

KIC 012156549

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})
012156549-01	OBS	No	284.848857	350.076252	3177.2	2.963	11.0	4.4	1.04	5888	6.21	1.70
012156549-02	OBS	No	417.044172	259.704533	11378.5	12.976	9.7	12.0	1.04	5888	11.29	1.02

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
012156549-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
012156549-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_SKYE—LPP_DV—MOD_NONUNIQ_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS

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

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

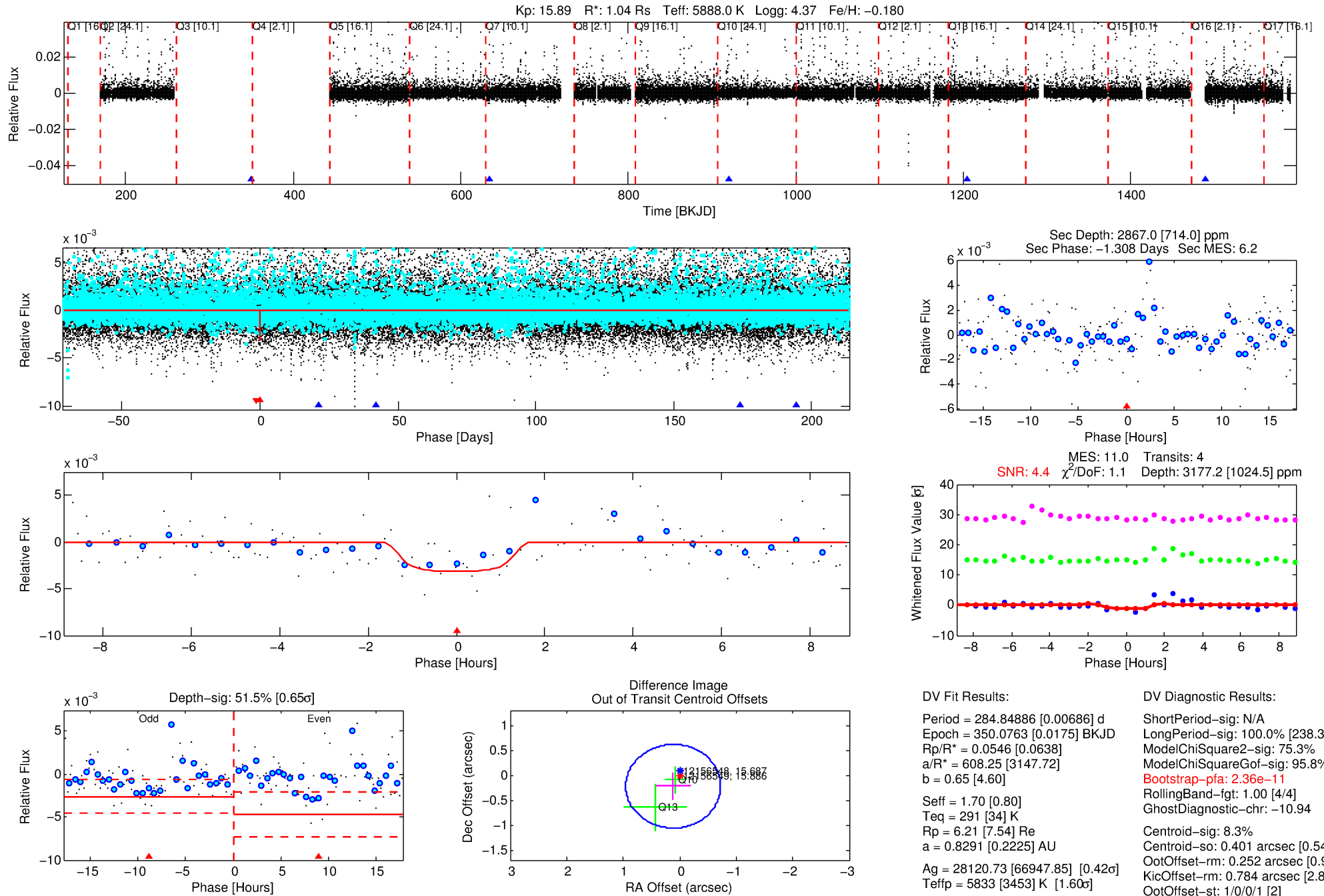
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 012156549-01

No Significant Match Found

DV One-Page Summary

KIC: 12156549 Candidate: 1 of 2 Period: 284.849 d



DV Fit Results:

Period = 284.84886 [0.00686] d
Epoch = 350.0763 [0.0175] BKJD
Rp/R* = 0.0546 [0.0638]
a/R* = 608.25 [3147.72]
b = 0.65 [4.60]
Seff = 1.70 [0.80]
Teq = 291 [34] K
Rp = 6.21 [7.54] Re
a = 0.8291 [0.2225] AU
Ag = 28120.73 [66947.85] [0.42σ]
Teffp = 5833 [3453] K [1.60σ]

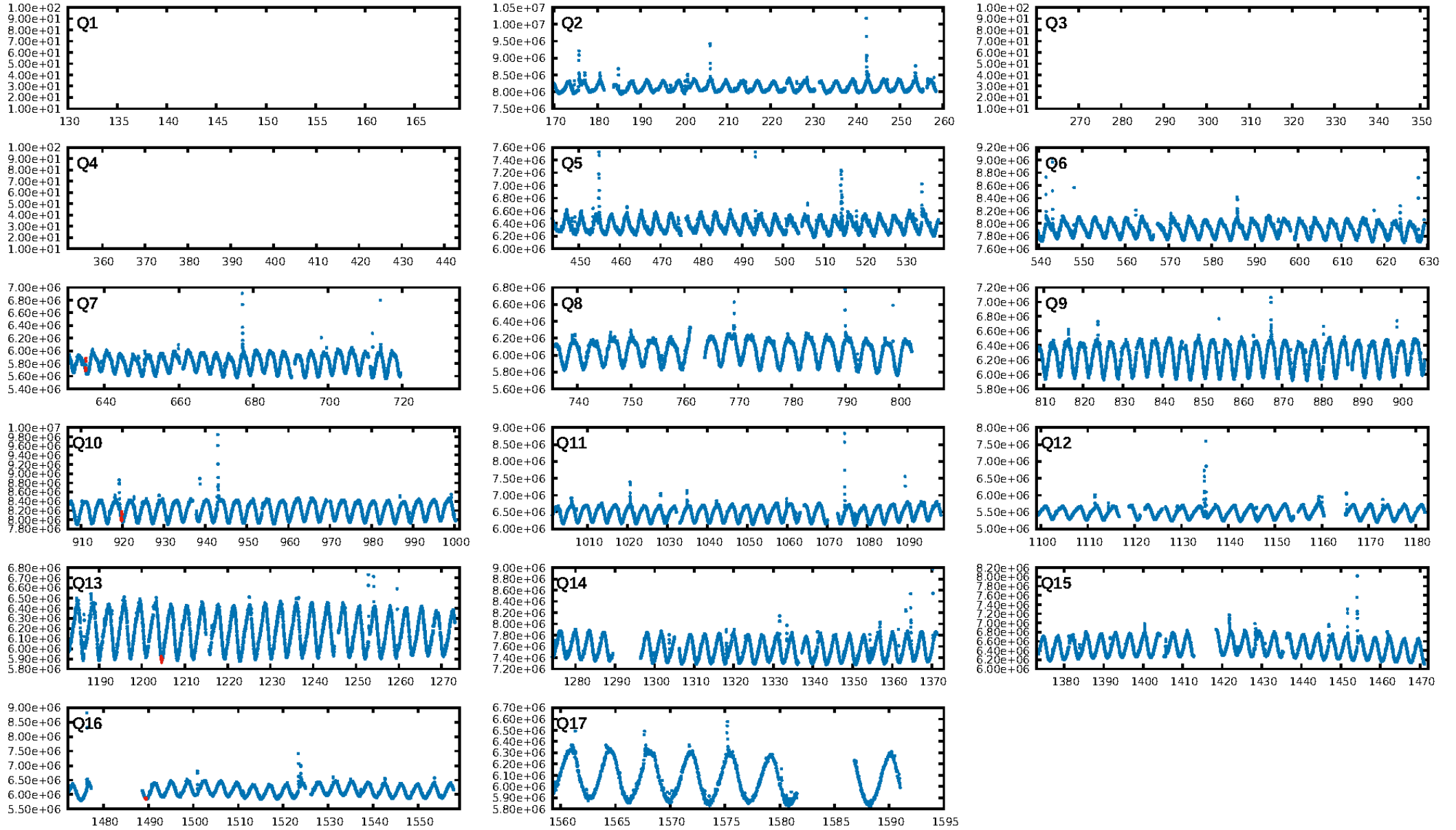
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 100.0% [238.37σ]
ModelChiSquare2-sig: 75.3%
ModelChiSquareGof-sig: 95.8%
Bootstrap-pfa: 2.36e-11
RollingBand-fgt: 1.00 [4/4]
GhostDiagnostic-chr: -10.94
Centroid-sig: 8.3%
Centroid-so: 0.401 arcsec [0.54σ]
OotOffset-rm: 0.252 arcsec [0.90σ]
KicOffset-rm: 0.784 arcsec [2.82σ]
OotOffset-st: 1/0/0/1 [2]
KicOffset-st: 1/0/0/1 [2]
DiffImageQuality-fgm: 1.00 [2/2]
DiffImageOverlap-fno: 1.00 [3/3]

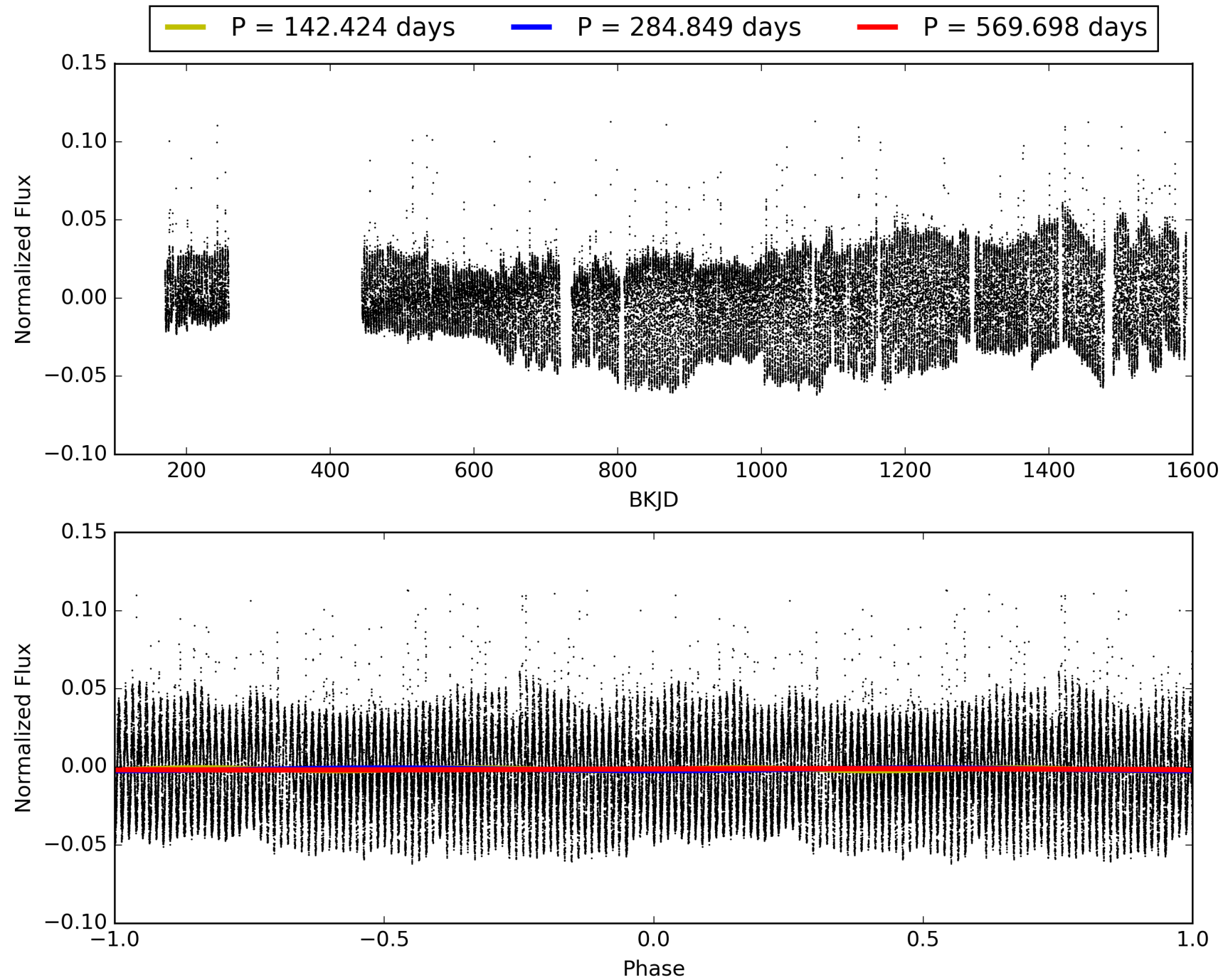
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 04:18:35 Z

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

TCE 012156549-01, PDC Light Curves

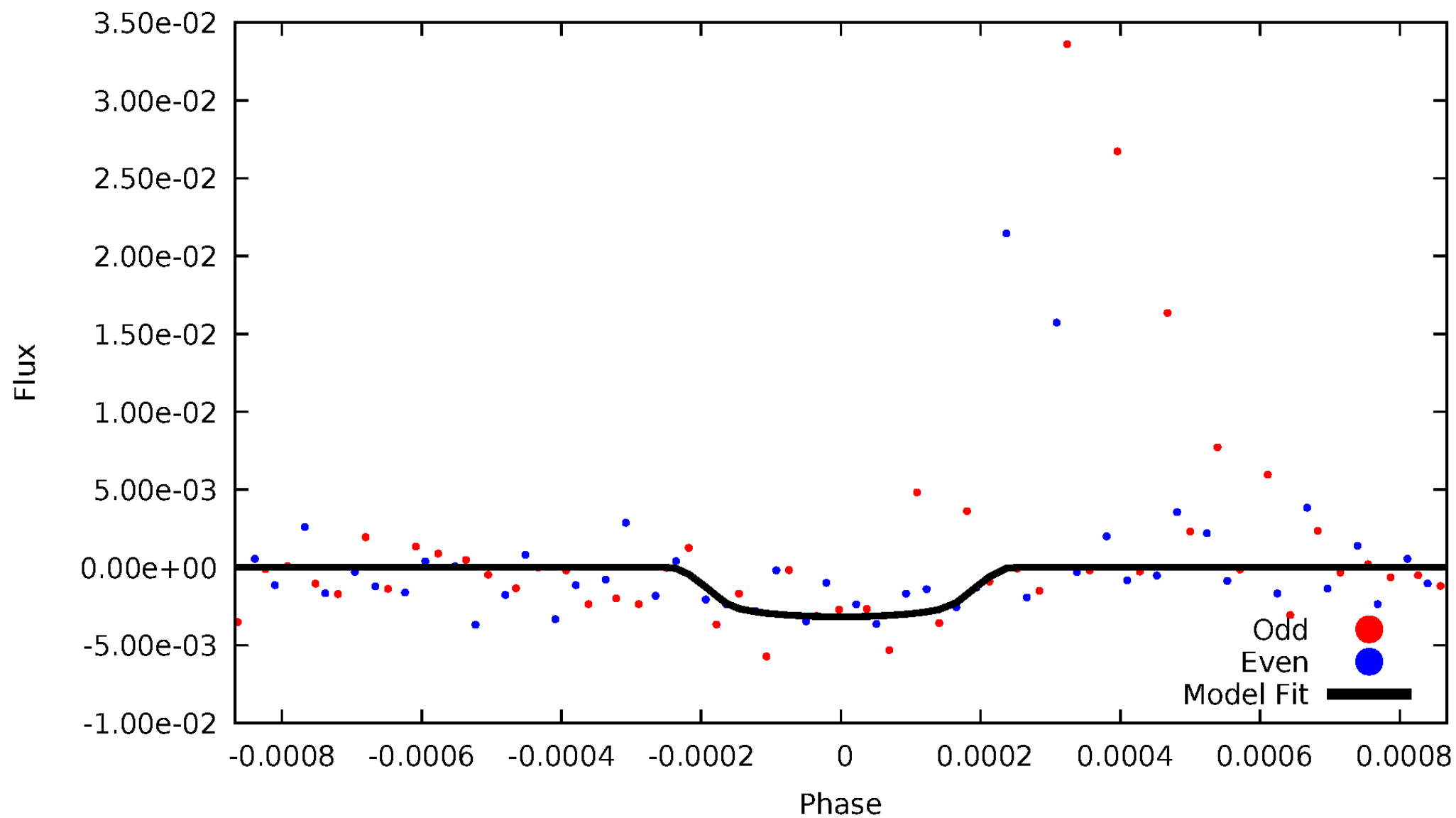


TCE 012156549-01



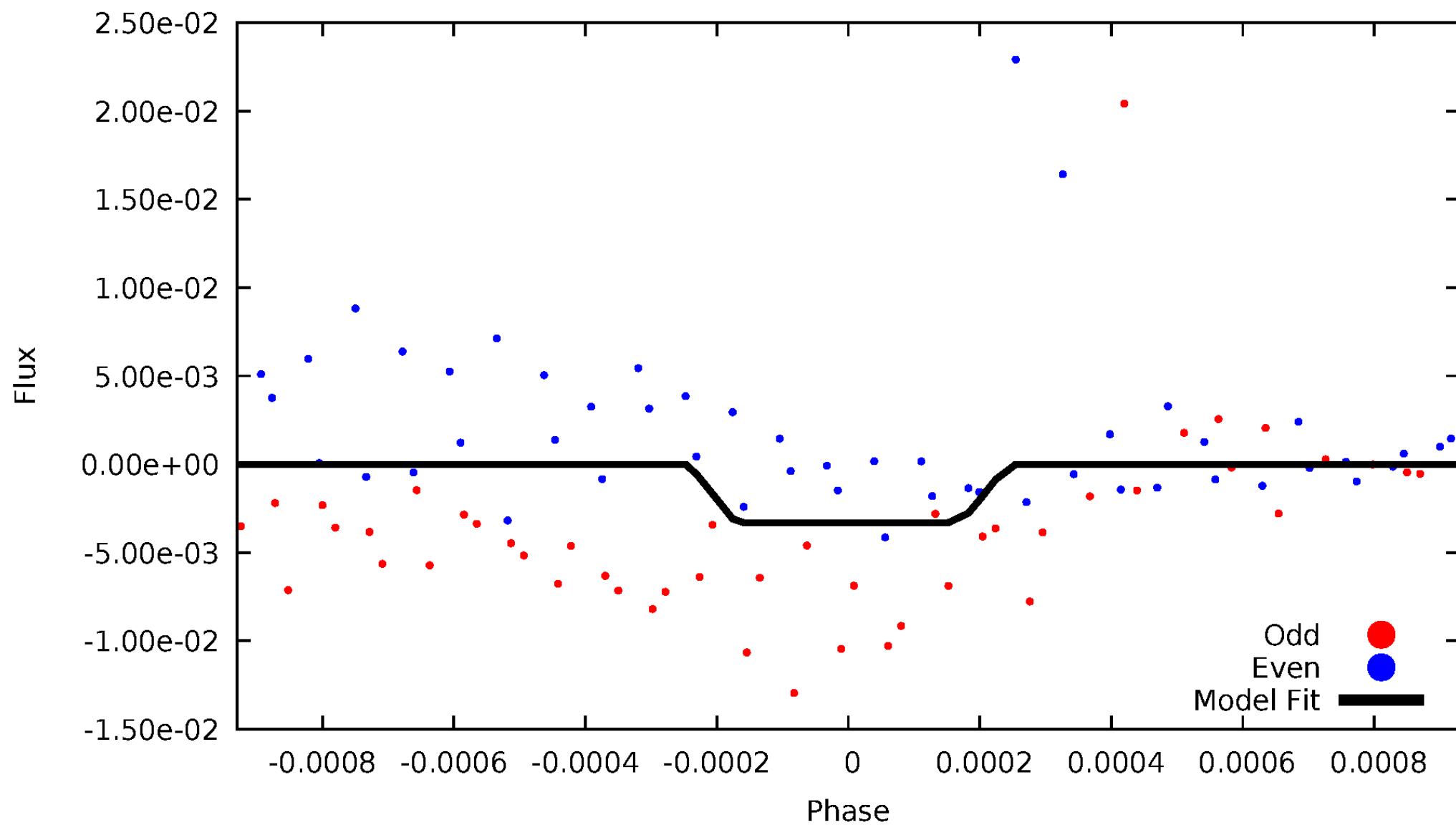
DV Odd/Even

TCE 012156549-01



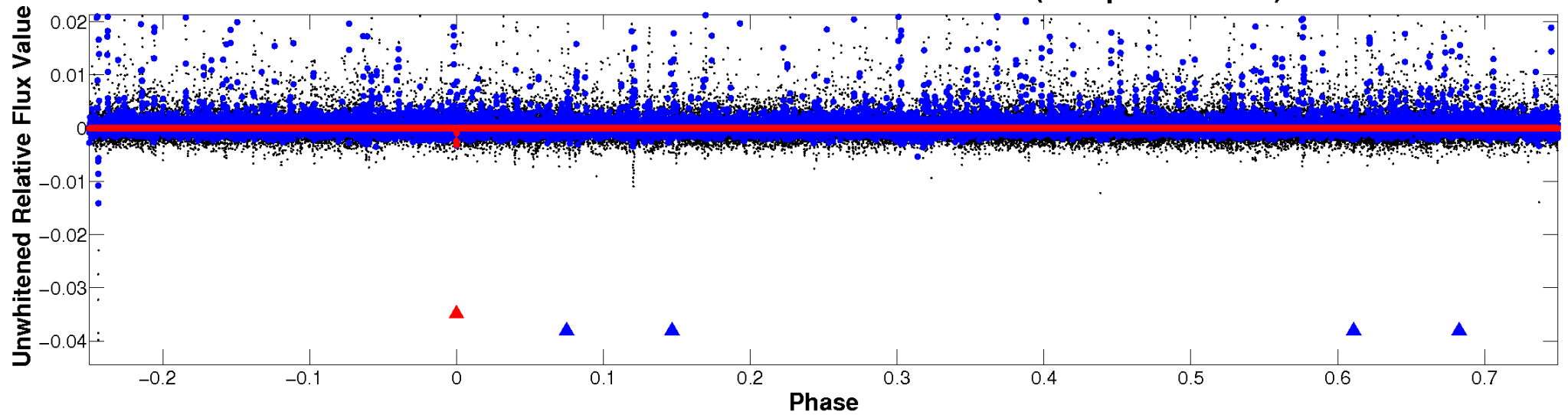
ALT Odd/Even

TCE 012156549-01

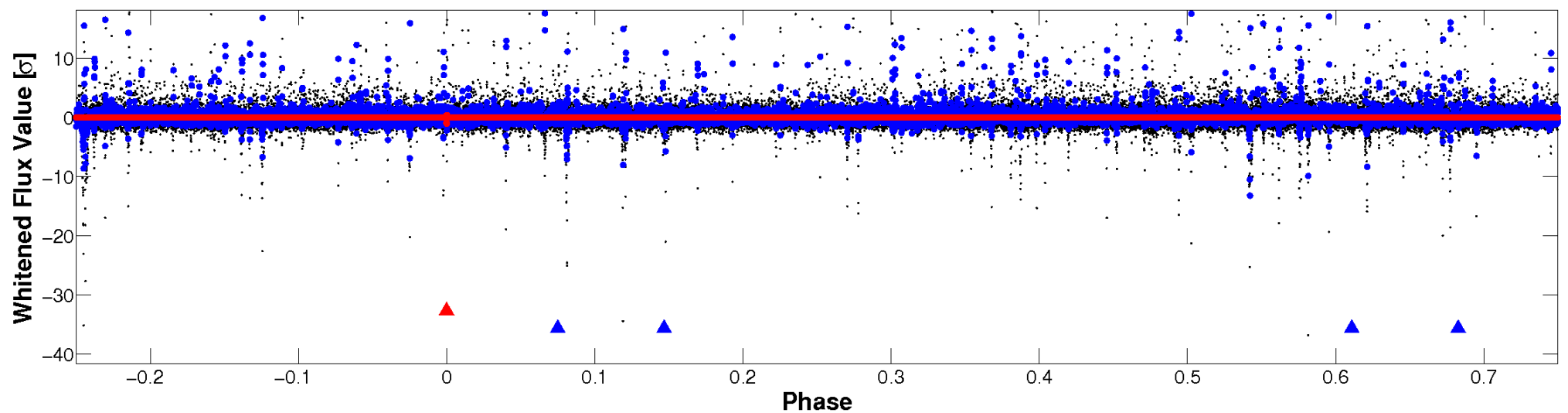


Non-Whitened Vs. Whitened Light Curve

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

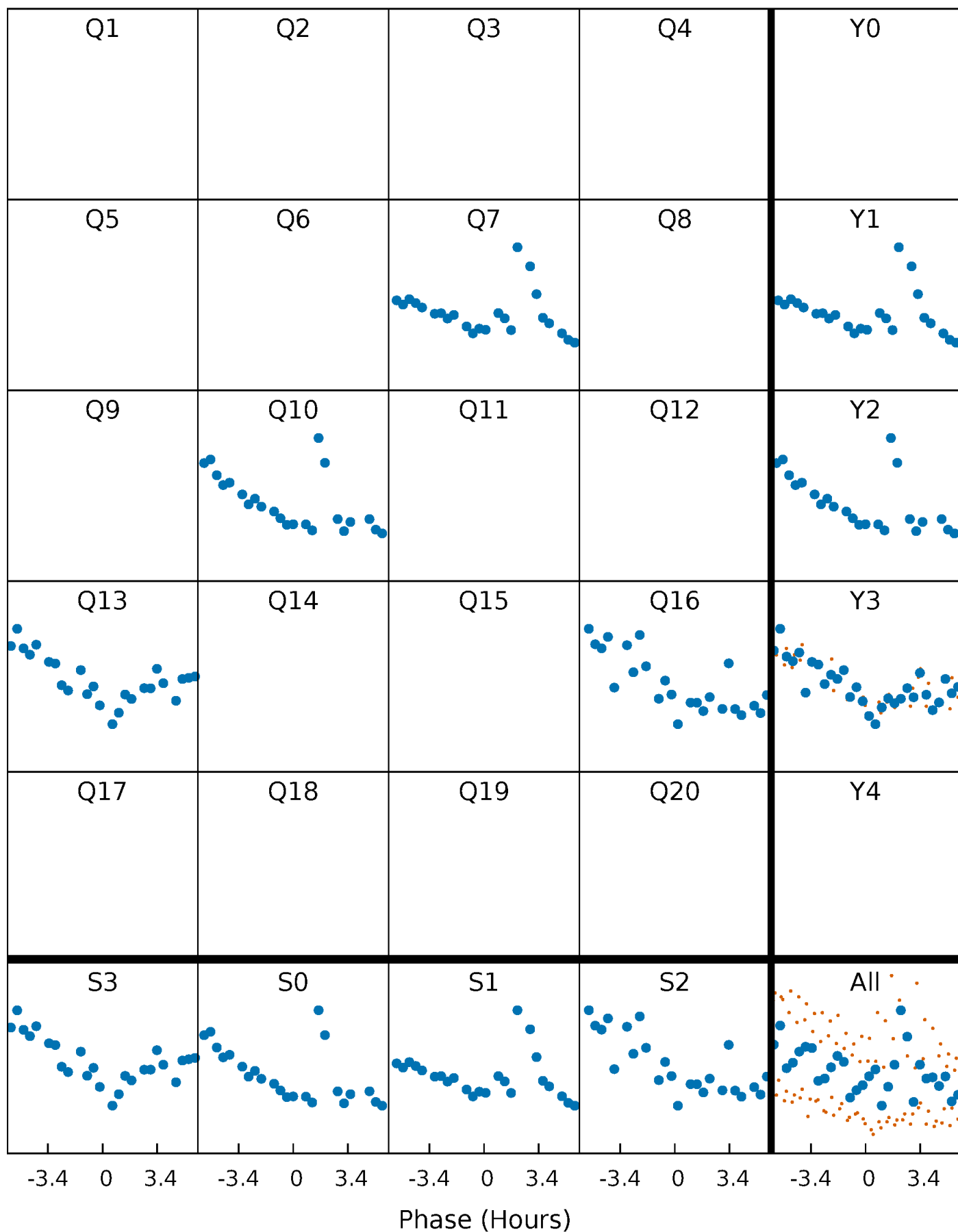


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



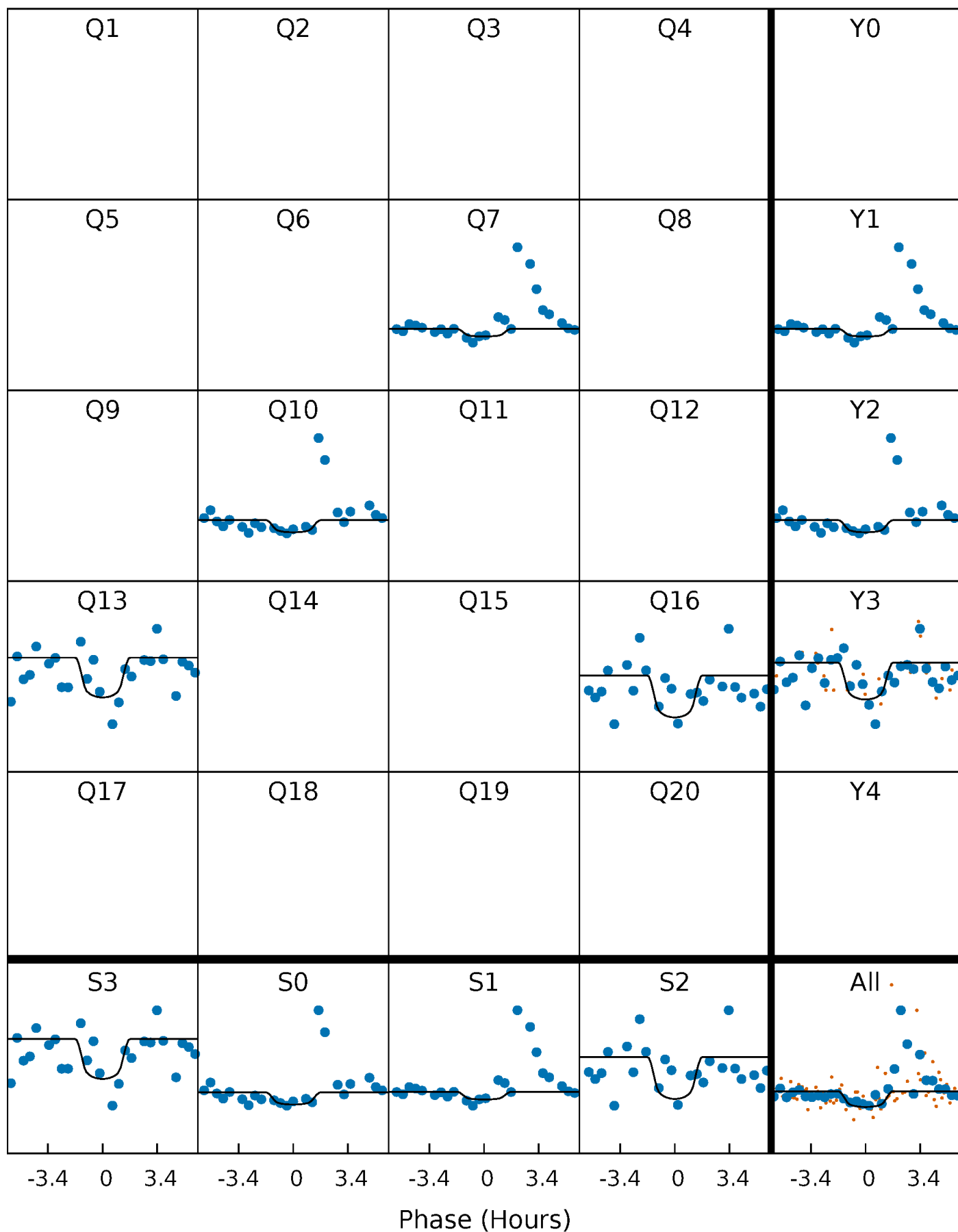
PDC Quarter-Phased Transit Curves

TCE 012156549-01 P=284.848858 Days $T_0=350.076252$ (BKJD)



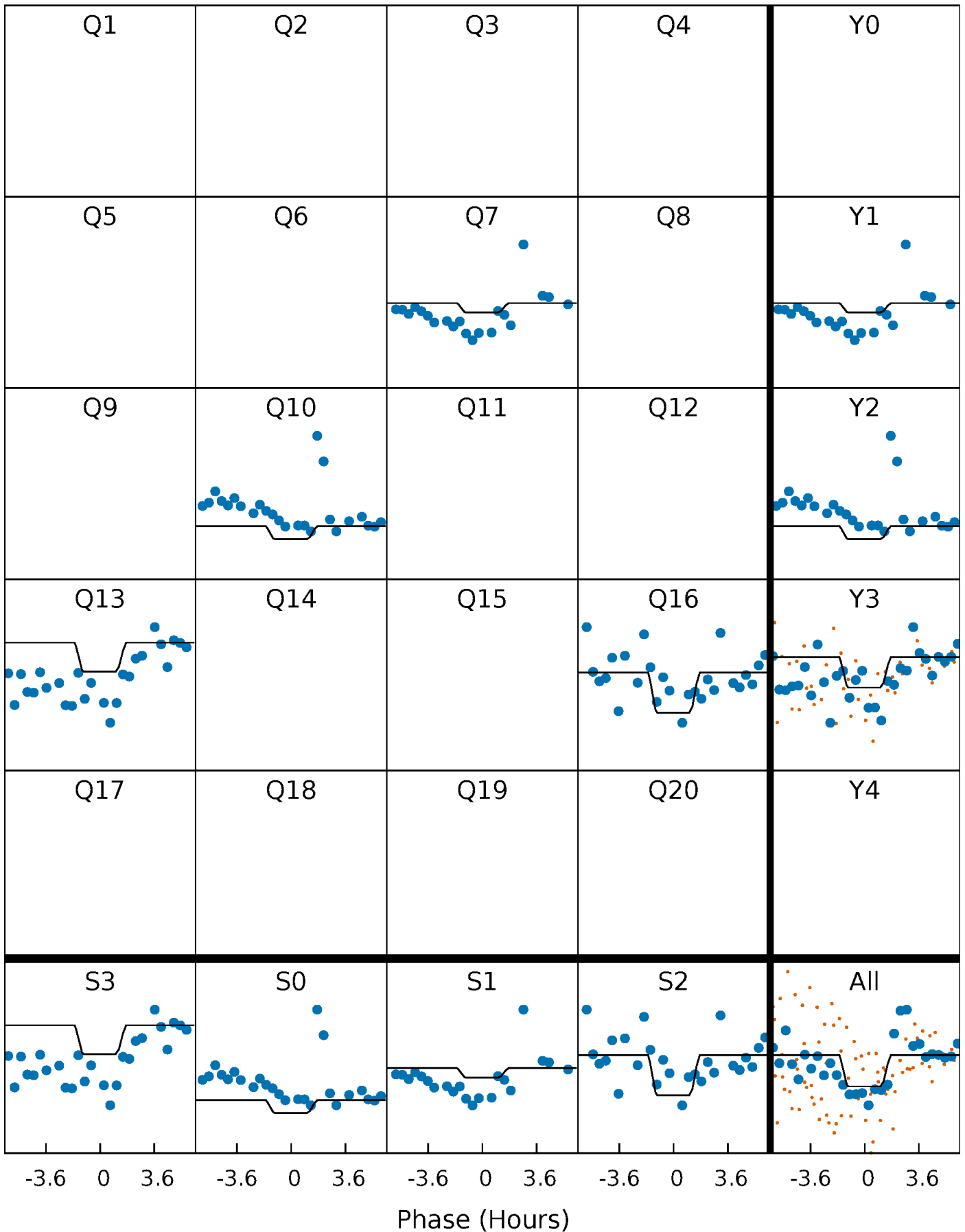
DV Quarter-Phased Transit Curves

TCE 012156549-01 P=284.848858 Days $T_0=350.076252$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

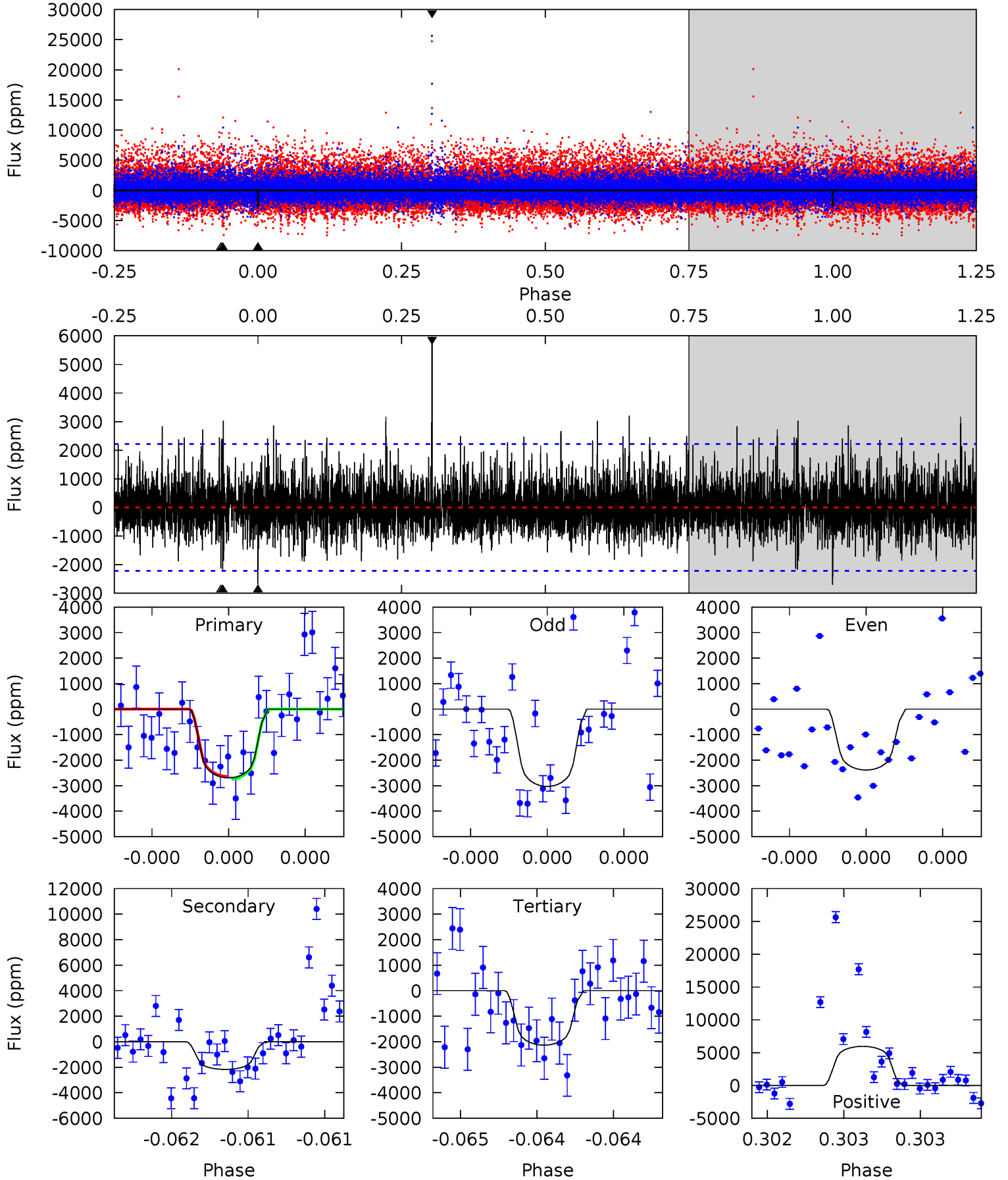
TCE 012156549-01 P=284.850638 Days $T_0=350.067711$ (BKJD)



DV Model-Shift Uniqueness Test

012156549-01, P = 284.848858 Days, E = 65.227394 Days

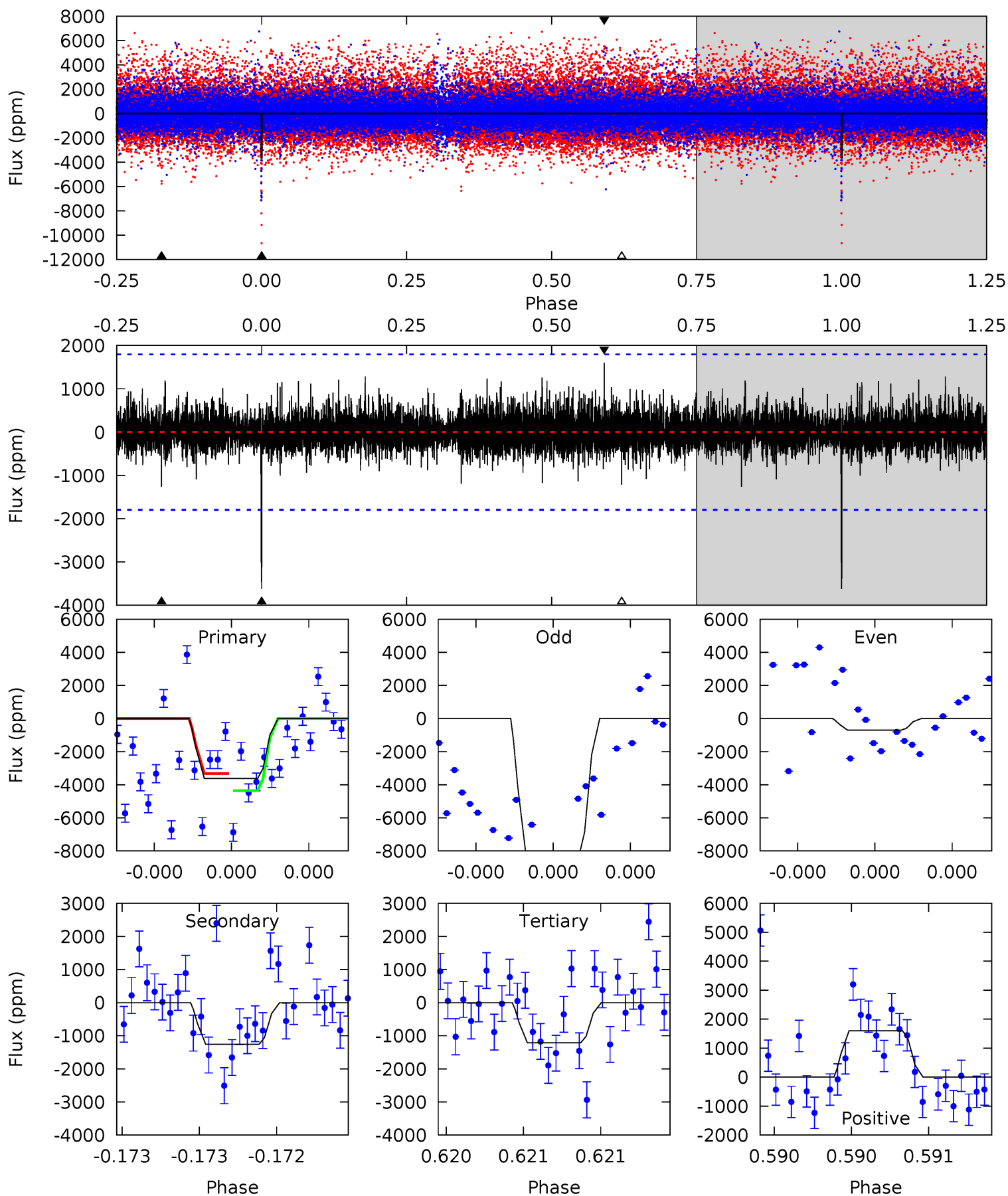
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.78	5.45	5.36	15.0	5.58	3.49	1.63	1.41	-8.21	0.09	-9.54	0.58	0.97	0.69	0.14



Alt Model-Shift Uniqueness Test

012156549-01, P = 284.850638 Days, E = 65.217073 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.3	3.93	3.78	4.98	5.59	3.51	0.92	7.50	6.29	0.15	-1.06	12.6	1.00	0.31	0



Stellar Parameters For KIC 012156549

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	5888^{+418}_{-418}	$4.373^{+0.162}_{-0.198}$	$-0.180^{+0.300}_{-0.300}$	$1.043^{+0.346}_{-0.231}$	$0.938^{+0.167}_{-0.137}$	$1.164^{+0.993}_{-0.613}$
	+7%/-7%	+4%/-5%	+167%/-167%	+33%/-22%	+18%/-15%	+85%/-53%
Source	PHO1	KIC0	KIC0	DSEP		

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

Secondary Eclipse Parameters for KIC 012156549-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	-2168 ± 398	$8.40^{+6.83}_{-5.33}$	411^{+45}_{-39}	4812^{+3381}_{-934}	12083^{+77212}_{-8611}
Alt.	-1259 ± 321	$8.12^{+7.17}_{-5.26}$	409^{+42}_{-37}	4338^{+2785}_{-870}	6913^{+56199}_{-5024}

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 $A_{obs} \gg 1.0$

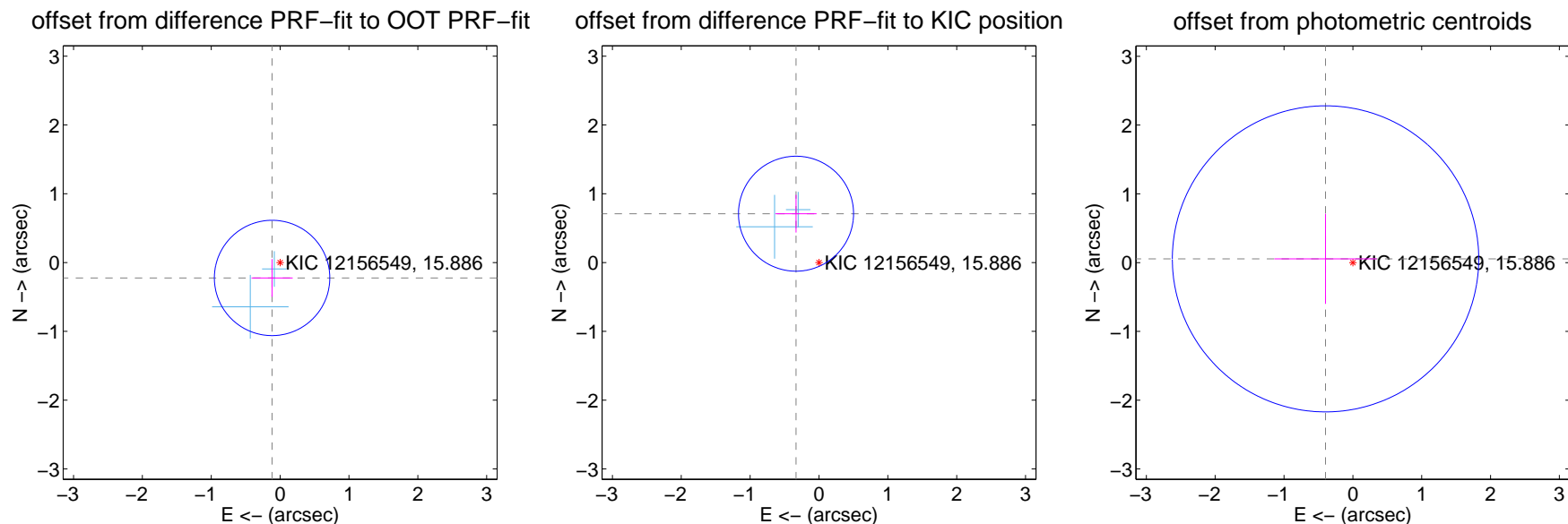
DV Centroid Data

Supplemental centroid analysis for 012156549-01. Kepler magnitude: 15.89. Transit SNR 4.42

There are 2 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 1.18 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.252 ± 0.279	0.90	0.117 ± 0.299	-0.224 ± 0.274
PRF-fit source offset from KIC position	0.784 ± 0.279	2.82	0.334 ± 0.299	0.710 ± 0.274
photometric centroid source offset	0.40 ± 0.74	0.54	0.40 ± 0.74	0.05 ± 0.66



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

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



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

Q5 no difference image



Q5 no OOT image



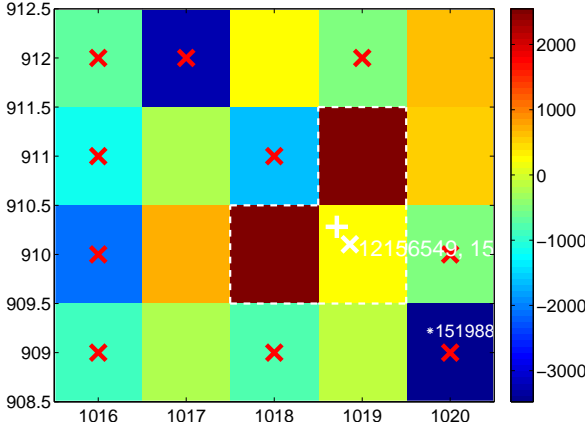
Q6 no difference image



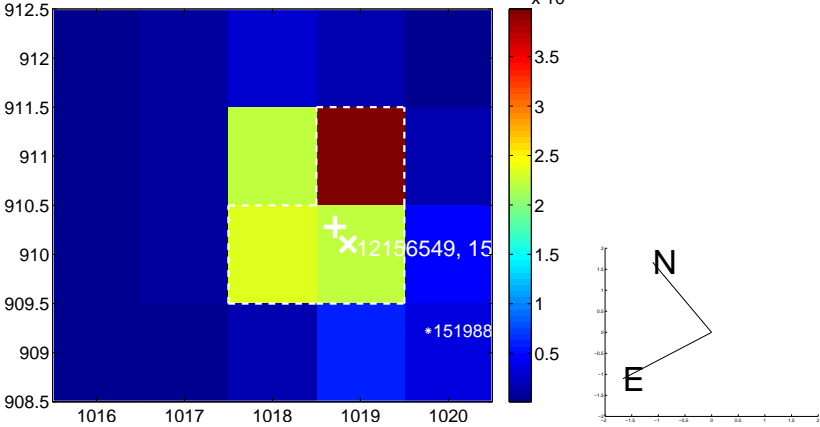
Q6 no OOT image



Q7 difference image. Poor Quality



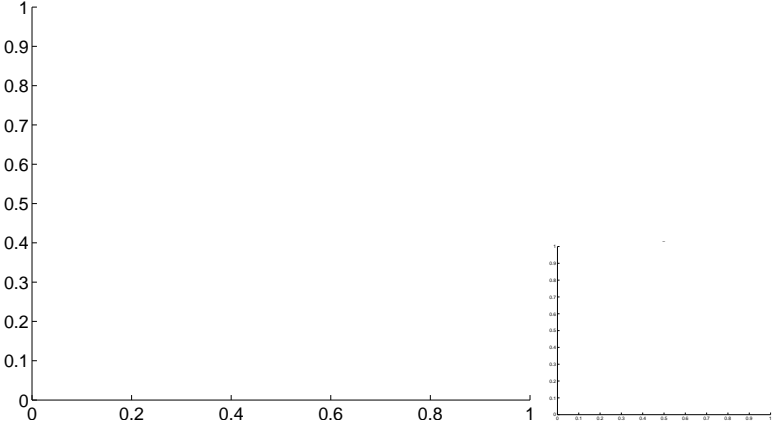
Q7 OOT image



Q8 no difference image



Q8 no OOT image



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

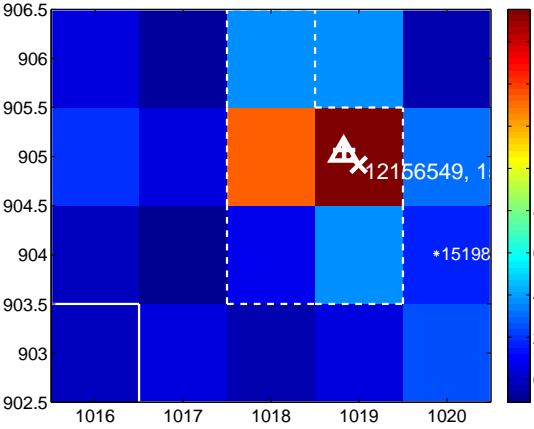
Q9 no difference image



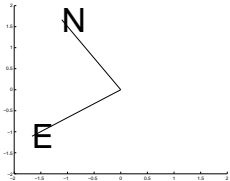
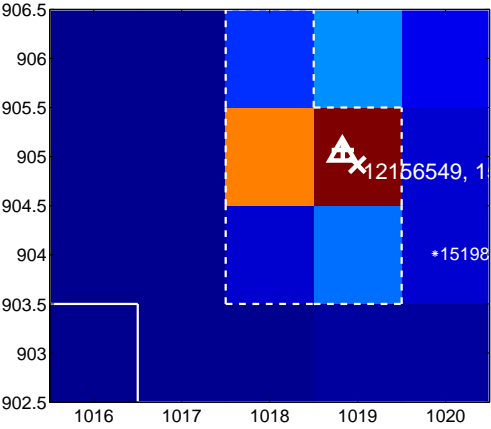
Q9 no OOT image



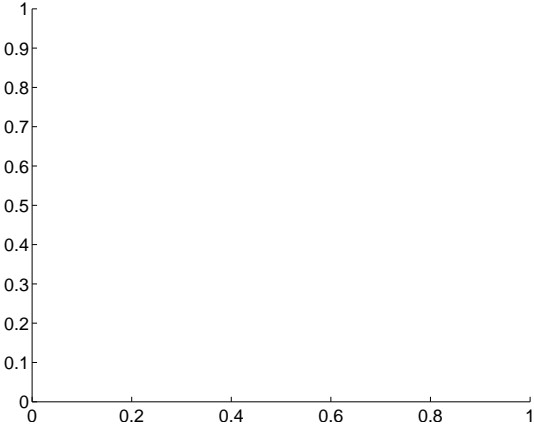
Q10 difference image



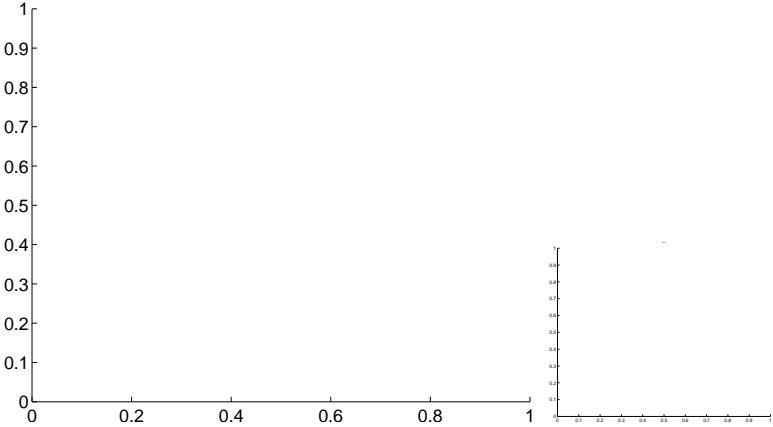
Q10 OOT image



Q11 no difference image



Q11 no OOT image



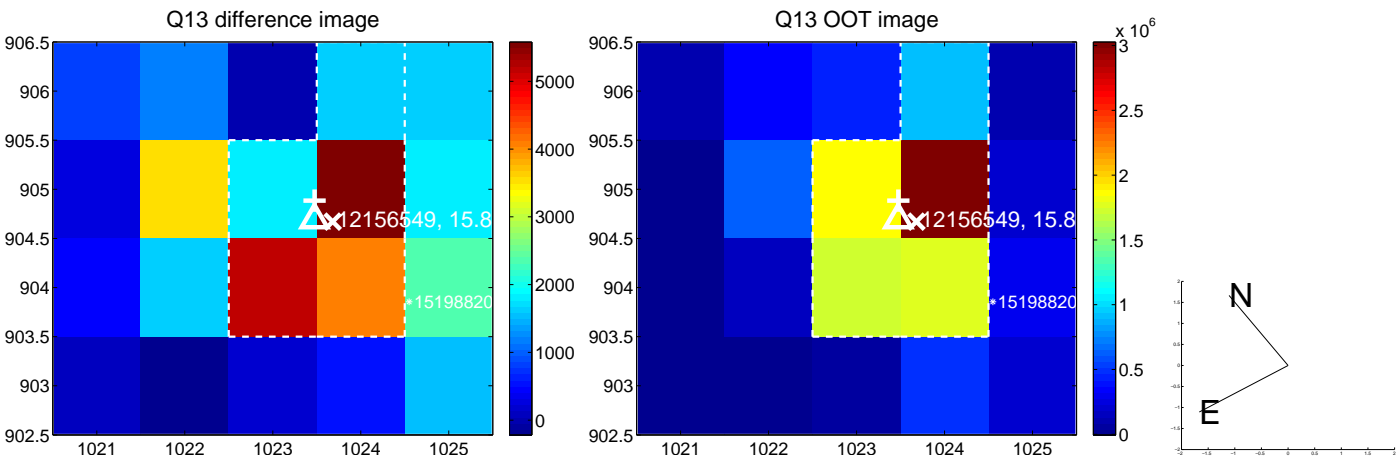
Q12 no difference image



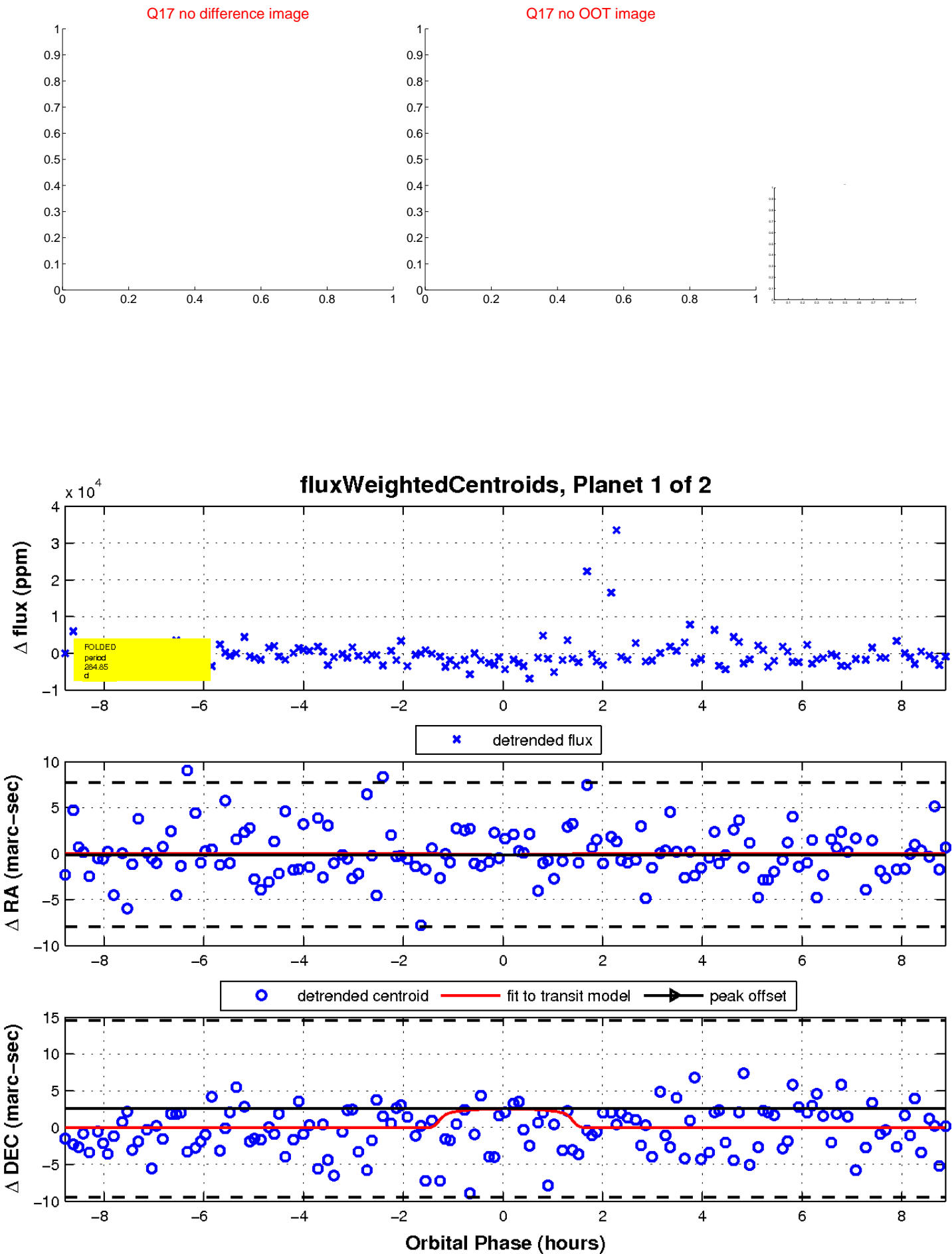
Q12 no OOT image



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

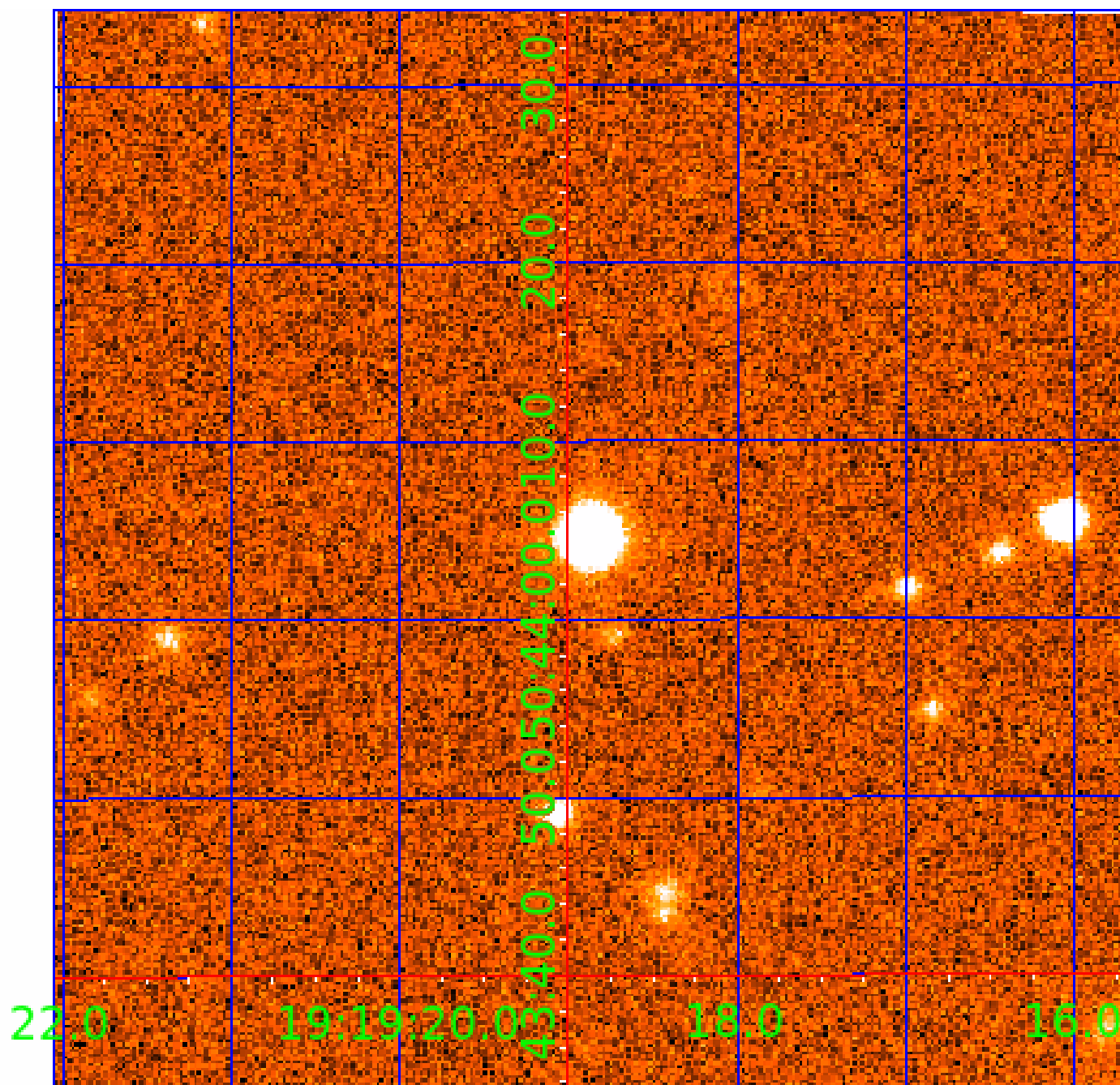


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 012156549

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})
012156549-01	OBS	No	284.848857	350.076252	3177.2	2.963	11.0	4.4	1.04	5888	6.21	1.70
012156549-02	OBS	No	417.044172	259.704533	11378.5	12.976	9.7	12.0	1.04	5888	11.29	1.02

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
012156549-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
012156549-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_SKYE—LPP_DV—MOD_NONUNIQ_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS

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

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

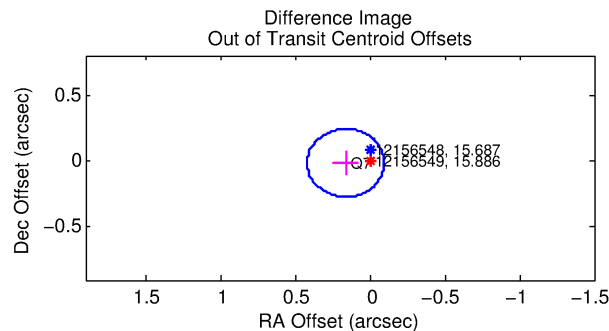
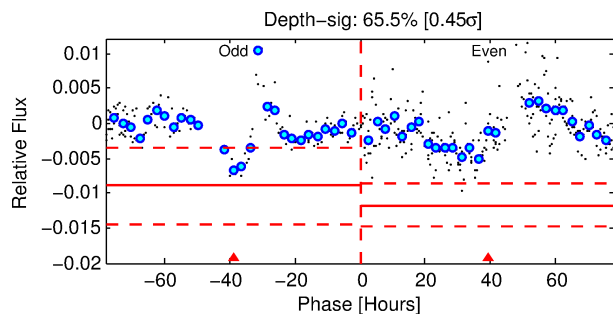
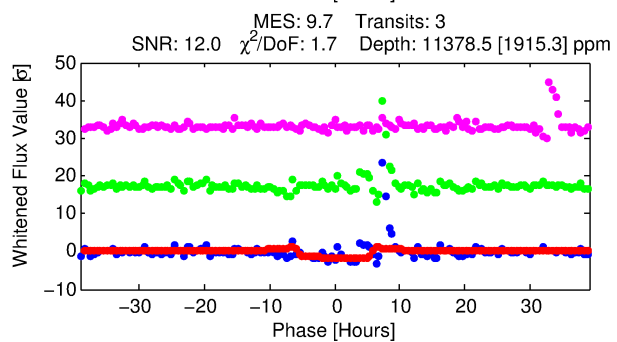
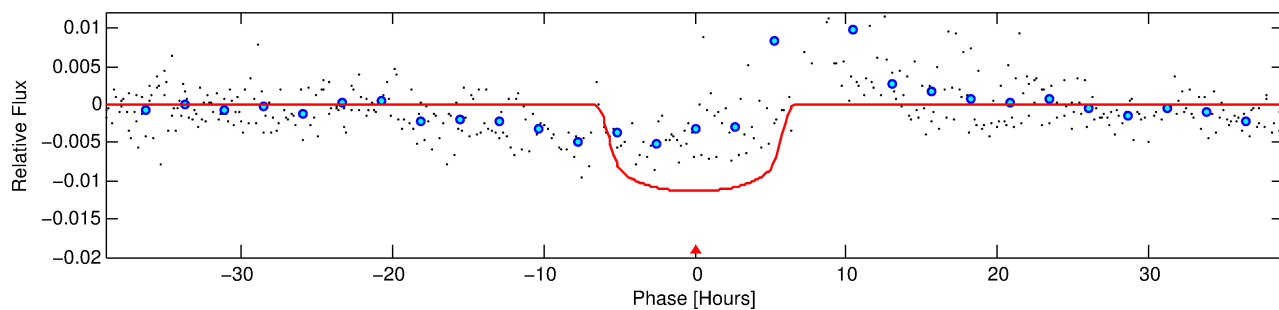
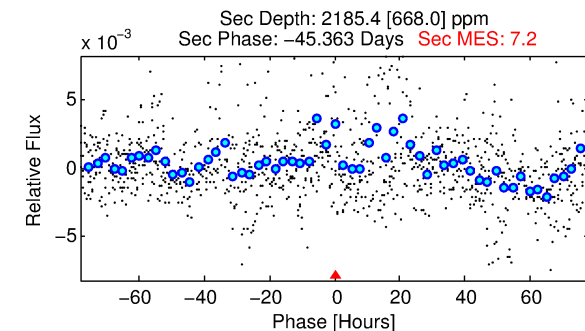
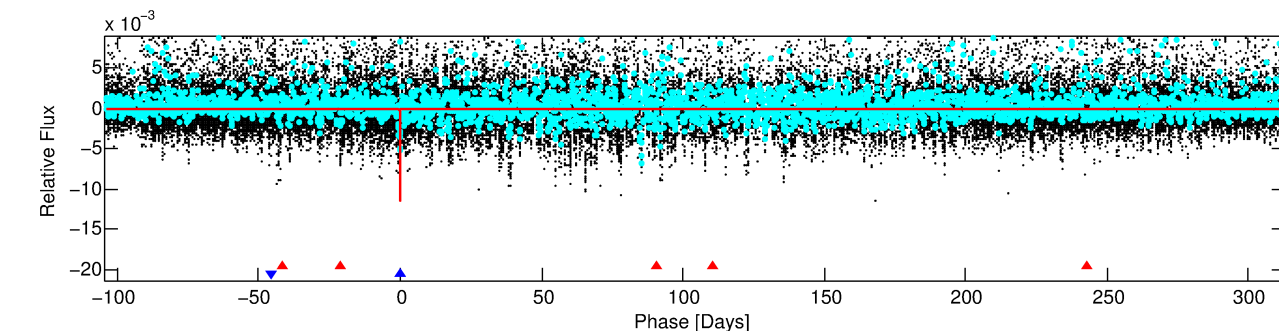
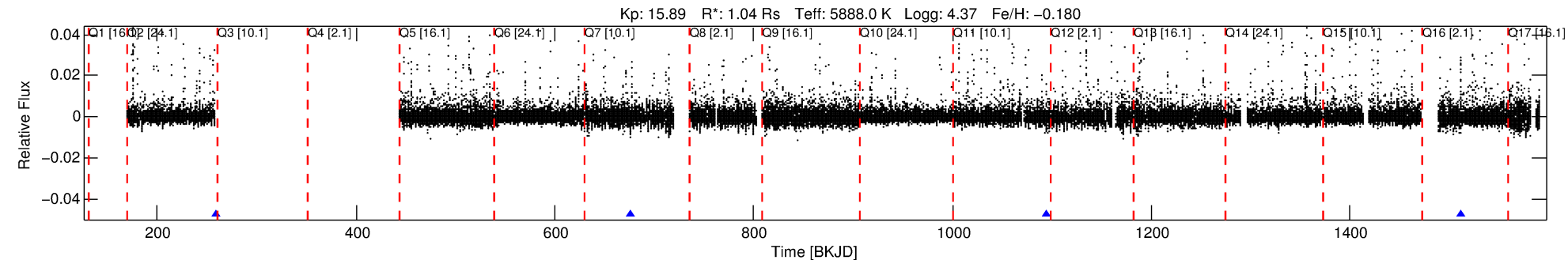
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 012156549-02

No Significant Match Found

DV One-Page Summary

KIC: 12156549 Candidate: 2 of 2 Period: 417.044 d



DV Fit Results:

Period = 417.04417 [0.01176] d
Epoch = 259.7045 [0.0276] BKJD
Rp/R* = 0.0992 [0.0119]
a/R* = 249.81 [86.01]
b = 0.42 [0.68]
Seff = 1.02 [0.48]
Teq = 257 [30] K
Rp = 11.29 [3.98] Re
a = 1.0691 [0.2869] AU
Ag = 10777.01 [5829.35] [1.85σ]
Teffp = 4042 [487] K [7.76σ]

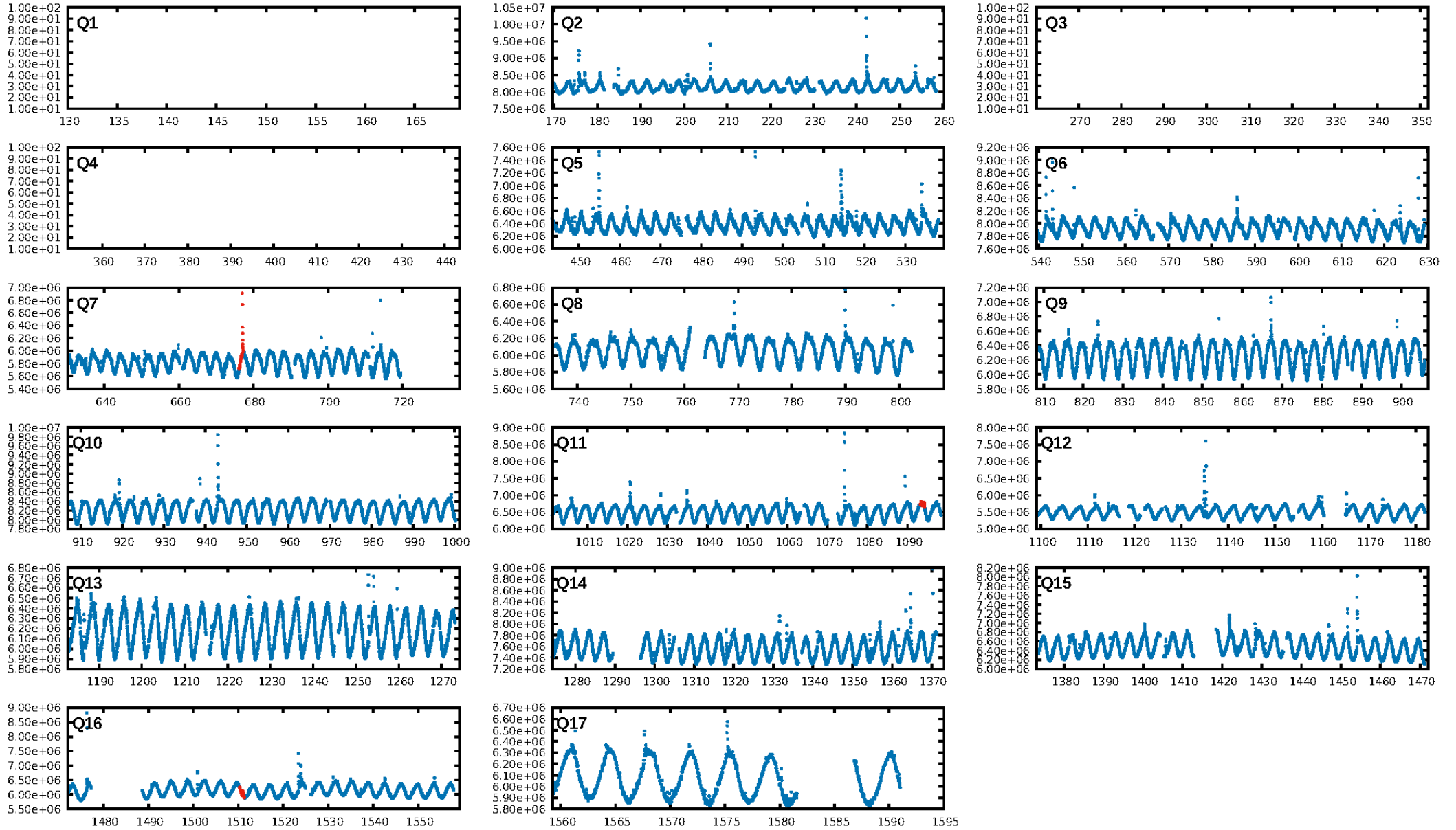
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [238.37σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 2.4%
ModelChiSquareGof-sig: 96.4%
Bootstrap-pfa: 2.50e-09
RollingBand-fgt: 1.00 [3/3]
GhostDiagnostic-chr: 1.678
Centroid-sig: 45.4%
Centroid-so: 1.012 arcsec [9.20σ]
OotOffset-rm: 0.163 arcsec [1.89σ]
KicOffset-rm: 0.964 arcsec [11.46σ]
OotOffset-st: 0/1/0/0 [1]
KicOffset-st: 0/1/0/0 [1]
DiffImageQuality-fgm: 0.00 [0/1]
DiffImageOverlap-fno: 1.00 [1/1]

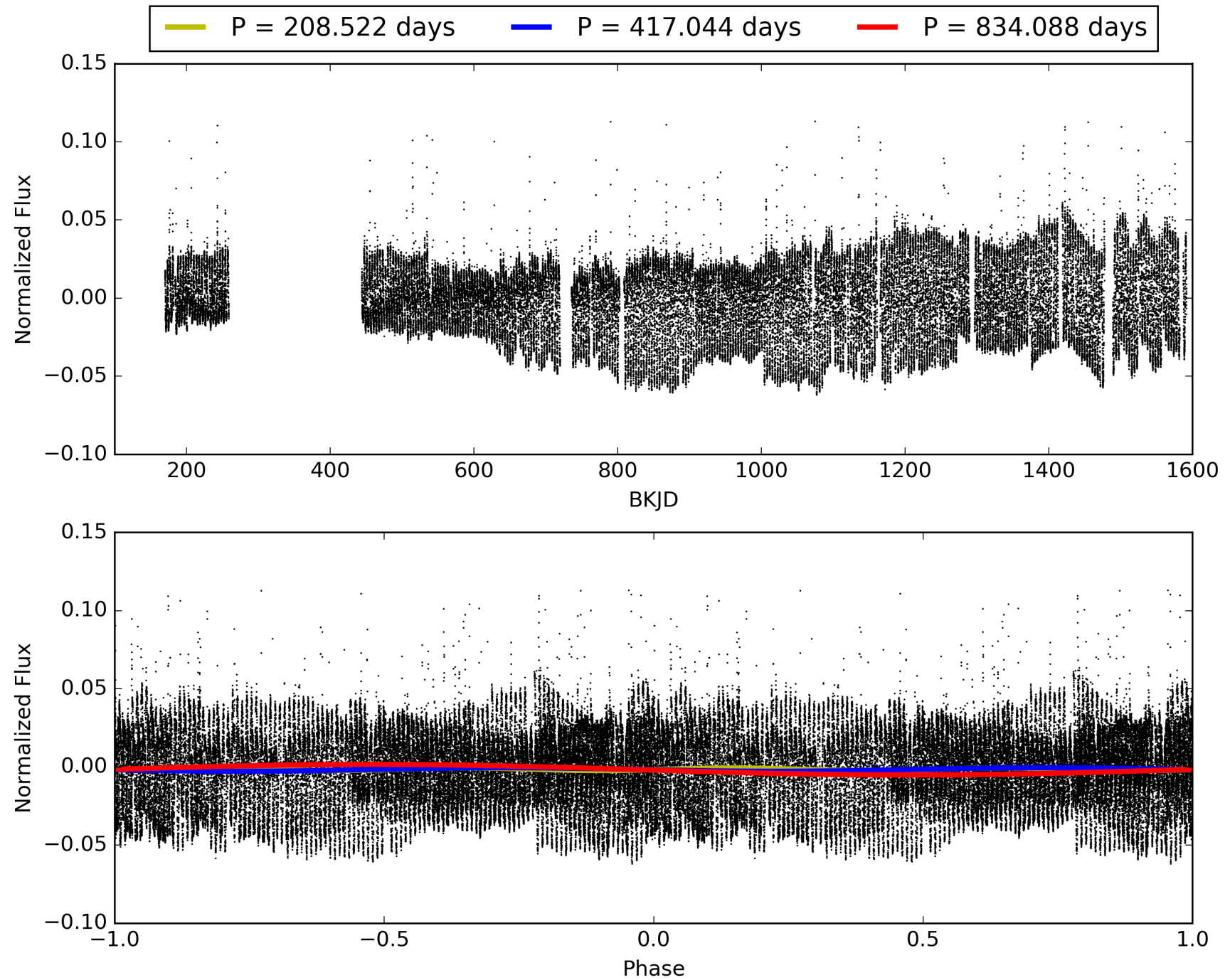
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 04:18:43 Z

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TCE 012156549-02, PDC Light Curves

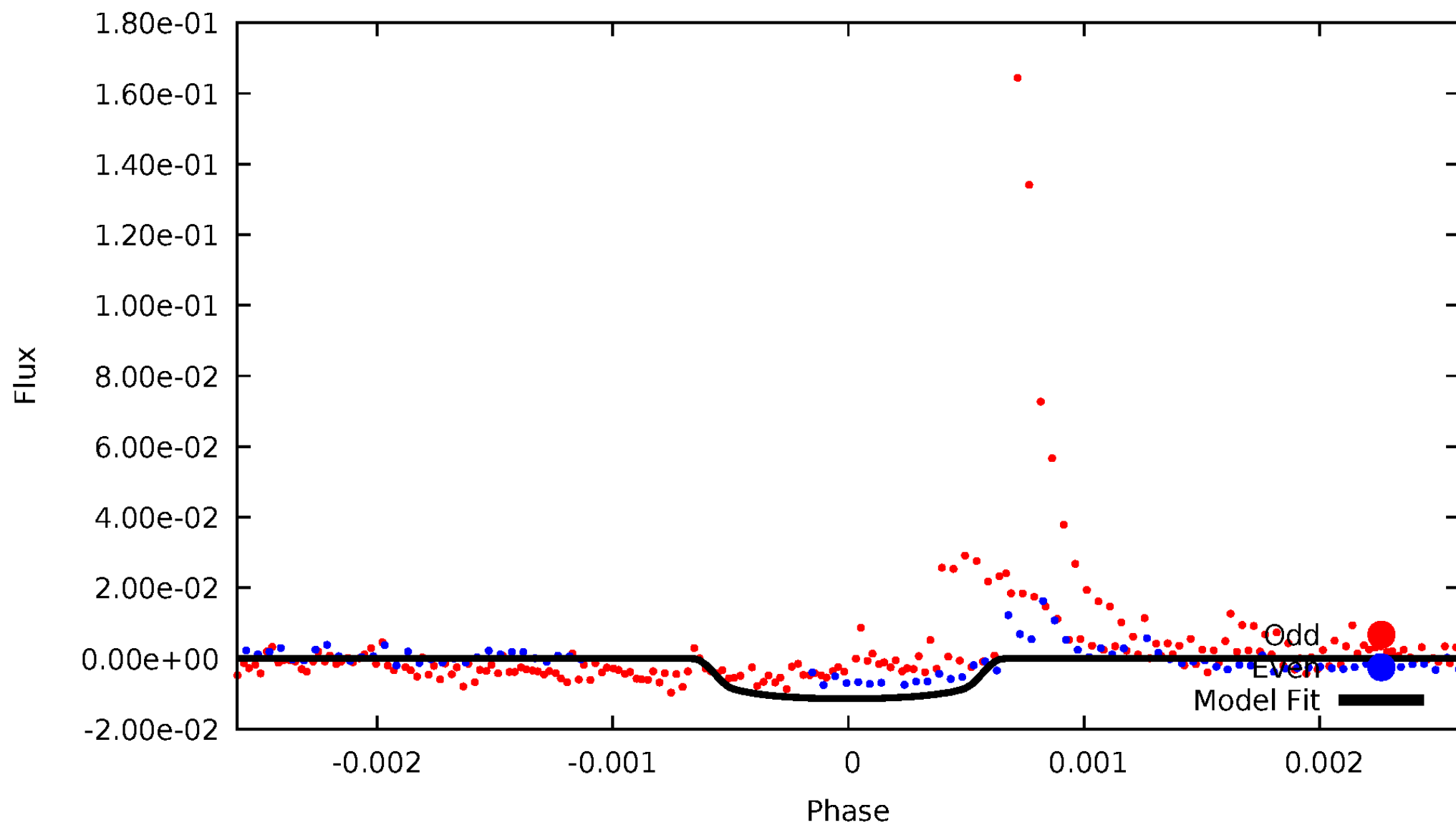


TCE 012156549-02



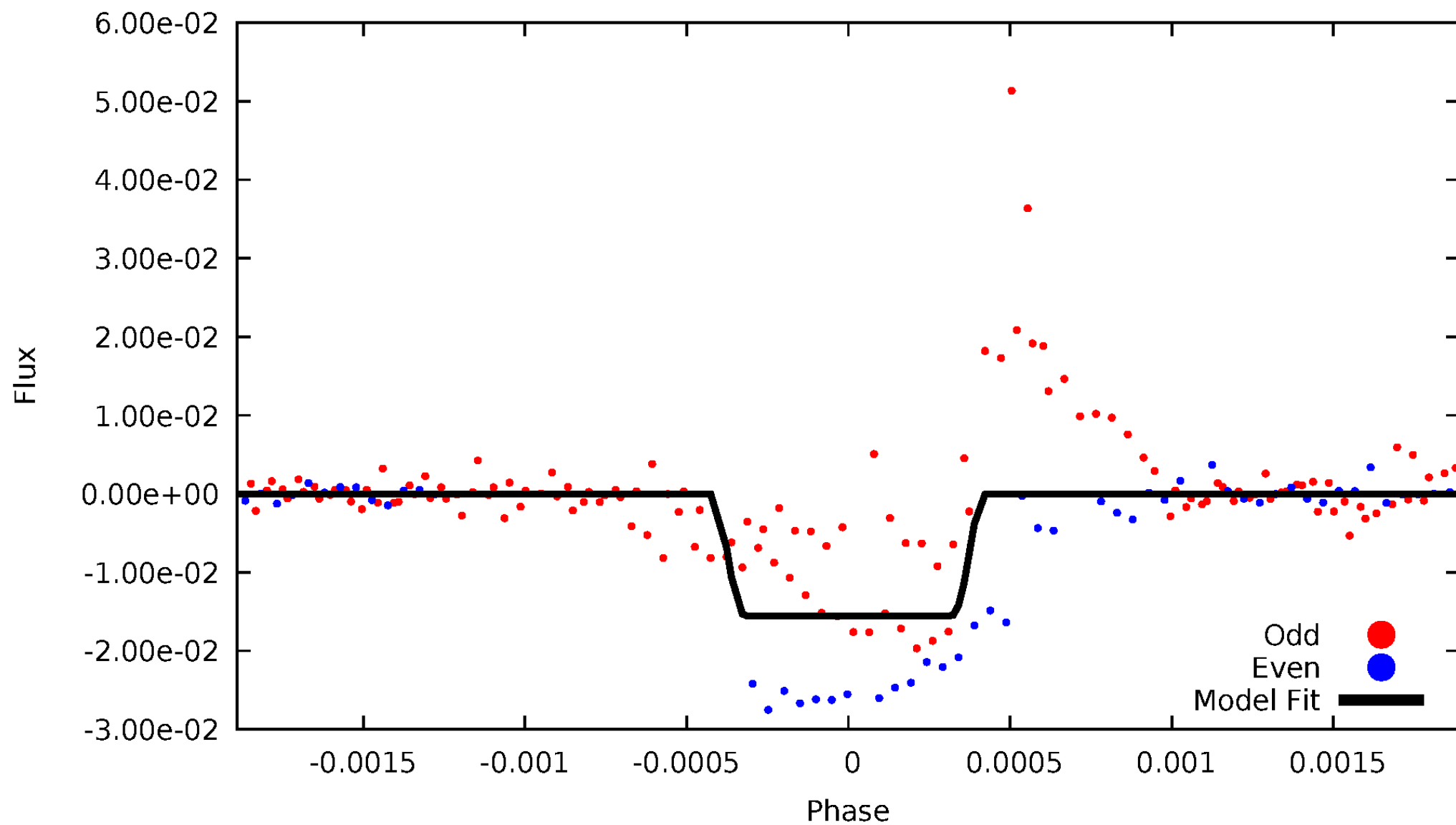
DV Odd/Even

TCE 012156549-02



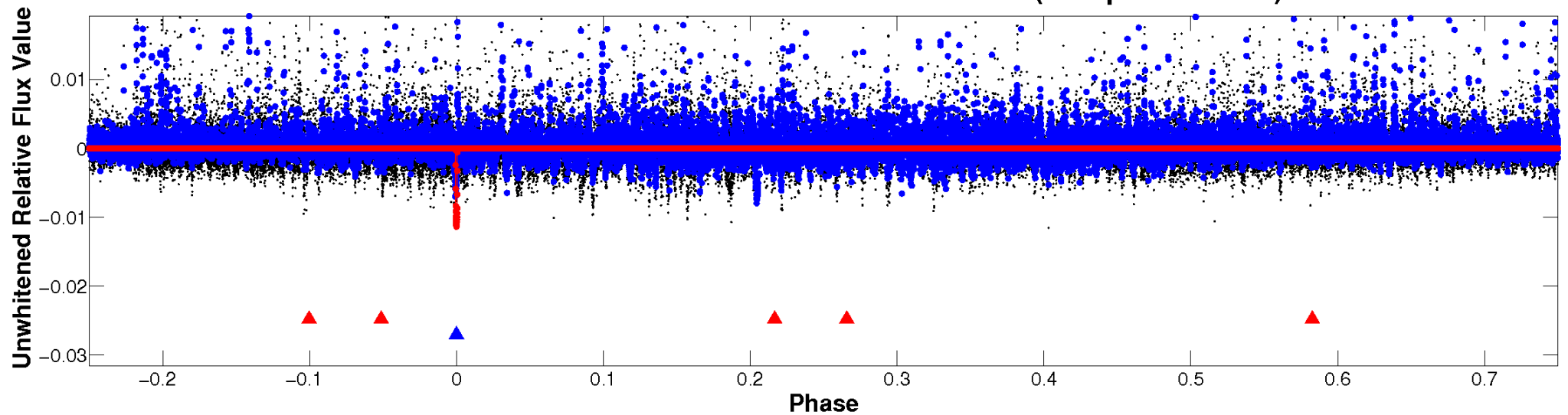
ALT Odd/Even

TCE 012156549-02

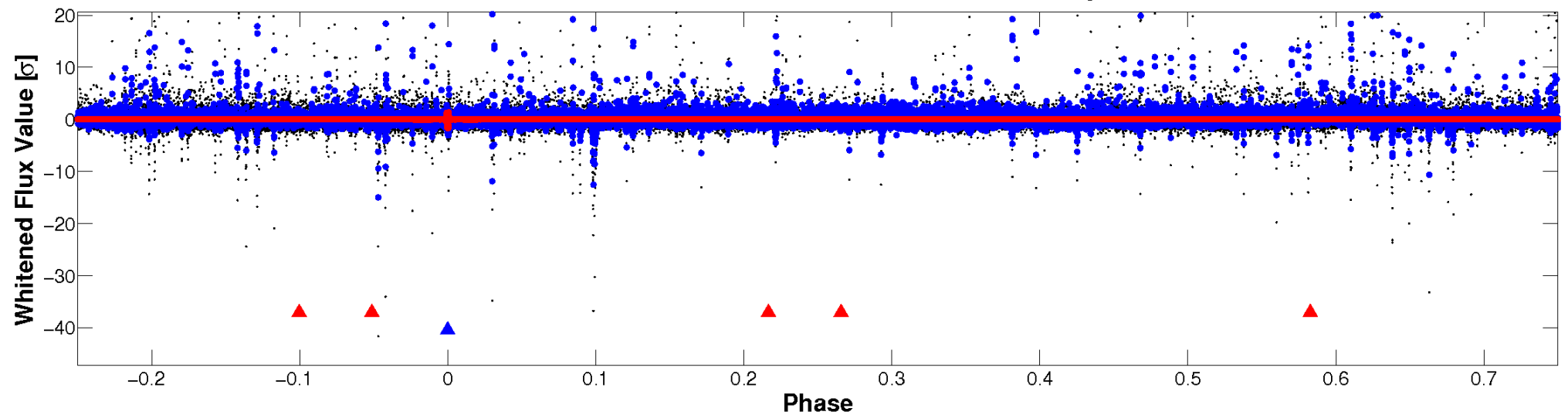


Non-Whitened Vs. Whitened Light Curve

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

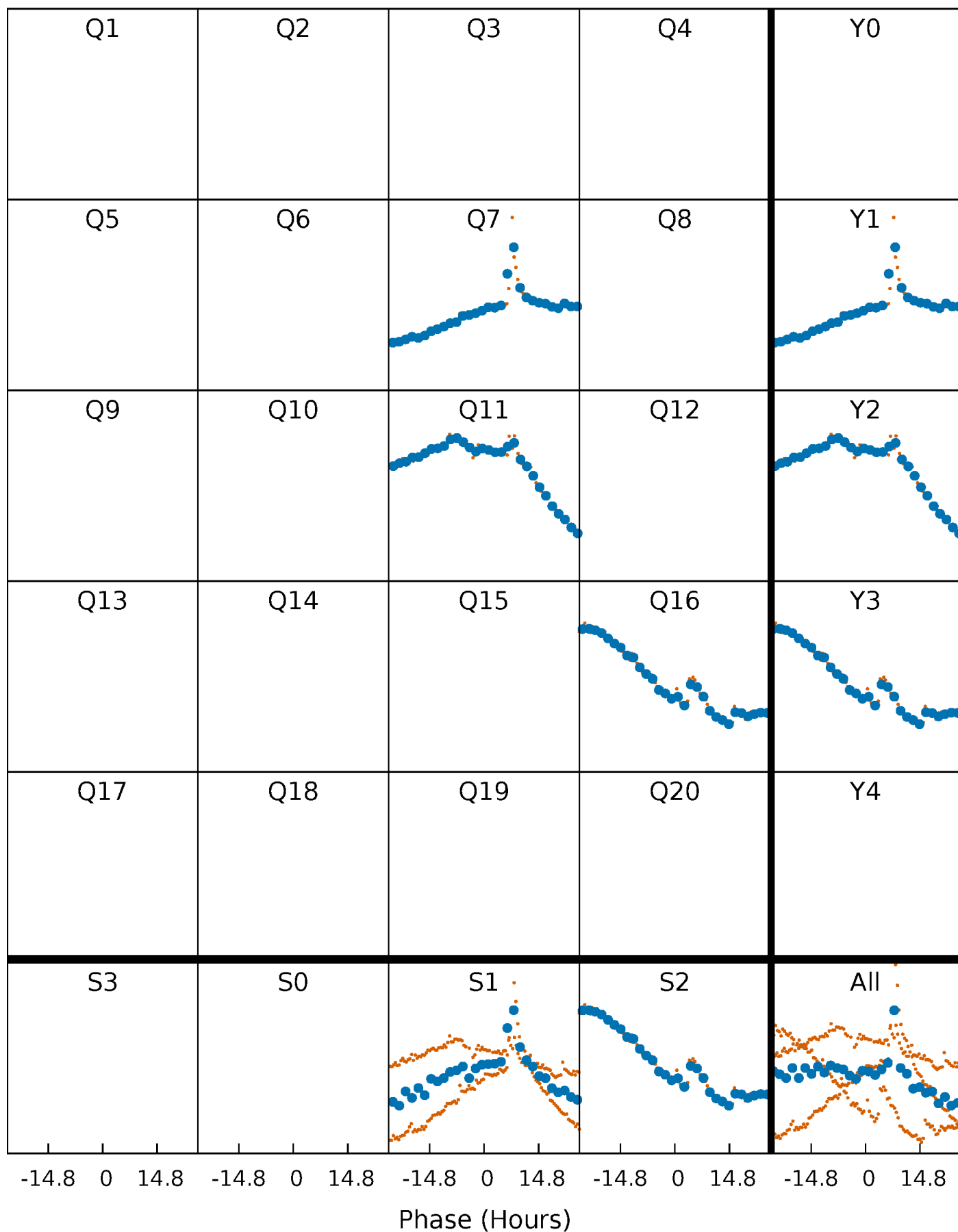


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



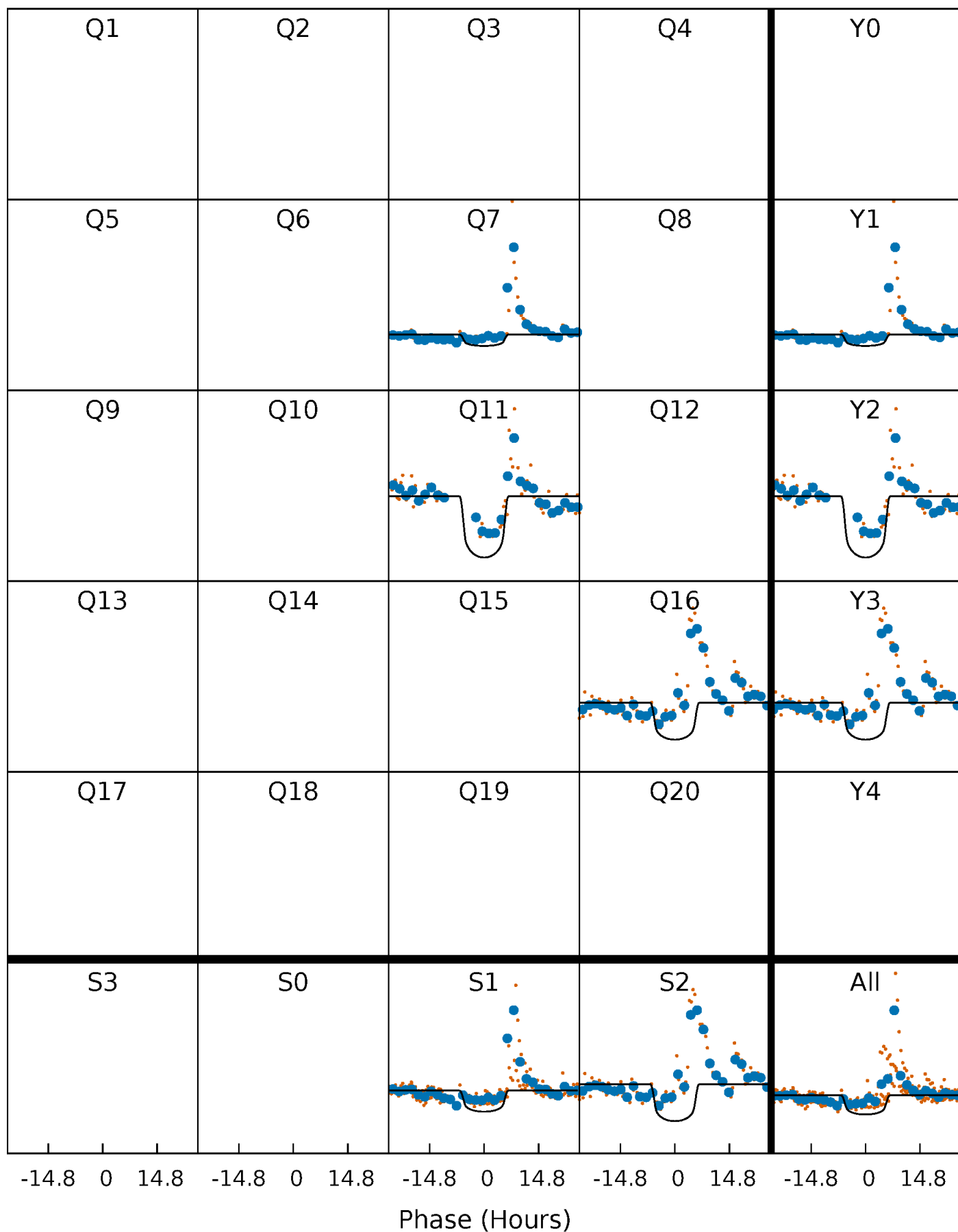
PDC Quarter-Phased Transit Curves

TCE 012156549-02 P=417.044172 Days $T_0=259.704533$ (BKJD)



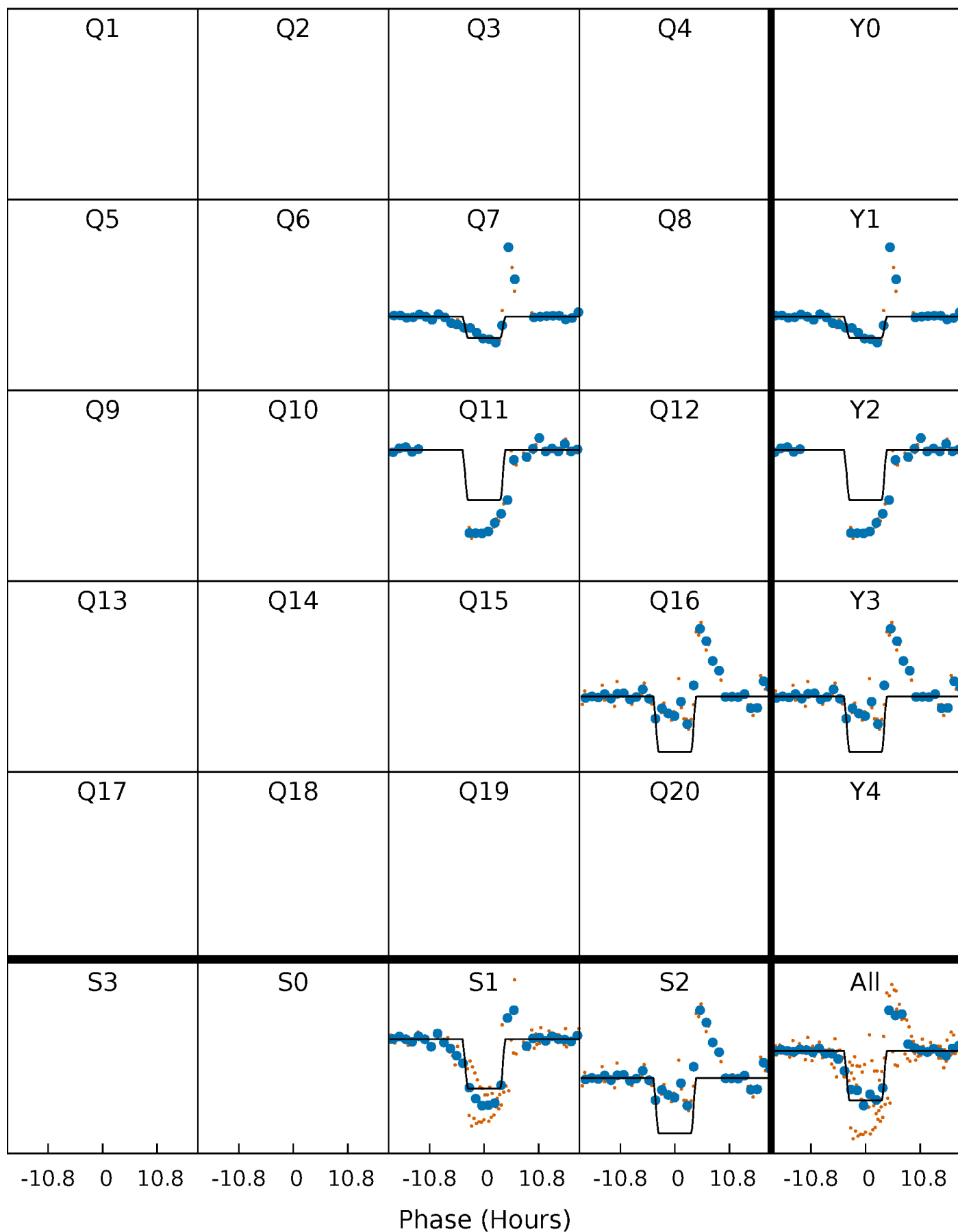
DV Quarter-Phased Transit Curves

TCE 012156549-02 $P=417.044172$ Days $T_0=259.704533$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

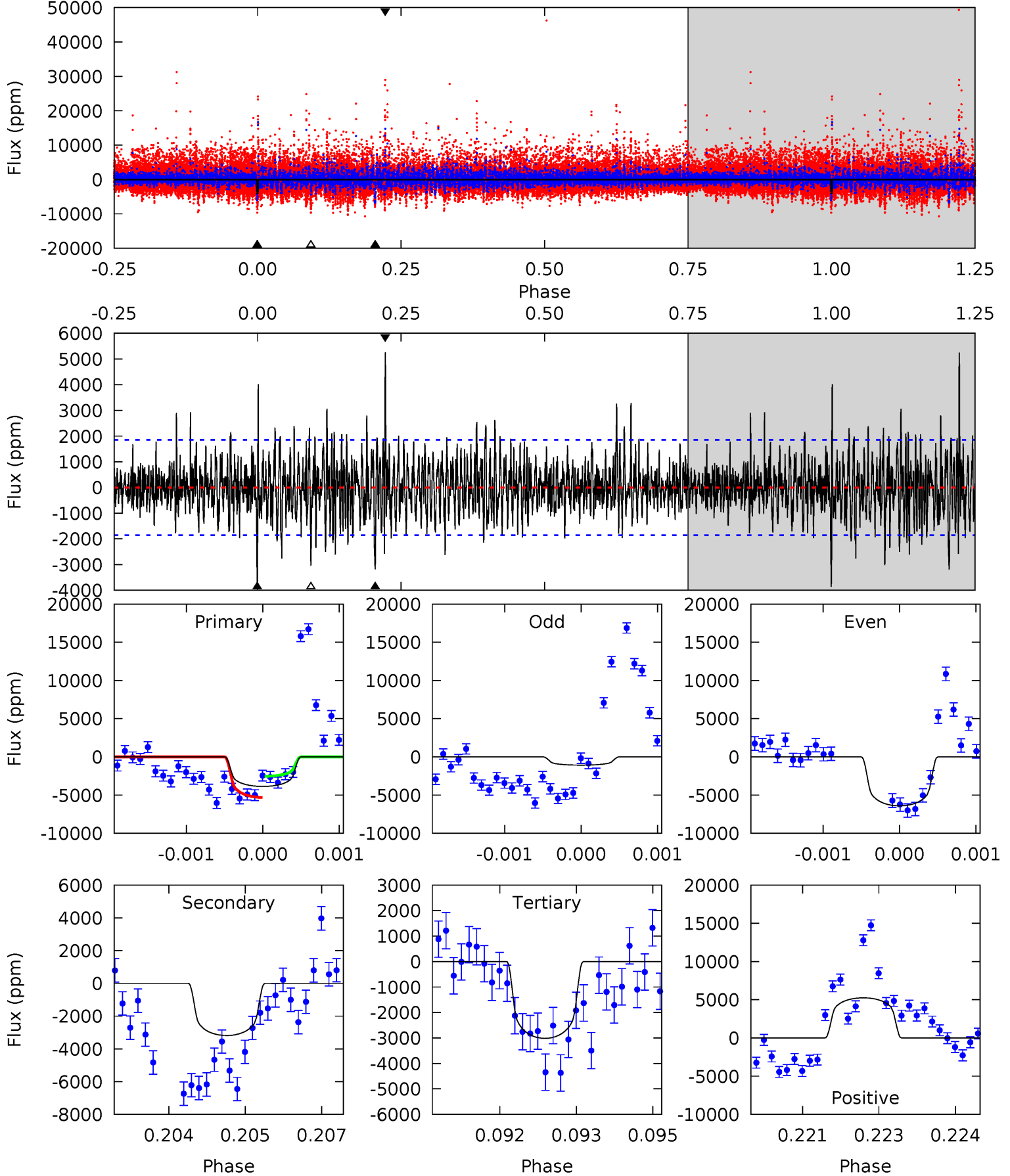
TCE 012156549-02 P=416.974037 Days $T_0=259.904226$ (BKJD)



DV Model-Shift Uniqueness Test

012156549-02, P = 417.044172 Days, E = 259.704533 Days

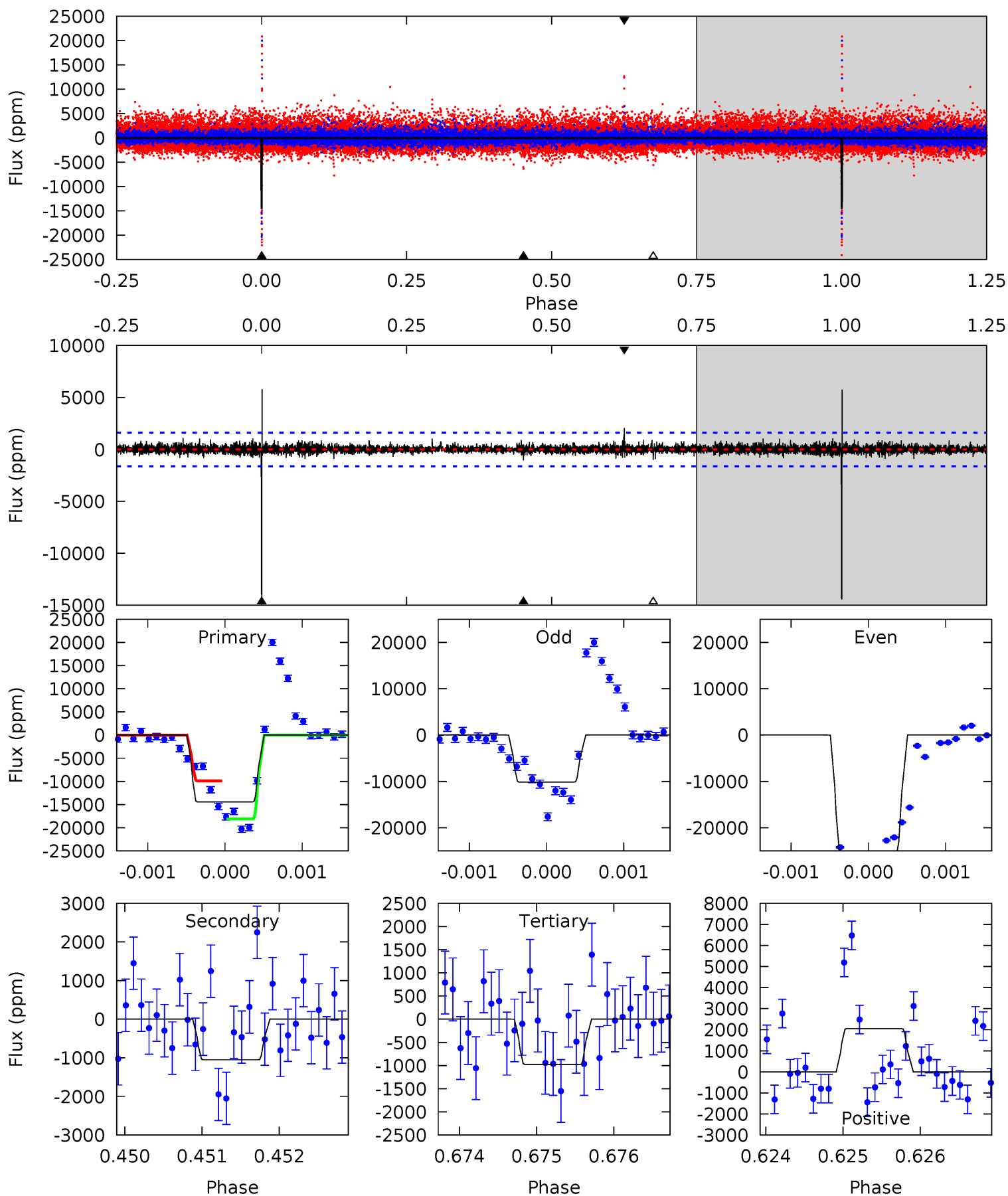
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.3	9.27	8.78	15.3	5.40	3.21	2.38	2.48	-4.03	0.49	-6.02	3.84	0.63	0.58	3.99



Alt Model-Shift Uniqueness Test

012156549-02, P = 416.974037 Days, E = 259.904226 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
48.9	3.55	3.30	6.93	5.48	3.33	0.74	45.6	41.9	0.25	-3.38	29.0	1.05	0.29	0



Stellar Parameters For KIC 012156549

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	5888^{+418}_{-418}	$4.373^{+0.162}_{-0.198}$	$-0.180^{+0.300}_{-0.300}$	$1.043^{+0.346}_{-0.231}$	$0.938^{+0.167}_{-0.137}$	$1.164^{+0.993}_{-0.613}$
	+7%/-7%	+4%/-5%	+167%/-167%	+33%/-22%	+18%/-15%	+85%/-53%
Source	PHO1	KIC0	KIC0	DSEP		

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

Secondary Eclipse Parameters for KIC 012156549-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	-3182 ± 343	$11.42^{+2.29}_{-2.10}$	360^{+38}_{-34}	4601^{+395}_{-351}	15299^{+7814}_{-4717}
Alt.	-1049 ± 295	$14.47^{+2.96}_{-2.29}$	362^{+40}_{-32}	3470^{+261}_{-236}	3053^{+1556}_{-1144}

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 $A_{obs} \gg 1.0$

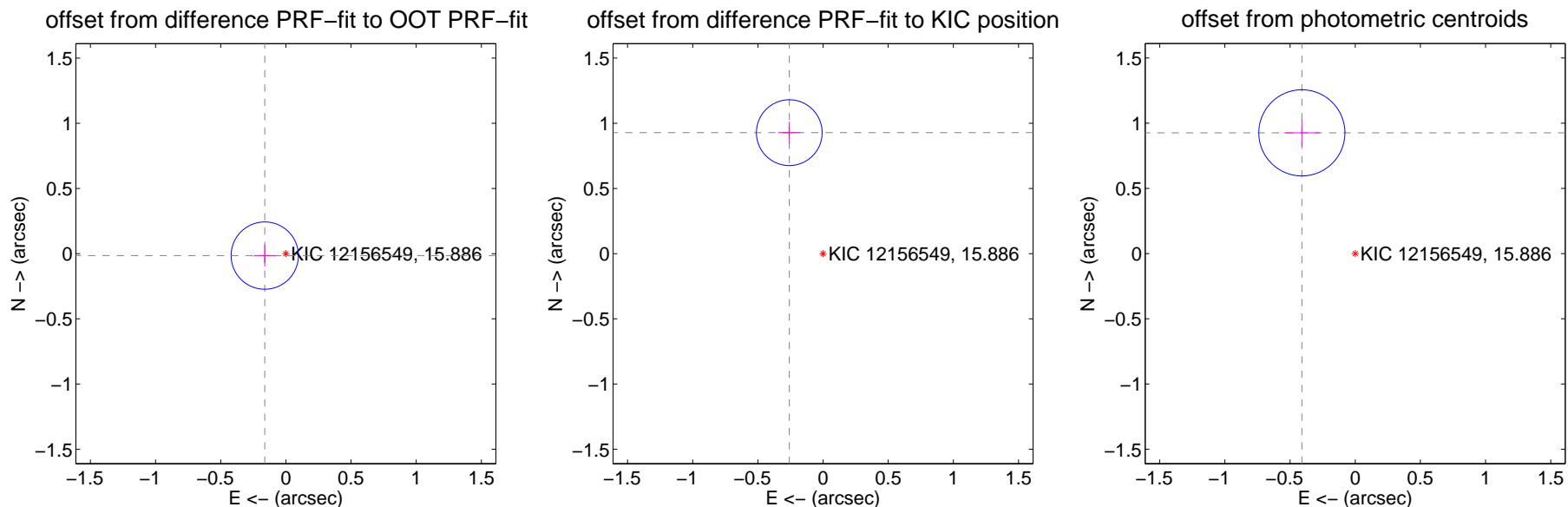
DV Centroid Data

Supplemental centroid analysis for 012156549-02. Kepler magnitude: 15.89. Transit SNR 12.01

There are 0 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.95 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.163 ± 0.086	1.89	0.162 ± 0.086	-0.015 ± 0.084
PRF-fit source offset from KIC position	0.964 ± 0.084	11.46	0.259 ± 0.086	0.928 ± 0.084
photometric centroid source offset	1.01 ± 0.11	9.20	0.41 ± 0.14	0.93 ± 0.10



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

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



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

Q5 no difference image



Q5 no OOT image



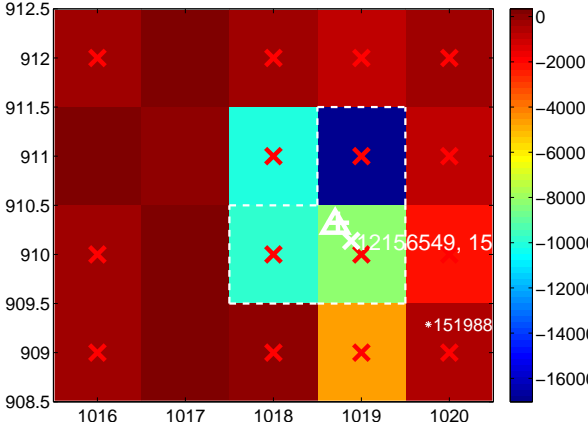
Q6 no difference image



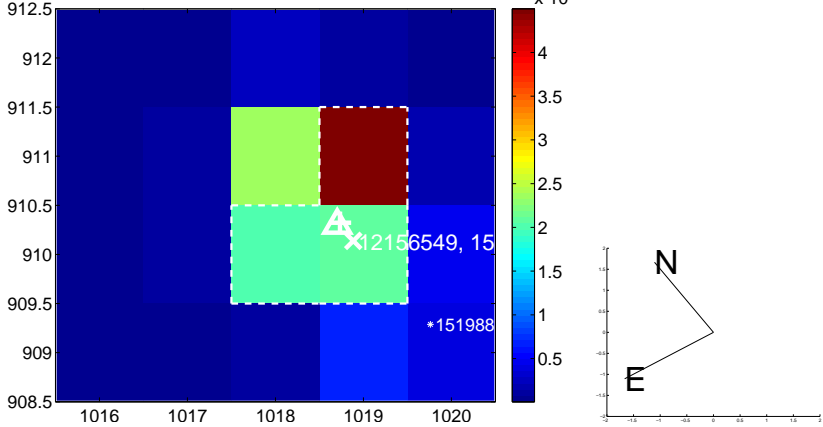
Q6 no OOT image



Q7 difference image. Poor Quality



Q7 OOT image



Q8 no difference image



Q8 no OOT image



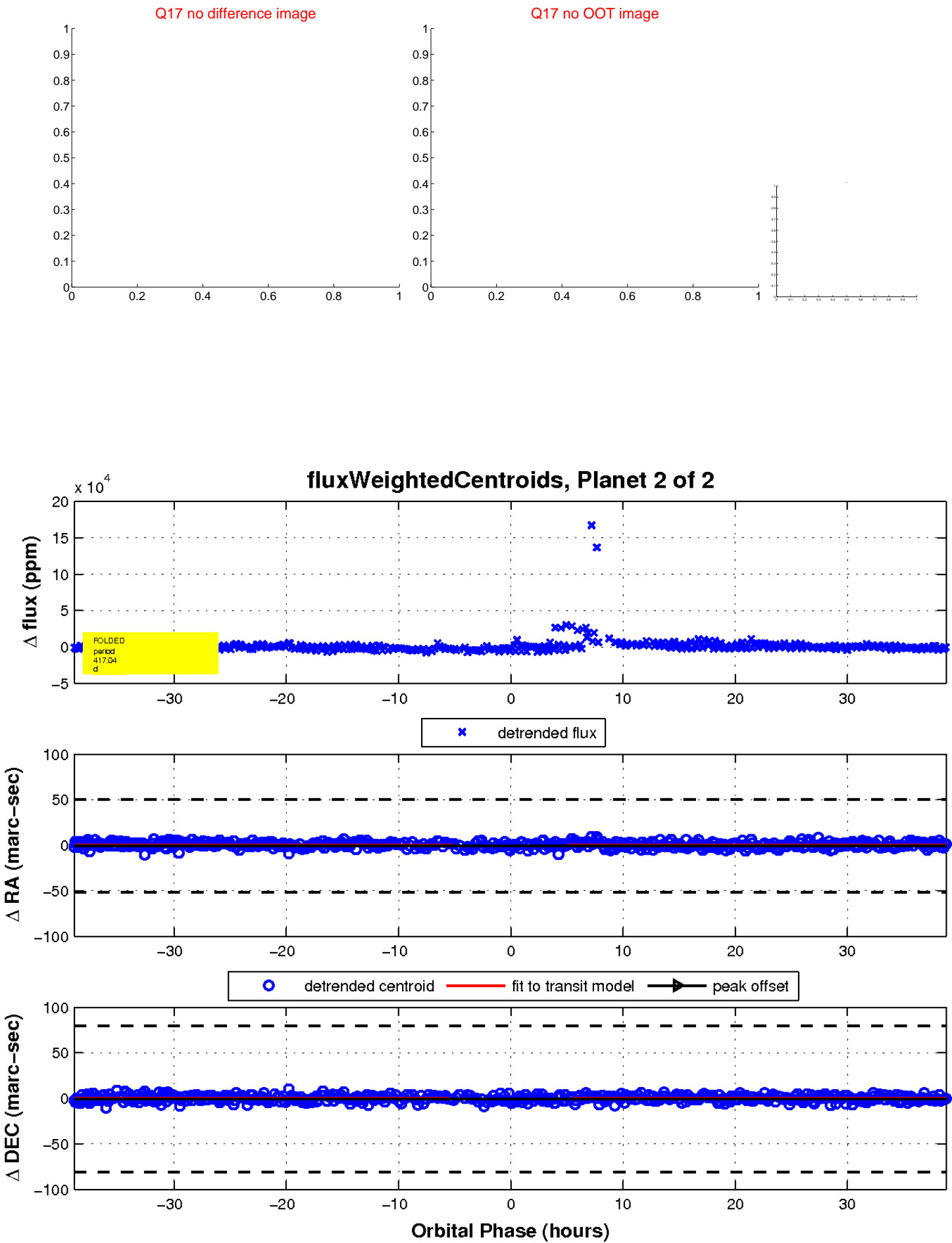
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

