

KIC 009016693

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})
009016693-01	OBS	No	26.361712	142.258097	482.4	35.988	13.5	25.8	2.07	7262	8.61	258.99
009016693-02	OBS	No	4.393589	132.906063	105.5	30.102	9.9	16.3	2.07	7262	4.14	2823.67

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009016693-01	OBS	FP	0.00	1	0	0	0	LPP_DV
009016693-02	OBS	FP	0.00	1	0	0	0	LPP_DV—SAME_NTL_PERIOD

Notes: OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

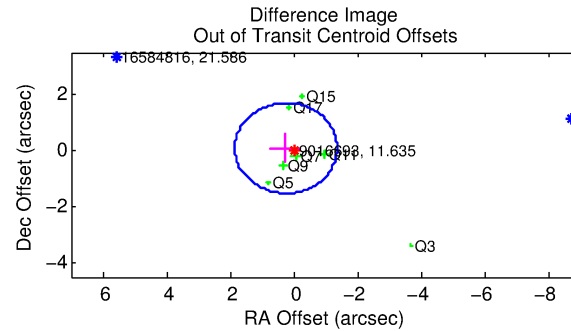
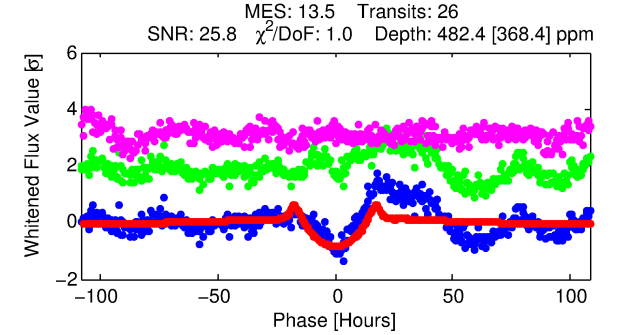
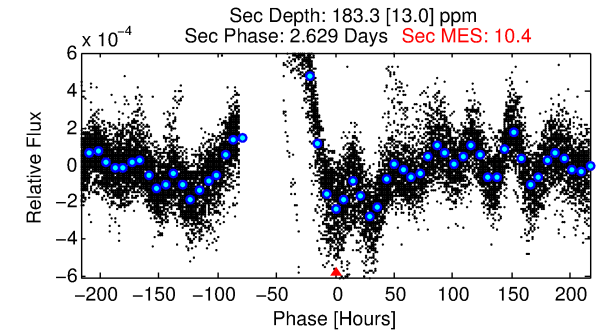
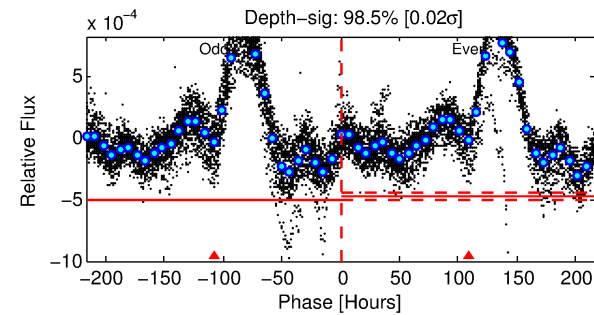
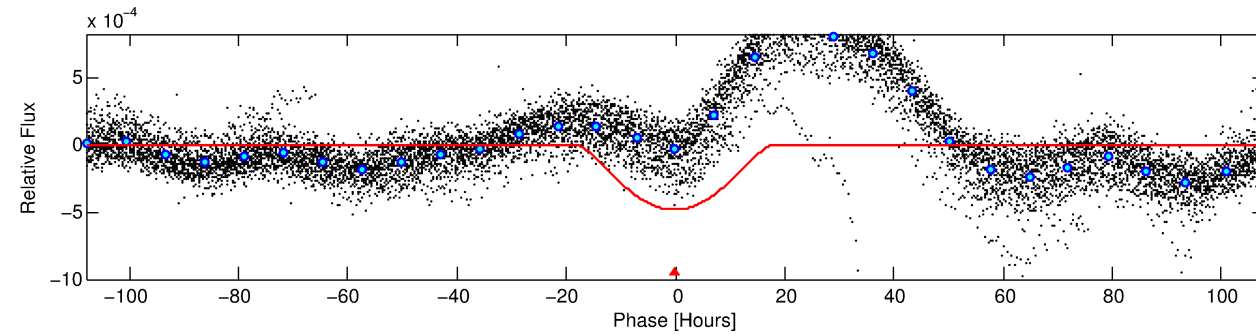
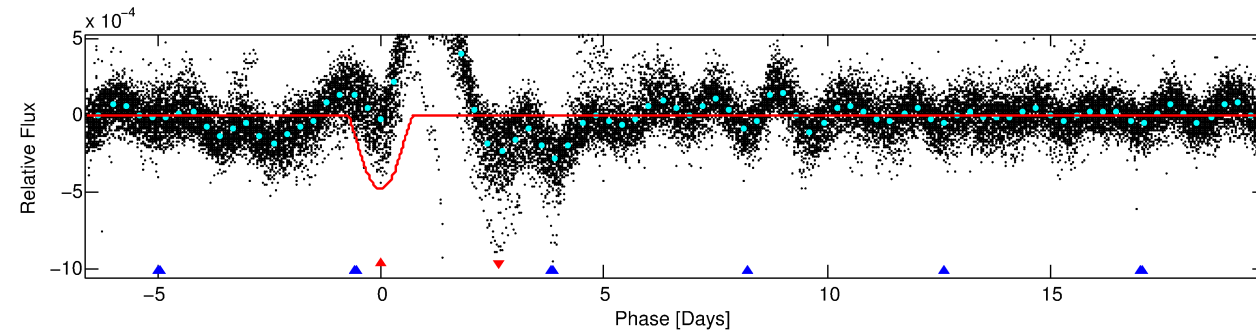
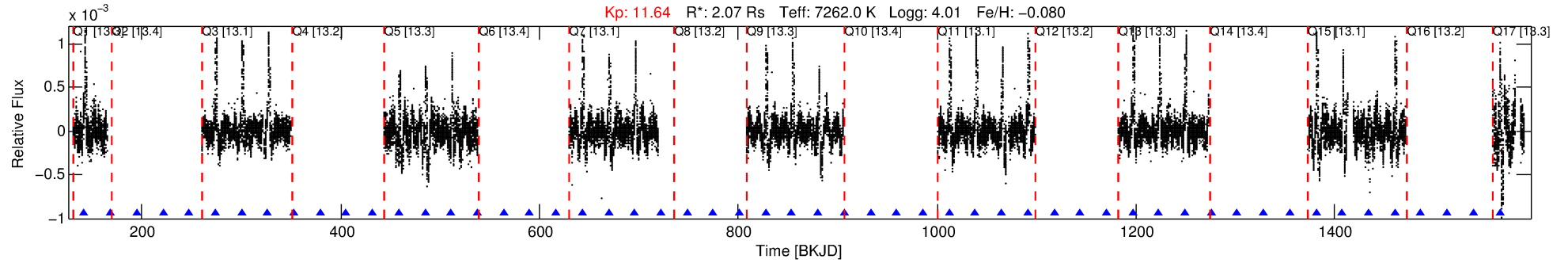
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009016693-01

No Significant Match Found

DV One-Page Summary

KIC: 9016693 Candidate: 1 of 2 Period: 26.362 d



DV Fit Results:

Period = 26.36171 [0.00064] d
Epoch = 142.2581 [0.0194] BKJD
Rp/R* = 0.0381 [0.0142]
a/R* = 1.86 [0.11]
b = 1.00 [0.00]
Seff = 258.98 [106.78]
Teff = 1023 [105] K
Rp = 8.61 [4.01] Re
a = 0.2031 [0.0499] AU
Ag = 56.12 [46.88] [1.18σ]
Teffp = 4329 [833] K [3.94σ]

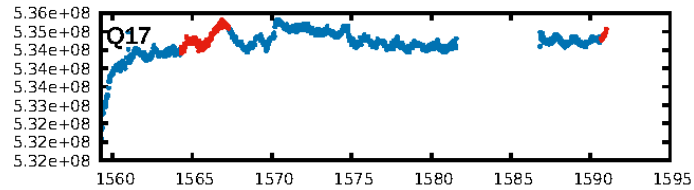
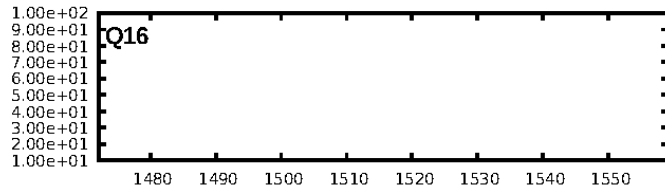
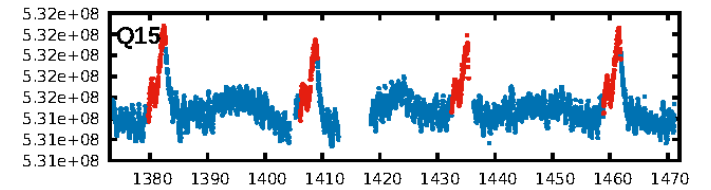
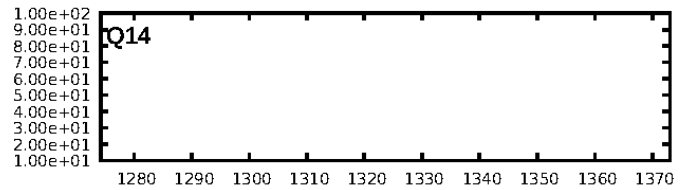
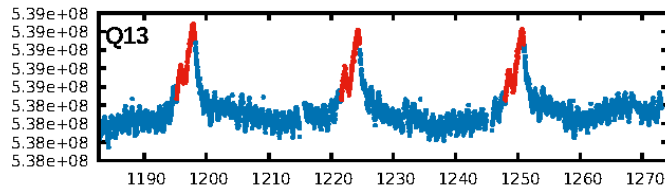
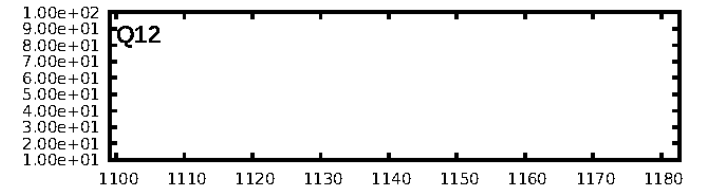
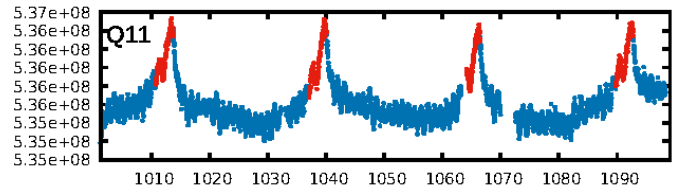
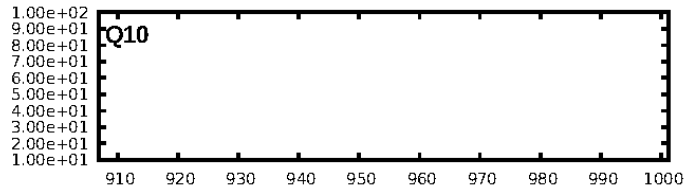
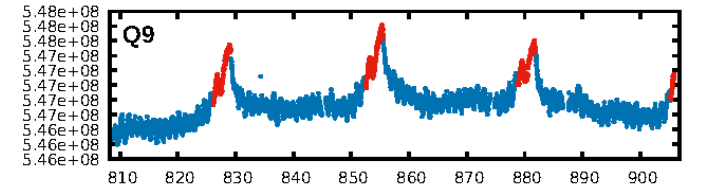
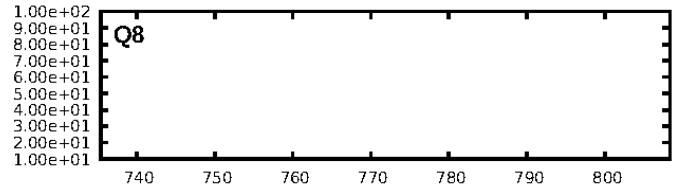
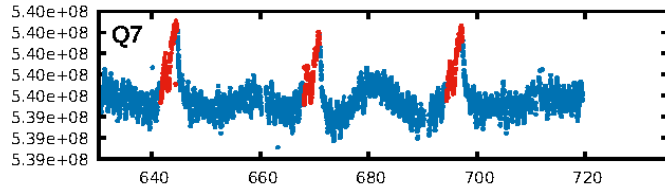
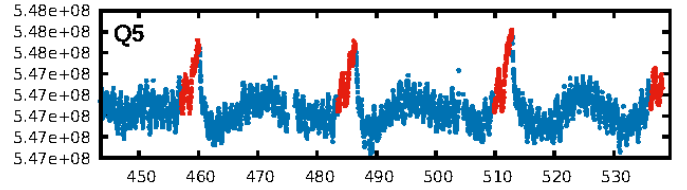
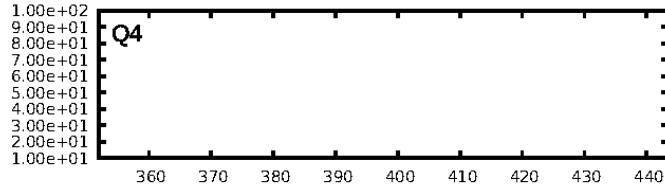
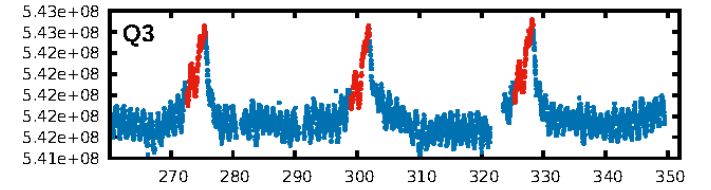
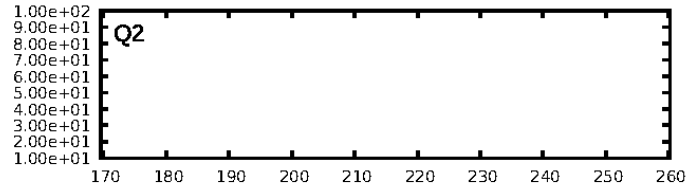
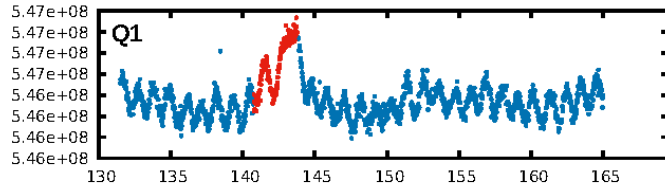
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [11.24σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 99.2%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 7.07e-53
RollingBand-fgt: 1.00 [24/24]
GhostDiagnostic-chr: 8.588
Centroid-sig: 0.0%
Centroid-so: 1.139 arcsec [4.34σ]
OotOffset-rm: 0.257 arcsec [0.48σ]
KicOffset-rm: 1.030 arcsec [1.79σ]
OotOffset-st: 0/4/0/3 [7]
KicOffset-st: 0/4/0/3 [7]
DiffImageQuality-fgm: 0.71 [5/7]
DiffImageOverlap-fno: 0.00 [0/9]

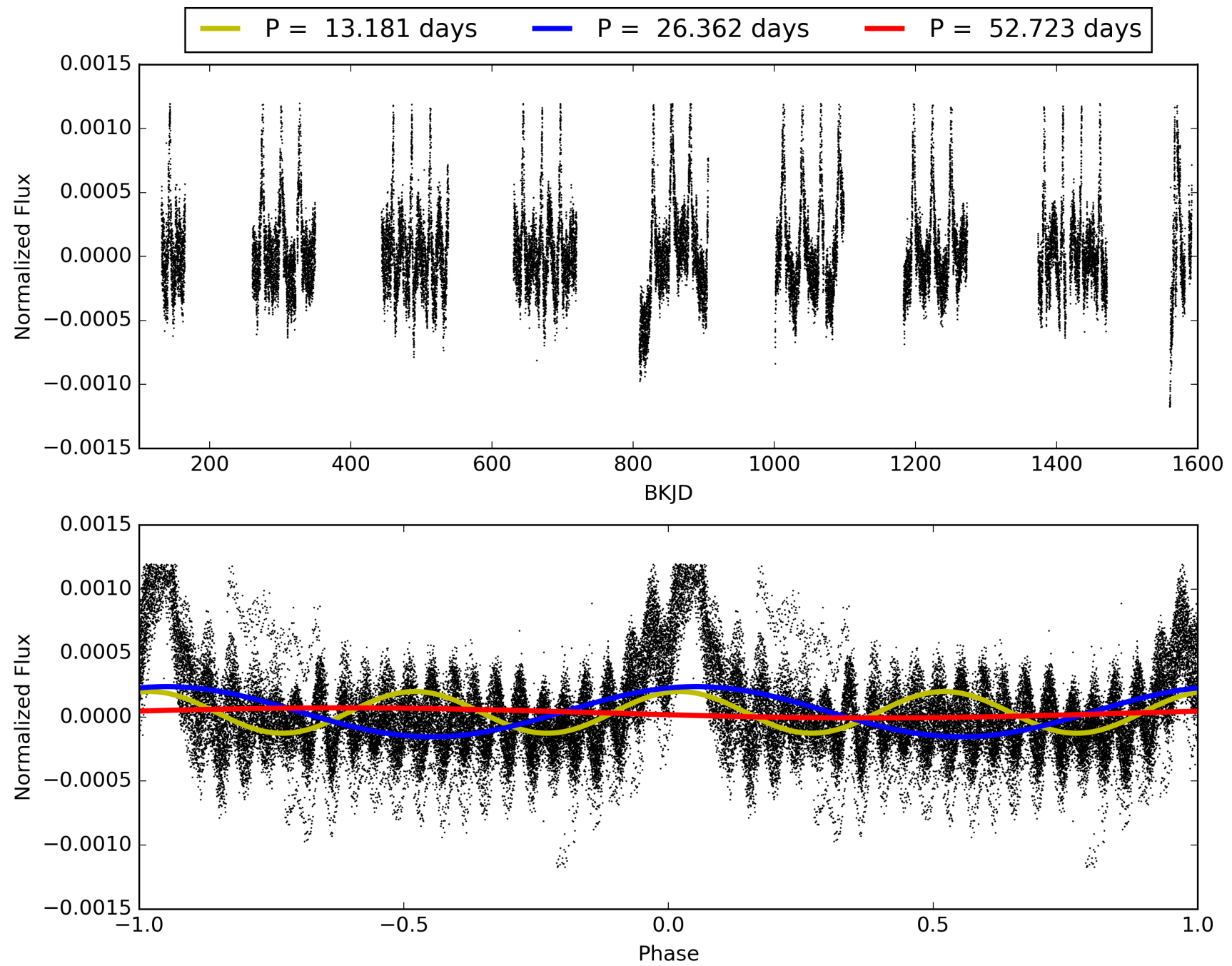
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 00:07:19 Z

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

TCE 009016693-01, PDC Light Curves

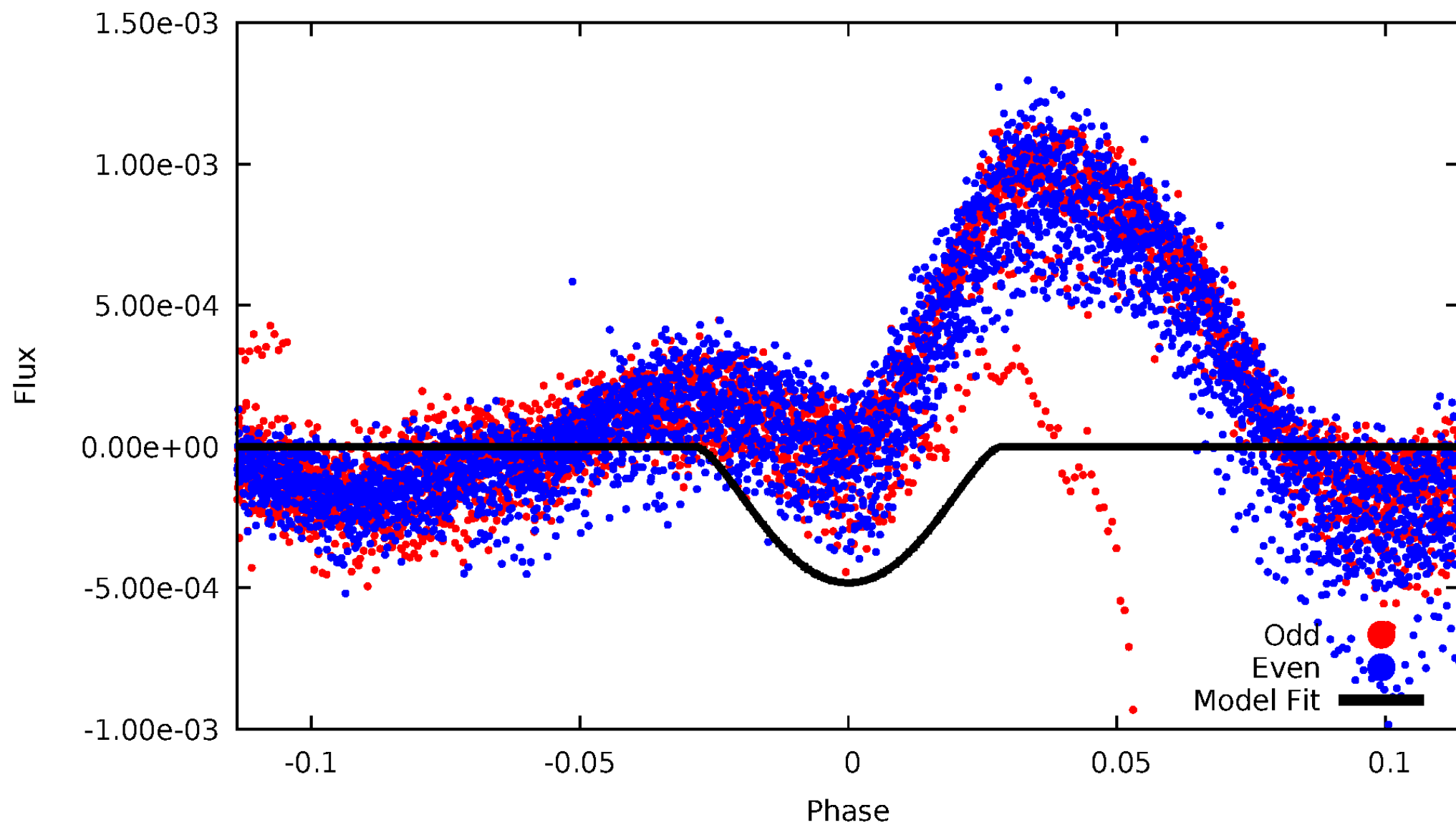


TCE 009016693-01



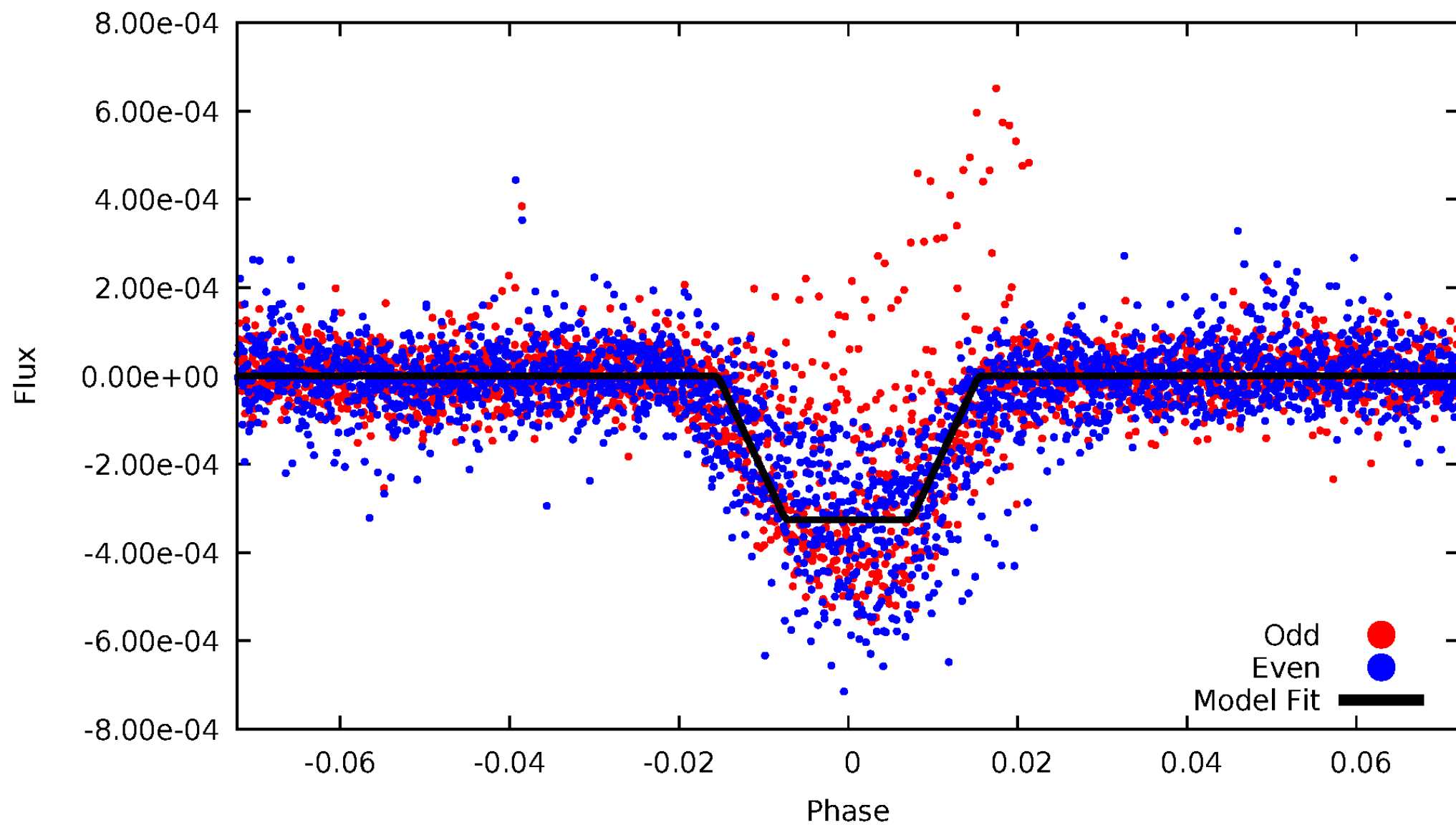
DV Odd/Even

TCE 009016693-01



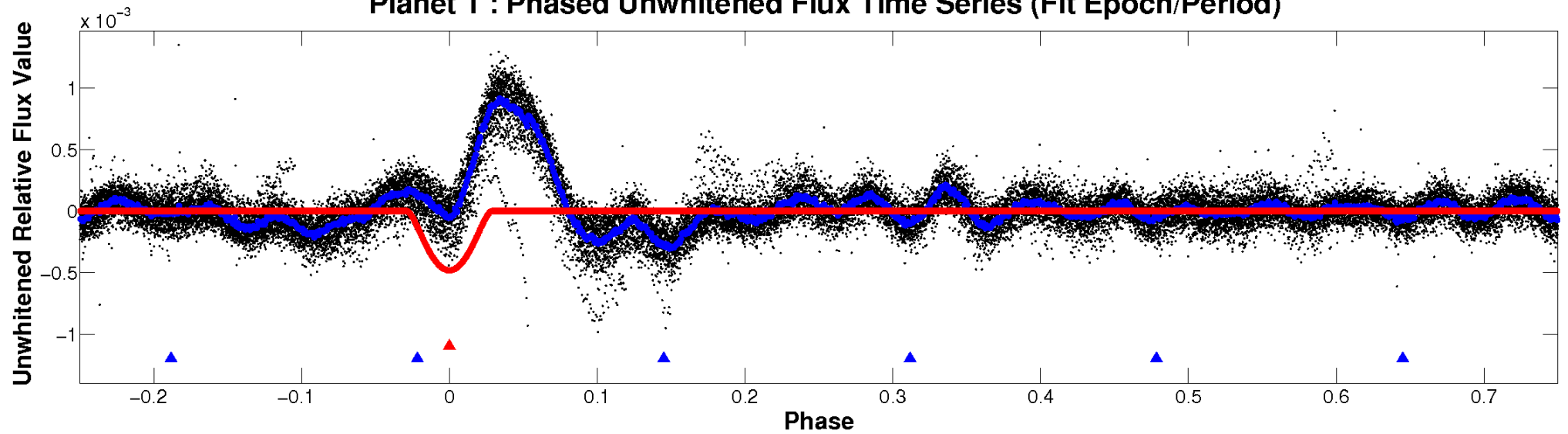
ALT Odd/Even

TCE 009016693-01

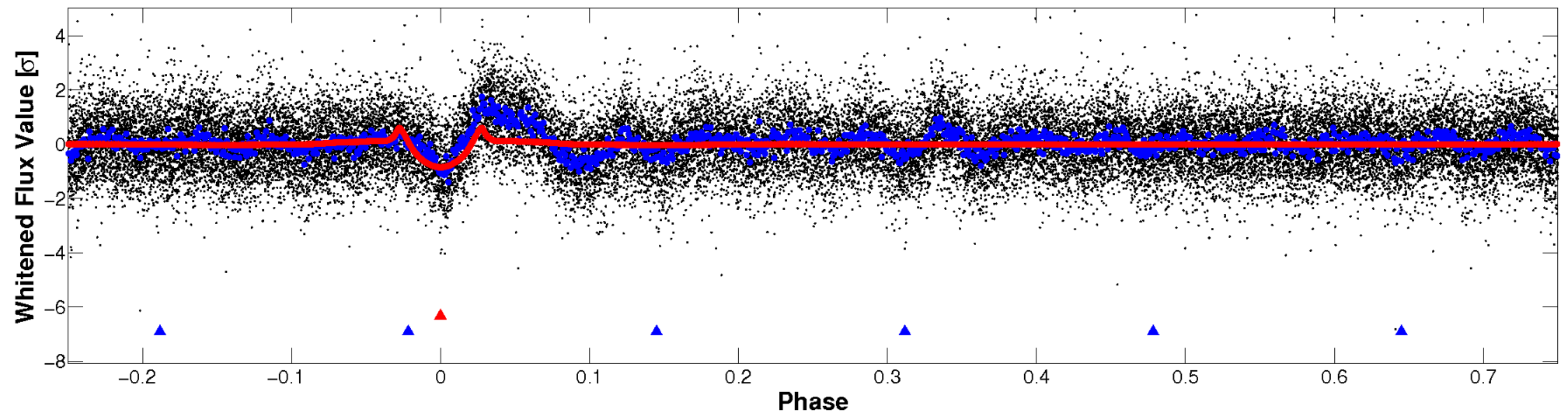


Non-Whitened Vs. Whitened Light Curve

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

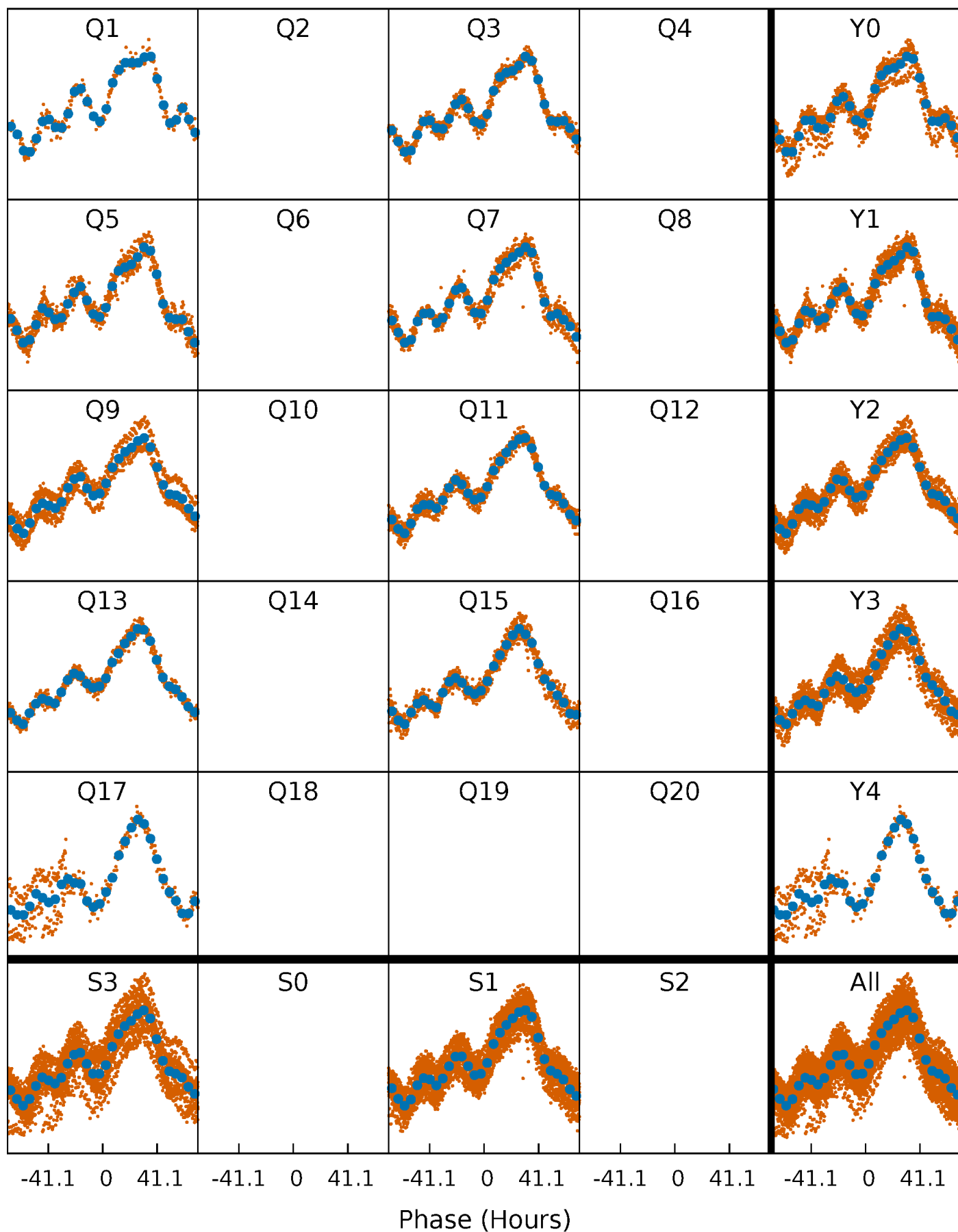


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



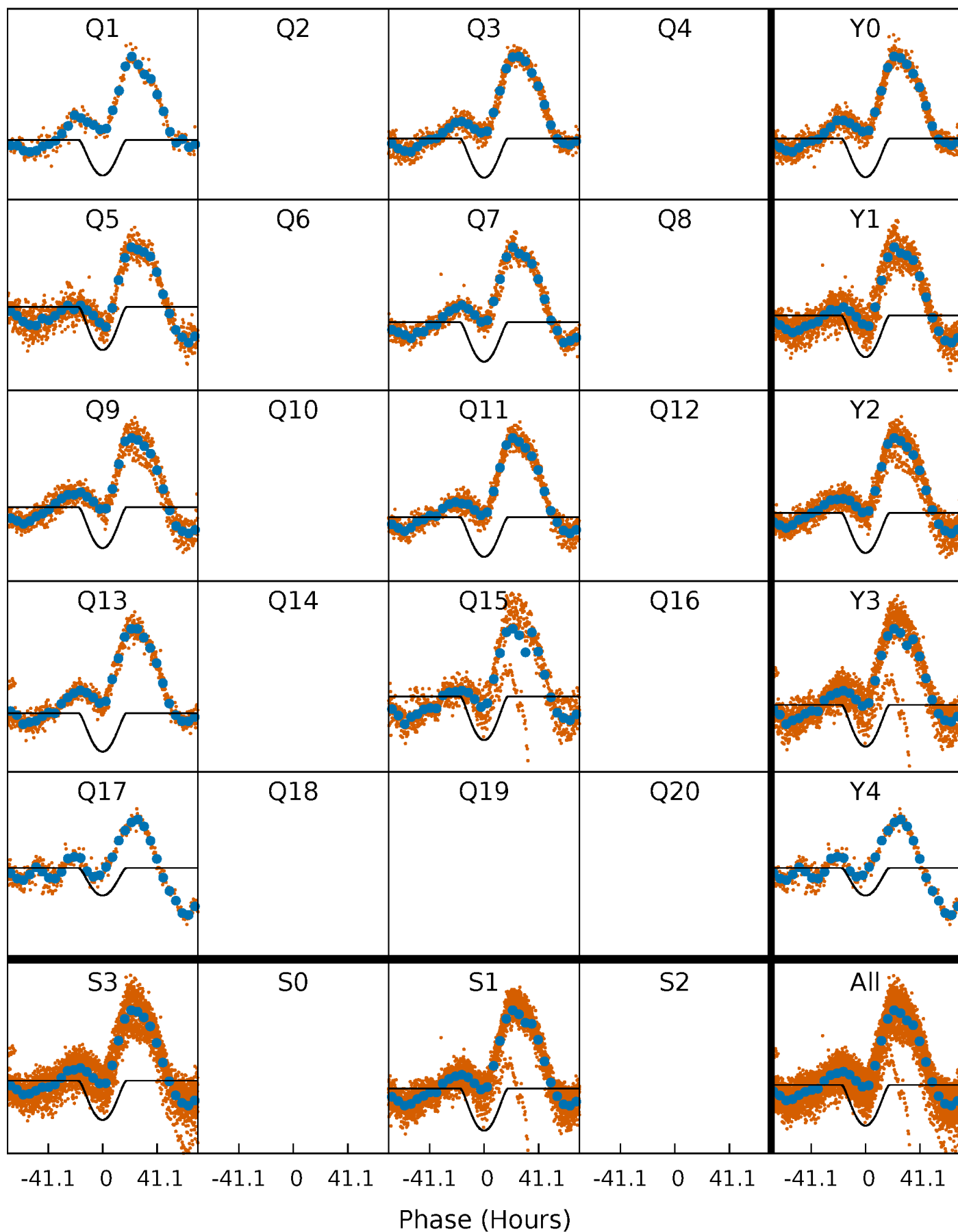
PDC Quarter-Phased Transit Curves

TCE 009016693-01 P= 26.361712 Days $T_0=142.258097$ (BKJD)



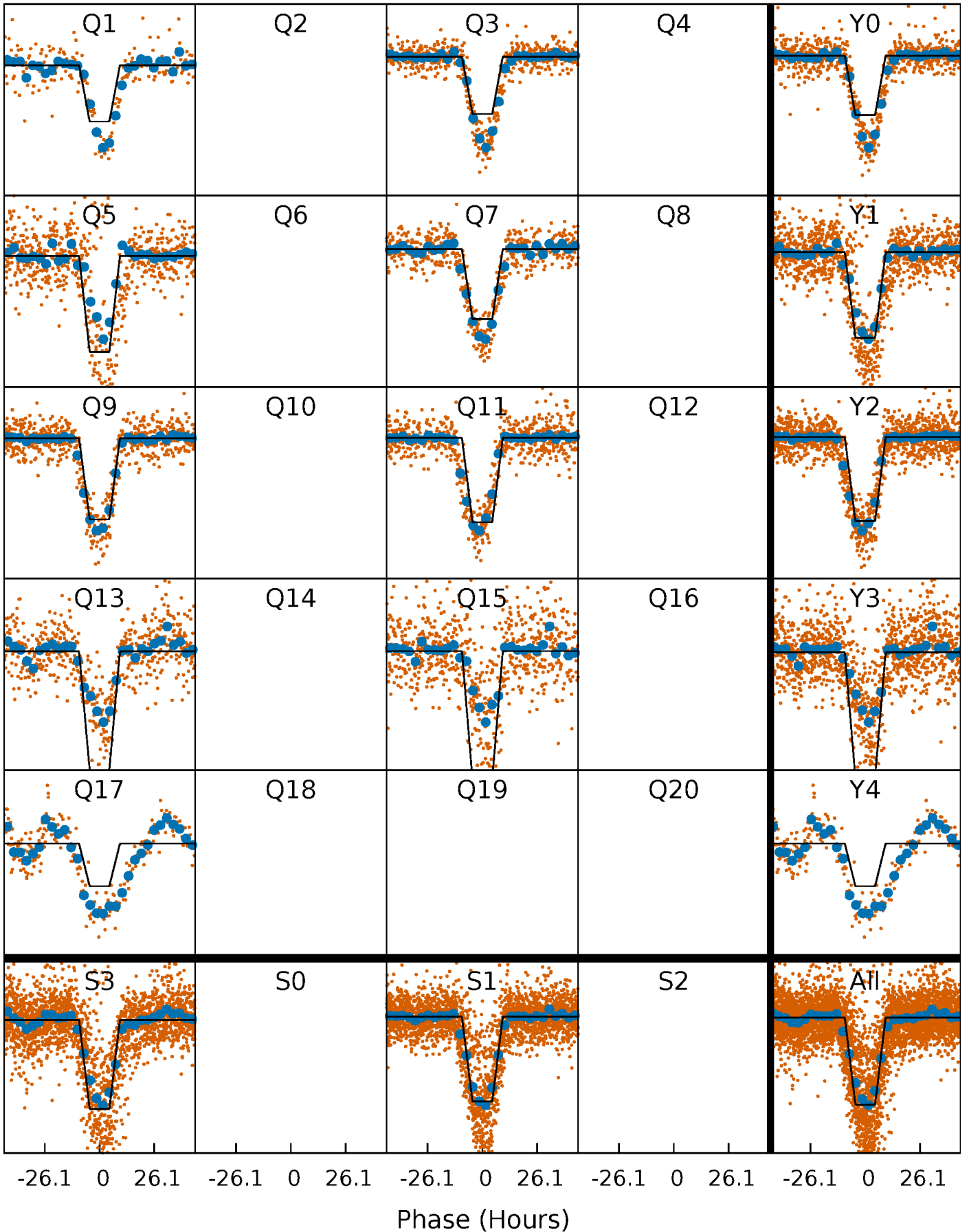
DV Quarter-Phased Transit Curves

TCE 009016693-01 P= 26.361712 Days $T_0=142.258097$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

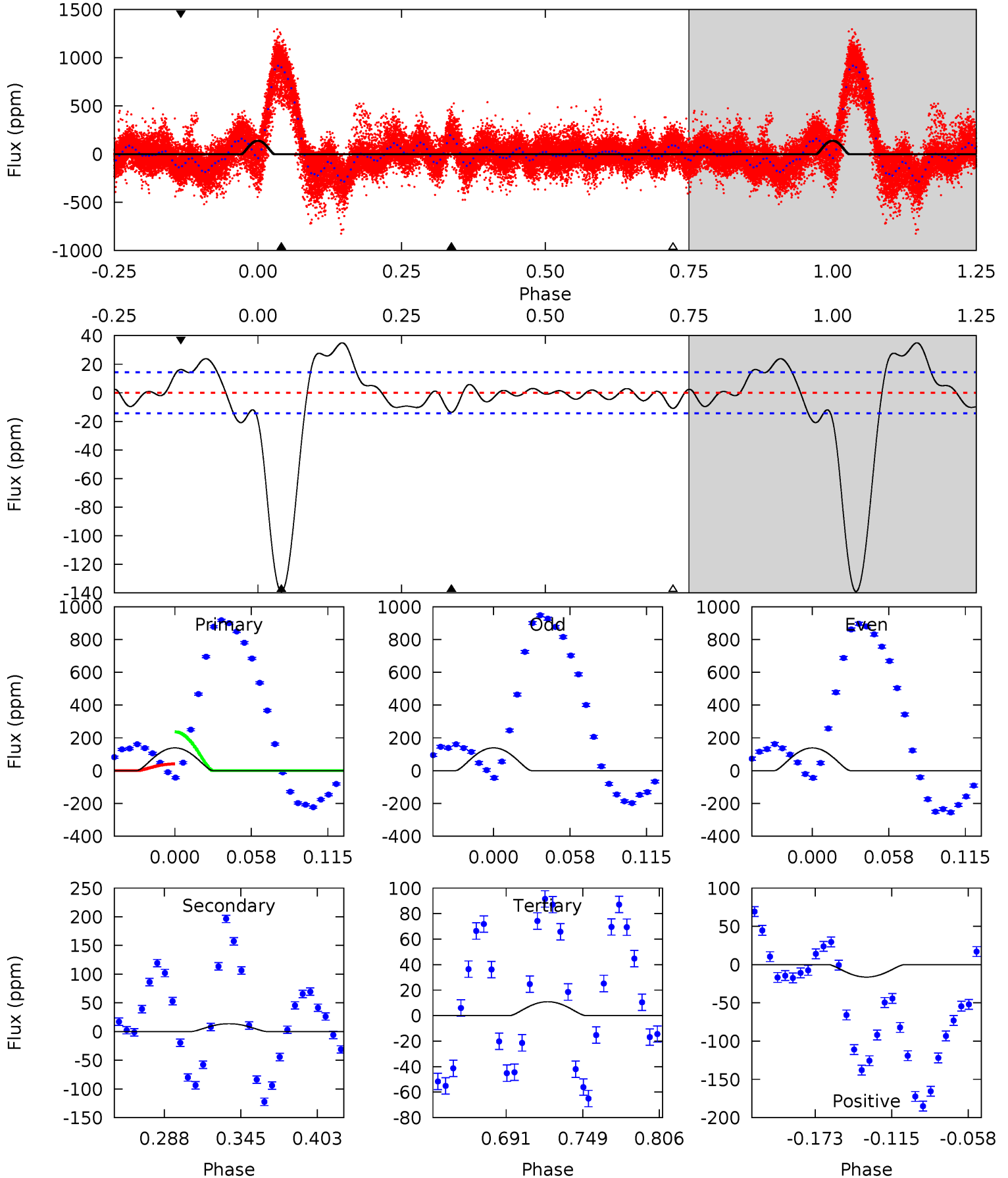
TCE 009016693-01 P= 26.361468 Days $T_0=142.137175$ (BKJD)



DV Model-Shift Uniqueness Test

009016693-01, P = 26.361712 Days, E = 115.896385 Days

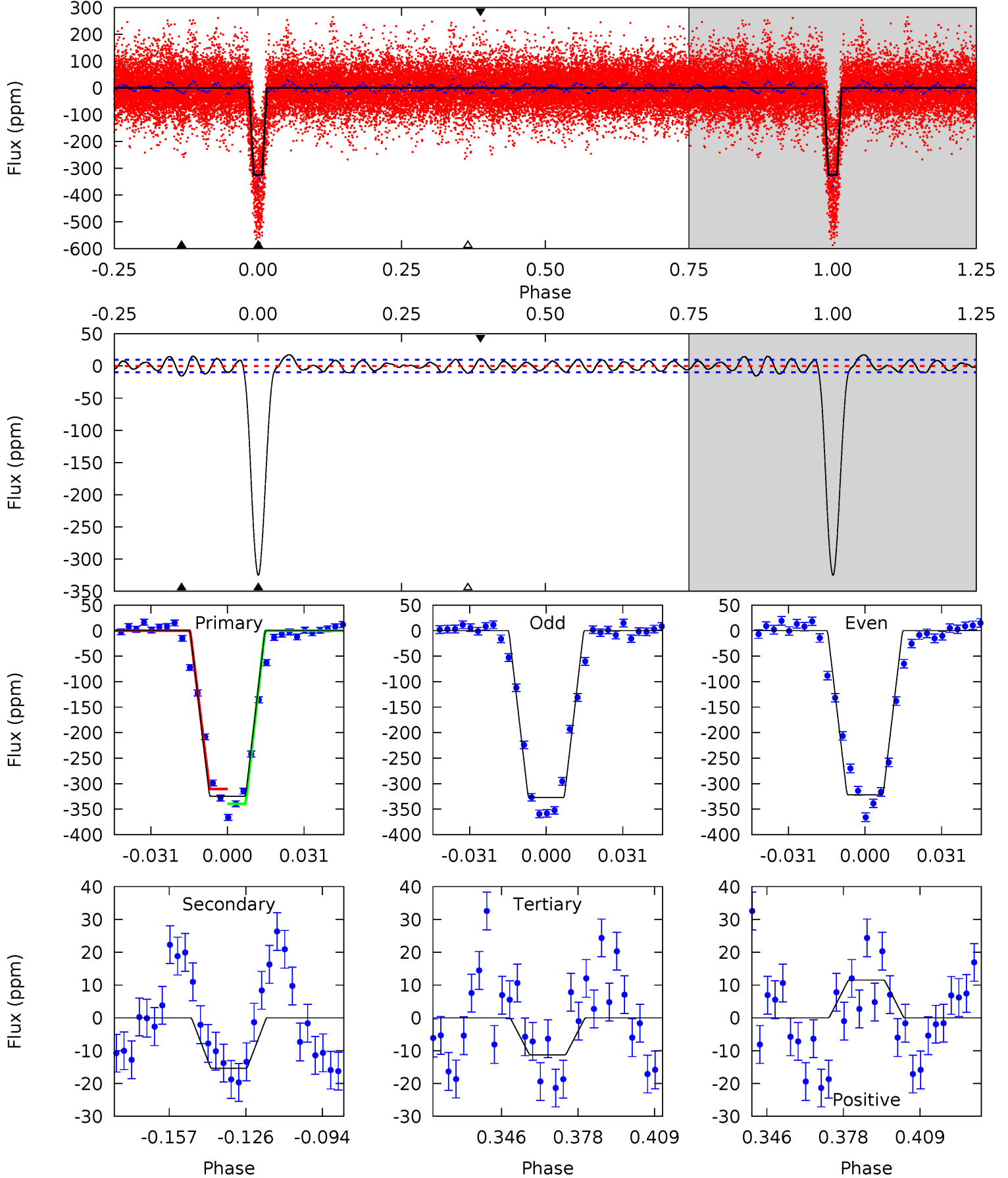
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
45.3	4.46	3.55	5.31	4.68	1.90	3.72	41.7	40.0	0.91	-0.86	0.08	0.76	0.20	29.6



Alt Model-Shift Uniqueness Test

009016693-01, P = 26.361468 Days, E = 115.775707 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
161.3	7.64	5.60	5.72	4.80	2.15	3.04	155.7	155.5	2.04	1.92	1.36	0.89	0.05	7.25



Stellar Parameters For KIC 009016693

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	7262^{+201}_{-327}	$4.012^{+0.209}_{-0.171}$	$-0.080^{+0.250}_{-0.350}$	$2.071^{+0.520}_{-0.578}$	$1.605^{+0.200}_{-0.326}$	$0.255^{+0.351}_{-0.111}$
	+3%/-5%	+5%/-4%	+312%/-438%	+25%/-28%	+12%/-20%	+138%/-44%
Source	KIC0	KIC0	KIC0	DSEP		

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

Secondary Eclipse Parameters for KIC 009016693-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	A_{obs}
DV	-14 ± 3	$8.47^{+3.60}_{-3.25}$	1433^{+103}_{-117}	2893^{+481}_{-286}	$4.160^{+7.494}_{-2.229}$
Alt.	-15 ± 2	$4.34^{+3.20}_{-2.56}$	1419^{+113}_{-114}	3599^{+1412}_{-551}	17^{+89}_{-12}

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

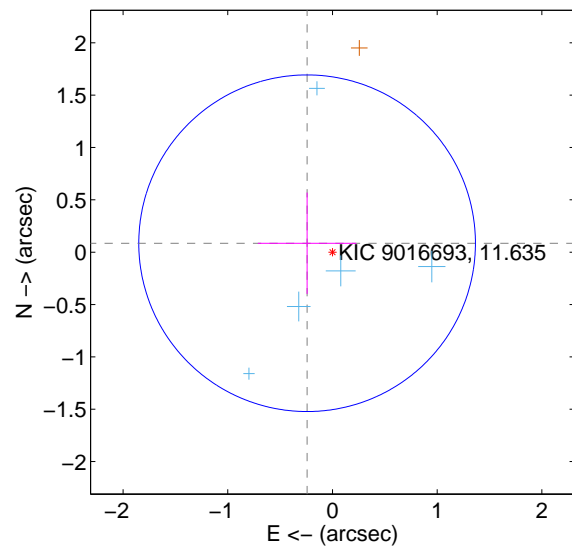
Supplemental centroid analysis for 009016693-01. **Kepler magnitude: 11.63.** Transit SNR 25.80

There are 5 quarters with good PRF difference image offsets

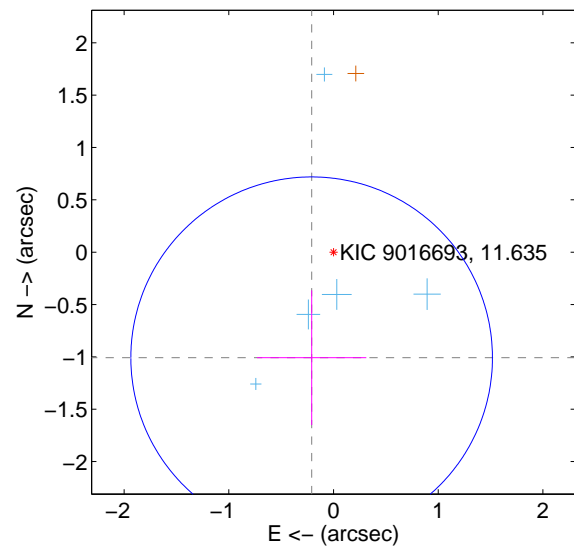
The direct PRF centroid is offset from the target star catalog position by about 0.15 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.257 ± 0.536	0.48	0.242 ± 0.470	0.085 ± 0.484
PRF-fit source offset from KIC position	1.030 ± 0.576	1.79	0.209 ± 0.523	-1.008 ± 0.643
photometric centroid source offset	1.14 ± 0.26	4.34	-1.14 ± 0.26	0.03 ± 0.11

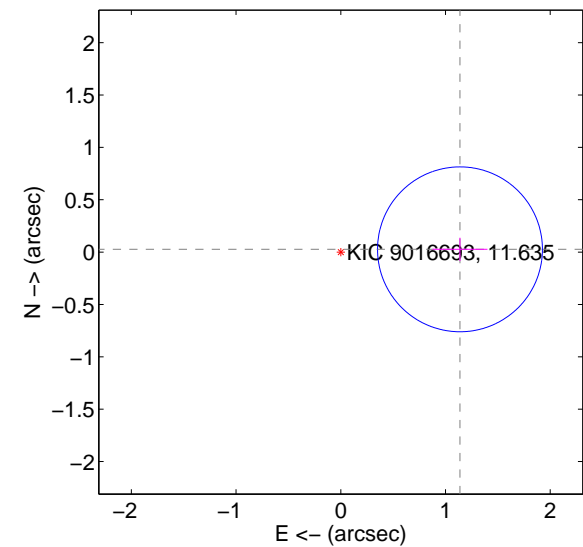
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

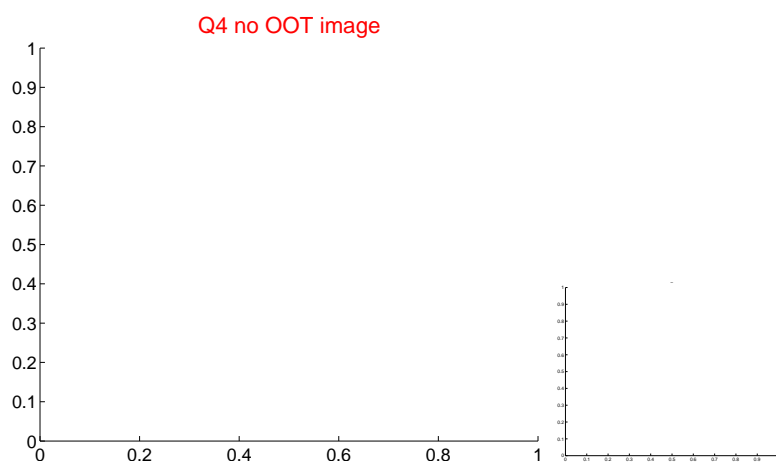
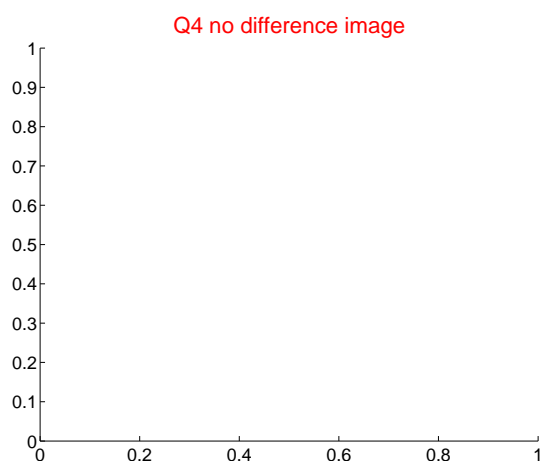
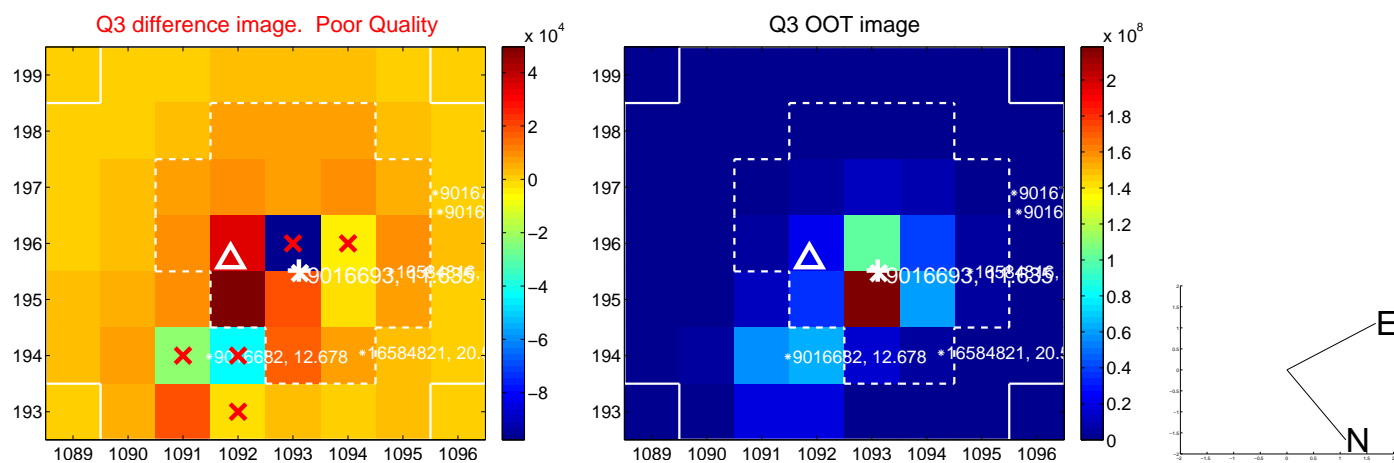
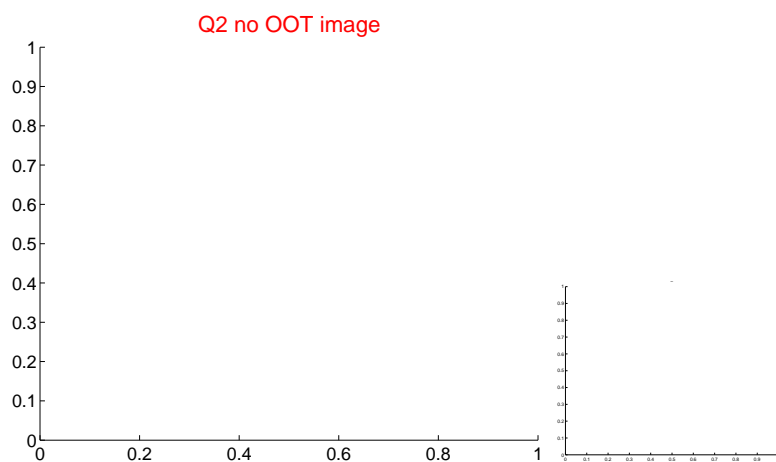
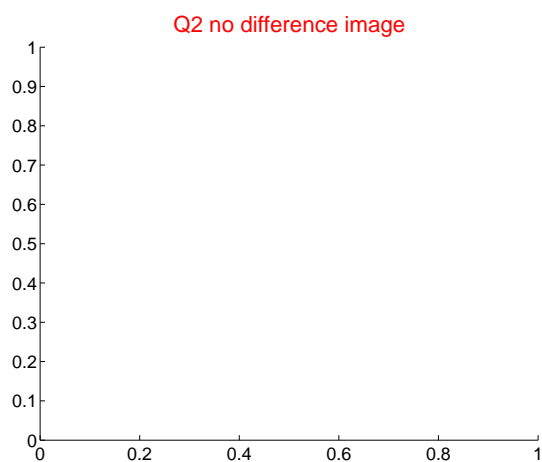
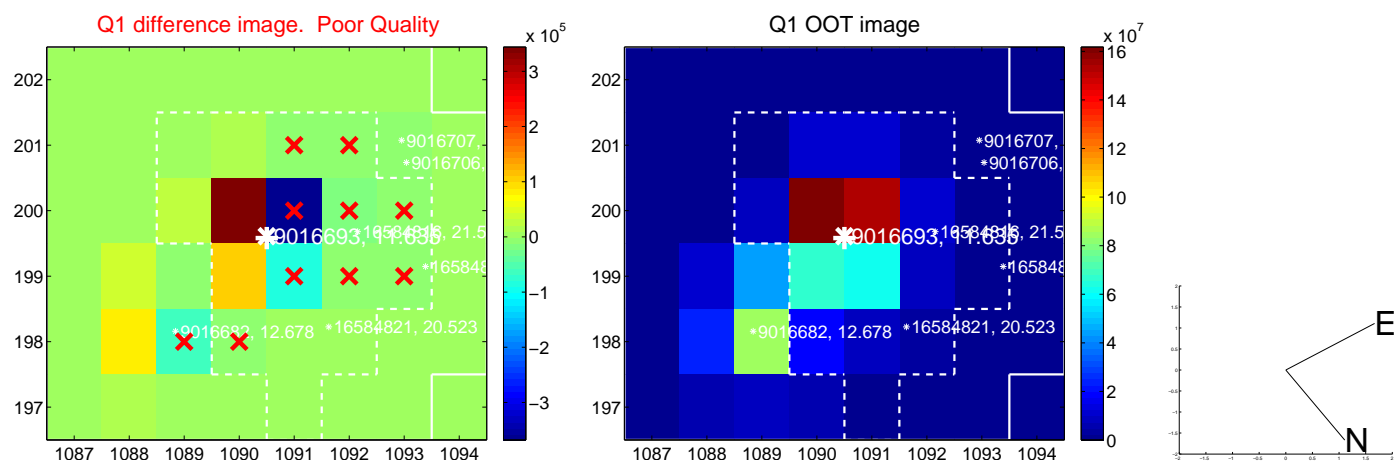


offset from photometric centroids

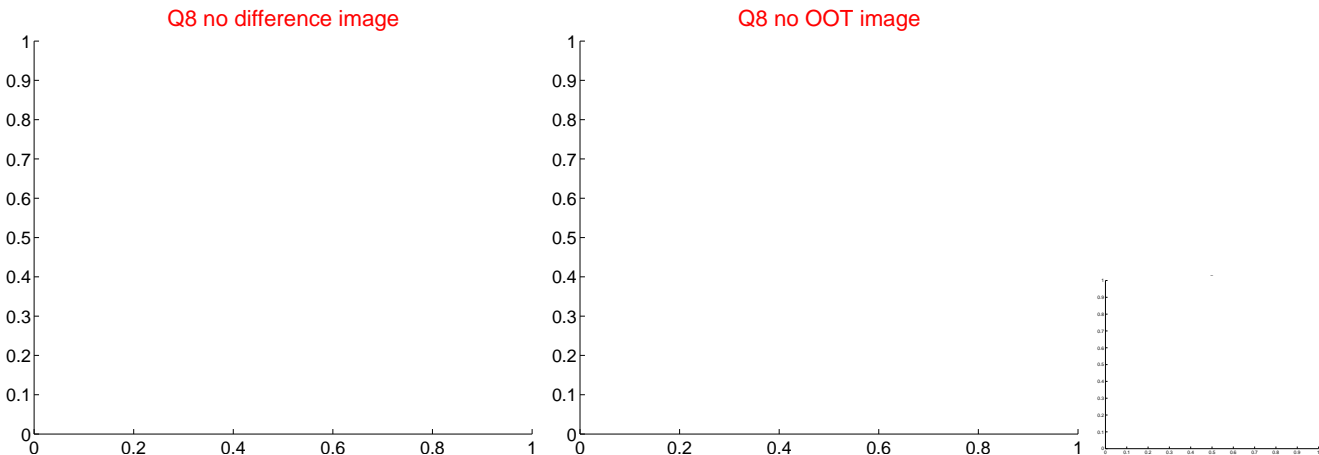
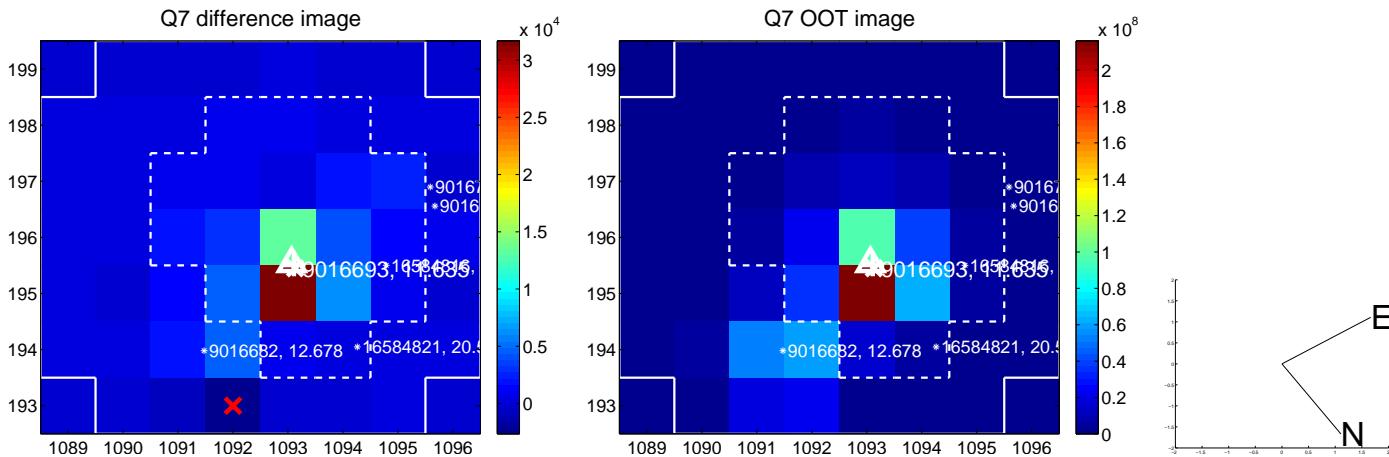
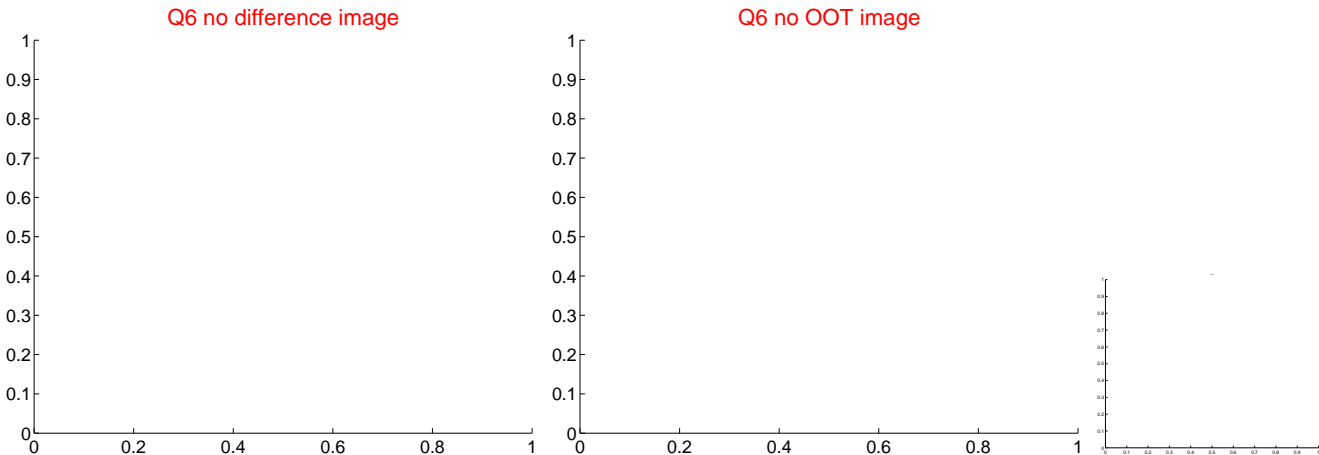
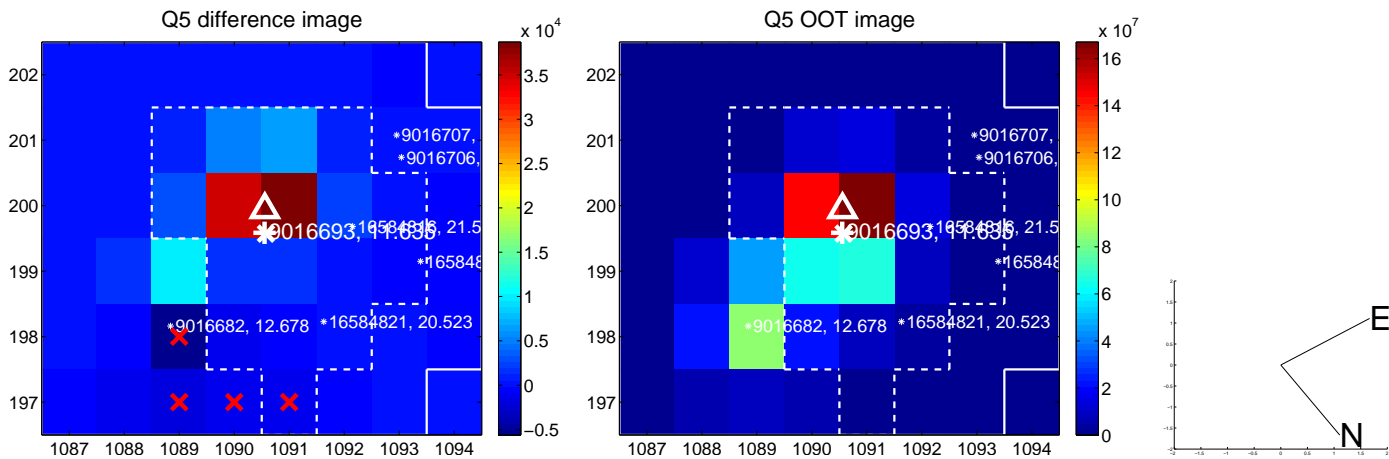


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

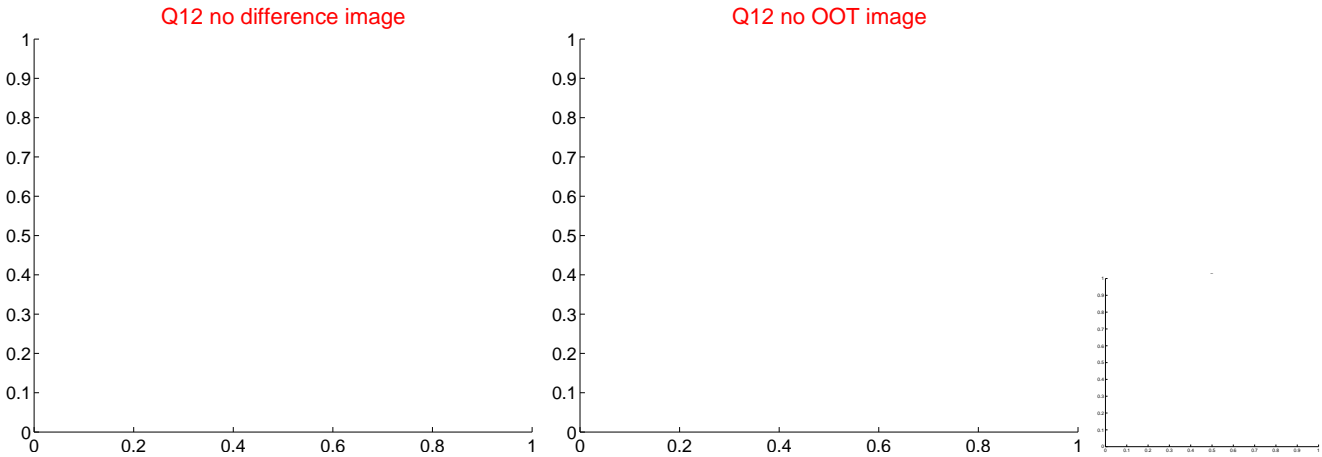
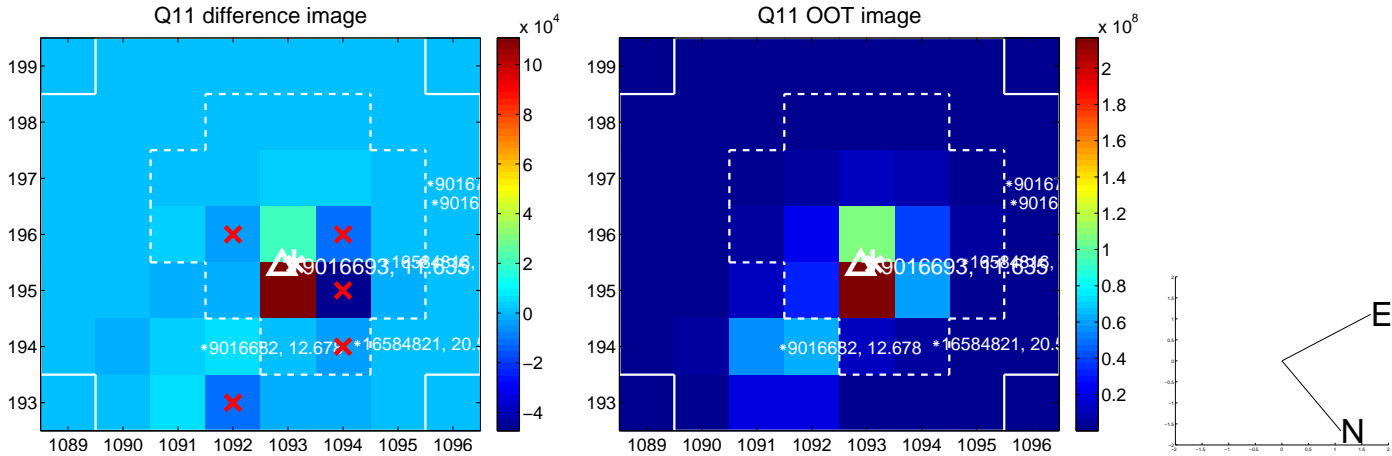
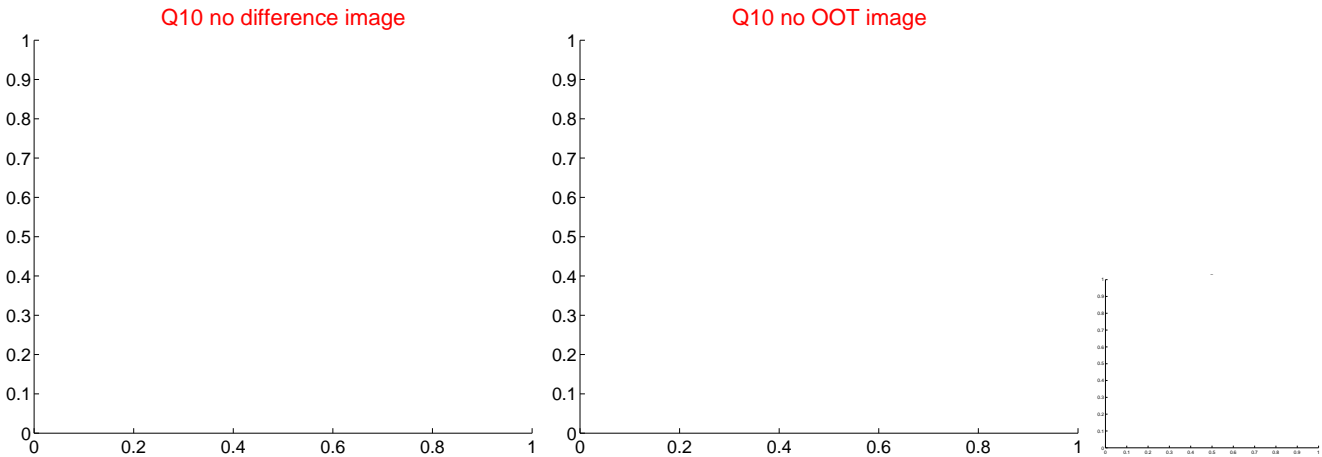
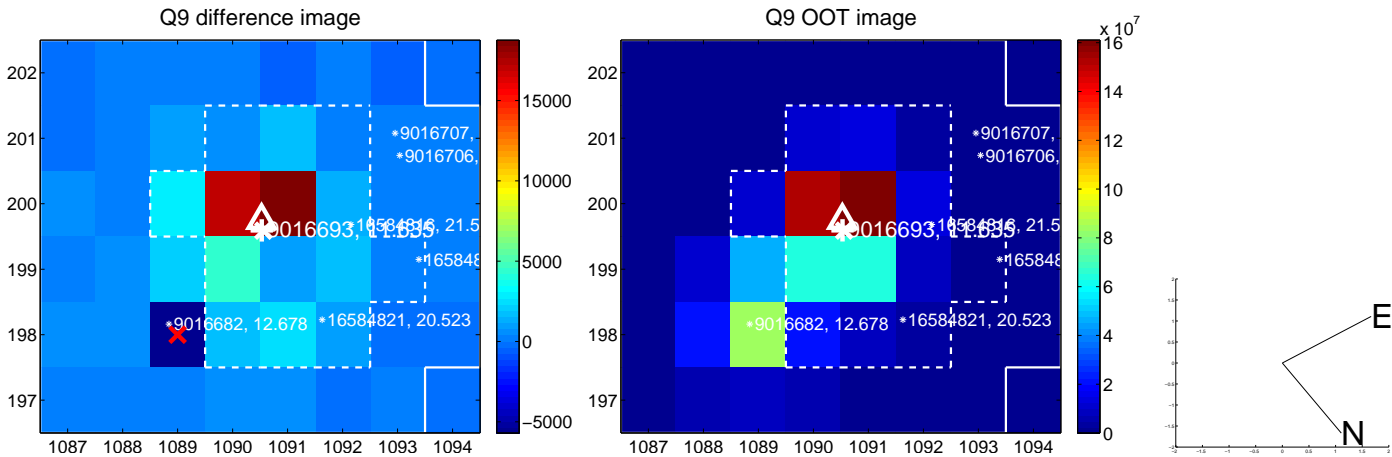
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



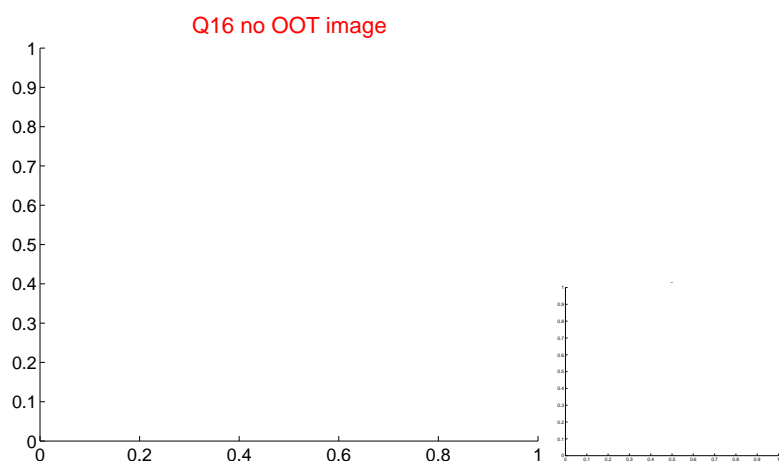
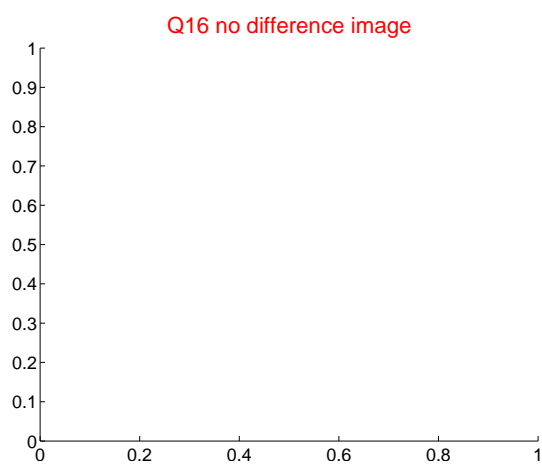
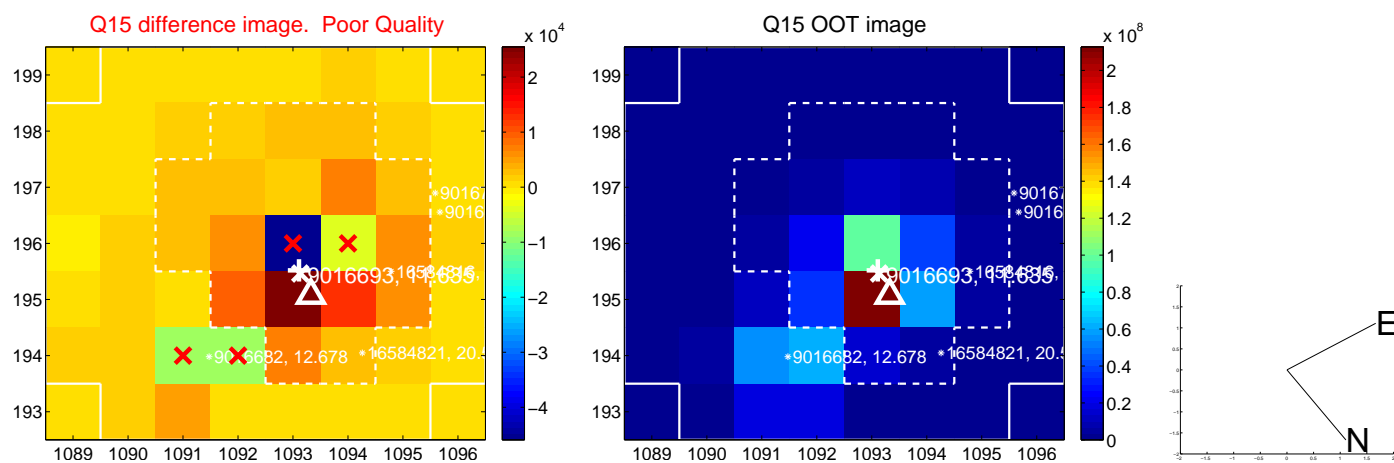
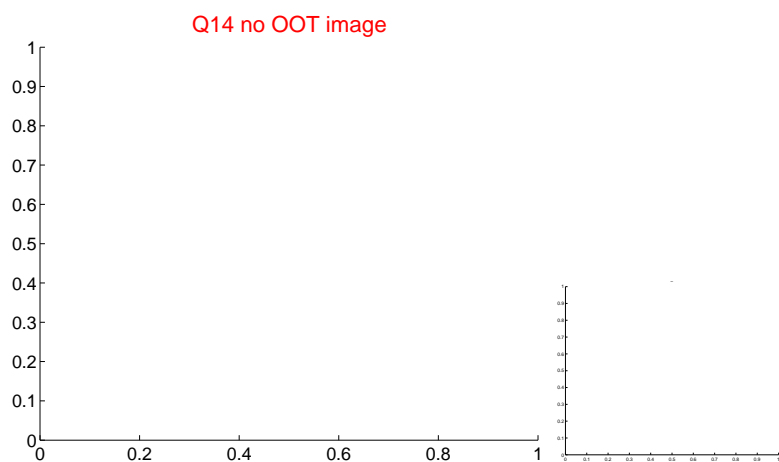
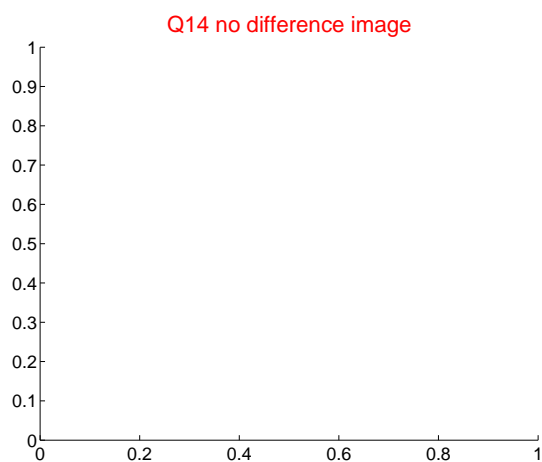
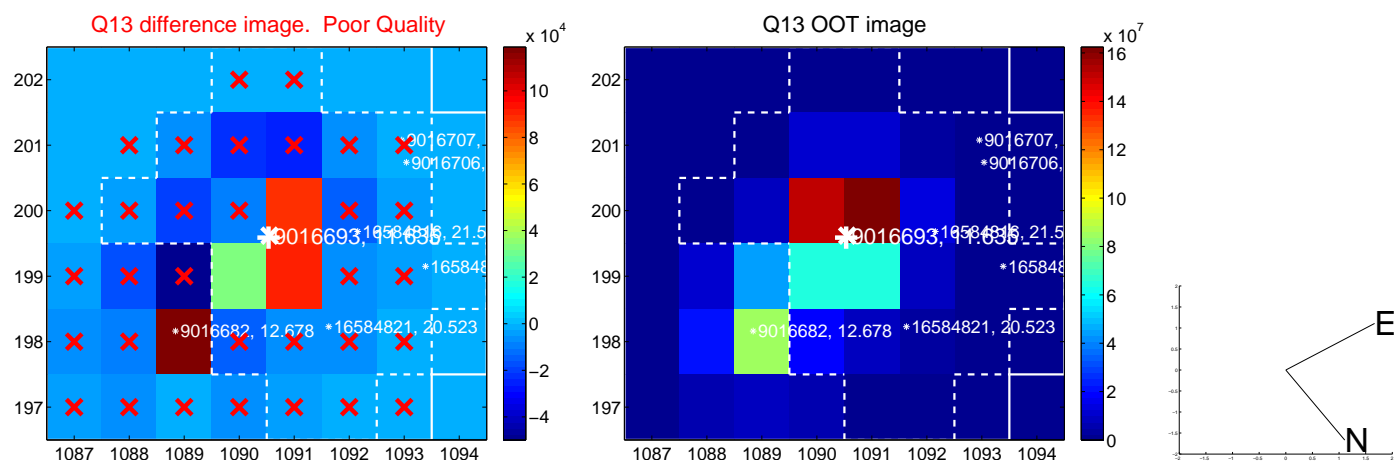
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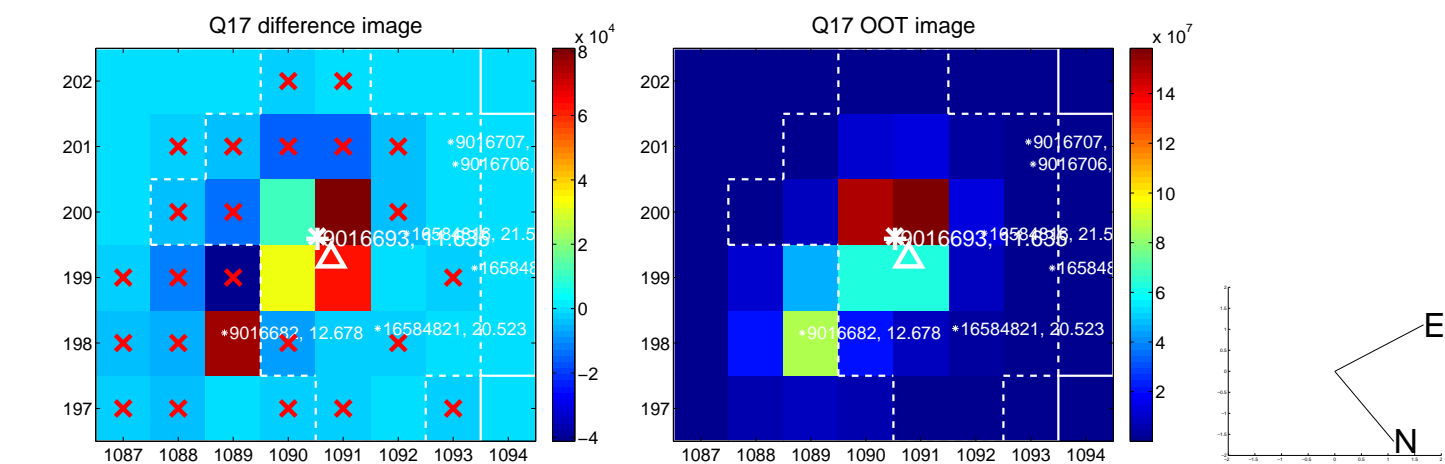
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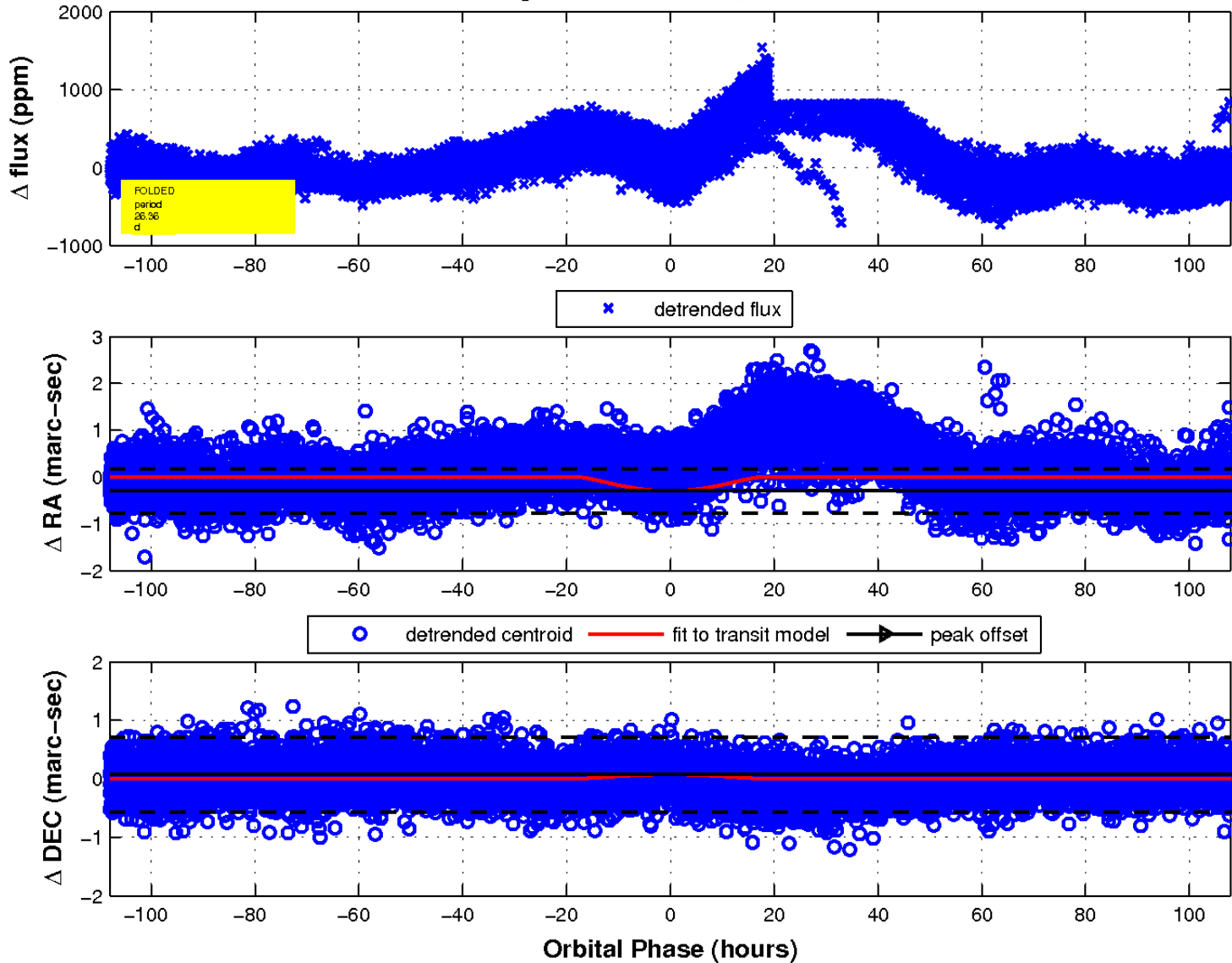
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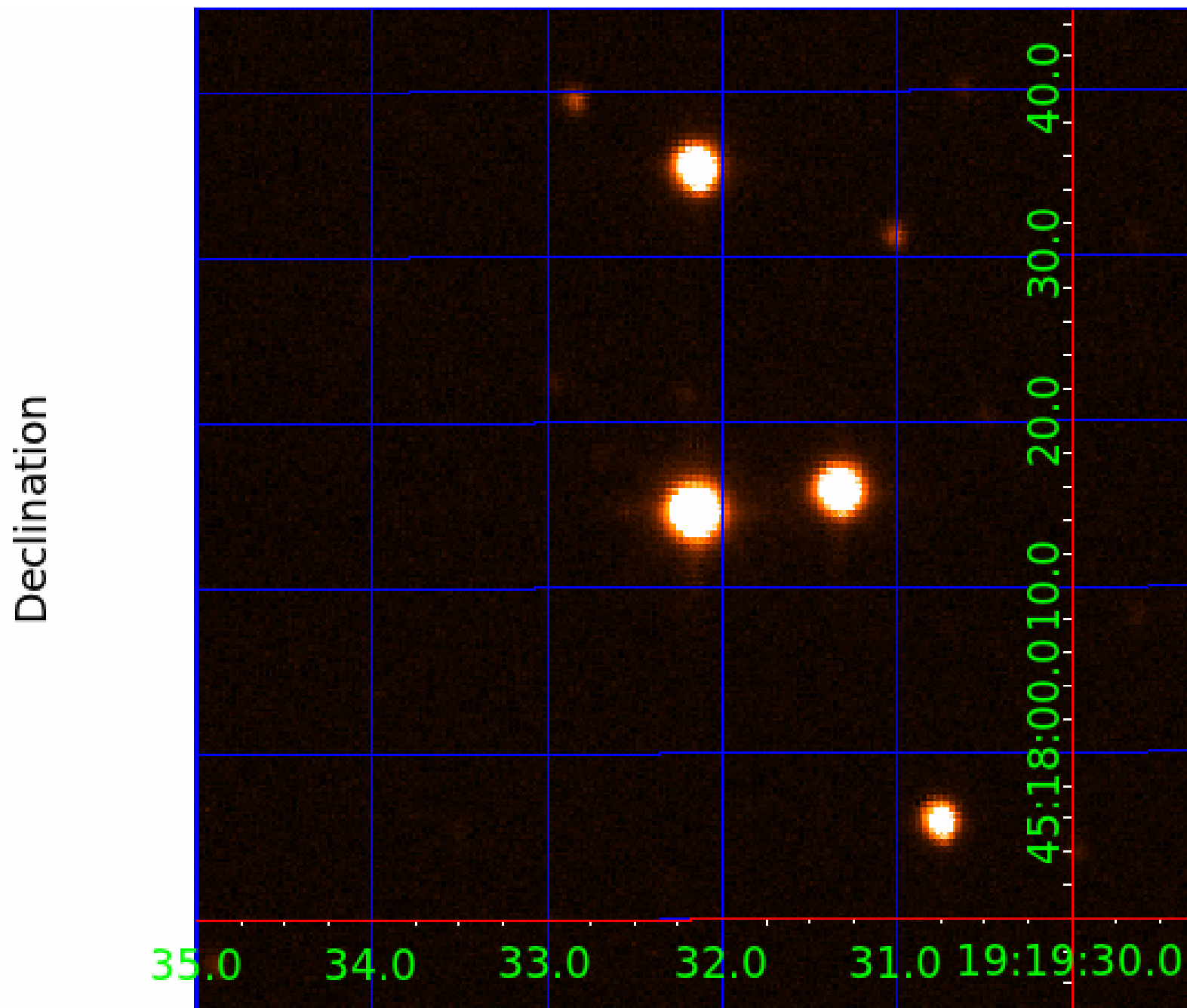
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fluxWeightedCentroids, Planet 1 of 2



UKIRT Image



KIC 009016693

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})
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Robovetter Results

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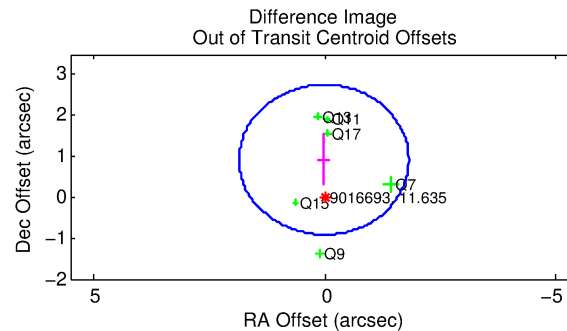
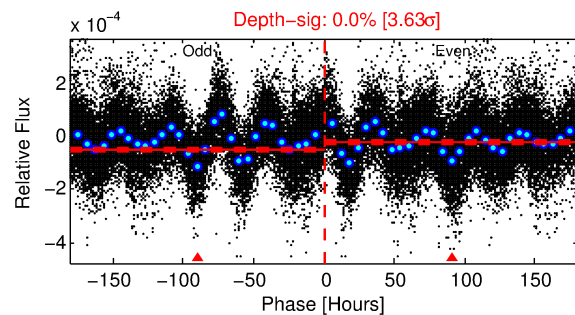
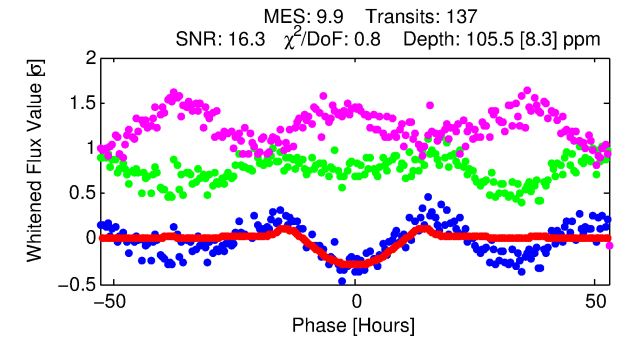
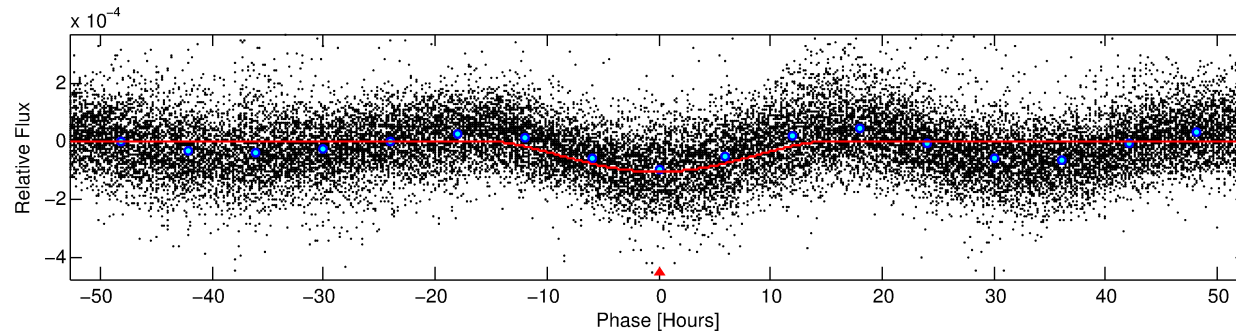
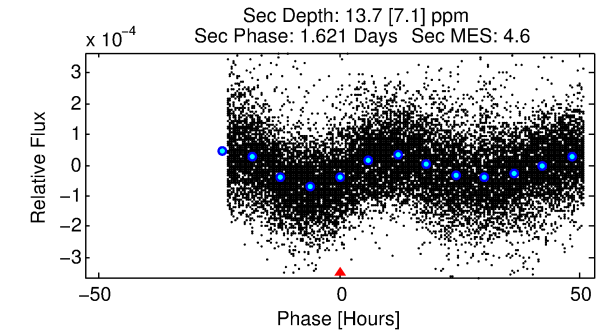
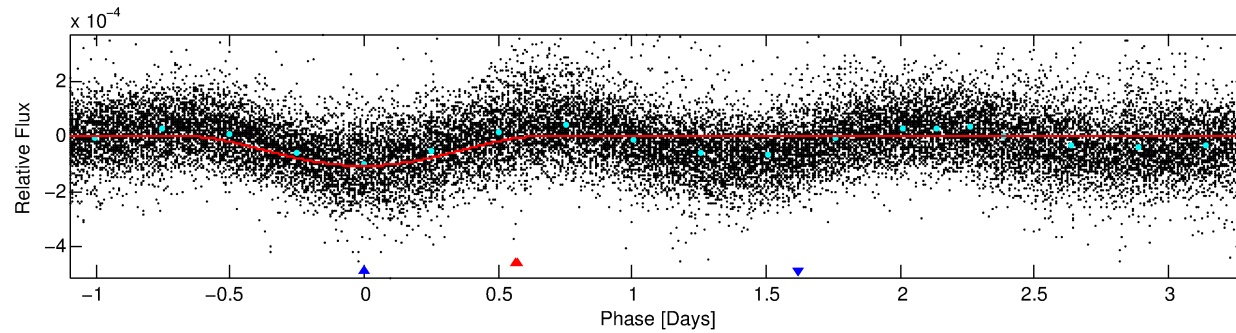
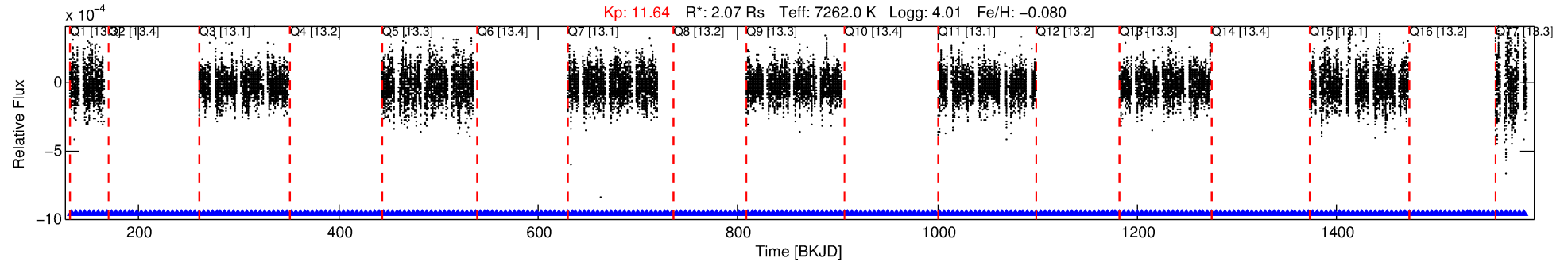
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009016693-02

No Significant Match Found

DV One-Page Summary

KIC: 9016693 Candidate: 2 of 2 Period: 4.394 d



DV Fit Results:

Period = 4.39359 [0.00016] d
Epoch = 132.9061 [0.0289] BKJD
Rp/R* = 0.0183 [0.0097]
a/R* = 1.03 [0.01]
b = 1.00 [0.01]
Seff = 2823.67 [1164.19]
Teq = 1859 [192] K
Rp = 4.14 [2.47] Re
a = 0.0615 [0.0151] AU
Ag = 1.67 [2.05] [0.32σ]
Teffp = 3266 [971] K [1.42σ]

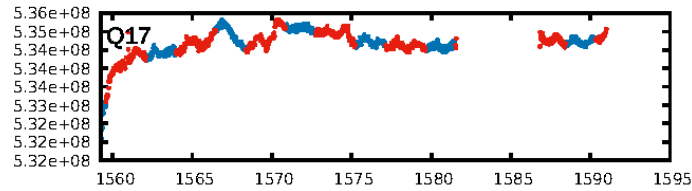
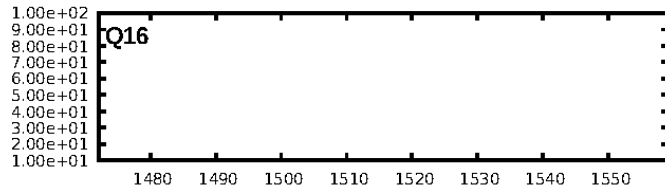
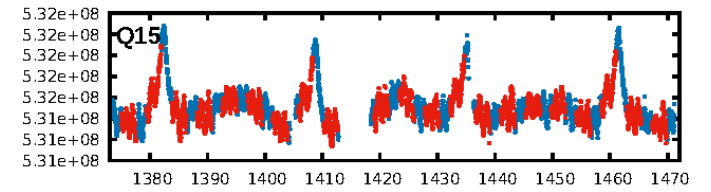
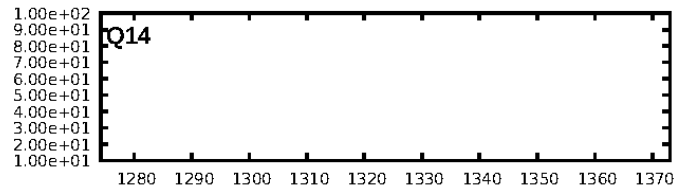
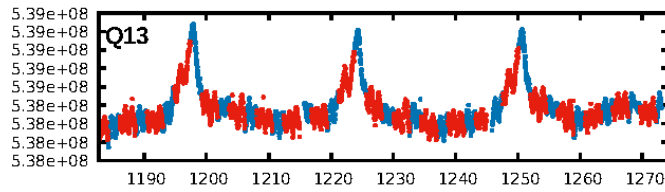
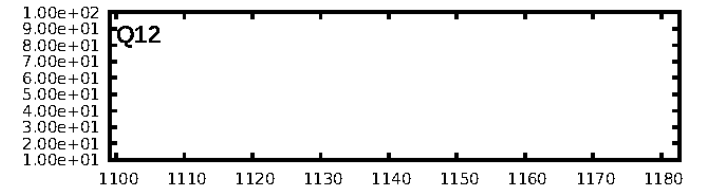
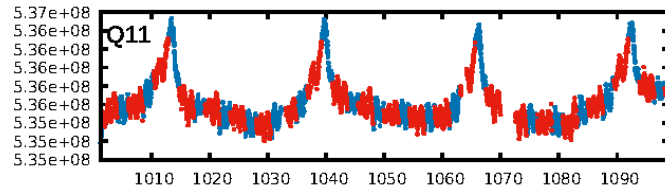
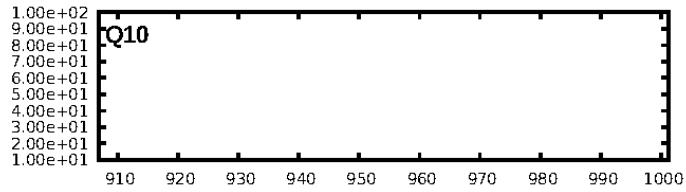
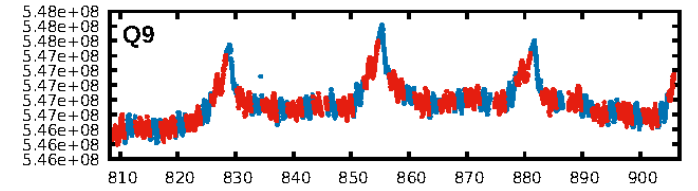
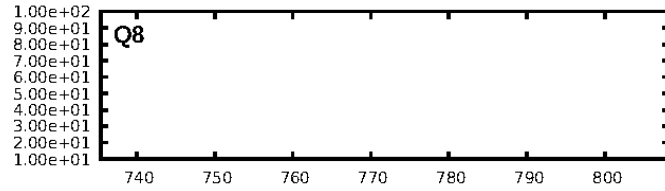
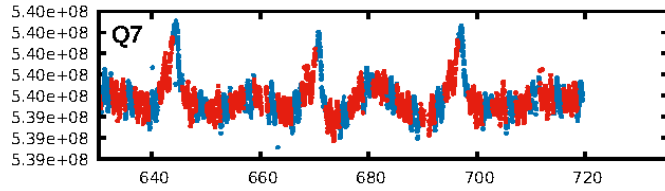
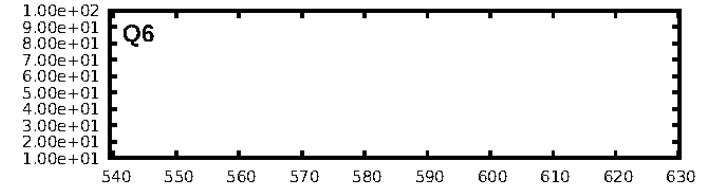
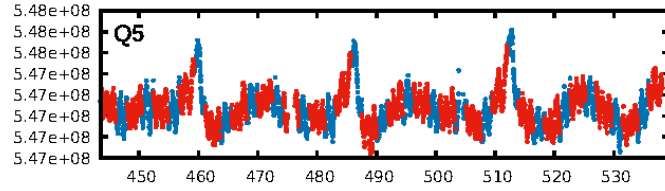
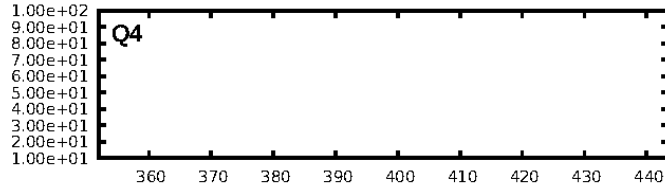
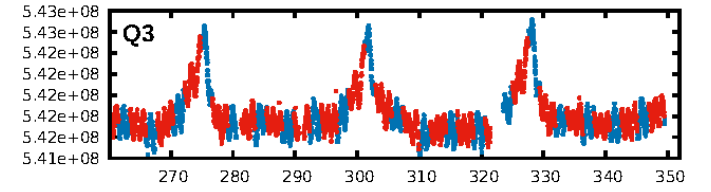
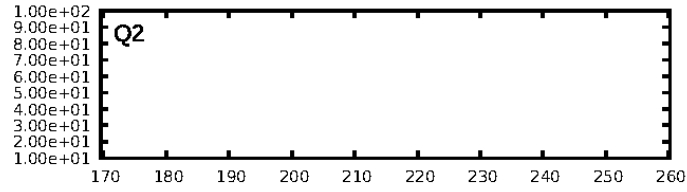
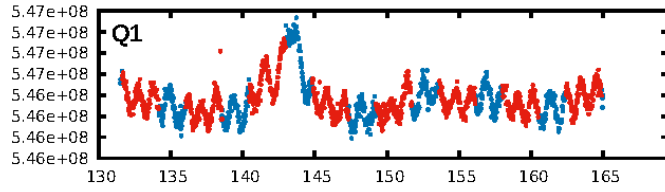
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 100.0% [11.24σ]
ModelChiSquare2-sig: 95.4%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 4.18e-31
RollingBand-fgt: 1.00 [125/125]
GhostDiagnostic-chr: -42.36
Centroid-sig: 0.0%
Centroid-so: 2.452 arcsec [6.15σ]
OotOffset-rm: 0.921 arcsec [1.51σ]
KicOffset-rm: 0.841 arcsec [1.30σ]
OotOffset-st: 0/3/0/3 [6]
KicOffset-st: 0/3/0/3 [6]
DiffImageQuality-fgm: 0.83 [5/6]
DiffImageOverlap-fno: 1.00 [9/9]

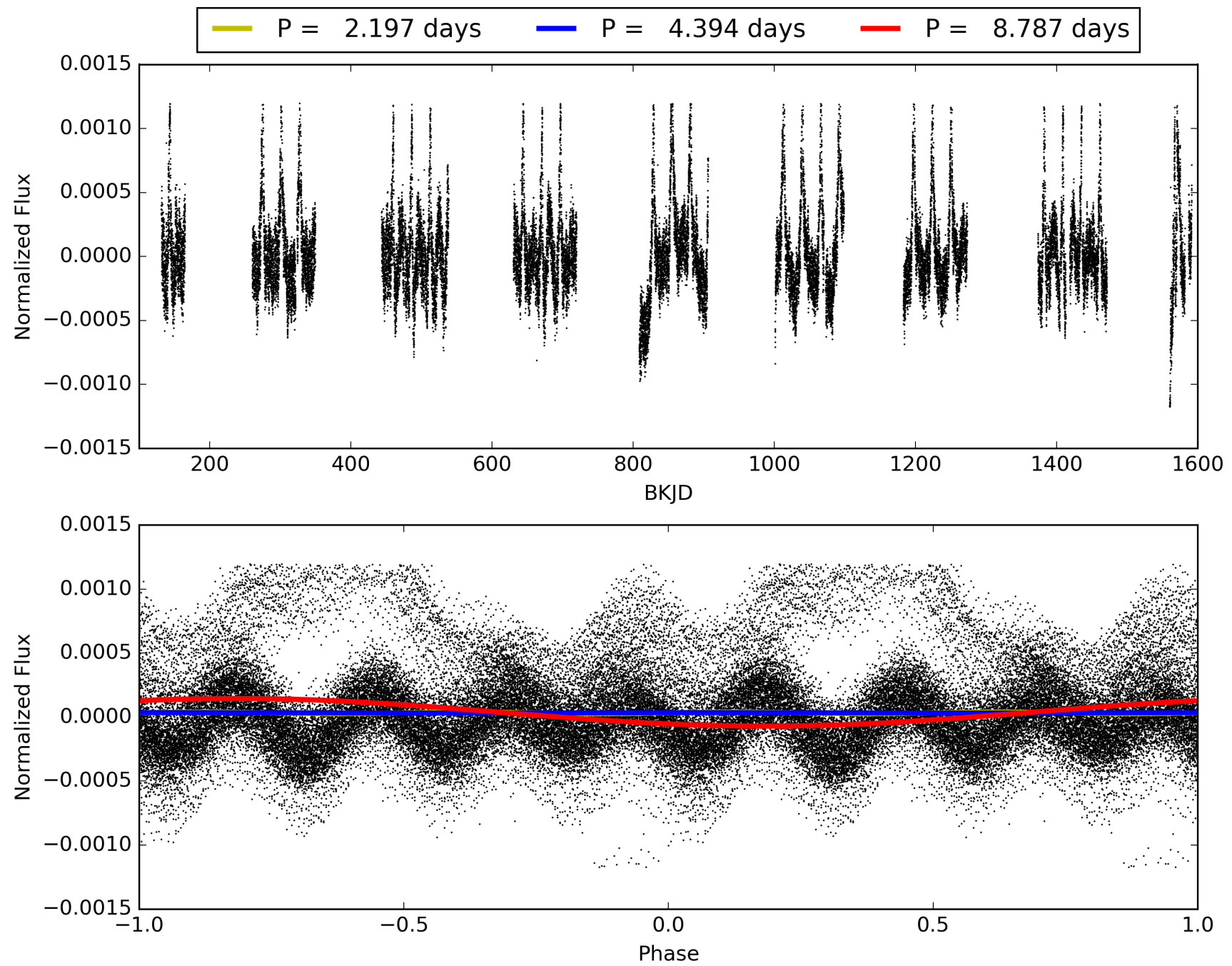
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 00:07:29 Z

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

TCE 009016693-02, PDC Light Curves

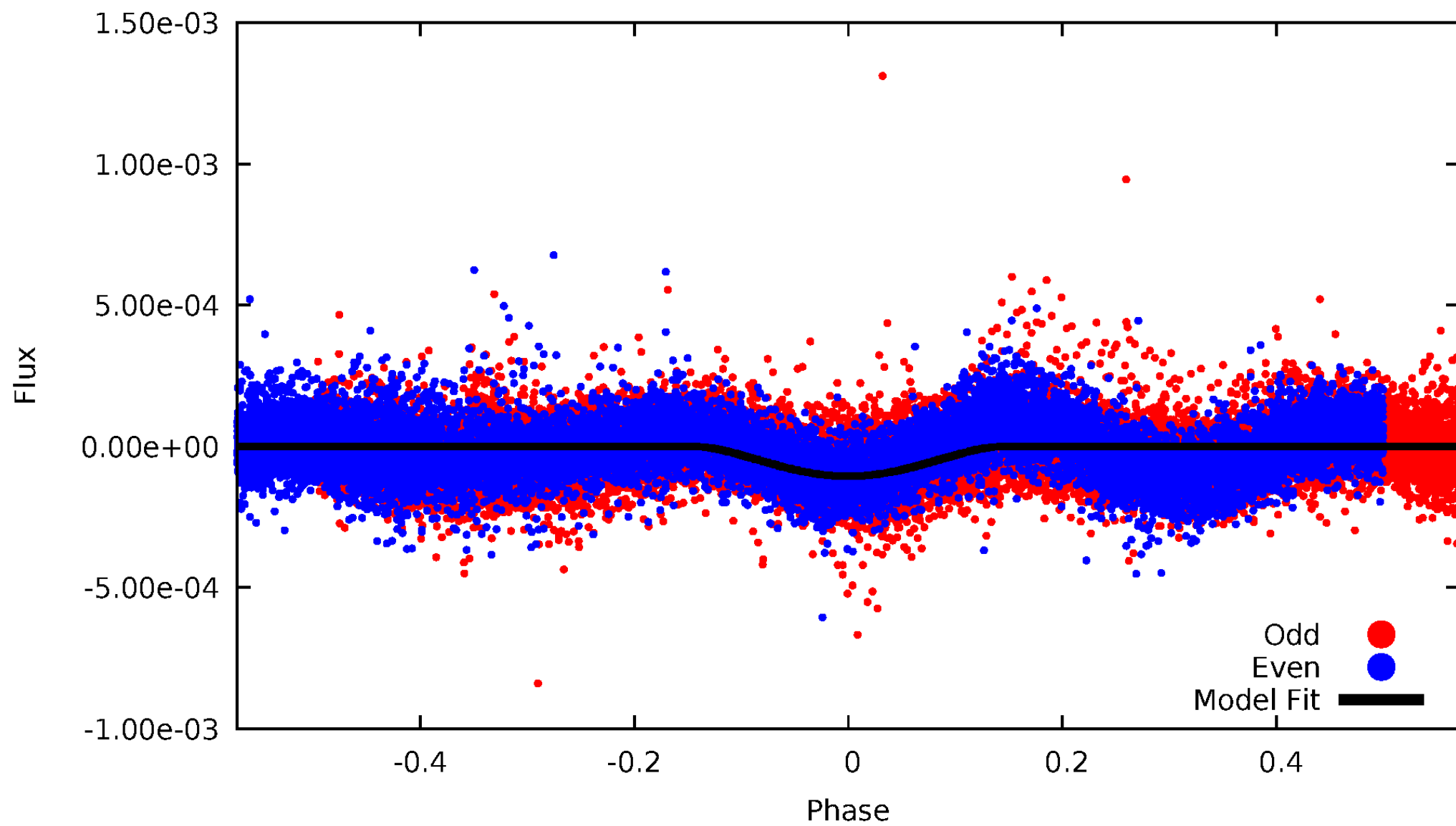


TCE 009016693-02



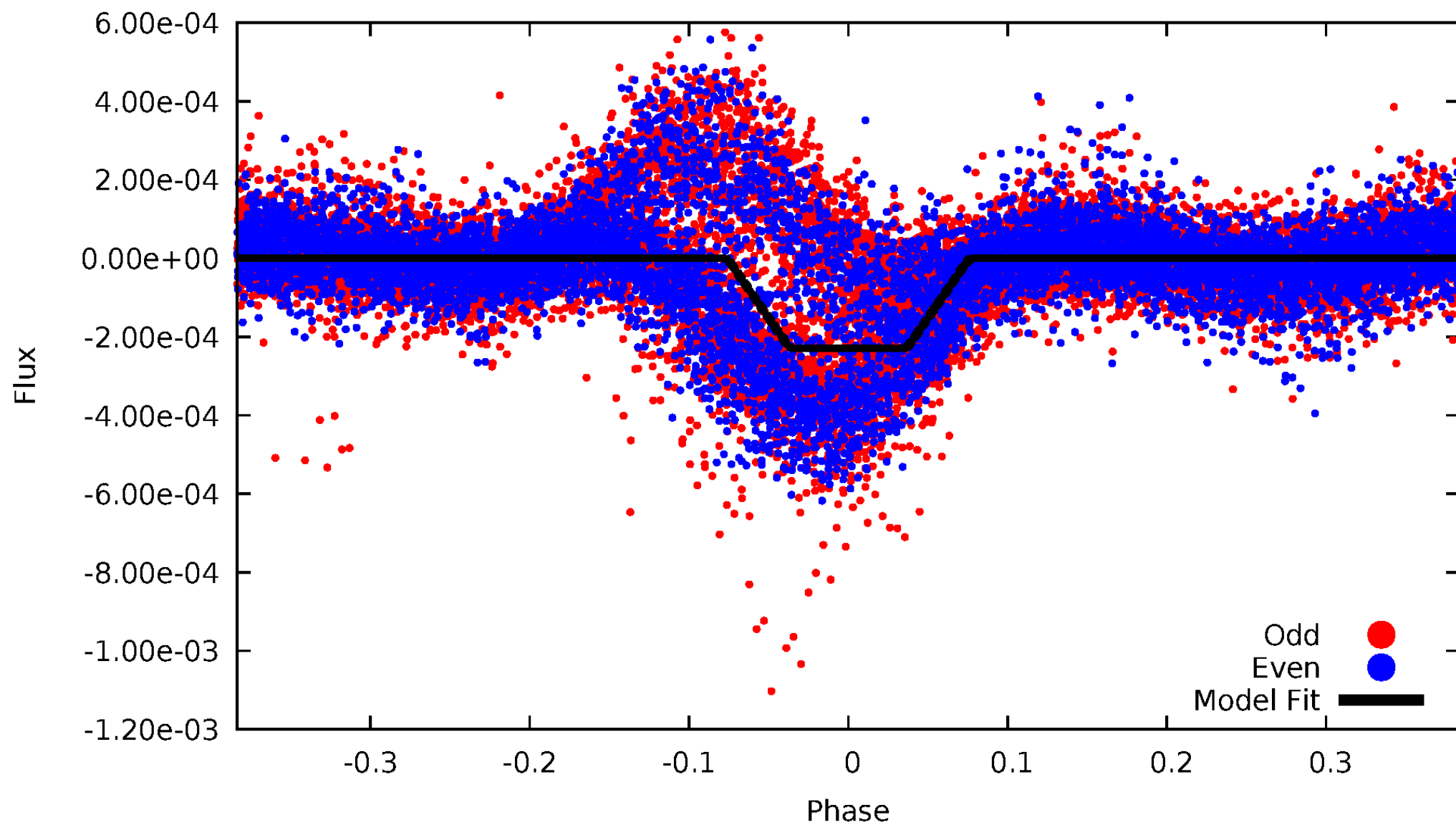
DV Odd/Even

TCE 009016693-02



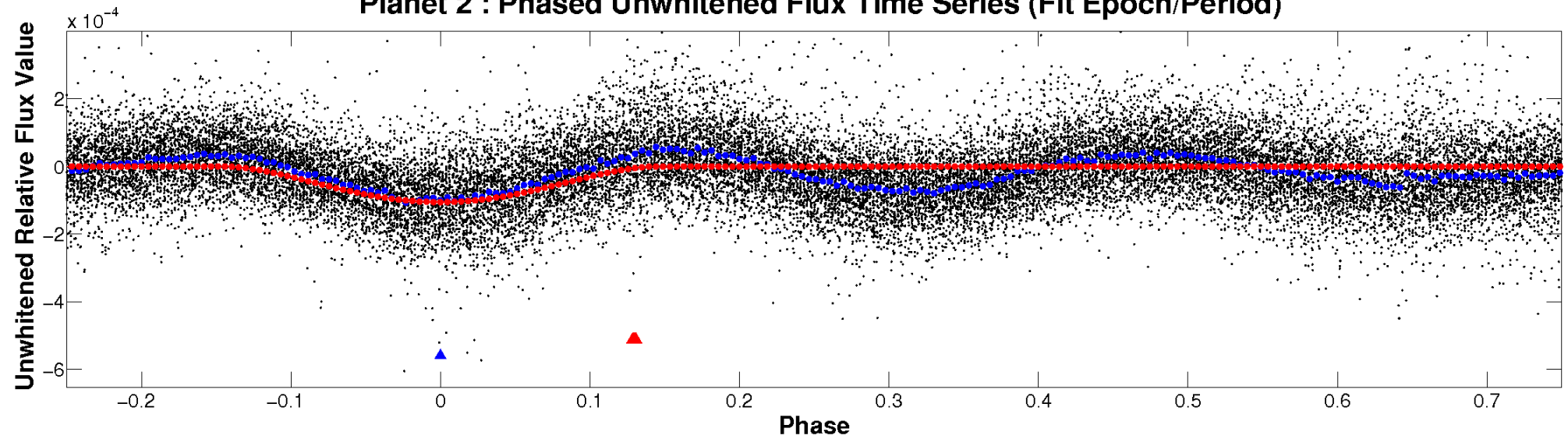
ALT Odd/Even

TCE 009016693-02

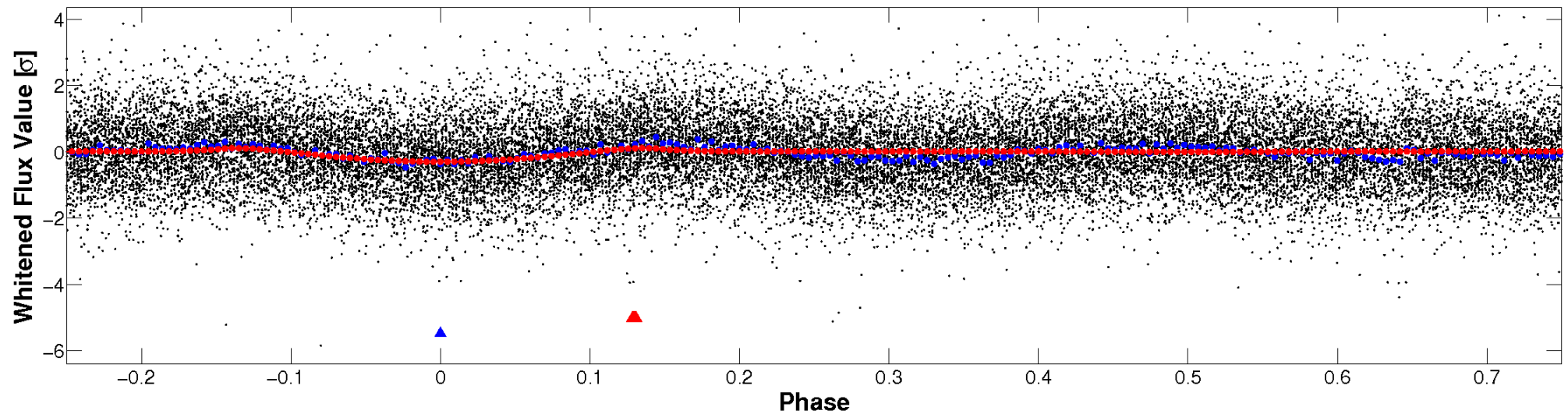


Non-Whitened Vs. Whitened Light Curve

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

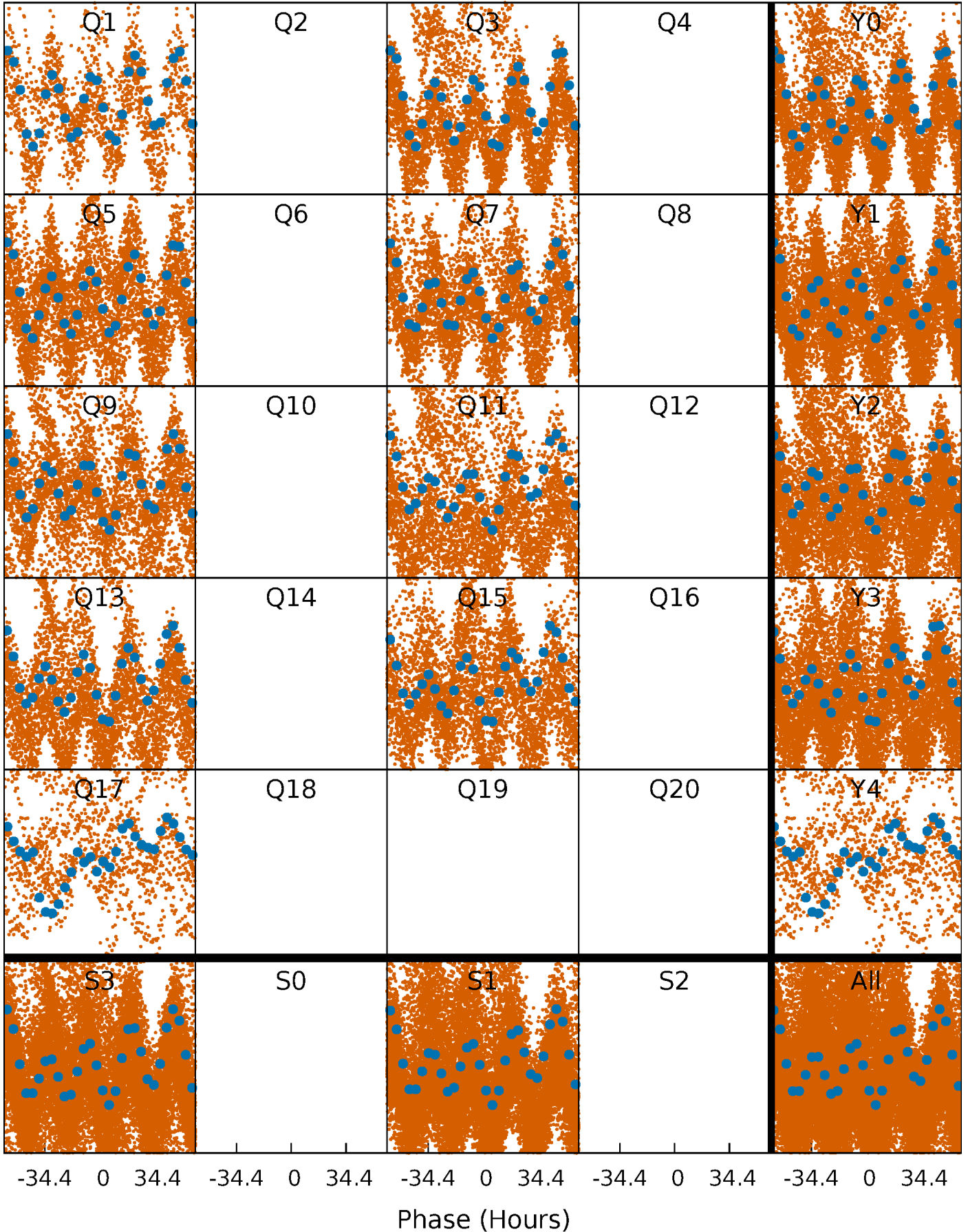


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



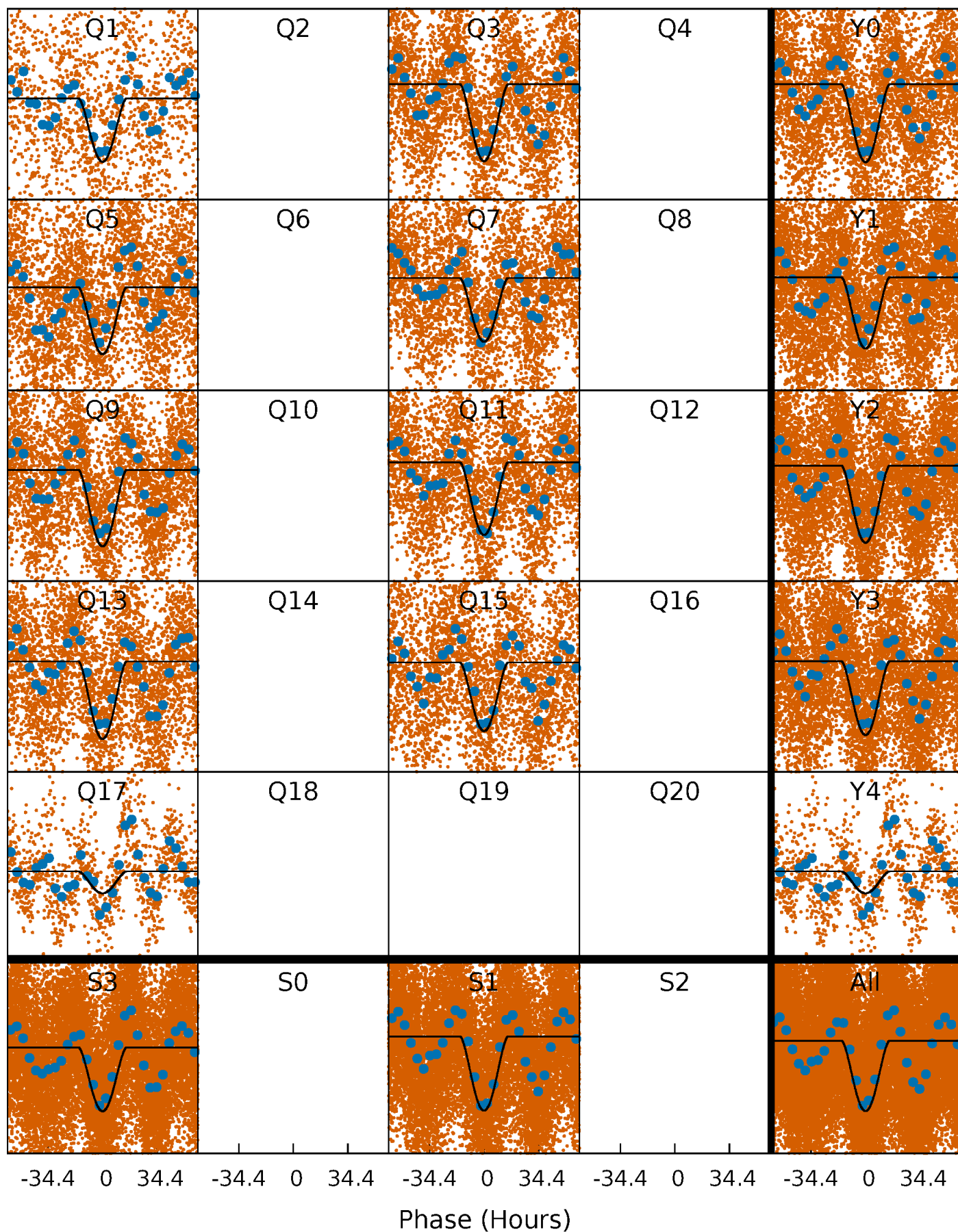
PDC Quarter-Phased Transit Curves

TCE 009016693-02 P= 4.393589 Days $T_0=132.906063$ (BKJD)



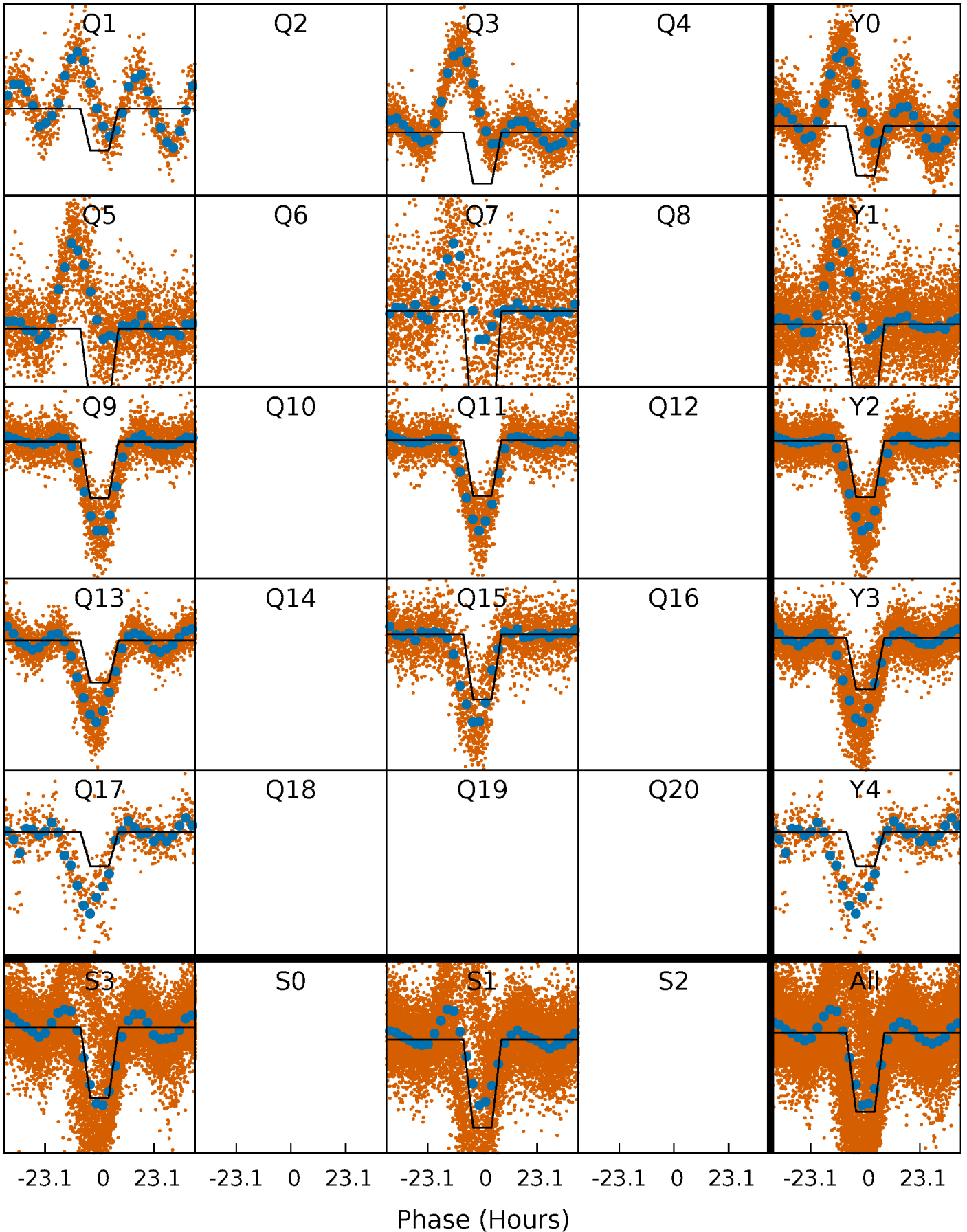
DV Quarter-Phased Transit Curves

TCE 009016693-02 P= 4.393589 Days $T_0=132.906063$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

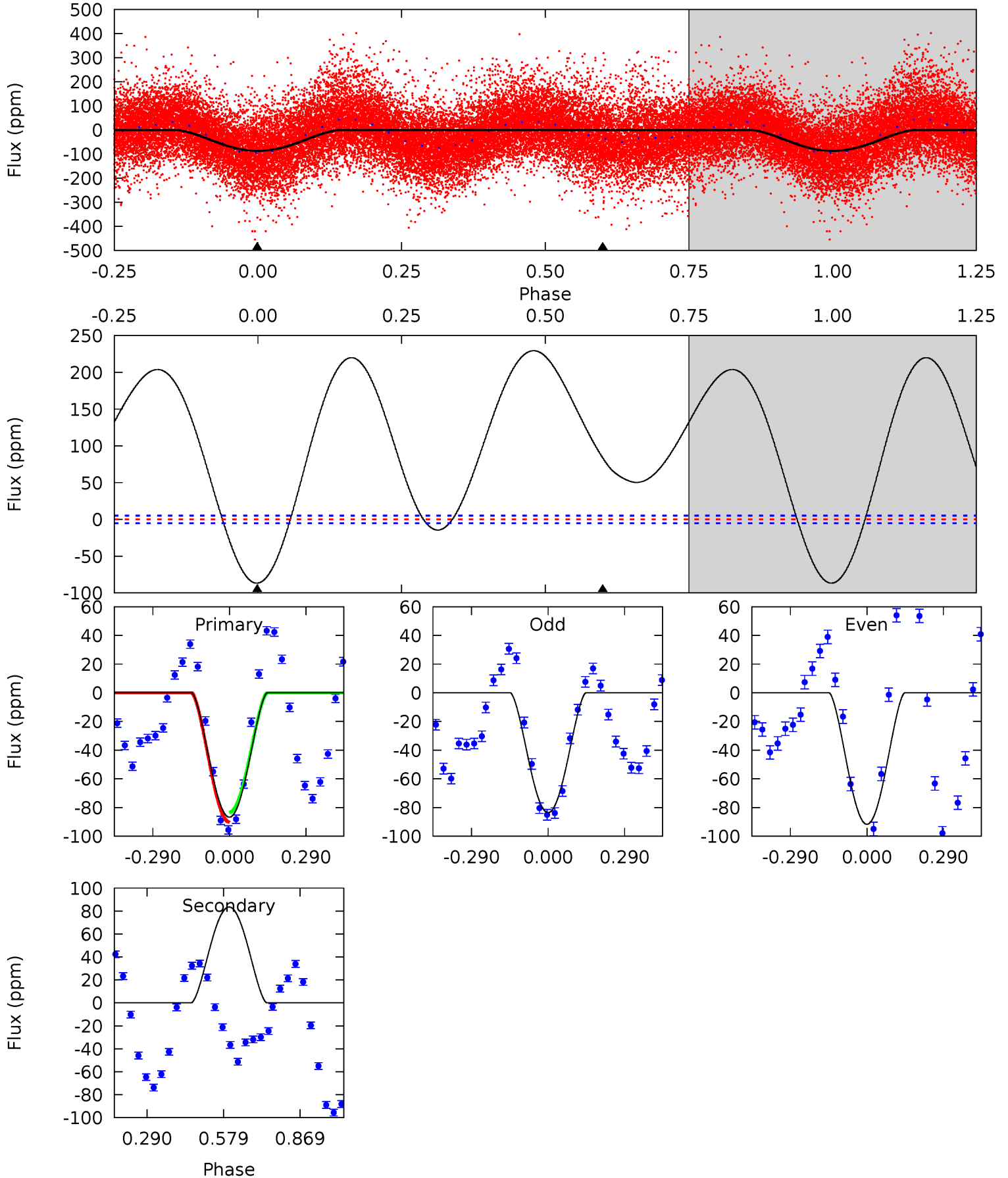
TCE 009016693-02 $P = 4.393680$ Days $T_0 = 133.126302$ (BKJD)



DV Model-Shift Uniqueness Test

009016693-02, P = 4.393589 Days, E = 128.512474 Days

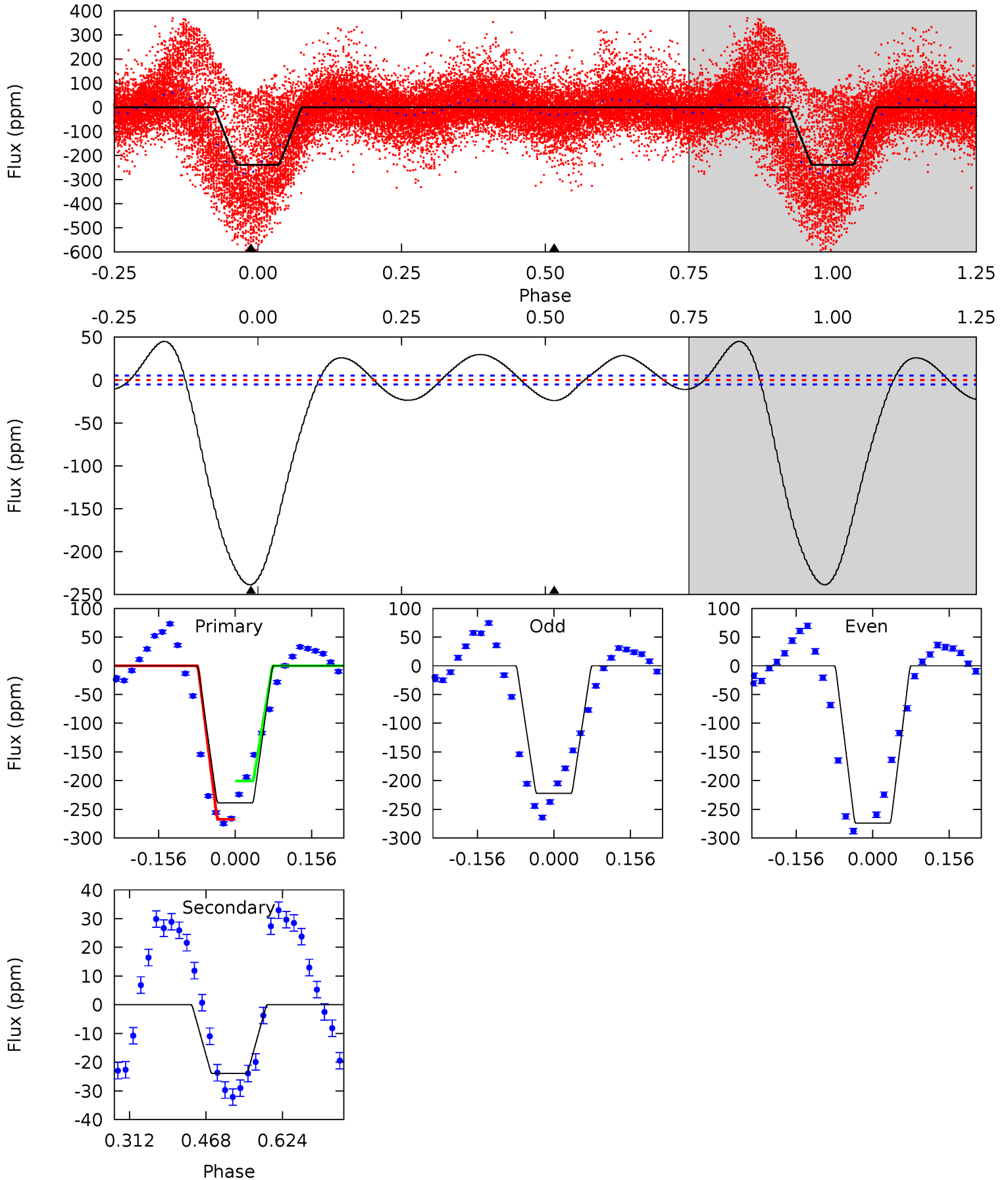
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
71.7	-69.0	0	0	4.34	1.06	19.8	71.7	71.7	-69.0	-69.0	3.10	1.00	0.73	3.28



Alt Model-Shift Uniqueness Test

009016693-02, P = 4.393680 Days, E = 128.732622 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
206.2	20.7	0	0	4.47	1.42	14.6	206.2	206.2	20.7	20.7	21.4	0.70	0.16	29.0



Stellar Parameters For KIC 009016693

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$
	7262^{+201}_{-327}	$4.012^{+0.209}_{-0.171}$	$-0.080^{+0.250}_{-0.350}$	$2.071^{+0.520}_{-0.578}$	$1.605^{+0.200}_{-0.326}$	$0.255^{+0.351}_{-0.111}$
	+3%/-5%	+5%/-4%	+312%/-438%	+25%/-28%	+12%/-20%	+138%/-44%
Source	KIC0	KIC0	KIC0	DSEP		

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

Secondary Eclipse Parameters for KIC 009016693-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	A_{obs}
DV	84 ± 1	$4.25^{+2.23}_{-2.08}$	2566^{+216}_{-206}	-5053^{+742}_{-1996}	$-9.523^{+5.471}_{-28.165}$
Alt.	-24 ± 1	$3.63^{+2.18}_{-2.01}$	2588^{+196}_{-200}	4119^{+1601}_{-687}	$3.798^{+14.409}_{-2.335}$

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

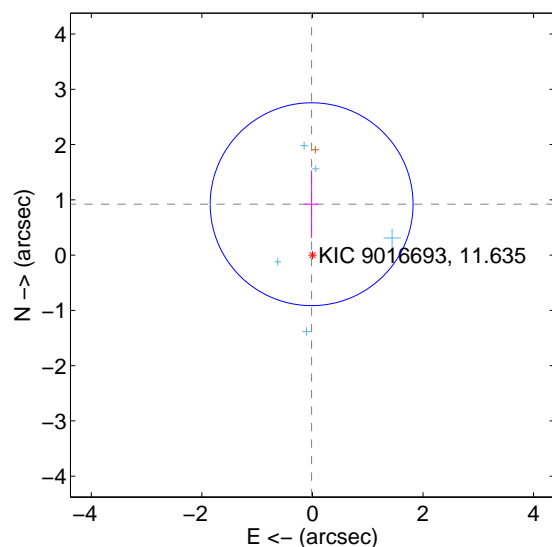
Supplemental centroid analysis for 009016693-02. **Kepler magnitude: 11.63.** Transit SNR 16.31

There are 5 quarters with good PRF difference image offsets

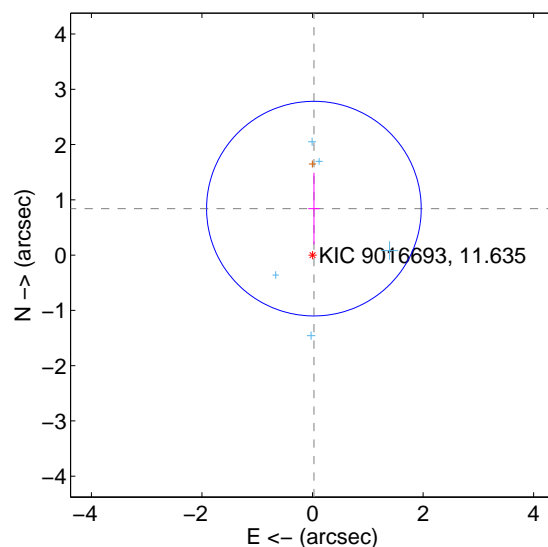
The direct PRF centroid is offset from the target star catalog position by about 0.15 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.921 ± 0.612	1.51	0.015 ± 0.127	0.920 ± 0.612
PRF-fit source offset from KIC position	0.841 ± 0.647	1.30	-0.025 ± 0.103	0.841 ± 0.647
photometric centroid source offset	2.45 ± 0.40	6.15	-2.39 ± 0.41	0.53 ± 0.18

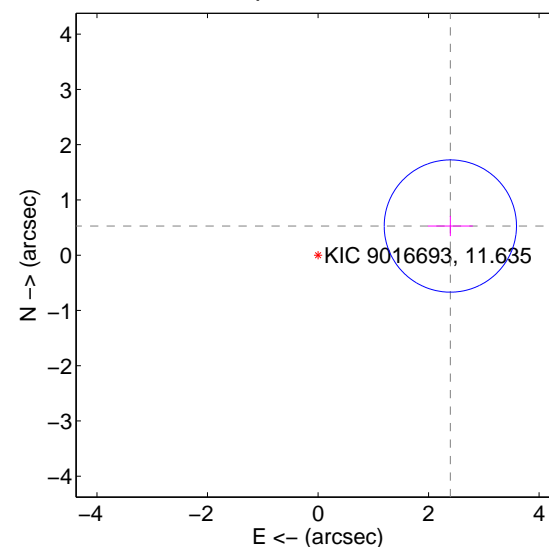
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

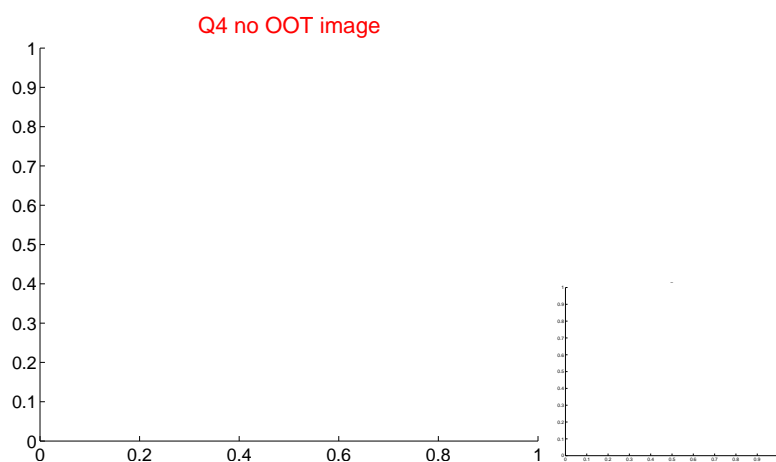
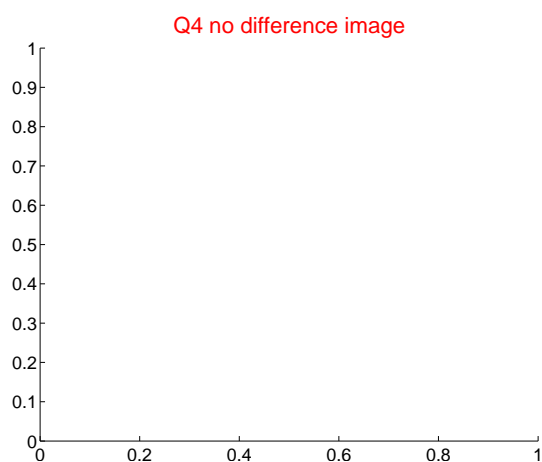
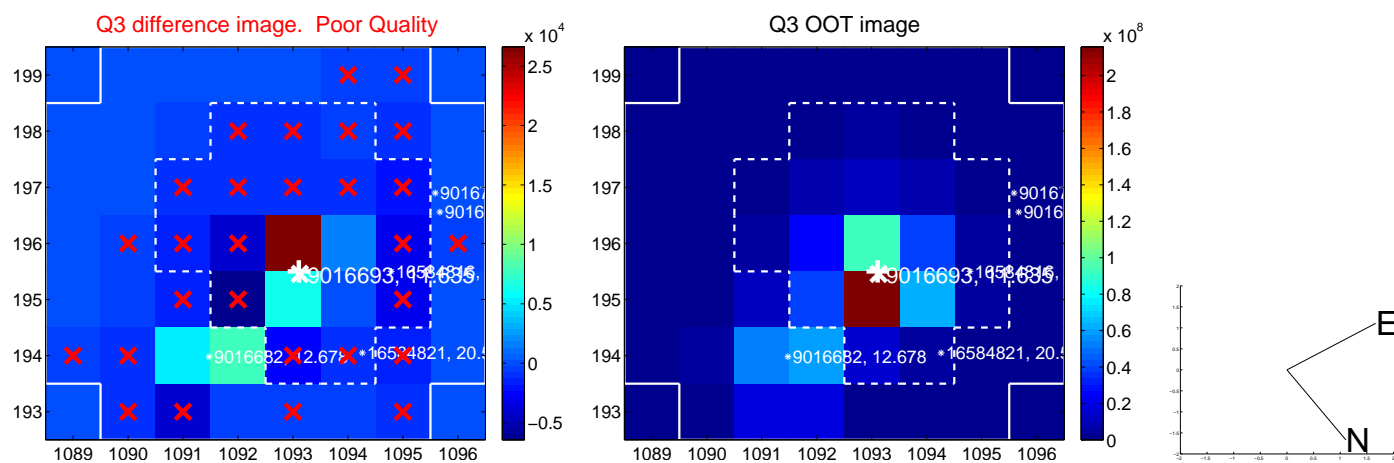
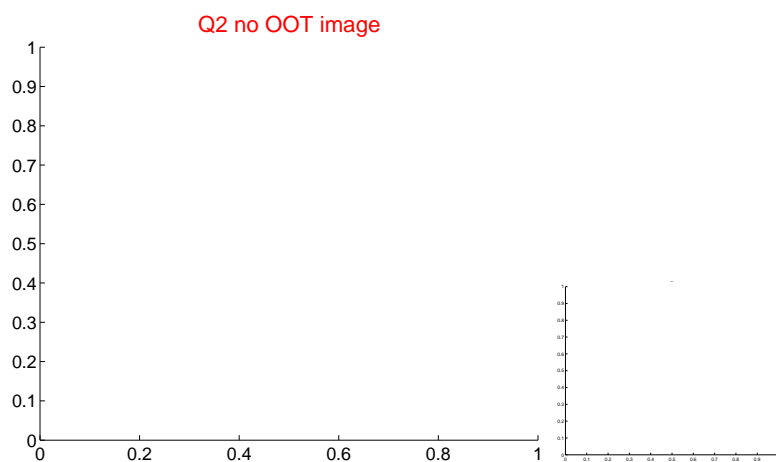
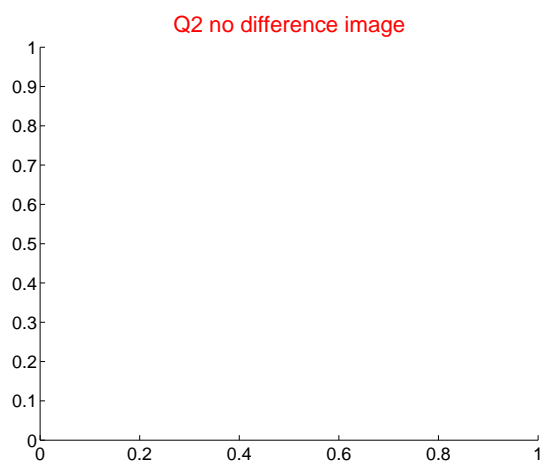
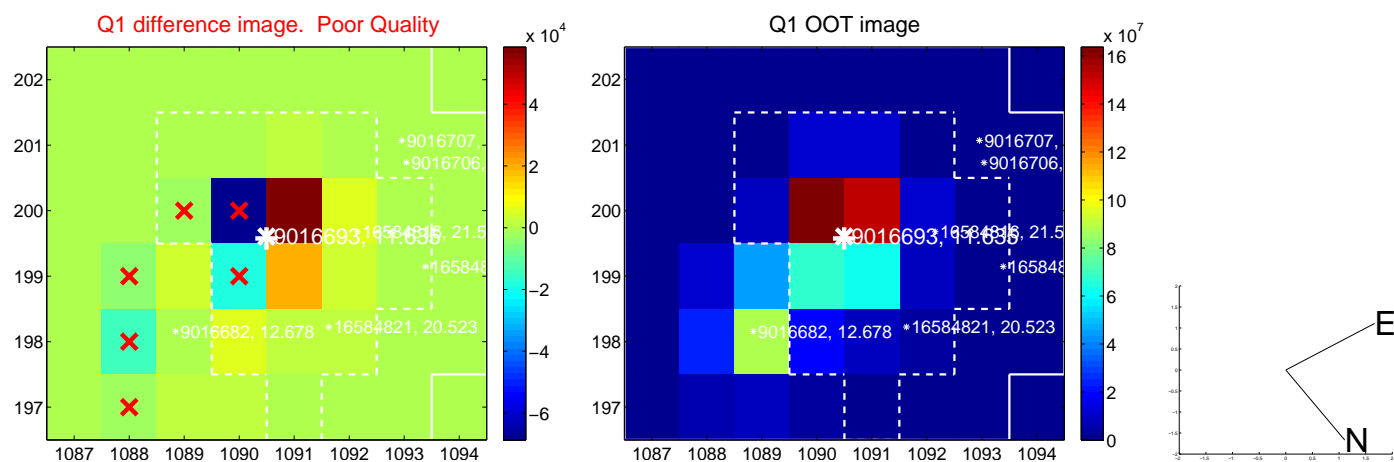


offset from photometric centroids

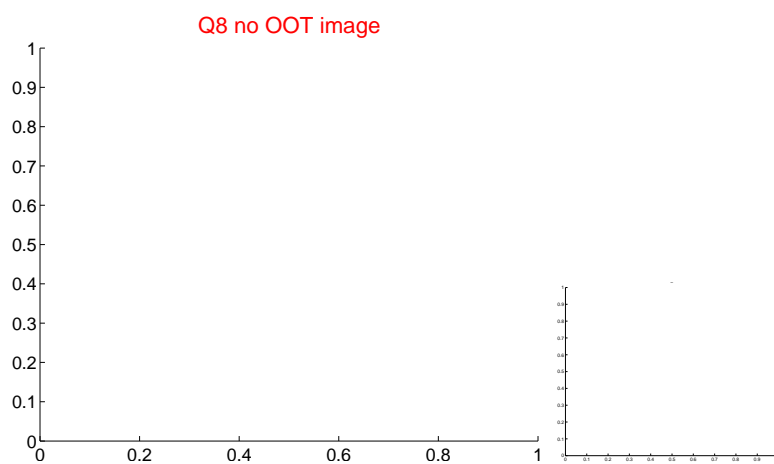
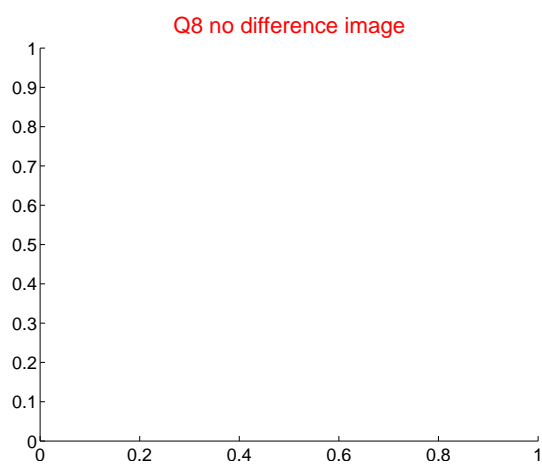
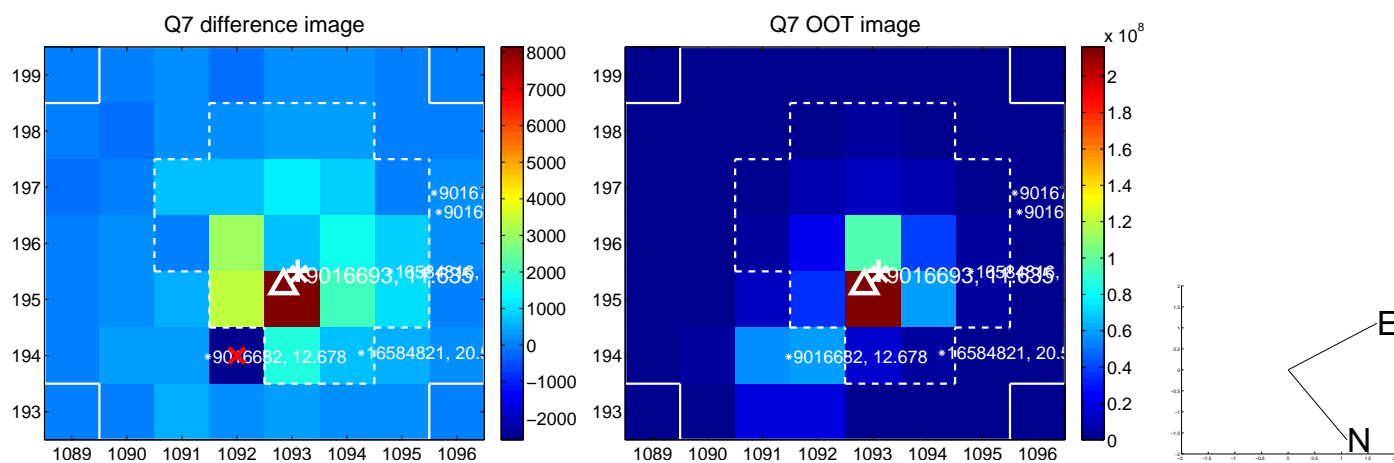
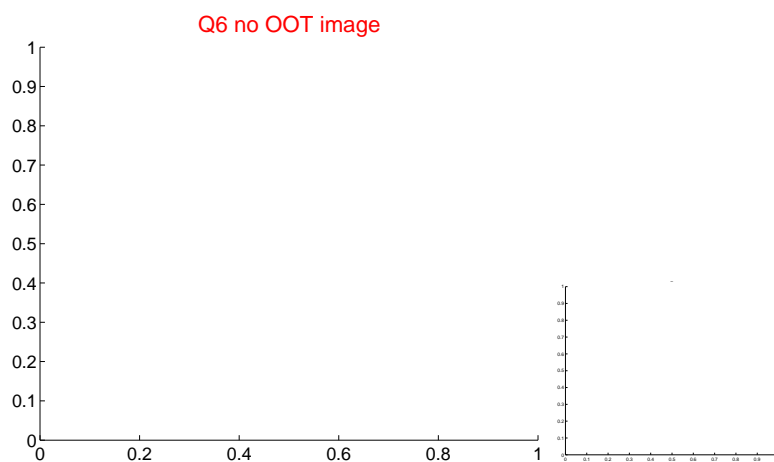
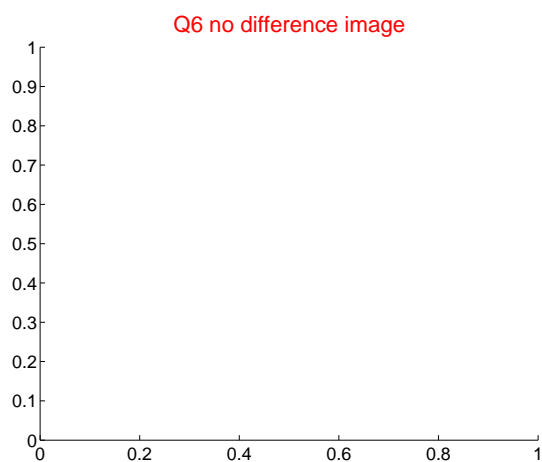
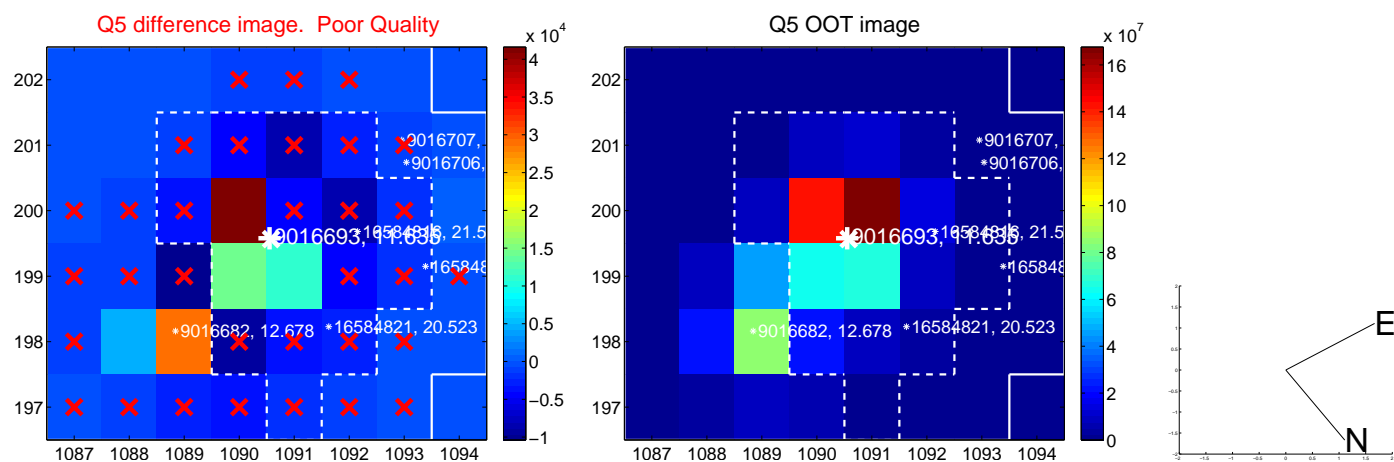


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

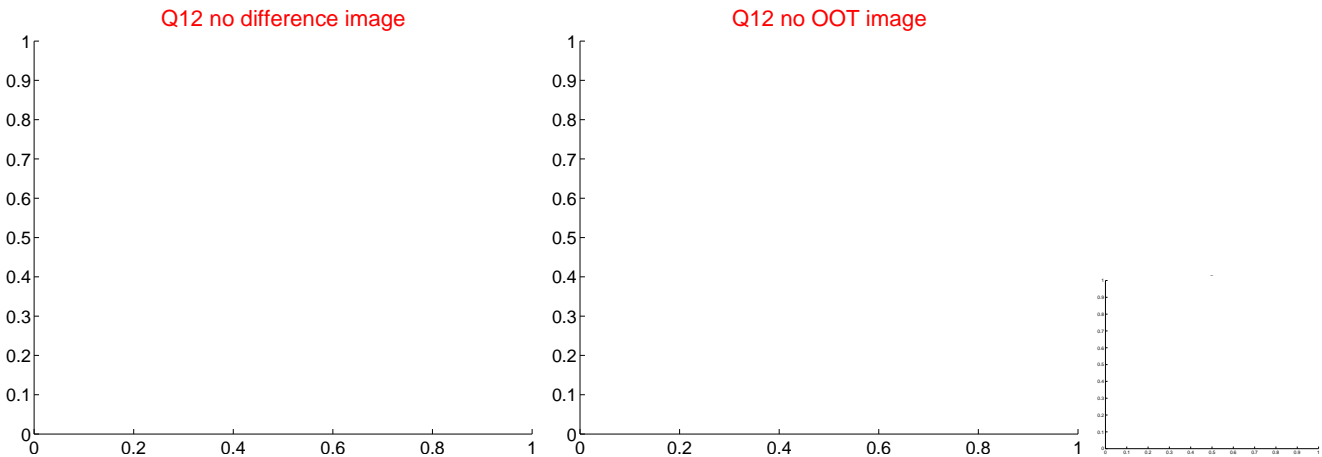
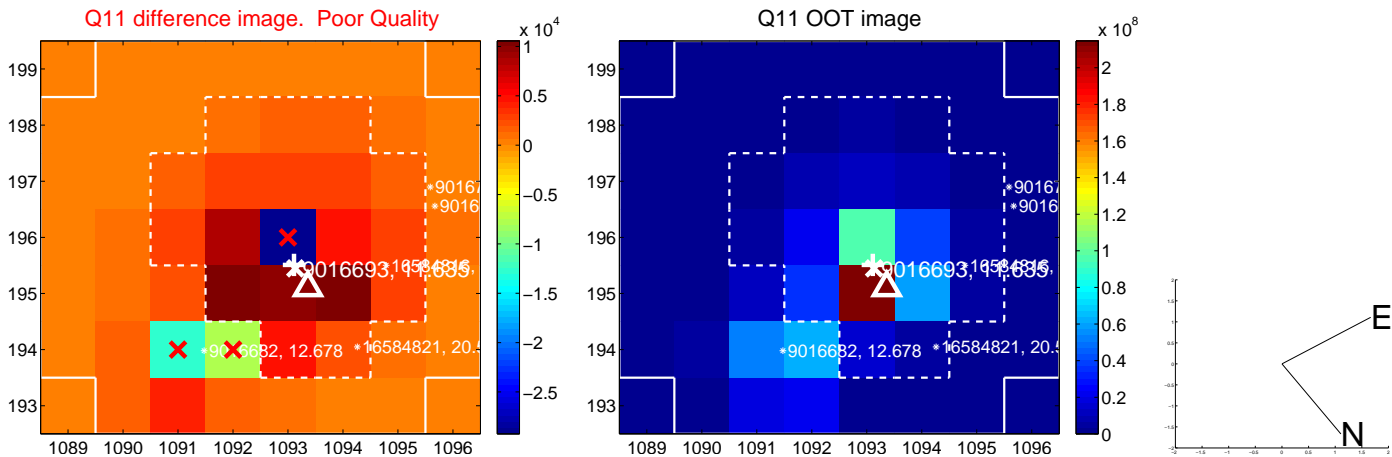
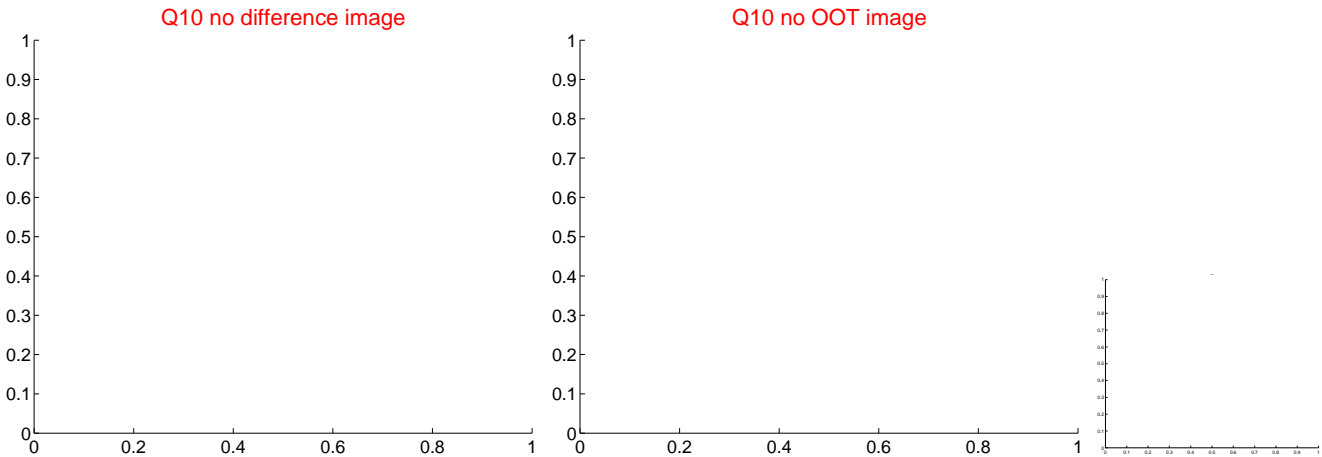
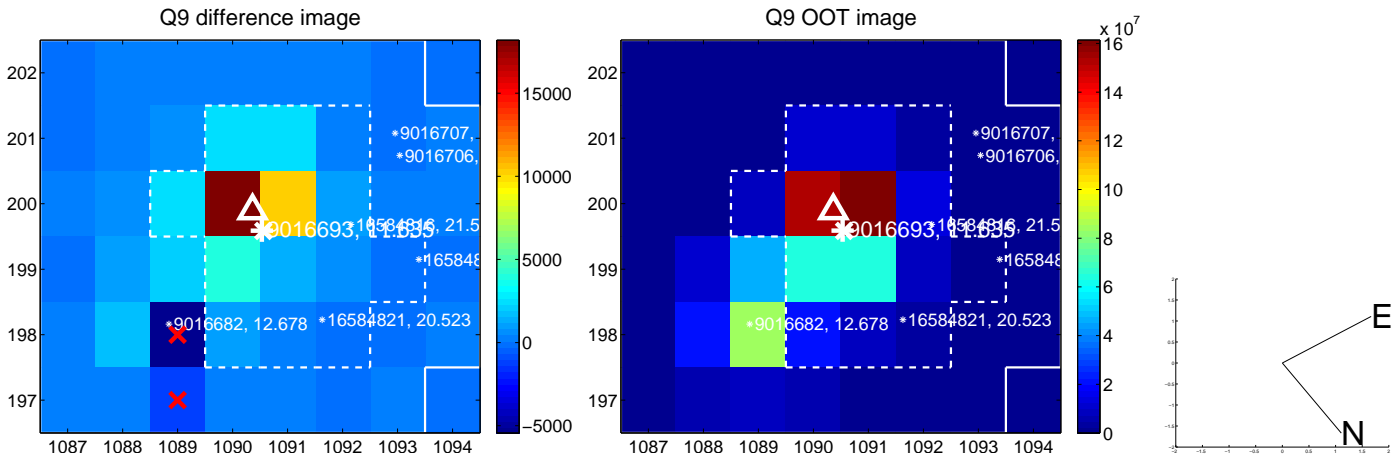
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



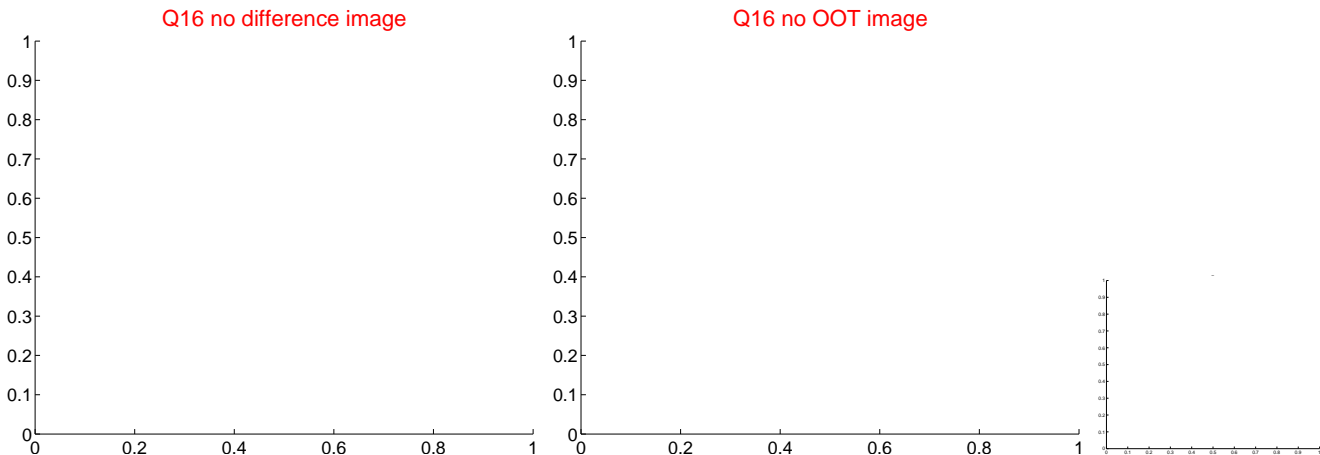
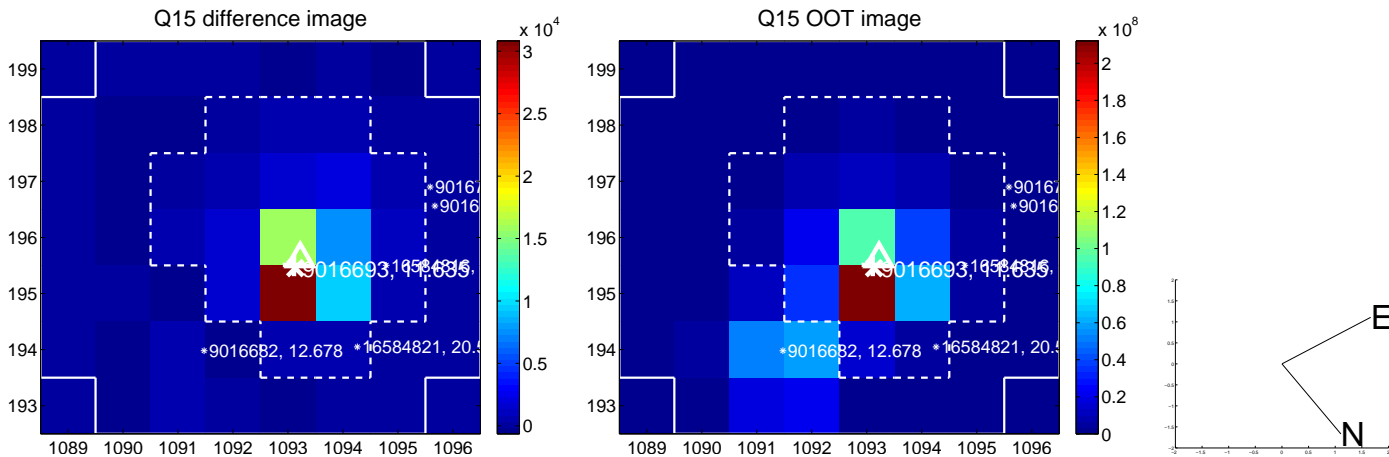
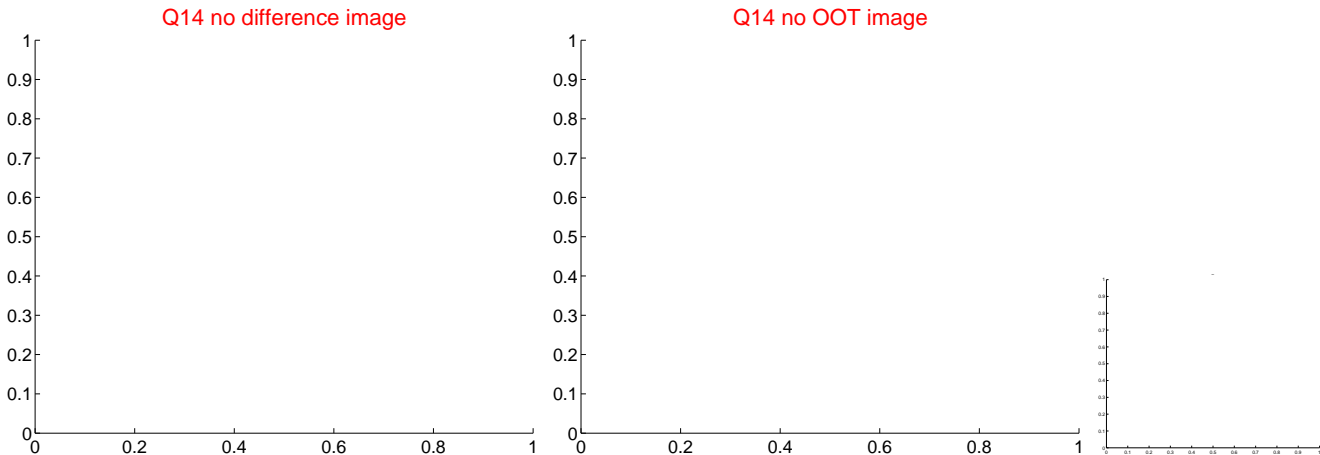
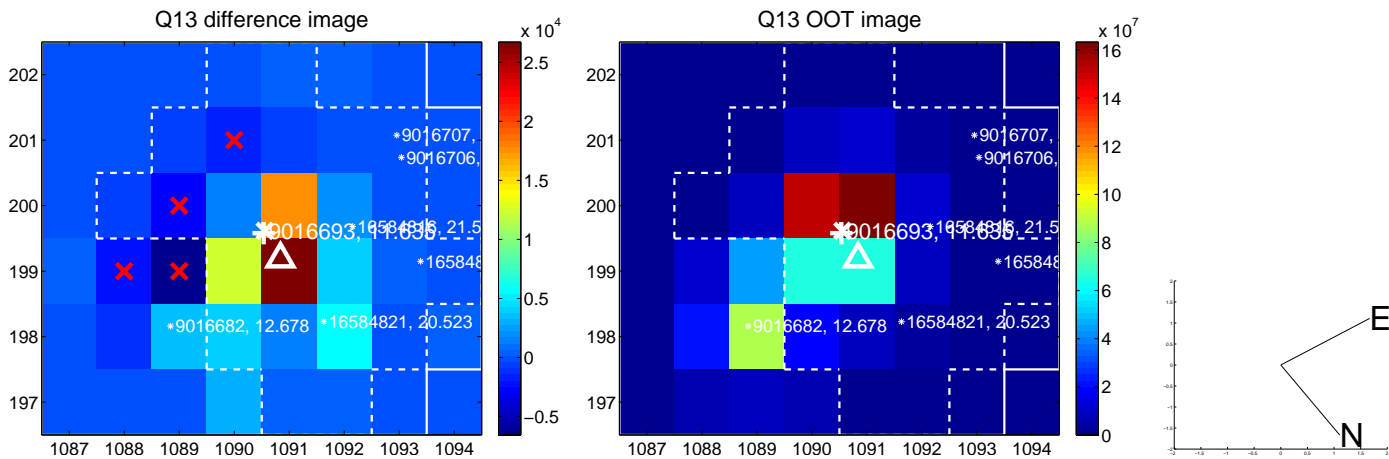
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



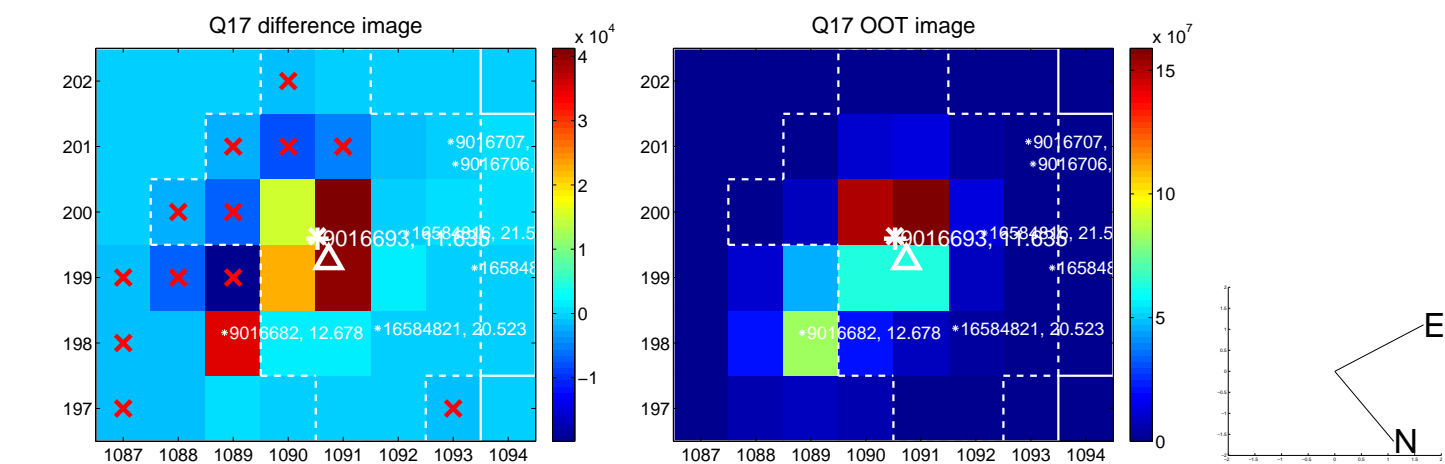
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.



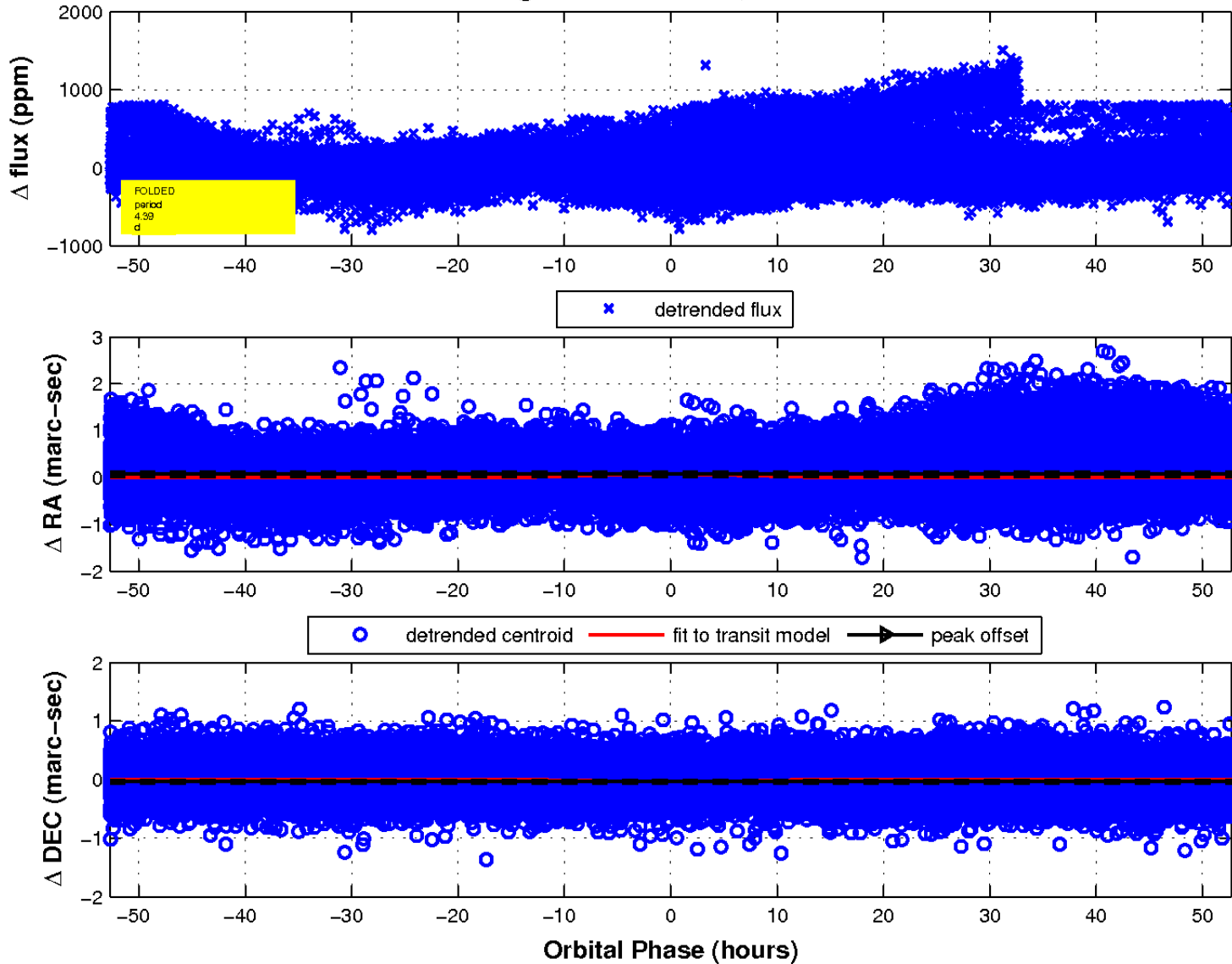
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

