

KIC 009209624

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})
009209624-01	OBS	2443.01	6.791556	136.496371	99.4	3.460	15.7	16.9	1.00	5772	1.20	231.09
009209624-02	OBS	2443.02	11.837613	142.218293	101.5	3.400	11.7	12.7	1.00	5772	1.15	110.17

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009209624-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
009209624-02	OBS	PC	0.99	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.

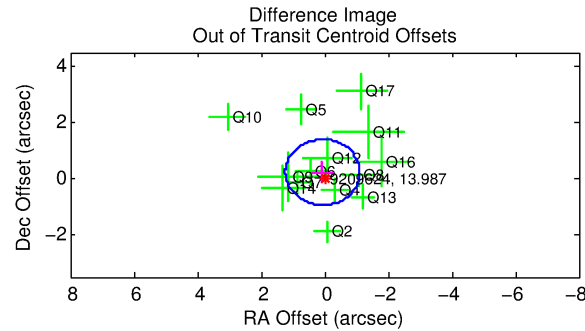
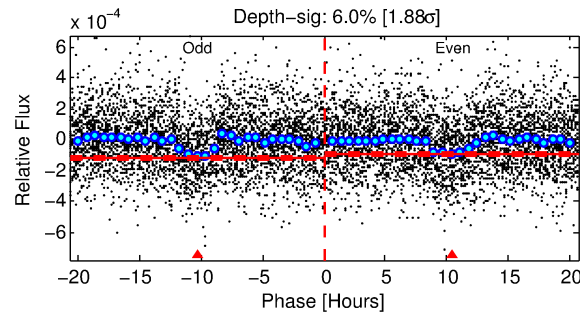
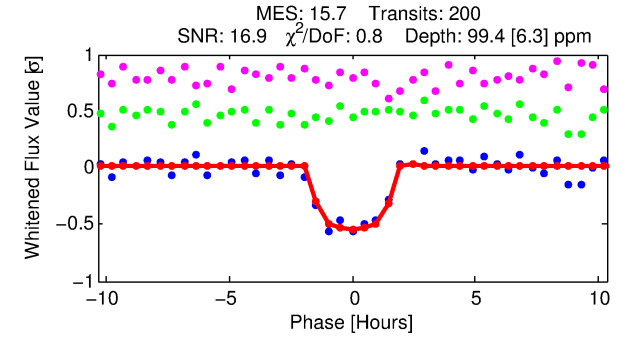
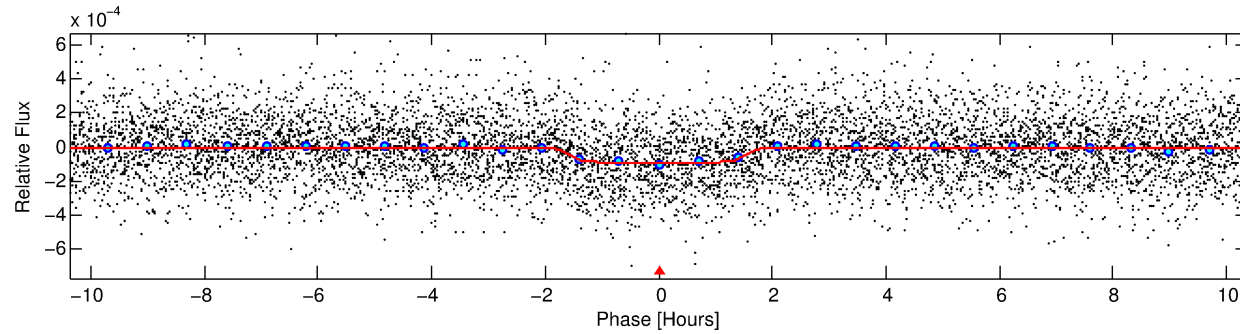
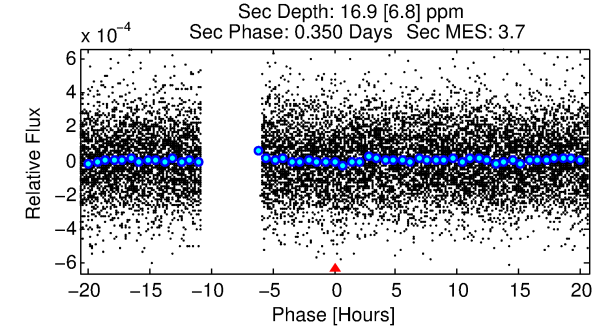
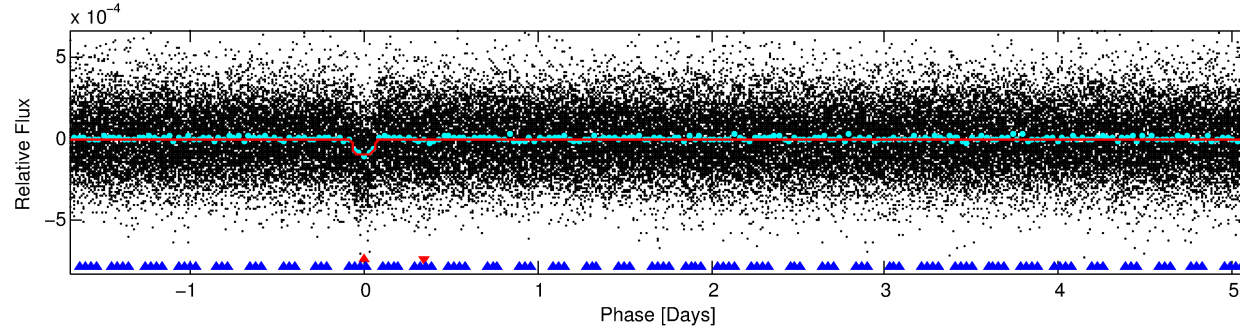
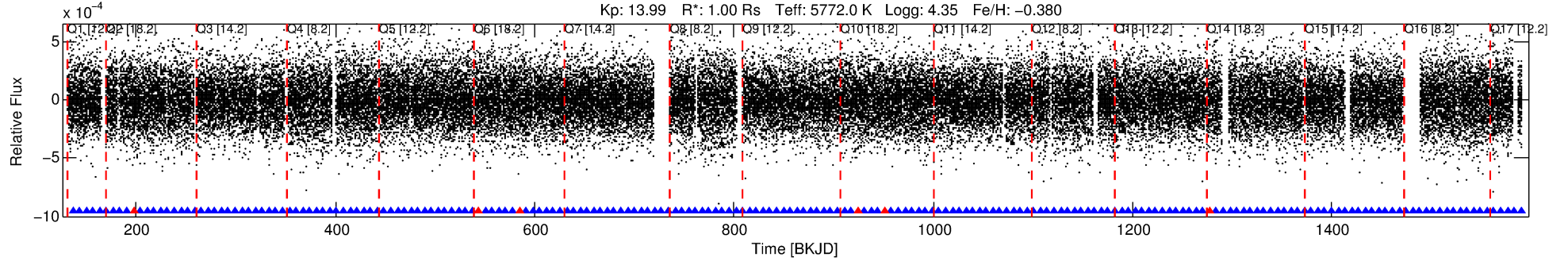
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009209624-01

No Significant Match Found

DV One-Page Summary

KIC: 9209624 Candidate: 1 of 2 Period: 6.792 d
KOI: K02443.01 Name: Kepler-387b Corr: 0.961



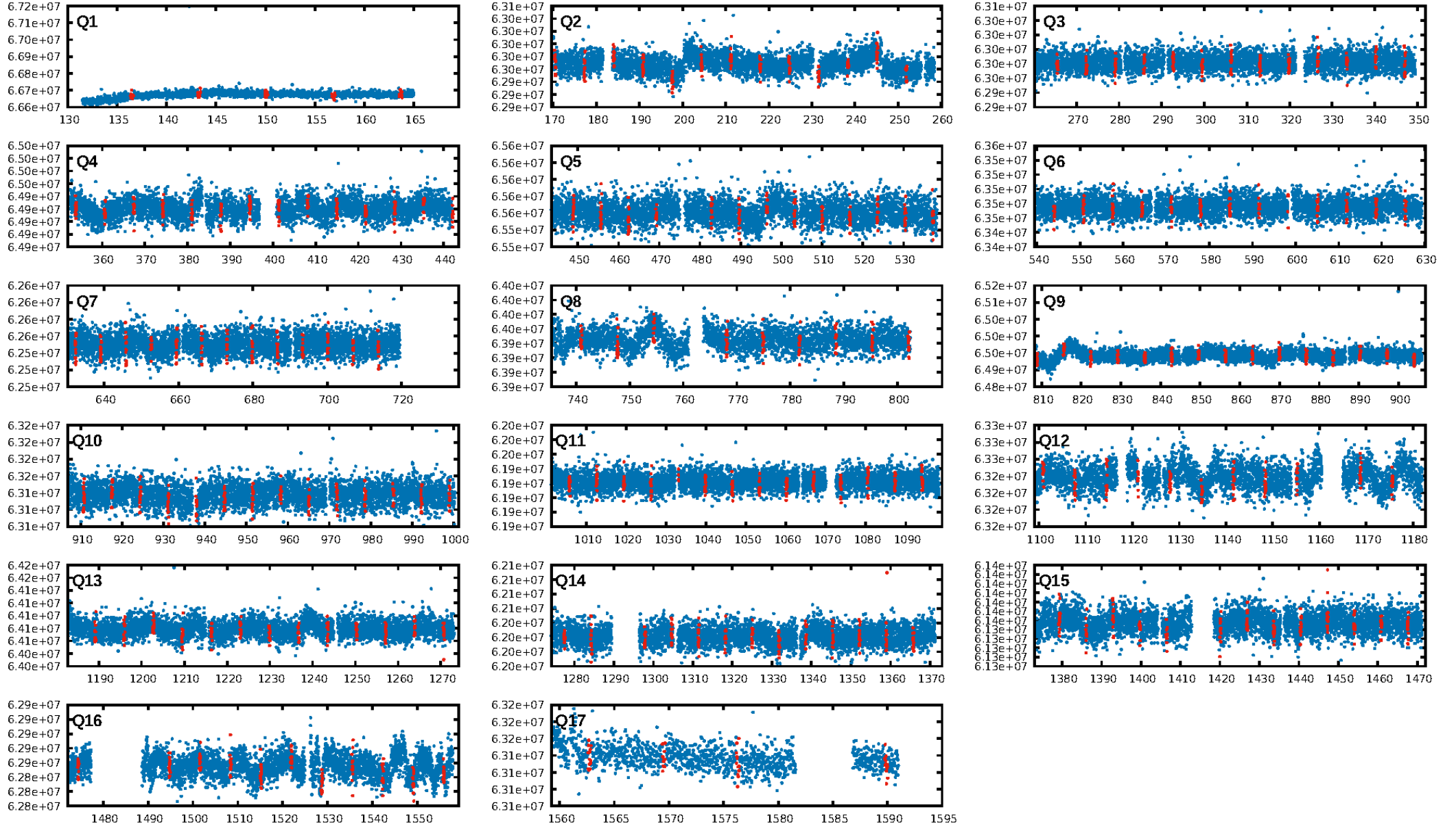
DV Fit Results:

Period = 6.79156 [0.00004] d
Epoch = 136.4964 [0.0038] BKJD
Rp/R* = 0.0109 [0.0036]
a/R* = 6.65 [10.88]
b = 0.91 [0.32]
Seff = 231.09 [60.66]
Teq = 994 [65] K
Rp = 1.19 [0.43] Re
a = 0.0658 [0.0099] AU
Ag = 28.19 [22.70] [1.20 σ]
Teffp = 3542 [681] K [3.72 σ]

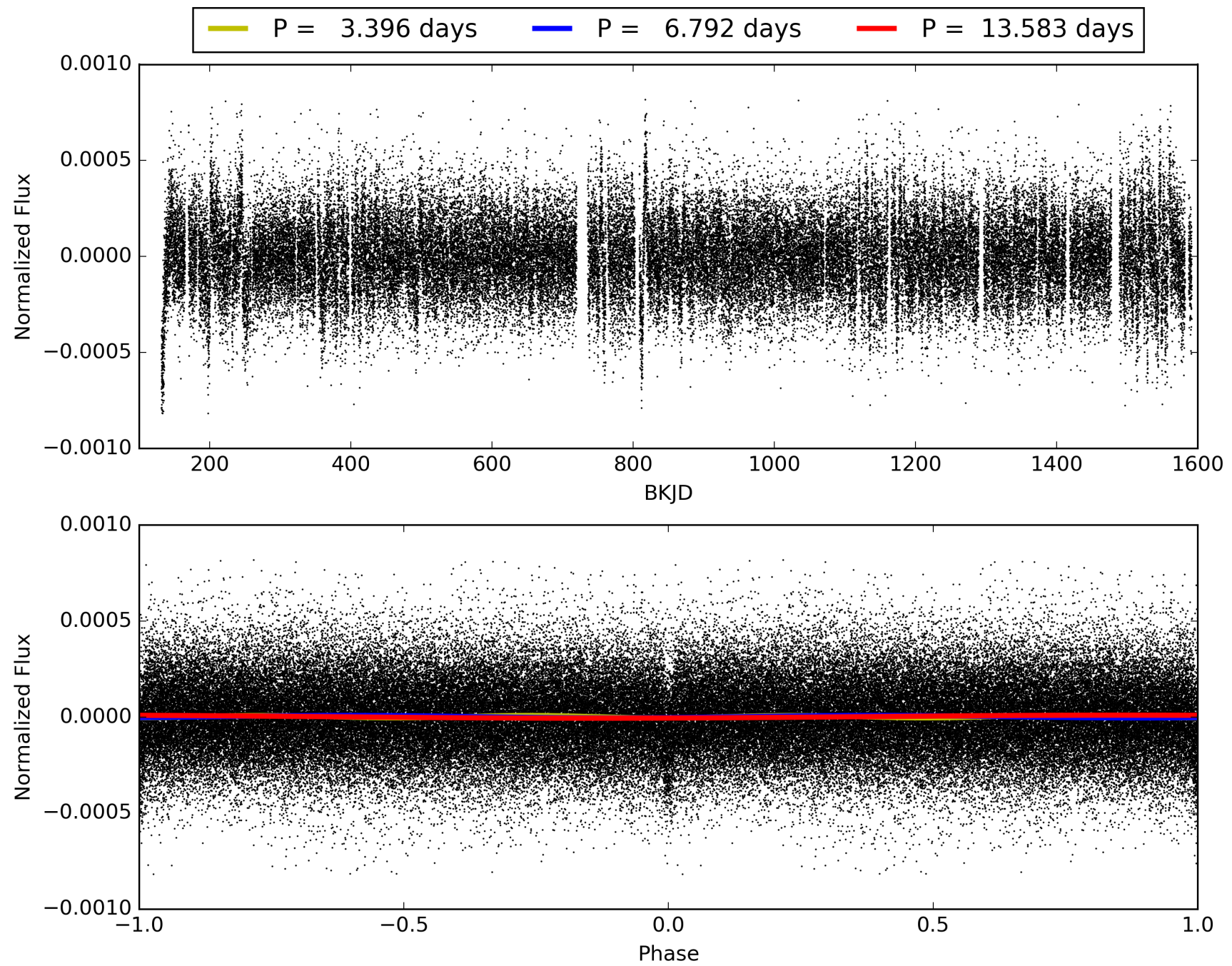
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 100.0% [24.97 σ]
ModelChiSquare2-sig: 99.9%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 1.44e-54
RollingBand-fgt: 0.97 [185/191]
GhostDiagnostic-chr: -7.657
Centroid-sig: 0.3%
Centroid-so: 2.161 arcsec [2.69 σ]
OotOffset-rm: 0.240 arcsec [0.61 σ]
KicOffset-rm: 0.508 arcsec [1.26 σ]
OotOffset-st: 4/2/4/4 [14]
KicOffset-st: 4/2/4/4 [14]
DiffImageQuality-fgm: 0.93 [13/14]
DiffImageOverlap-fno: 1.00 [17/17]

TCE 009209624-01, PDC Light Curves

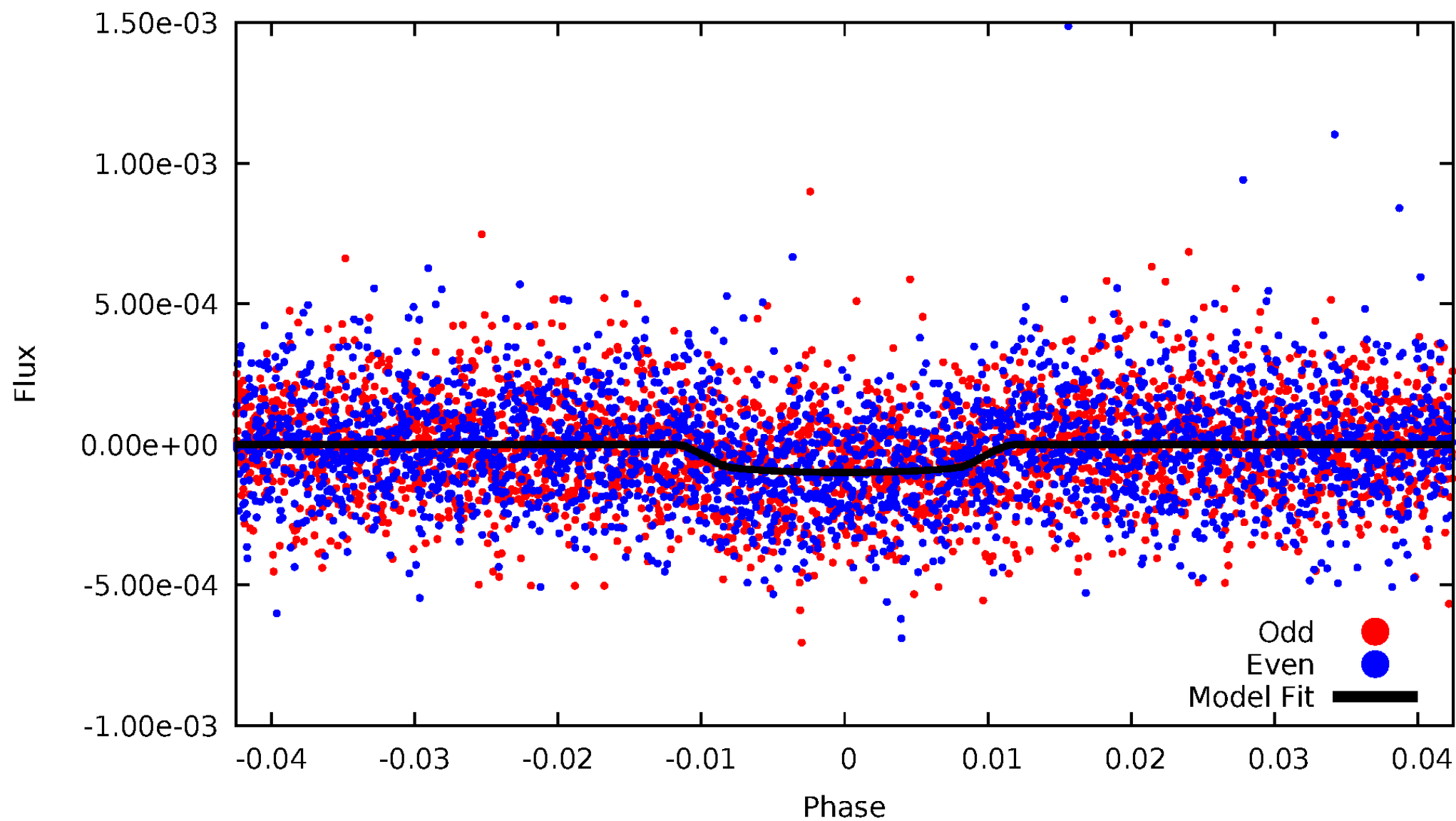


TCE 009209624-01



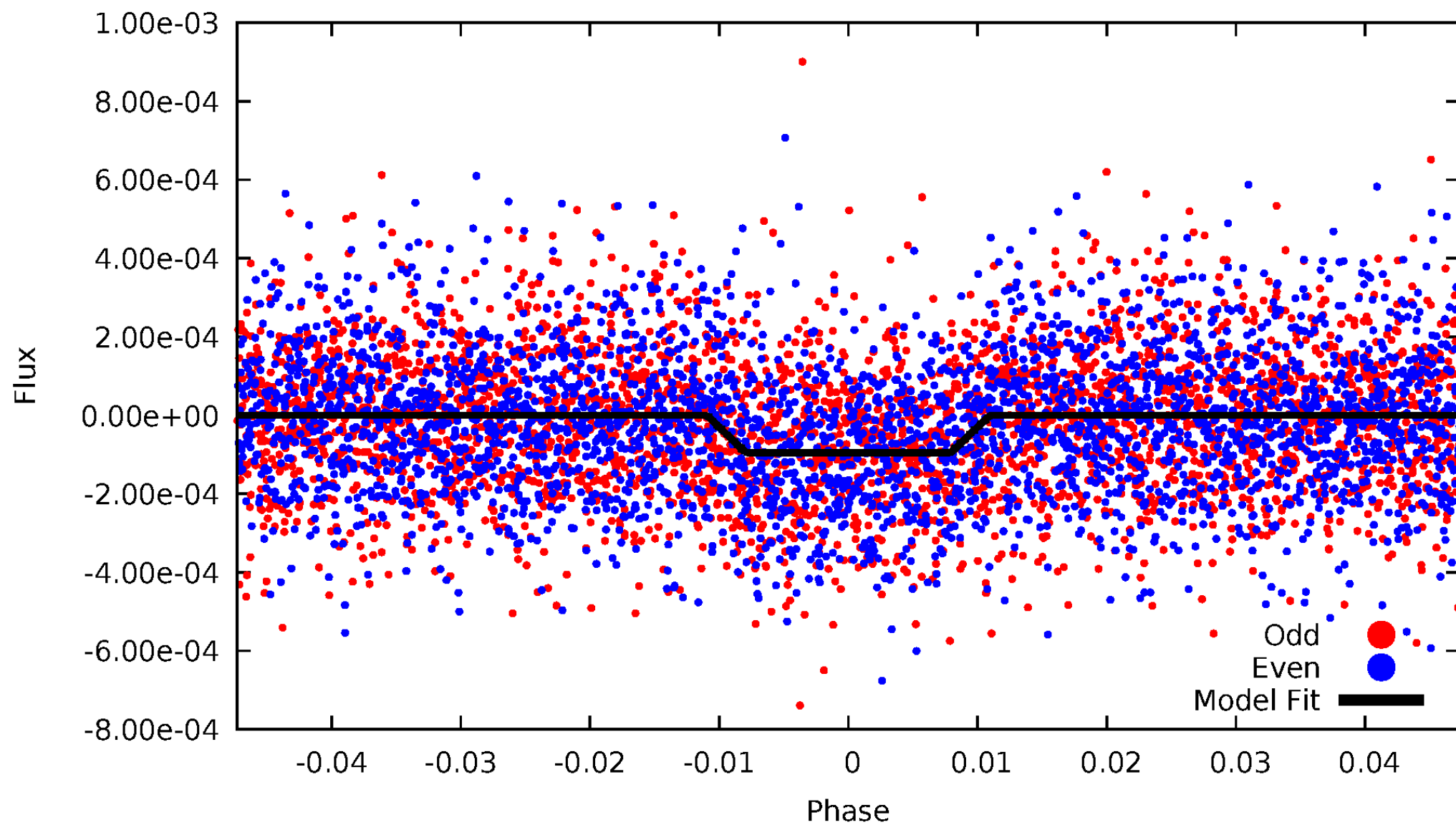
DV Odd/Even

TCE 009209624-01



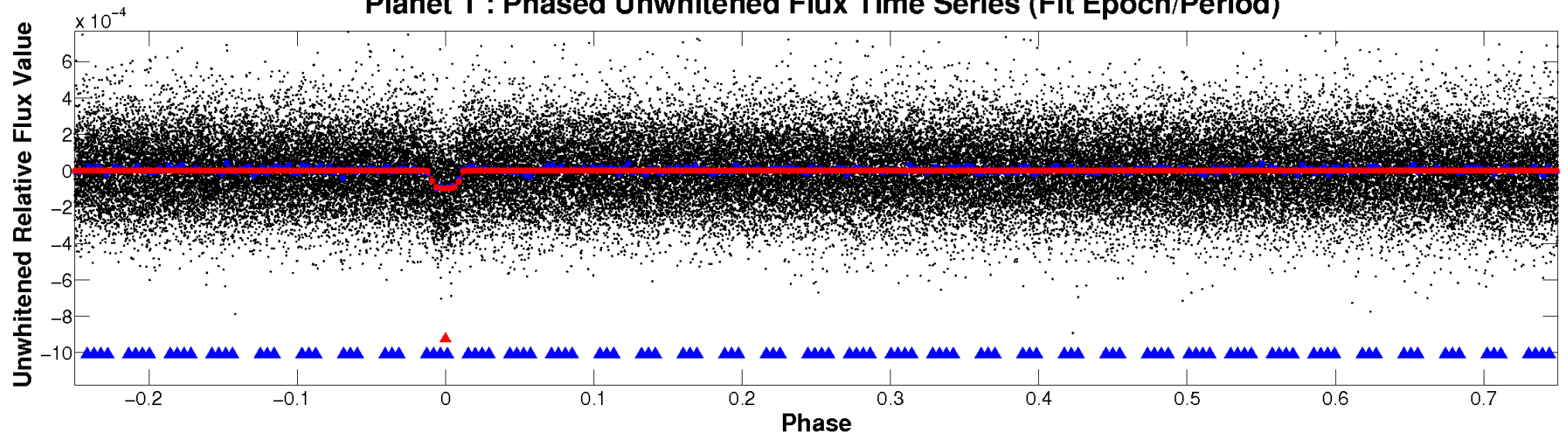
ALT Odd/Even

TCE 009209624-01

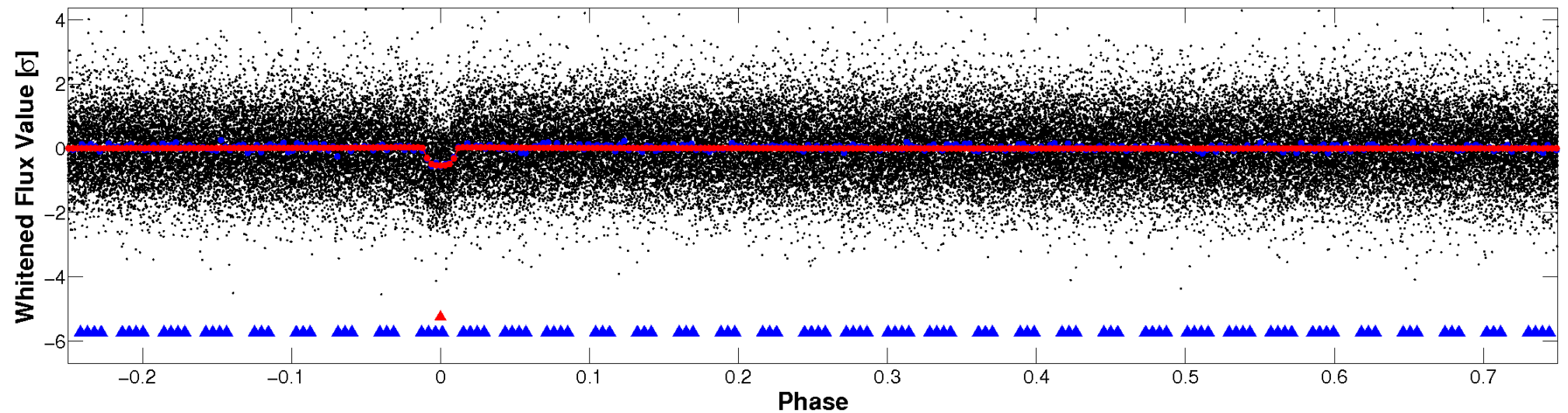


Non-Whitened Vs. Whitened Light Curve

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

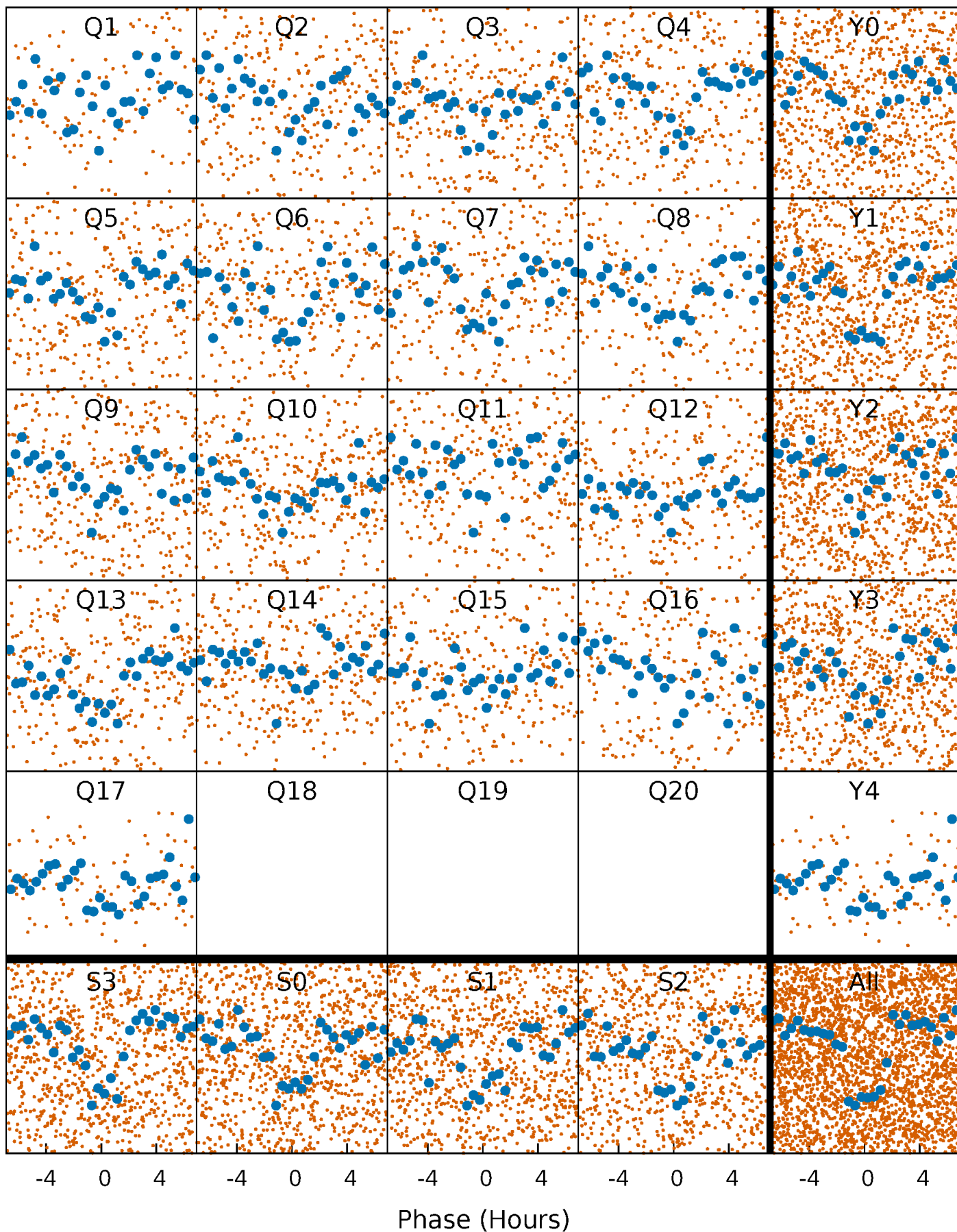


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



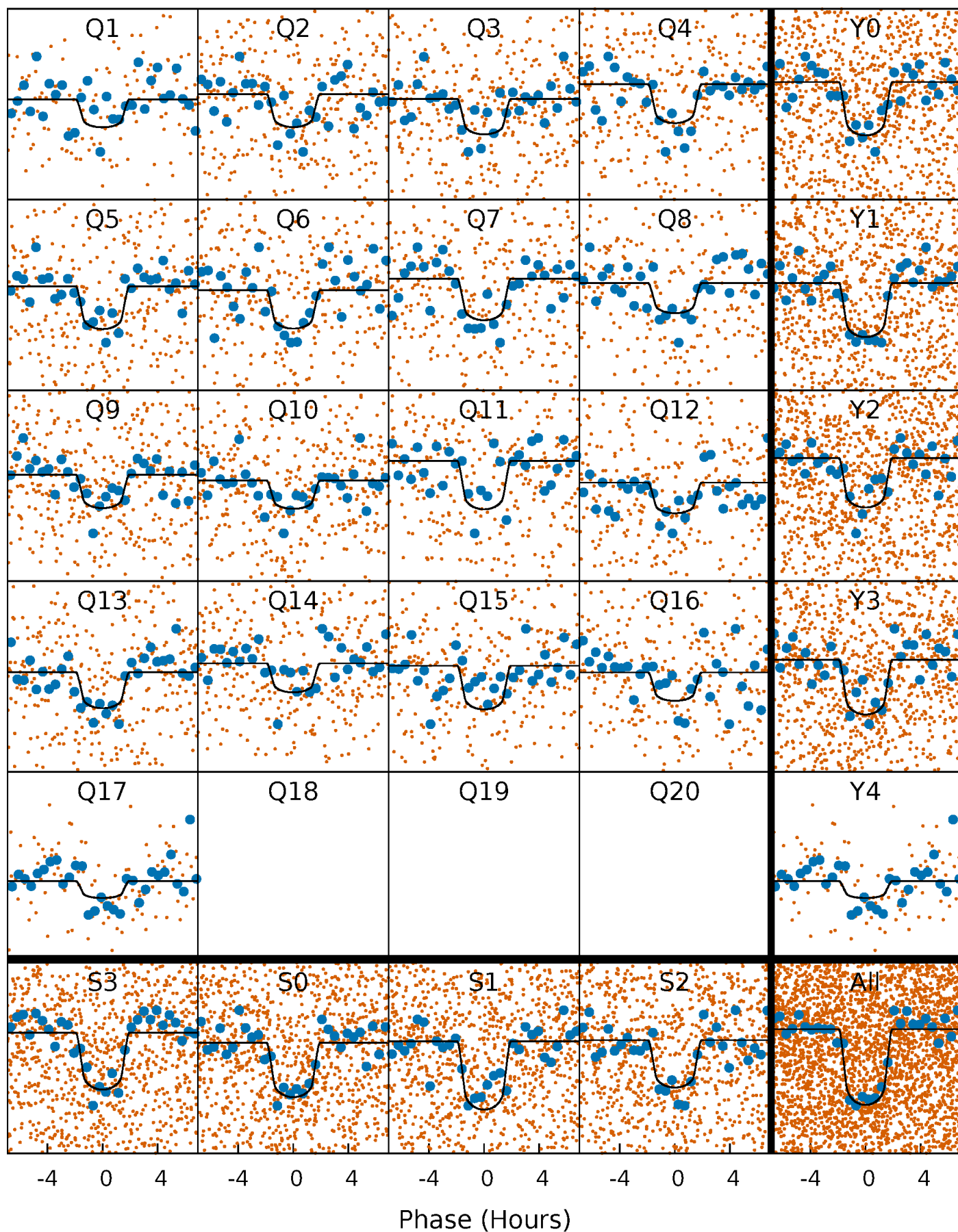
PDC Quarter-Phased Transit Curves

TCE 009209624-01 P= 6.791556 Days $T_0=136.496371$ (BKJD)



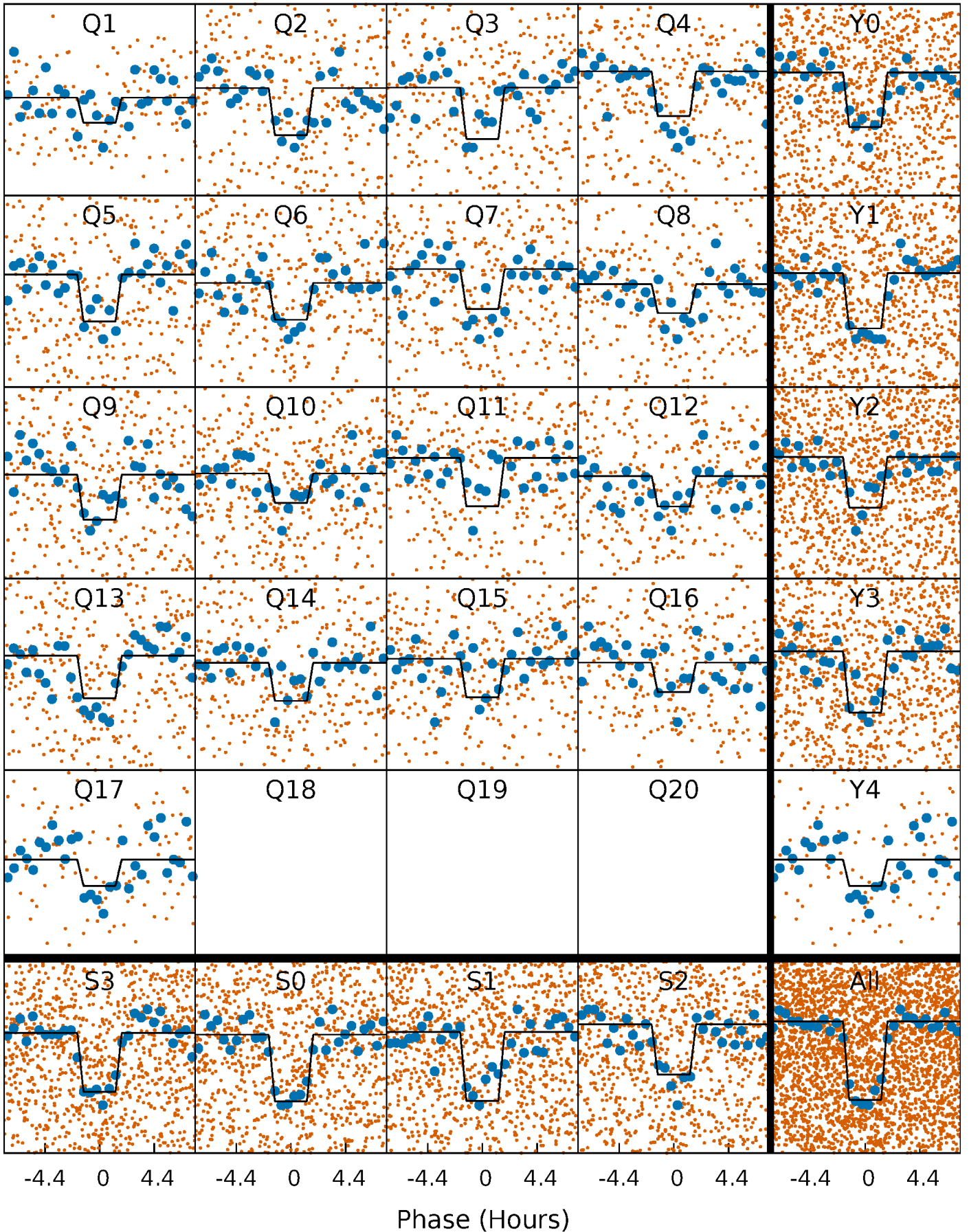
DV Quarter-Phased Transit Curves

TCE 009209624-01 P= 6.791556 Days $T_0=136.496371$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

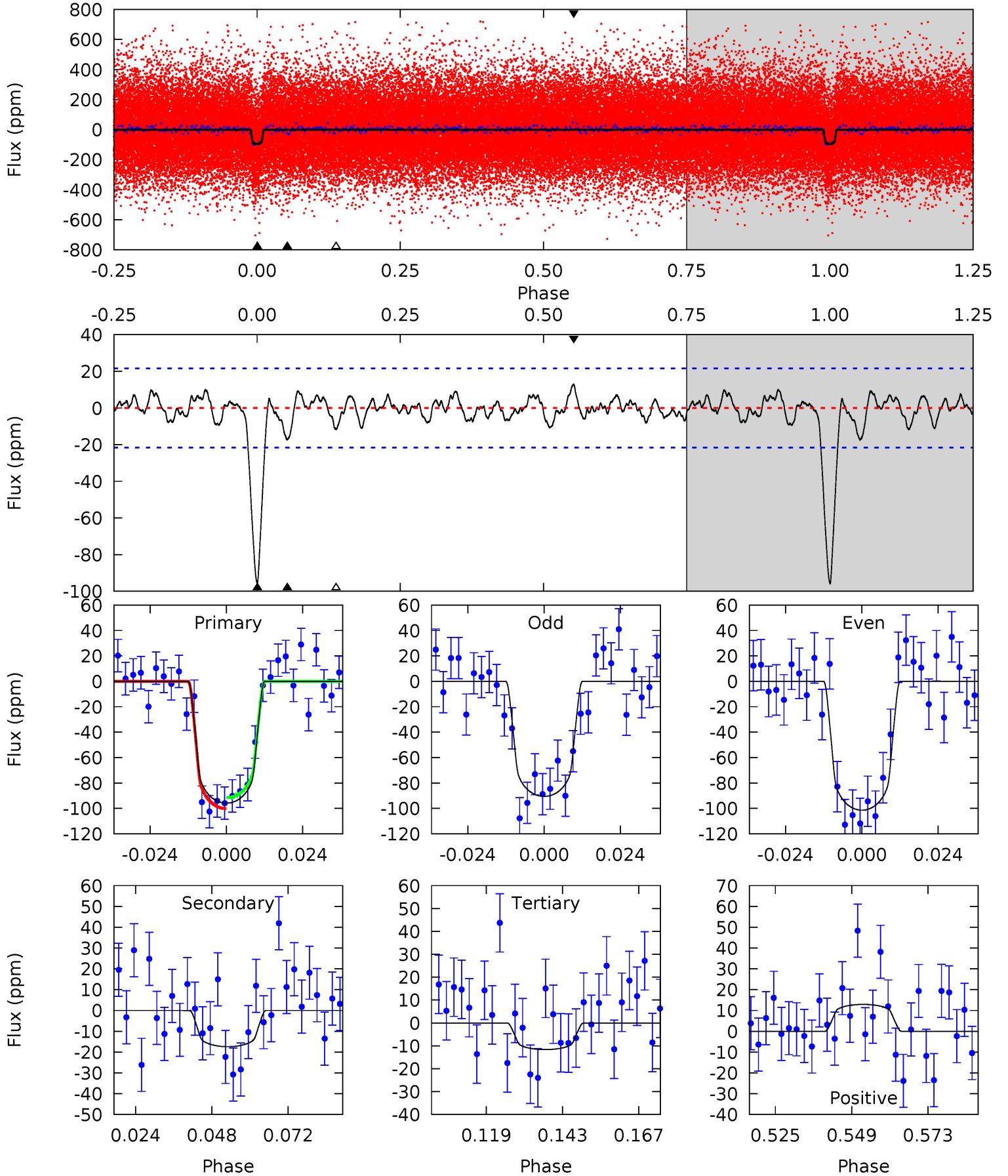
TCE 009209624-01 P= 6.791663 Days $T_0=136.483643$ (BKJD)



DV Model-Shift Uniqueness Test

009209624-01, P = 6.791556 Days, E = 129.704815 Days

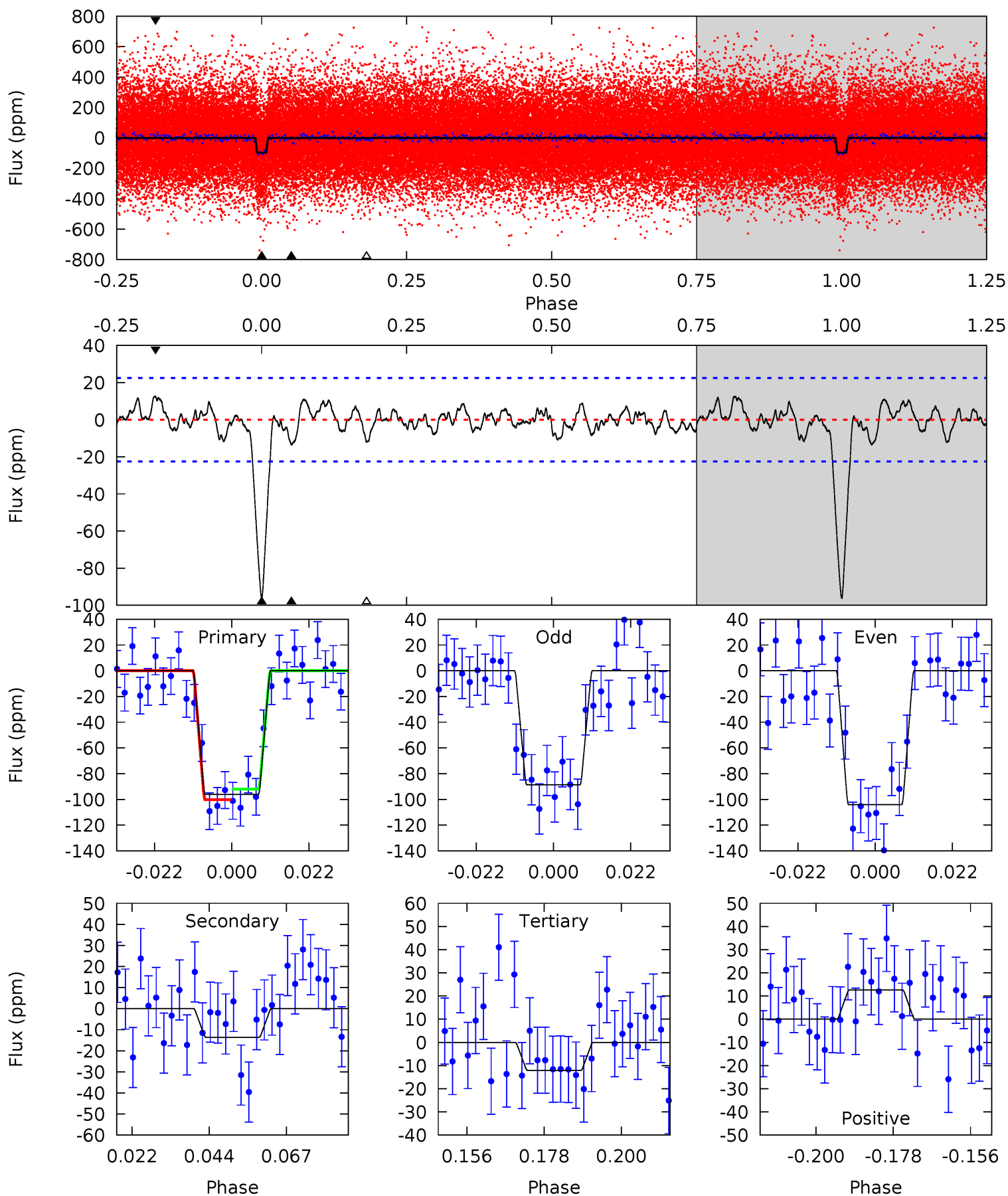
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
21.6	3.92	2.62	2.90	4.86	2.26	1.03	18.9	18.7	1.30	1.02	1.22	0.93	0.12	0.98



Alt Model-Shift Uniqueness Test

009209624-01, P = 6.791663 Days, E = 129.691980 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
20.8	2.94	2.62	2.73	4.87	2.29	1.02	18.2	18.1	0.32	0.21	1.67	0.97	0.12	0.89



Stellar Parameters For KIC 009209624

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	$M(M_{\odot})$	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	5772^{+115}_{-104}	$4.351^{+0.150}_{-0.100}$	$-0.380^{+0.150}_{-0.150}$	$1.003^{+0.147}_{-0.147}$	$0.824^{+0.071}_{-0.036}$	$1.149^{+0.785}_{-0.336}$
	+2%/-2%	+3%/-2%	+39%/-39%	+15%/-15%	+9%/-4%	+68%/-29%
Source	SPE58	SPE58	SPE58	DSEP		

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

Secondary Eclipse Parameters for KIC 009209624-01 / KOI 2443.01

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-17 ± 4	$1.21^{+0.38}_{-0.39}$	1384^{+62}_{-61}	3863^{+592}_{-381}	29^{+34}_{-14}
Alt.	-14 ± 5	$1.04^{+0.41}_{-0.36}$	1385^{+62}_{-60}	3895^{+703}_{-473}	29^{+46}_{-16}

T_{max} = Theoretical Maximum Planetary Temperature

T_{obs} = Observed Planetary Temperature (Assuming $A=0.3$)

A_{obs} = Observed Albedo (Assuming $T=0$)

If a secondary eclipse is present, the system is likely an EB if $T_{obs} \gg T_{max}$ AND $A_{obs} \gg 1.0$

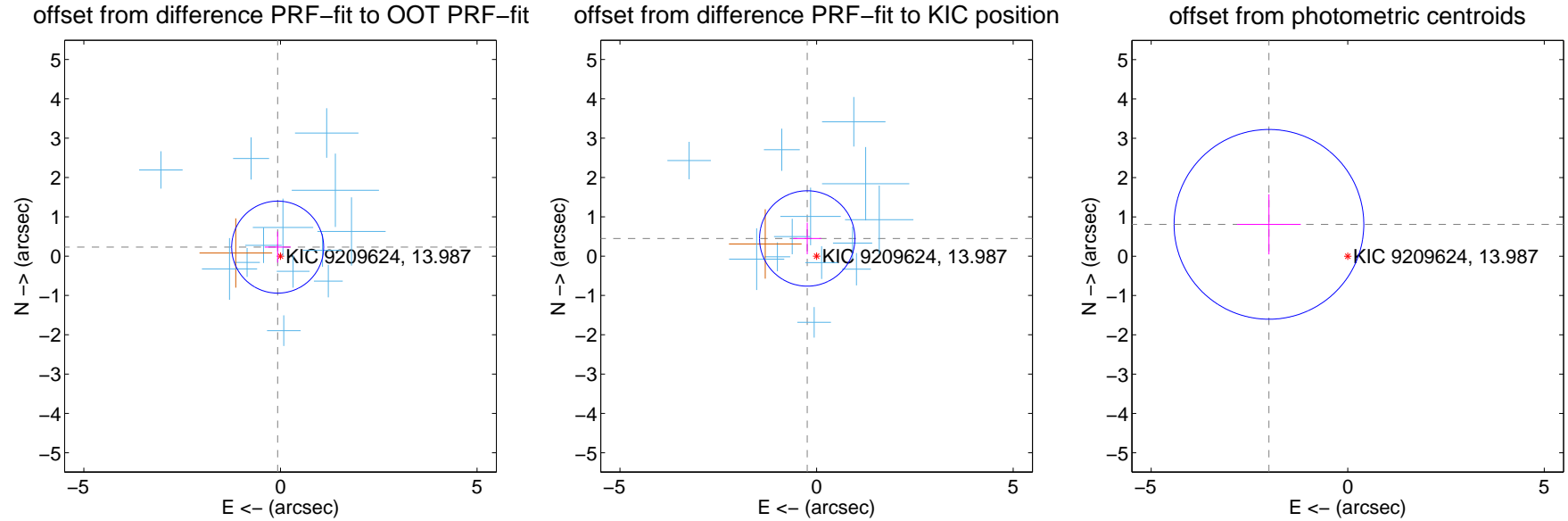
DV Centroid Data

Supplemental centroid analysis for 009209624-01. Kepler magnitude: 13.99. Transit SNR 16.88

There are 13 quarters with good PRF difference image offsets

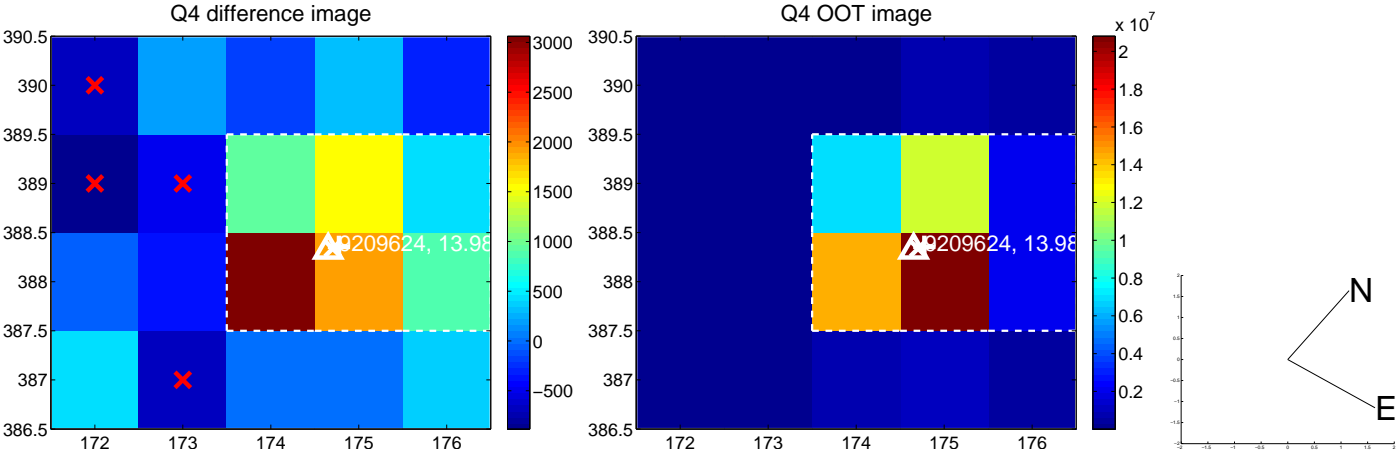
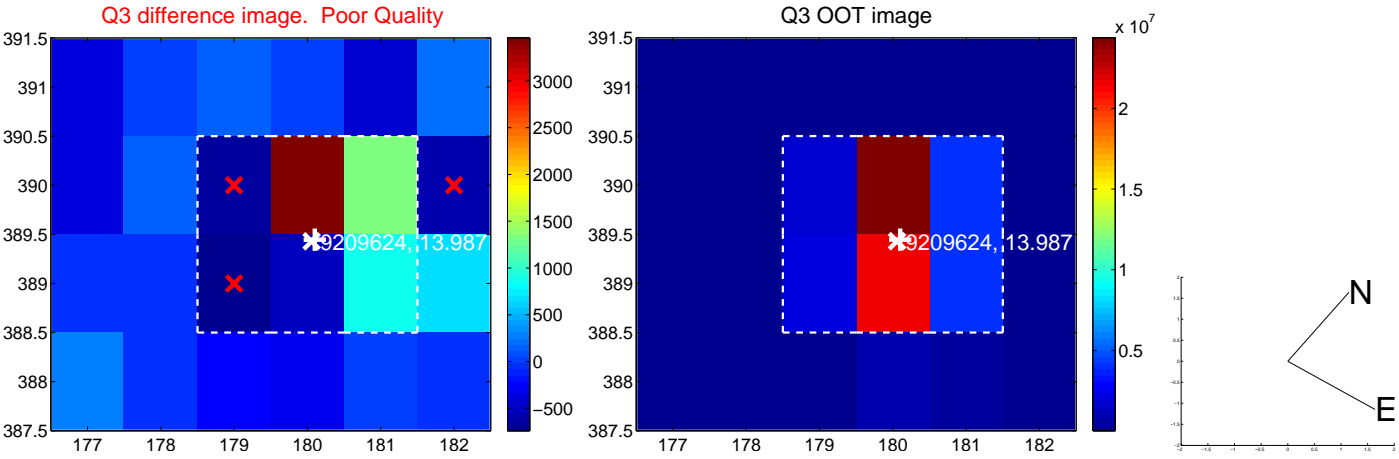
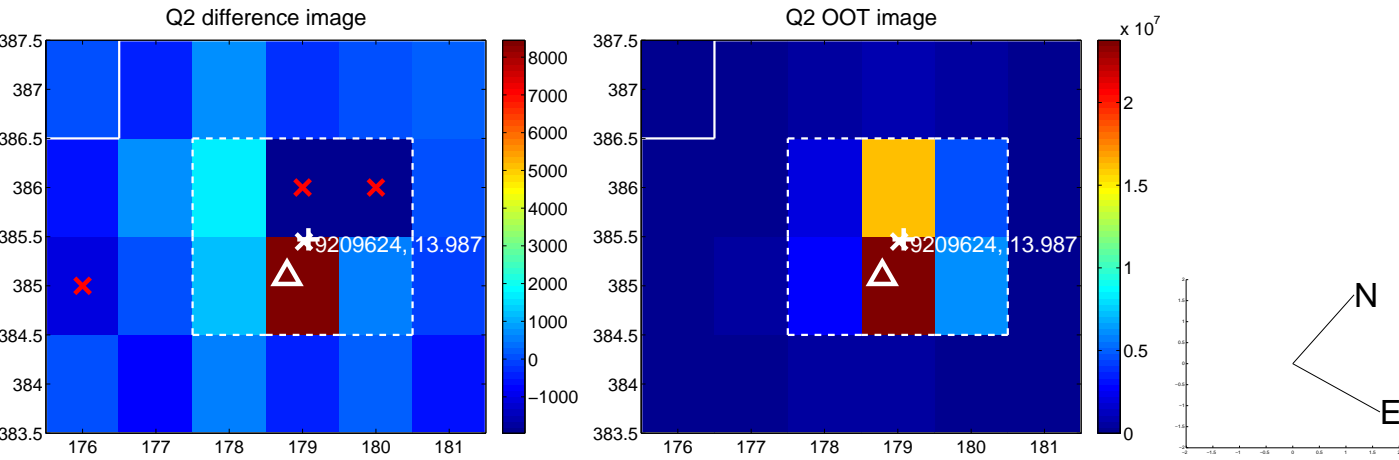
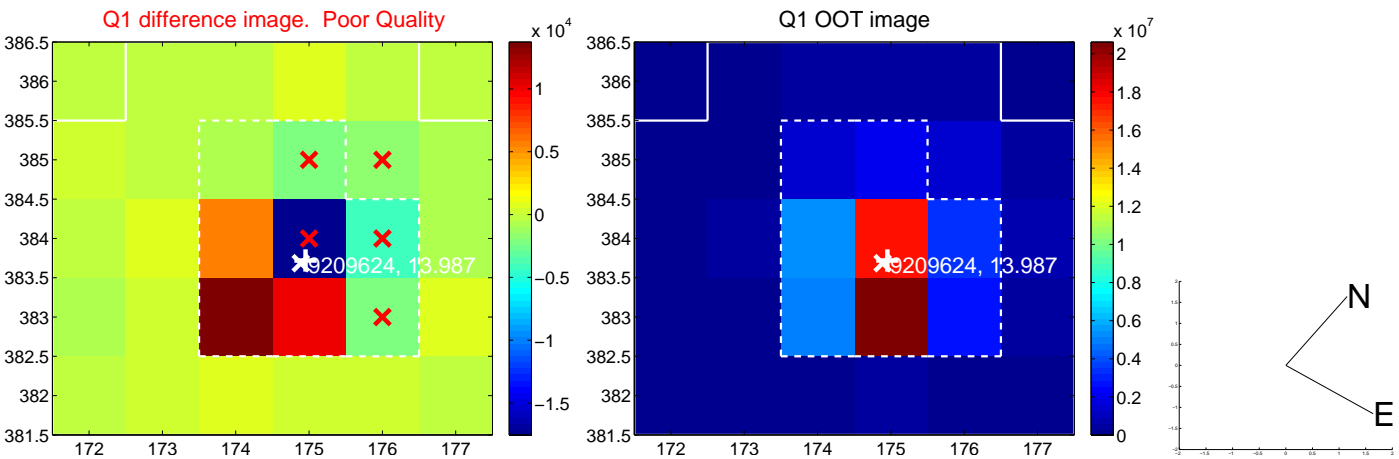
The direct PRF centroid is offset from the target star catalog position by about 0.37 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.240 ± 0.390	0.61	0.071 ± 0.331	0.229 ± 0.395
PRF-fit source offset from KIC position	0.508 ± 0.404	1.26	0.238 ± 0.358	0.449 ± 0.402
photometric centroid source offset	2.16 ± 0.80	2.69	2.00 ± 0.81	0.81 ± 0.77

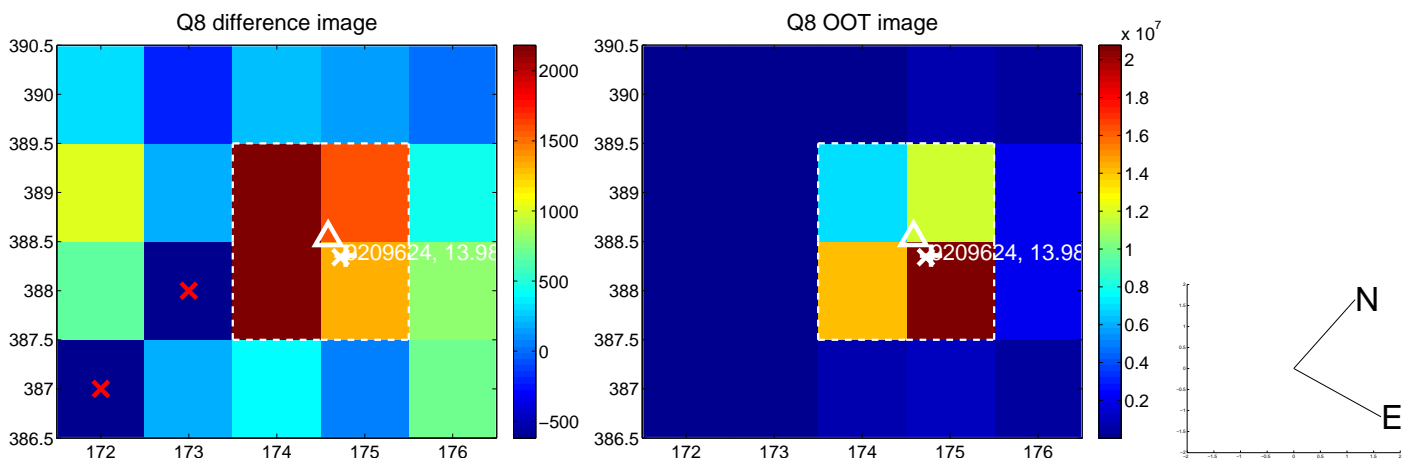
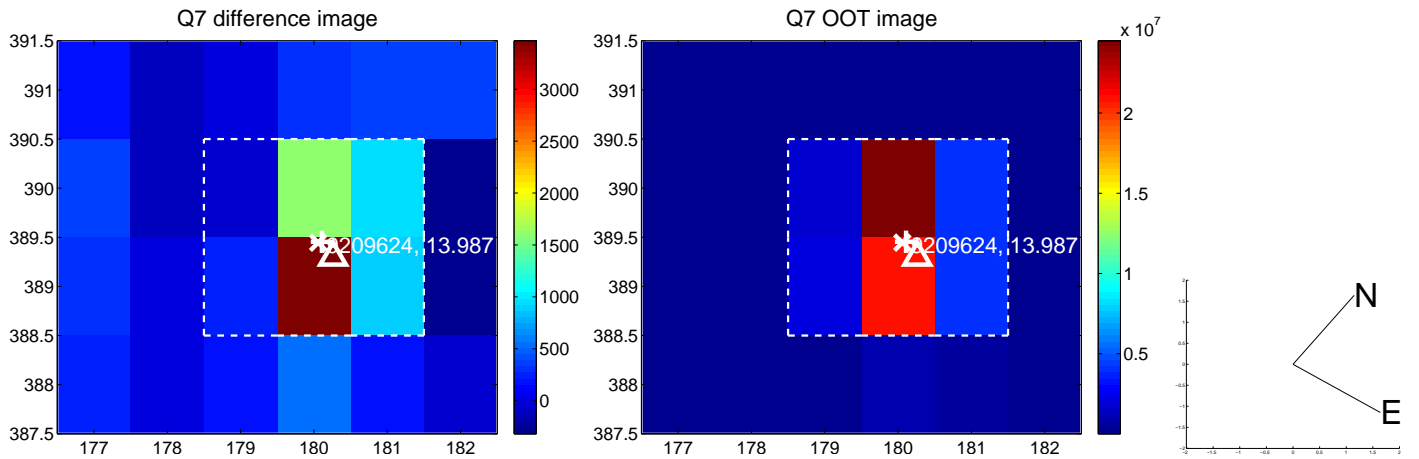
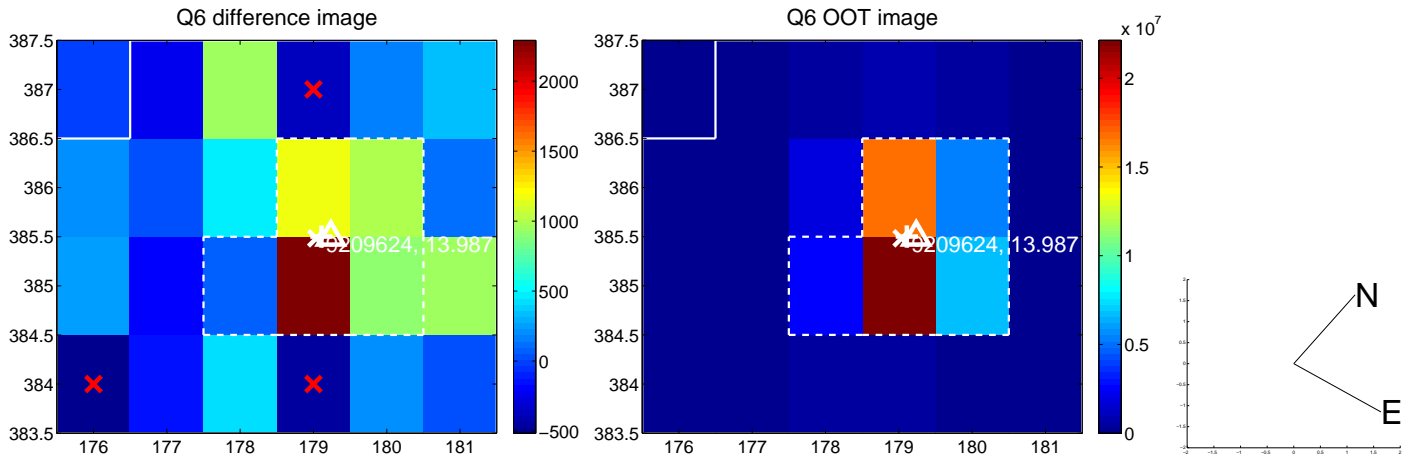
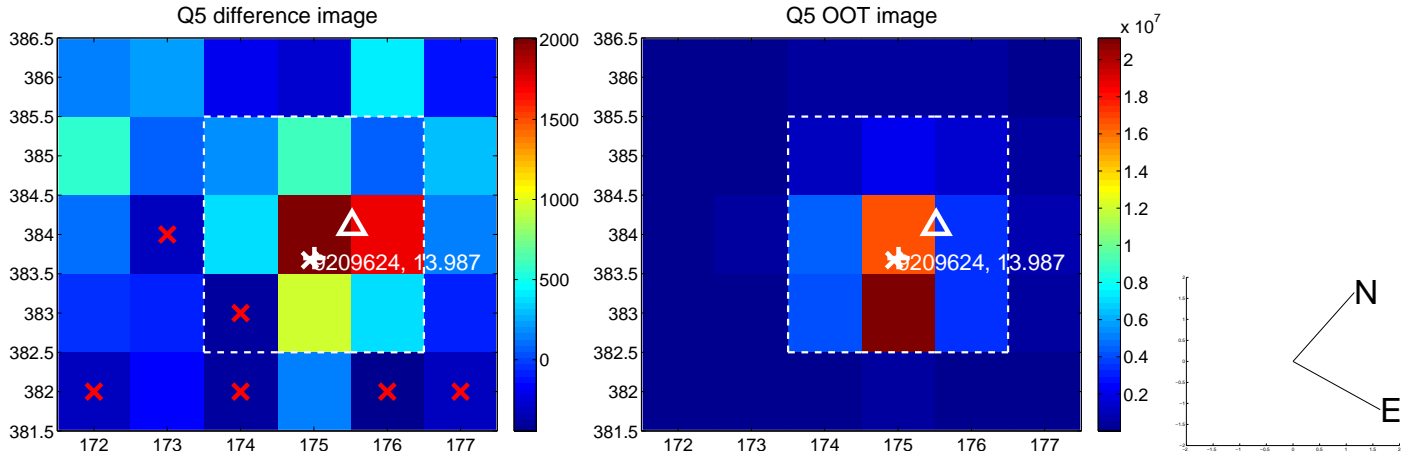


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

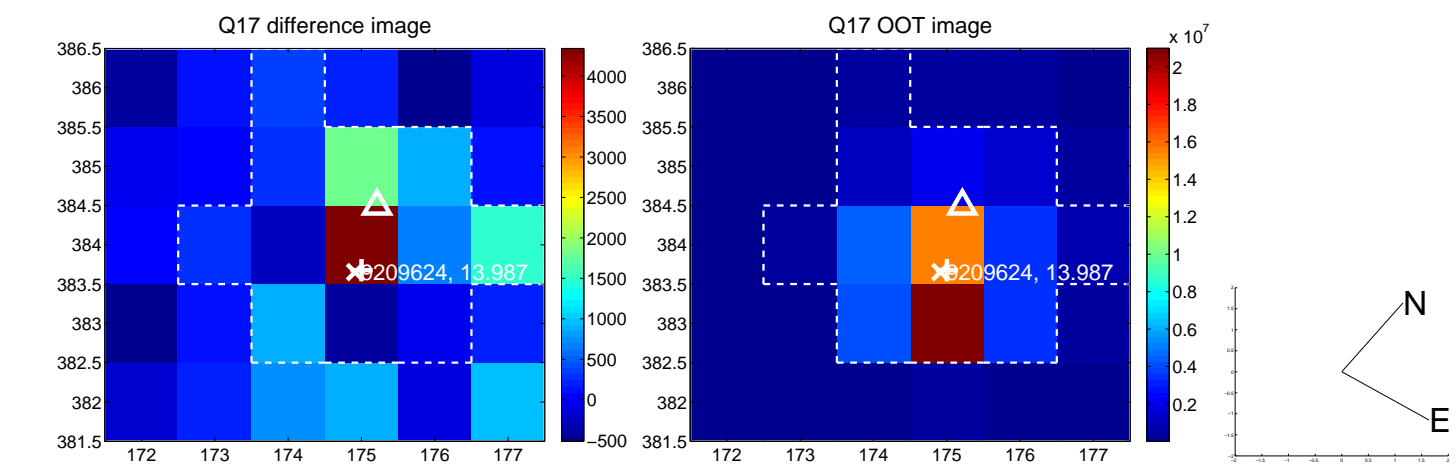
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



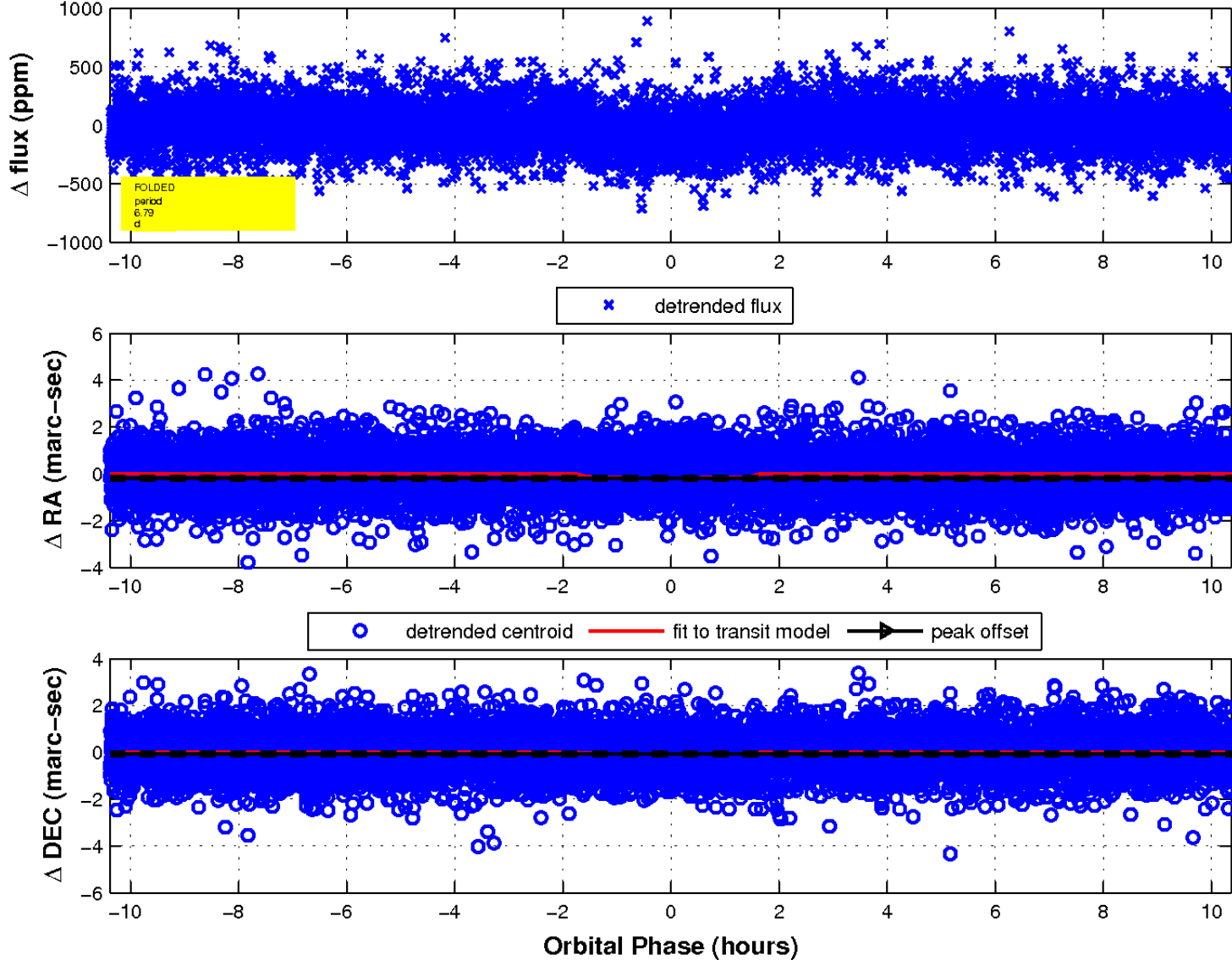
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



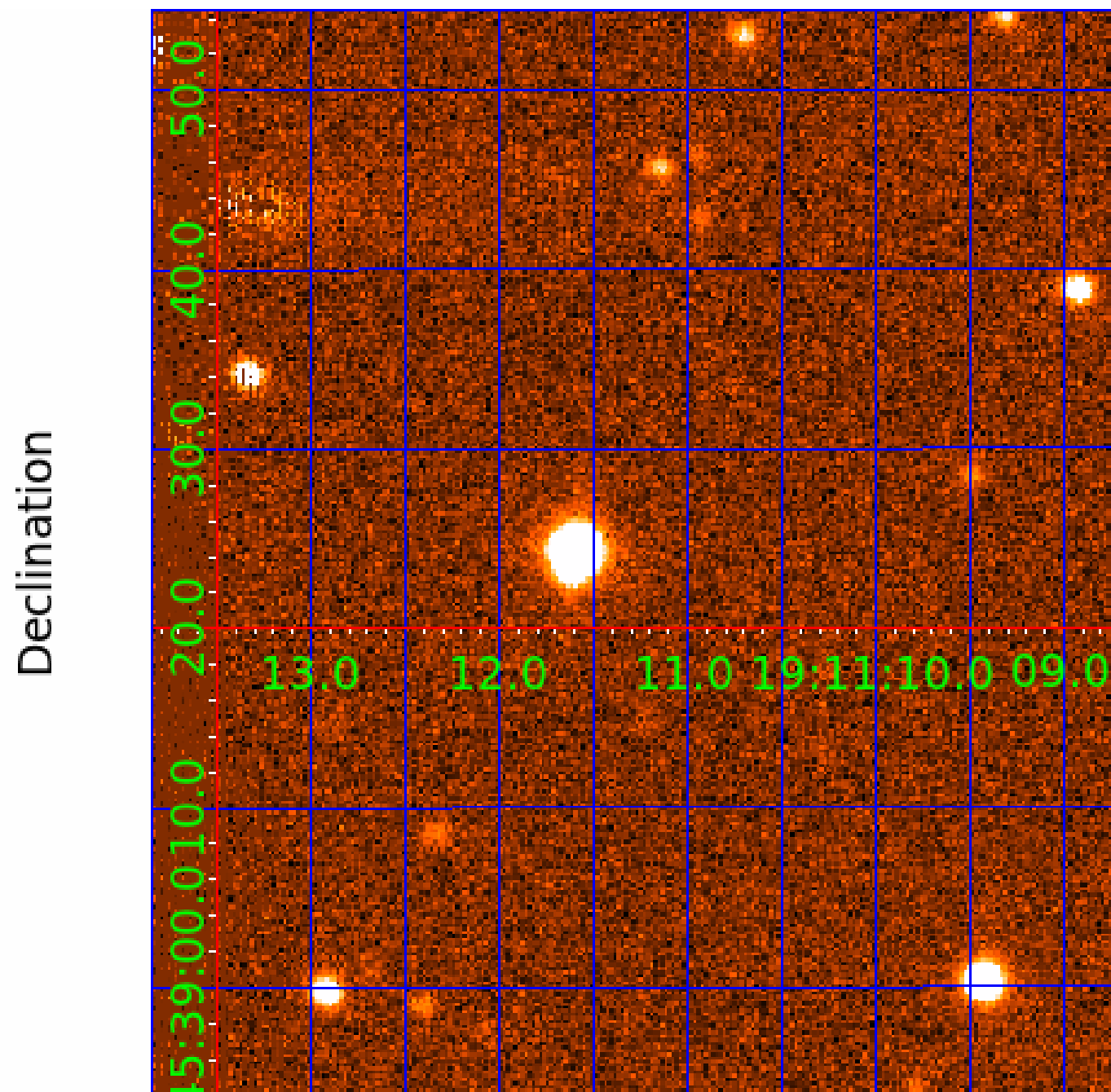
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



fluxWeightedCentroids, Planet 1 of 2



UKIRT Image



KIC 009209624

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})
009209624-01	OBS	2443.01	6.791556	136.496371	99.4	3.460	15.7	16.9	1.00	5772	1.20	231.09
009209624-02	OBS	2443.02	11.837613	142.218293	101.5	3.400	11.7	12.7	1.00	5772	1.15	110.17

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009209624-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
009209624-02	OBS	PC	0.99	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.

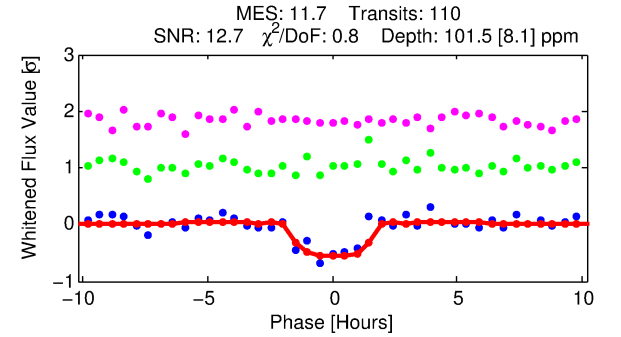
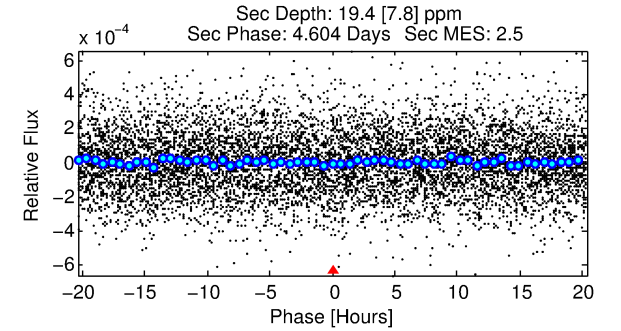
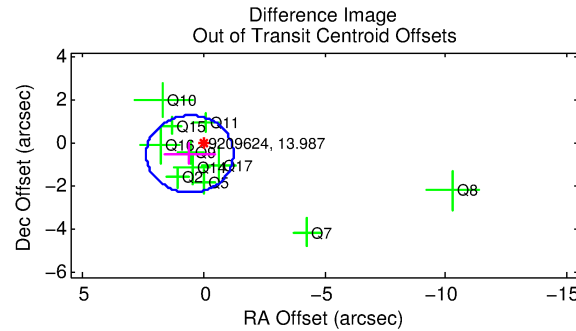
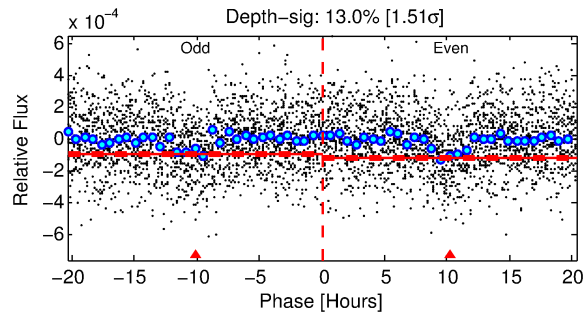
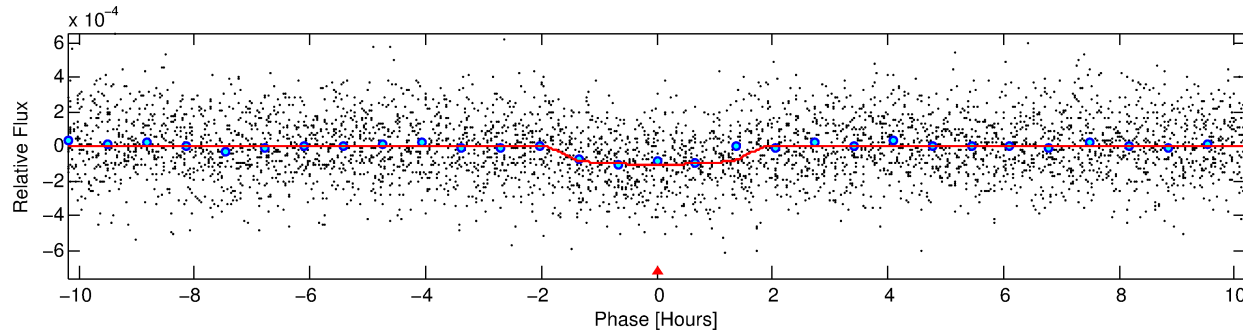
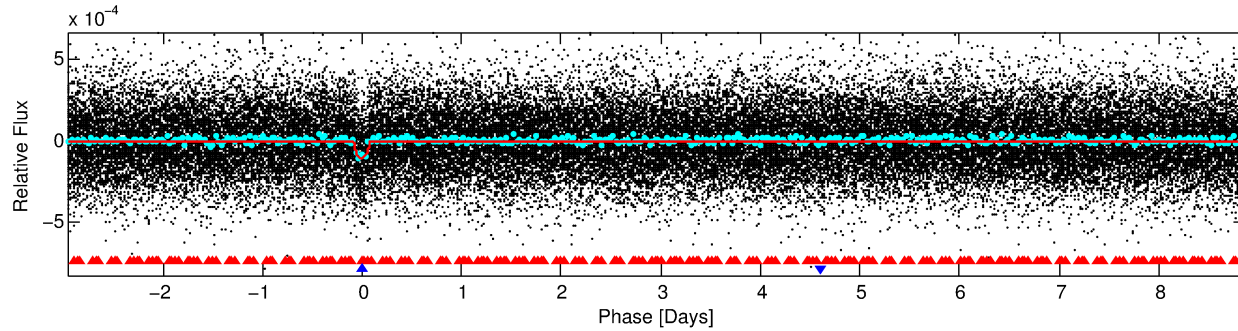
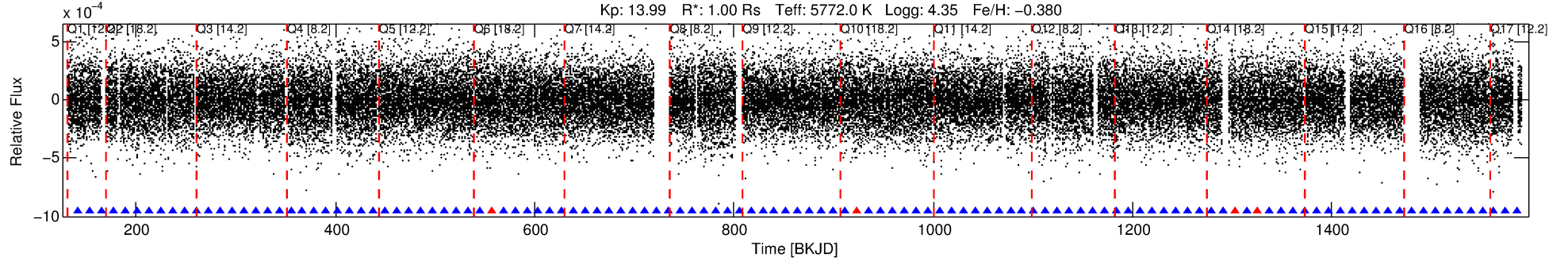
Ephemeris Match Information For 009209624-02

No Significant Match Found

DV One-Page Summary

KIC: 9209624 Candidate: 2 of 2 Period: 11.838 d
KOI: K02443.02 Name: Kepler-387c Corr: 0.973

Kp: 13.99 R*: 1.00 Rs Teff: 5772.0 K Logg: 4.35 Fe/H: -0.380



DV Fit Results:

Period = 11.83761 [0.00009] d
Epoch = 142.2183 [0.0058] BKJD
Rp/R* = 0.0105 [0.0058]
a/R* = 14.79 [39.79]
b = 0.84 [0.93]
Seff = 110.17 [28.92]
Teq = 826 [54] K
Rp = 1.15 [0.65] Re
a = 0.0953 [0.0144] AU
Ag = 73.81 [88.56] [0.82σ]
Teffp = 3744 [1101] K [2.65σ]

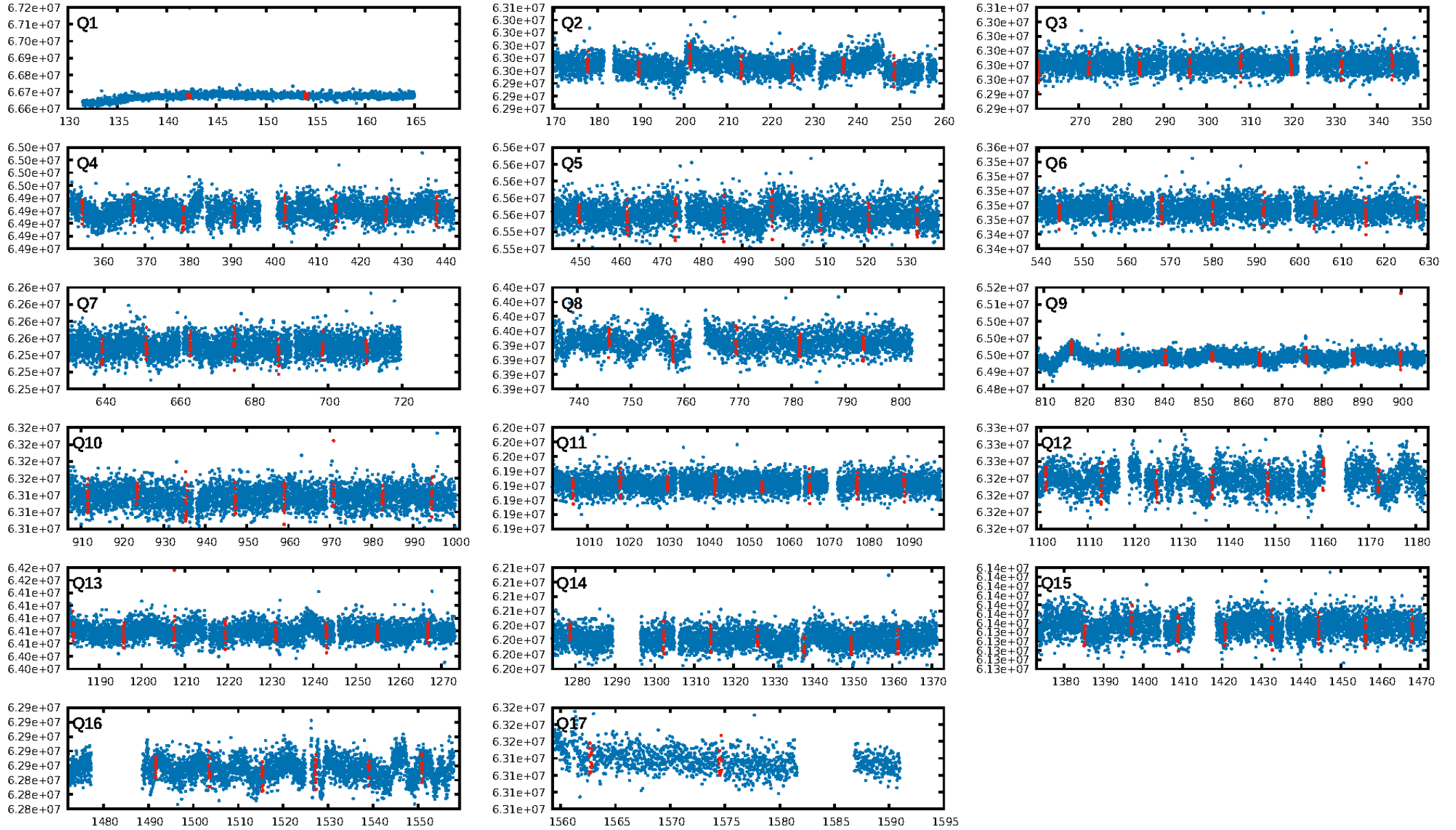
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [24.97σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 99.9%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 7.44e-31
RollingBand-fgt: 0.96 [103/107]
GhostDiagnostic-chr: 2.601
Centroid-sig: 81.0%
Centroid-so: 0.649 arcsec [0.62σ]
OotOffset-rm: 0.761 arcsec [1.27σ]
KicOffset-rm: 0.781 arcsec [0.84σ]
OotOffset-st: 3/3/2/3 [11]
KicOffset-st: 3/3/2/3 [11]
DiffImageQuality-fgm: 0.73 [8/11]
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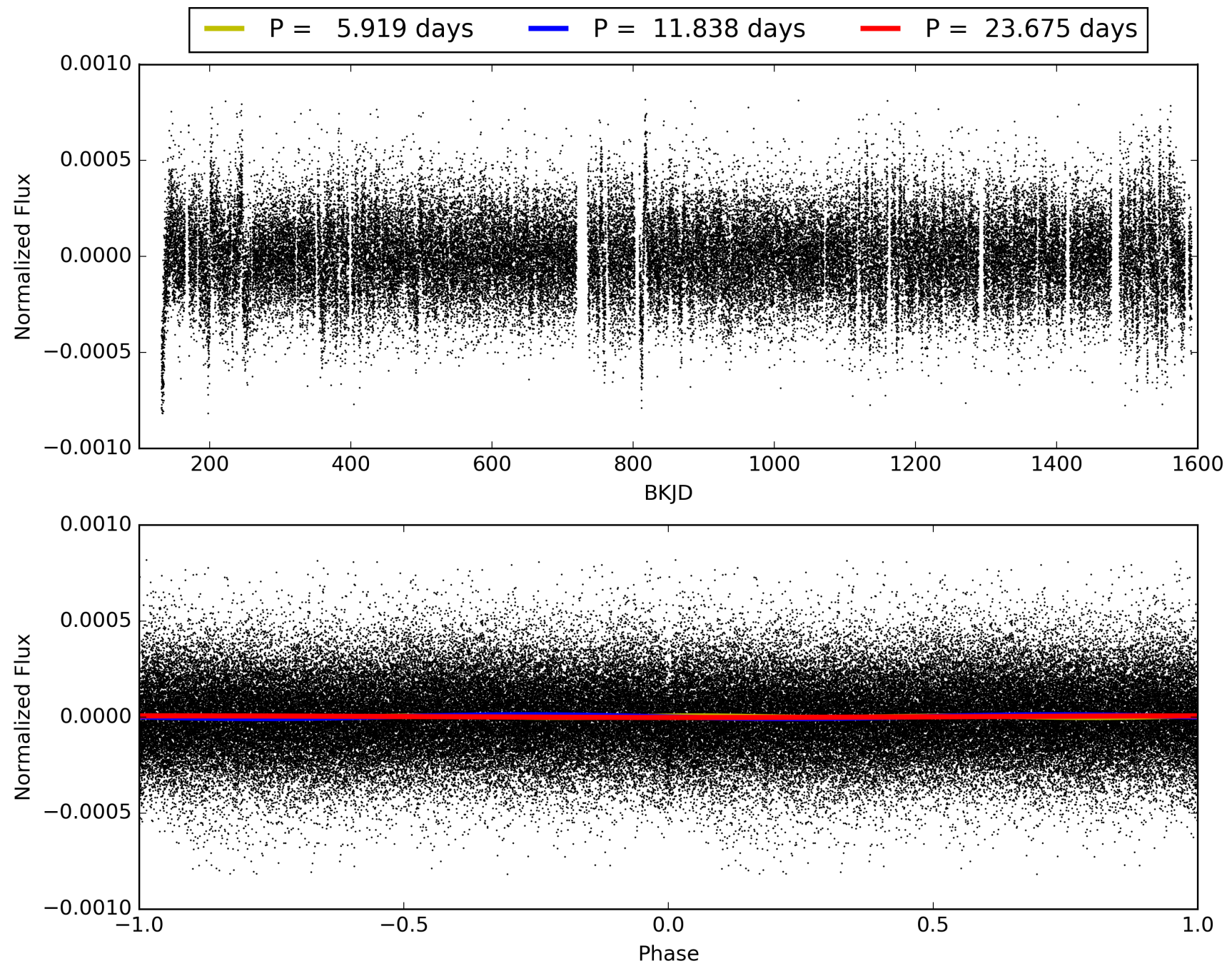
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 03:22:41 Z

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

TCE 009209624-02, PDC Light Curves

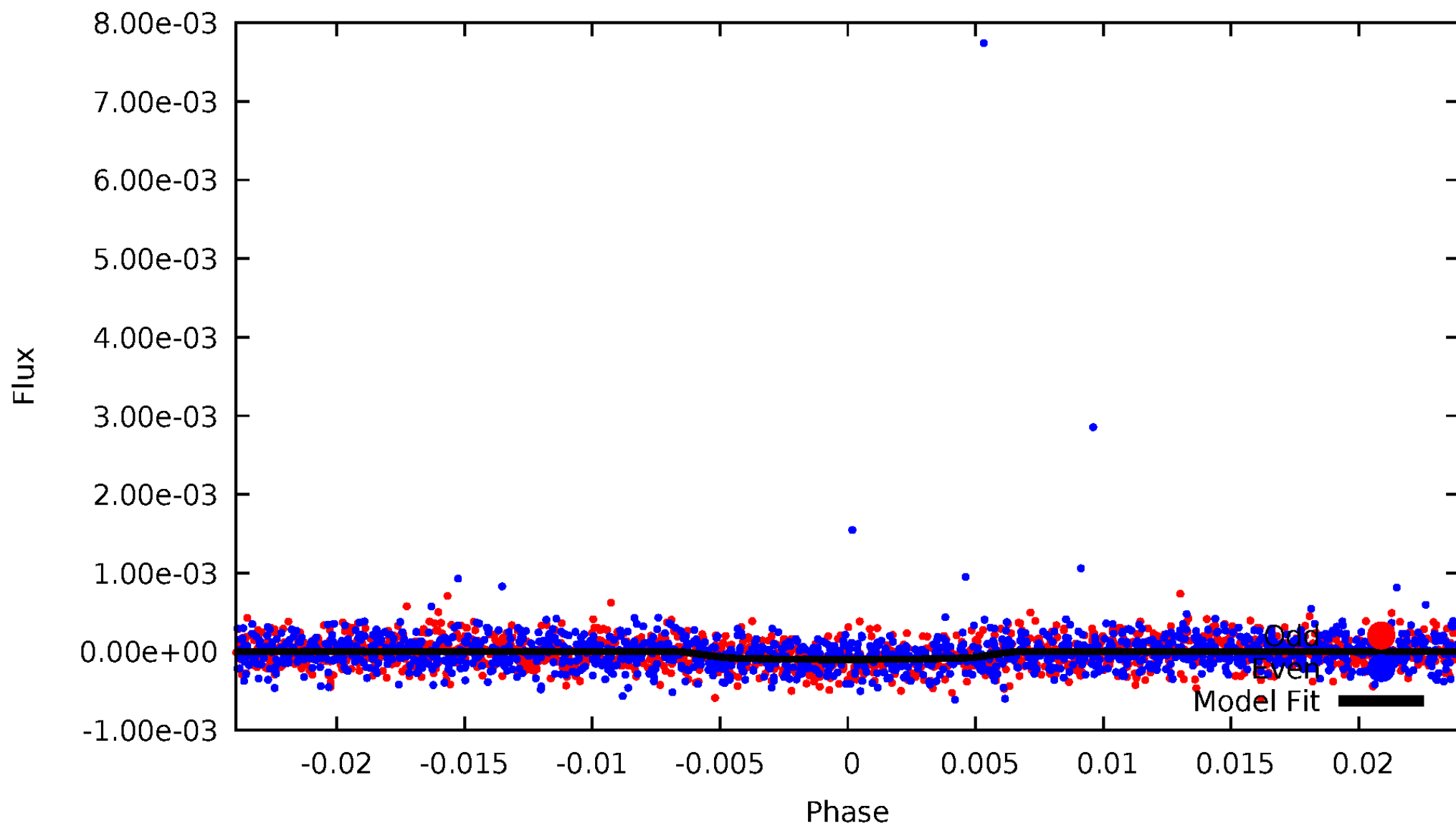


TCE 009209624-02



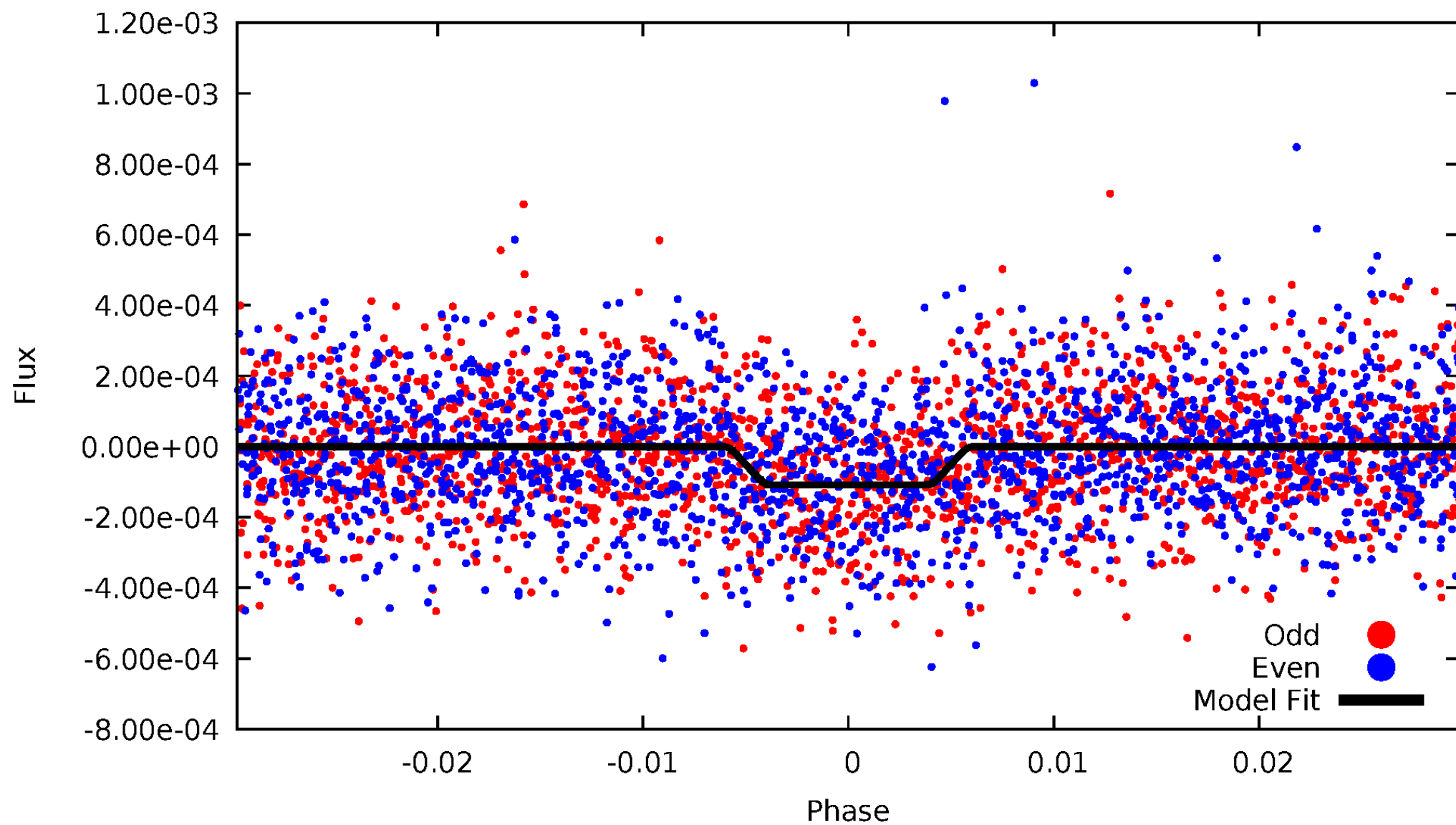
DV Odd/Even

TCE 009209624-02



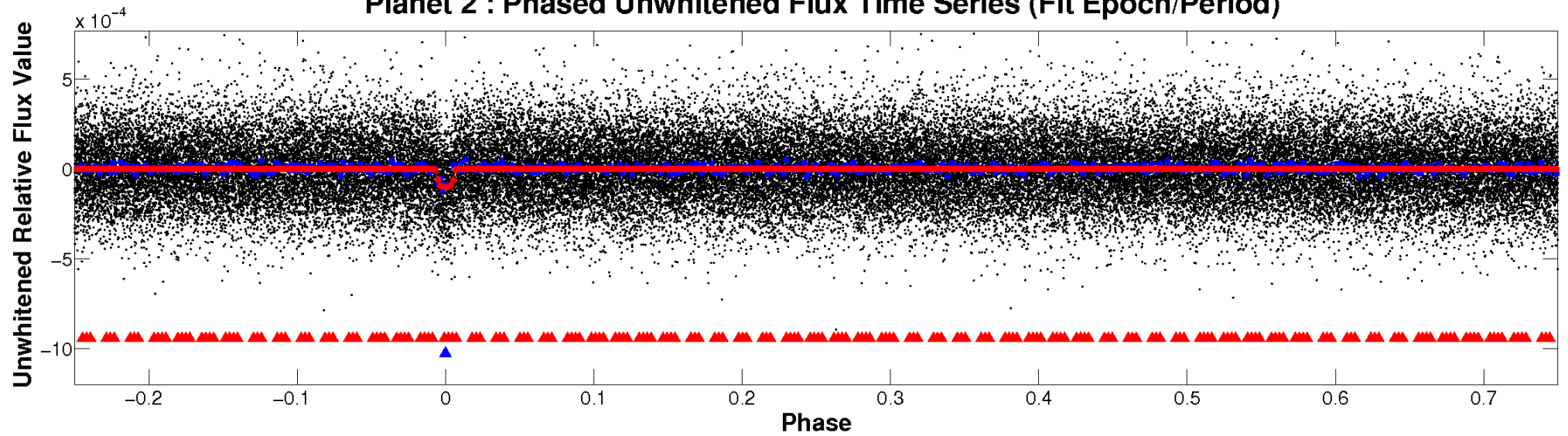
ALT Odd/Even

TCE 009209624-02

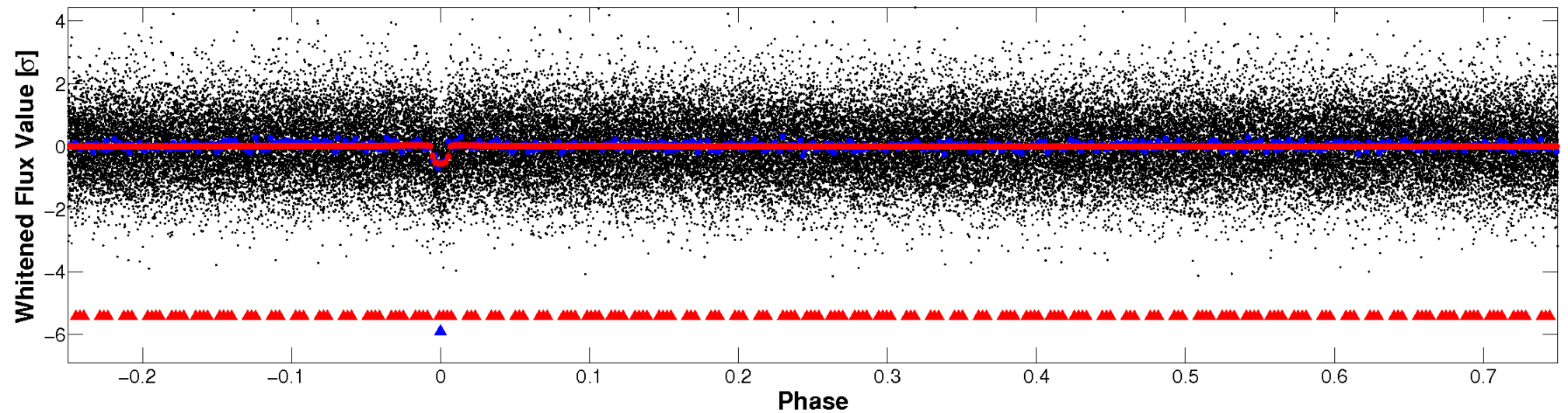


Non-Whitened Vs. Whitened Light Curve

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

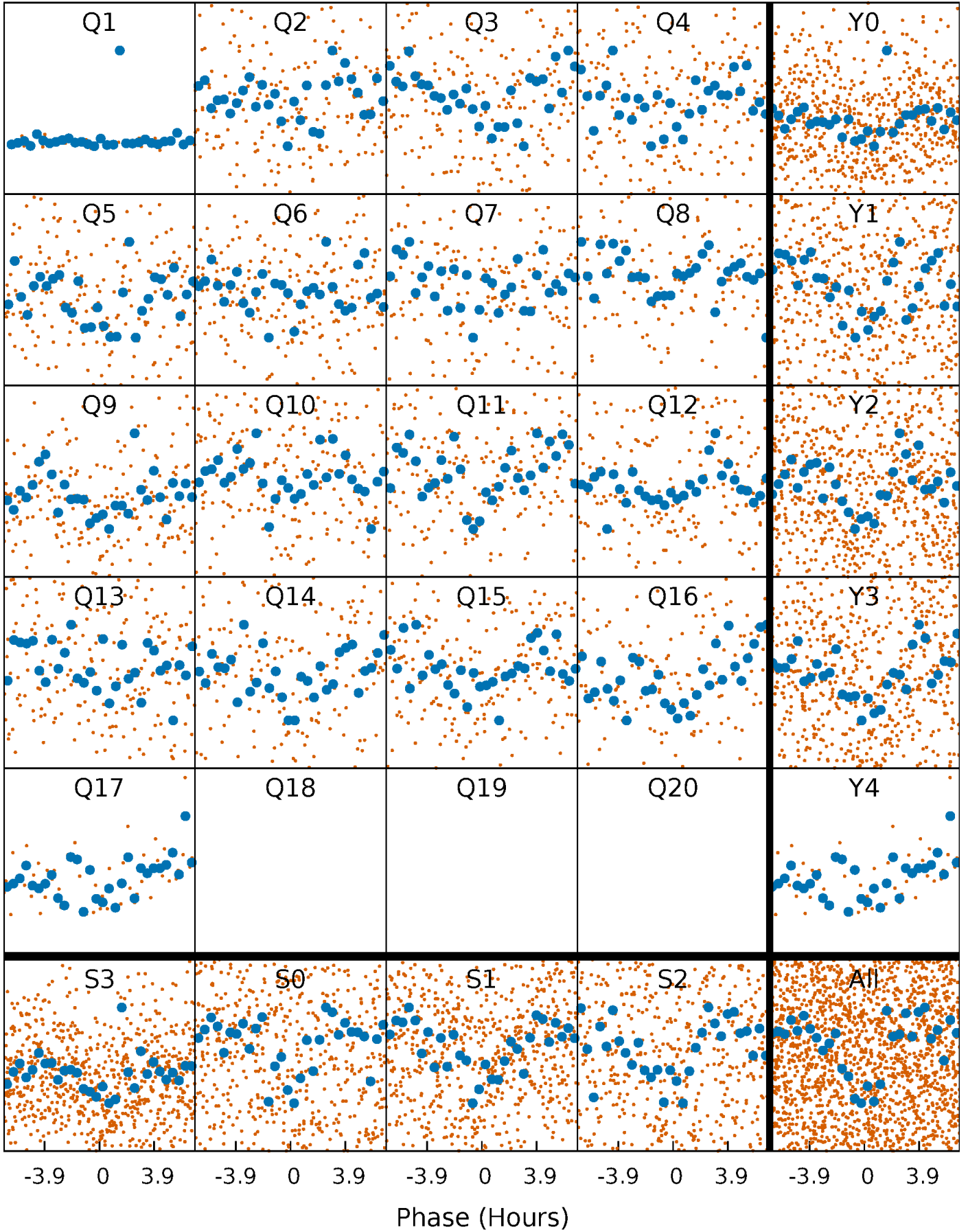


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



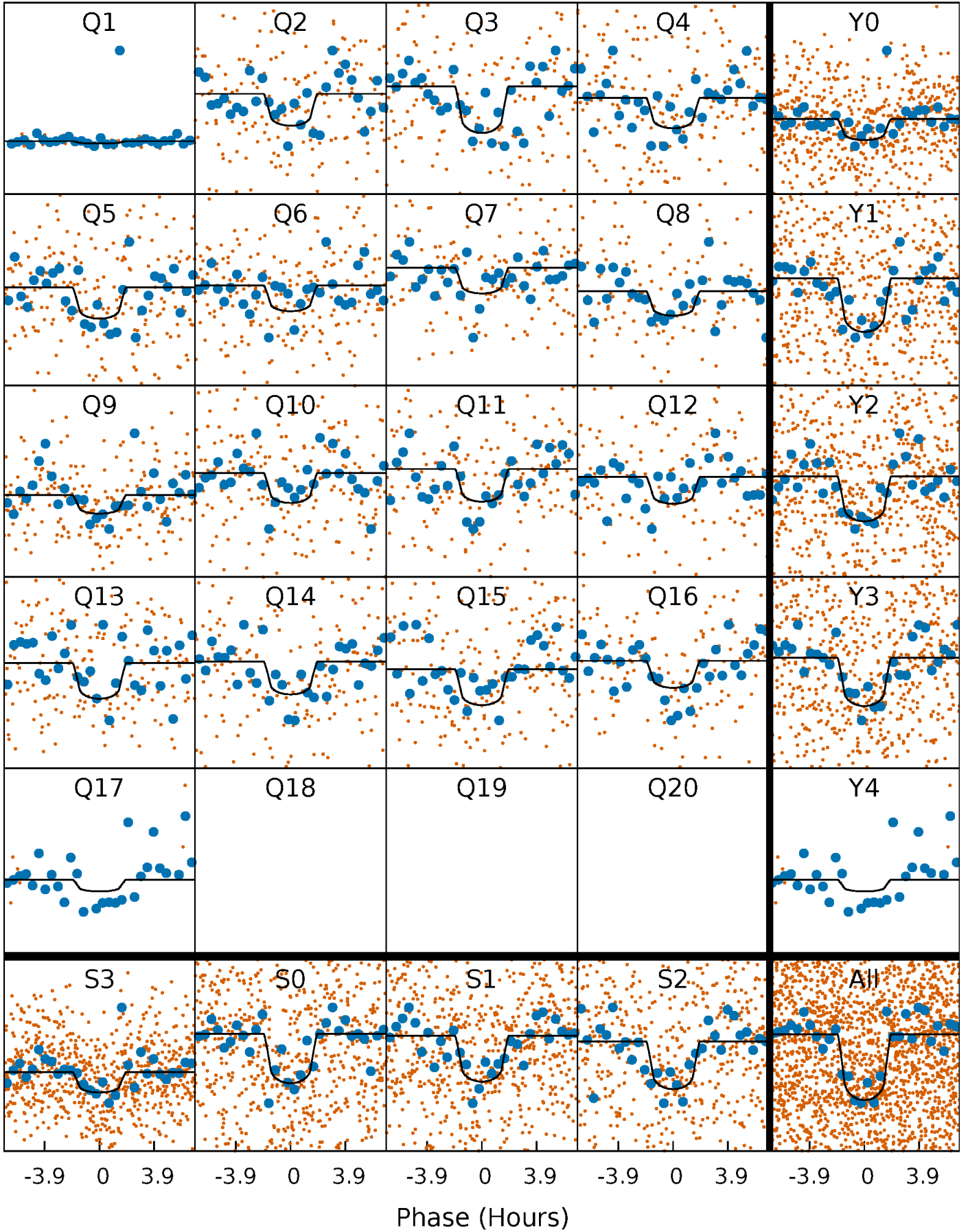
PDC Quarter-Phased Transit Curves

TCE 009209624-02 P= 11.837613 Days $T_0=142.218293$ (BKJD)



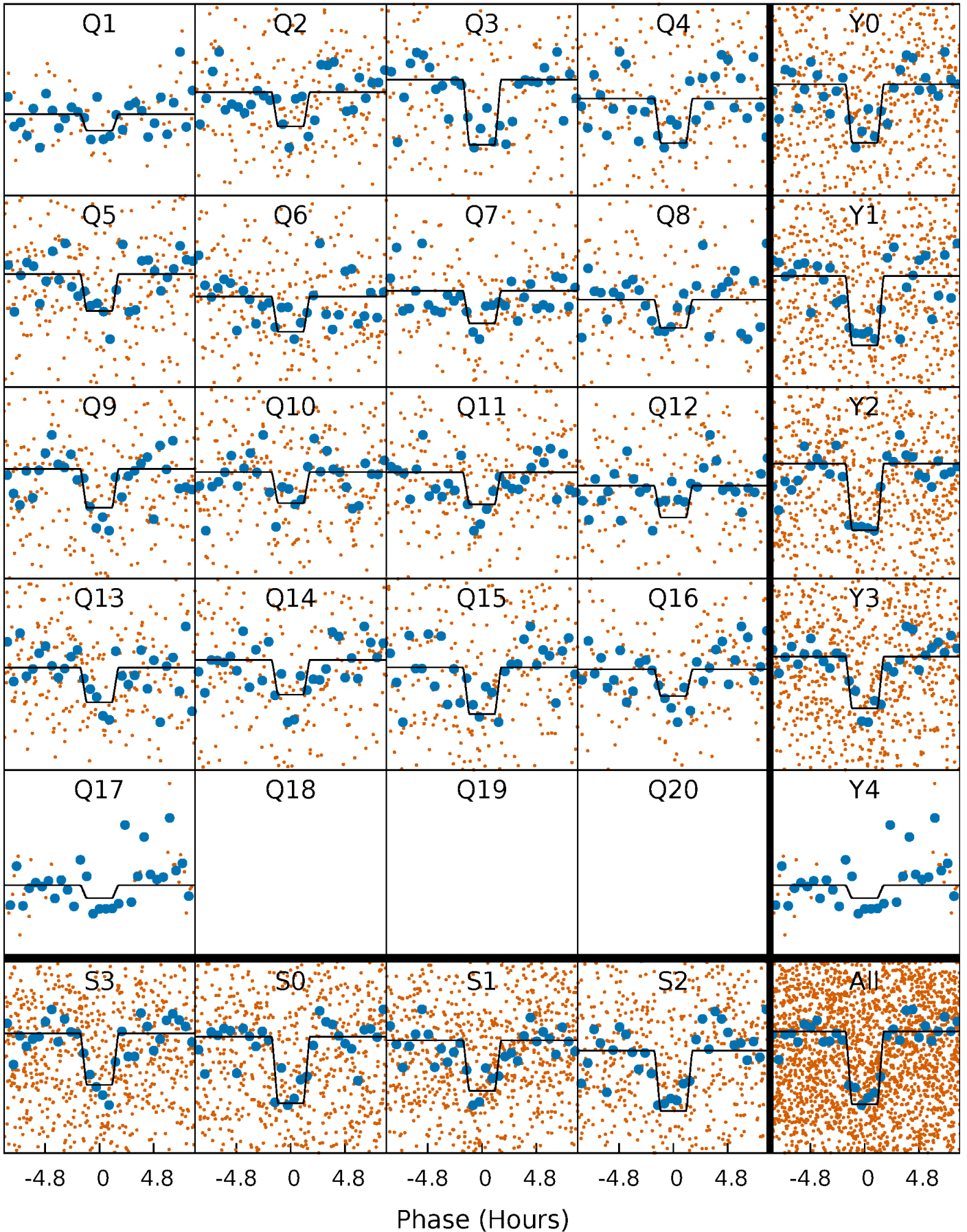
DV Quarter-Phased Transit Curves

TCE 009209624-02 P= 11.837613 Days $T_0=142.218293$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

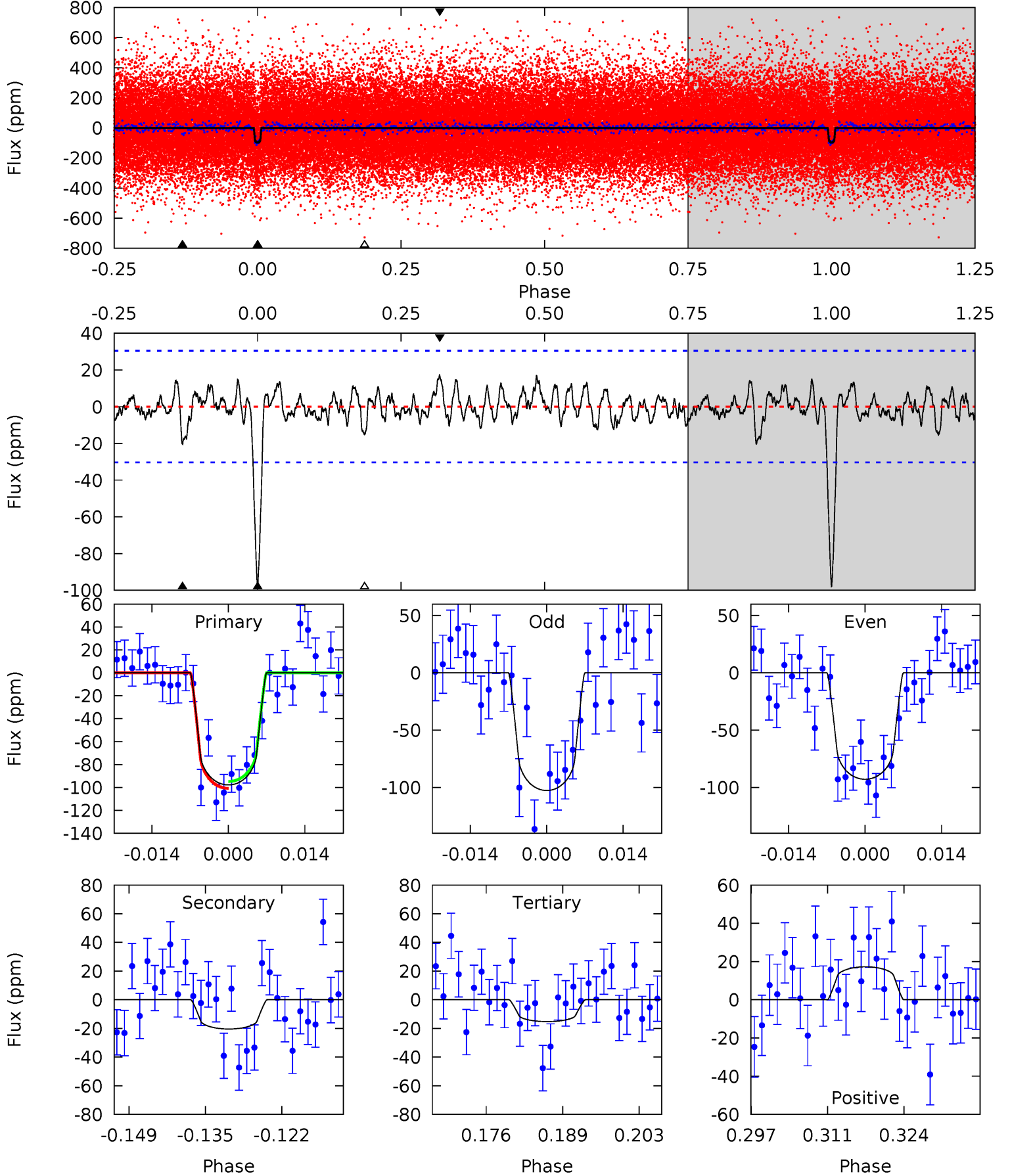
TCE 009209624-02 P= 11.837550 Days $T_0=142.221735$ (BKJD)



DV Model-Shift Uniqueness Test

009209624-02, $P = 11.837613$ Days, $E = 130.380680$ Days

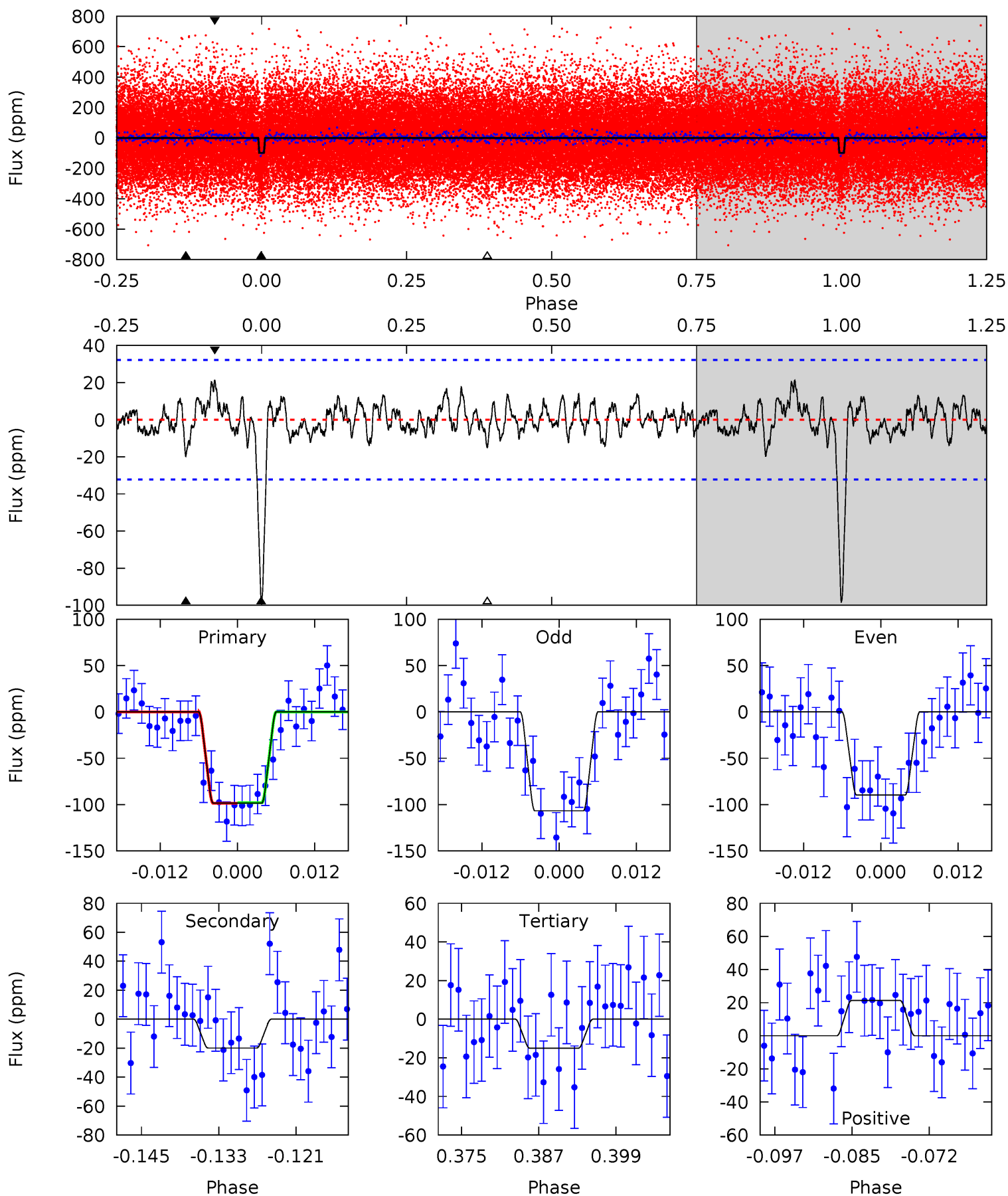
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
16.0	3.34	2.49	2.82	4.97	2.47	0.97	13.5	13.2	0.85	0.52	0.80	0.95	0.15	0.49



Alt Model-Shift Uniqueness Test

009209624-02, P = 11.837550 Days, E = 130.384185 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
15.2	3.09	2.33	3.30	4.99	2.51	1.01	12.9	11.9	0.76	-0.21	1.31	1.04	0.18	0.05



Stellar Parameters For KIC 009209624

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	M (M_{\odot})	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	5772^{+115}_{-104}	$4.351^{+0.150}_{-0.100}$	$-0.380^{+0.150}_{-0.150}$	$1.003^{+0.147}_{-0.147}$	$0.824^{+0.071}_{-0.036}$	$1.149^{+0.785}_{-0.336}$
	+2%/-2%	+3%/-2%	+39%/-39%	+15%/-15%	+9%/-4%	+68%/-29%
Source	SPE58	SPE58	SPE58	DSEP		

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

Secondary Eclipse Parameters for KIC 009209624-02 / KOI 2443.02

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-20 ± 6	$1.17^{+0.62}_{-0.57}$	1148^{+56}_{-53}	4026^{+1208}_{-587}	74^{+210}_{-45}
Alt.	-20 ± 6	$1.13^{+0.59}_{-0.56}$	1148^{+52}_{-54}	4038^{+1301}_{-561}	78^{+237}_{-47}

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

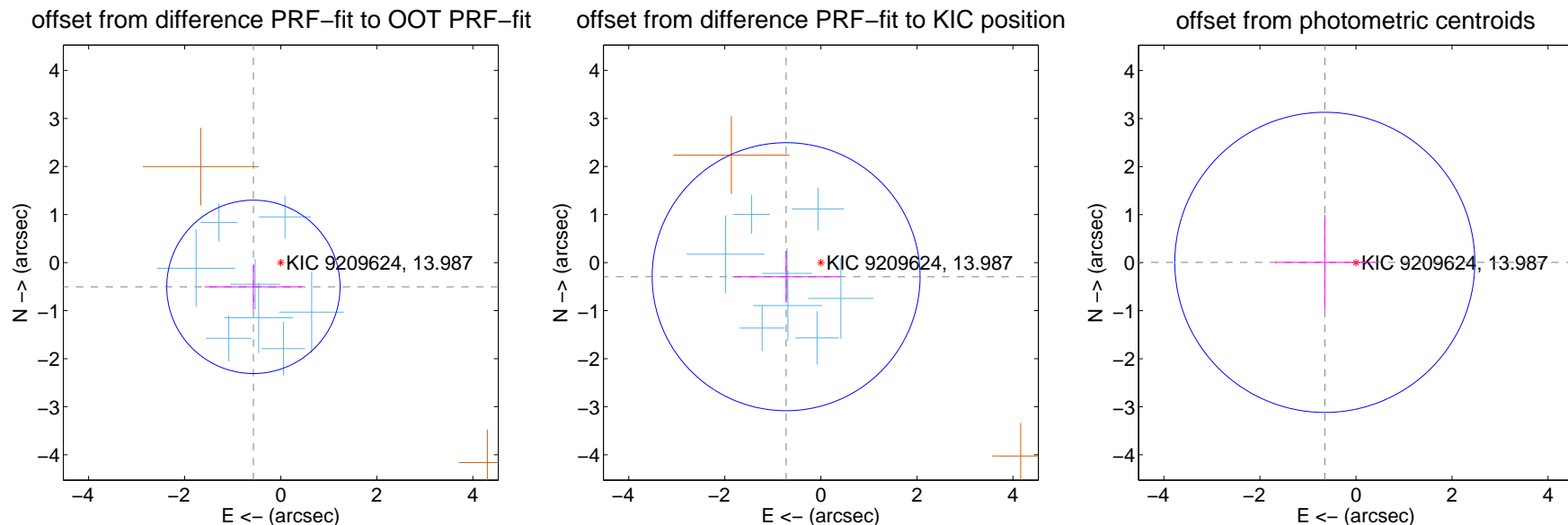
DV Centroid Data

Supplemental centroid analysis for 009209624-02. Kepler magnitude: 13.99. Transit SNR 12.74

There are 8 quarters with good PRF difference image offsets

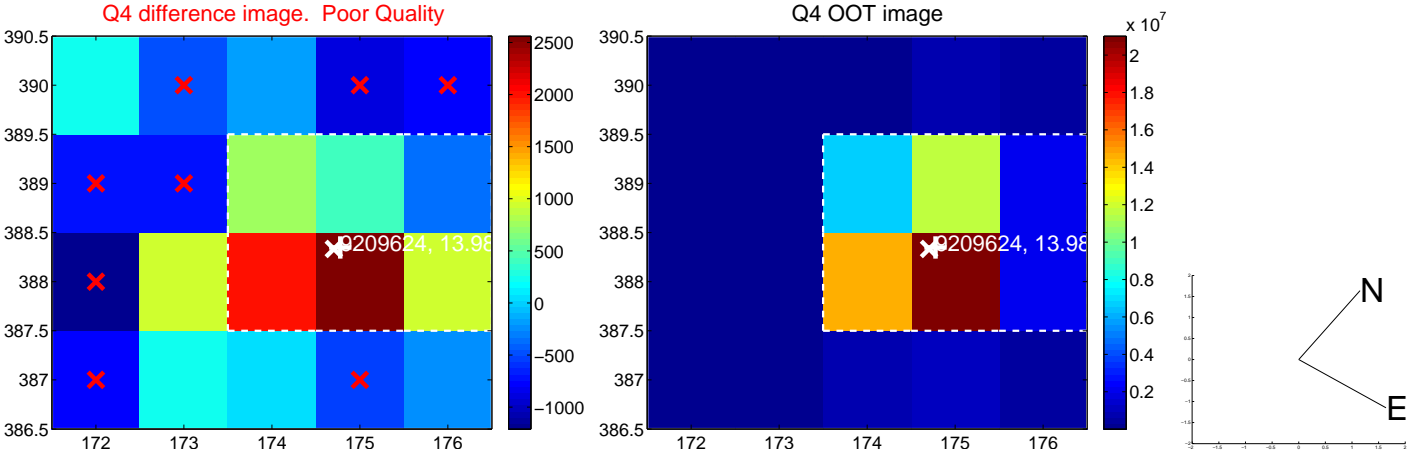
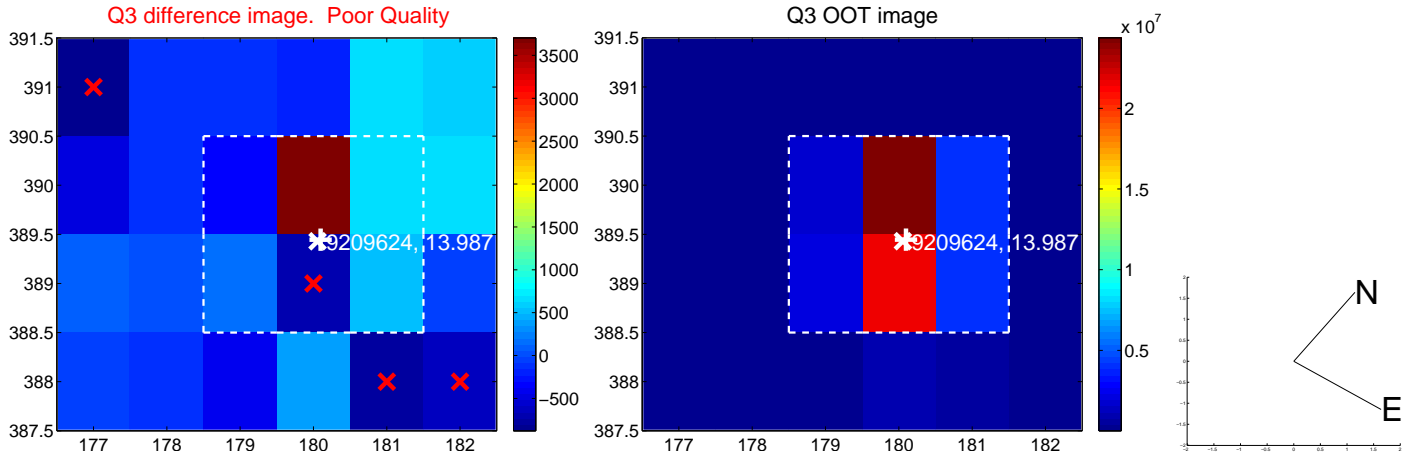
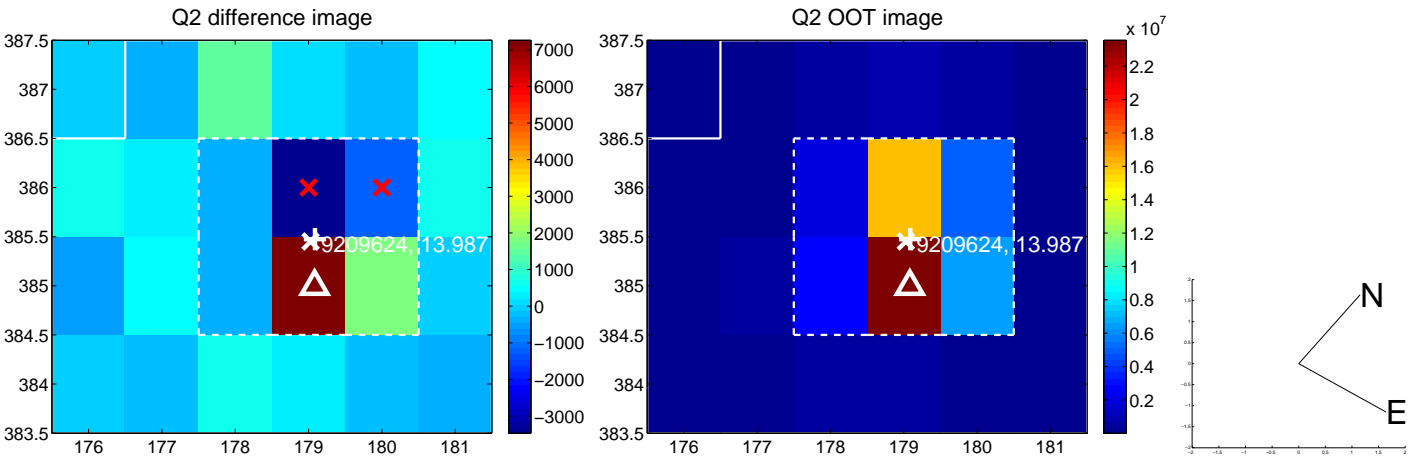
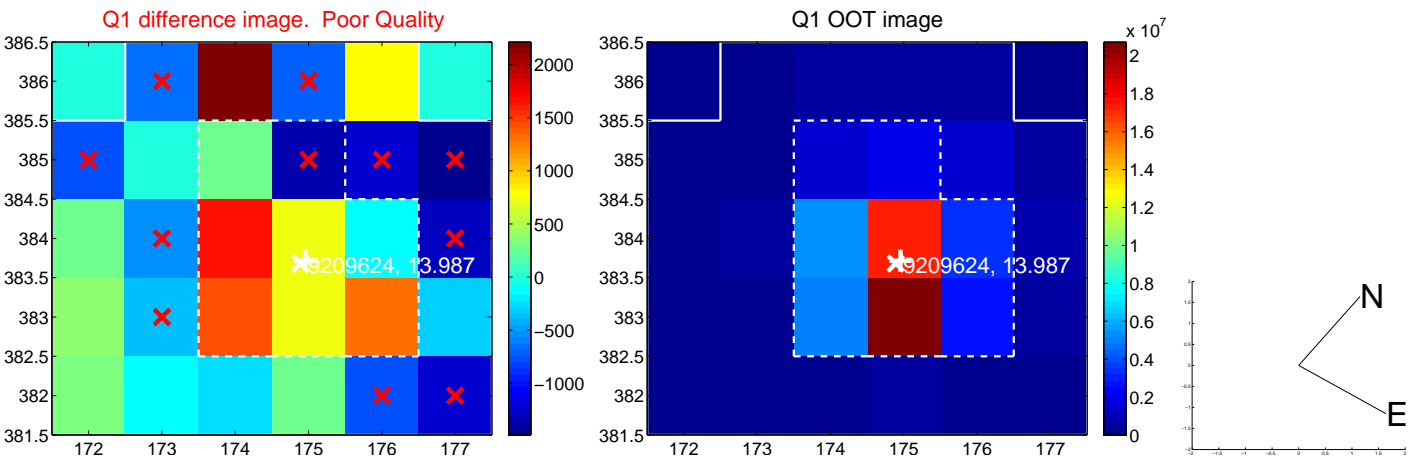
The direct PRF centroid is offset from the target star catalog position by about 0.37 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.761 ± 0.601	1.27	0.569 ± 1.016	-0.505 ± 0.474
PRF-fit source offset from KIC position	0.781 ± 0.930	0.84	0.723 ± 1.118	-0.294 ± 0.532
photometric centroid source offset	0.65 ± 1.04	0.62	0.65 ± 1.04	0.01 ± 0.99

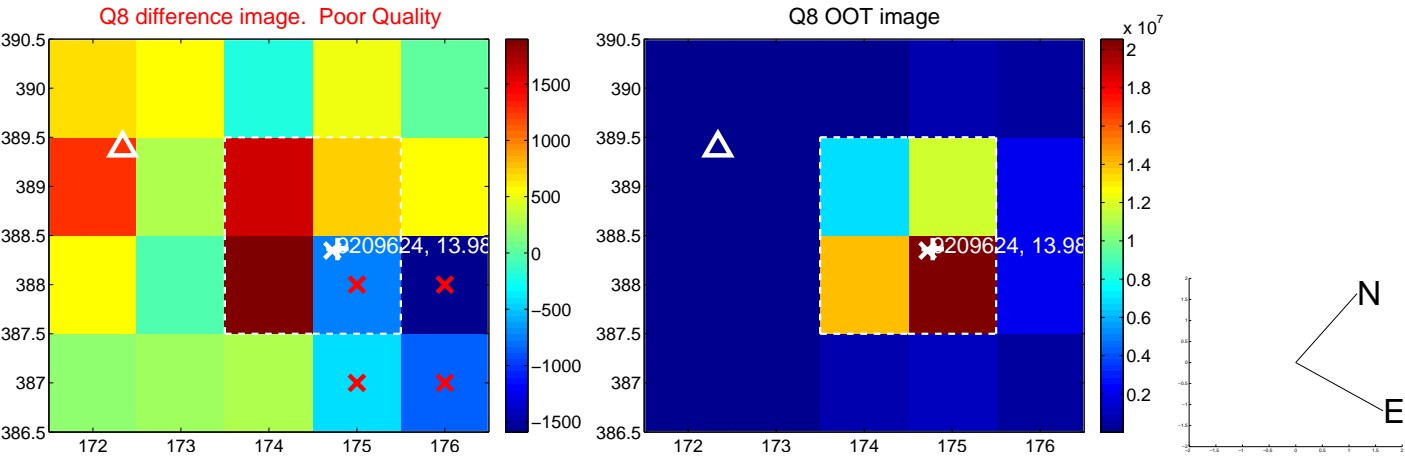
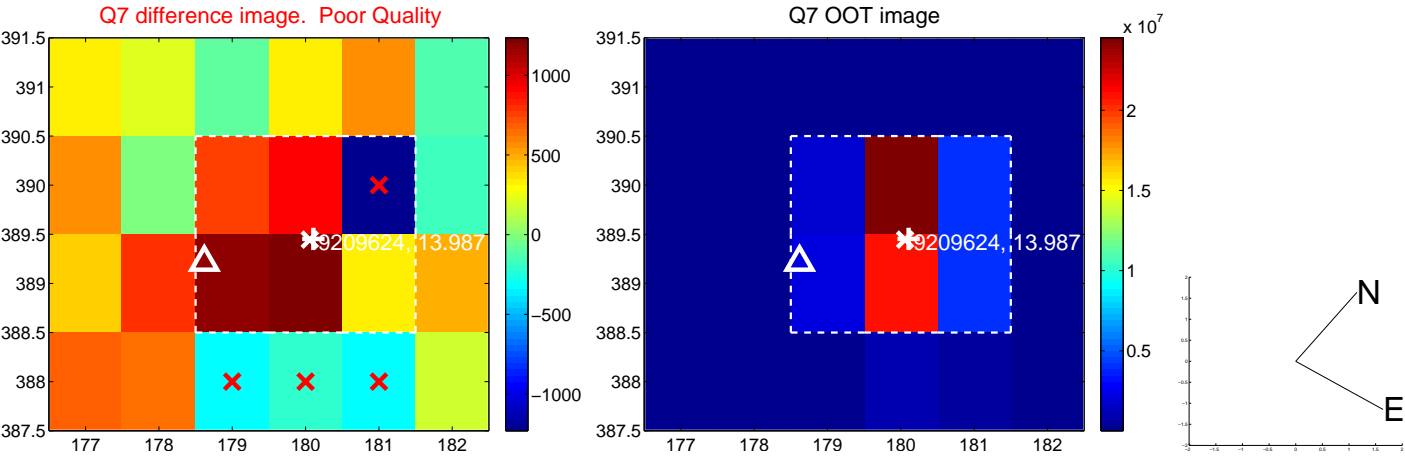
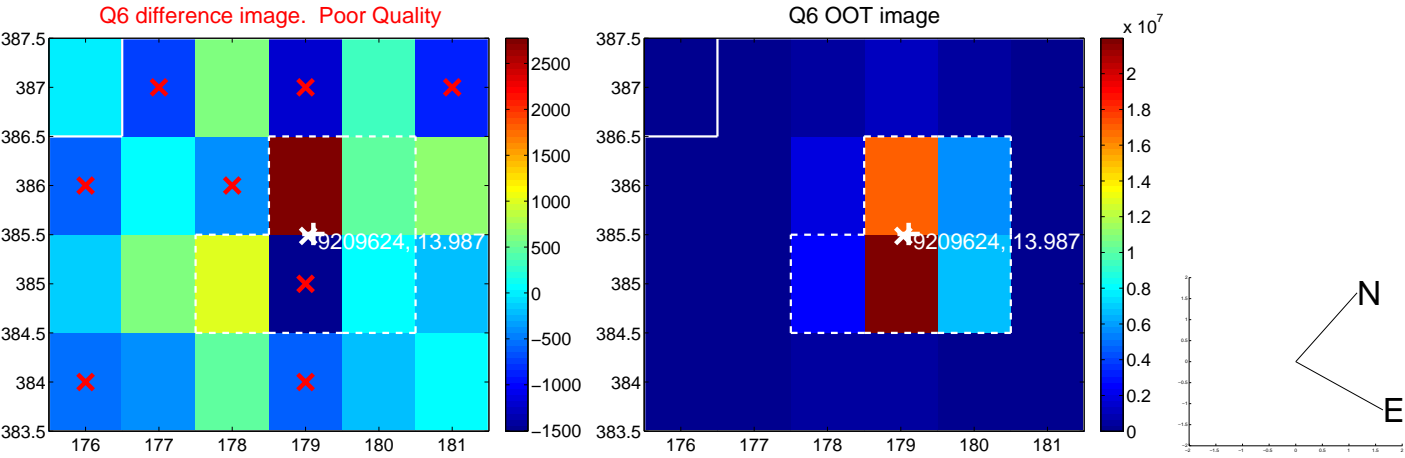
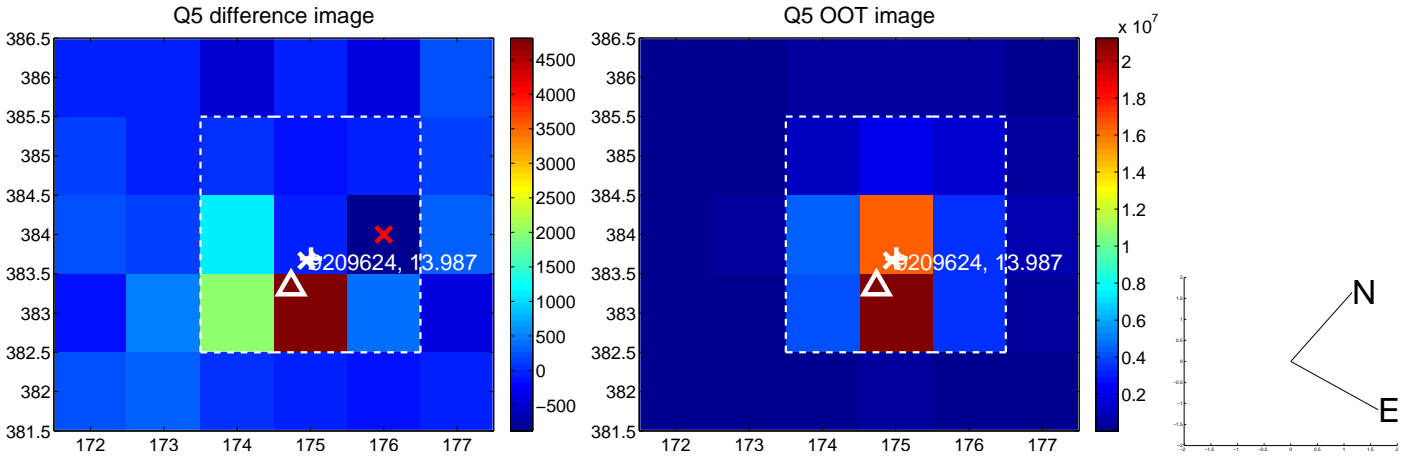


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

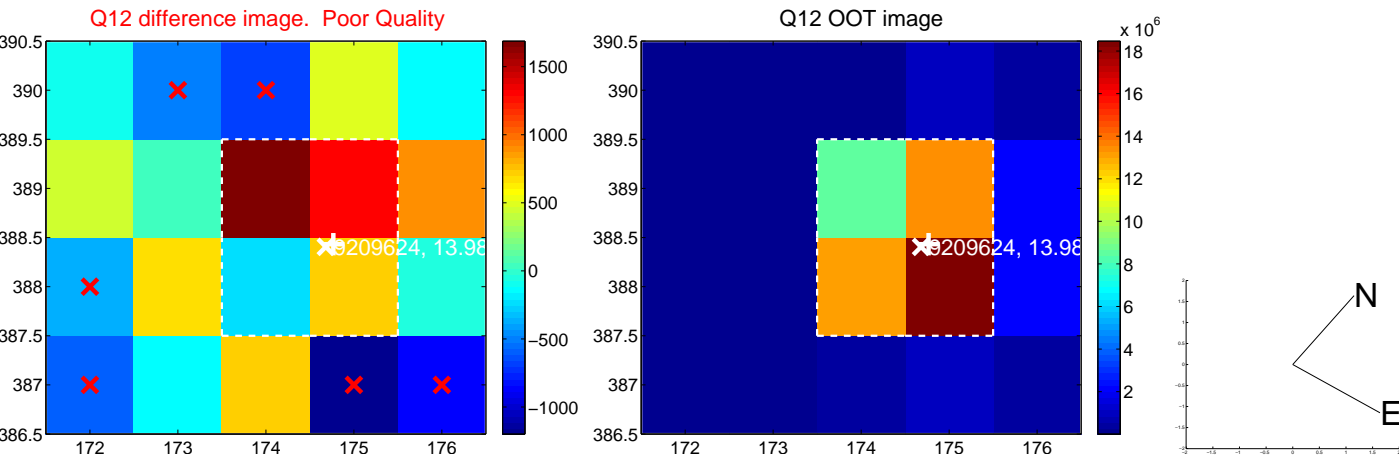
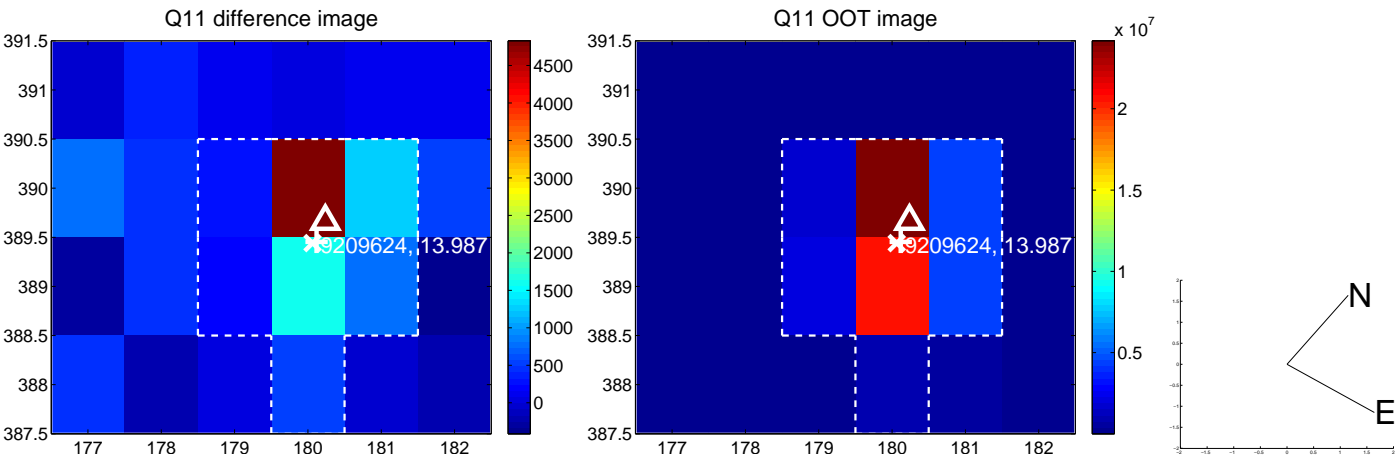
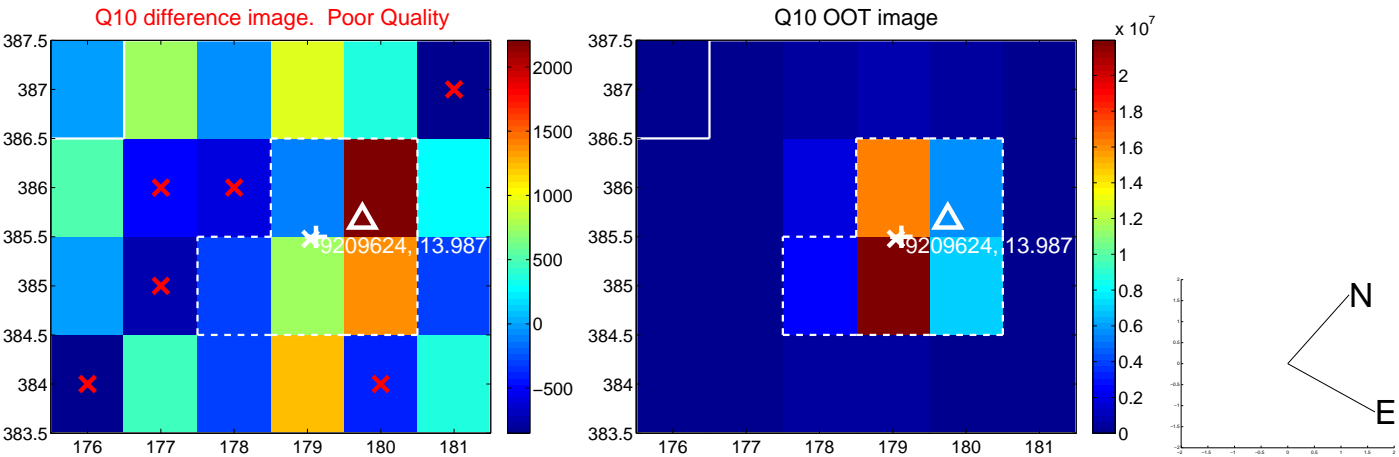
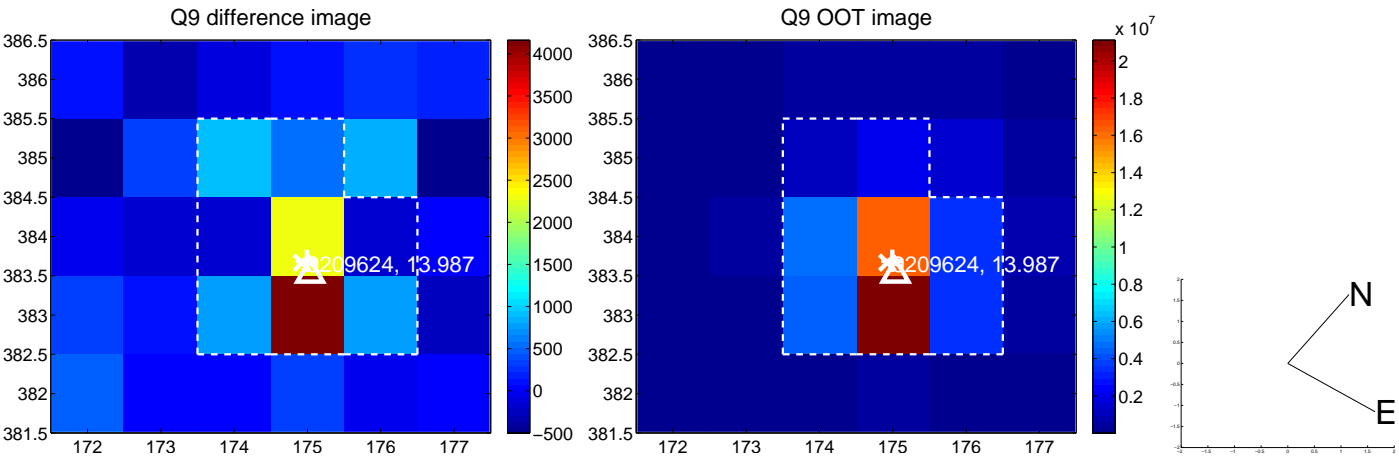
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



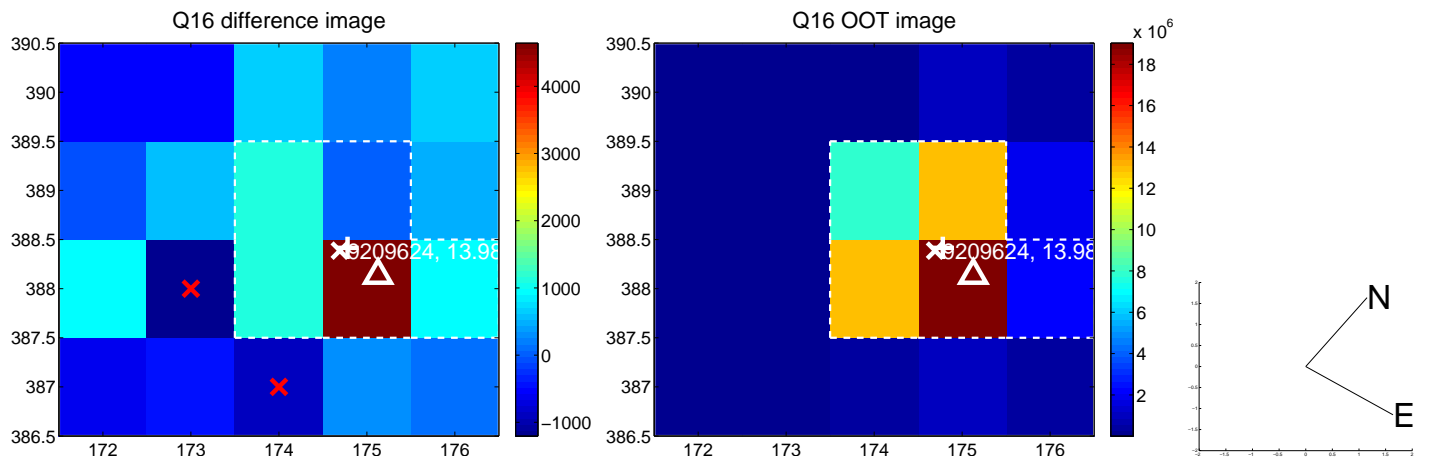
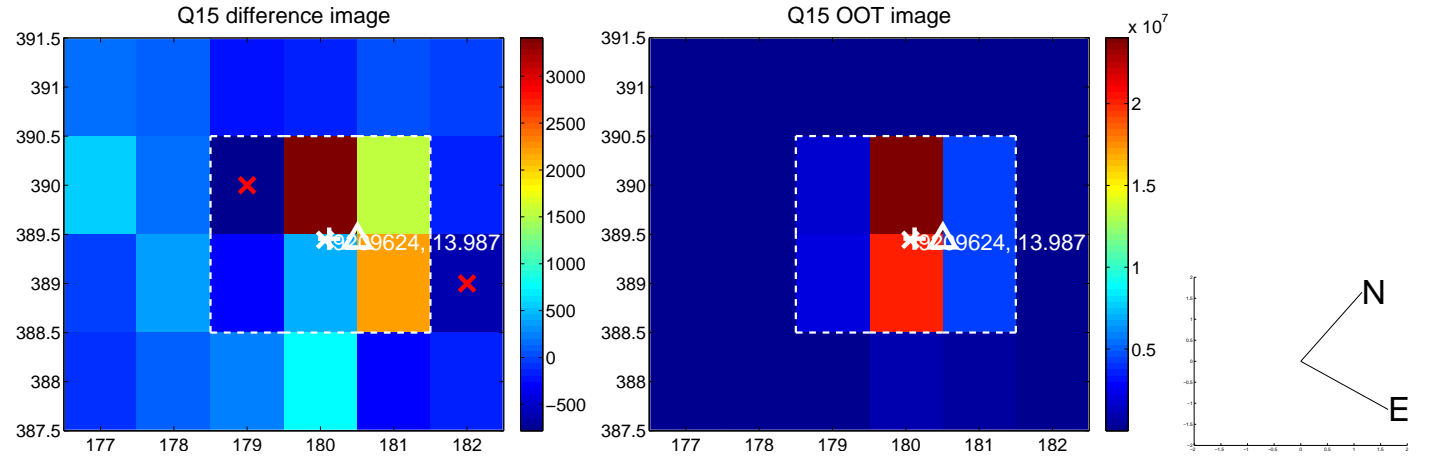
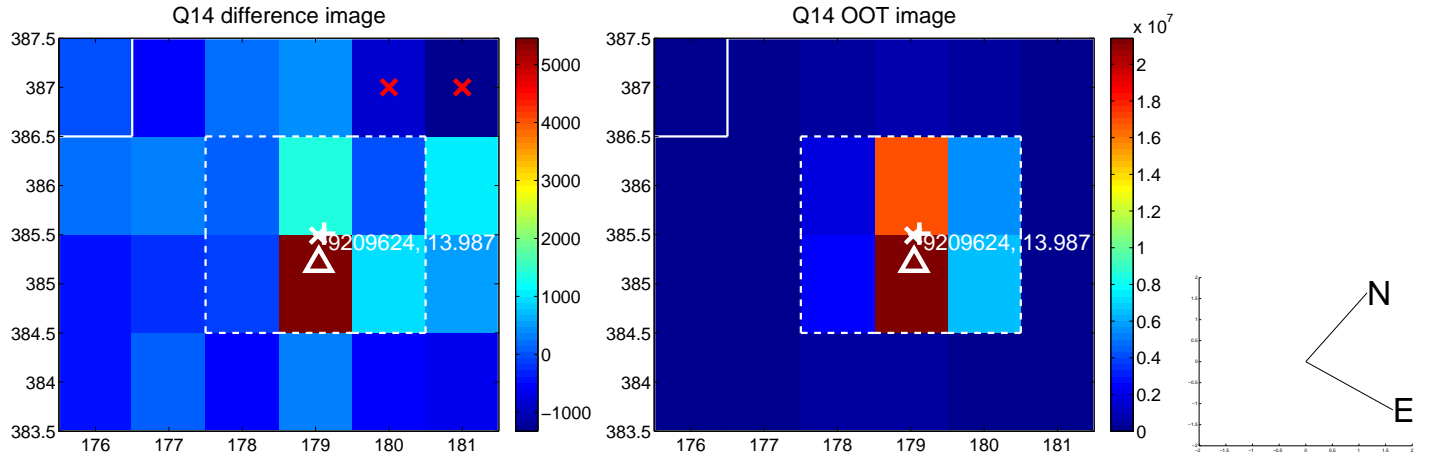
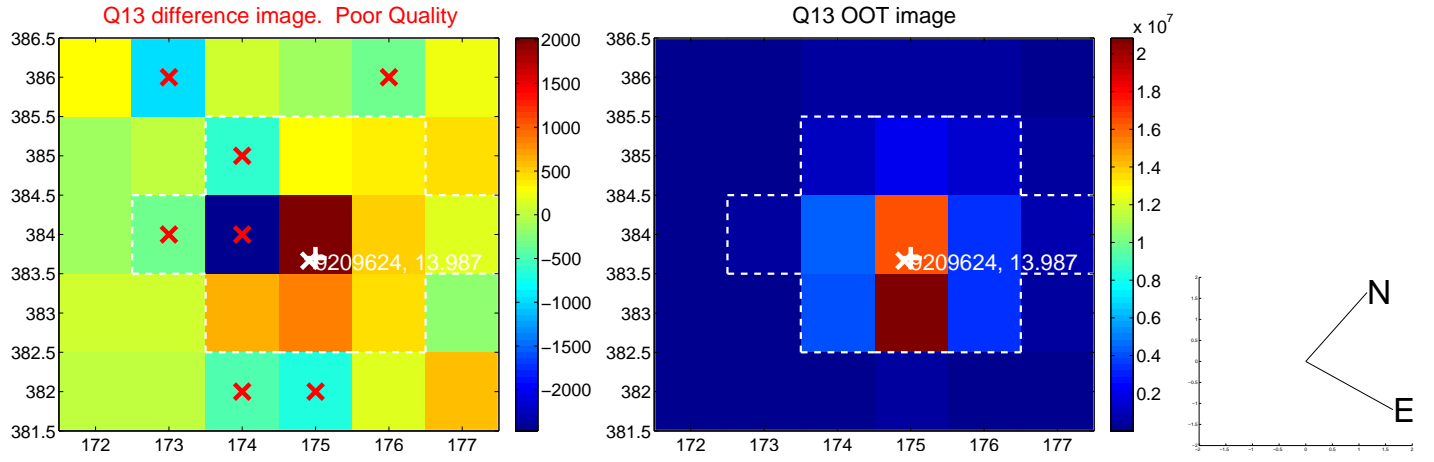
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



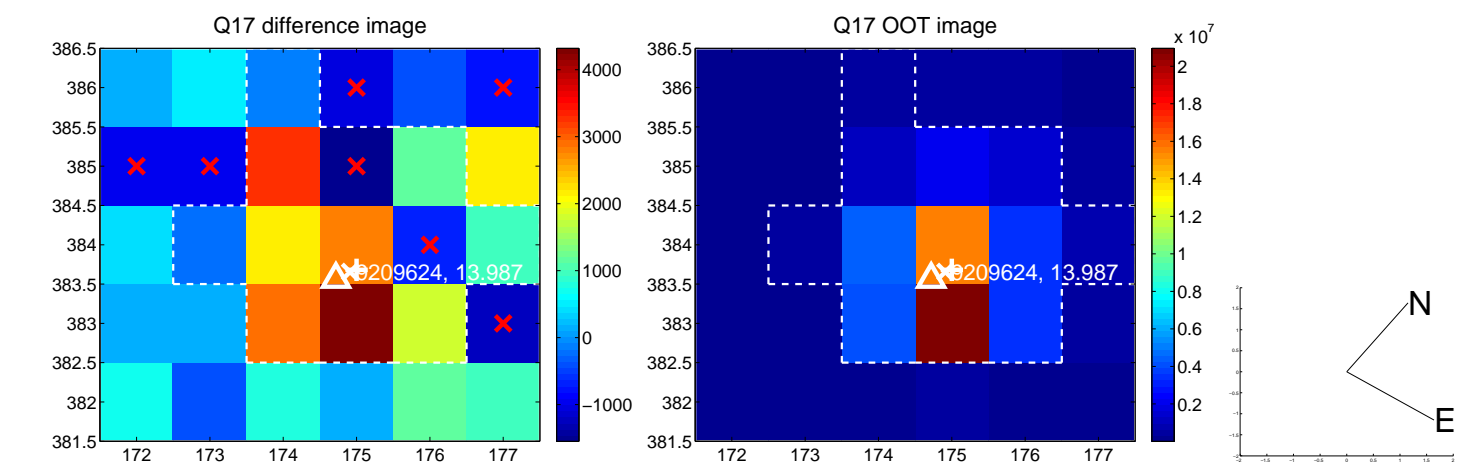
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



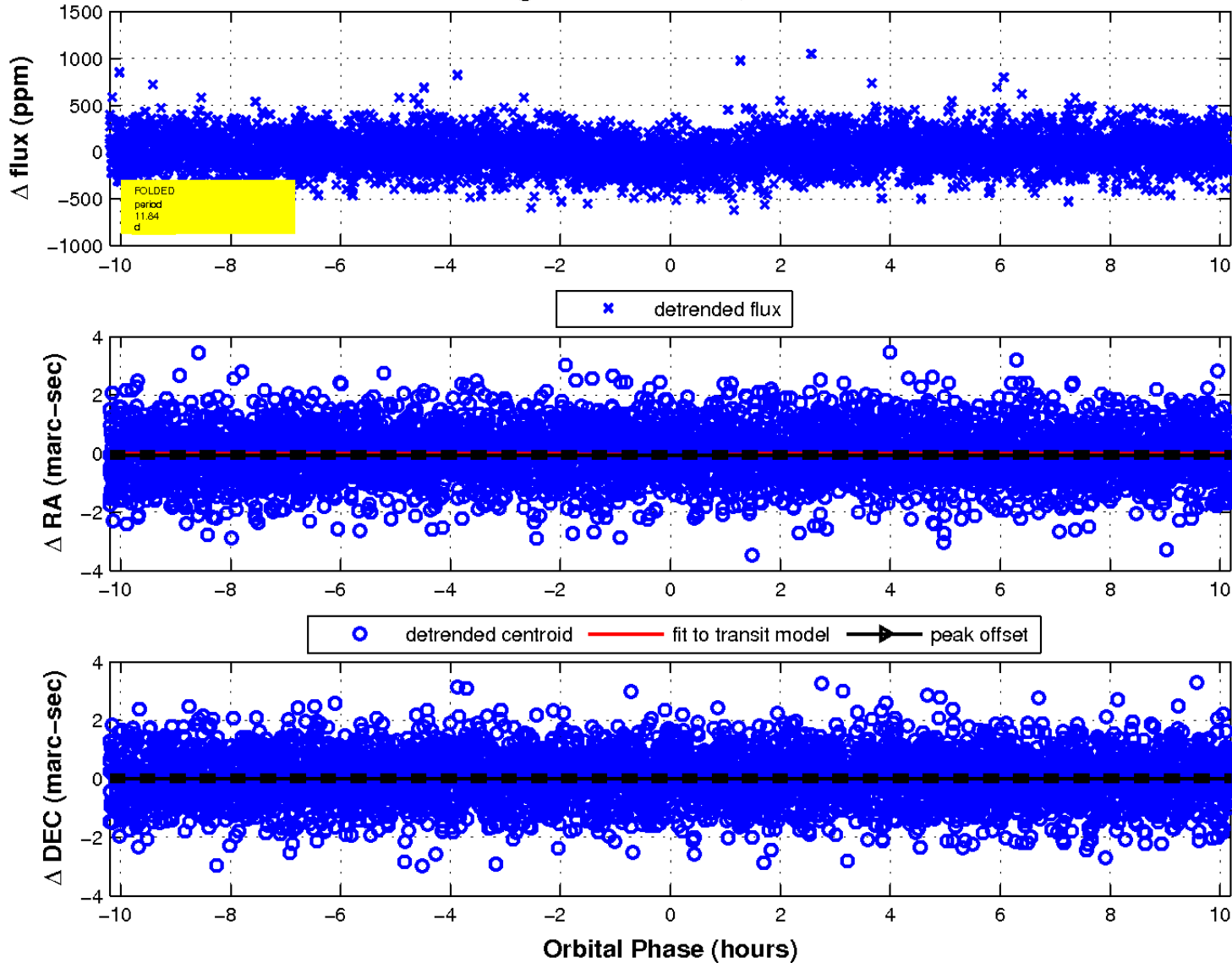
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

