

KIC 012406908

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})
012406908-01	OBS	No	392.064555	308.188915	875.7	2.133	47.1	7.5	0.70	4582	2.09	0.23
012406908-02	OBS	No	442.076574	160.767457	776.3	7.442	17.0	5.7	0.70	4582	2.00	0.19
012406908-03	OBS	No	431.399437	544.550660	665.0	15.384	18.5	3.4	0.70	4582	1.78	0.20
012406908-04	OBS	No	266.736851	192.091122	344.1	7.430	15.6	2.7	0.70	4582	1.24	0.38

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
012406908-01	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
012406908-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV
012406908-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
012406908-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_TRACKER—LPP_DV—LPP_ALT—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.

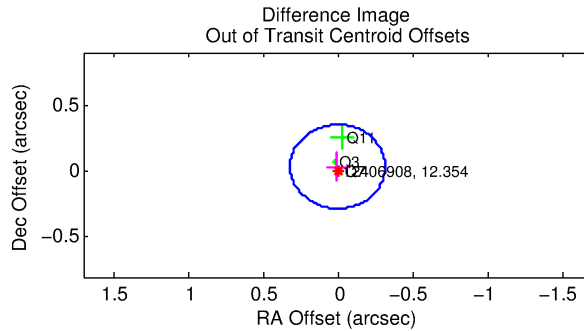
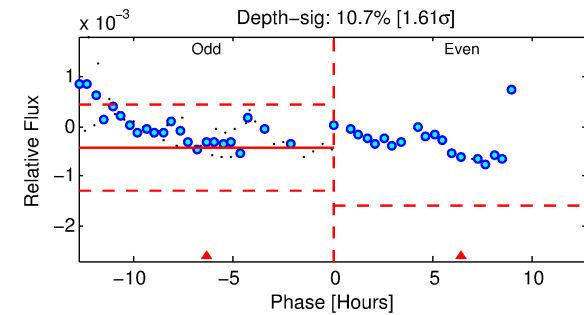
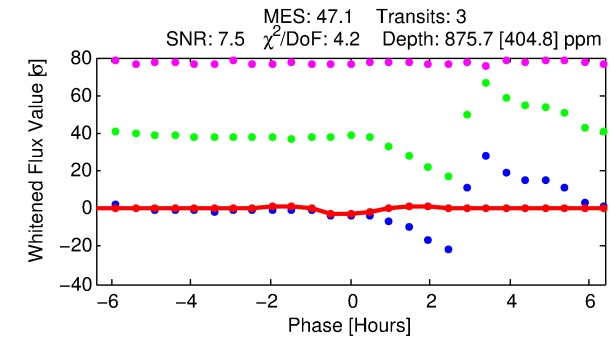
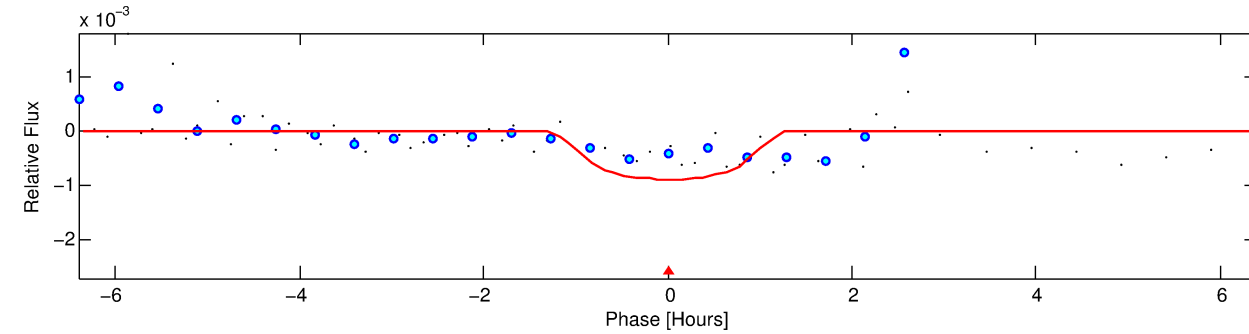
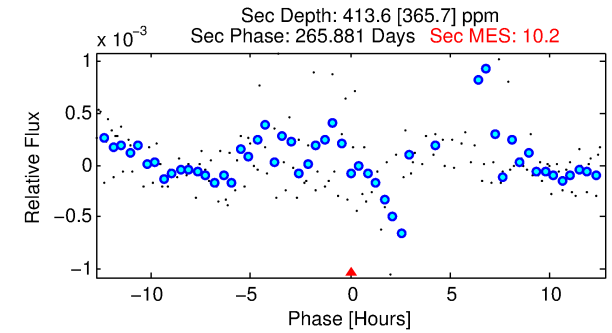
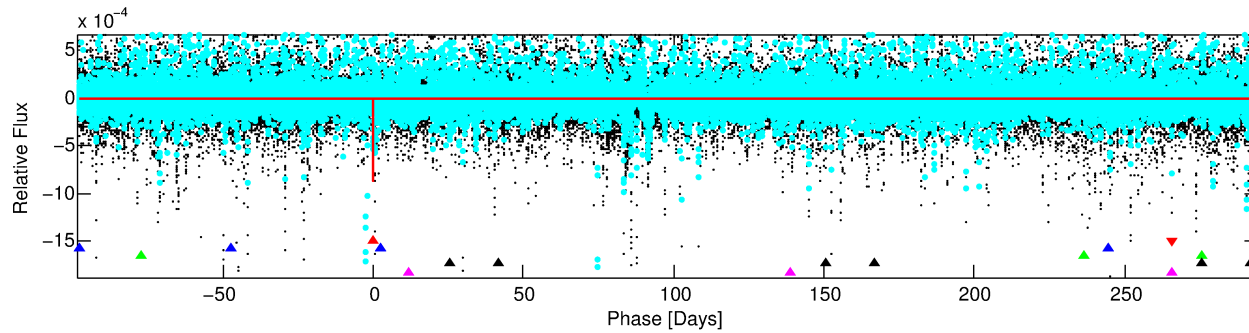
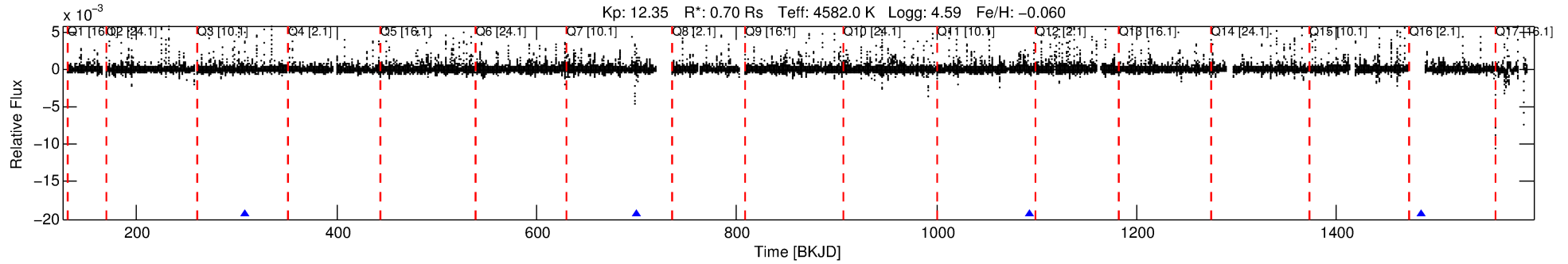
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 012406908-01

No Significant Match Found

DV One-Page Summary

KIC: 12406908 Candidate: 1 of 5 Period: 392.065 d



DV Fit Results:

Period = 392.06455 [0.01005] d
Epoch = 308.1889 [0.0161] BKJD
Rp/R* = 0.0275 [0.1125]
a/R* = 1230.55 [15287.34]
b = 0.54 [16.93]
Seff = 0.22 [0.04]
Teq = 176 [8] K
Rp = 2.09 [8.56] Re
a = 0.9242 [0.0690] AU
Ag = 44439.11 [365742.19] [0.12 σ]
Teffp = 3941 [8109] K [0.46 σ]

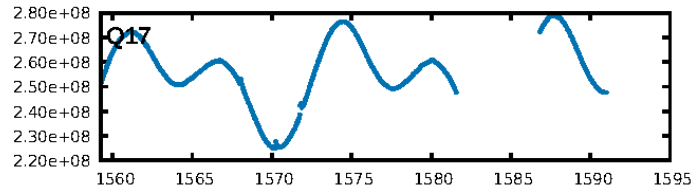
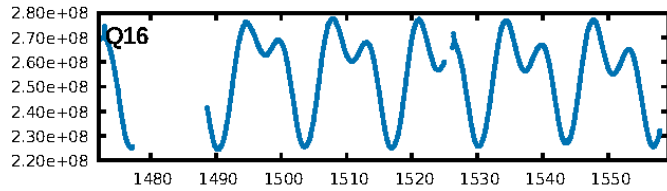
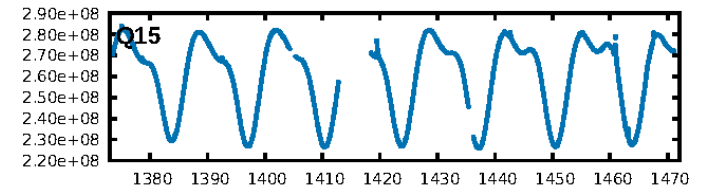
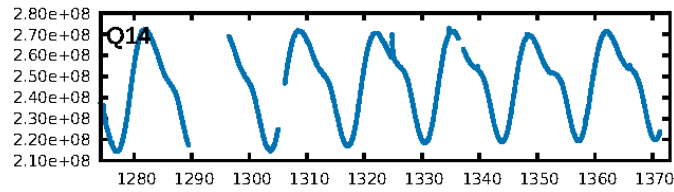
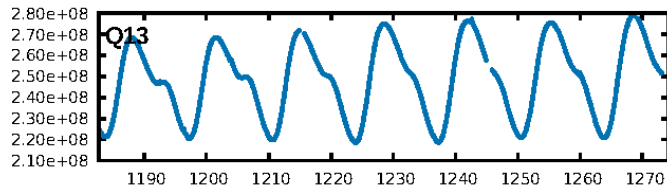
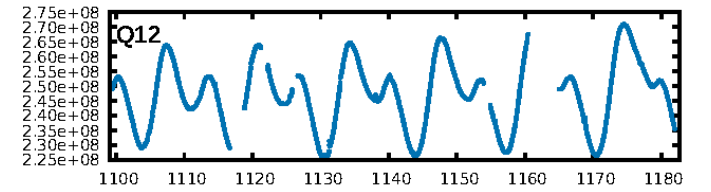
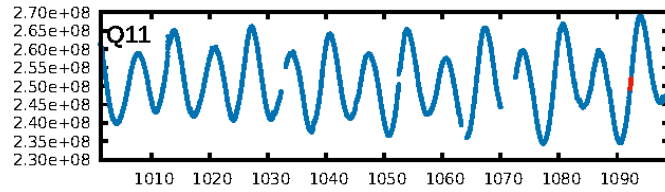
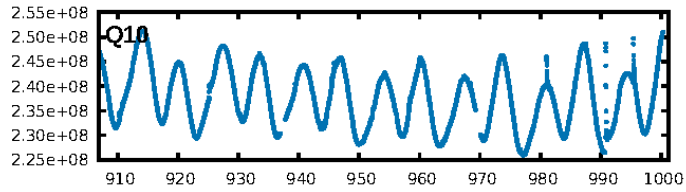
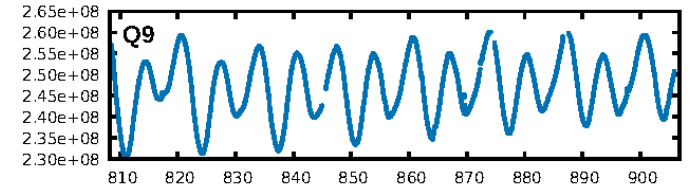
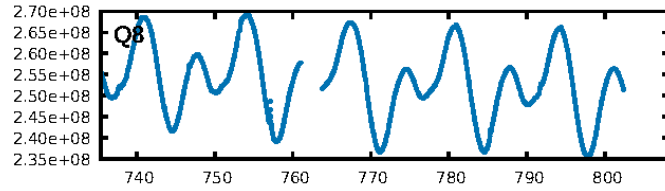
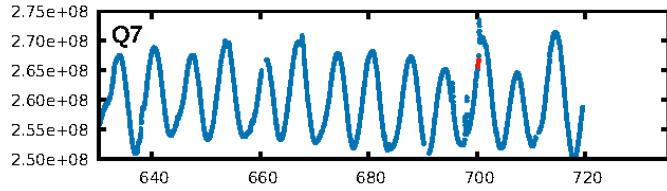
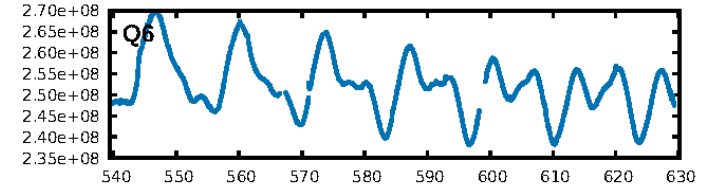
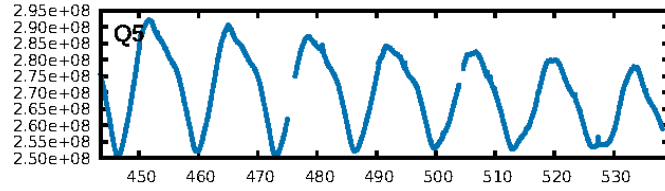
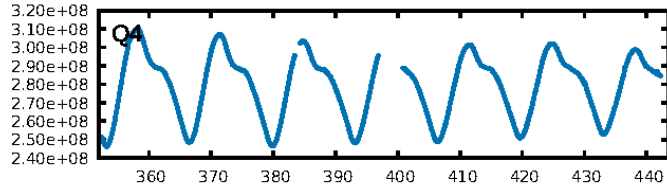
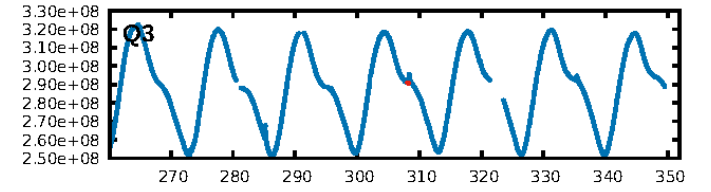
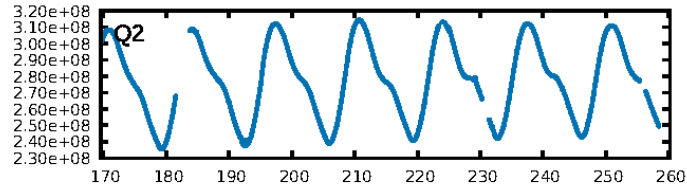
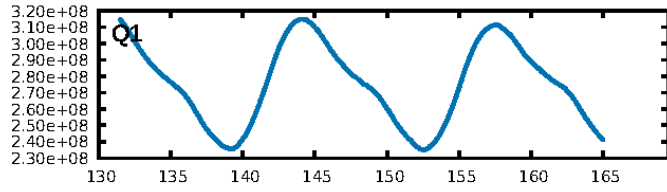
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [389.12 σ]
LongPeriod-sig: 100.0% [60.78 σ]
ModelChiSquare2-sig: 0.0%
ModelChiSquareGof-sig: 0.0%
Bootstrap-pfa: N/A
RollingBand-fgt: 1.00 [3/3]
GhostDiagnostic-chr: 0.02124
Centroid-sig: 0.0%
Centroid-so: 1.547 arcsec [2.12 σ]
OotOffset-rm: 0.035 arcsec [0.33 σ]
OotOffset-st: 0/3/0/0 [3]
KicOffset-rm: 0.040 arcsec [0.56 σ]
KicOffset-st: 0/3/0/0 [3]
DiffImageQuality-fgm: 0.67 [2/3]
DiffImageOverlap-fno: 1.00 [3/3]

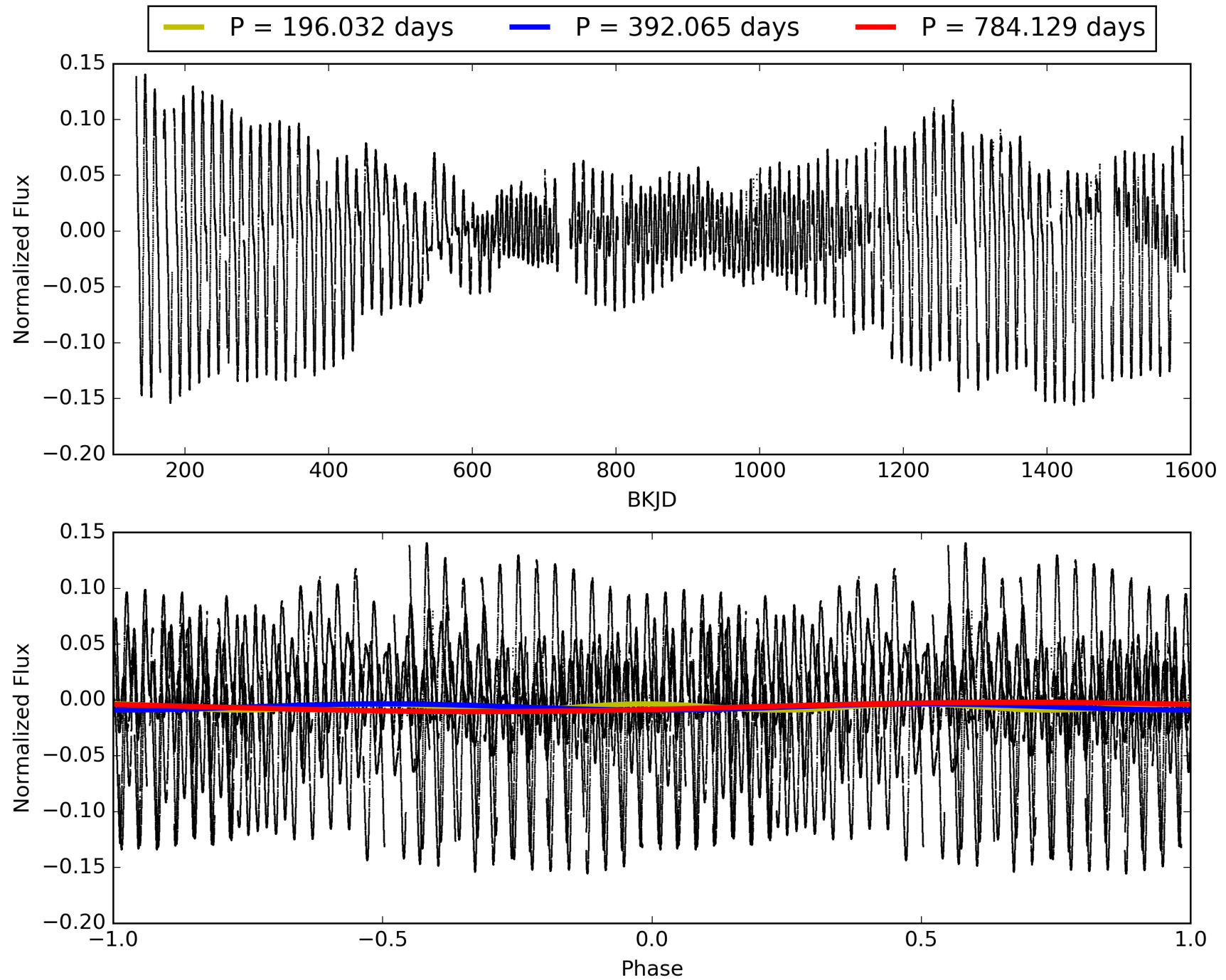
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 05:53:43 Z

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

TCE 012406908-01, PDC Light Curves

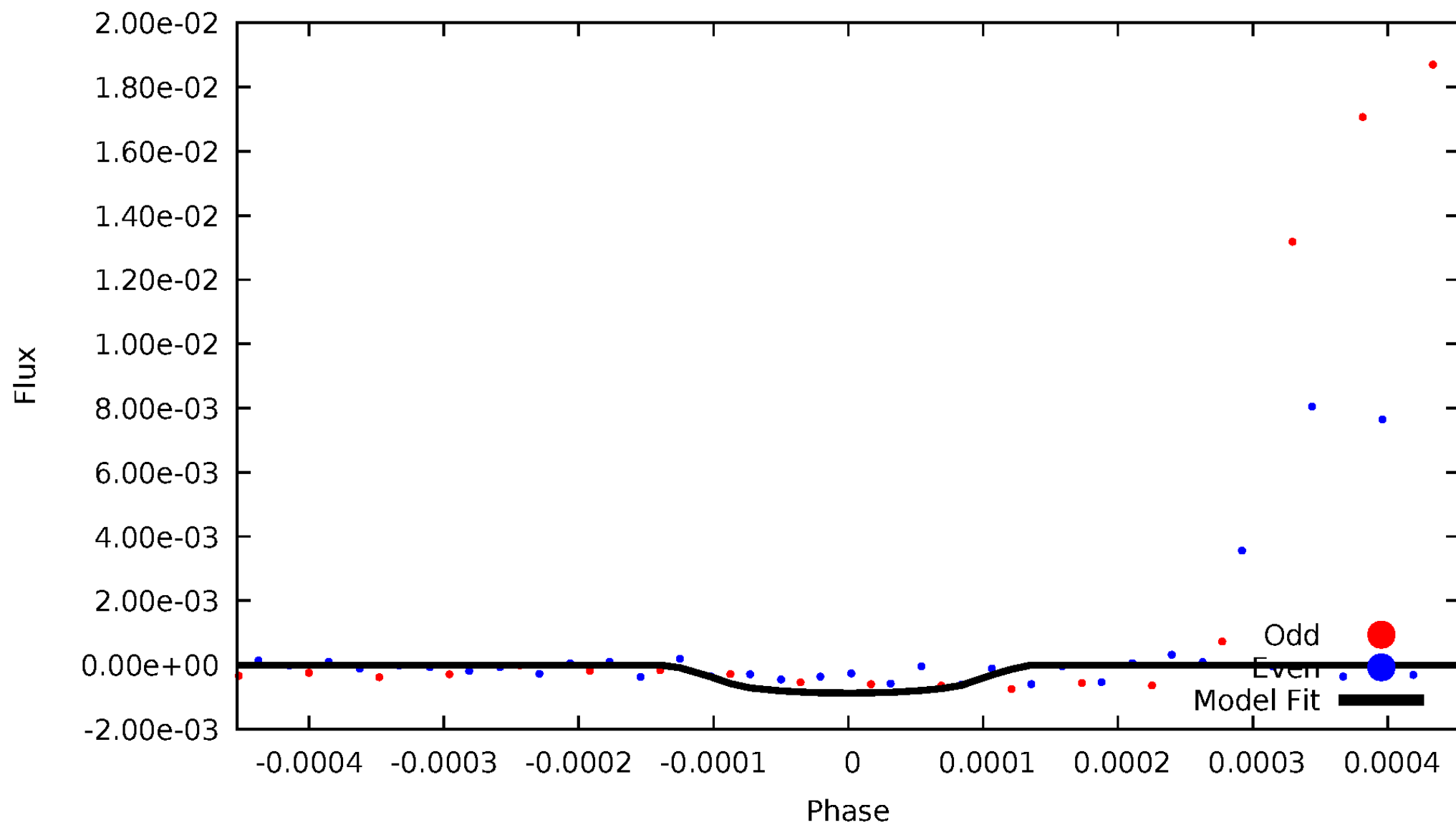


TCE 012406908-01



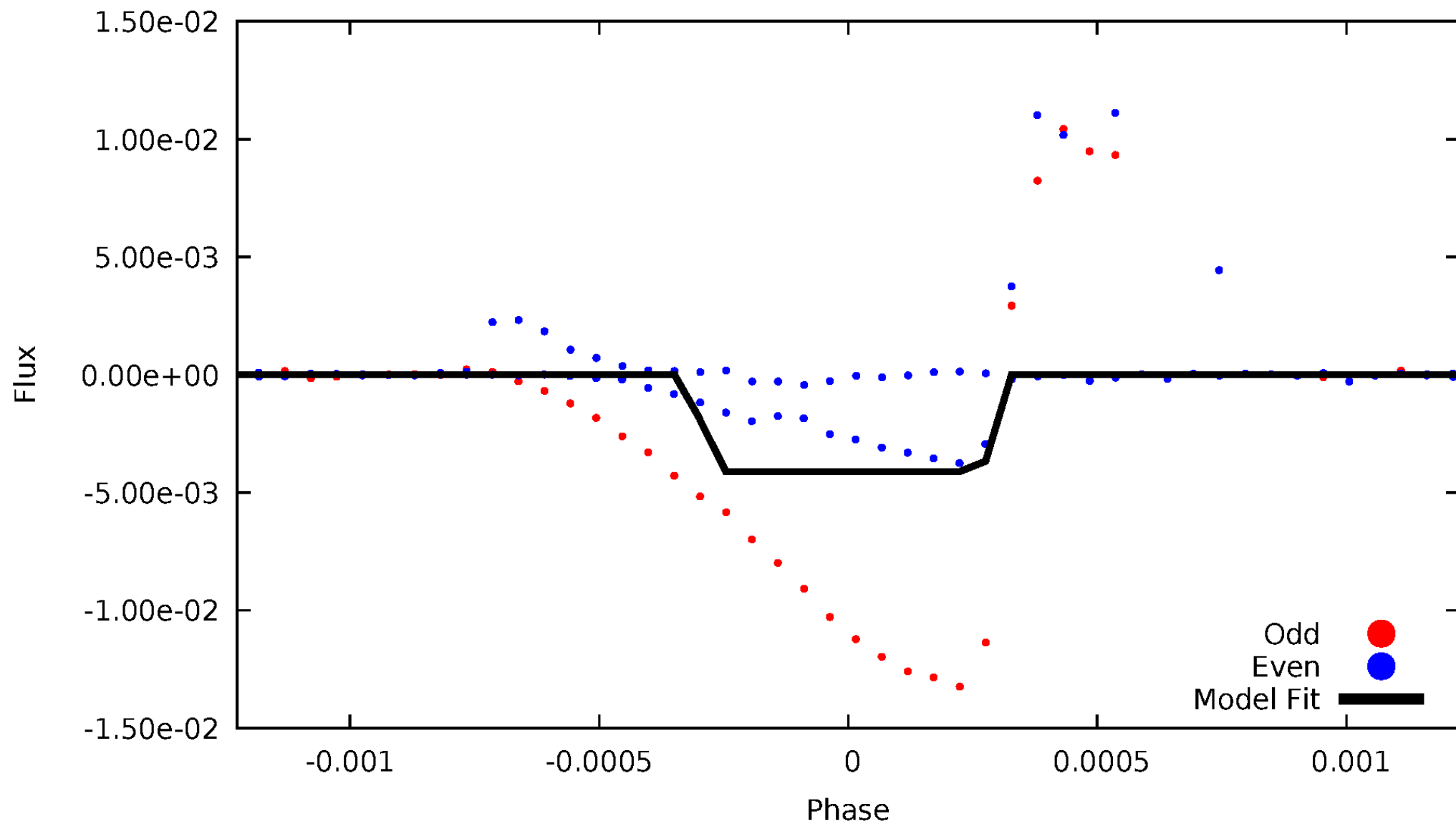
DV Odd/Even

TCE 012406908-01



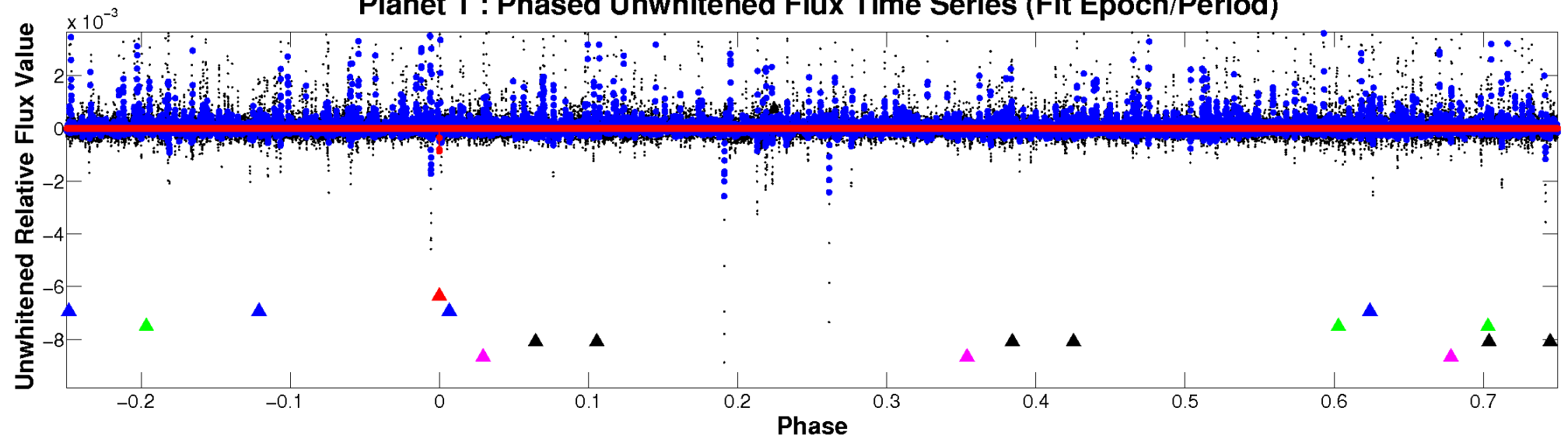
ALT Odd/Even

TCE 012406908-01

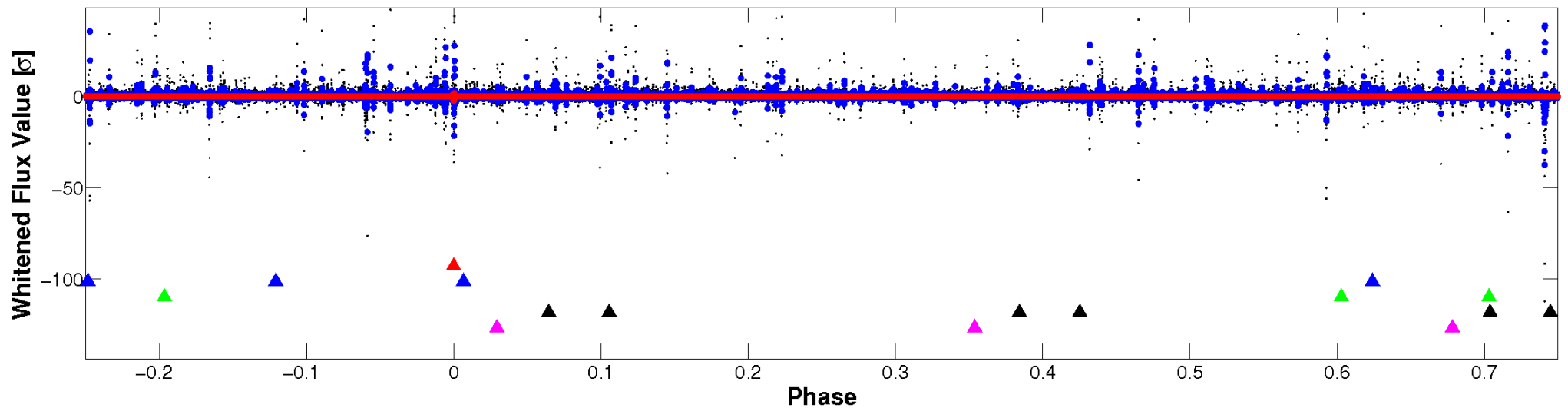


Non-Whitened Vs. Whitened Light Curve

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

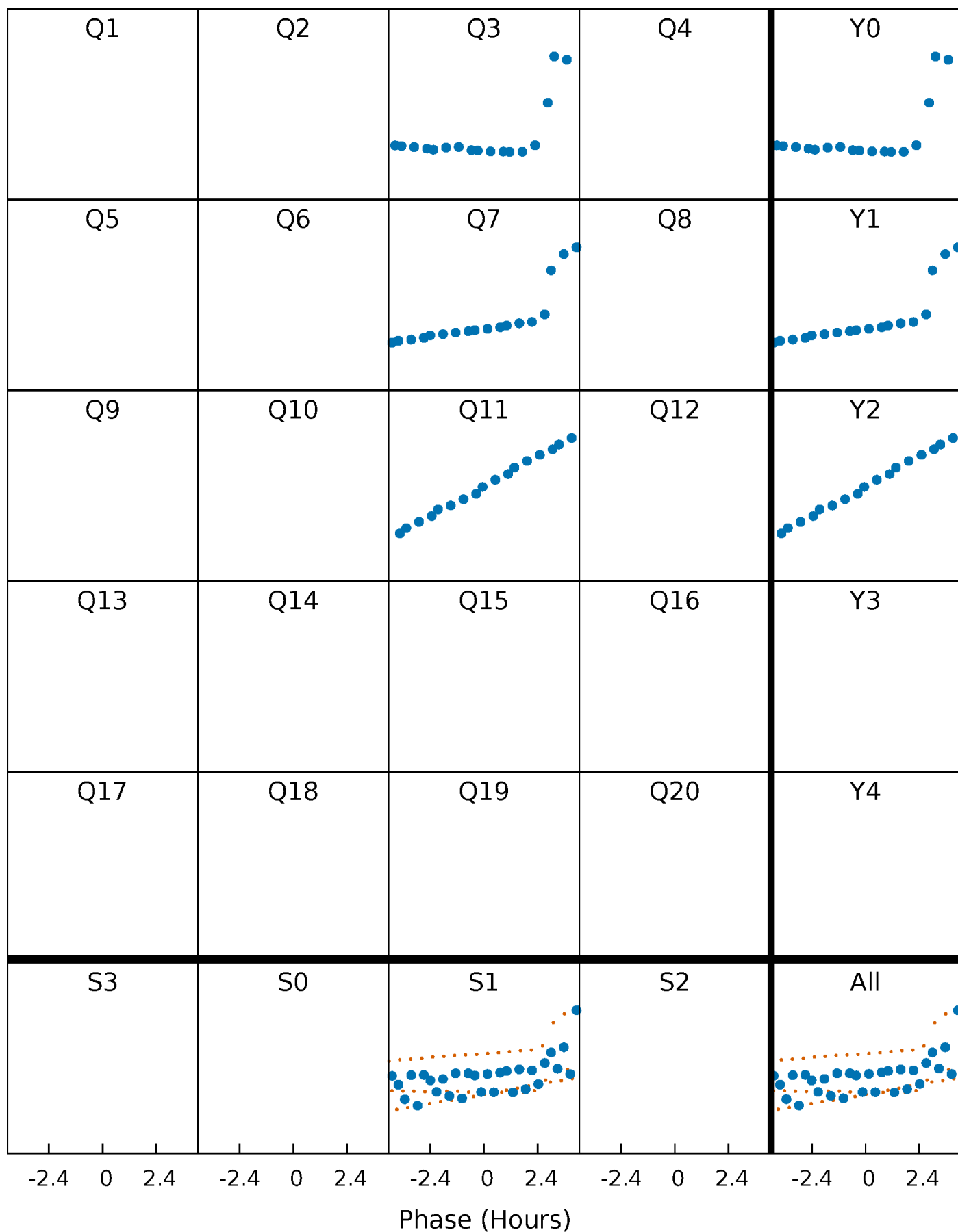


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



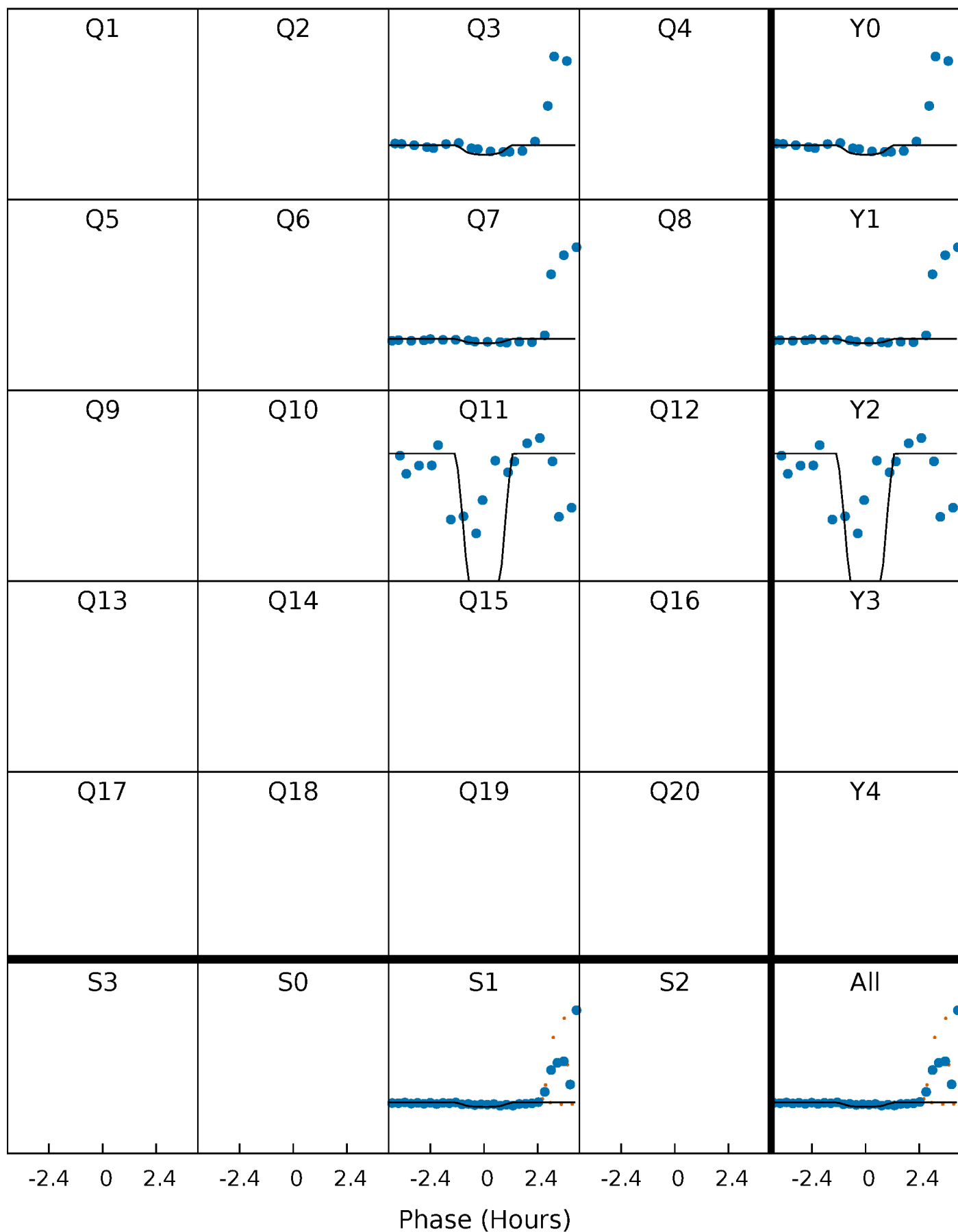
PDC Quarter-Phased Transit Curves

TCE 012406908-01 P=392.064555 Days $T_0=308.188915$ (BKJD)



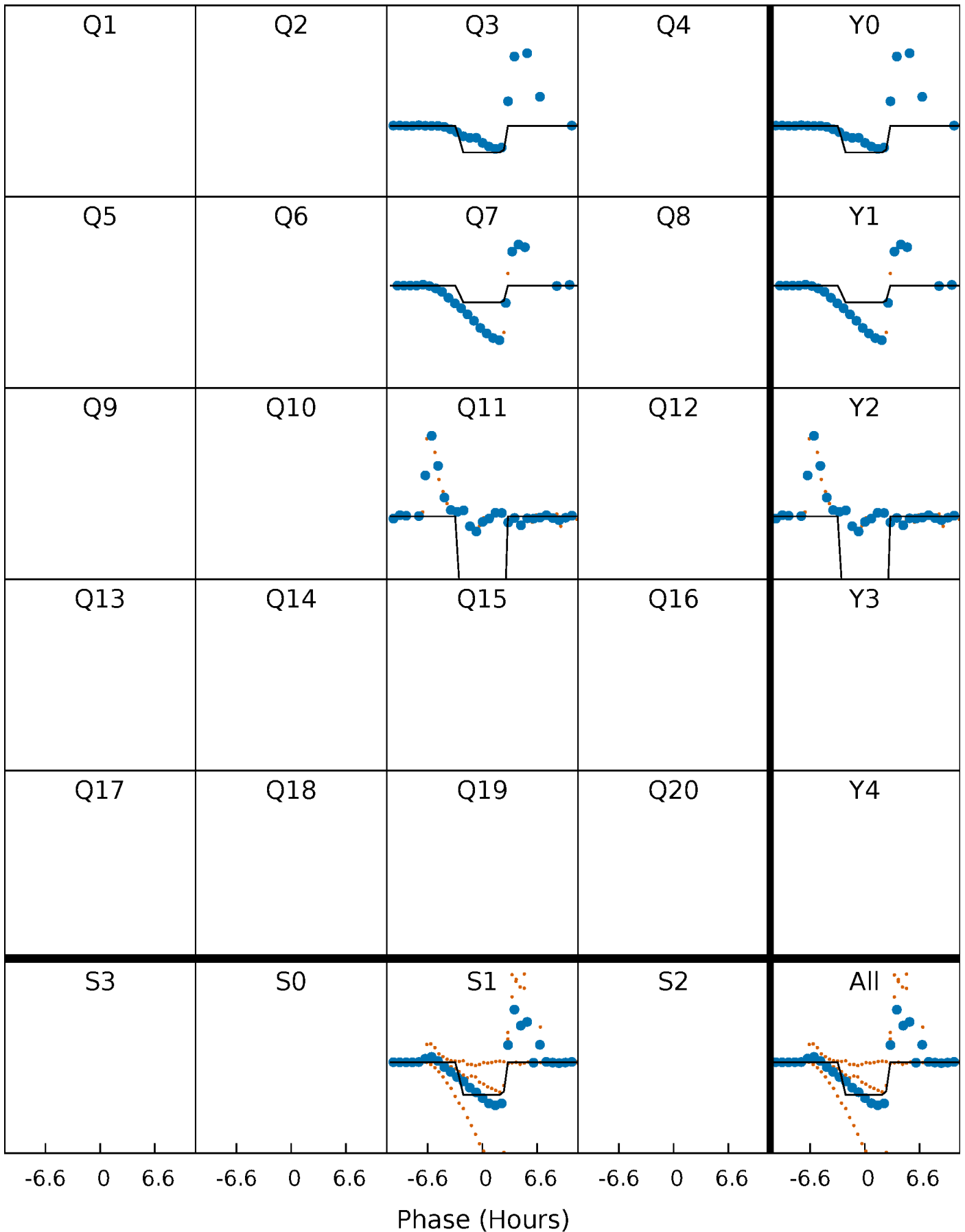
DV Quarter-Phased Transit Curves

TCE 012406908-01 P=392.064555 Days $T_0=308.188915$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

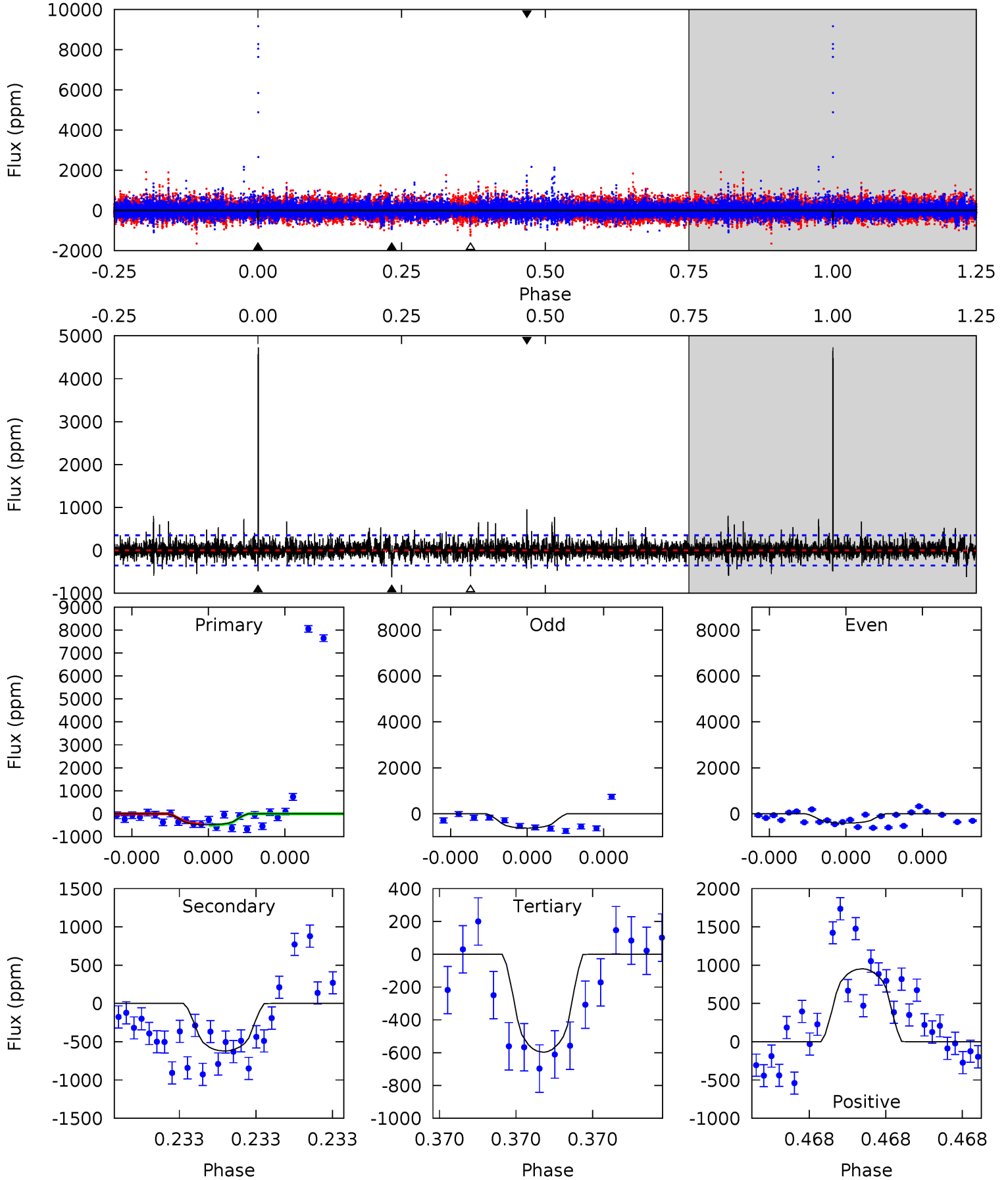
TCE 012406908-01 P=392.079149 Days $T_0=308.174969$ (BKJD)



DV Model-Shift Uniqueness Test

012406908-01, P = 392.064555 Days, E = 308.188915 Days

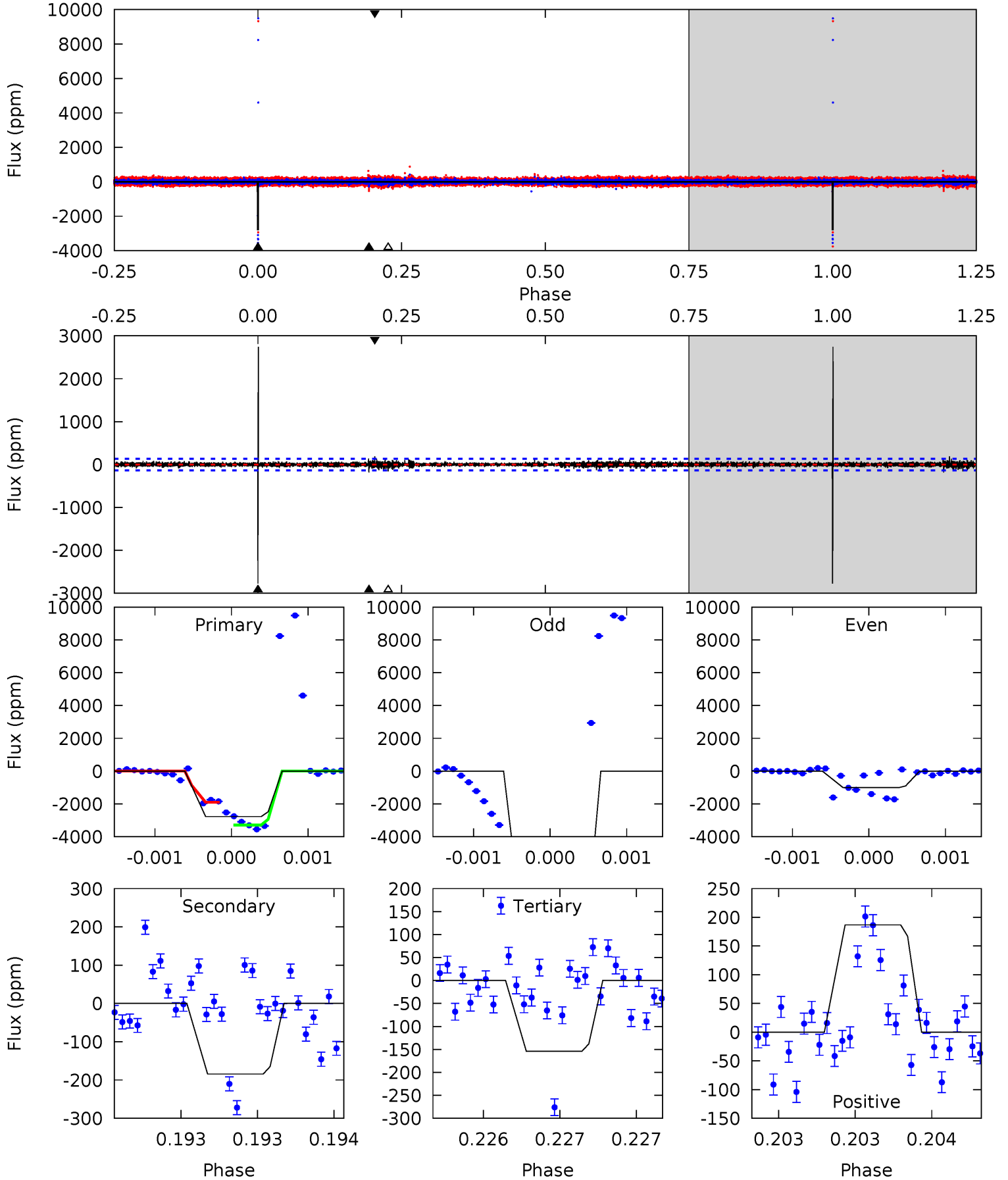
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.81	10.0	9.63	15.4	5.69	3.65	1.97	-1.82	-7.55	0.39	-5.34	0.98	0.95	0.88	0.45



Alt Model-Shift Uniqueness Test

012406908-01, P = 392.079149 Days, E = 308.174969 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
113.7	7.56	6.32	7.66	5.55	3.44	1.09	107.4	106.0	1.23	-0.10	262.4	1.65	0.50	0



Stellar Parameters For KIC 012406908

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (g \cdot \text{cm}^{-3})$
	4582^{+161}_{-161}	$4.587^{+0.059}_{-0.027}$	$-0.060^{+0.300}_{-0.300}$	$0.697^{+0.045}_{-0.062}$	$0.683^{+0.074}_{-0.056}$	$2.848^{+0.715}_{-0.323}$
	+4%/-4%	+1%/-1%	+500%/-500%	+6%/-9%	+11%/-8%	+25%/-11%
Source	PHO54	PHO54	PHO54	DSEP		

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

Secondary Eclipse Parameters for KIC 012406908-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	-622 ± 62	$6.71^{+7.33}_{-4.58}$	244^{+10}_{-10}	3007^{+1424}_{-525}	6529^{+61537}_{-5046}
Alt.	-184 ± 24	$7.81^{+7.36}_{-5.48}$	244^{+9}_{-10}	2471^{+957}_{-358}	1412^{+14101}_{-1033}

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 $A_{obs} \gg 1.0$

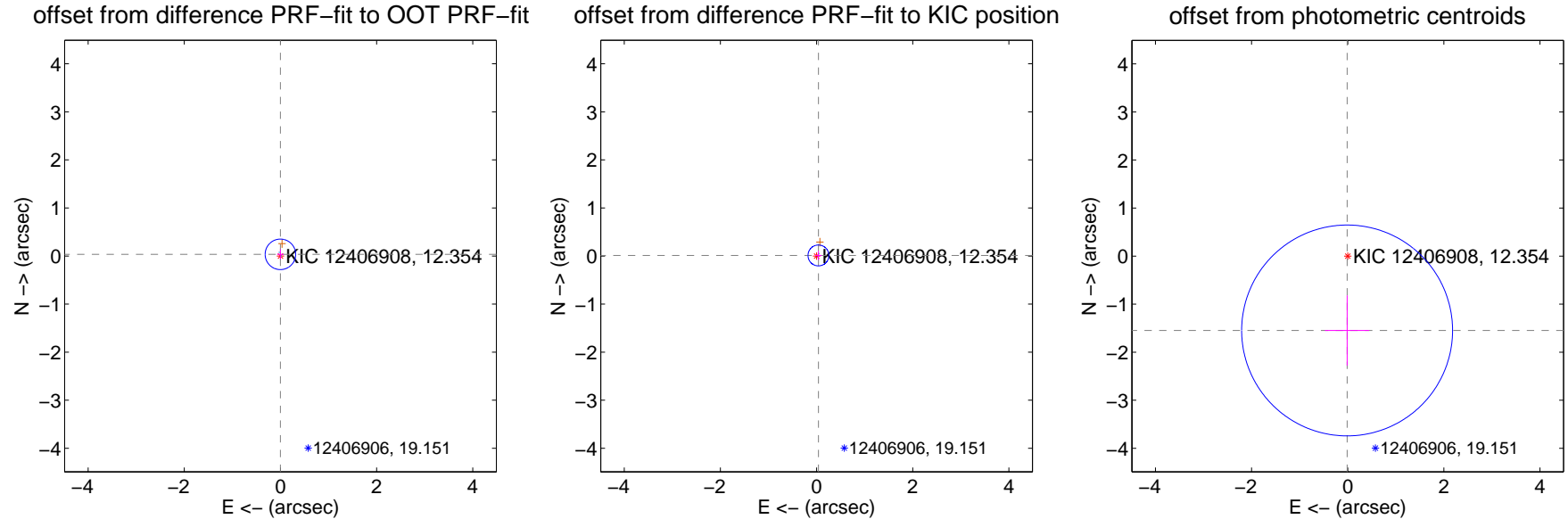
DV Centroid Data

Supplemental centroid analysis for 012406908-01. Kepler magnitude: 12.35. Transit SNR 7.52

There are 2 quarters with good PRF difference image offsets

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

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.035 ± 0.106	0.33	0.001 ± 0.068	0.035 ± 0.106
PRF-fit source offset from KIC position	0.040 ± 0.072	0.56	-0.038 ± 0.067	0.012 ± 0.094
photometric centroid source offset	1.55 ± 0.73	2.12	0.01 ± 0.46	-1.55 ± 0.73



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.

Q1 no difference image



Q1 no OOT image



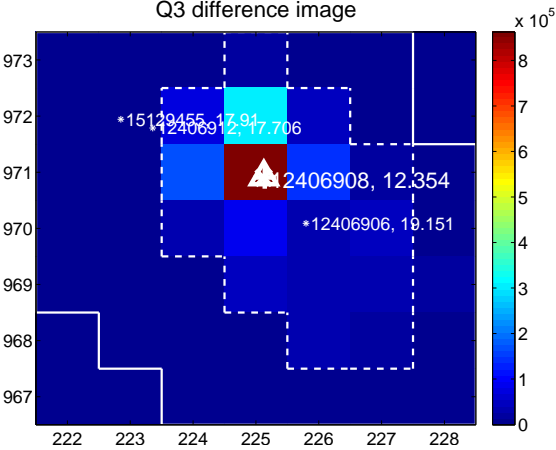
Q2 no difference image



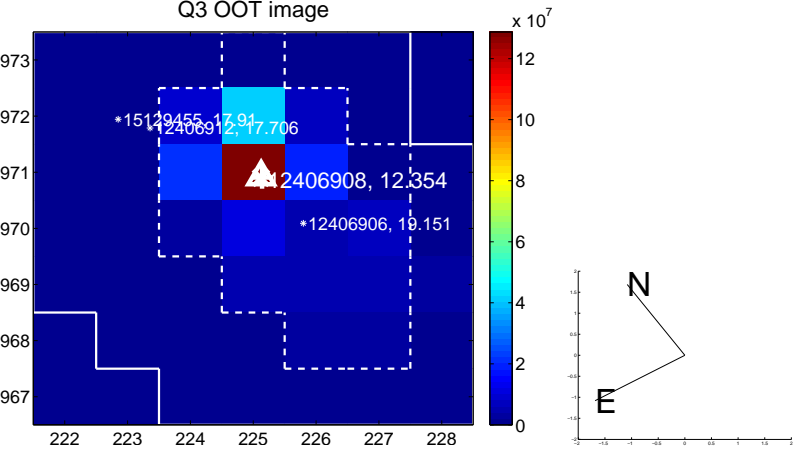
Q2 no OOT image



Q3 difference image



Q3 OOT image



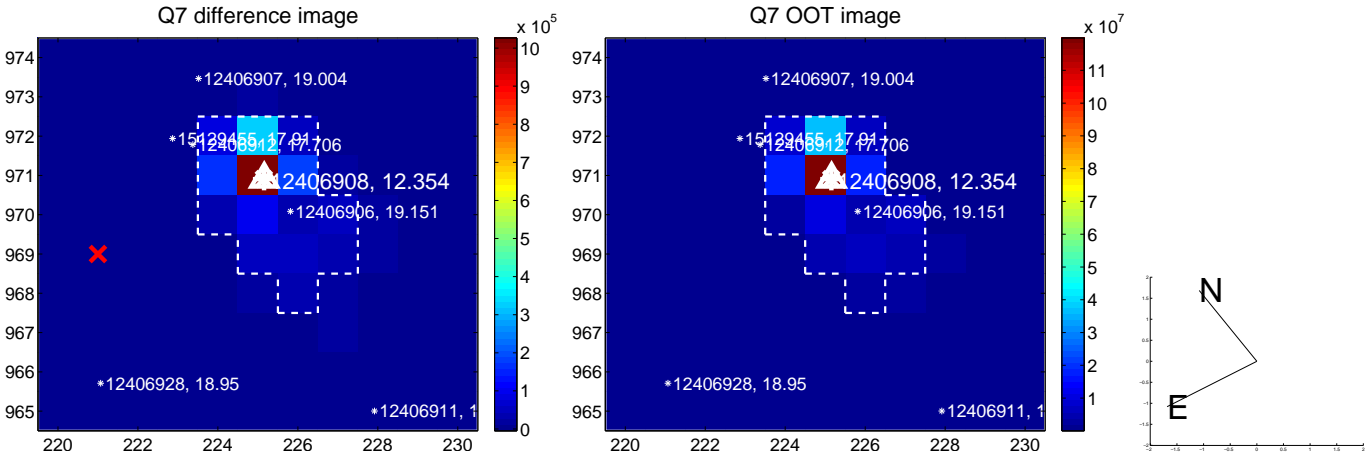
Q4 no difference image



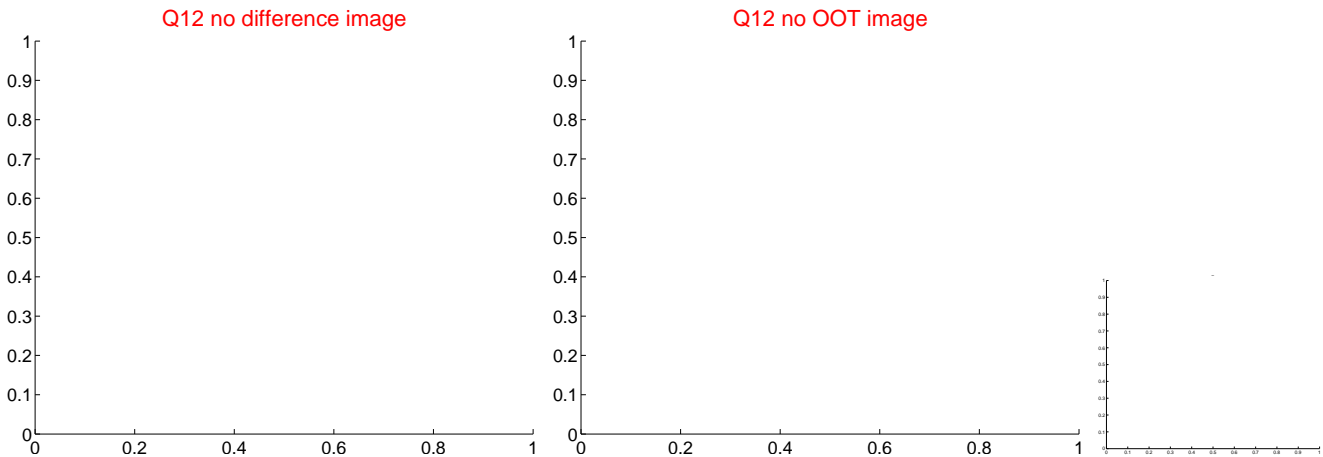
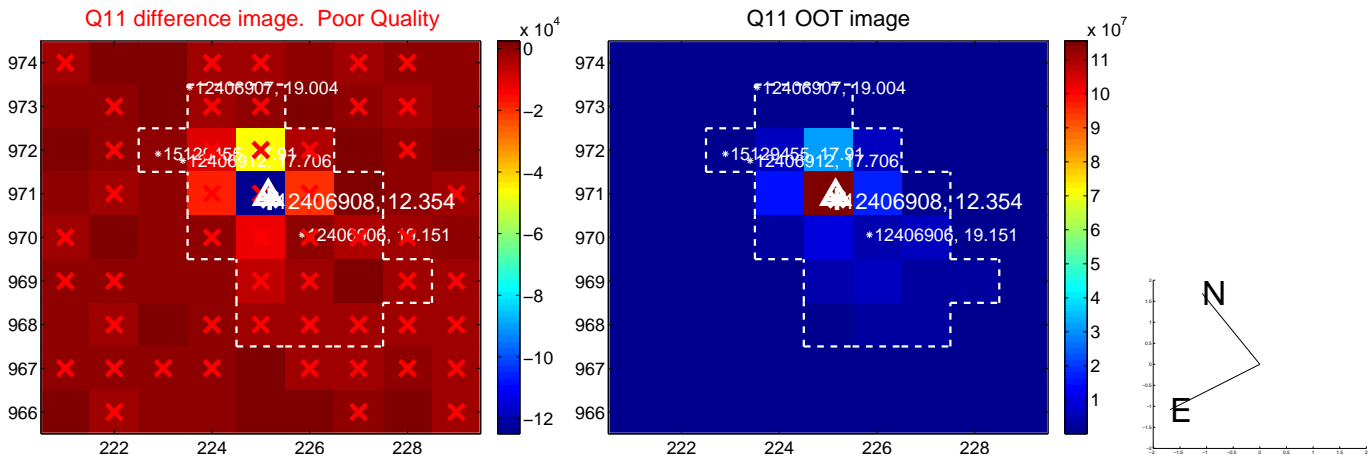
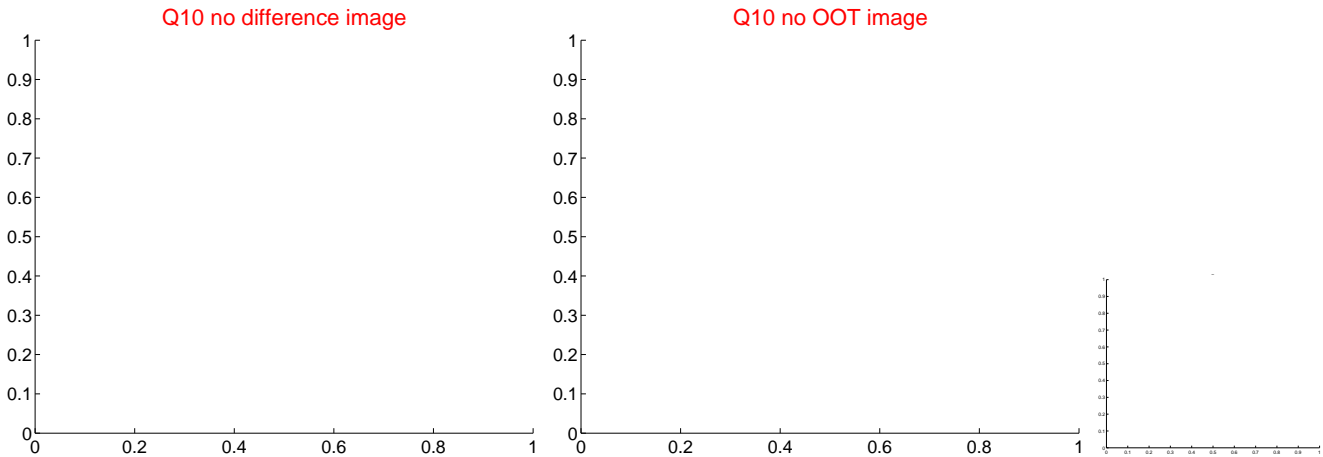
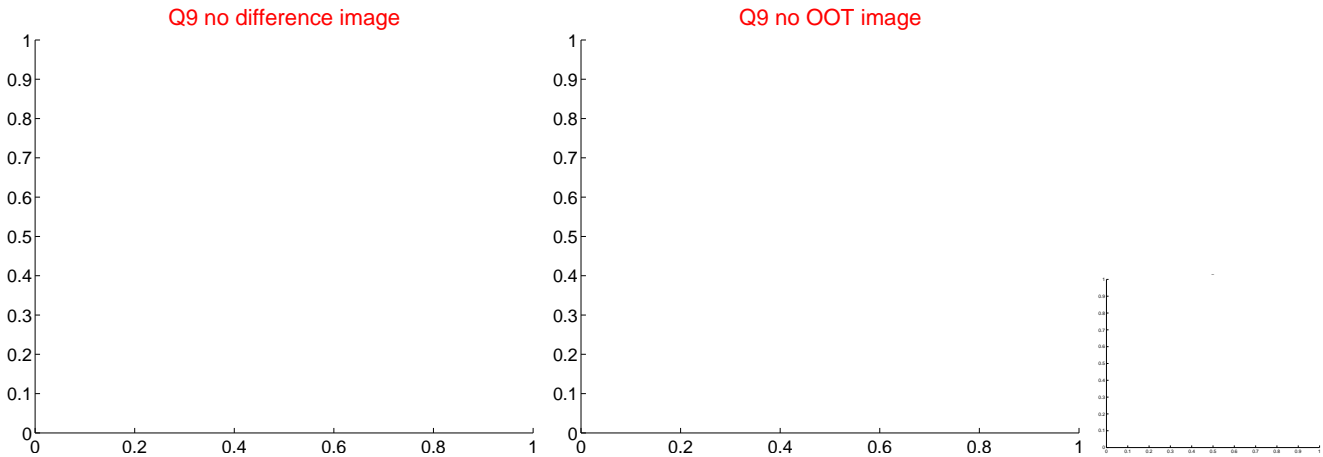
Q4 no OOT image



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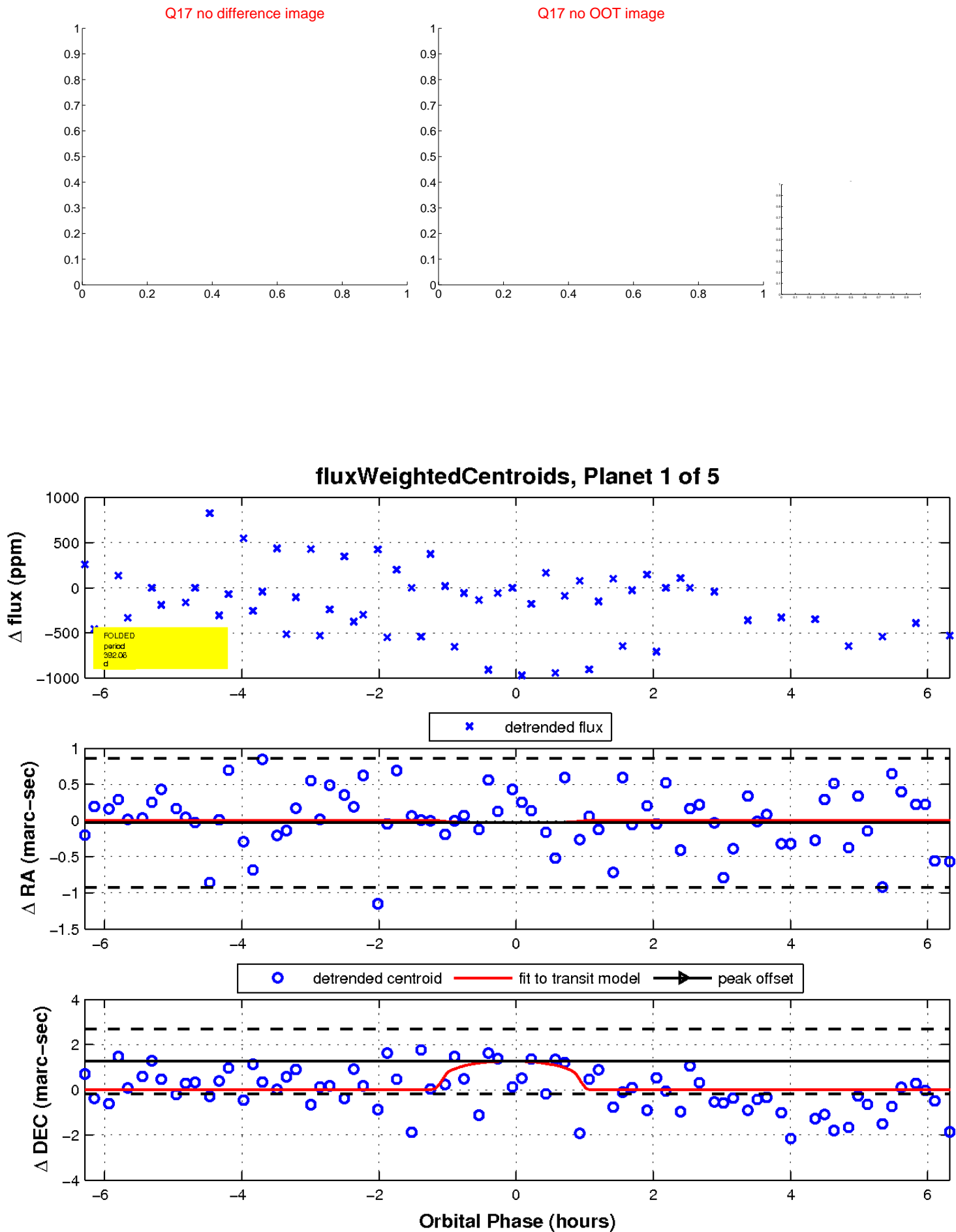
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value



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

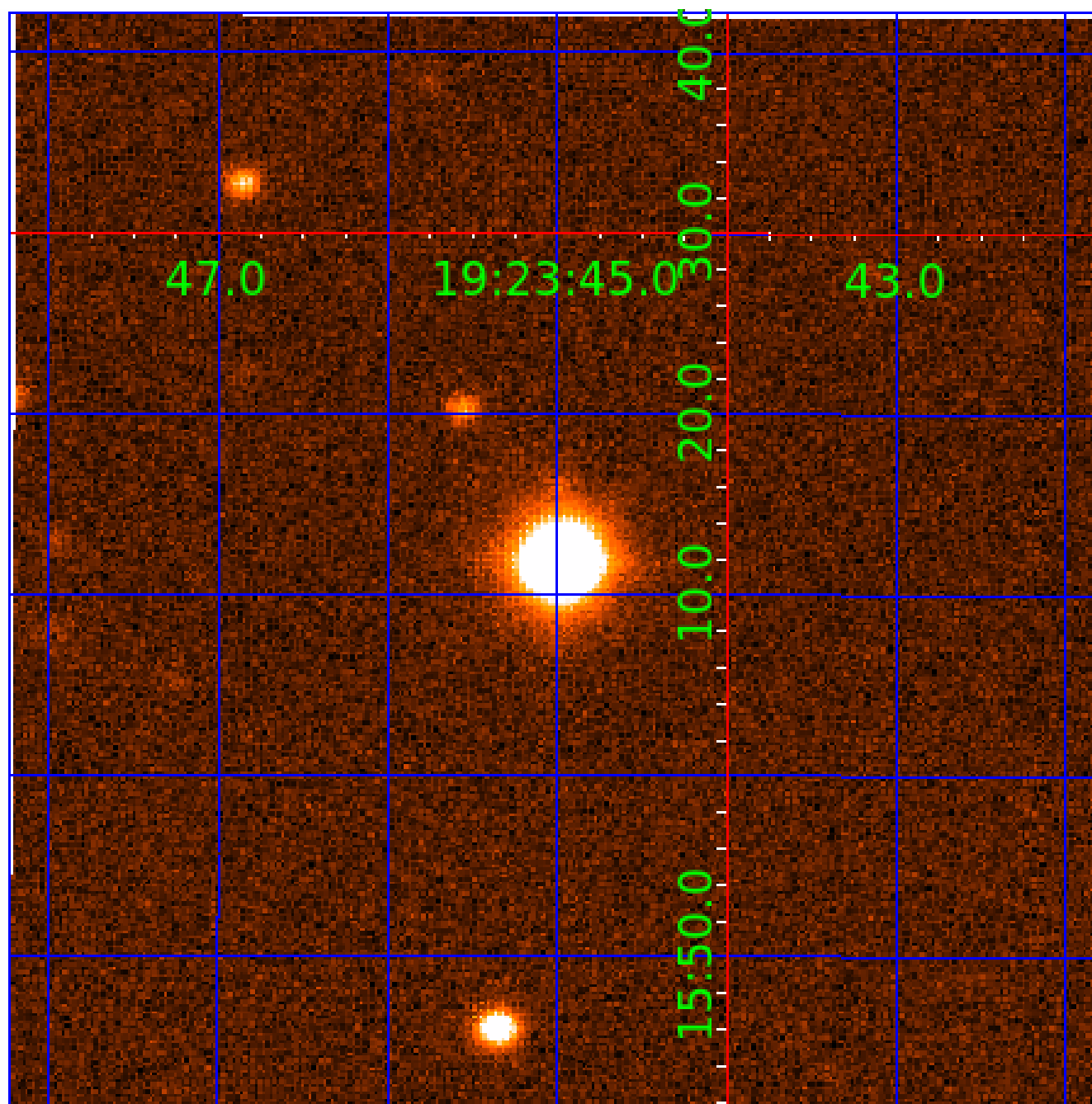


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 012406908

Q1-17 DR25 TCE Parameters

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Robovetter Results

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012406908-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV
012406908-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
012406908-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_TRACKER—LPP_DV—LPP_ALT—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.

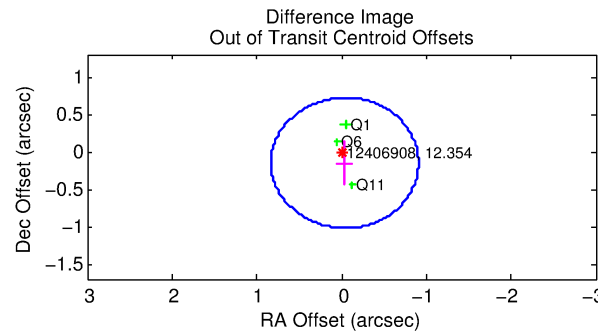
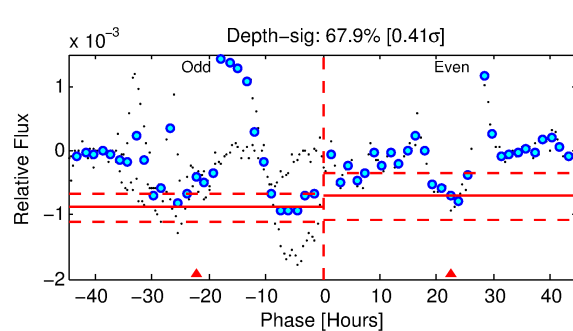
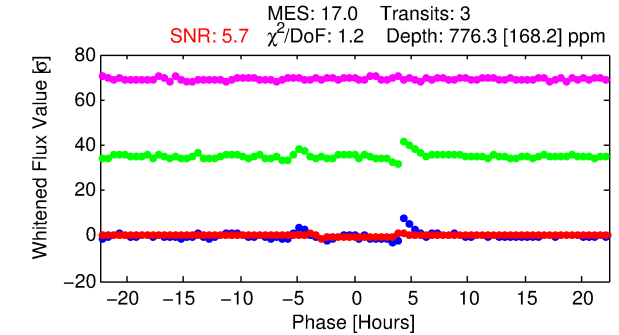
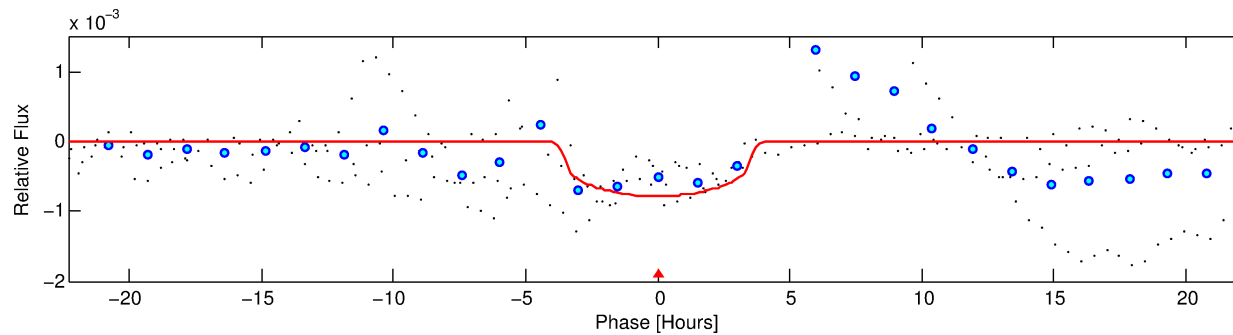
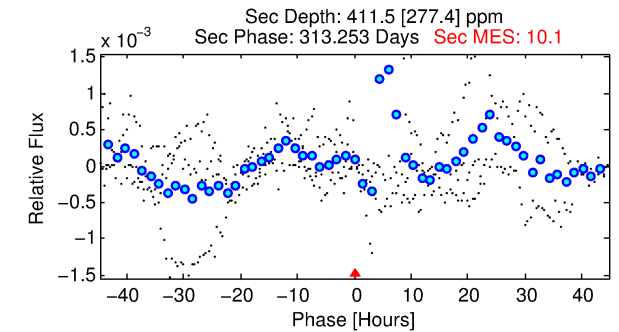
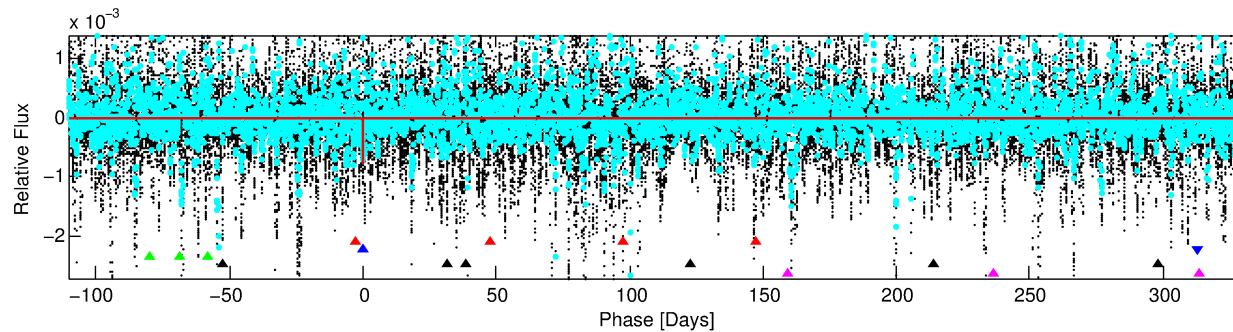
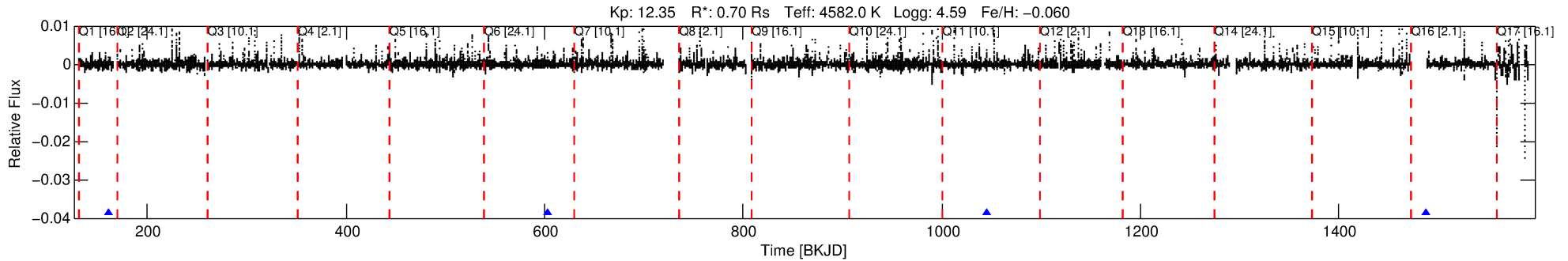
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 012406908-02

No Significant Match Found

DV One-Page Summary

KIC: 12406908 Candidate: 2 of 5 Period: 442.077 d



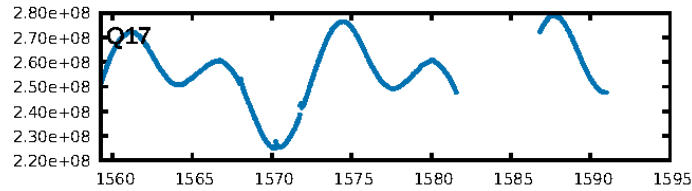
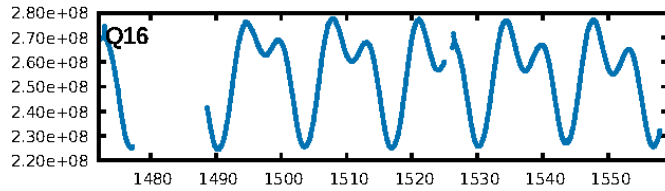
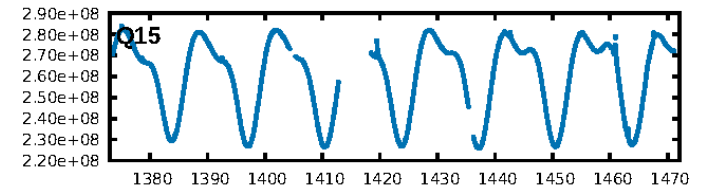
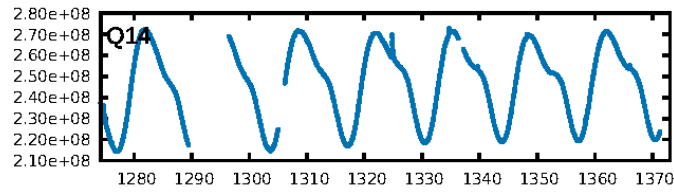
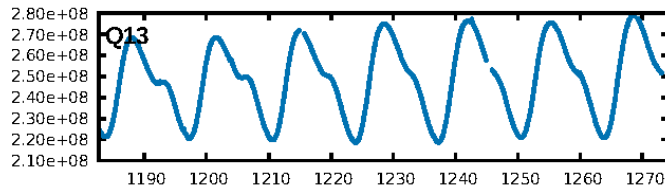
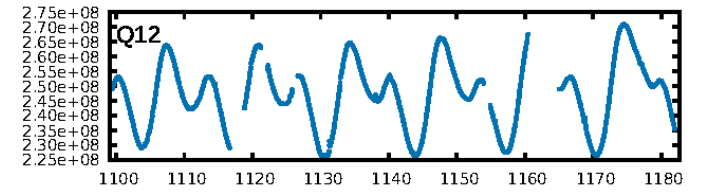
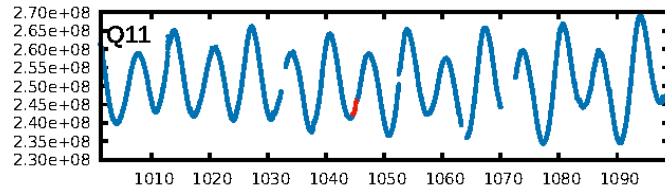
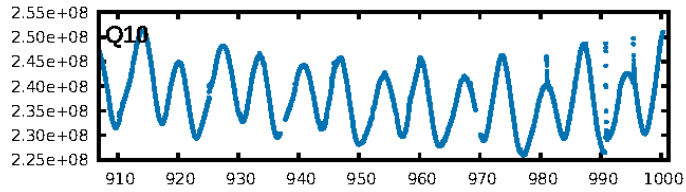
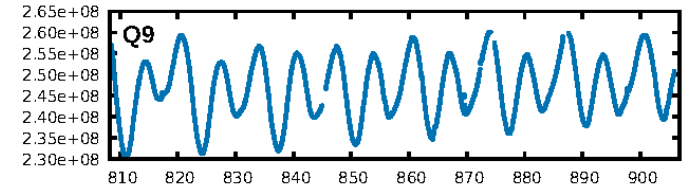
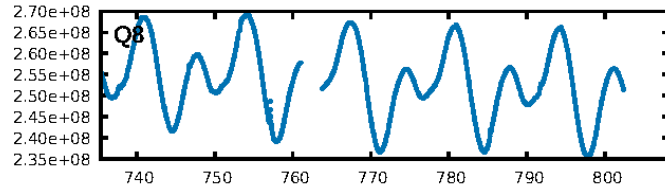
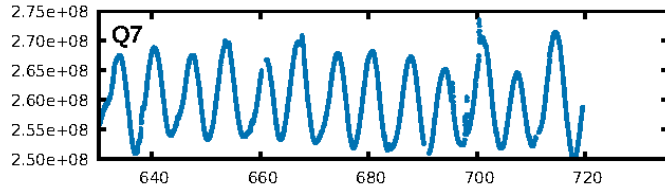
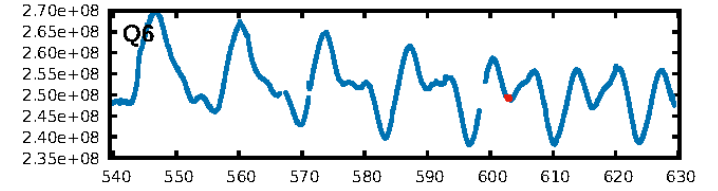
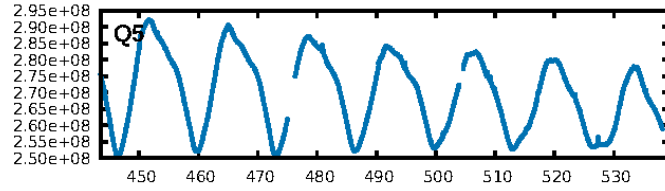
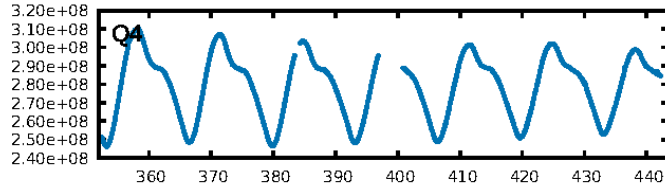
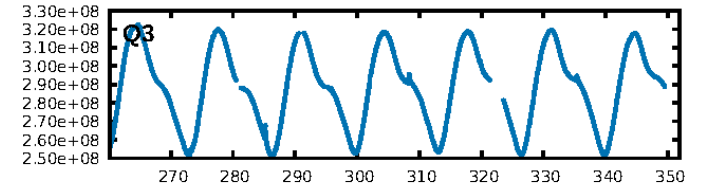
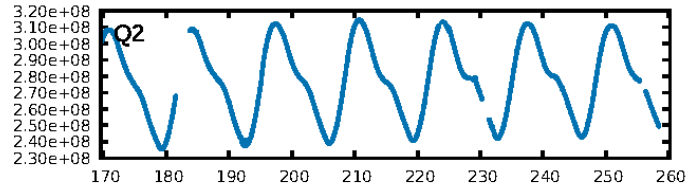
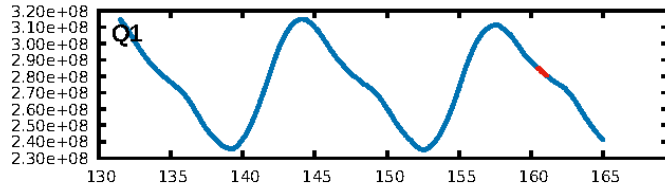
DV Fit Results:

Period = 442.07657 [0.00513] d
Epoch = 160.7675 [0.0062] BKJD
Rp/R* = 0.0263 [0.0135]
a/R* = 378.18 [607.01]
b = 0.60 [1.74]
Seff = 0.19 [0.03]
Teq = 169 [7] K
Rp = 2.00 [1.05] Re
a = 1.0012 [0.0747] AU
Ag = 56886.20 [70364.54] [0.81σ]
Teffp = 4027 [1249] K [3.09σ]

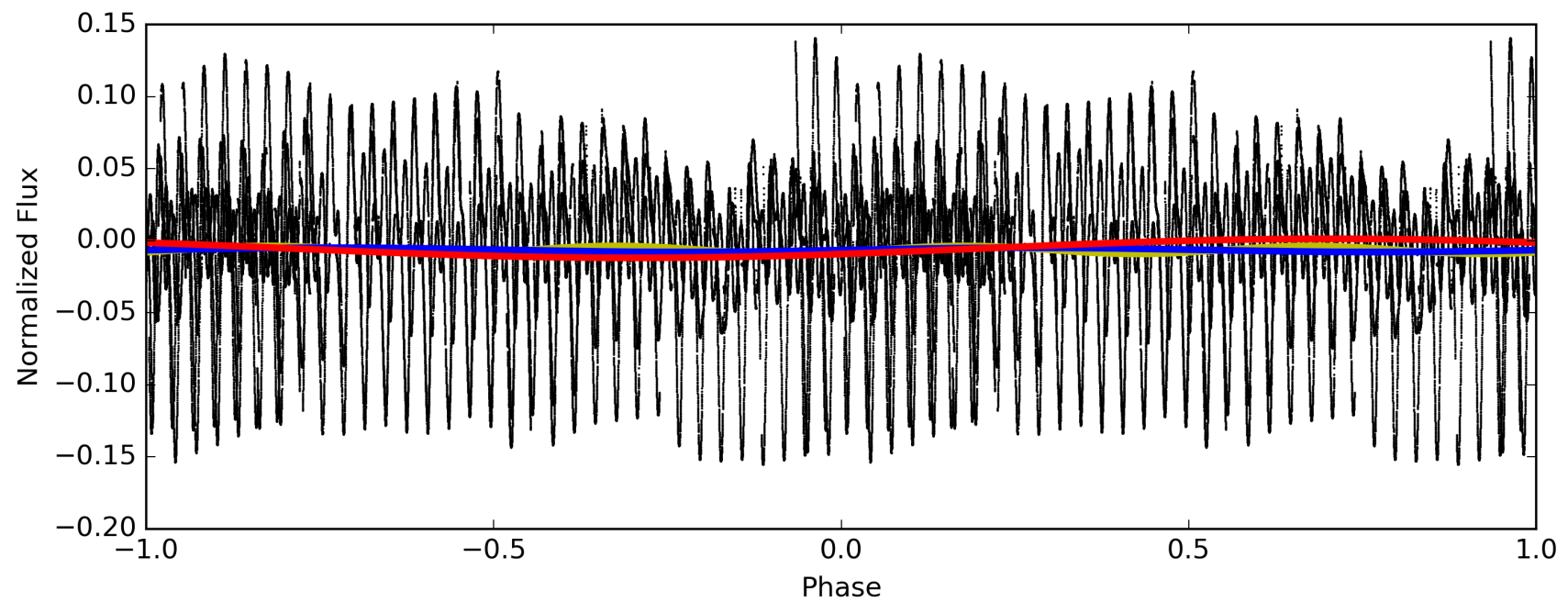
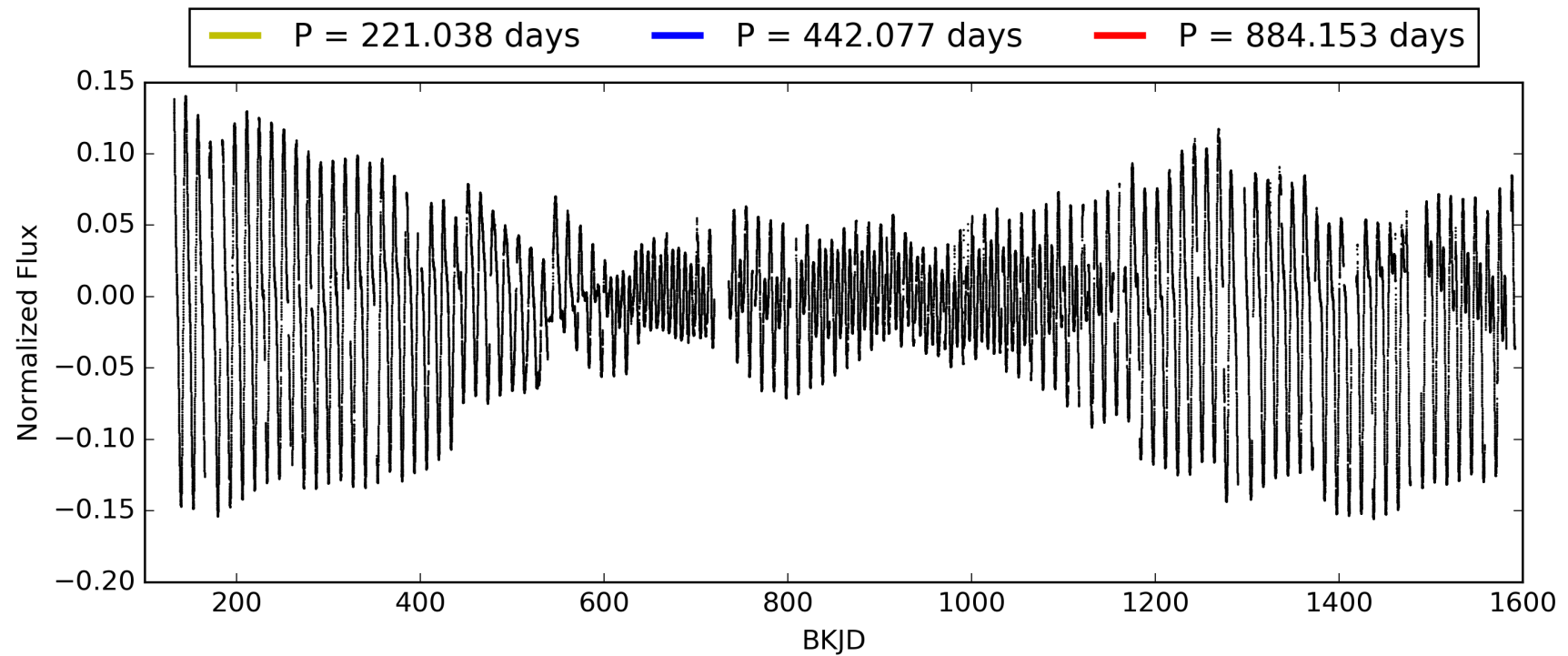
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [14.99σ]
LongPeriod-sig: 100.0% [225.31σ]
ModelChiSquare2-sig: 55.4%
ModelChiSquareGof-sig: 46.4%
Bootstrap-pfa: N/A
RollingBand-fgt: 1.00 [2/2]
GhostDiagnostic-chr: 1.059
Centroid-sig: 0.2%
Centroid-so: 1.096 arcsec [1.70σ]
OotOffset-rm: 0.155 arcsec [0.53σ]
OotOffset-st: 1/1/0/1 [3]
KicOffset-rm: 0.134 arcsec [0.48σ]
KicOffset-st: 1/1/0/1 [3]
DiffImageQuality-fgm: 1.00 [3/3]
DiffImageOverlap-fno: 1.00 [3/3]

TCE 012406908-02, PDC Light Curves

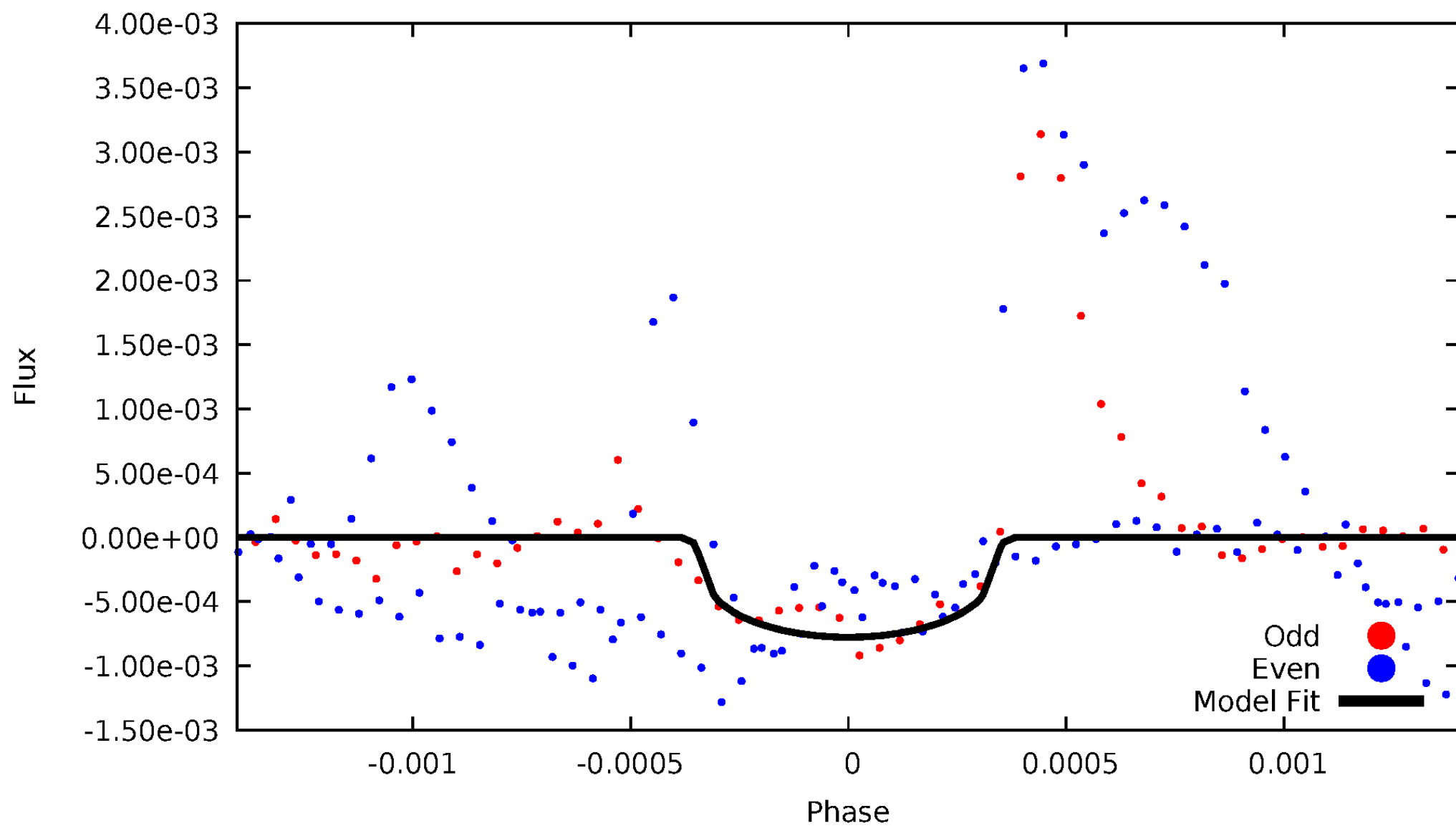


TCE 012406908-02



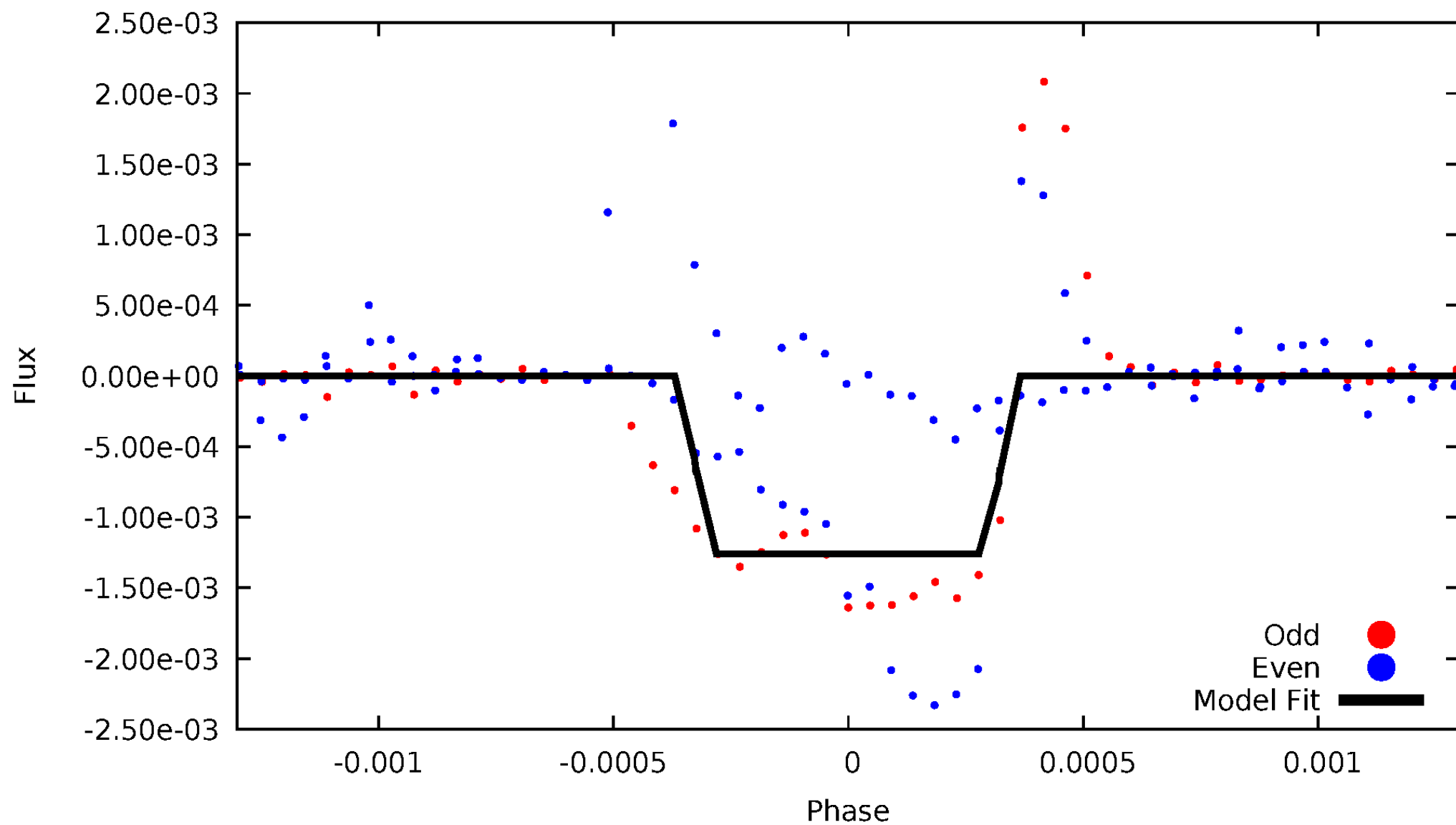
DV Odd/Even

TCE 012406908-02



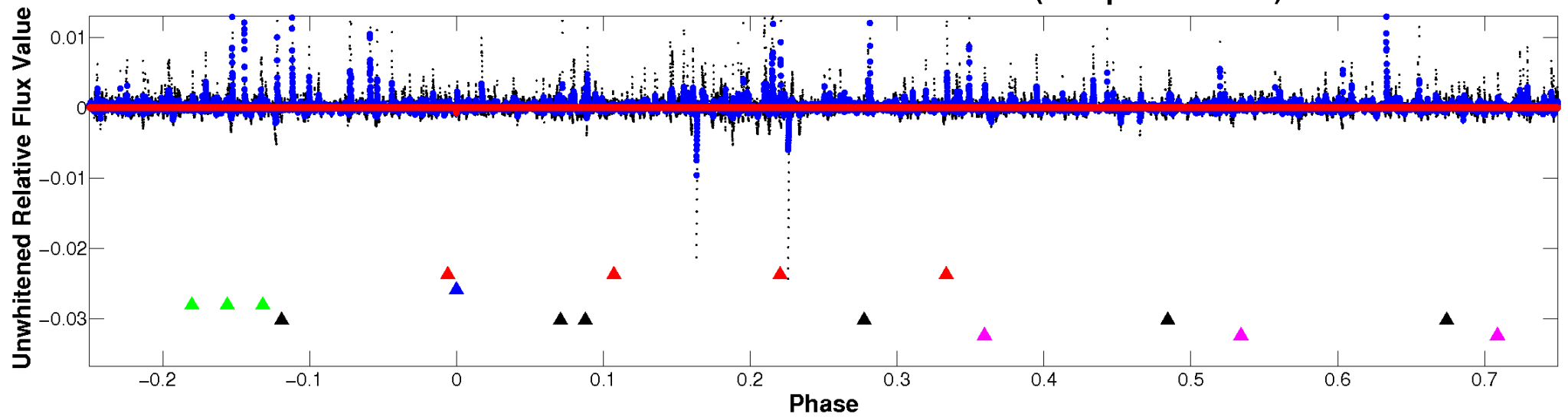
ALT Odd/Even

TCE 012406908-02

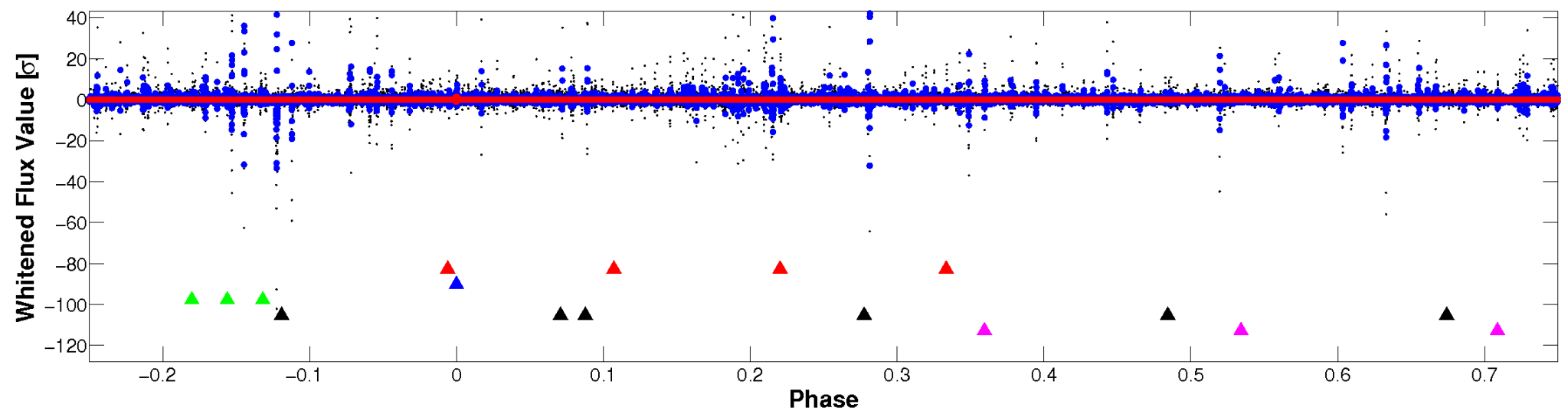


Non-Whitened Vs. Whitened Light Curve

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

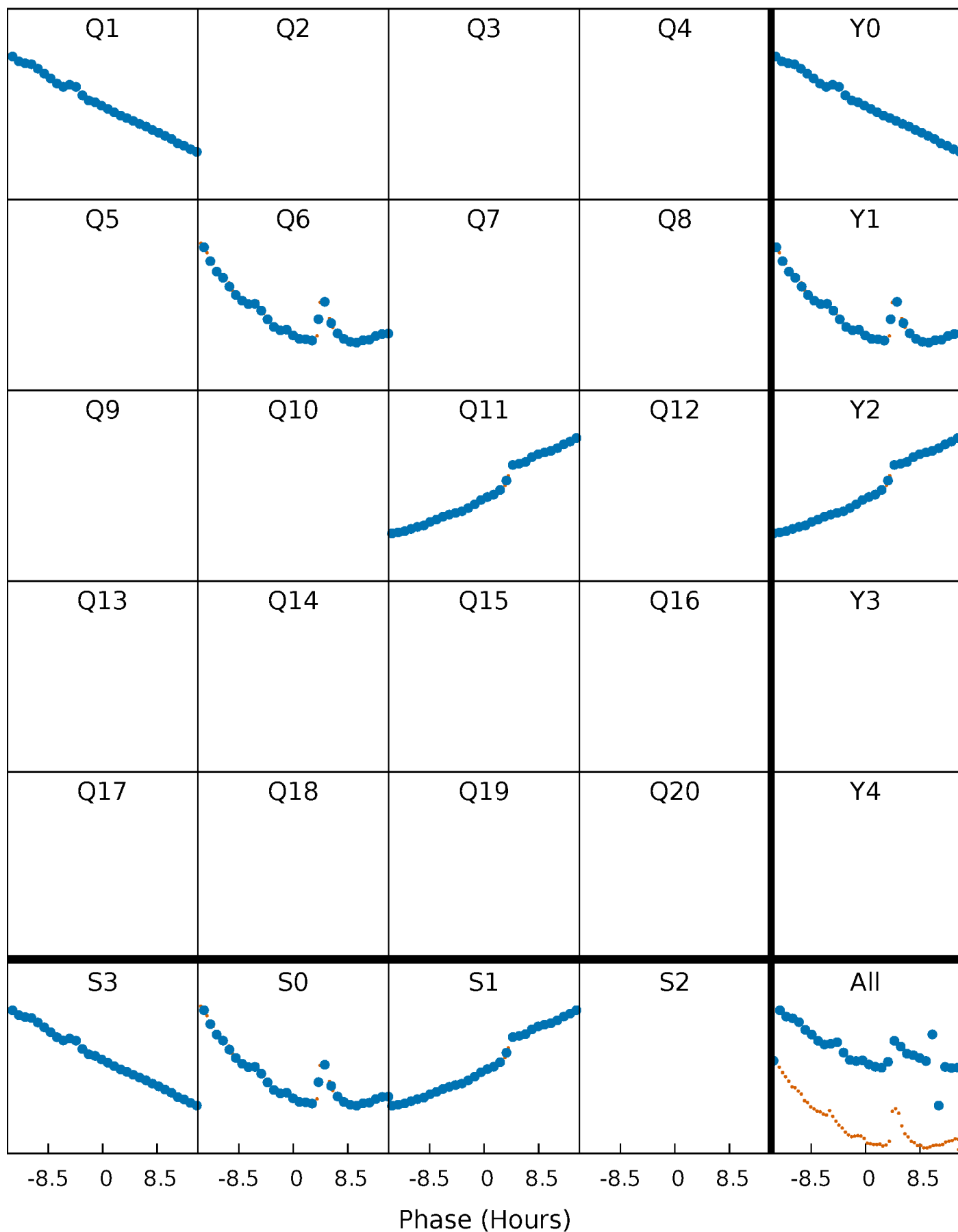


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



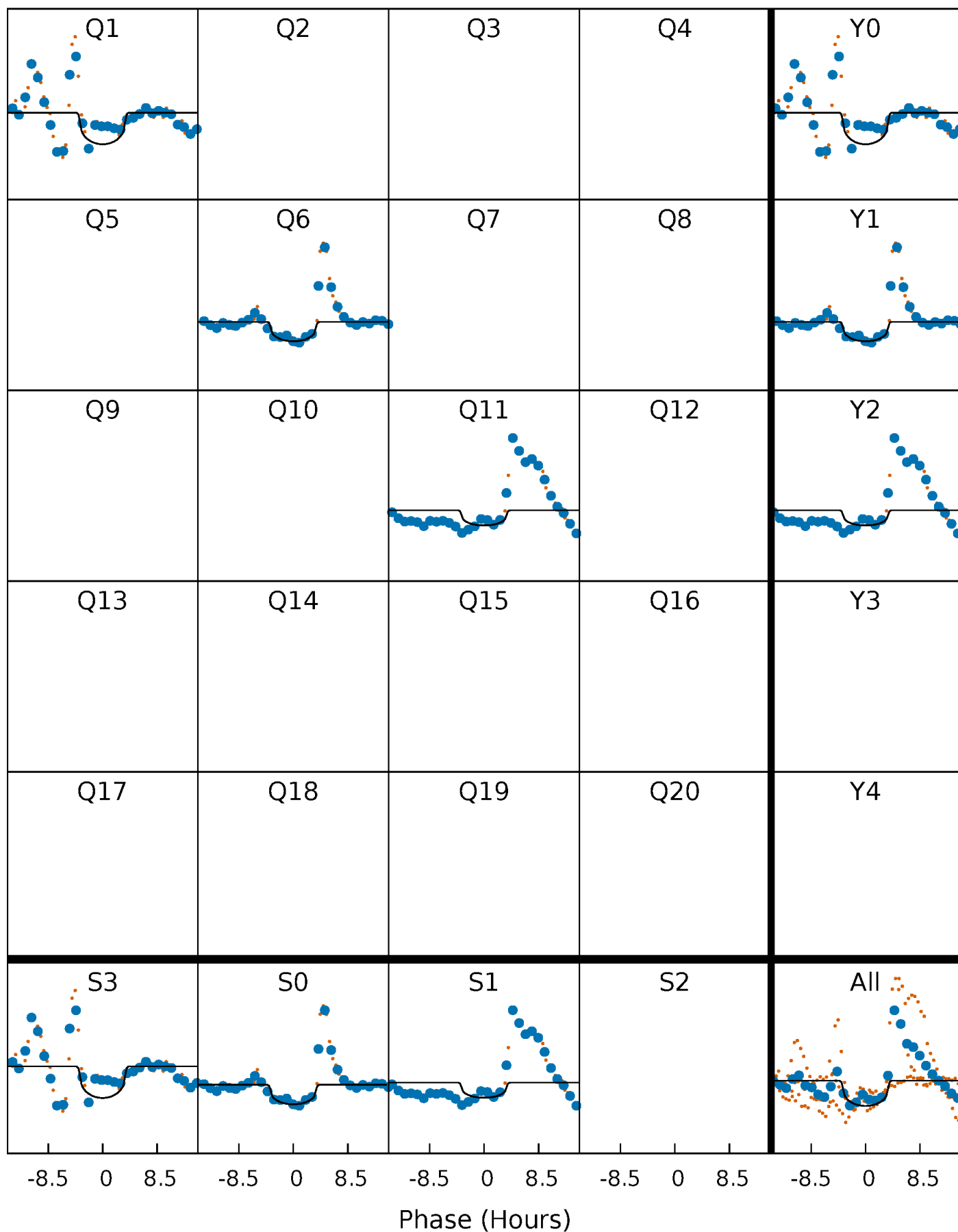
PDC Quarter-Phased Transit Curves

TCE 012406908-02 P=442.076574 Days $T_0=160.767457$ (BKJD)



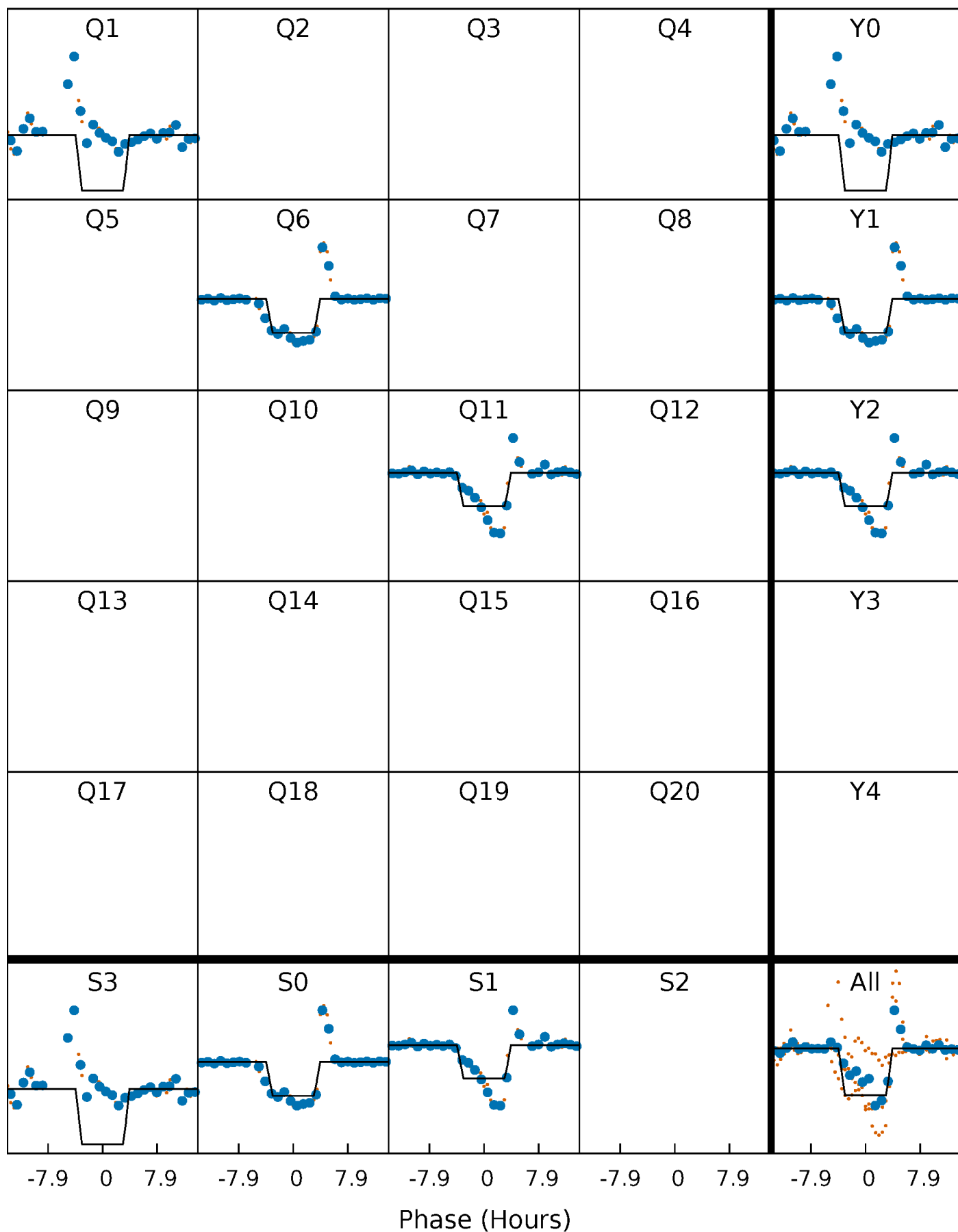
DV Quarter-Phased Transit Curves

TCE 012406908-02 P=442.076574 Days $T_0=160.767457$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

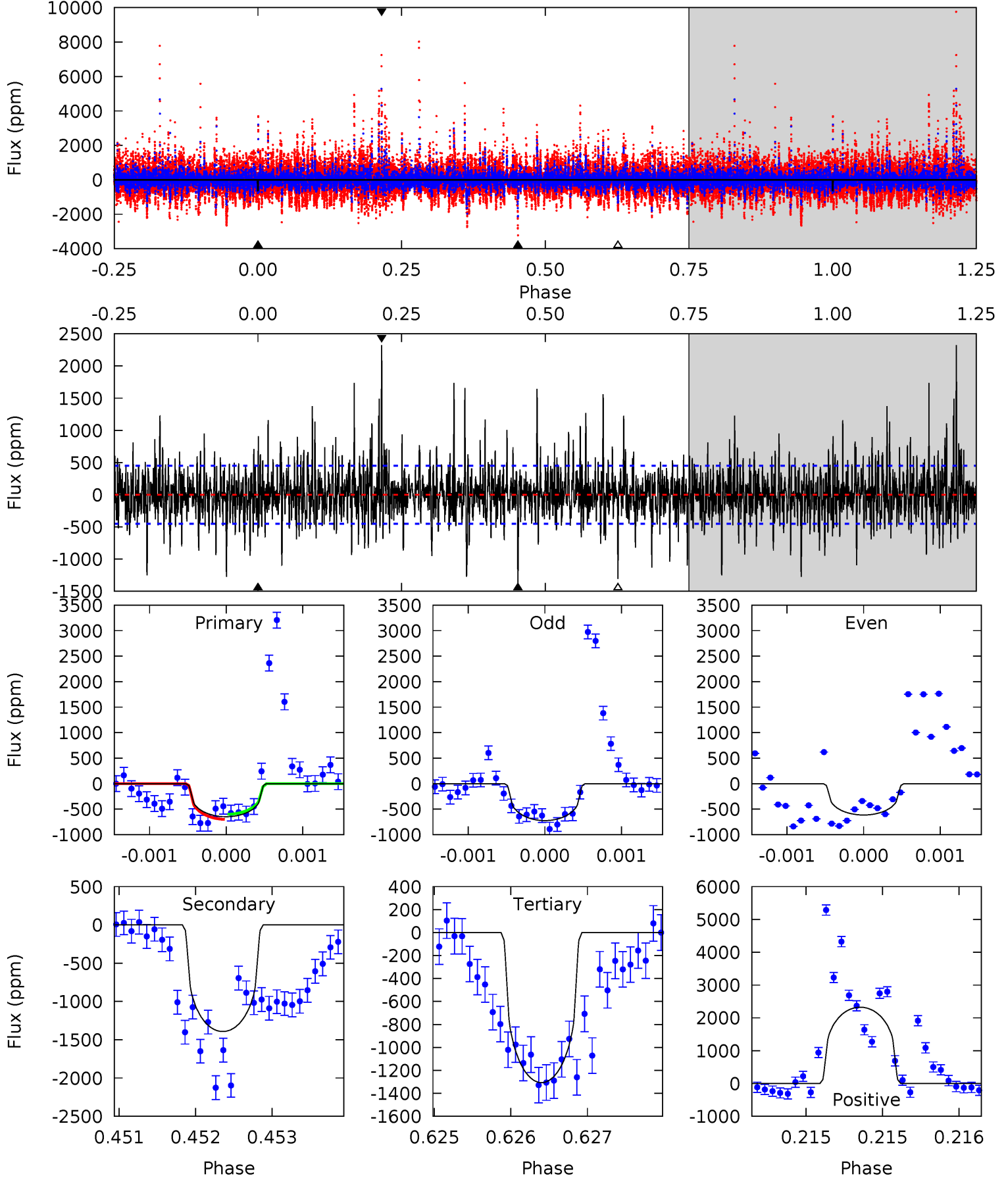
TCE 012406908-02 P=442.080071 Days $T_0=160.775248$ (BKJD)



DV Model-Shift Uniqueness Test

012406908-02, P = 442.076574 Days, E = 160.767457 Days

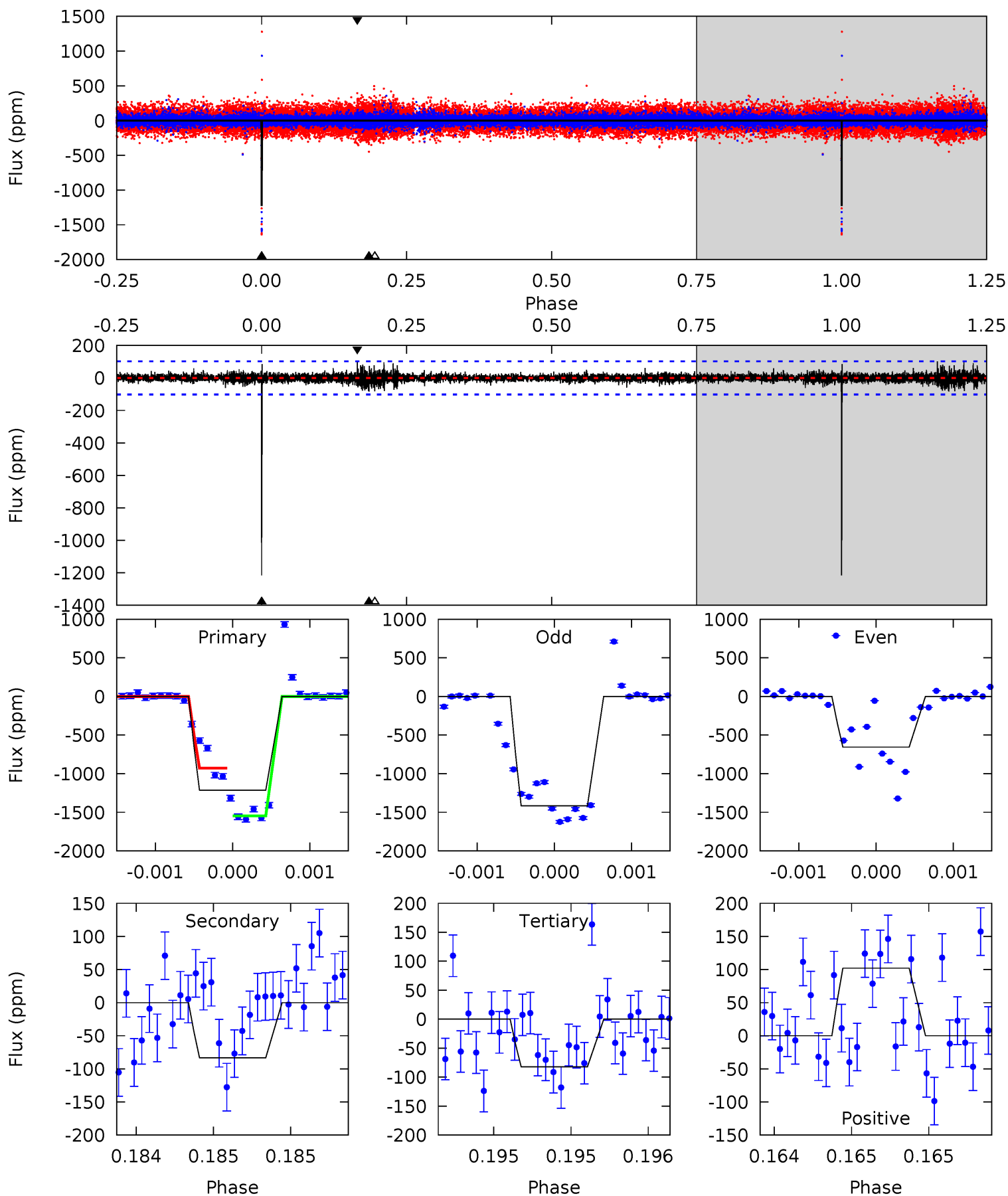
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.90	17.0	15.9	28.3	5.51	3.38	3.87	-8.03	-20.4	1.05	-11.3	0.32	0.89	0.63	0.60



Alt Model-Shift Uniqueness Test

012406908-02, P = 442.080071 Days, E = 160.775248 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
65.6	4.50	4.44	5.52	5.53	3.41	0.74	61.2	60.1	0.05	-1.02	25.4	0.68	0.08	0



Stellar Parameters For KIC 012406908

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	$M(M_{\odot})$	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	4582^{+161}_{-161}	$4.587^{+0.059}_{-0.027}$	$-0.060^{+0.300}_{-0.300}$	$0.697^{+0.045}_{-0.062}$	$0.683^{+0.074}_{-0.056}$	$2.848^{+0.715}_{-0.323}$
	+4%/-4%	+1%/-1%	+500%/-500%	+6%/-9%	+11%/-8%	+25%/-11%
Source	PHO54	PHO54	PHO54	DSEP		

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

Secondary Eclipse Parameters for KIC 012406908-02 / KOI

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-1392 ± 82	$2.02^{+1.01}_{-0.95}$	234^{+10}_{-9}	5251^{+2049}_{-806}	$188195^{+506260}_{-103049}$
Alt.	-83 ± 19	$2.71^{+1.05}_{-1.06}$	234^{+9}_{-9}	2918^{+479}_{-256}	6386^{+10781}_{-3306}

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

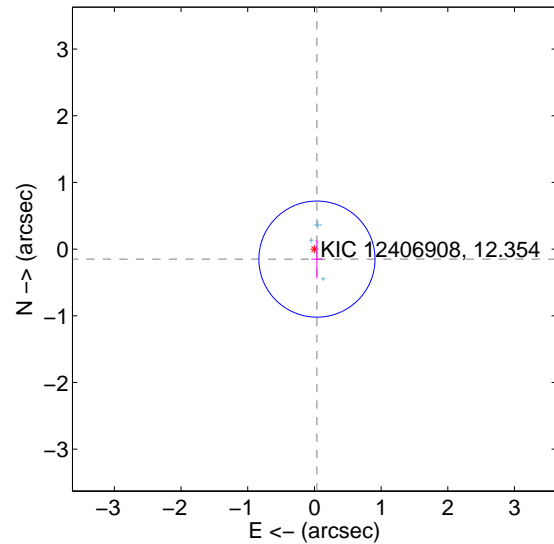
Supplemental centroid analysis for 012406908-02. Kepler magnitude: 12.35. Transit SNR 5.73

There are 3 quarters with good PRF difference image offsets

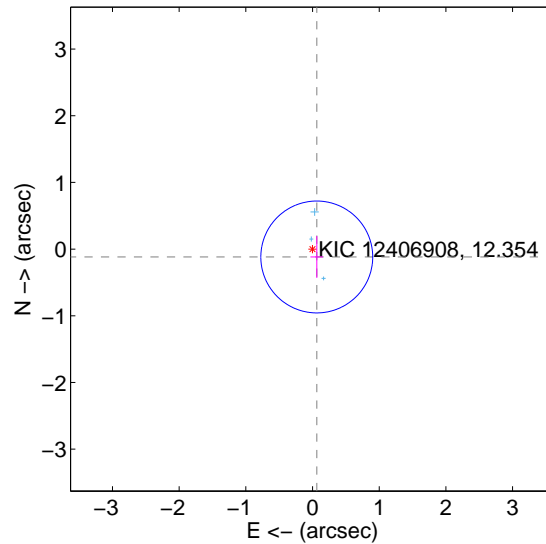
The direct PRF centroid is offset from the target star catalog position by about 0.04 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.155 ± 0.290	0.53	-0.037 ± 0.083	-0.150 ± 0.290
PRF-fit source offset from KIC position	0.134 ± 0.280	0.48	-0.064 ± 0.095	-0.118 ± 0.314
photometric centroid source offset	1.10 ± 0.64	1.70	-0.22 ± 0.40	1.07 ± 0.65

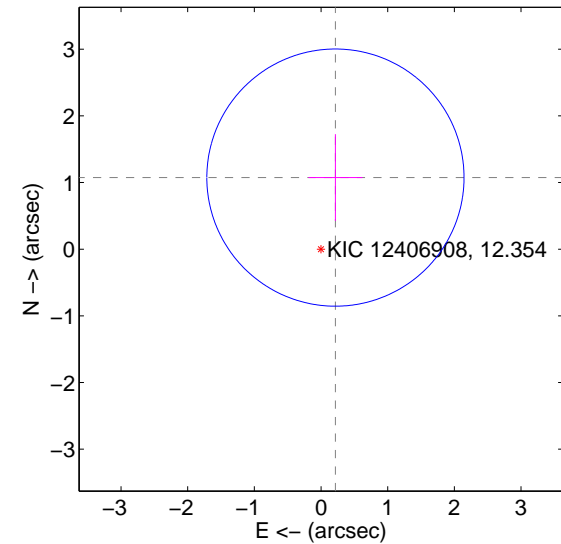
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

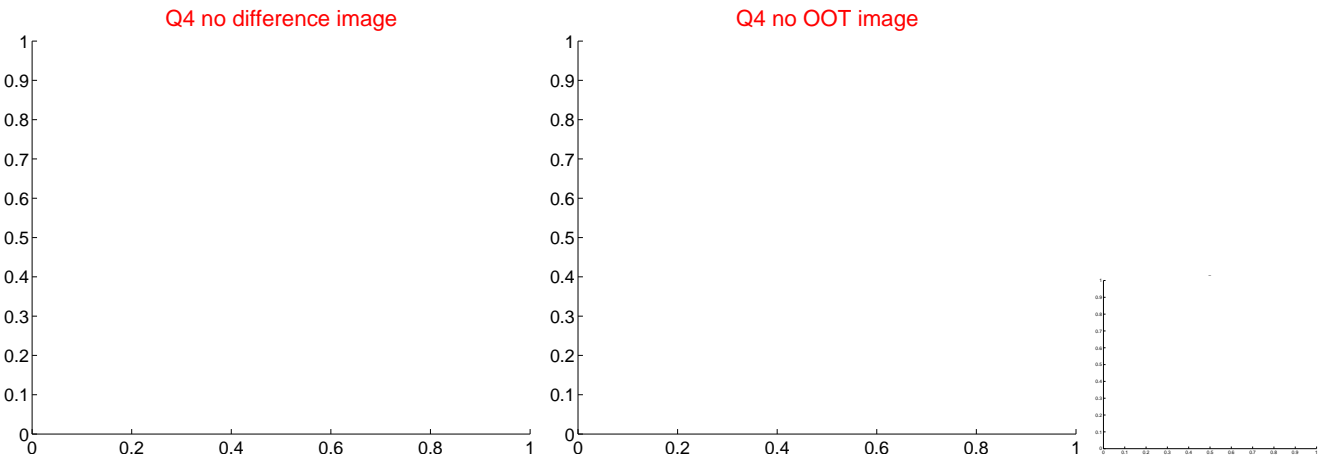
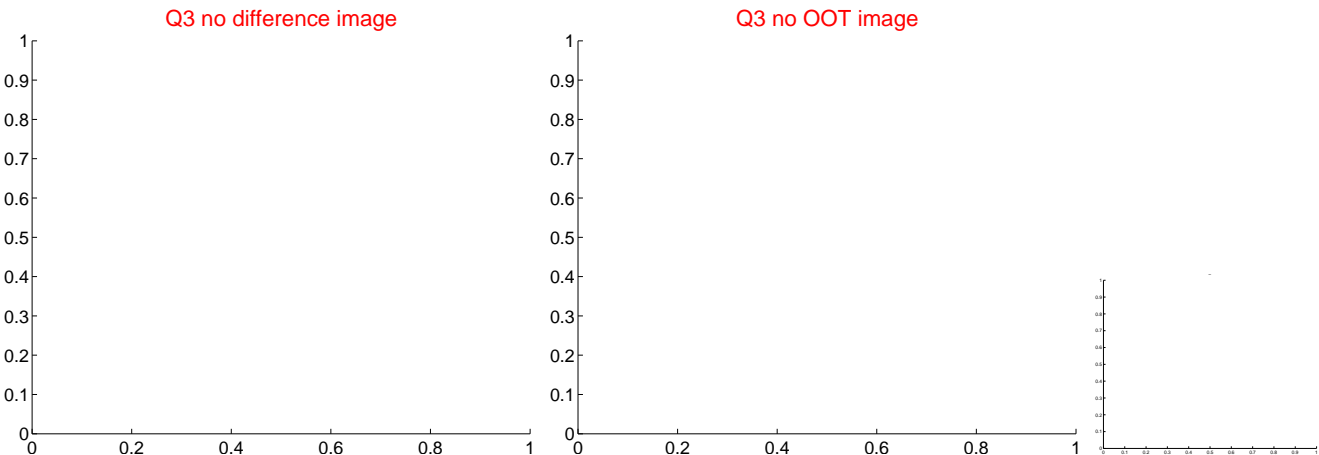
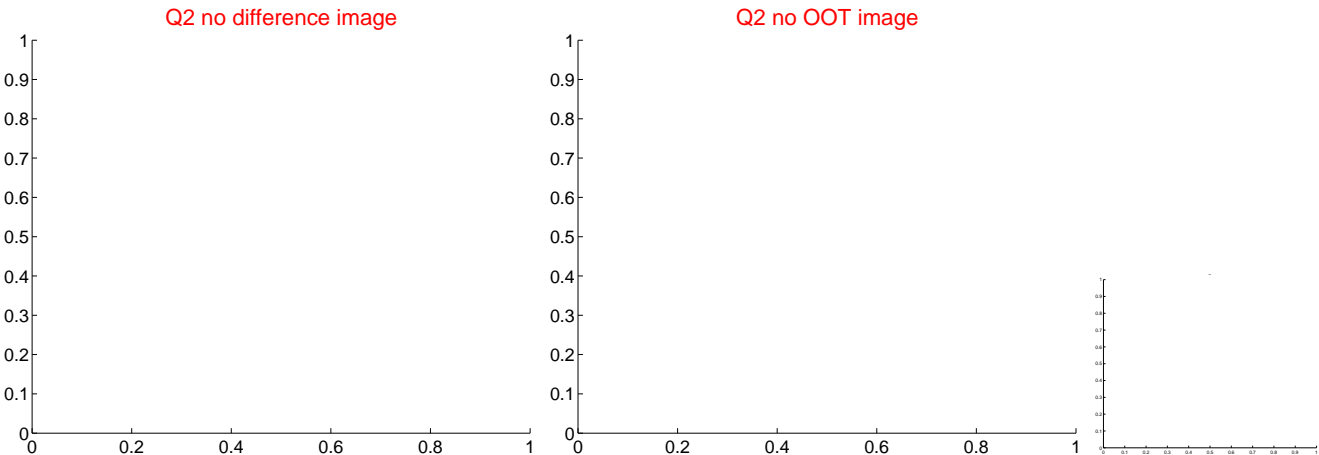
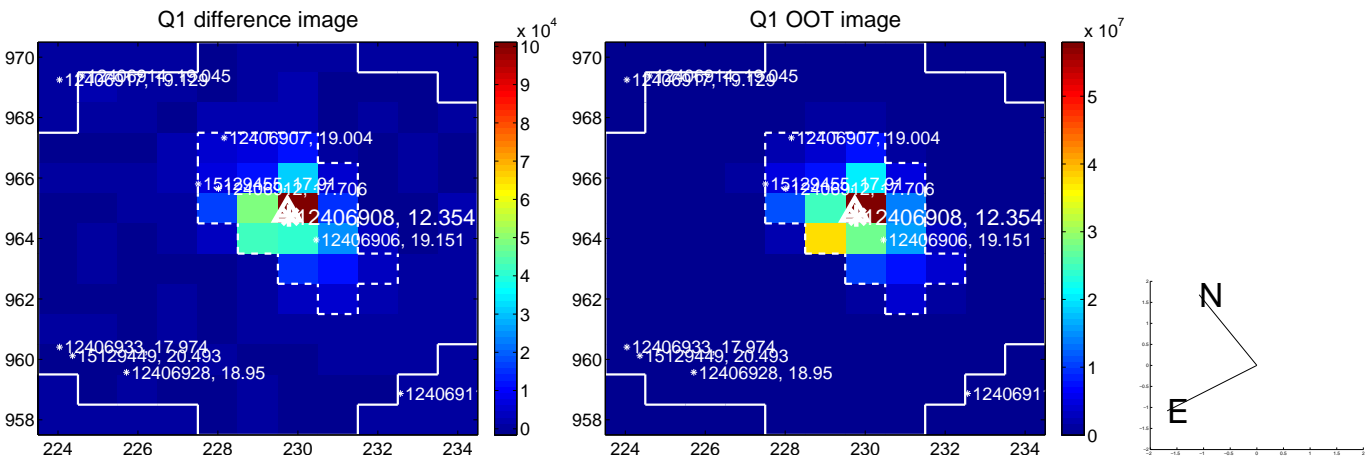


offset from photometric centroids



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.

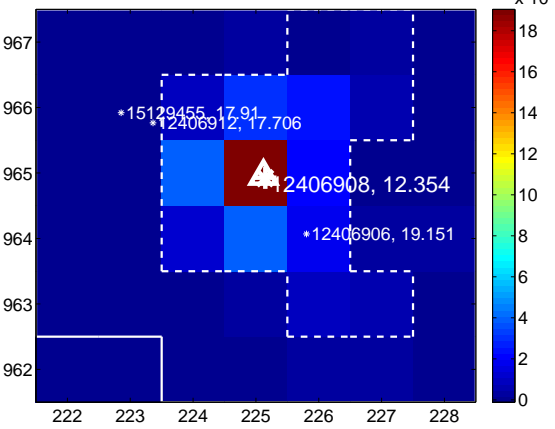
Q5 no difference image



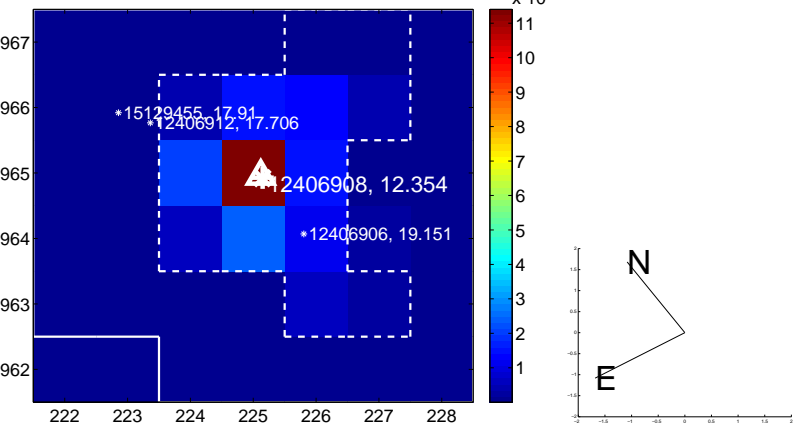
Q5 no OOT image



Q6 difference image



Q6 OOT image



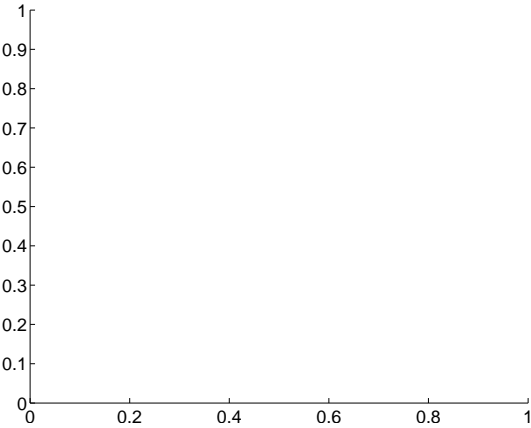
Q7 no difference image



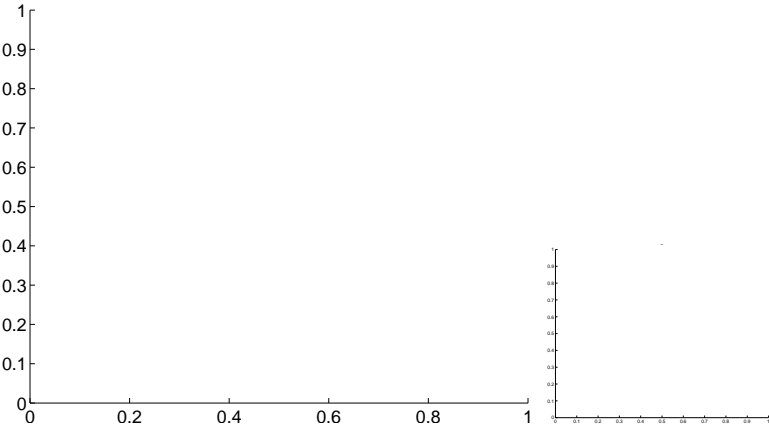
Q7 no OOT image



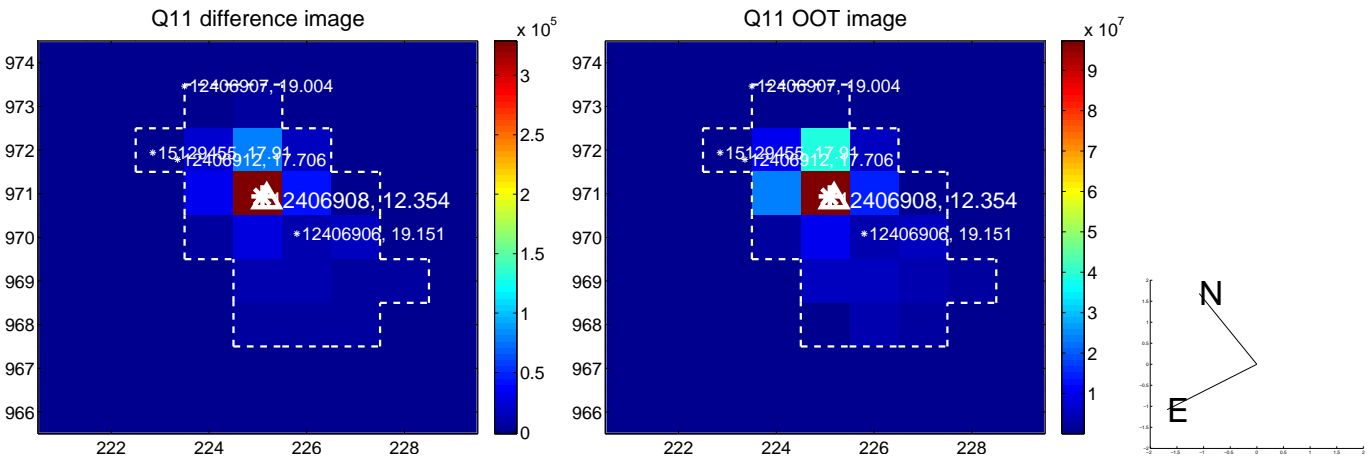
Q8 no difference image



Q8 no OOT image



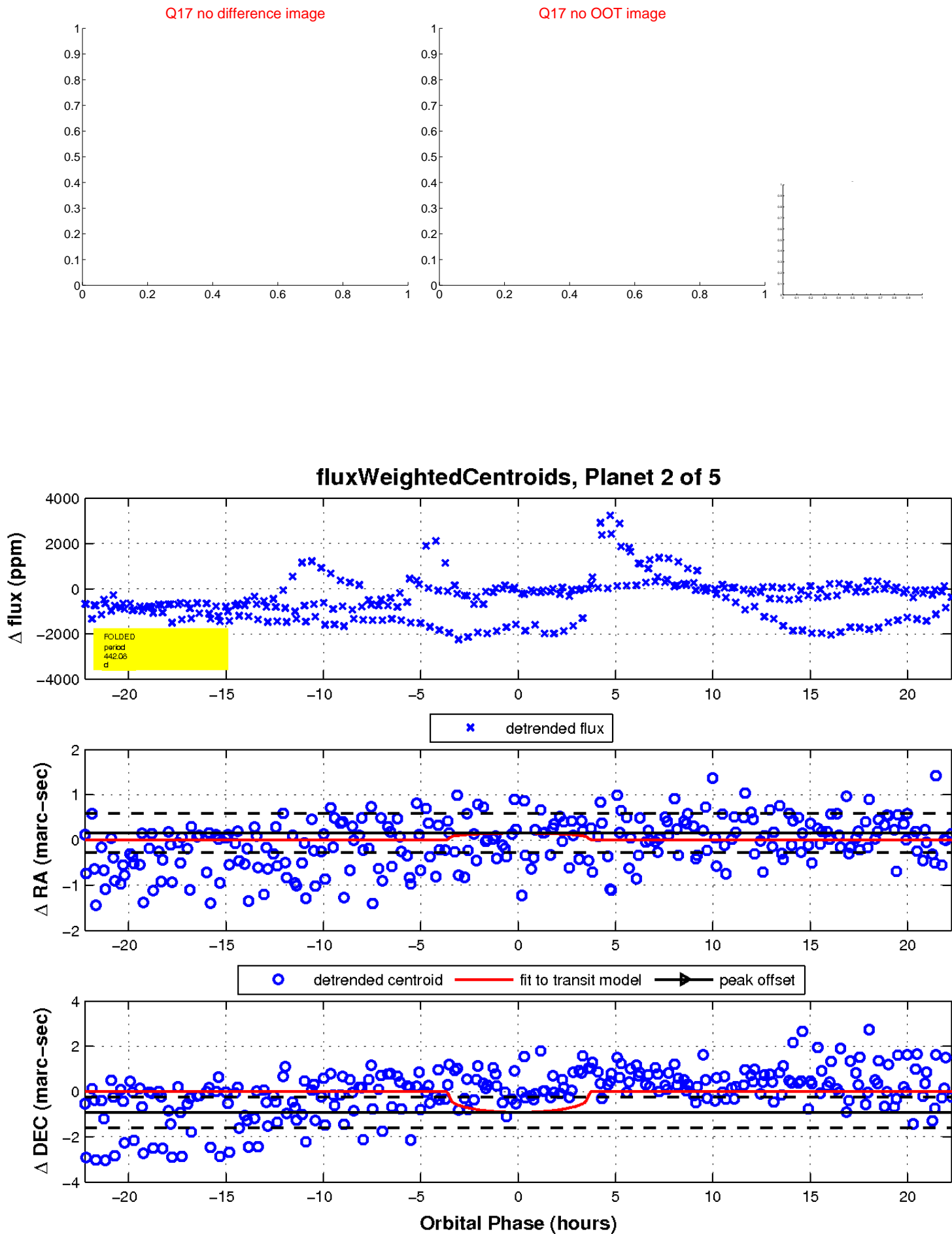
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

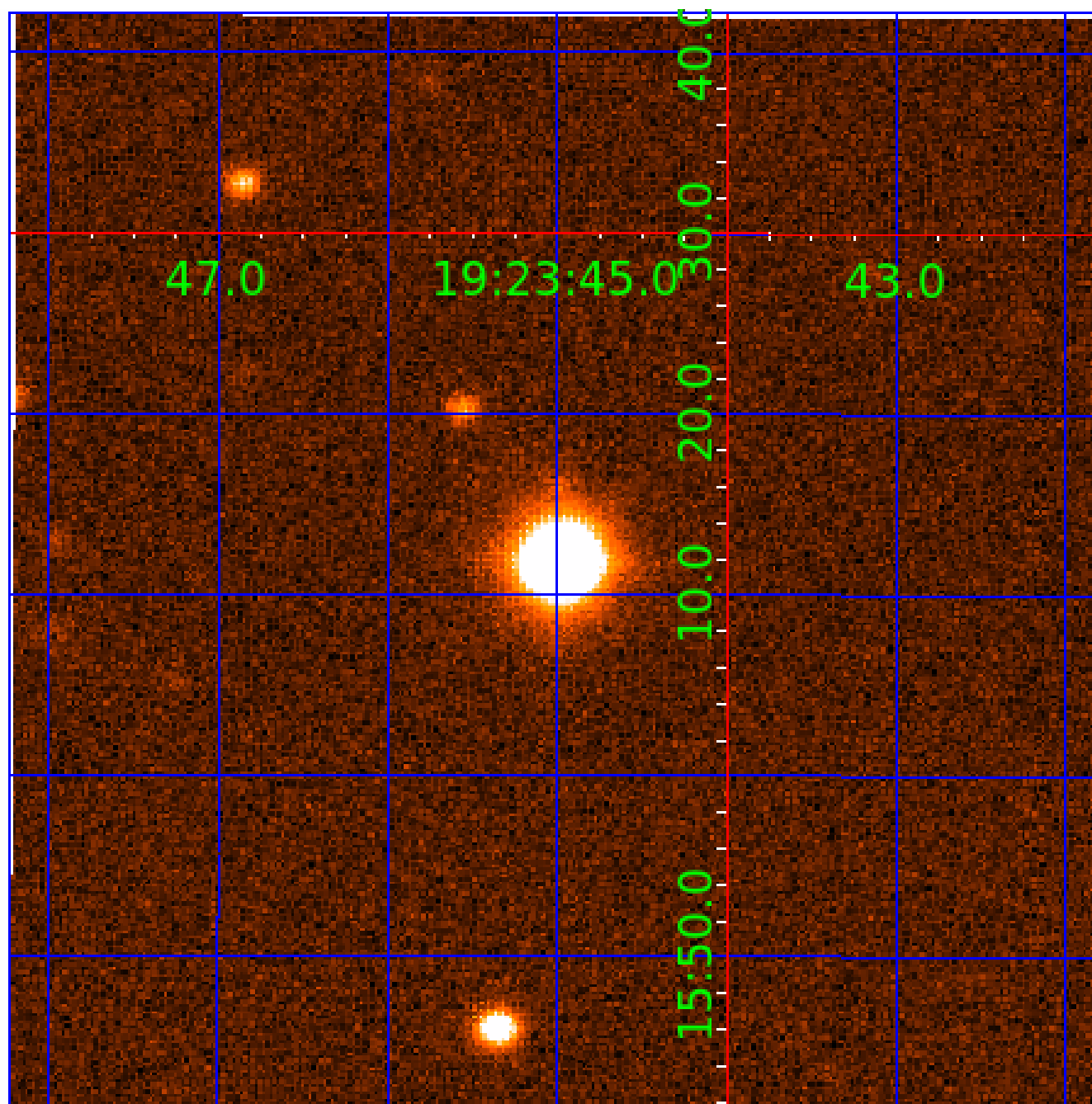


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 012406908

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})
012406908-01	OBS	No	392.064555	308.188915	875.7	2.133	47.1	7.5	0.70	4582	2.09	0.23
012406908-02	OBS	No	442.076574	160.767457	776.3	7.442	17.0	5.7	0.70	4582	2.00	0.19
012406908-03	OBS	No	431.399437	544.550660	665.0	15.384	18.5	3.4	0.70	4582	1.78	0.20
012406908-04	OBS	No	266.736851	192.091122	344.1	7.430	15.6	2.7	0.70	4582	1.24	0.38

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
012406908-01	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
012406908-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV
012406908-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
012406908-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_TRACKER—LPP_DV—LPP_ALT—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.

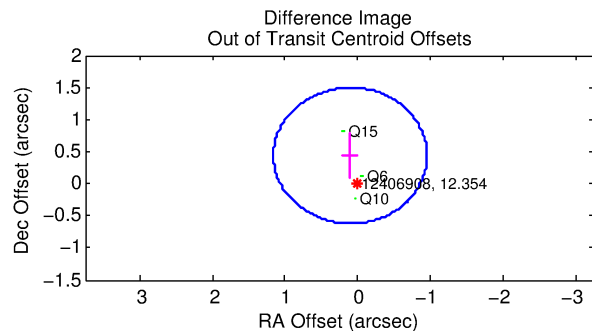
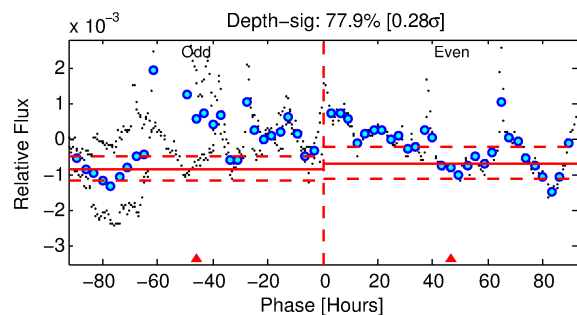
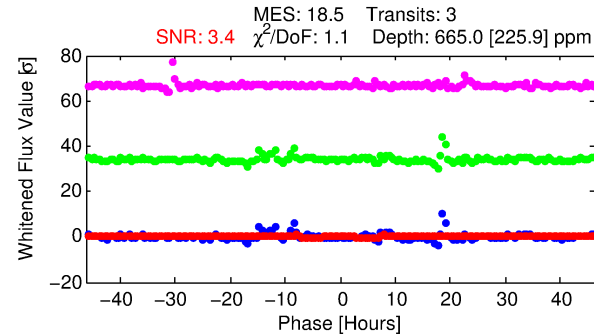
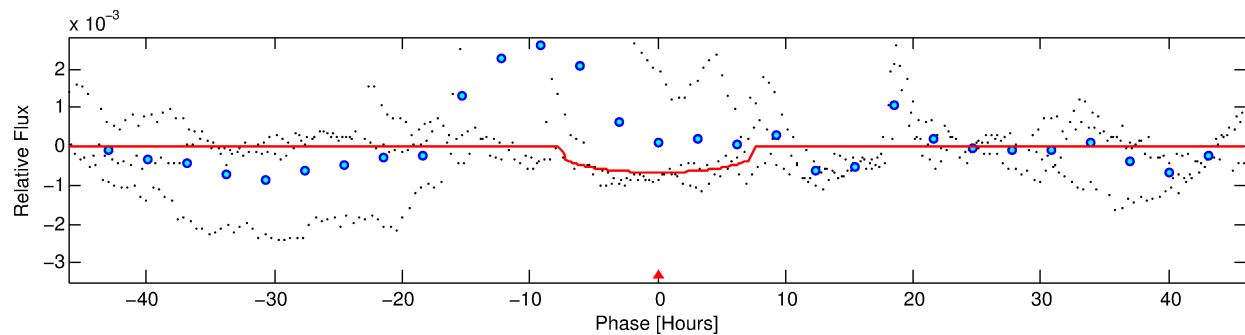
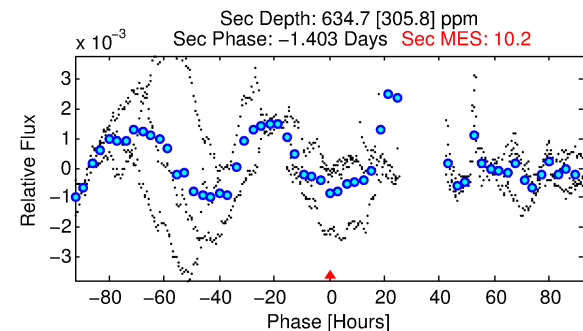
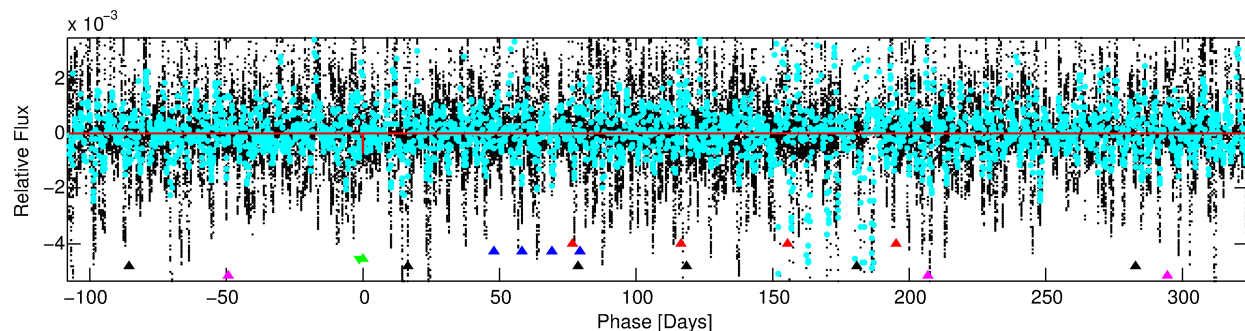
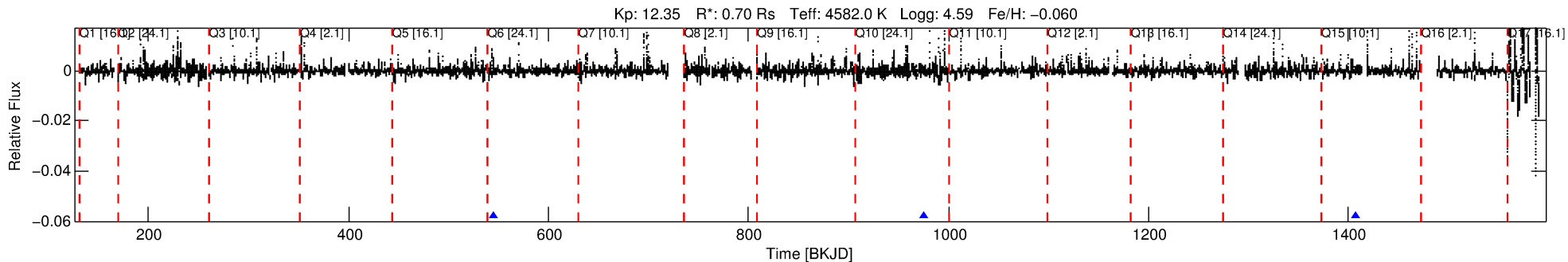
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 012406908-03

No Significant Match Found

DV One-Page Summary

KIC: 12406908 Candidate: 3 of 5 Period: 431.399 d



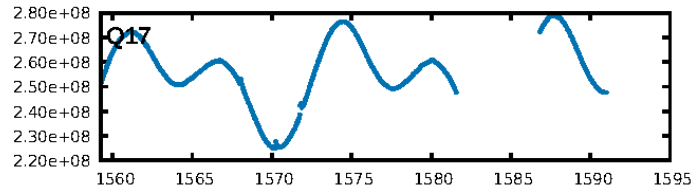
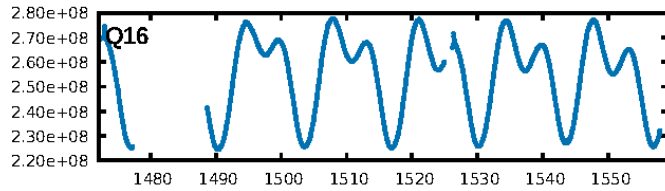
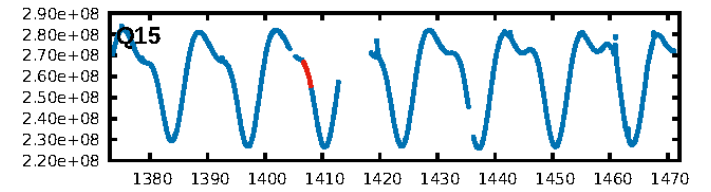
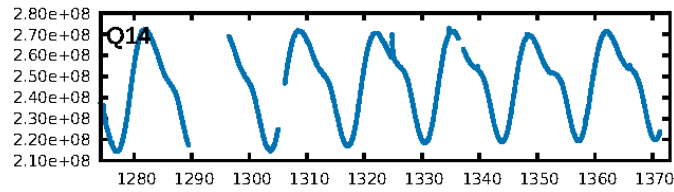
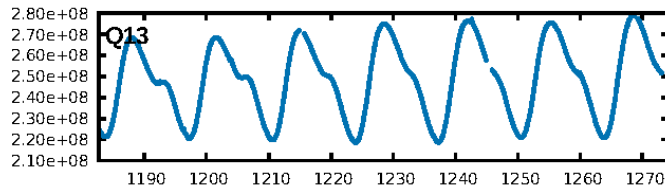
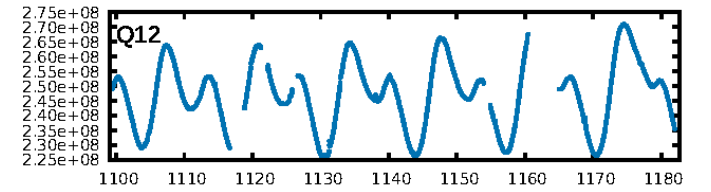
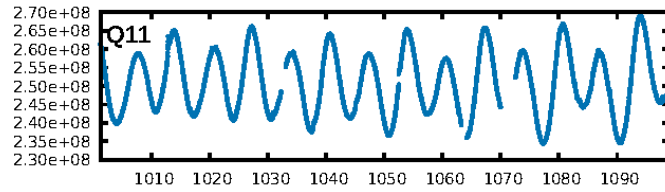
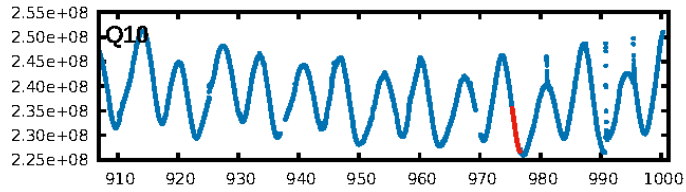
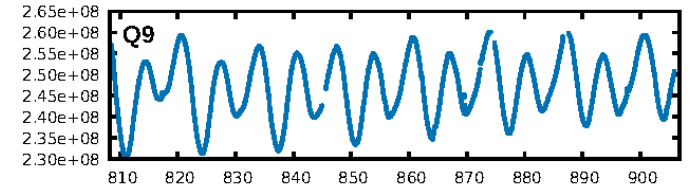
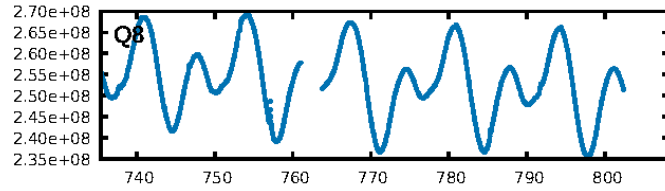
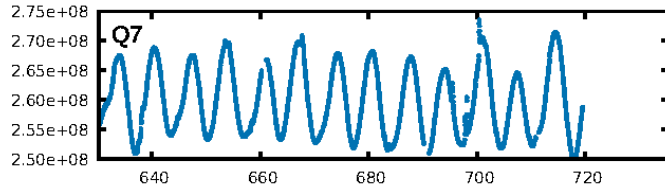
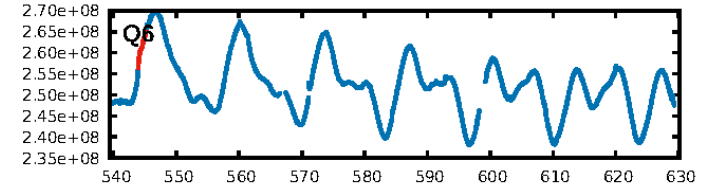
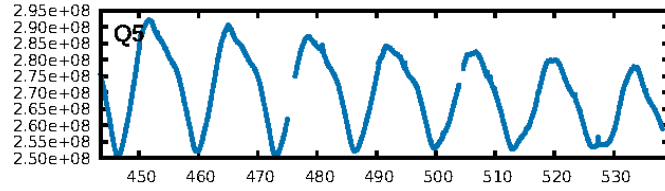
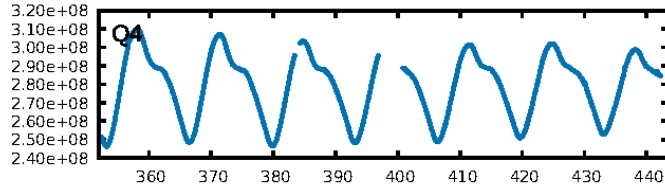
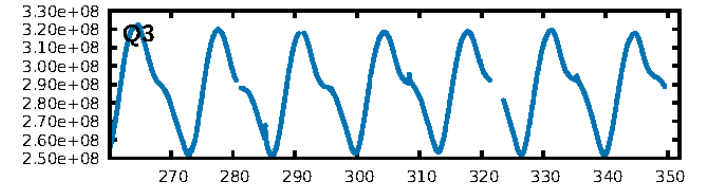
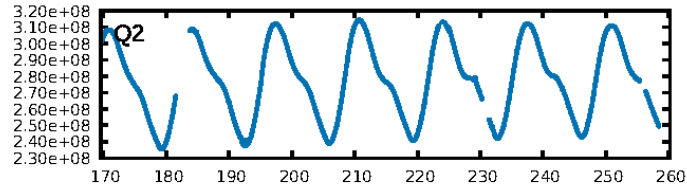
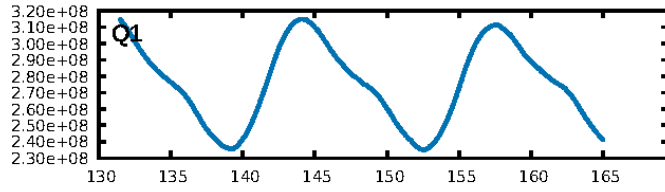
DV Fit Results:

Period = 431.39944 [0.00844] d
Epoch = 544.5507 [0.0118] BKJD
Rp/R* = 0.0234 [0.0112]
a/R* = 199.21 [291.40]
b = 0.43 [2.81]
Seff = 0.20 [0.04]
Teq = 170 [8] K
Rp = 1.78 [0.87] Re
a = 0.9850 [0.0735] AU
Ag = 107417.98 [116298.19] [0.92σ]
Teffp = 4759 [1293] K [3.55σ]

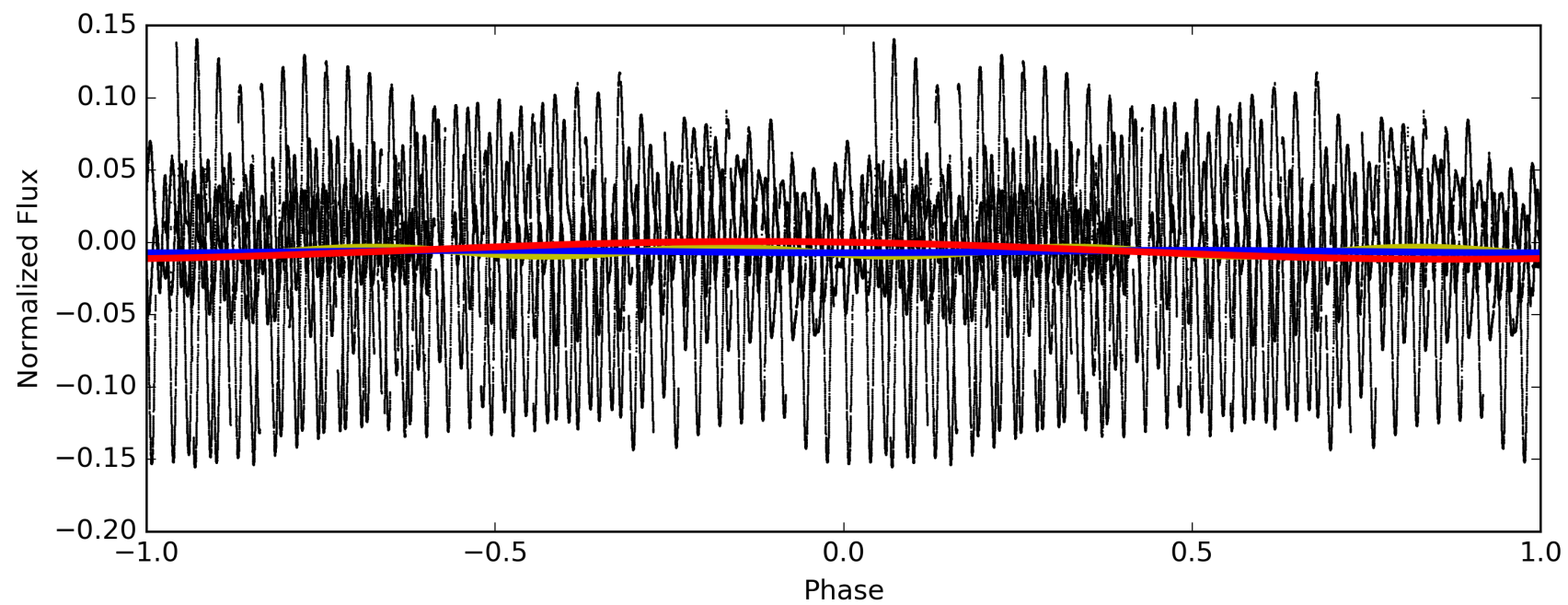
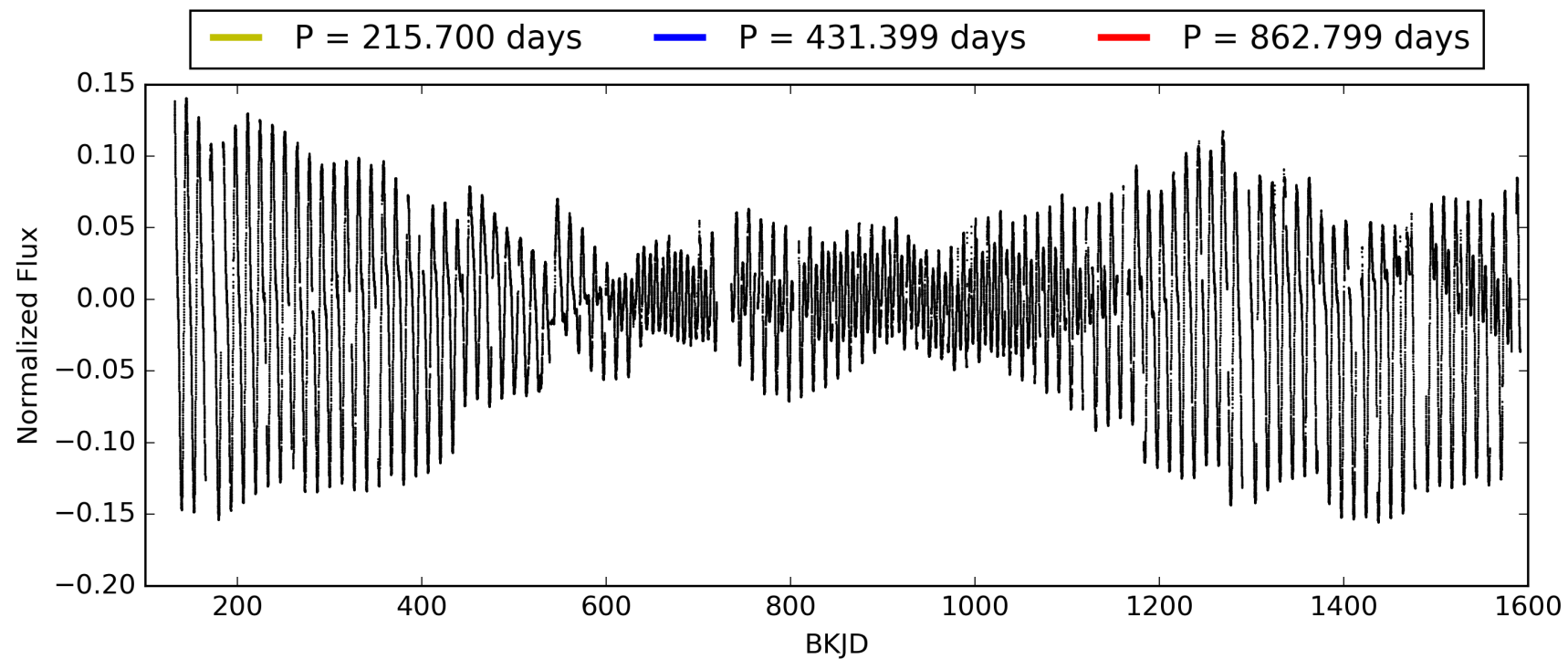
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [60.78σ]
LongPeriod-sig: 100.0% [14.99σ]
ModelChiSquare2-sig: 62.7%
ModelChiSquareGof-sig: 99.2%
Bootstrap-pfa: N/A
RollingBand-fgt: 1.00 [3/3]
GhostDiagnostic-chr: 0.3742
Centroid-sig: 71.5%
Centroid-so: 0.342 arcsec [0.76σ]
OotOffset-rm: 0.449 arcsec [1.27σ]
OotOffset-st: 2/1/0/0 [3]
KicOffset-rm: 0.472 arcsec [1.20σ]
KicOffset-st: 2/1/0/0 [3]
DiffImageQuality-fgm: 0.33 [1/3]
DiffImageOverlap-fno: 1.00 [3/3]

TCE 012406908-03, PDC Light Curves

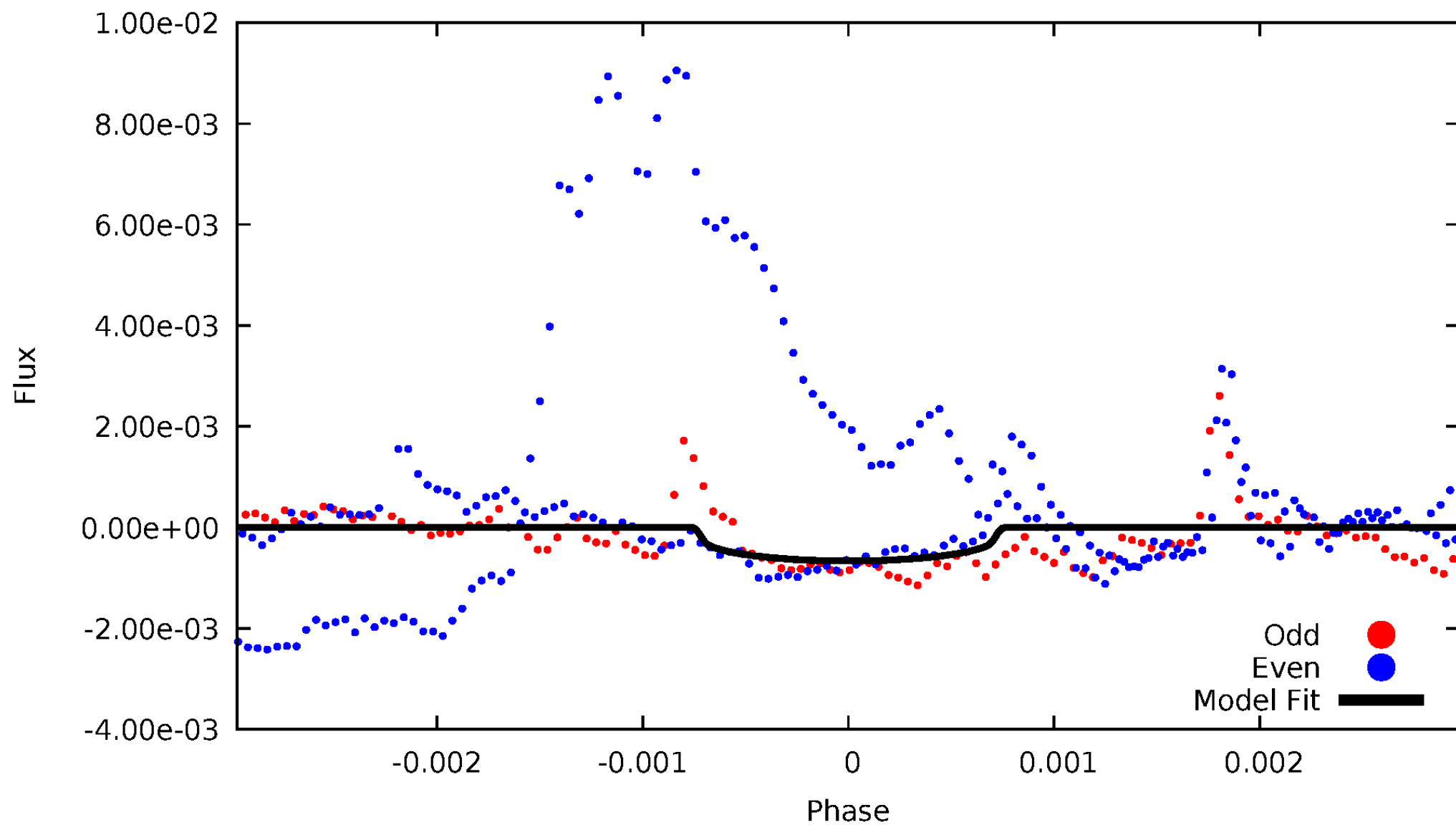


TCE 012406908-03



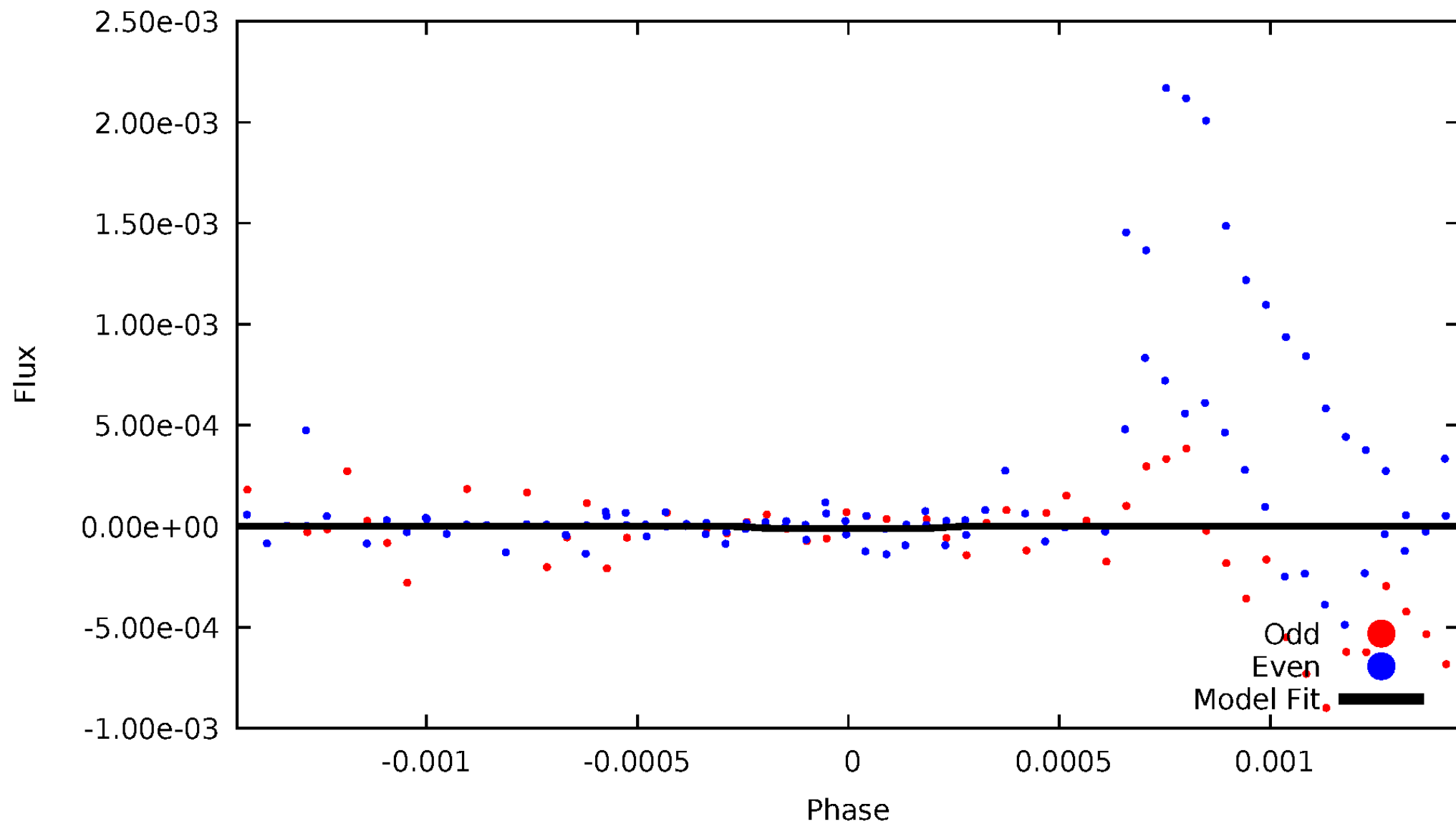
DV Odd/Even

TCE 012406908-03



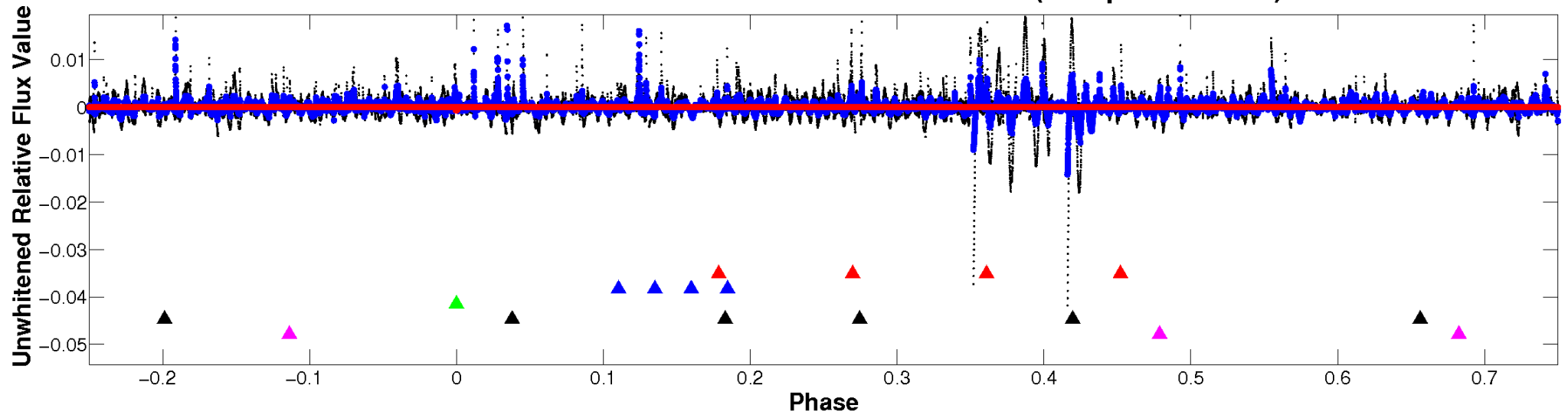
ALT Odd/Even

TCE 012406908-03

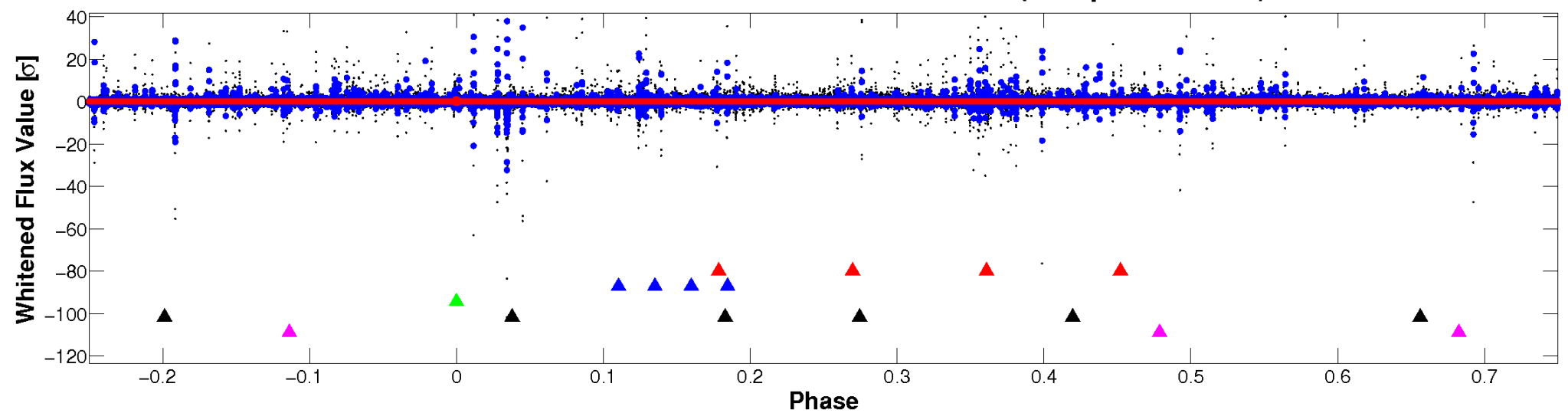


Non-Whitened Vs. Whitened Light Curve

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

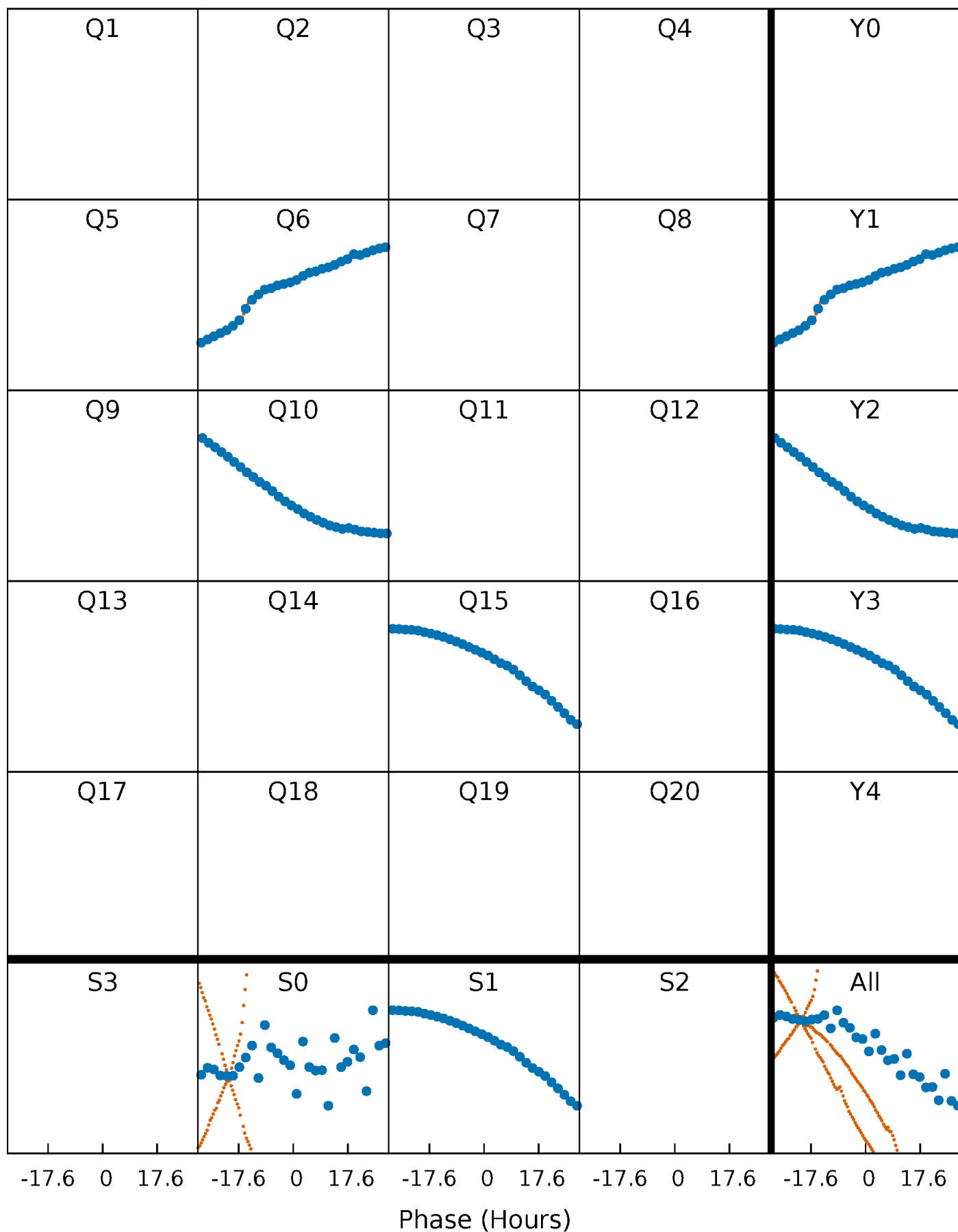


Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



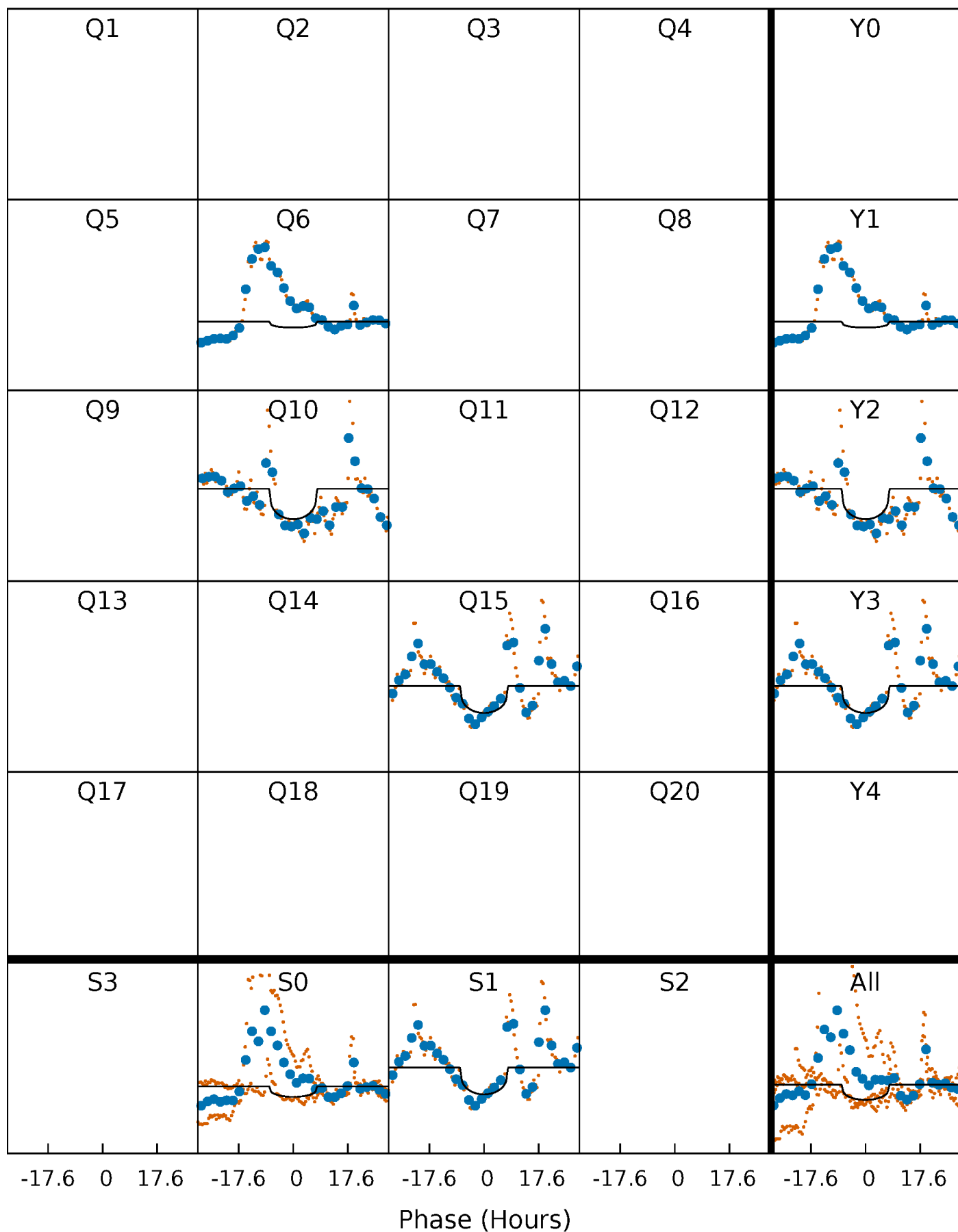
PDC Quarter-Phased Transit Curves

TCE 012406908-03 P=431.399437 Days $T_0=544.550660$ (BKJD)



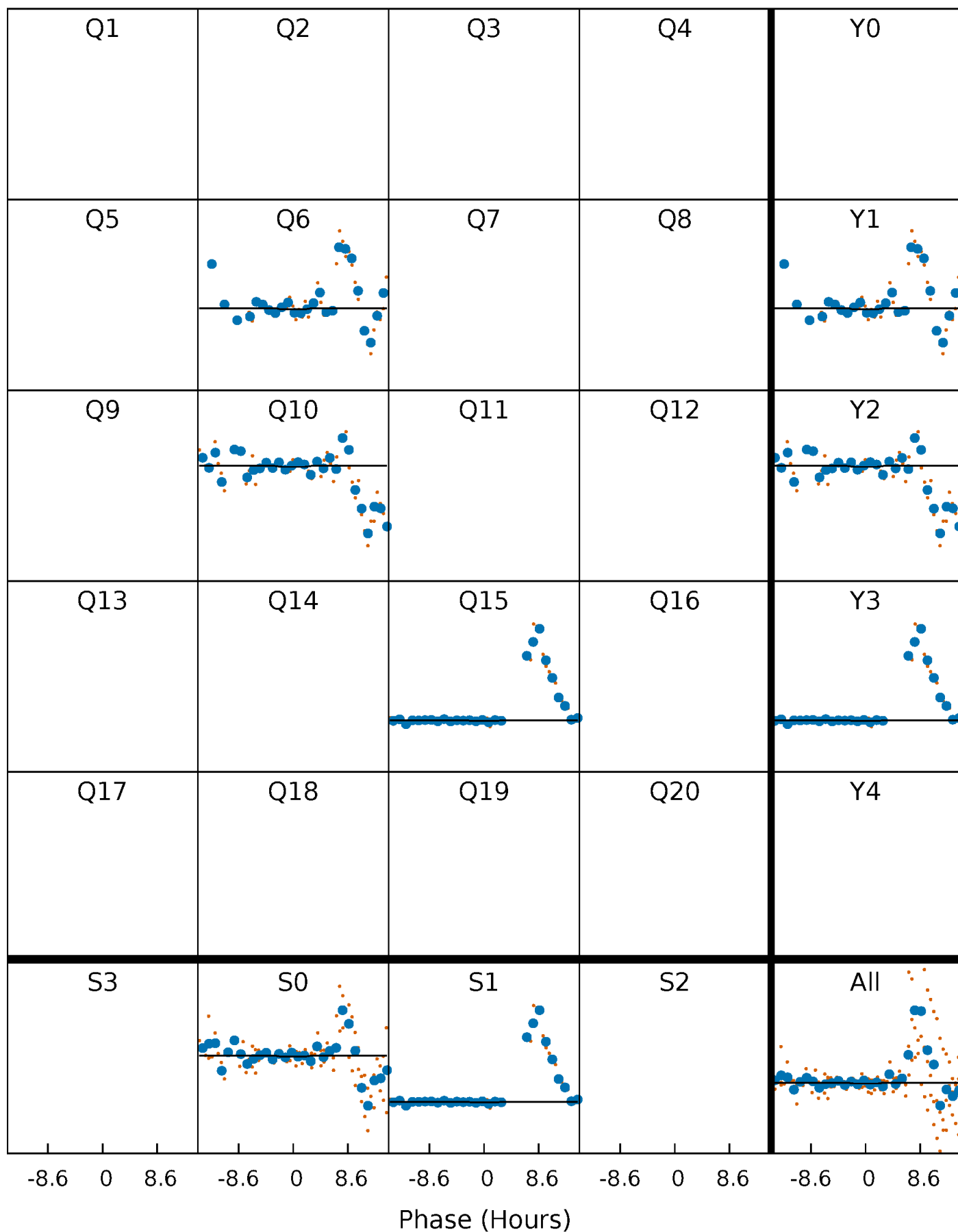
DV Quarter-Phased Transit Curves

TCE 012406908-03 $P=431.399437$ Days $T_0=544.550660$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

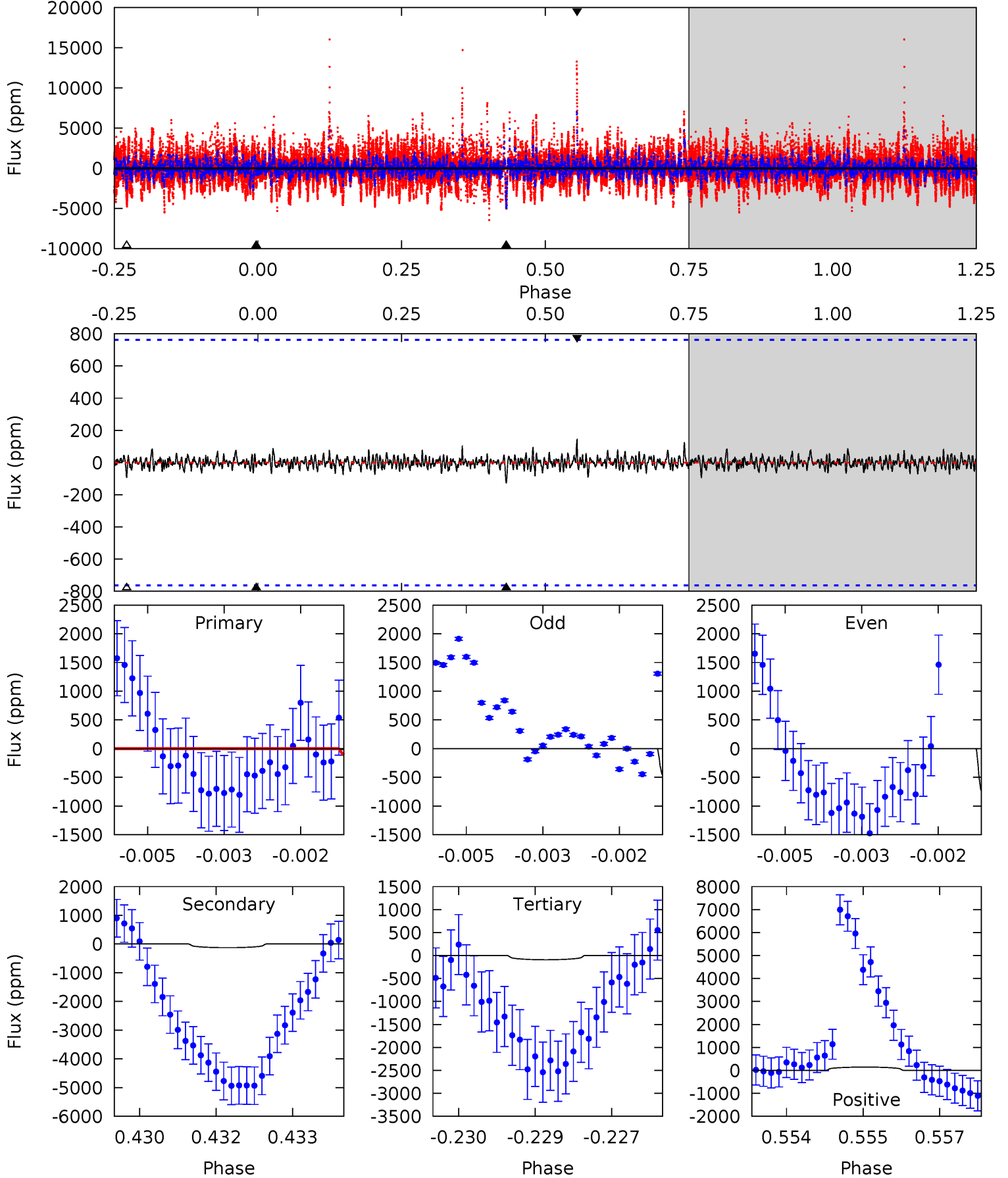
TCE 012406908-03 $P=431.393319$ Days $T_0=544.581302$ (BKJD)



DV Model-Shift Uniqueness Test

012406908-03, P = 431.399437 Days, E = 113.151223 Days

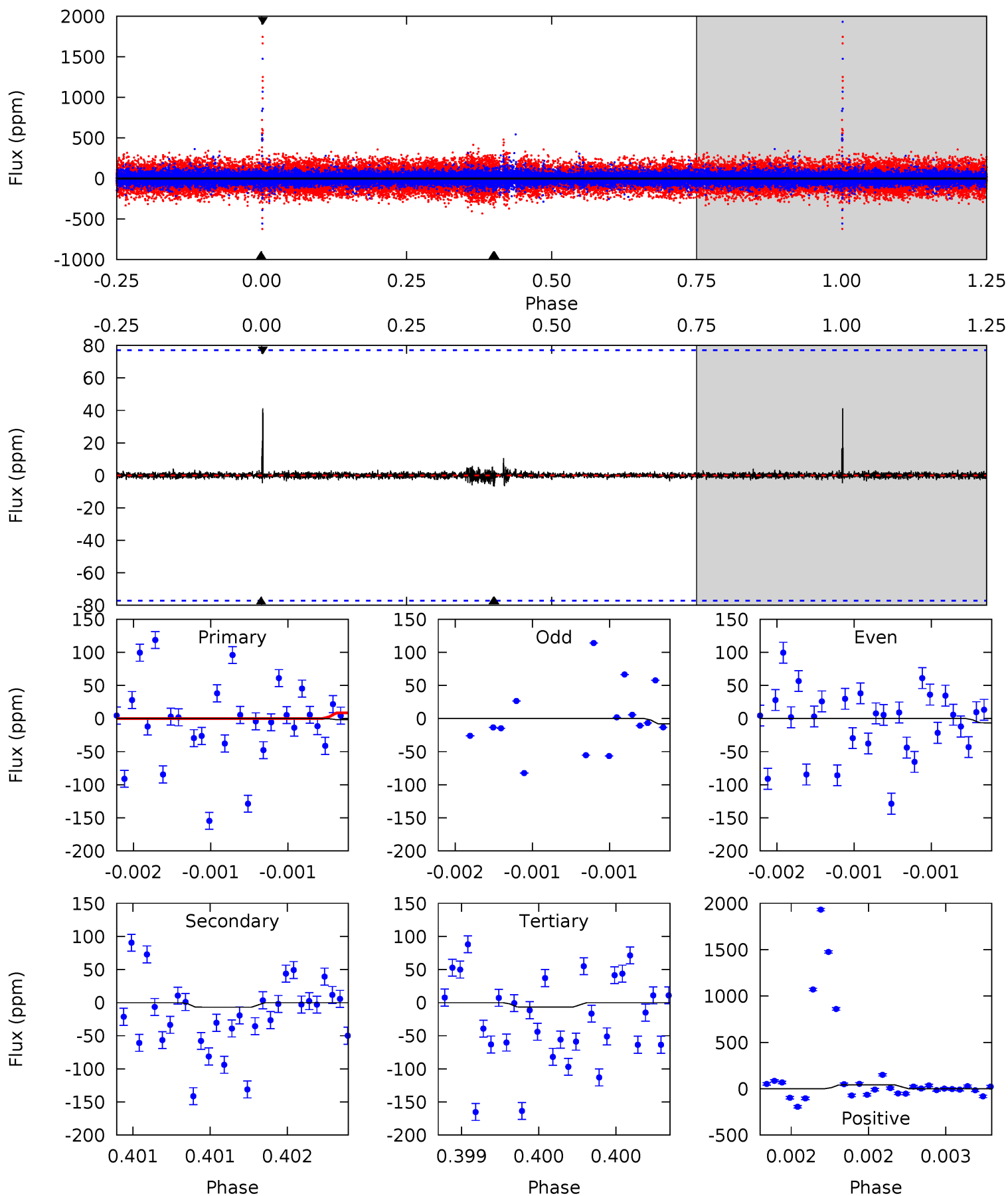
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0.19	0.89	0.65	1.01	5.38	3.17	0.19	-0.46	-0.82	0.24	-0.11	1.02	-0.83	0.53	0.29



Alt Model-Shift Uniqueness Test

012406908-03, P = 431.393319 Days, E = 113.187983 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0.12	0.49	0.48	2.99	5.57	3.47	0.09	-0.36	-2.87	0.01	-2.49	0.05	0.40	0.86	0.19



Stellar Parameters For KIC 012406908

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (g \cdot \text{cm}^{-3})$
	4582^{+161}_{-161}	$4.587^{+0.059}_{-0.027}$	$-0.060^{+0.300}_{-0.300}$	$0.697^{+0.045}_{-0.062}$	$0.683^{+0.074}_{-0.056}$	$2.848^{+0.715}_{-0.323}$
	+4%/-4%	+1%/-1%	+500%/-500%	+6%/-9%	+11%/-8%	+25%/-11%
Source	PHO54	PHO54	PHO54	DSEP		

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

Secondary Eclipse Parameters for KIC 012406908-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	-127 ± 142	$1.74^{+0.91}_{-0.72}$	236^{+10}_{-10}	3438^{+1009}_{-5904}	19418^{+57857}_{-21081}
Alt.	-7 ± 14	$0.71^{+0.64}_{-0.49}$	237^{+9}_{-10}	2862^{+1548}_{-5861}	4957^{+70642}_{-11945}

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 $A_{obs} \gg 1.0$

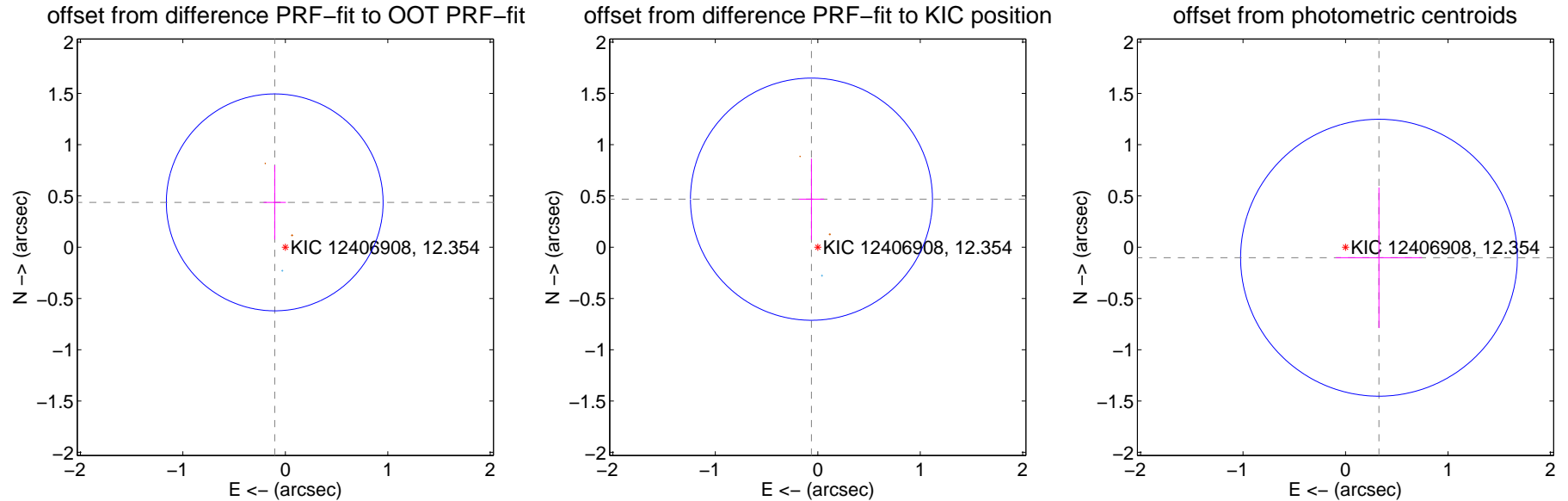
DV Centroid Data

Supplemental centroid analysis for 012406908-03. Kepler magnitude: 12.35. Transit SNR 3.41

There are 1 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	0.449 ± 0.353	1.27	0.104 ± 0.109	0.437 ± 0.361
PRF-fit source offset from KIC position	0.472 ± 0.394	1.20	0.062 ± 0.122	0.468 ± 0.397
photometric centroid source offset	0.34 ± 0.45	0.76	-0.33 ± 0.42	-0.10 ± 0.69

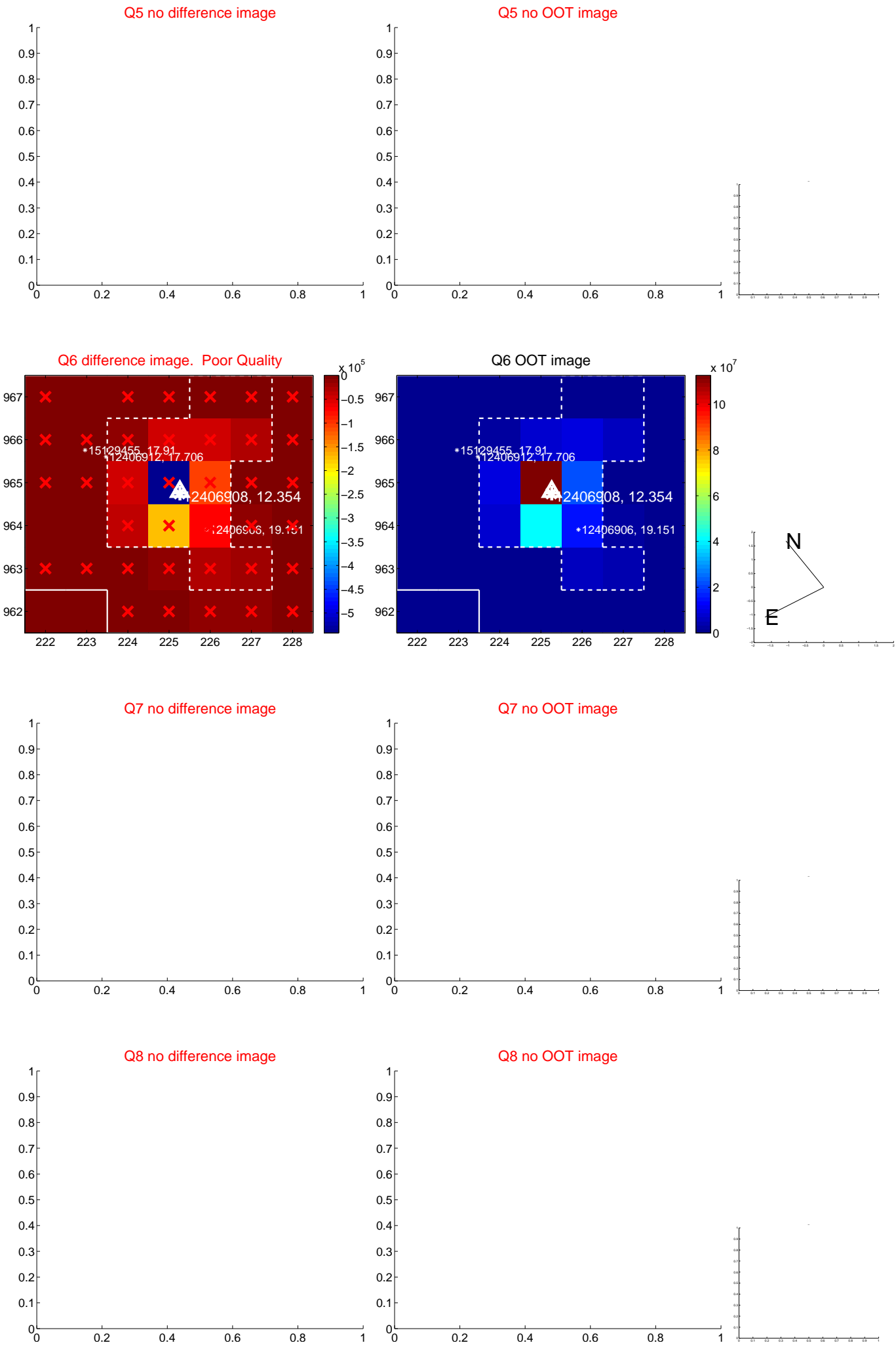


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

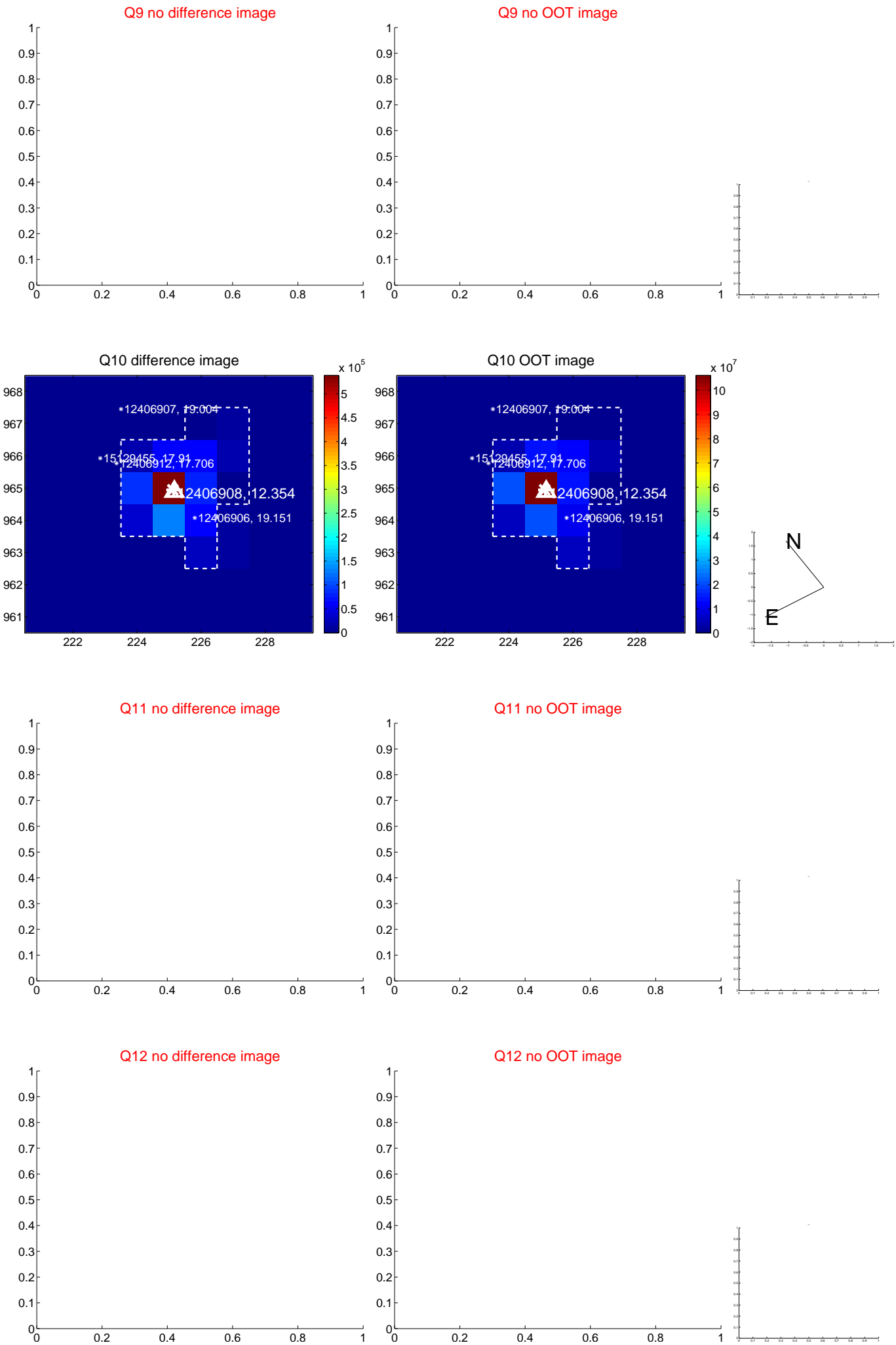
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



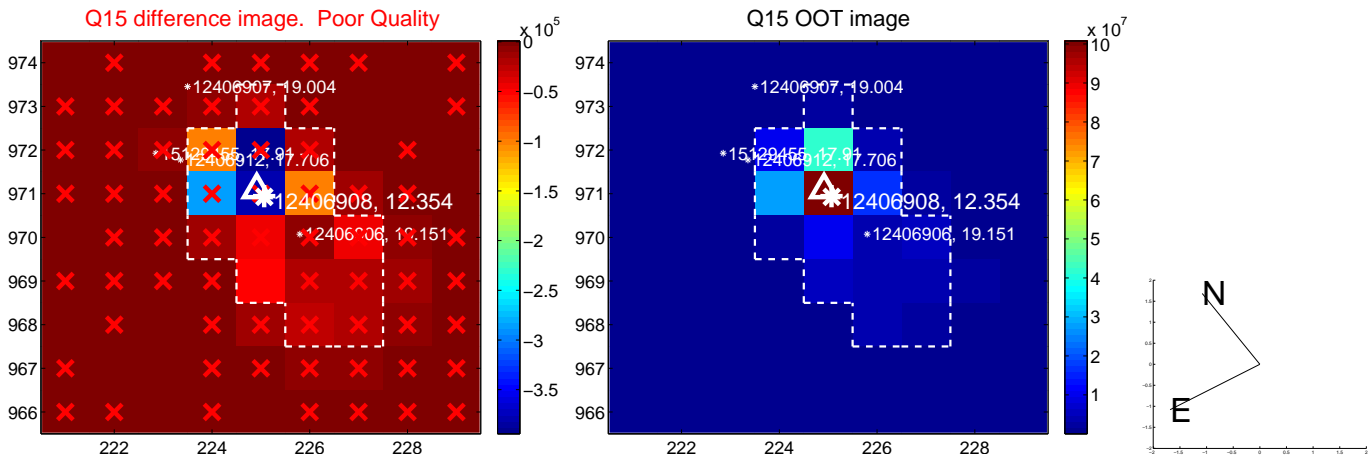
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



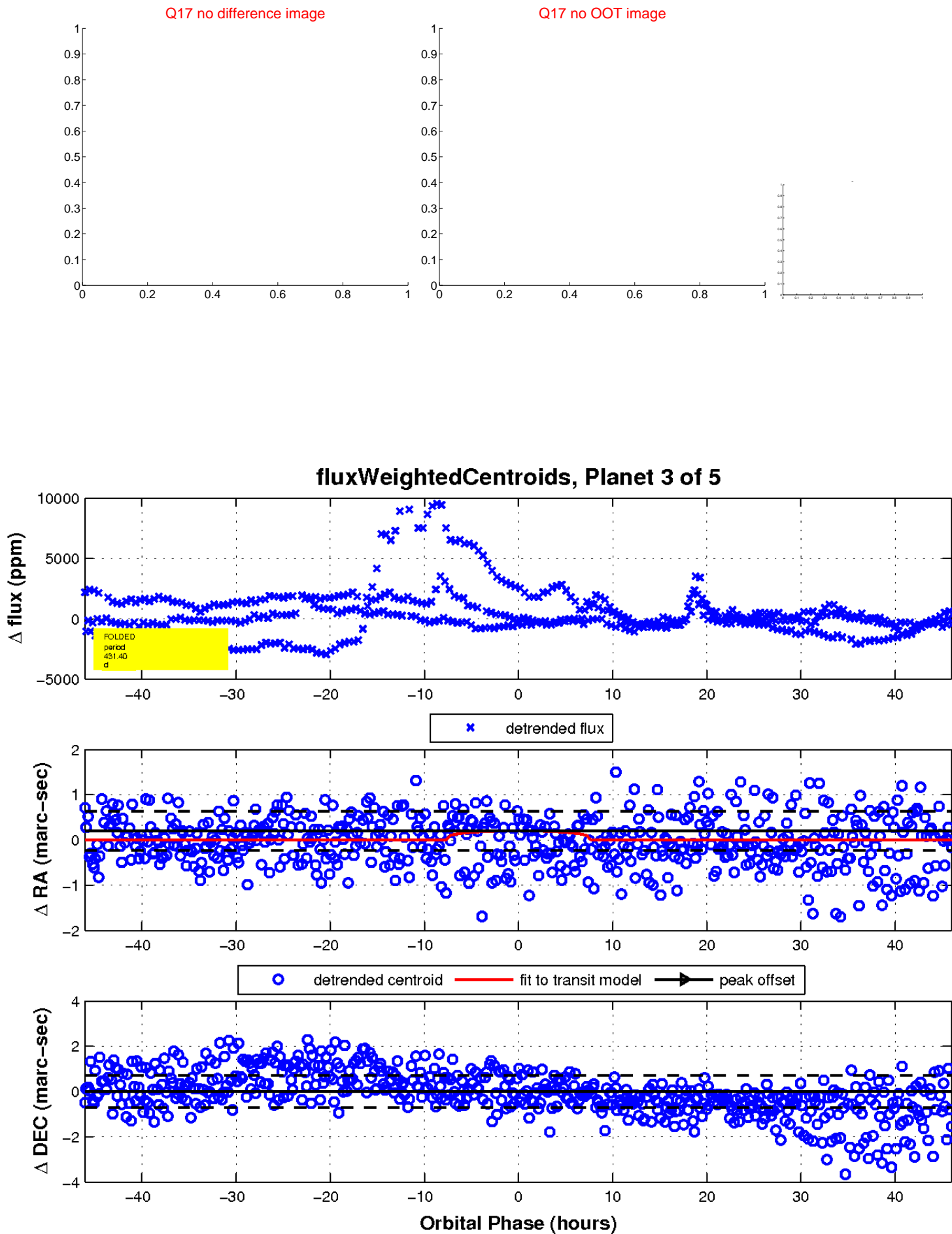
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

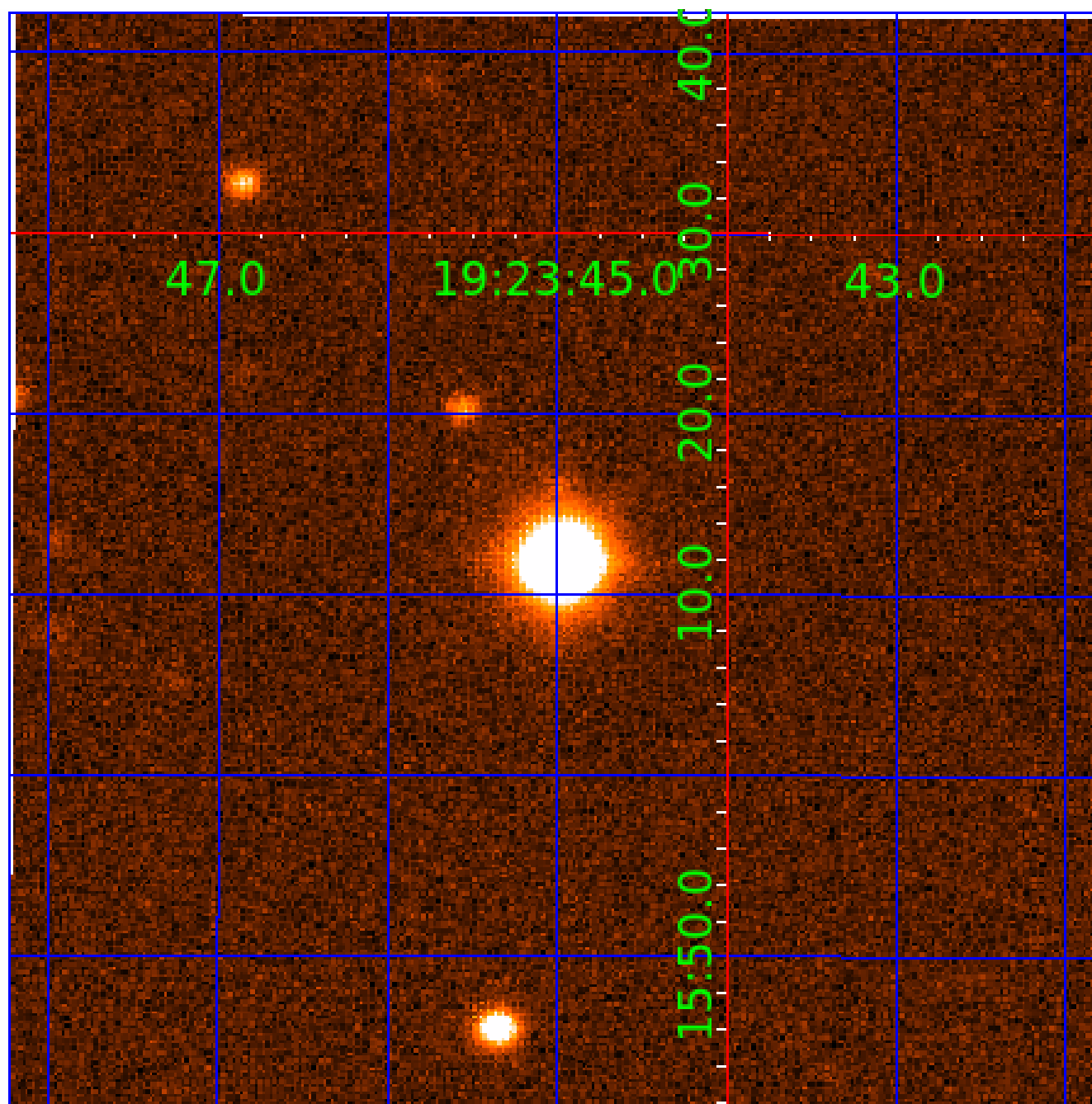


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 012406908

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})
012406908-01	OBS	No	392.064555	308.188915	875.7	2.133	47.1	7.5	0.70	4582	2.09	0.23
012406908-02	OBS	No	442.076574	160.767457	776.3	7.442	17.0	5.7	0.70	4582	2.00	0.19
012406908-03	OBS	No	431.399437	544.550660	665.0	15.384	18.5	3.4	0.70	4582	1.78	0.20
012406908-04	OBS	No	266.736851	192.091122	344.1	7.430	15.6	2.7	0.70	4582	1.24	0.38

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
012406908-01	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
012406908-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV
012406908-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
012406908-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_TRACKER—LPP_DV—LPP_ALT—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.

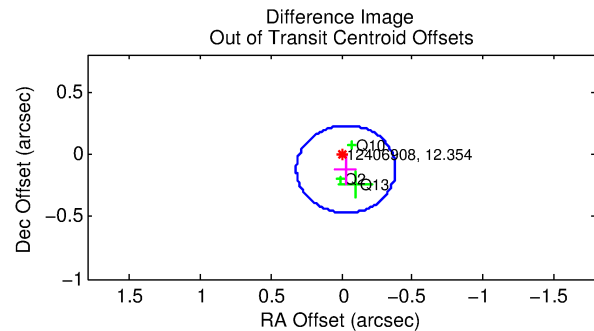
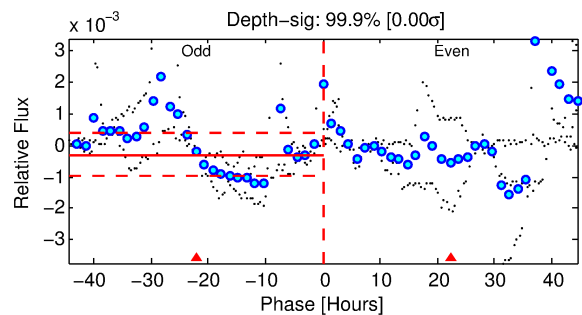
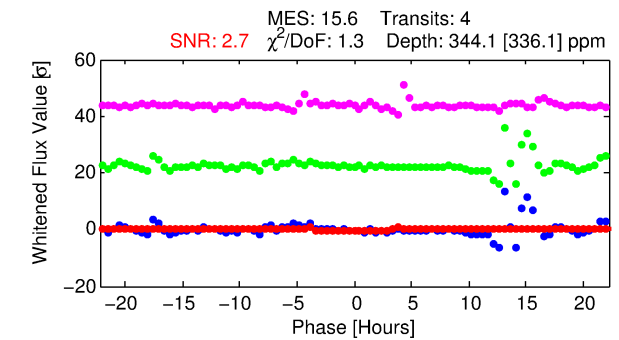
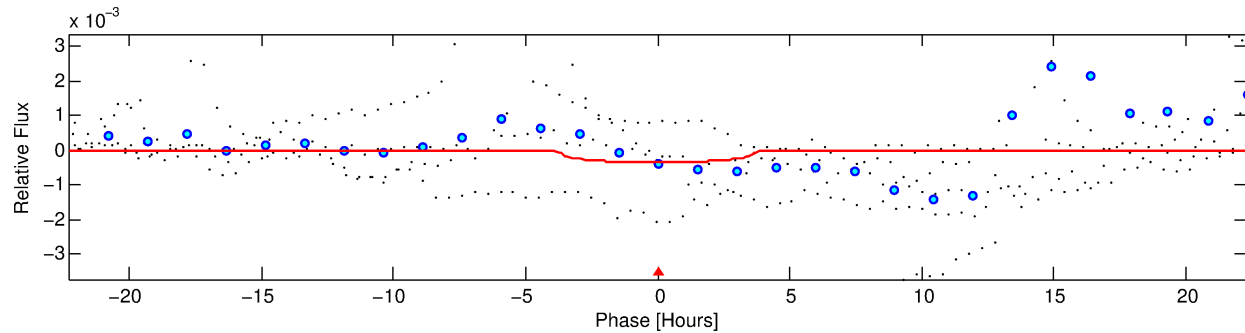
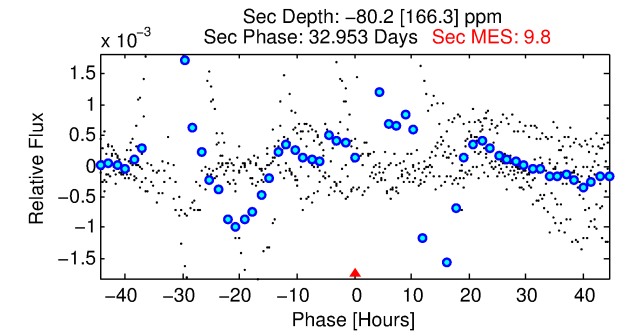
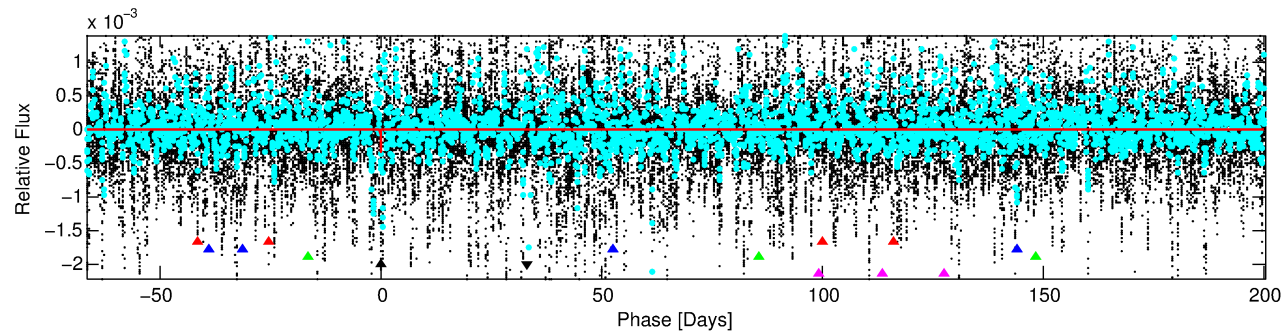
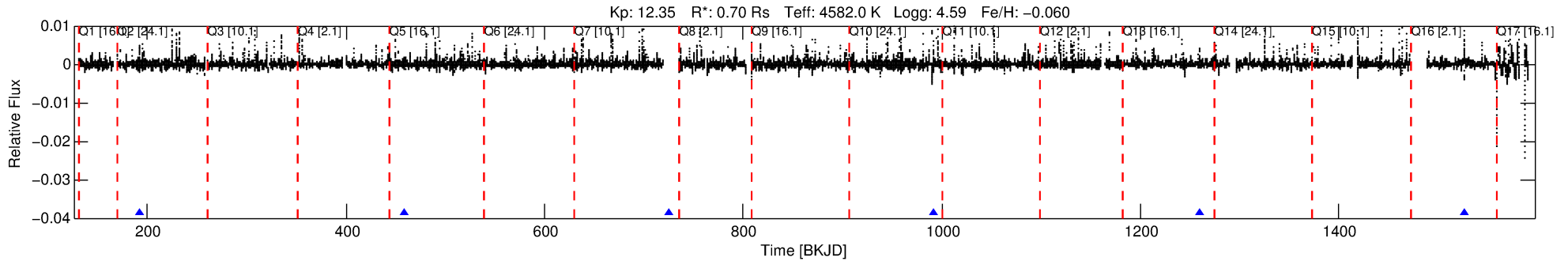
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 012406908-04

No Significant Match Found

DV One-Page Summary

KIC: 12406908 Candidate: 4 of 5 Period: 266.737 d



DV Fit Results:

Period = 266.73685 [0.00950] d
Epoch = 192.0911 [0.0232] BKJD
Rp/R* = 0.0164 [0.0489]
a/R* = 273.35 [2588.55]
b = 0.20 [46.26]
Seff = 0.38 [0.07]
Teq = 200 [9] K
Rp = 1.24 [3.72] Re
a = 0.7149 [0.0533] AU
Ag = N/A
Teffp = N/A

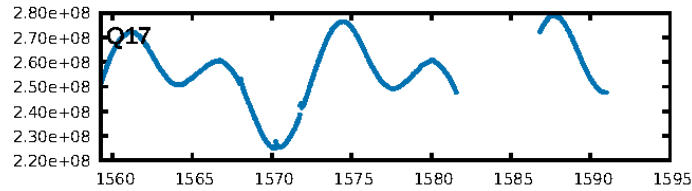
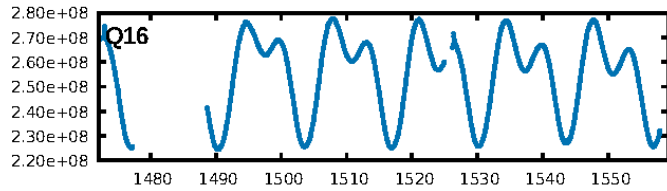
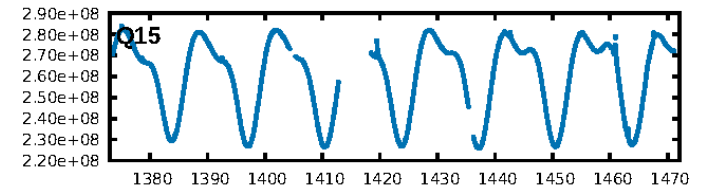
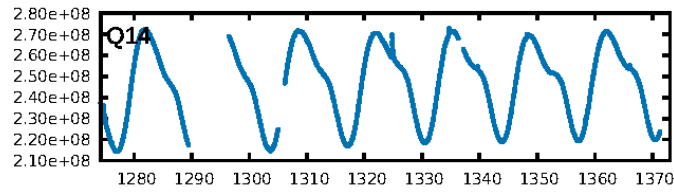
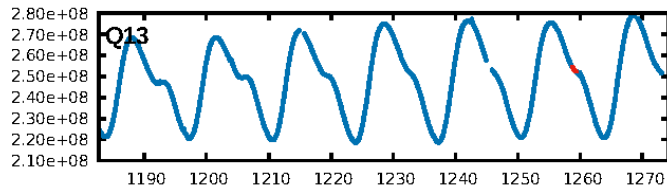
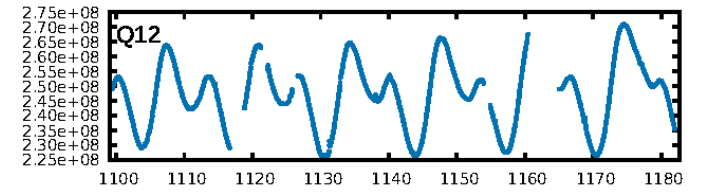
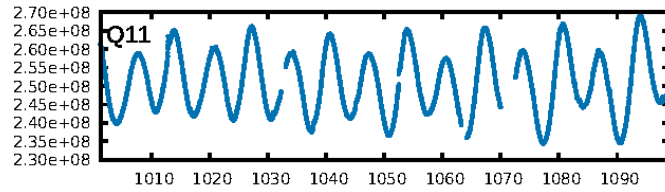
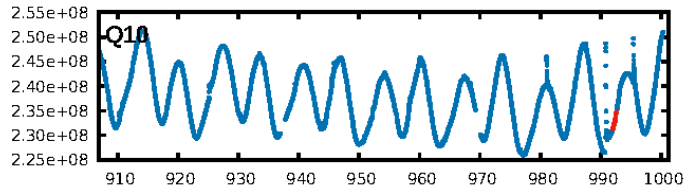
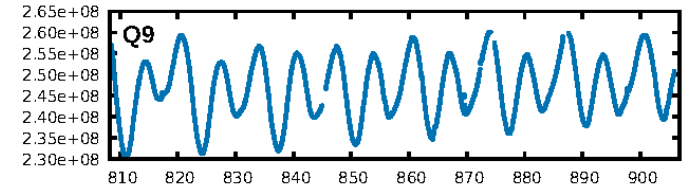
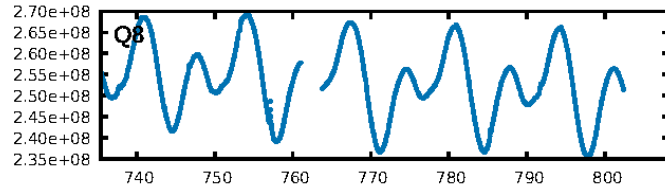
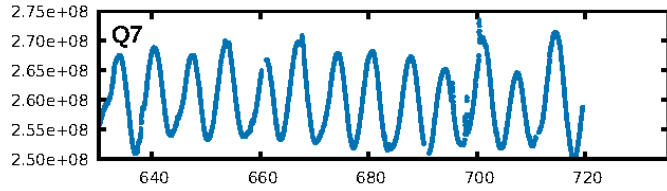
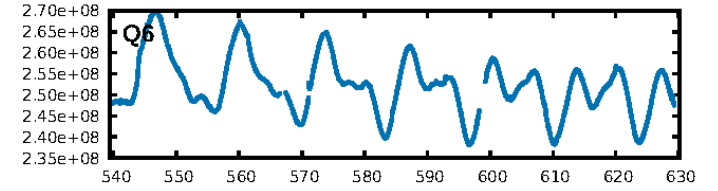
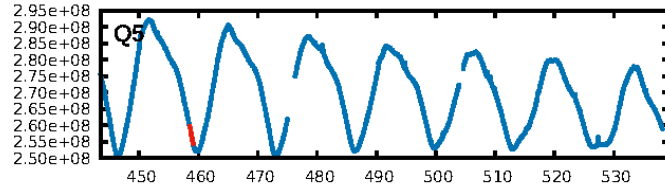
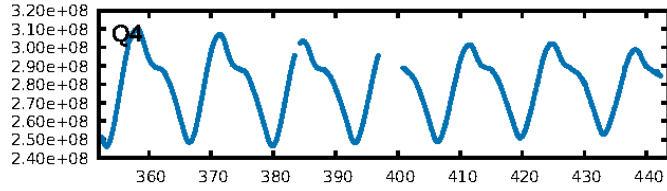
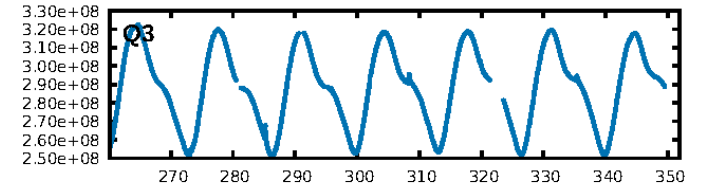
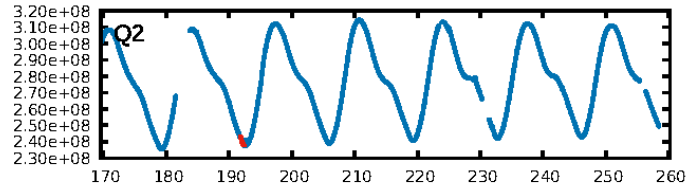
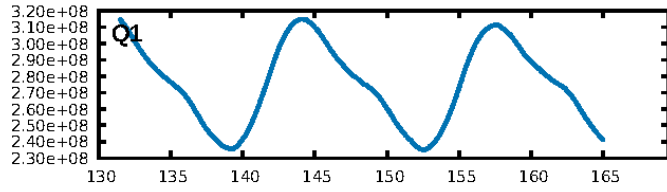
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 100.0% [389.12σ]
ModelChiSquare2-sig: 7.0%
ModelChiSquareGof-sig: 99.2%
Bootstrap-pfa: N/A
RollingBand-fgt: 1.00 [4/4]
GhostDiagnostic-chr: 0.7359
Centroid-sig: 2.2%
Centroid-so: 1.961 arcsec [1.58σ]
OotOffset-rm: 0.125 arcsec [1.07σ]
KicOffset-rm: 0.146 arcsec [1.86σ]
OotOffset-st: 2/0/0/1 [3]
KicOffset-st: 2/0/0/1 [3]
DiffImageQuality-fgm: 1.00 [3/3]
DiffImageOverlap-fno: 1.00 [4/4]

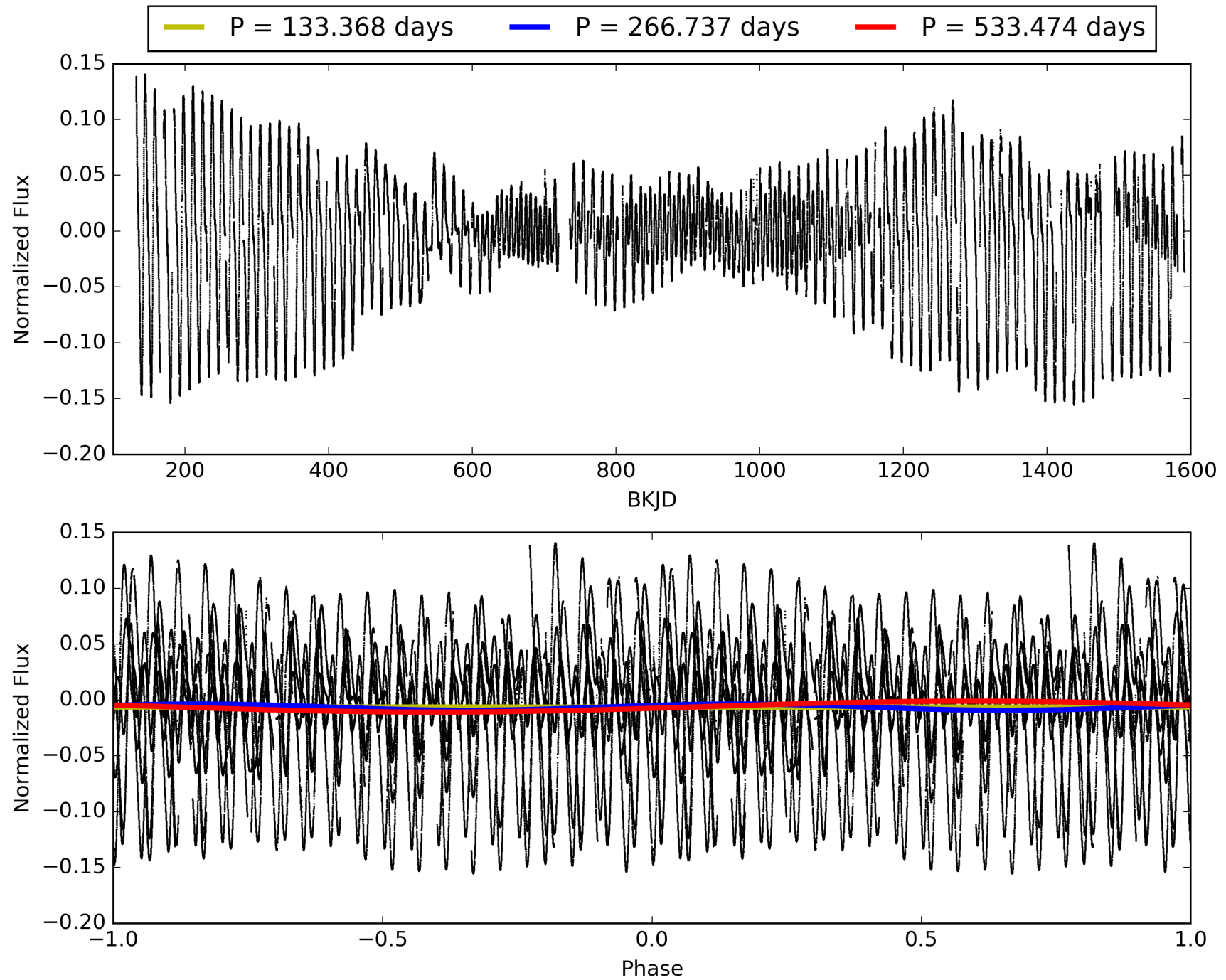
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 05:54:12 Z

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

TCE 012406908-04, PDC Light Curves

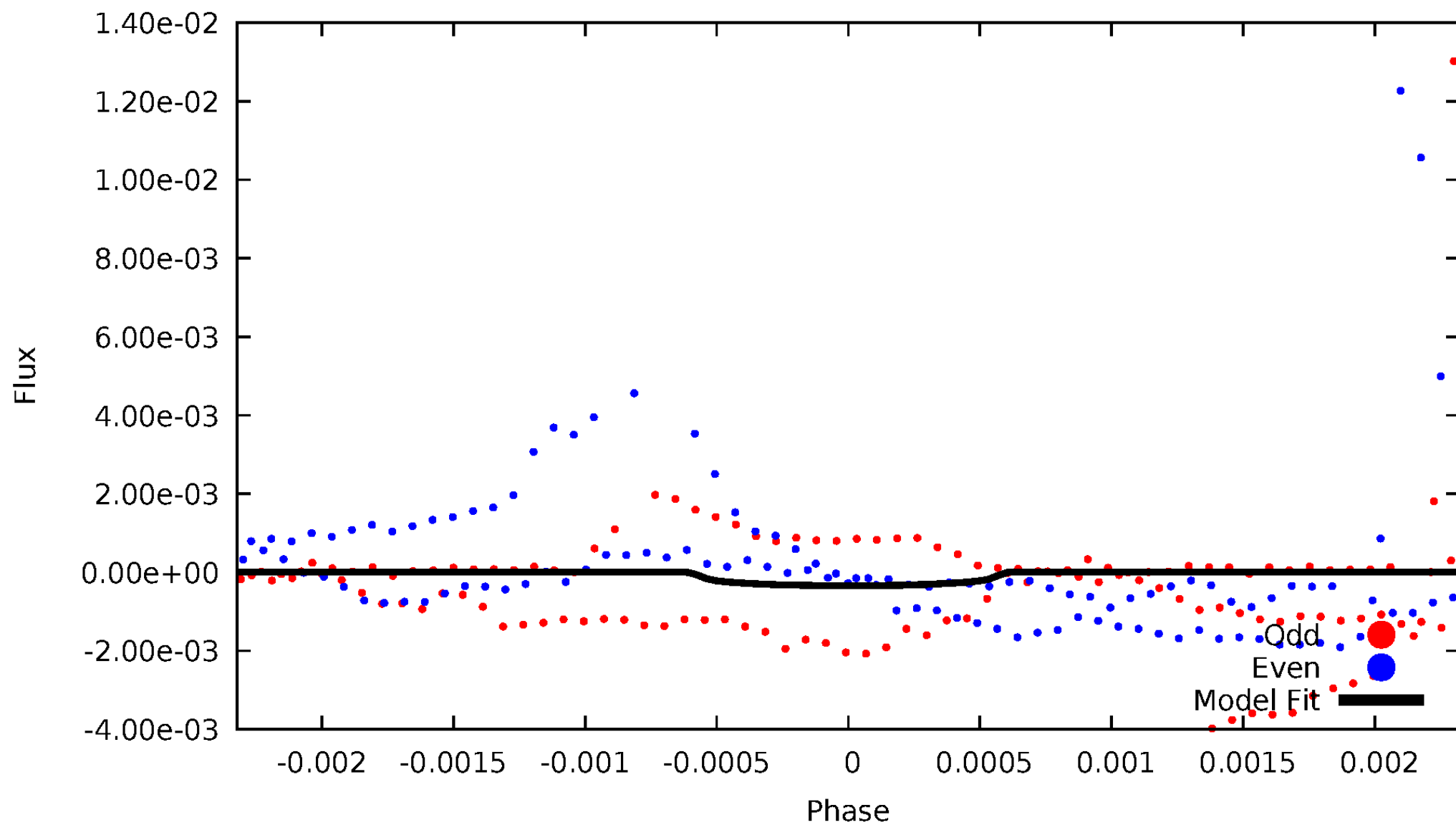


TCE 012406908-04



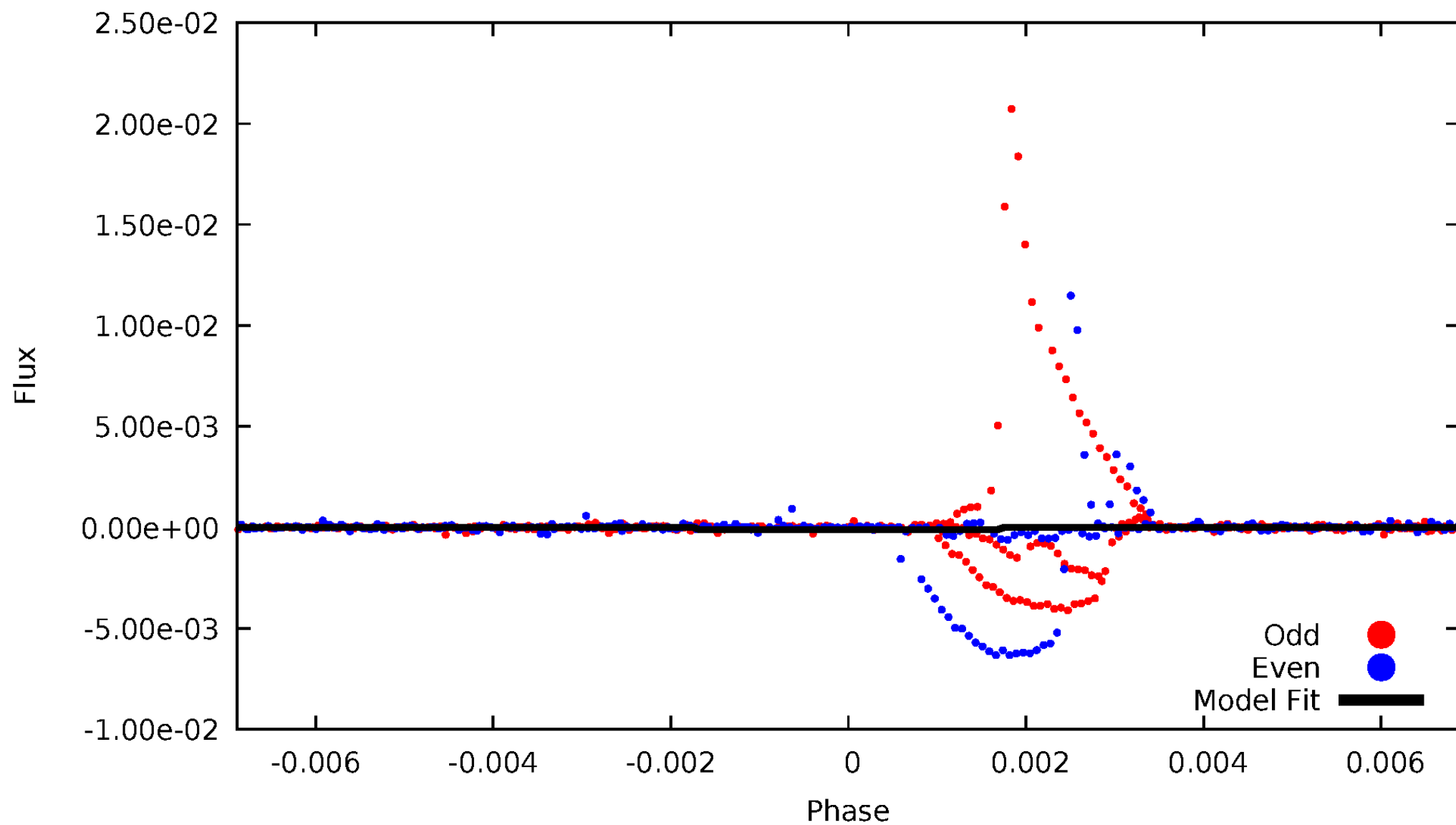
DV Odd/Even

TCE 012406908-04



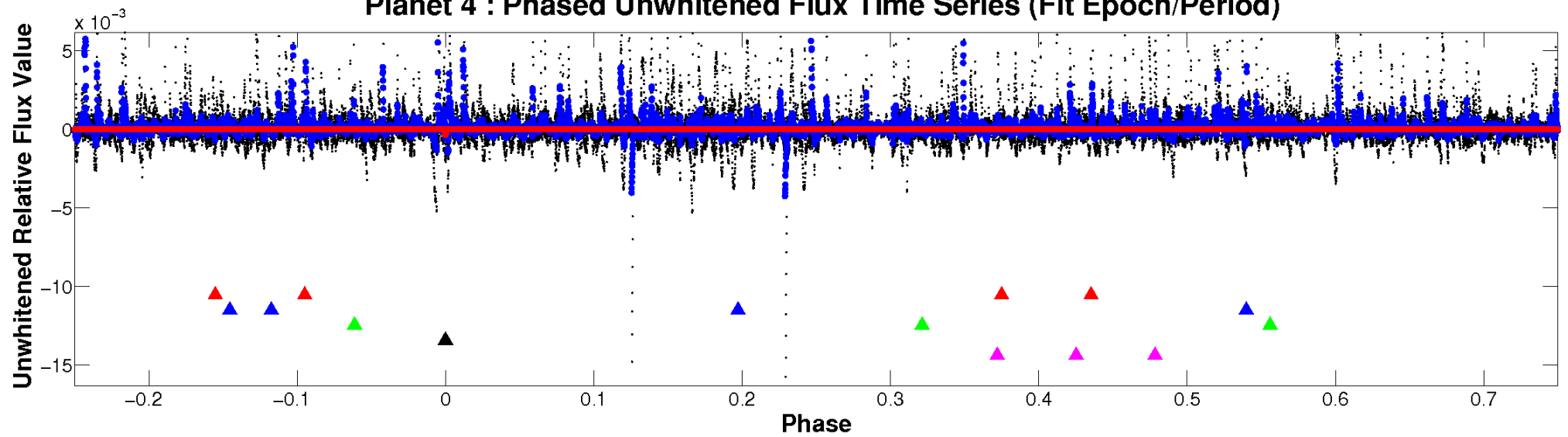
ALT Odd/Even

TCE 012406908-04

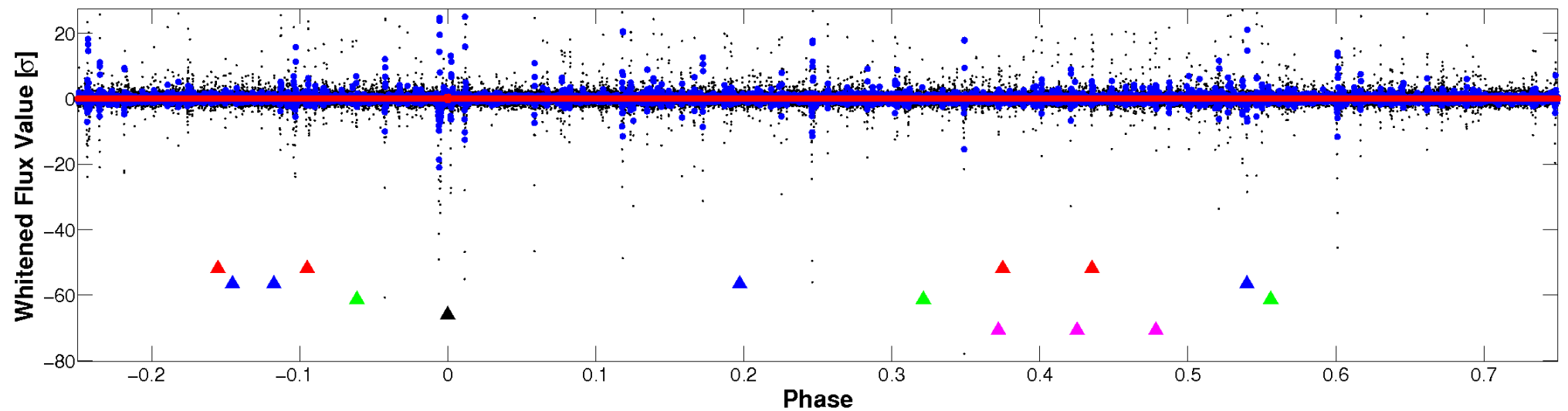


Non-Whitened Vs. Whitened Light Curve

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

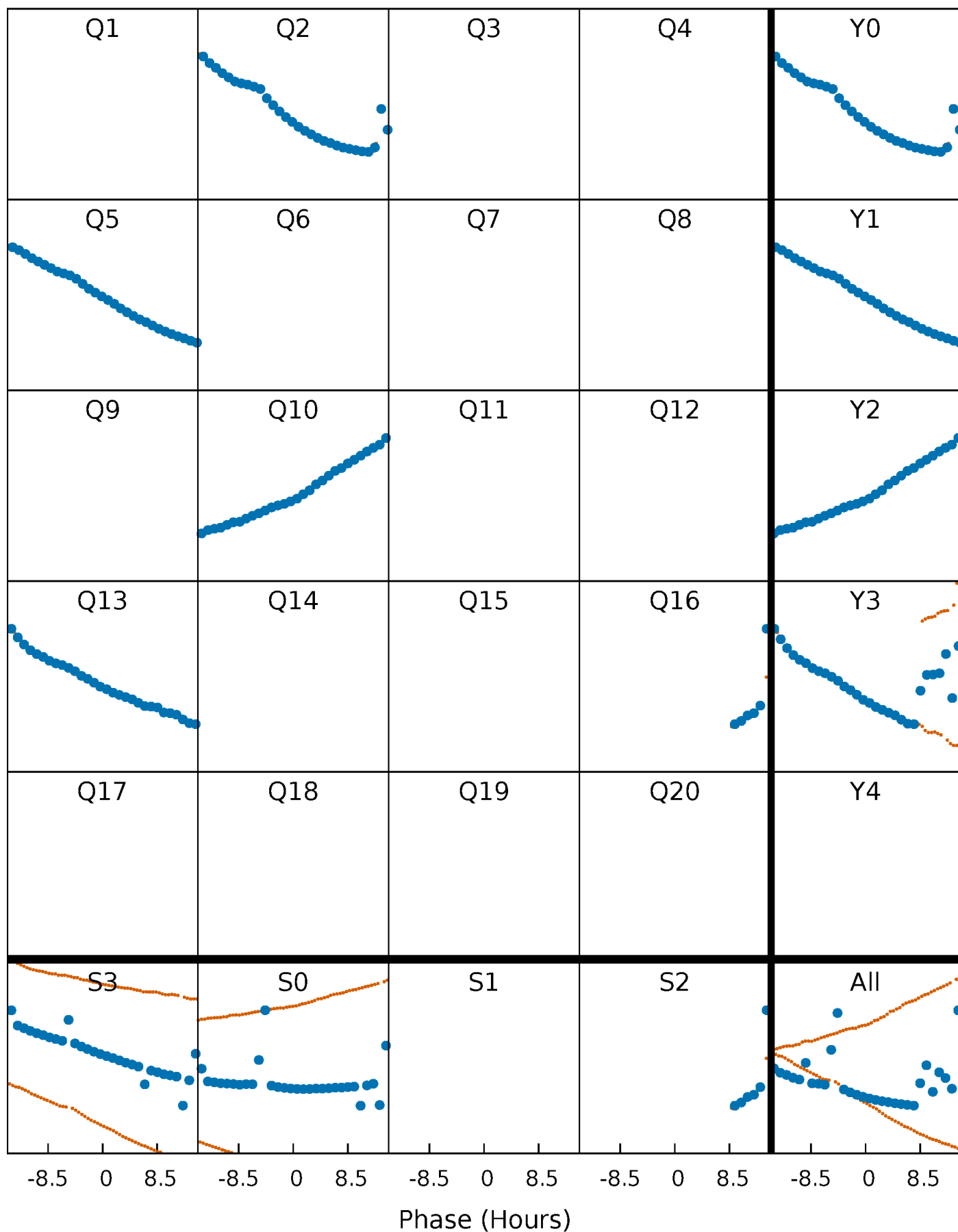


Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



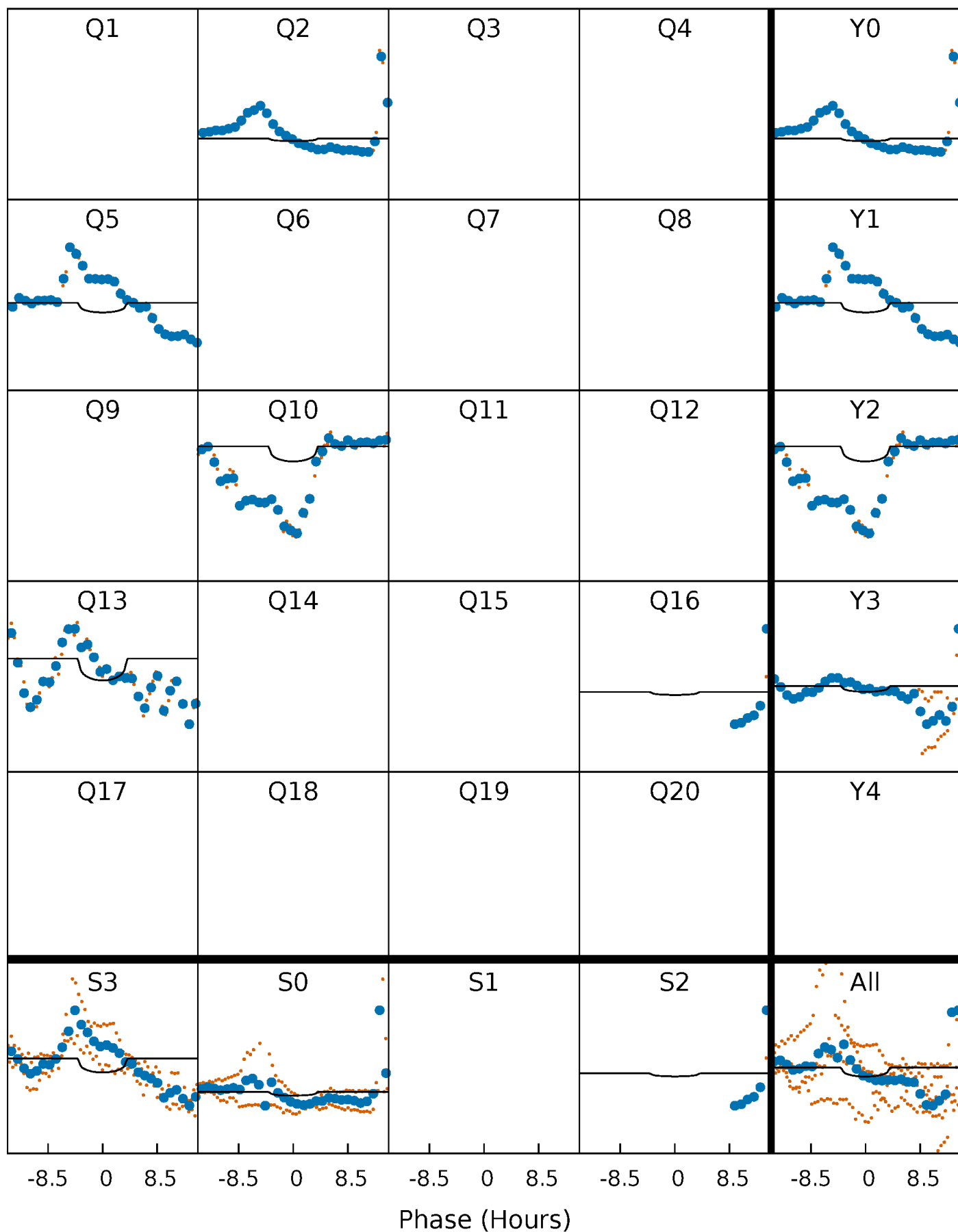
PDC Quarter-Phased Transit Curves

TCE 012406908-04 $P=266.736851$ Days $T_0=192.091122$ (BKJD)



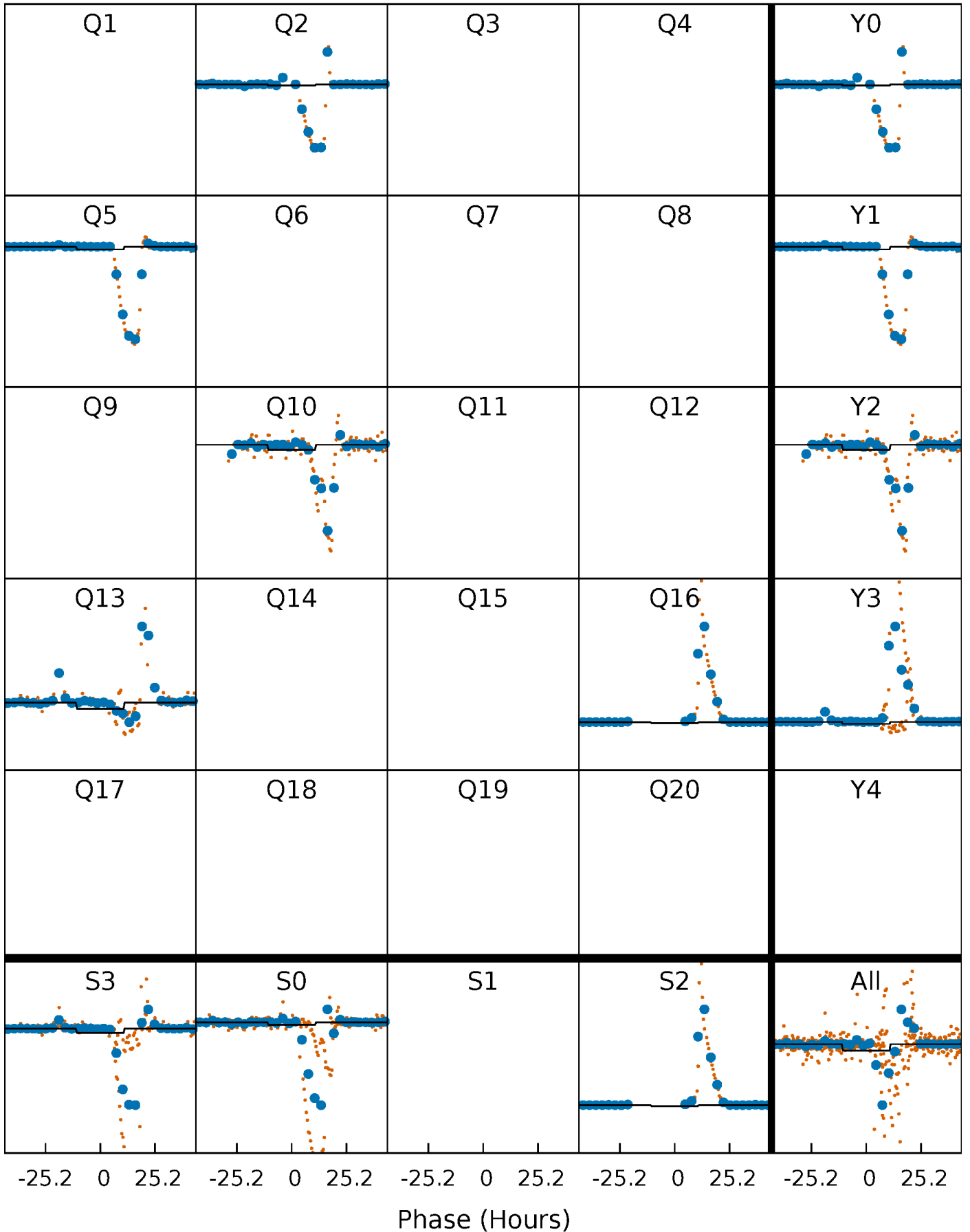
DV Quarter-Phased Transit Curves

TCE 012406908-04 P=266.736851 Days $T_0=192.091122$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

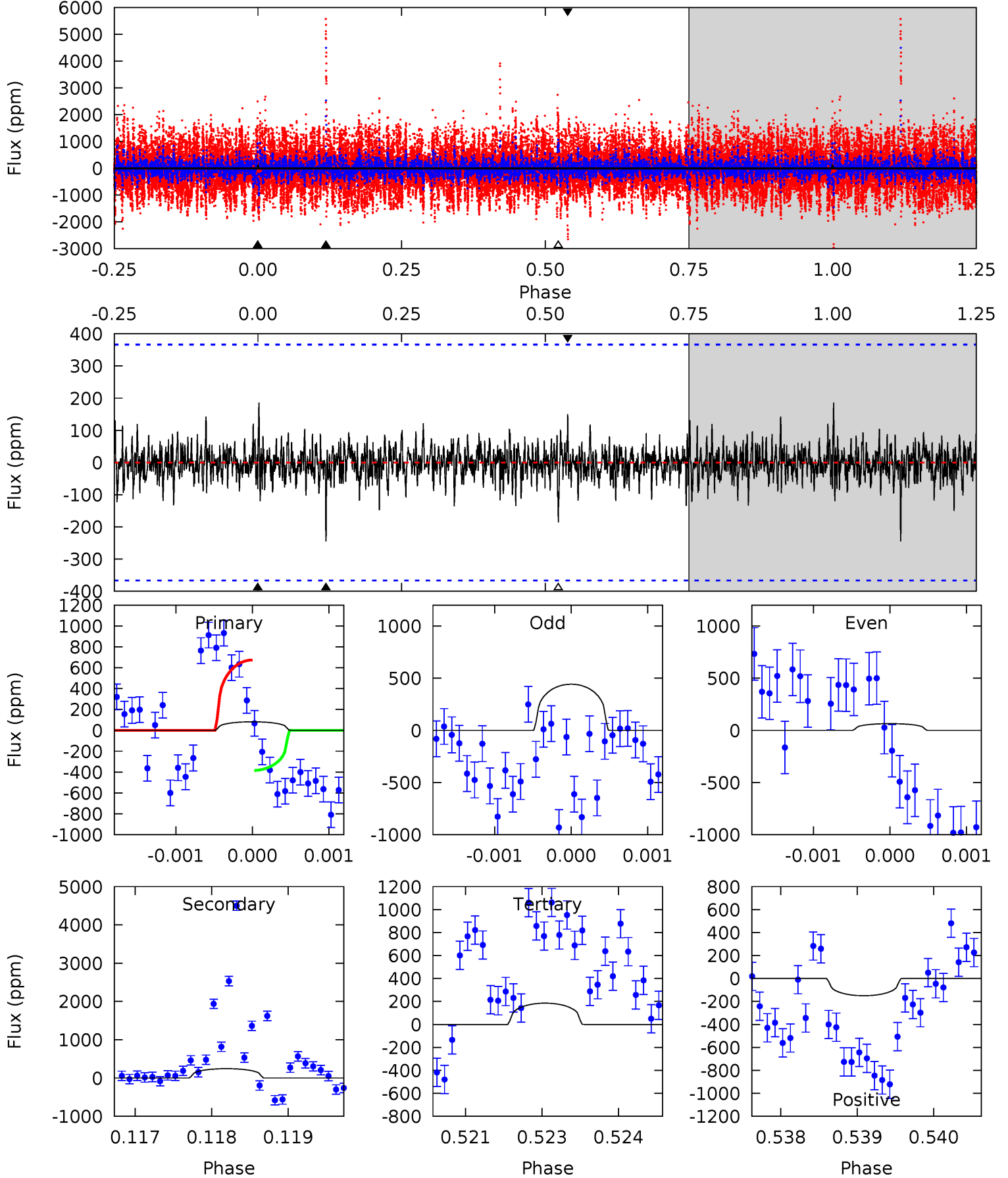
TCE 012406908-04 $P=266.787371$ Days $T_0=191.982239$ (BKJD)



DV Model-Shift Uniqueness Test

012406908-04, P = 266.736851 Days, E = 192.091122 Days

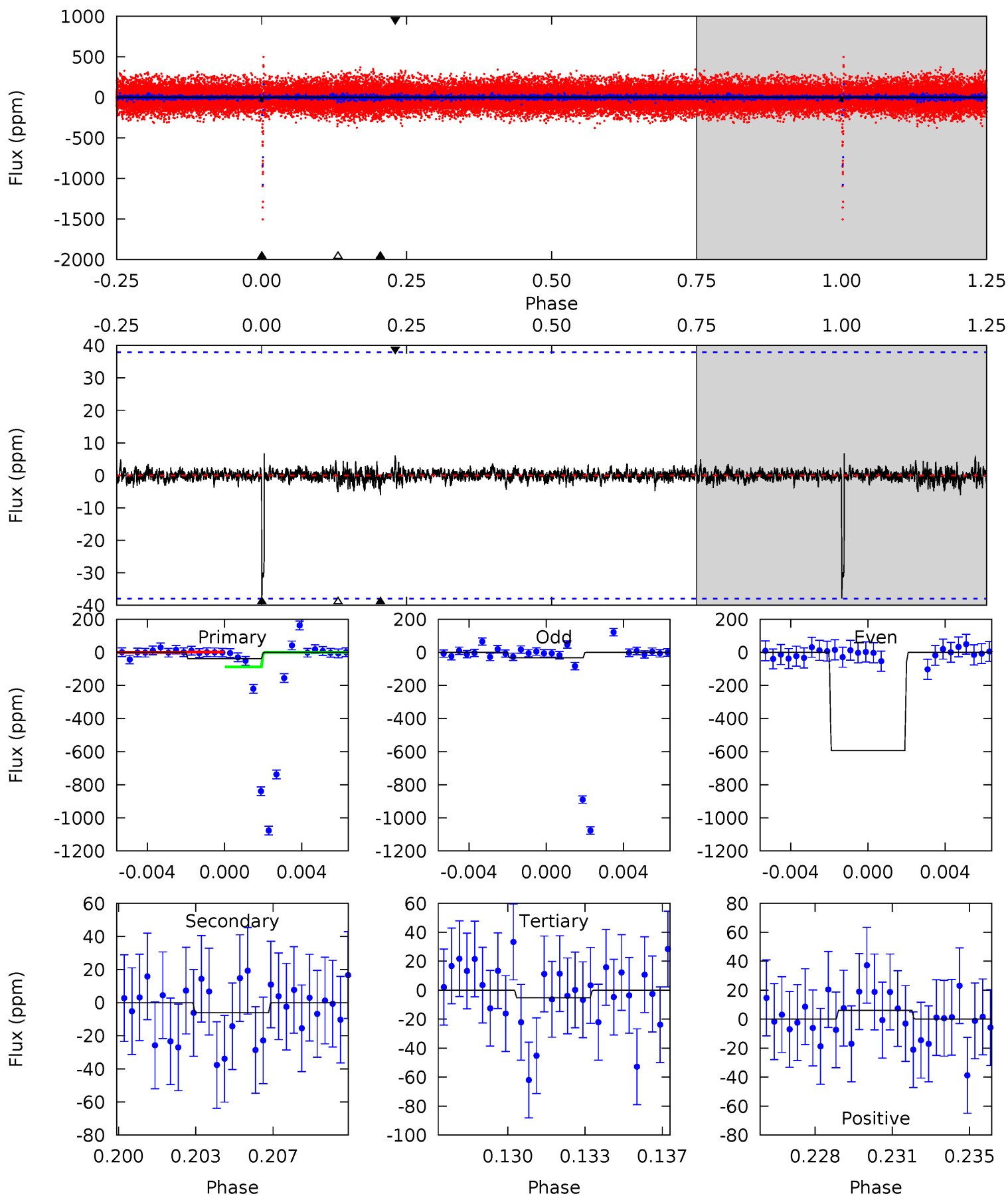
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
1.21	3.61	2.73	2.22	5.41	3.23	0.59	-1.52	-1.00	0.88	1.39	2.33	5.88	0.43	2.13



Alt Model-Shift Uniqueness Test

012406908-04, P = 266.787371 Days, E = 191.982239 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.21	0.83	0.71	0.83	5.22	2.92	0.18	4.50	4.38	0.12	-0.00	38.2	4.59	0.15	5.94



Stellar Parameters For KIC 012406908

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (g \cdot \text{cm}^{-3})$
	4582^{+161}_{-161}	$4.587^{+0.059}_{-0.027}$	$-0.060^{+0.300}_{-0.300}$	$0.697^{+0.045}_{-0.062}$	$0.683^{+0.074}_{-0.056}$	$2.848^{+0.715}_{-0.323}$
	+4%/-4%	+1%/-1%	+500%/-500%	+6%/-9%	+11%/-8%	+25%/-11%
Source	PHO54	PHO54	PHO54	DSEP		

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

Secondary Eclipse Parameters for KIC 012406908-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	-245 ± 68	$2.96^{+2.87}_{-1.94}$	277^{+12}_{-11}	3316^{+1533}_{-600}	8014^{+53674}_{-6148}
Alt.	-6 ± 7	$2.76^{+3.13}_{-1.83}$	276^{+11}_{-10}	2013^{+694}_{-3711}	141^{+1685}_{-163}

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 $A_{obs} \gg 1.0$

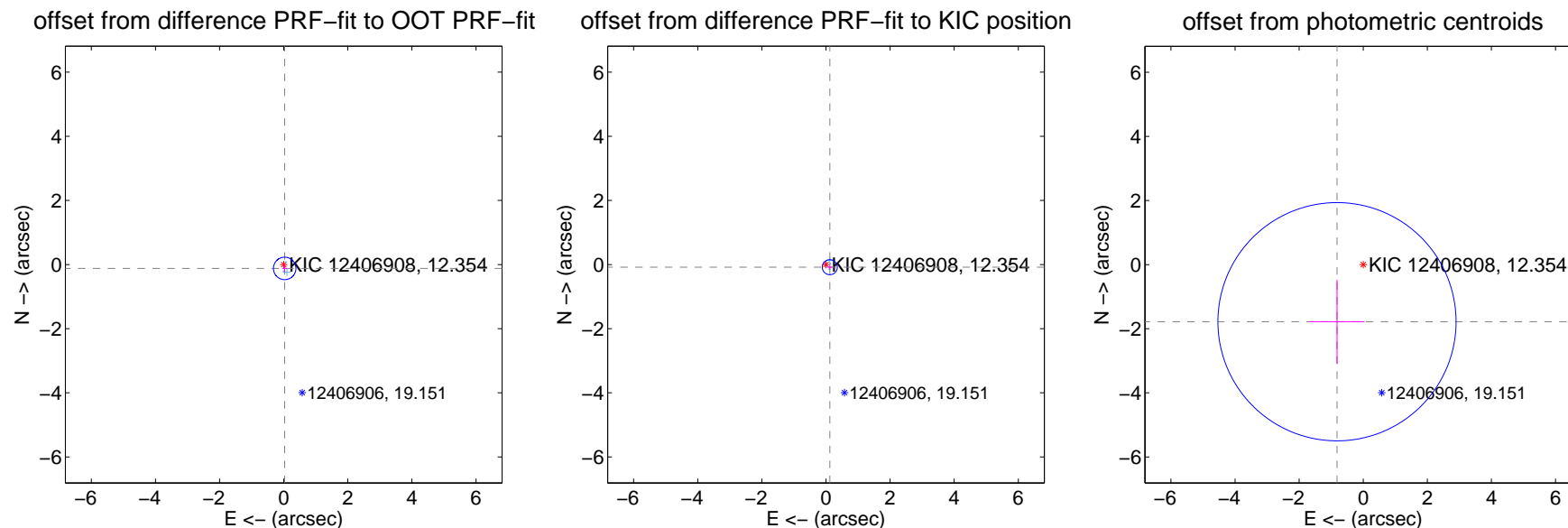
DV Centroid Data

Supplemental centroid analysis for 012406908-04. Kepler magnitude: 12.35. Transit SNR 2.74

There are 3 quarters with good PRF difference image offsets

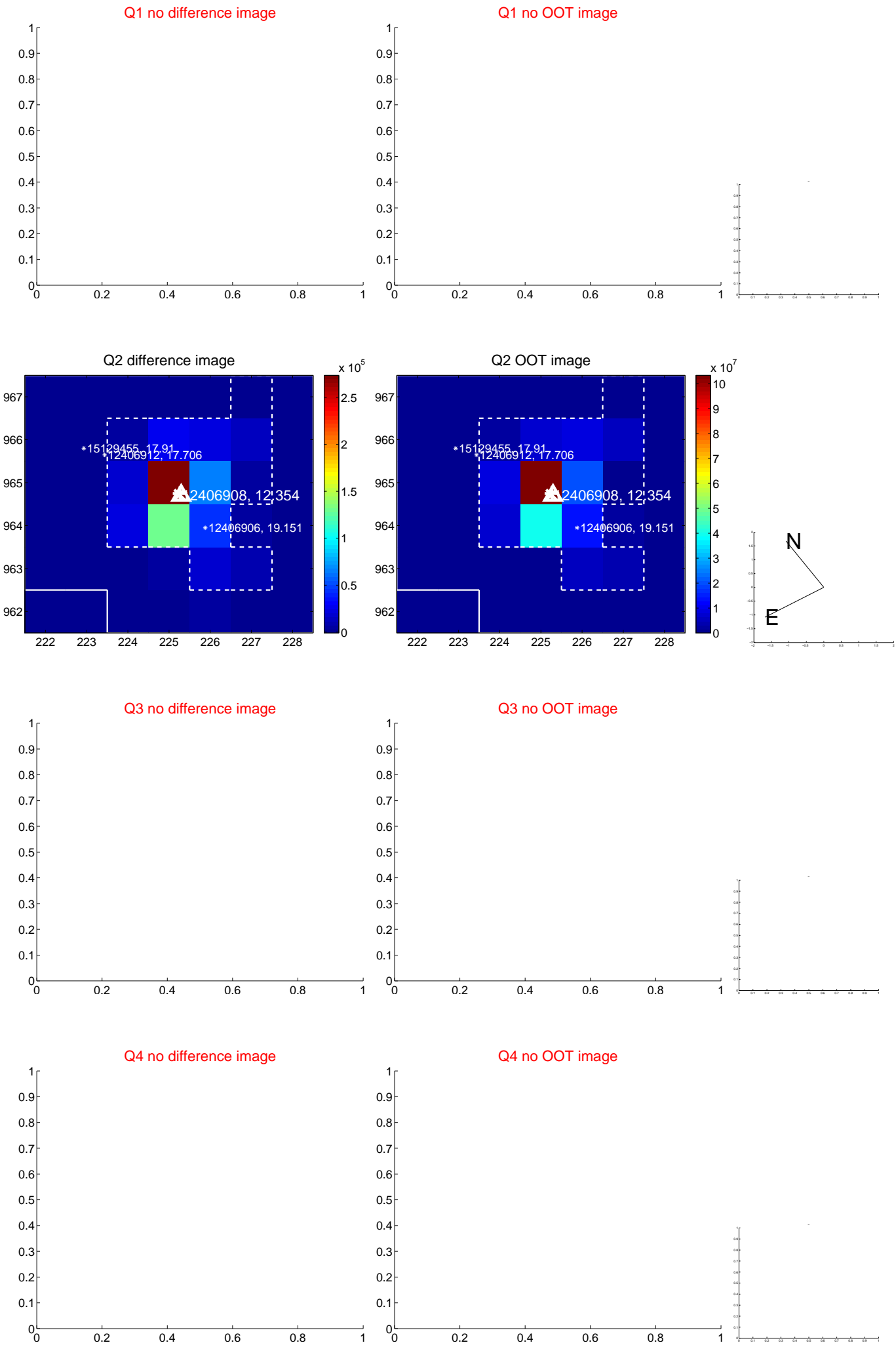
The direct PRF centroid is offset from the target star catalog position by about 0.37 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.125 ± 0.117	1.07	-0.031 ± 0.073	-0.121 ± 0.119
PRF-fit source offset from KIC position	0.146 ± 0.078	1.86	-0.120 ± 0.079	-0.083 ± 0.077
photometric centroid source offset	1.96 ± 1.24	1.58	0.82 ± 0.86	-1.78 ± 1.30

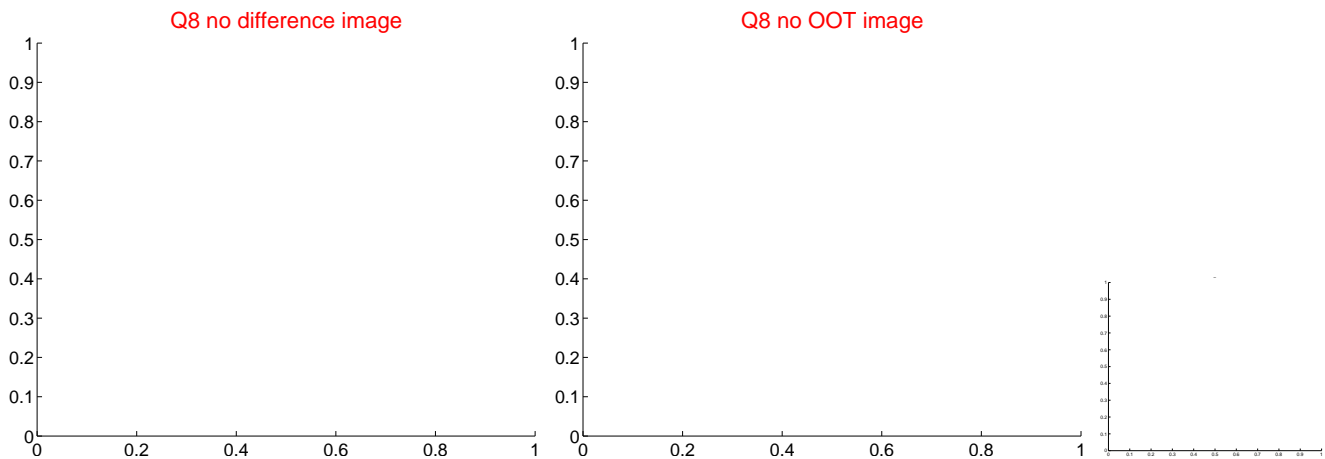
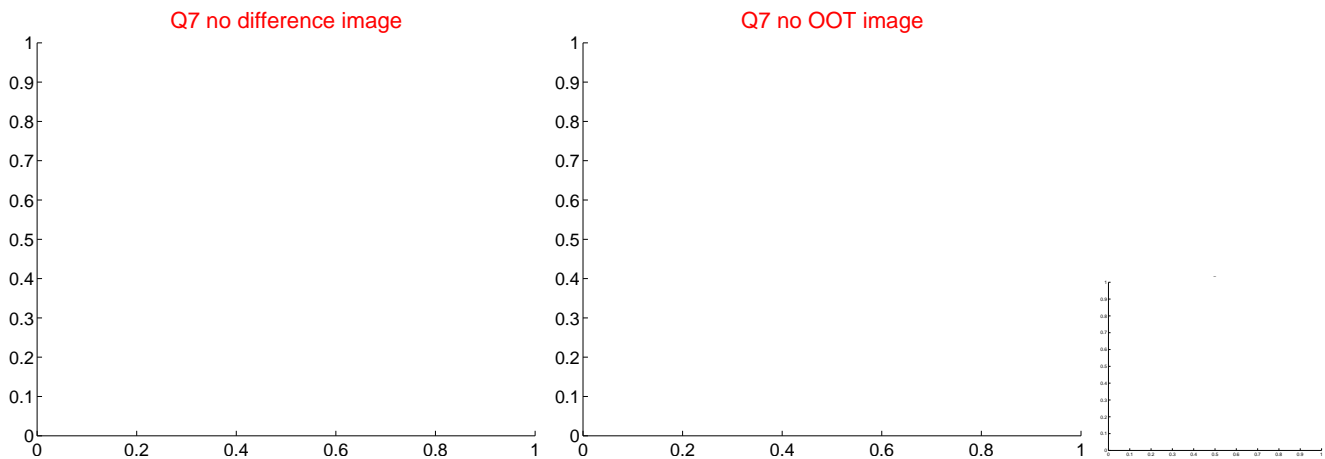
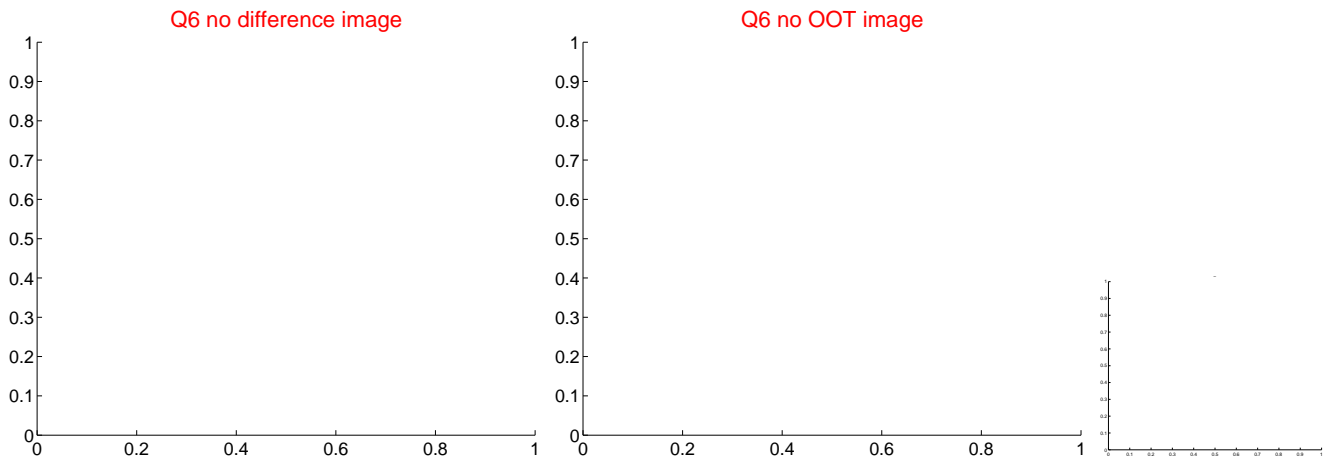
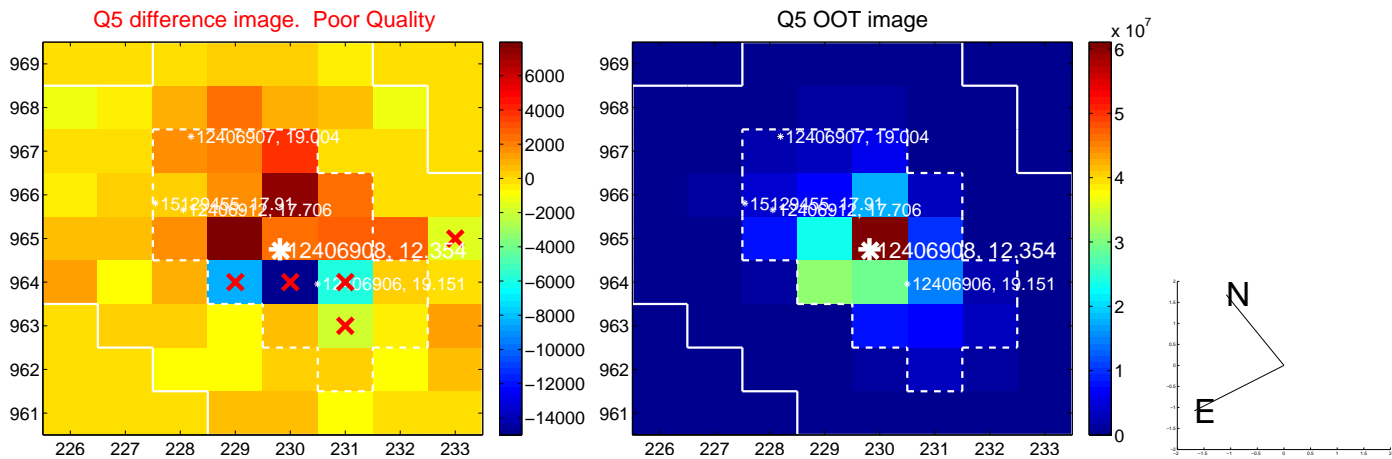


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

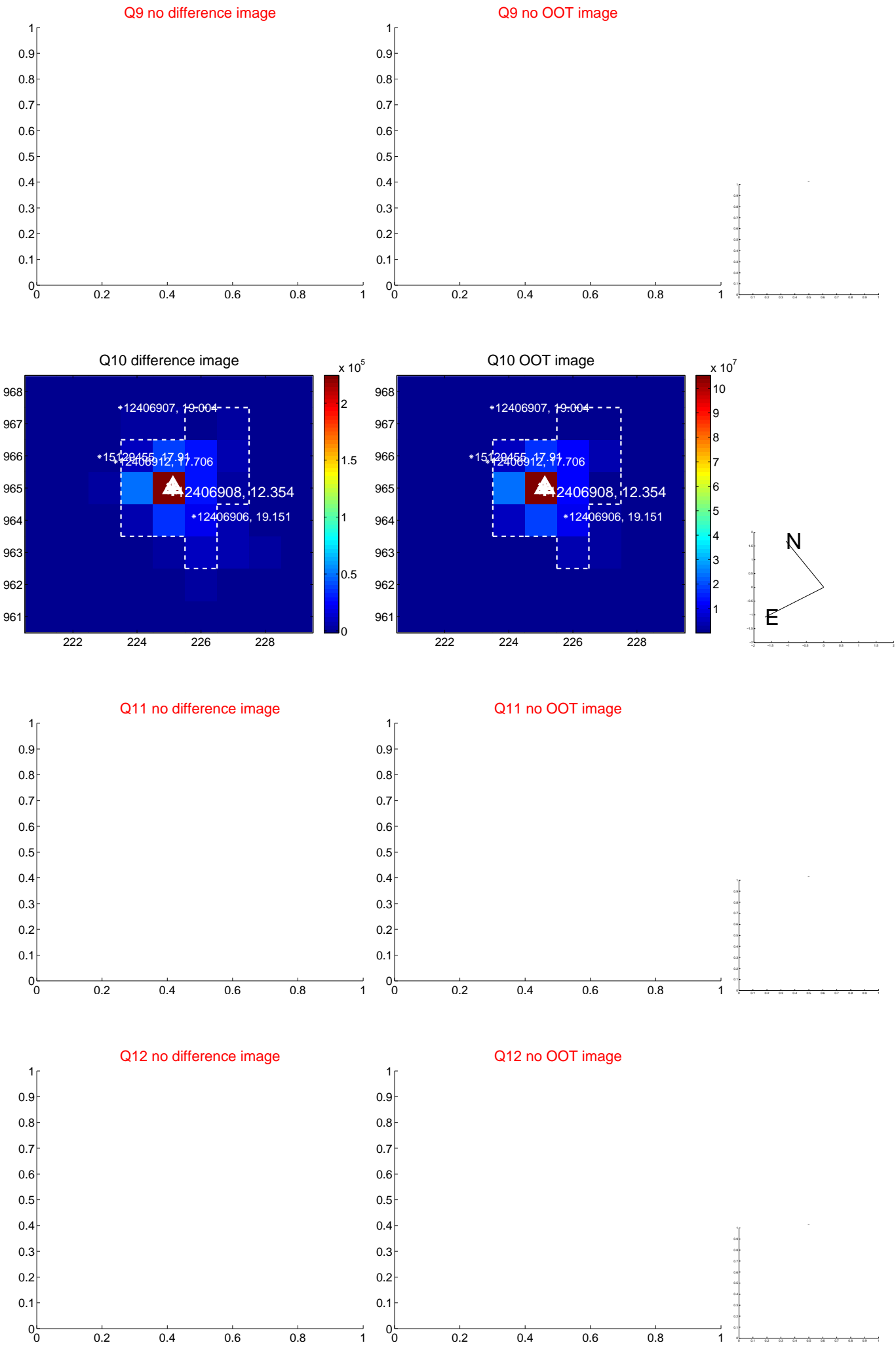
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



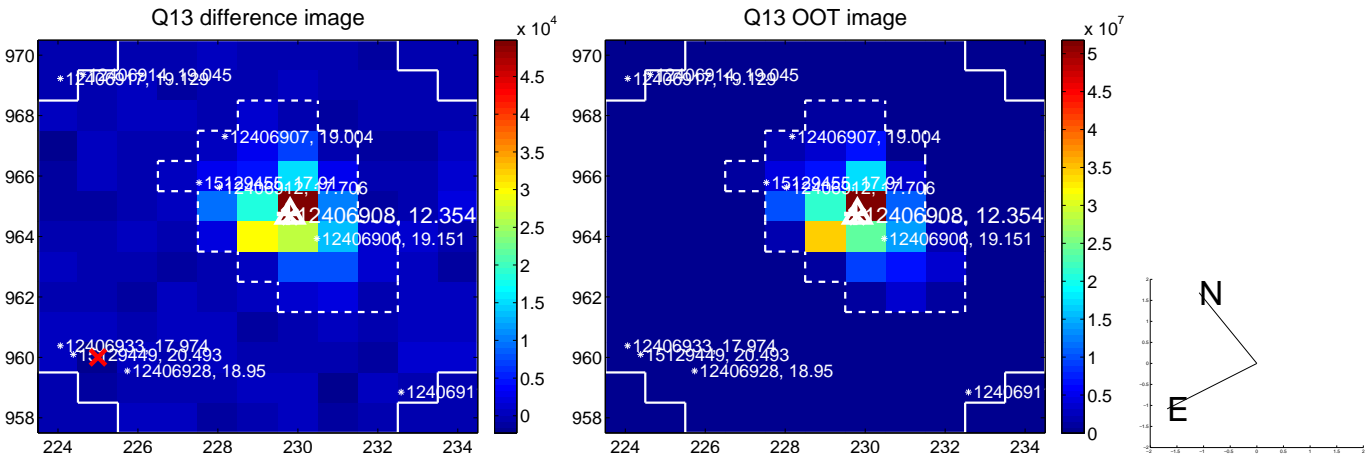
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.



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



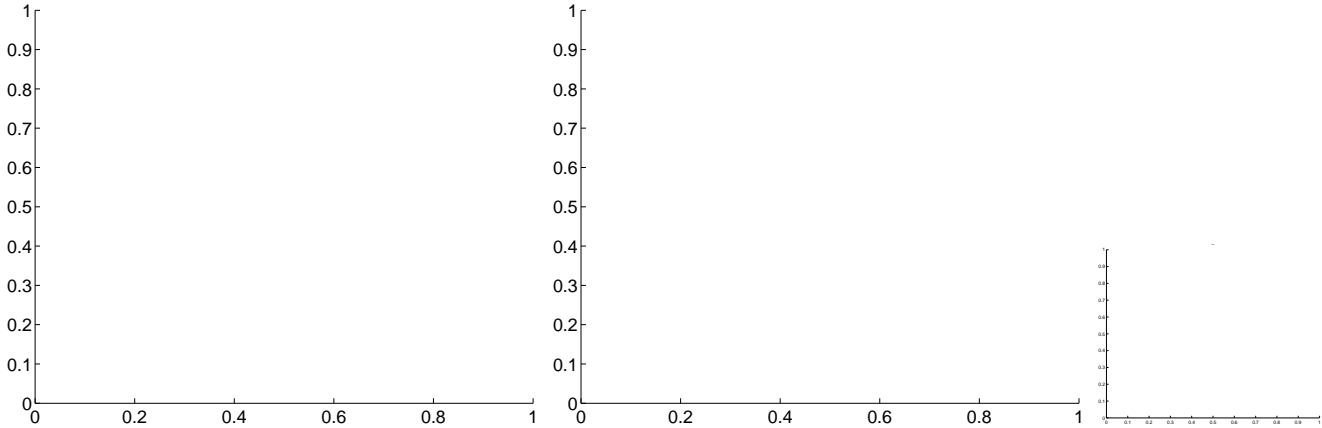
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



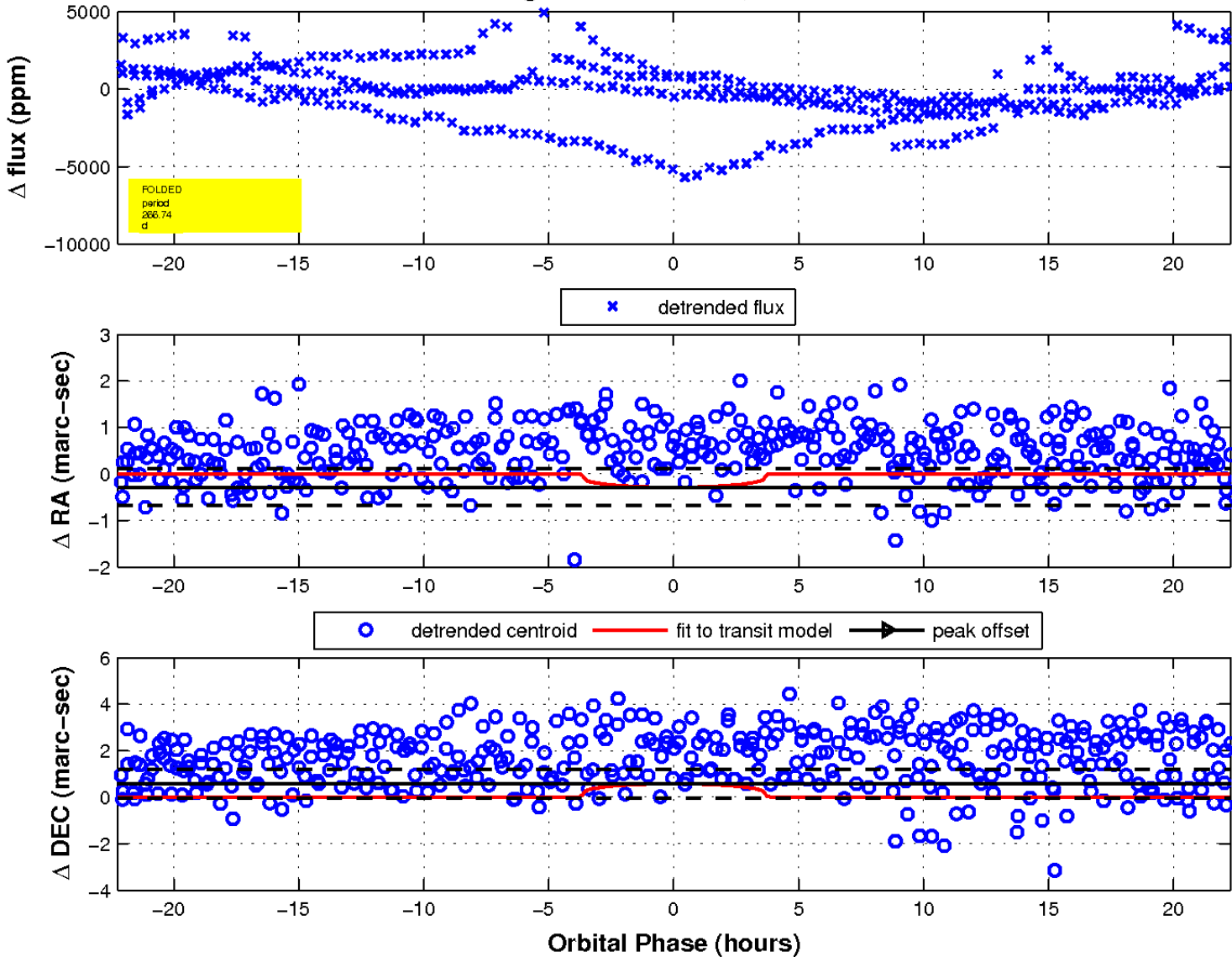
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.

Q17 no difference image

Q17 no OOT image



fluxWeightedCentroids, Planet 4 of 5



UKIRT Image

Declination

