

KIC 003945784

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})
003945784-01	OBS	No	601.042878	157.176841	740.5	4.679	14.2	10.0	0.59	4979	1.73	0.14
003945784-03	OBS	No	456.957341	161.809761	483.6	4.930	9.2	6.5	0.59	4979	1.31	0.20
003945784-04	OBS	No	347.402756	452.152653	357.5	5.843	10.3	5.6	0.59	4979	1.20	0.29
003945784-05	OBS	No	409.660386	306.892157	361.7	6.570	9.9	5.8	0.59	4979	1.19	0.23

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003945784-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
003945784-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES
003945784-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_ZUMA—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS
003945784-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV

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

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

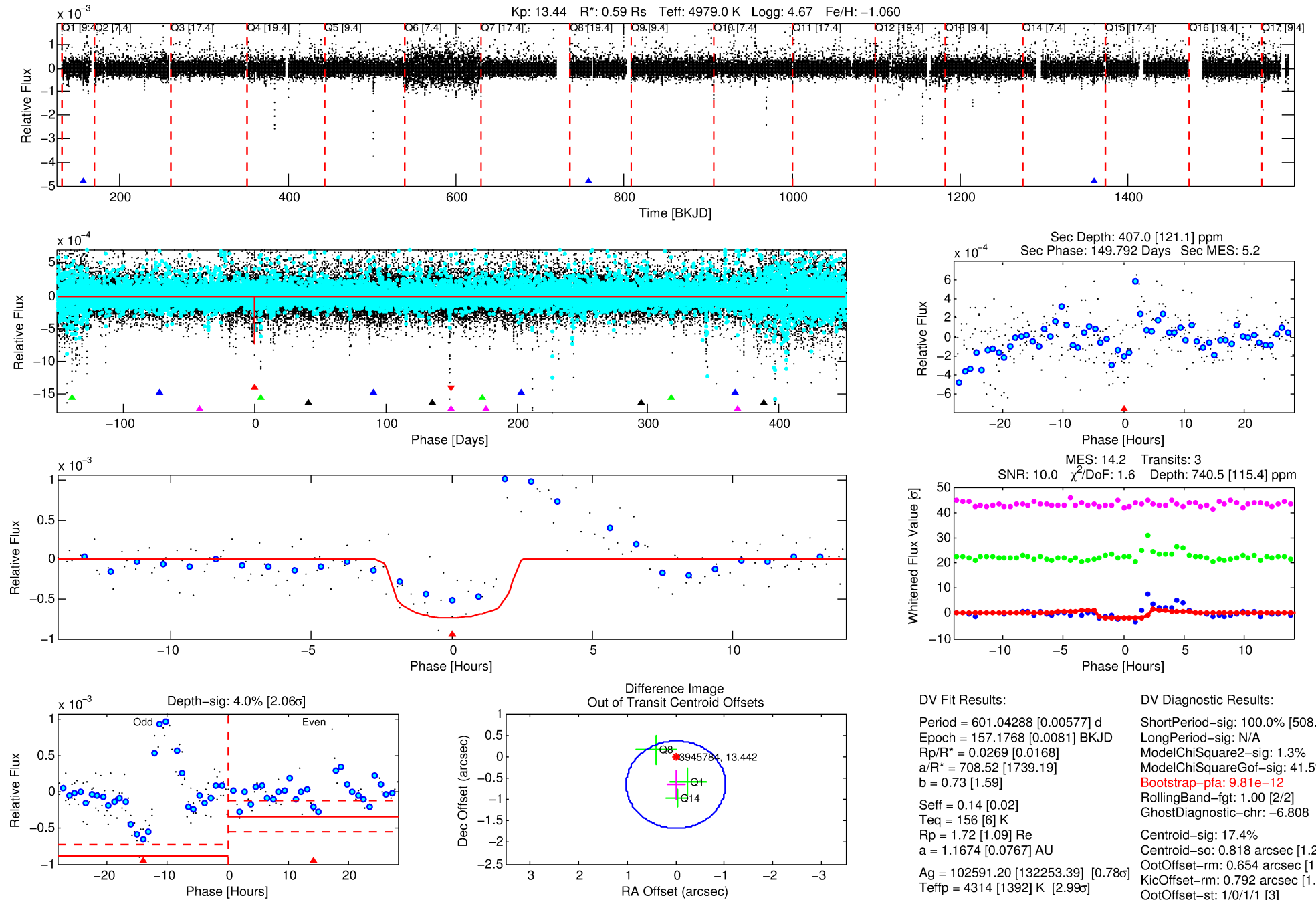
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 003945784-01

No Significant Match Found

DV One-Page Summary

KIC: 3945784 Candidate: 1 of 5 Period: 601.043 d



DV Fit Results:

Period = 601.04288 [0.00577] d
Epoch = 157.1768 [0.0081] BKJD
Rp/R* = 0.0269 [0.0168]
a/R* = 708.52 [1739.19]
b = 0.73 [1.59]
Seff = 0.14 [0.02]
Teq = 156 [6] K
Rp = 1.72 [1.09] Re
a = 1.1674 [0.0767] AU
Ag = 102591.20 [132253.39] [0.78σ]
Teffp = 4314 [1392] K [2.99σ]

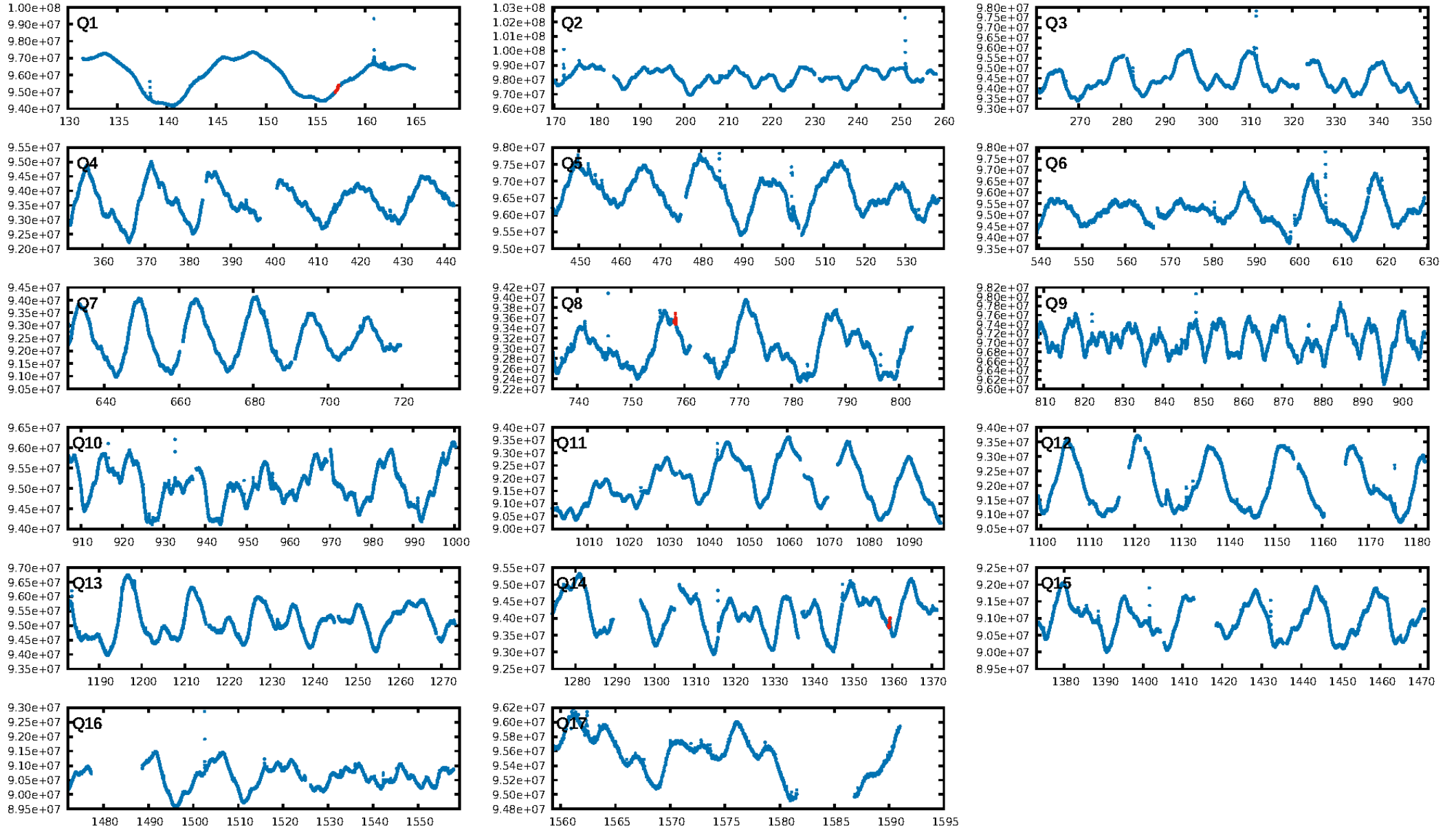
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [508.76σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 1.3%
ModelChiSquareGof-sig: 41.5%
Bootstrap-pfa: 9.81e-12
RollingBand-fgt: 1.00 [2/2]
GhostDiagnostic-chr: -6.808
Centroid-sig: 17.4%
Centroid-so: 0.818 arcsec [1.24σ]
OotOffset-rm: 0.654 arcsec [1.92σ]
KicOffset-rm: 0.792 arcsec [1.75σ]
OotOffset-st: 1/0/1/1 [3]
KicOffset-st: 1/0/1/1 [3]
DiffImageQuality-fgm: 0.67 [2/3]
DiffImageOverlap-fno: 1.00 [3/3]

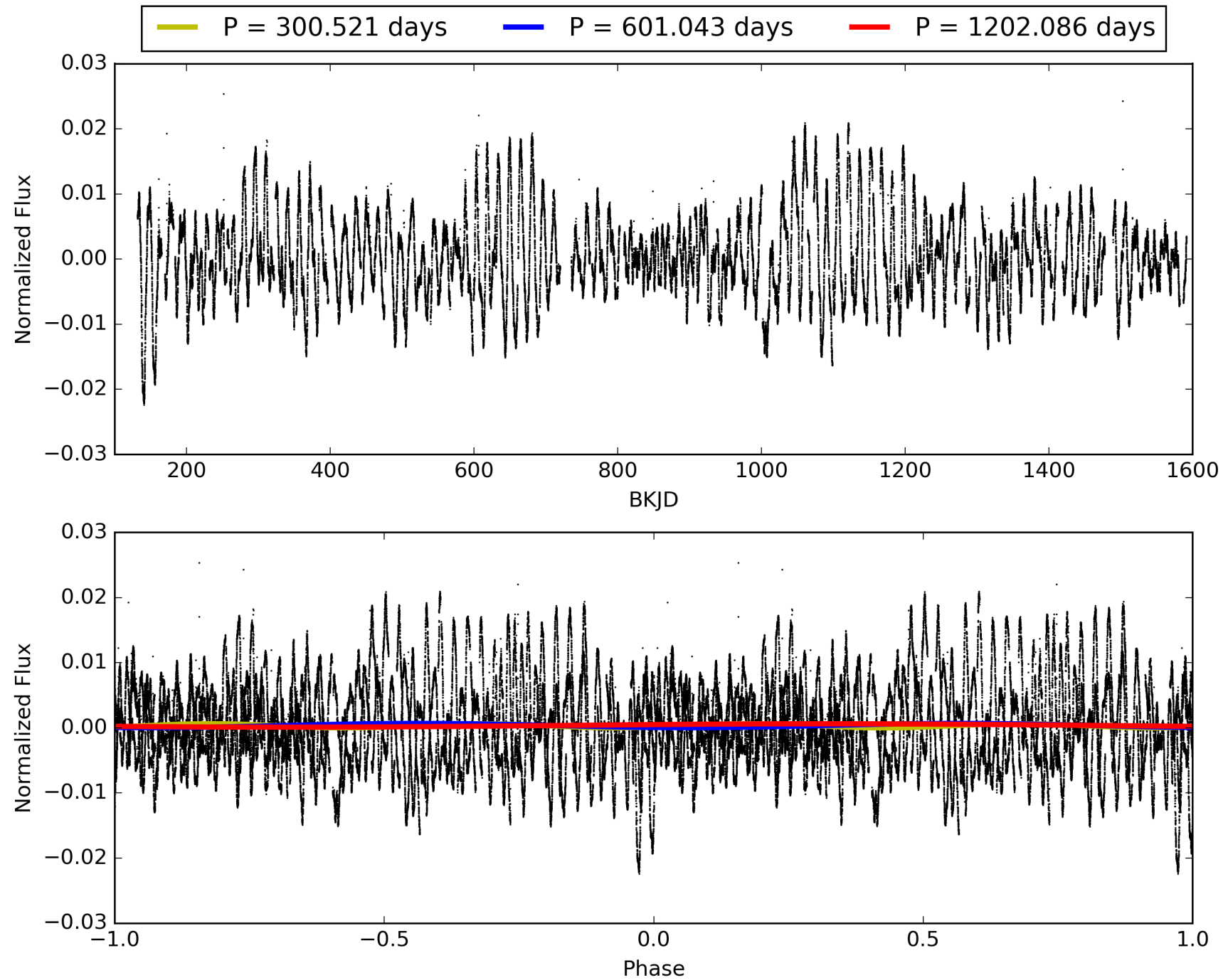
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 23:53:06 Z

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

TCE 003945784-01, PDC Light Curves

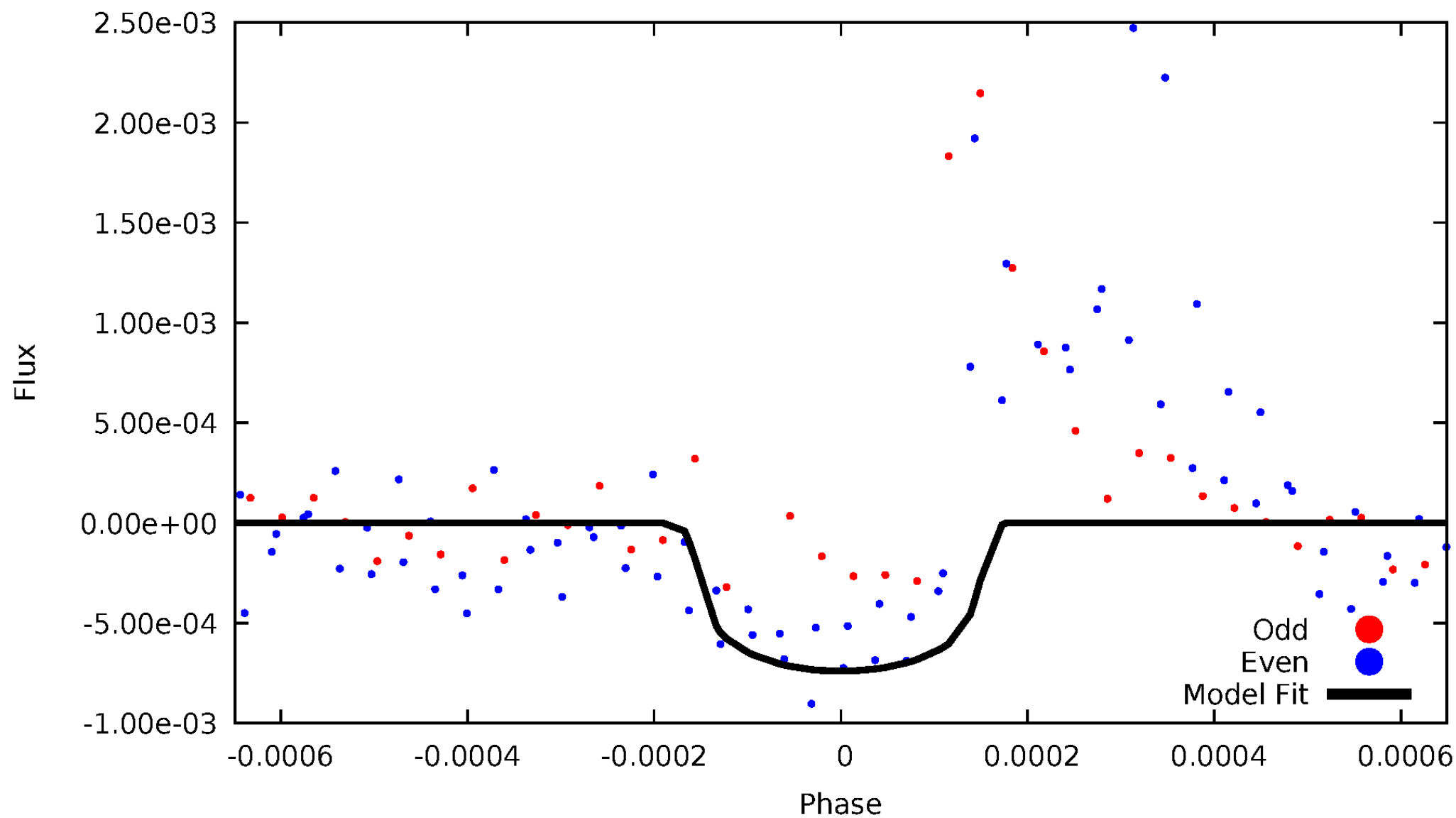


TCE 003945784-01



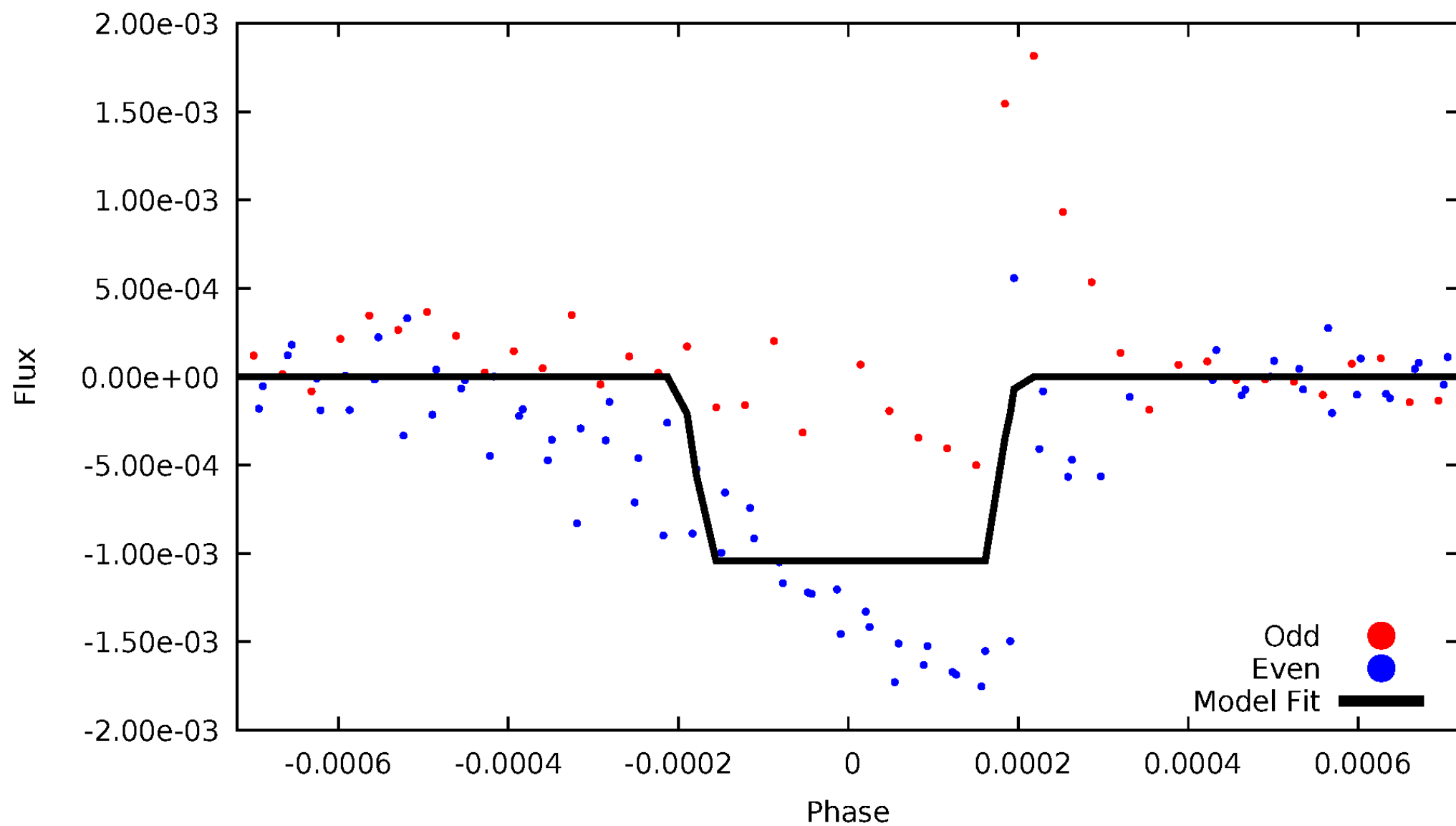
DV Odd/Even

TCE 003945784-01



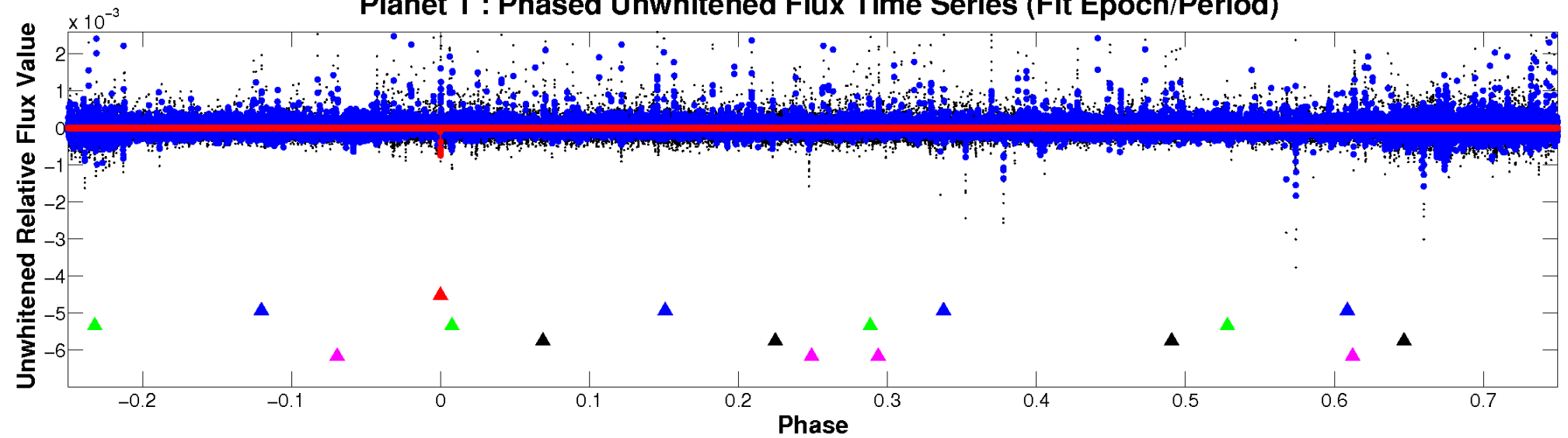
ALT Odd/Even

TCE 003945784-01

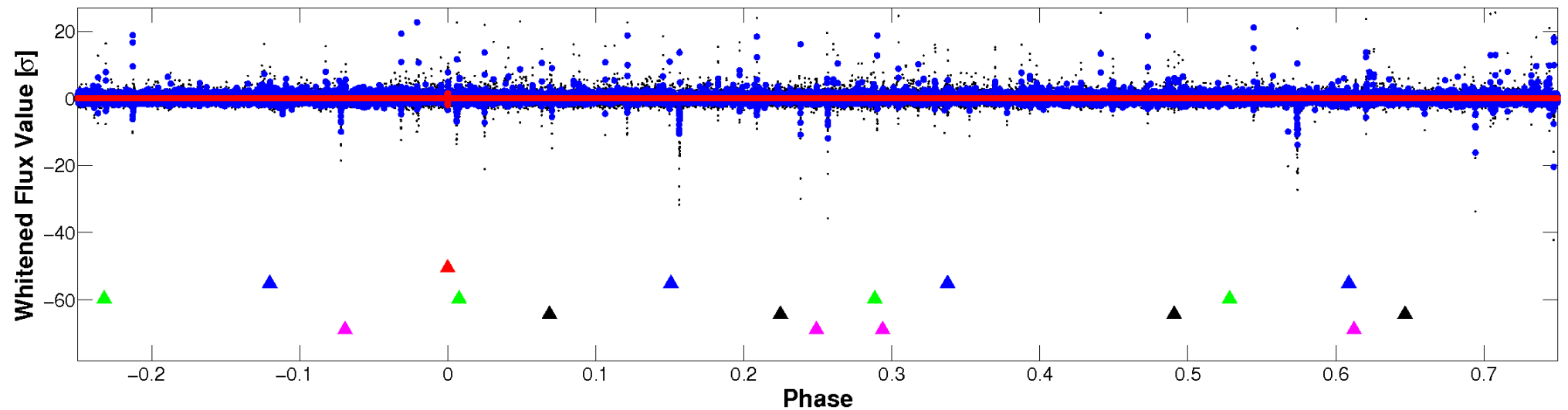


Non-Whitened Vs. Whitened Light Curve

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

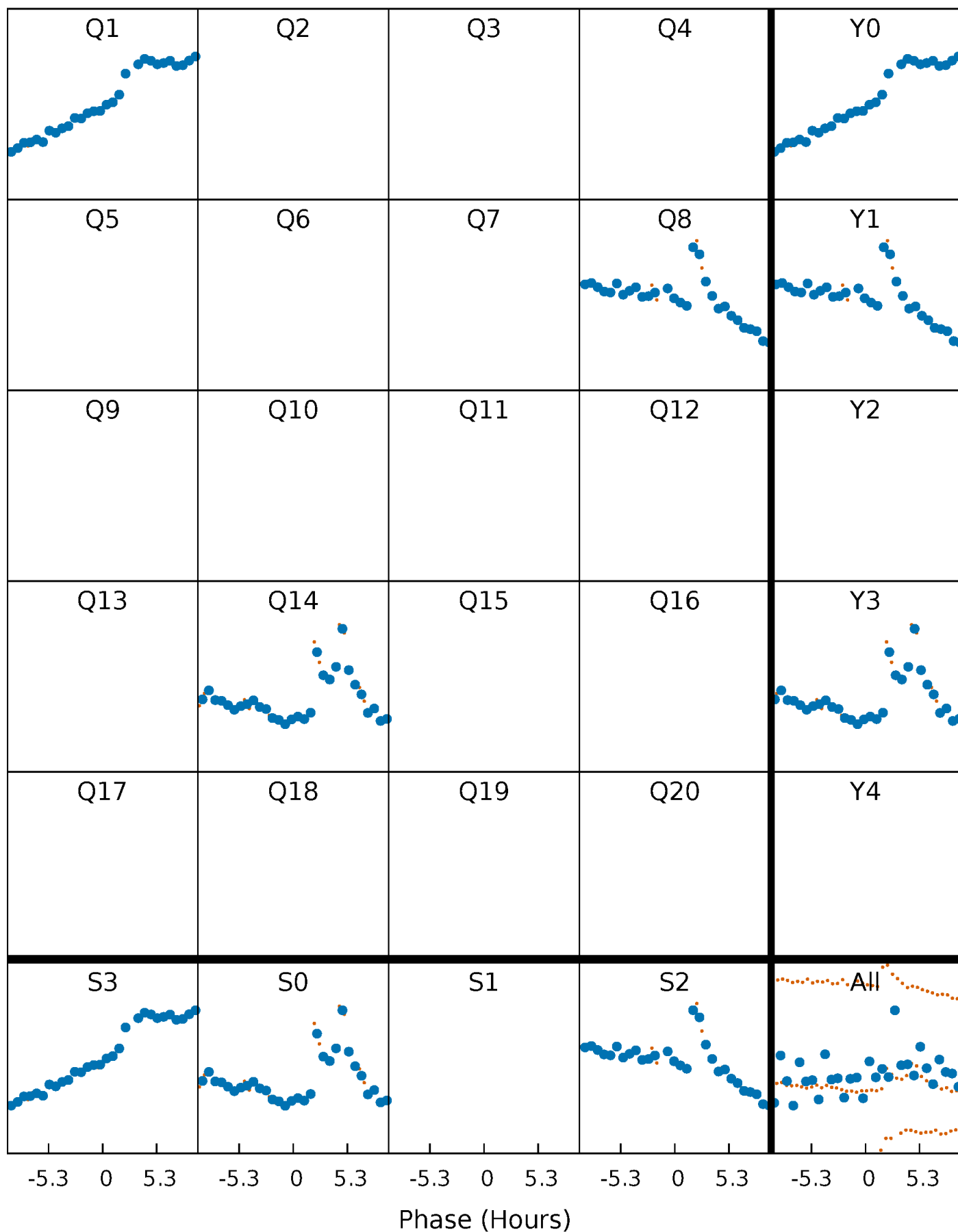


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



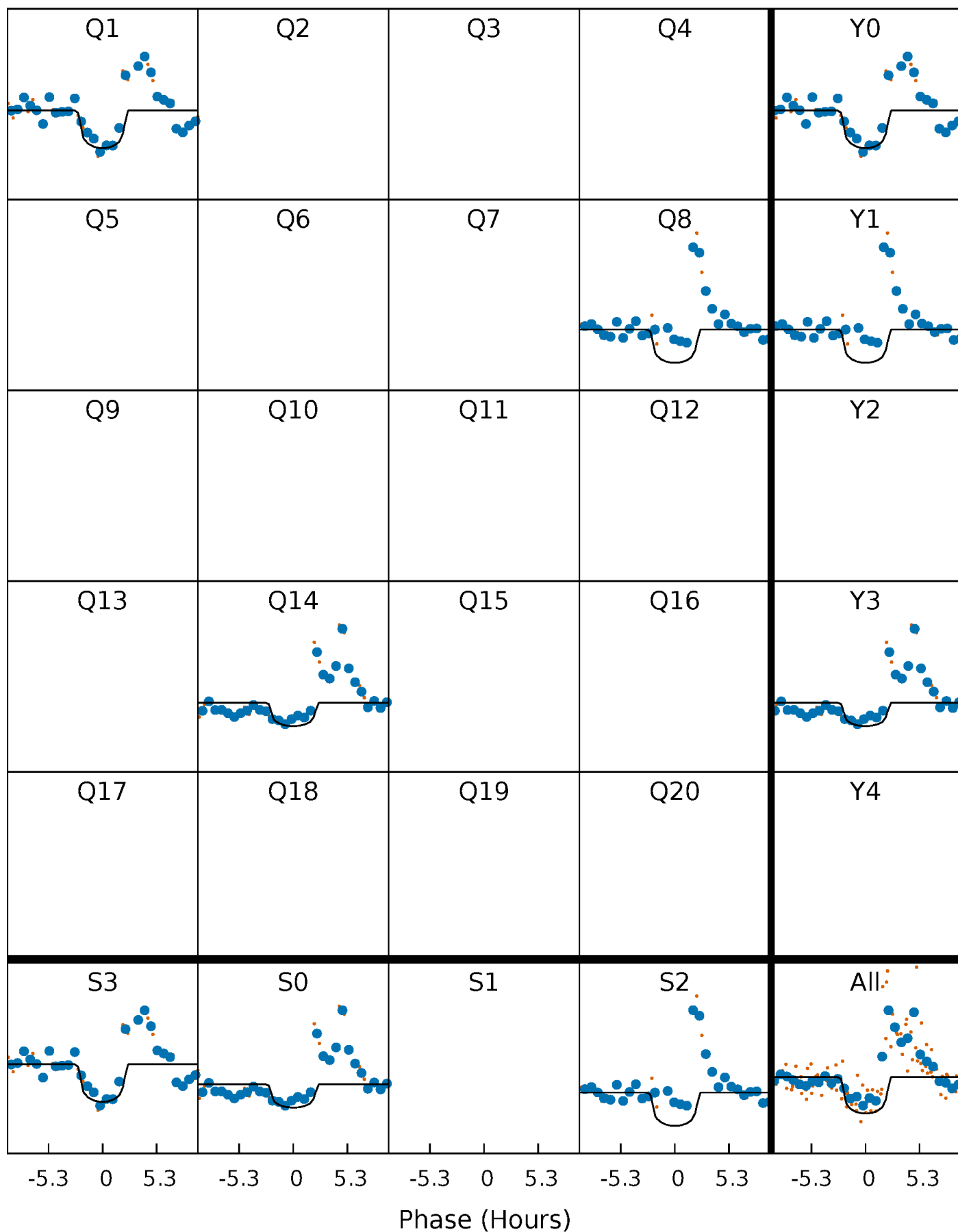
PDC Quarter-Phased Transit Curves

TCE 003945784-01 P=601.042878 Days $T_0=157.176841$ (BKJD)



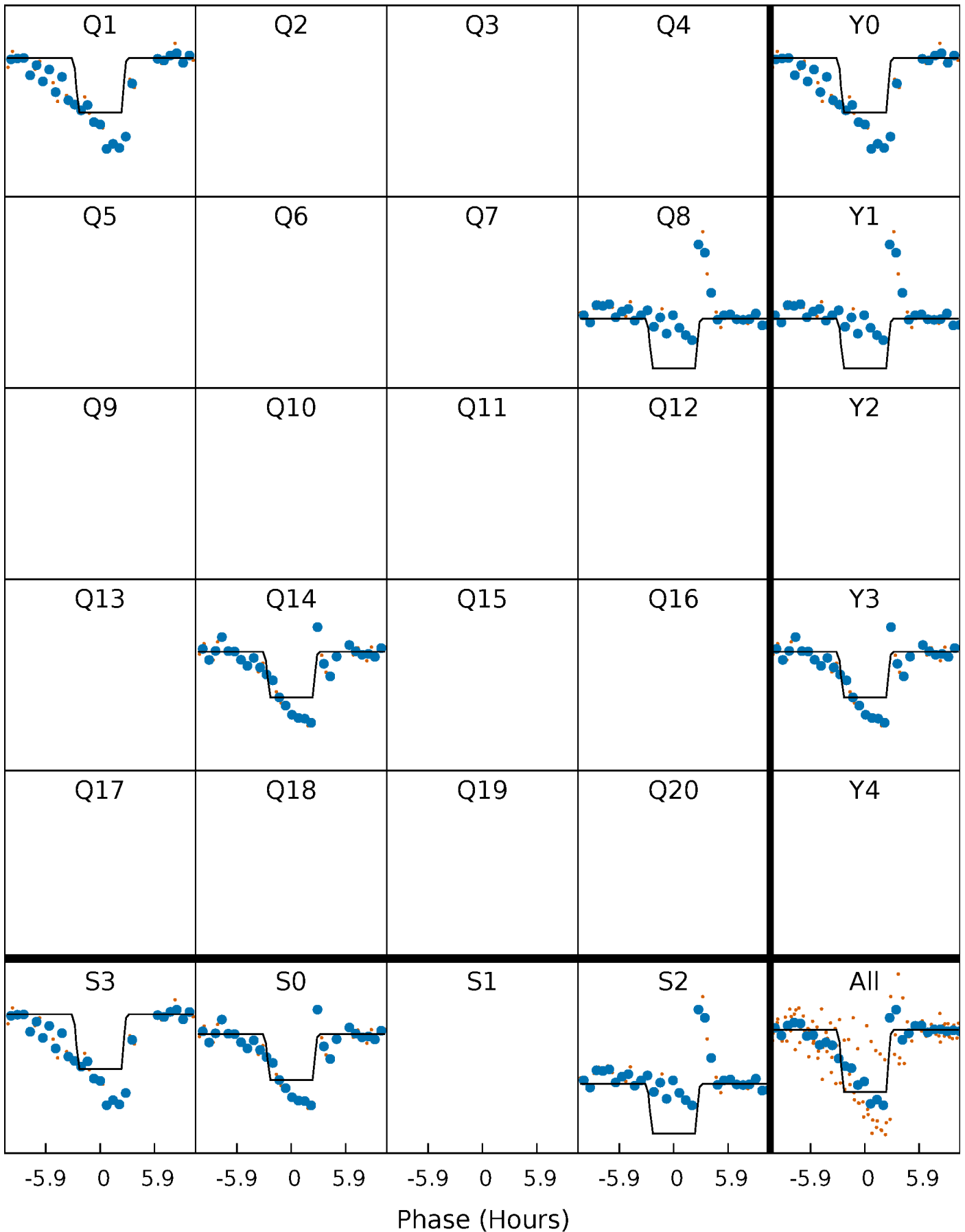
DV Quarter-Phased Transit Curves

TCE 003945784-01 P=601.042878 Days $T_0=157.176841$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

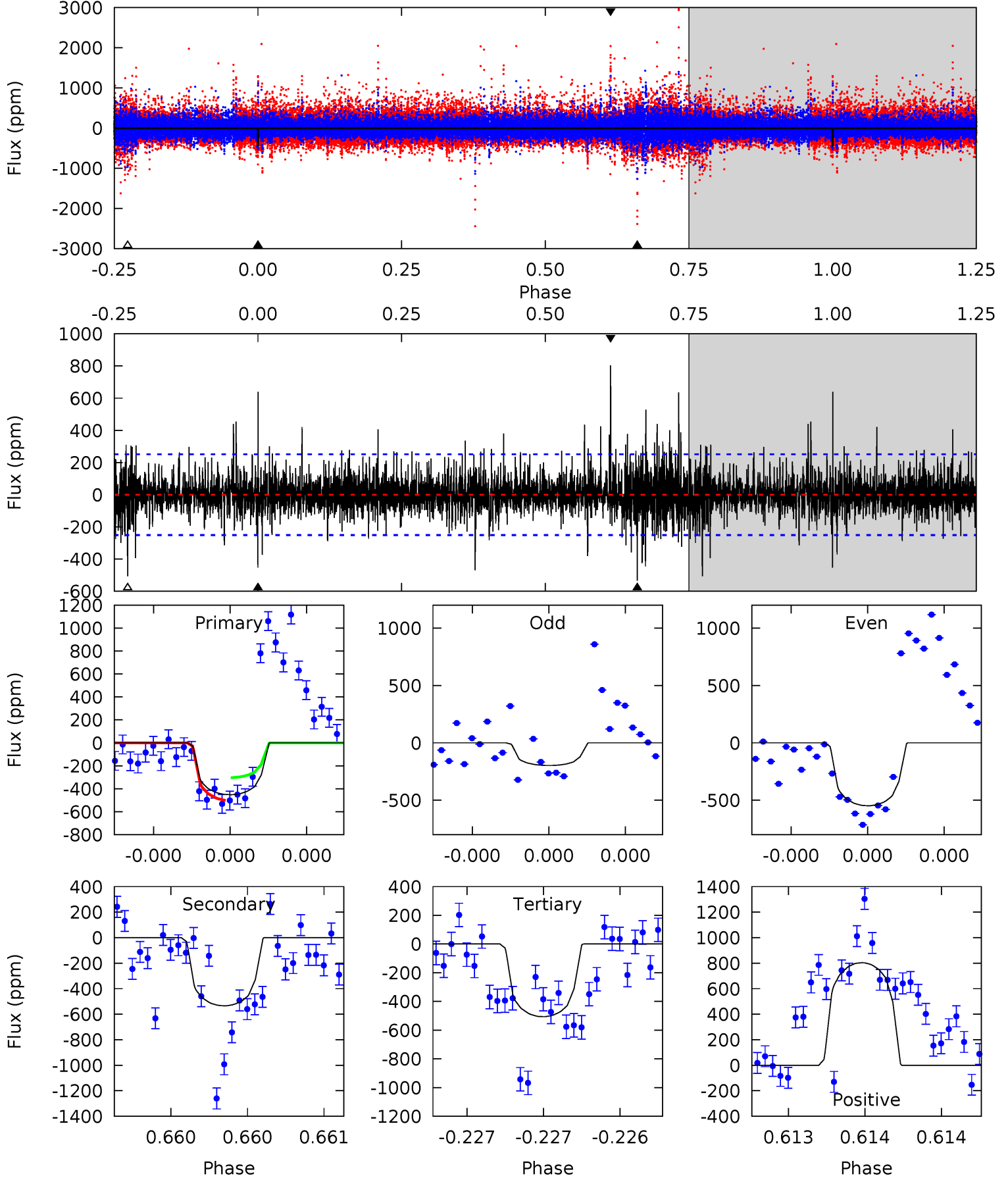
TCE 003945784-01 P=601.053167 Days $T_0=157.125166$ (BKJD)



DV Model-Shift Uniqueness Test

003945784-01, P = 601.042878 Days, E = 157.176841 Days

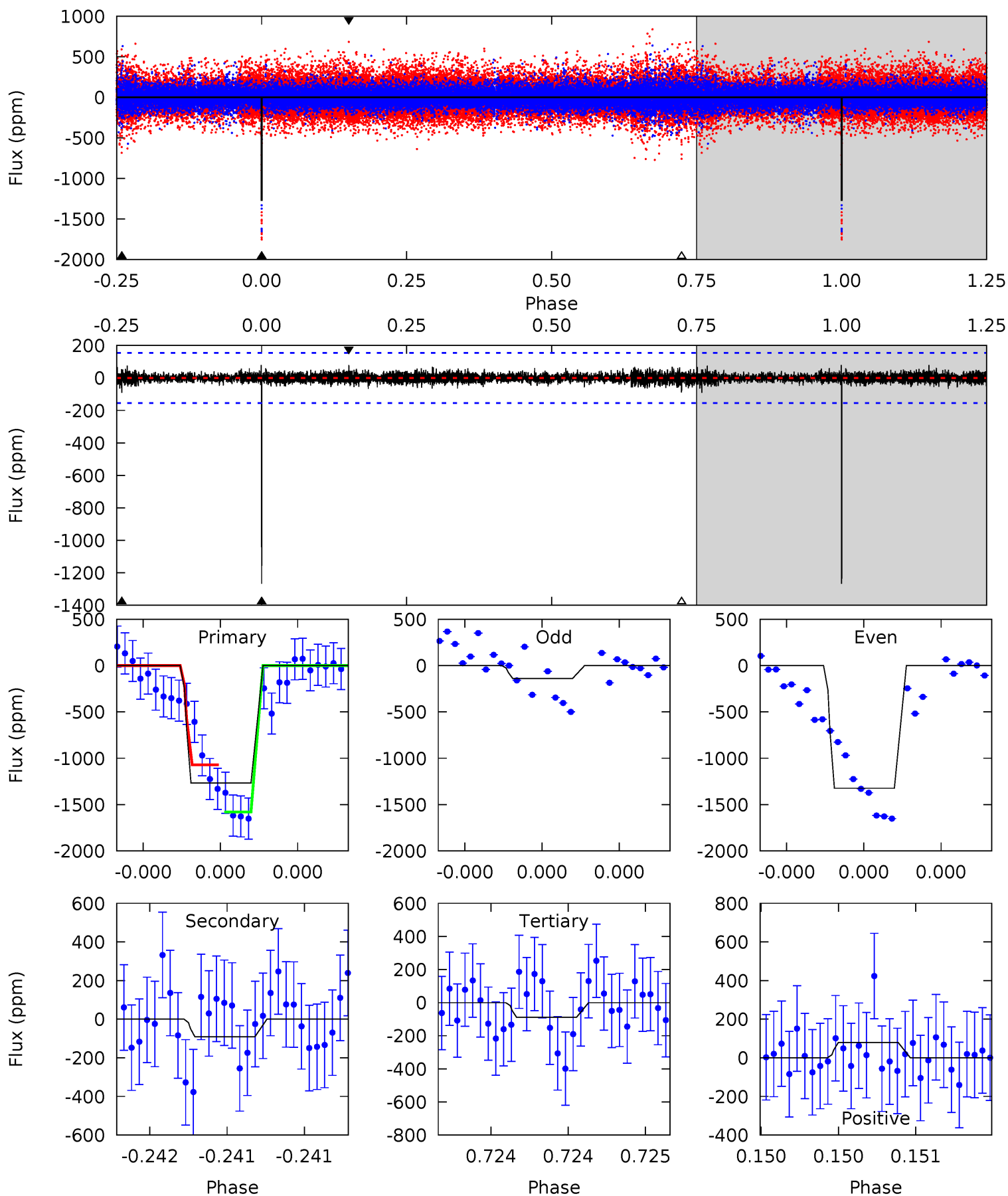
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.1	12.0	11.4	18.0	5.64	3.58	1.94	-1.22	-7.90	0.62	-6.05	2.92	0.63	0.60	2.21



Alt Model-Shift Uniqueness Test

003945784-01, P = 601.053167 Days, E = 157.125166 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
46.0	3.32	3.23	2.87	5.61	3.53	0.56	42.7	43.1	0.09	0.45	22.2	0.72	0.06	9.02



Stellar Parameters For KIC 003945784

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	$M(M_{\odot})$	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	4979^{+149}_{-149}	$4.668^{+0.054}_{-0.032}$	$-1.060^{+0.350}_{-0.300}$	$0.588^{+0.045}_{-0.037}$	$0.587^{+0.051}_{-0.022}$	$4.069^{+0.794}_{-0.552}$
	+3%/-3%	+1%/-1%	+33%/-28%	+8%/-6%	+9%/-4%	+20%/-14%
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 003945784-01 / KOI

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-534 ± 45	$1.81^{+1.02}_{-0.94}$	217^{+7}_{-7}	4585^{+1787}_{-705}	$124580^{+402939}_{-74026}$
Alt.	-92 ± 28	$2.11^{+1.06}_{-1.03}$	216^{+8}_{-7}	3221^{+778}_{-394}	15311^{+46963}_{-9022}

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

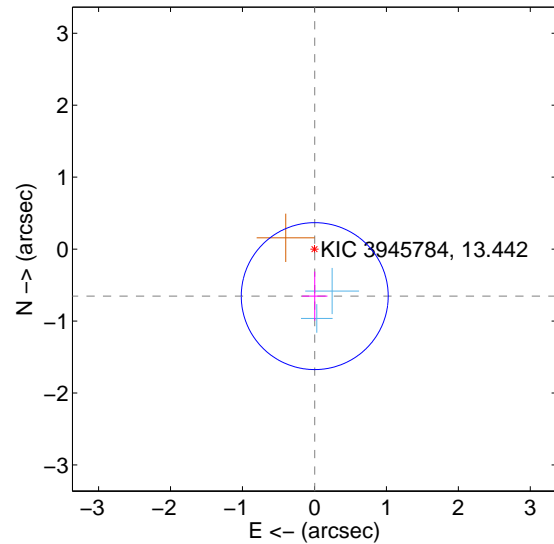
Supplemental centroid analysis for 003945784-01. Kepler magnitude: 13.44. Transit SNR 9.99

There are 2 quarters with good PRF difference image offsets

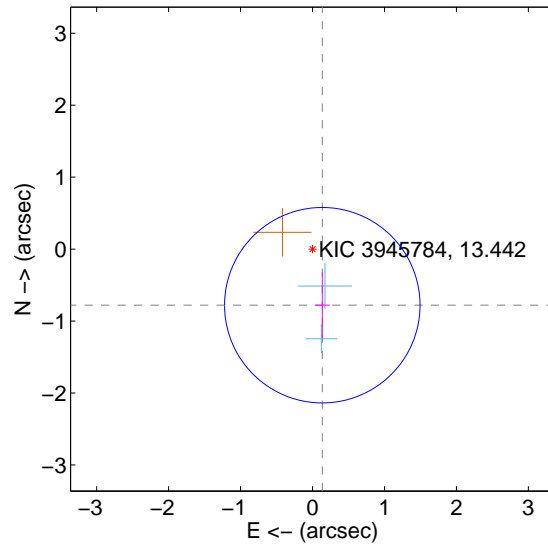
The direct PRF centroid is offset from the target star catalog position by about 0.30 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.654 ± 0.340	1.92	-0.004 ± 0.177	-0.654 ± 0.340
PRF-fit source offset from KIC position	0.792 ± 0.453	1.75	-0.136 ± 0.104	-0.780 ± 0.459
photometric centroid source offset	0.82 ± 0.66	1.24	-0.08 ± 0.59	0.81 ± 0.66

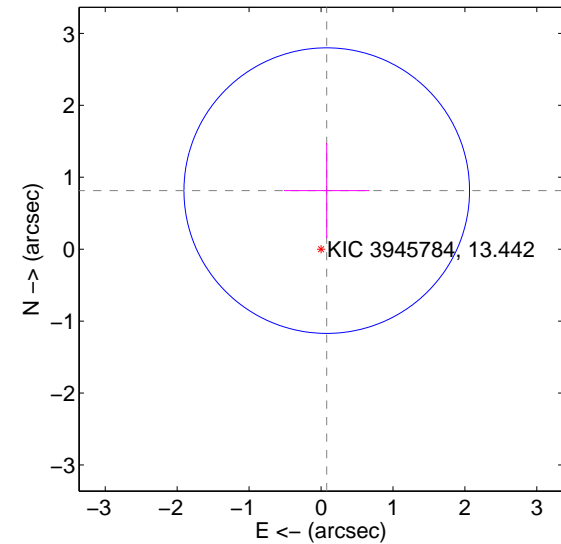
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

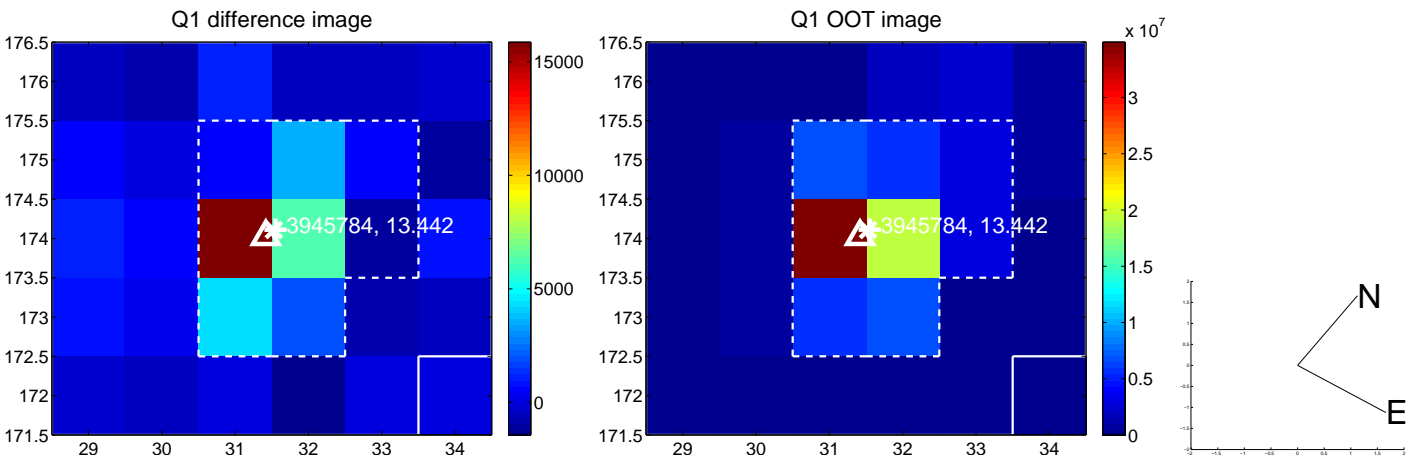


offset from photometric centroids



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.

Q5 no difference image



Q5 no OOT image



Q6 no difference image



Q6 no OOT image



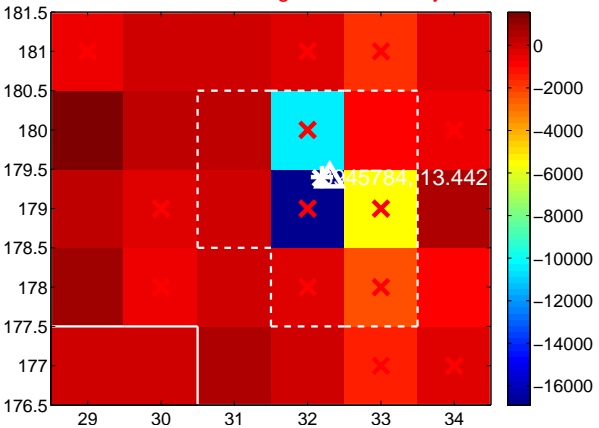
Q7 no difference image



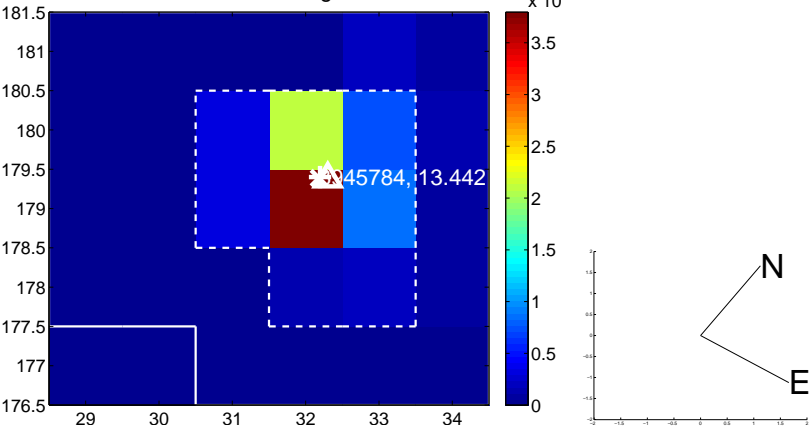
Q7 no OOT image



Q8 difference image. Poor Quality



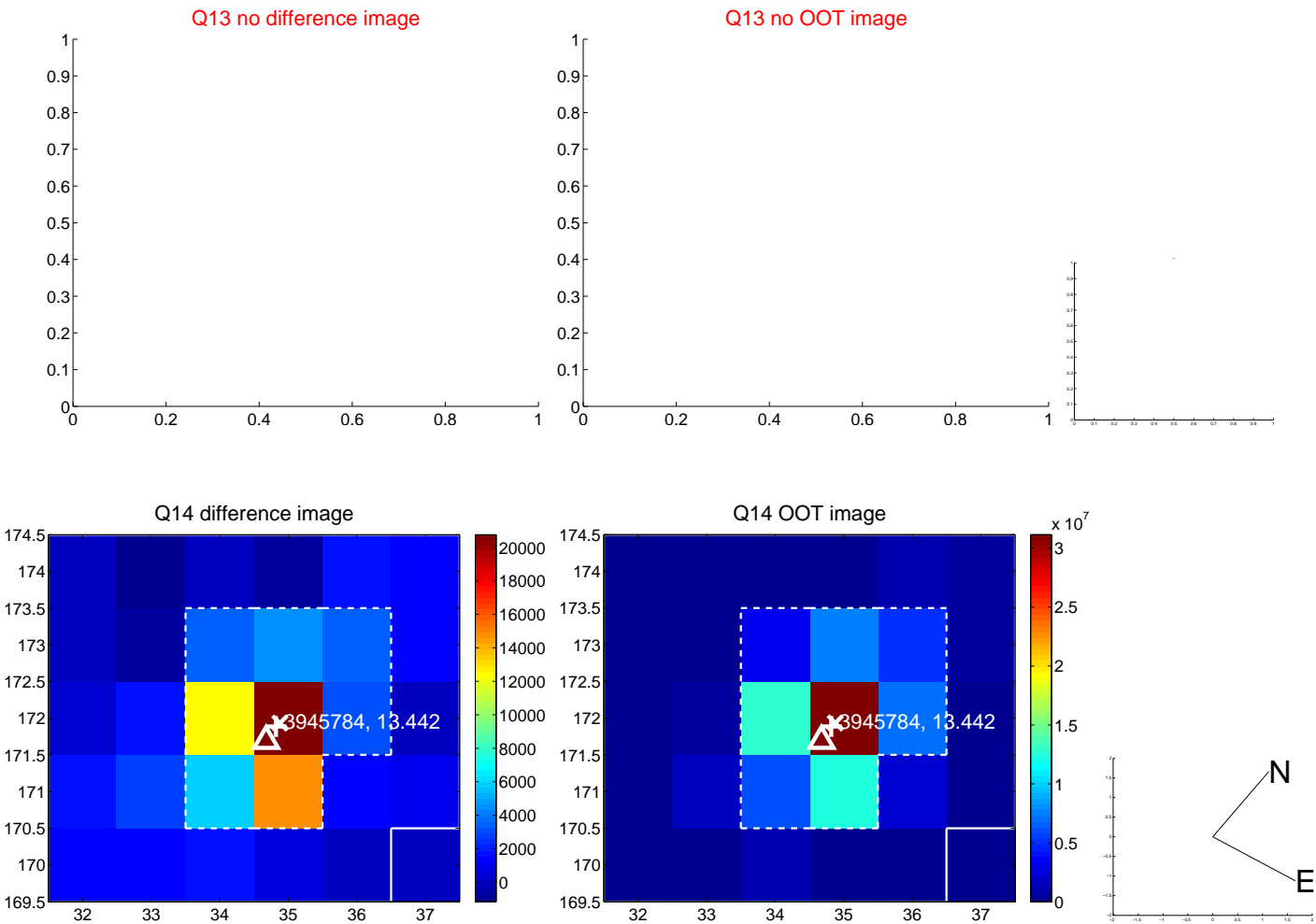
Q8 OOT image



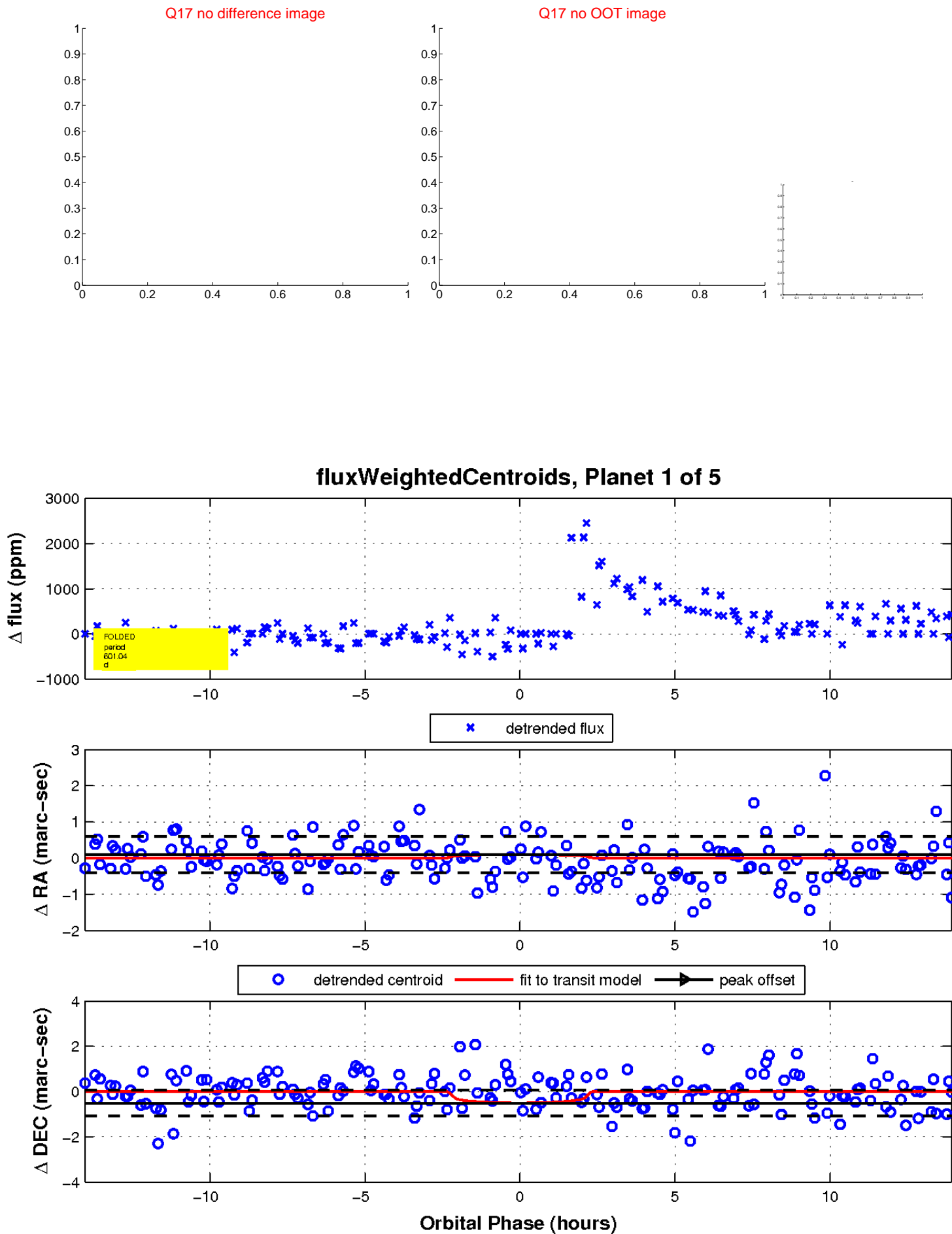
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

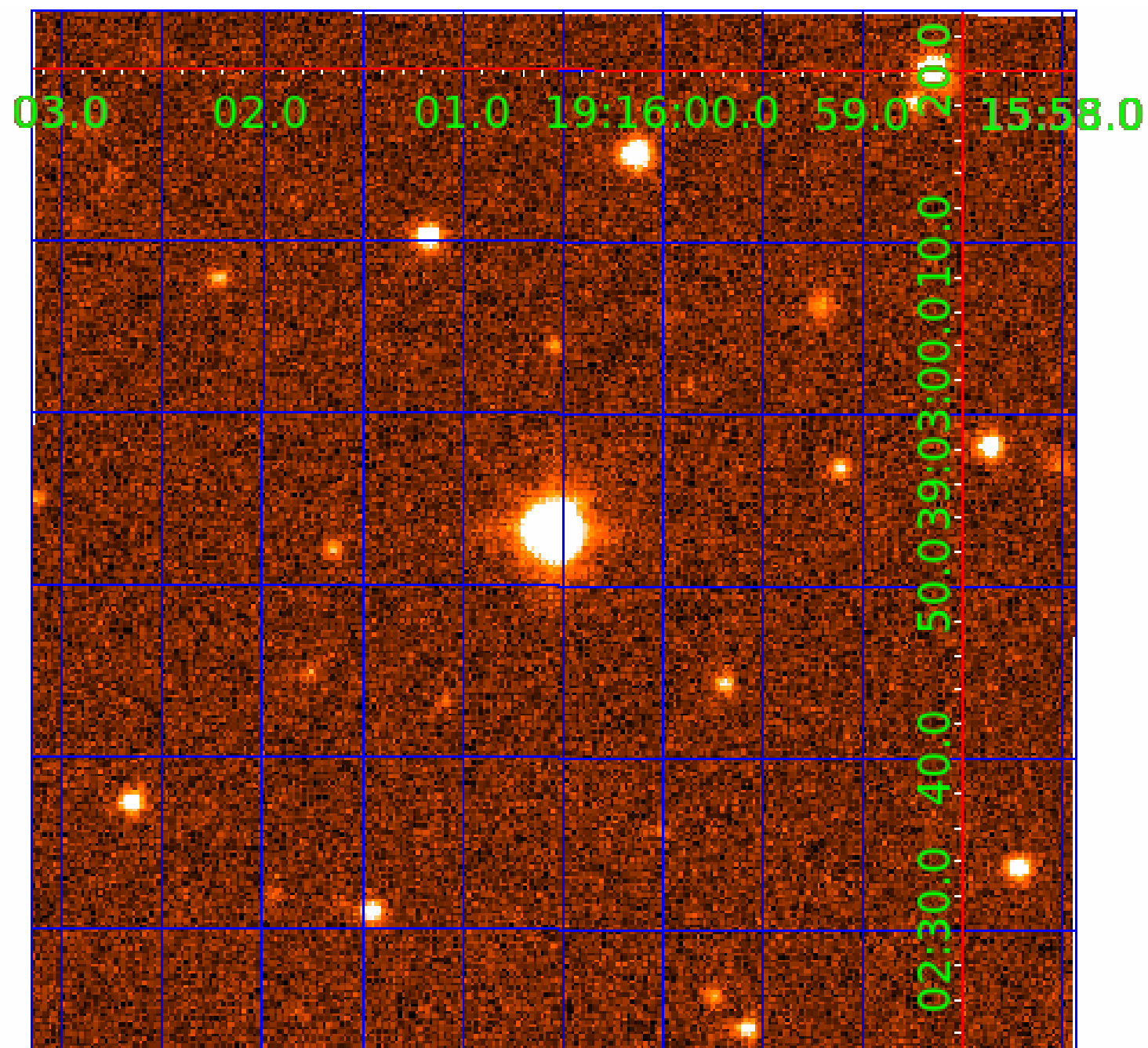


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 003945784

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})
003945784-01	OBS	No	601.042878	157.176841	740.5	4.679	14.2	10.0	0.59	4979	1.73	0.14
003945784-03	OBS	No	456.957341	161.809761	483.6	4.930	9.2	6.5	0.59	4979	1.31	0.20
003945784-04	OBS	No	347.402756	452.152653	357.5	5.843	10.3	5.6	0.59	4979	1.20	0.29
003945784-05	OBS	No	409.660386	306.892157	361.7	6.570	9.9	5.8	0.59	4979	1.19	0.23

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003945784-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
003945784-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES
003945784-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_ZUMA—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS
003945784-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV

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

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

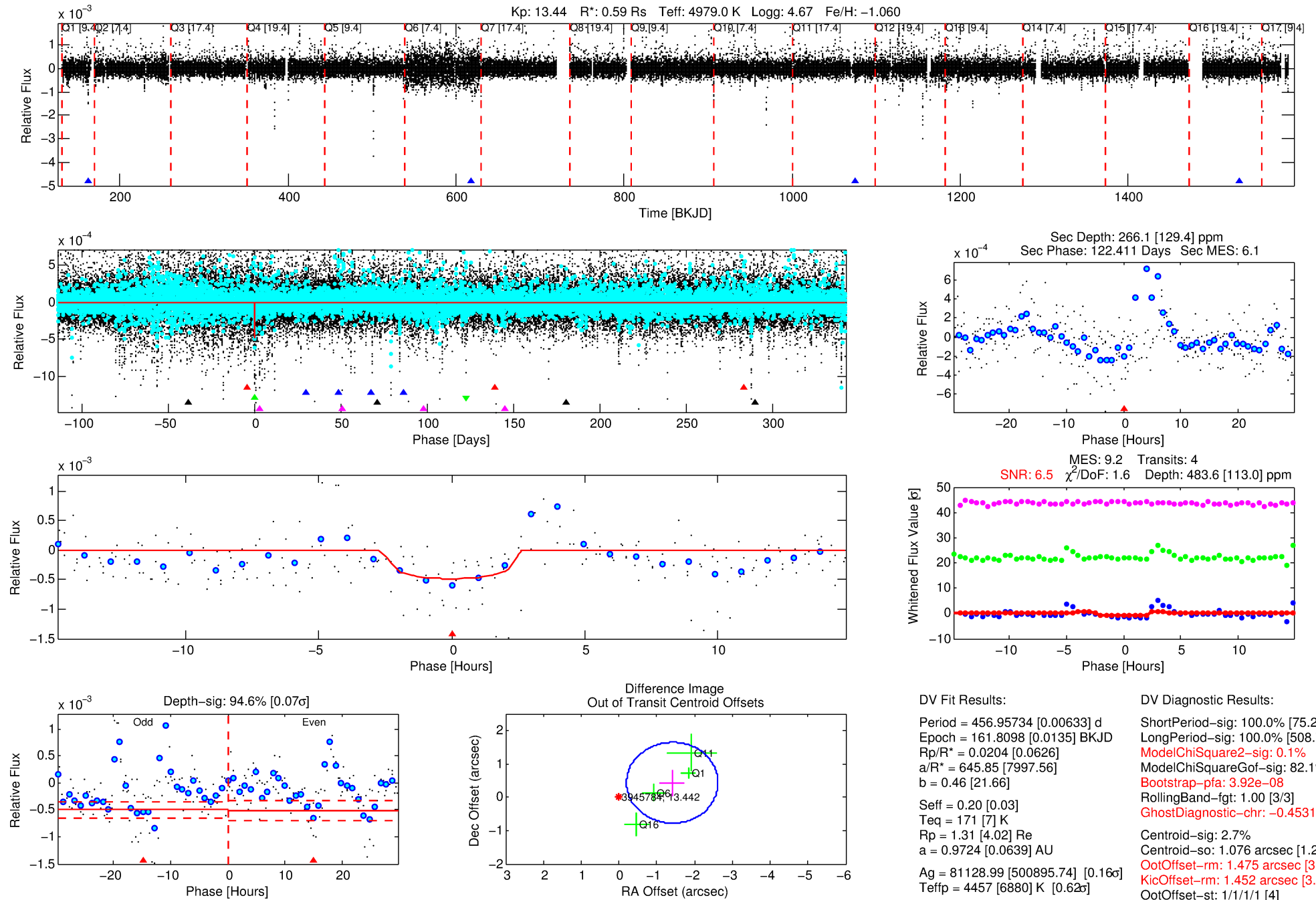
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 003945784-03

No Significant Match Found

DV One-Page Summary

KIC: 3945784 Candidate: 3 of 5 Period: 456.957 d



DV Fit Results:

Period = 456.95734 [0.00633] d
Epoch = 161.8098 [0.0135] BKJD
Rp/R* = 0.0204 [0.0626]
a/R* = 645.85 [7997.56]
b = 0.46 [21.66]
Seff = 0.20 [0.03]
Teq = 171 [7] K
Rp = 1.31 [4.02] Re
a = 0.9724 [0.0639] AU
Ag = 81128.99 [500895.74] [0.16 σ]
Teffp = 4457 [6880] K [0.62 σ]

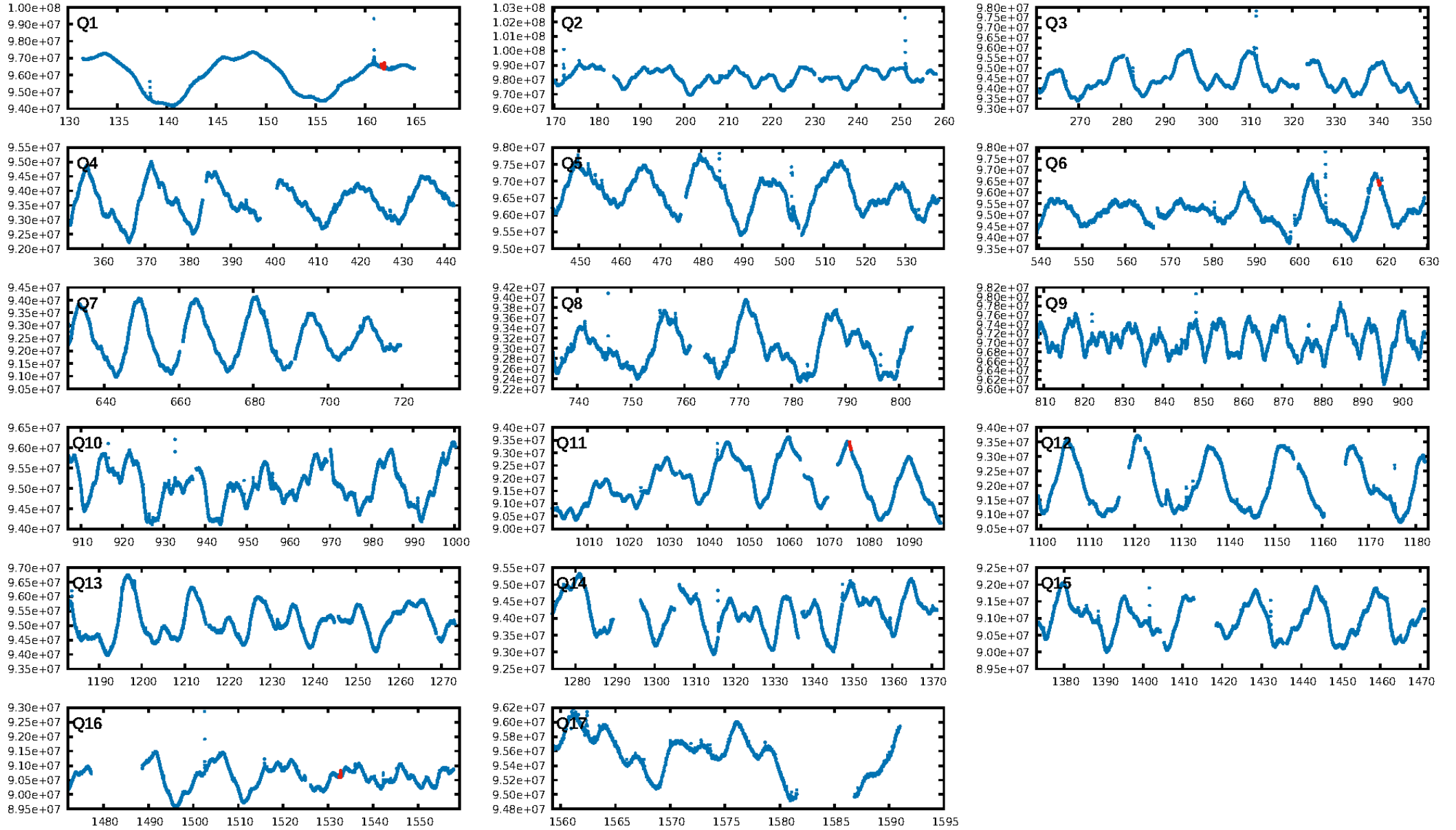
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [75.20 σ]
LongPeriod-sig: 100.0% [508.76 σ]
ModelChiSquare2-sig: 0.1%
ModelChiSquareGof-sig: 82.1%
Bootstrap-pfa: 3.92e-08
RollingBand-fgt: 1.00 [3/3]
GhostDiagnostic-chr: -0.4531
Centroid-sig: 2.7%
Centroid-so: 1.076 arcsec [1.29 σ]
OotOffset-rm: 1.475 arcsec [3.65 σ]
KicOffset-rm: 1.452 arcsec [3.51 σ]
OotOffset-st: 1/1/1/1 [4]
KicOffset-st: 1/1/1/1 [4]
DiffImageQuality-fgm: 0.75 [3/4]
DiffImageOverlap-fno: 1.00 [4/4]

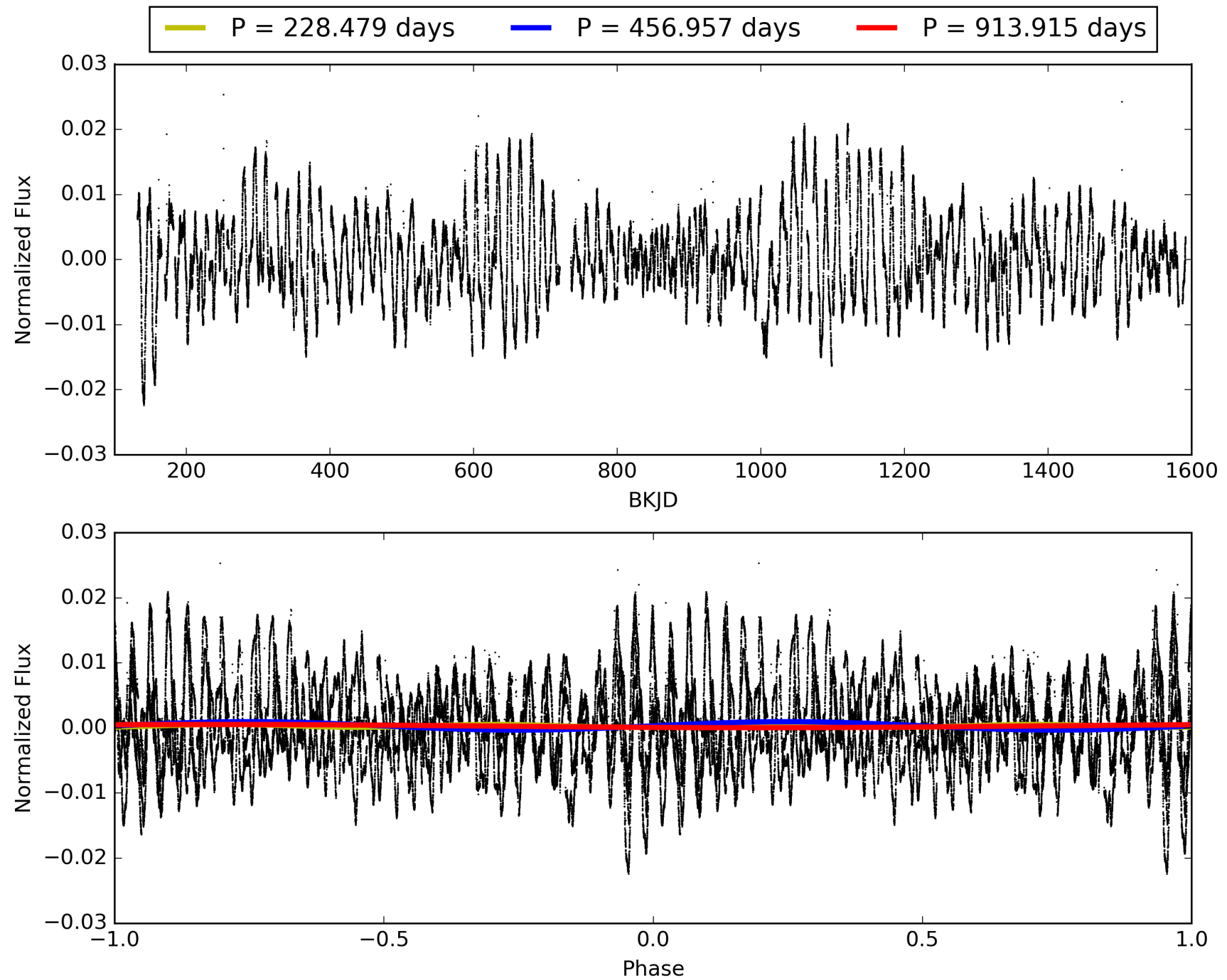
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 23:53:40 Z

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

TCE 003945784-03, PDC Light Curves

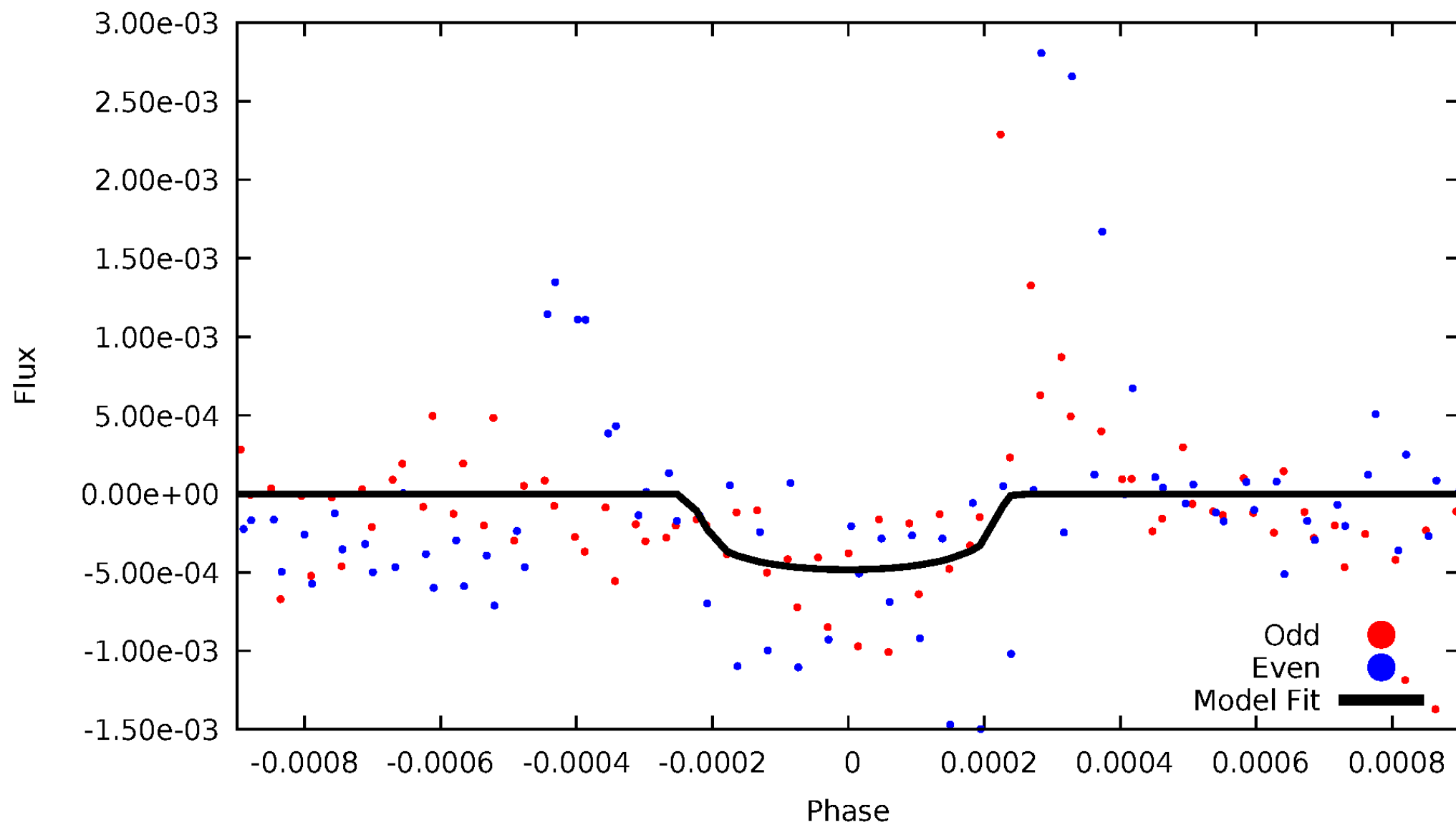


TCE 003945784-03



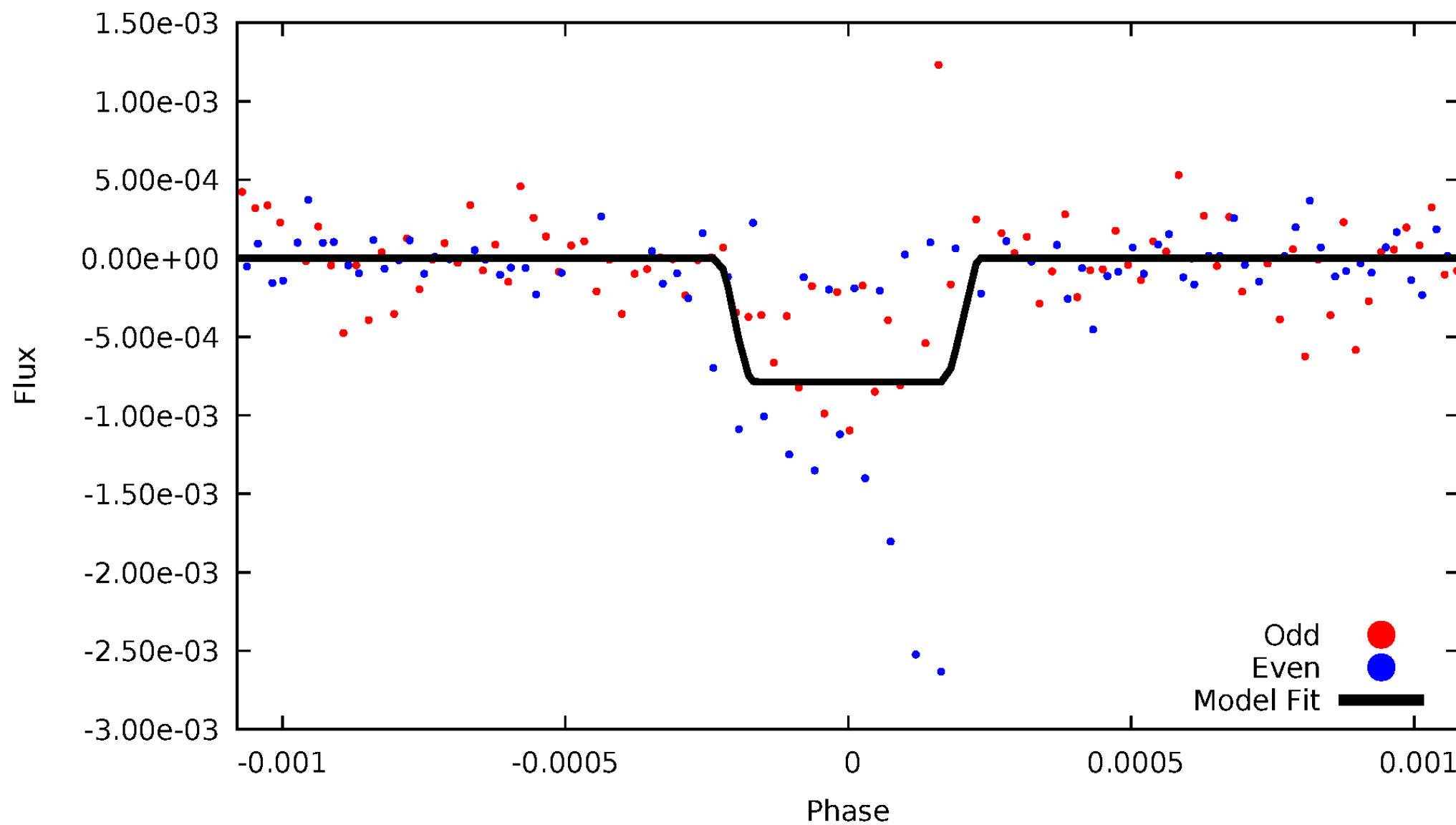
DV Odd/Even

TCE 003945784-03



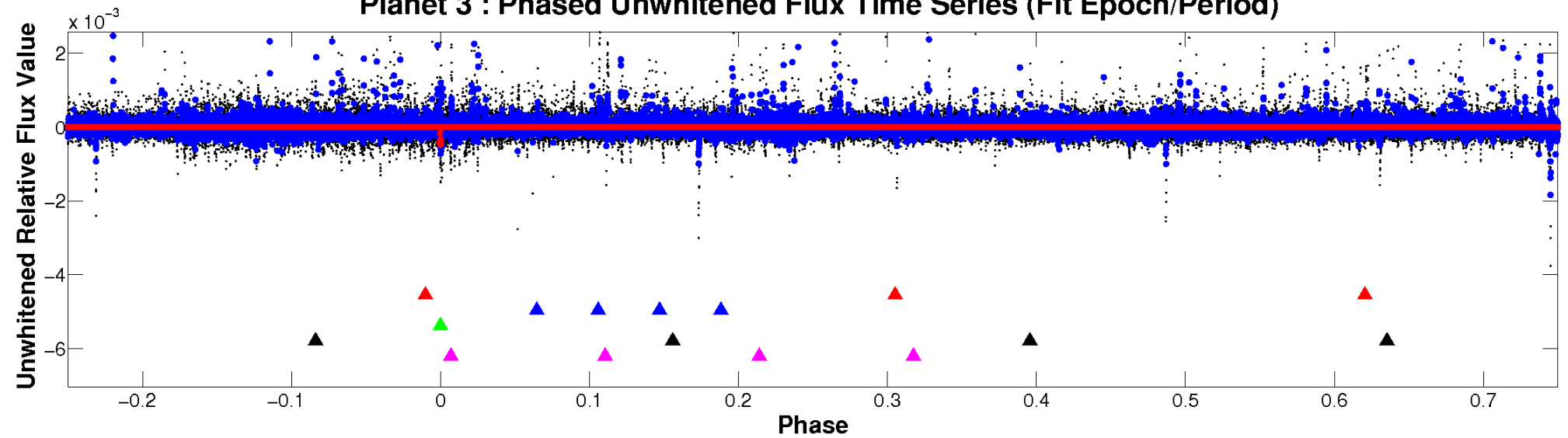
ALT Odd/Even

TCE 003945784-03

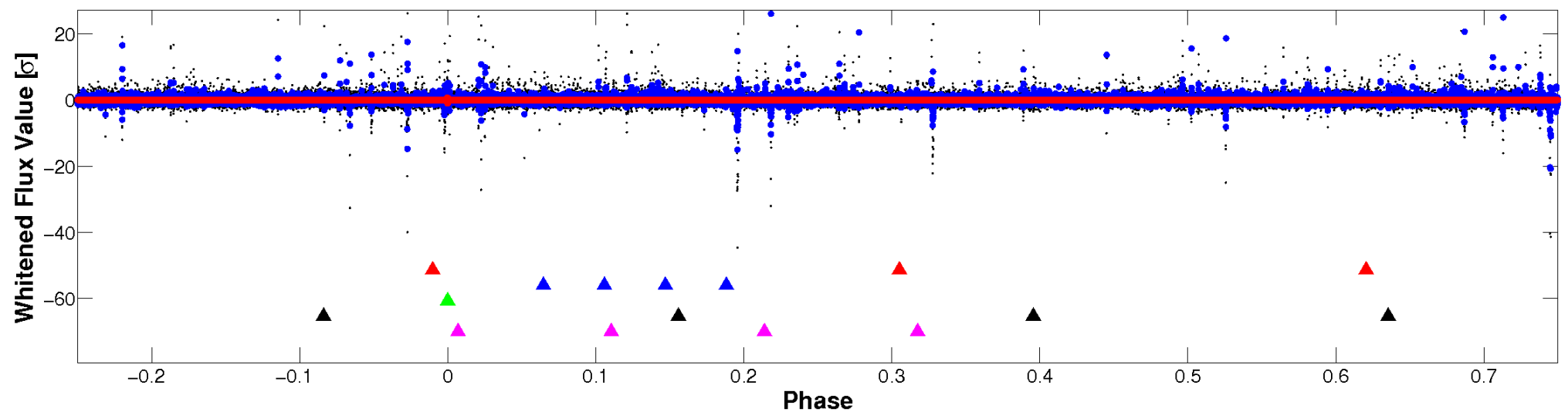


Non-Whitened Vs. Whitened Light Curve

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

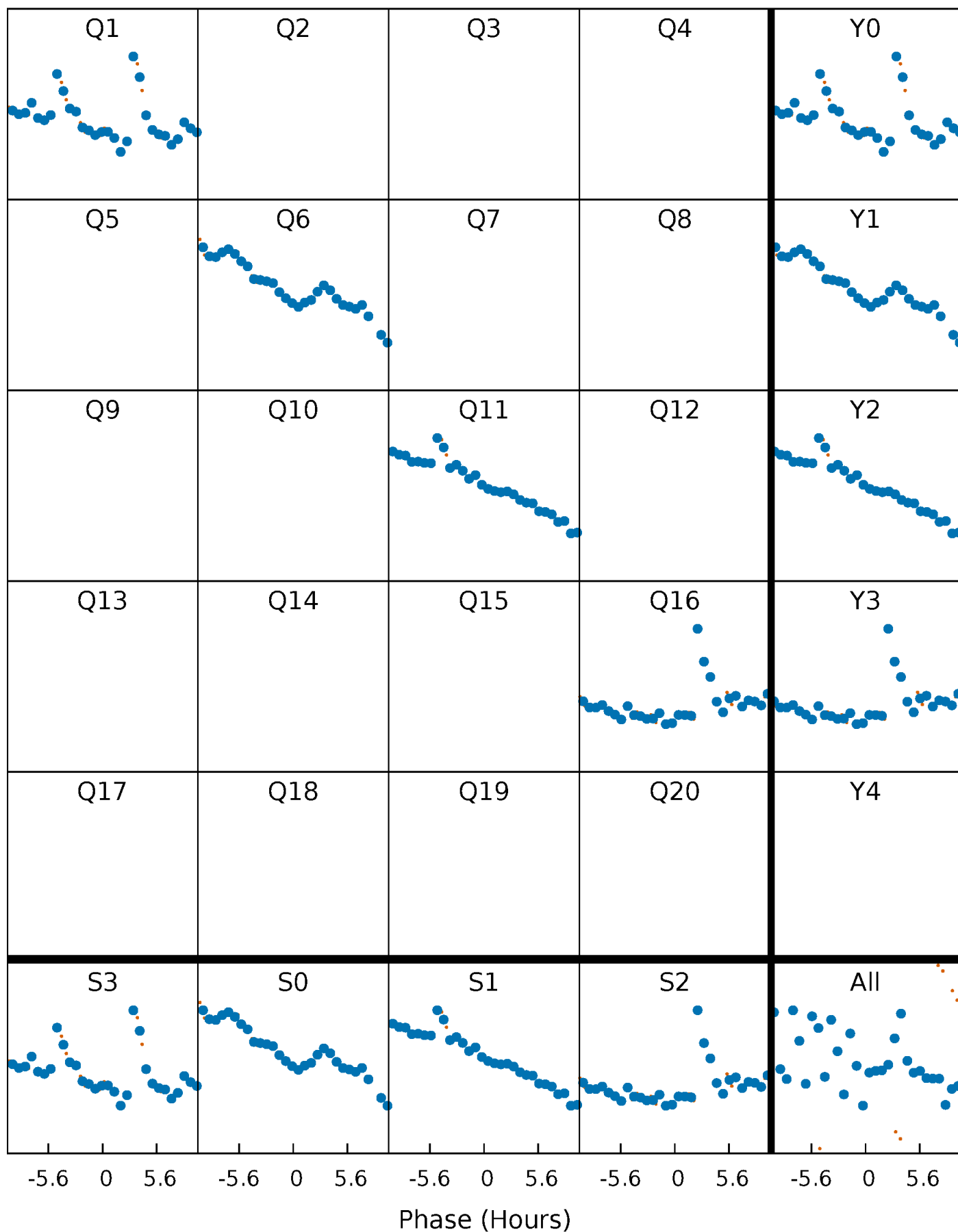


Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



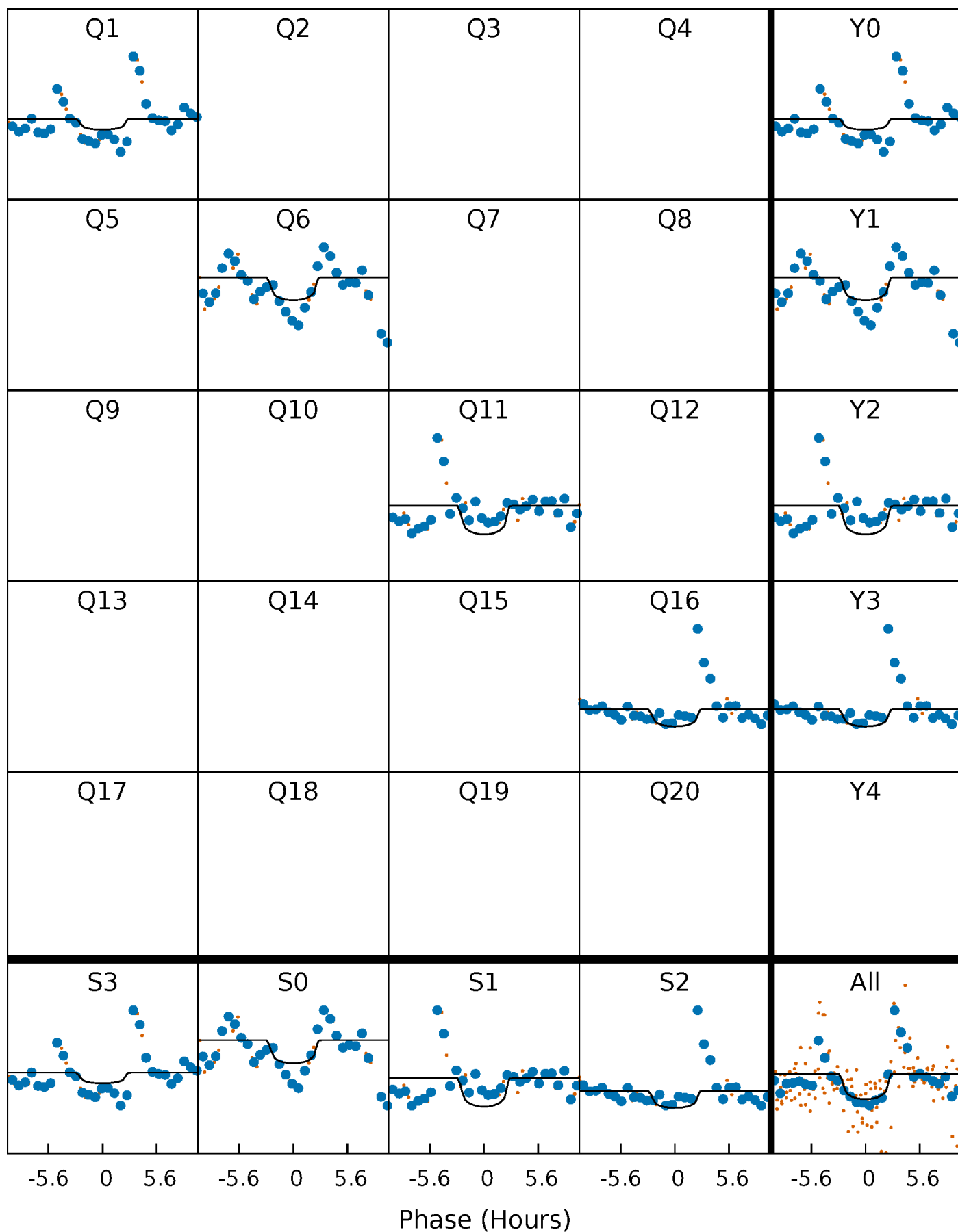
PDC Quarter-Phased Transit Curves

TCE 003945784-03 $P=456.957341$ Days $T_0=161.809761$ (BKJD)



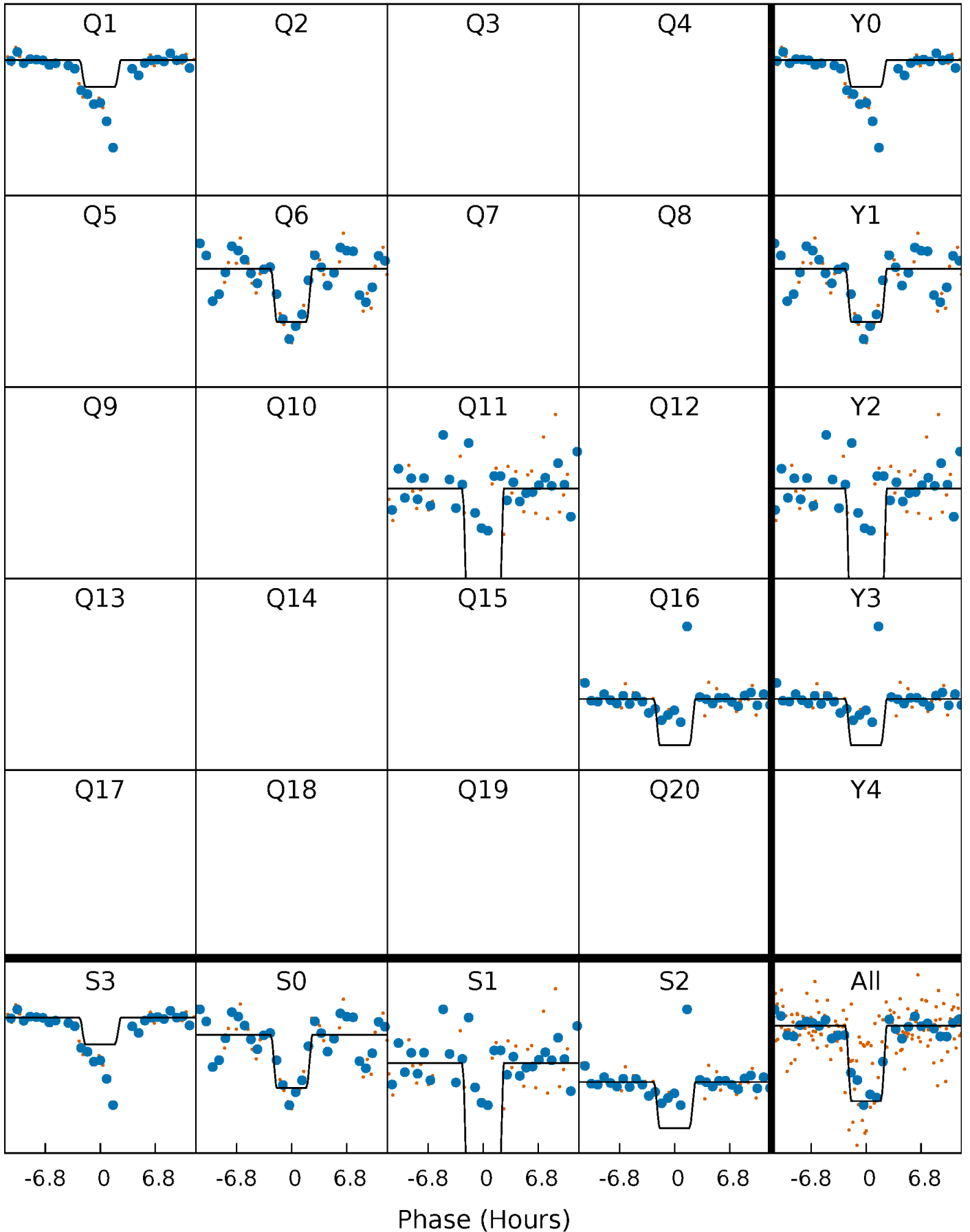
DV Quarter-Phased Transit Curves

TCE 003945784-03 P=456.957341 Days $T_0=161.809761$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

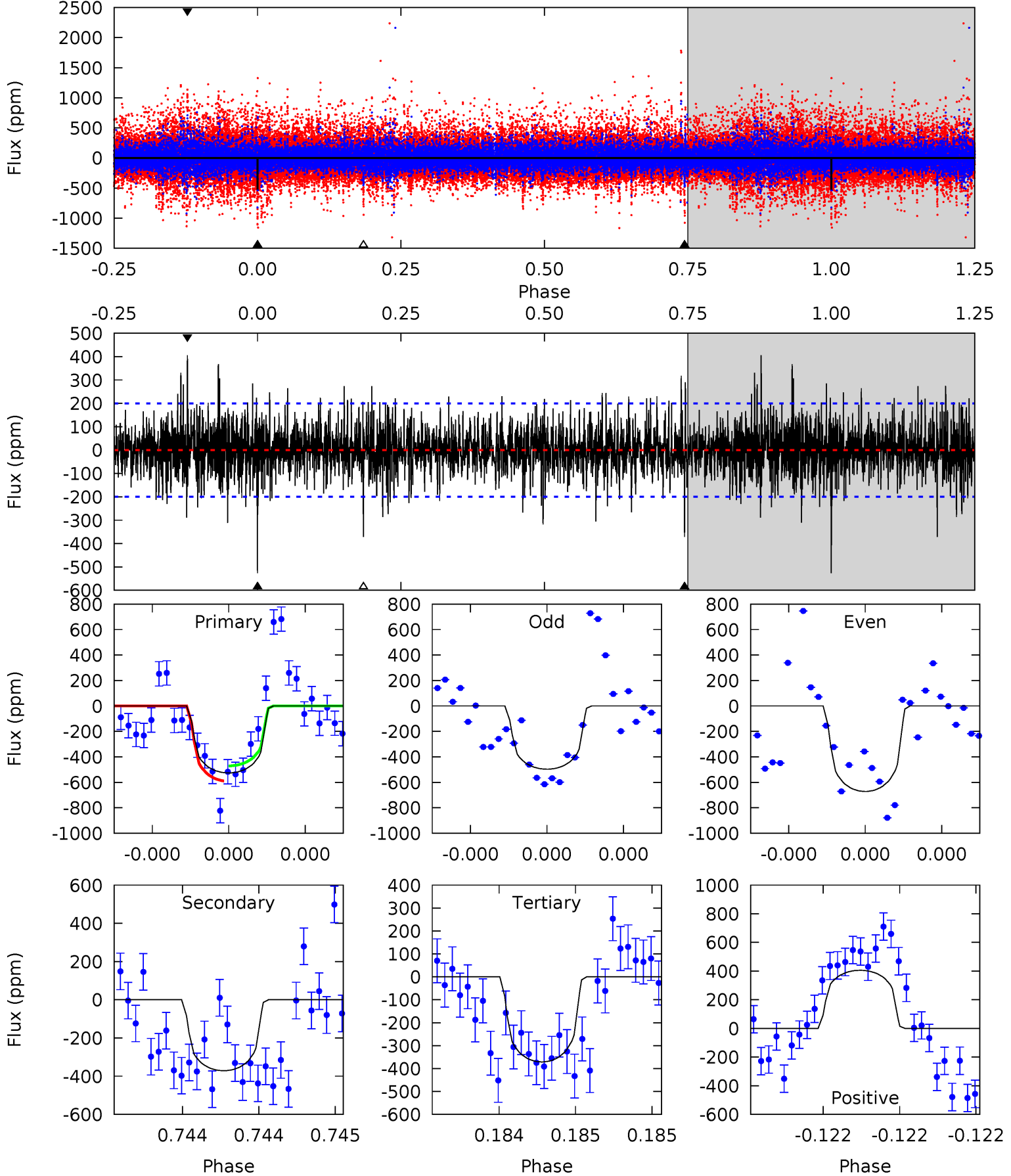
TCE 003945784-03 $P=456.969325$ Days $T_0=161.823744$ (BKJD)



DV Model-Shift Uniqueness Test

003945784-03, P = 456.957341 Days, E = 161.809761 Days

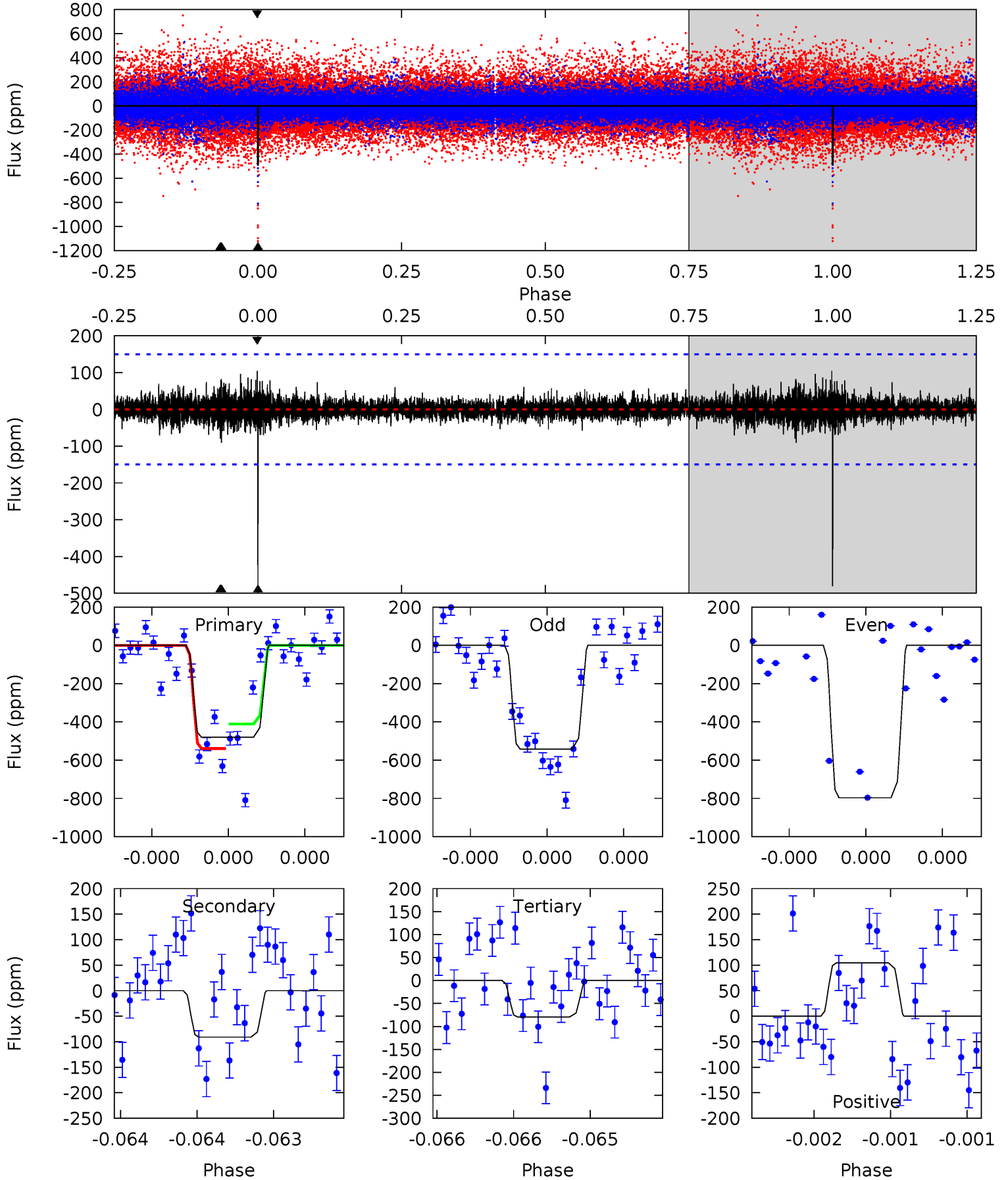
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
14.7	10.4	10.4	11.4	5.59	3.50	2.11	4.34	3.38	0.00	-0.96	2.09	1.19	0.44	1.66



Alt Model-Shift Uniqueness Test

003945784-03, P = 456.969325 Days, E = 161.823744 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
18.0	3.40	2.97	3.91	5.60	3.52	0.59	15.0	14.1	0.43	-0.51	5.10	1.54	0.18	2.42



Stellar Parameters For KIC 003945784

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	$M(M_{\odot})$	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	4979^{+149}_{-149}	$4.668^{+0.054}_{-0.032}$	$-1.060^{+0.350}_{-0.300}$	$0.588^{+0.045}_{-0.037}$	$0.587^{+0.051}_{-0.022}$	$4.069^{+0.794}_{-0.552}$
	+3%/-3%	+1%/-1%	+33%/-28%	+8%/-6%	+9%/-4%	+20%/-14%
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 003945784-03 / KOI

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-371 ± 36	$3.45^{+3.10}_{-2.34}$	237^{+8}_{-8}	3426^{+1842}_{-579}	$16856^{+149411}_{-12243}$
Alt.	-91 ± 27	$3.56^{+3.04}_{-2.38}$	238^{+9}_{-7}	2747^{+1105}_{-381}	3581^{+29272}_{-2556}

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

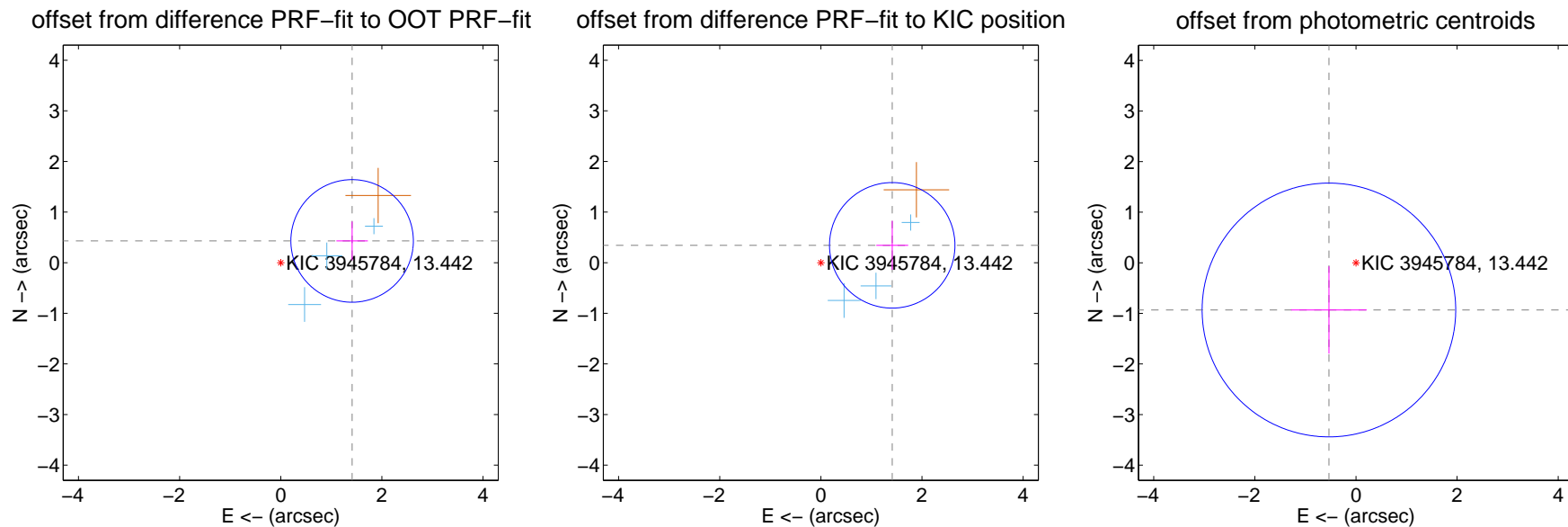
DV Centroid Data

Supplemental centroid analysis for 003945784-03. Kepler magnitude: 13.44. Transit SNR 6.50

There are 3 quarters with good PRF difference image offsets

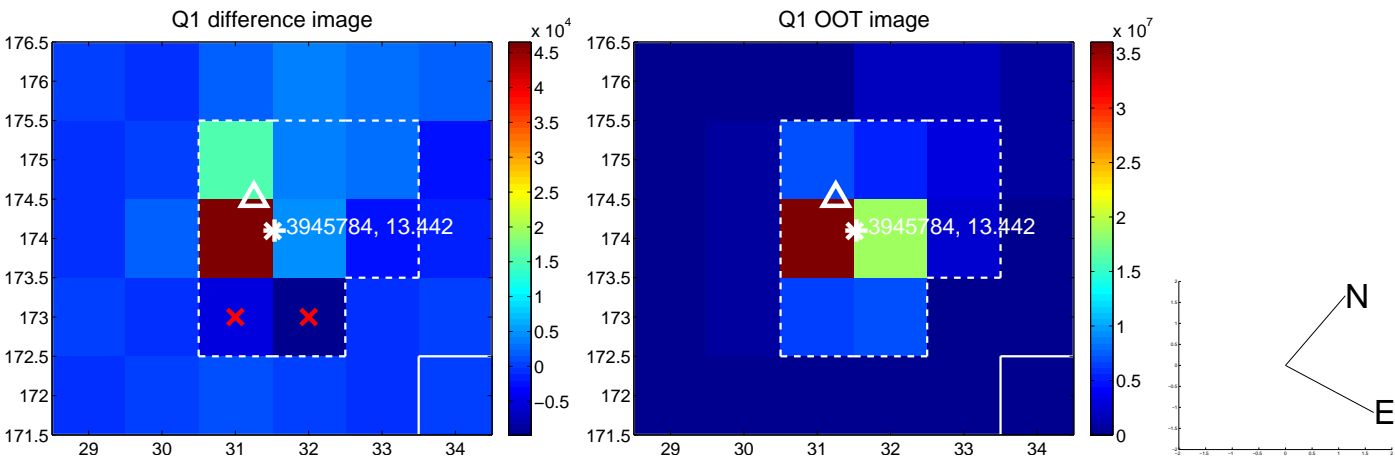
The direct PRF centroid is offset from the target star catalog position by about 0.08 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	1.475 ± 0.404	3.65	-1.411 ± 0.312	0.430 ± 0.382
PRF-fit source offset from KIC position	1.452 ± 0.413	3.51	-1.411 ± 0.316	0.343 ± 0.484
photometric centroid source offset	1.08 ± 0.84	1.29	0.53 ± 0.75	-0.93 ± 0.86

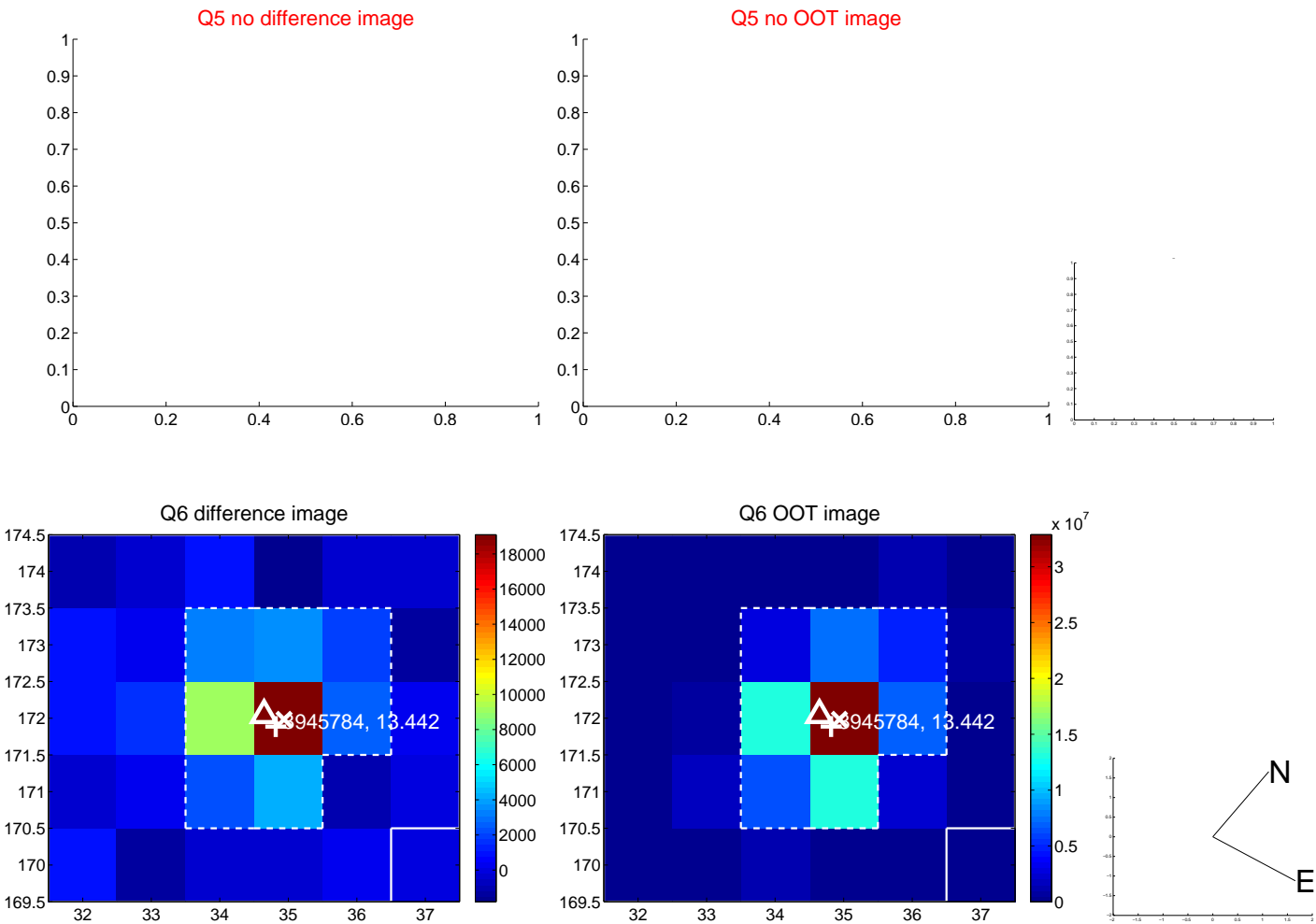


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

Q9 no difference image



Q9 no OOT image



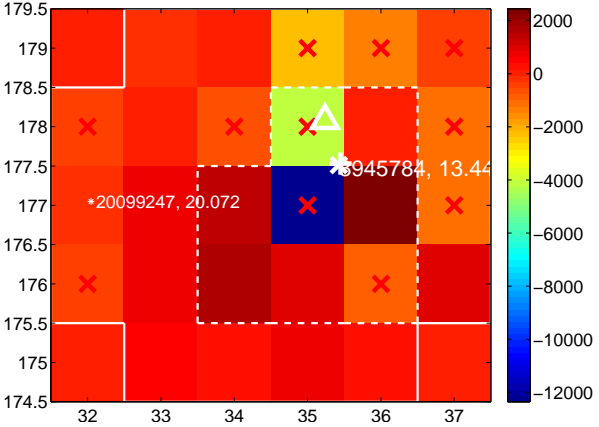
Q10 no difference image



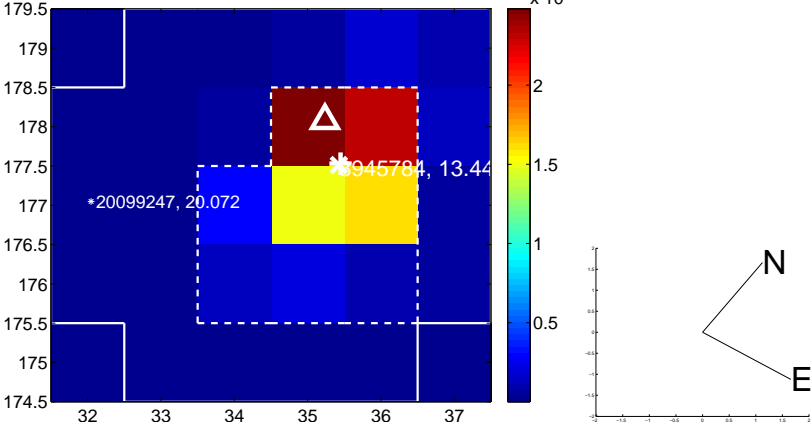
Q10 no OOT image



Q11 difference image. Poor Quality



Q11 OOT image



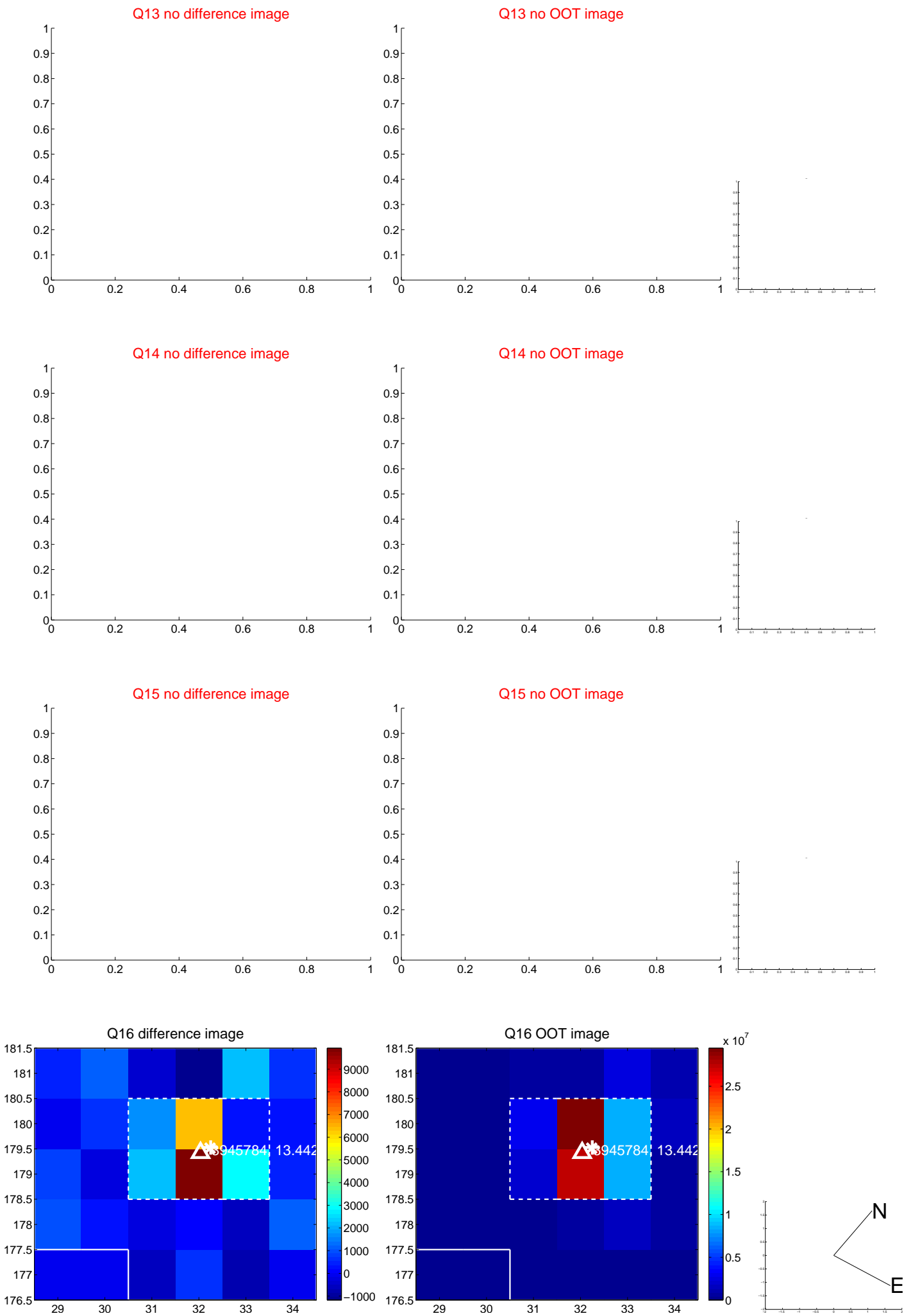
Q12 no difference image



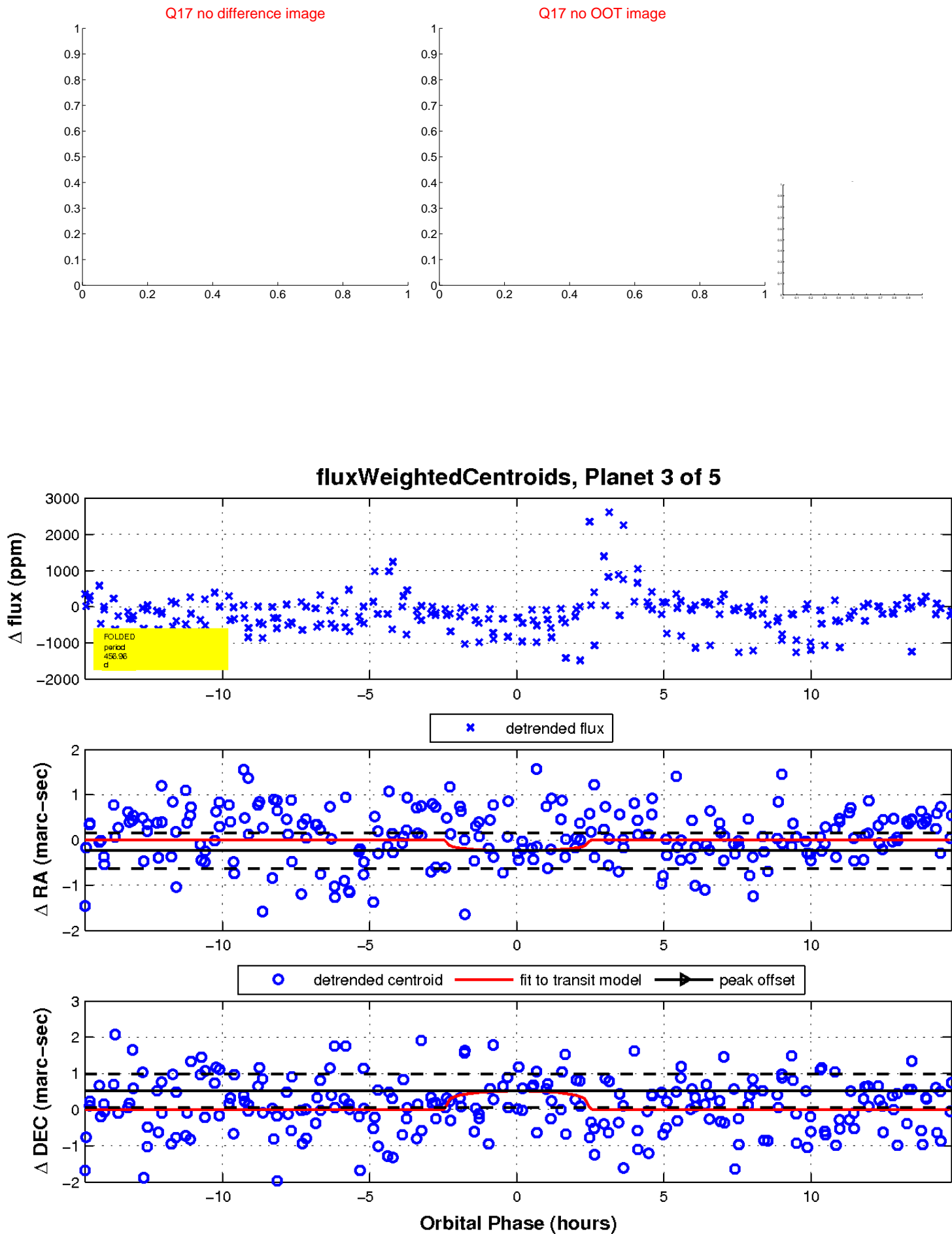
Q12 no OOT image



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

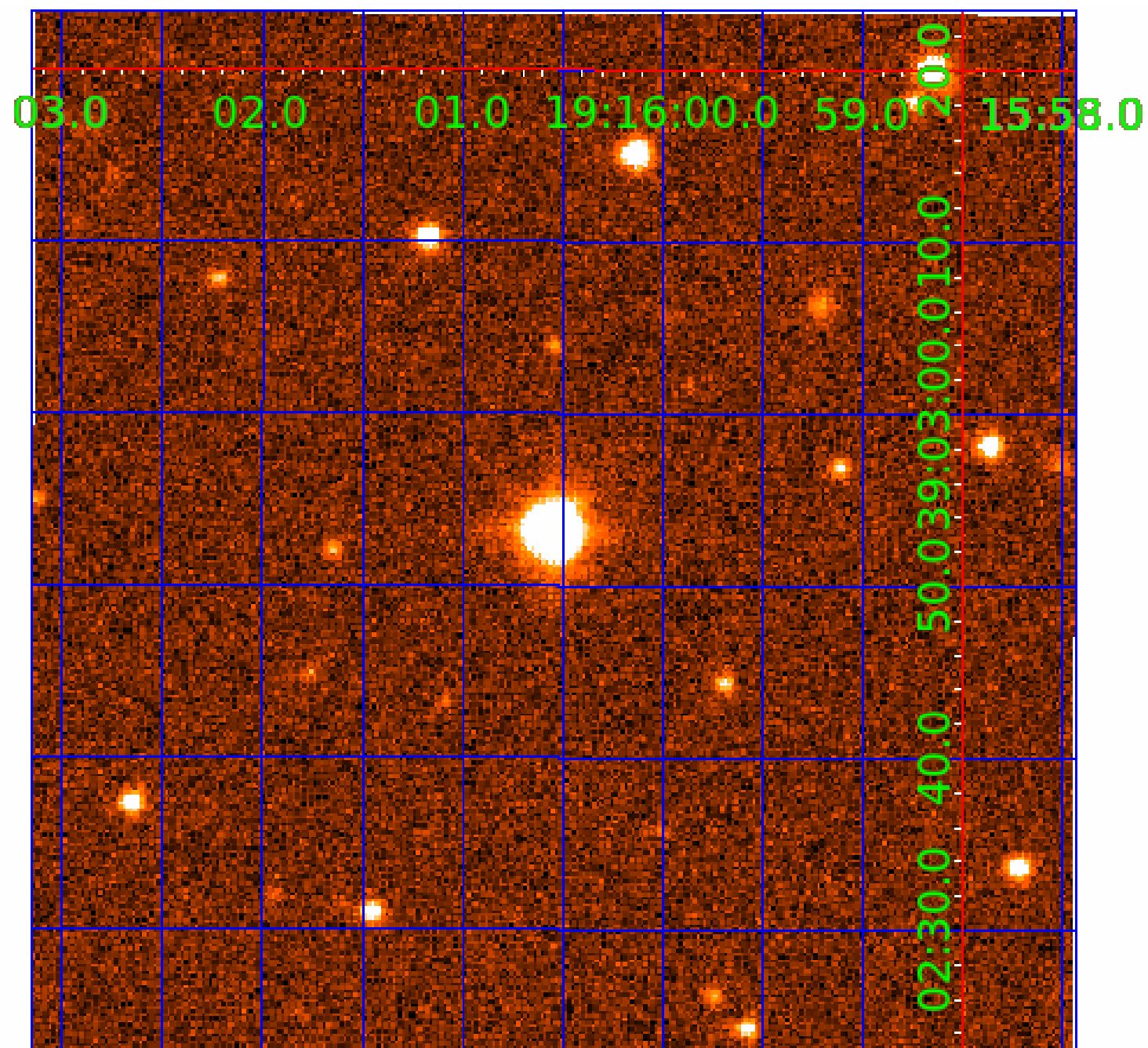


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 003945784

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})
003945784-01	OBS	No	601.042878	157.176841	740.5	4.679	14.2	10.0	0.59	4979	1.73	0.14
003945784-03	OBS	No	456.957341	161.809761	483.6	4.930	9.2	6.5	0.59	4979	1.31	0.20
003945784-04	OBS	No	347.402756	452.152653	357.5	5.843	10.3	5.6	0.59	4979	1.20	0.29
003945784-05	OBS	No	409.660386	306.892157	361.7	6.570	9.9	5.8	0.59	4979	1.19	0.23

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003945784-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
003945784-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES
003945784-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_ZUMA—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS
003945784-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV

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

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

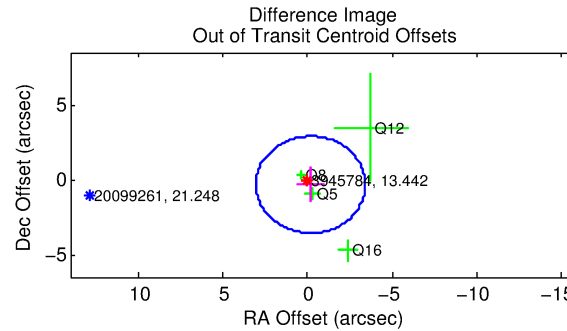
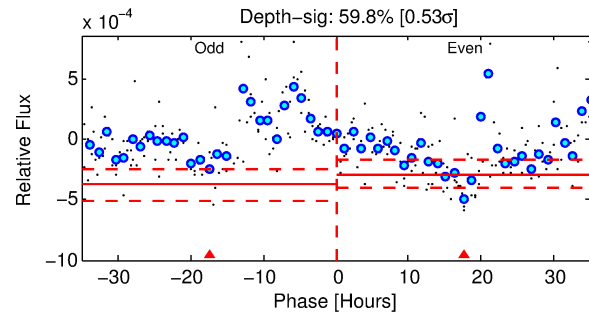
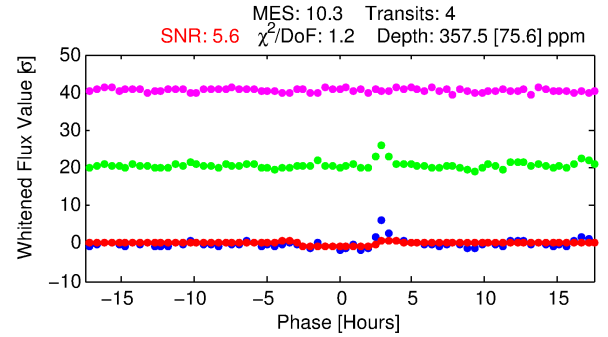
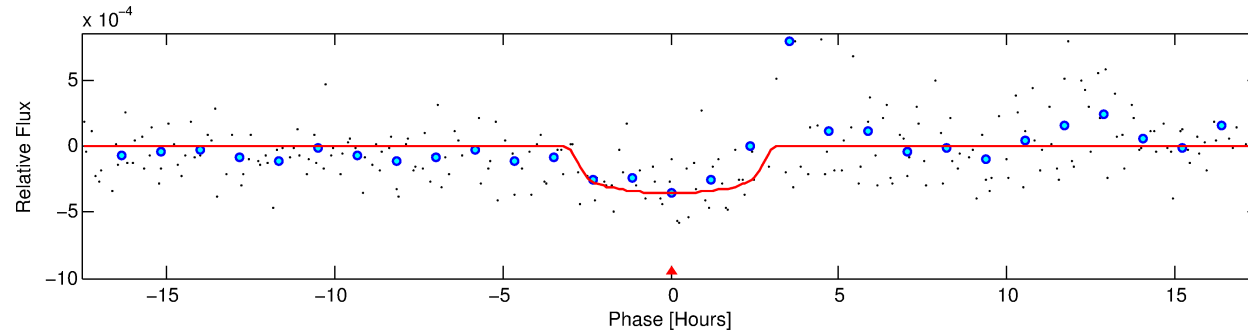
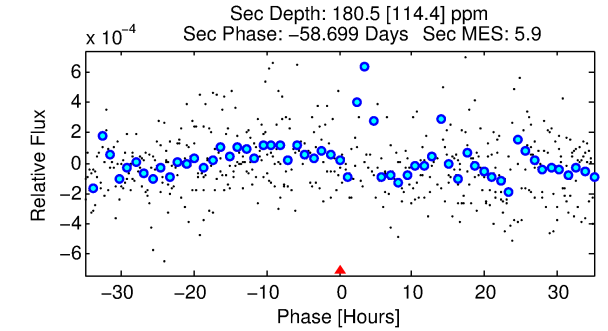
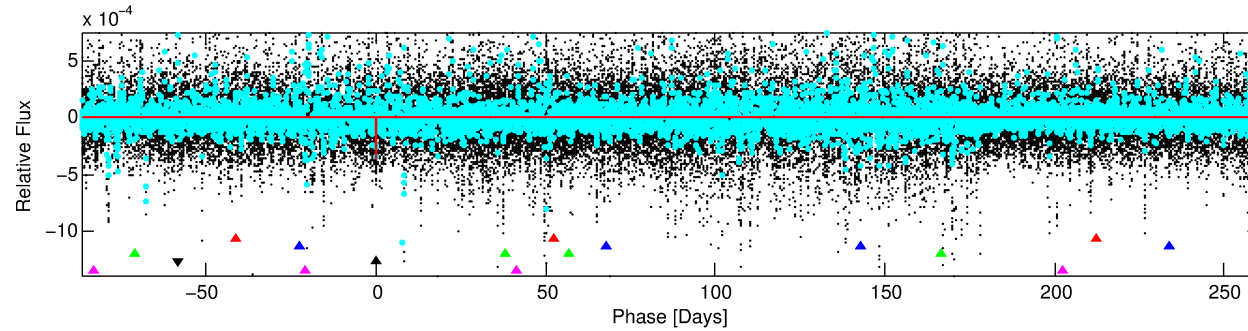
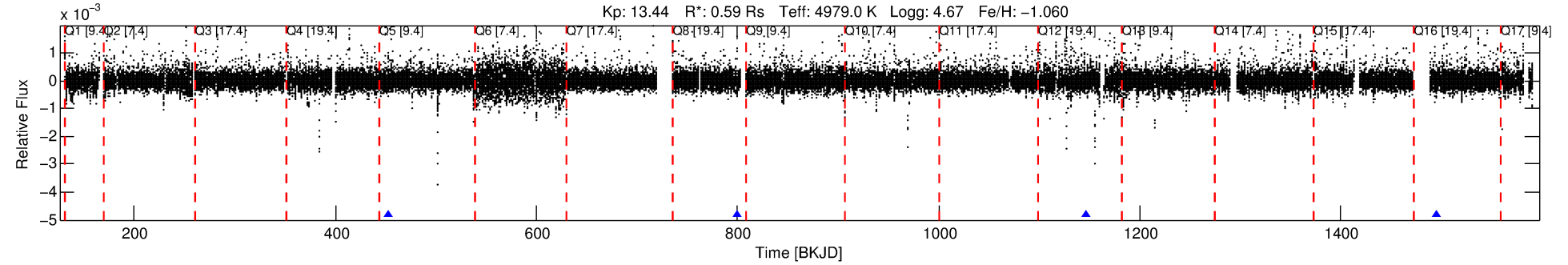
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 003945784-04

No Significant Match Found

DV One-Page Summary

KIC: 3945784 Candidate: 4 of 5 Period: 347.403 d



DV Fit Results:

Period = 347.40276 [0.00642] d
Epoch = 452.1527 [0.0117] BKJD
Rp/R* = 0.0187 [0.0318]
a/R* = 319.26 [2195.52]
b = 0.74 [4.33]
Seff = 0.29 [0.04]
Teq = 187 [7] K
Rp = 1.20 [2.04] Re
a = 0.8100 [0.0532] AU
Ag = 45151.62 [156080.96] [0.29 σ]
Teffp = 4218 [3646] K [1.11 σ]

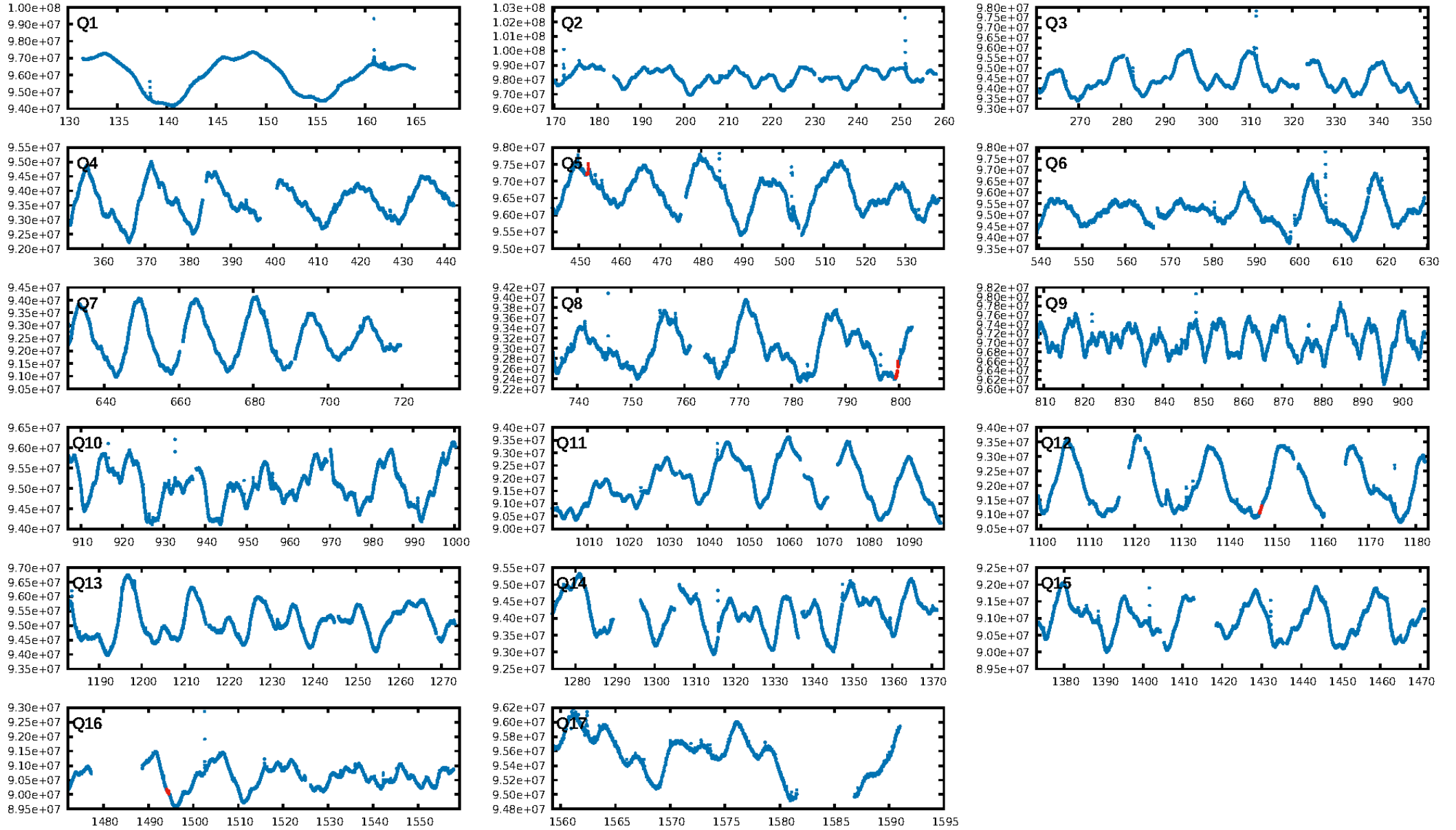
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 100.0% [169.93 σ]
ModelChiSquare2-sig: 3.1%
ModelChiSquareGof-sig: 88.3%
Bootstrap-pfa: 2.07e-08
RollingBand-fgt: 1.00 [4/4]
GhostDiagnostic-chr: -9.282
Centroid-sig: 7.7%
Centroid-so: 1.054 arcsec [1.03 σ]
OotOffset-rm: 0.376 arcsec [0.35 σ]
OotOffset-st: 0/0/3/1 [4]
KicOffset-rm: 0.276 arcsec [0.19 σ]
KicOffset-st: 0/0/3/1 [4]
DiffImageQuality-fgm: 0.50 [2/4]
DiffImageOverlap-fno: 1.00 [4/4]

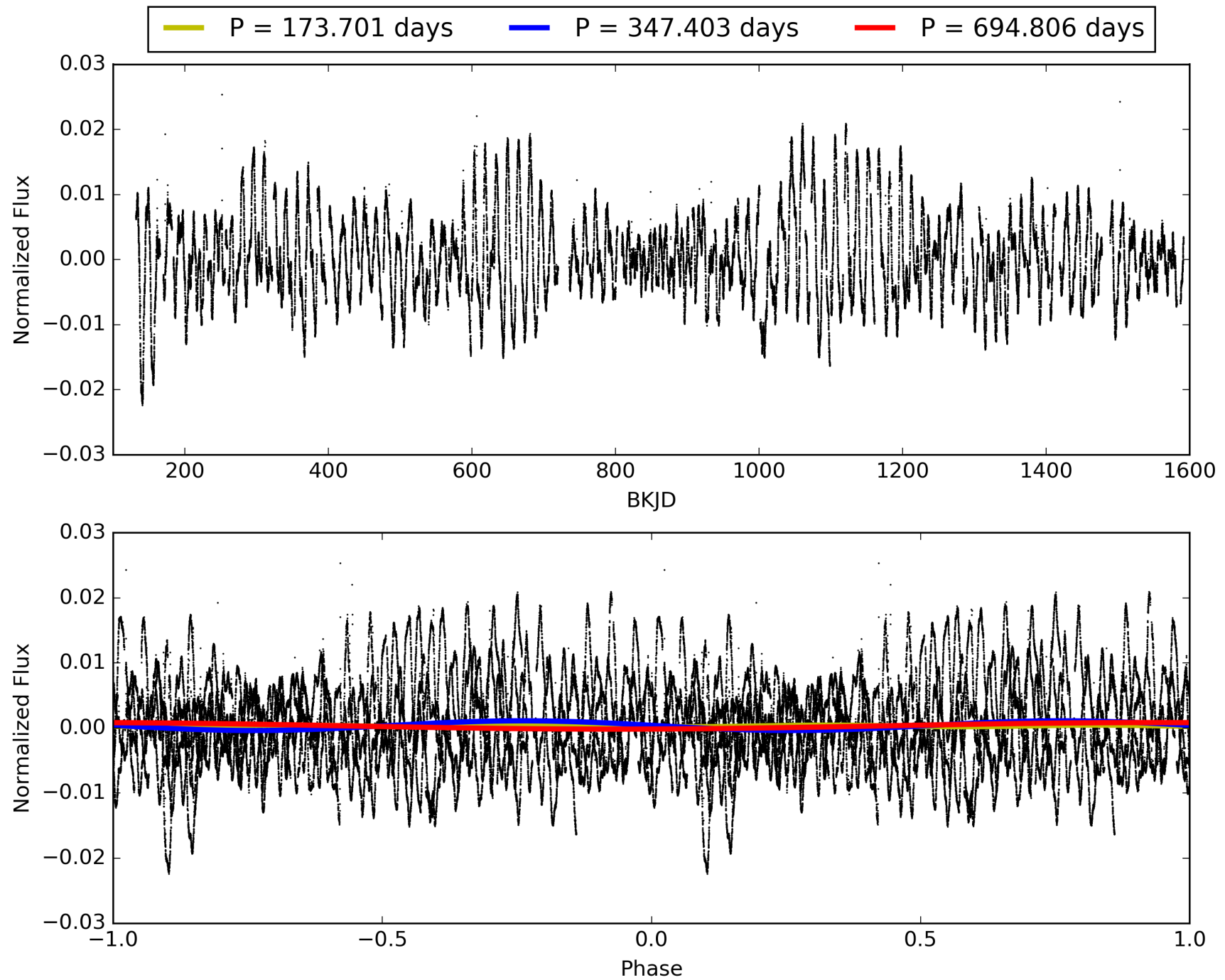
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 23:53:52 Z

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

TCE 003945784-04, PDC Light Curves

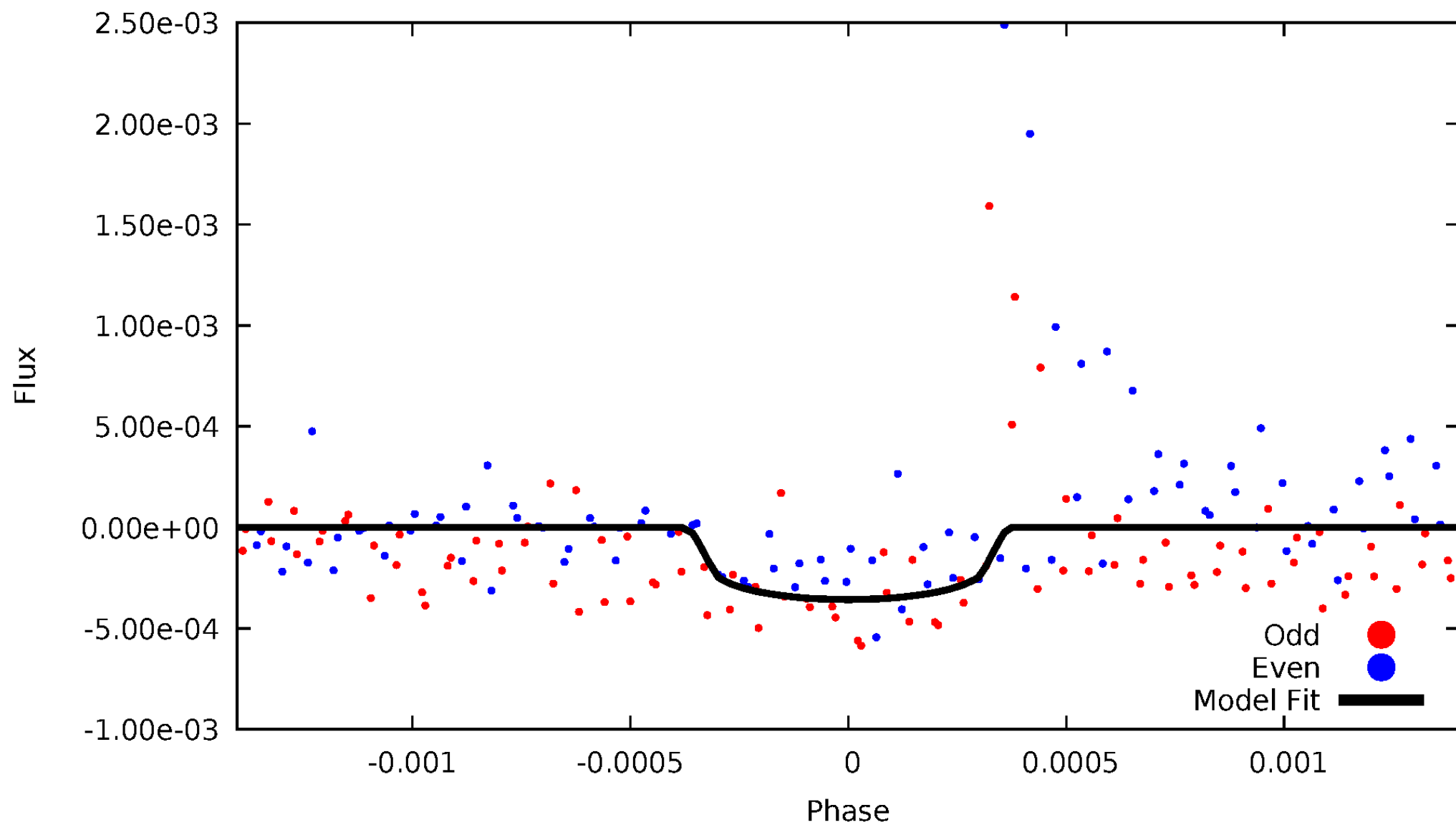


TCE 003945784-04



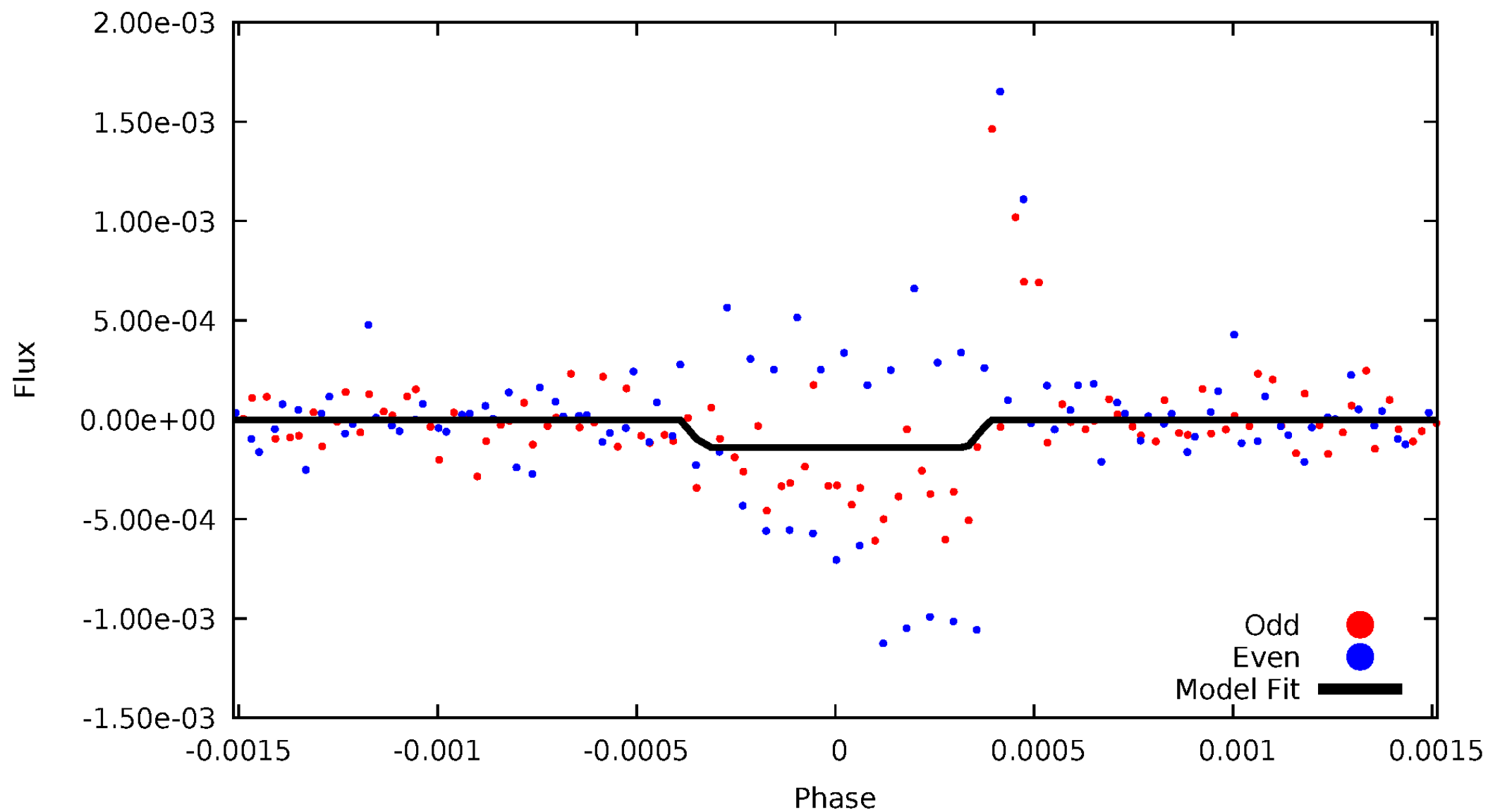
DV Odd/Even

TCE 003945784-04



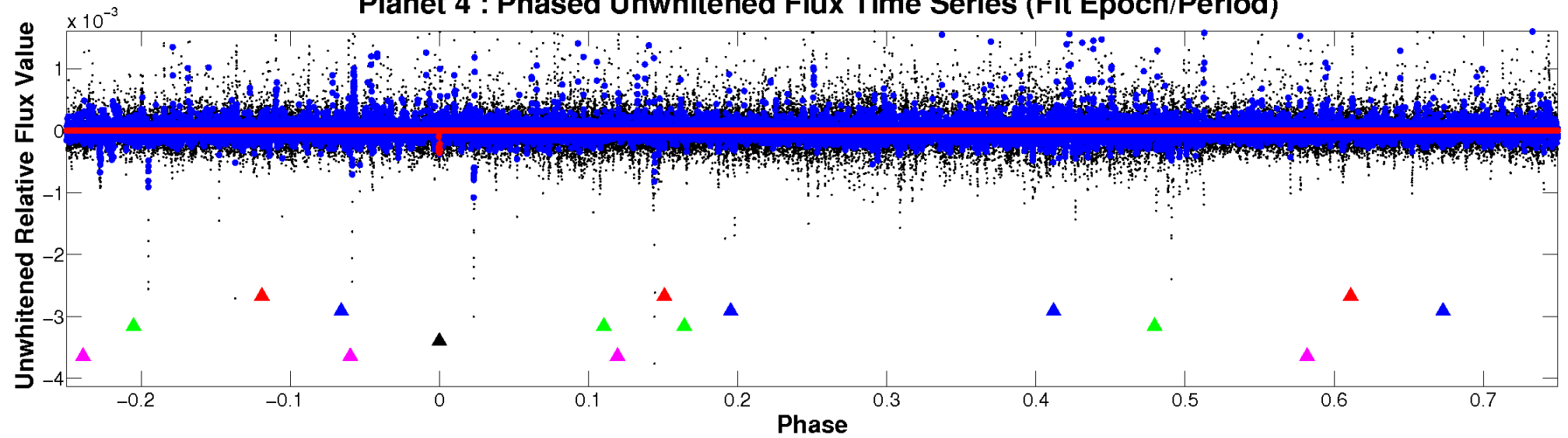
ALT Odd/Even

TCE 003945784-04

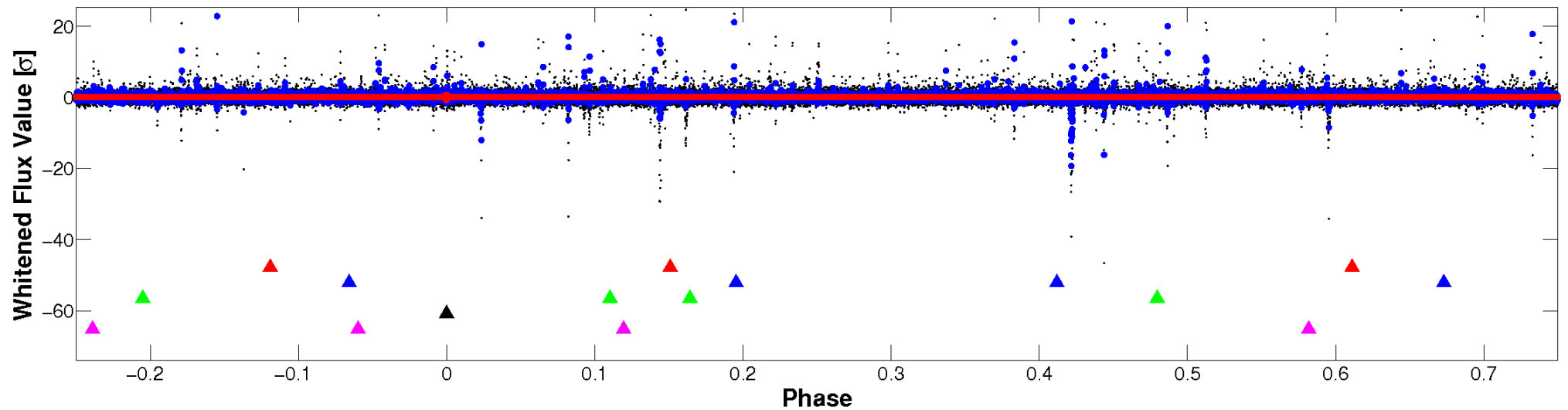


Non-Whitened Vs. Whitened Light Curve

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

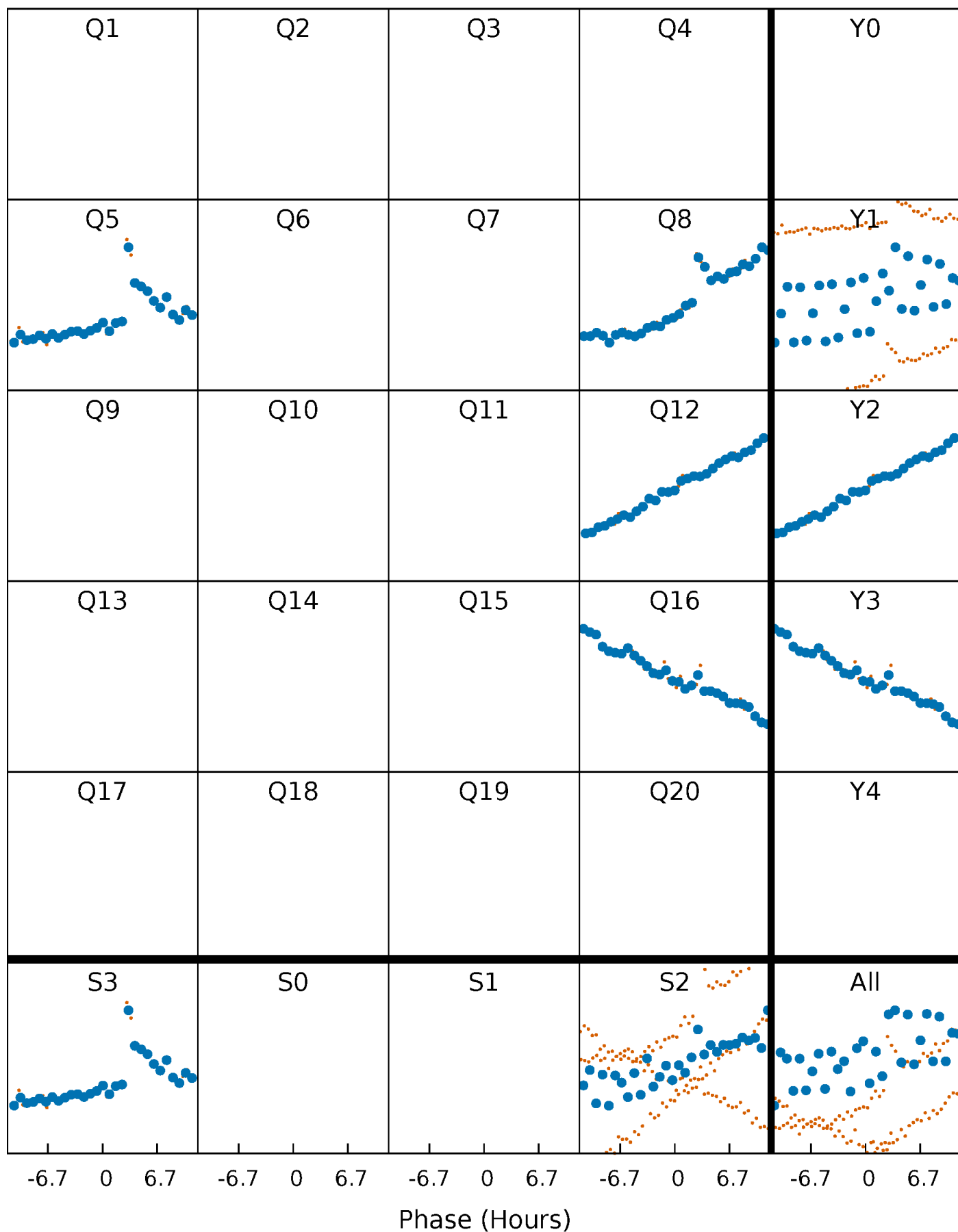


Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



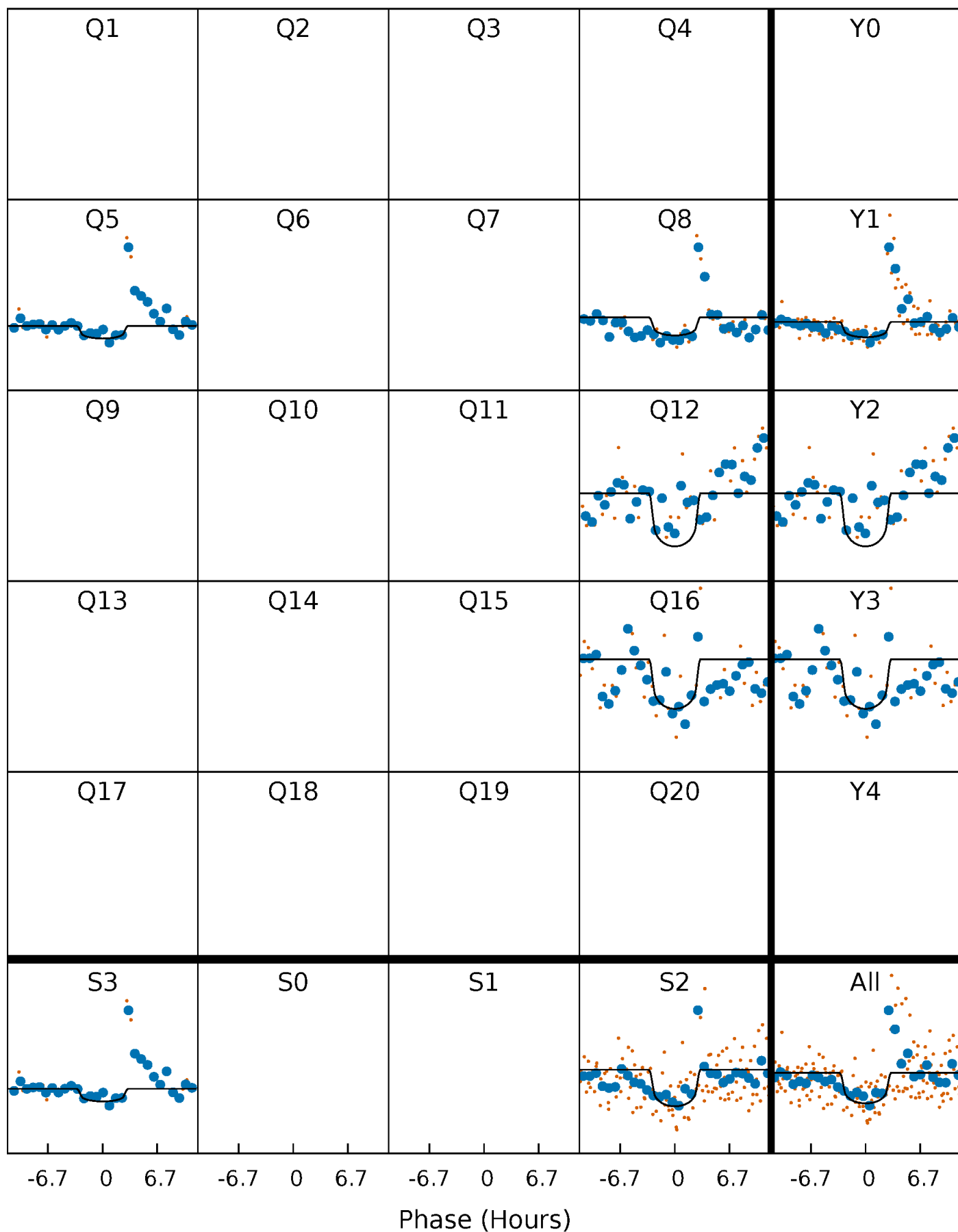
PDC Quarter-Phased Transit Curves

TCE 003945784-04 $P=347.402756$ Days $T_0=452.152653$ (BKJD)



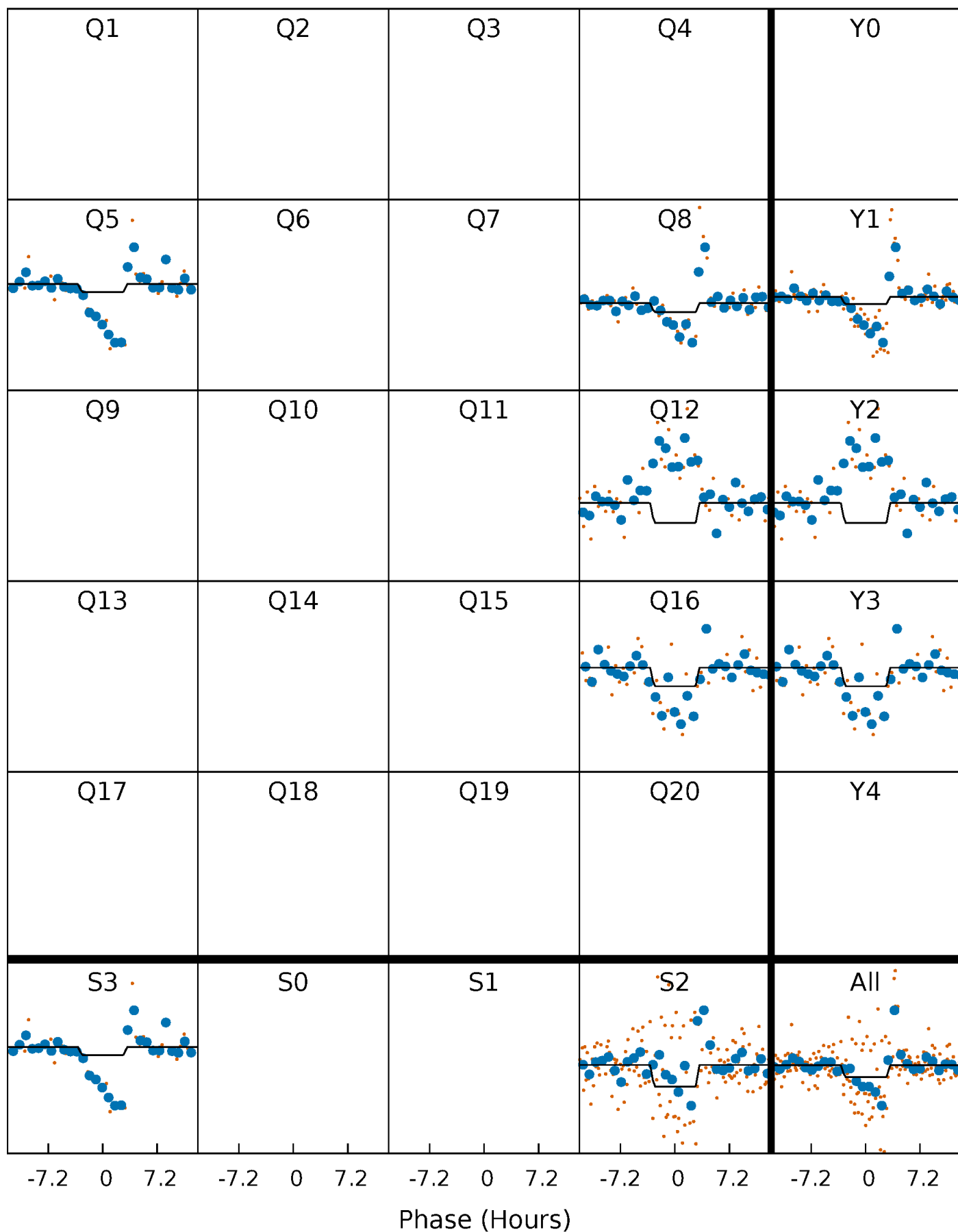
DV Quarter-Phased Transit Curves

TCE 003945784-04 $P=347.402756$ Days $T_0=452.152653$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

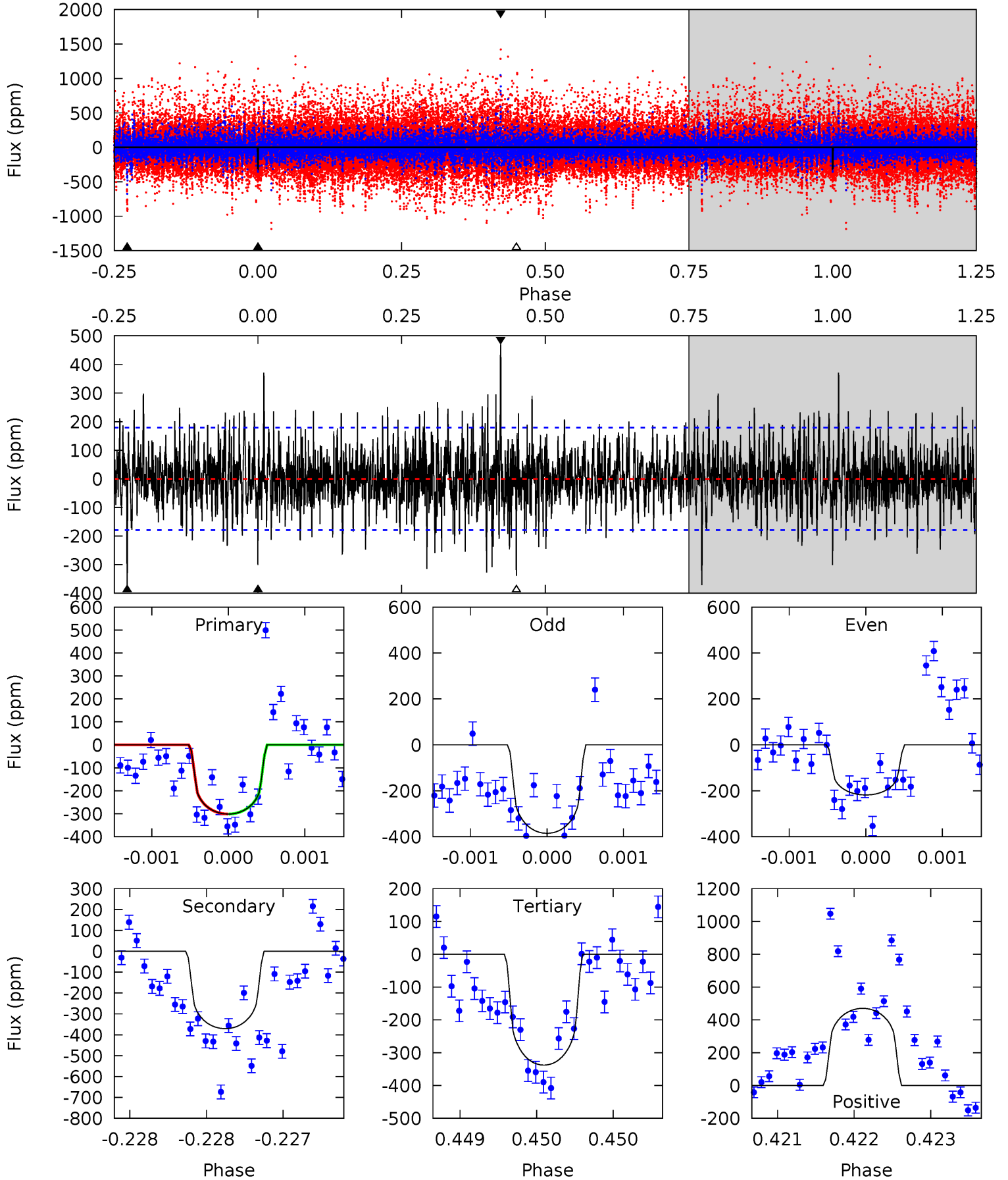
TCE 003945784-04 $P=347.397765$ Days $T_0=452.133138$ (BKJD)



DV Model-Shift Uniqueness Test

003945784-04, P = 347.402756 Days, E = 104.749897 Days

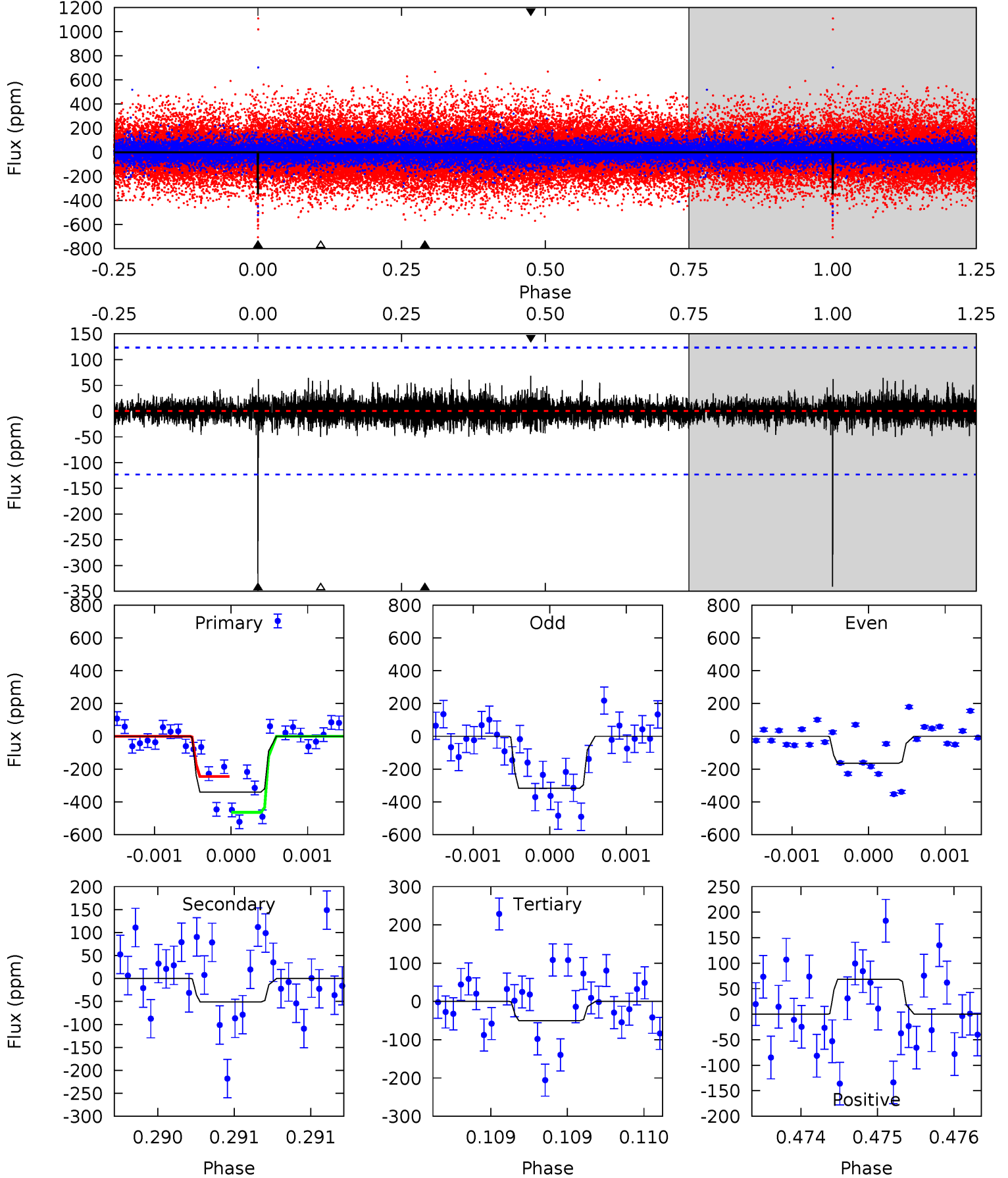
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.28	11.4	10.4	14.5	5.50	3.37	2.43	-1.13	-5.19	1.01	-3.06	2.27	0.88	0.56	0.00



Alt Model-Shift Uniqueness Test

003945784-04, P = 347.397765 Days, E = 104.735373 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	2.28	2.24	3.06	5.50	3.37	0.59	13.0	12.1	0.04	-0.78	3.90	0.81	0.17	4.97



Stellar Parameters For KIC 003945784

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	$M(M_{\odot})$	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	4979^{+149}_{-149}	$4.668^{+0.054}_{-0.032}$	$-1.060^{+0.350}_{-0.300}$	$0.588^{+0.045}_{-0.037}$	$0.587^{+0.051}_{-0.022}$	$4.069^{+0.794}_{-0.552}$
	+3%/-3%	+1%/-1%	+33%/-28%	+8%/-6%	+9%/-4%	+20%/-14%
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 003945784-04 / KOI

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-371 ± 32	$1.98^{+1.64}_{-1.28}$	260^{+10}_{-9}	4157^{+2473}_{-786}	$34296^{+241710}_{-24322}$
Alt.	-51 ± 22	$1.75^{+1.55}_{-1.26}$	260^{+9}_{-9}	3082^{+1647}_{-552}	5524^{+67742}_{-4218}

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

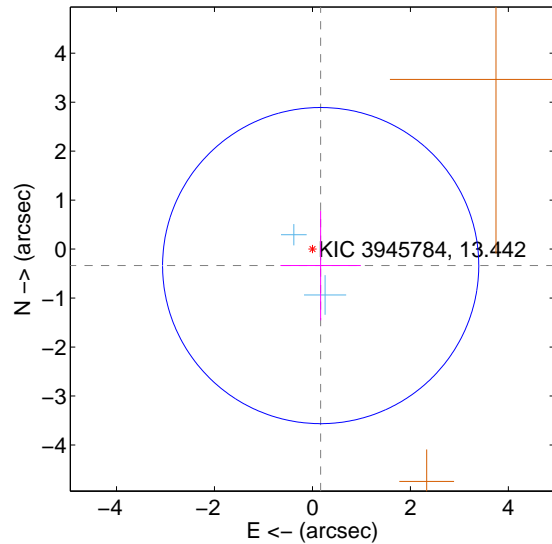
Supplemental centroid analysis for 003945784-04. Kepler magnitude: 13.44. Transit SNR 5.64

There are 2 quarters with good PRF difference image offsets

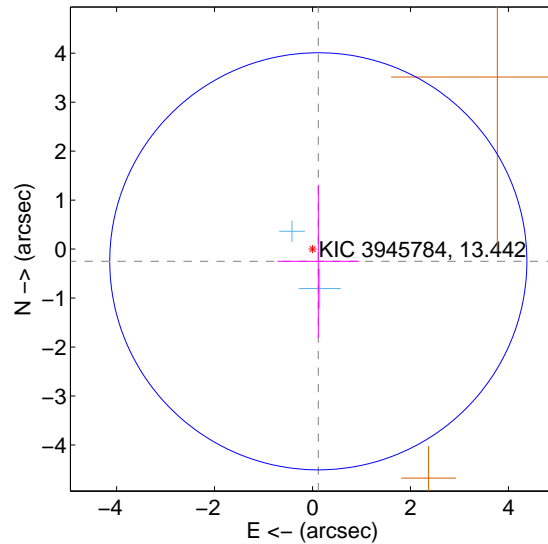
The direct PRF centroid is offset from the target star catalog position by about 0.08 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.376 ± 1.076	0.35	-0.168 ± 0.821	-0.337 ± 1.117
PRF-fit source offset from KIC position	0.276 ± 1.419	0.19	-0.118 ± 0.834	-0.249 ± 1.563
photometric centroid source offset	1.05 ± 1.02	1.03	0.30 ± 0.96	-1.01 ± 1.03

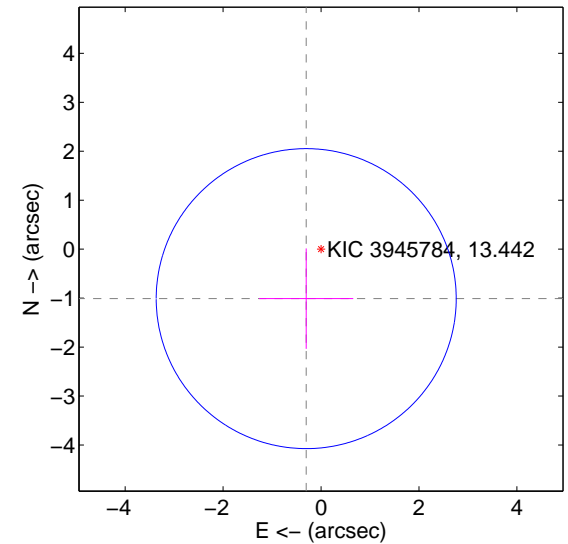
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



offset from photometric centroids

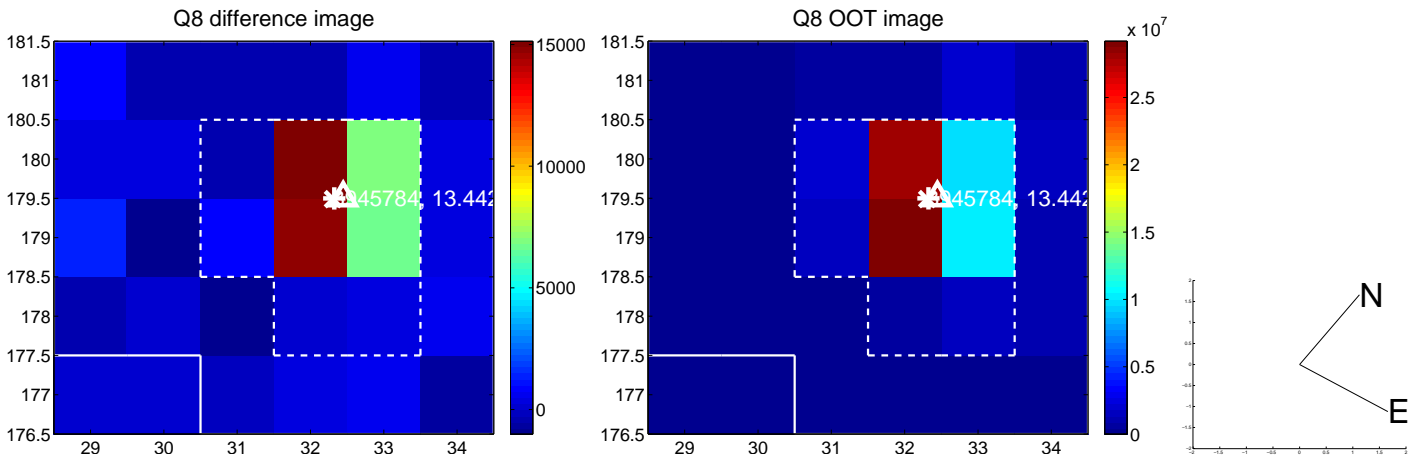
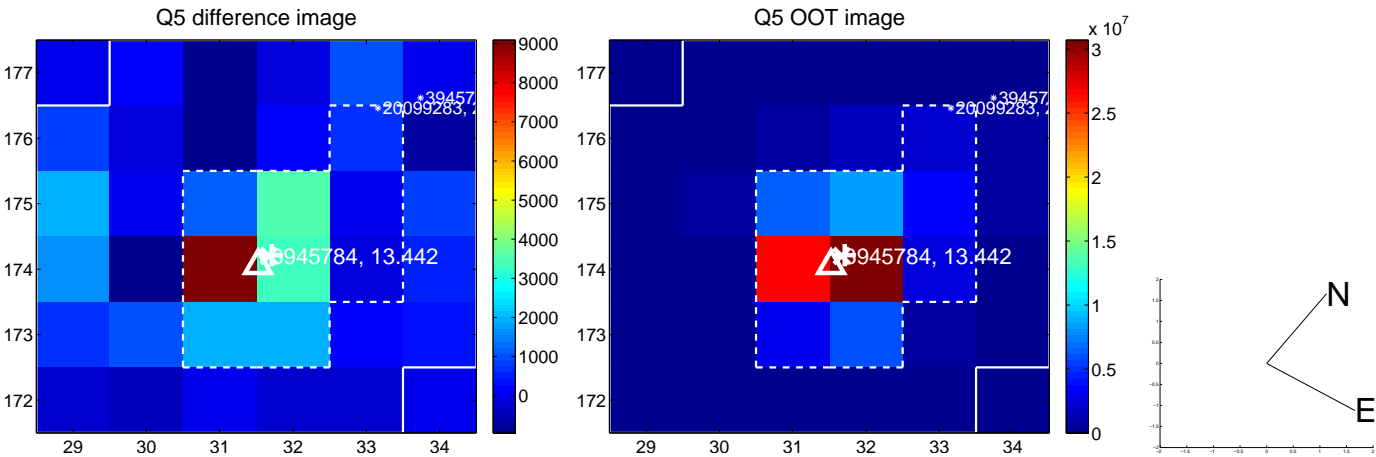


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

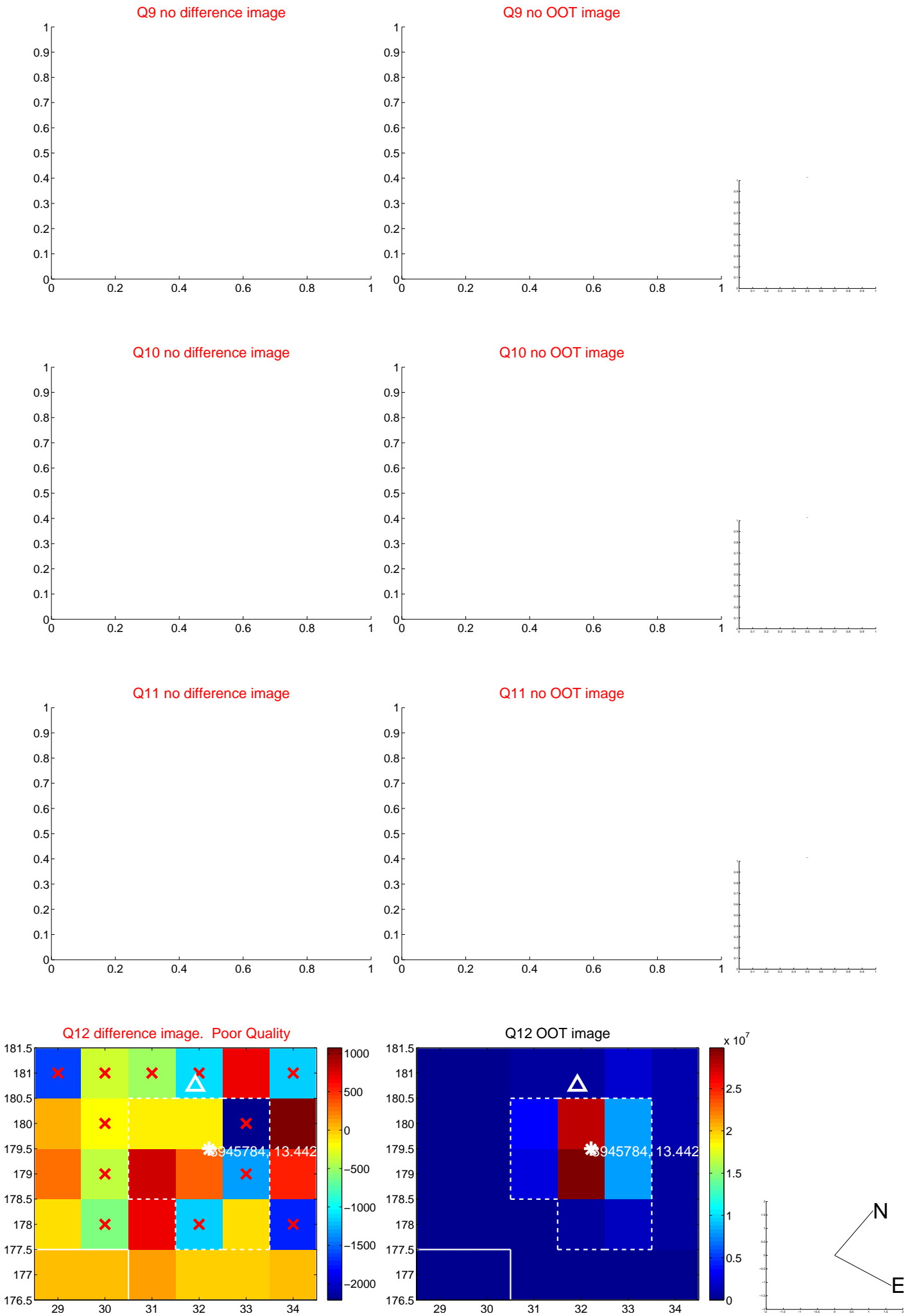
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



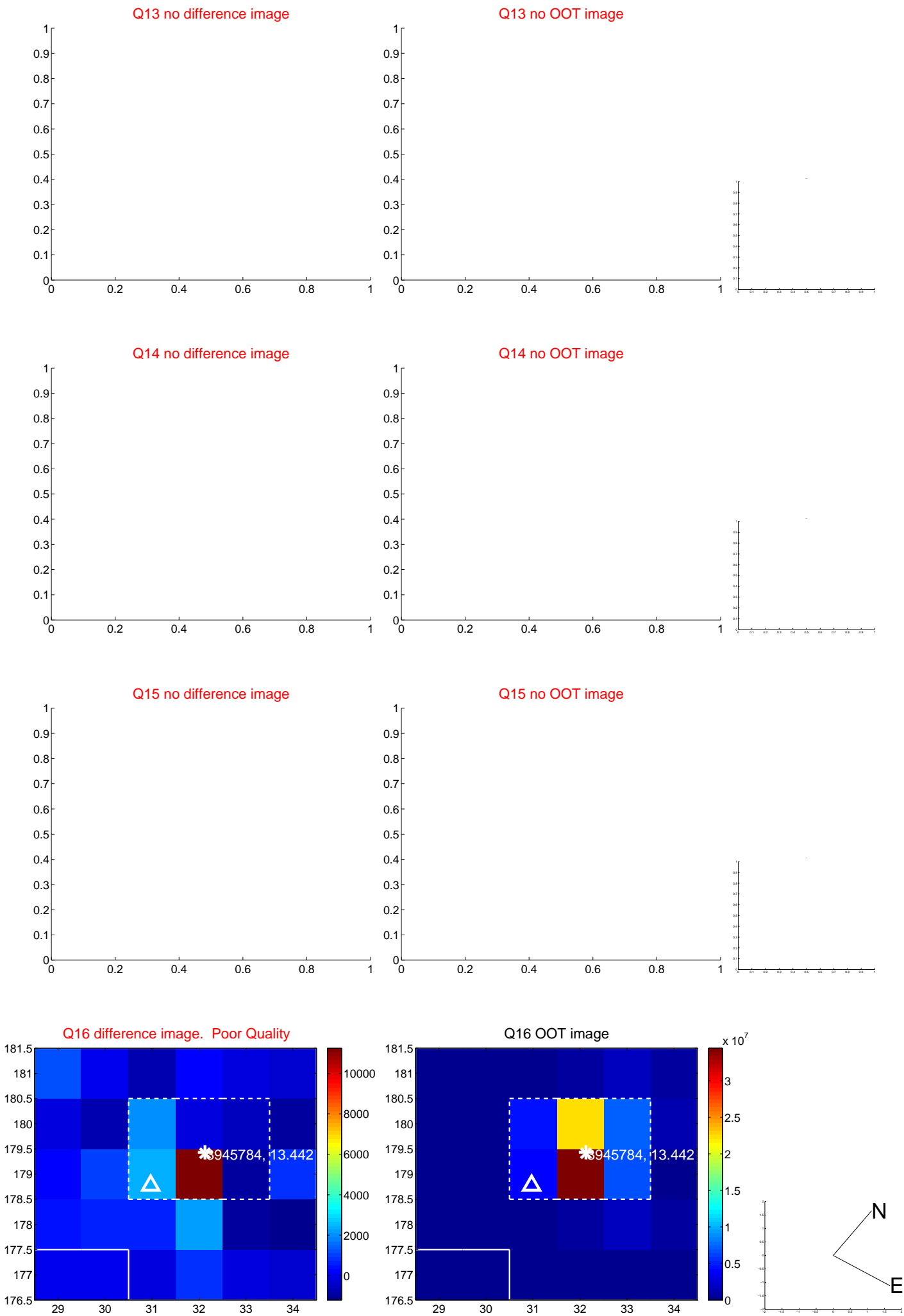
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



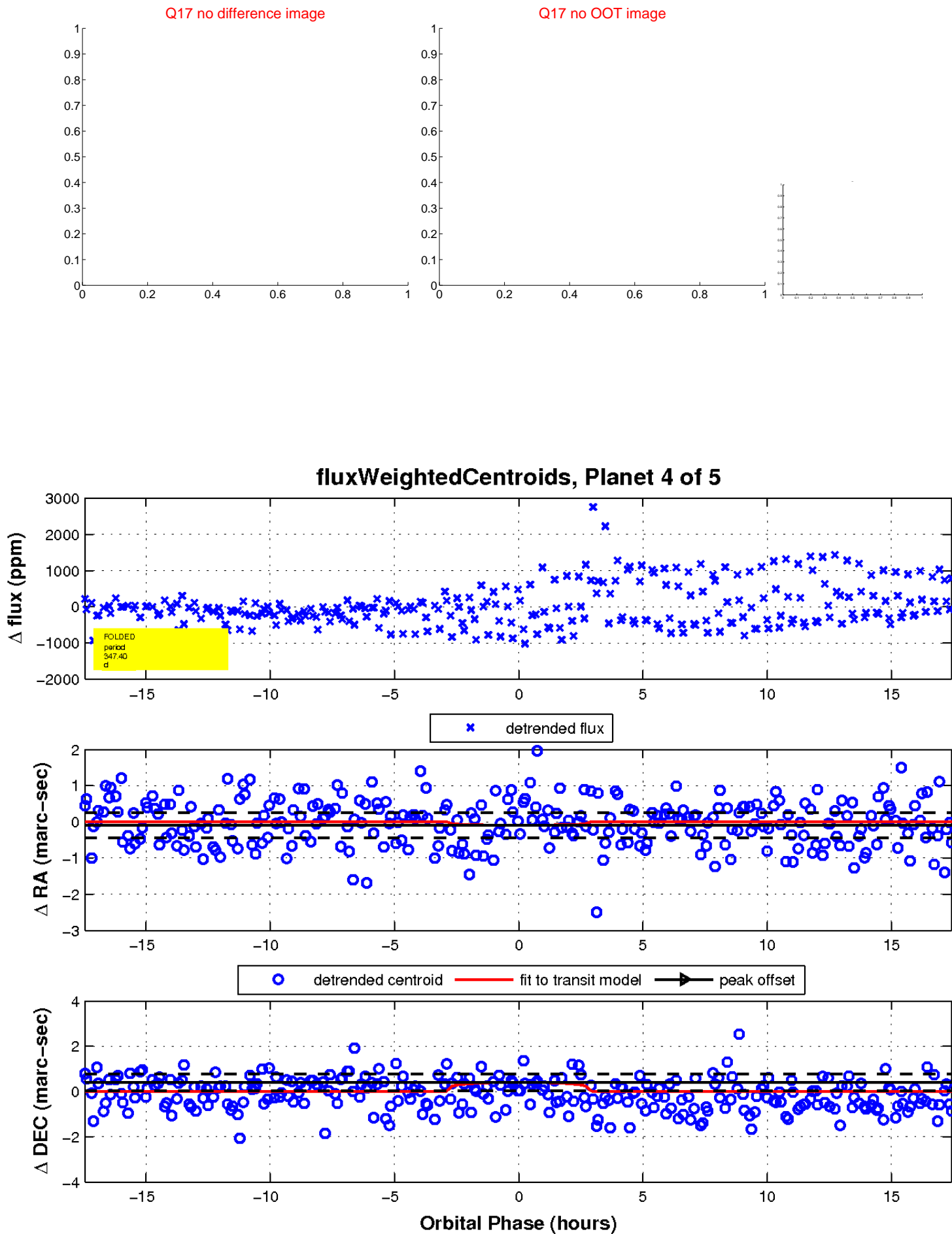
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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.



Declination

KIC 003945784

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})
003945784-01	OBS	No	601.042878	157.176841	740.5	4.679	14.2	10.0	0.59	4979	1.73	0.14
003945784-03	OBS	No	456.957341	161.809761	483.6	4.930	9.2	6.5	0.59	4979	1.31	0.20
003945784-04	OBS	No	347.402756	452.152653	357.5	5.843	10.3	5.6	0.59	4979	1.20	0.29
003945784-05	OBS	No	409.660386	306.892157	361.7	6.570	9.9	5.8	0.59	4979	1.19	0.23

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003945784-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
003945784-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES
003945784-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_ZUMA—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS
003945784-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV

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

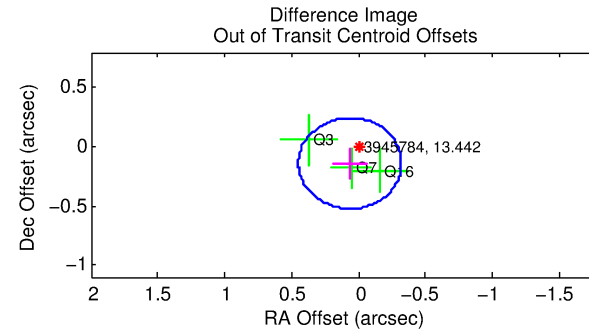
N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

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

Ephemeris Match Information For 003945784-05

No Significant Match Found

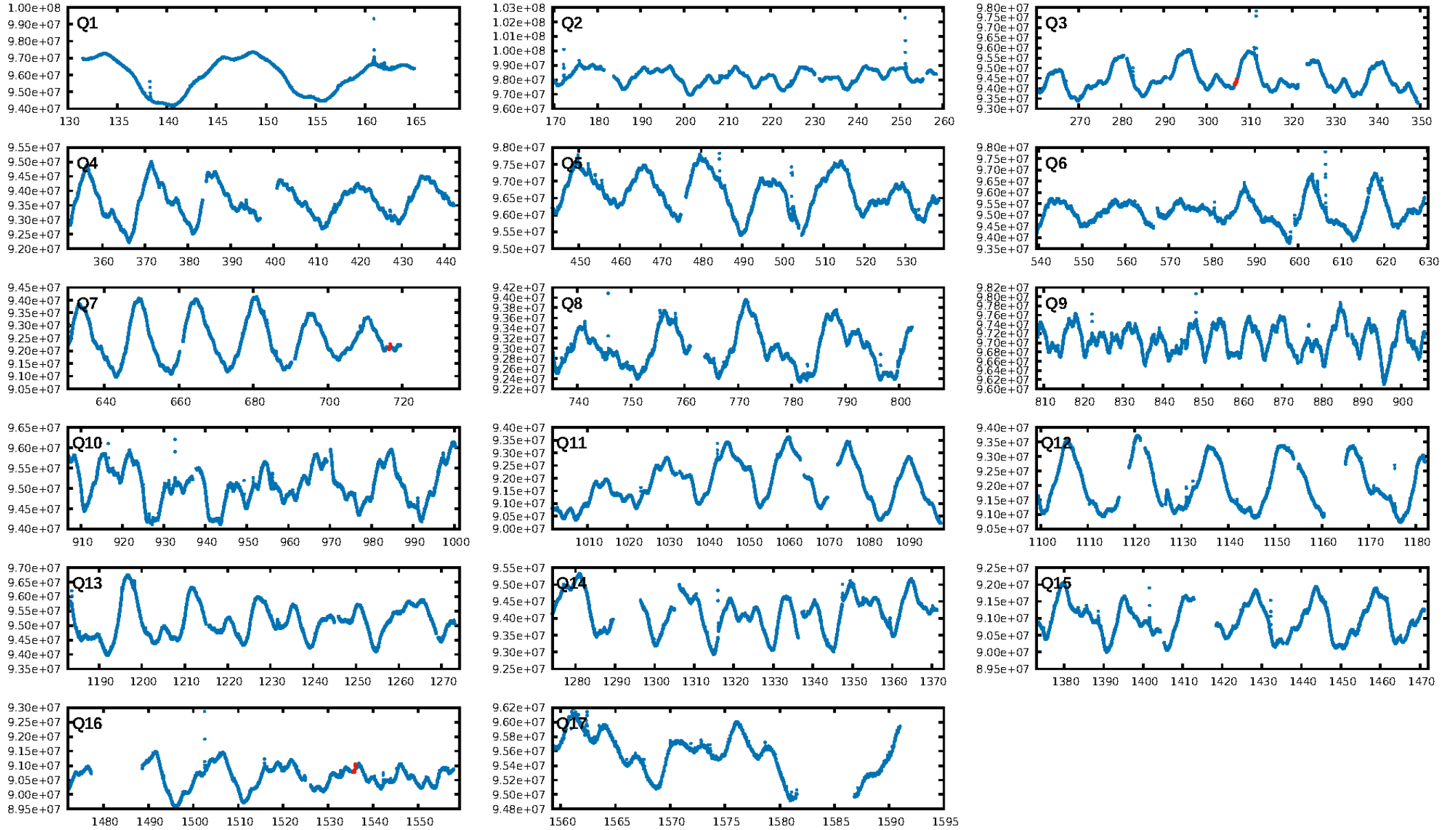
KIC: 3945784 Candidate: 5 of 5 Period: 409.660 d



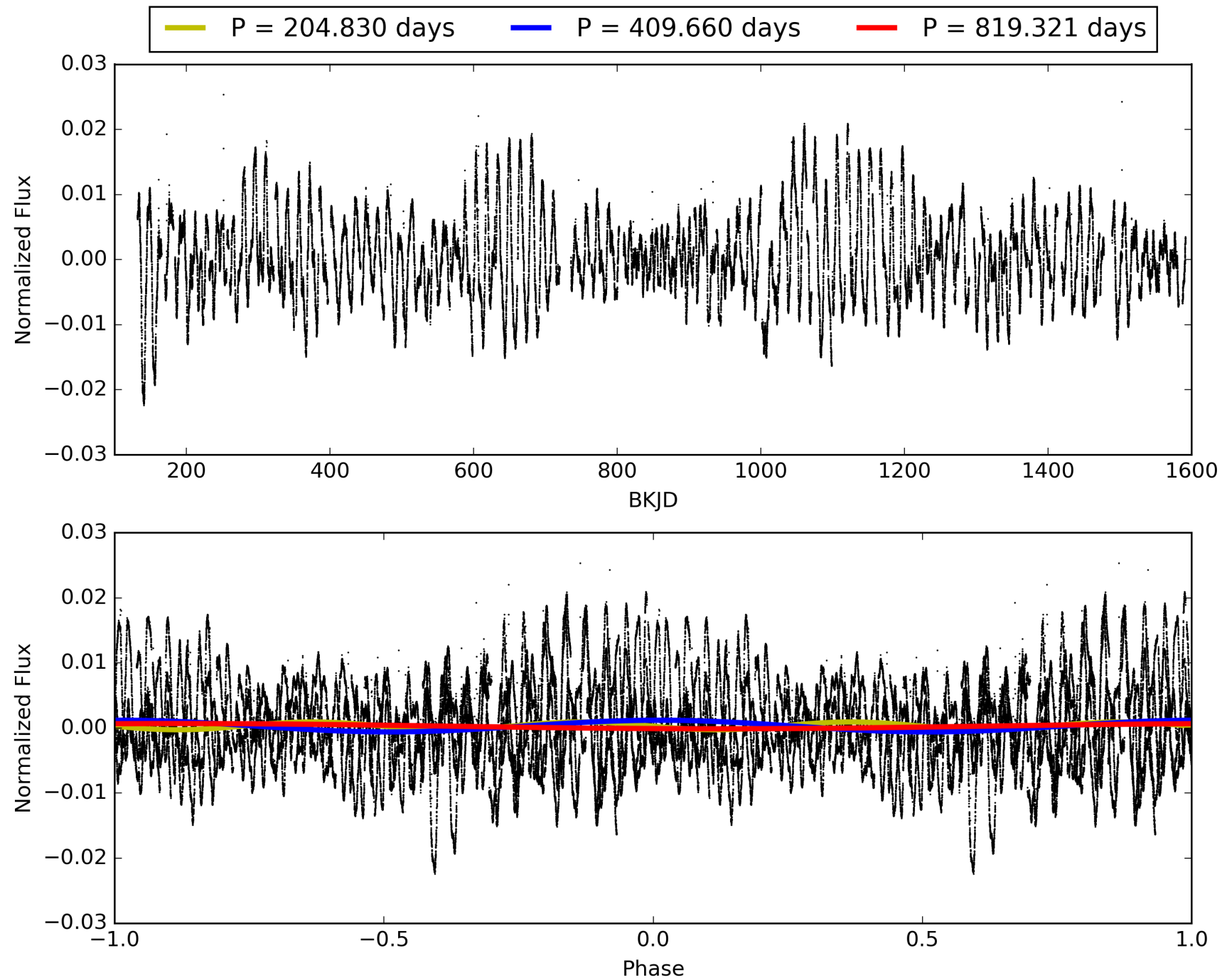
ShortPeriod-sig: 100.0% [169.93σ]
 LongPeriod-sig: 100.0% [92.19σ]
 ModelChiSquare2-sig: 25.2%
 ModelChiSquareGof-sig: 91.5%
Bootstrap-pfa: 4.18e-08
 RollingBand-fgt: 1.00 [3/3]
 GhostDiagnostic-chr: 2.517

Centroid-sig: 86.0%
 Centroid-so: 0.250 arcsec [0.27σ]
 OotOffset-rm: 0.154 arcsec [1.20σ]
 KicOffset-rm: 0.132 arcsec [0.75σ]
 OotOffset-st: 0/2/1/0 [3]
 KicOffset-st: 0/2/1/0 [3]
 DiffImageQuality-fgm: 1.00 [3/3]
 DiffImageOverlap-fno: 1.00 [3/3]

TCE 003945784-05, PDC Light Curves

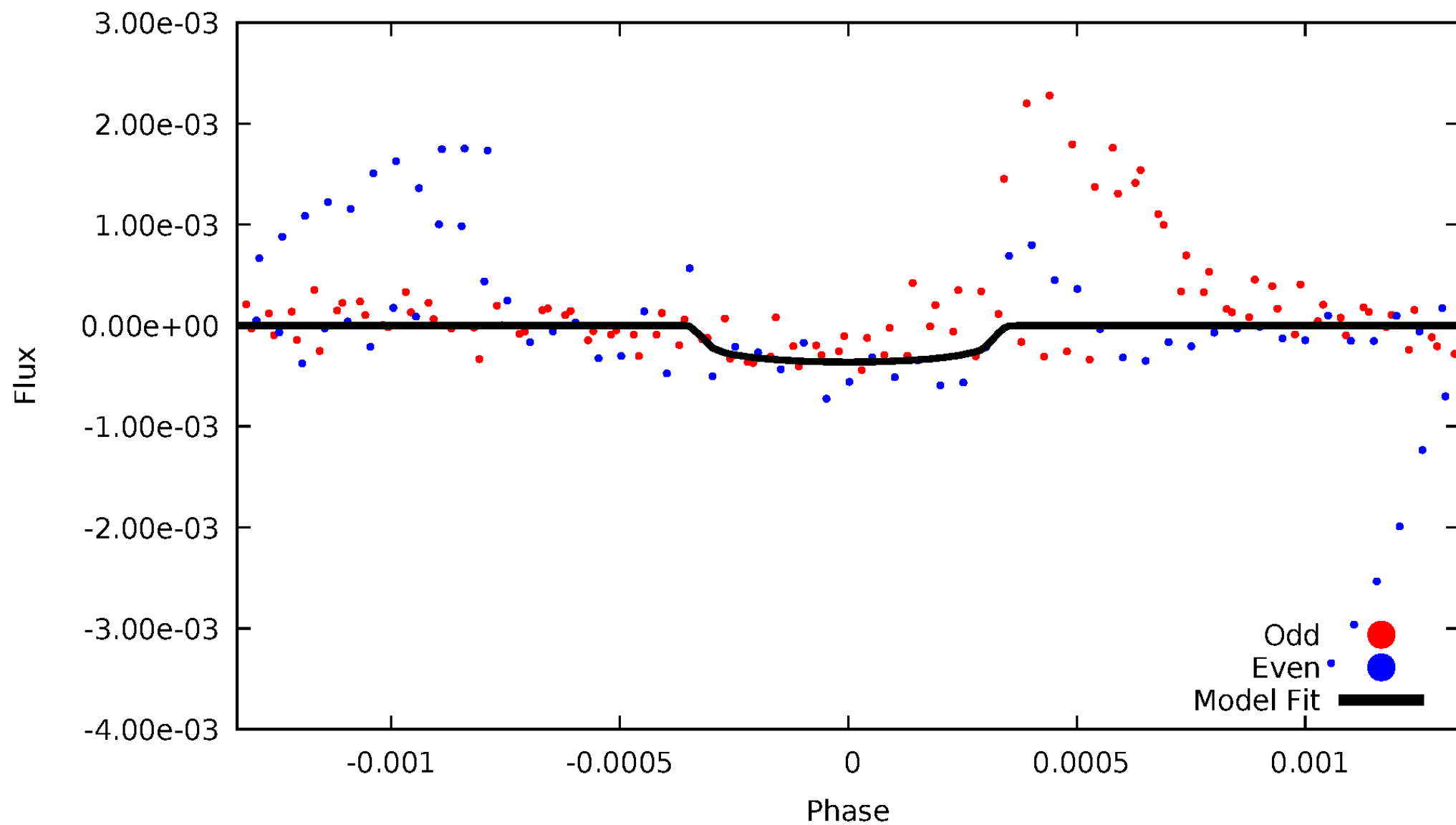


TCE 003945784-05



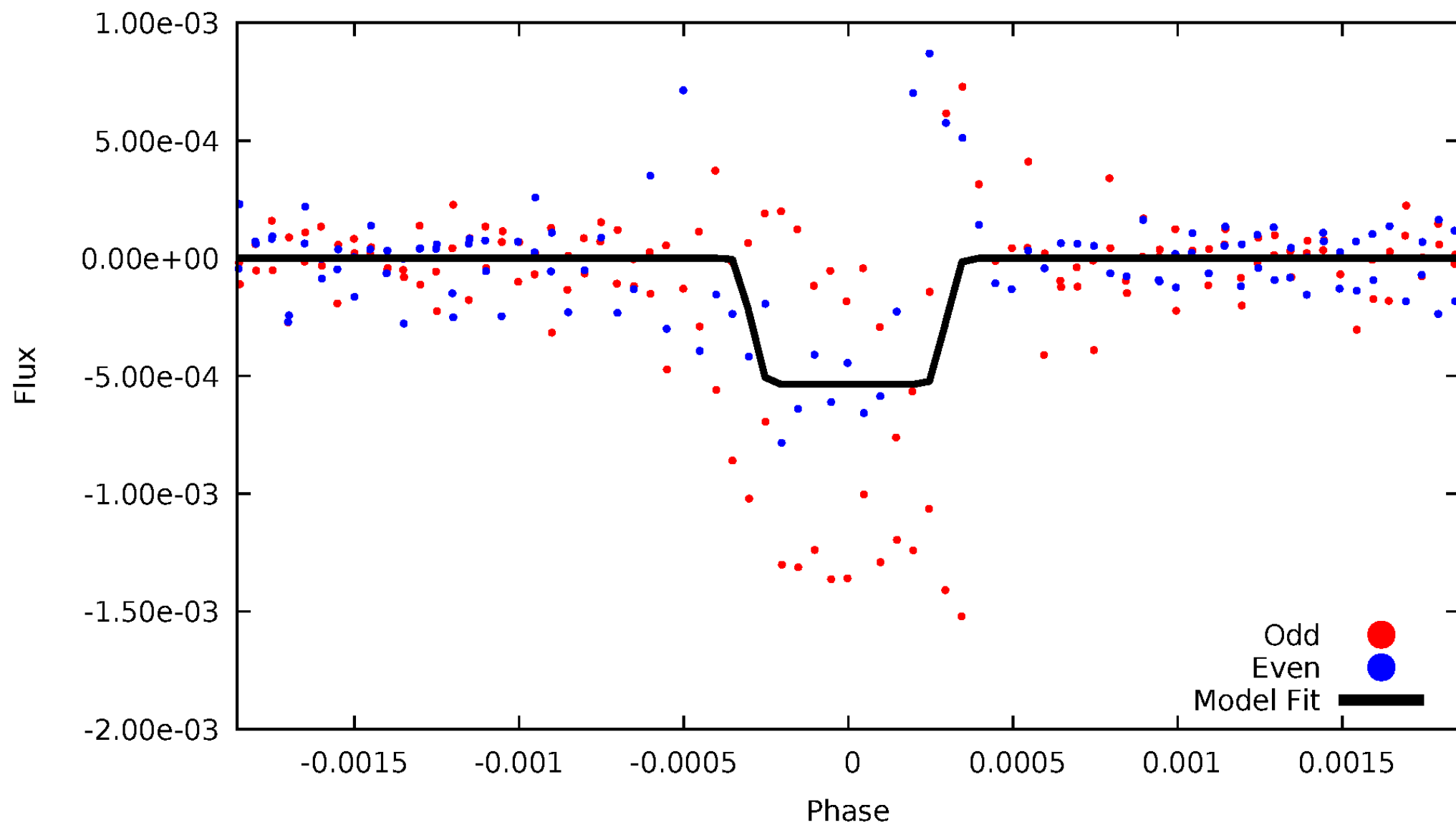
DV Odd/Even

TCE 003945784-05



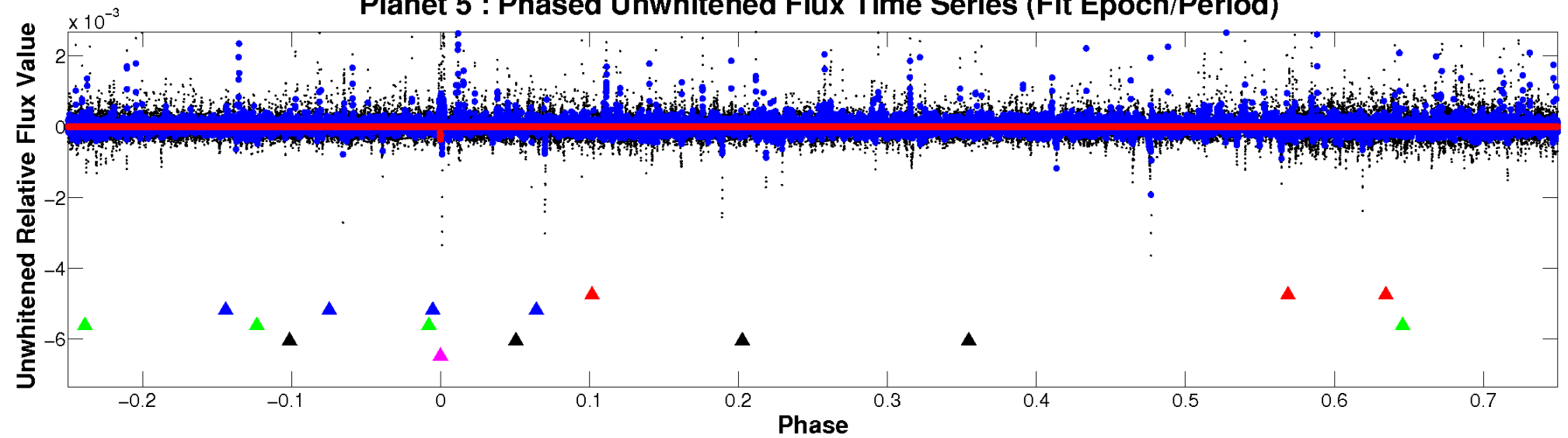
ALT Odd/Even

TCE 003945784-05

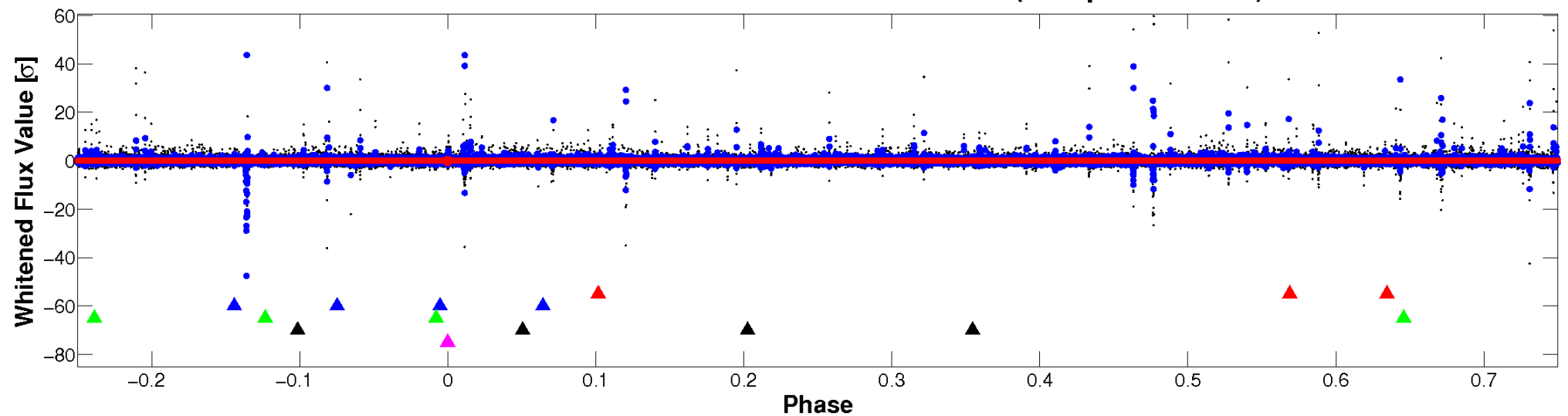


Non-Whitened Vs. Whitened Light Curve

Planet 5 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

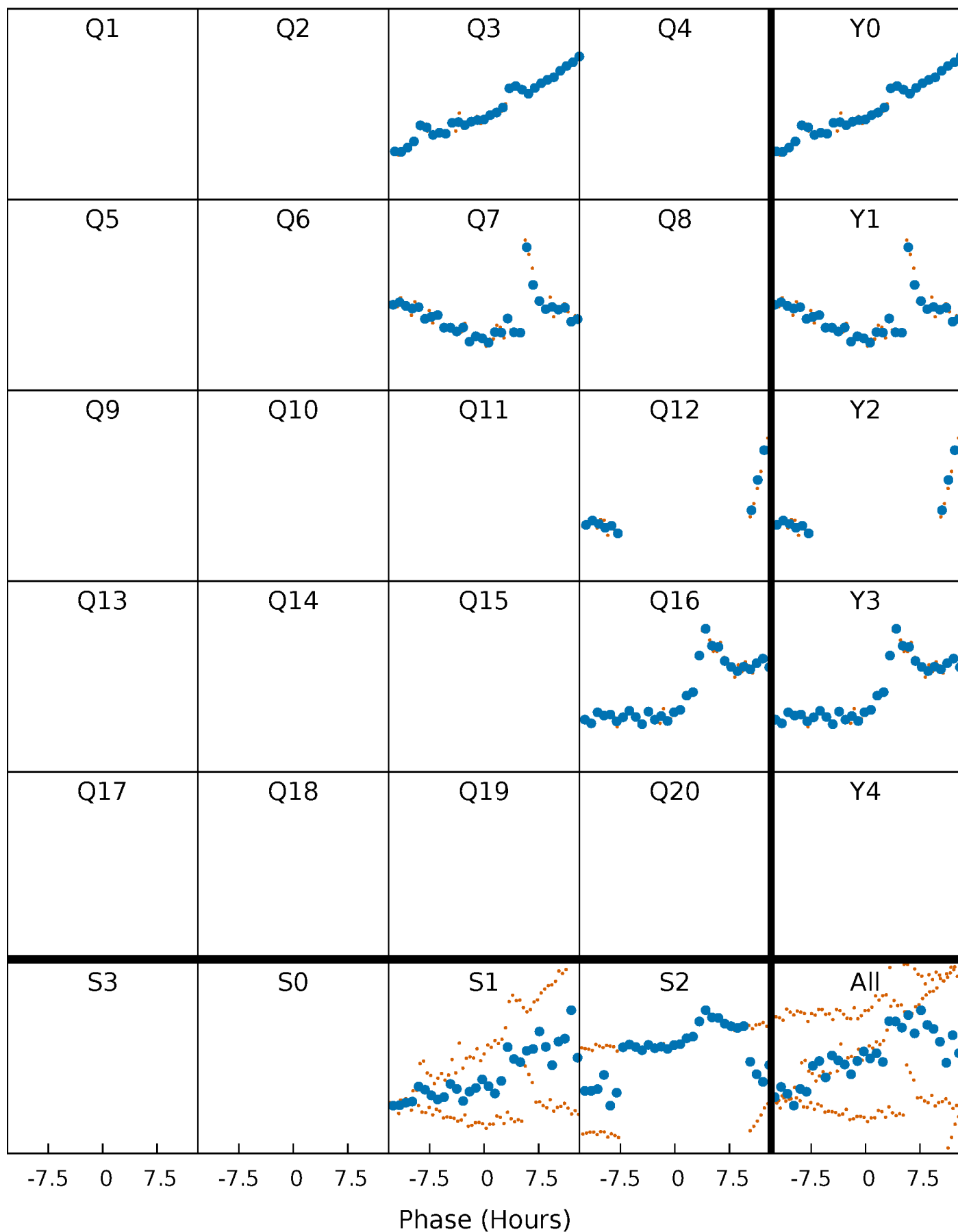


Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)



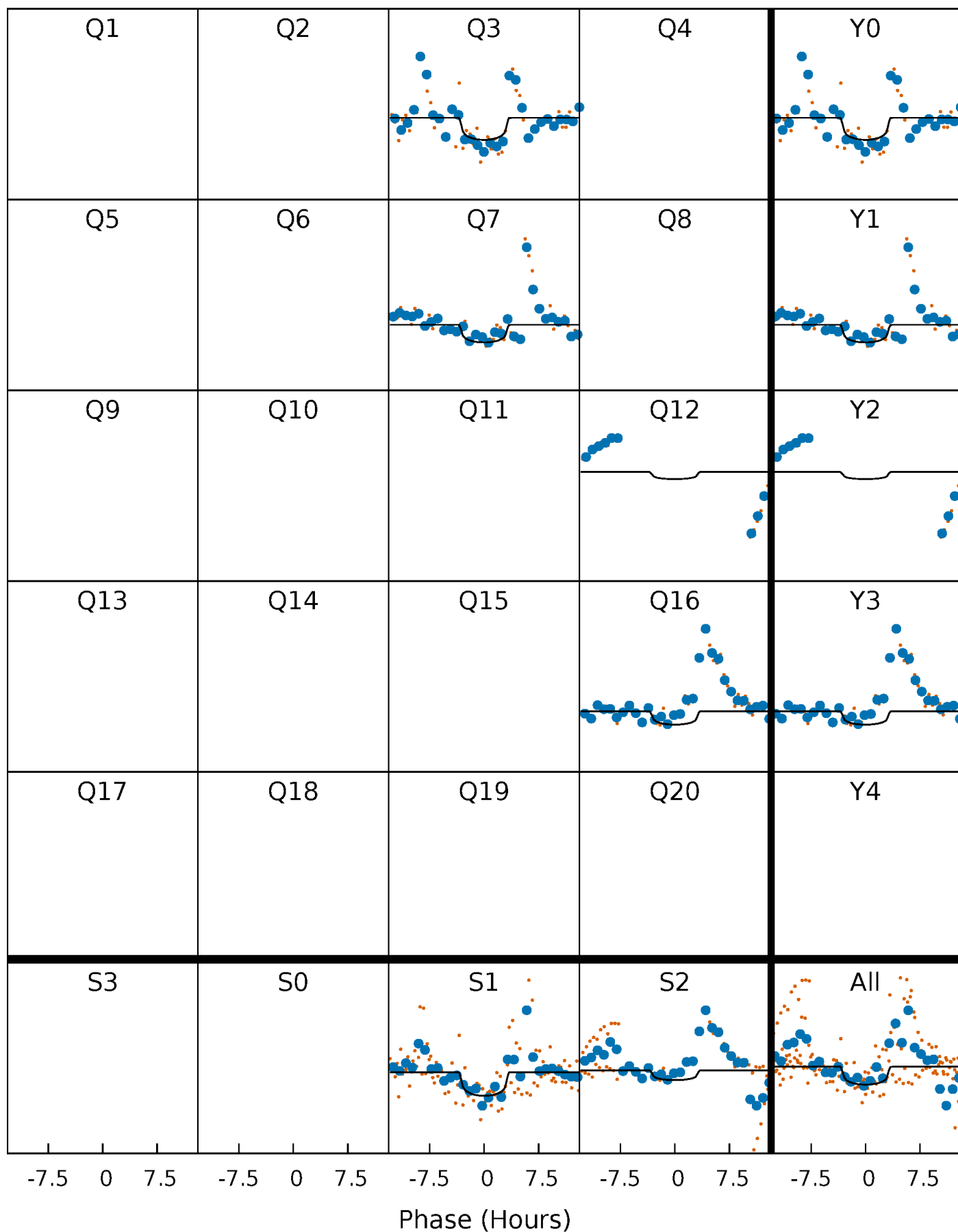
PDC Quarter-Phased Transit Curves

TCE 003945784-05 $P=409.660386$ Days $T_0=306.892157$ (BKJD)



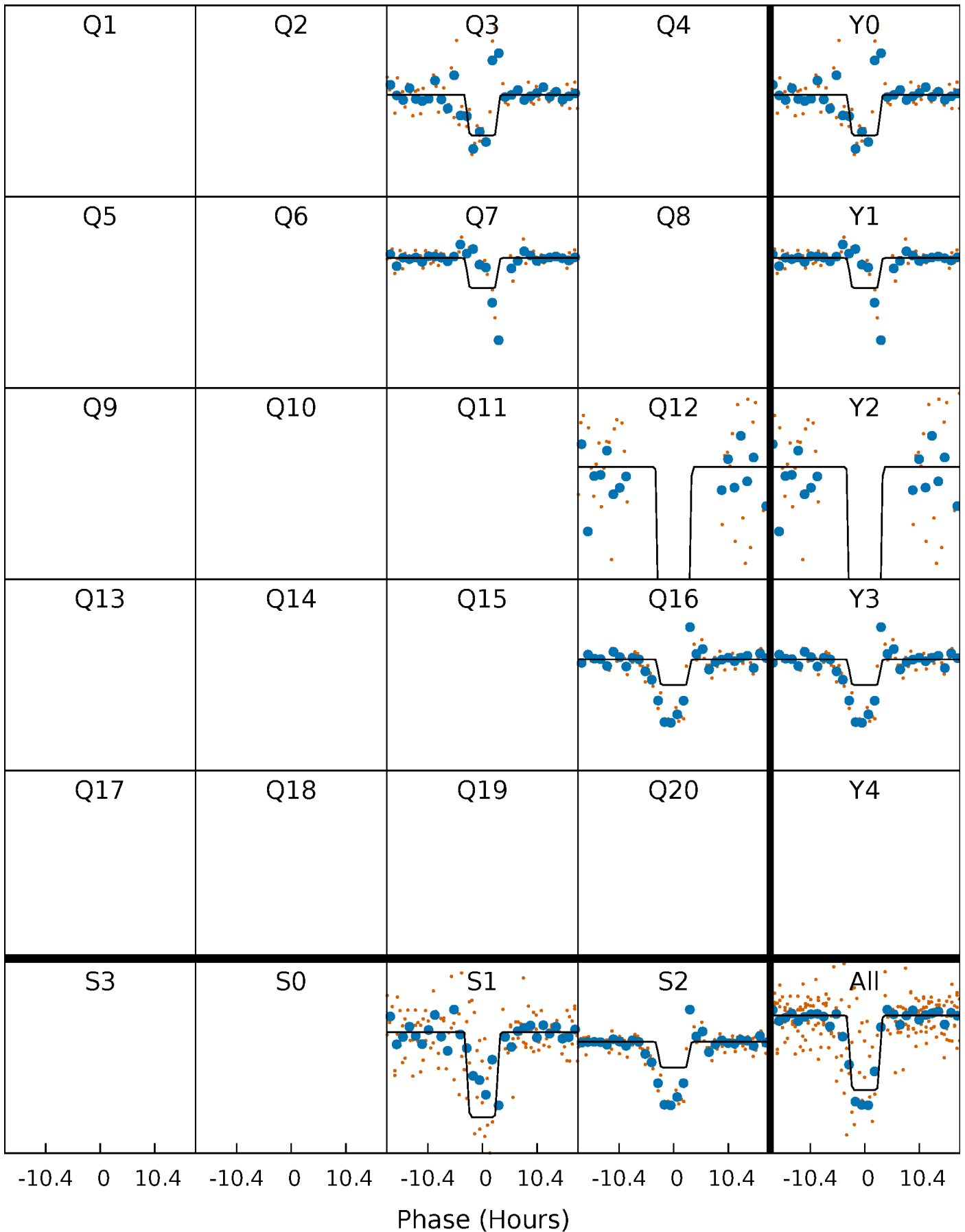
DV Quarter-Phased Transit Curves

TCE 003945784-05 $P=409.660386$ Days $T_0=306.892157$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

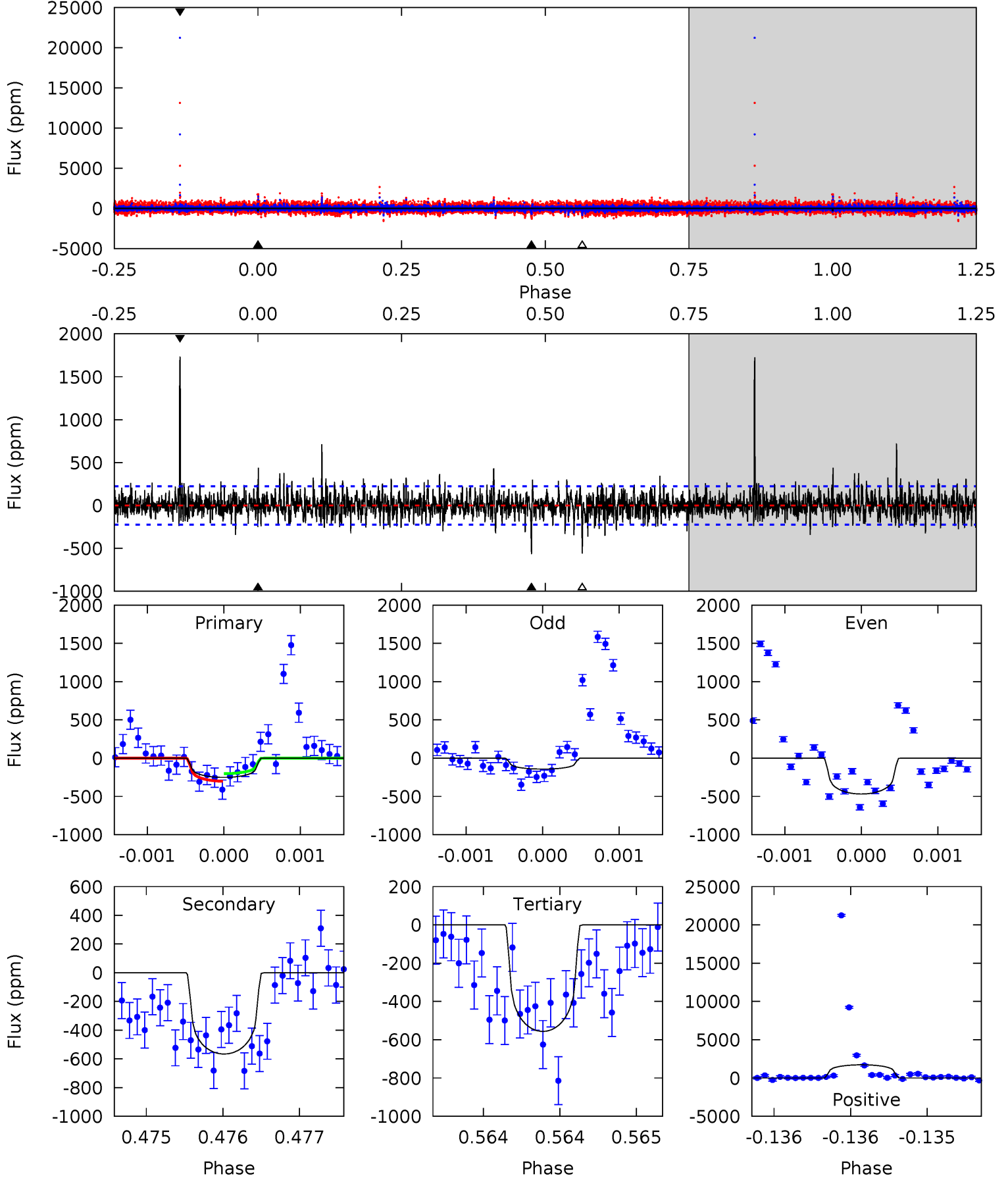
TCE 003945784-05 $P=409.652011$ Days $T_0=306.955430$ (BKJD)



DV Model-Shift Uniqueness Test

003945784-05, P = 409.660386 Days, E = 306.892157 Days

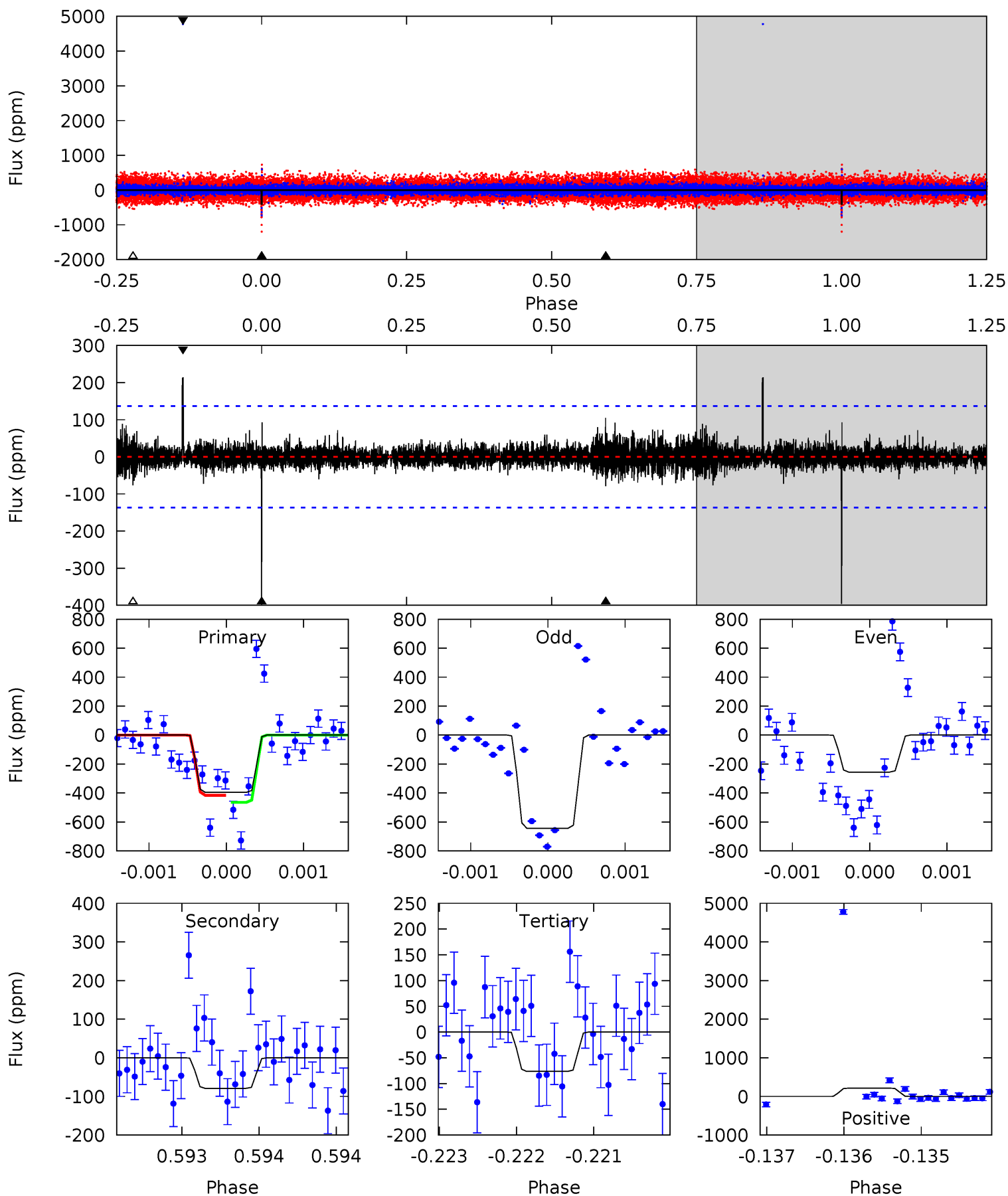
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.16	13.9	13.6	42.3	5.51	3.38	2.56	-7.47	-36.1	0.23	-28.4	3.37	1.01	0.75	1.23



Alt Model-Shift Uniqueness Test

003945784-05, P = 409.652011 Days, E = 306.955430 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
15.9	3.18	3.07	8.62	5.50	3.37	0.70	12.9	7.31	0.11	-5.43	8.88	1.85	0.35	1.01



Stellar Parameters For KIC 003945784

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	$M(M_{\odot})$	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	4979^{+149}_{-149}	$4.668^{+0.054}_{-0.032}$	$-1.060^{+0.350}_{-0.300}$	$0.588^{+0.045}_{-0.037}$	$0.587^{+0.051}_{-0.022}$	$4.069^{+0.794}_{-0.552}$
	+3%/-3%	+1%/-1%	+33%/-28%	+8%/-6%	+9%/-4%	+20%/-14%
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 003945784-05 / KOI

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-566 ± 41	$1.40^{+1.12}_{-0.88}$	246^{+10}_{-9}	5182^{+3450}_{-1135}	$130277^{+801964}_{-90316}$
Alt.	-79 ± 25	$1.67^{+1.23}_{-0.98}$	247^{+9}_{-9}	3347^{+1259}_{-510}	12007^{+63086}_{-8177}

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

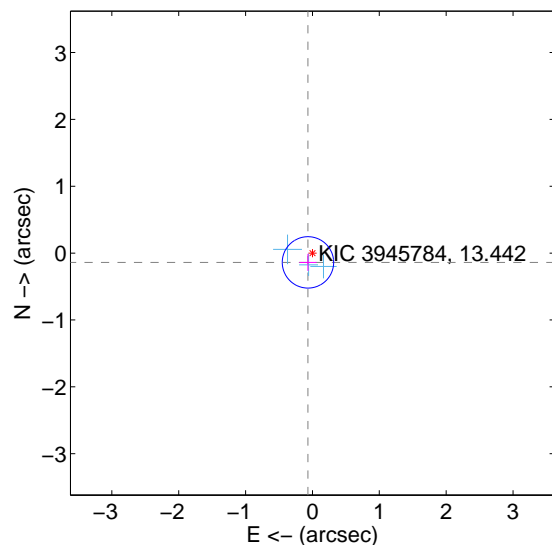
Supplemental centroid analysis for 003945784-05. Kepler magnitude: 13.44. Transit SNR 5.84

There are 3 quarters with good PRF difference image offsets

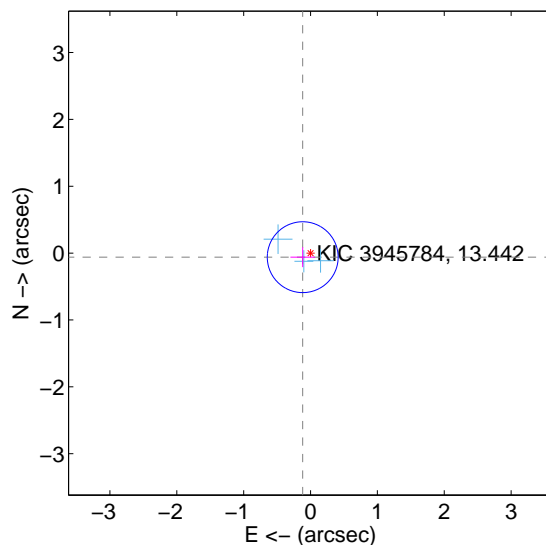
The direct PRF centroid is offset from the target star catalog position by about 0.09 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.154 ± 0.128	1.20	0.067 ± 0.127	-0.139 ± 0.128
PRF-fit source offset from KIC position	0.132 ± 0.177	0.75	0.117 ± 0.183	-0.061 ± 0.149
photometric centroid source offset	0.25 ± 0.92	0.27	-0.25 ± 0.92	0.02 ± 1.09

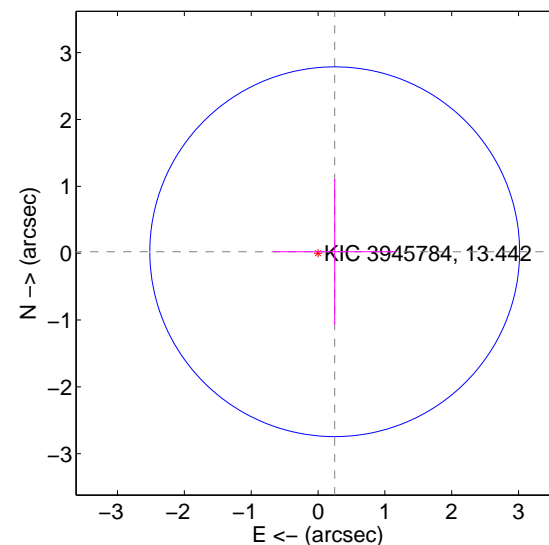
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

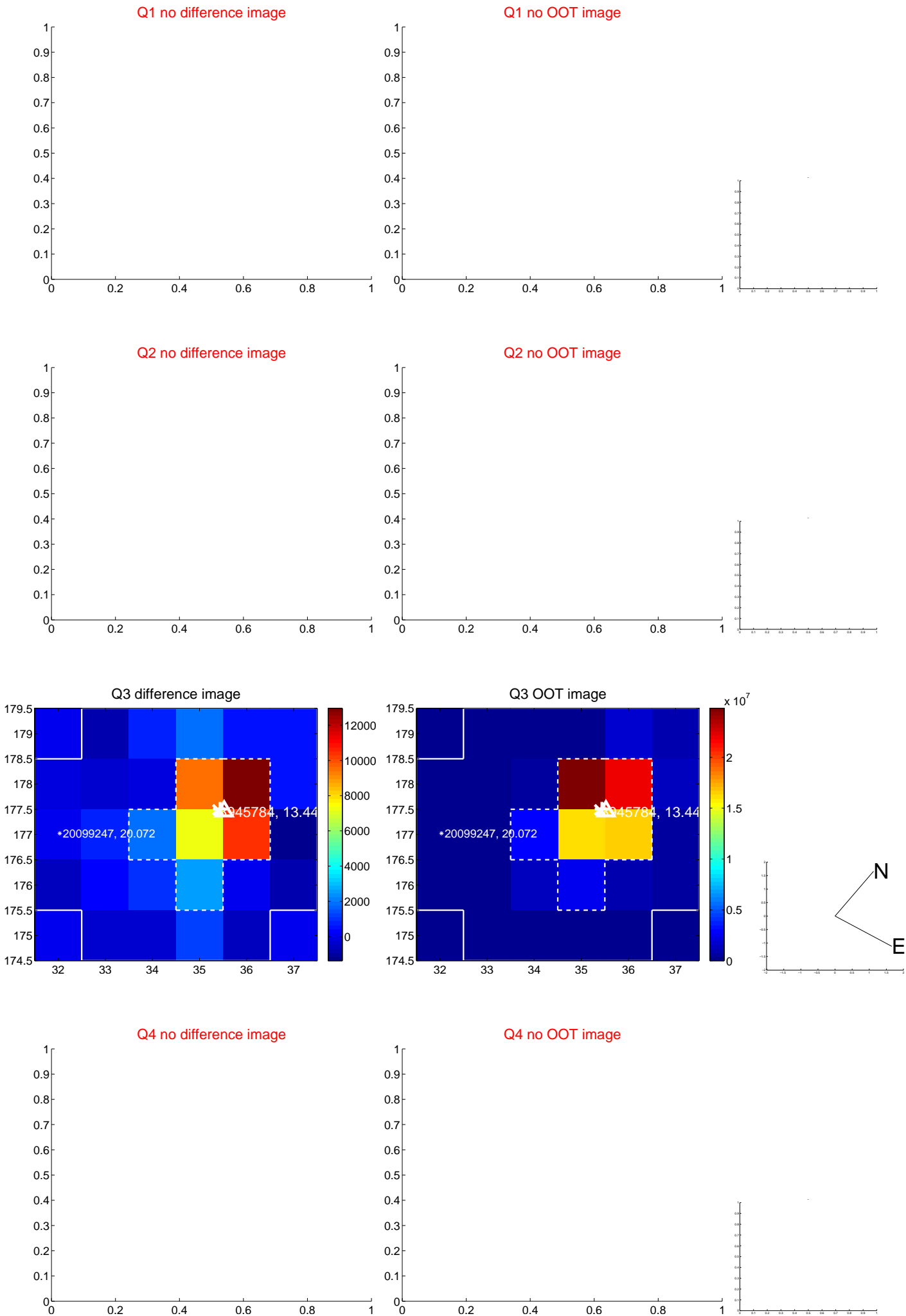


offset from photometric centroids

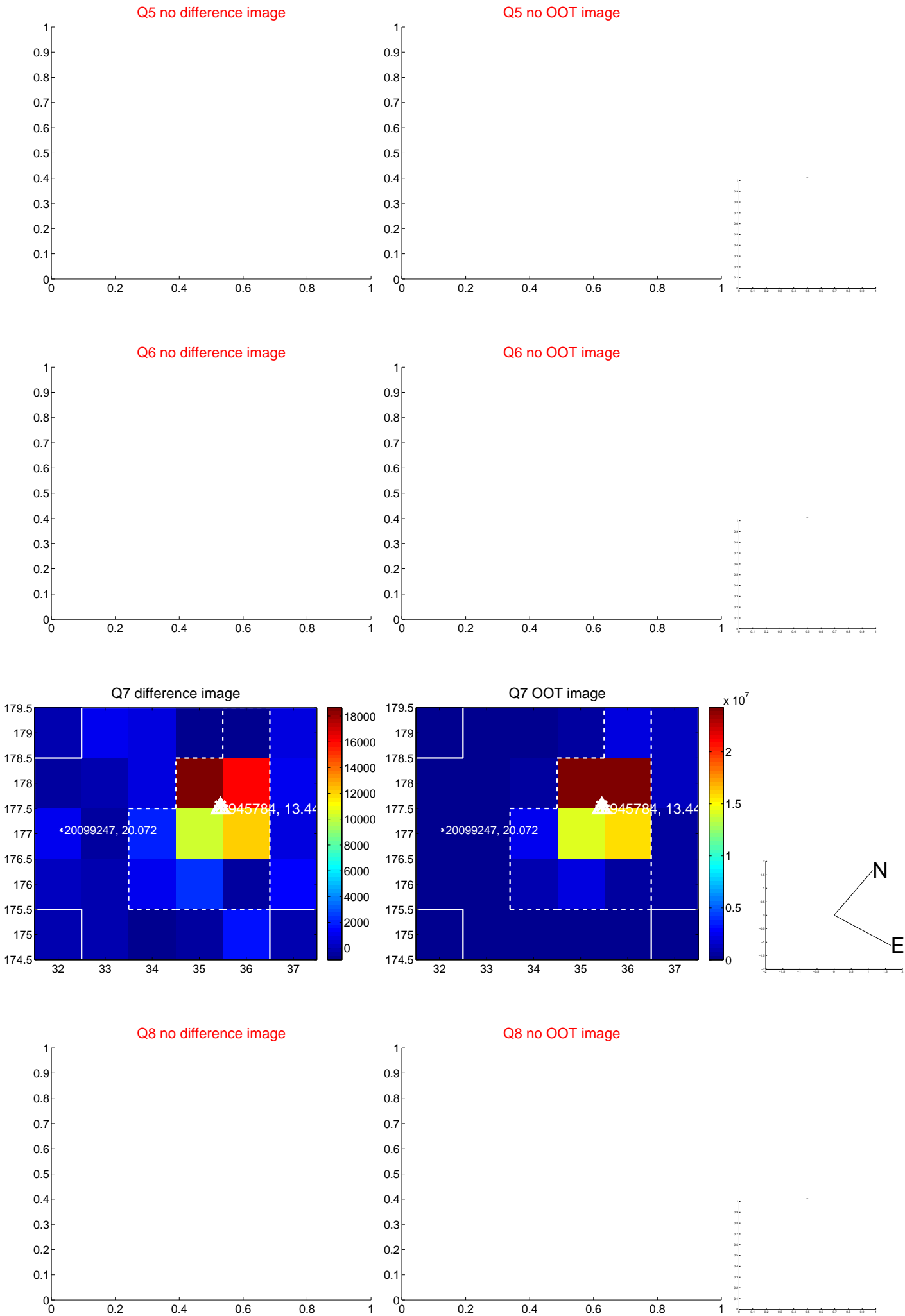


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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



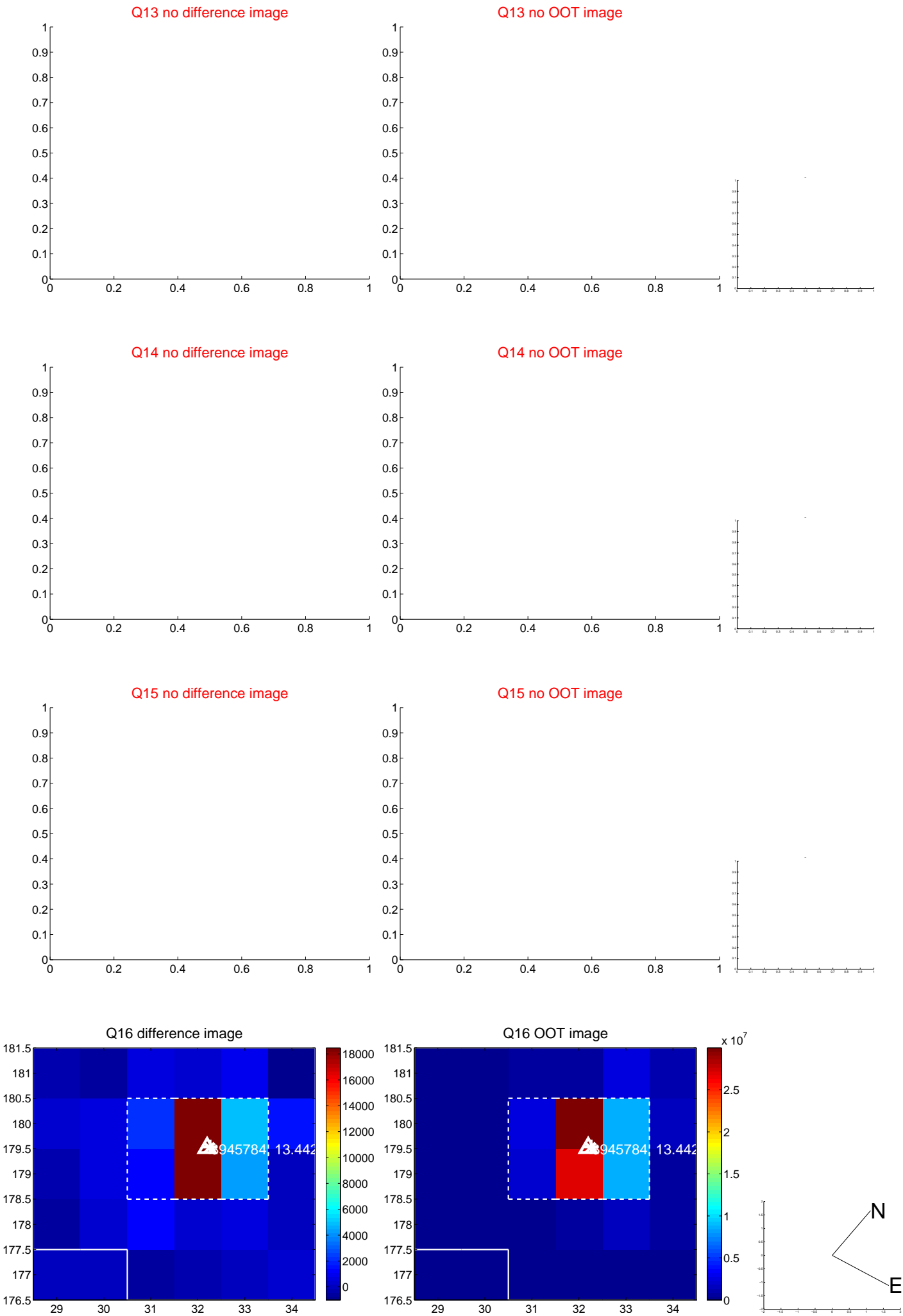
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



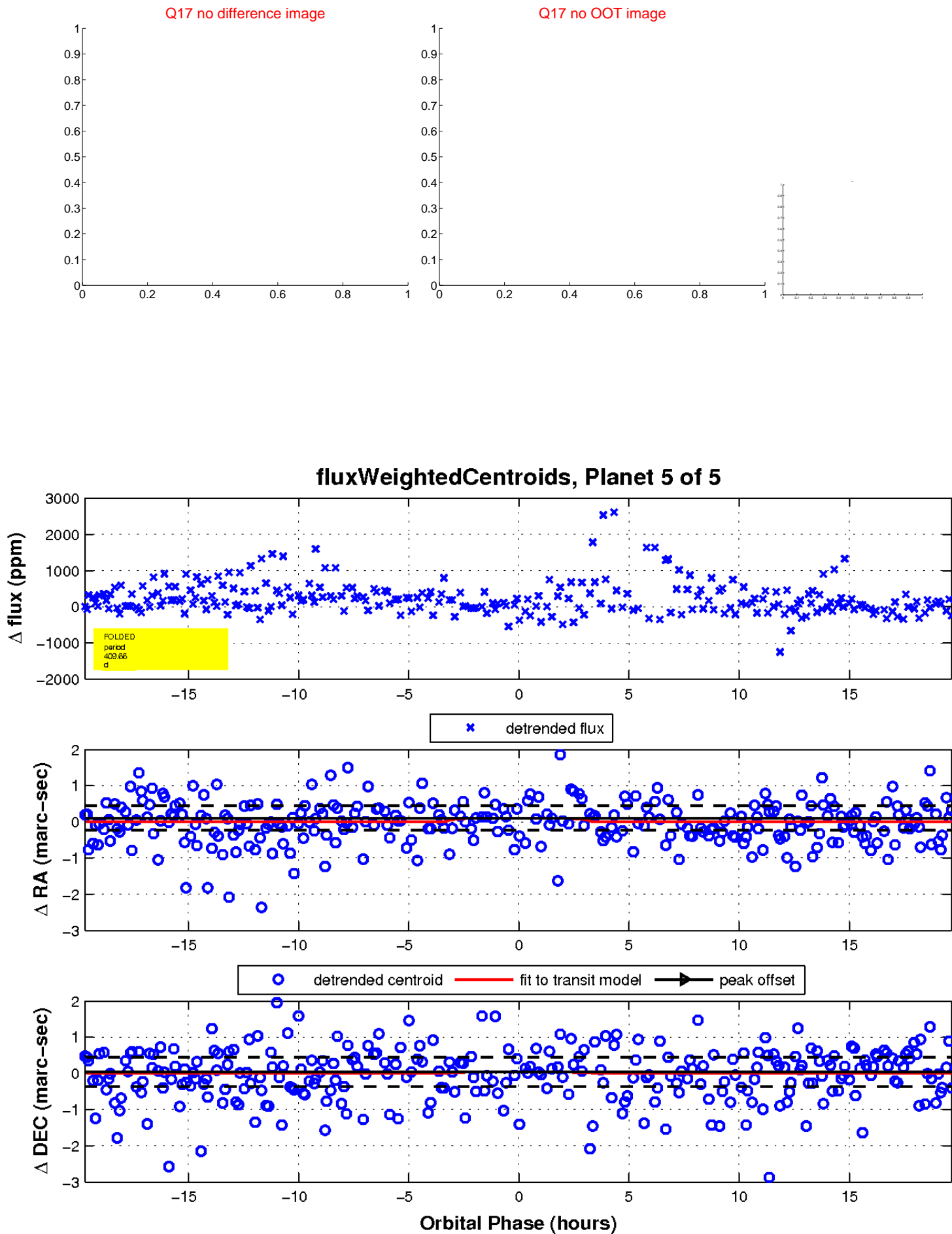
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

