

KIC 009157001

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})
009157001-01	OBS	No	1.666756	132.200853	11.5	8.449	8.7	4.4	1.48	7020	0.51	5160.21
009157001-02	OBS	No	117.123712	177.411444	385.2	4.626	9.5	7.5	1.48	7020	3.59	17.80
009157001-03	OBS	No	72.178166	146.785194	166.9	11.117	8.1	7.8	1.48	7020	2.06	33.93
009157001-04	OBS	No	221.711158	152.864165	180.7	6.511	7.7	7.1	1.48	7020	2.20	7.60

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009157001-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—LPP_ALT
009157001-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
009157001-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_ALT
009157001-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

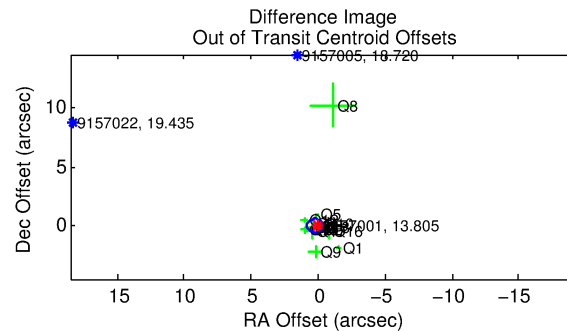
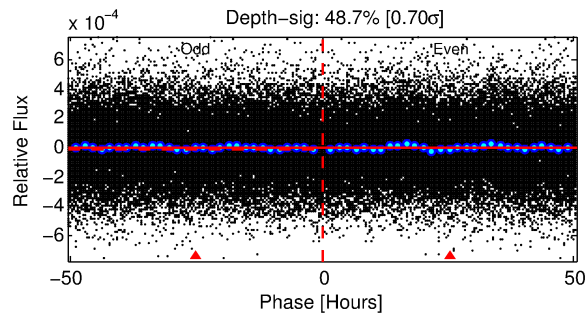
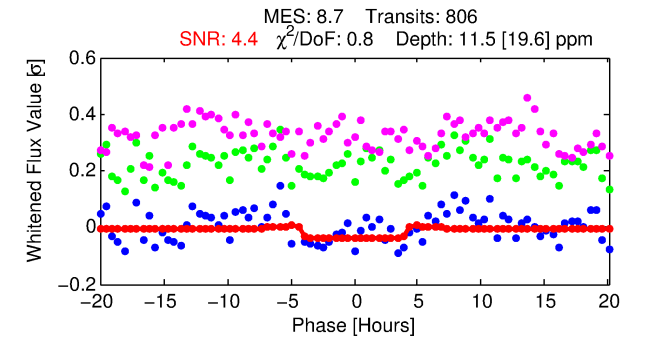
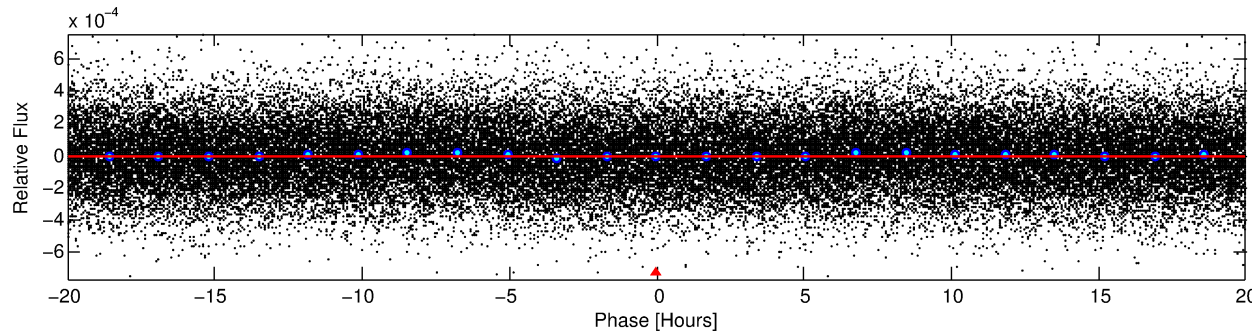
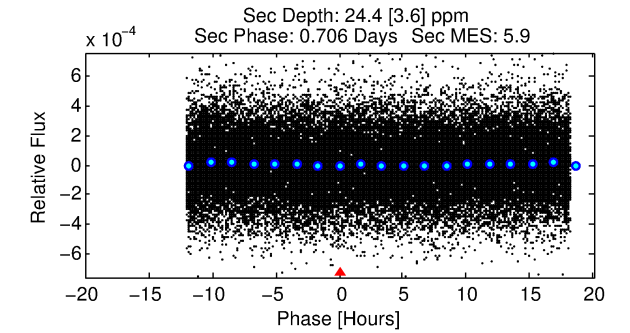
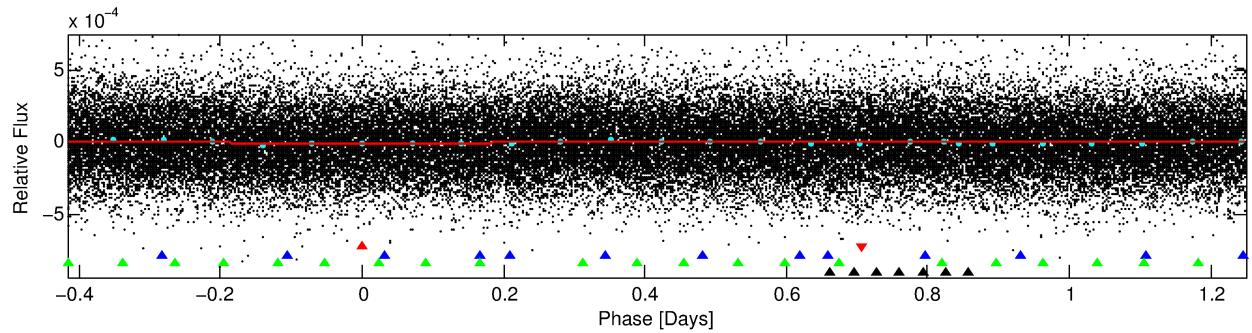
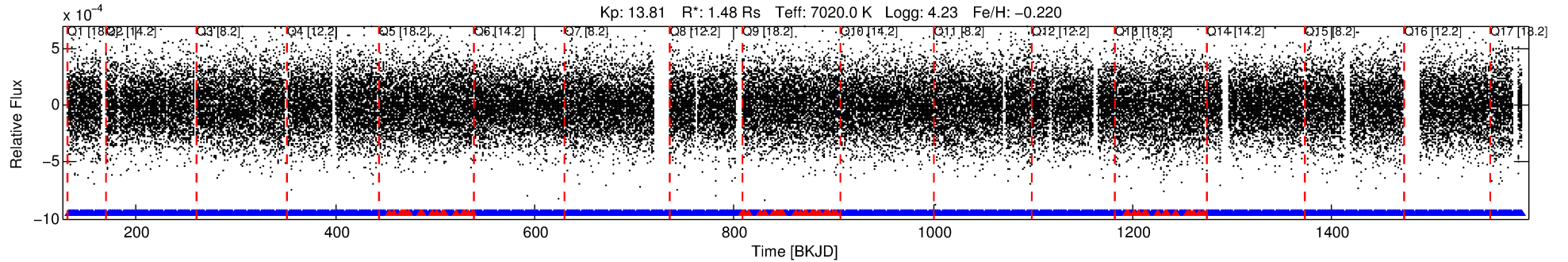
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009157001-01

No Significant Match Found

DV One-Page Summary

KIC: 9157001 Candidate: 1 of 4 Period: 1.667 d



DV Fit Results:

Period = 1.66676 [0.00005] d
Epoch = 132.2009 [0.0135] BKJD
Rp/R* = 0.0031 [0.0014]
a/R* = 1.63 [2.43]
b = 0.08 [28.59]
Seff = 5160.21 [2082.45]
Teq = 2161 [218] K
Rp = 0.51 [0.27] Re
a = 0.0303 [0.0079] AU
Ag = 48.06 [45.78] [1.03σ]
Teffp = 8798 [1968] K [3.35σ]

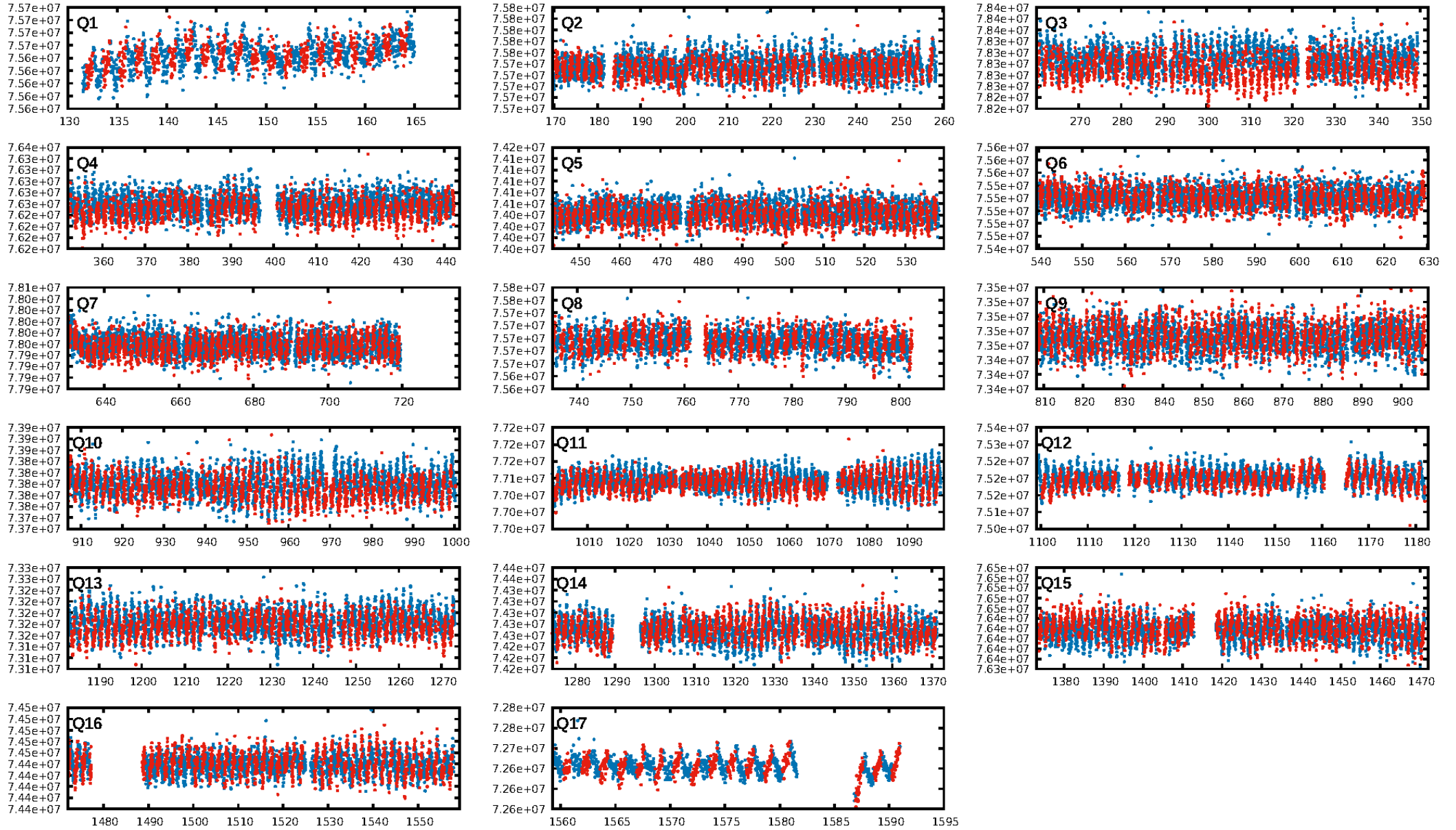
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 100.0% [121.19σ]
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: 5.85e-12
RollingBand-fgt: 0.93 [714/770]
GhostDiagnostic-chr: 1.788
Centroid-sig: 45.1%
Centroid-so: 1.441 arcsec [0.76σ]
OotOffset-rm: 0.264 arcsec [1.38σ]
KicOffset-rm: 0.236 arcsec [1.35σ]
OotOffset-st: 3/3/4/5 [15]
KicOffset-st: 3/3/4/5 [15]
DiffImageQuality-fgm: 0.80 [12/15]
DiffImageOverlap-fno: 1.00 [17/17]

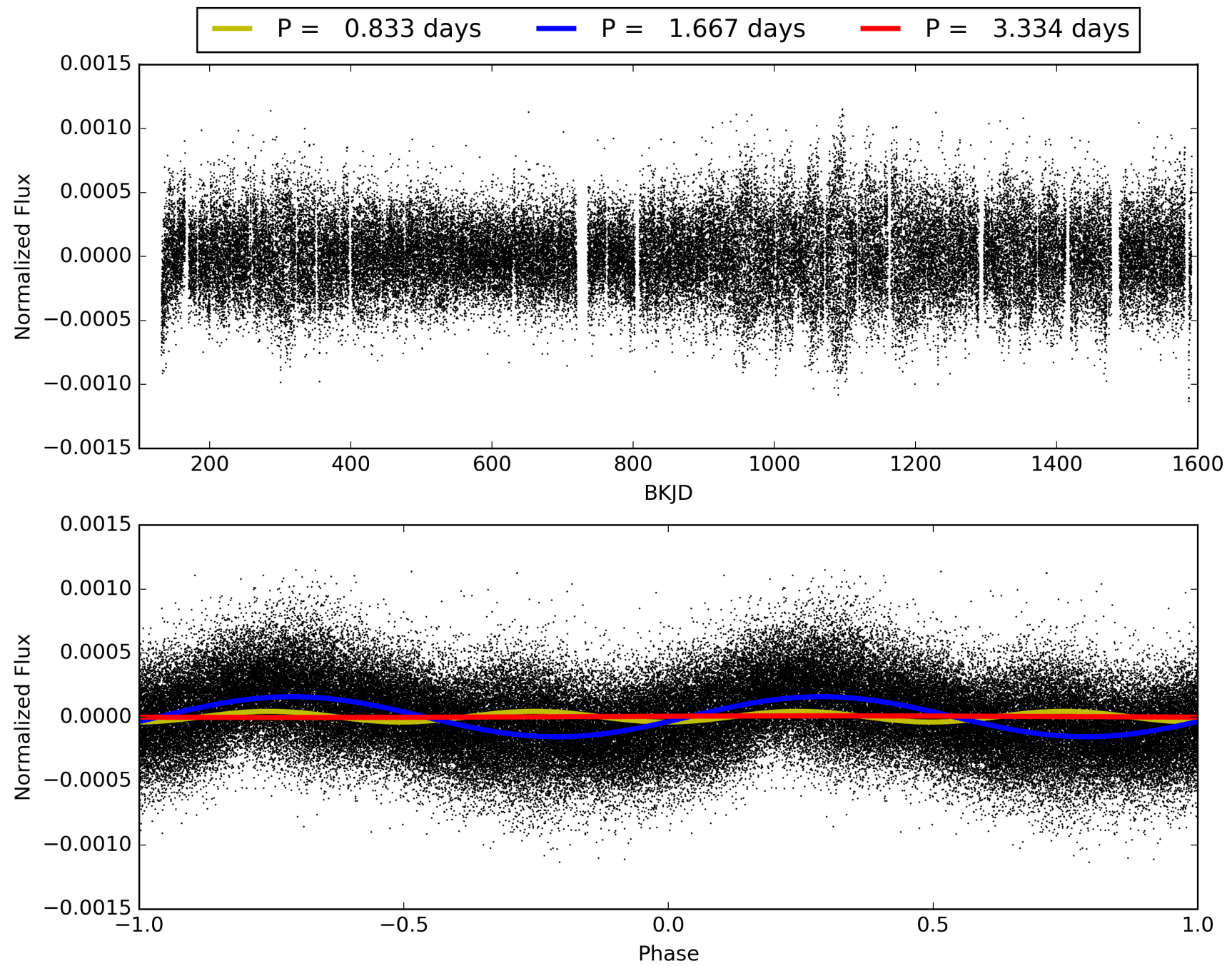
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 03:46:18 Z

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

TCE 009157001-01, PDC Light Curves

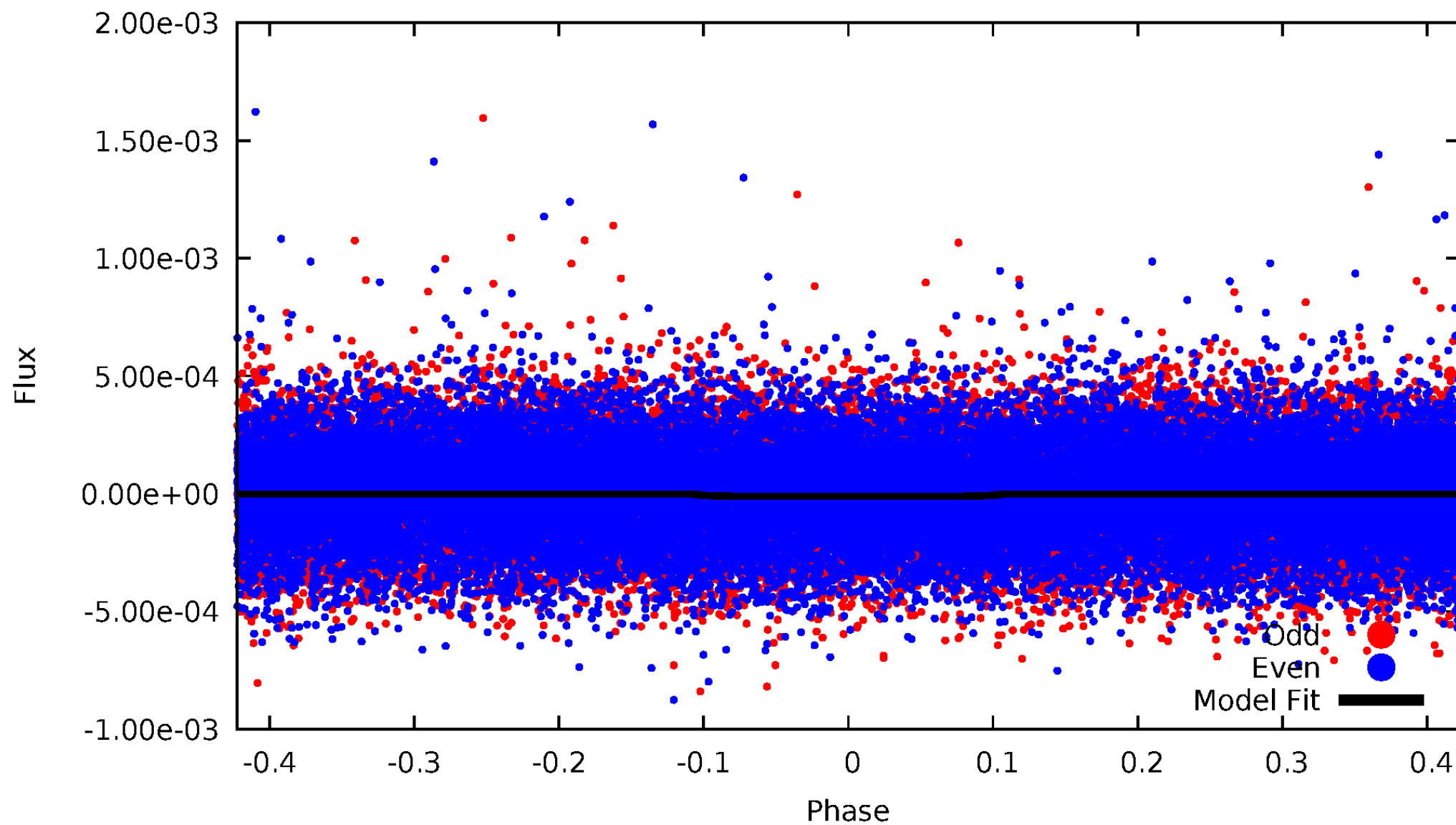


TCE 009157001-01



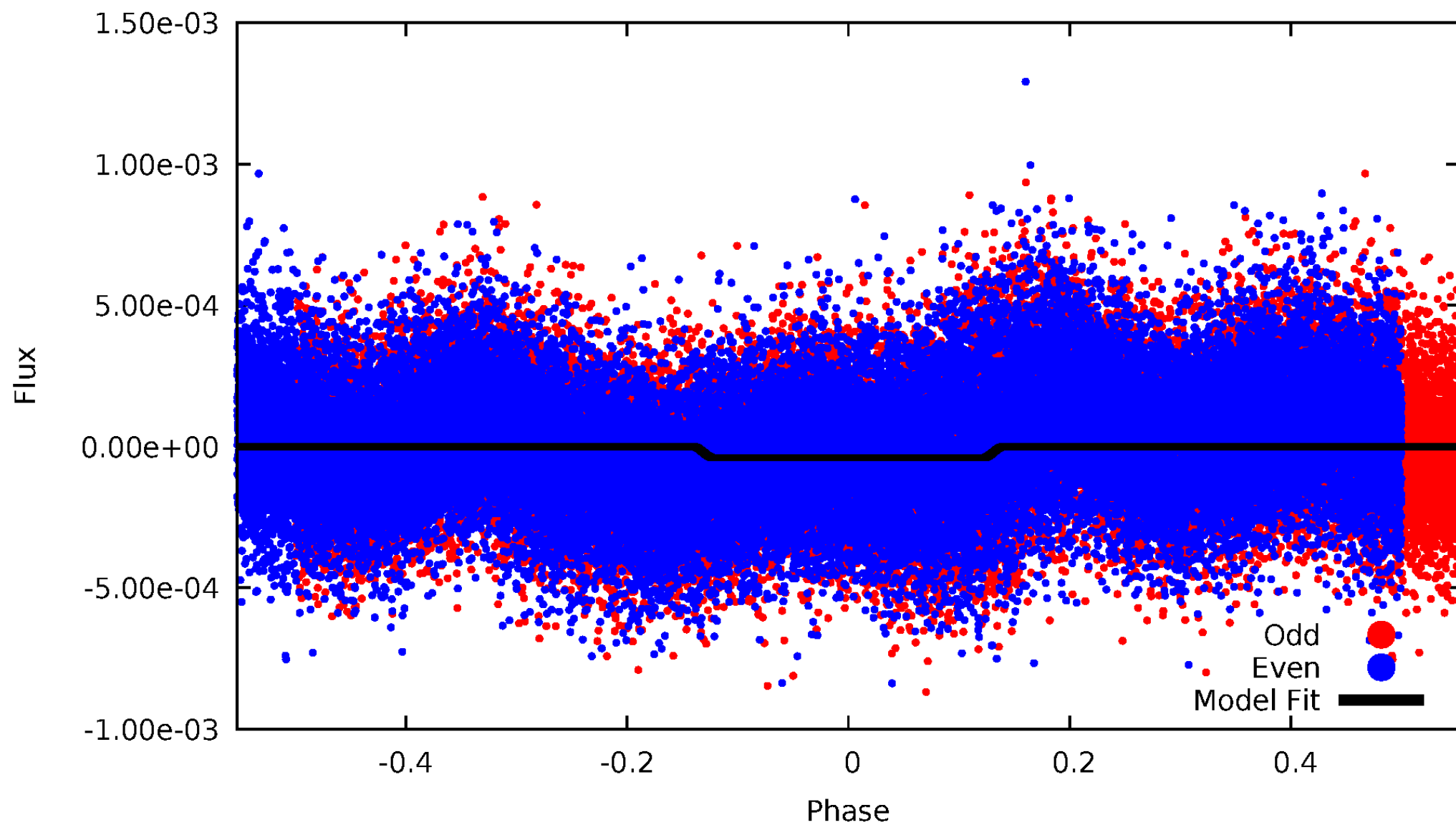
DV Odd/Even

TCE 009157001-01

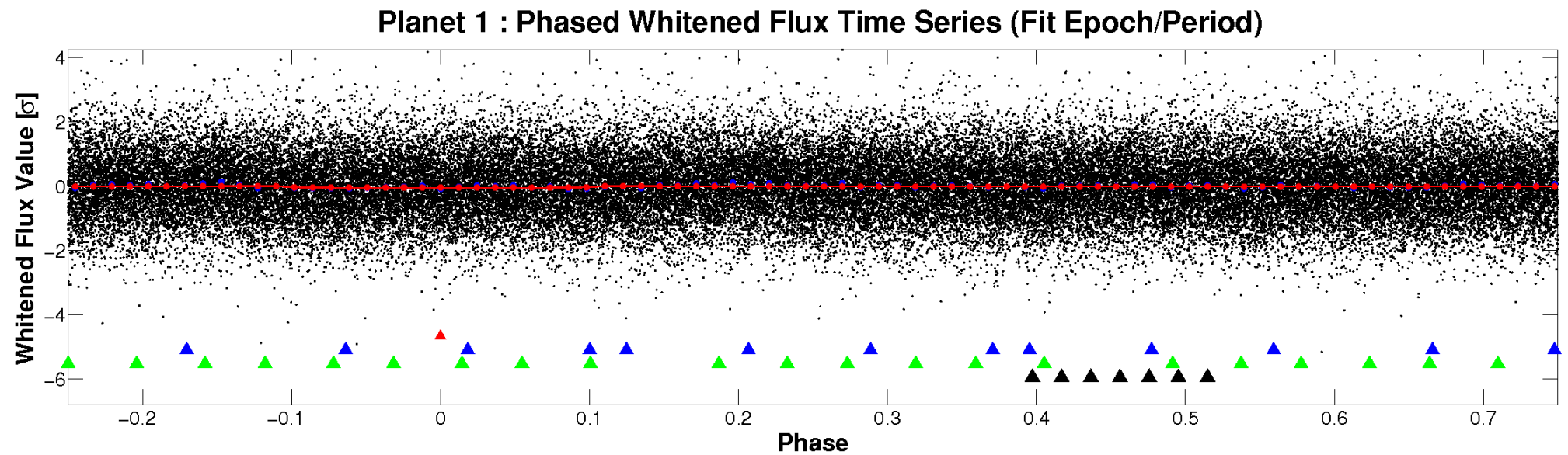
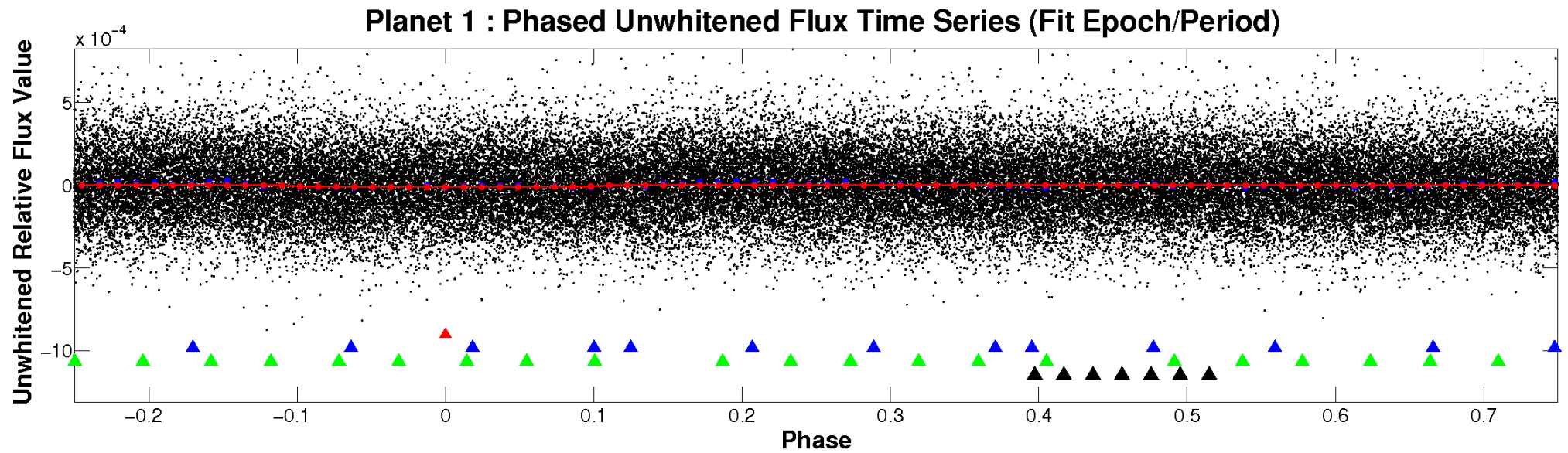


ALT Odd/Even

TCE 009157001-01

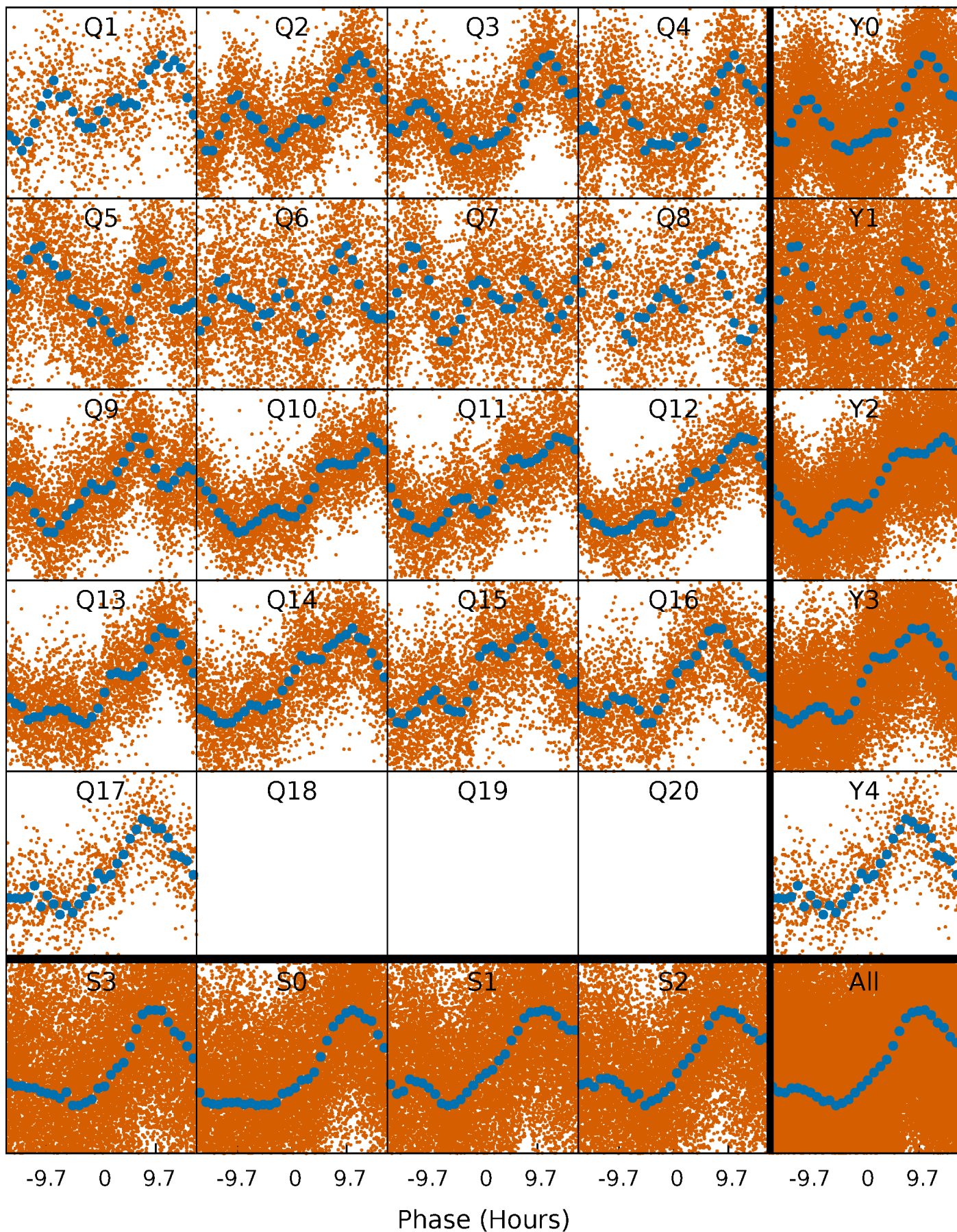


Non-Whitened Vs. Whitened Light Curve



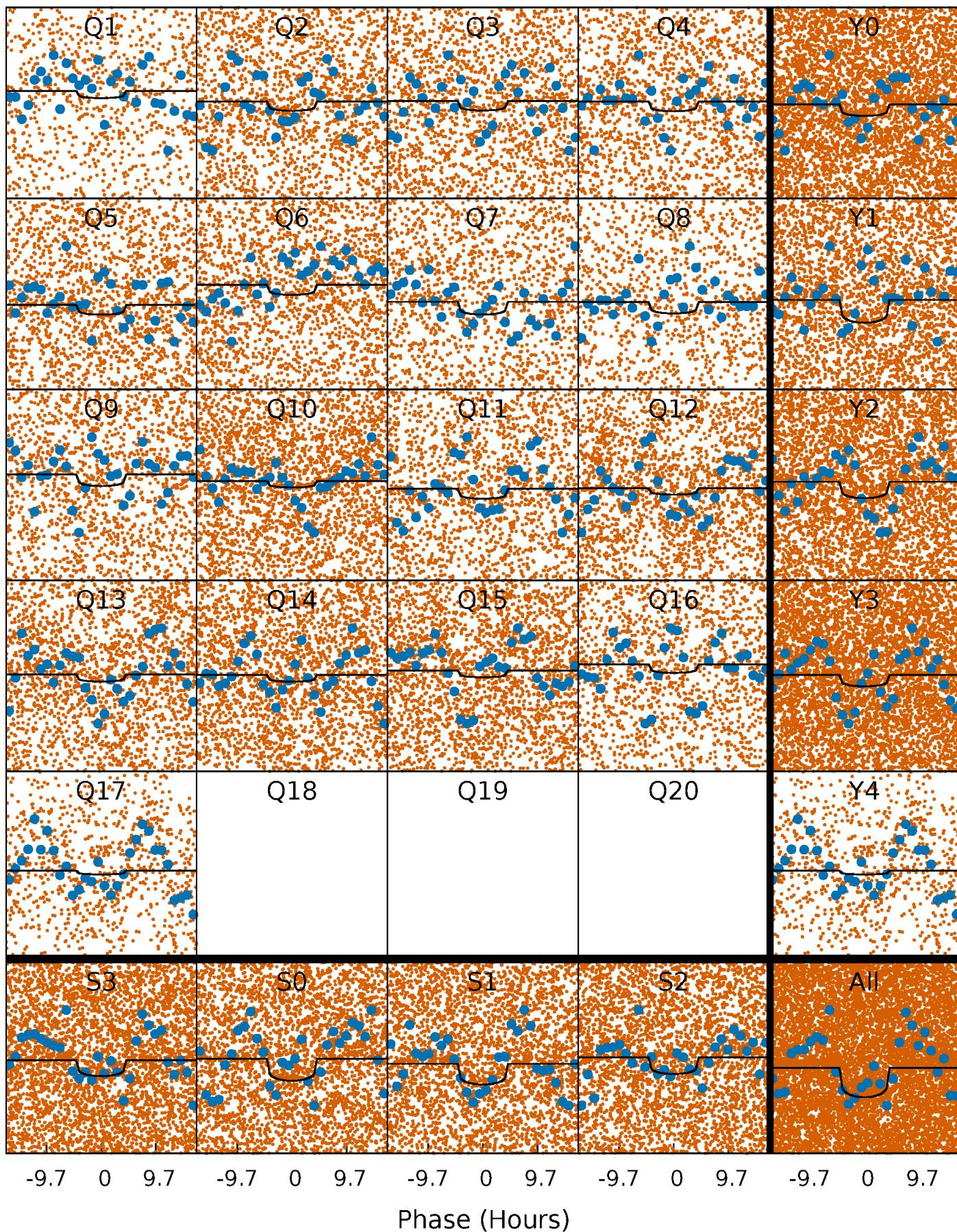
PDC Quarter-Phased Transit Curves

TCE 009157001-01 P= 1.666755 Days $T_0=132.200853$ (BKJD)



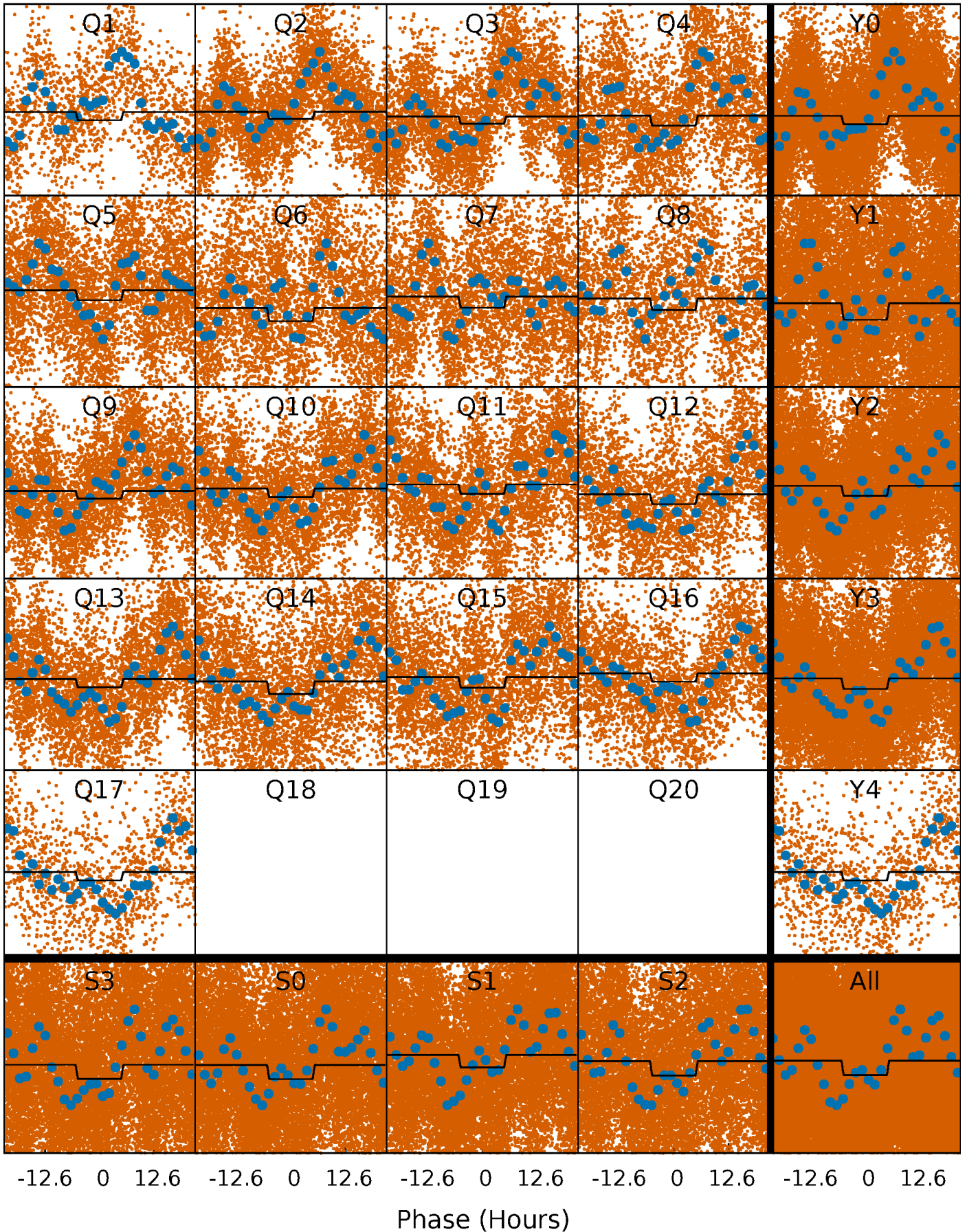
DV Quarter-Phased Transit Curves

TCE 009157001-01 P= 1.666755 Days $T_0=132.200853$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

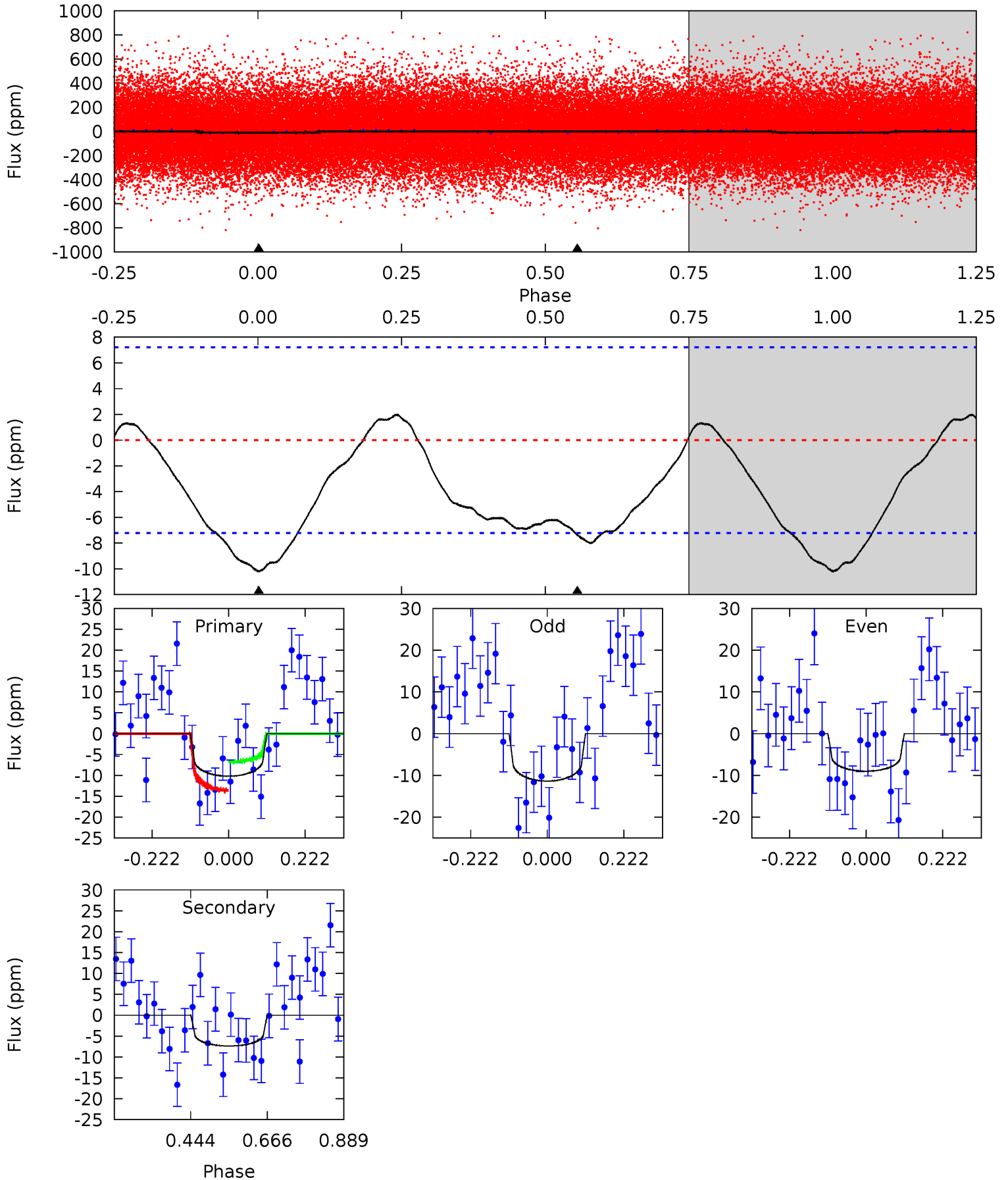
TCE 009157001-01 P= 1.666024 Days $T_0=132.458175$ (BKJD)



DV Model-Shift Uniqueness Test

009157001-01, P = 1.666755 Days, E = 130.534098 Days

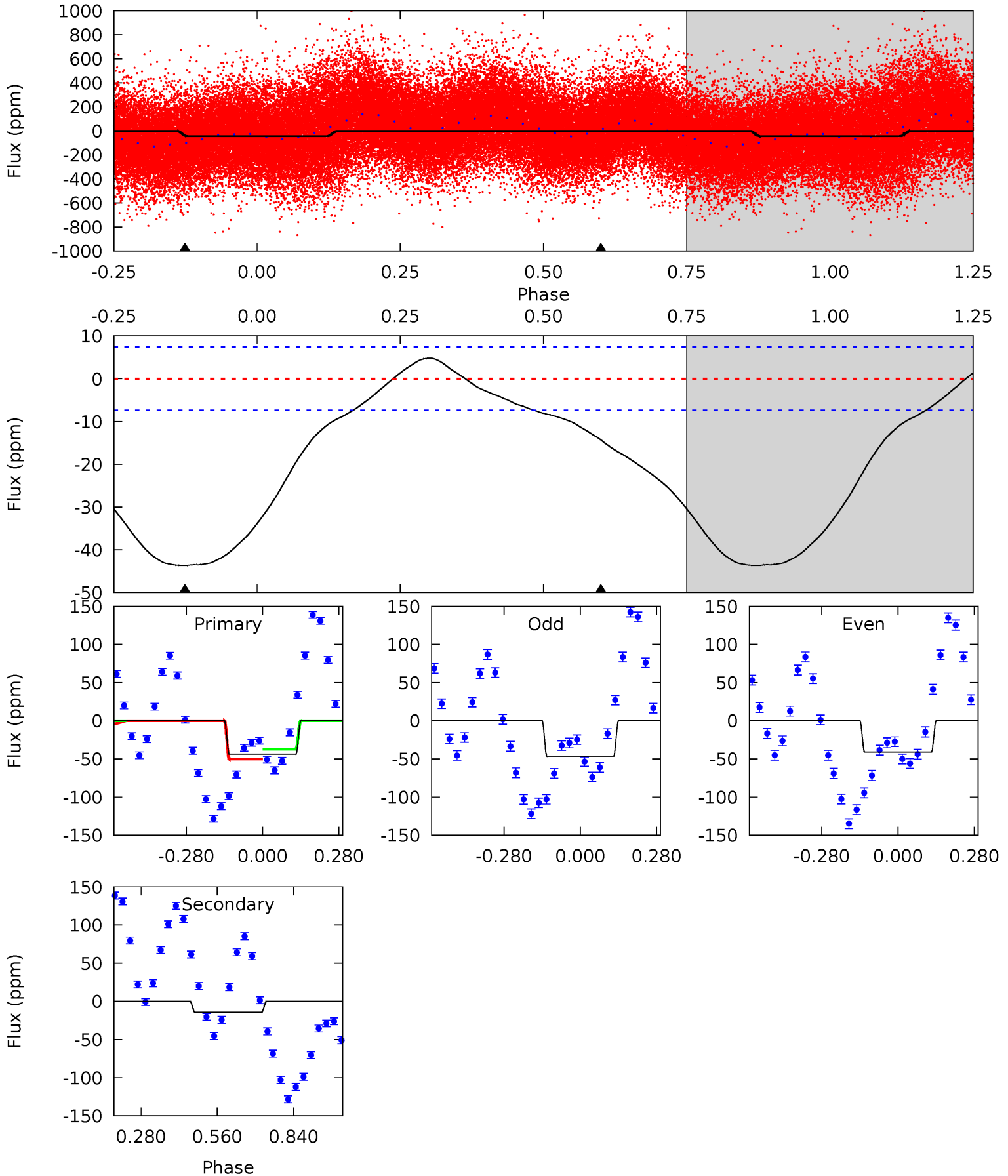
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.20	4.49	0	0	4.39	1.22	1.32	6.20	6.20	4.49	4.49	0.72	0.85	0.16	2.05



Alt Model-Shift Uniqueness Test

009157001-01, P = 1.666024 Days, E = 130.792151 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
25.6	8.37	0	0	4.34	1.08	2.59	25.6	25.6	8.37	8.37	1.61	1.05	0.10	3.76



Stellar Parameters For KIC 009157001

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$
	7020^{+196}_{-295}	$4.226^{+0.120}_{-0.195}$	$-0.220^{+0.250}_{-0.350}$	$1.477^{+0.470}_{-0.253}$	$1.348^{+0.200}_{-0.220}$	$0.590^{+0.360}_{-0.304}$
	+3%/-4%	+3%/-5%	+114%/-159%	+32%/-17%	+15%/-16%	+61%/-52%
Source	PHO1	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 009157001-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	A_{obs}
DV	-7 ± 2	$0.52^{+0.25}_{-0.22}$	3041^{+221}_{-197}	6329^{+2369}_{-1087}	14^{+26}_{-8}
Alt.	-14 ± 2	$1.01^{+0.29}_{-0.23}$	3036^{+223}_{-191}	5397^{+748}_{-517}	$6.798^{+4.938}_{-2.594}$

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

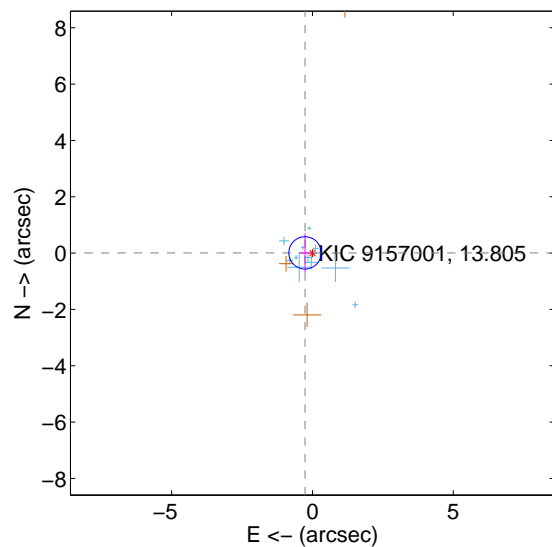
Supplemental centroid analysis for 009157001-01. Kepler magnitude: 13.80. Transit SNR 4.45

There are 12 quarters with good PRF difference image offsets

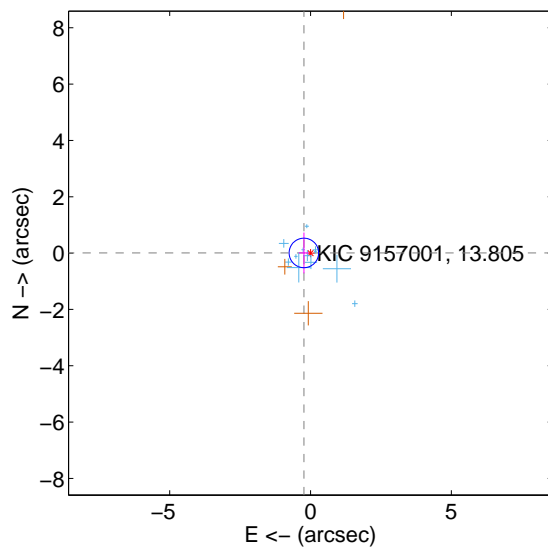
The direct PRF centroid is offset from the target star catalog position by about 0.05 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.264 ± 0.191	1.38	0.264 ± 0.198	0.008 ± 0.691
PRF-fit source offset from KIC position	0.236 ± 0.175	1.35	0.236 ± 0.180	0.006 ± 0.723
photometric centroid source offset	1.44 ± 1.91	0.76	-0.09 ± 1.94	-1.44 ± 1.91

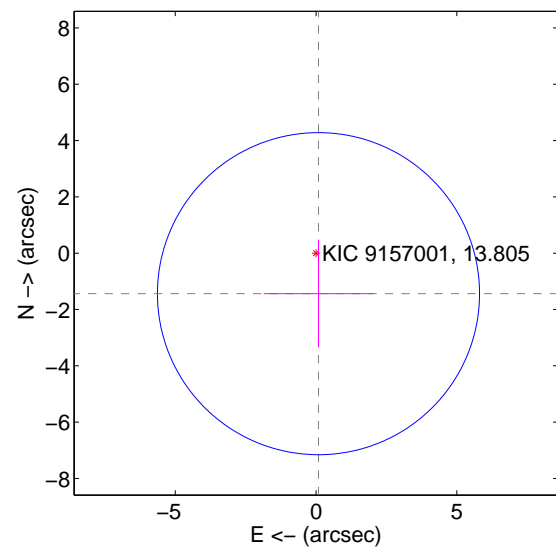
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

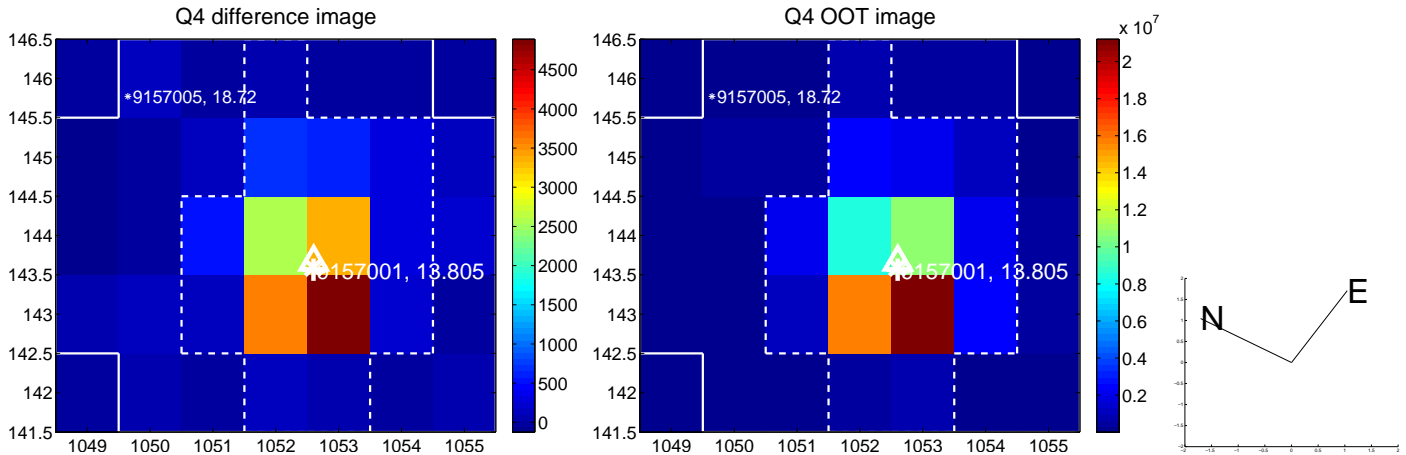
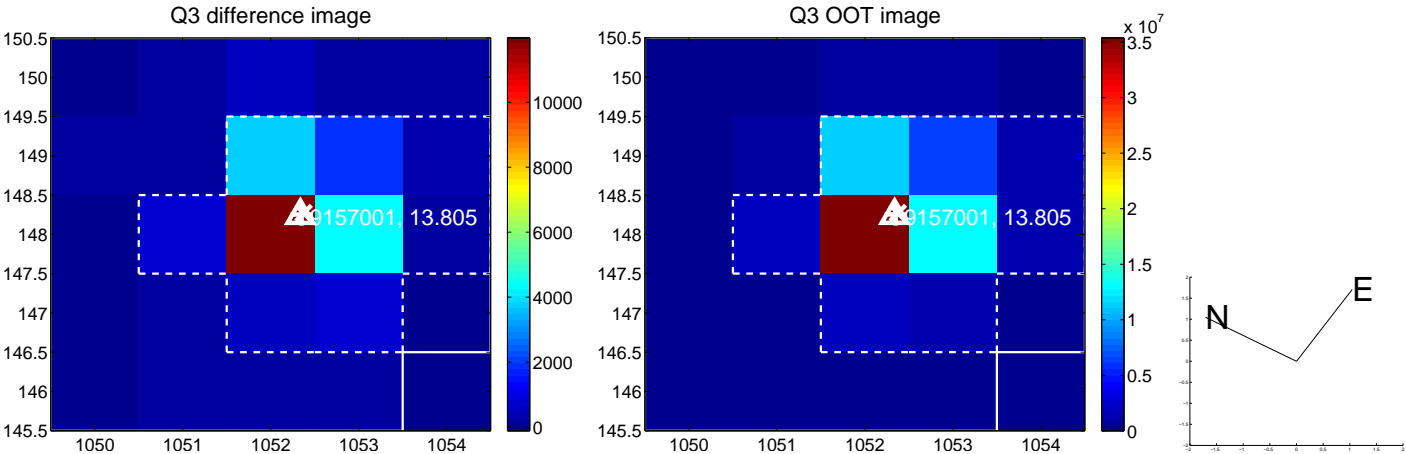
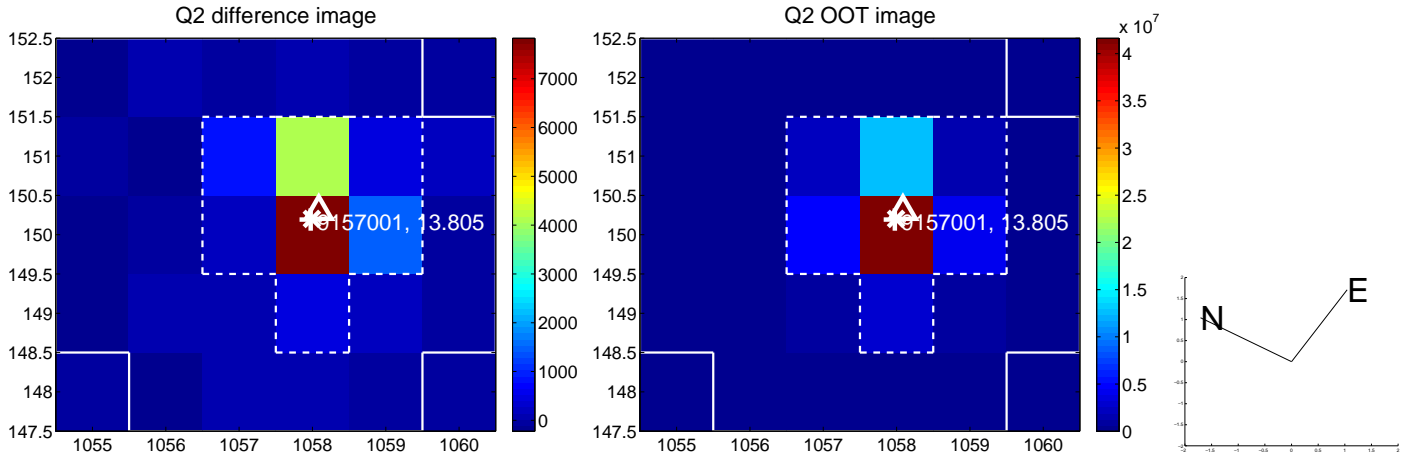
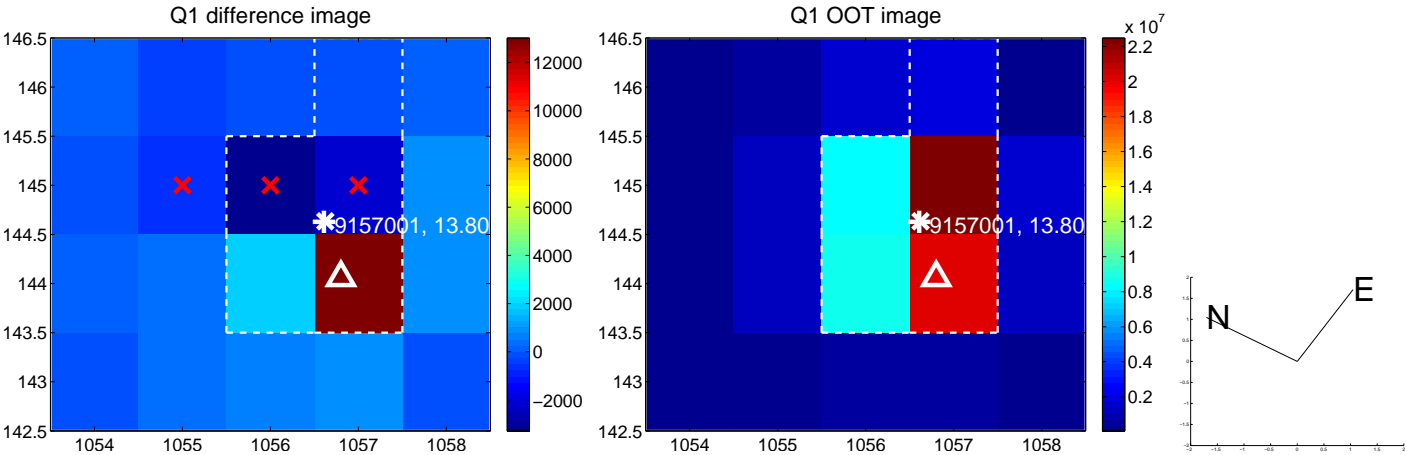


offset from photometric centroids

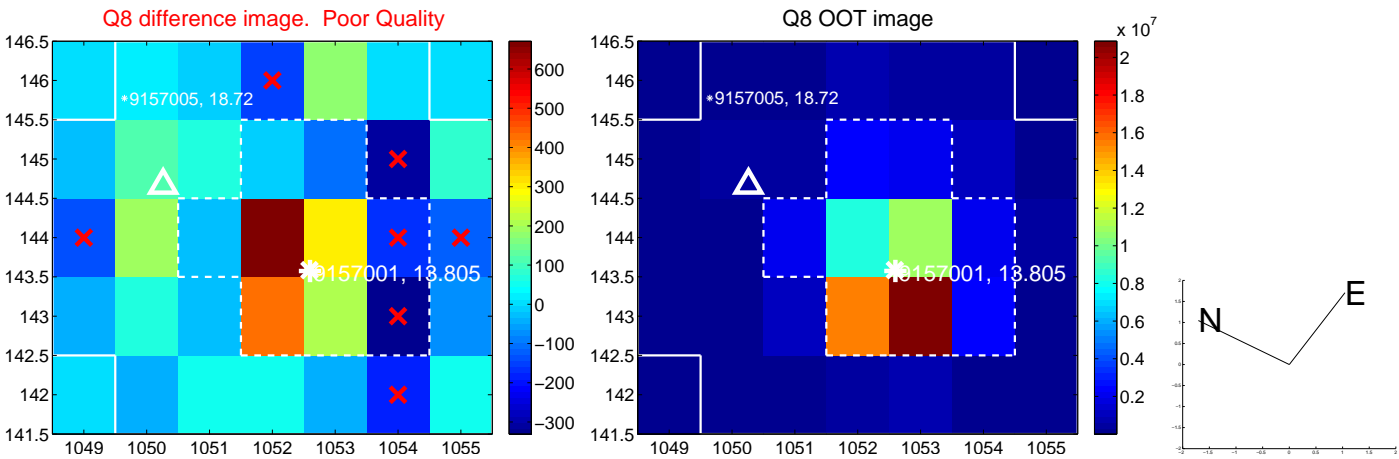
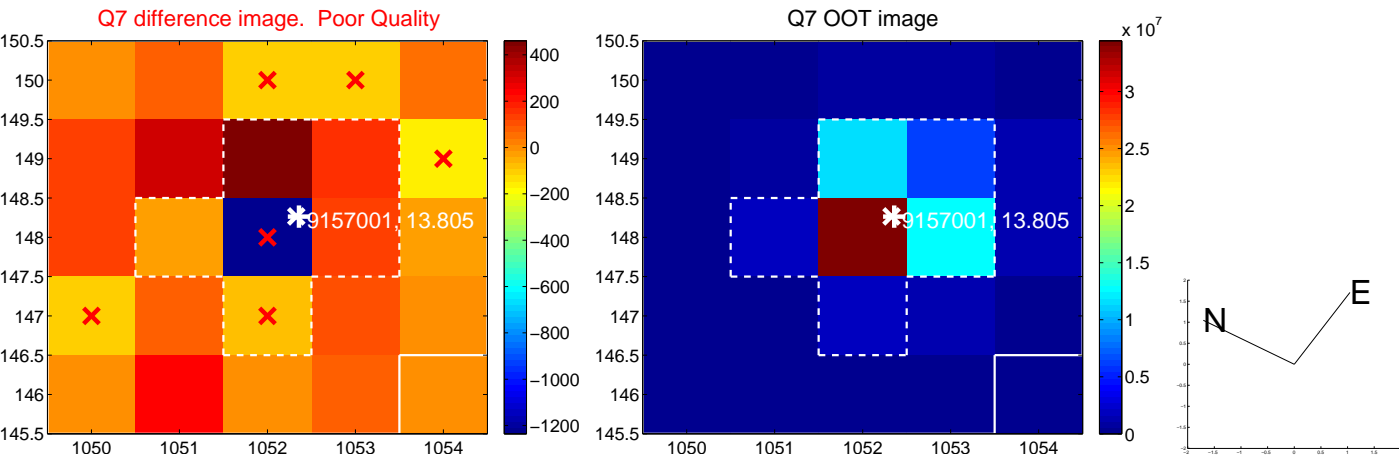
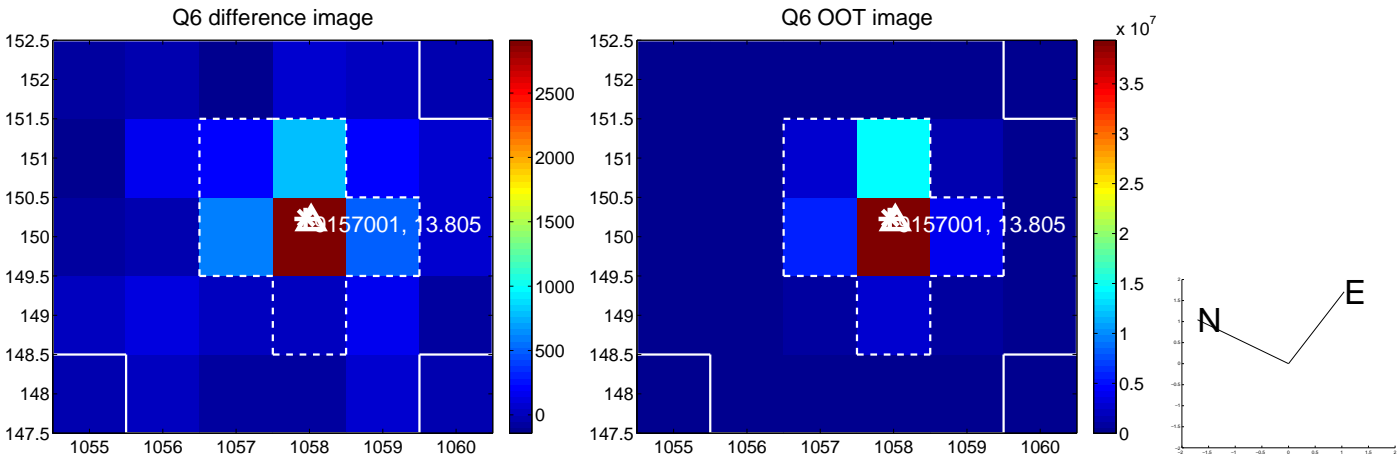
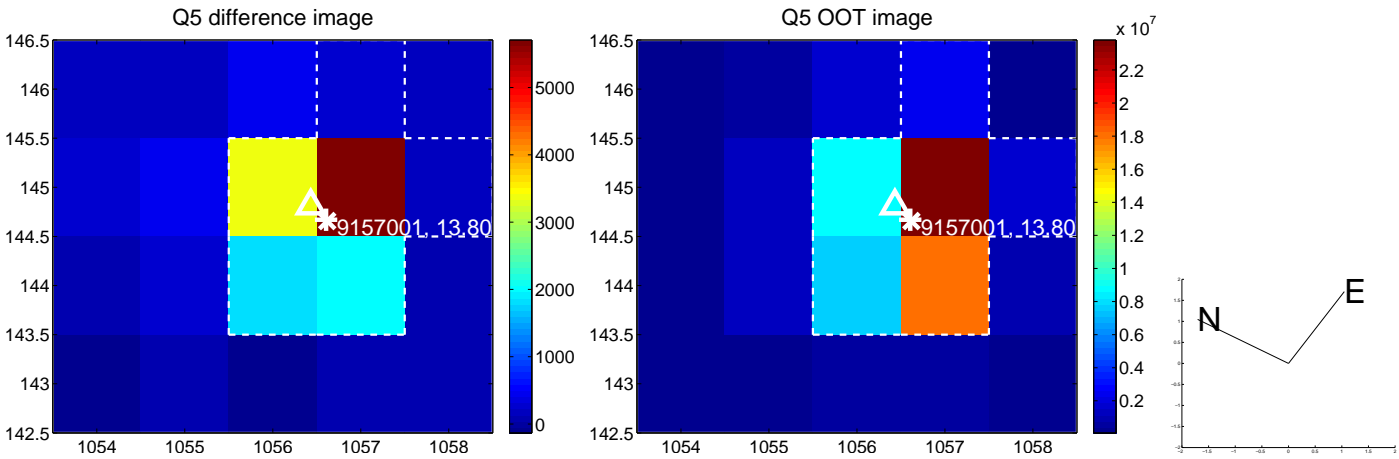


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

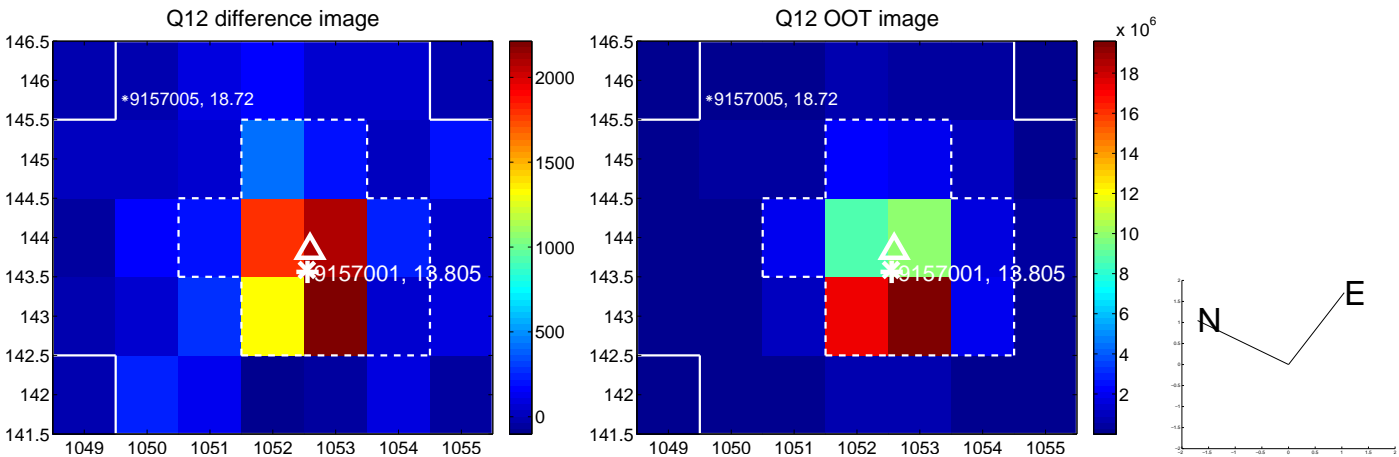
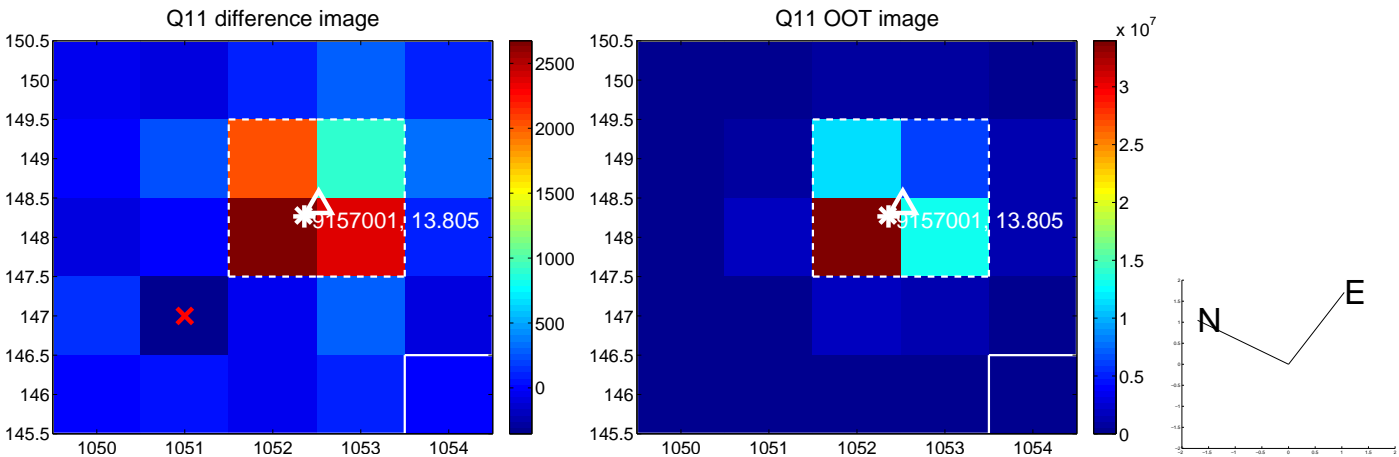
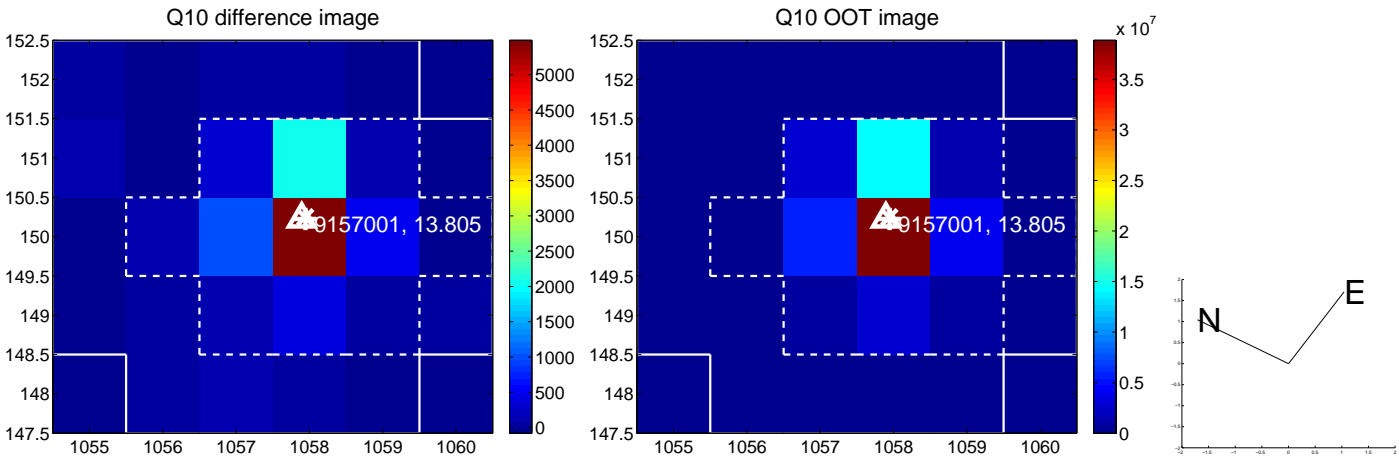
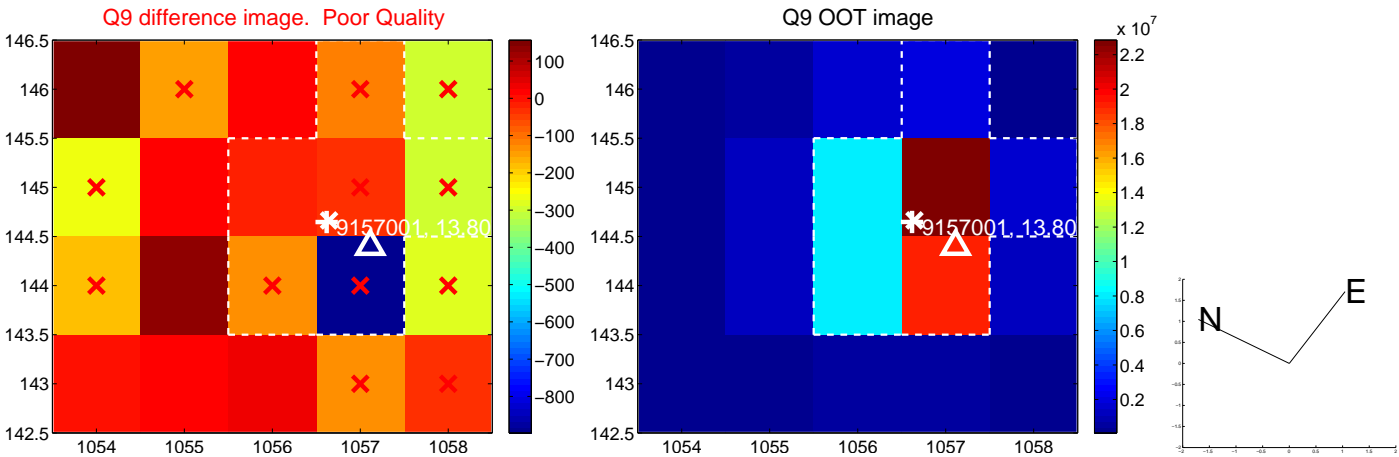
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



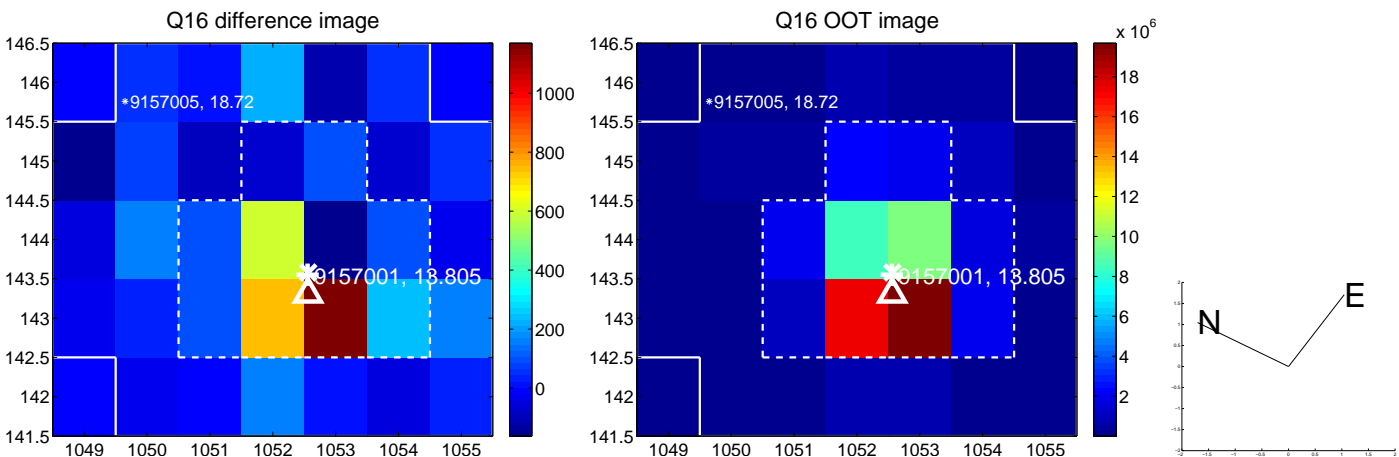
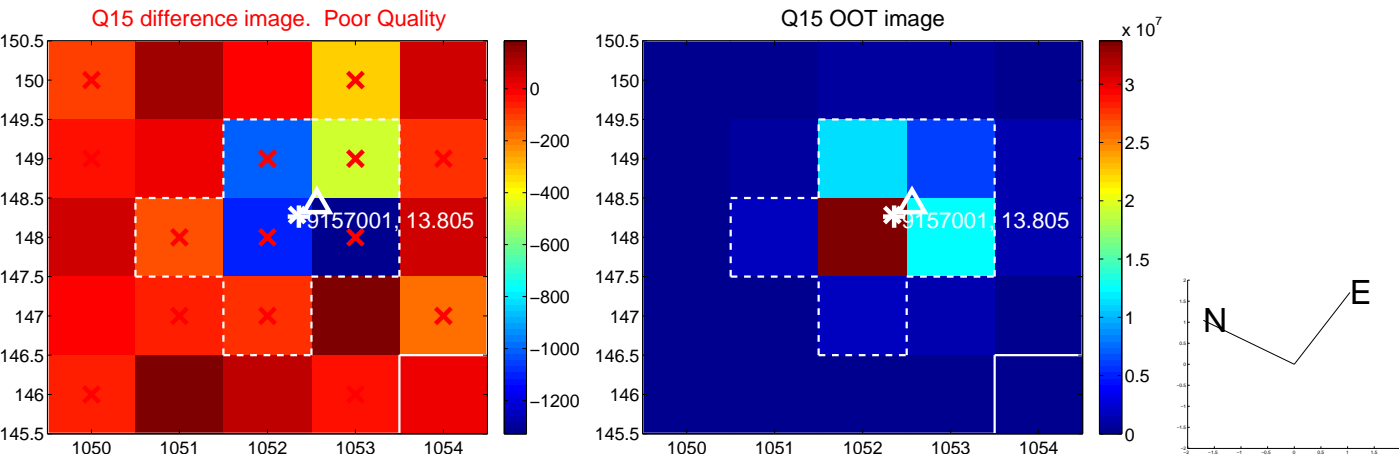
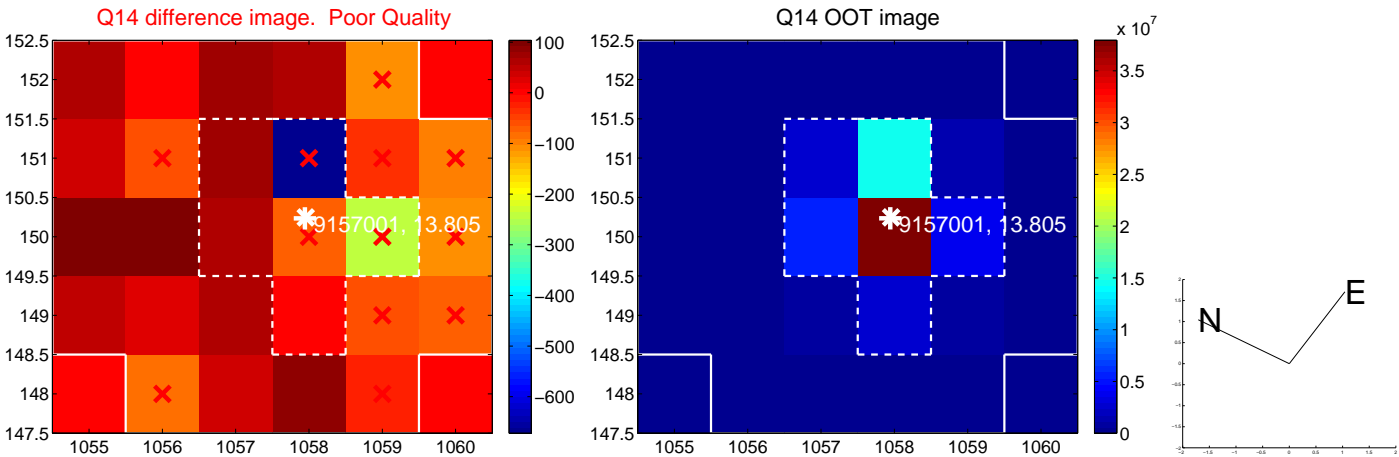
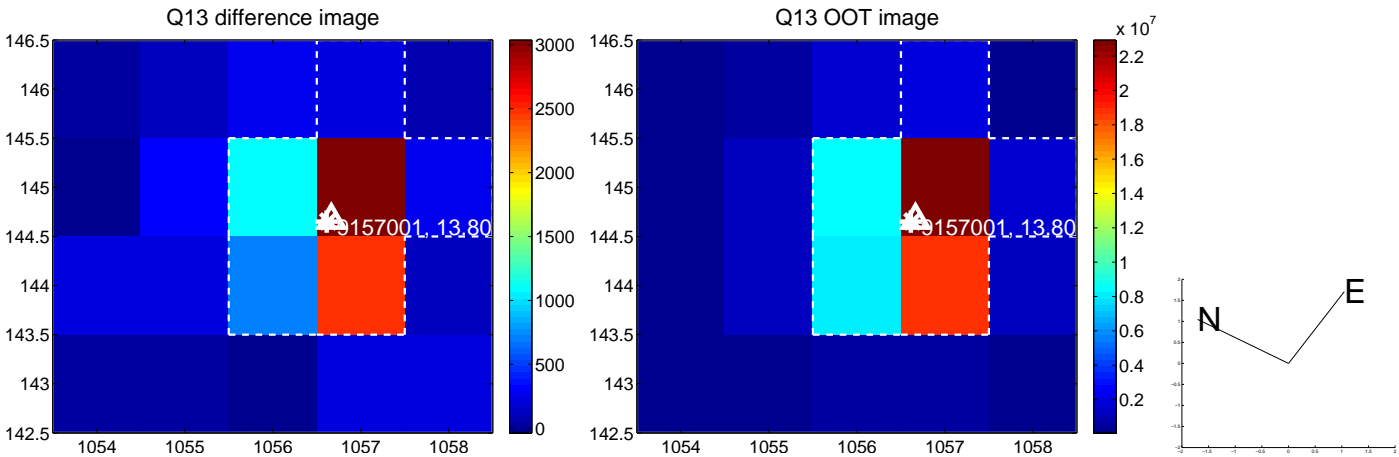
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



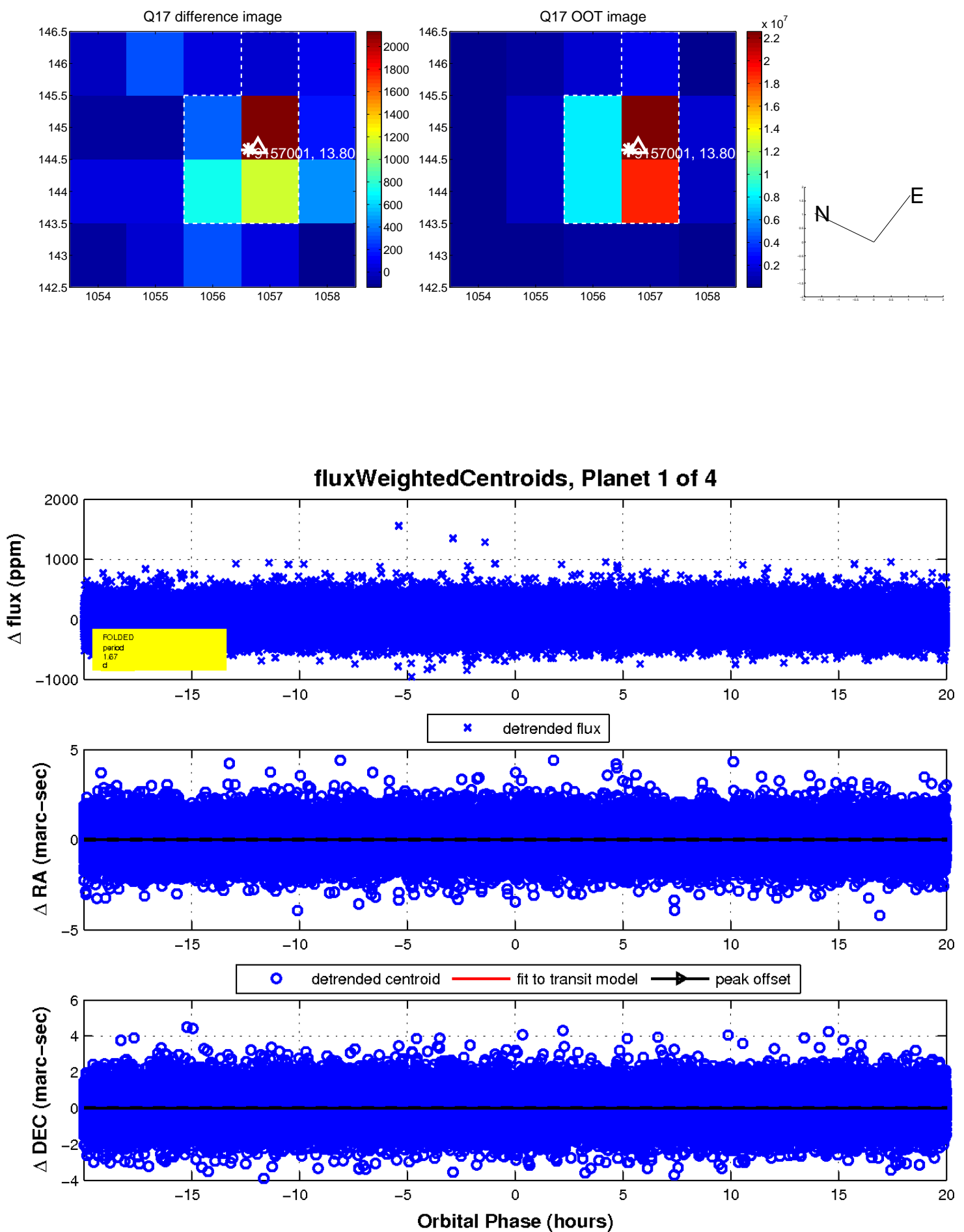
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

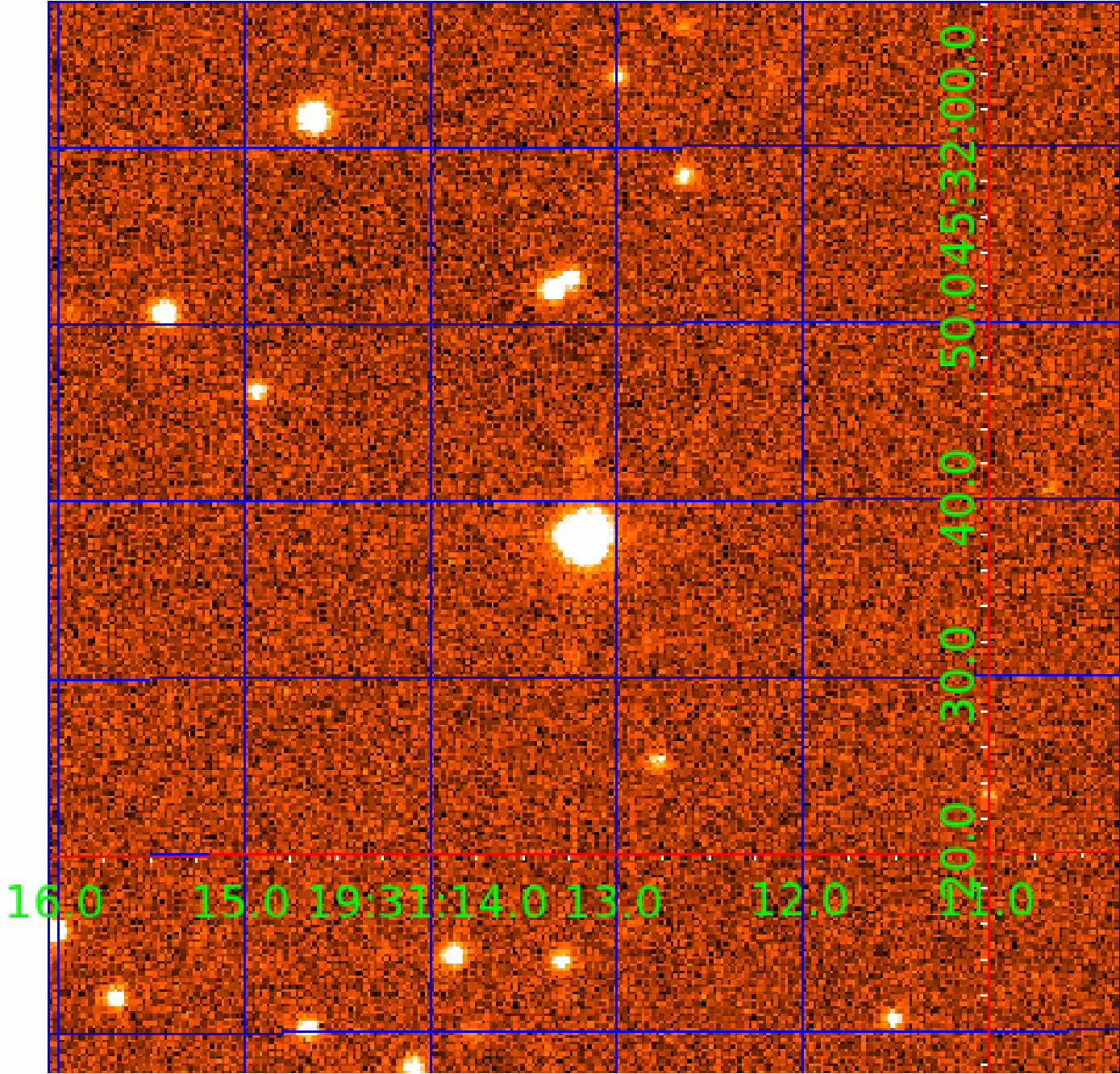


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 009157001

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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009157001-02	OBS	No	117.123712	177.411444	385.2	4.626	9.5	7.5	1.48	7020	3.59	17.80
009157001-03	OBS	No	72.178166	146.785194	166.9	11.117	8.1	7.8	1.48	7020	2.06	33.93
009157001-04	OBS	No	221.711158	152.864165	180.7	6.511	7.7	7.1	1.48	7020	2.20	7.60

Robovetter Results

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009157001-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
009157001-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_ALT
009157001-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

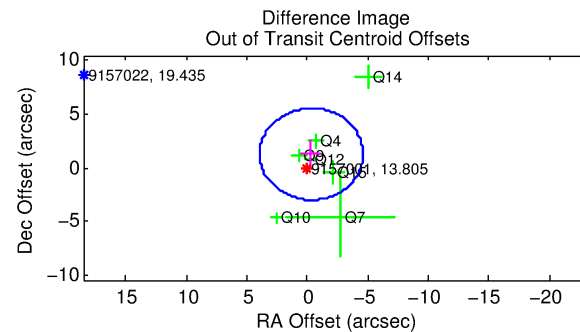
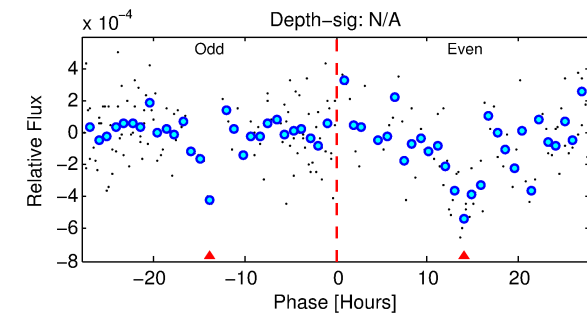
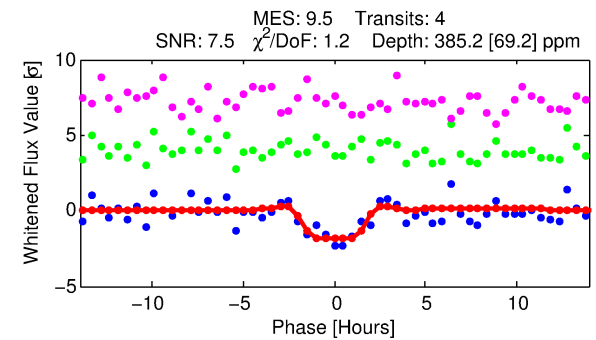
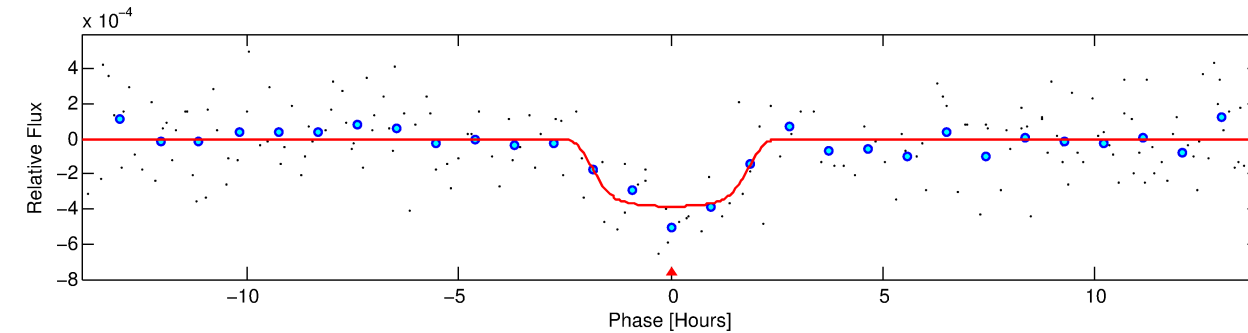
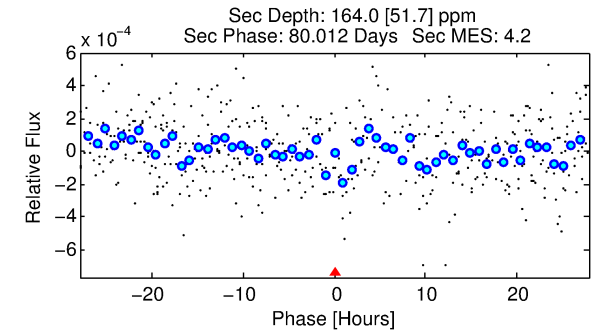
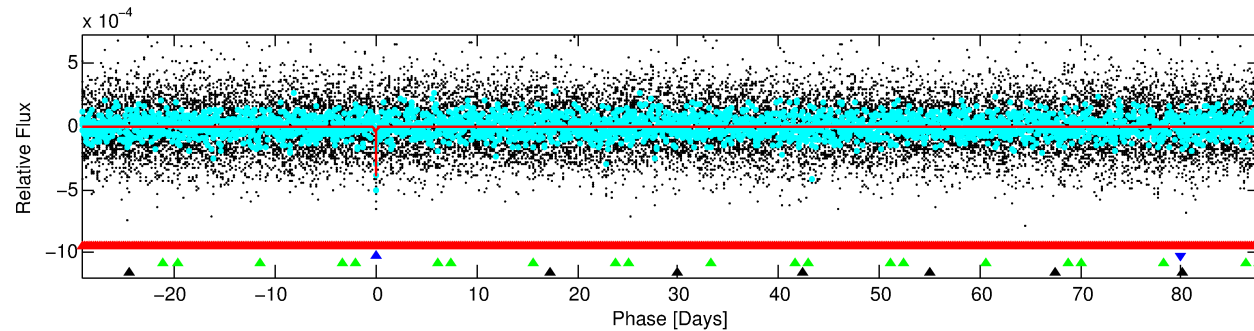
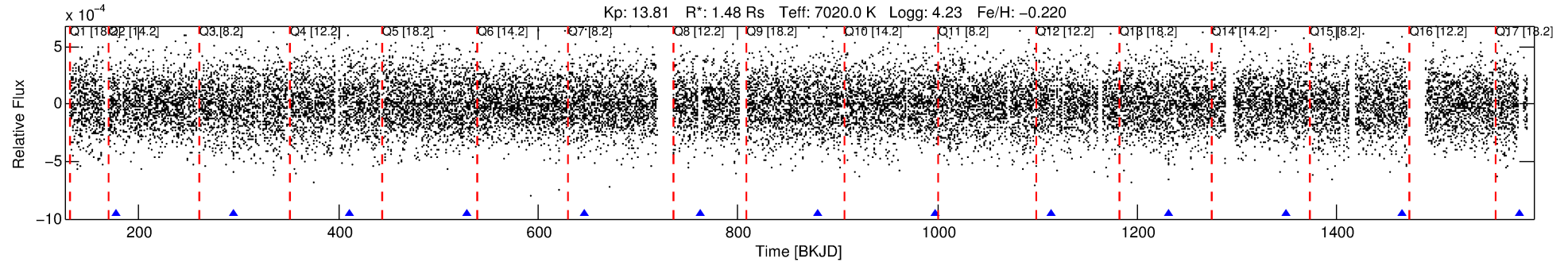
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009157001-02

No Significant Match Found

DV One-Page Summary

KIC: 9157001 Candidate: 2 of 4 Period: 117.124 d



DV Fit Results:

Period = 117.12371 [0.00214] d
Epoch = 177.4114 [0.0127] BKJD
Rp/R* = 0.0222 [0.0030]
a/R* = 69.89 [35.33]
b = 0.96 [0.05]
Seff = 17.80 [7.18]
Teq = 524 [53] K
Rp = 3.59 [1.24] Re
a = 0.5165 [0.1341] AU
Ag = 1871.58 [1040.05] [1.80σ]
Teffp = 5326 [599] K [7.98σ]

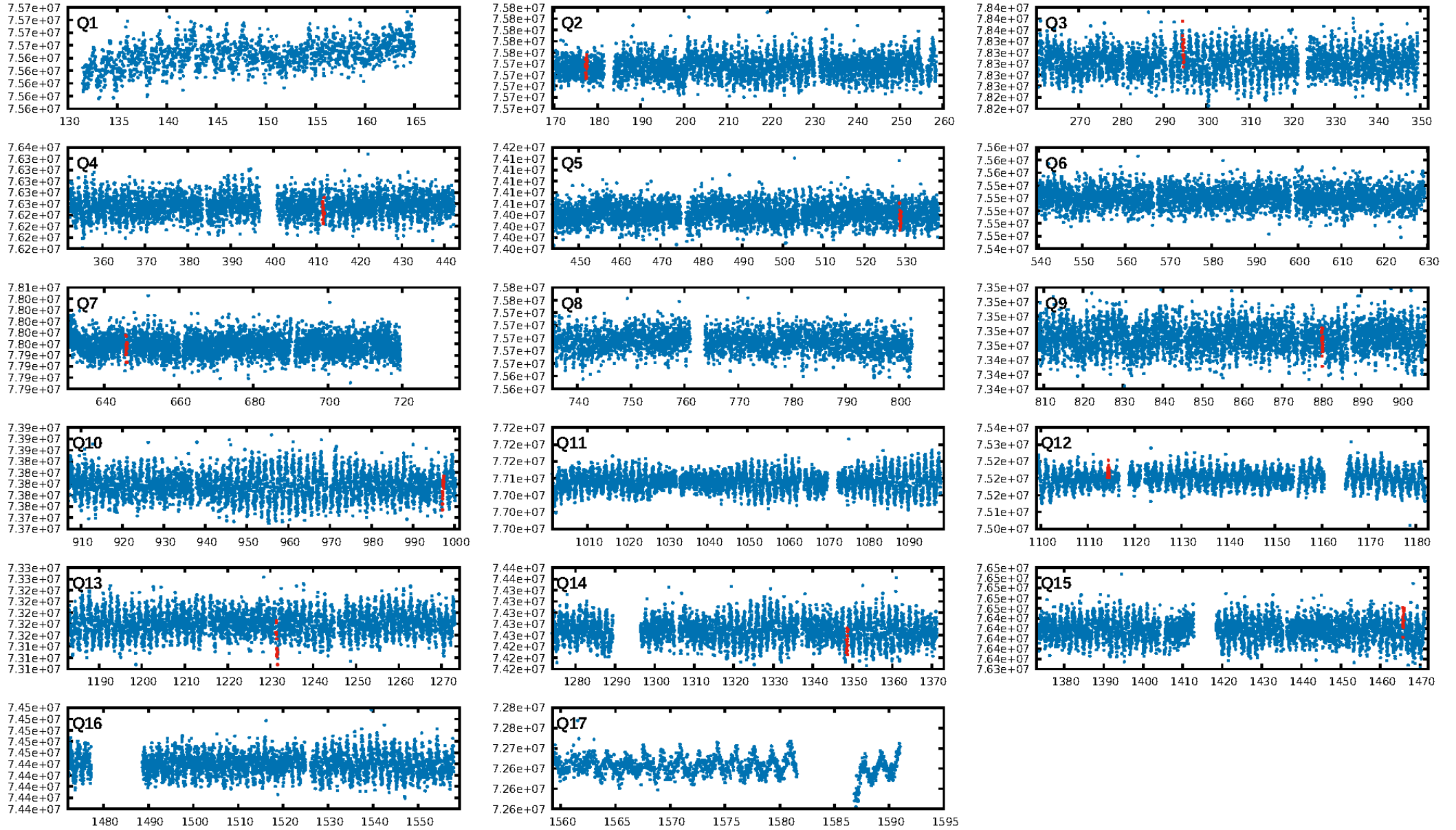
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [89.58σ]
LongPeriod-sig: 100.0% [314.28σ]
ModelChiSquare2-sig: 1.6%
ModelChiSquareGof-sig: 99.8%
Bootstrap-pfa: 3.49e-13
RollingBand-fgt: 1.00 [4/4]
GhostDiagnostic-chr: -0.9933
Centroid-sig: 20.5%
Centroid-so: 0.620 arcsec [0.84σ]
OotOffset-rm: 1.299 arcsec [0.91σ]
OotOffset-st: 2/2/2/1 [7]
KicOffset-rm: 1.289 arcsec [0.72σ]
KicOffset-st: 2/2/2/1 [7]
DiffImageQuality-fgm: 0.29 [2/7]
DiffImageOverlap-fno: 0.10 [1/10]

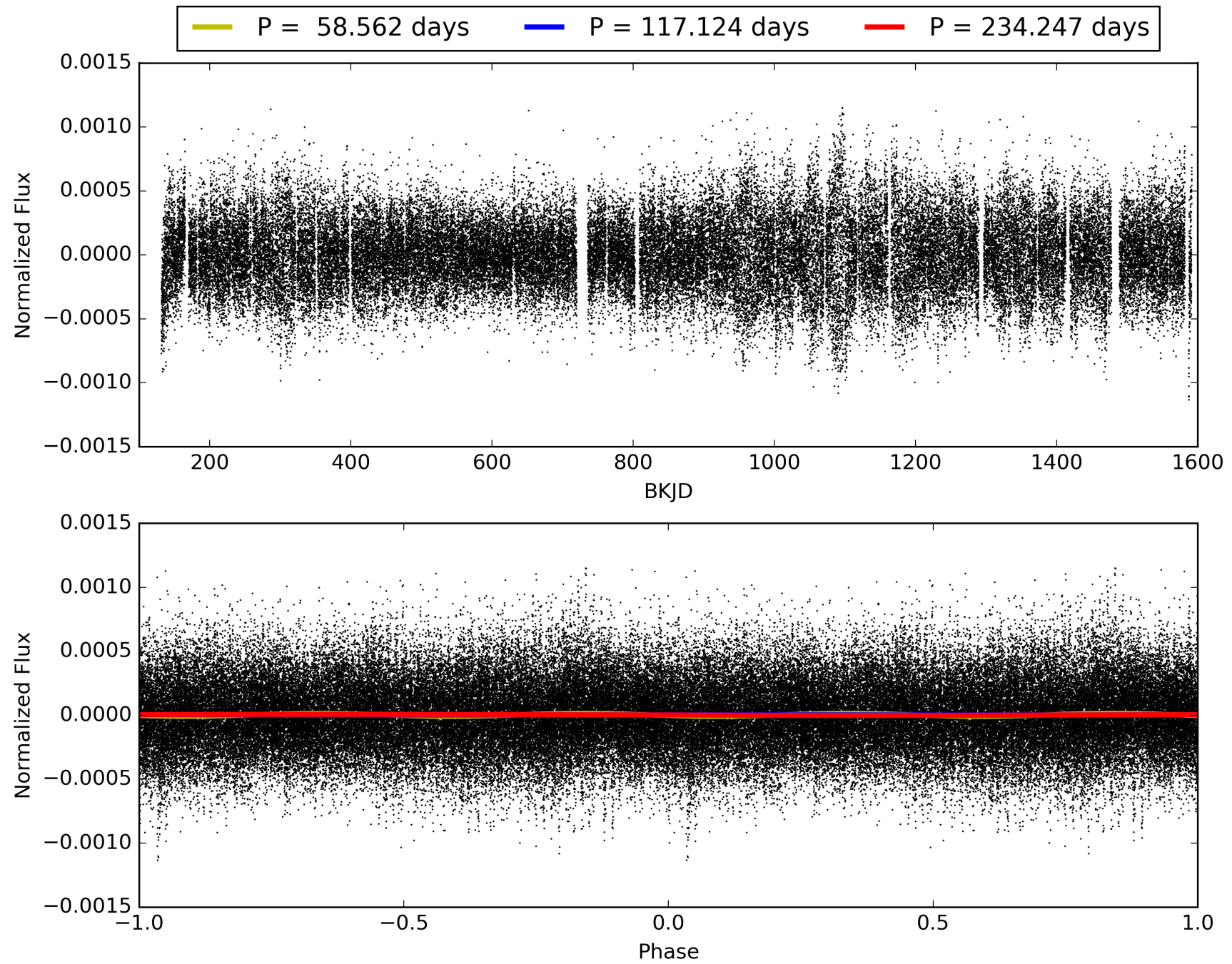
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 03:46:29 Z

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

TCE 009157001-02, PDC Light Curves

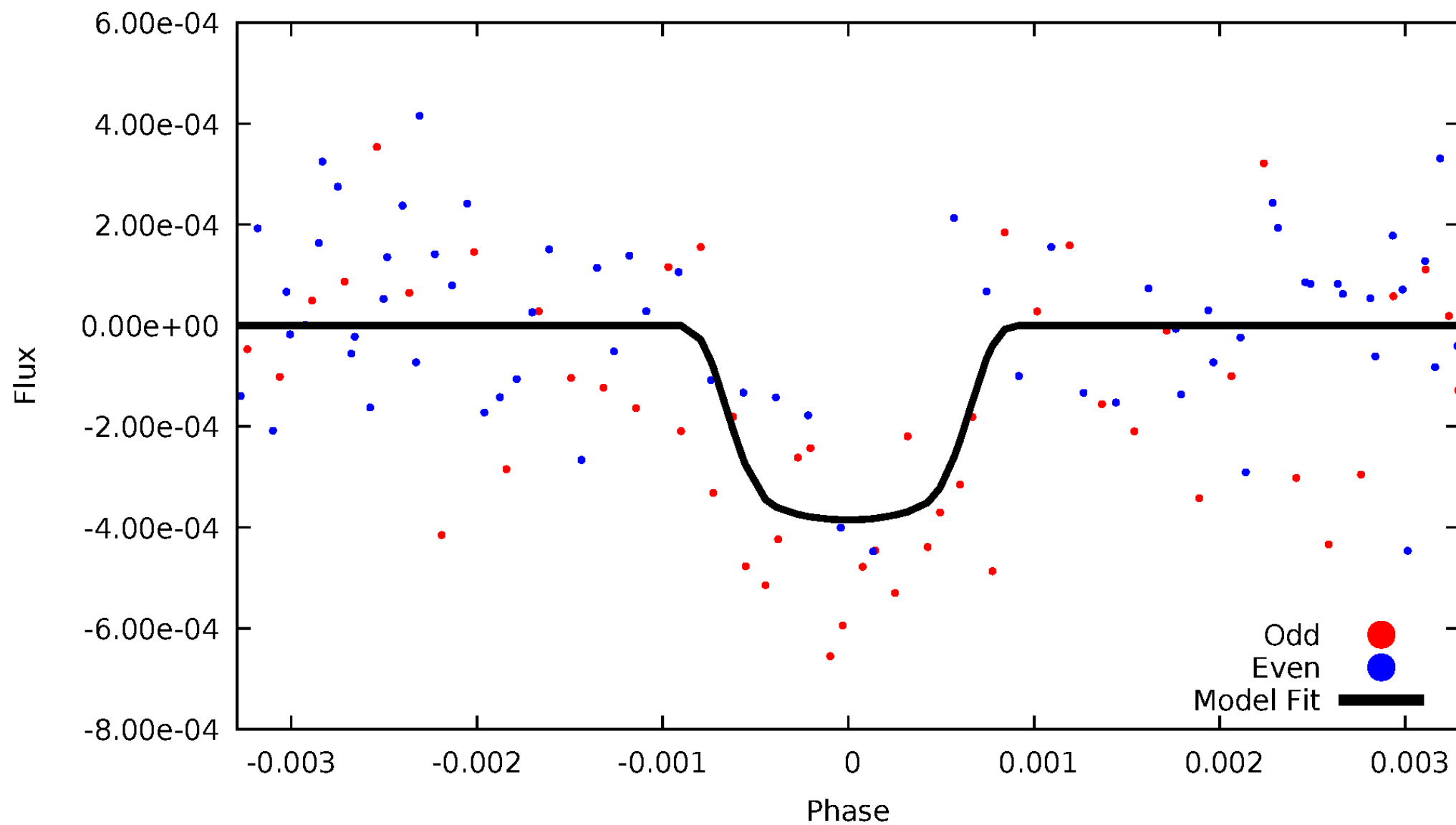


TCE 009157001-02



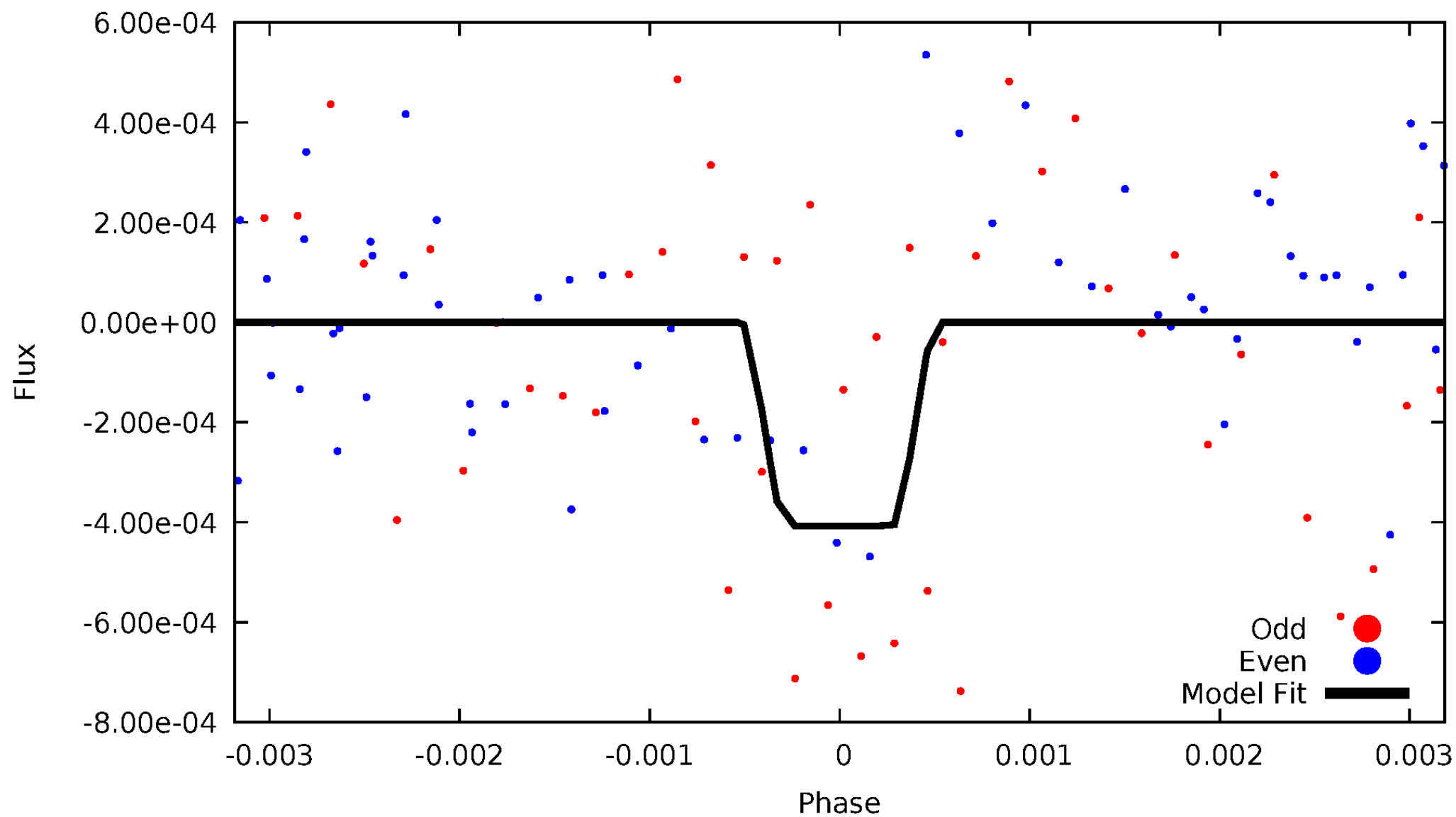
DV Odd/Even

TCE 009157001-02



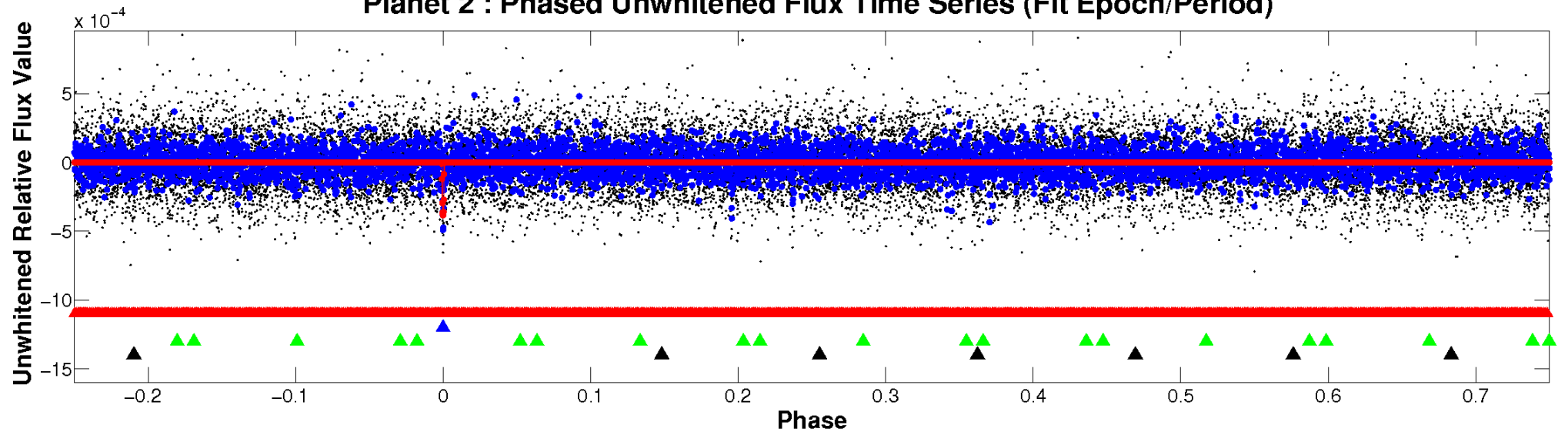
ALT Odd/Even

TCE 009157001-02

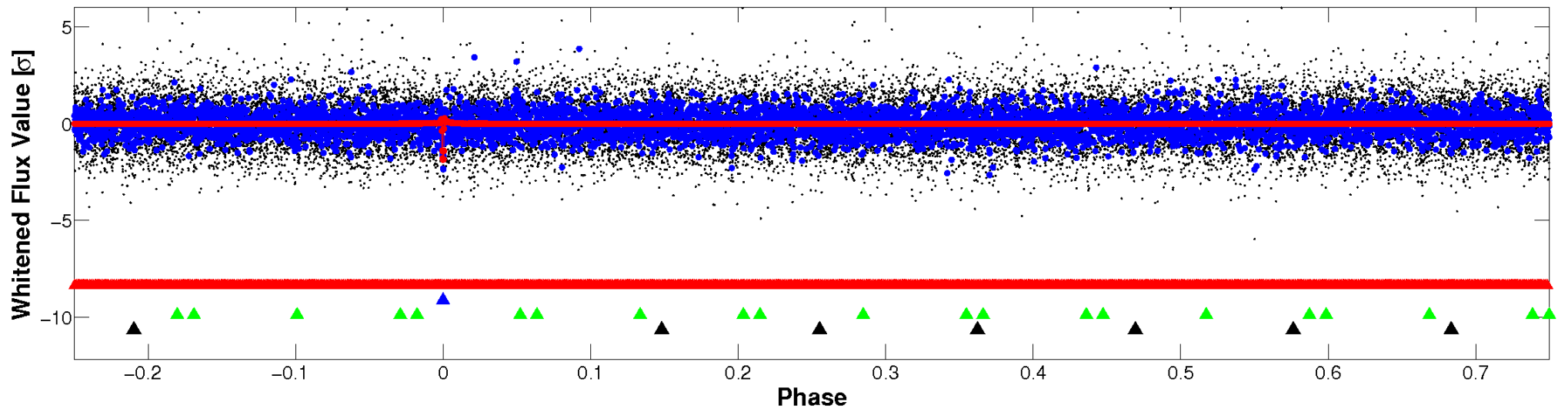


Non-Whitened Vs. Whitened Light Curve

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

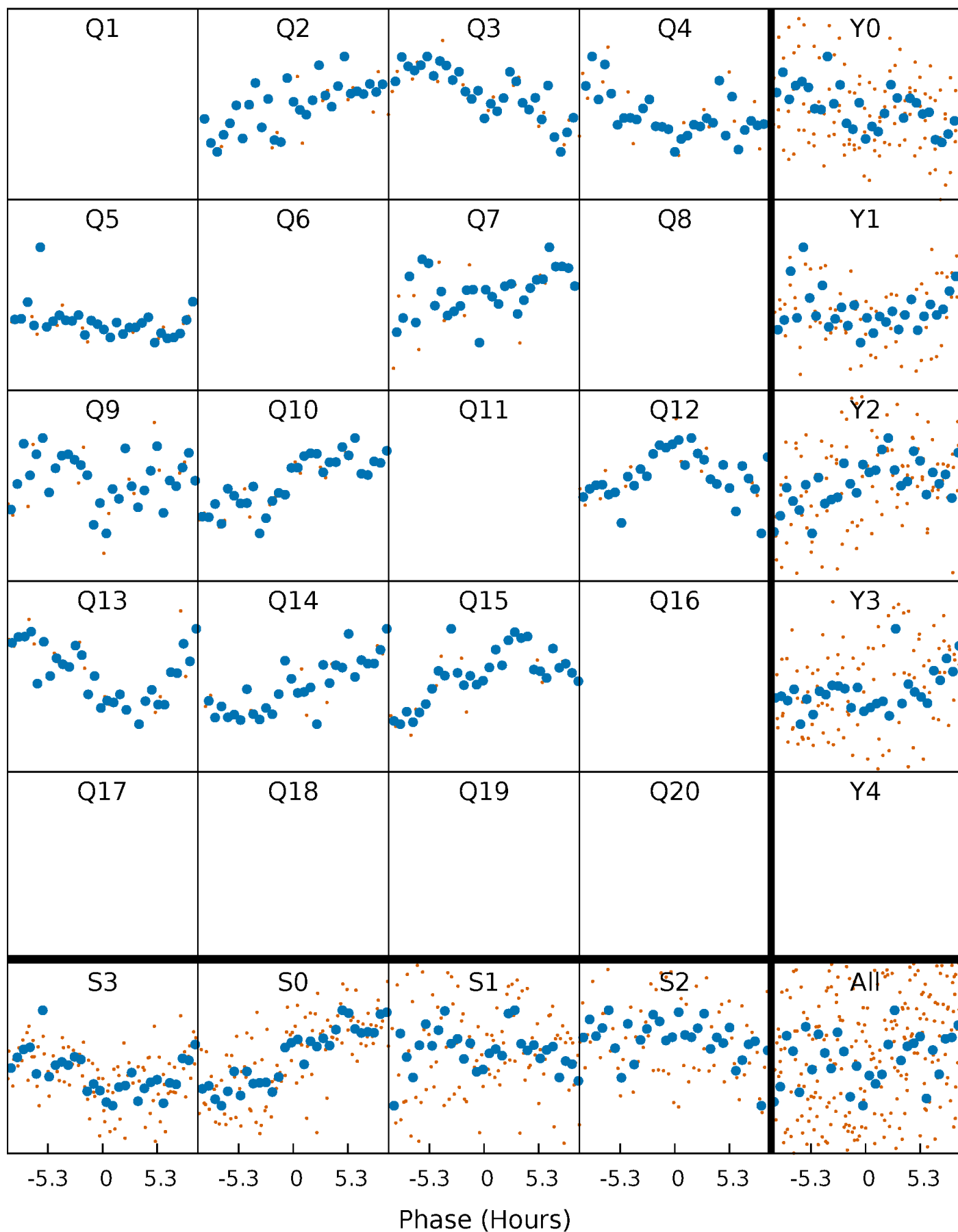


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



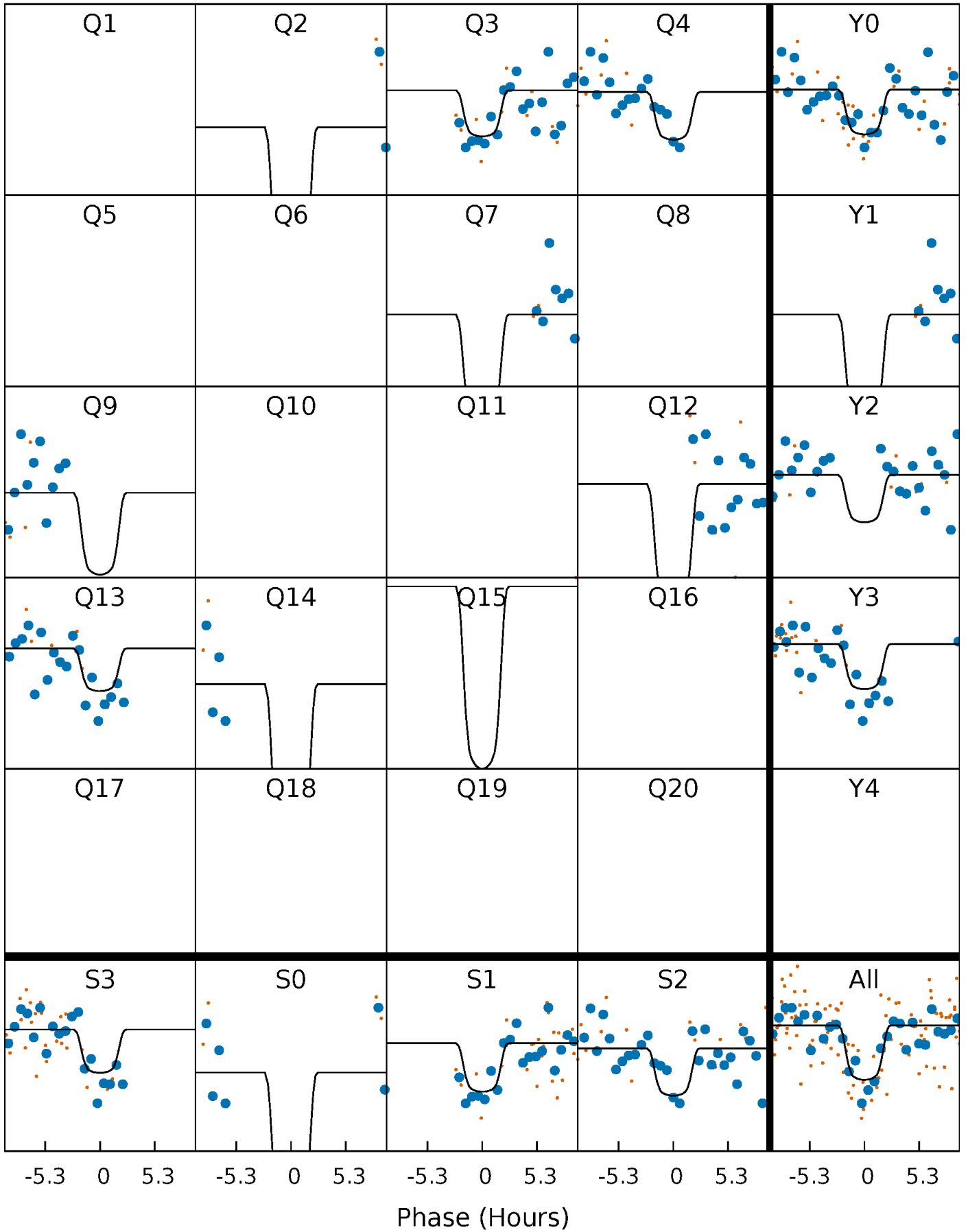
PDC Quarter-Phased Transit Curves

TCE 009157001-02 P=117.123712 Days $T_0=177.411444$ (BKJD)



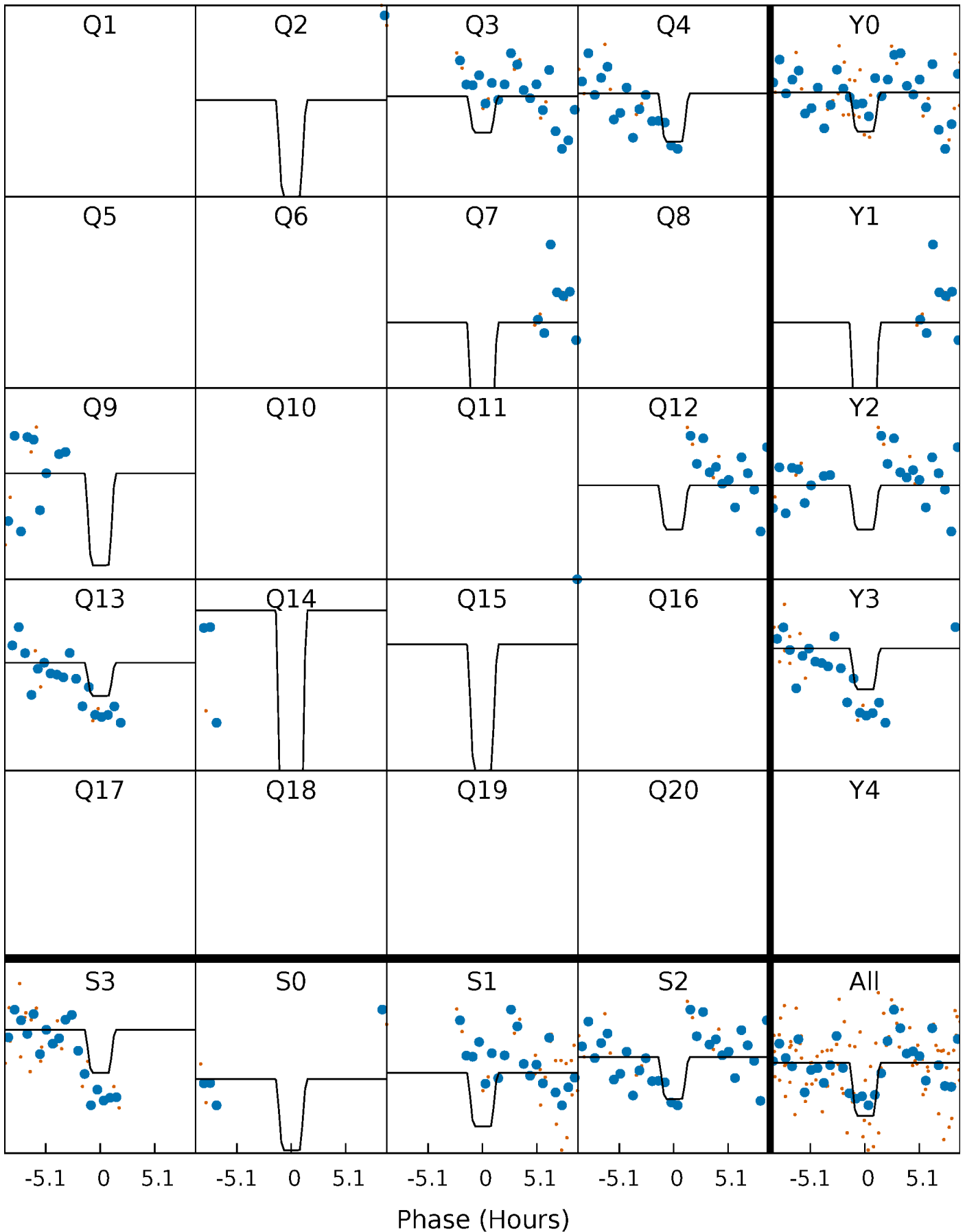
DV Quarter-Phased Transit Curves

TCE 009157001-02 $P=117.123712$ Days $T_0=177.411444$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

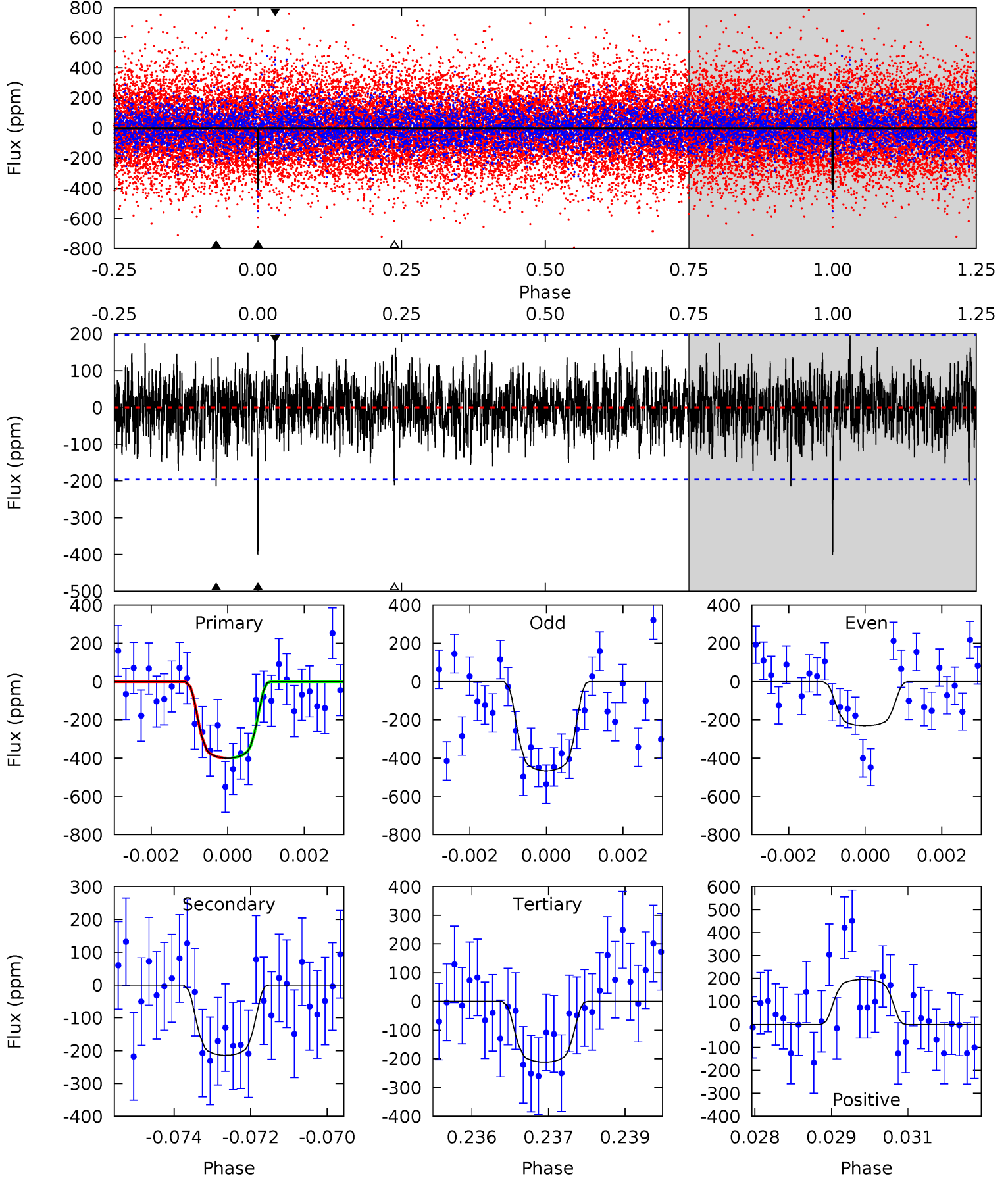
TCE 009157001-02 P=117.126463 Days $T_0=177.402936$ (BKJD)



DV Model-Shift Uniqueness Test

009157001-02, P = 117.123712 Days, E = 60.287732 Days

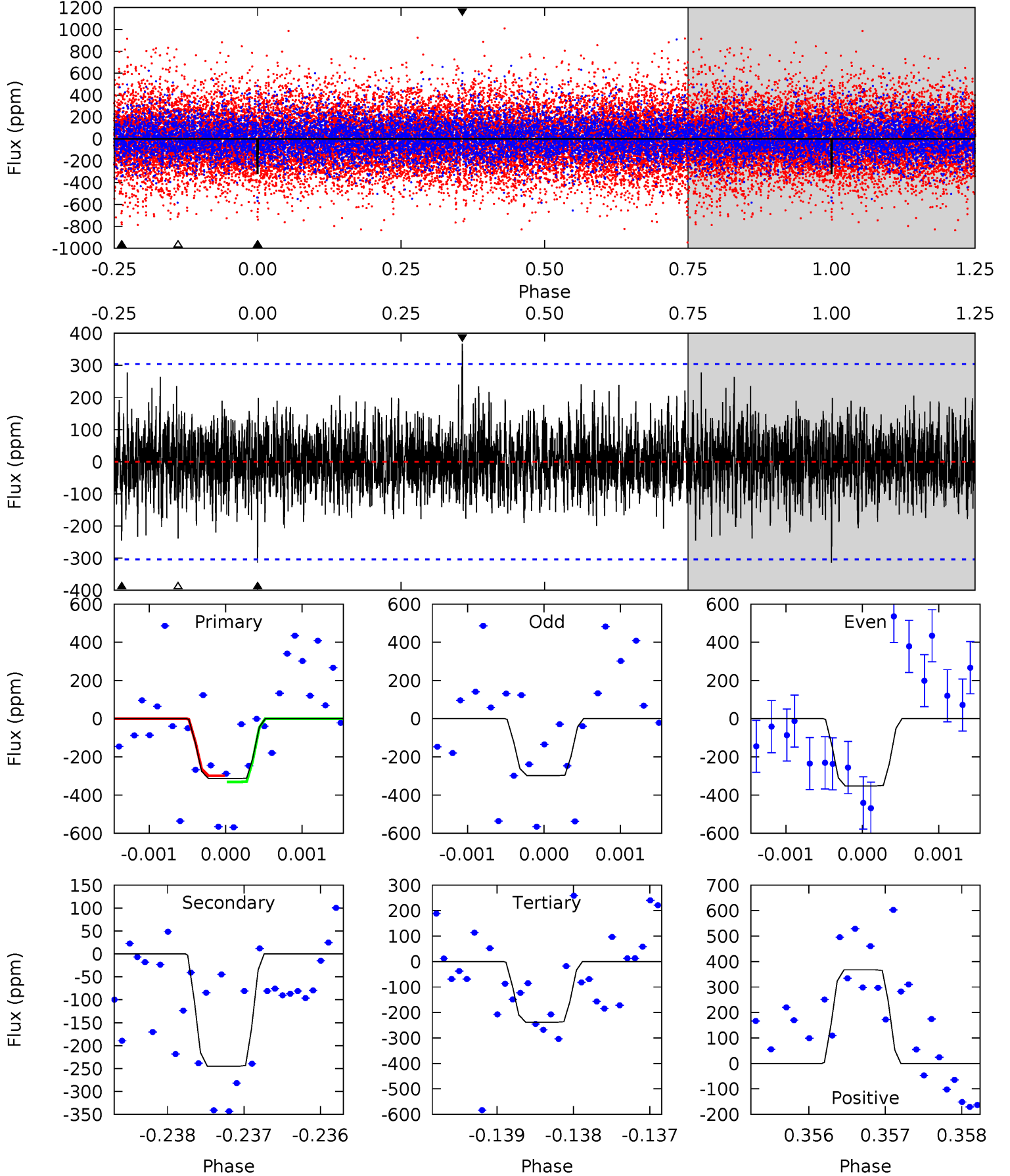
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.9	5.86	5.78	5.36	5.36	3.15	1.50	5.16	5.58	0.08	0.50	2.99	0.62	0.33	0.01



Alt Model-Shift Uniqueness Test

009157001-02, P = 117.126463 Days, E = 60.276473 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.62	4.39	4.26	6.58	5.44	3.28	1.27	1.36	-0.96	0.12	-2.20	0.45	0.86	0.54	0.30



Stellar Parameters For KIC 009157001

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	7020^{+196}_{-295}	$4.226^{+0.120}_{-0.195}$	$-0.220^{+0.250}_{-0.350}$	$1.477^{+0.470}_{-0.253}$	$1.348^{+0.200}_{-0.220}$	$0.590^{+0.360}_{-0.304}$
	+3%/-4%	+3%/-5%	+114%/-159%	+32%/-17%	+15%/-16%	+61%/-52%
Source	PHO1	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 009157001-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	-214 ± 37	$3.66^{+0.74}_{-0.61}$	737^{+57}_{-48}	5654^{+498}_{-439}	2317^{+1141}_{-758}
Alt.	-245 ± 56	$3.34^{+0.74}_{-0.68}$	735^{+59}_{-46}	6054^{+695}_{-566}	3180^{+1731}_{-1215}

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 $A_{obs} \gg 1.0$

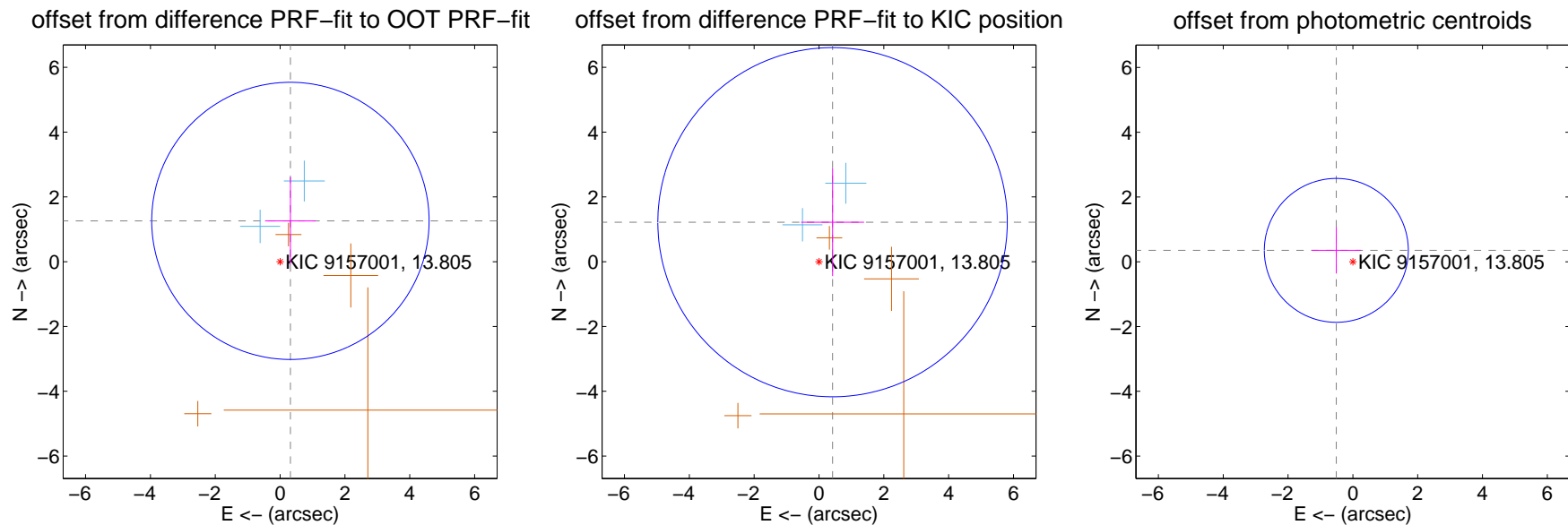
DV Centroid Data

Supplemental centroid analysis for 009157001-02. Kepler magnitude: 13.80. Transit SNR 7.51

There are 2 quarters with good PRF difference image offsets

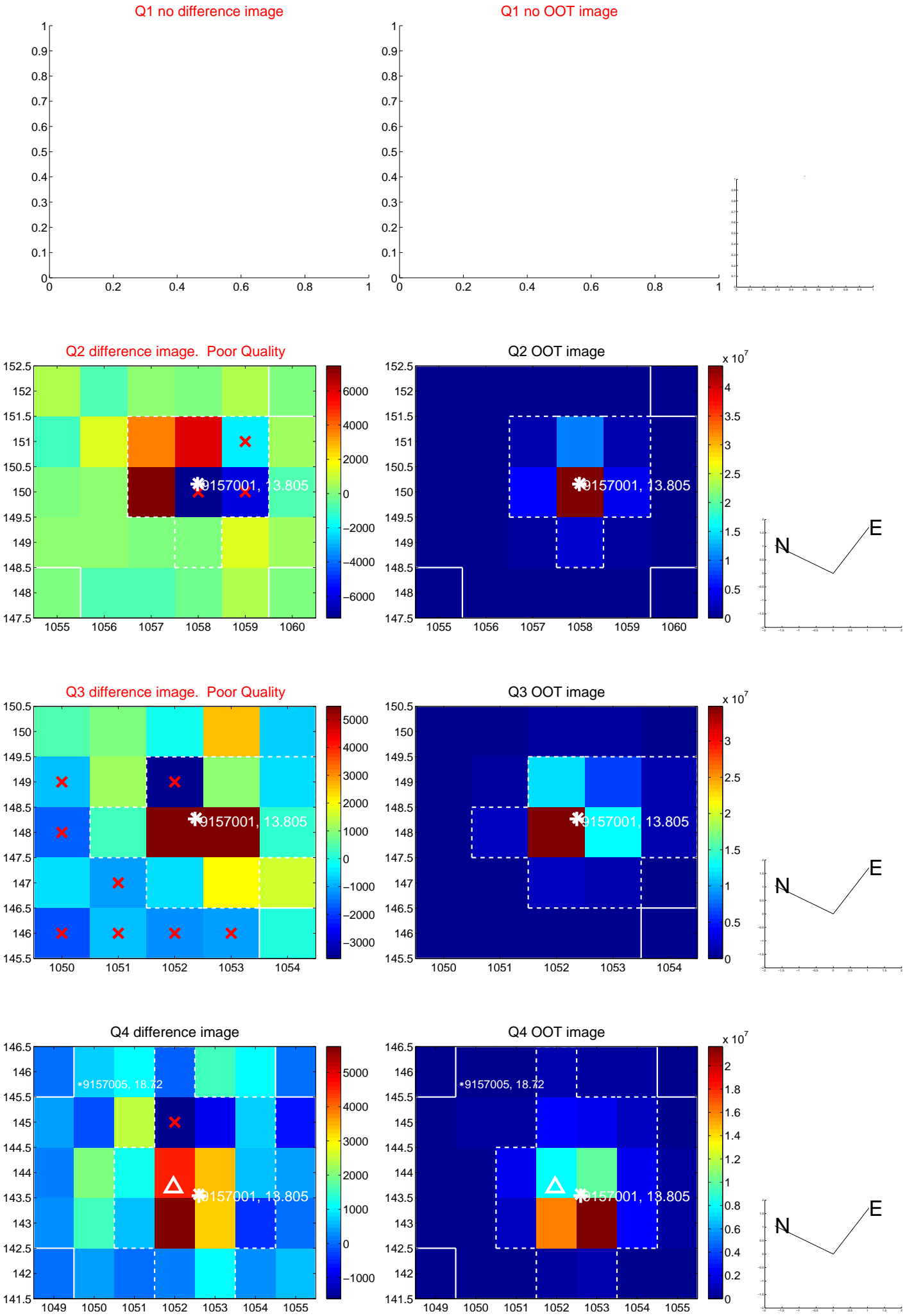
The direct PRF centroid is offset from the target star catalog position by about 0.12 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	1.299 ± 1.426	0.91	-0.317 ± 0.782	1.260 ± 1.349
PRF-fit source offset from KIC position	1.289 ± 1.797	0.72	-0.419 ± 0.972	1.219 ± 1.663
photometric centroid source offset	0.62 ± 0.74	0.84	0.51 ± 0.75	0.35 ± 0.72

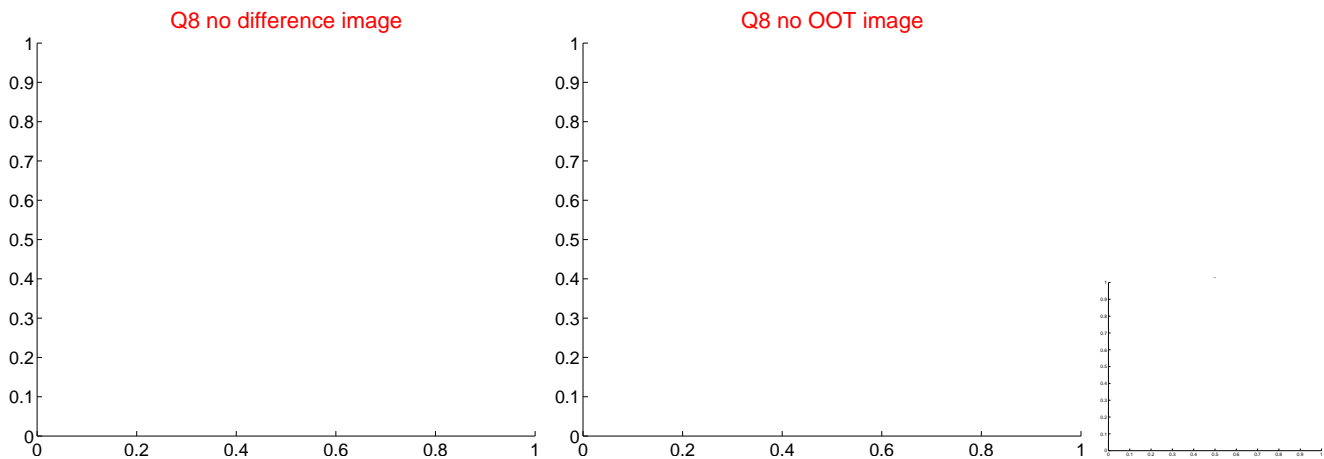
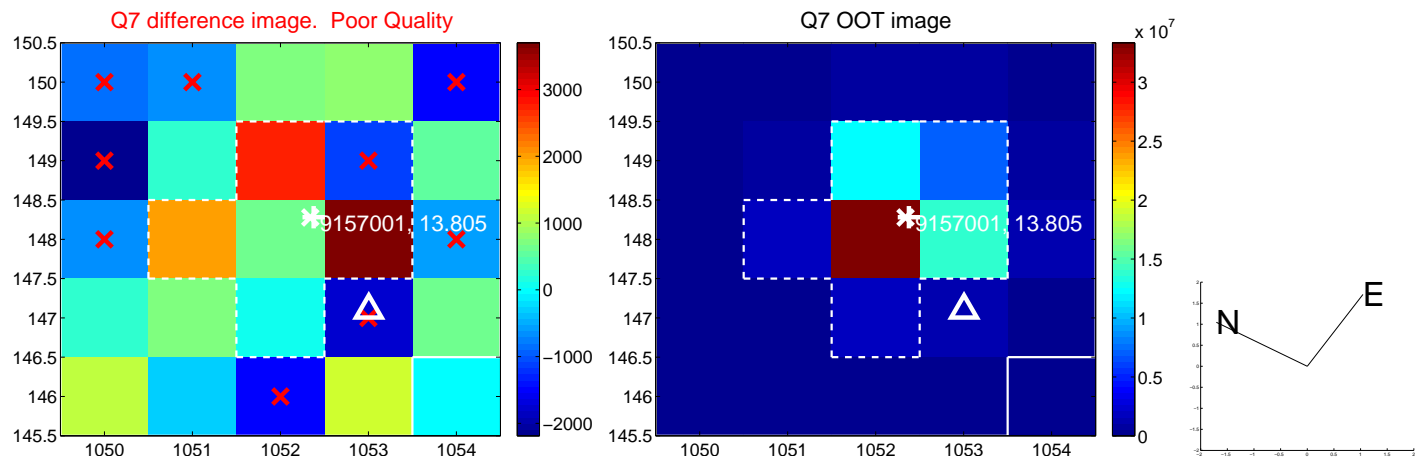
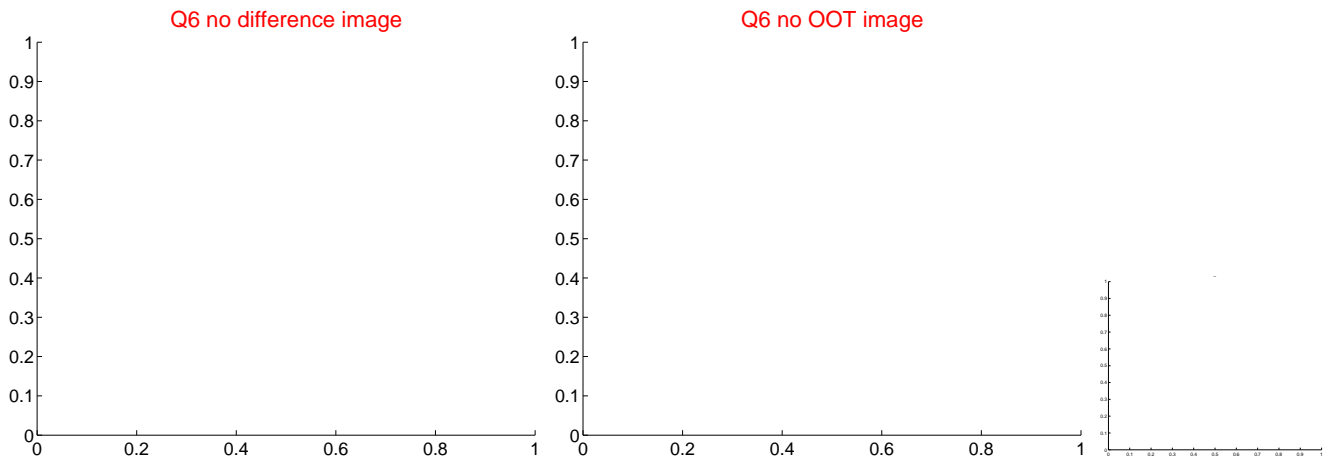
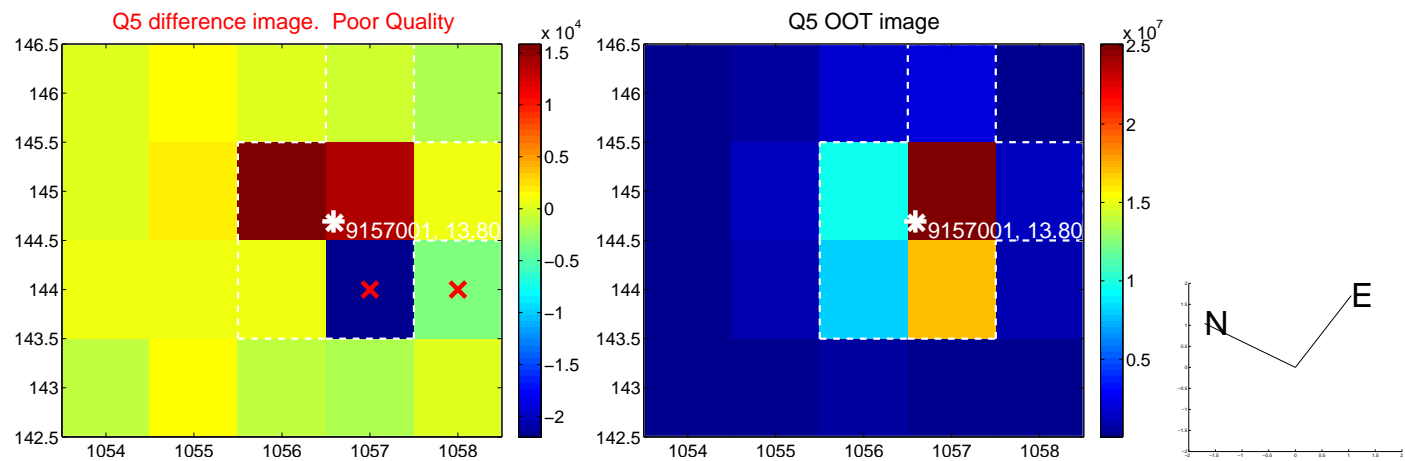


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

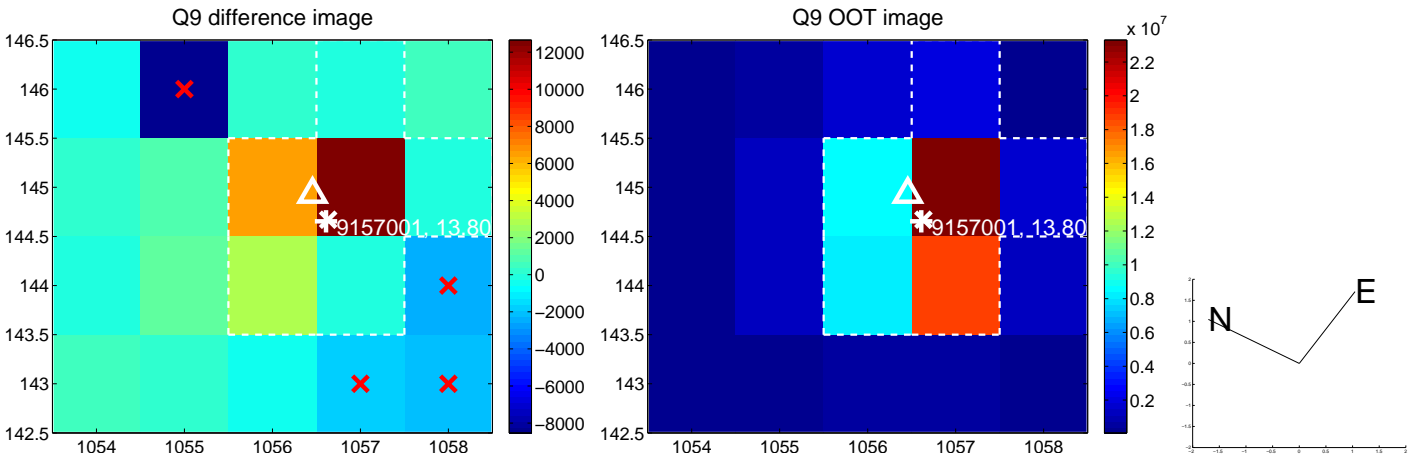
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



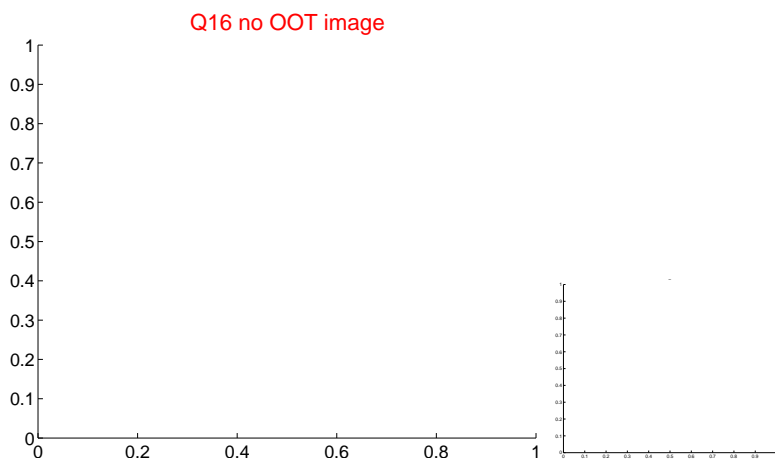
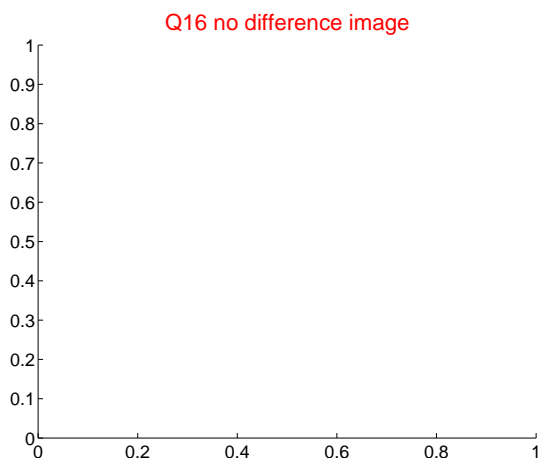
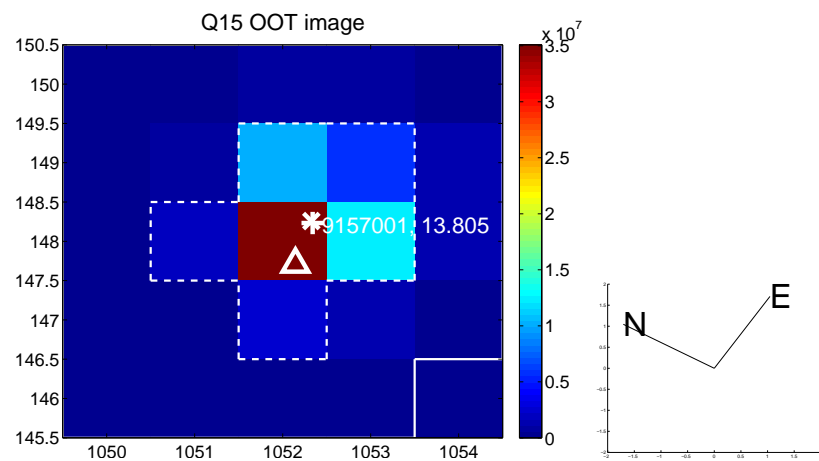
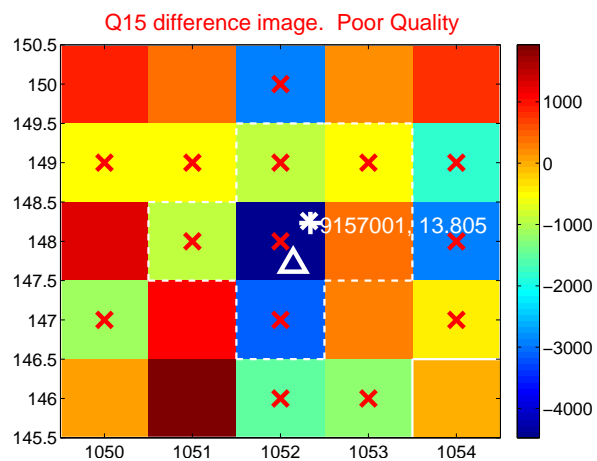
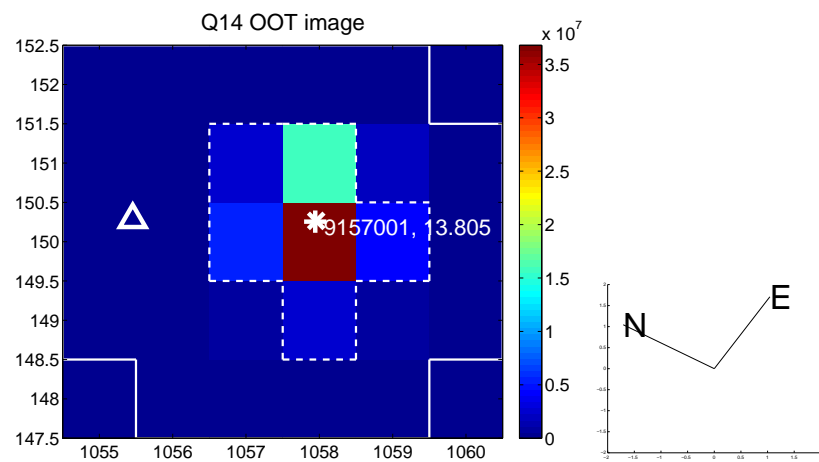
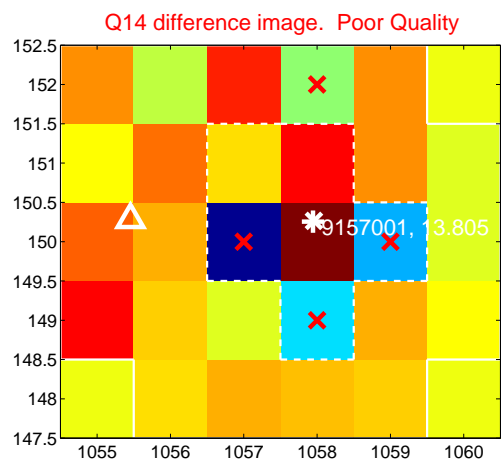
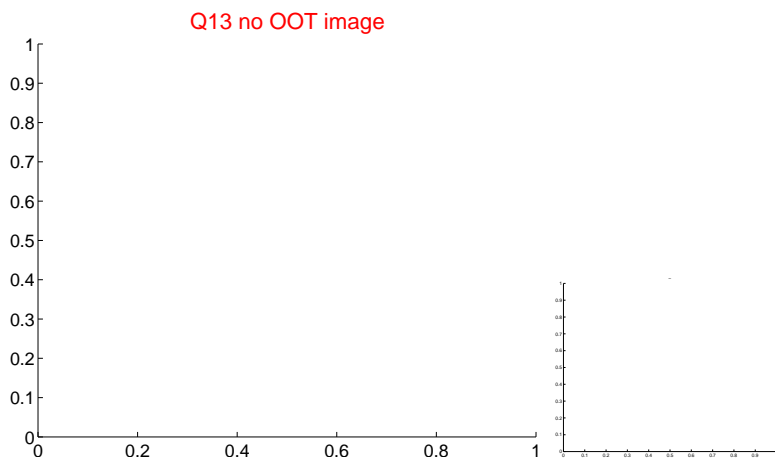
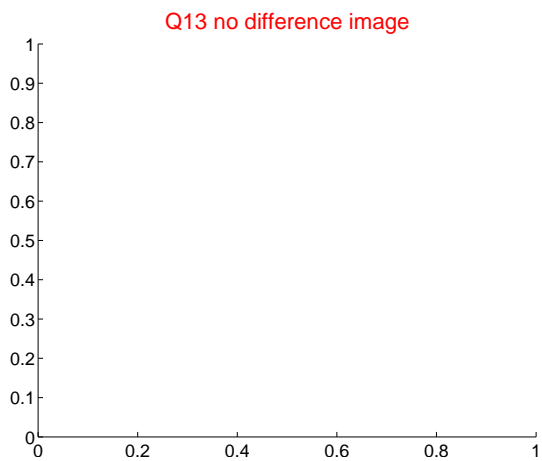
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



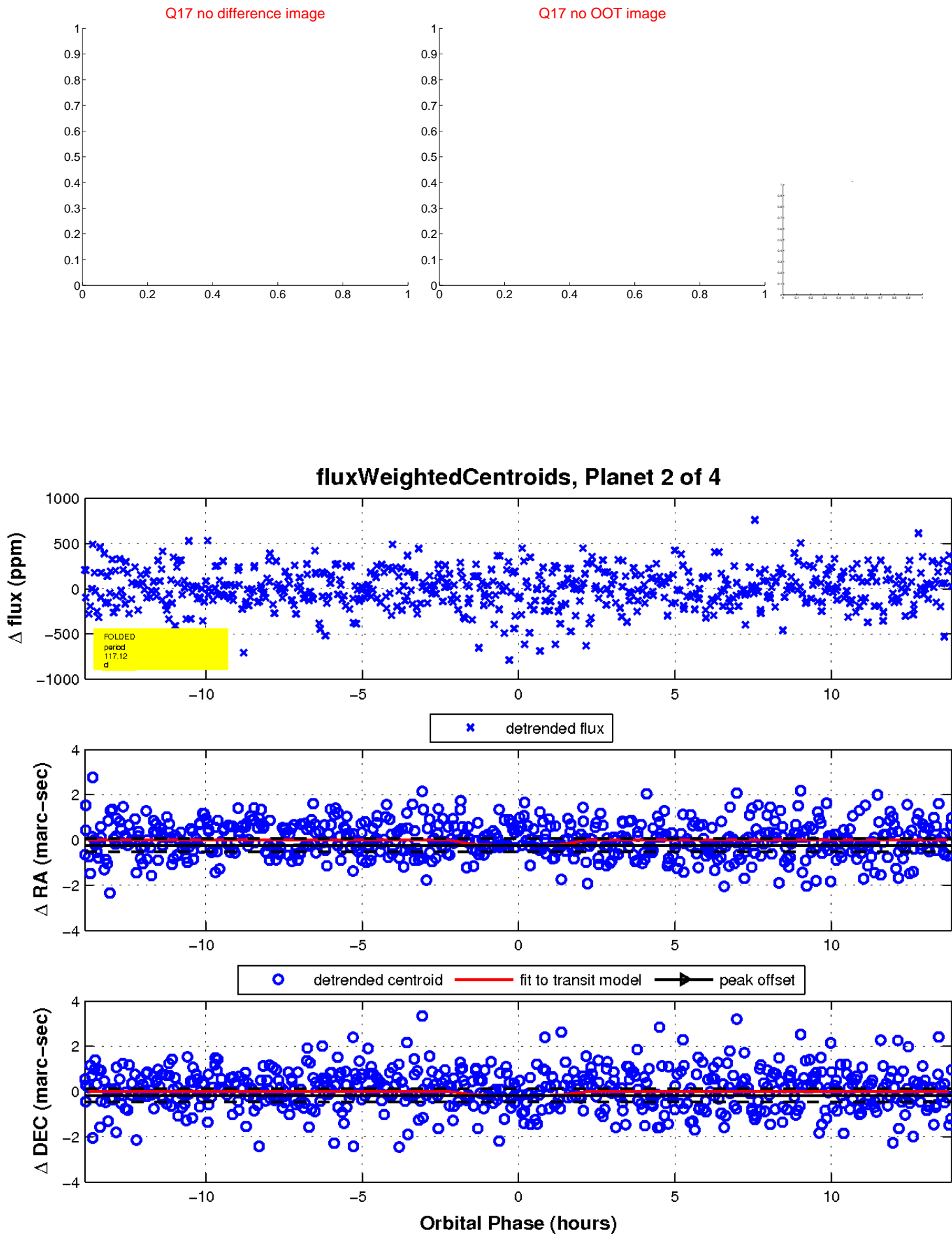
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

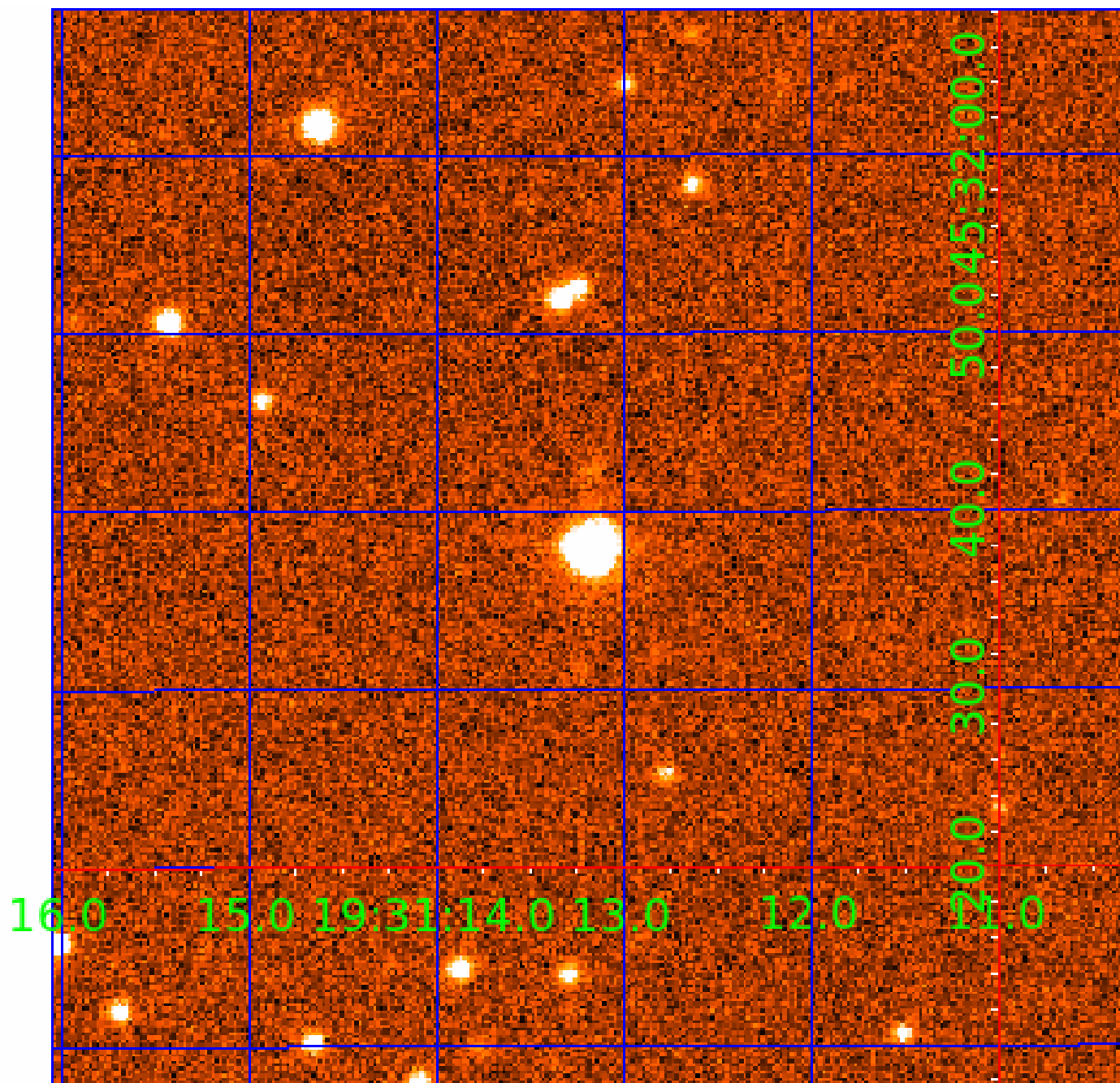


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 009157001

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})
009157001-01	OBS	No	1.666756	132.200853	11.5	8.449	8.7	4.4	1.48	7020	0.51	5160.21
009157001-02	OBS	No	117.123712	177.411444	385.2	4.626	9.5	7.5	1.48	7020	3.59	17.80
009157001-03	OBS	No	72.178166	146.785194	166.9	11.117	8.1	7.8	1.48	7020	2.06	33.93
009157001-04	OBS	No	221.711158	152.864165	180.7	6.511	7.7	7.1	1.48	7020	2.20	7.60

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009157001-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—LPP_ALT
009157001-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
009157001-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_ALT
009157001-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

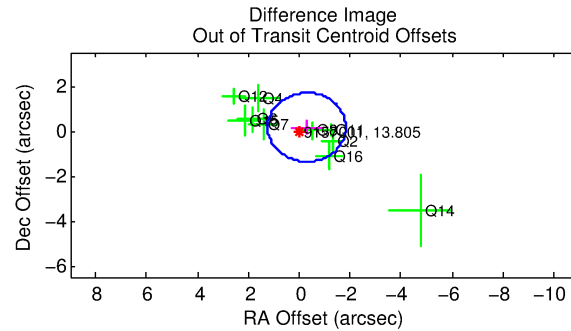
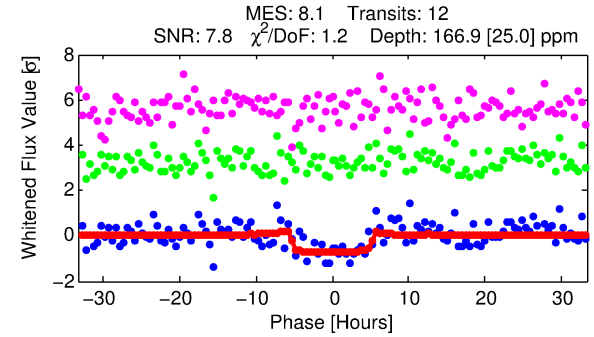
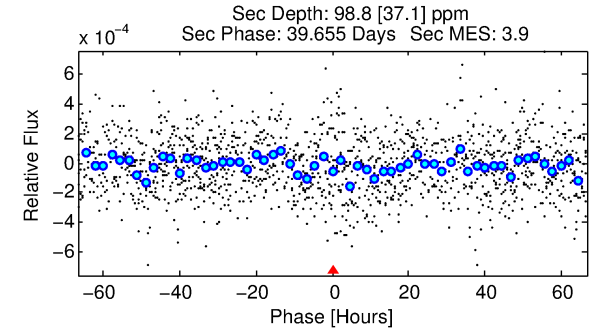
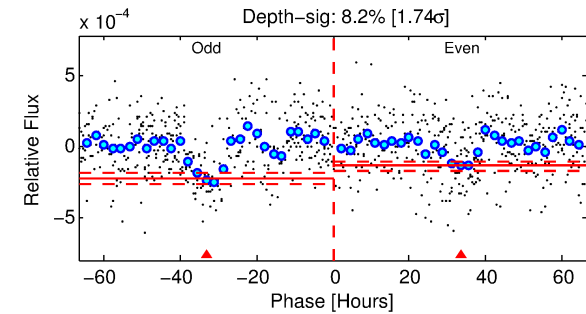
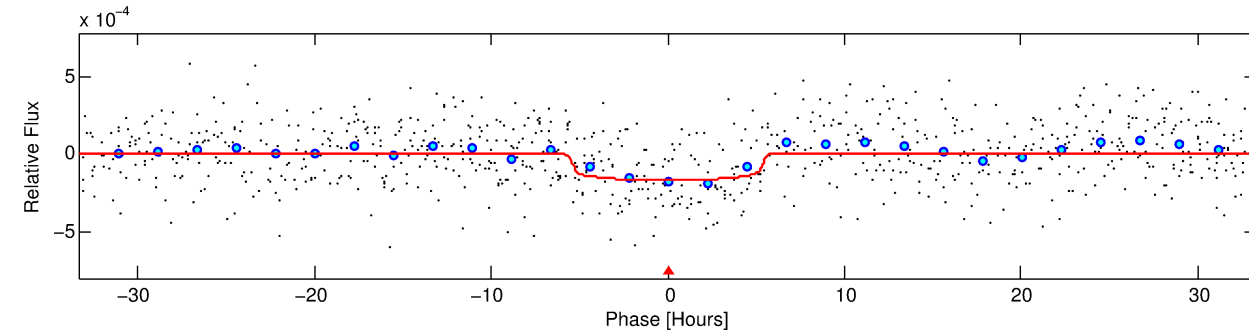
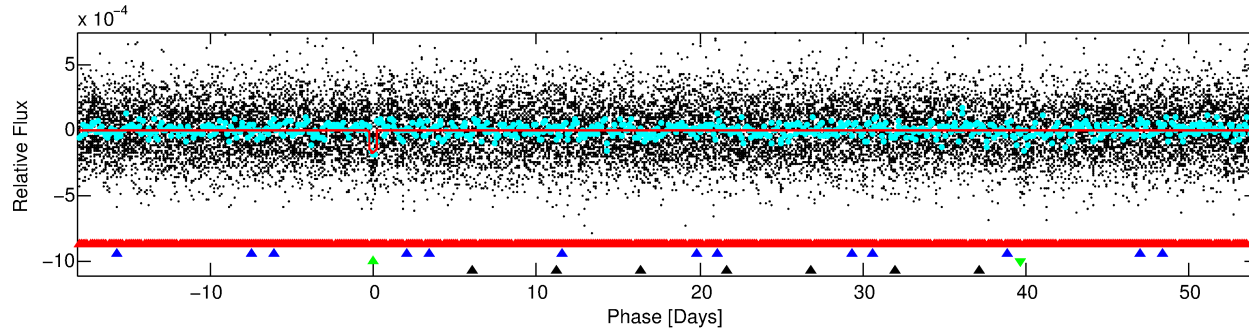
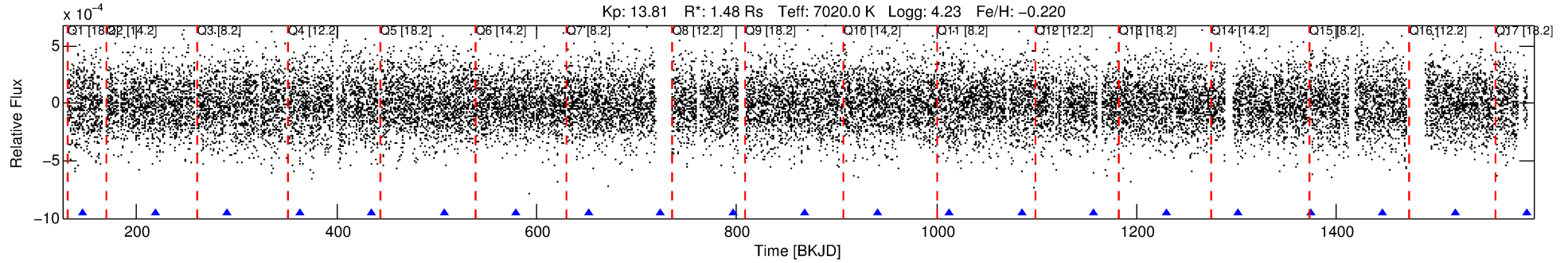
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009157001-03

No Significant Match Found

DV One-Page Summary

KIC: 9157001 Candidate: 3 of 4 Period: 72.178 d



DV Fit Results:

Period = 72.17817 [0.00174] d
Epoch = 146.7852 [0.0232] BKJD
Rp/R* = 0.0128 [0.0043]
a/R* = 34.80 [66.77]
b = 0.73 [1.23]
Seff = 33.93 [13.69]
Teff = 615 [62] K
Rp = 2.06 [0.95] Re
a = 0.3740 [0.0971] AU
Ag = 1793.81 [1525.42] [1.18 σ]
Teffp = 6193 [1216] K [4.58 σ]

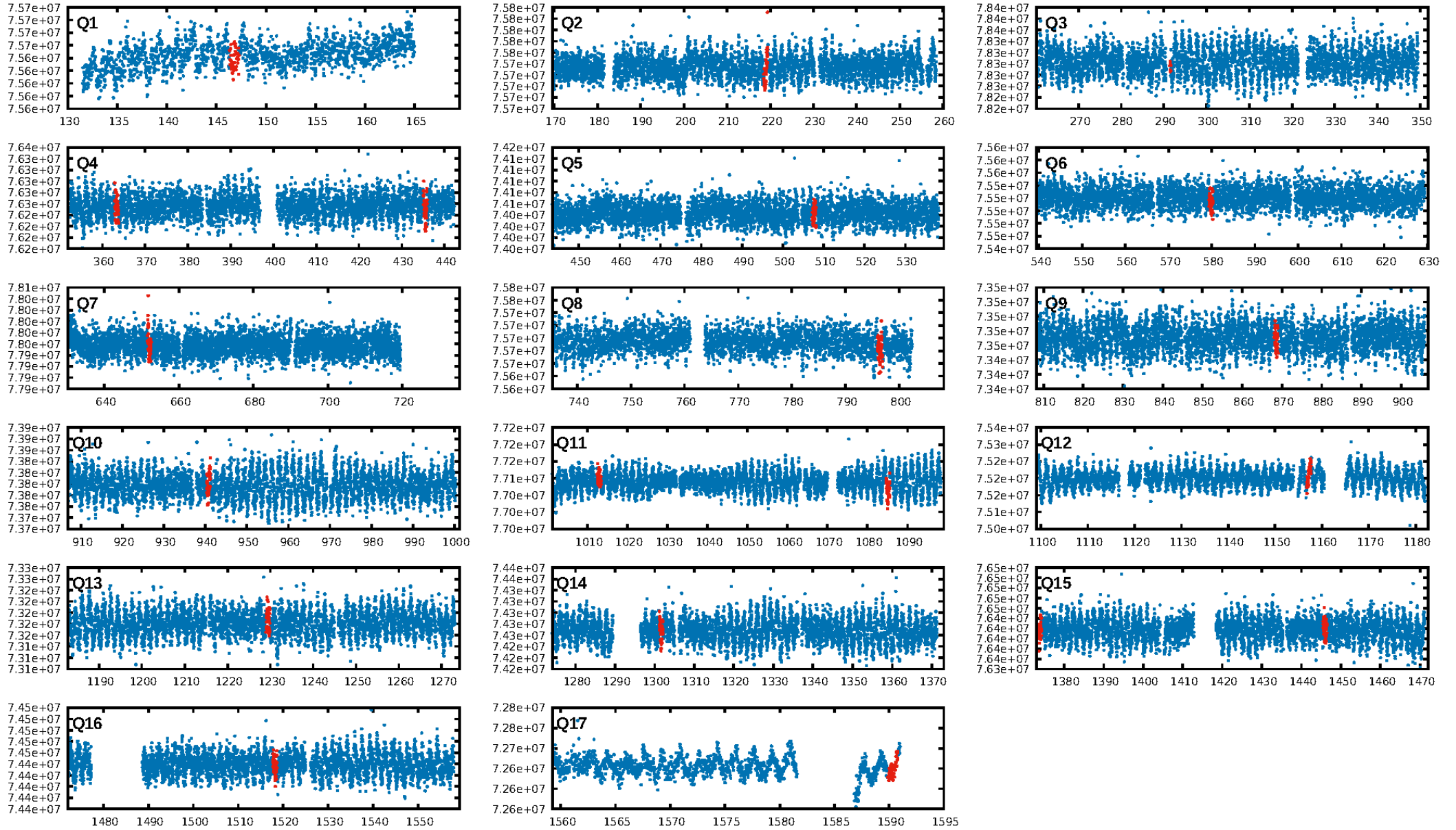
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [121.19 σ]
LongPeriod-sig: 100.0% [89.58 σ]
ModelChiSquare2-sig: 1.6%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 2.43e-10
RollingBand-fgt: 1.00 [11/11]
GhostDiagnostic-chr: 11.2
Centroid-sig: 0.2%
Centroid-so: 1.596 arcsec [2.02 σ]
OotOffset-rm: 0.333 arcsec [0.65 σ]
KicOffset-rm: 0.339 arcsec [0.62 σ]
OotOffset-st: 3/3/4/0 [10]
KicOffset-st: 3/3/4/0 [10]
DiffImageQuality-fgm: 0.90 [9/10]
DiffImageOverlap-fno: 0.00 [0/14]

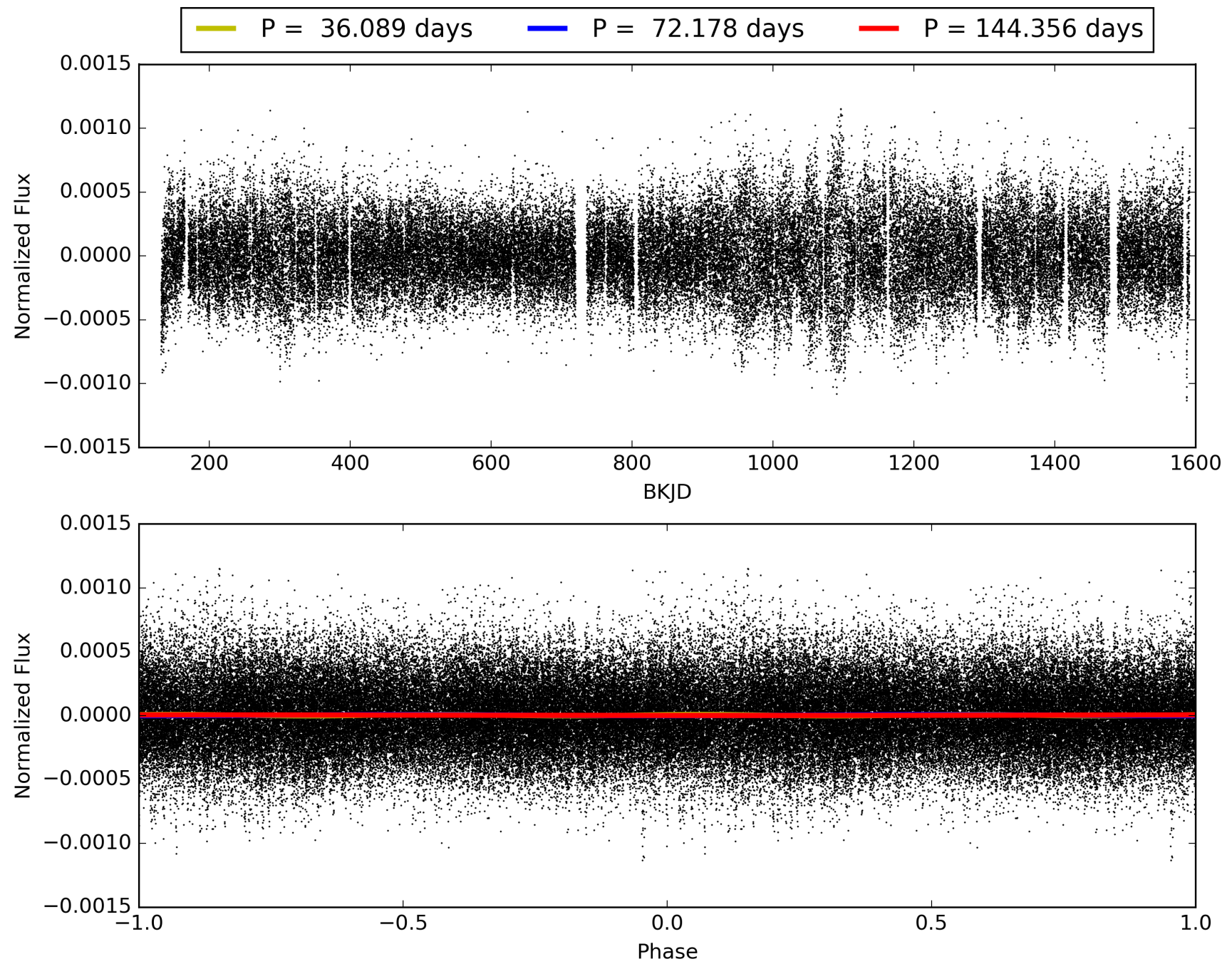
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 03:46:34 Z

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

TCE 009157001-03, PDC Light Curves

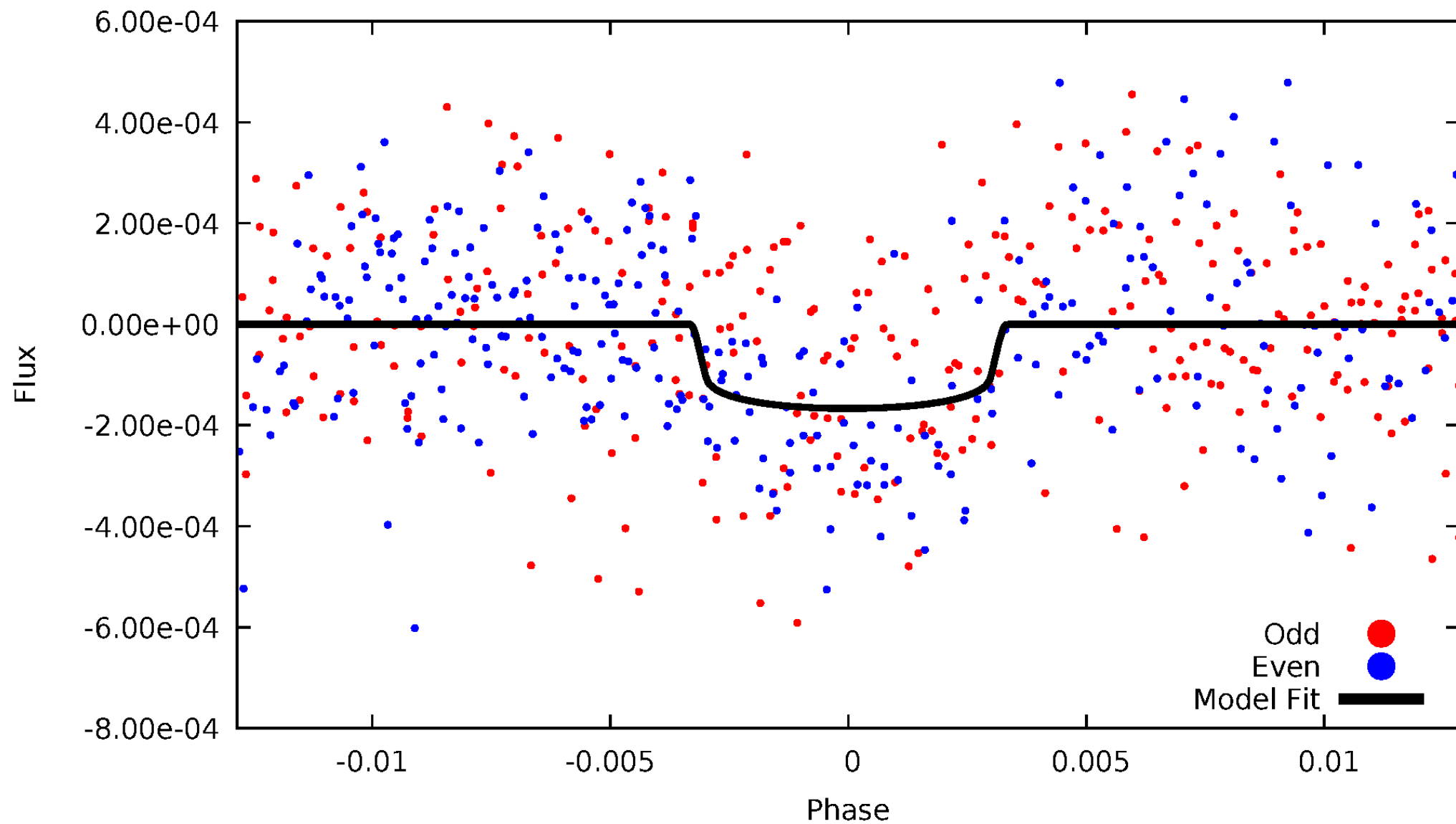


TCE 009157001-03



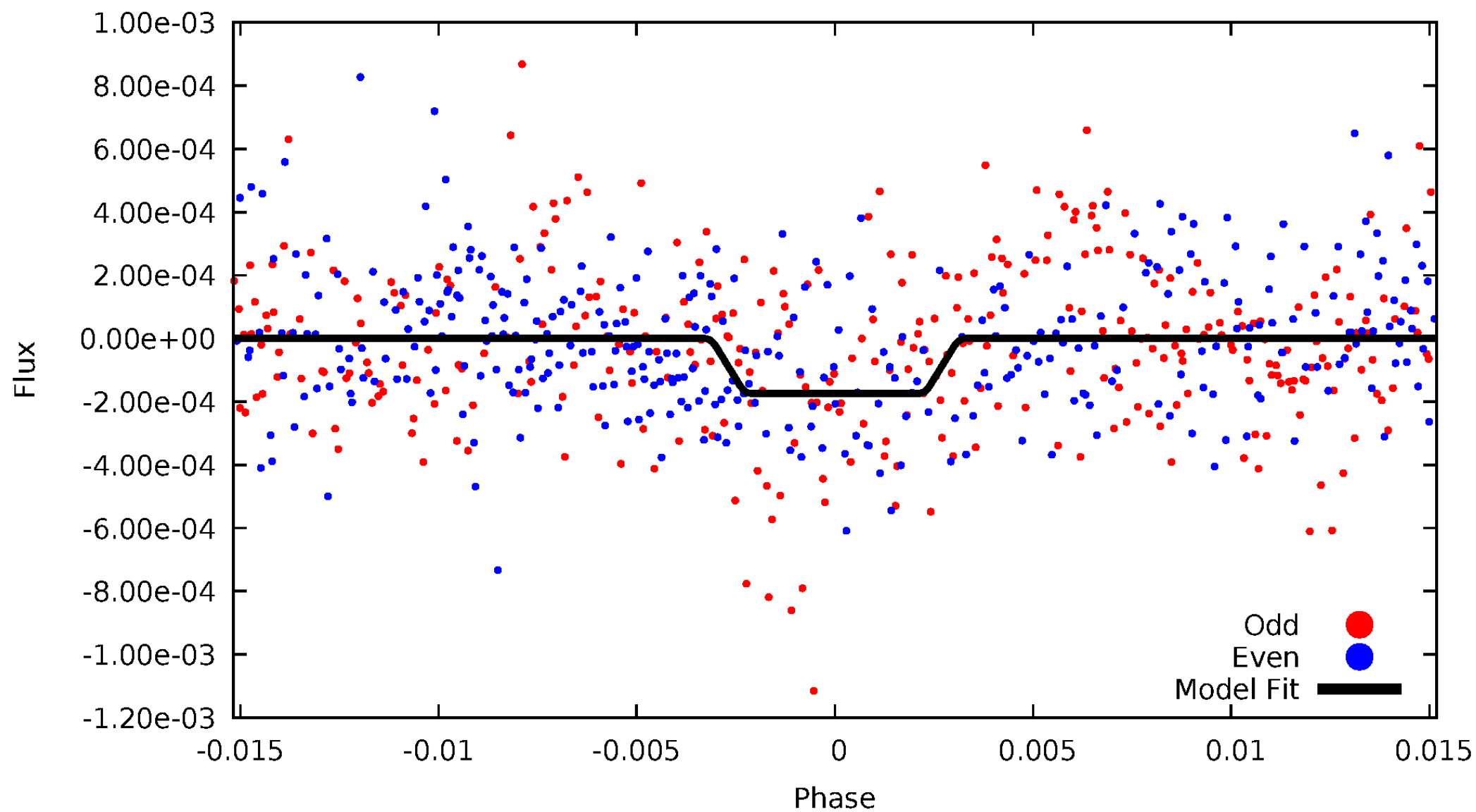
DV Odd/Even

TCE 009157001-03



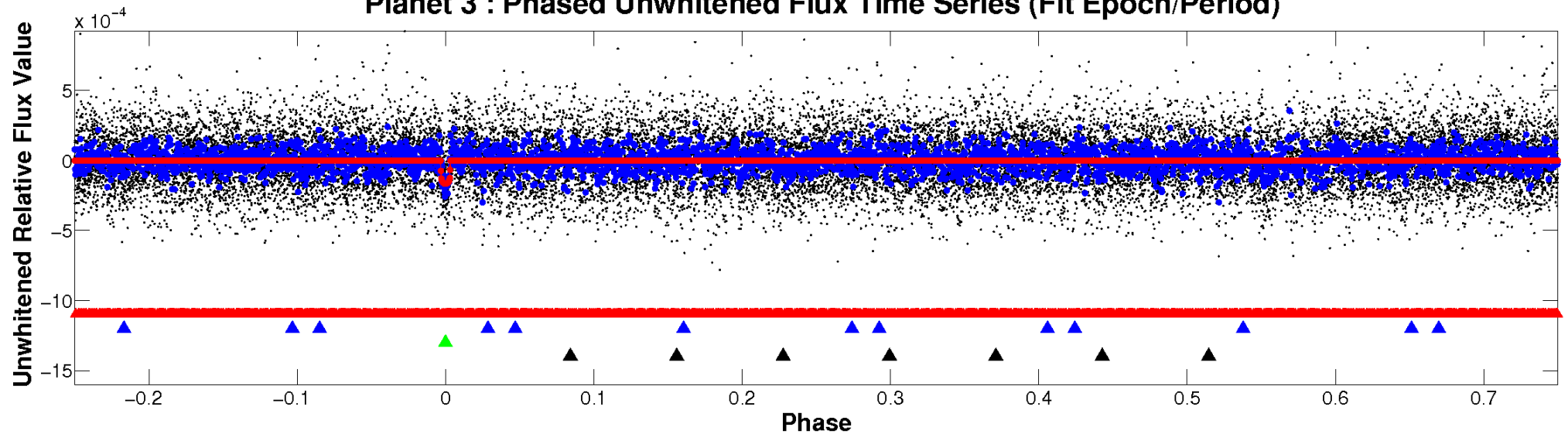
ALT Odd/Even

TCE 009157001-03

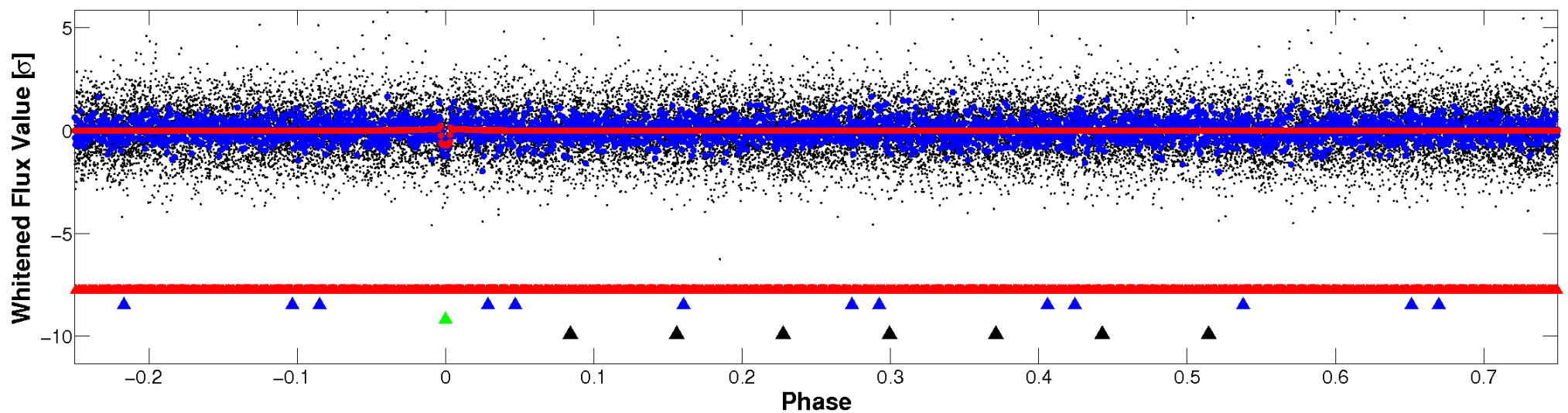


Non-Whitened Vs. Whitened Light Curve

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

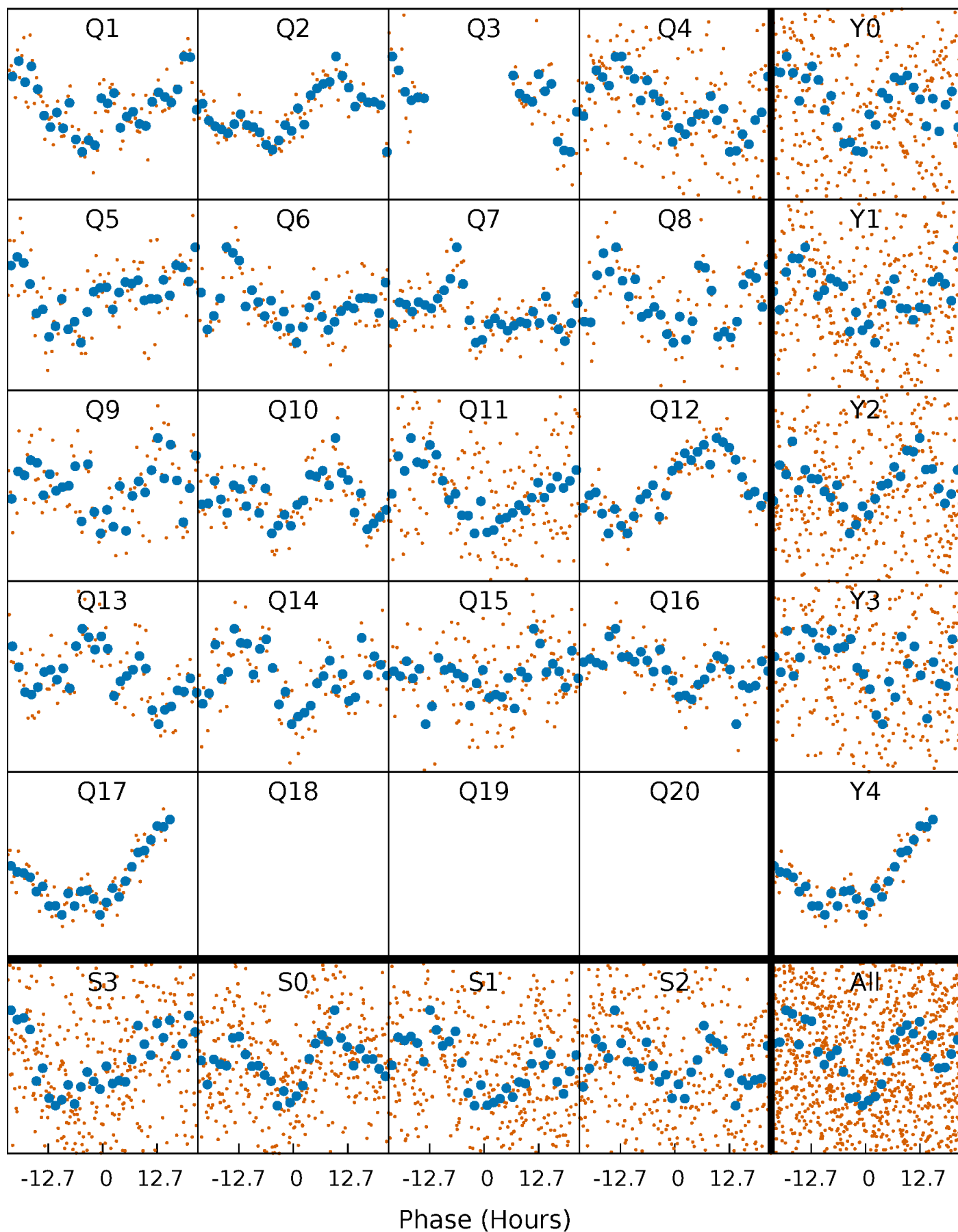


Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



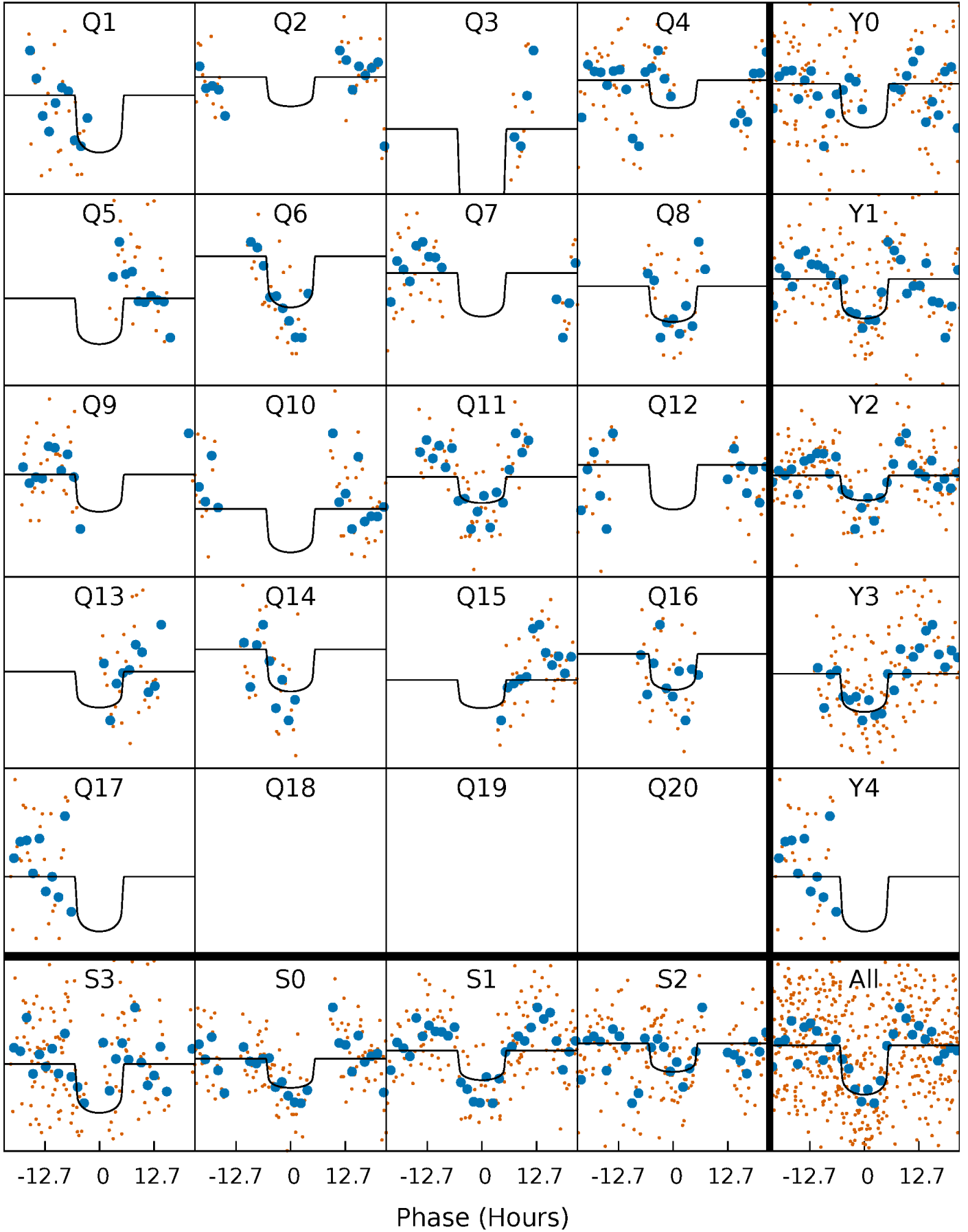
PDC Quarter-Phased Transit Curves

TCE 009157001-03 P= 72.178166 Days $T_0=146.785194$ (BKJD)



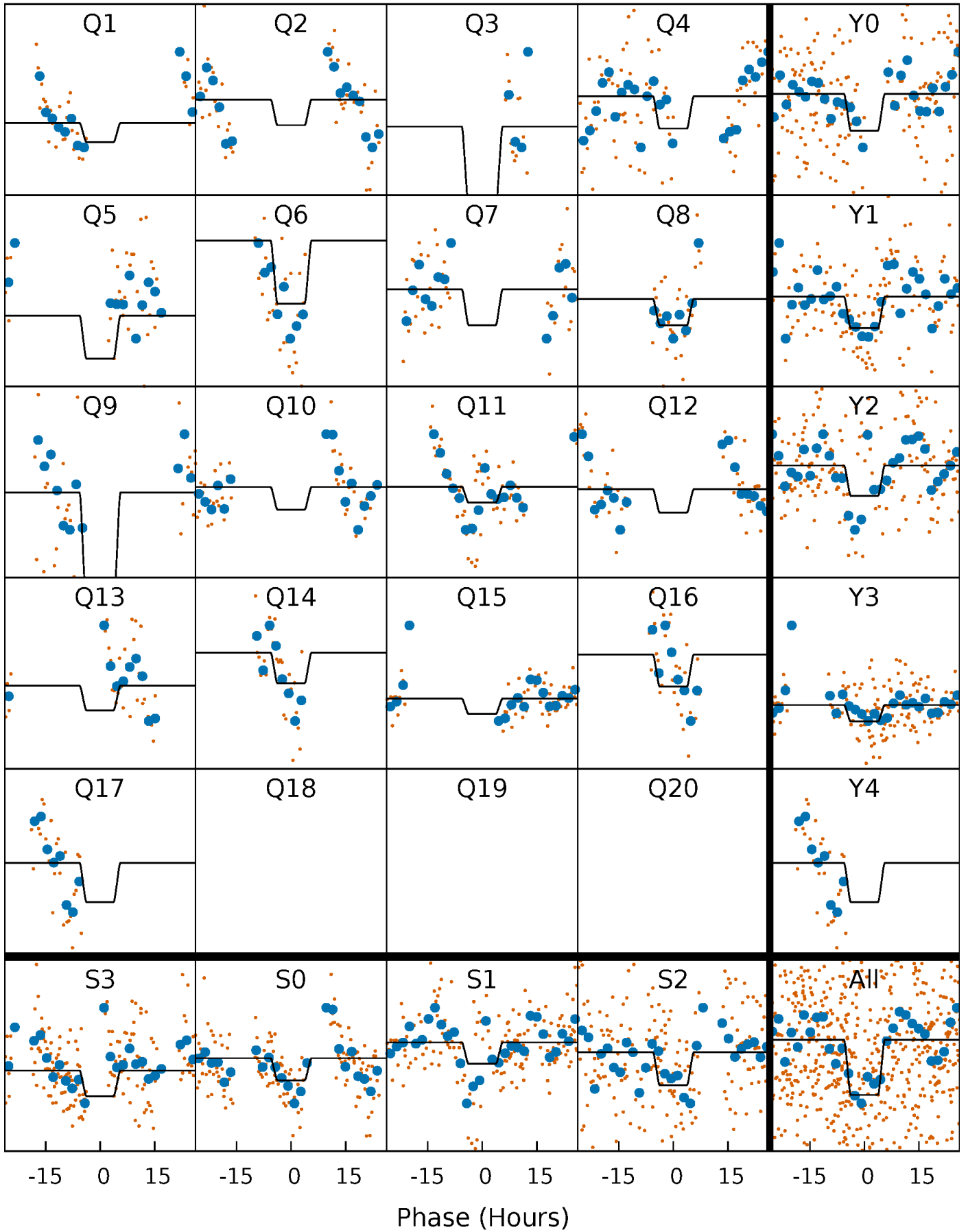
DV Quarter-Phased Transit Curves

TCE 009157001-03 P= 72.178166 Days $T_0=146.785194$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

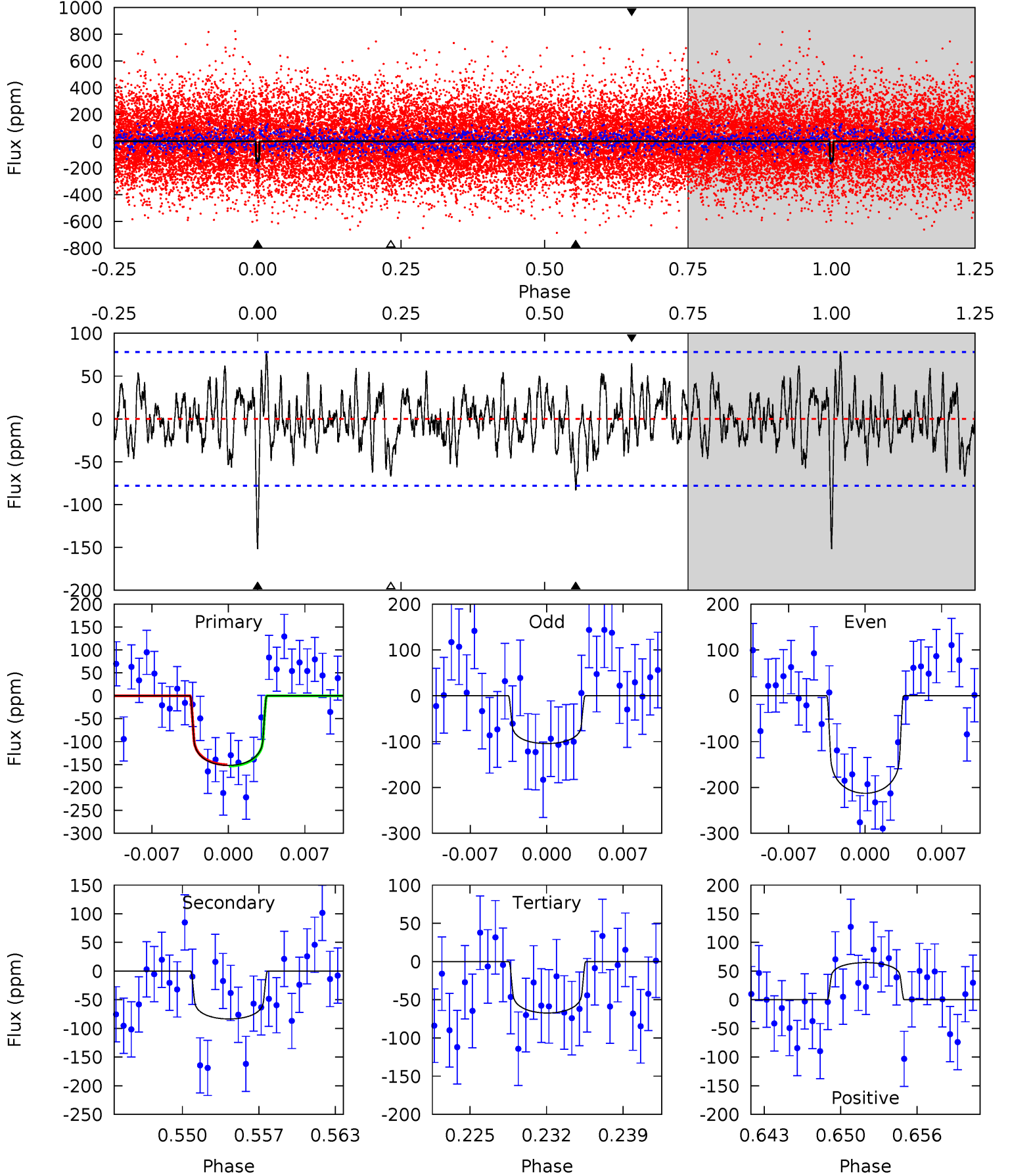
TCE 009157001-03 P= 72.173208 Days $T_0=146.810962$ (BKJD)



DV Model-Shift Uniqueness Test

009157001-03, P = 72.178166 Days, E = 74.607028 Days

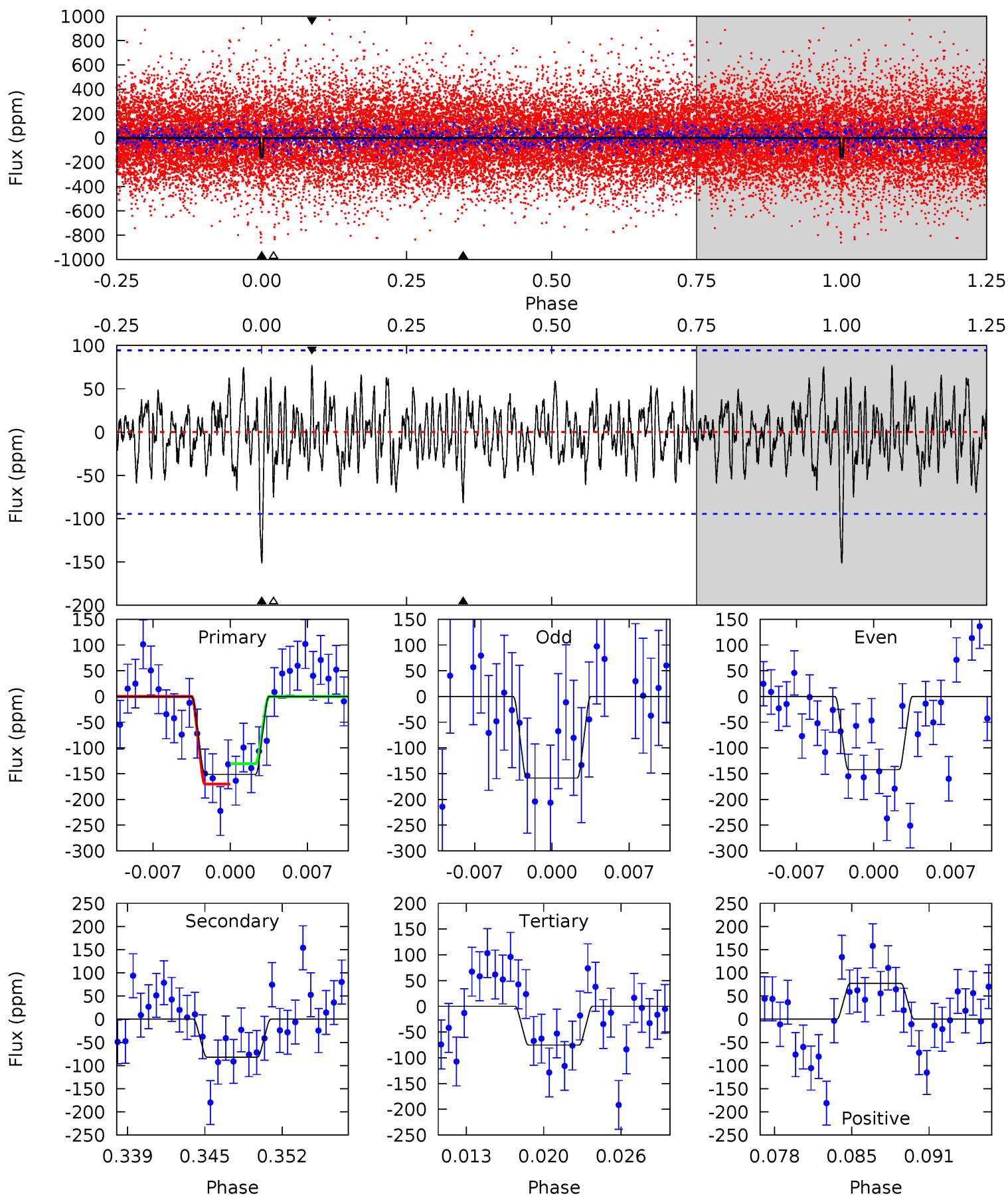
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.94	5.47	4.41	4.24	5.10	2.71	1.59	5.54	5.70	1.06	1.22	3.52	0.87	0.34	0.09



Alt Model-Shift Uniqueness Test

009157001-03, P = 72.173208 Days, E = 74.637754 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.19	4.43	4.07	4.18	5.11	2.72	1.42	4.12	4.01	0.36	0.24	0.45	0.92	0.34	1.07



Stellar Parameters For KIC 009157001

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	7020^{+196}_{-295}	$4.226^{+0.120}_{-0.195}$	$-0.220^{+0.250}_{-0.350}$	$1.477^{+0.470}_{-0.253}$	$1.348^{+0.200}_{-0.220}$	$0.590^{+0.360}_{-0.304}$
	+3%/-4%	+3%/-5%	+114%/-159%	+32%/-17%	+15%/-16%	+61%/-52%
Source	PHO1	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 009157001-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	-83 ± 15	$2.05^{+0.86}_{-0.69}$	866^{+64}_{-53}	5926^{+1362}_{-843}	1513^{+1761}_{-774}
Alt.	-82 ± 18	$2.17^{+0.79}_{-0.76}$	864^{+70}_{-51}	5760^{+1347}_{-765}	1315^{+1879}_{-656}

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 $A_{obs} \gg 1.0$

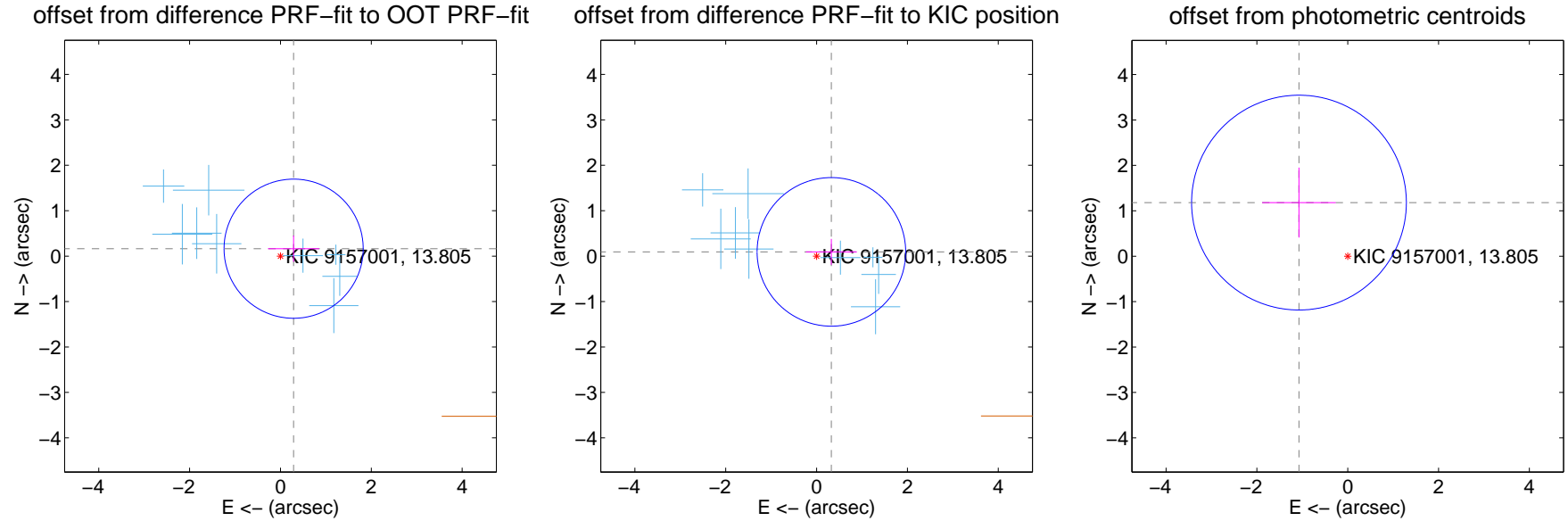
DV Centroid Data

Supplemental centroid analysis for 009157001-03. Kepler magnitude: 13.80. Transit SNR 7.80

There are 9 quarters with good PRF difference image offsets

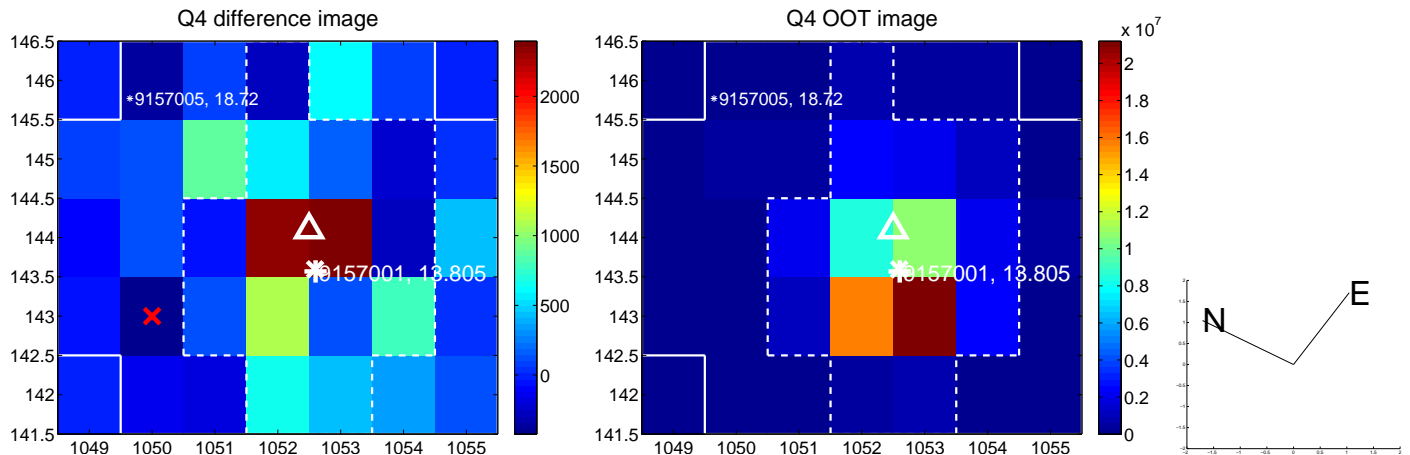
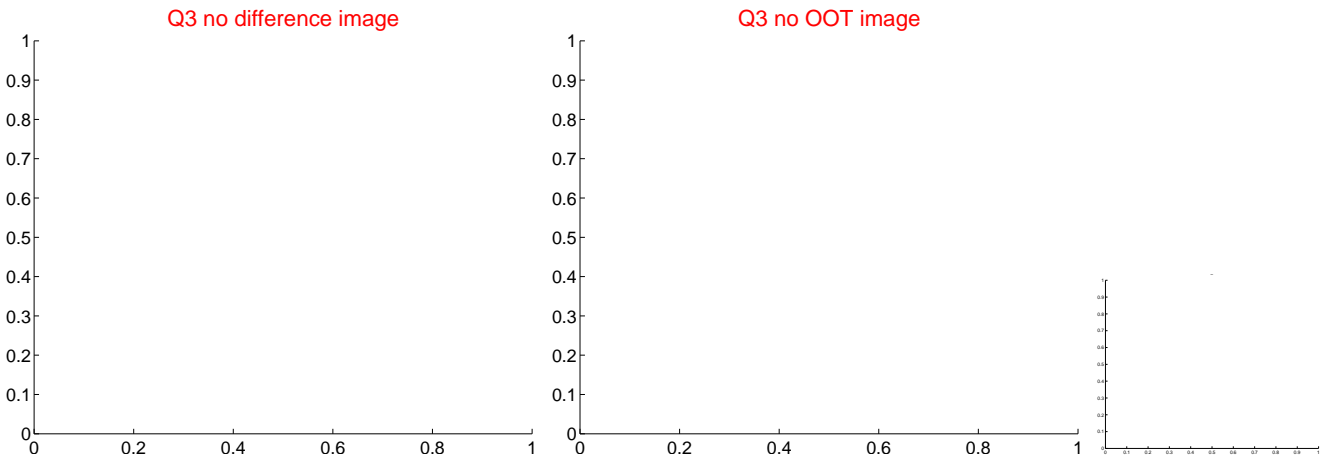
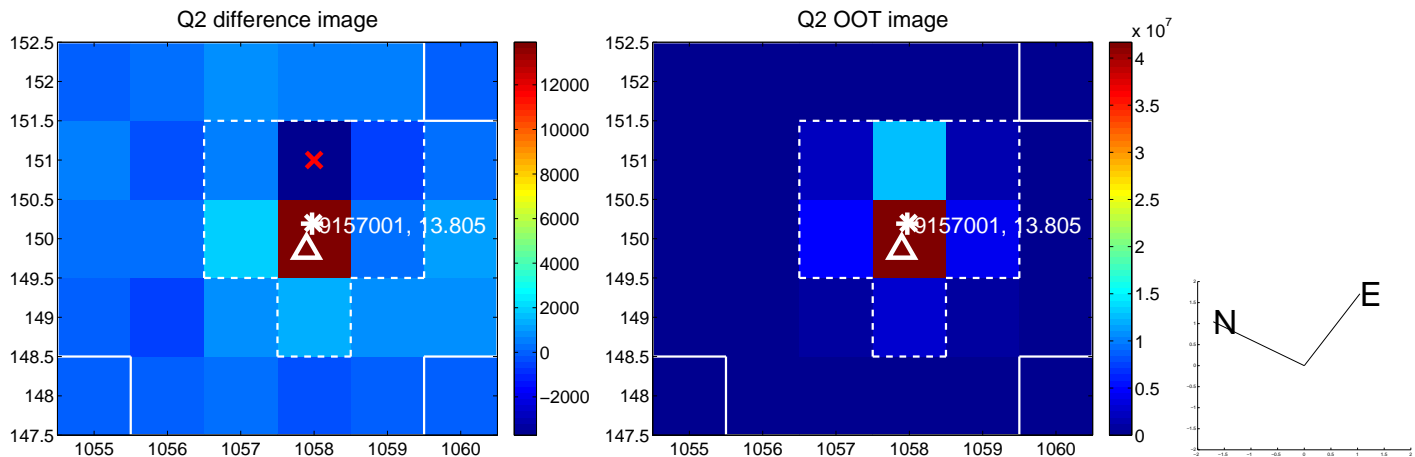
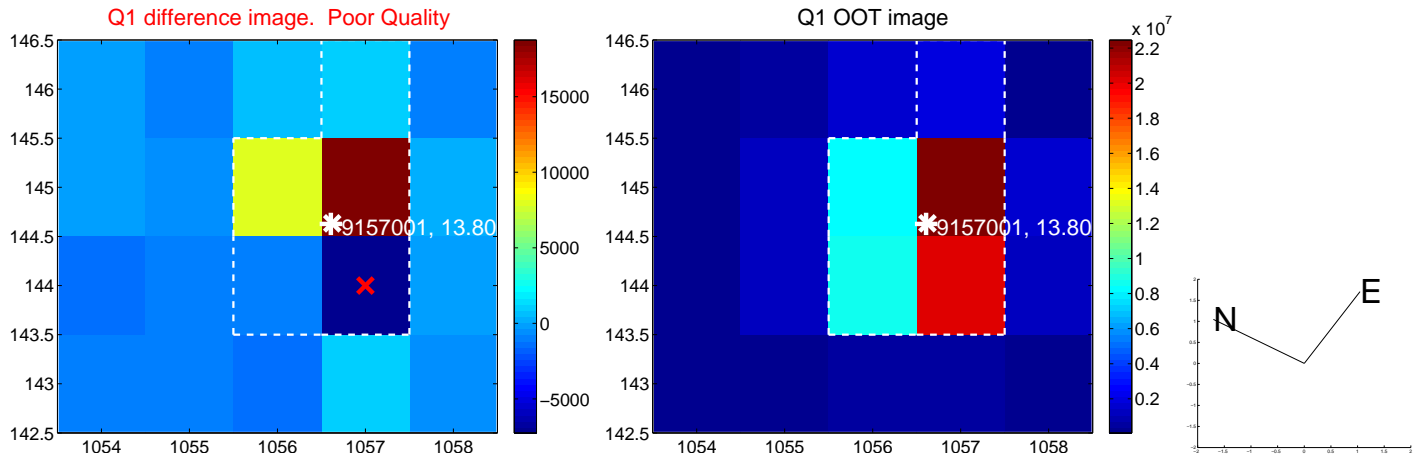
The direct PRF centroid is offset from the target star catalog position by about 0.12 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.333 ± 0.511	0.65	-0.290 ± 0.563	0.164 ± 0.289
PRF-fit source offset from KIC position	0.339 ± 0.545	0.62	-0.326 ± 0.561	0.094 ± 0.285
photometric centroid source offset	1.60 ± 0.79	2.02	1.07 ± 0.81	1.18 ± 0.77

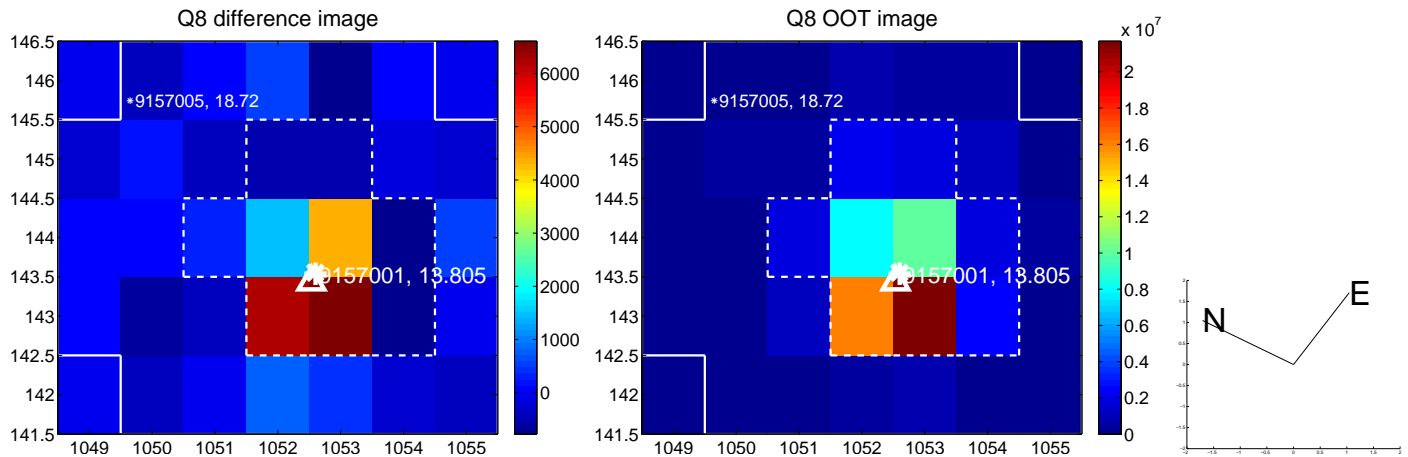
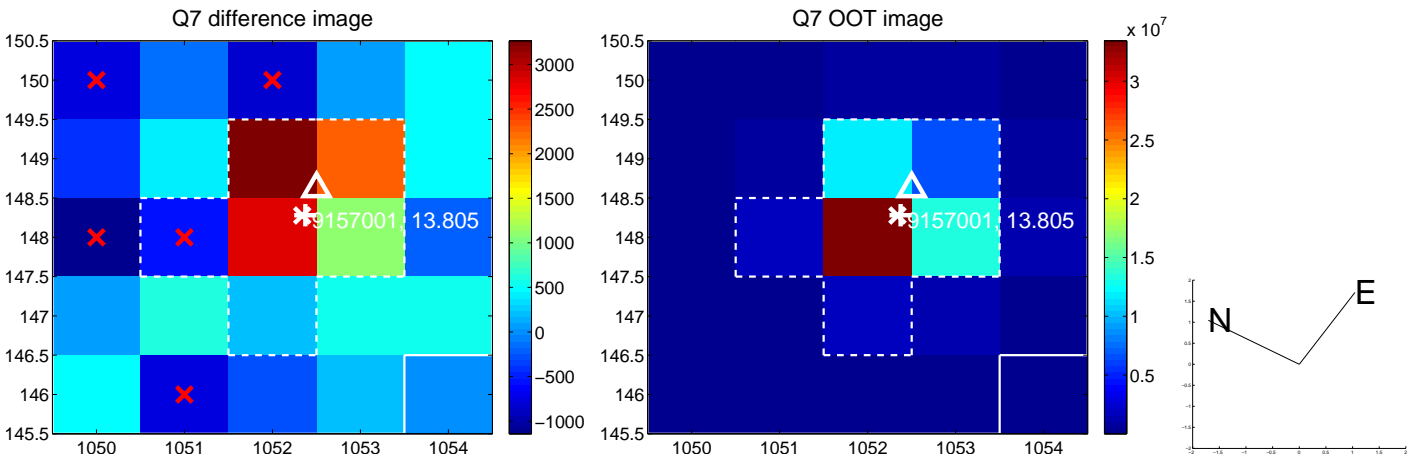
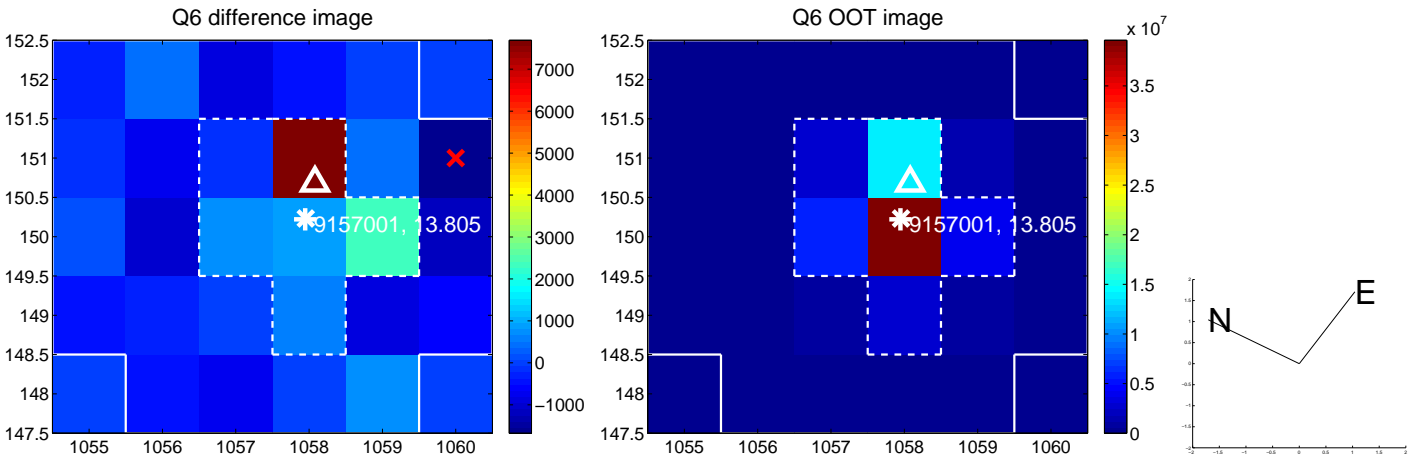
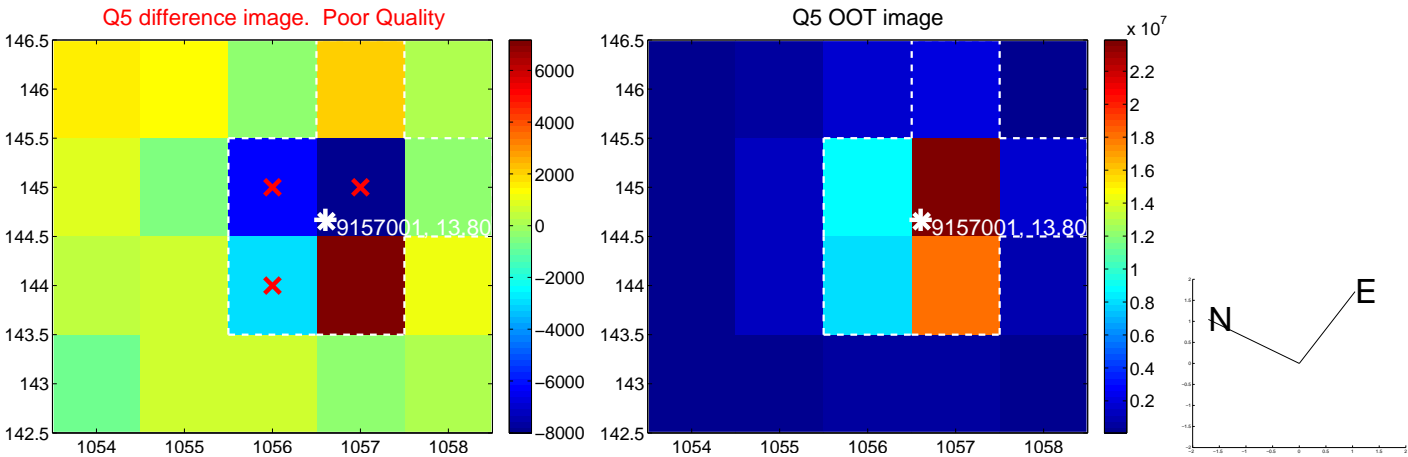


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ . Red *: target star. Blue *: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

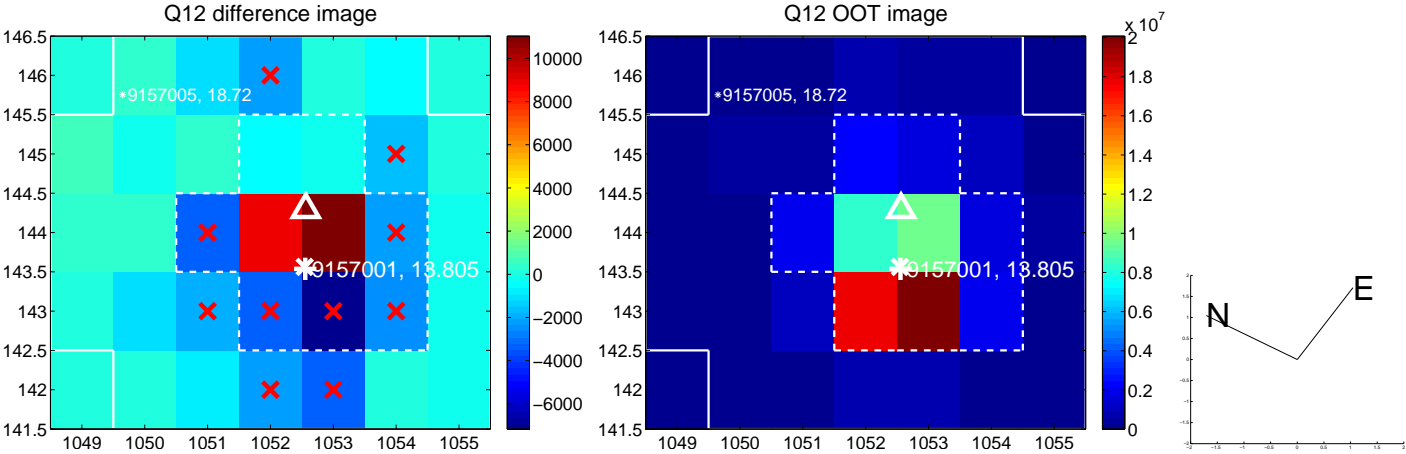
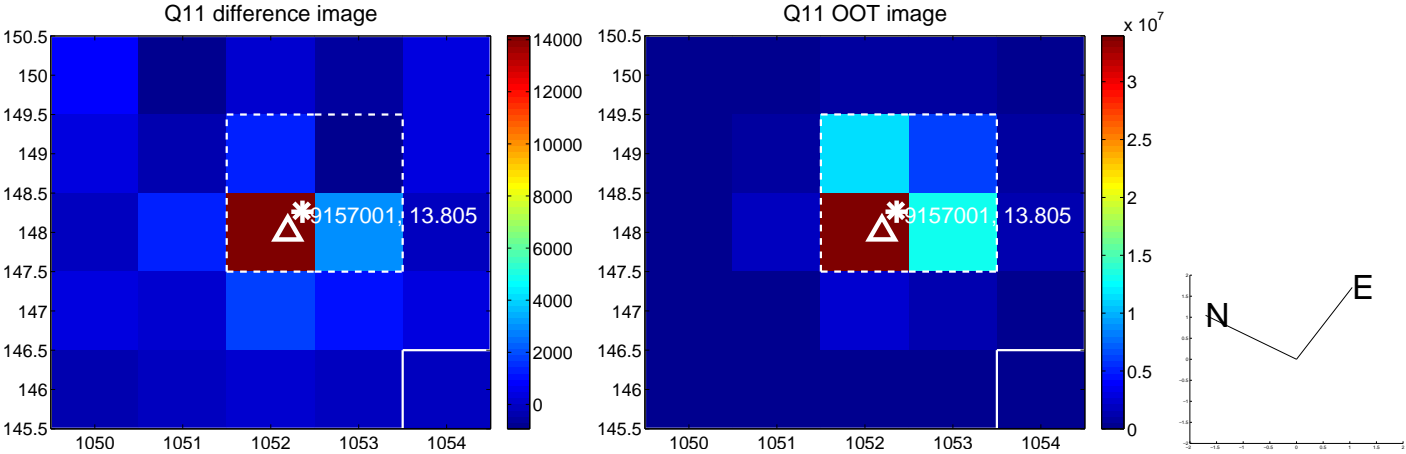
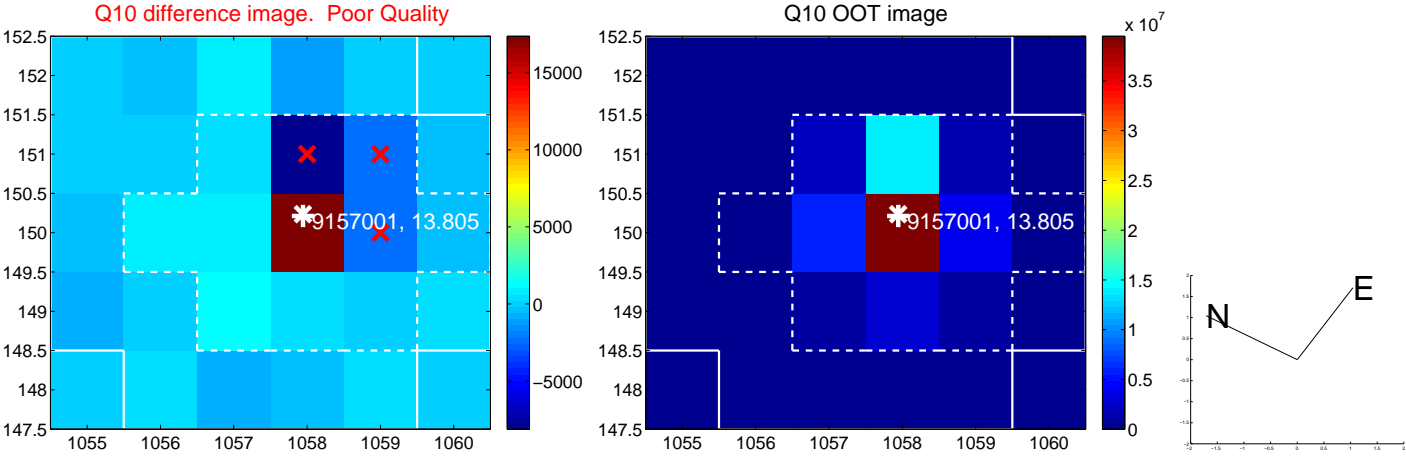
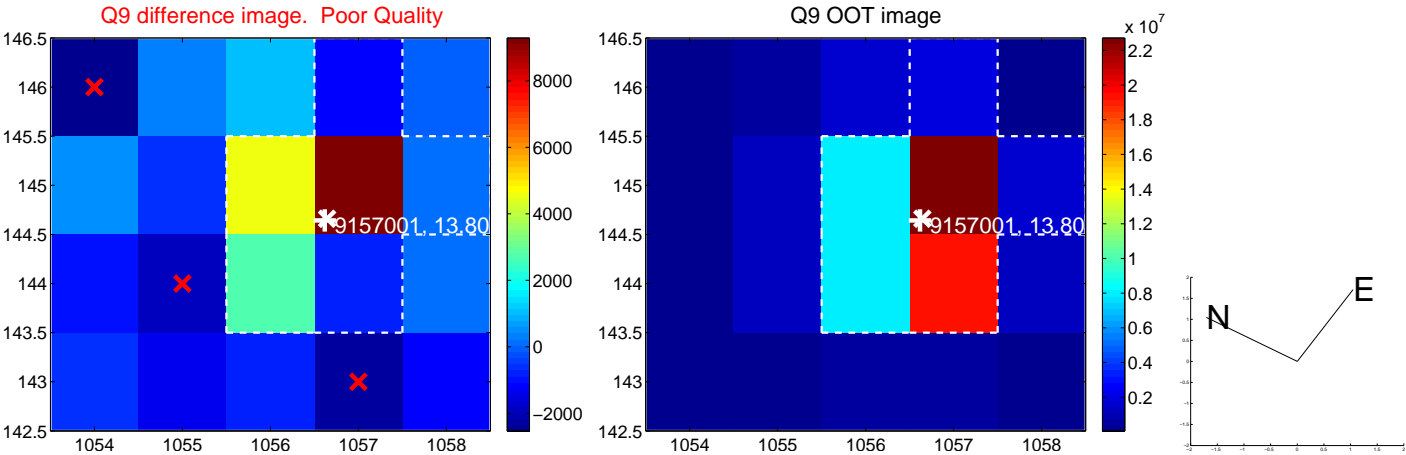
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



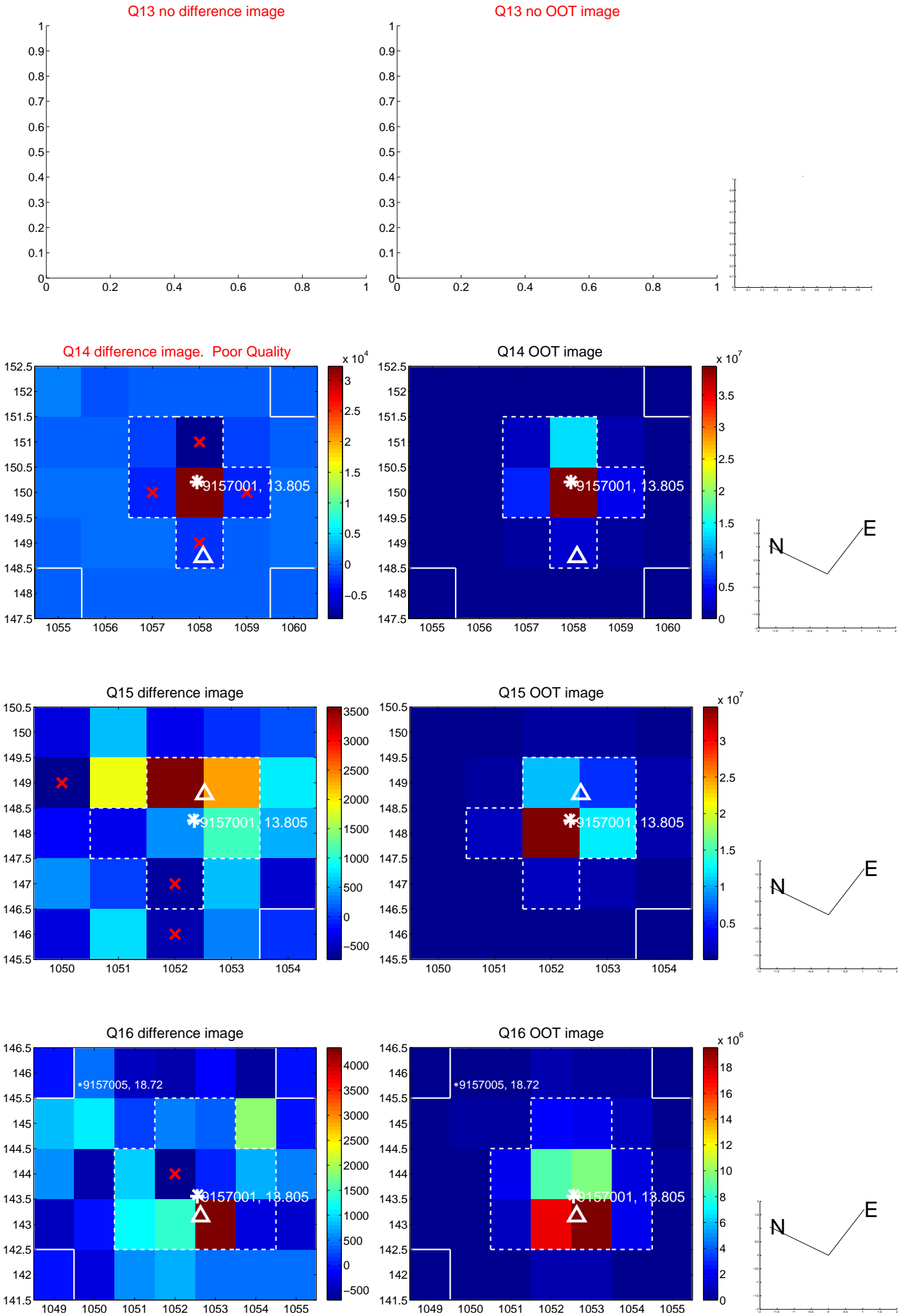
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



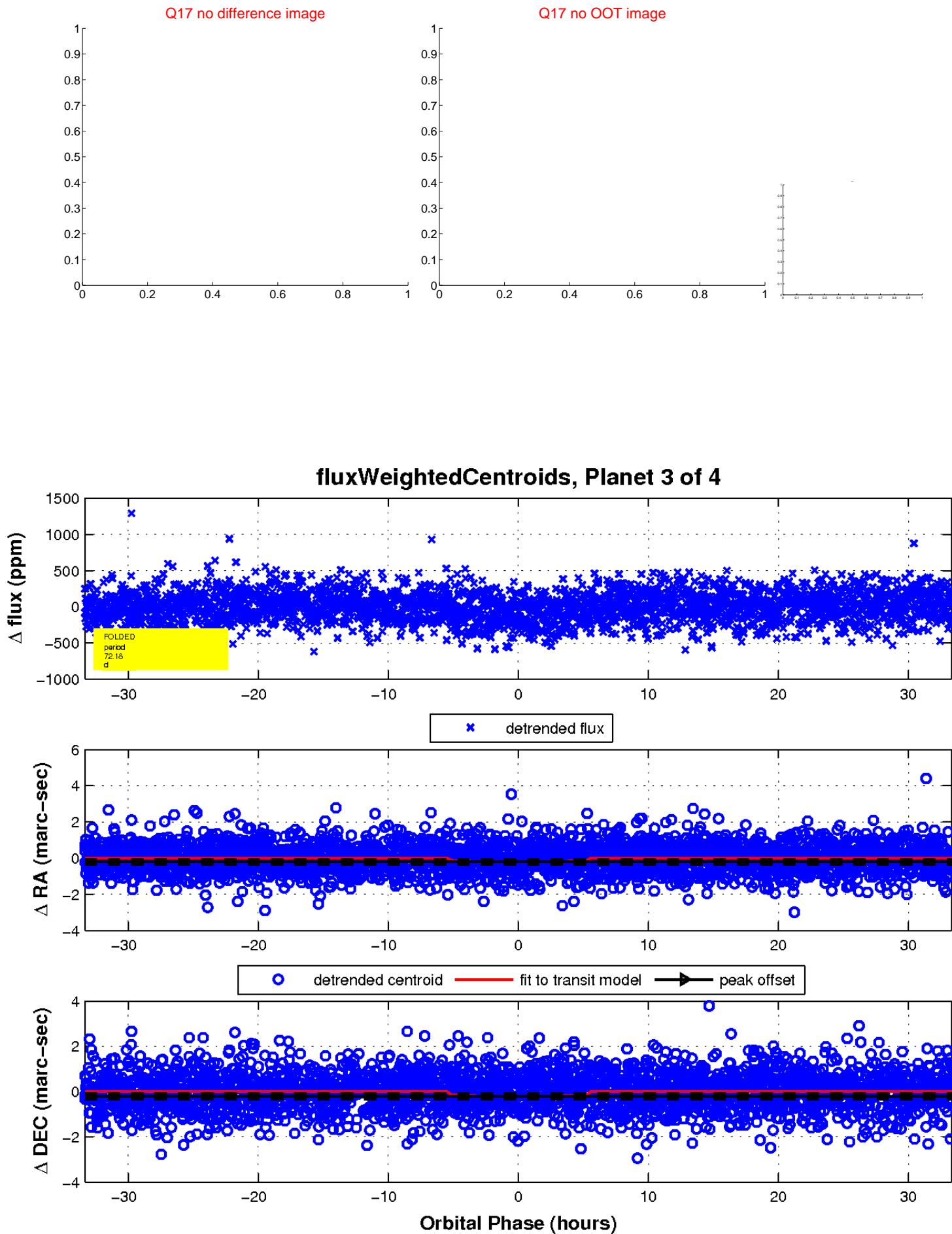
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

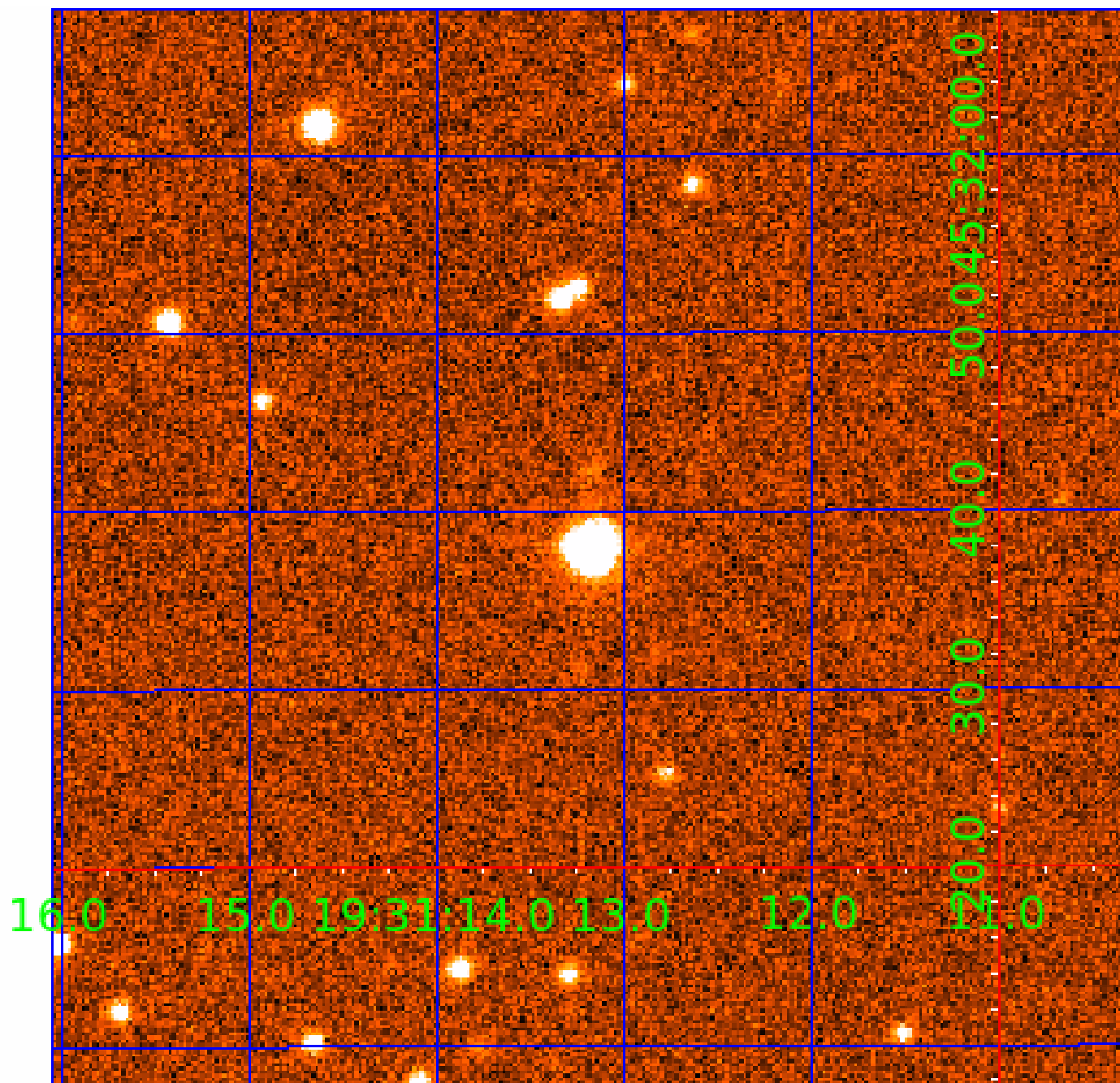


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 009157001

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})
009157001-01	OBS	No	1.666756	132.200853	11.5	8.449	8.7	4.4	1.48	7020	0.51	5160.21
009157001-02	OBS	No	117.123712	177.411444	385.2	4.626	9.5	7.5	1.48	7020	3.59	17.80
009157001-03	OBS	No	72.178166	146.785194	166.9	11.117	8.1	7.8	1.48	7020	2.06	33.93
009157001-04	OBS	No	221.711158	152.864165	180.7	6.511	7.7	7.1	1.48	7020	2.20	7.60

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009157001-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—LPP_ALT
009157001-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
009157001-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_ALT
009157001-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

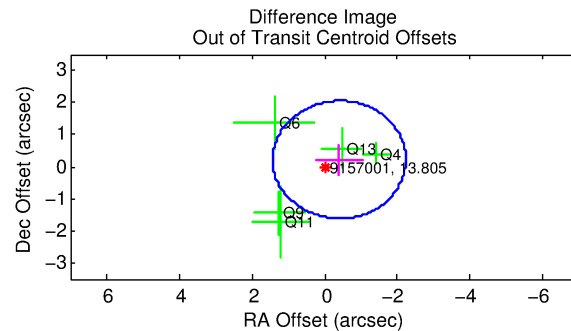
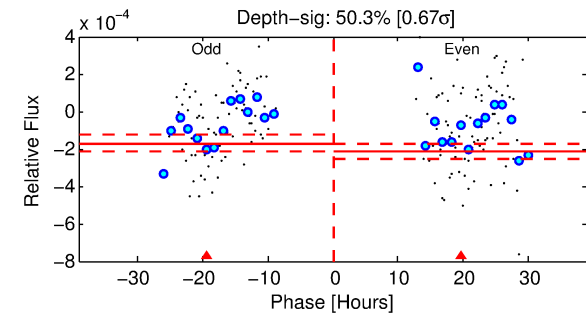
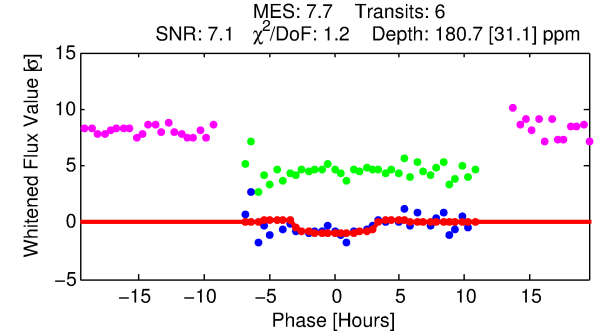
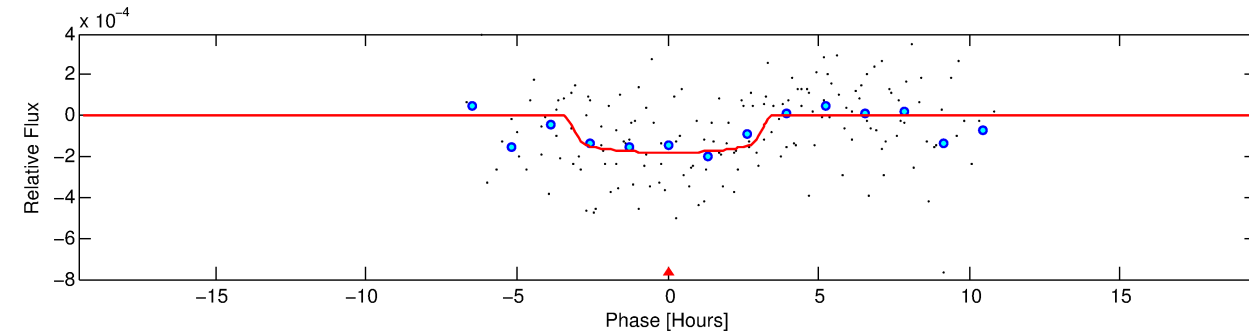
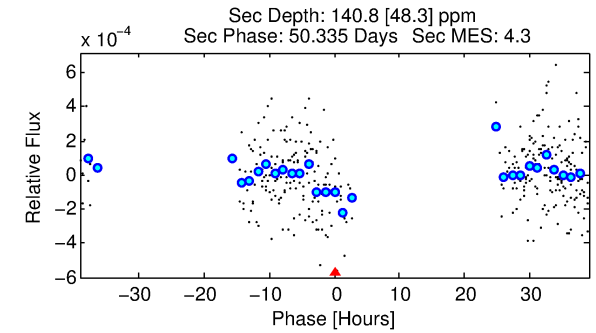
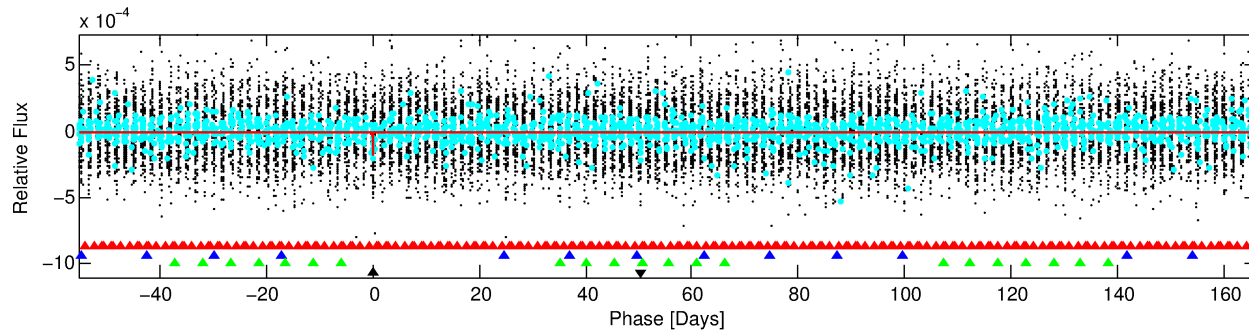
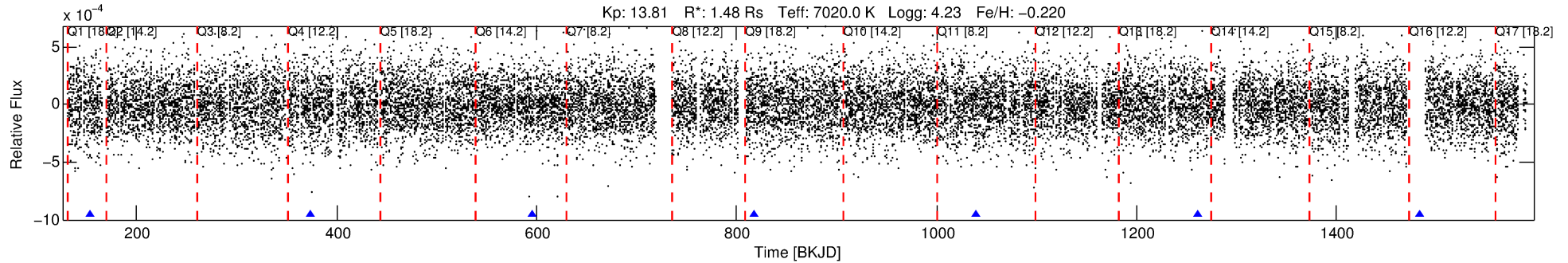
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009157001-04

No Significant Match Found

DV One-Page Summary

KIC: 9157001 Candidate: 4 of 4 Period: 221.711 d



DV Fit Results:

Period = 221.71116 [0.00528] d
Epoch = 152.8642 [0.0163] BKJD
Rp/R* = 0.0136 [0.0116]
a/R* = 157.96 [815.92]
b = 0.81 [2.18]
Seff = 7.60 [3.07]
Teq = 423 [43] K
Rp = 2.20 [2.00] Re
a = 0.7903 [0.2052] AU
Ag = 10007.15 [17770.70] [0.56σ]
Teffp = 6547 [2857] K [2.14σ]

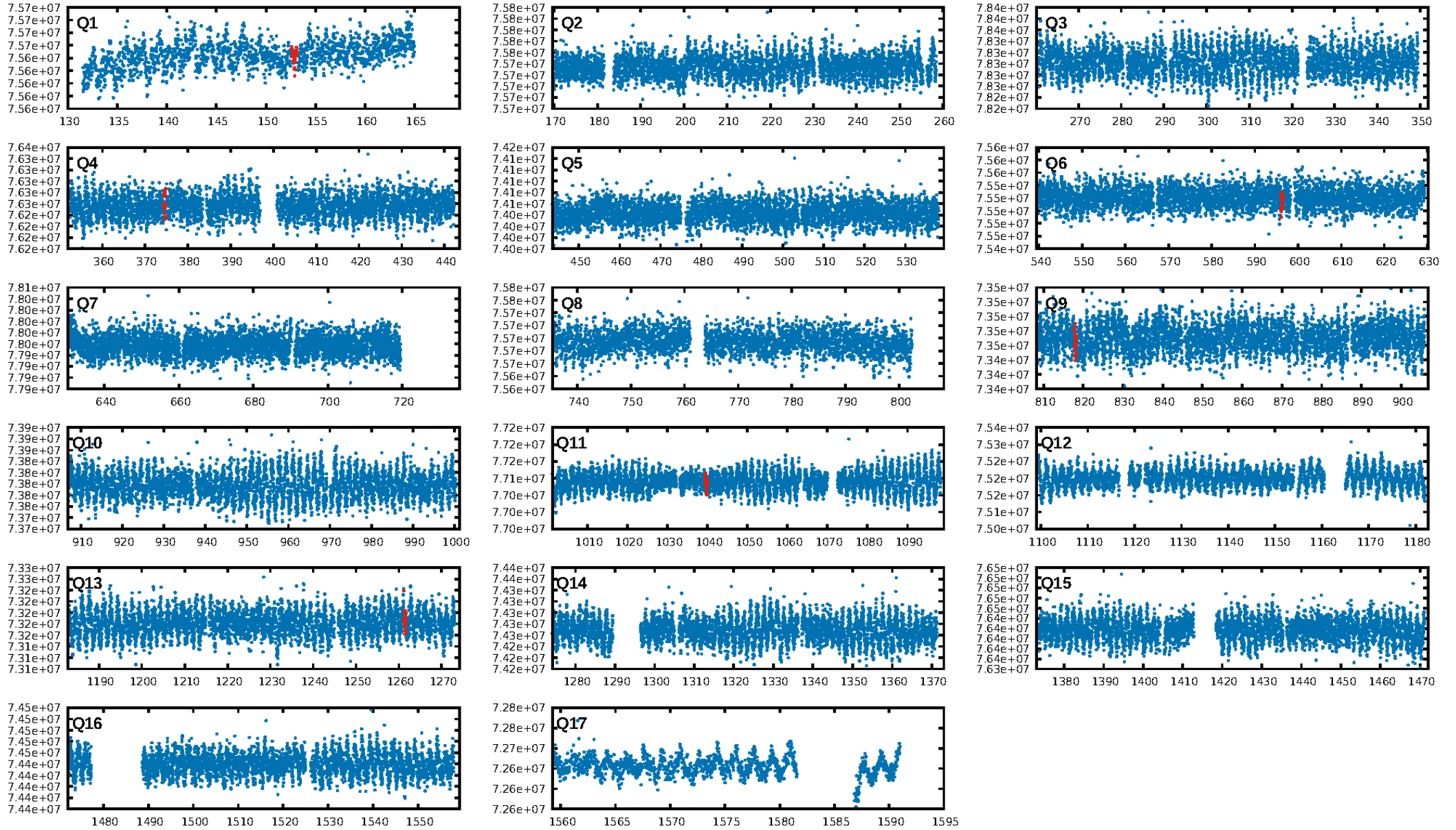
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [314.28σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 9.7%
ModelChiSquareGof-sig: 64.1%
Bootstrap-pfa: 1.57e-09
RollingBand-fgt: 1.00 [5/5]
GhostDiagnostic-chr: -3.947
Centroid-sig: 24.7%
Centroid-so: 1.315 arcsec [0.84σ]
OotOffset-rm: 0.455 arcsec [0.74σ]
KicOffset-rm: 0.499 arcsec [0.80σ]
OotOffset-st: 1/1/1/2 [5]
KicOffset-st: 1/1/1/2 [5]
DiffImageQuality-fgm: 0.60 [3/5]
DiffImageOverlap-fno: 0.67 [4/6]

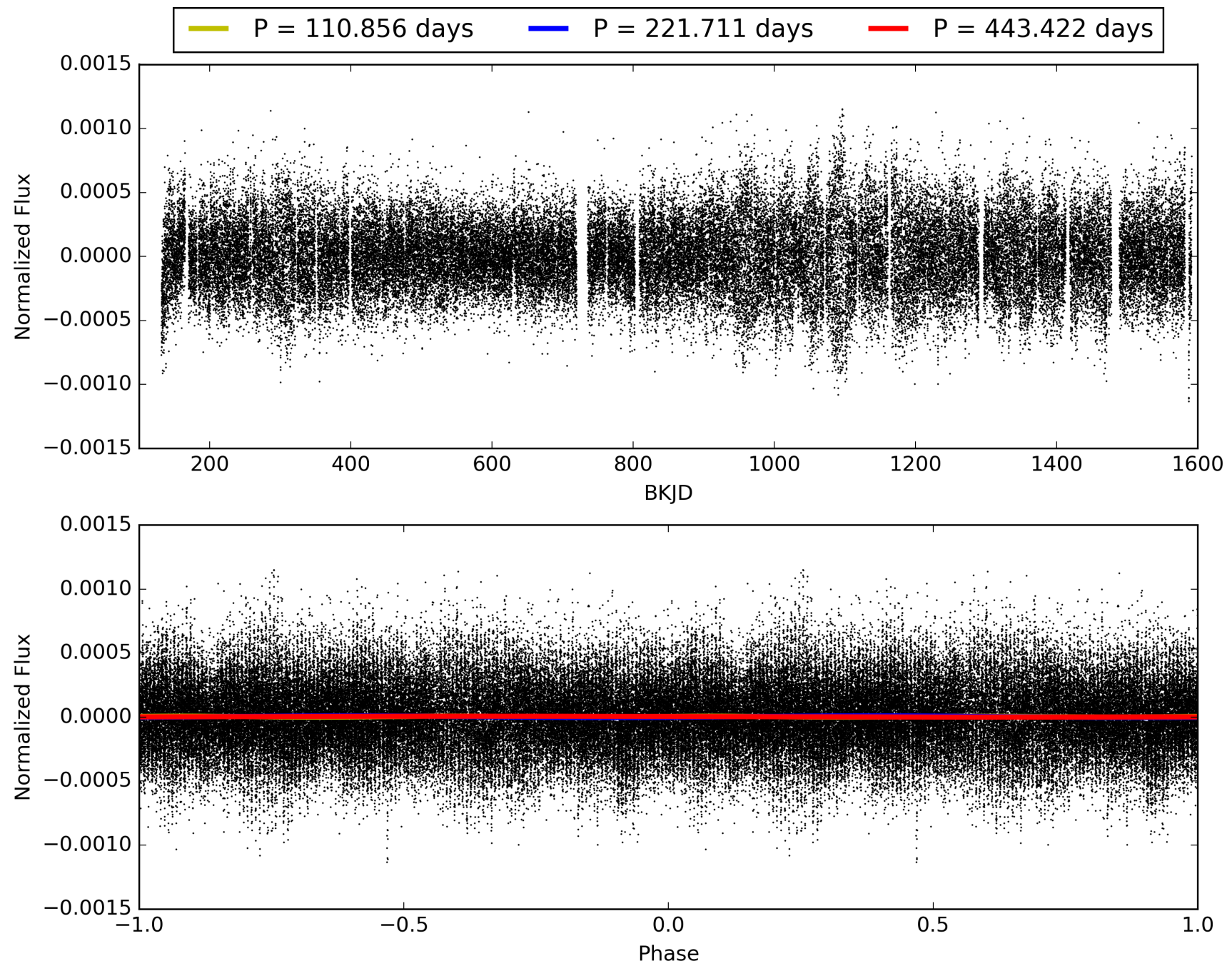
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 03:46:40 Z

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

TCE 009157001-04, PDC Light Curves

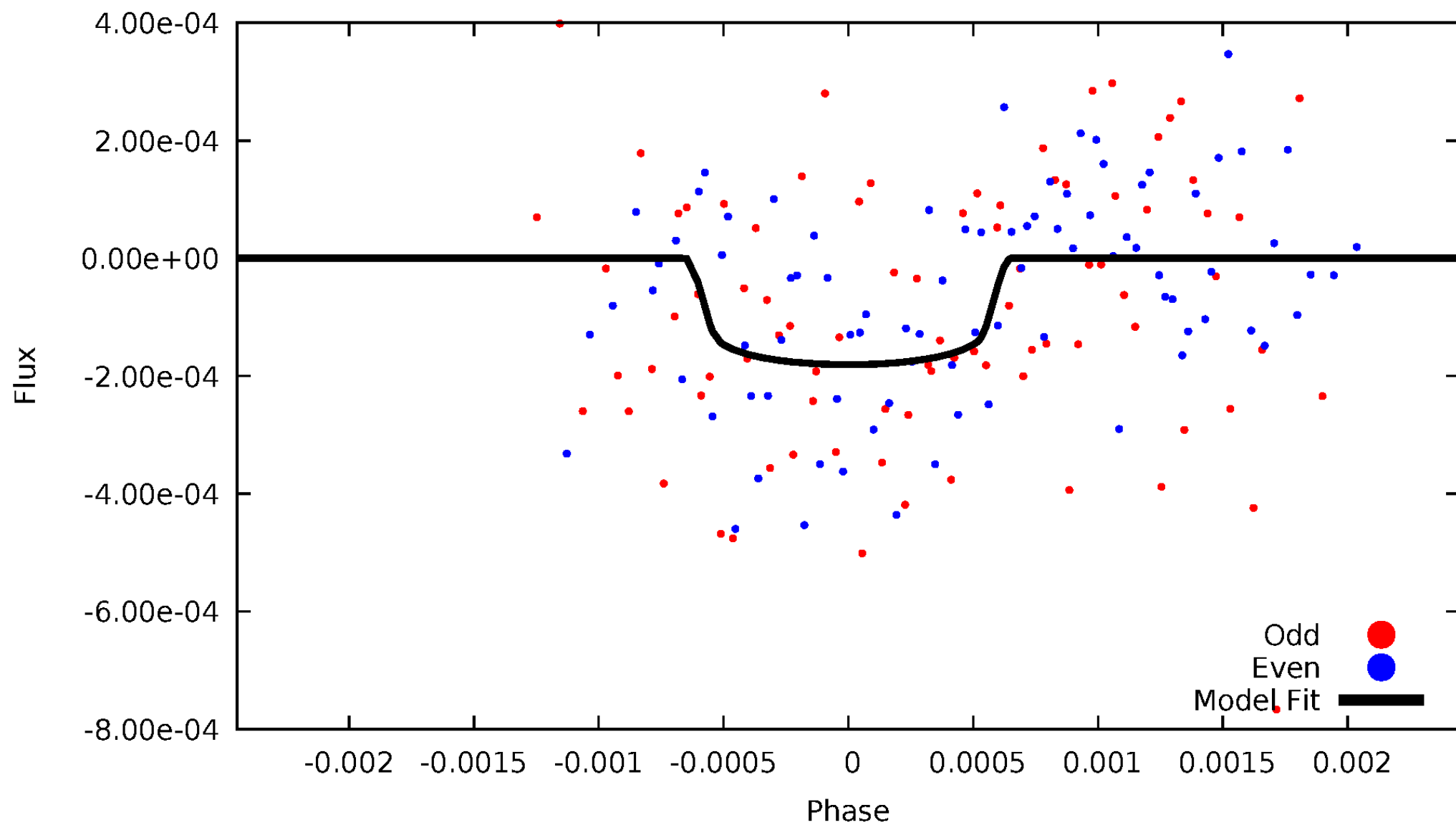


TCE 009157001-04



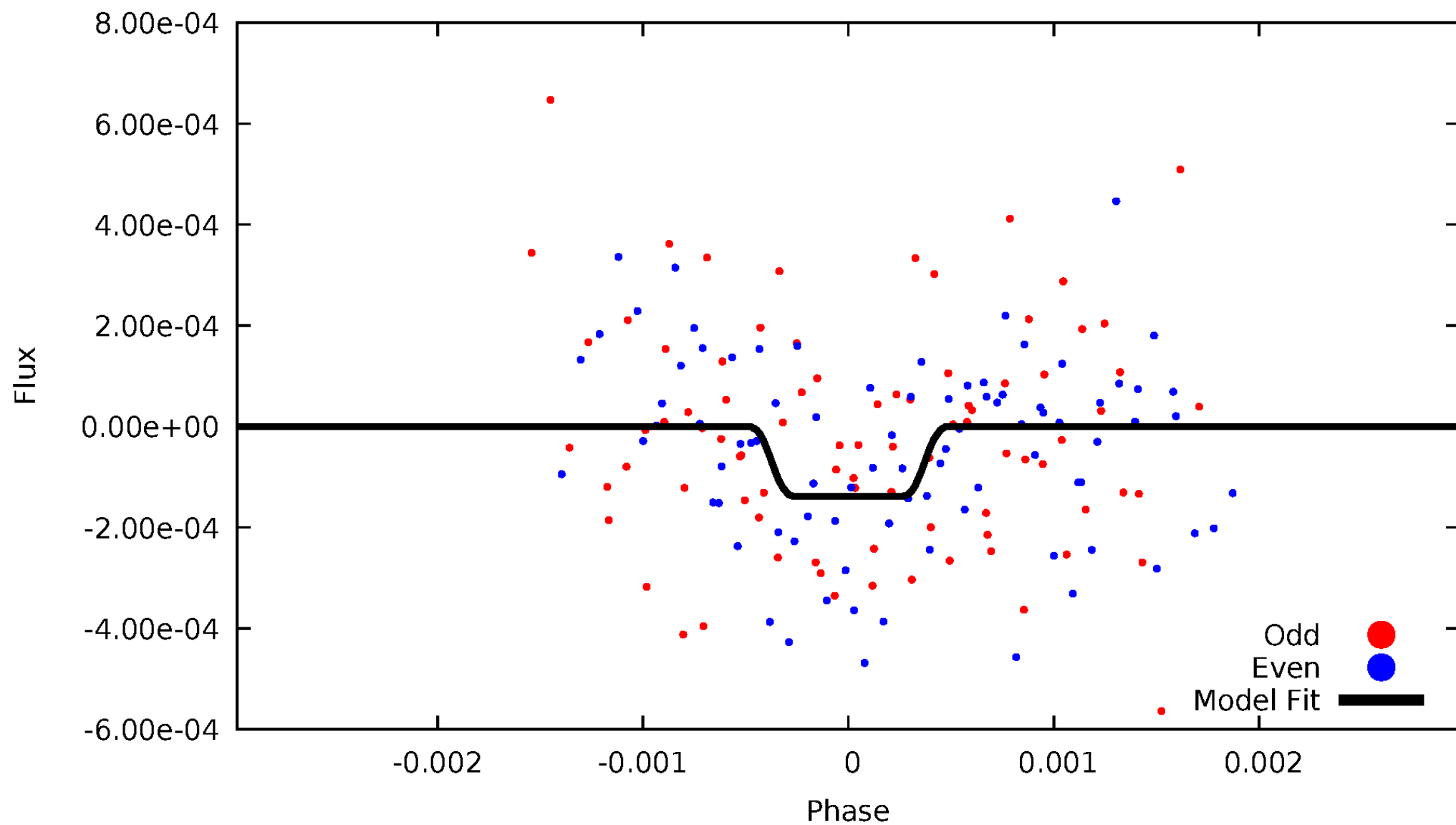
DV Odd/Even

TCE 009157001-04



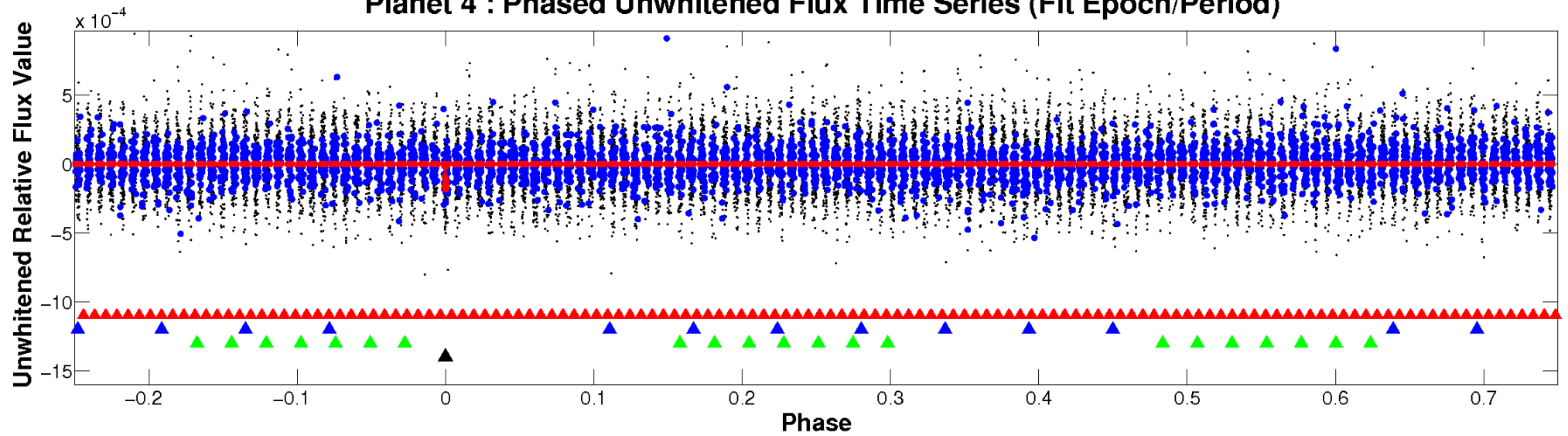
ALT Odd/Even

TCE 009157001-04

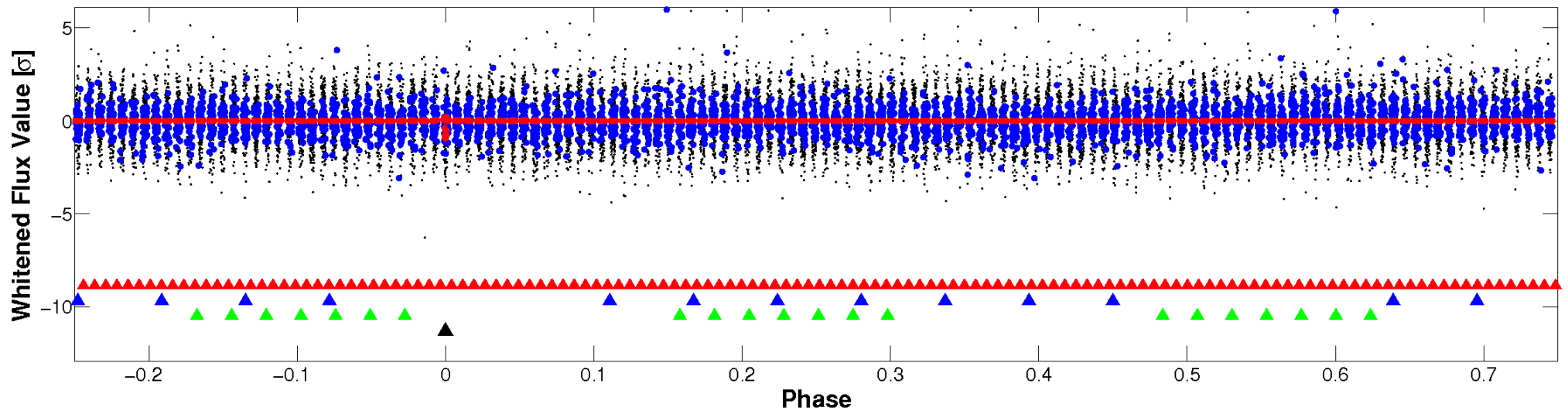


Non-Whitened Vs. Whitened Light Curve

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

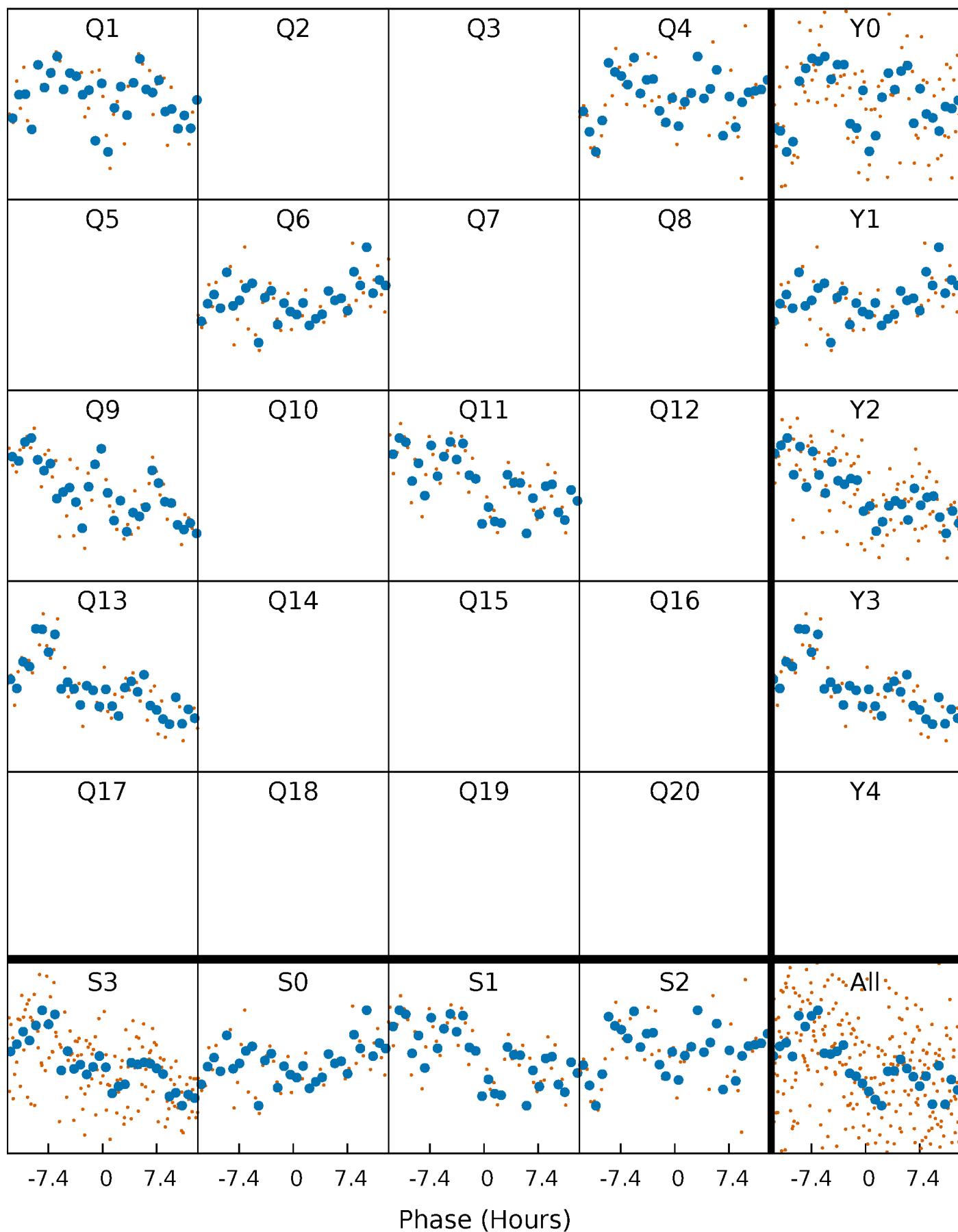


Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



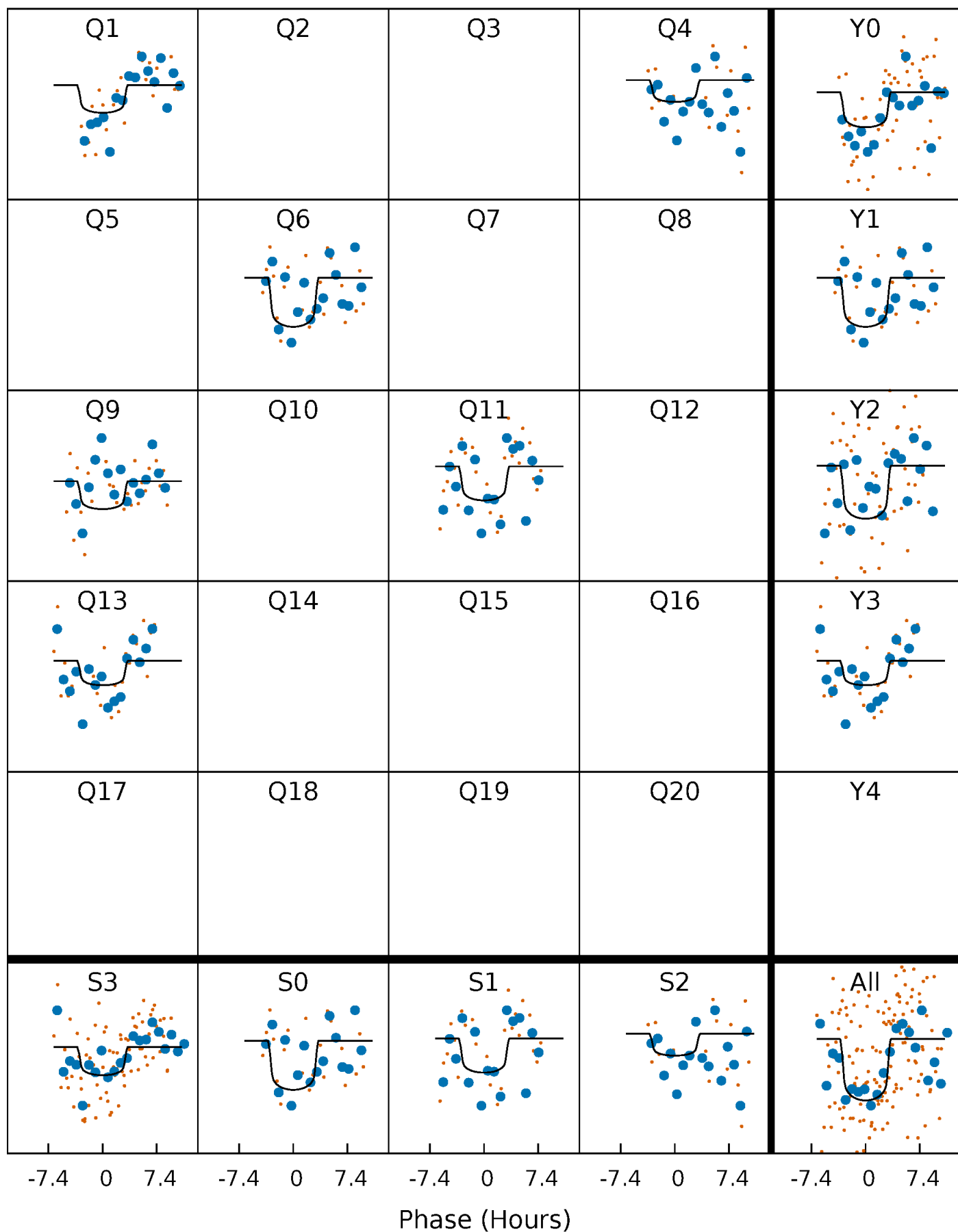
PDC Quarter-Phased Transit Curves

TCE 009157001-04 $P=221.711158$ Days $T_0=152.864165$ (BKJD)



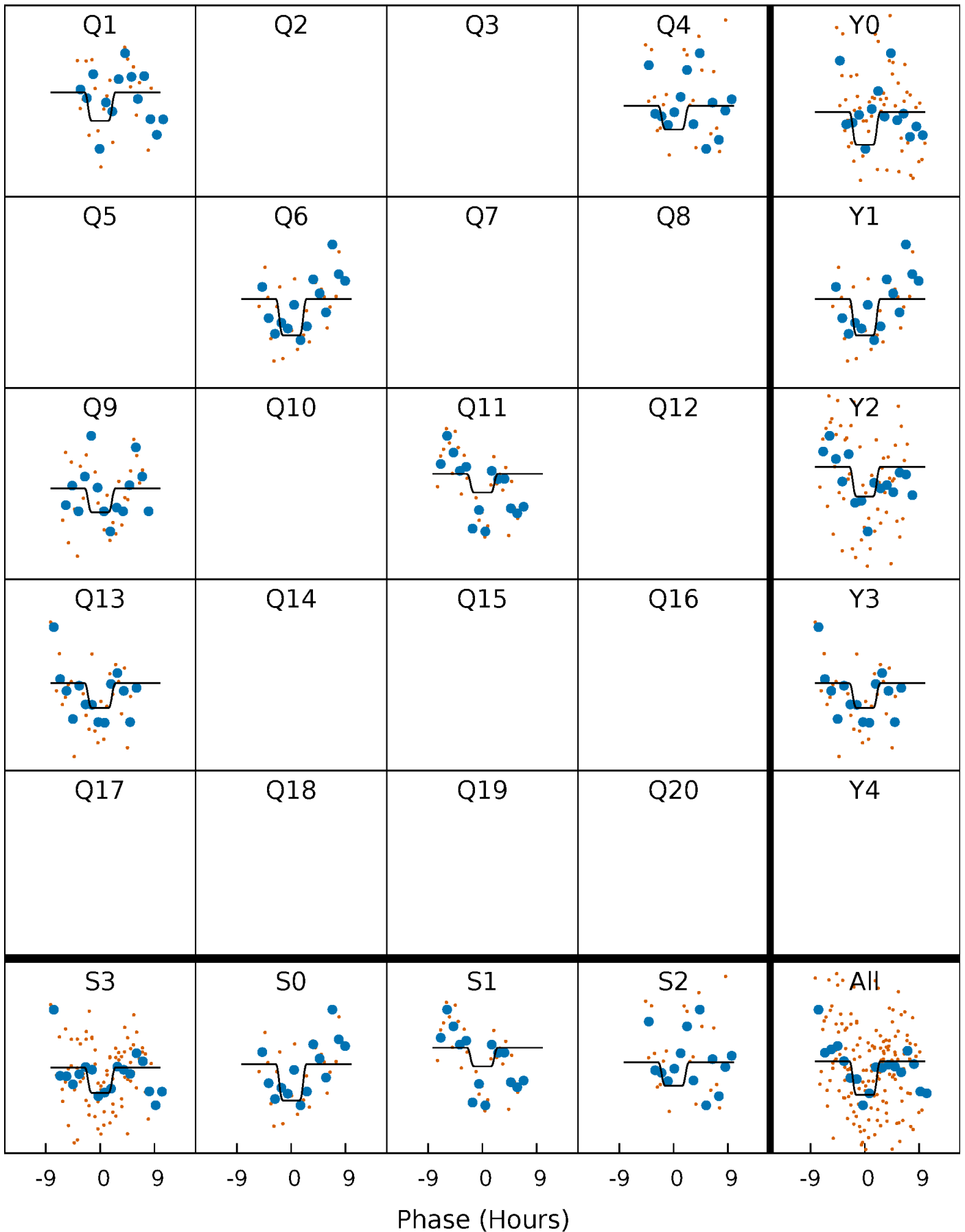
DV Quarter-Phased Transit Curves

TCE 009157001-04 P=221.711158 Days $T_0=152.864165$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

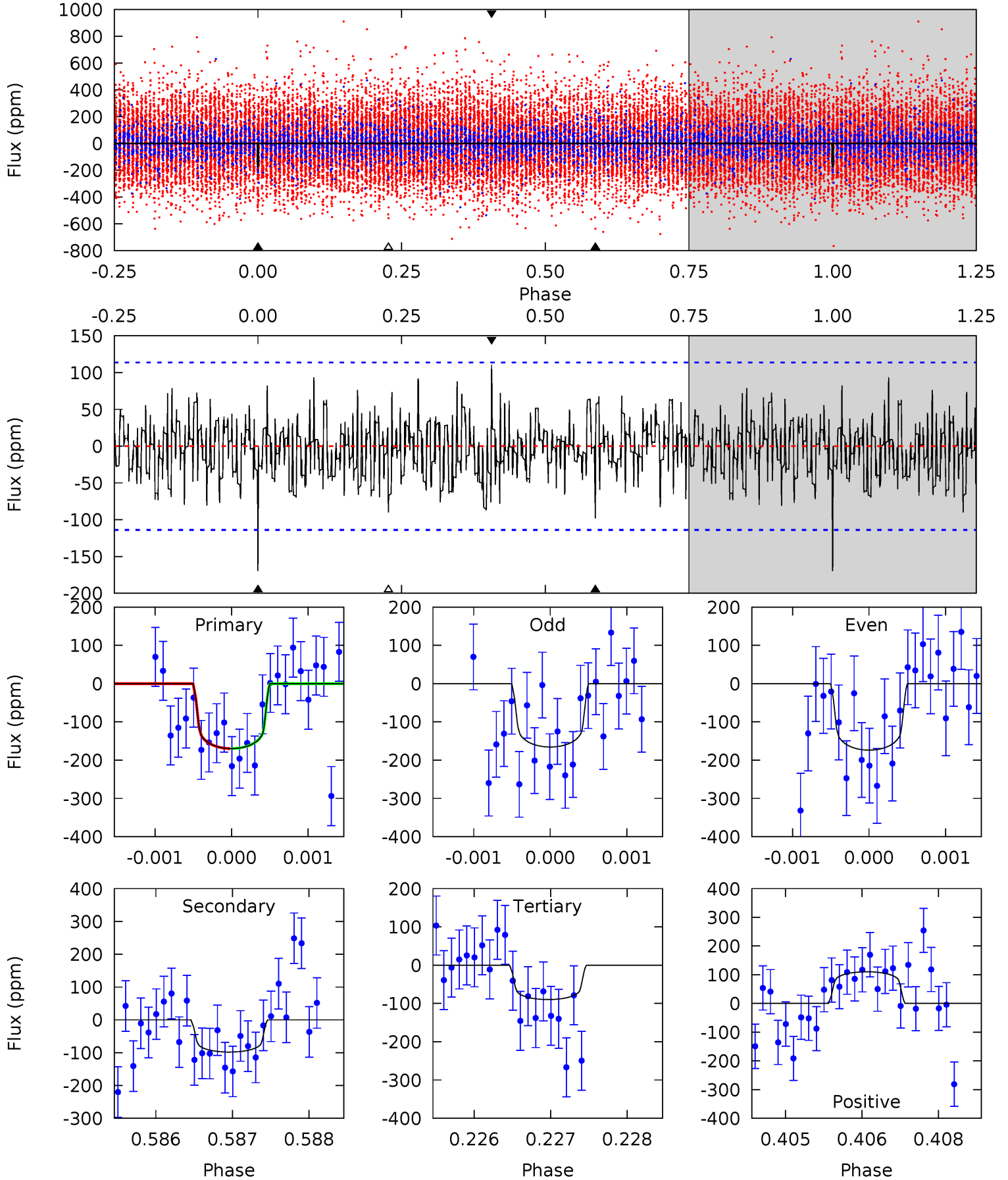
TCE 009157001-04 P=221.716861 Days $T_0=152.900796$ (BKJD)



DV Model-Shift Uniqueness Test

009157001-04, P = 221.711158 Days, E = 152.864165 Days

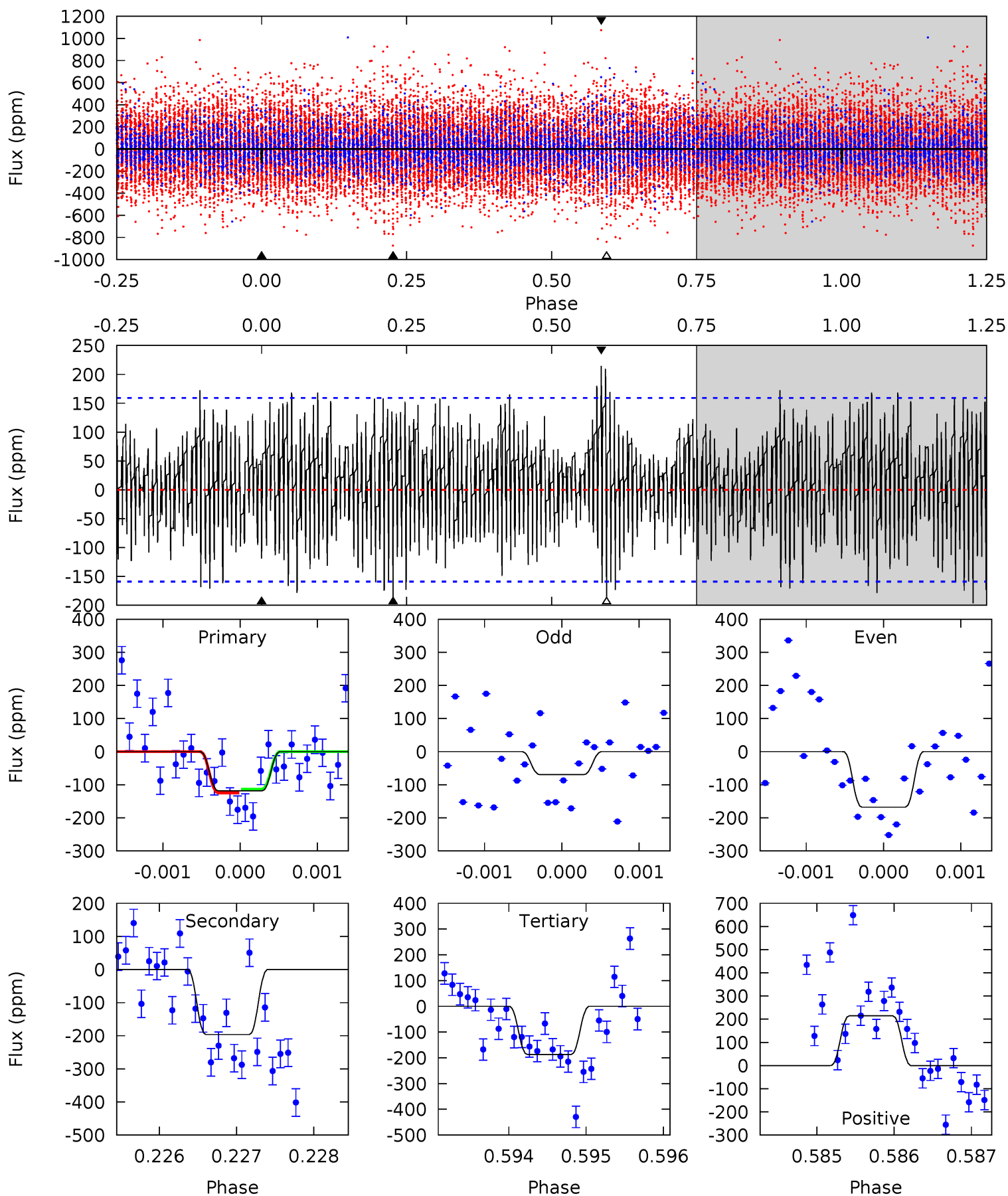
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.06	4.66	4.26	5.24	5.41	3.22	1.48	3.80	2.82	0.40	-0.58	0.19	0.86	0.39	0.01



Alt Model-Shift Uniqueness Test

009157001-04, P = 221.716861 Days, E = 152.900796 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
4.08	6.74	6.44	7.36	5.46	3.31	2.31	-2.36	-3.28	0.31	-0.61	1.69	1.19	0.52	0.19



Stellar Parameters For KIC 009157001

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	7020^{+196}_{-295}	$4.226^{+0.120}_{-0.195}$	$-0.220^{+0.250}_{-0.350}$	$1.477^{+0.470}_{-0.253}$	$1.348^{+0.200}_{-0.220}$	$0.590^{+0.360}_{-0.304}$
	+3%/-4%	+3%/-5%	+114%/-159%	+32%/-17%	+15%/-16%	+61%/-52%
Source	PHO1	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 009157001-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	-98 ± 21	$2.40^{+1.81}_{-1.45}$	594^{+49}_{-39}	5751^{+3777}_{-1249}	5759^{+27618}_{-3972}
Alt.	-196 ± 29	$2.17^{+1.89}_{-1.40}$	594^{+48}_{-37}	7132^{+7471}_{-1863}	13884^{+94017}_{-10034}

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 $A_{obs} \gg 1.0$

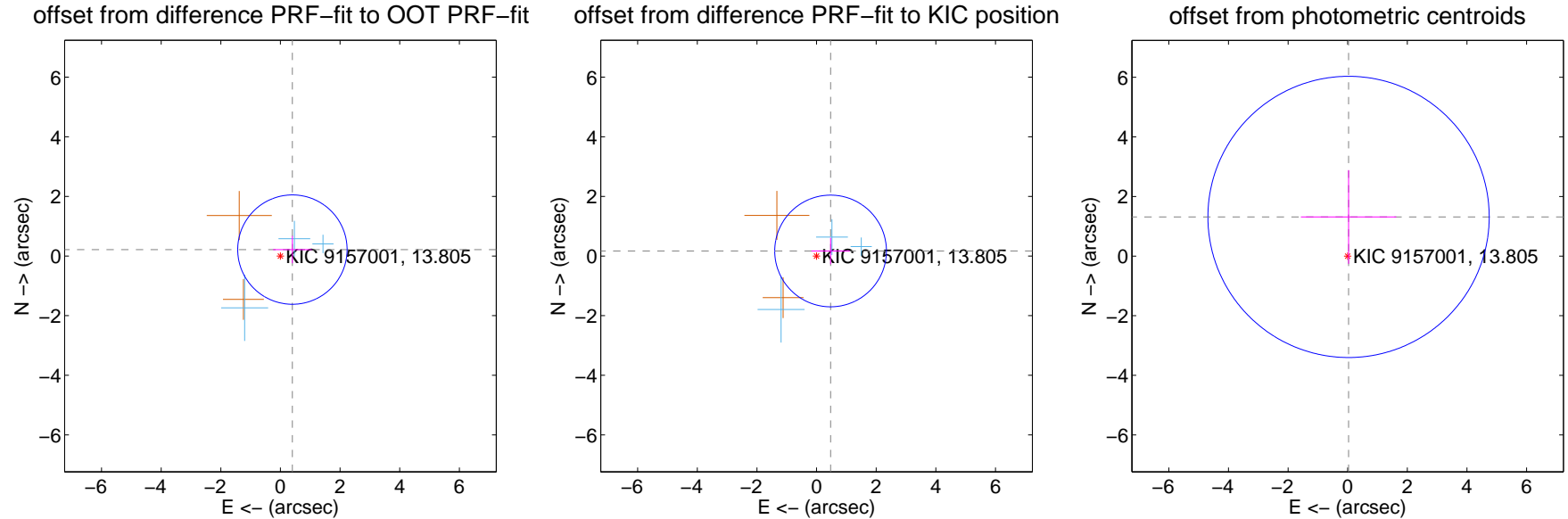
DV Centroid Data

Supplemental centroid analysis for 009157001-04. Kepler magnitude: 13.80. Transit SNR 7.12

There are 3 quarters with good PRF difference image offsets

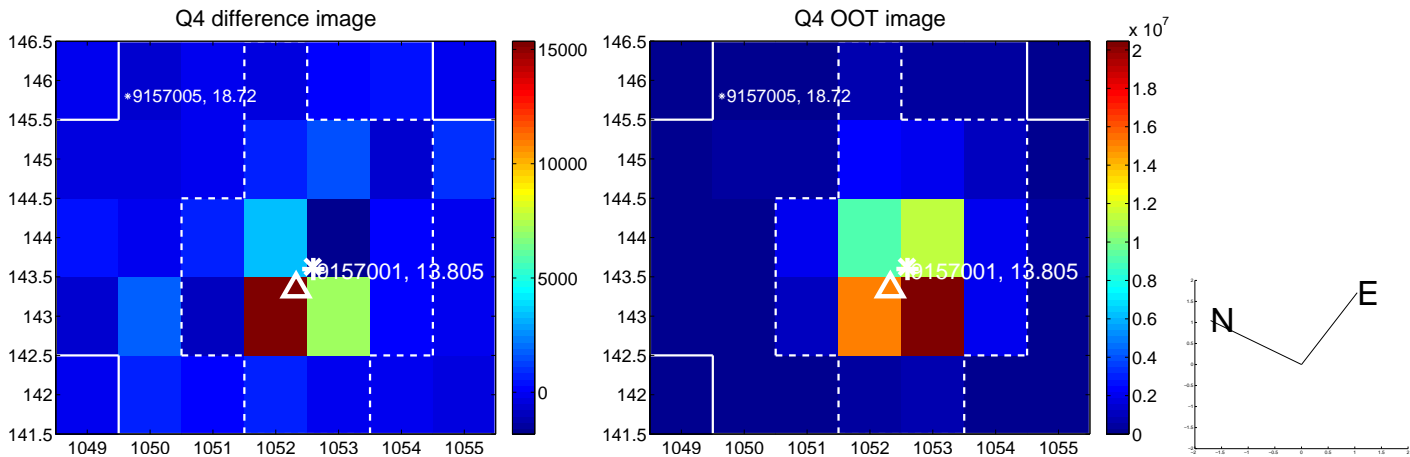
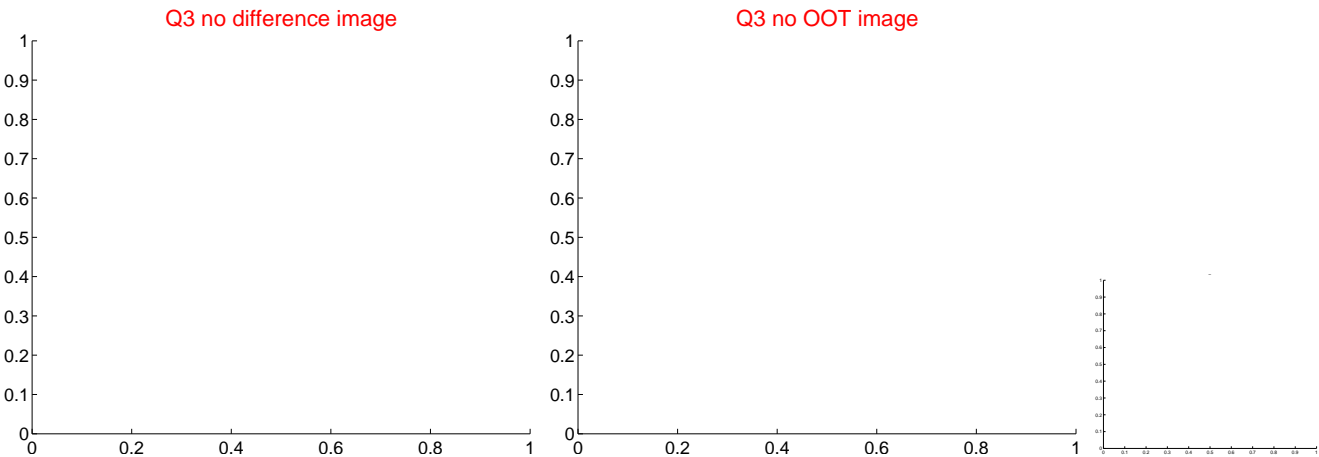
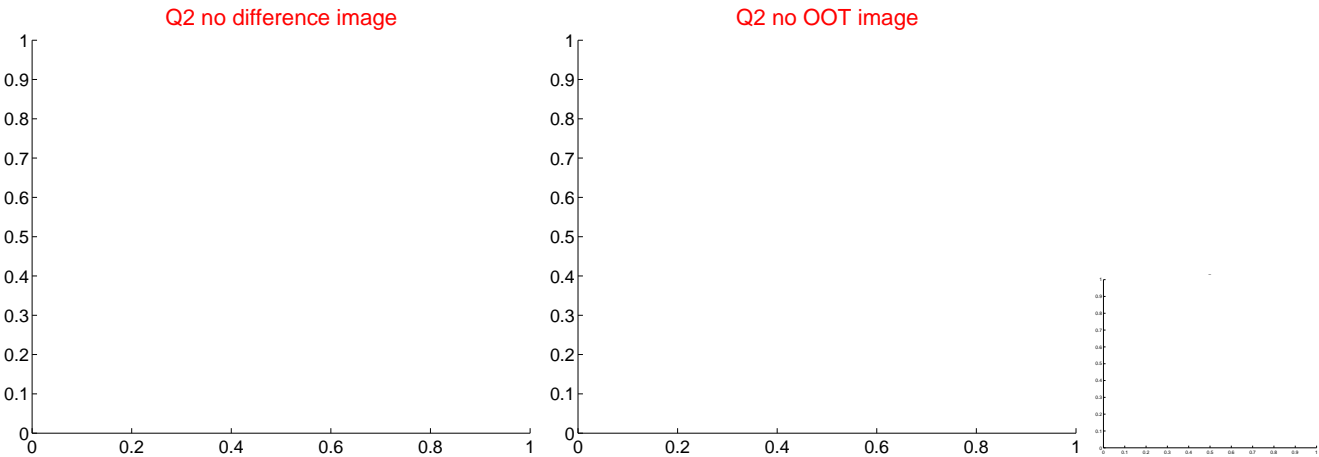
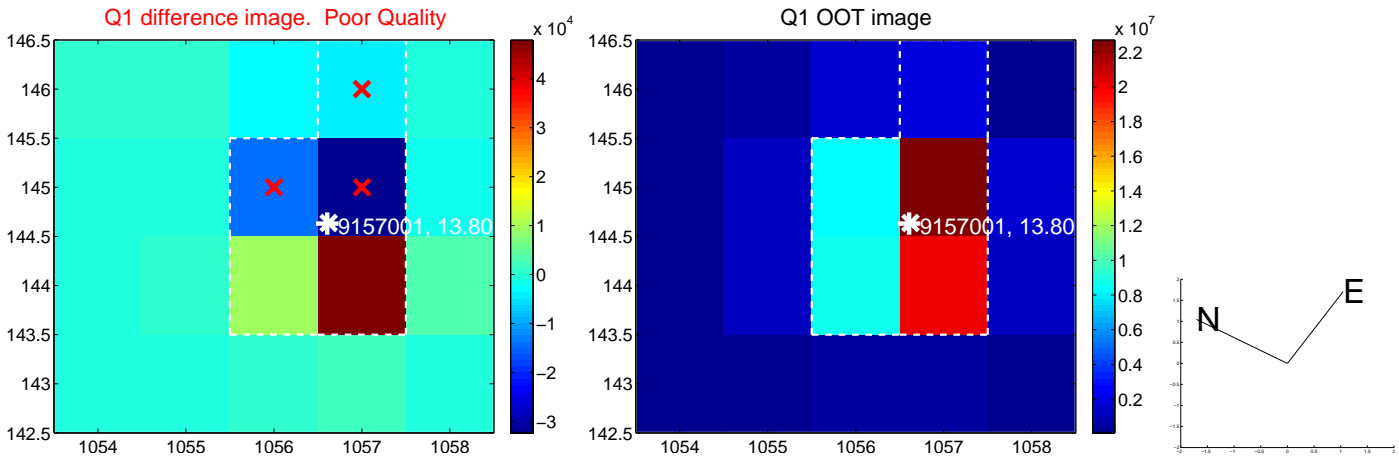
The direct PRF centroid is offset from the target star catalog position by about 0.07 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.455 ± 0.611	0.74	-0.401 ± 0.649	0.216 ± 0.458
PRF-fit source offset from KIC position	0.499 ± 0.624	0.80	-0.470 ± 0.644	0.169 ± 0.446
photometric centroid source offset	1.31 ± 1.57	0.84	-0.03 ± 1.60	1.31 ± 1.57

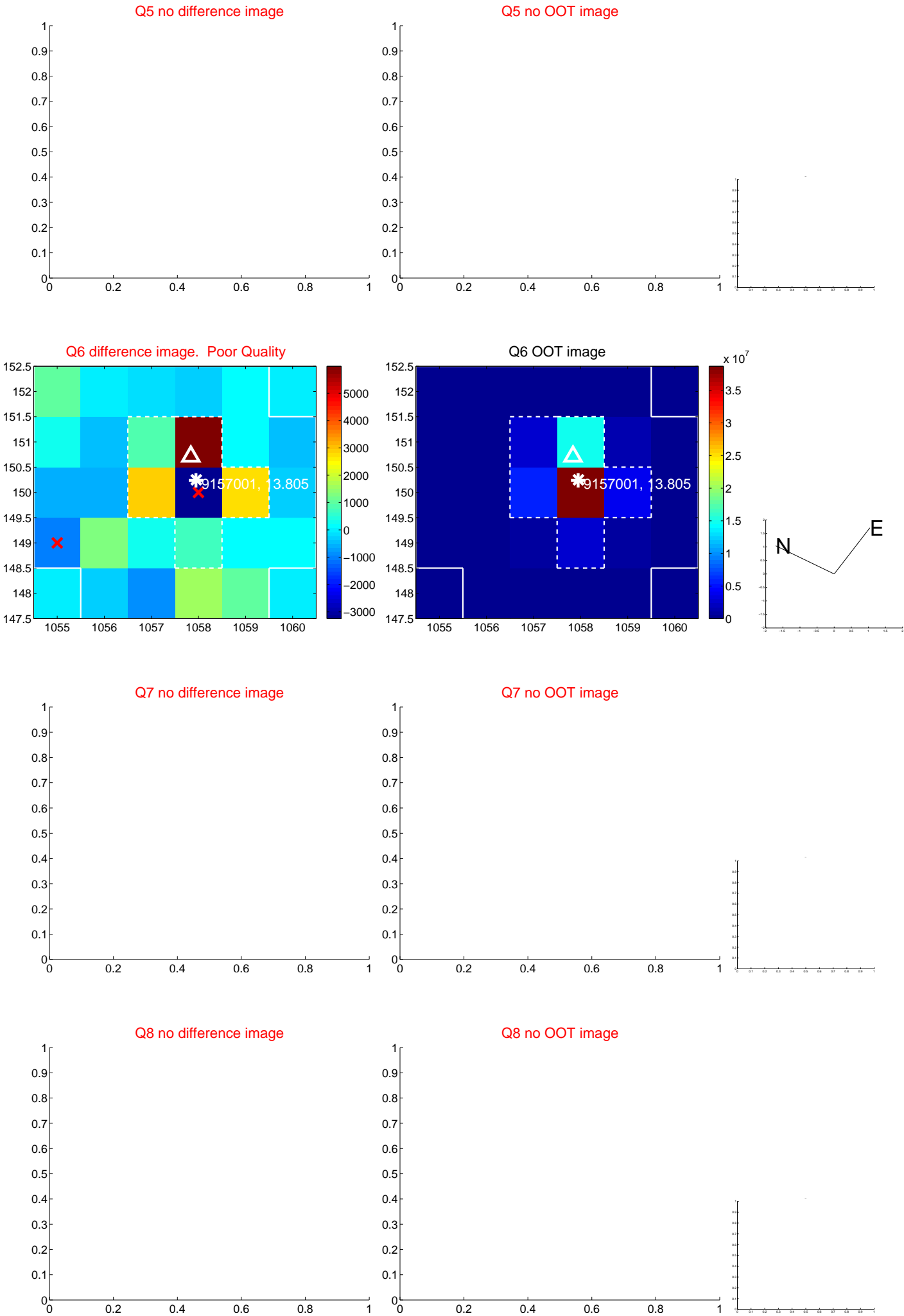


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

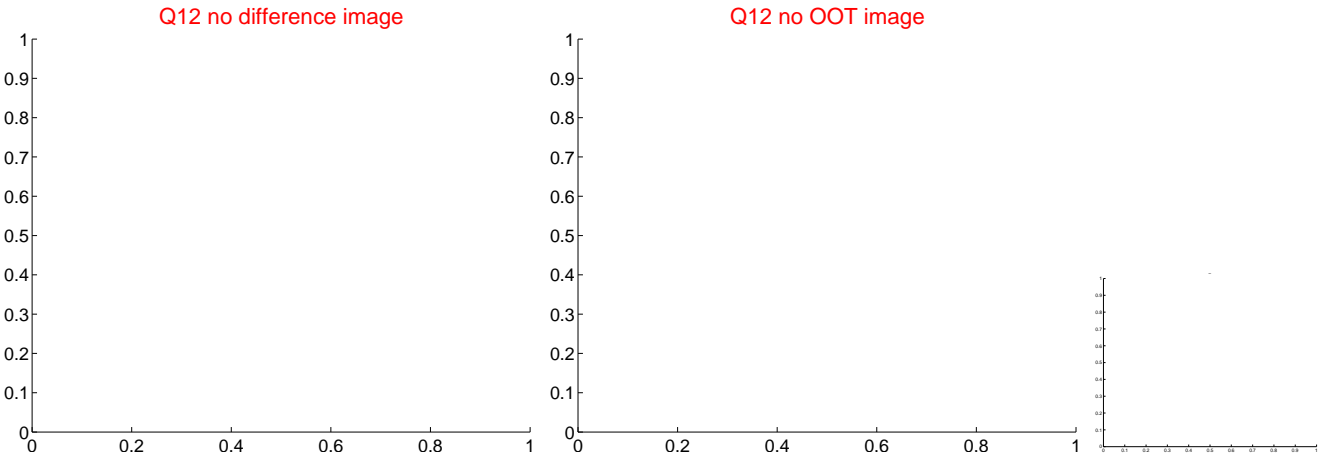
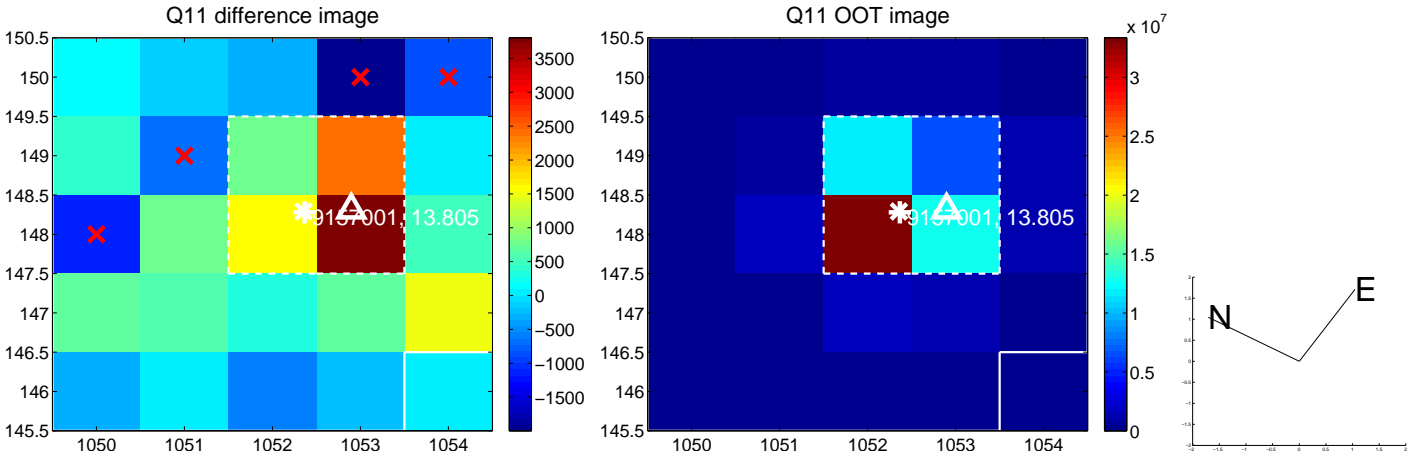
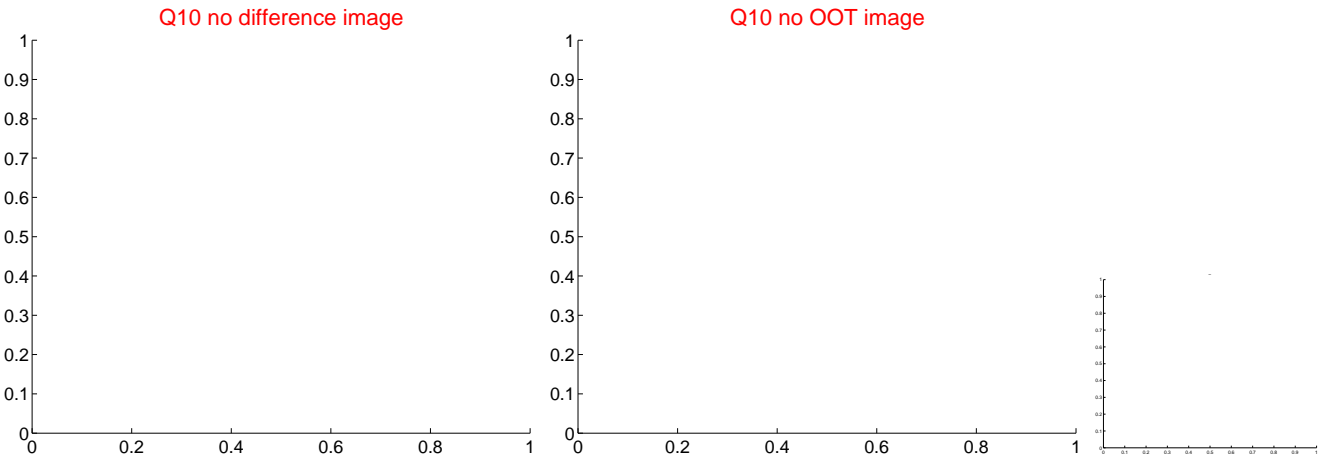
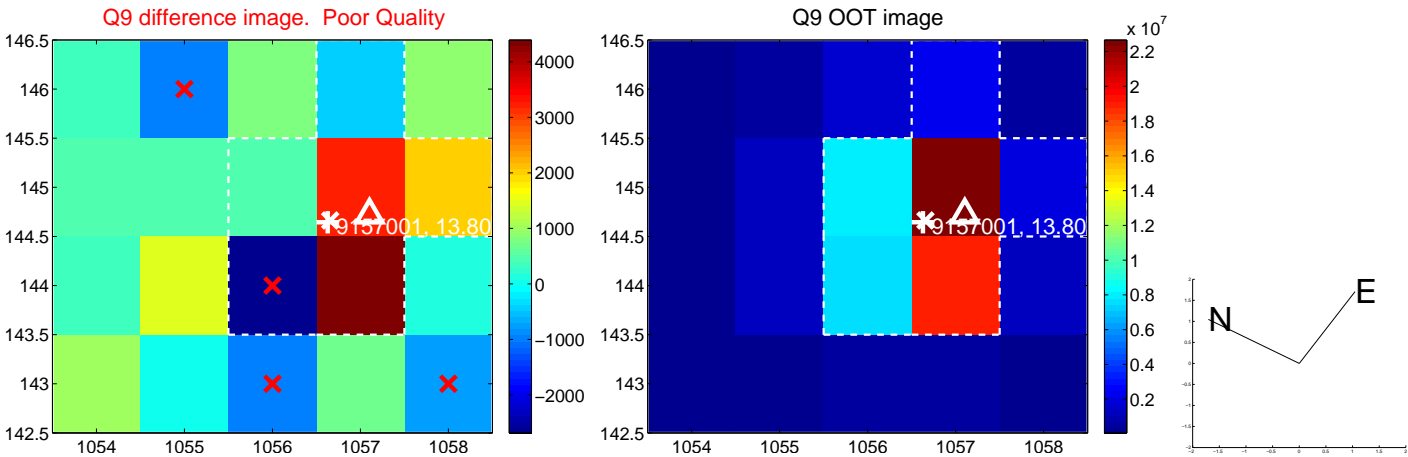
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



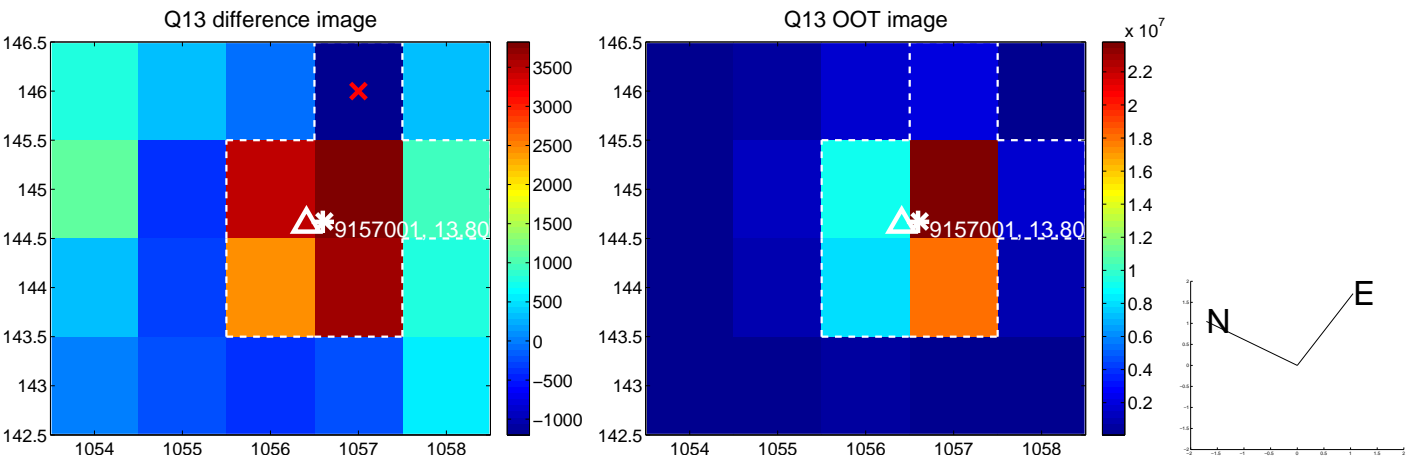
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



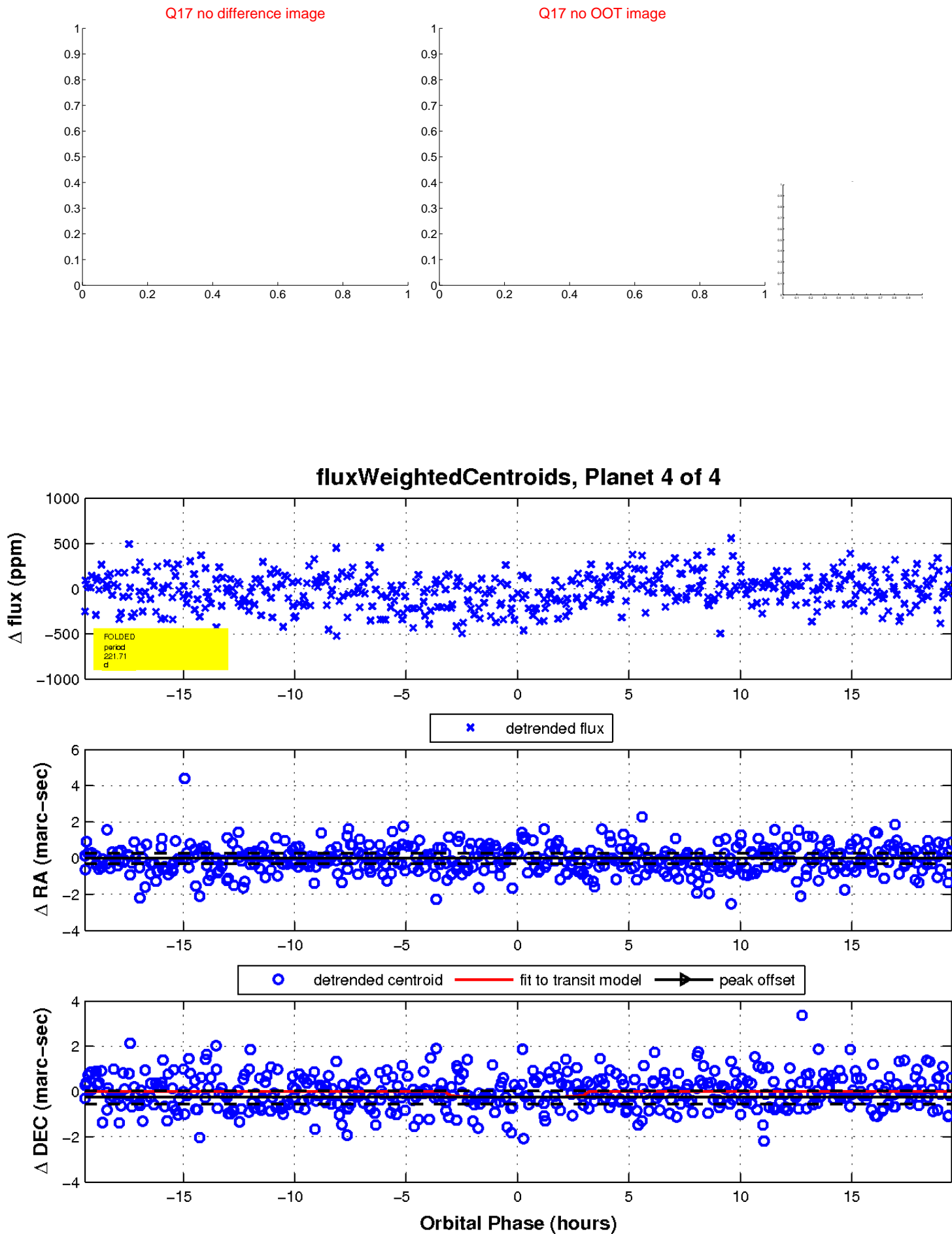
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.



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.



UKIRT Image

Declination

