

KIC 005021176

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})
005021176-01	OBS	0447.01	4.045055	132.233354	708.4	2.846	50.5	56.9	0.87	5906	3.64	381.23
005021176-02	OBS	No	2.022540	132.226004	102.7	2.173	8.6	9.1	0.87	5906	1.10	960.62

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005021176-01	OBS	FP	0.00	0	1	1	1	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE—CENT_RESOLVED_OFFSET—EPHEM_MATCH
005021176-02	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 005021176-01

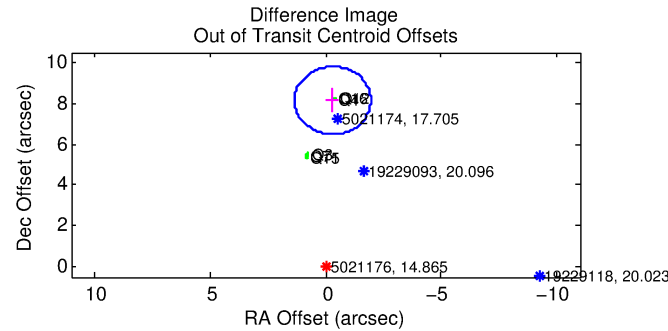
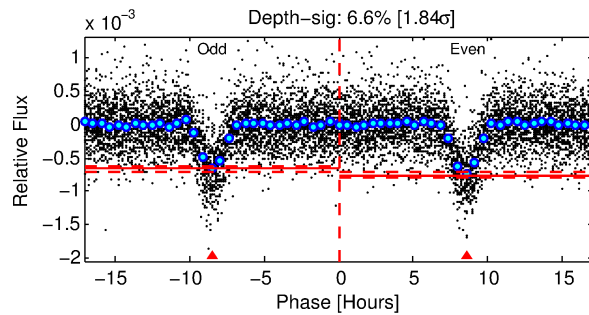
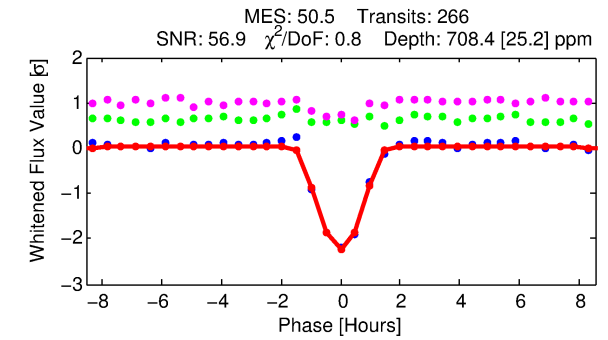
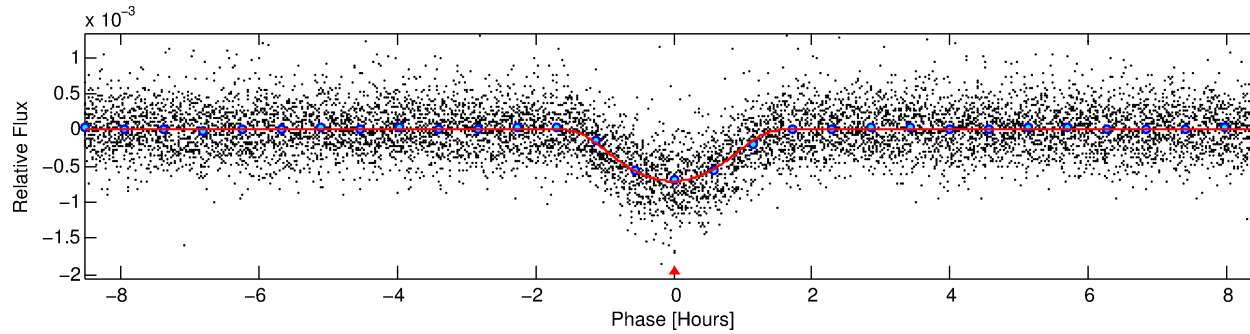
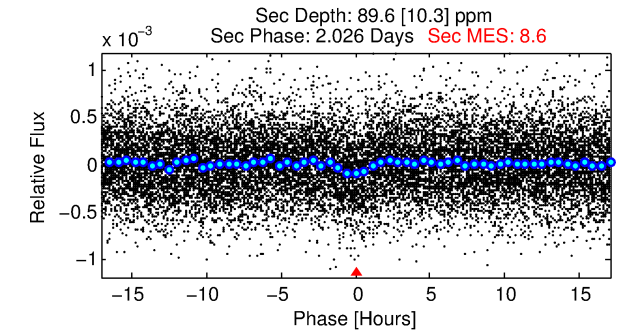
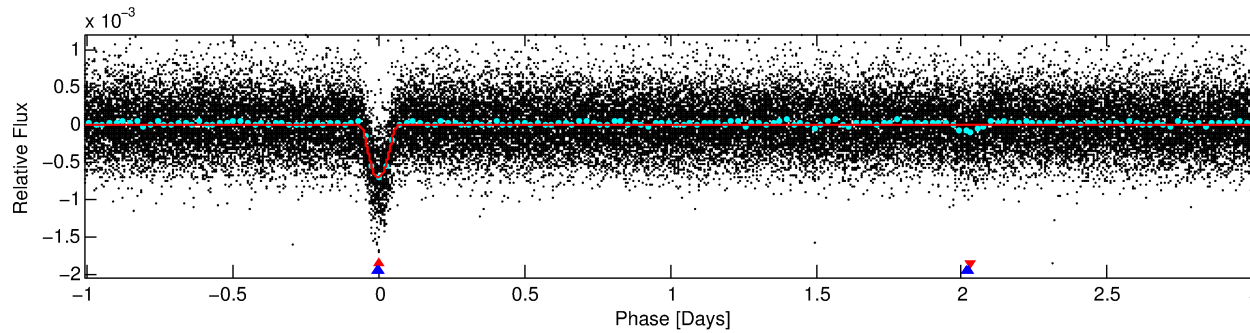
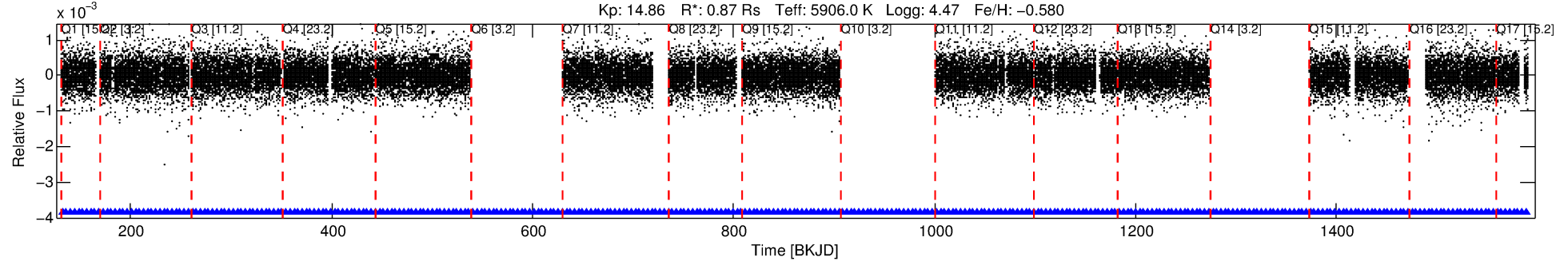
TCE (1)	KIC	Parent (2)	Parent KIC	$P_1:P_2$	Dist ($''$)	Δ Row	Δ Col	m_2	m_1	D_2/D_1	Mechanism	Flag	σ_P	σ_T
005021176-01	5021176	3679.01	5021174	1:1	7.3	1	1	17.70	14.86	530.96	Direct-PRF	0	0.10	0.04

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: 5021176 Candidate: 1 of 2 Period: 4.045 d
KOI: K00447.01 Corr: 0.977

Kp: 14.86 R*: 0.87 Rs Teff: 5906.0 K Logg: 4.47 Fe/H: -0.580



DV Fit Results:

Period = 4.04506 [0.00001] d
Epoch = 132.2334 [0.0010] BKJD
Rp/R* = 0.0384 [0.0130]
a/R* = 3.70 [0.44]
b = 0.99 [0.02]
Seff = 381.23 [127.83]
Teq = 1127 [94] K
Rp = 3.64 [1.51] Re
a = 0.0465 [0.0098] AU
Ag = 8.03 [6.05] [1.16σ]
Teffp = 2933 [510] K [3.48σ]

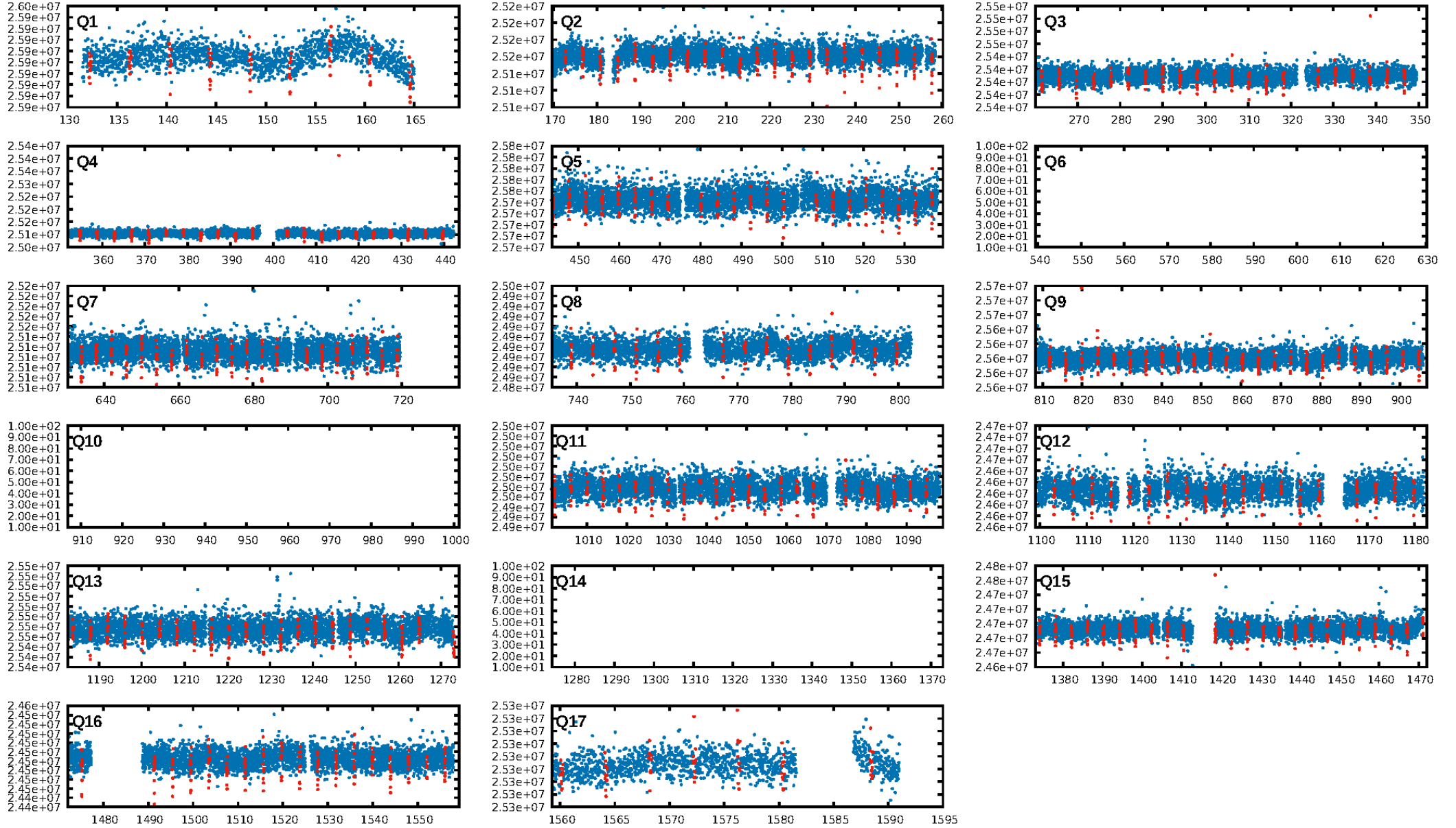
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [13.56σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: 0.00e+00
RollingBand-fgt: 1.00 [250/250]
GhostDiagnostic-chr: -0.479
Centroid-sig: 0.0%
Centroid-so: 54.000 arcsec [144.94σ]
OotOffset-rm: 8.152 arcsec [14.78σ]
KicOffset-rm: 8.202 arcsec [13.45σ]
OotOffset-st: 0/4/3/0 [7]
KicOffset-st: 0/4/3/0 [7]
DiffImageQuality-fgm: 1.00 [7/7]
DiffImageOverlap-fno: 0.00 [0/14]

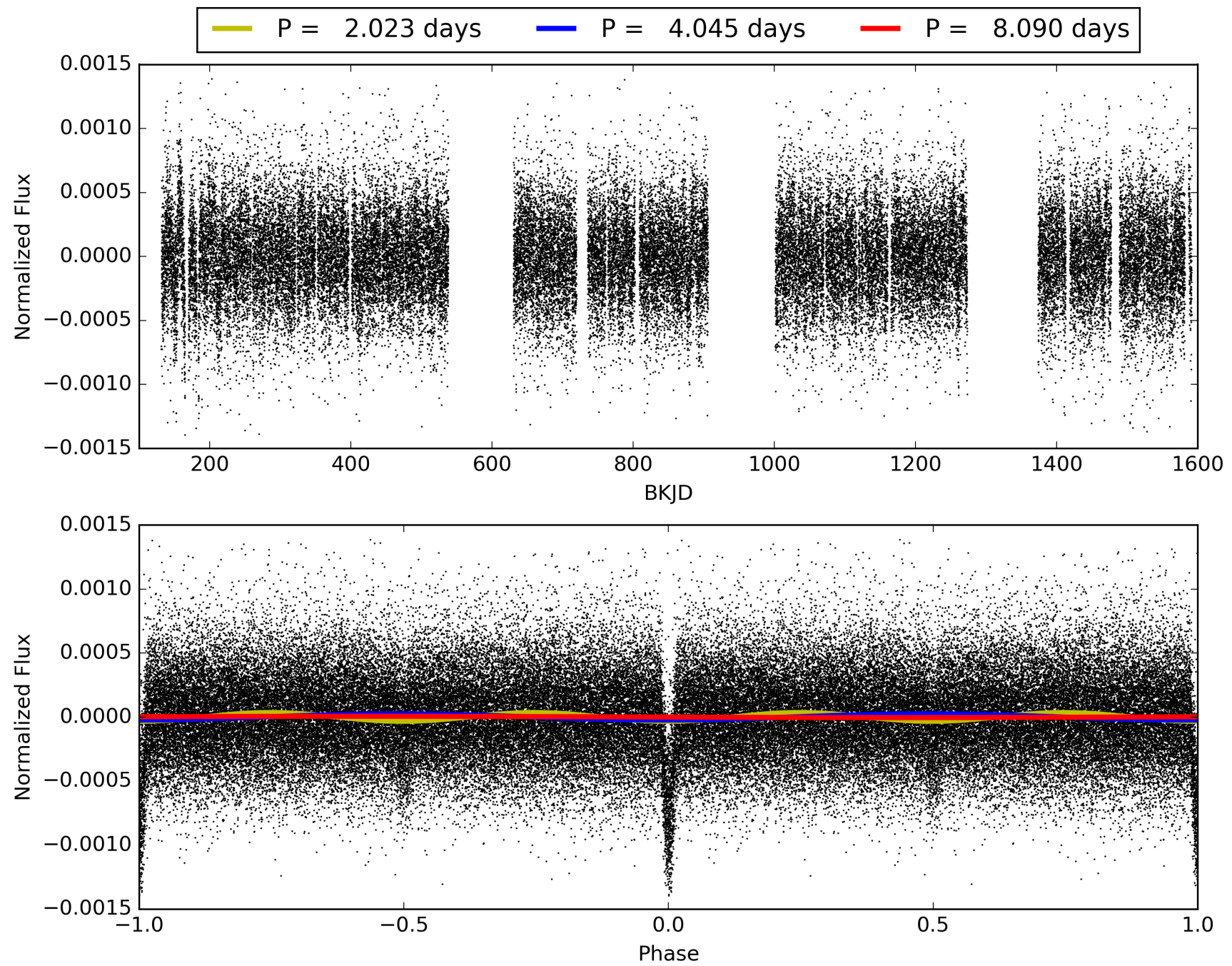
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 04:09:44 Z

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

TCE 005021176-01, PDC Light Curves

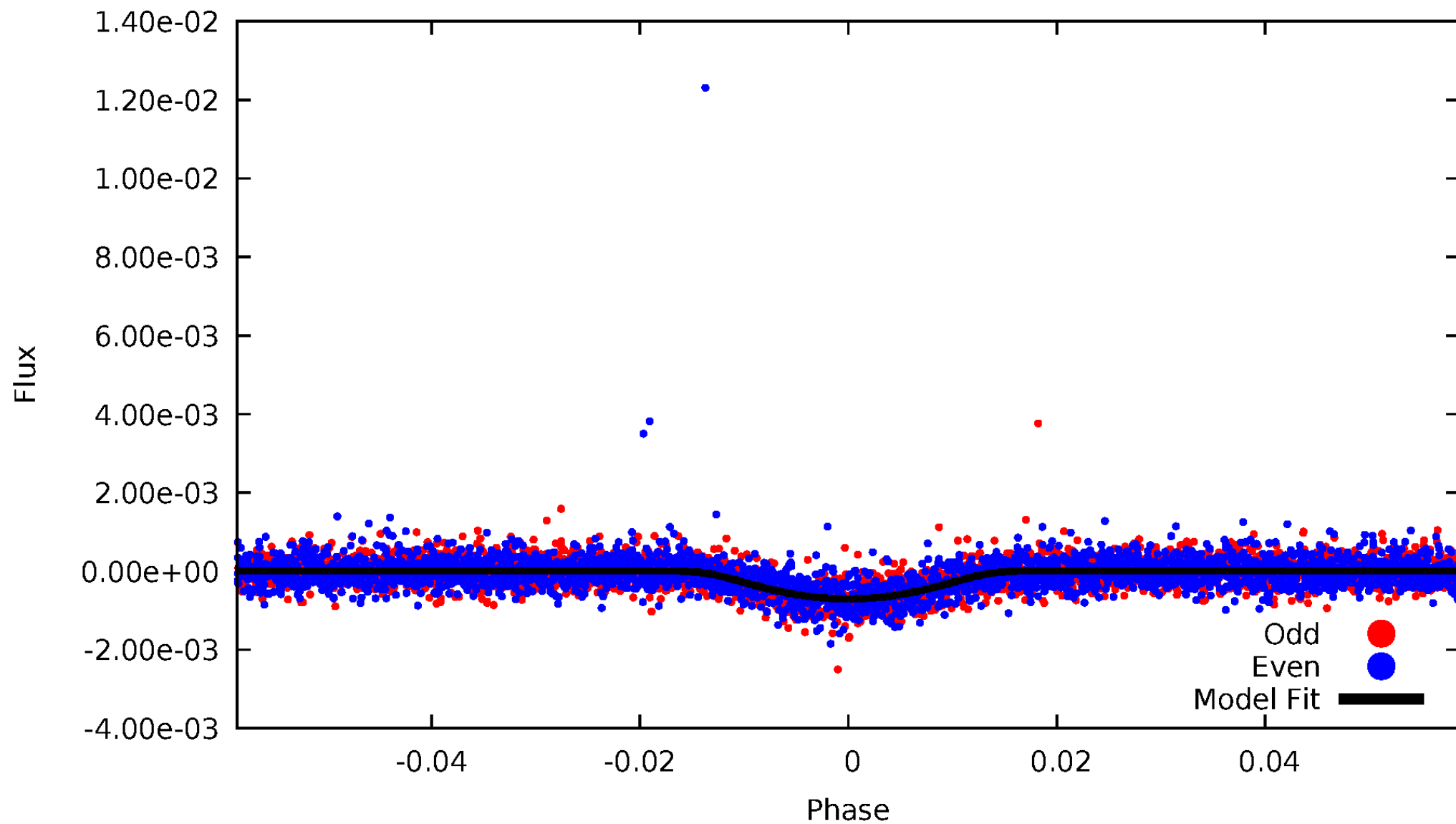


TCE 005021176-01



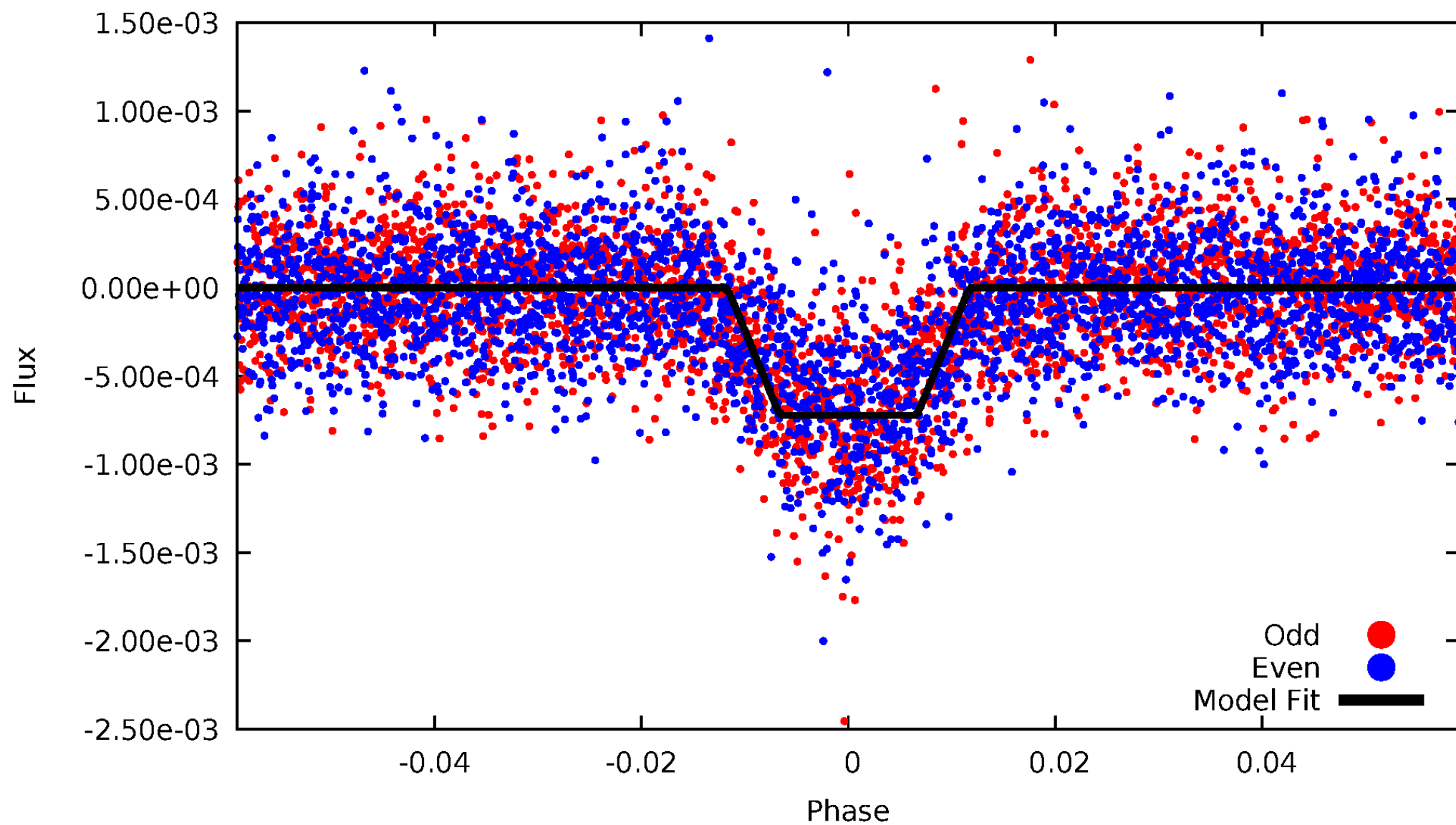
DV Odd/Even

TCE 005021176-01

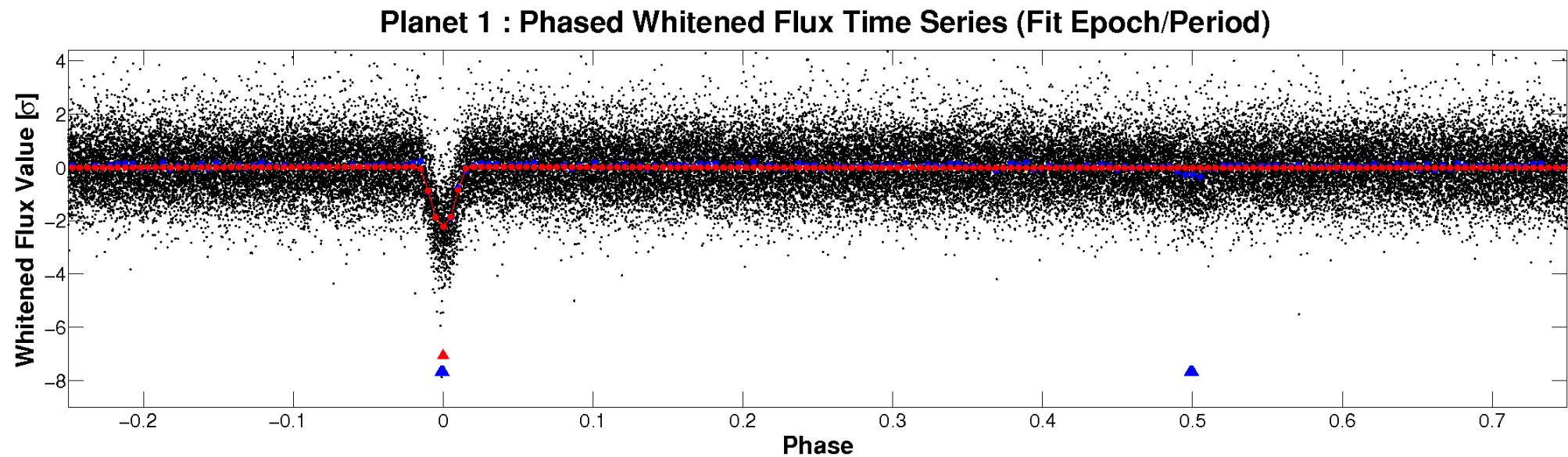
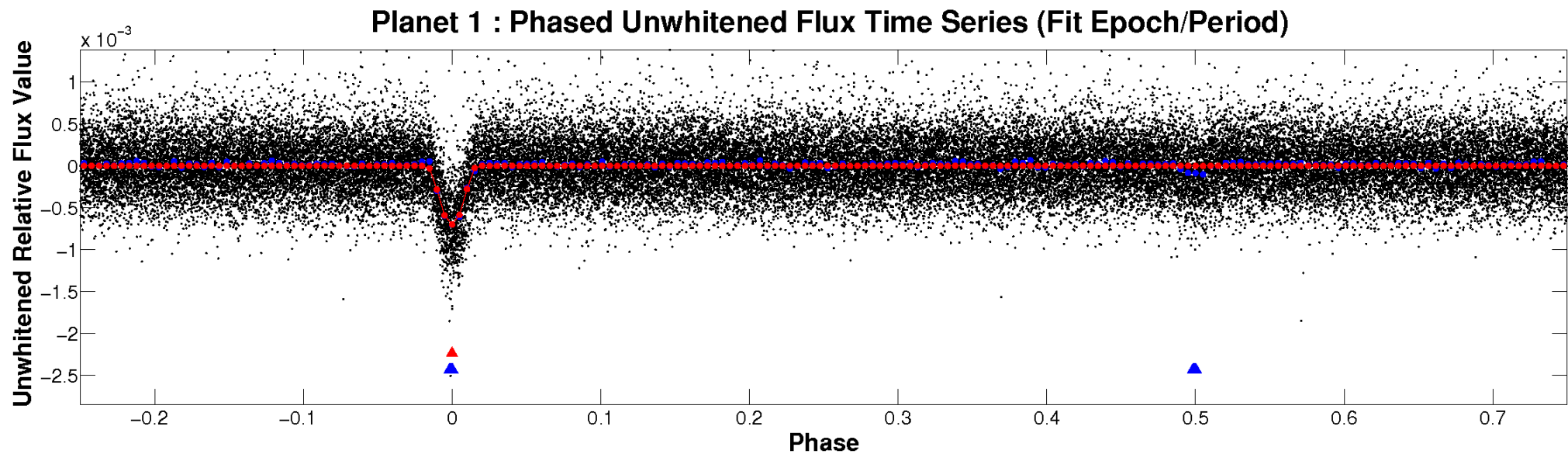


ALT Odd/Even

TCE 005021176-01

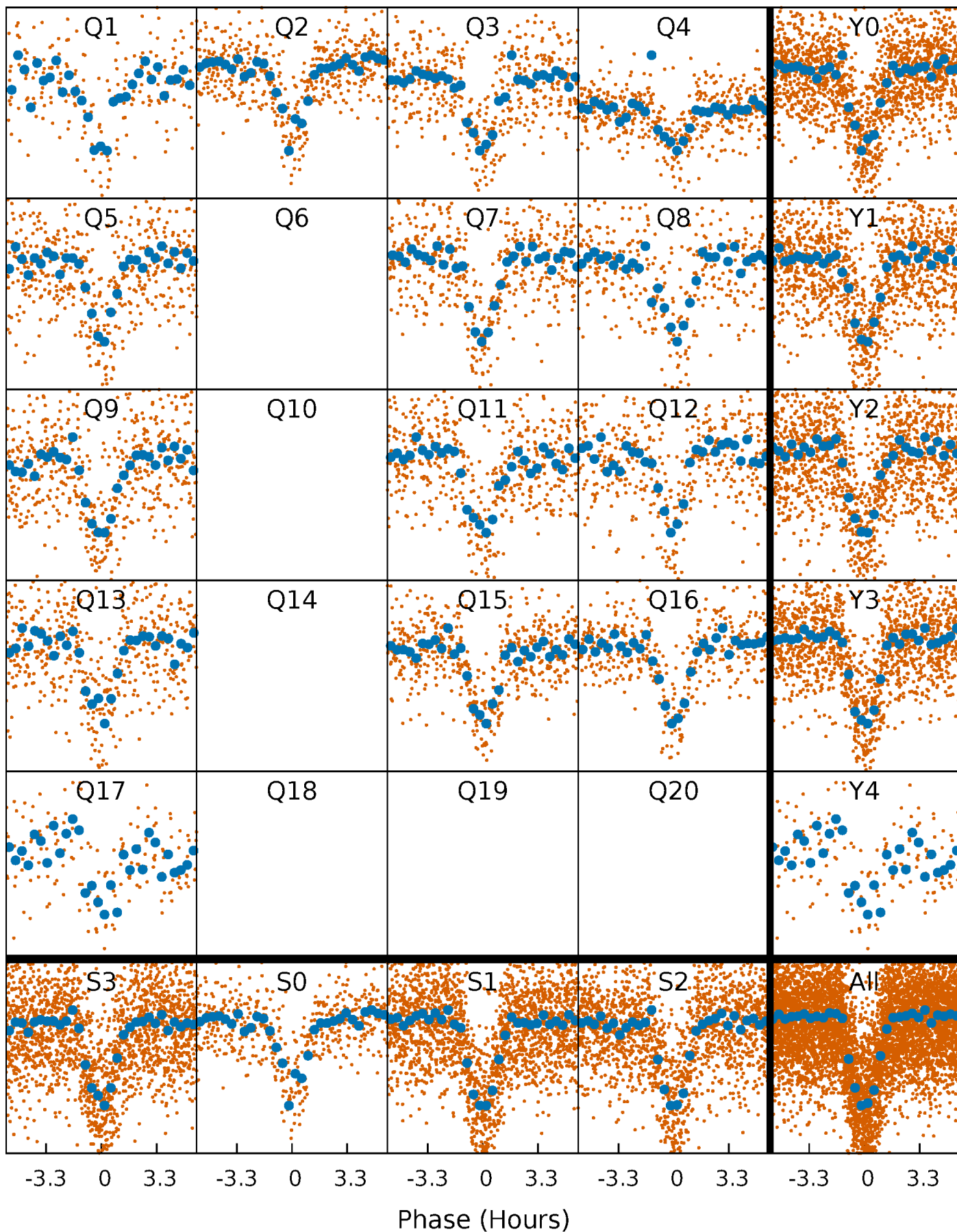


Non-Whitened Vs. Whitened Light Curve



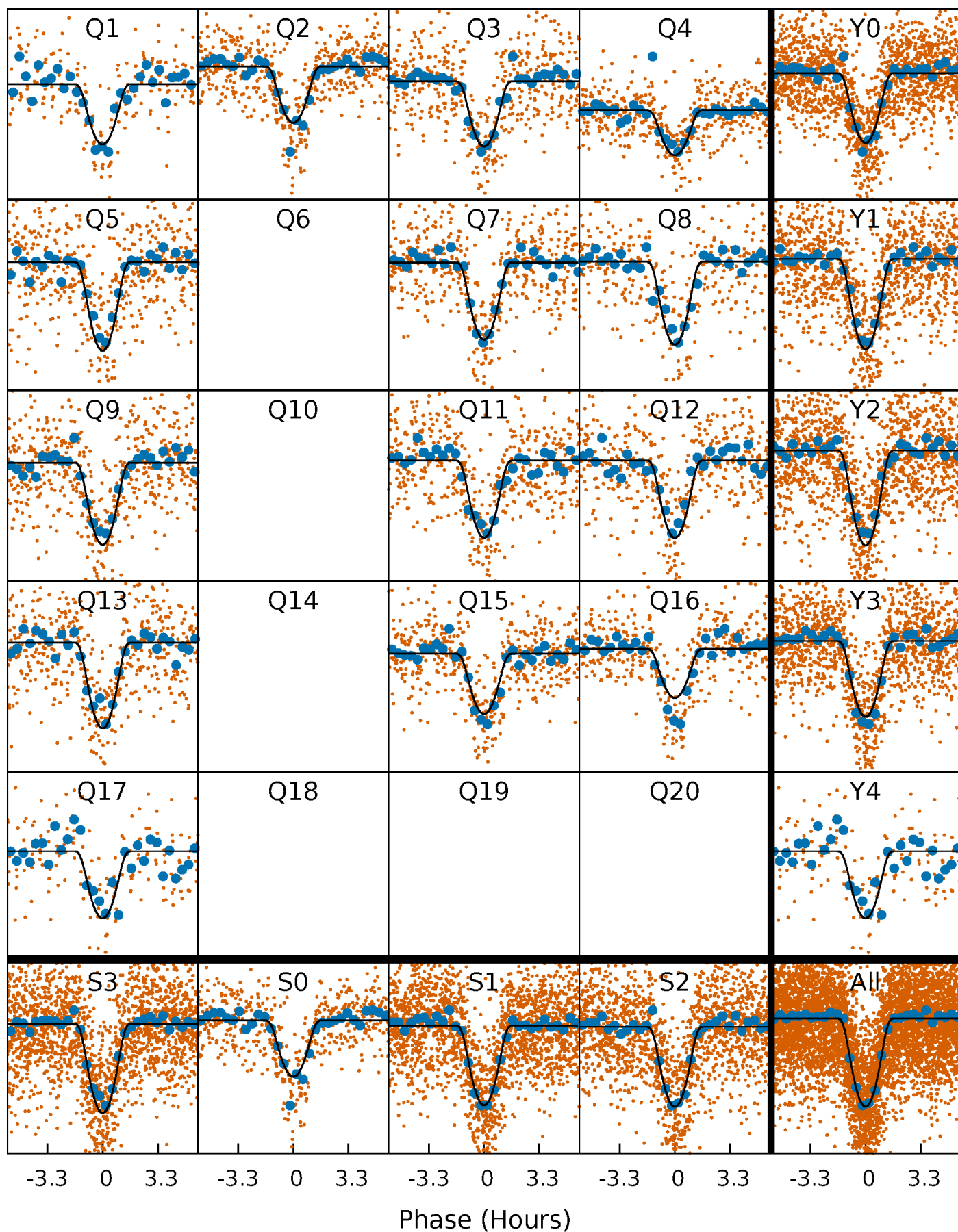
PDC Quarter-Phased Transit Curves

TCE 005021176-01 P= 4.045055 Days $T_0=132.233354$ (BKJD)



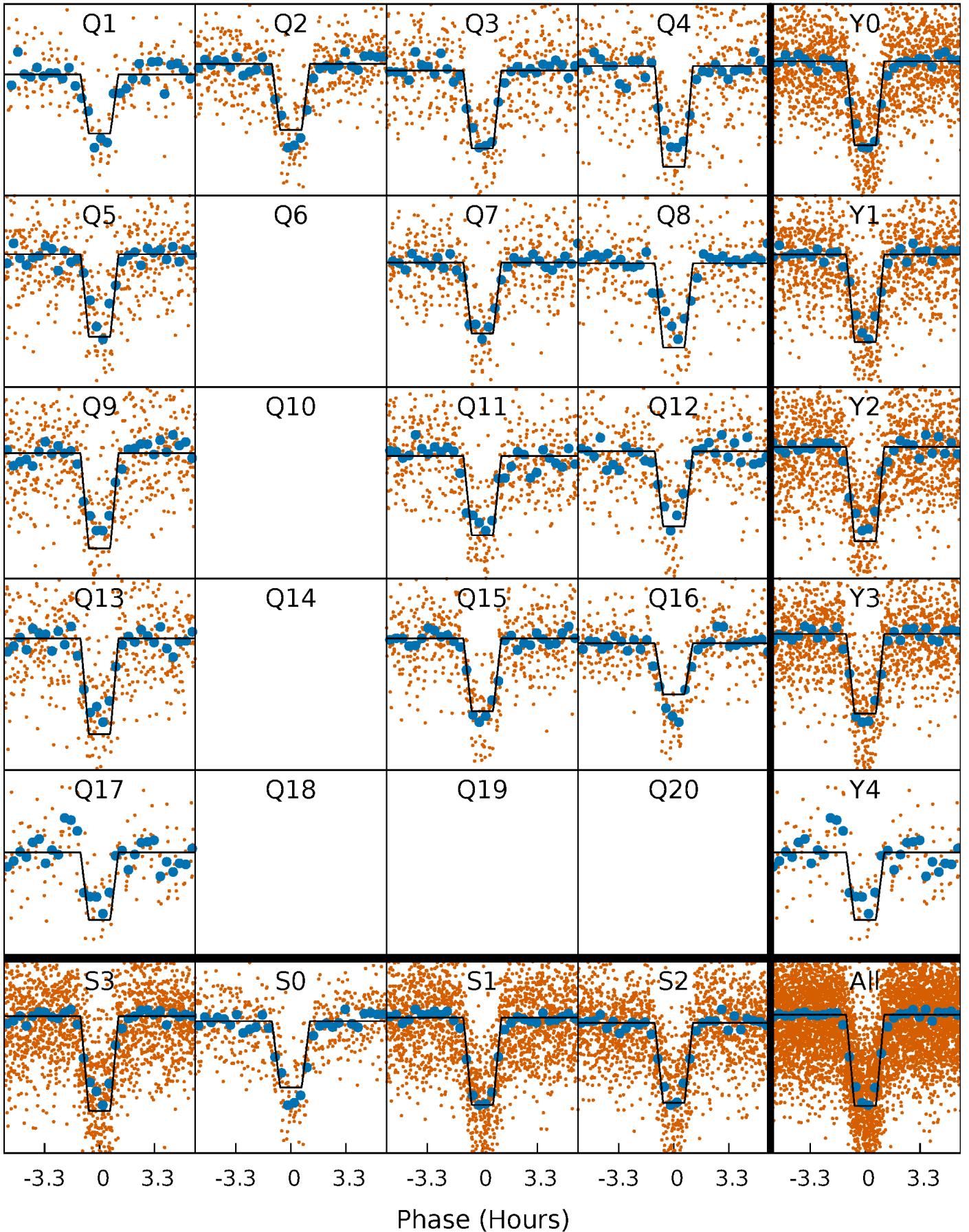
DV Quarter-Phased Transit Curves

TCE 005021176-01 P= 4.045055 Days $T_0=132.233354$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

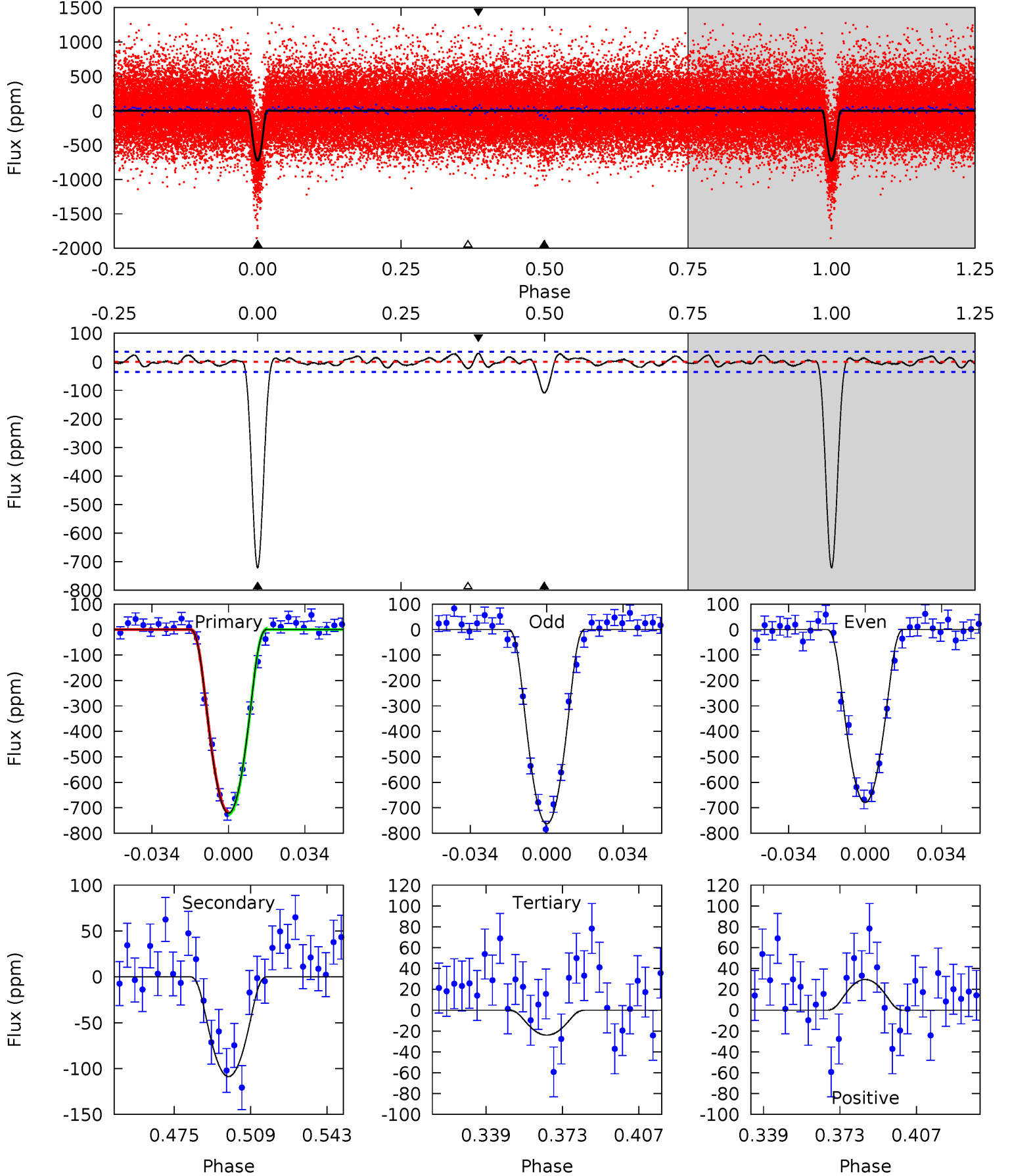
TCE 005021176-01 P= 4.045073 Days $T_0=132.230400$ (BKJD)



DV Model-Shift Uniqueness Test

005021176-01, P = 4.045055 Days, E = 128.188299 Days

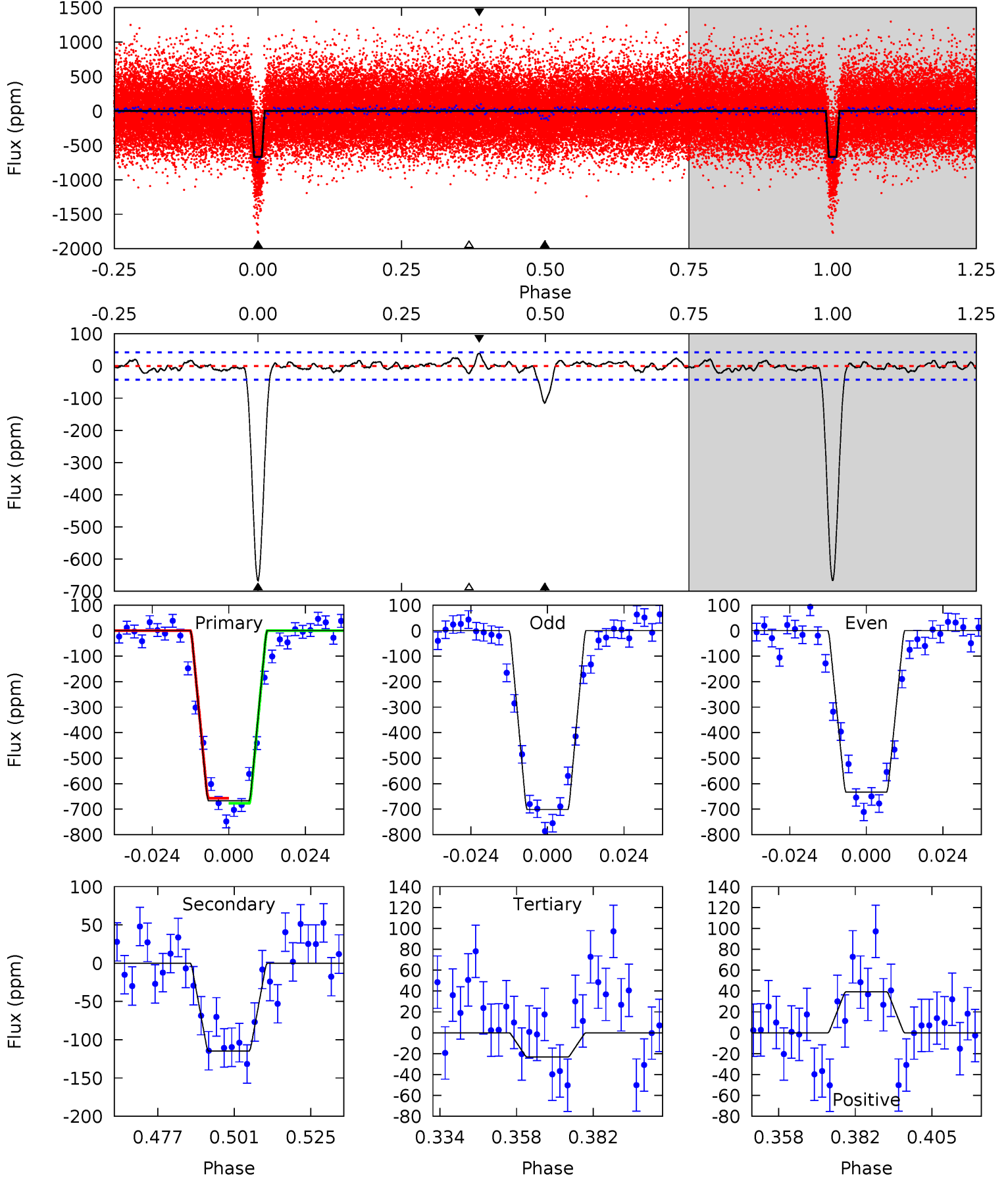
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
97.5	14.7	3.24	3.98	4.79	2.12	1.46	94.2	93.5	11.5	10.7	5.66	1.00	0.04	0.53



Alt Model-Shift Uniqueness Test

005021176-01, P = 4.045073 Days, E = 128.185327 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
75.8	13.0	2.65	4.46	4.86	2.26	1.19	73.2	71.4	10.4	8.58	3.89	1.01	0.06	1.16



Stellar Parameters For KIC 005021176

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	$M(M_{\odot})$	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	5906^{+177}_{-177}	$4.473^{+0.094}_{-0.175}$	$-0.580^{+0.300}_{-0.300}$	$0.870^{+0.210}_{-0.113}$	$0.821^{+0.096}_{-0.061}$	$1.753^{+0.801}_{-0.801}$
	+3%/-3%	+2%/-4%	+52%/-52%	+24%/-13%	+12%/-7%	+46%/-46%
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 005021176-01 / KOI 0447.01

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-109 ± 7	$3.82^{+1.28}_{-1.30}$	1593^{+100}_{-81}	3503^{+563}_{-300}	$8.979^{+11.456}_{-3.973}$
Alt.	-115 ± 9	$2.72^{+1.25}_{-1.32}$	1584^{+108}_{-77}	3989^{+1183}_{-488}	19^{+50}_{-10}

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

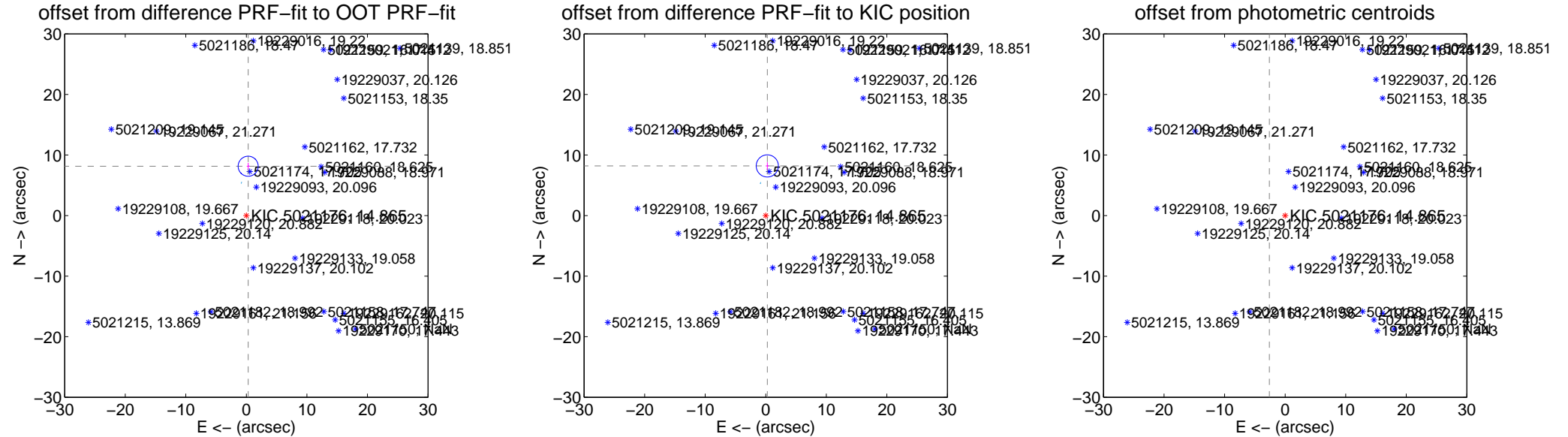
DV Centroid Data

Supplemental centroid analysis for 005021176-01. Kepler magnitude: 14.87. Transit SNR 56.93

There are 7 quarters with good PRF difference image offsets

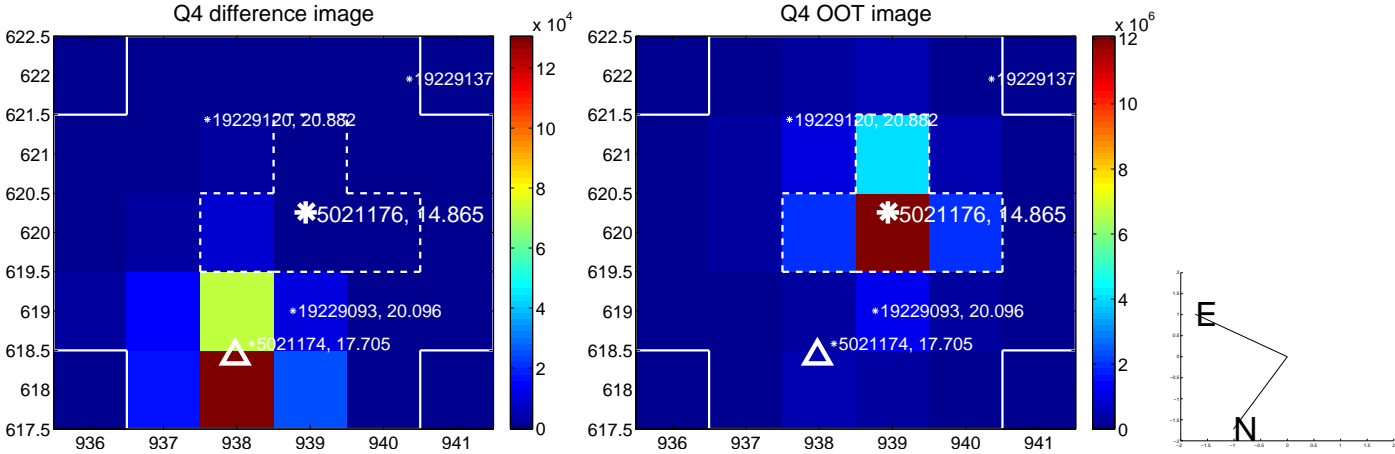
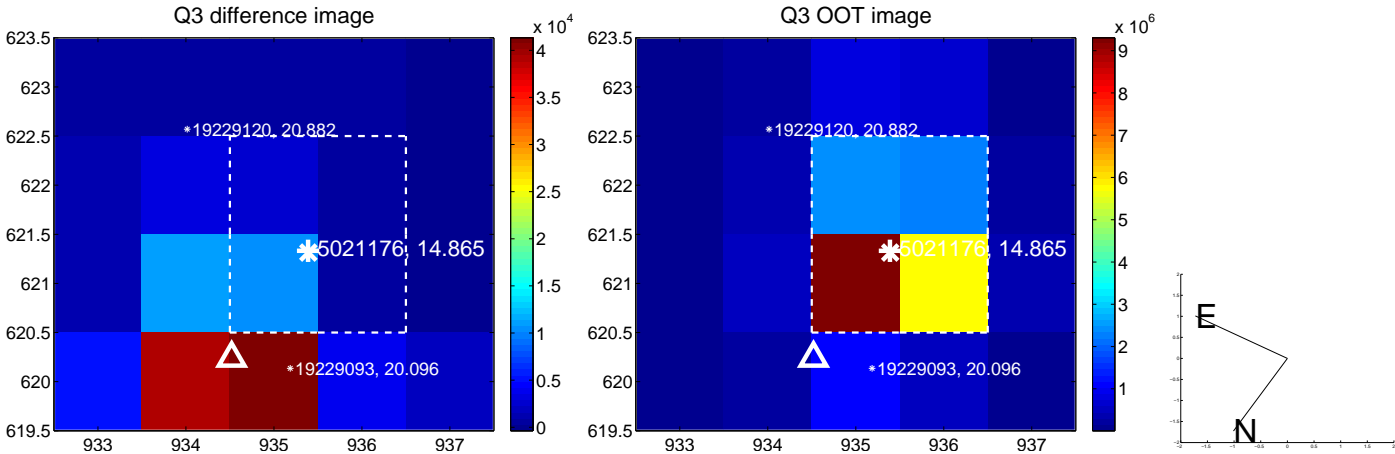
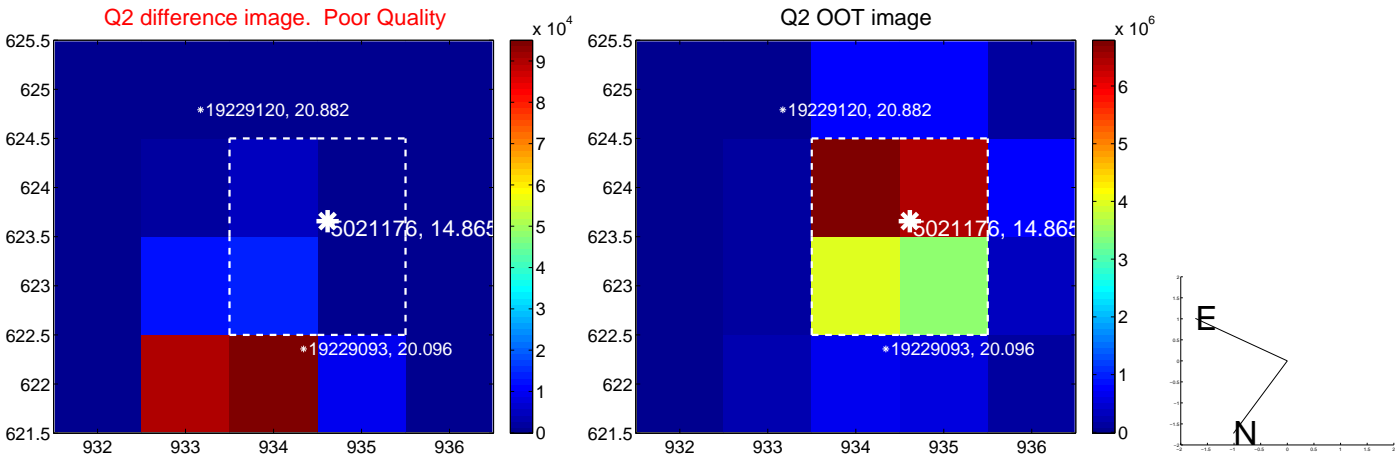
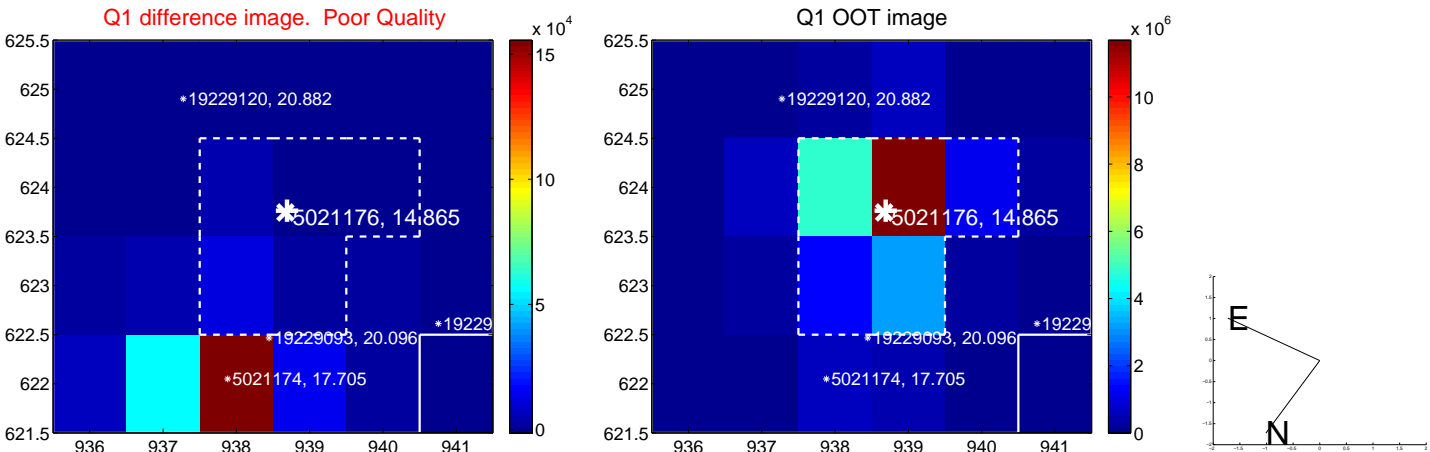
The direct PRF centroid is offset from the target star catalog position by about 0.07 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	8.152 \pm 0.552	14.78	-0.300 \pm 0.241	8.147 \pm 0.544
PRF-fit source offset from KIC position	8.202 \pm 0.610	13.45	-0.256 \pm 0.257	8.198 \pm 0.603
photometric centroid source offset	54.00 \pm 0.37	144.94	2.60 \pm 0.37	53.94 \pm 0.37

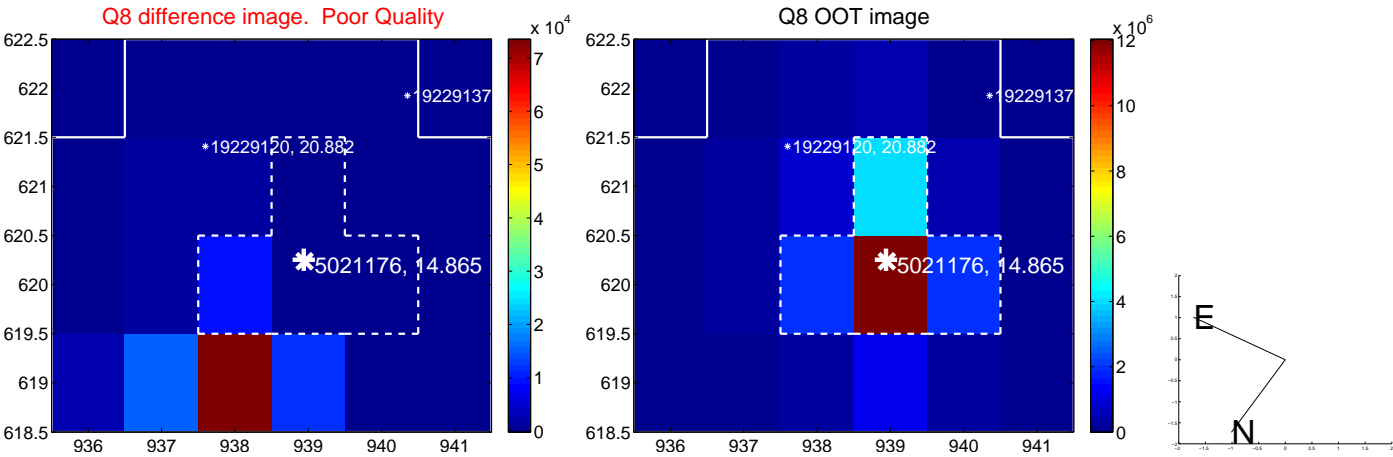
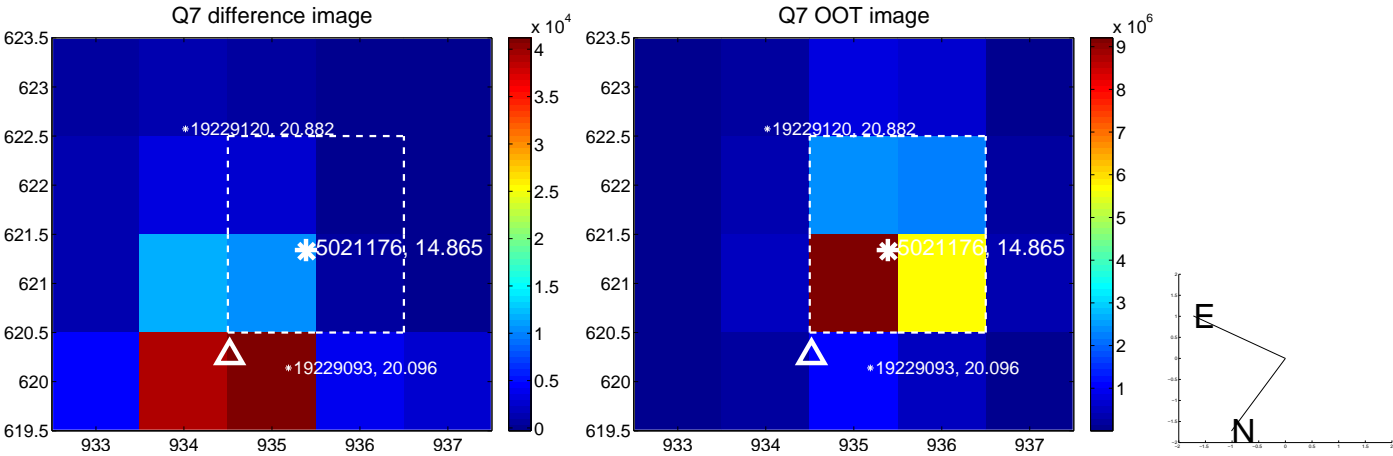
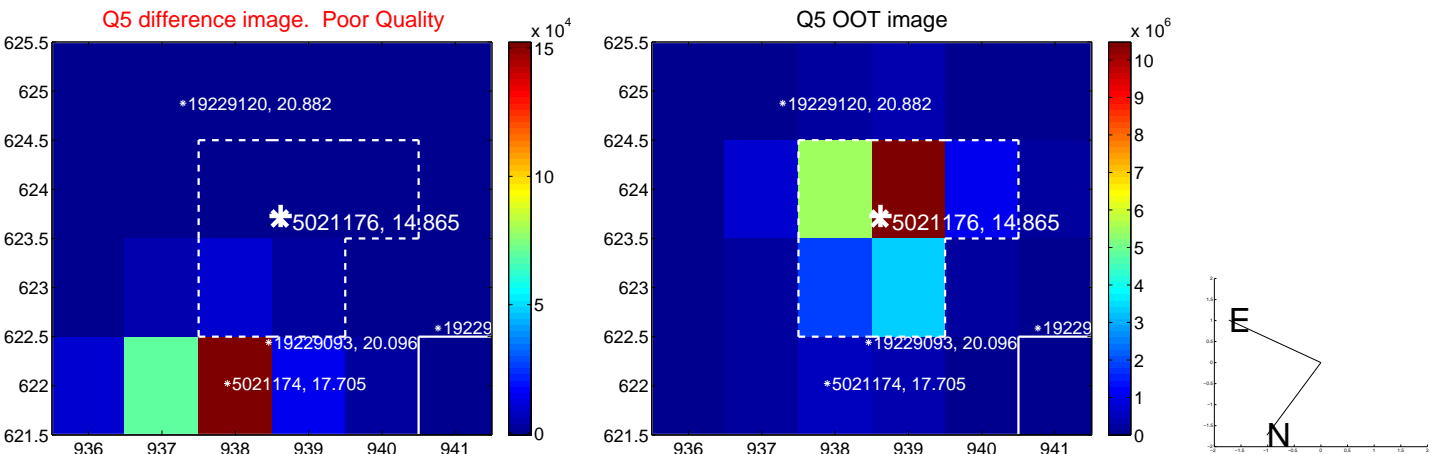


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

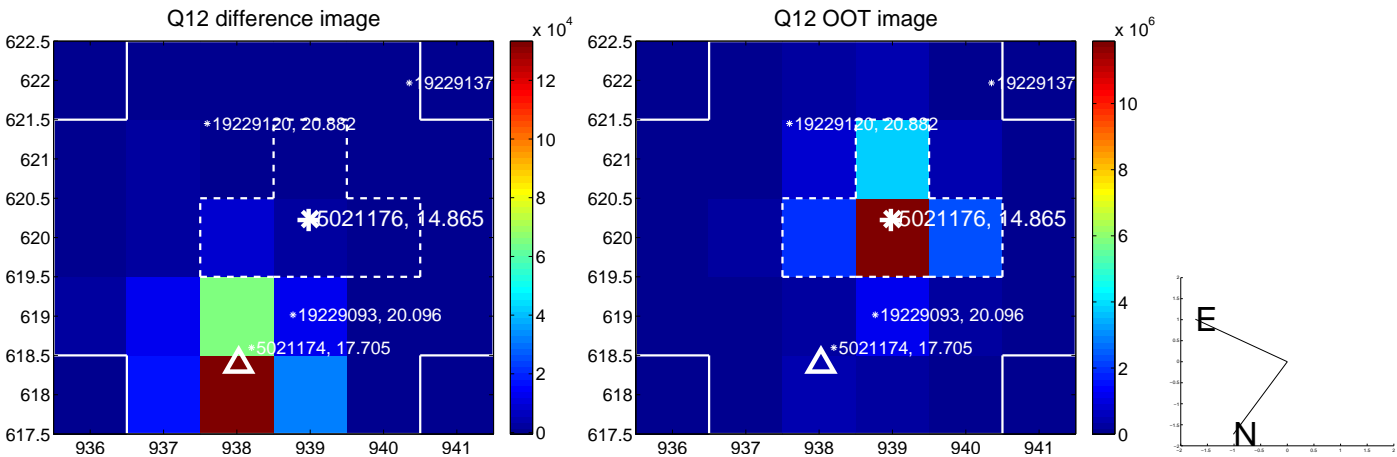
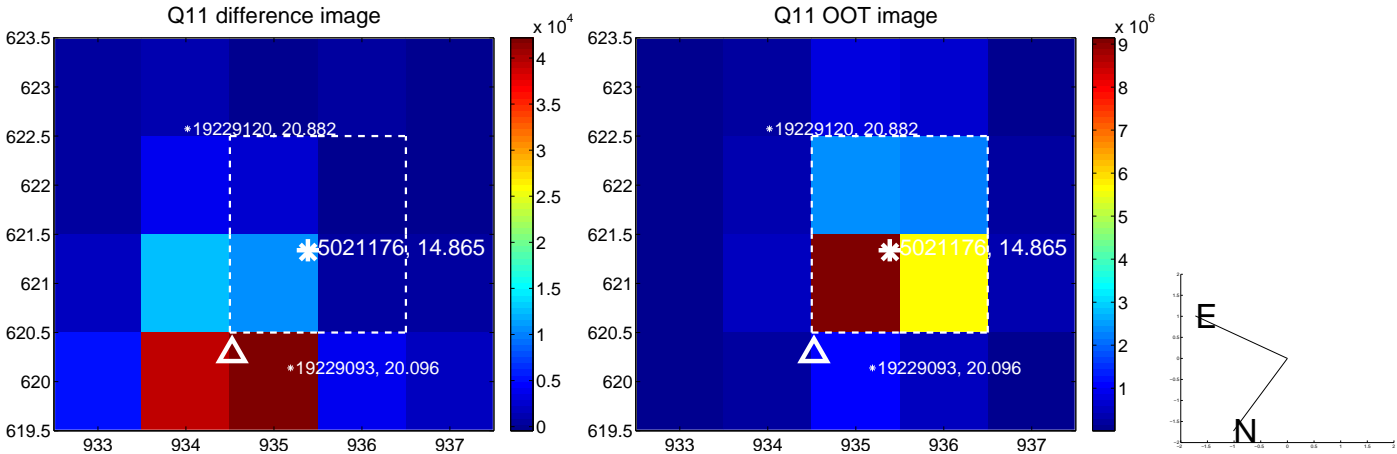
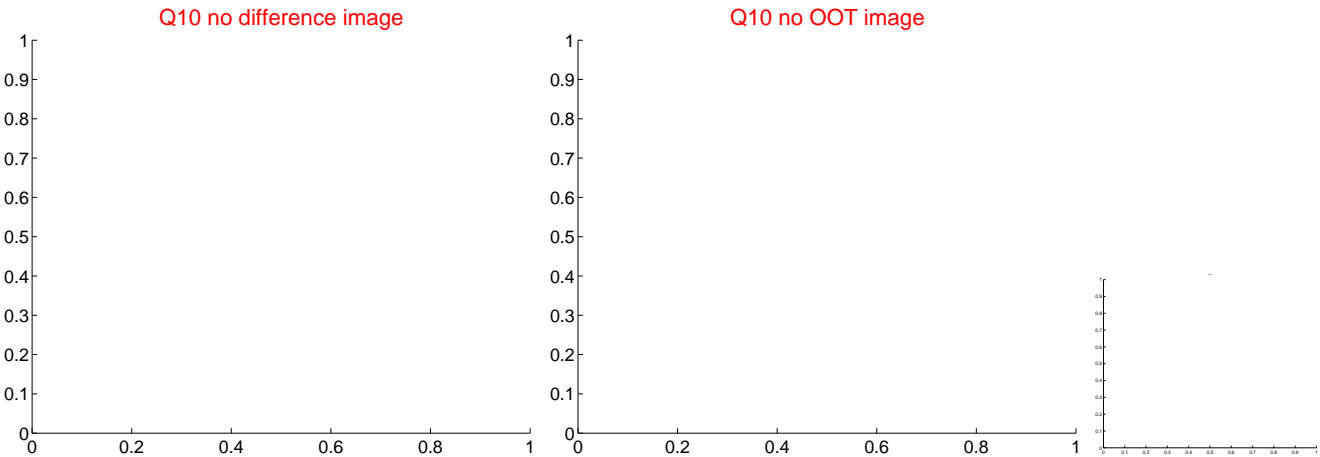
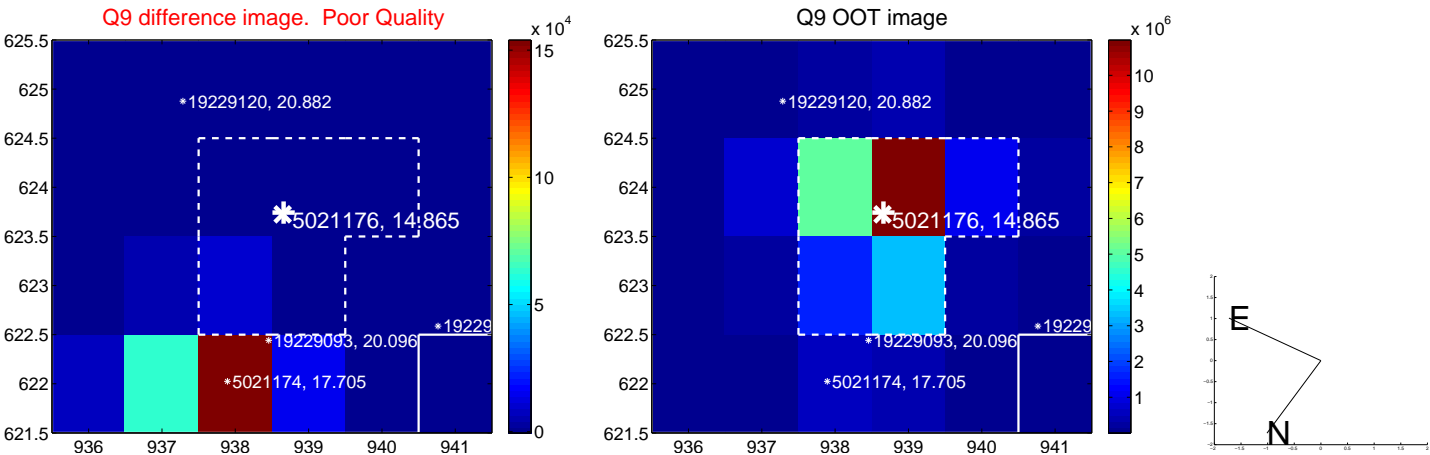
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



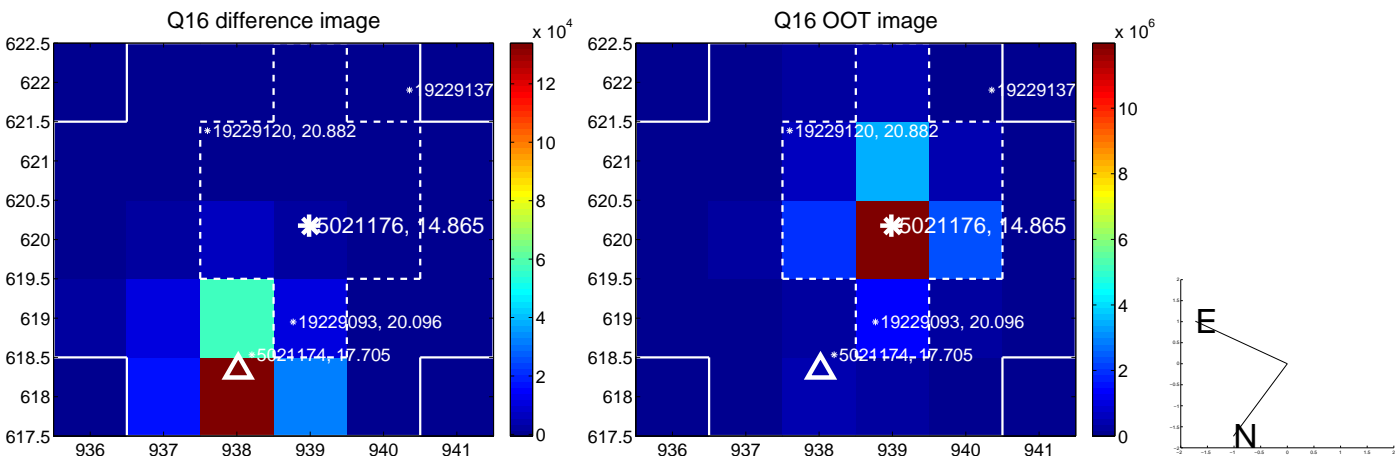
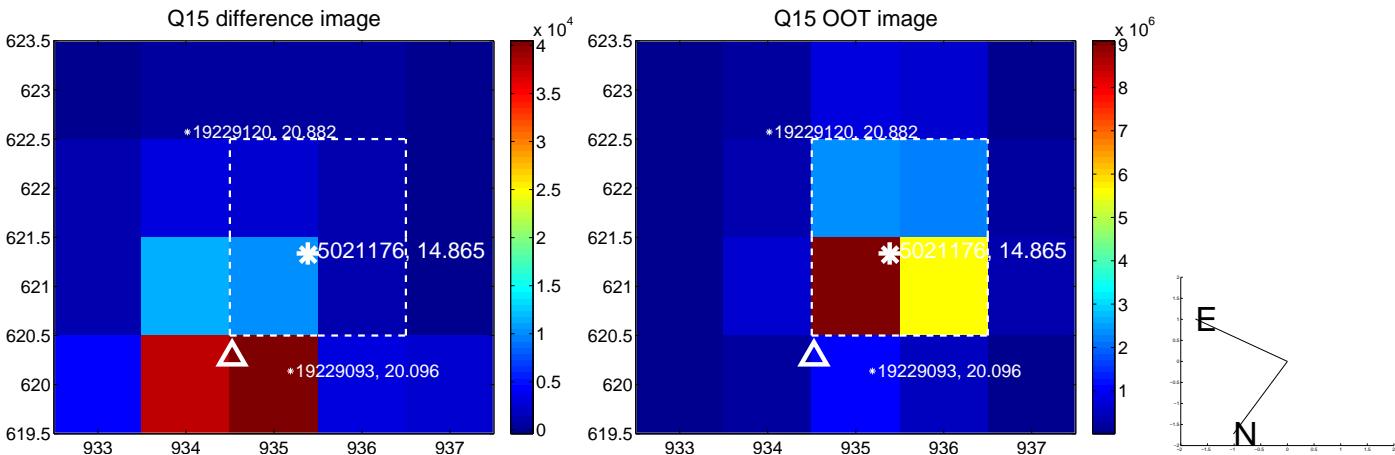
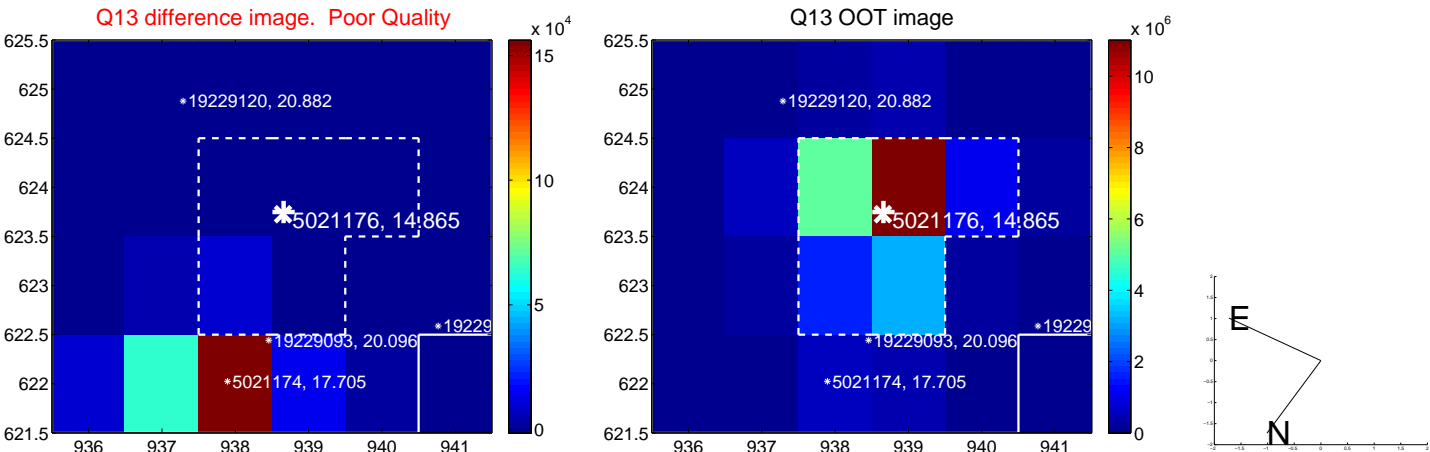
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



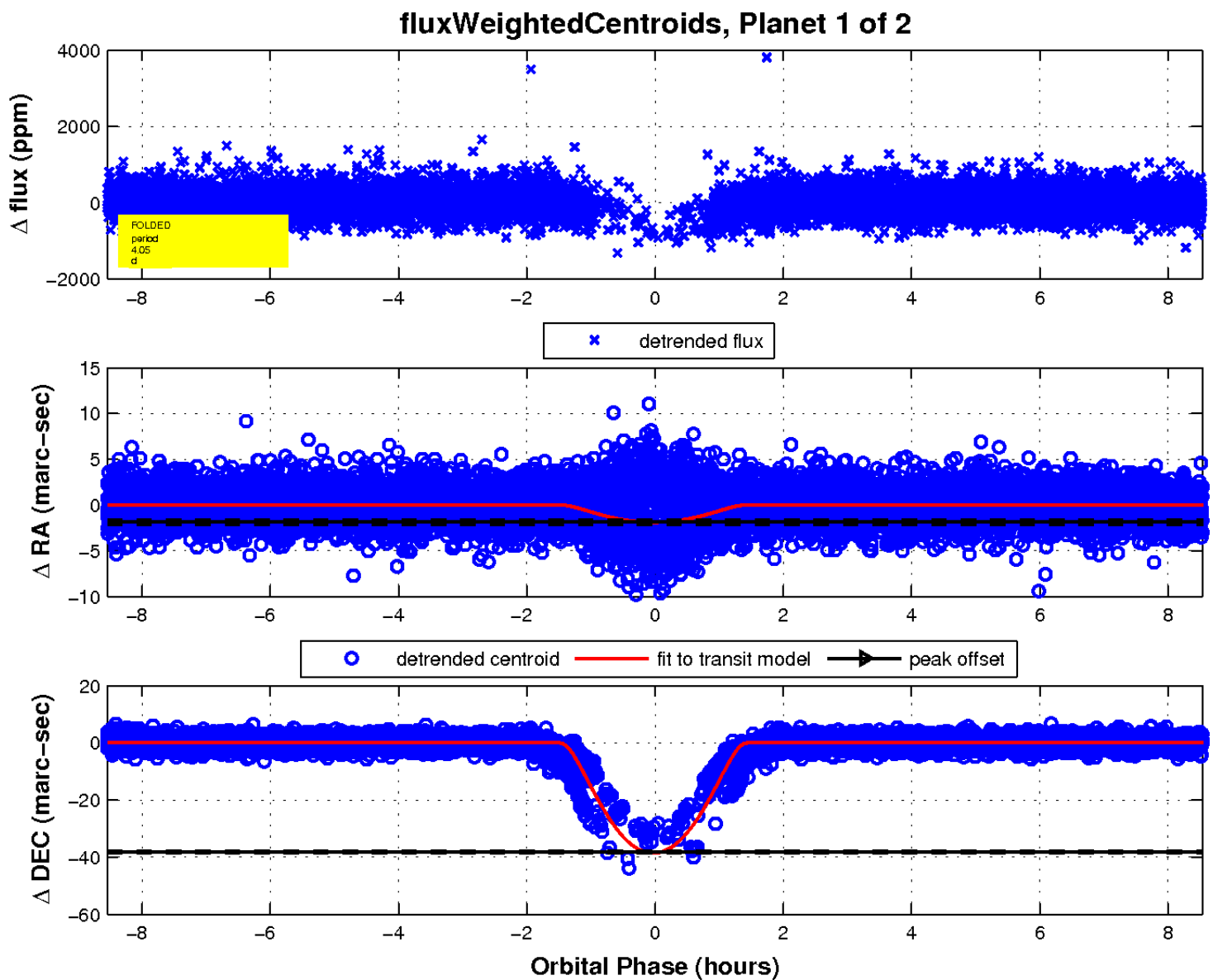
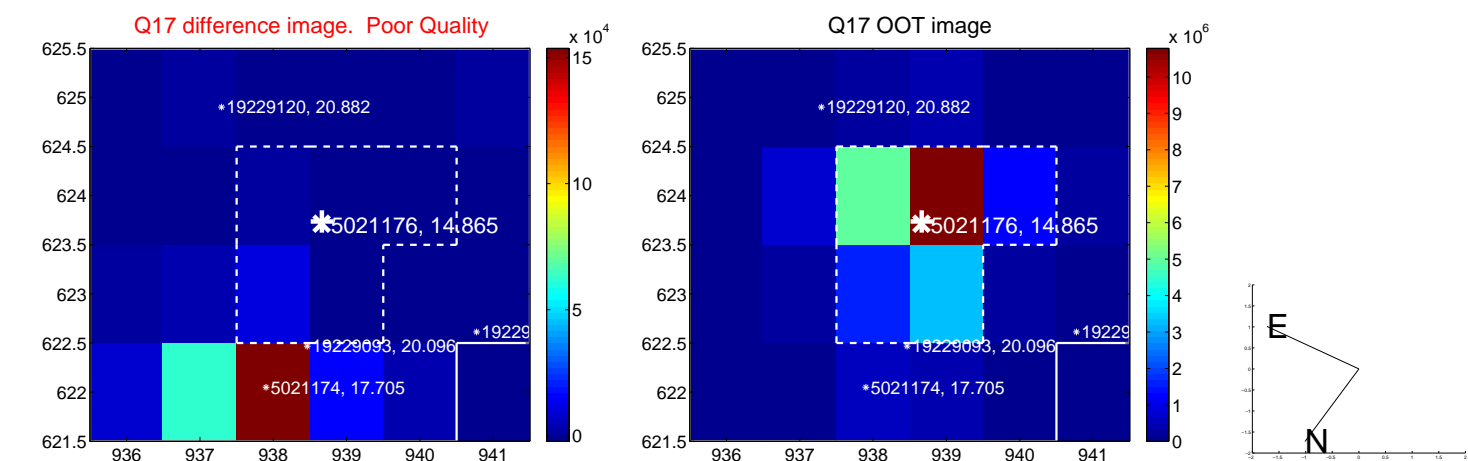
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

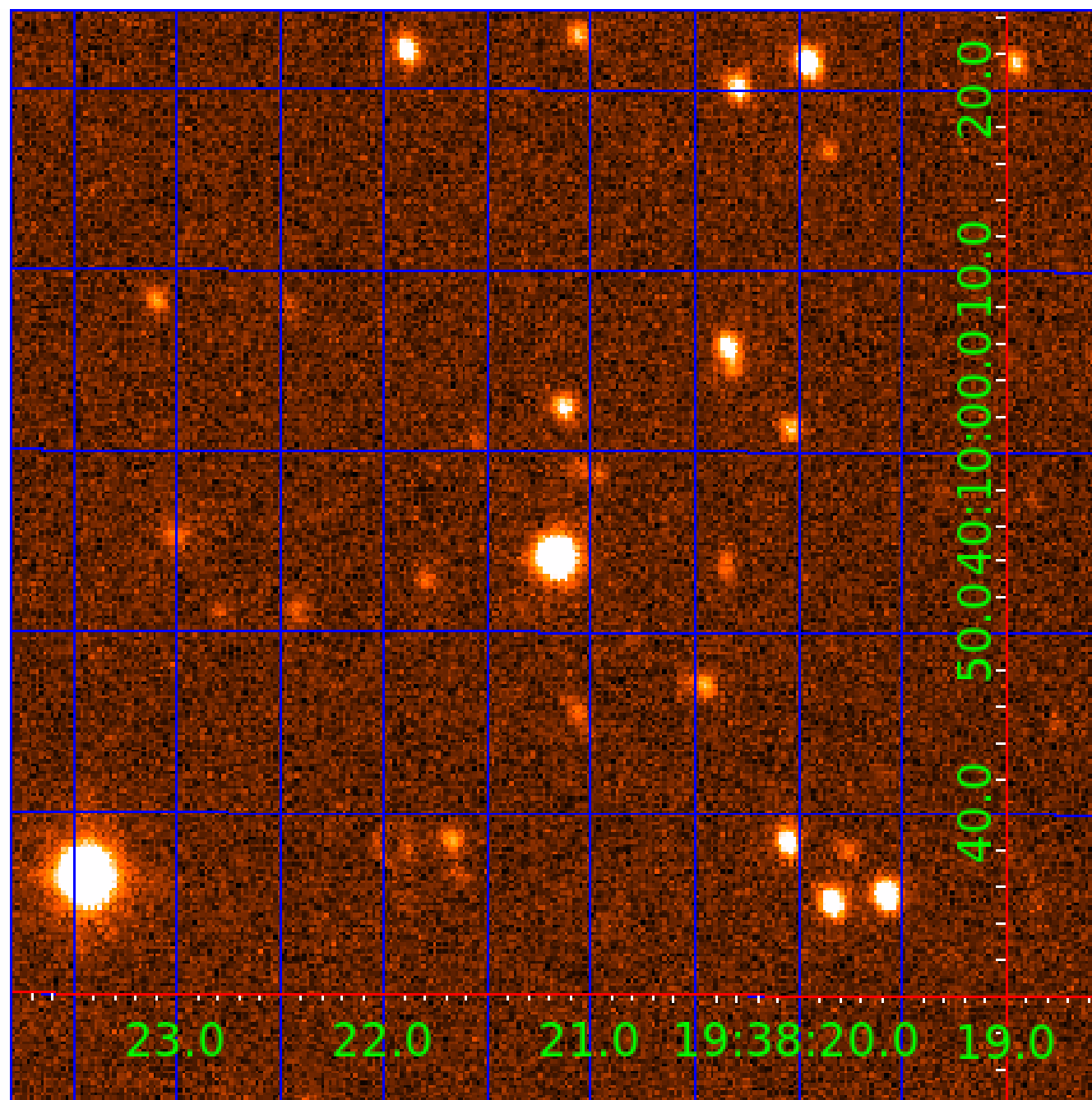


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 005021176

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})
005021176-01	OBS	0447.01	4.045055	132.233354	708.4	2.846	50.5	56.9	0.87	5906	3.64	381.23
005021176-02	OBS	No	2.022540	132.226004	102.7	2.173	8.6	9.1	0.87	5906	1.10	960.62

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005021176-01	OBS	FP	0.00	0	1	1	1	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE—CENT_RESOLVED_OFFSET—EPHEM_MATCH
005021176-02	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 005021176-02

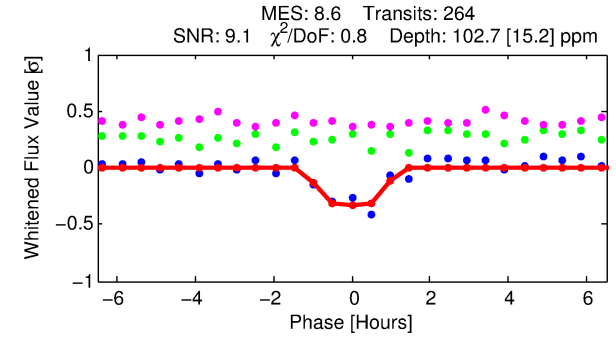
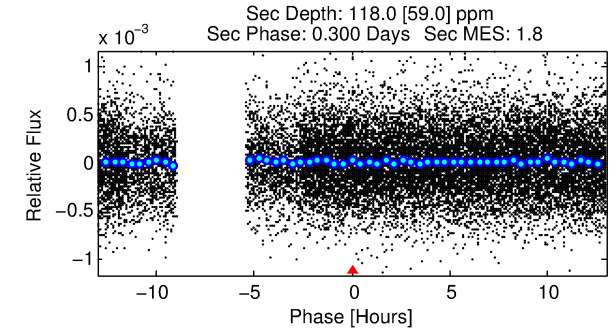
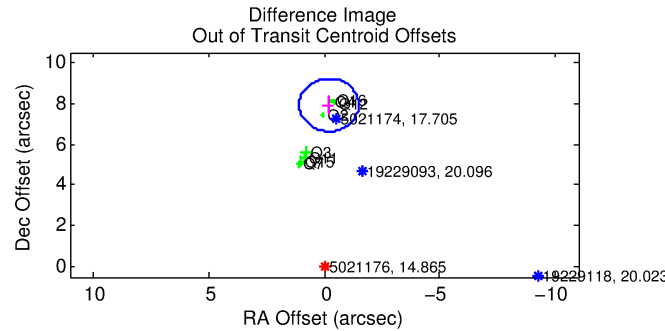
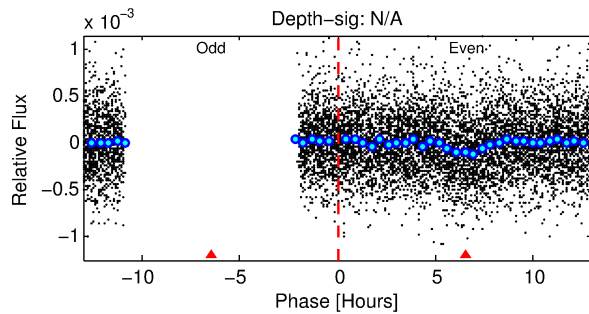
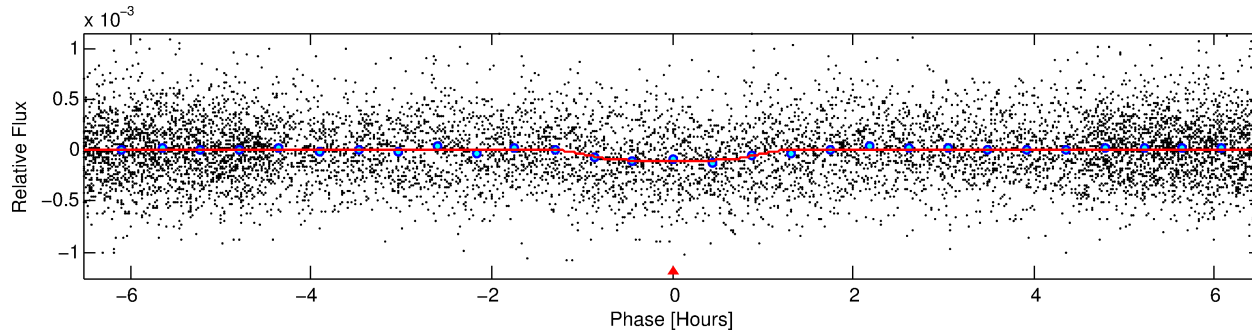
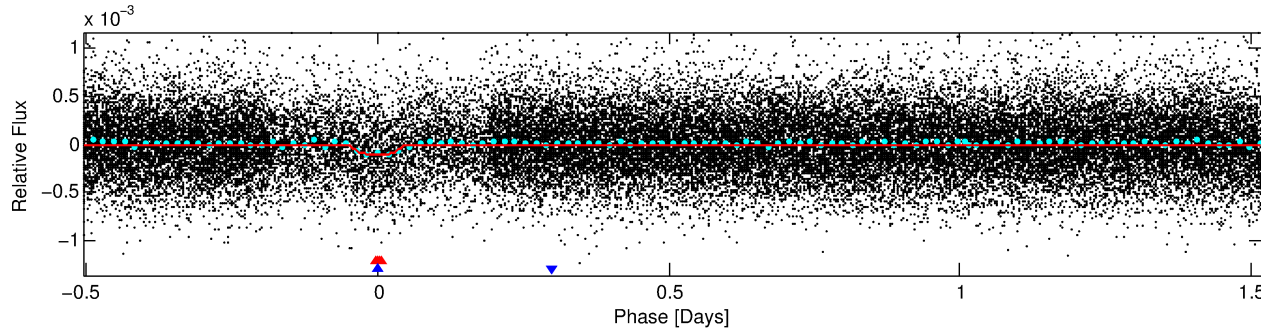
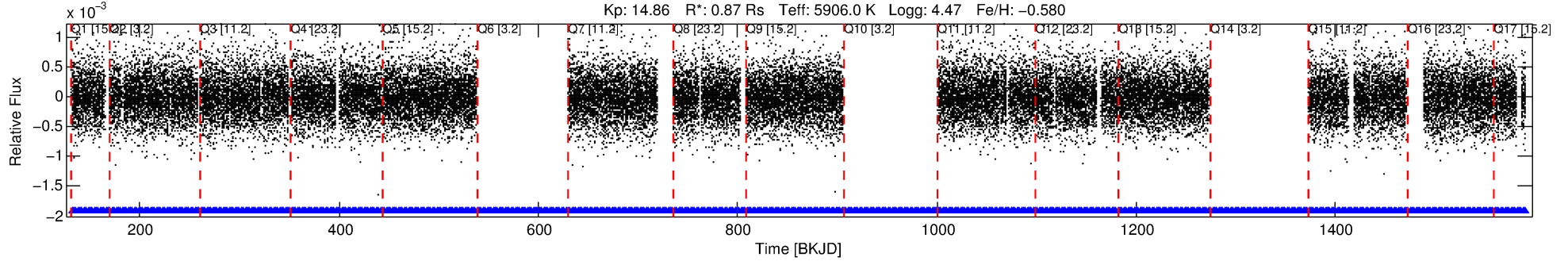
TCE (1)	KIC	Parent (2)	Parent KIC	$P_1:P_2$	Dist ($''$)	Δ Row	Δ Col	m_2	m_1	D_2/D_1	Mechanism	Flag	σ_P	σ_T
005021176-02	5021176	3679.01	5021174	1:2	7.3	1	1	17.70	14.86	3649.70	Direct-PRF	0	0.62	0.36

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: 5021176 Candidate: 2 of 2 Period: 2.023 d
KOI: K00447 Corr: No Ephemeris Match

Kp: 14.86 R*: 0.87 Rs Teff: 5906.0 K Logg: 4.47 Fe/H: -0.580



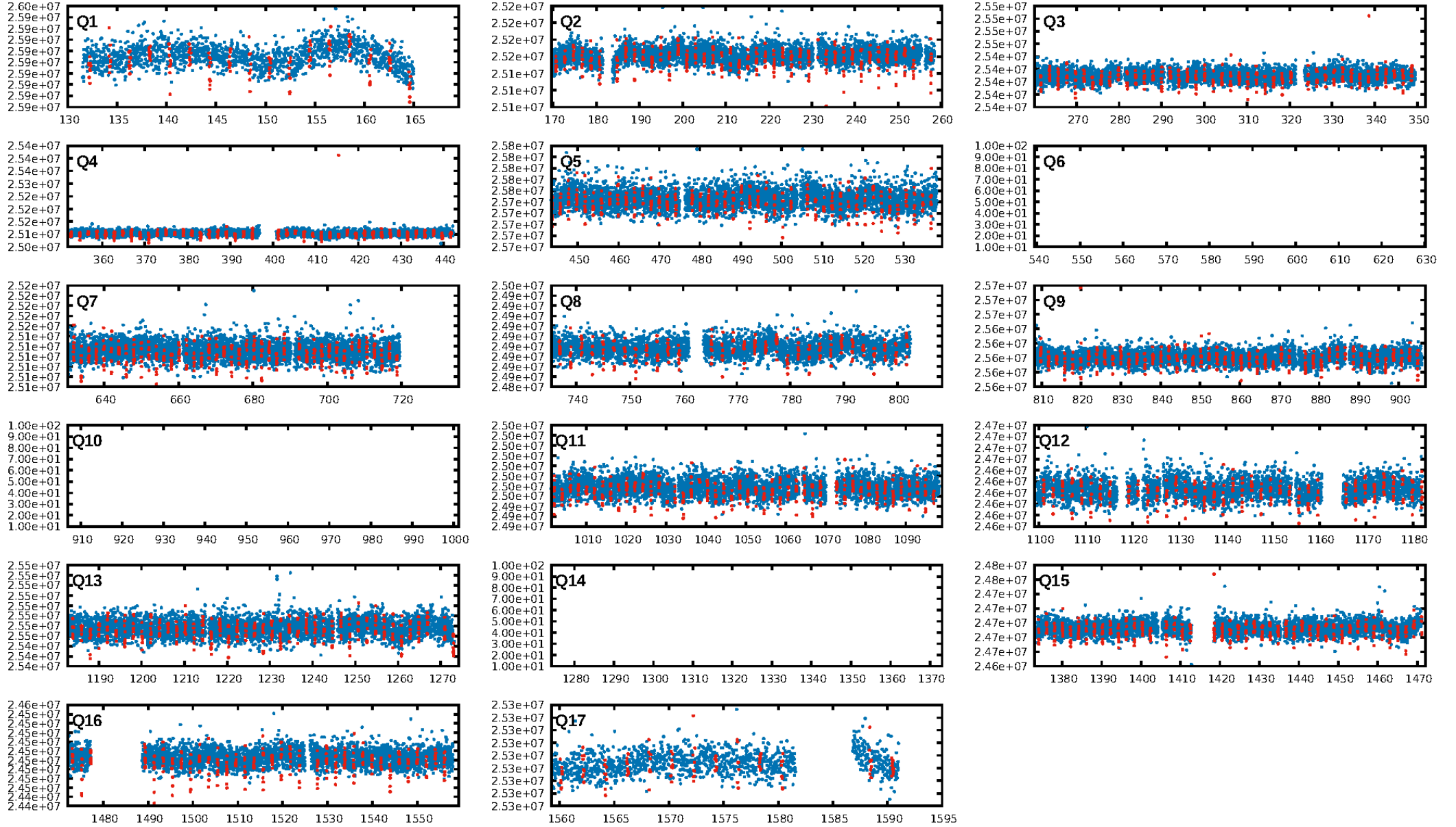
DV Fit Results:

Period = 2.02254 [0.00002] d
Epoch = 132.2260 [0.0037] BKJD
Rp/R* = 0.0116 [0.0047]
a/R* = 2.62 [5.01]
b = 0.95 [0.23]
Seff = 960.62 [322.10]
Teff = 1420 [119] K
Rp = 1.11 [0.52] Re
a = 0.0293 [0.0061] AU
Ag = 45.64 [45.84] [0.97σ]
Teffp = 5705 [1372] K [3.11σ]

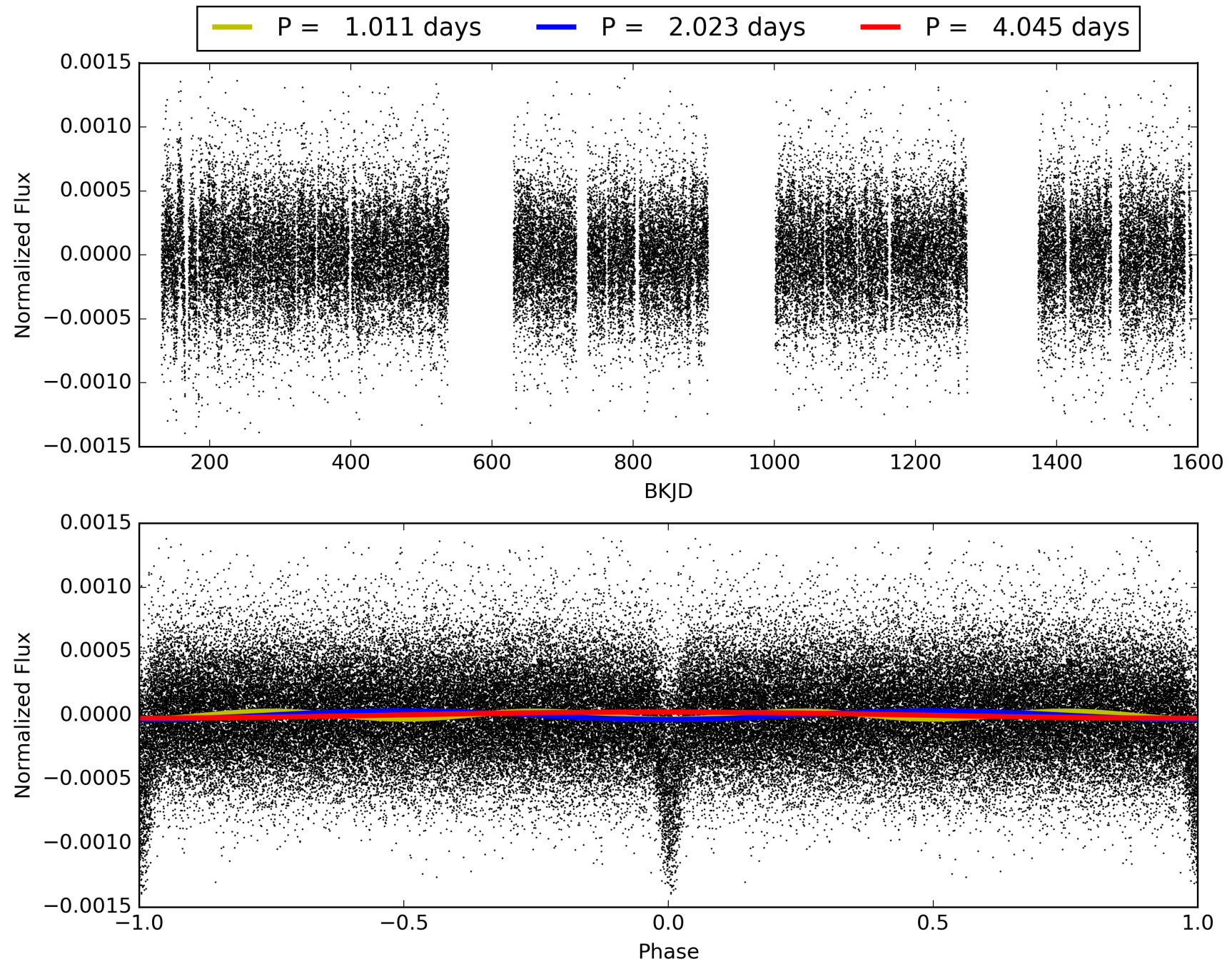
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 100.0% [13.56σ]
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: 1.82e-18
RollingBand-fgt: 1.00 [250/250]
GhostDiagnostic-chr: -0.5084
Centroid-sig: 0.0%
Centroid-so: 43.352 arcsec [26.09σ]
OotOffset-rm: 7.922 arcsec [18.47σ]
KicOffset-rm: 7.936 arcsec [15.46σ]
OotOffset-st: 1/4/3/0 [8]
KicOffset-st: 1/4/3/0 [8]
DiffImageQuality-fgm: 1.00 [8/8]
DiffImageOverlap-fno: 1.00 [14/14]

TCE 005021176-02, PDC Light Curves

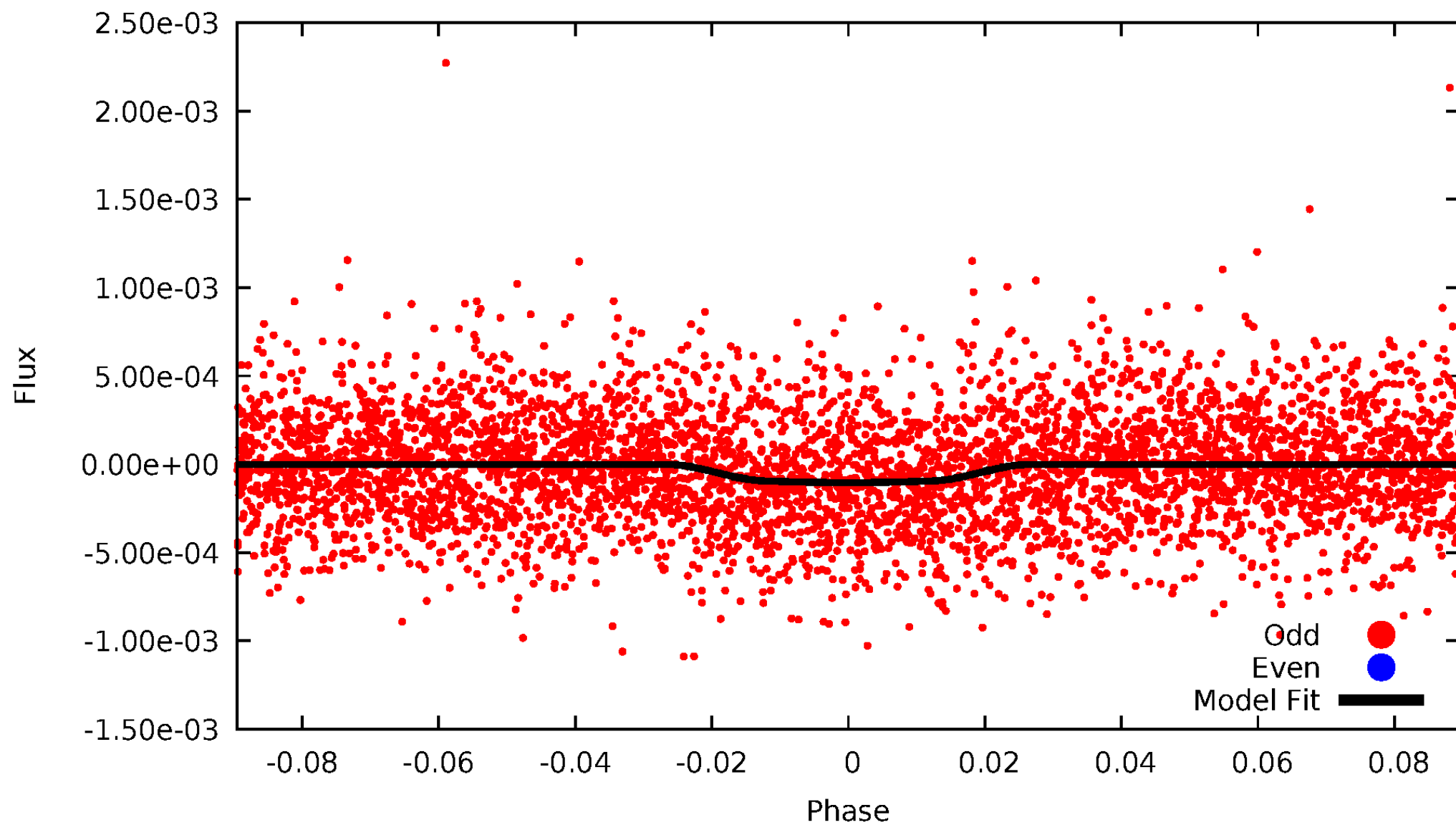


TCE 005021176-02



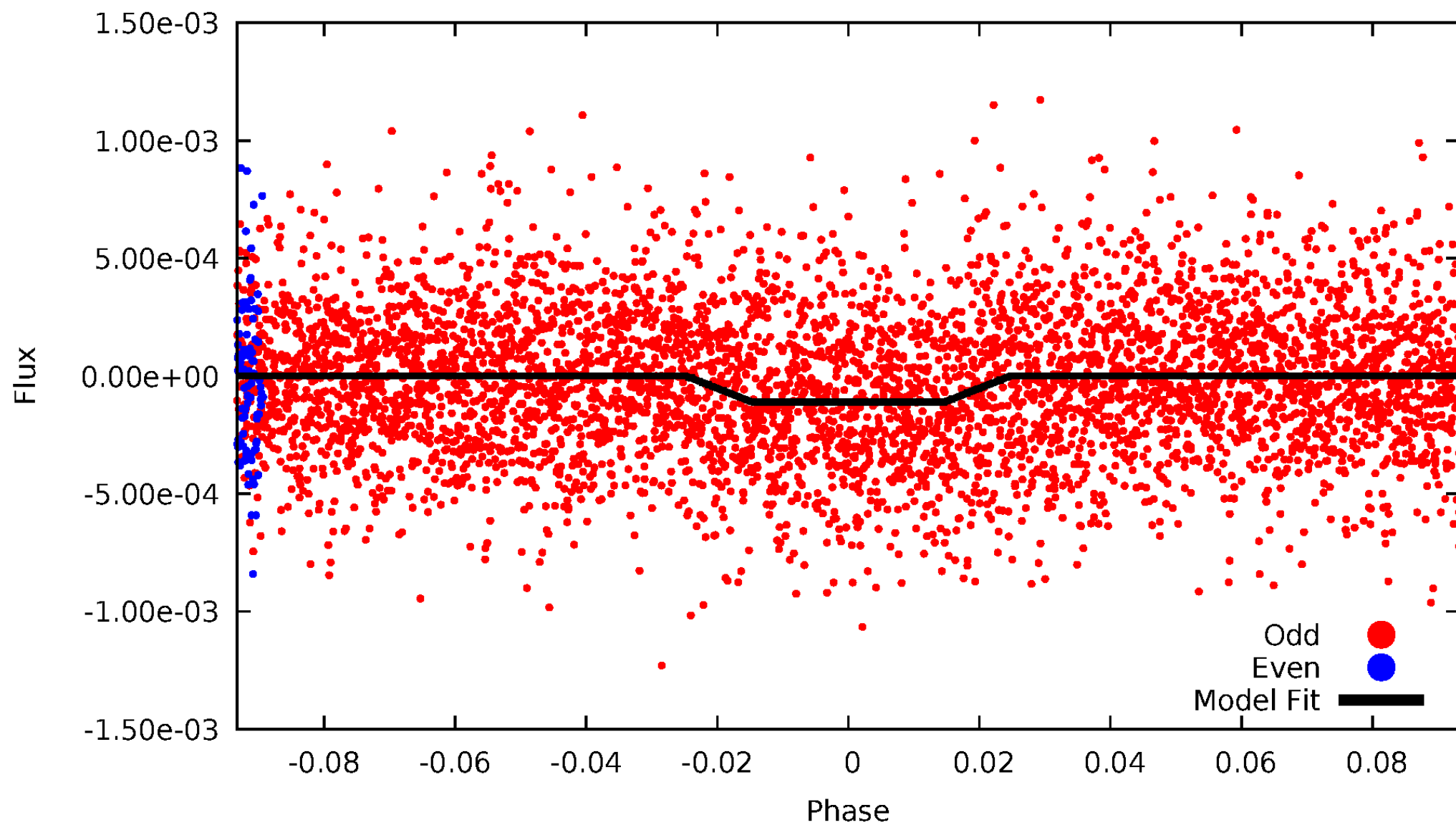
DV Odd/Even

TCE 005021176-02



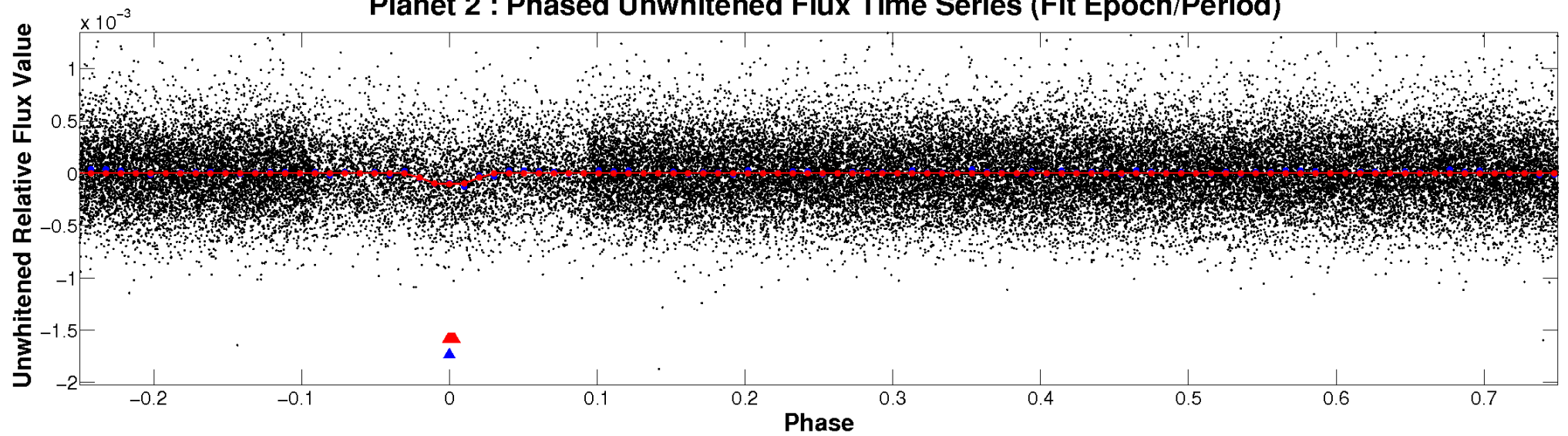
ALT Odd/Even

TCE 005021176-02

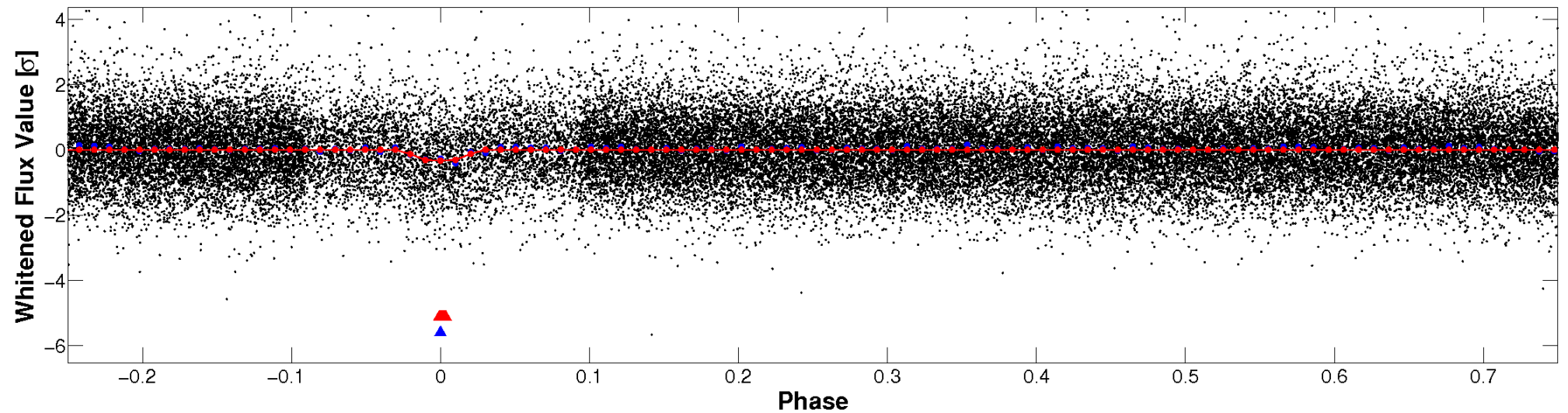


Non-Whitened Vs. Whitened Light Curve

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

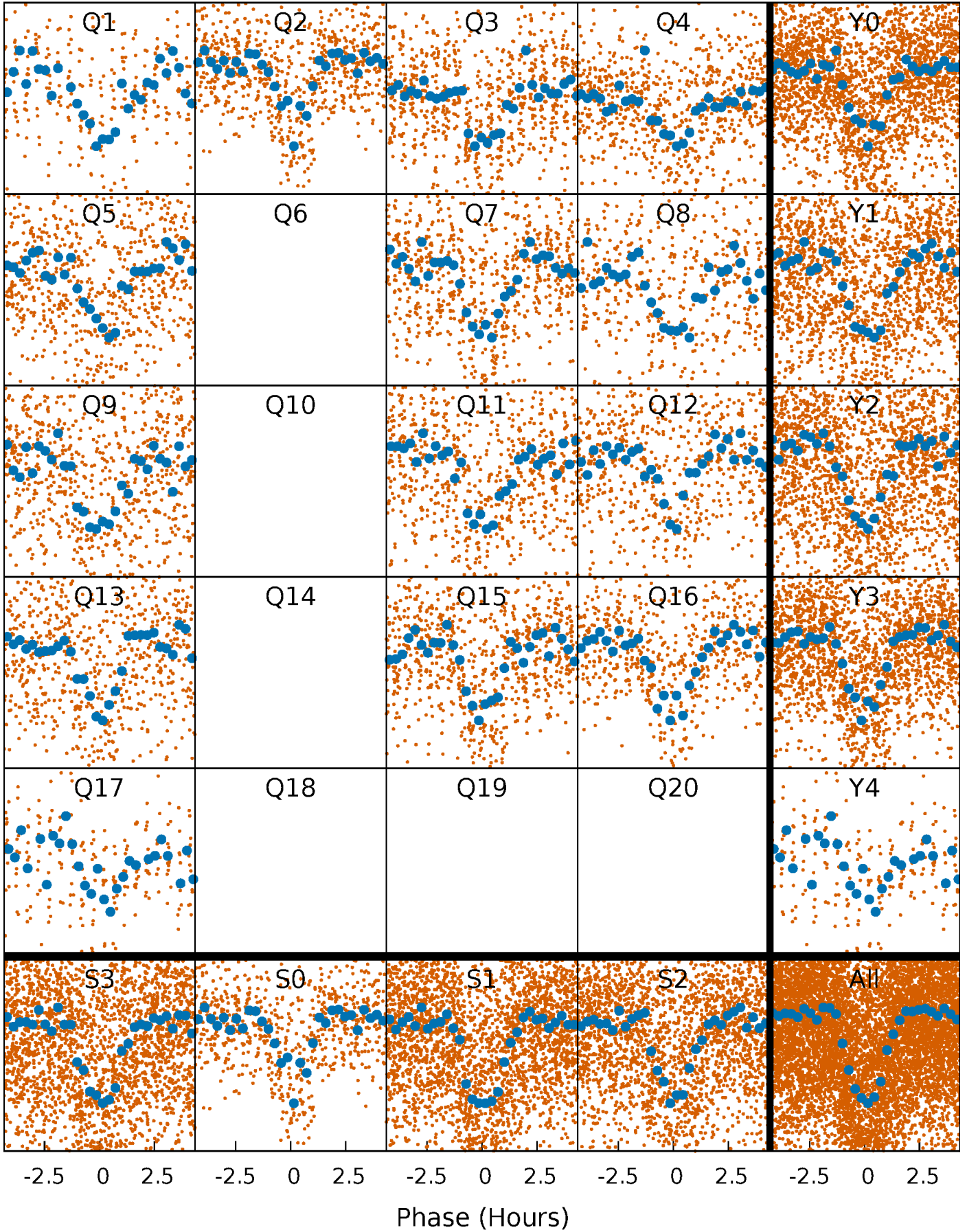


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



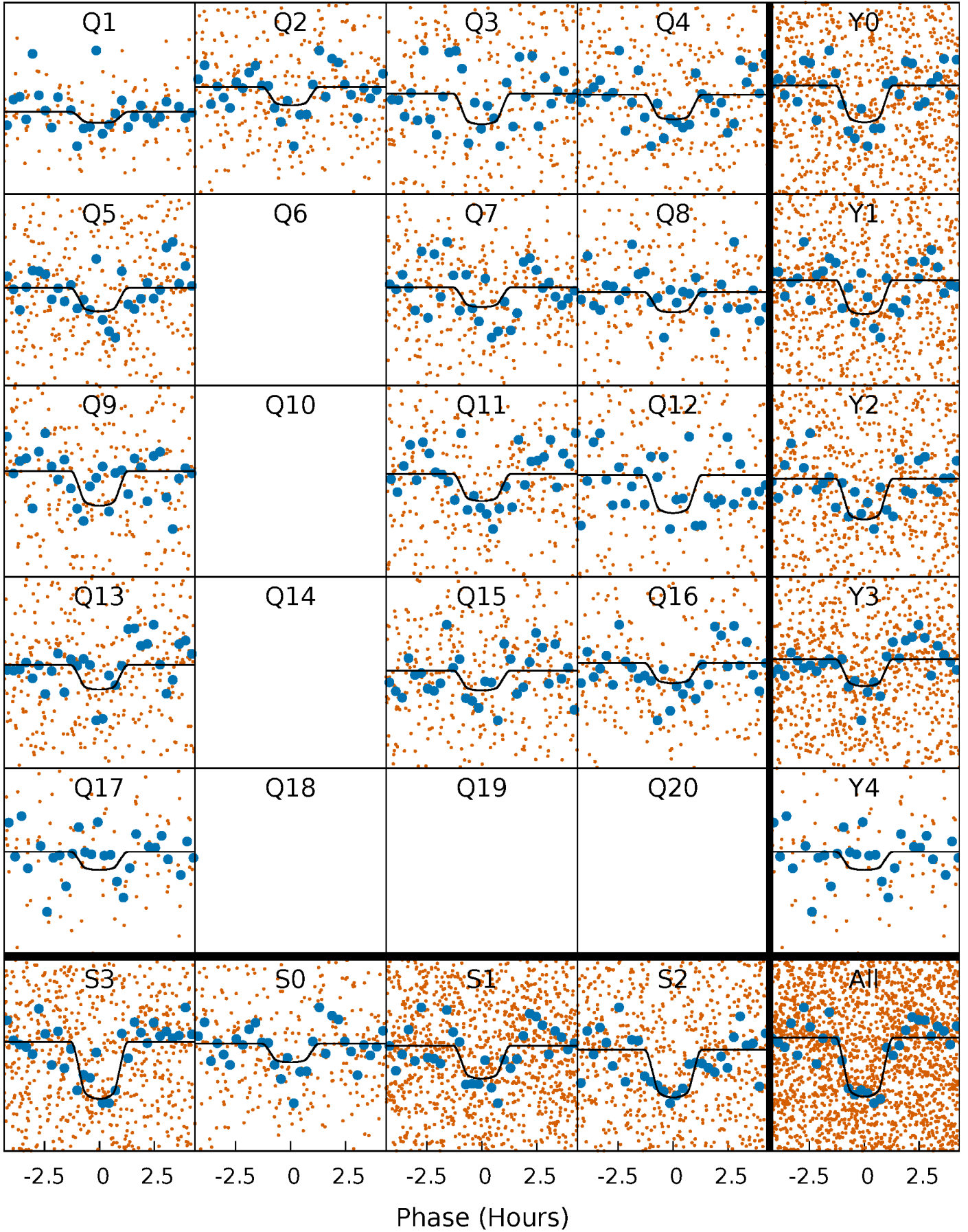
PDC Quarter-Phased Transit Curves

TCE 005021176-02 P= 2.022540 Days $T_0=132.226004$ (BKJD)



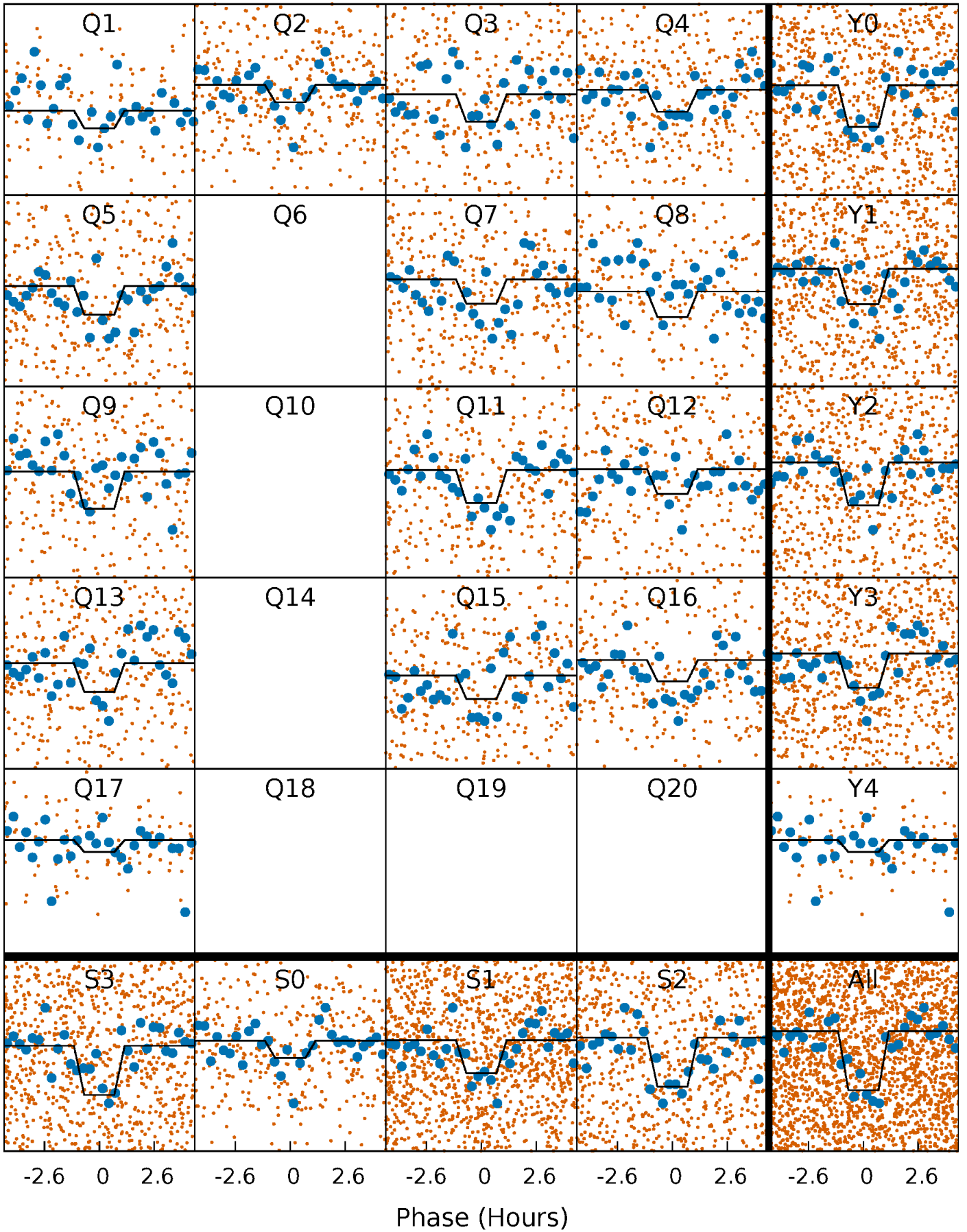
DV Quarter-Phased Transit Curves

TCE 005021176-02 P= 2.022540 Days $T_0=132.226004$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

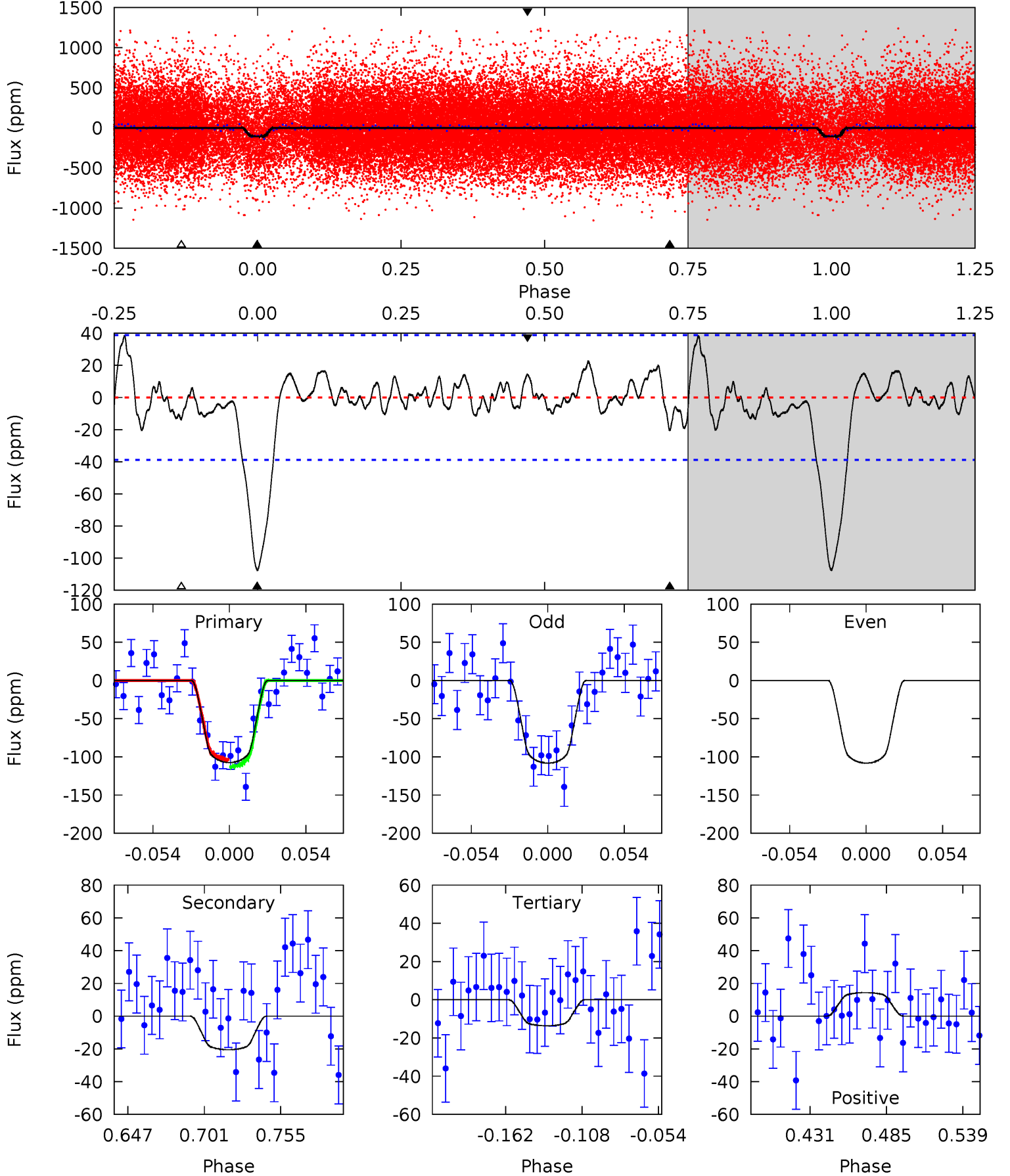
TCE 005021176-02 P= 2.022523 Days $T_0=132.228330$ (BKJD)



DV Model-Shift Uniqueness Test

005021176-02, P = 2.022540 Days, E = 130.203464 Days

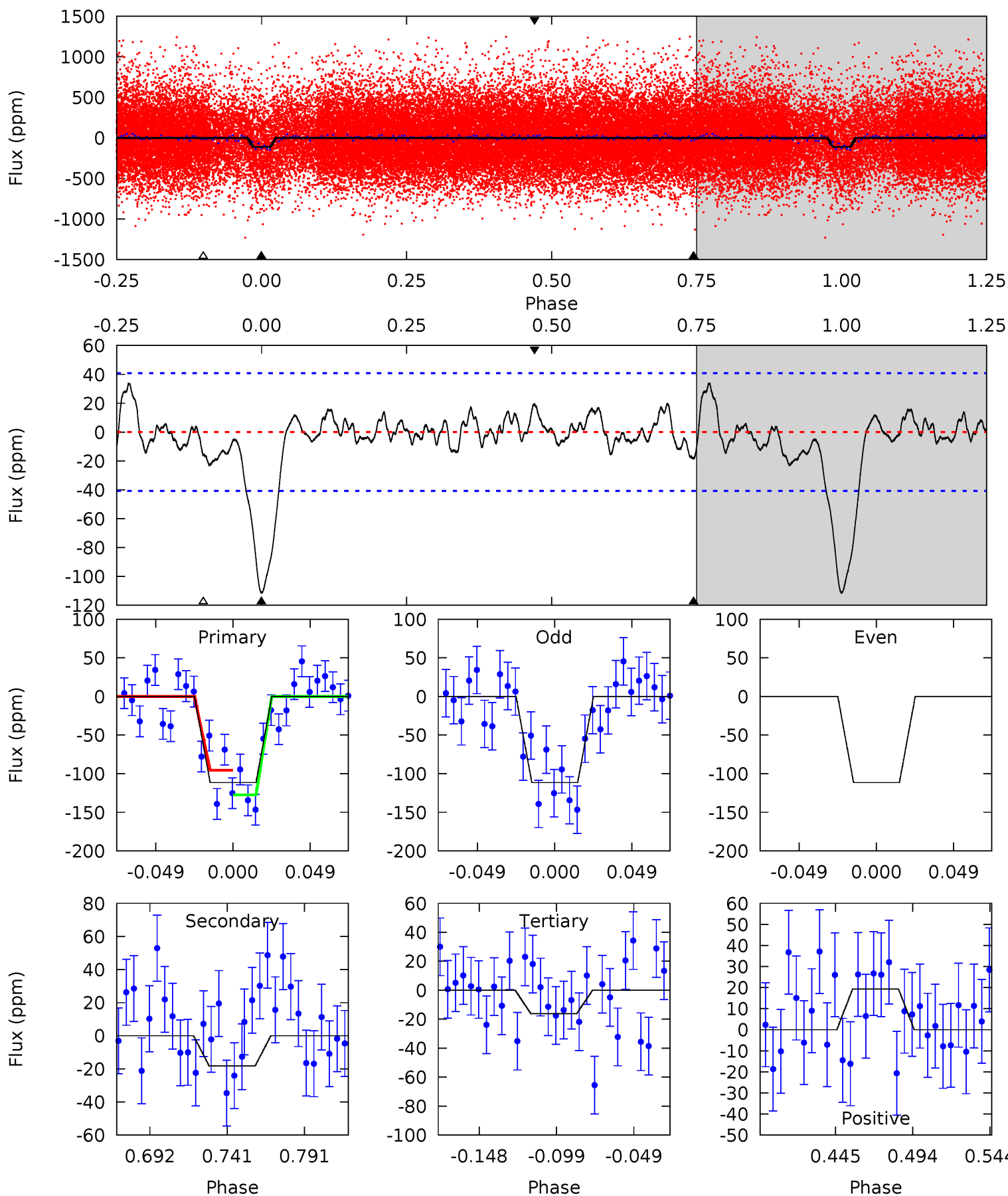
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
13.0	2.48	1.65	1.73	4.69	1.93	0.98	11.3	11.2	0.83	0.74	0	0.99	0.26	0.58



Alt Model-Shift Uniqueness Test

005021176-02, P = 2.022523 Days, E = 130.205807 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.9	2.11	1.87	2.23	4.71	1.96	0.94	11.0	10.6	0.24	-0.12	0	1.05	0.23	1.84



Stellar Parameters For KIC 005021176

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	$M(M_{\odot})$	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	5906^{+177}_{-177}	$4.473^{+0.094}_{-0.175}$	$-0.580^{+0.300}_{-0.300}$	$0.870^{+0.210}_{-0.113}$	$0.821^{+0.096}_{-0.061}$	$1.753^{+0.801}_{-0.801}$
	+3%/-3%	+2%/-4%	+52%/-52%	+24%/-13%	+12%/-7%	+46%/-46%
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 005021176-02 / KOI

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-20 ± 8	$1.13^{+0.50}_{-0.45}$	2004^{+131}_{-104}	3965^{+902}_{-582}	$7.674^{+14.072}_{-4.739}$
Alt.	-18 ± 9	$1.00^{+0.51}_{-0.41}$	2006^{+128}_{-111}	4032^{+1057}_{-636}	$8.421^{+18.124}_{-5.384}$

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

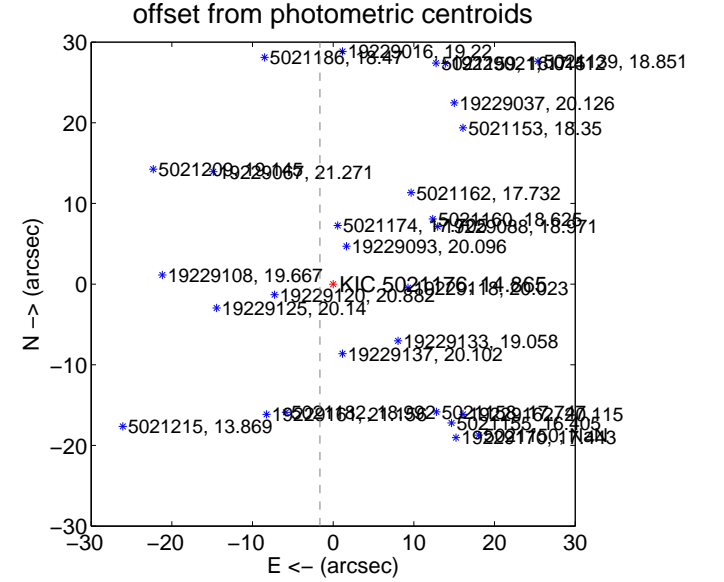
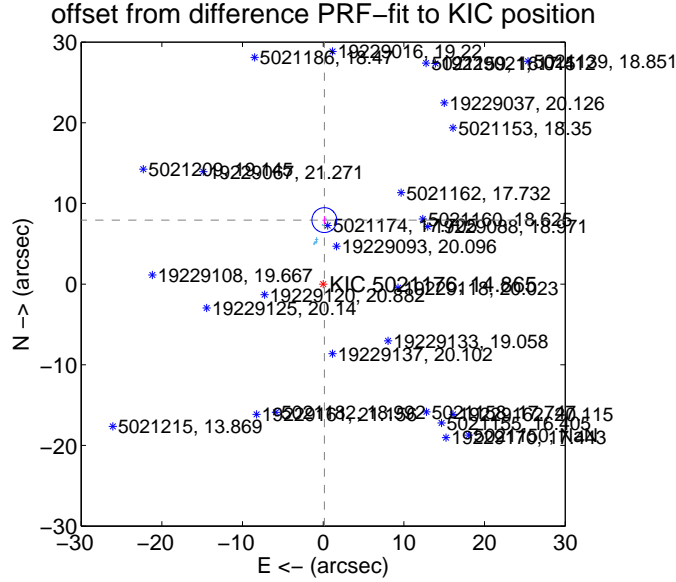
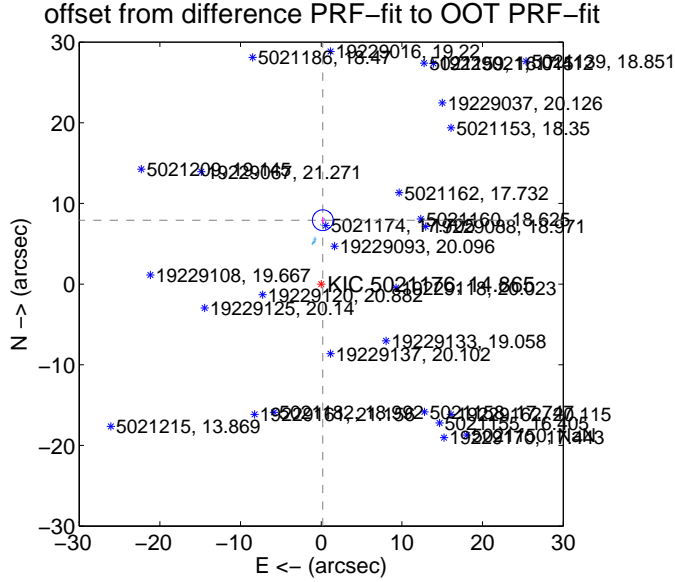
DV Centroid Data

Supplemental centroid analysis for 005021176-02. Kepler magnitude: 14.87. Transit SNR 9.11

There are 8 quarters with good PRF difference image offsets

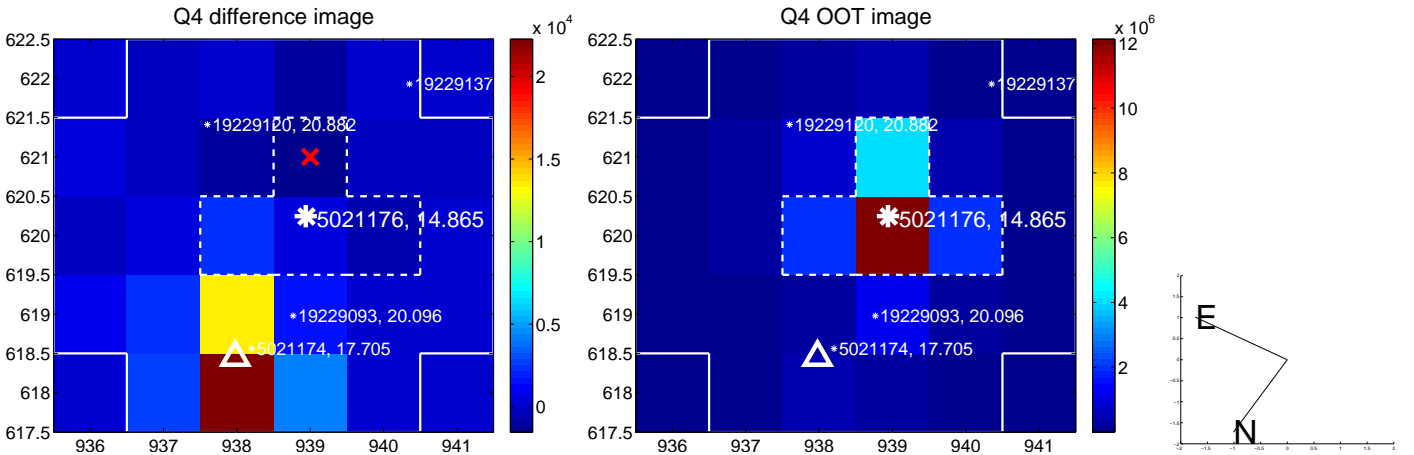
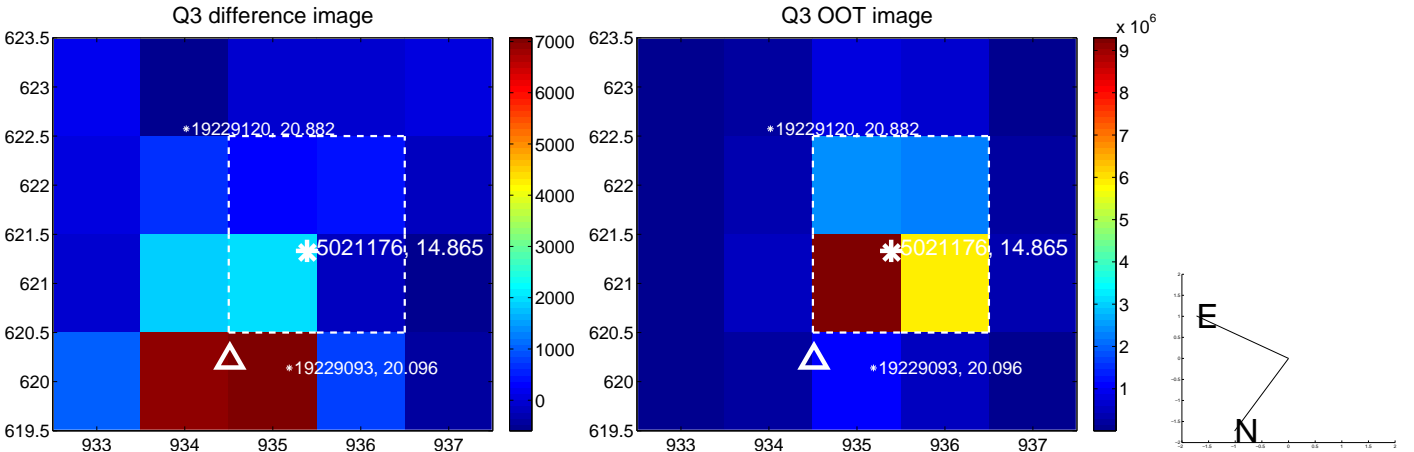
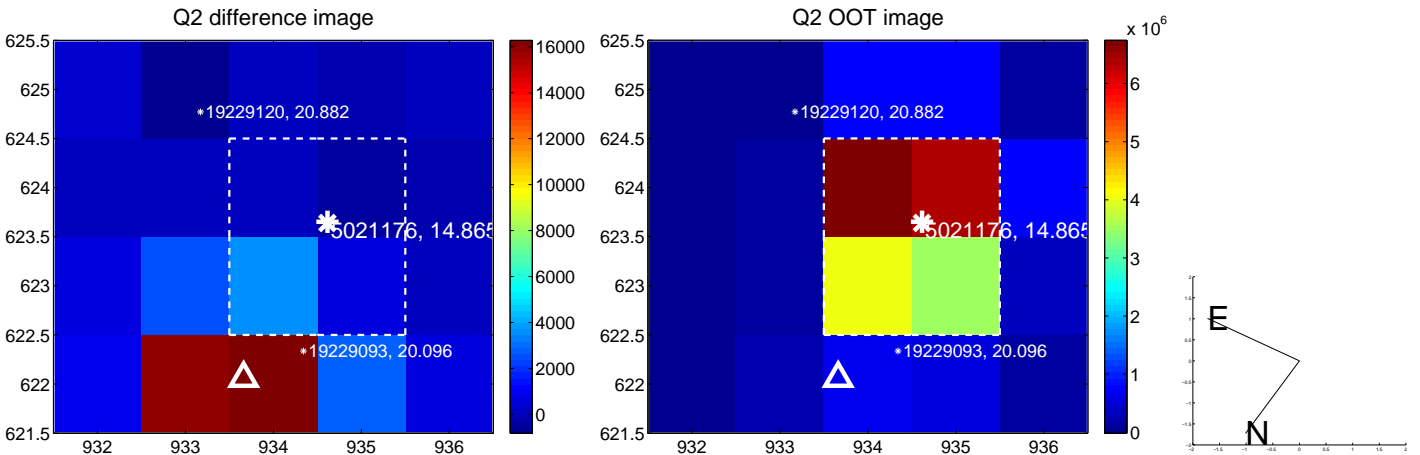
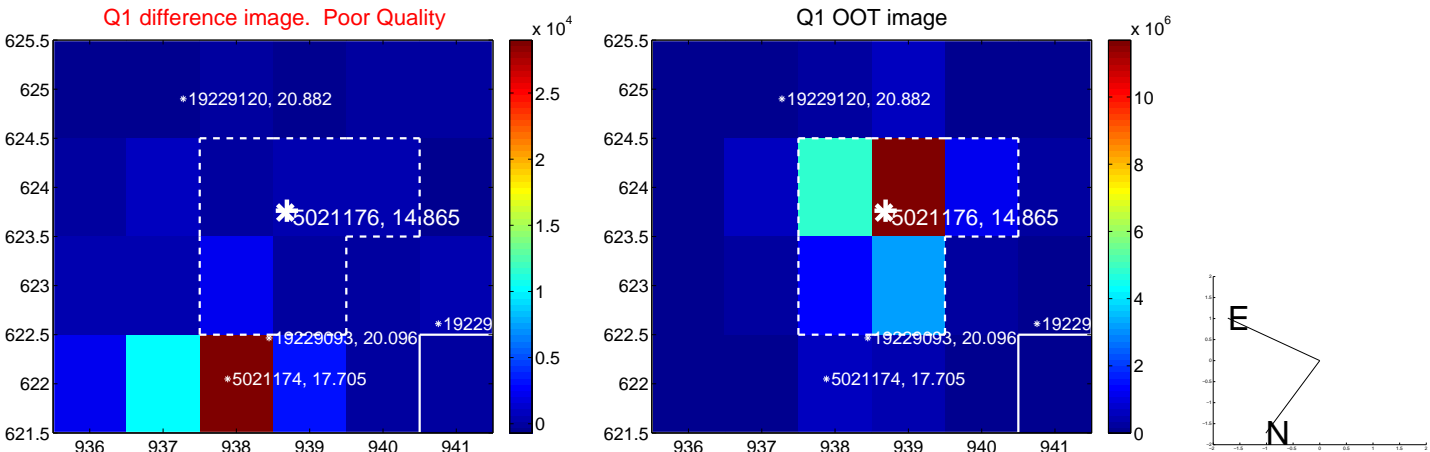
The direct PRF centroid is offset from the target star catalog position by about 0.07 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	7.922 \pm 0.429	18.47	-0.198 \pm 0.204	7.919 \pm 0.424
PRF-fit source offset from KIC position	7.936 \pm 0.513	15.46	-0.144 \pm 0.237	7.935 \pm 0.509
photometric centroid source offset	43.35 \pm 1.66	26.09	1.64 \pm 1.66	43.32 \pm 1.66

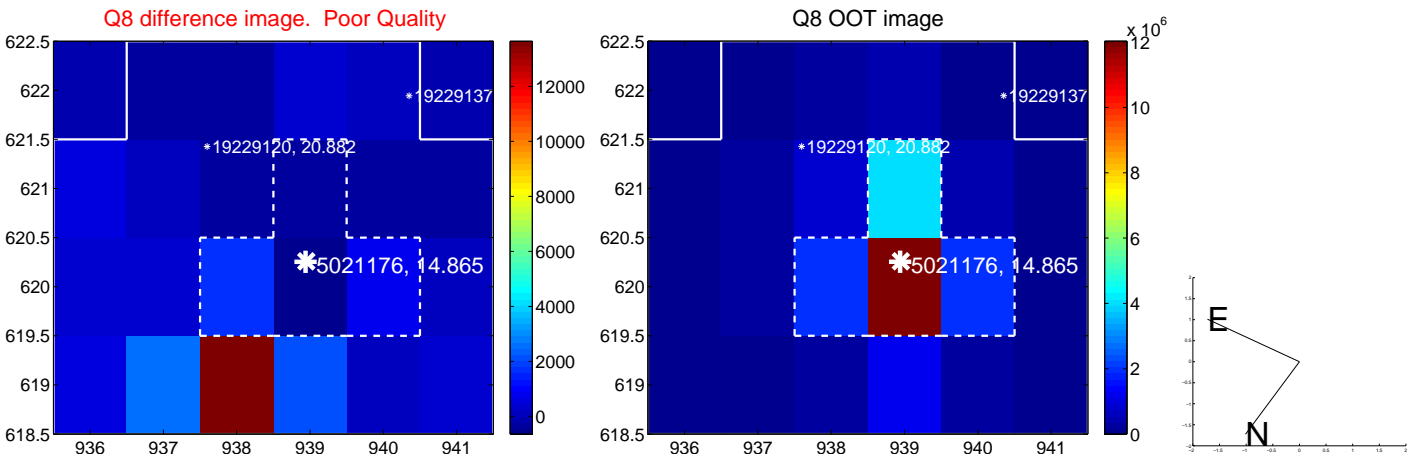
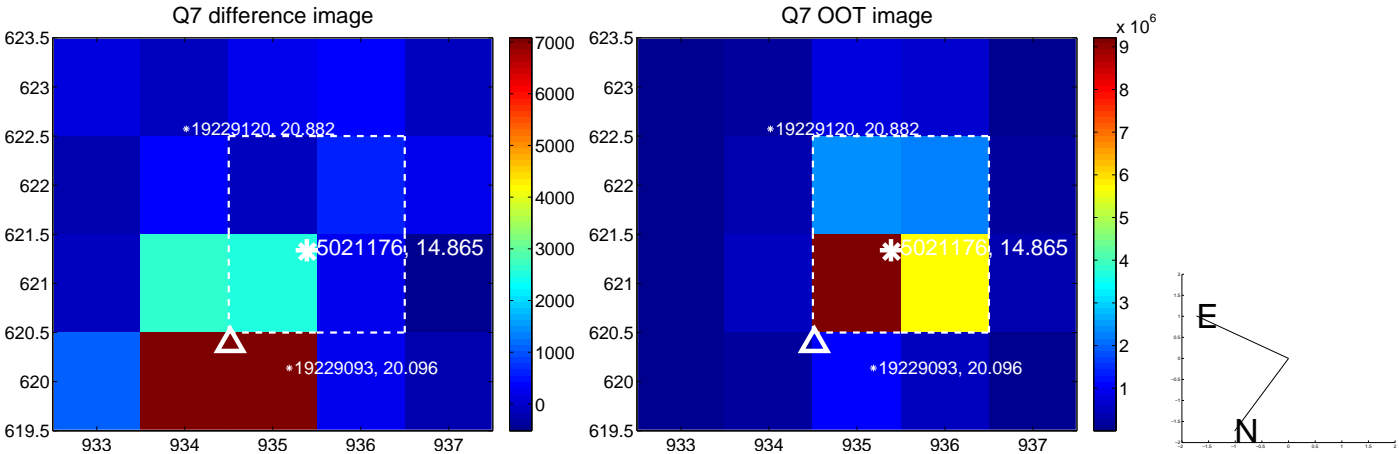
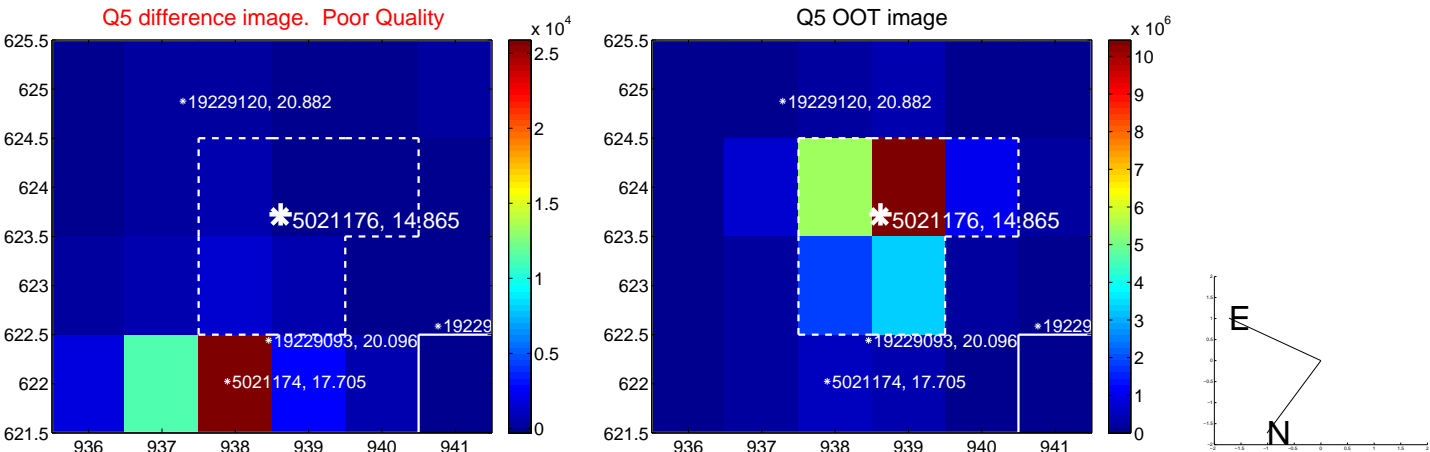


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

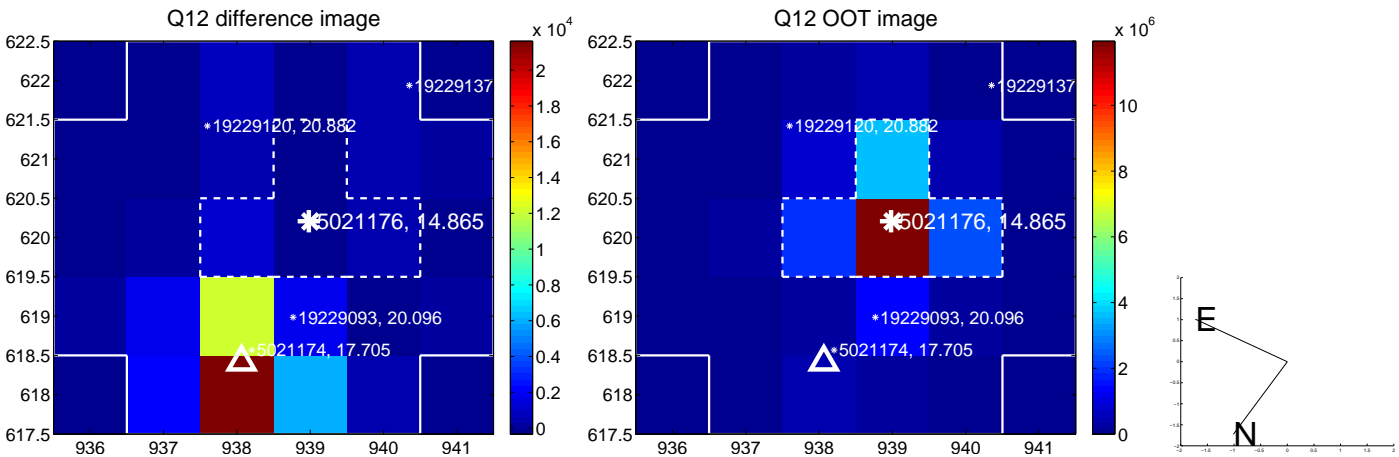
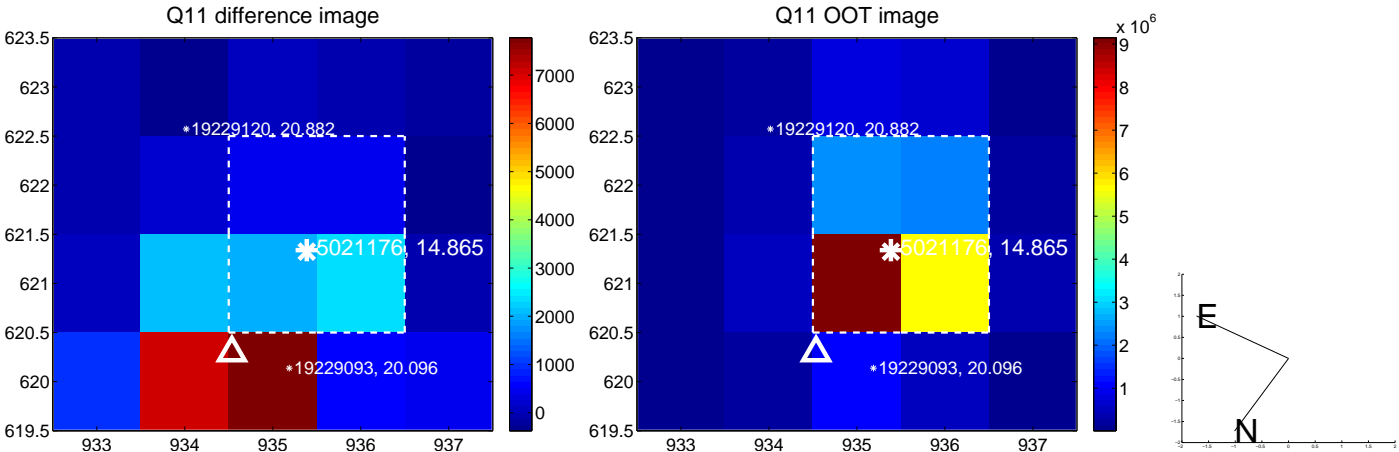
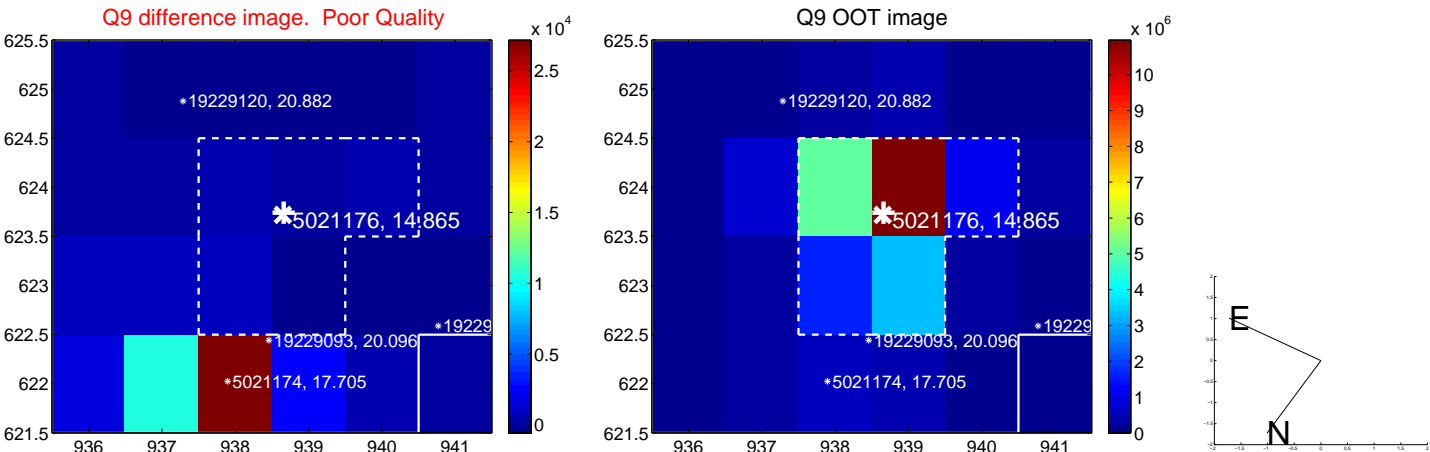
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



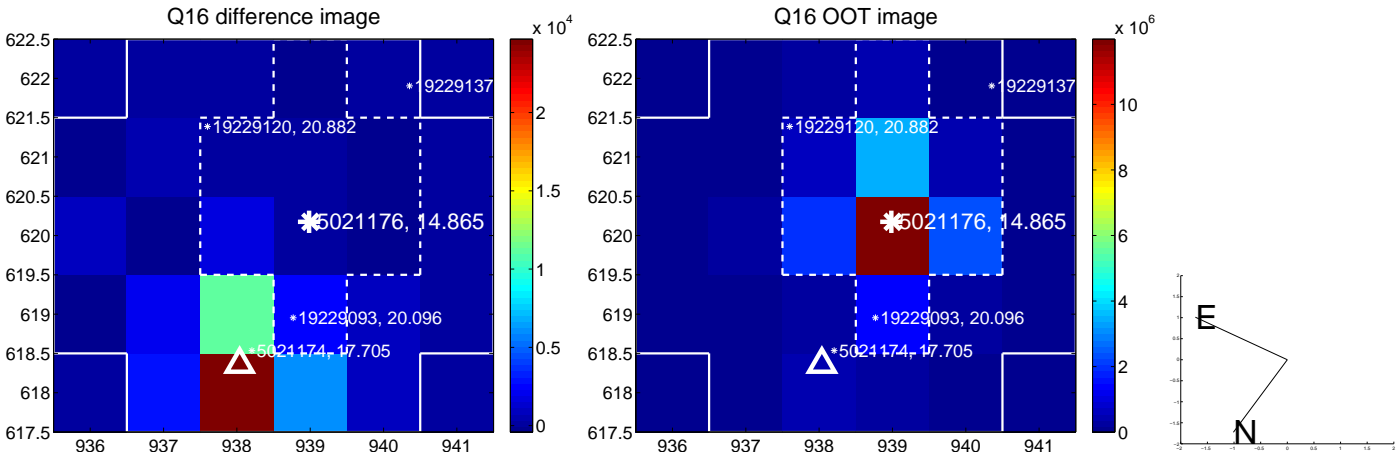
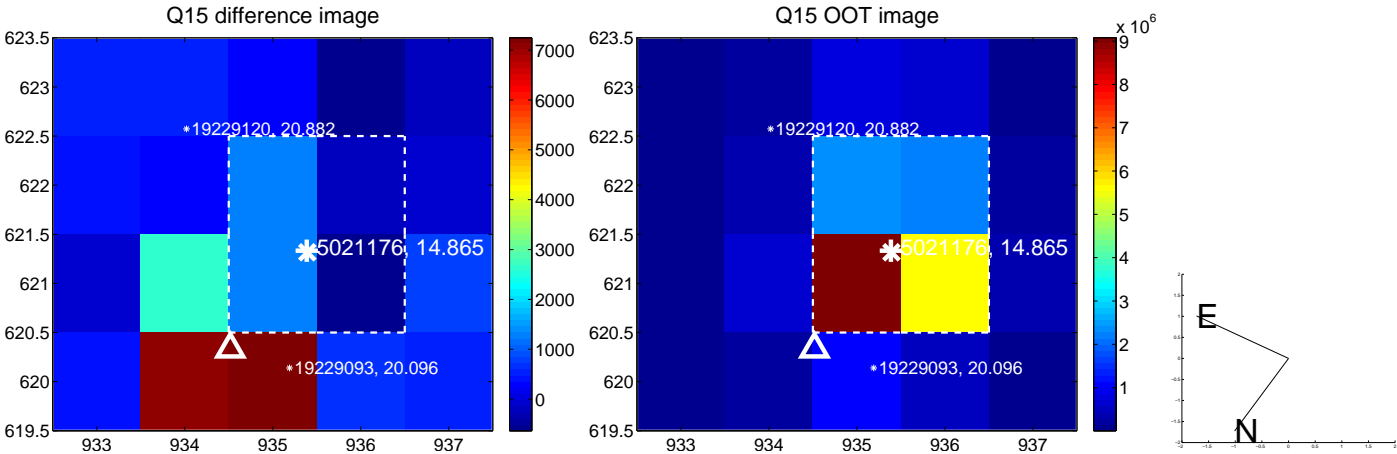
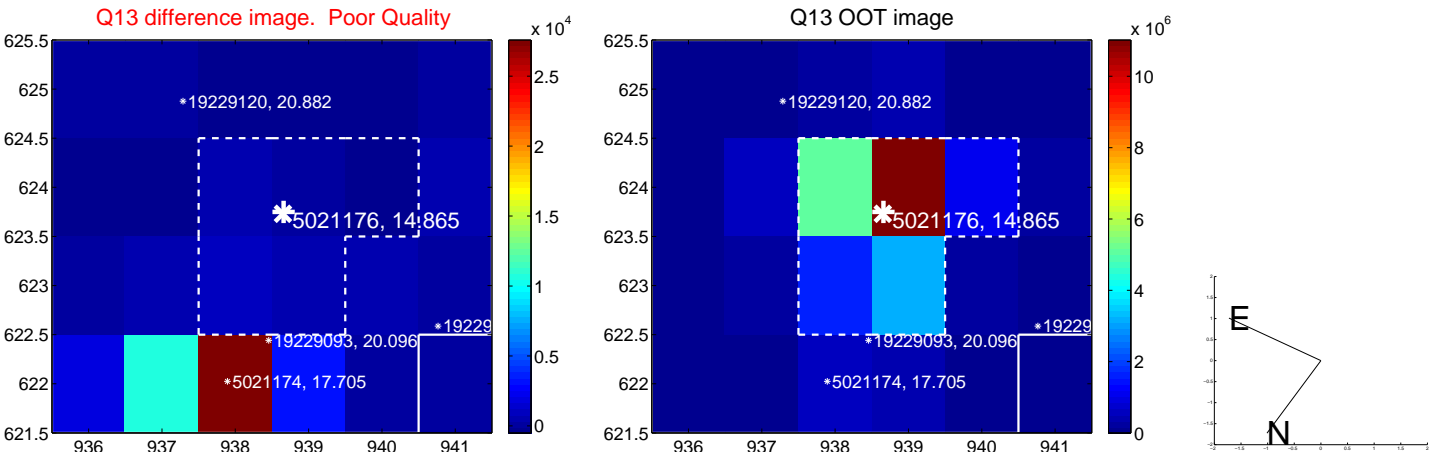
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



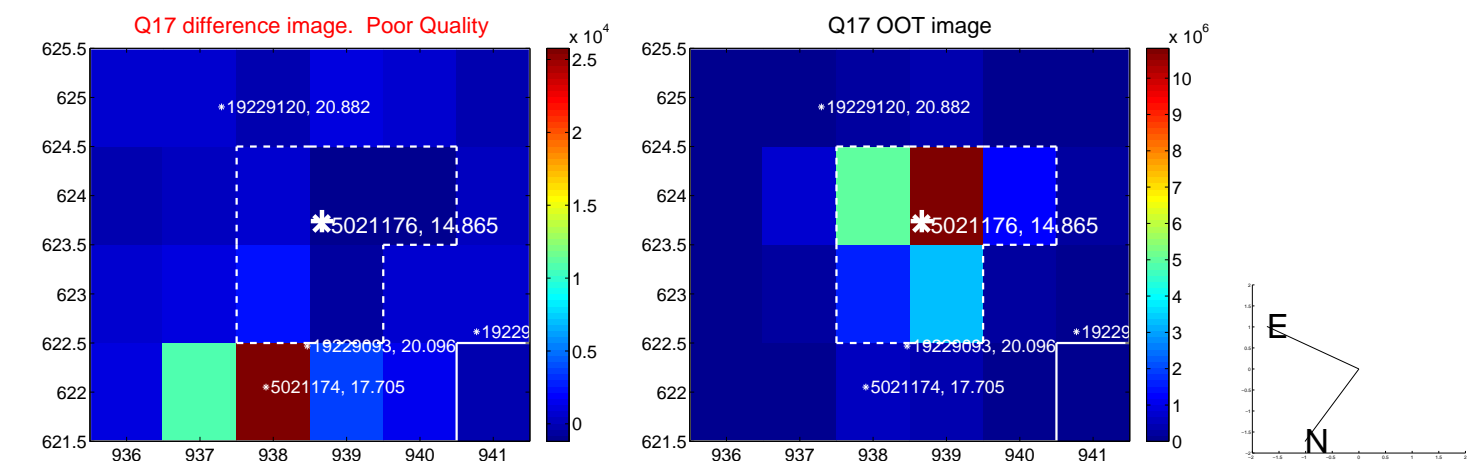
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



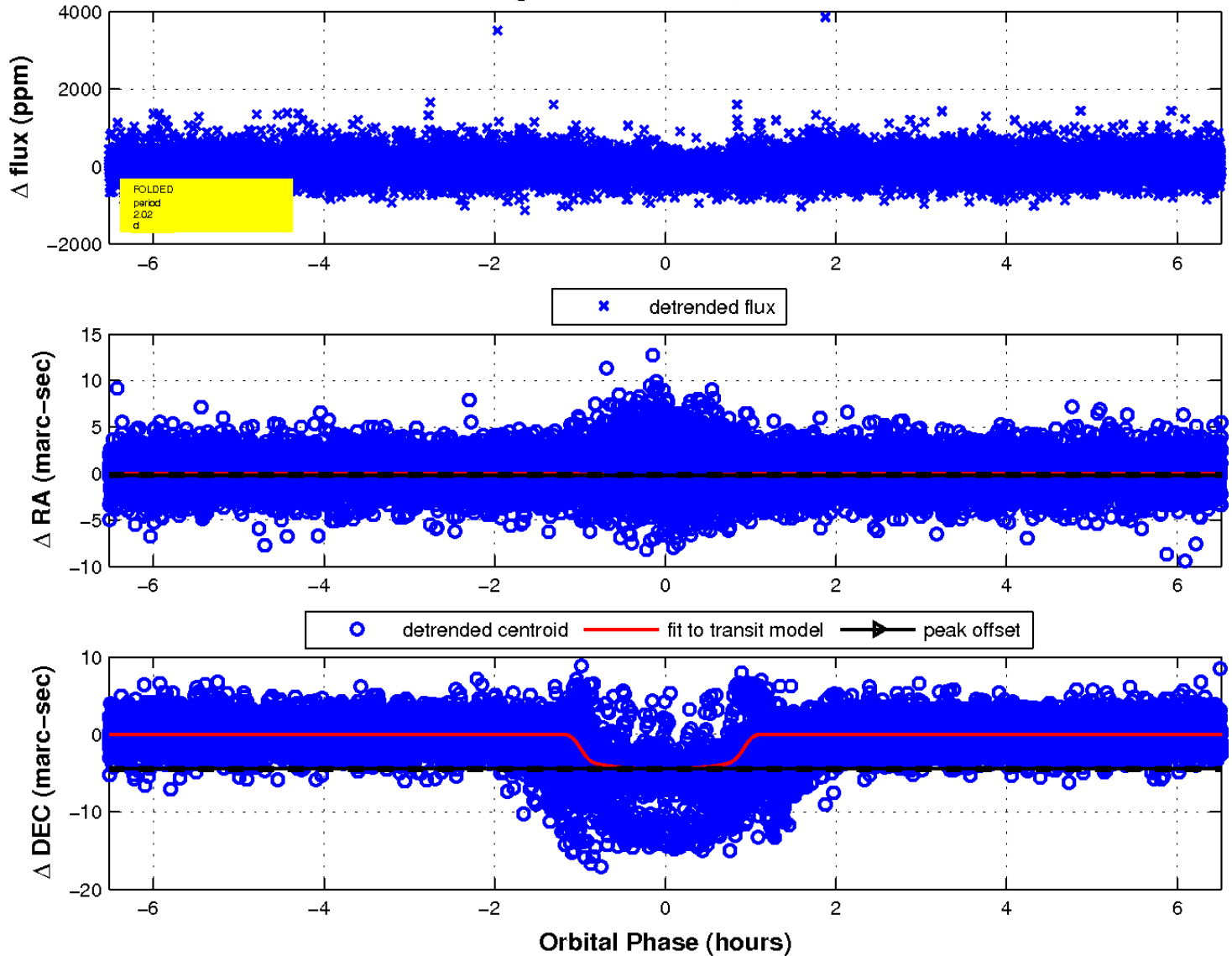
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

Declination

