KIC 009220002

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 ($S_\oplus$)
009220002-01	OBS	No	436.550310	386.570460	3029.6	15.981	21.9	8.0	0.75	5364	7.86	0.42
009220002-03	OBS	No	433.263943	563.175136	2690.7	4.767	18.5	12.1	0.75	5364	5.14	0.42
009220002-04	OBS	No	709.889119	144.425004	1682.8	10.500	18.4	-1.0	0.75	5364	3.05	0.22
009220002-05	OBS	No	431.152578	523.443317	1824.3	8.893	16.8	7.9	0.75	5364	3.18	0.43

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009220002-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009220002-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
009220002-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_NOFITS
009220002-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—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.

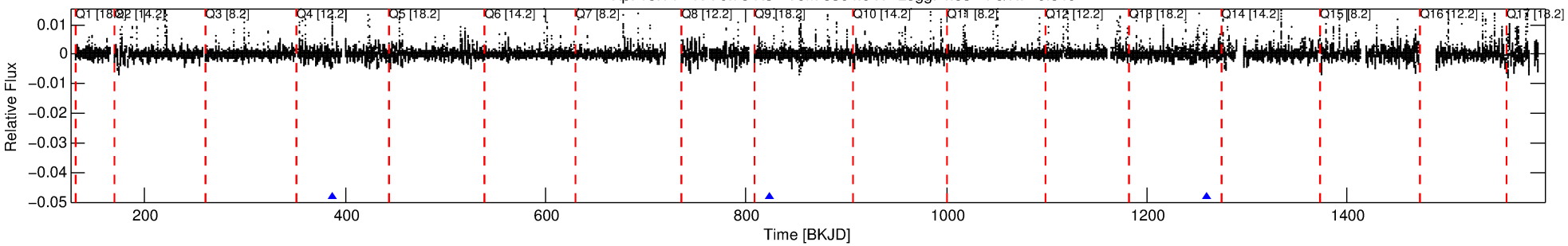
Ephemeris Match Information For 009220002-01

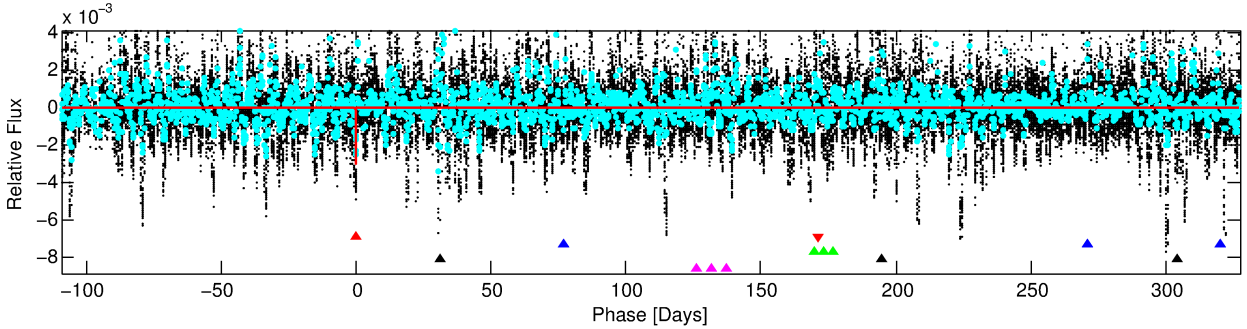
No Significant Match Found

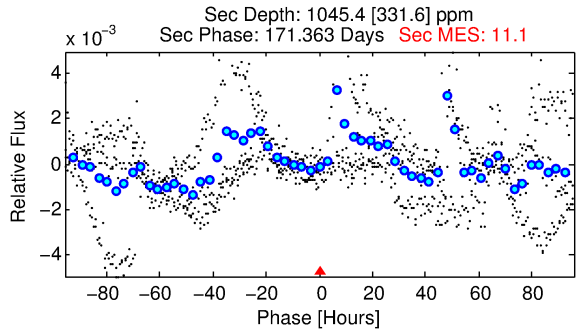
DV One-Page Summary

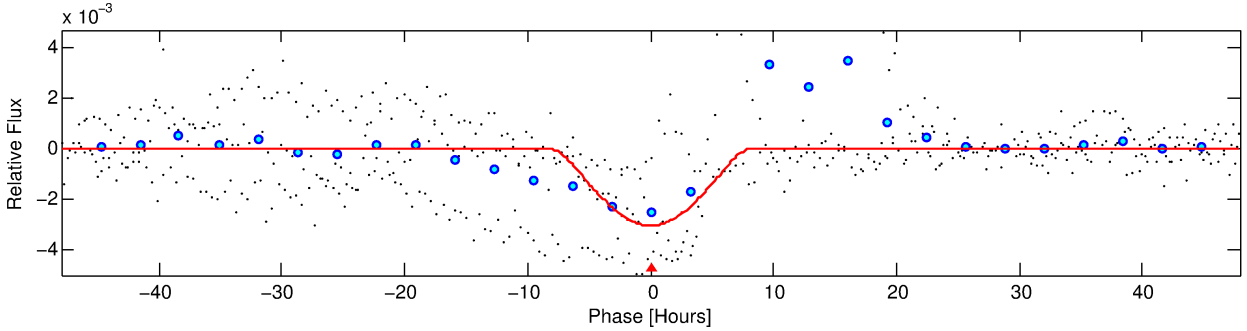
KIC: 9220002 Candidate: 1 of 5 Period: 436.550 d

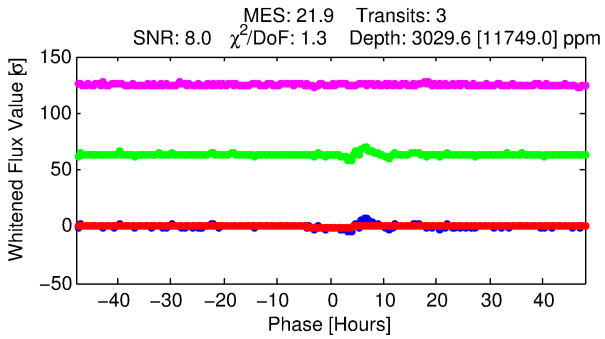
Kp: 15.14 R*: 0.75 Rs Teff: 5364.0 K Logg: 4.53 Fe/H: −0.540

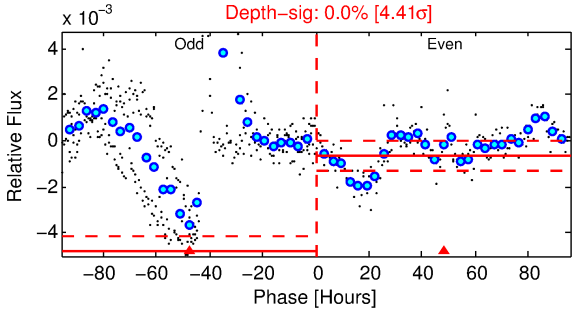


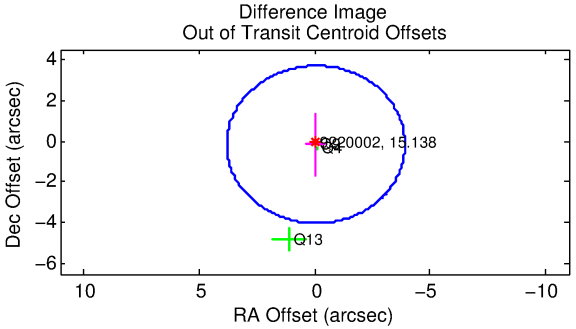












DV Fit Results:

Period = 436.55031 [0.02142] d
Epoch = 386.5705 [0.0270] BKJD
Rp/R* = 0.0955 [0.2089]
a/R* = 93.36 [39.88]
b = 1.00 [0.05]

Seff = 0.42 [0.10]
Teq = 205 [12] K
Rp = 7.86 [17.22] Re
a = 1.0007 [0.1205] AU

Ag = 9327.00 [40946.77] [0.23σ]
Teffp = 3121 [3424] K [0.85σ]

DV Diagnostic Results:

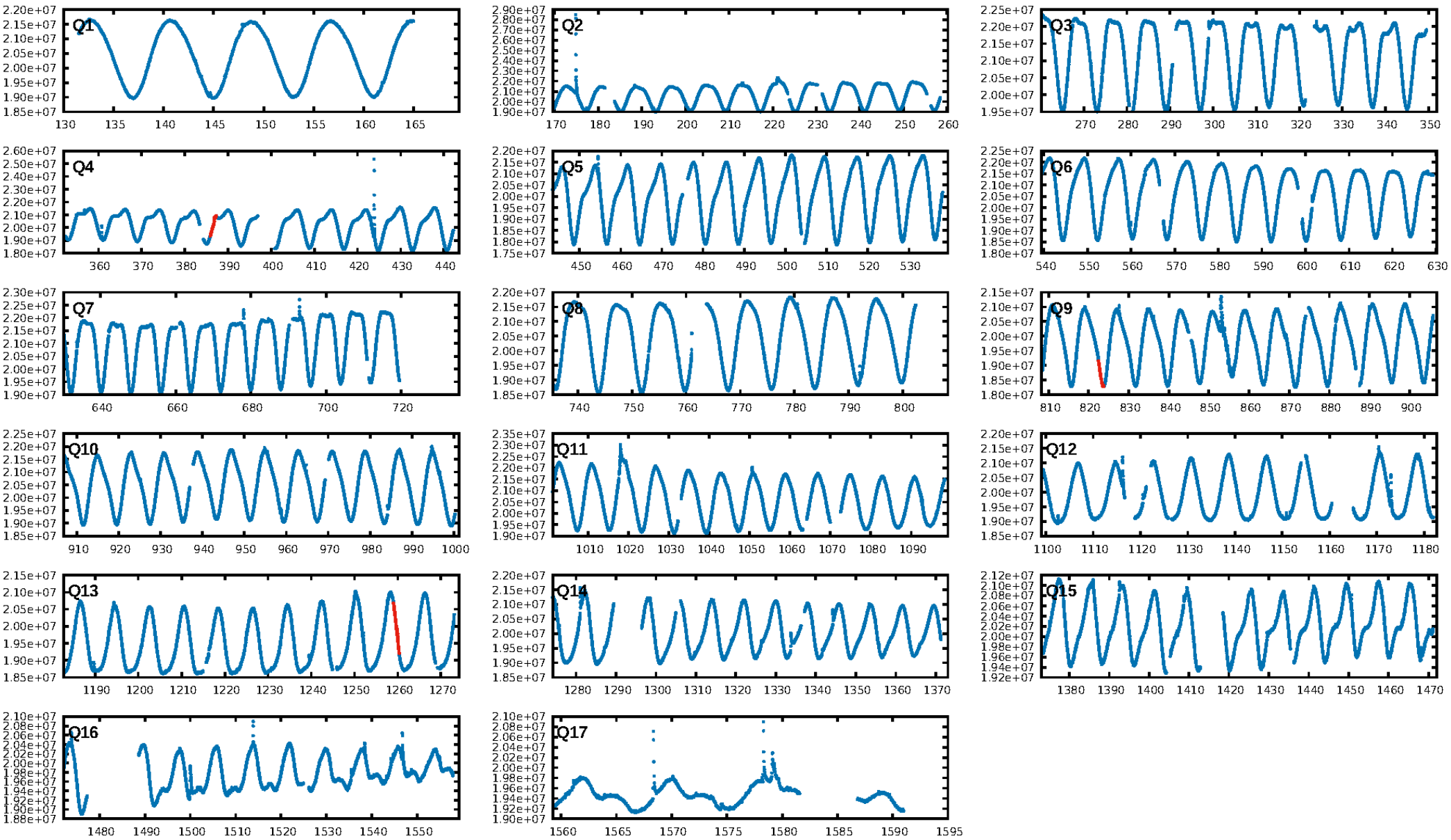
ShortPeriod−sig: 100.0% [4.73σ]
LongPeriod−sig: 100.0% [314.81σ]
ModelChiSquare2−sig: 0.0%
ModelChiSquareGof−sig: 99.2%
Bootstrap−pfa: N/A
RollingBand−fgt: 1.00 [3/3]
GhostDiagnostic−chr: 0.3799

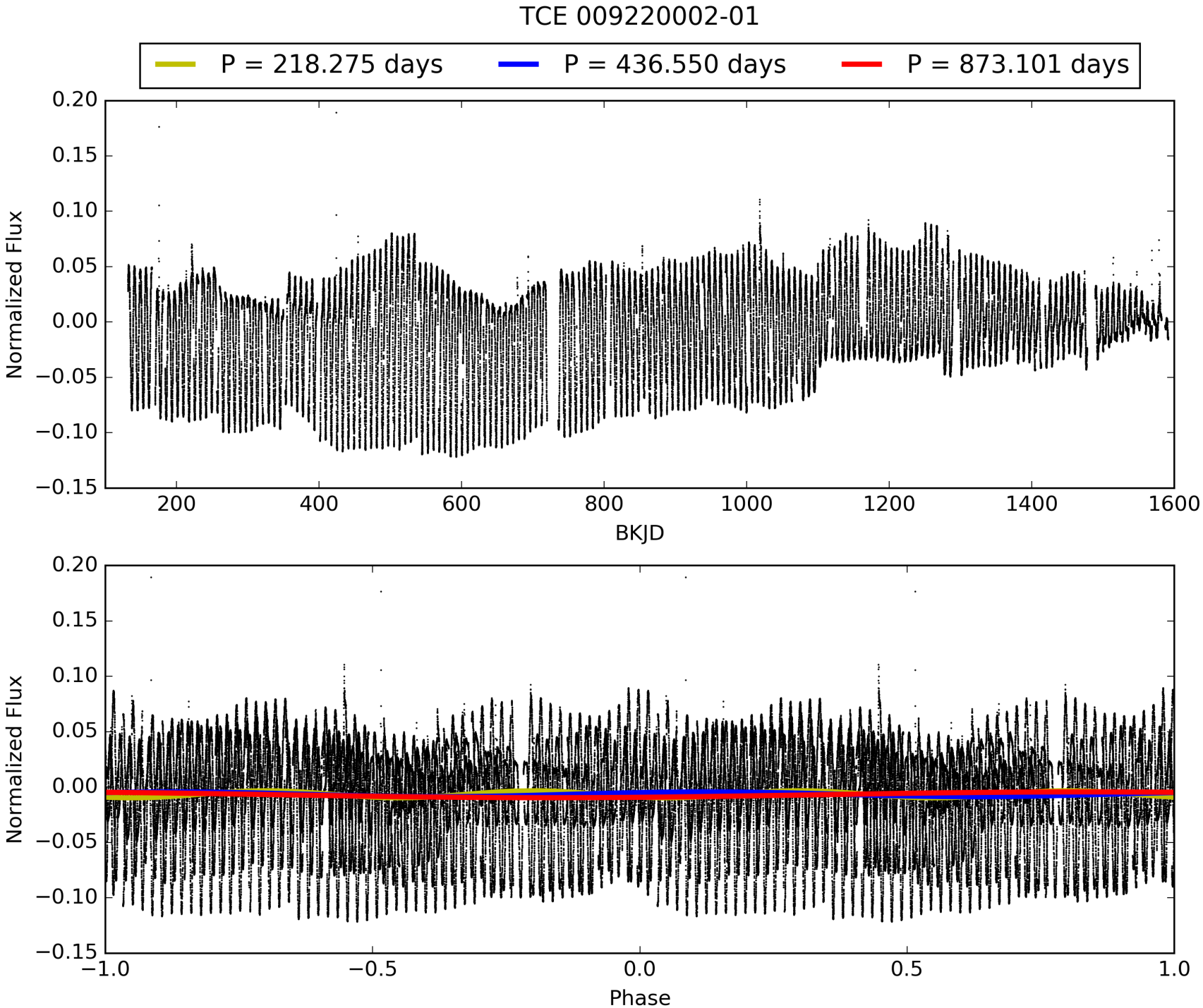
Centroid−sig: N/A
Centroid−so: 0.690 arcsec [1.40σ]
OotOffset−rm: 0.170 arcsec [0.13σ]
KicOffset−rm: 0.204 arcsec [0.83σ]
OotOffset−st: 0/0/1/2 [3]
KicOffset−st: 0/0/1/2 [3]
DiffImageQuality−fgm: 0.33 [1/3]
DiffImageOverlap−fno: 1.00 [3/3]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31−Jan−2016 22:08:46 Z

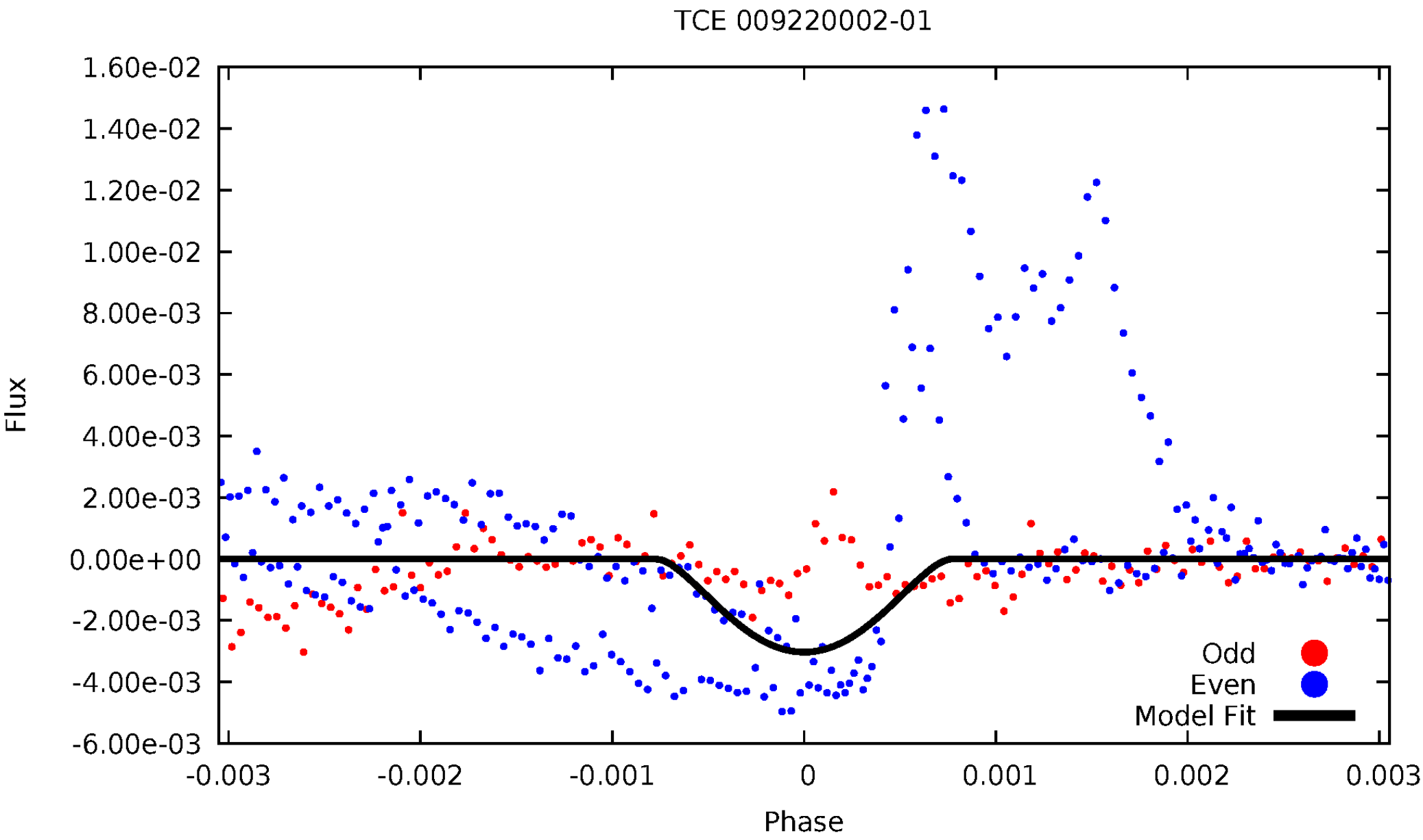
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

TCE 009220002-01, PDC Light Curves




TCE 009220002-01
P = 218.275 days
P = 436.550 days
P = 873.101 days
Normalized Flux
BKJD
Normalized Flux
Phase

DV Odd/Even


TCE 009220002-01
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1.40e-02
1.20e-02
1.00e-02
8.00e-03
6.00e-03
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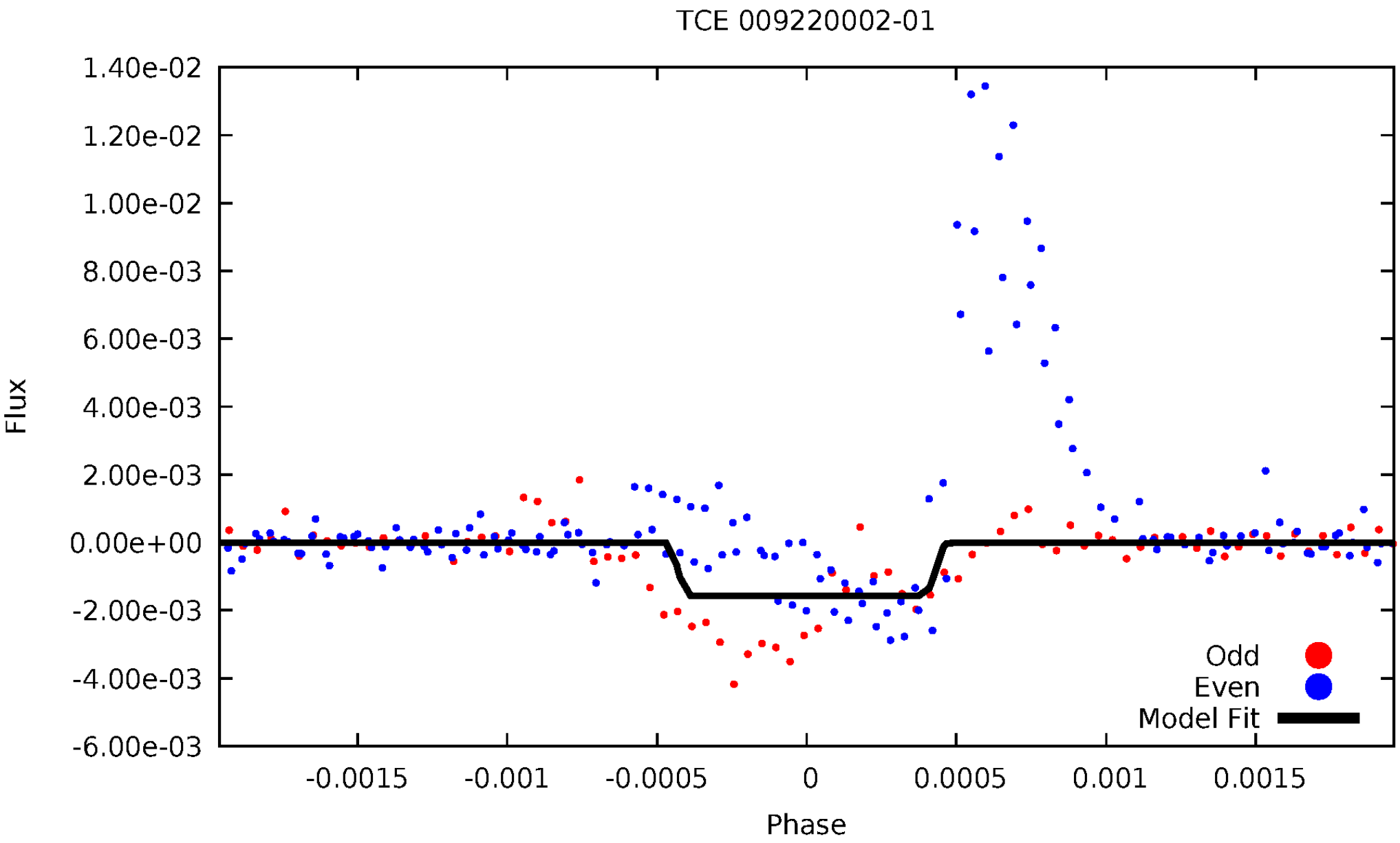
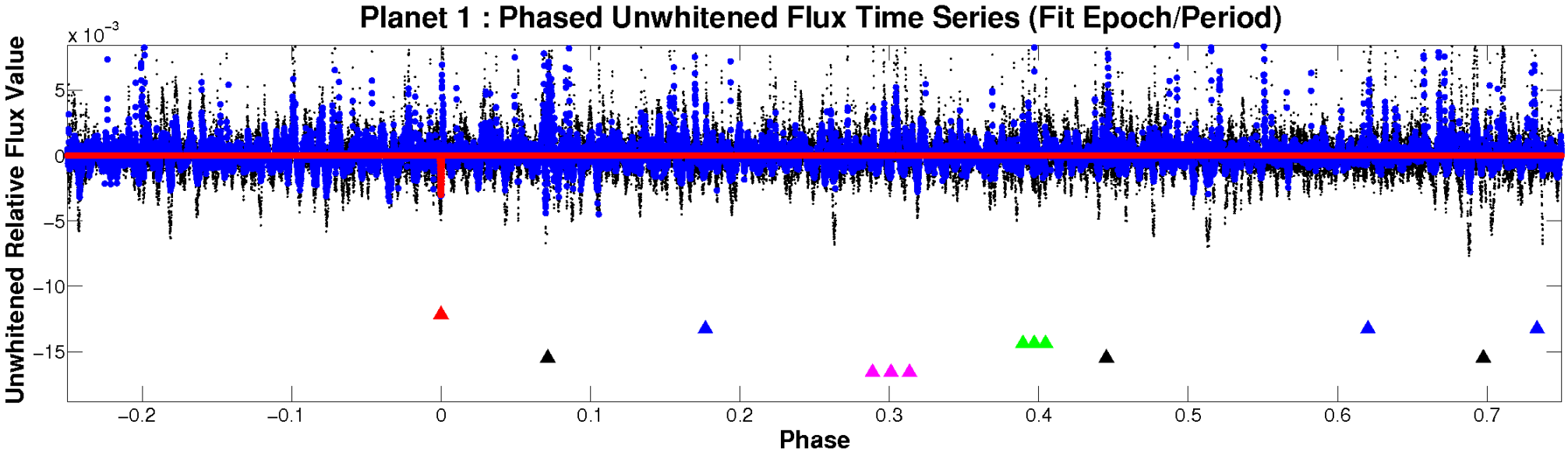
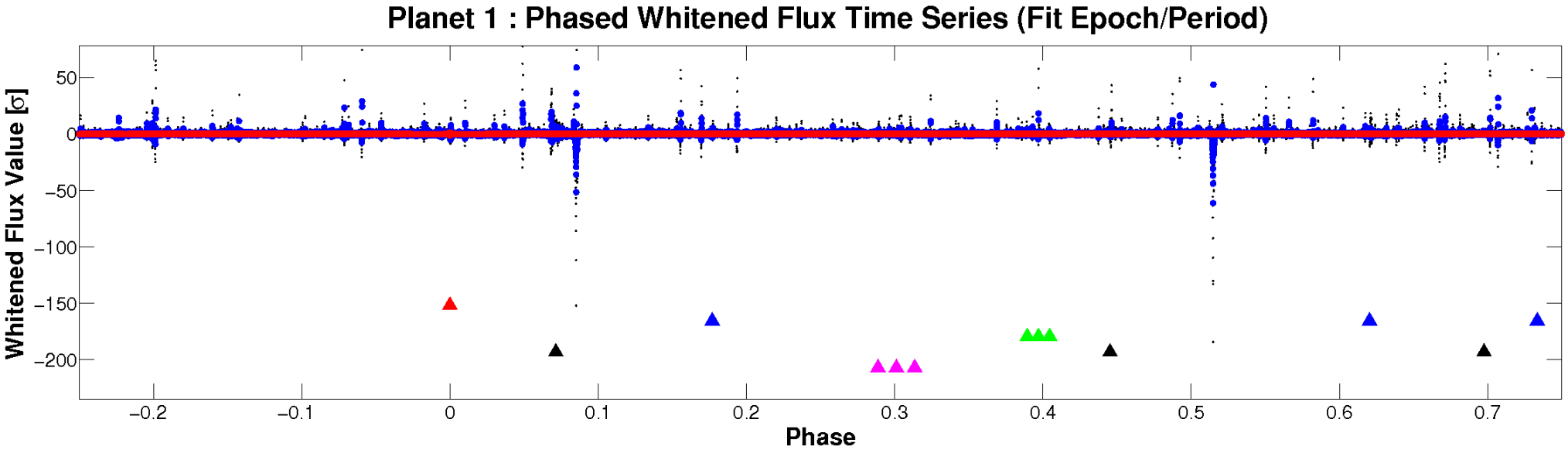
2.00e-03
0.00e+00
-2.00e-03
-4.00e-03
-6.00e-03
Flux
-0.003
-0.002
-0.001
0
0.001
0.002
0.003
Phase
Odd
Even
Model Fit

ALT Odd/Even


TCE 009220002-01
1.40e-02
1.20e-02
1.00e-02
8.00e-03
6.00e-03
4.00e-03
2.00e-03
0.00e+00
-2.00e-03
-4.00e-03
-6.00e-03
Flux
-0.0015
-0.001
-0.0005
0
0.0005
0.001
0.0015
Phase
Odd
Even
Model Fit

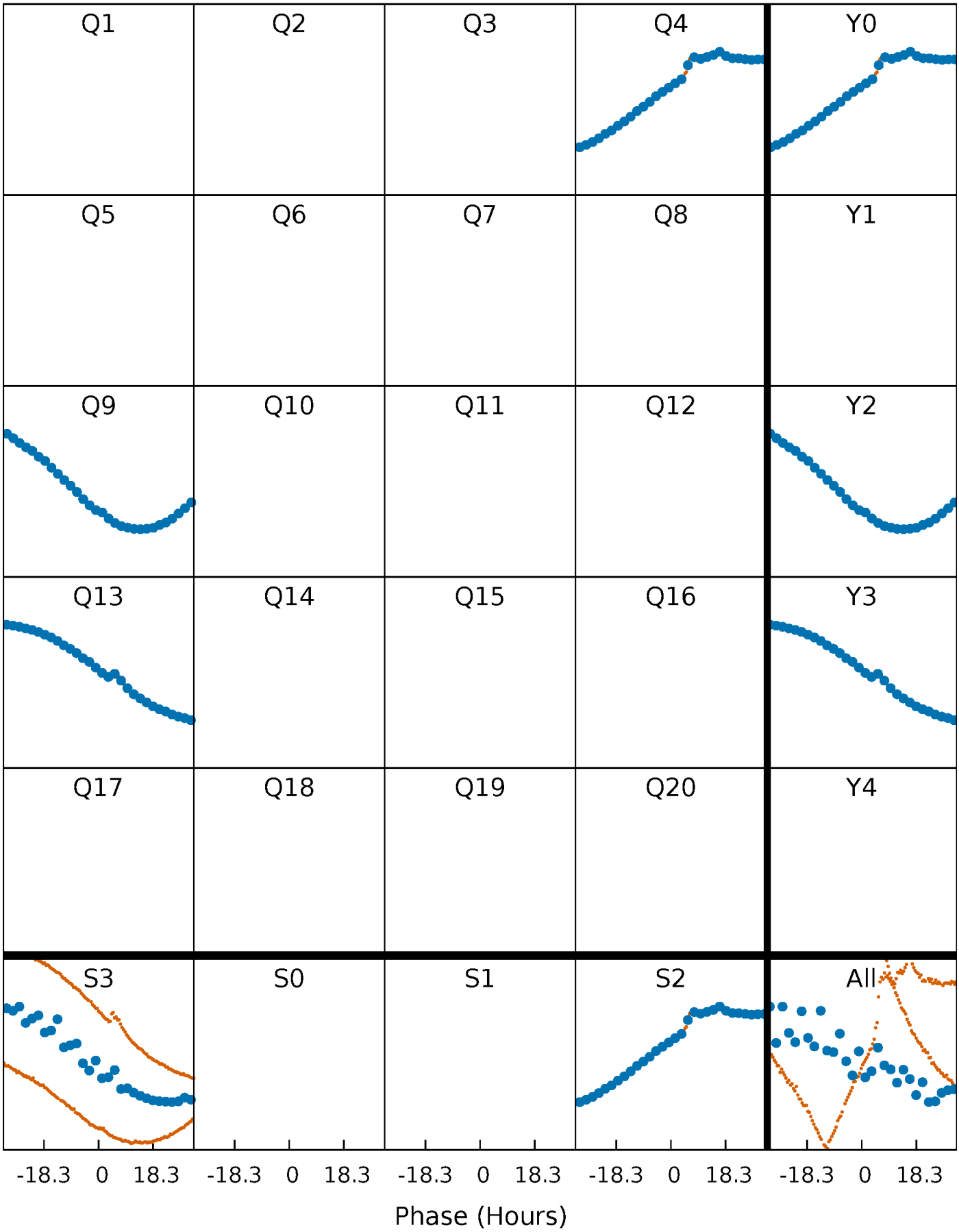
Non-Whitened Vs. Whitened Light Curve





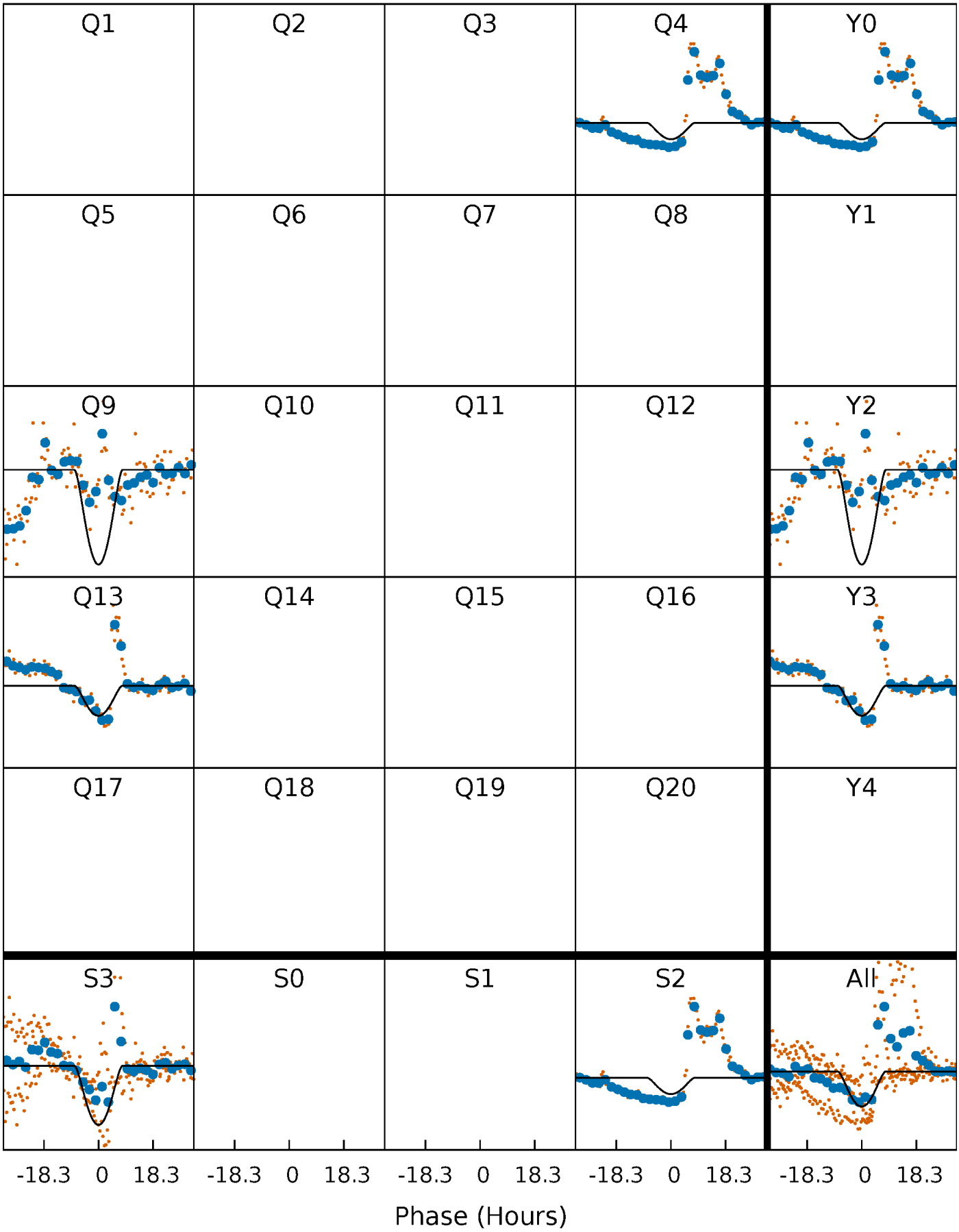
PDC Quarter-Phased Transit Curves

TCE 009220002-01 P=436.550310 Days T_0=386.570460 (BKJD)



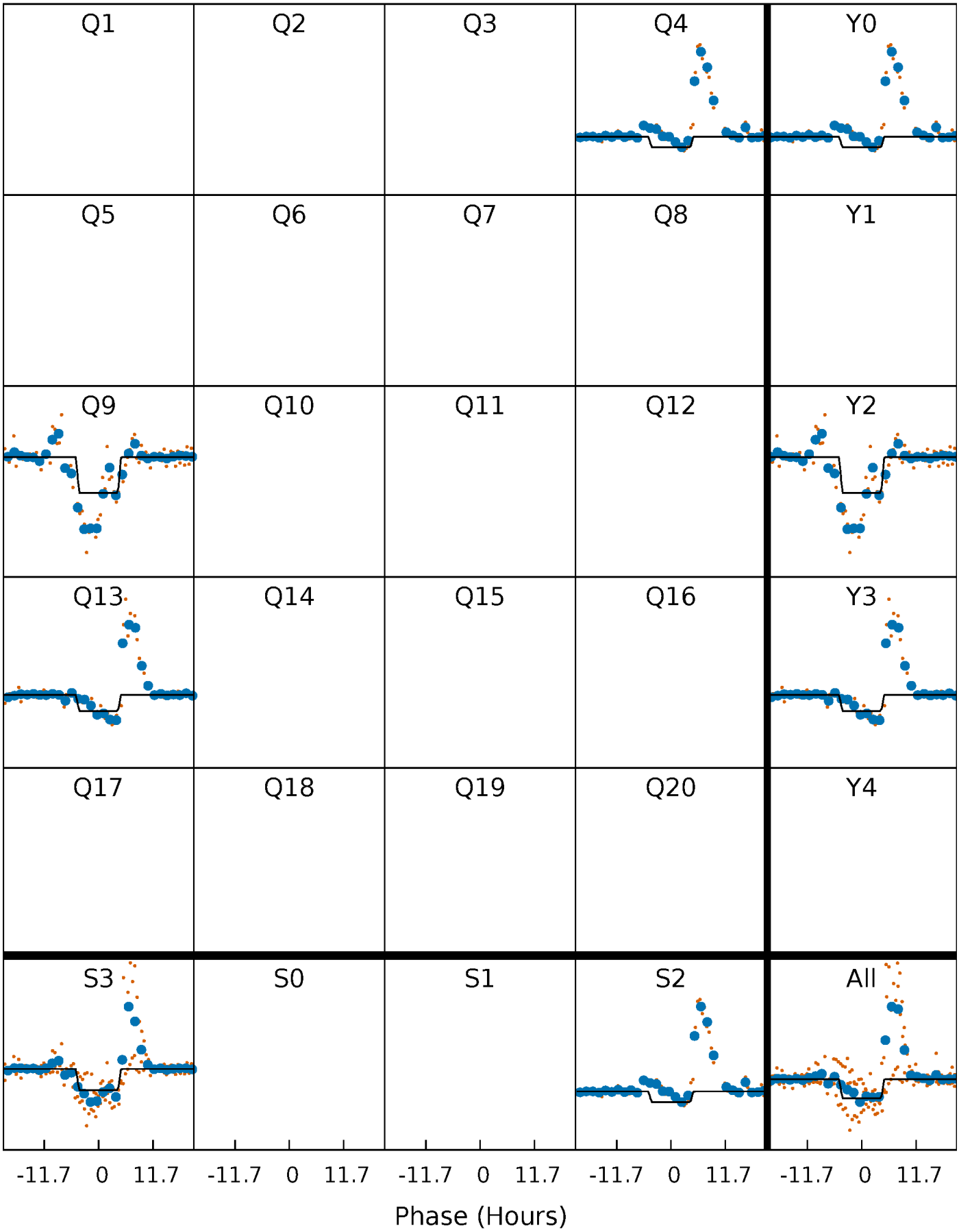
DV Quarter-Phased Transit Curves

TCE 009220002-01 P=436.550310 Days T_0=386.570460 (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

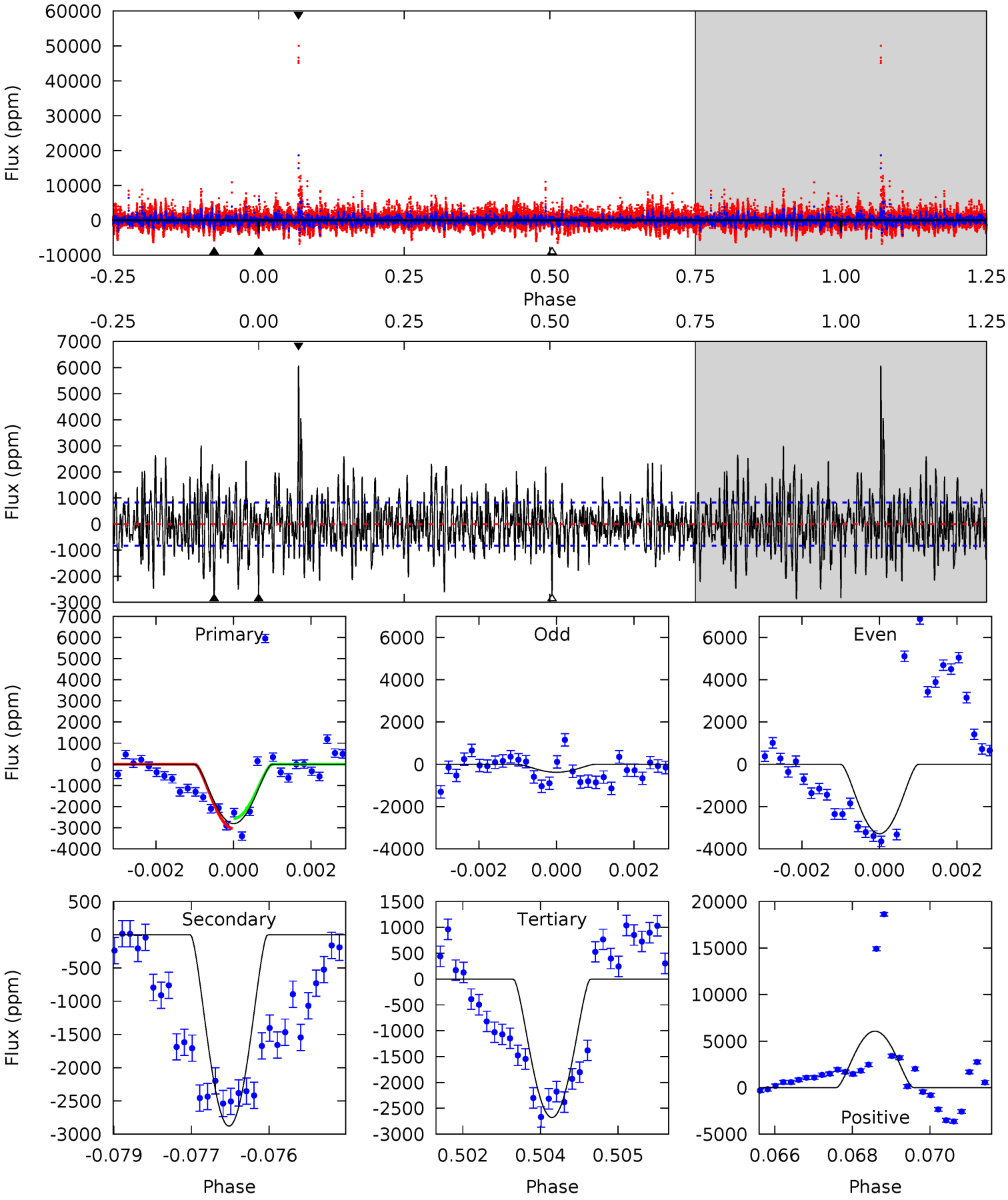
TCE 009220002-01 P=436.522142 Days T_0=386.587489 (BKJD)



DV Model-Shift Uniqueness Test

009220002-01, P = 436.550310 Days, E = 386.570460 Days

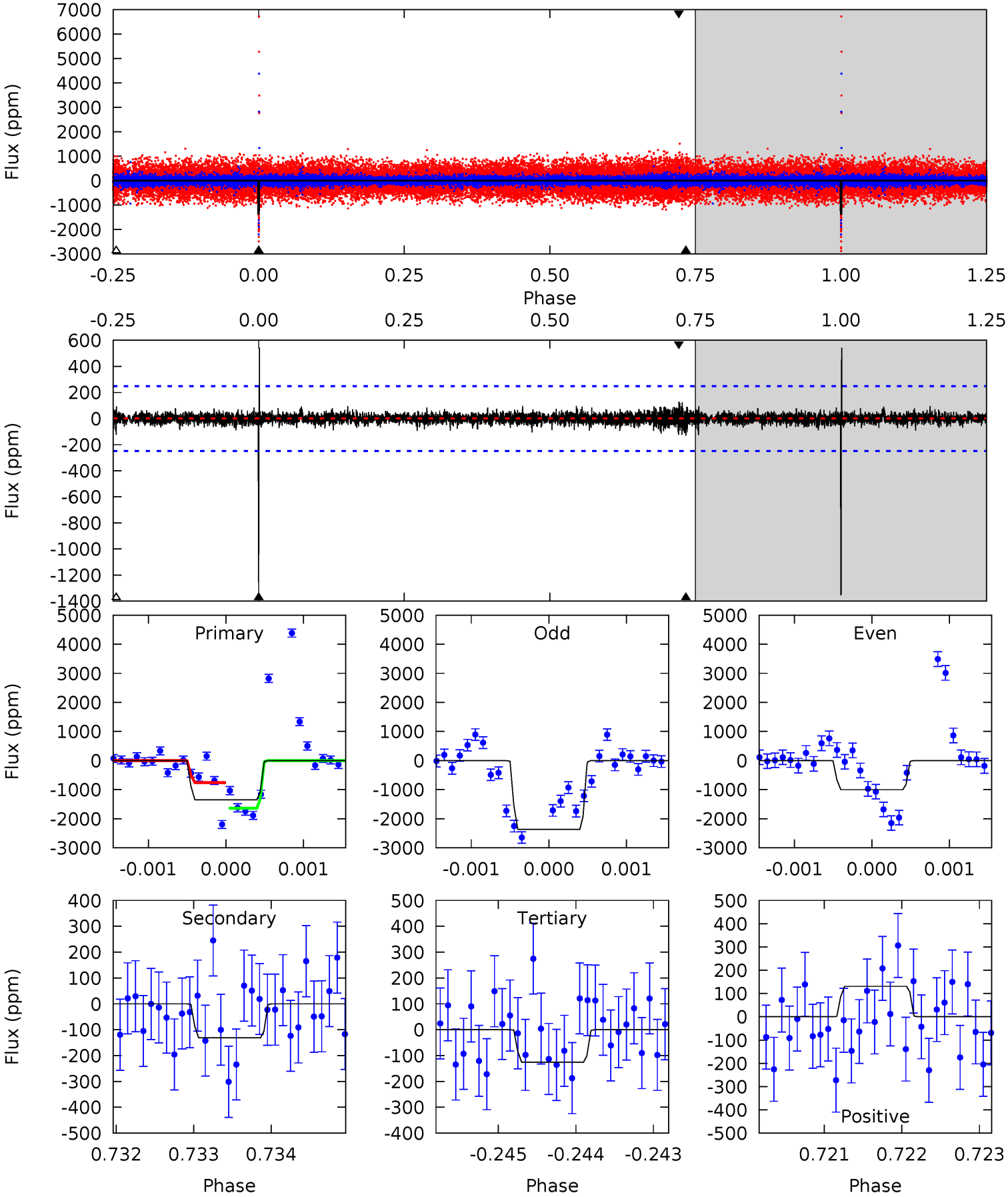
Pri	Sec	Ter	Pos	FA_1	FA_2	F_{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
18.3	18.7	17.4	39.5	5.37	3.17	5.24	0.84	-21.2	1.31	-20.8	7.07	1.05	0.68	1.59



Alt Model-Shift Uniqueness Test

009220002-01, P = 436.522142 Days, E = 386.587489 Days

Pri	Sec	Ter	Pos	FA_1	FA_2	F_{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
29.7	2.88	2.76	2.88	5.46	3.31	0.54	26.9	26.8	0.12	0.00	17.3	0.83	0.29	9.32



Stellar Parameters For KIC 009220002

	$T_{\rm eff}(K)$	$\log(g)$	[Fe/H]	R ($R_\odot$)	$M(M_\odot)$	$p_\star$ (g·cm^{-3})
	5364^{+177}_{-177}	$4.529^{+0.104}_{-0.095}$	$-0.540^{+0.350}_{-0.300}$	$0.754^{+0.102}_{-0.092}$	$0.702^{+0.100}_{-0.036}$	$2.302^{+1.059}_{-0.612}$
	+3%/-3%	+2%/-2%	+65%/-56%	+14%/-12%	+14%/-5%	+46%/-27%
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 009220002-01 / KOI

Detrend	Depth (ppm)	R_p ($R_\oplus$)	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-2879±154	$15.34^{+15.15}_{-10.23}$	287^{+14}_{-14}	3383^{+1663}_{-602}	6836^{+56278}_{-5077}
Alt.	-131±45	$12.14^{+13.97}_{-8.05}$	287^{+14}_{-14}	2353^{+739}_{-355}	454^{+3268}_{-355}

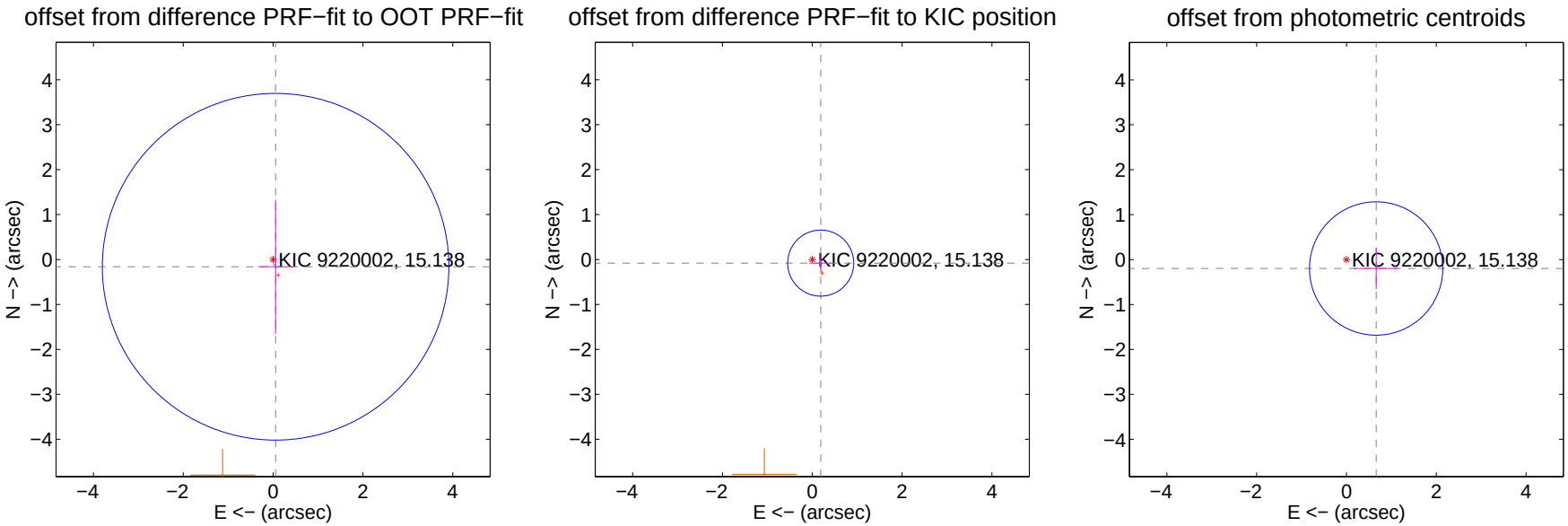
T_{max} = Theoretical Maximum Planetary Temperature
T_{obs} = Observed Planetary Temperature (Assuming A=0.3)
A_{obs} = Observed Albedo (Assuming T=0)

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

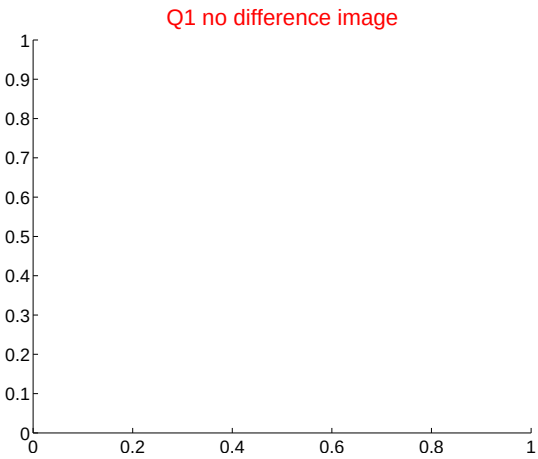
Supplemental centroid analysis for 009220002-01. Kepler magnitude: 15.14. Transit SNR 8.02
There are 1 quarters with good PRF difference image offsets
The direct PRF centroid is offset from the target star catalog position by about 0.06 arcsec

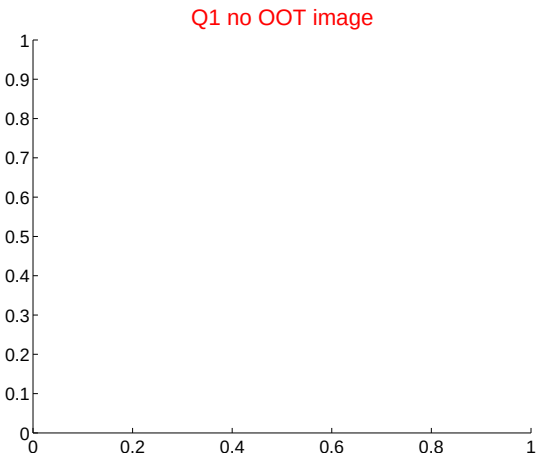
	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.170 ± 1.286	0.13	-0.056 ± 0.389	-0.161 ± 1.492
PRF-fit source offset from KIC position	0.204 ± 0.245	0.83	-0.188 ± 0.251	-0.080 ± 0.206
photometric centroid source offset	0.69 ± 0.49	1.40	-0.66 ± 0.50	-0.20 ± 0.46

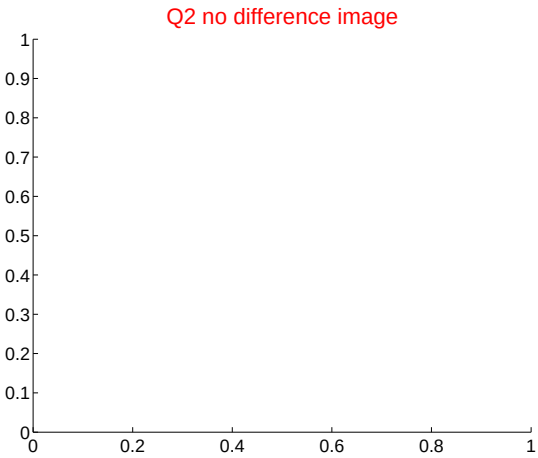


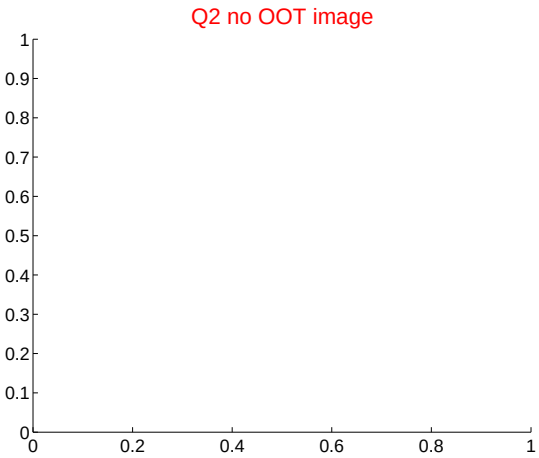
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one-σ uncertainty. Blue circle: three-σ. Red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

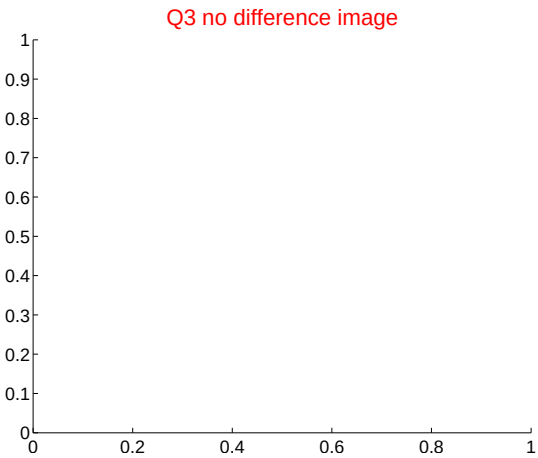
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.

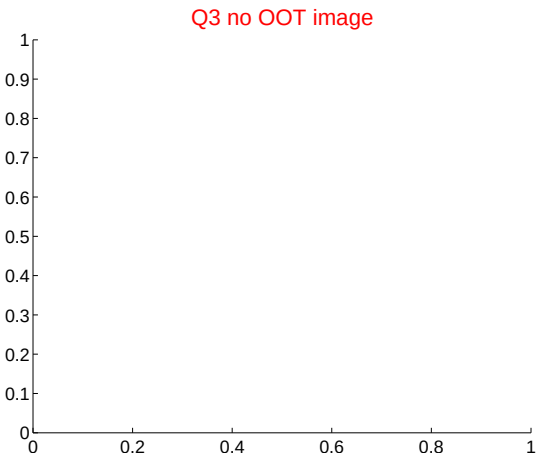


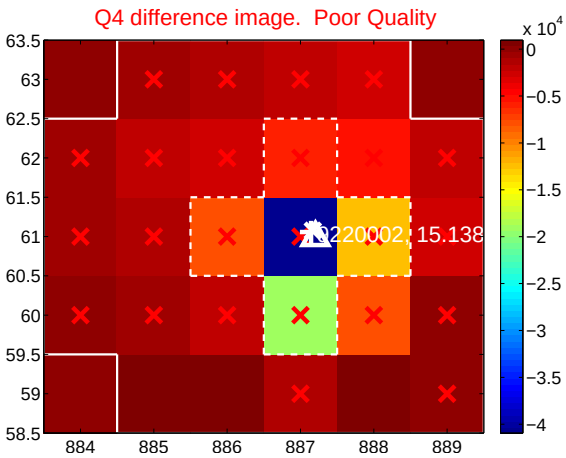


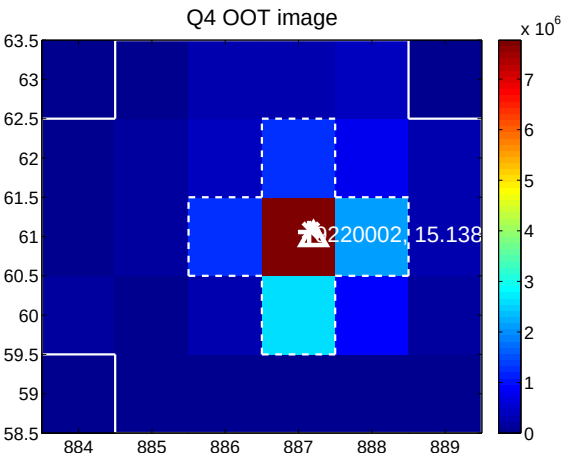


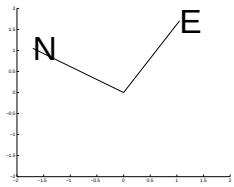




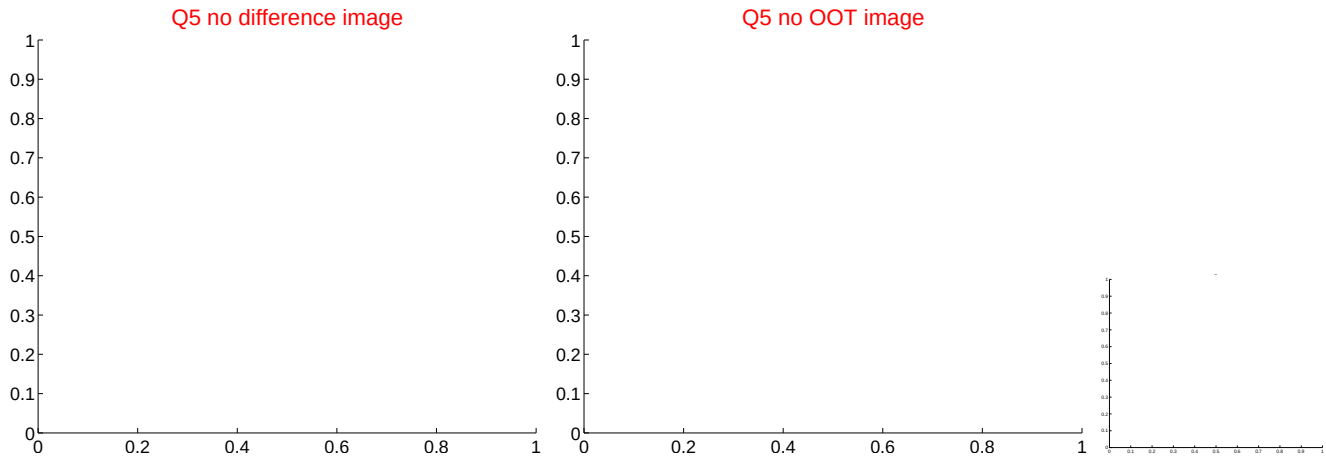


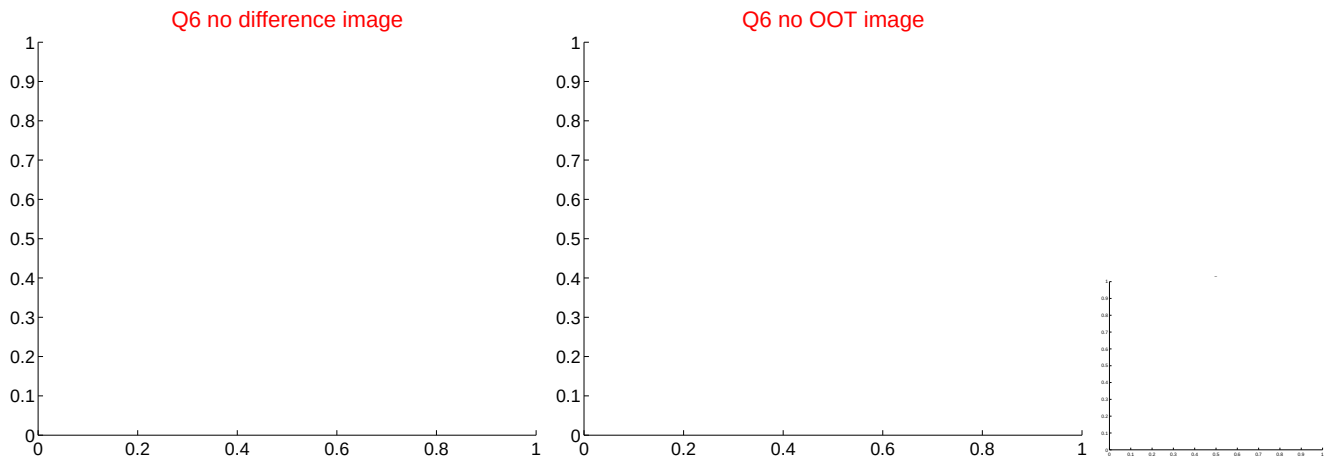


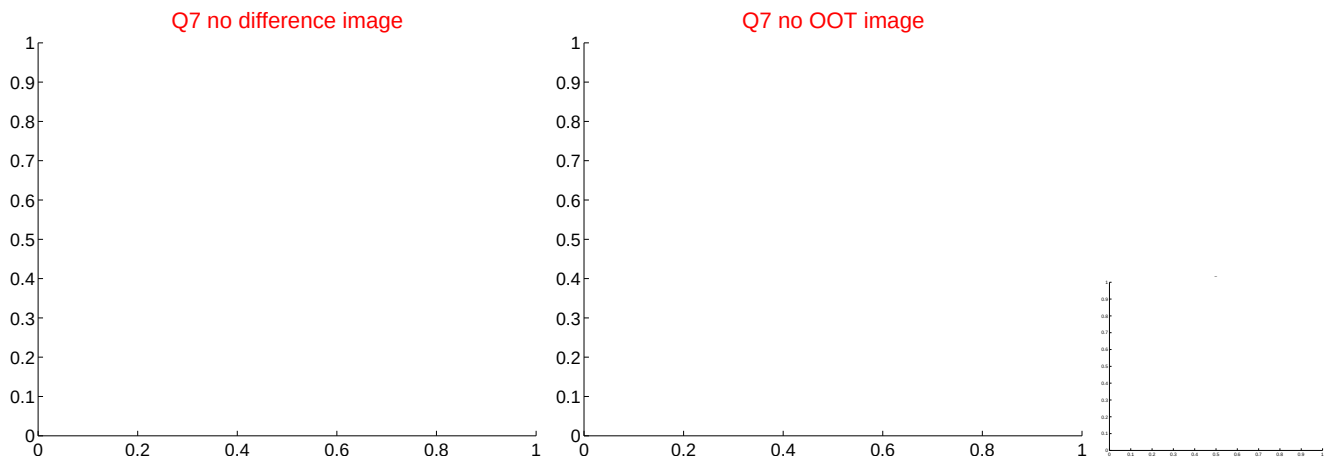


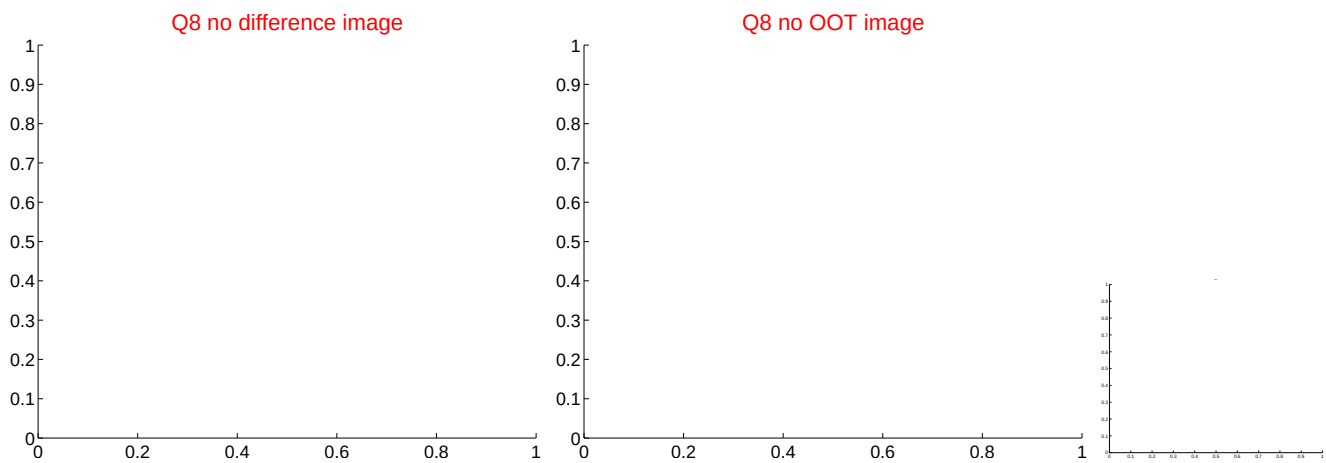


white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.

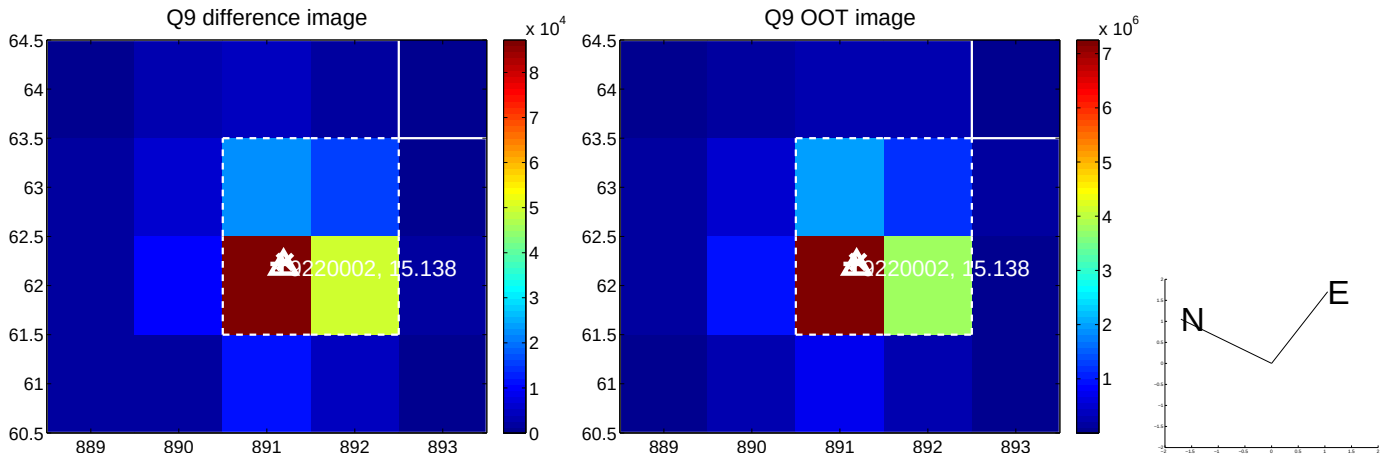


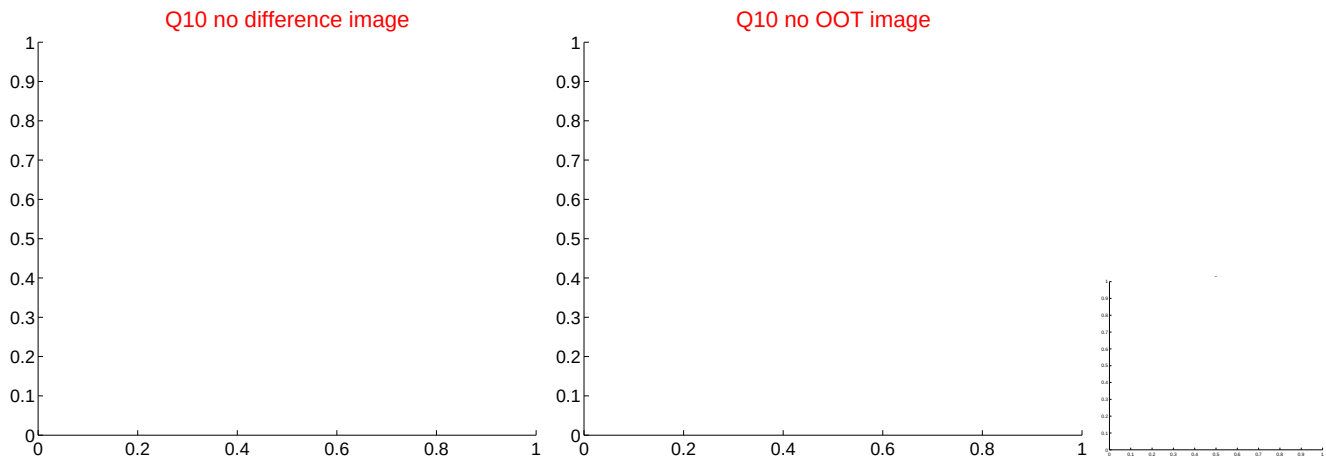


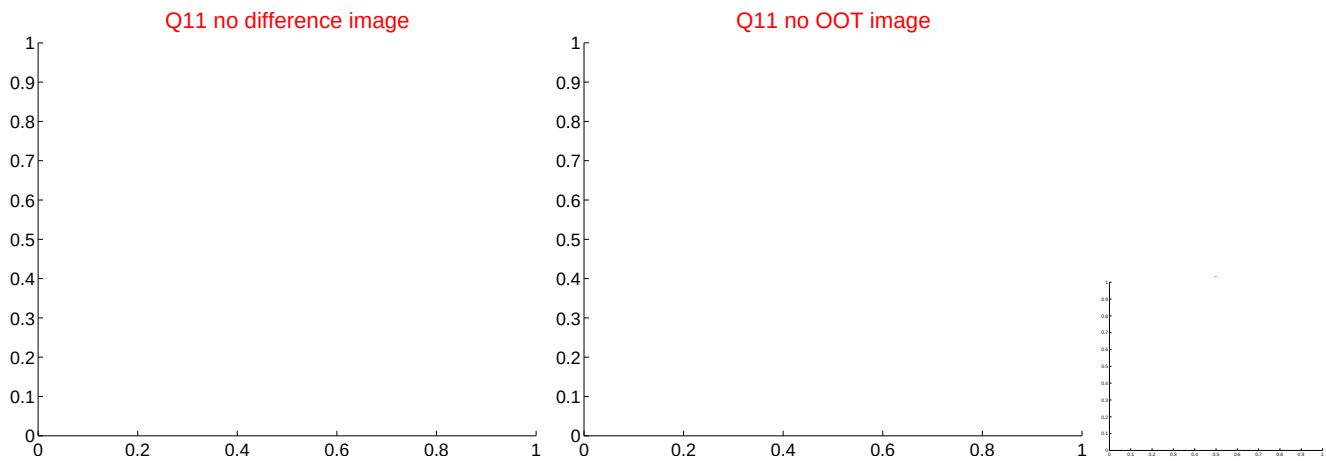


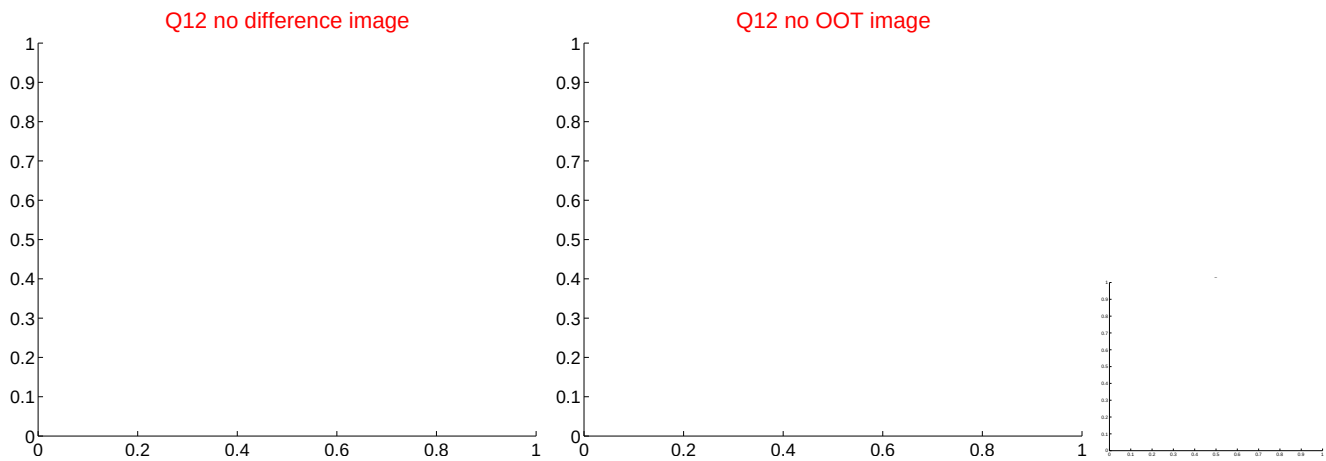


white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.

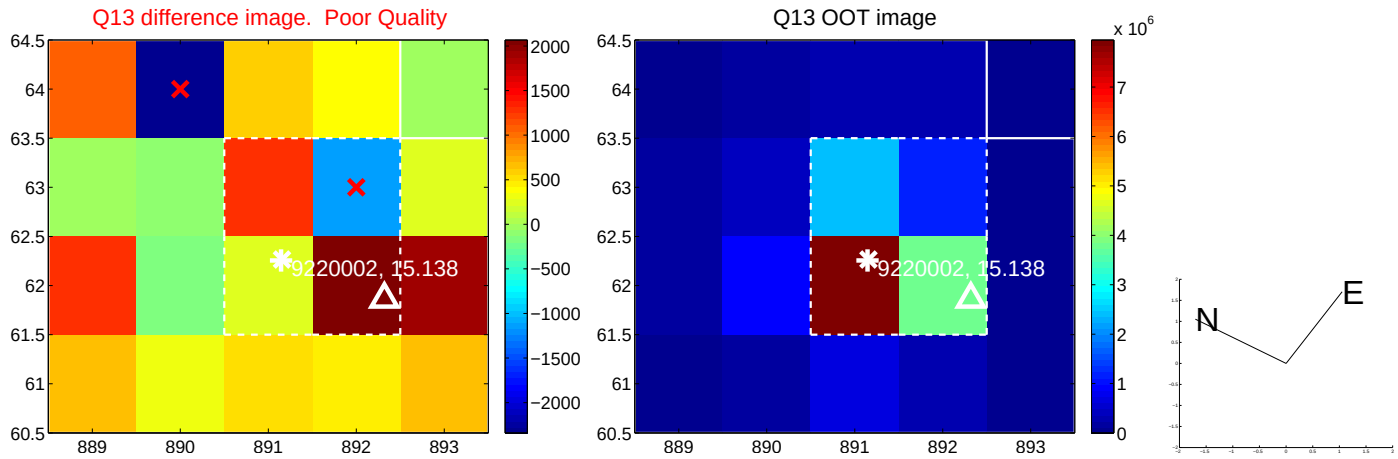


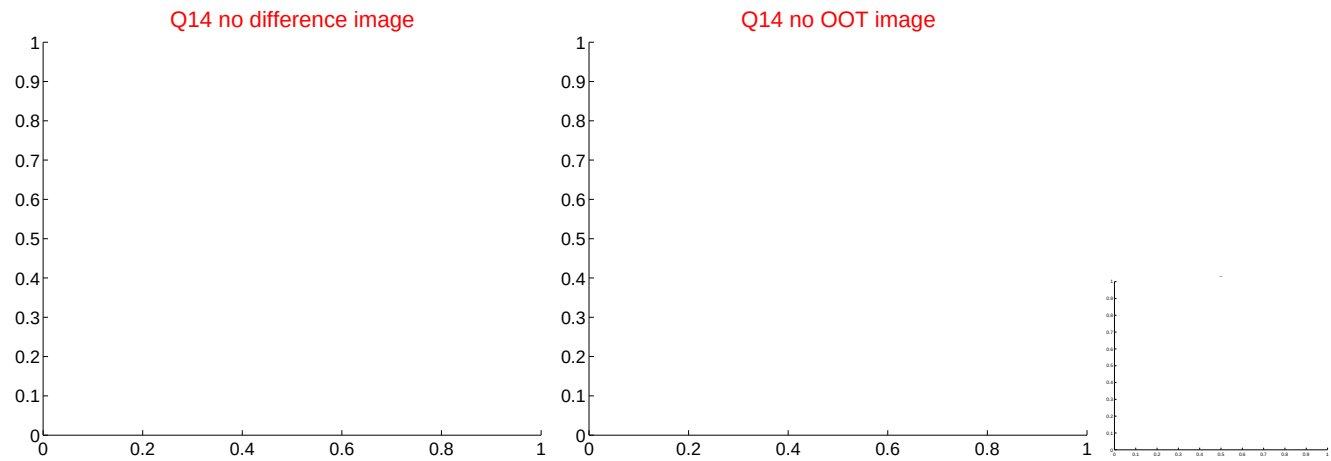


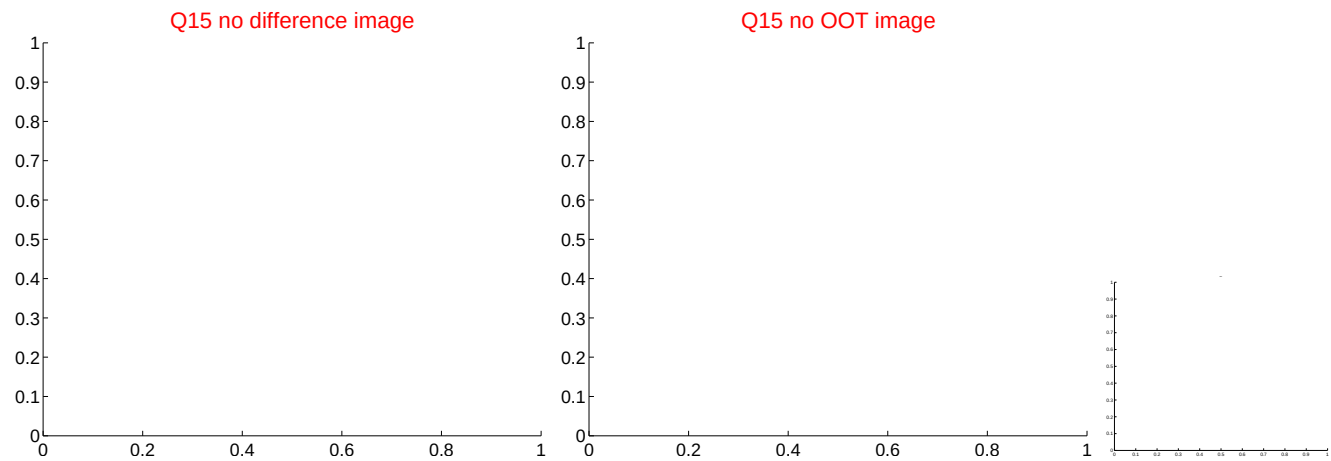


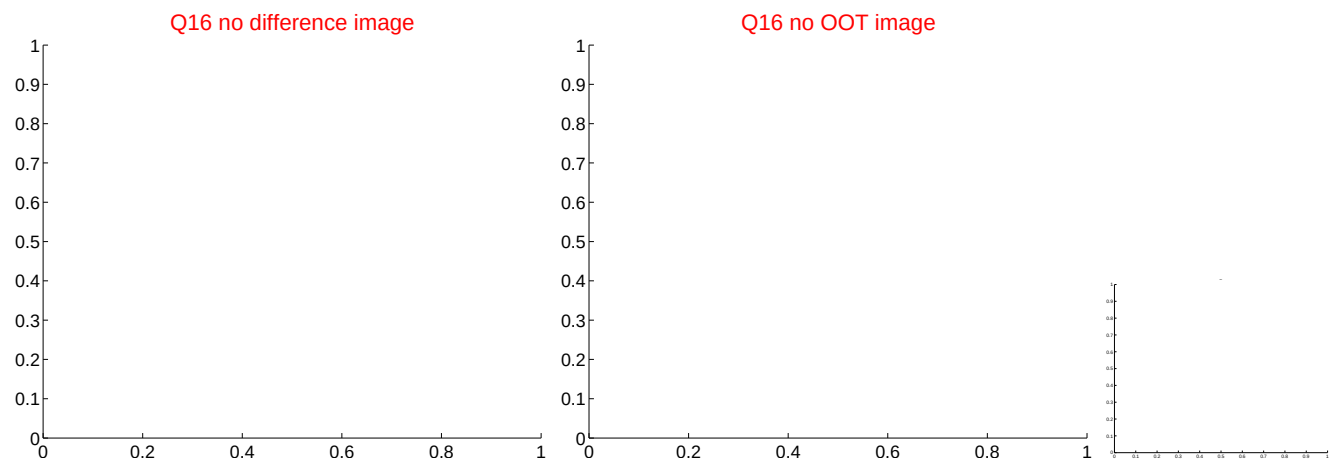


white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.

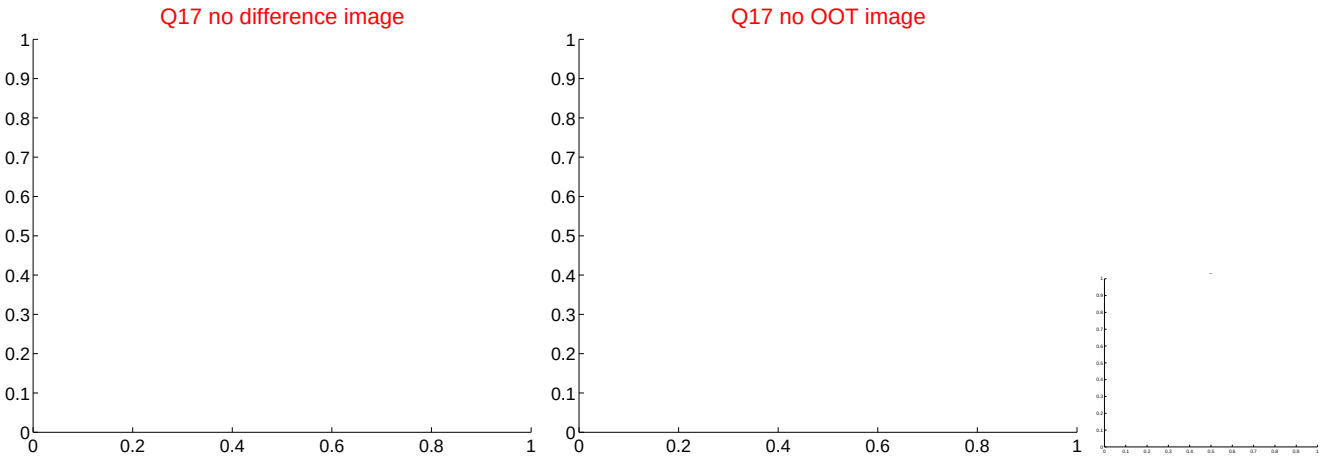


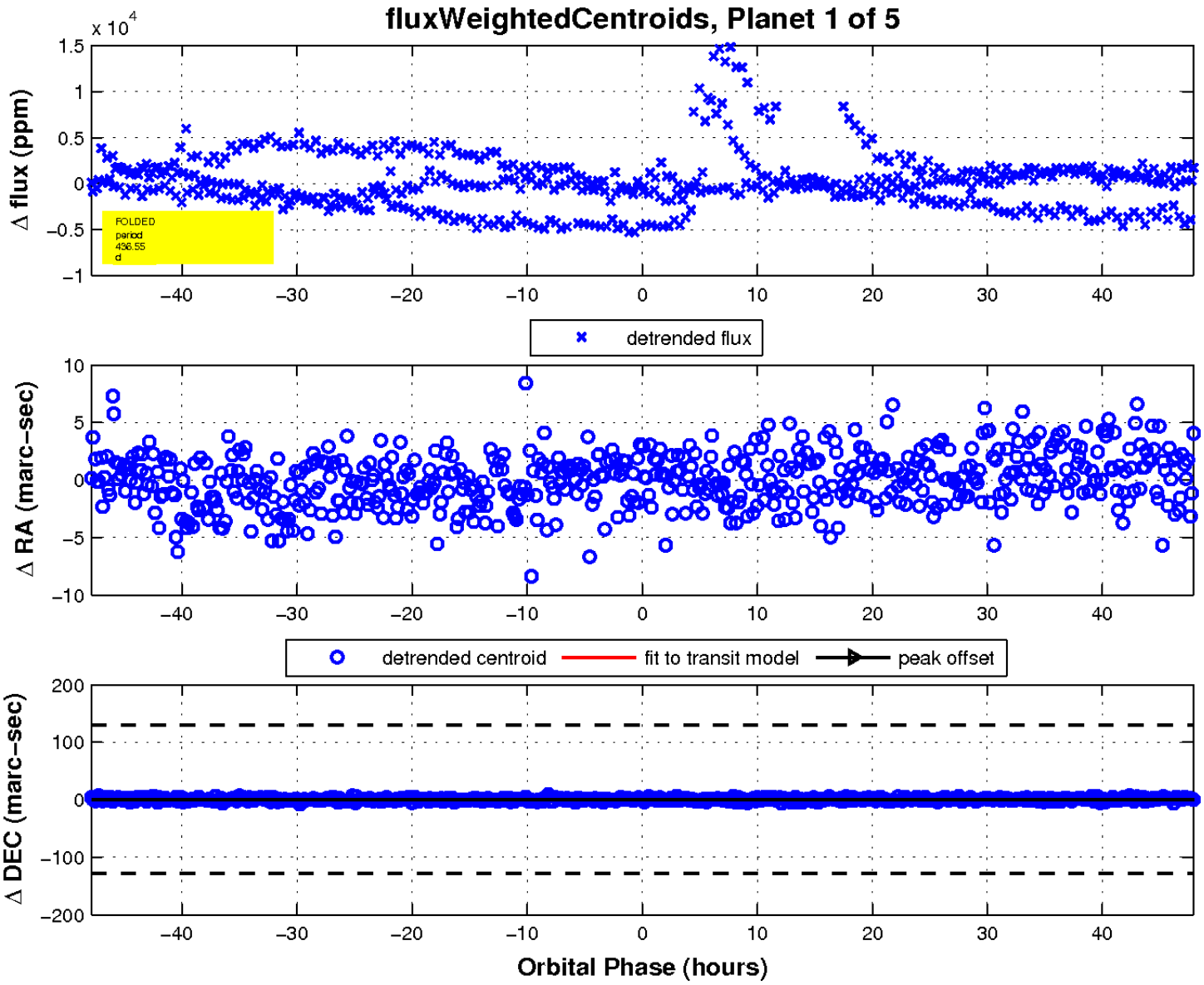




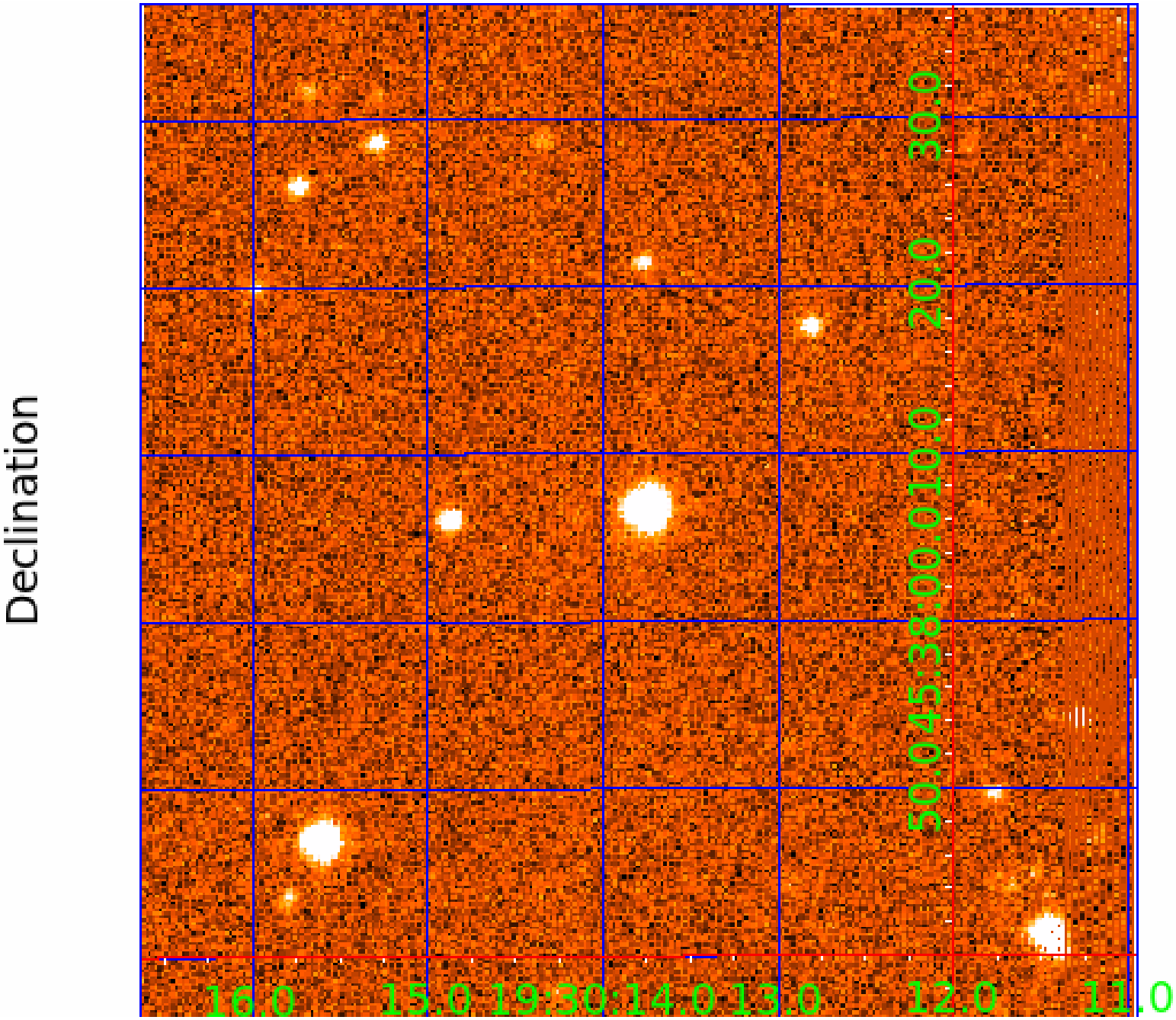


white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.





UKIRT Image


Declination
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30.0
20.0
10.0
16.0
15.0
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13.0
12.0
11.0

KIC 009220002

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 ($S_\oplus$)
009220002-01	OBS	No	436.550310	386.570460	3029.6	15.981	21.9	8.0	0.75	5364	7.86	0.42
009220002-03	OBS	No	433.263943	563.175136	2690.7	4.767	18.5	12.1	0.75	5364	5.14	0.42
009220002-04	OBS	No	709.889119	144.425004	1682.8	10.500	18.4	-1.0	0.75	5364	3.05	0.22
009220002-05	OBS	No	431.152578	523.443317	1824.3	8.893	16.8	7.9	0.75	5364	3.18	0.43

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009220002-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009220002-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
009220002-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_NOFITS
009220002-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—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.

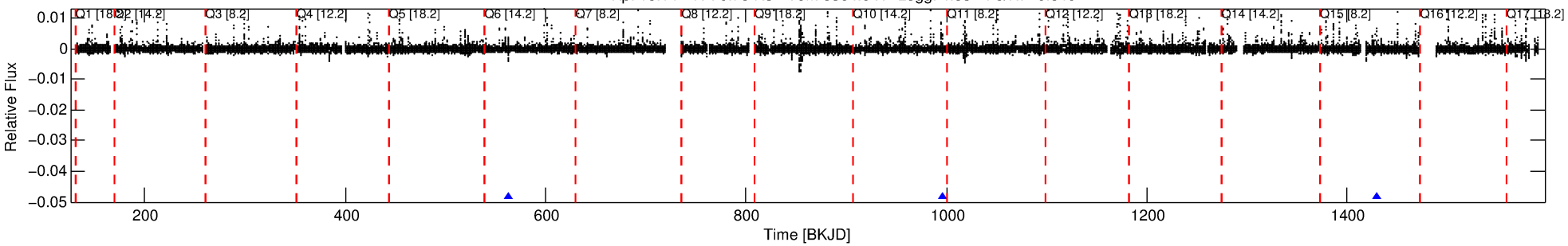
Ephemeris Match Information For 009220002-03

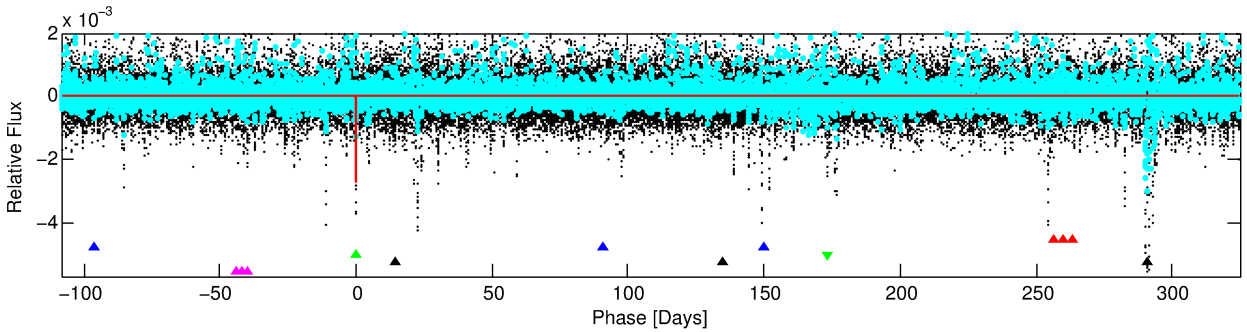
No Significant Match Found

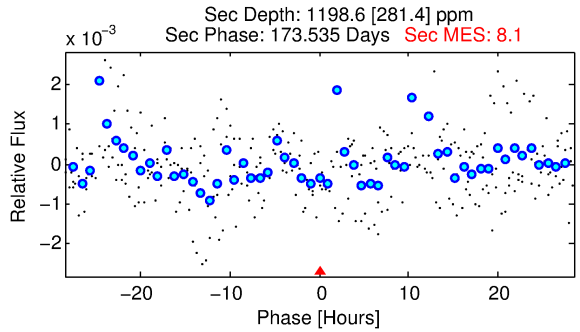
DV One-Page Summary

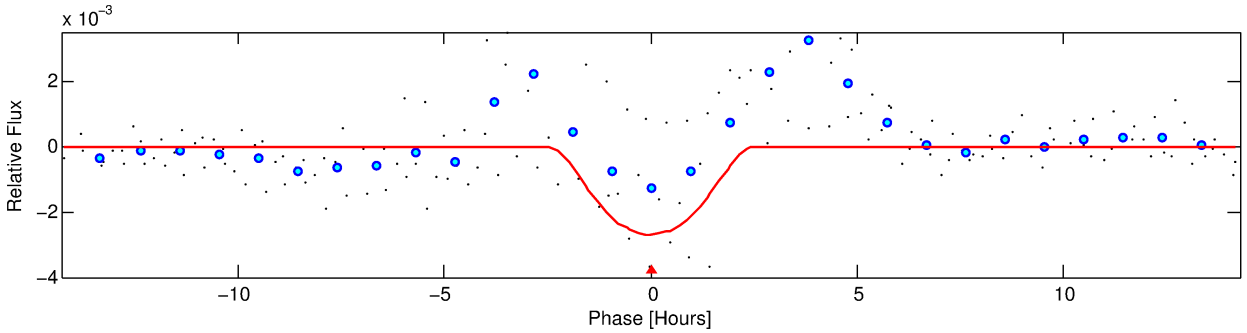
KIC: 9220002 Candidate: 3 of 5 Period: 433.264 d

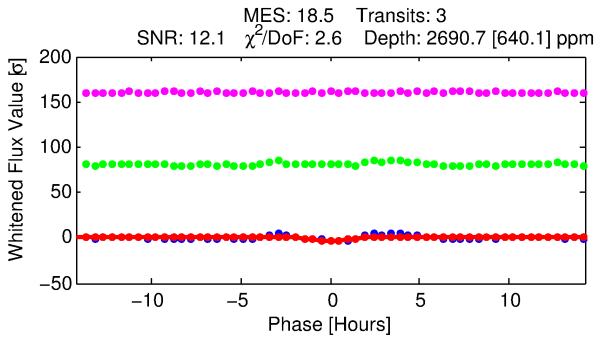
Kp: 15.14 R*: 0.75 Rs Teff: 5364.0 K Logg: 4.53 Fe/H: −0.540

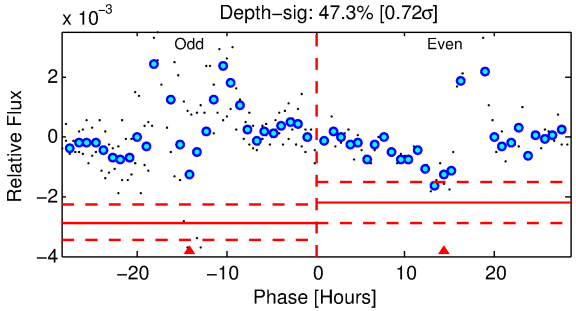


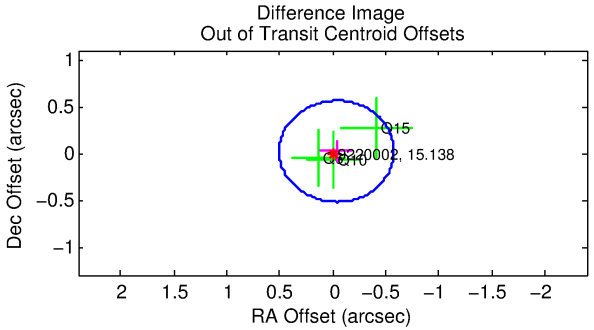












DV Fit Results:

Period = 433.26394 [0.00801] d
Epoch = 563.1751 [0.0093] BKJD
Rp/R* = 0.0624 [0.0277]
a/R* = 333.46 [102.44]
b = 0.95 [0.08]

Seff = 0.43 [0.10]
Teq = 206 [12] K
Rp = 5.14 [2.38] Re
a = 0.9957 [0.1199] AU

Ag = 24773.78 [23160.13] [1.07σ]
Teffp = 3994 [925] K [4.10σ]

DV Diagnostic Results:

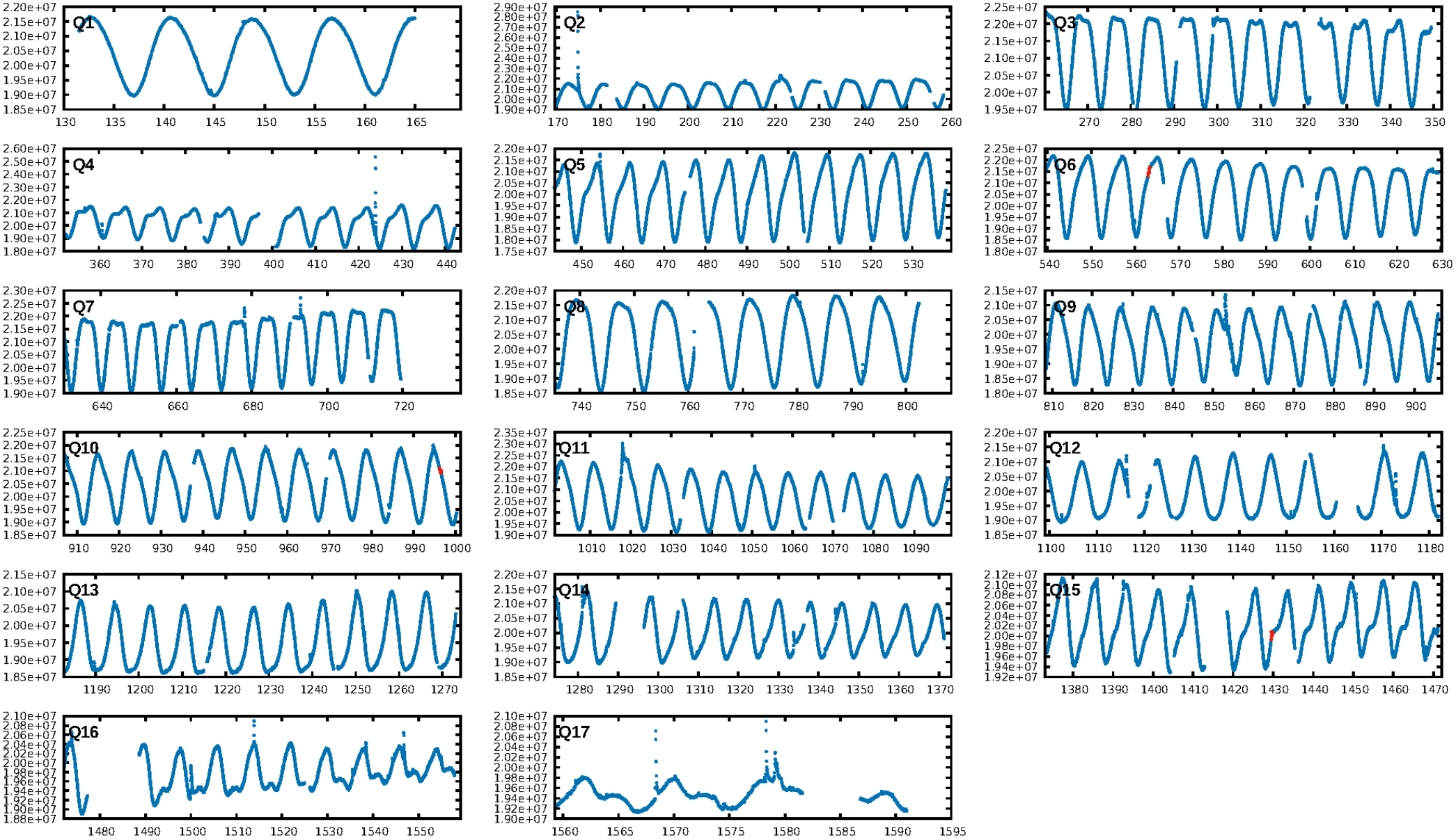
ShortPeriod−sig: 100.0% [5.02σ]
LongPeriod−sig: 100.0% [4.73σ]
ModelChiSquare2−sig: 0.1%
ModelChiSquareGof−sig: 0.7%
Bootstrap−pfa: N/A
RollingBand−fgt: 1.00 [3/3]
GhostDiagnostic−chr: −0.1676

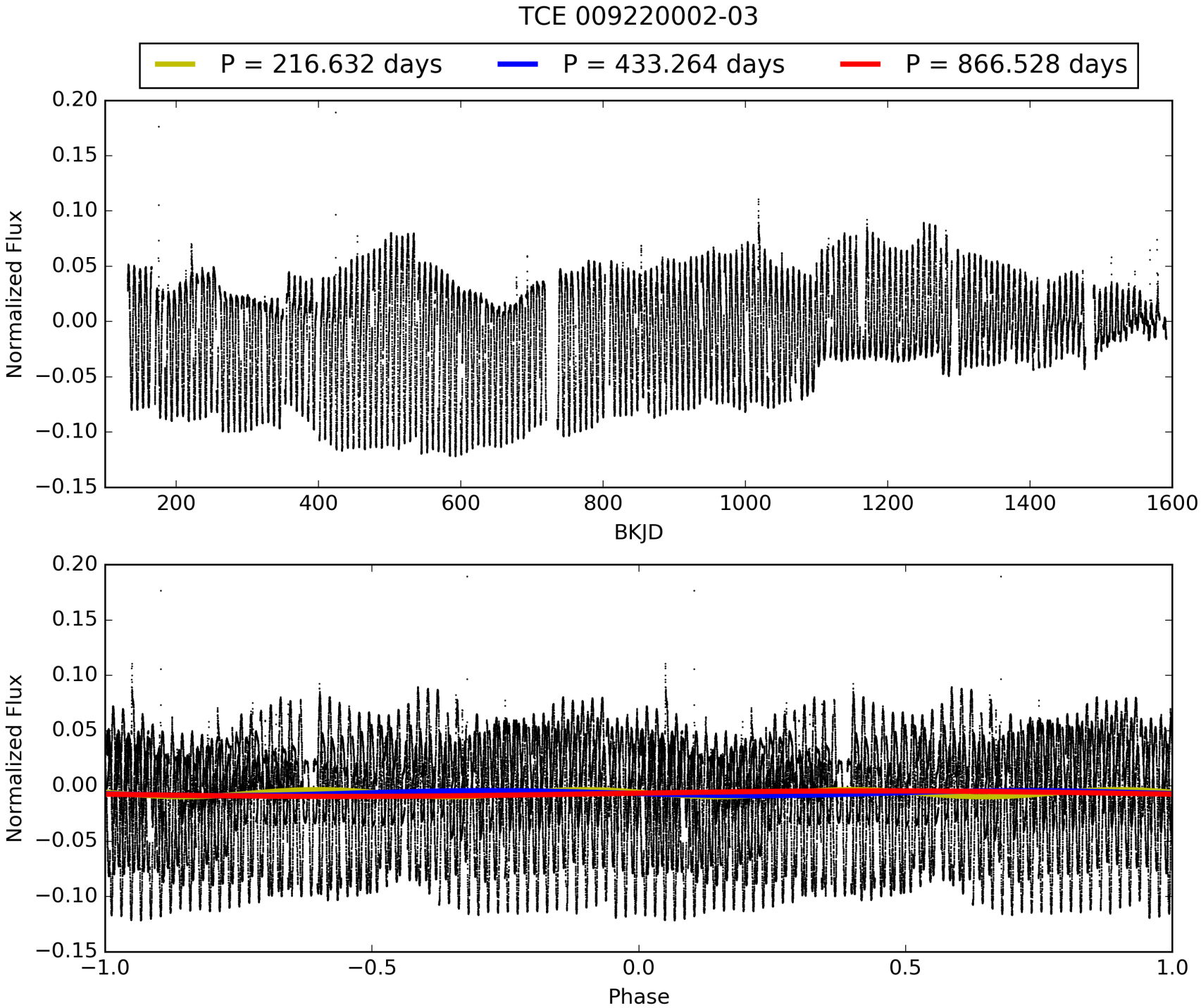
Centroid−sig: N/A
Centroid−so: 0.534 arcsec [0.82σ]
OotOffset−rm: 0.042 arcsec [0.24σ]
KicOffset−rm: 0.111 arcsec [0.57σ]
OotOffset−st: 2/1/0/0 [3]
KicOffset−st: 2/1/0/0 [3]
DiffImageQuality−fgm: 0.67 [2/3]
DiffImageOverlap−fno: 1.00 [3/3]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31−Jan−2016 22:09:13 Z

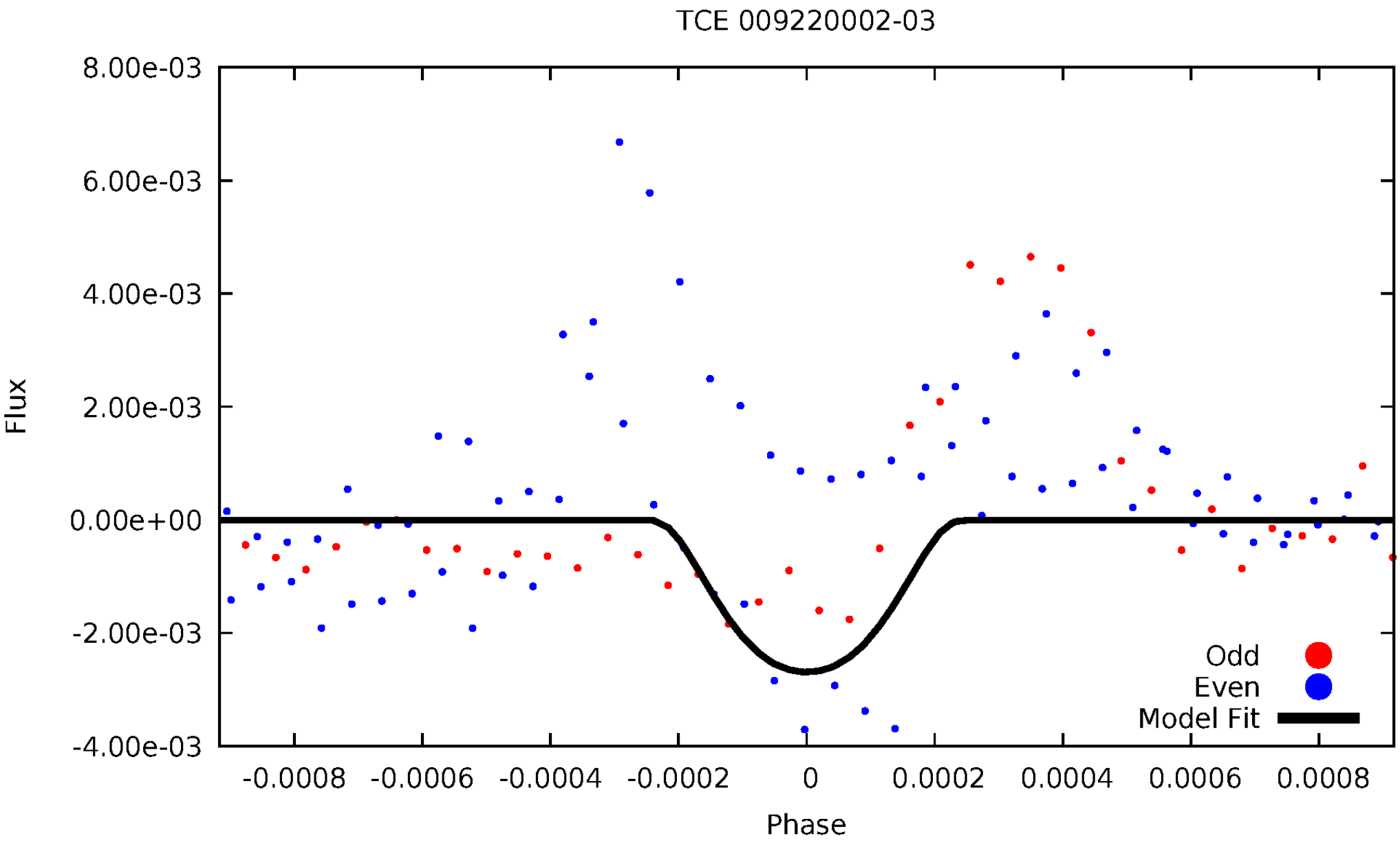
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

TCE 009220002-03, PDC Light Curves

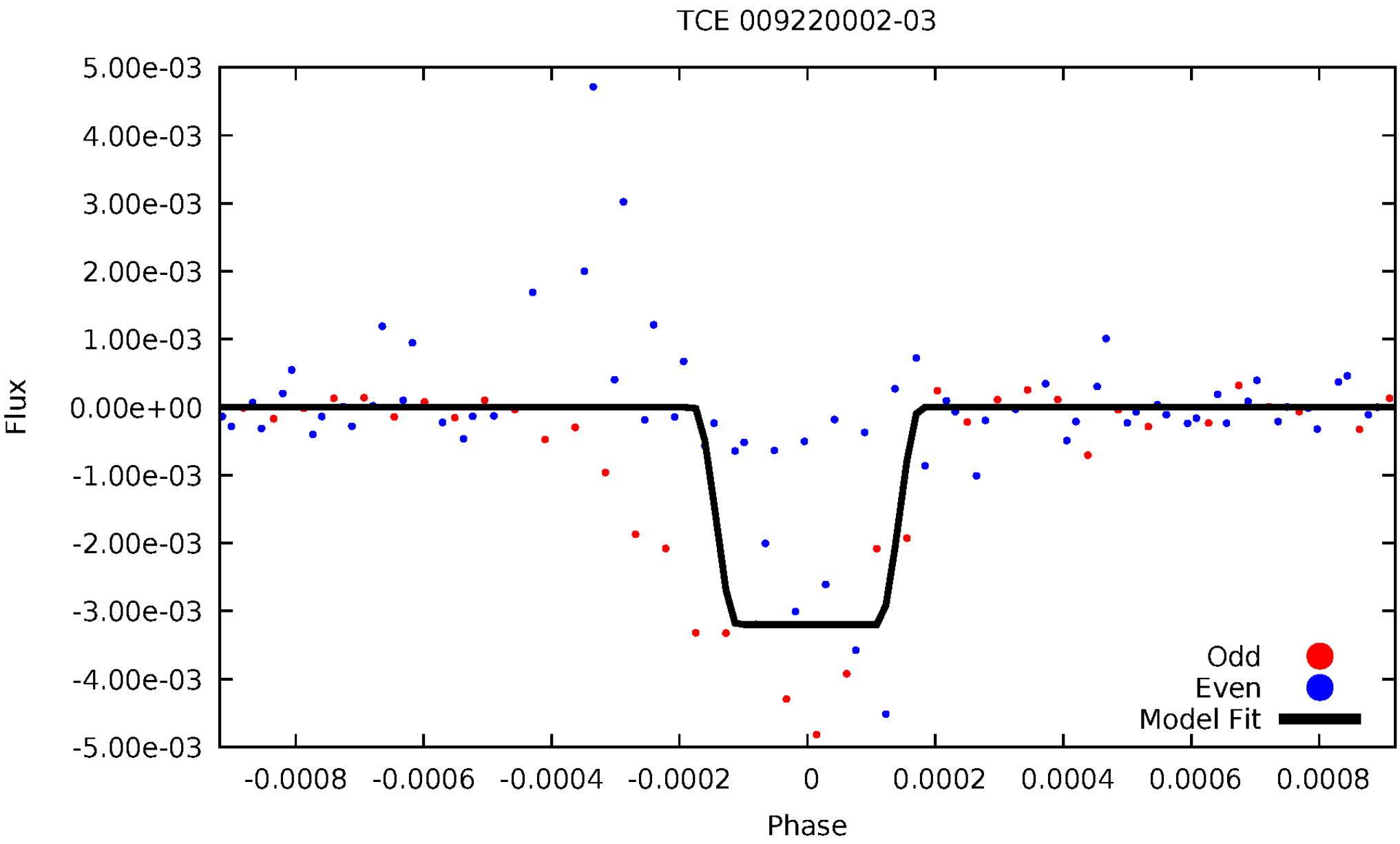



TCE 009220002-03
P = 216.632 days
P = 433.264 days
P = 866.528 days
Normalized Flux
BKJD
Normalized Flux
Phase

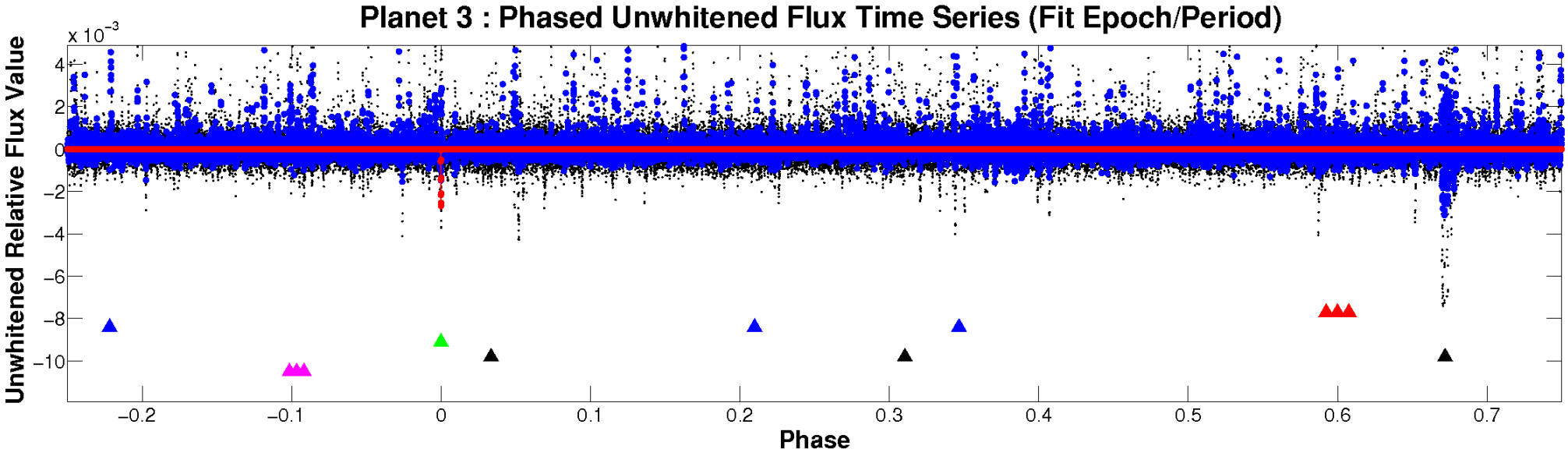
DV Odd/Even

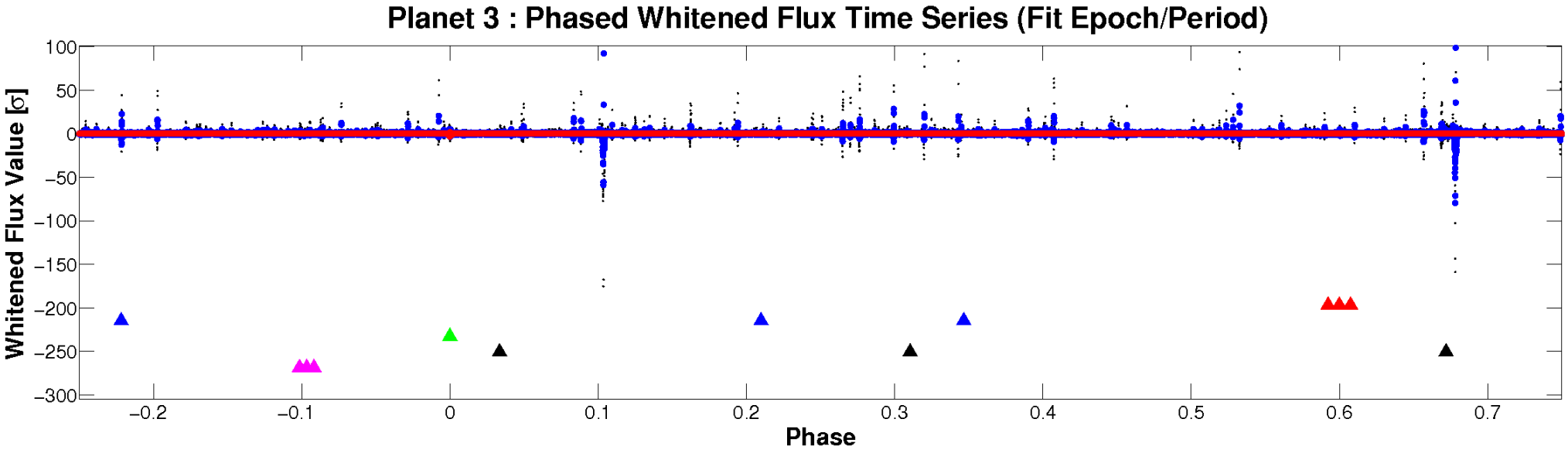

TCE 009220002-03
8.00e-03
6.00e-03
4.00e-03
2.00e-03
0.00e+00
-2.00e-03
-4.00e-03
Flux
-0.0008
-0.0006
-0.0004
-0.0002
0
0.0002
0.0004
0.0006
0.0008
Phase
Odd
Even
Model Fit

ALT Odd/Even


TCE 009220002-03
5.00e-03
4.00e-03
3.00e-03
2.00e-03
1.00e-03
0.00e+00
-1.00e-03
-2.00e-03
-3.00e-03
-4.00e-03
-5.00e-03
Flux
-0.0008
-0.0006
-0.0004
-0.0002
0
0.0002
0.0004
0.0006
0.0008
Phase
Odd
Even
Model Fit

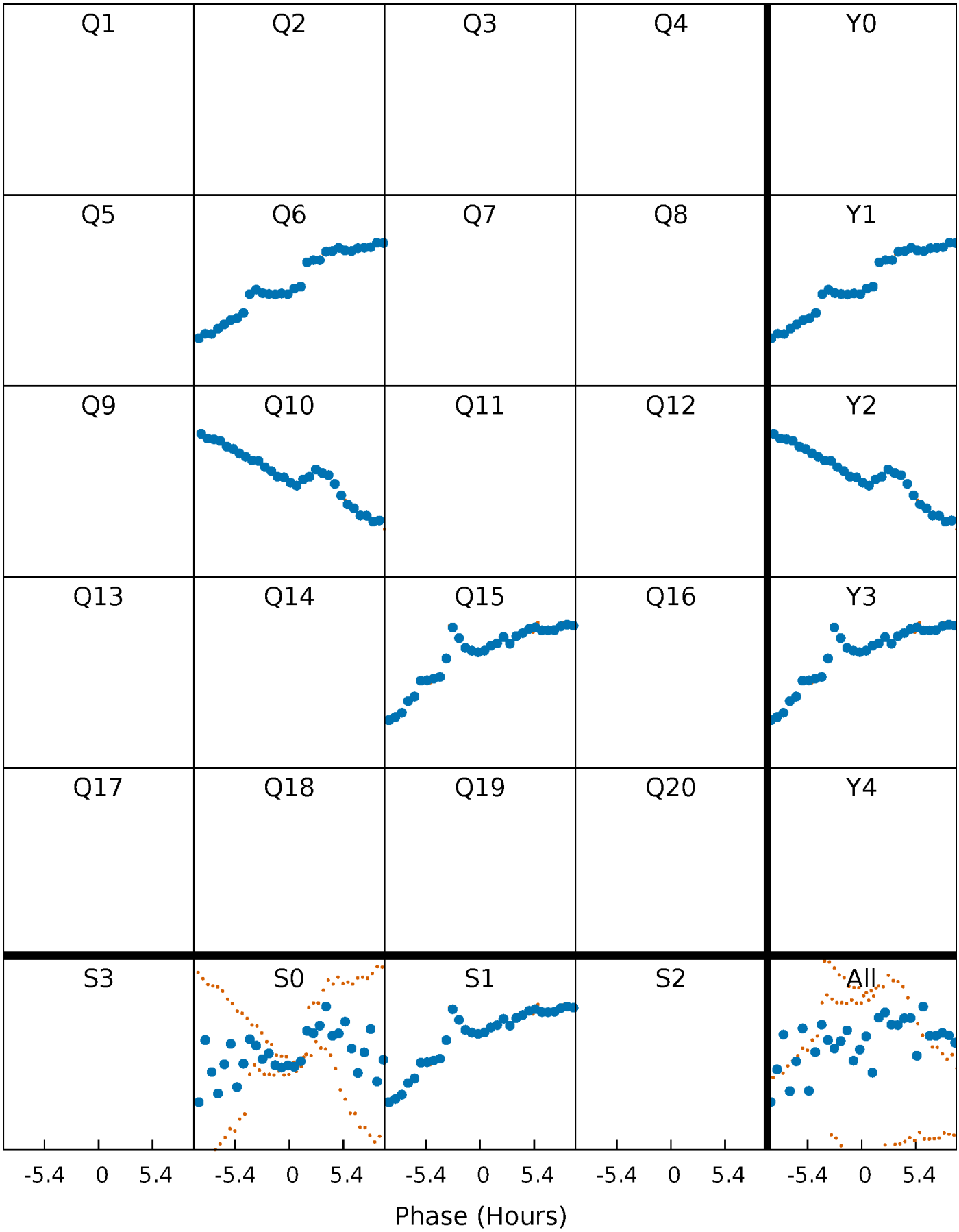
Non-Whitened Vs. Whitened Light Curve





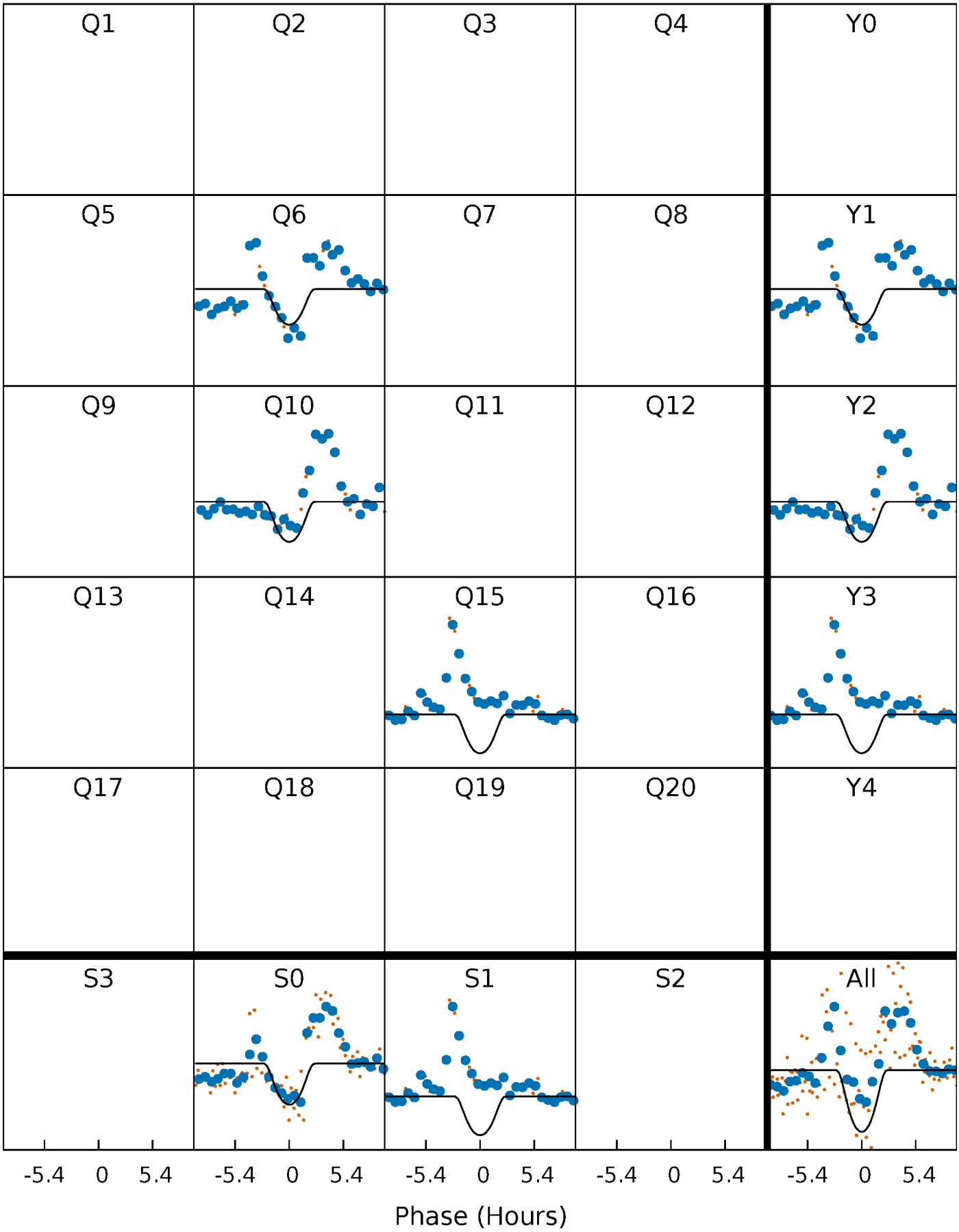
PDC Quarter-Phased Transit Curves

TCE 009220002-03 P=433.263943 Days T_0=563.175136 (BKJD)



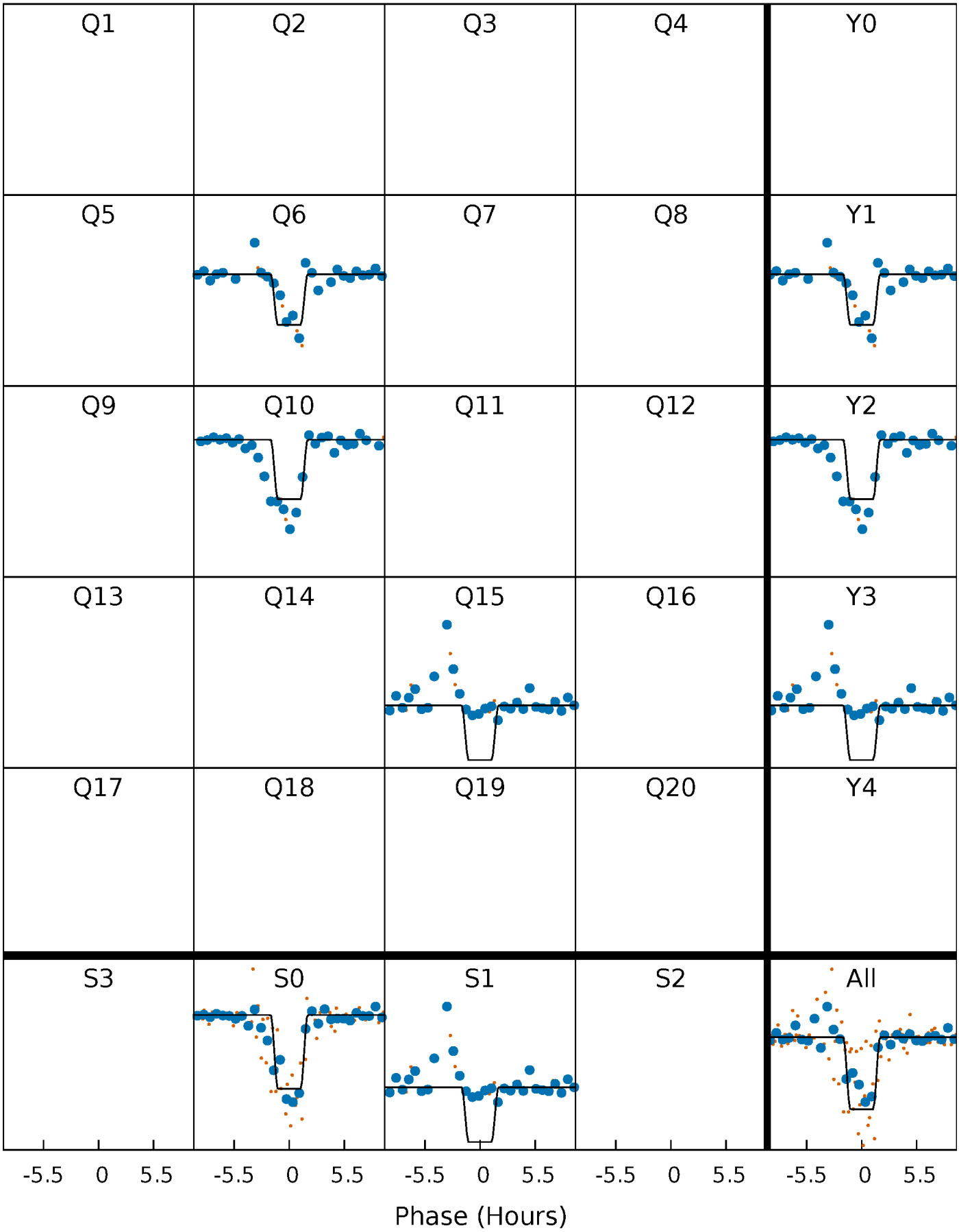
DV Quarter-Phased Transit Curves

TCE 009220002-03 P=433.263943 Days T_0=563.175136 (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

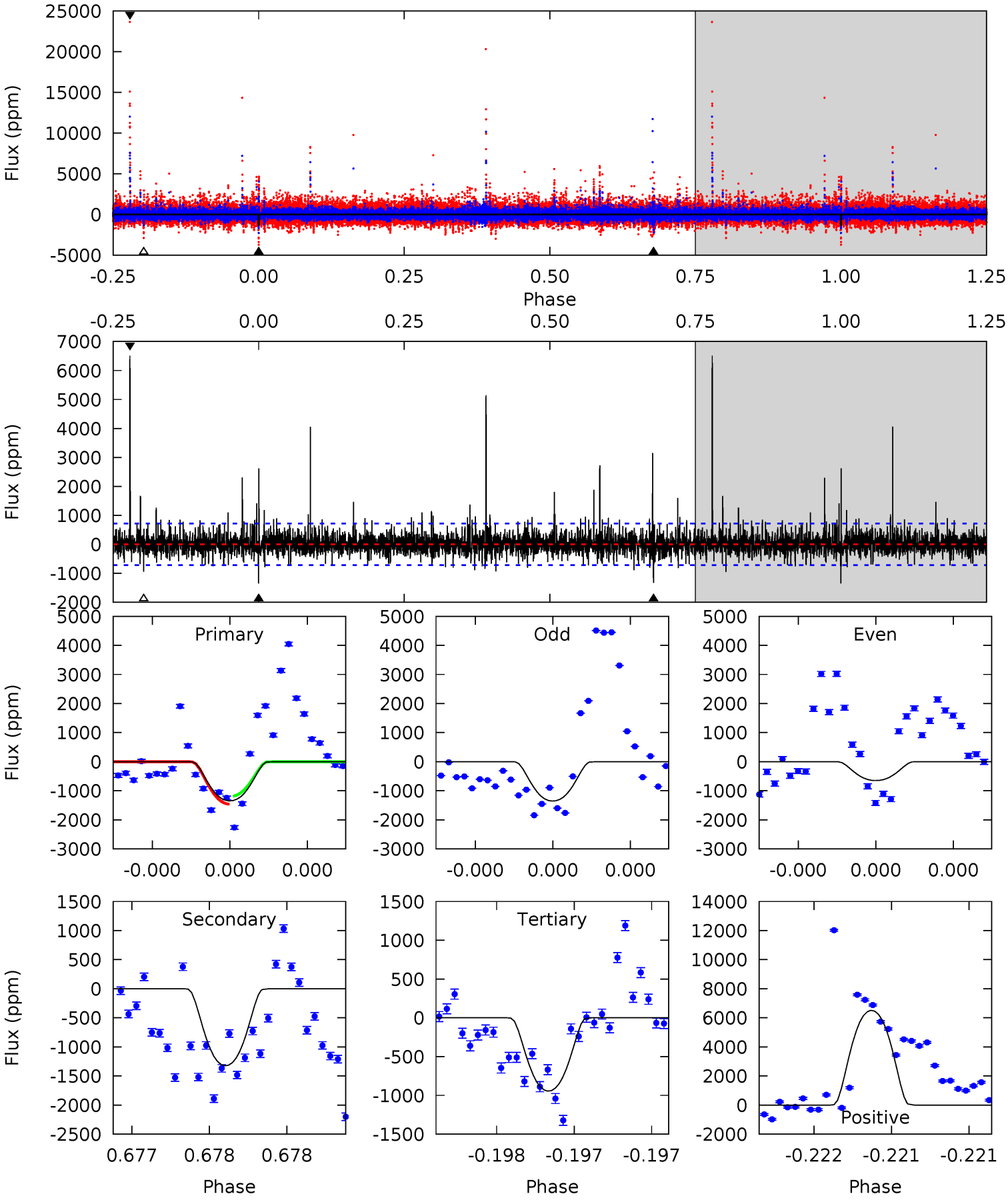
TCE 009220002-03 P=433.280017 Days T_0=563.181869 (BKJD)



DV Model-Shift Uniqueness Test

009220002-03, P = 433.263943 Days, E = 129.911193 Days

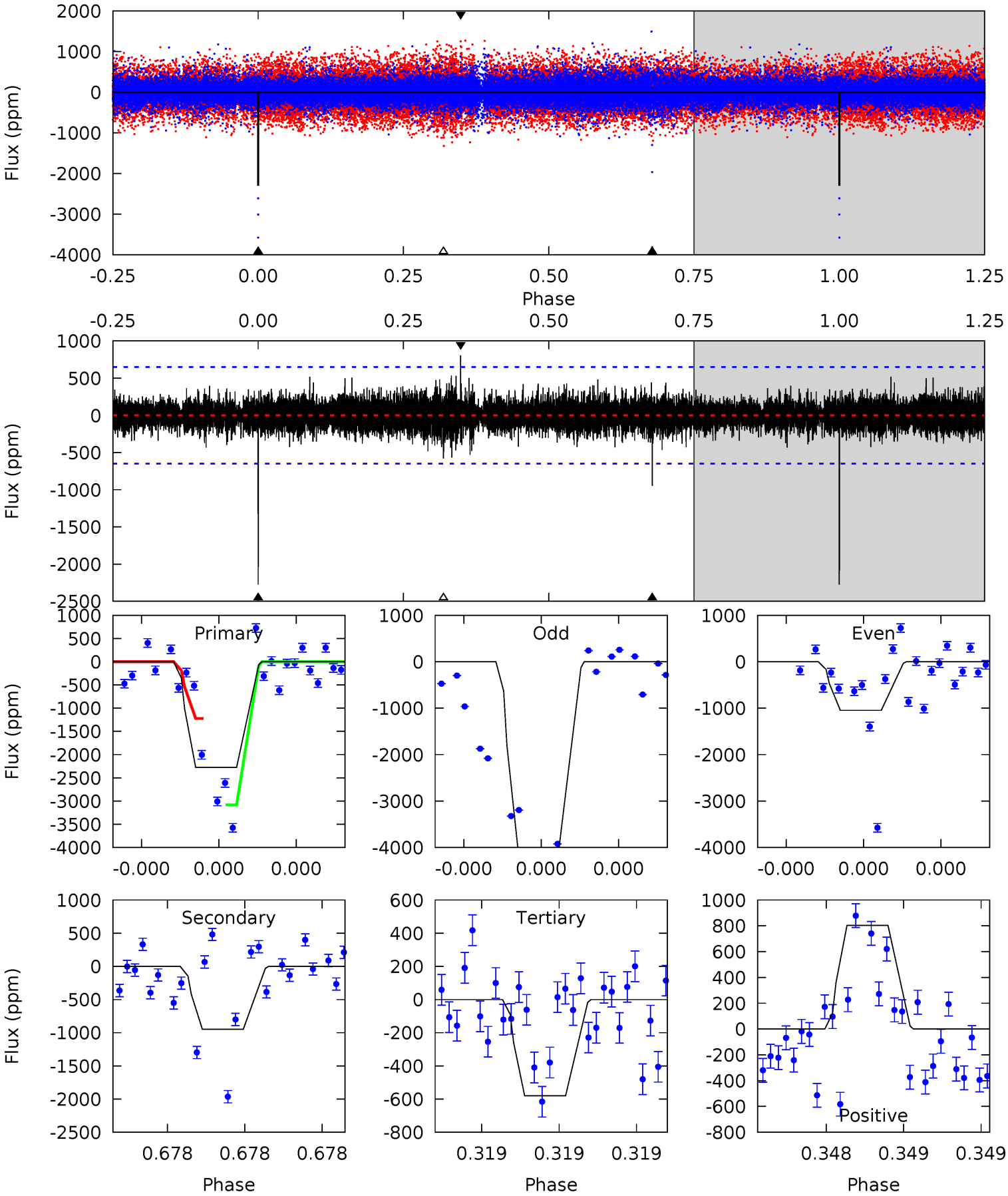
Pri	Sec	Ter	Pos	FA_1	FA_2	F_{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.5	10.3	7.35	50.7	5.58	3.48	2.39	3.14	-40.2	2.95	-40.4	1.17	0.74	0.83	1.05



Alt Model-Shift Uniqueness Test

009220002-03, P = 433.280017 Days, E = 129.901852 Days

Pri	Sec	Ter	Pos	FA_1	FA_2	F_{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
19.8	8.23	5.05	6.99	5.65	3.59	0.92	14.7	12.8	3.18	1.24	19.4	0.83	0.26	0



Stellar Parameters For KIC 009220002

	$T_{\rm eff}(K)$	$\log(g)$	[Fe/H]	R ($R_\odot$)	$M(M_\odot)$	$p_\star$ (g·cm^{-3})
	5364^{+177}_{-177}	$4.529^{+0.104}_{-0.095}$	$-0.540^{+0.350}_{-0.300}$	$0.754^{+0.102}_{-0.092}$	$0.702^{+0.100}_{-0.036}$	$2.302^{+1.059}_{-0.612}$
	+3%/-3%	+2%/-2%	+65%/-56%	+14%/-12%	+14%/-5%	+46%/-27%
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 009220002-03 / KOI

Detrend	Depth (ppm)	R_p ($R_\oplus$)	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-1323±129	$5.25^{+2.37}_{-2.23}$	287^{+15}_{-14}	4246^{+1046}_{-494}	26923^{+53896}_{-14340}
Alt.	-946±115	$4.73^{+2.34}_{-2.27}$	287^{+15}_{-14}	4190^{+1426}_{-551}	23873^{+71866}_{-13506}

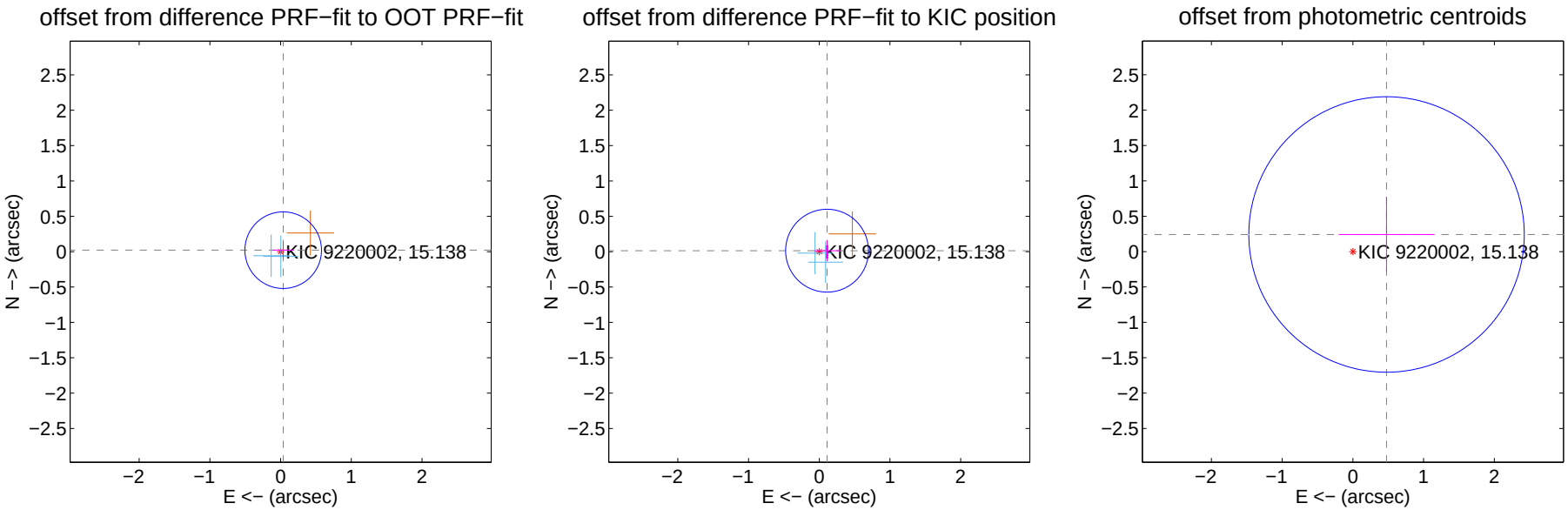
T_{max} = Theoretical Maximum Planetary Temperature
T_{obs} = Observed Planetary Temperature (Assuming A=0.3)
A_{obs} = Observed Albedo (Assuming T=0)

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

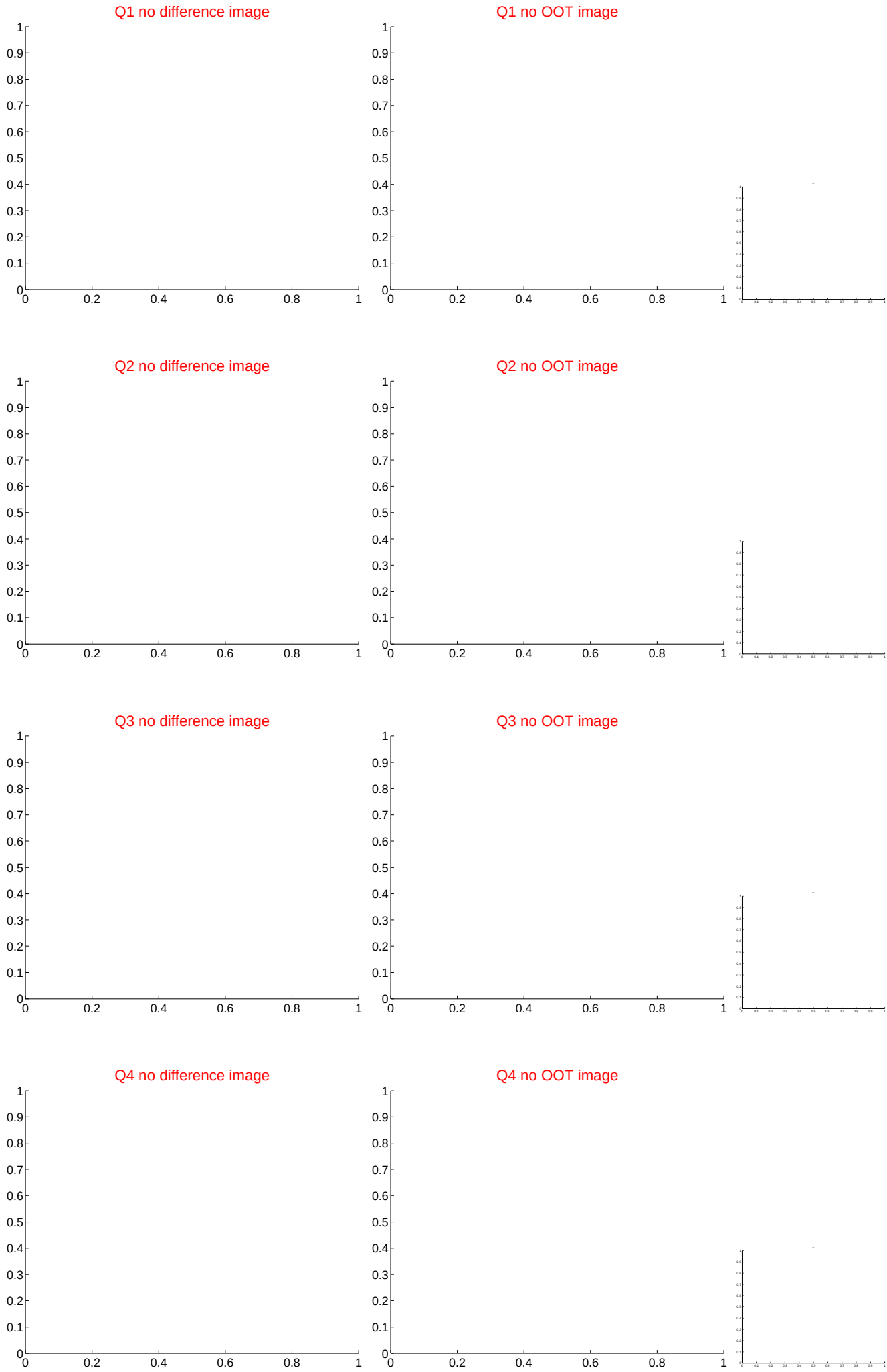
Supplemental centroid analysis for 009220002-03. Kepler magnitude: 15.14. Transit SNR 12.15
There are 2 quarters with good PRF difference image offsets
The direct PRF centroid is offset from the target star catalog position by about 0.05 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.042 ± 0.180	0.24	-0.037 ± 0.154	0.021 ± 0.117
PRF-fit source offset from KIC position	0.111 ± 0.195	0.57	-0.110 ± 0.182	0.014 ± 0.146
photometric centroid source offset	0.53 ± 0.65	0.82	-0.48 ± 0.68	0.24 ± 0.53

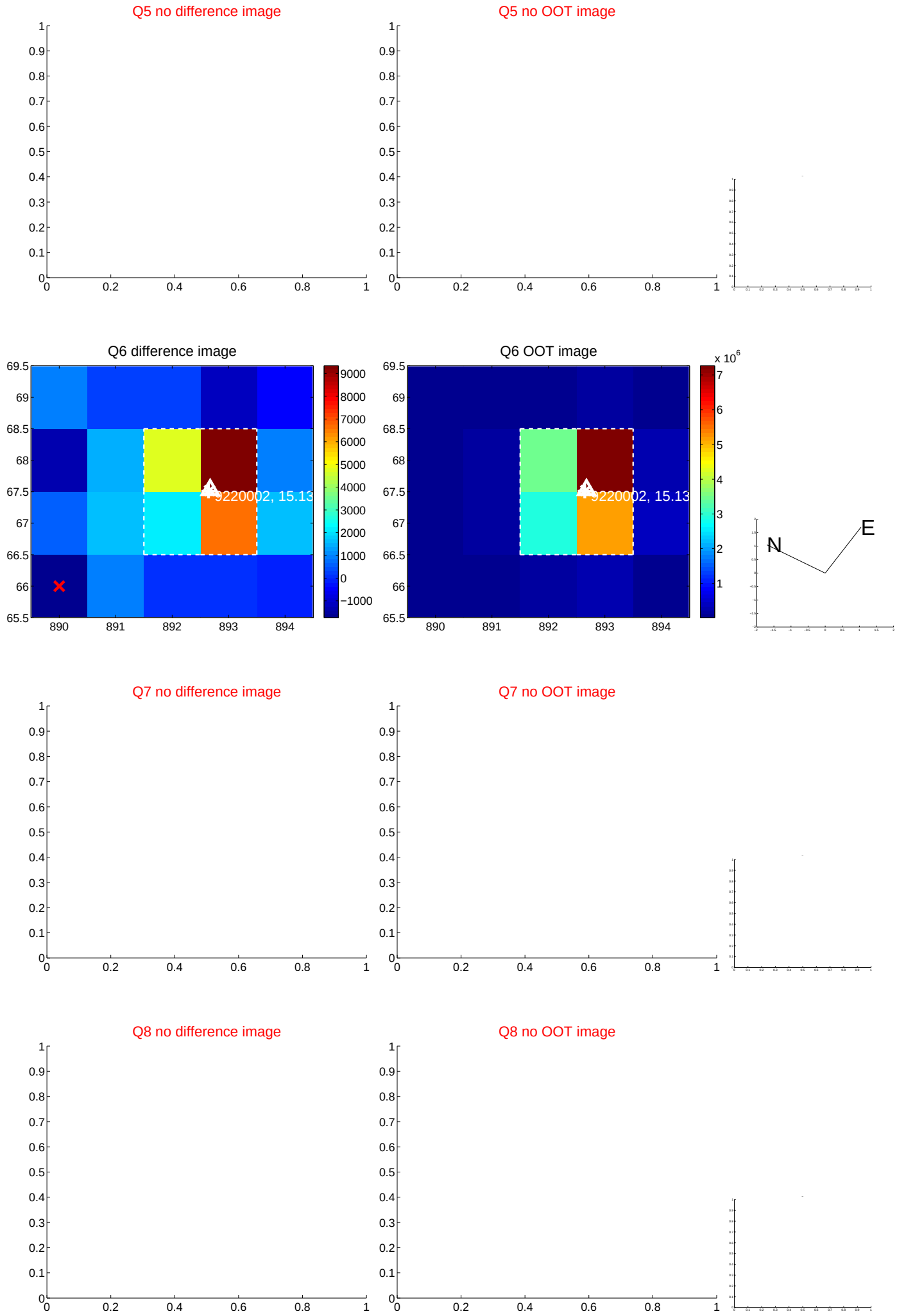


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one-σ uncertainty. Blue circle: three-σ. Red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

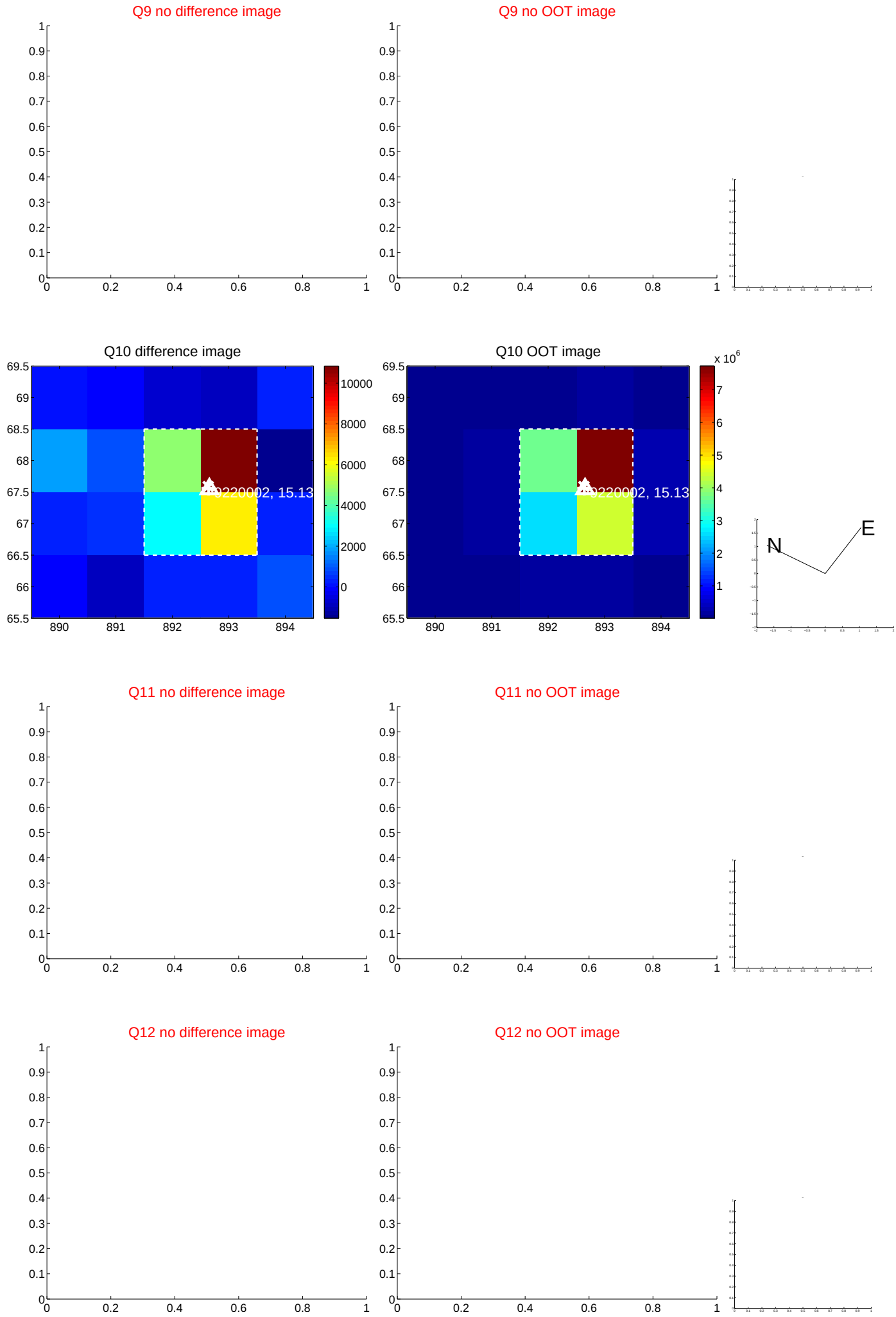
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.



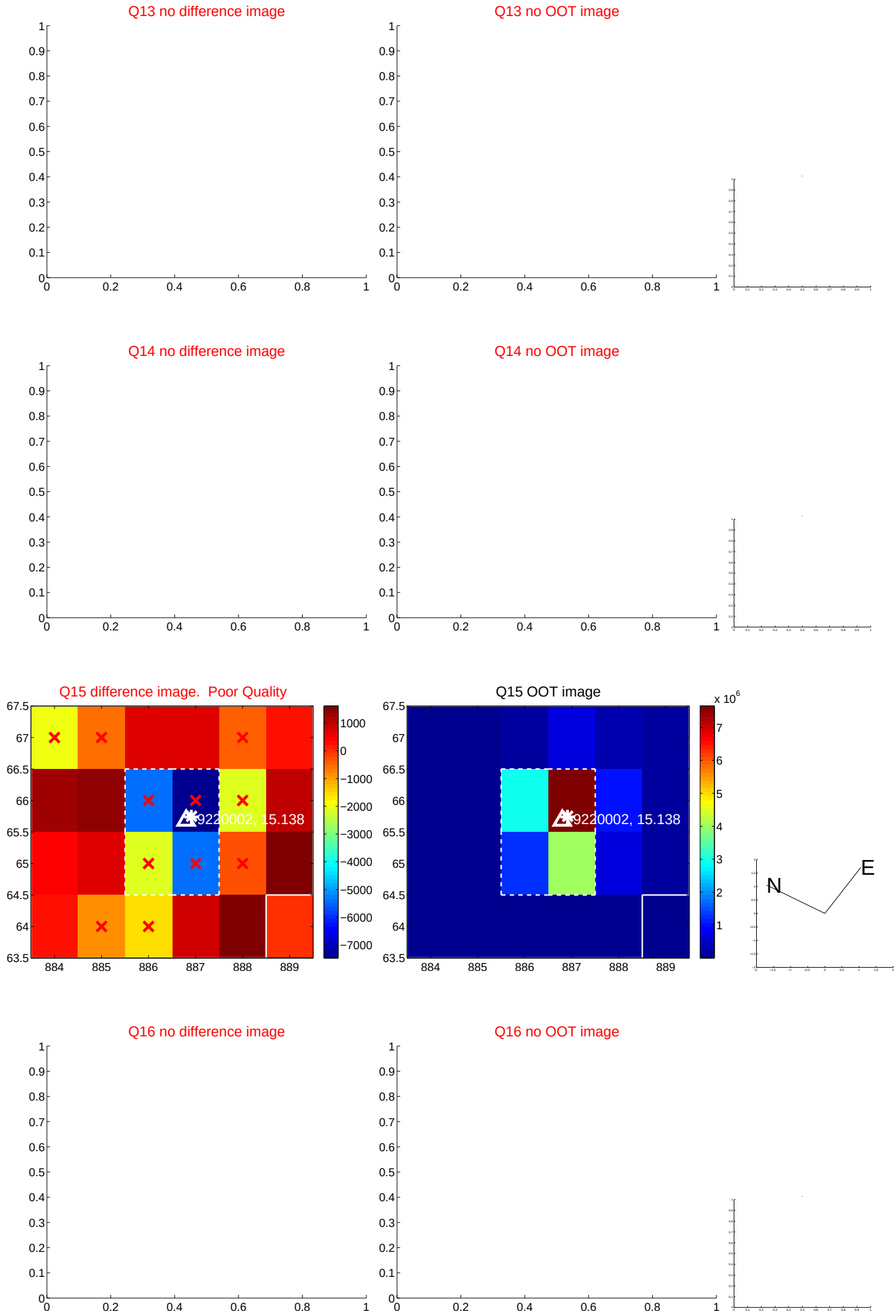
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.



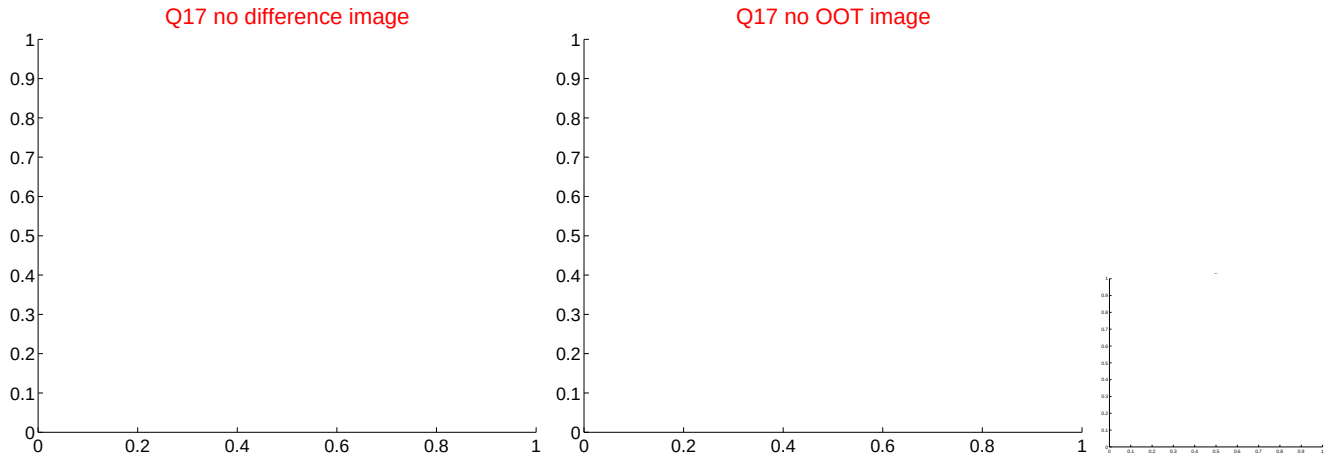
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.

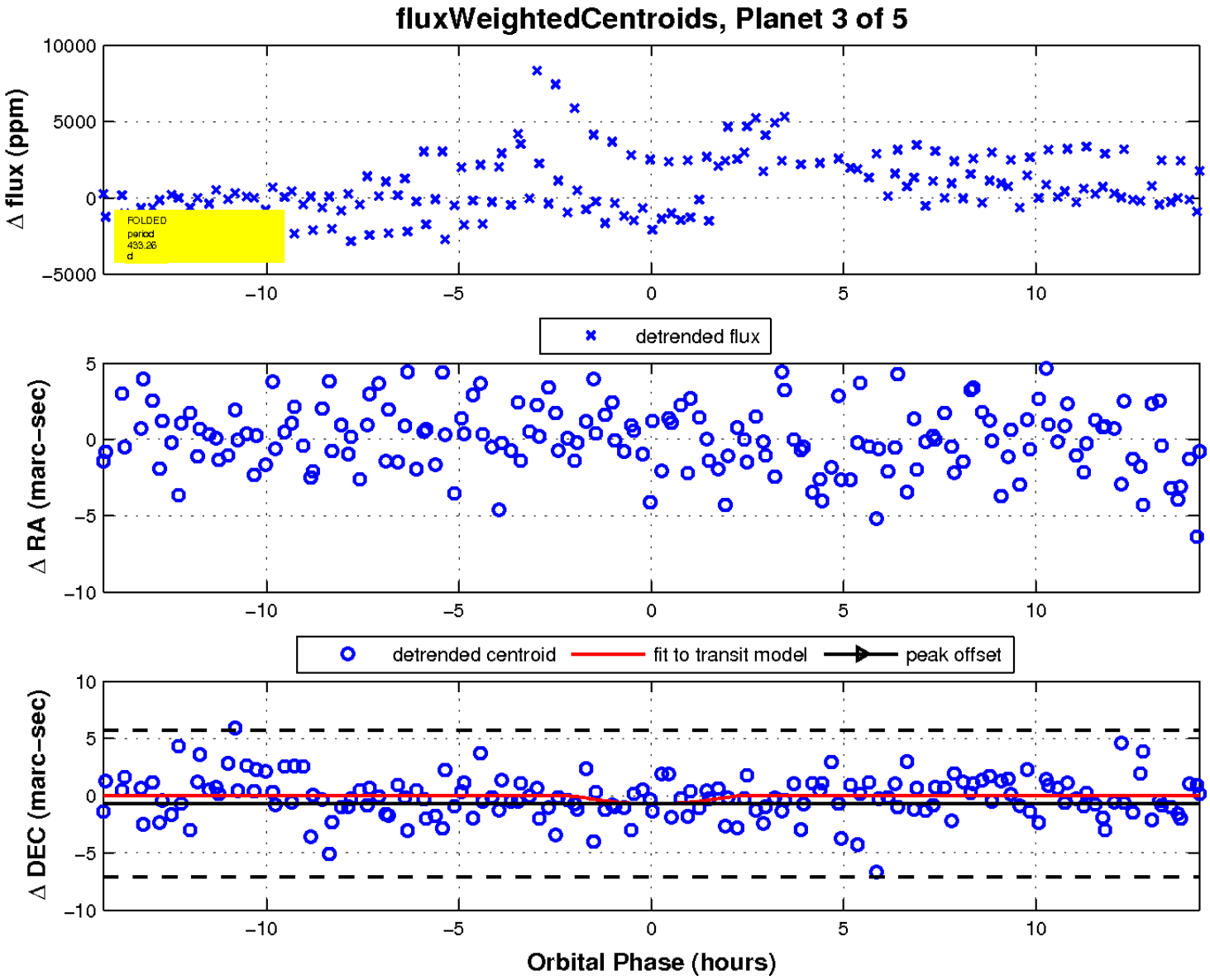


white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.

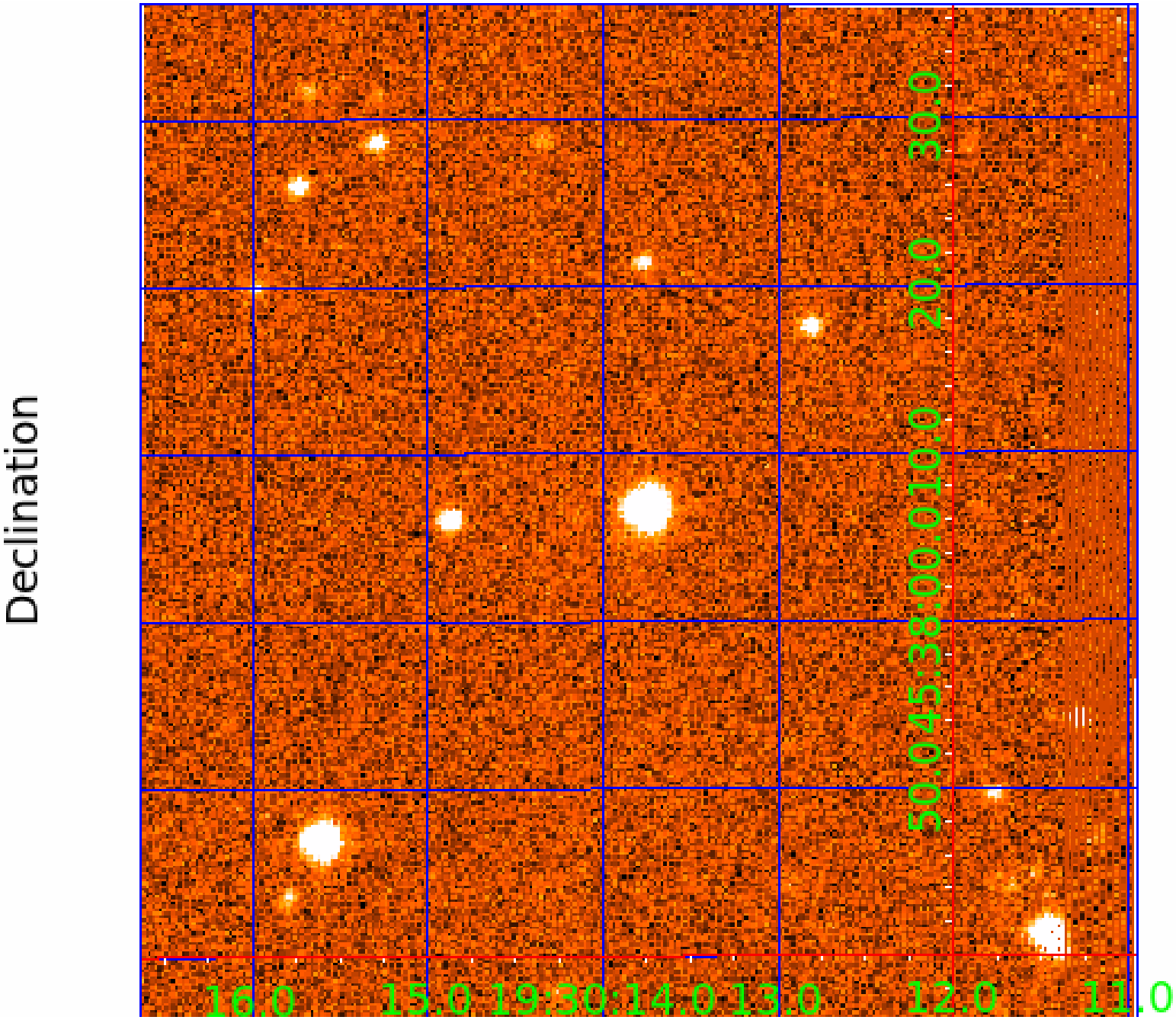


white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.





UKIRT Image


Declination
50:45:38.00:
30.0
20.0
10.0
16.0
15.0
19:30:14.0
13.0
12.0
11.0

KIC 009220002

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 ($S_\oplus$)
009220002-01	OBS	No	436.550310	386.570460	3029.6	15.981	21.9	8.0	0.75	5364	7.86	0.42
009220002-03	OBS	No	433.263943	563.175136	2690.7	4.767	18.5	12.1	0.75	5364	5.14	0.42
009220002-04	OBS	No	709.889119	144.425004	1682.8	10.500	18.4	-1.0	0.75	5364	3.05	0.22
009220002-05	OBS	No	431.152578	523.443317	1824.3	8.893	16.8	7.9	0.75	5364	3.18	0.43

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009220002-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009220002-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
009220002-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_NOFITS
009220002-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—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.

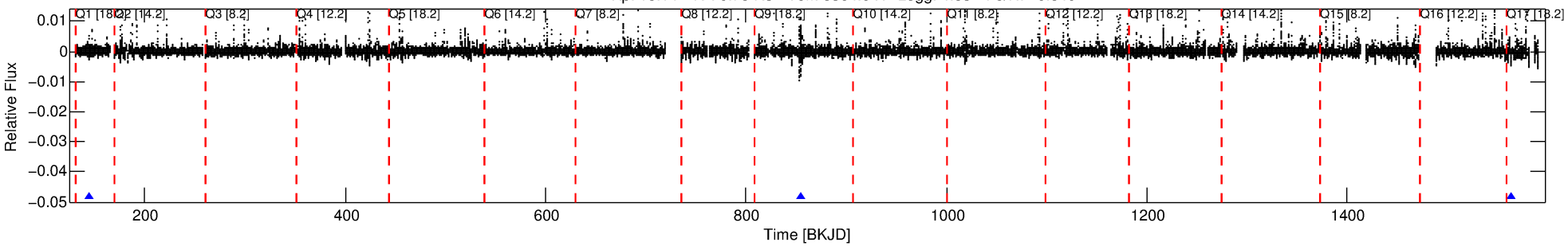
Ephemeris Match Information For 009220002-04

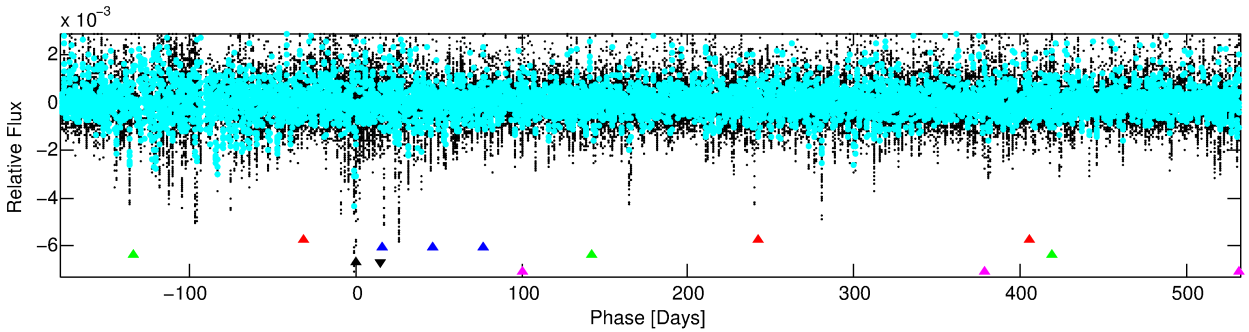
No Significant Match Found

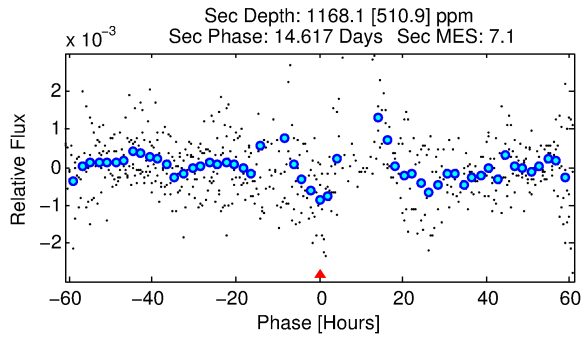
DV One-Page Summary

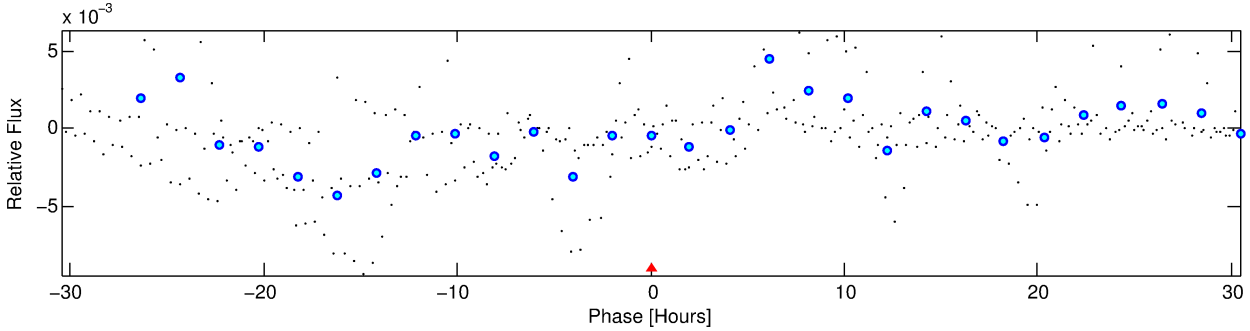
KIC: 9220002 Candidate: 4 of 5 Period: 709.889 d

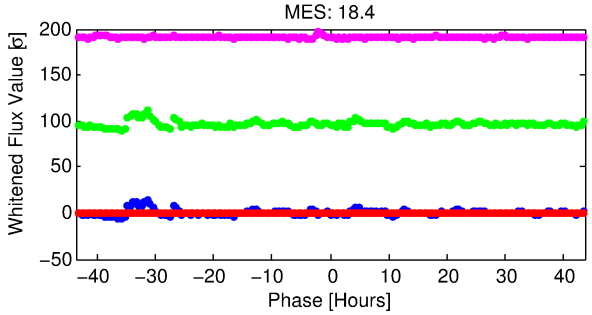
Kp: 15.14 R*: 0.75 Rs Teff: 5364.0 K Logg: 4.53 Fe/H: −0.540

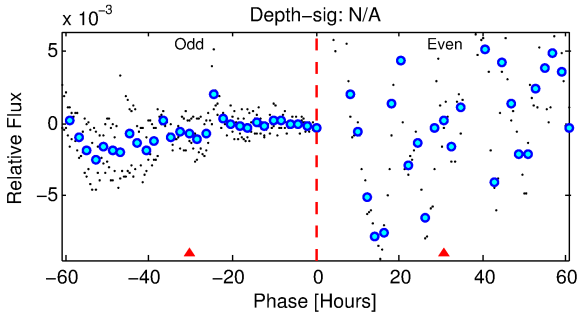


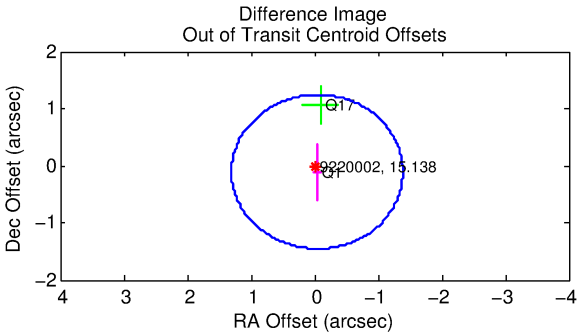












TPS TCE Results:

Period = 709.88912 d
Epoch = 144.4250 BKJD

DV fit results are unavailable

DV Diagnostic Results:

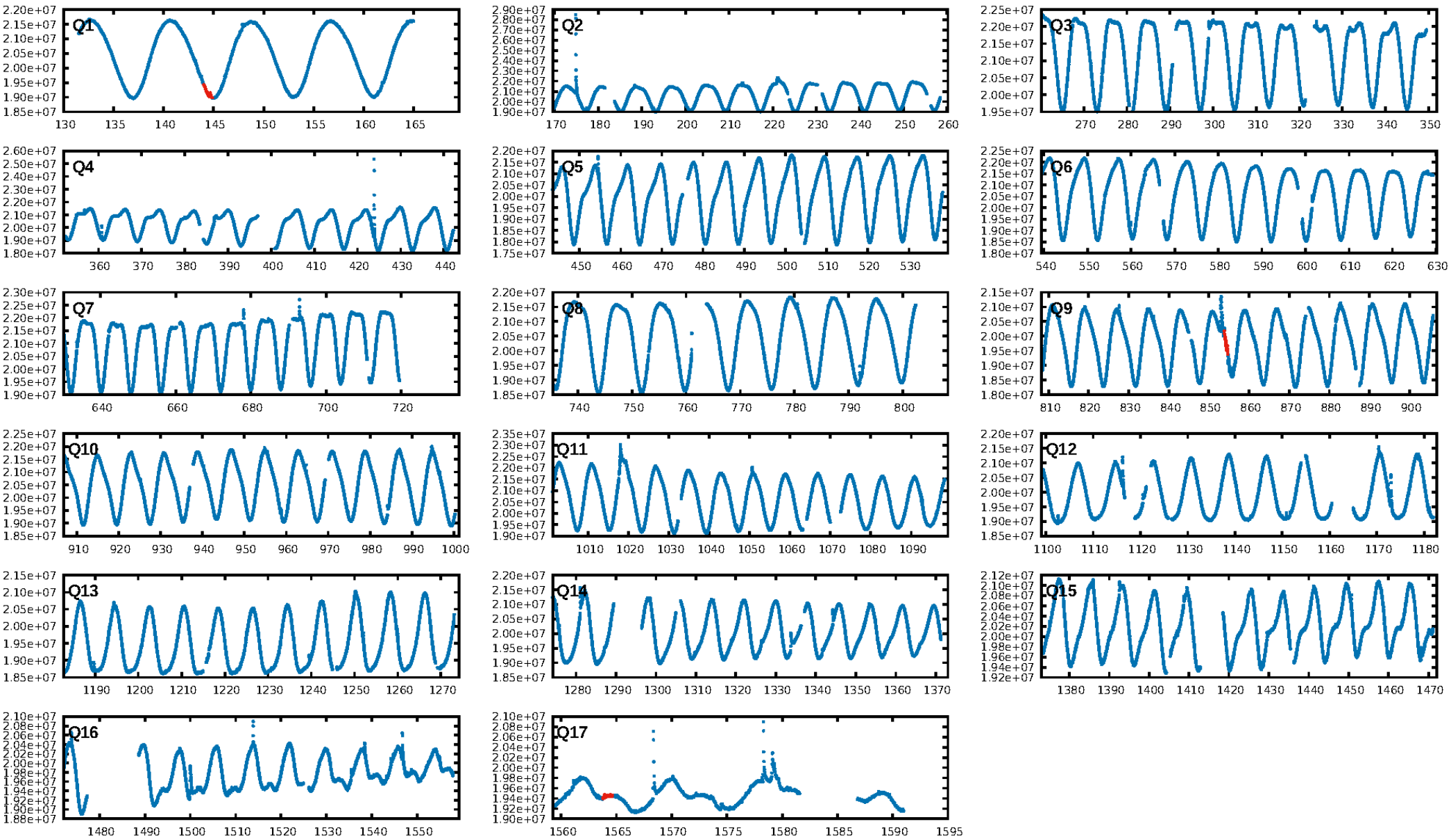
ShortPeriod−sig: 100.0% [51.80σ]
LongPeriod−sig: N/A
ModelChiSquare2−sig: N/A
ModelChiSquareGof−sig: N/A
Bootstrap−pfa: N/A
RollingBand−fgt: 1.00 [1/1]
GhostDiagnostic−chr: 0.8143

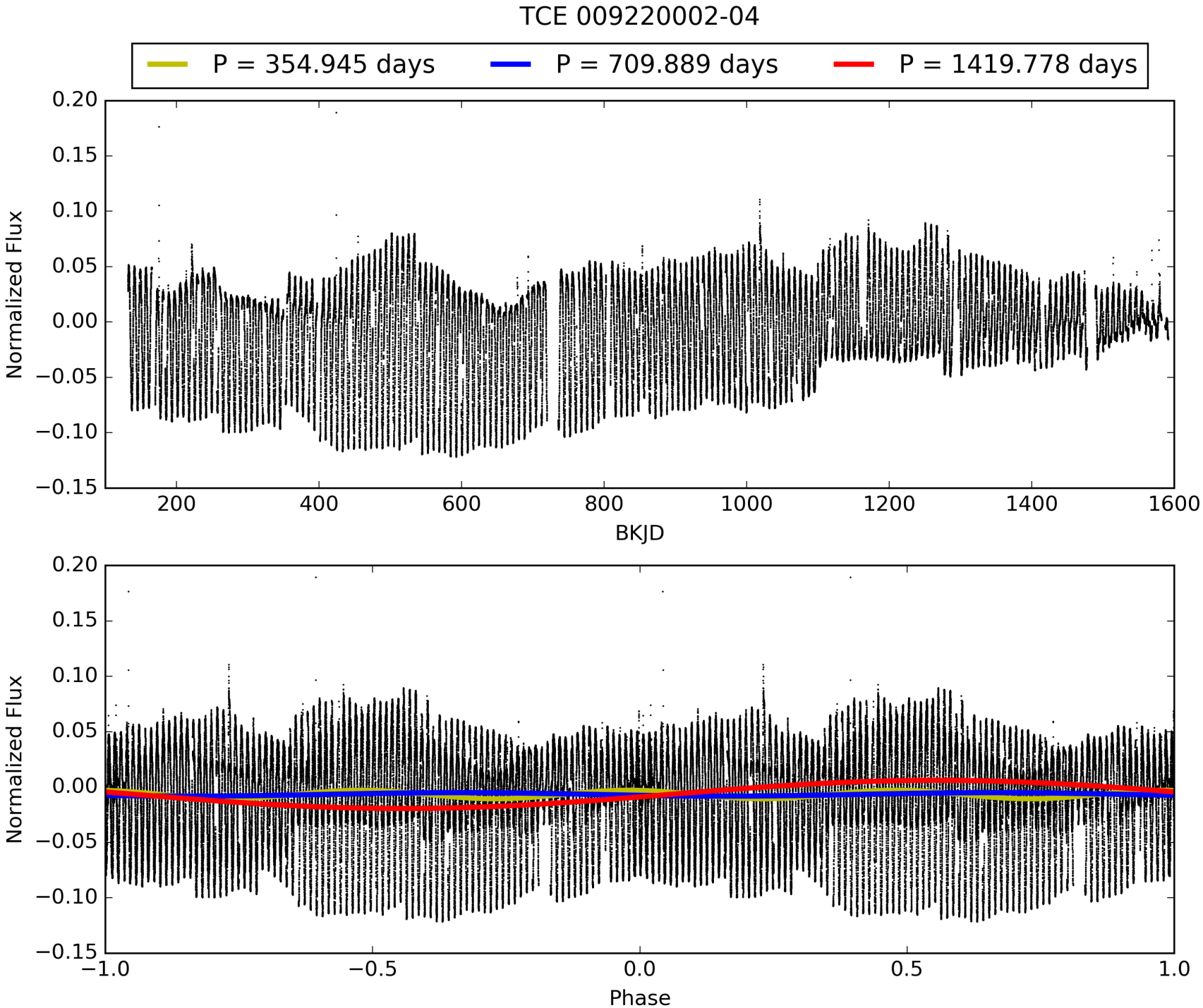
Centroid−sig: N/A
Centroid−so: 0.567 arcsec [1.65σ]
OotOffset−rm: 0.113 arcsec [0.25σ]
KicOffset−rm: 0.122 arcsec [0.70σ]
OotOffset−st: 0/0/0/2 [2]
KicOffset−st: 0/0/0/2 [2]
DiffImageQuality−fgm: 0.50 [1/2]
DiffImageOverlap−fno: 1.00 [3/3]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31−Jan−2016 22:09:25 Z

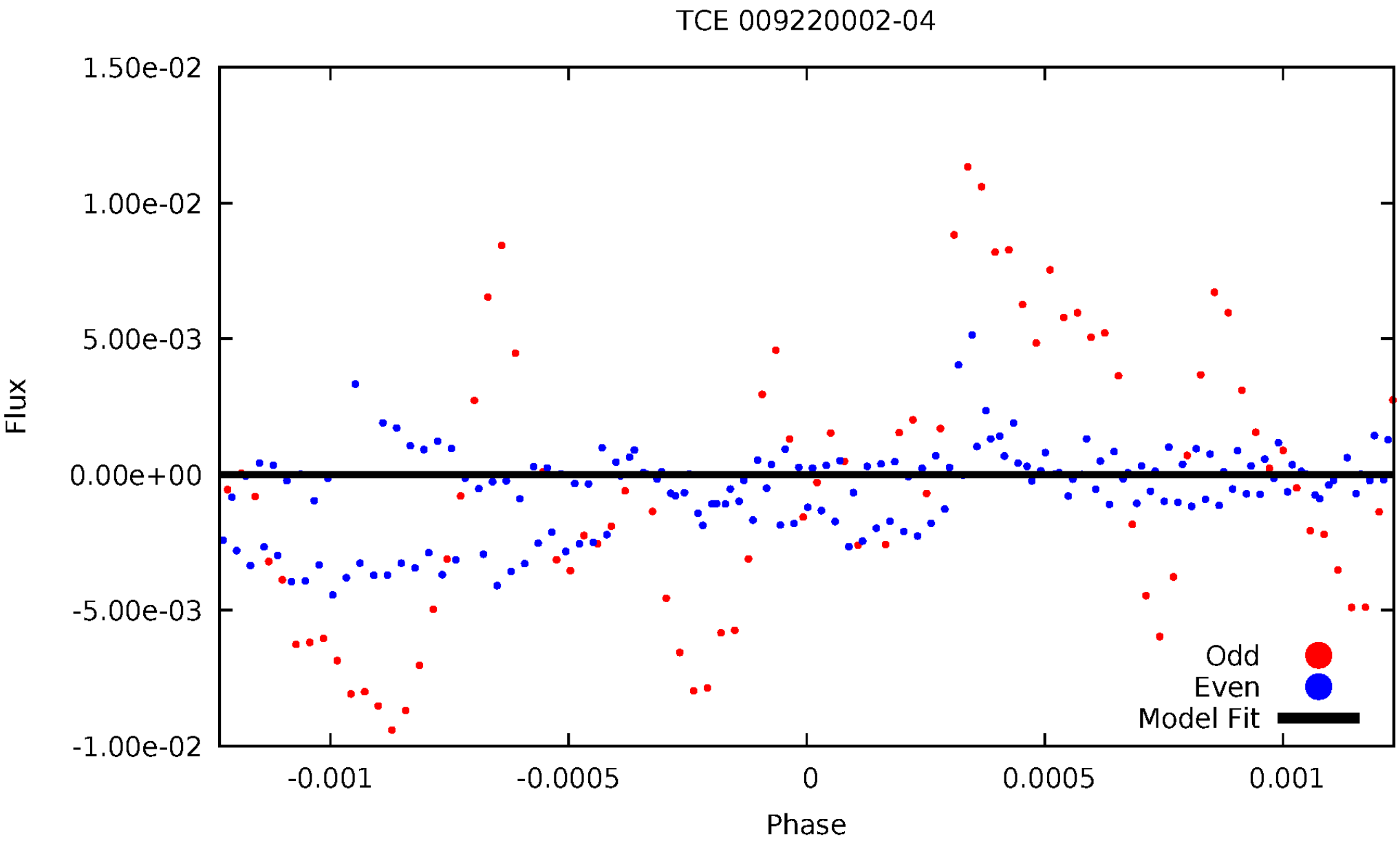
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

TCE 009220002-04, PDC Light Curves

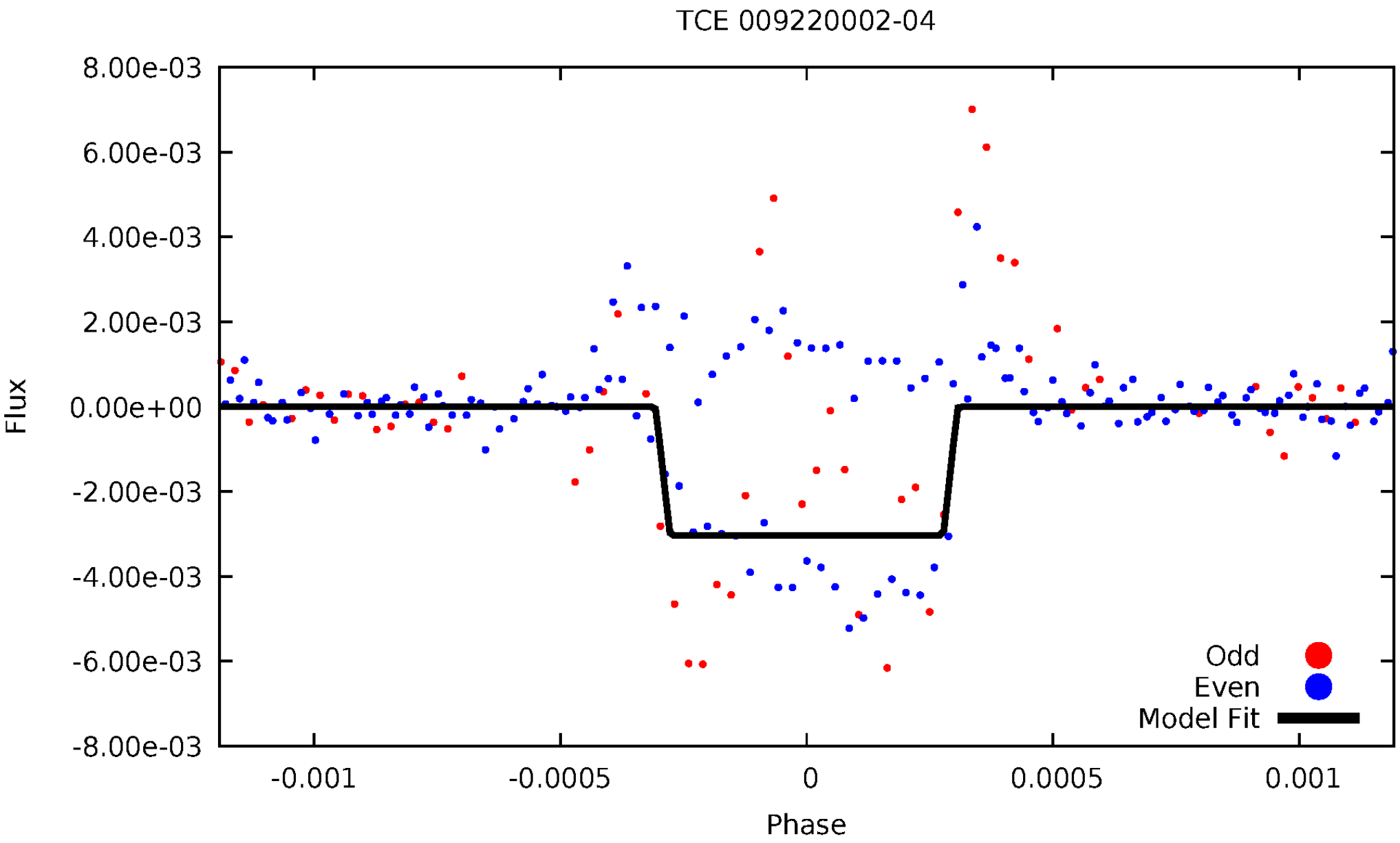



TCE 009220002-04
P = 354.945 days
P = 709.889 days
P = 1419.778 days
Normalized Flux
BKJD
Phase

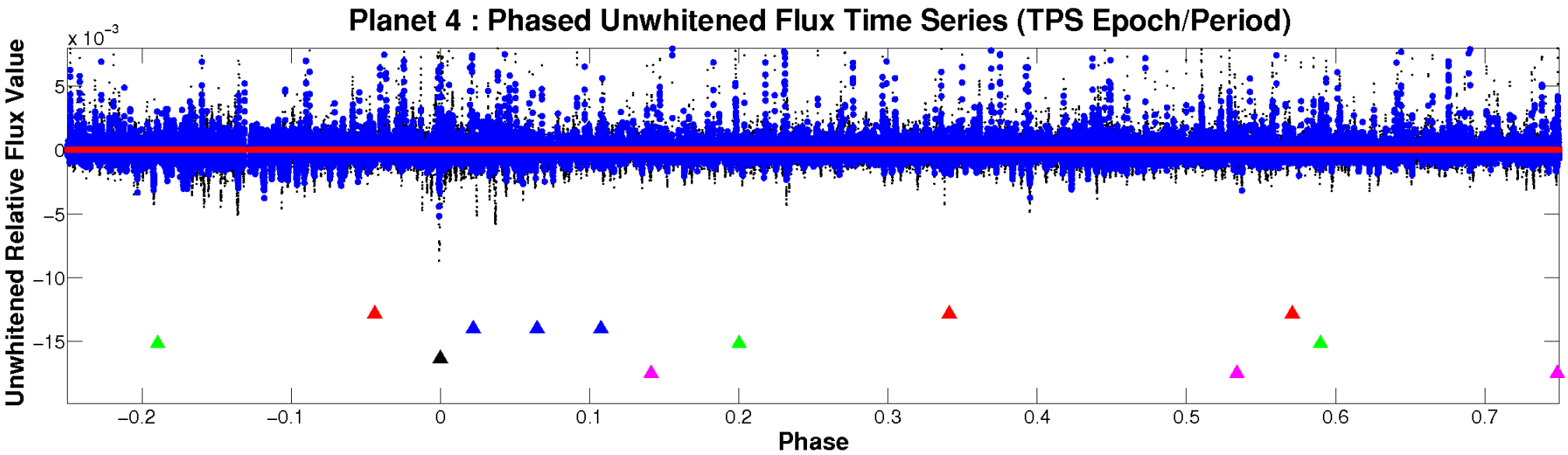
DV Odd/Even

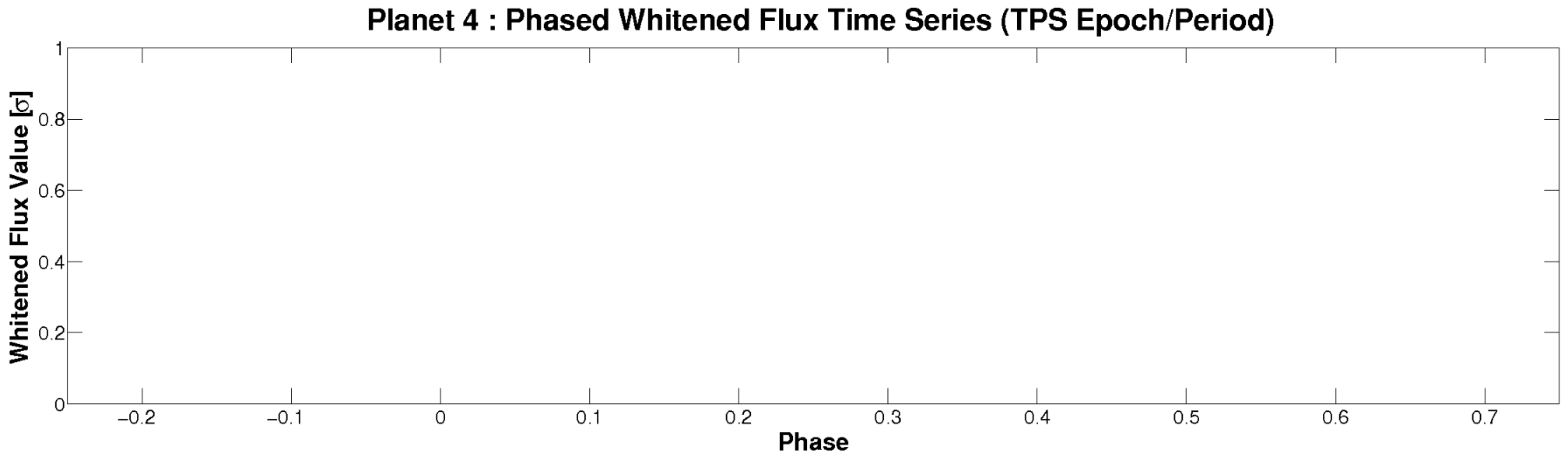

TCE 009220002-04
1.50e-02
1.00e-02
5.00e-03
0.00e+00
-5.00e-03
-1.00e-02
Flux
-0.001
-0.0005
0
0.0005
0.001
Phase
Odd
Even
Model Fit

ALT Odd/Even


TCE 009220002-04
8.00e-03
6.00e-03
4.00e-03
2.00e-03
0.00e+00
-2.00e-03
-4.00e-03
-6.00e-03
-8.00e-03
Flux
-0.001
-0.0005
0
0.0005
0.001
Phase
Odd
Even
Model Fit

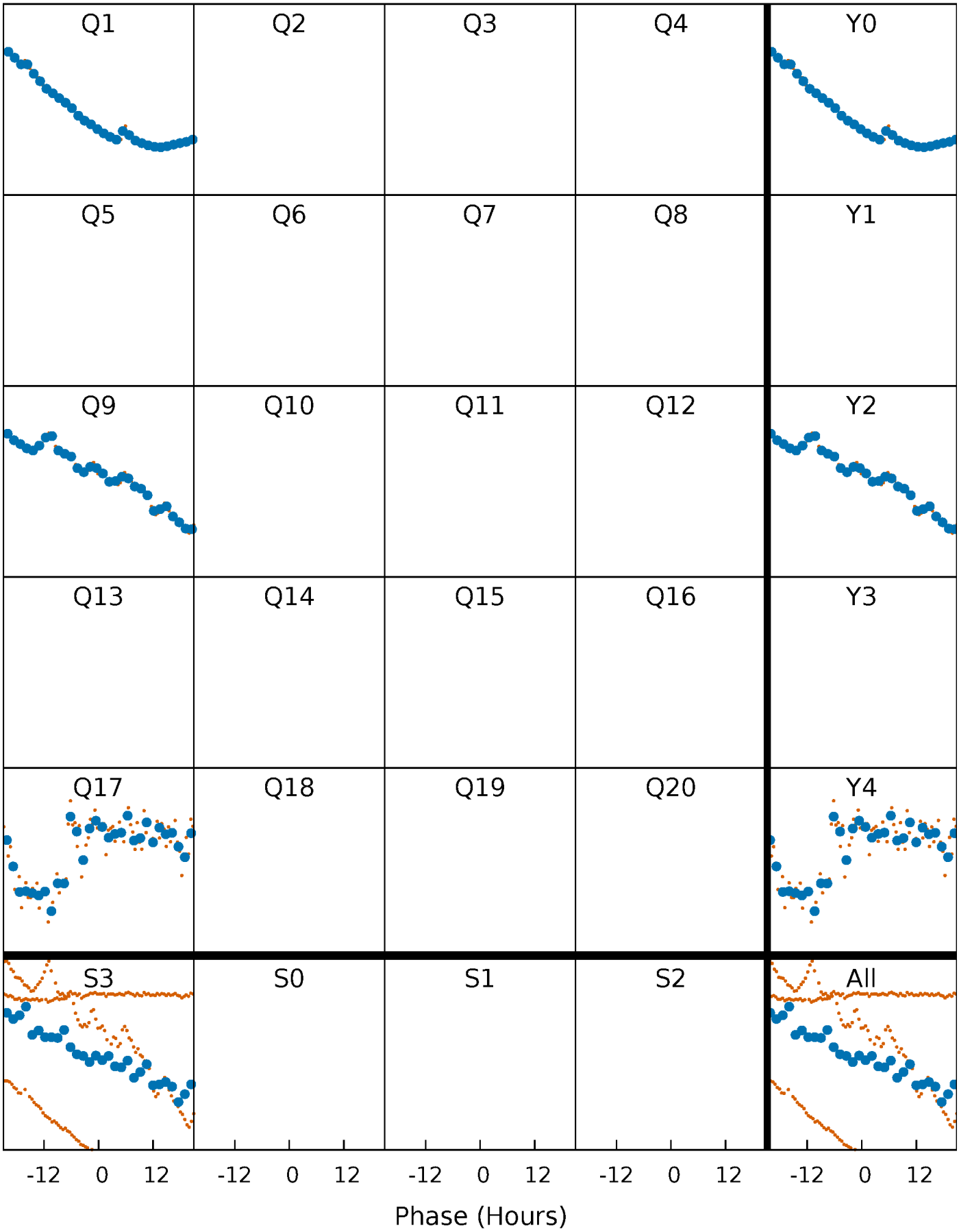
Non-Whitened Vs. Whitened Light Curve





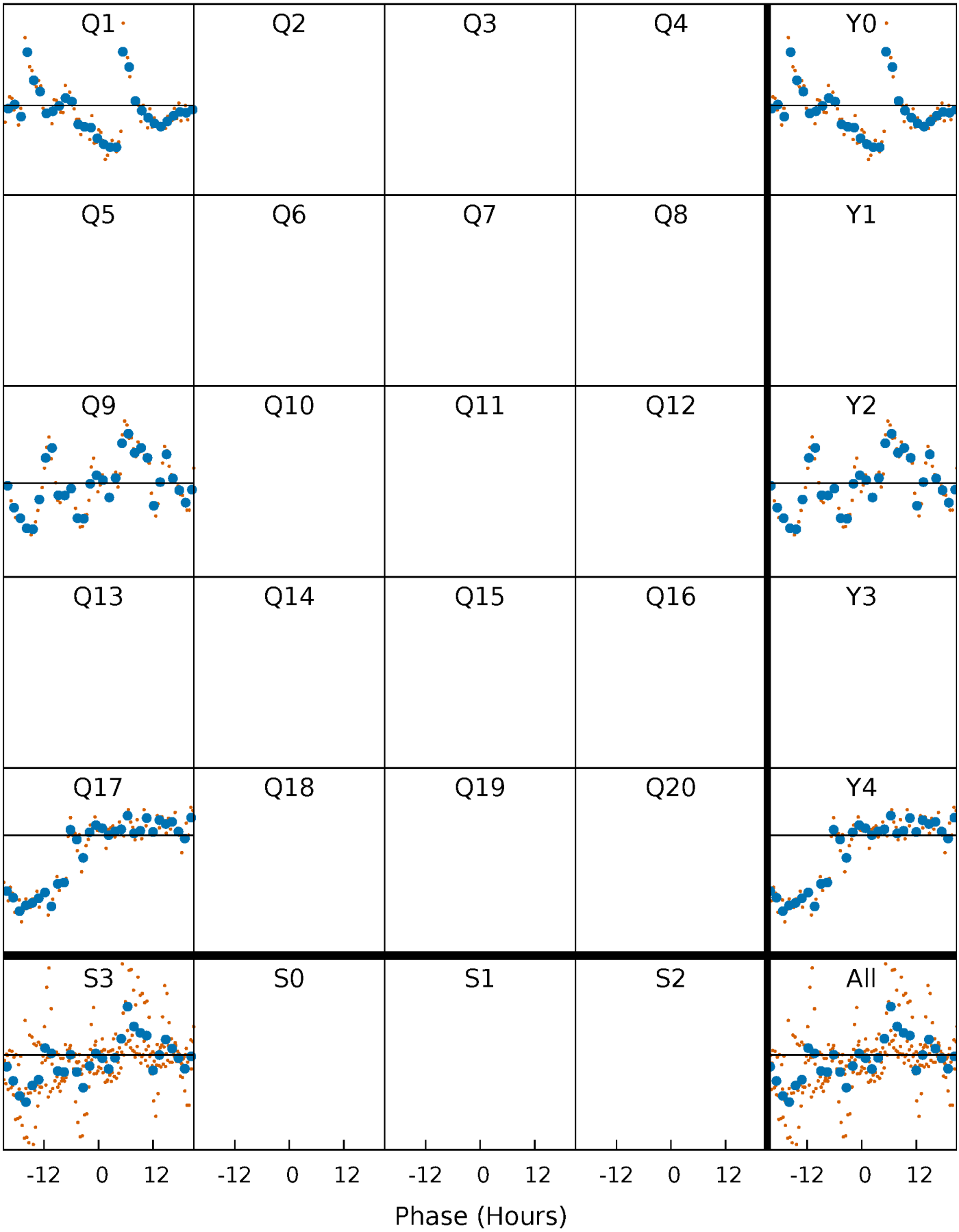
PDC Quarter-Phased Transit Curves

TCE 009220002-04 P=709.889119 Days T_0=144.425004 (BKJD)



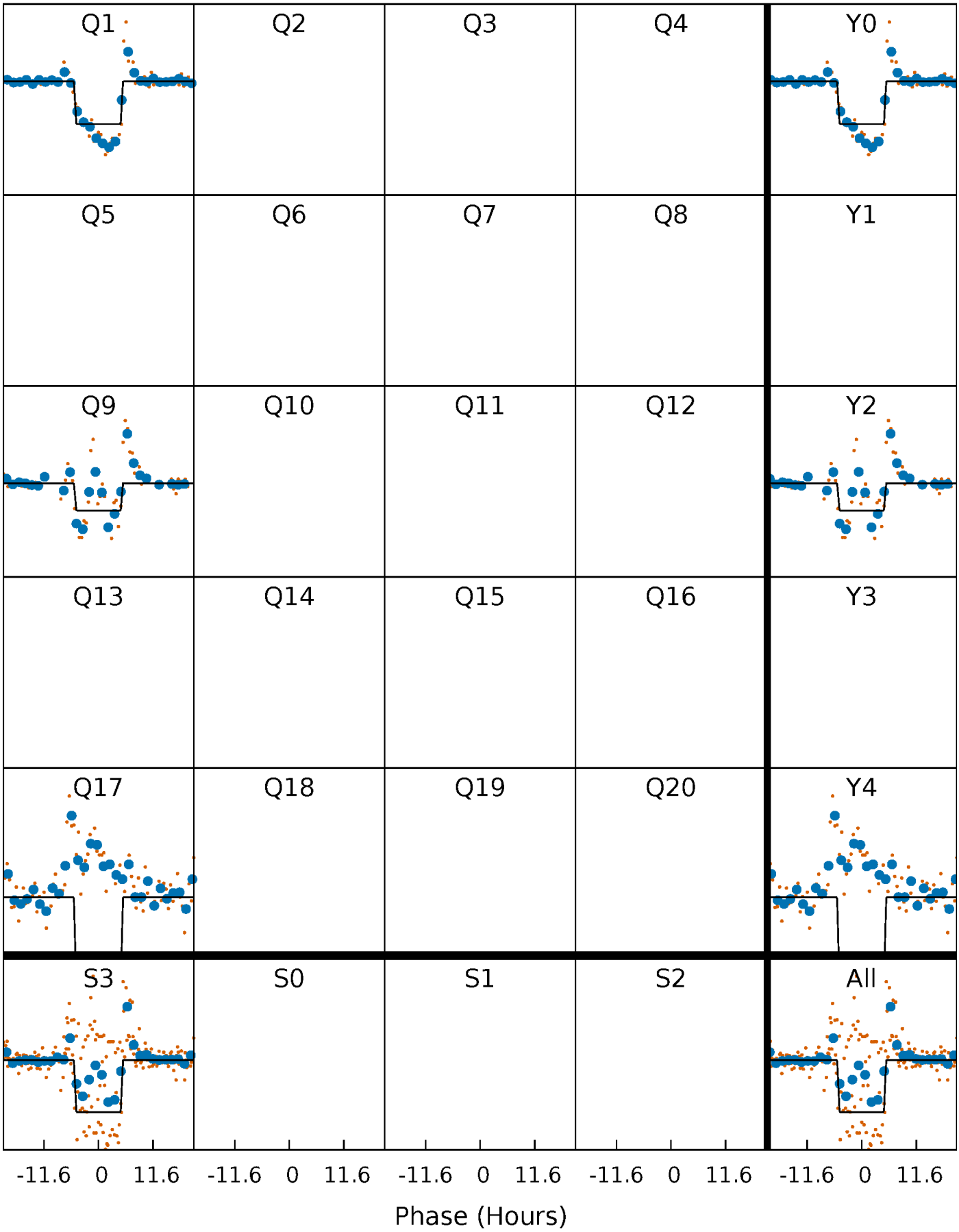
DV Quarter-Phased Transit Curves

TCE 009220002-04 P=709.889119 Days T_0=144.425004 (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

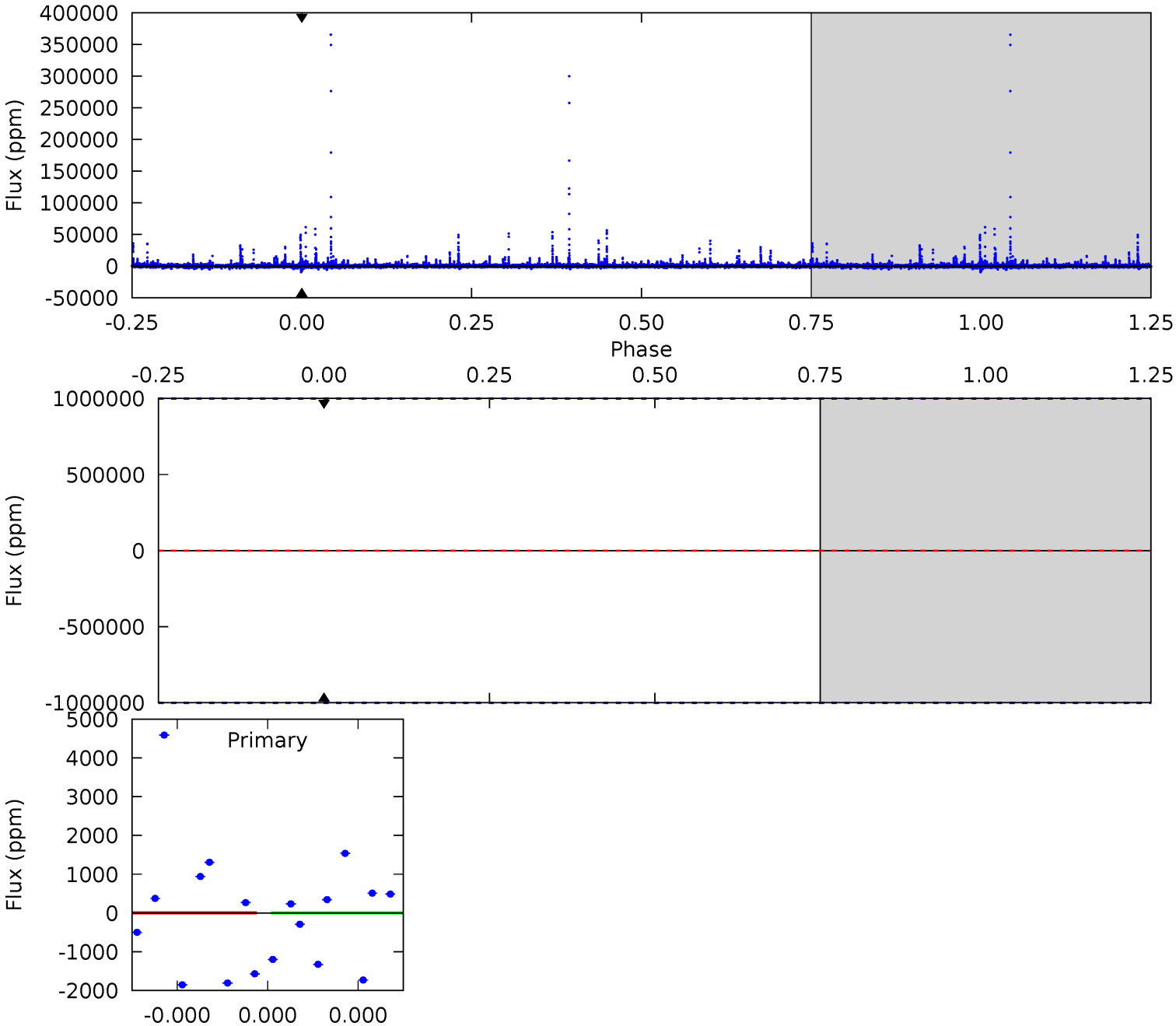
TCE 009220002-04 P=709.889119 Days T_0=144.426545 (BKJD)



DV Model-Shift Uniqueness Test

009220002-04, P = 709.889119 Days, E = 144.425004 Days

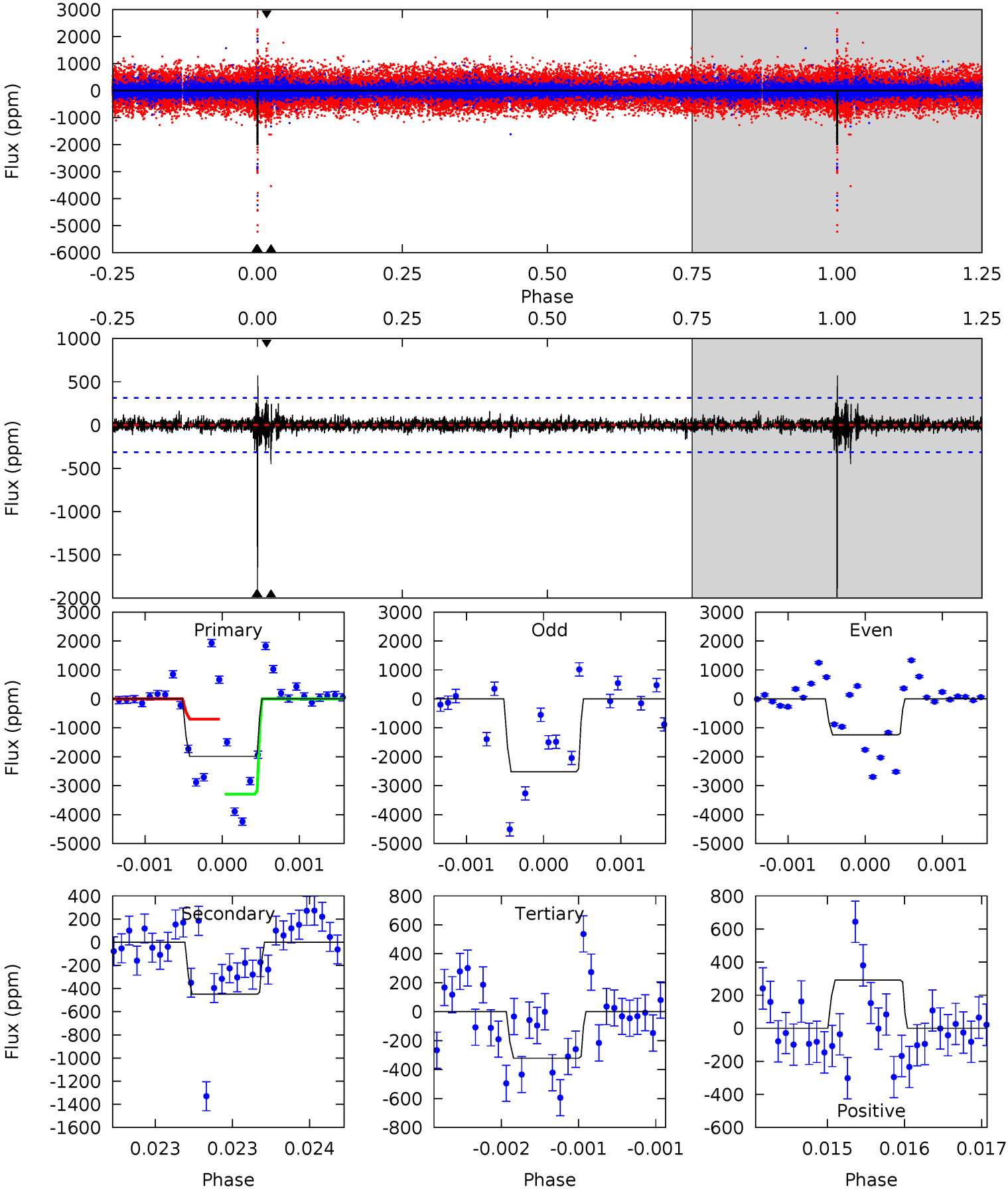
Pri	Sec	Ter	Pos	FA_1	FA_2	F_{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



Alt Model-Shift Uniqueness Test

009220002-04, P = 709.889119 Days, E = 144.426545 Days

Pri	Sec	Ter	Pos	FA_1	FA_2	F_{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
35.1	7.92	5.67	5.14	5.54	3.43	0.64	29.4	29.9	2.25	2.78	13.7	0.68	0.22	0



Stellar Parameters For KIC 009220002

	$T_{\rm eff}(K)$	$\log(g)$	[Fe/H]	R ($R_\odot$)	$M(M_\odot)$	$p_\star$ (g·cm^{-3})
	5364^{+177}_{-177}	$4.529^{+0.104}_{-0.095}$	$-0.540^{+0.350}_{-0.300}$	$0.754^{+0.102}_{-0.092}$	$0.702^{+0.100}_{-0.036}$	$2.302^{+1.059}_{-0.612}$
	+3%/-3%	+2%/-2%	+65%/-56%	+14%/-12%	+14%/-5%	+46%/-27%
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 009220002-04 / KOI

Detrend	Depth (ppm)	R_p ($R_\oplus$)	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	0±1000000	$6.63^{+6.83}_{-4.70}$	244^{+11}_{-12}	4086^{+11836}_{-17514}	$42944^{+4311068}_{-2840180}$
Alt.	-449±57	$7.57^{+7.30}_{-5.28}$	244^{+11}_{-11}	3179^{+1545}_{-534}	8585^{+83517}_{-6420}

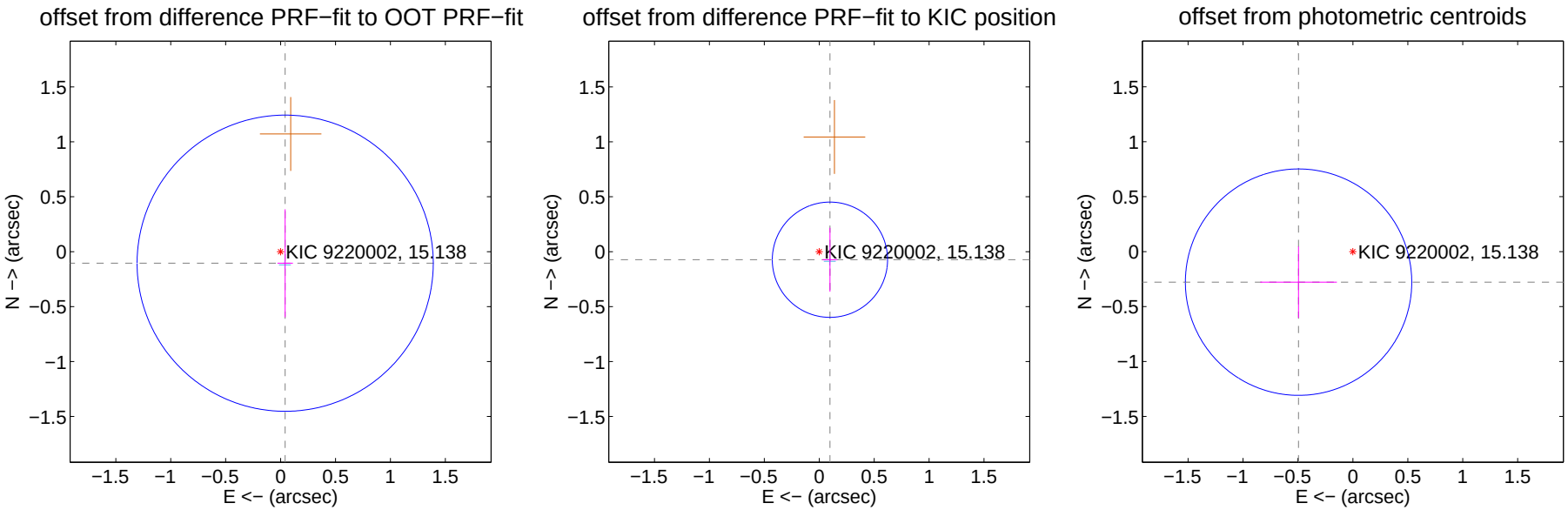
T_{max} = Theoretical Maximum Planetary Temperature
T_{obs} = Observed Planetary Temperature (Assuming A=0.3)
A_{obs} = Observed Albedo (Assuming T=0)

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

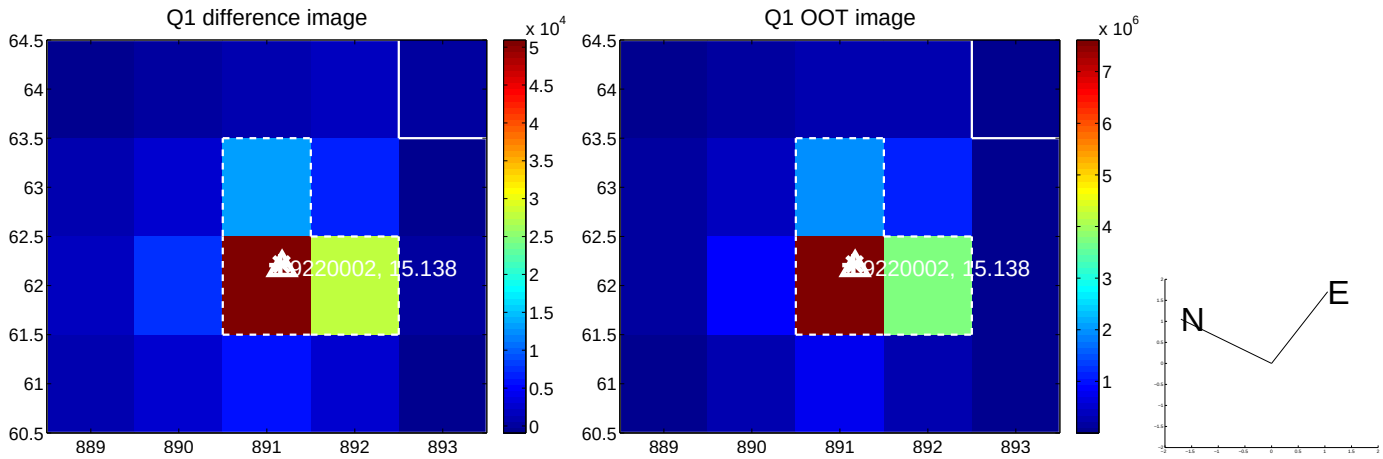
Supplemental centroid analysis for 009220002-04. Kepler magnitude: 15.14. Transit SNR -1.00
There are 1 quarters with good PRF difference image offsets
The direct PRF centroid is offset from the target star catalog position by about 0.05 arcsec

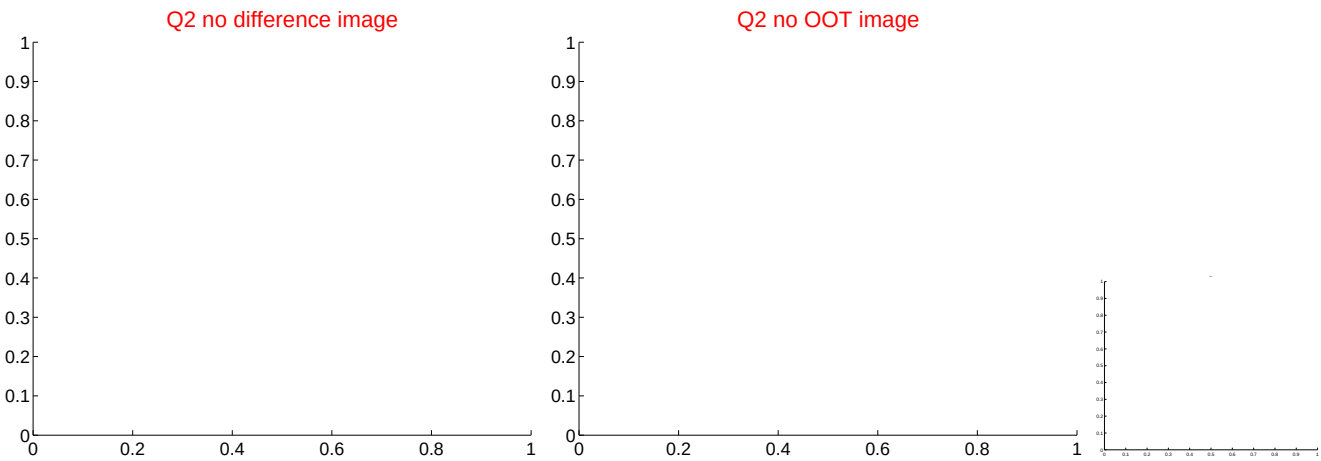
	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.113 ± 0.449	0.25	-0.042 ± 0.070	-0.105 ± 0.491
PRF-fit source offset from KIC position	0.122 ± 0.175	0.70	-0.097 ± 0.068	-0.073 ± 0.291
photometric centroid source offset	0.57 ± 0.34	1.65	0.49 ± 0.35	-0.28 ± 0.33

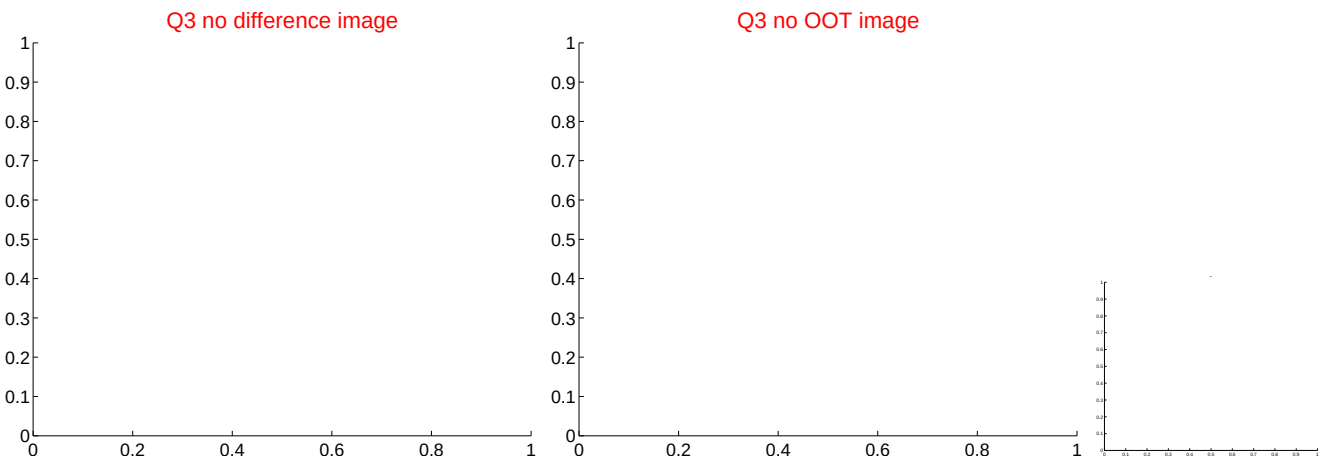


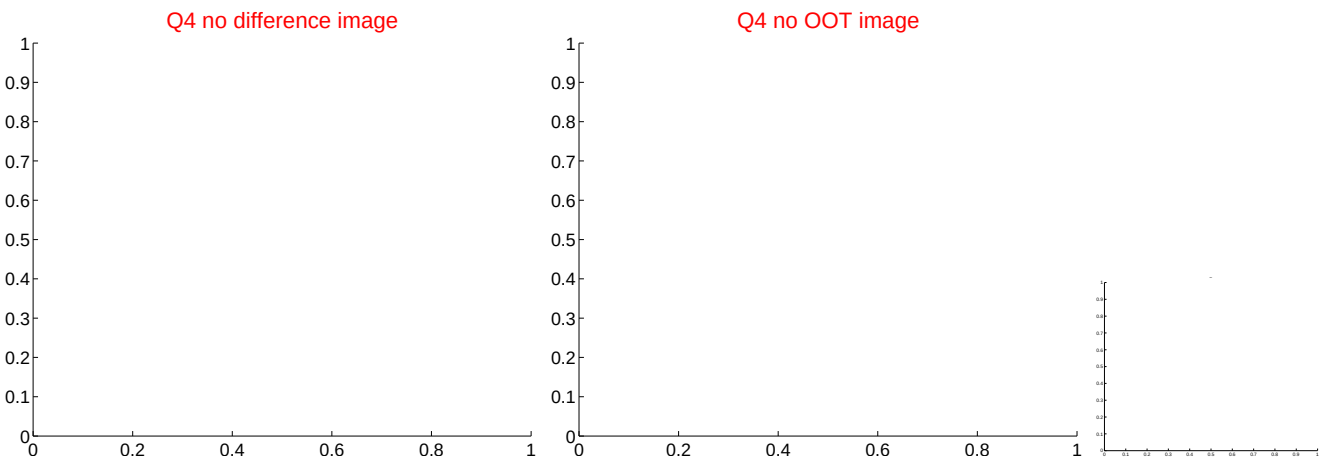
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one-σ uncertainty. Blue circle: three-σ. Red *: 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 ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.

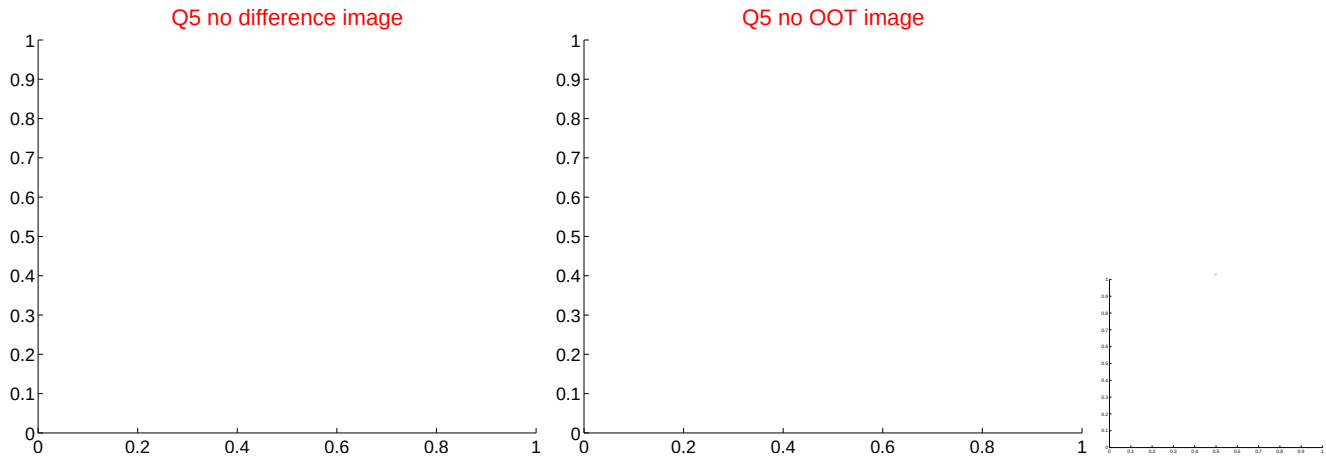


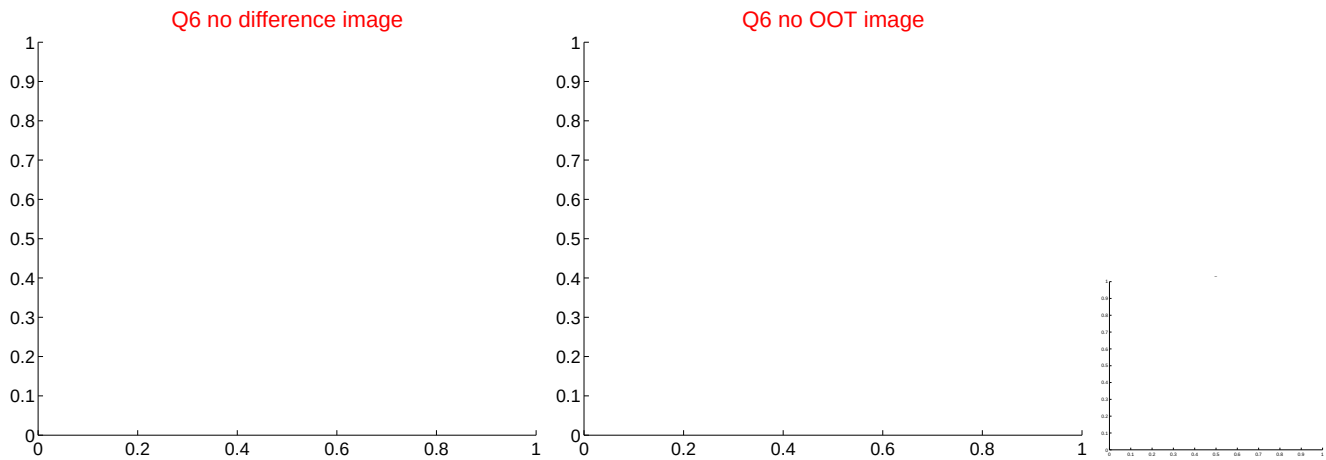


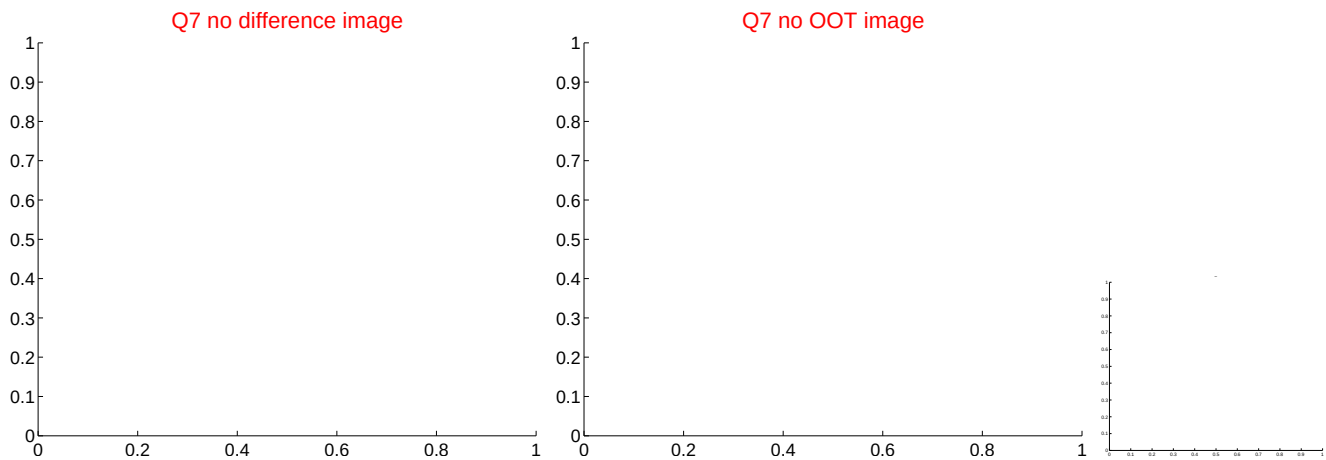


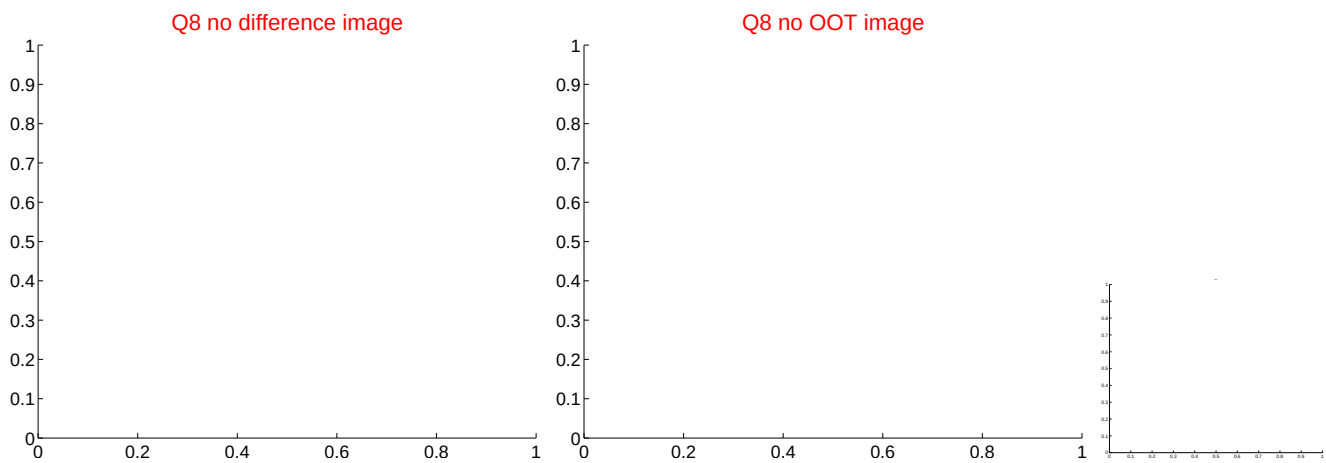


white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.

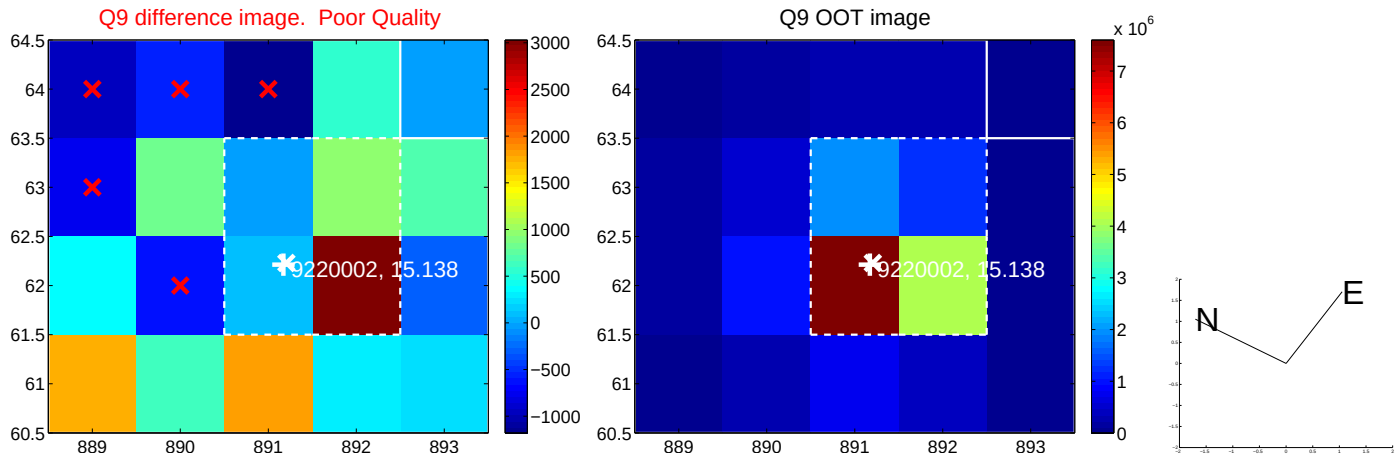


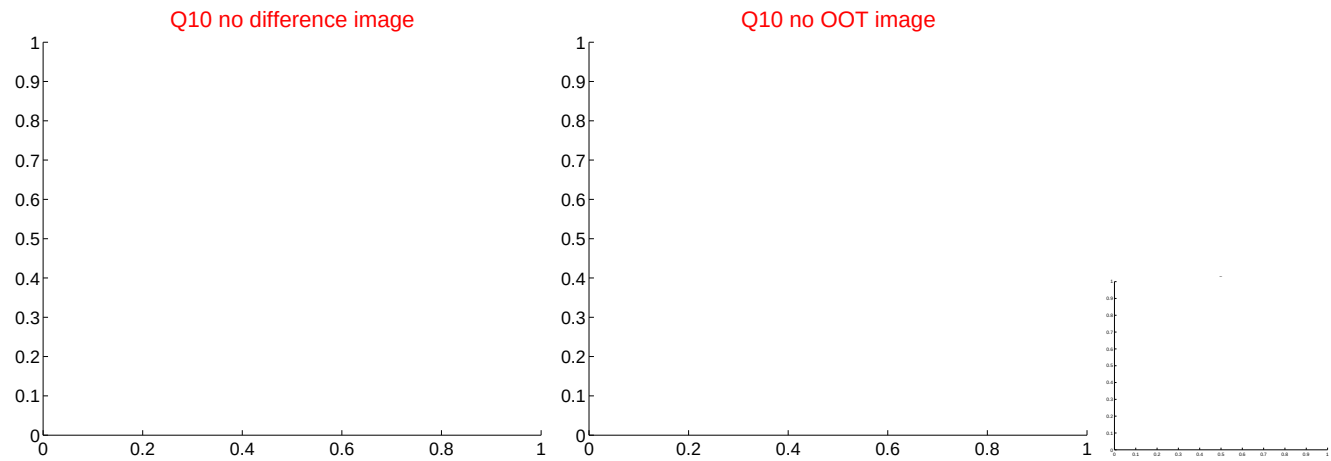


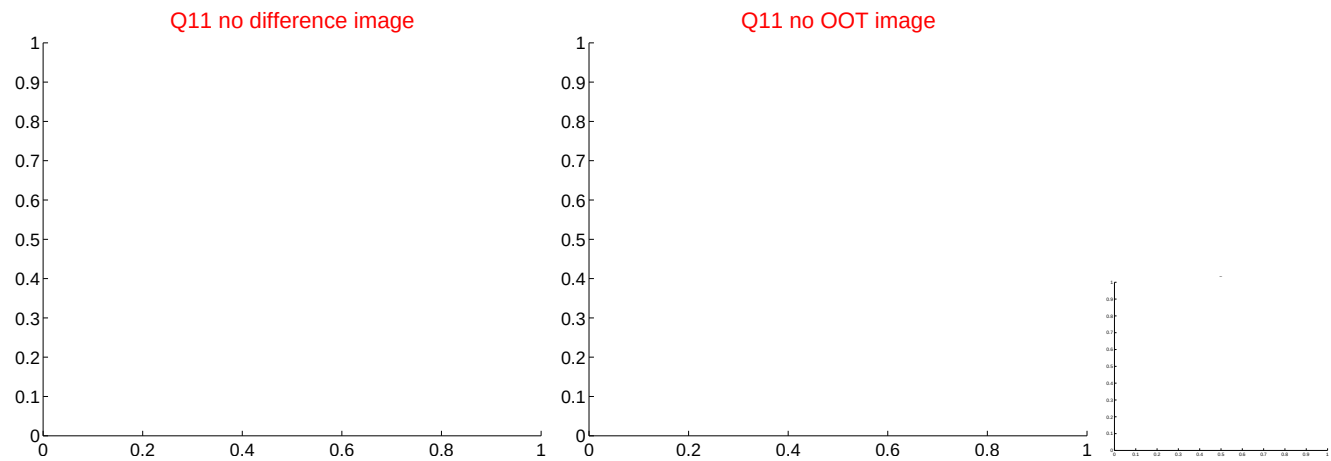


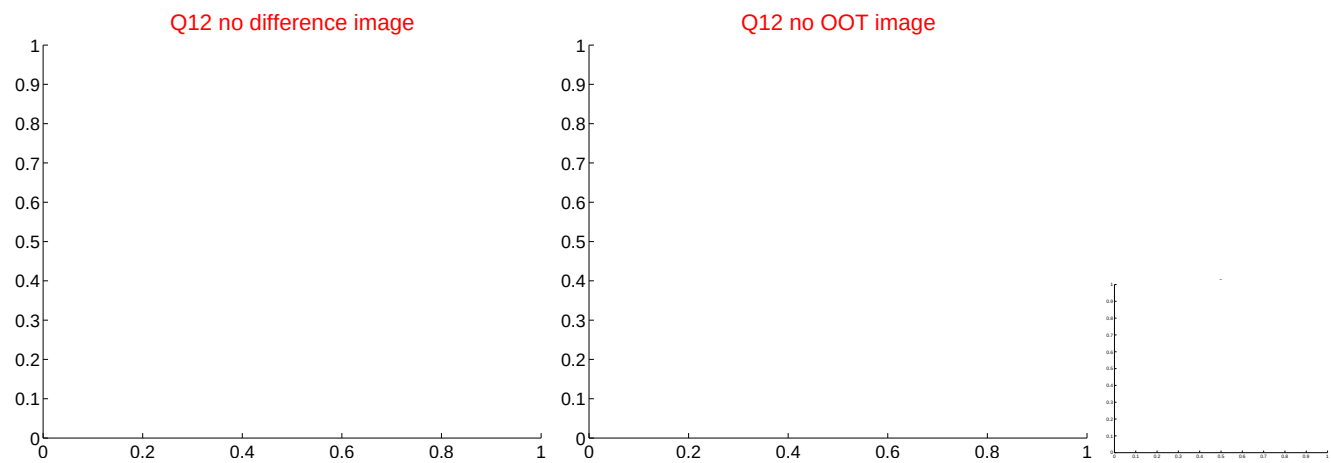


white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.

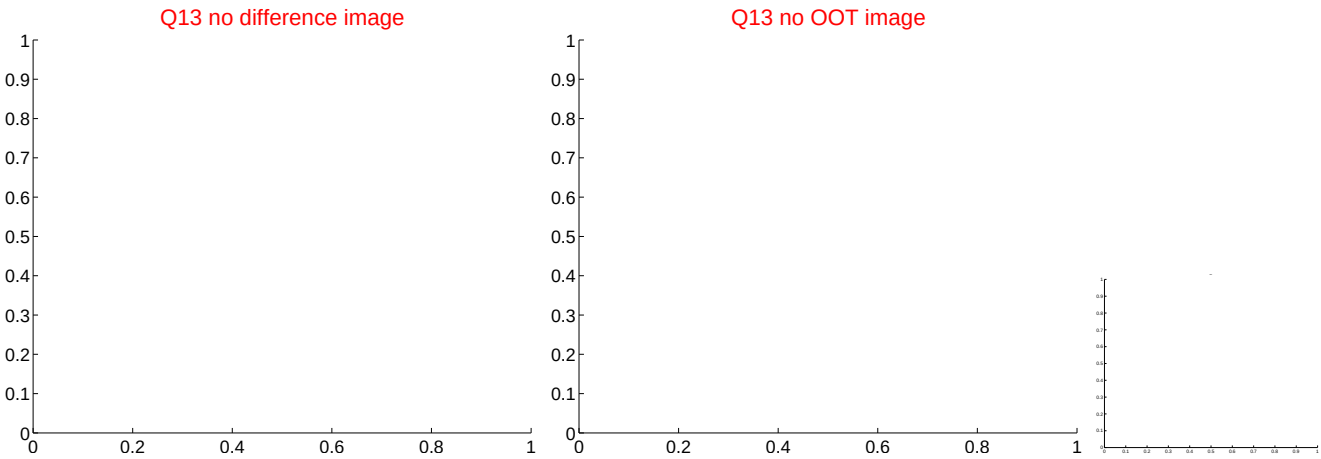


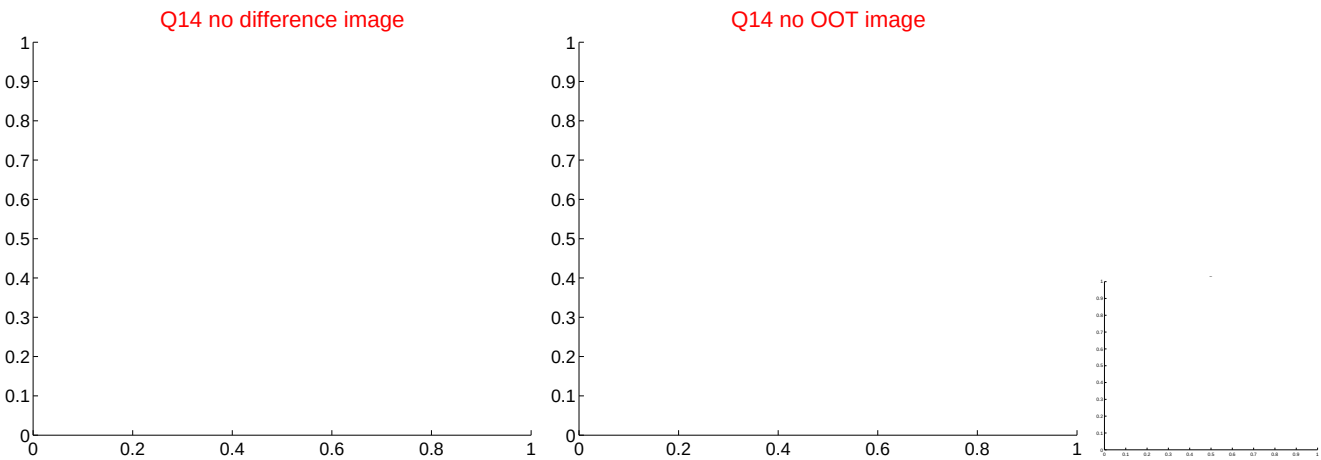


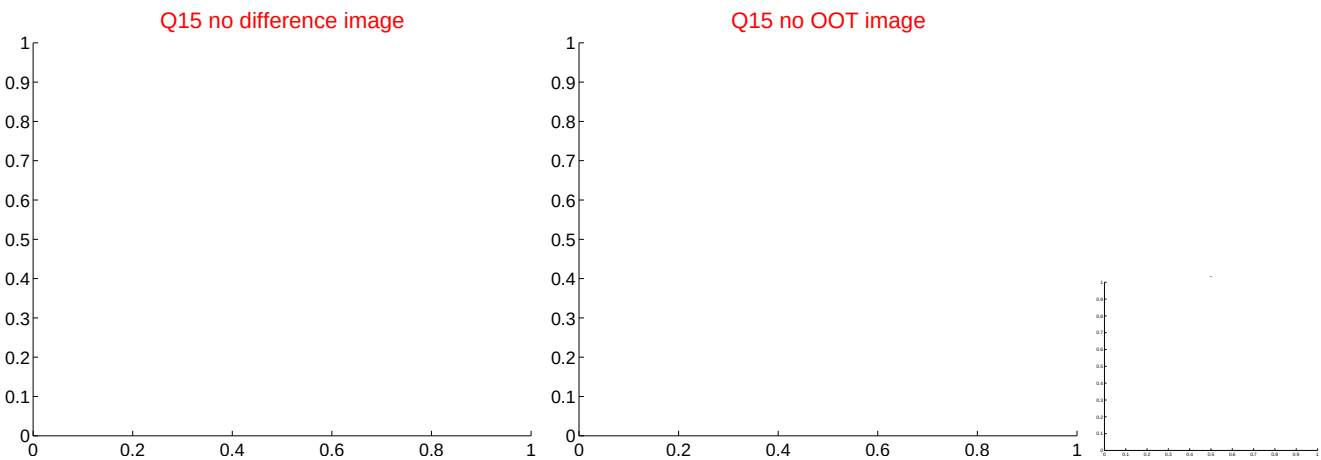


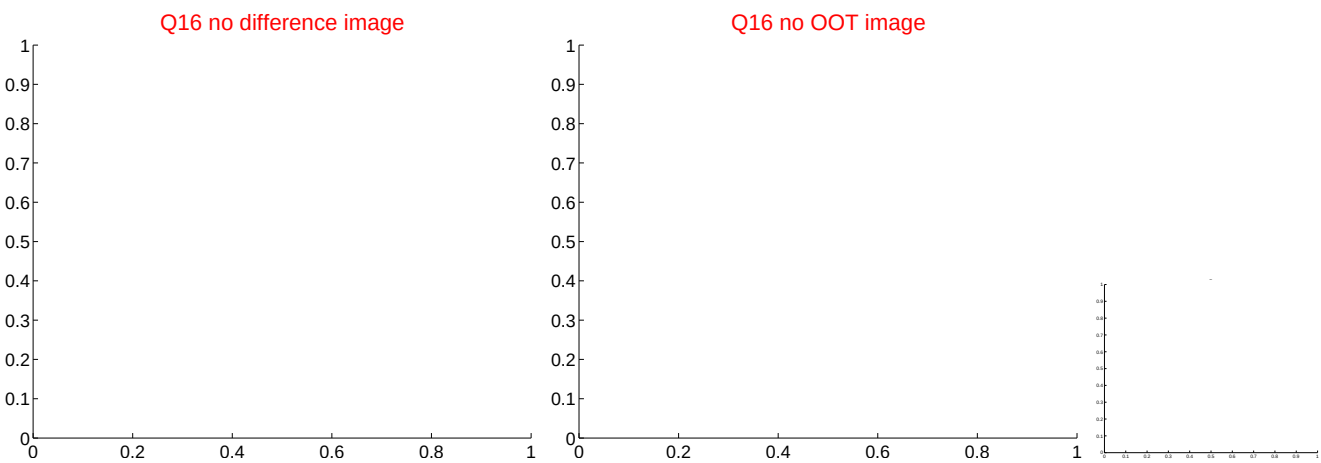


white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.

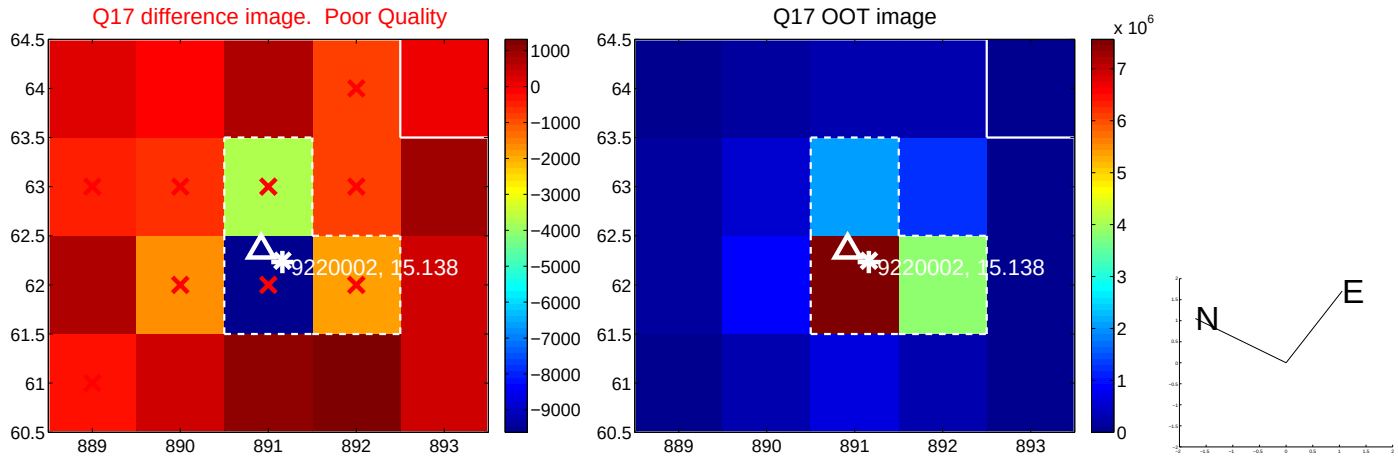


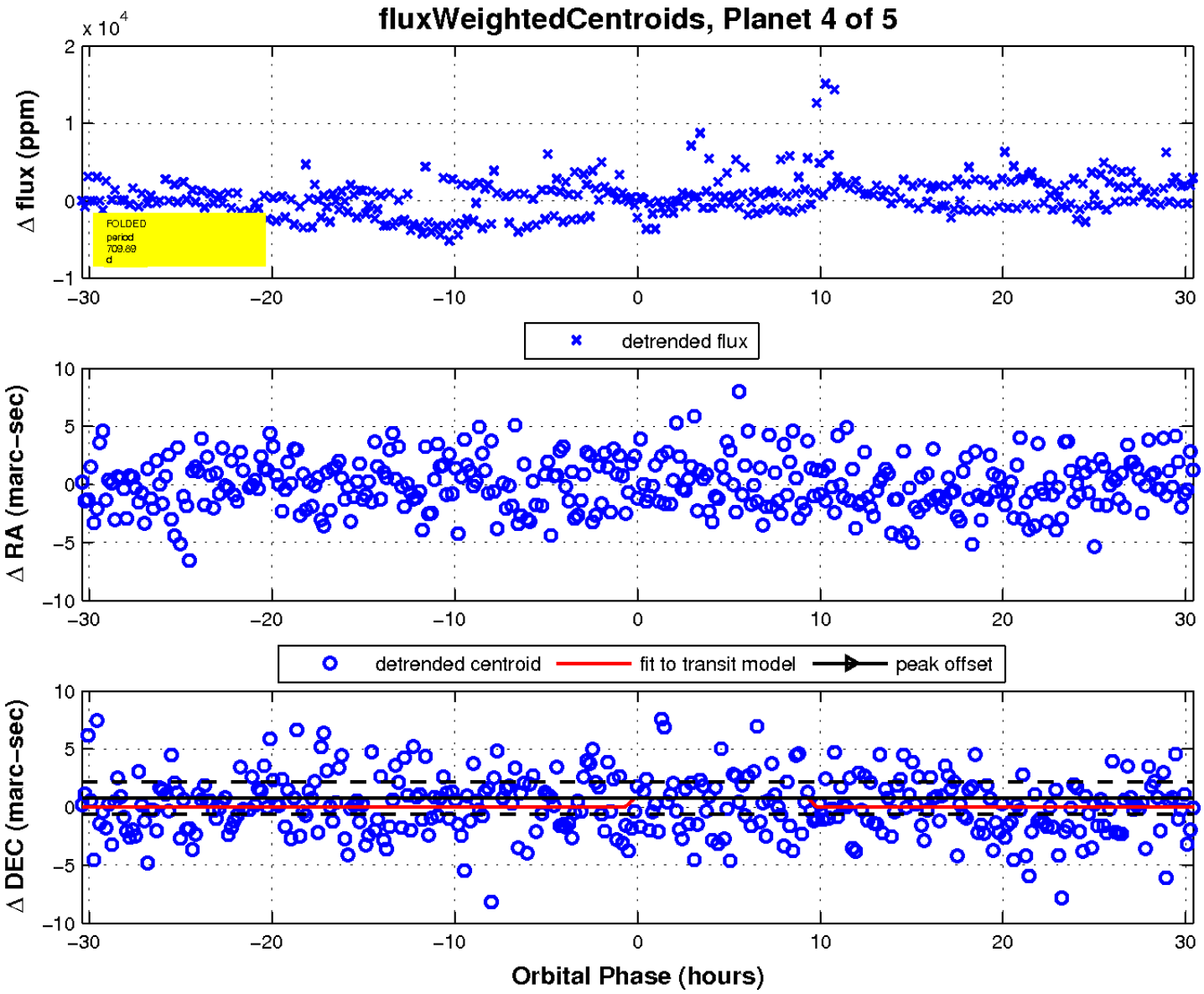




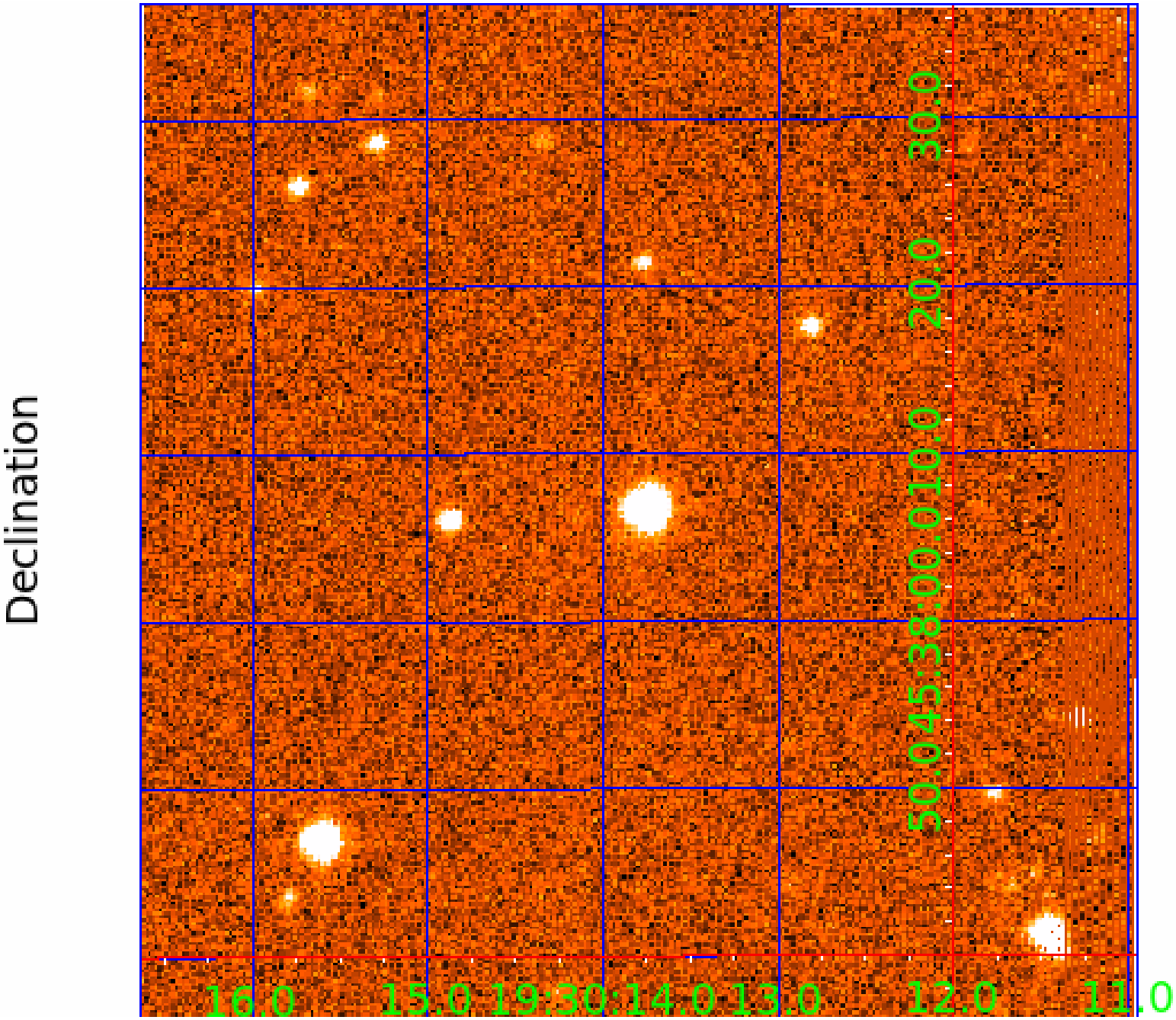


white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.





UKIRT Image


Declination
50:45:38.00:
30.0
20.0
10.0
16.0
15.0
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13.0
12.0
11.0

KIC 009220002

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 ($S_\oplus$)
009220002-01	OBS	No	436.550310	386.570460	3029.6	15.981	21.9	8.0	0.75	5364	7.86	0.42
009220002-03	OBS	No	433.263943	563.175136	2690.7	4.767	18.5	12.1	0.75	5364	5.14	0.42
009220002-04	OBS	No	709.889119	144.425004	1682.8	10.500	18.4	-1.0	0.75	5364	3.05	0.22
009220002-05	OBS	No	431.152578	523.443317	1824.3	8.893	16.8	7.9	0.75	5364	3.18	0.43

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009220002-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009220002-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
009220002-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_NOFITS
009220002-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—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.

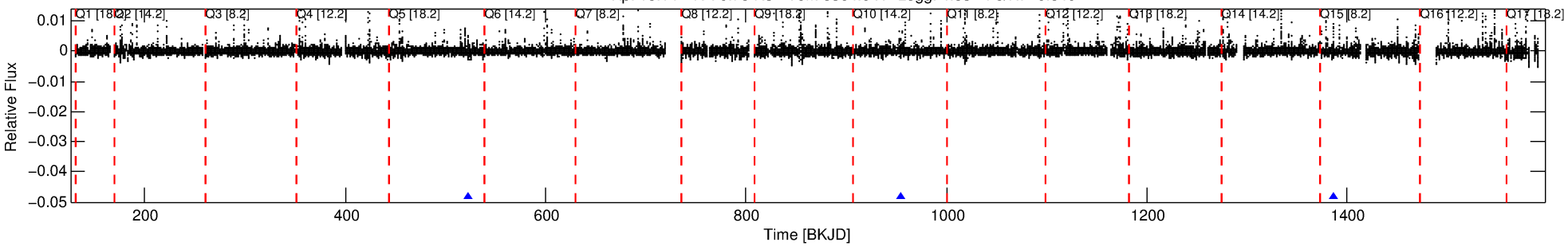
Ephemeris Match Information For 009220002-05

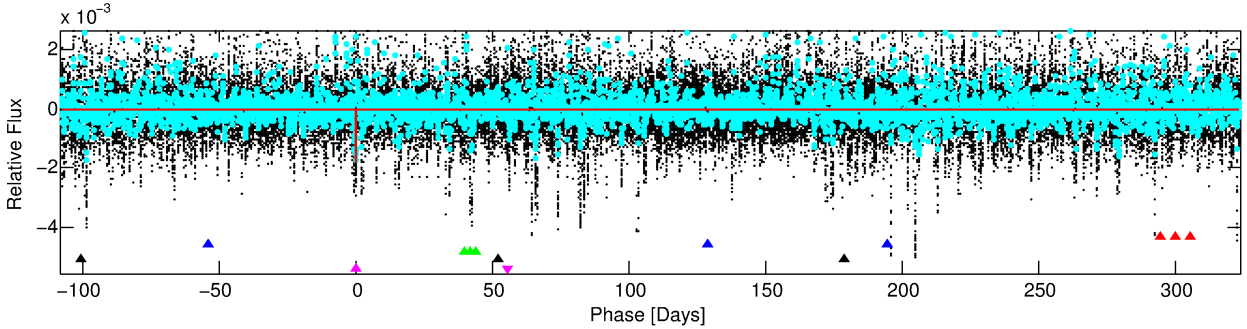
No Significant Match Found

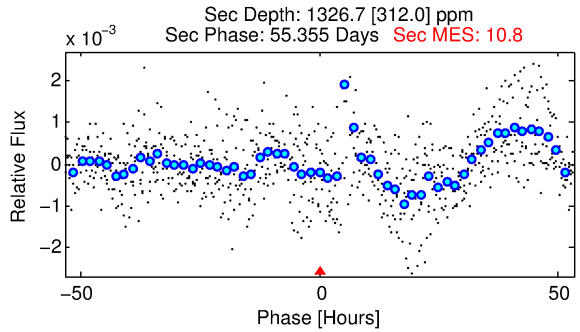
DV One-Page Summary

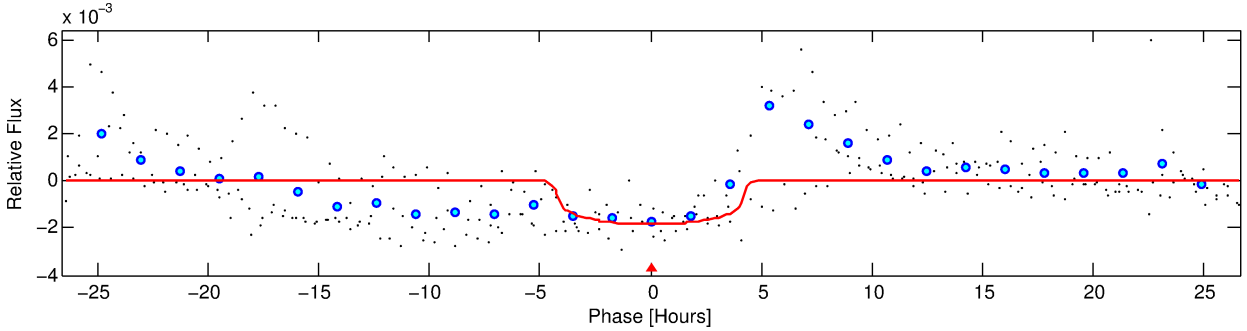
KIC: 9220002 Candidate: 5 of 5 Period: 431.153 d

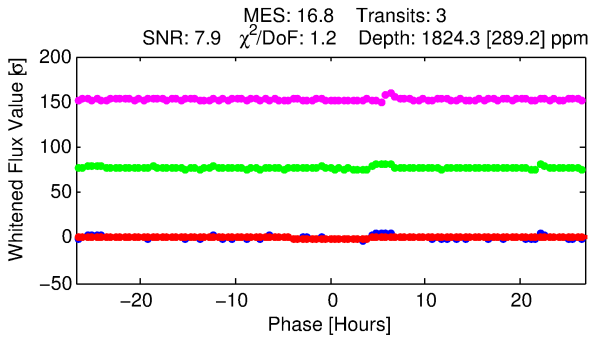
Kp: 15.14 R*: 0.75 Rs Teff: 5364.0 K Logg: 4.53 Fe/H: −0.540

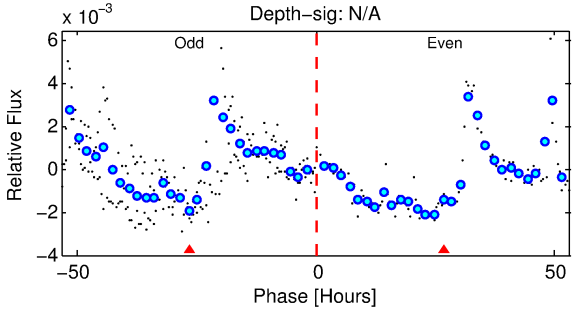


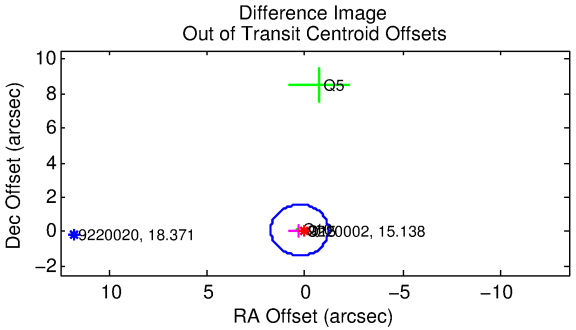












DV Fit Results:

Period = 431.15258 [0.00746] d
Epoch = 523.4433 [0.0100] BKJD
Rp/R* = 0.0387 [0.0194]
a/R* = 380.94 [765.00]
b = 0.14 [13.66]

Seff = 0.43 [0.10]
Teq = 206 [12] K
Rp = 3.18 [1.65] Re
a = 0.9924 [0.1195] AU

Ag = 71016.82 [74261.43] [0.96σ]
Teffp = 5206 [1351] K [3.70σ]

DV Diagnostic Results:

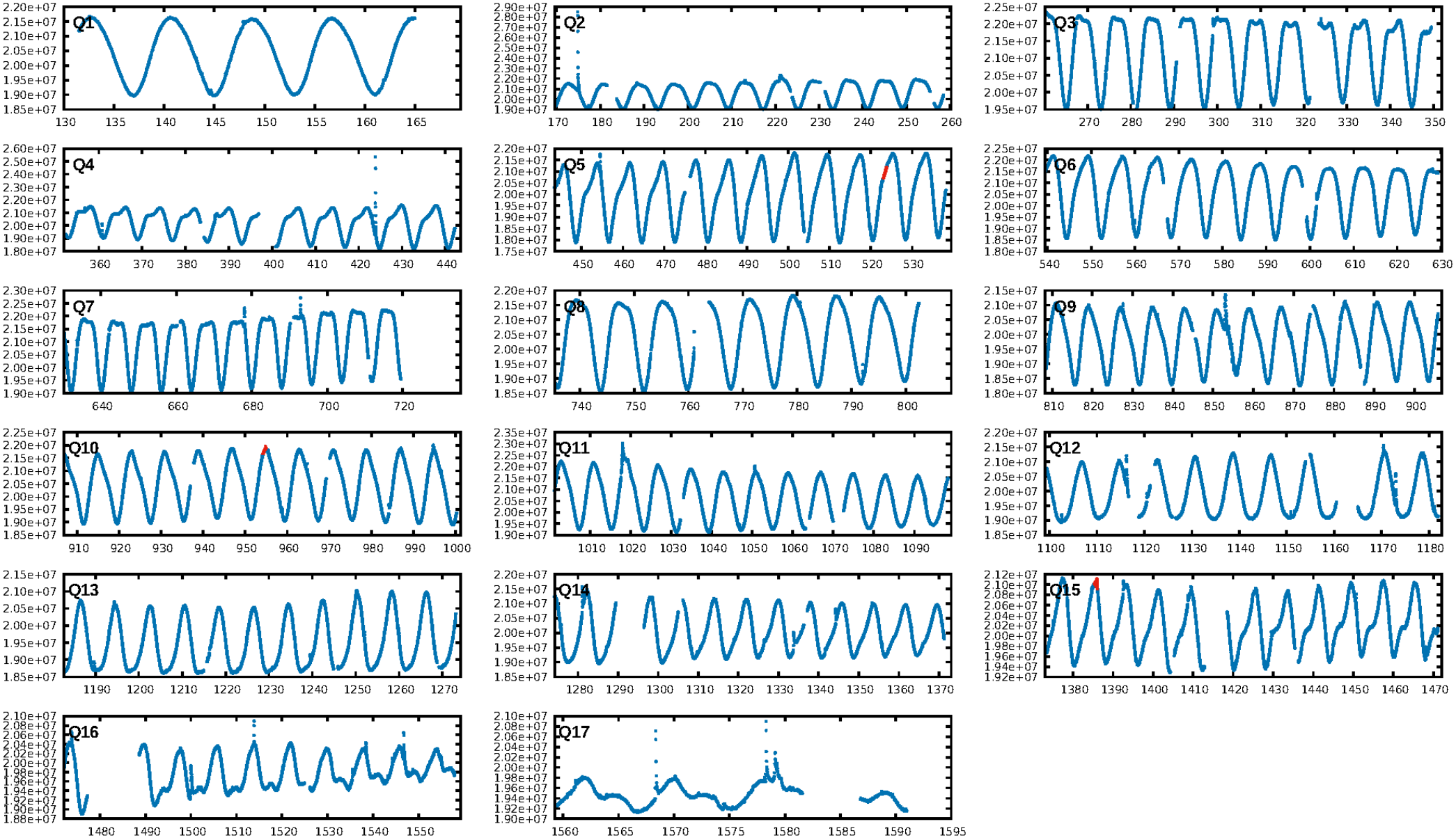
ShortPeriod−sig: N/A
LongPeriod−sig: 100.0% [5.02σ]
ModelChiSquare2−sig: 4.5%
ModelChiSquareGof−sig: 90.5%
Bootstrap−pfa: N/A
RollingBand−fgt: 1.00 [3/3]
GhostDiagnostic−chr: 3.712

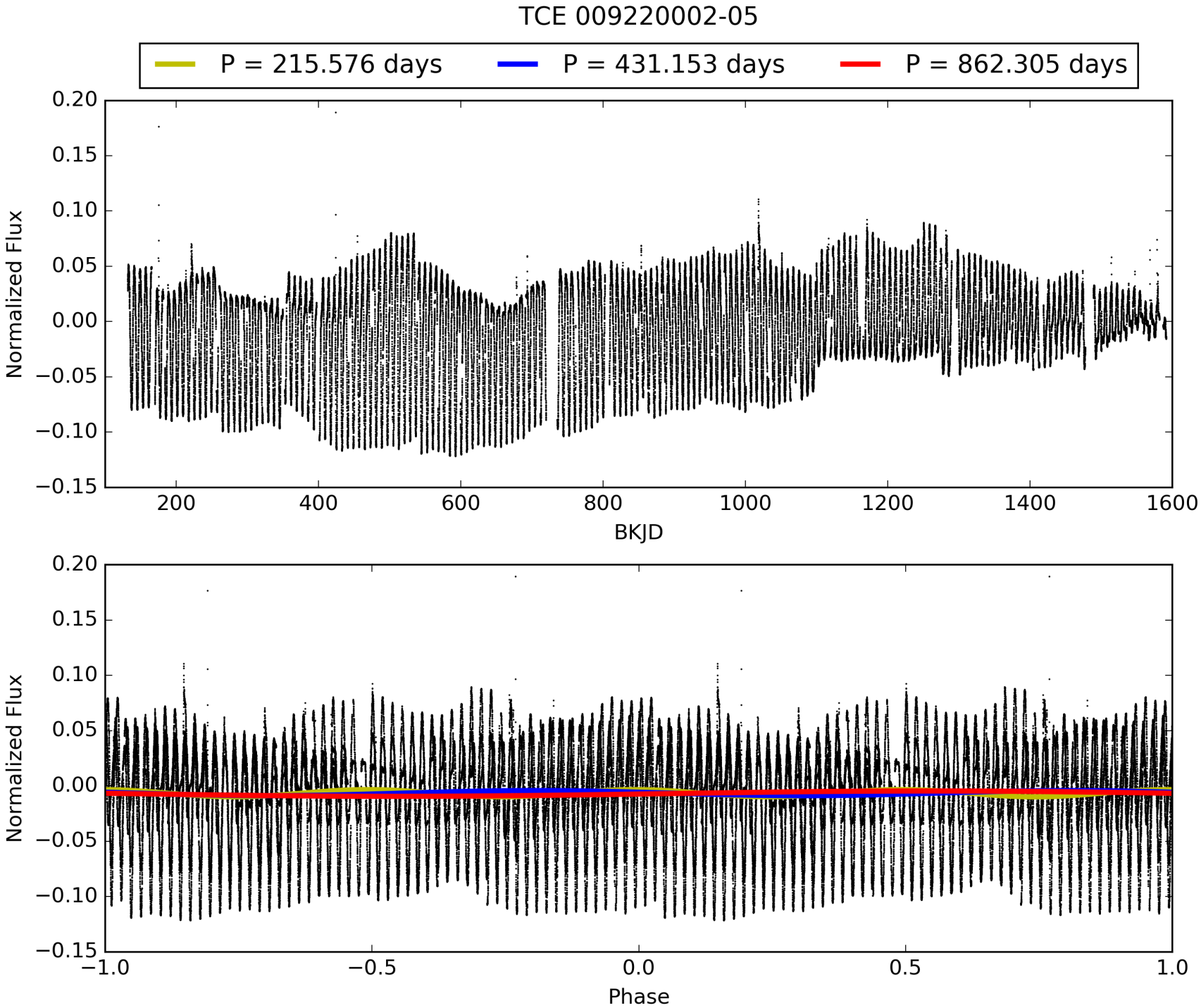
Centroid−sig: N/A
Centroid−so: 0.175 arcsec [0.32σ]
OotOffset−rm: 0.293 arcsec [0.60σ]
KicOffset−rm: 0.210 arcsec [0.42σ]
OotOffset−st: 1/1/0/1 [3]
KicOffset−st: 1/1/0/1 [3]
DiffImageQuality−fgm: 0.00 [0/3]
DiffImageOverlap−fno: 1.00 [3/3]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31−Jan−2016 22:09:36 Z

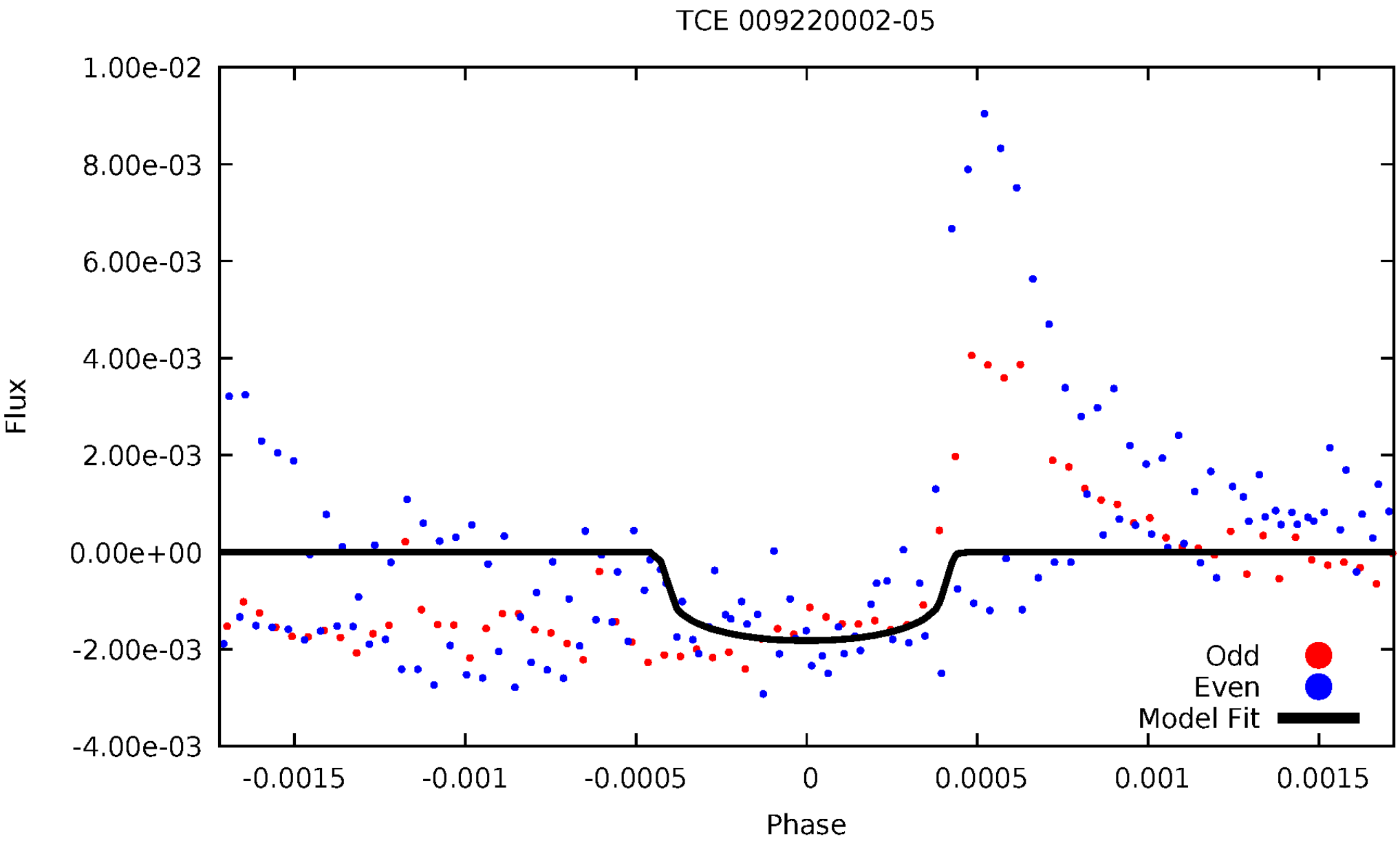
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

TCE 009220002-05, PDC Light Curves

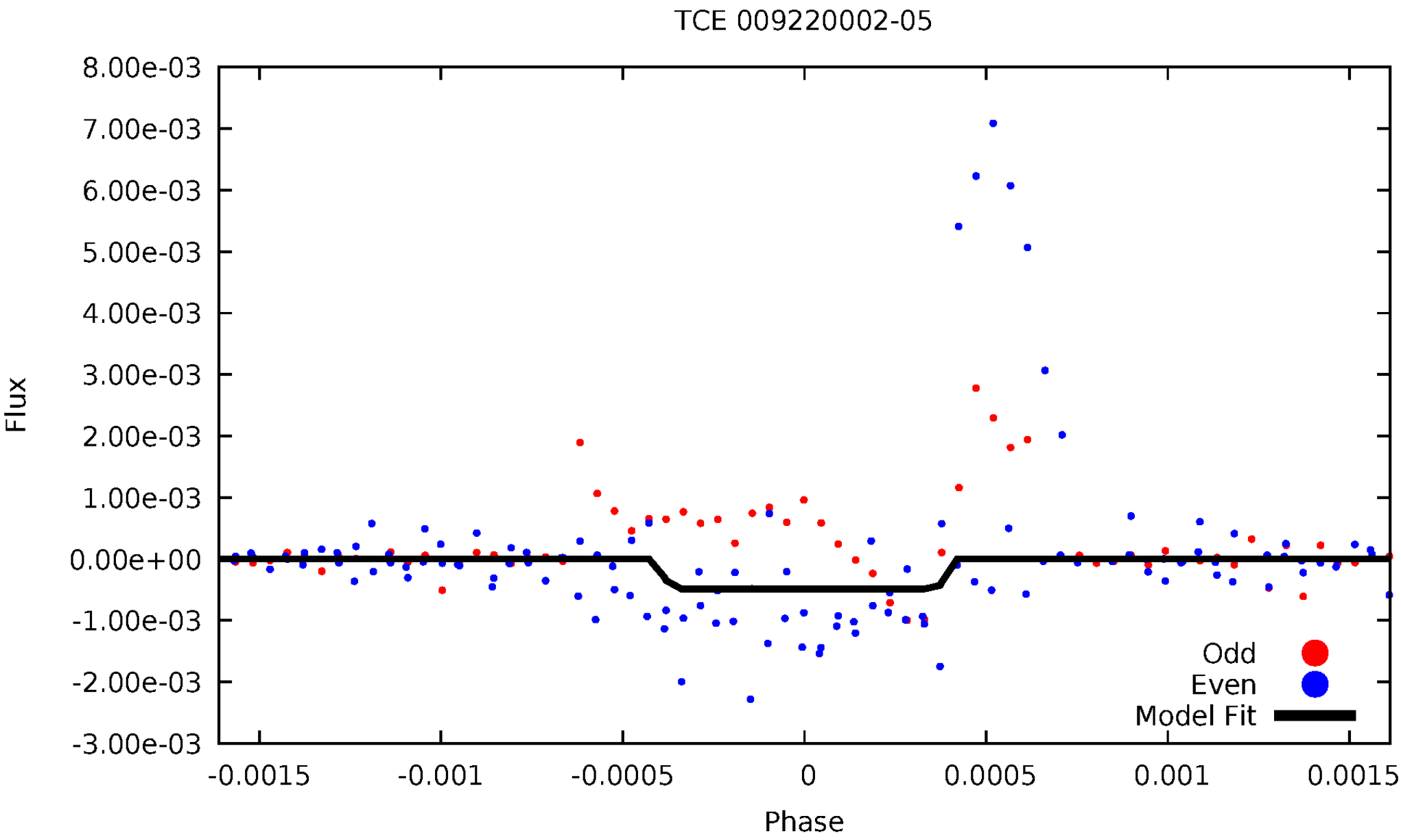



TCE 009220002-05
P = 215.576 days
P = 431.153 days
P = 862.305 days
Normalized Flux
BKJD
Normalized Flux
Phase

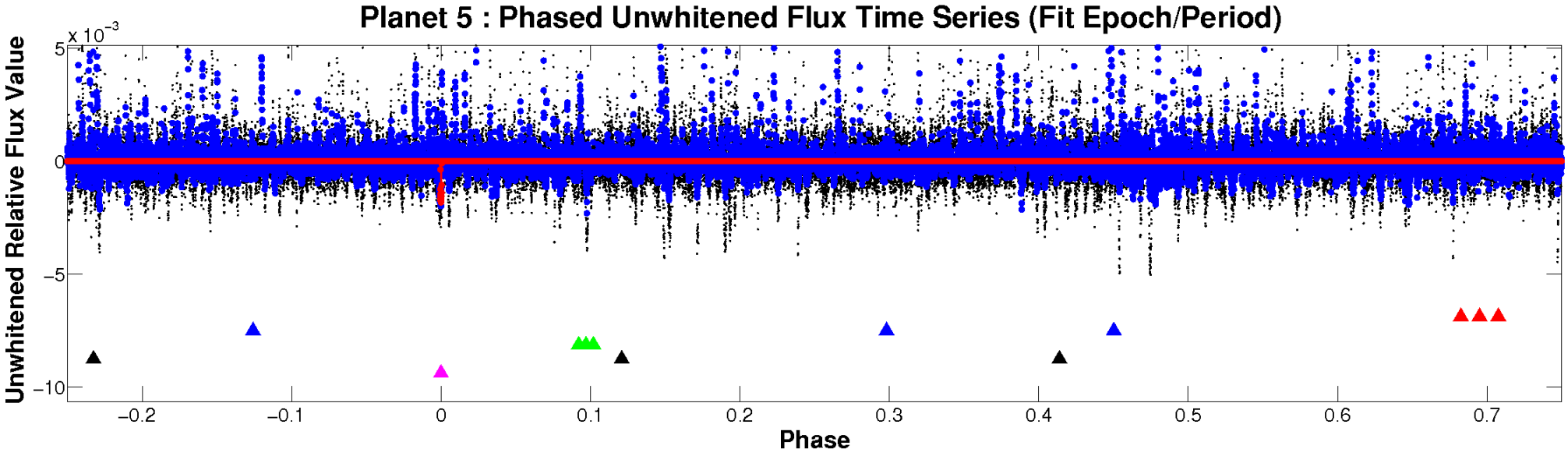
DV Odd/Even

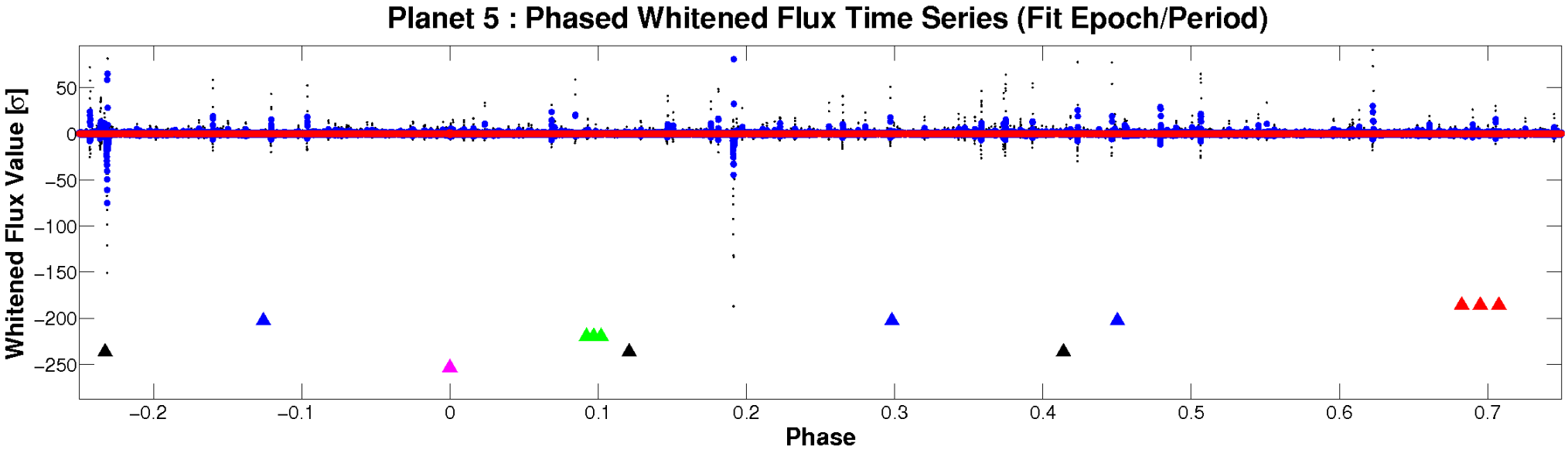

TCE 009220002-05
1.00e-02
8.00e-03
6.00e-03
4.00e-03
2.00e-03
0.00e+00
-2.00e-03
-4.00e-03
Flux
-0.0015
-0.001
-0.0005
0
0.0005
0.001
0.0015
Phase
Odd
Even
Model Fit

ALT Odd/Even


TCE 009220002-05
8.00e-03
7.00e-03
6.00e-03
5.00e-03
4.00e-03
3.00e-03
2.00e-03
1.00e-03
0.00e+00
-1.00e-03
-2.00e-03
-3.00e-03
Flux
-0.0015
-0.001
-0.0005
0
0.0005
0.001
0.0015
Phase
Odd
Even
Model Fit

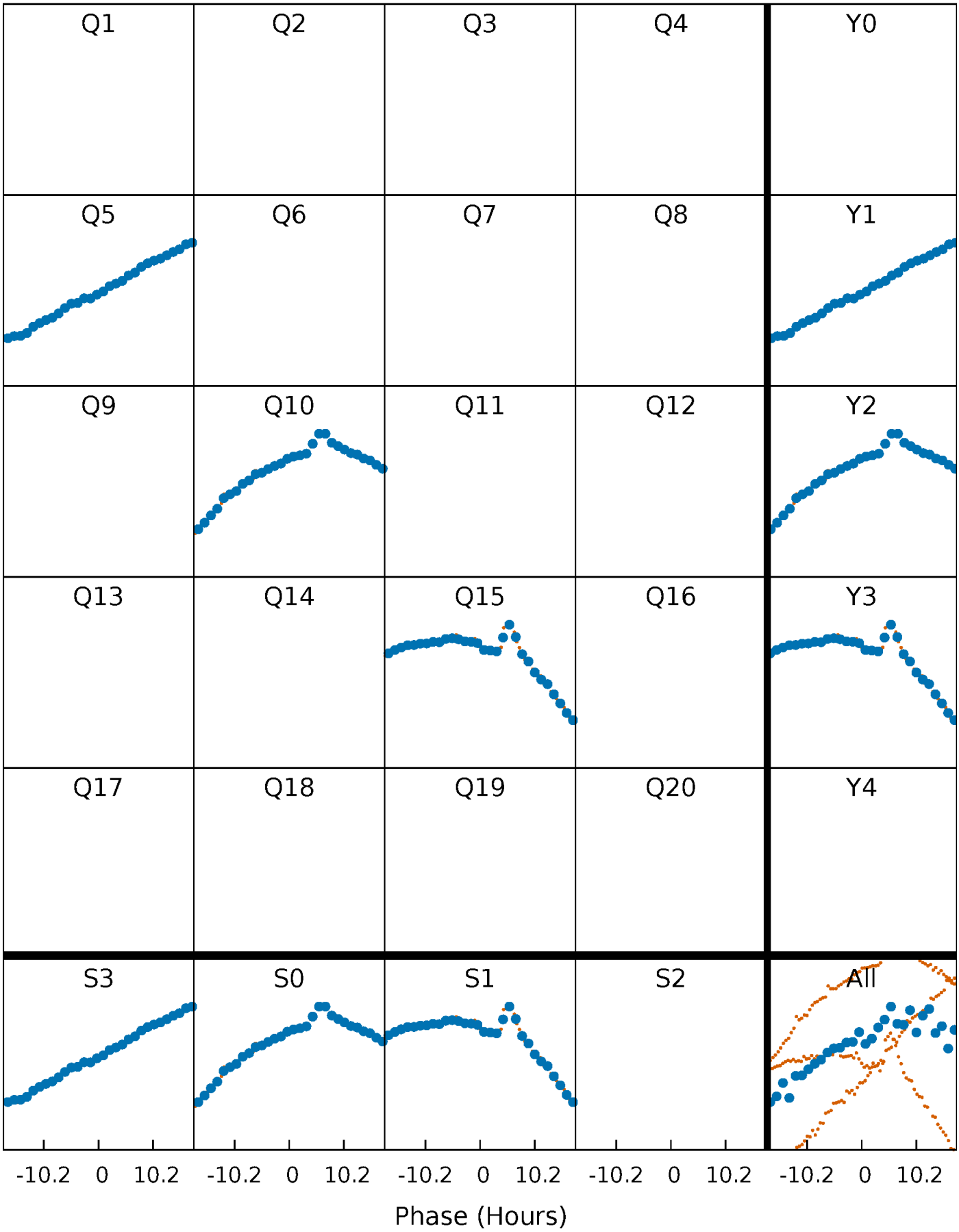
Non-Whitened Vs. Whitened Light Curve





PDC Quarter-Phased Transit Curves

TCE 009220002-05 P=431.152578 Days T_0=523.443317 (BKJD)



DV Quarter-Phased Transit Curves

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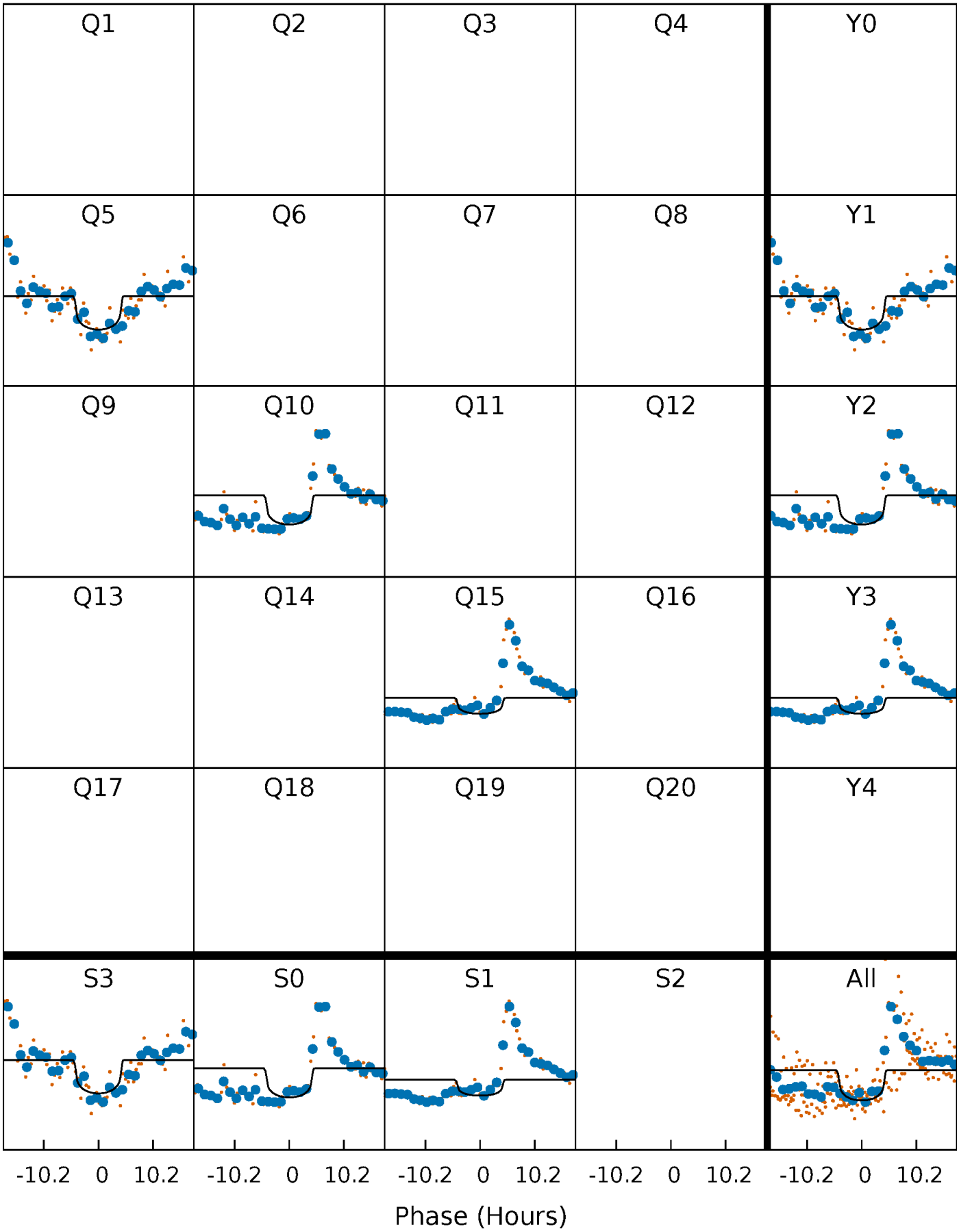
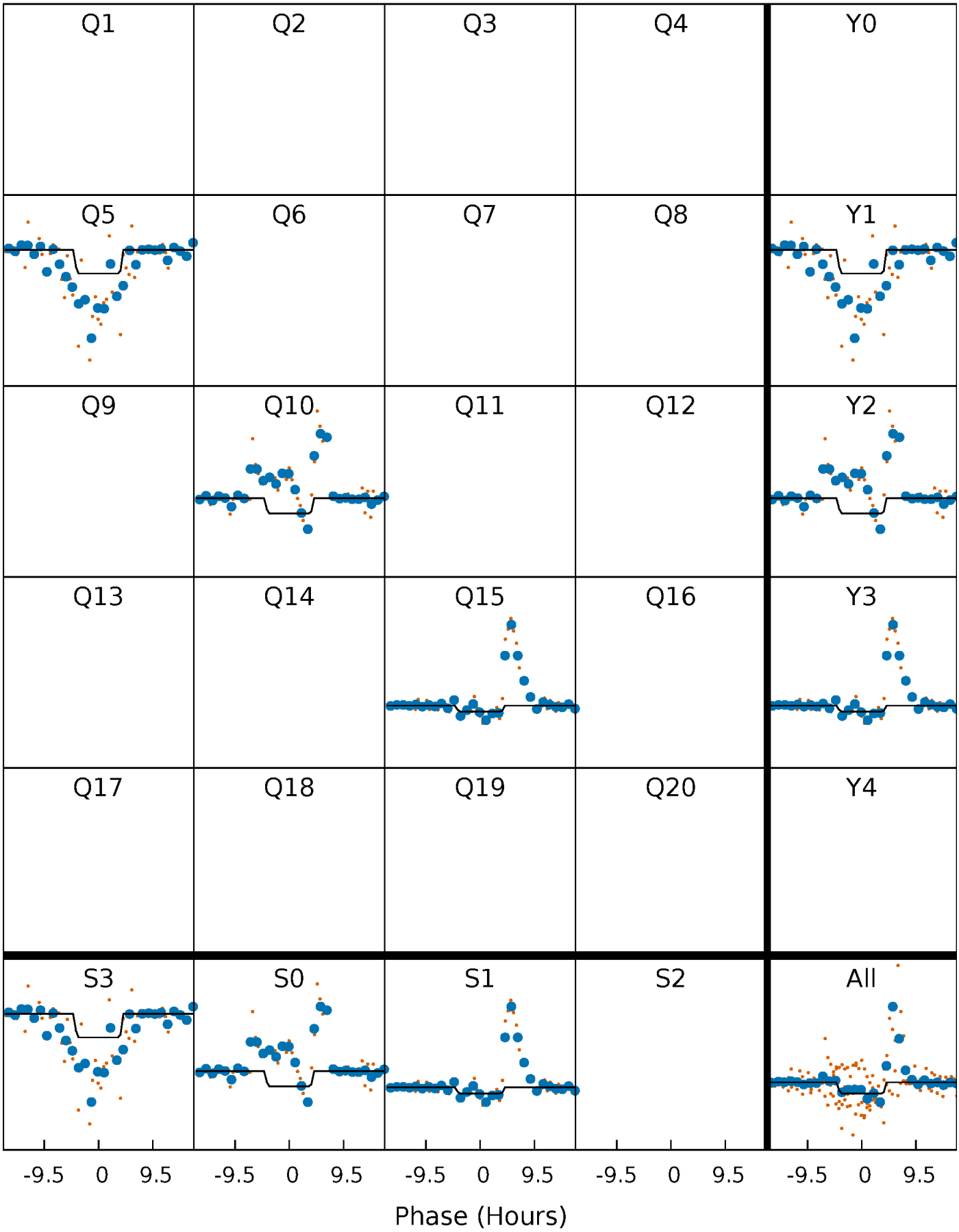


Alt. Detrend Quarter-Phased Transit Curves

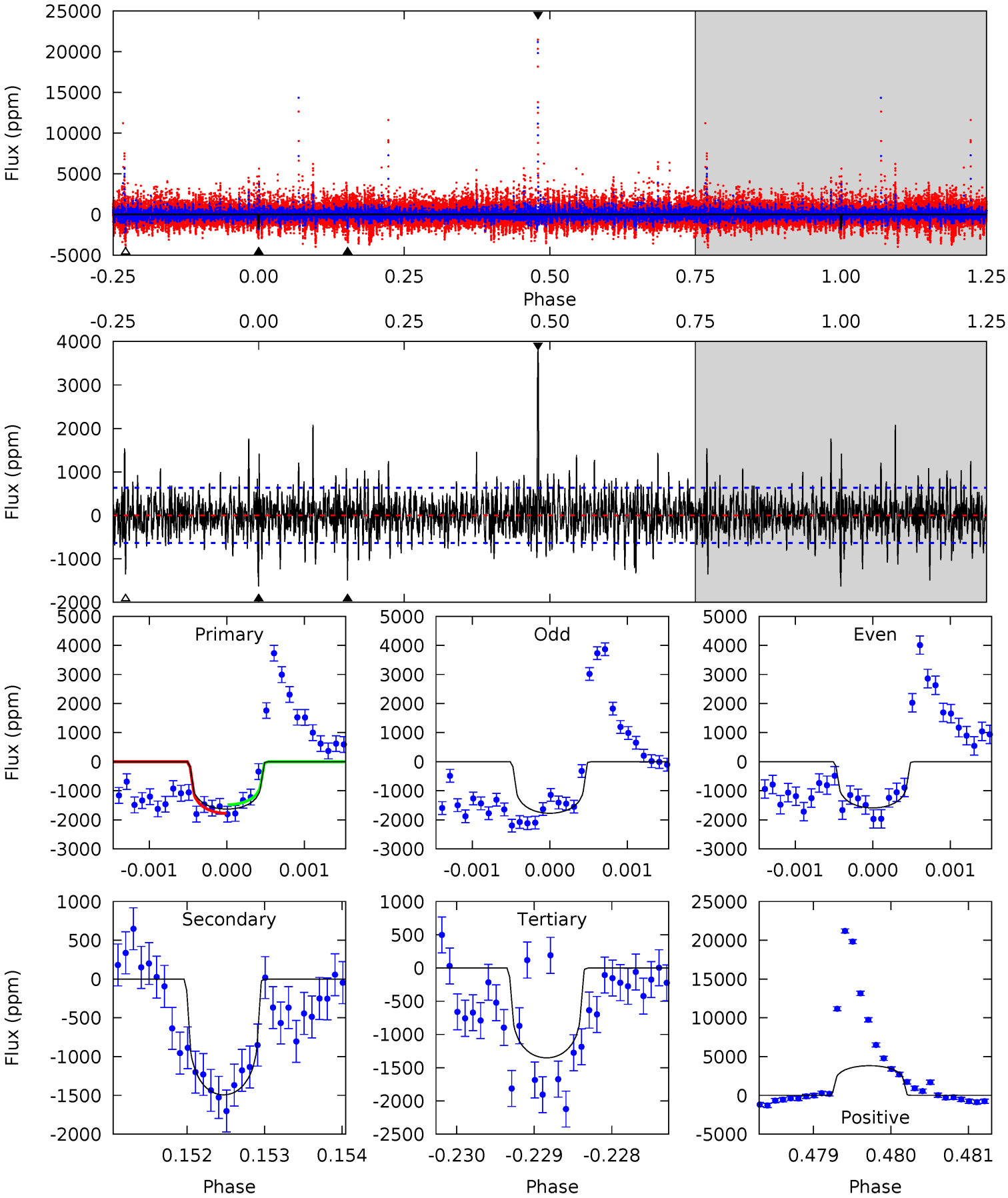
TCE 009220002-05 P=431.148116 Days T_0=523.452523 (BKJD)



DV Model-Shift Uniqueness Test

009220002-05, P = 431.152578 Days, E = 92.290739 Days

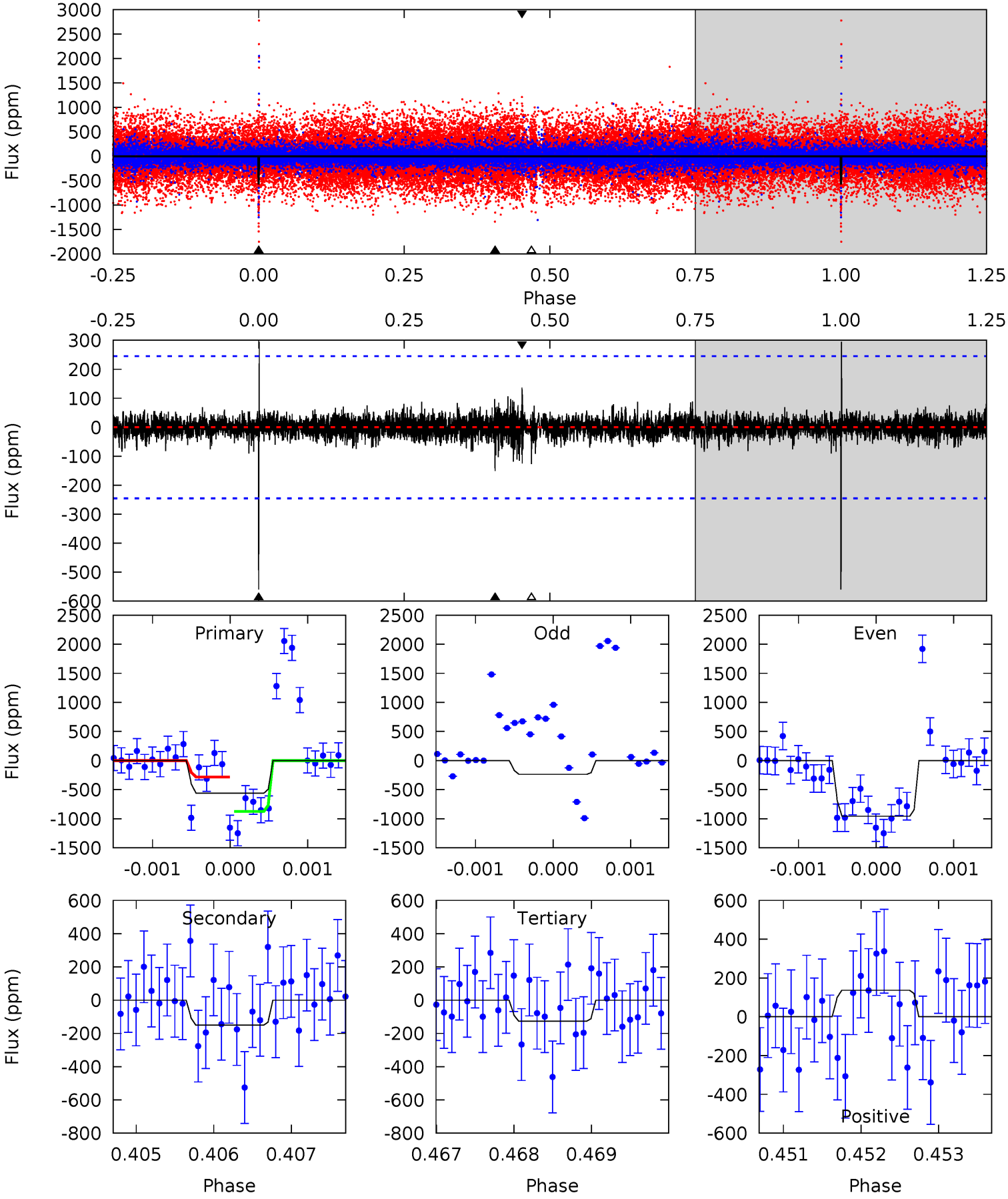
Pri	Sec	Ter	Pos	FA_1	FA_2	F_{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
14.1	12.9	11.7	33.1	5.47	3.32	3.20	2.41	-19.0	1.22	-20.2	0.47	0.92	0.70	1.28



Alt Model-Shift Uniqueness Test

009220002-05, P = 431.148116 Days, E = 92.304407 Days

Pri	Sec	Ter	Pos	FA_1	FA_2	F_{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.6	3.37	2.84	3.06	5.50	3.37	0.50	9.72	9.50	0.53	0.31	8.12	0.85	0.35	0



Stellar Parameters For KIC 009220002

	$T_{\rm eff}(K)$	$\log(g)$	[Fe/H]	R ($R_\odot$)	$M(M_\odot)$	$p_\star$ (g·cm^{-3})
	5364^{+177}_{-177}	$4.529^{+0.104}_{-0.095}$	$-0.540^{+0.350}_{-0.300}$	$0.754^{+0.102}_{-0.092}$	$0.702^{+0.100}_{-0.036}$	$2.302^{+1.059}_{-0.612}$
	+3%/-3%	+2%/-2%	+65%/-56%	+14%/-12%	+14%/-5%	+46%/-27%
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 009220002-05 / KOI

Detrend	Depth (ppm)	R_p ($R_\oplus$)	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-1493±116	$3.18^{+1.76}_{-1.47}$	288^{+13}_{-14}	5318^{+2117}_{-827}	$80712^{+208238}_{-46497}$
Alt.	-150±45	$2.12^{+1.49}_{-1.35}$	288^{+14}_{-15}	3985^{+2039}_{-661}	$18364^{+111370}_{-12500}$

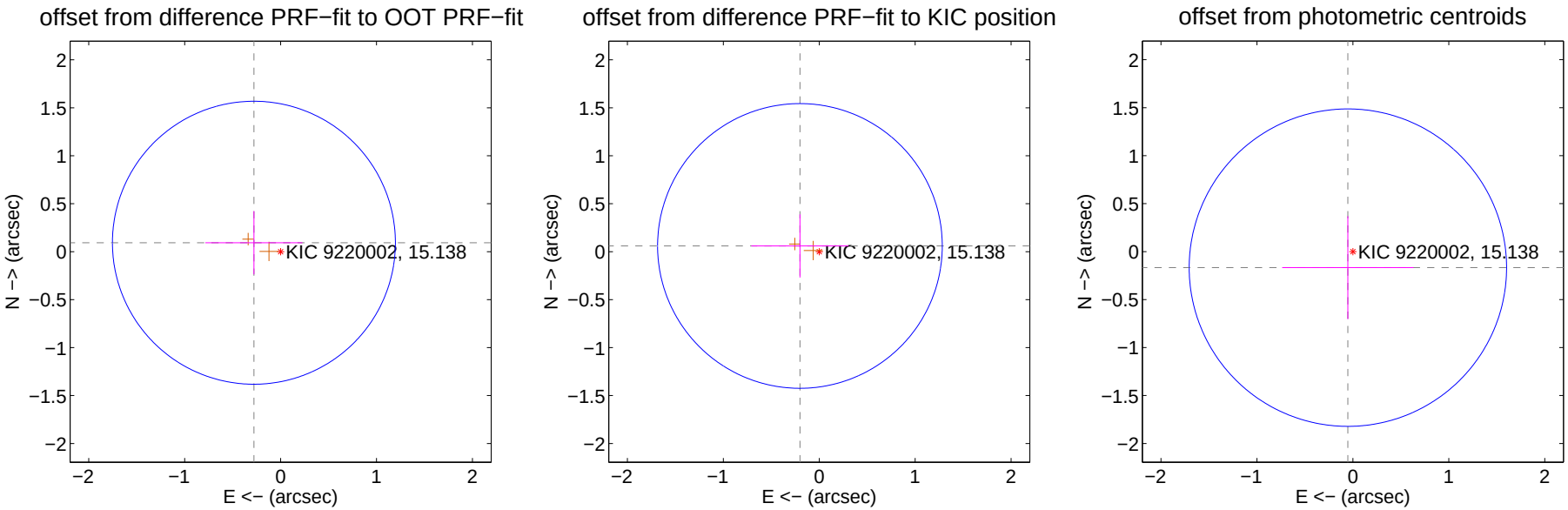
T_{max} = Theoretical Maximum Planetary Temperature
T_{obs} = Observed Planetary Temperature (Assuming A=0.3)
A_{obs} = Observed Albedo (Assuming T=0)

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

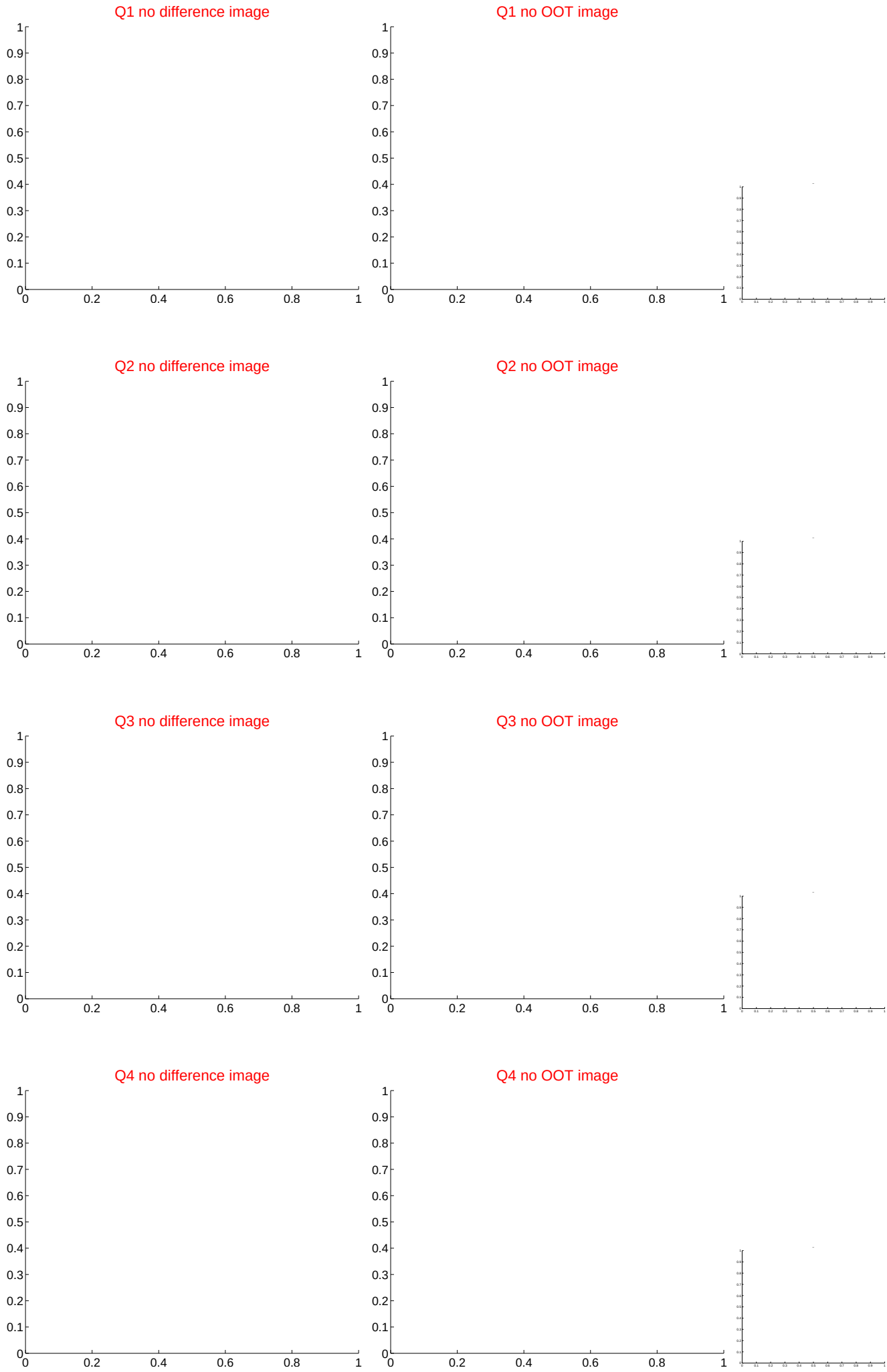
Supplemental centroid analysis for 009220002-05. Kepler magnitude: 15.14. Transit SNR 7.94
There are 0 quarters with good PRF difference image offsets
The direct PRF centroid is offset from the target star catalog position by about 0.06 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.293 ± 0.492	0.60	0.278 ± 0.507	0.093 ± 0.330
PRF-fit source offset from KIC position	0.210 ± 0.495	0.42	0.201 ± 0.507	0.060 ± 0.330
photometric centroid source offset	0.18 ± 0.55	0.32	0.05 ± 0.68	-0.17 ± 0.54

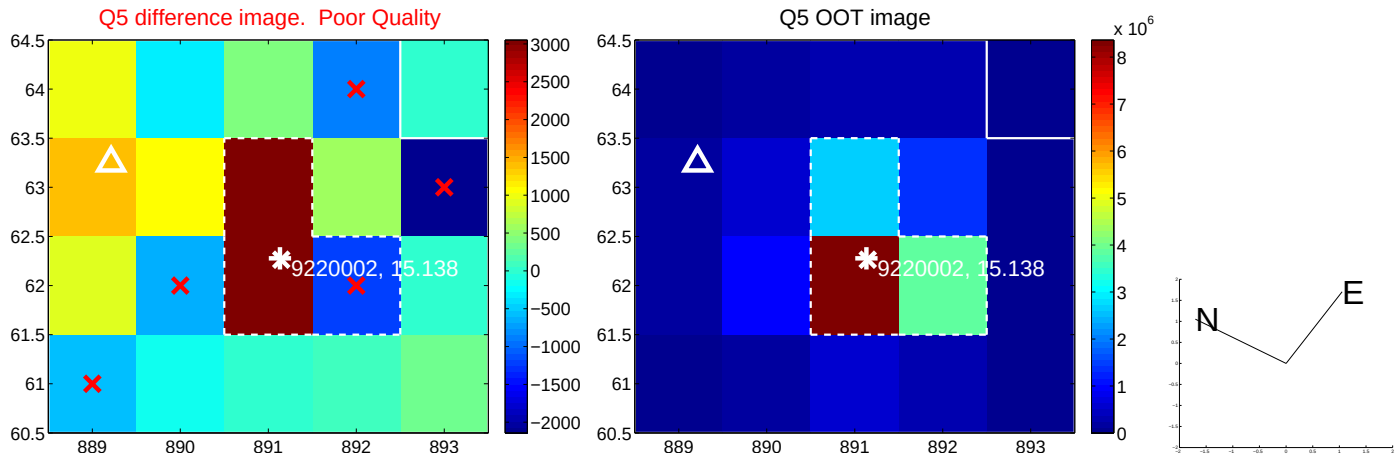


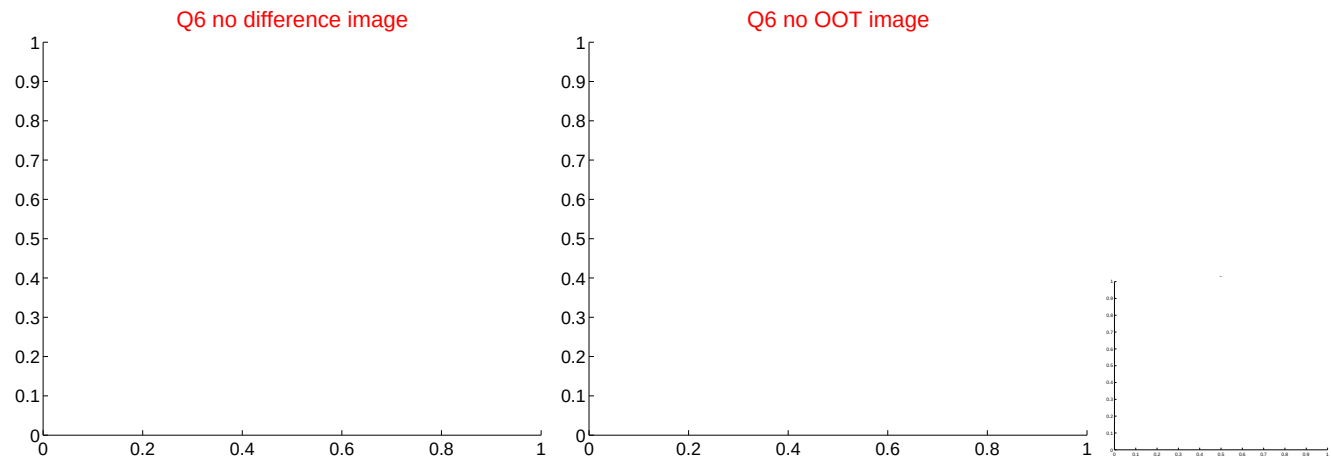
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one-σ uncertainty. Blue circle: three-σ. Red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

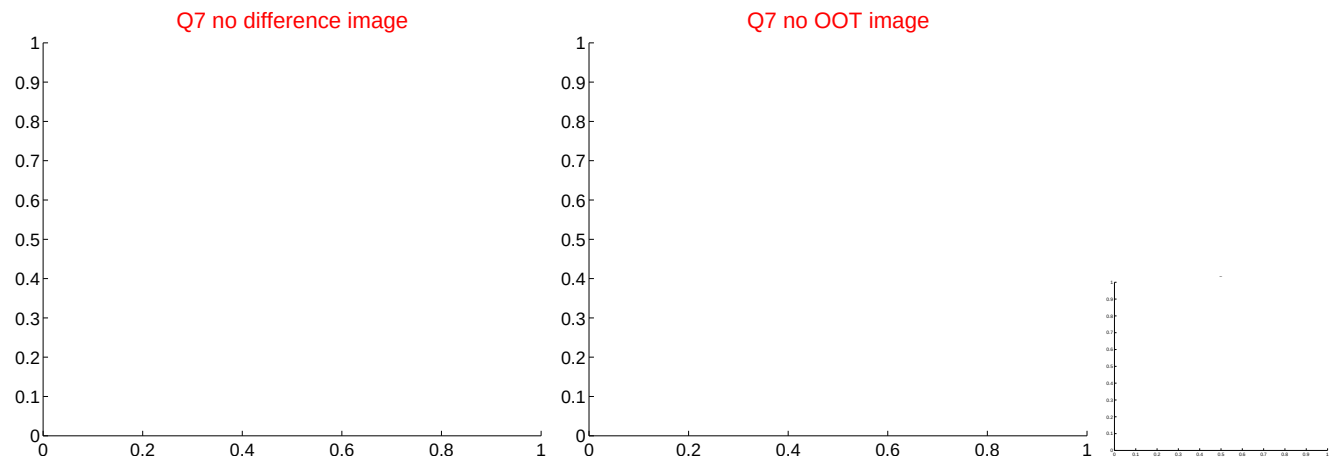
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.

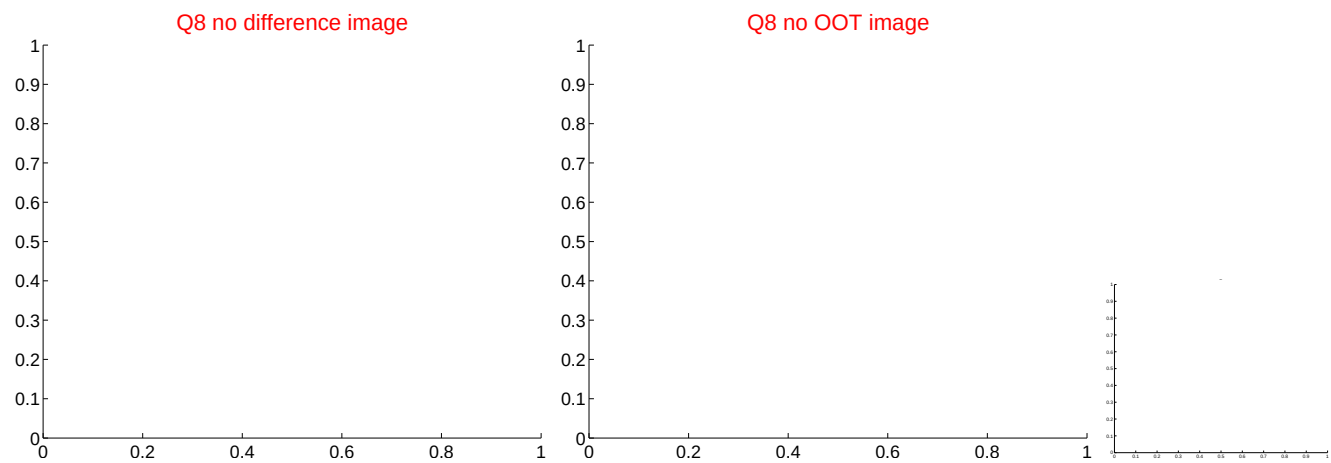


white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.

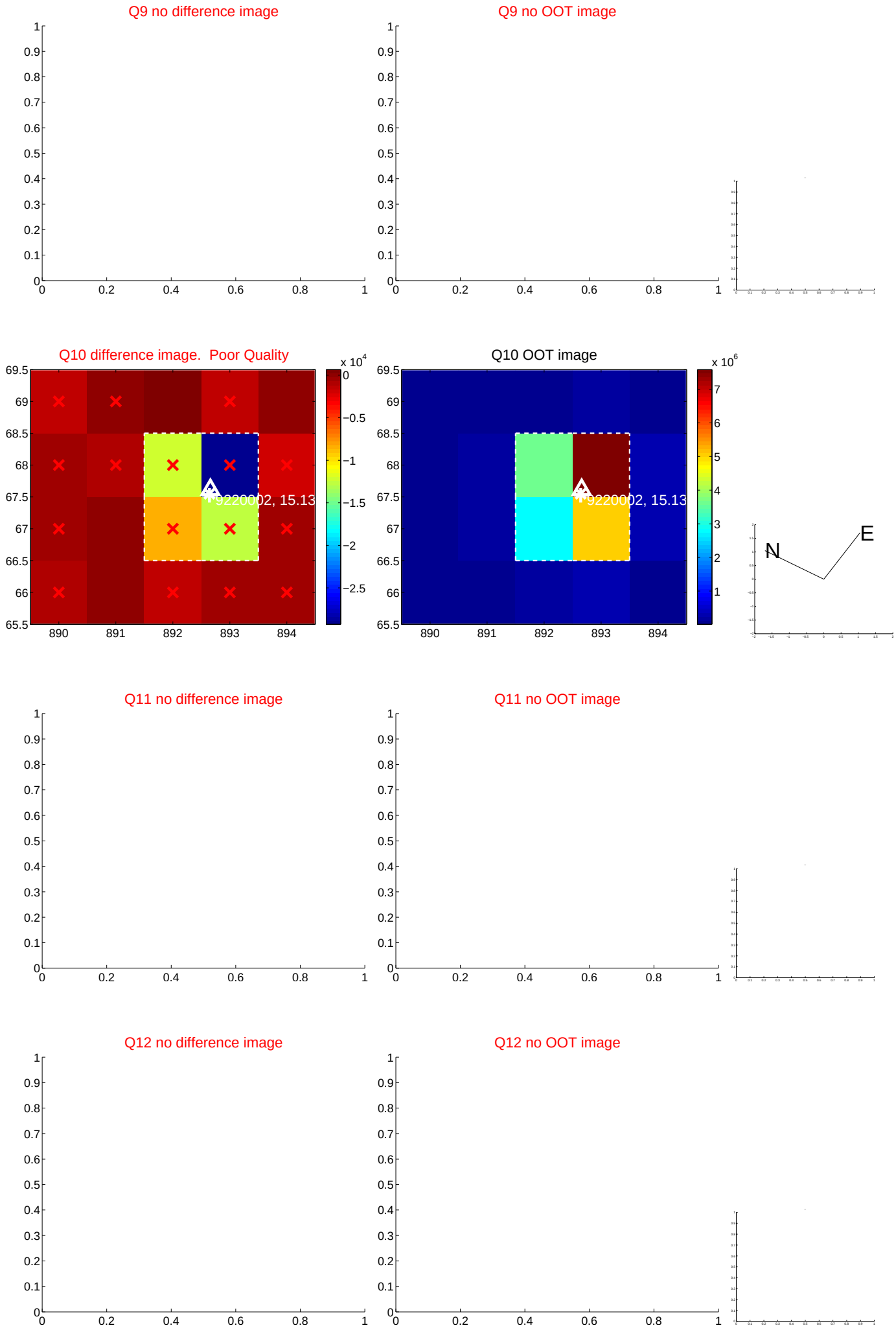




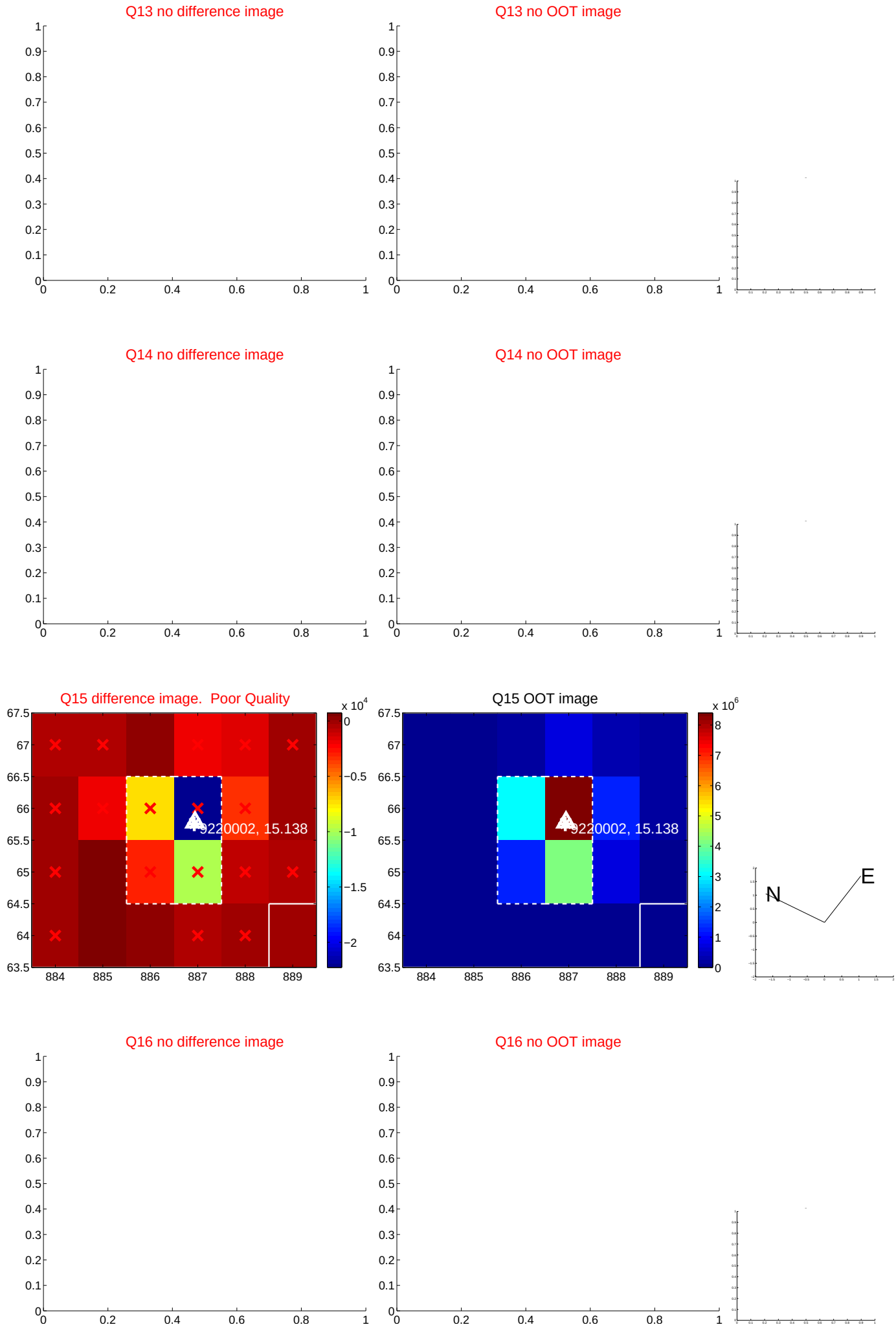




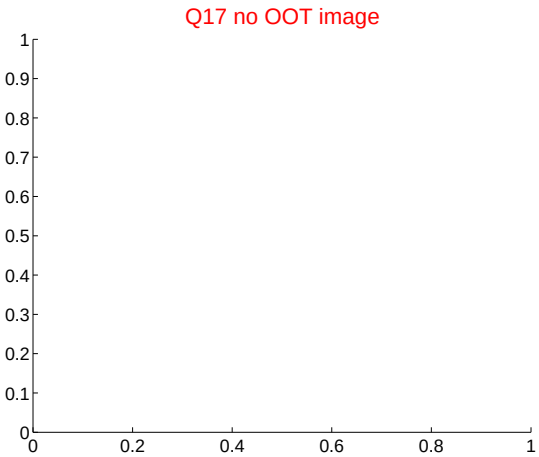
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.

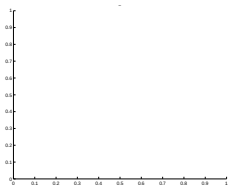


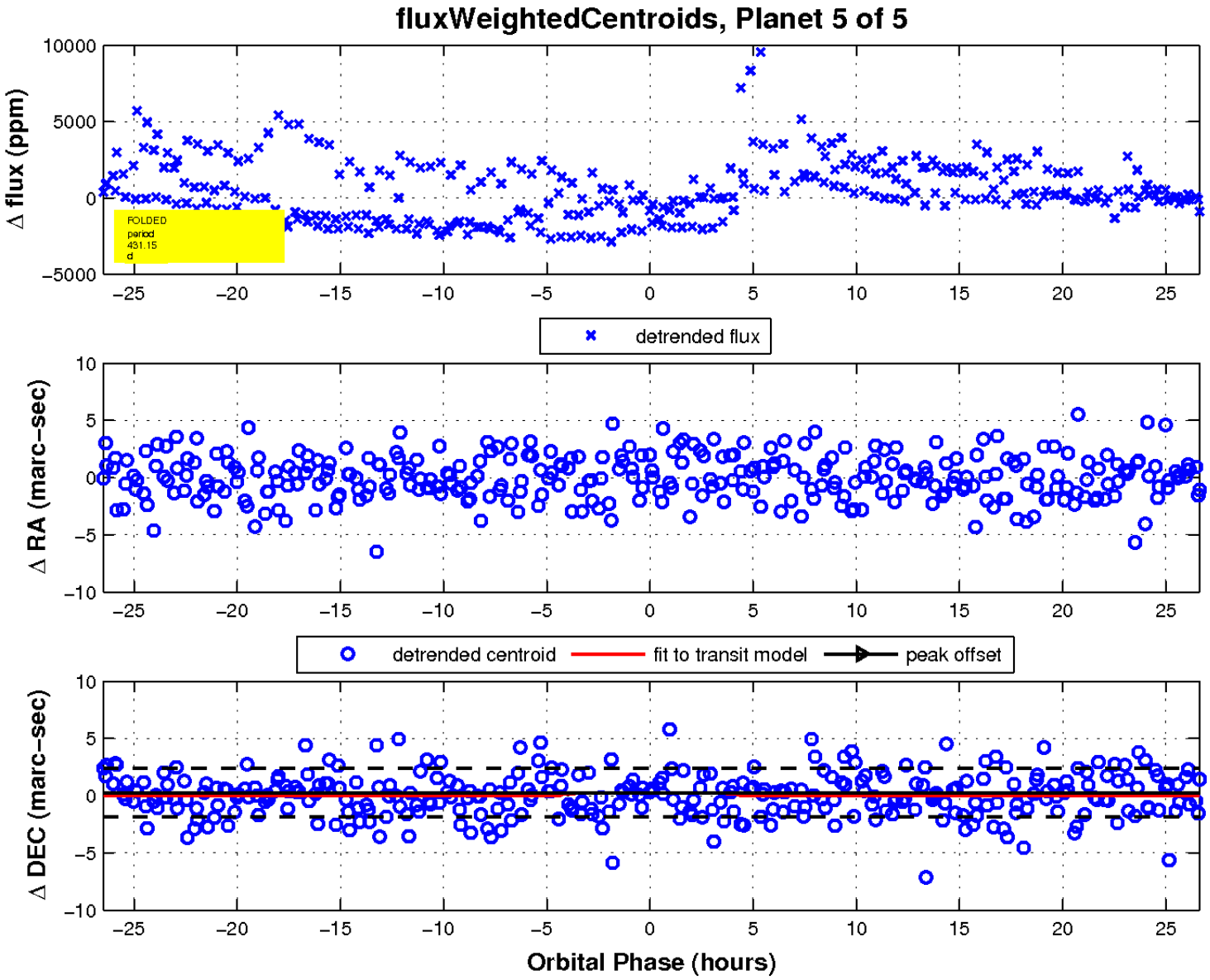
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.



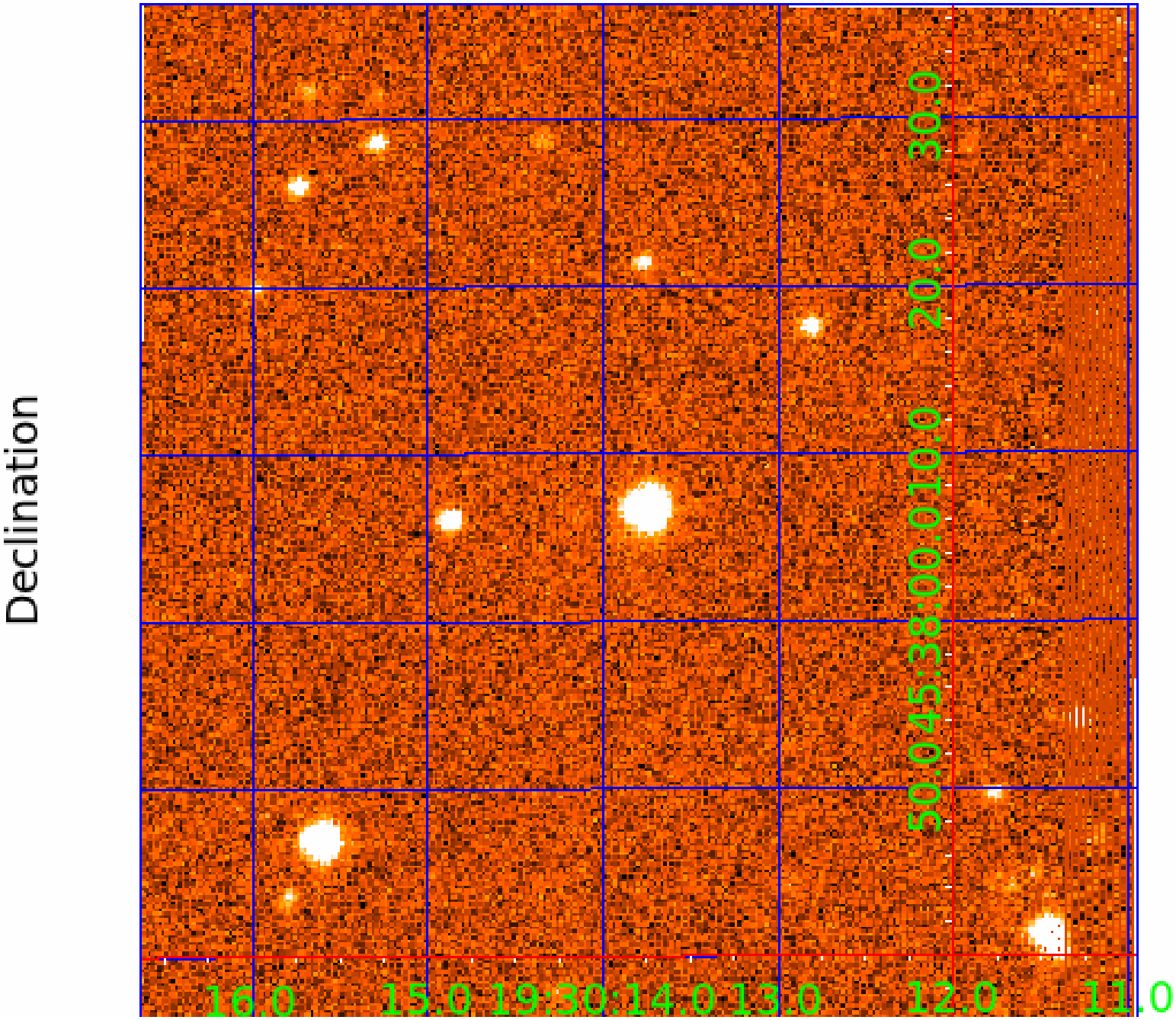
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.







UKIRT Image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