

KIC 009412760

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})
009412760-01	OBS	1977.01	9.387408	137.383518	393.5	1.551	25.3	29.7	0.65	4500	1.63	25.89
009412760-02	OBS	1977.02	7.415572	137.814994	133.1	1.897	11.4	12.4	0.65	4500	0.92	35.46

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009412760-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
009412760-02	OBS	PC	1.00	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.

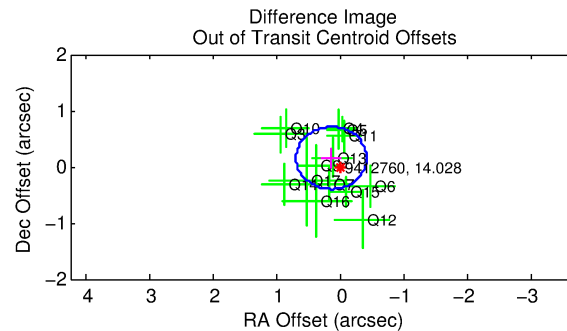
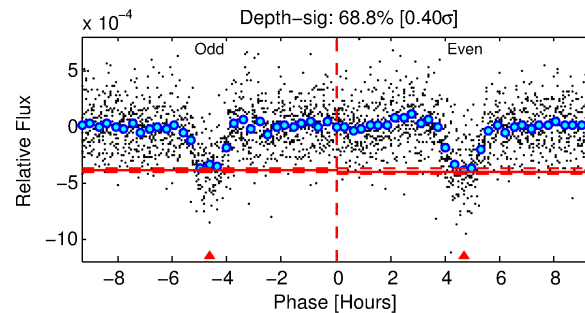
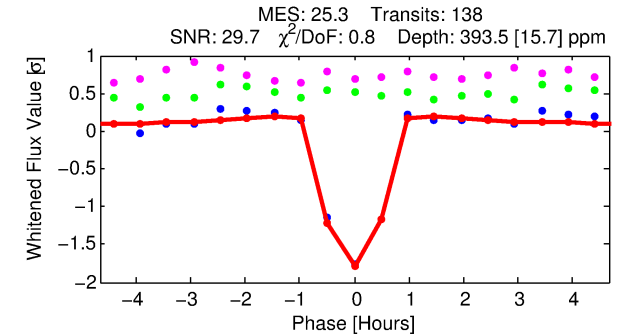
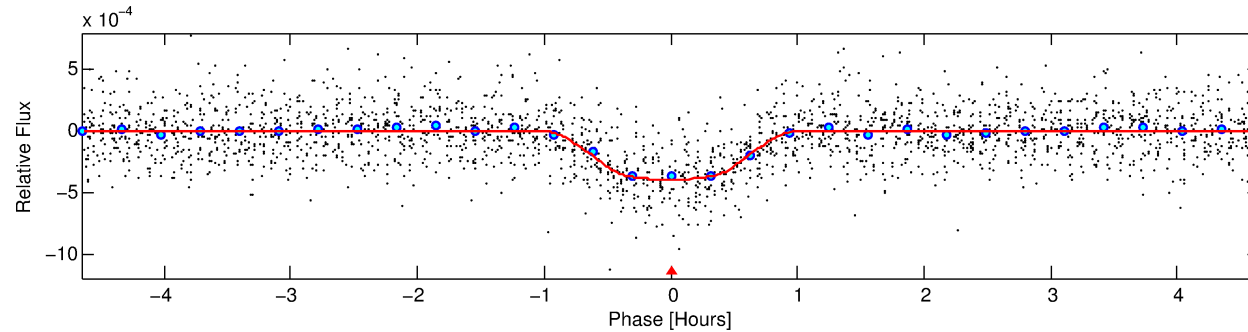
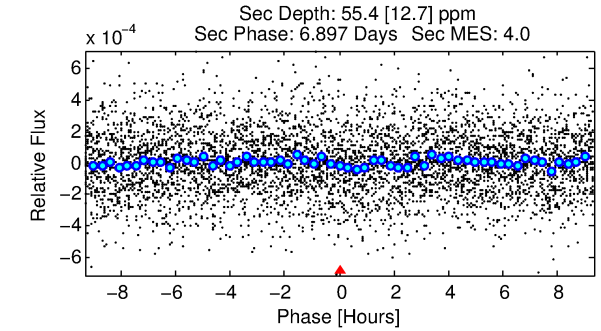
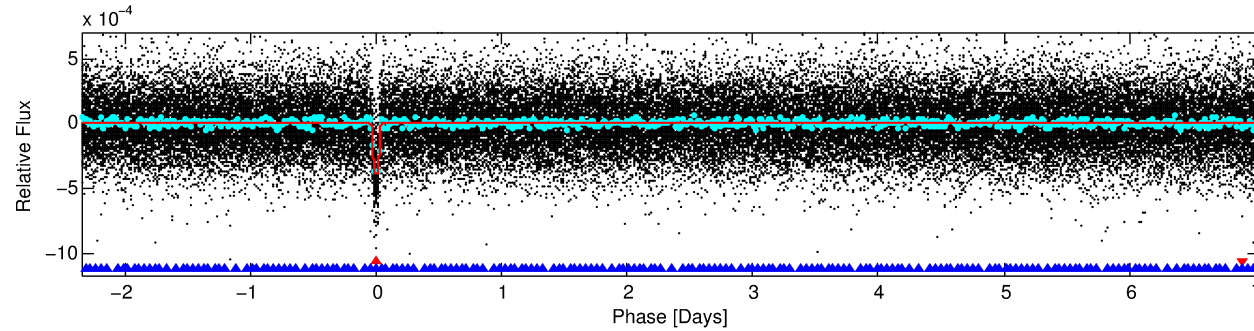
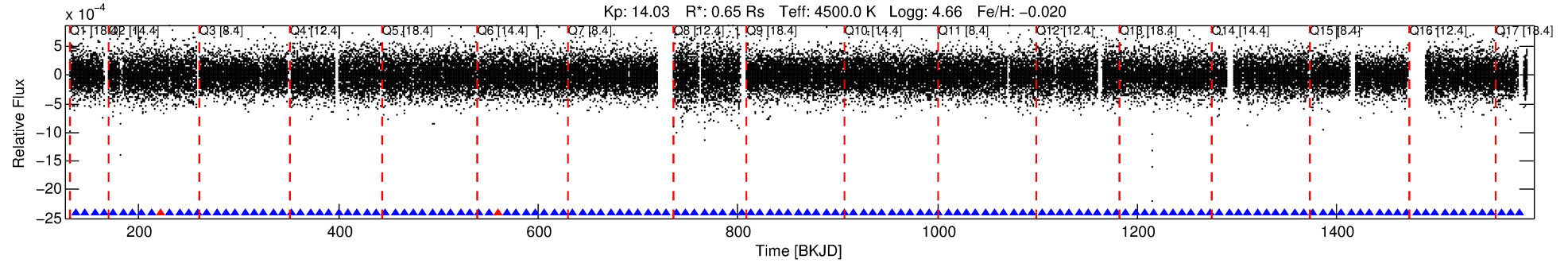
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009412760-01

No Significant Match Found

DV One-Page Summary

KIC: 9412760 Candidate: 1 of 2 Period: 9.387 d
KOI: K01977.01 Name: Kepler-345c Corr: 0.972



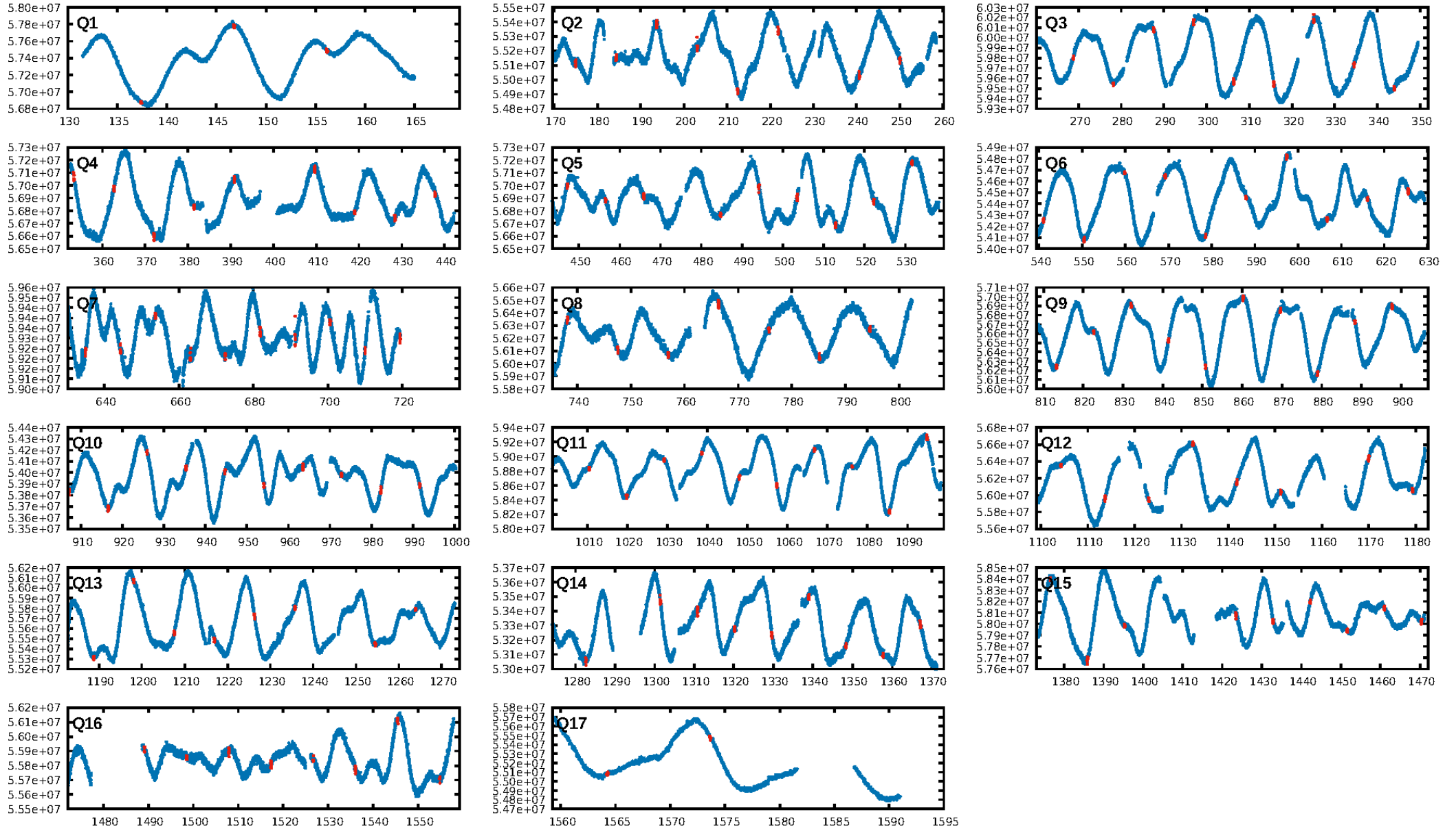
DV Fit Results:

Period = 9.38741 [0.00001] d
Epoch = 137.3835 [0.0012] BKJD
Rp/R* = 0.0232 [0.0048]
a/R* = 20.73 [15.75]
b = 0.92 [0.13]
Seff = 25.89 [3.00]
Teq = 575 [17] K
Rp = 1.63 [0.36] Re
a = 0.0770 [0.0045] AU
Ag = 67.60 [32.30] [2.06σ]
Teffp = 2550 [304] K [6.48σ]

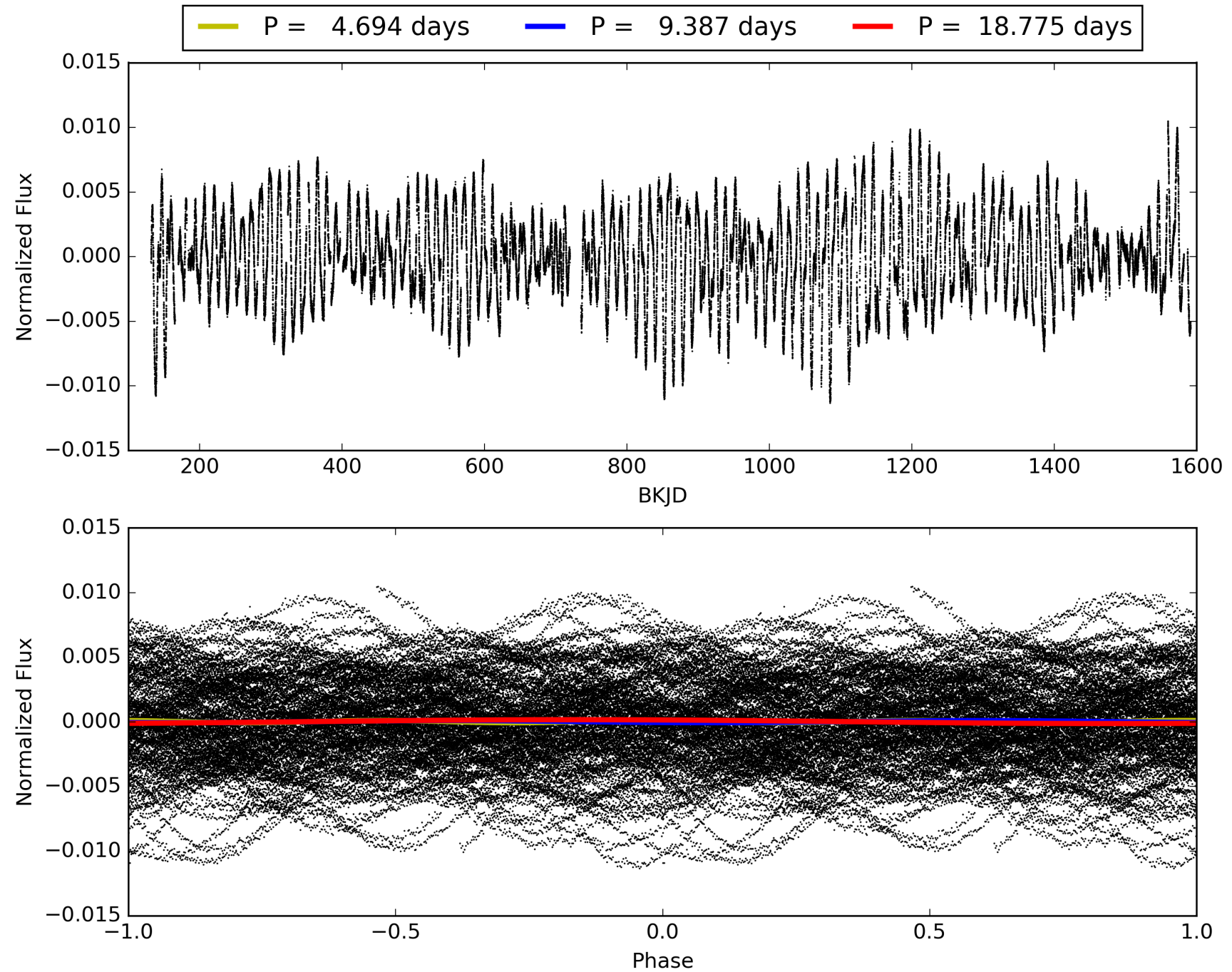
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [19.31σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 99.8%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 2.70e-130
RollingBand-fgt: 0.98 [131/133]
GhostDiagnostic-chr: 1.61
Centroid-sig: 31.4%
Centroid-so: 0.574 arcsec [1.24σ]
OotOffset-rm: 0.213 arcsec [1.15σ]
KicOffset-rm: 0.357 arcsec [2.15σ]
OotOffset-st: 3/4/3/4 [14]
KicOffset-st: 3/4/3/4 [14]
DiffImageQuality-fgm: 0.71 [10/14]
DiffImageOverlap-fno: 1.00 [17/17]

TCE 009412760-01, PDC Light Curves

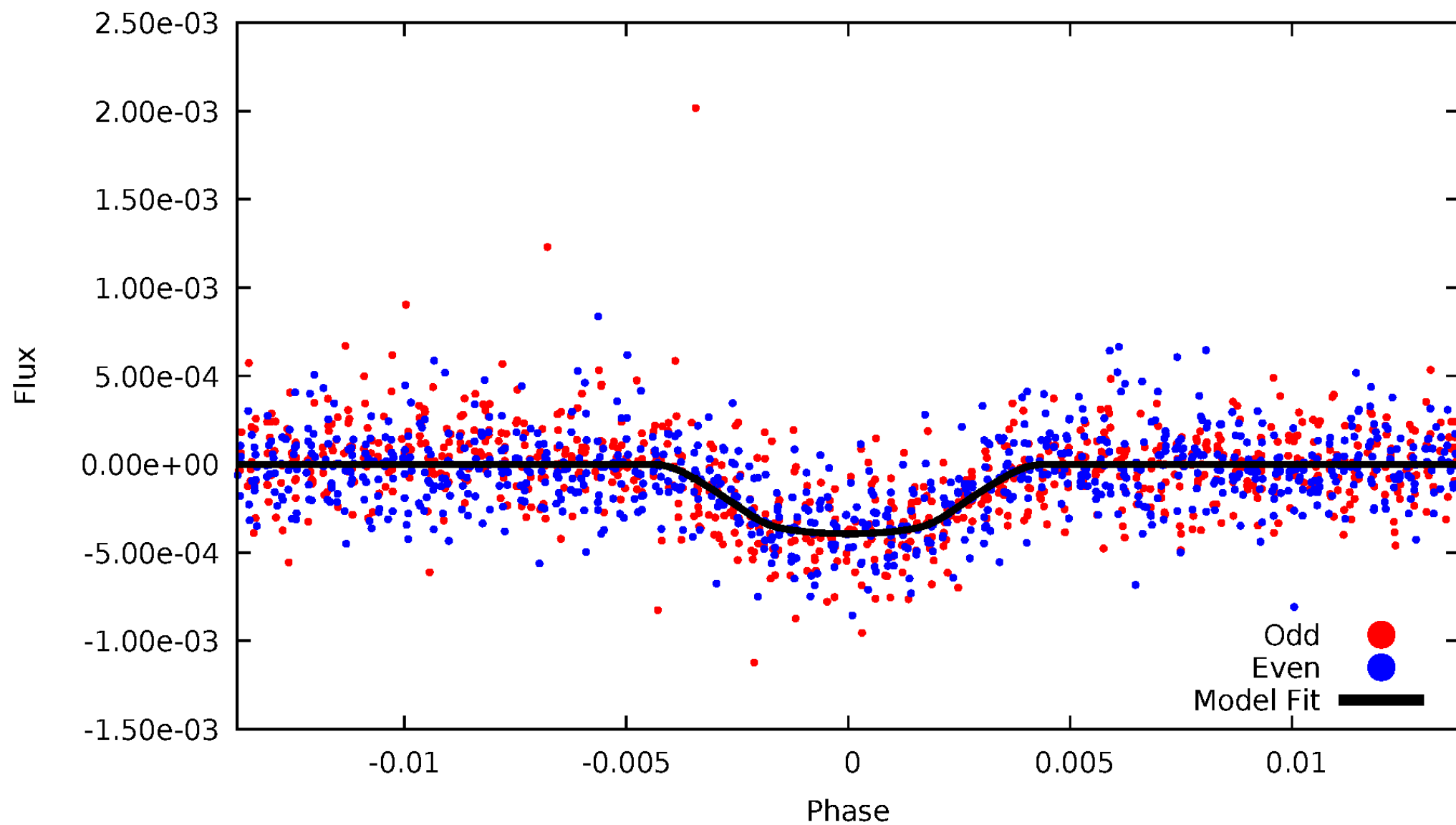


TCE 009412760-01



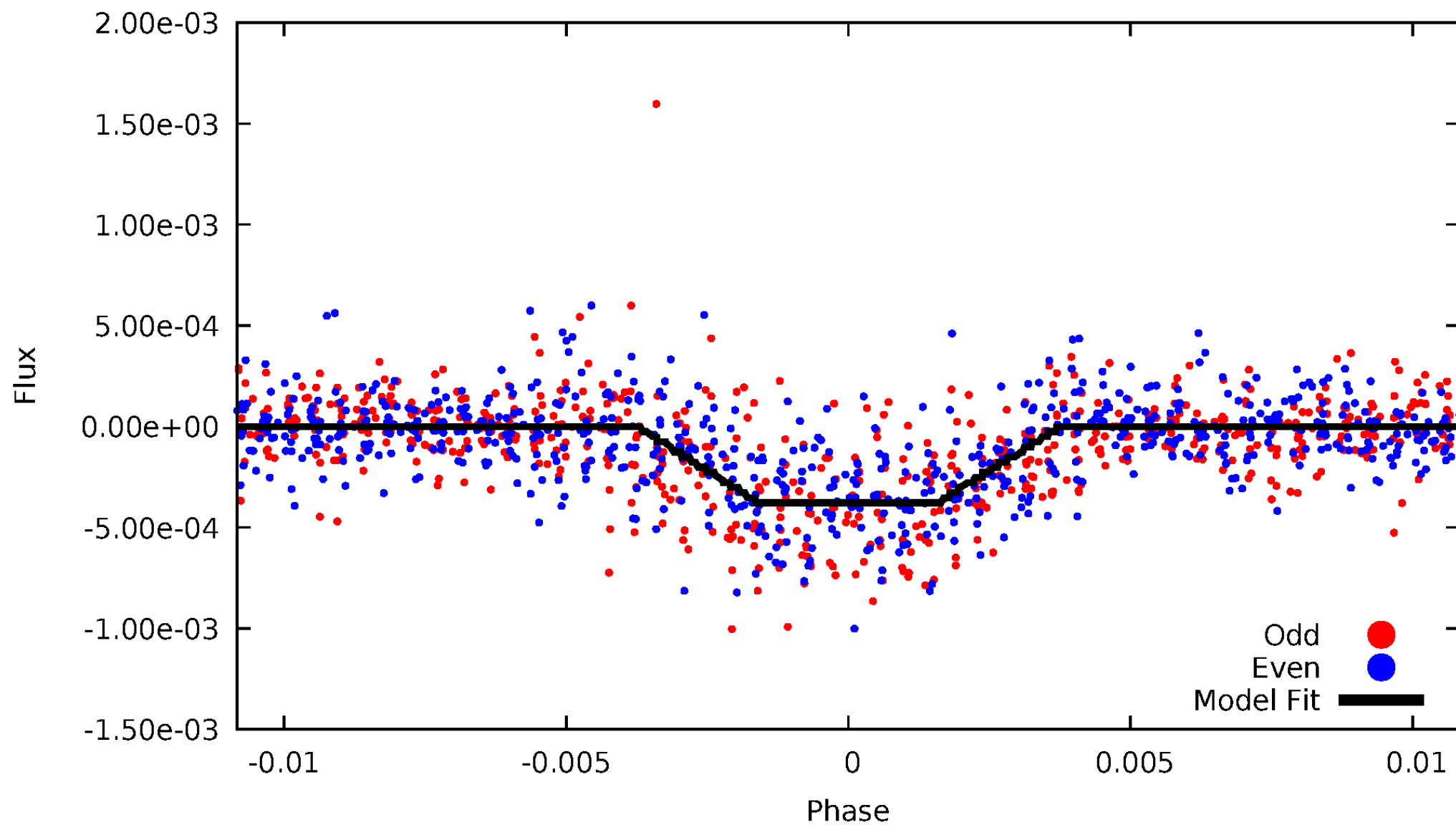
DV Odd/Even

TCE 009412760-01



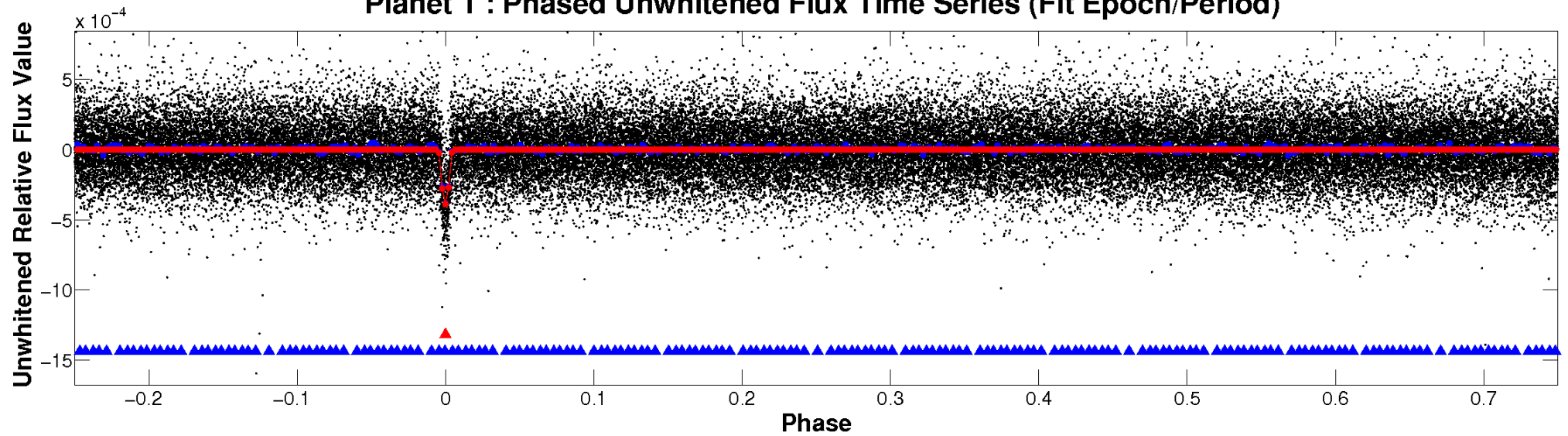
ALT Odd/Even

TCE 009412760-01

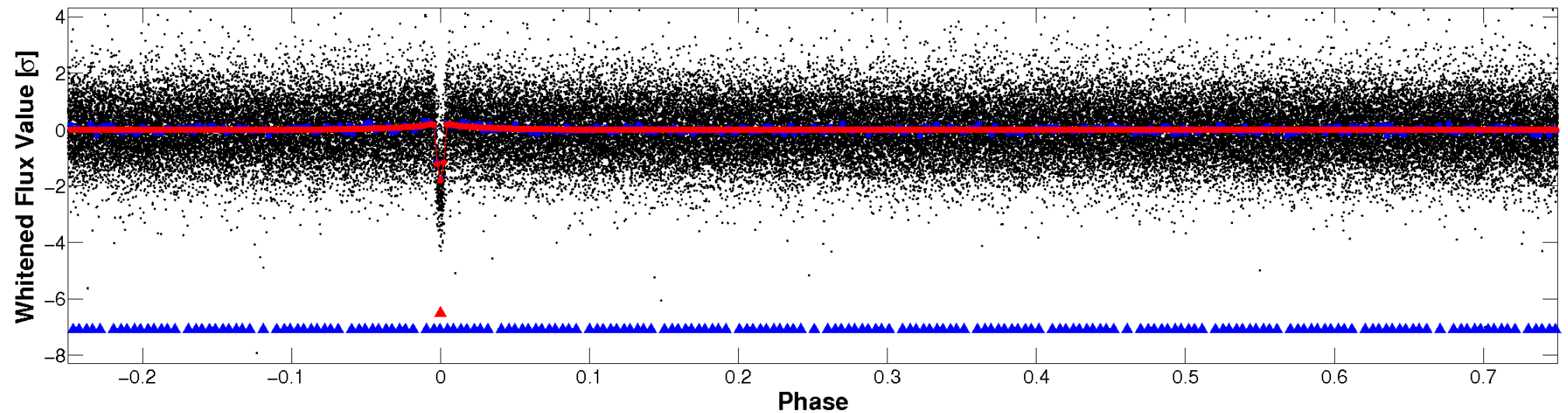


Non-Whitened Vs. Whitened Light Curve

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

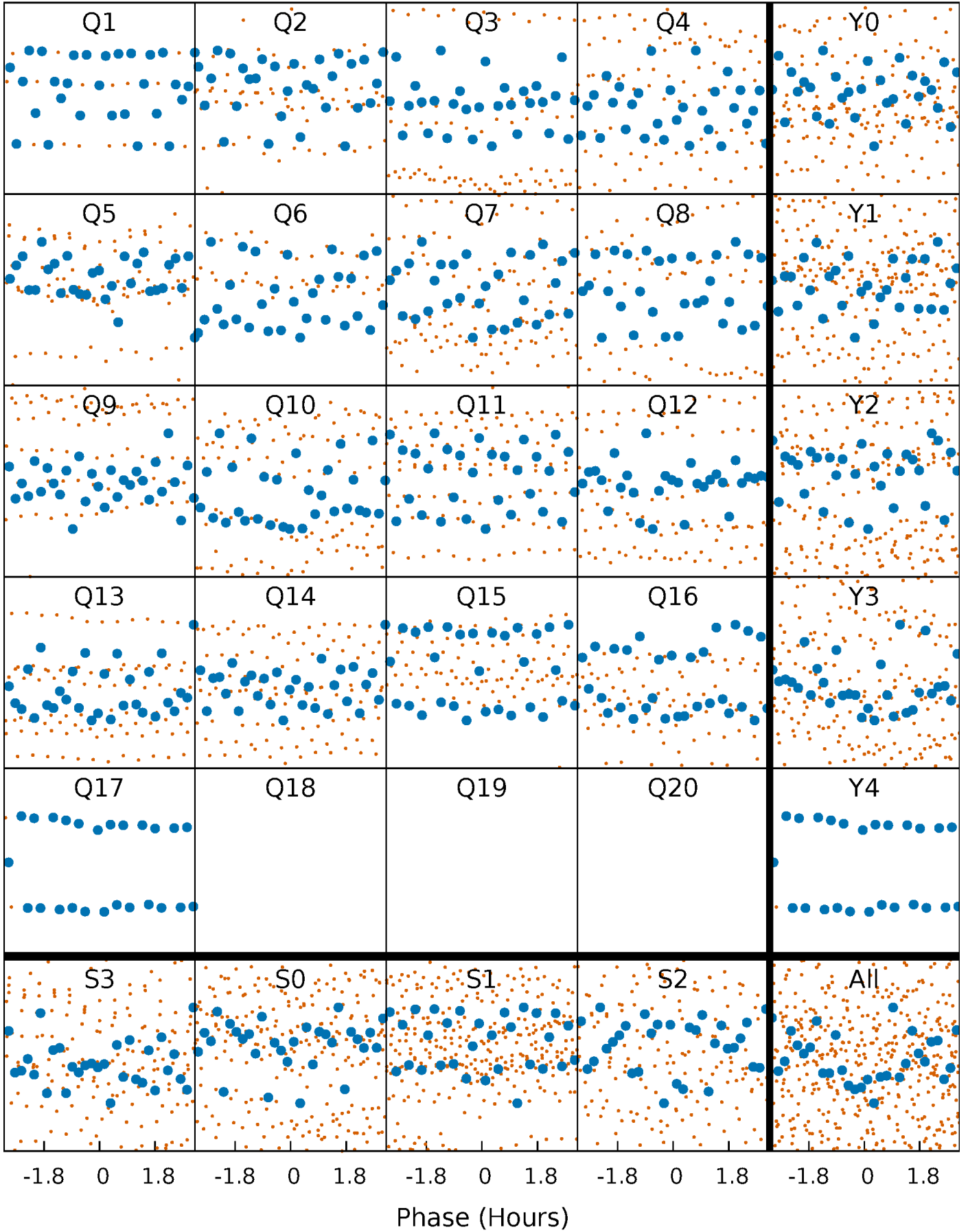


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



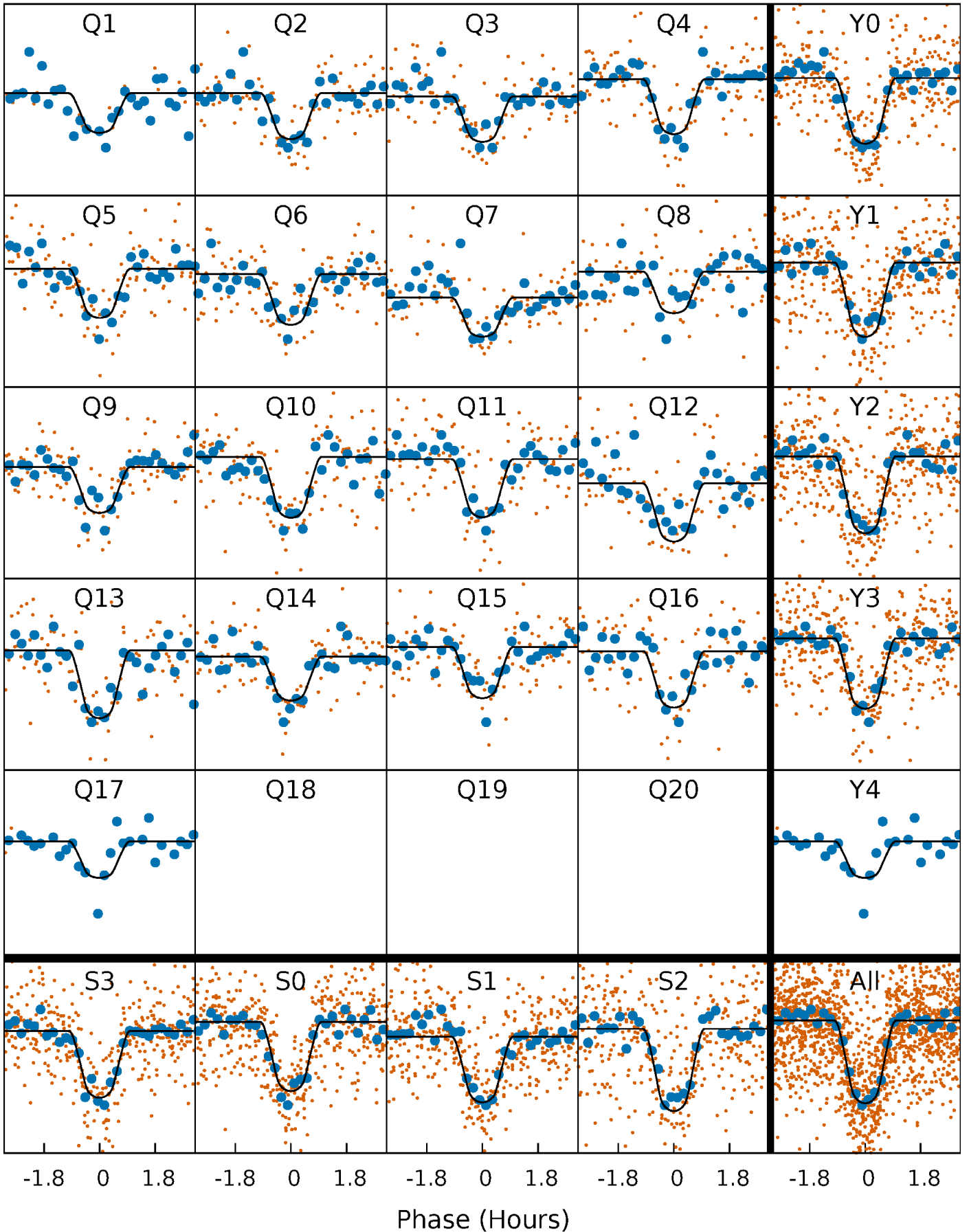
PDC Quarter-Phased Transit Curves

TCE 009412760-01 P= 9.387408 Days $T_0=137.383518$ (BKJD)



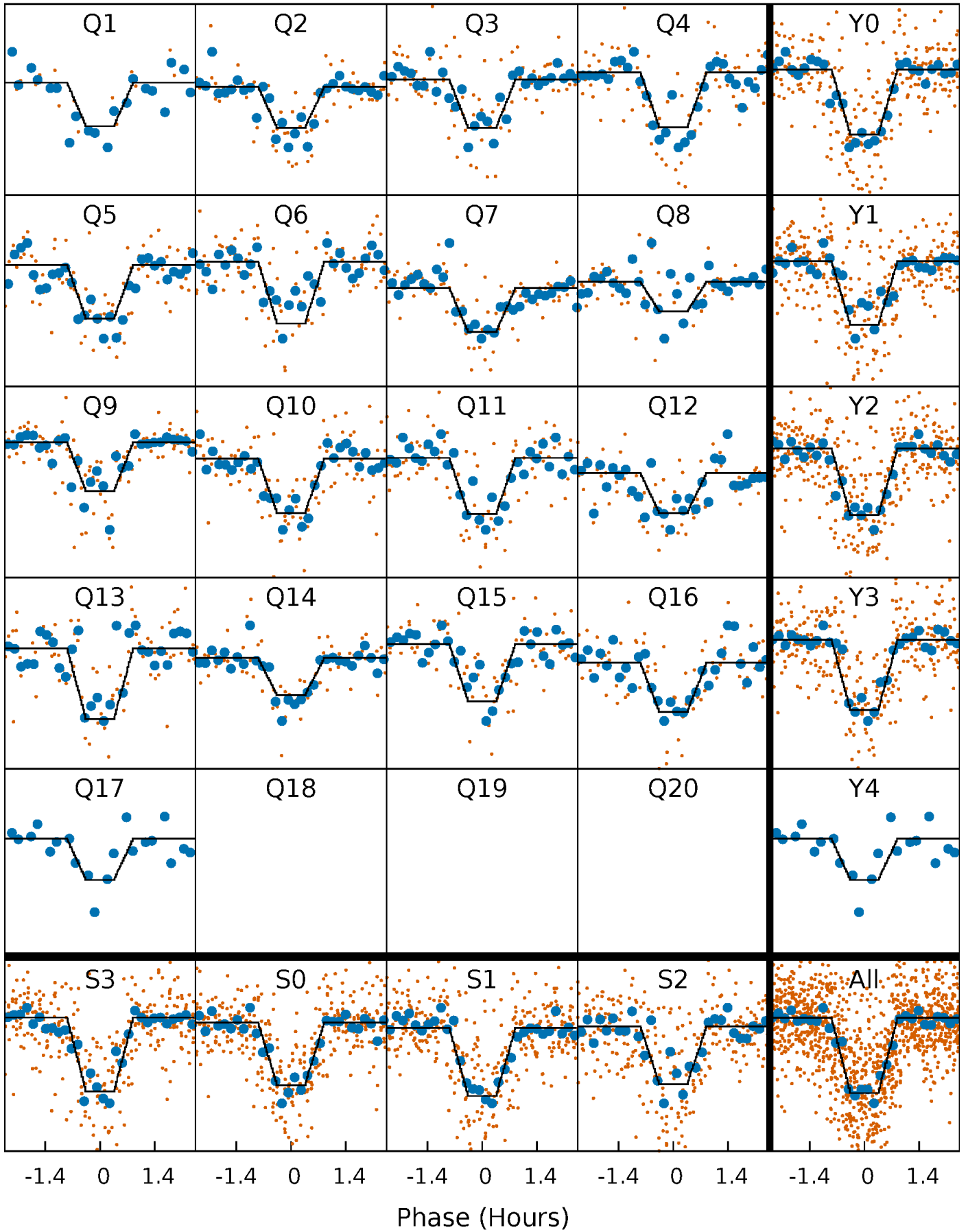
DV Quarter-Phased Transit Curves

TCE 009412760-01 P= 9.387408 Days $T_0=137.383518$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

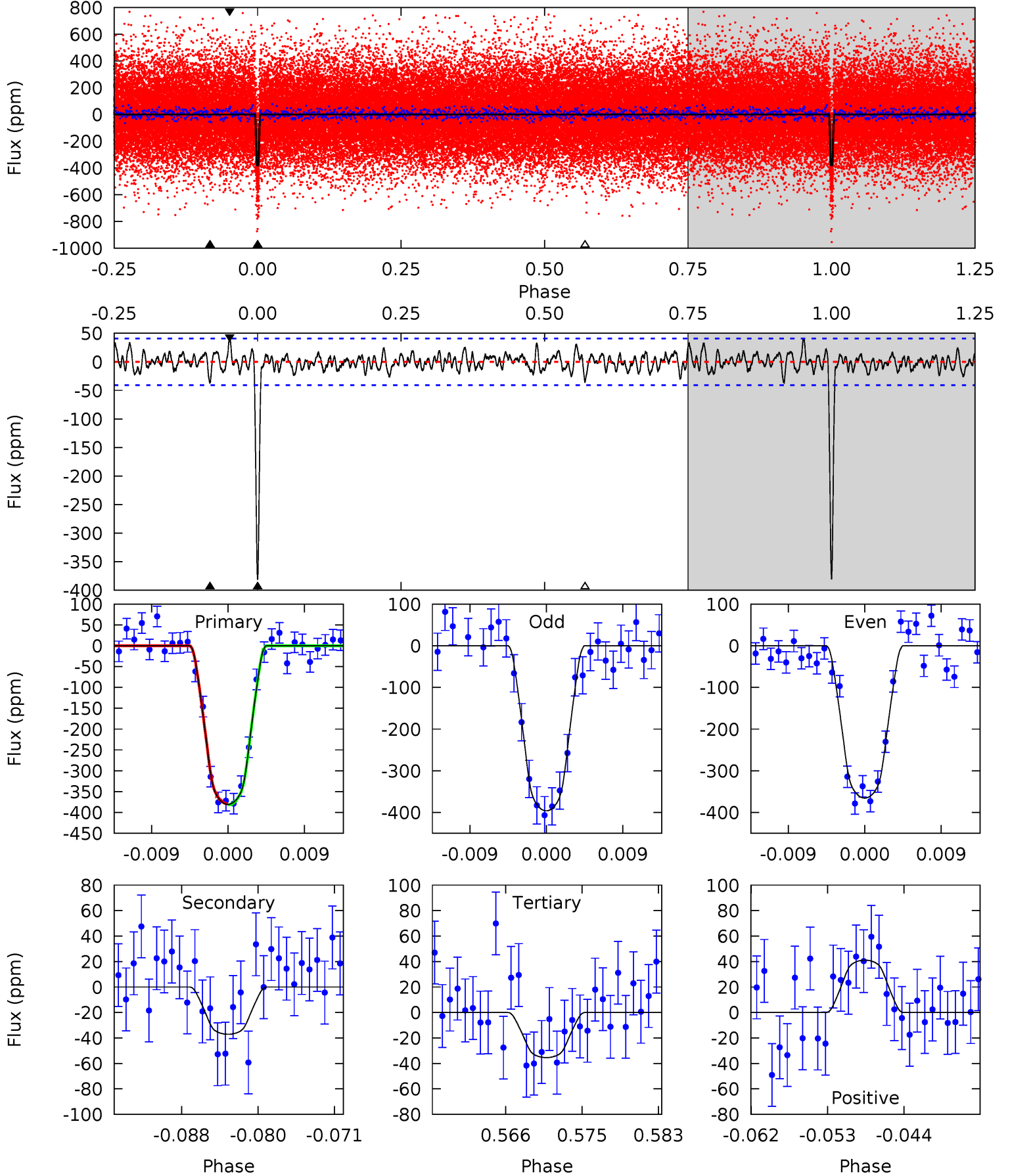
TCE 009412760-01 P= 9.387396 Days $T_0=137.383783$ (BKJD)



DV Model-Shift Uniqueness Test

009412760-01, P = 9.387408 Days, E = 127.996110 Days

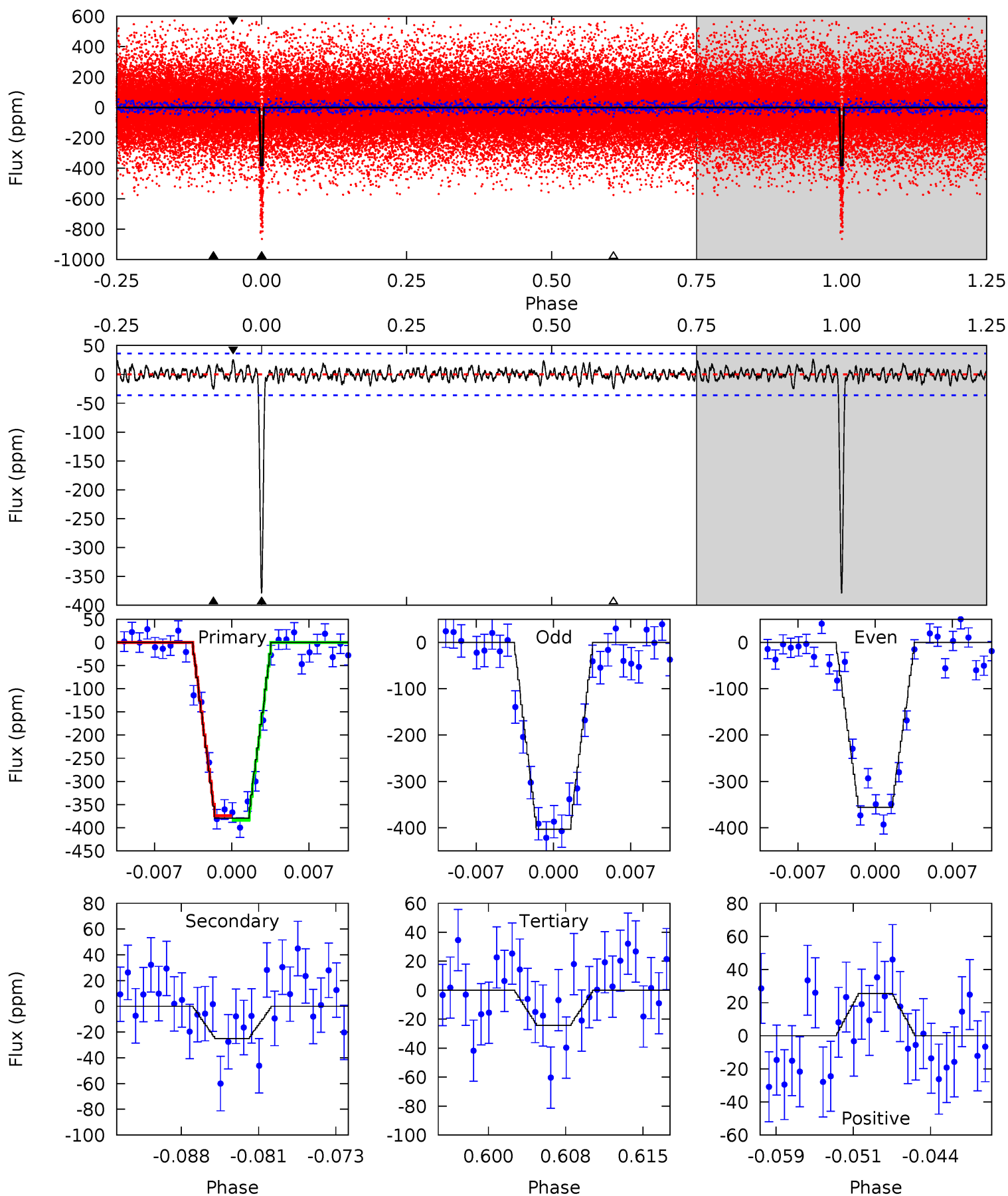
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
47.1	4.59	4.38	5.09	5.05	2.62	1.42	42.7	42.0	0.21	-0.49	1.90	0.98	0.10	0.14



Alt Model-Shift Uniqueness Test

009412760-01, P = 9.387396 Days, E = 127.996387 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
53.4	3.54	3.43	3.59	5.09	2.68	1.06	50.0	49.8	0.11	-0.05	3.36	0.98	0.06	0.69



Stellar Parameters For KIC 009412760

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	4500^{+90}_{-90}	$4.656^{+0.012}_{-0.045}$	$-0.020^{+0.150}_{-0.150}$	$0.646^{+0.046}_{-0.020}$	$0.710^{+0.029}_{-0.043}$	$3.719^{+0.193}_{-0.641}$
	+2%/-2%	+0%/-1%	+750%/-750%	+7%/-3%	+4%/-6%	+5%/-17%
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 009412760-01 / KOI 1977.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	A_{obs}
DV	-37 ± 8	$1.68^{+0.33}_{-0.33}$	811^{+18}_{-19}	2906^{+217}_{-173}	44^{+28}_{-16}
Alt.	-25 ± 7	$1.39^{+0.33}_{-0.34}$	811^{+19}_{-20}	2908^{+255}_{-215}	43^{+35}_{-18}

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

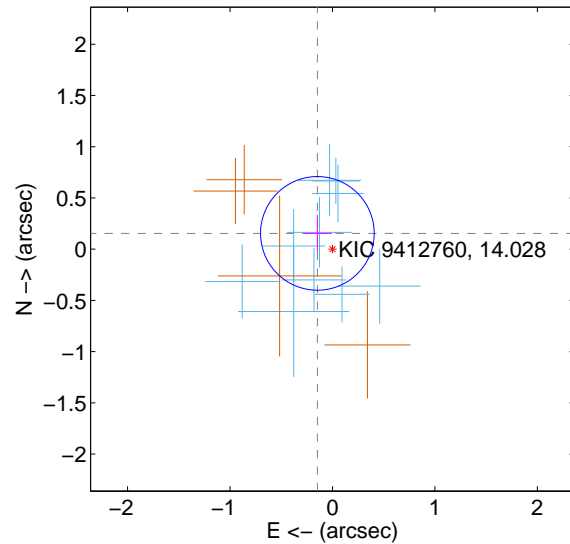
Supplemental centroid analysis for 009412760-01. Kepler magnitude: 14.03. Transit SNR 29.65

There are 10 quarters with good PRF difference image offsets

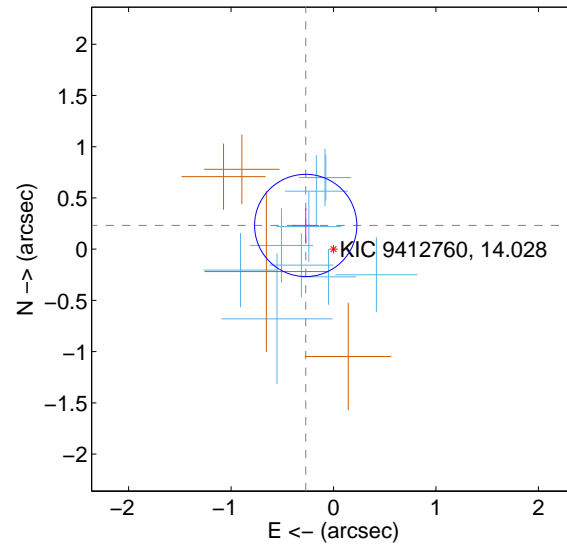
The direct PRF centroid is offset from the target star catalog position by about 0.15 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.213 ± 0.185	1.15	0.147 ± 0.140	0.154 ± 0.179
PRF-fit source offset from KIC position	0.357 ± 0.166	2.15	0.271 ± 0.128	0.232 ± 0.171
photometric centroid source offset	0.57 ± 0.46	1.24	0.02 ± 0.32	-0.57 ± 0.46

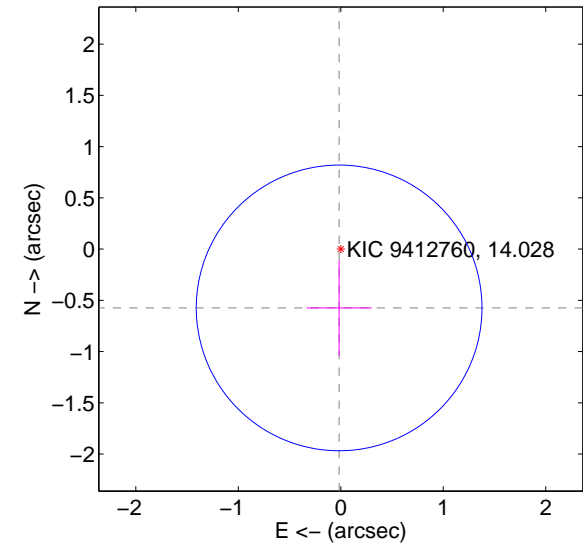
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

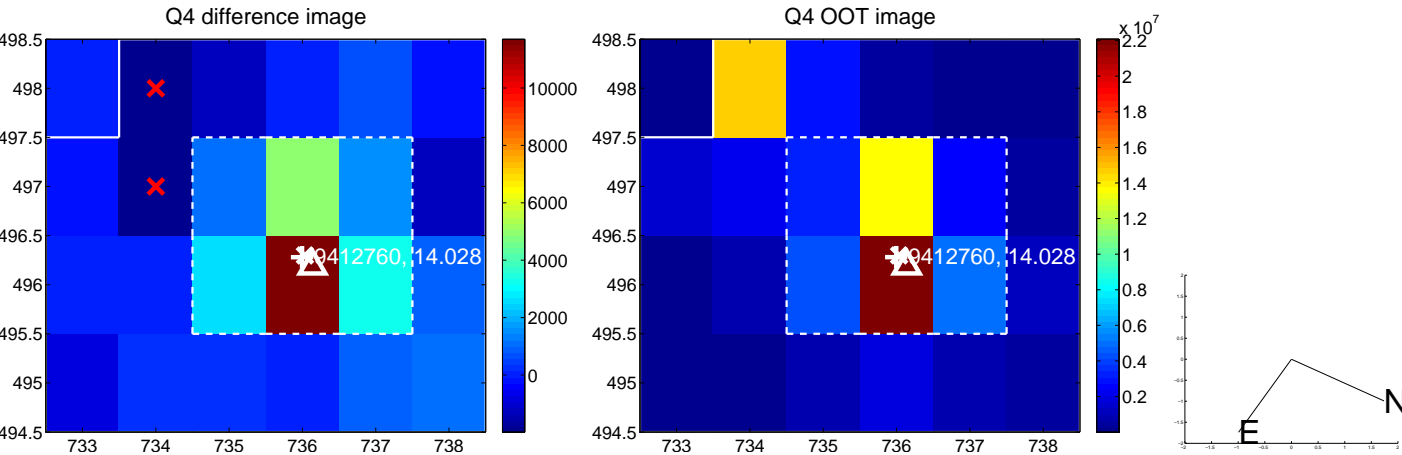
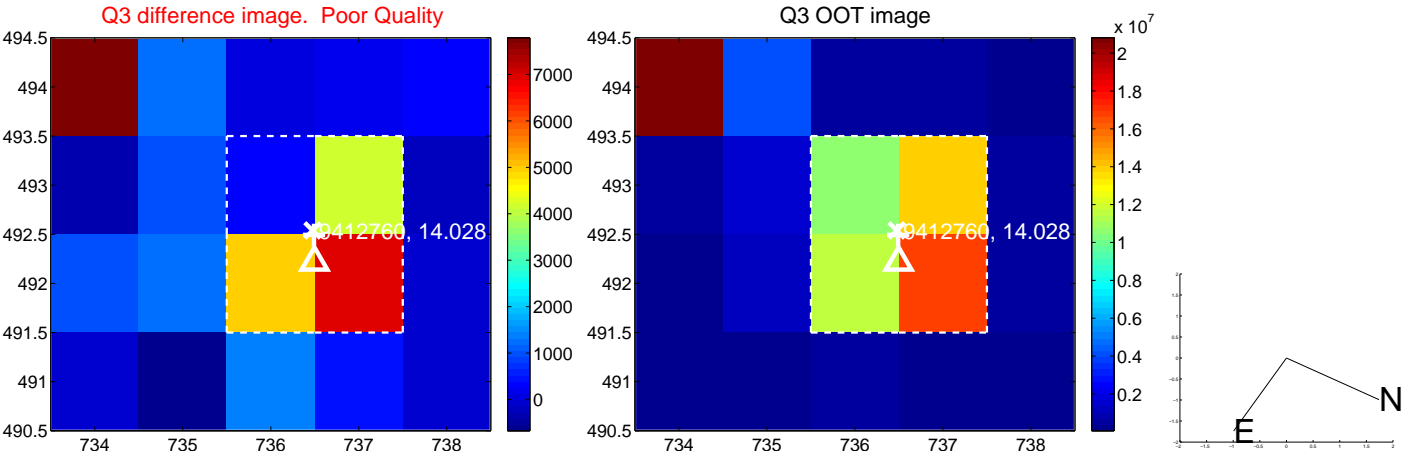
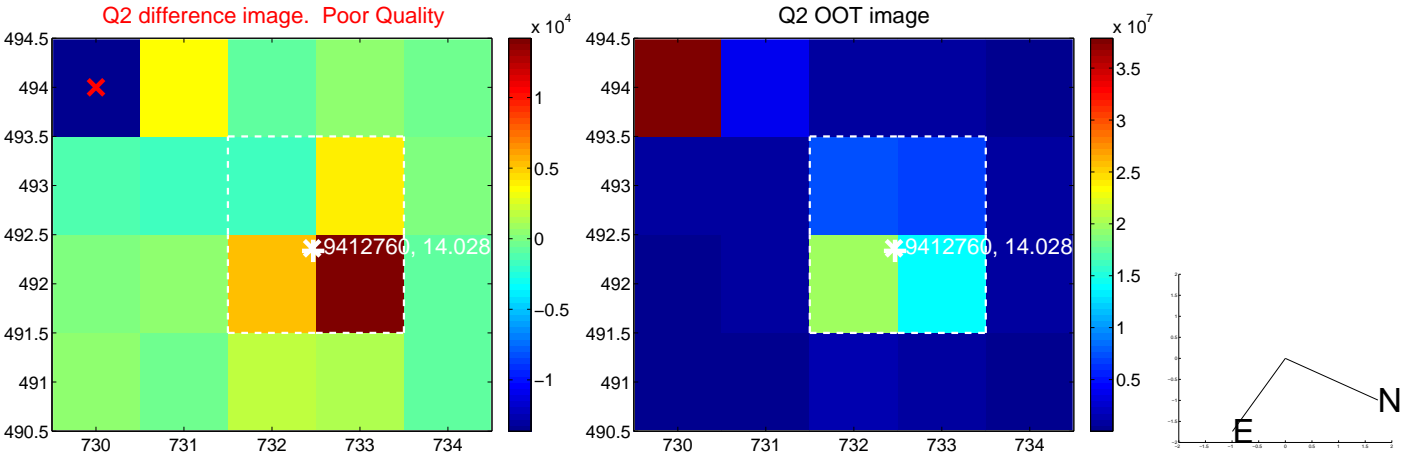
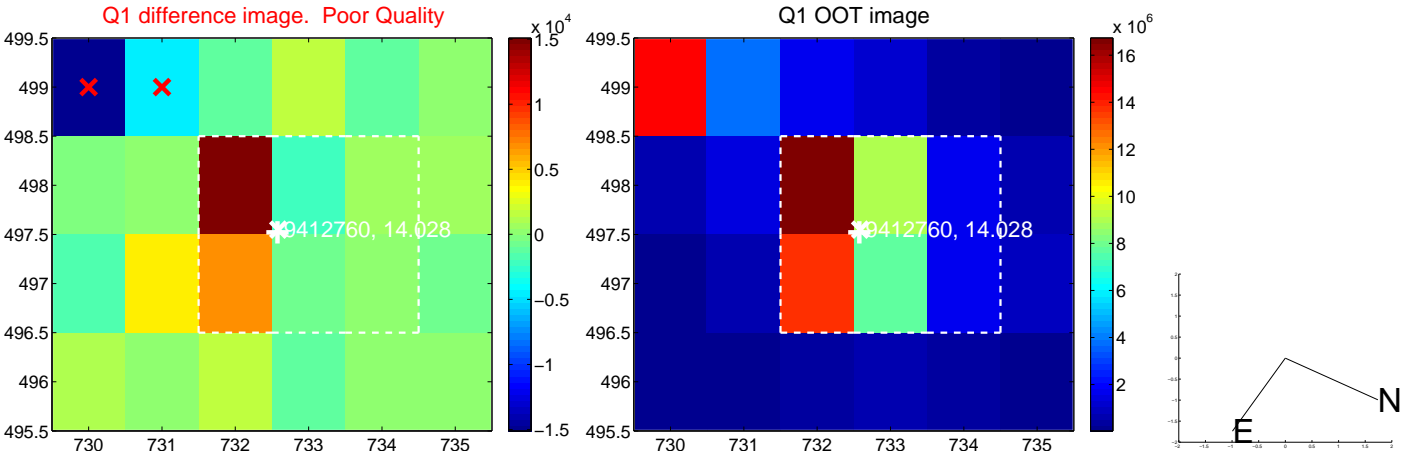


offset from photometric centroids

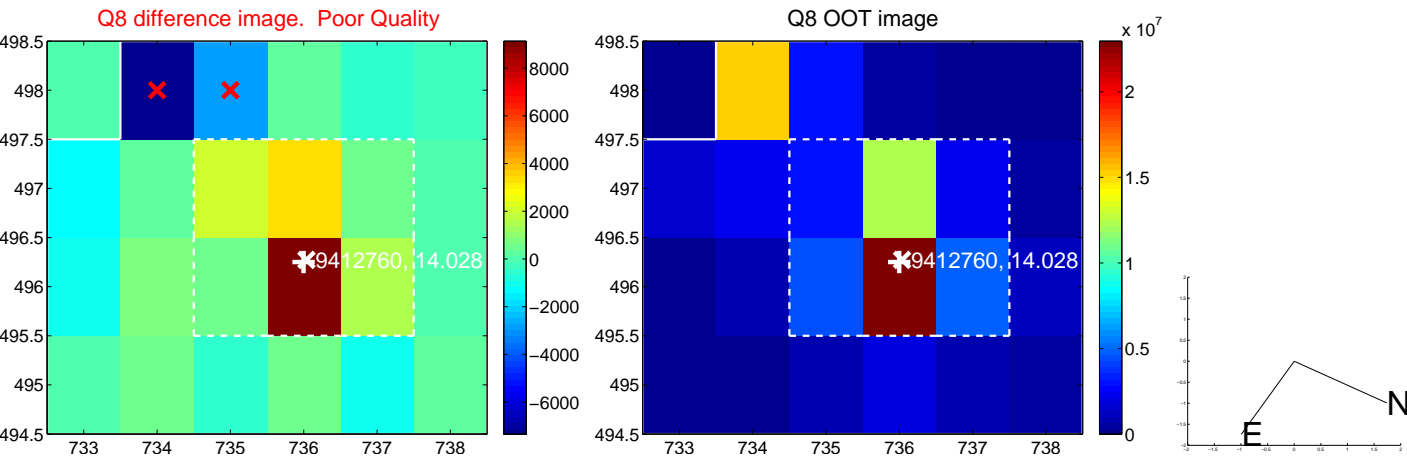
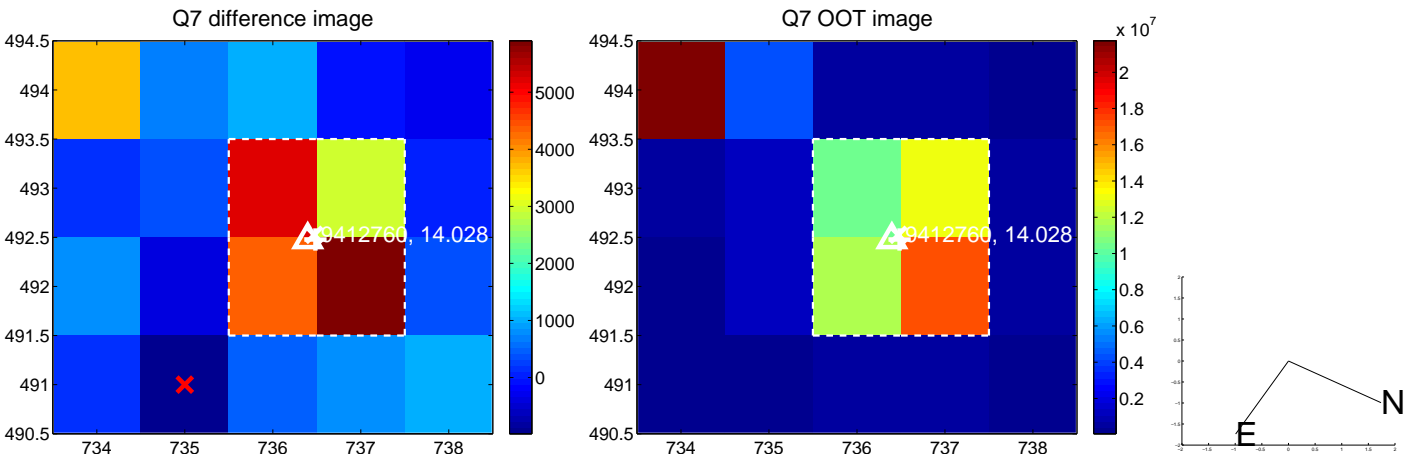
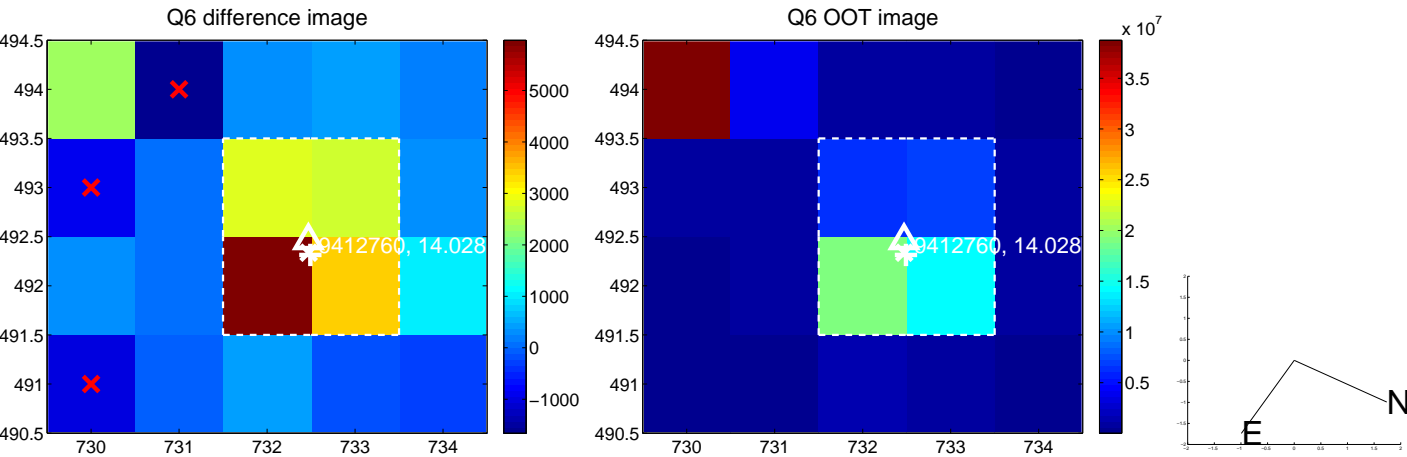
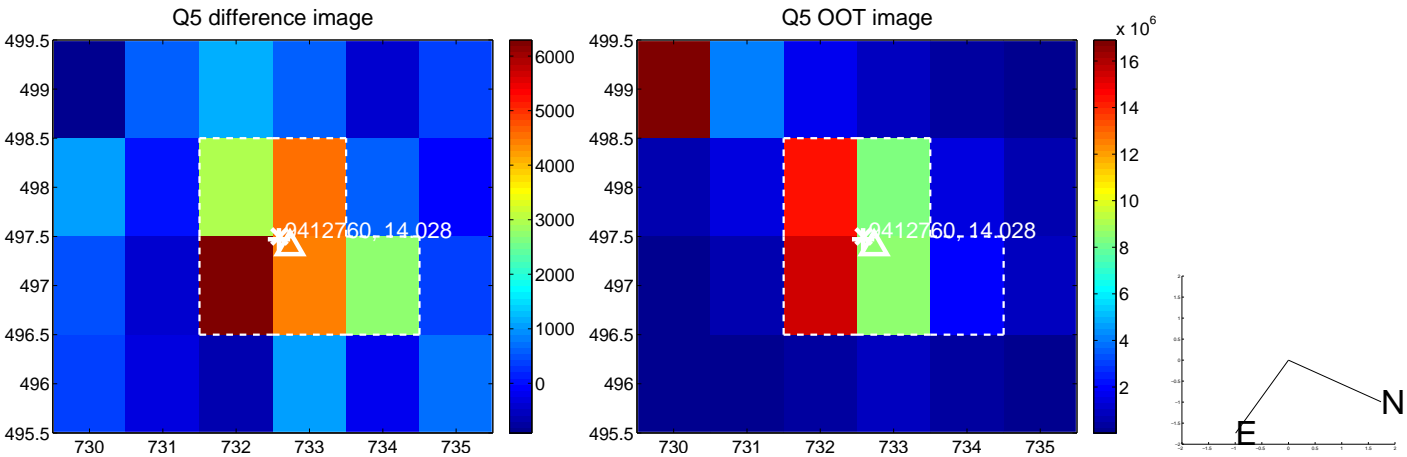


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

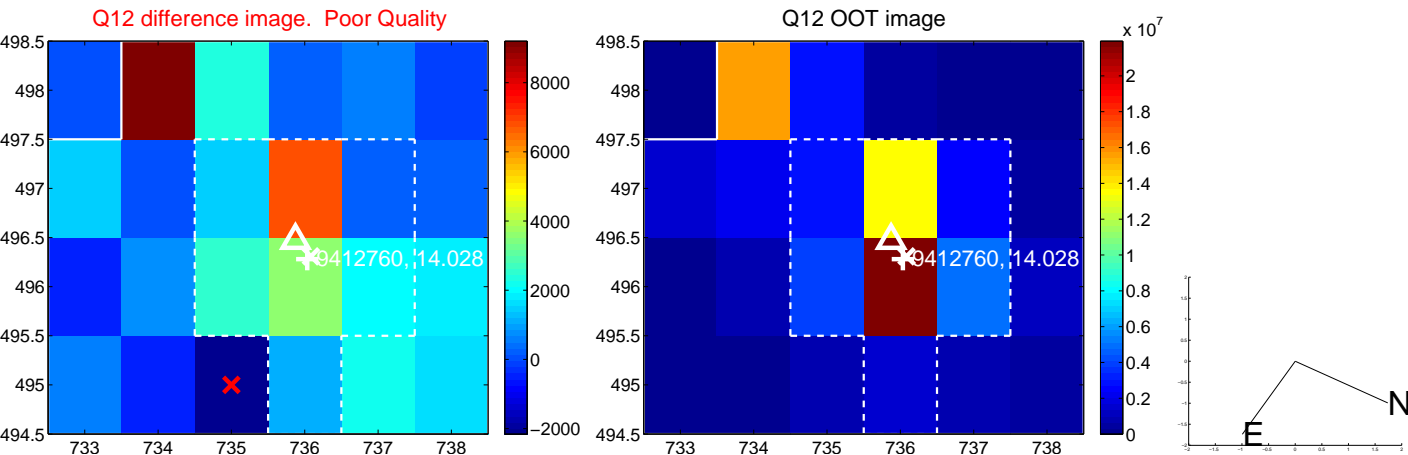
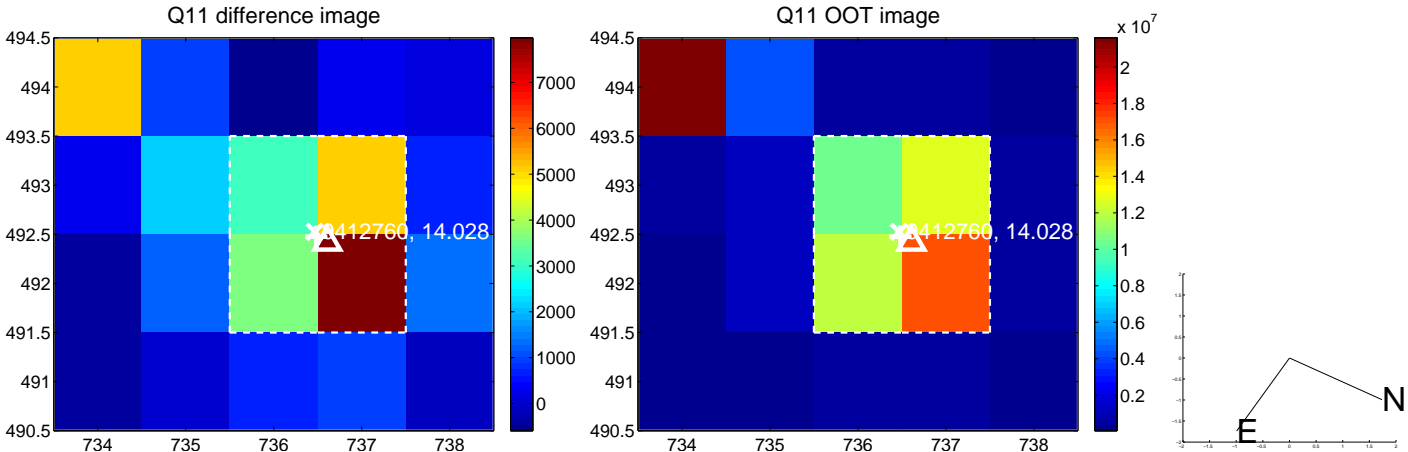
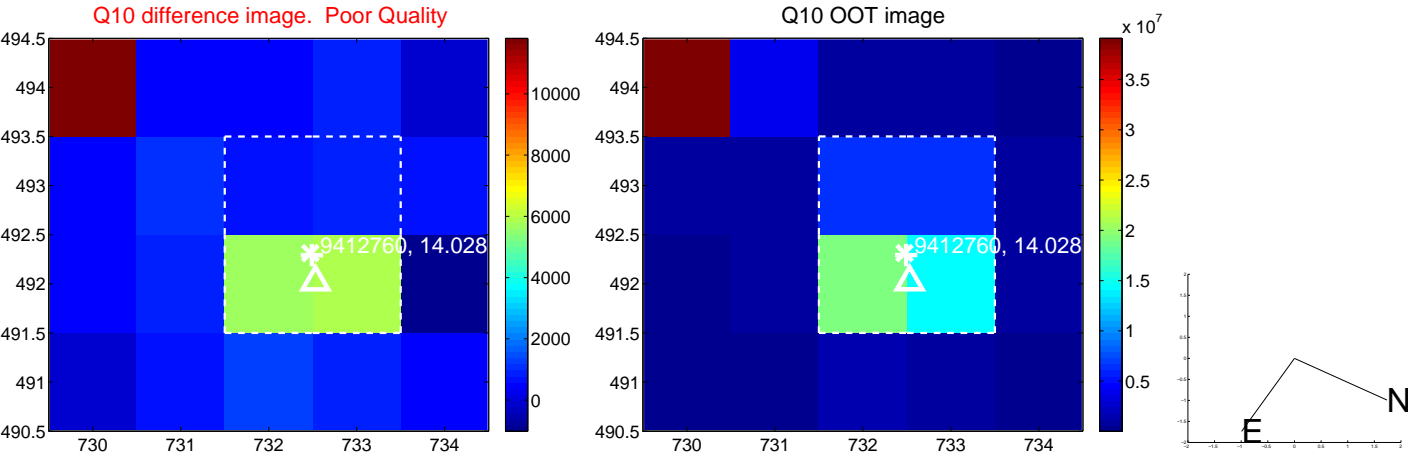
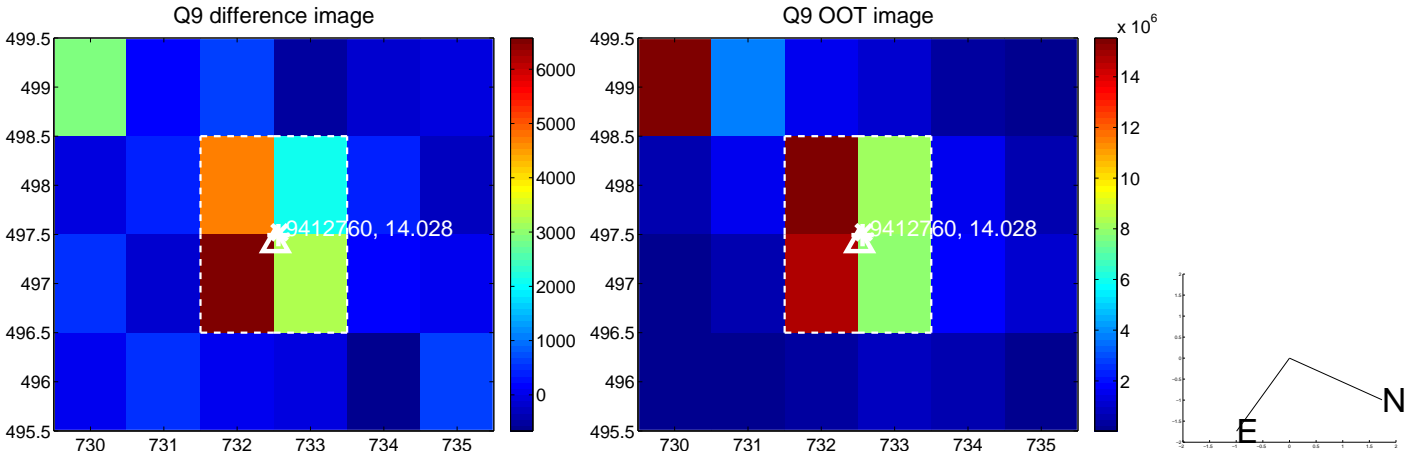
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



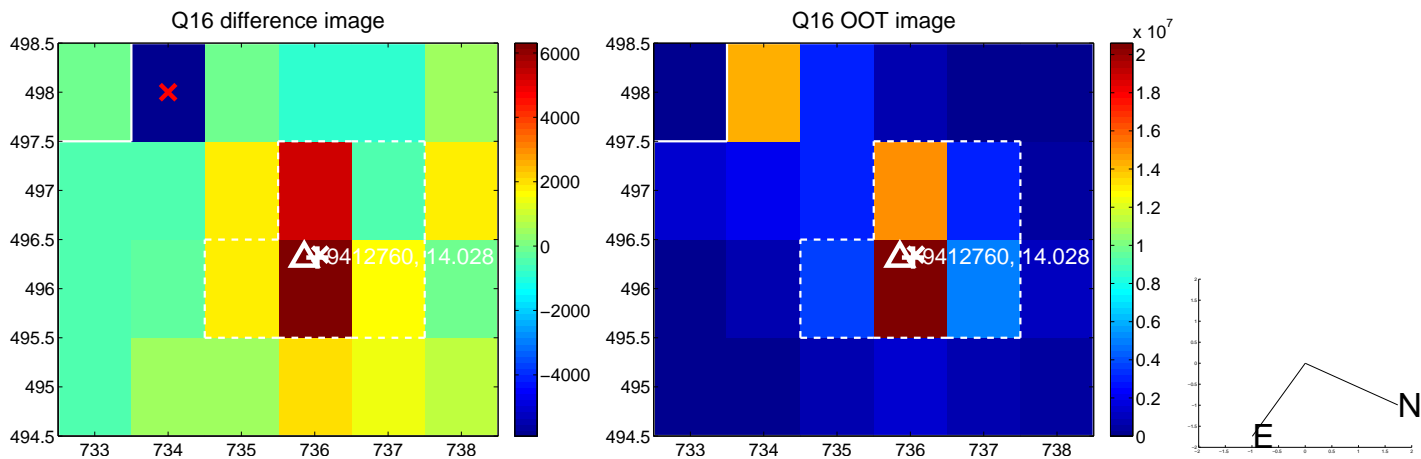
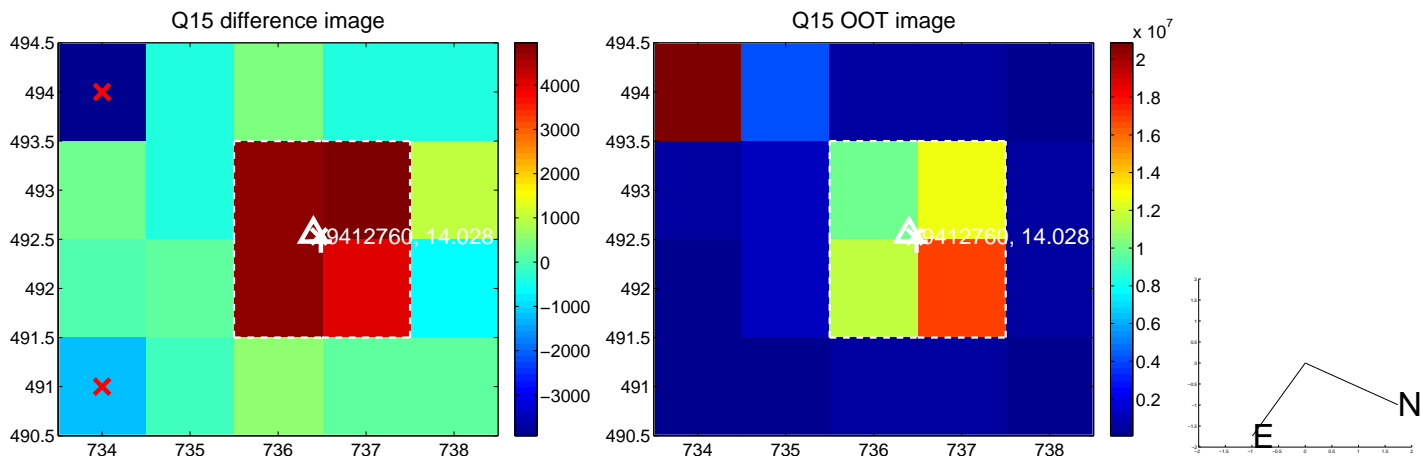
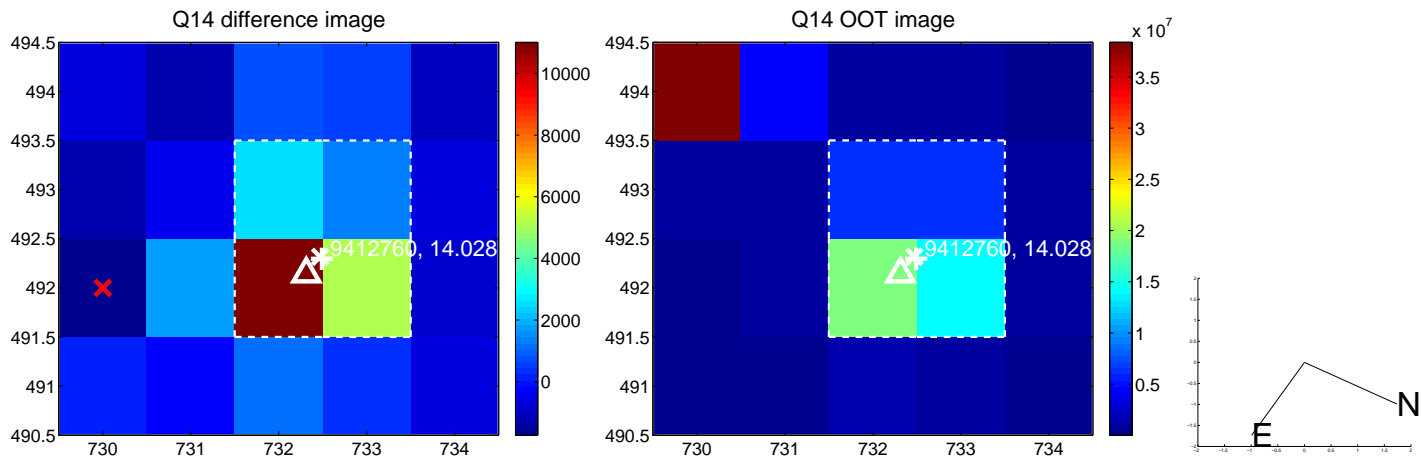
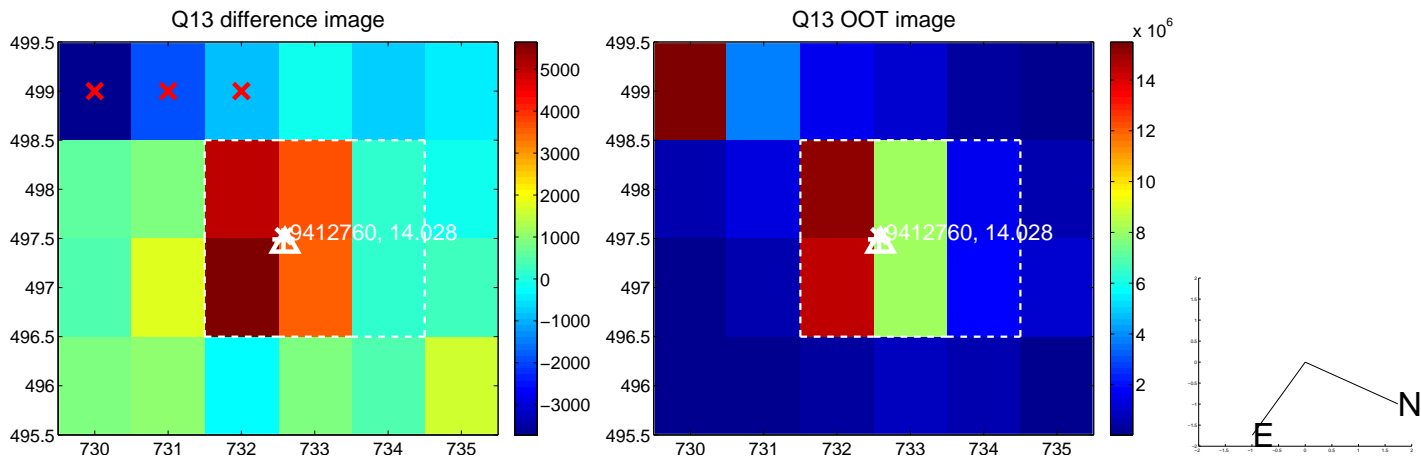
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



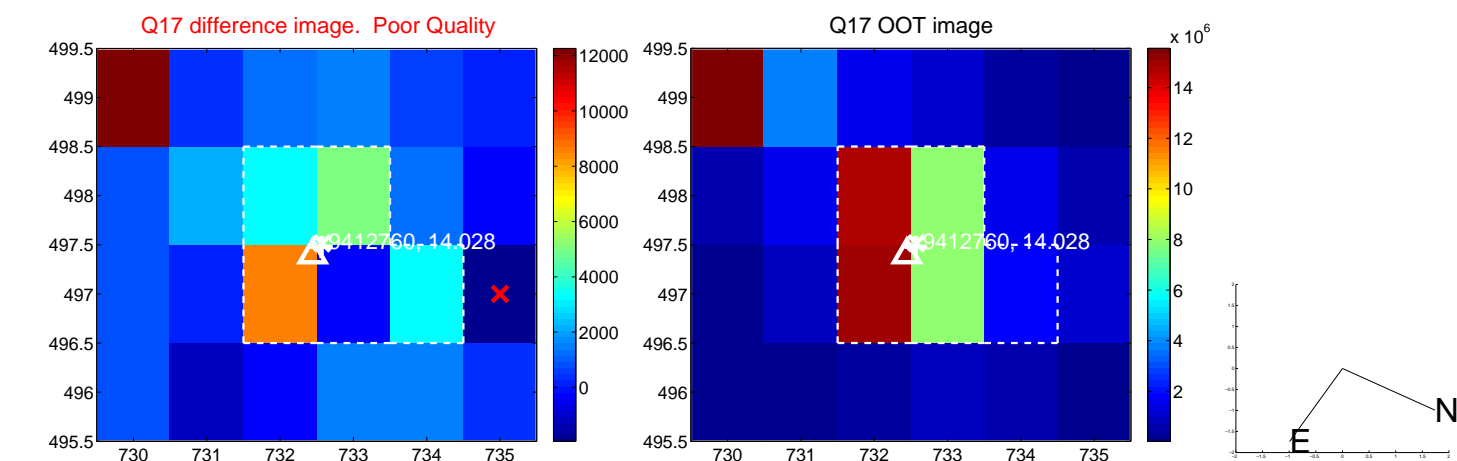
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



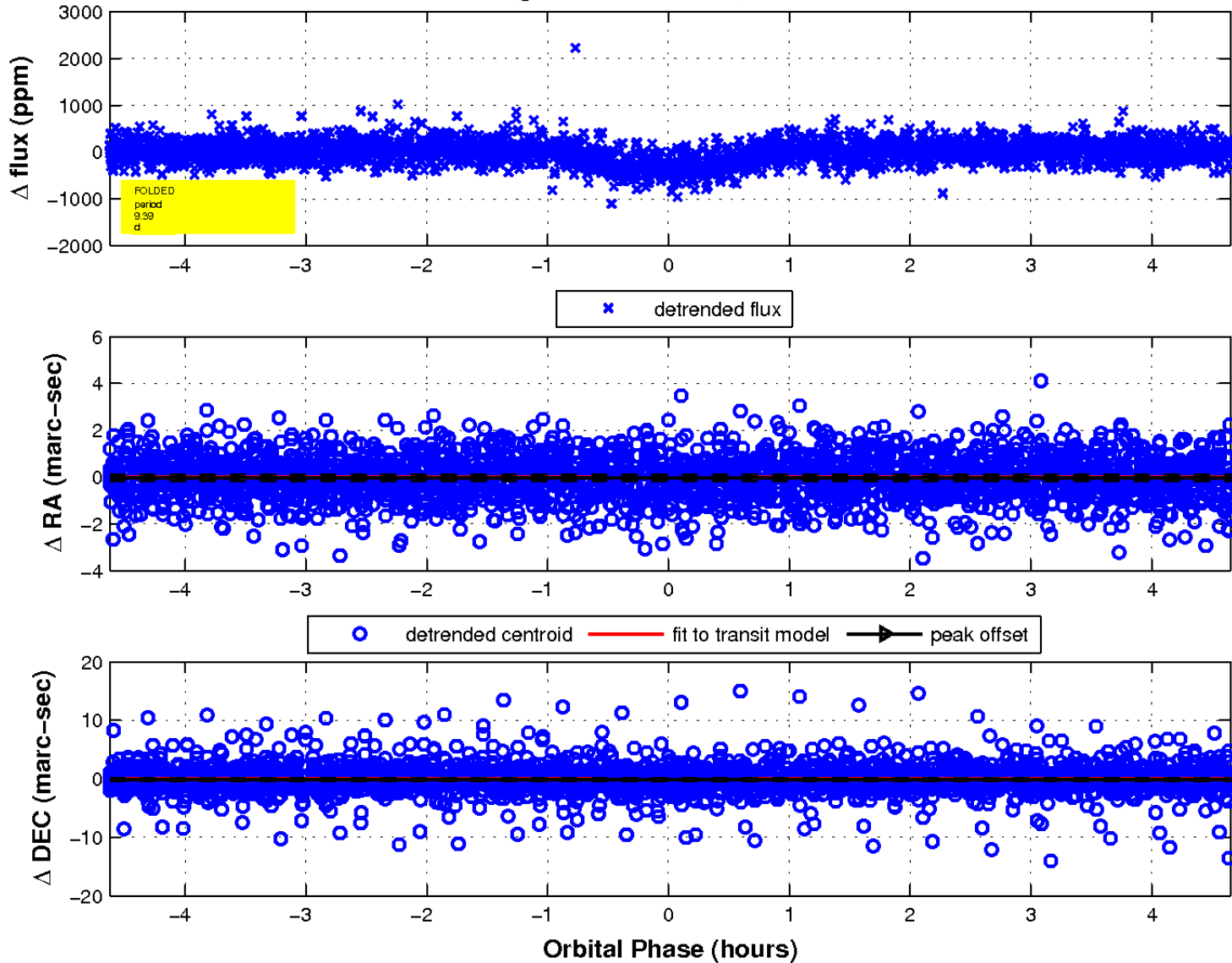
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

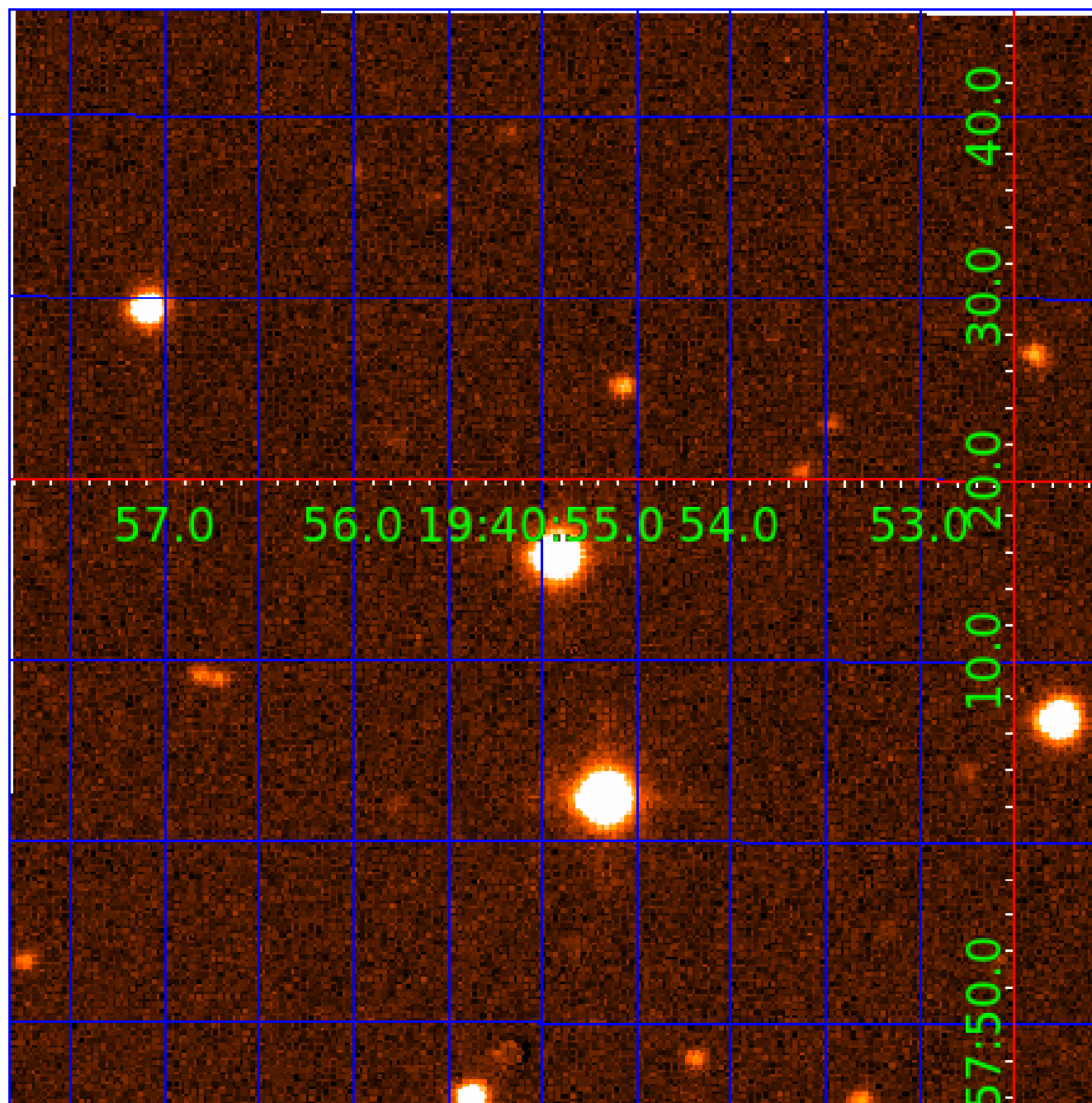


fluxWeightedCentroids, Planet 1 of 2



UKIRT Image

Declination



KIC 009412760

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})
009412760-01	OBS	1977.01	9.387408	137.383518	393.5	1.551	25.3	29.7	0.65	4500	1.63	25.89
009412760-02	OBS	1977.02	7.415572	137.814994	133.1	1.897	11.4	12.4	0.65	4500	0.92	35.46

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009412760-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
009412760-02	OBS	PC	1.00	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.

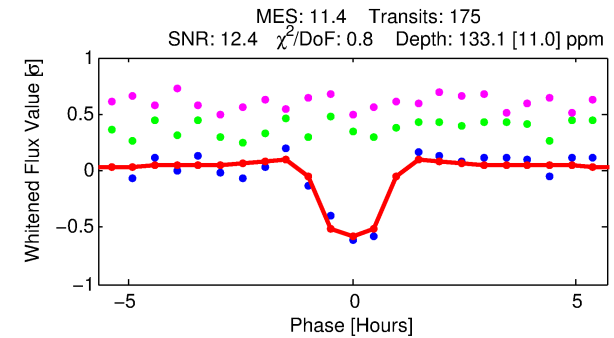
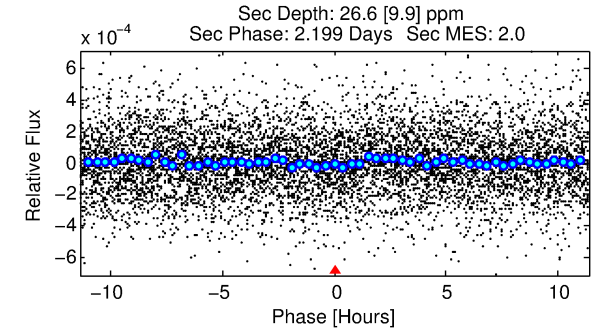
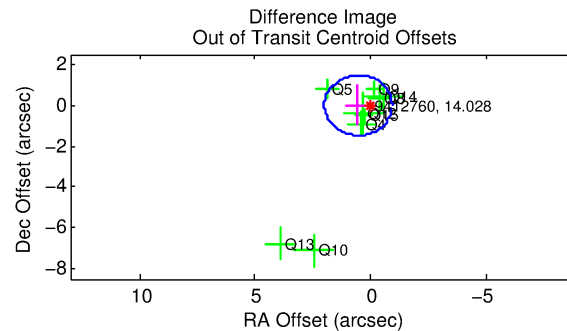
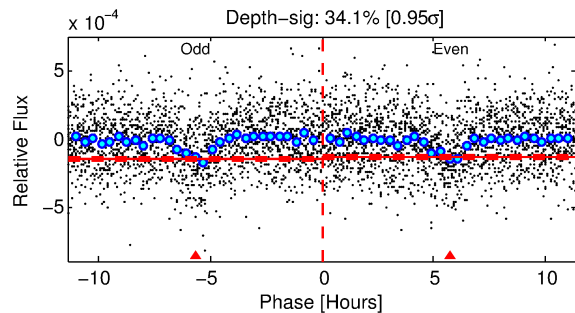
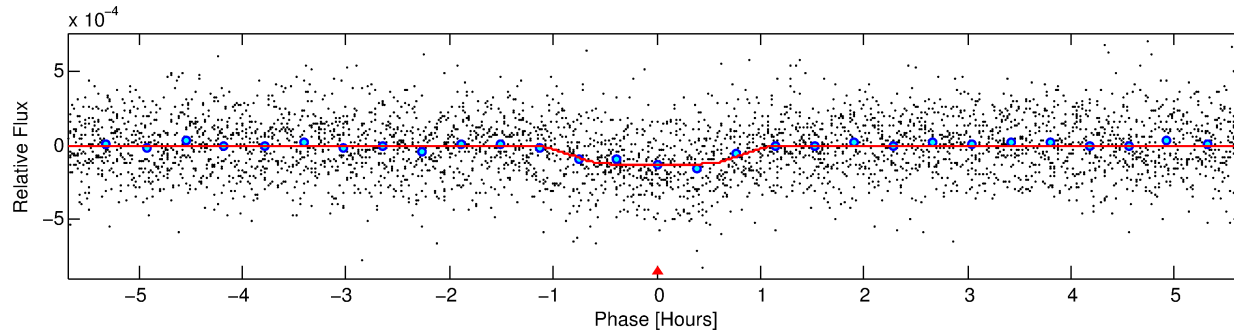
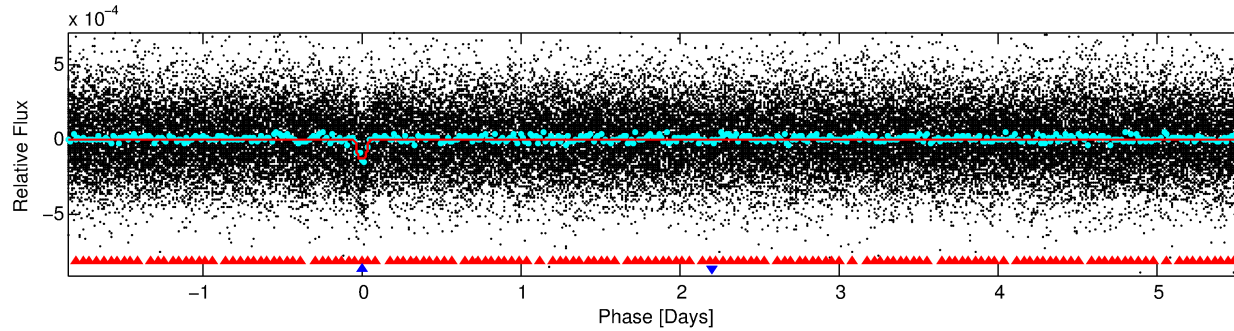
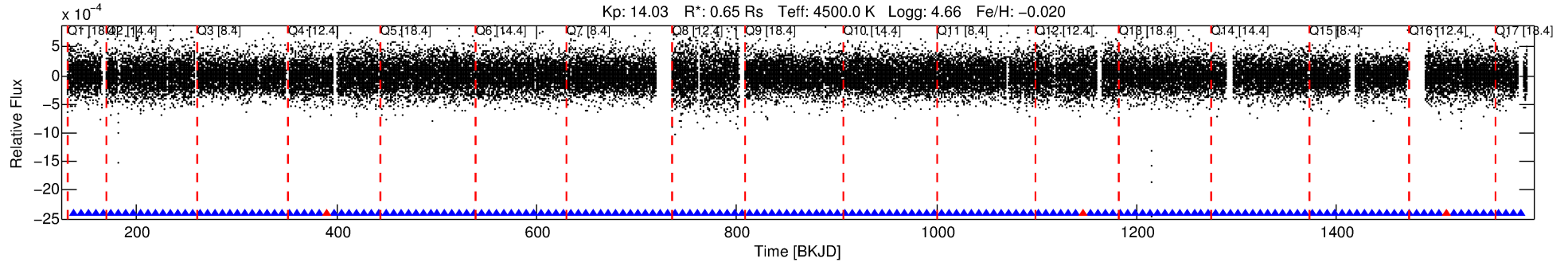
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009412760-02

No Significant Match Found

DV One-Page Summary

KIC: 9412760 Candidate: 2 of 2 Period: 7.416 d
KOI: K01977.02 Name: Kepler-345b Corr: 0.955



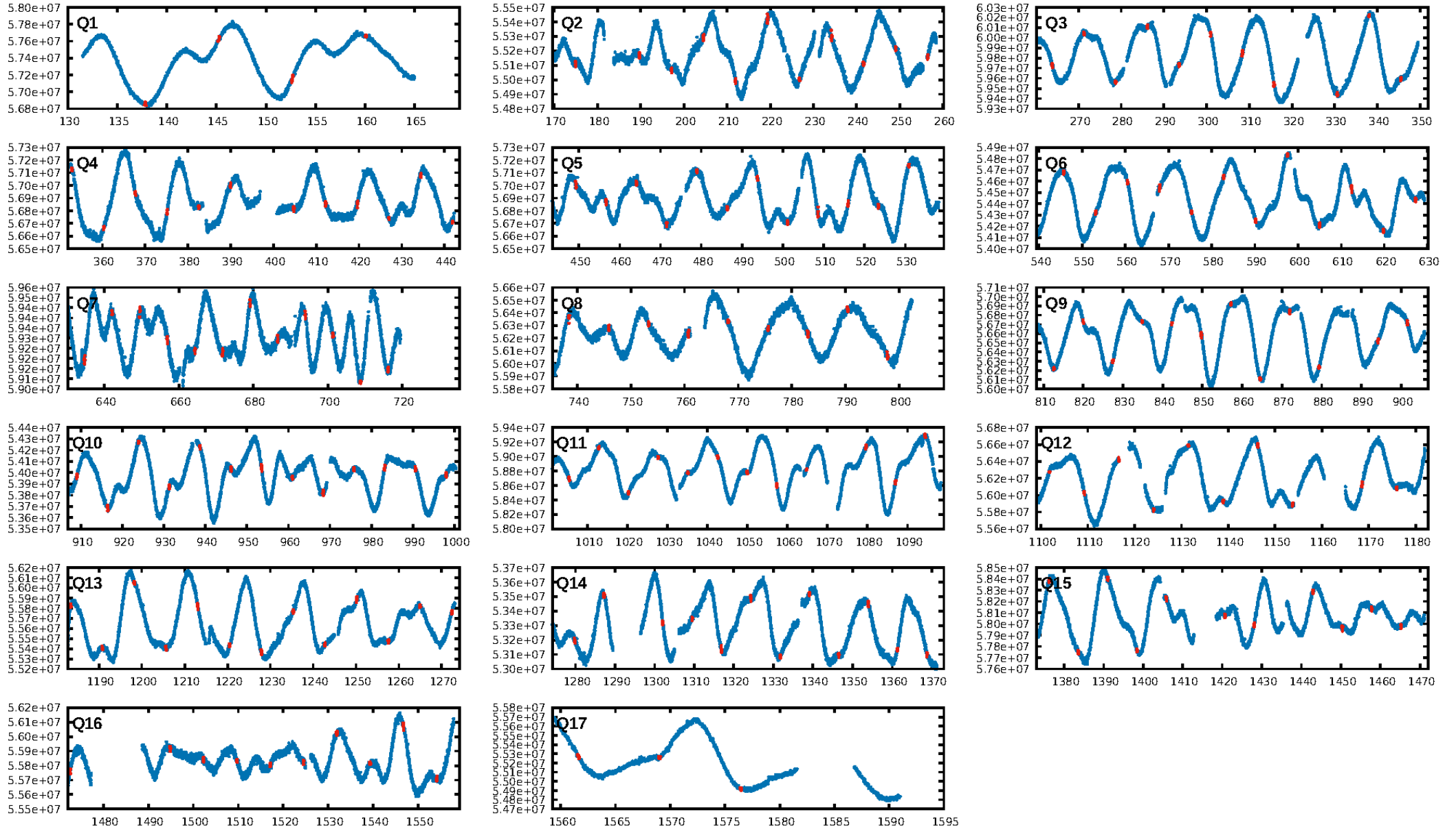
DV Fit Results:

Period = 7.41557 [0.00003] d
Epoch = 137.8150 [0.0032] BKJD
Rp/R* = 0.0131 [0.0094]
a/R* = 13.89 [37.14]
b = 0.90 [0.59]
Seff = 35.46 [4.11]
Teq = 622 [18] K
Rp = 0.92 [0.67] Re
a = 0.0658 [0.0039] AU
Ag = 74.35 [110.96] [0.66 σ]
Teffp = 2825 [1054] K [2.09 σ]

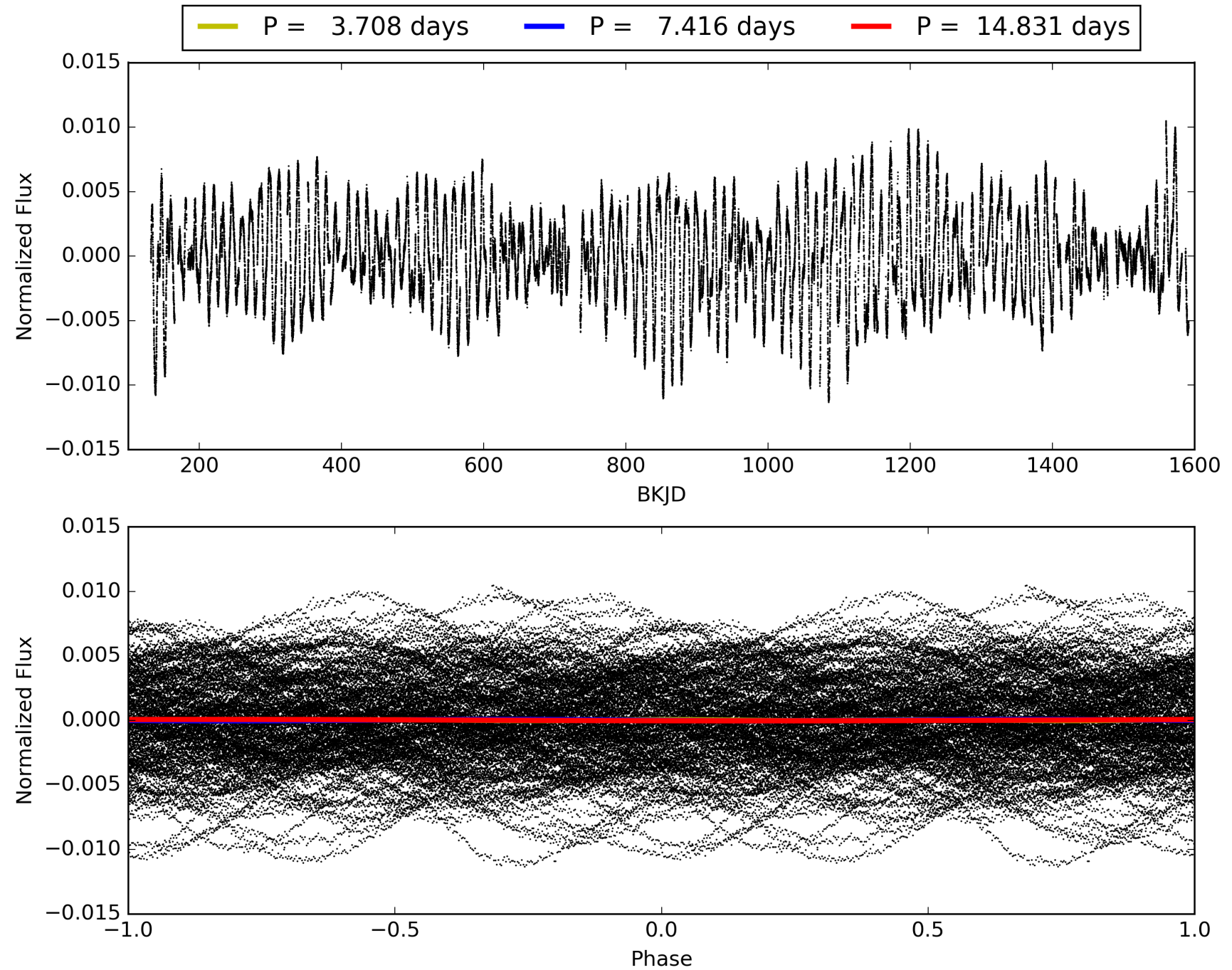
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 100.0% [19.31 σ]
ModelChiSquare2-sig: 98.9%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 4.66e-29
RollingBand-fgt: 0.98 [165/168]
GhostDiagnostic-chr: -6.949
Centroid-sig: 28.9%
Centroid-so: 1.480 arcsec [1.46 σ]
OotOffset-rm: 0.550 arcsec [1.13 σ]
OotOffset-st: 2/1/3/3 [9]
KicOffset-rm: 0.681 arcsec [1.57 σ]
KicOffset-st: 2/1/3/3 [9]
DiffImageQuality-fgm: 0.67 [6/9]
DiffImageOverlap-fno: 1.00 [17/17]

TCE 009412760-02, PDC Light Curves

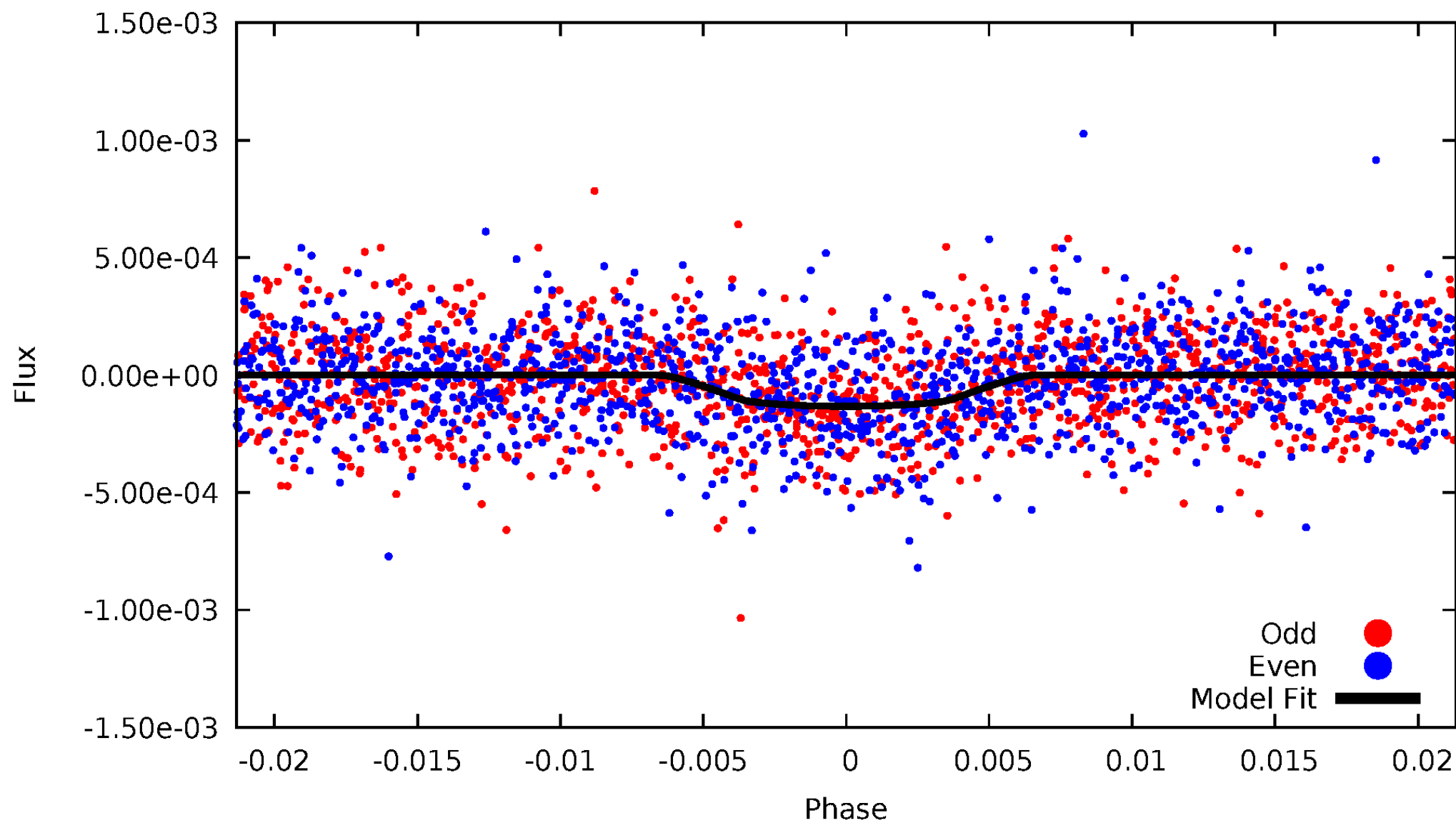


TCE 009412760-02



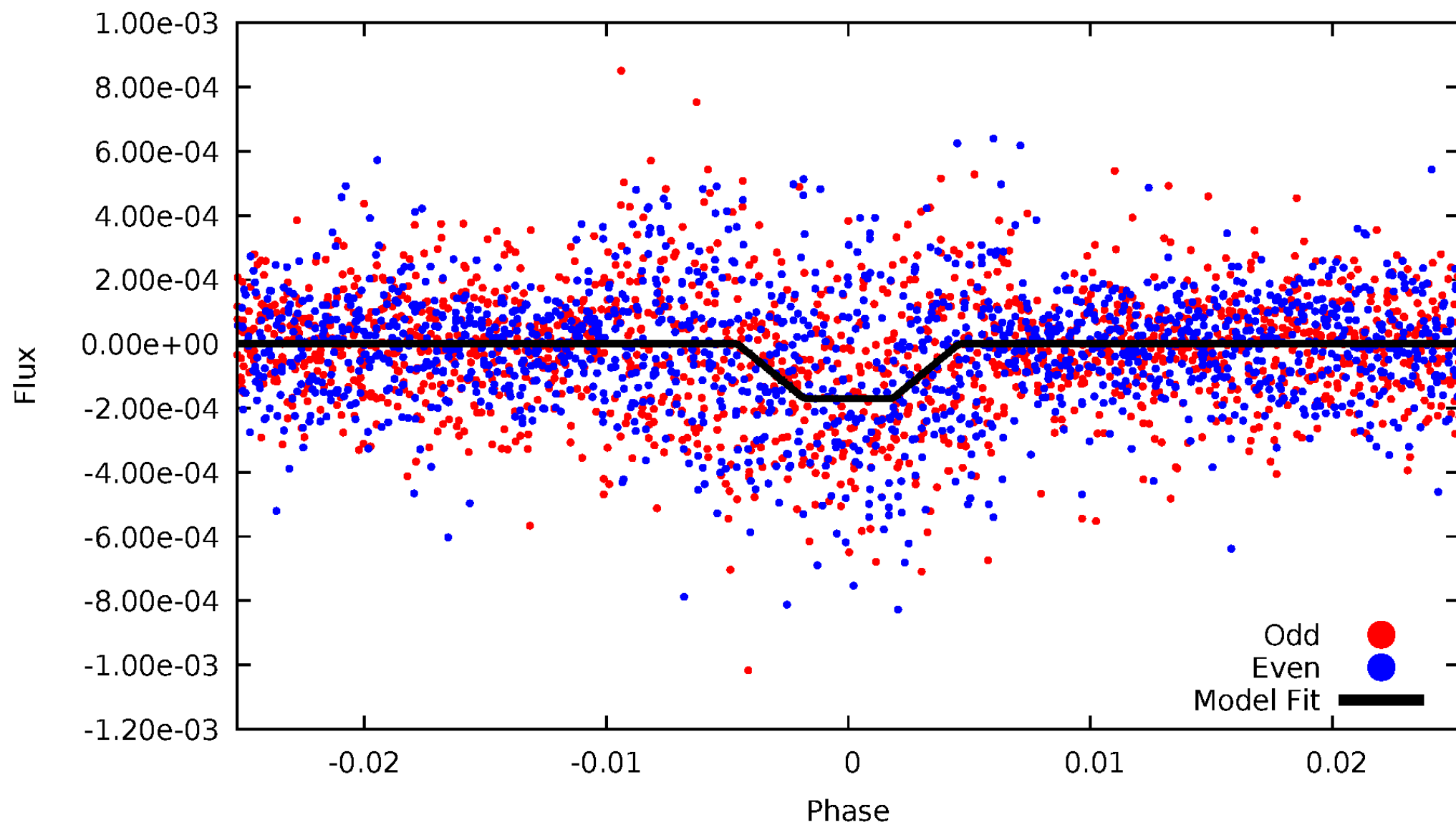
DV Odd/Even

TCE 009412760-02



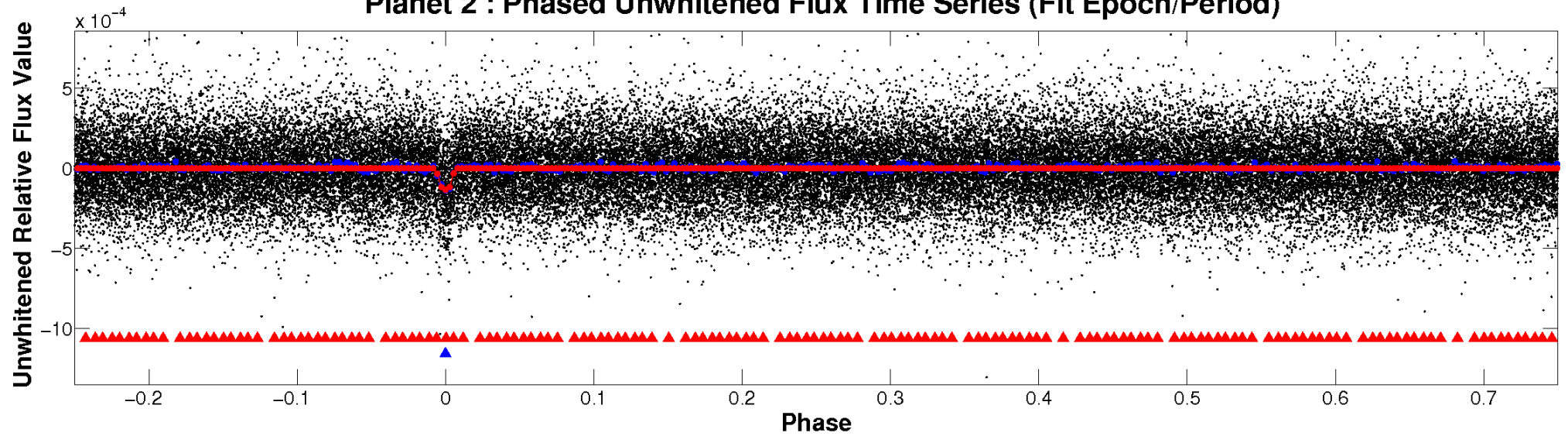
ALT Odd/Even

TCE 009412760-02

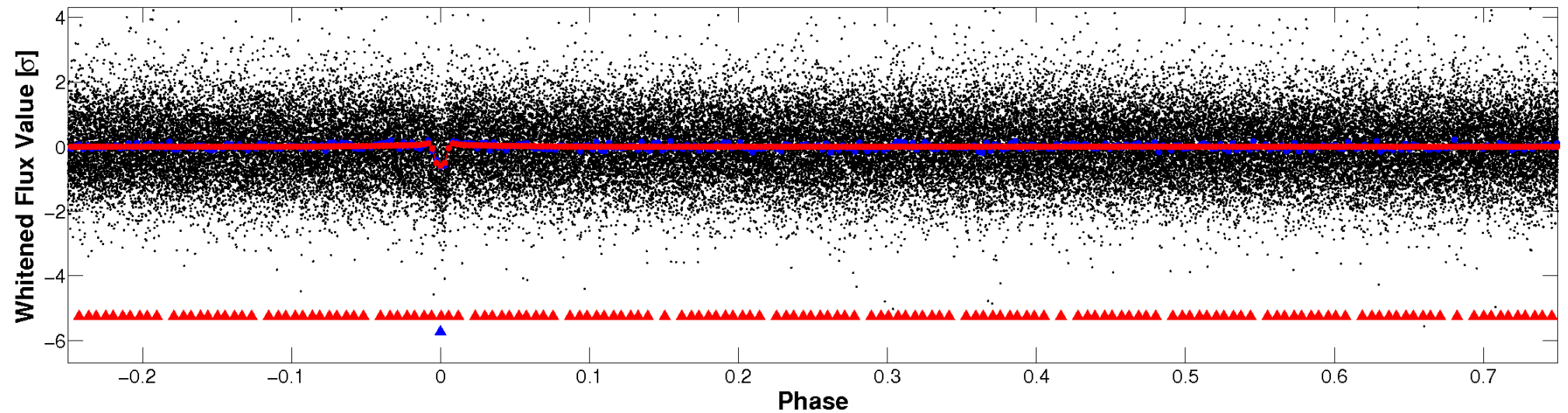


Non-Whitened Vs. Whitened Light Curve

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

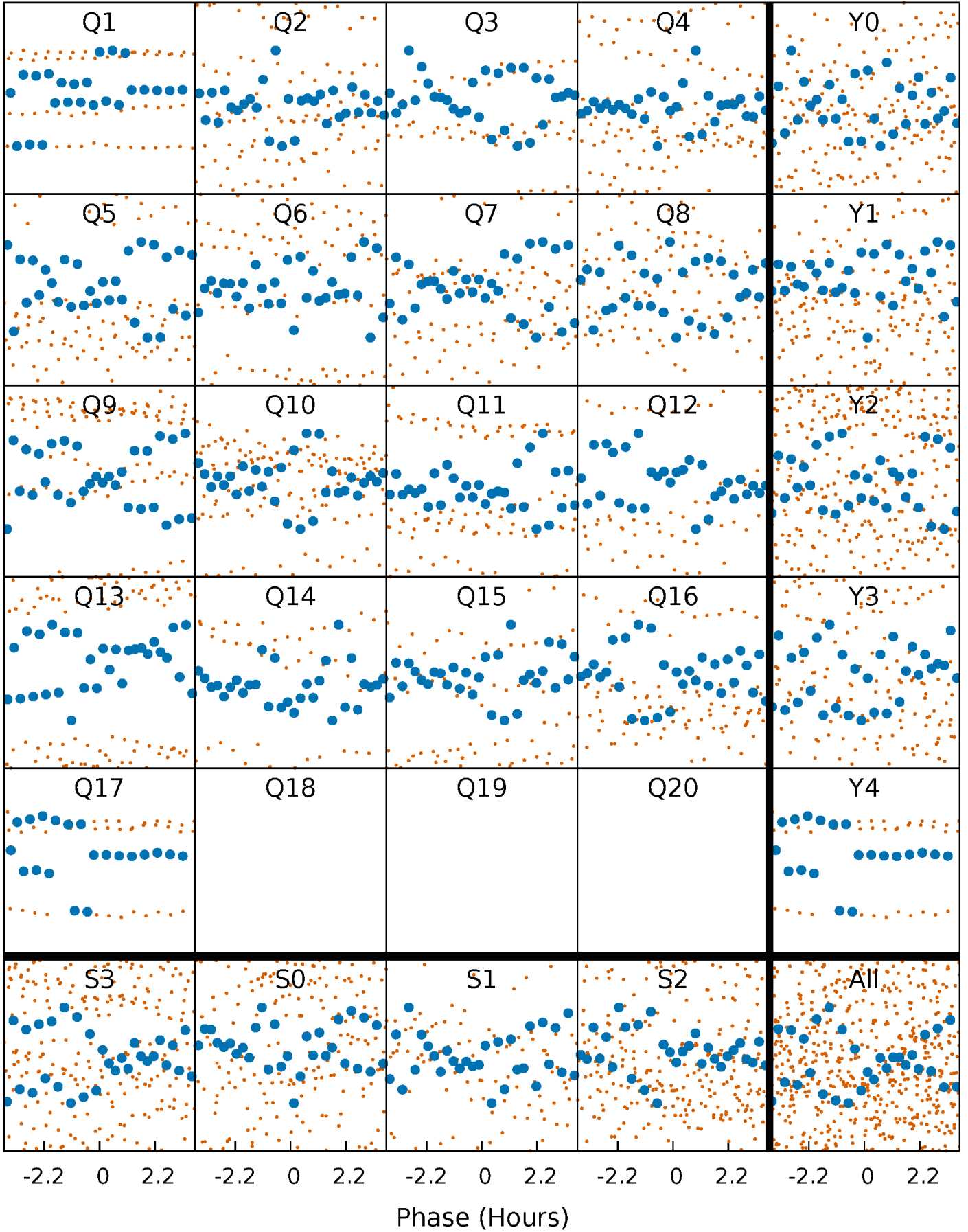


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



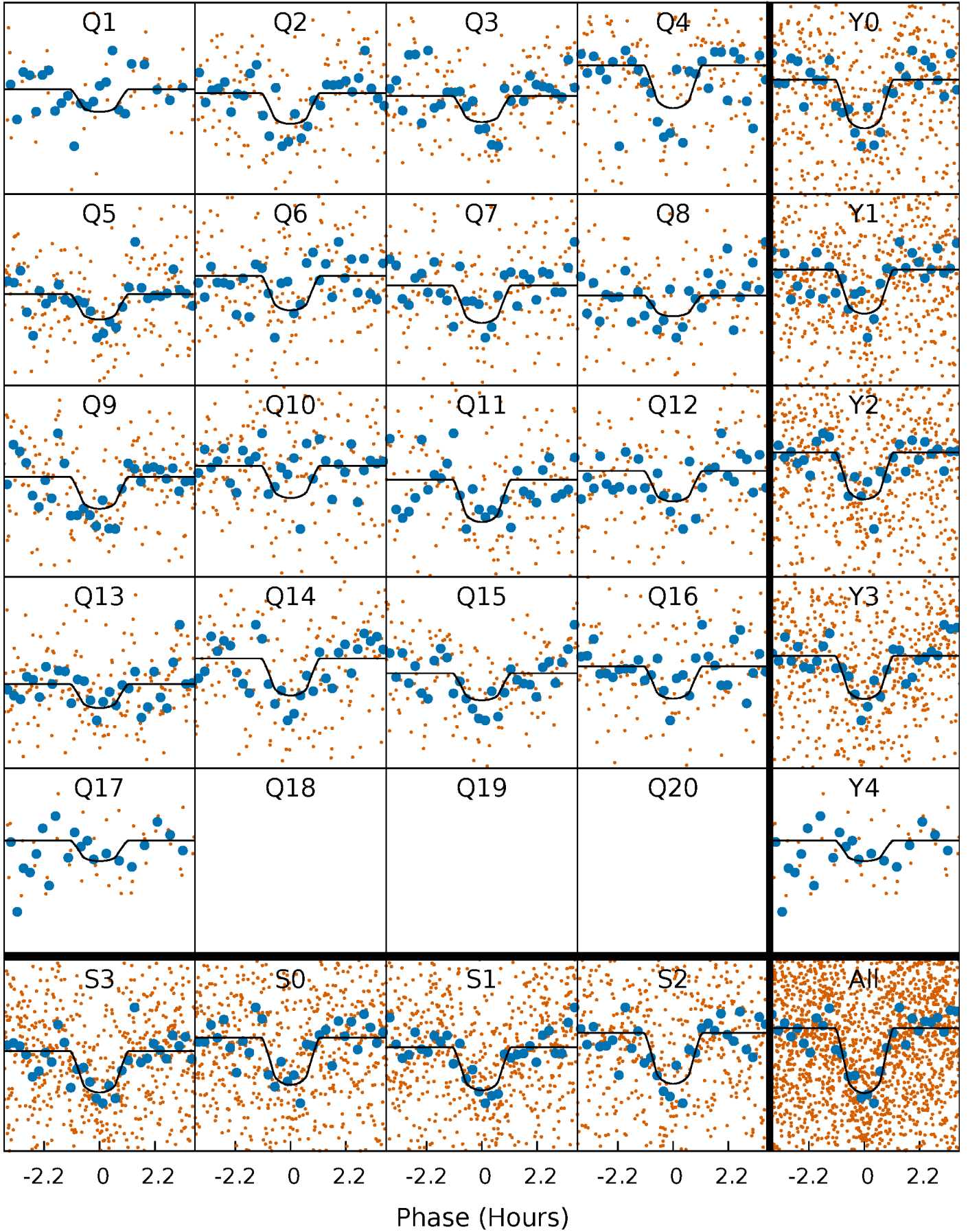
PDC Quarter-Phased Transit Curves

TCE 009412760-02 P= 7.415572 Days $T_0=137.814994$ (BKJD)



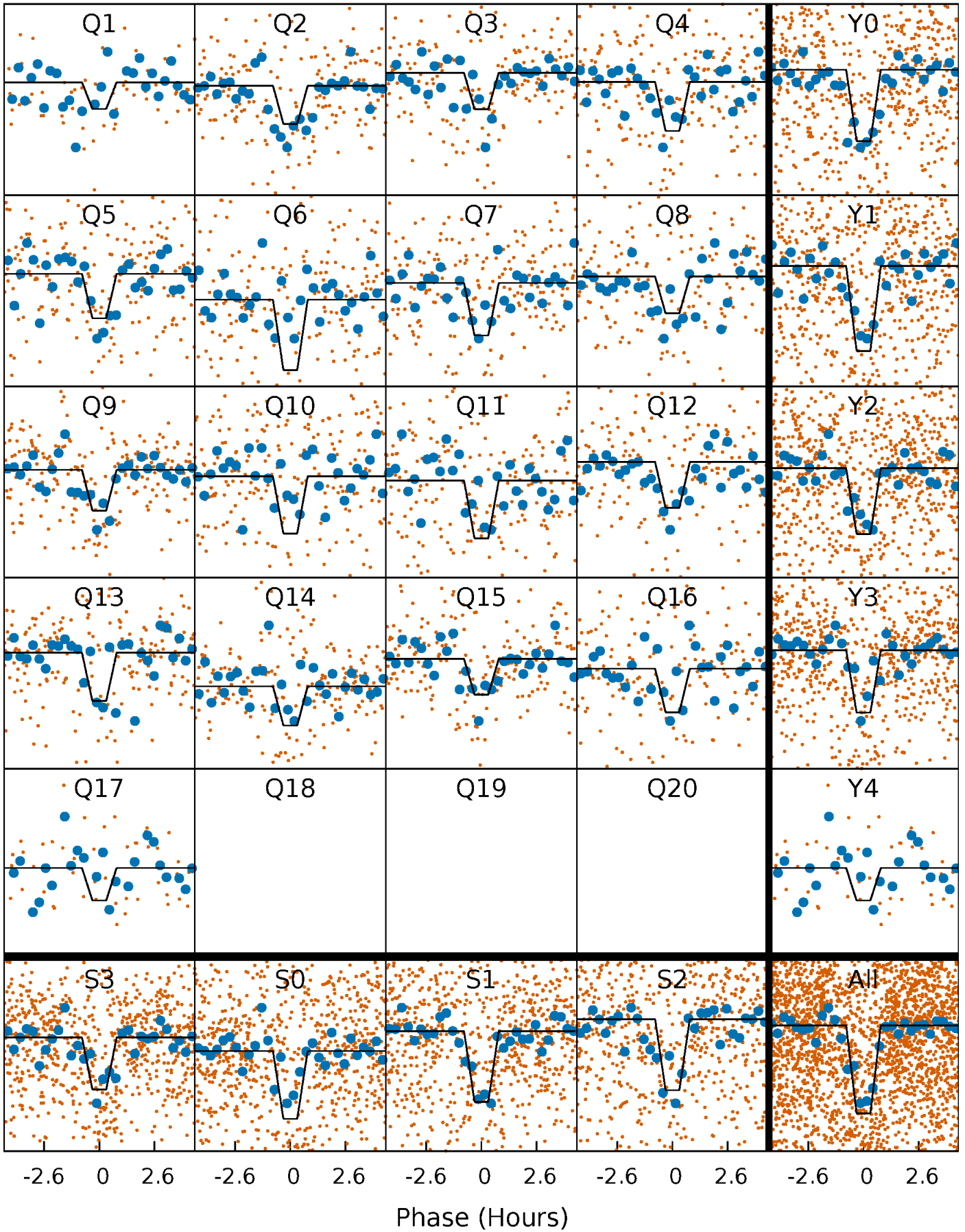
DV Quarter-Phased Transit Curves

TCE 009412760-02 $P = 7.415572$ Days $T_0 = 137.814994$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

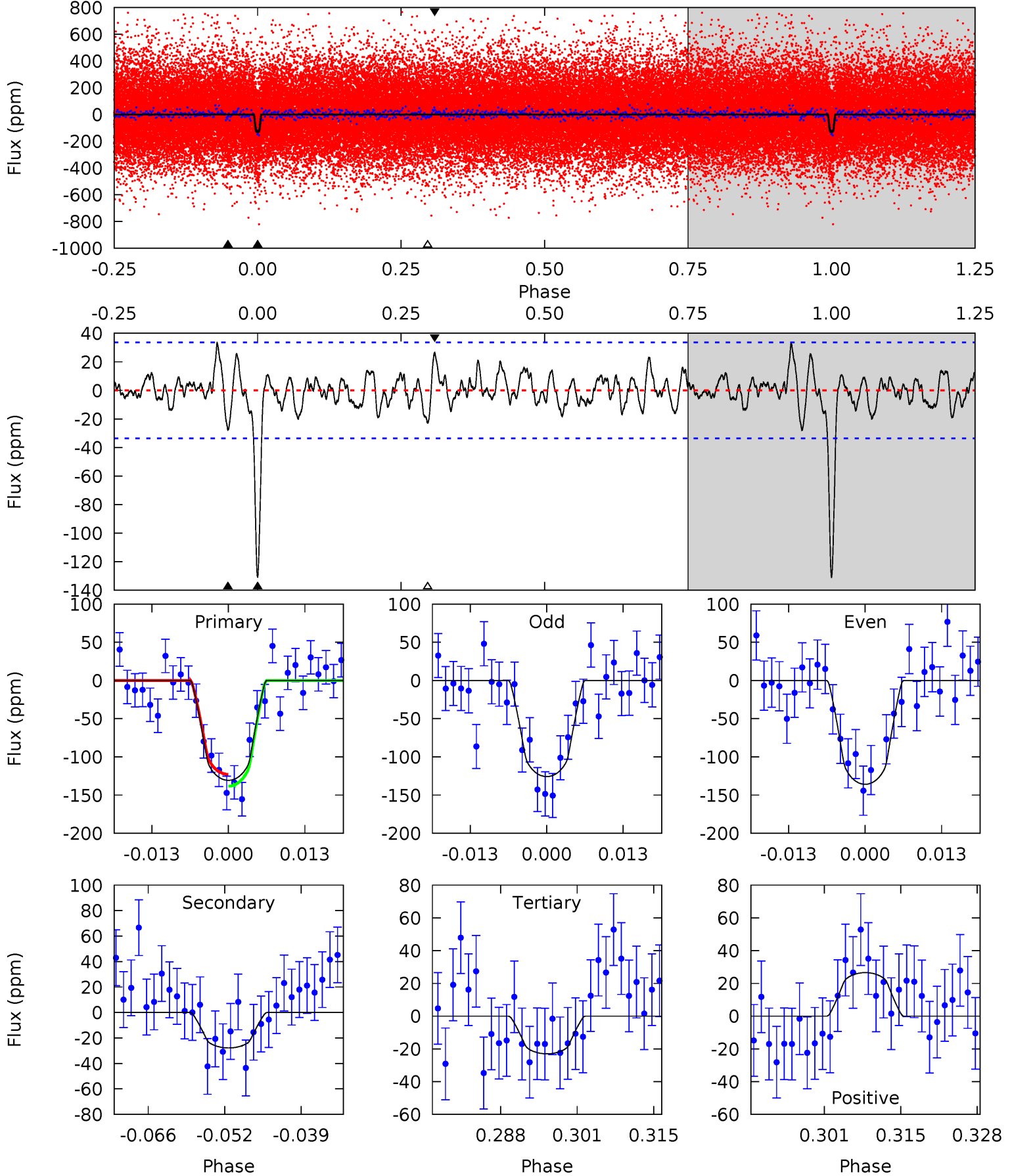
TCE 009412760-02 P= 7.415558 Days $T_0=137.819487$ (BKJD)



DV Model-Shift Uniqueness Test

009412760-02, P = 7.415572 Days, E = 130.399422 Days

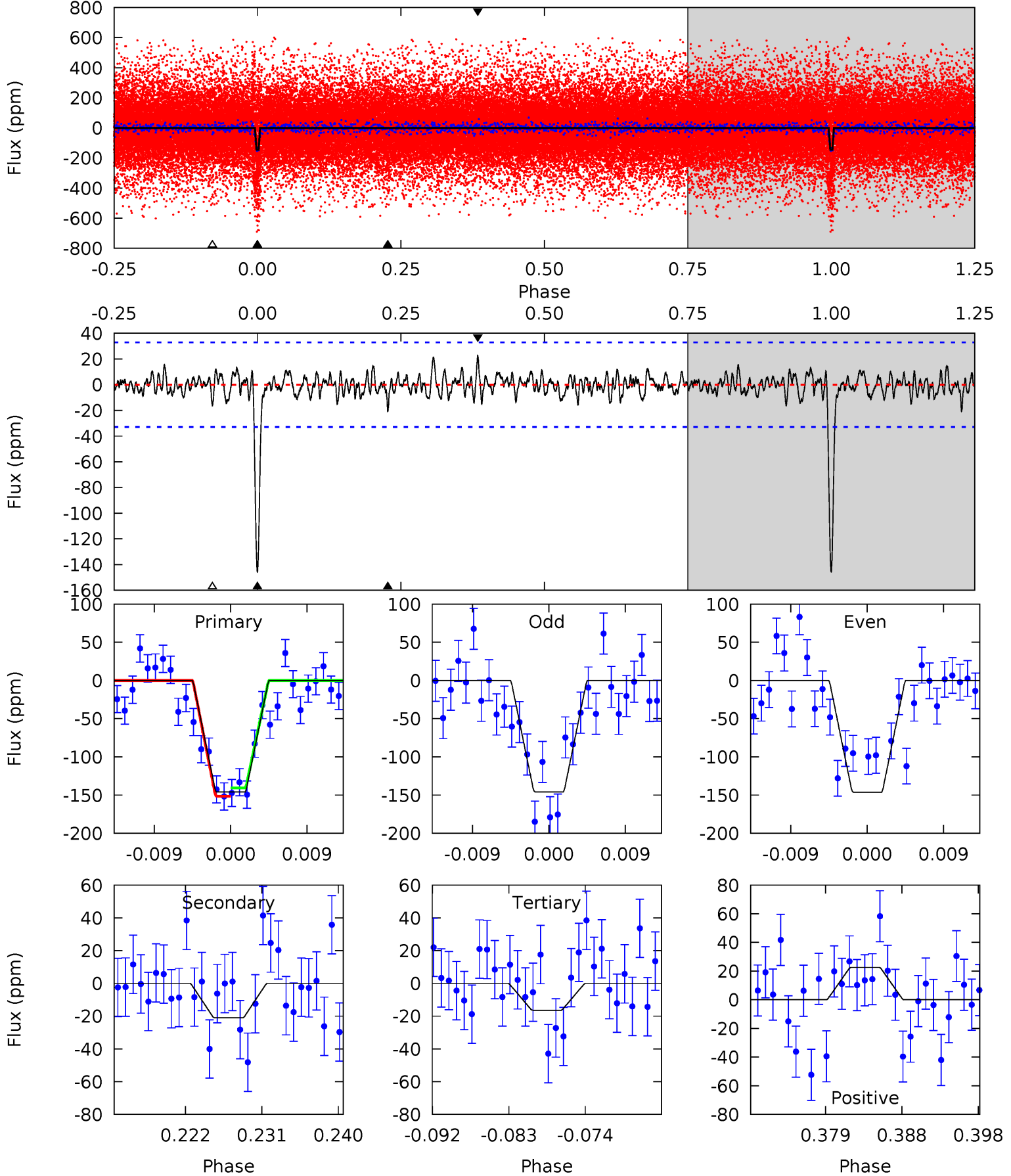
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
19.3	4.12	3.40	3.93	4.97	2.48	1.35	15.9	15.4	0.71	0.18	0.75	0.99	0.20	1.15



Alt Model-Shift Uniqueness Test

009412760-02, P = 7.415558 Days, E = 130.403929 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
22.4	3.22	2.51	3.46	5.04	2.60	0.94	19.9	18.9	0.70	-0.25	0.04	0.99	0.13	0.85



Stellar Parameters For KIC 009412760

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	4500^{+90}_{-90}	$4.656^{+0.012}_{-0.045}$	$-0.020^{+0.150}_{-0.150}$	$0.646^{+0.046}_{-0.020}$	$0.710^{+0.029}_{-0.043}$	$3.719^{+0.193}_{-0.641}$
	+2%/-2%	+0%/-1%	+750%/-750%	+7%/-3%	+4%/-6%	+5%/-17%
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 009412760-02 / KOI 1977.02

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	-28 ± 7	$1.02^{+0.65}_{-0.57}$	877^{+20}_{-20}	3229^{+1004}_{-438}	66^{+264}_{-42}
Alt.	-21 ± 7	$1.02^{+0.65}_{-0.58}$	878^{+20}_{-19}	3075^{+989}_{-425}	47^{+205}_{-32}

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 $A_{obs} \gg 1.0$

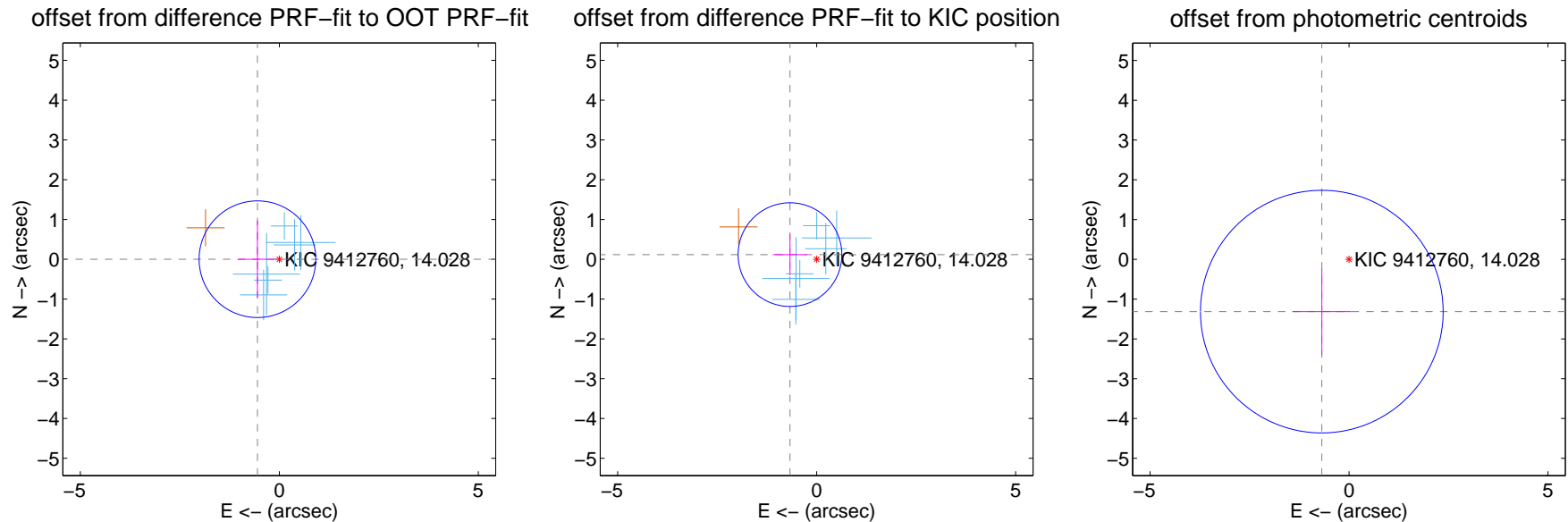
DV Centroid Data

Supplemental centroid analysis for 009412760-02. Kepler magnitude: 14.03. Transit SNR 12.44

There are 6 quarters with good PRF difference image offsets

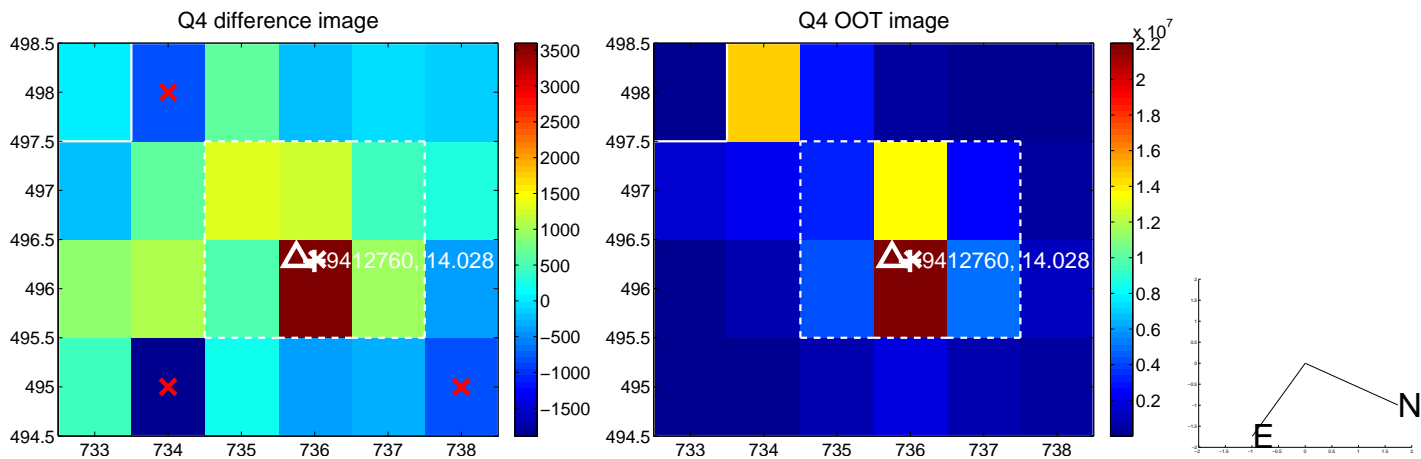
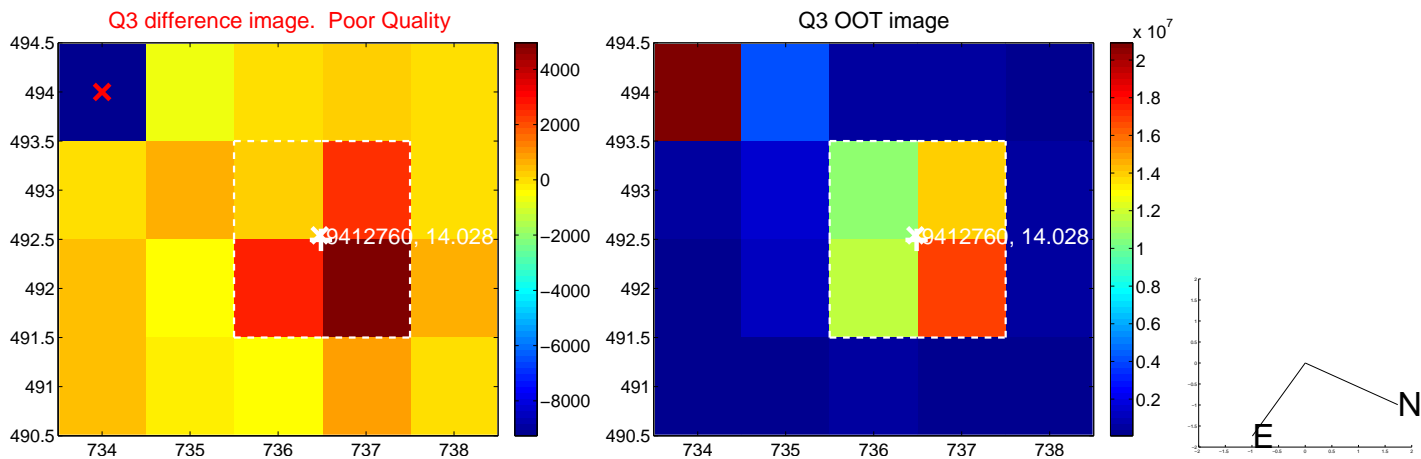
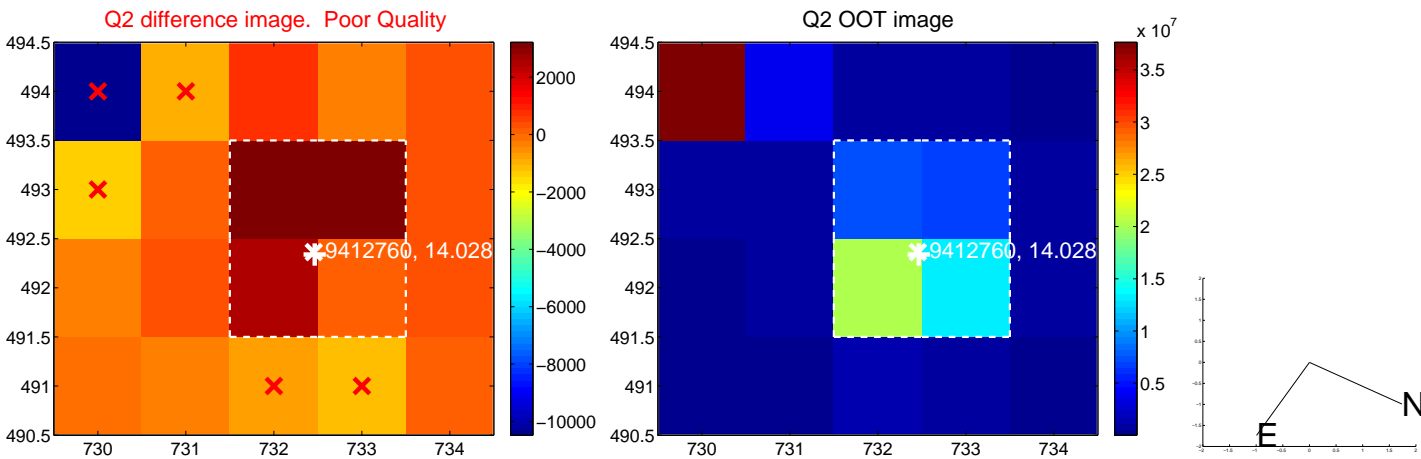
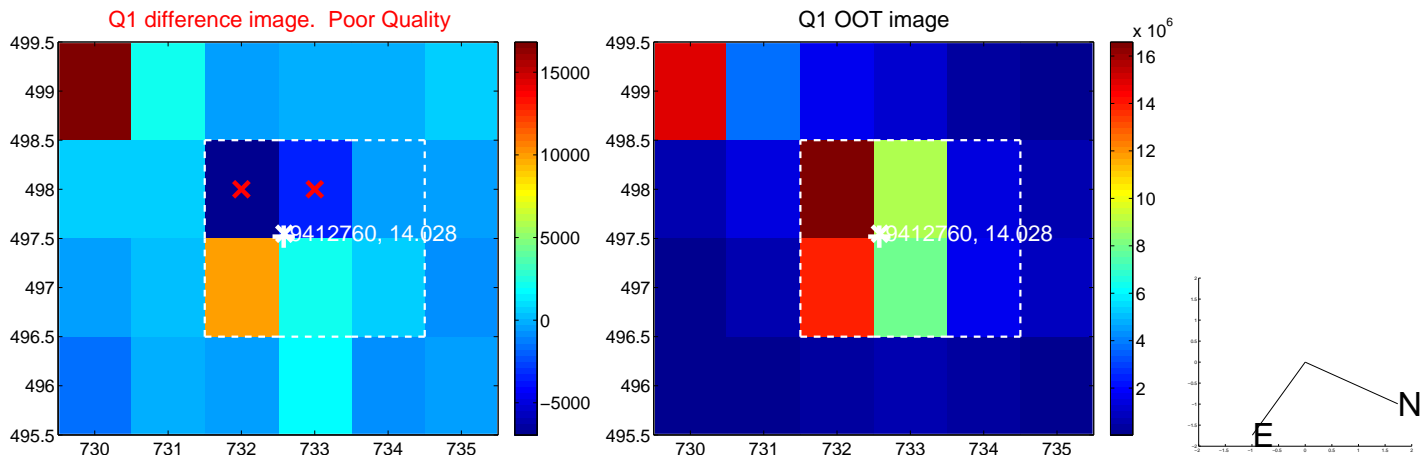
The direct PRF centroid is offset from the target star catalog position by about 0.21 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.550 ± 0.489	1.13	0.550 ± 0.492	0.003 ± 0.967
PRF-fit source offset from KIC position	0.681 ± 0.434	1.57	0.670 ± 0.432	0.117 ± 0.514
photometric centroid source offset	1.48 ± 1.02	1.46	0.68 ± 0.74	-1.31 ± 1.08

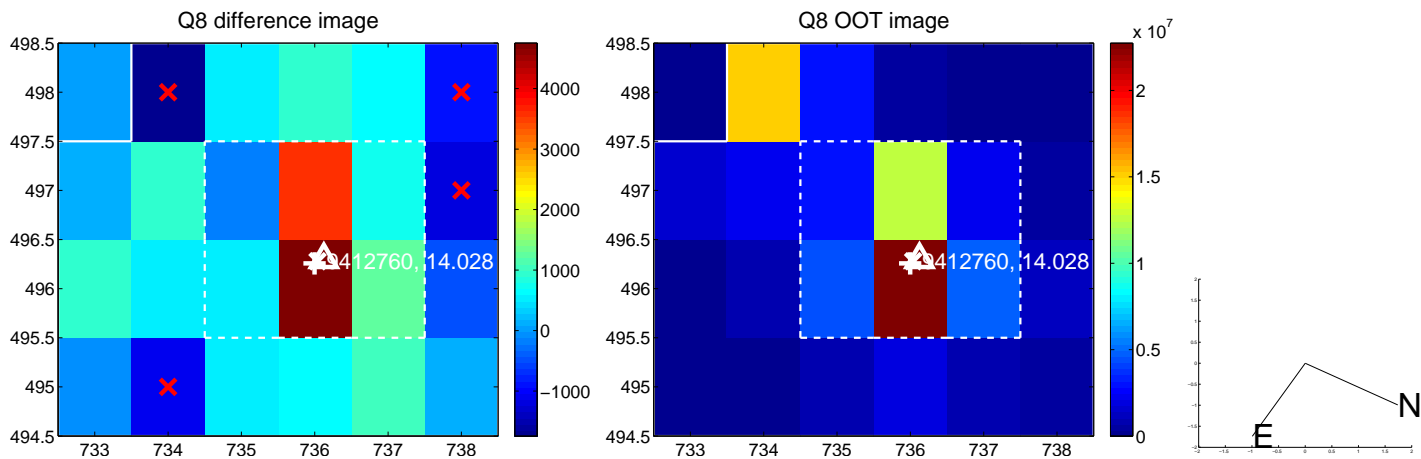
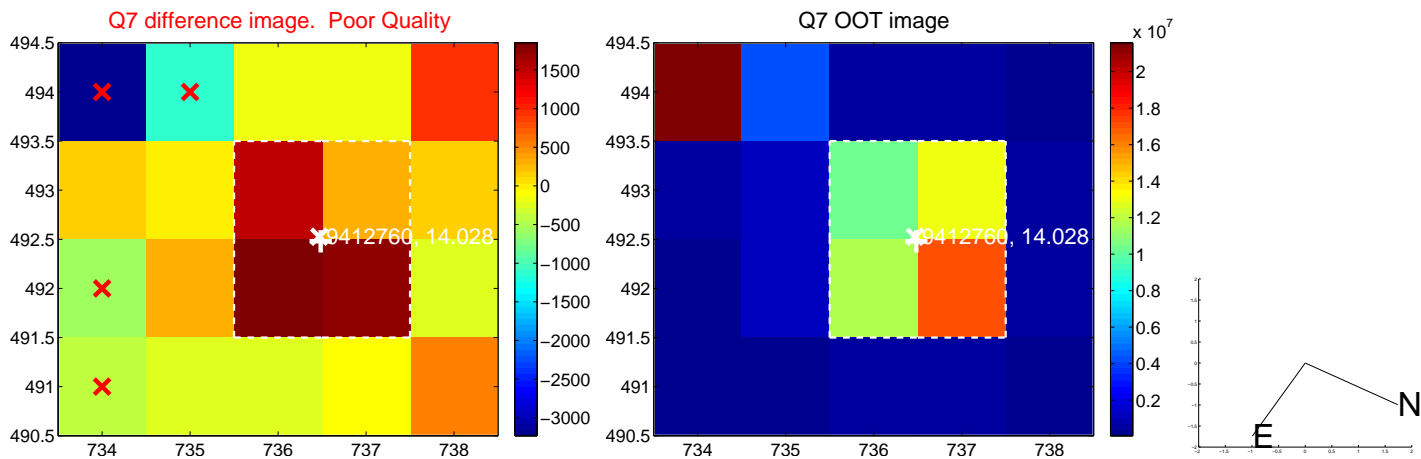
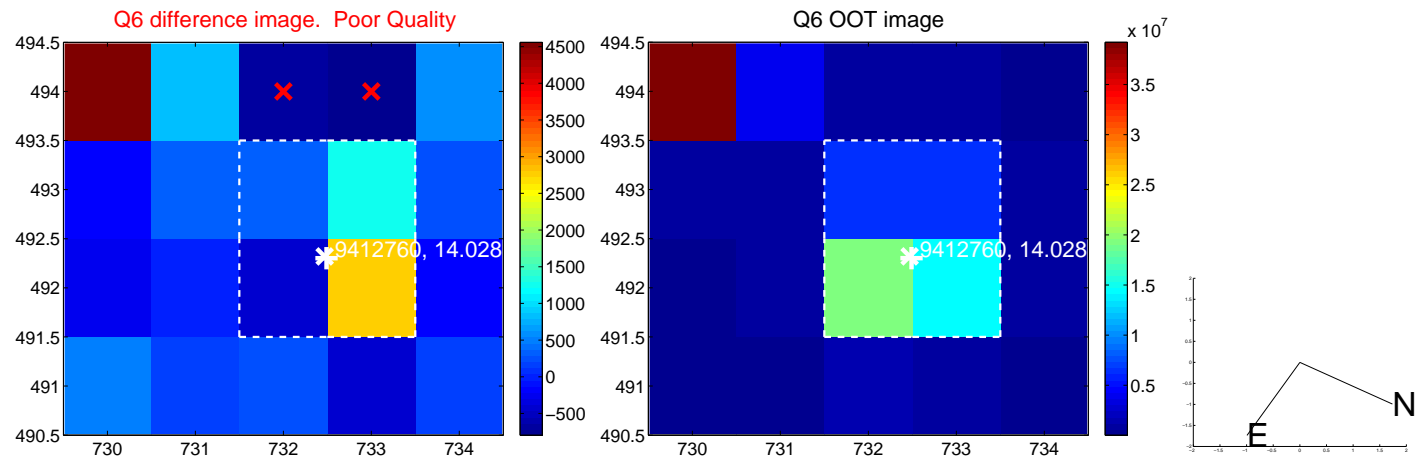
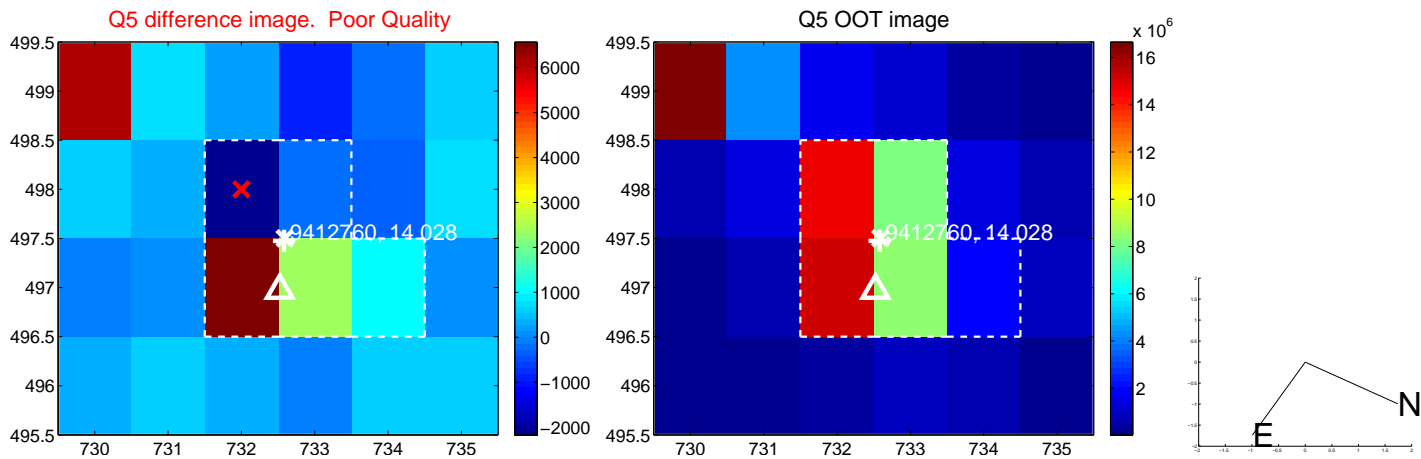


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

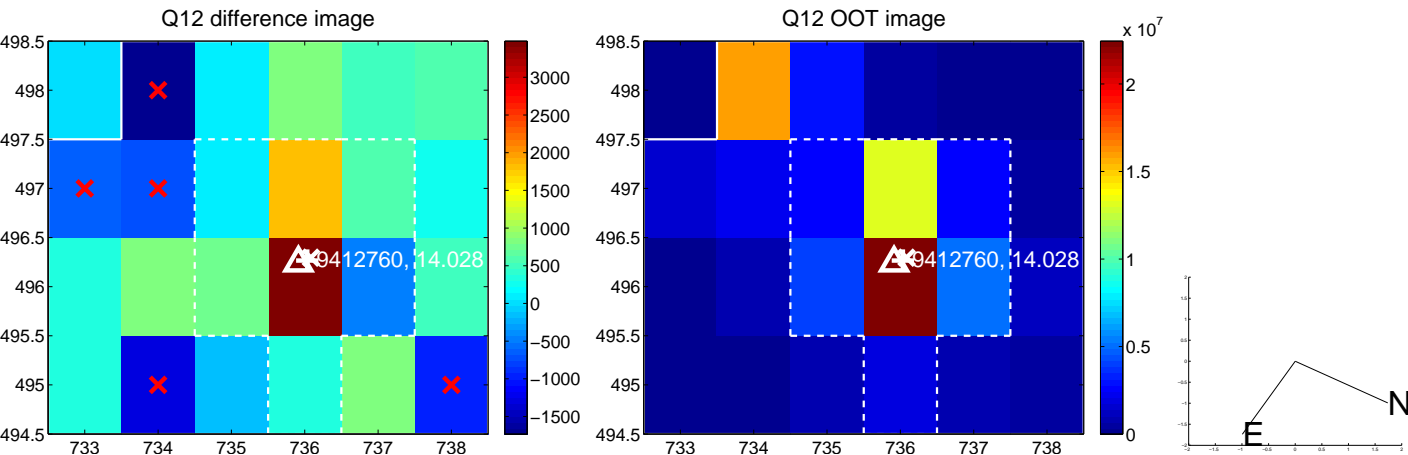
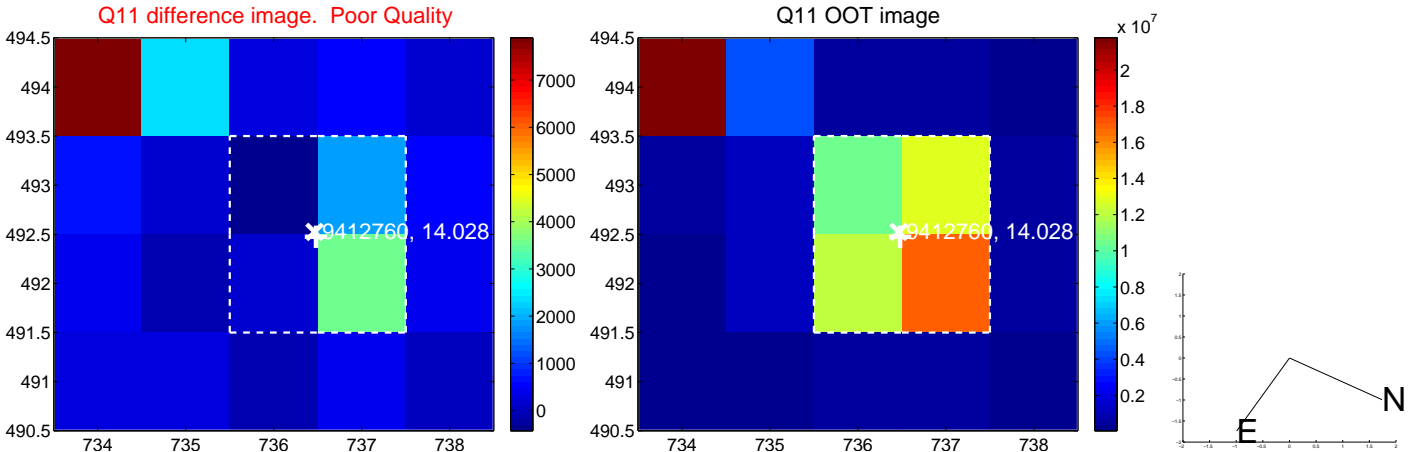
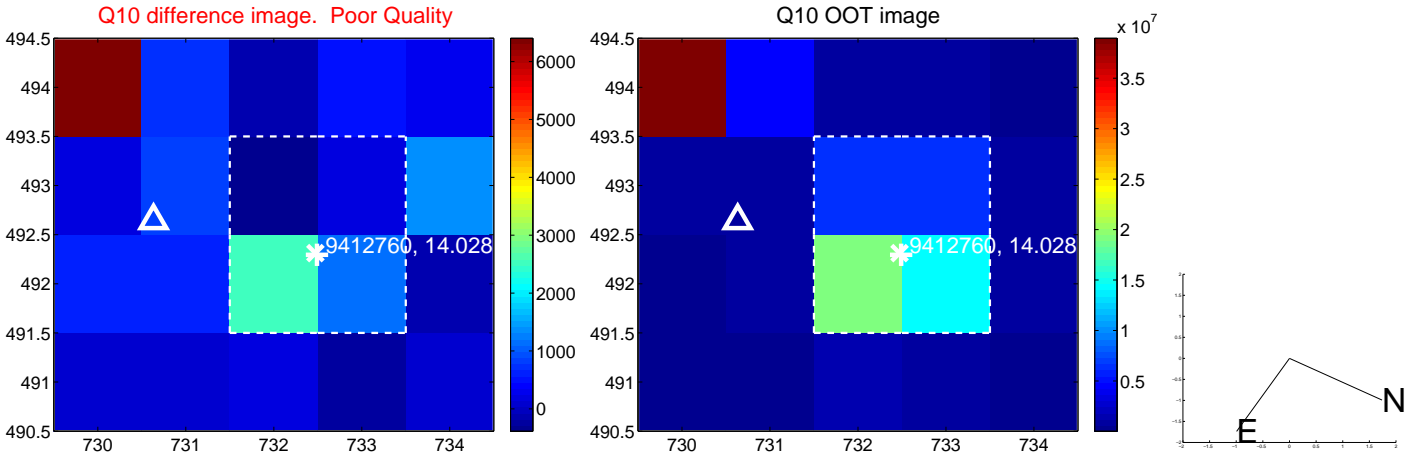
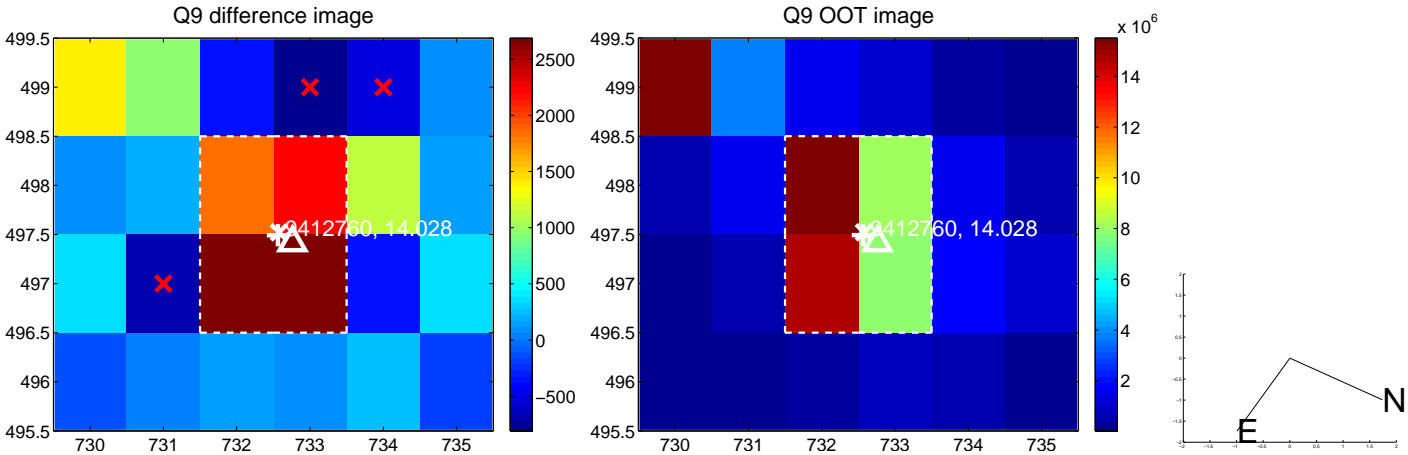
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



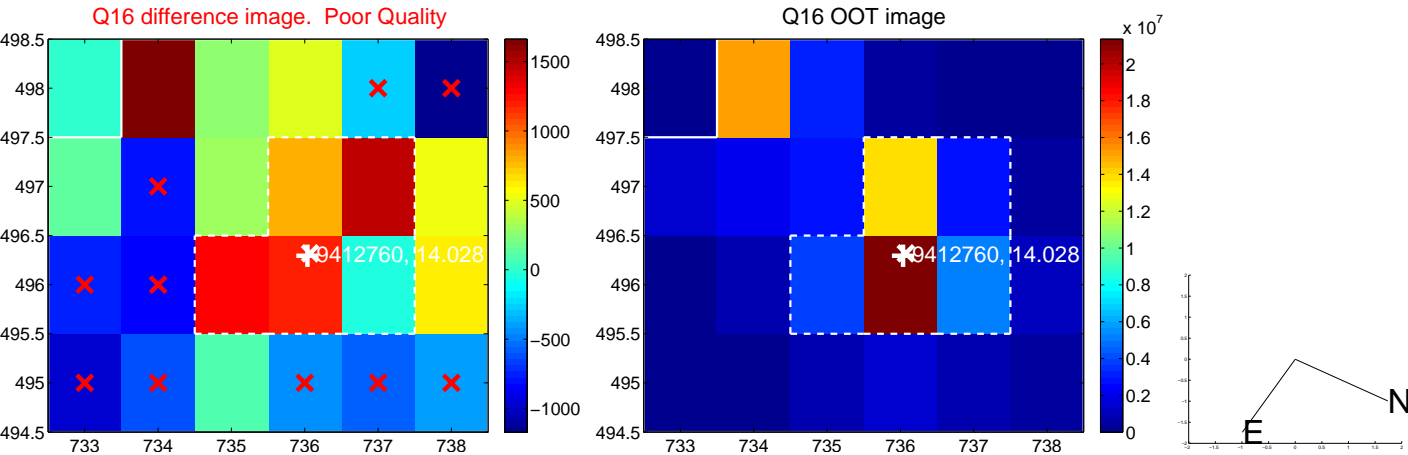
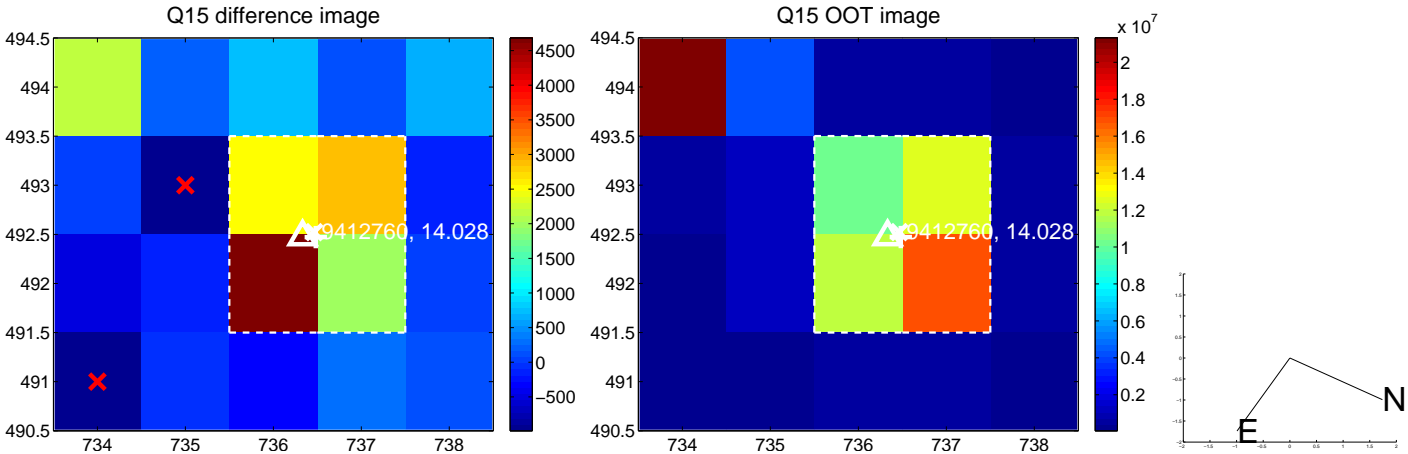
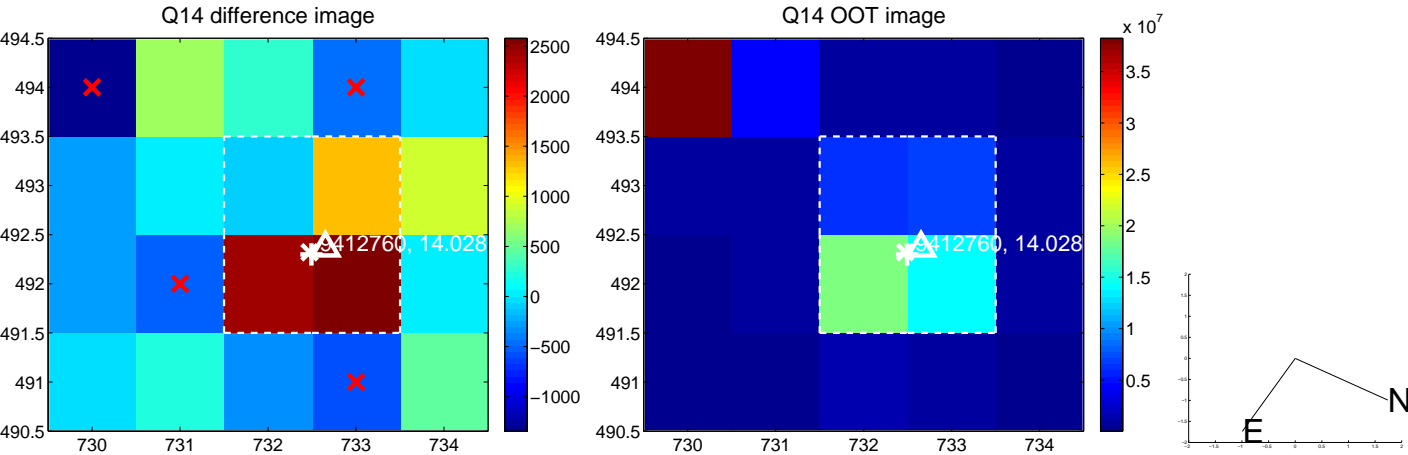
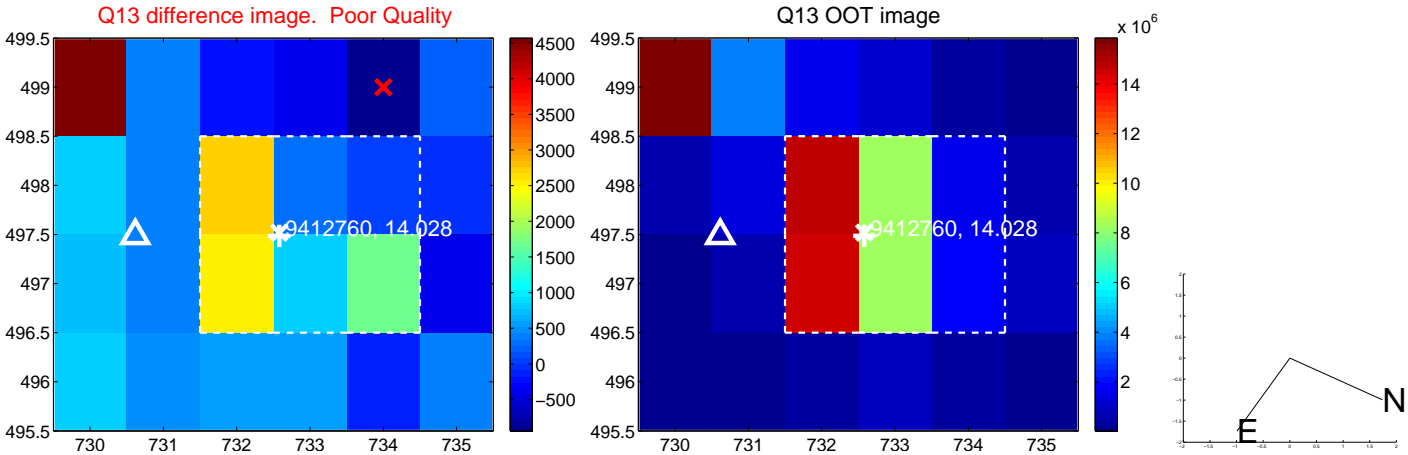
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



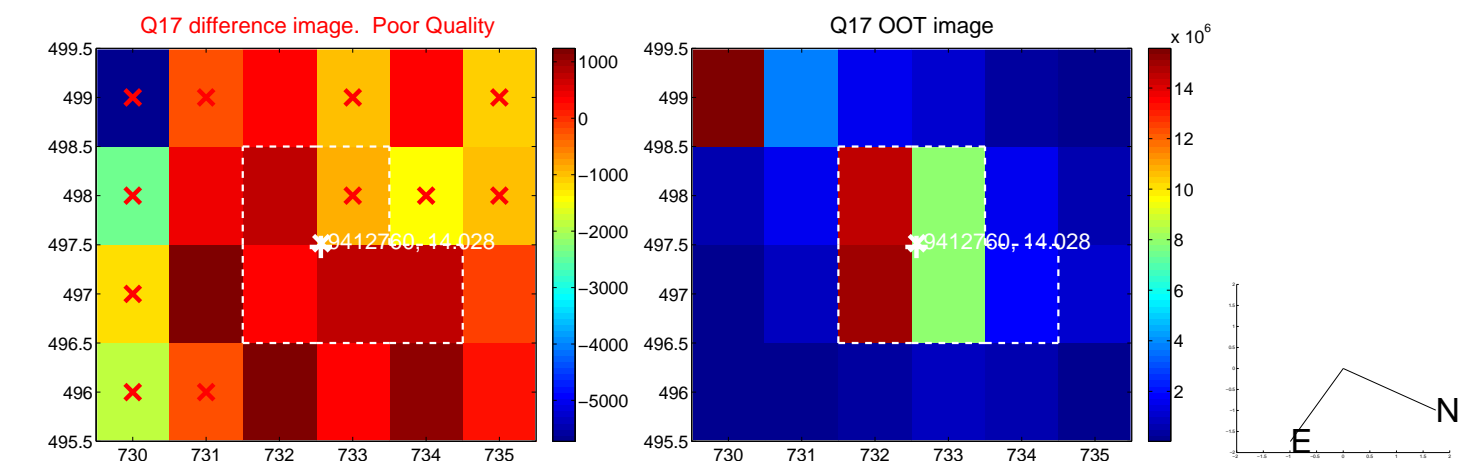
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



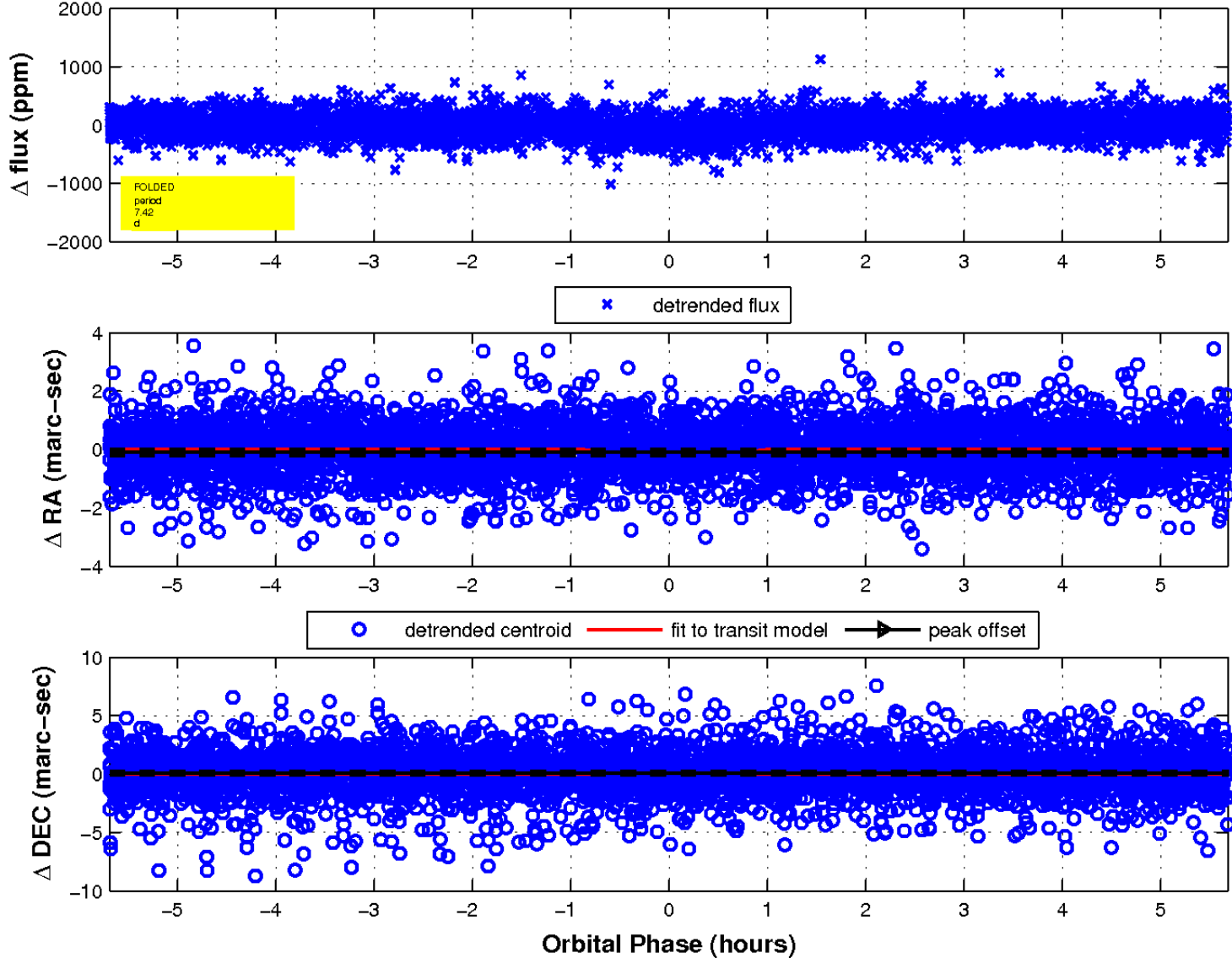
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

Declination

