

KIC 002716857

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})
002716857-01	OBS	No	0.999528	131.965666	78.4	4.796	7.2	8.3	0.48	4314	0.43	306.14
002716857-03	OBS	No	501.685715	552.306256	3109.6	18.970	8.9	8.1	0.48	4314	3.29	0.08
002716857-05	OBS	No	177.320689	160.517220	1139.9	1.884	8.6	4.9	0.48	4314	2.30	0.31
002716857-06	OBS	No	227.237438	187.552018	1641.3	3.886	7.9	8.1	0.48	4314	1.95	0.22

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
002716857-01	OBS	FP	0.00	1	0	0	0	LPP_DV
002716857-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS
002716857-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_TRACKER—MOD_TER_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
002716857-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—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.

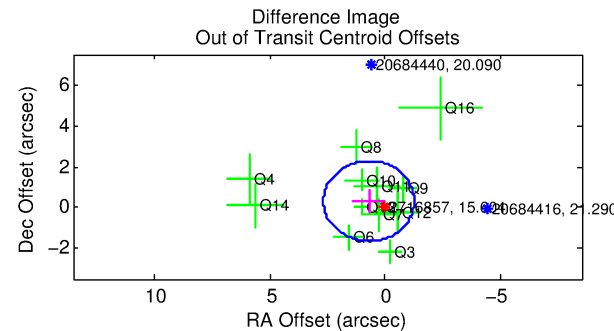
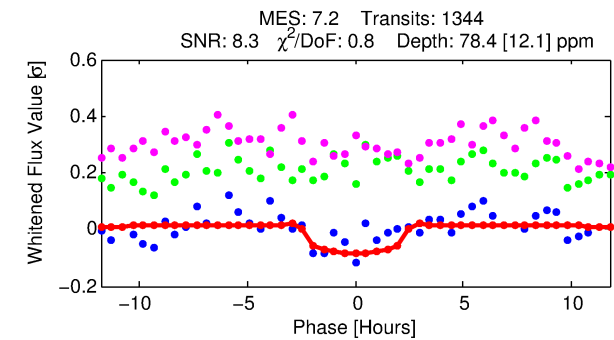
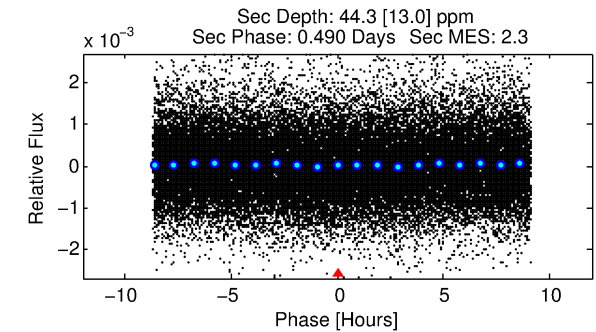
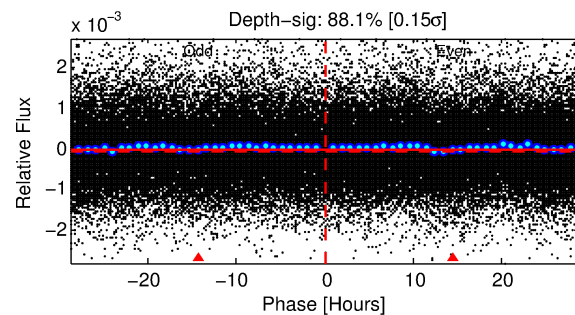
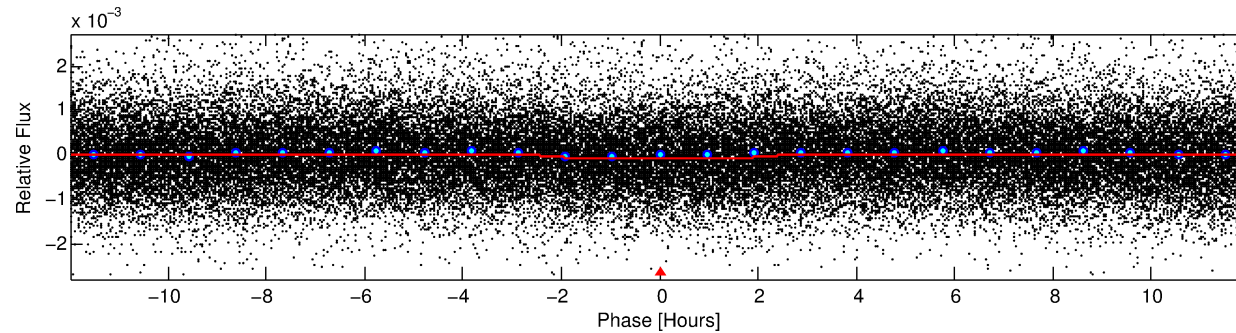
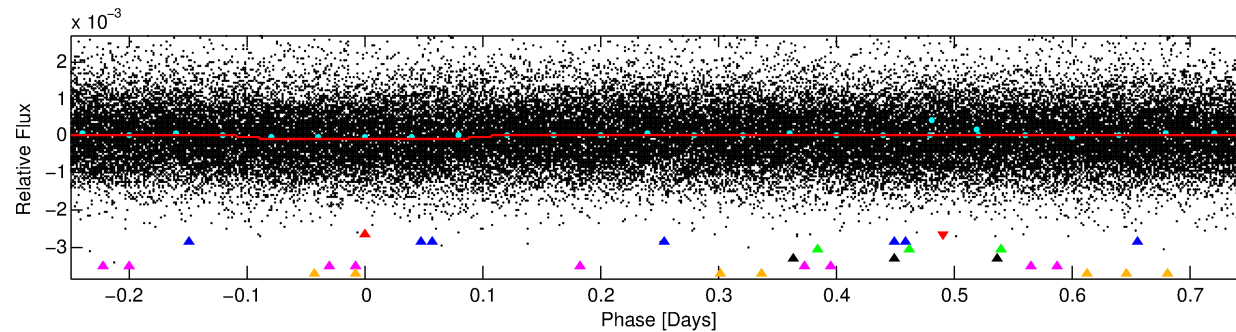
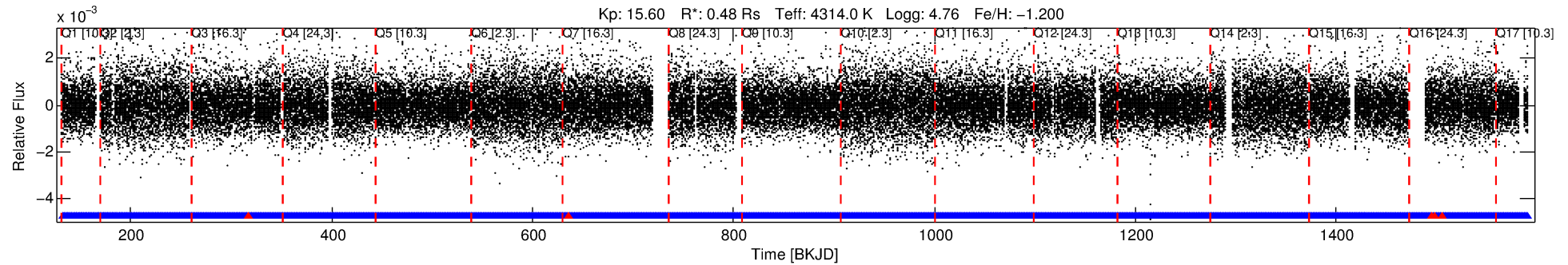
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 002716857-01

No Significant Match Found

DV One-Page Summary

KIC: 2716857 Candidate: 1 of 6 Period: 1.000 d



DV Fit Results:

Period = 0.99953 [0.00001] d
Epoch = 131.9657 [0.0056] BKJD
Rp/R* = 0.0081 [0.0083]
a/R* = 1.70 [4.90]
b = 0.19 [22.58]
Seff = 306.14 [60.42]
Teq = 1067 [53] K
Rp = 0.43 [0.44] Re
a = 0.0154 [0.0015] AU
Ag = 31.86 [66.19] [0.47 σ]
Teffp = 3918 [2035] K [1.40 σ]

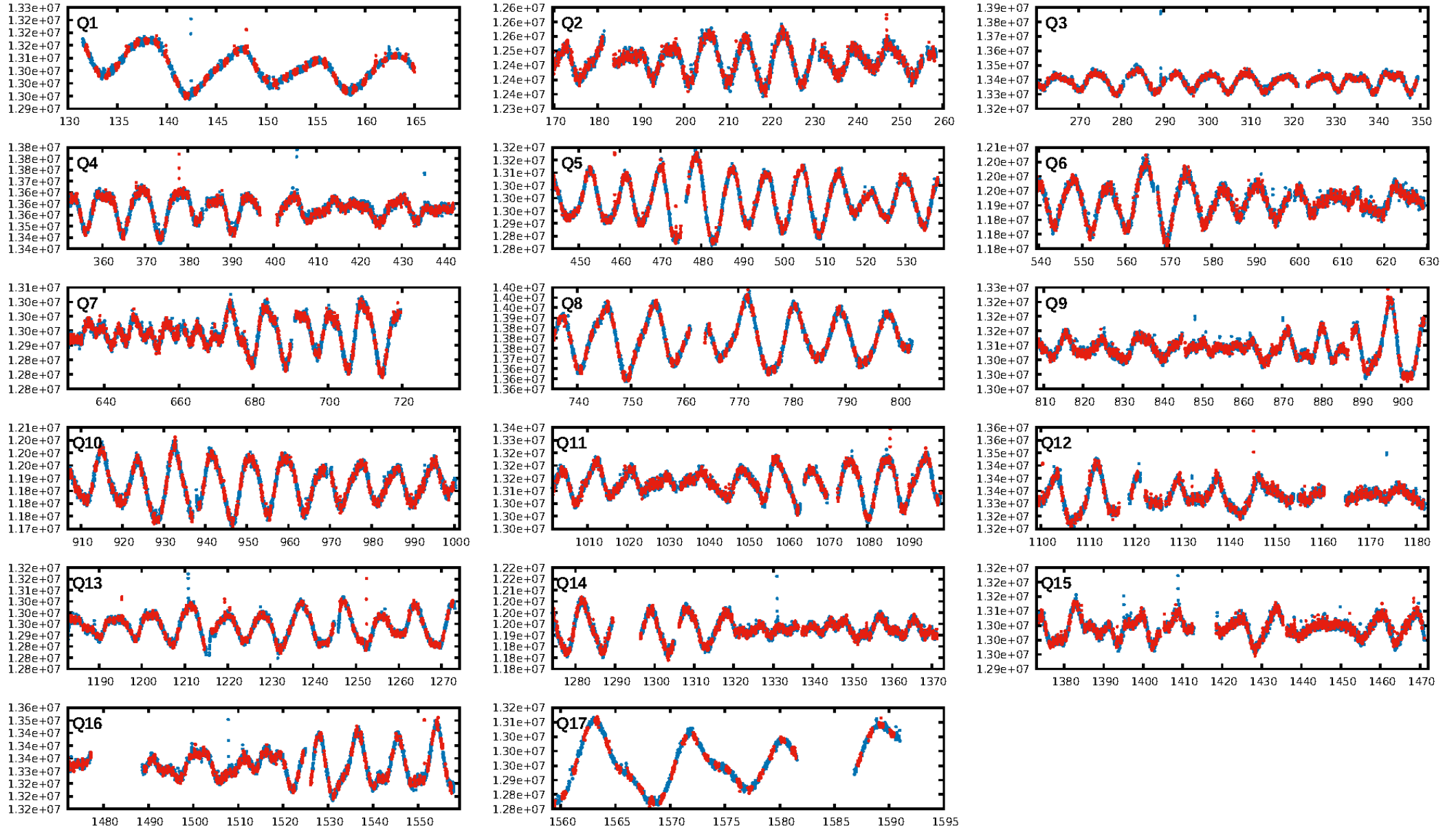
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 100.0% [821.22 σ]
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: 1.06e-10
RollingBand-fgt: 1.00 [1278/1283]
GhostDiagnostic-chr: 2.339
Centroid-sig: 0.0%
Centroid-so: 4.081 arcsec [3.15 σ]
OotOffset-rm: 0.779 arcsec [1.19 σ]
KicOffset-rm: 0.652 arcsec [0.96 σ]
OotOffset-st: 3/3/4/2 [12]
KicOffset-st: 3/3/4/2 [12]
DiffImageQuality-fgm: 0.42 [5/12]
DiffImageOverlap-fno: 1.00 [17/17]

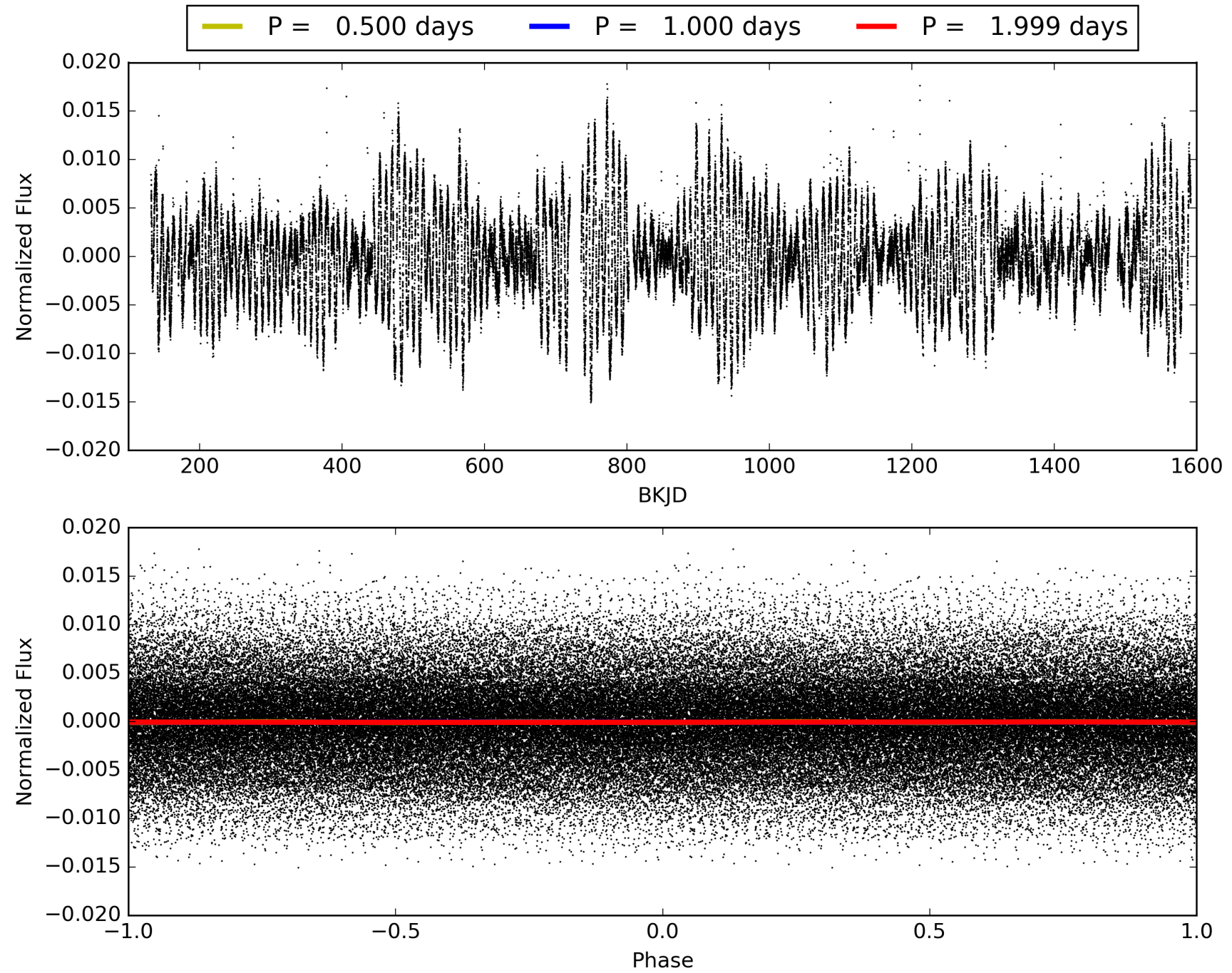
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 15:55:59 Z

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

TCE 002716857-01, PDC Light Curves

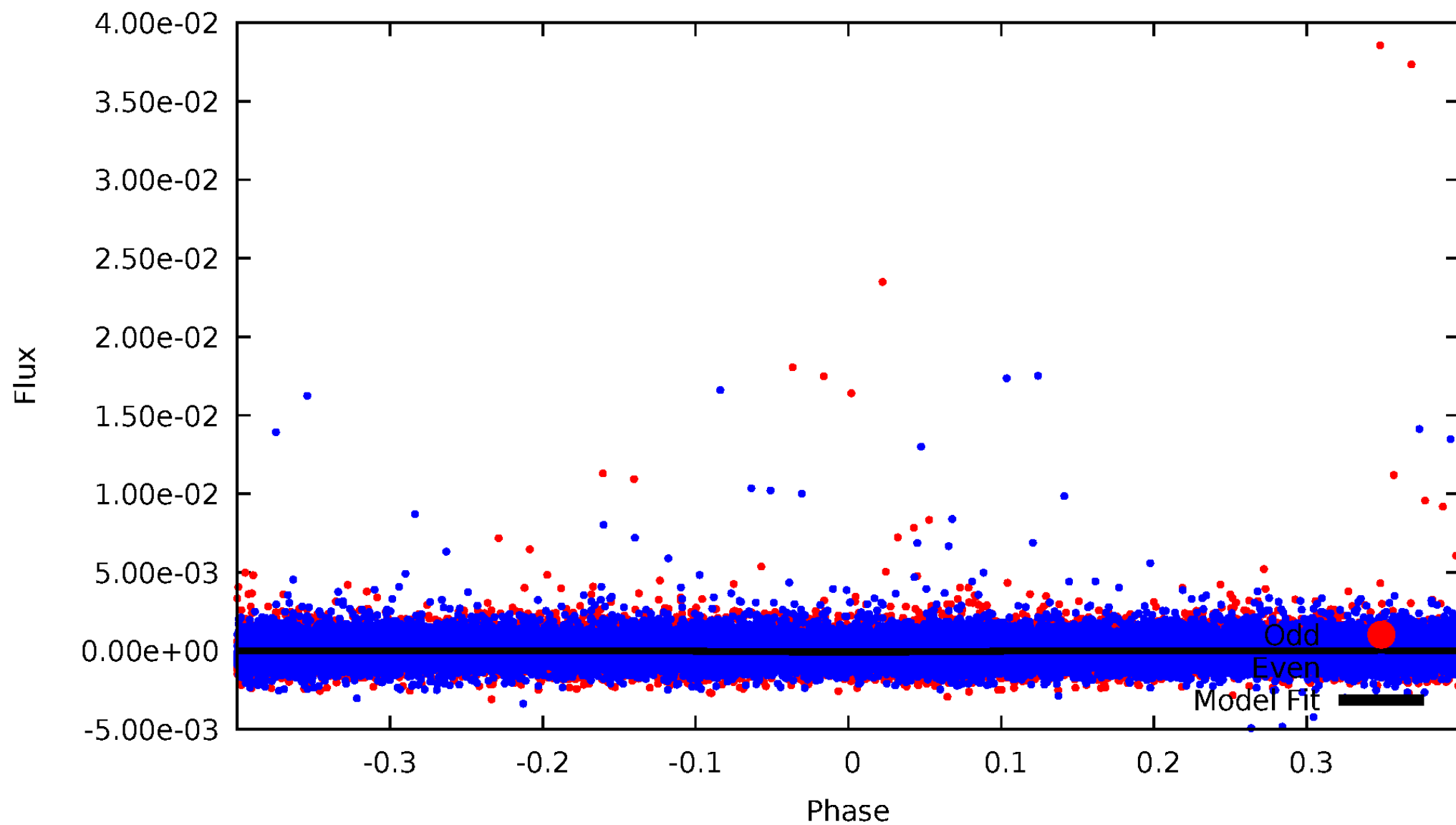


TCE 002716857-01



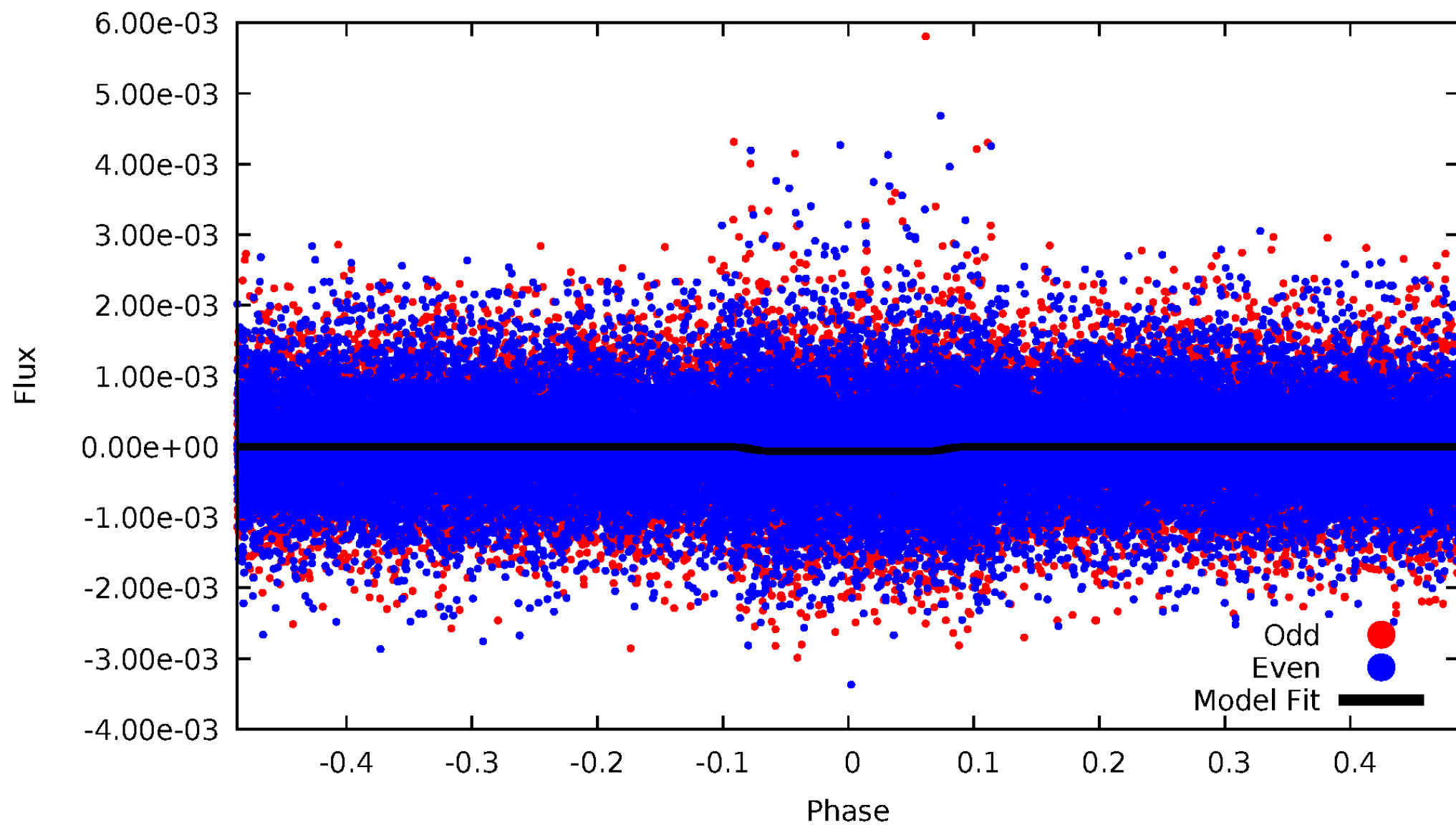
DV Odd/Even

TCE 002716857-01



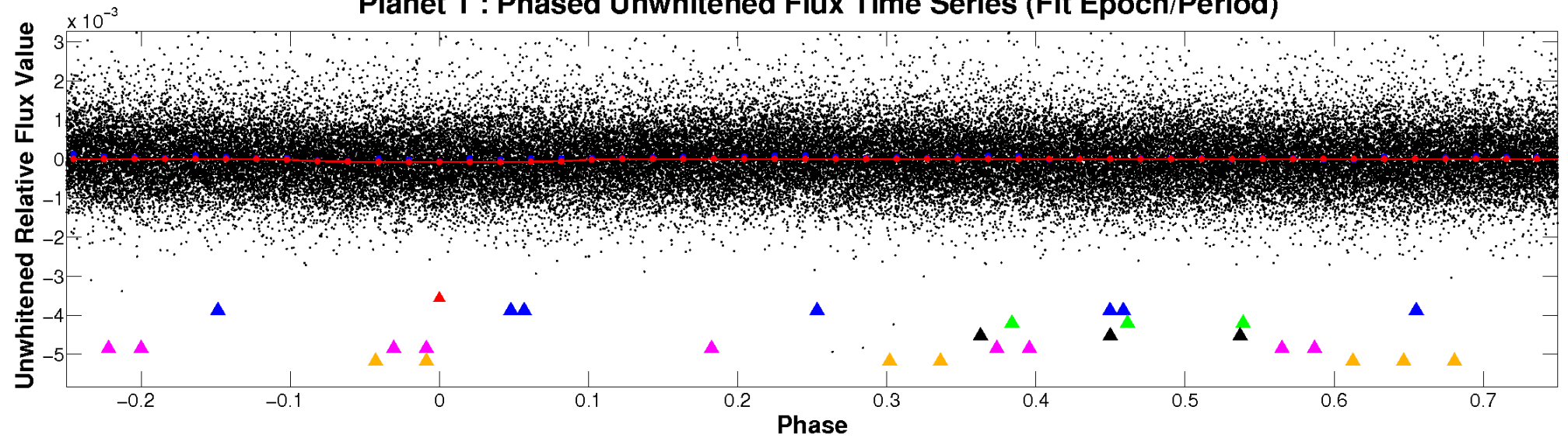
ALT Odd/Even

TCE 002716857-01

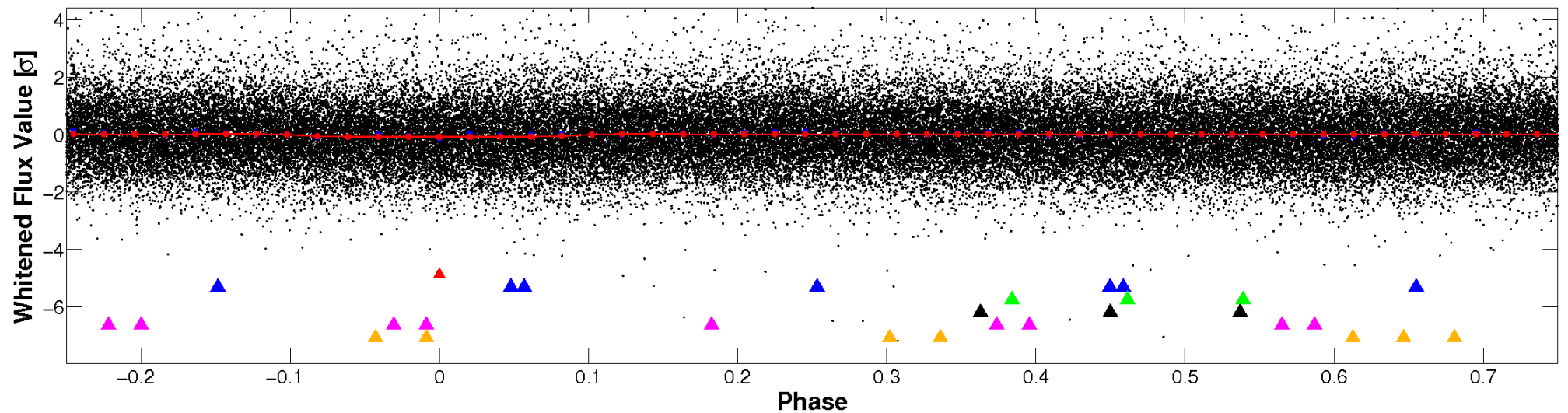


Non-Whitened Vs. Whitened Light Curve

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

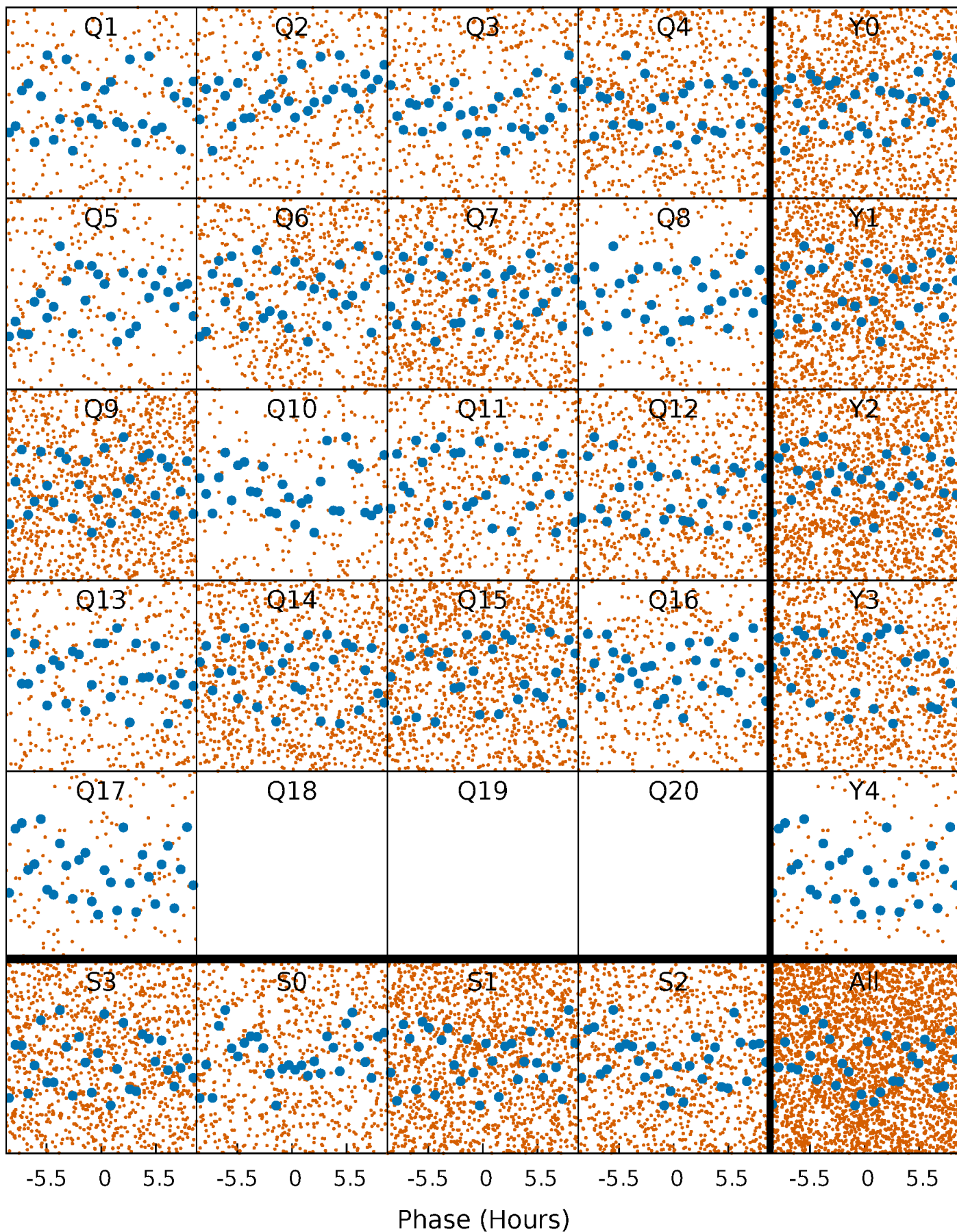


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



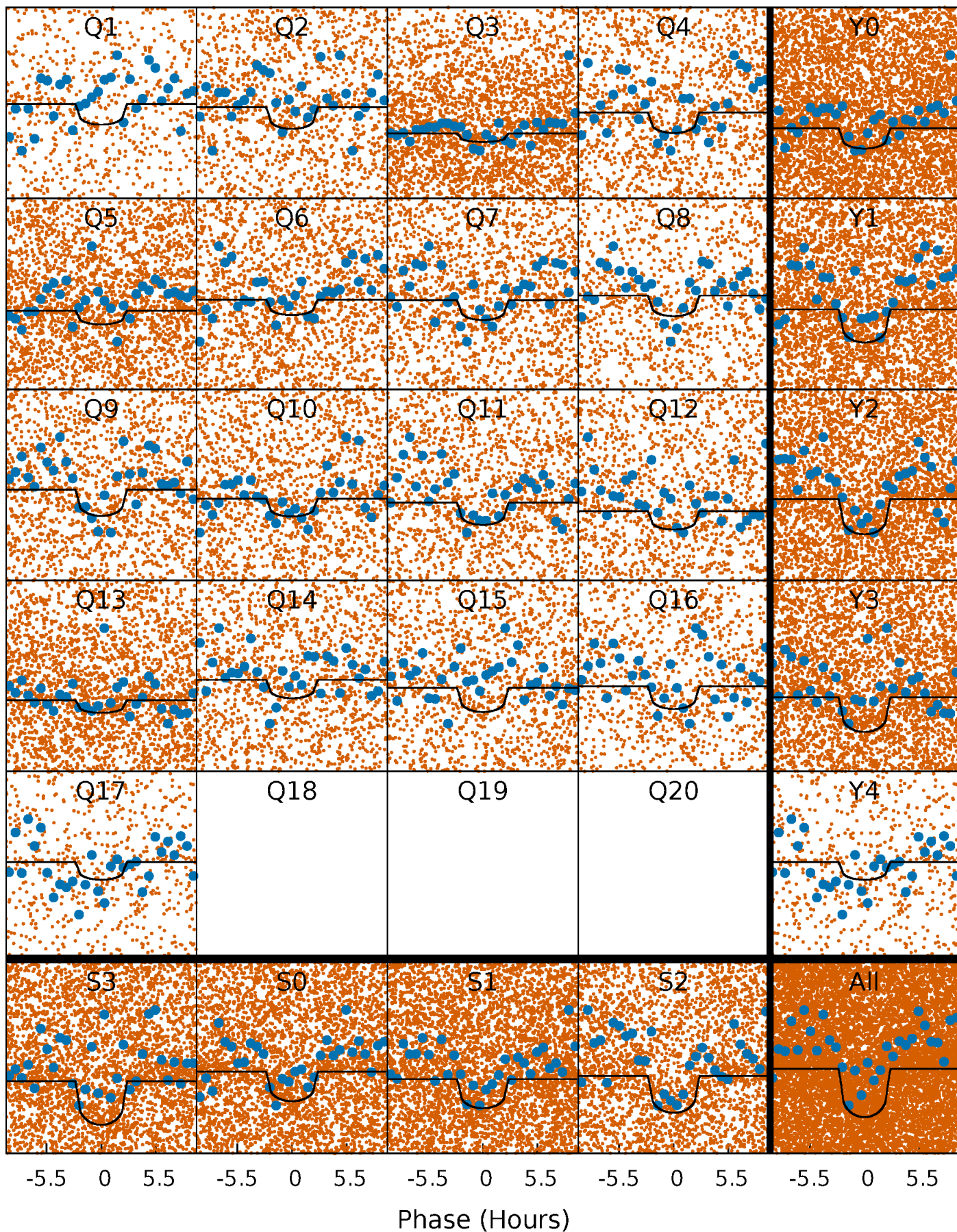
PDC Quarter-Phased Transit Curves

TCE 002716857-01 P= 0.999528 Days $T_0=131.965666$ (BKJD)



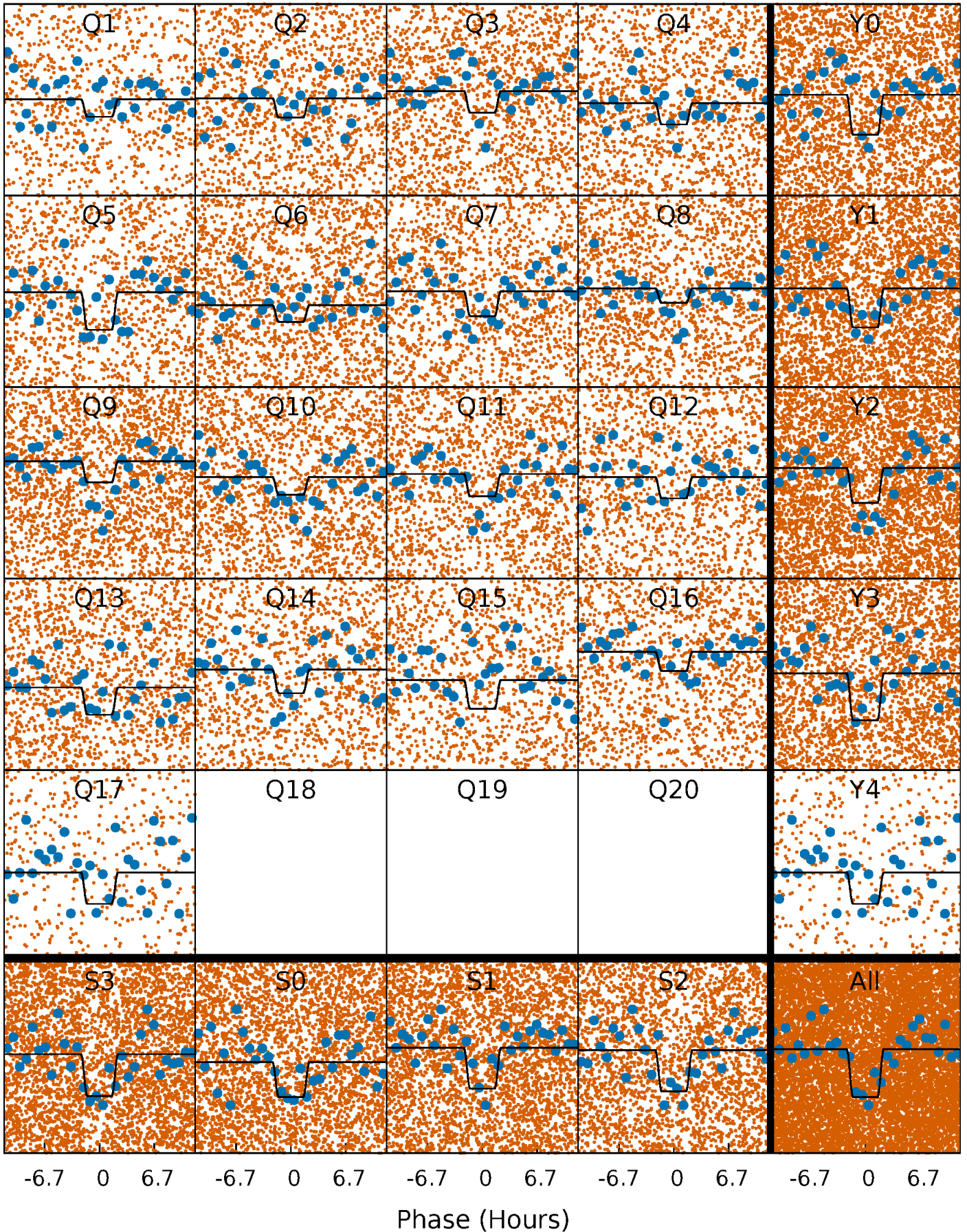
DV Quarter-Phased Transit Curves

TCE 002716857-01 P= 0.999528 Days $T_0=131.965666$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

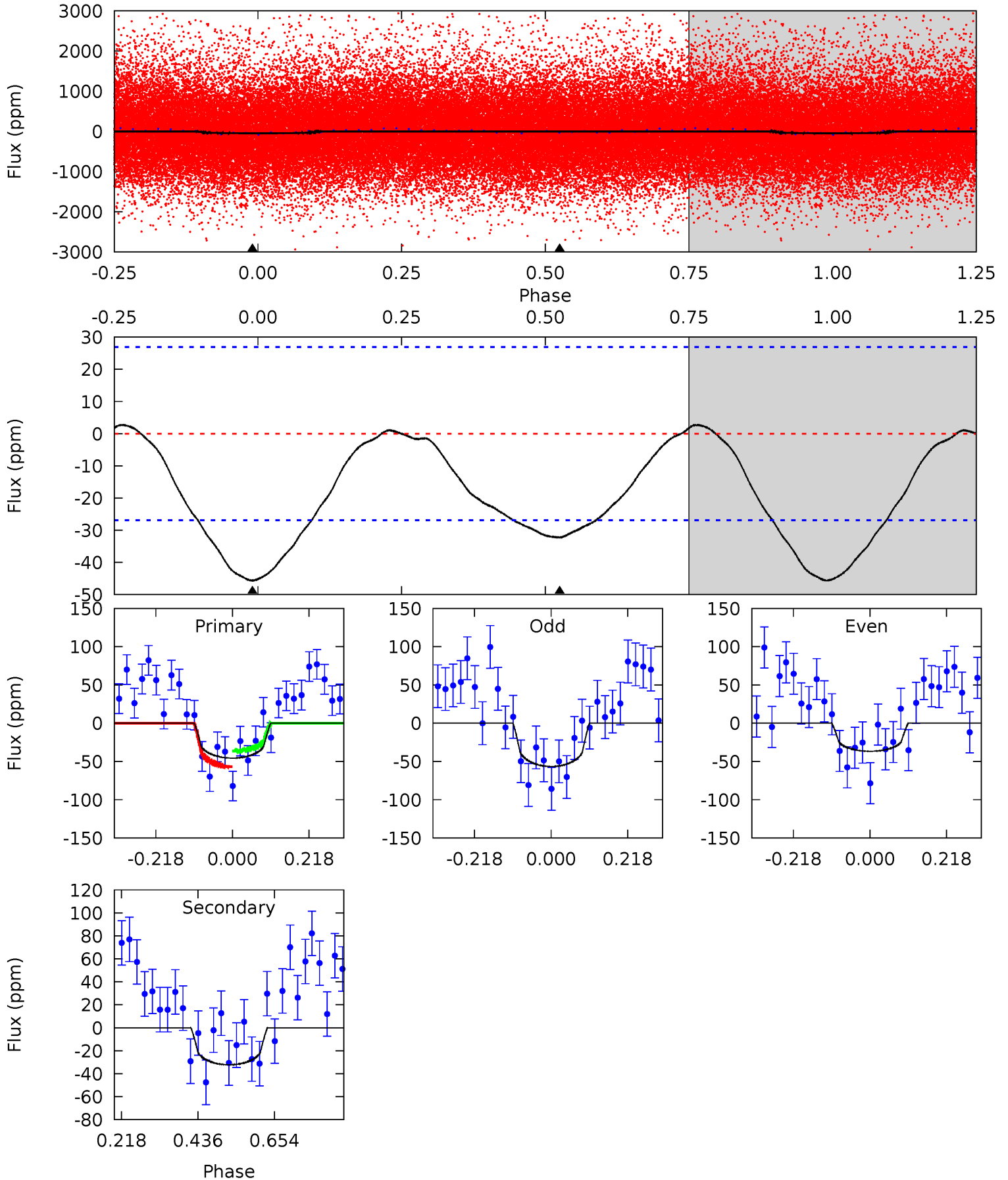
TCE 002716857-01 P= 0.999525 Days $T_0=131.936618$ (BKJD)



DV Model-Shift Uniqueness Test

002716857-01, P = 0.999528 Days, E = 130.966138 Days

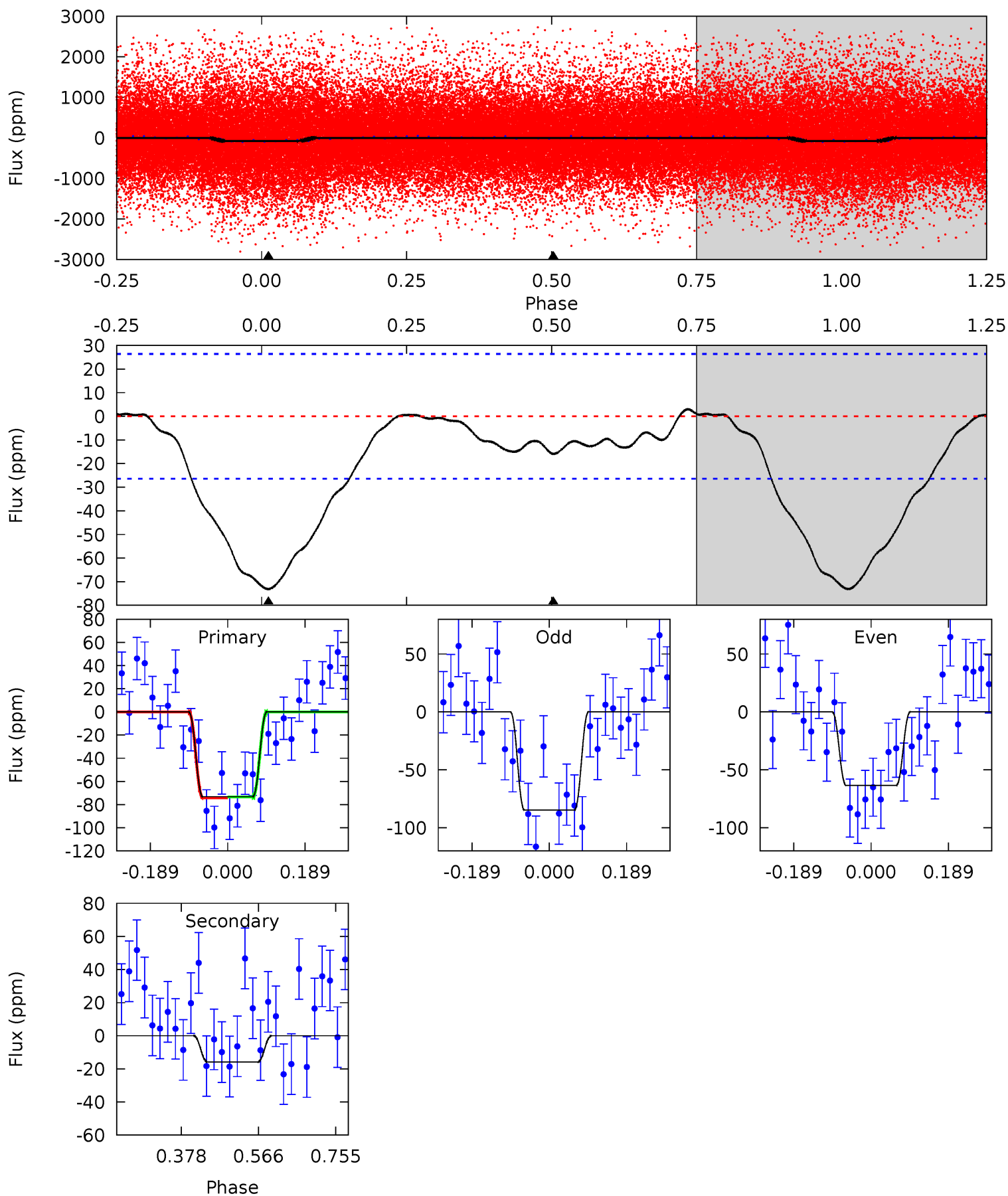
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.46	5.27	0	0	4.40	1.23	0.26	7.46	7.46	5.27	5.27	1.63	0.27	0.06	1.67



Alt Model-Shift Uniqueness Test

002716857-01, P = 0.999525 Days, E = 130.937093 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.3	2.67	0	0	4.43	1.31	0.47	12.3	12.3	2.67	2.67	1.77	0.73	0.04	0



Stellar Parameters For KIC 002716857

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	$M(M_{\odot})$	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	4314^{+115}_{-153}	$4.757^{+0.072}_{-0.033}$	$-1.200^{+0.300}_{-0.350}$	$0.484^{+0.034}_{-0.059}$	$0.489^{+0.037}_{-0.042}$	$6.066^{+2.004}_{-0.865}$
	+3%/-4%	+2%/-1%	+25%/-29%	+7%/-12%	+8%/-9%	+33%/-14%
Source	PHO1	KIC0	KIC0	DSEP		

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

Secondary Eclipse Parameters for KIC 002716857-01 / KOI

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-32 ± 6	$0.49^{+0.44}_{-0.30}$	1475^{+52}_{-62}	3584^{+1563}_{-646}	18^{+102}_{-13}
Alt.	-16 ± 6	$0.52^{+0.40}_{-0.34}$	1479^{+53}_{-65}	3134^{+1283}_{-523}	$7.464^{+45.649}_{-5.386}$

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

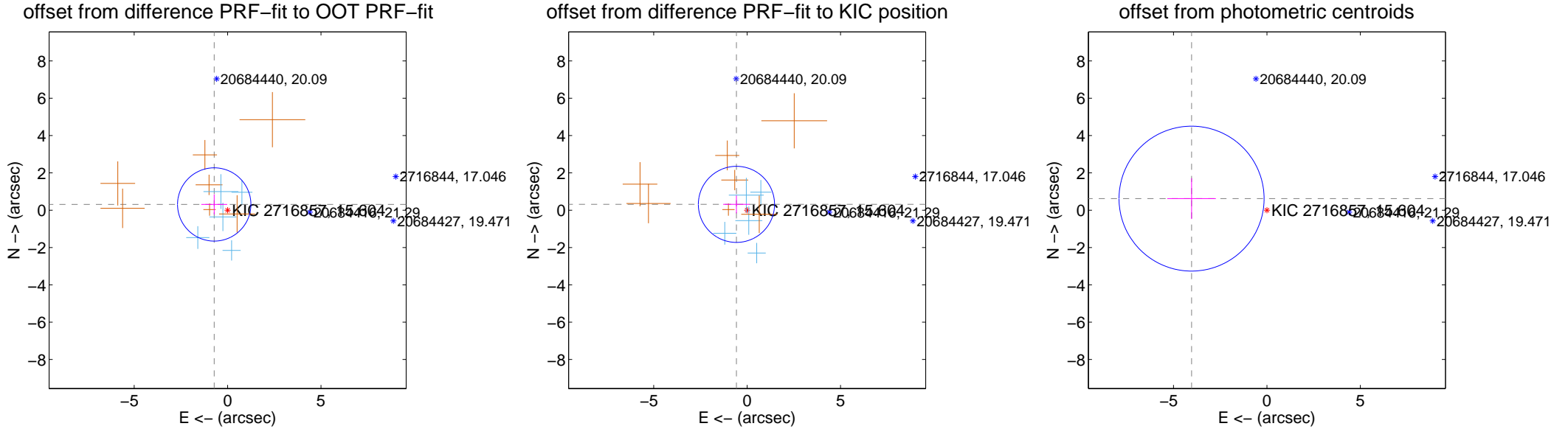
DV Centroid Data

Supplemental centroid analysis for 002716857-01. Kepler magnitude: 15.60. Transit SNR 8.25

There are 5 quarters with good PRF difference image offsets

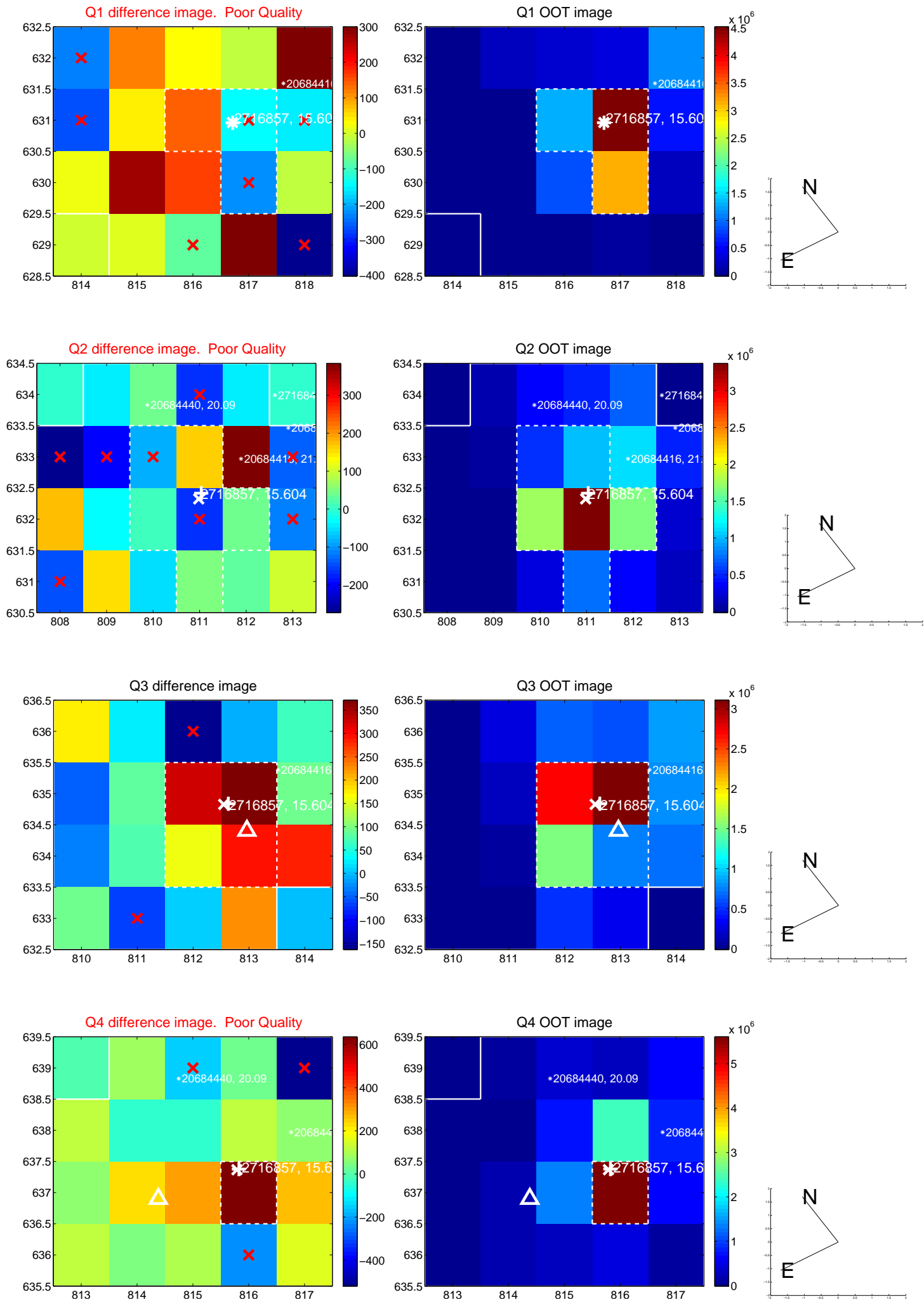
The direct PRF centroid is offset from the target star catalog position by about 0.14 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.779 ± 0.654	1.19	0.716 ± 0.695	0.308 ± 0.536
PRF-fit source offset from KIC position	0.652 ± 0.680	0.96	0.572 ± 0.711	0.313 ± 0.477
photometric centroid source offset	4.08 ± 1.29	3.15	4.03 ± 1.30	0.62 ± 1.09

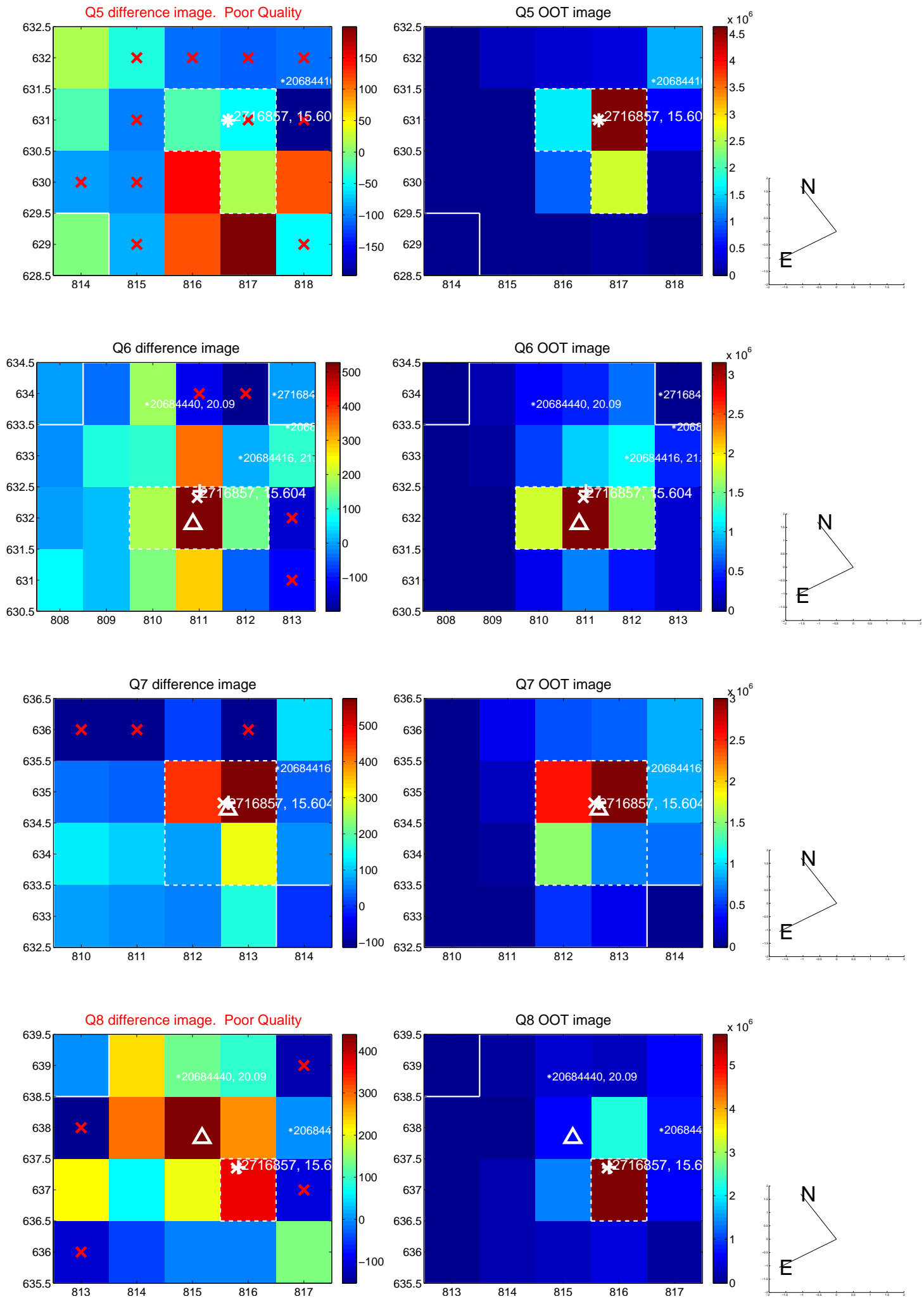


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

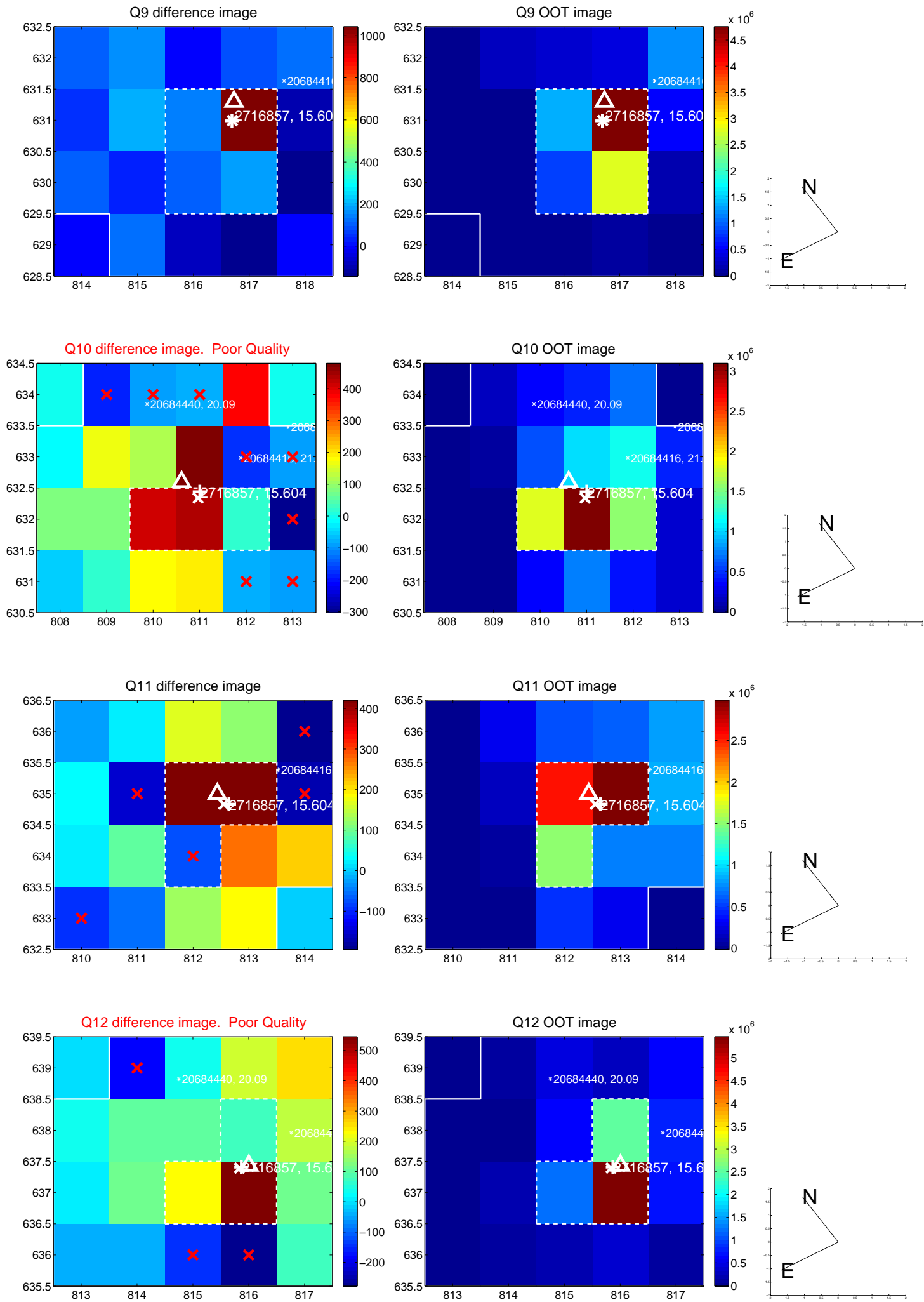
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



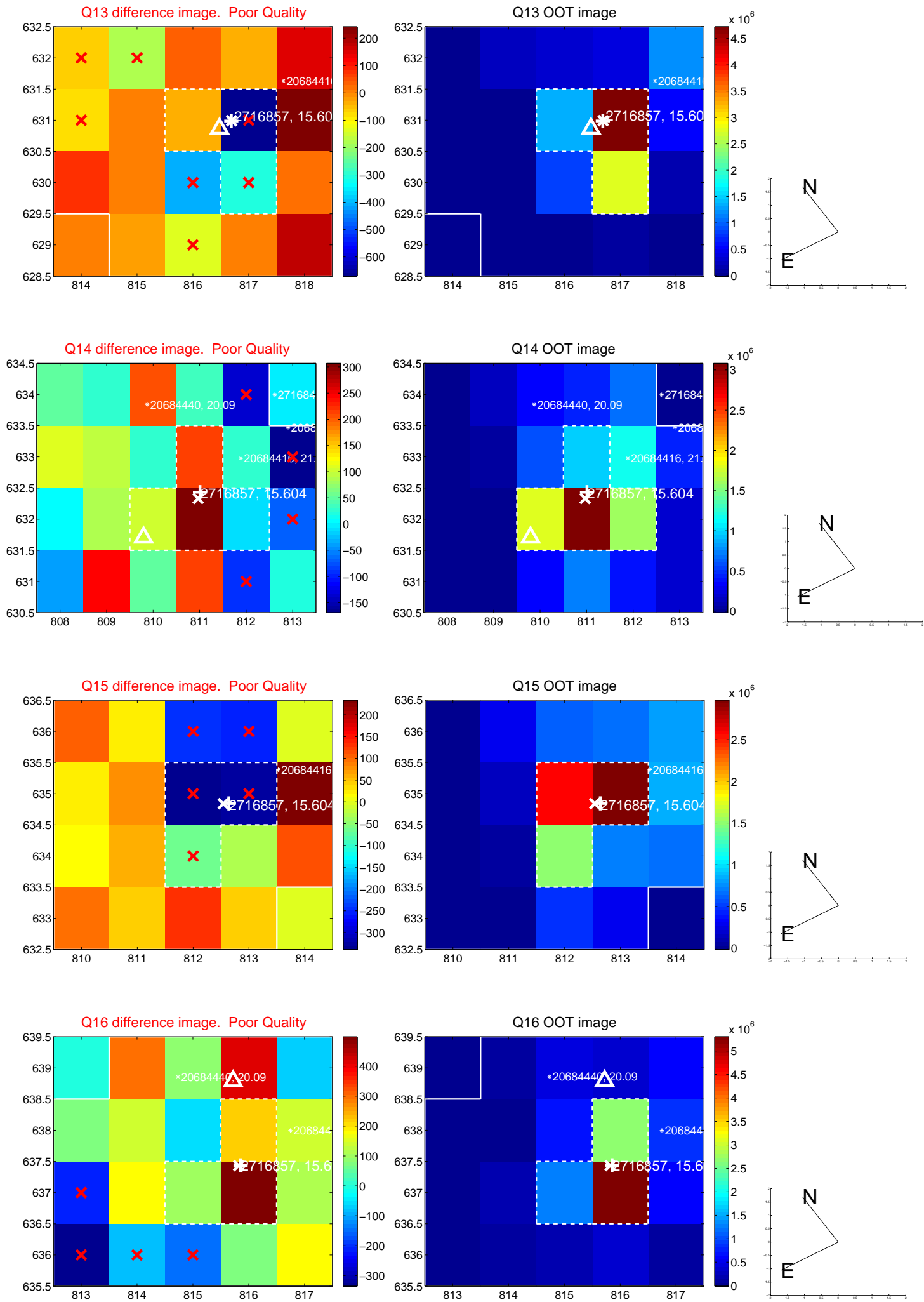
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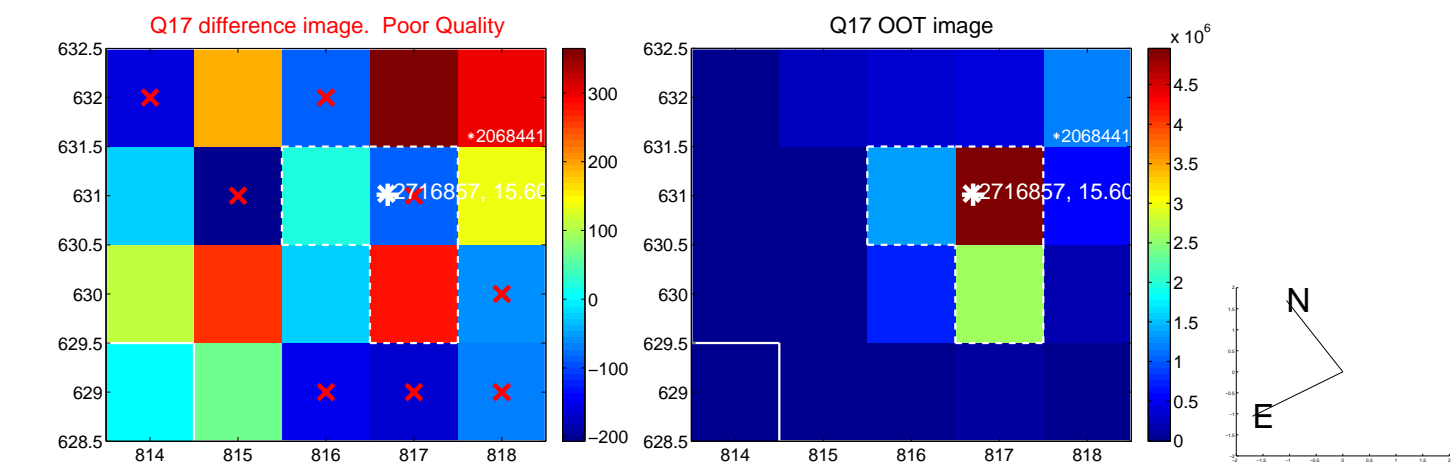
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



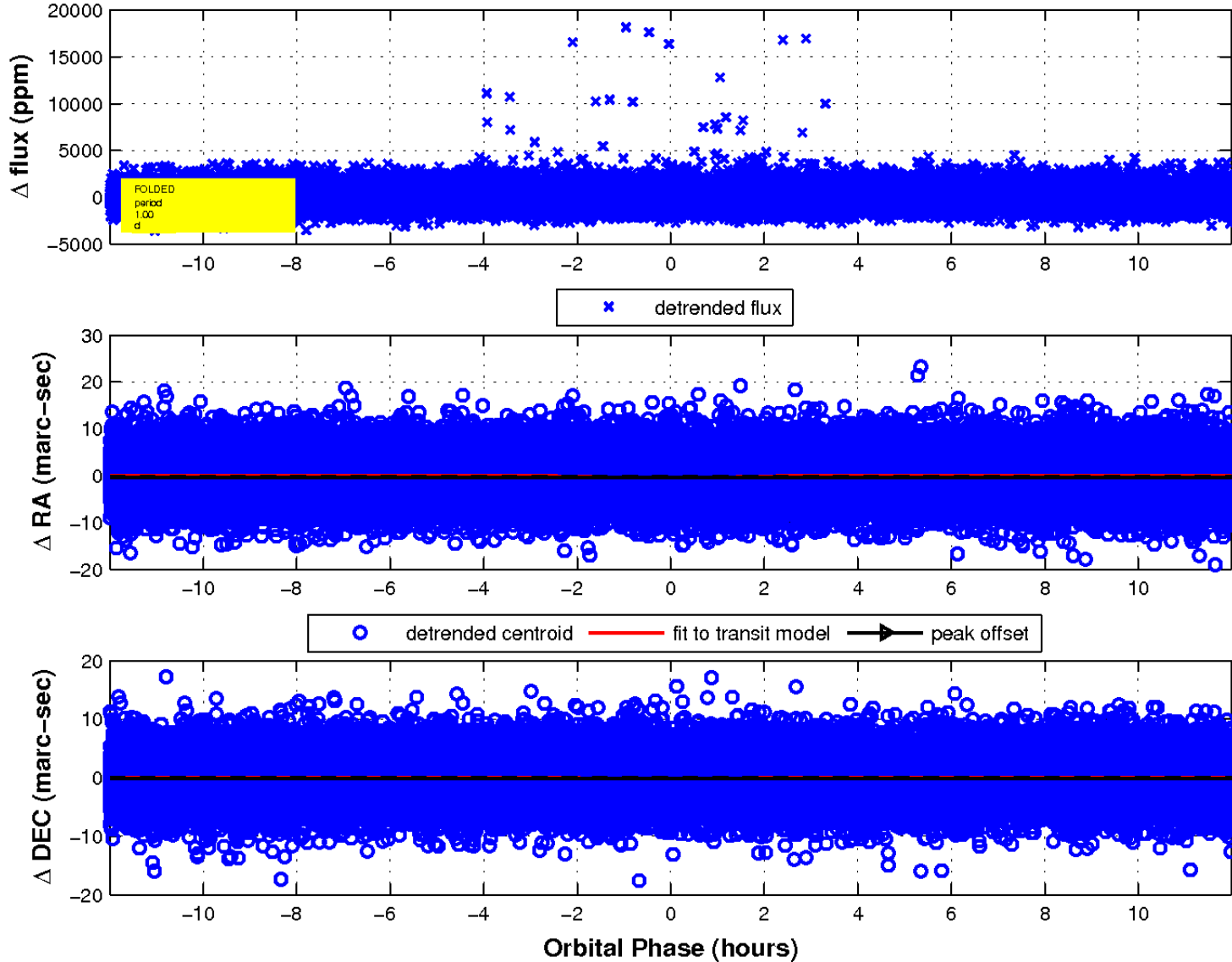
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

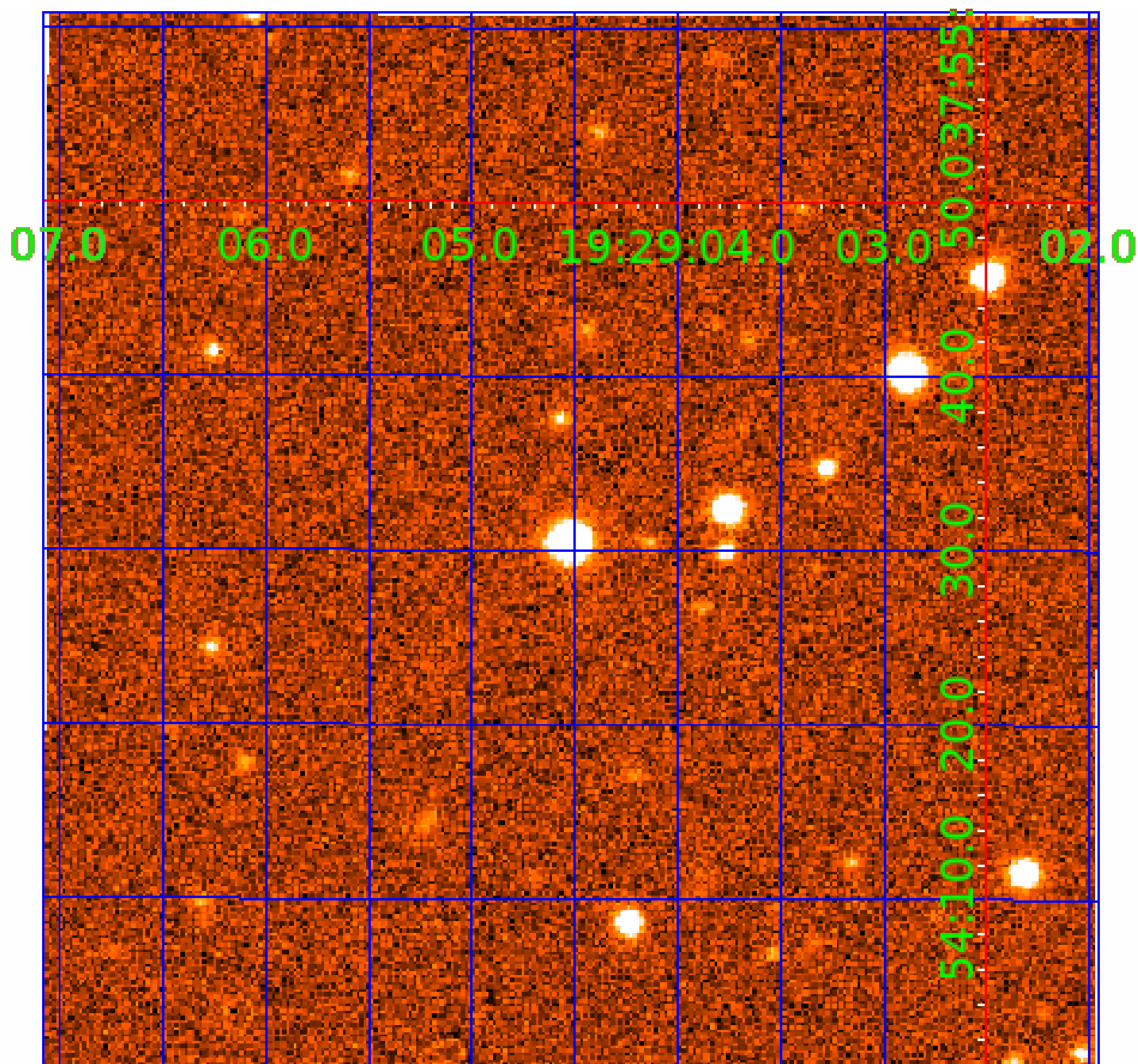


fluxWeightedCentroids, Planet 1 of 6



UKIRT Image

Declination



KIC 002716857

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})
002716857-01	OBS	No	0.999528	131.965666	78.4	4.796	7.2	8.3	0.48	4314	0.43	306.14
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Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
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002716857-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS
002716857-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_TRACKER—MOD_TER_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
002716857-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—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.

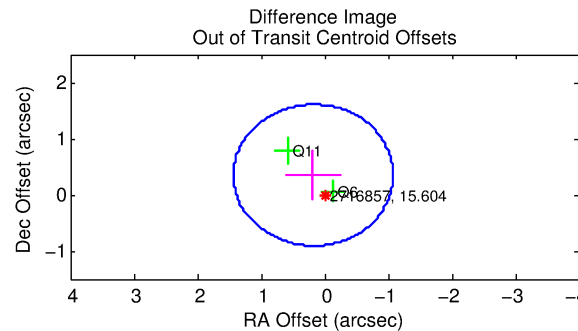
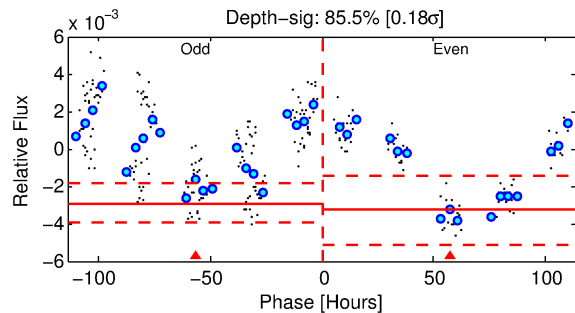
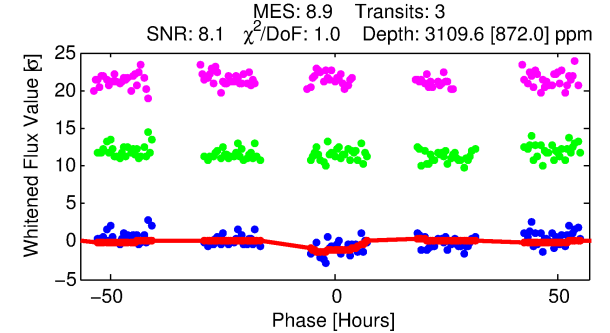
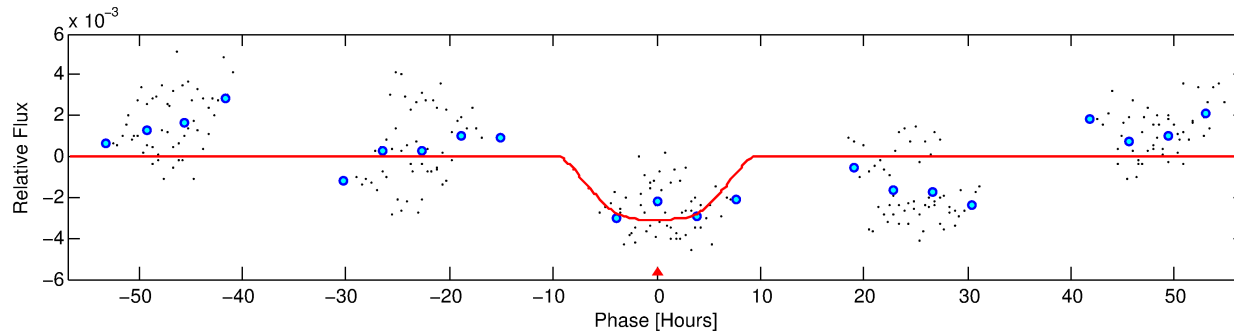
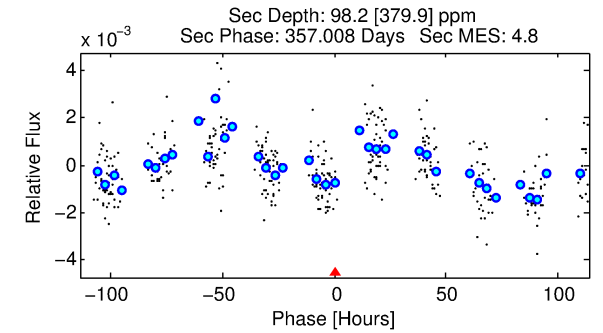
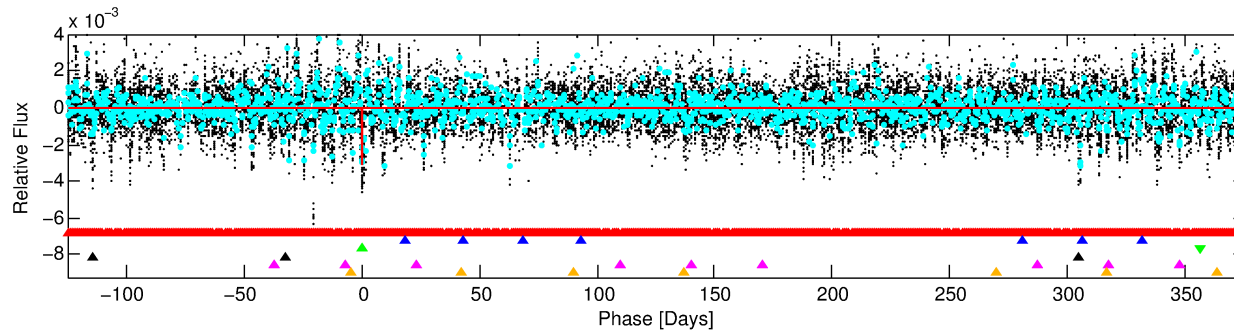
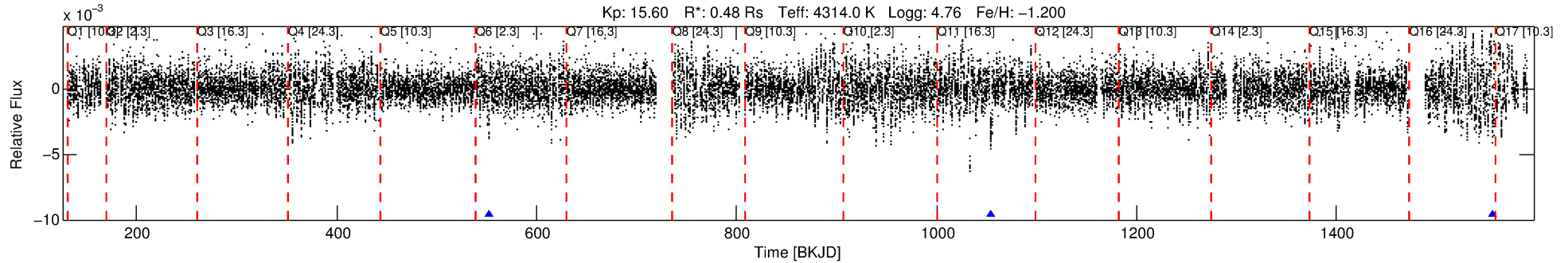
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 002716857-03

No Significant Match Found

DV One-Page Summary

KIC: 2716857 Candidate: 3 of 6 Period: 501.686 d



DV Fit Results:

Period = 501.68571 [0.08458] d
Epoch = 552.3063 [0.0843] BKJD
Rp/R* = 0.0622 [0.0101]
a/R* = 107.06 [45.89]
b = 0.92 [0.04]
Seff = 0.08 [0.02]
Teq = 134 [7] K
Rp = 3.29 [0.67] Re
a = 0.9732 [0.0956] AU
Ag = 4741.34 [18411.98] [0.26σ]
Teffp = 1722 [1672] K [0.95σ]

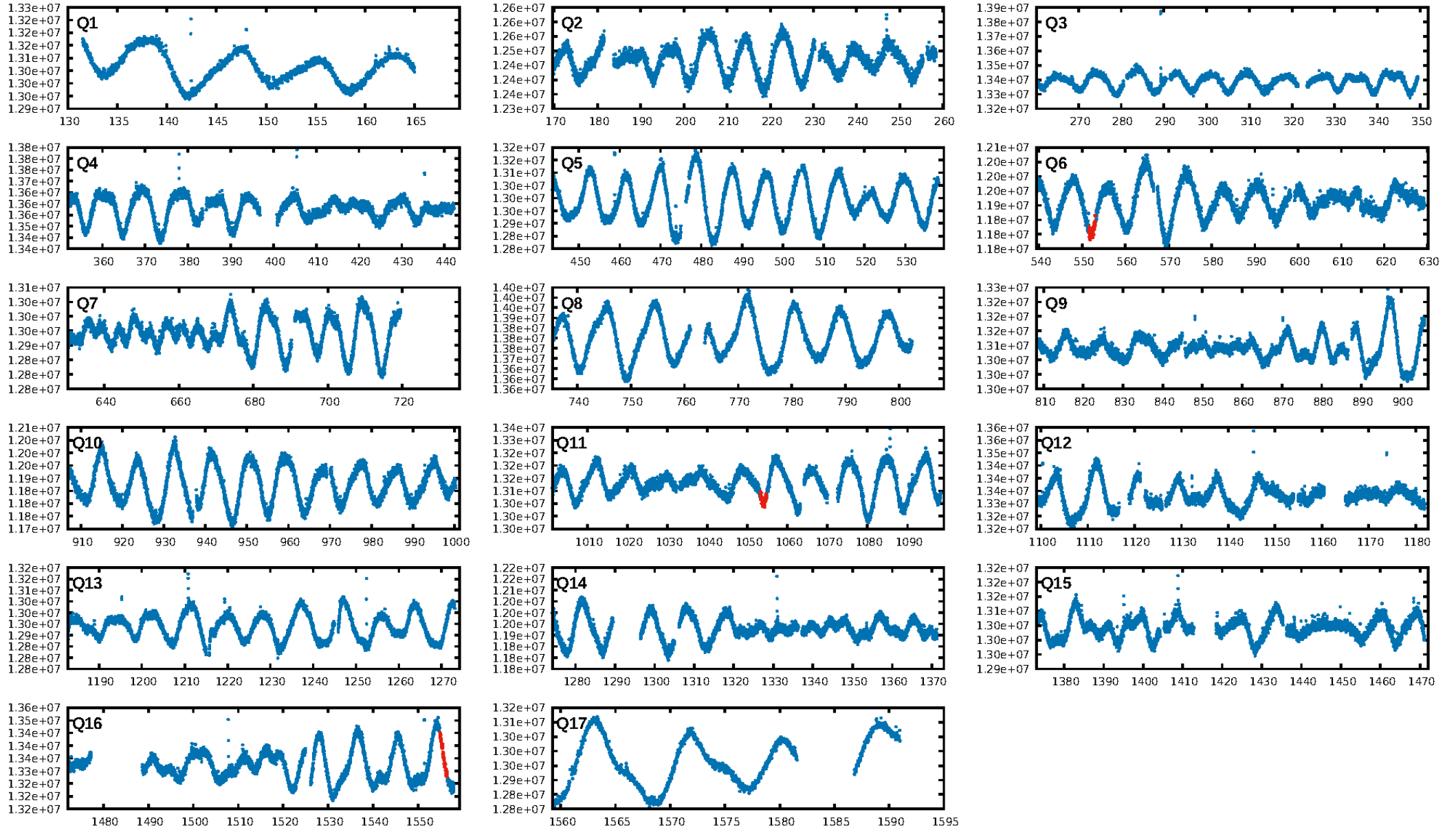
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [247.85σ]
LongPeriod-sig: 100.0% [87.70σ]
ModelChiSquare2-sig: 10.7%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 1.83e-08
RollingBand-fgt: 1.00 [3/3]
GhostDiagnostic-chr: 0.5436
Centroid-sig: 11.2%
Centroid-so: 1.323 arcsec [2.67σ]
OotOffset-rm: 0.391 arcsec [0.93σ]
KicOffset-rm: 0.333 arcsec [1.08σ]
OotOffset-st: 1/1/0/0 [2]
KicOffset-st: 1/1/0/0 [2]
DiffImageQuality-fgm: 1.00 [2/2]
DiffImageOverlap-fno: 0.00 [0/3]

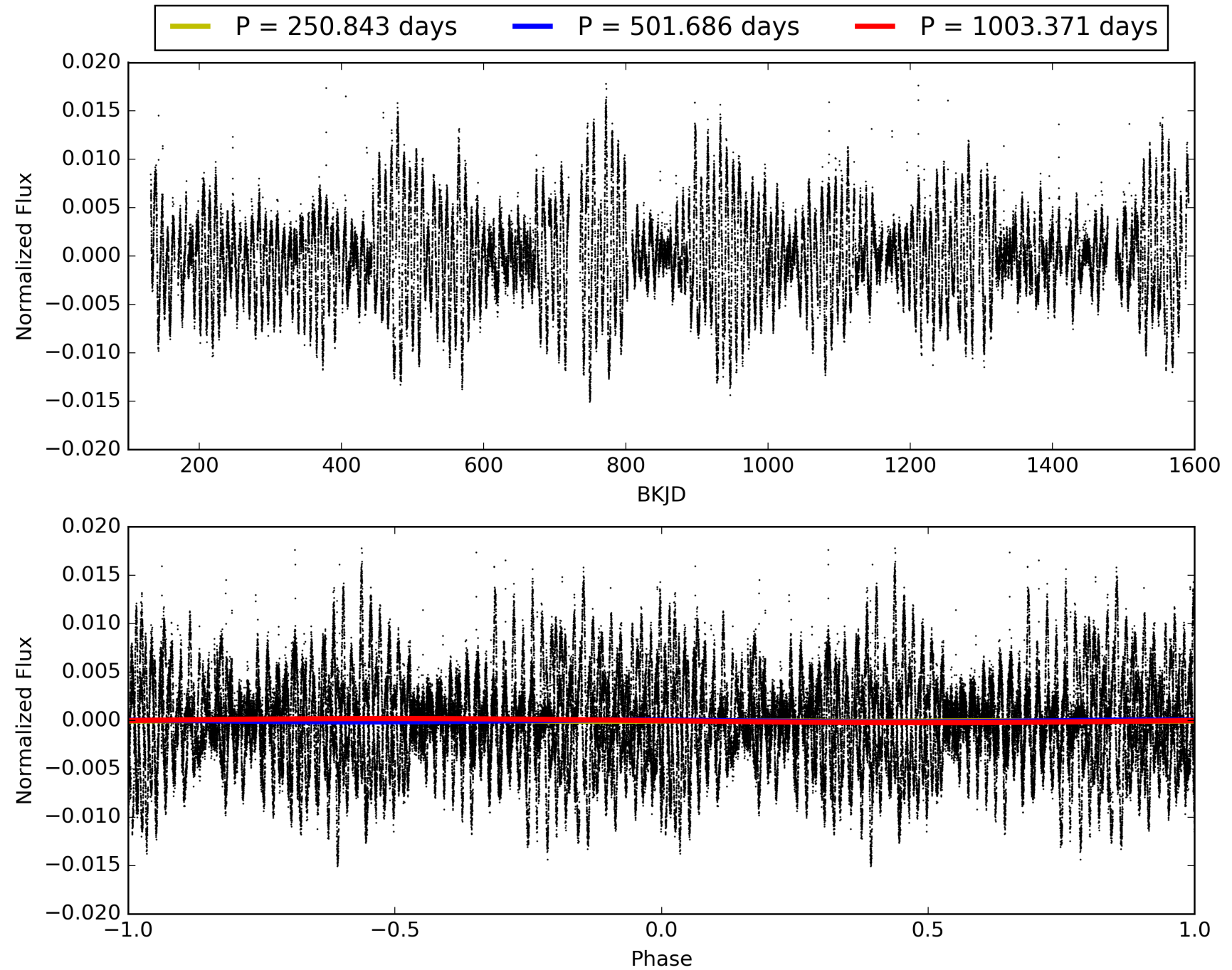
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 15:56:15 Z

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

TCE 002716857-03, PDC Light Curves

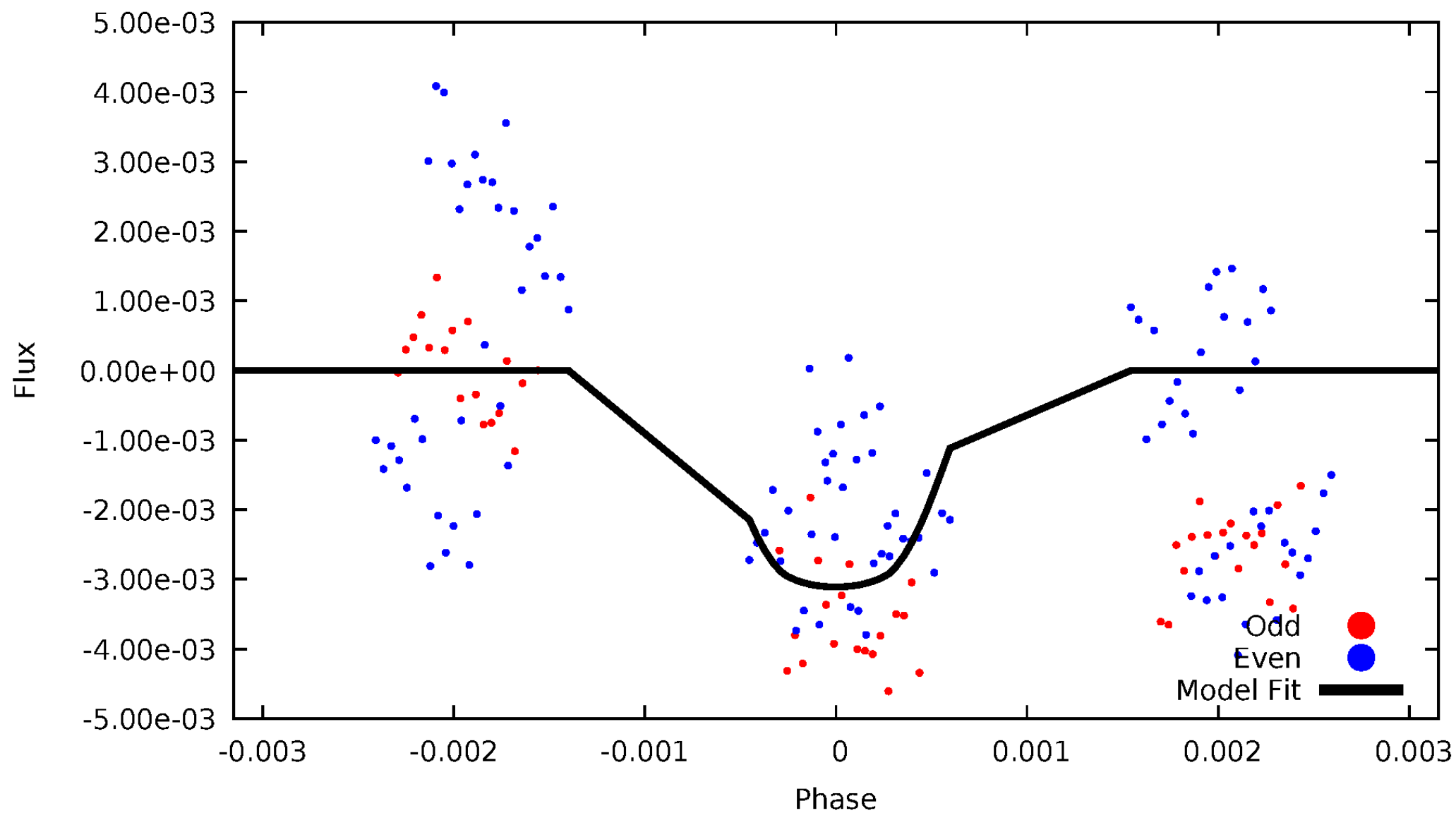


TCE 002716857-03



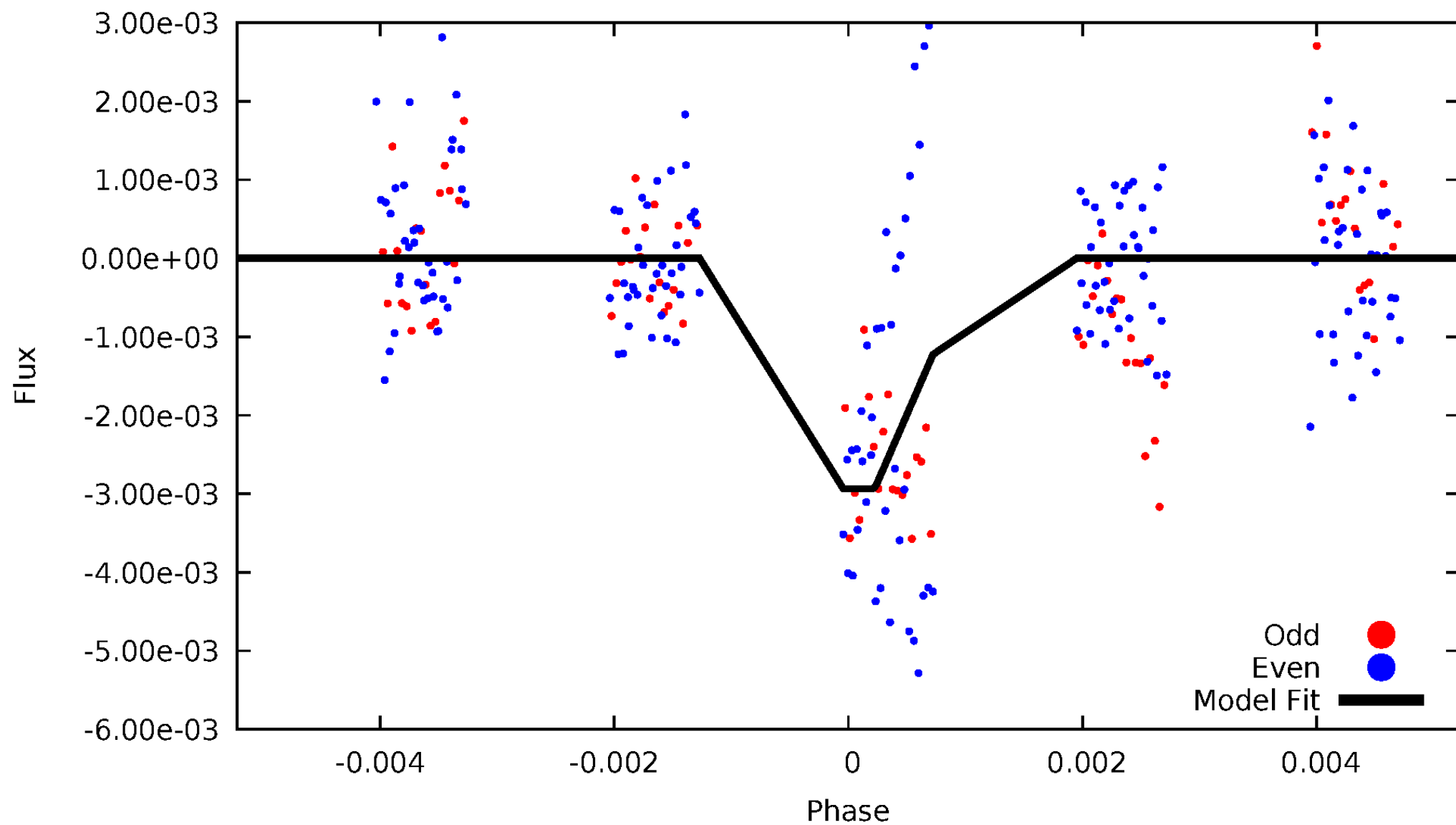
DV Odd/Even

TCE 002716857-03

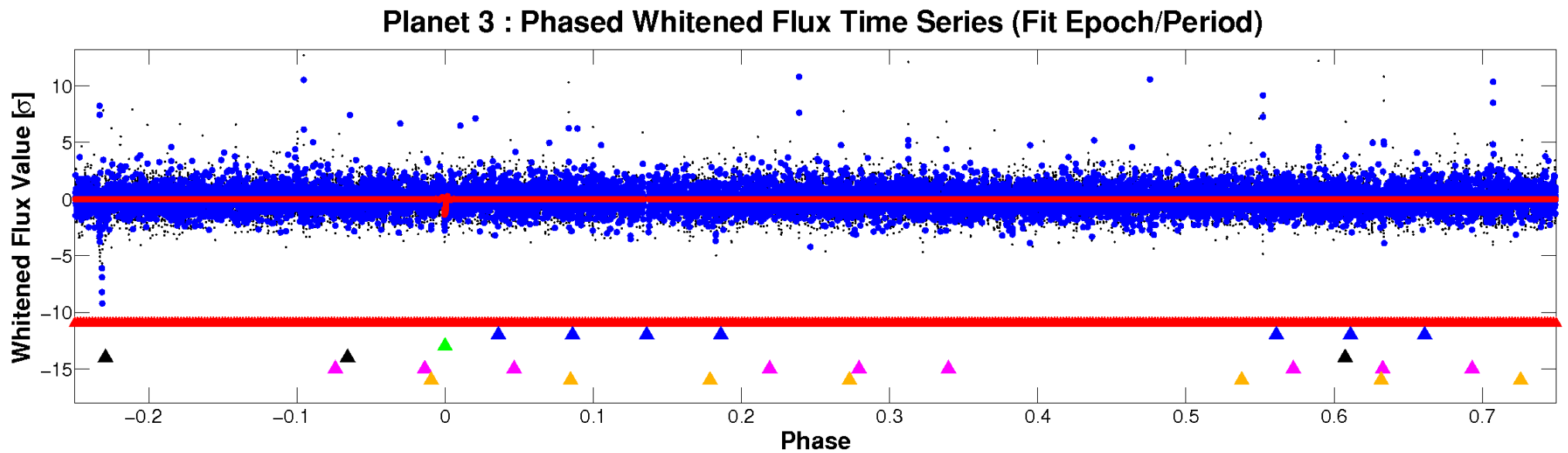
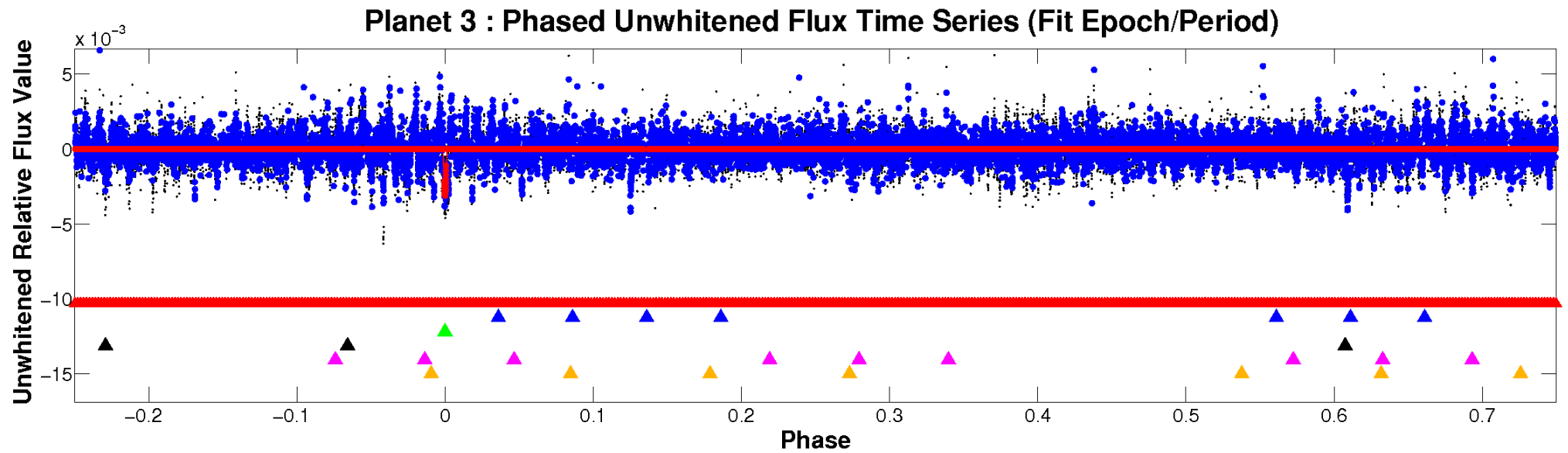


ALT Odd/Even

TCE 002716857-03

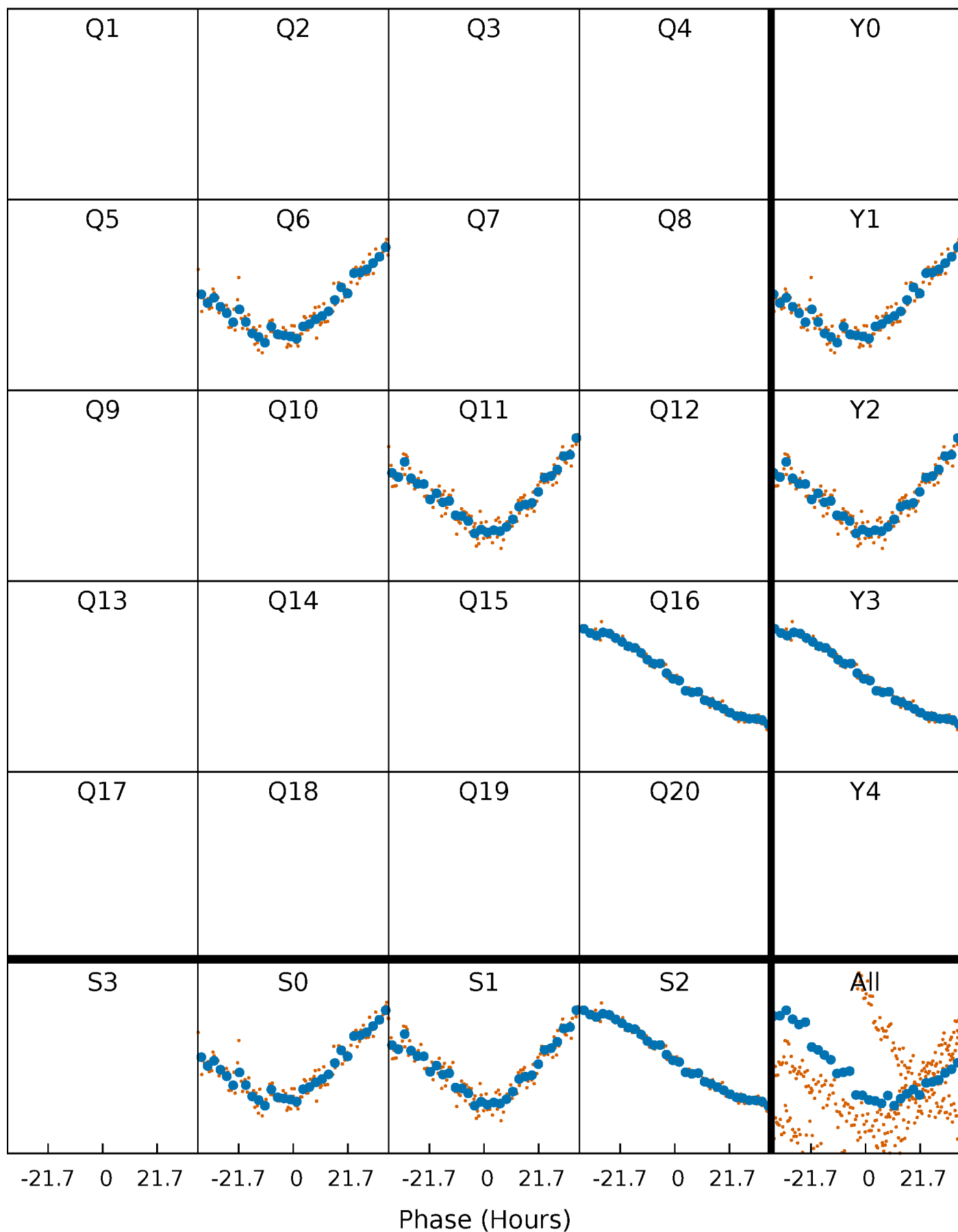


Non-Whitened Vs. Whitened Light Curve



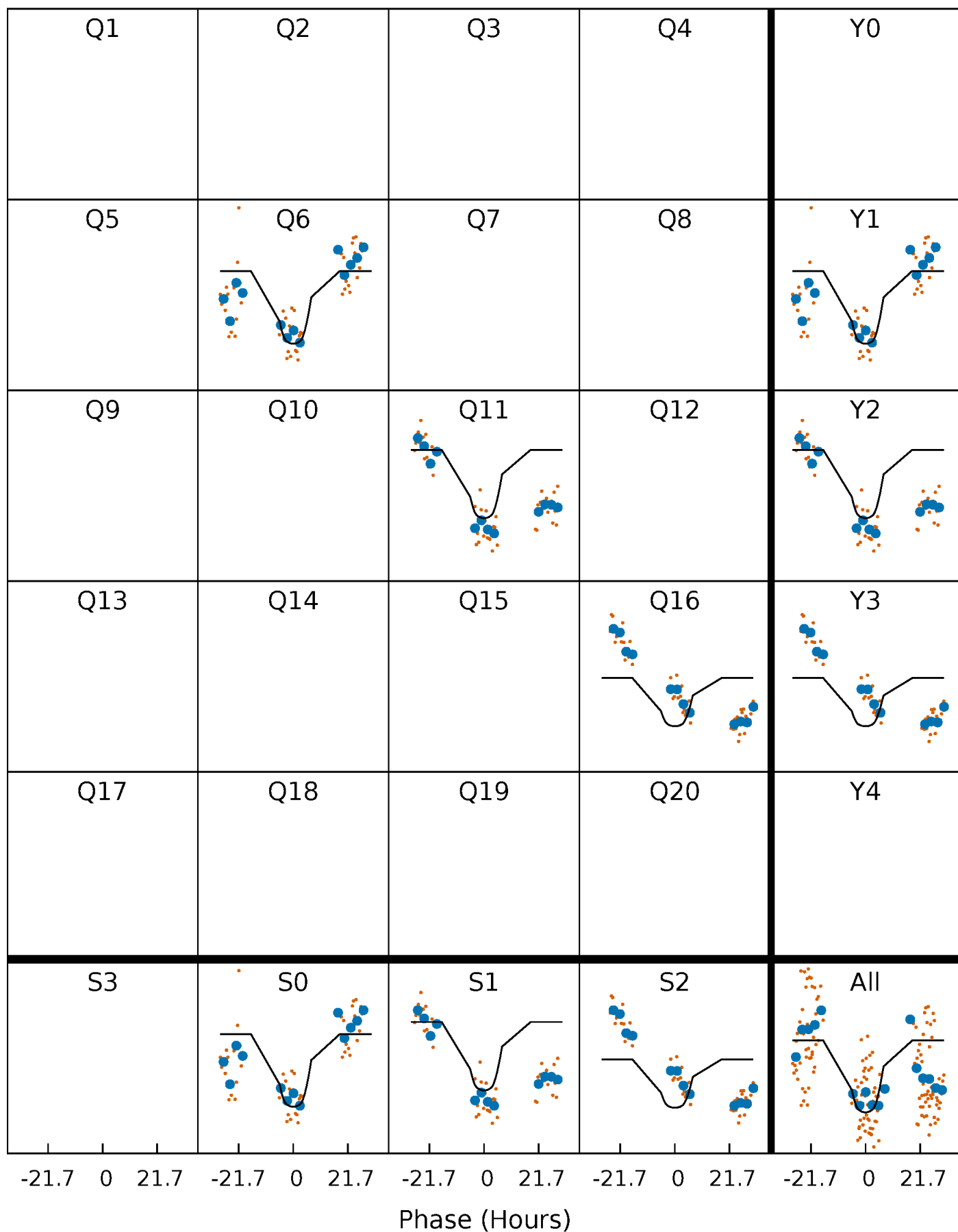
PDC Quarter-Phased Transit Curves

TCE 002716857-03 $P=501.685715$ Days $T_0=552.306256$ (BKJD)



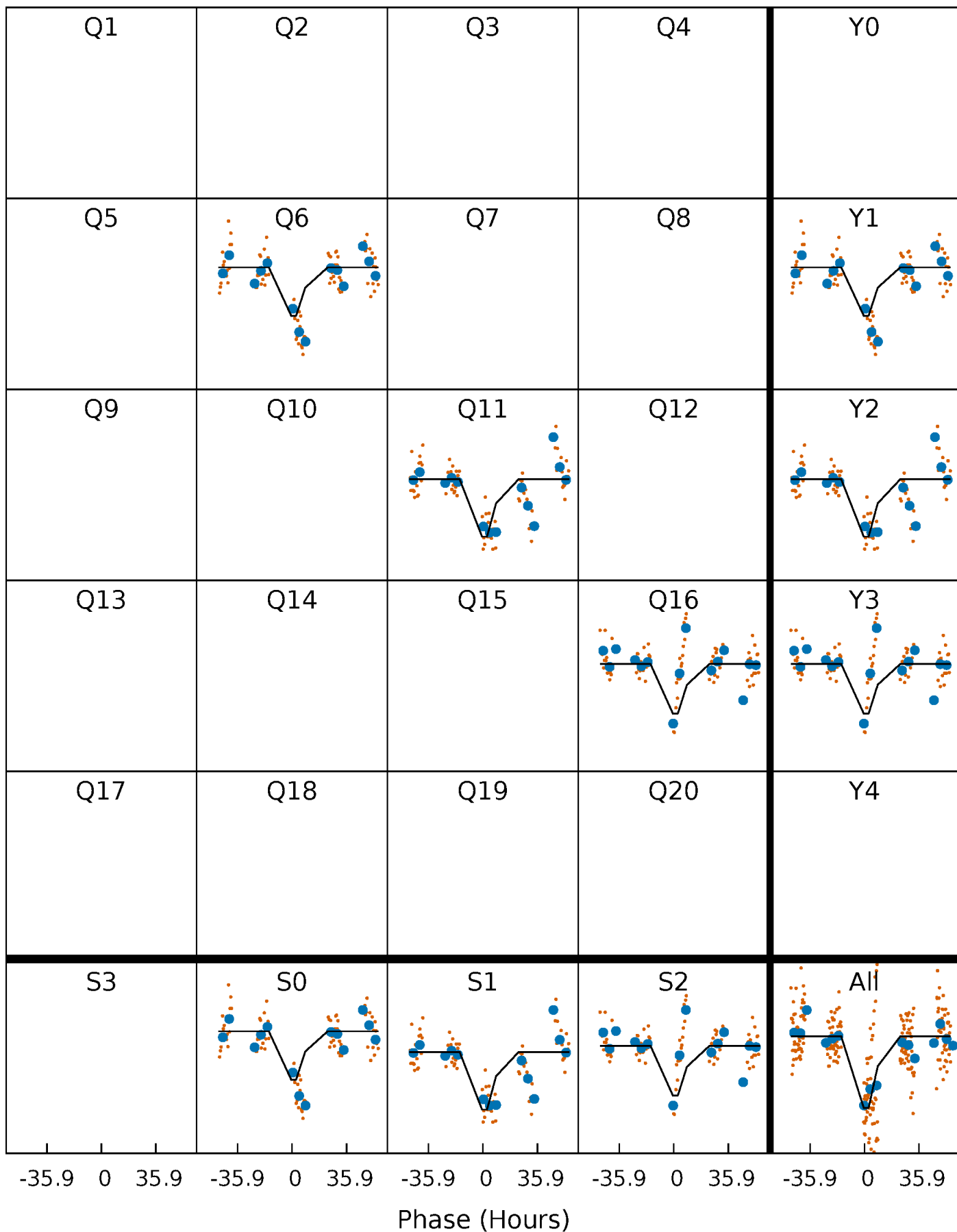
DV Quarter-Phased Transit Curves

TCE 002716857-03 $P=501.685715$ Days $T_0=552.306256$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

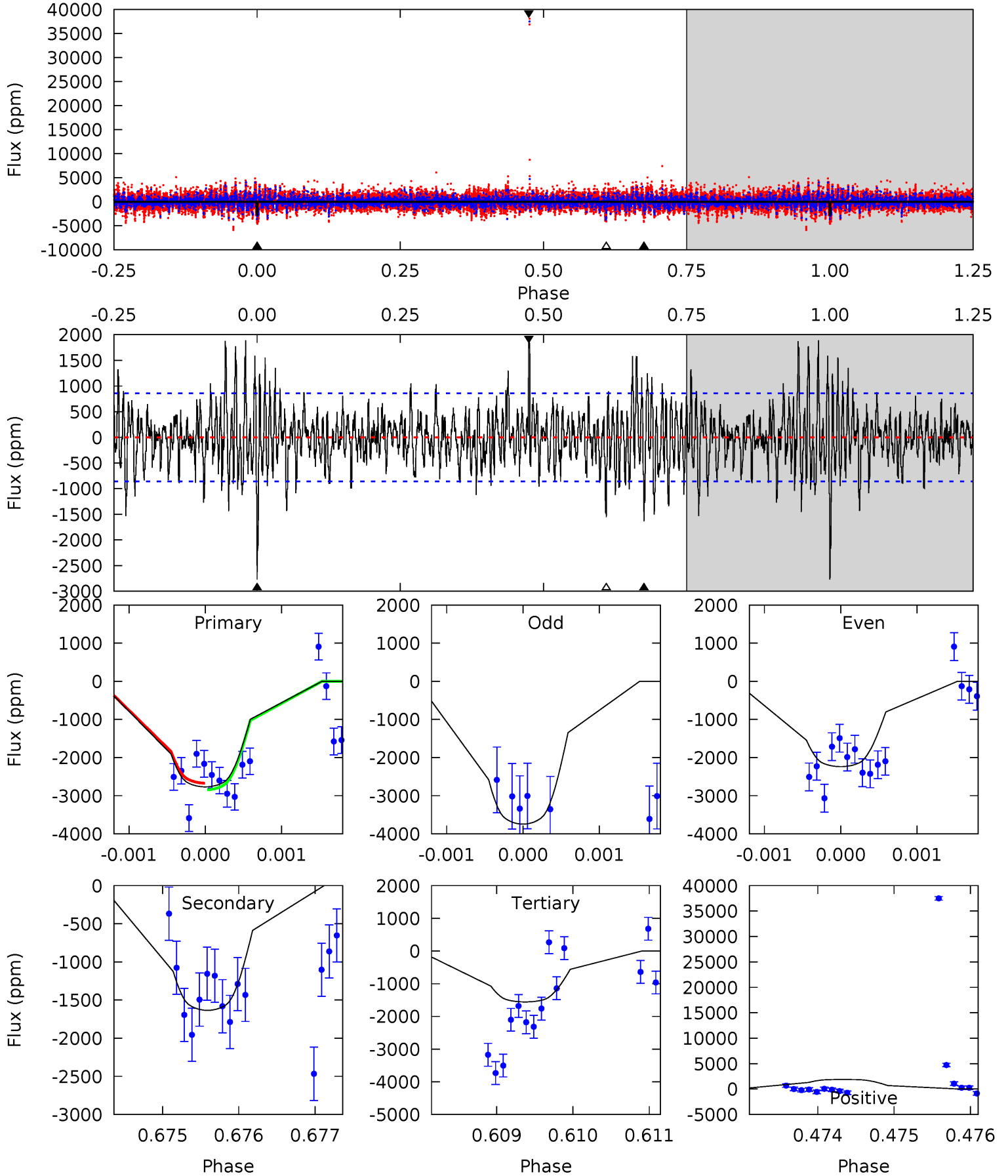
TCE 002716857-03 P=501.773310 Days $T_0=552.083833$ (BKJD)



DV Model-Shift Uniqueness Test

002716857-03, P = 501.685715 Days, E = 50.620541 Days

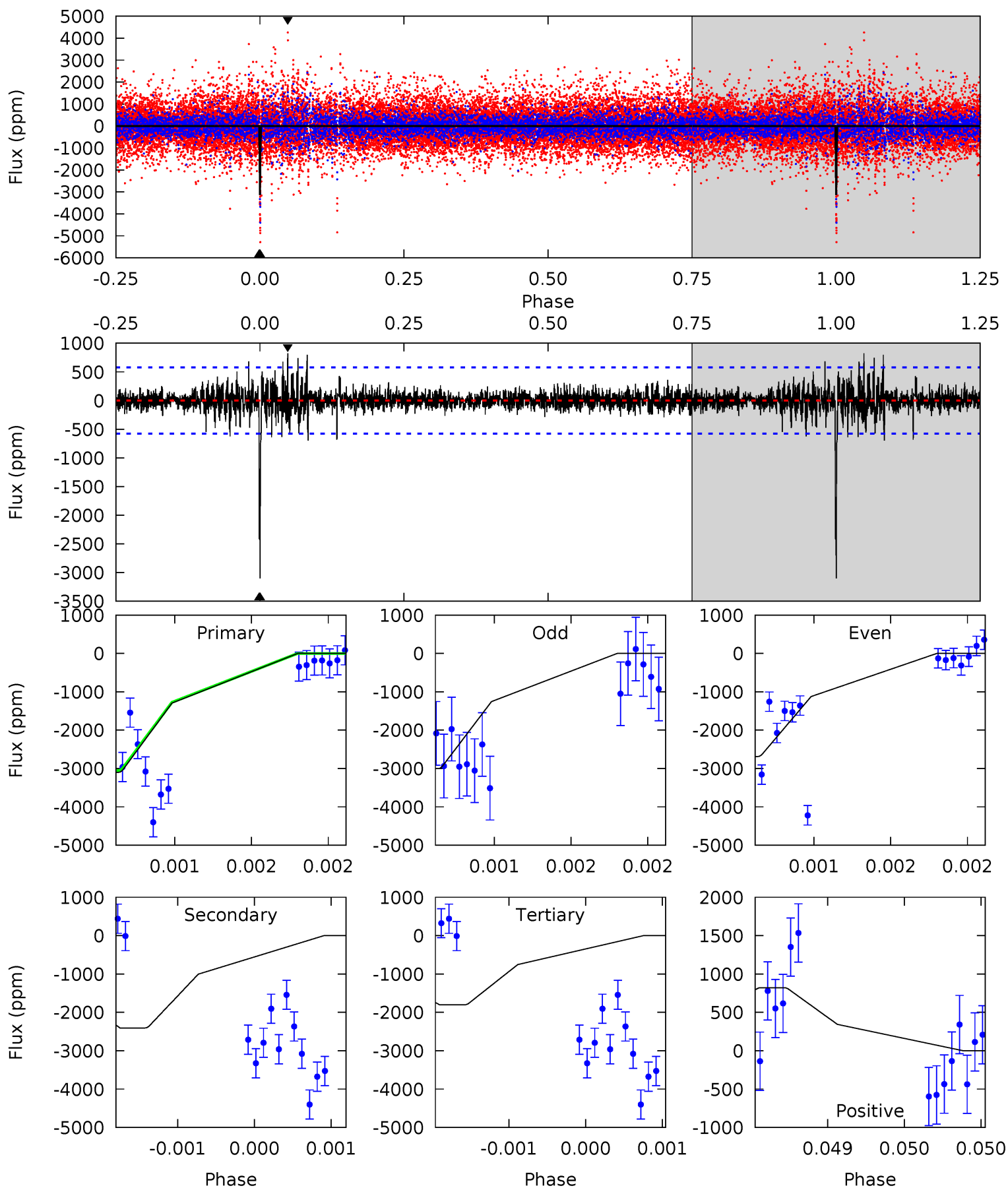
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
17.6	10.4	9.89	12.0	5.45	3.29	3.20	7.68	5.55	0.49	-1.64	4.47	0.94	0.41	0.55



Alt Model-Shift Uniqueness Test

002716857-03, P = 501.773310 Days, E = 50.310523 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
29.5	22.9	17.1	7.81	5.50	3.37	1.26	12.3	21.7	5.74	15.1	1.50	0.92	0.21	0.10



Stellar Parameters For KIC 002716857

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	R (R_{\odot})	$M(M_{\odot})$	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	4314^{+115}_{-153}	$4.757^{+0.072}_{-0.033}$	$-1.200^{+0.300}_{-0.350}$	$0.484^{+0.034}_{-0.059}$	$0.489^{+0.037}_{-0.042}$	$6.066^{+2.004}_{-0.865}$
	+3%/-4%	+2%/-1%	+25%/-29%	+7%/-12%	+8%/-9%	+33%/-14%
Source	PHO1	KIC0	KIC0	DSEP		

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

Secondary Eclipse Parameters for KIC 002716857-03 / KOI

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-1635 ± 158	$3.26^{+0.57}_{-0.56}$	186^{+7}_{-8}	3692^{+261}_{-205}	79561^{+40079}_{-21080}
Alt.	-2406 ± 105	$2.82^{+0.56}_{-0.53}$	186^{+7}_{-8}	4151^{+346}_{-269}	163359^{+74841}_{-51767}

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

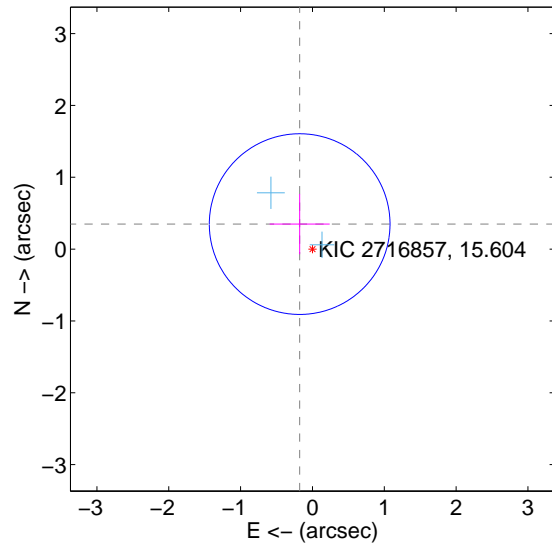
Supplemental centroid analysis for 002716857-03. Kepler magnitude: 15.60. Transit SNR 8.10

There are 2 quarters with good PRF difference image offsets

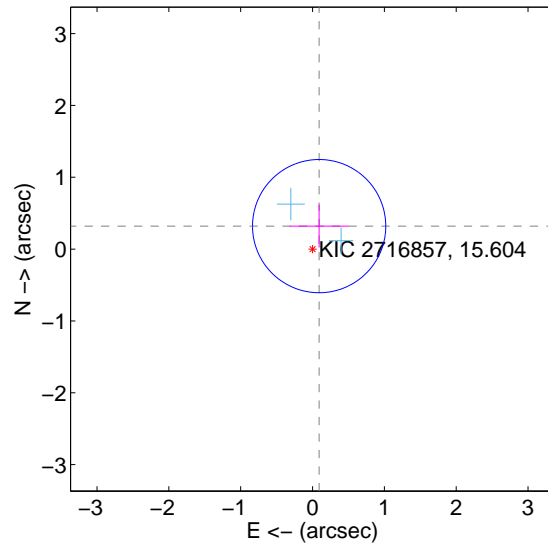
The direct PRF centroid is offset from the target star catalog position by about 0.32 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.391 ± 0.419	0.93	0.178 ± 0.417	0.348 ± 0.420
PRF-fit source offset from KIC position	0.333 ± 0.309	1.08	-0.092 ± 0.411	0.320 ± 0.299
photometric centroid source offset	1.32 ± 0.49	2.67	-0.79 ± 0.64	-1.06 ± 0.39

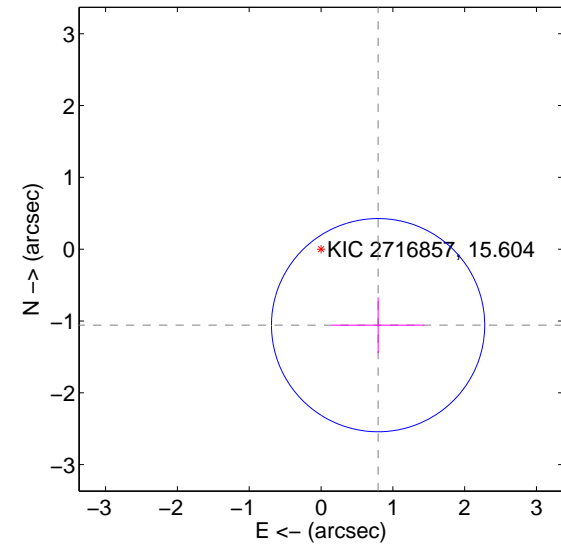
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

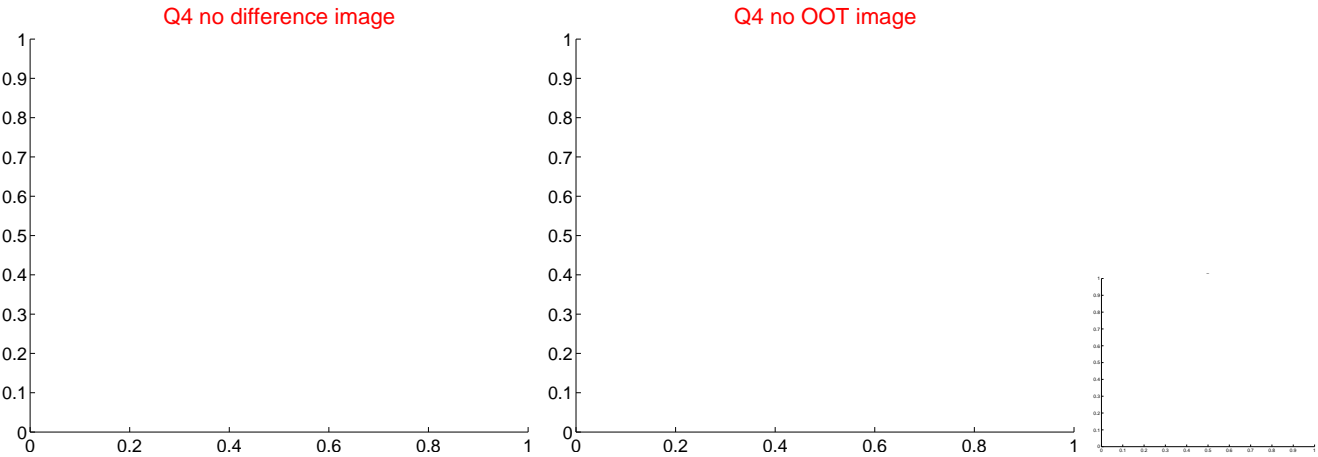
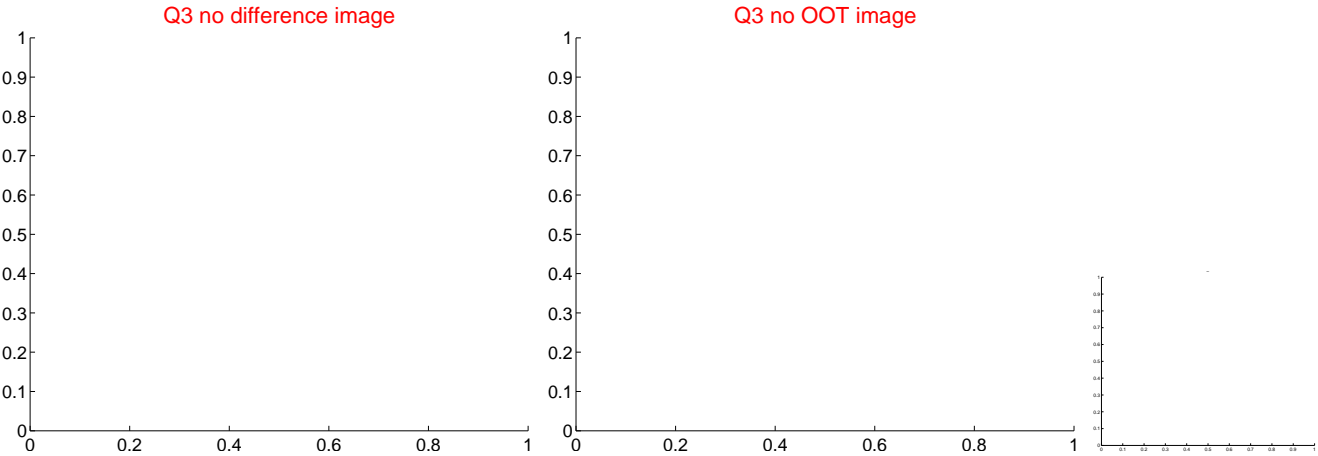
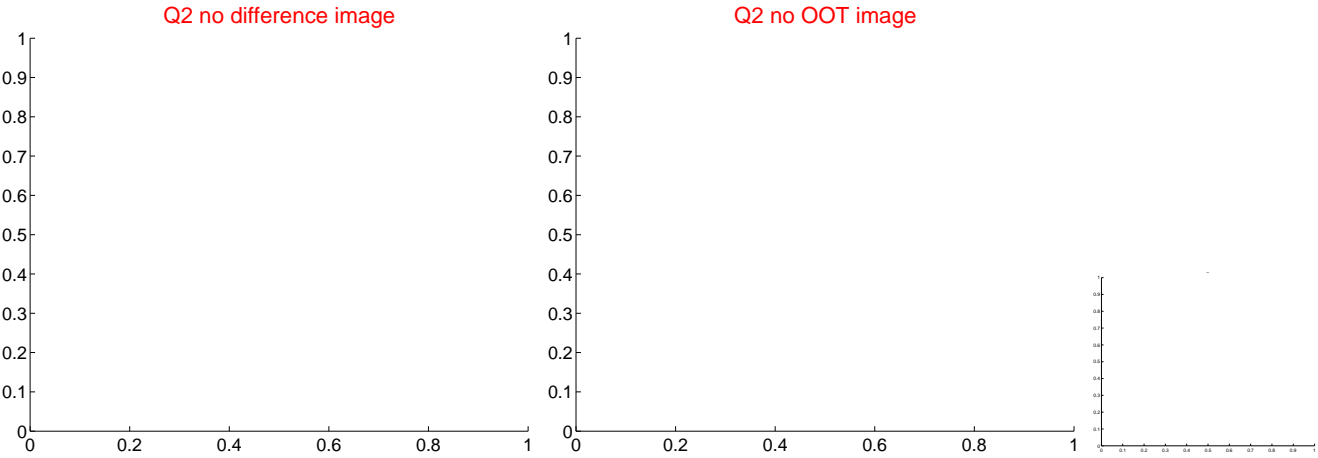
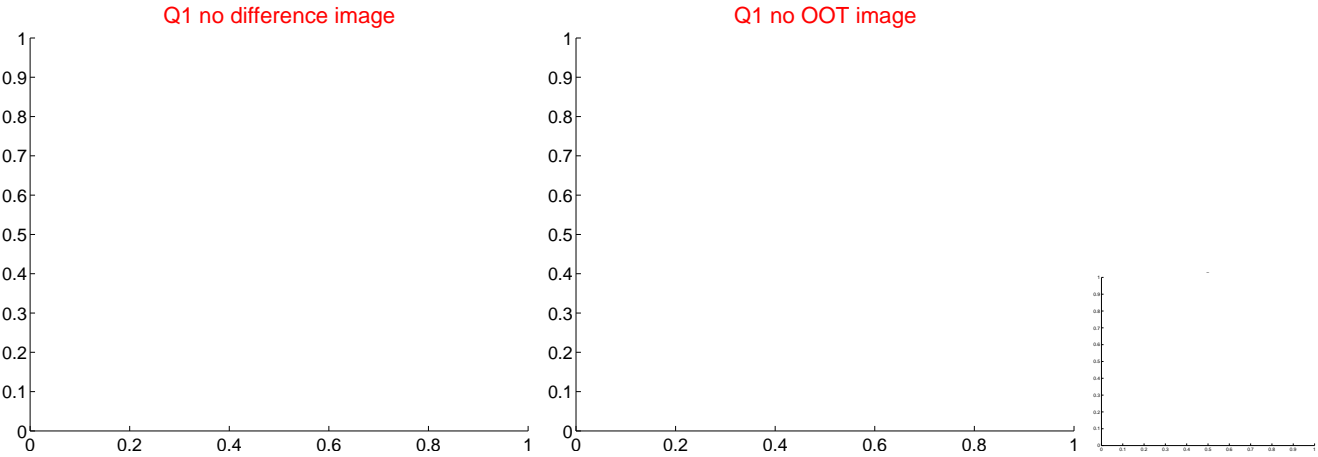


offset from photometric centroids



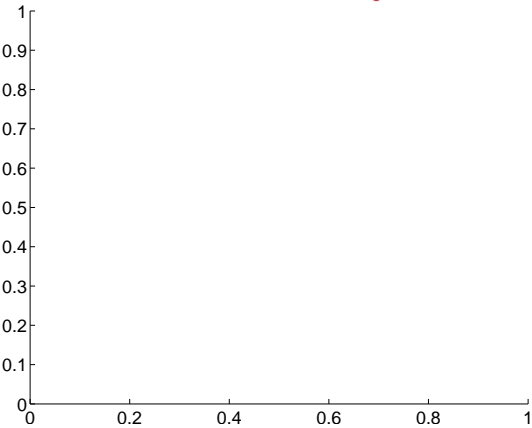
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

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

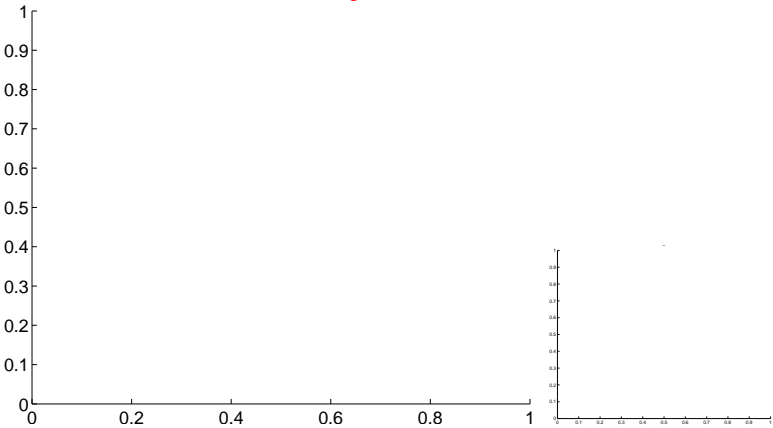


white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.

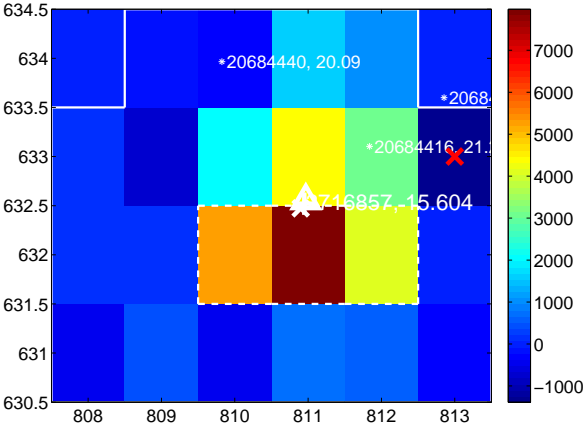
Q5 no difference image



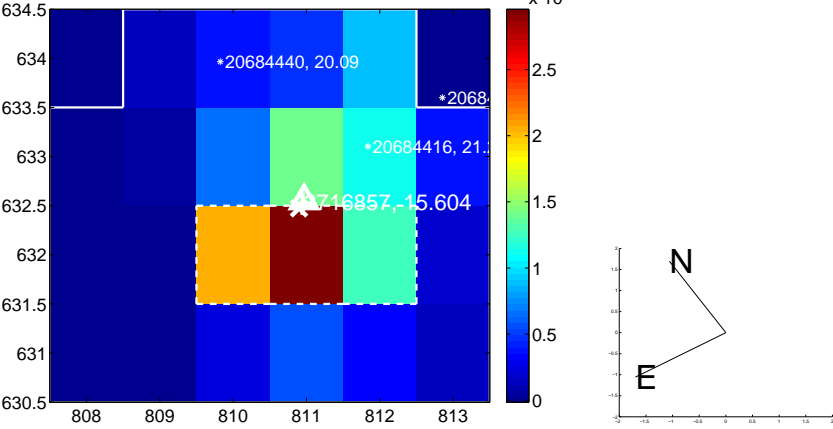
Q5 no OOT image



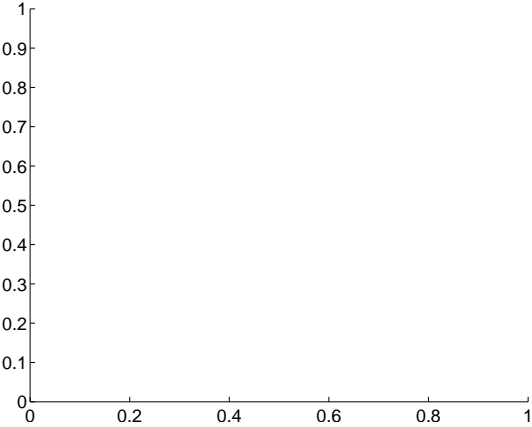
Q6 difference image



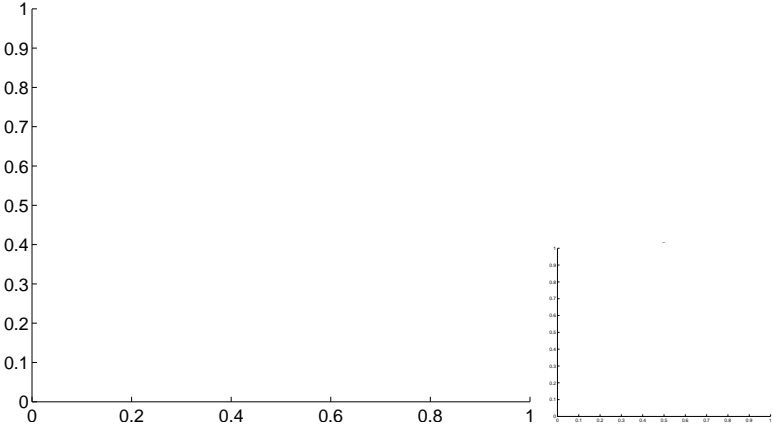
Q6 OOT image



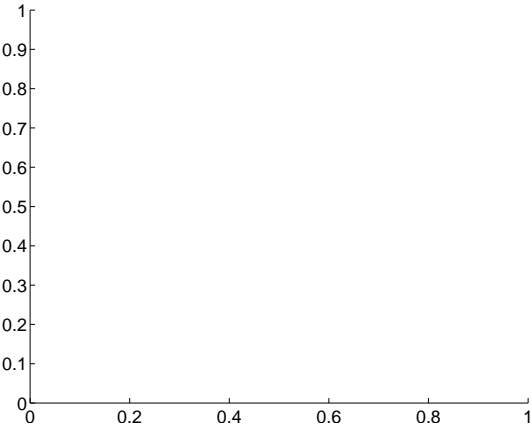
Q7 no difference image



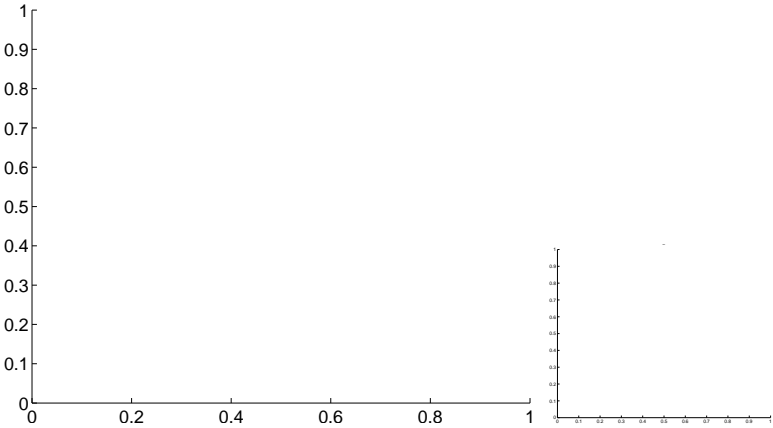
Q7 no OOT image



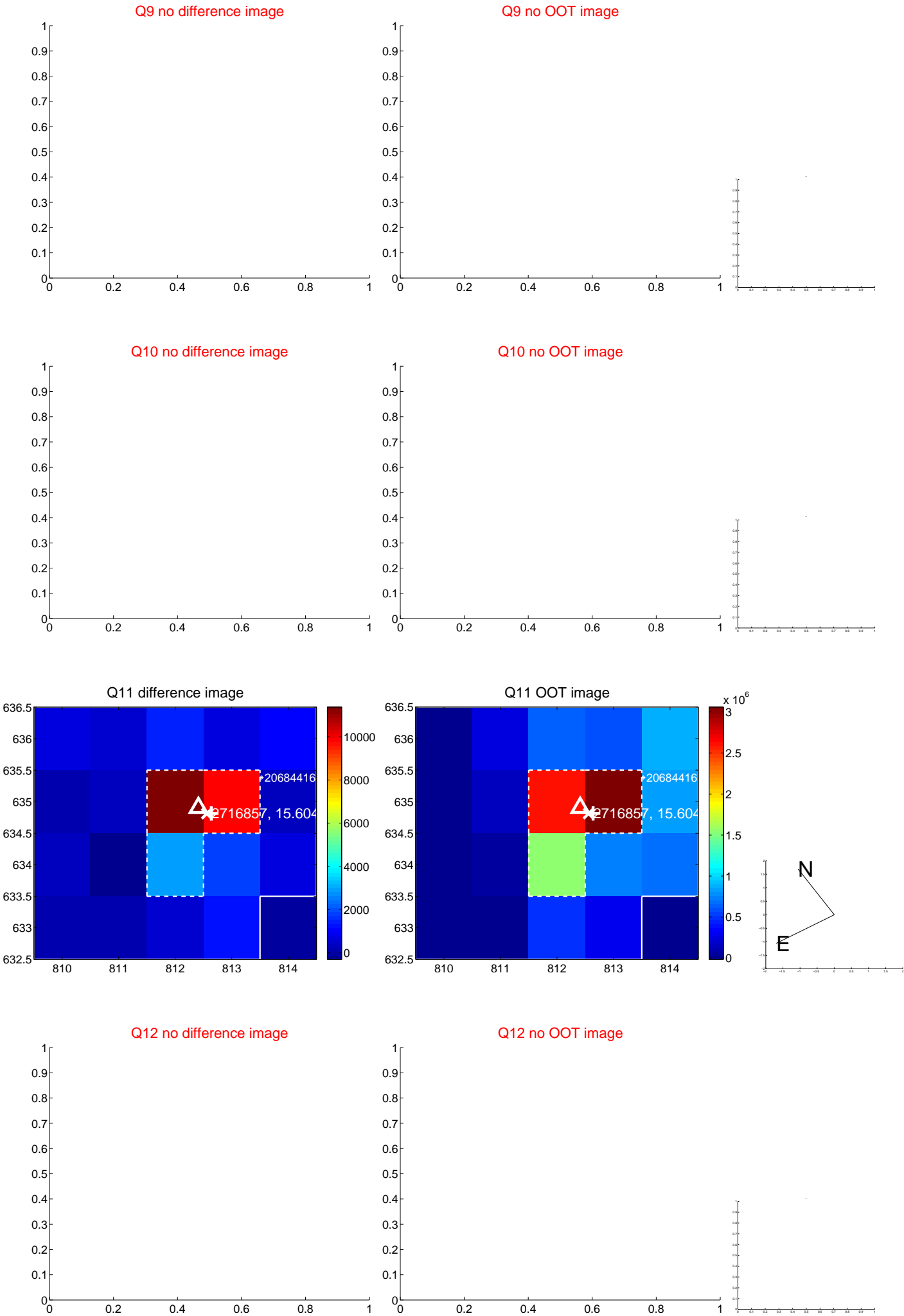
Q8 no difference image



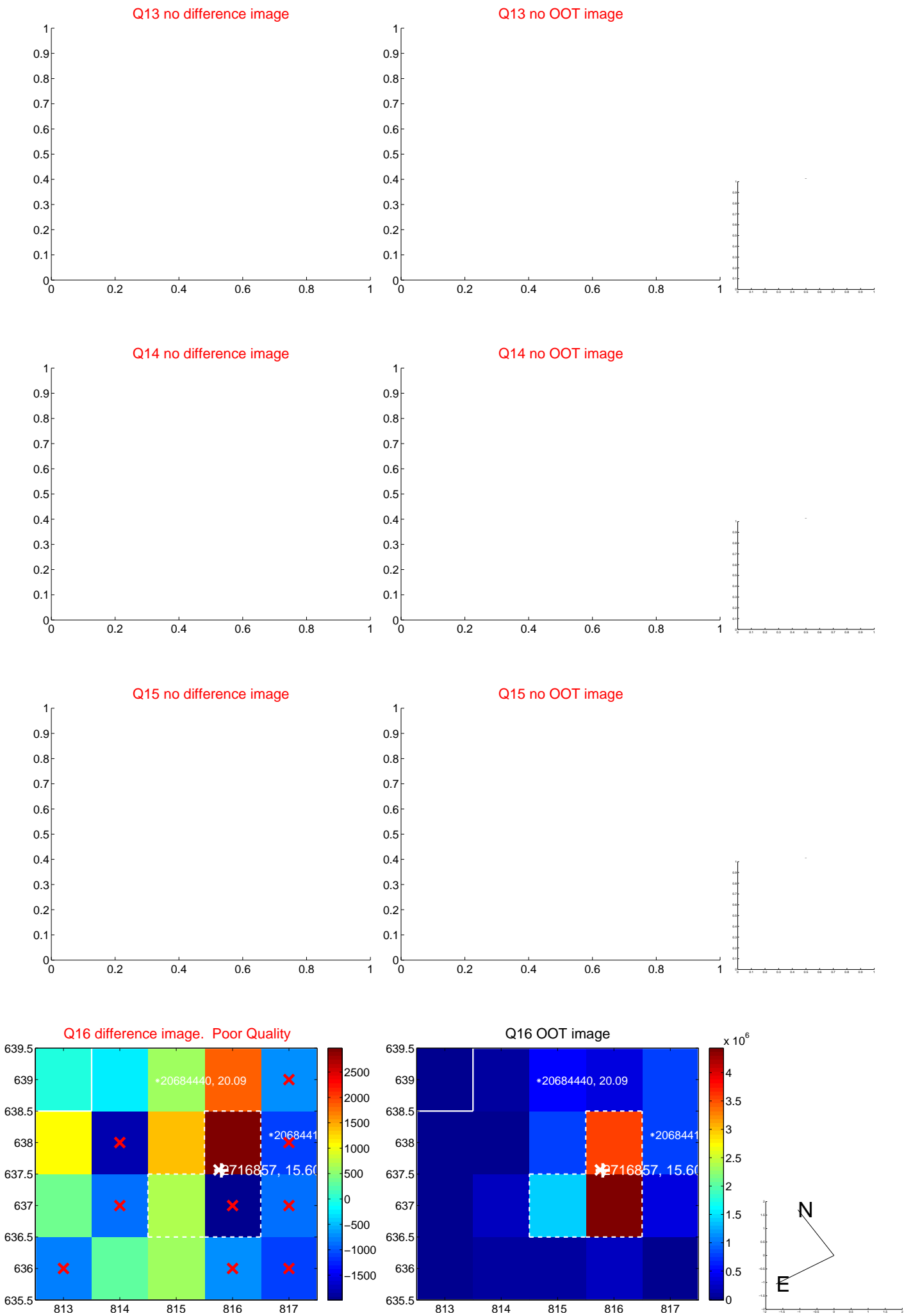
Q8 no OOT image



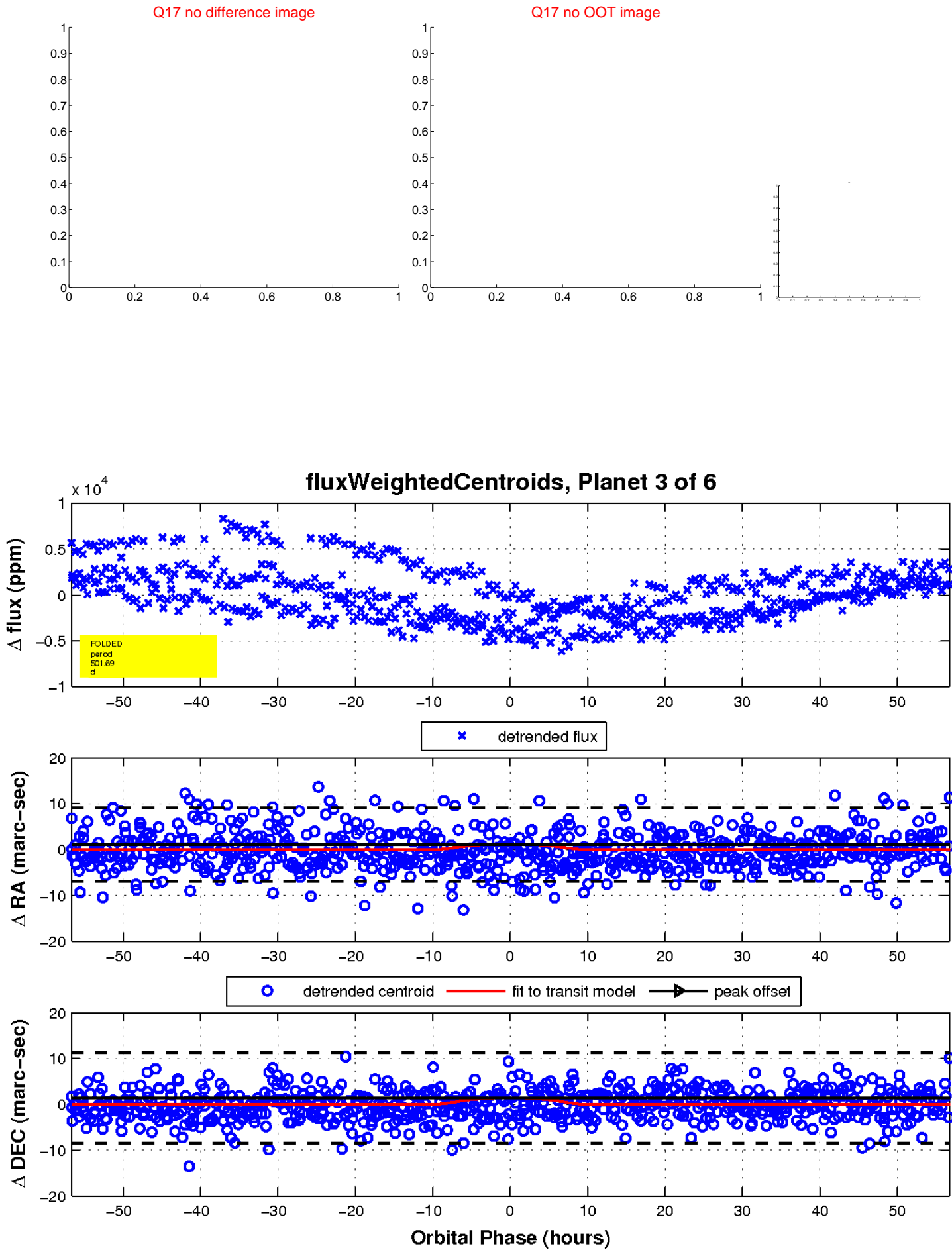
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



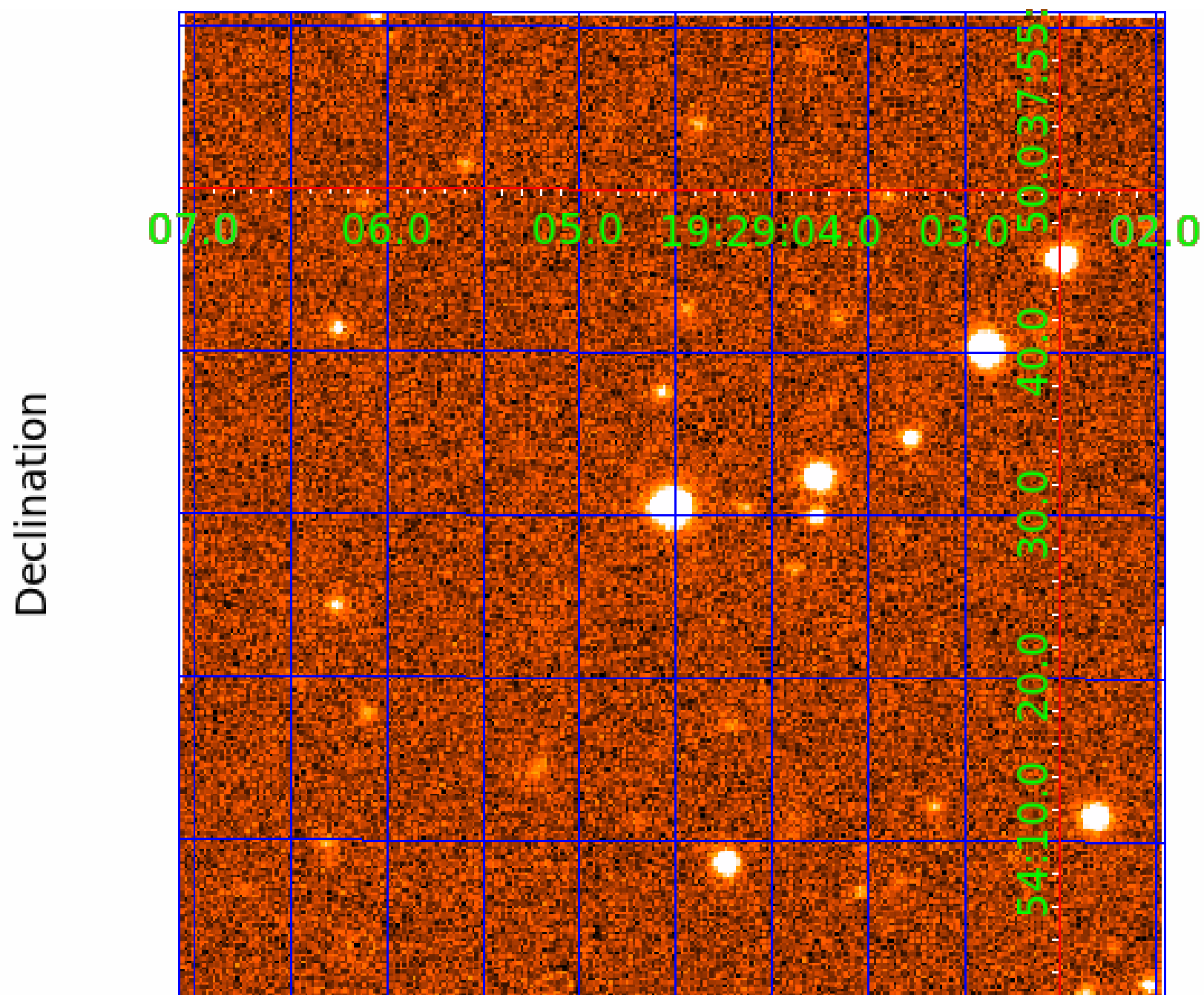
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



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



UKIRT Image



KIC 002716857

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})
002716857-01	OBS	No	0.999528	131.965666	78.4	4.796	7.2	8.3	0.48	4314	0.43	306.14
002716857-03	OBS	No	501.685715	552.306256	3109.6	18.970	8.9	8.1	0.48	4314	3.29	0.08
002716857-05	OBS	No	177.320689	160.517220	1139.9	1.884	8.6	4.9	0.48	4314	2.30	0.31
002716857-06	OBS	No	227.237438	187.552018	1641.3	3.886	7.9	8.1	0.48	4314	1.95	0.22

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
002716857-01	OBS	FP	0.00	1	0	0	0	LPP_DV
002716857-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS
002716857-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_TRACKER—MOD_TER_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
002716857-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—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.

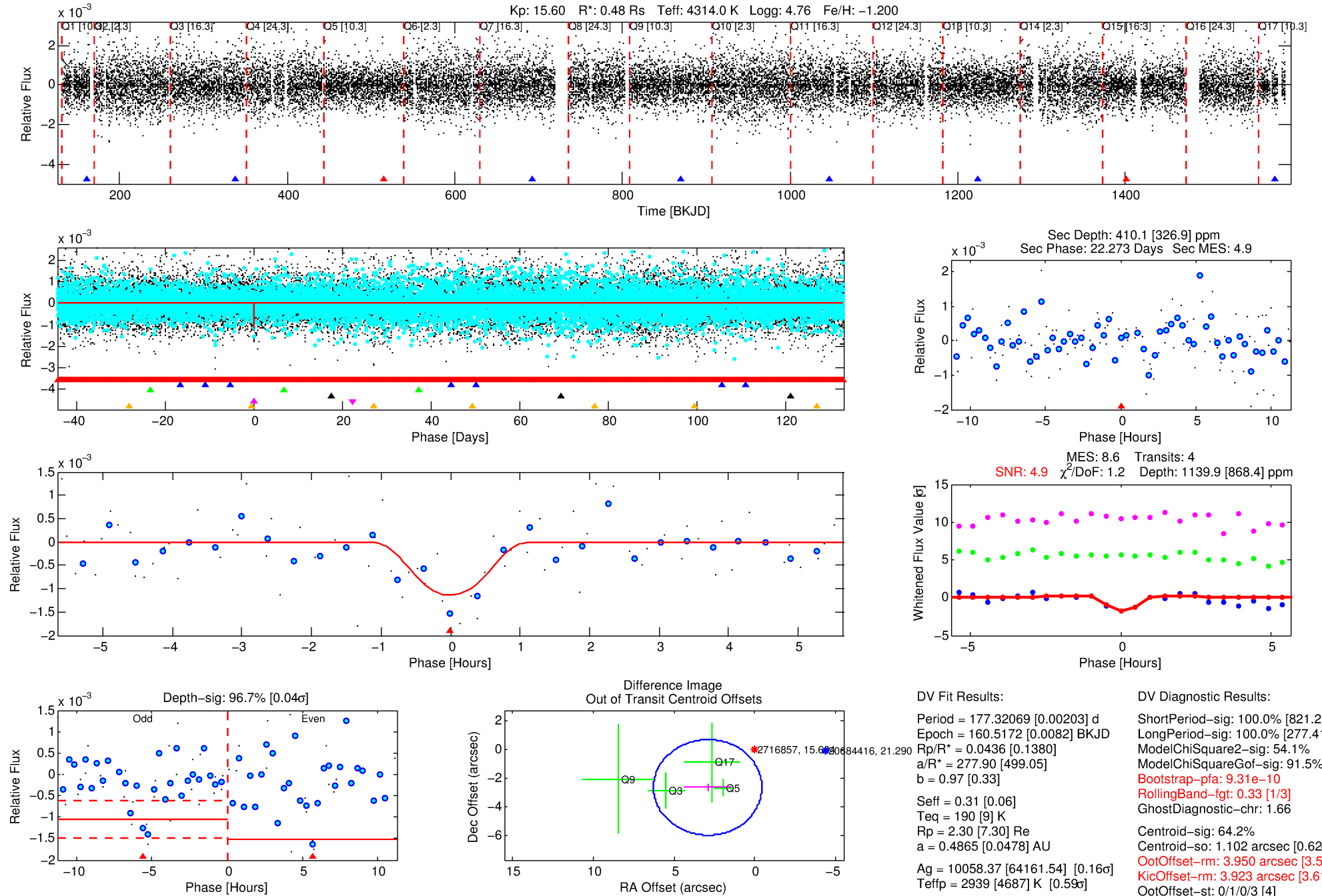
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 002716857-05

No Significant Match Found

DV One-Page Summary

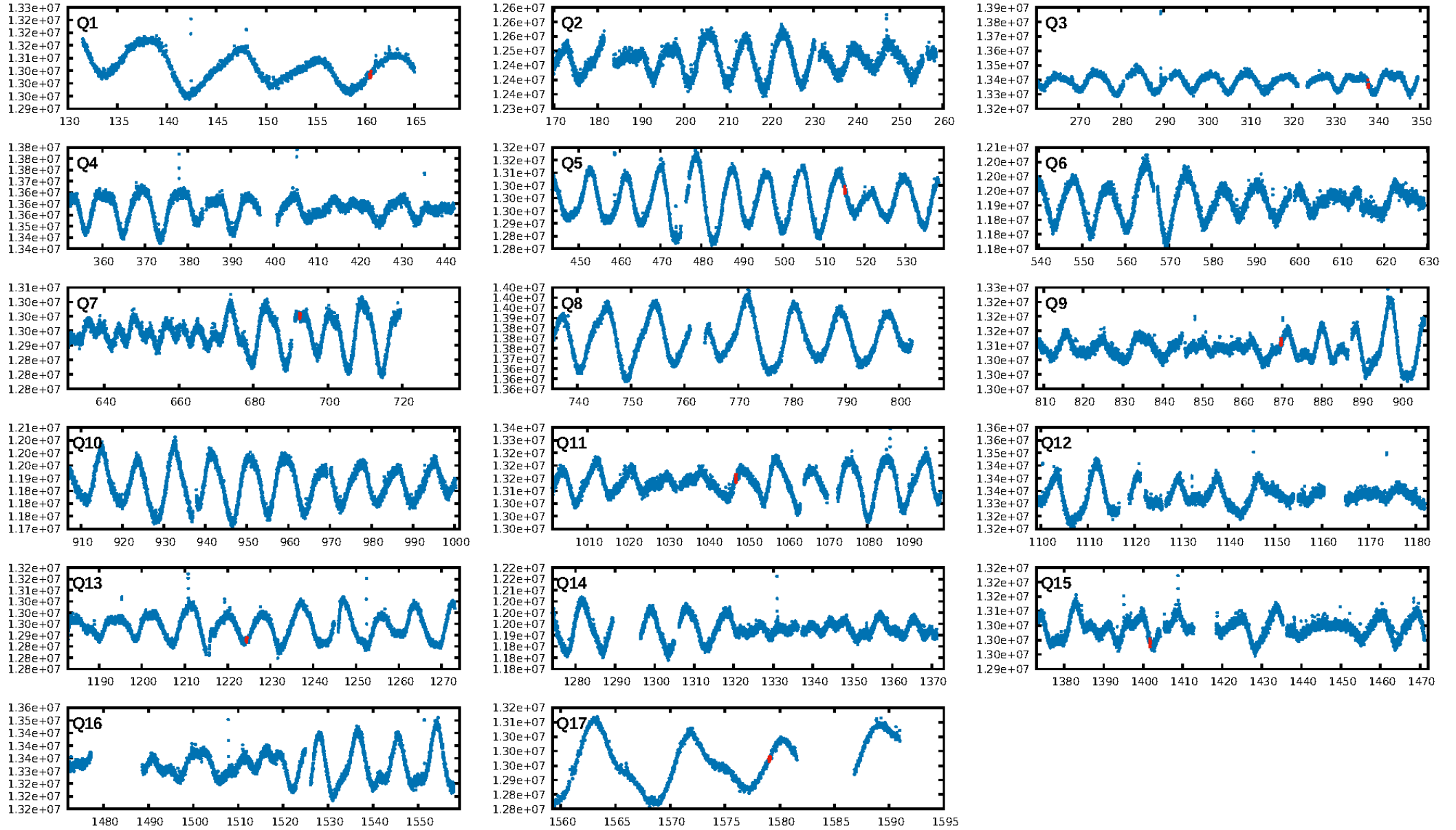
KIC: 2716857 Candidate: 5 of 6 Period: 177.321 d



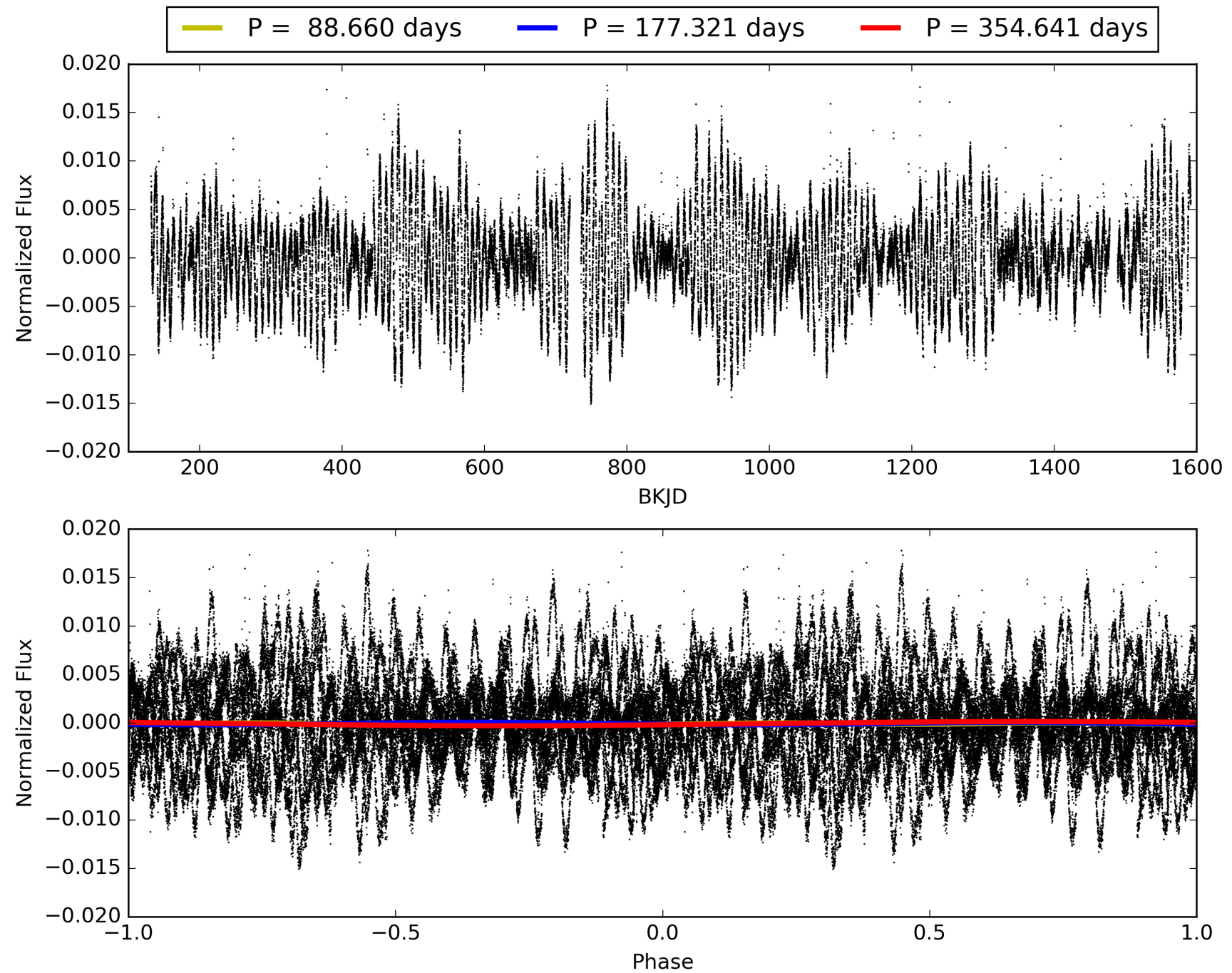
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 15:56:29 Z

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

TCE 002716857-05, PDC Light Curves

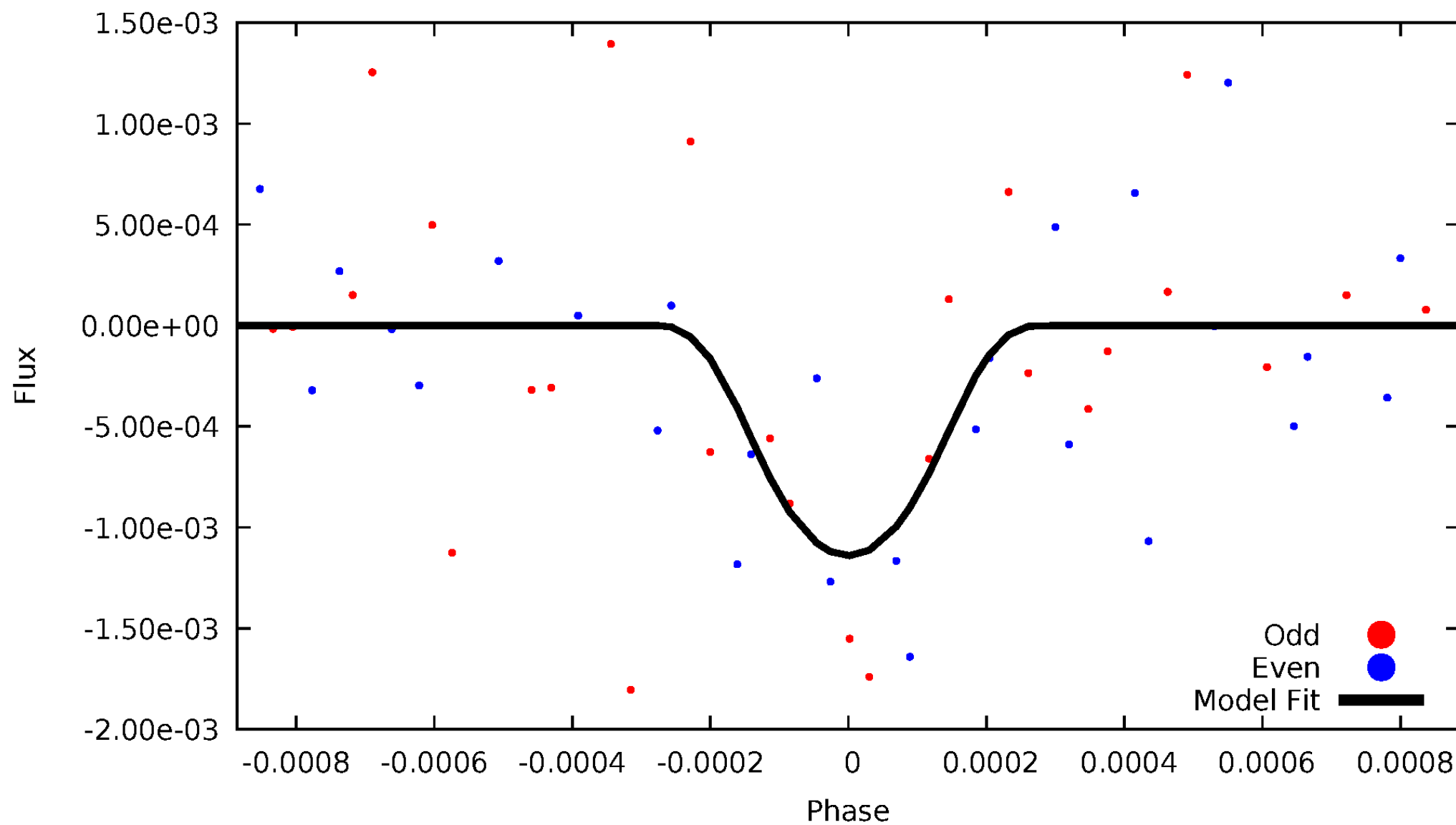


TCE 002716857-05



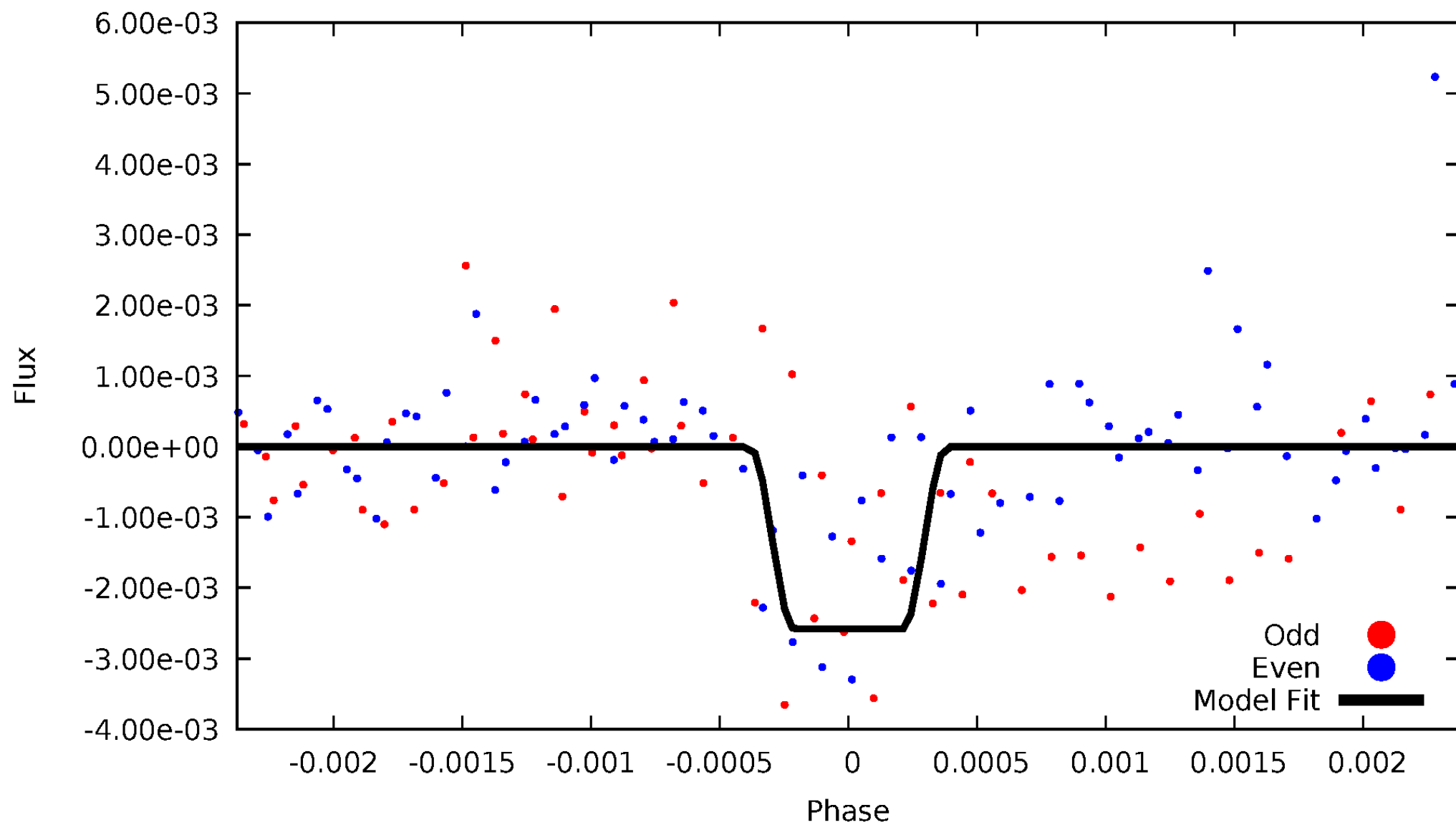
DV Odd/Even

TCE 002716857-05



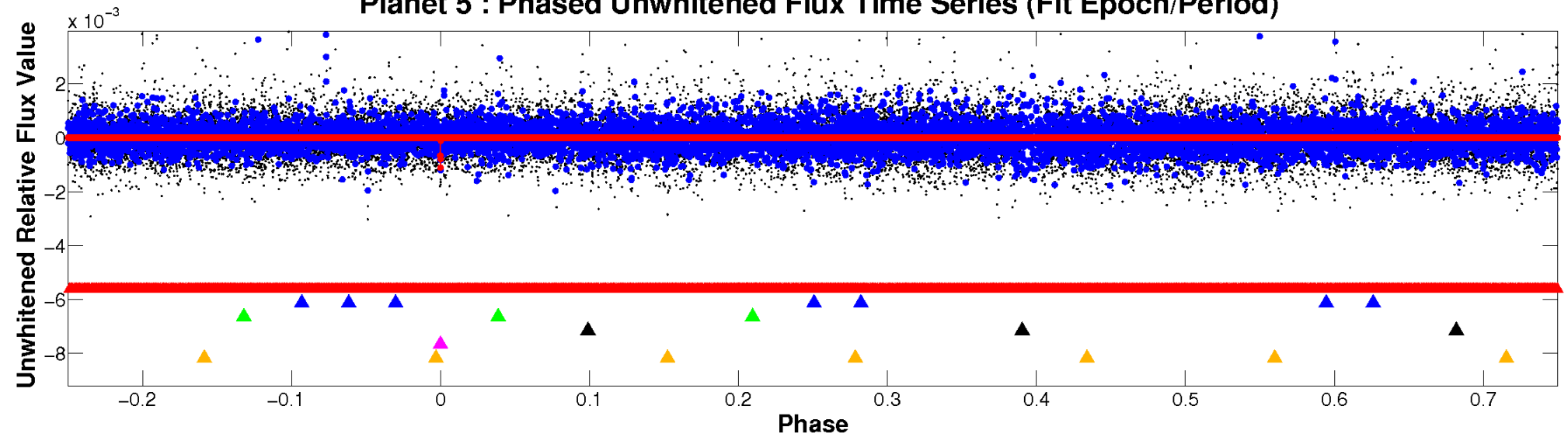
ALT Odd/Even

TCE 002716857-05

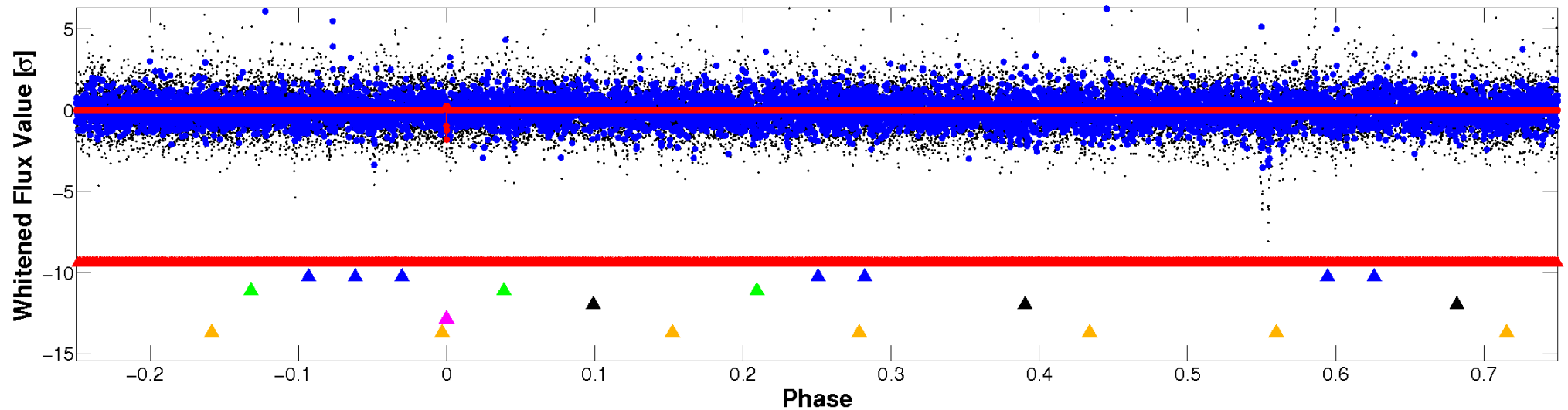


Non-Whitened Vs. Whitened Light Curve

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

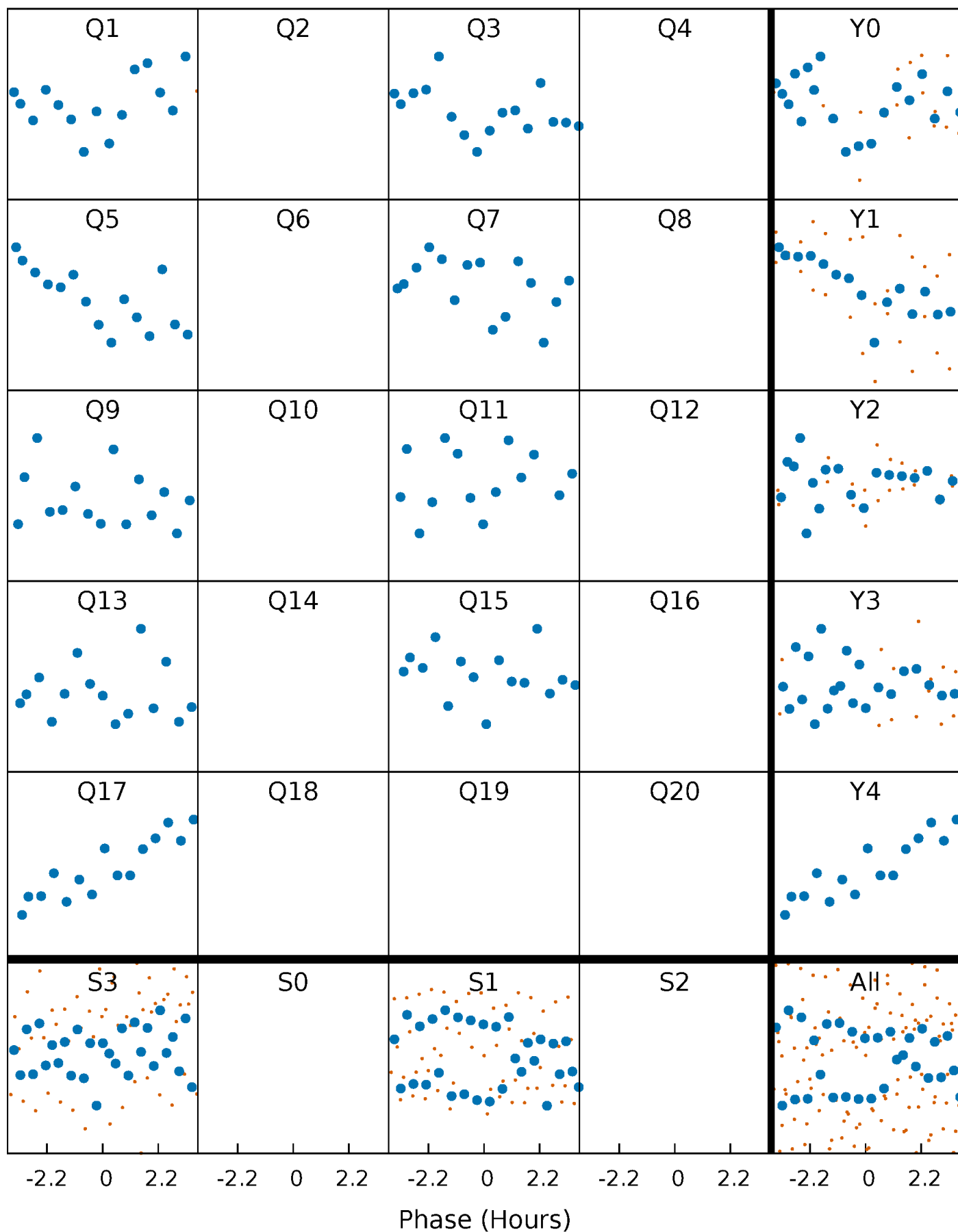


Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)



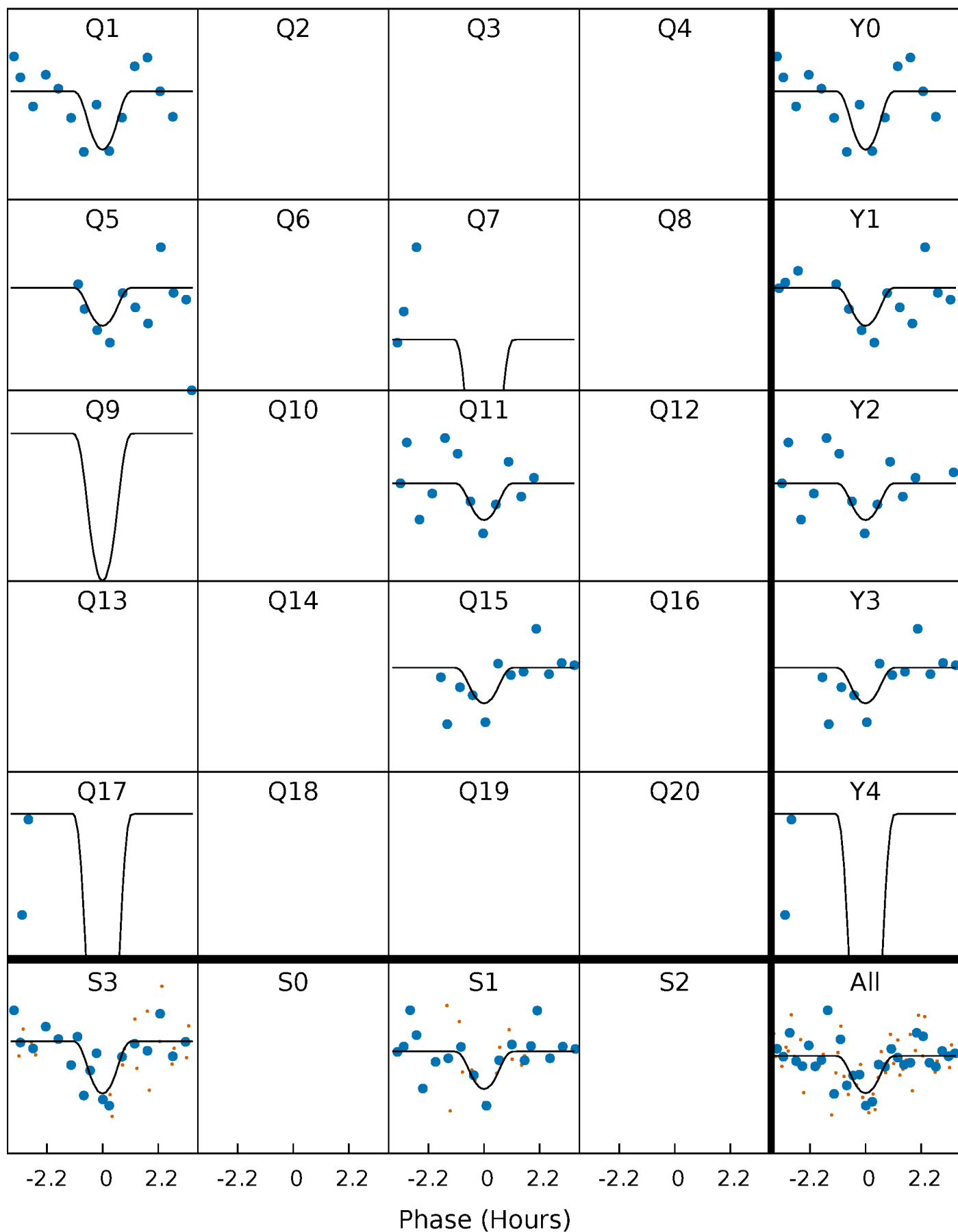
PDC Quarter-Phased Transit Curves

TCE 002716857-05 $P=177.320689$ Days $T_0=160.517220$ (BKJD)



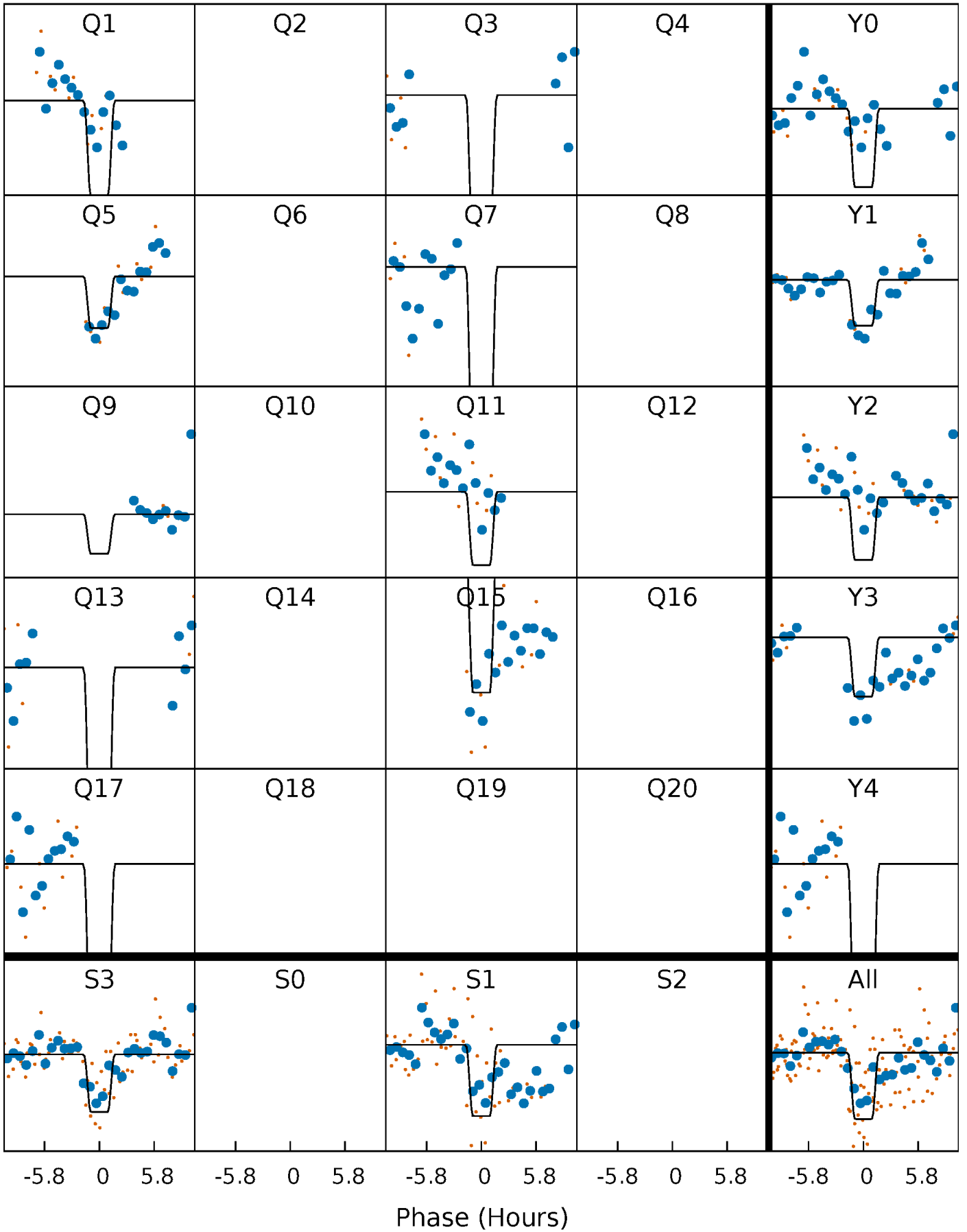
DV Quarter-Phased Transit Curves

TCE 002716857-05 $P=177.320689$ Days $T_0=160.517220$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

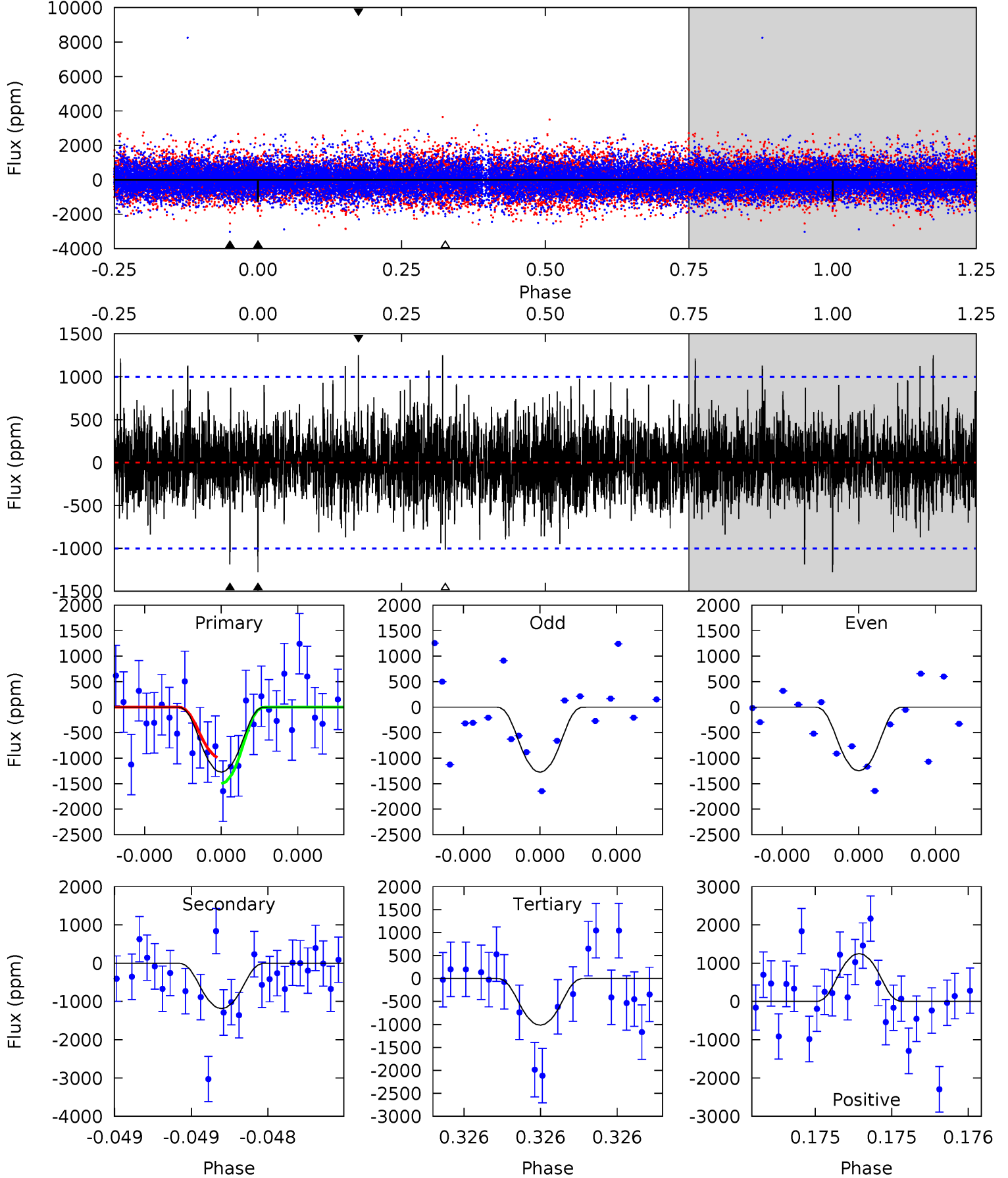
TCE 002716857-05 $P=177.315622$ Days $T_0=160.540714$ (BKJD)



DV Model-Shift Uniqueness Test

002716857-05, P = 177.320689 Days, E = 160.517220 Days

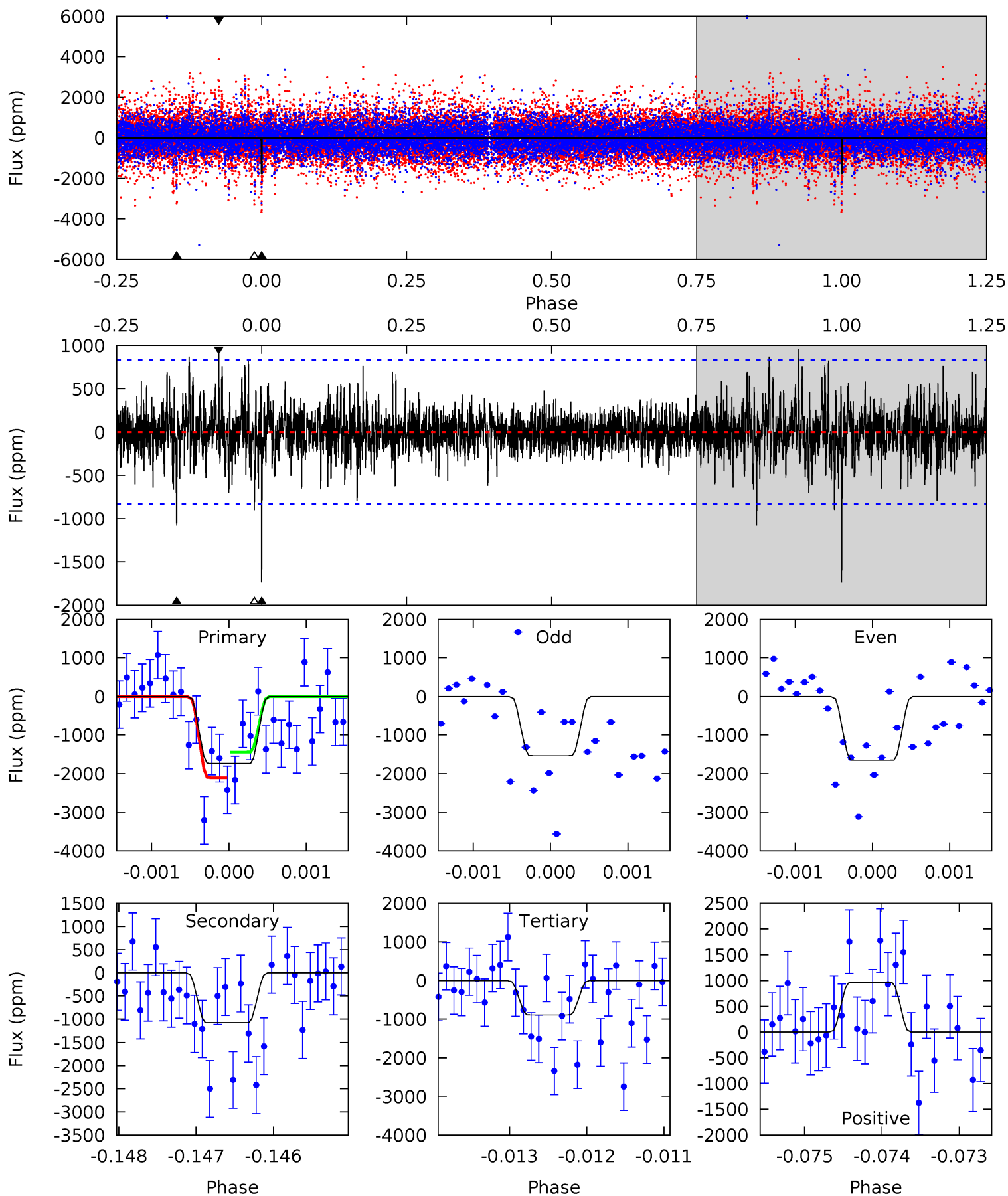
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.10	6.60	5.66	6.97	5.58	3.49	1.54	1.44	0.13	0.94	-0.37	0.07	1.00	0.50	1.42



Alt Model-Shift Uniqueness Test

002716857-05, $P = 177.315622$ Days, $E = 160.540714$ Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.5	7.14	5.91	6.35	5.50	3.37	1.30	5.60	5.15	1.23	0.79	0.38	0.97	0.36	2.18



Stellar Parameters For KIC 002716857

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	4314^{+115}_{-153}	$4.757^{+0.072}_{-0.033}$	$-1.200^{+0.300}_{-0.350}$	$0.484^{+0.034}_{-0.059}$	$0.489^{+0.037}_{-0.042}$	$6.066^{+2.004}_{-0.865}$
	+3%/-4%	+2%/-1%	+25%/-29%	+7%/-12%	+8%/-9%	+33%/-14%
Source	PHO1	KIC0	KIC0	DSEP		

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

Secondary Eclipse Parameters for KIC 002716857-05 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	A_{obs}
DV	-1185 ± 180	$5.93^{+5.70}_{-4.01}$	263^{+9}_{-11}	2927^{+1240}_{-469}	4212^{+36170}_{-3109}
Alt.	-1078 ± 151	$6.31^{+5.50}_{-4.32}$	263^{+9}_{-11}	2879^{+1175}_{-461}	3657^{+30930}_{-2635}

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

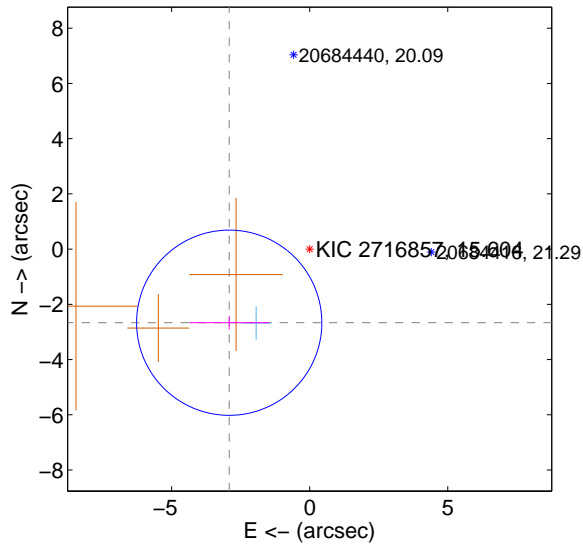
Supplemental centroid analysis for 002716857-05. Kepler magnitude: 15.60. Transit SNR 4.87

There are 1 quarters with good PRF difference image offsets

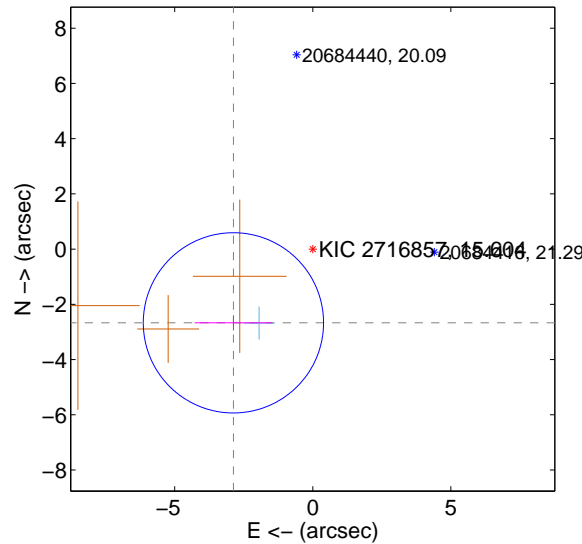
The direct PRF centroid is offset from the target star catalog position by about 0.07 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	3.950 ± 1.118	3.53	2.914 ± 1.444	-2.666 ± 0.249
PRF-fit source offset from KIC position	3.923 ± 1.088	3.61	2.874 ± 1.407	-2.671 ± 0.276
photometric centroid source offset	1.10 ± 1.77	0.62	0.69 ± 1.97	-0.86 ± 1.64

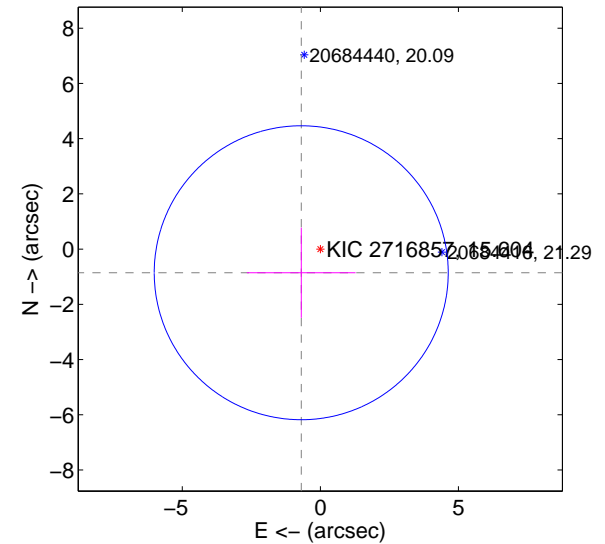
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

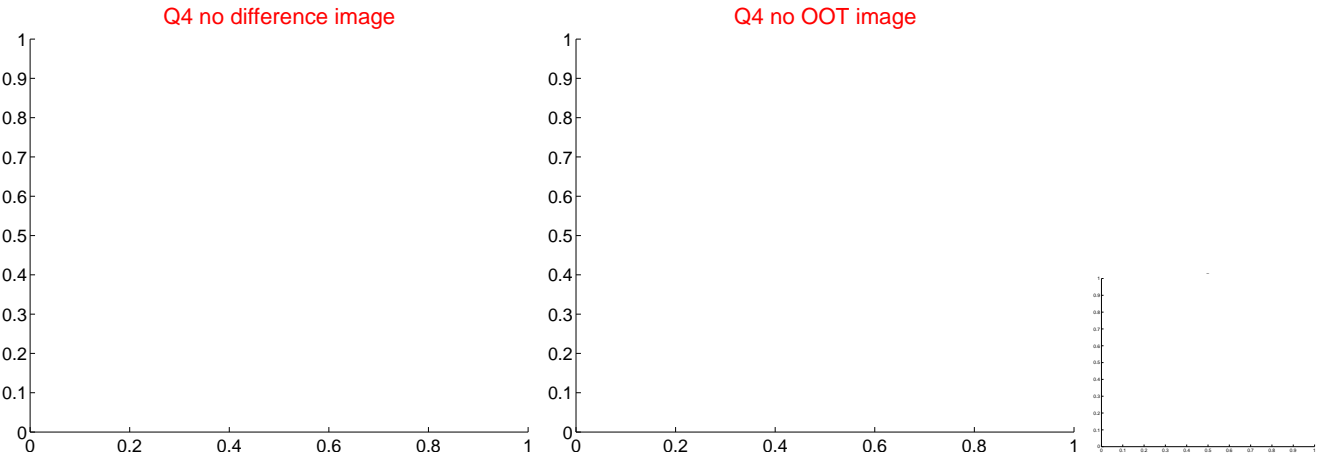
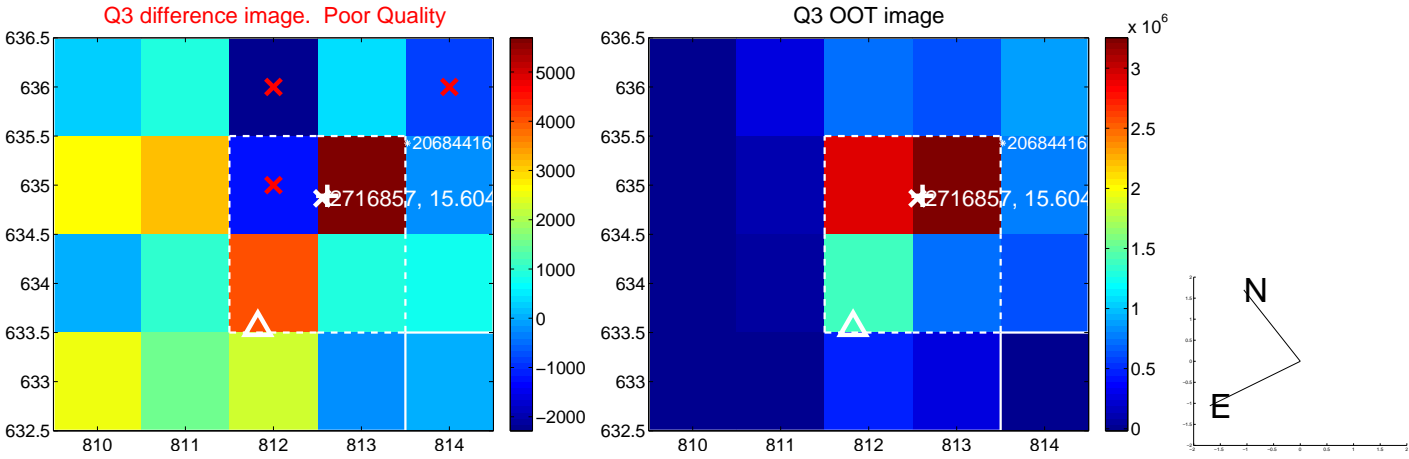
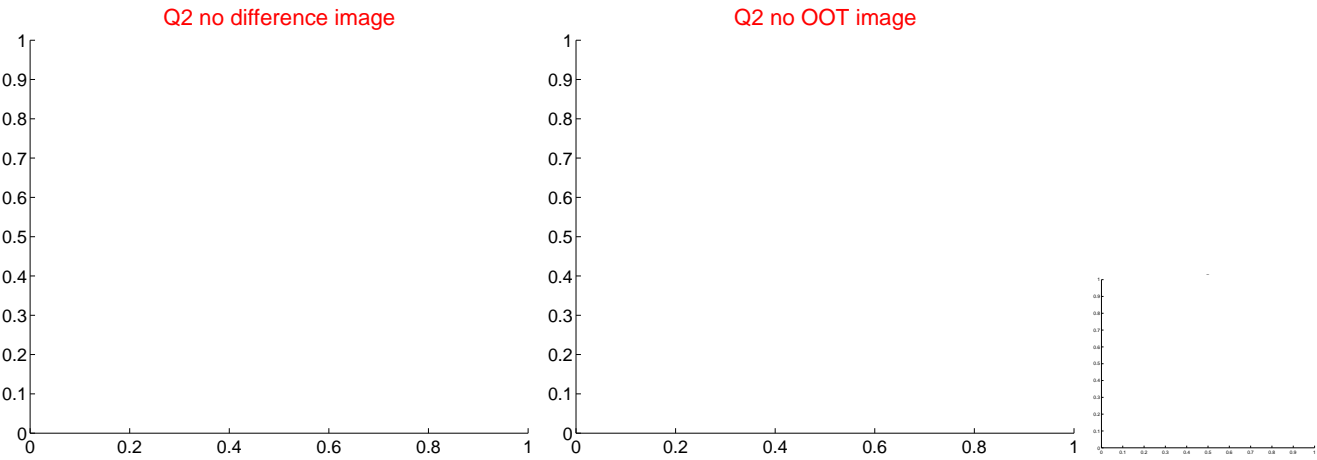
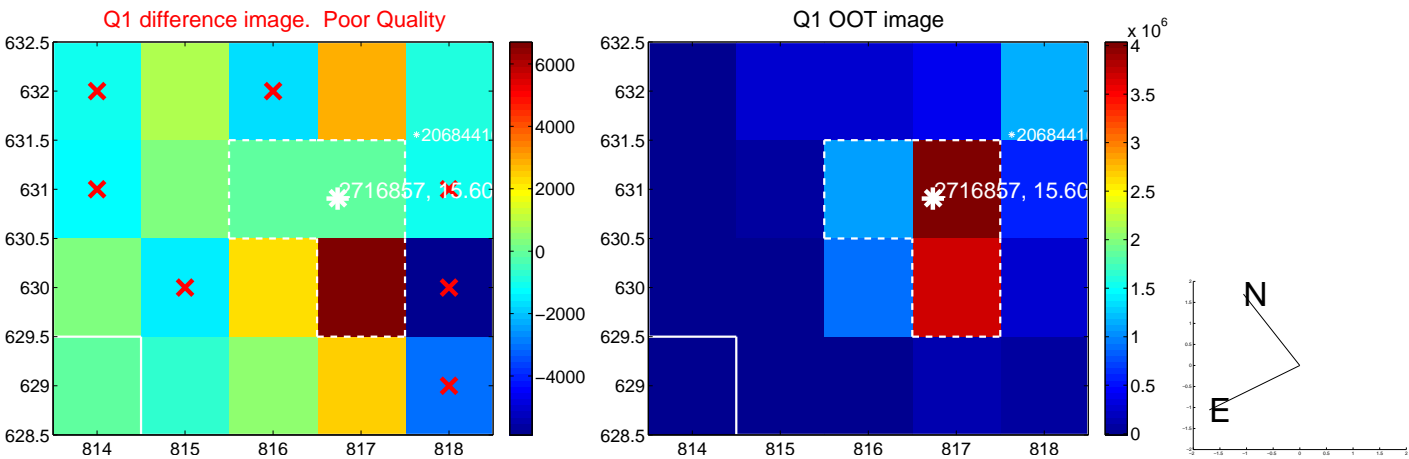


offset from photometric centroids

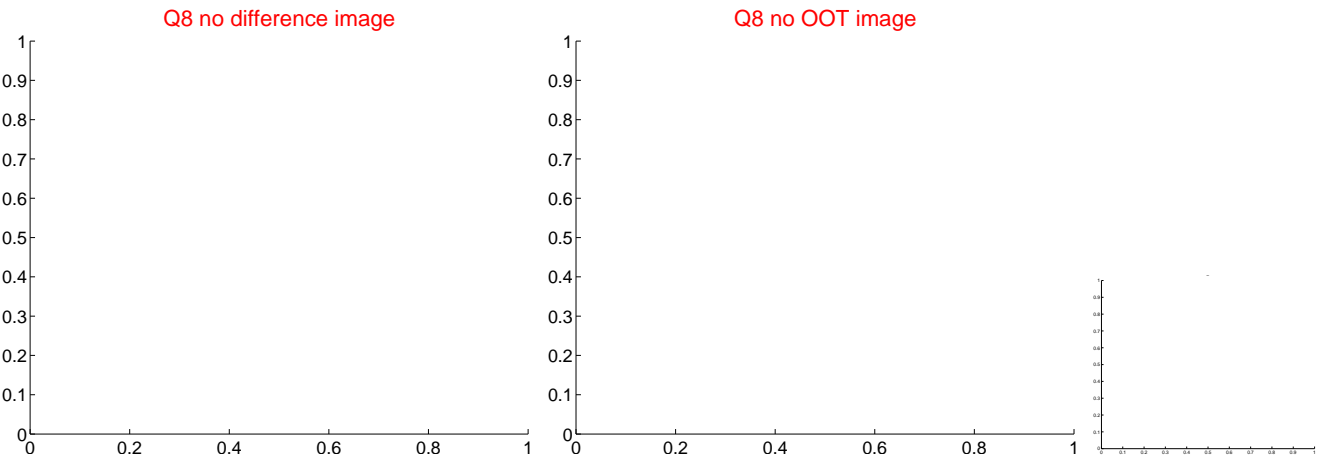
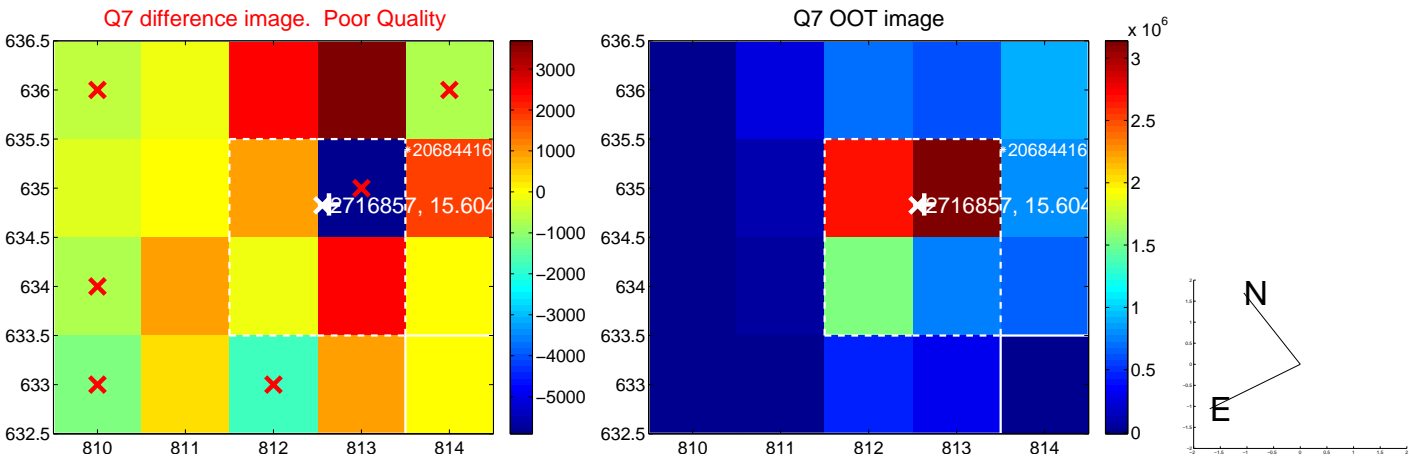
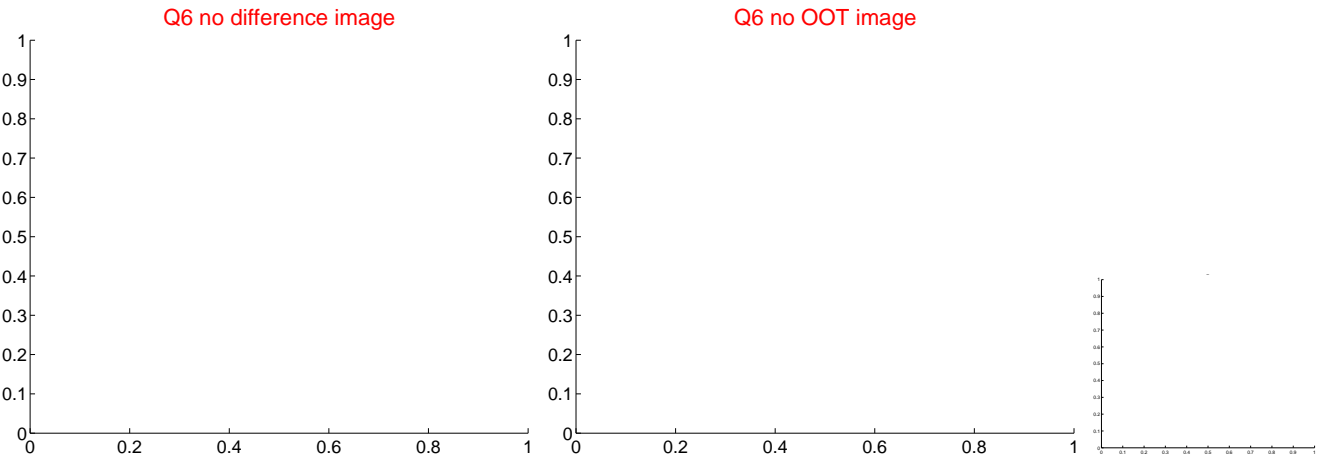
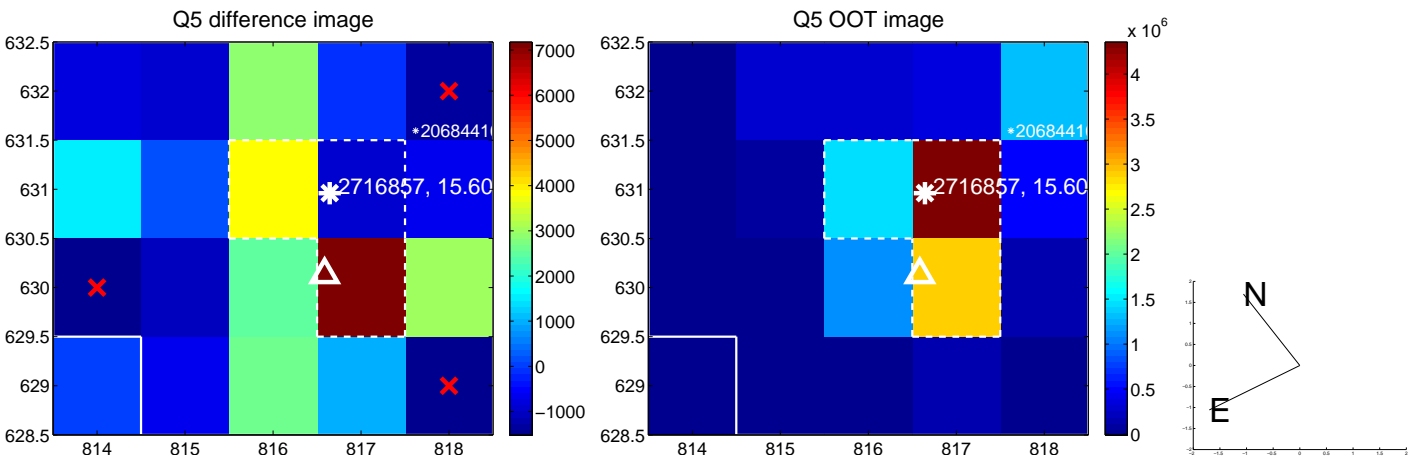


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

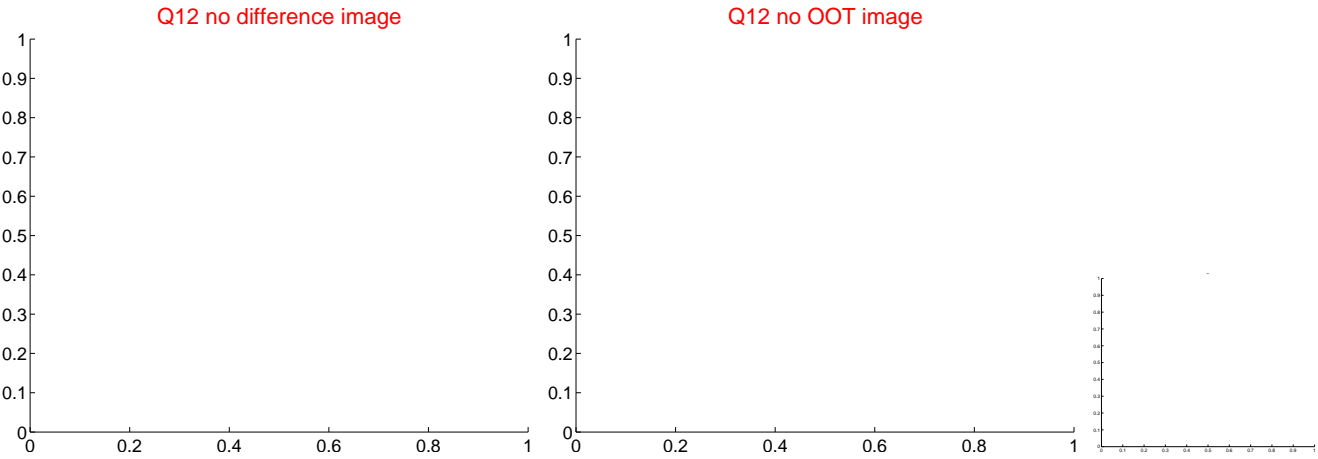
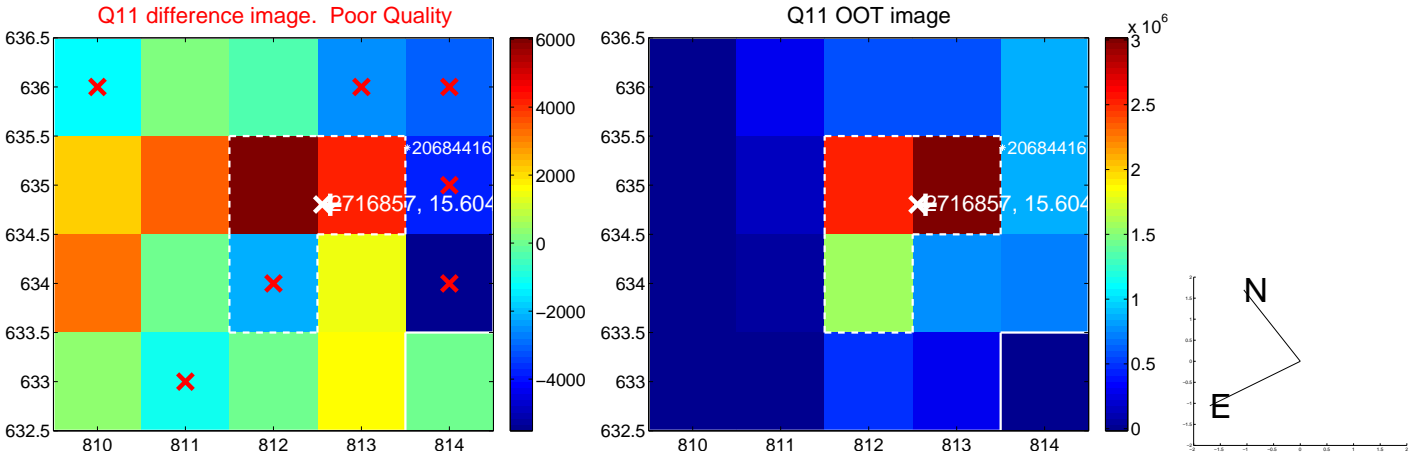
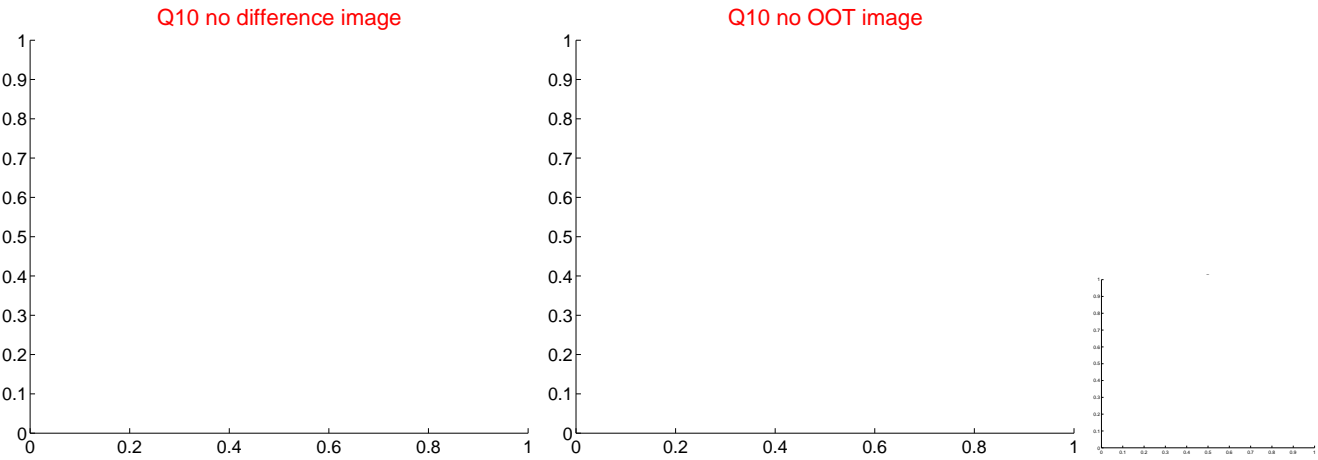
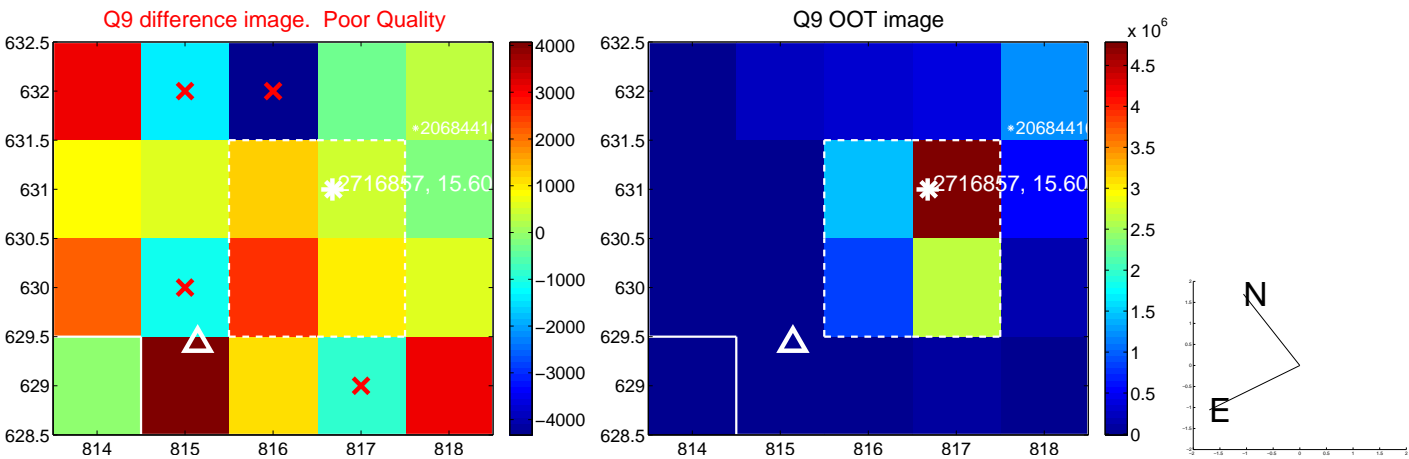
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



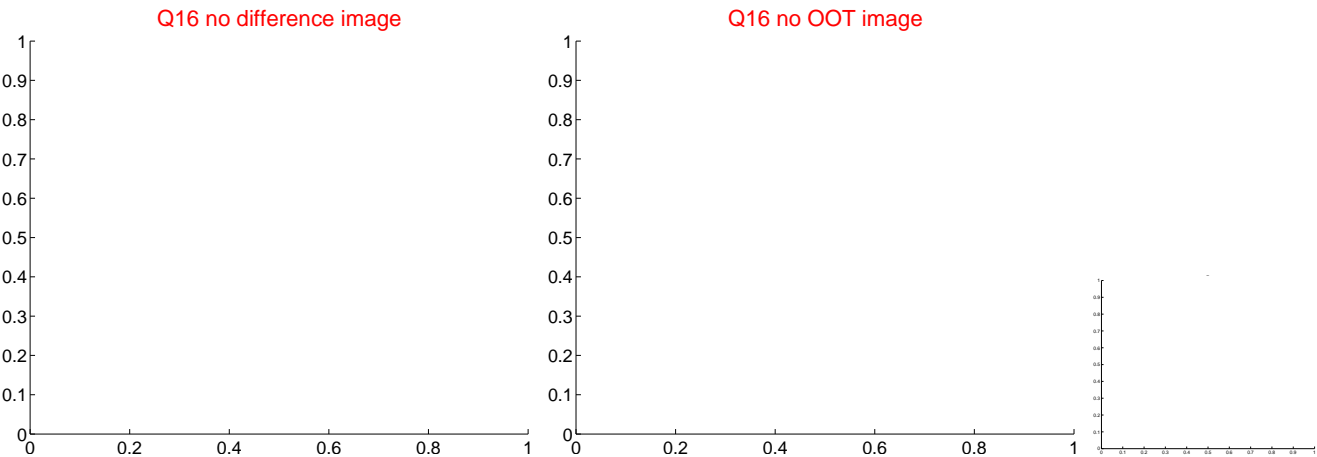
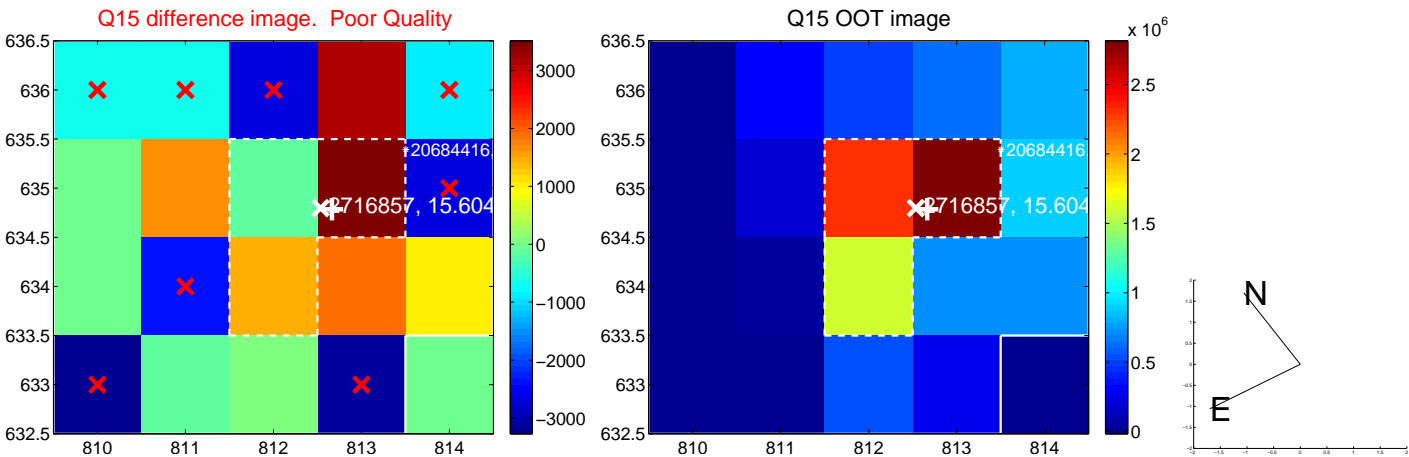
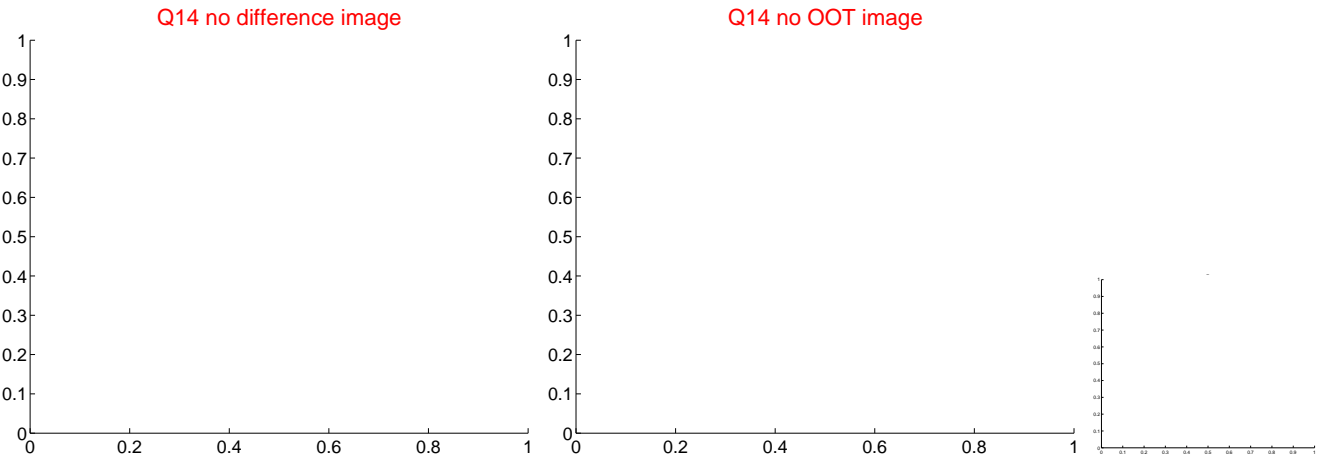
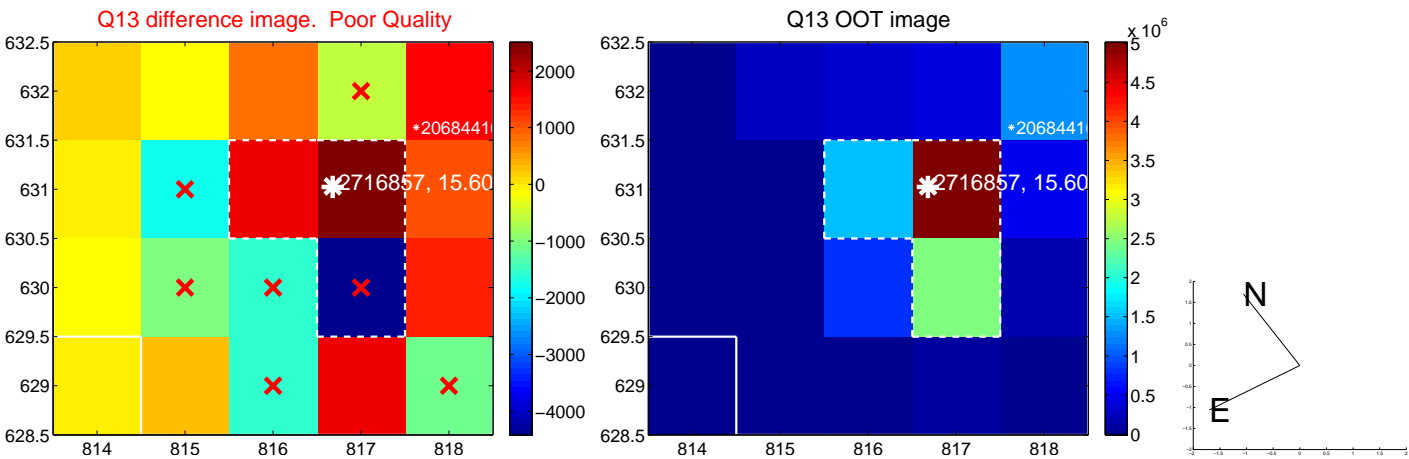
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



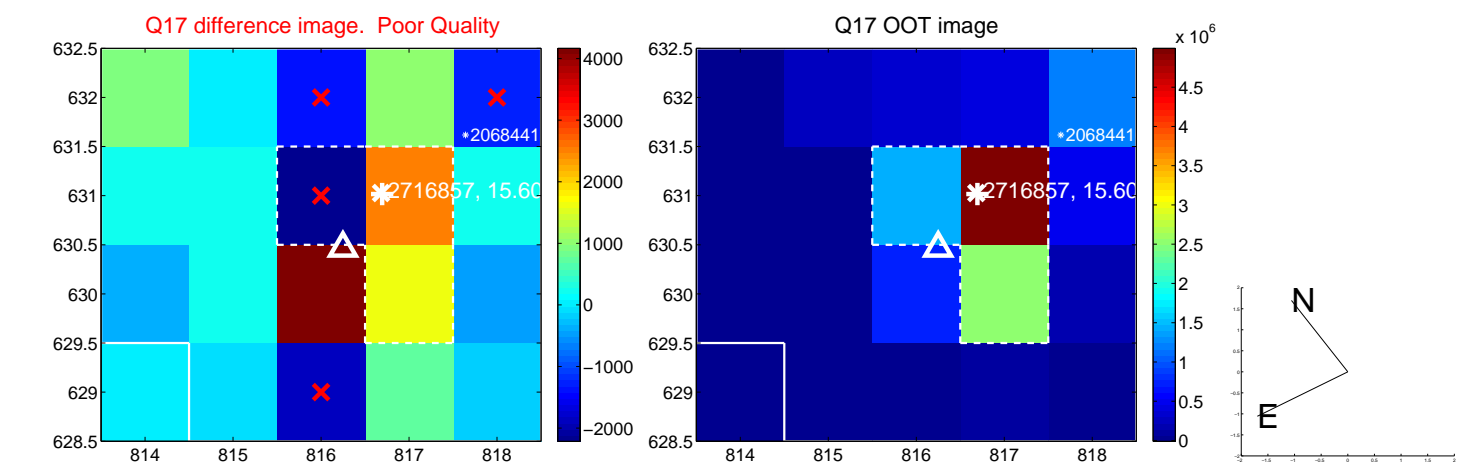
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



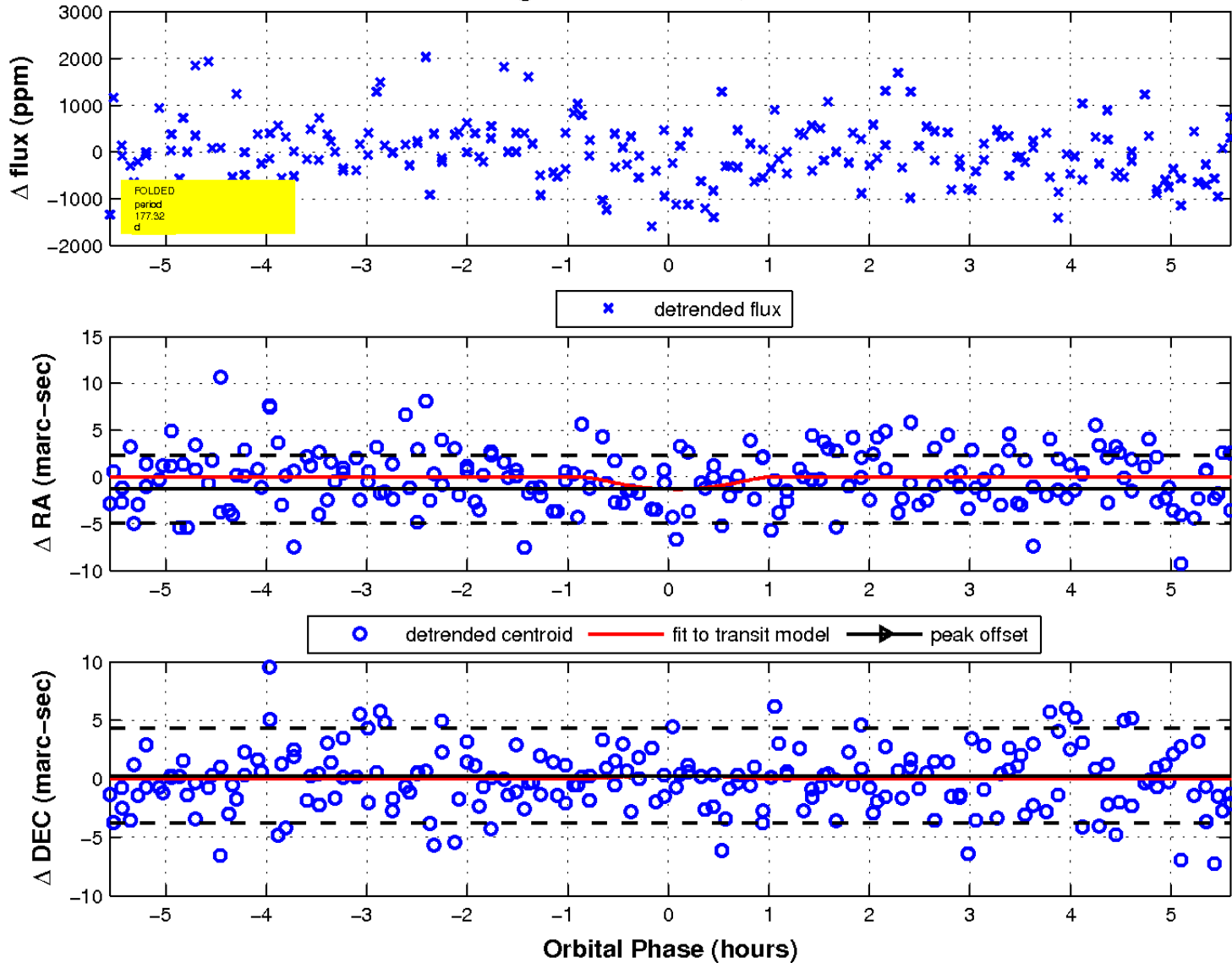
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



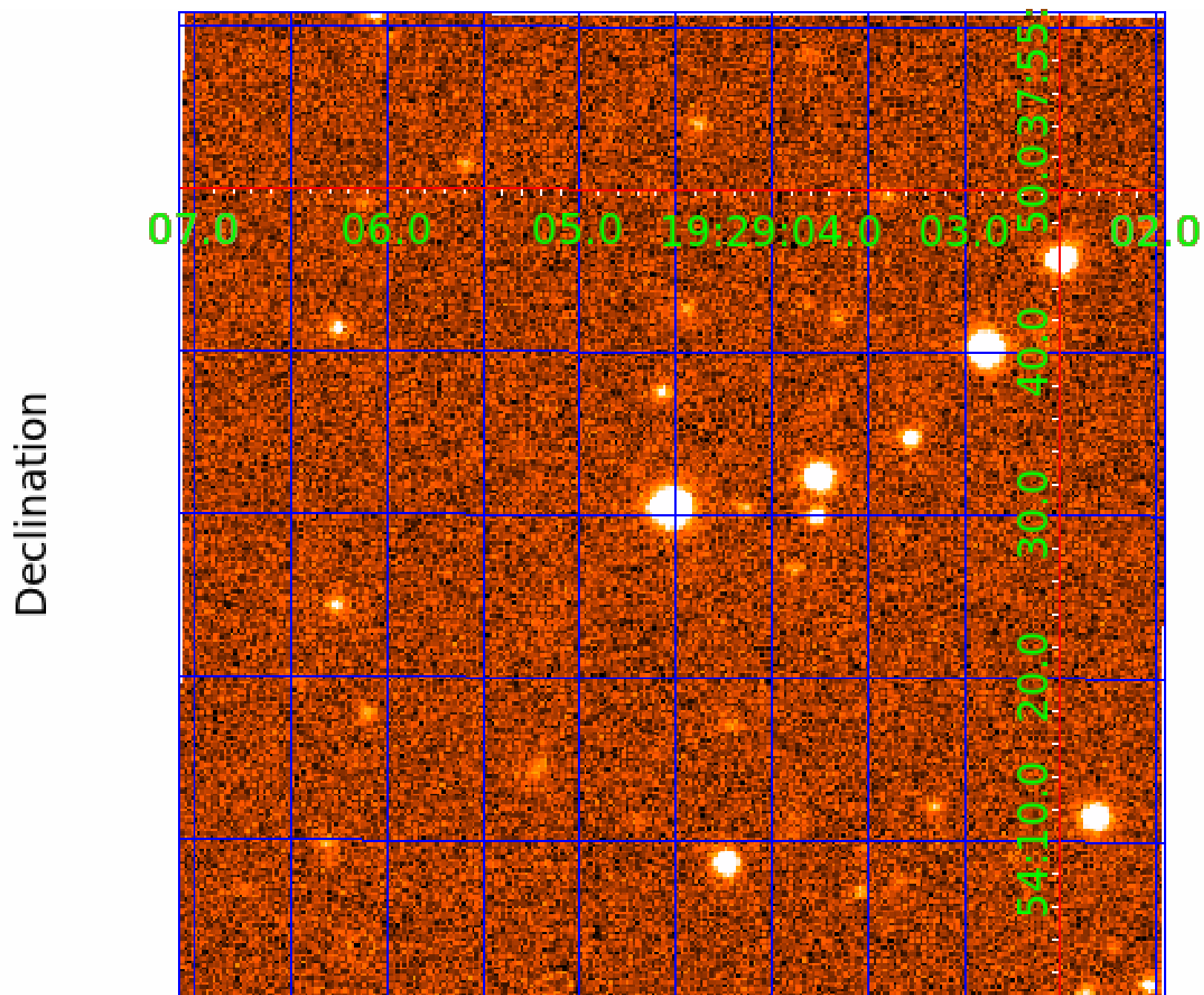
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



fluxWeightedCentroids, Planet 5 of 6



UKIRT Image



KIC 002716857

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})
002716857-01	OBS	No	0.999528	131.965666	78.4	4.796	7.2	8.3	0.48	4314	0.43	306.14
002716857-03	OBS	No	501.685715	552.306256	3109.6	18.970	8.9	8.1	0.48	4314	3.29	0.08
002716857-05	OBS	No	177.320689	160.517220	1139.9	1.884	8.6	4.9	0.48	4314	2.30	0.31
002716857-06	OBS	No	227.237438	187.552018	1641.3	3.886	7.9	8.1	0.48	4314	1.95	0.22

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
002716857-01	OBS	FP	0.00	1	0	0	0	LPP_DV
002716857-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS
002716857-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_TRACKER—MOD_TER_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
002716857-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—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.

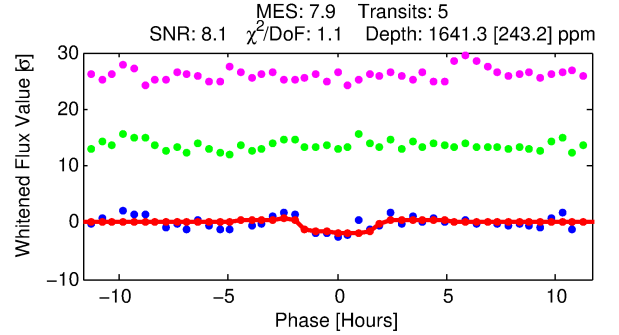
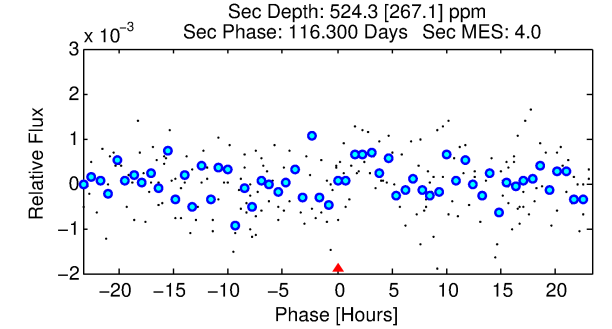
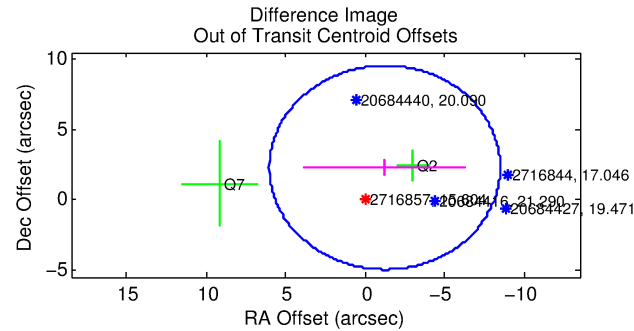
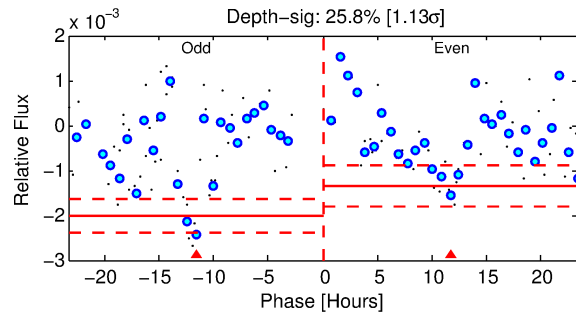
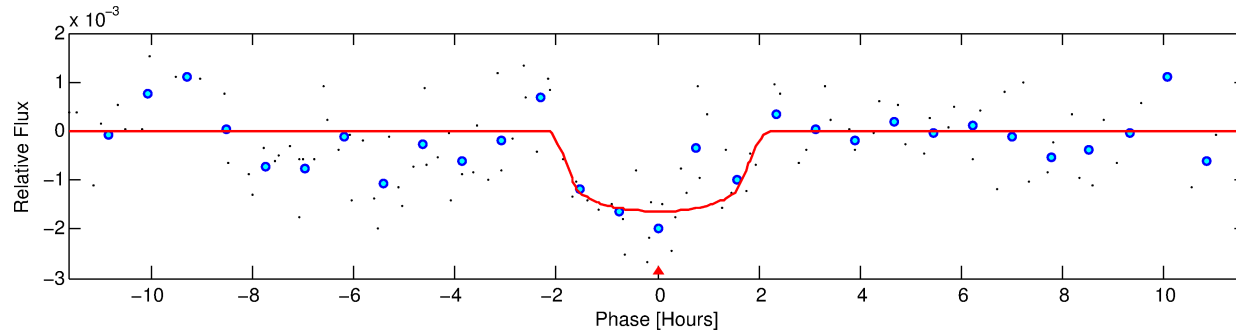
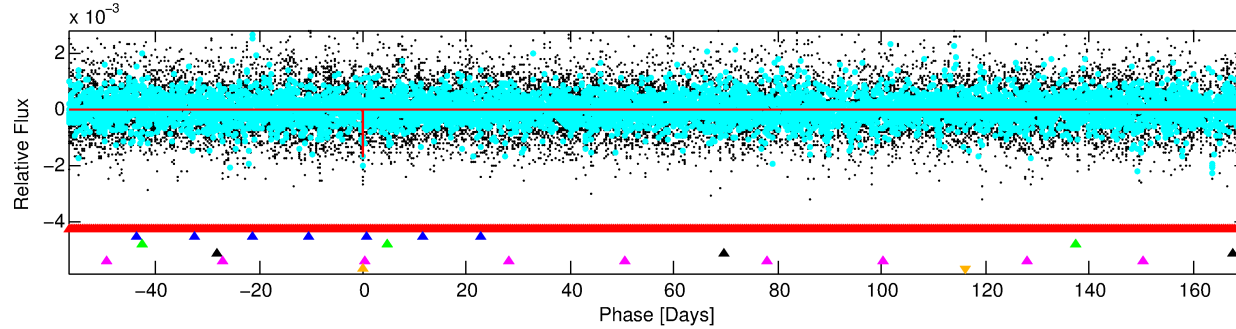
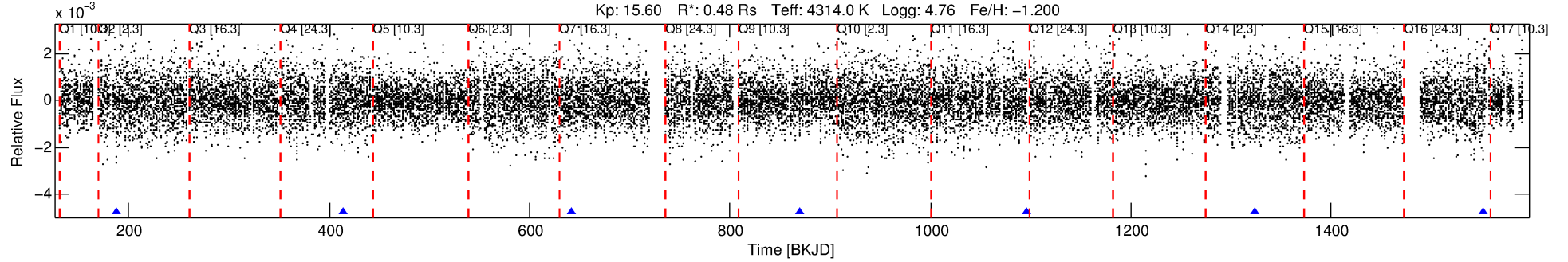
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 002716857-06

No Significant Match Found

DV One-Page Summary

KIC: 2716857 Candidate: 6 of 6 Period: 227.237 d



DV Fit Results:

Period = 227.23744 [0.00258] d
Epoch = 187.5520 [0.0083] BKJD
Rp/R* = 0.0370 [0.0586]
a/R* = 453.53 [3051.94]
b = 0.21 [30.83]
Seff = 0.22 [0.04]
Teq = 175 [9] K
Rp = 1.95 [3.10] Re
a = 0.5740 [0.0564] AU
Ag = 24934.34 [80121.43] [0.31 σ]
Teffp = 3395 [2728] K [1.18 σ]

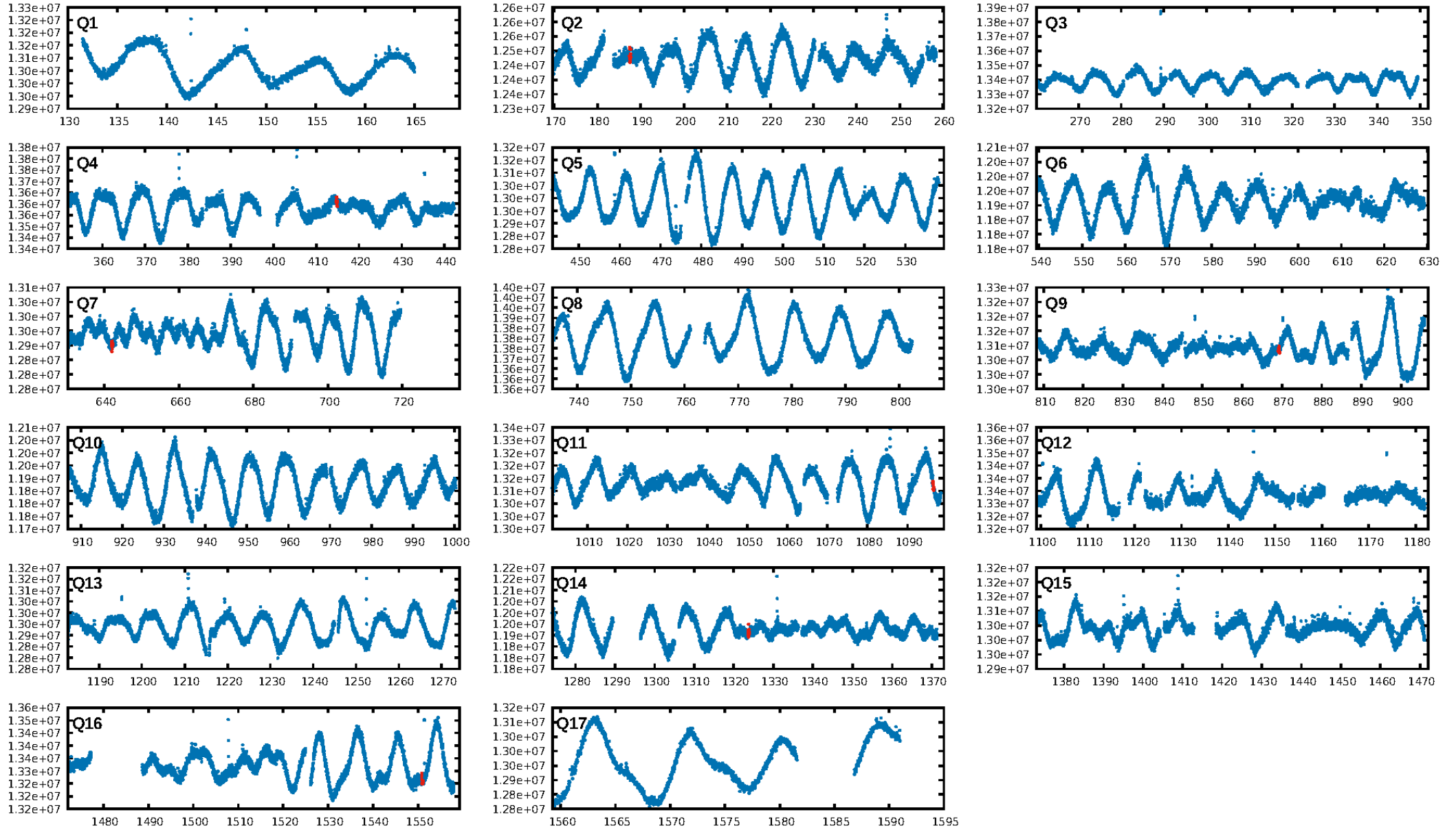
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [277.41 σ]
LongPeriod-sig: 100.0% [15.17 σ]
ModelChiSquare2-sig: 16.1%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 2.37e-10
RollingBand-fgt: 1.00 [5/5]
GhostDiagnostic-chr: -3.047
Centroid-sig: 47.3%
Centroid-so: 1.262 arcsec [1.23 σ]
OotOffset-rm: 2.597 arcsec [1.07 σ]
KicOffset-rm: 2.749 arcsec [0.85 σ]
OotOffset-st: 1/1/0/0 [2]
KicOffset-st: 1/1/0/0 [2]
DiffImageQuality-fgm: 0.00 [0/2]
DiffImageOverlap-fno: 0.00 [0/6]

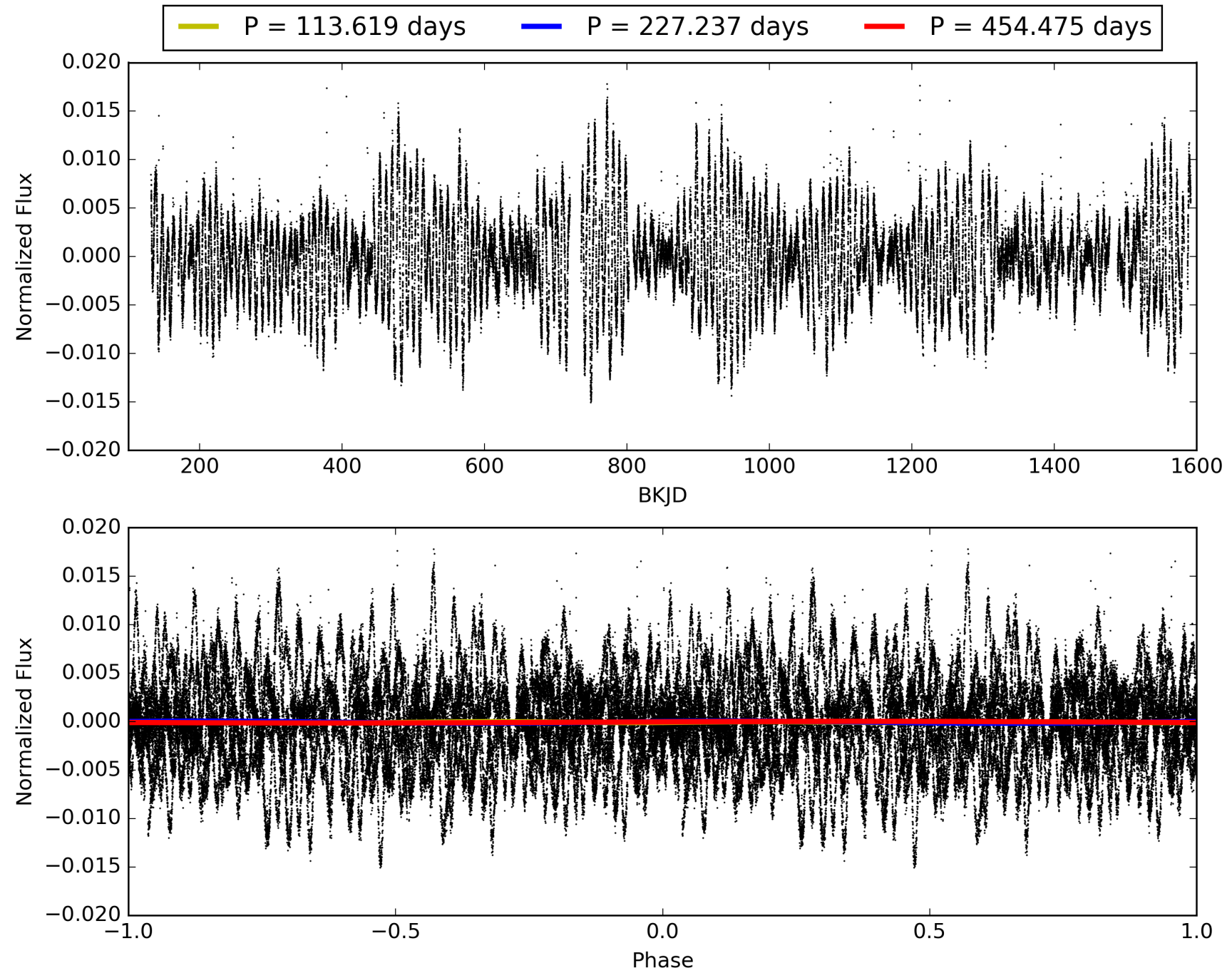
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 15:56:36 Z

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

TCE 002716857-06, PDC Light Curves

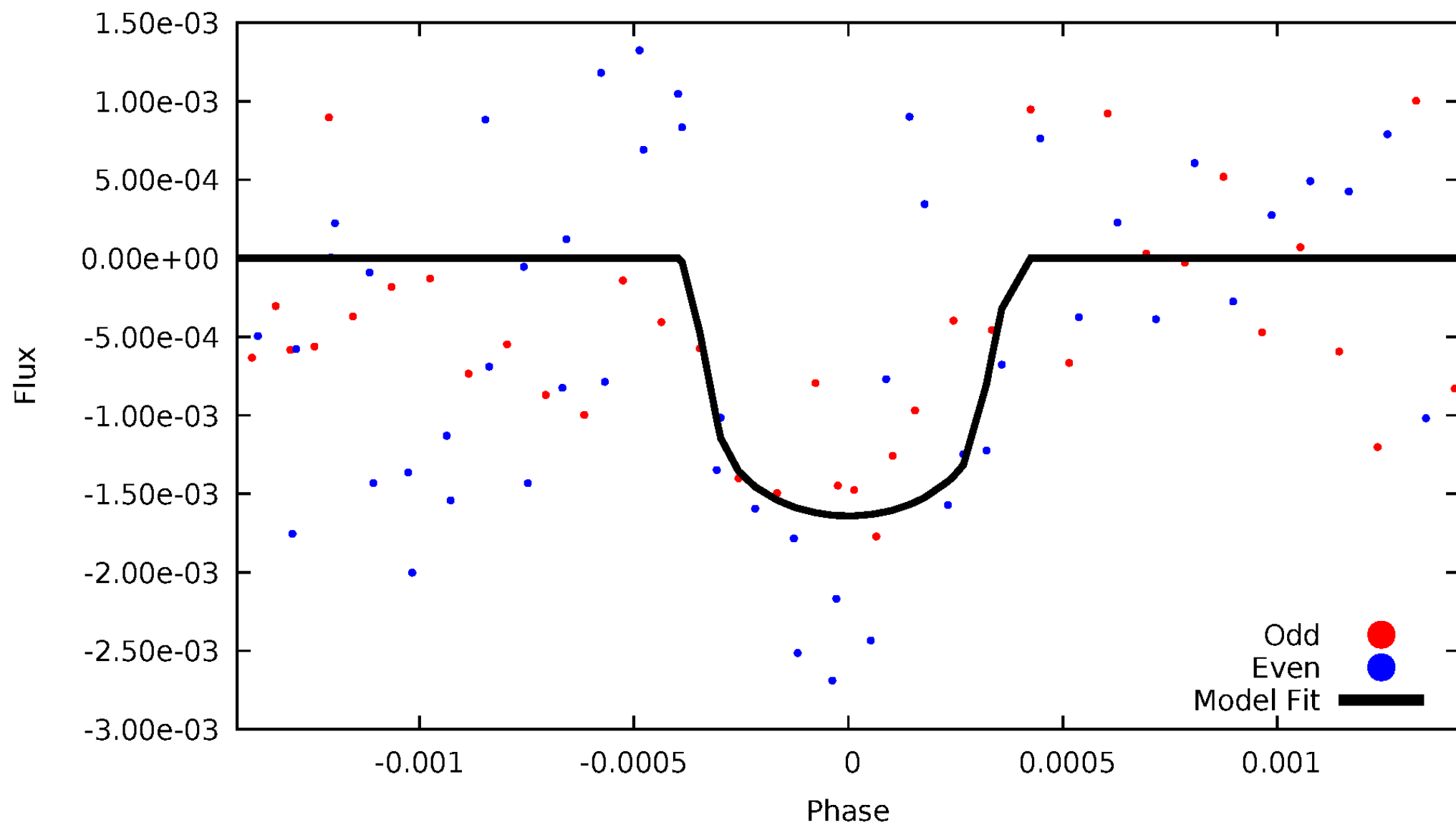


TCE 002716857-06



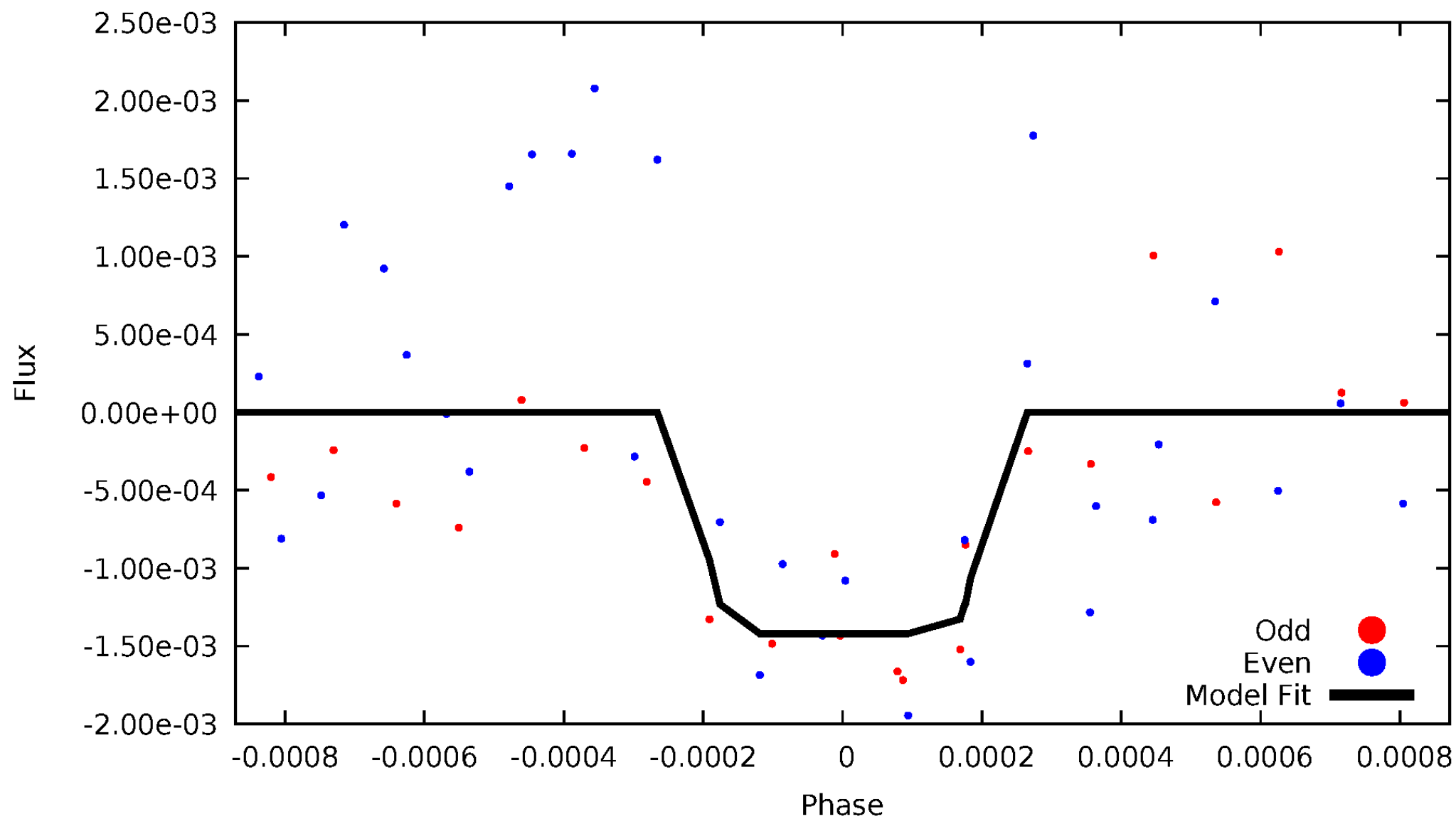
DV Odd/Even

TCE 002716857-06



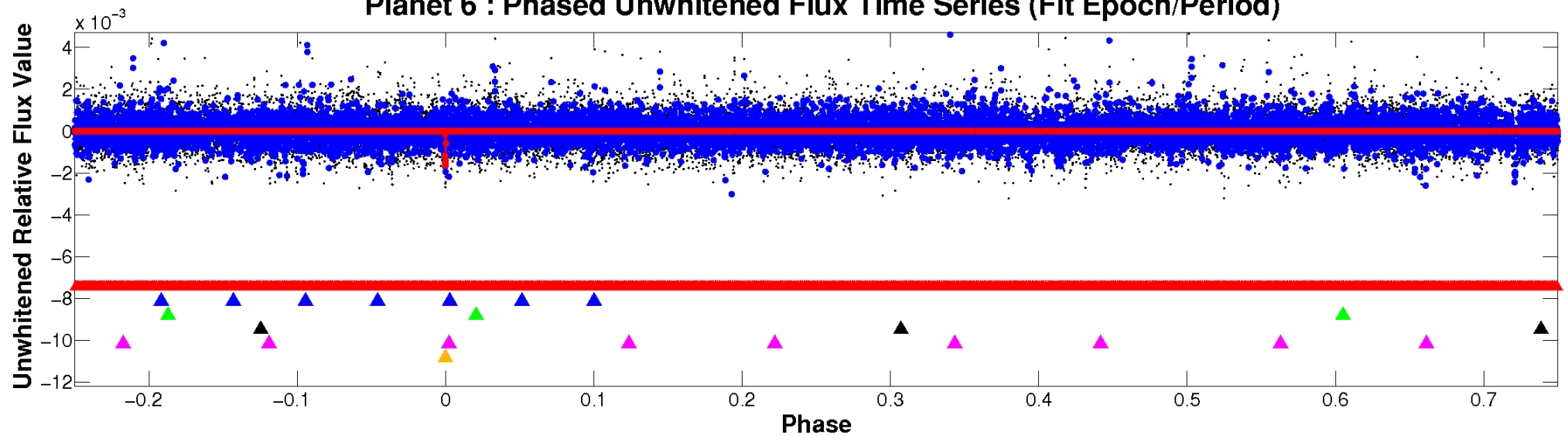
ALT Odd/Even

TCE 002716857-06

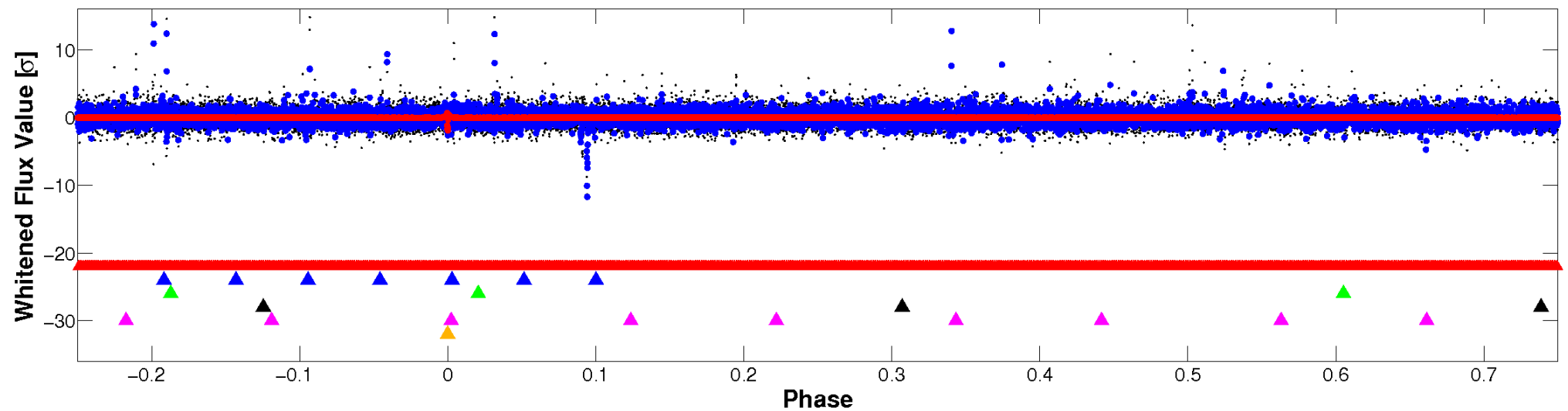


Non-Whitened Vs. Whitened Light Curve

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

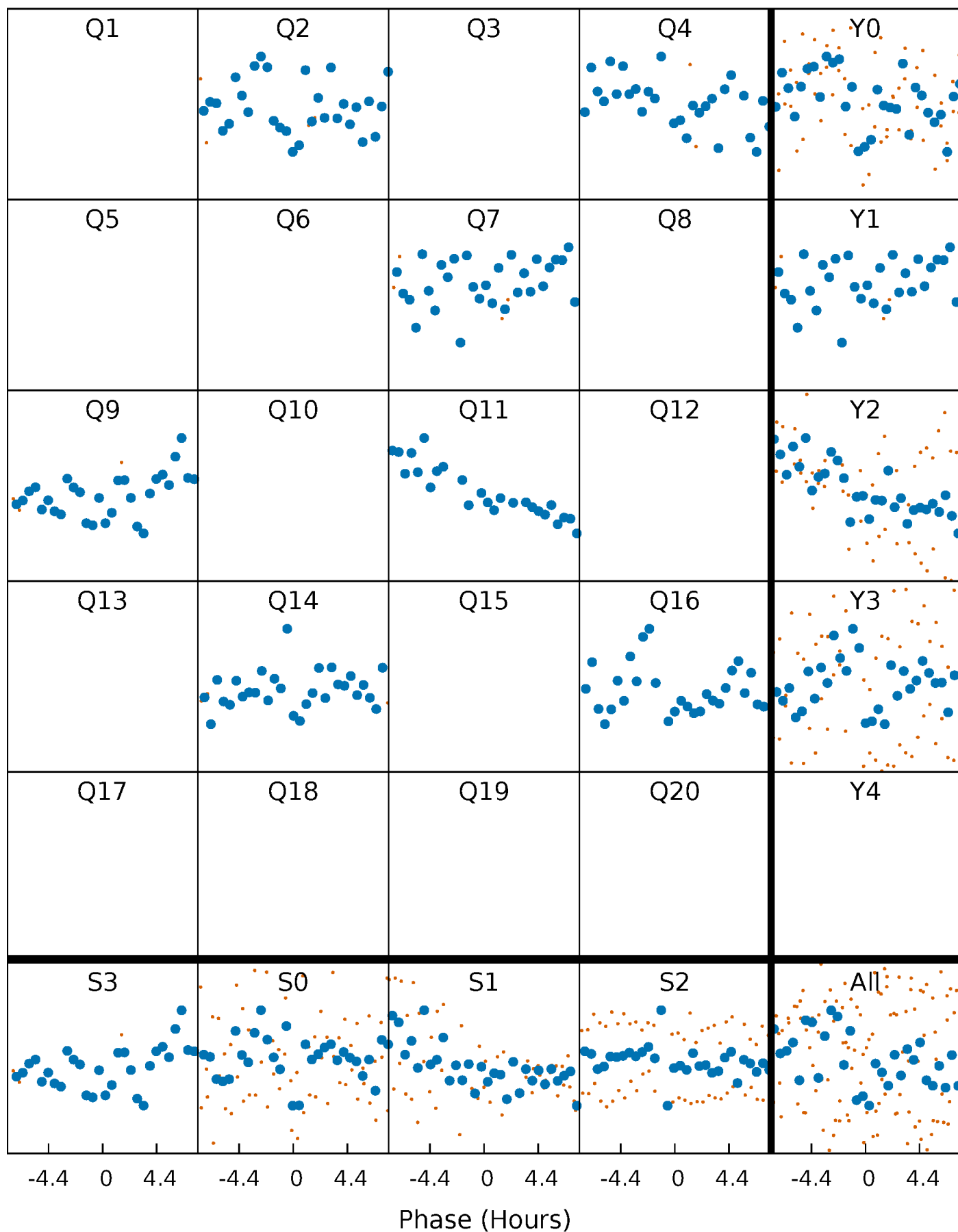


Planet 6 : Phased Whitened Flux Time Series (Fit Epoch/Period)



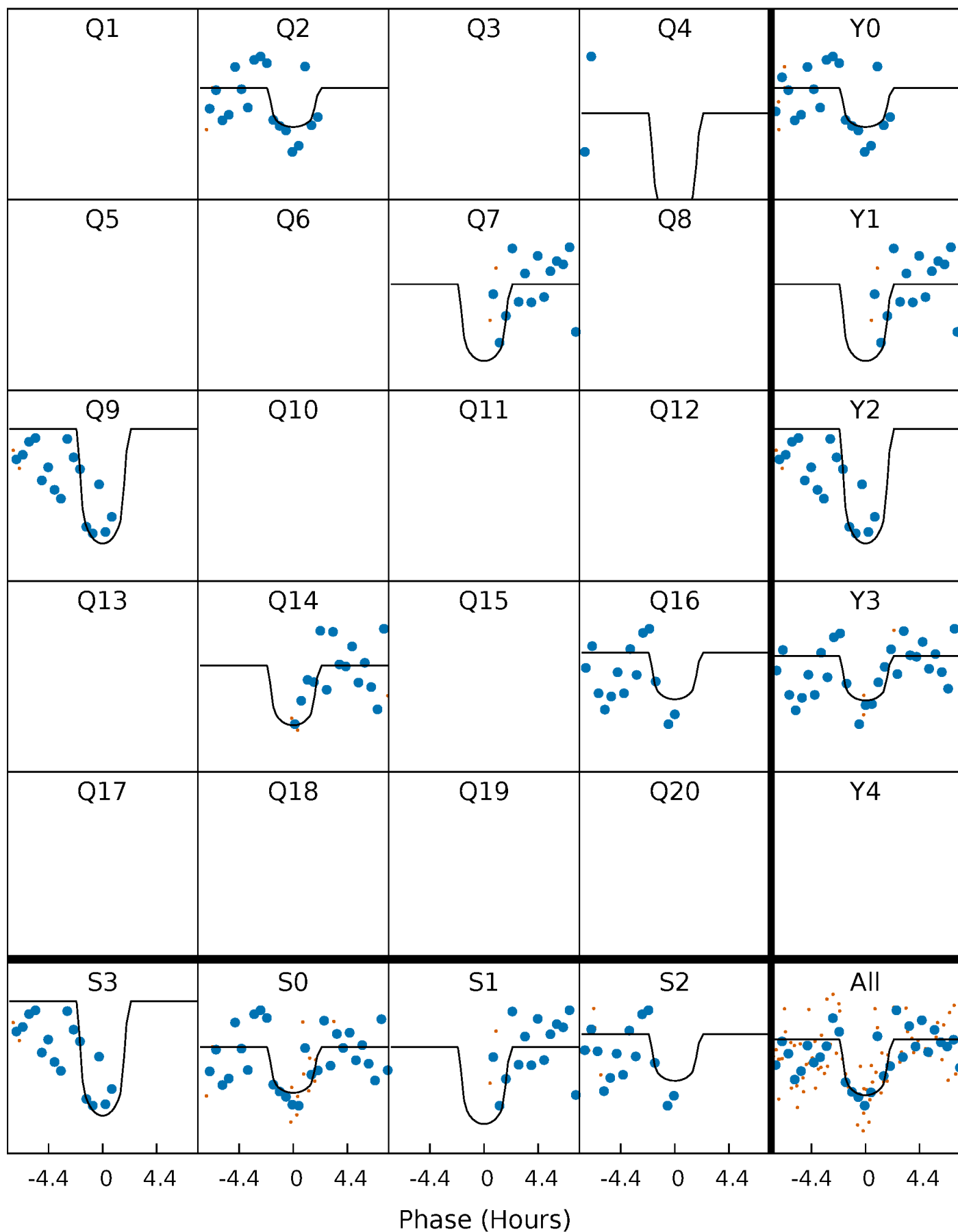
PDC Quarter-Phased Transit Curves

TCE 002716857-06 P=227.237438 Days $T_0=187.552018$ (BKJD)



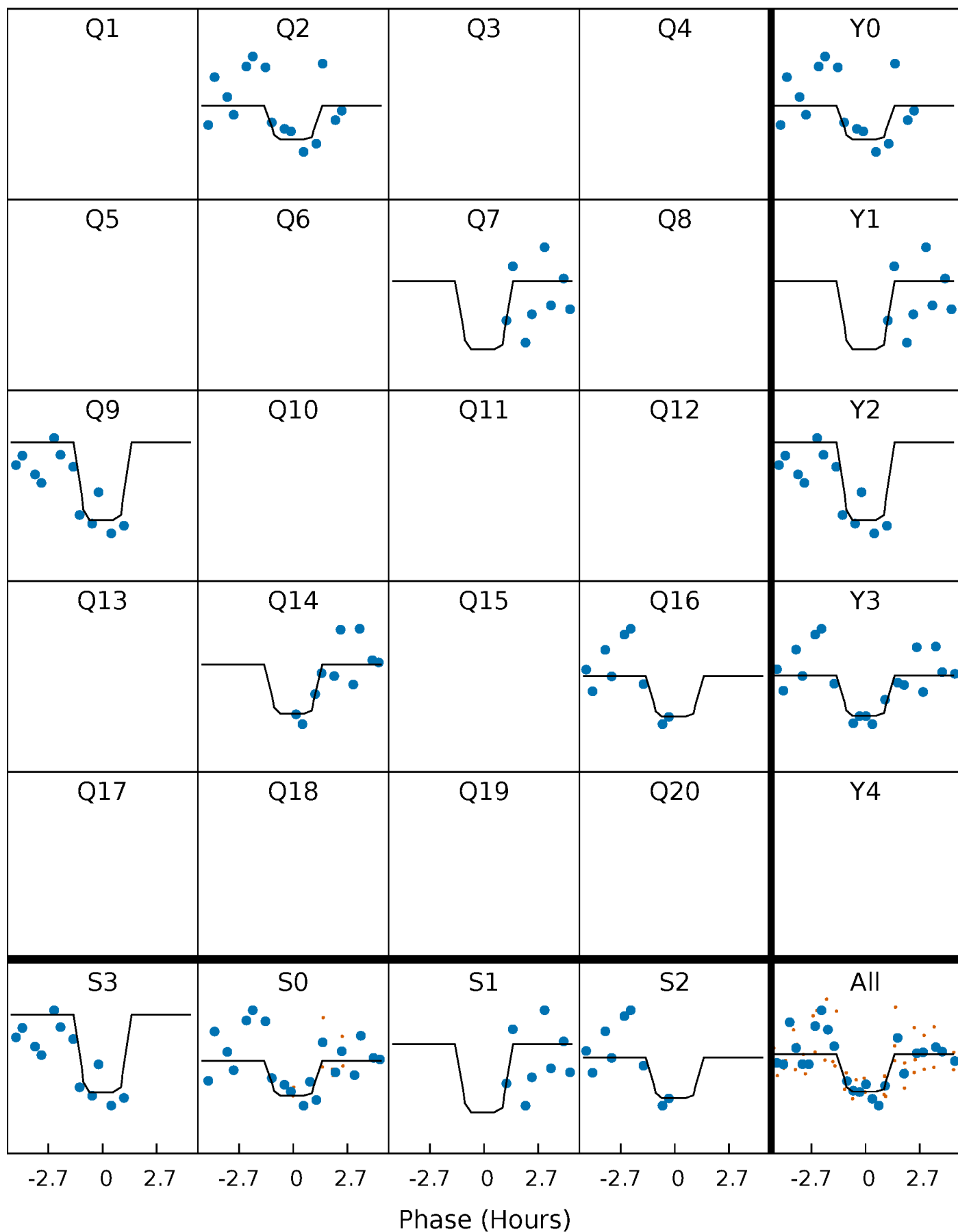
DV Quarter-Phased Transit Curves

TCE 002716857-06 P=227.237438 Days $T_0=187.552018$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

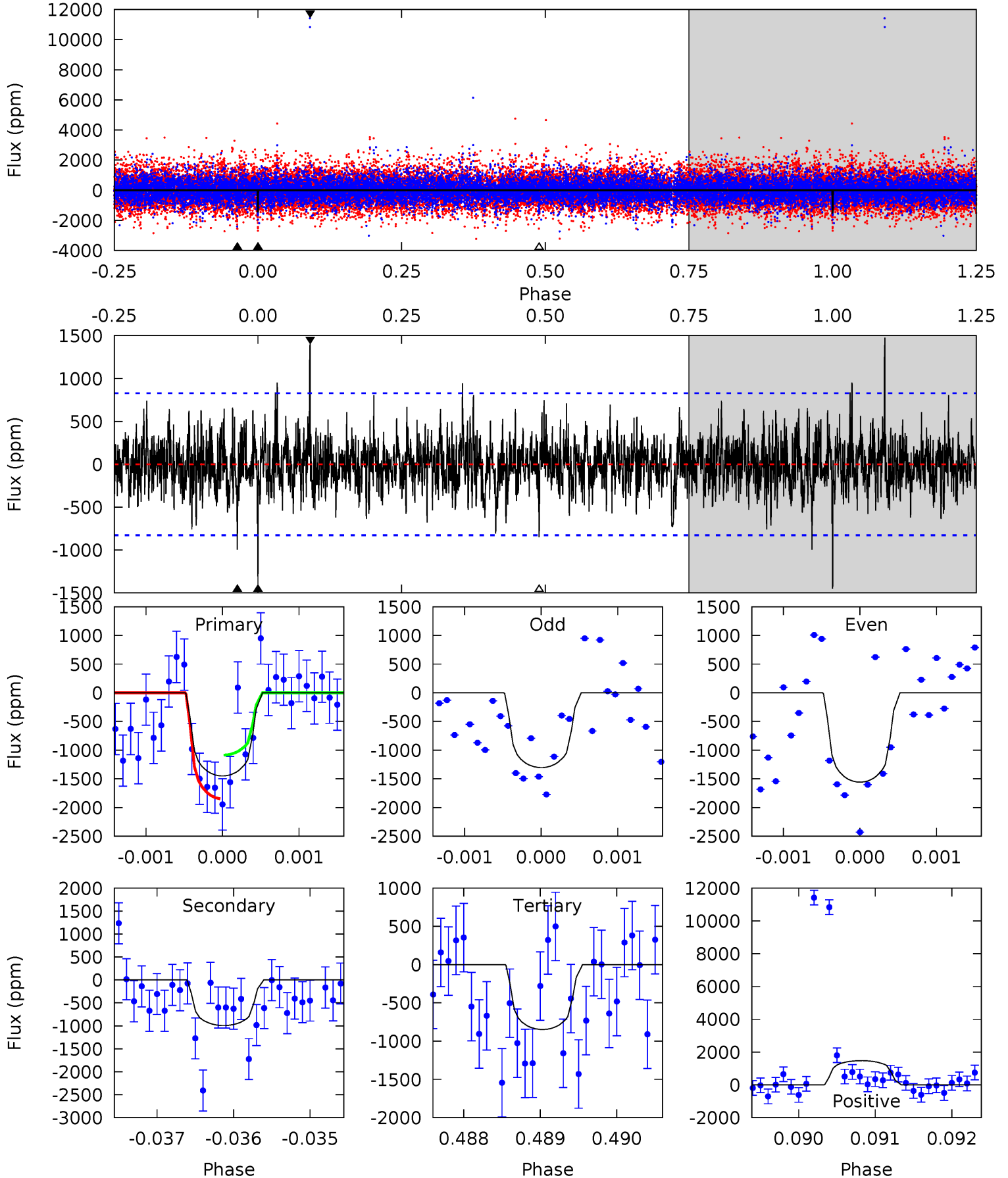
TCE 002716857-06 P=227.242440 Days $T_0=187.522193$ (BKJD)



DV Model-Shift Uniqueness Test

002716857-06, P = 227.237438 Days, E = 187.552018 Days

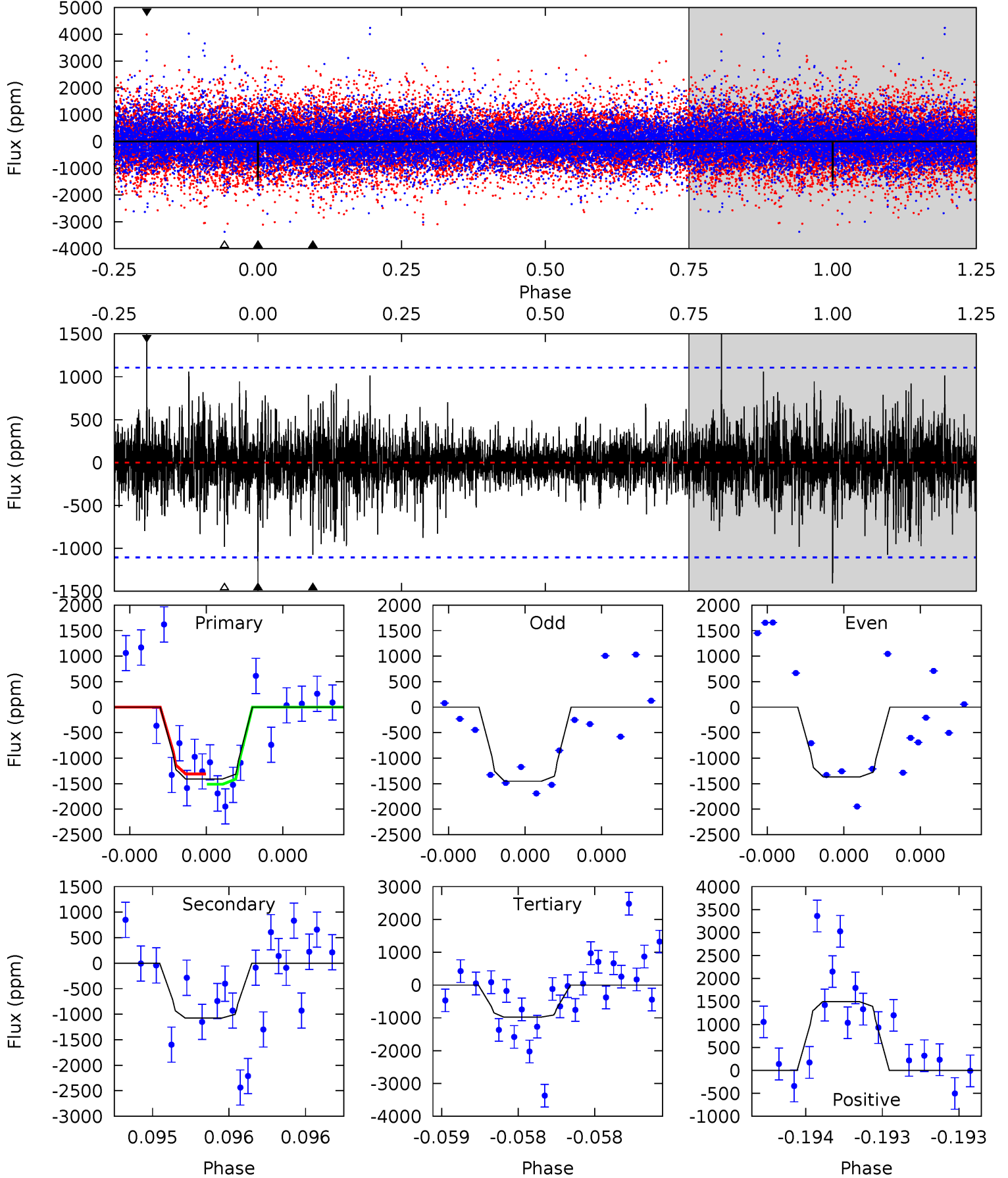
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.60	6.58	5.62	9.77	5.49	3.35	1.56	3.98	-0.17	0.96	-3.19	0.74	1.05	0.50	2.51



Alt Model-Shift Uniqueness Test

002716857-06, P = 227.242440 Days, E = 187.522193 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.12	5.44	4.95	7.56	5.60	3.51	1.14	2.17	-0.43	0.48	-2.12	0.22	1.00	0.51	0.51



Stellar Parameters For KIC 002716857

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	$M(M_{\odot})$	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	4314^{+115}_{-153}	$4.757^{+0.072}_{-0.033}$	$-1.200^{+0.300}_{-0.350}$	$0.484^{+0.034}_{-0.059}$	$0.489^{+0.037}_{-0.042}$	$6.066^{+2.004}_{-0.865}$
	+3%/-4%	+2%/-1%	+25%/-29%	+7%/-12%	+8%/-9%	+33%/-14%
Source	PHO1	KIC0	KIC0	DSEP		

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

Secondary Eclipse Parameters for KIC 002716857-06 / KOI

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-993 ± 151	$2.93^{+2.68}_{-1.97}$	242^{+8}_{-10}	3557^{+1738}_{-653}	$21871^{+165662}_{-16136}$
Alt.	-1075 ± 198	$2.83^{+2.59}_{-1.90}$	241^{+9}_{-9}	3588^{+1892}_{-627}	$24487^{+199201}_{-17910}$

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 $A_{obs} \gg 1.0$

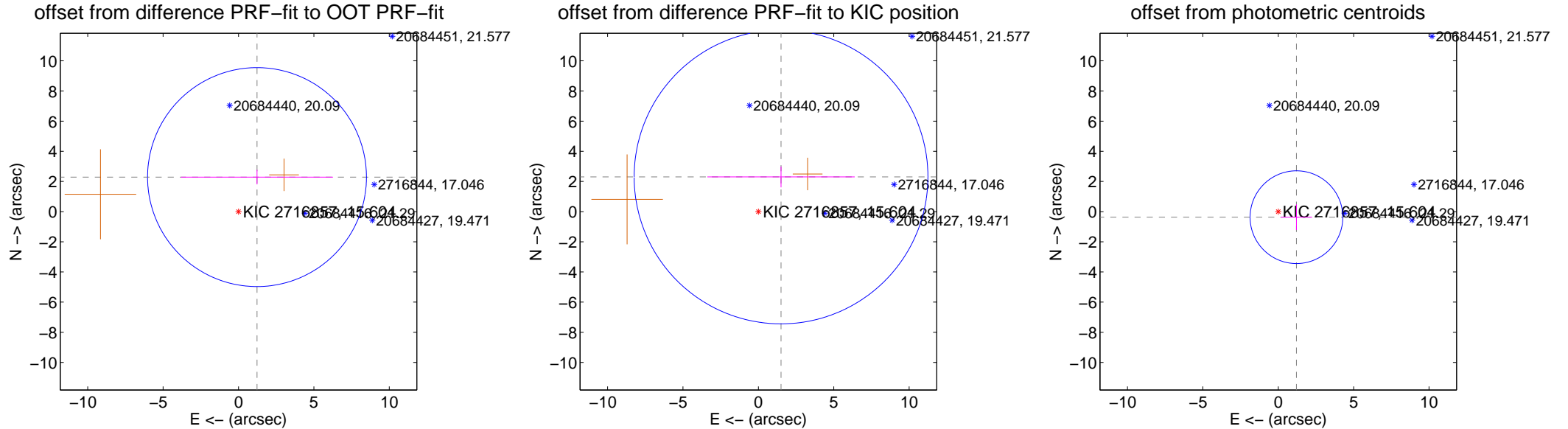
DV Centroid Data

Supplemental centroid analysis for 002716857-06. Kepler magnitude: 15.60. Transit SNR 8.06

There are 0 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.56 arcsec

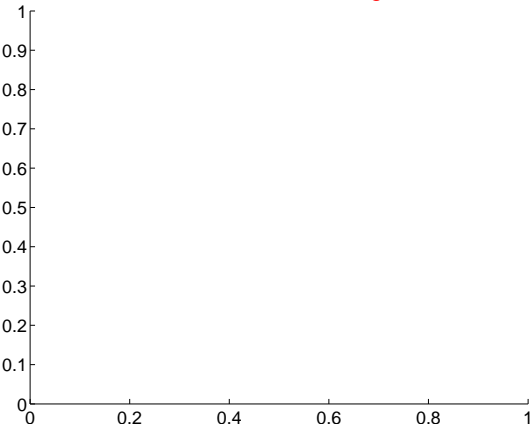
	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	2.597 ± 2.420	1.07	-1.227 ± 5.040	2.289 ± 0.485
PRF-fit source offset from KIC position	2.749 ± 3.248	0.85	-1.503 ± 4.887	2.302 ± 0.690
photometric centroid source offset	1.26 ± 1.03	1.23	-1.21 ± 1.04	-0.37 ± 0.85



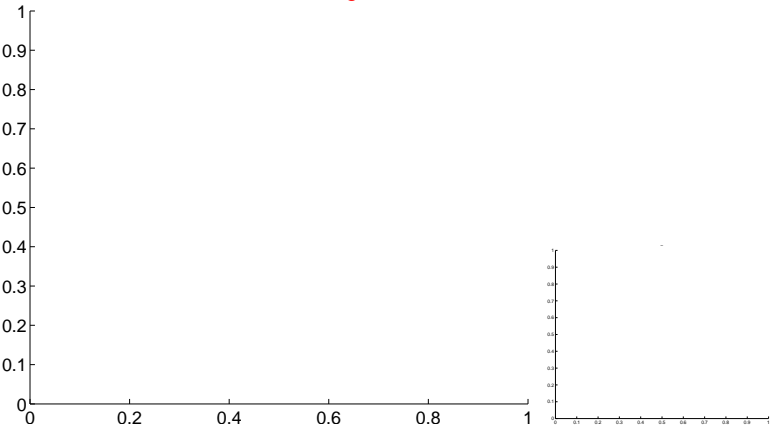
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

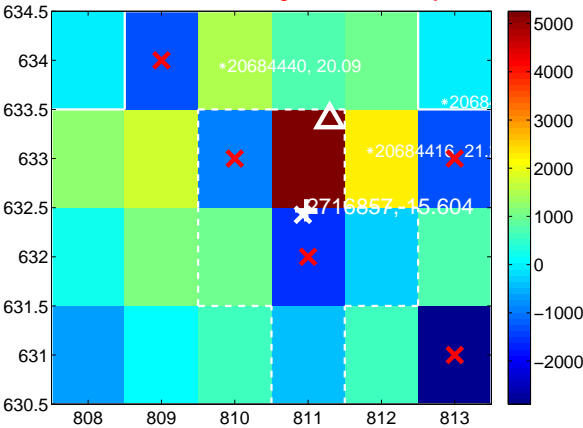
Q1 no difference image



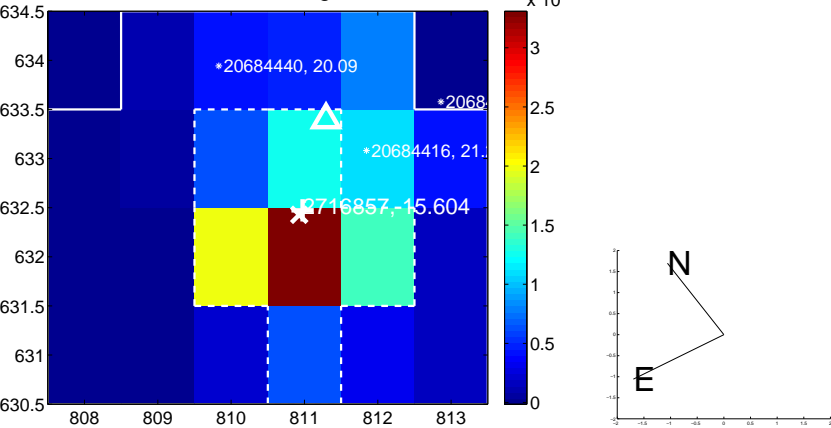
Q1 no OOT image



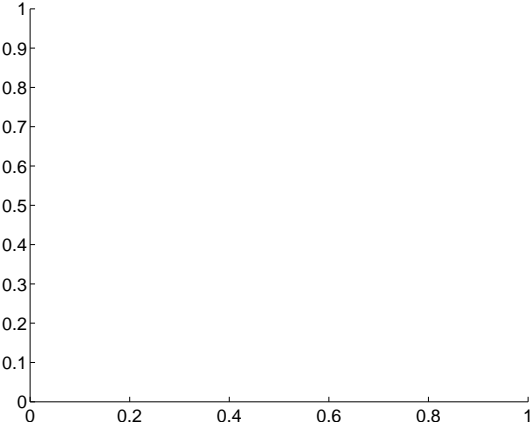
Q2 difference image. Poor Quality



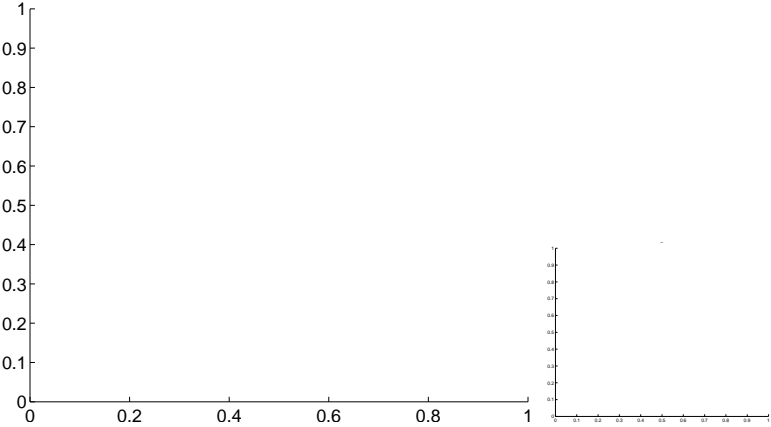
Q2 OOT image



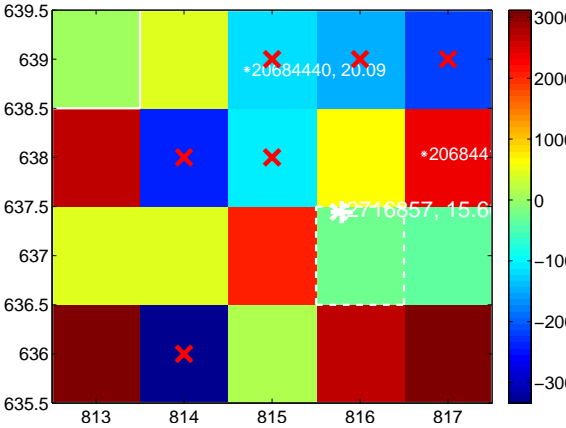
Q3 no difference image



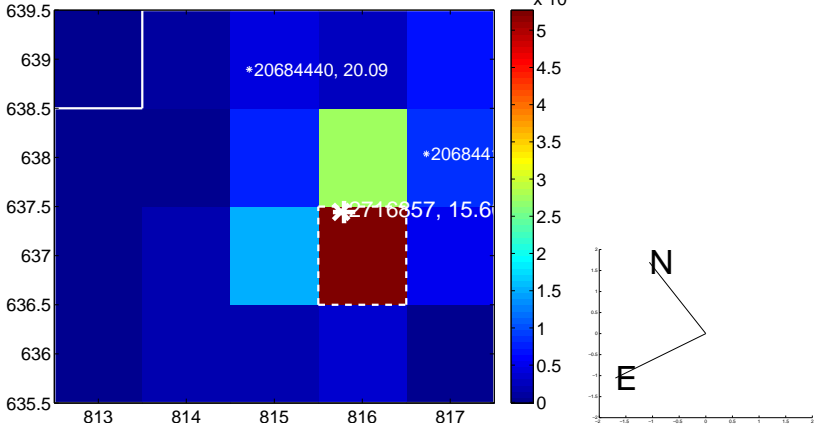
Q3 no OOT image



Q4 difference image. Poor Quality

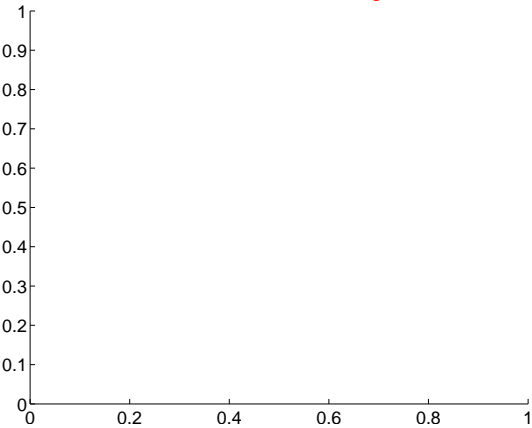


Q4 OOT image

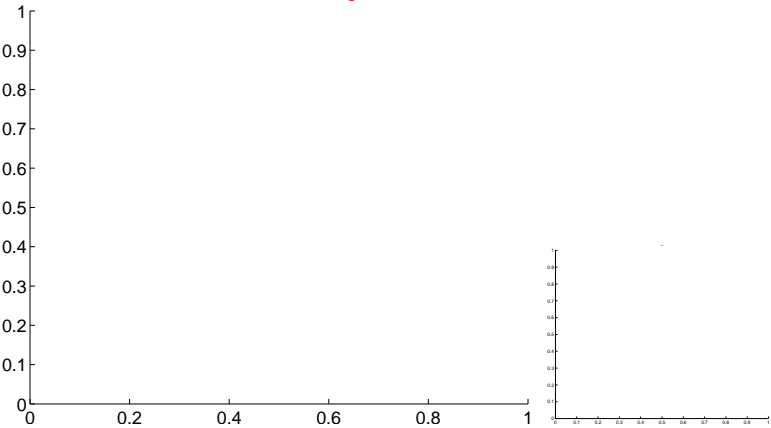


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.

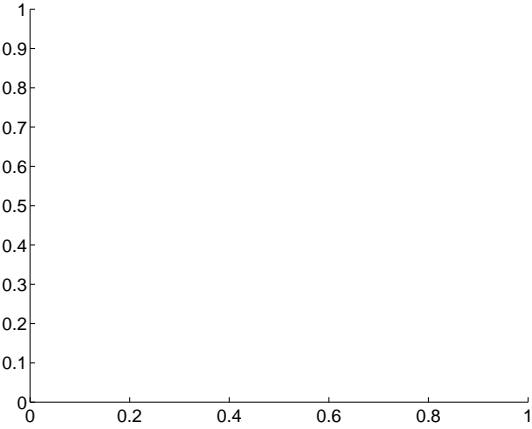
Q5 no difference image



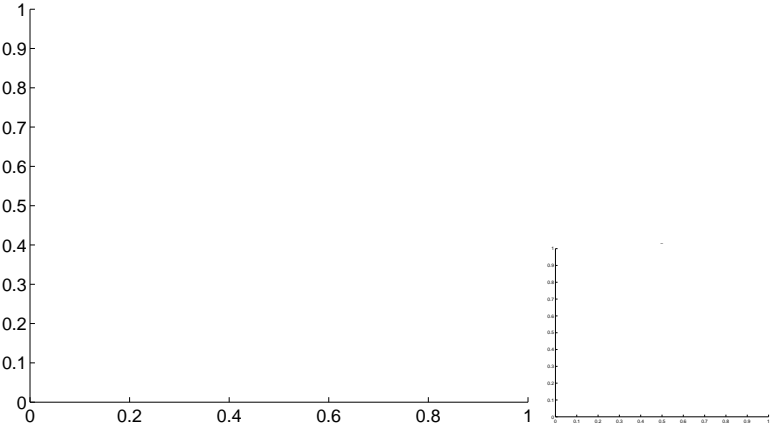
Q5 no OOT image



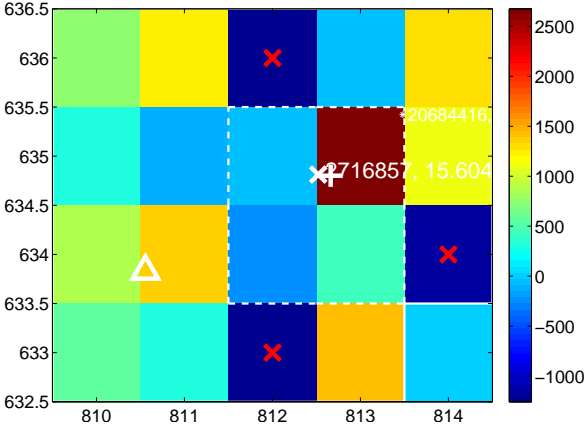
Q6 no difference image



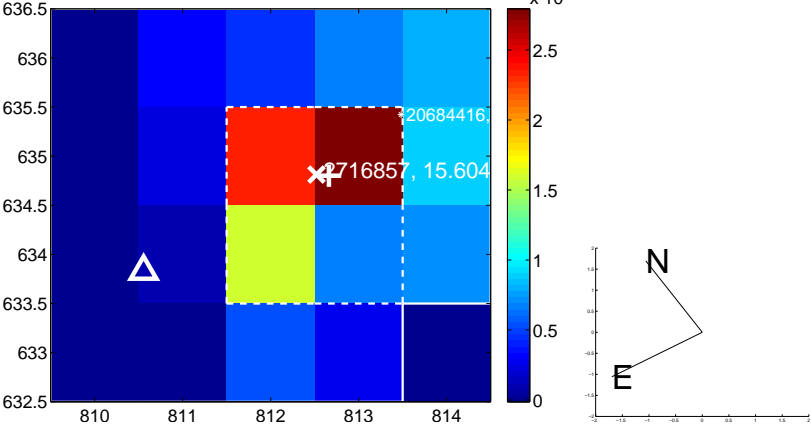
Q6 no OOT image



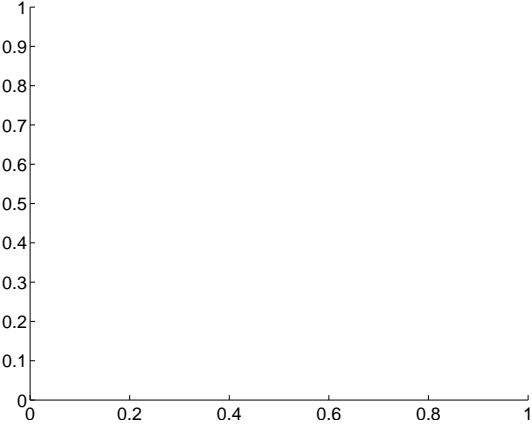
Q7 difference image. Poor Quality



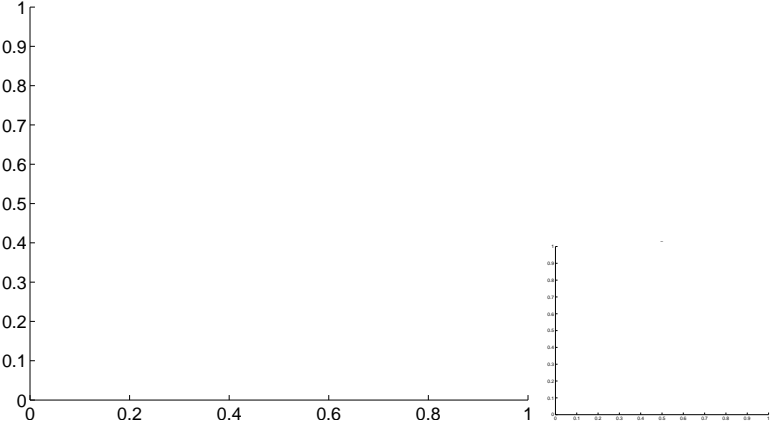
Q7 OOT image



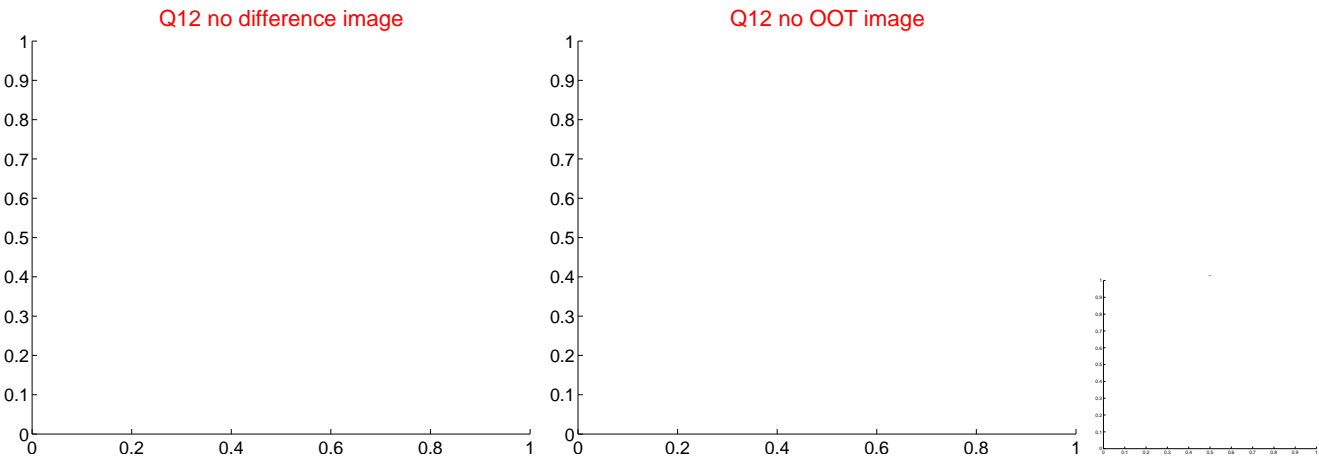
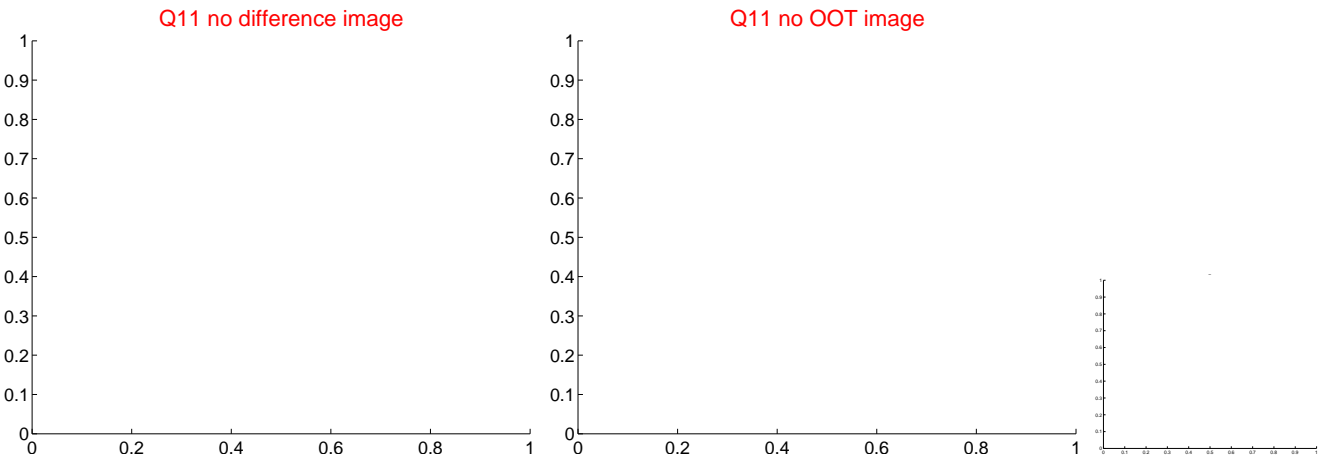
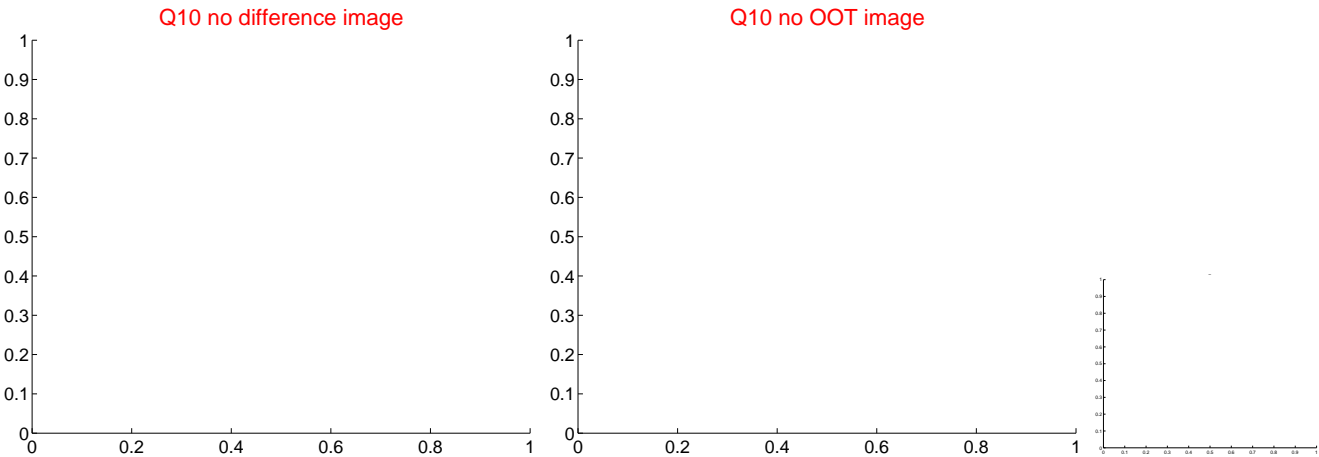
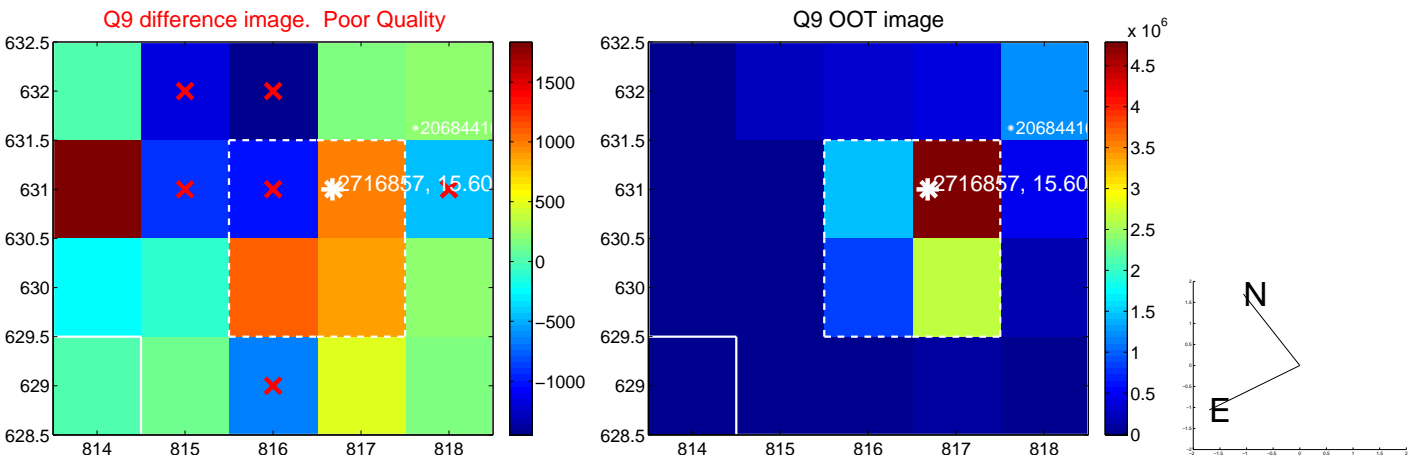
Q8 no difference image



Q8 no OOT image

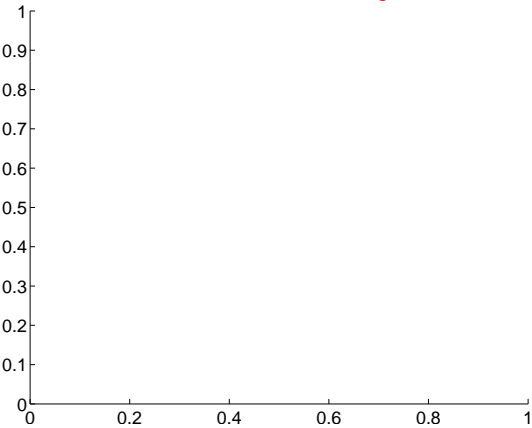


white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.

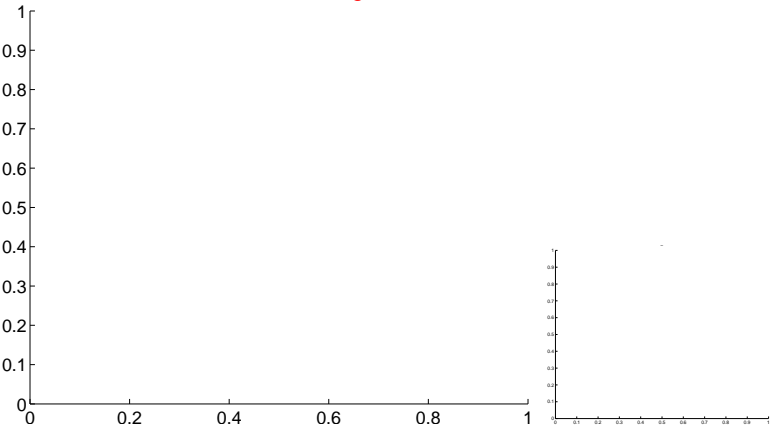


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.

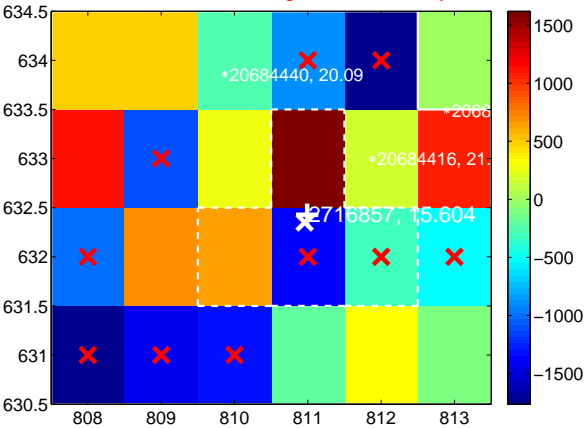
Q13 no difference image



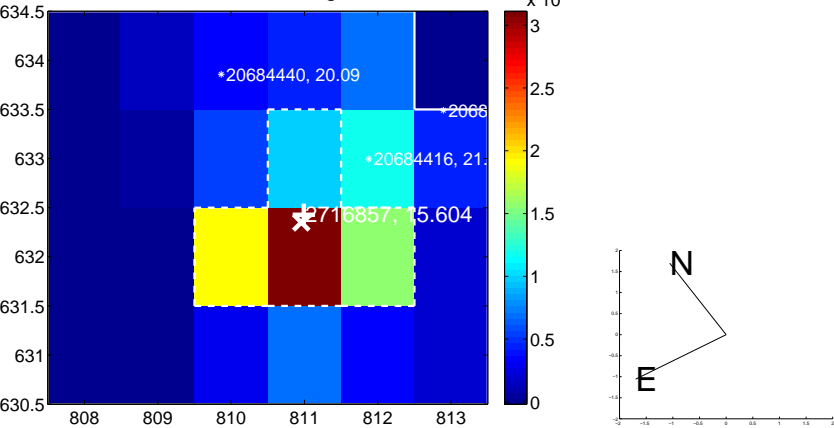
Q13 no OOT image



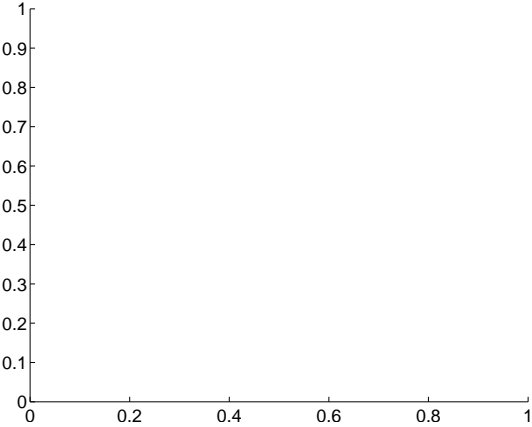
Q14 difference image. Poor Quality



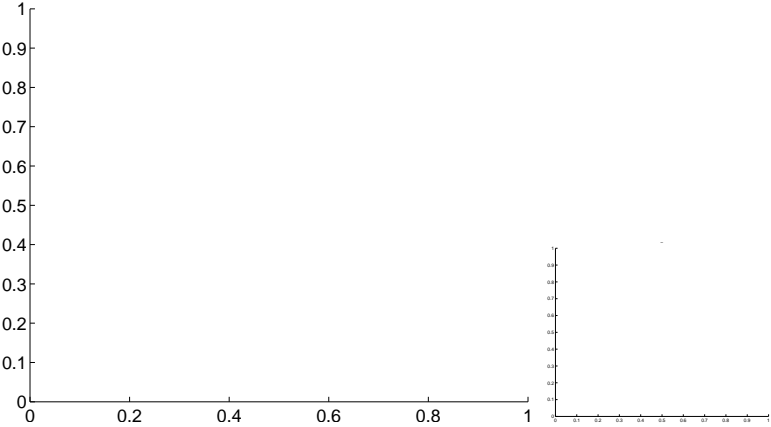
Q14 OOT image



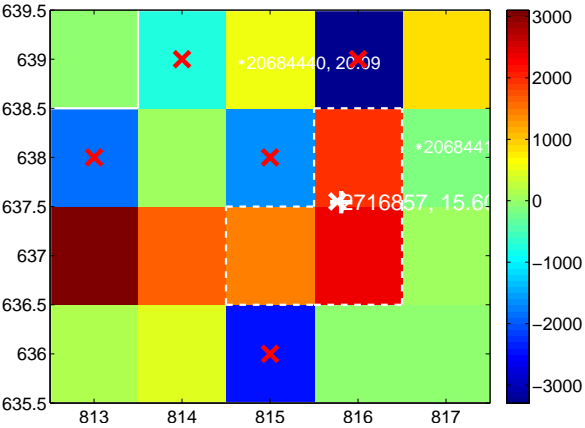
Q15 no difference image



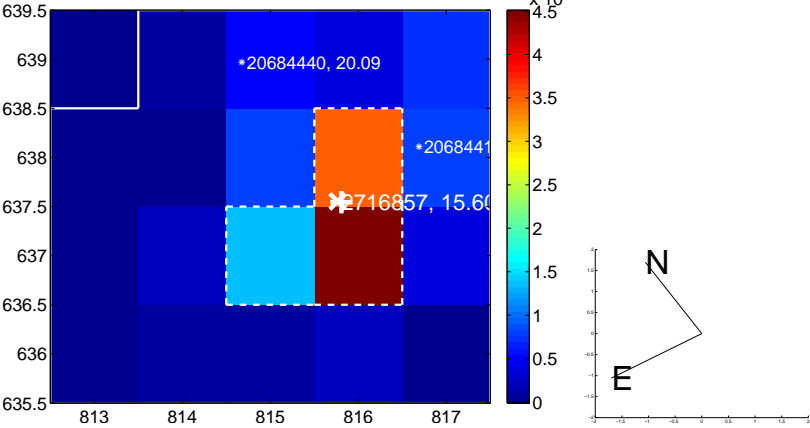
Q15 no OOT image



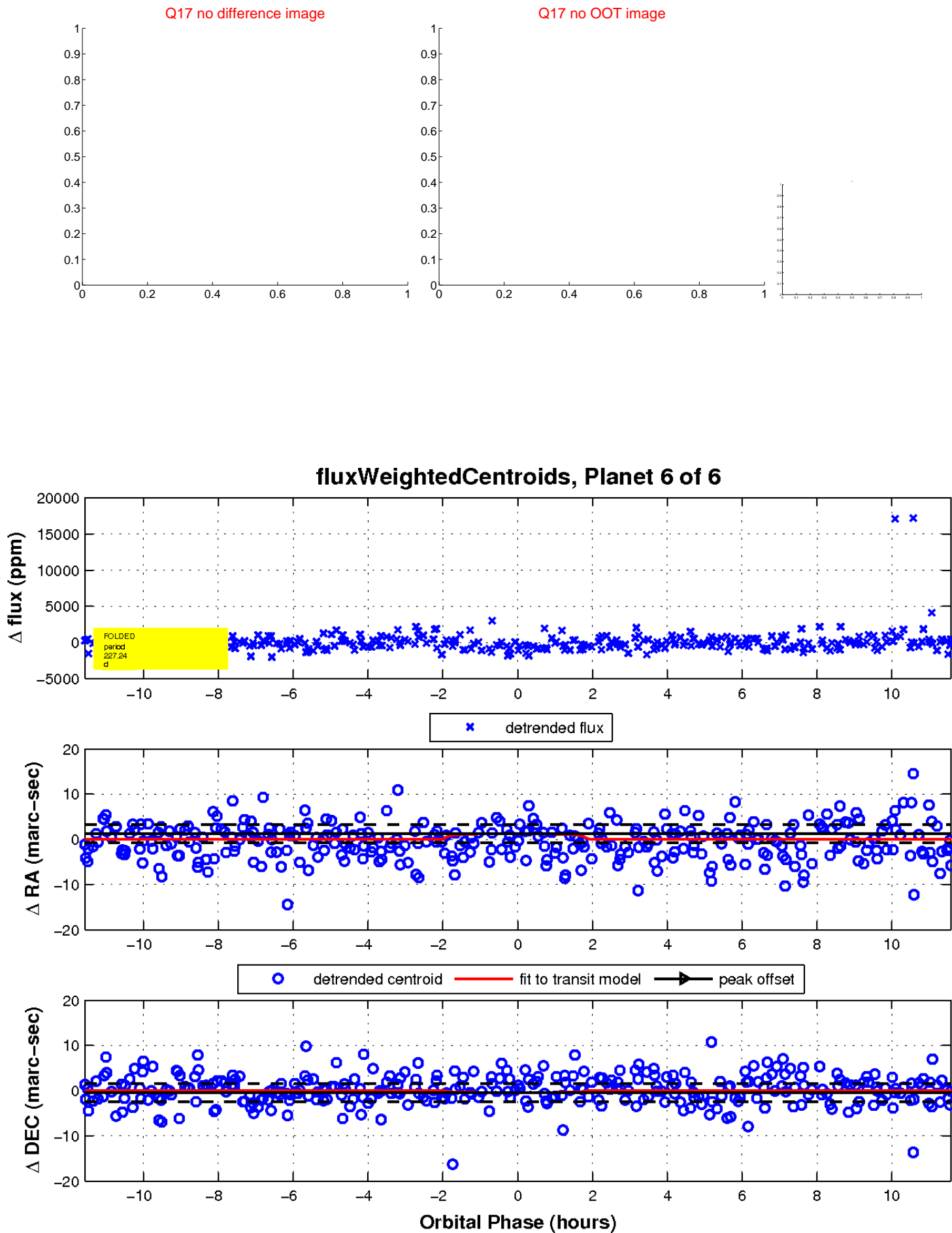
Q16 difference image. Poor Quality



Q16 OOT image



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



UKIRT Image

Declination

