

KIC 010015516

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})
010015516-01	OBS	No	203.054331	172.514115	3456.6	50.398	210.0	127.3	4.06	5374	26.77	19.19
010015516-02	OBS	No	338.463157	240.070106	106215.5	58.718	213.7	359.6	4.06	5374	130.64	9.71
010015516-05	OBS	No	67.692101	172.377510	2730.5	50.673	102.3	239.8	4.06	5374	24.25	83.01
010015516-06	OBS	No	338.488733	138.540138	264.1	15.000	50.3	-1.0	4.06	5374	6.49	9.71

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010015516-01	OBS	FP	0.00	1	0	0	0	ALL_TRANS_CHASES—CENT_SATURATED
010015516-02	OBS	FP	0.00	1	0	0	0	ALL_TRANS_CHASES—CENT_SATURATED
010015516-05	OBS	FP	0.00	1	0	1	0	TRANS_GAPPED—SAME_NTL_PERIOD—CENT_SATURATED—HALO_GHOST
010015516-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—SAME_NTL_PERIOD—CENT_SATURATED

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 010015516-01

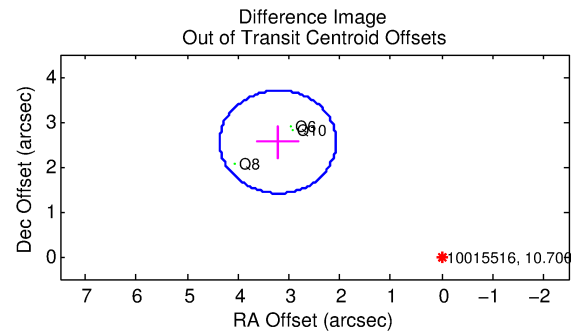
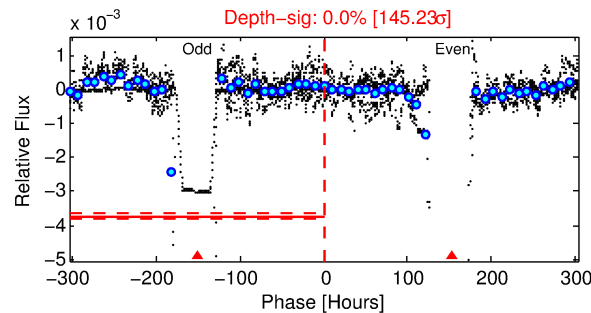
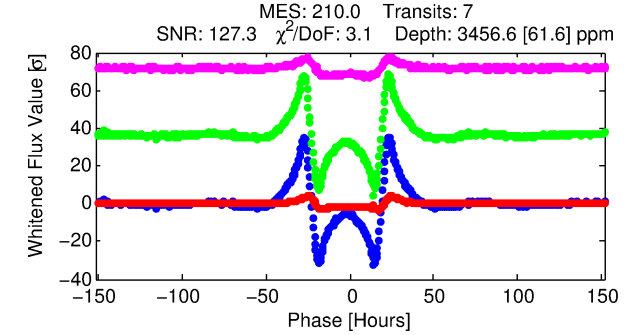
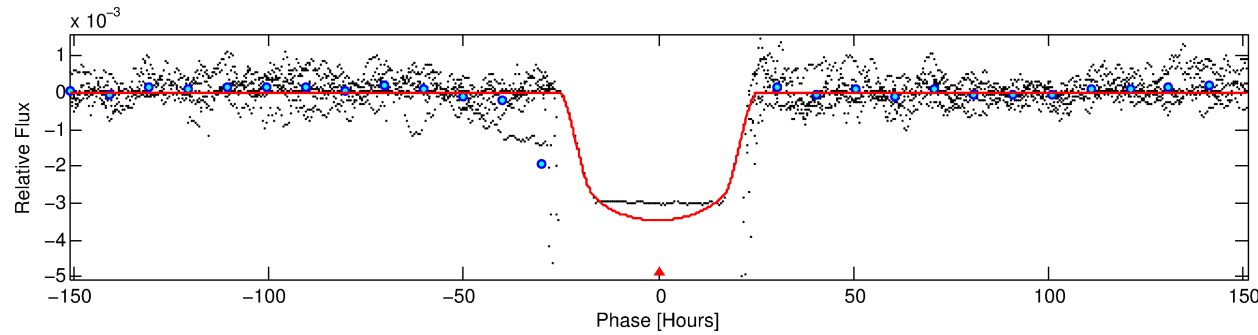
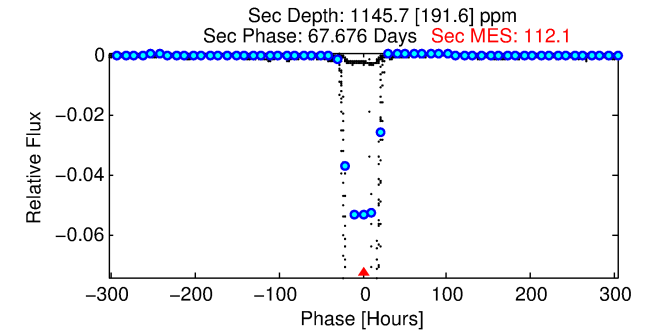
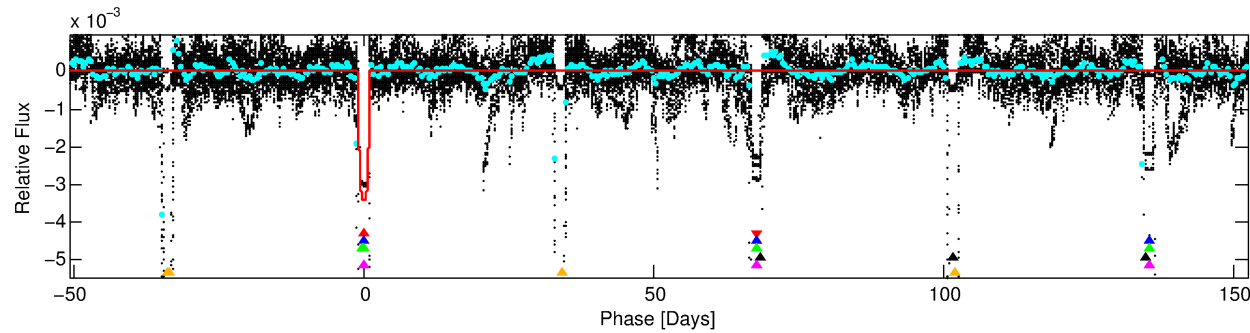
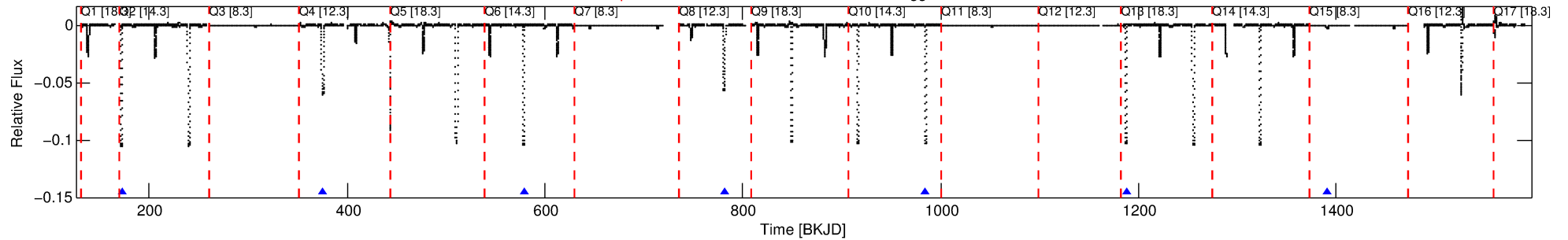
No Significant Match Found

DV One-Page Summary

KIC: 10015516 Candidate: 1 of 6 Period: 203.054 d

KOI: K00990 Corr: No Ephemeris Match

Kp: 10.70 R*: 4.06 Rs Teff: 5374.0 K Logg: 3.44 Fe/H: -0.200



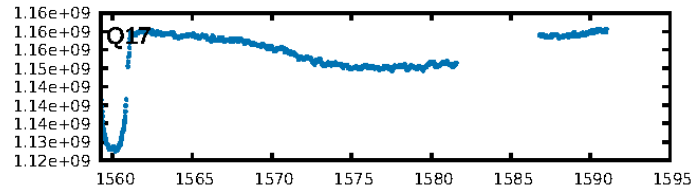
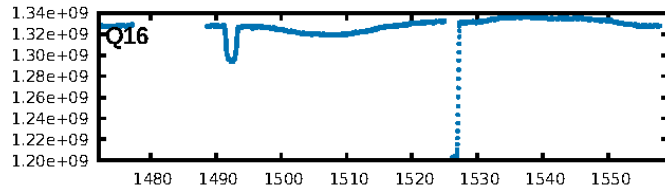
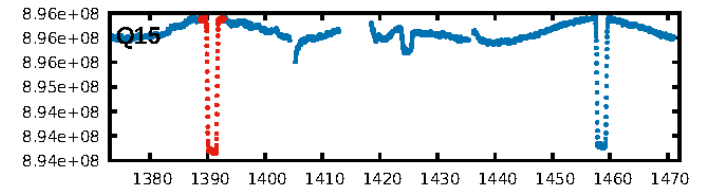
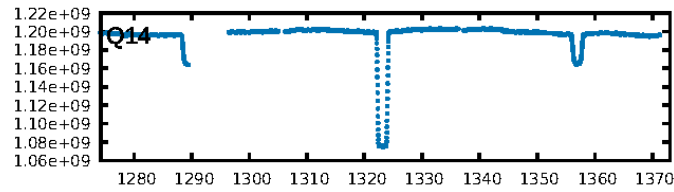
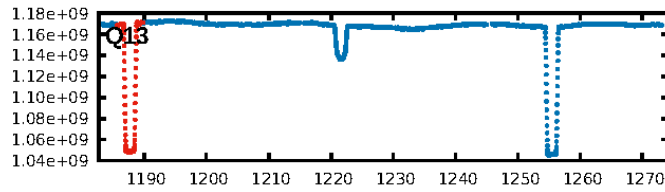
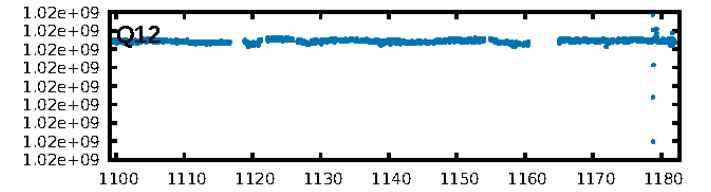
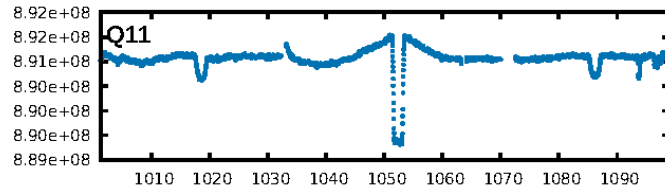
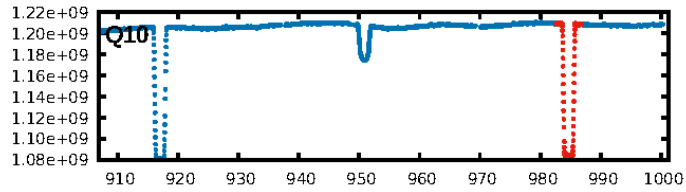
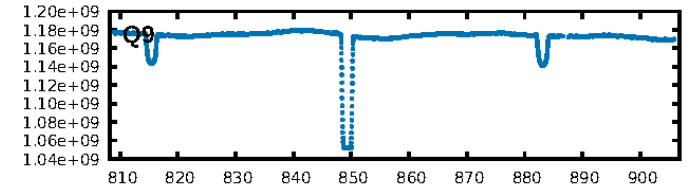
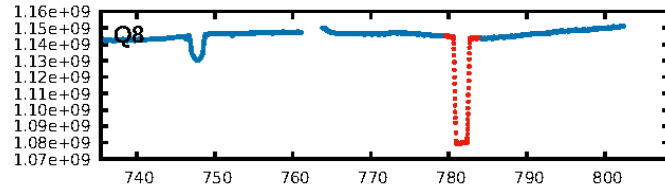
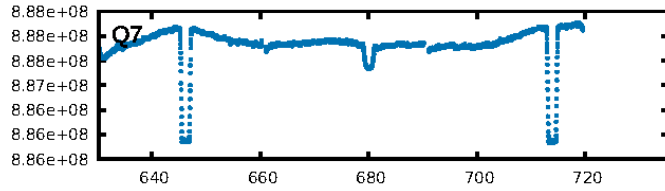
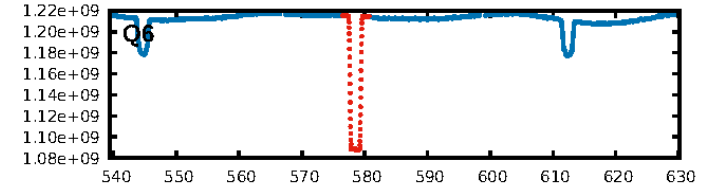
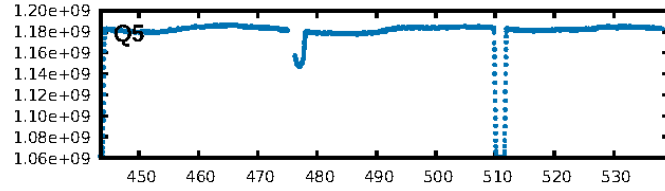
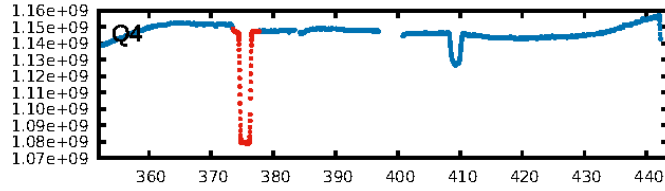
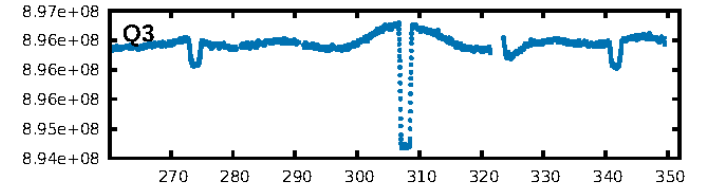
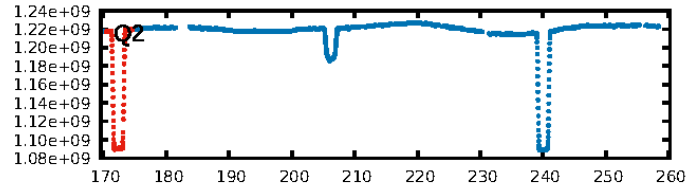
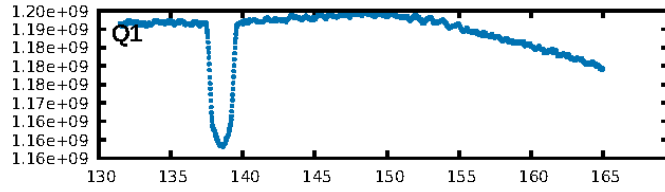
DV Fit Results:

Period = 203.05433 [0.00380] d
Epoch = 172.5141 [0.0225] BKJD
Rp/R* = 0.0604 [0.0006]
a/R* = 21.02 [0.30]
b = 0.81 [0.01]
Seff = 19.19 [9.10]
Teff = 534 [63] K
Rp = 26.76 [9.27] Re
a = 0.8014 [0.2394] AU
Ag = 565.14 [268.31] [2.10σ]
Teffp = 4023 [239] K [14.12σ]

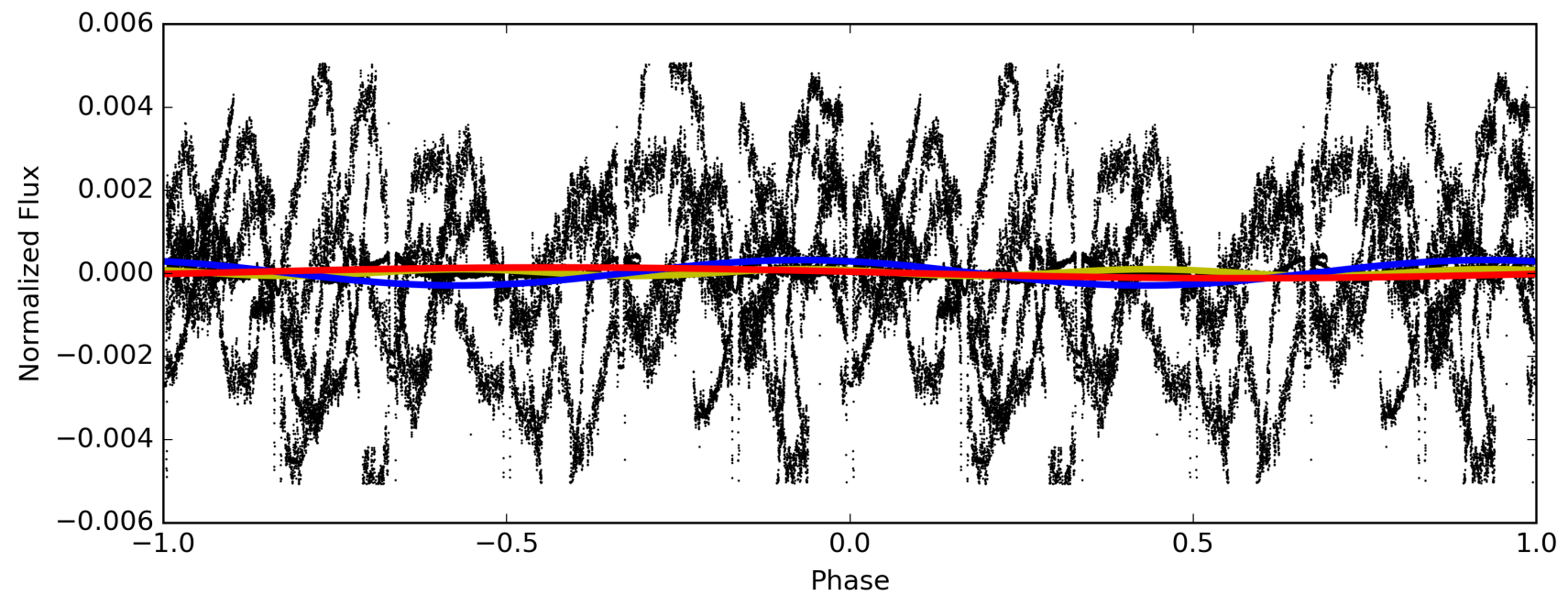
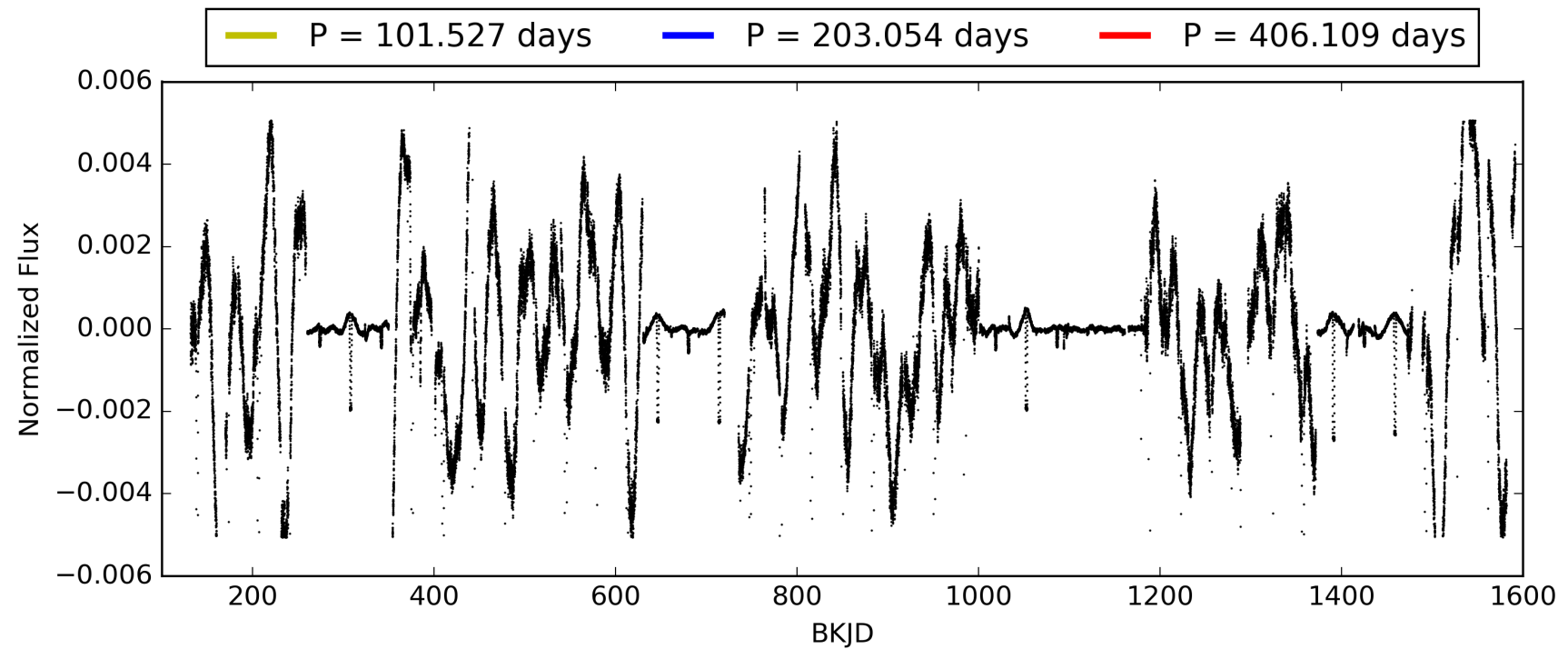
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [45.46σ]
LongPeriod-sig: 100.0% [42.00σ]
ModelChiSquare2-sig: 0.0%
ModelChiSquareGof-sig: 0.0%
Bootstrap-pfa: N/A
RollingBand-fgt: 1.00 [7/7]
GhostDiagnostic-chr: 5.08
Centroid-sig: N/A
Centroid-so: 0.969 arcsec [7.39σ]
OotOffset-rm: 4.104 arcsec [10.75σ]
KicOffset-rm: 3.313 arcsec [6.68σ]
OotOffset-st: 2/0/1/0 [3]
KicOffset-st: 2/0/1/0 [3]
DiffImageQuality-fgm: 0.67 [2/3]
DiffImageOverlap-fno: 0.00 [0/3]

TCE 010015516-01, PDC Light Curves

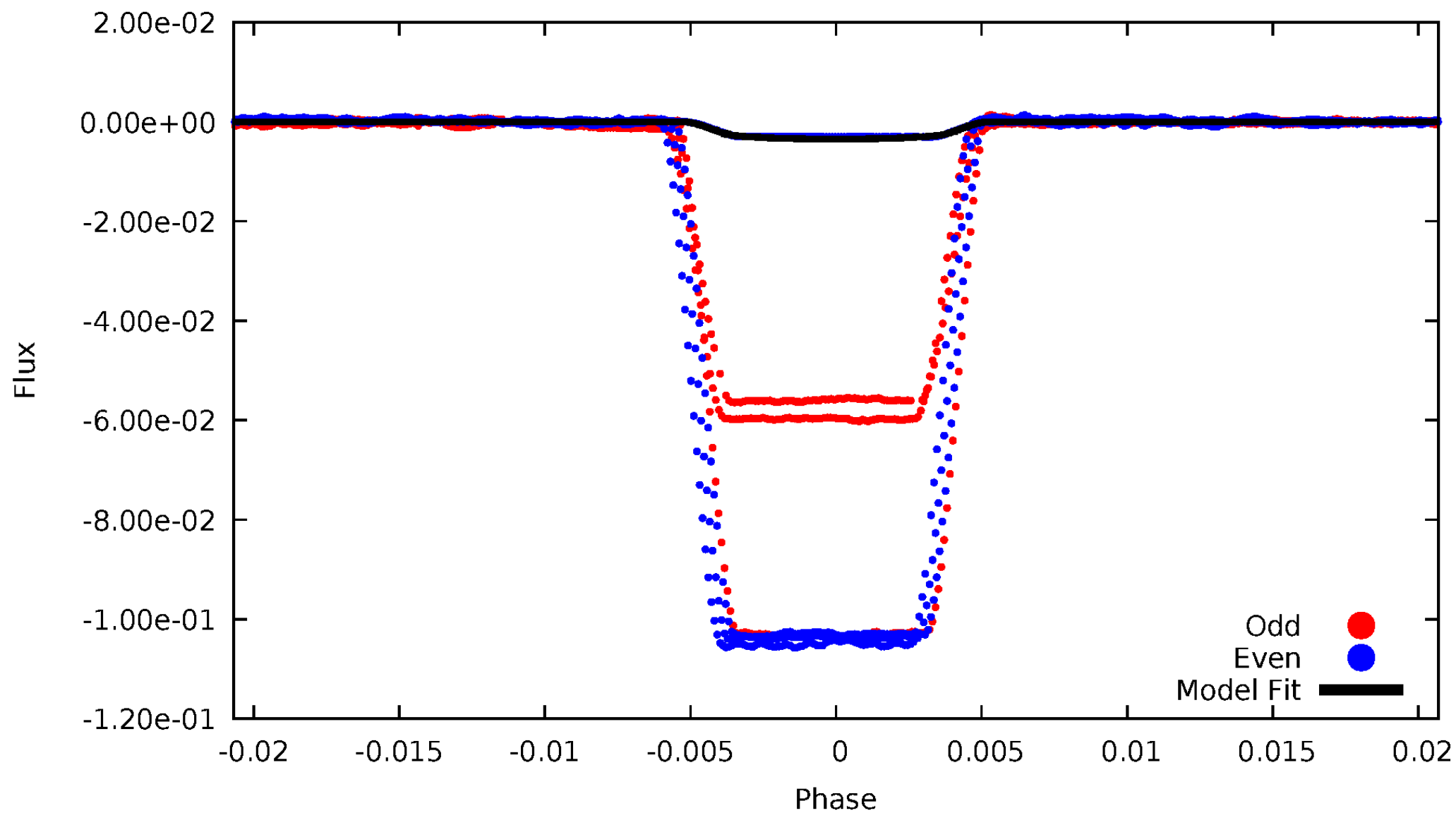


TCE 010015516-01



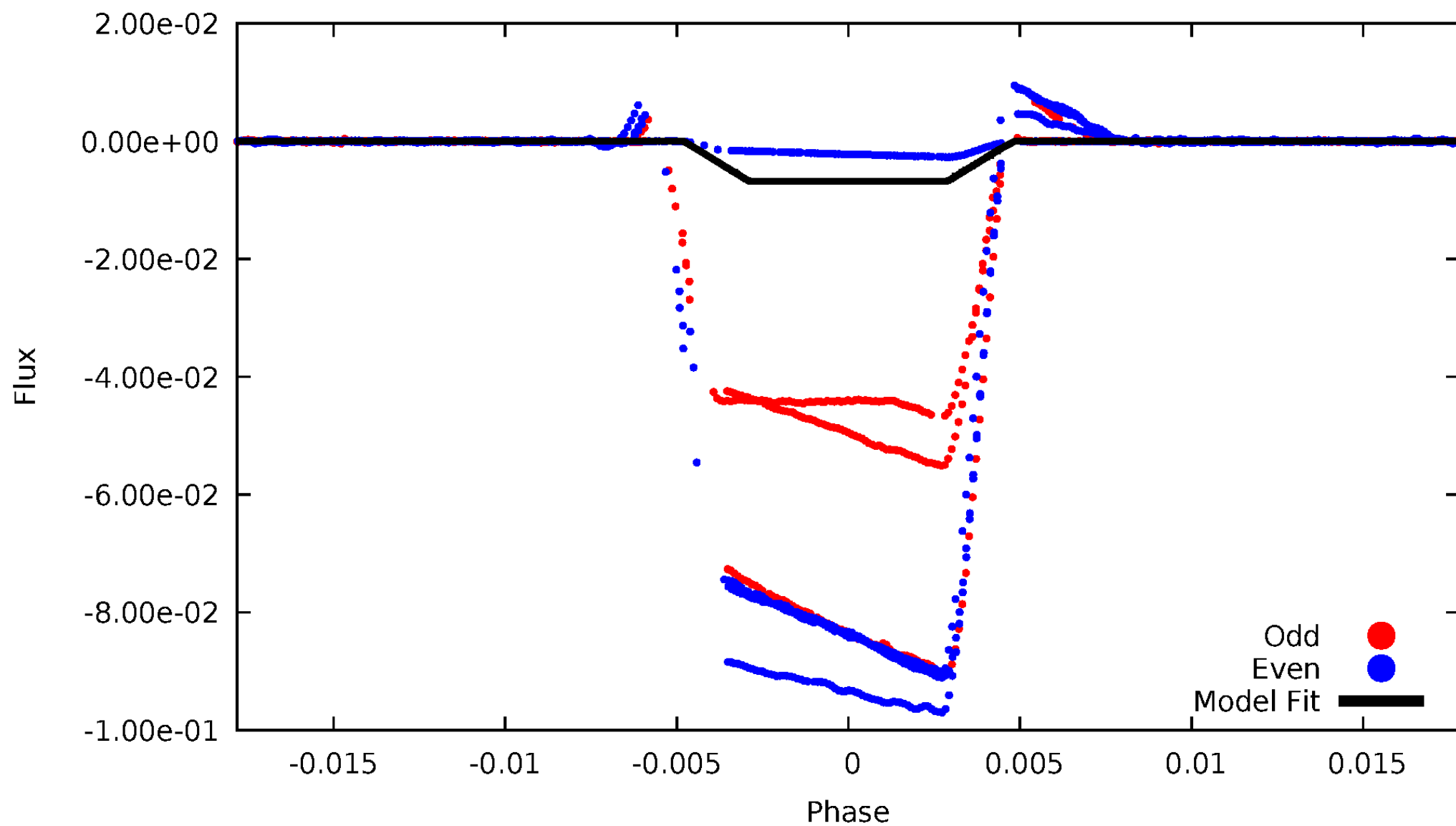
DV Odd/Even

TCE 010015516-01



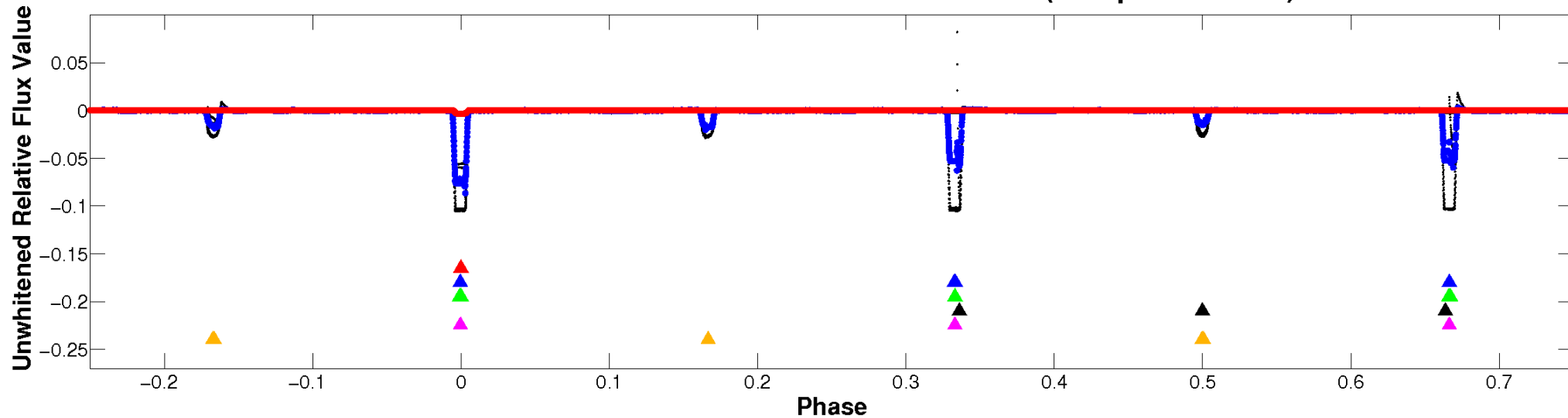
ALT Odd/Even

TCE 010015516-01

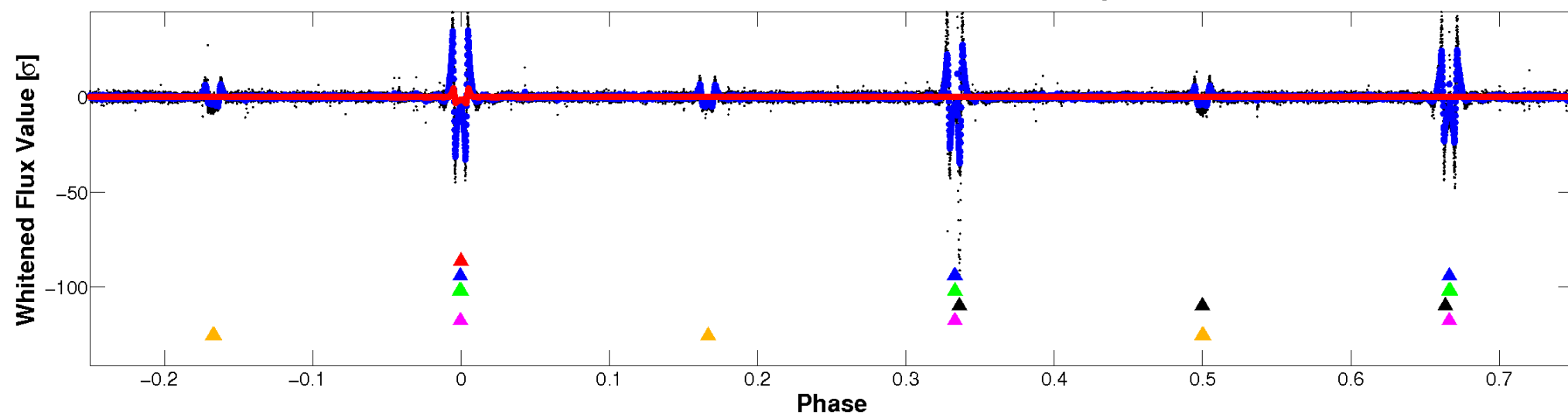


Non-Whitened Vs. Whitened Light Curve

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

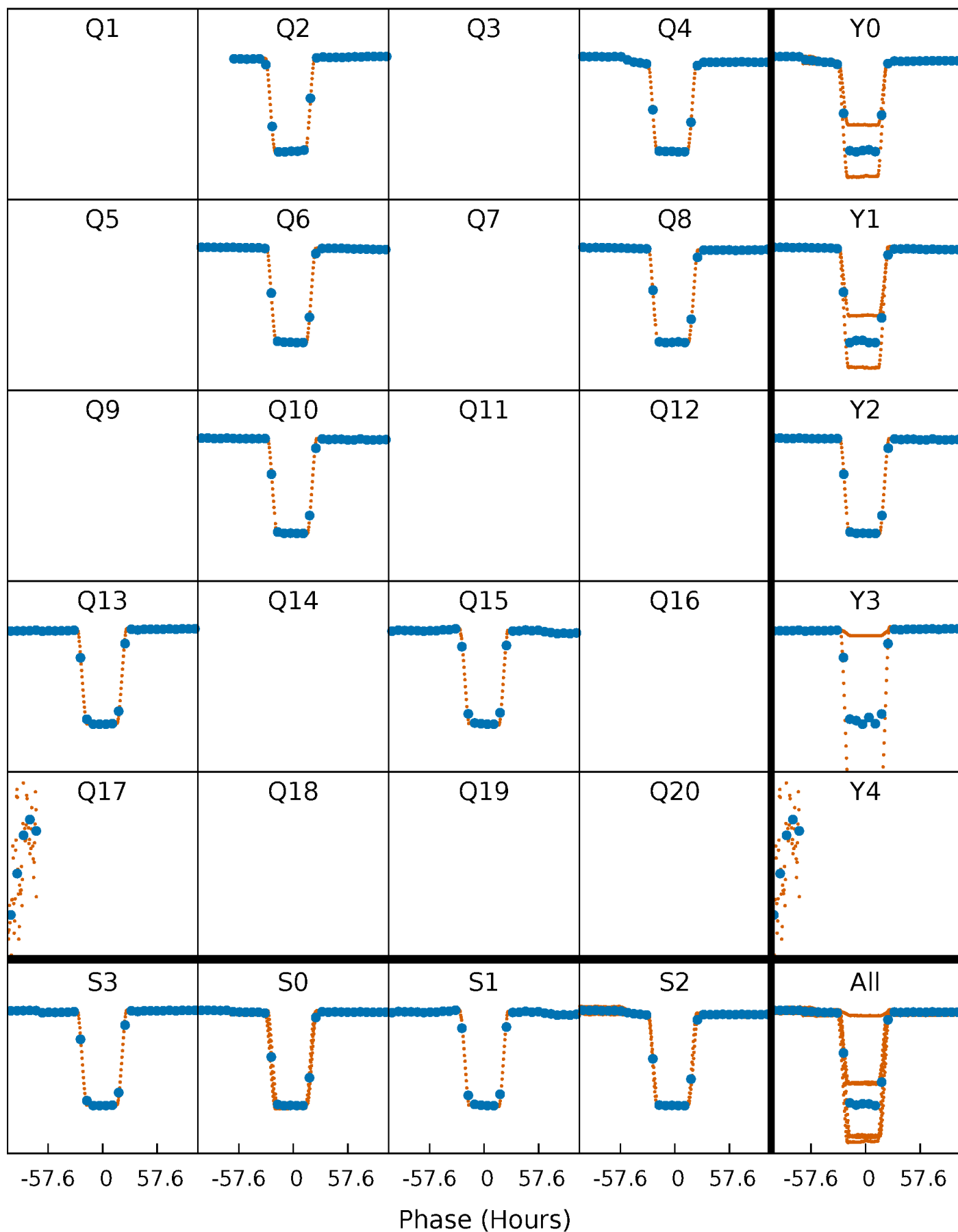


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



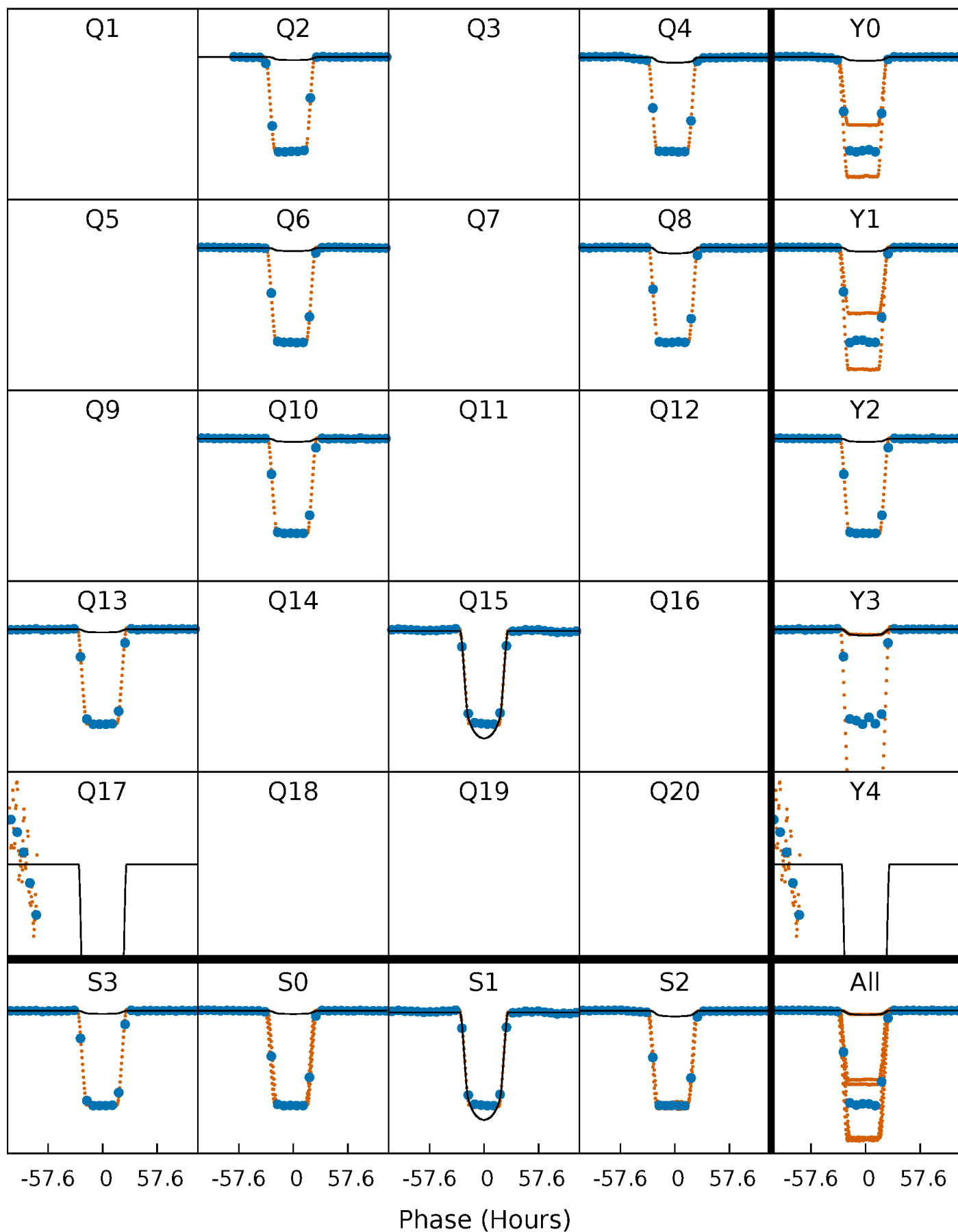
PDC Quarter-Phased Transit Curves

TCE 010015516-01 P=203.054331 Days $T_0=172.514115$ (BKJD)



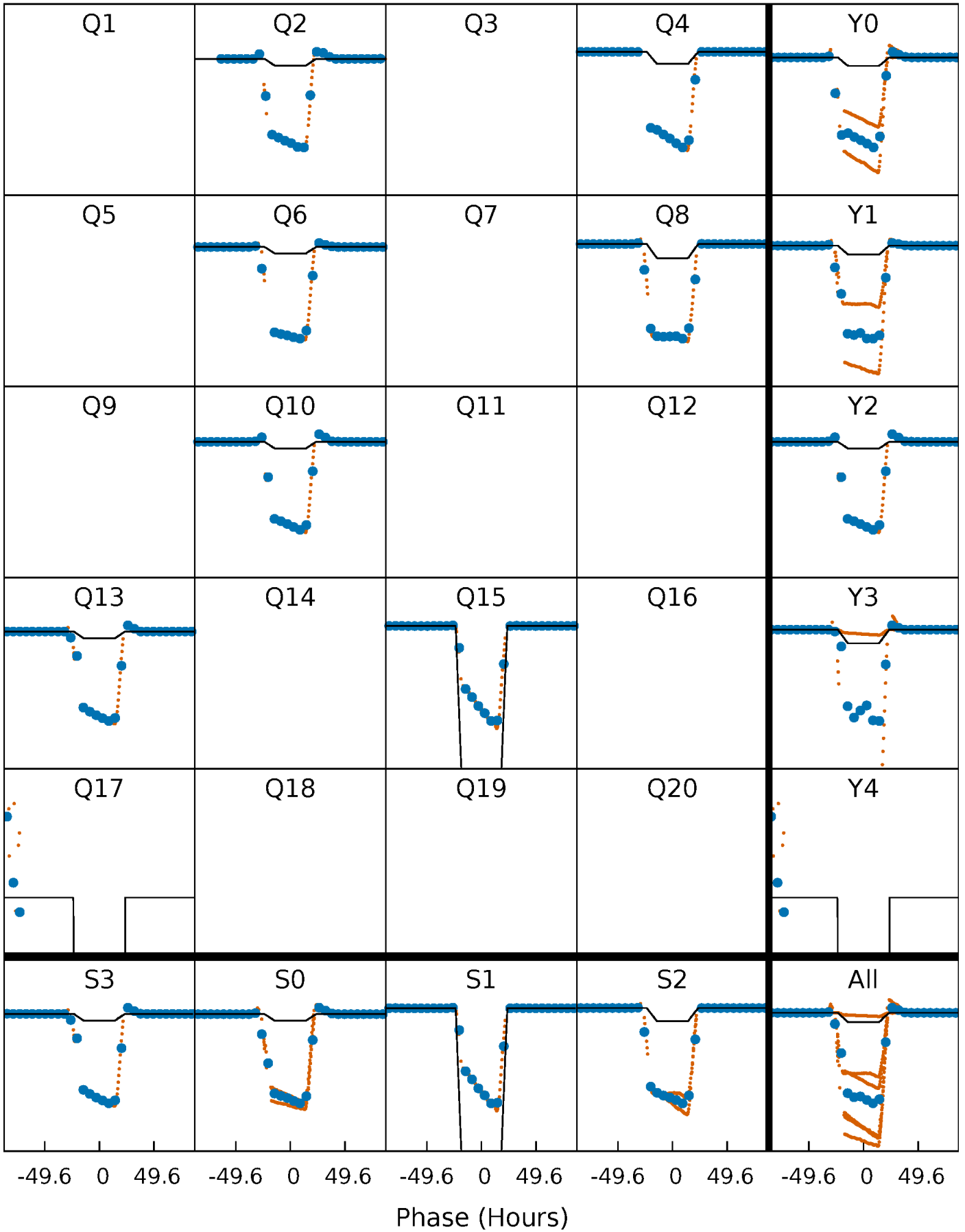
DV Quarter-Phased Transit Curves

TCE 010015516-01 P=203.054331 Days $T_0=172.514115$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

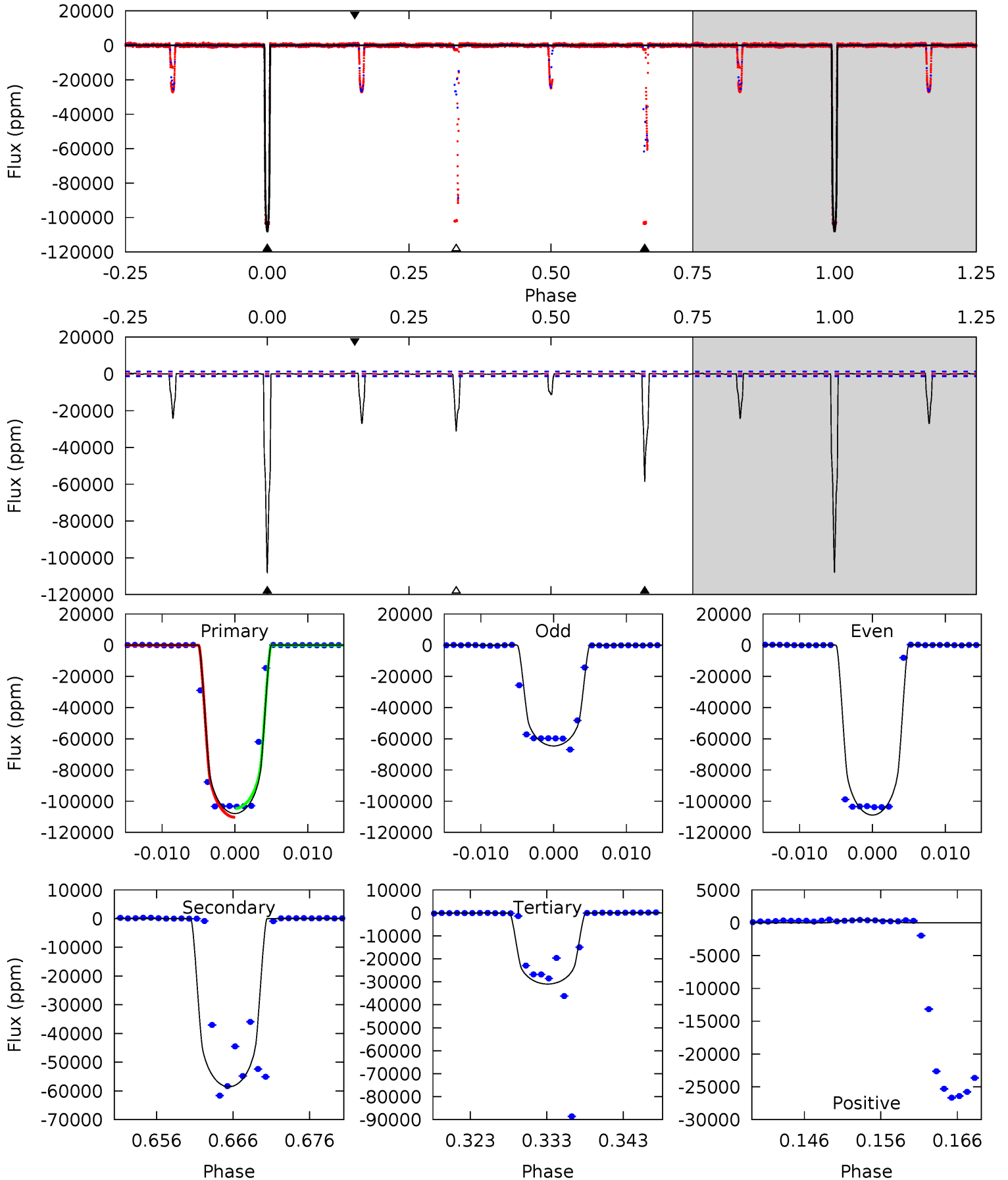
TCE 010015516-01 P=203.068719 Days $T_0=172.501357$ (BKJD)



DV Model-Shift Uniqueness Test

010015516-01, P = 203.054331 Days, E = 172.514115 Days

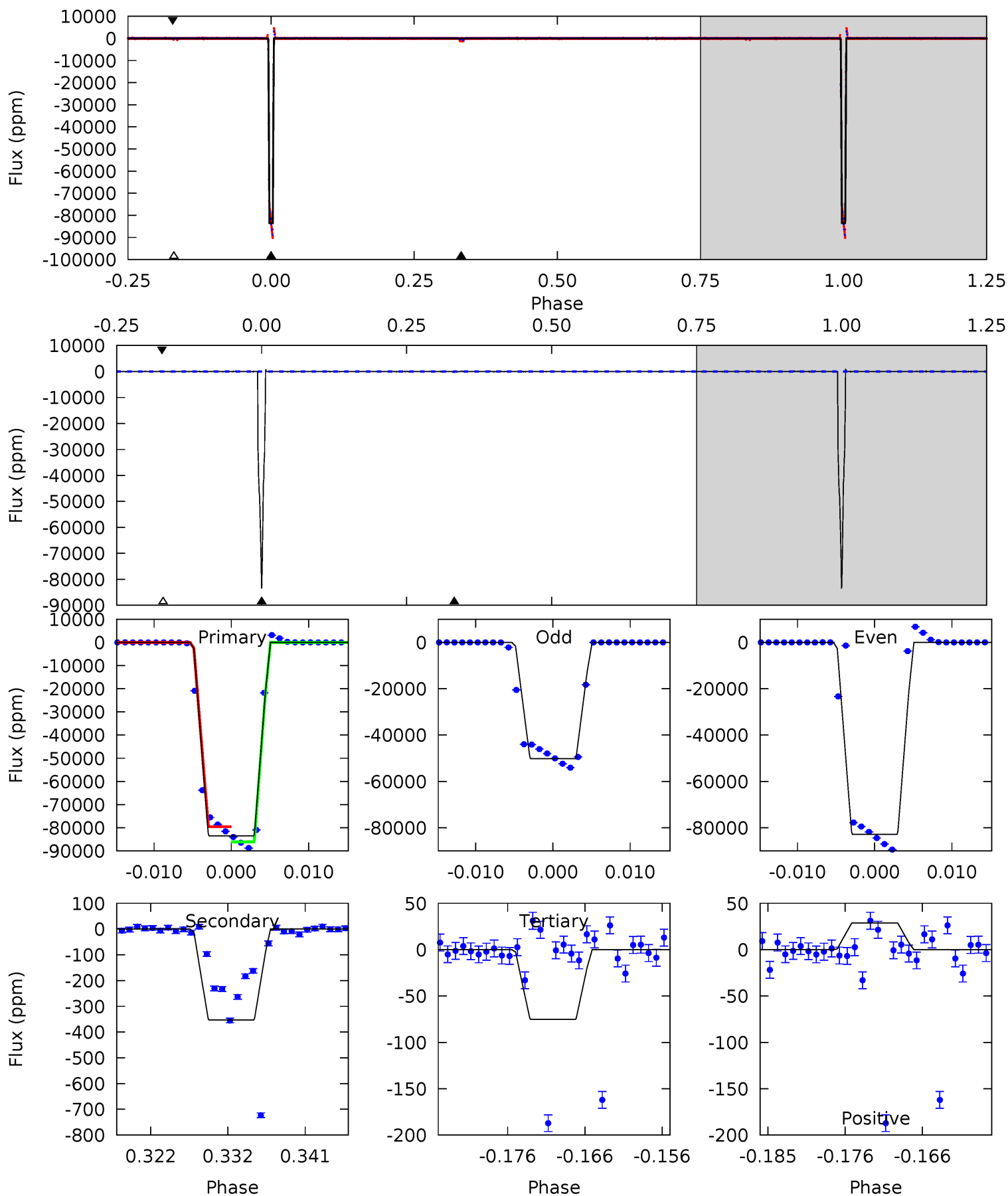
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
427.7	232.1	122.7	1.62	5.02	2.56	9.64	305.0	426.1	109.4	230.5	147.7	0.74	0.00	7.46



Alt Model-Shift Uniqueness Test

010015516-01, P = 203.068719 Days, E = 172.501357 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10227	43.2	9.21	3.53	5.03	2.58	0.97	10218	10224	34.0	39.7	660.8	0.76	0.01	0



Stellar Parameters For KIC 010015516

	$T_{\text{eff}} (K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	5374^{+128}_{-225}	$3.442^{+0.247}_{-0.133}$	$-0.200^{+0.200}_{-0.350}$	$4.061^{+0.757}_{-1.406}$	$1.665^{+0.204}_{-0.611}$	$0.035^{+0.060}_{-0.012}$
	+2%/-4%	+7%/-4%	+100%/-175%	+19%/-35%	+12%/-37%	+172%/-35%
Source	PHO1	FLK73	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 010015516-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	A_{obs}
DV	-58577 ± 252	$26.92^{+2.98}_{-5.37}$	736^{+49}_{-64}	12916^{+701}_{-943}	31167^{+12166}_{-5826}
Alt.	-353 ± 8	$36.50^{+4.06}_{-7.52}$	735^{+49}_{-66}	3157^{+53}_{-81}	96^{+39}_{-19}

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

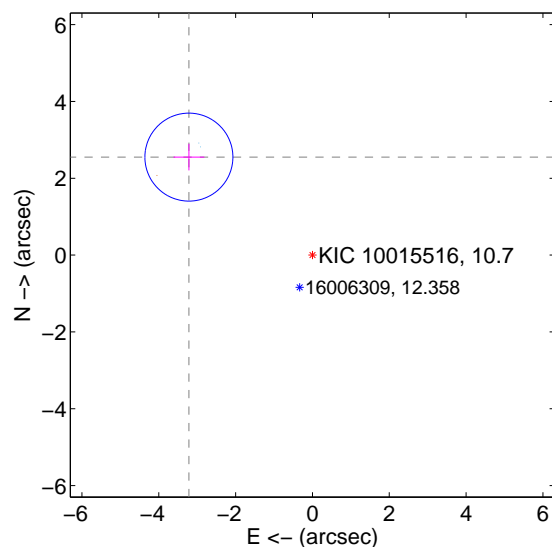
Supplemental centroid analysis for 010015516-01. **Kepler magnitude: 10.70.** Transit SNR 127.32

There are 2 quarters with good PRF difference image offsets

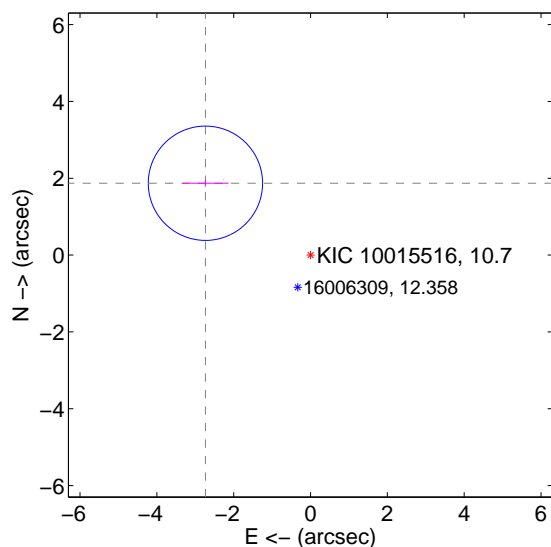
The direct PRF centroid is offset from the target star catalog position by about 1.25 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	4.104 ± 0.382	10.75	3.216 ± 0.403	2.550 ± 0.345
PRF-fit source offset from KIC position	3.313 ± 0.496	6.68	2.735 ± 0.598	1.870 ± 0.083
photometric centroid source offset	0.97 ± 0.13	7.39	0.66 ± 0.15	-0.71 ± 0.11

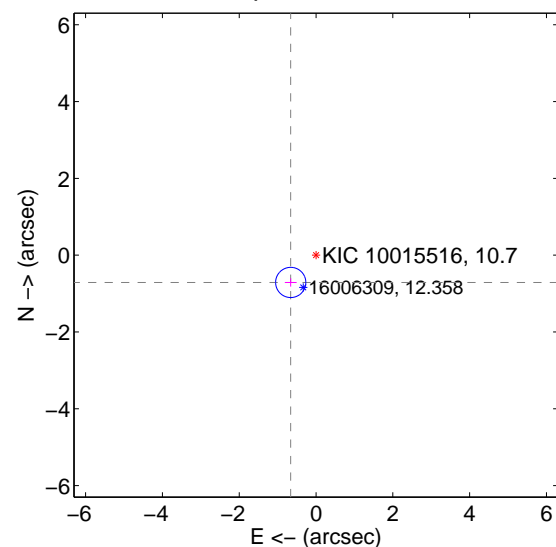
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



offset from photometric centroids



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

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



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

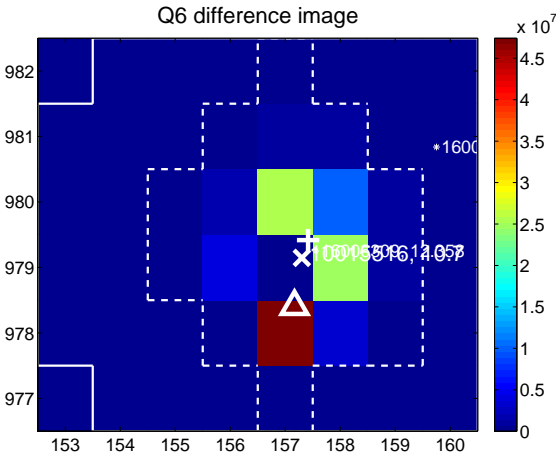
Q5 no difference image



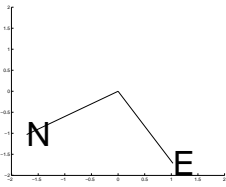
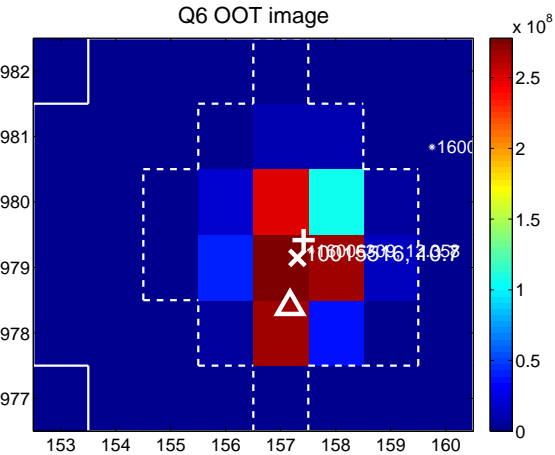
Q5 no OOT image



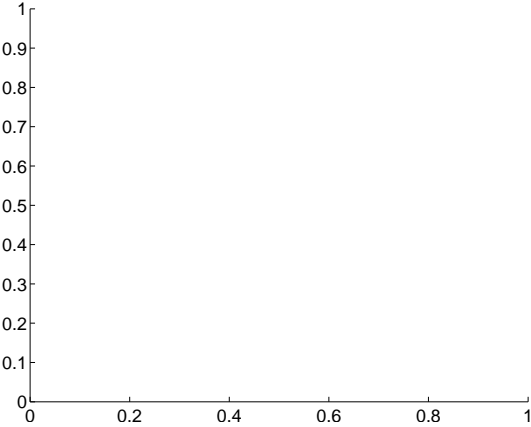
Q6 difference image



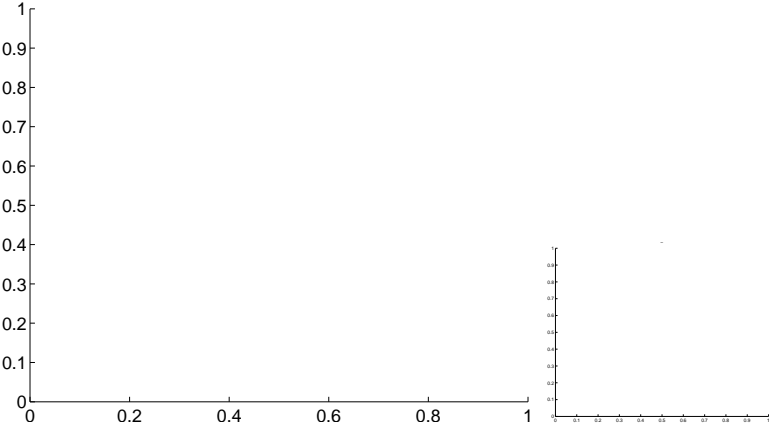
Q6 OOT image



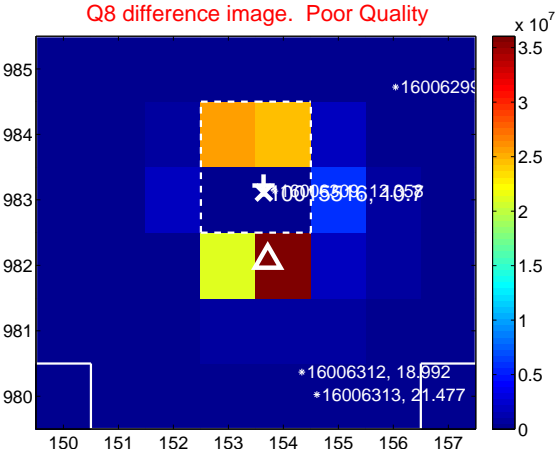
Q7 no difference image



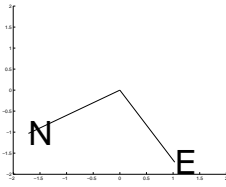
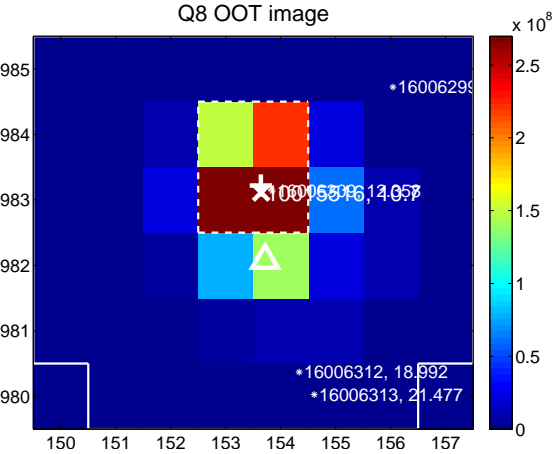
Q7 no OOT image



Q8 difference image. Poor Quality



Q8 OOT image



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

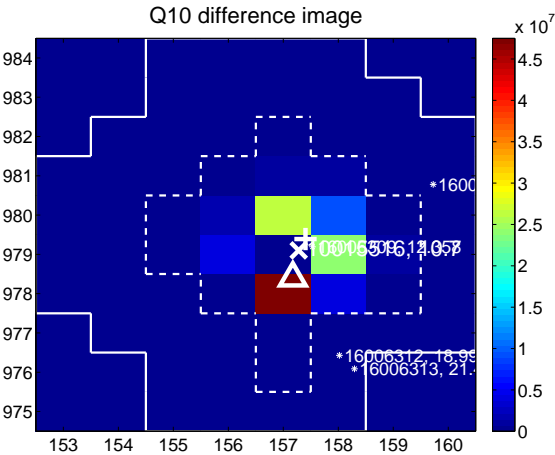
Q9 no difference image



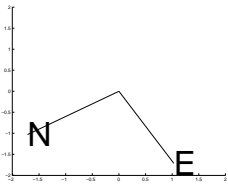
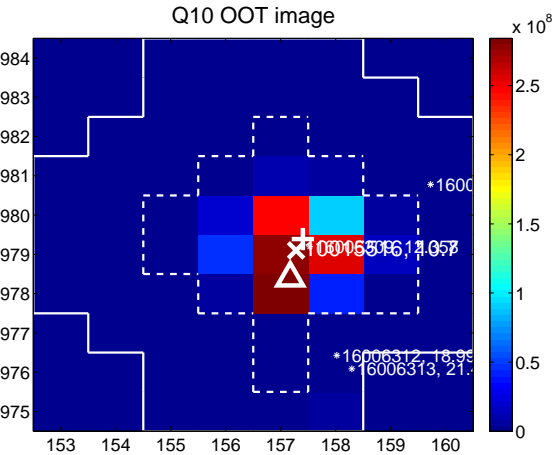
Q9 no OOT image



Q10 difference image



Q10 OOT image



Q11 no difference image



Q11 no OOT image



Q12 no difference image



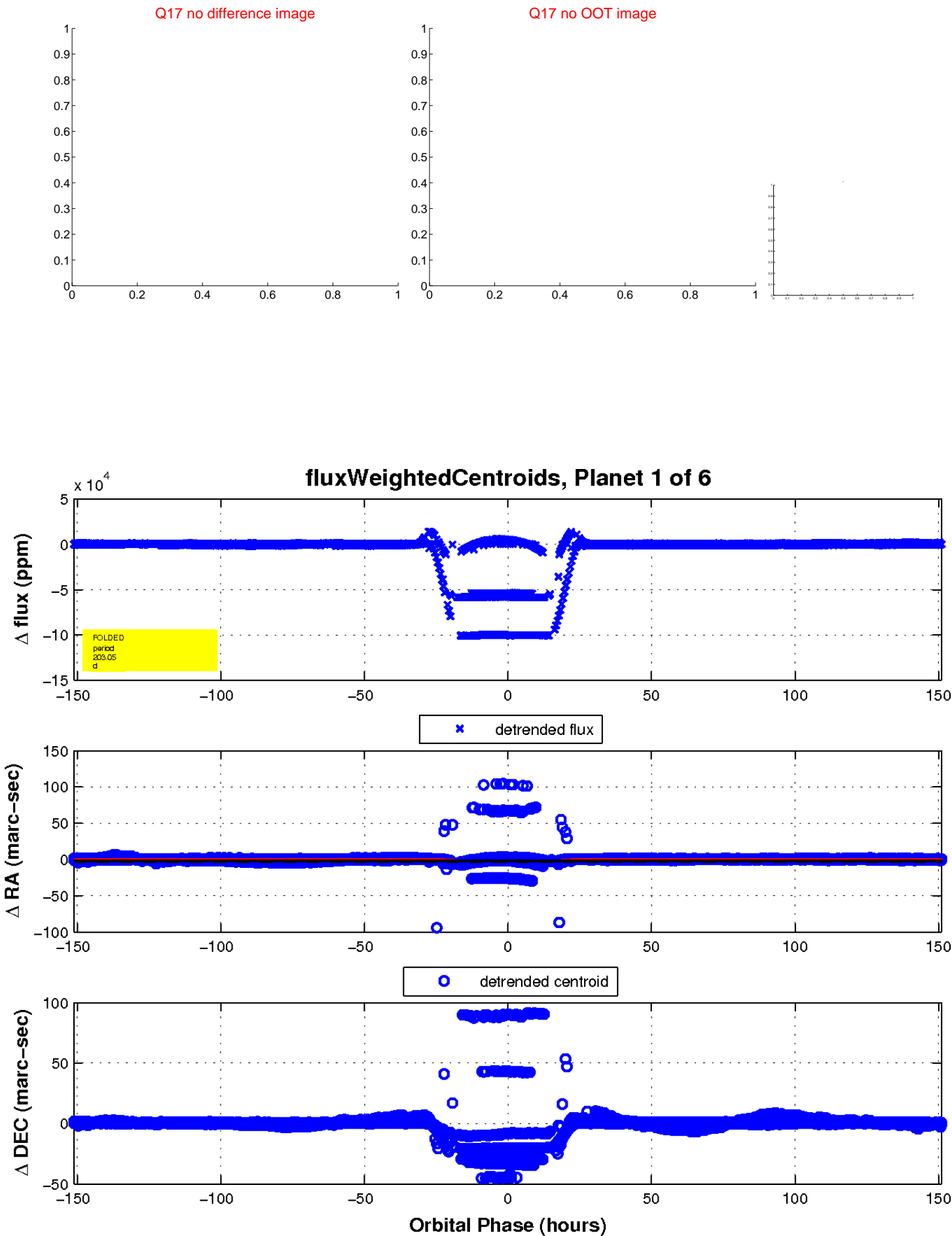
Q12 no OOT image



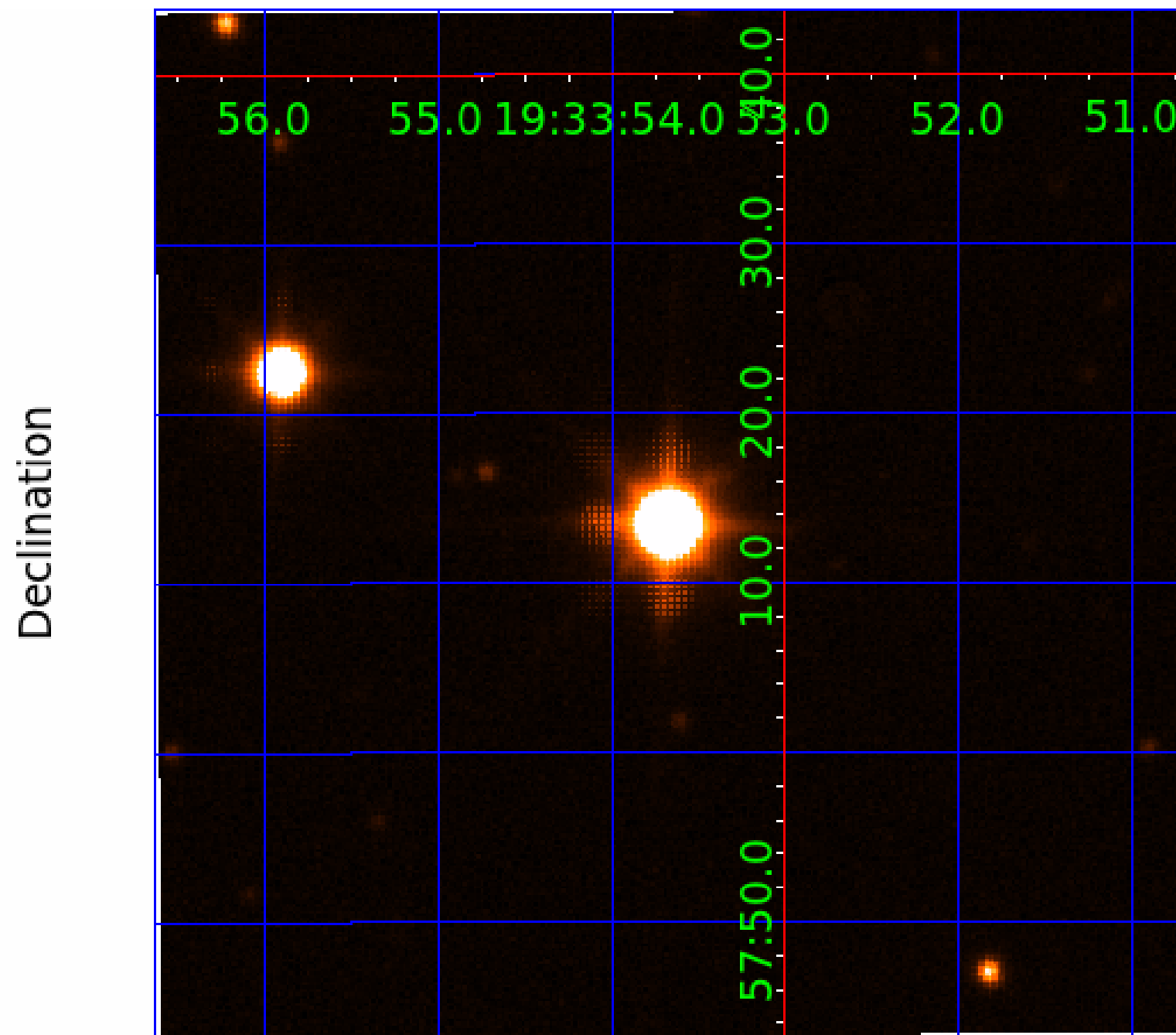
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UKIRT Image



KIC 010015516

Q1-17 DR25 TCE Parameters

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Robovetter Results

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010015516-01	OBS	FP	0.00	1	0	0	0	ALL_TRANS_CHASES—CENT_SATURATED
010015516-02	OBS	FP	0.00	1	0	0	0	ALL_TRANS_CHASES—CENT_SATURATED
010015516-05	OBS	FP	0.00	1	0	1	0	TRANS_GAPPED—SAME_NTL_PERIOD—CENT_SATURATED—HALO_GHOST
010015516-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—SAME_NTL_PERIOD—CENT_SATURATED

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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 010015516-02

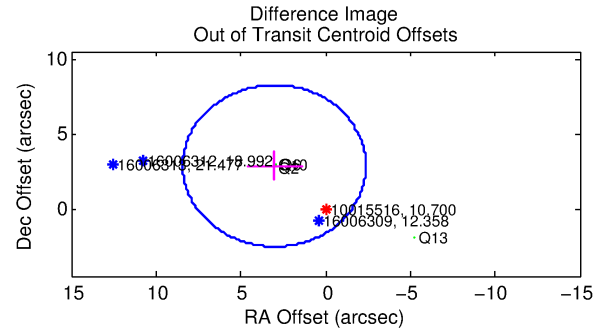
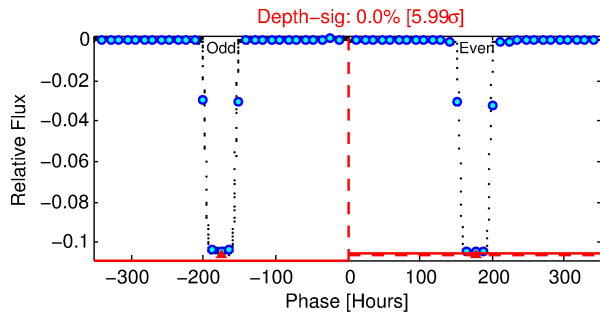
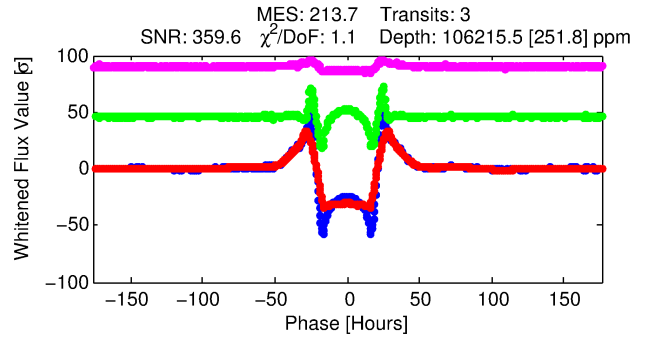
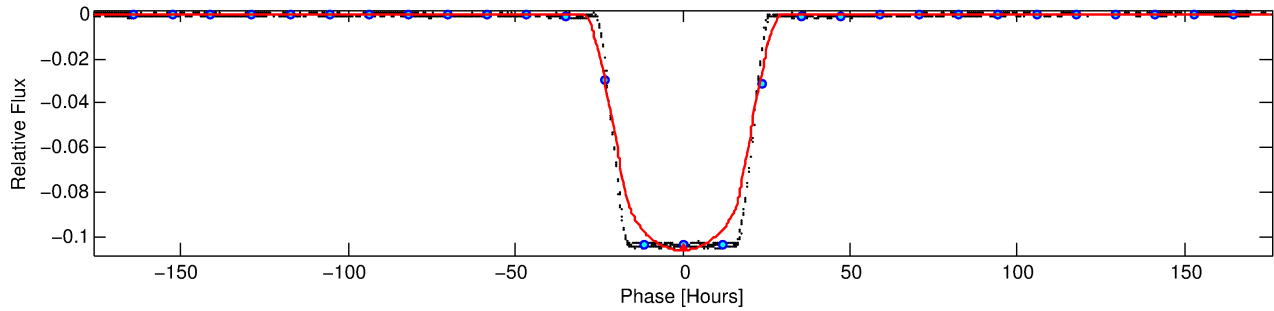
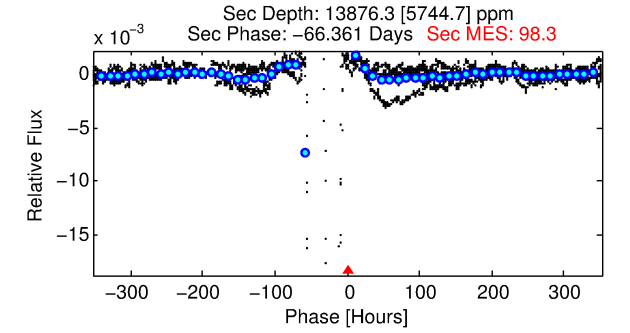
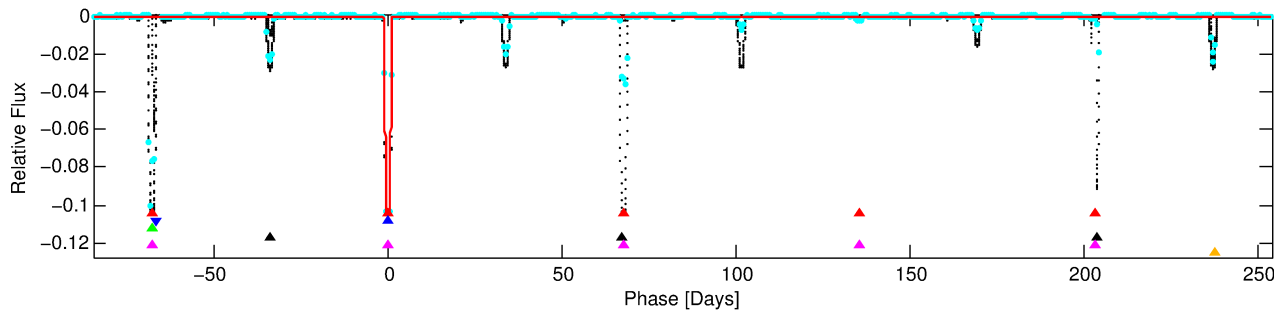
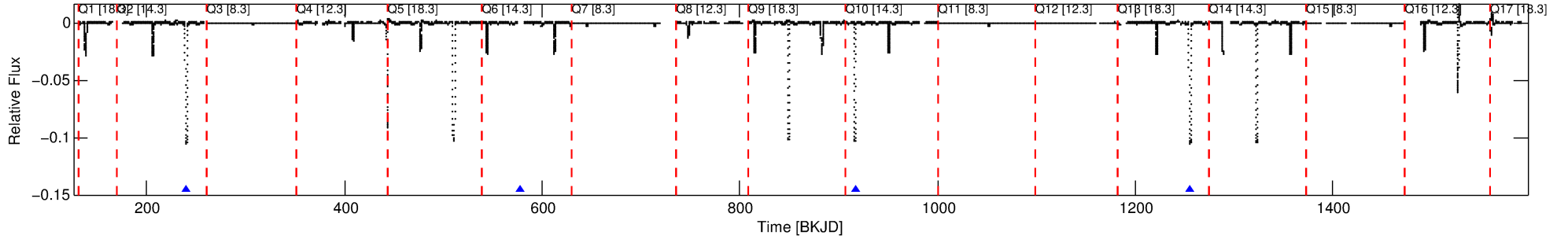
No Significant Match Found

DV One-Page Summary

KIC: 10015516 Candidate: 2 of 6 Period: 338.463 d

KOI: K00990 Corr: No Ephemeris Match

Kp: 10.70 R*: 4.06 Rs Teff: 5374.0 K Logg: 3.44 Fe/H: -0.200



DV Fit Results:

Period = 338.46316 [0.00056] d
Epoch = 240.0701 [0.0011] BKJD
Rp/R* = 0.2948 [0.0004]
a/R* = 57.02 [0.11]
b = 0.00 [0.80]
Seff = 9.71 [4.61]
Teq = 450 [53] K
Rp = 130.64 [45.23] Re
a = 1.1267 [0.3365] AU
Ag = 567.80 [344.65] [1.64σ]
Teffp = 3397 [379] K [7.69σ]

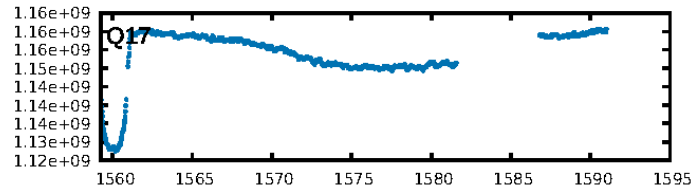
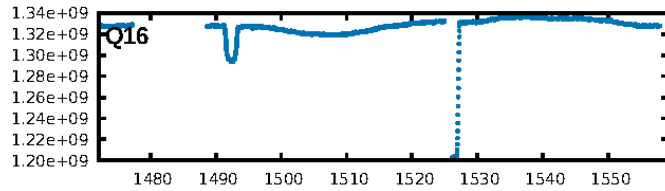
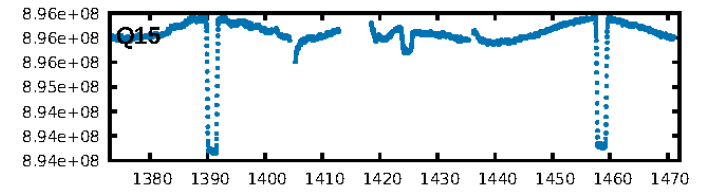
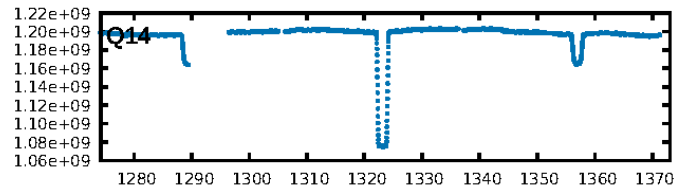
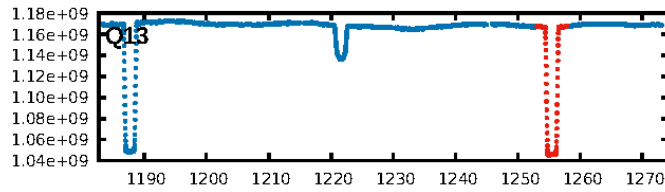
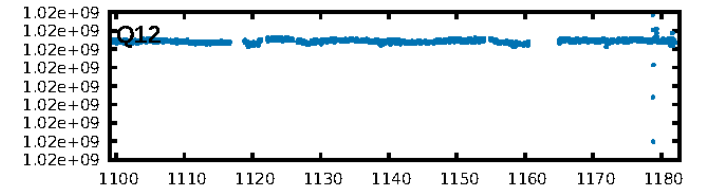
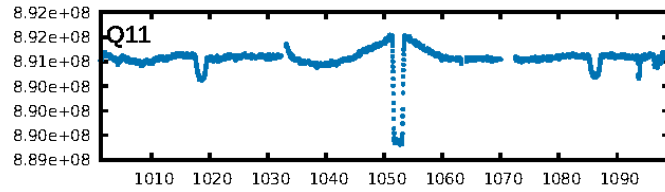
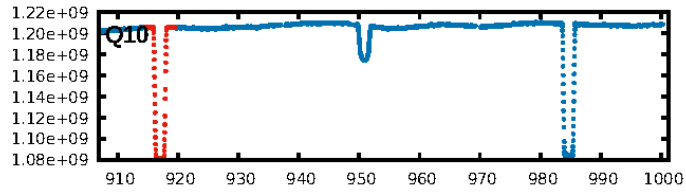
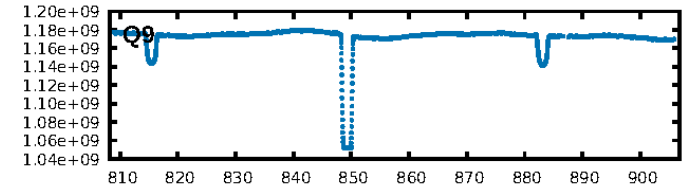
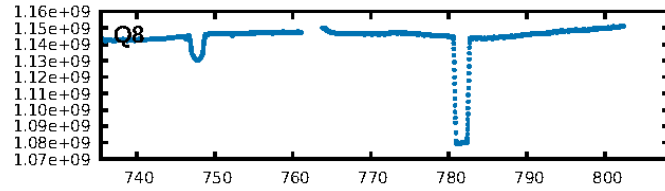
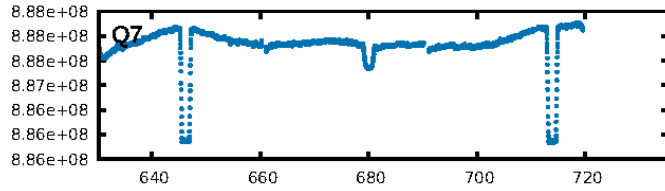
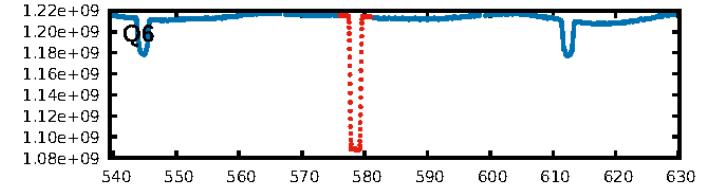
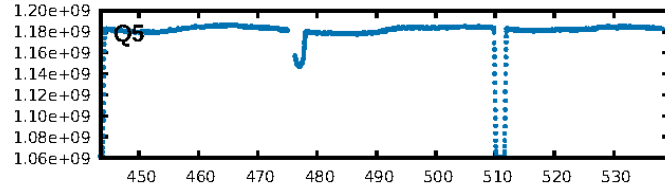
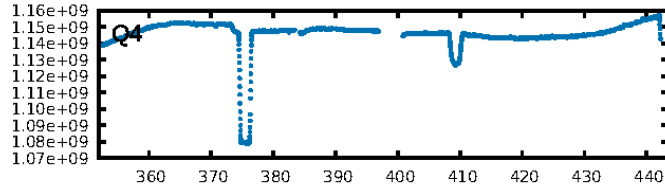
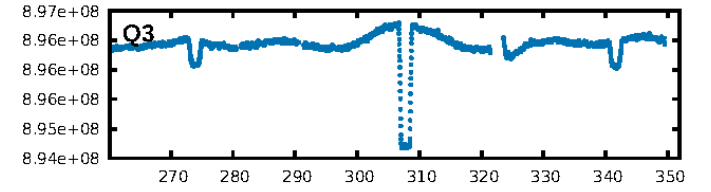
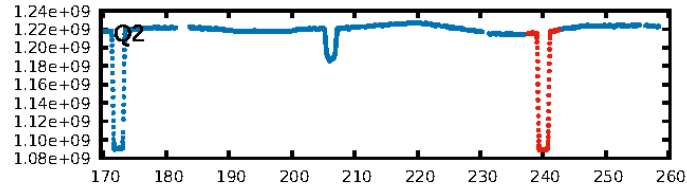
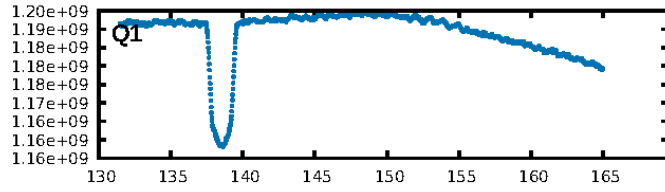
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [42.00σ]
LongPeriod-sig: 0.5% [0.01σ]
ModelChiSquare2-sig: 3.3%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: N/A
RollingBand-fgt: 1.00 [3/3]
GhostDiagnostic-chr: -5.273
Centroid-sig: N/A
Centroid-so: 0.184 arcsec [32.64σ]
OotOffset-rm: 4.153 arcsec [2.31σ]
KicOffset-rm: 3.119 arcsec [1.52σ]
OotOffset-st: 3/0/0/1 [4]
KicOffset-st: 3/0/0/1 [4]
DiffImageQuality-fgm: 1.00 [4/4]
DiffImageOverlap-fno: 0.00 [0/4]

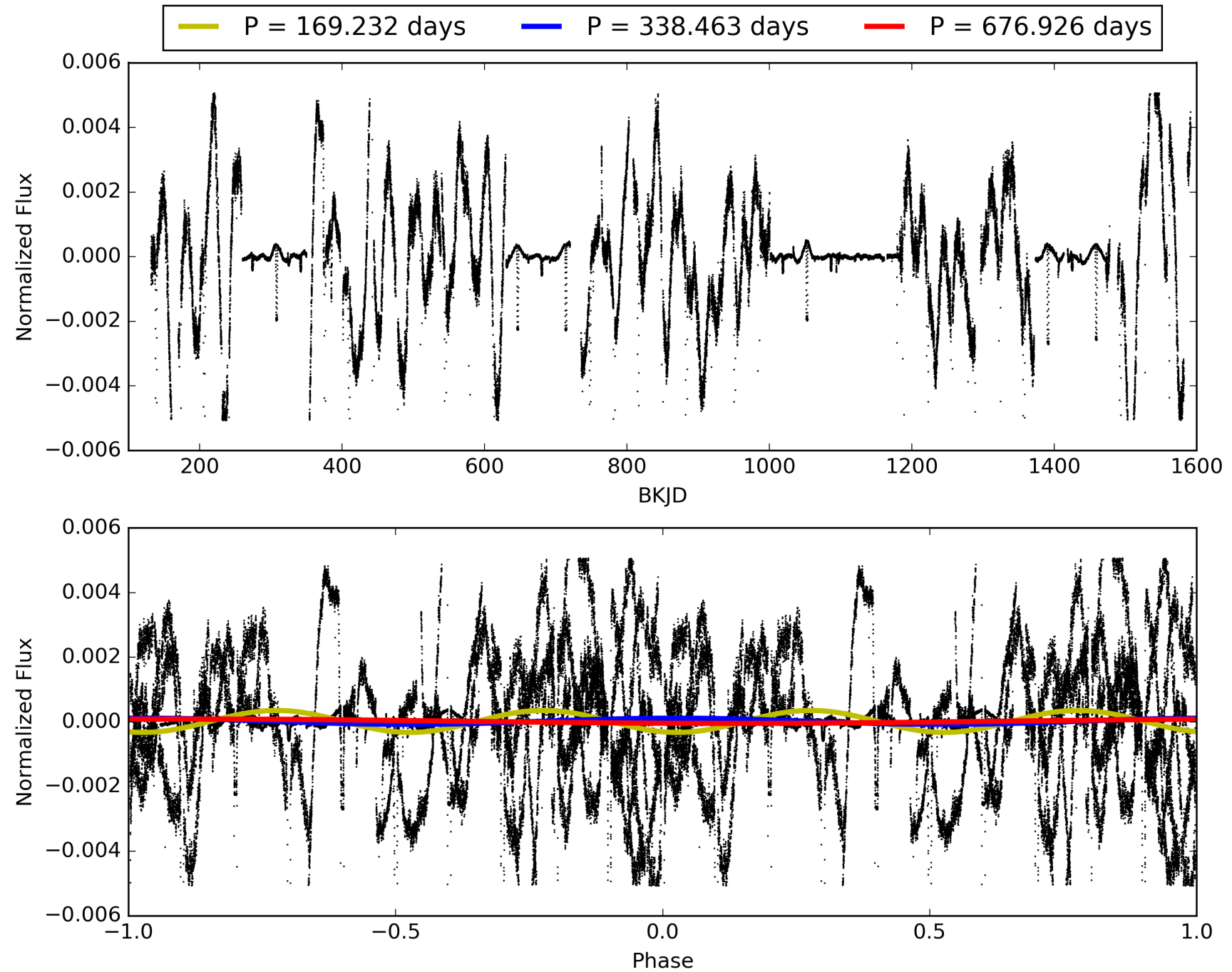
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 01:36:13 Z

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

TCE 010015516-02, PDC Light Curves

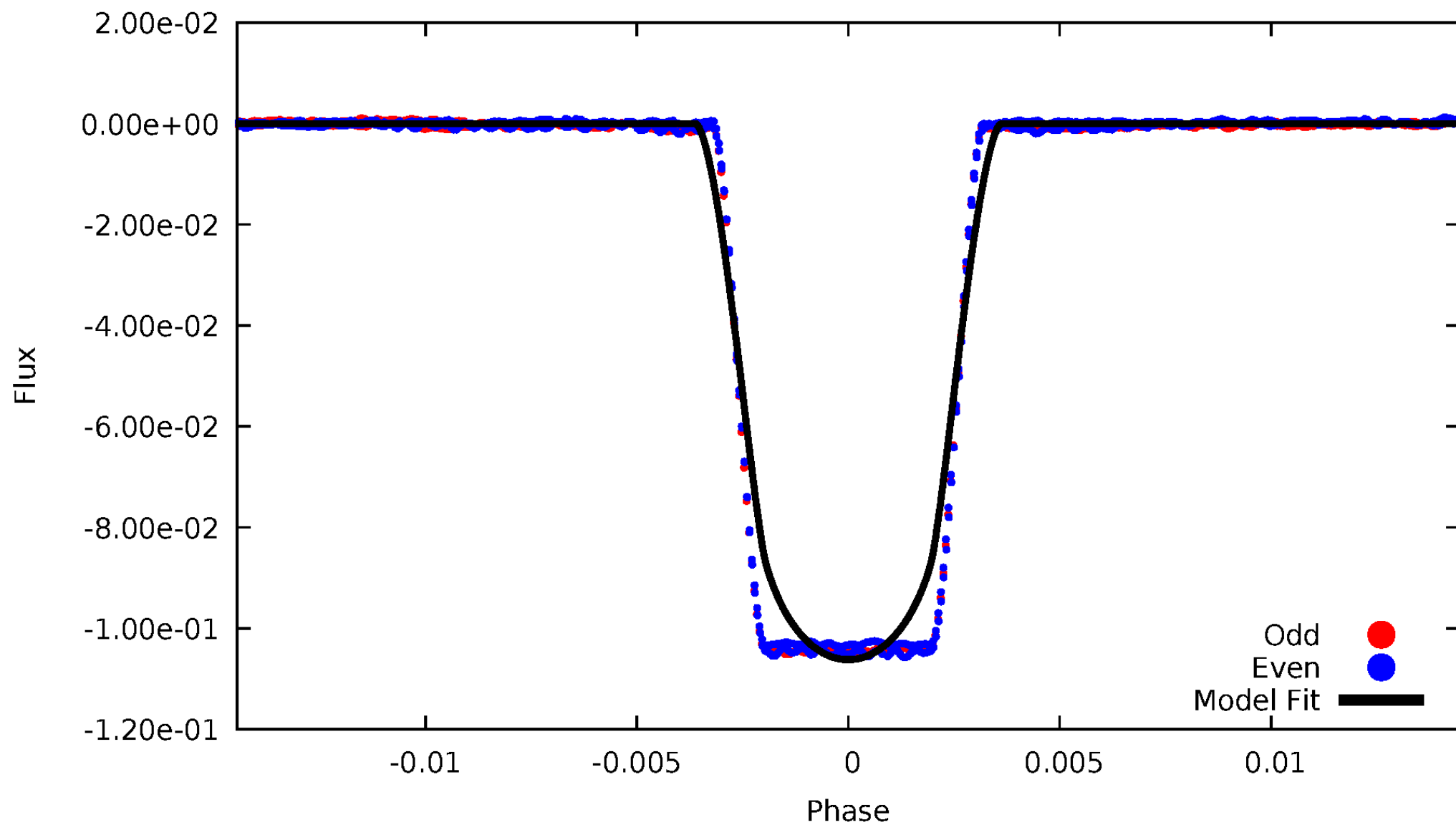


TCE 010015516-02



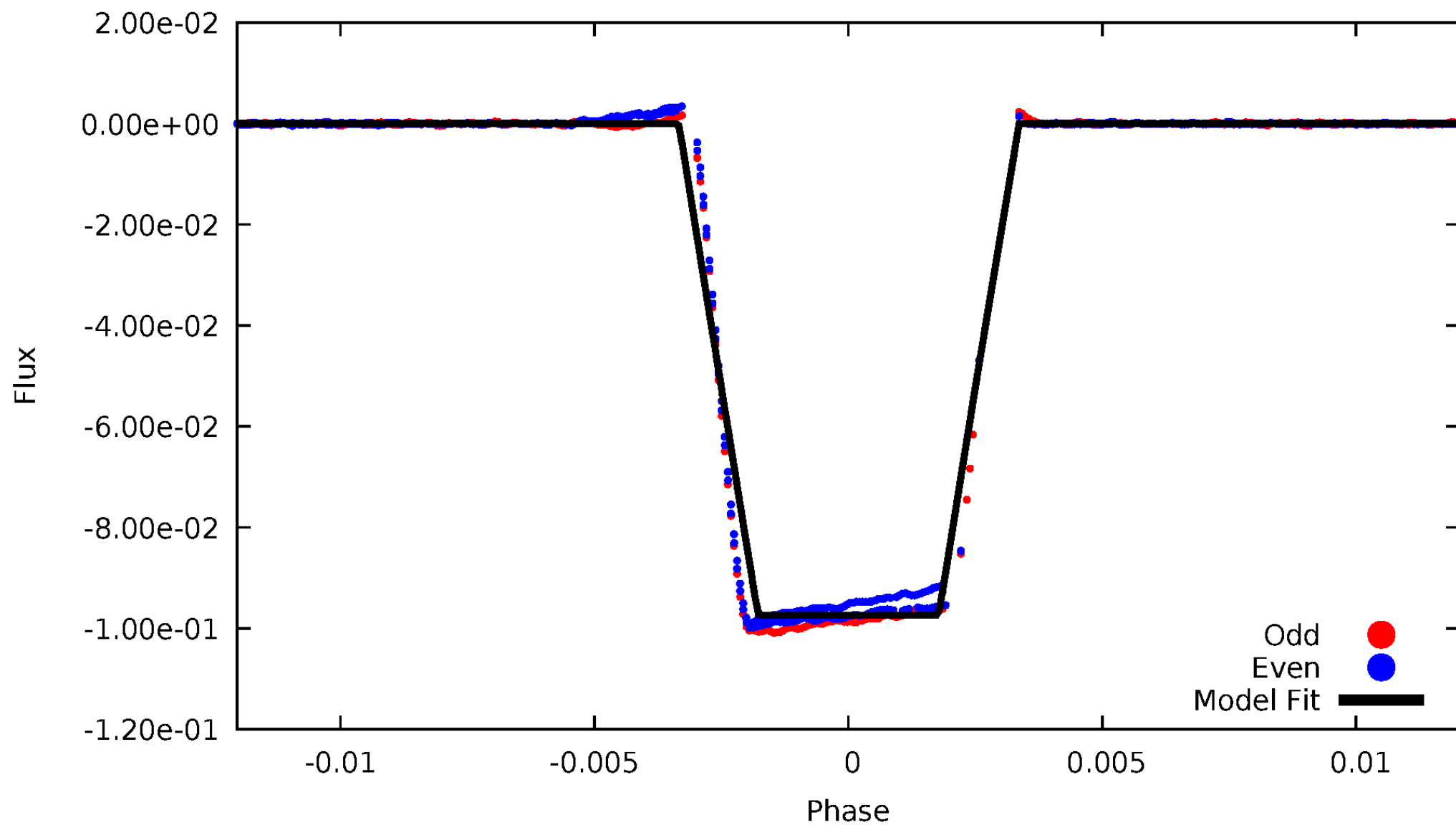
DV Odd/Even

TCE 010015516-02



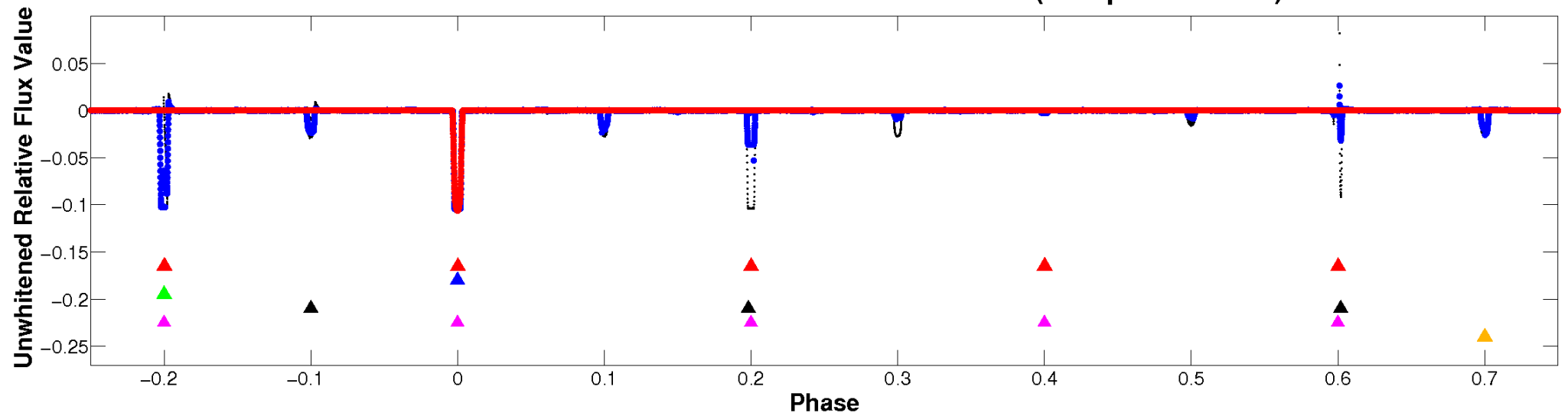
ALT Odd/Even

TCE 010015516-02

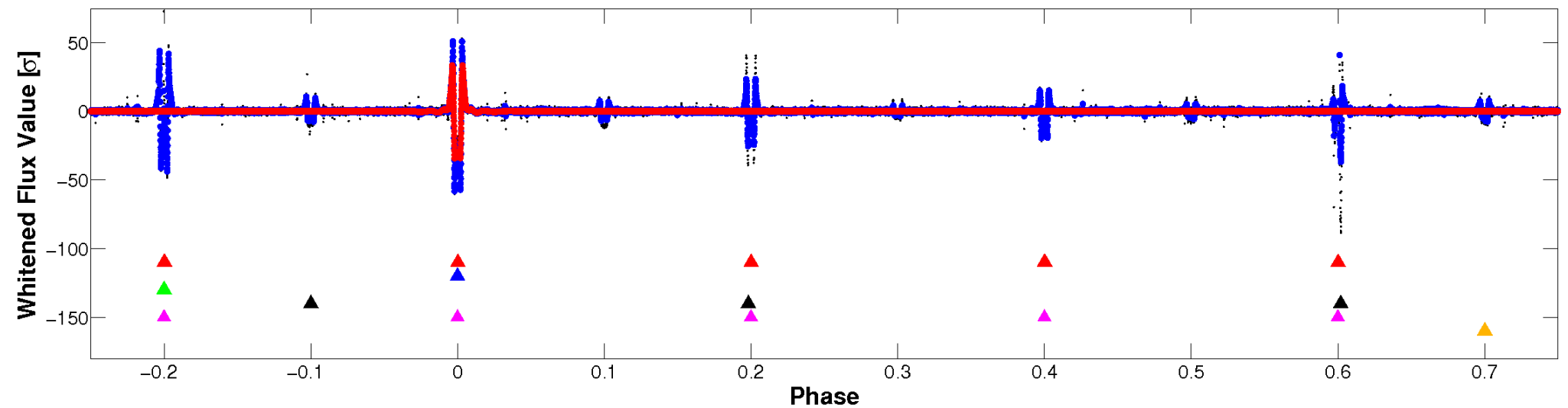


Non-Whitened Vs. Whitened Light Curve

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

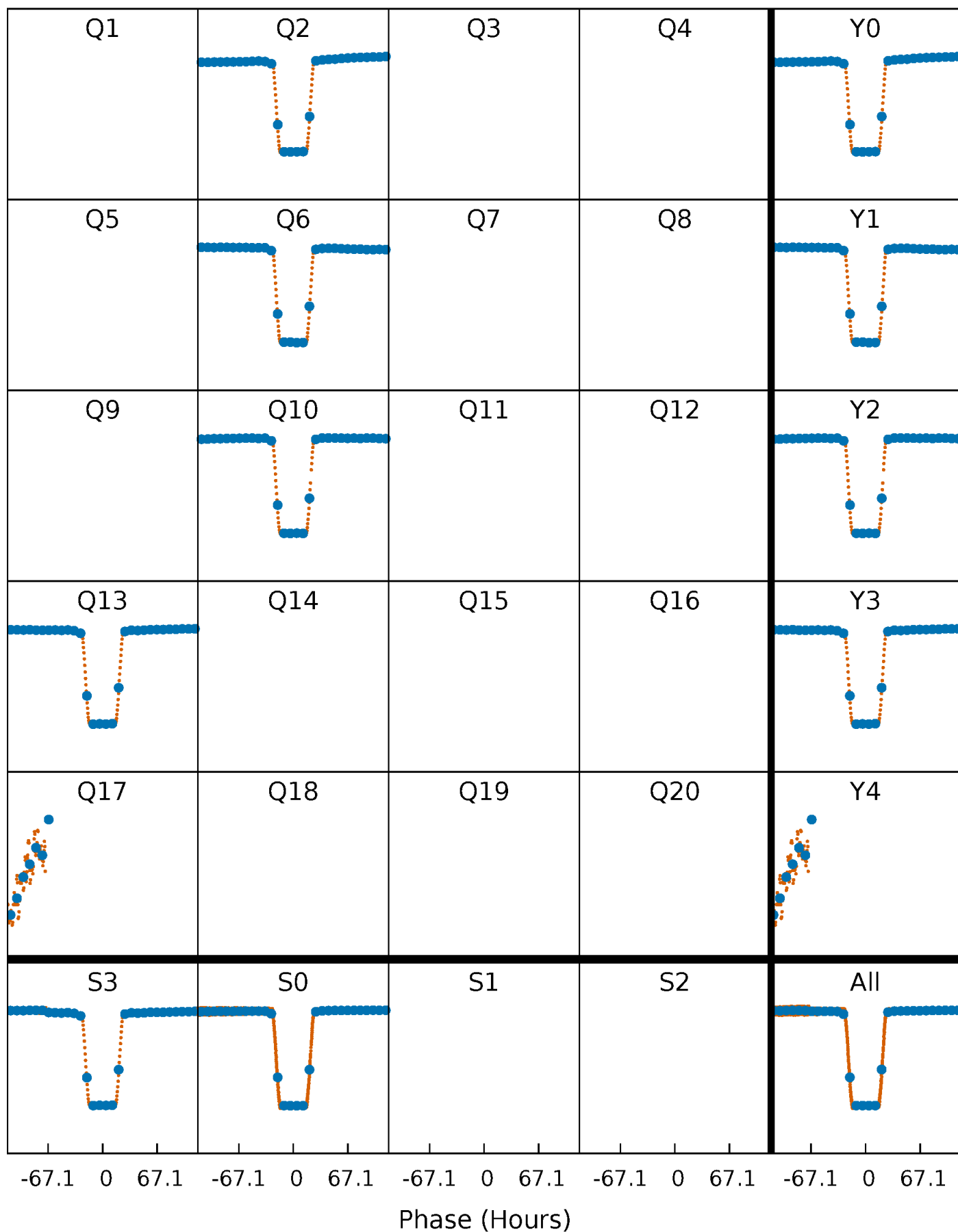


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



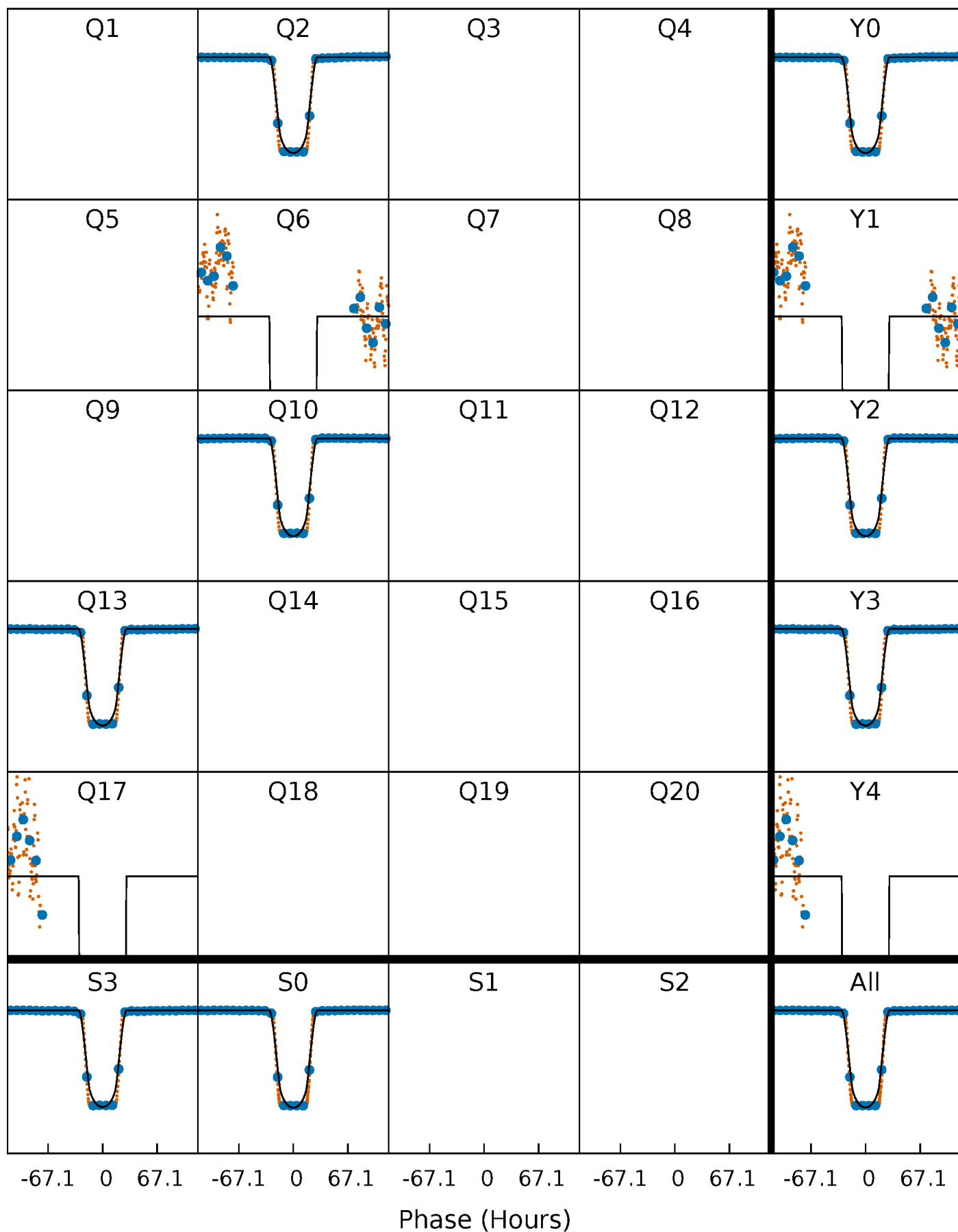
PDC Quarter-Phased Transit Curves

TCE 010015516-02 P=338.463157 Days $T_0=240.070106$ (BKJD)



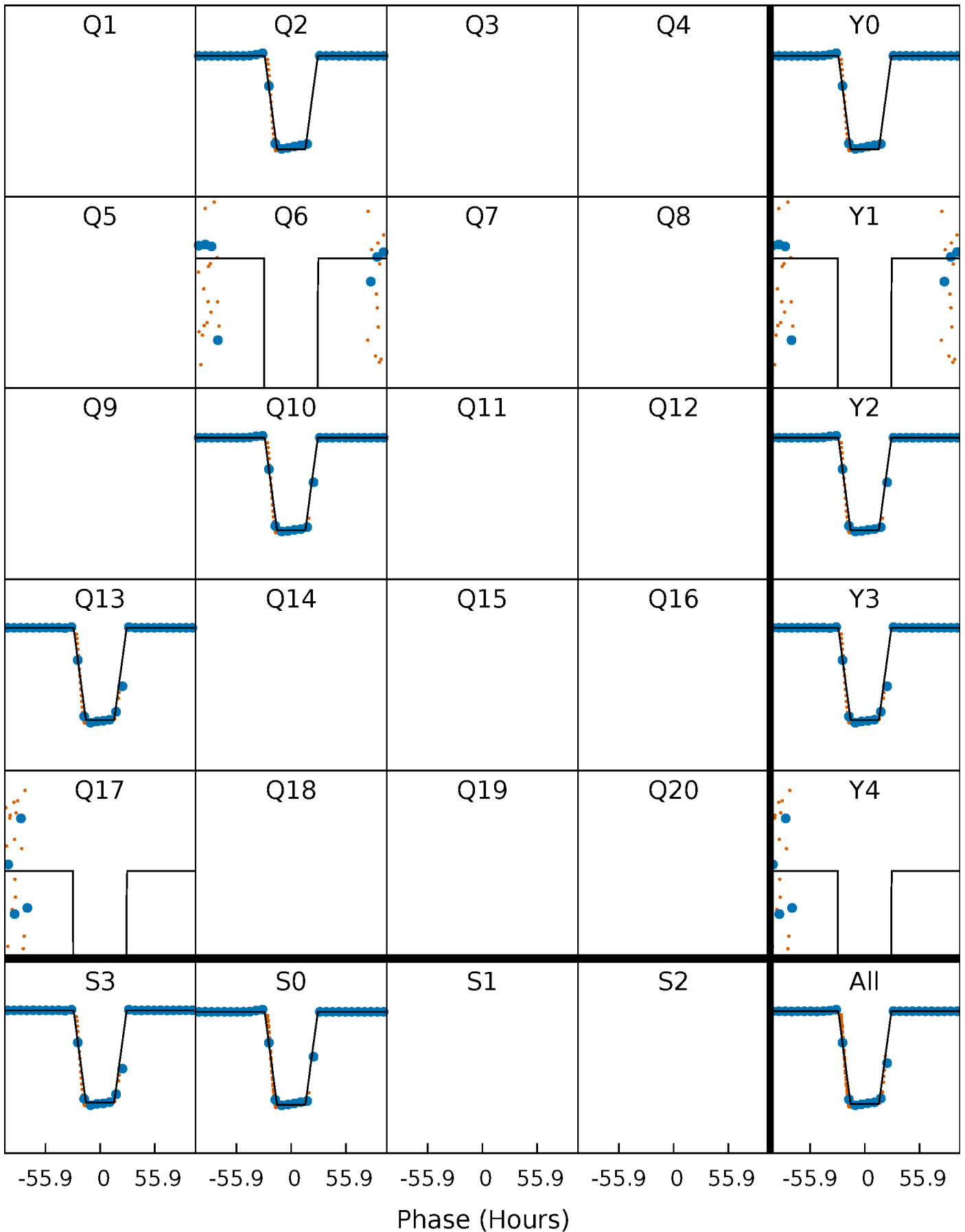
DV Quarter-Phased Transit Curves

TCE 010015516-02 P=338.463157 Days $T_0=240.070106$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

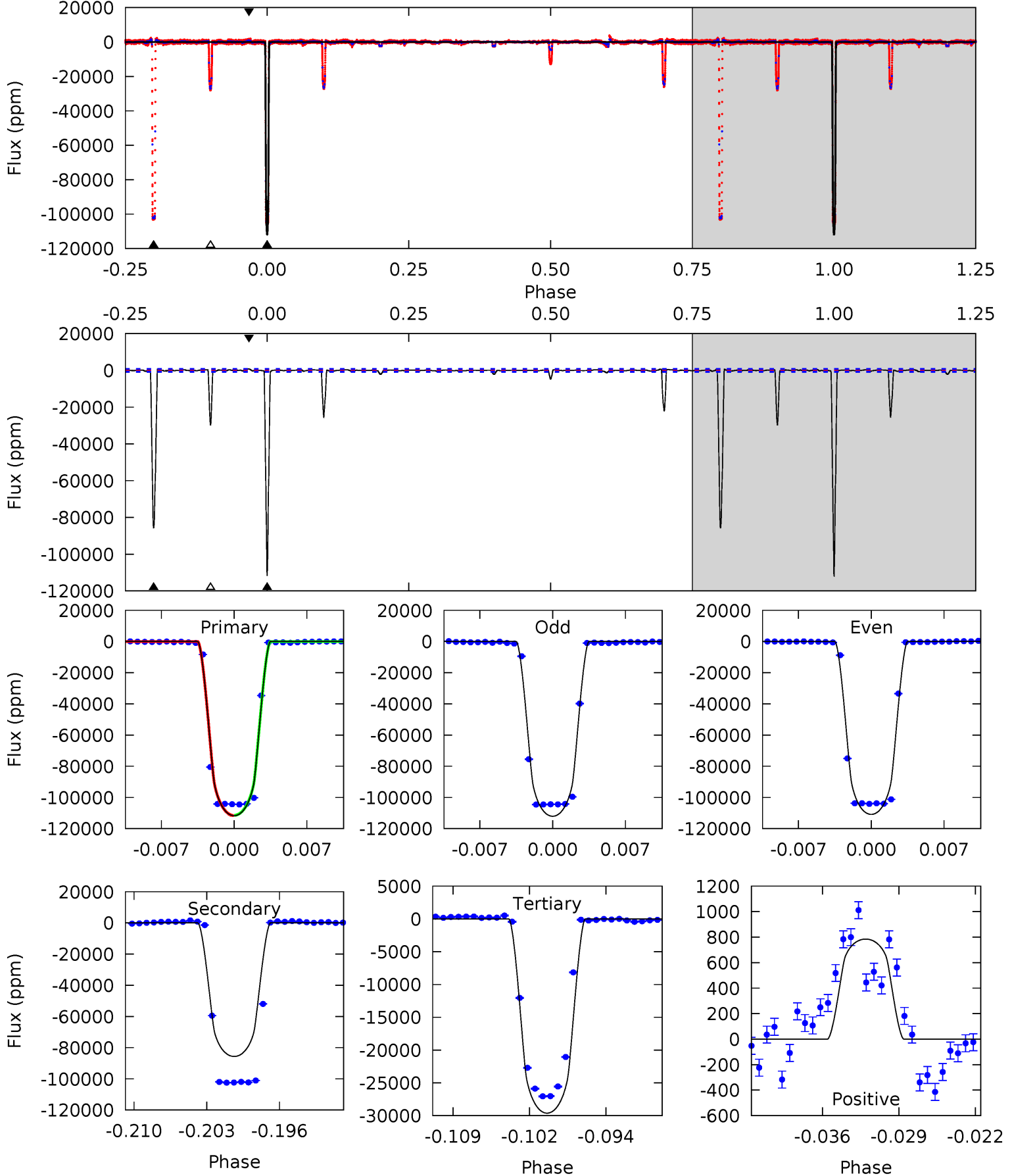
TCE 010015516-02 P=338.461488 Days $T_0=240.063573$ (BKJD)



DV Model-Shift Uniqueness Test

010015516-02, P = 338.463157 Days, E = 240.070106 Days

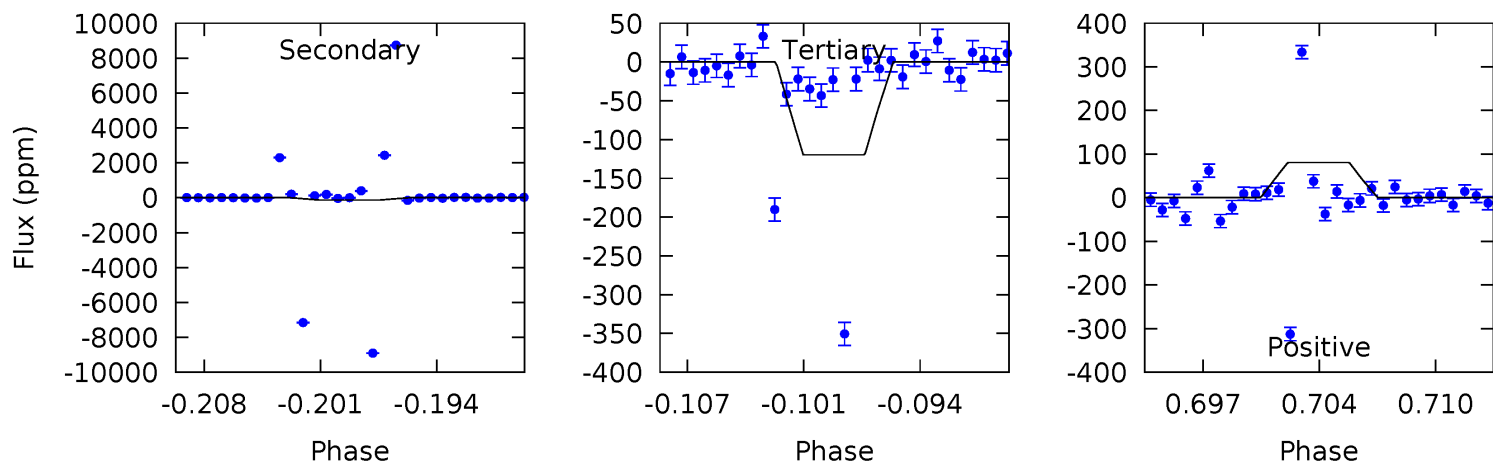
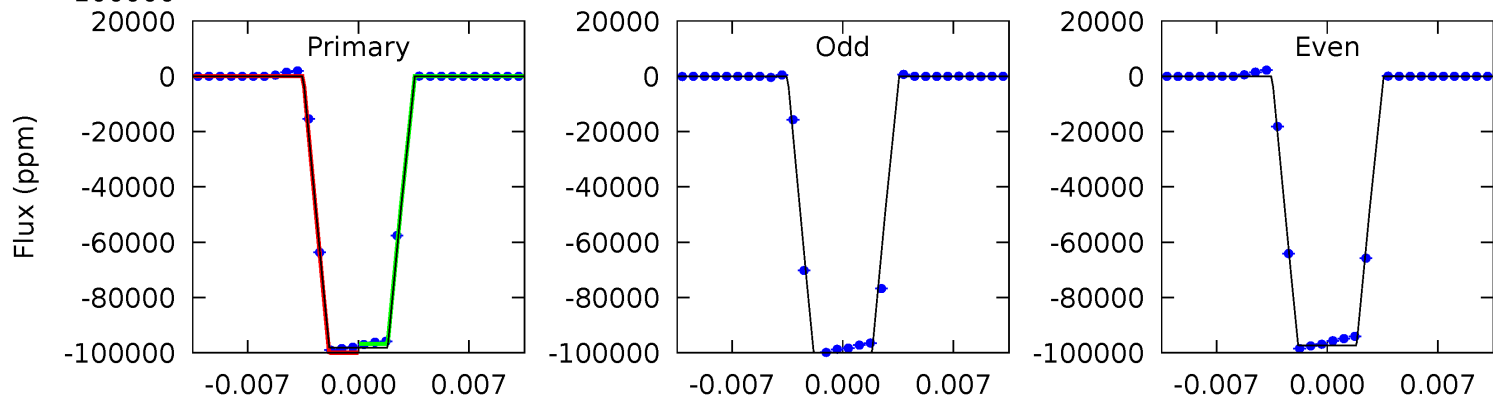
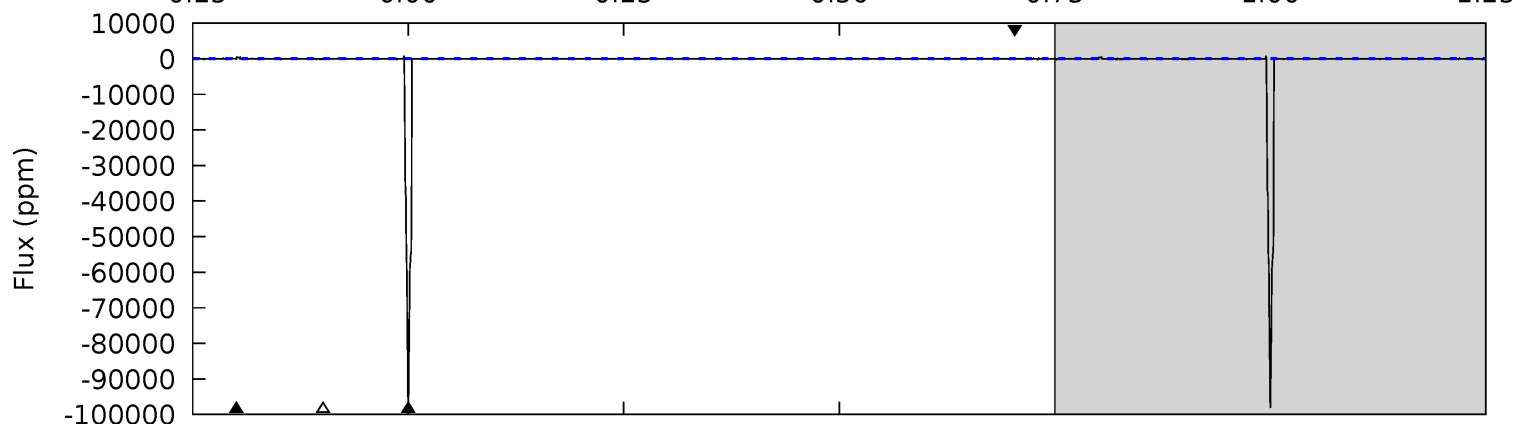
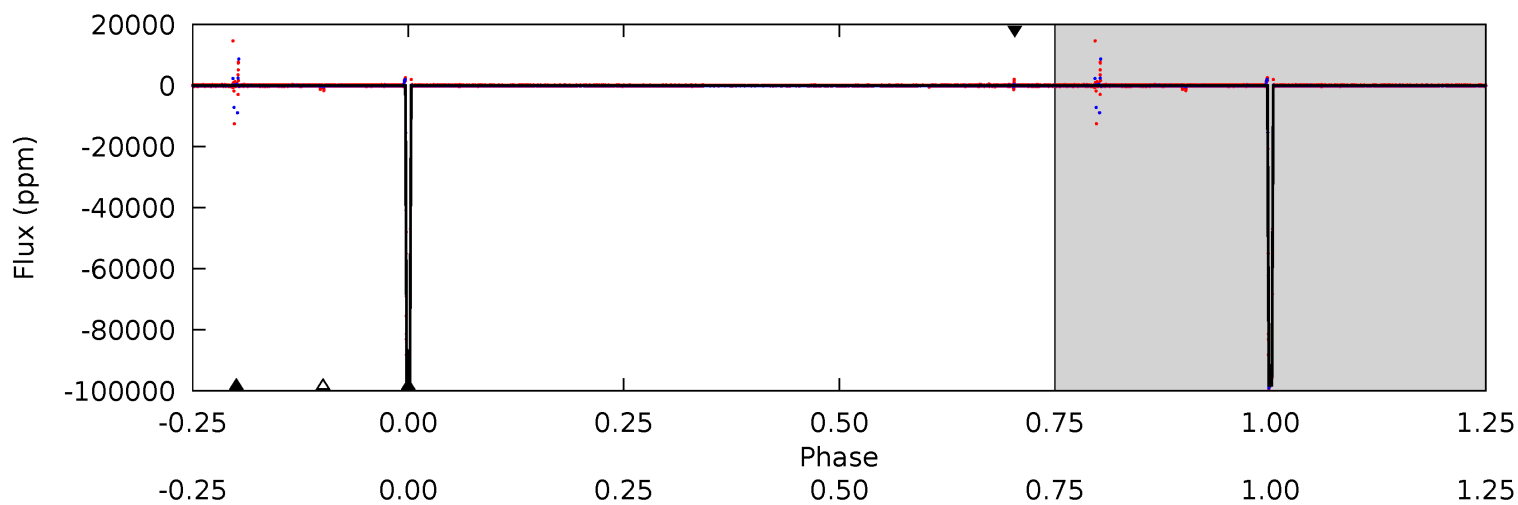
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
722.1	553.6	191.4	5.07	5.09	2.69	16.0	530.6	717.0	362.1	548.5	2.20	1.00	0.01	0.53



Alt Model-Shift Uniqueness Test

010015516-02, P = 338.461488 Days, E = 240.063573 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10909	14.4	13.3	8.95	5.10	2.71	0.98	10896	10900	1.12	5.45	87.6	0.99	0.01	108.1



Stellar Parameters For KIC 010015516

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	M (M_{\odot})	ρ_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	5374^{+128}_{-225}	$3.442^{+0.247}_{-0.133}$	$-0.200^{+0.200}_{-0.350}$	$4.061^{+0.757}_{-1.406}$	$1.665^{+0.204}_{-0.611}$	$0.035^{+0.060}_{-0.012}$
	+2%/-4%	+7%/-4%	+100%/-175%	+19%/-35%	+12%/-37%	+172%/-35%
Source	PHO1	FLK73	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 010015516-02 / KOI

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-85658 ± 155	$130.69^{+15.86}_{-26.12}$	622^{+42}_{-52}	5462^{+161}_{-247}	3868^{+1484}_{-714}
Alt.	-130 ± 9	$136.89^{+16.35}_{-26.20}$	617^{+44}_{-50}	2002^{+32}_{-41}	$4.805^{+1.971}_{-0.938}$

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

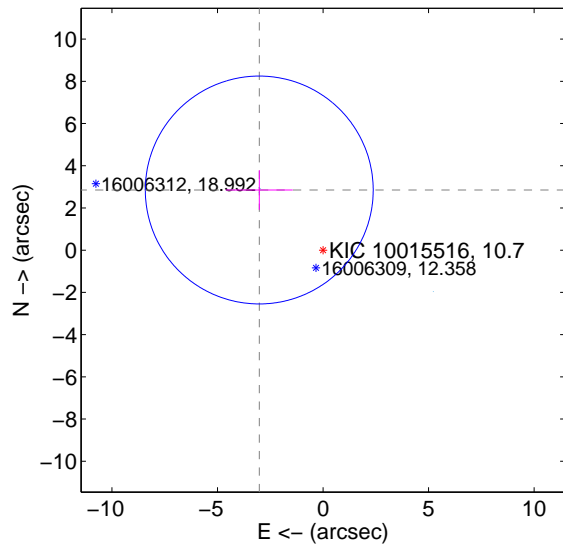
Supplemental centroid analysis for 010015516-02. **Kepler magnitude: 10.70.** Transit SNR 359.60

There are 4 quarters with good PRF difference image offsets

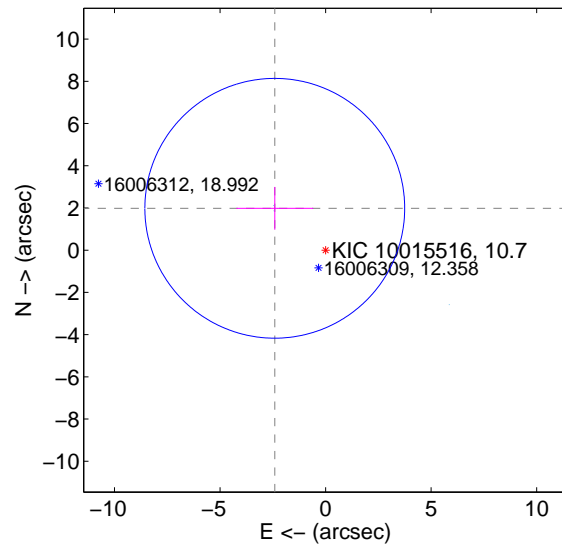
The direct PRF centroid is offset from the target star catalog position by about 0.89 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	4.153 ± 1.799	2.31	3.021 ± 1.589	2.850 ± 0.941
PRF-fit source offset from KIC position	3.119 ± 2.051	1.52	2.406 ± 1.824	1.984 ± 1.015
photometric centroid source offset	0.18 ± 0.01	32.64	0.11 ± 0.01	0.14 ± 0.00

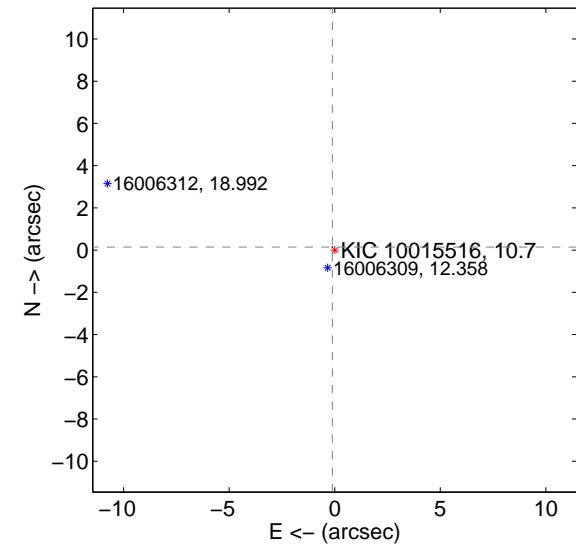
offset from difference PRF-fit to OOT PRF-fit



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.

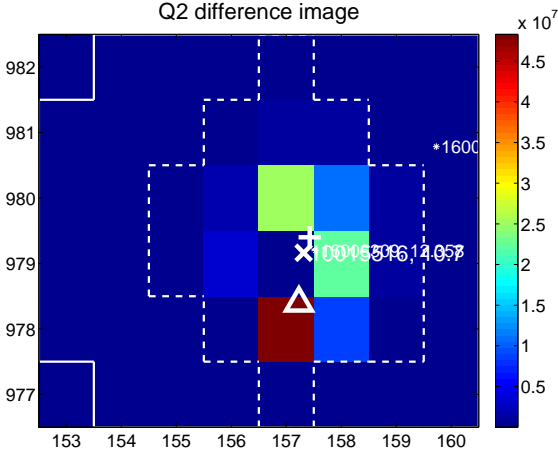
Q1 no difference image



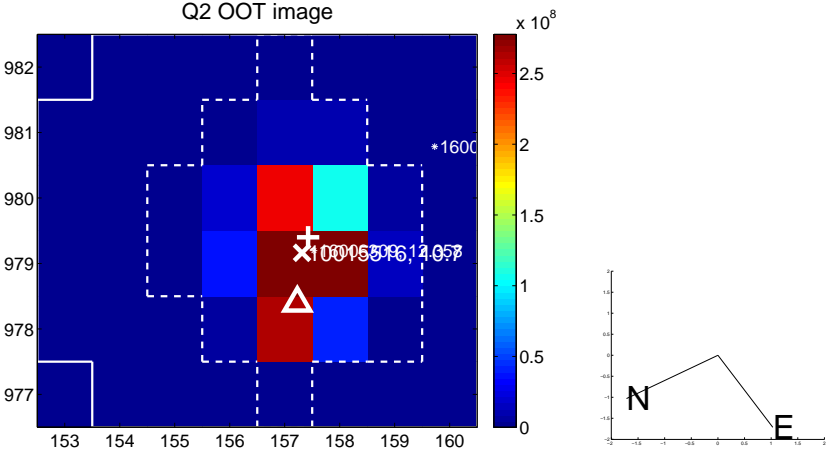
Q1 no OOT image



Q2 difference image



Q2 OOT image



Q3 no difference image



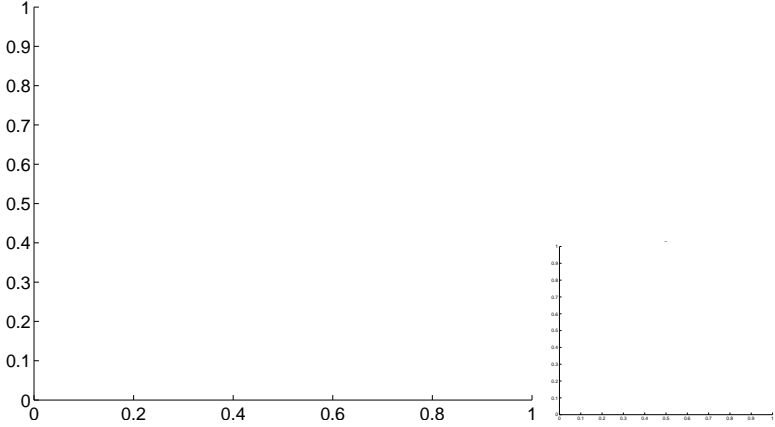
Q3 no OOT image



Q4 no difference image



Q4 no OOT image



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

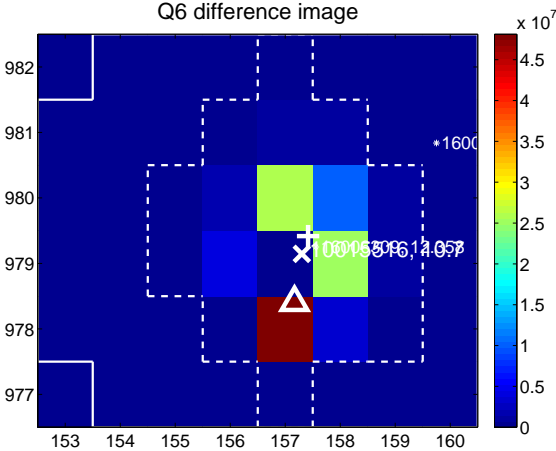
Q5 no difference image



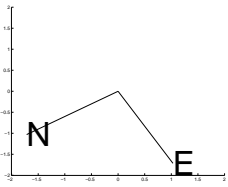
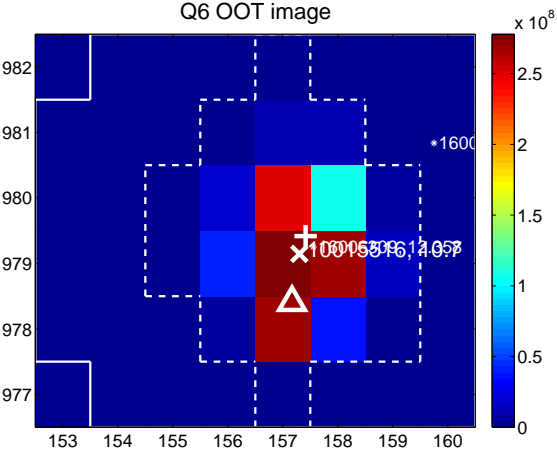
Q5 no OOT image



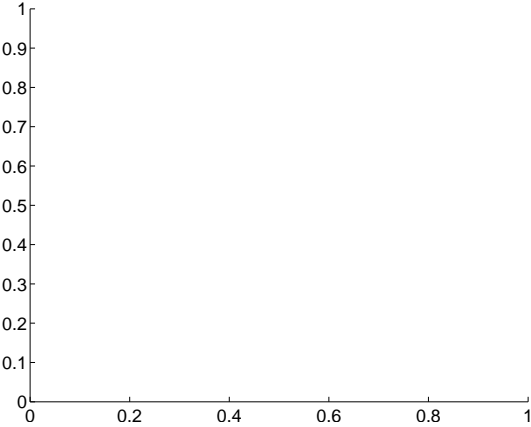
Q6 difference image



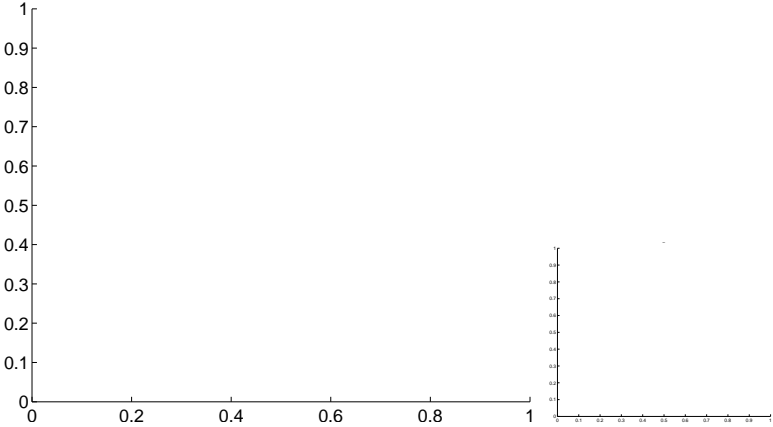
Q6 OOT image



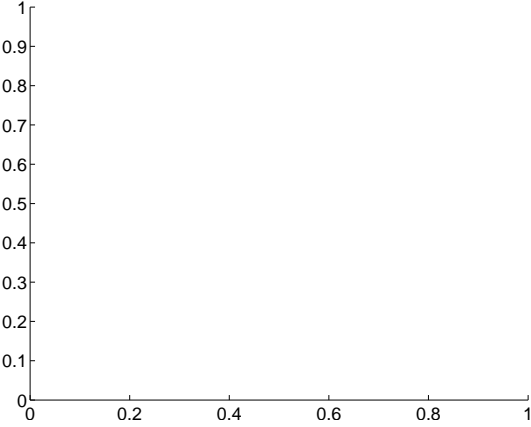
Q7 no difference image



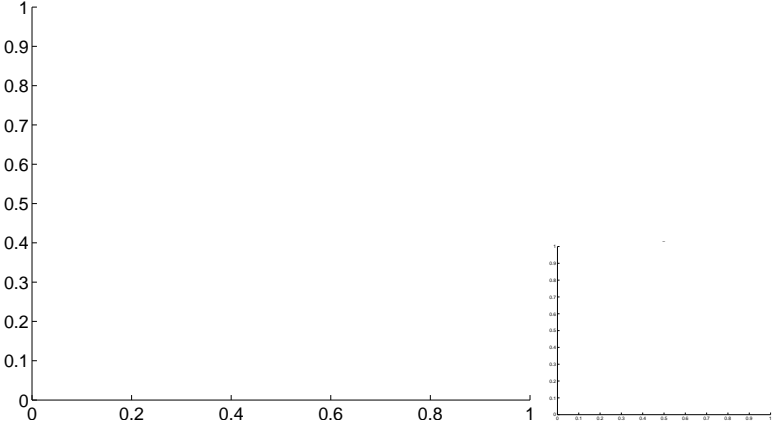
Q7 no OOT image



Q8 no difference image



Q8 no OOT image



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

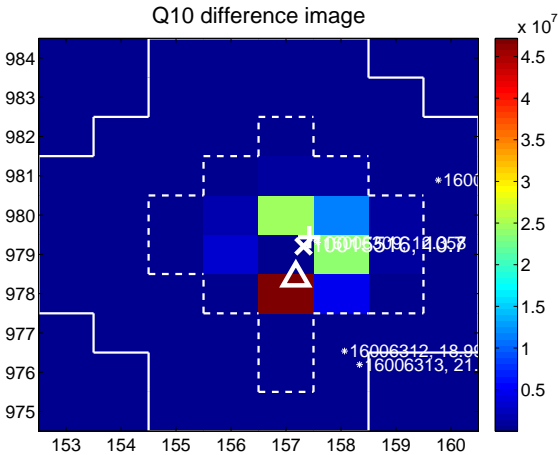
Q9 no difference image



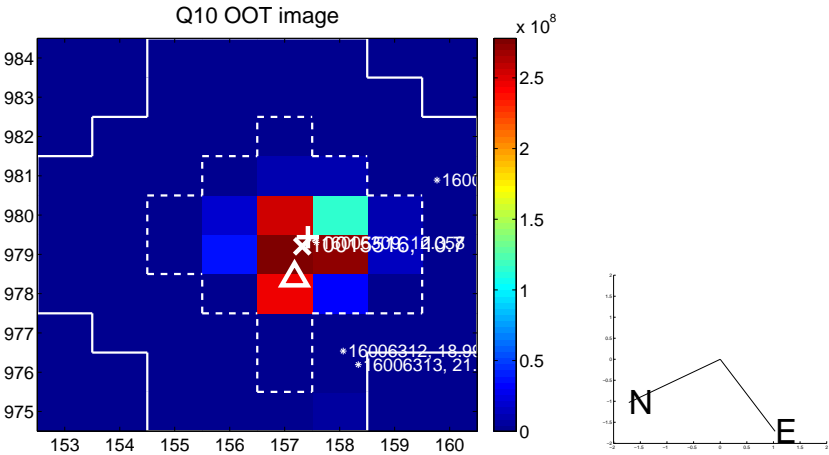
Q9 no OOT image



Q10 difference image



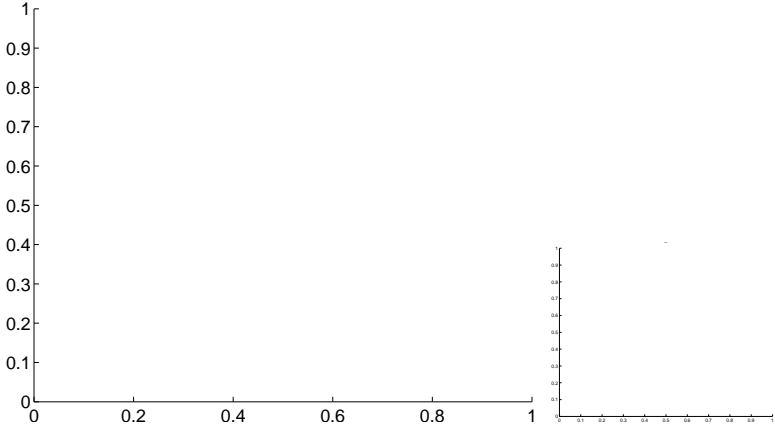
Q10 OOT image



Q11 no difference image



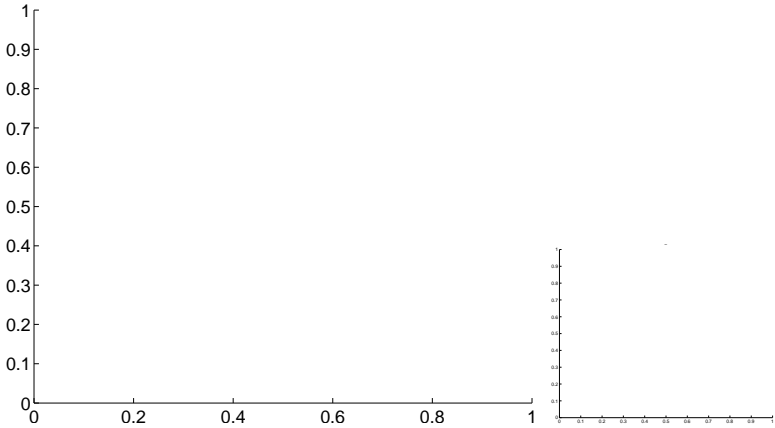
Q11 no OOT image



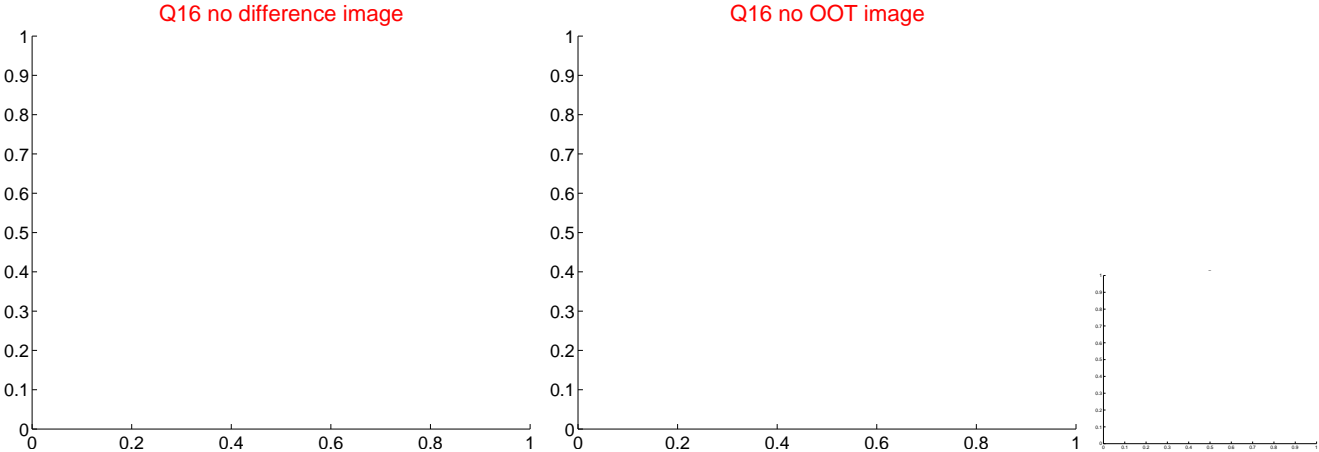
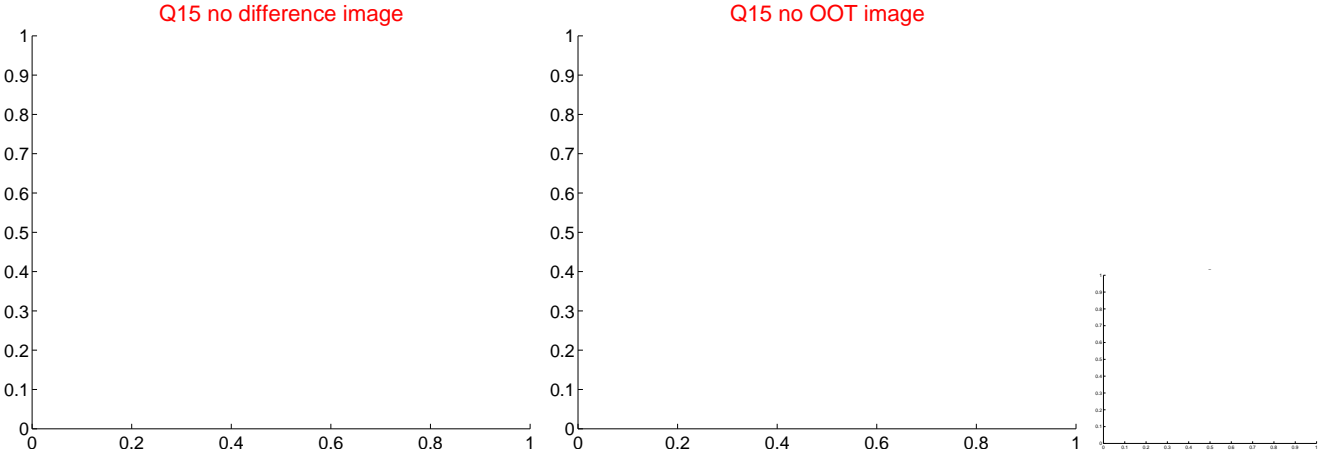
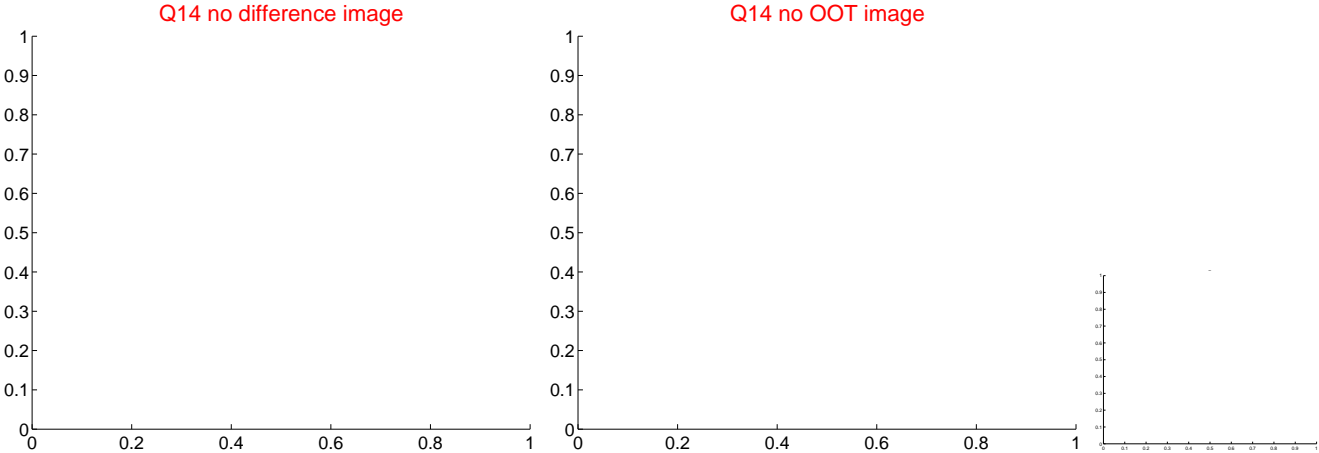
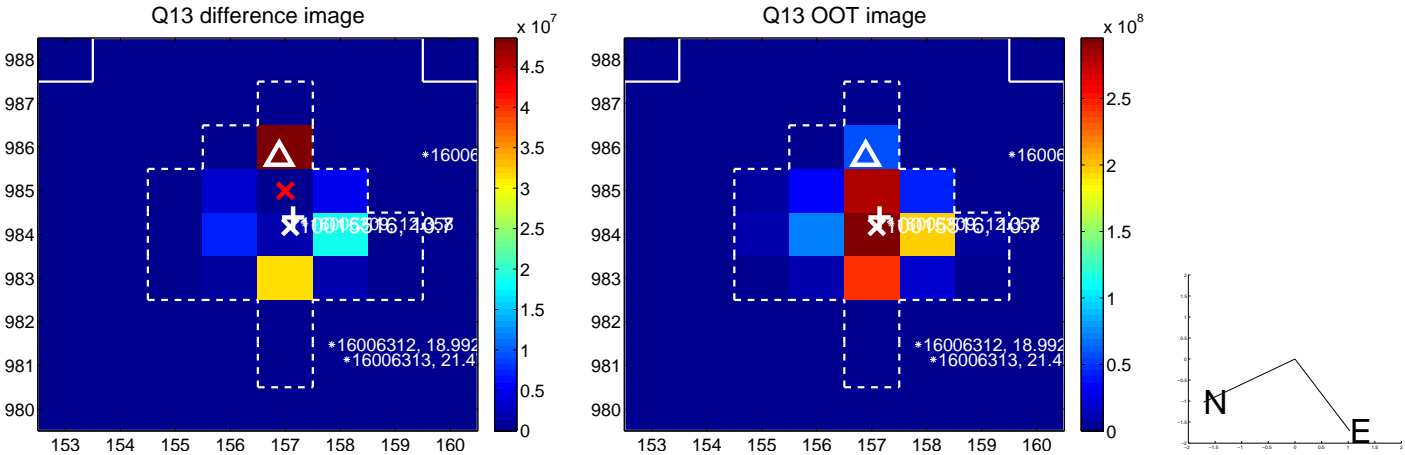
Q12 no difference image



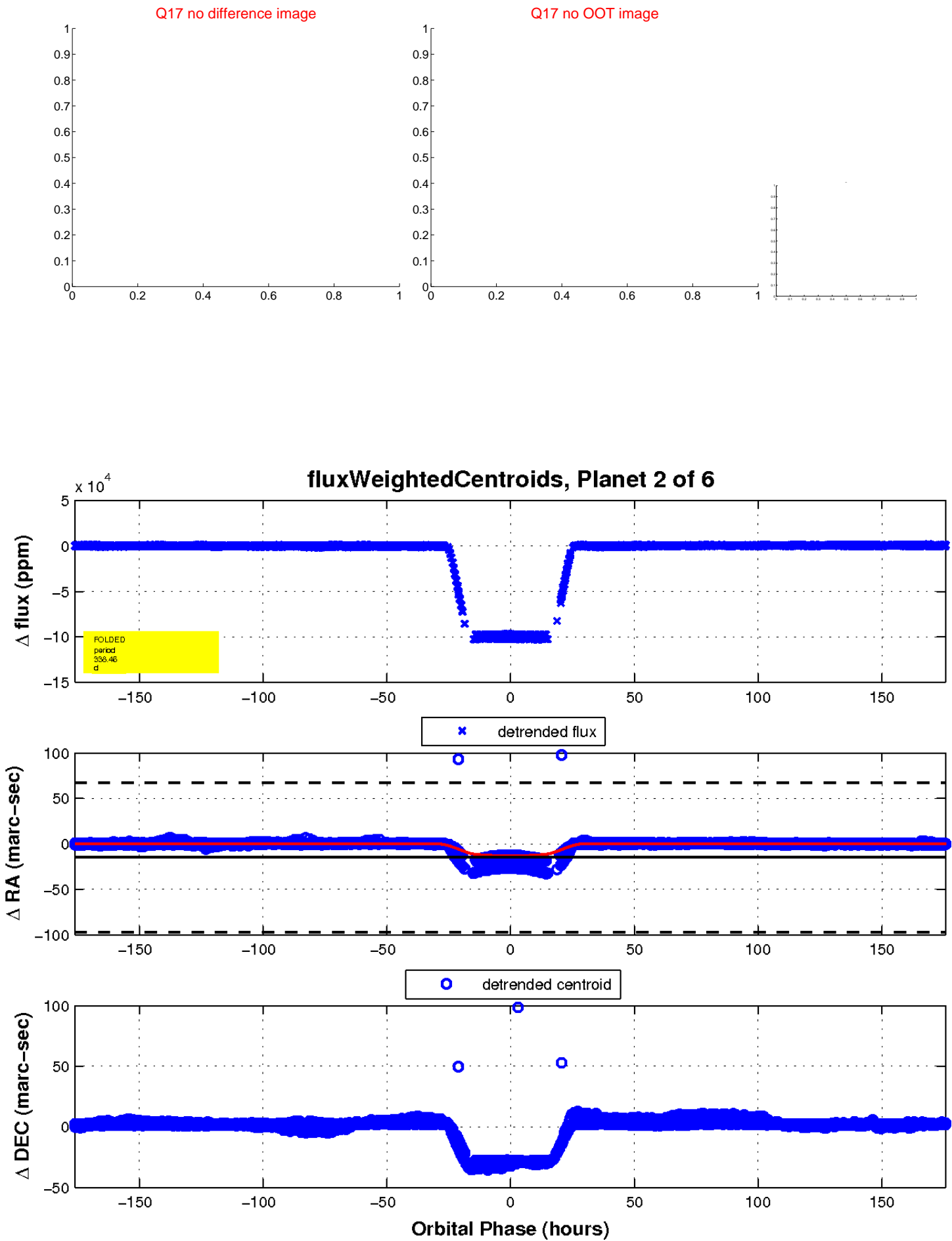
Q12 no OOT image



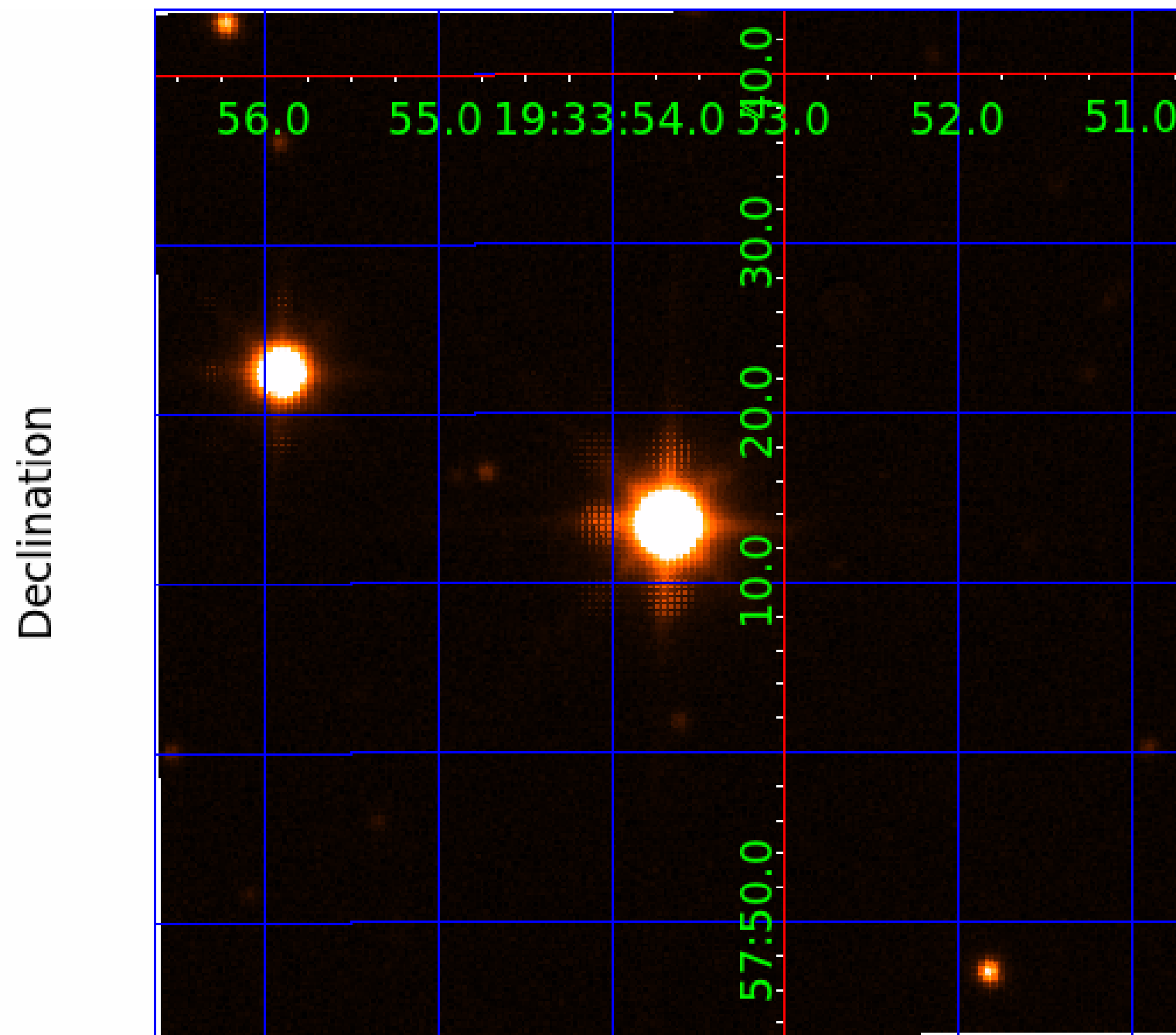
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



UKIRT Image



KIC 010015516

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})
010015516-01	OBS	No	203.054331	172.514115	3456.6	50.398	210.0	127.3	4.06	5374	26.77	19.19
010015516-02	OBS	No	338.463157	240.070106	106215.5	58.718	213.7	359.6	4.06	5374	130.64	9.71
010015516-05	OBS	No	67.692101	172.377510	2730.5	50.673	102.3	239.8	4.06	5374	24.25	83.01
010015516-06	OBS	No	338.488733	138.540138	264.1	15.000	50.3	-1.0	4.06	5374	6.49	9.71

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010015516-01	OBS	FP	0.00	1	0	0	0	ALL_TRANS_CHASES—CENT_SATURATED
010015516-02	OBS	FP	0.00	1	0	0	0	ALL_TRANS_CHASES—CENT_SATURATED
010015516-05	OBS	FP	0.00	1	0	1	0	TRANS_GAPPED—SAME_NTL_PERIOD—CENT_SATURATED—HALO_GHOST
010015516-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—SAME_NTL_PERIOD—CENT_SATURATED

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 010015516-05

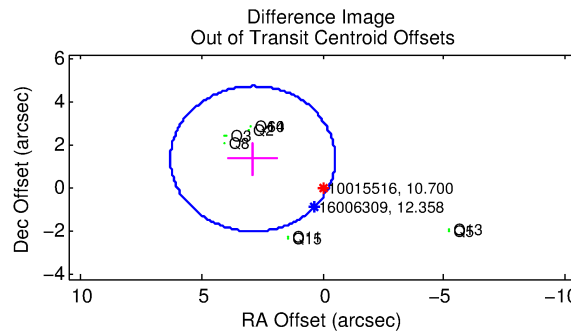
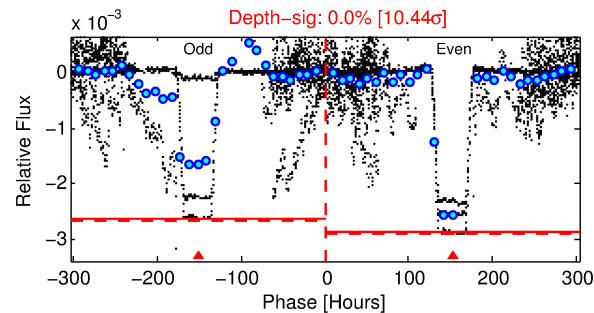
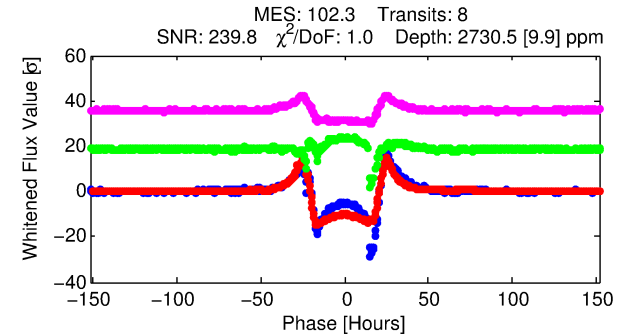
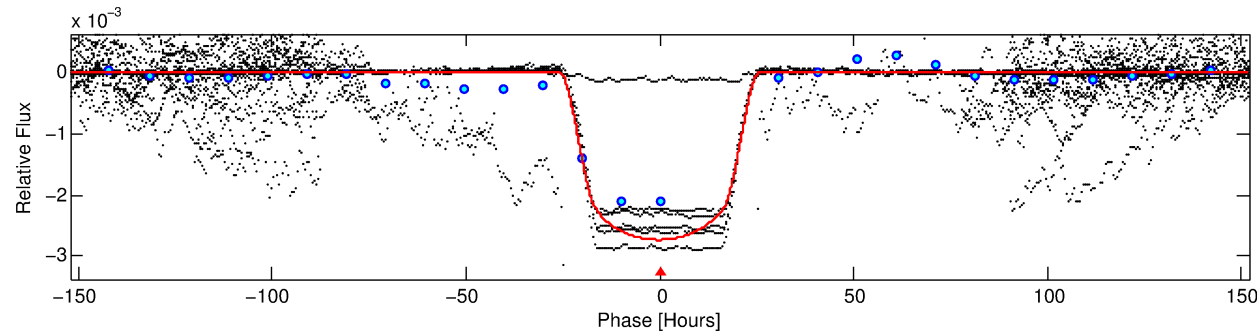
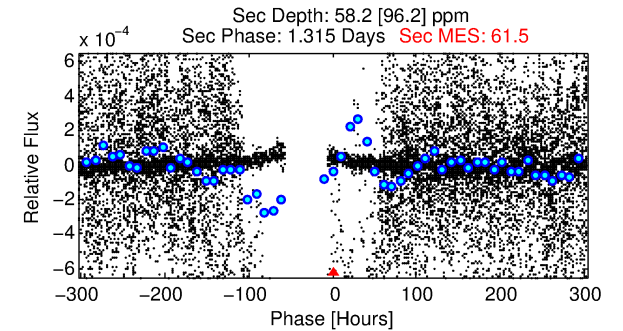
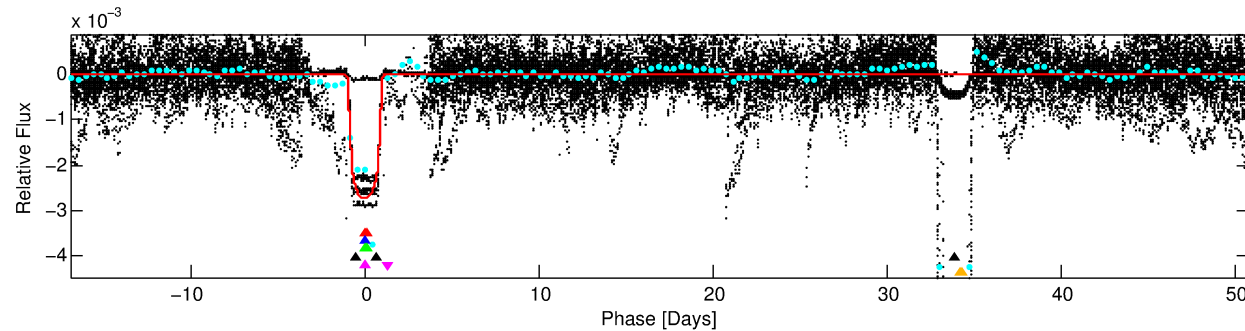
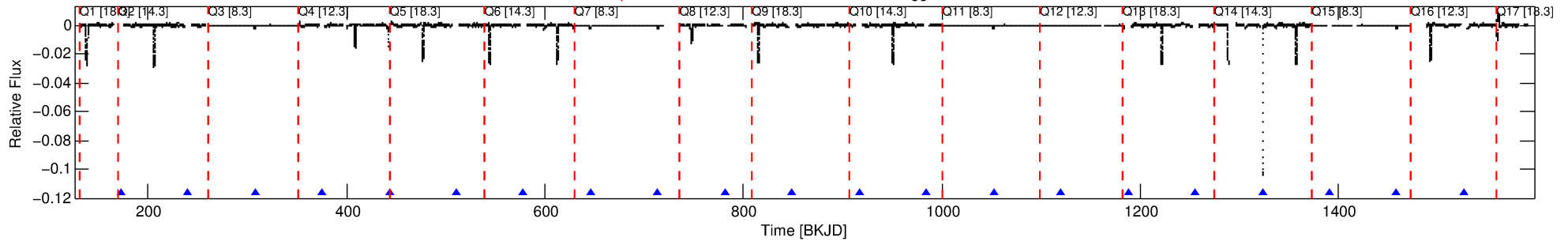
No Significant Match Found

DV One-Page Summary

KIC: 10015516 Candidate: 5 of 6 Period: 67.692 d

KOI: K00990 Corr: No Ephemeris Match

Kp: 10.70 R*: 4.06 Rs Teff: 5374.0 K Logg: 3.44 Fe/H: -0.200



DV Fit Results:

Period = 67.69210 [0.00014] d
Epoch = 172.3775 [0.0017] BKJD
Rp/R* = 0.0547 [0.0001]
a/R* = 6.54 [0.02]
b = 0.84 [0.00]
Seff = 83.01 [39.38]
Teq = 770 [91] K
Rp = 24.25 [8.40] Re
a = 0.3853 [0.1151] AU
Ag = 8.08 [13.83] [0.51σ]
Teffp = 2006 [833] K [1.47σ]

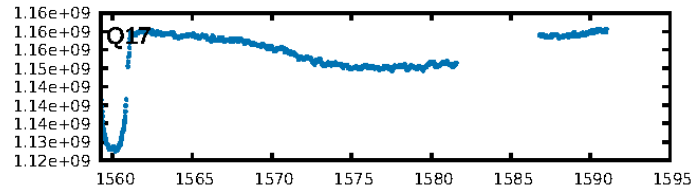
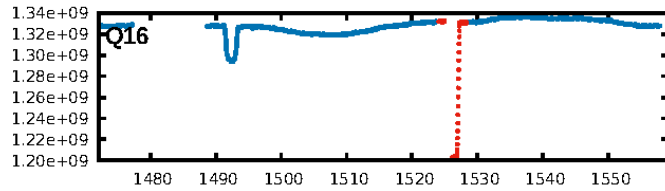
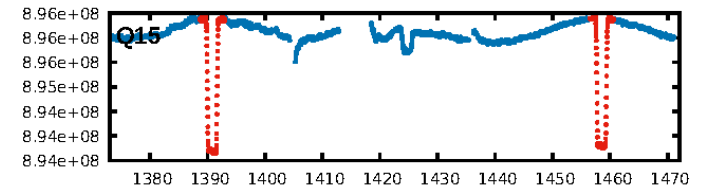
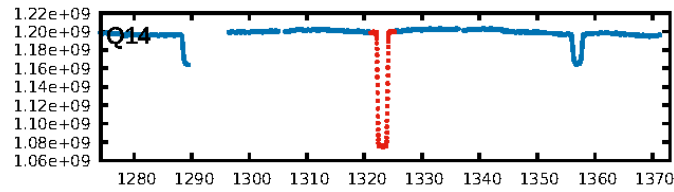
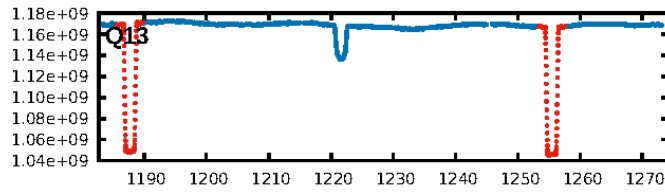
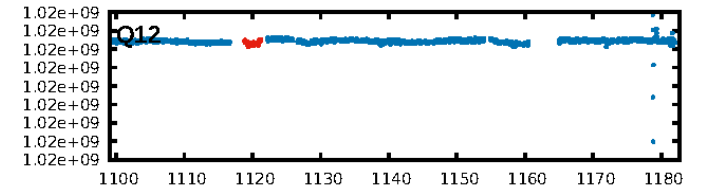
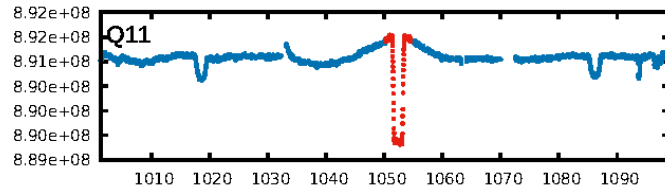
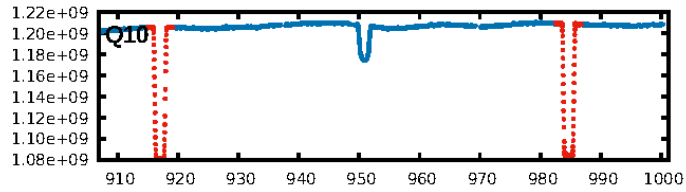
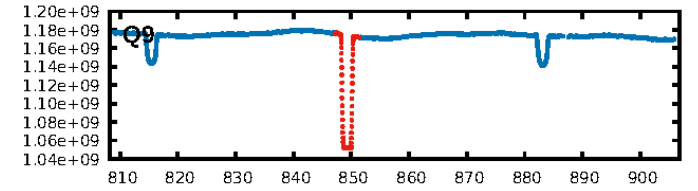
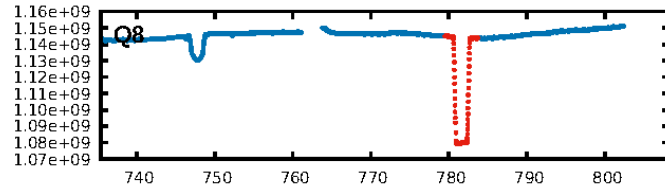
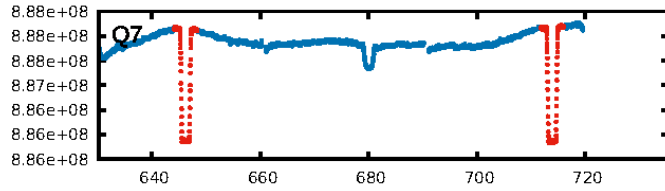
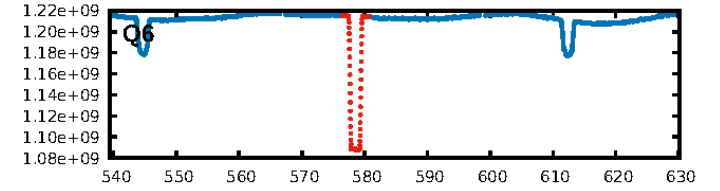
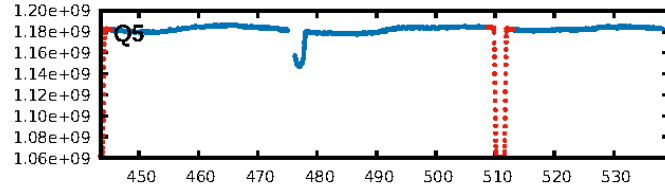
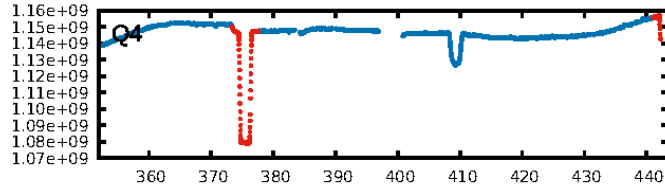
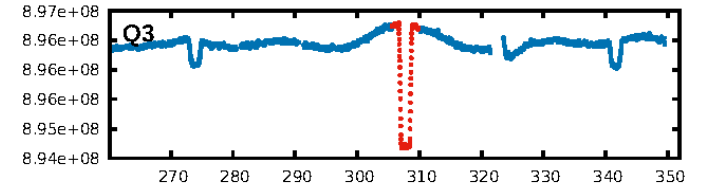
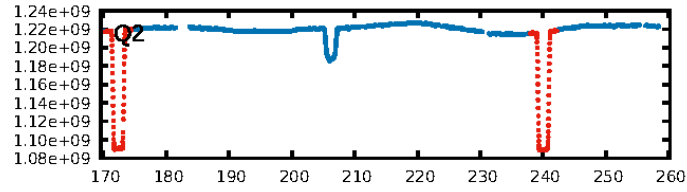
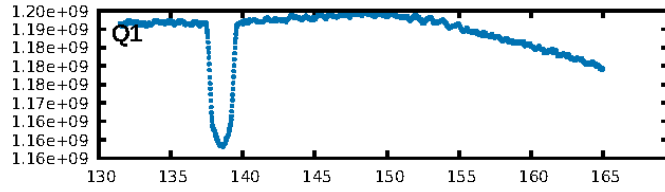
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 100.0% [45.46σ]
ModelChiSquare2-sig: 0.0%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: N/A
RollingBand-fgt: 1.00 [8/8]
GhostDiagnostic-chr: -0.2359
Centroid-sig: N/A
Centroid-so: 17.795 arcsec [112.78σ]
OotOffset-rm: 3.193 arcsec [2.82σ]
KicOffset-rm: 2.900 arcsec [2.39σ]
OotOffset-st: 4/3/1/2 [10]
KicOffset-st: 4/3/1/2 [10]
DiffImageQuality-fgm: 0.70 [7/10]
DiffImageOverlap-fno: 0.30 [3/10]

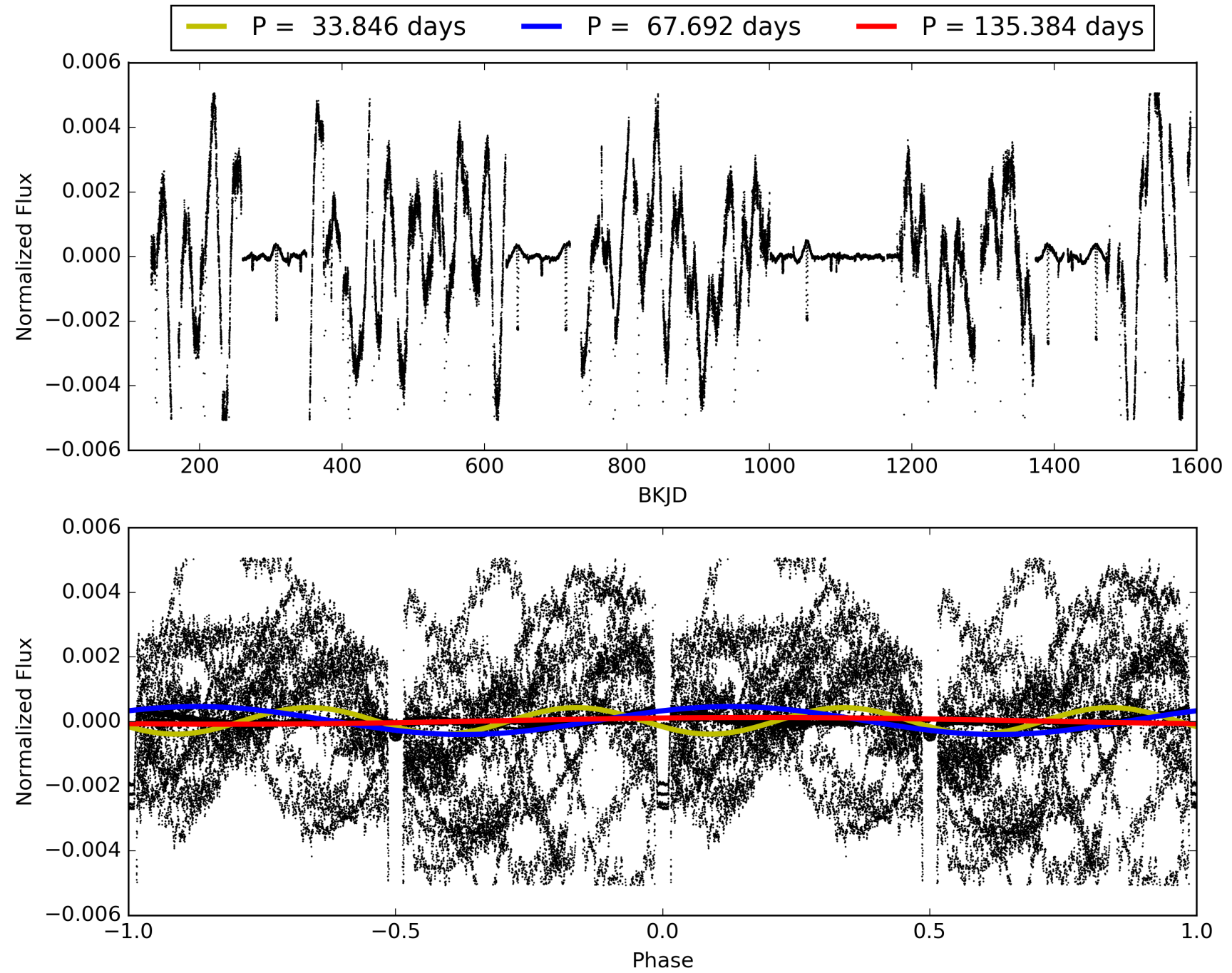
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 01:36:32 Z

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

TCE 010015516-05, PDC Light Curves

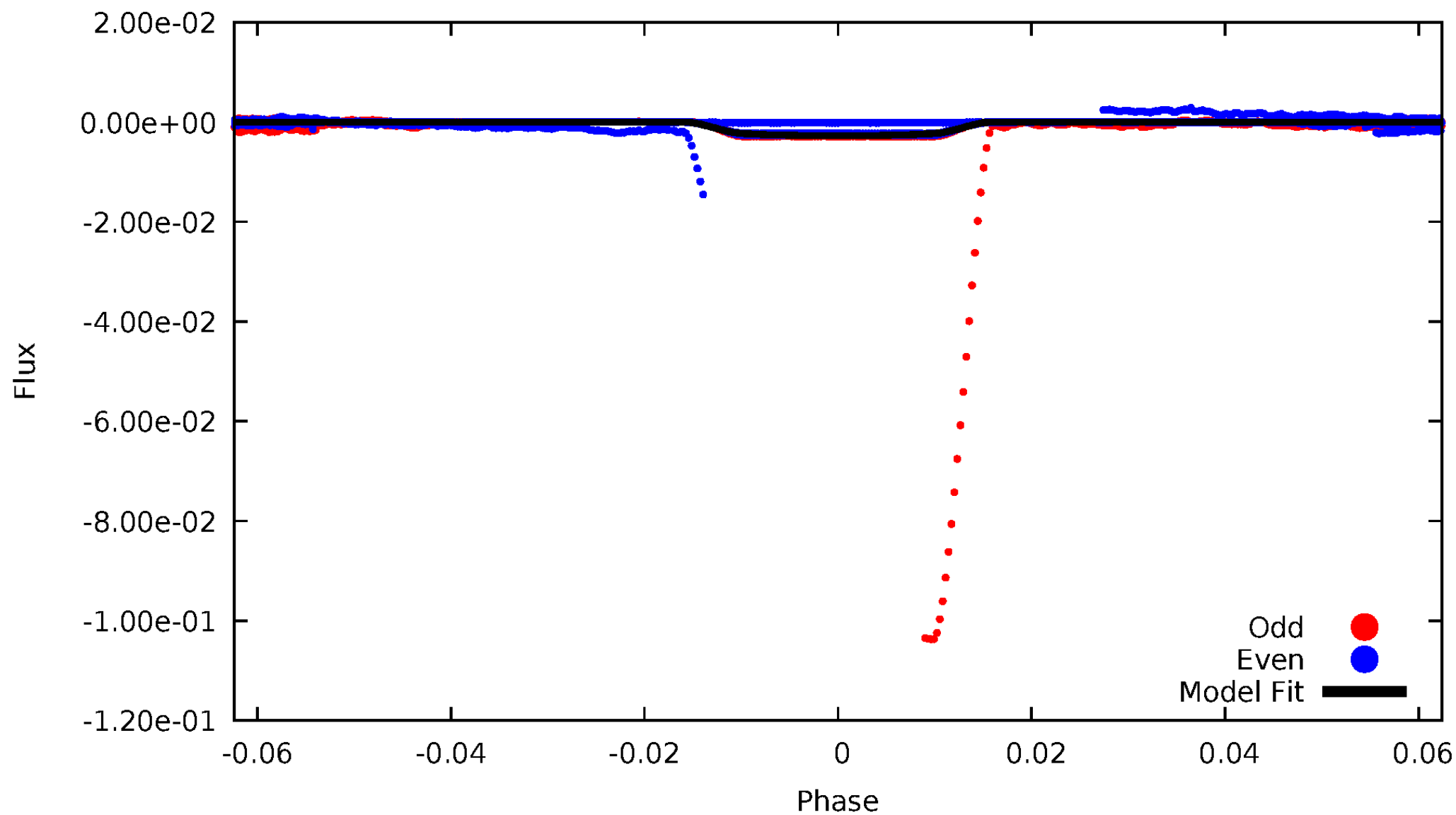


TCE 010015516-05



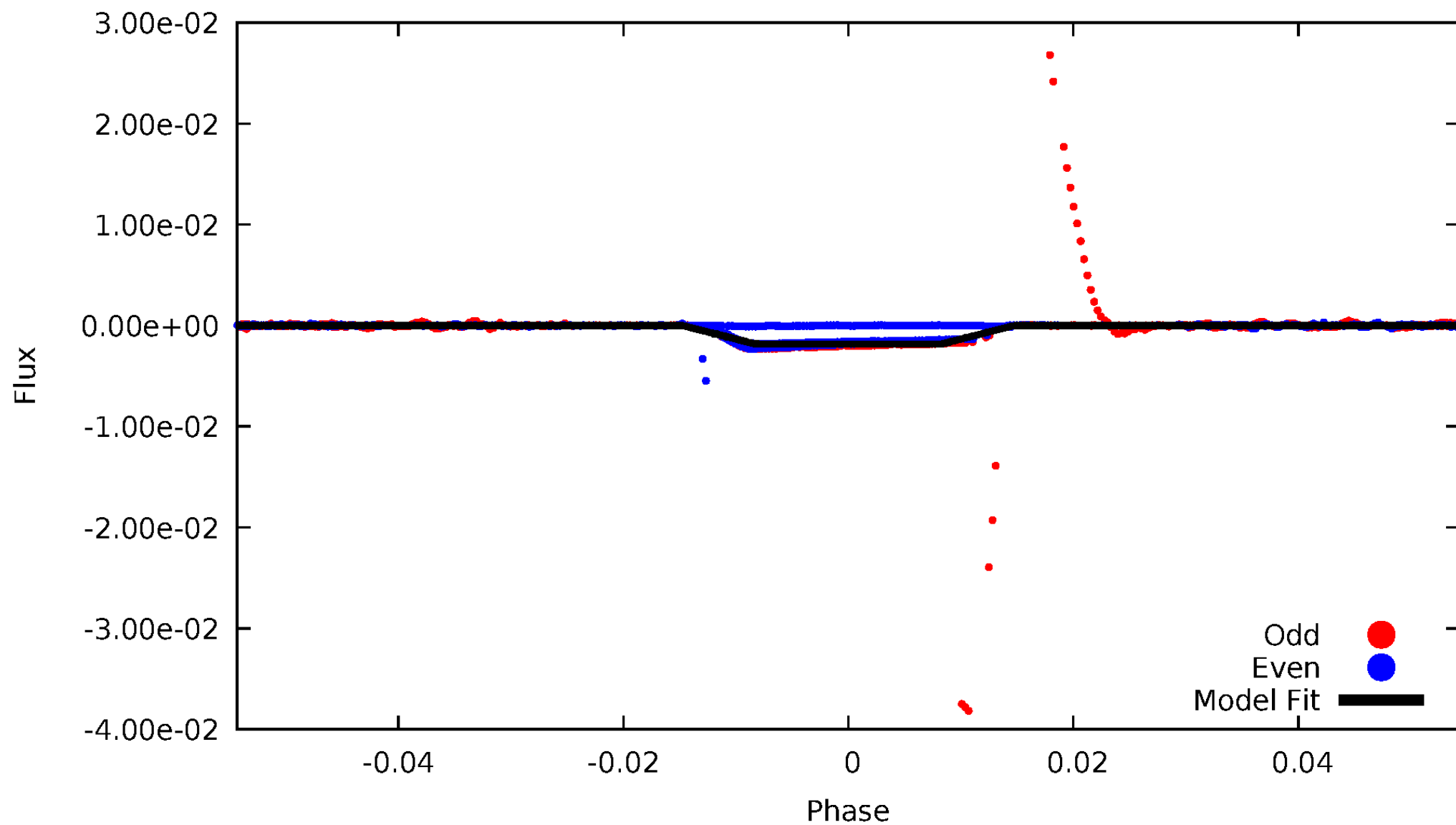
DV Odd/Even

TCE 010015516-05



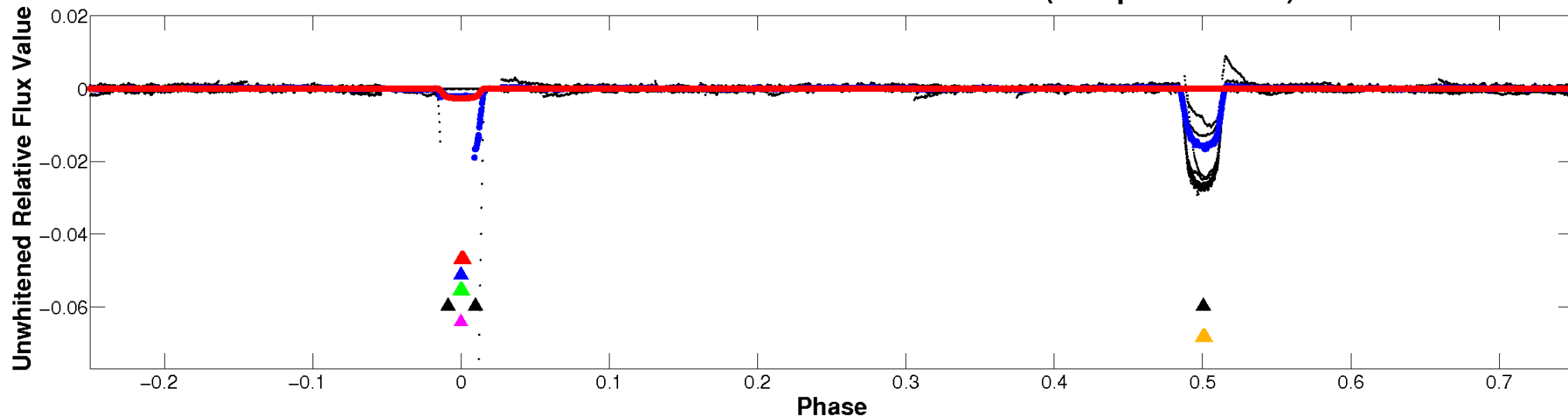
ALT Odd/Even

TCE 010015516-05

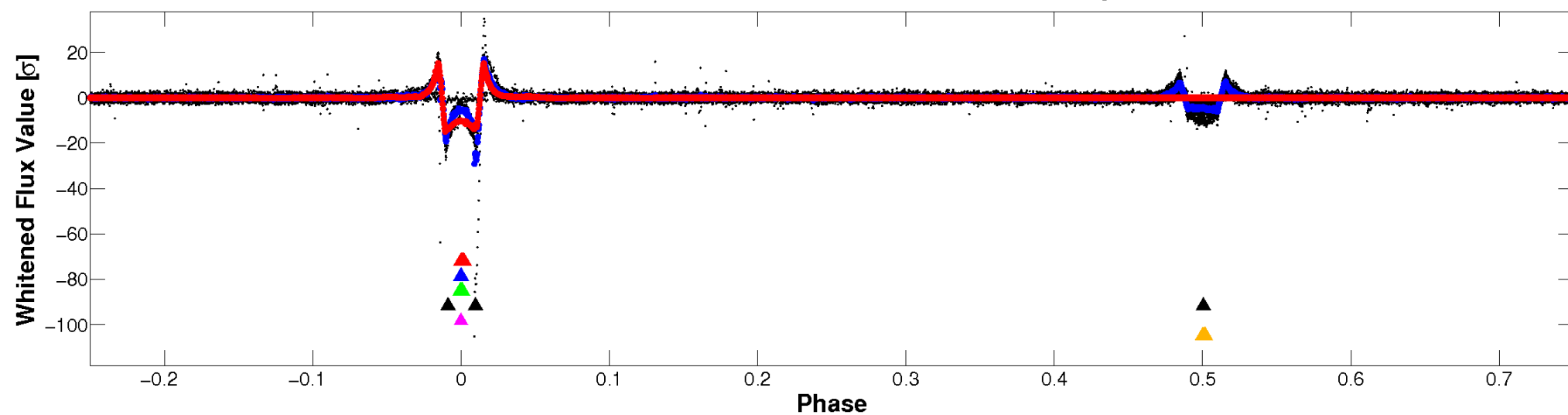


Non-Whitened Vs. Whitened Light Curve

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

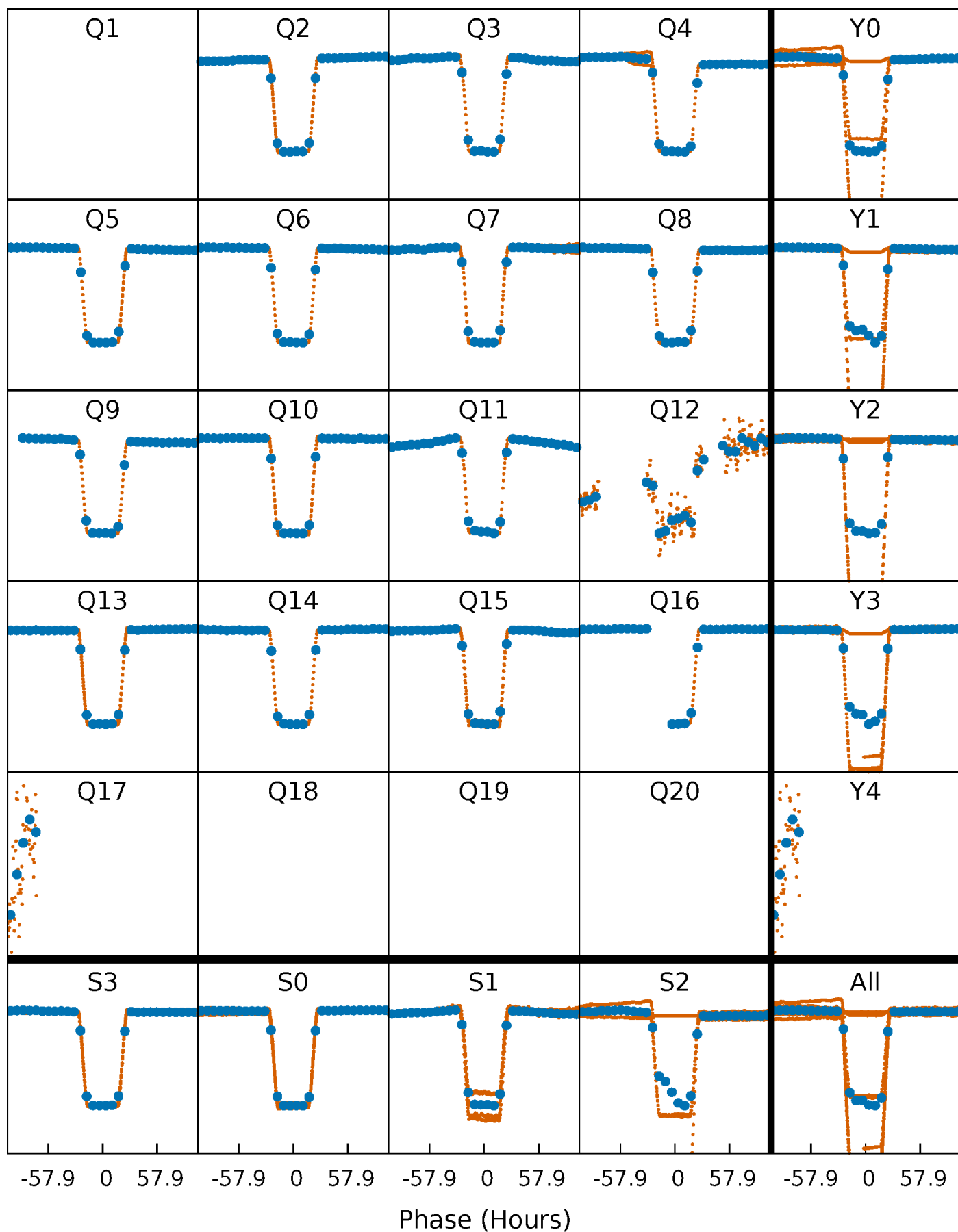


Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)



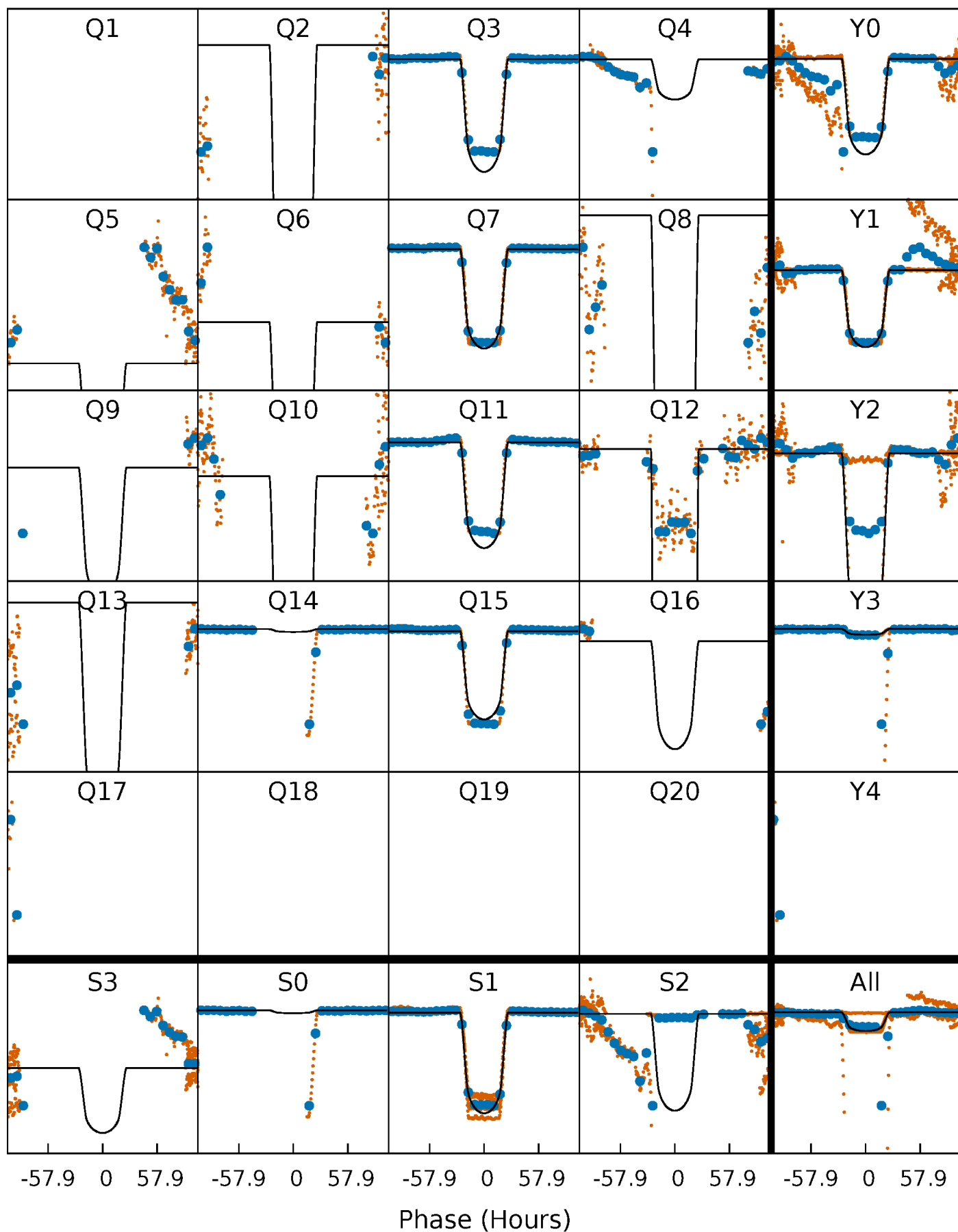
PDC Quarter-Phased Transit Curves

TCE 010015516-05 P= 67.692101 Days $T_0=172.377510$ (BKJD)



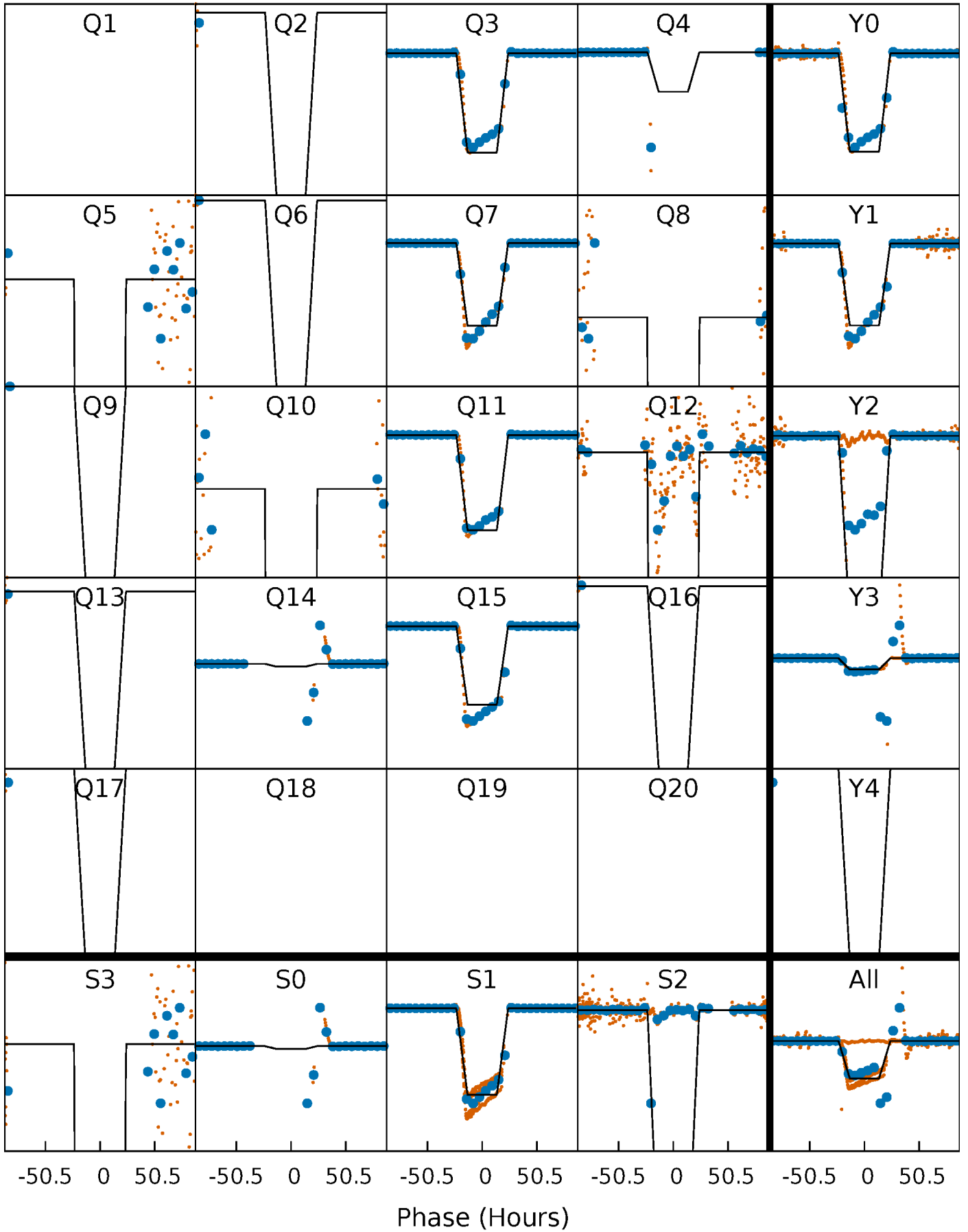
DV Quarter-Phased Transit Curves

TCE 010015516-05 P= 67.692101 Days $T_0=172.377510$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

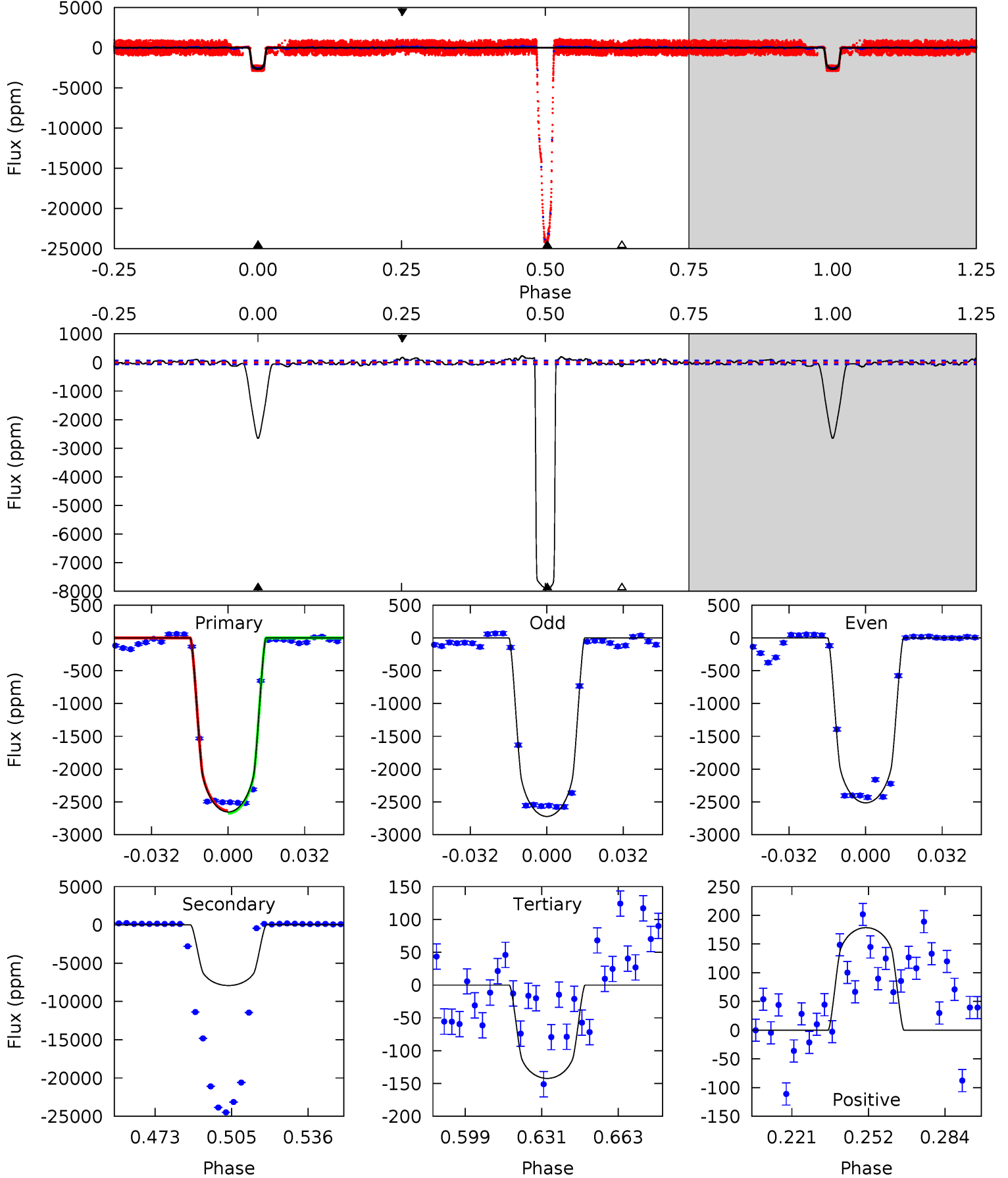
TCE 010015516-05 $P = 67.693081$ Days $T_0 = 172.287819$ (BKJD)



DV Model-Shift Uniqueness Test

010015516-05, P = 67.692101 Days, E = 104.685409 Days

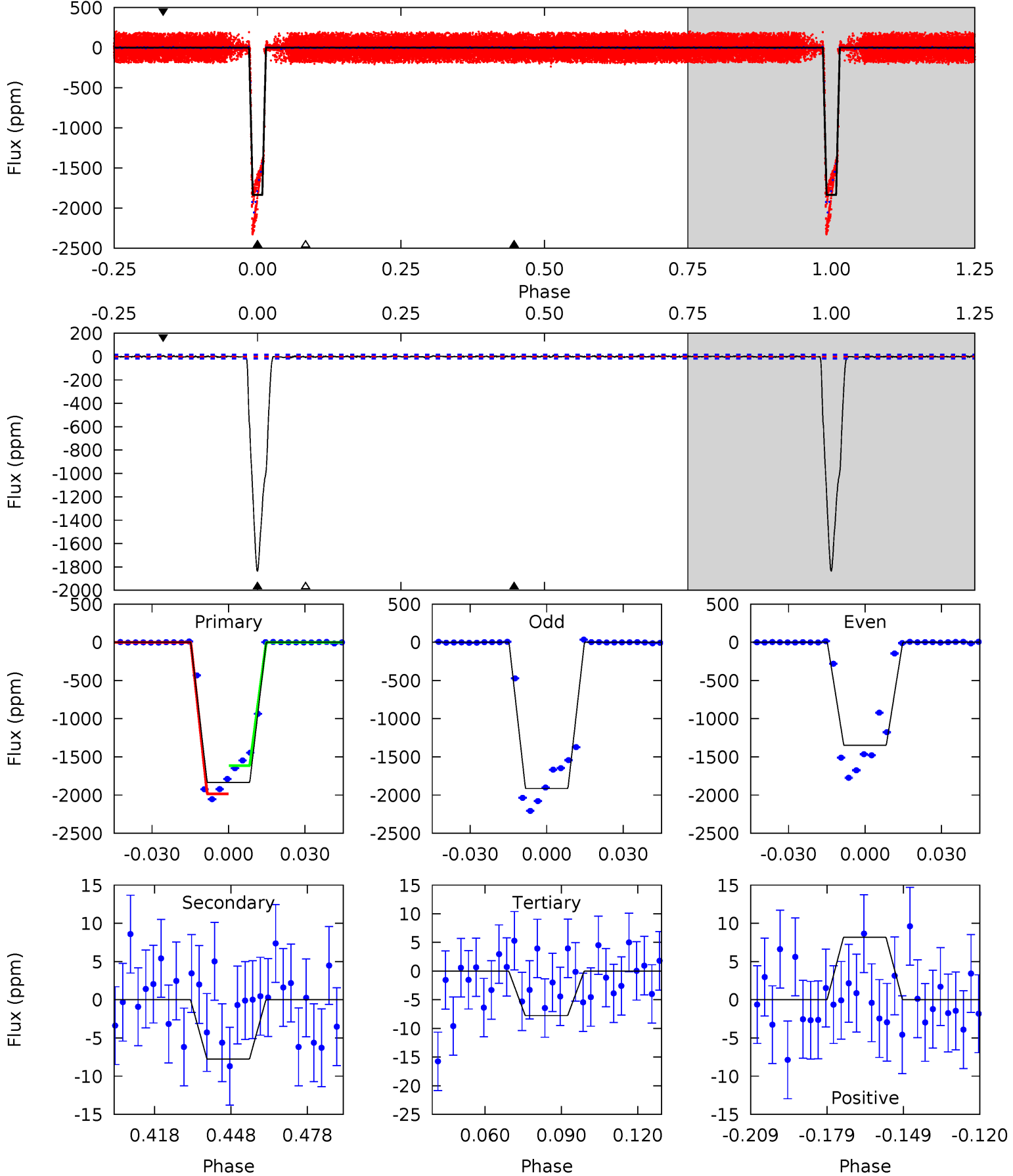
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
190.0	567.0	10.2	12.8	4.80	2.15	4.84	179.8	177.2	556.8	554.2	7.41	10.2	0.03	0



Alt Model-Shift Uniqueness Test

010015516-05, P = 67.693081 Days, E = 104.594738 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
541.5	2.29	2.29	2.41	4.81	2.17	0.75	539.3	539.1	0.00	-0.12	78.0	5.22	0.00	53.7



Stellar Parameters For KIC 010015516

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	5374^{+128}_{-225}	$3.442^{+0.247}_{-0.133}$	$-0.200^{+0.200}_{-0.350}$	$4.061^{+0.757}_{-1.406}$	$1.665^{+0.204}_{-0.611}$	$0.035^{+0.060}_{-0.012}$
	+2%/-4%	+7%/-4%	+100%/-175%	+19%/-35%	+12%/-37%	+172%/-35%
Source	PHO1	FLK73	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 010015516-05 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	-7918 ± 14	$24.31^{+2.57}_{-4.51}$	1060^{+74}_{-79}	6843^{+206}_{-351}	1115^{+400}_{-199}
Alt.	-8 ± 3	$18.95^{+2.06}_{-3.97}$	1065^{+67}_{-90}	2238^{+108}_{-177}	$1.843^{+1.057}_{-0.841}$

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

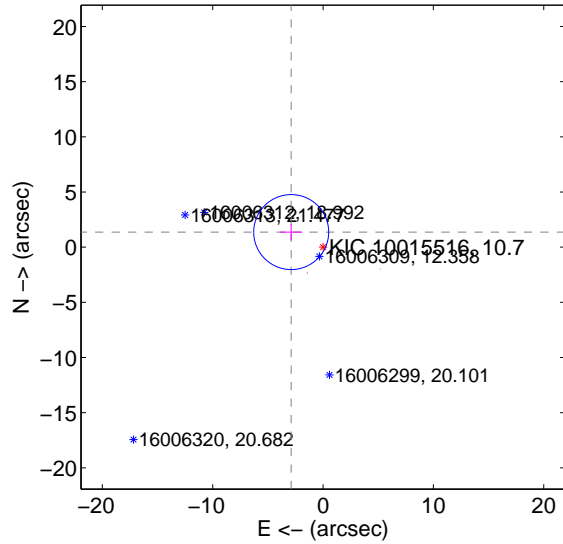
Supplemental centroid analysis for 010015516-05. **Kepler magnitude: 10.70**. Transit SNR 239.80

There are 7 quarters with good PRF difference image offsets

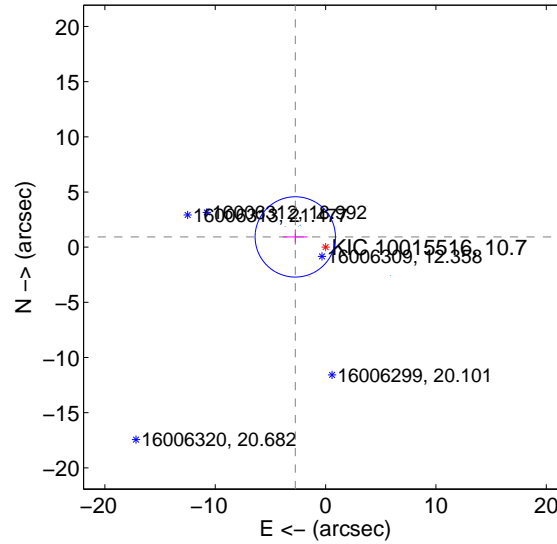
The direct PRF centroid is offset from the target star catalog position by about 0.32 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	3.193 ± 1.132	2.82	2.886 ± 0.994	1.367 ± 0.729
PRF-fit source offset from KIC position	2.900 ± 1.213	2.39	2.747 ± 1.115	0.930 ± 0.685
photometric centroid source offset	17.79 ± 0.16	112.78	15.05 ± 0.17	9.49 ± 0.12

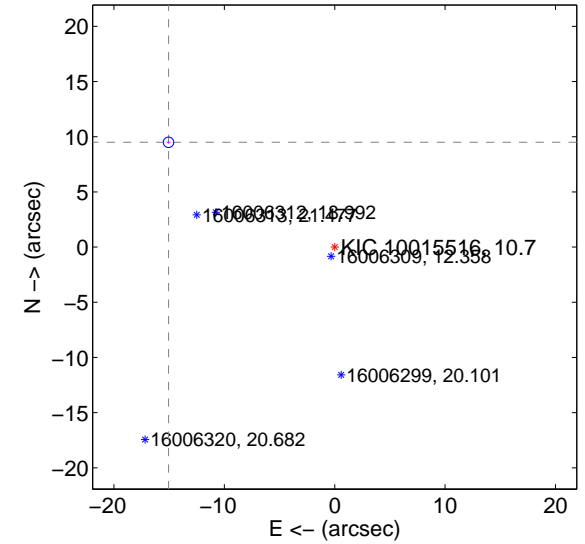
offset from difference PRF-fit to OOT PRF-fit



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.

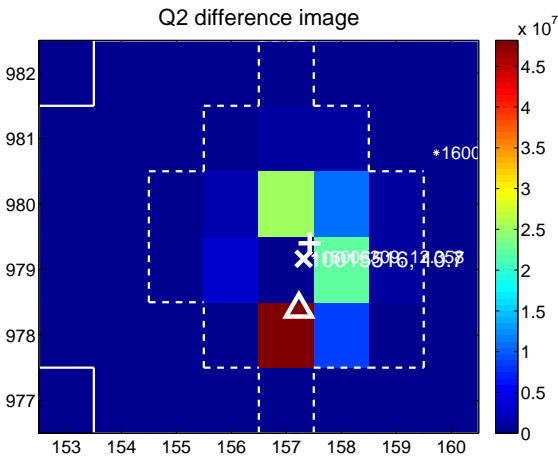
Q1 no difference image



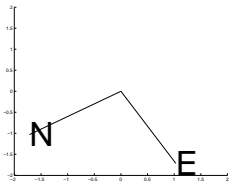
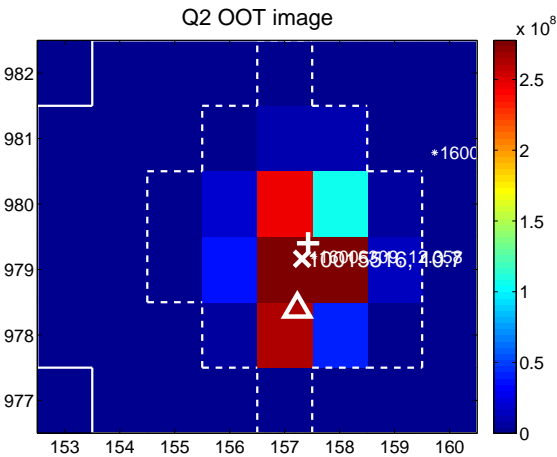
Q1 no OOT image



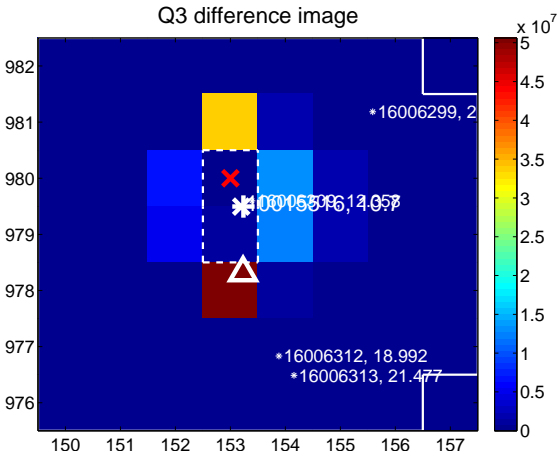
Q2 difference image



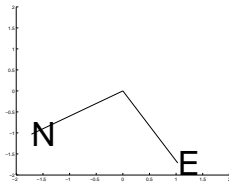
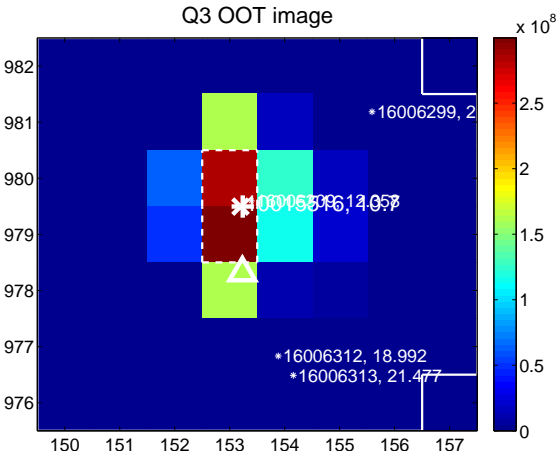
Q2 OOT image



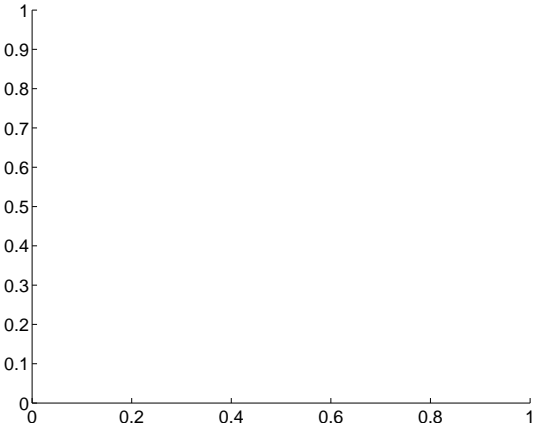
Q3 difference image



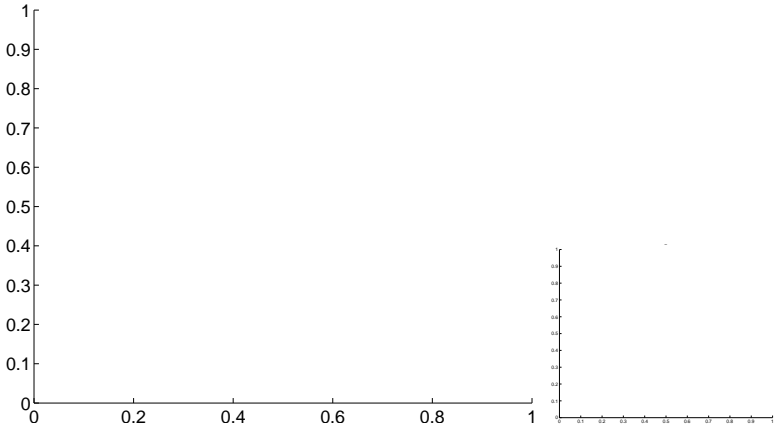
Q3 OOT image



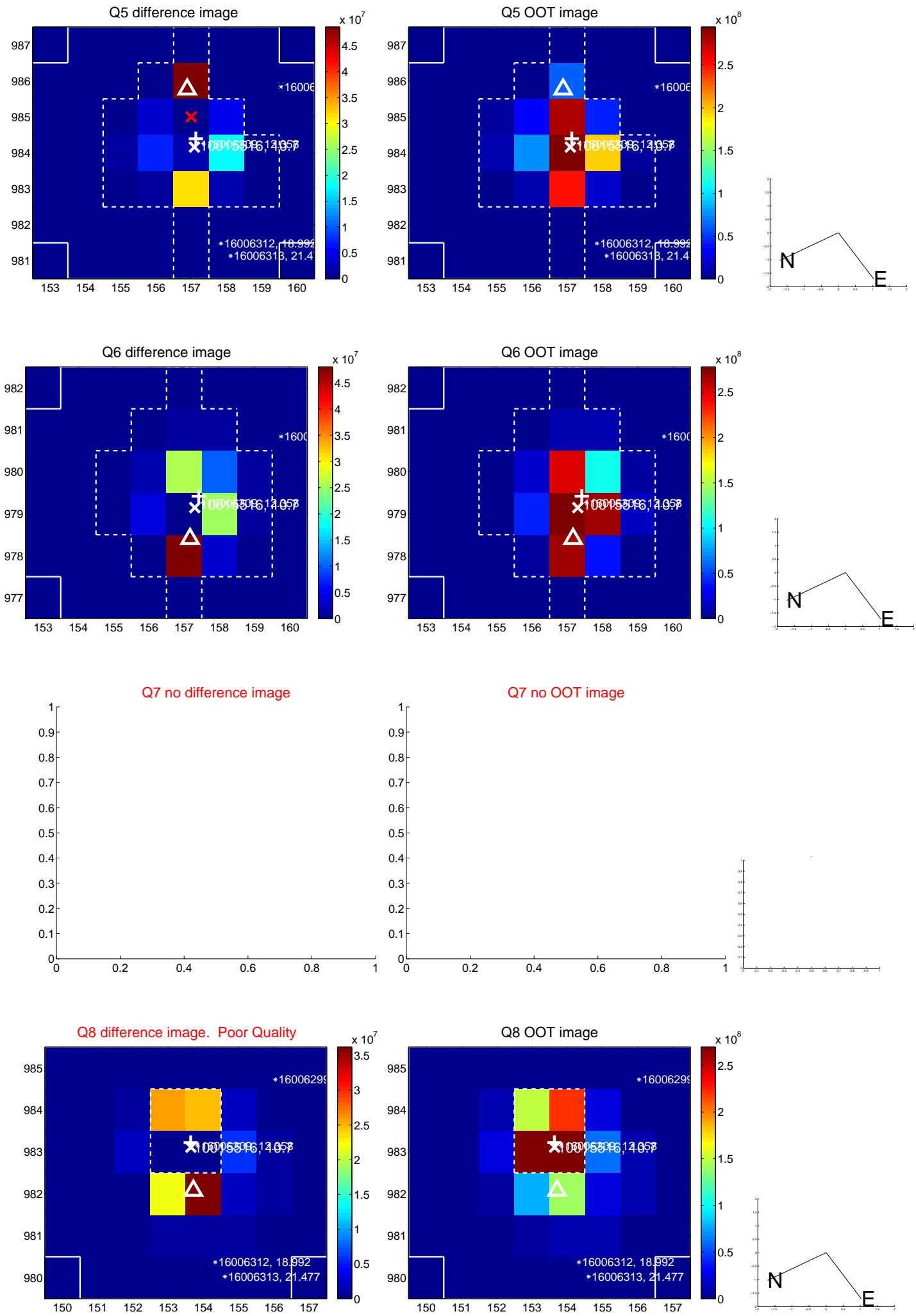
Q4 no difference image



Q4 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.

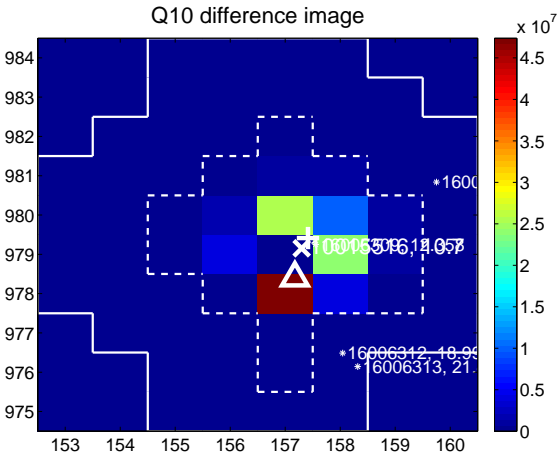
Q9 no difference image



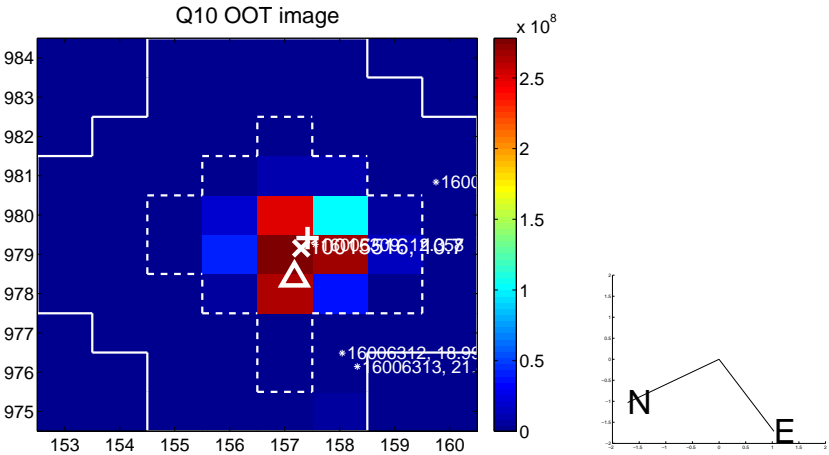
Q9 no OOT image



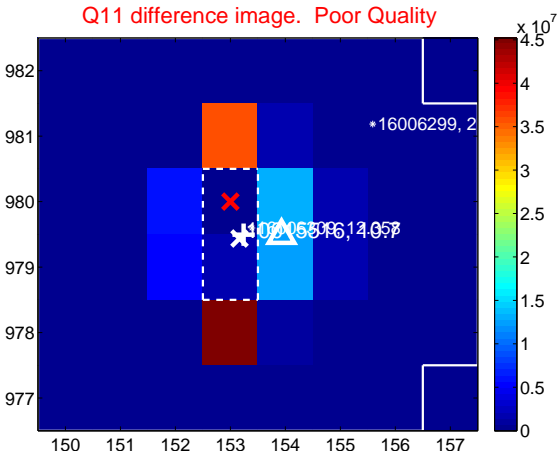
Q10 difference image



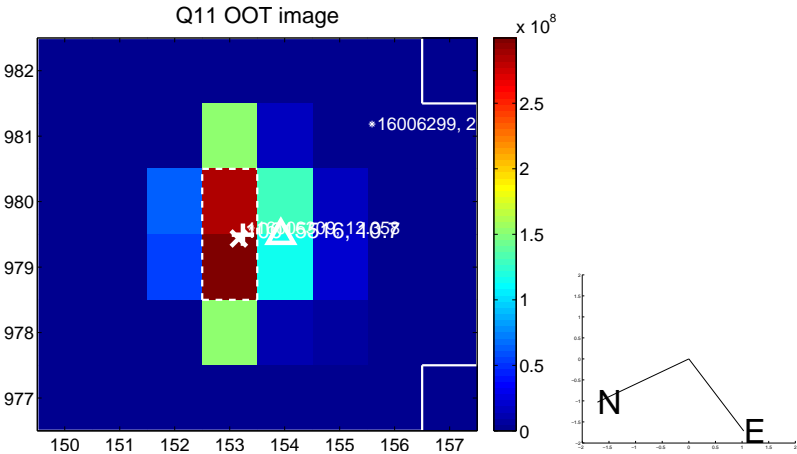
Q10 OOT image



Q11 difference image. Poor Quality



Q11 OOT image



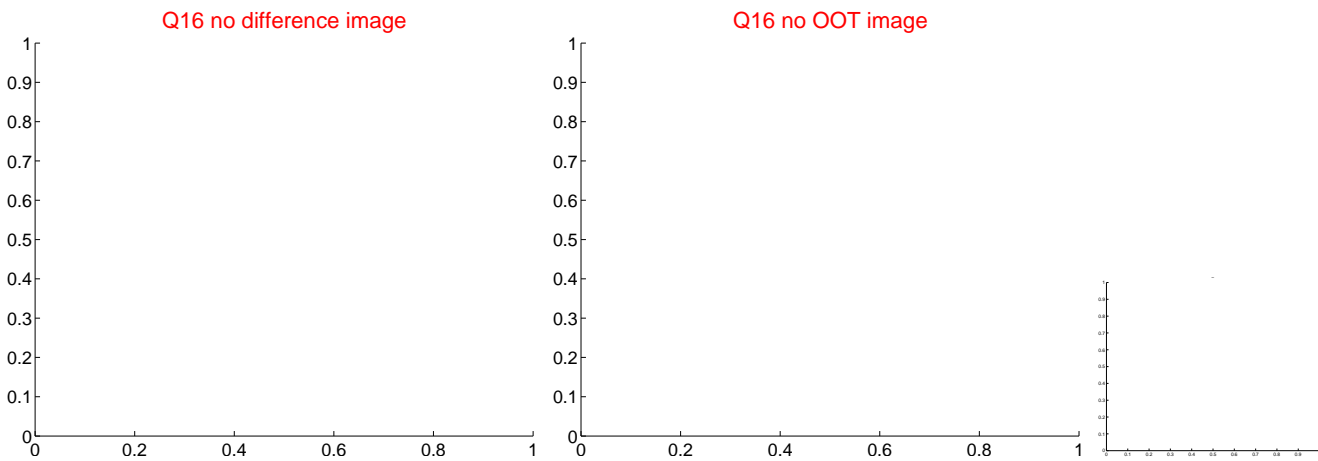
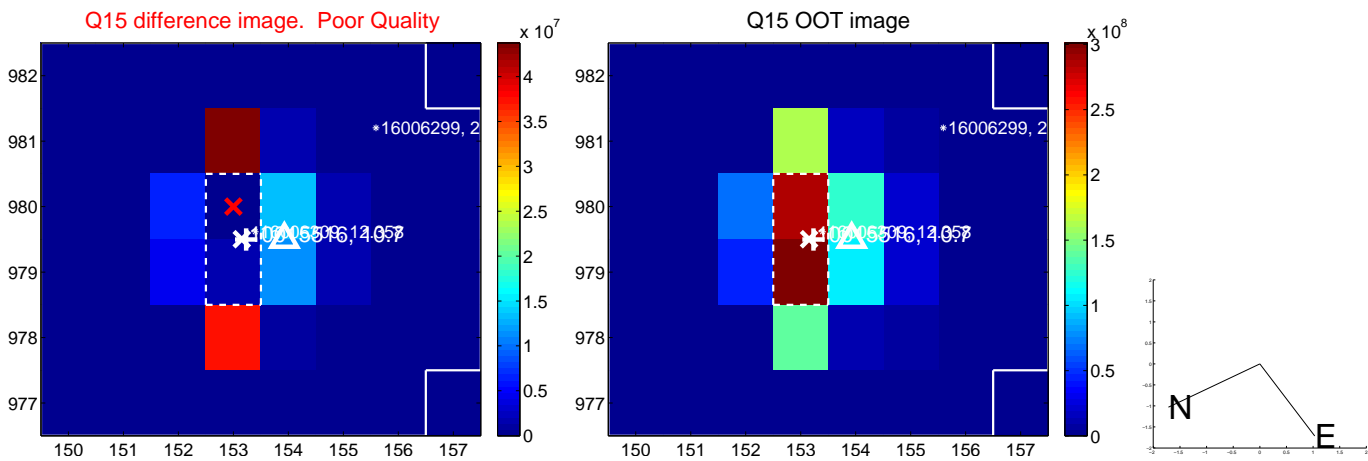
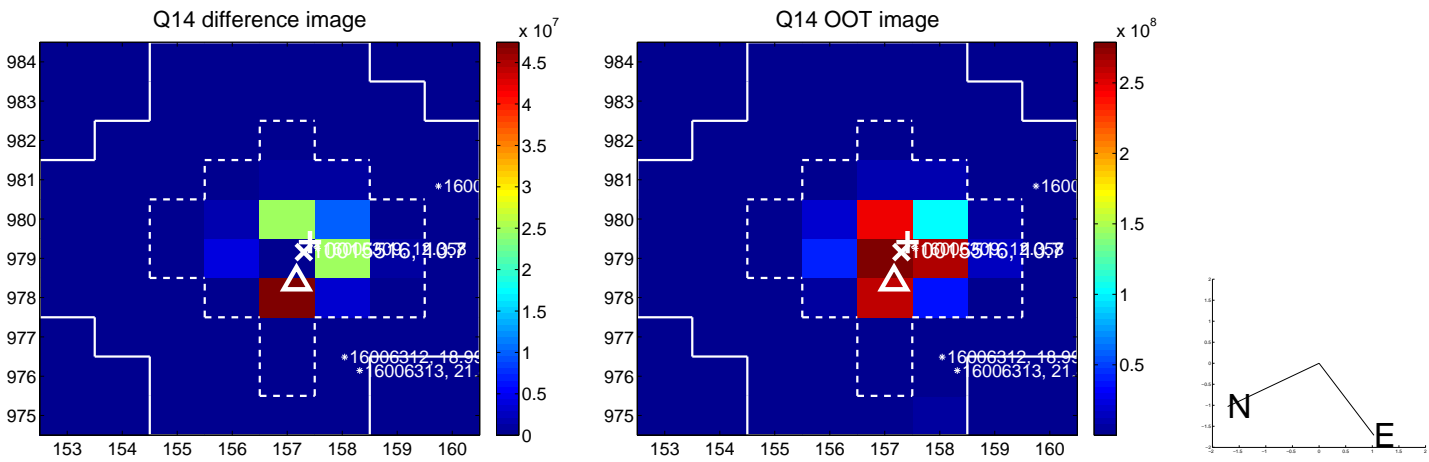
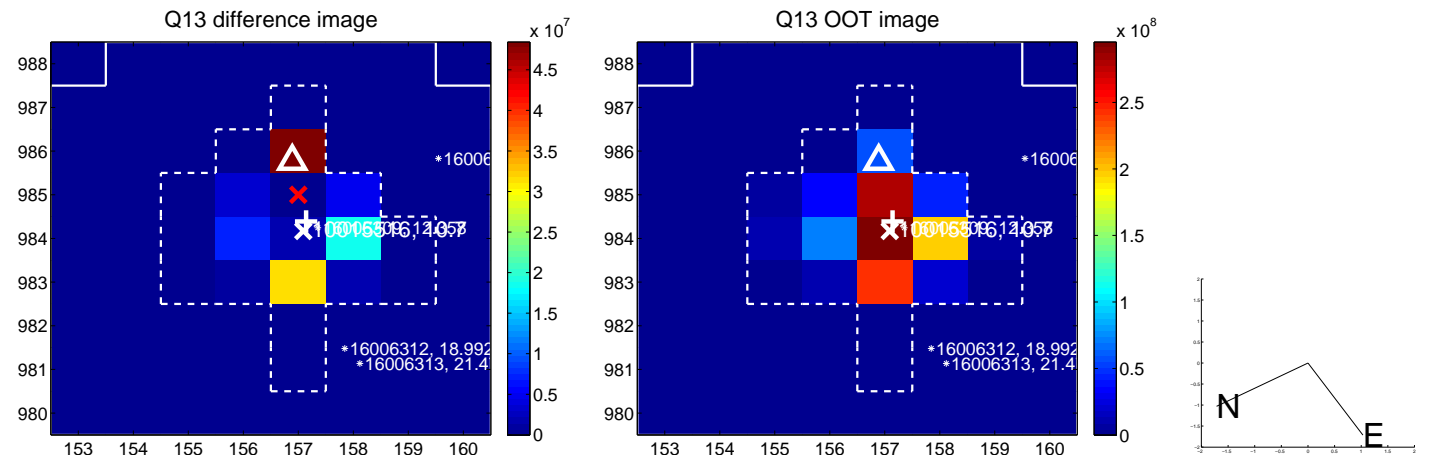
Q12 no difference image



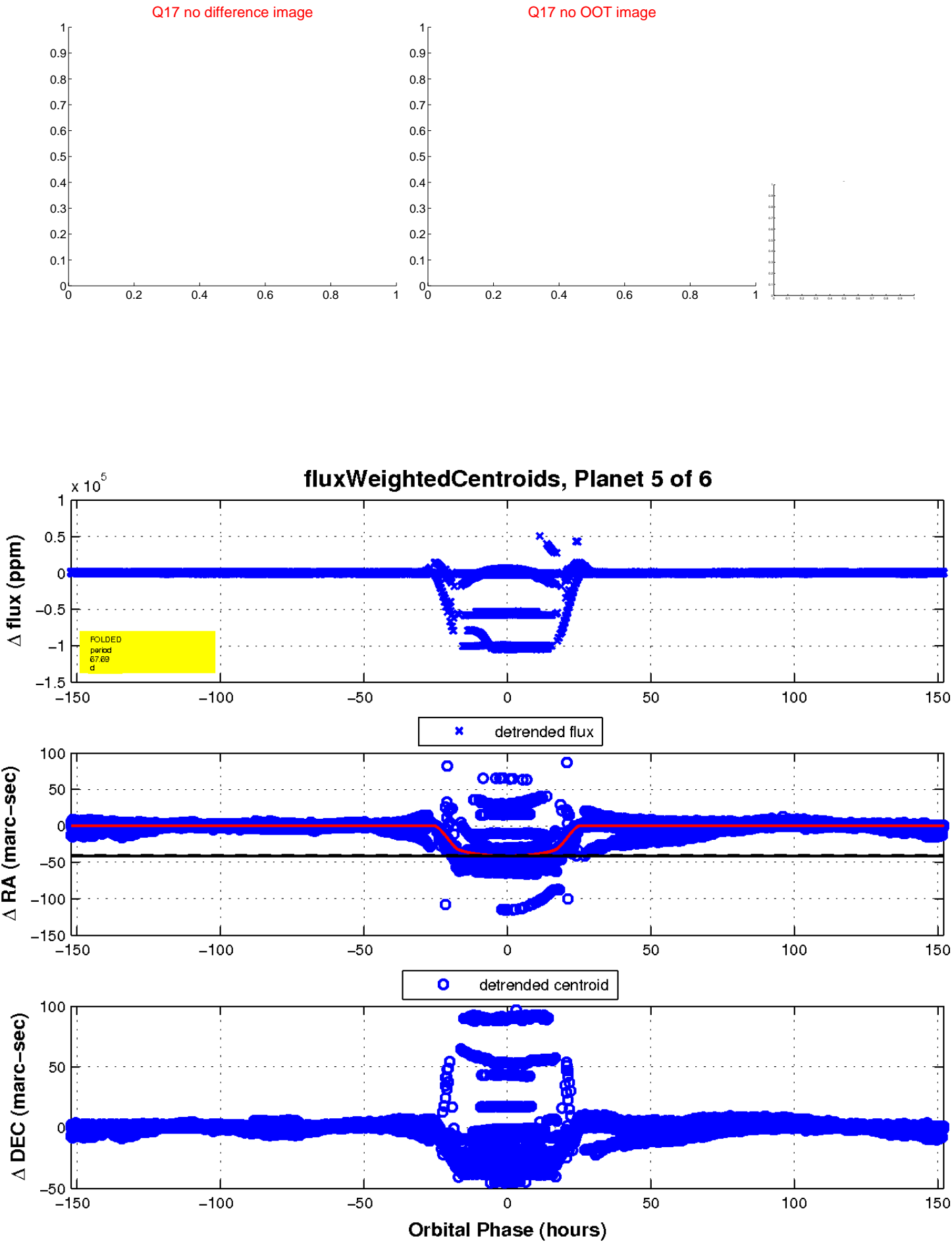
Q12 no OOT image



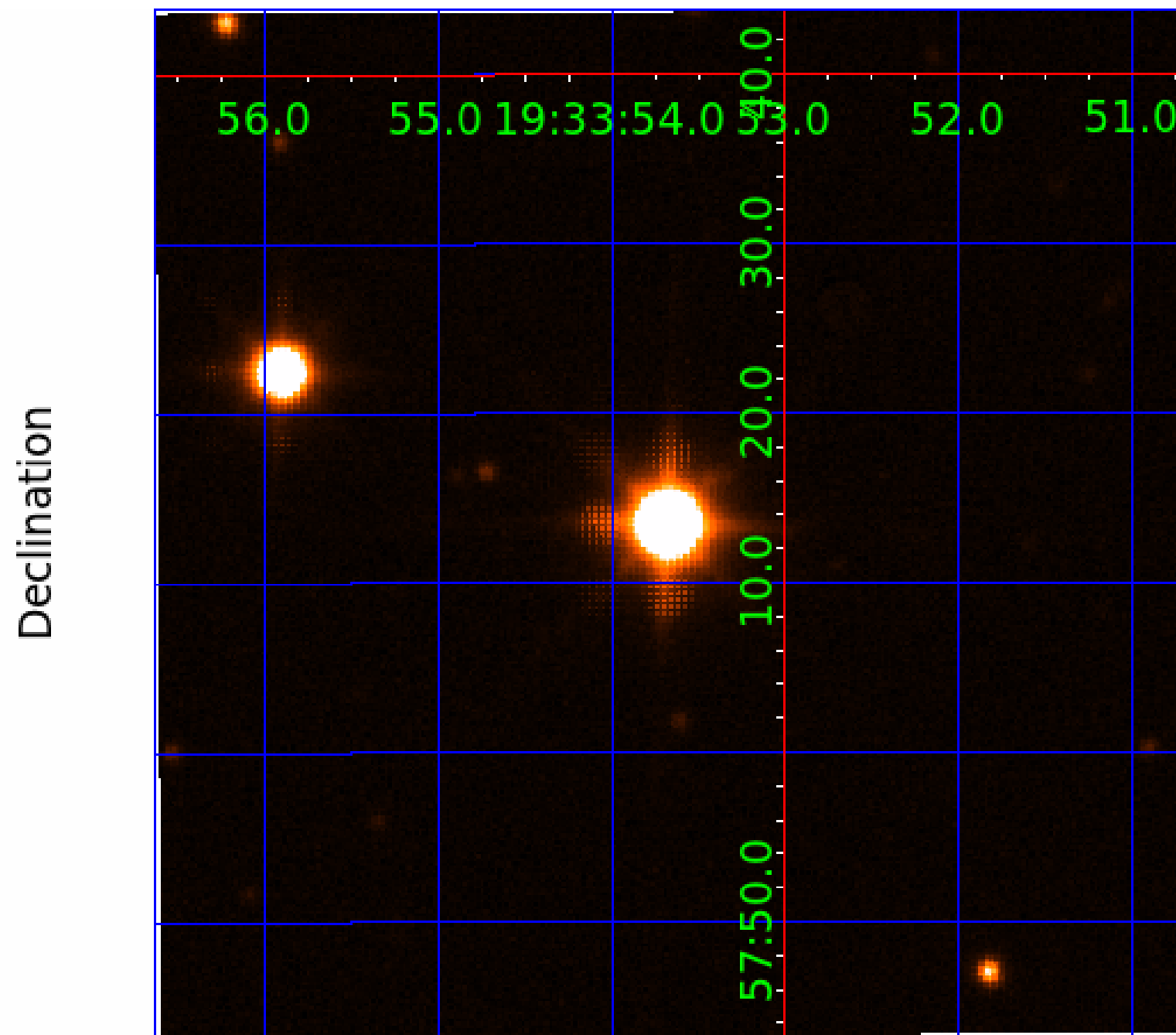
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



UKIRT Image



KIC 010015516

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})
010015516-01	OBS	No	203.054331	172.514115	3456.6	50.398	210.0	127.3	4.06	5374	26.77	19.19
010015516-02	OBS	No	338.463157	240.070106	106215.5	58.718	213.7	359.6	4.06	5374	130.64	9.71
010015516-05	OBS	No	67.692101	172.377510	2730.5	50.673	102.3	239.8	4.06	5374	24.25	83.01
010015516-06	OBS	No	338.488733	138.540138	264.1	15.000	50.3	-1.0	4.06	5374	6.49	9.71

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010015516-01	OBS	FP	0.00	1	0	0	0	ALL_TRANS_CHASES—CENT_SATURATED
010015516-02	OBS	FP	0.00	1	0	0	0	ALL_TRANS_CHASES—CENT_SATURATED
010015516-05	OBS	FP	0.00	1	0	1	0	TRANS_GAPPED—SAME_NTL_PERIOD—CENT_SATURATED—HALO_GHOST
010015516-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—SAME_NTL_PERIOD—CENT_SATURATED

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 010015516-06

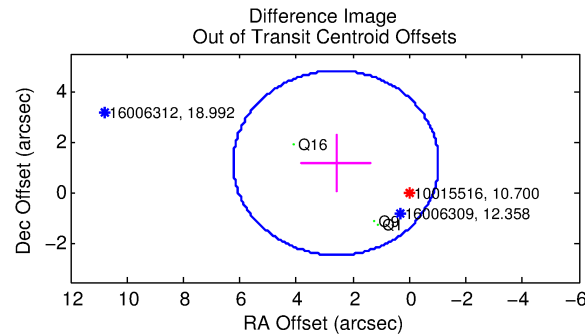
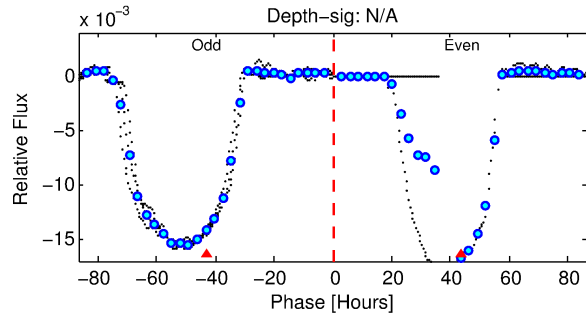
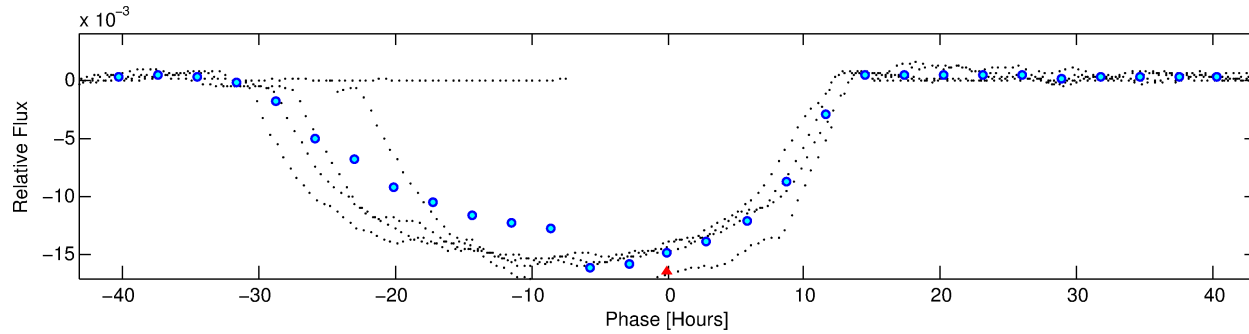
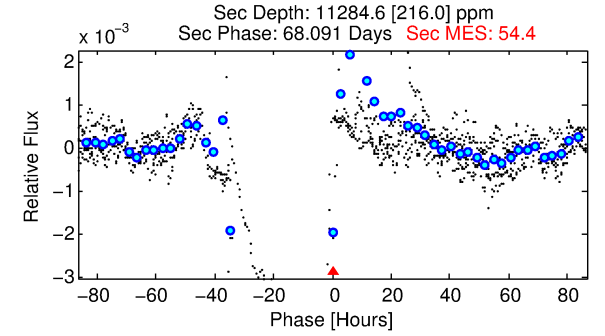
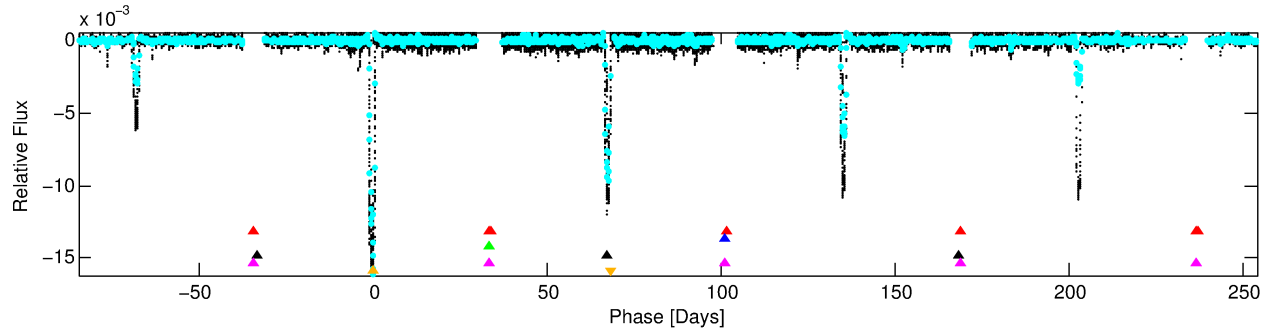
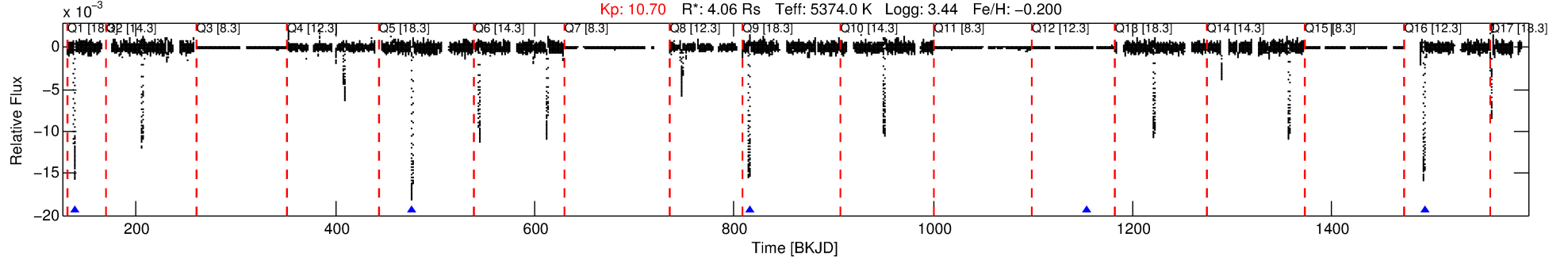
No Significant Match Found

DV One-Page Summary

KIC: 10015516 Candidate: 6 of 6 Period: 338.489 d

KOI: K00990 Corr: No Ephemeris Match

Kp: 10.70 R*: 4.06 Rs Teff: 5374.0 K Logg: 3.44 Fe/H: -0.200



TPS TCE Results:

Period = 338.48873 d
Epoch = 138.5401 BKJD

DV fit results are unavailable

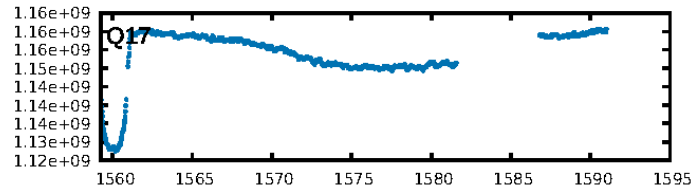
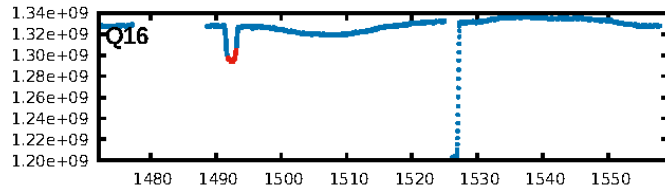
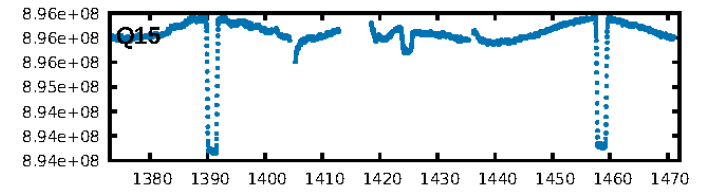
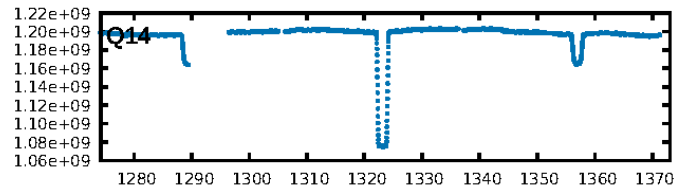
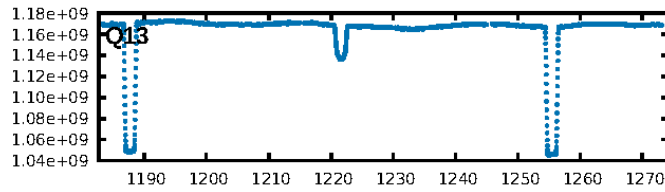
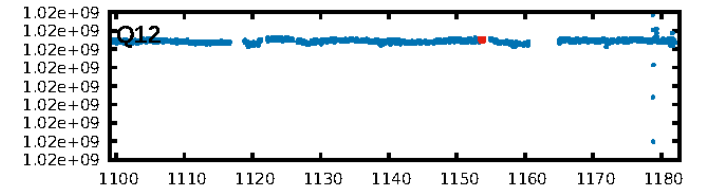
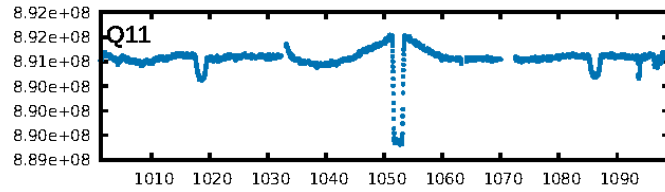
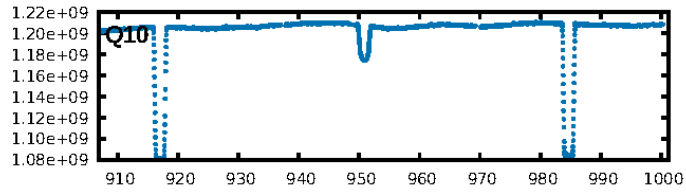
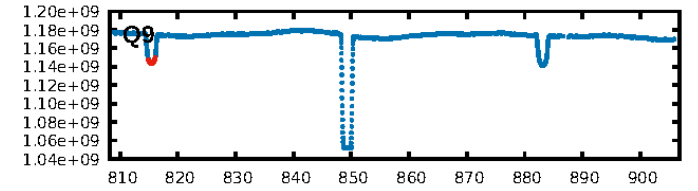
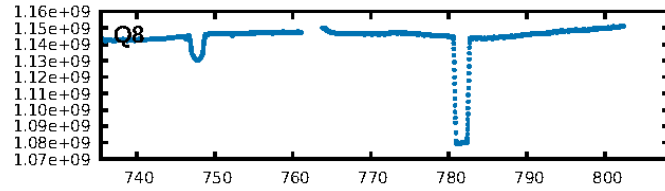
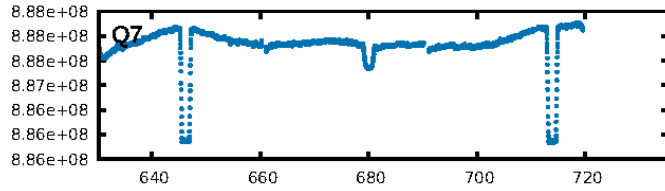
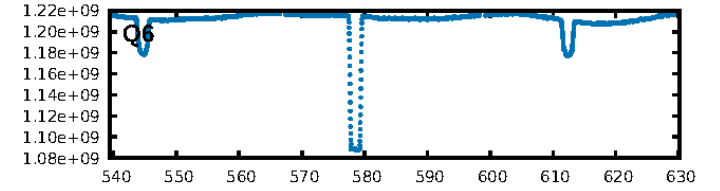
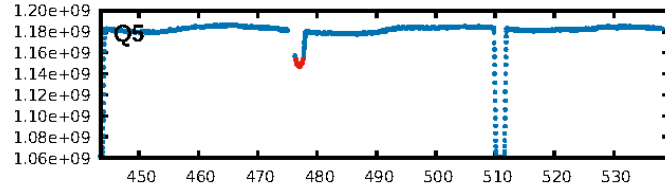
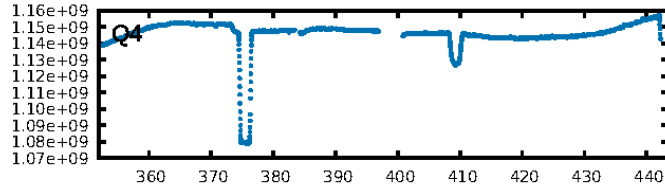
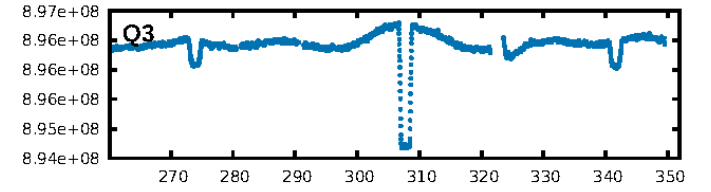
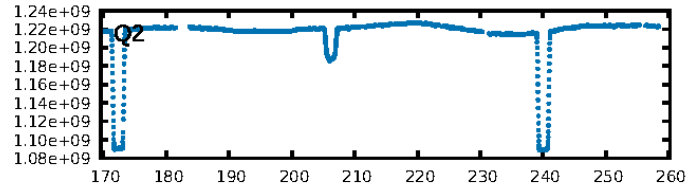
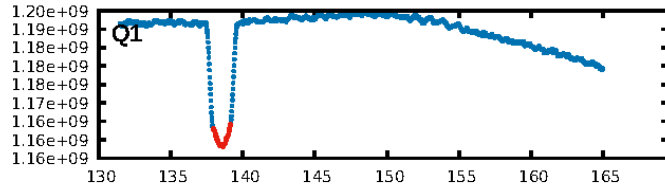
DV Diagnostic Results:

ShortPeriod-sig: 0.1% [0.00σ]
LongPeriod-sig: 100.0% [100.45σ]
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: N/A
RollingBand-fgt: 1.00 [4/4]
GhostDiagnostic-chr: 1.273
Centroid-sig: N/A
Centroid-so: 0.198 arcsec [8.50σ]
OotOffset-rm: 2.860 arcsec [2.36σ]
KicOffset-rm: 2.195 arcsec [1.76σ]
OotOffset-st: 0/0/1/2 [3]
KicOffset-st: 0/0/1/2 [3]
DiffImageQuality-fgm: 0.33 [1/3]
DiffImageOverlap-fno: 1.00 [3/3]

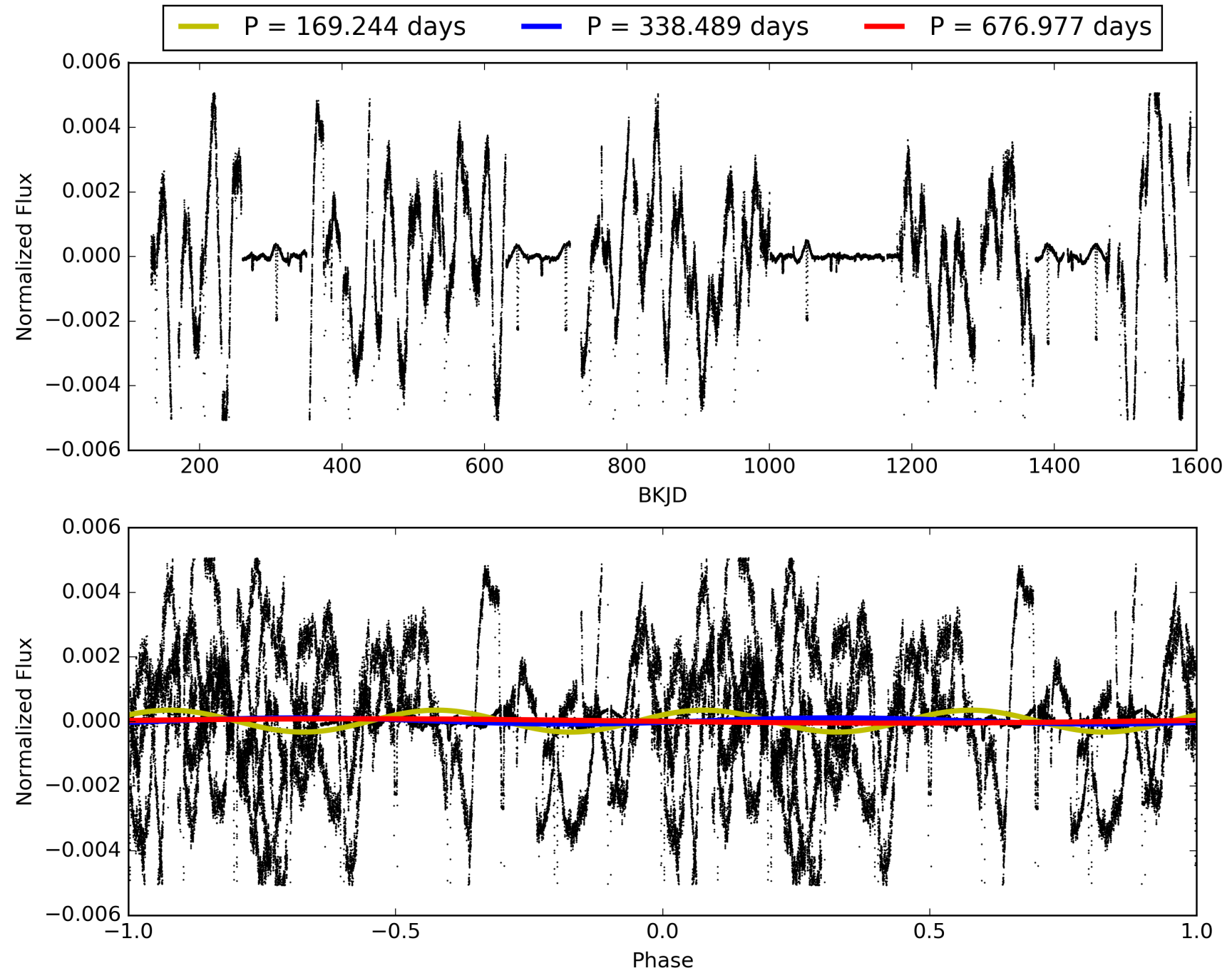
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 01:36:39 Z

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

TCE 010015516-06, PDC Light Curves

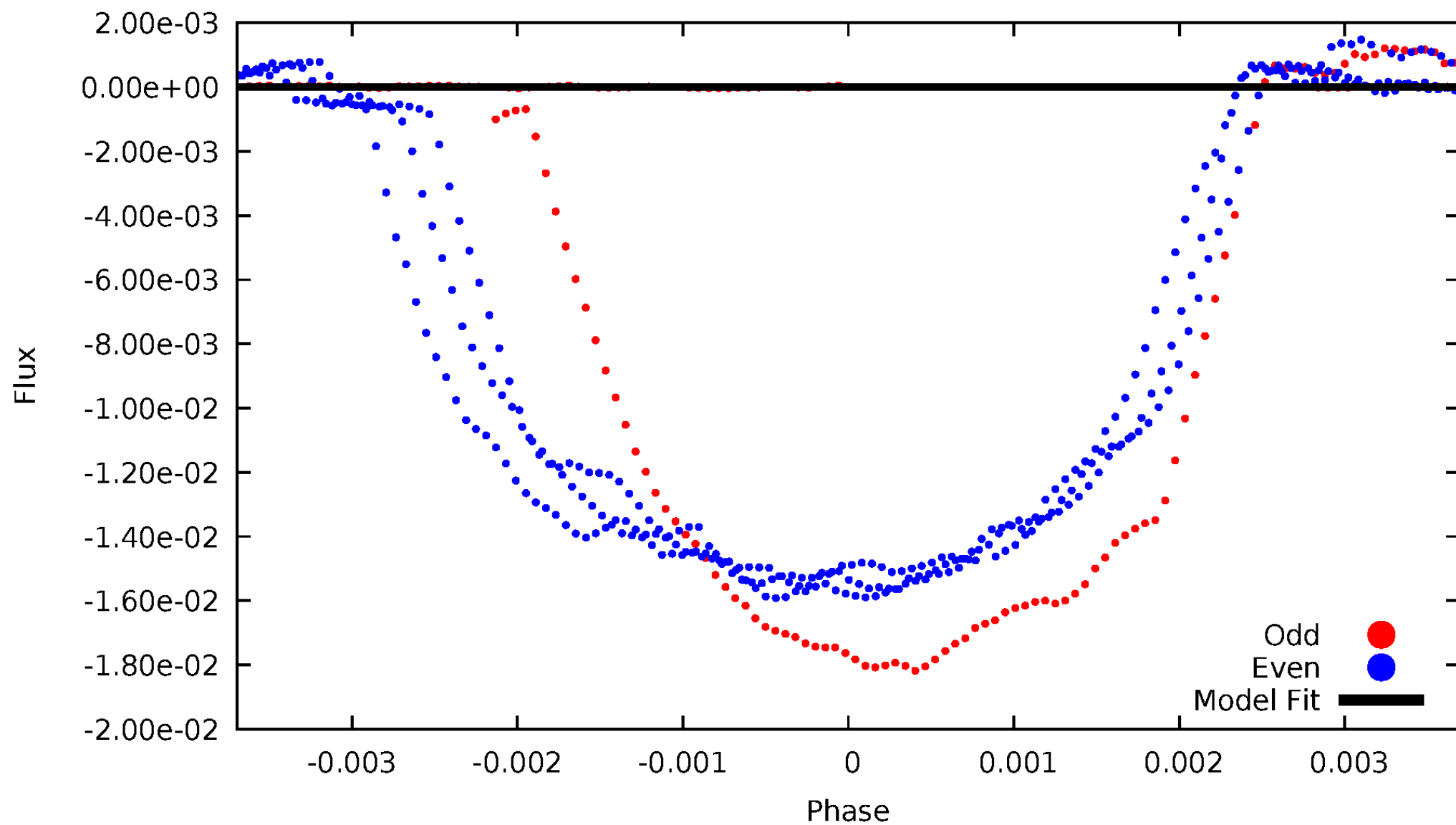


TCE 010015516-06



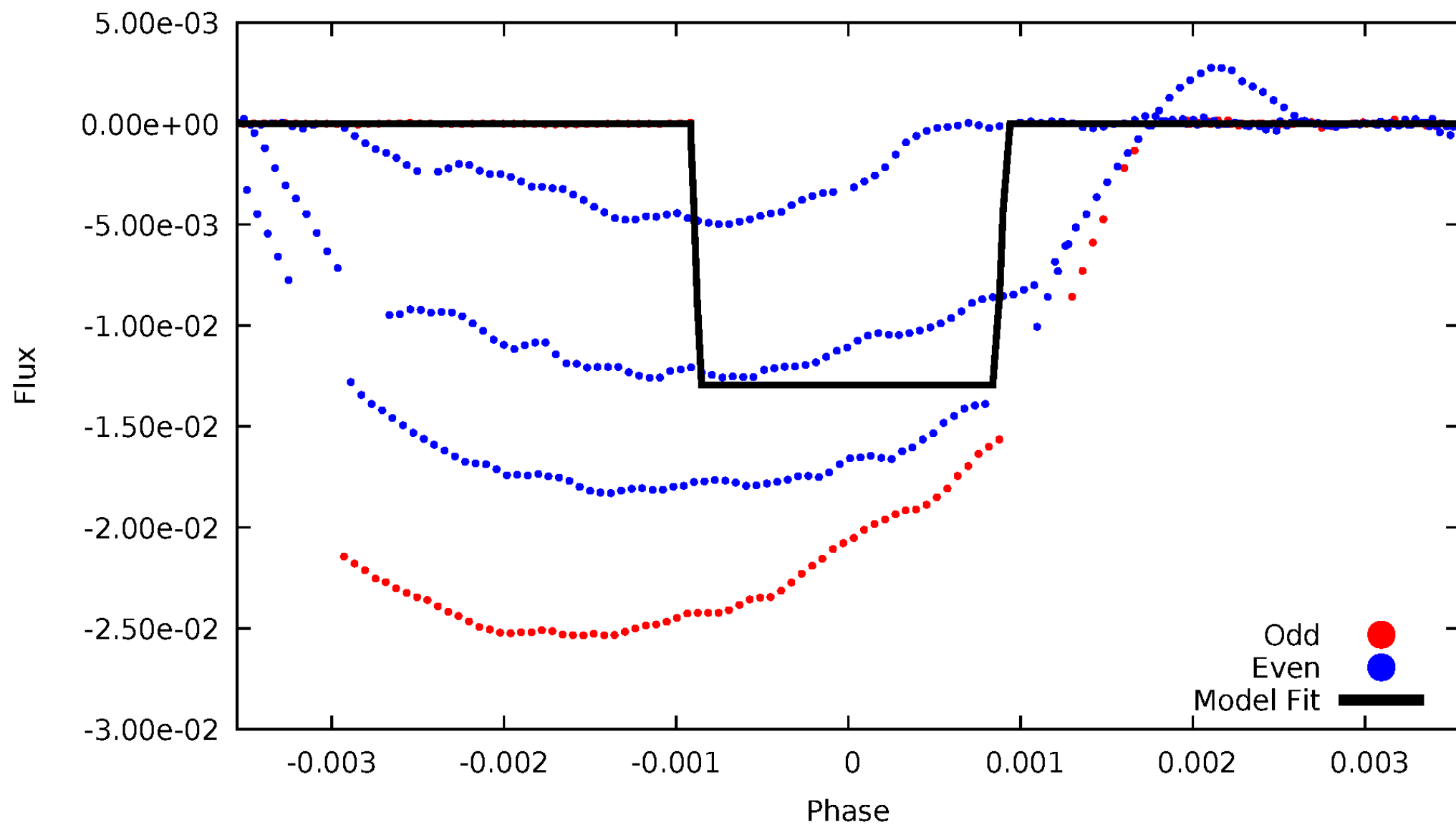
DV Odd/Even

TCE 010015516-06



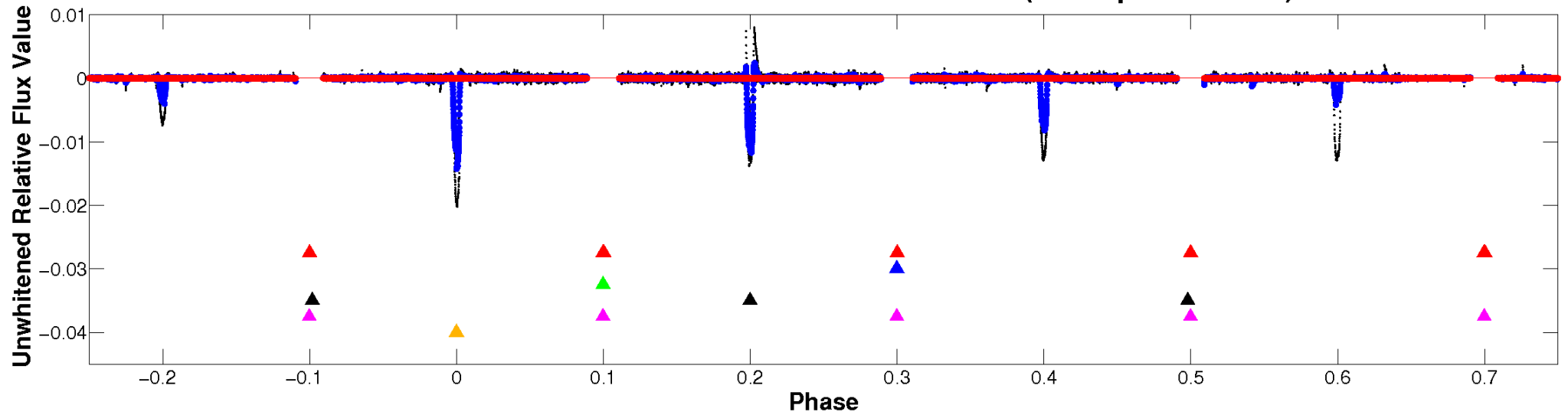
ALT Odd/Even

TCE 010015516-06

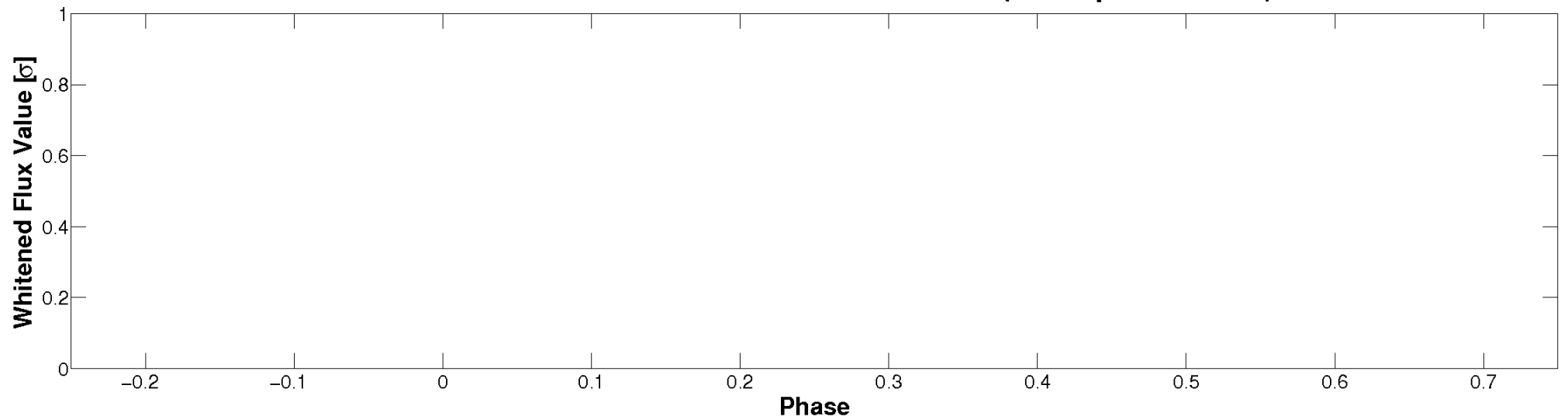


Non-Whitened Vs. Whitened Light Curve

Planet 6 : Phased Unwhitened Flux Time Series (TPS Epoch/Period)

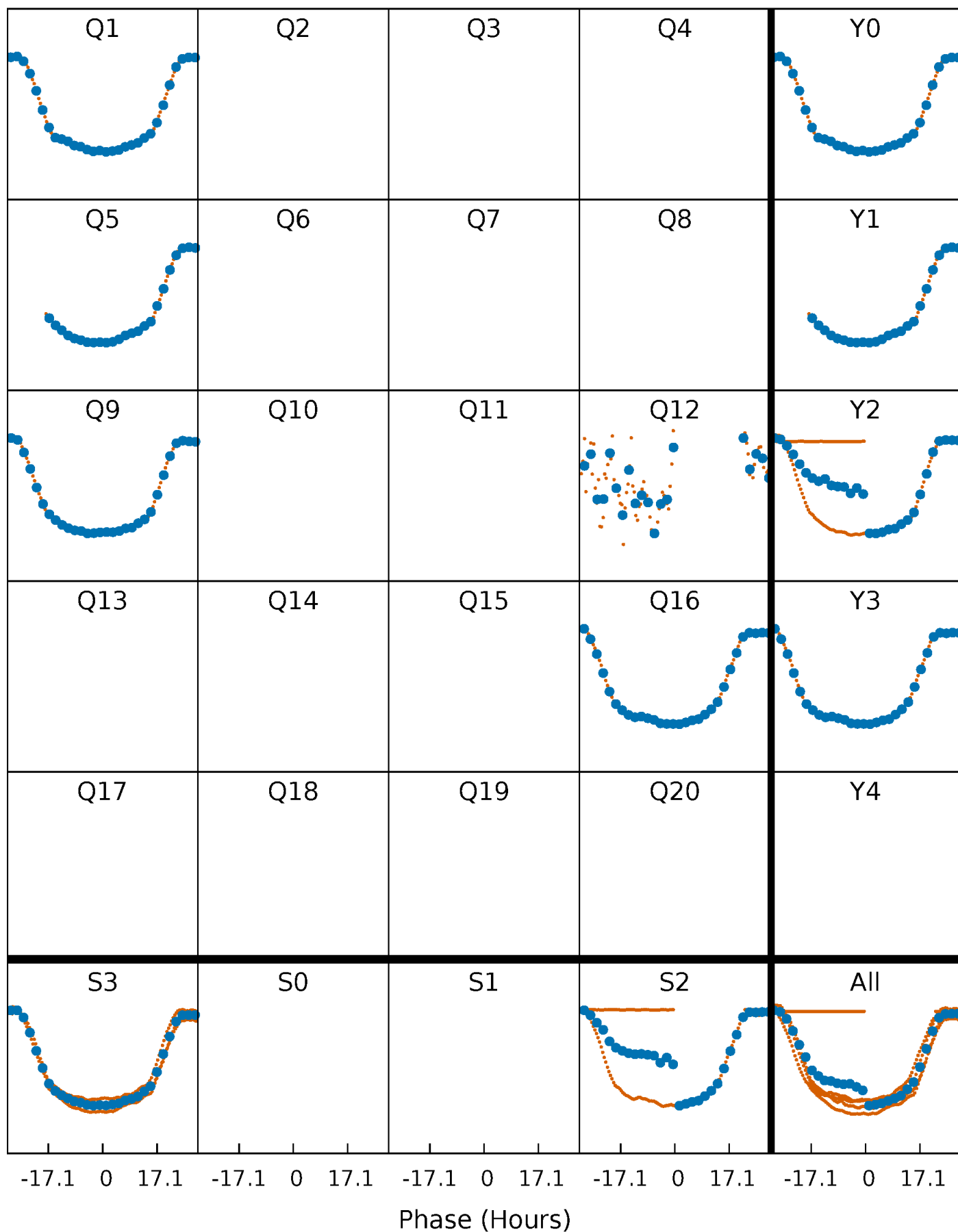


Planet 6 : Phased Whitened Flux Time Series (TPS Epoch/Period)



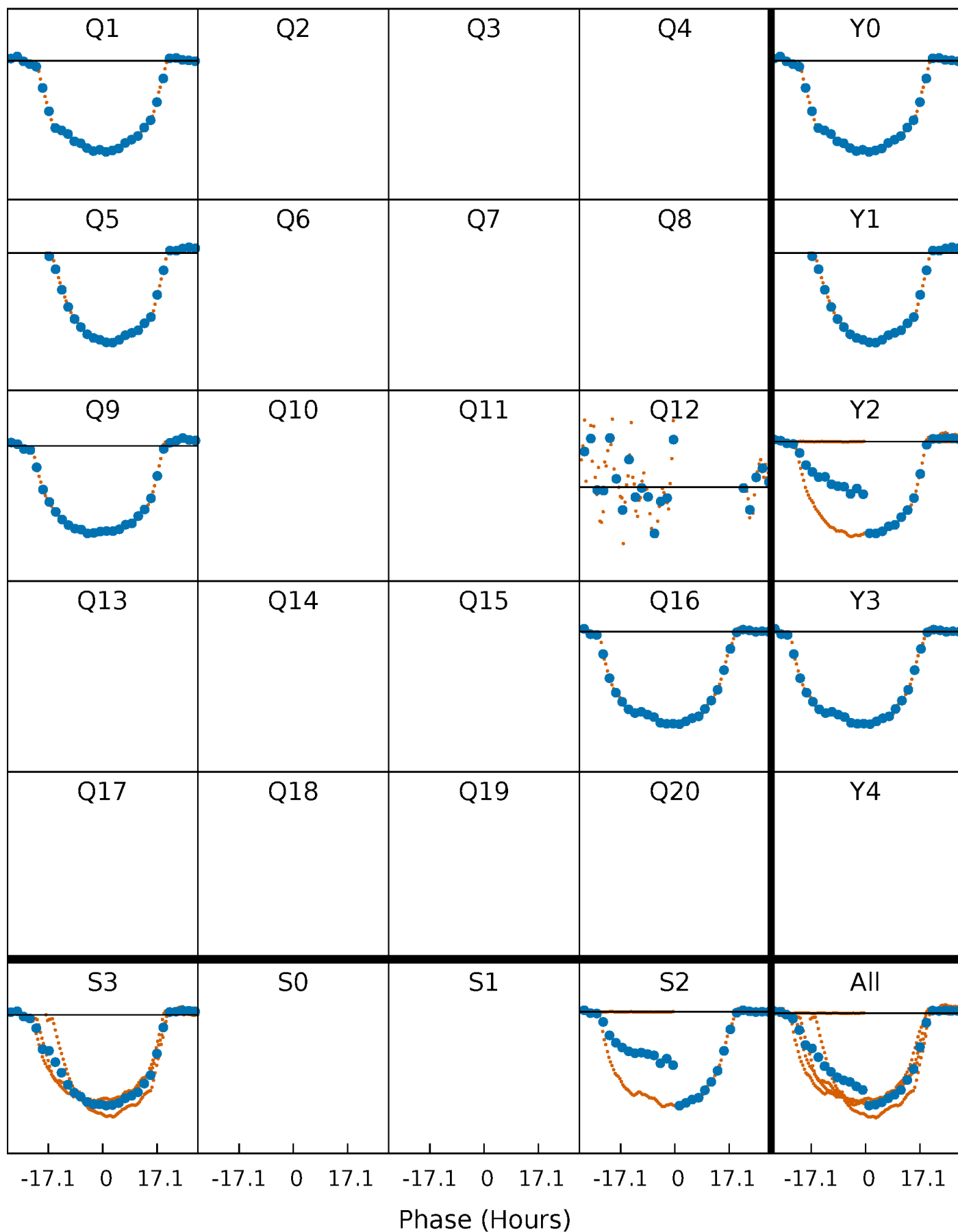
PDC Quarter-Phased Transit Curves

TCE 010015516-06 P=338.488733 Days $T_0=138.540139$ (BKJD)



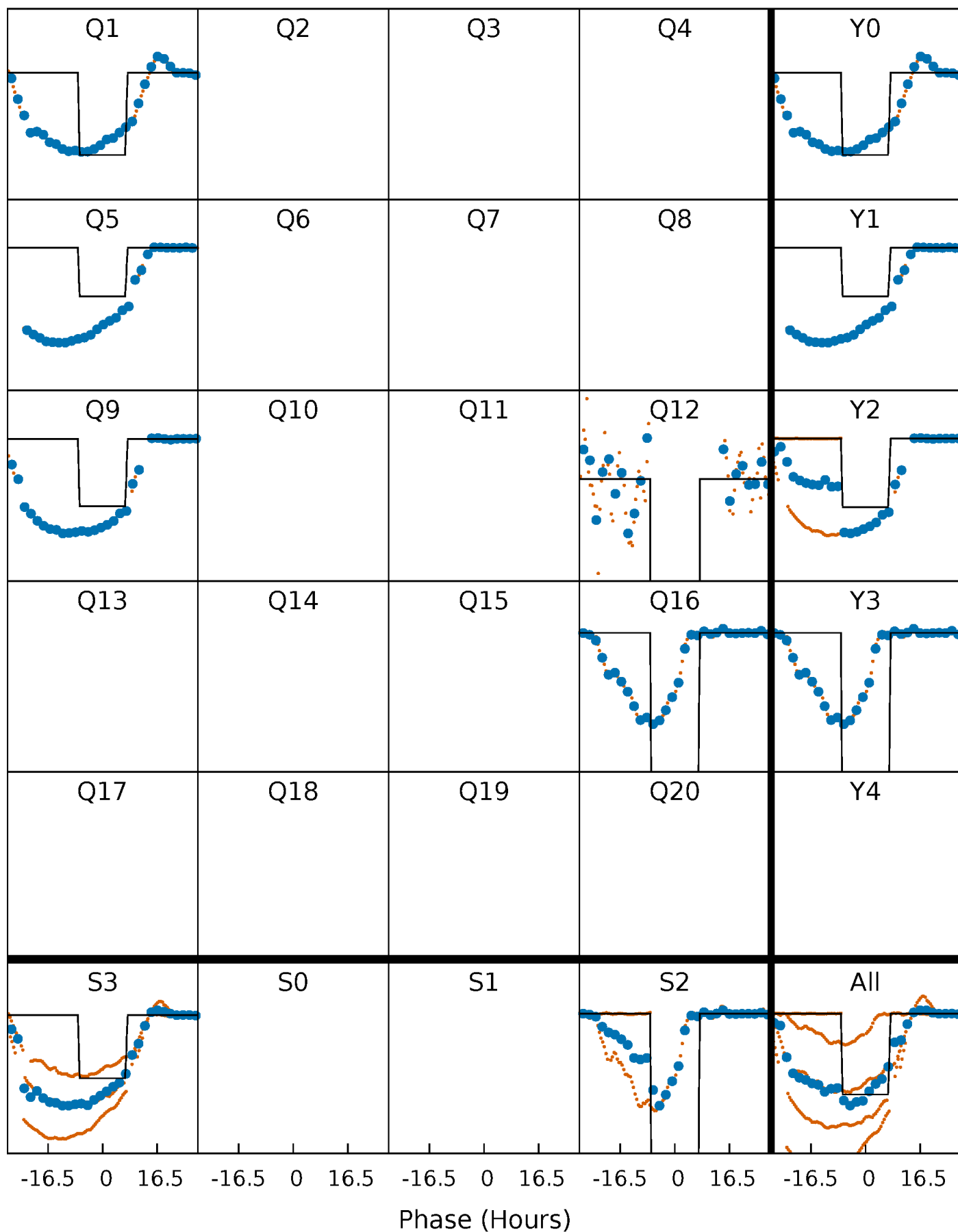
DV Quarter-Phased Transit Curves

TCE 010015516-06 P=338.488733 Days $T_0=138.540139$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

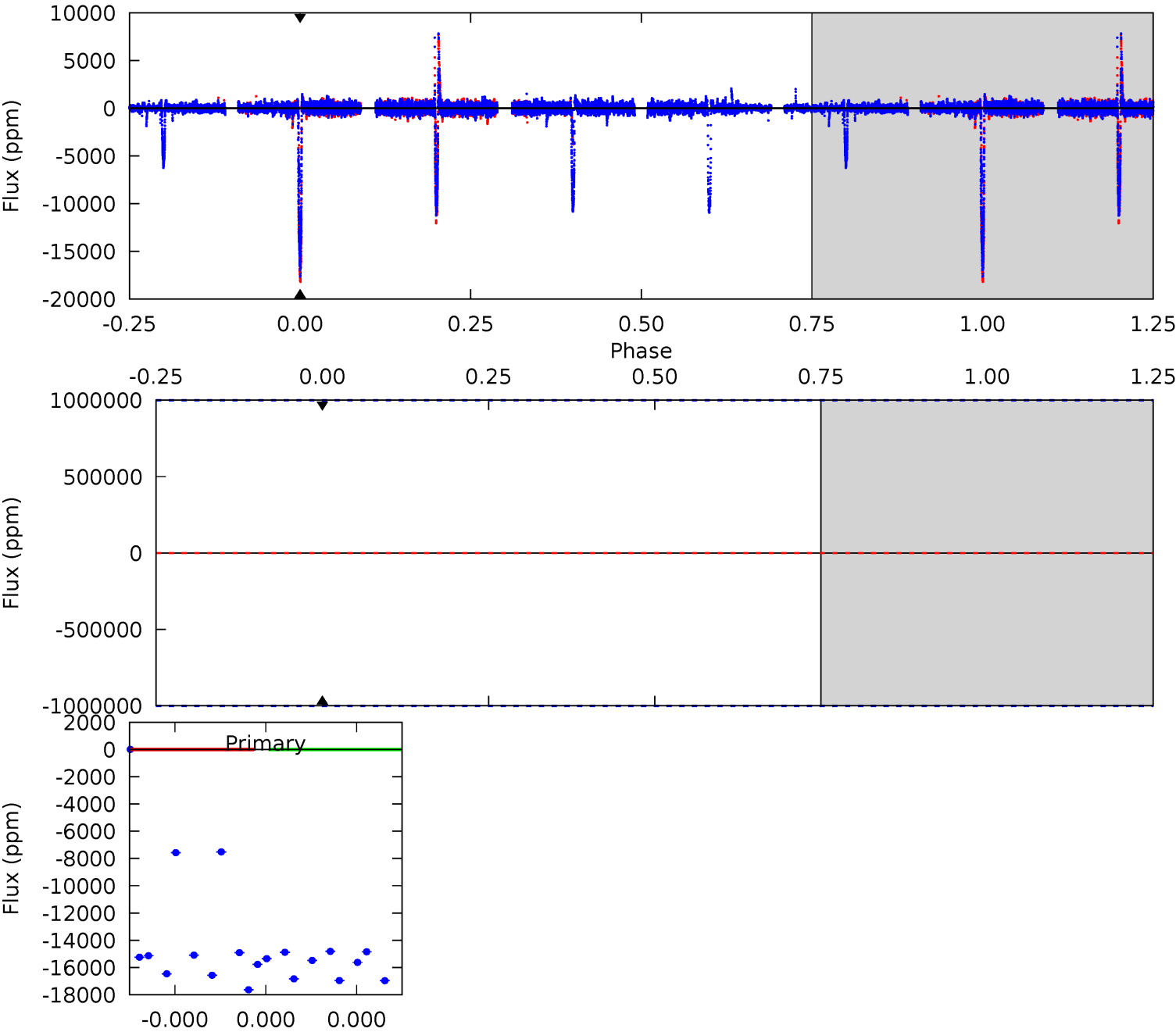
TCE 010015516-06 P=338.488733 Days $T_0=138.829954$ (BKJD)



DV Model-Shift Uniqueness Test

010015516-06, P = 338.488733 Days, E = 138.540139 Days

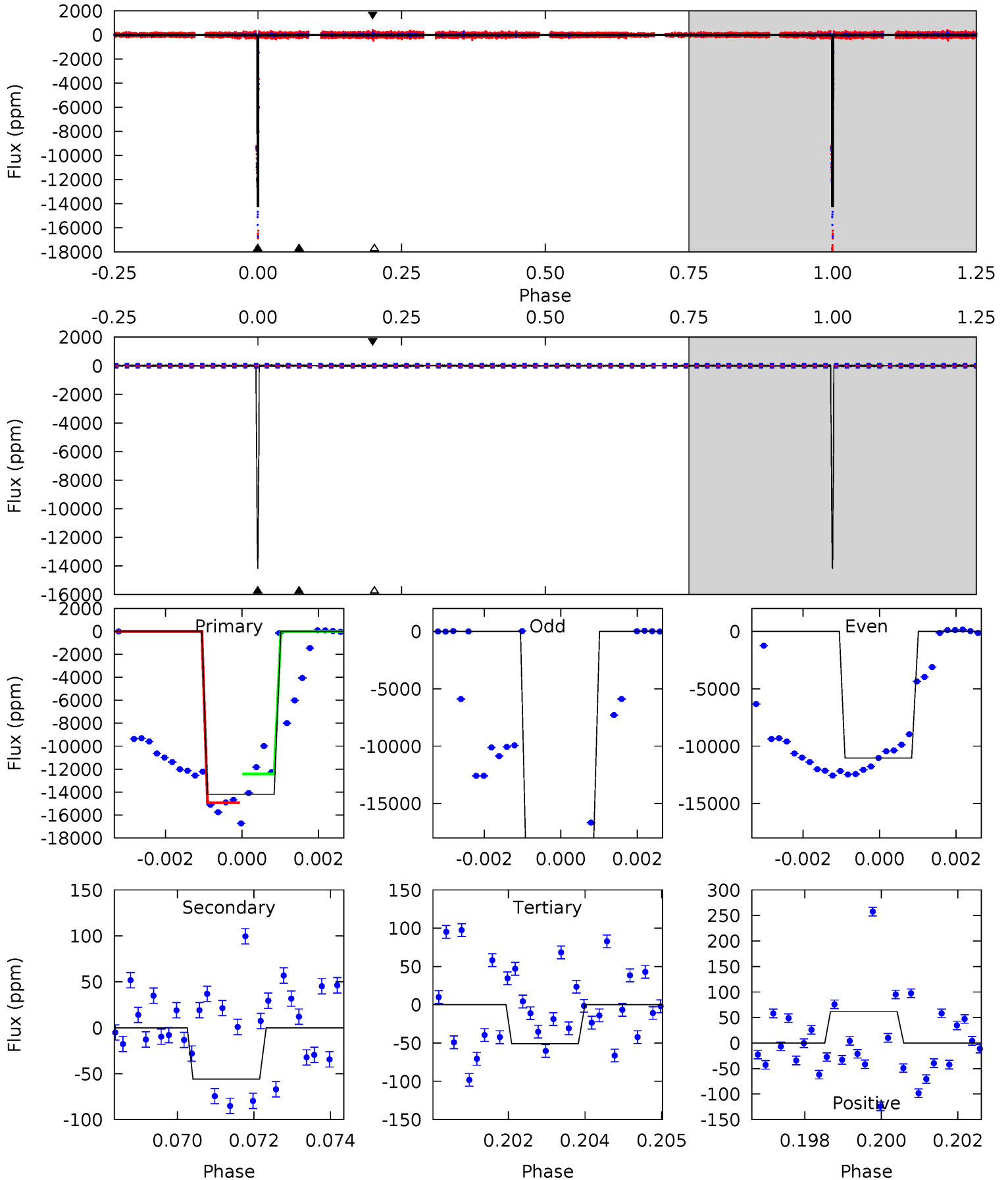
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



Alt Model-Shift Uniqueness Test

010015516-06, P = 338.488733 Days, E = 138.829954 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
614.2	2.42	2.20	2.66	5.34	3.11	4.36	612.0	611.5	0.22	-0.24	140.4	0.93	0.00	0



Stellar Parameters For KIC 010015516

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	5374^{+128}_{-225}	$3.442^{+0.247}_{-0.133}$	$-0.200^{+0.200}_{-0.350}$	$4.061^{+0.757}_{-1.406}$	$1.665^{+0.204}_{-0.611}$	$0.035^{+0.060}_{-0.012}$
	+2%/-4%	+7%/-4%	+100%/-175%	+19%/-35%	+12%/-37%	+172%/-35%
Source	PHO1	FLK73	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 010015516-06 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	A_{obs}
DV	0 ± 1000000	$32.41^{+33.05}_{-23.00}$	619^{+42}_{-56}	-3355^{+21922}_{-11870}	$-241.829^{+143596.855}_{-100889.148}$
Alt.	-56 ± 23	$54.42^{+38.61}_{-35.35}$	618^{+44}_{-55}	2204^{+604}_{-265}	12^{+87}_{-8}

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

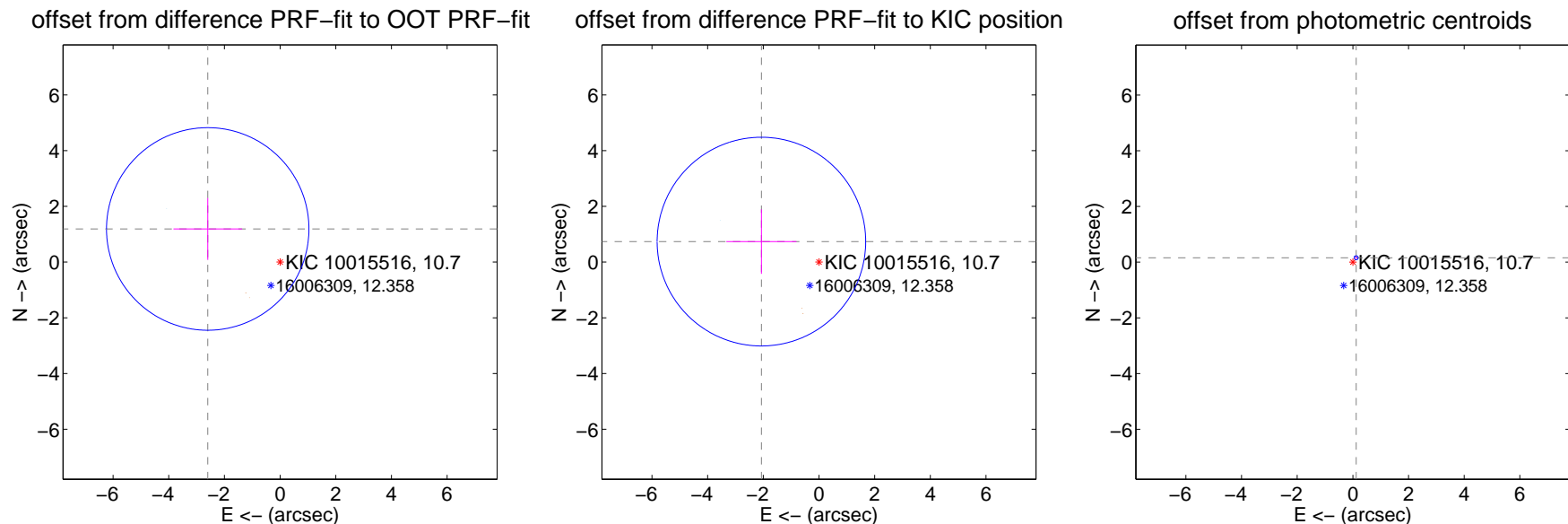
DV Centroid Data

Supplemental centroid analysis for 010015516-06. **Kepler magnitude: 10.70.** Transit SNR -1.00

There are 1 quarters with good PRF difference image offsets

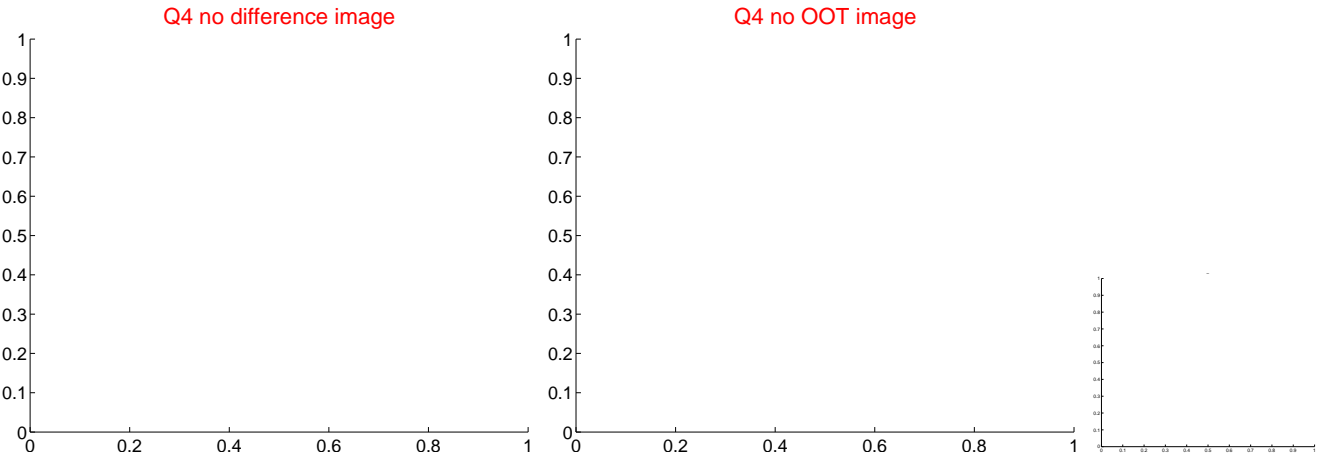
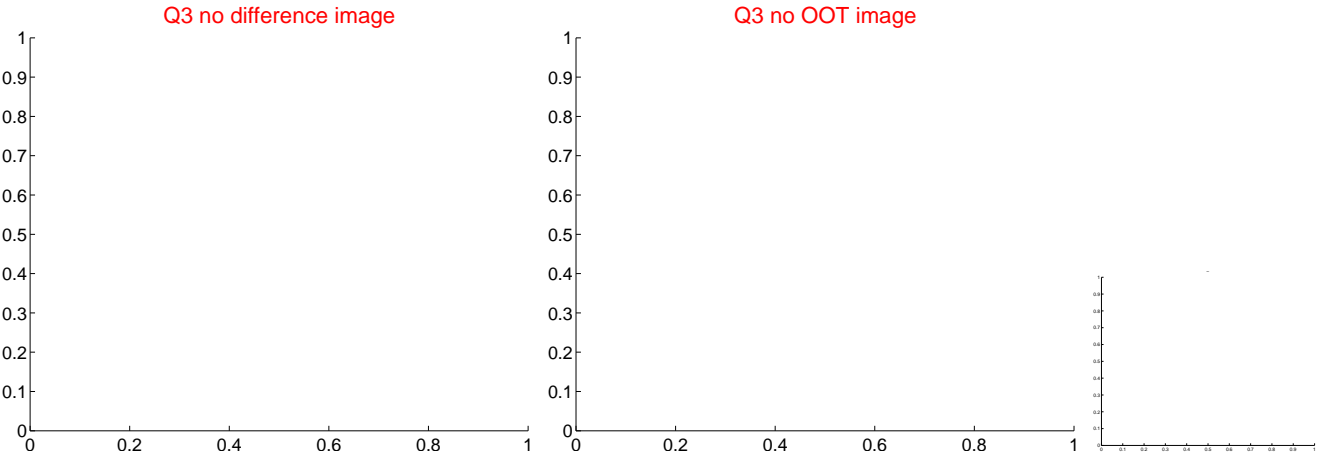
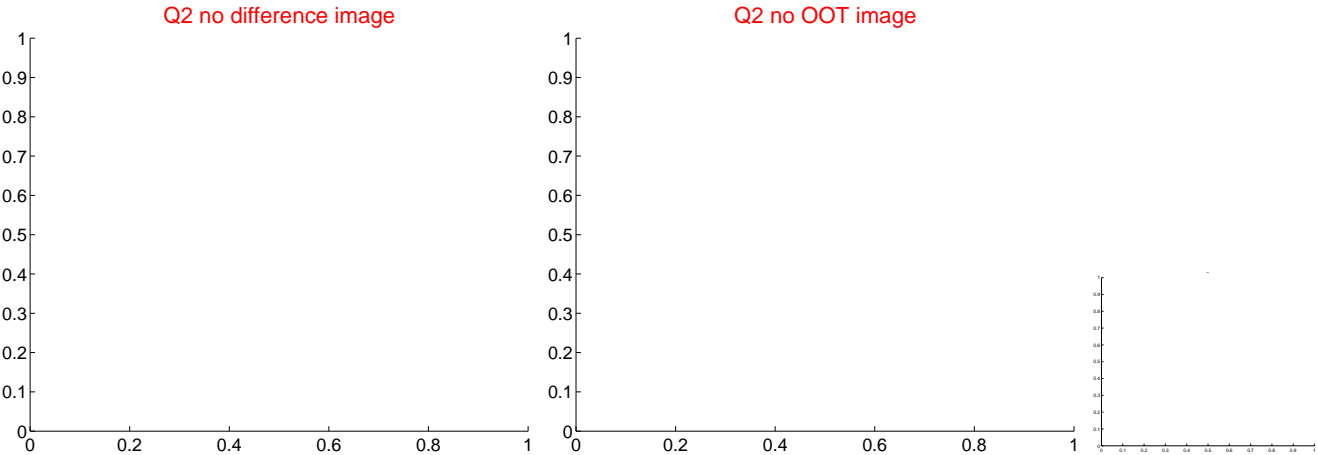
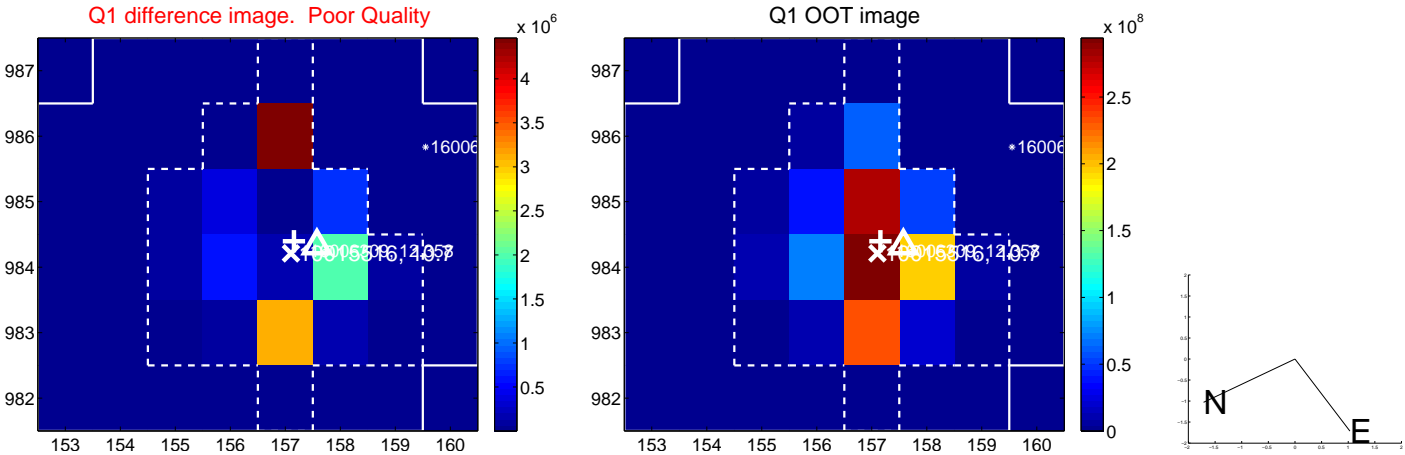
The direct PRF centroid is offset from the target star catalog position by about 0.68 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	2.860 ± 1.212	2.36	2.601 ± 1.232	1.190 ± 1.112
PRF-fit source offset from KIC position	2.195 ± 1.249	1.76	2.068 ± 1.260	0.735 ± 1.158
photometric centroid source offset	0.20 ± 0.02	8.50	-0.12 ± 0.03	0.16 ± 0.02



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.

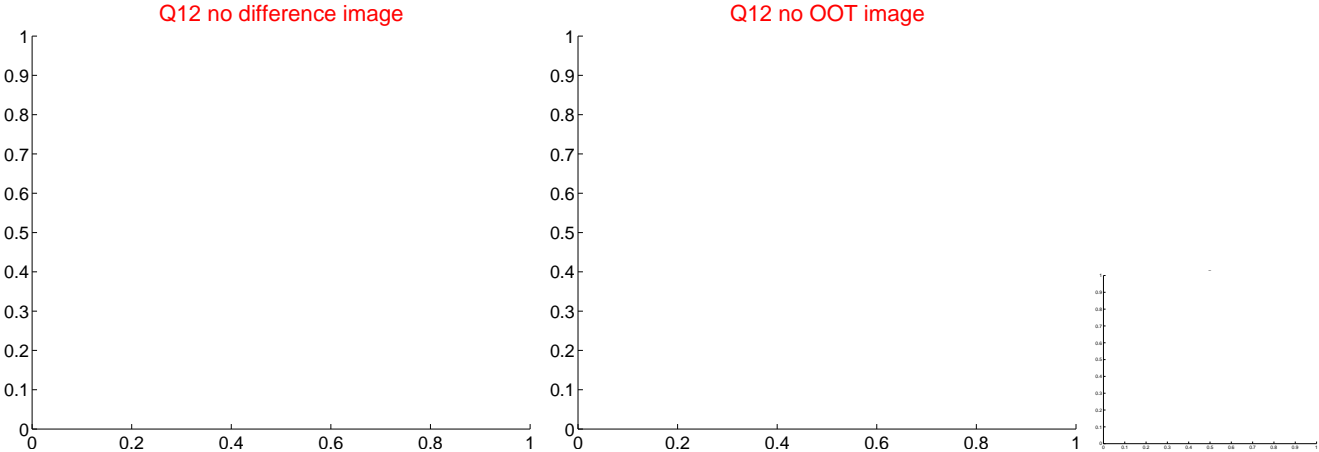
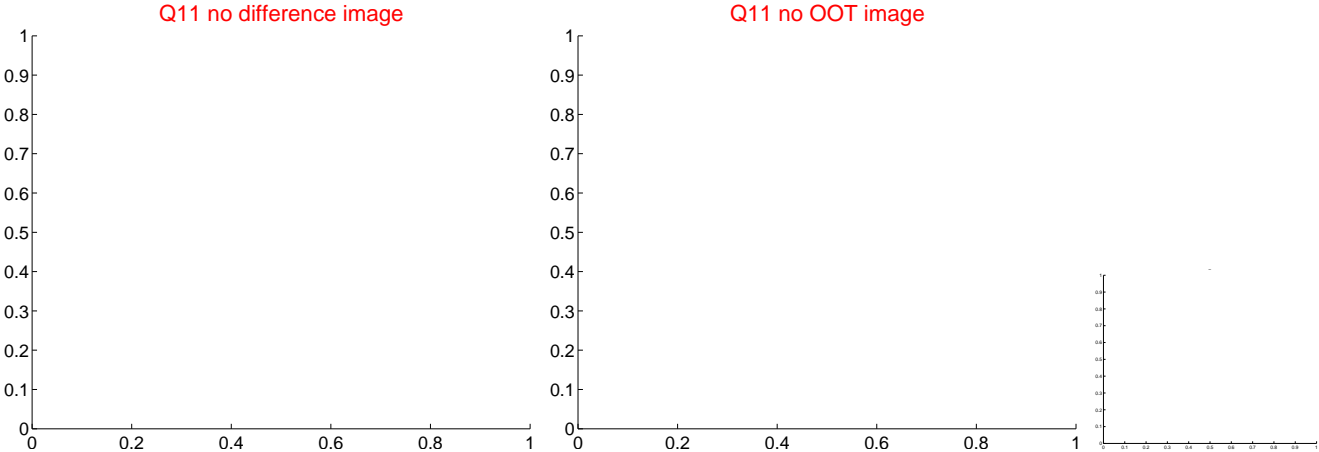
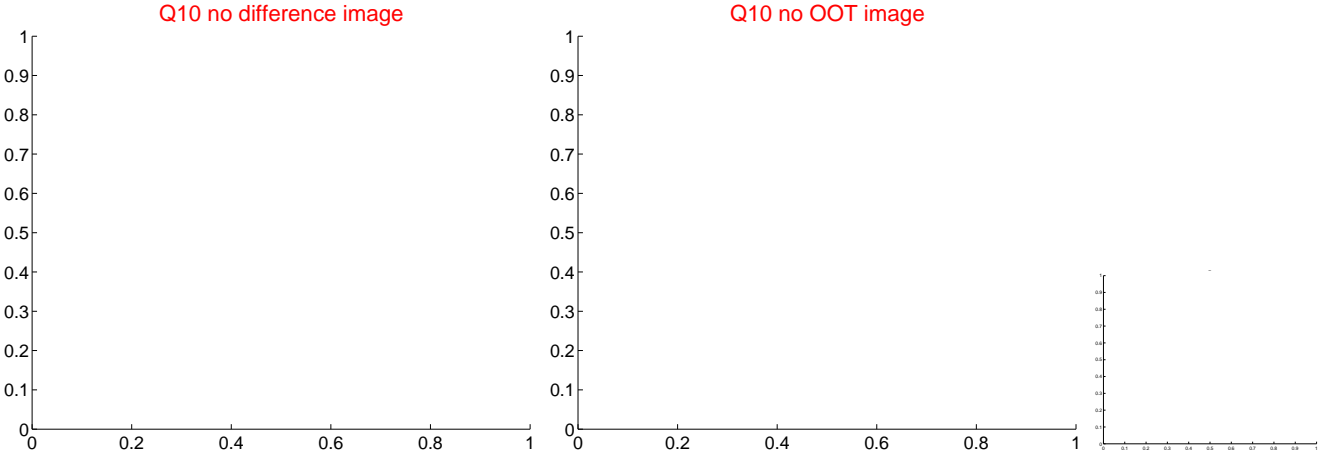
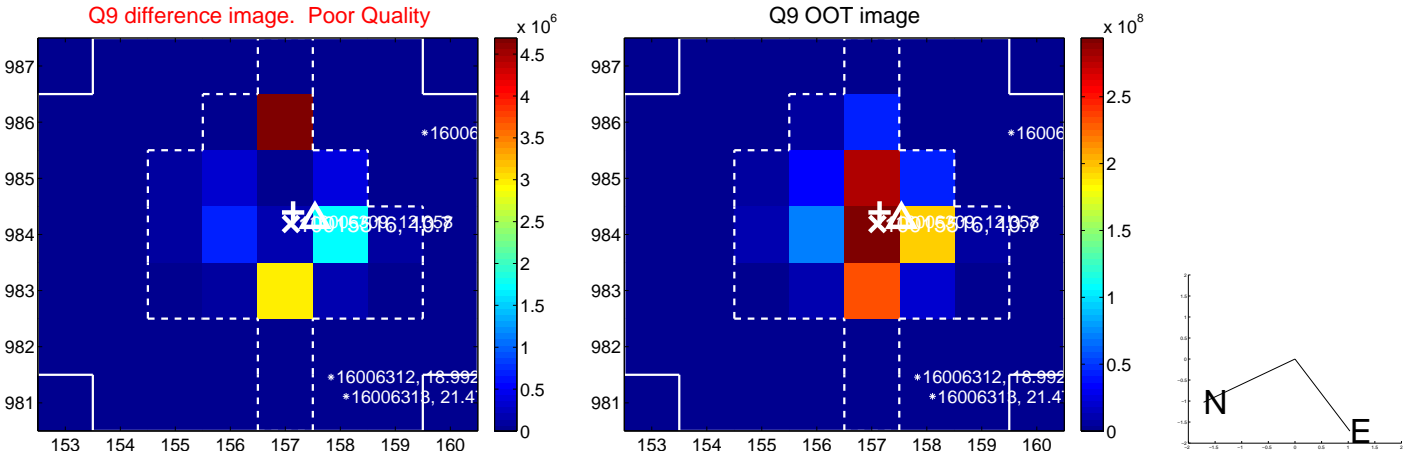
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



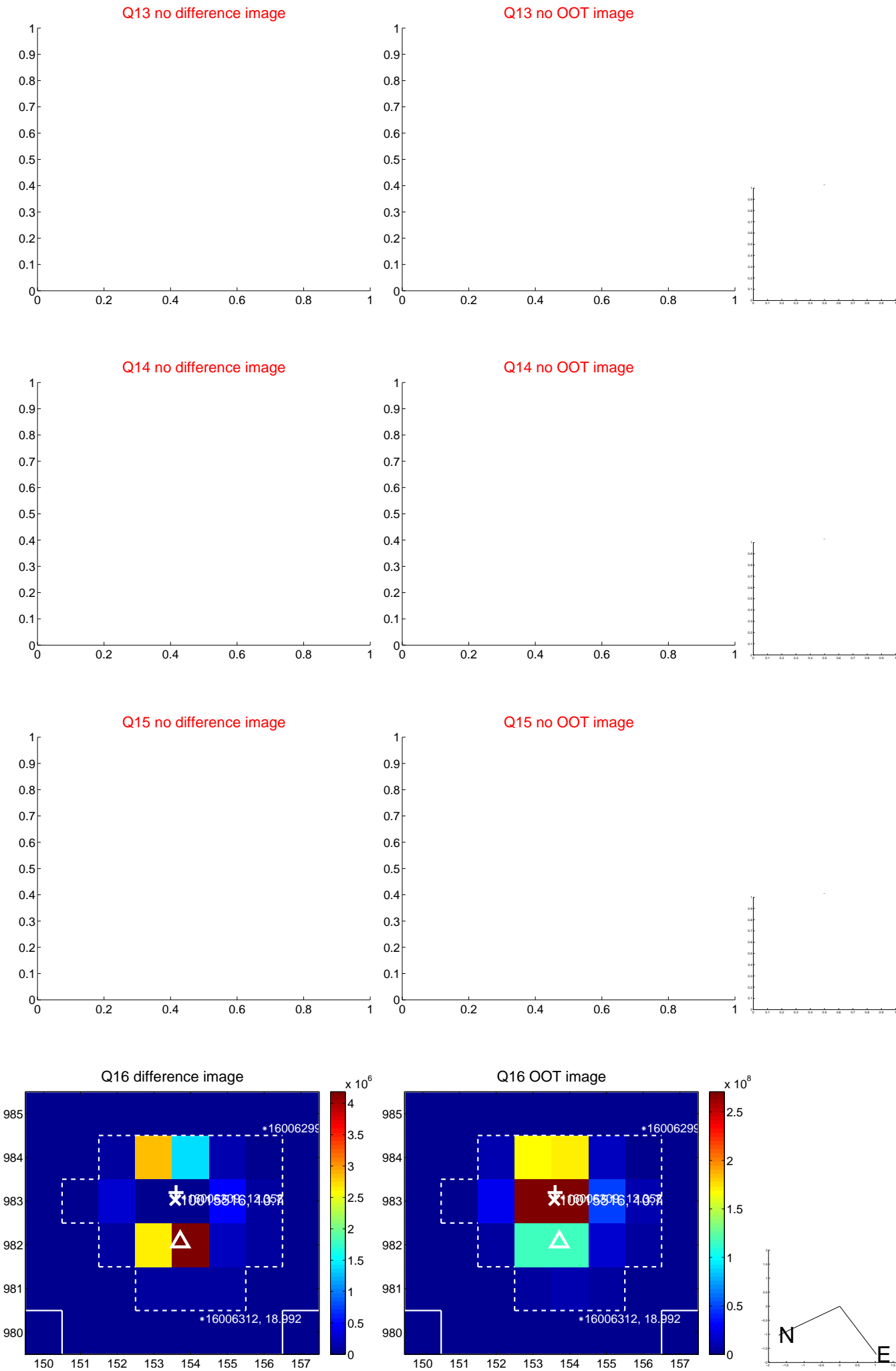
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



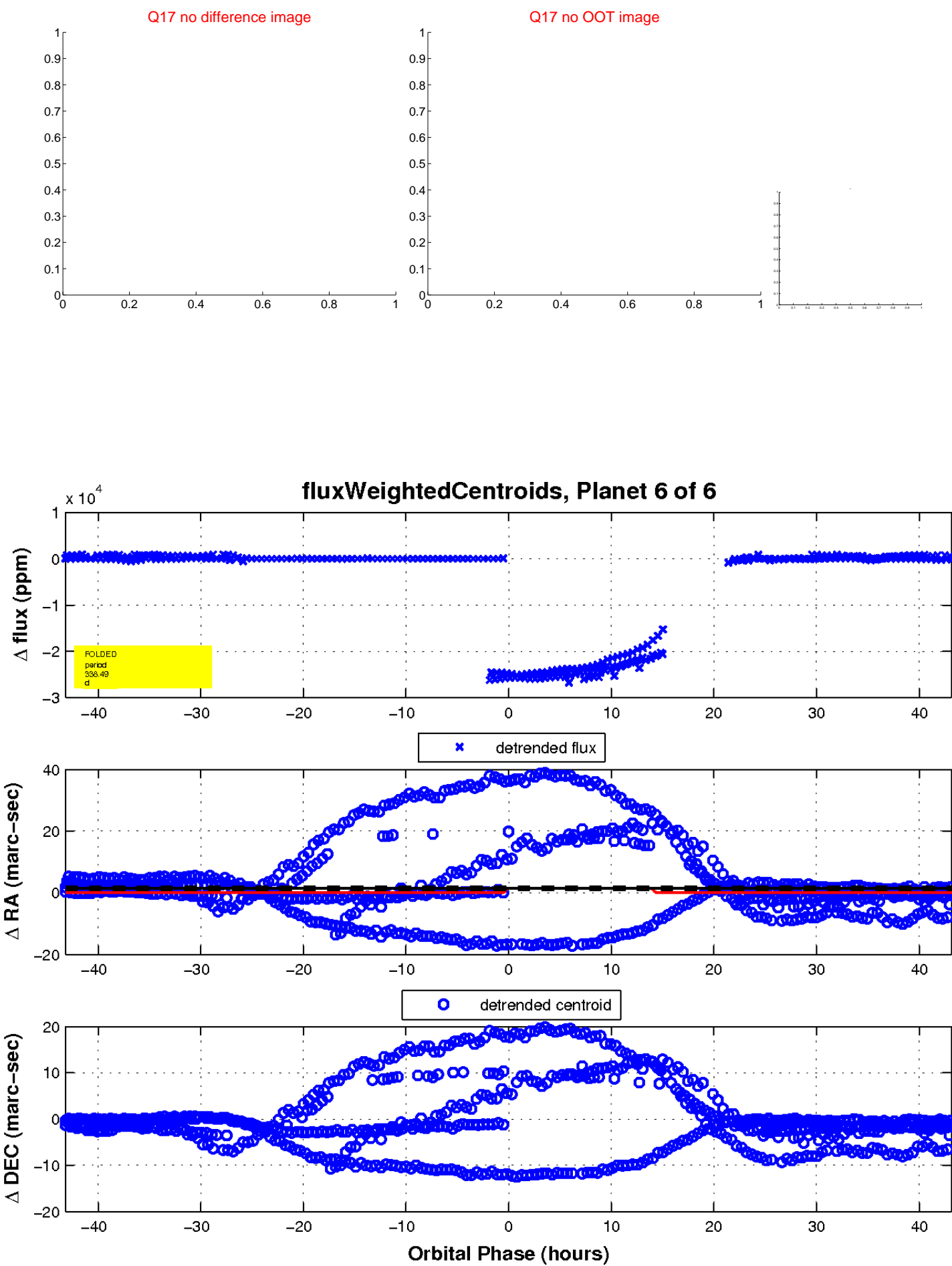
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

