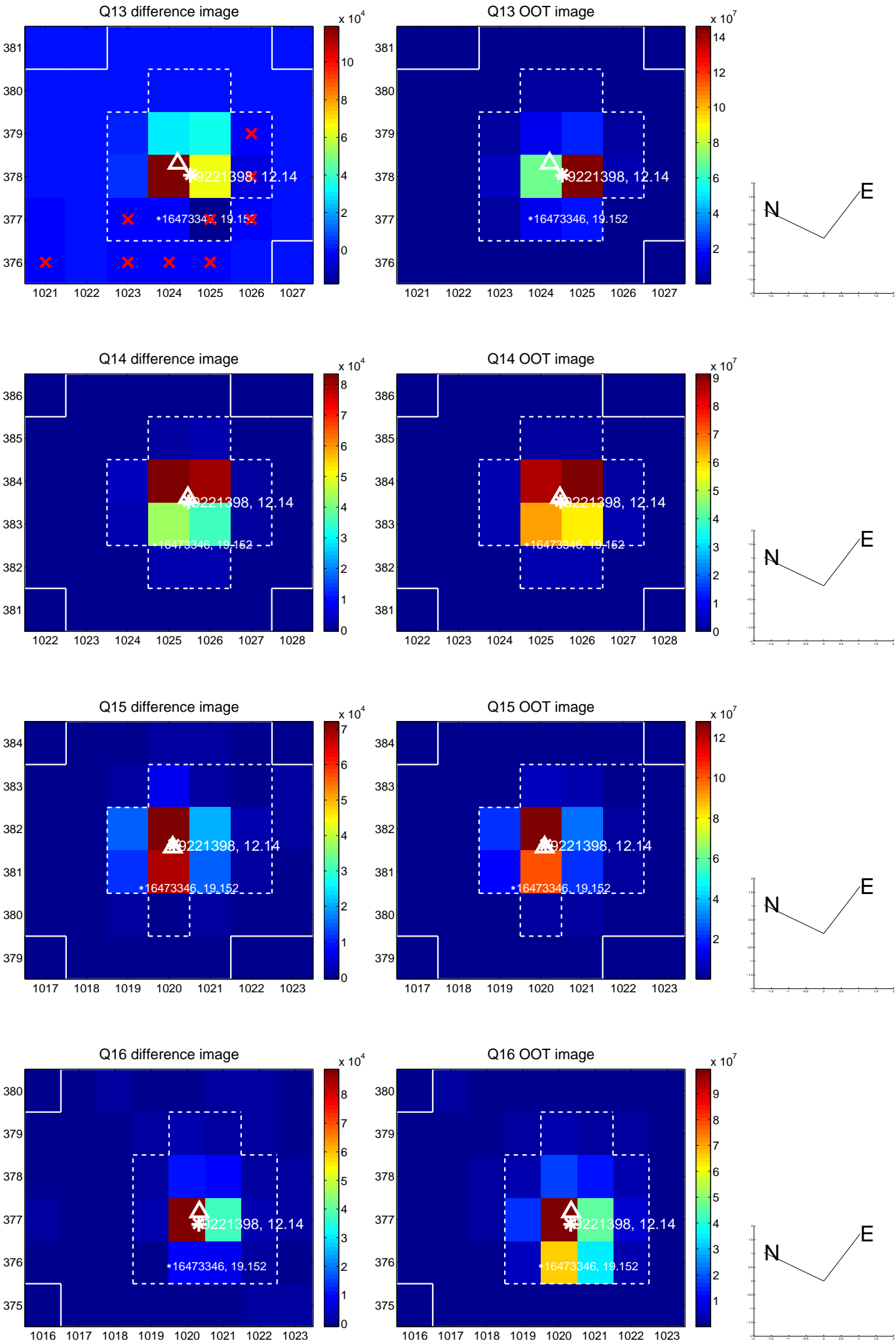
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



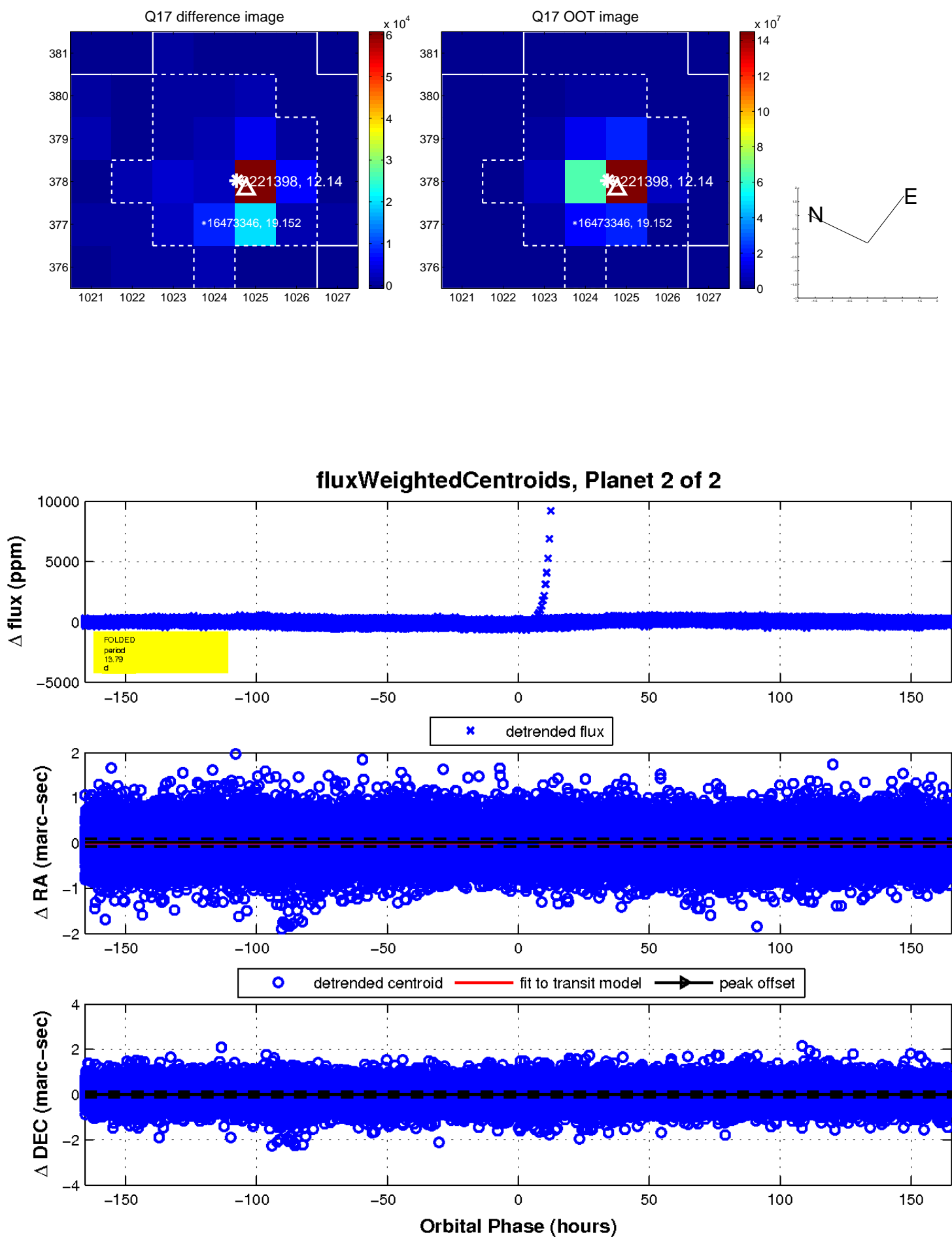
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

