

KIC 009527159

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})
009527159-01	OBS	No	0.702259	132.071222	109.6	1.432	9.3	9.9	10.64	4915	11.28	0.00
009527159-02	OBS	No	148.082914	148.808098	1181.7	2.971	7.3	8.2	10.64	4915	40.94	122.73

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009527159-01	OBS	FP	0.00	1	0	1	0	LPP_DV—MOD_NONUNIQ_ALT—CENT_RESOLVED_OFFSET
009527159-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES—LPP_DV—MOD_NONUNIQ_ALT—CENT_FEW_DIFFS

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

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

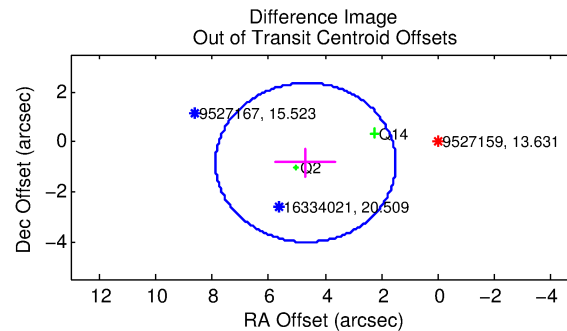
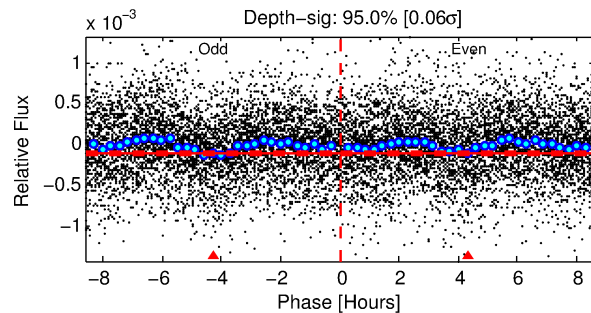
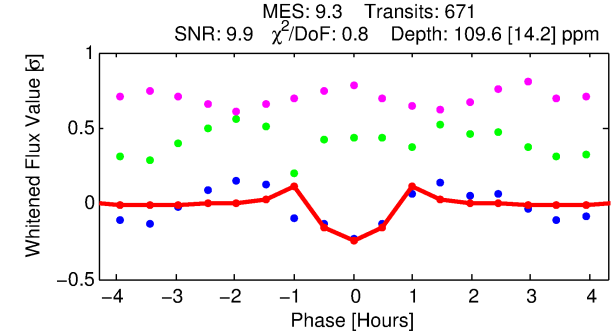
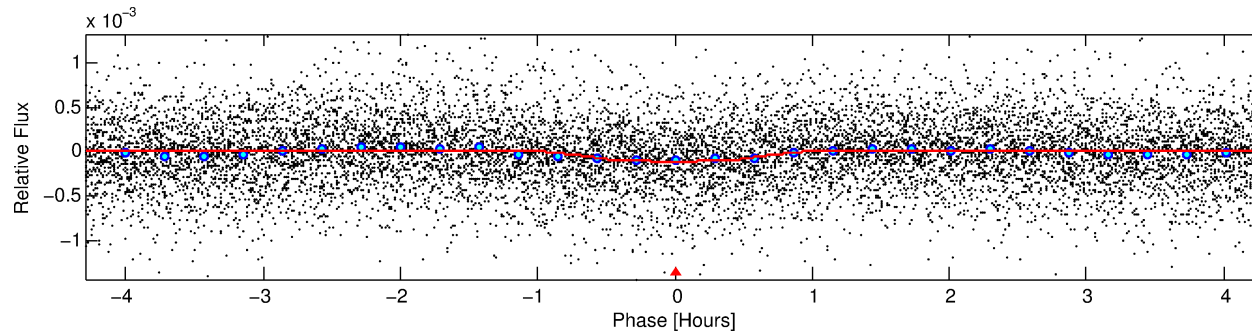
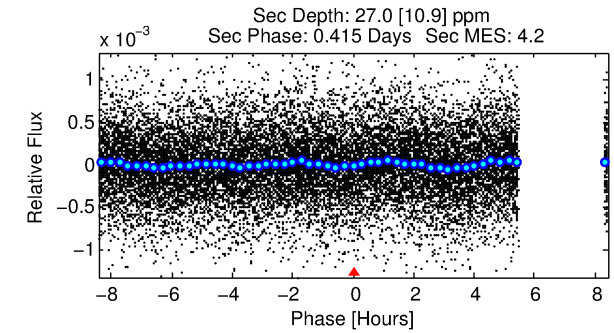
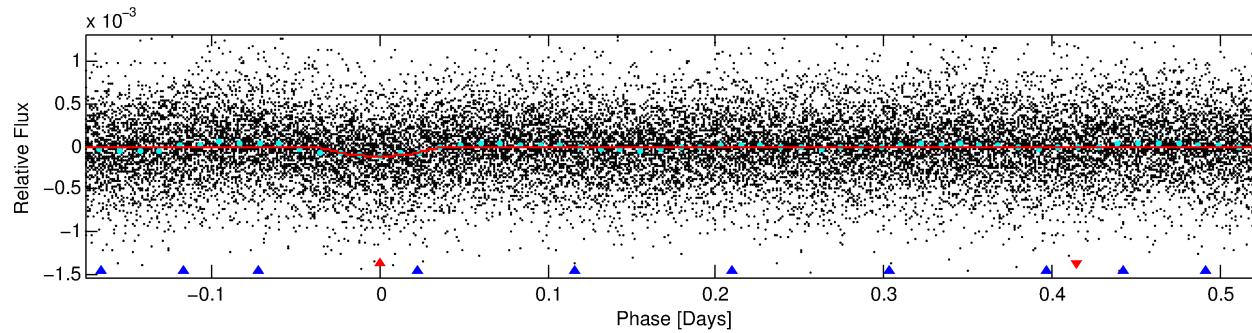
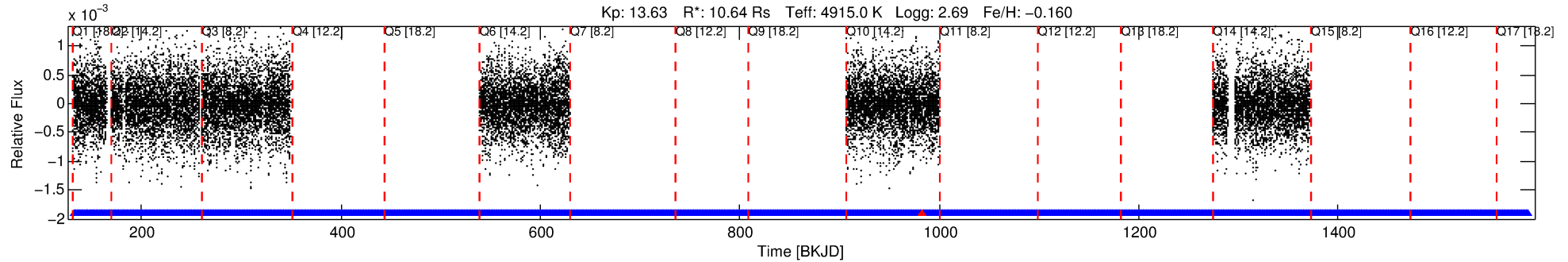
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009527159-01

No Significant Match Found

DV One-Page Summary

KIC: 9527159 Candidate: 1 of 2 Period: 0.702 d



DV Fit Results:

Period = 0.70226 [0.00001] d
Epoch = 132.0712 [0.0014] BKJD
Rp/R* = 0.0097 [0.0046]
a/R* = 3.39 [4.94]
b = 0.49 [2.54]
Seff = N/A
Teq = N/A
Rp = 11.28 [6.12] Re
a = N/A
Ag = N/A
Teffp = N/A

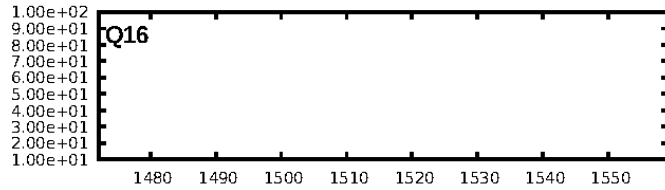
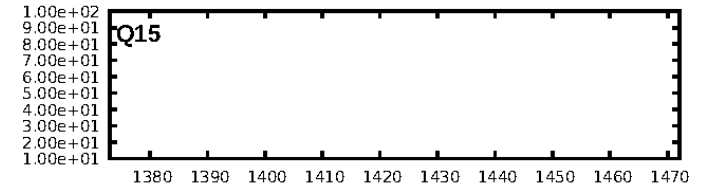
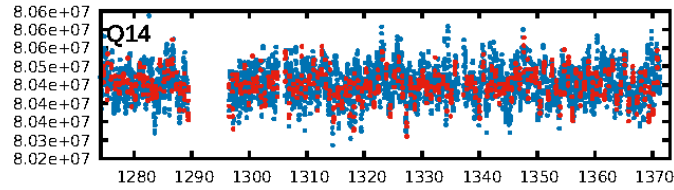
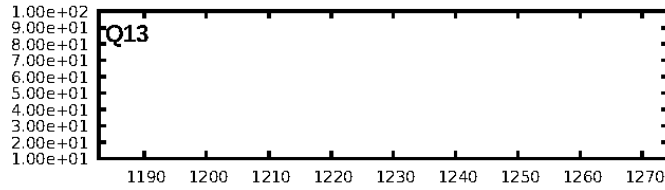
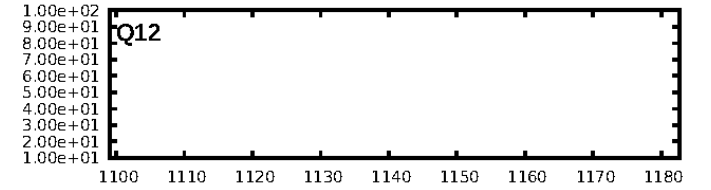
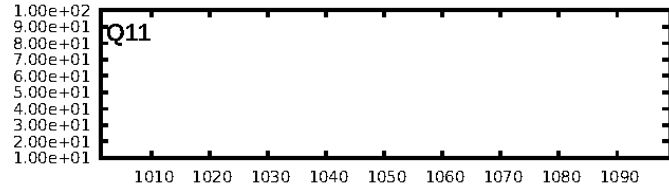
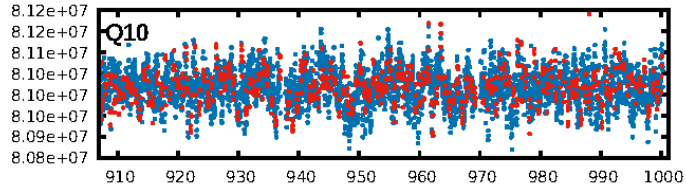
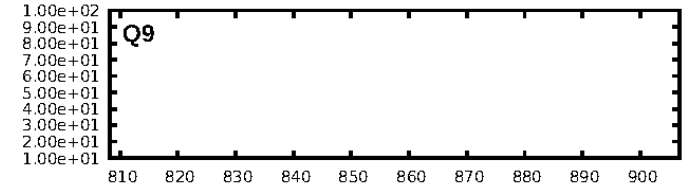
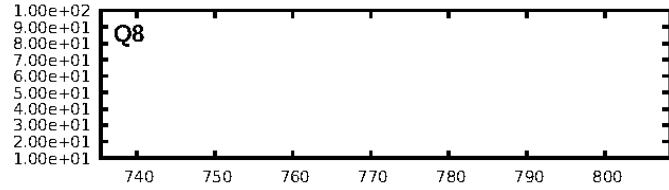
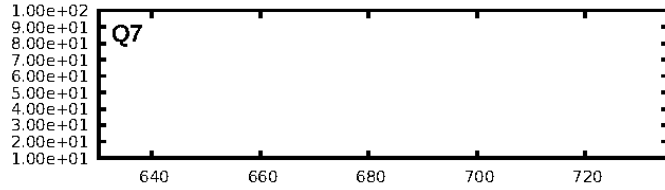
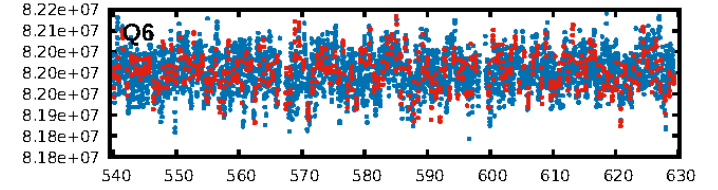
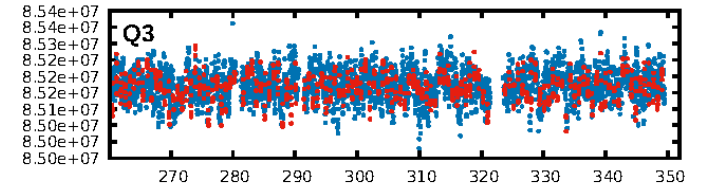
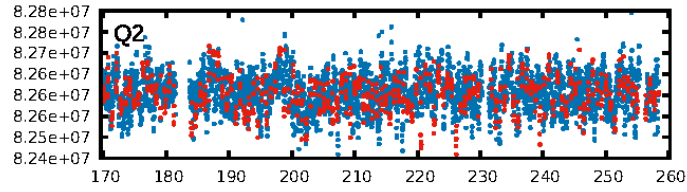
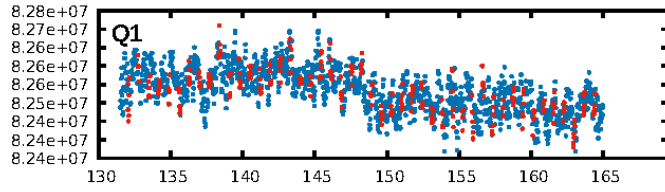
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 100.0% [1072.51σ]
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: 1.17e-15
RollingBand-fgt: 1.00 [623/624]
GhostDiagnostic-chr: -22.22
Centroid-sig: 0.1%
Centroid-so: 1.116 arcsec [2.18σ]
OotOffset-rm: 4.753 arcsec [4.47σ]
KicOffset-rm: 4.656 arcsec [2.68σ]
OotOffset-st: 2/0/0/0 [2]
KicOffset-st: 2/0/0/0 [2]
DiffImageQuality-fgm: 1.00 [2/2]
DiffImageOverlap-fno: 1.00 [6/6]

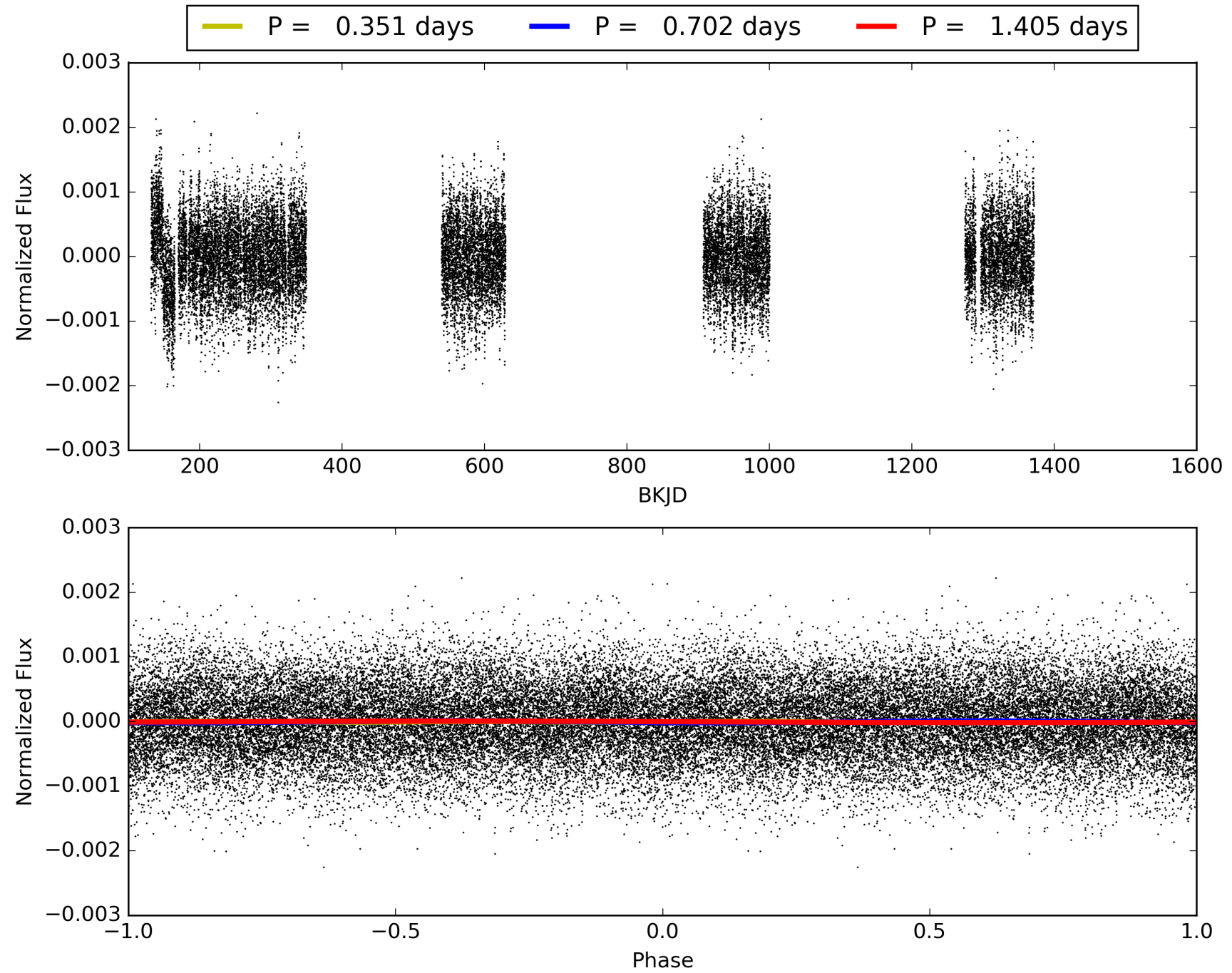
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 17:03:07 Z

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

TCE 009527159-01, PDC Light Curves

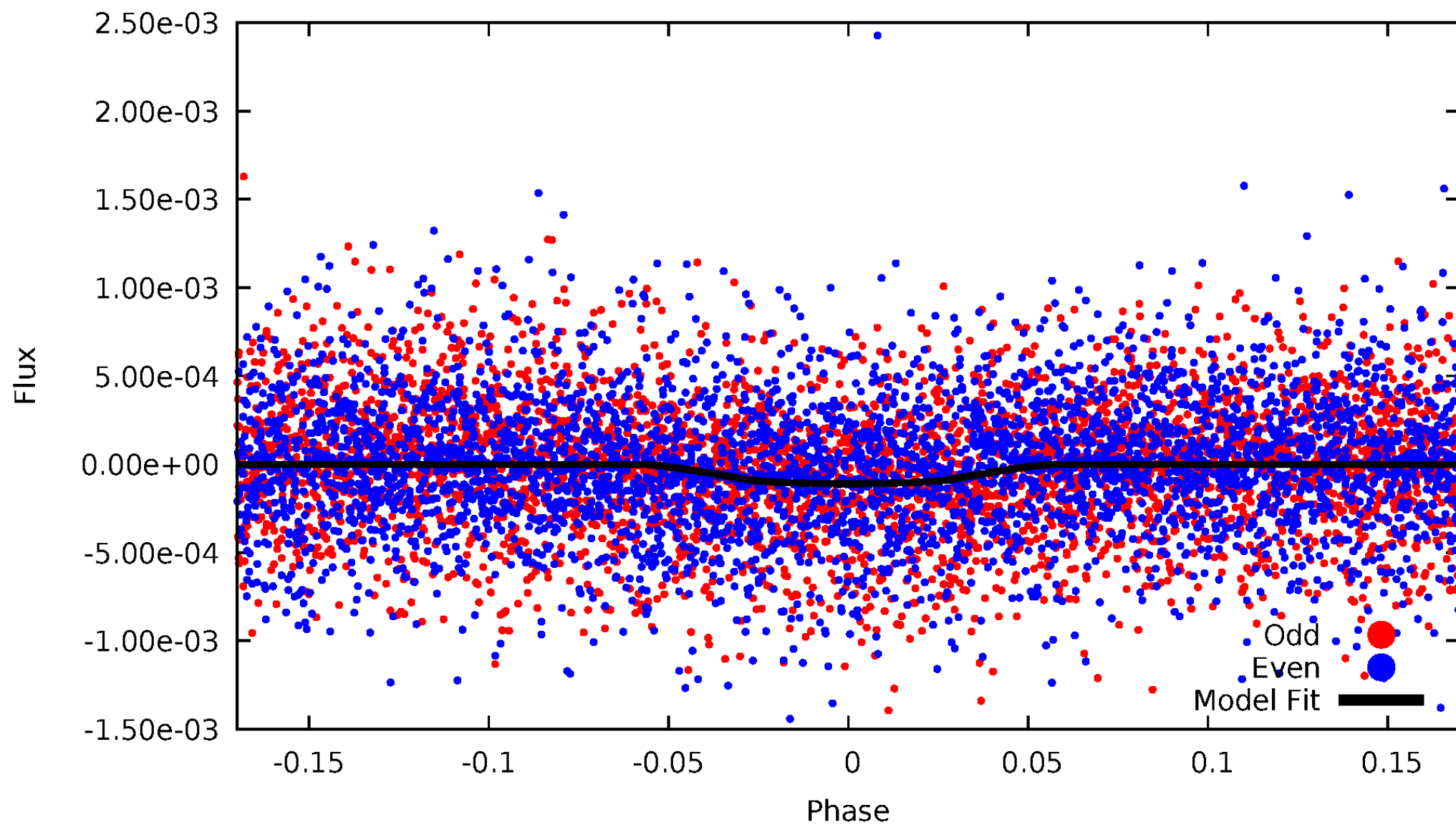


TCE 009527159-01



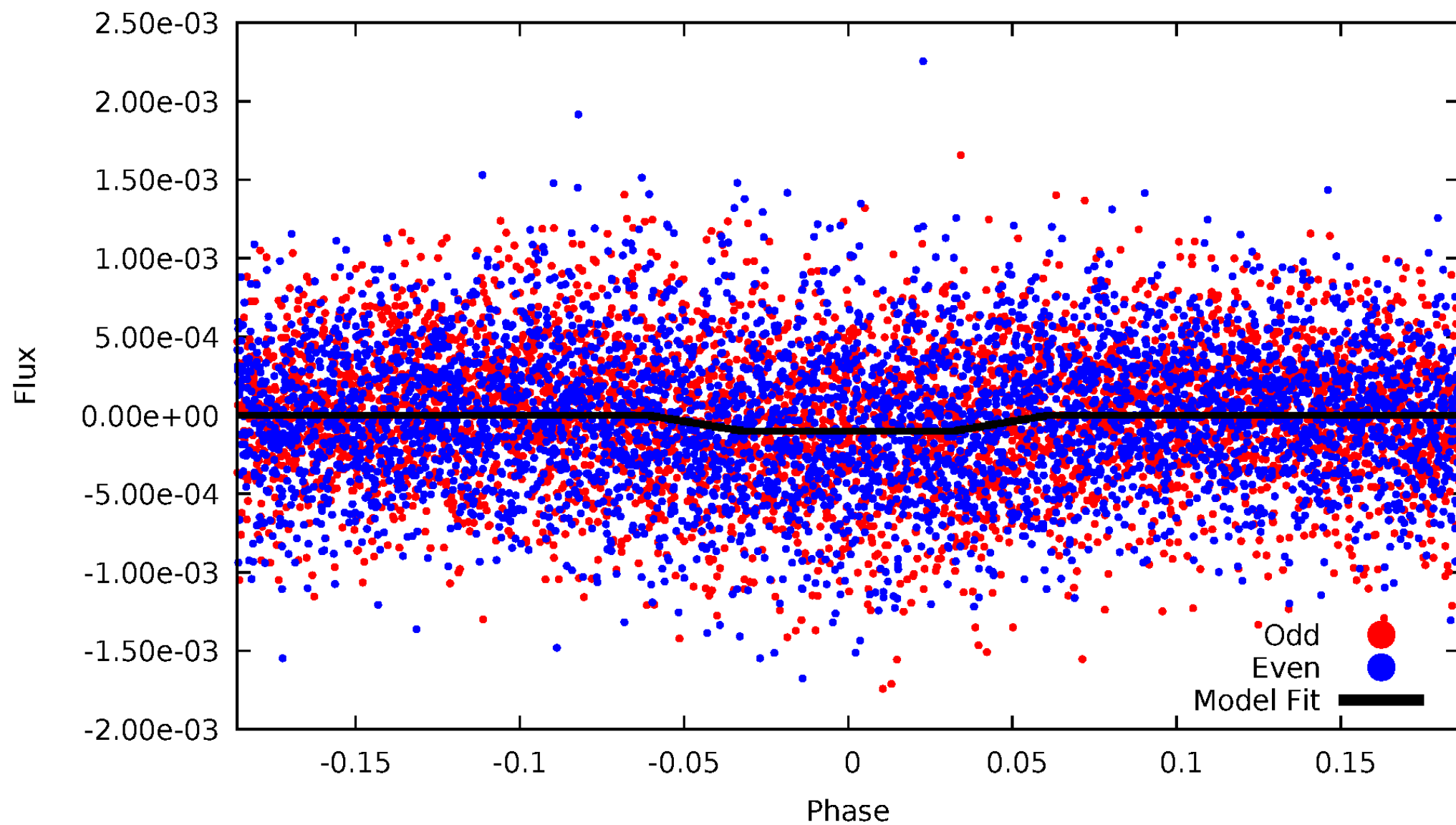
DV Odd/Even

TCE 009527159-01



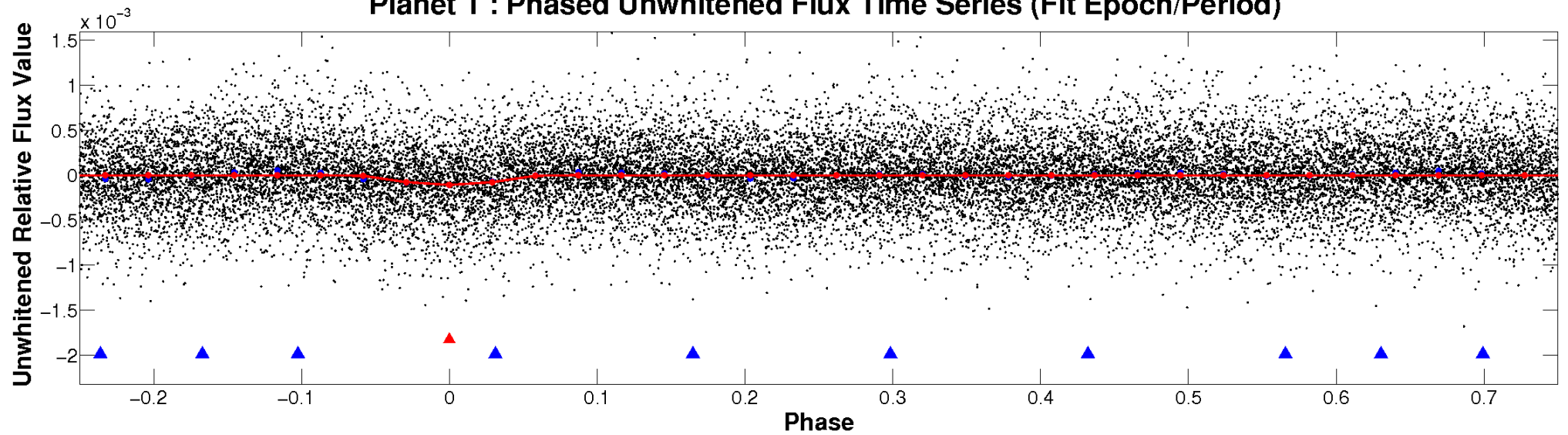
ALT Odd/Even

TCE 009527159-01

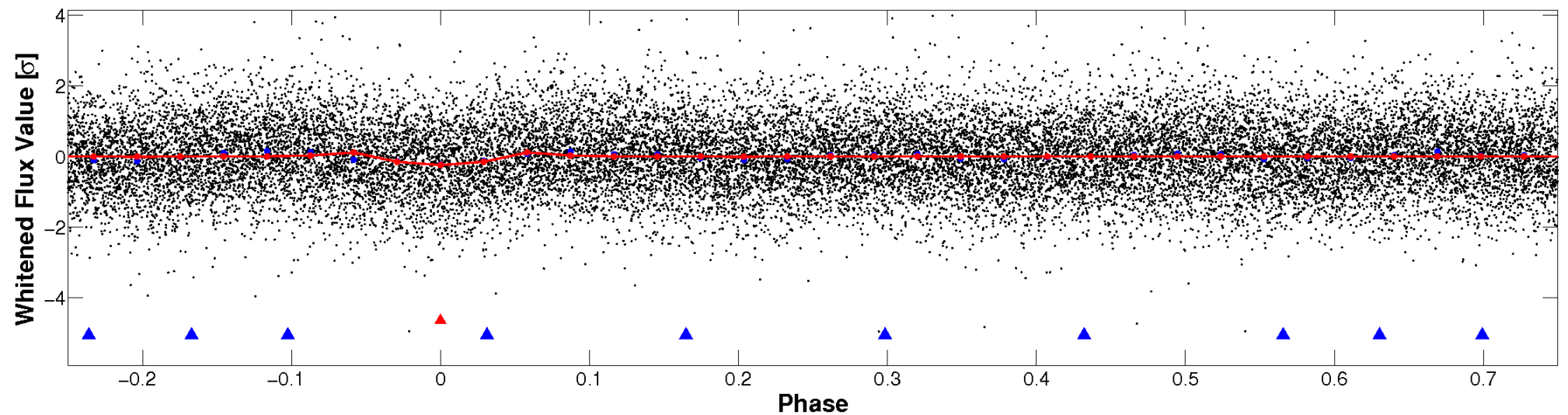


Non-Whitened Vs. Whitened Light Curve

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

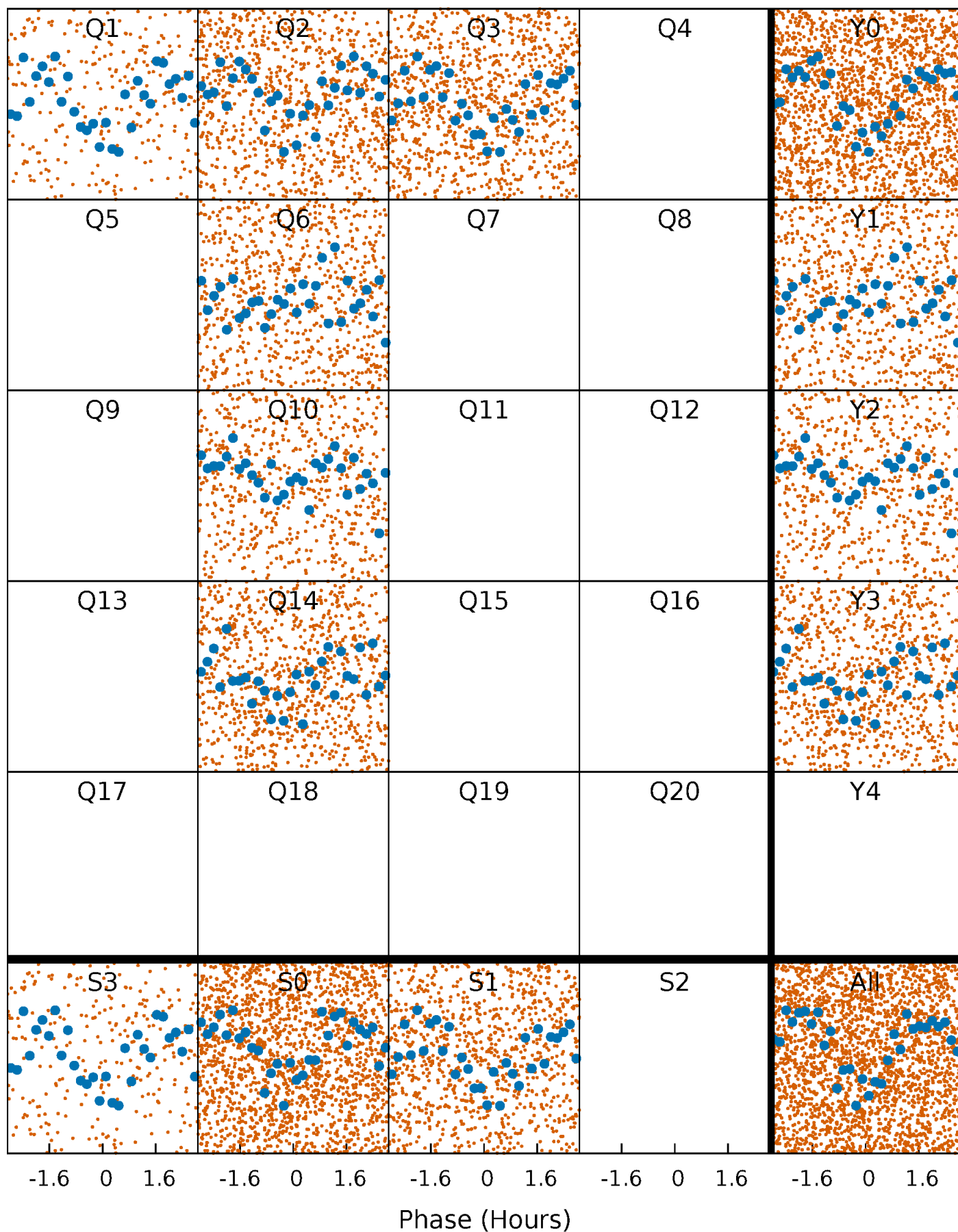


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



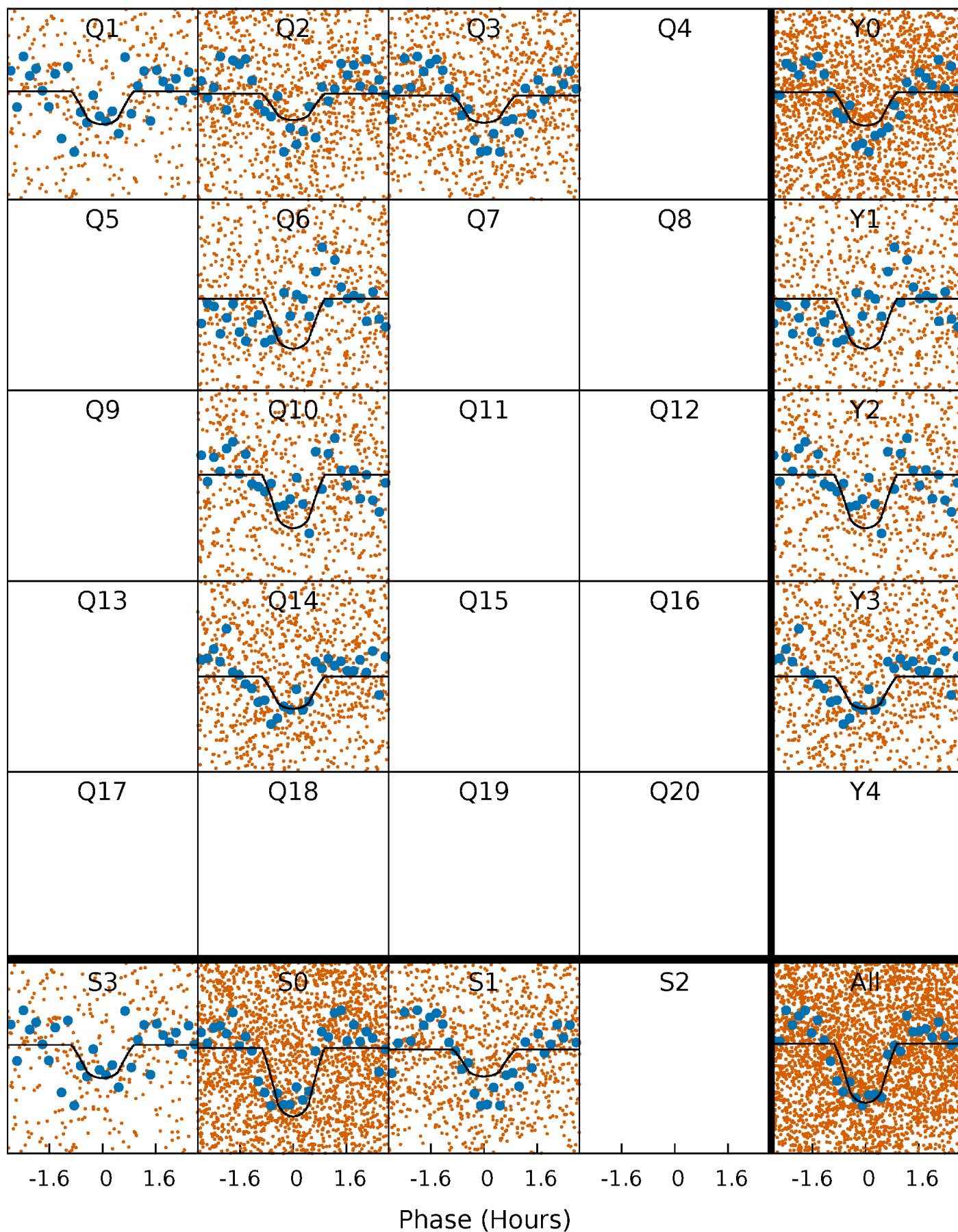
PDC Quarter-Phased Transit Curves

TCE 009527159-01 P= 0.702259 Days $T_0=132.071222$ (BKJD)



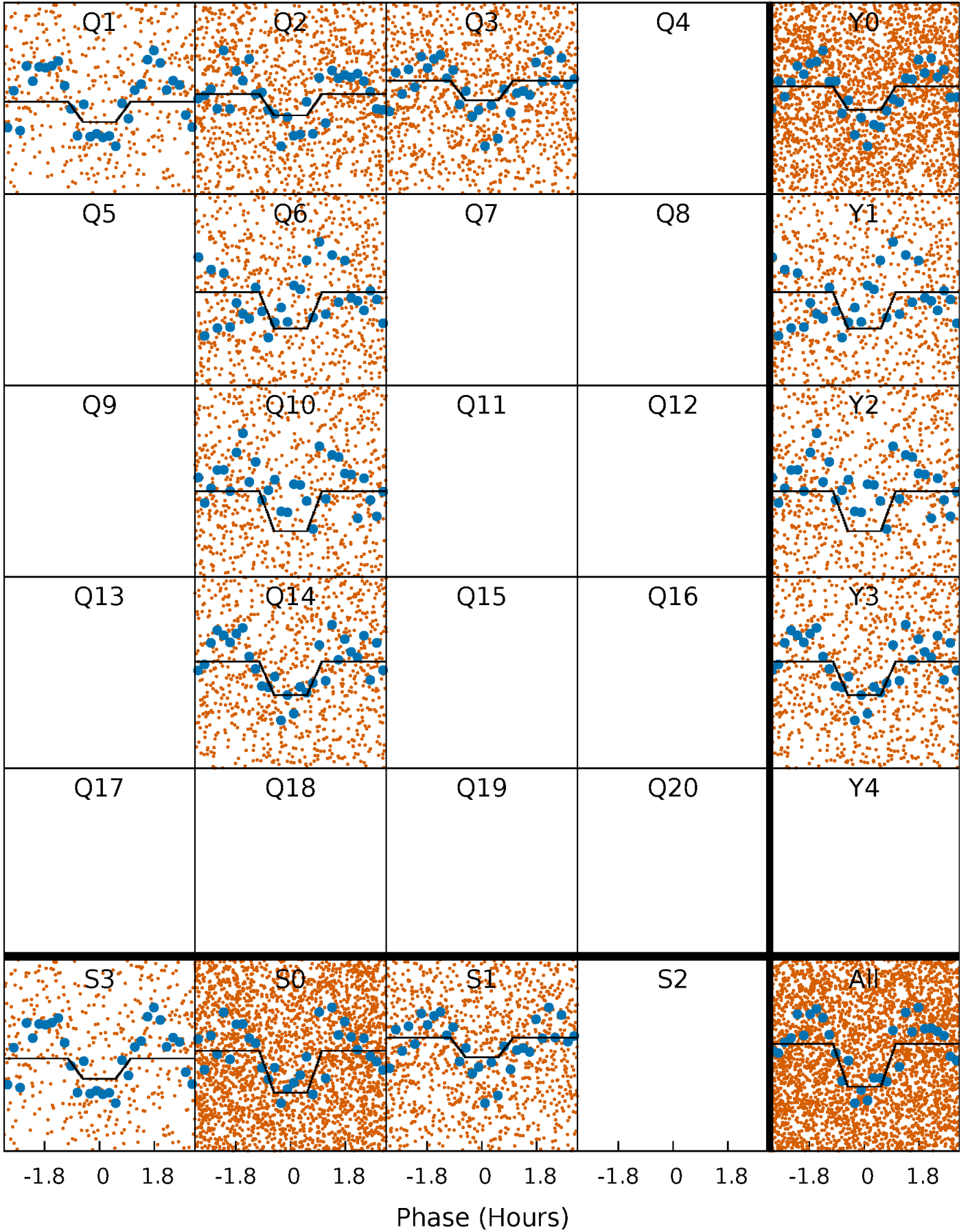
DV Quarter-Phased Transit Curves

TCE 009527159-01 P= 0.702259 Days $T_0=132.071222$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

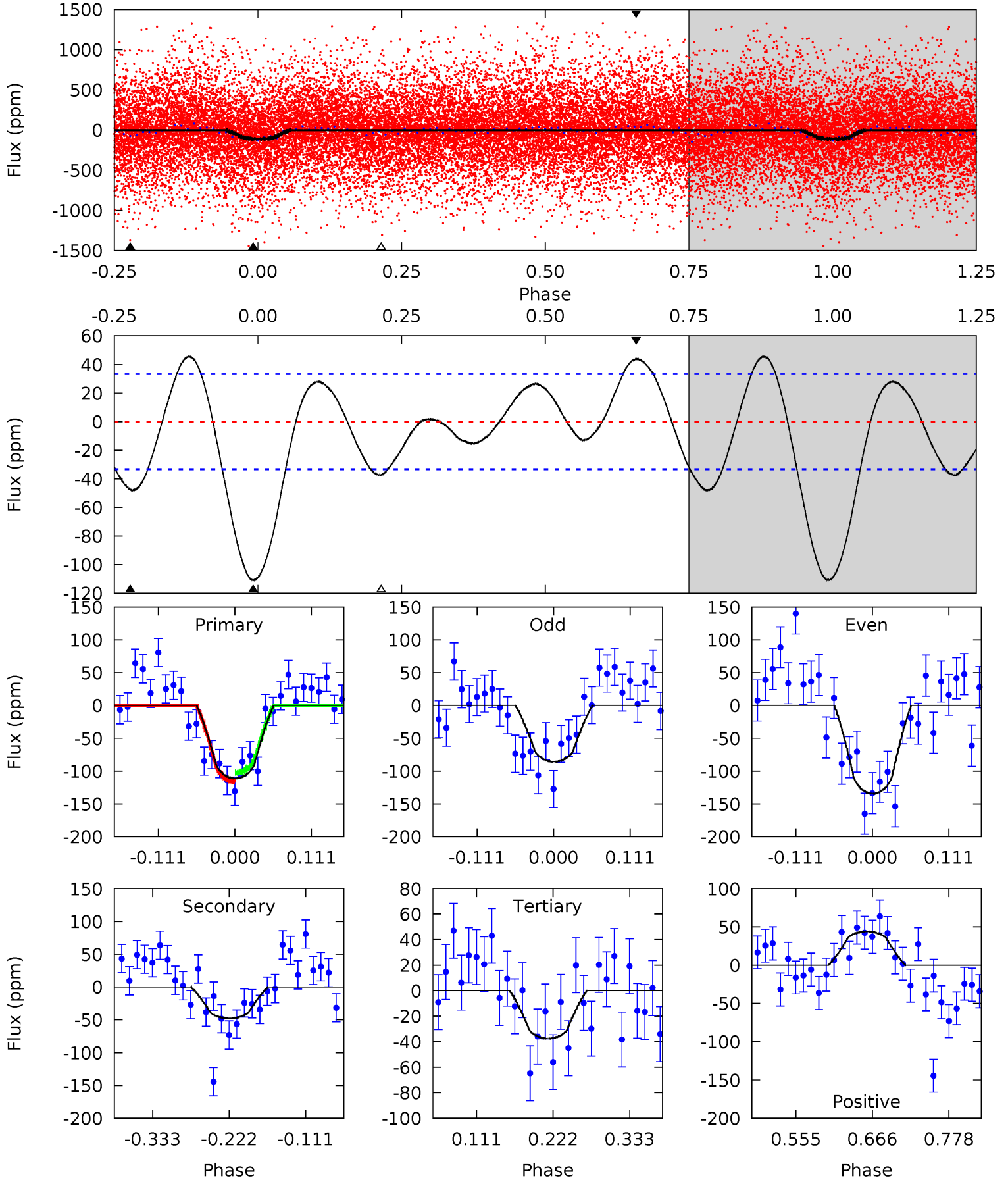
TCE 009527159-01 P= 0.702251 Days $T_0=132.070890$ (BKJD)



DV Model-Shift Uniqueness Test

009527159-01, P = 0.702259 Days, E = 131.368963 Days

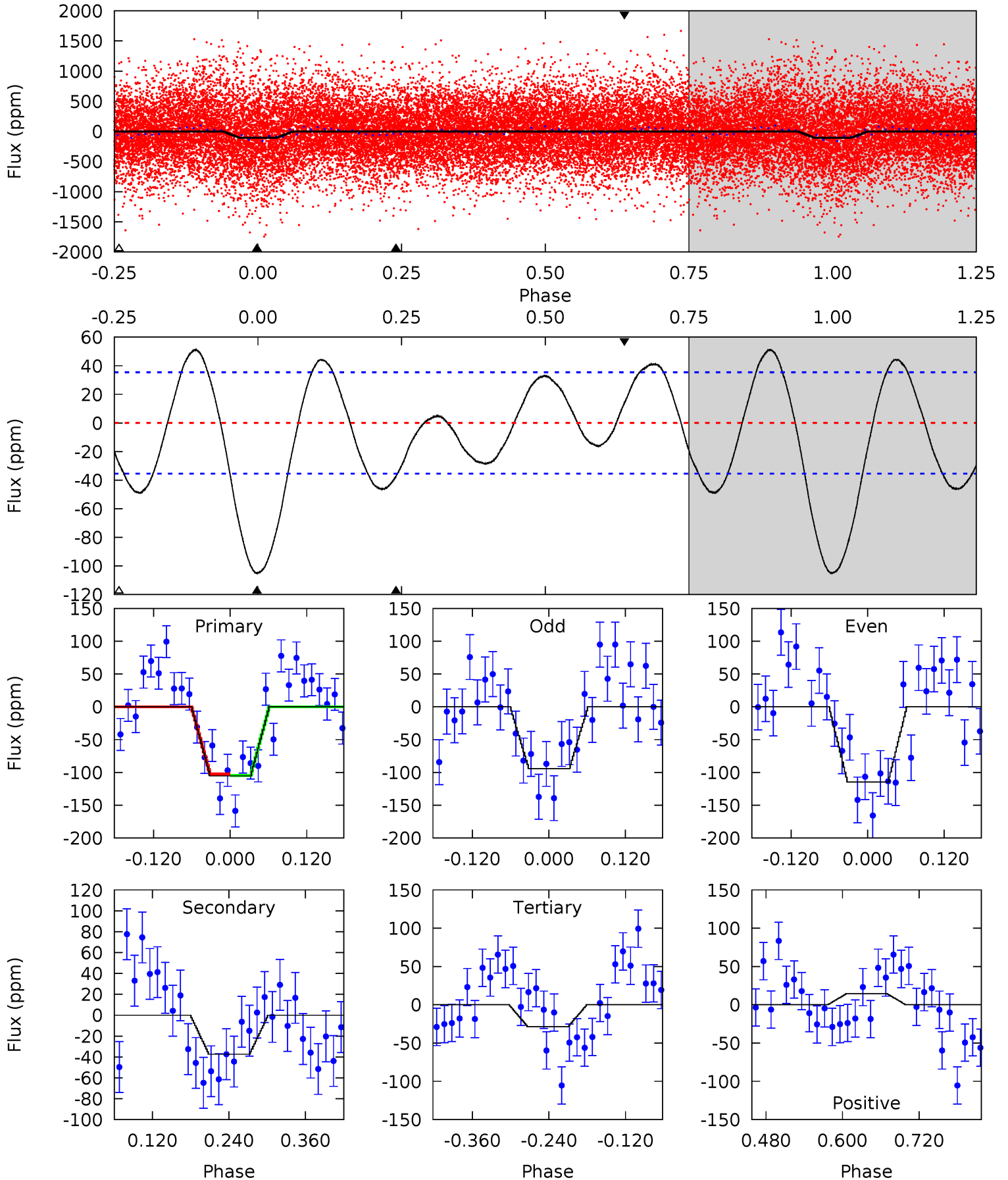
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
15.2	6.49	5.13	6.01	4.54	1.59	2.80	10.0	9.16	1.37	0.49	3.33	1.26	0.29	0.90



Alt Model-Shift Uniqueness Test

009527159-01, P = 0.702251 Days, E = 131.368639 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
13.5	4.78	3.64	1.85	4.53	1.55	3.41	9.81	11.6	1.13	2.93	1.32	0.86	0.33	0.15



Stellar Parameters For KIC 009527159

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	4915^{+86}_{-147}	$2.693^{+0.033}_{-0.030}$	$-0.160^{+0.250}_{-0.300}$	$10.640^{+1.899}_{-2.849}$	$2.037^{+0.774}_{-0.946}$	$0.002^{+0.001}_{-0.000}$
	+2%/-3%	+1%/-1%	+156%/-188%	+18%/-27%	+38%/-46%	+37%/-15%
Source	PHO1	AST9	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 009527159-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	-48 ± 7	$11.59^{+6.19}_{-5.48}$	7058^{+229}_{-269}	-5249^{+1613}_{-333}	$0.077^{+0.193}_{-0.043}$
Alt.	-37 ± 8	$11.90^{+6.58}_{-5.31}$	7063^{+229}_{-257}	-5348^{+723}_{-288}	$0.053^{+0.121}_{-0.029}$

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

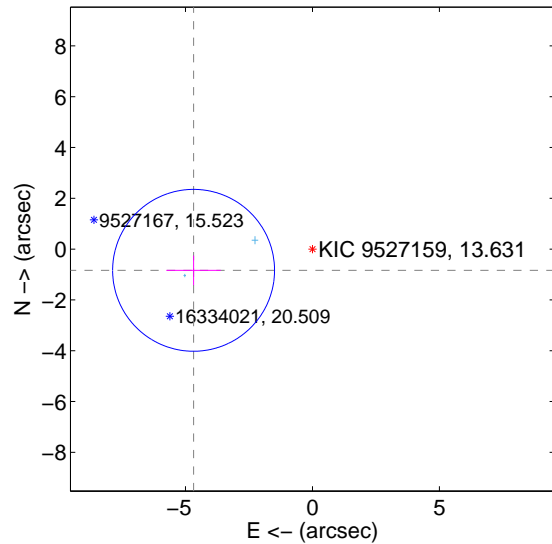
Supplemental centroid analysis for 009527159-01. Kepler magnitude: 13.63. Transit SNR 9.89

There are 2 quarters with good PRF difference image offsets

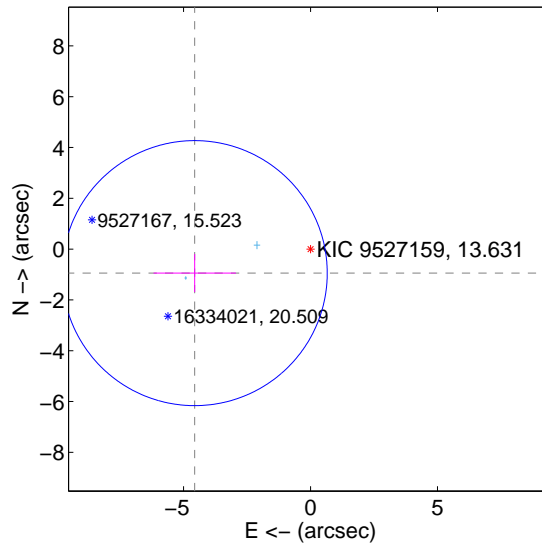
The direct PRF centroid is offset from the target star catalog position by about 0.25 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	4.753 ± 1.062	4.47	4.679 ± 1.074	-0.835 ± 0.581
PRF-fit source offset from KIC position	4.656 ± 1.739	2.68	4.559 ± 1.621	-0.946 ± 0.749
photometric centroid source offset	1.12 ± 0.51	2.18	0.81 ± 0.55	-0.77 ± 0.47

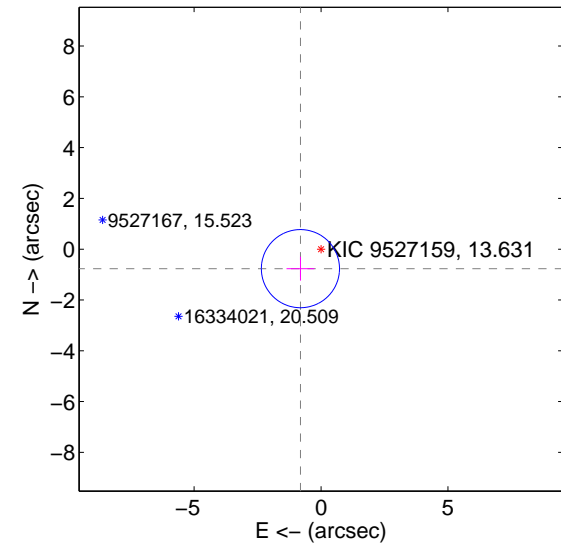
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

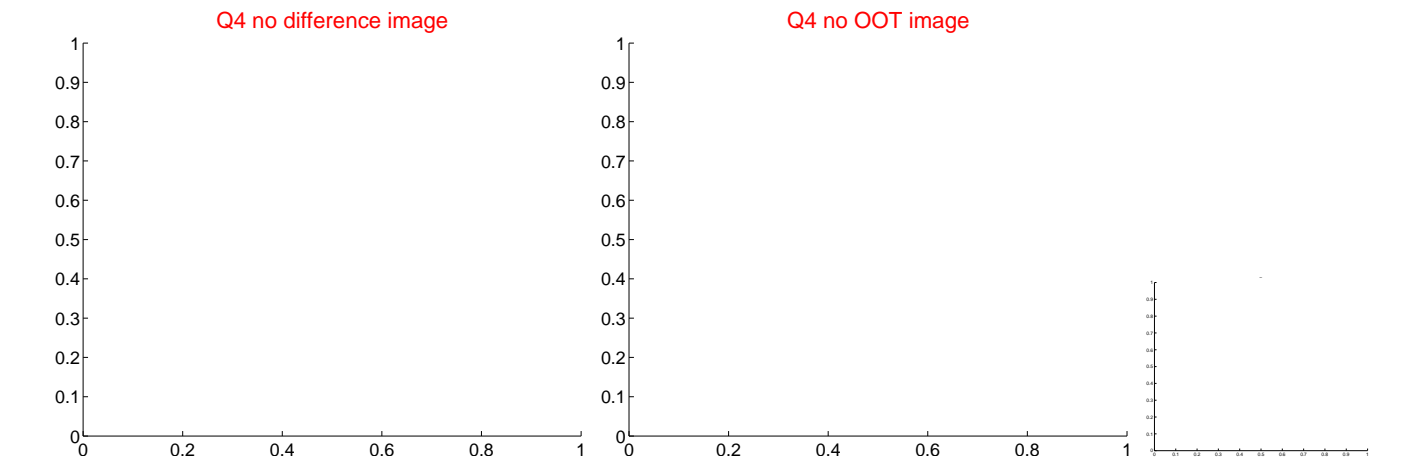
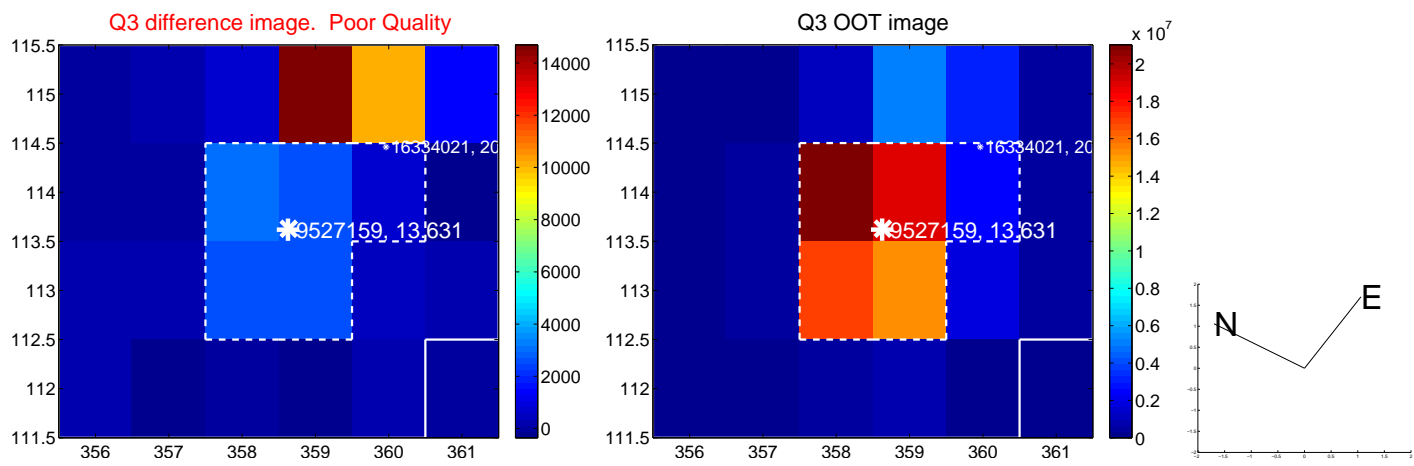
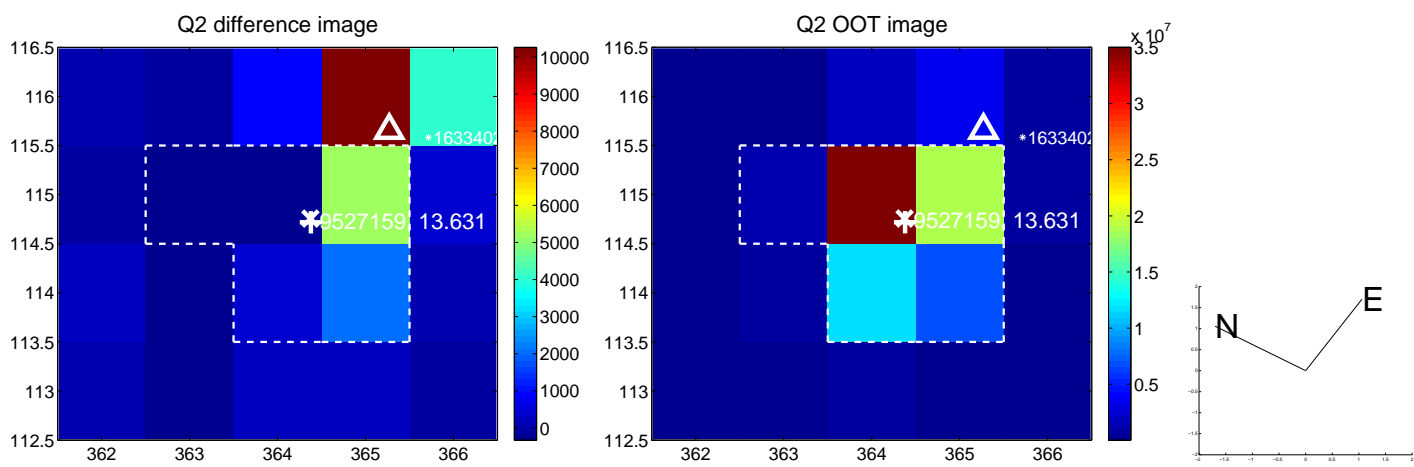
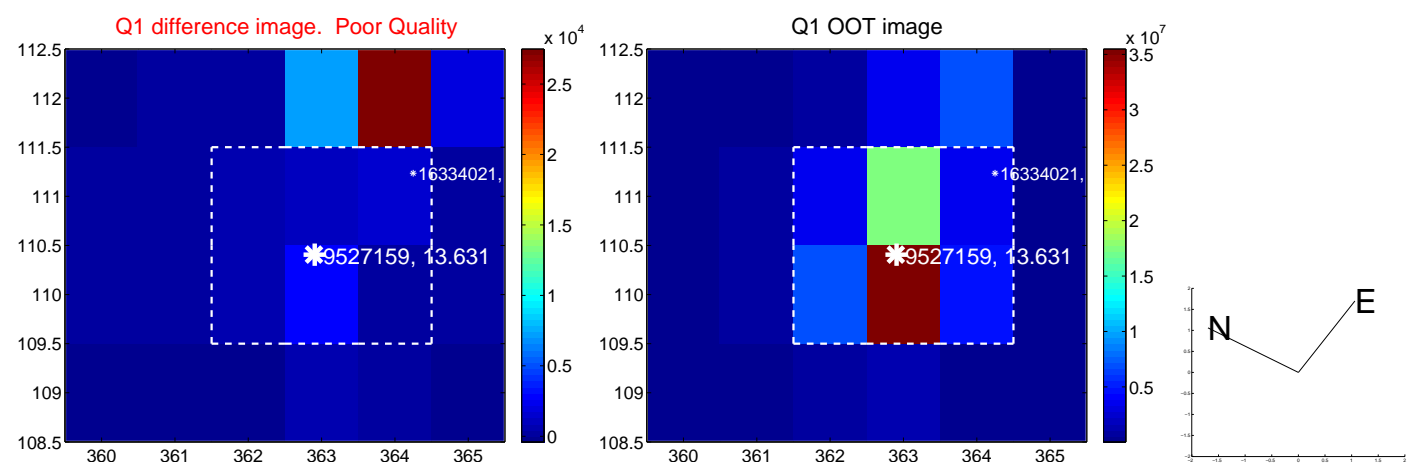


offset from photometric centroids

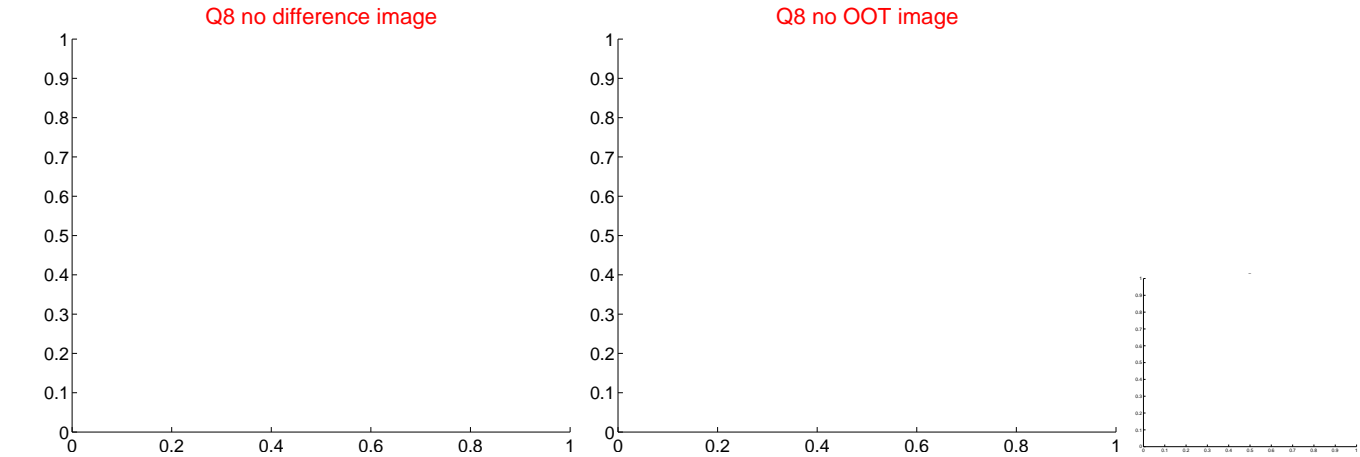
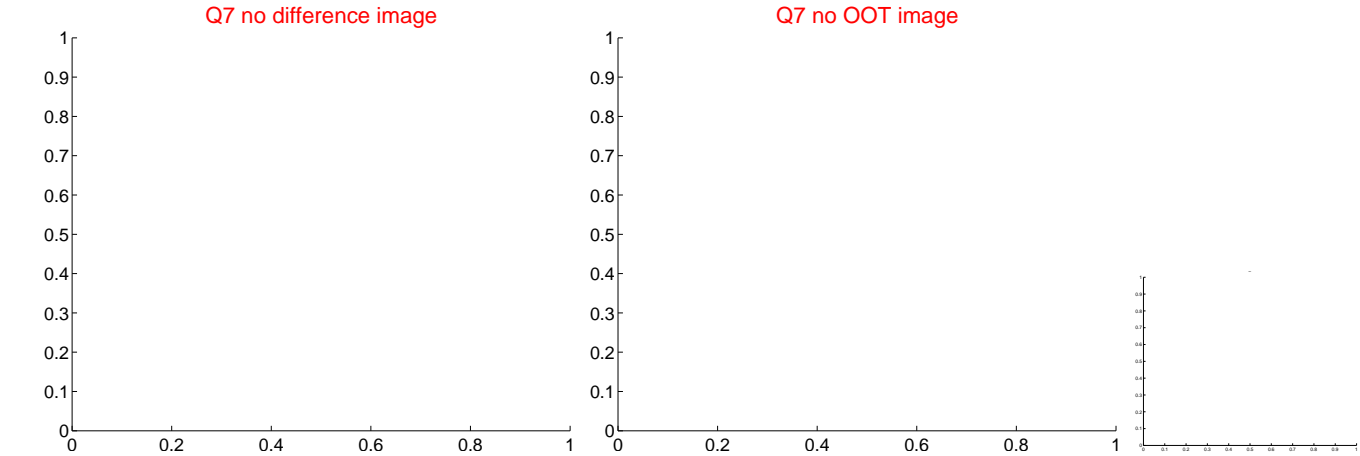
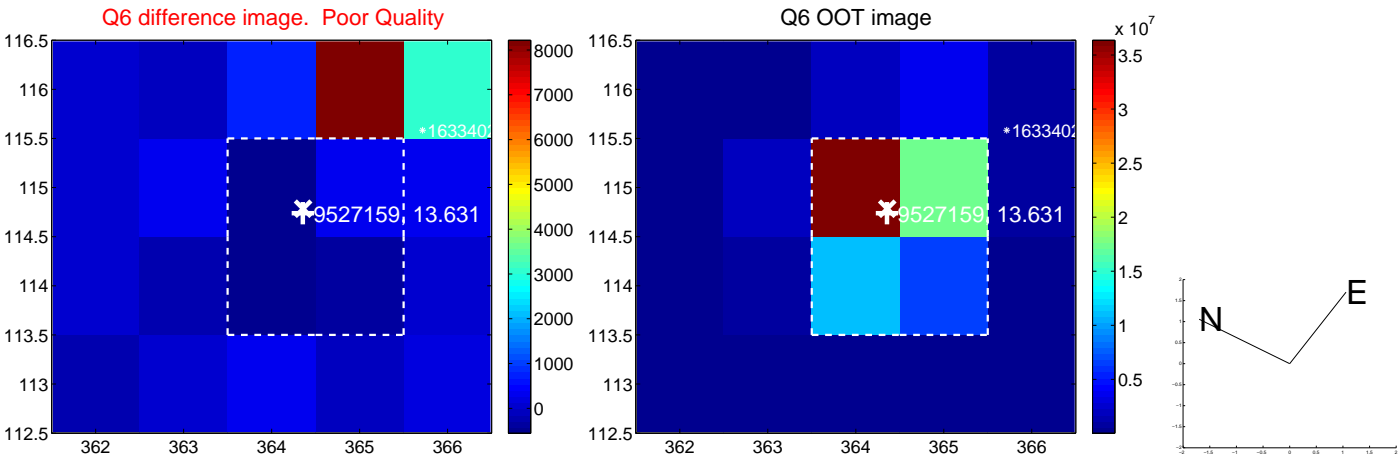
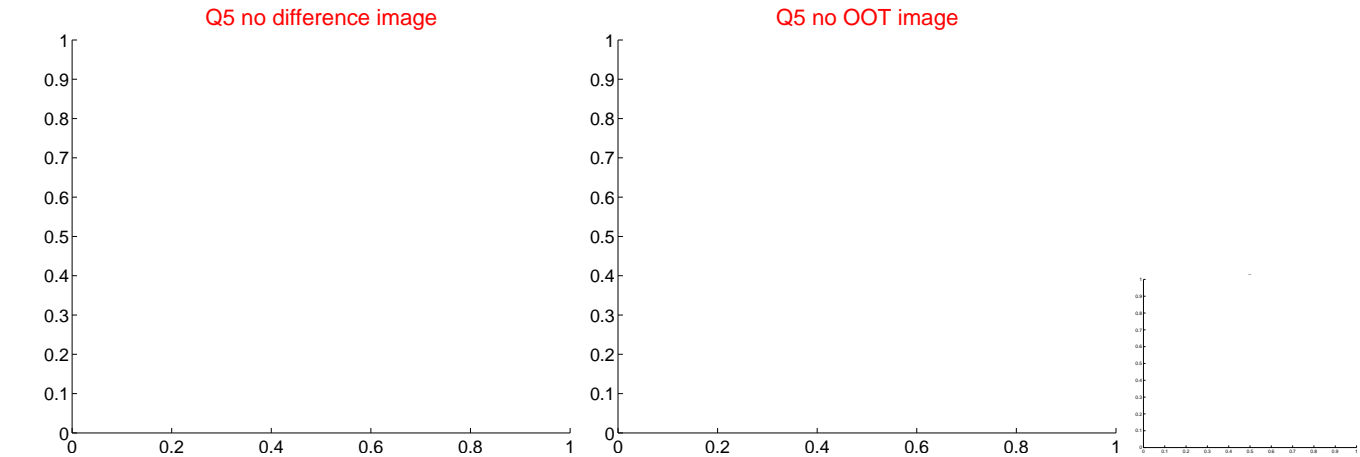


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

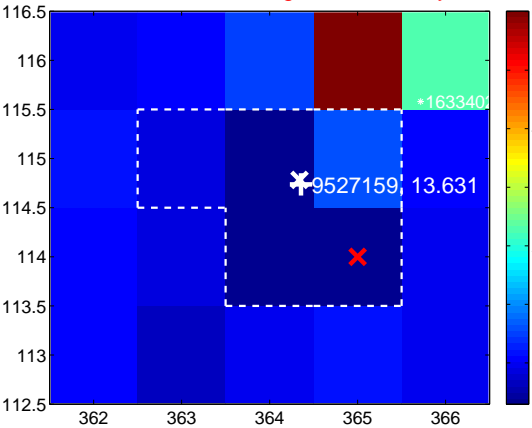
Q9 no difference image



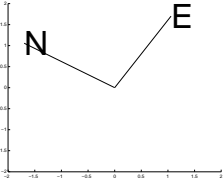
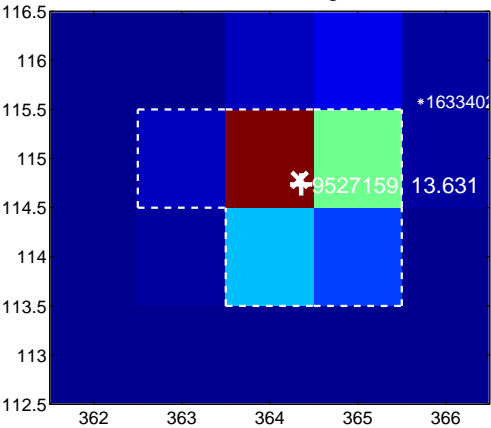
Q9 no OOT image



Q10 difference image. Poor Quality



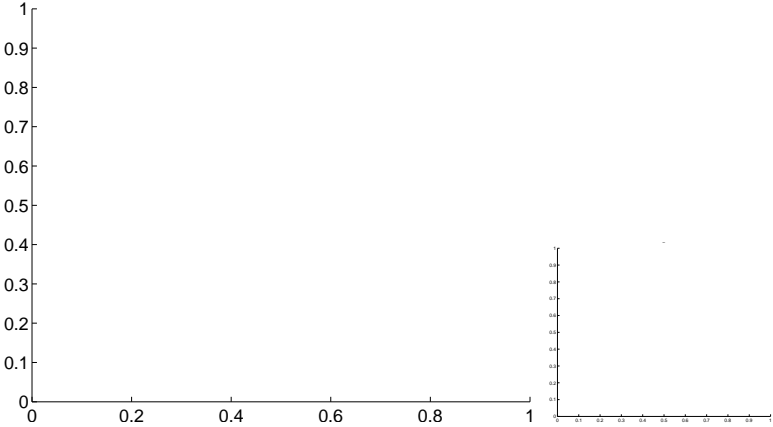
Q10 OOT image



Q11 no difference image



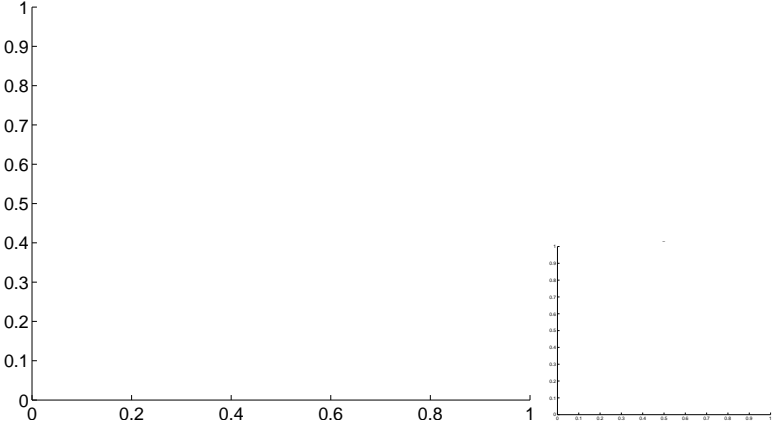
Q11 no OOT image



Q12 no difference image



Q12 no OOT image

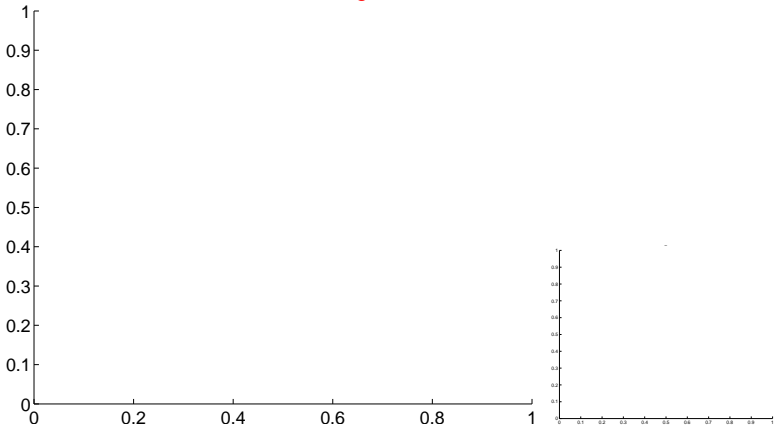


white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.

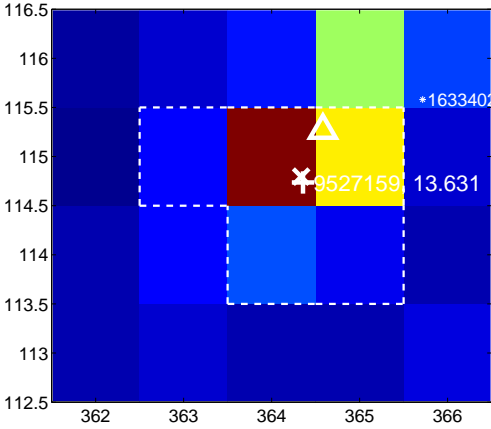
Q13 no difference image



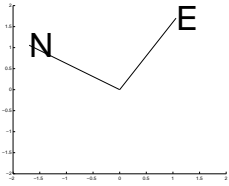
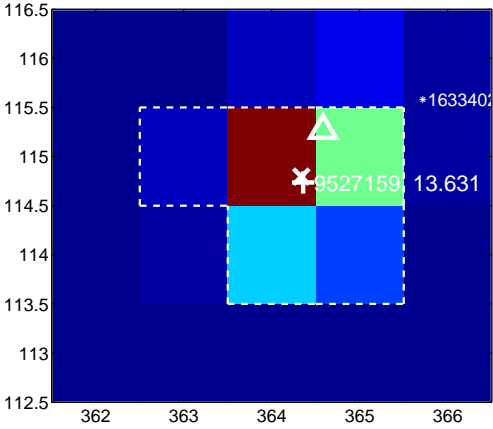
Q13 no OOT image



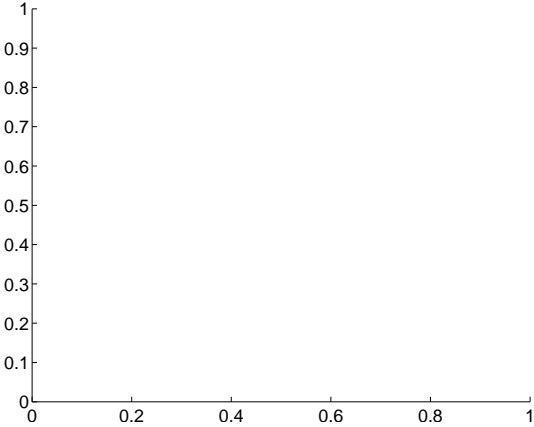
Q14 difference image



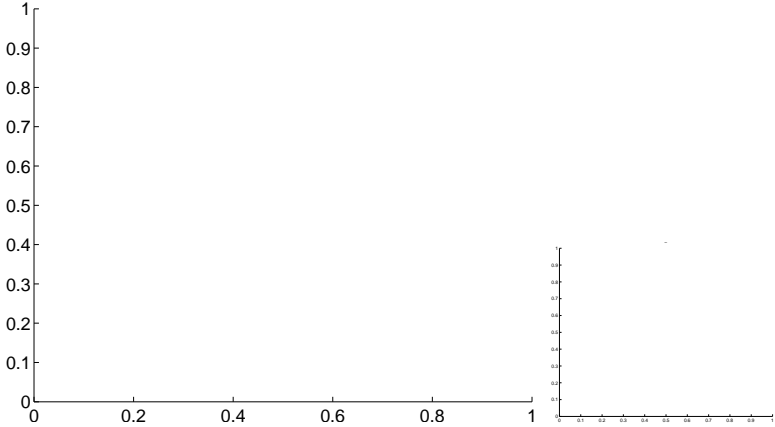
Q14 OOT image



Q15 no difference image



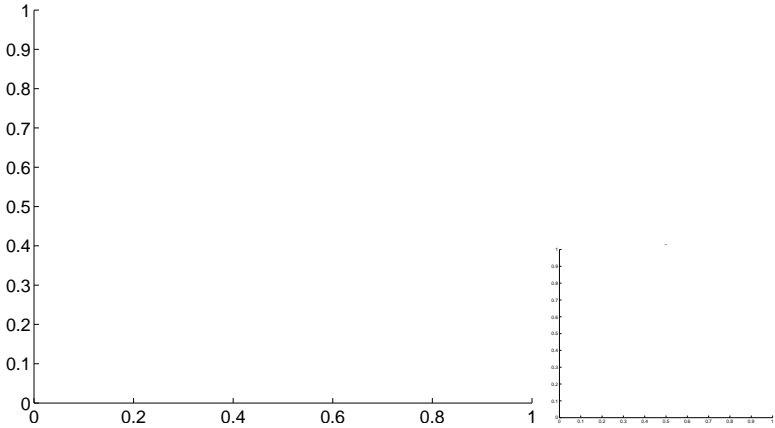
Q15 no OOT image



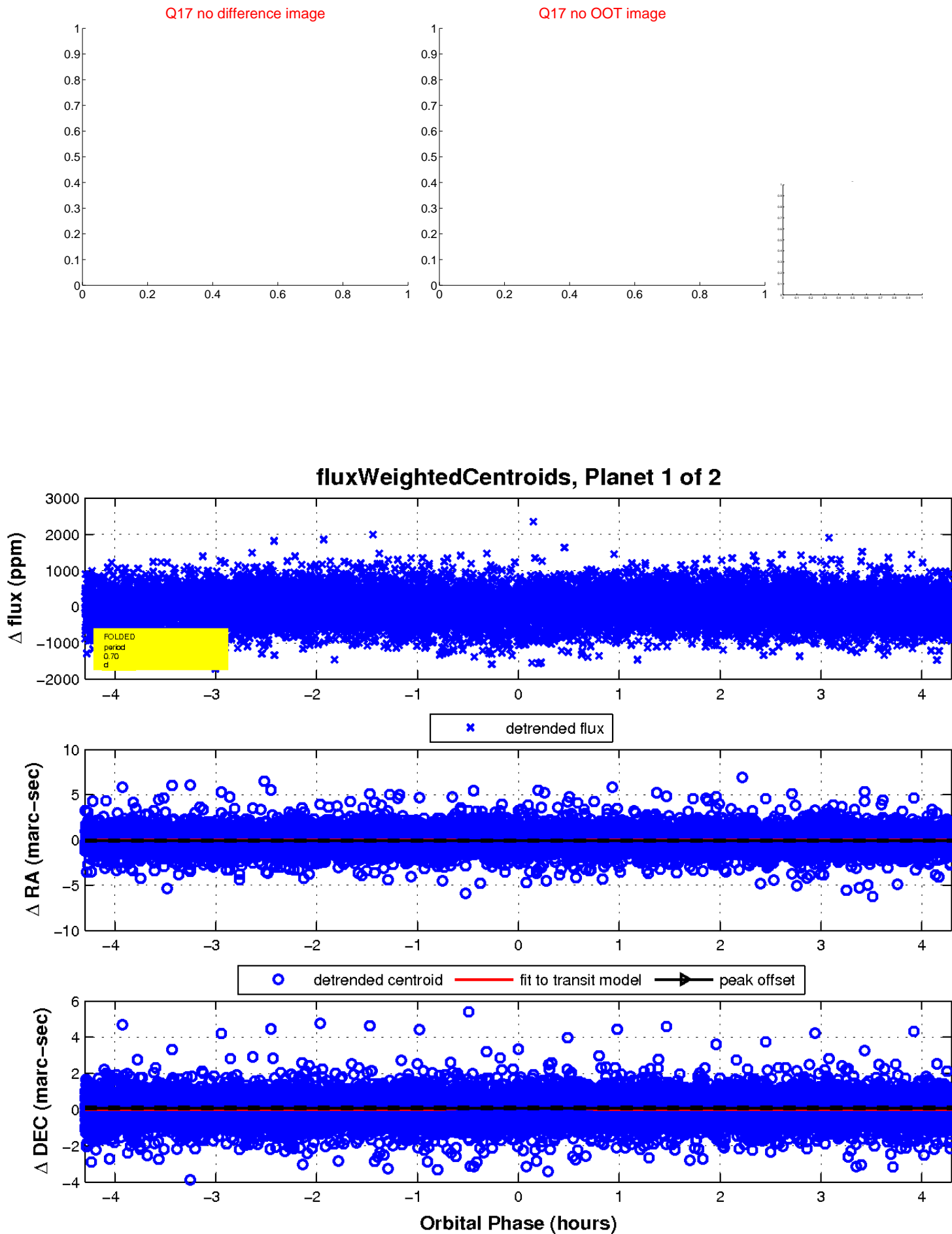
Q16 no difference image



Q16 no OOT image

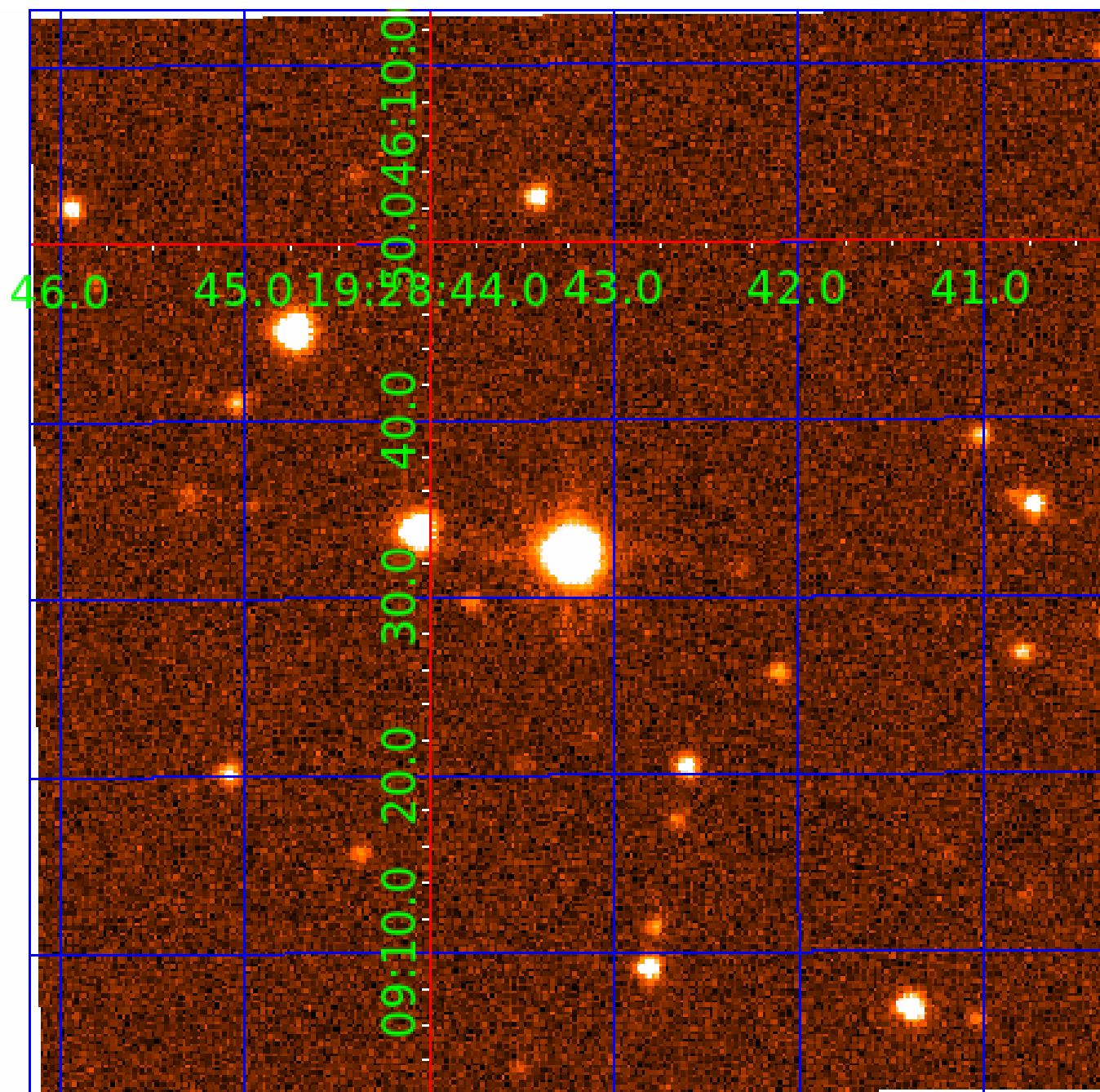


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 009527159

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})
009527159-01	OBS	No	0.702259	132.071222	109.6	1.432	9.3	9.9	10.64	4915	11.28	0.00
009527159-02	OBS	No	148.082914	148.808098	1181.7	2.971	7.3	8.2	10.64	4915	40.94	122.73

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009527159-01	OBS	FP	0.00	1	0	1	0	LPP_DV—MOD_NONUNIQ_ALT—CENT_RESOLVED_OFFSET
009527159-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES—LPP_DV—MOD_NONUNIQ_ALT—CENT_FEW_DIFFS

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

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

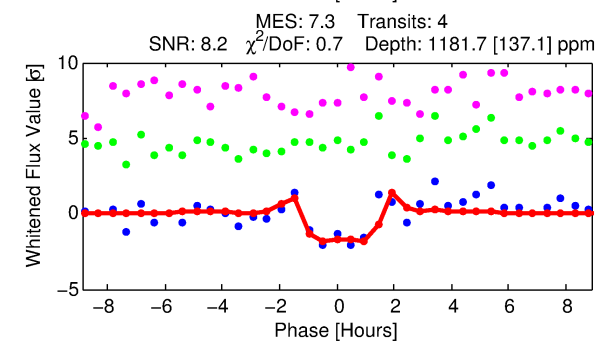
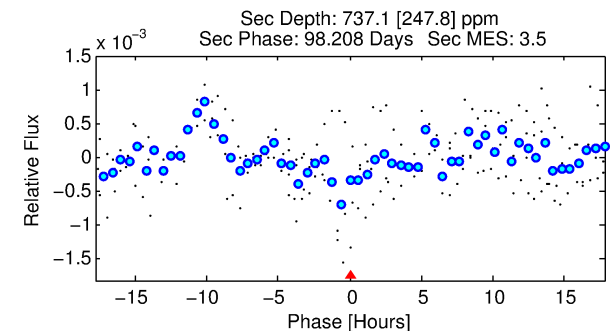
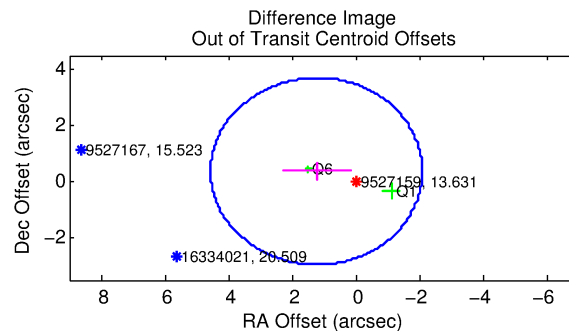
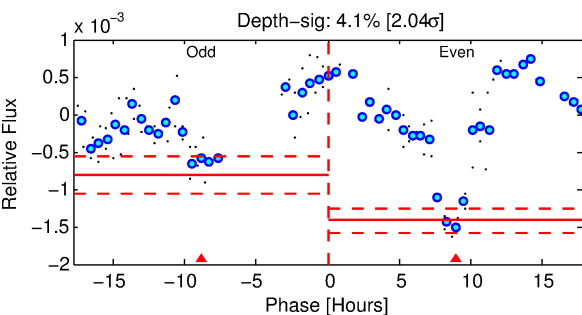
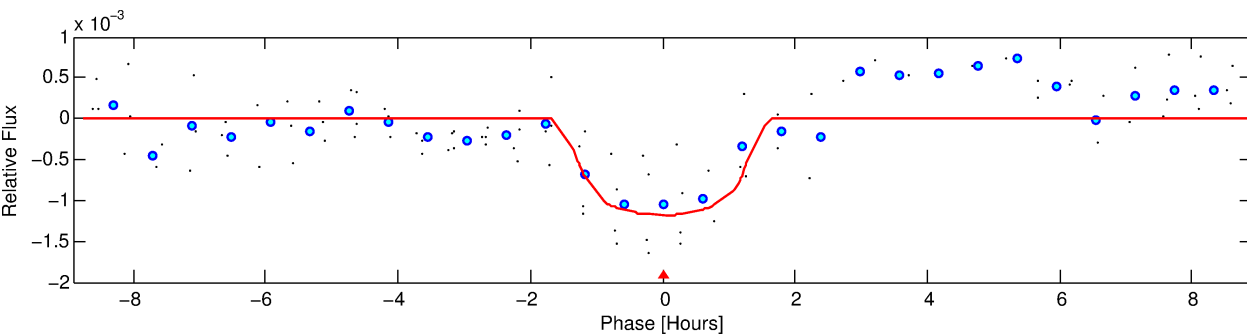
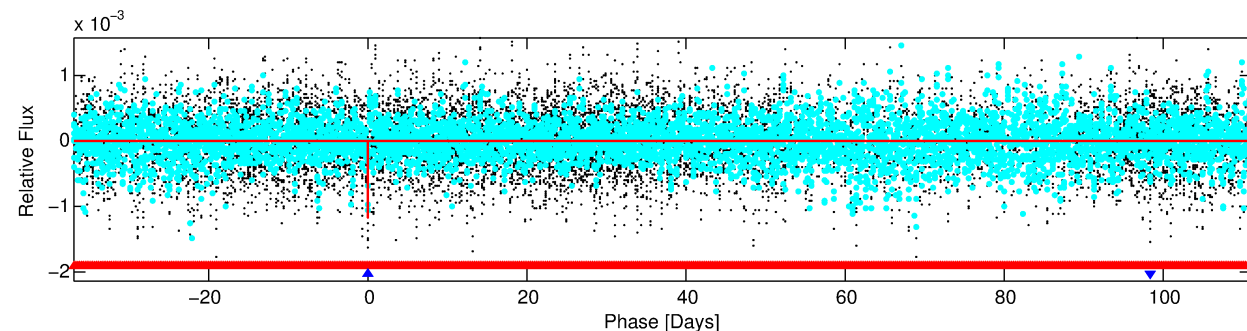
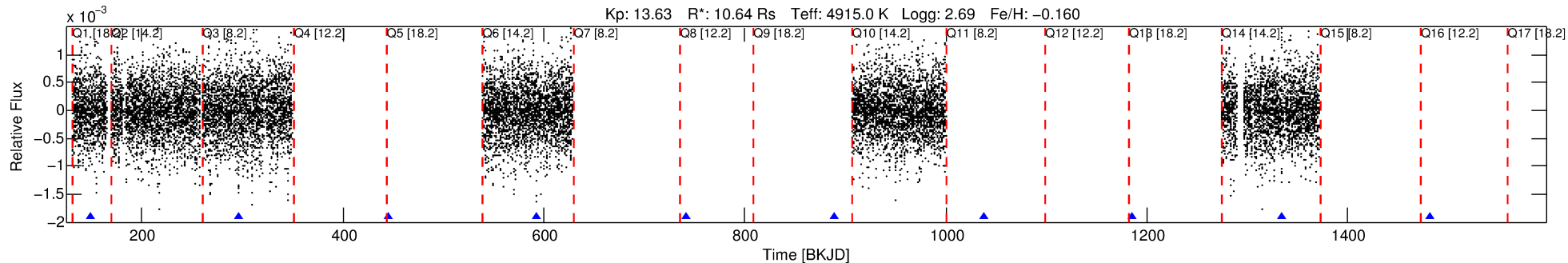
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009527159-02

No Significant Match Found

DV One-Page Summary

KIC: 9527159 Candidate: 2 of 2 Period: 148.083 d



DV Fit Results:

Period = 148.08291 [0.00071] d
Epoch = 148.8081 [0.0035] BKJD
Rp/R* = 0.0353 [0.0249]
a/R* = 251.53 [634.35]
b = 0.80 [1.18]
Seff = 122.73 [27.10]
Teff = 849 [47] K
Rp = 40.94 [30.88] Re
a = 0.6945 [0.1252] AU
Ag = 116.68 [170.55] [0.68σ]
Teffp = 4313 [1569] K [2.21σ]

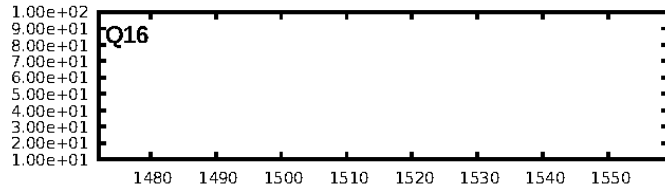
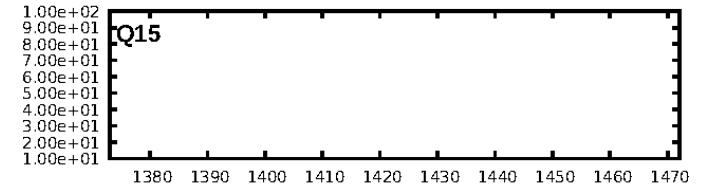
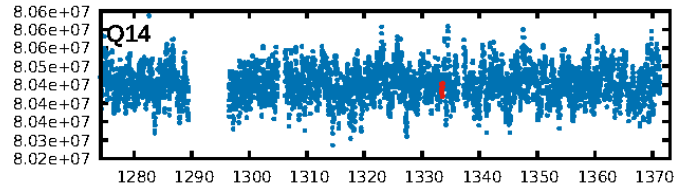
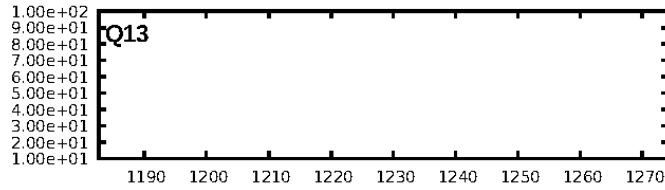
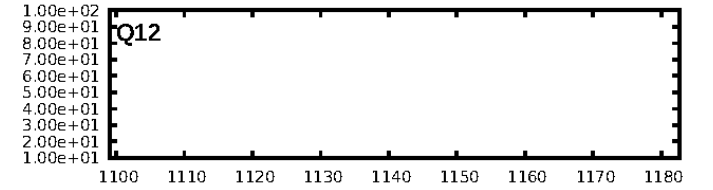
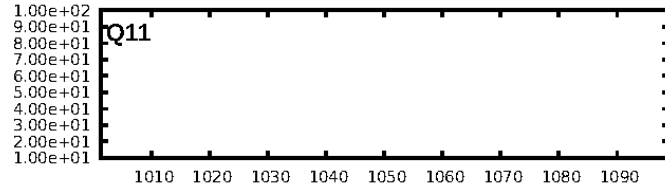
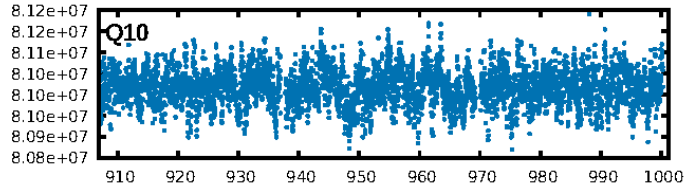
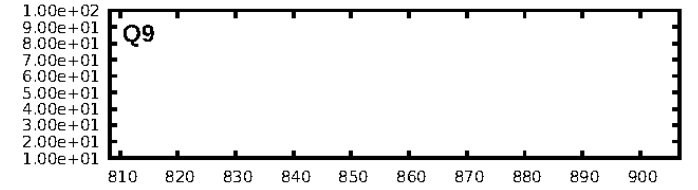
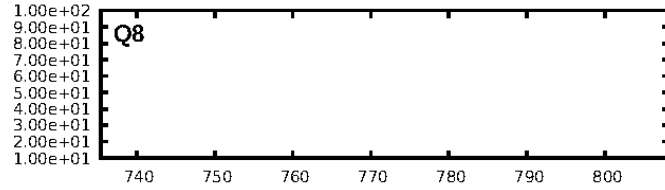
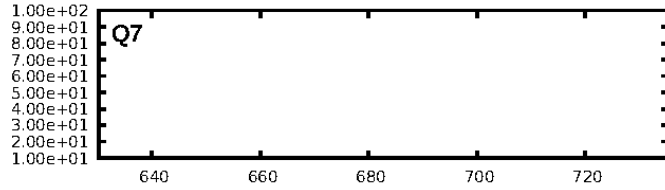
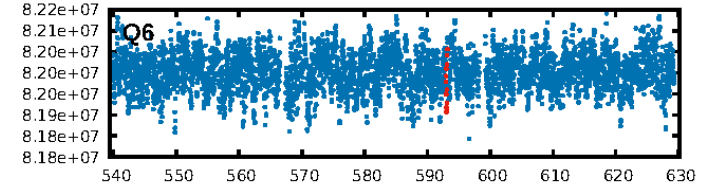
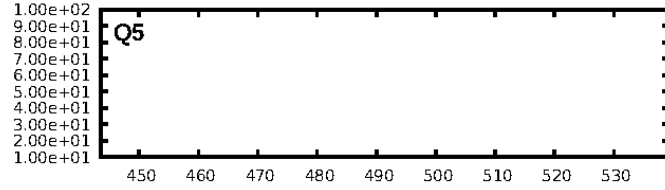
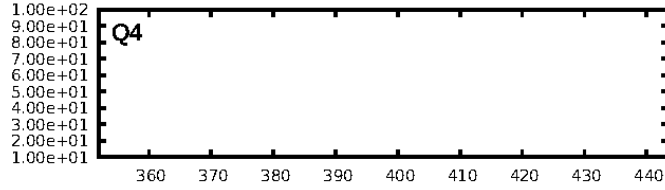
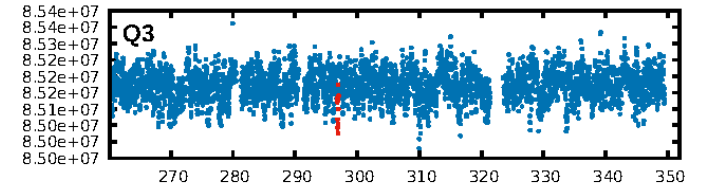
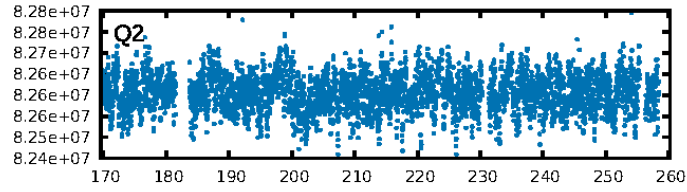
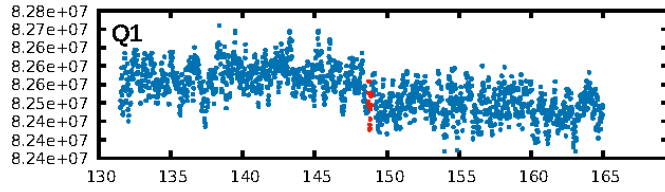
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [1072.51σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 11.8%
ModelChiSquareGof-sig: 99.3%
Bootstrap-pfa: 3.04e-10
RollingBand-fgt: 1.00 [3/3]
GhostDiagnostic-chr: 3.332
Centroid-sig: 36.1%
Centroid-so: 0.283 arcsec [0.71σ]
OotOffset-rm: 1.281 arcsec [1.16σ]
KicOffset-rm: 1.122 arcsec [1.39σ]
OotOffset-st: 1/0/0/1 [2]
KicOffset-st: 1/0/0/1 [2]
DiffImageQuality-fgm: 1.00 [2/2]
DiffImageOverlap-fno: 0.00 [0/4]

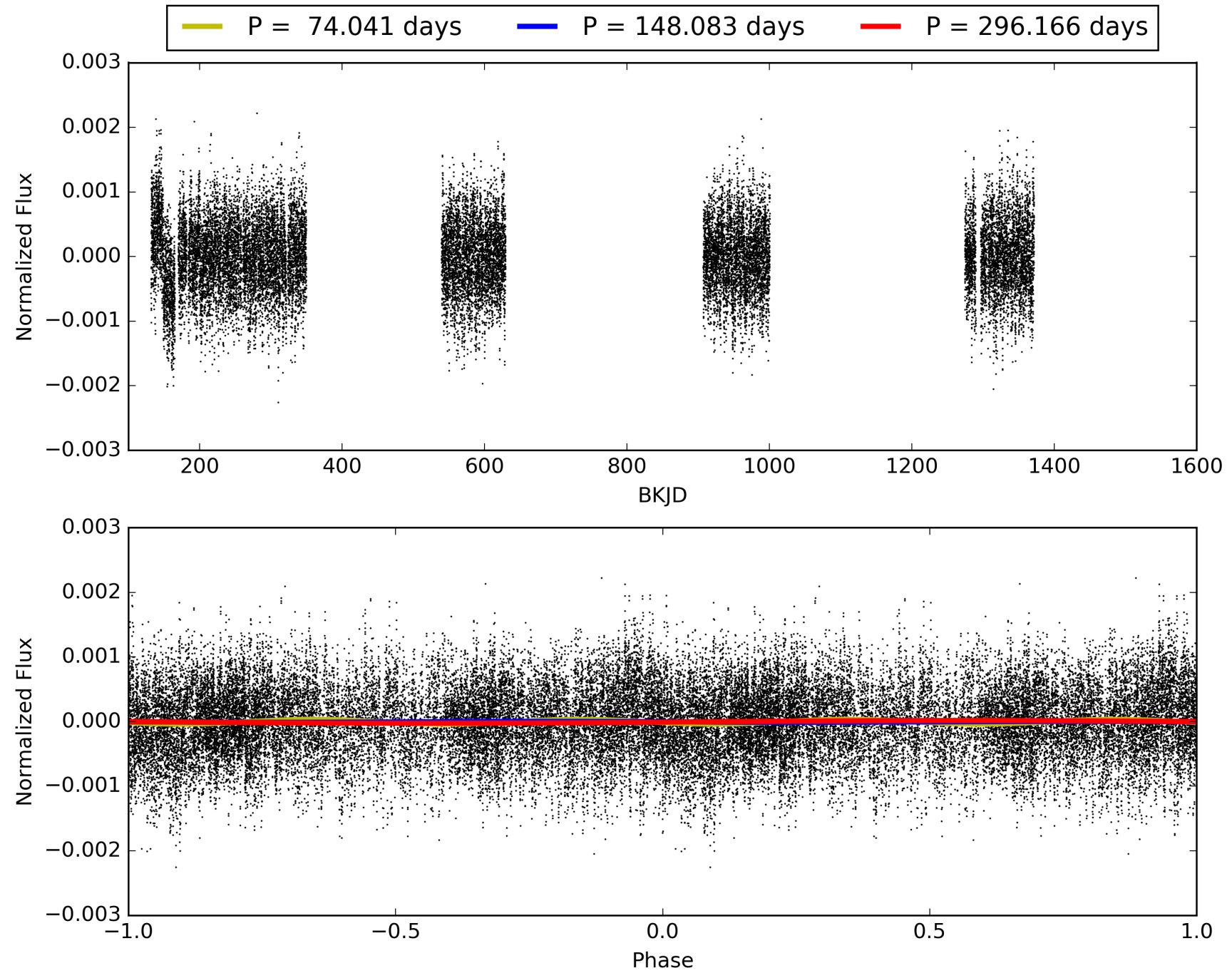
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 17:03:14 Z

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

TCE 009527159-02, PDC Light Curves

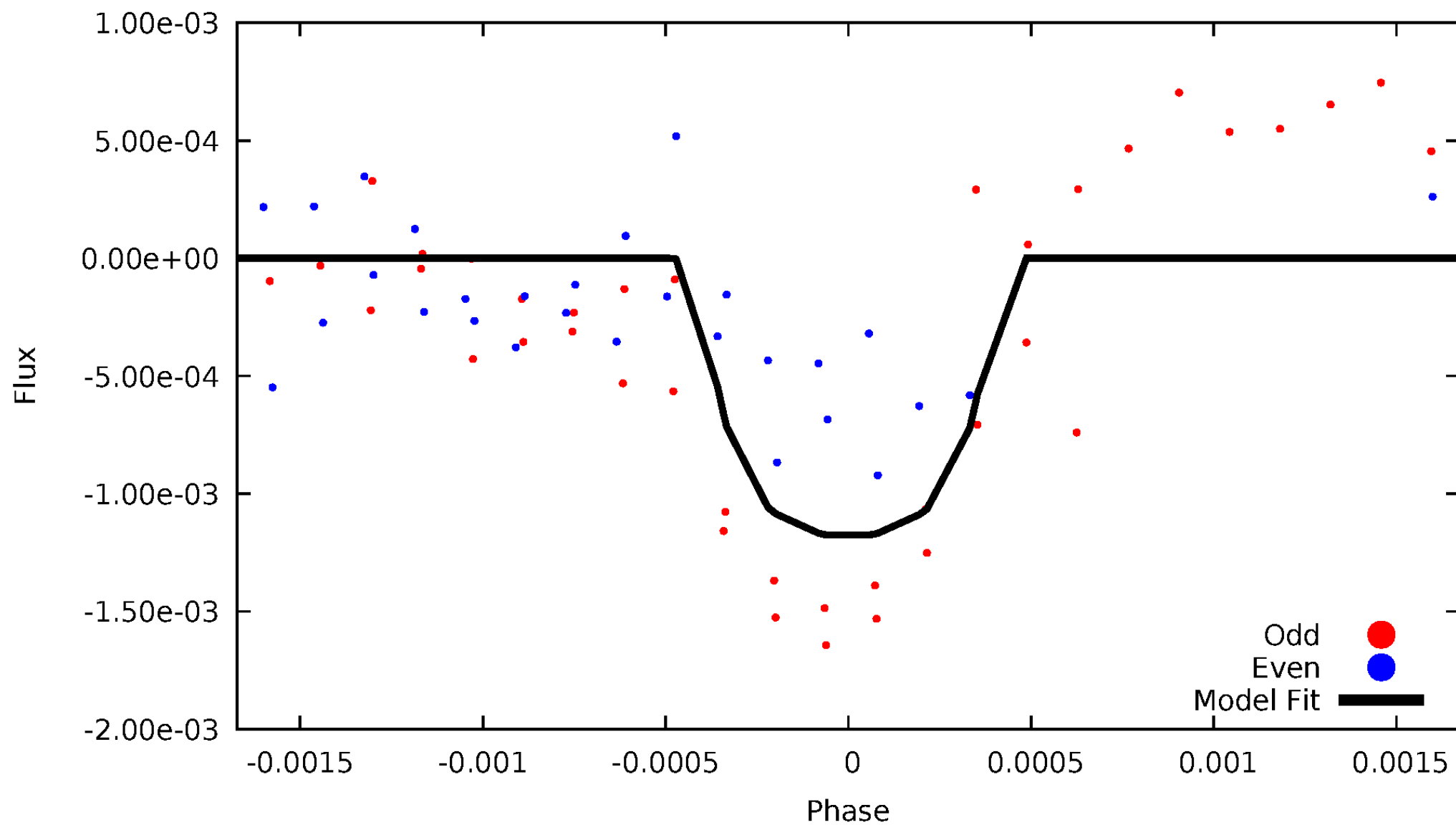


TCE 009527159-02



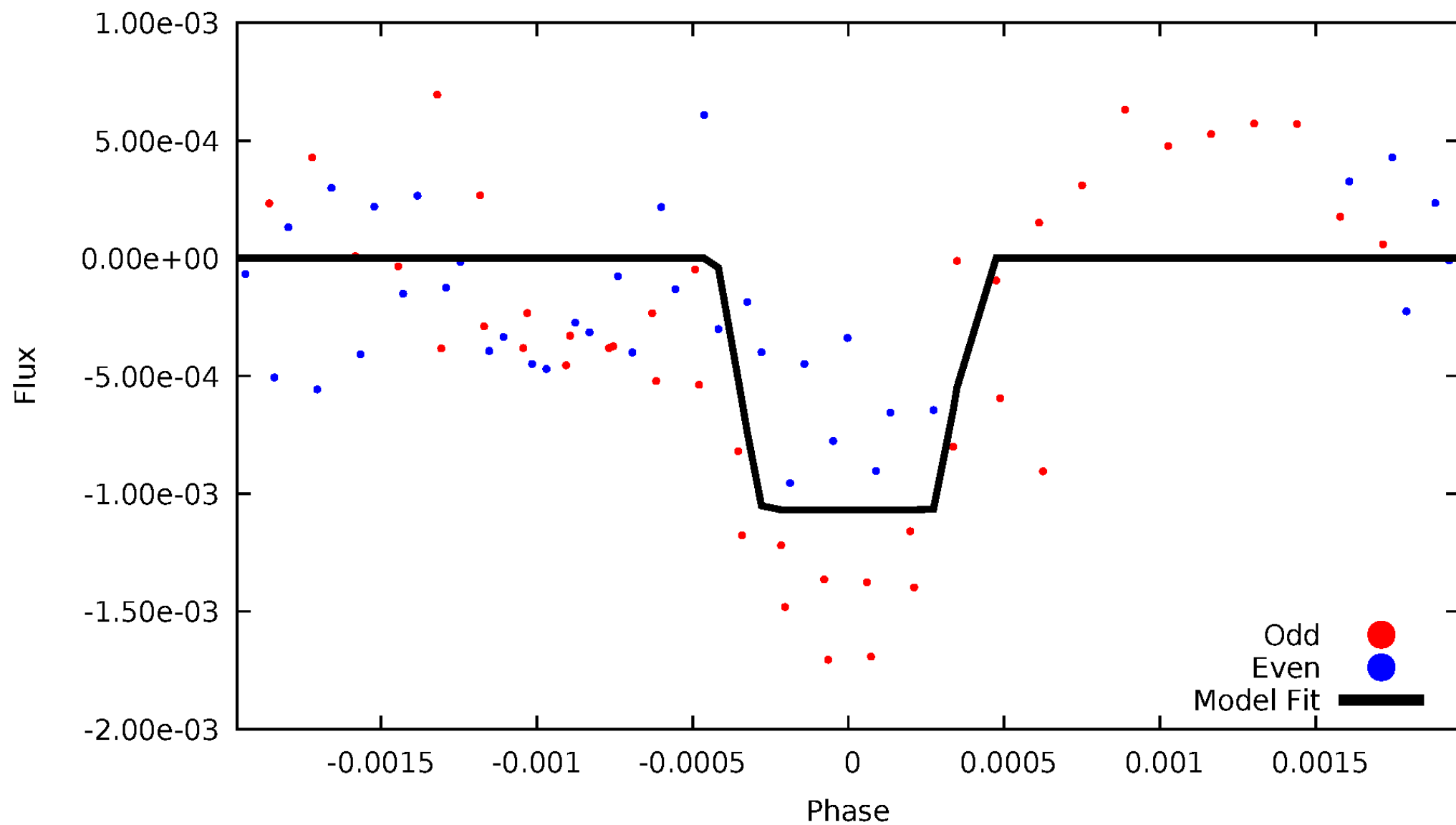
DV Odd/Even

TCE 009527159-02



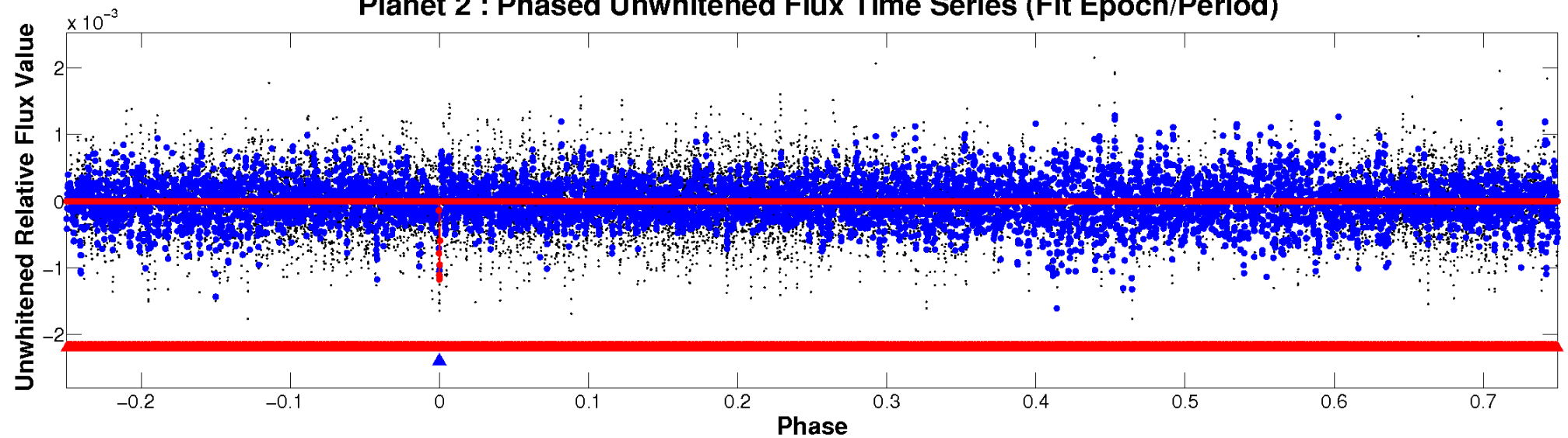
ALT Odd/Even

TCE 009527159-02

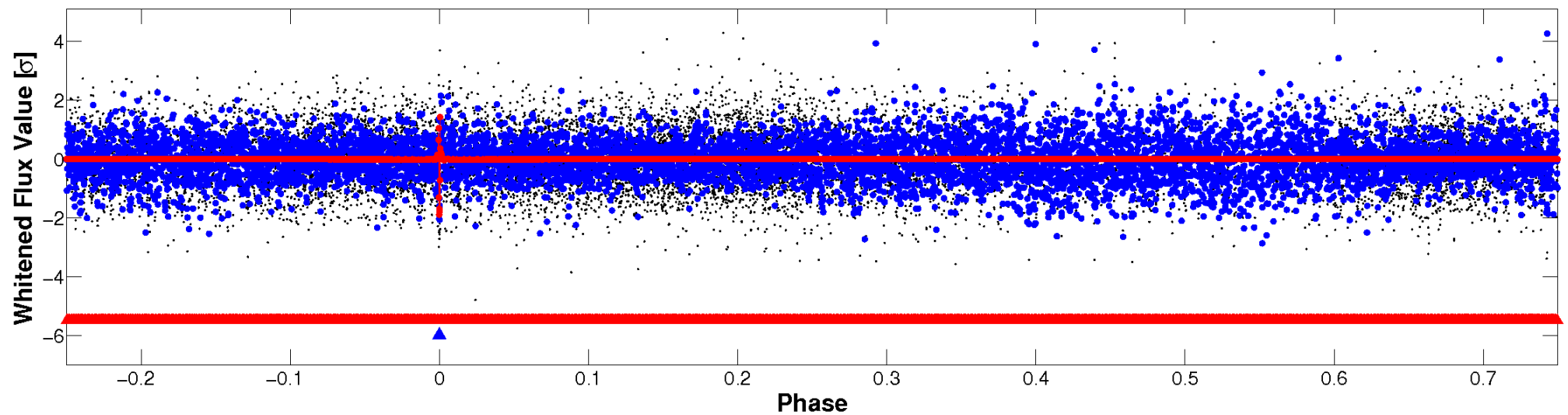


Non-Whitened Vs. Whitened Light Curve

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

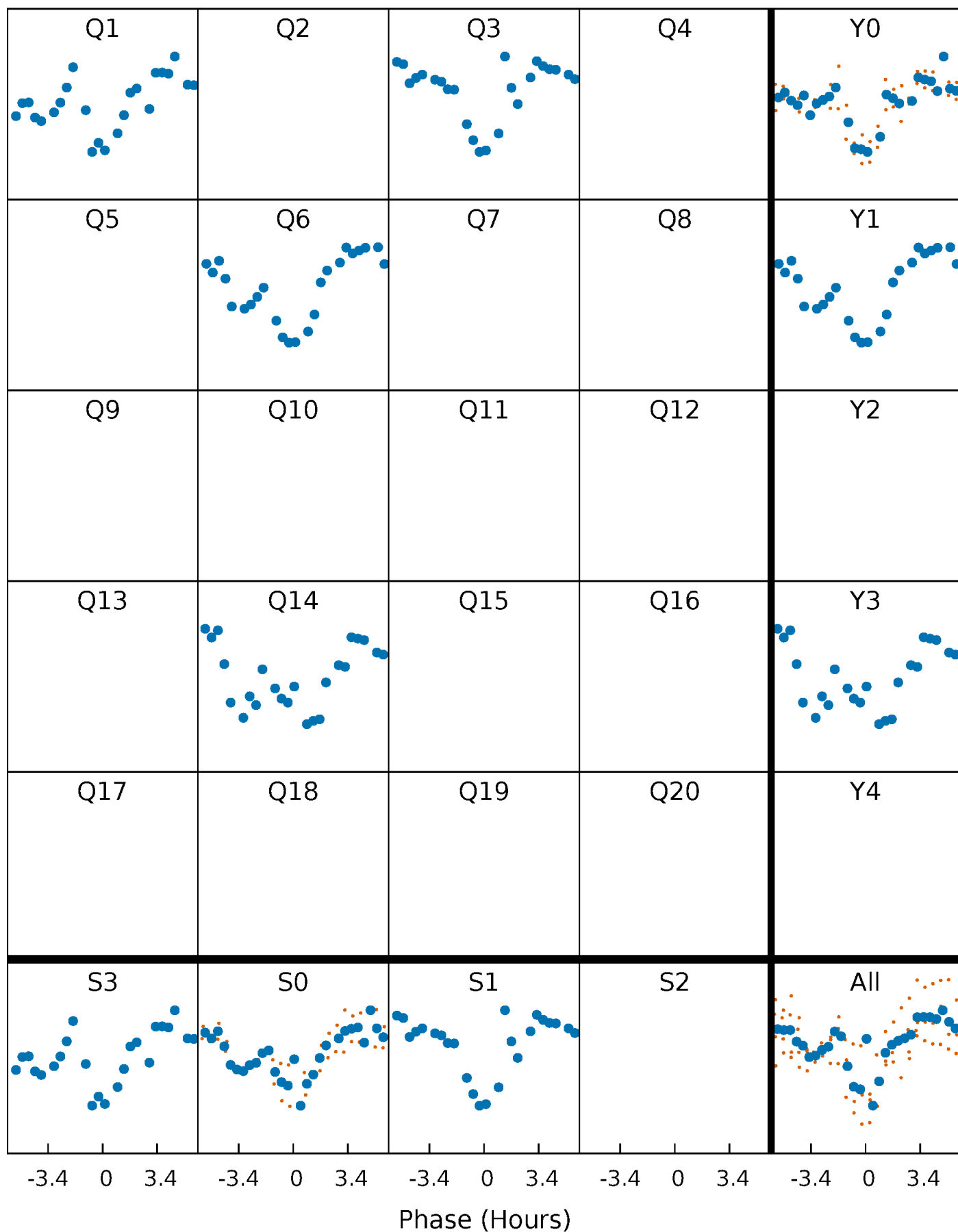


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



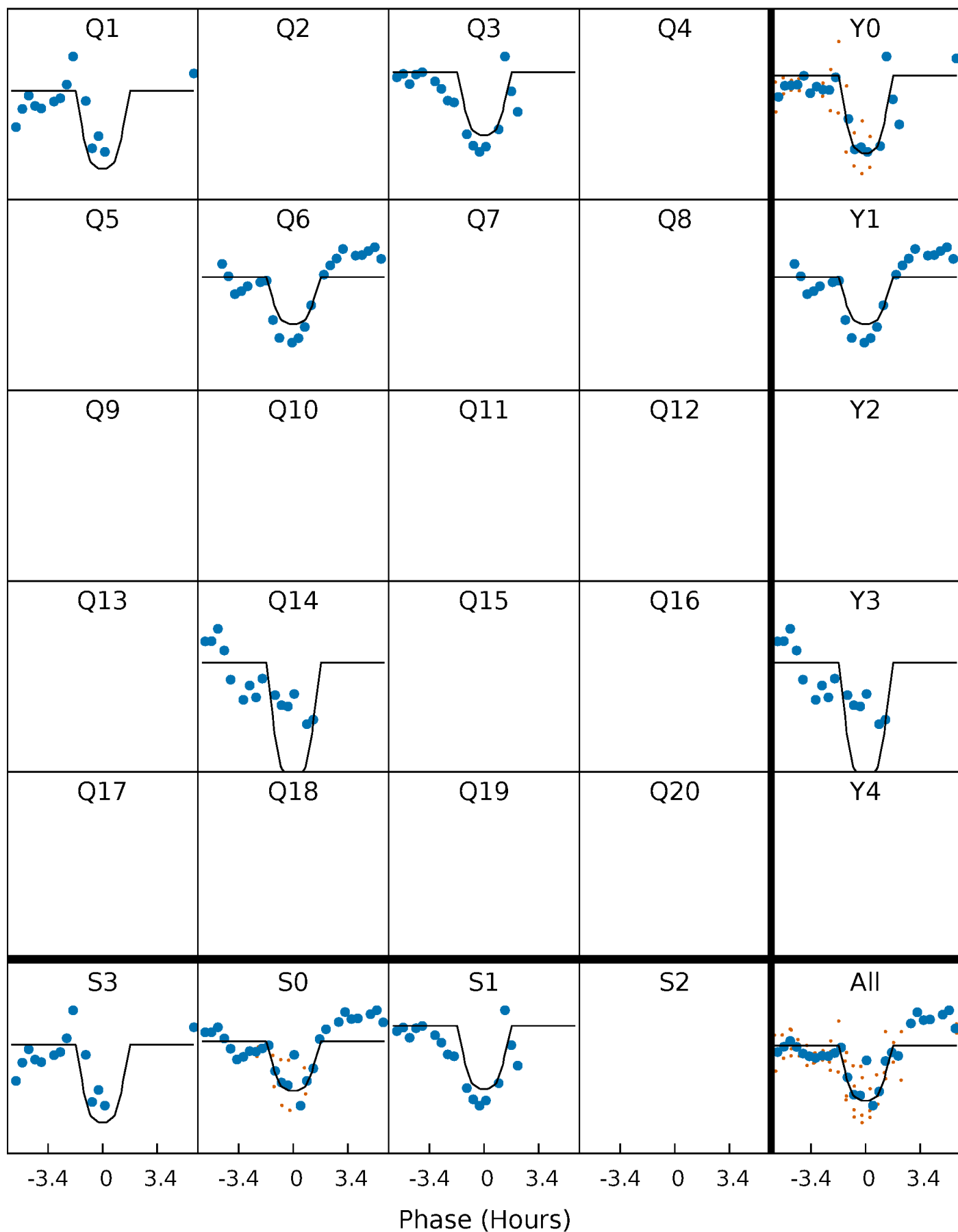
PDC Quarter-Phased Transit Curves

TCE 009527159-02 P=148.082914 Days $T_0=148.808098$ (BKJD)



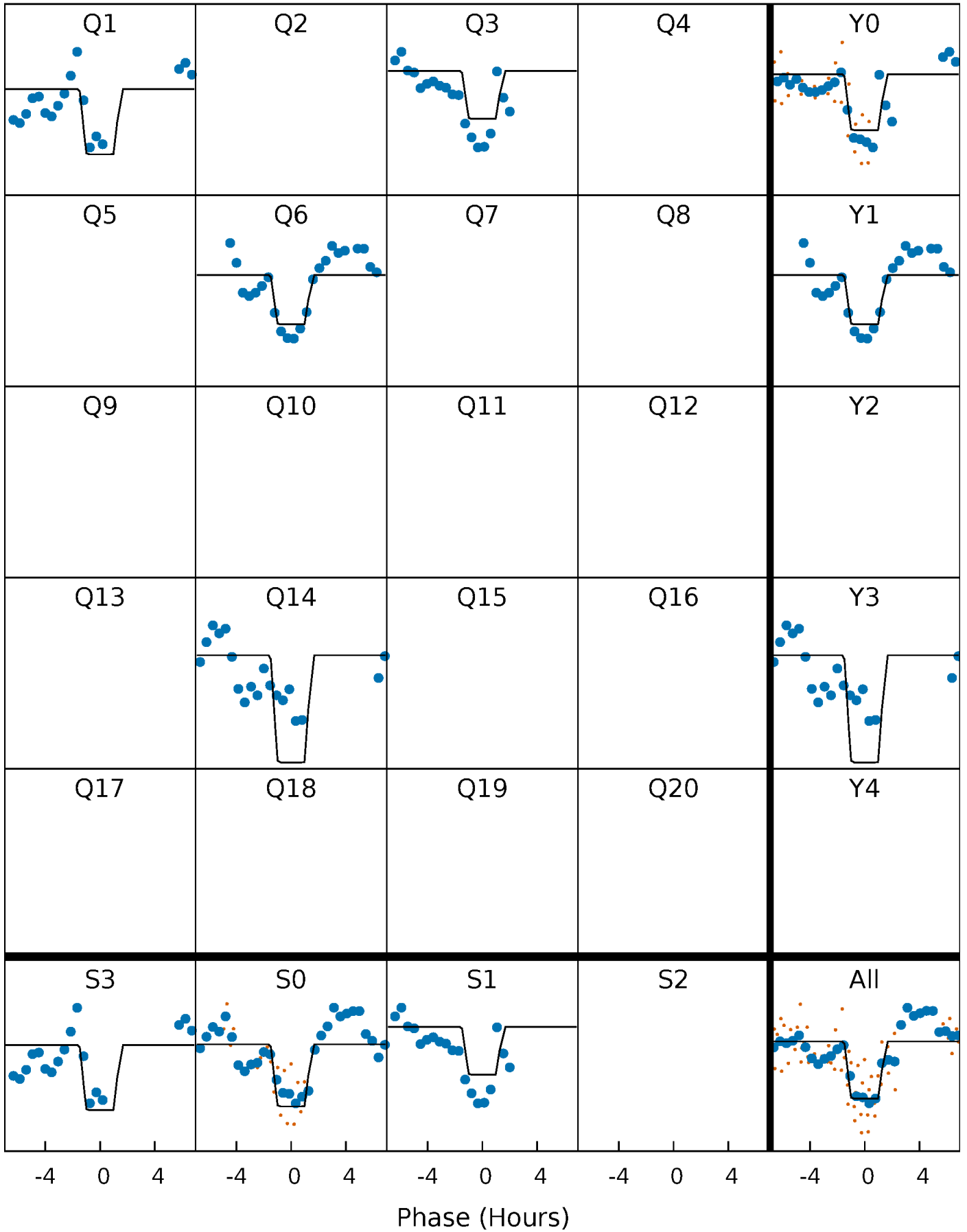
DV Quarter-Phased Transit Curves

TCE 009527159-02 $P=148.082914$ Days $T_0=148.808098$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

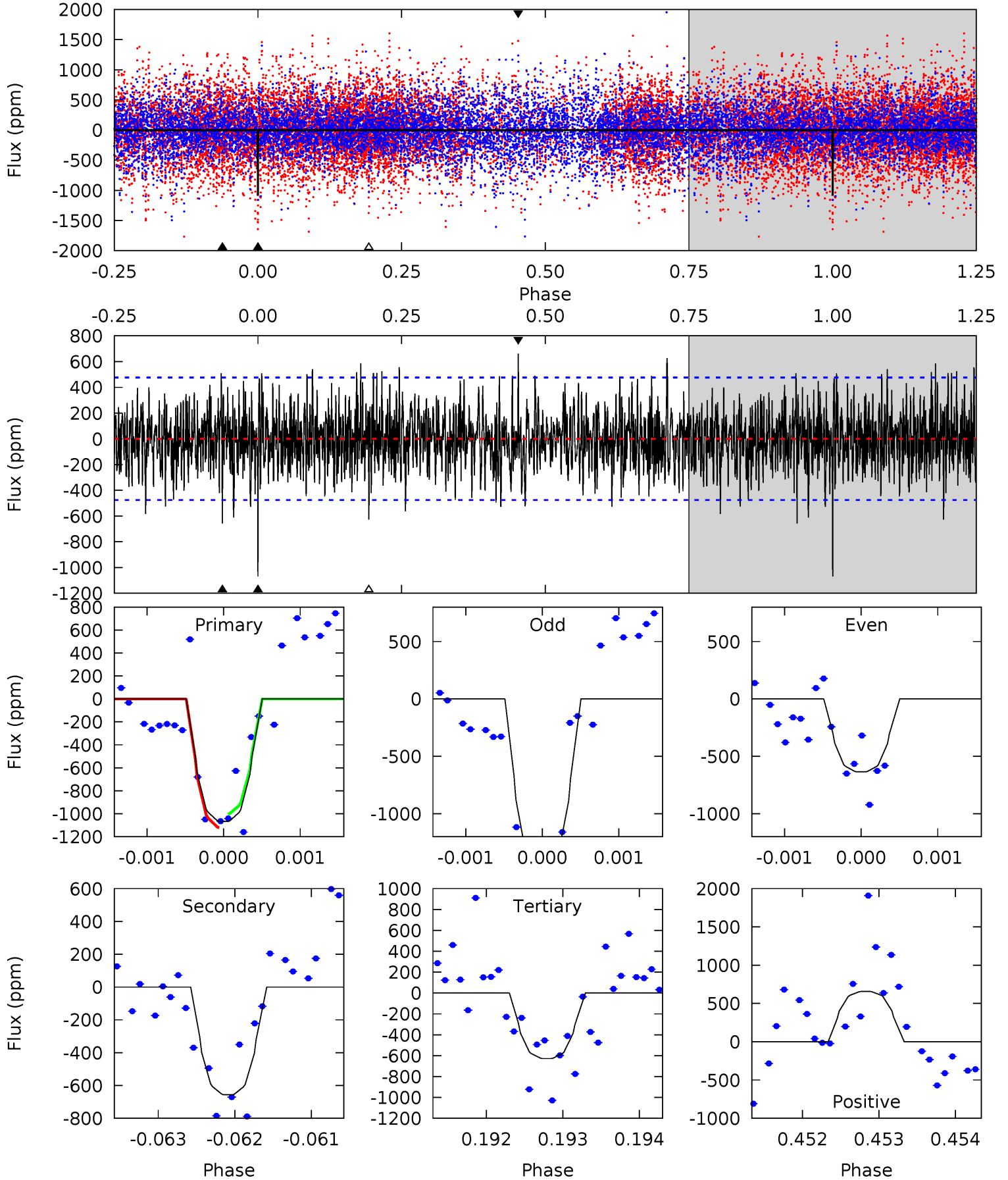
TCE 009527159-02 P=148.084167 Days $T_0=148.806835$ (BKJD)



DV Model-Shift Uniqueness Test

009527159-02, P = 148.082914 Days, E = 0.725184 Days

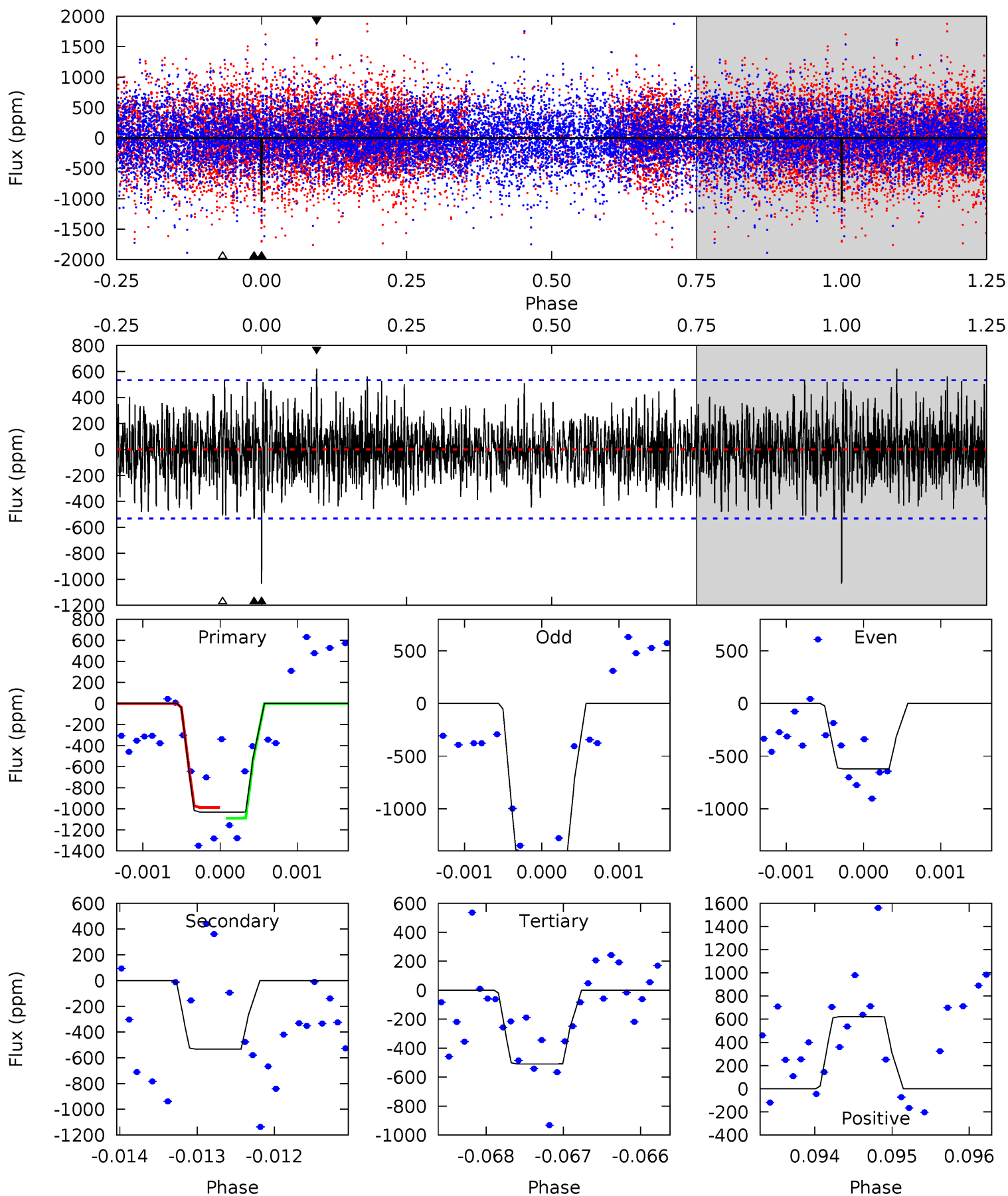
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.2	7.53	7.20	7.53	5.46	3.30	2.10	5.05	4.71	0.33	-0.00	4.66	1.00	0.38	0.67



Alt Model-Shift Uniqueness Test

009527159-02, P = 148.084167 Days, E = 0.722668 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.6	5.49	5.25	6.41	5.48	3.34	1.74	5.39	4.24	0.24	-0.91	4.06	0.98	0.38	0.53



Stellar Parameters For KIC 009527159

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	4915^{+86}_{-147}	$2.693^{+0.033}_{-0.030}$	$-0.160^{+0.250}_{-0.300}$	$10.640^{+1.899}_{-2.849}$	$2.037^{+0.774}_{-0.946}$	$0.002^{+0.001}_{-0.000}$
	+2%/-3%	+1%/-1%	+156%/-188%	+18%/-27%	+38%/-46%	+37%/-15%
Source	PHO1	AST9	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 009527159-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	-656 ± 87	$46.08^{+29.85}_{-26.39}$	1186^{+38}_{-45}	4156^{+1698}_{-650}	83^{+348}_{-51}
Alt.	-533 ± 97	$41.47^{+30.07}_{-24.97}$	1187^{+37}_{-46}	4113^{+2017}_{-639}	83^{+426}_{-53}

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 $A_{obs} \gg 1.0$

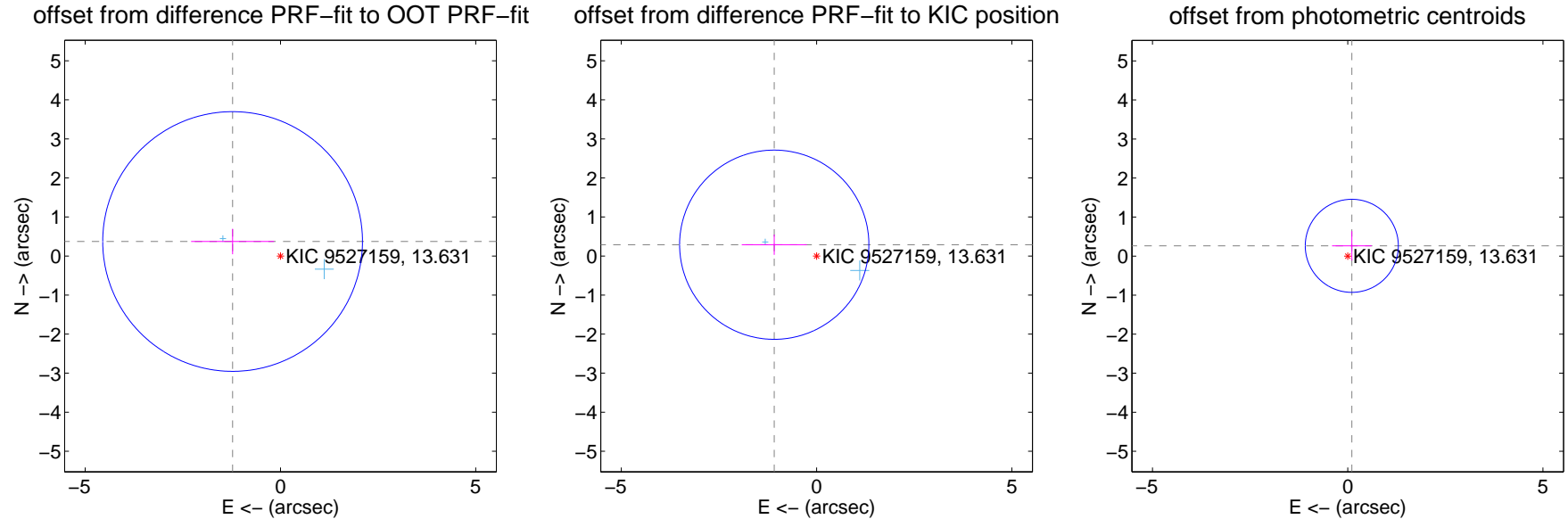
DV Centroid Data

Supplemental centroid analysis for 009527159-02. Kepler magnitude: 13.63. Transit SNR 8.19

There are 2 quarters with good PRF difference image offsets

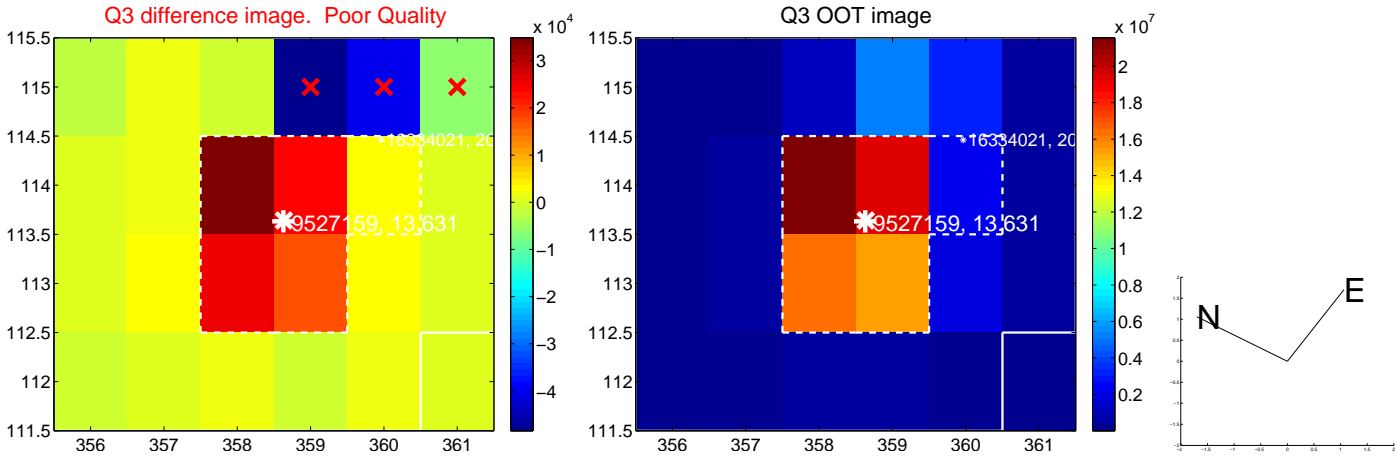
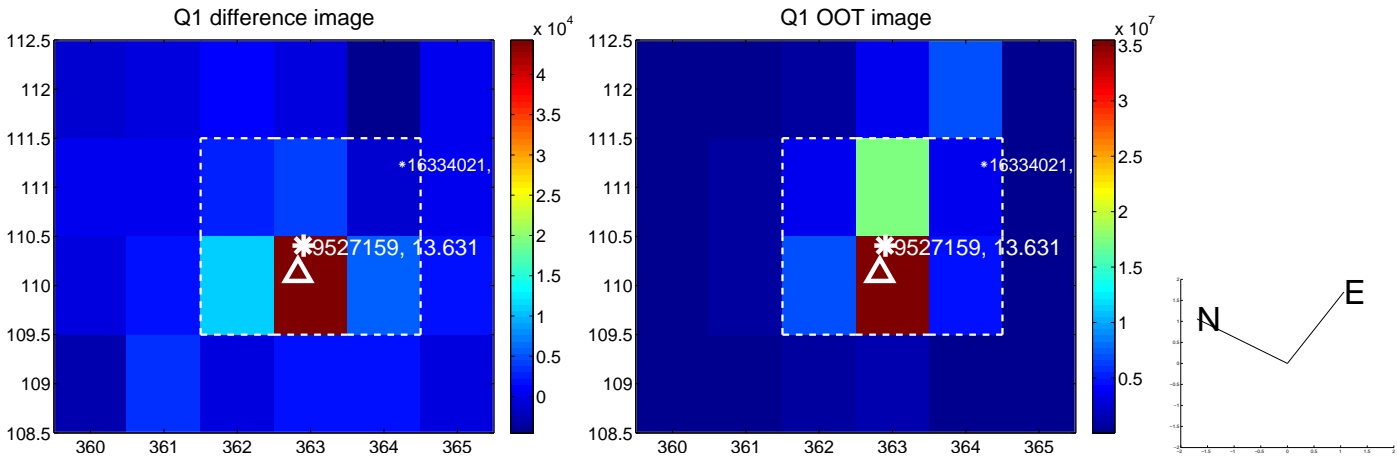
The direct PRF centroid is offset from the target star catalog position by about 0.18 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	1.281 ± 1.109	1.16	1.225 ± 1.062	0.372 ± 0.326
PRF-fit source offset from KIC position	1.122 ± 0.808	1.39	1.084 ± 0.833	0.290 ± 0.260
photometric centroid source offset	0.28 ± 0.40	0.71	-0.10 ± 0.51	0.26 ± 0.38



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.

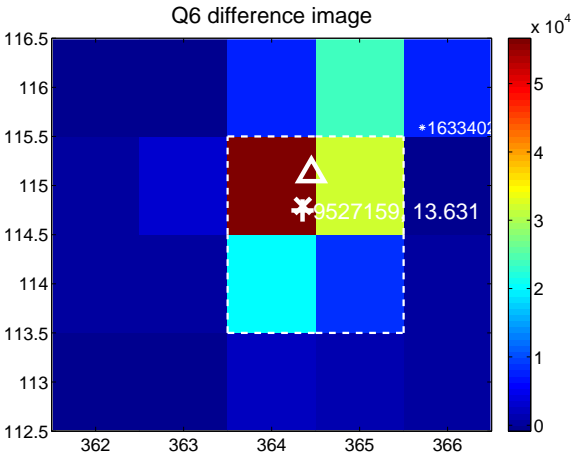
Q5 no difference image



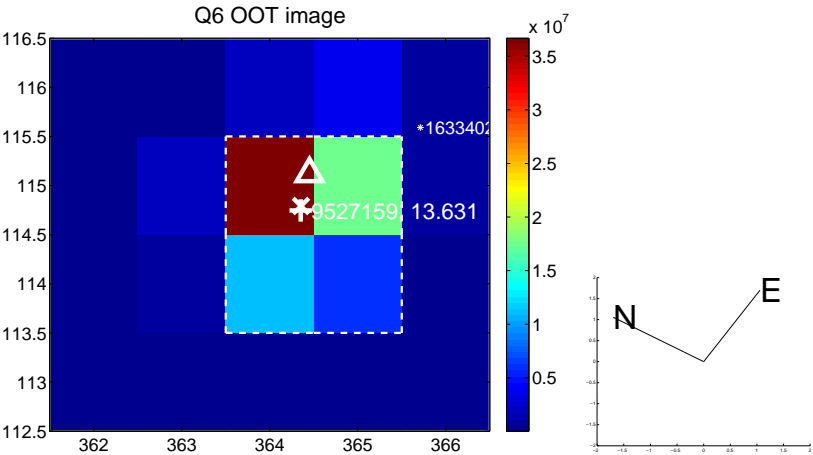
Q5 no OOT image



Q6 difference image



Q6 OOT image



Q7 no difference image



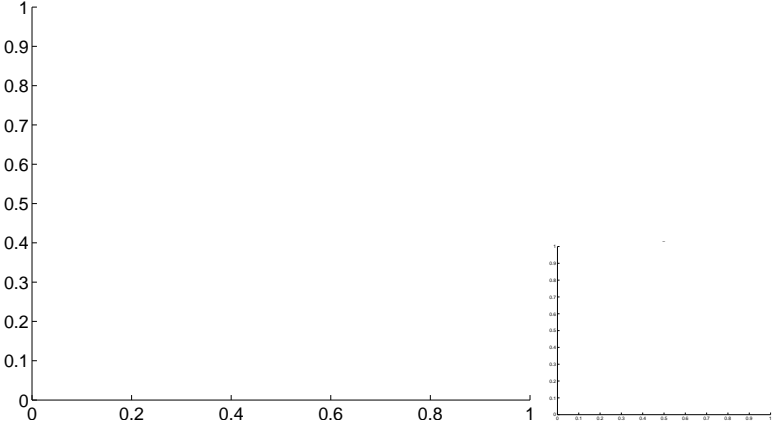
Q7 no OOT image



Q8 no difference image



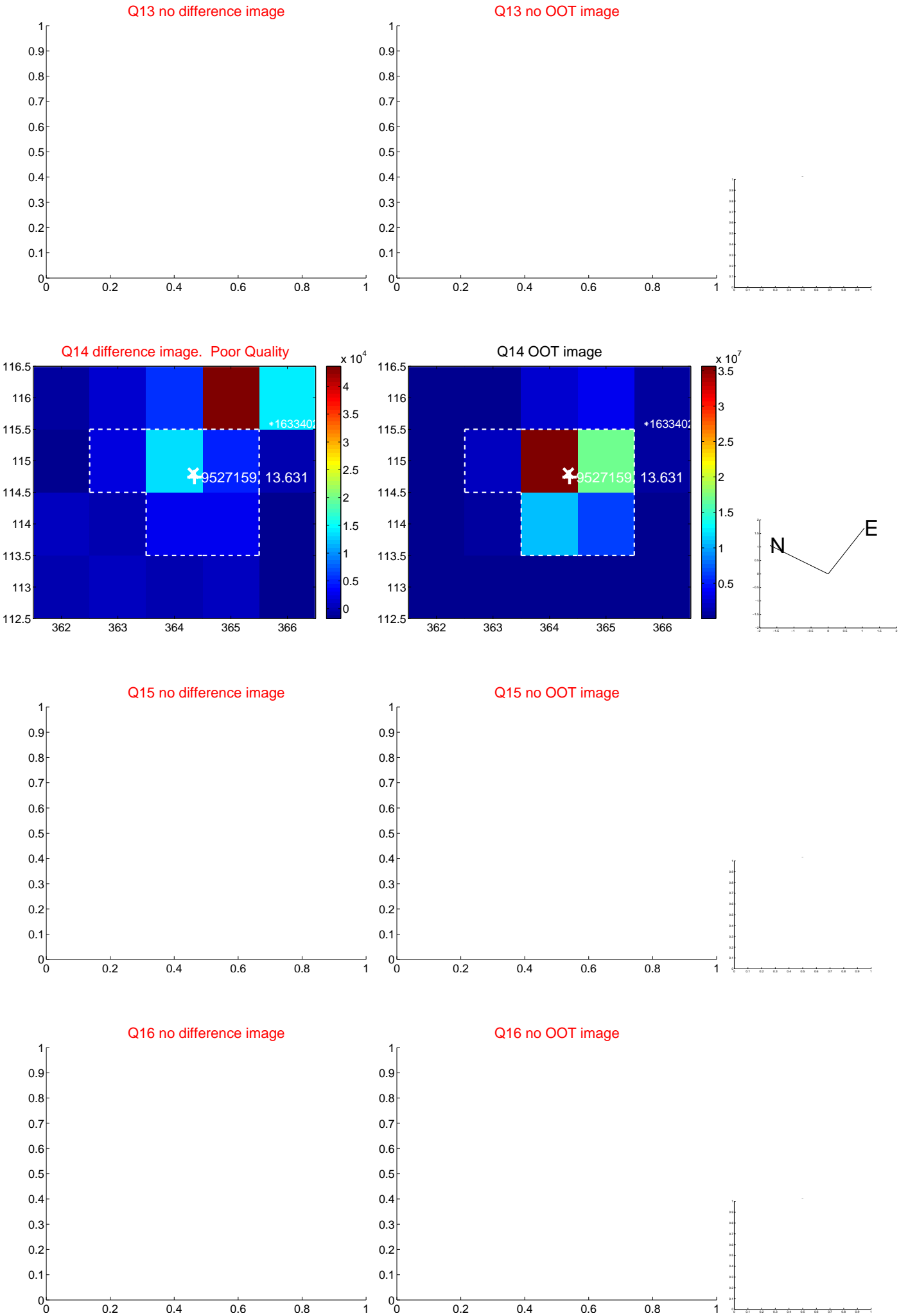
Q8 no OOT image



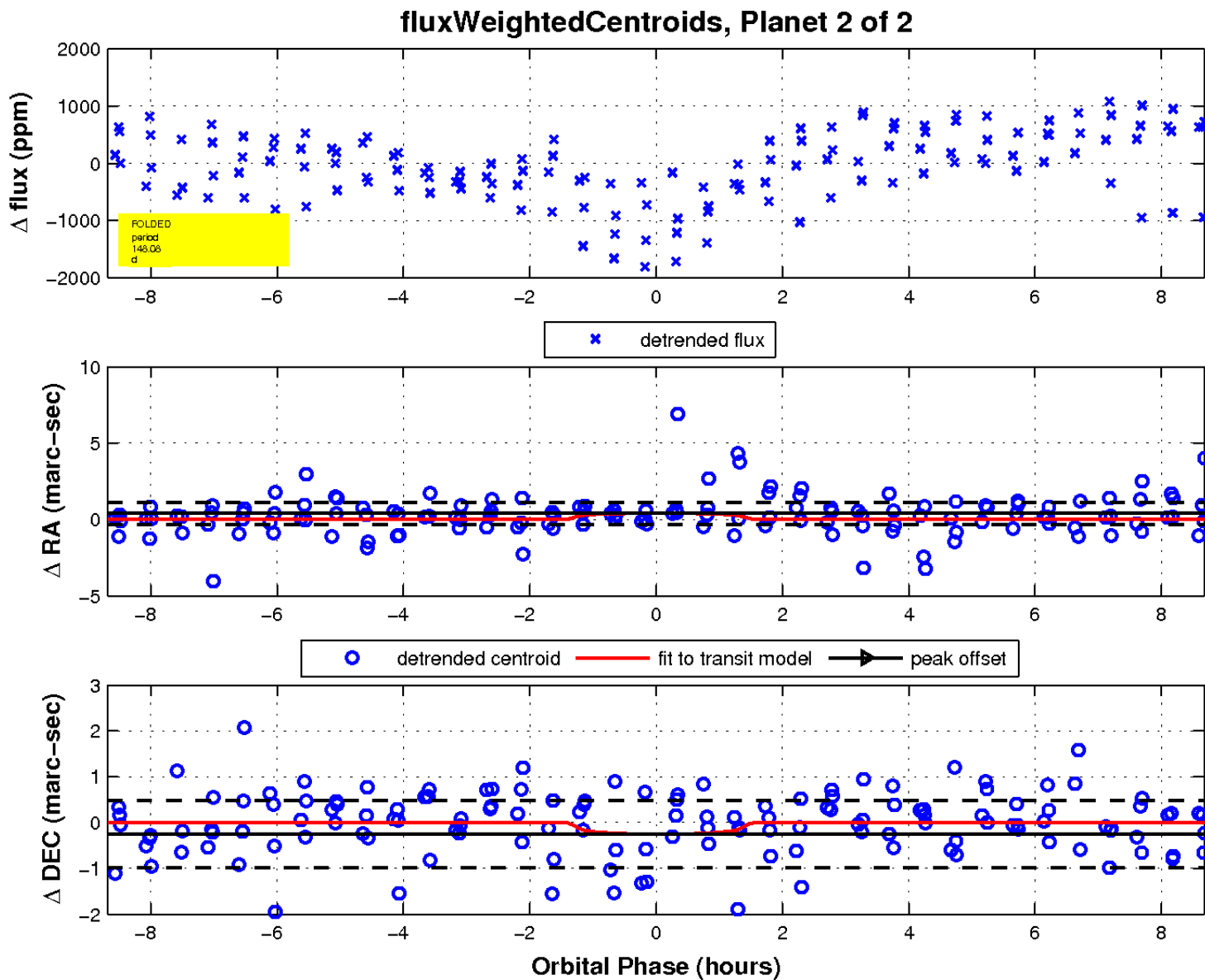
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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.



UKIRT Image

Declination

