

KIC 008037145

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})
008037145-01	OBS	0520.01	12.759310	132.044689	844.6	4.300	50.4	54.5	0.83	4963	3.15	38.03
008037145-02	OBS	0520.03	25.752791	136.437973	751.8	3.744	28.7	30.7	0.83	4963	3.23	14.91
008037145-03	OBS	0520.02	5.433079	132.941491	271.7	2.557	23.6	25.4	0.83	4963	1.65	118.70
008037145-04	OBS	0520.04	51.166266	172.299979	274.5	5.143	10.2	10.3	0.83	4963	1.73	5.97

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008037145-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
008037145-02	OBS	PC	1.00	0	0	0	0	NO_COMMENT
008037145-03	OBS	PC	1.00	0	0	0	0	NO_COMMENT
008037145-04	OBS	PC	0.91	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.

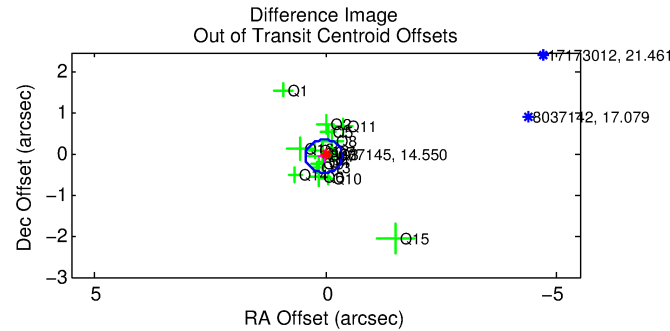
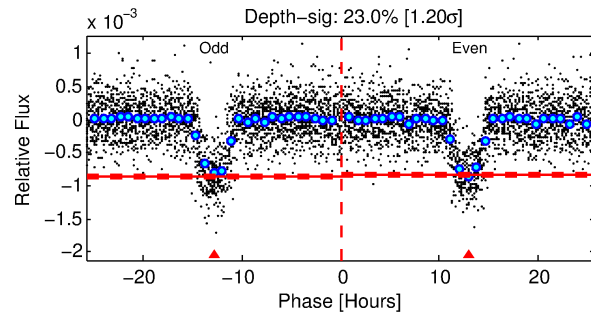
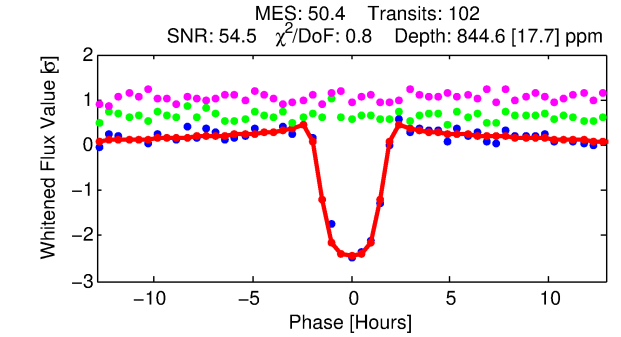
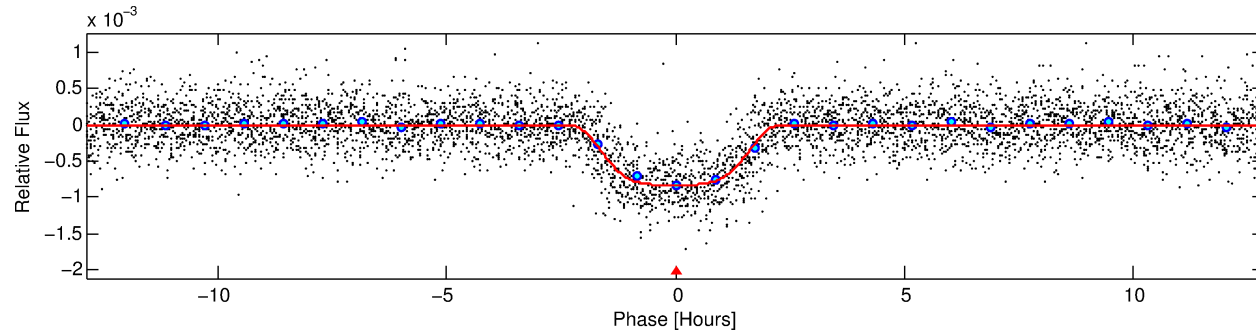
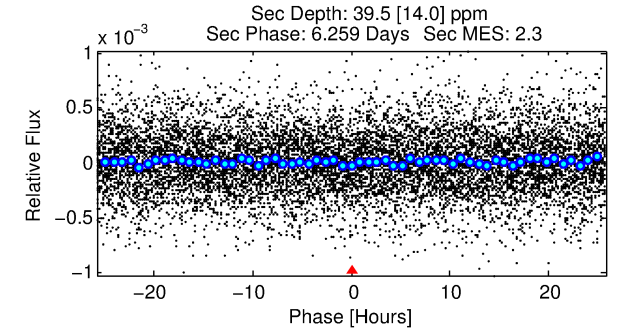
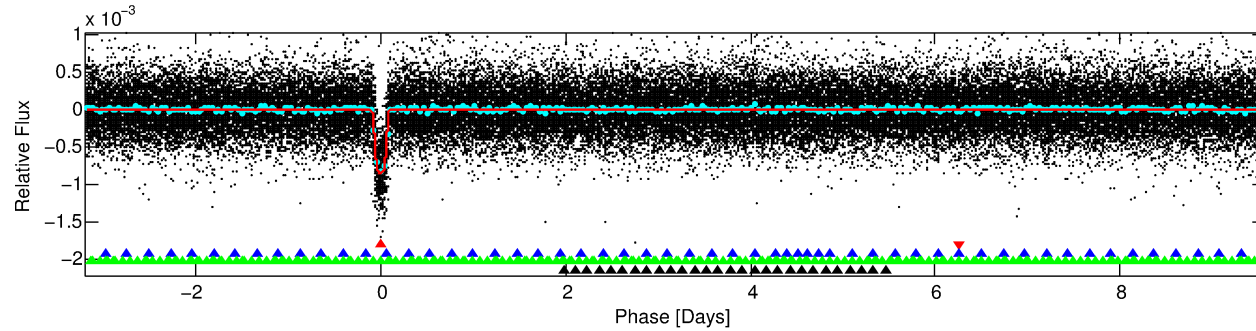
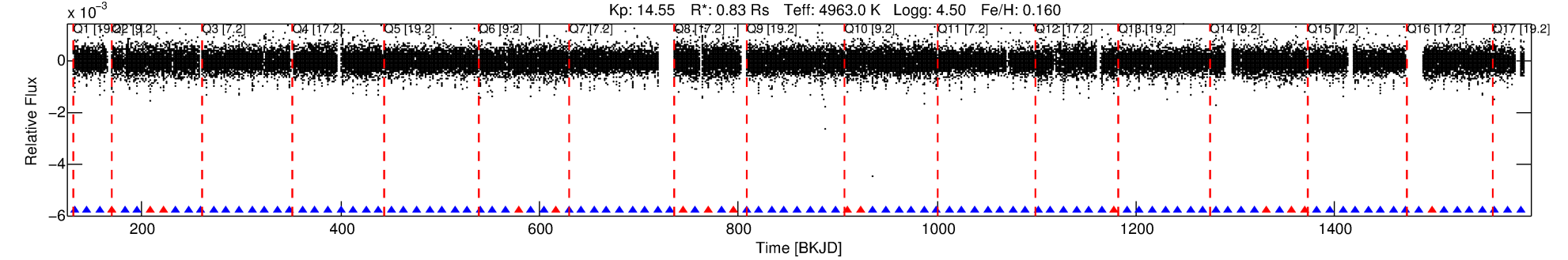
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 008037145-01

No Significant Match Found

DV One-Page Summary

KIC: 8037145 Candidate: 1 of 4 Period: 12.759 d
KOI: K00520.01 Name: Kepler-176c Corr: 0.904



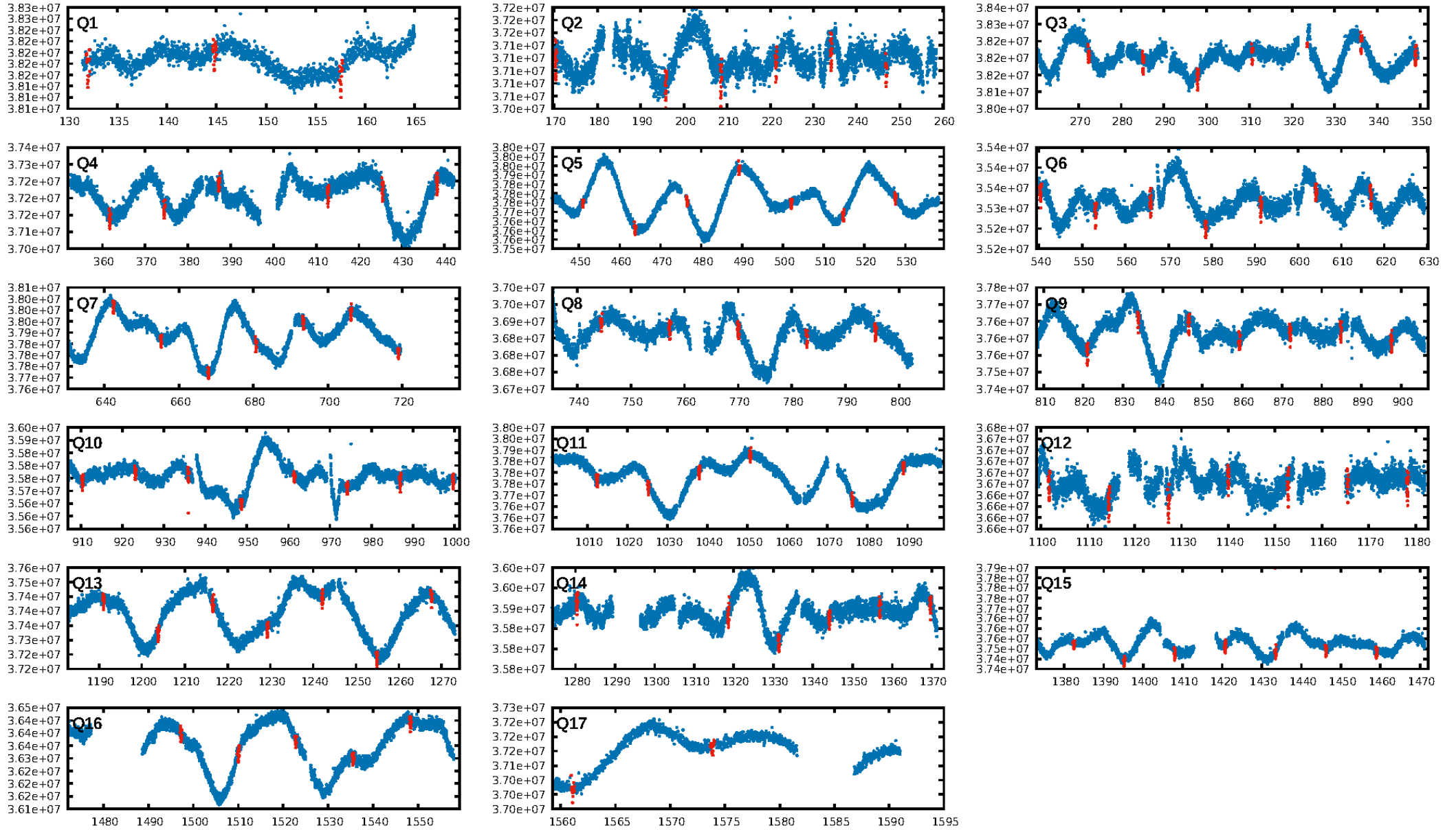
DV Fit Results:

Period = 12.75931 [0.00003] d
Epoch = 132.0447 [0.0017] BKJD
Rp/R* = 0.0349 [0.0007]
a/R* = 9.63 [0.49]
b = 0.94 [0.01]
Seff = 38.03 [5.22]
Teff = 633 [22] K
Rp = 3.15 [0.24] Re
a = 0.0988 [0.0073] AU
Ag = 21.42 [8.06] [2.53σ]
Teffp = 2106 [191] K [7.67σ]

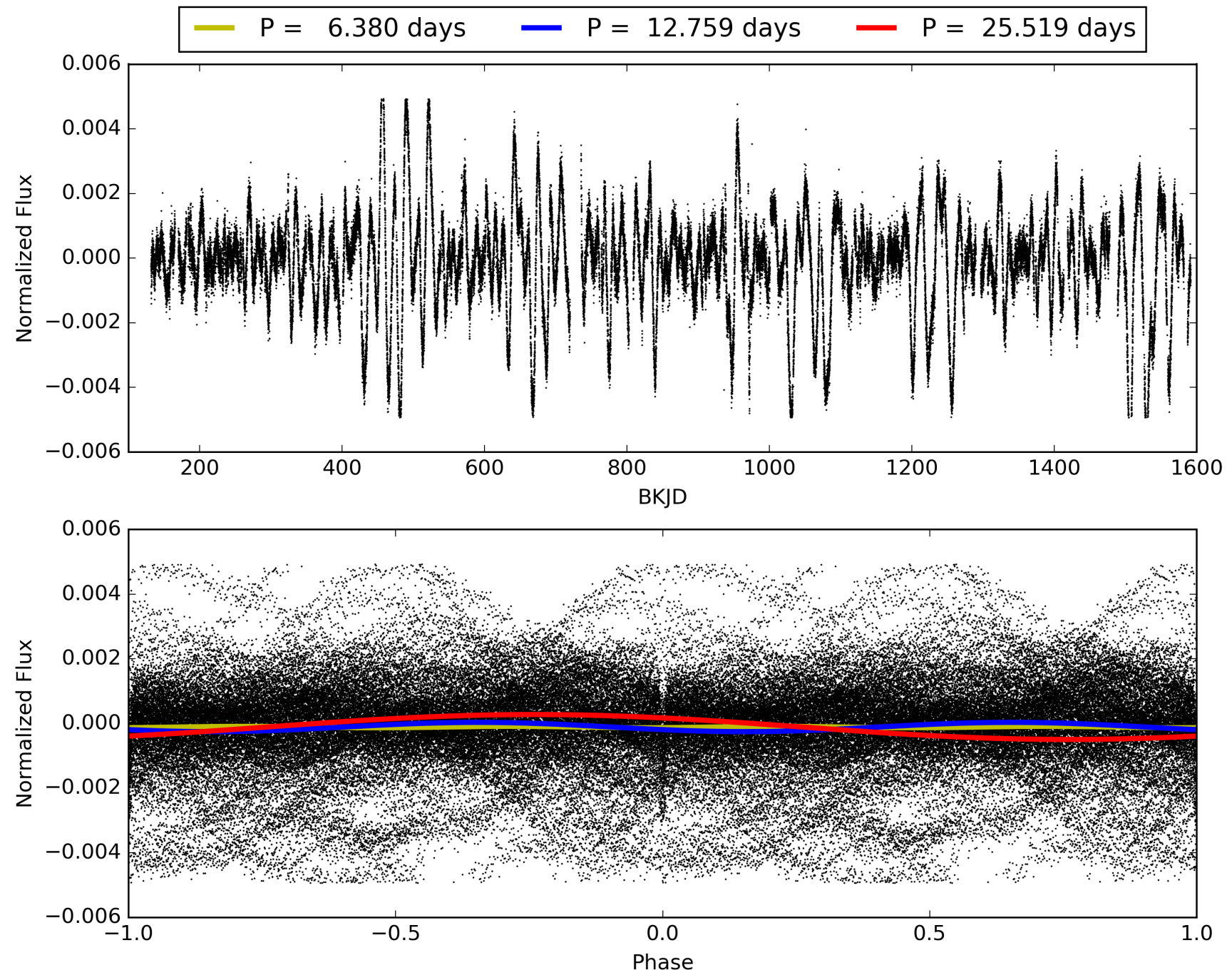
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [35.15σ]
LongPeriod-sig: 100.0% [54.70σ]
ModelChiSquare2-sig: 99.8%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 0.00e+00
RollingBand-fgt: 0.85 [82/97]
GhostDiagnostic-chr: 4.95
Centroid-sig: 39.0%
Centroid-so: 0.490 arcsec [2.12σ]
OotOffset-rm: 0.059 arcsec [0.44σ]
KicOffset-rm: 0.160 arcsec [0.78σ]
OotOffset-st: 4/4/4/5 [17]
KicOffset-st: 4/4/4/5 [17]
DiffImageQuality-fgm: 0.94 [16/17]
DiffImageOverlap-fno: 1.00 [17/17]

TCE 008037145-01, PDC Light Curves

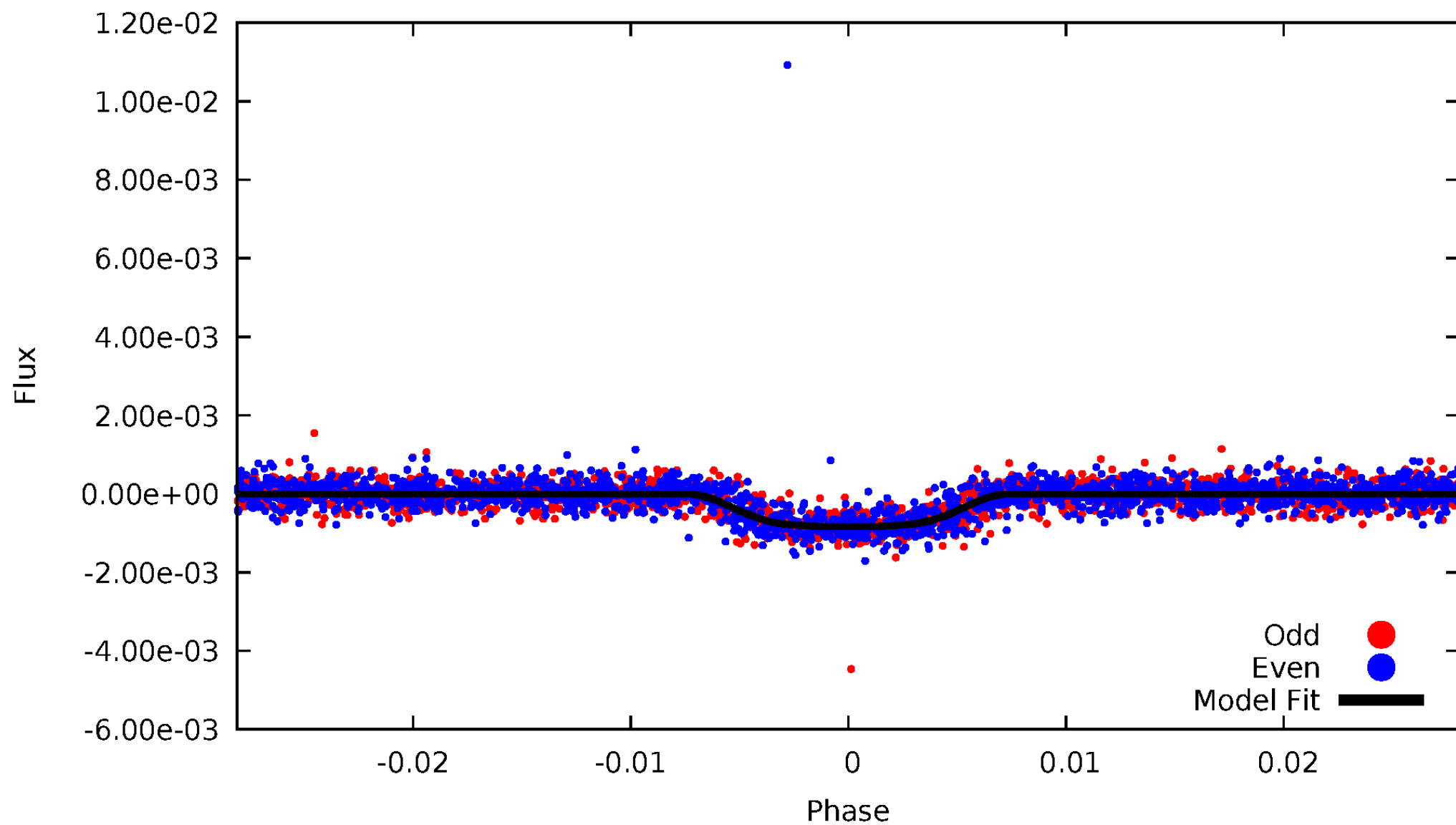


TCE 008037145-01



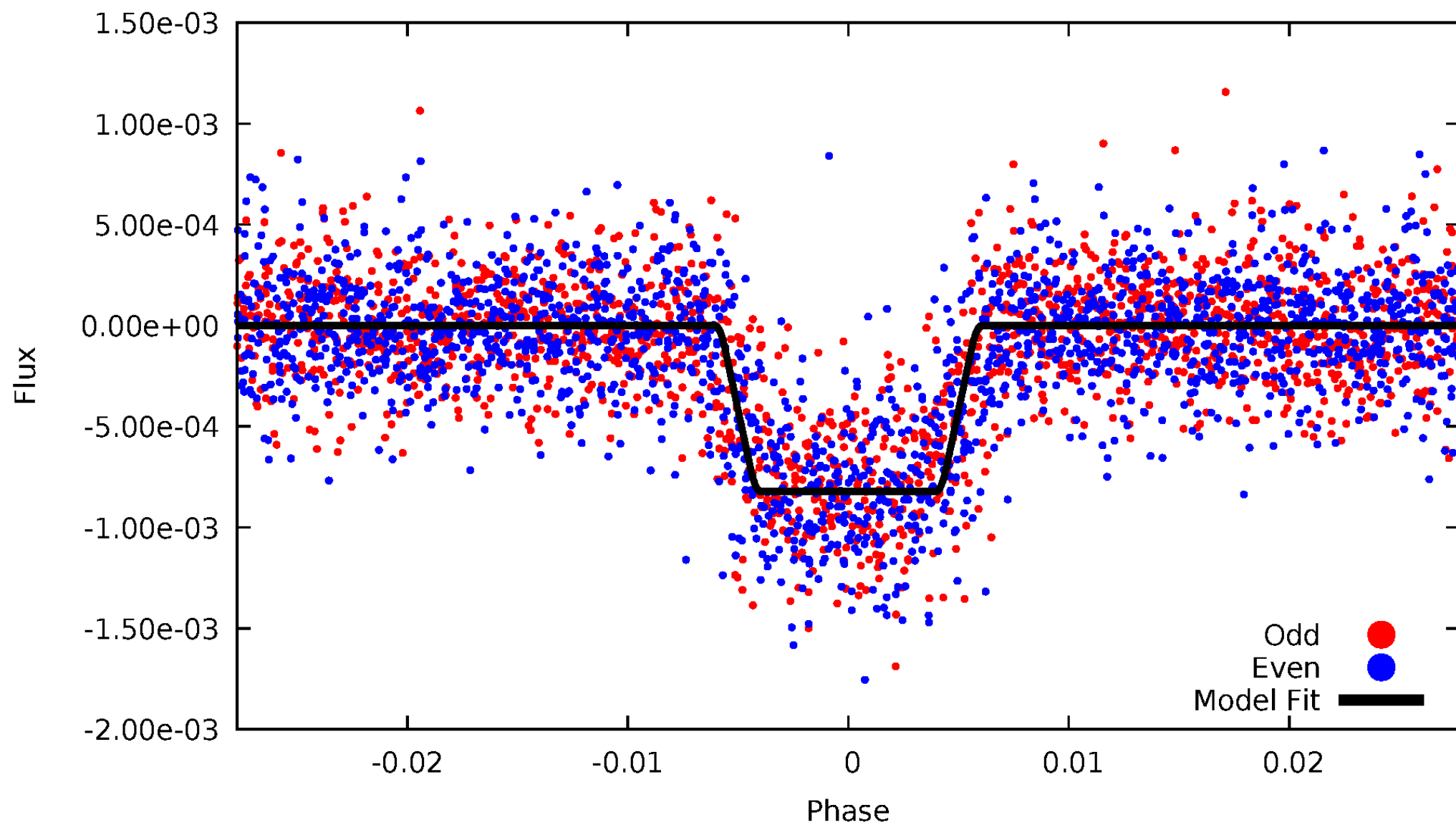
DV Odd/Even

TCE 008037145-01

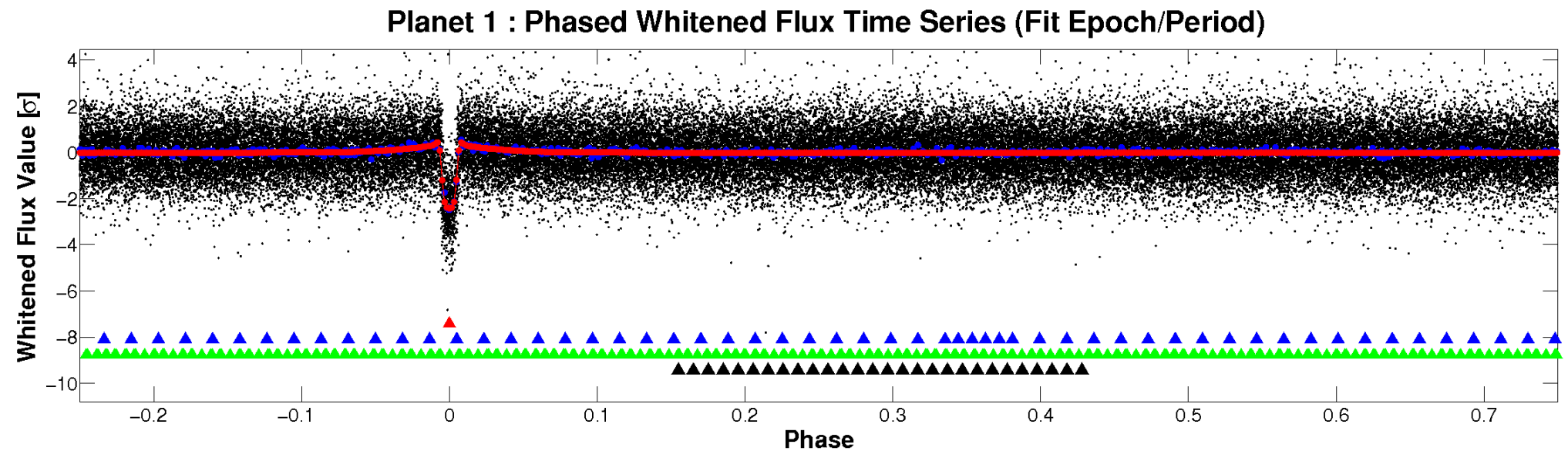
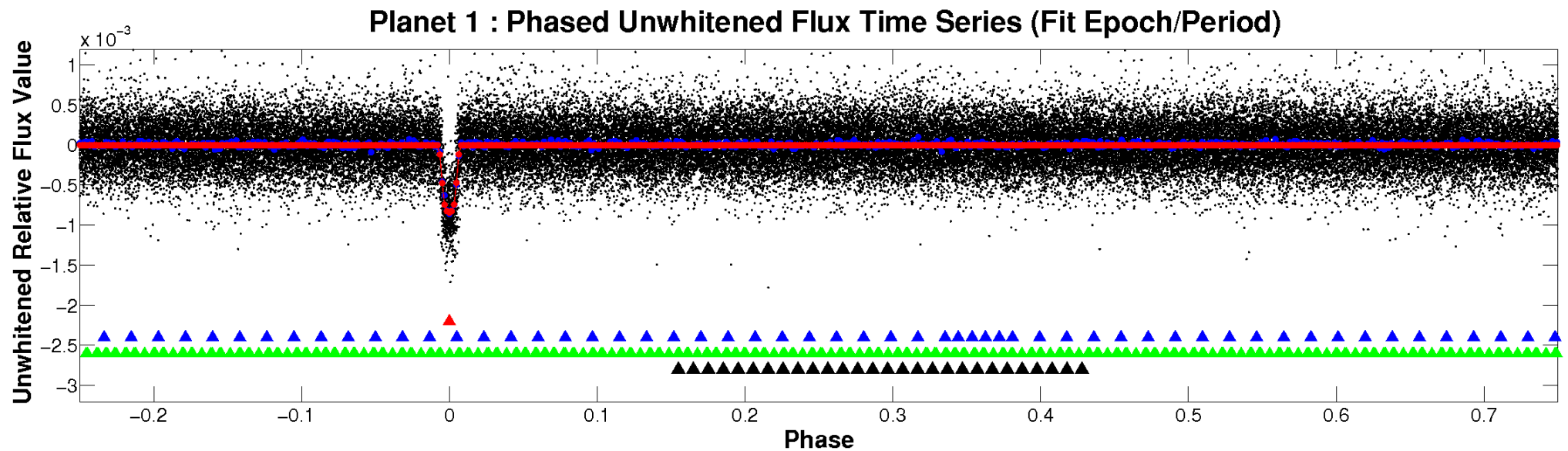


ALT Odd/Even

TCE 008037145-01

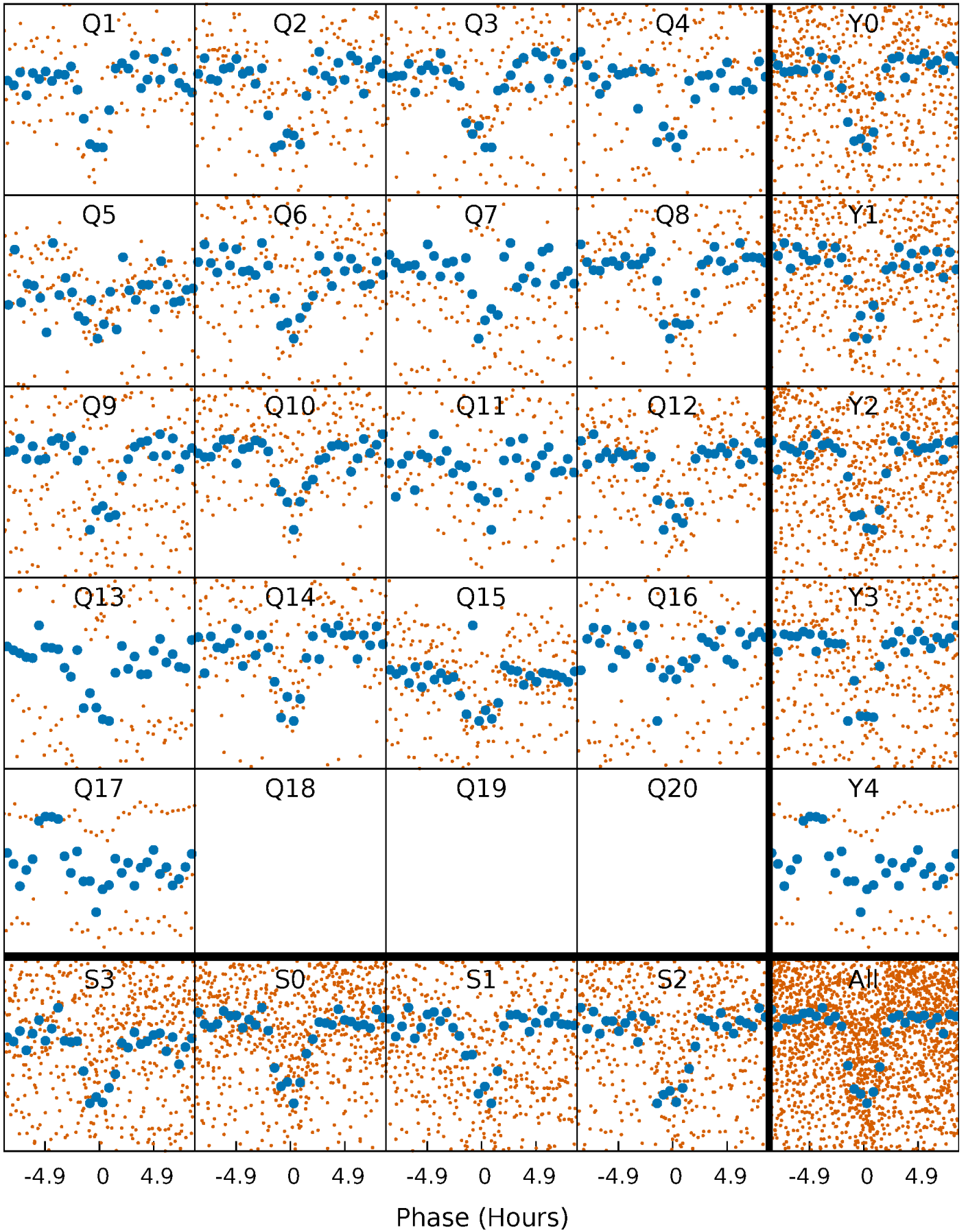


Non-Whitened Vs. Whitened Light Curve



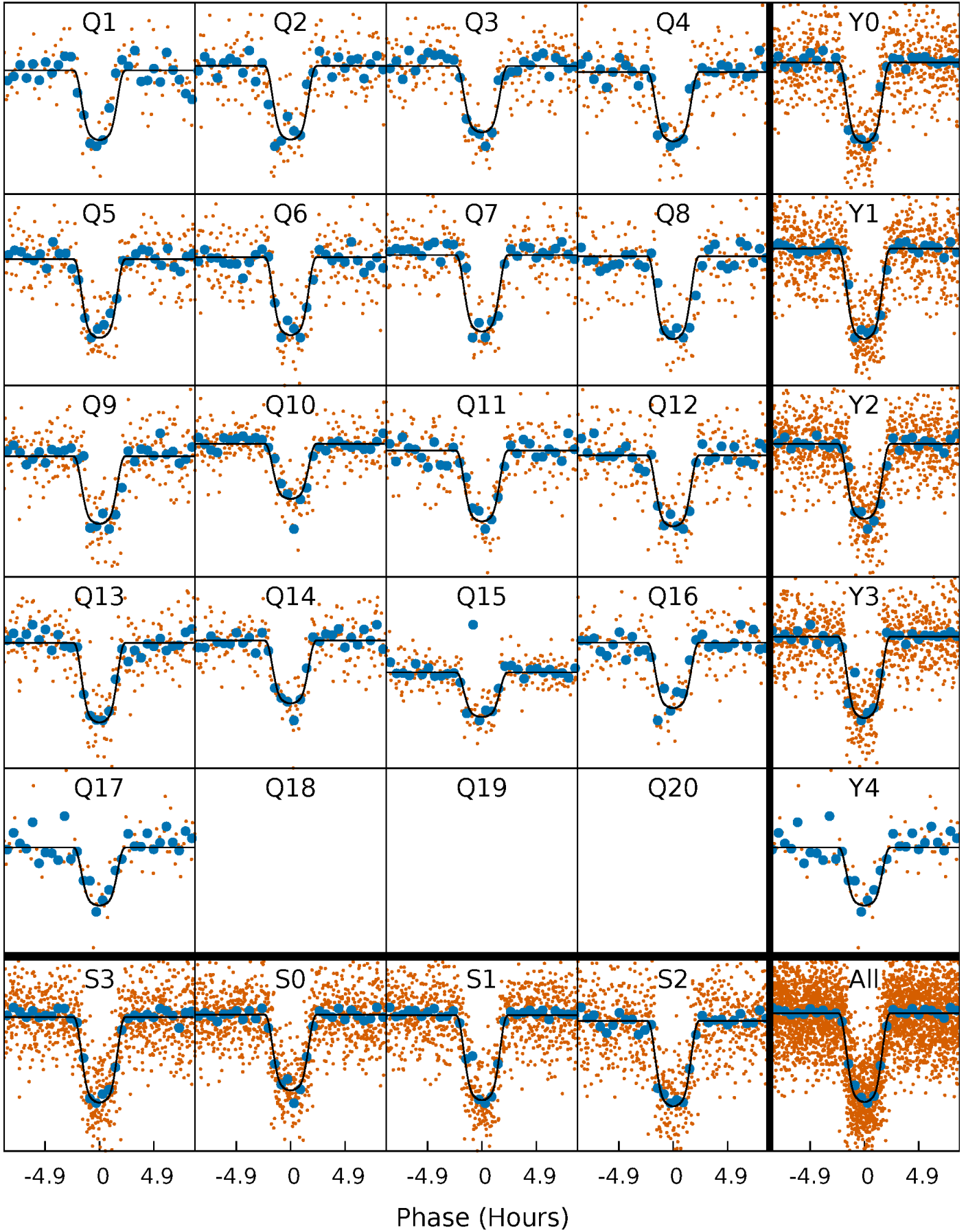
PDC Quarter-Phased Transit Curves

TCE 008037145-01 P= 12.759310 Days $T_0=132.044689$ (BKJD)



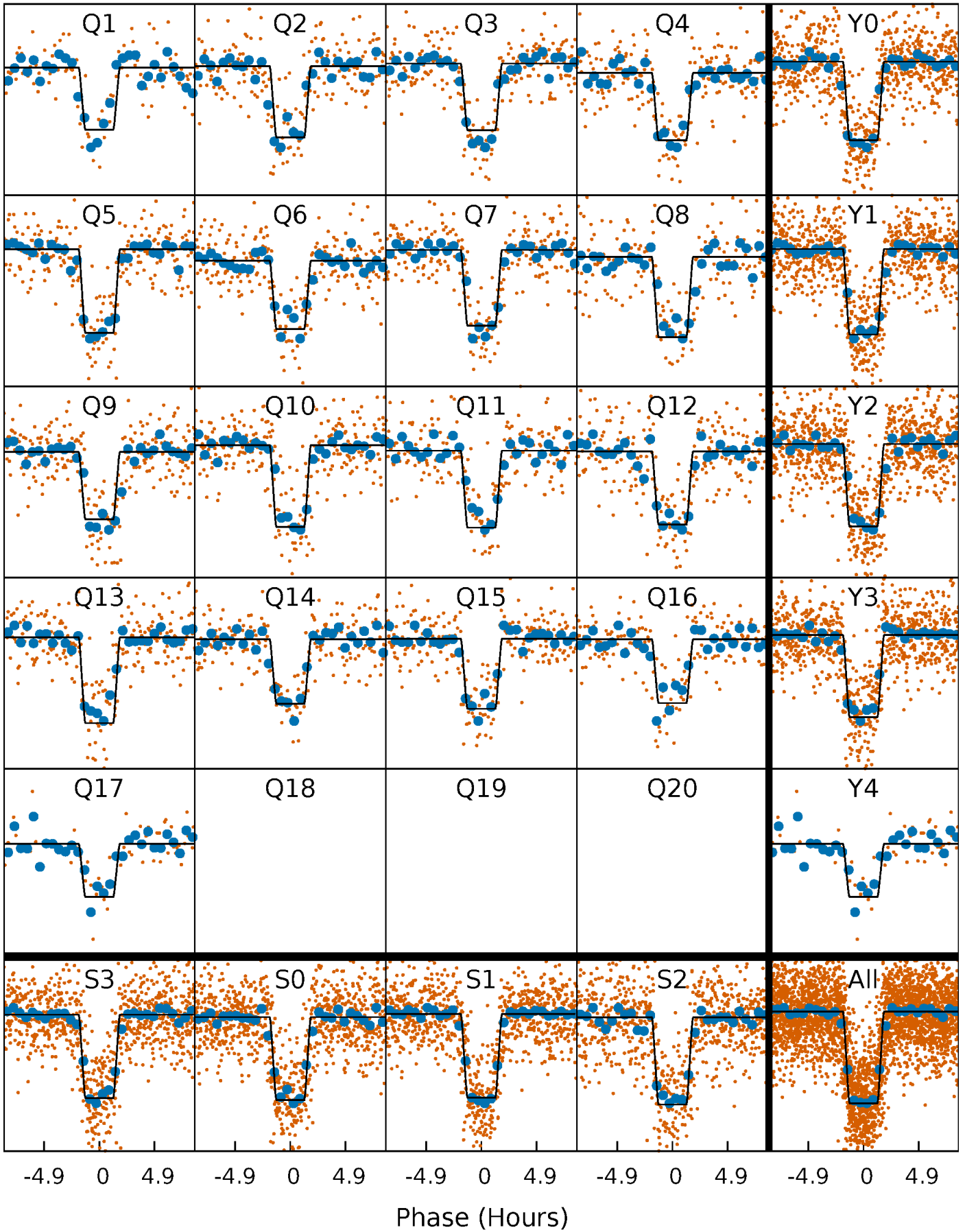
DV Quarter-Phased Transit Curves

TCE 008037145-01 P= 12.759310 Days $T_0=132.044689$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

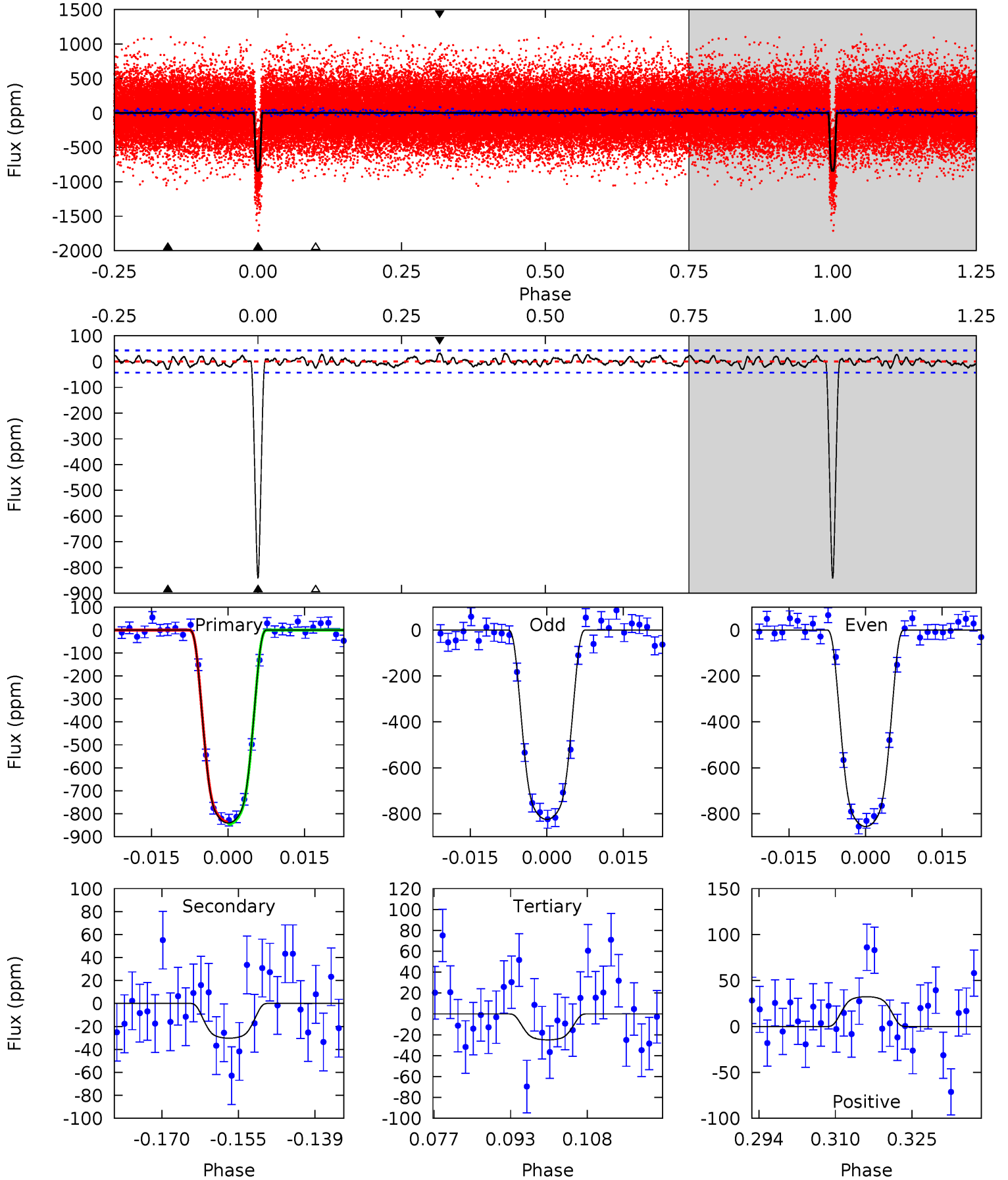
TCE 008037145-01 P= 12.759306 Days $T_0=132.045435$ (BKJD)



DV Model-Shift Uniqueness Test

008037145-01, P = 12.759310 Days, E = 119.285379 Days

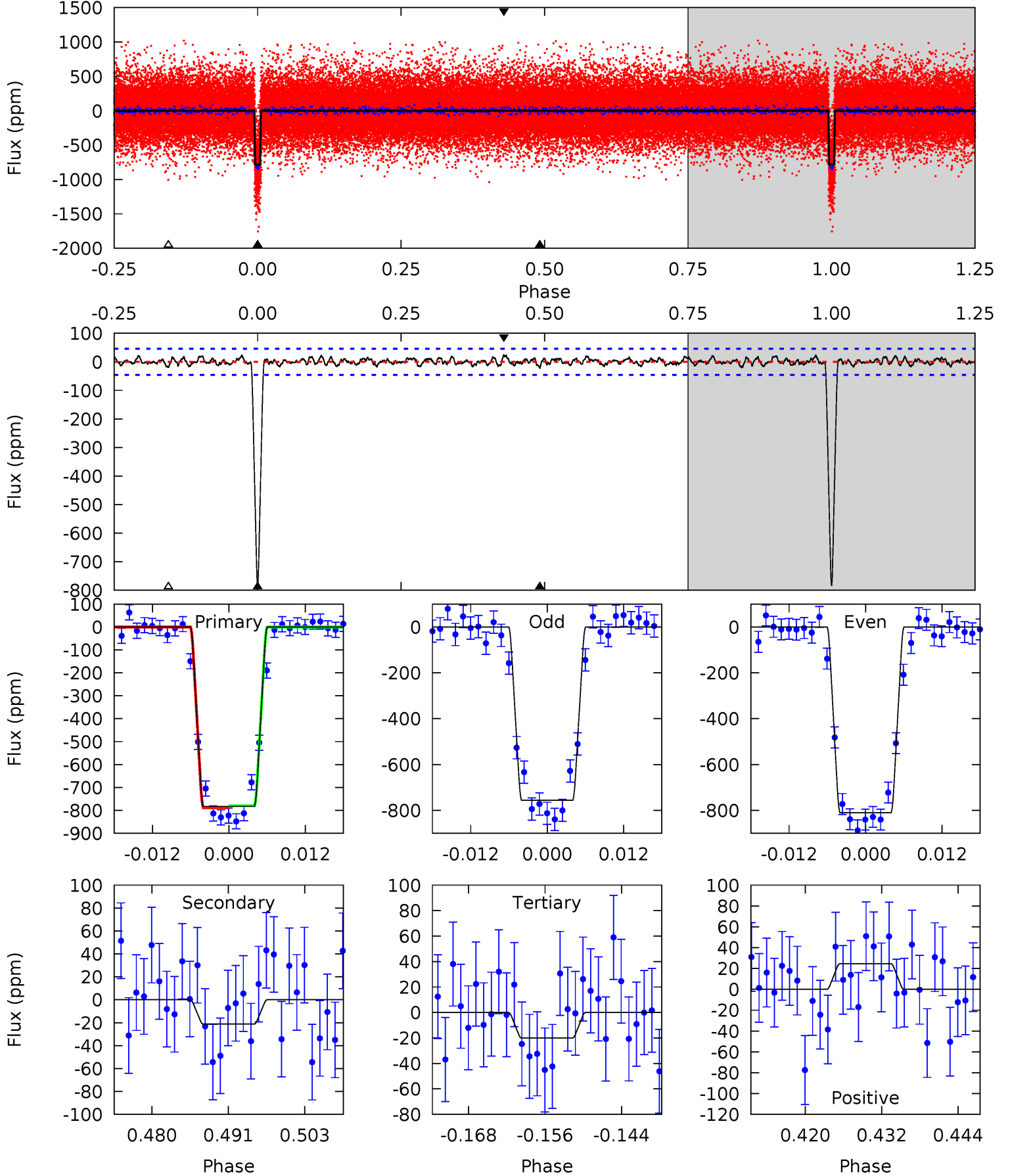
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
96.3	3.47	2.85	3.71	4.94	2.42	1.29	93.4	92.6	0.61	-0.24	1.76	0.99	0.04	0.55



Alt Model-Shift Uniqueness Test

008037145-01, $P = 12.759306$ Days, $E = 119.286129$ Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
85.6	2.33	2.19	2.69	4.99	2.51	0.91	83.4	82.9	0.13	-0.37	2.95	0.99	0.03	0.46



Stellar Parameters For KIC 008037145

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	4963^{+81}_{-74}	$4.501^{+0.072}_{-0.022}$	$0.160^{+0.150}_{-0.150}$	$0.826^{+0.032}_{-0.060}$	$0.789^{+0.055}_{-0.029}$	$1.973^{+0.537}_{-0.181}$
	+2%/-1%	+2%/-0%	+94%/-94%	+4%/-7%	+7%/-4%	+27%/-9%
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 008037145-01 / KOI 0520.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	A_{obs}
DV	-30 ± 9	$3.13^{+0.12}_{-0.14}$	880^{+17}_{-22}	2699^{+100}_{-103}	17^{+5}_{-4}
Alt.	-21 ± 9	$2.57^{+0.10}_{-0.12}$	879^{+19}_{-21}	2710^{+144}_{-202}	17^{+8}_{-8}

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

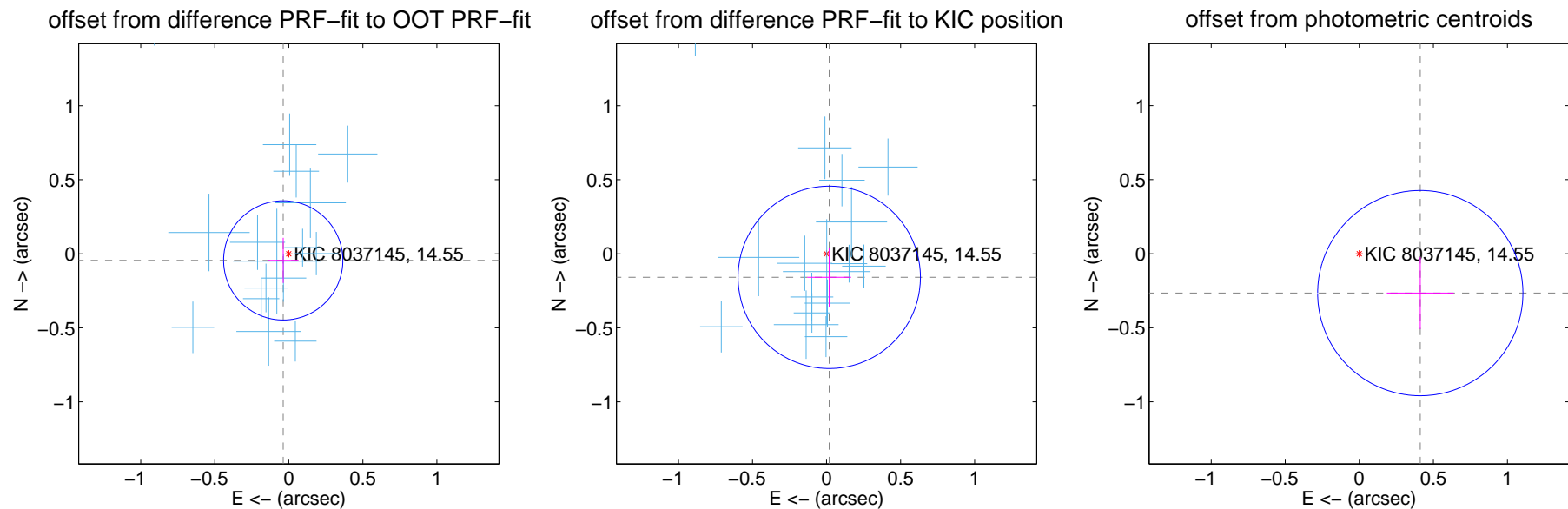
DV Centroid Data

Supplemental centroid analysis for 008037145-01. Kepler magnitude: 14.55. Transit SNR 54.49

There are 16 quarters with good PRF difference image offsets

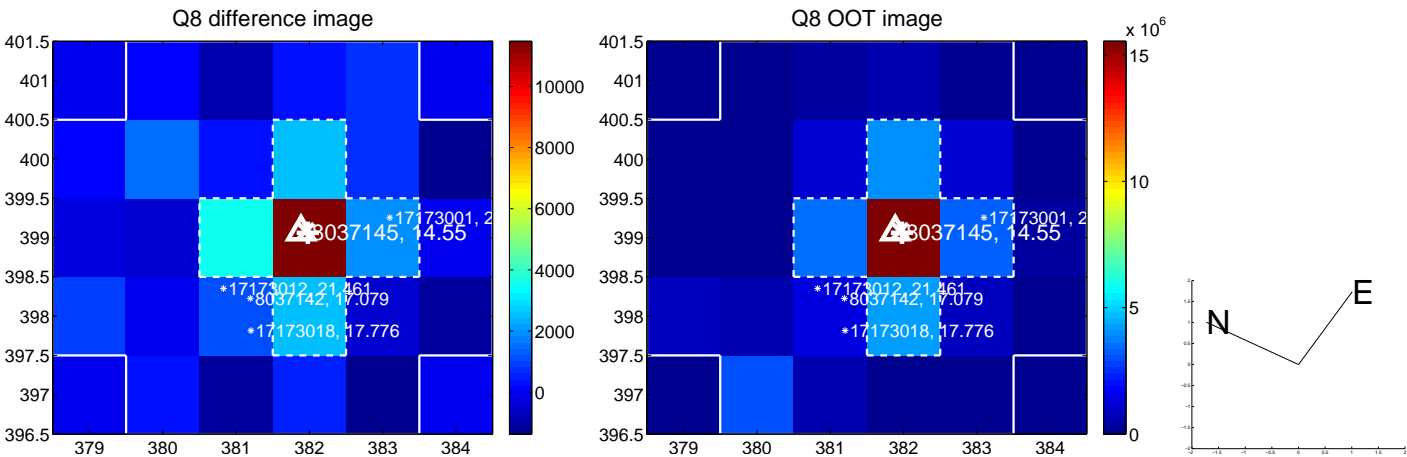
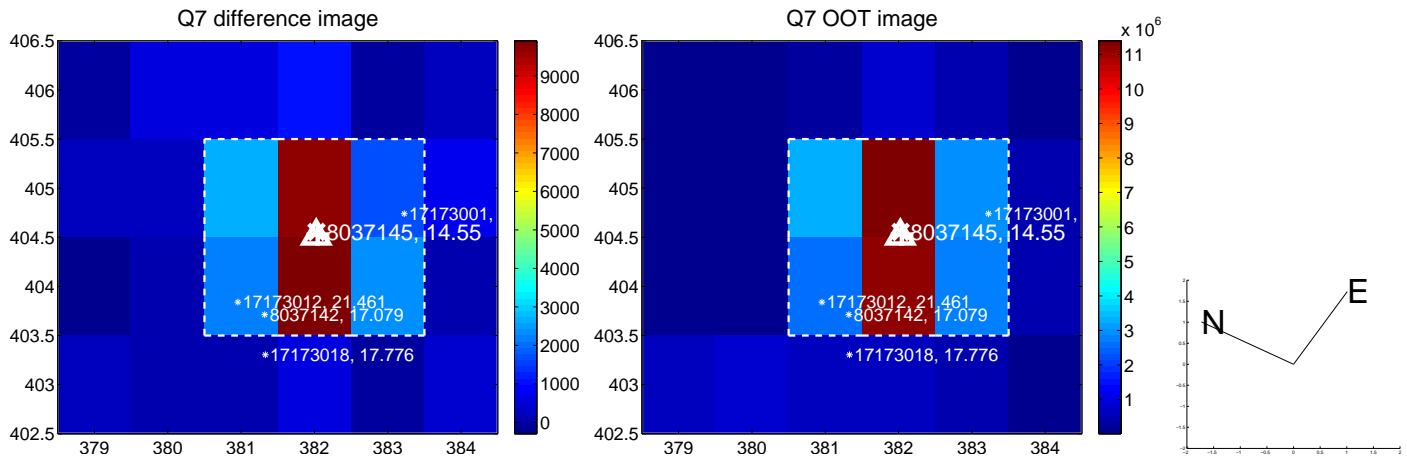
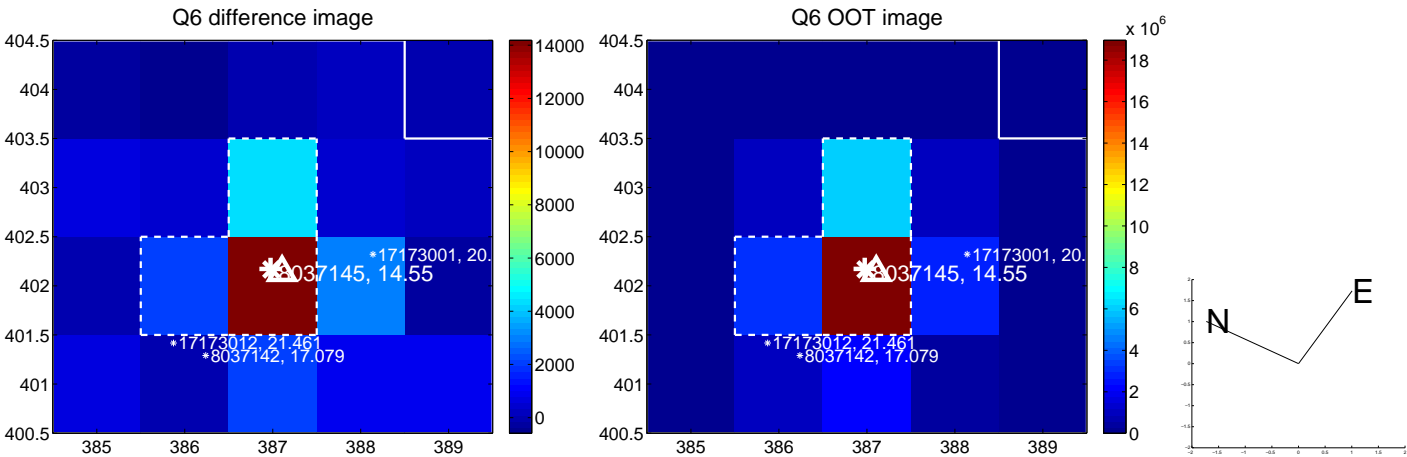
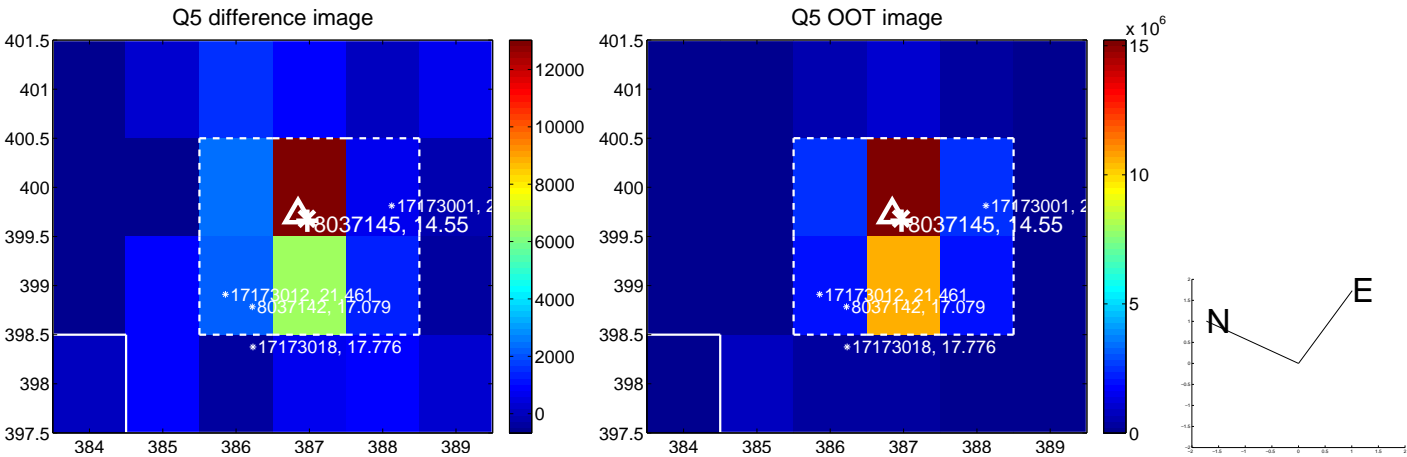
The direct PRF centroid is offset from the target star catalog position by about 0.11 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.059 ± 0.134	0.44	0.038 ± 0.103	-0.045 ± 0.153
PRF-fit source offset from KIC position	0.160 ± 0.205	0.78	-0.018 ± 0.148	-0.159 ± 0.197
photometric centroid source offset	0.49 ± 0.23	2.12	-0.41 ± 0.23	-0.27 ± 0.24

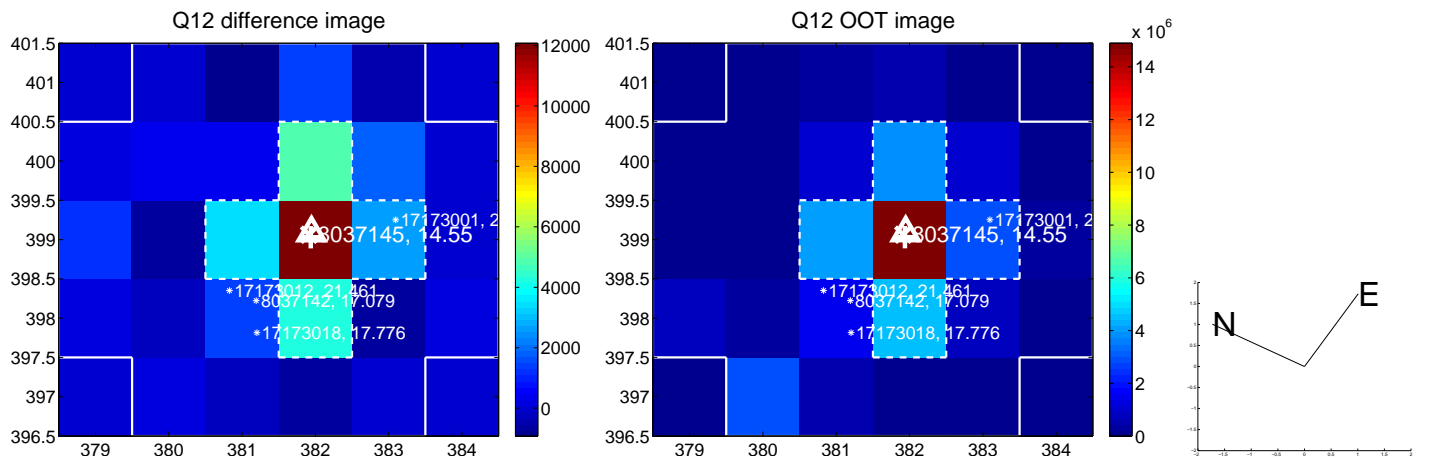
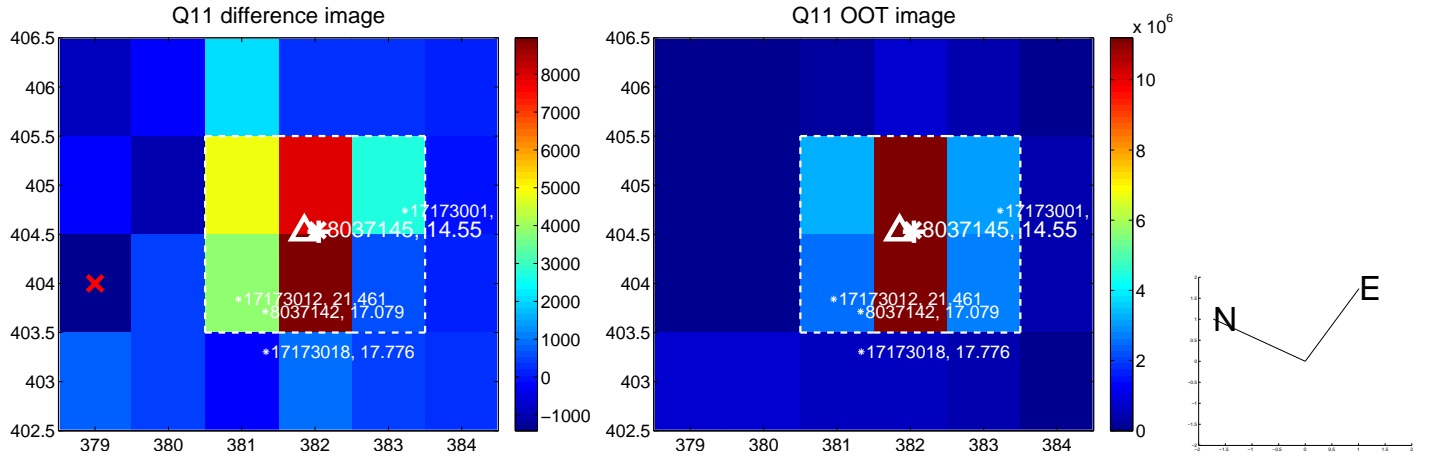
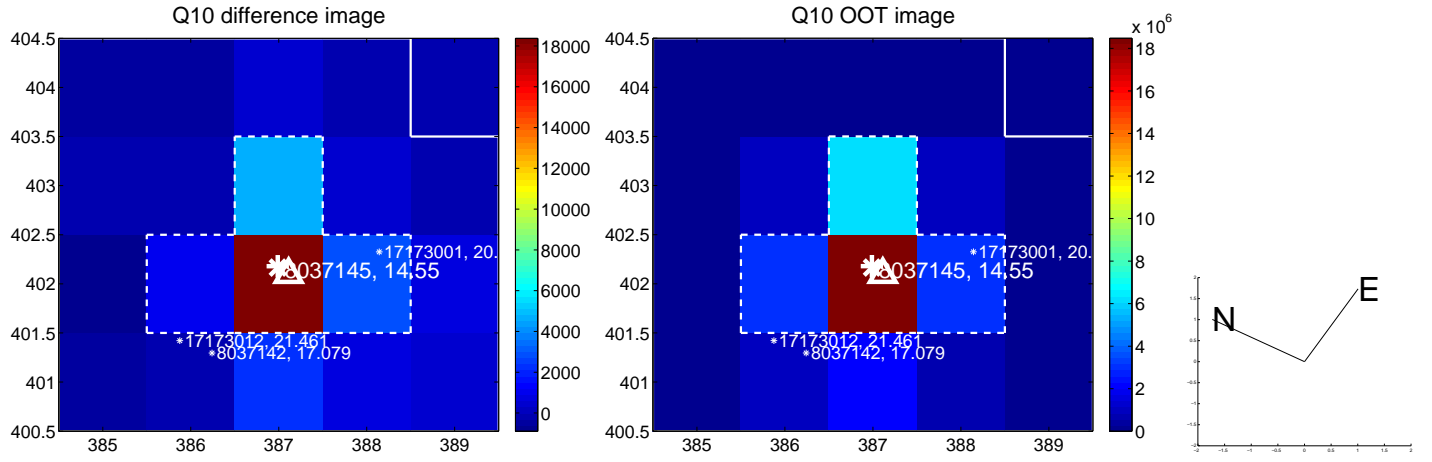
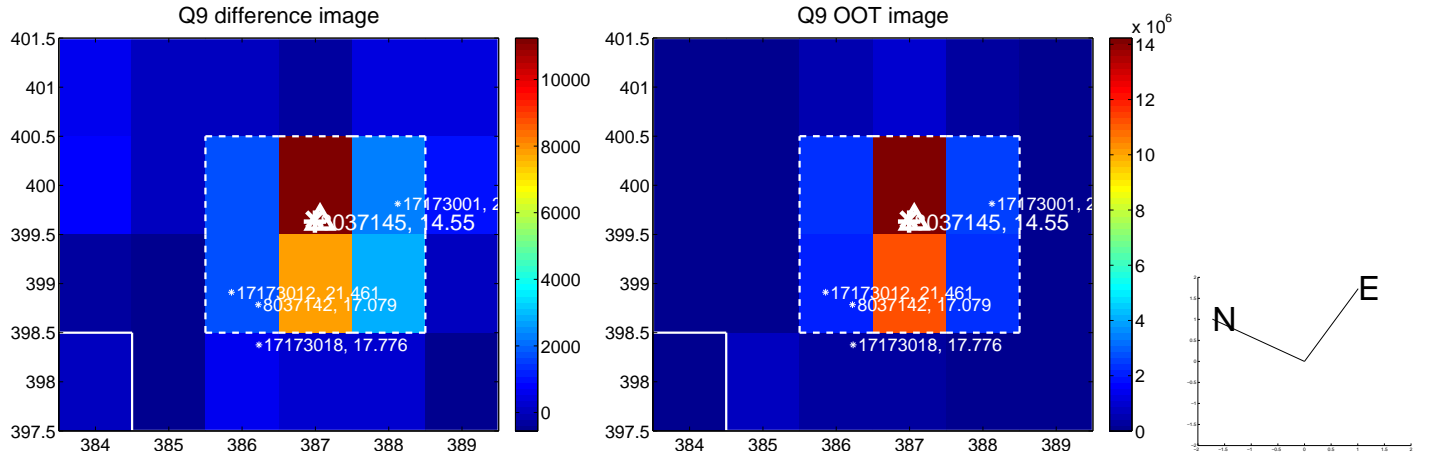


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

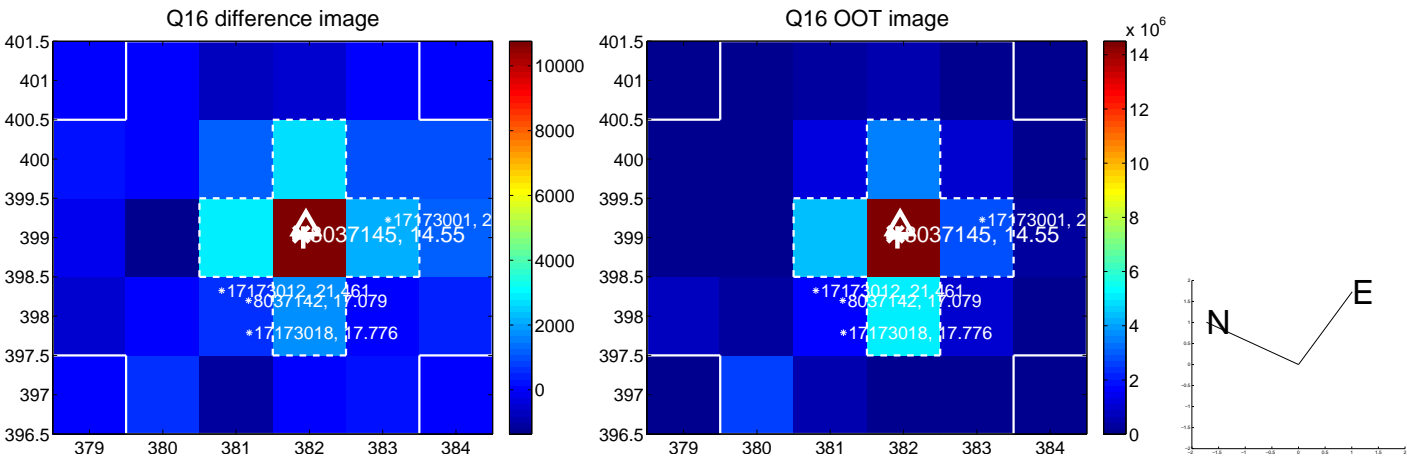
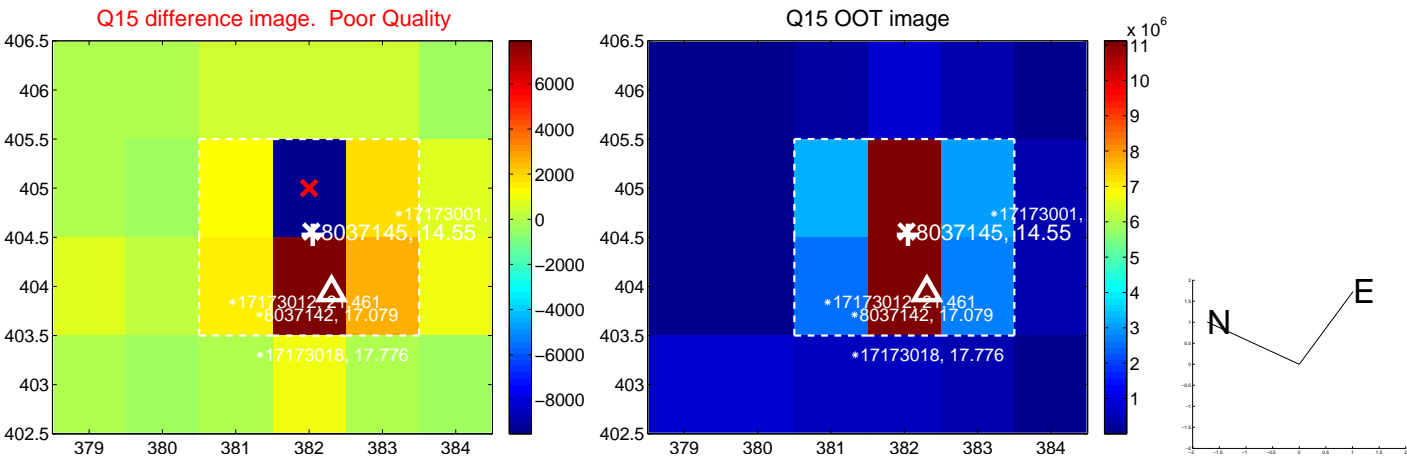
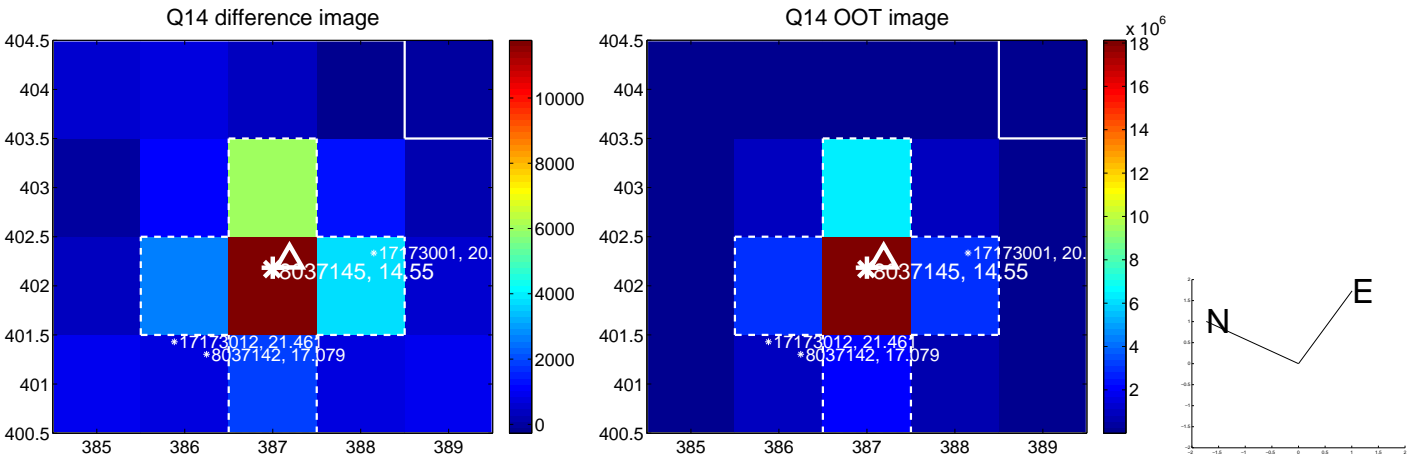
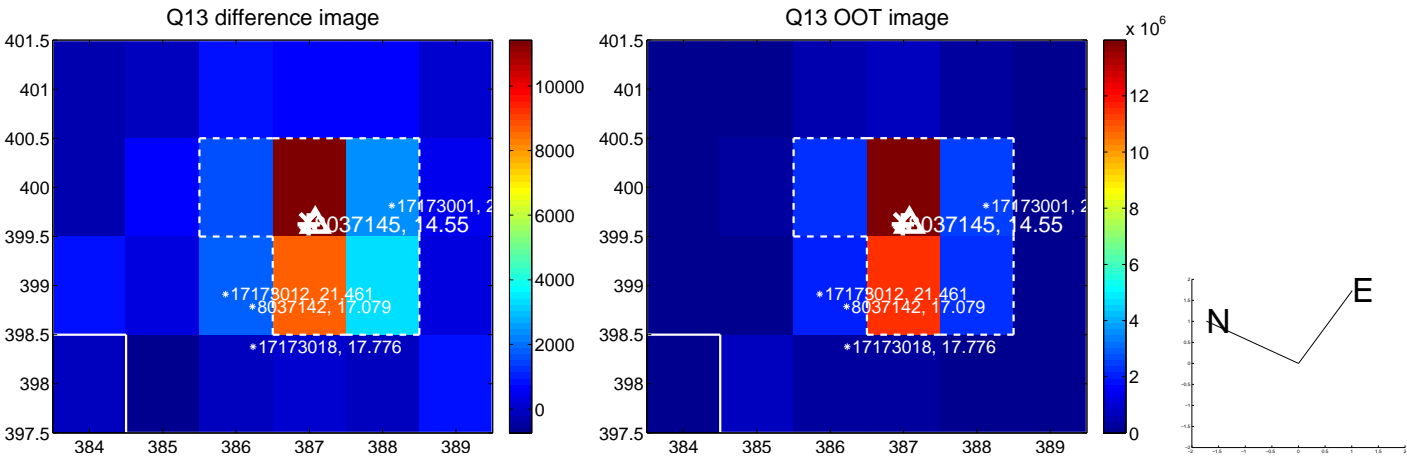
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



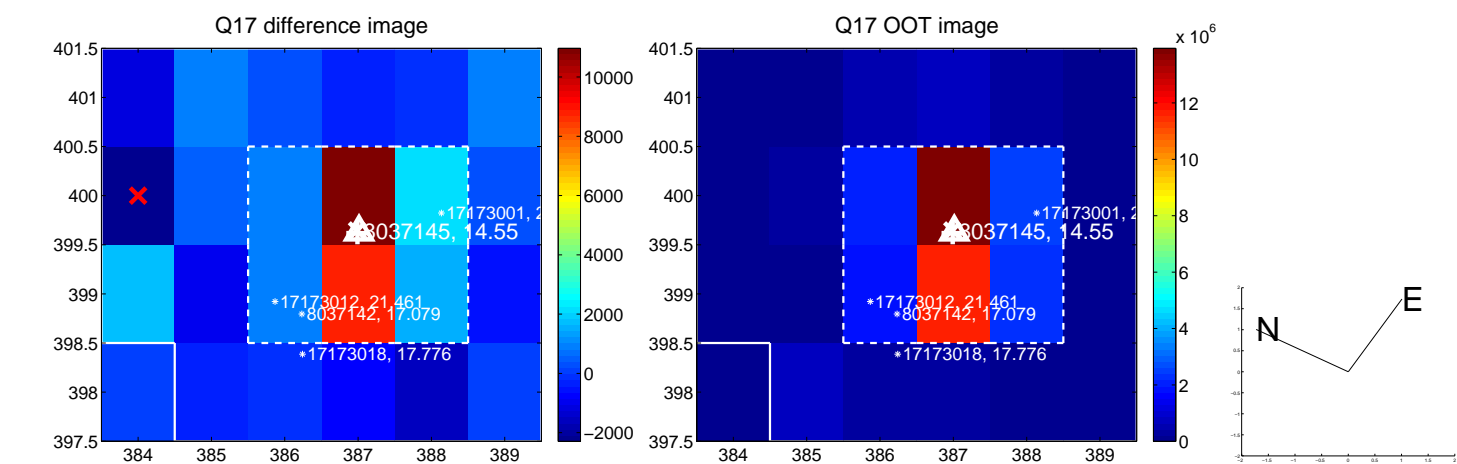
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



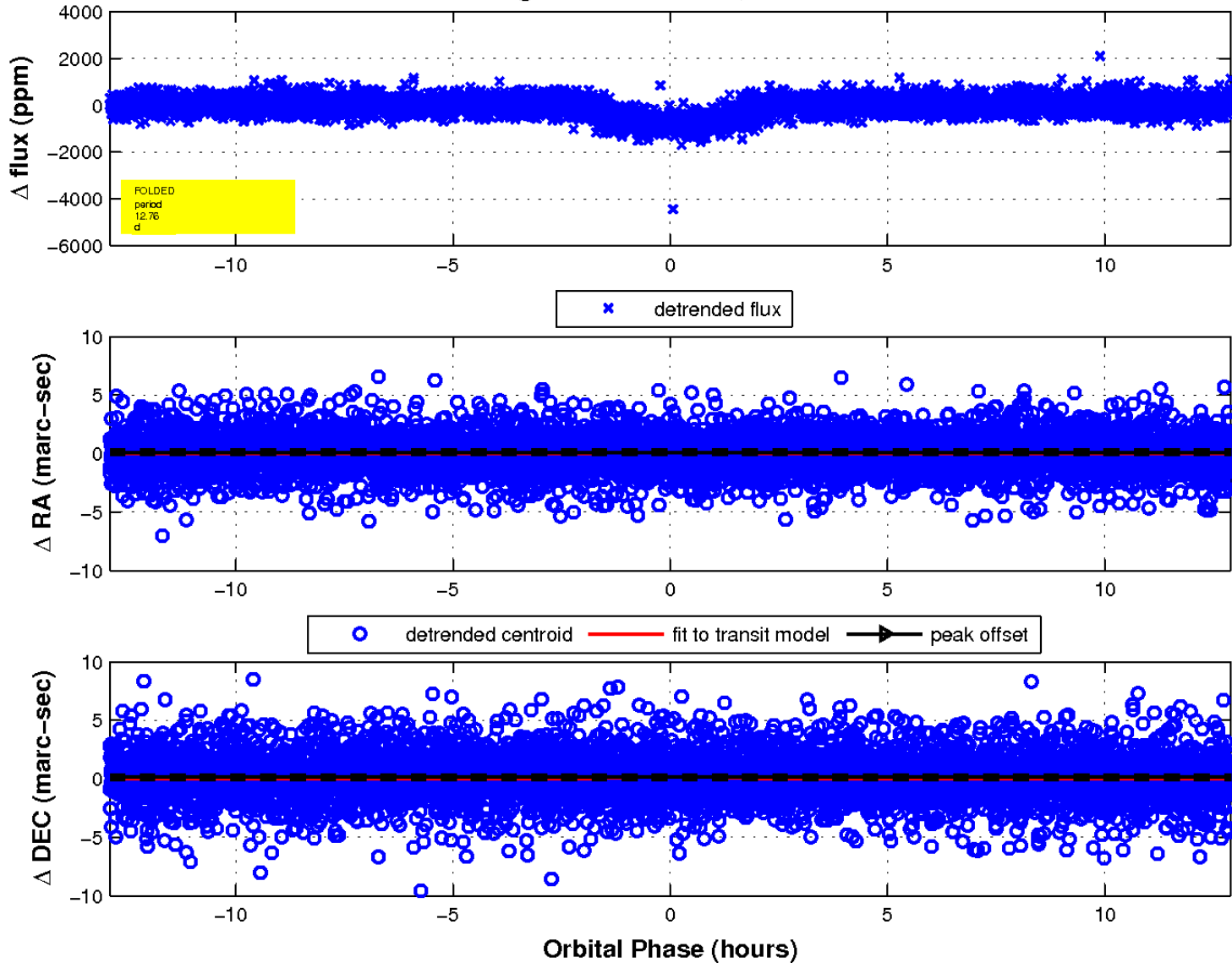
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



fluxWeightedCentroids, Planet 1 of 4



UKIRT Image



KIC 008037145

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})
008037145-01	OBS	0520.01	12.759310	132.044689	844.6	4.300	50.4	54.5	0.83	4963	3.15	38.03
008037145-02	OBS	0520.03	25.752791	136.437973	751.8	3.744	28.7	30.7	0.83	4963	3.23	14.91
008037145-03	OBS	0520.02	5.433079	132.941491	271.7	2.557	23.6	25.4	0.83	4963	1.65	118.70
008037145-04	OBS	0520.04	51.166266	172.299979	274.5	5.143	10.2	10.3	0.83	4963	1.73	5.97

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008037145-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
008037145-02	OBS	PC	1.00	0	0	0	0	NO_COMMENT
008037145-03	OBS	PC	1.00	0	0	0	0	NO_COMMENT
008037145-04	OBS	PC	0.91	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.

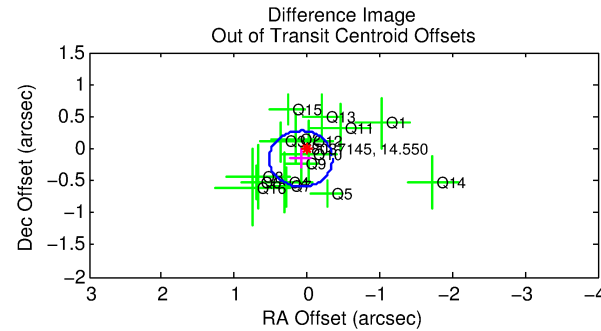
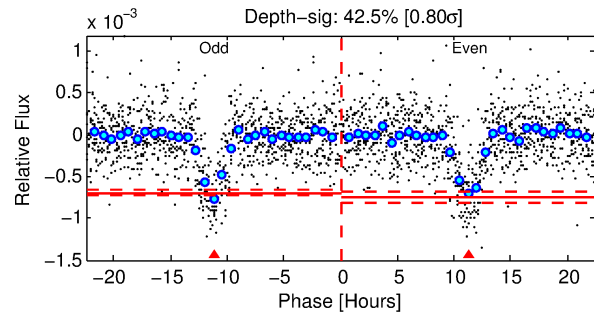
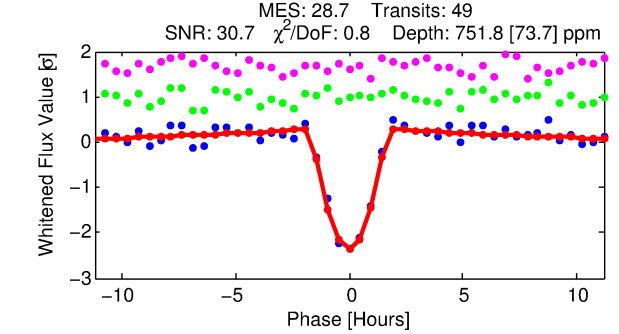
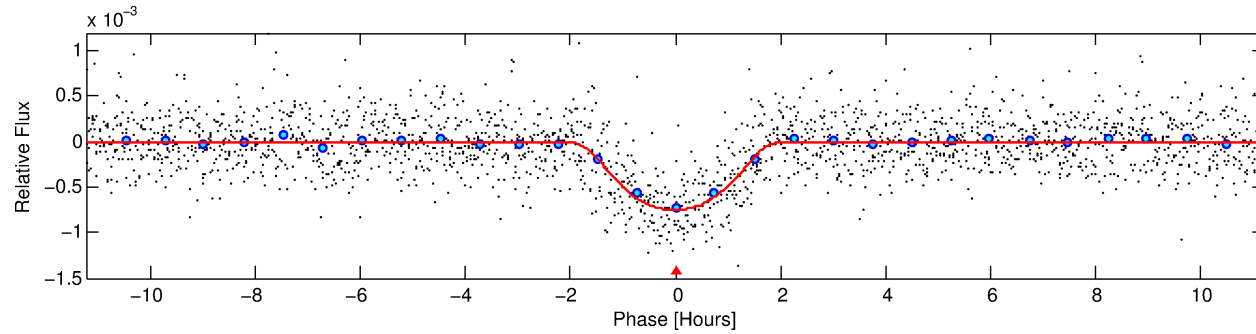
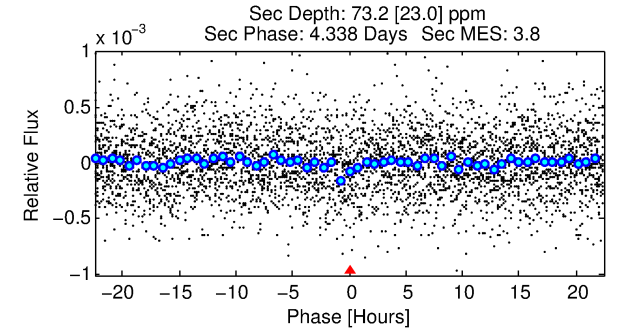
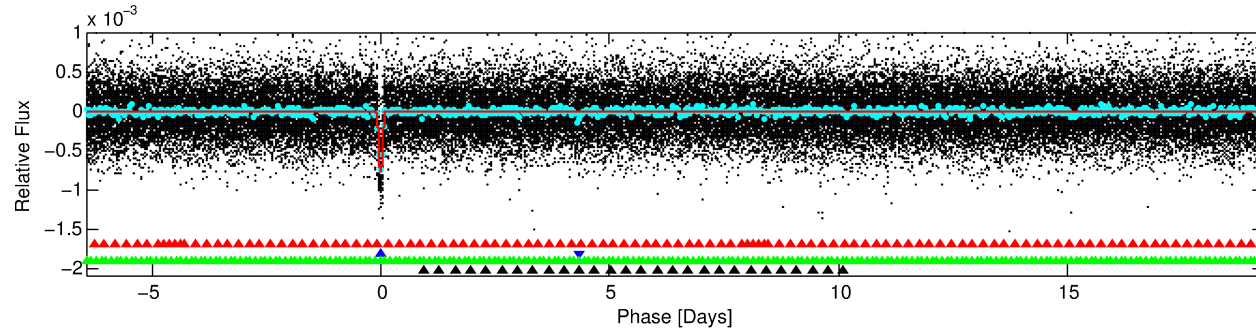
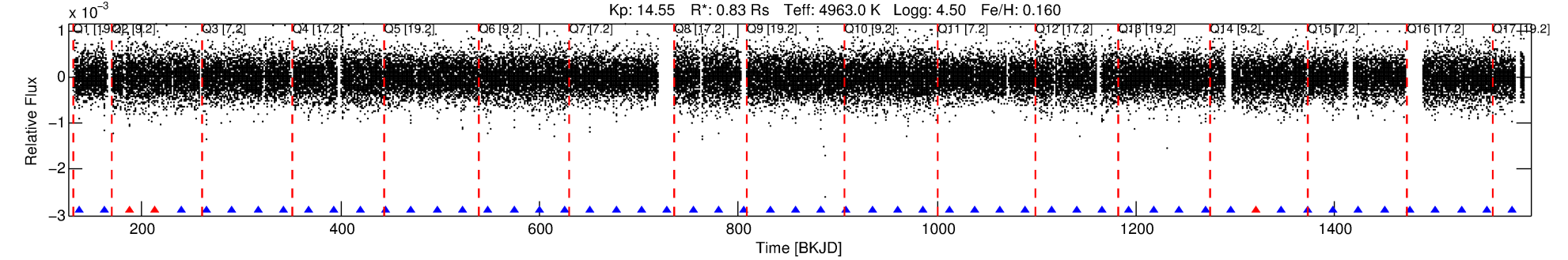
Ephemeris Match Information For 008037145-02

No Significant Match Found

DV One-Page Summary

KIC: 8037145 Candidate: 2 of 4 Period: 25.753 d
KOI: K00520.03 Name: Kepler-176d Corr: 0.882

Kp: 14.55 R*: 0.83 Rs Teff: 4963.0 K Logg: 4.50 Fe/H: 0.160



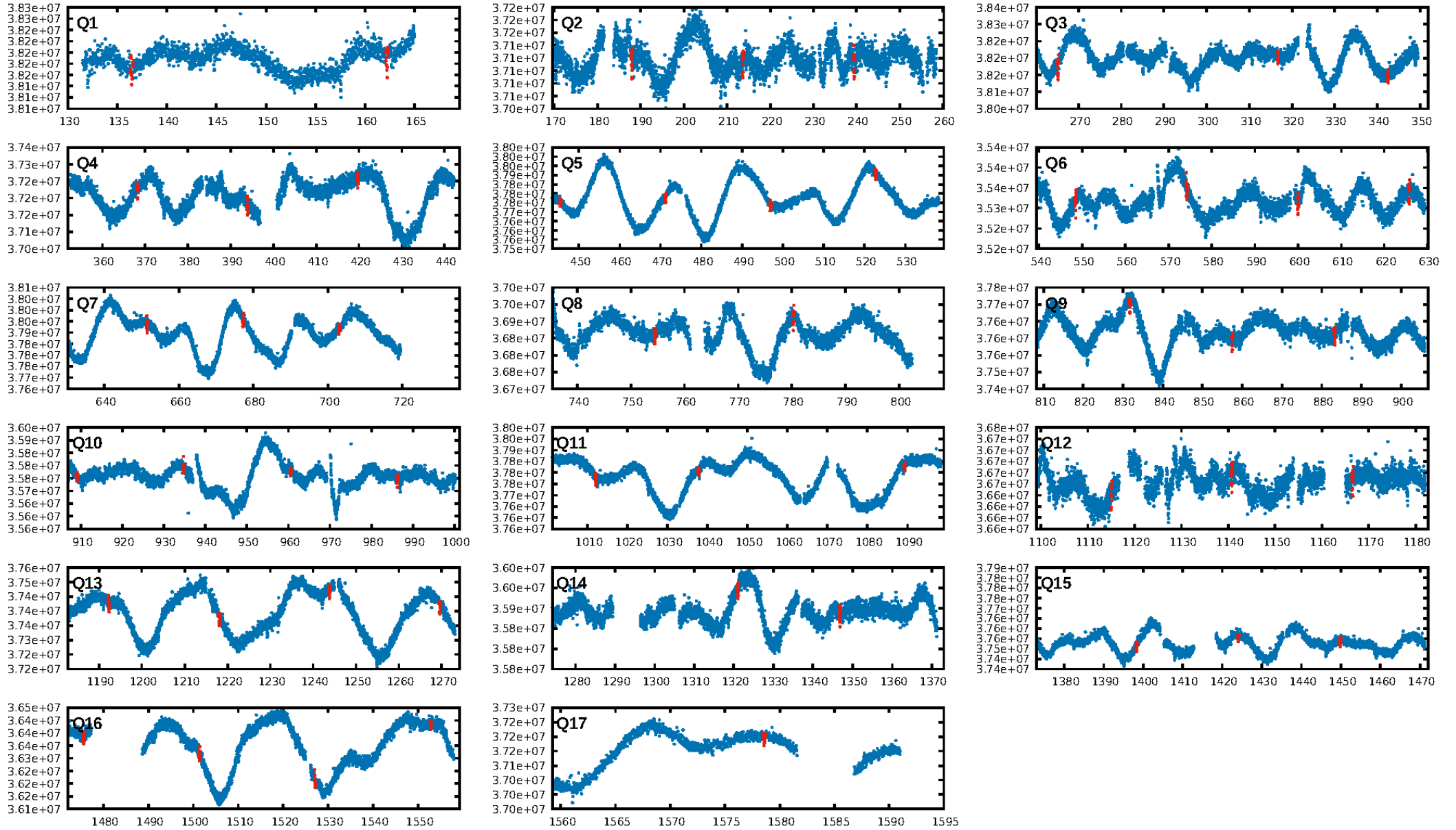
DV Fit Results:

Period = 25.75279 [0.00008] d
Epoch = 136.4380 [0.0026] BKJD
Rp/R* = 0.0358 [0.0048]
a/R* = 19.22 [1.99]
b = 0.97 [0.01]
Seff = 14.91 [2.05]
Teq = 501 [17] K
Rp = 3.23 [0.49] Re
a = 0.1577 [0.0116] AU
Ag = 96.13 [41.46] [2.29σ]
Teffp = 2426 [254] K [7.55σ]

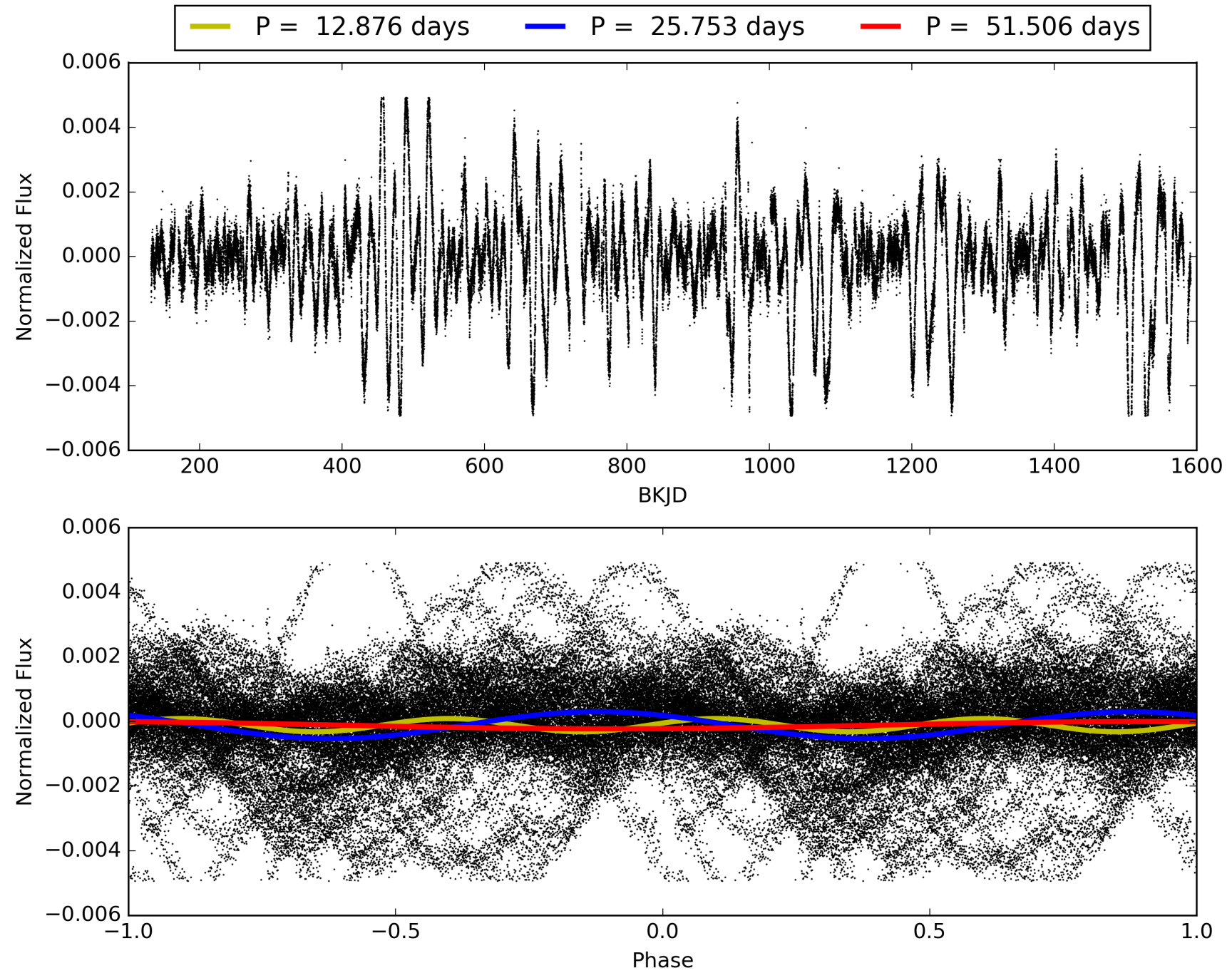
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [54.70σ]
LongPeriod-sig: 100.0% [95.88σ]
ModelChiSquare2-sig: 99.7%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 3.94e-173
RollingBand-fgt: 0.93 [43/46]
GhostDiagnostic-chr: 11.98
Centroid-sig: 17.3%
Centroid-so: 0.343 arcsec [0.75σ]
OotOffset-rm: 0.182 arcsec [1.25σ]
KicOffset-rm: 0.220 arcsec [1.57σ]
OotOffset-st: 4/4/4/4 [16]
KicOffset-st: 4/4/4/4 [16]
DiffImageQuality-fgm: 1.00 [16/16]
DiffImageOverlap-fno: 0.94 [16/17]

TCE 008037145-02, PDC Light Curves

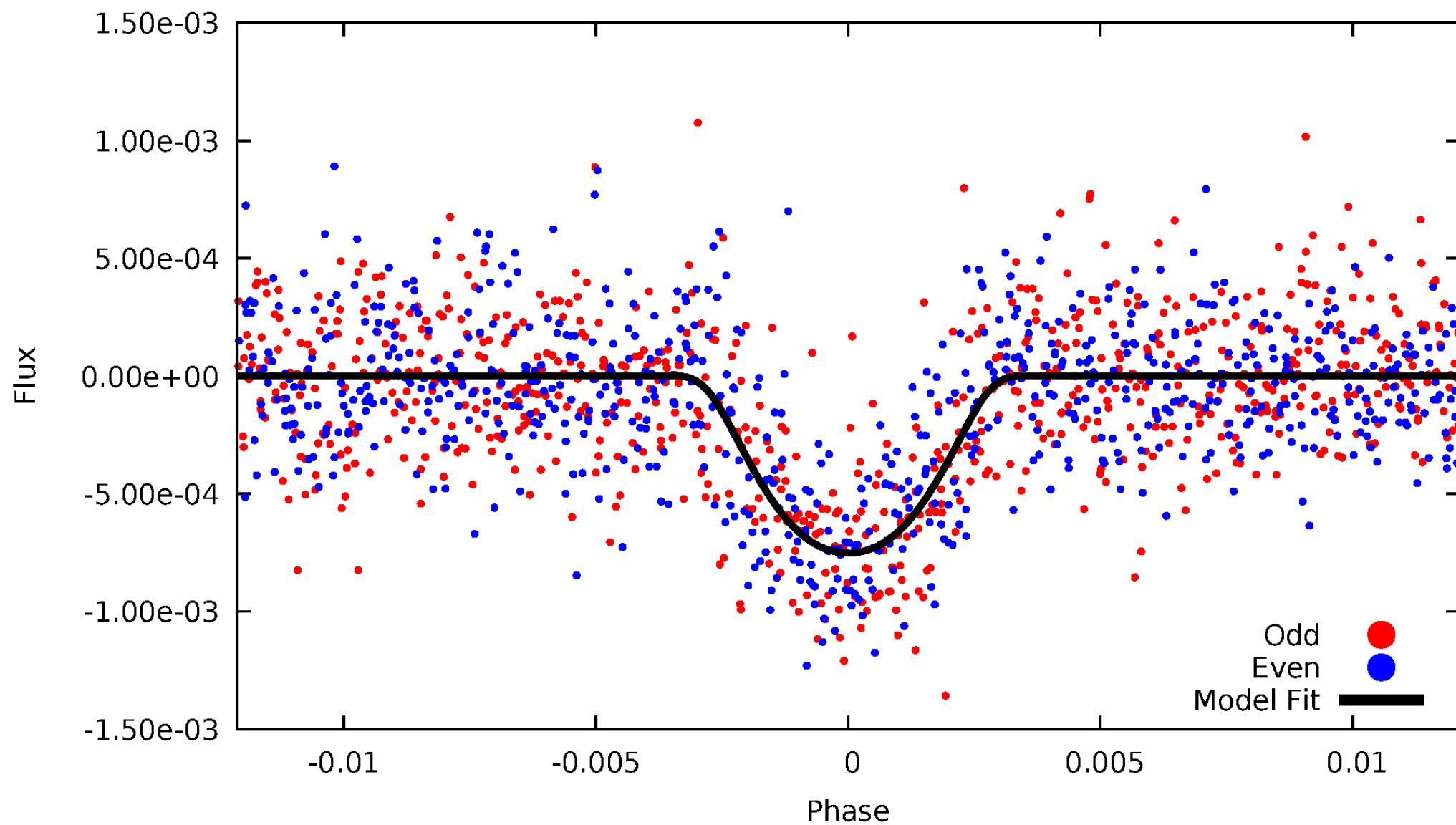


TCE 008037145-02



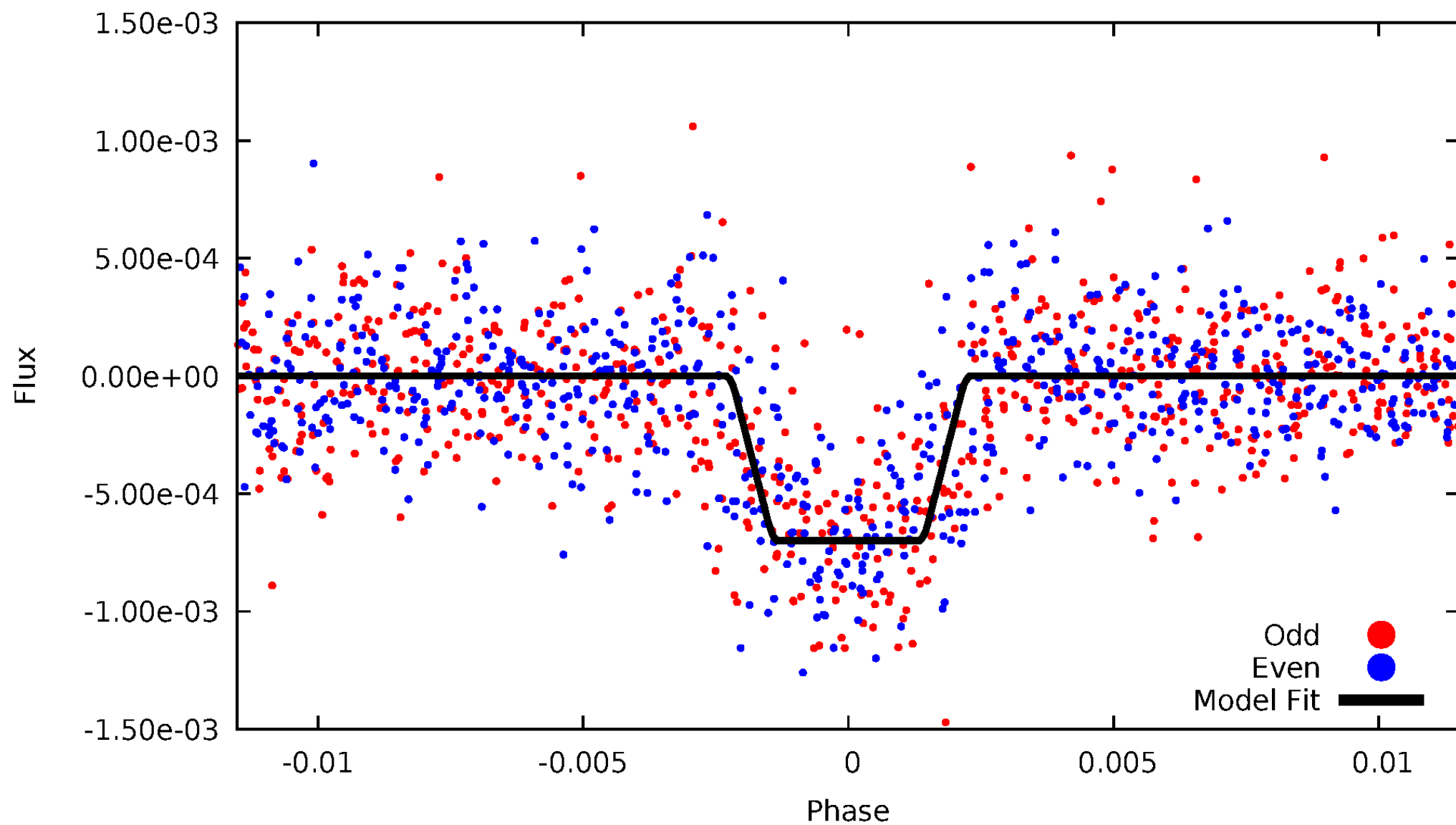
DV Odd/Even

TCE 008037145-02



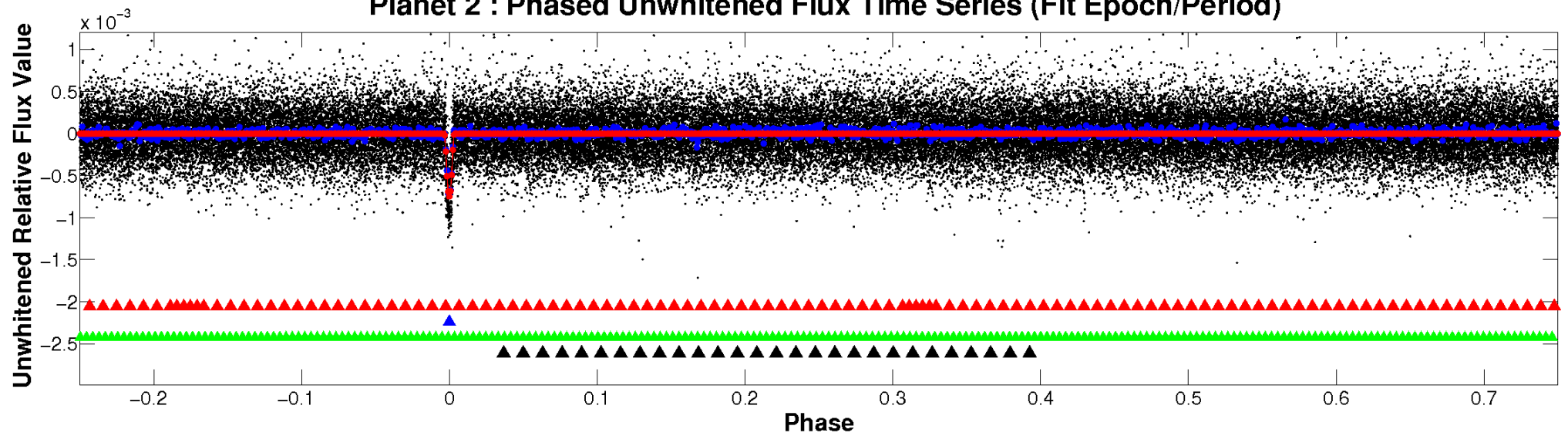
ALT Odd/Even

TCE 008037145-02

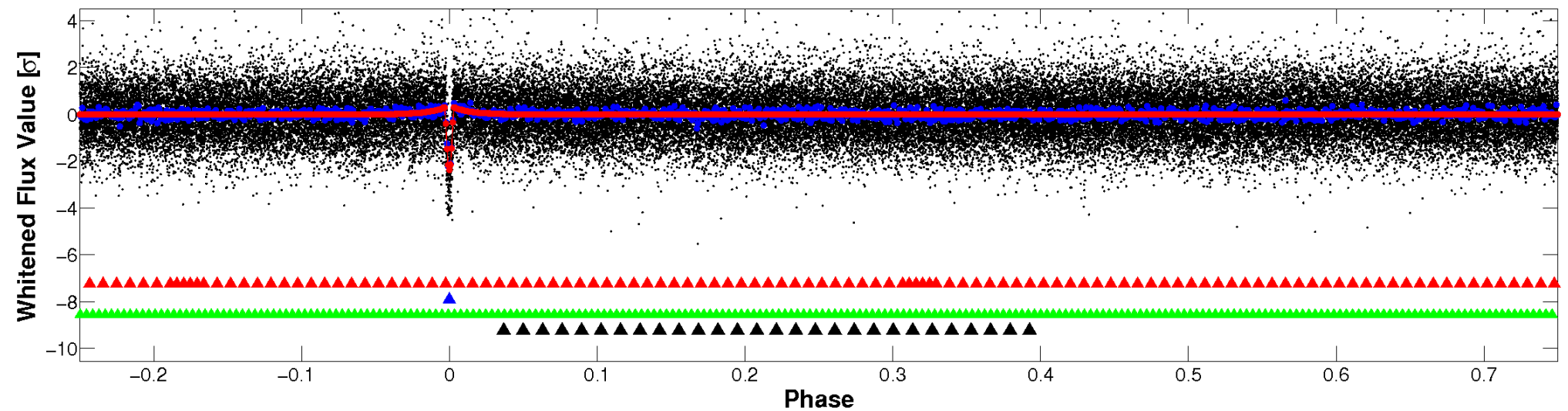


Non-Whitened Vs. Whitened Light Curve

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

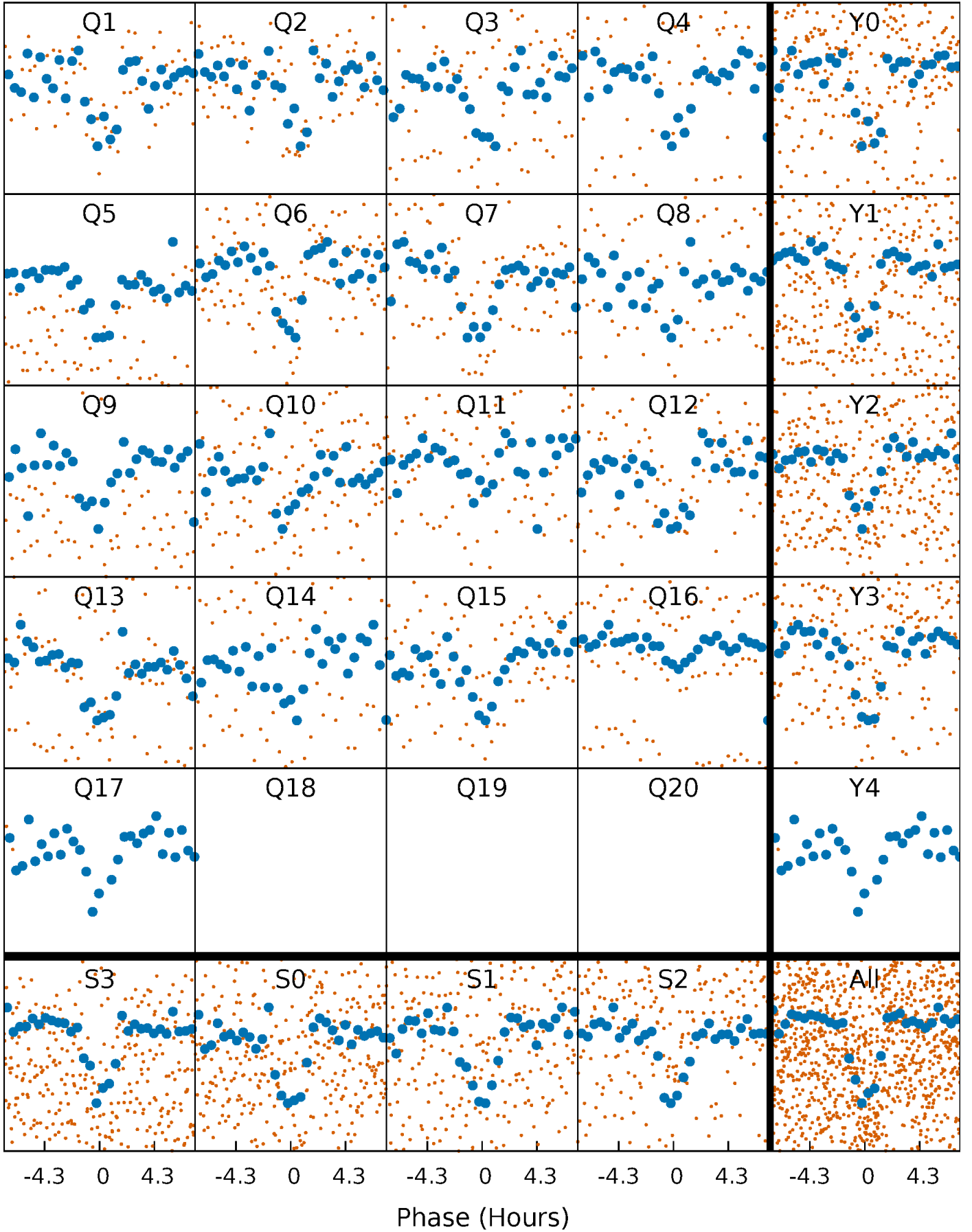


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



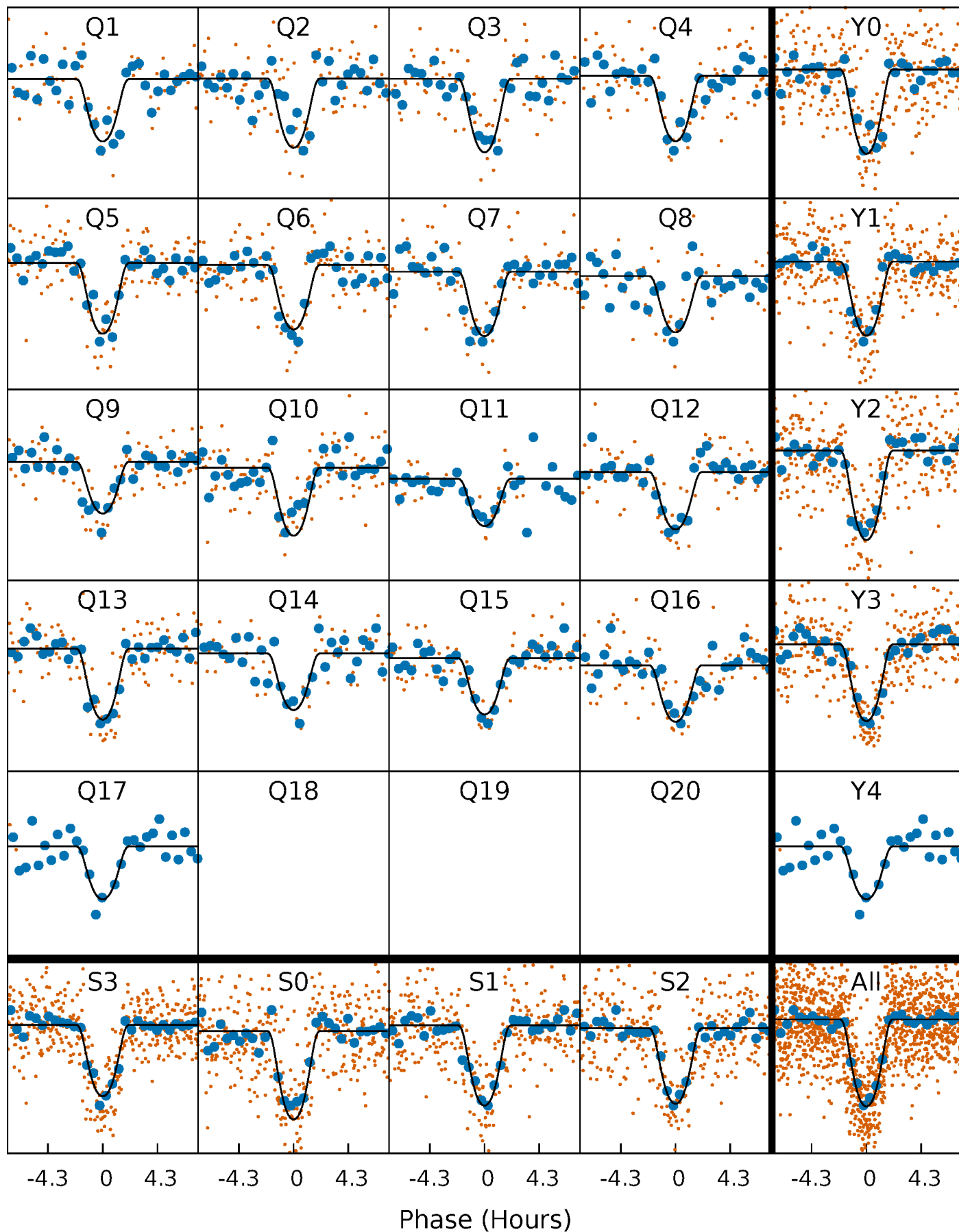
PDC Quarter-Phased Transit Curves

TCE 008037145-02 P= 25.752791 Days $T_0=136.437973$ (BKJD)



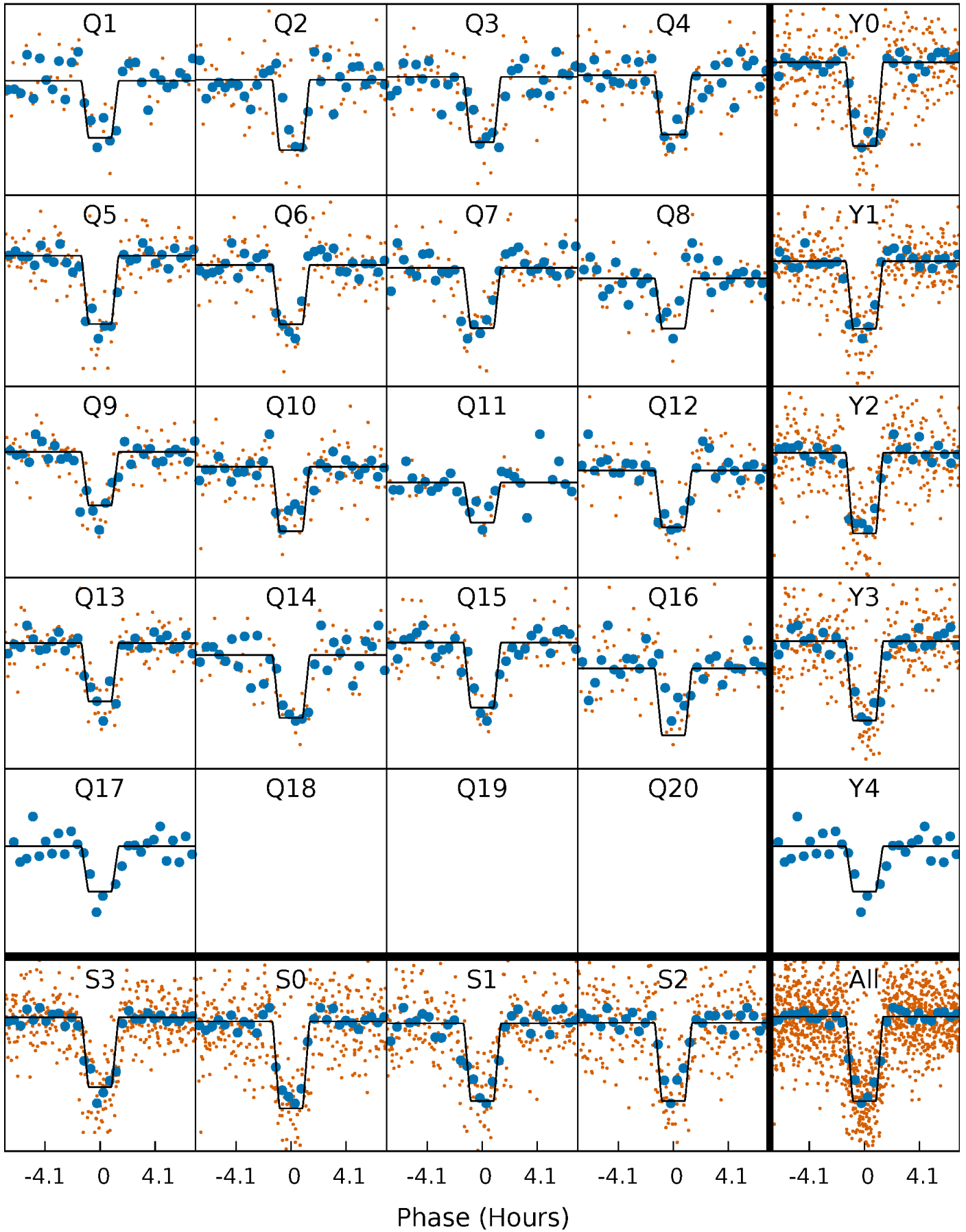
DV Quarter-Phased Transit Curves

TCE 008037145-02 P= 25.752791 Days $T_0=136.437973$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

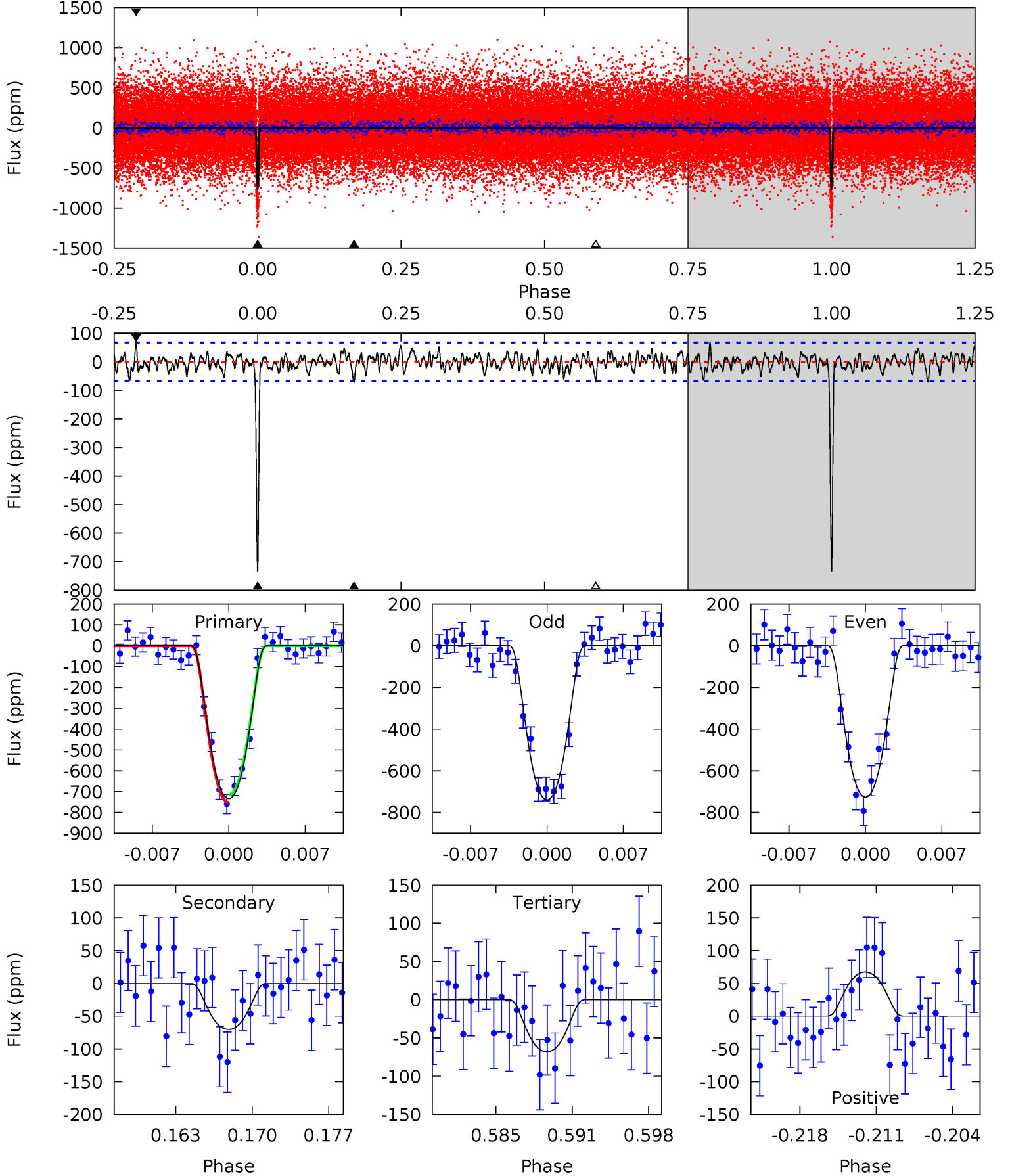
TCE 008037145-02 P= 25.752644 Days $T_0=136.441140$ (BKJD)



DV Model-Shift Uniqueness Test

008037145-02, $P = 25.752791$ Days, $E = 110.685182$ Days

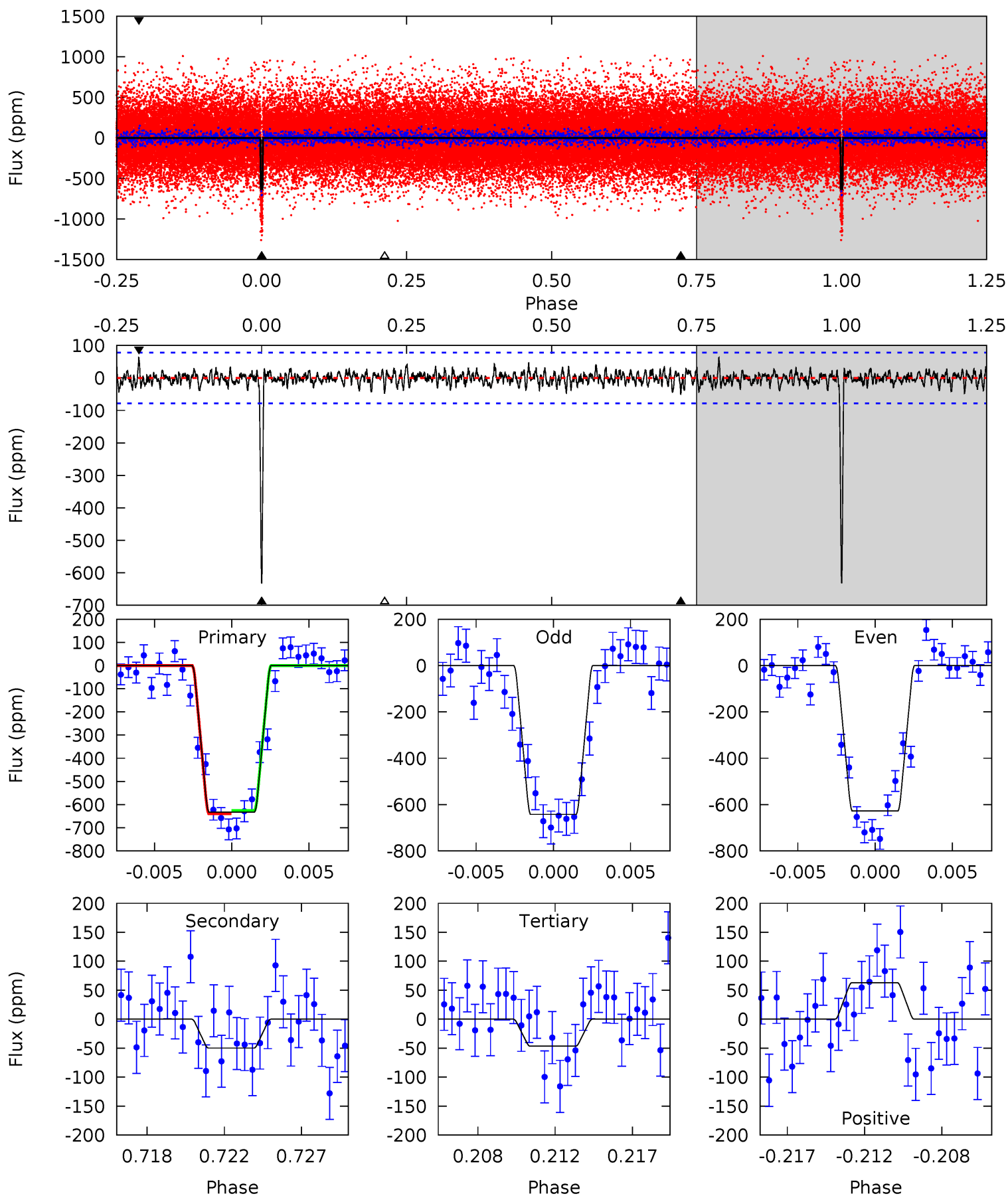
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
55.3	5.30	5.14	5.07	5.10	2.71	1.58	50.2	50.2	0.16	0.22	0.48	0.95	0.08	1.40



Alt Model-Shift Uniqueness Test

008037145-02, $P = 25.752644$ Days, $E = 110.688496$ Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
41.8	3.30	3.09	4.16	5.18	2.84	1.00	38.7	37.6	0.21	-0.86	0.48	1.02	0.09	0.46



Stellar Parameters For KIC 008037145

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	4963^{+81}_{-74}	$4.501^{+0.072}_{-0.022}$	$0.160^{+0.150}_{-0.150}$	$0.826^{+0.032}_{-0.060}$	$0.789^{+0.055}_{-0.029}$	$1.973^{+0.537}_{-0.181}$
	+2%/-1%	+2%/-0%	+94%/-94%	+4%/-7%	+7%/-4%	+27%/-9%
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 008037145-02 / KOI 0520.03

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	A_{obs}
DV	-70 ± 13	$3.18^{+0.46}_{-0.46}$	695^{+14}_{-16}	3022^{+155}_{-145}	97^{+40}_{-29}
Alt.	-50 ± 15	$2.35^{+0.43}_{-0.44}$	696^{+15}_{-17}	3140^{+242}_{-237}	124^{+80}_{-52}

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

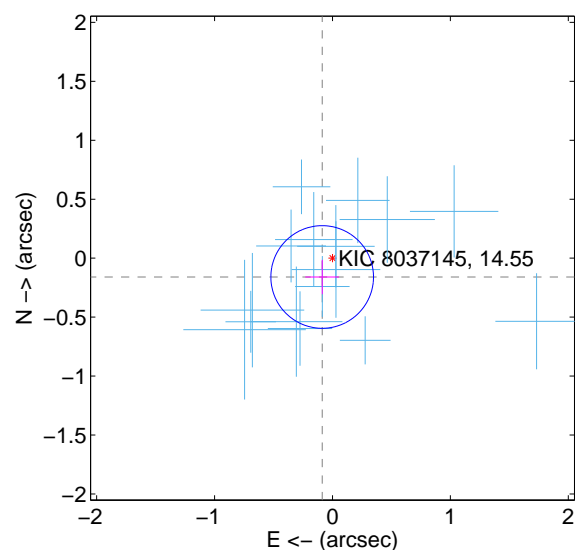
Supplemental centroid analysis for 008037145-02. Kepler magnitude: 14.55. Transit SNR 30.72

There are 16 quarters with good PRF difference image offsets

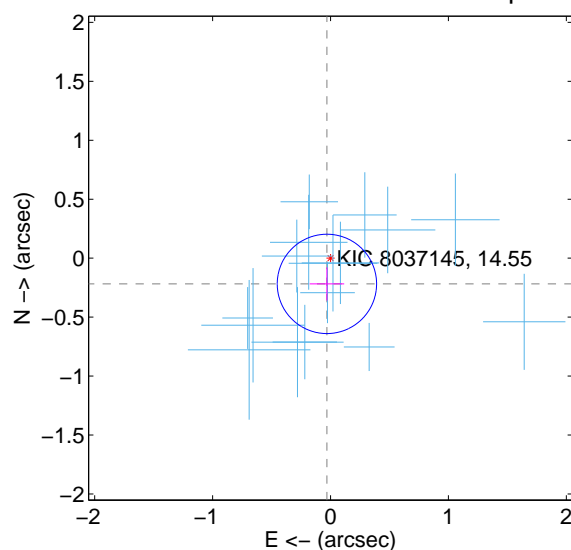
The direct PRF centroid is offset from the target star catalog position by about 0.18 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.182 ± 0.145	1.25	0.087 ± 0.144	-0.160 ± 0.146
PRF-fit source offset from KIC position	0.220 ± 0.140	1.57	0.031 ± 0.146	-0.218 ± 0.140
photometric centroid source offset	0.34 ± 0.46	0.75	-0.12 ± 0.42	0.32 ± 0.46

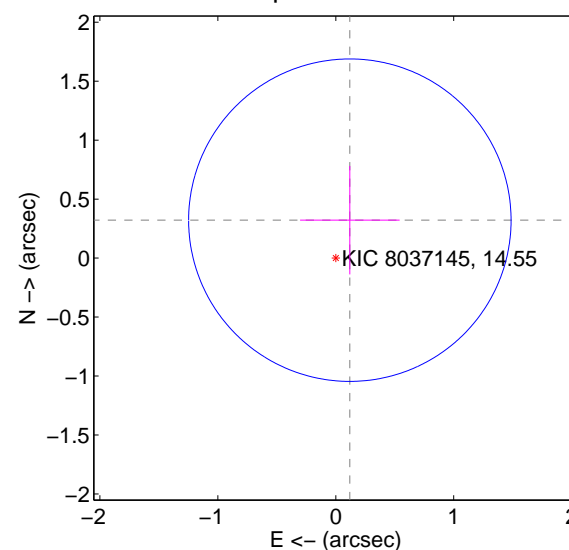
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

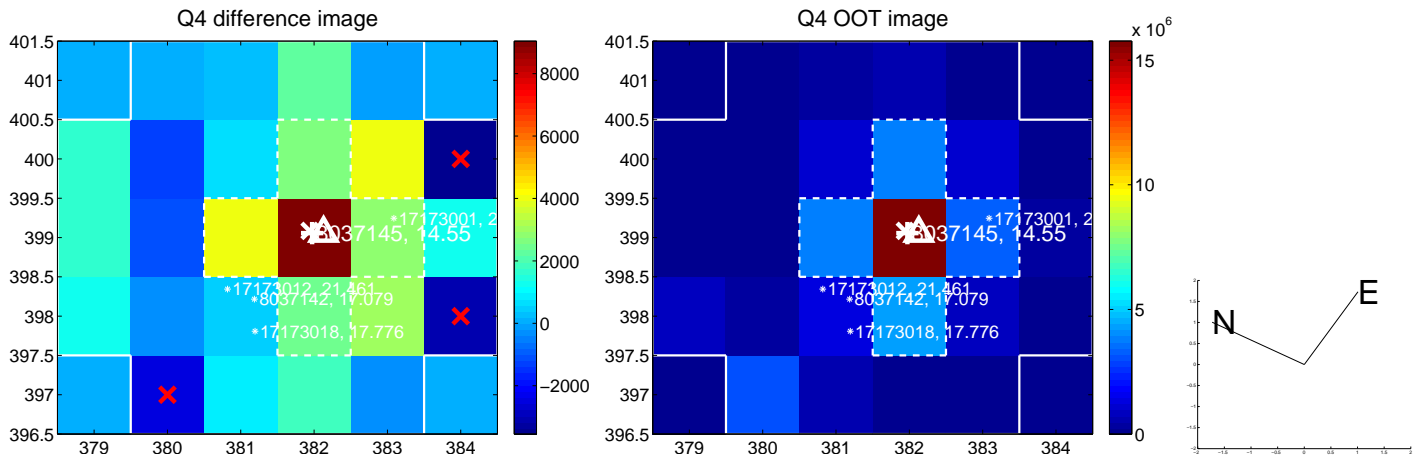
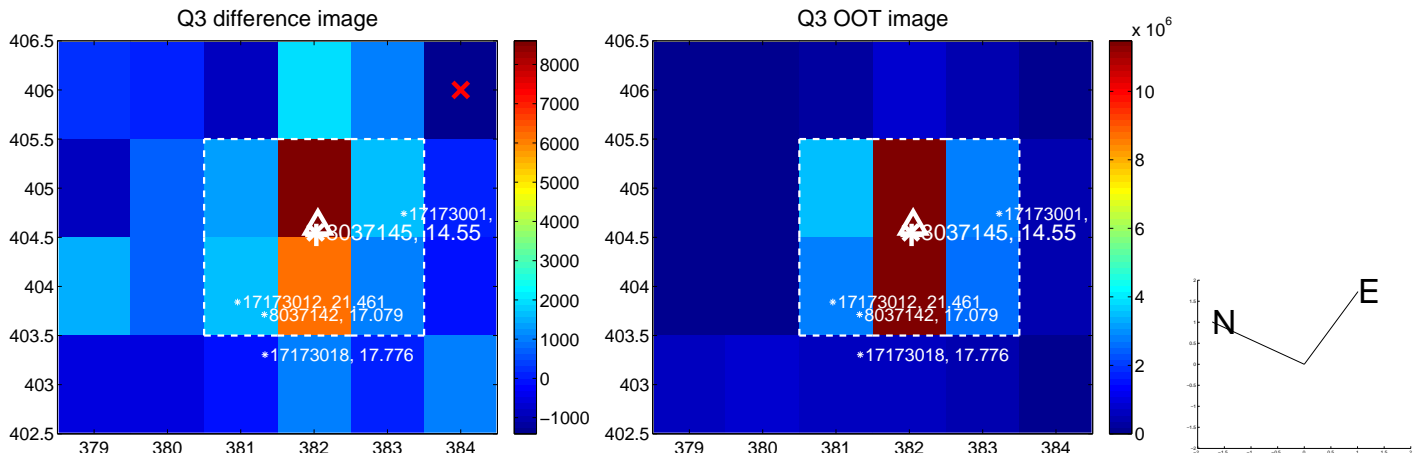
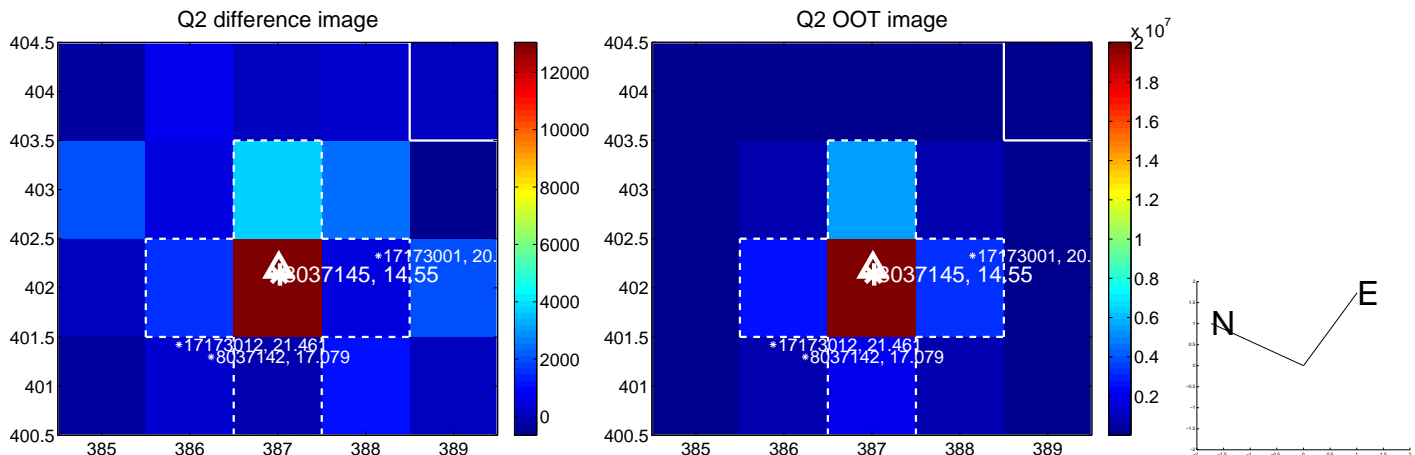
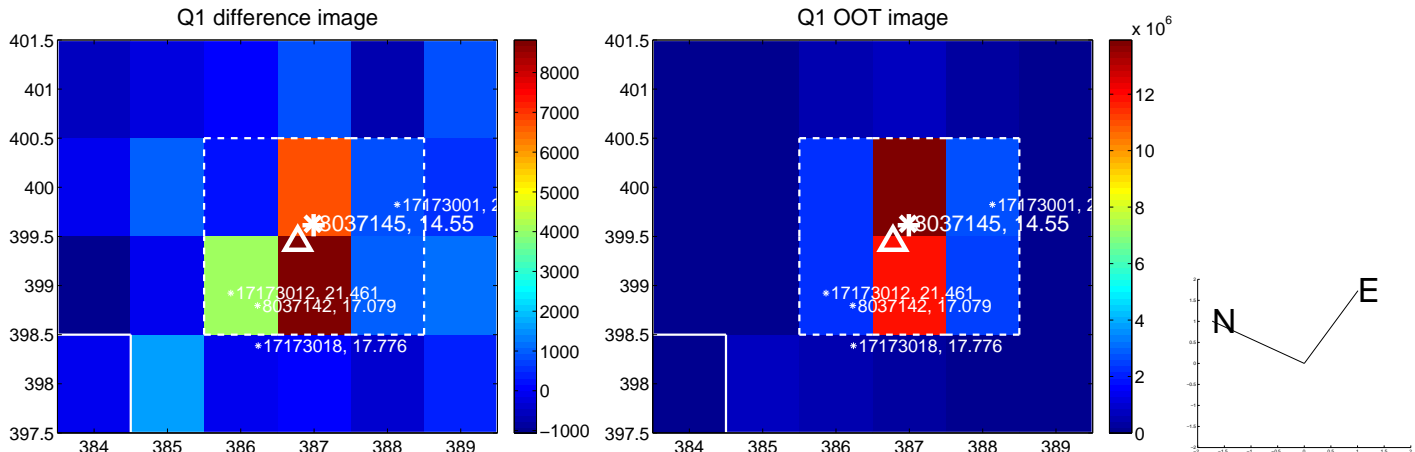


offset from photometric centroids

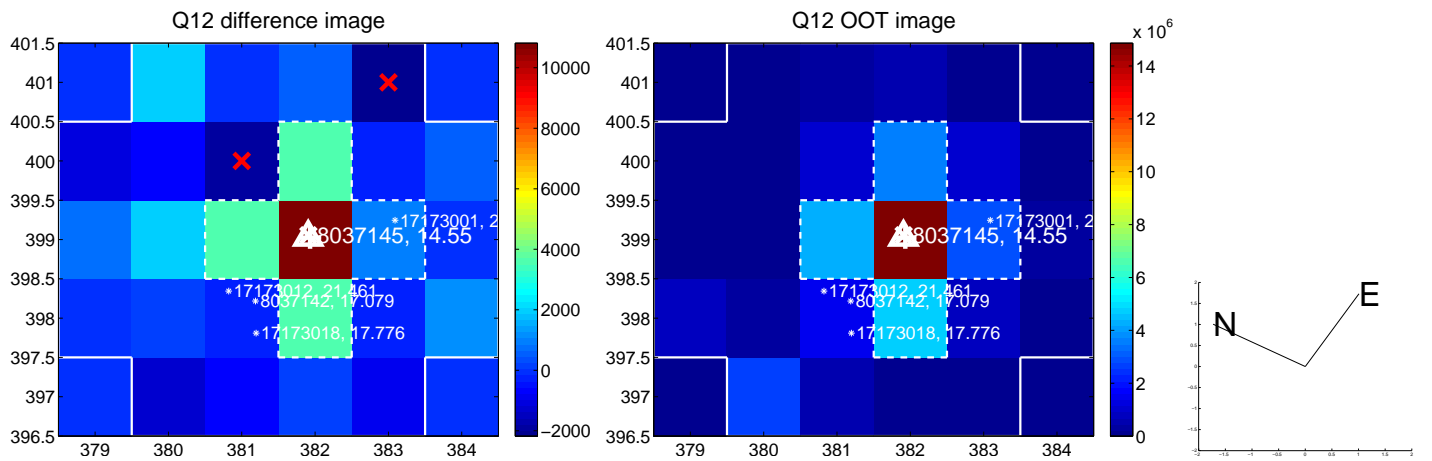
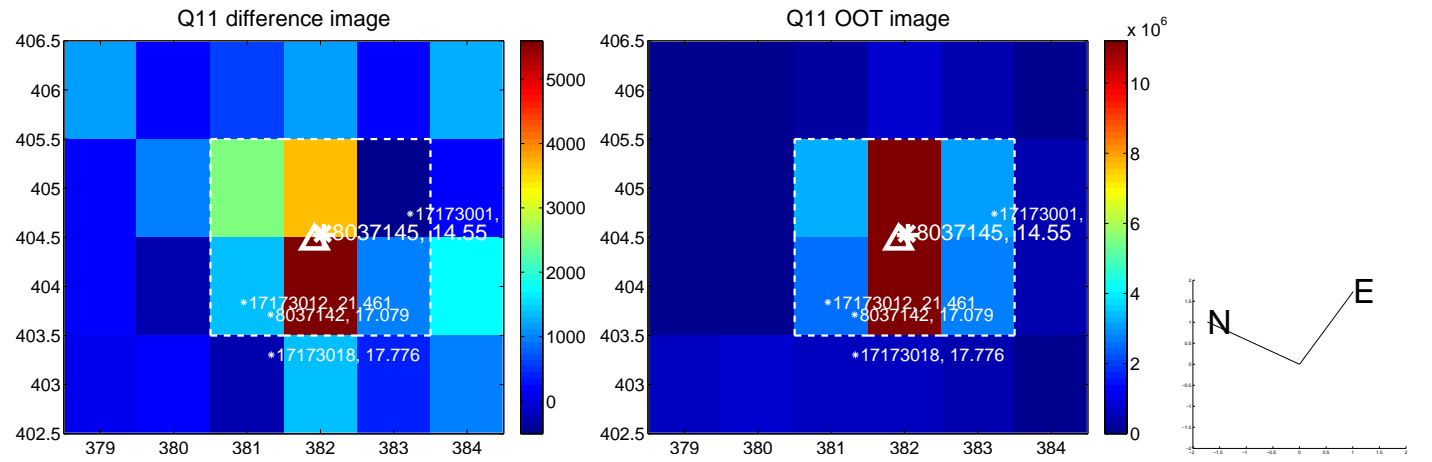
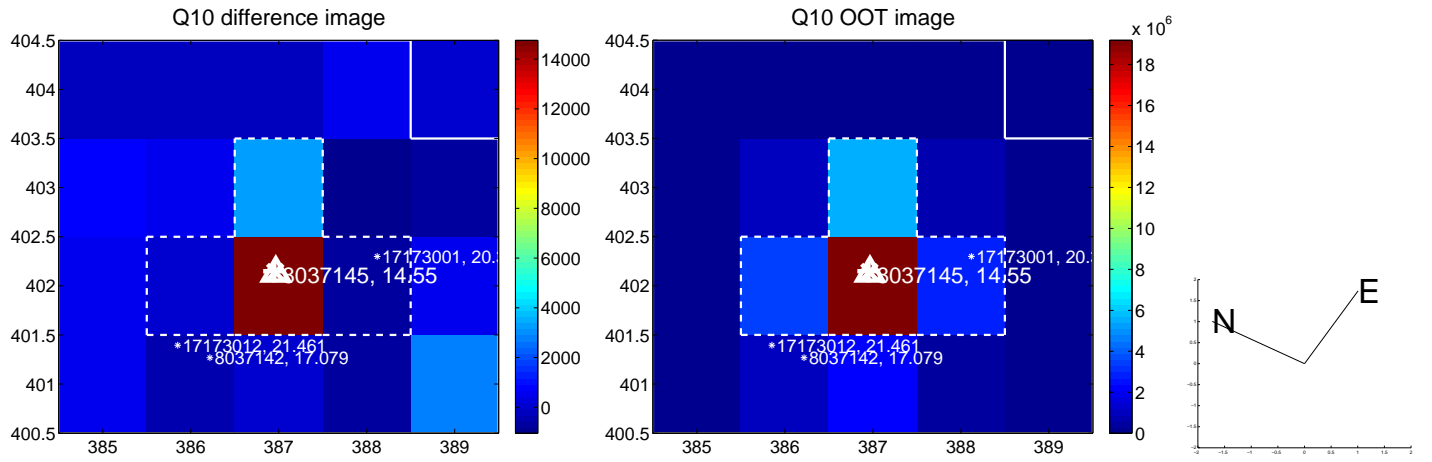
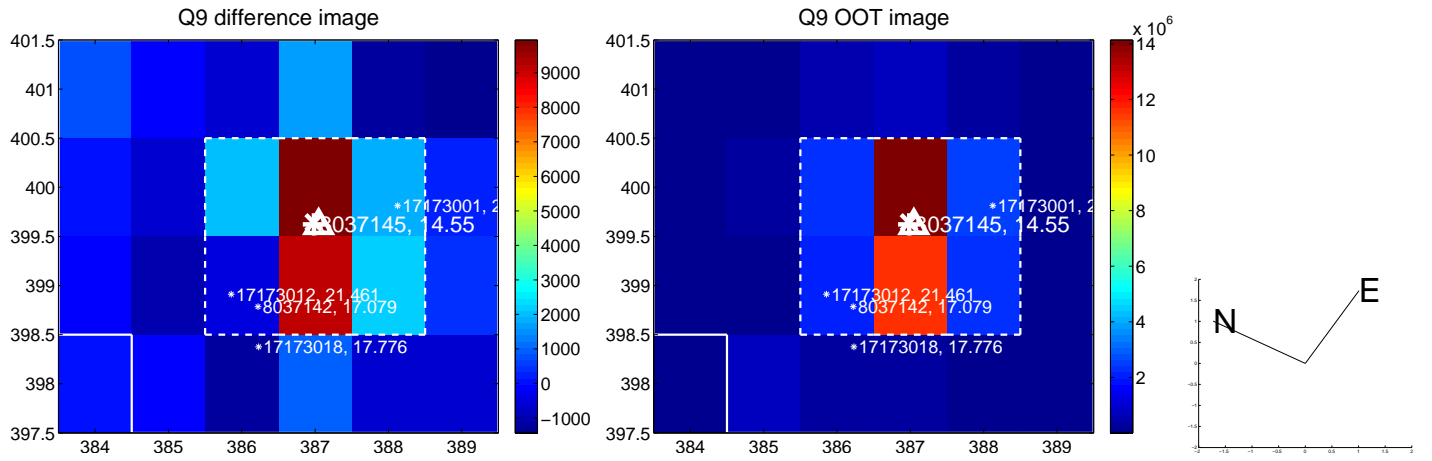


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

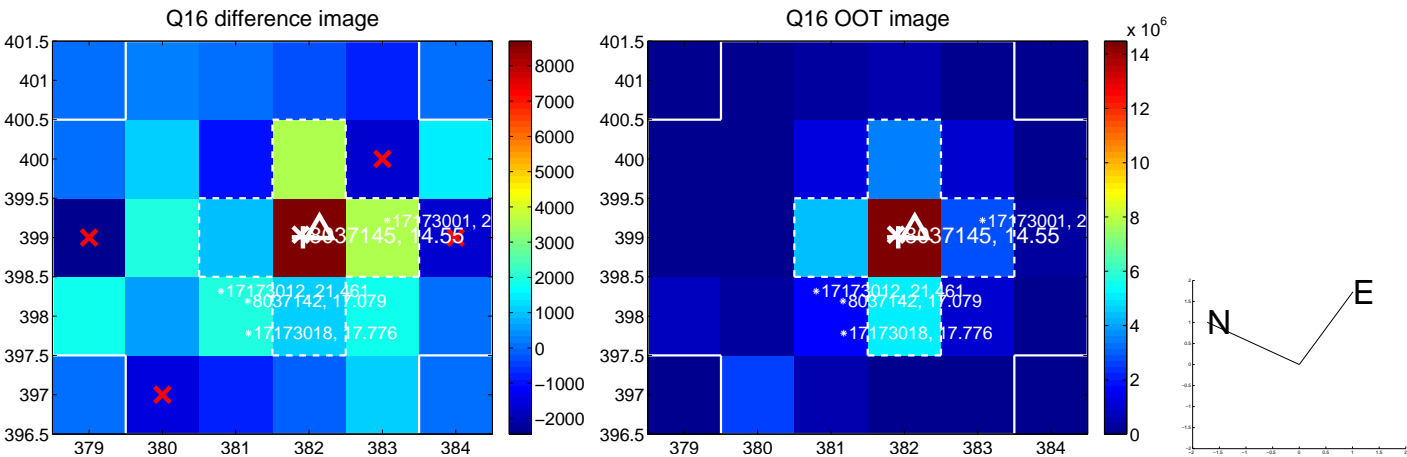
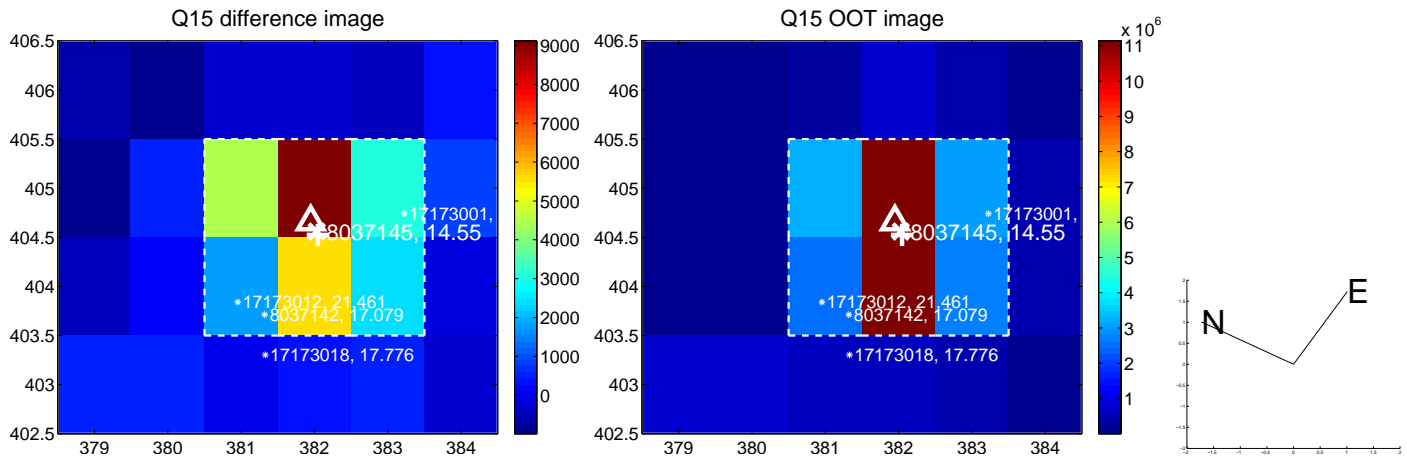
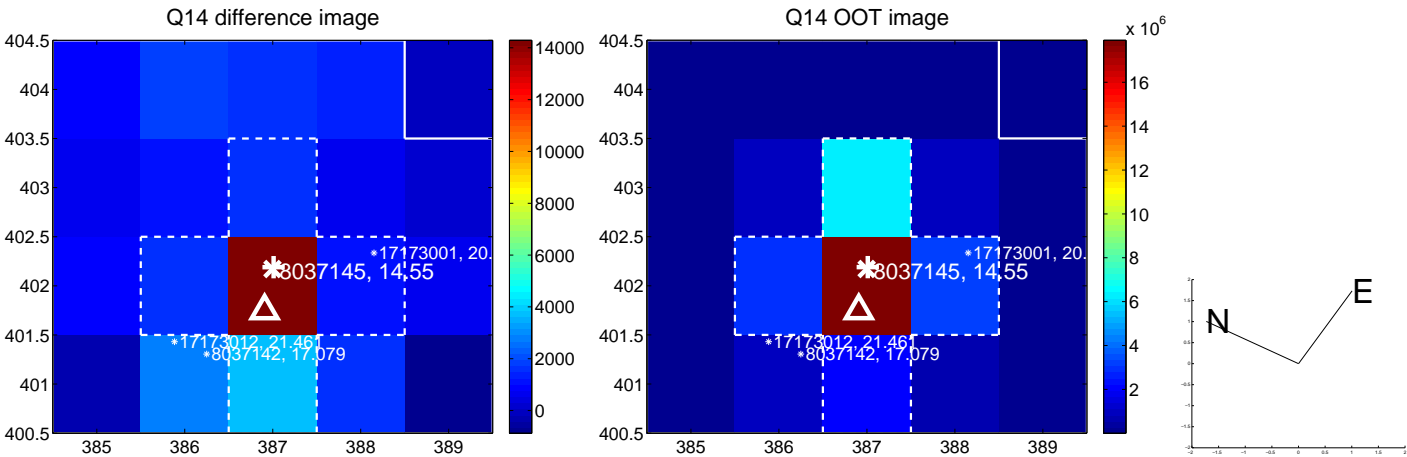
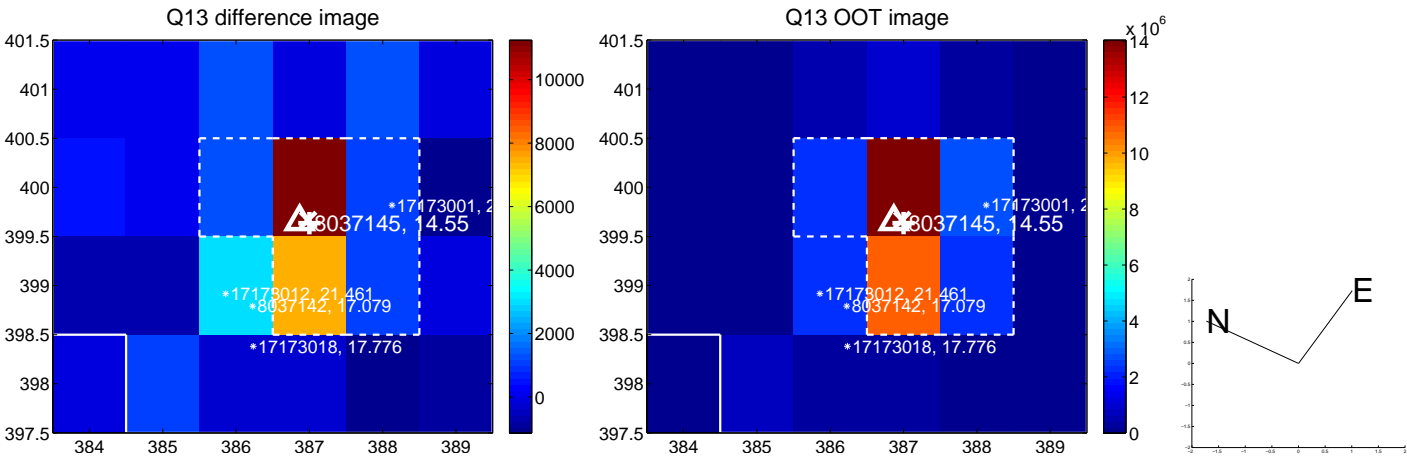
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



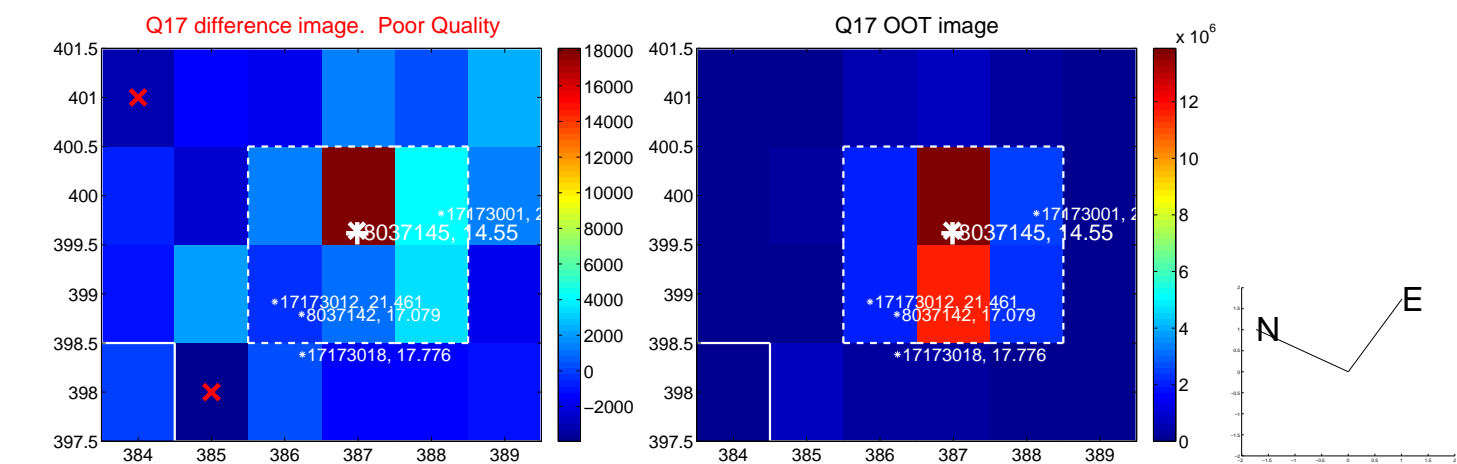
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



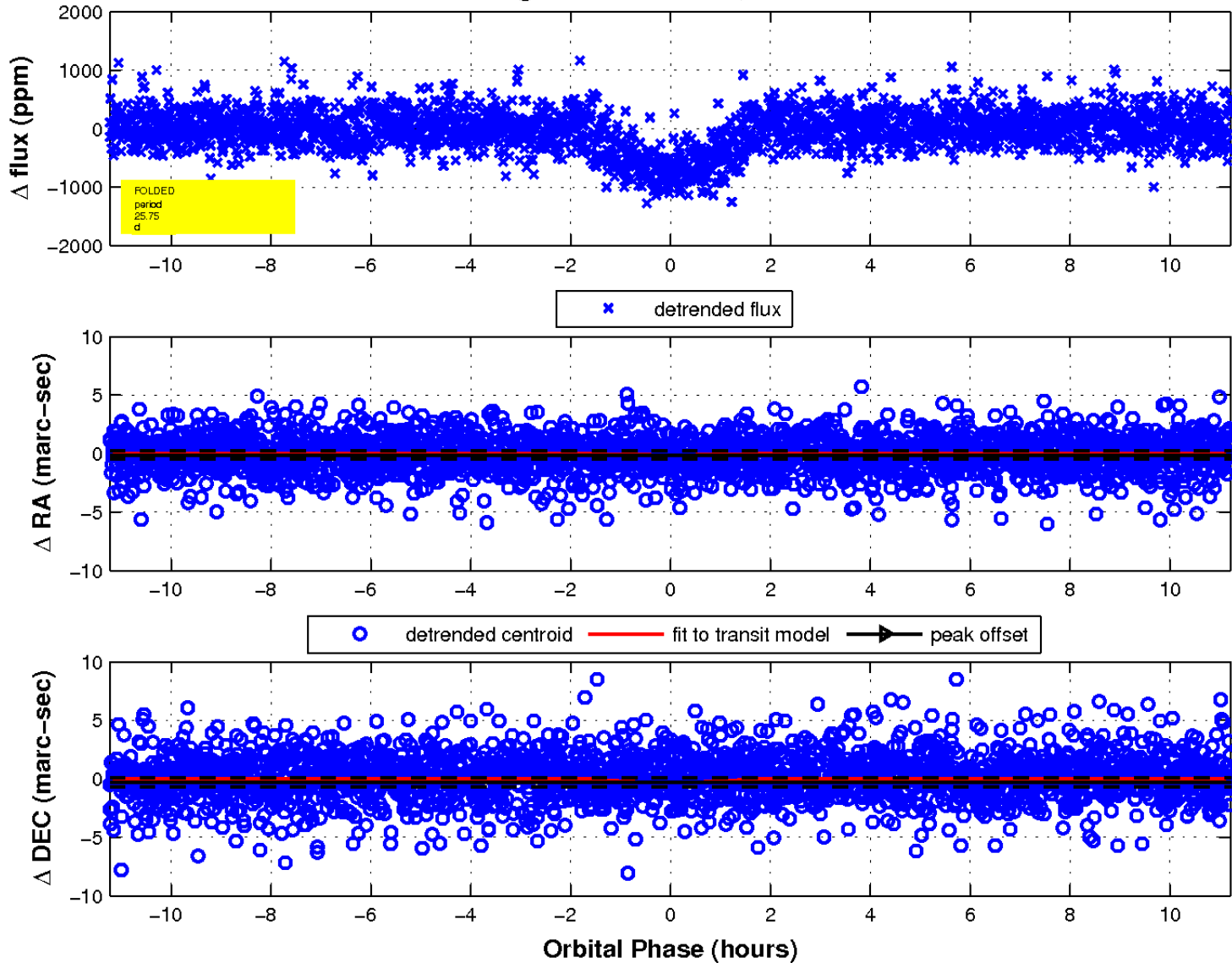
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



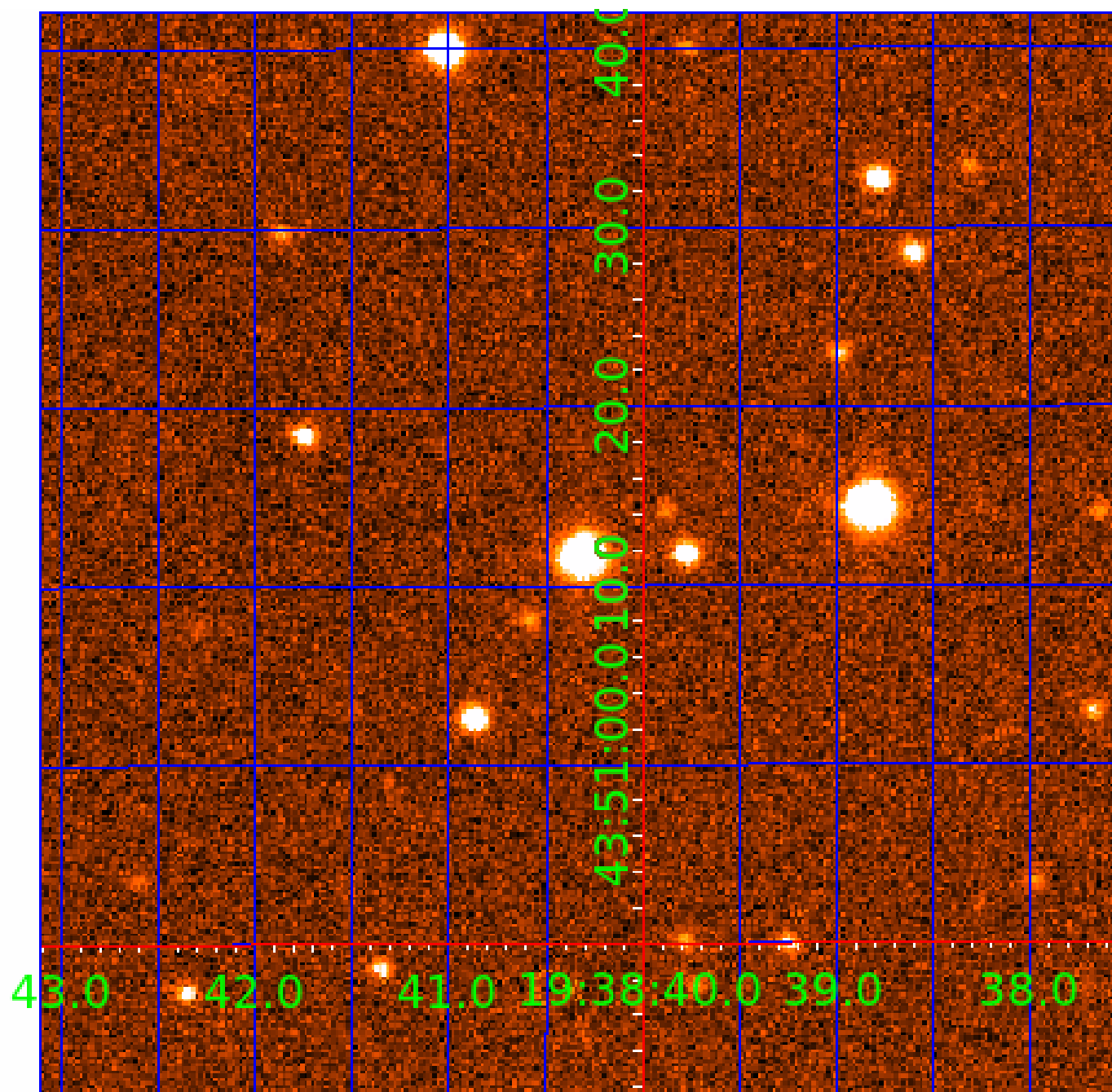
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



fluxWeightedCentroids, Planet 2 of 4



UKIRT Image



KIC 008037145

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})
008037145-01	OBS	0520.01	12.759310	132.044689	844.6	4.300	50.4	54.5	0.83	4963	3.15	38.03
008037145-02	OBS	0520.03	25.752791	136.437973	751.8	3.744	28.7	30.7	0.83	4963	3.23	14.91
008037145-03	OBS	0520.02	5.433079	132.941491	271.7	2.557	23.6	25.4	0.83	4963	1.65	118.70
008037145-04	OBS	0520.04	51.166266	172.299979	274.5	5.143	10.2	10.3	0.83	4963	1.73	5.97

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008037145-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
008037145-02	OBS	PC	1.00	0	0	0	0	NO_COMMENT
008037145-03	OBS	PC	1.00	0	0	0	0	NO_COMMENT
008037145-04	OBS	PC	0.91	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.

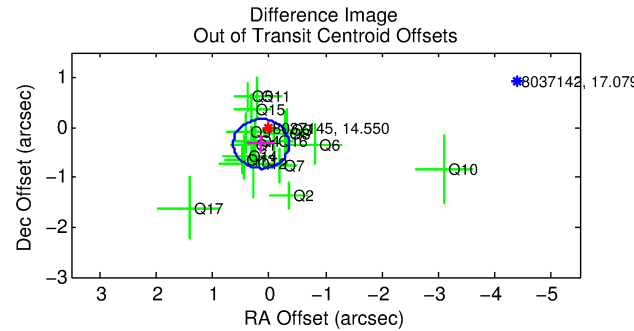
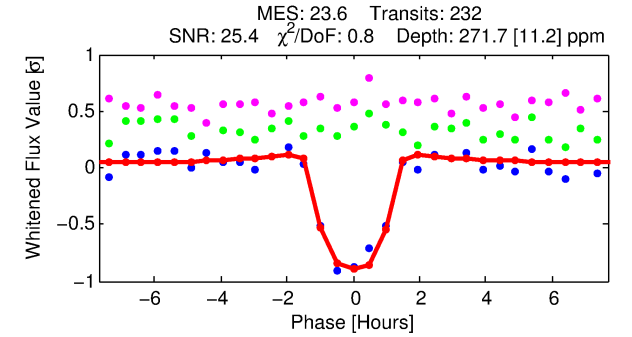
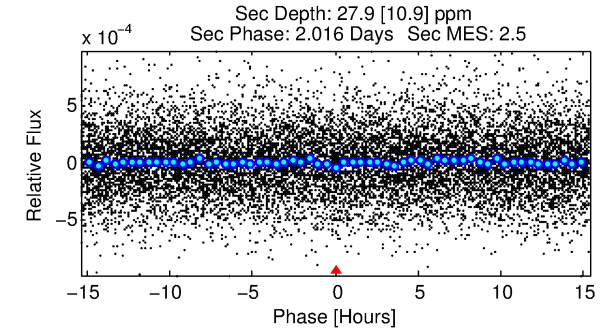
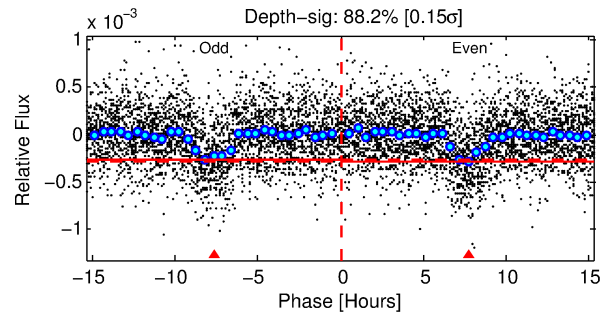
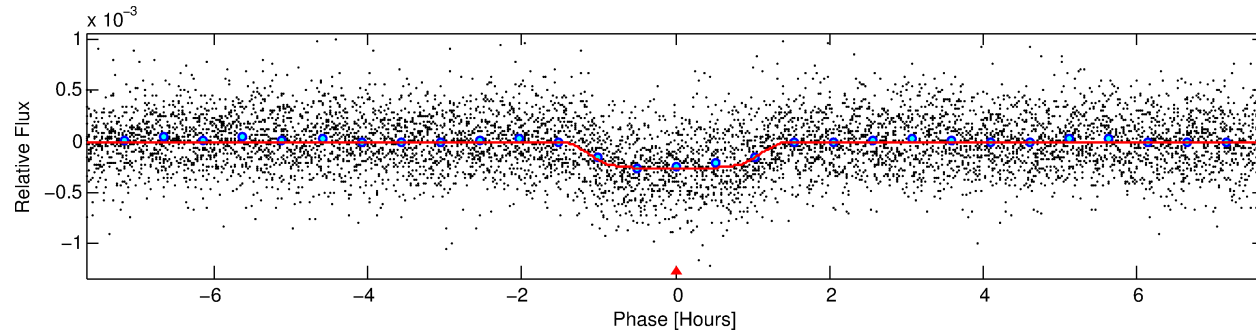
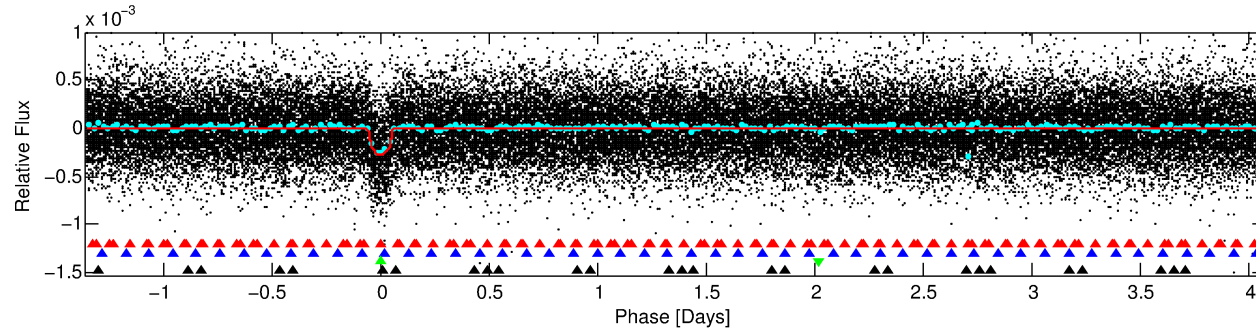
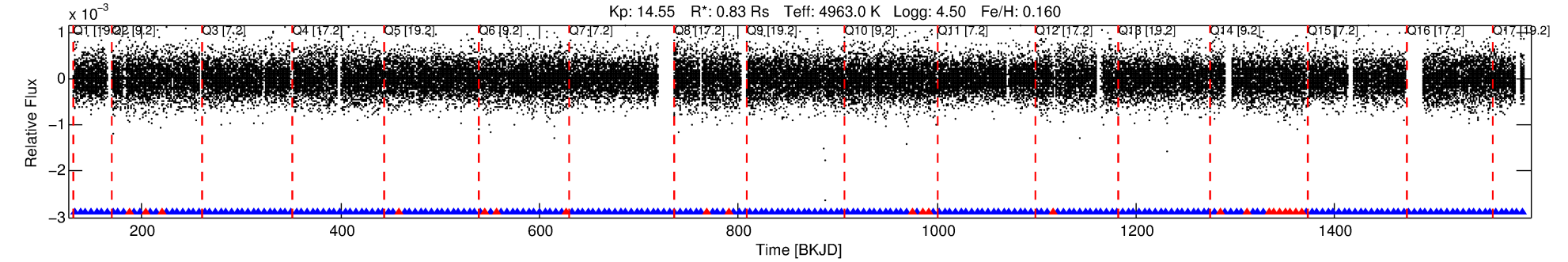
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 008037145-03

No Significant Match Found

DV One-Page Summary

KIC: 8037145 Candidate: 3 of 4 Period: 5.433 d
KOI: K00520.02 Name: Kepler-17b Corr: 0.961



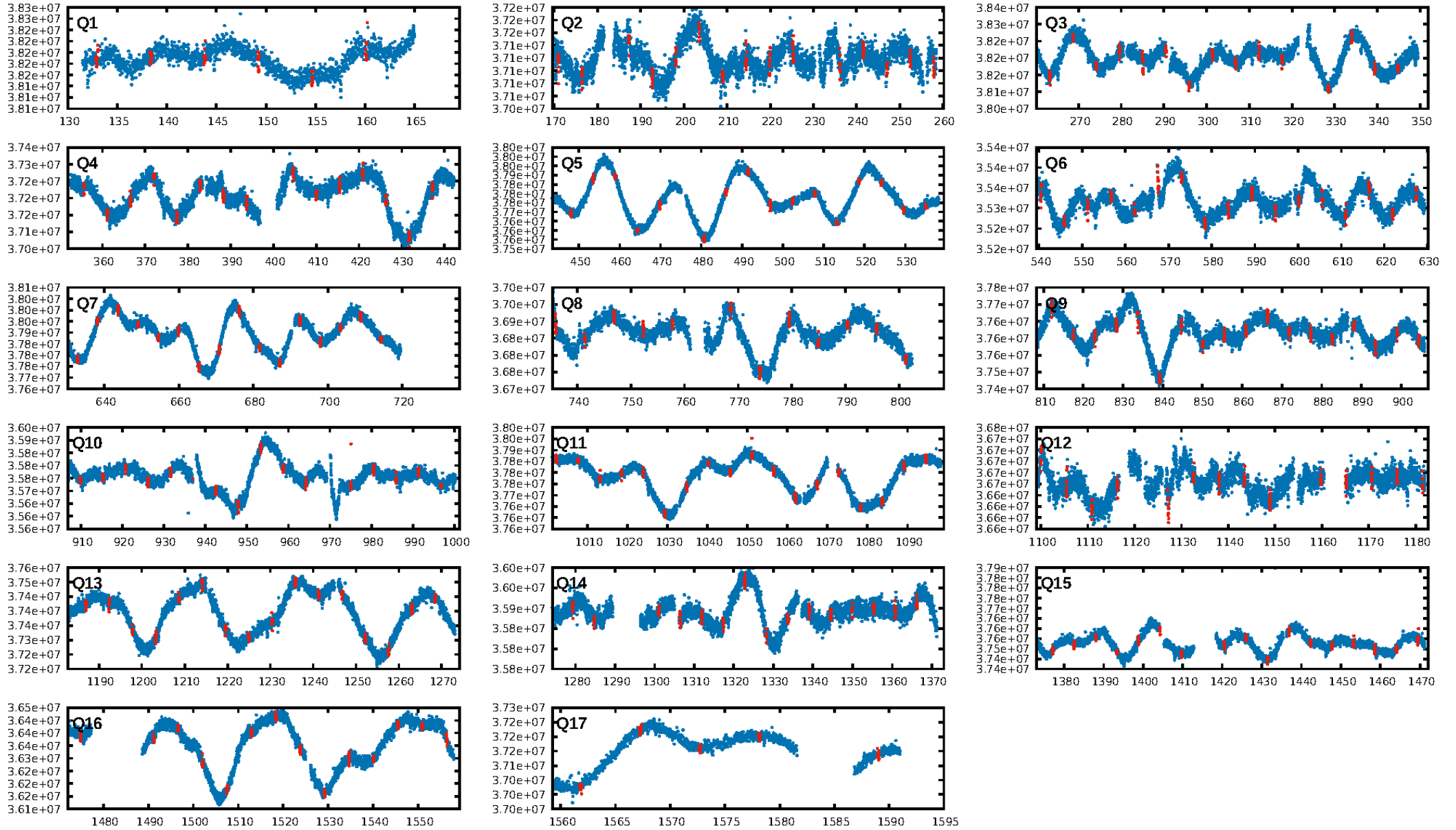
DV Fit Results:

Period = 5.43308 [0.00001] d
Epoch = 132.9415 [0.0018] BKJD
Rp/R* = 0.0184 [0.0051]
a/R* = 7.96 [8.48]
b = 0.89 [0.25]
Seff = 118.70 [16.29]
Teff = 842 [29] K
Rp = 1.65 [0.48] Re
a = 0.0559 [0.0041] AU
Ag = 17.53 [12.14] [1.36 σ]
Teffp = 2663 [456] K [3.99 σ]

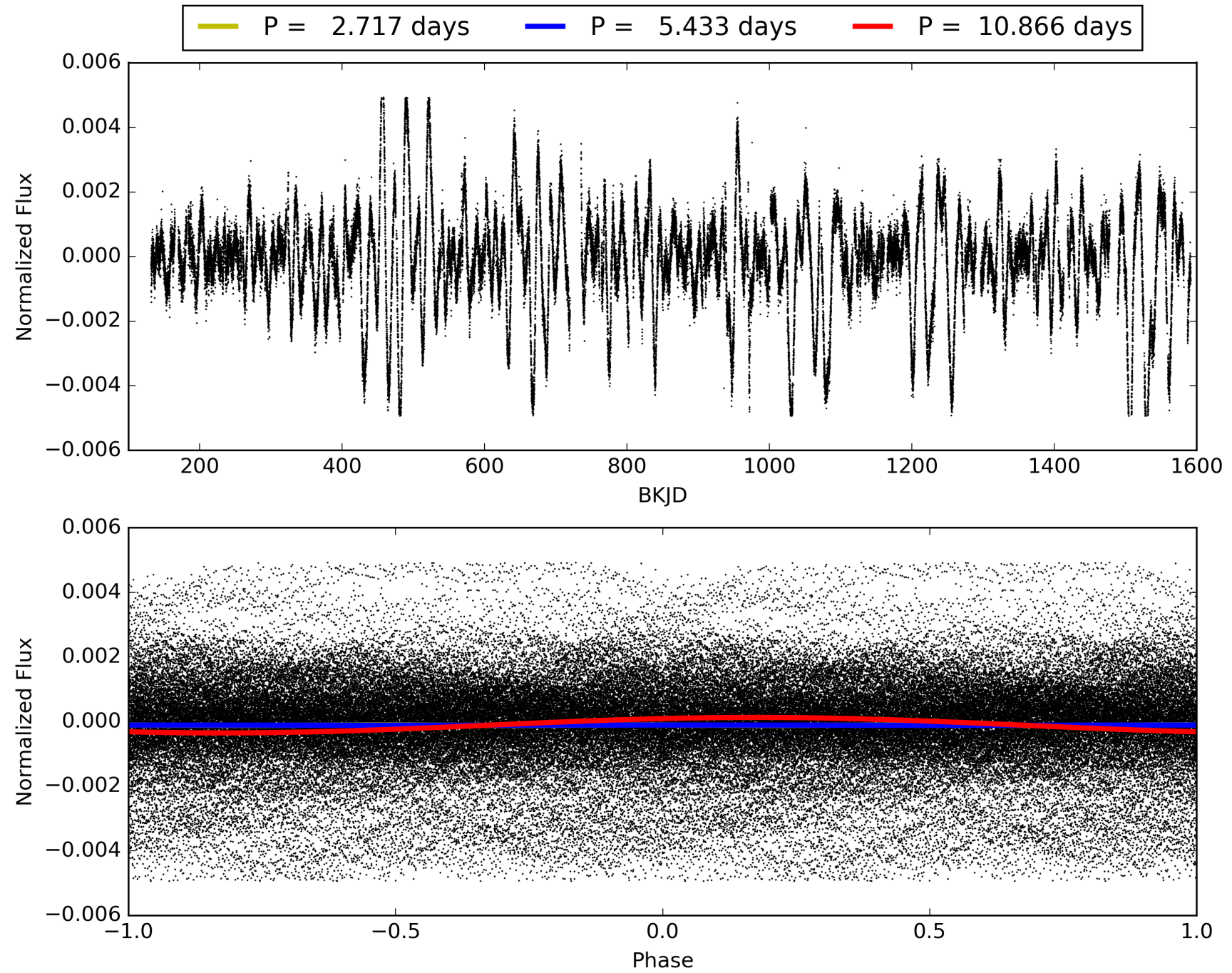
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 100.0% [35.15 σ]
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: 2.71e-118
RollingBand-fgt: 0.90 [199/221]
GhostDiagnostic-chr: 2.666
Centroid-sig: 2.2%
Centroid-so: 0.922 arcsec [1.64 σ]
OotOffset-rm: 0.362 arcsec [2.21 σ]
KicOffset-rm: 0.436 arcsec [2.75 σ]
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]

TCE 008037145-03, PDC Light Curves

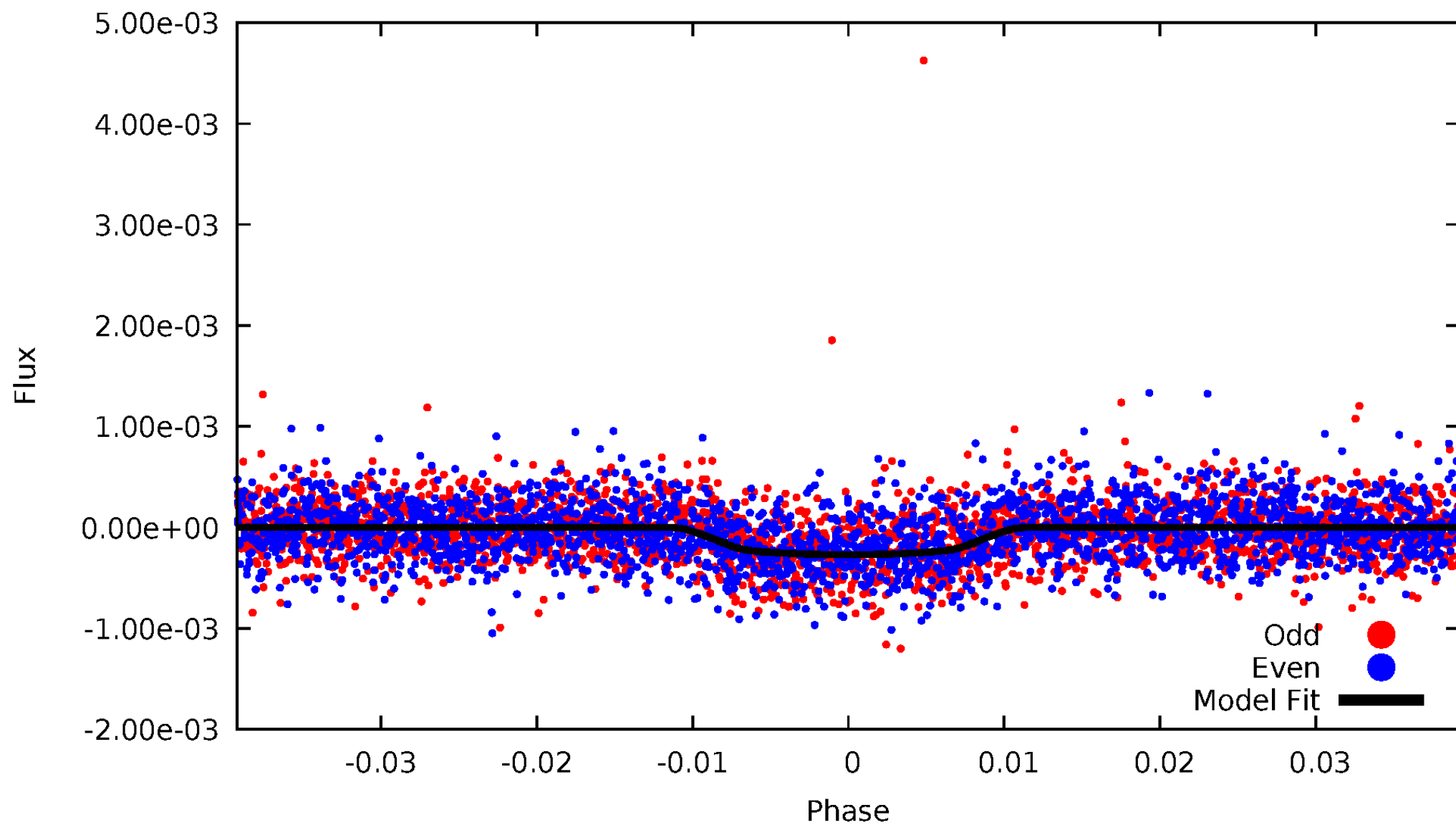


TCE 008037145-03



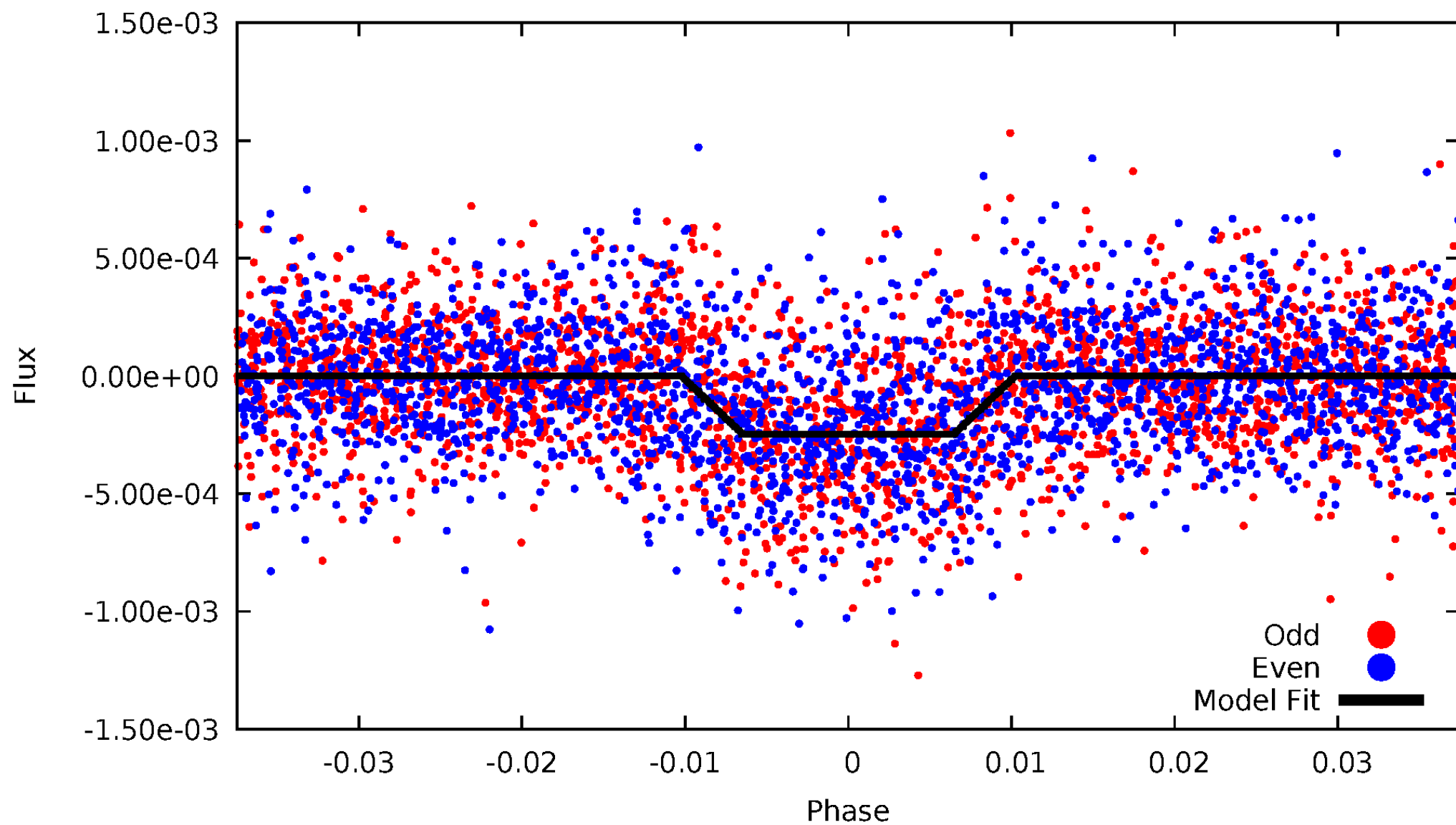
DV Odd/Even

TCE 008037145-03



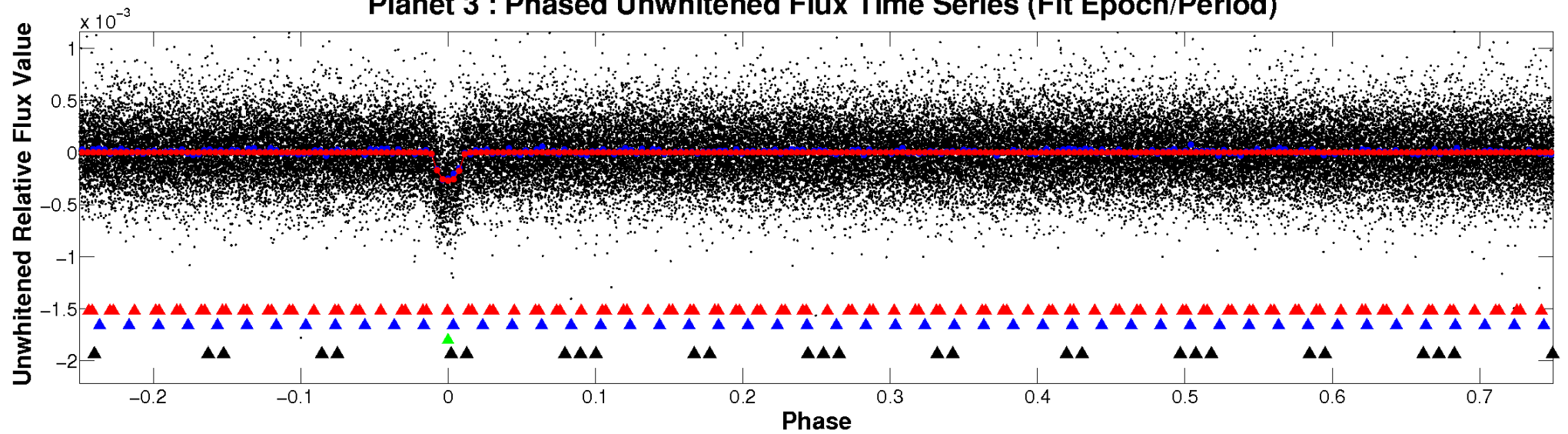
ALT Odd/Even

TCE 008037145-03

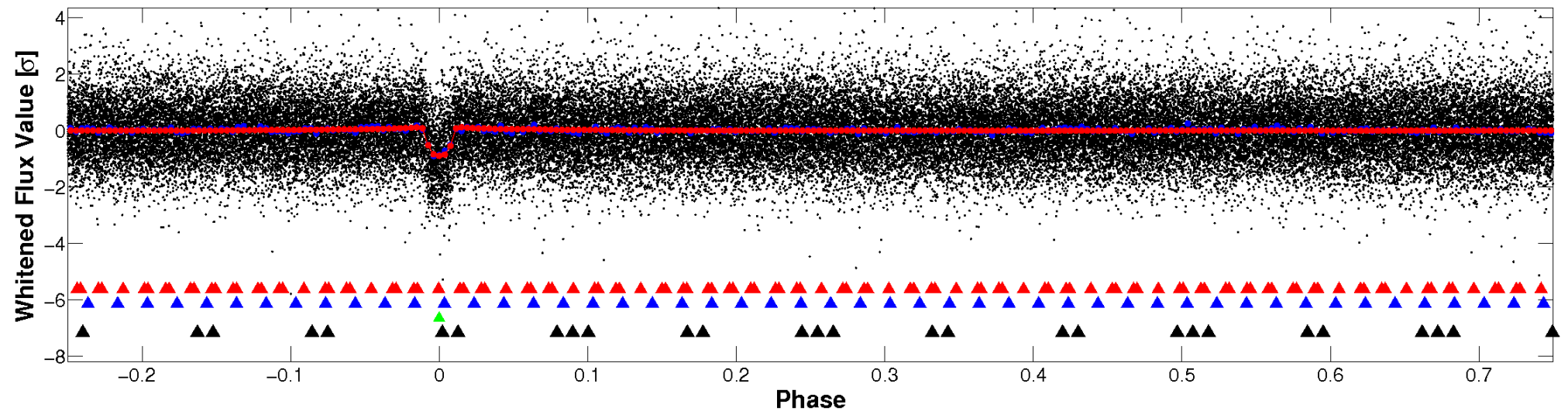


Non-Whitened Vs. Whitened Light Curve

Planet 3 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

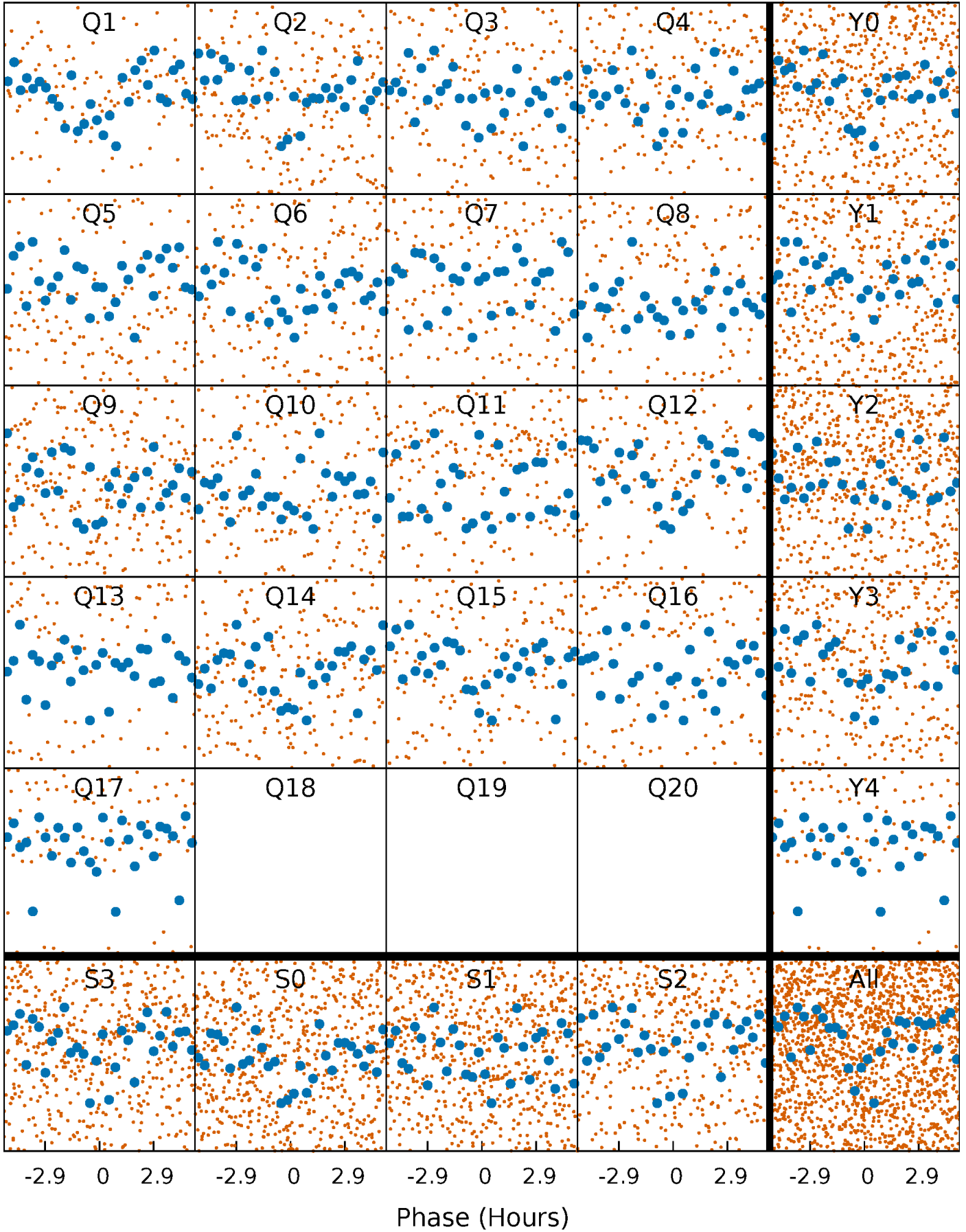


Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



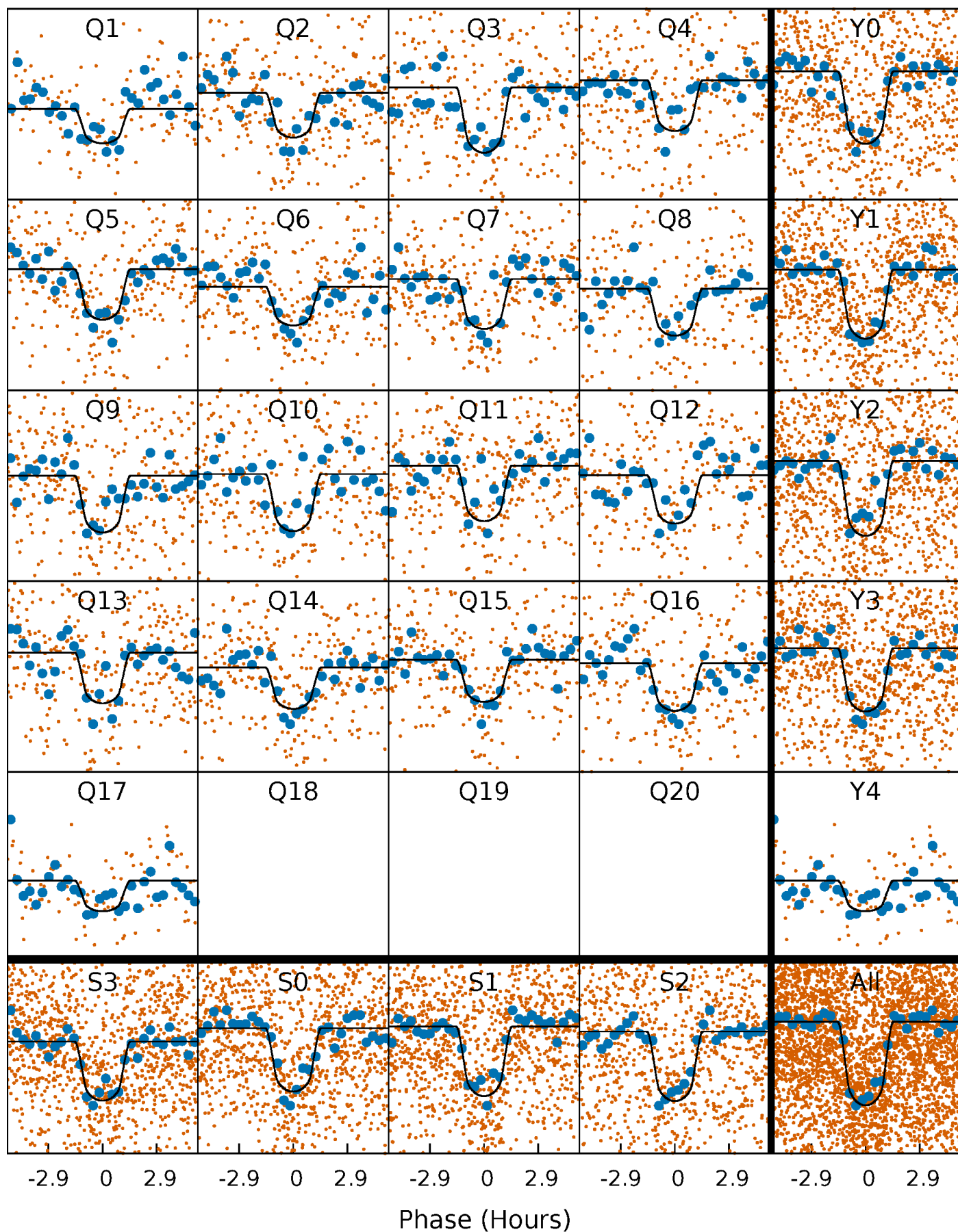
PDC Quarter-Phased Transit Curves

TCE 008037145-03 P= 5.433079 Days $T_0=132.941491$ (BKJD)



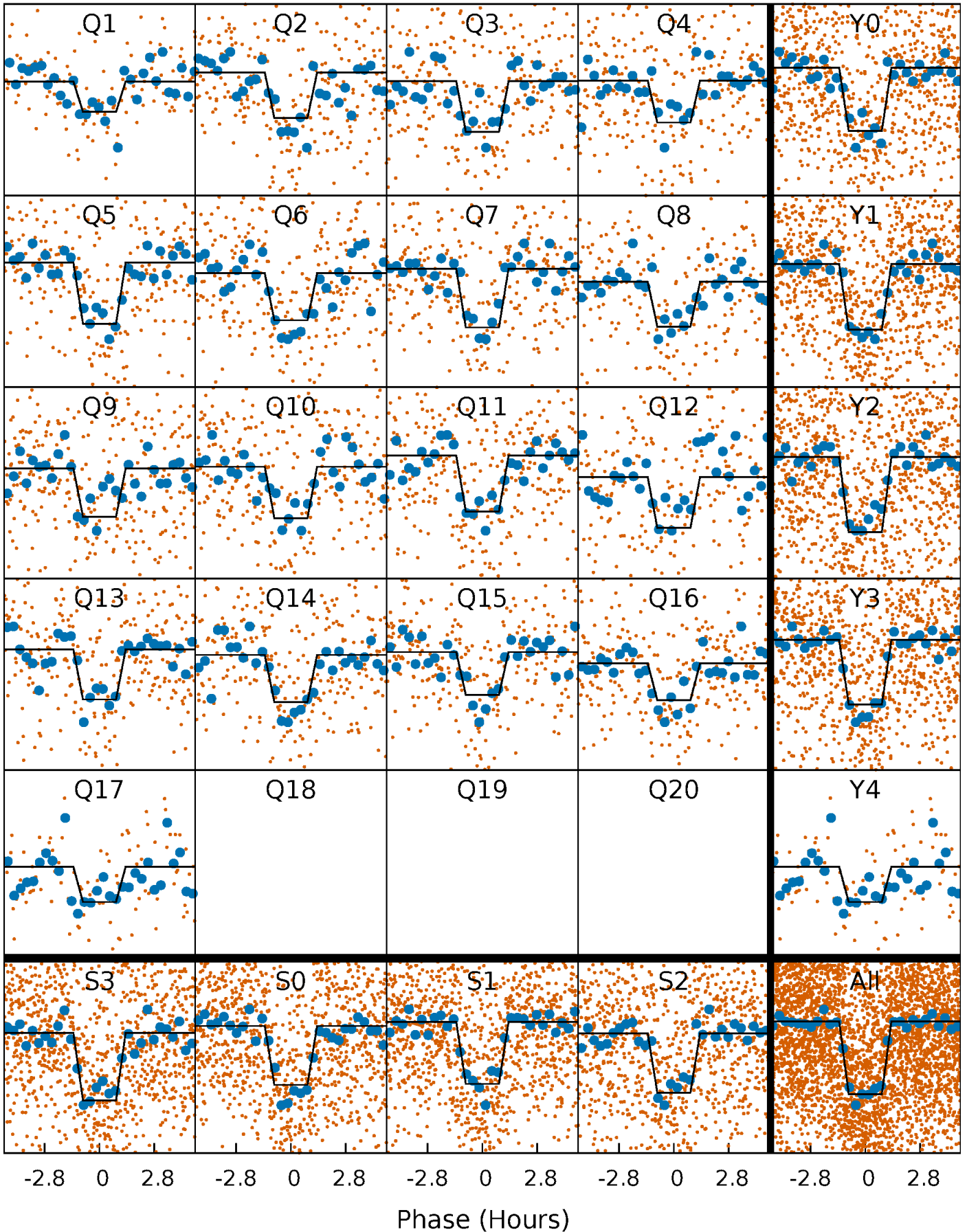
DV Quarter-Phased Transit Curves

TCE 008037145-03 P= 5.433079 Days $T_0=132.941491$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

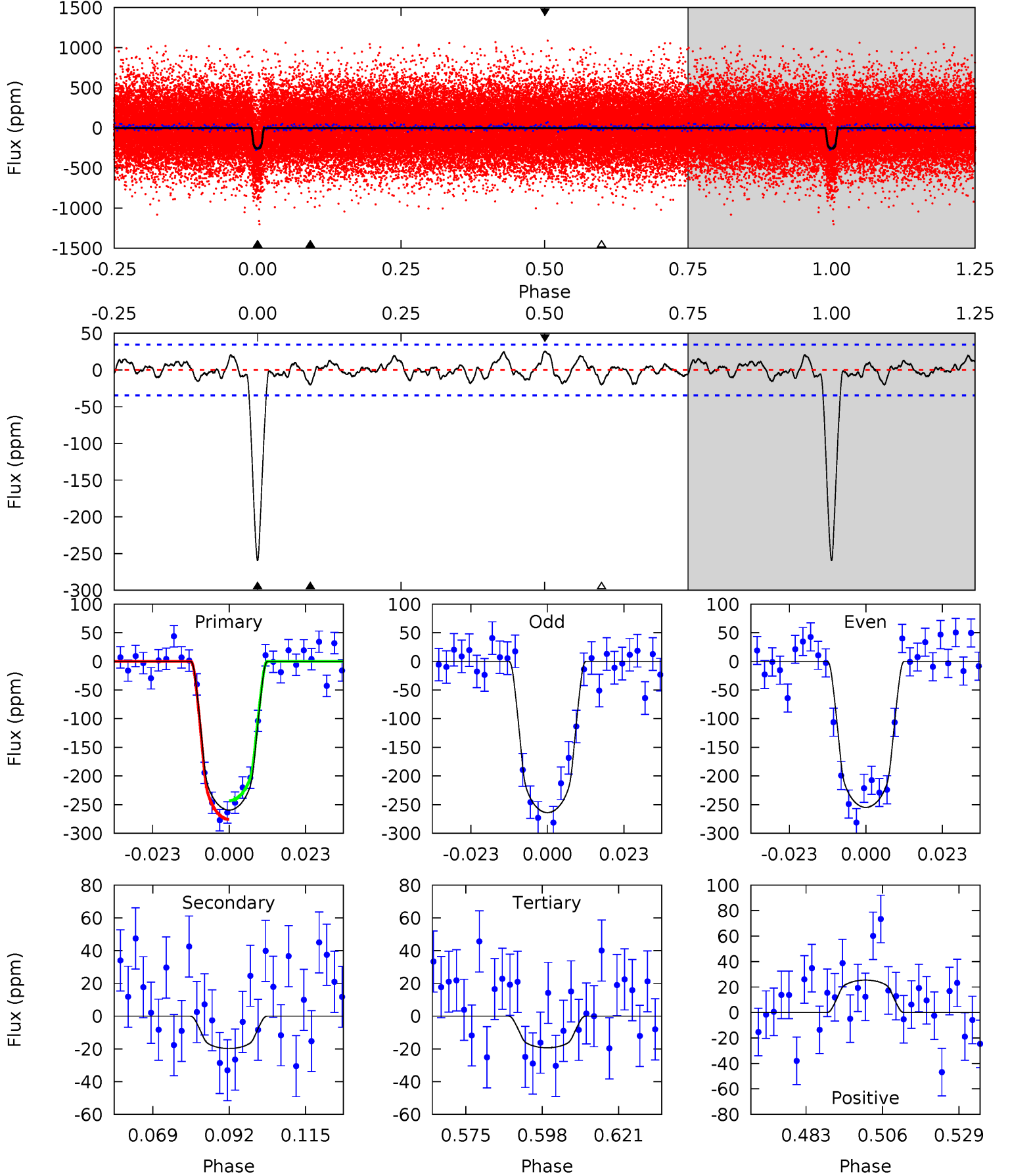
TCE 008037145-03 P= 5.433117 Days $T_0=132.936256$ (BKJD)



DV Model-Shift Uniqueness Test

008037145-03, P = 5.433079 Days, E = 127.508412 Days

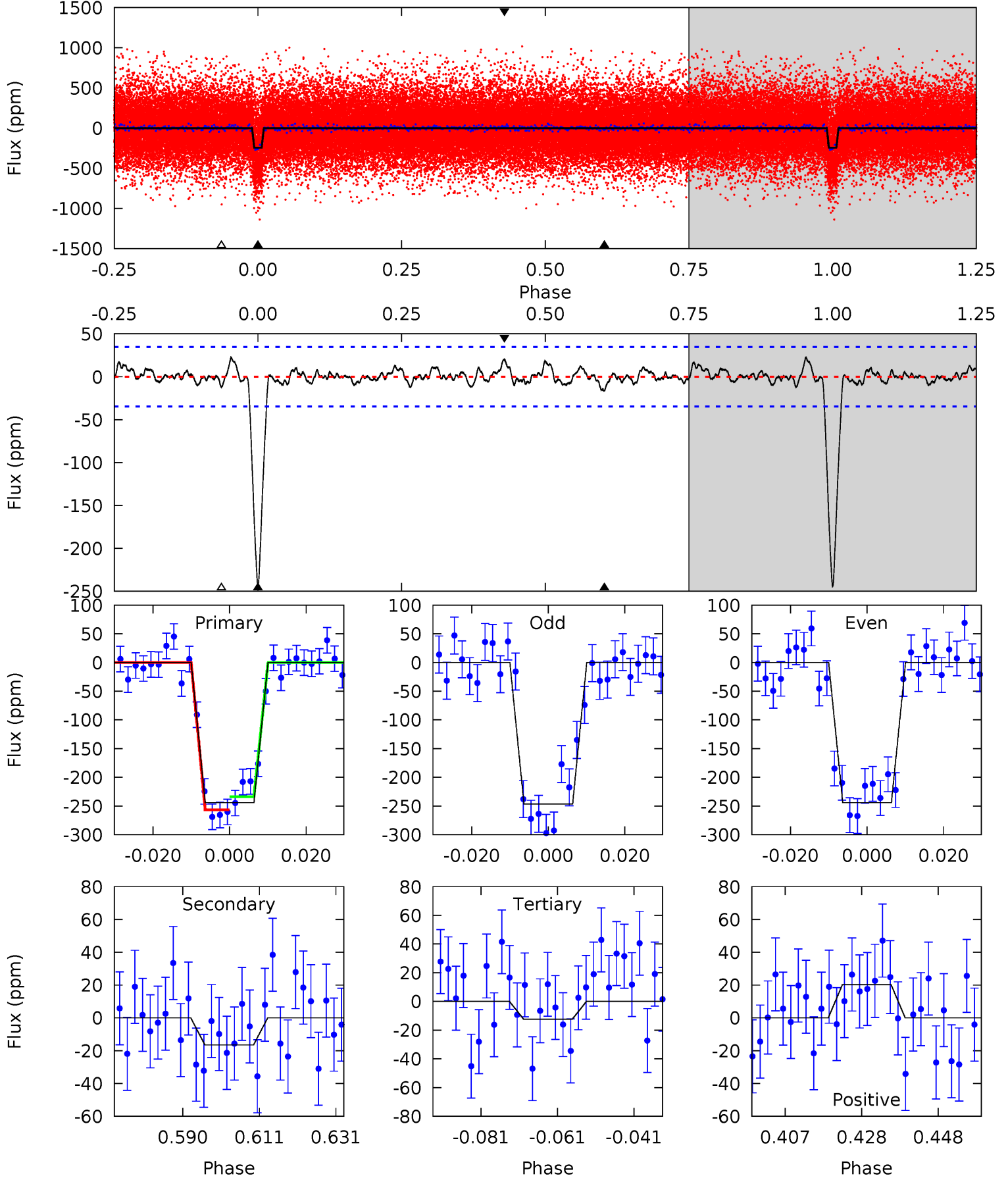
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
36.6	2.79	2.73	3.58	4.86	2.27	1.26	33.9	33.0	0.06	-0.80	0.64	0.98	0.09	2.30



Alt Model-Shift Uniqueness Test

008037145-03, P = 5.433117 Days, E = 127.503139 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
34.4	2.32	1.74	2.85	4.89	2.32	0.89	32.6	31.5	0.58	-0.53	0.16	1.01	0.08	1.59



Stellar Parameters For KIC 008037145

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	4963^{+81}_{-74}	$4.501^{+0.072}_{-0.022}$	$0.160^{+0.150}_{-0.150}$	$0.826^{+0.032}_{-0.060}$	$0.789^{+0.055}_{-0.029}$	$1.973^{+0.537}_{-0.181}$
	+2%/-1%	+2%/-0%	+94%/-94%	+4%/-7%	+7%/-4%	+27%/-9%
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 008037145-03 / KOI 0520.02

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	A_{obs}
DV	-20 ± 7	$1.69^{+0.44}_{-0.50}$	1168^{+25}_{-29}	3024^{+314}_{-269}	12^{+12}_{-6}
Alt.	-17 ± 7	$1.39^{+0.44}_{-0.46}$	1168^{+24}_{-29}	3081^{+448}_{-337}	14^{+21}_{-8}

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

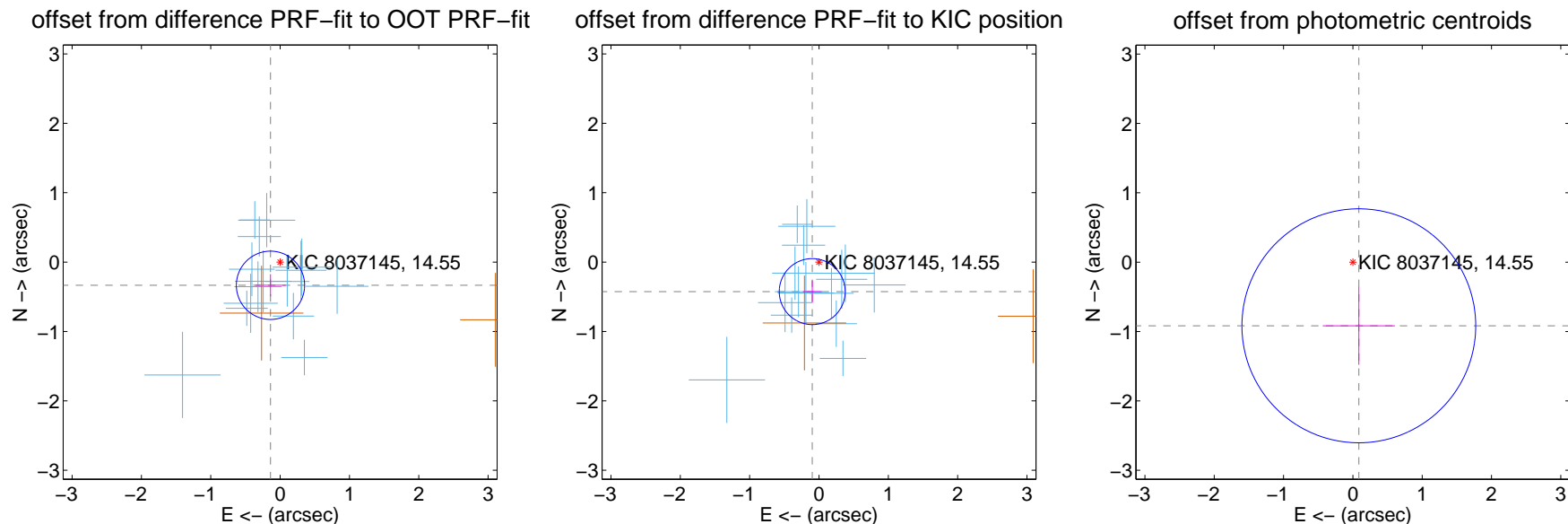
DV Centroid Data

Supplemental centroid analysis for 008037145-03. Kepler magnitude: 14.55. Transit SNR 25.38

There are 15 quarters with good PRF difference image offsets

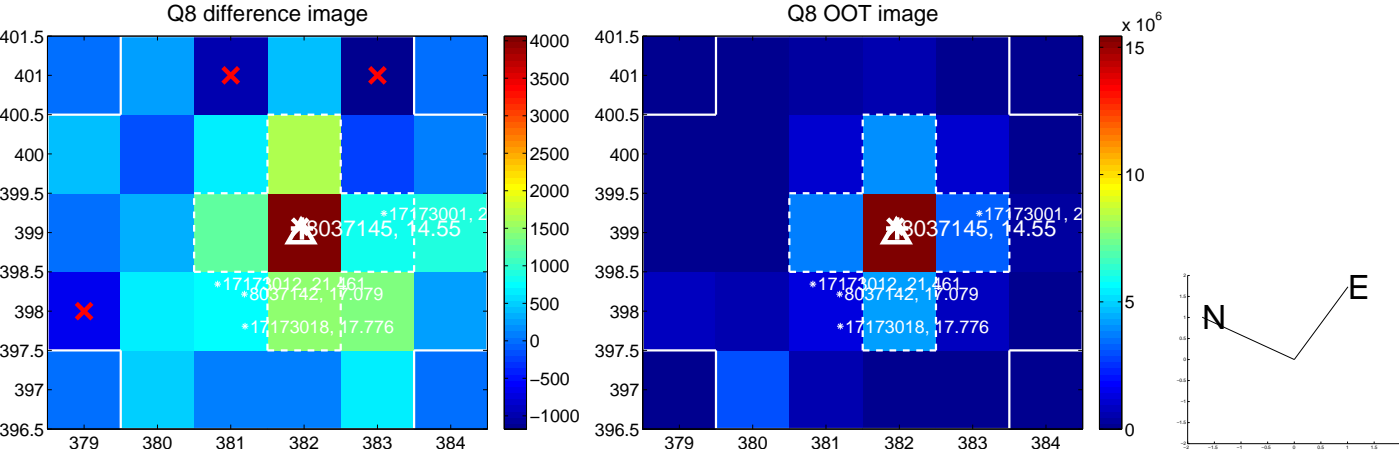
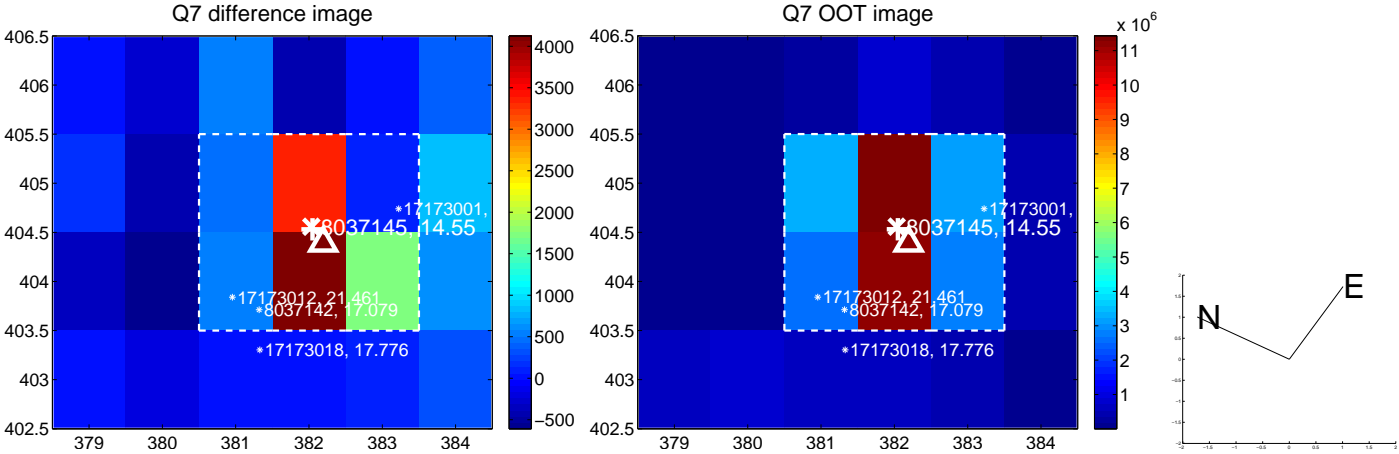
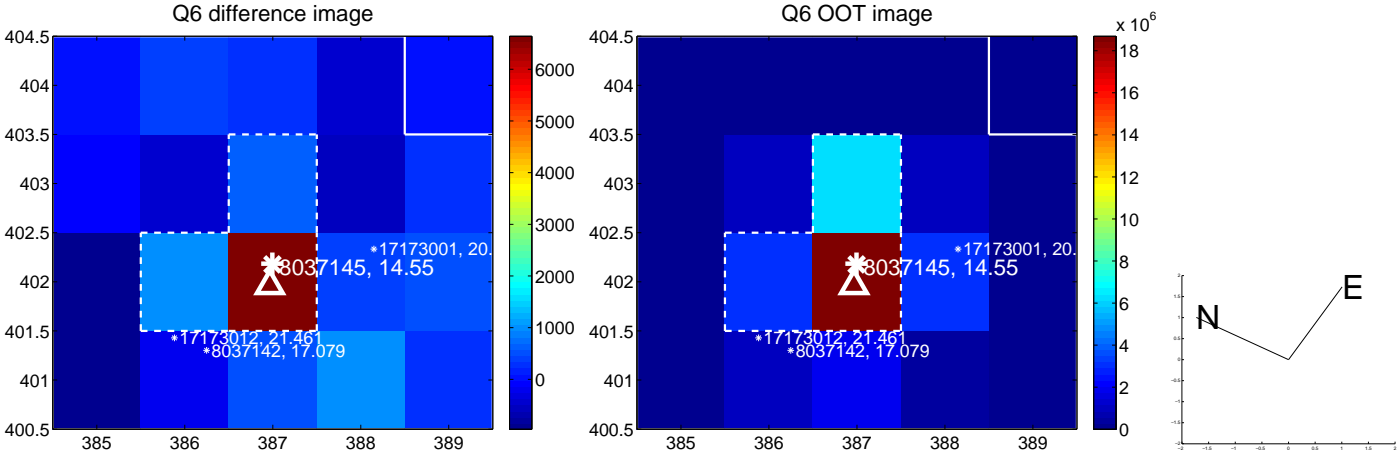
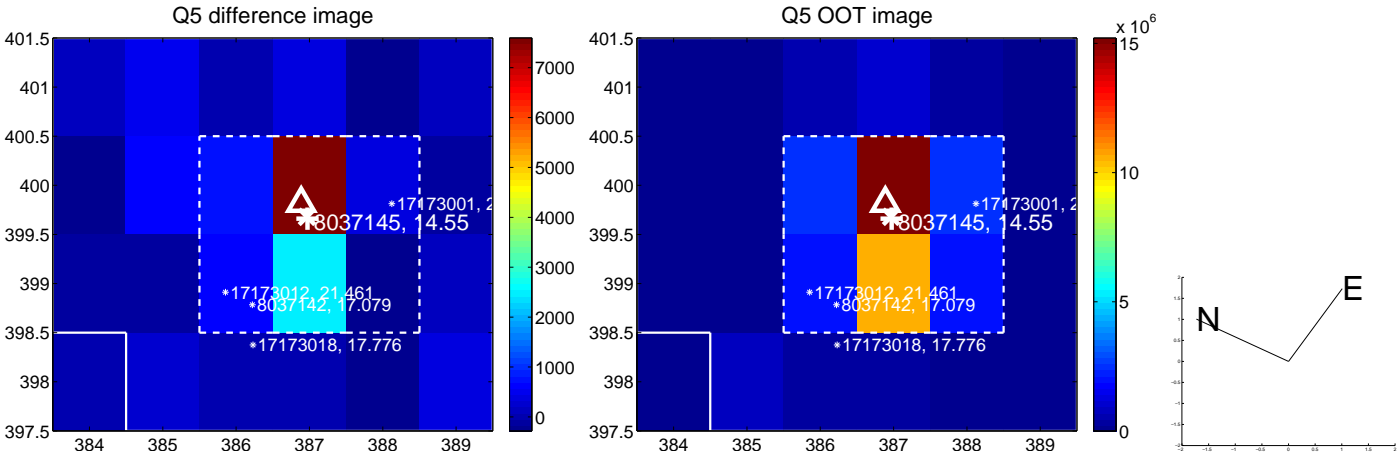
The direct PRF centroid is offset from the target star catalog position by about 0.11 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.362 ± 0.164	2.21	0.139 ± 0.219	-0.335 ± 0.160
PRF-fit source offset from KIC position	0.436 ± 0.159	2.75	0.097 ± 0.134	-0.425 ± 0.160
photometric centroid source offset	0.92 ± 0.56	1.64	-0.09 ± 0.52	-0.92 ± 0.56

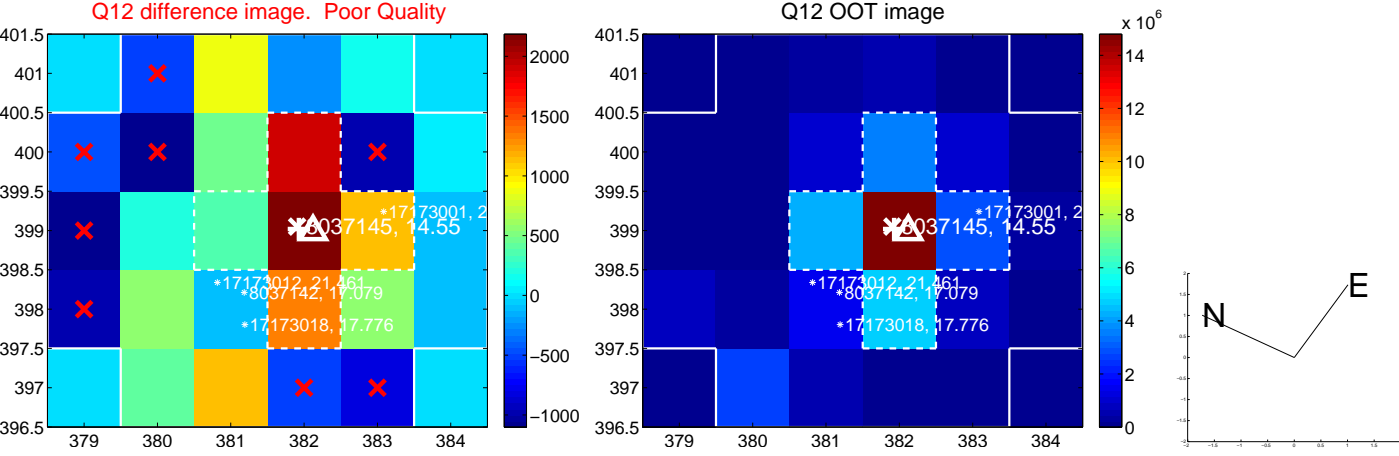
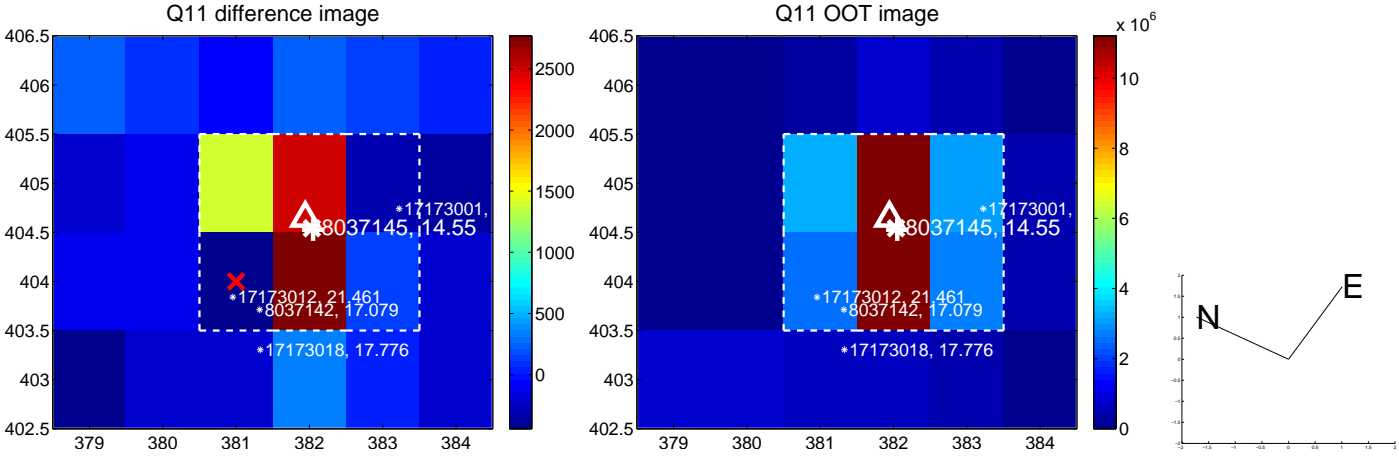
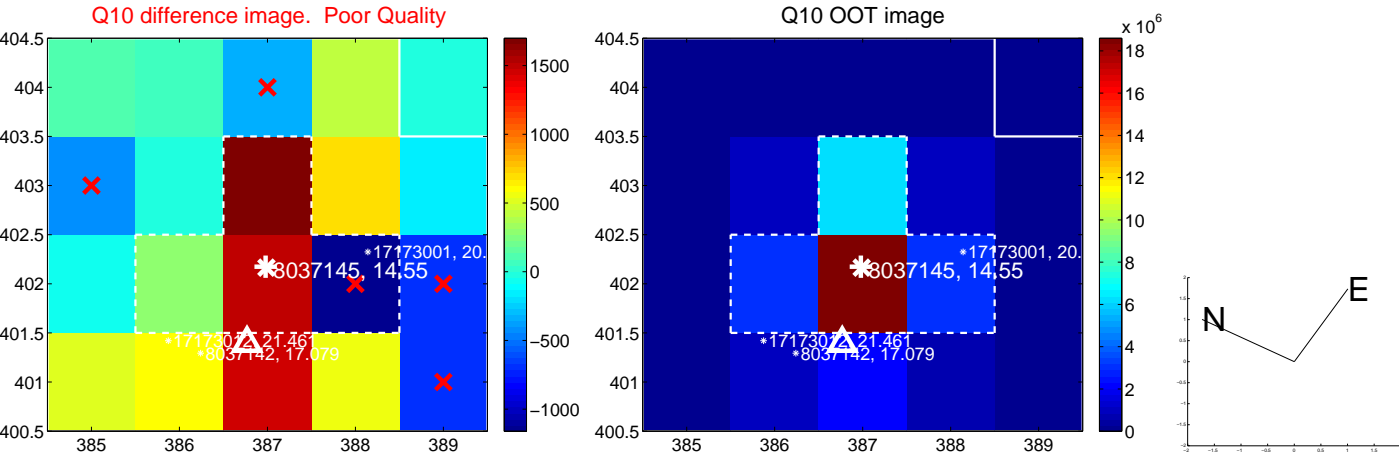
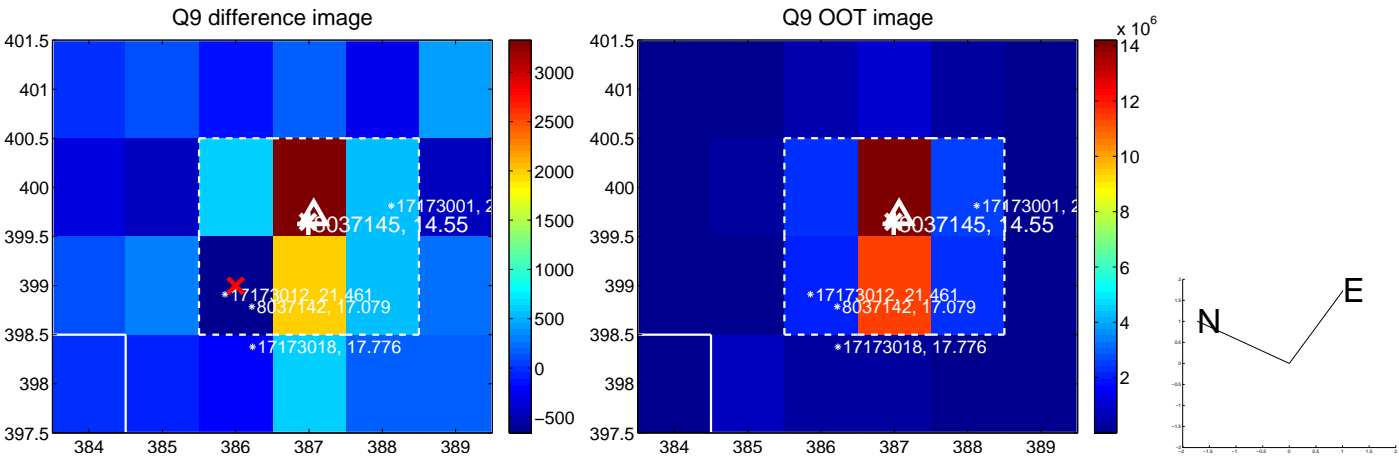


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

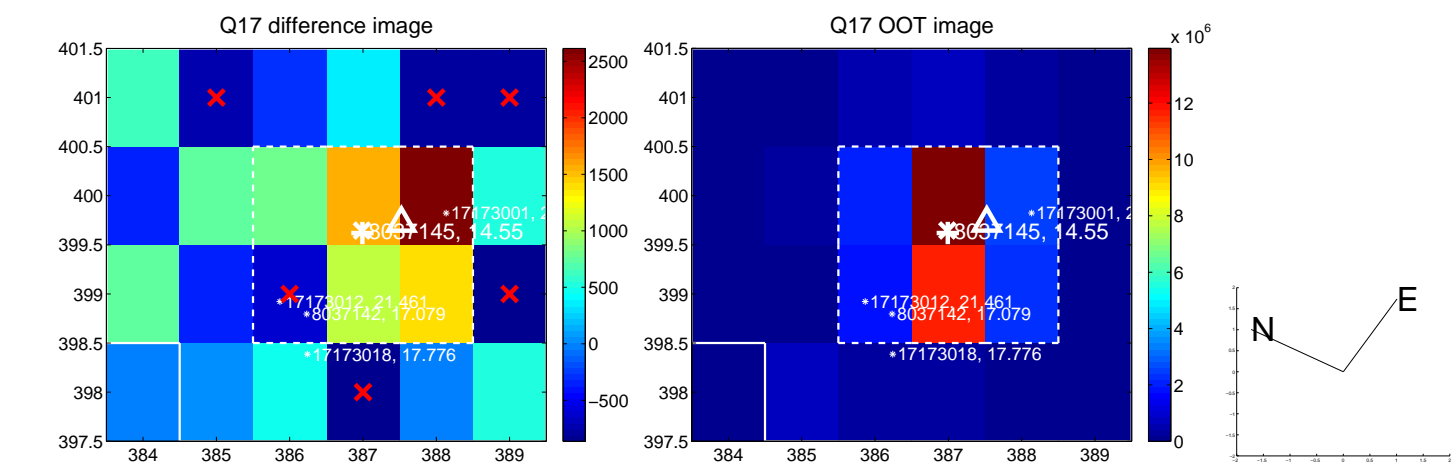
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



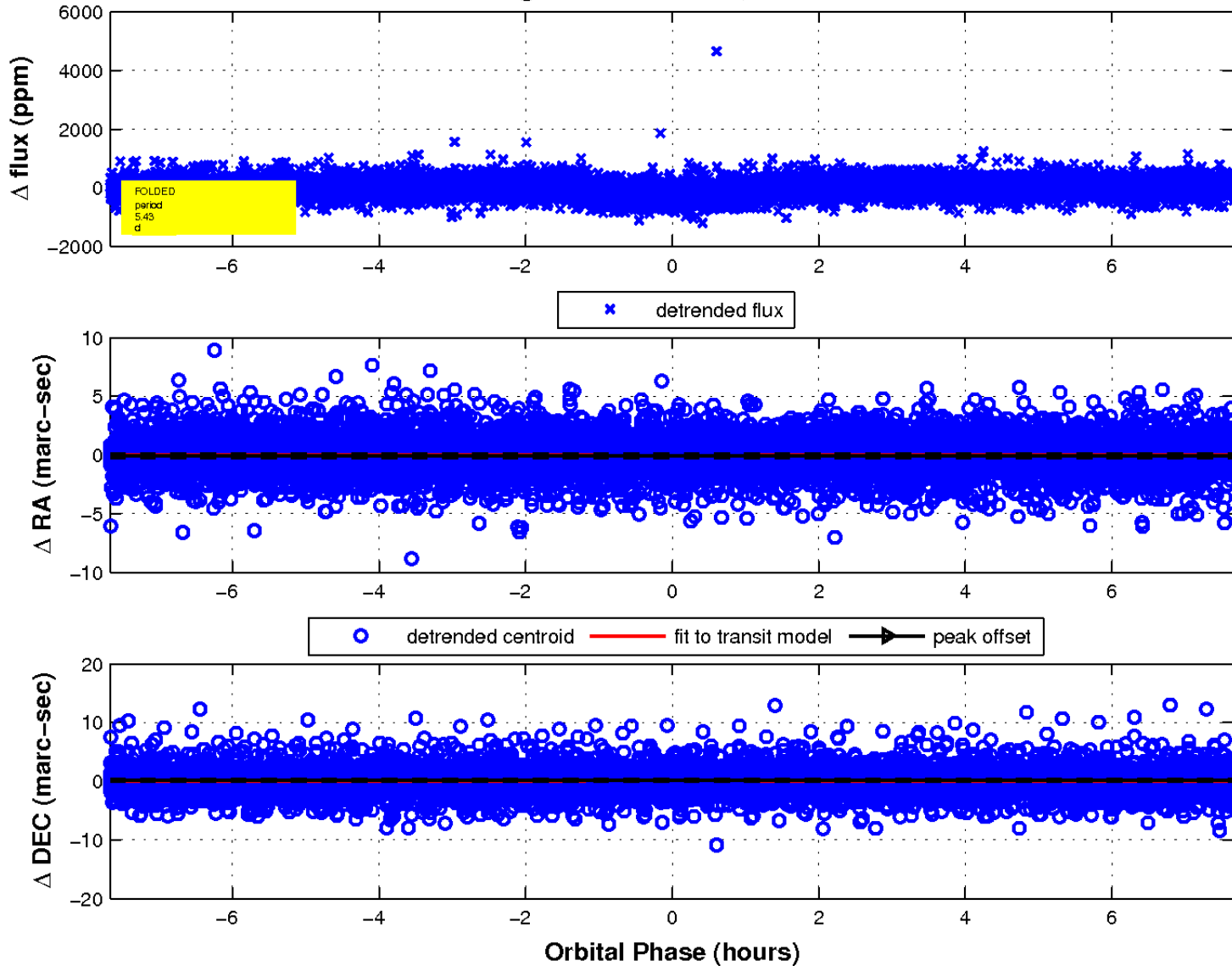
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



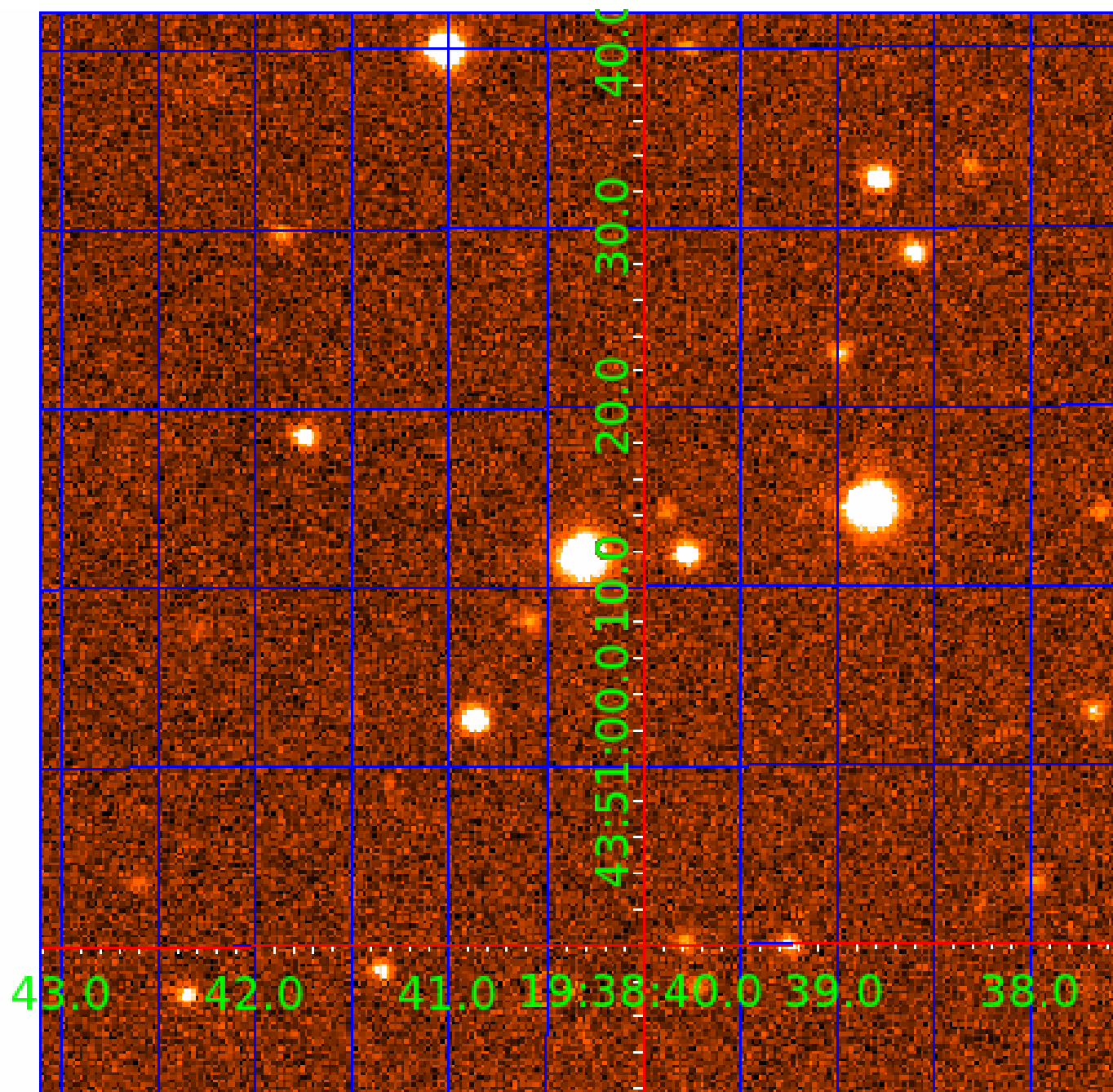
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



fluxWeightedCentroids, Planet 3 of 4



UKIRT Image



KIC 008037145

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})
008037145-01	OBS	0520.01	12.759310	132.044689	844.6	4.300	50.4	54.5	0.83	4963	3.15	38.03
008037145-02	OBS	0520.03	25.752791	136.437973	751.8	3.744	28.7	30.7	0.83	4963	3.23	14.91
008037145-03	OBS	0520.02	5.433079	132.941491	271.7	2.557	23.6	25.4	0.83	4963	1.65	118.70
008037145-04	OBS	0520.04	51.166266	172.299979	274.5	5.143	10.2	10.3	0.83	4963	1.73	5.97

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008037145-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
008037145-02	OBS	PC	1.00	0	0	0	0	NO_COMMENT
008037145-03	OBS	PC	1.00	0	0	0	0	NO_COMMENT
008037145-04	OBS	PC	0.91	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 008037145-04

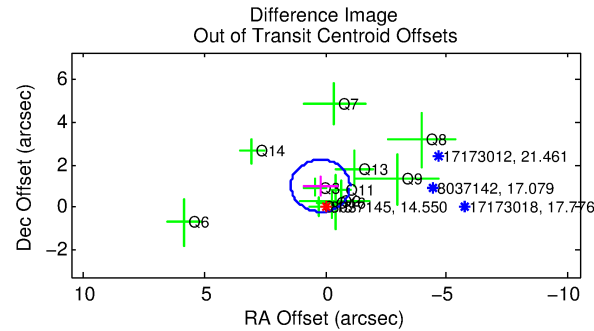
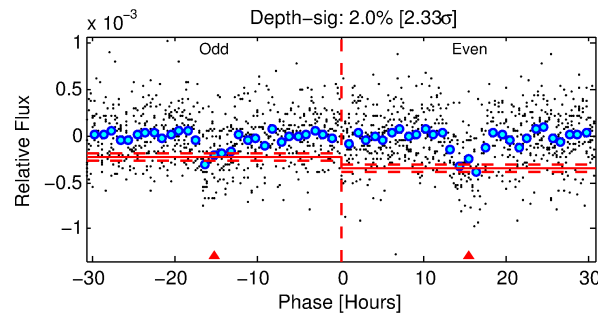
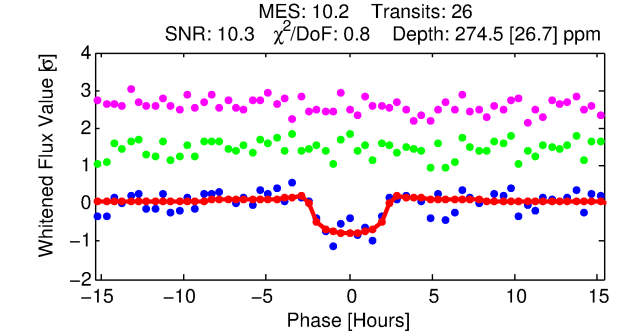
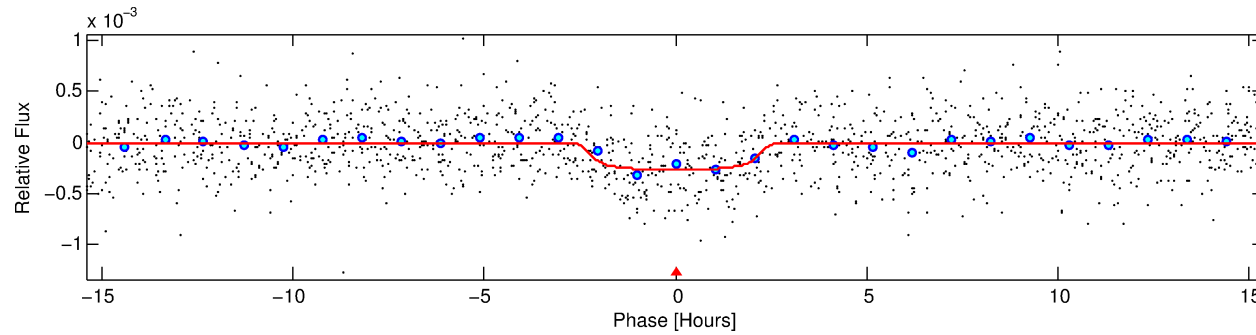
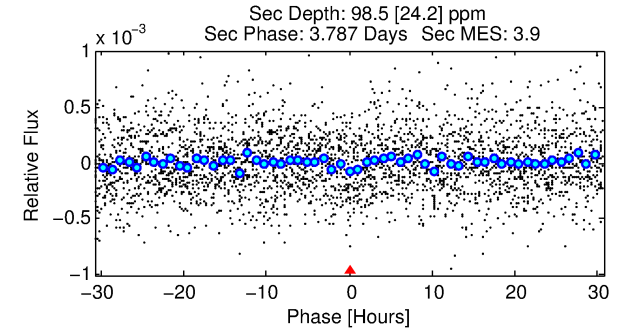
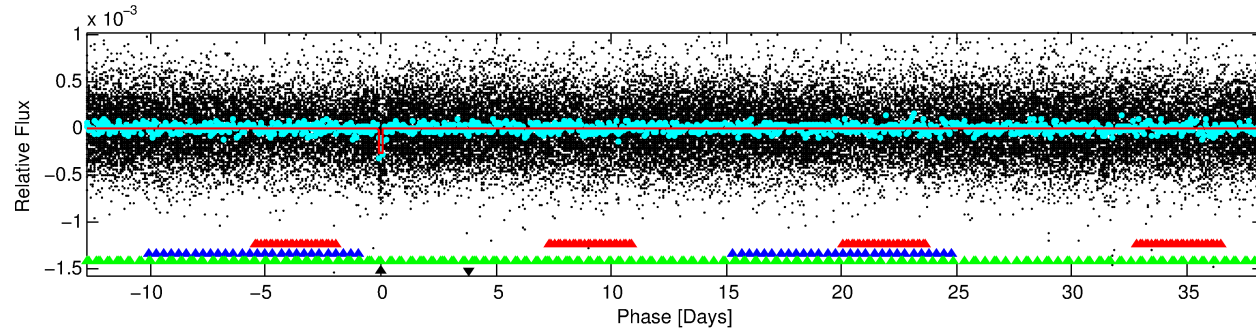
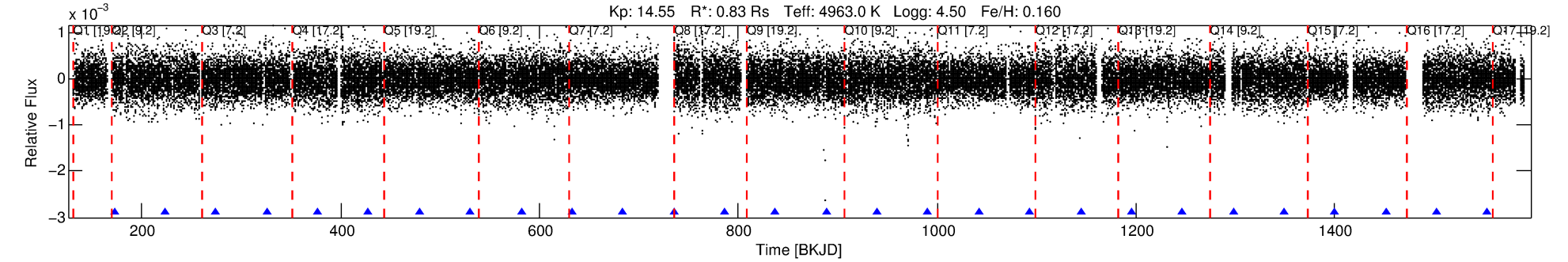
No Significant Match Found

DV One-Page Summary

KIC: 8037145 Candidate: 4 of 4 Period: 51.166 d

KOI: K00520.04 Corr: 0.958

Kp: 14.55 R*: 0.83 Rs Teff: 4963.0 K Logg: 4.50 Fe/H: 0.160



DV Fit Results:

Period = 51.16627 [0.00057] d
Epoch = 172.3000 [0.0091] BKJD
Rp/R* = 0.0191 [0.0039]
a/R* = 32.69 [25.88]
b = 0.92 [0.13]
Seff = 5.97 [0.82]
Teff = 399 [14] K
Rp = 1.73 [0.37] Re
a = 0.2493 [0.0183] AU
Ag = 1130.93 [553.25] [2.04σ]
Teffp = 3574 [428] K [7.42σ]

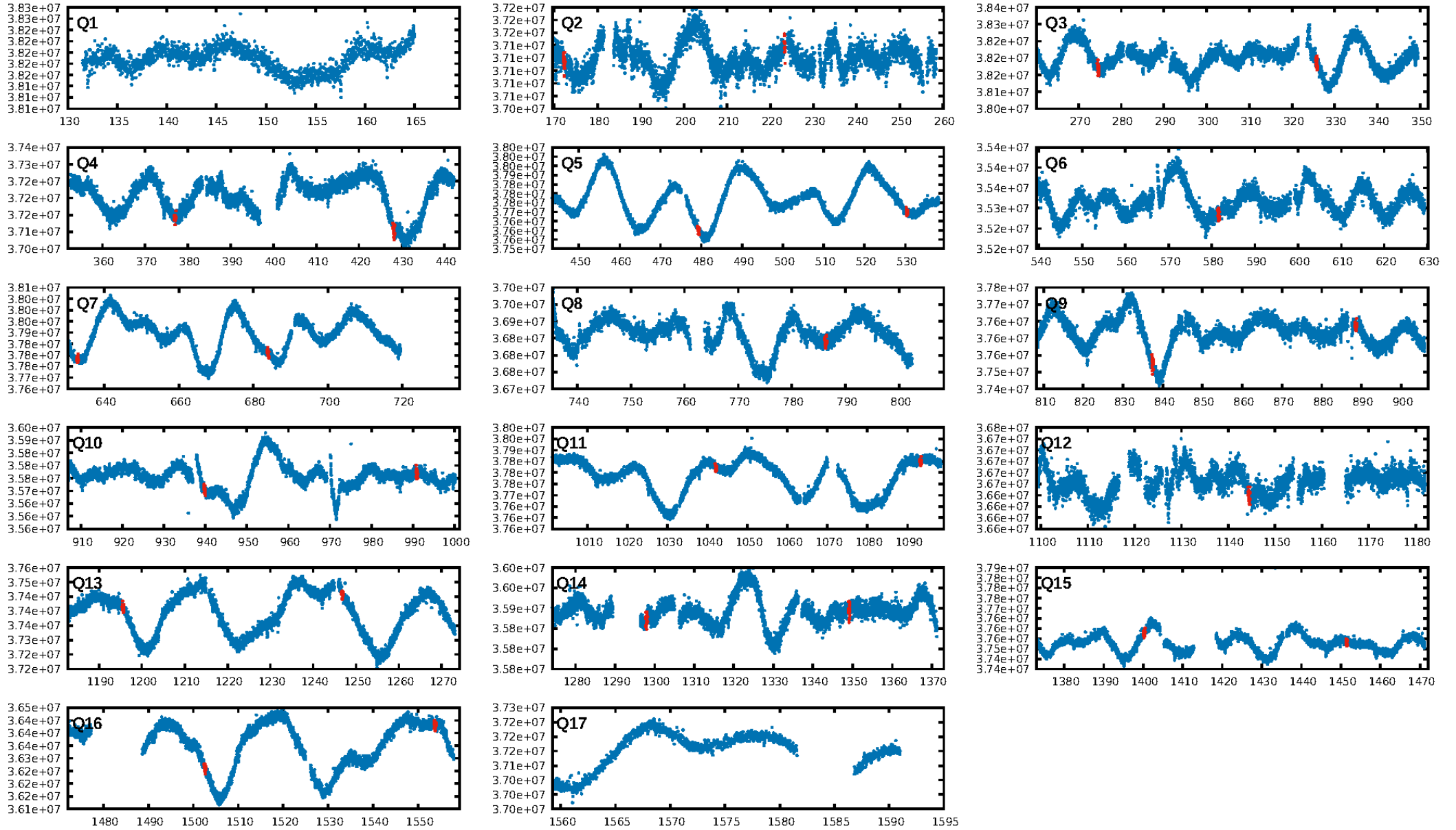
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [95.88σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 71.1%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 2.10e-22
RollingBand-fgt: 1.00 [26/26]
GhostDiagnostic-chr: -5.951
Centroid-sig: 68.5%
Centroid-so: 0.446 arcsec [0.38σ]
OotOffset-rm: 1.029 arcsec [2.53σ]
KicOffset-rm: 0.950 arcsec [2.26σ]
OotOffset-st: 3/4/2/2 [11]
KicOffset-st: 3/4/2/2 [11]
DiffImageQuality-fgm: 0.27 [3/11]
DiffImageOverlap-fno: 1.00 [15/15]

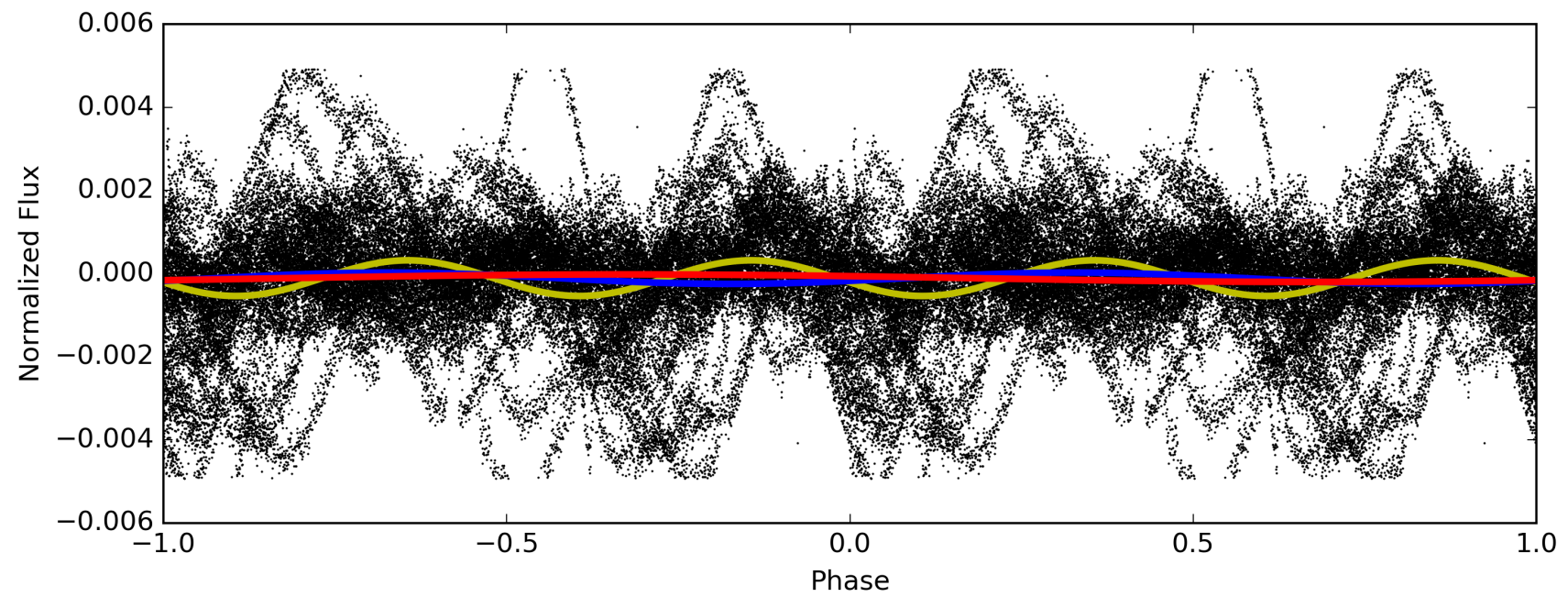
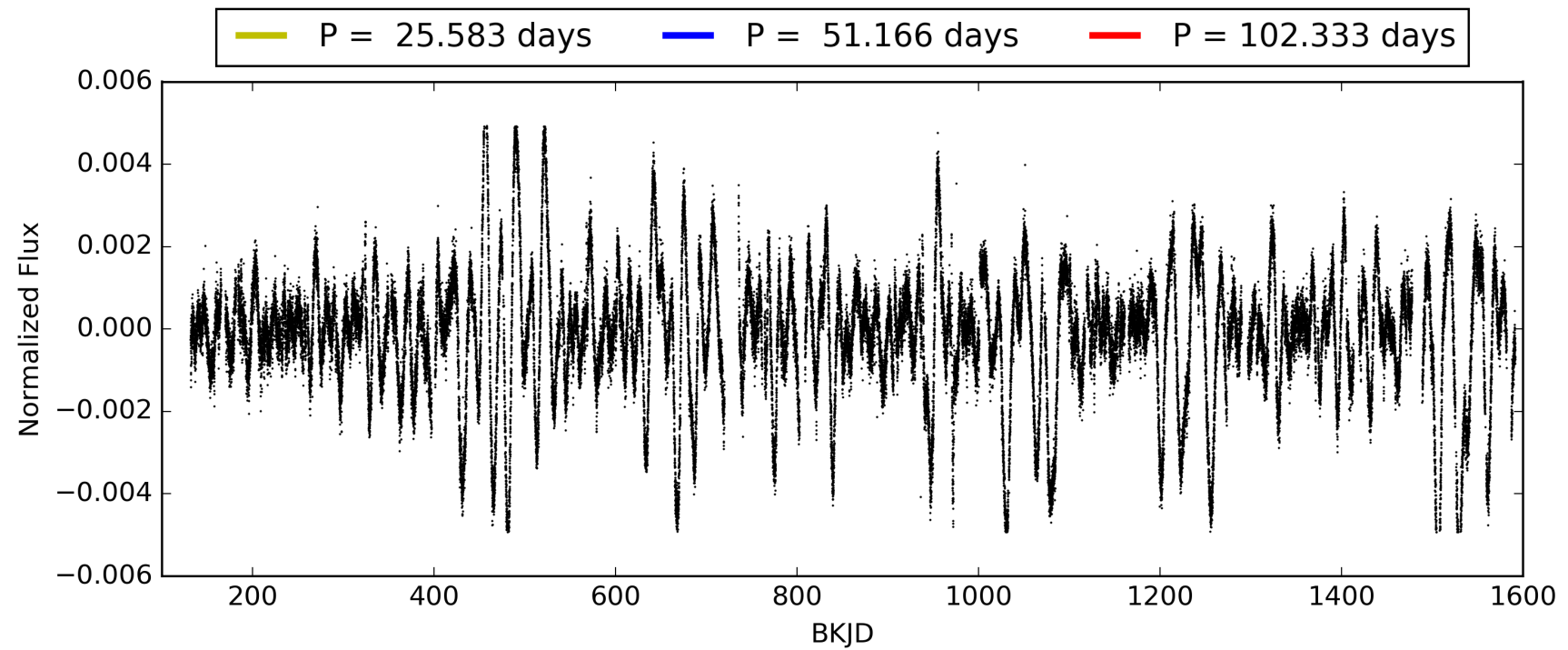
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 13:33:05 Z

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

TCE 008037145-04, PDC Light Curves

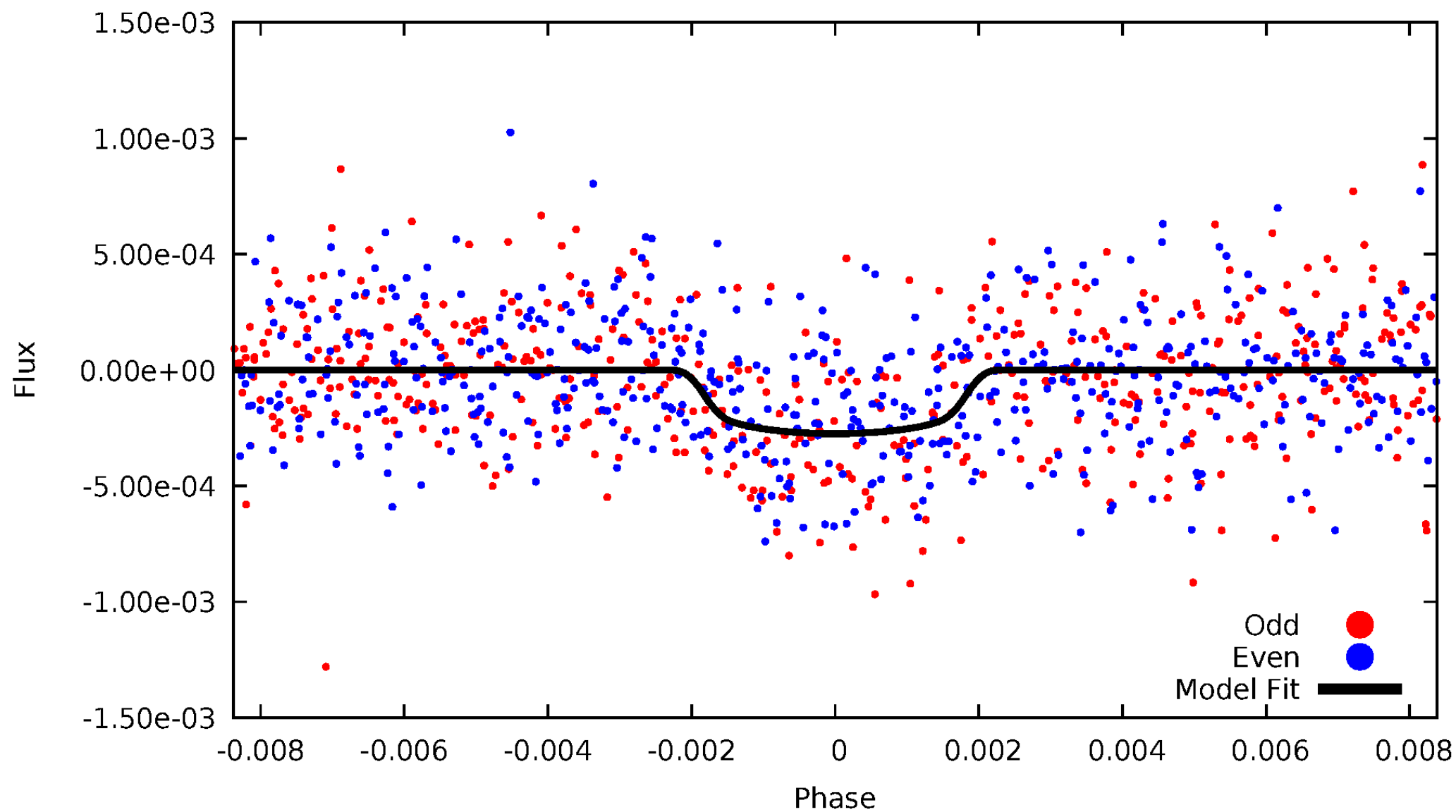


TCE 008037145-04



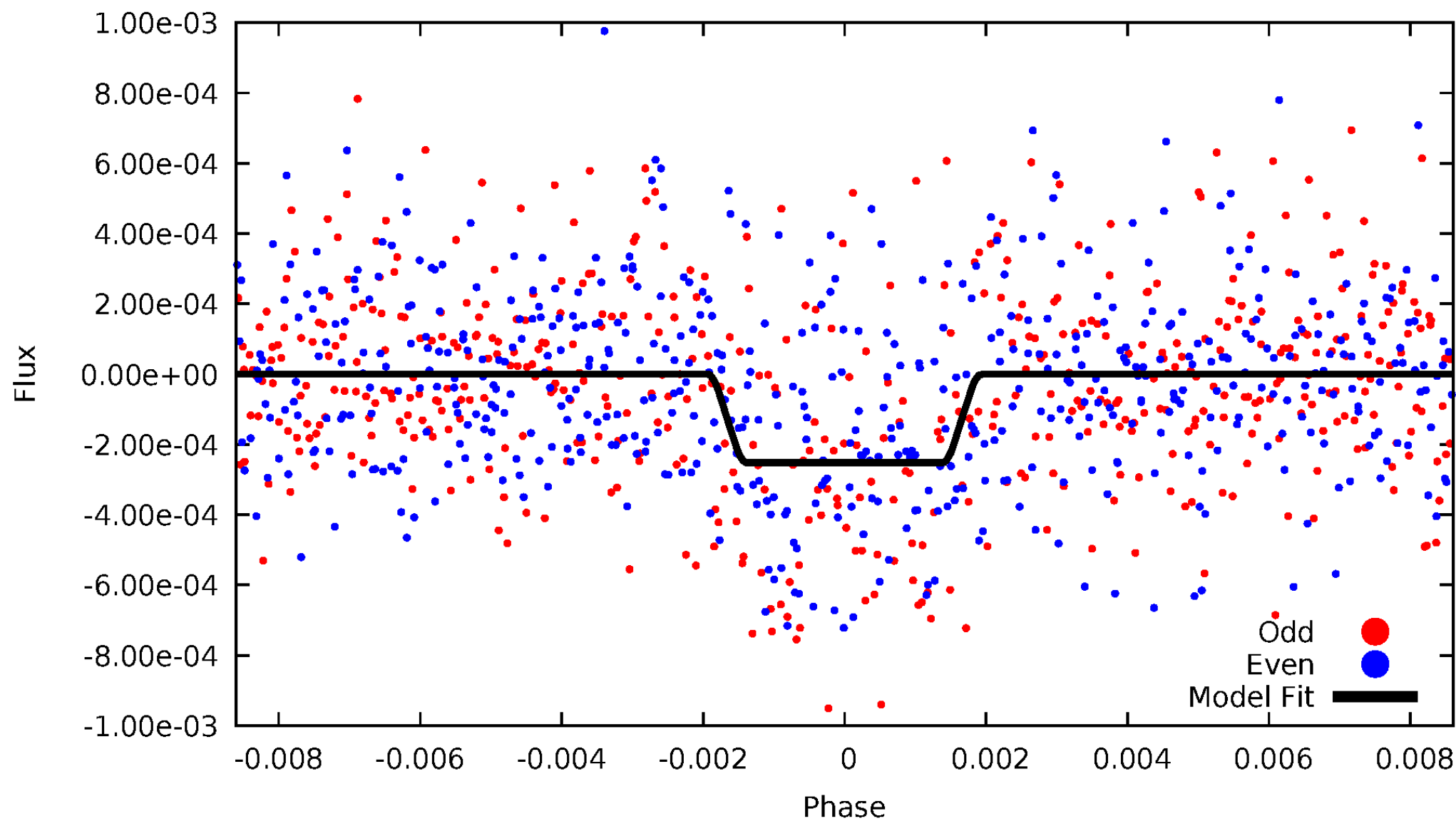
DV Odd/Even

TCE 008037145-04



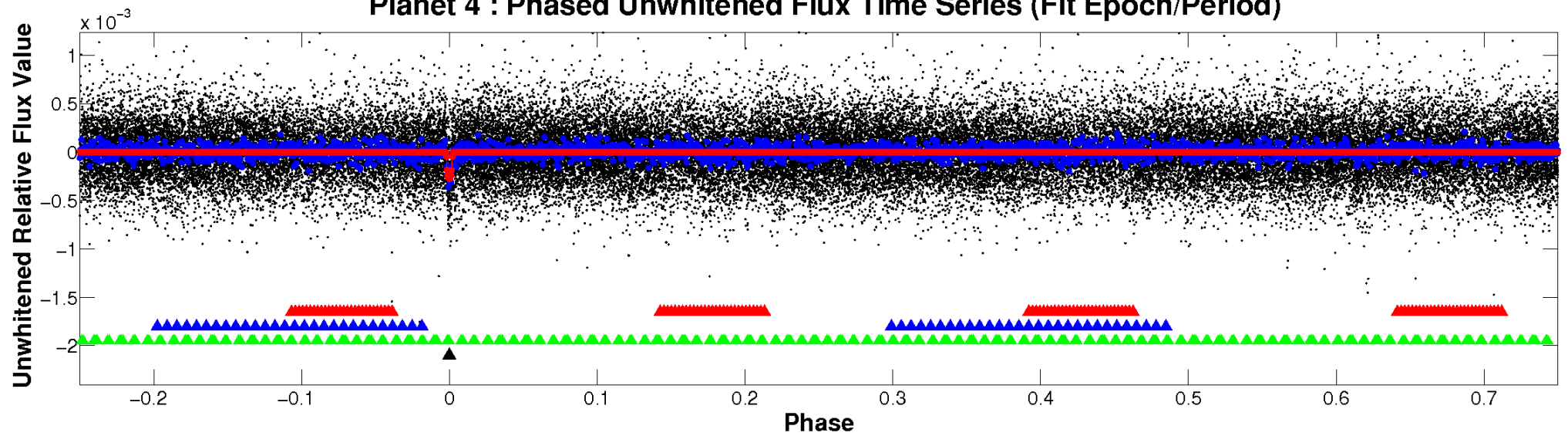
ALT Odd/Even

TCE 008037145-04

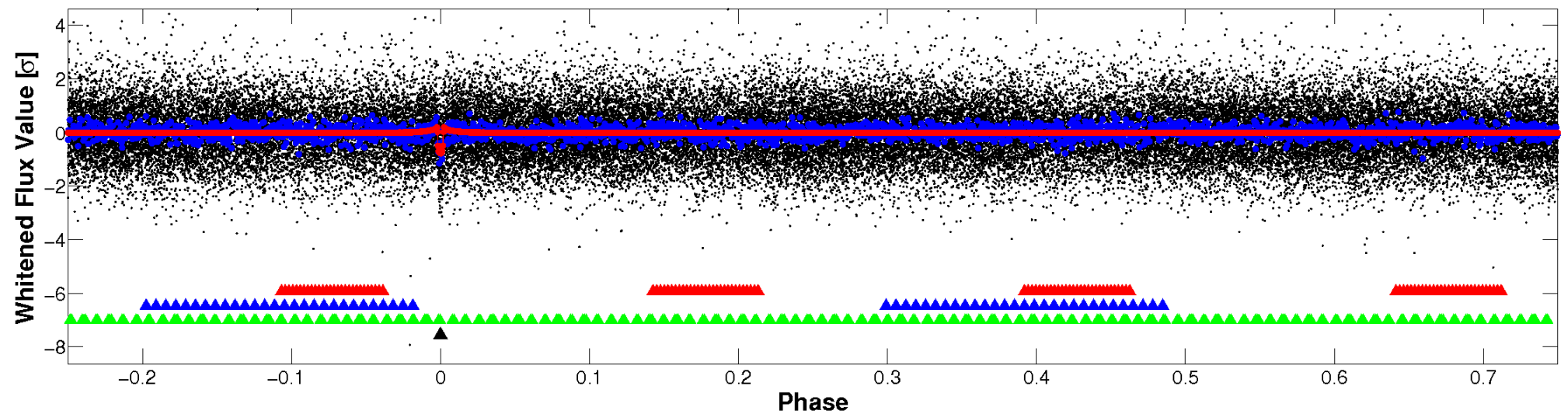


Non-Whitened Vs. Whitened Light Curve

Planet 4 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

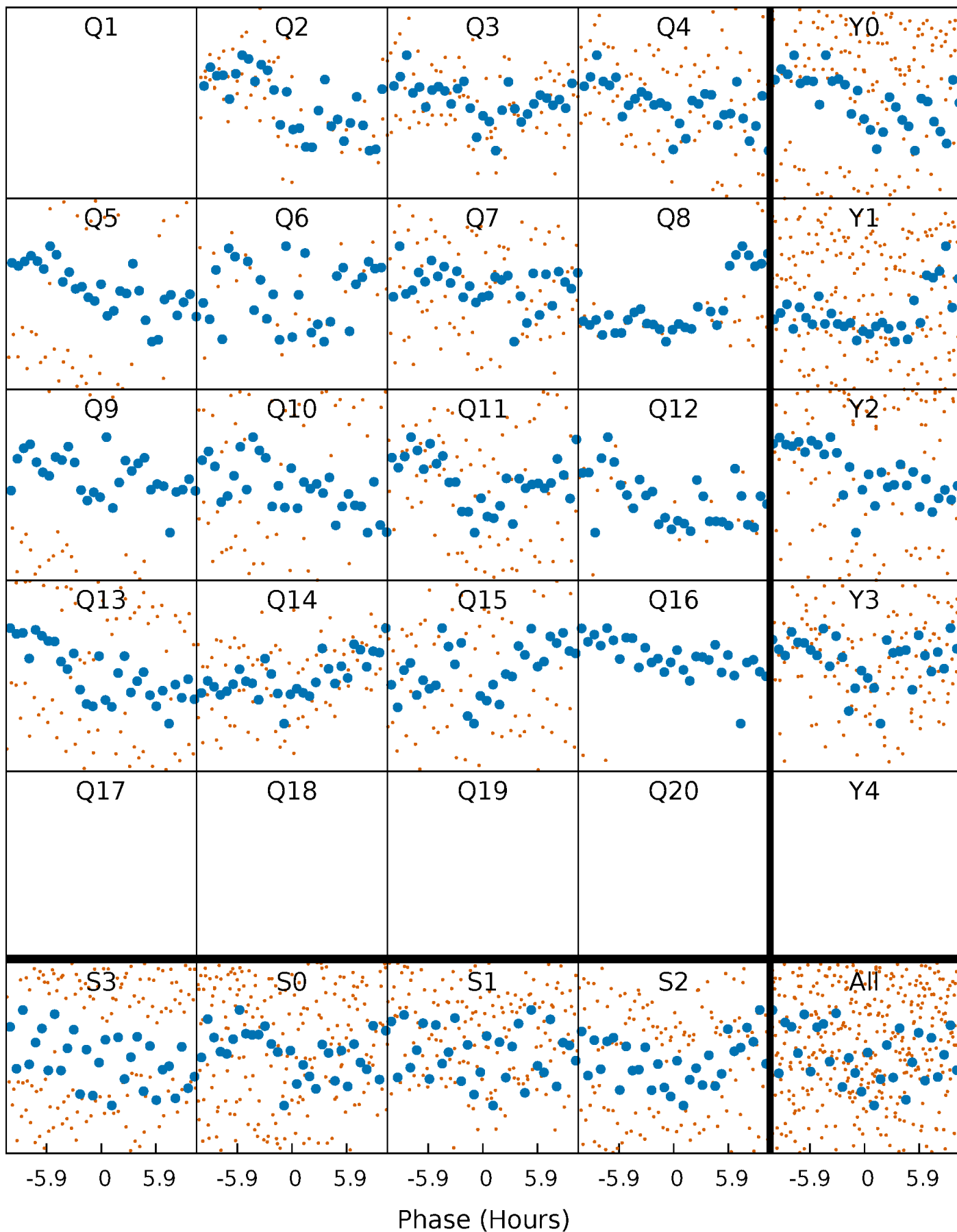


Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



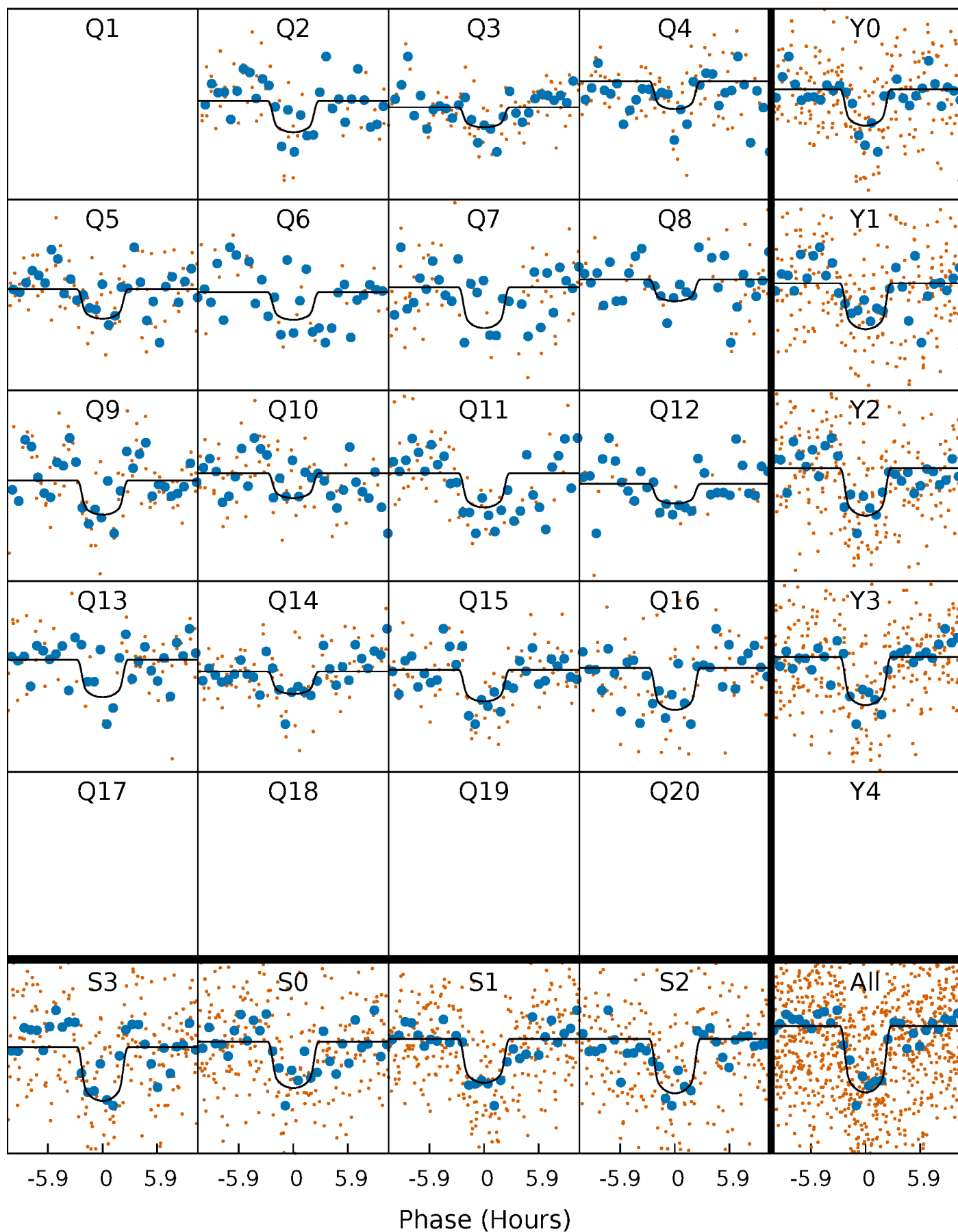
PDC Quarter-Phased Transit Curves

TCE 008037145-04 P= 51.166266 Days $T_0=172.299979$ (BKJD)



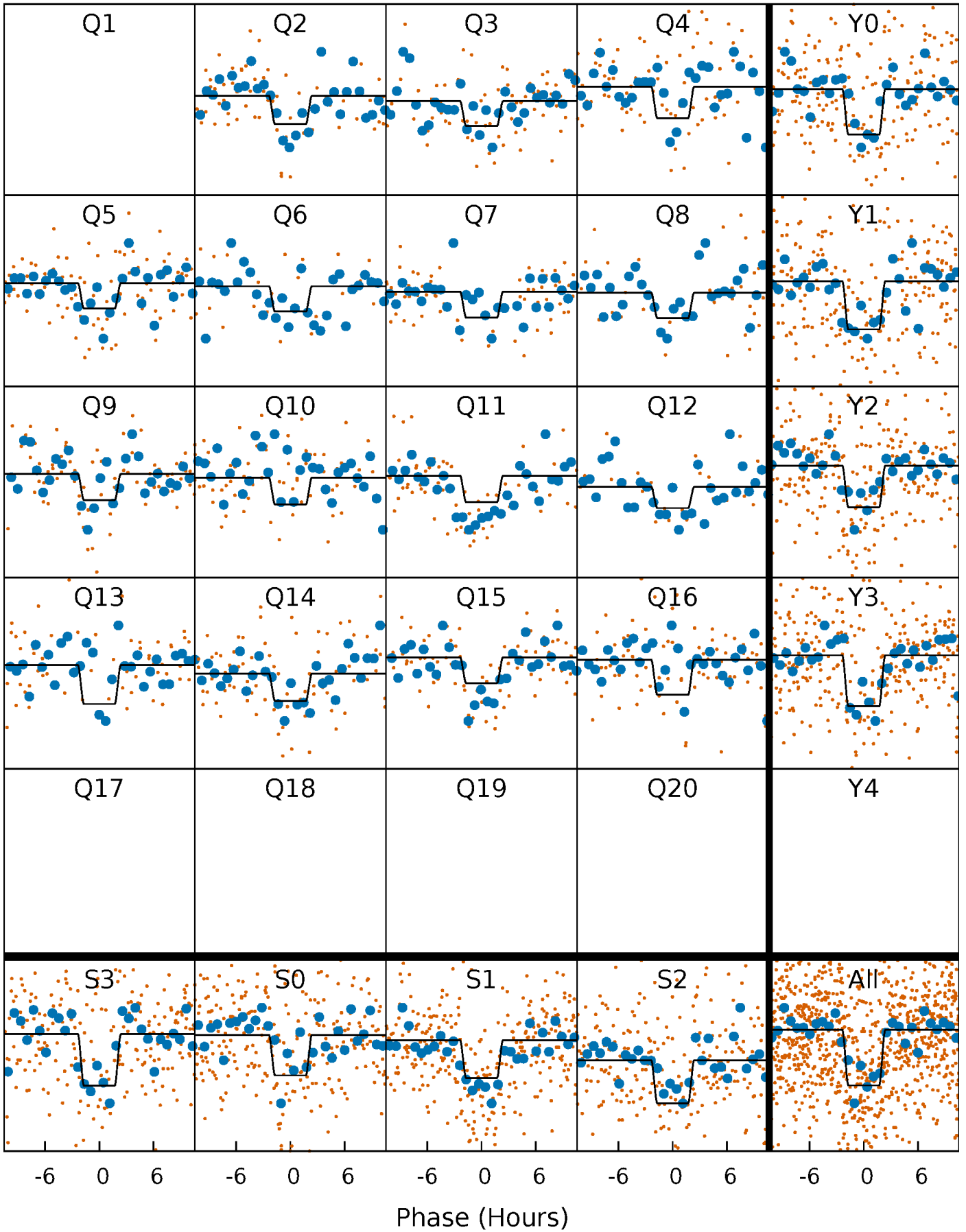
DV Quarter-Phased Transit Curves

TCE 008037145-04 P= 51.166266 Days $T_0=172.299979$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

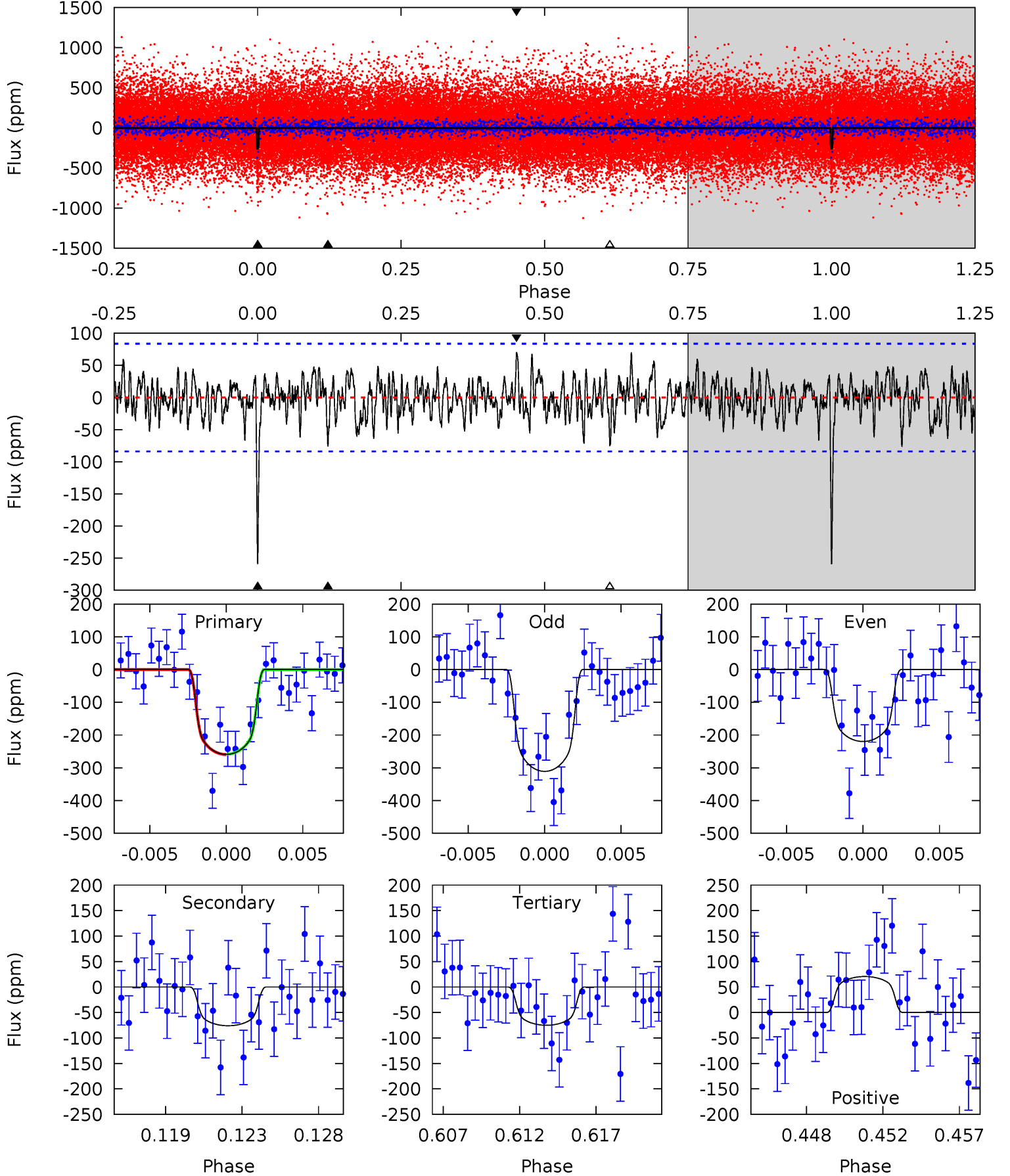
TCE 008037145-04 P= 51.166364 Days $T_0=172.299649$ (BKJD)



DV Model-Shift Uniqueness Test

008037145-04, P = 51.166266 Days, E = 121.133713 Days

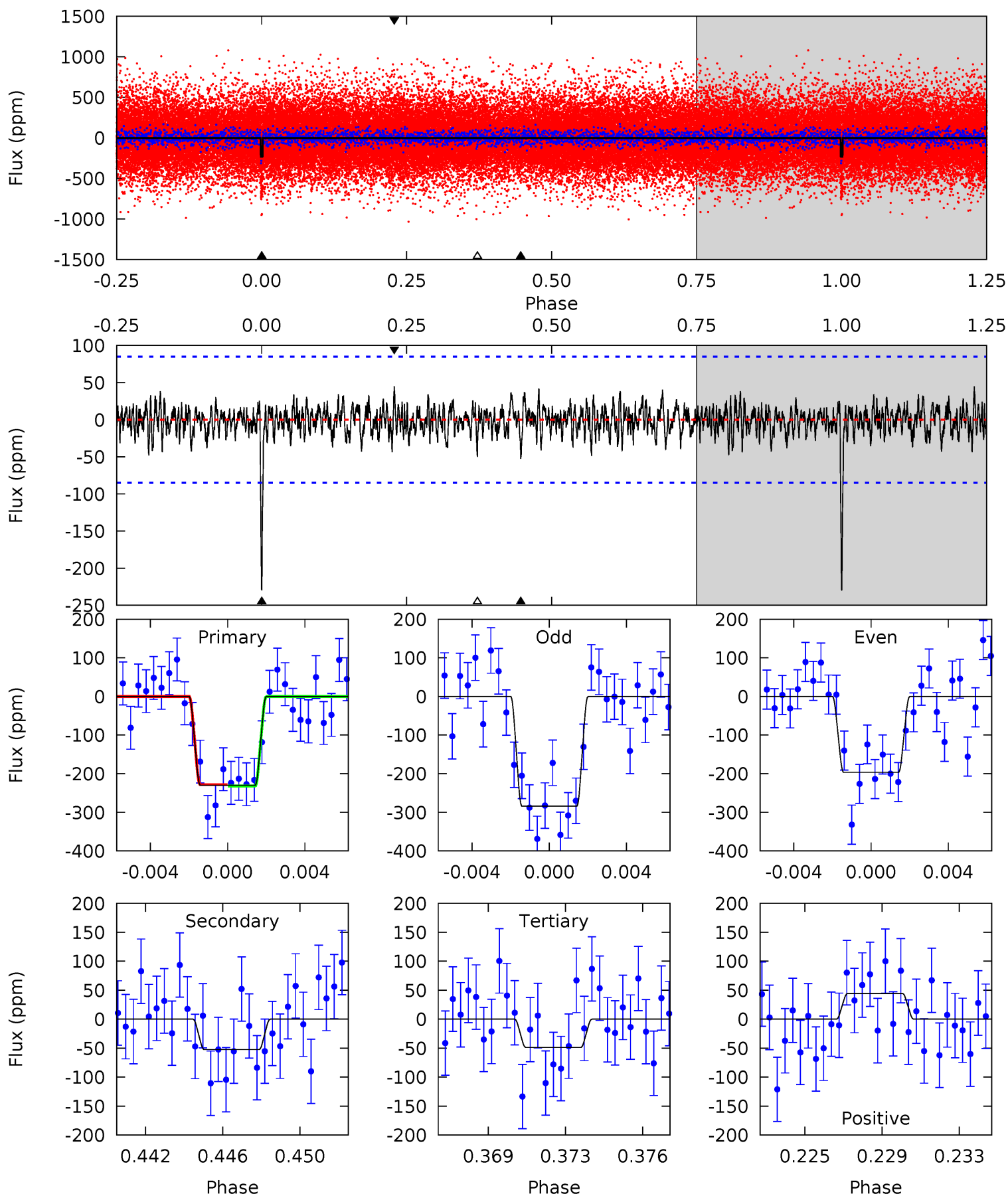
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
16.0	4.69	4.63	4.36	5.17	2.84	1.47	11.4	11.6	0.06	0.34	2.80	0.98	0.21	0.04



Alt Model-Shift Uniqueness Test

008037145-04, P = 51.166364 Days, E = 121.133285 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
14.1	3.21	2.99	2.71	5.20	2.89	0.92	11.1	11.4	0.22	0.49	2.66	1.12	0.16	0.11



Stellar Parameters For KIC 008037145

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	4963^{+81}_{-74}	$4.501^{+0.072}_{-0.022}$	$0.160^{+0.150}_{-0.150}$	$0.826^{+0.032}_{-0.060}$	$0.789^{+0.055}_{-0.029}$	$1.973^{+0.537}_{-0.181}$
	+2%/-1%	+2%/-0%	+94%/-94%	+4%/-7%	+7%/-4%	+27%/-9%
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 008037145-04 / KOI 0520.04

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	A_{obs}
DV	-76 ± 16	$1.70^{+0.36}_{-0.35}$	553^{+12}_{-14}	3709^{+335}_{-261}	901^{+637}_{-314}
Alt.	-52 ± 16	$1.40^{+0.38}_{-0.34}$	553^{+11}_{-13}	3691^{+421}_{-327}	883^{+749}_{-380}

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

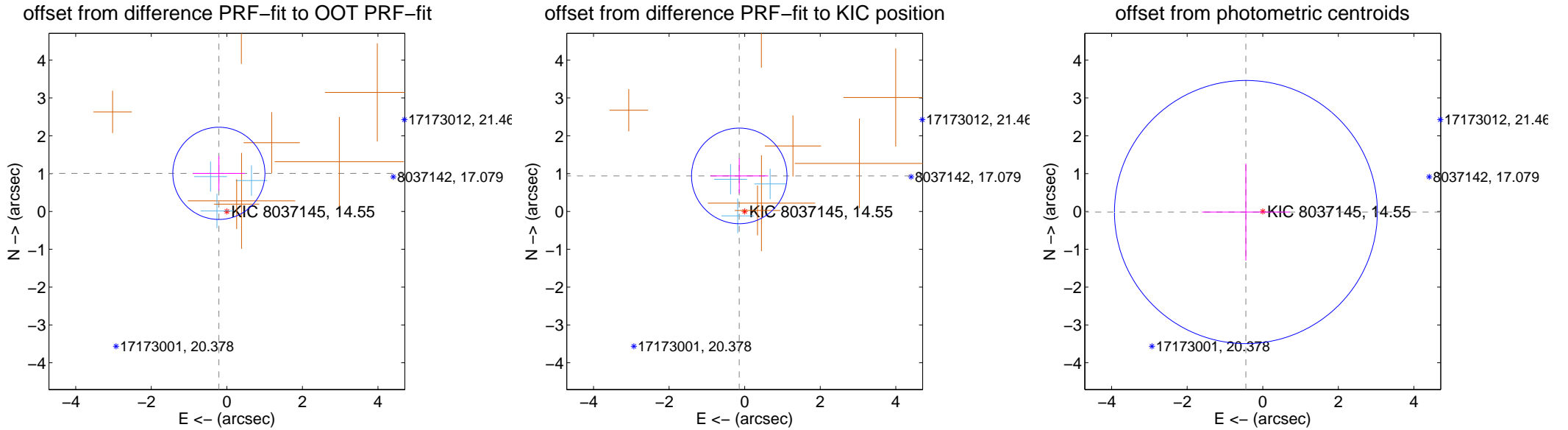
DV Centroid Data

Supplemental centroid analysis for 008037145-04. Kepler magnitude: 14.55. Transit SNR 10.34

There are 3 quarters with good PRF difference image offsets

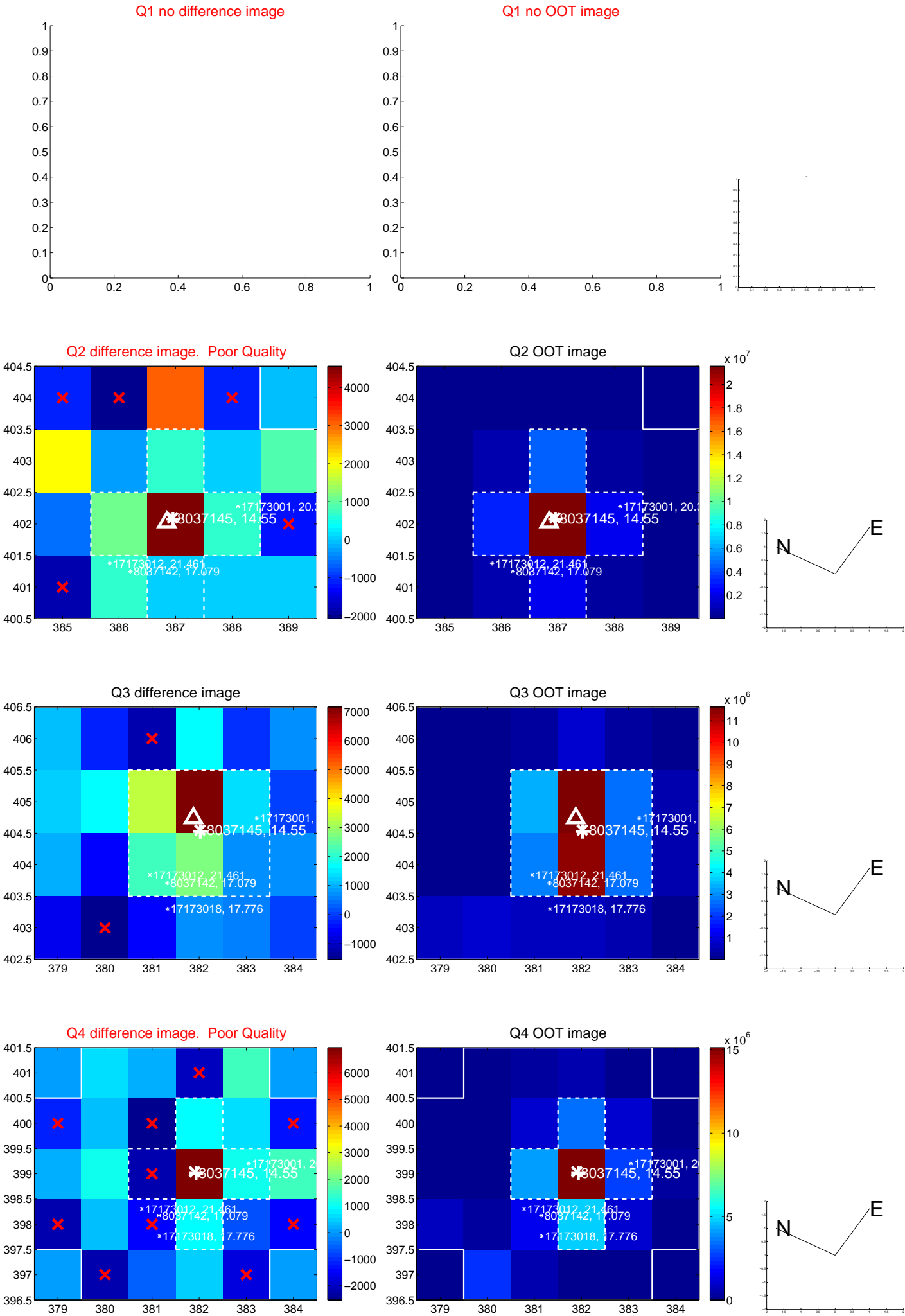
The direct PRF centroid is offset from the target star catalog position by about 0.19 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	1.029 ± 0.406	2.53	0.211 ± 0.686	1.007 ± 0.454
PRF-fit source offset from KIC position	0.950 ± 0.421	2.26	0.143 ± 0.768	0.939 ± 0.462
photometric centroid source offset	0.45 ± 1.16	0.38	0.45 ± 1.16	-0.02 ± 1.28

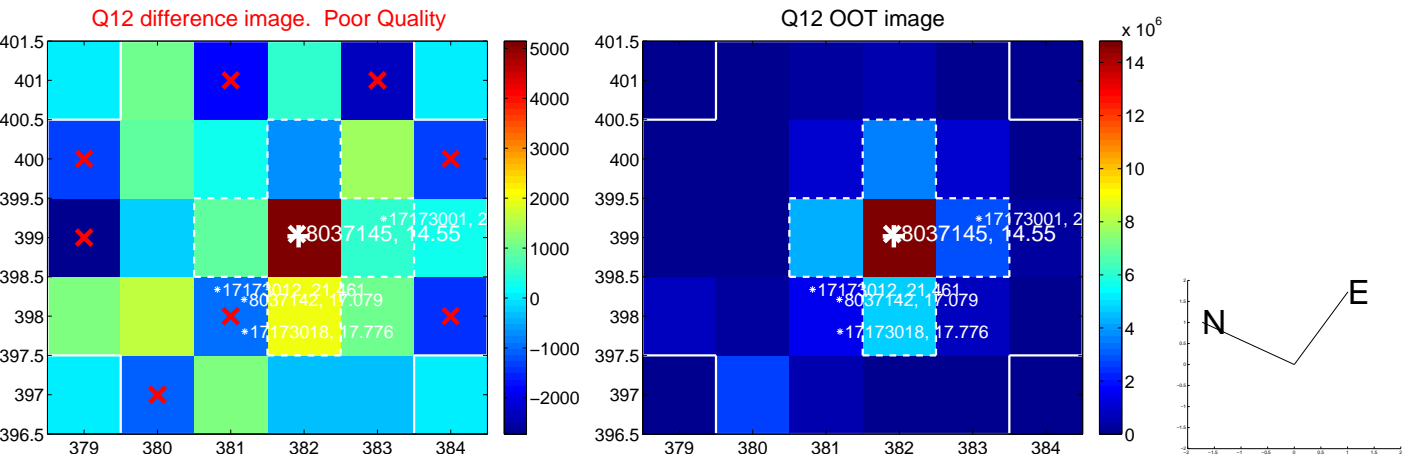
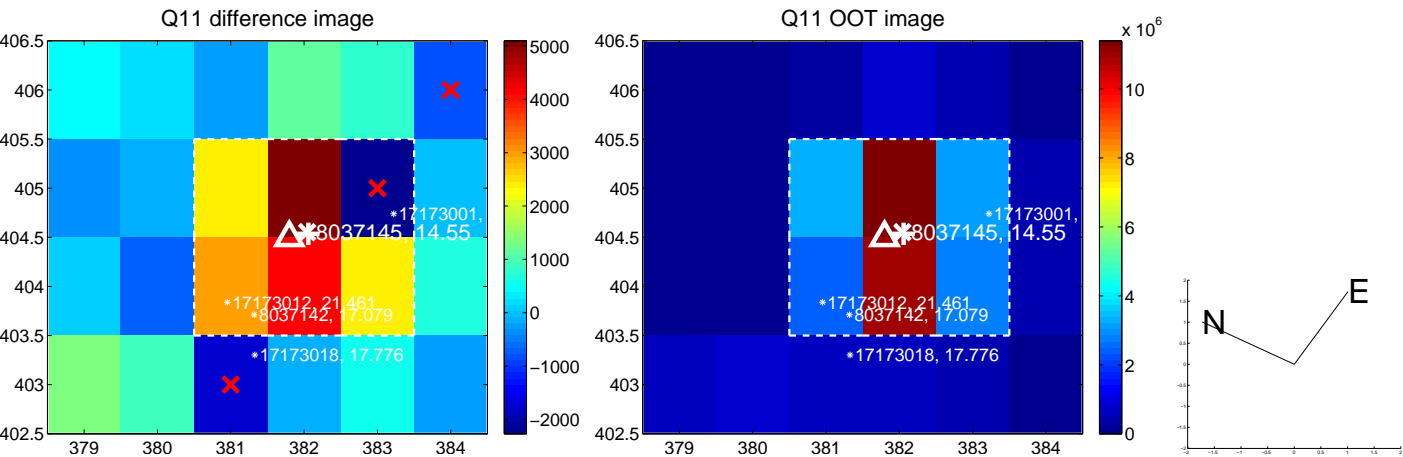
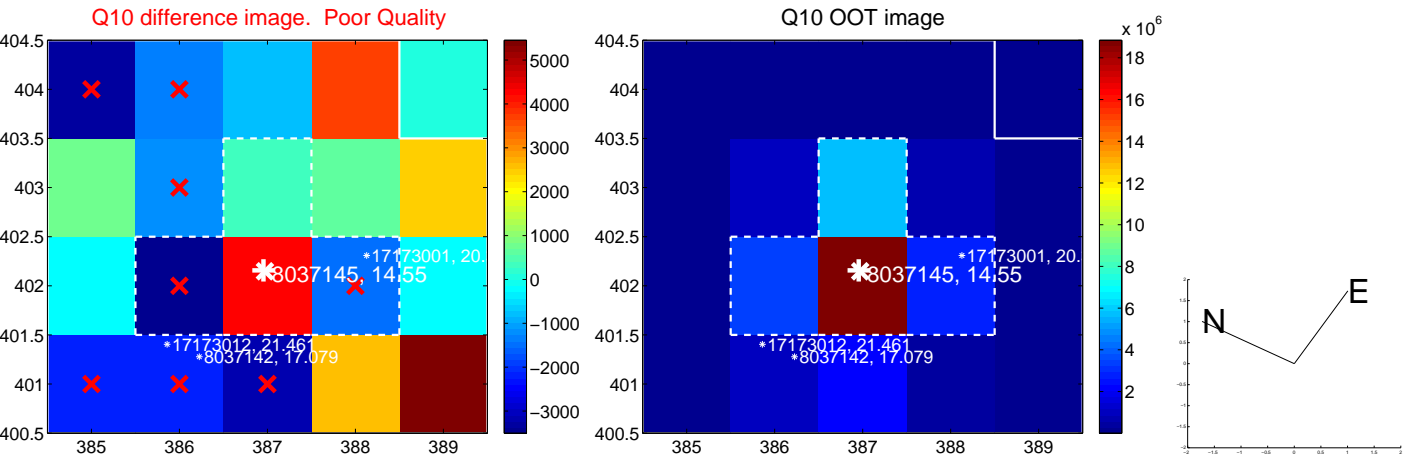
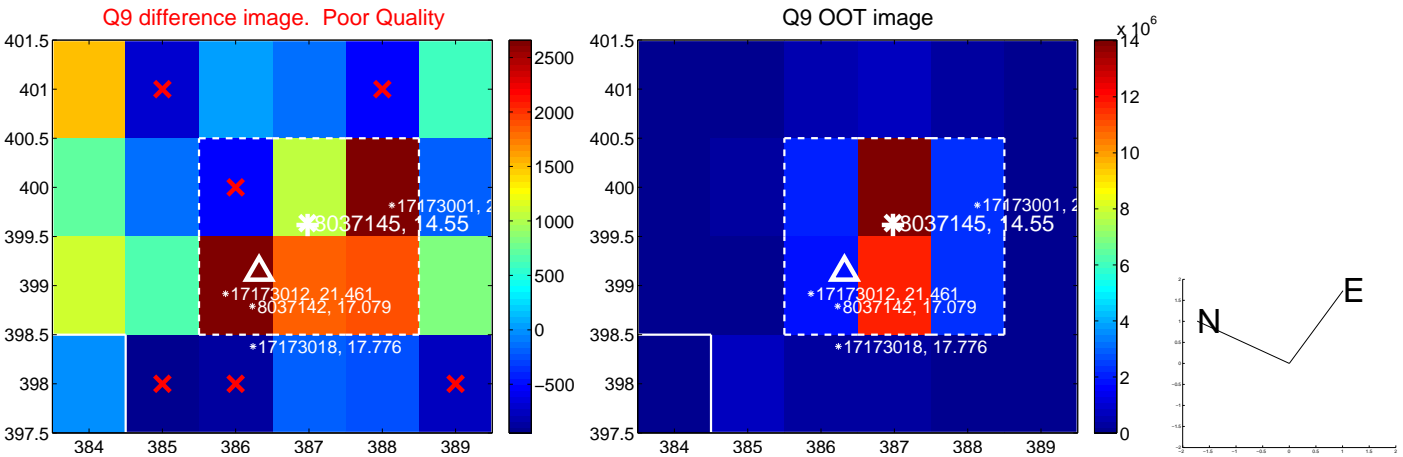


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

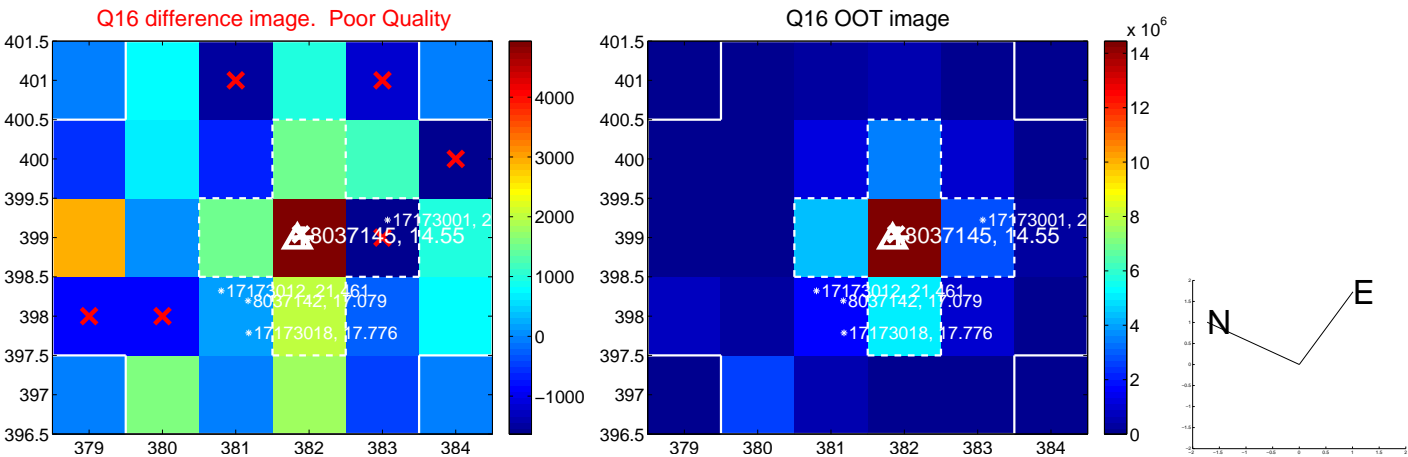
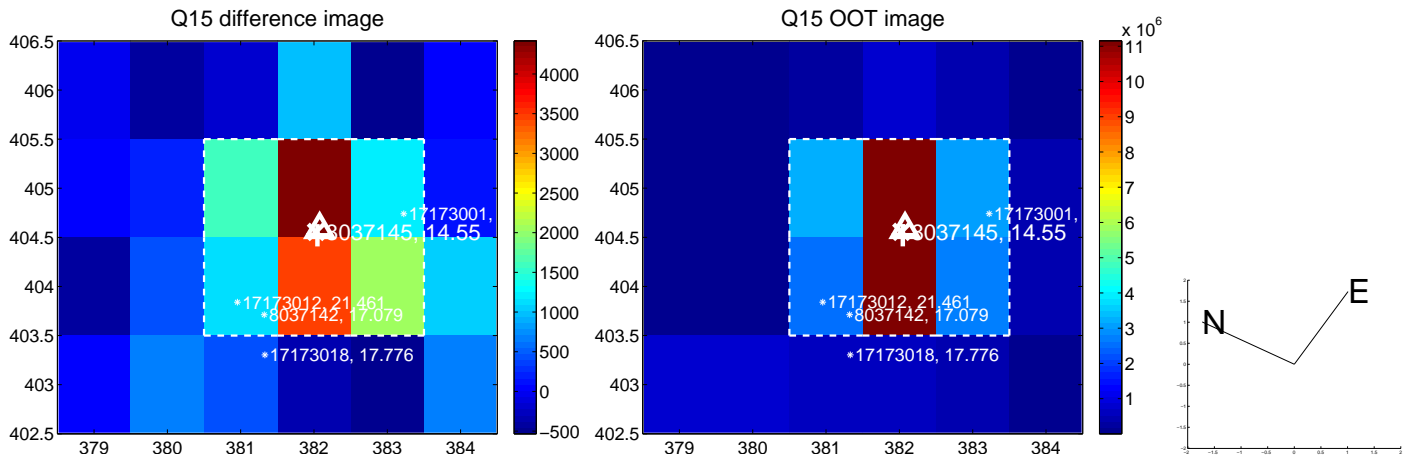
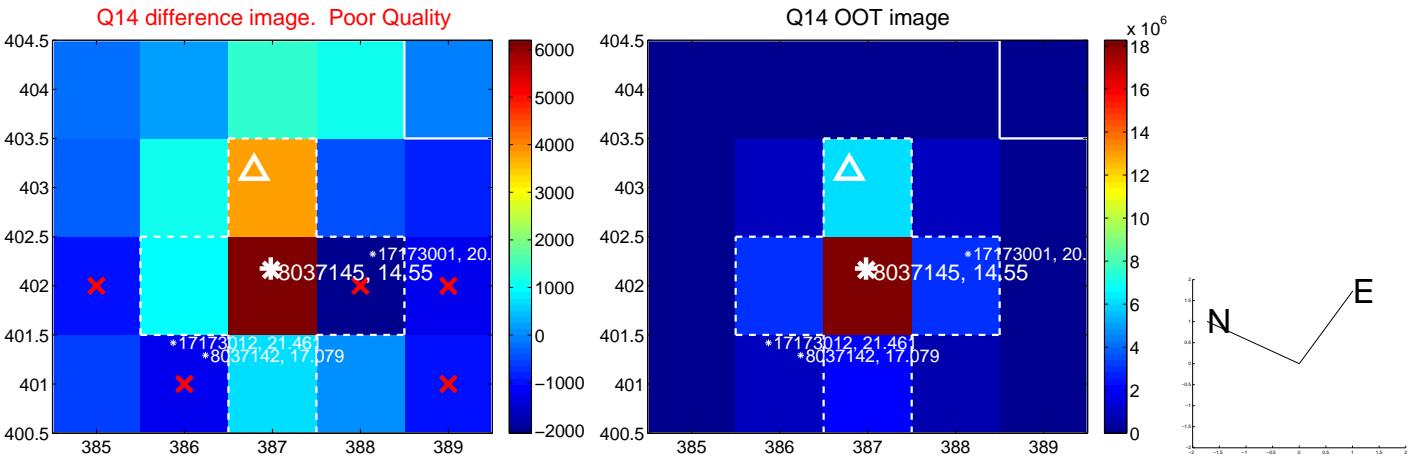
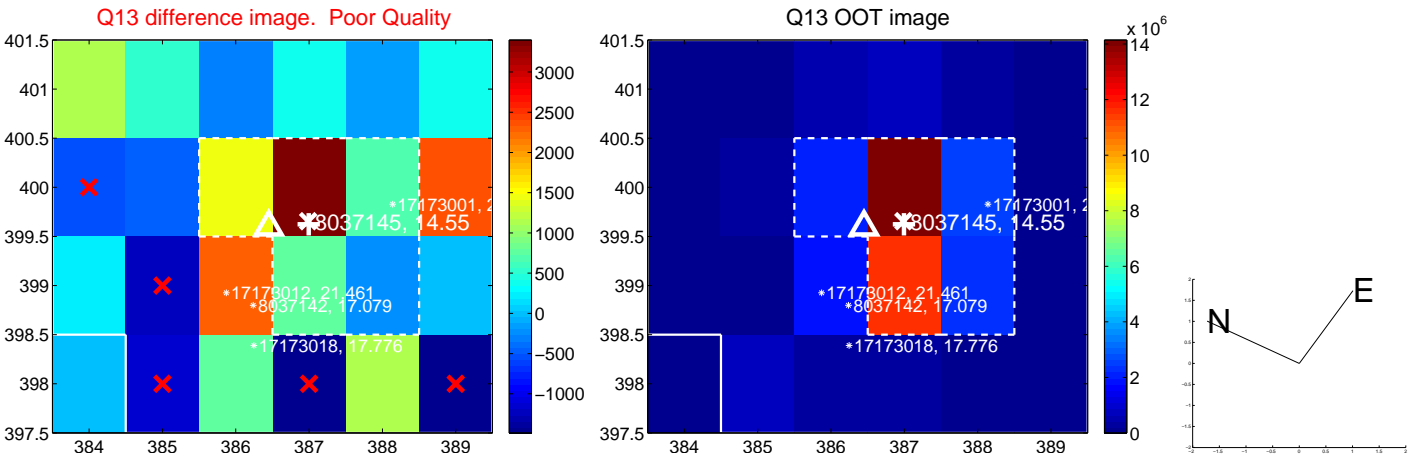
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



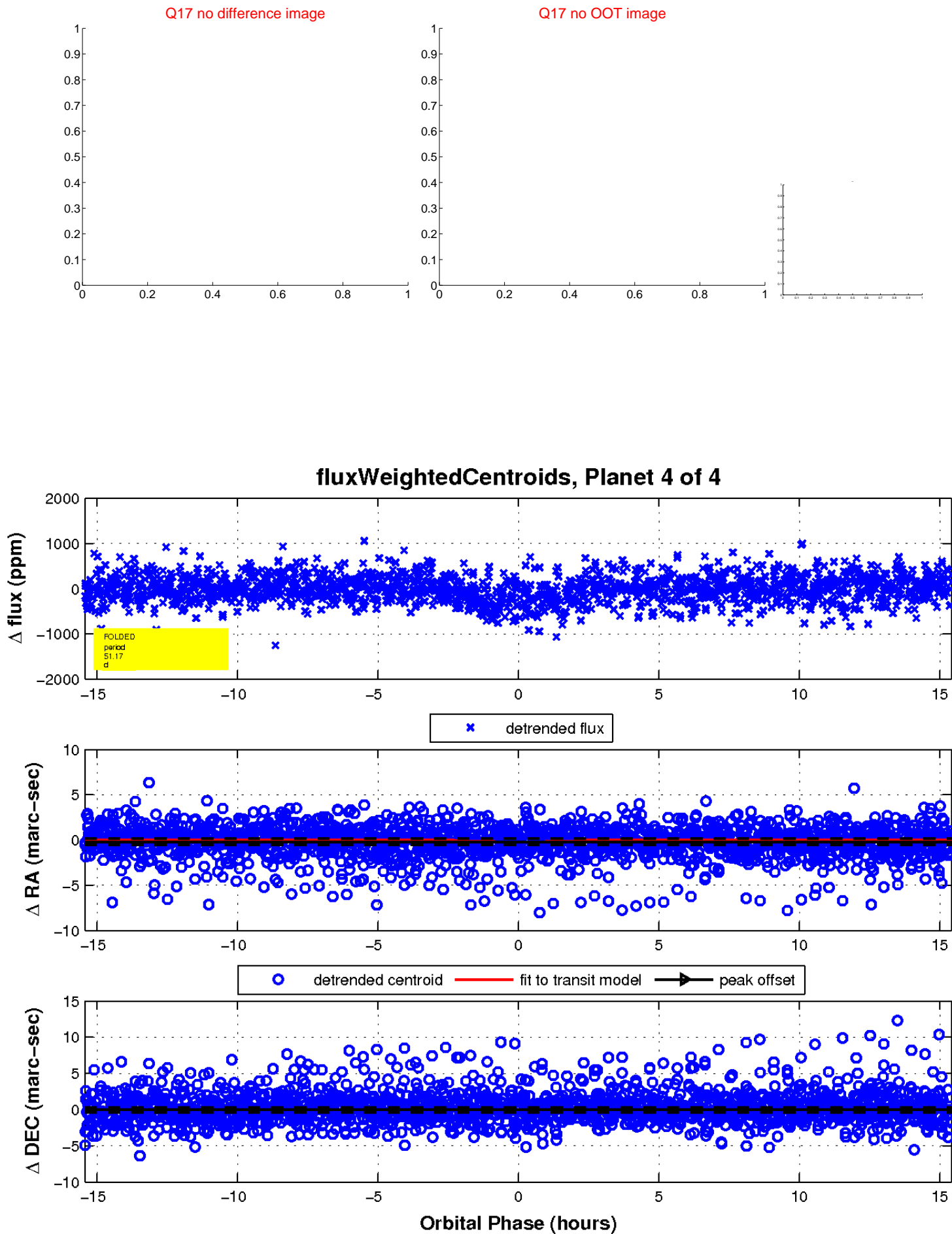
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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.



UKIRT Image

Declination

