

KIC 004588073

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})
004588073-01	OBS	No	2.263957	132.290732	32.2	9.427	9.1	8.2	2.49	7372	1.64	10276.89
004588073-02	OBS	No	389.281254	335.318420	387.4	4.598	8.2	6.0	2.49	7372	6.51	10.75
004588073-03	OBS	No	68.700947	139.714768	211.0	5.489	8.0	7.1	2.49	7372	4.10	108.58
004588073-04	OBS	No	488.804855	251.079617	476.1	3.252	7.6	8.4	2.49	7372	5.95	7.93
004588073-05	OBS	No	19.149293	146.585028	158.8	1.963	7.6	7.5	2.49	7372	3.58	596.32

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004588073-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
004588073-02	OBS	FP	0.00	1	0	0	0	LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
004588073-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004588073-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
004588073-05	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

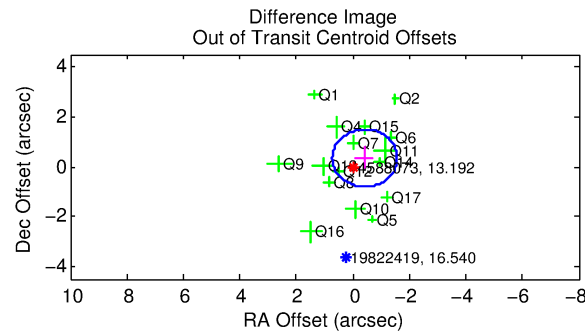
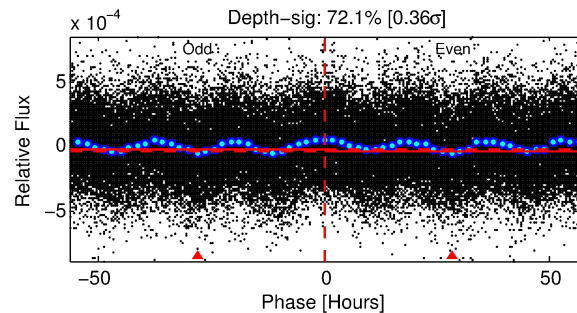
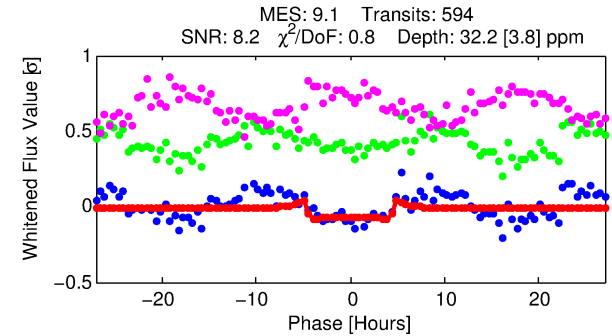
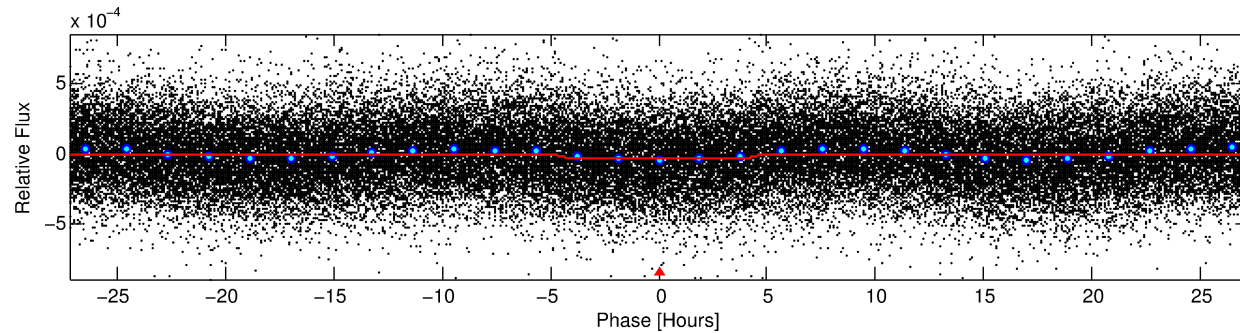
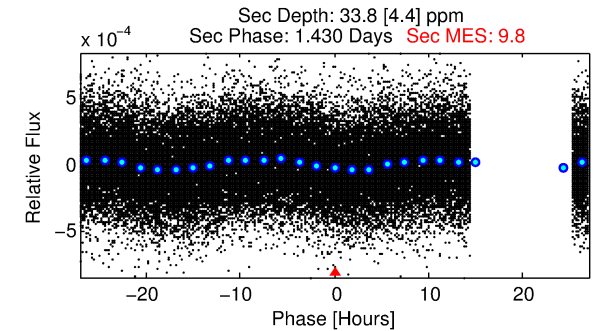
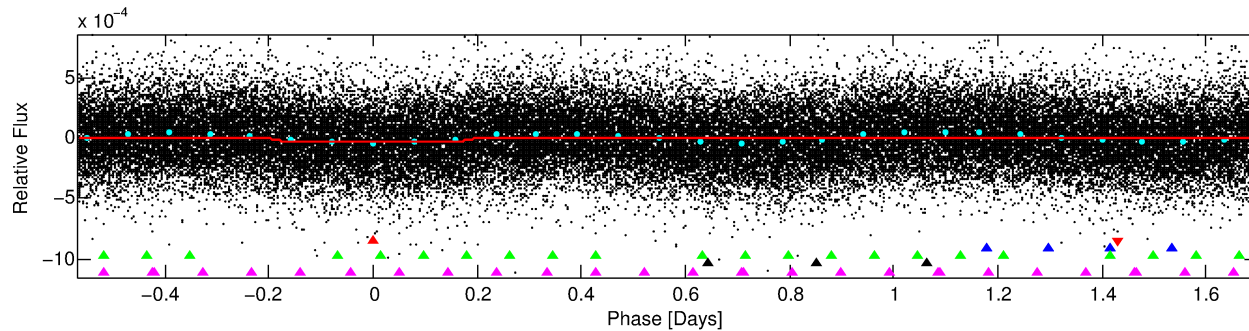
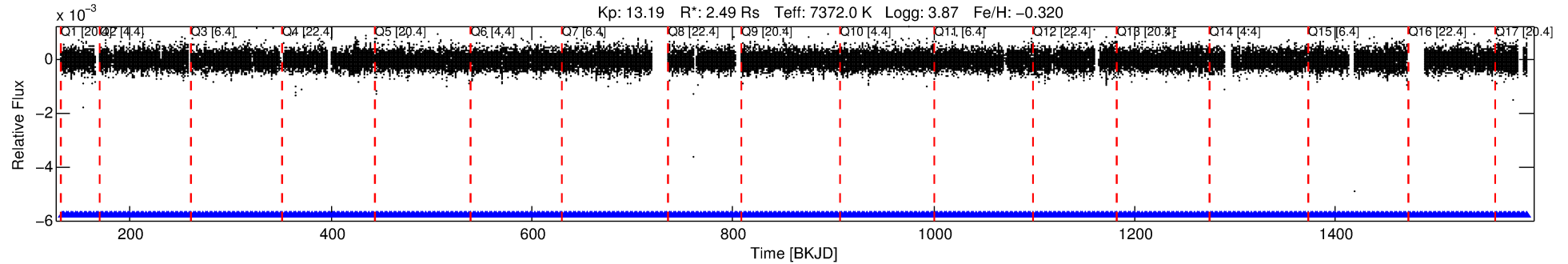
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 004588073-01

No Significant Match Found

DV One-Page Summary

KIC: 4588073 Candidate: 1 of 5 Period: 2.264 d



DV Fit Results:

Period = 2.26396 [0.00003] d
Epoch = 132.2907 [0.0054] BKJD
Rp/R* = 0.0060 [0.0010]
a/R* = 1.26 [0.45]
b = 0.90 [0.21]
Seff = 10276.89 [6400.48]
Teq = 2567 [400] K
Rp = 1.64 [0.70] Re
a = 0.0399 [0.0150] AU
Ag = 11.06 [7.74] [1.30σ]
Teffp = 7239 [718] K [5.68σ]

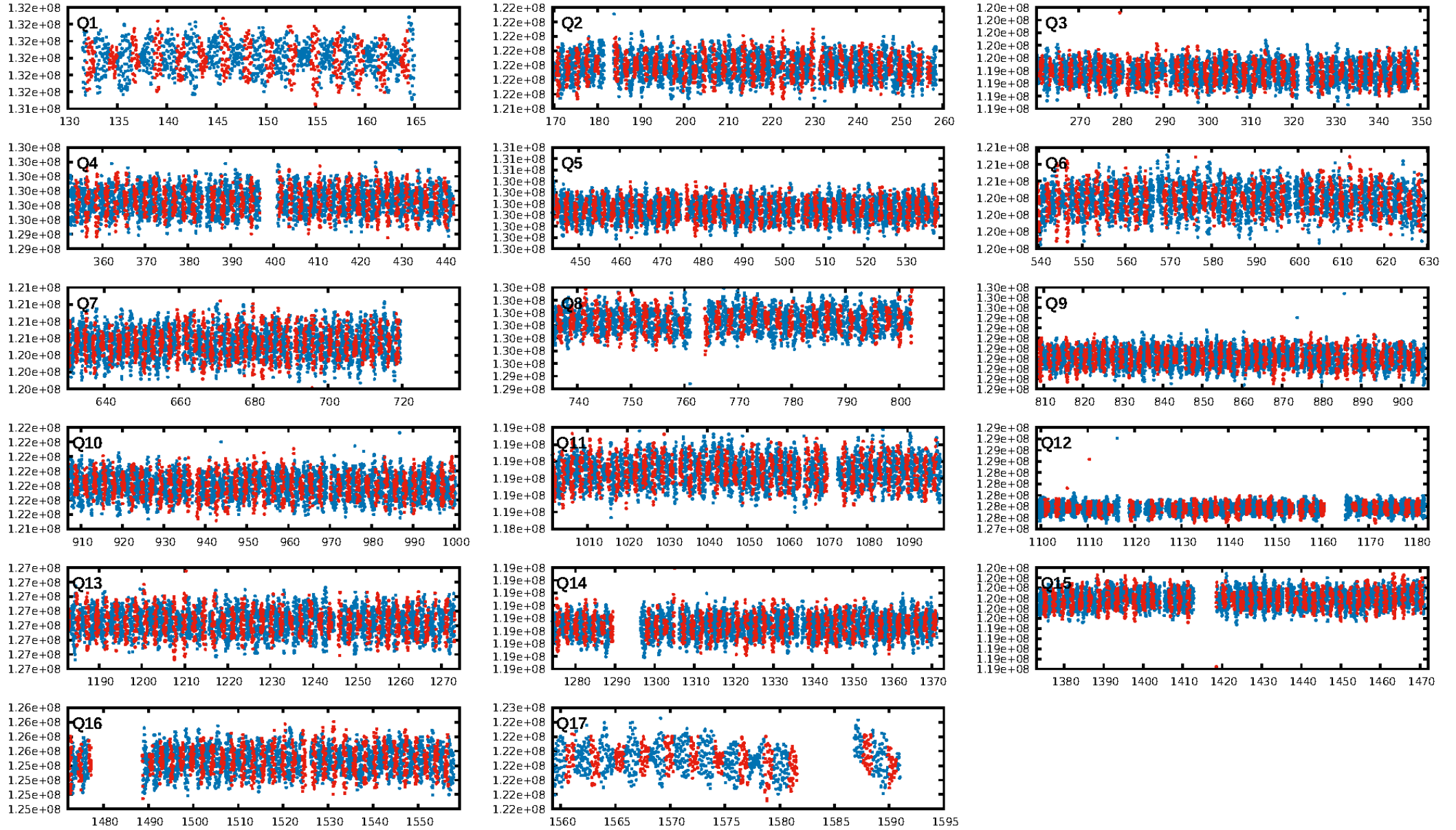
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 100.0% [42.08σ]
ModelChiSquare2-sig: N/A
ModelChiSquareGoF-sig: N/A
Bootstrap-pfa: 1.11e-13
RollingBand-fgt: 1.00 [567/567]
GhostDiagnostic-chr: 4.658
Centroid-sig: 2.5%
Centroid-so: 1.145 arcsec [1.38σ]
OotOffset-rm: 0.539 arcsec [1.40σ]
KicOffset-rm: 0.493 arcsec [1.22σ]
OotOffset-st: 4/3/4/5 [16]
KicOffset-st: 4/3/4/5 [16]
DiffImageQuality-fgm: 1.00 [16/16]
DiffImageOverlap-fno: 1.00 [17/17]

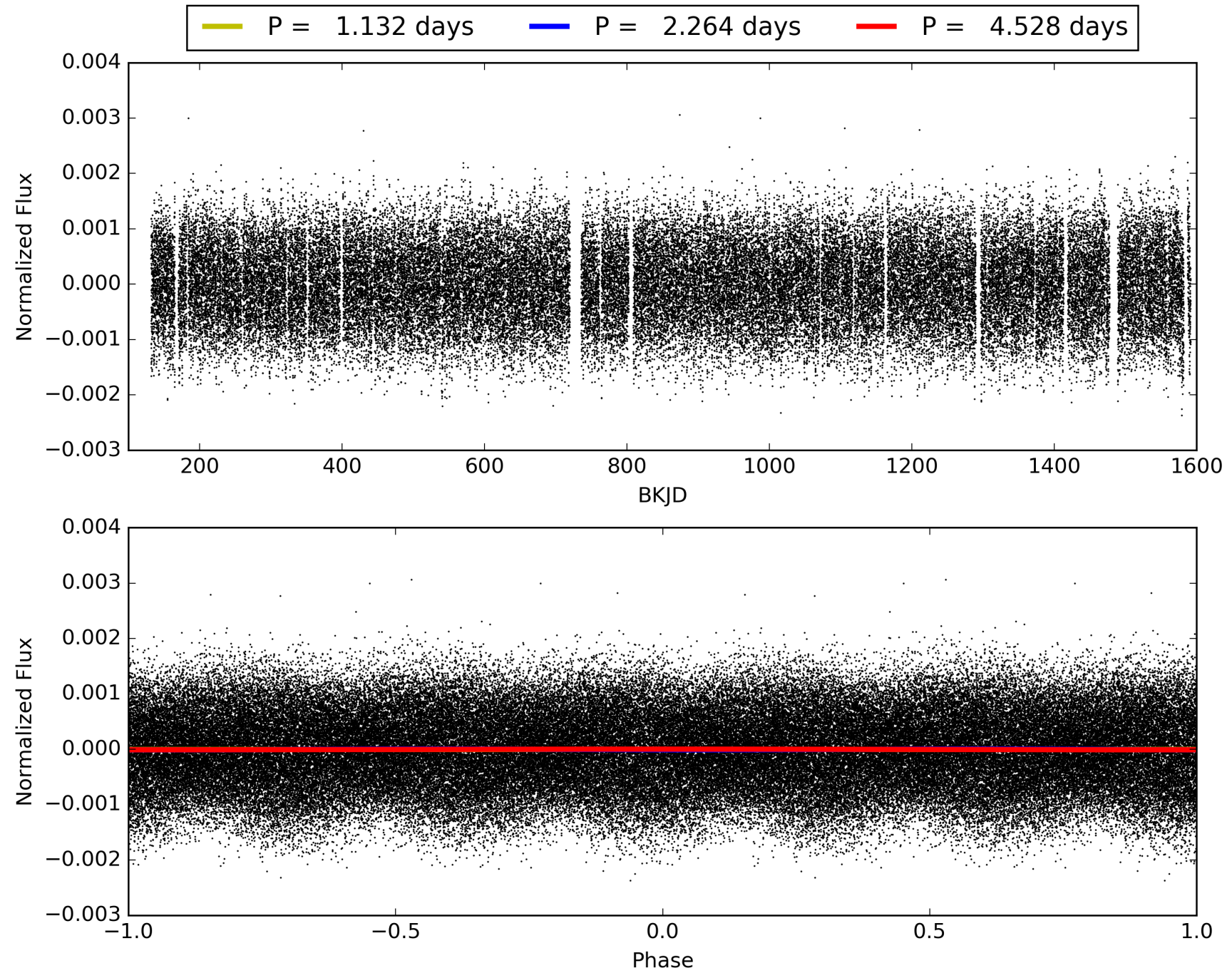
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 00:26:37 Z

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

TCE 004588073-01, PDC Light Curves

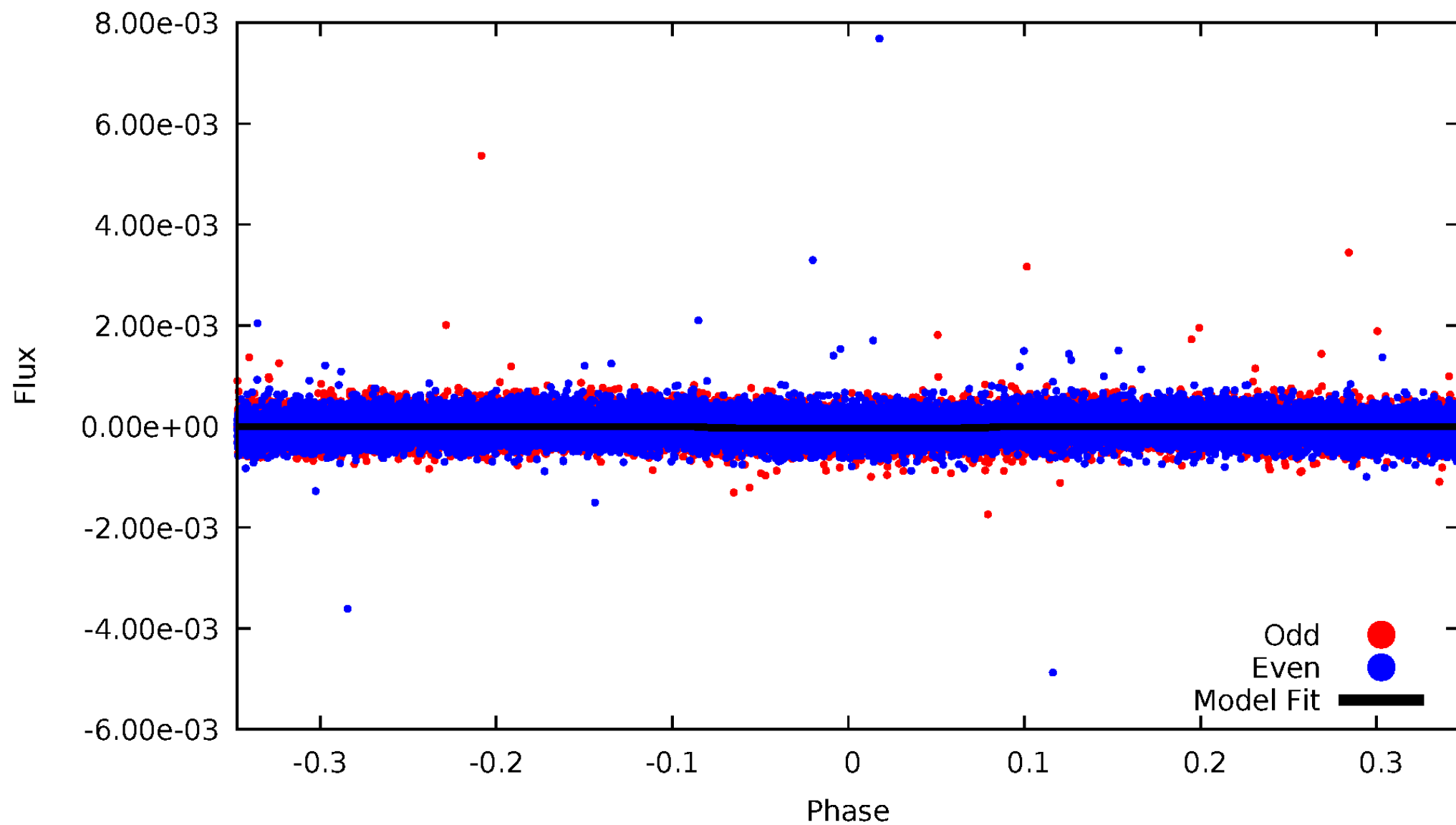


TCE 004588073-01



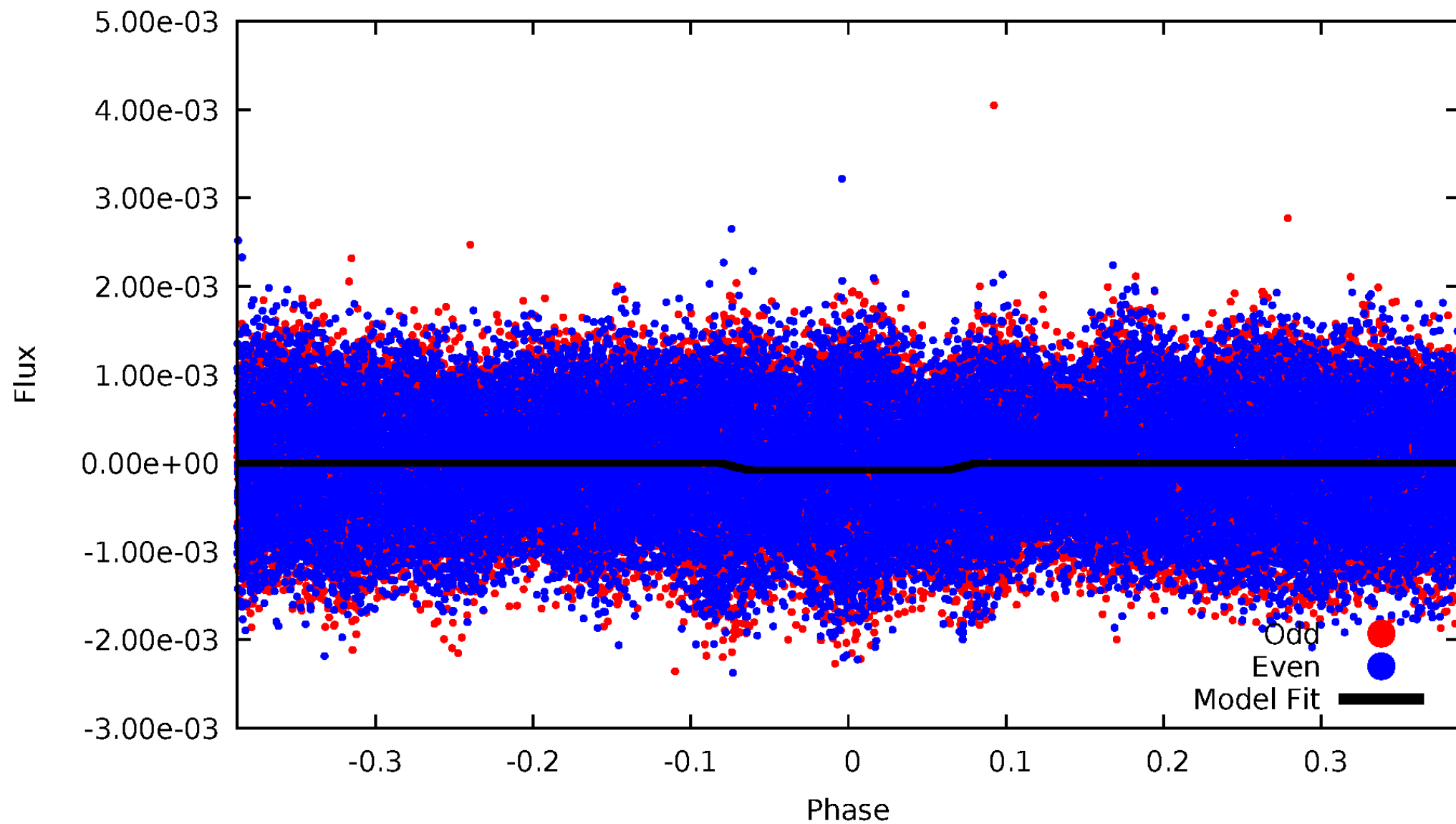
DV Odd/Even

TCE 004588073-01



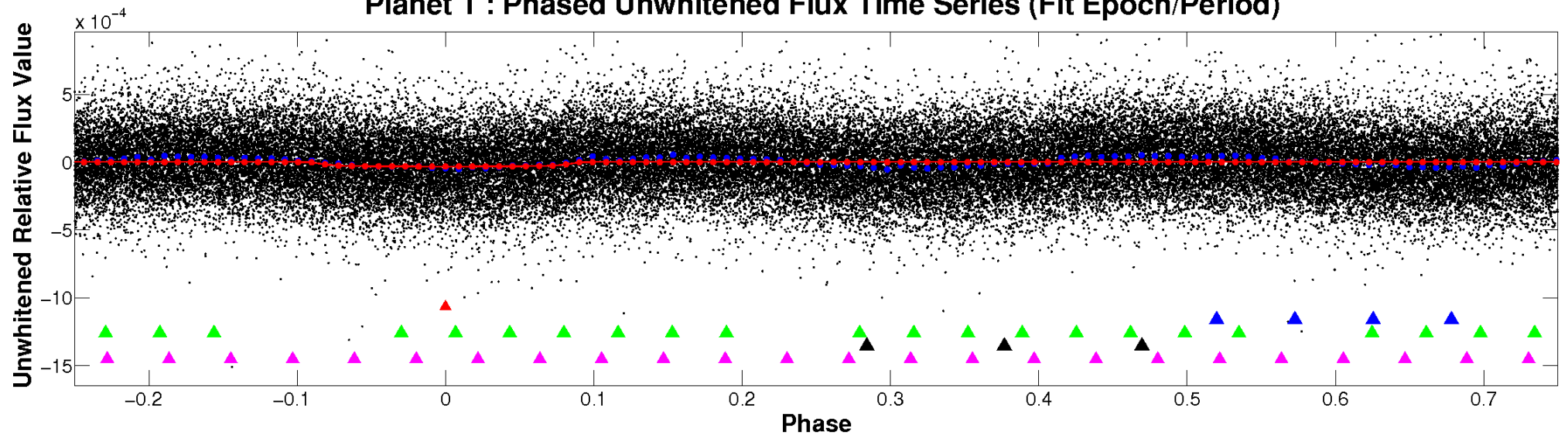
ALT Odd/Even

TCE 004588073-01

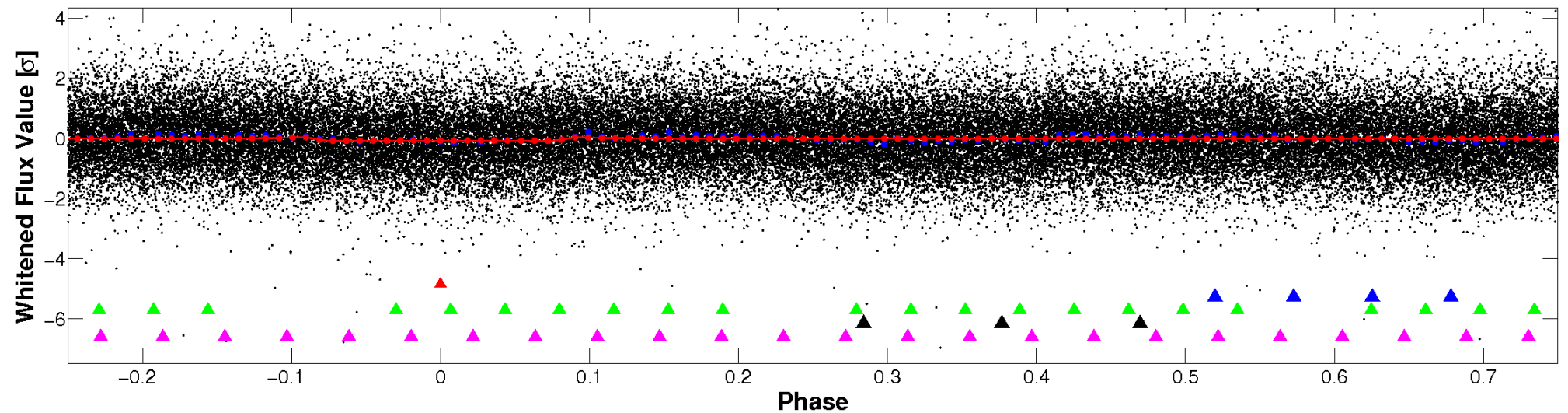


Non-Whitened Vs. Whitened Light Curve

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

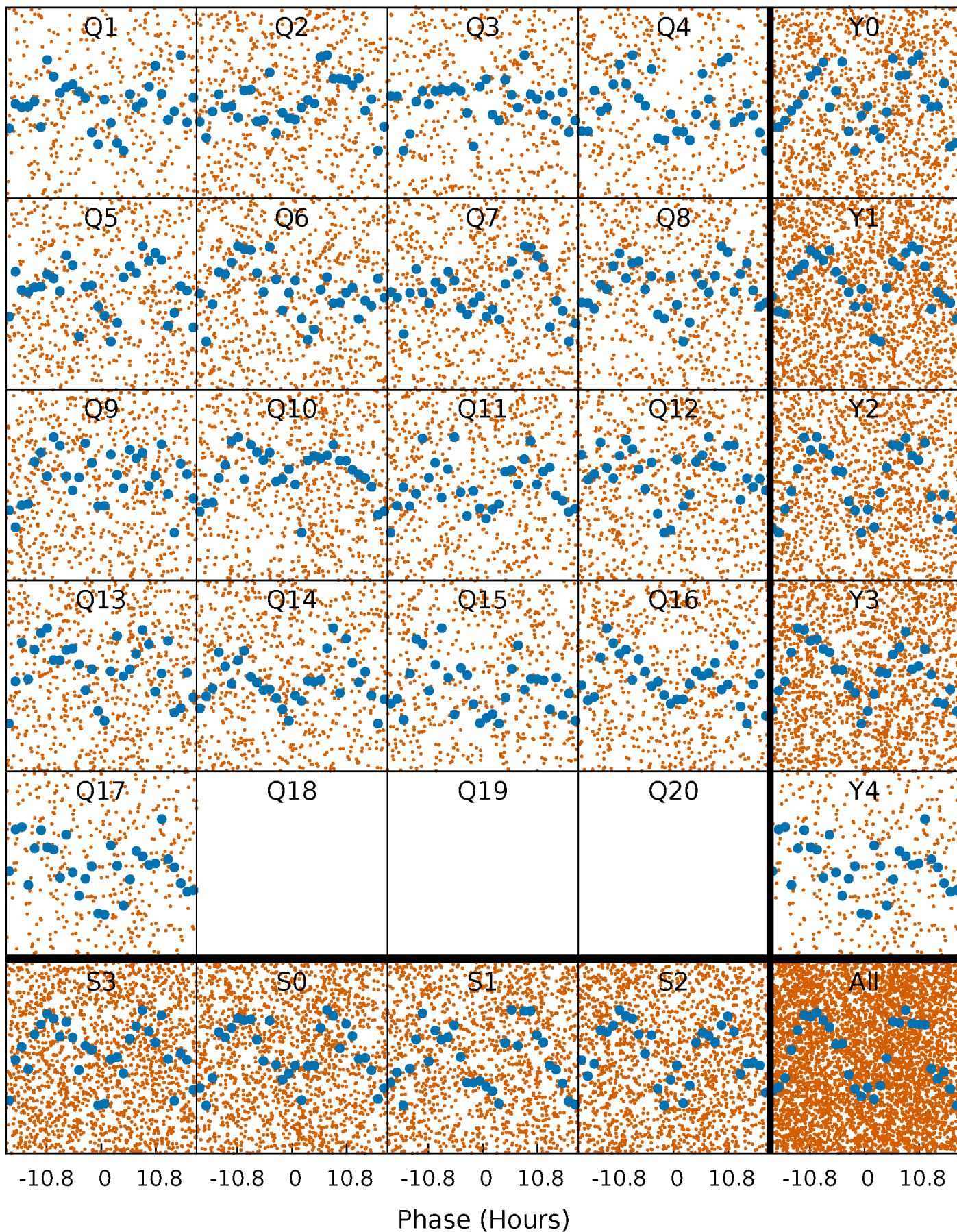


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



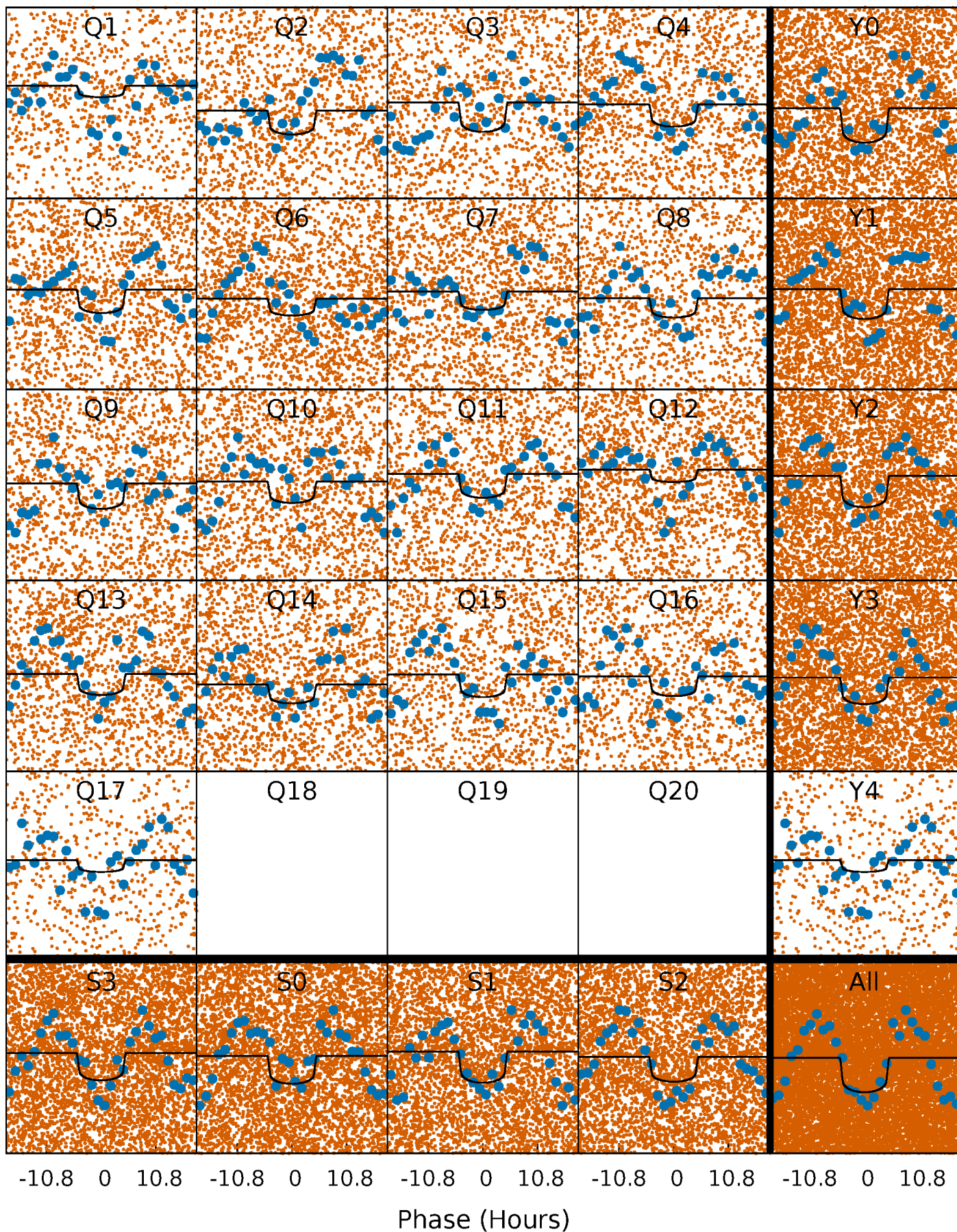
PDC Quarter-Phased Transit Curves

TCE 004588073-01 P= 2.263957 Days $T_0=132.290732$ (BKJD)



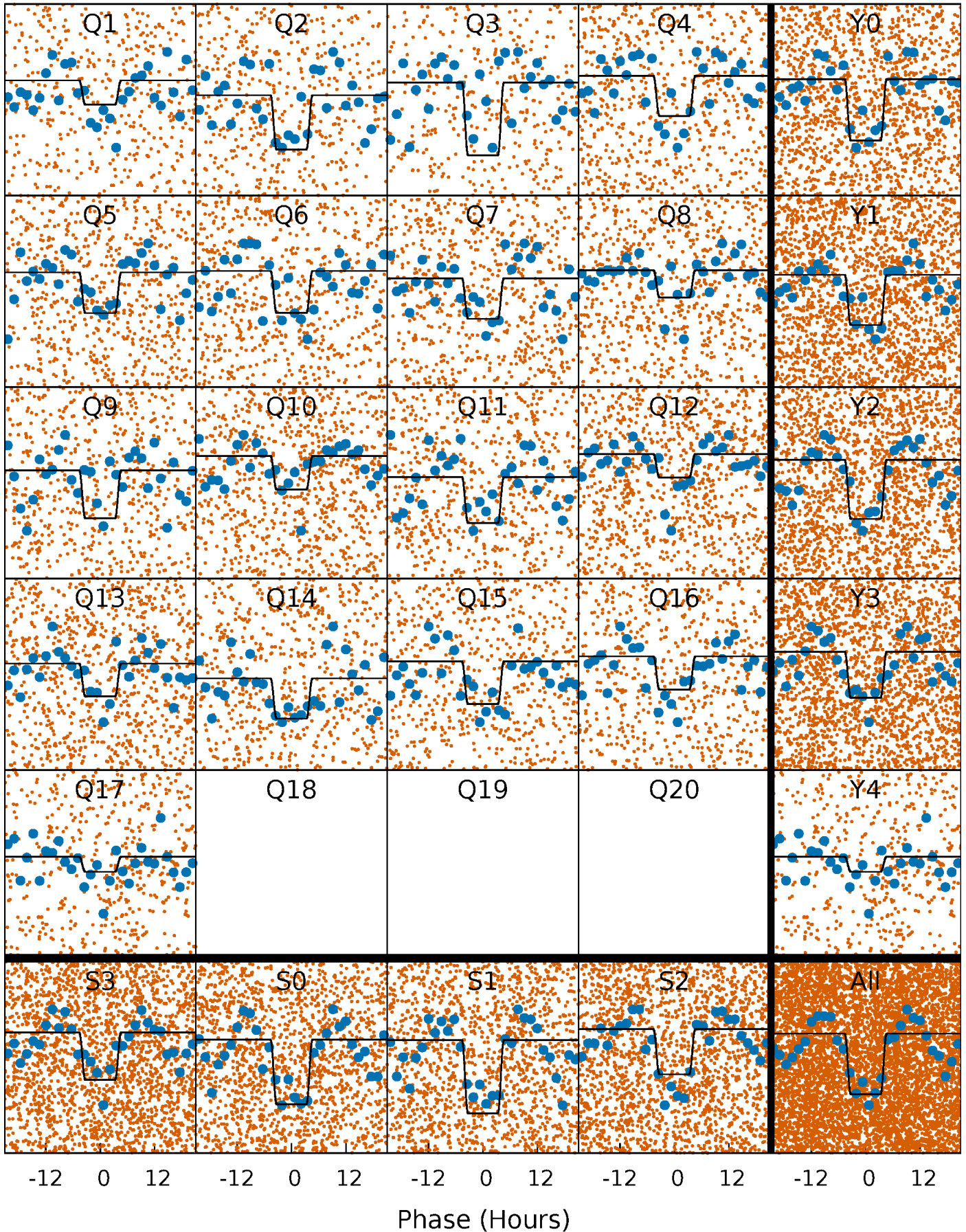
DV Quarter-Phased Transit Curves

TCE 004588073-01 P= 2.263957 Days $T_0=132.290732$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

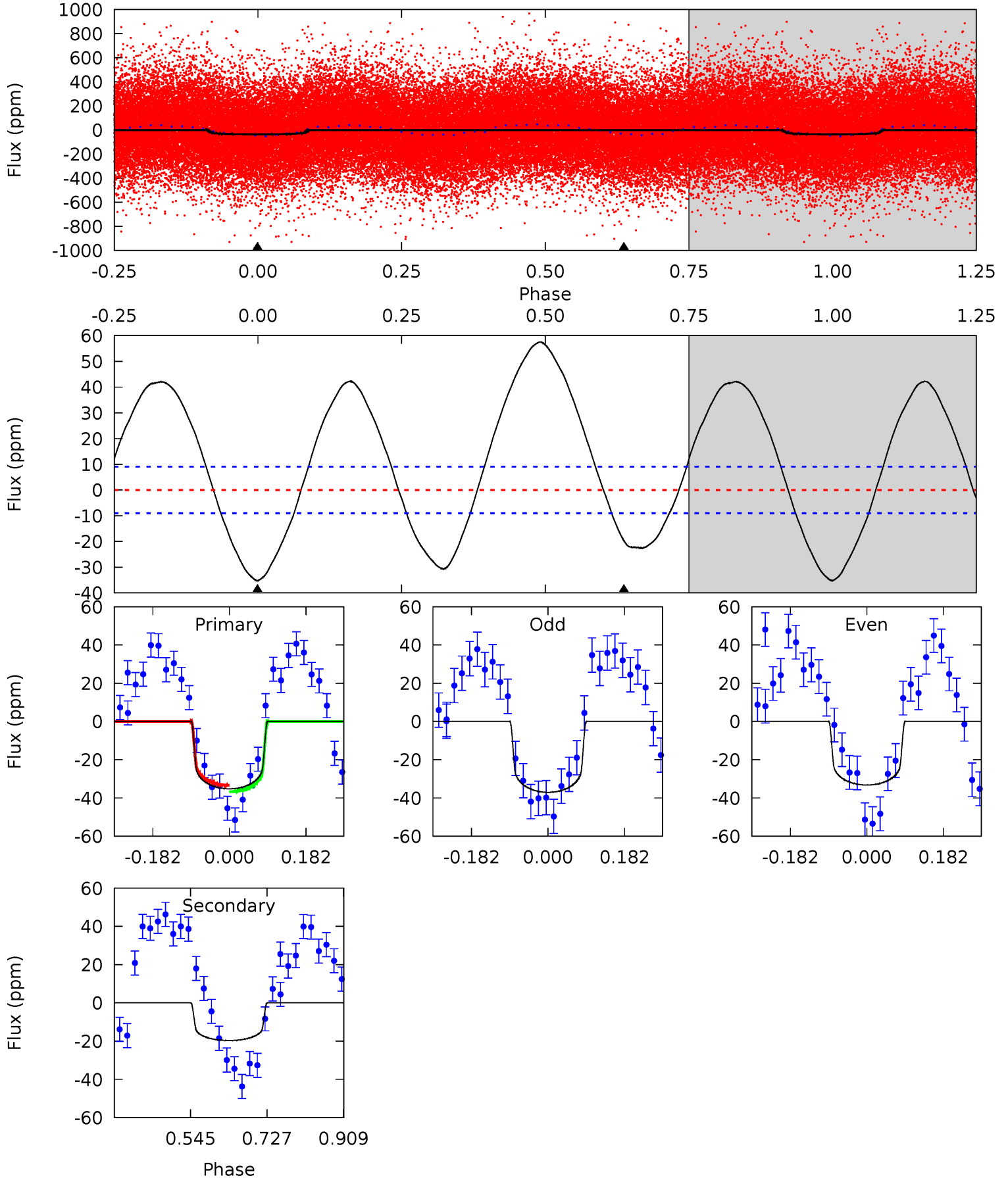
TCE 004588073-01 P= 2.263833 Days $T_0=132.319258$ (BKJD)



DV Model-Shift Uniqueness Test

004588073-01, P = 2.263957 Days, E = 130.026775 Days

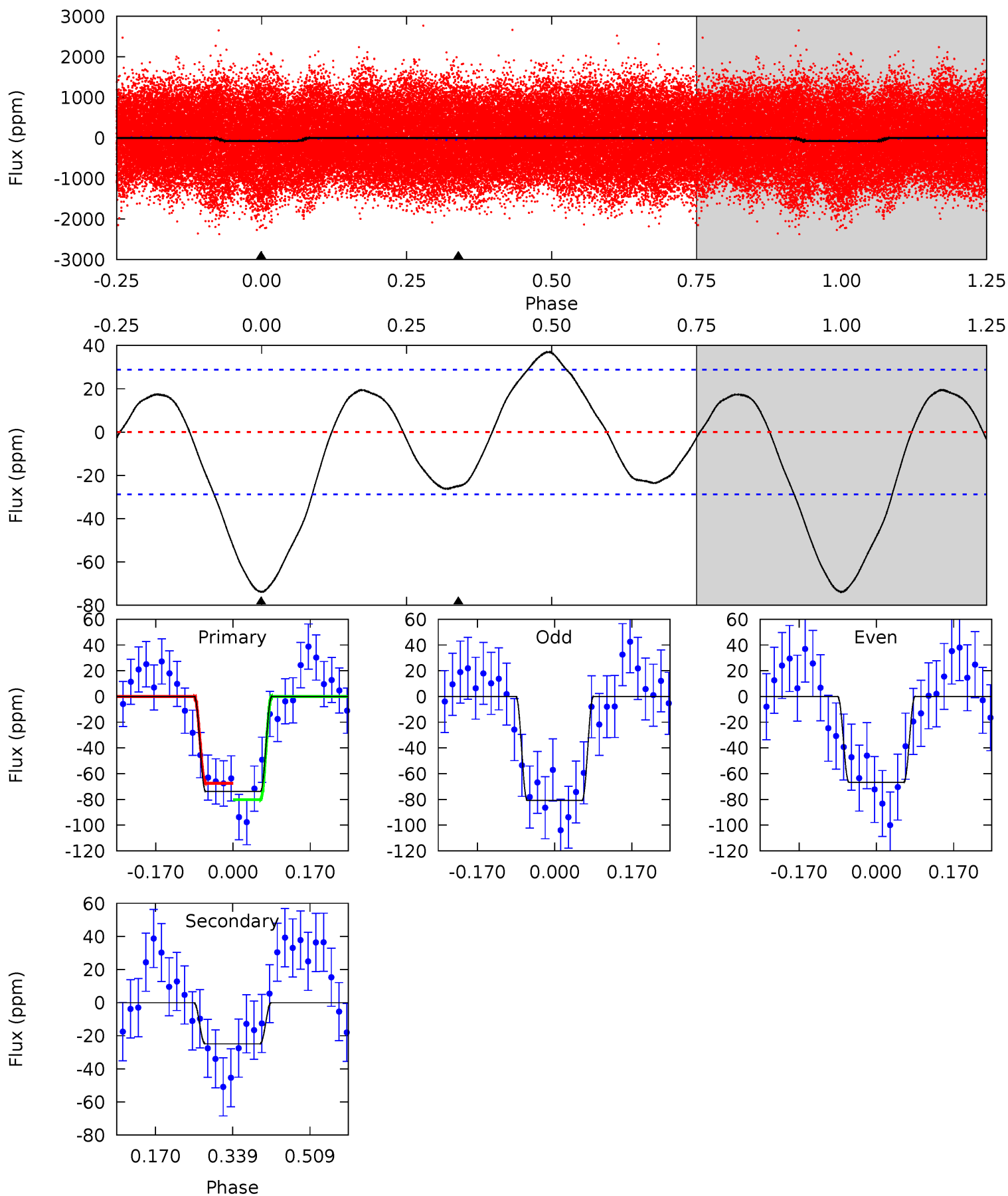
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
17.3	9.64	0	0	4.44	1.34	11.7	17.3	17.3	9.64	9.64	0.94	1.19	0.62	0.82



Alt Model-Shift Uniqueness Test

004588073-01, P = 2.263833 Days, E = 130.055425 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.4	3.85	0	0	4.45	1.37	2.71	11.4	11.4	3.85	3.85	1.09	1.03	0.33	1.00



Stellar Parameters For KIC 004588073

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	7372^{+230}_{-307}	$3.865^{+0.352}_{-0.117}$	$-0.320^{+0.250}_{-0.350}$	$2.487^{+0.525}_{-0.974}$	$1.650^{+0.170}_{-0.396}$	$0.151^{+0.426}_{-0.053}$
	+3%/-4%	+9%/-3%	+78%/-109%	+21%/-39%	+10%/-24%	+282%/-35%
Source	KIC0	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 004588073-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	A_{obs}
DV	-20 ± 2	$1.54^{+0.36}_{-0.38}$	3513^{+260}_{-351}	6160^{+747}_{-536}	$7.168^{+5.217}_{-2.492}$
Alt.	-25 ± 6	$2.22^{+0.45}_{-0.49}$	3500^{+254}_{-381}	5401^{+506}_{-484}	$4.304^{+3.056}_{-1.528}$

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

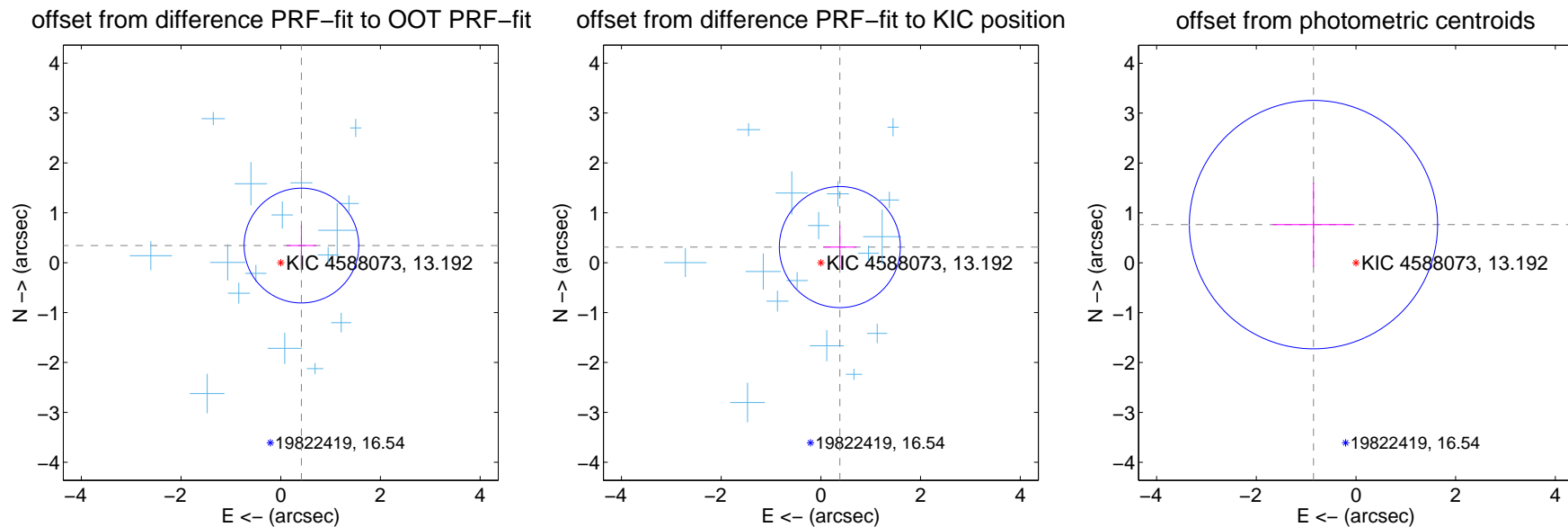
DV Centroid Data

Supplemental centroid analysis for 004588073-01. Kepler magnitude: 13.19. Transit SNR 8.21

There are 16 quarters with good PRF difference image offsets

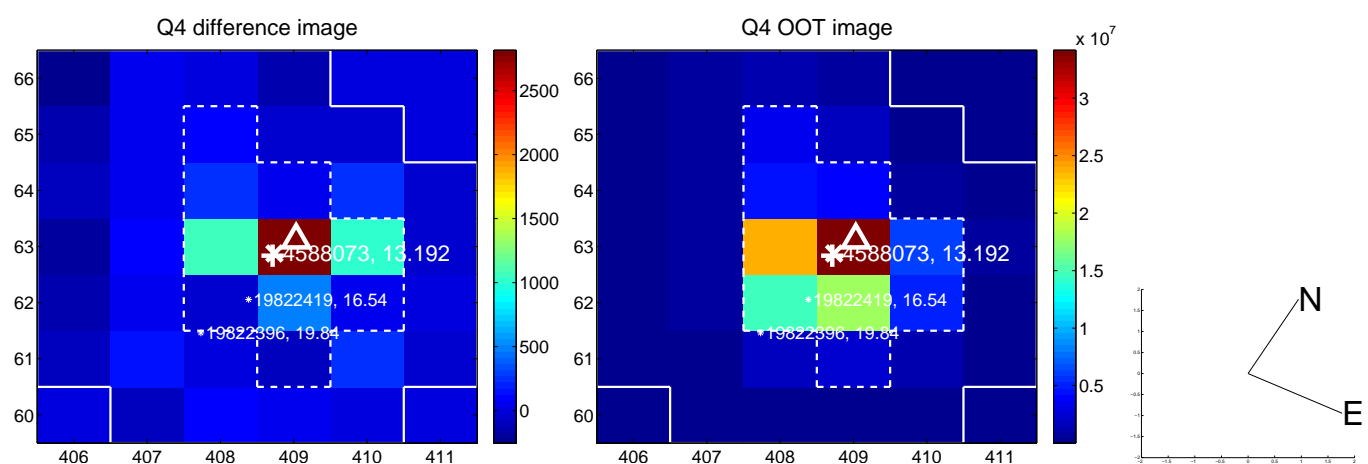
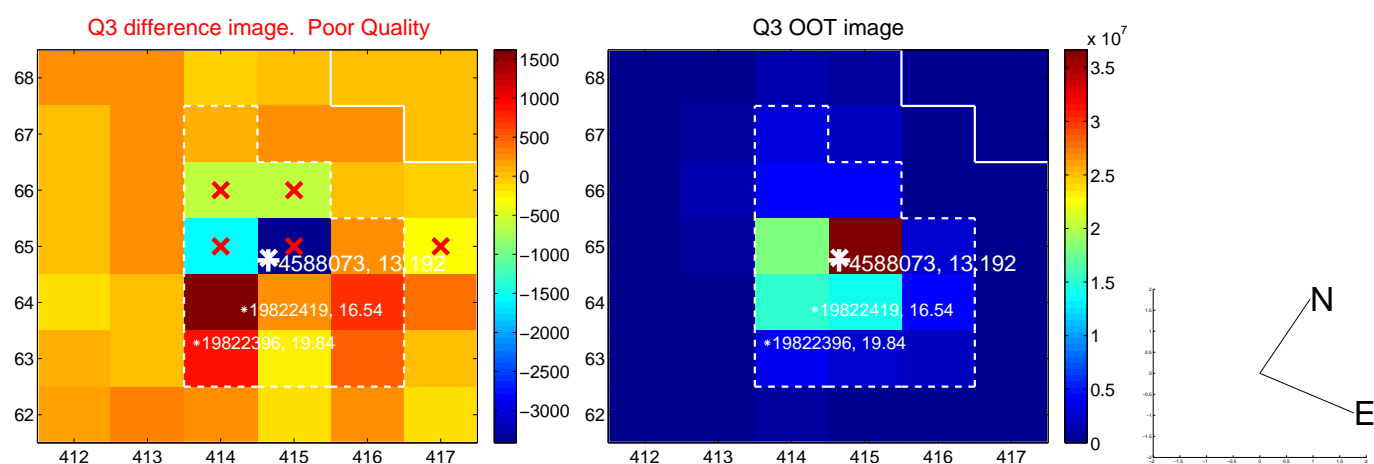
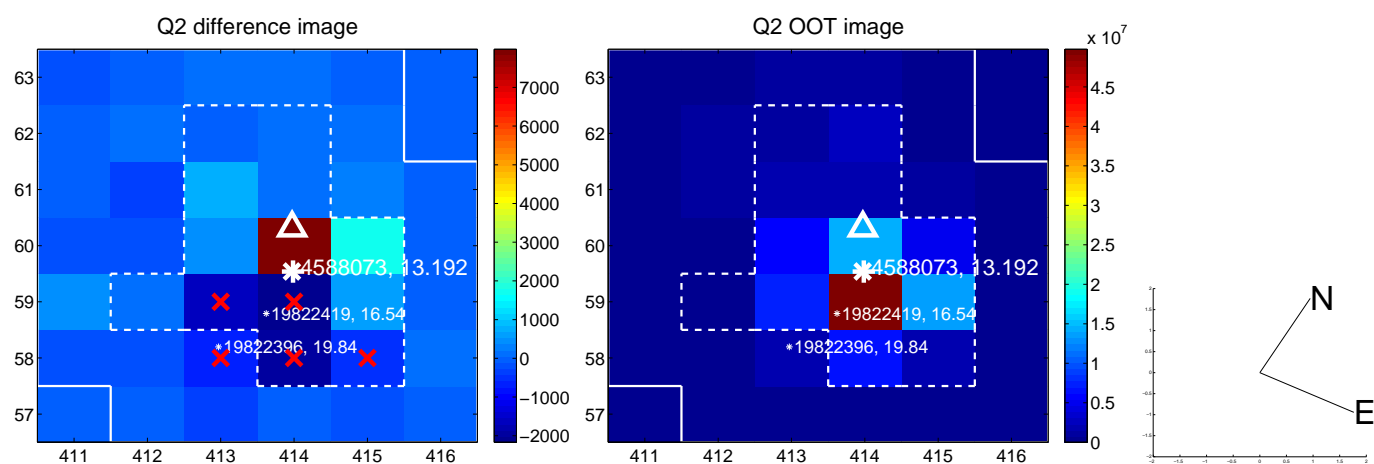
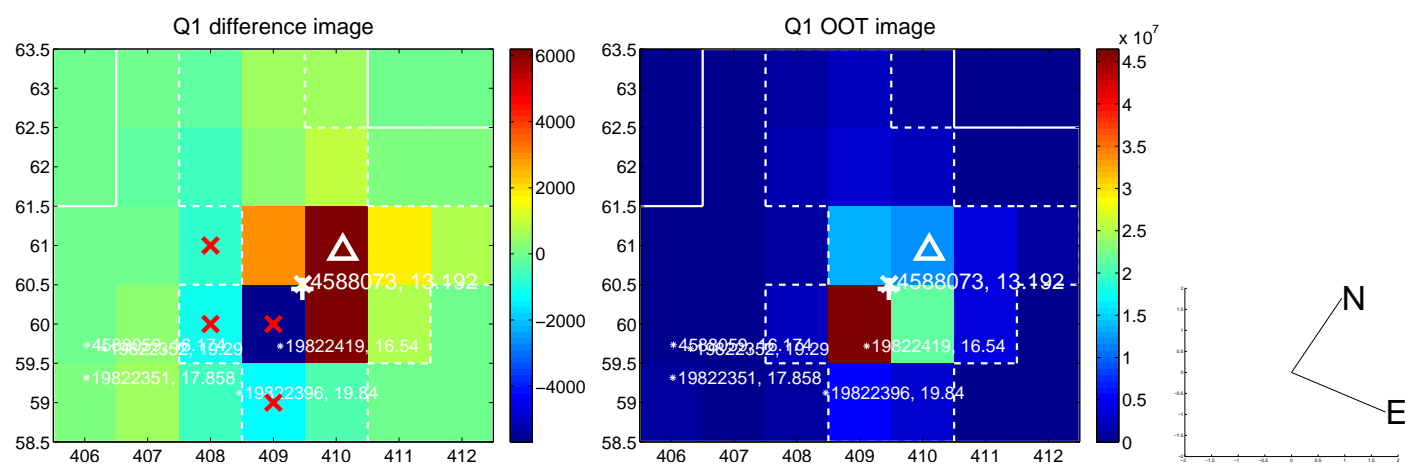
The direct PRF centroid is offset from the target star catalog position by about 0.23 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.539 ± 0.383	1.40	-0.415 ± 0.301	0.343 ± 0.407
PRF-fit source offset from KIC position	0.493 ± 0.404	1.22	-0.381 ± 0.336	0.313 ± 0.429
photometric centroid source offset	1.14 ± 0.83	1.38	0.85 ± 0.82	0.76 ± 0.84

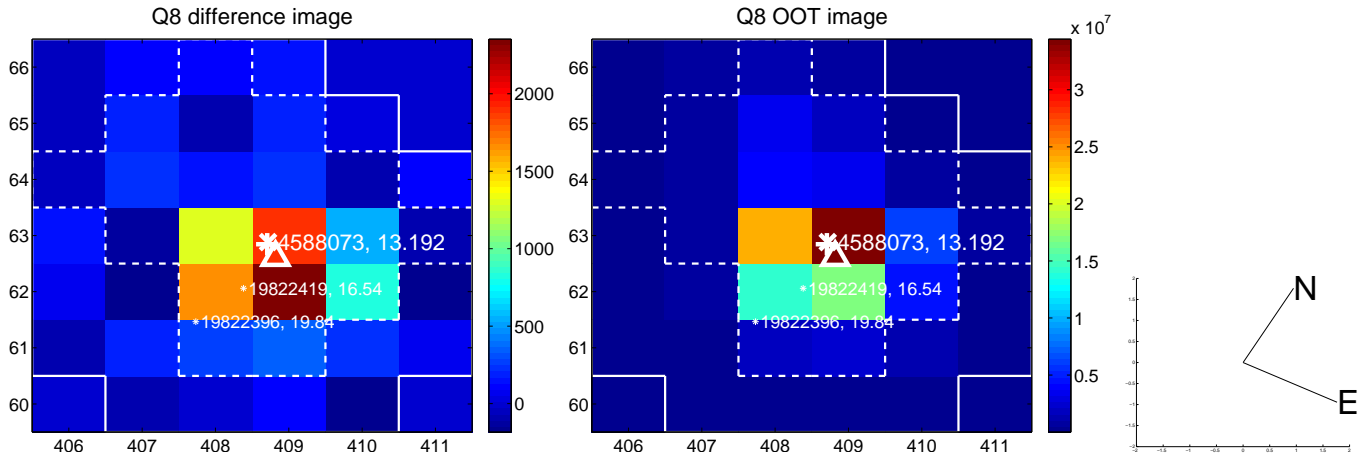
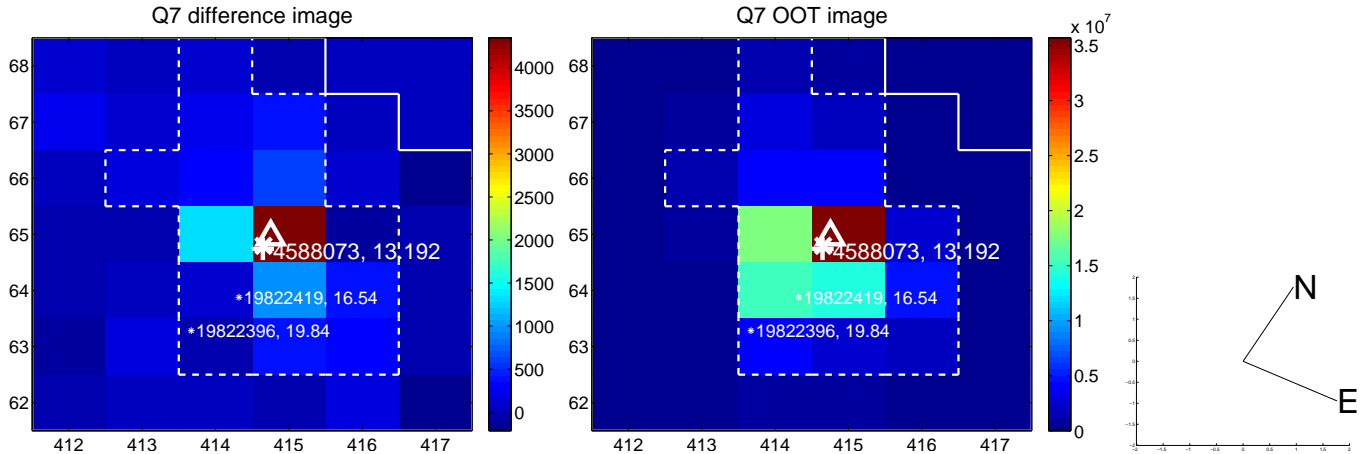
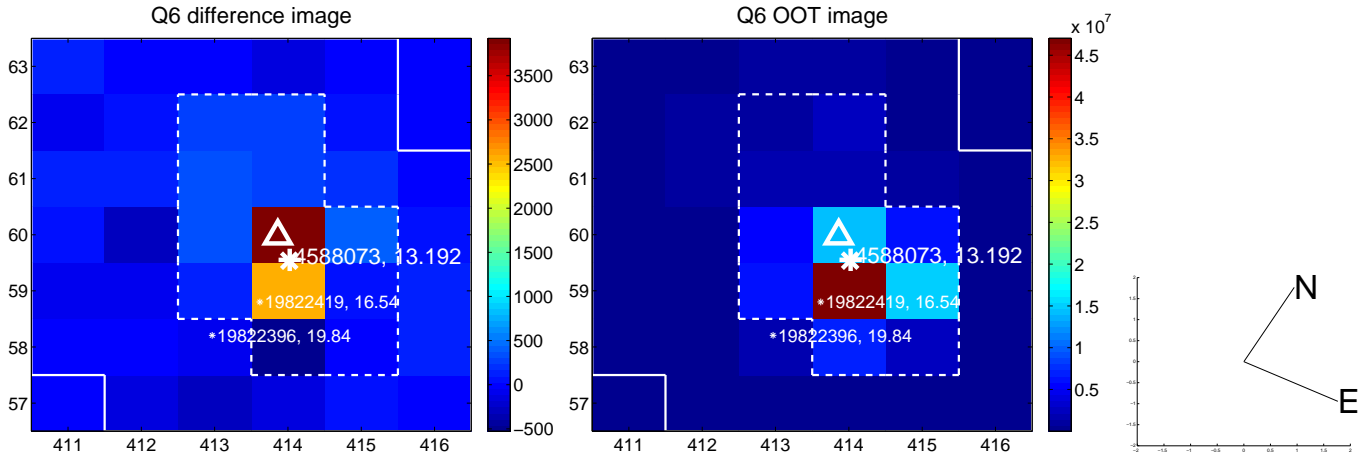
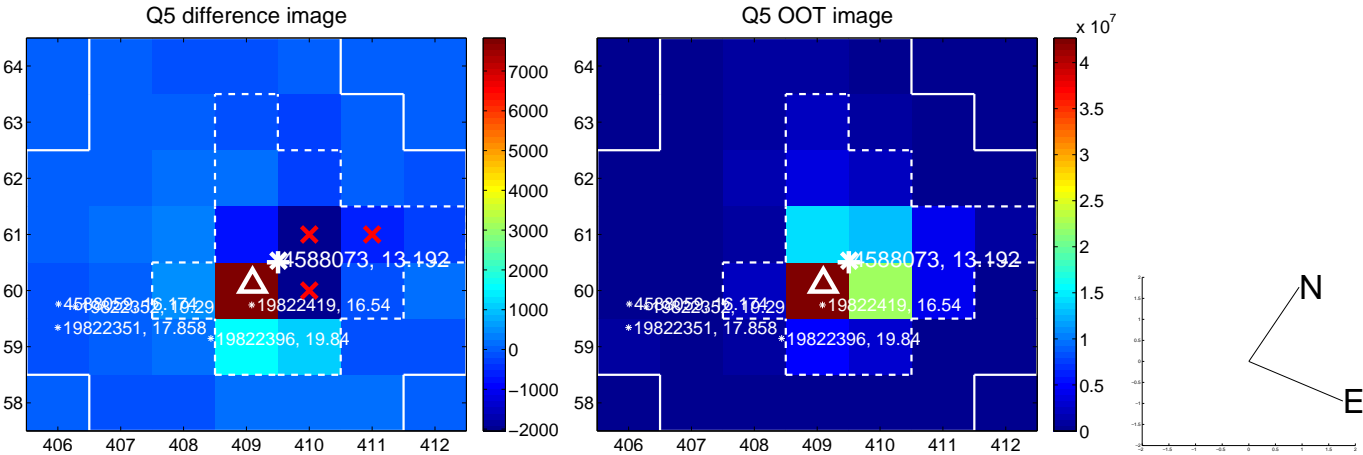


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

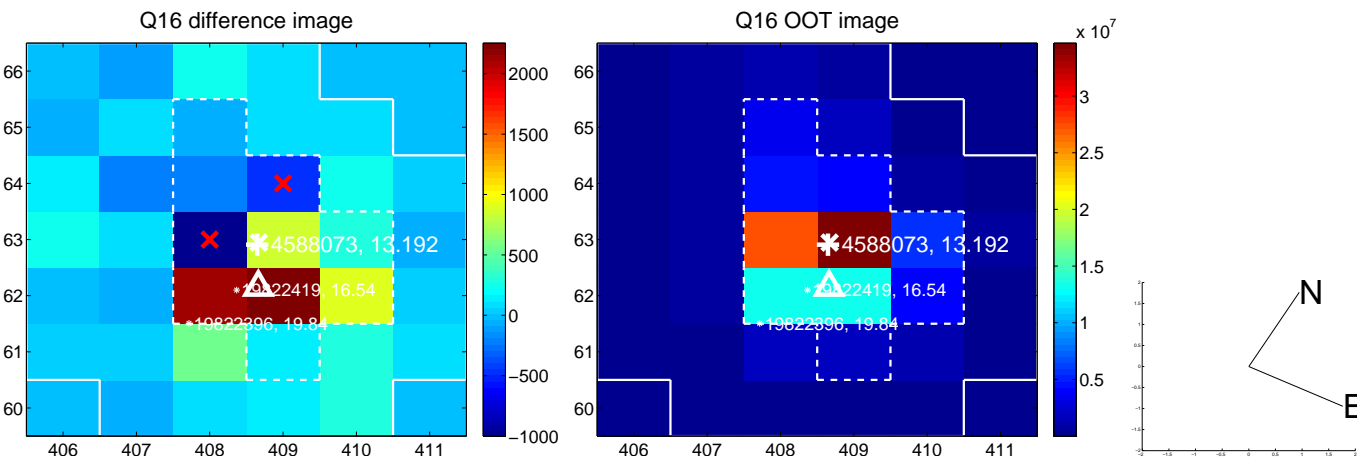
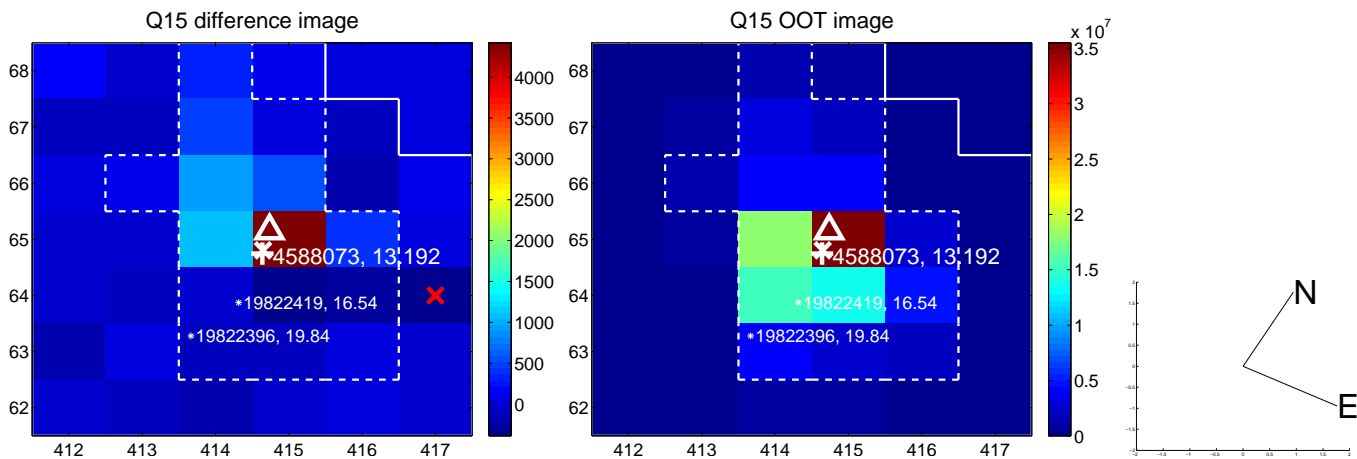
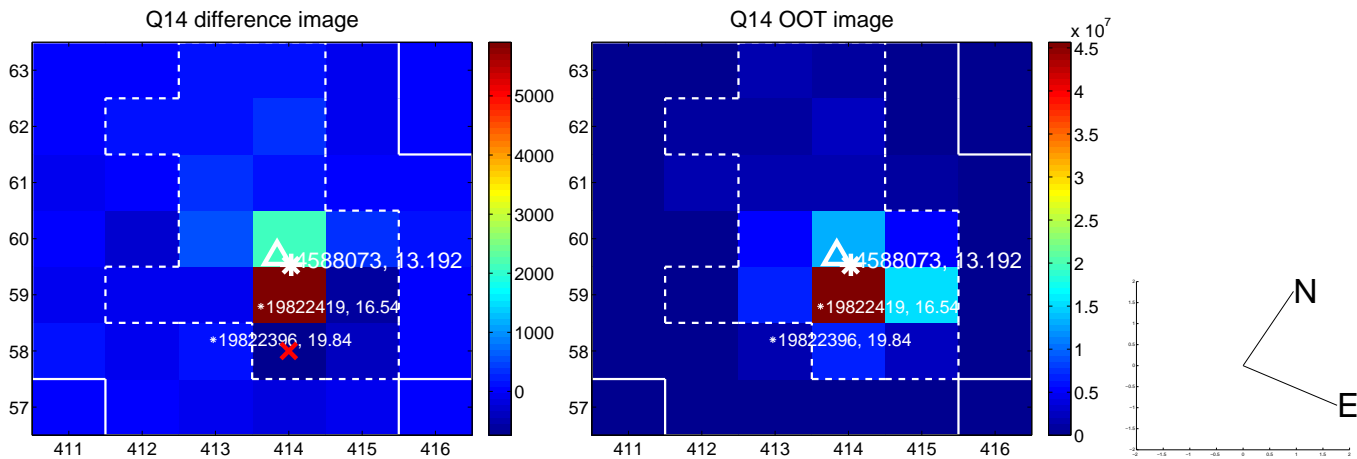
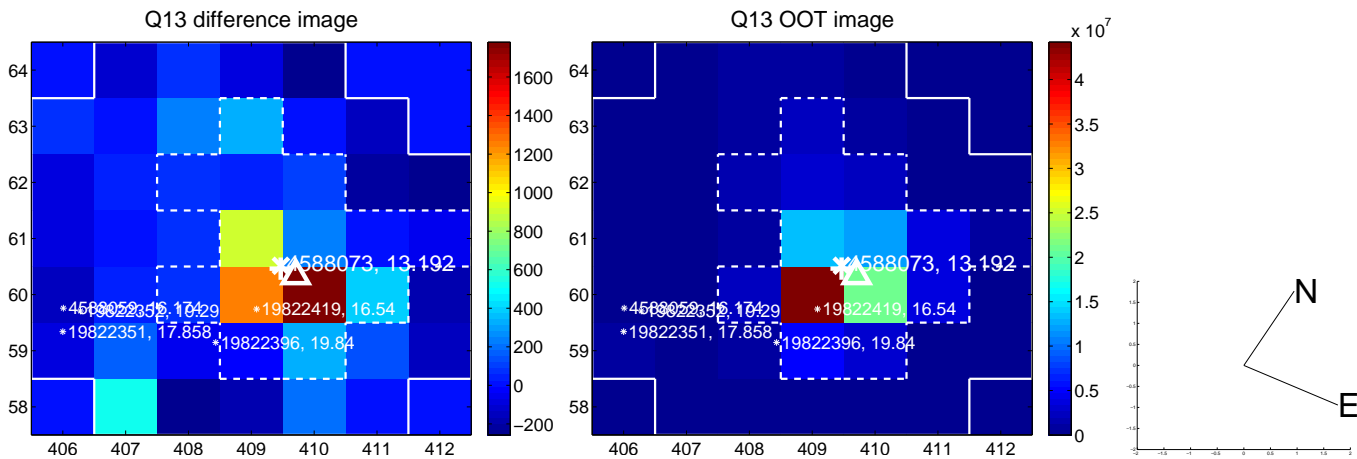
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



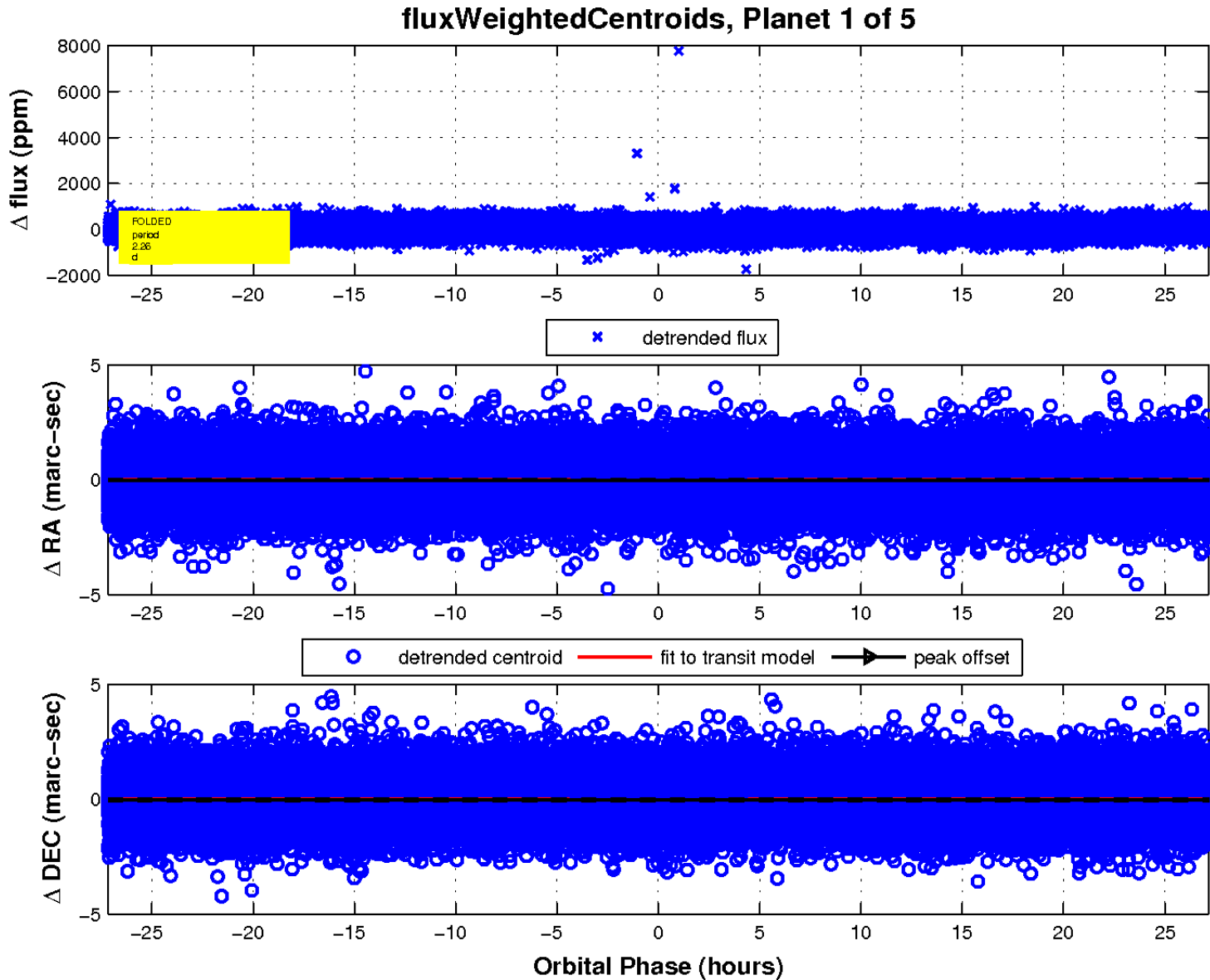
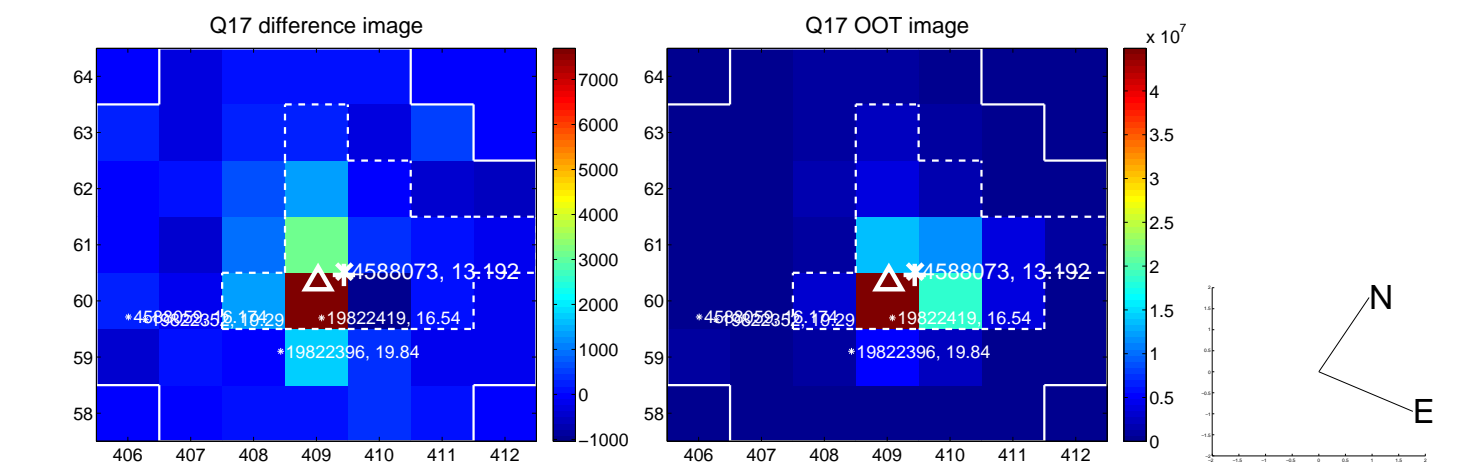
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

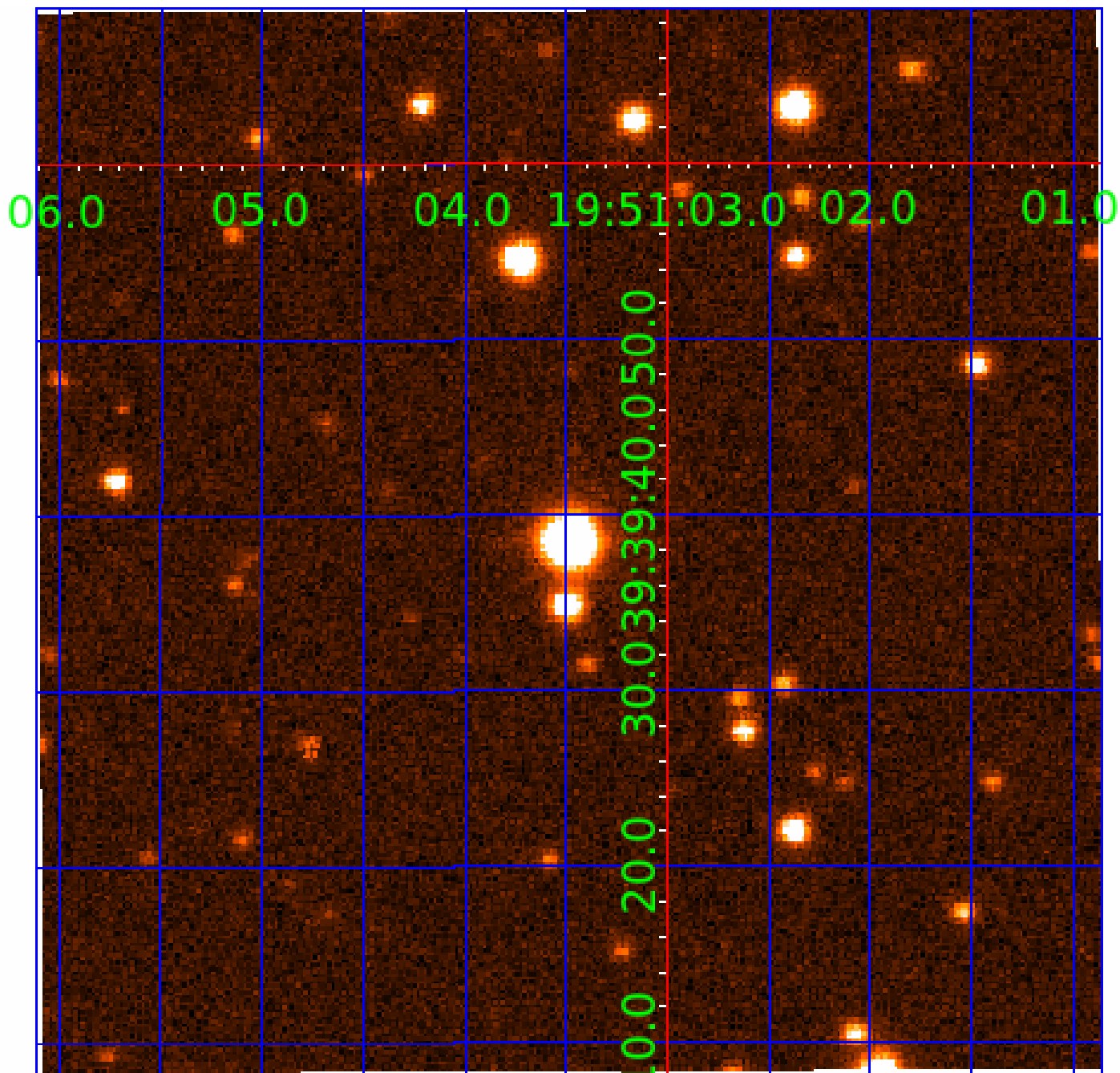


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 004588073

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})
004588073-01	OBS	No	2.263957	132.290732	32.2	9.427	9.1	8.2	2.49	7372	1.64	10276.89
004588073-02	OBS	No	389.281254	335.318420	387.4	4.598	8.2	6.0	2.49	7372	6.51	10.75
004588073-03	OBS	No	68.700947	139.714768	211.0	5.489	8.0	7.1	2.49	7372	4.10	108.58
004588073-04	OBS	No	488.804855	251.079617	476.1	3.252	7.6	8.4	2.49	7372	5.95	7.93
004588073-05	OBS	No	19.149293	146.585028	158.8	1.963	7.6	7.5	2.49	7372	3.58	596.32

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004588073-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
004588073-02	OBS	FP	0.00	1	0	0	0	LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
004588073-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004588073-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
004588073-05	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

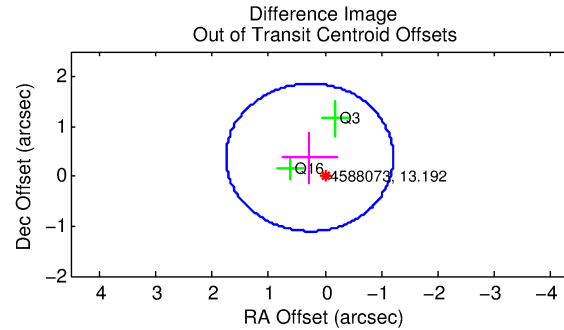
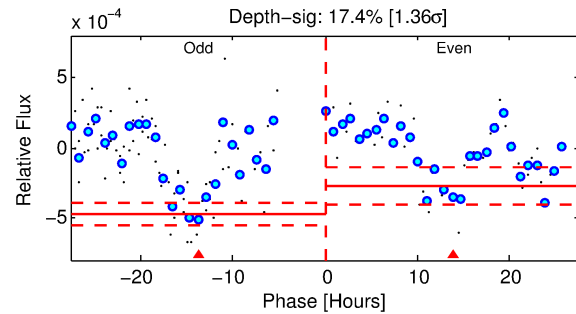
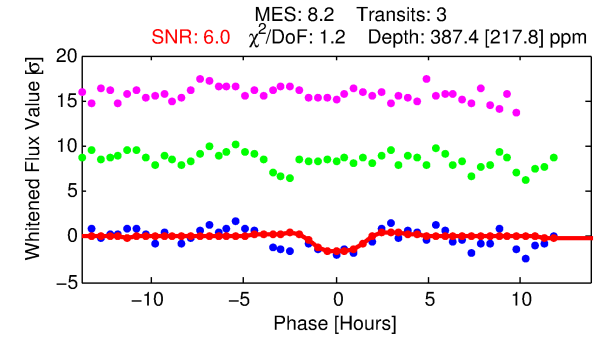
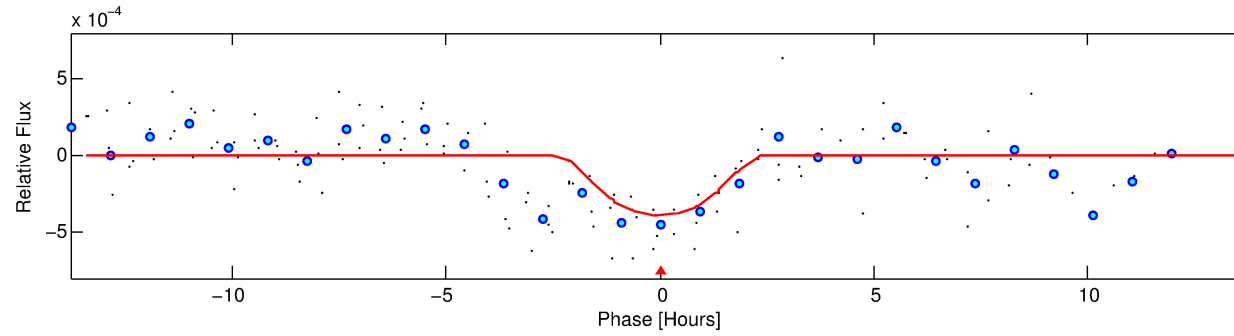
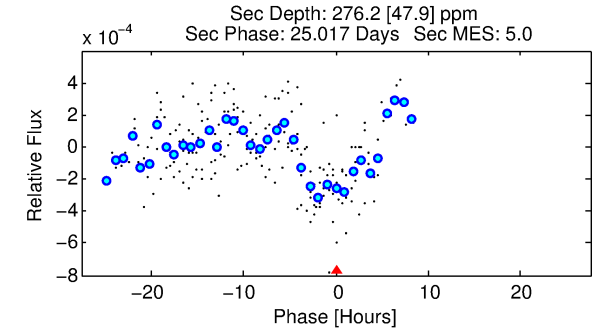
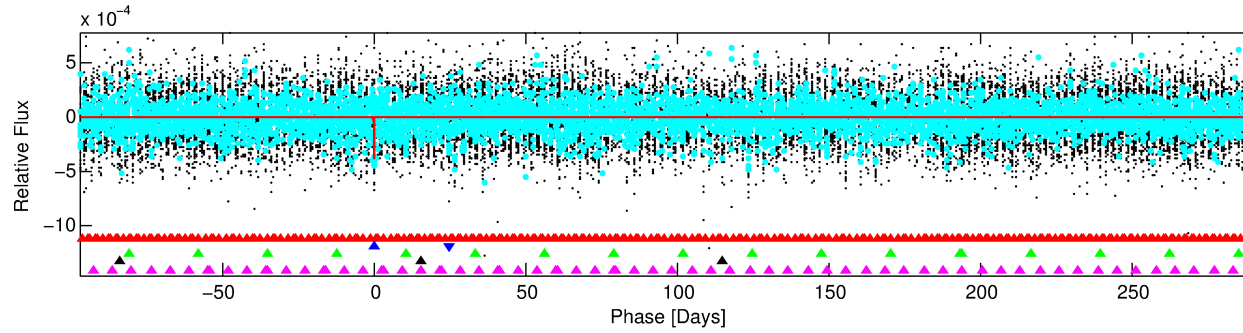
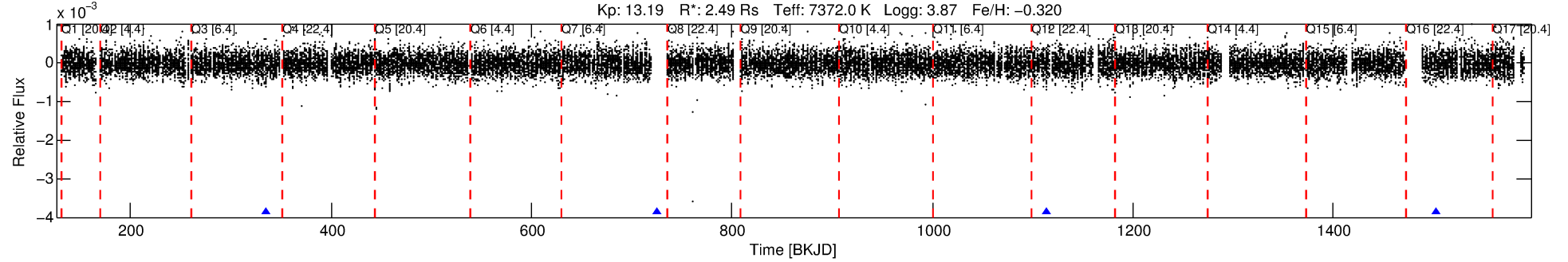
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 004588073-02

No Significant Match Found

DV One-Page Summary

KIC: 4588073 Candidate: 2 of 5 Period: 389.281 d



DV Fit Results:

Period = 389.28125 [0.00770] d
Epoch = 335.3184 [0.0164] BKJD
Rp/R* = 0.0240 [0.0126]
a/R* = 194.33 [91.49]
b = 0.98 [0.04]
Seff = 10.75 [6.69]
Teq = 462 [72] K
Rp = 6.51 [4.26] Re
a = 1.2340 [0.4636] AU
Ag = 5457.19 [6650.64] [0.82σ]
Teffp = 6135 [1647] K [3.44σ]

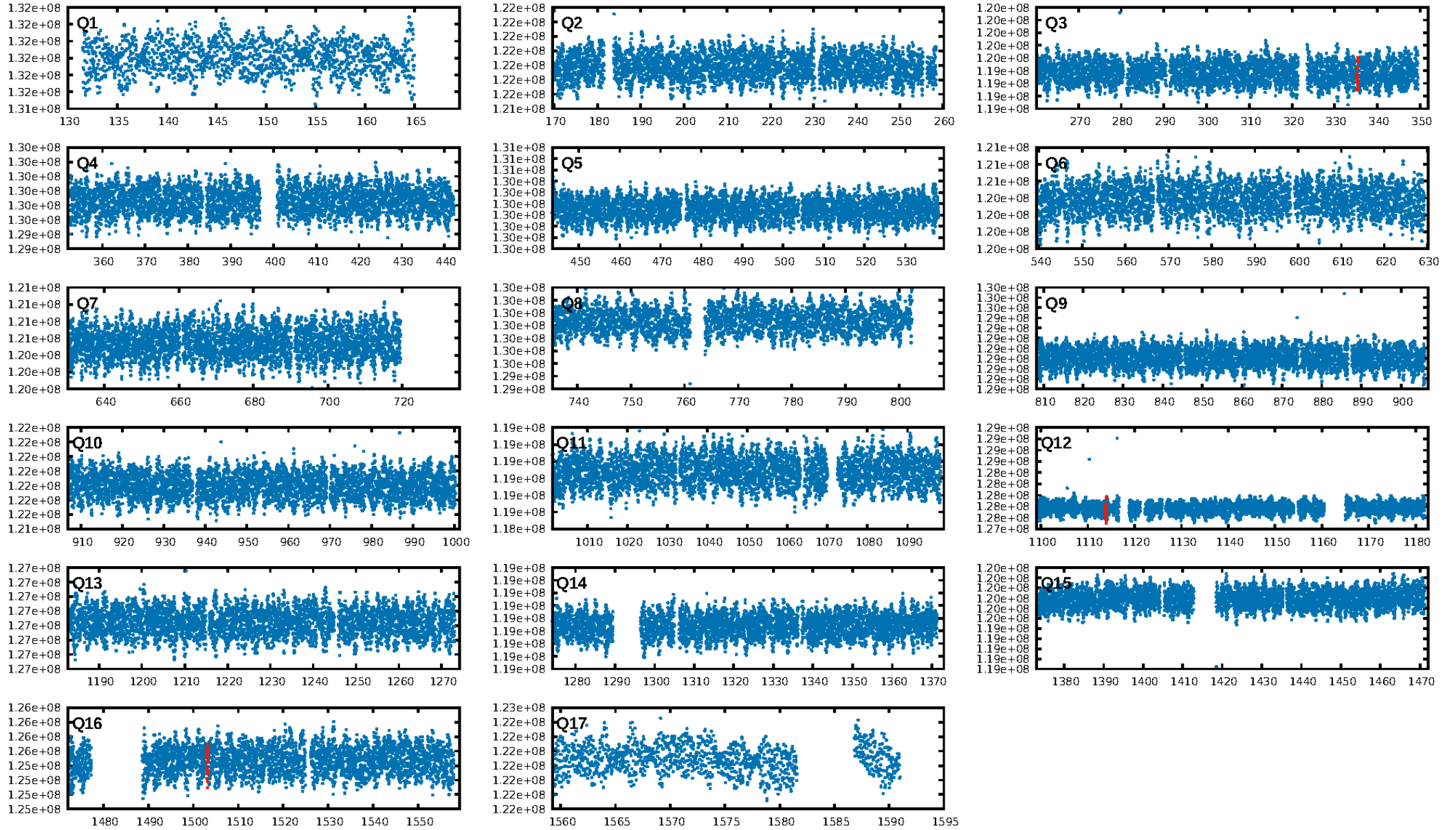
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [1074.53σ]
LongPeriod-sig: 100.0% [424.13σ]
ModelChiSquare2-sig: 27.0%
ModelChiSquareGof-sig: 99.0%
Bootstrap-pfa: 1.72e-08
RollingBand-fgt: 1.00 [3/3]
GhostDiagnostic-chr: 3.21
Centroid-sig: 23.1%
Centroid-so: 1.448 arcsec [0.88σ]
OotOffset-rm: 0.462 arcsec [0.94σ]
OotOffset-st: 0/1/1/0 [2]
KicOffset-rm: 0.366 arcsec [0.83σ]
KicOffset-st: 0/1/1/0 [2]
DiffImageQuality-fgm: 1.00 [2/2]
DiffImageOverlap-fno: 1.00 [3/3]

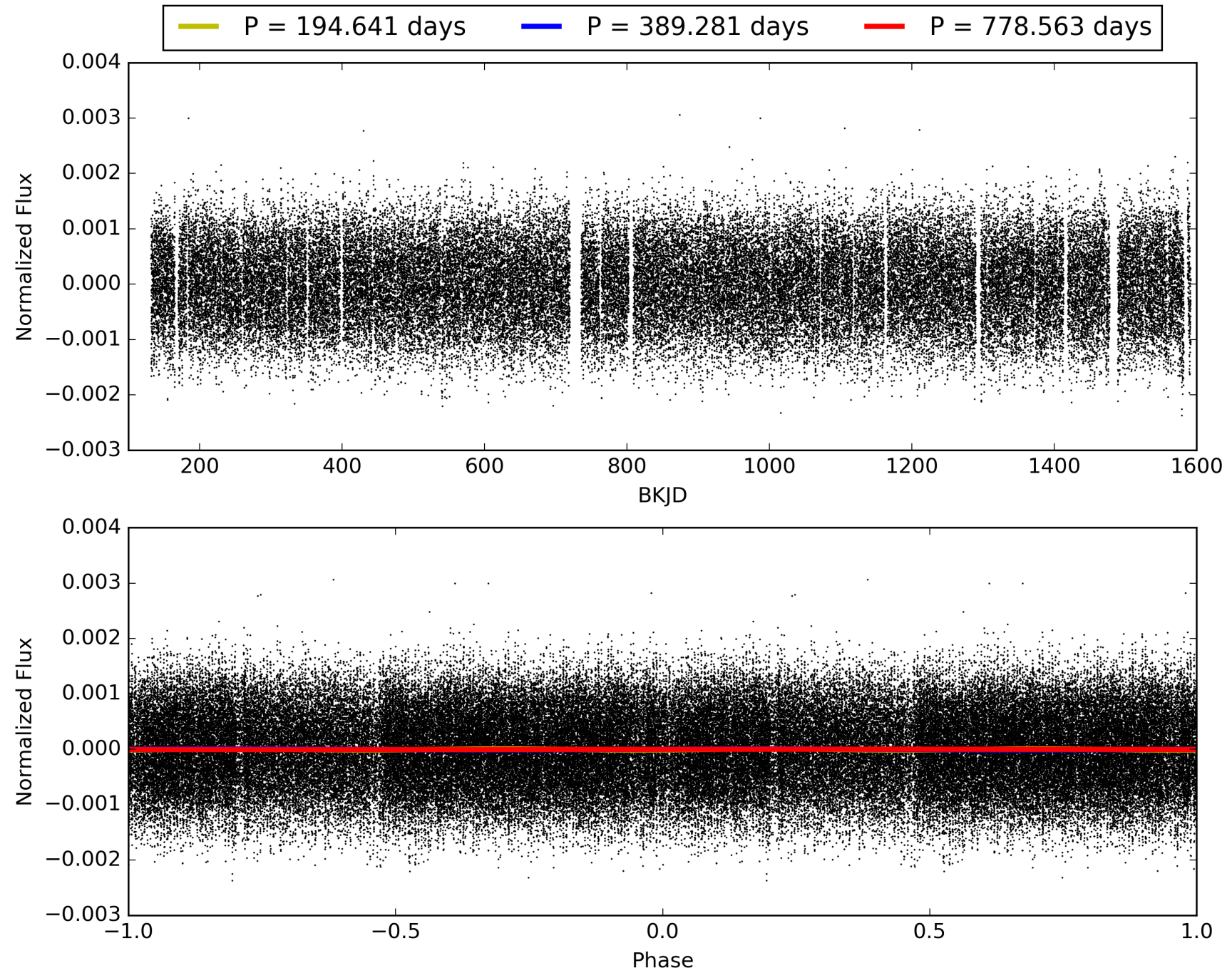
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 00:26:51 Z

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

TCE 004588073-02, PDC Light Curves

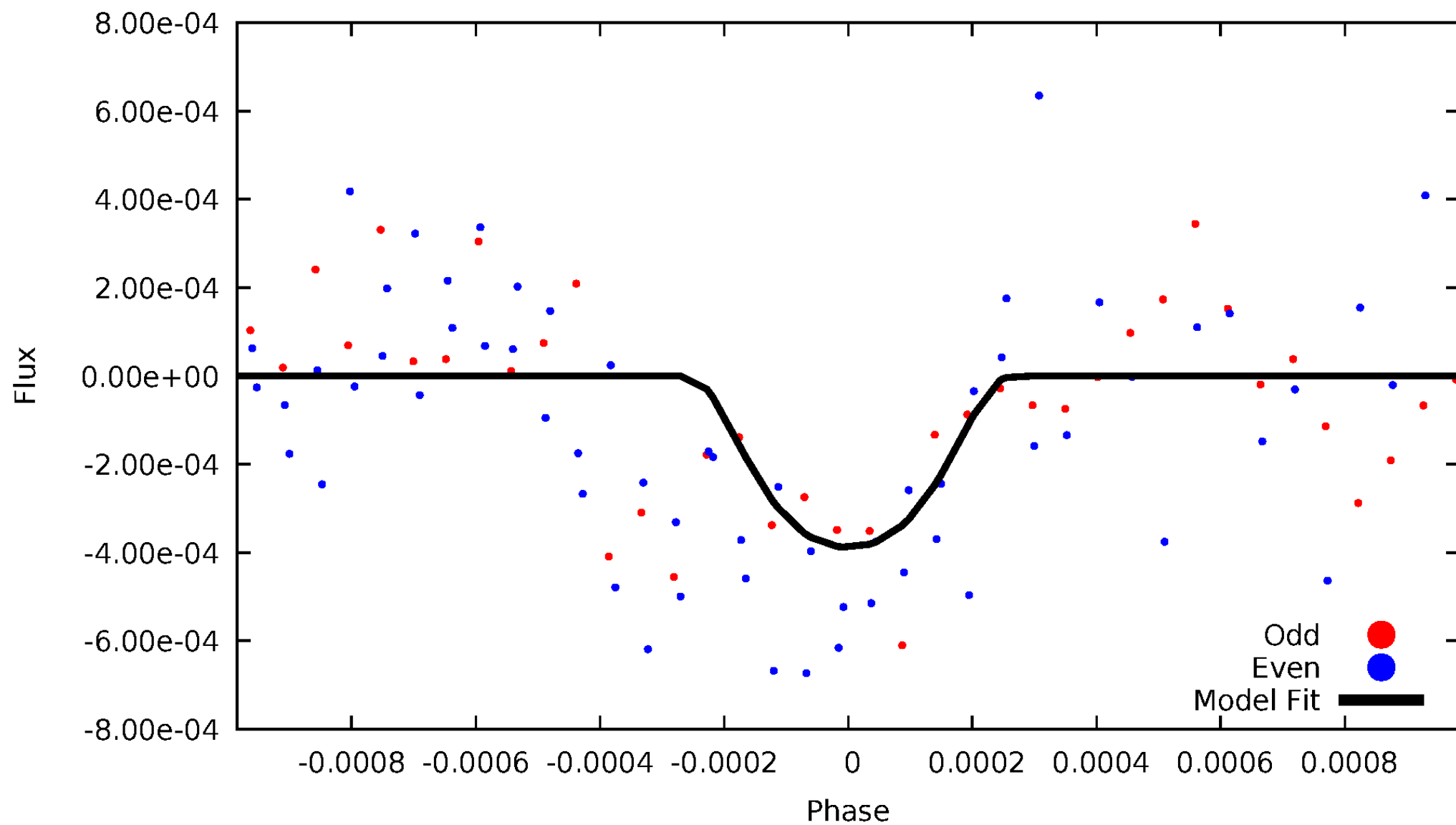


TCE 004588073-02



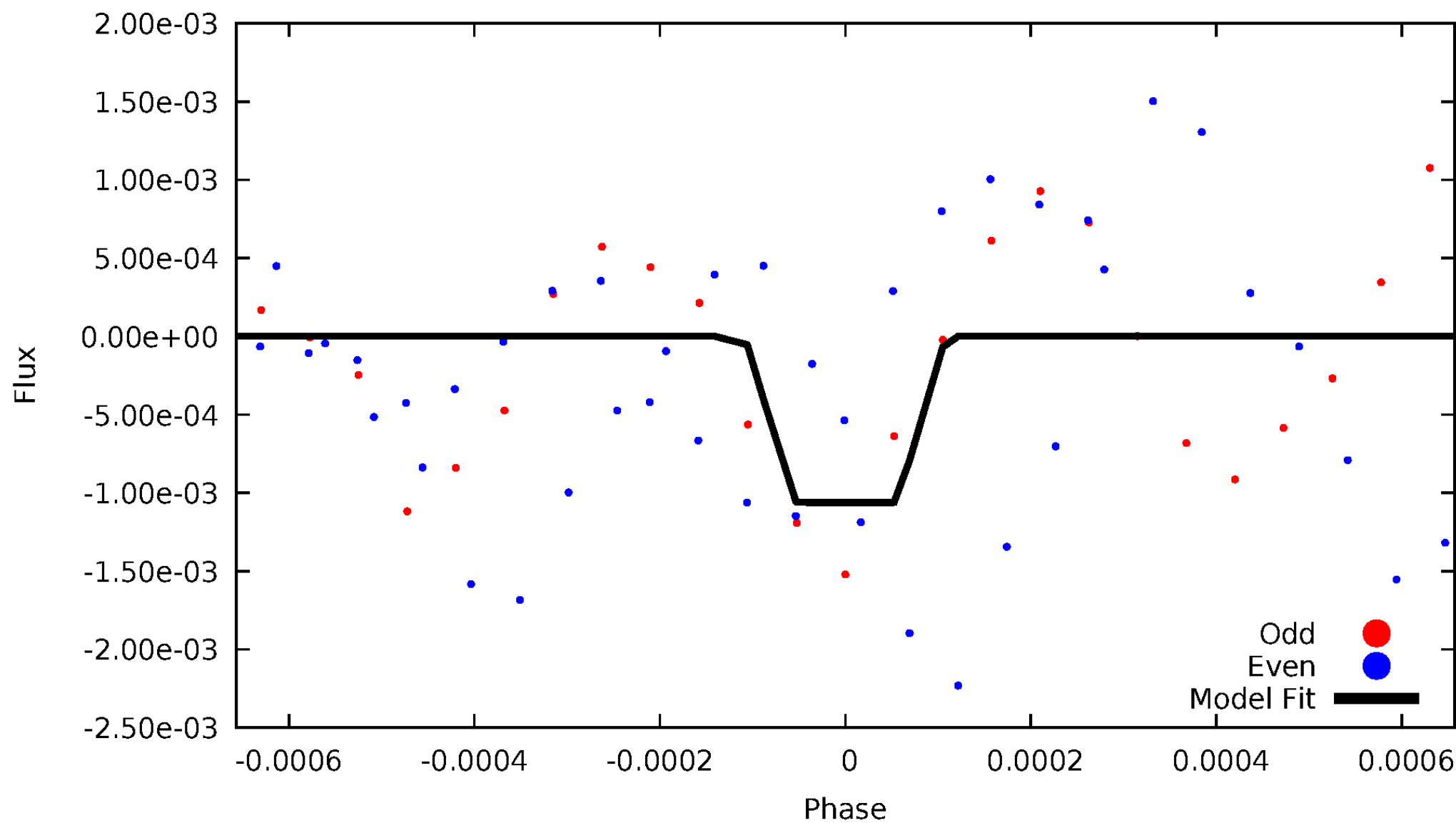
DV Odd/Even

TCE 004588073-02



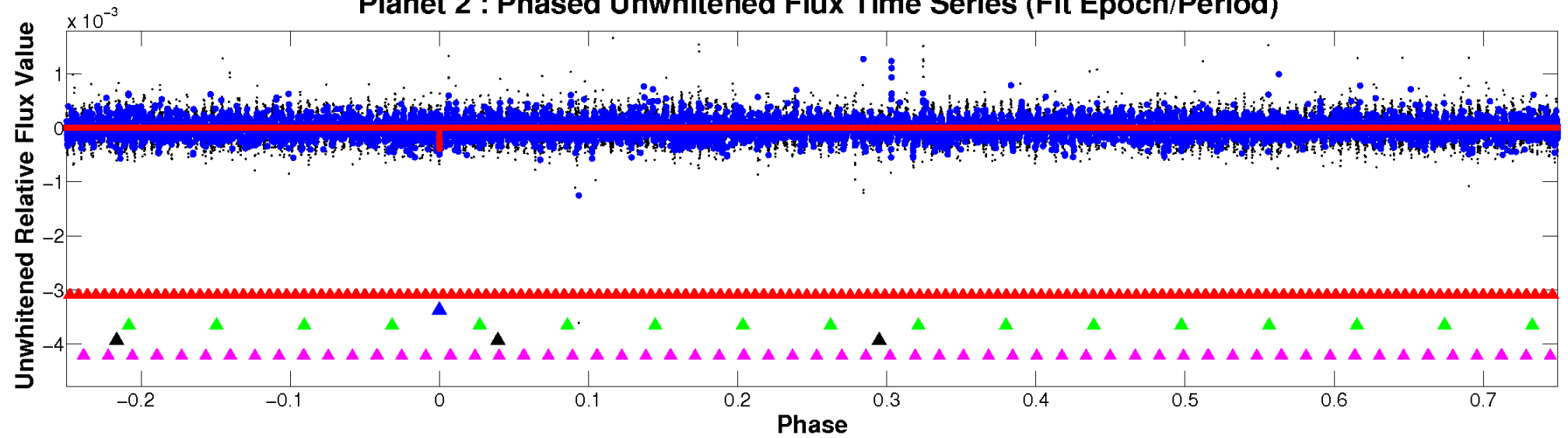
ALT Odd/Even

TCE 004588073-02

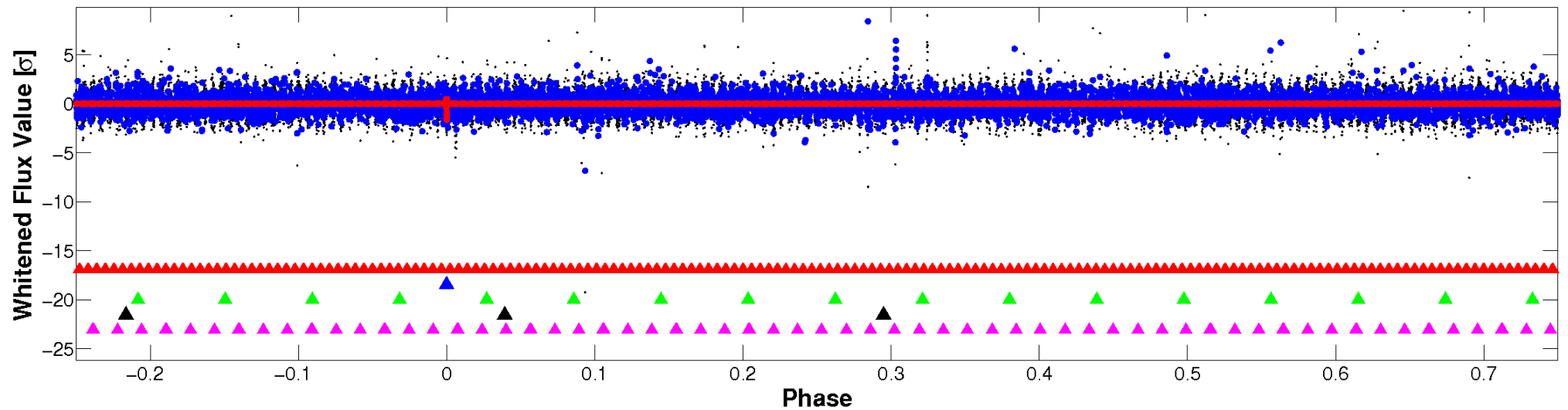


Non-Whitened Vs. Whitened Light Curve

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

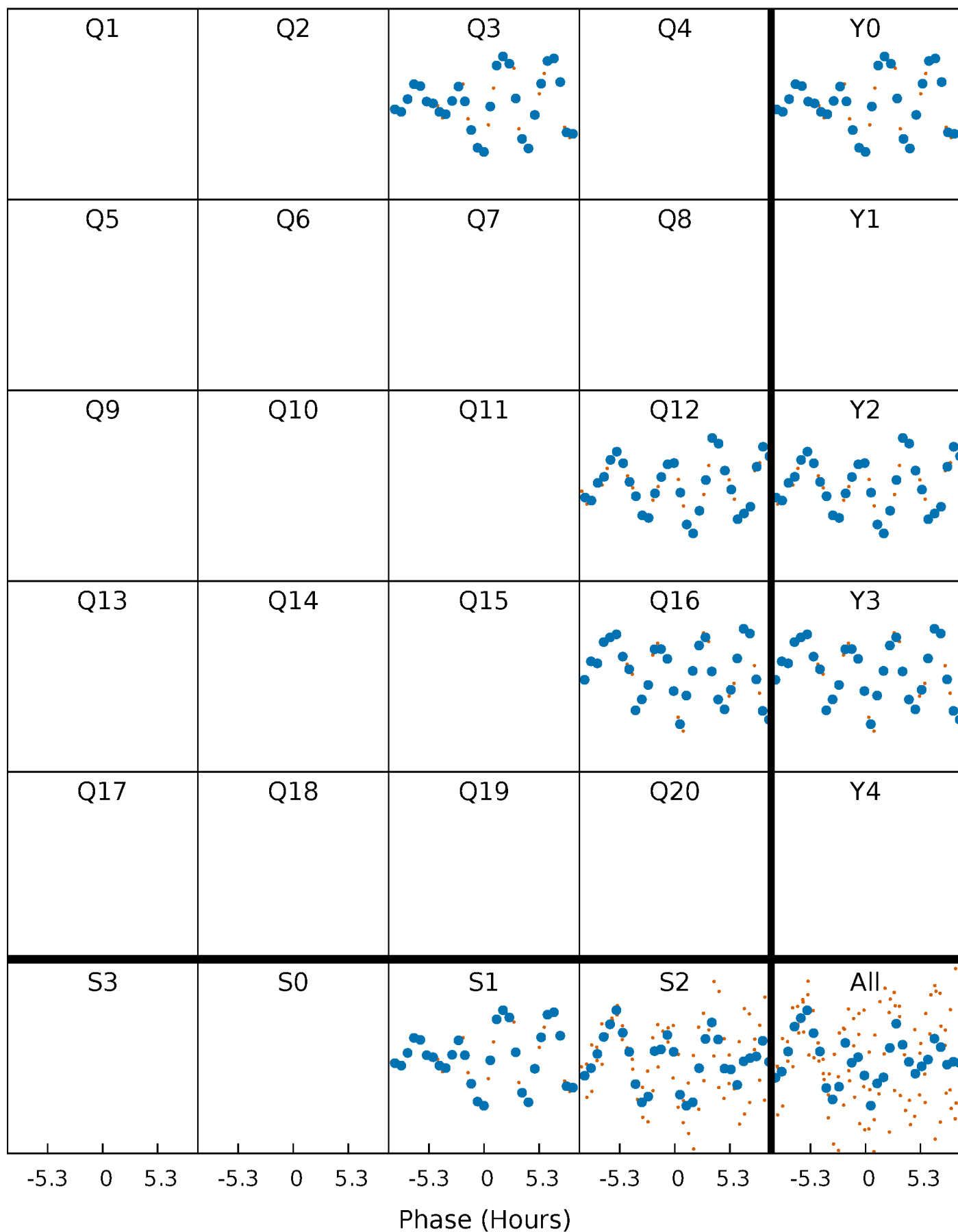


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



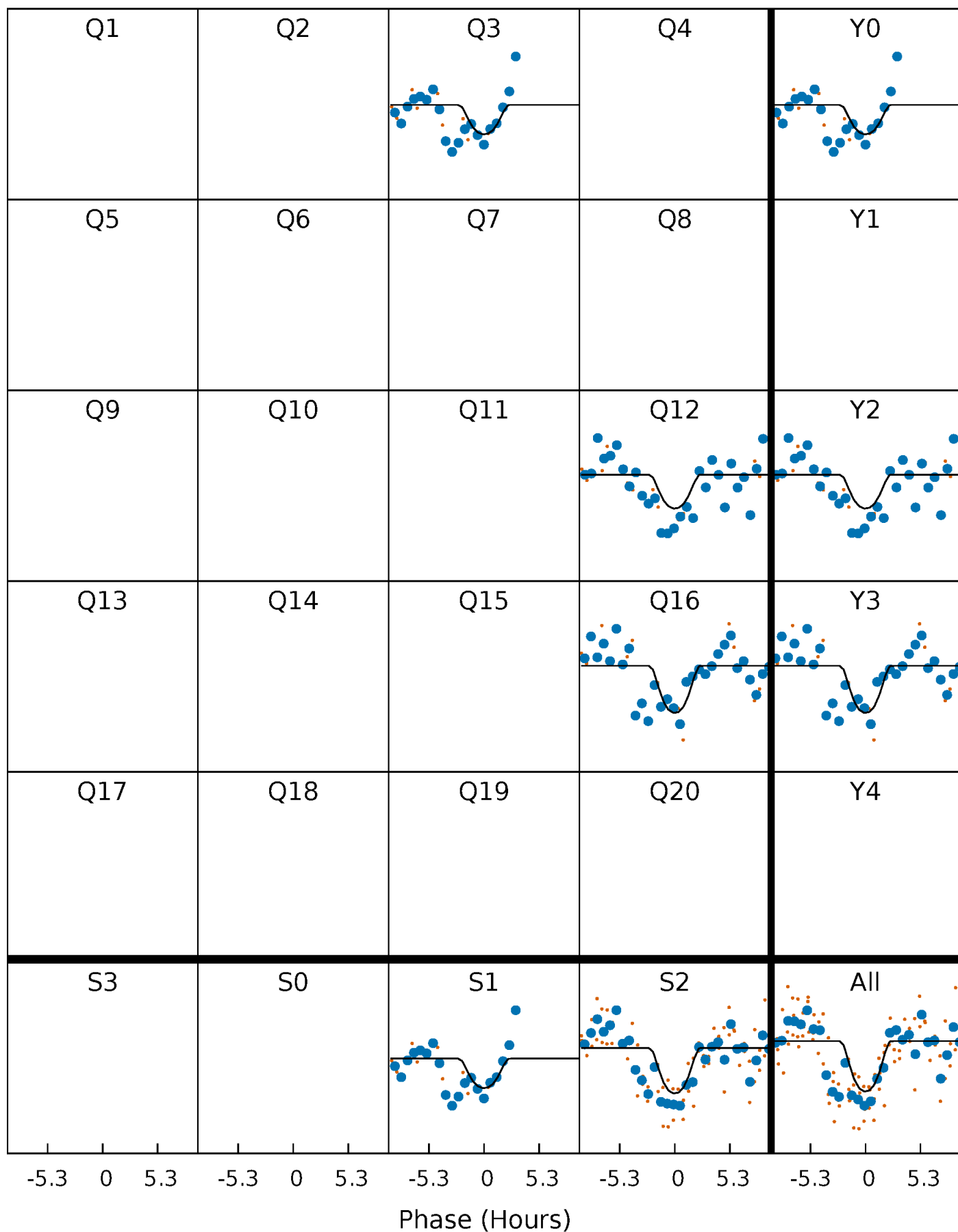
PDC Quarter-Phased Transit Curves

TCE 004588073-02 $P=389.281254$ Days $T_0=335.318420$ (BKJD)



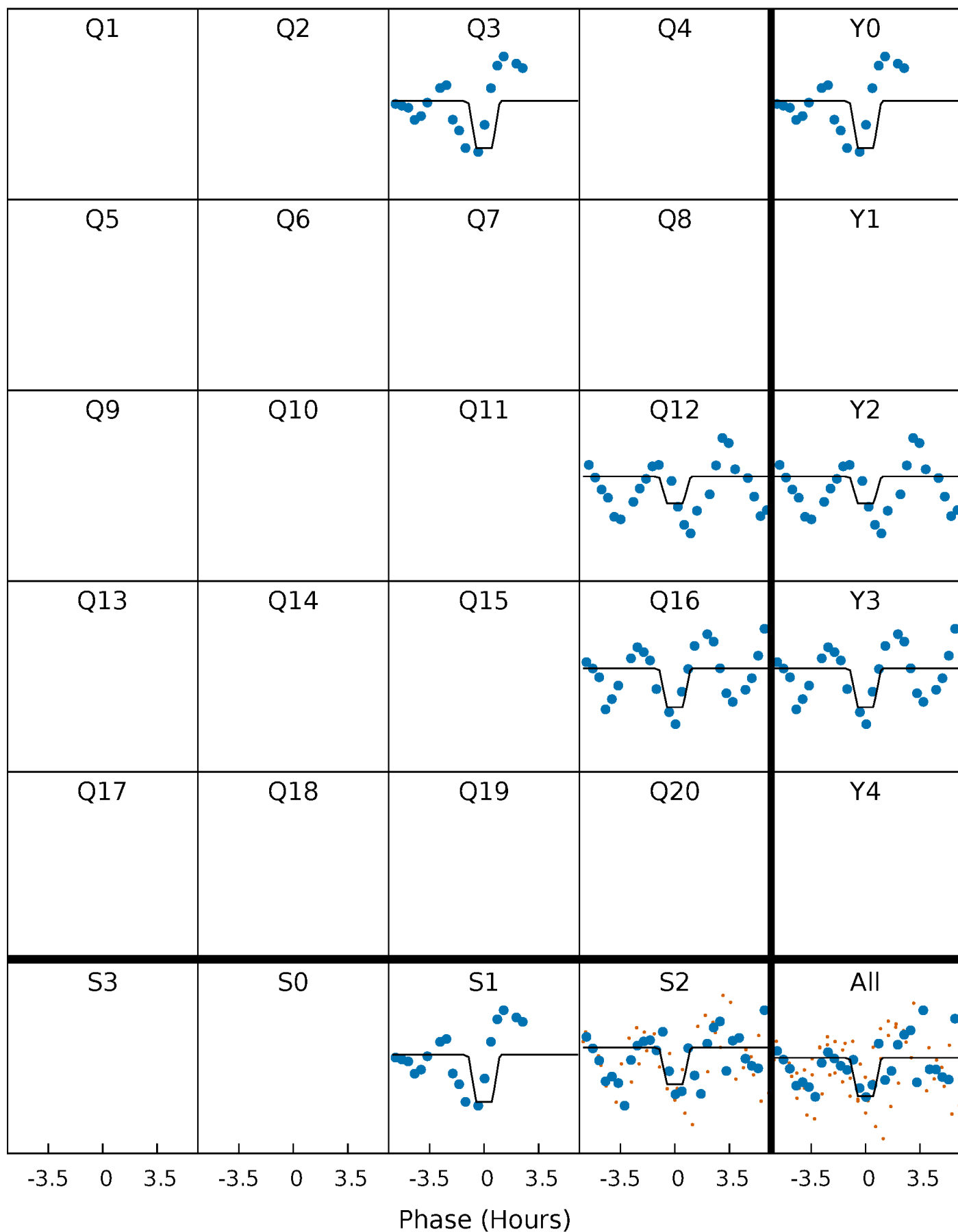
DV Quarter-Phased Transit Curves

TCE 004588073-02 P=389.281254 Days $T_0=335.318420$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

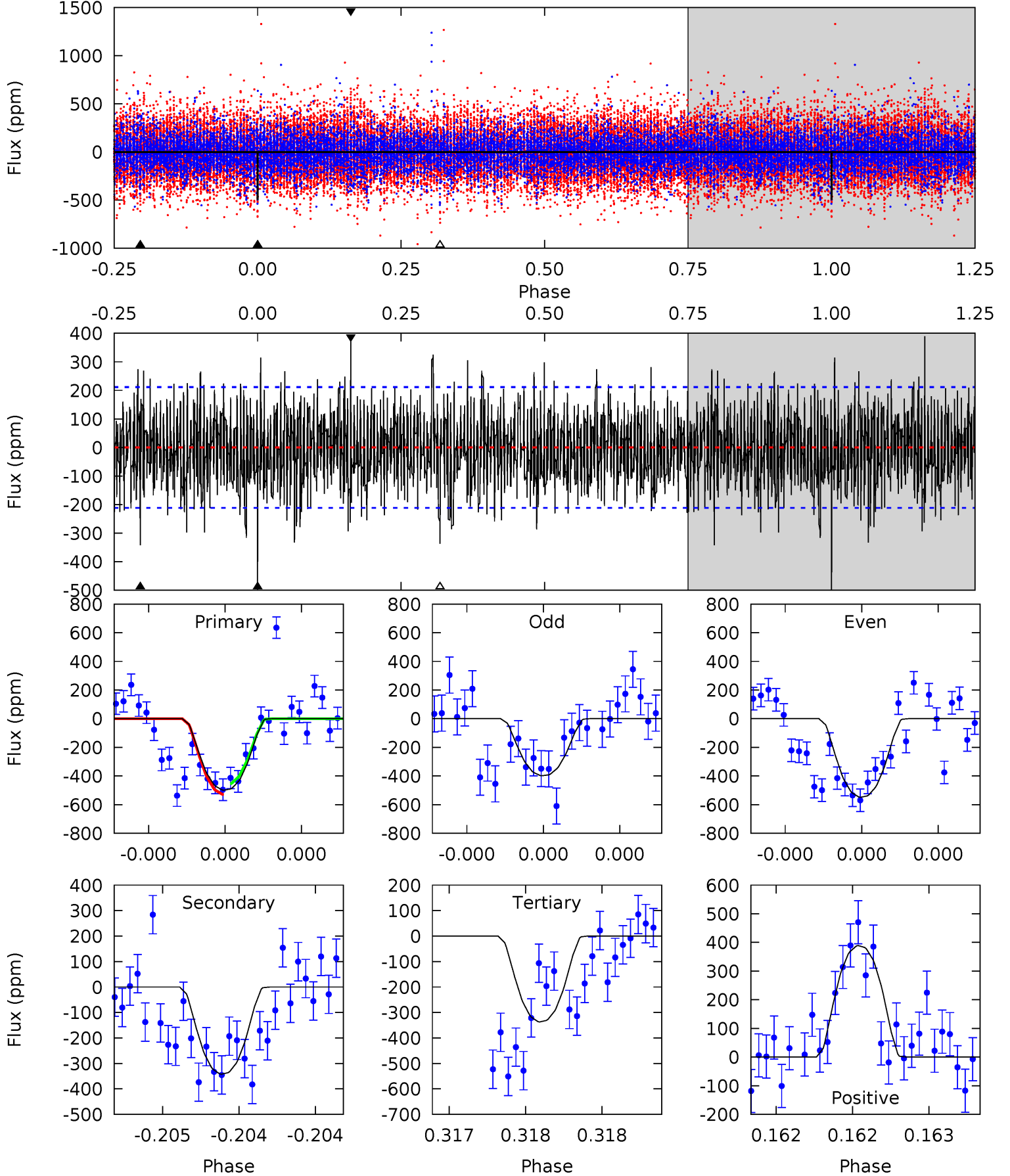
TCE 004588073-02 P=389.286563 Days $T_0=335.336219$ (BKJD)



DV Model-Shift Uniqueness Test

004588073-02, P = 389.281254 Days, E = 335.318420 Days

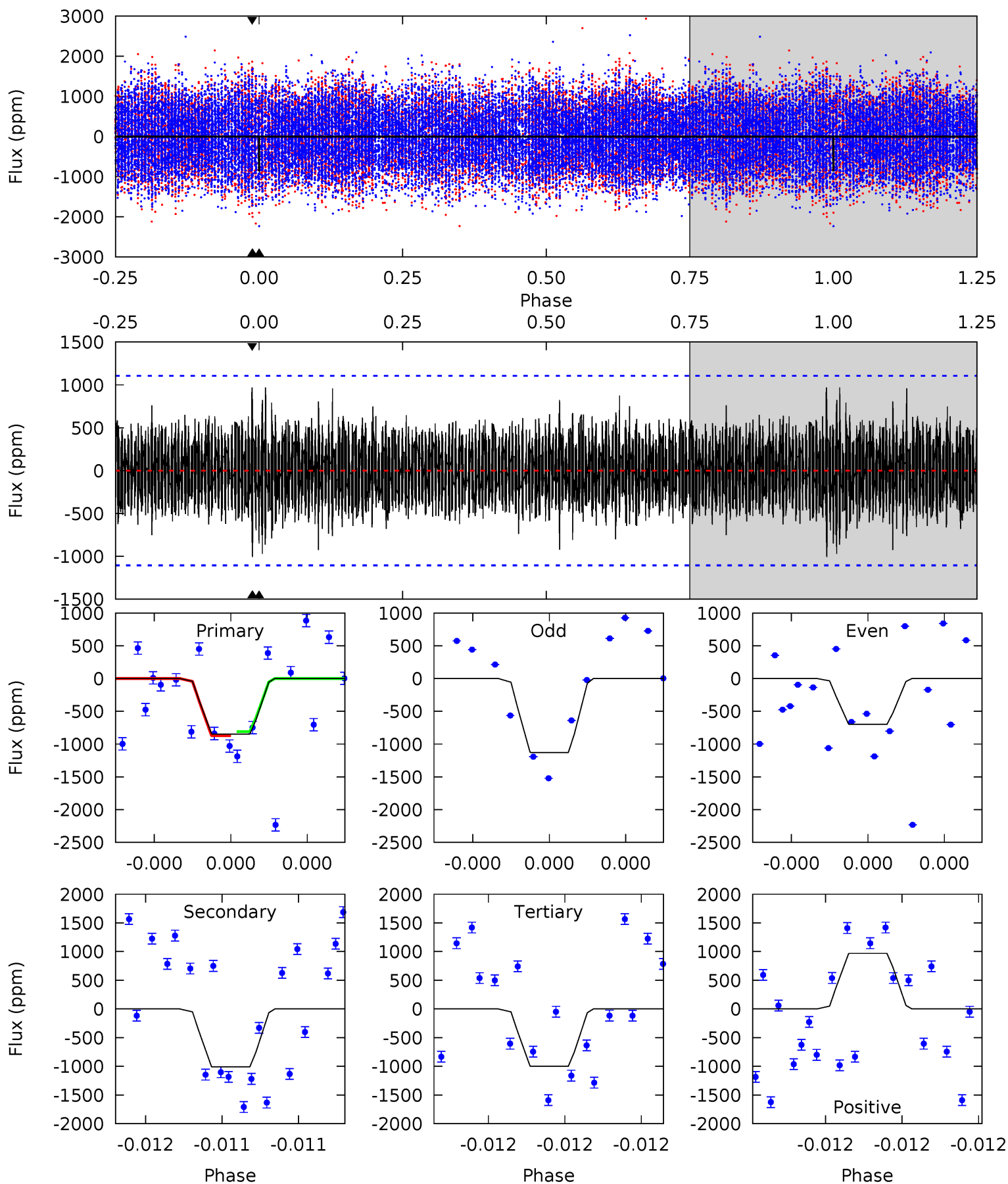
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
13.2	9.03	8.89	10.3	5.58	3.49	2.47	4.28	2.90	0.14	-1.24	1.84	1.15	0.44	0.98



Alt Model-Shift Uniqueness Test

004588073-02, P = 389.286563 Days, E = 335.336219 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
4.39	5.23	5.17	5.02	5.72	3.71	1.36	-0.78	-0.63	0.06	0.21	1.04	0.88	0.49	0.16



Stellar Parameters For KIC 004588073

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	7372^{+230}_{-307}	$3.865^{+0.352}_{-0.117}$	$-0.320^{+0.250}_{-0.350}$	$2.487^{+0.525}_{-0.974}$	$1.650^{+0.170}_{-0.396}$	$0.151^{+0.426}_{-0.053}$
	+3%/-4%	+9%/-3%	+78%/-109%	+21%/-39%	+10%/-24%	+282%/-35%
Source	KIC0	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 004588073-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	A_{obs}
DV	-342 ± 38	$5.90^{+3.64}_{-3.01}$	629^{+47}_{-71}	6312^{+3198}_{-1123}	7977^{+25523}_{-4902}
Alt.	-1010 ± 193	$8.31^{+3.67}_{-3.31}$	634^{+46}_{-64}	7241^{+2587}_{-1262}	11971^{+21628}_{-6164}

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

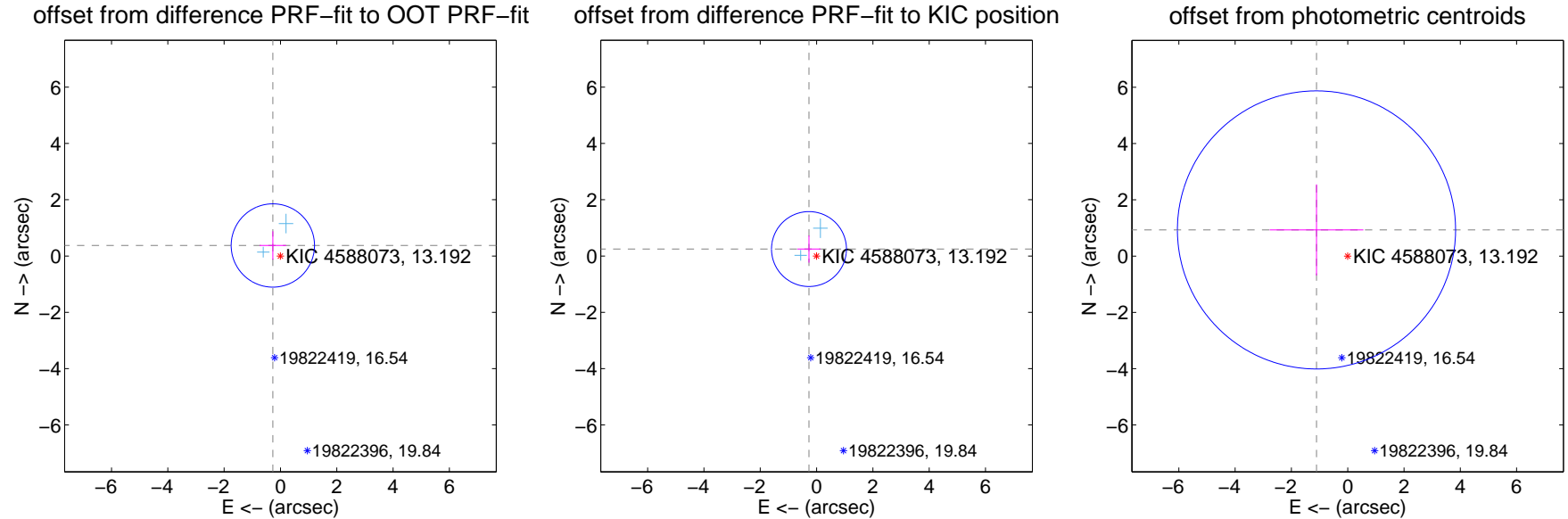
DV Centroid Data

Supplemental centroid analysis for 004588073-02. Kepler magnitude: 13.19. Transit SNR 6.00

There are 2 quarters with good PRF difference image offsets

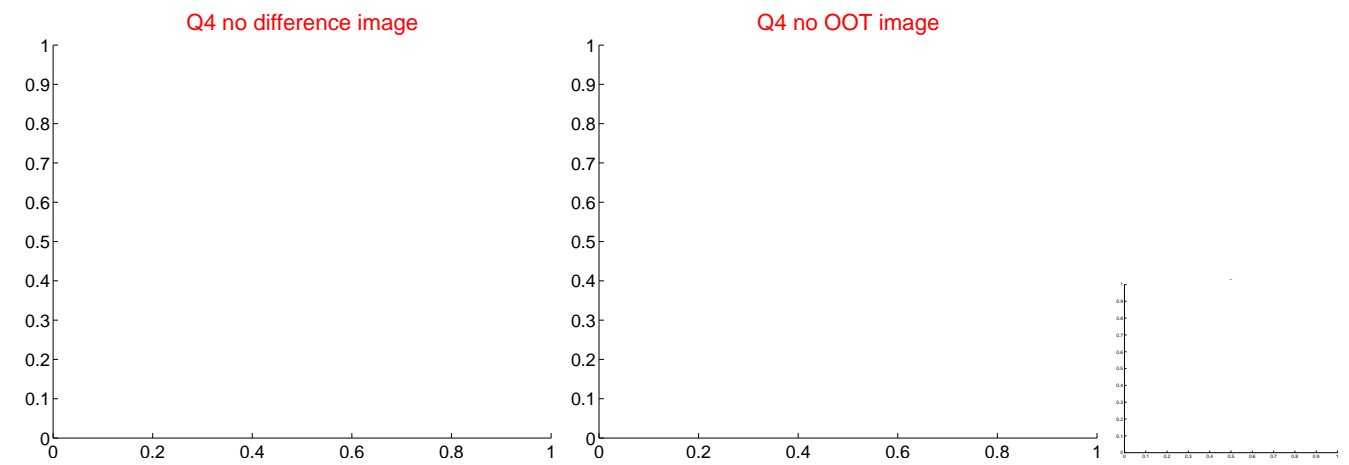
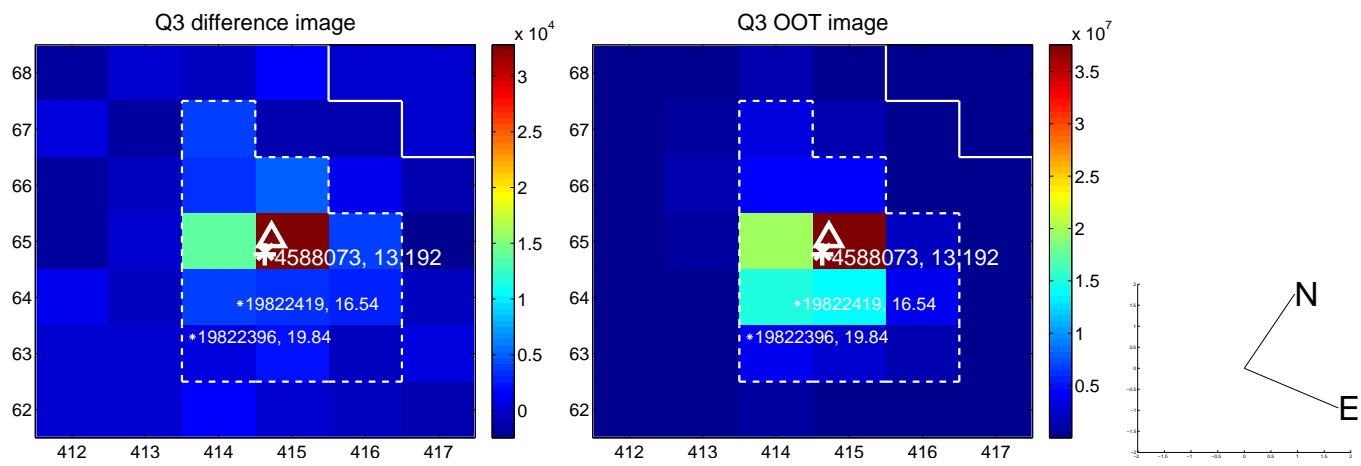
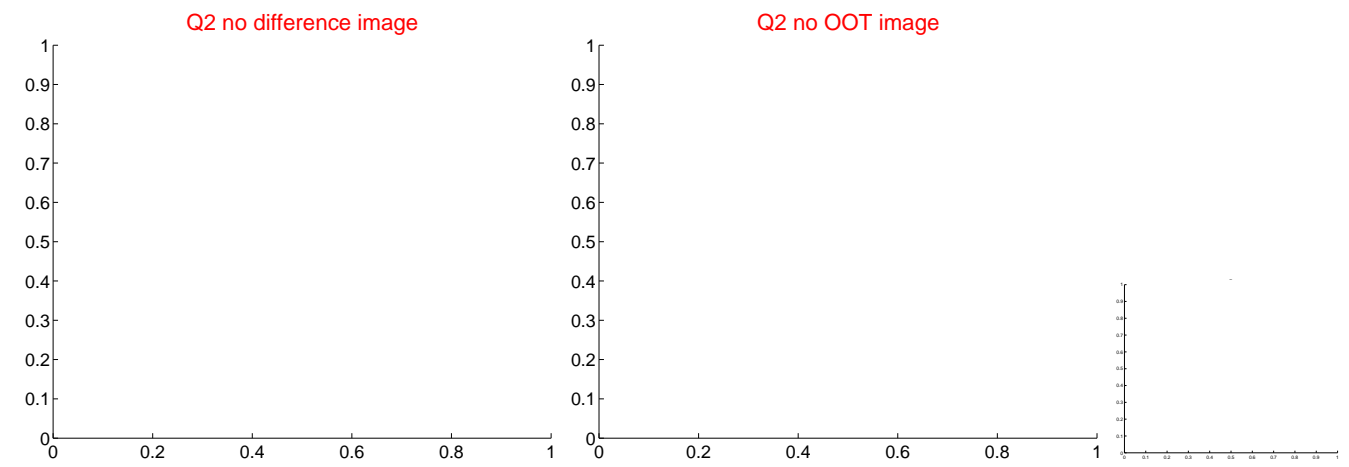
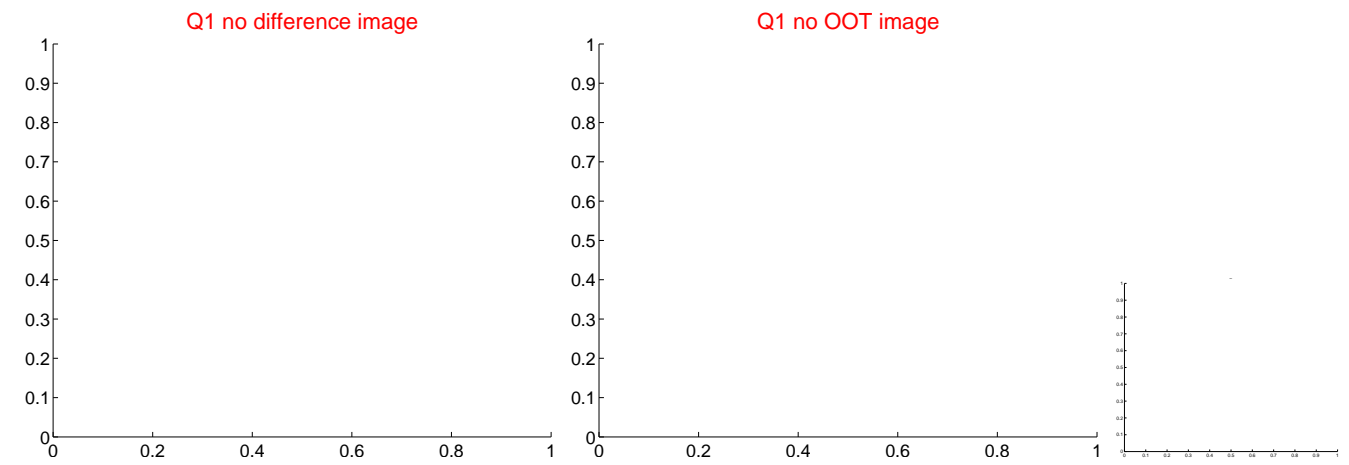
The direct PRF centroid is offset from the target star catalog position by about 0.12 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.462 ± 0.493	0.94	0.270 ± 0.471	0.374 ± 0.505
PRF-fit source offset from KIC position	0.366 ± 0.443	0.83	0.270 ± 0.410	0.248 ± 0.480
photometric centroid source offset	1.45 ± 1.65	0.88	1.11 ± 1.67	0.93 ± 1.62



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

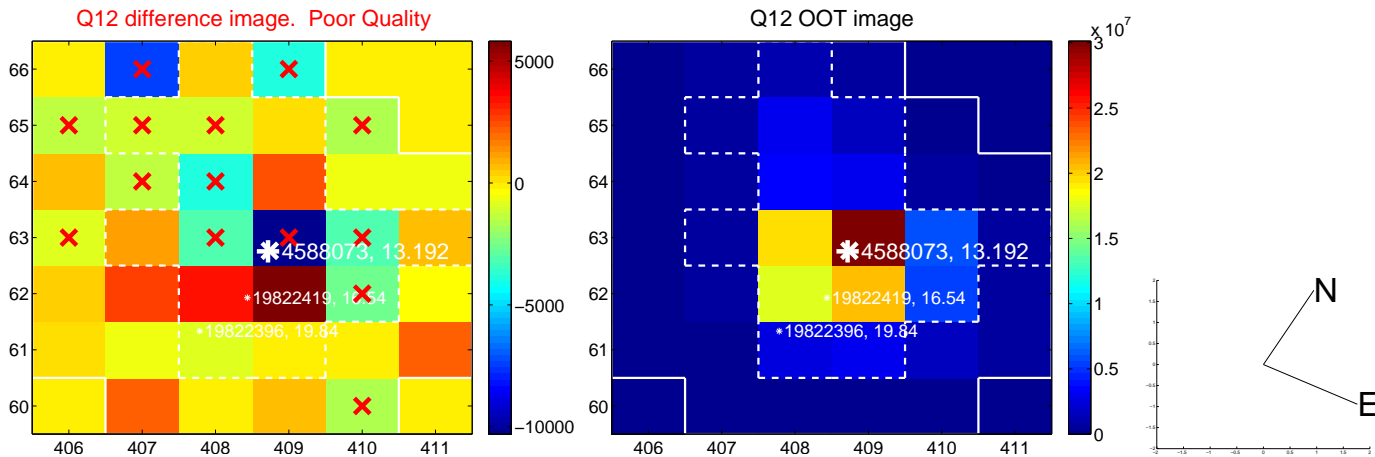
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



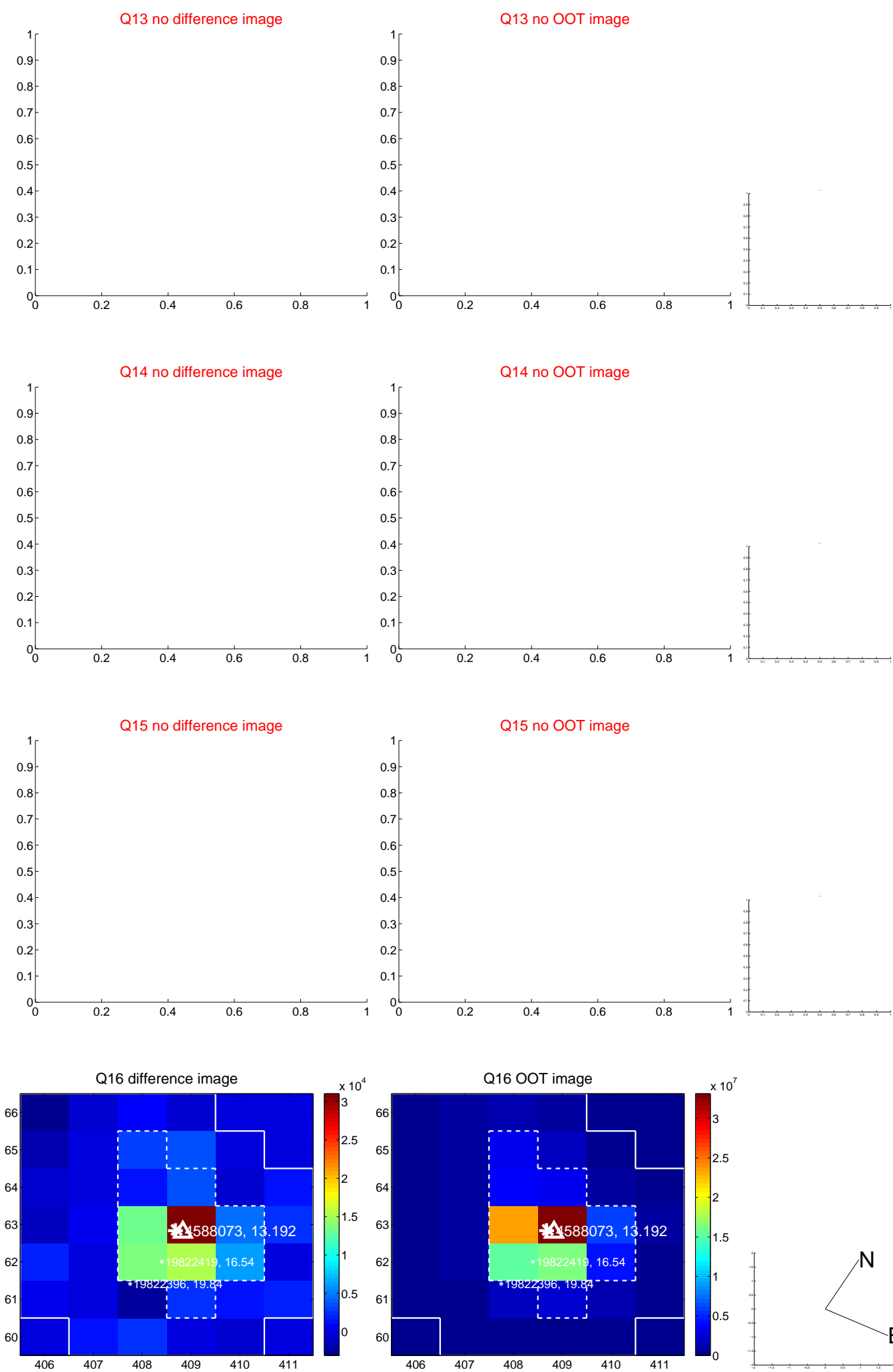
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



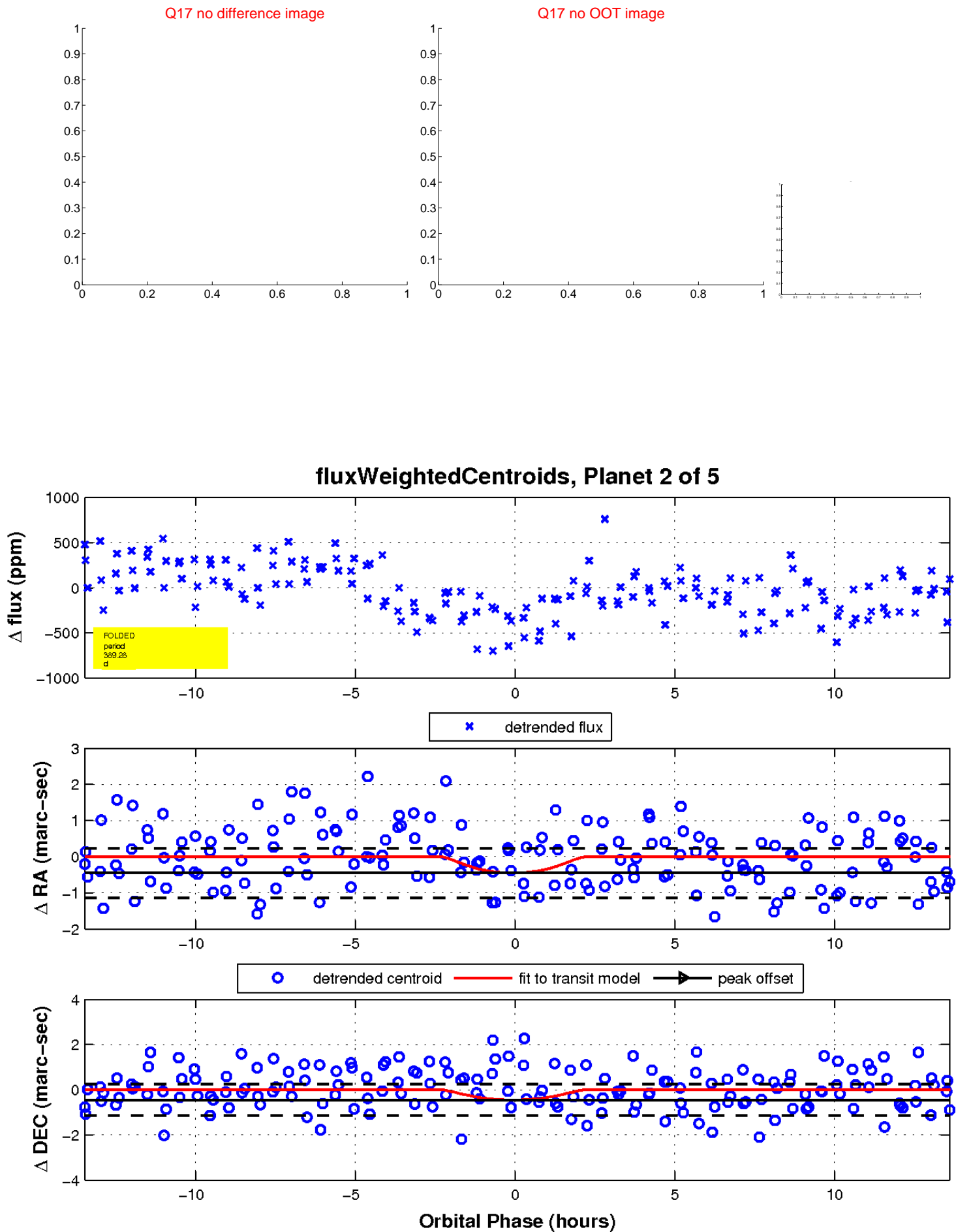
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value



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

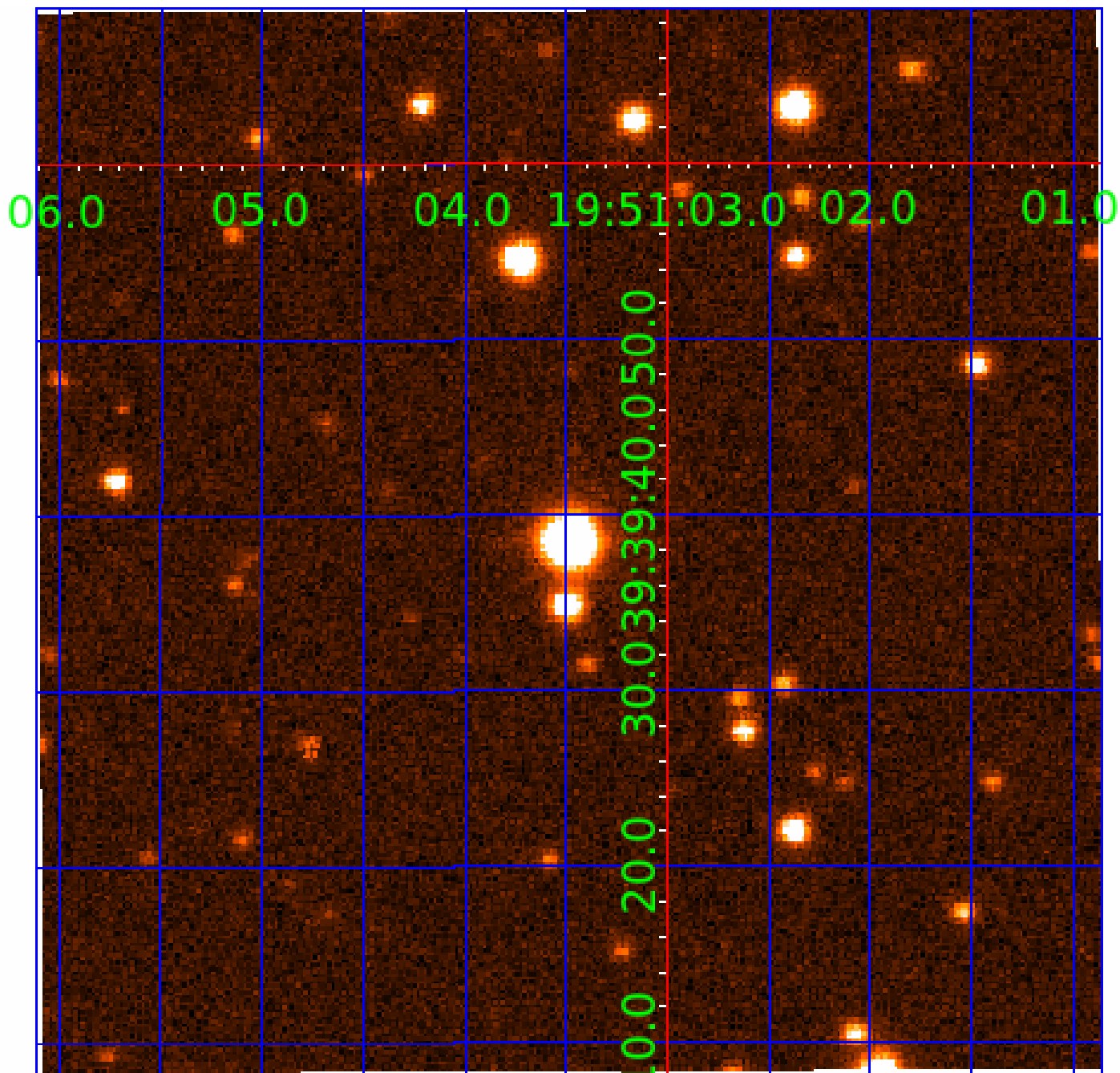


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 004588073

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})
004588073-01	OBS	No	2.263957	132.290732	32.2	9.427	9.1	8.2	2.49	7372	1.64	10276.89
004588073-02	OBS	No	389.281254	335.318420	387.4	4.598	8.2	6.0	2.49	7372	6.51	10.75
004588073-03	OBS	No	68.700947	139.714768	211.0	5.489	8.0	7.1	2.49	7372	4.10	108.58
004588073-04	OBS	No	488.804855	251.079617	476.1	3.252	7.6	8.4	2.49	7372	5.95	7.93
004588073-05	OBS	No	19.149293	146.585028	158.8	1.963	7.6	7.5	2.49	7372	3.58	596.32

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004588073-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
004588073-02	OBS	FP	0.00	1	0	0	0	LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
004588073-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004588073-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
004588073-05	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

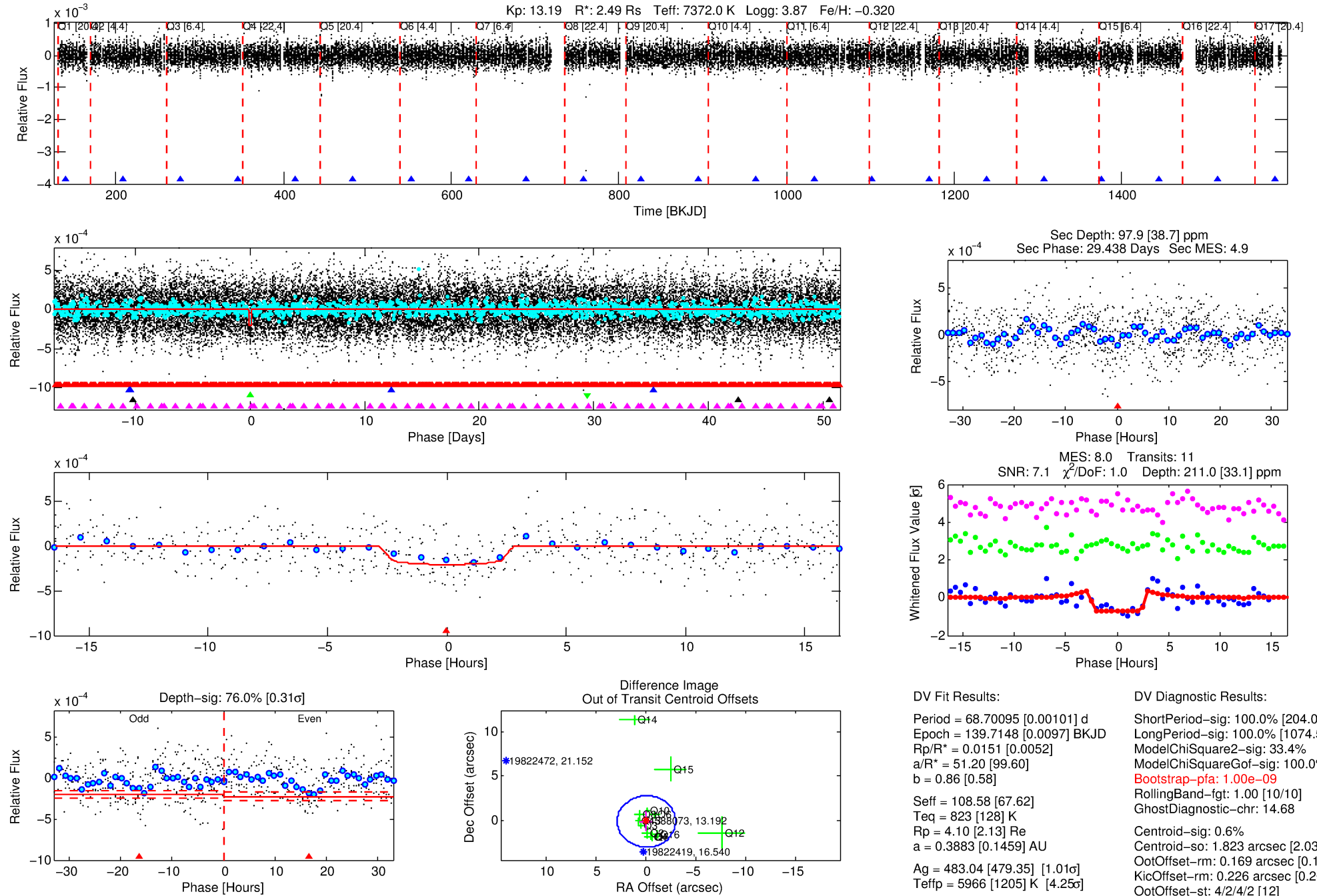
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 004588073-03

No Significant Match Found

DV One-Page Summary

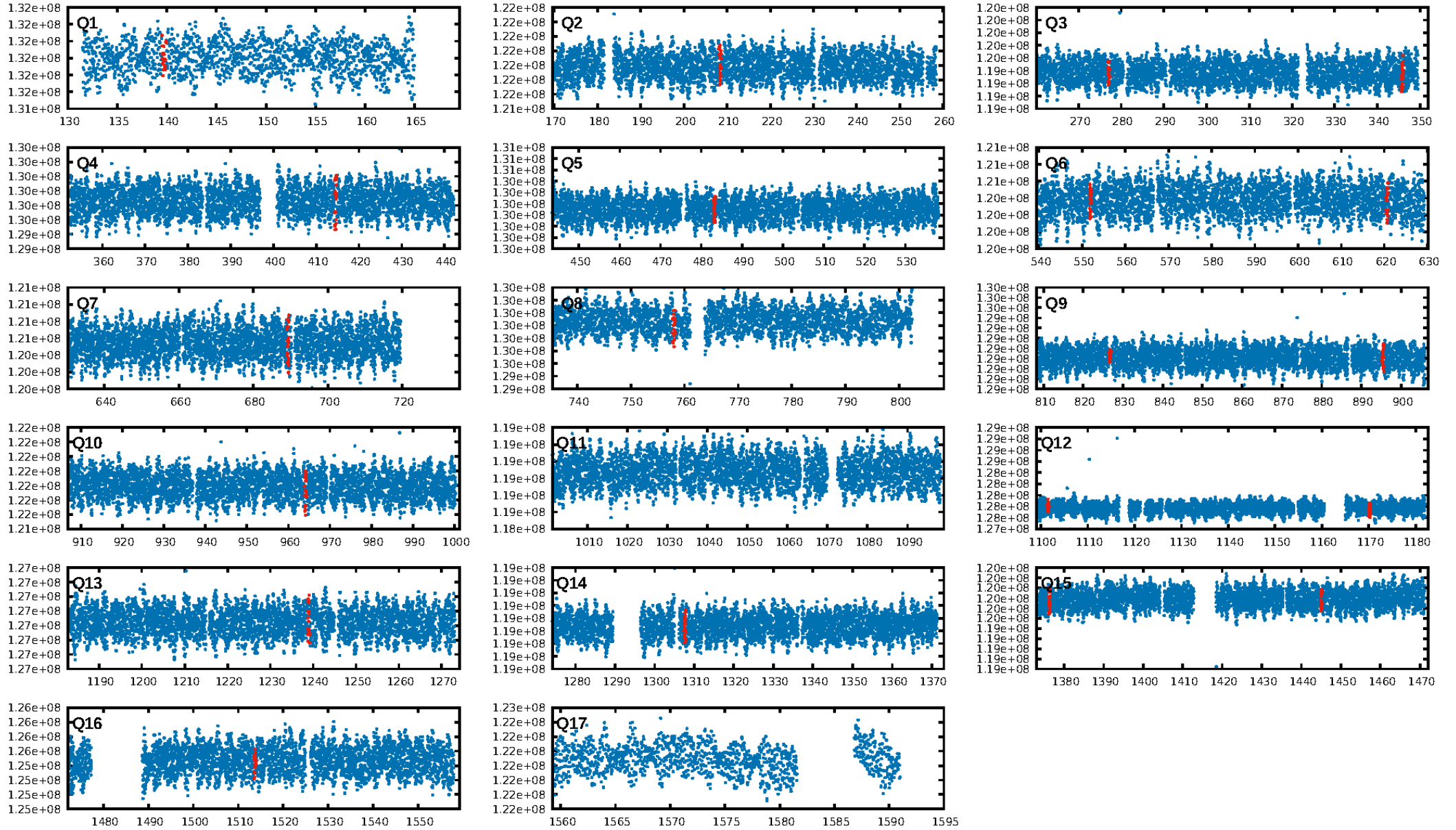
KIC: 4588073 Candidate: 3 of 5 Period: 68.701 d



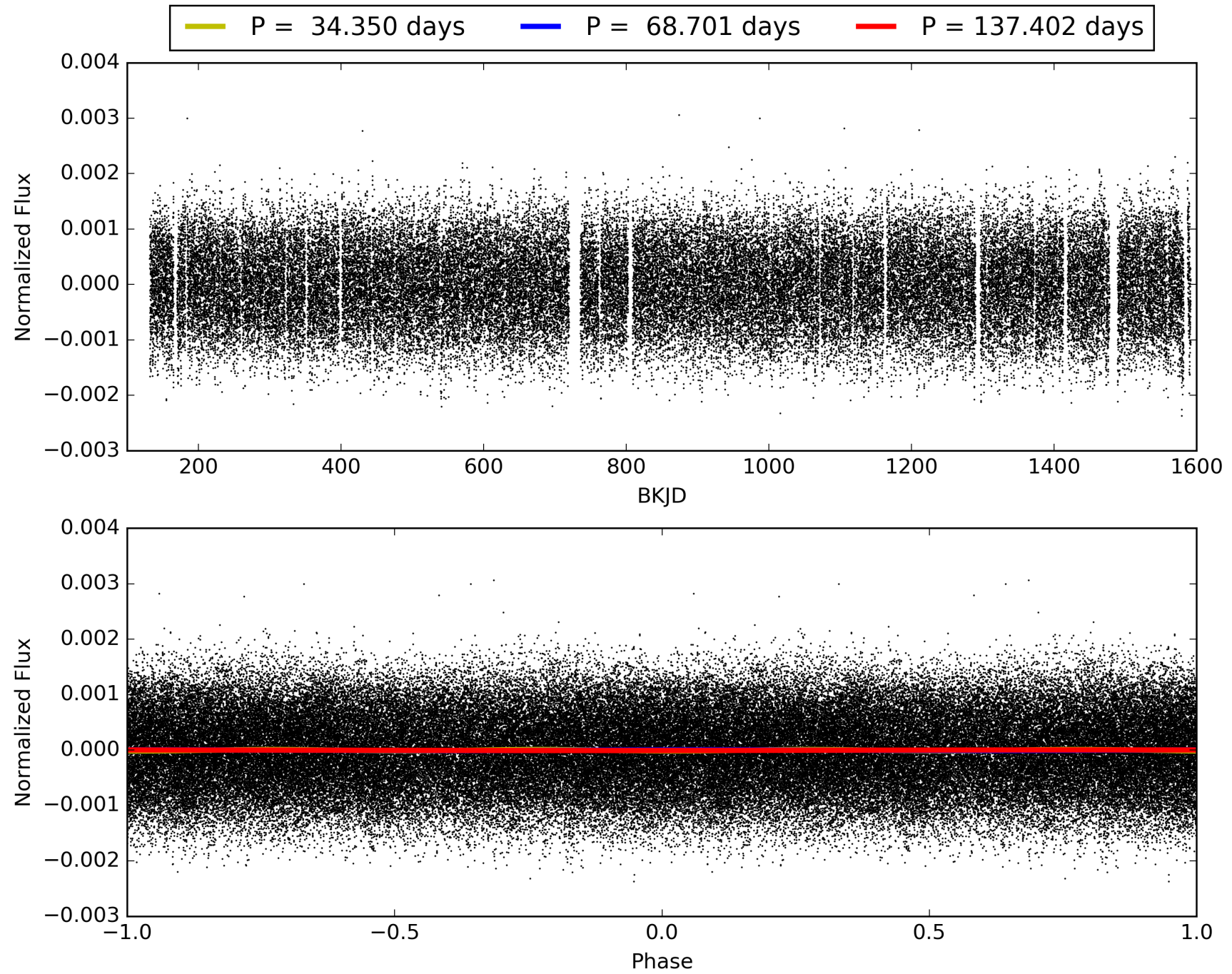
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 00:26:56 Z

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

TCE 004588073-03, PDC Light Curves

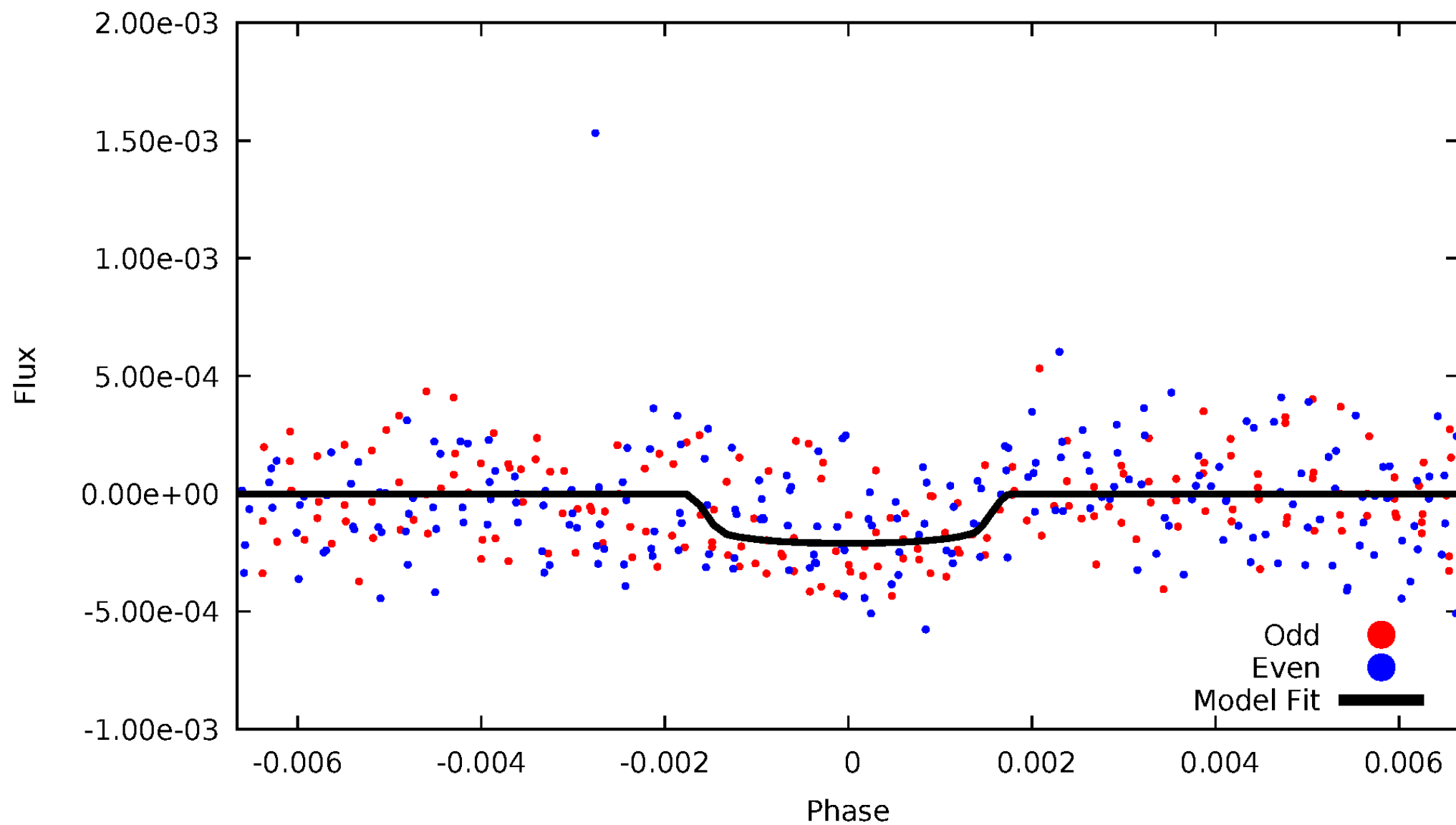


TCE 004588073-03



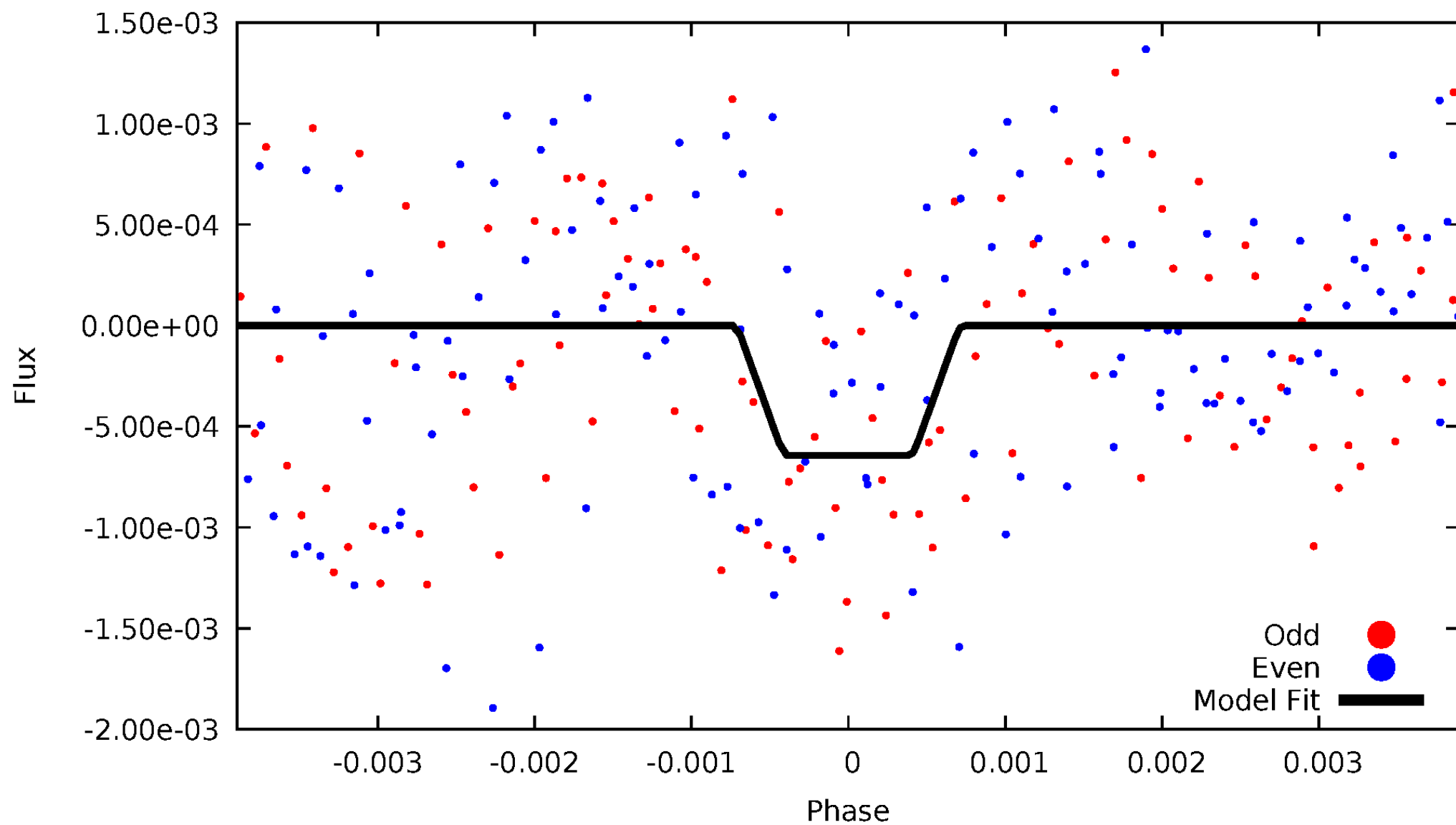
DV Odd/Even

TCE 004588073-03

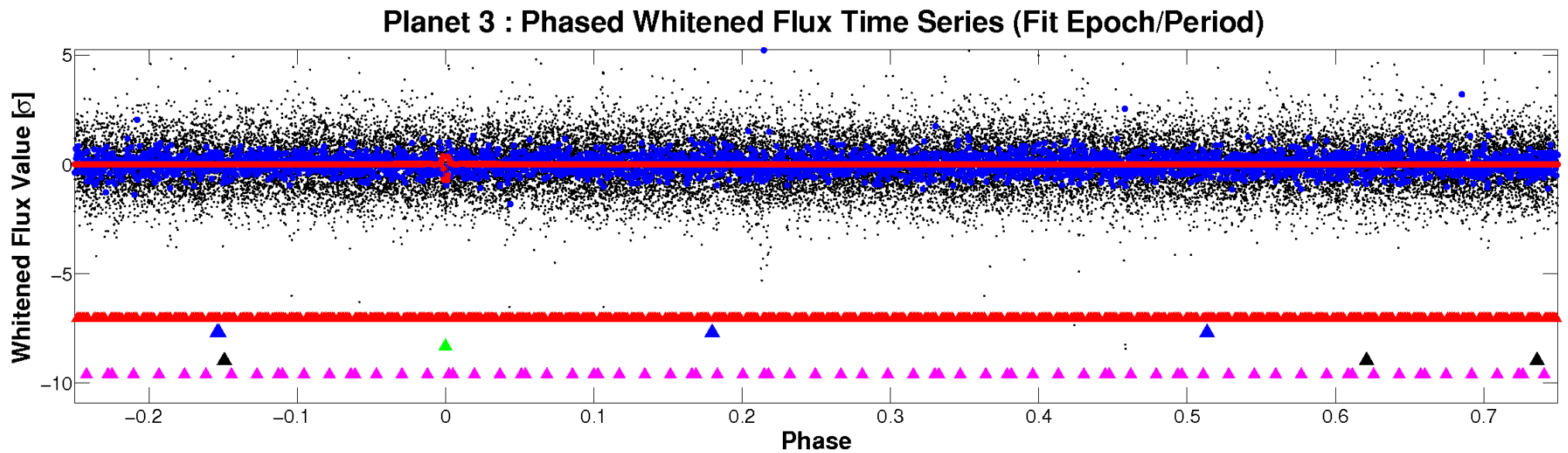
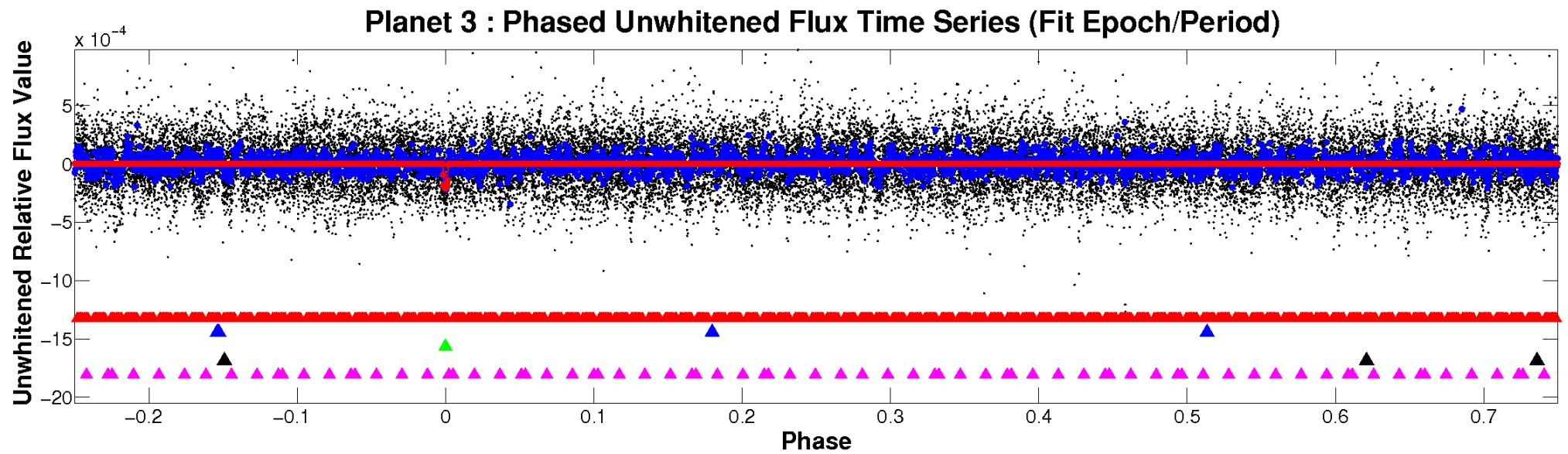


ALT Odd/Even

TCE 004588073-03

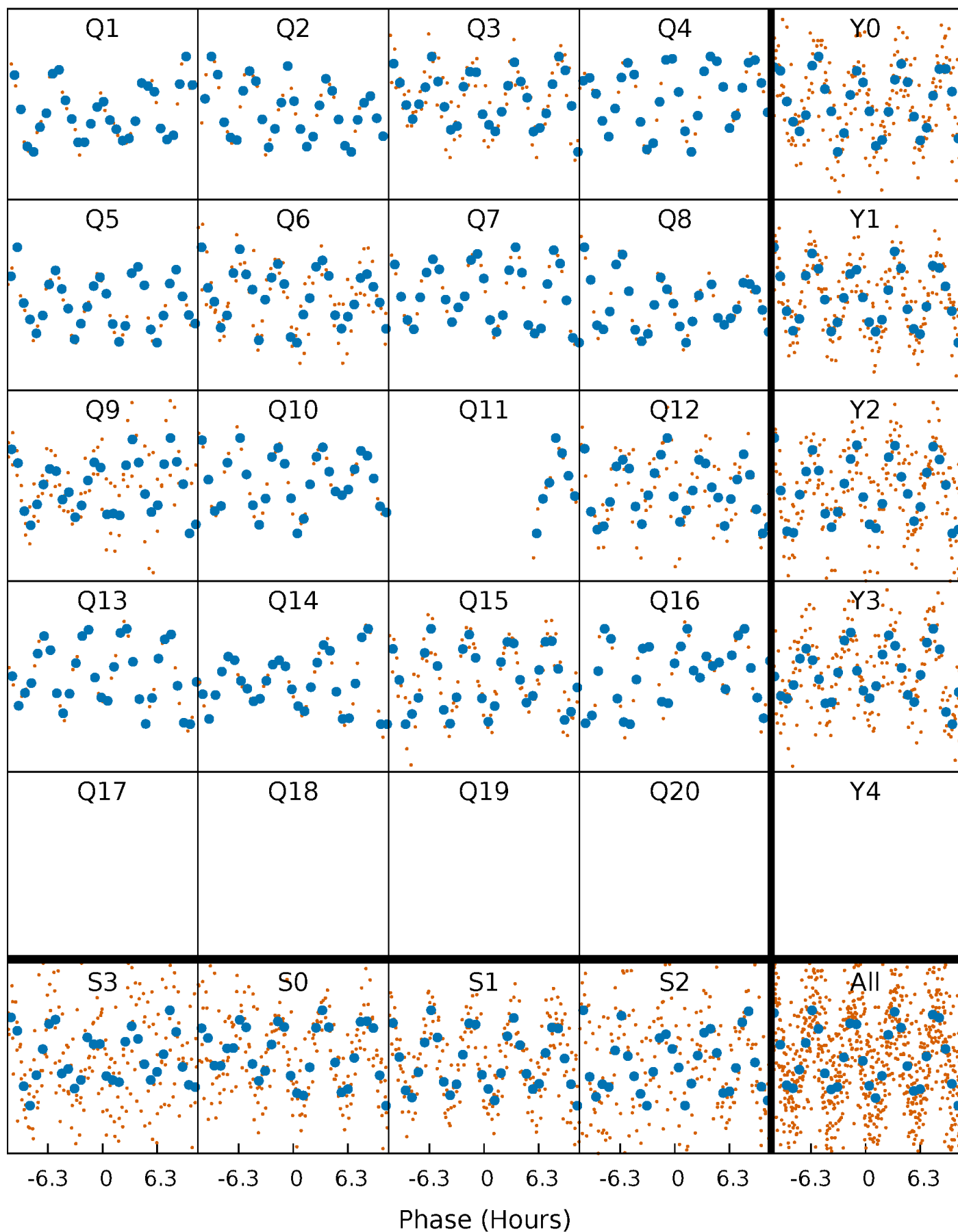


Non-Whitened Vs. Whitened Light Curve



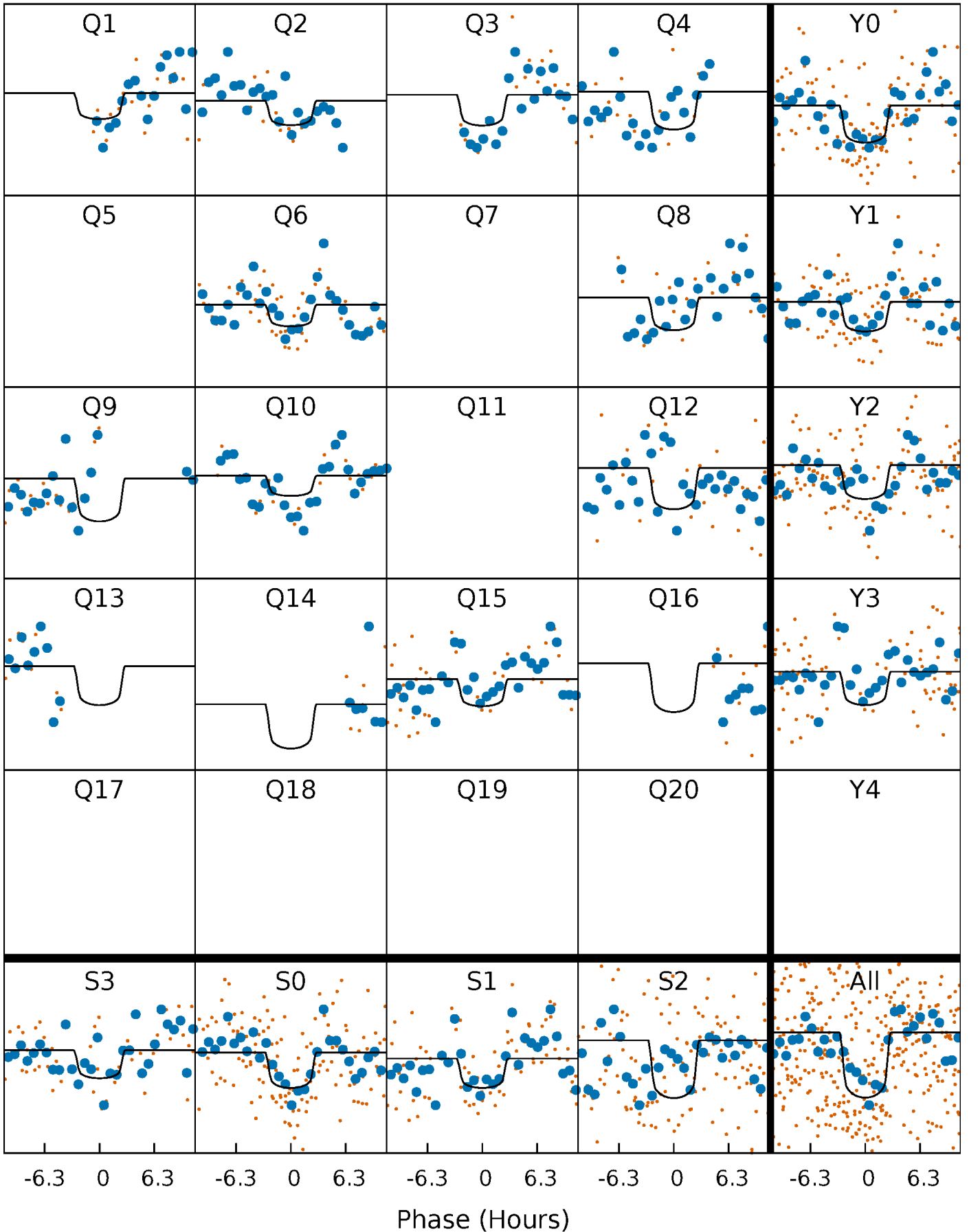
PDC Quarter-Phased Transit Curves

TCE 004588073-03 P= 68.700947 Days $T_0=139.714768$ (BKJD)



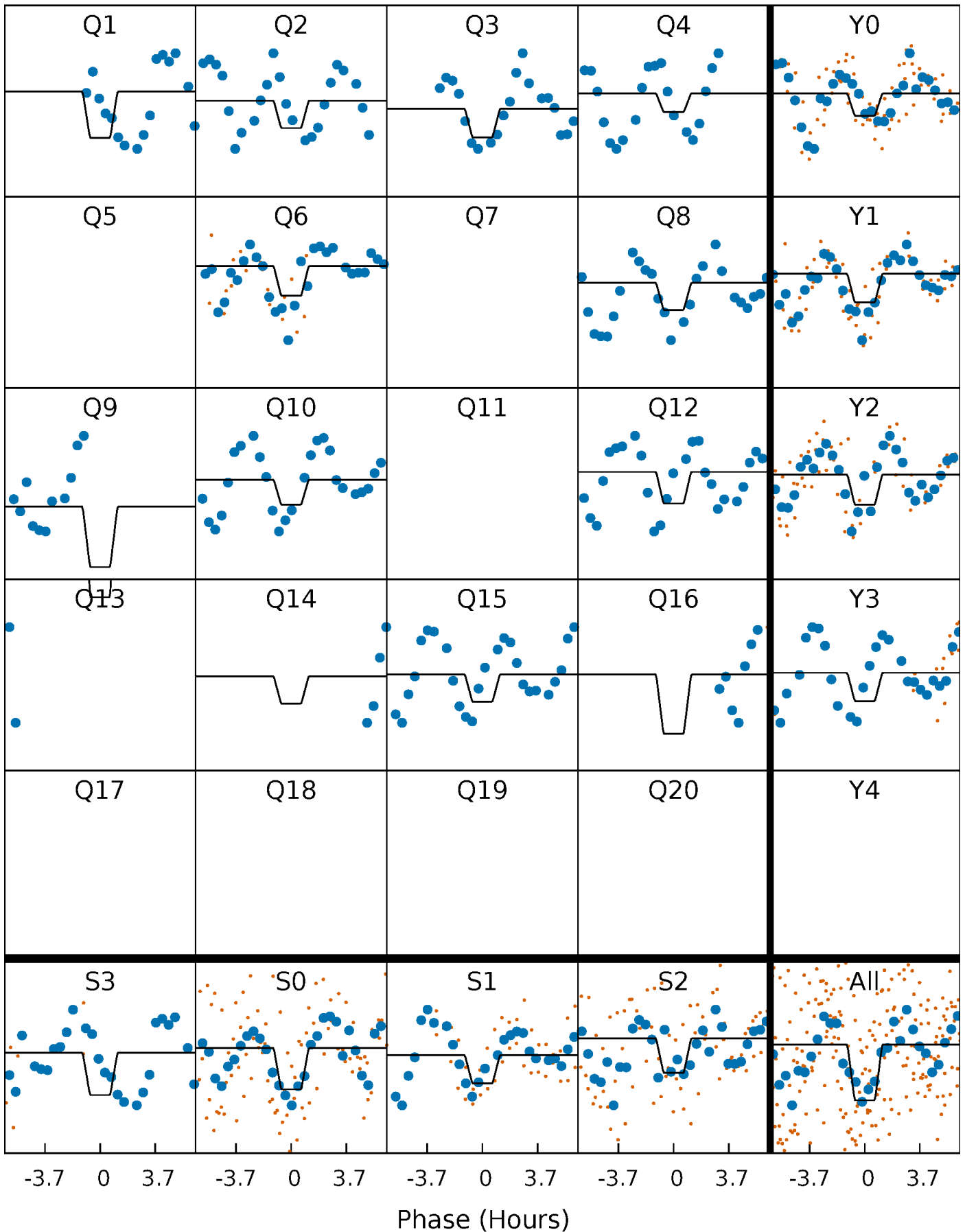
DV Quarter-Phased Transit Curves

TCE 004588073-03 P= 68.700947 Days $T_0=139.714768$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

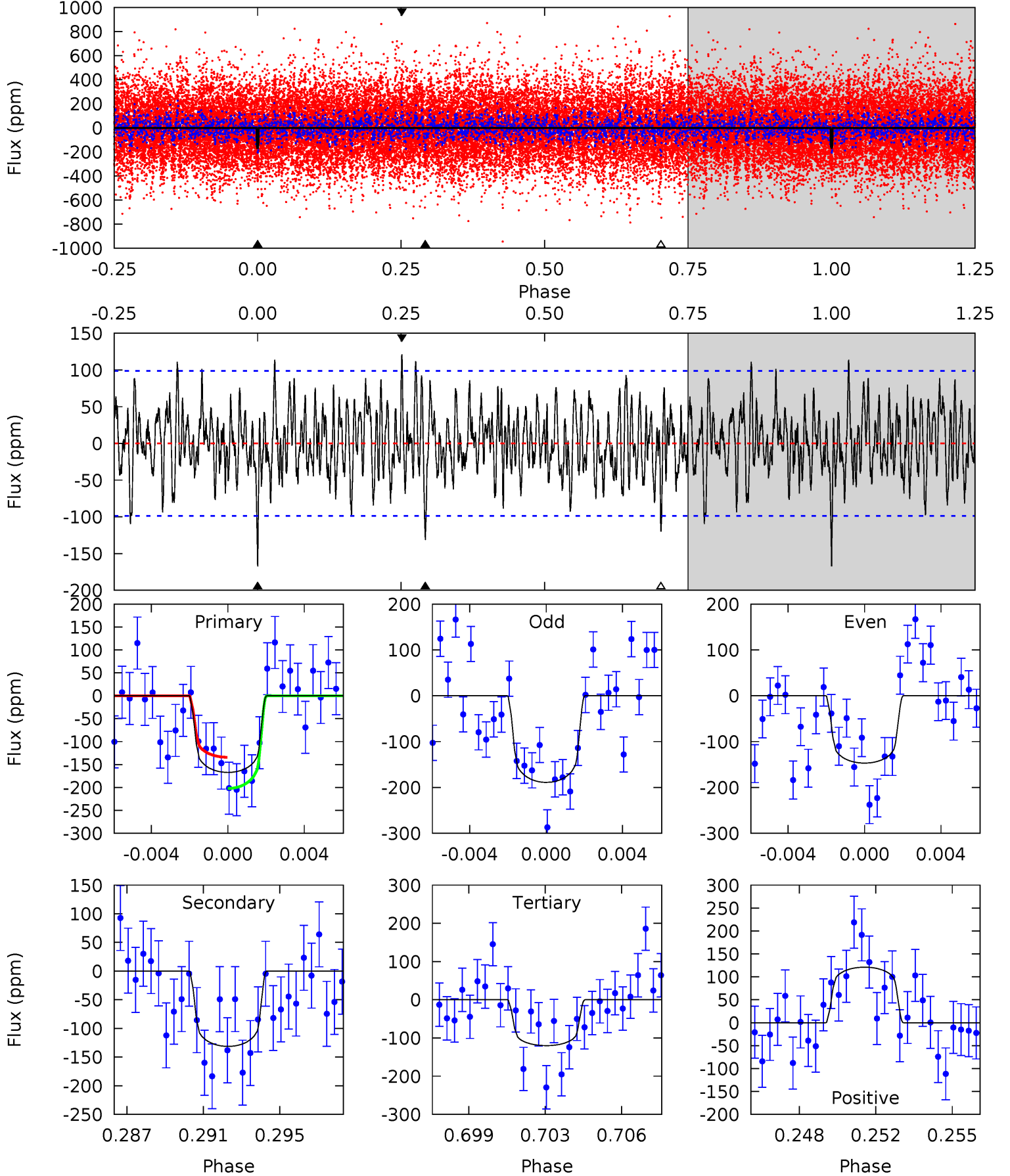
TCE 004588073-03 $P = 68.703539$ Days $T_0 = 139.733146$ (BKJD)



DV Model-Shift Uniqueness Test

004588073-03, P = 68.700947 Days, E = 71.013821 Days

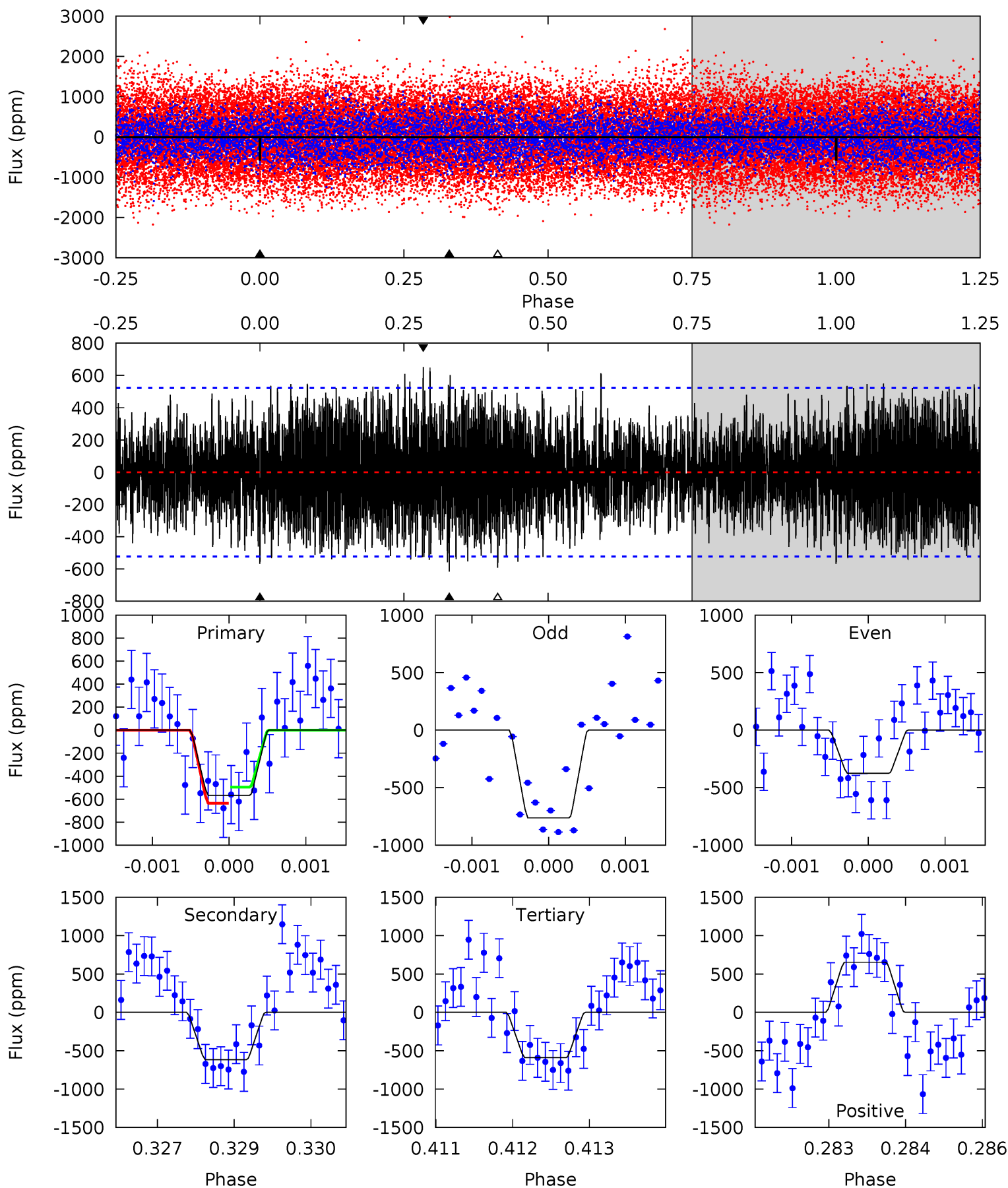
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.84	6.95	6.35	6.40	5.22	2.92	2.05	2.50	2.44	0.60	0.55	1.11	1.18	0.42	1.80



Alt Model-Shift Uniqueness Test

004588073-03, P = 68.703539 Days, E = 71.029607 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.85	6.35	6.09	6.72	5.39	3.19	2.53	-0.24	-0.87	0.26	-0.37	1.99	1.59	0.51	0.72



Stellar Parameters For KIC 004588073

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	7372^{+230}_{-307}	$3.865^{+0.352}_{-0.117}$	$-0.320^{+0.250}_{-0.350}$	$2.487^{+0.525}_{-0.974}$	$1.650^{+0.170}_{-0.396}$	$0.151^{+0.426}_{-0.053}$
	+3%/-4%	+9%/-3%	+78%/-109%	+21%/-39%	+10%/-24%	+282%/-35%
Source	KIC0	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 004588073-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	-131±19	$3.83^{+1.67}_{-1.36}$	1123^{+80}_{-111}	6242^{+1502}_{-880}	722^{+1064}_{-374}
Alt.	-616±97	$6.32^{+2.02}_{-1.55}$	1127^{+78}_{-111}	7281^{+1137}_{-807}	1253^{+976}_{-542}

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 $A_{obs} \gg 1.0$

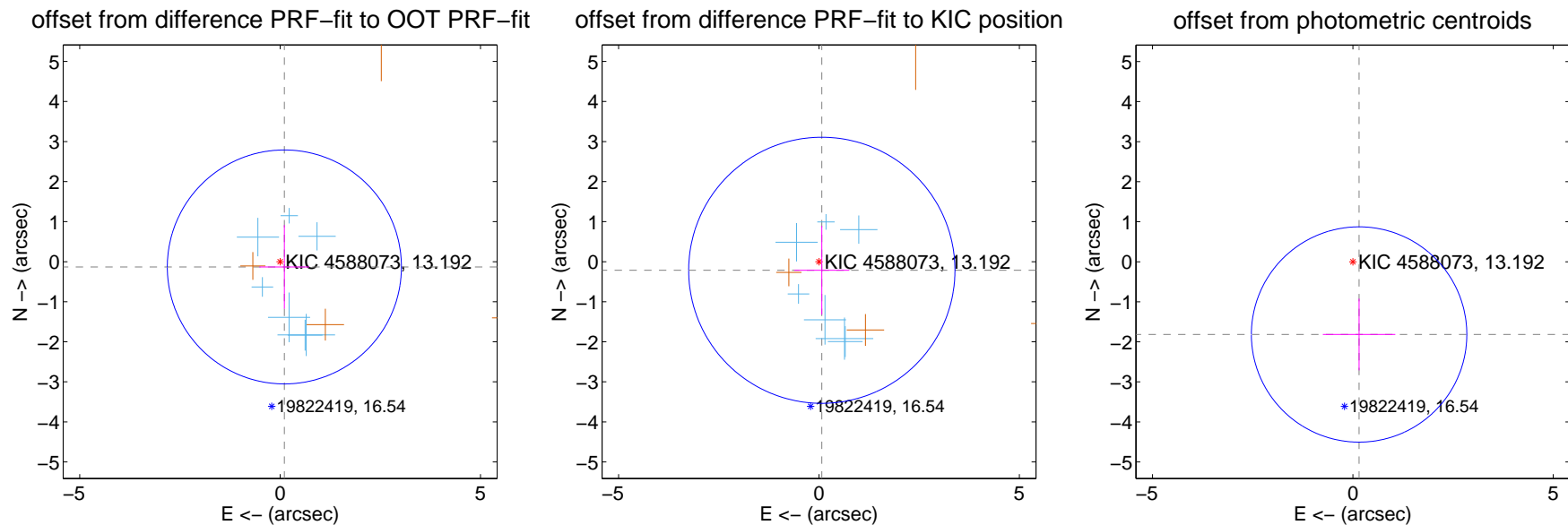
DV Centroid Data

Supplemental centroid analysis for 004588073-03. Kepler magnitude: 13.19. Transit SNR 7.14

There are 7 quarters with good PRF difference image offsets

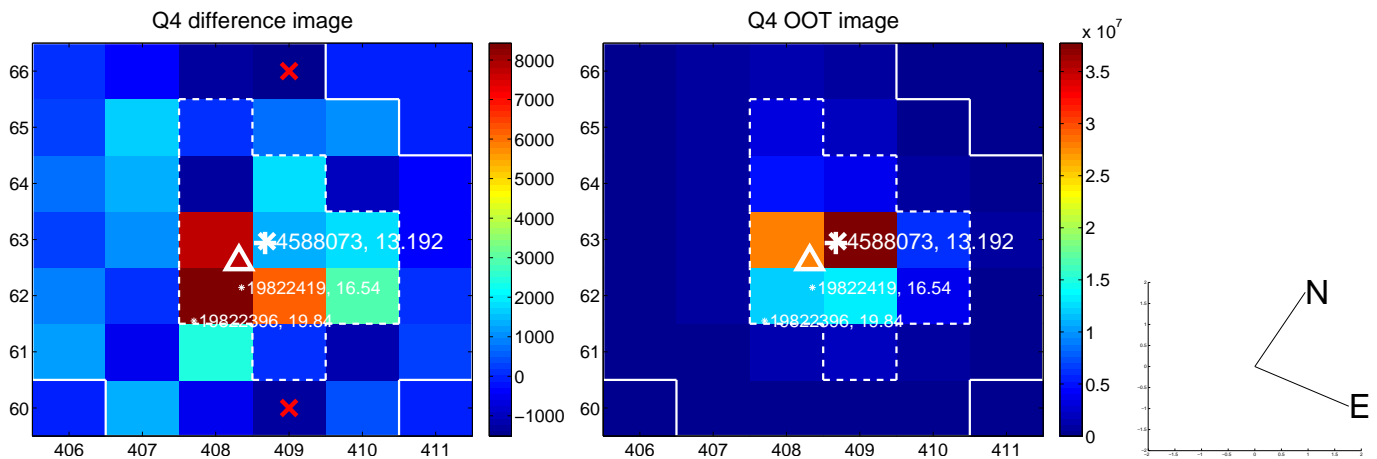
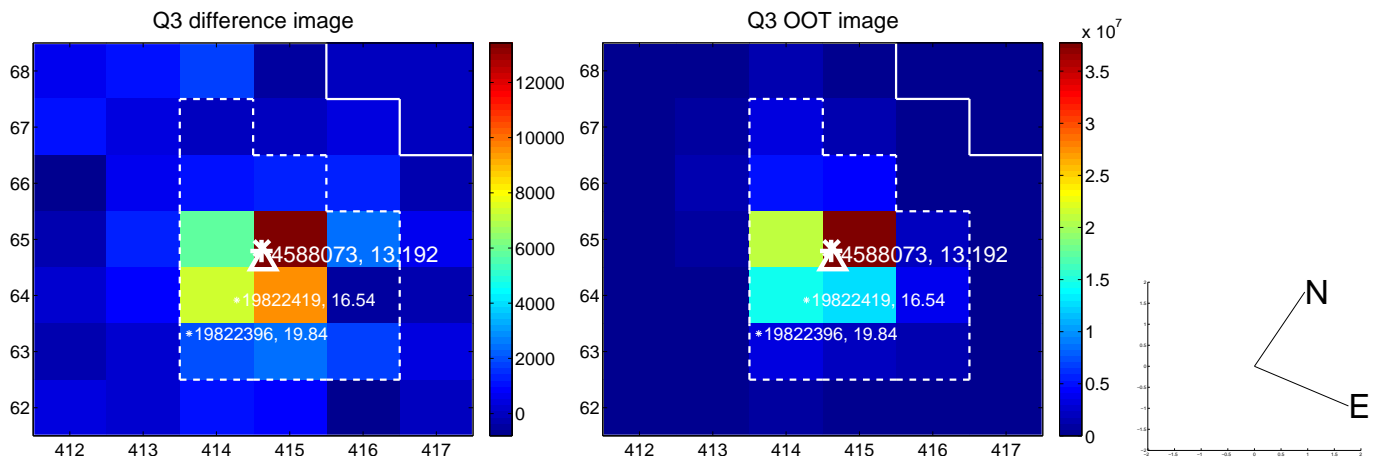
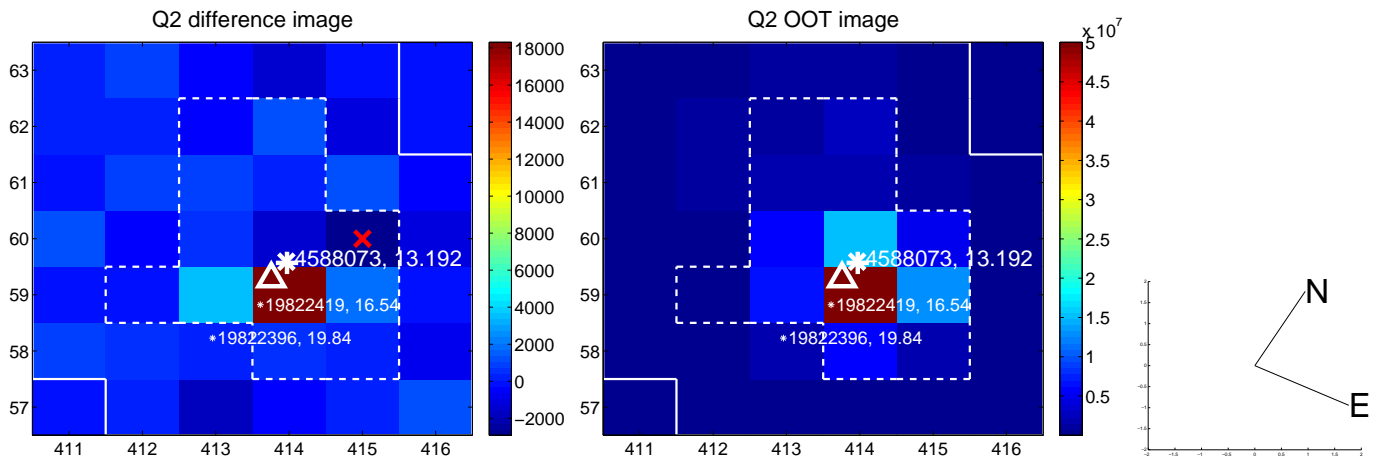
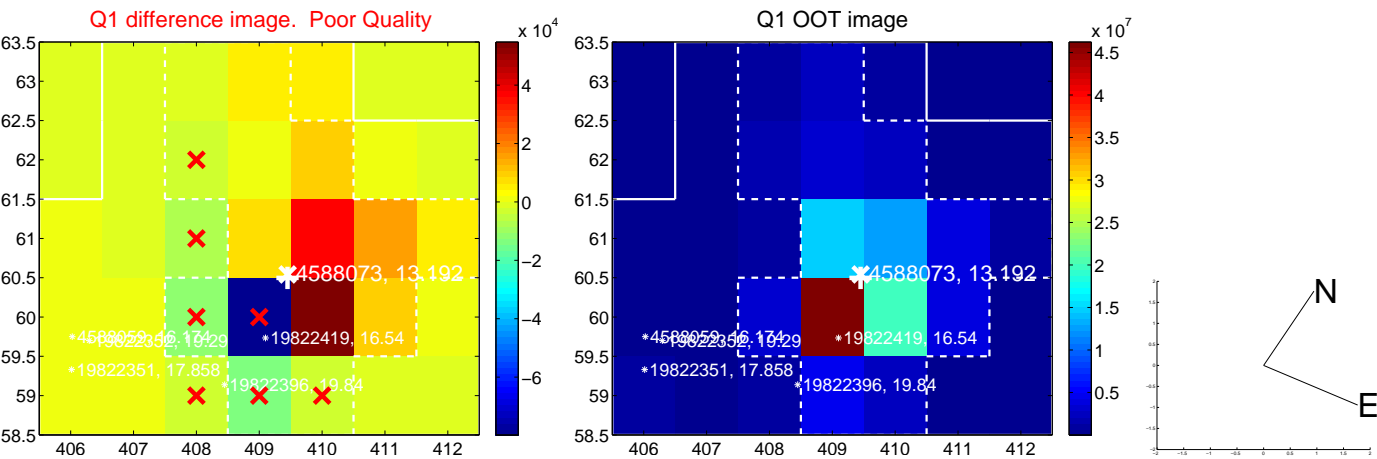
The direct PRF centroid is offset from the target star catalog position by about 0.14 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.169 ± 0.974	0.17	-0.106 ± 0.622	-0.131 ± 1.045
PRF-fit source offset from KIC position	0.226 ± 1.107	0.20	-0.070 ± 0.688	-0.214 ± 1.107
photometric centroid source offset	1.82 ± 0.90	2.03	-0.16 ± 0.90	-1.82 ± 0.90

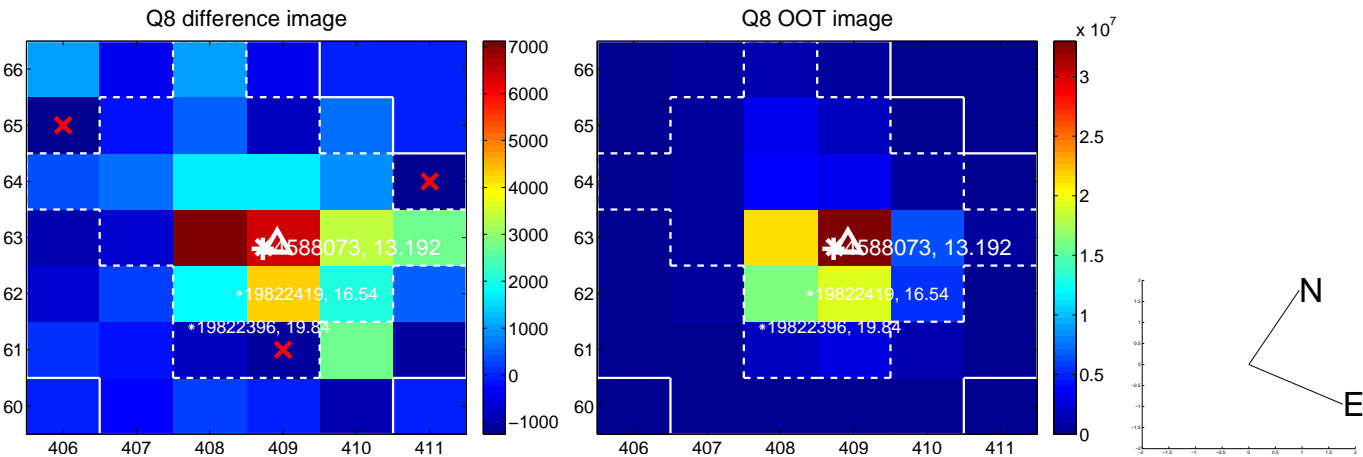
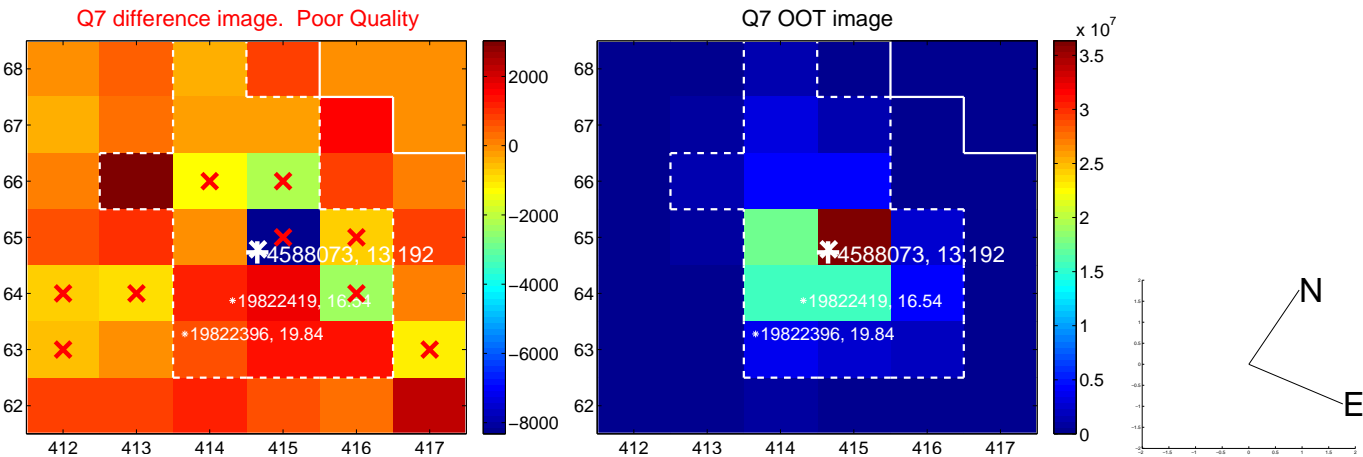
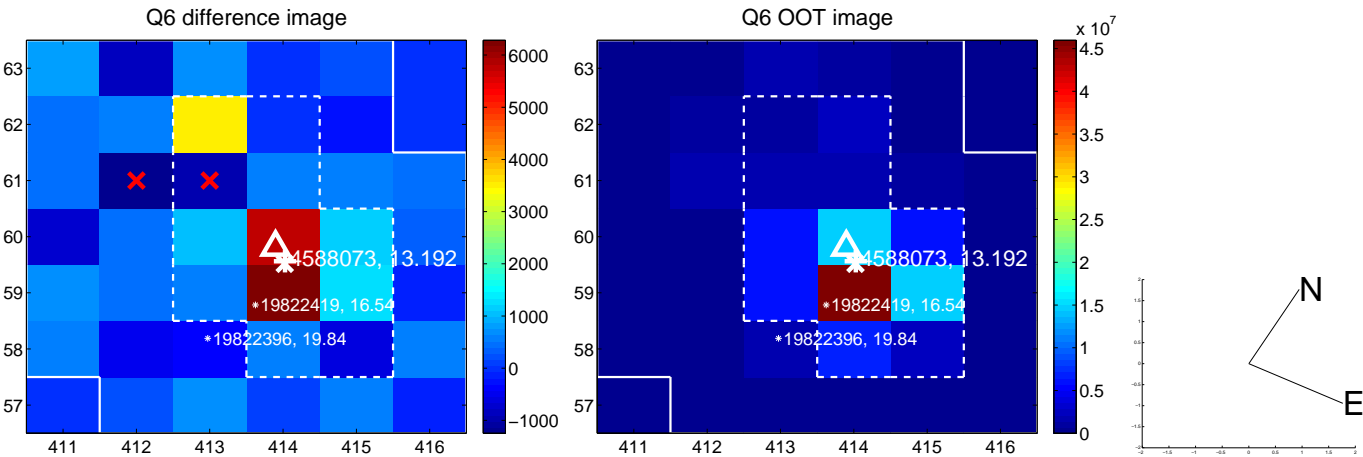
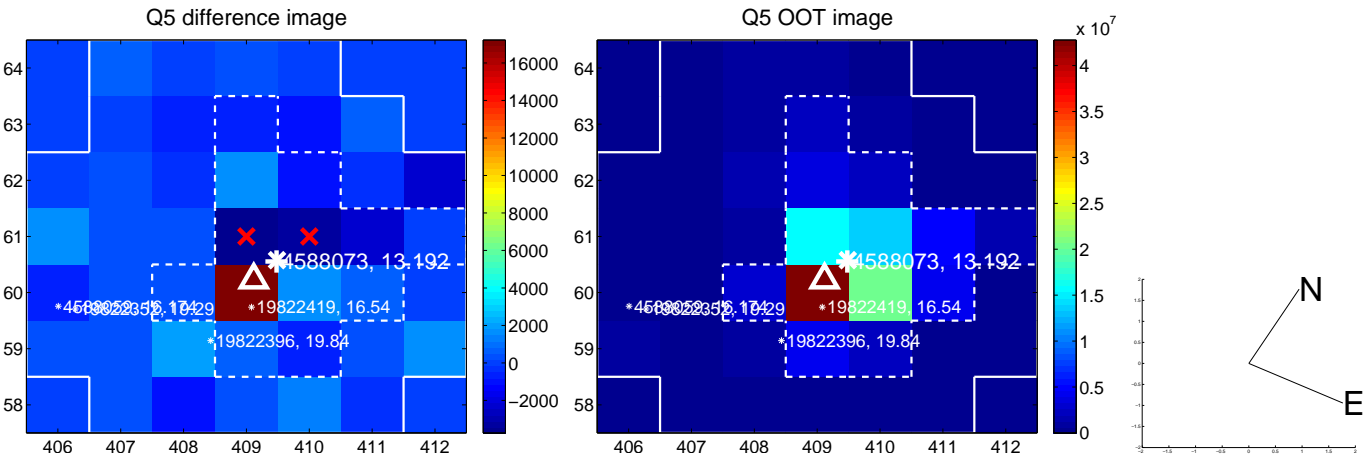


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

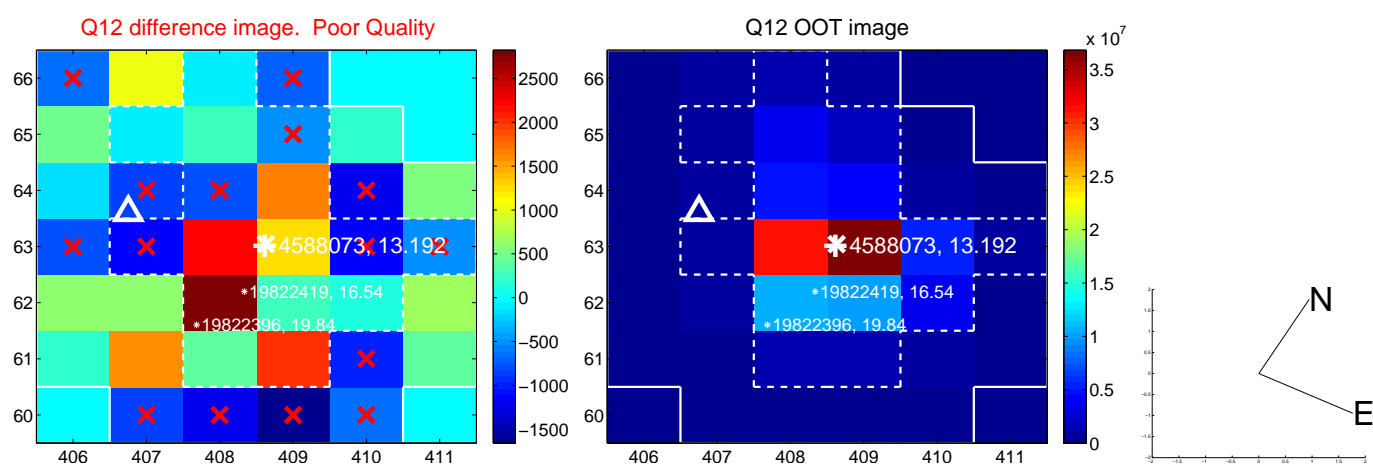
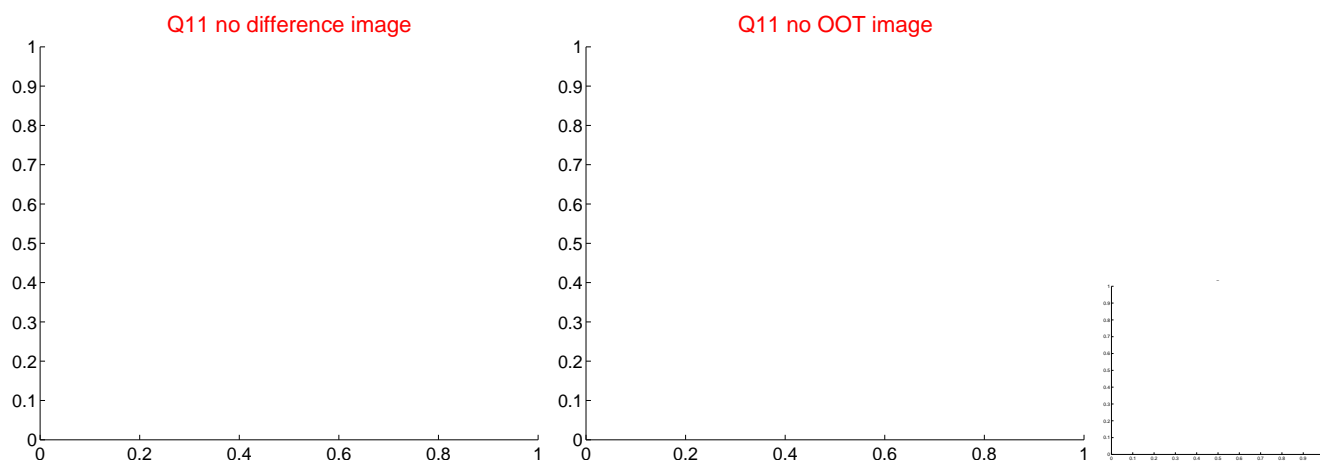
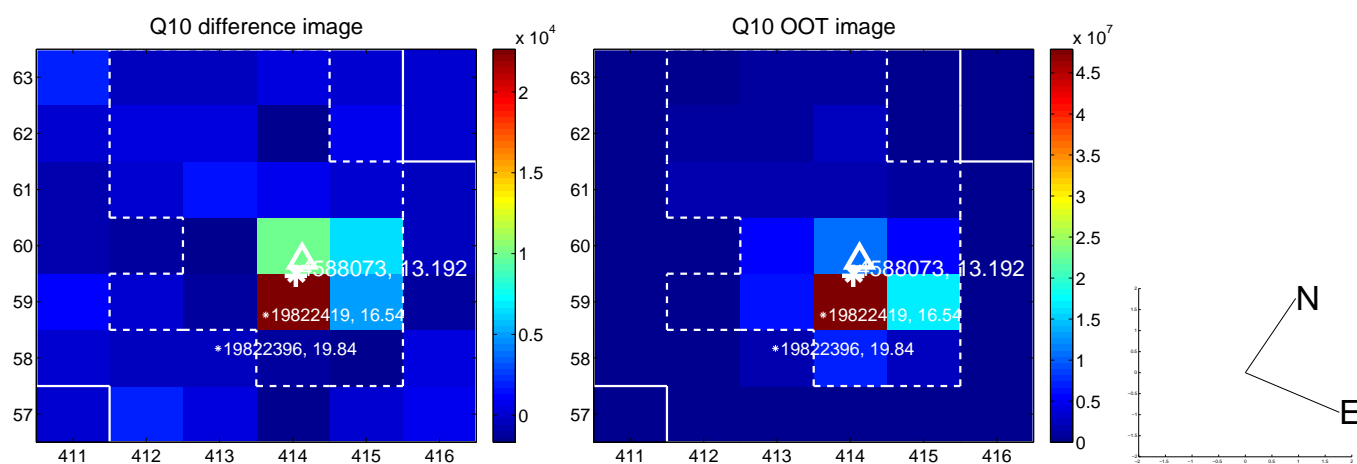
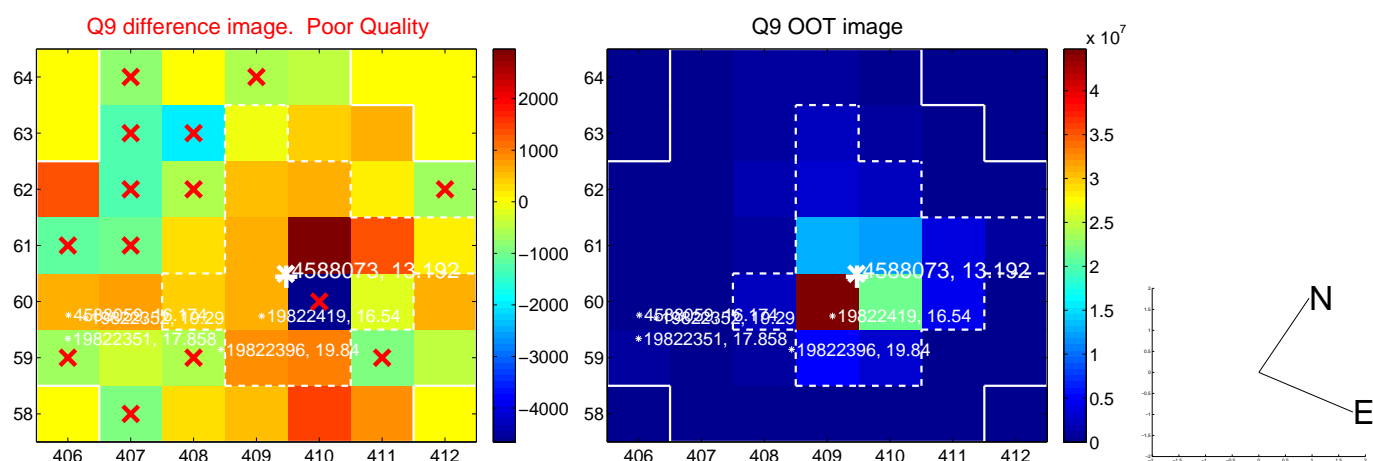
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



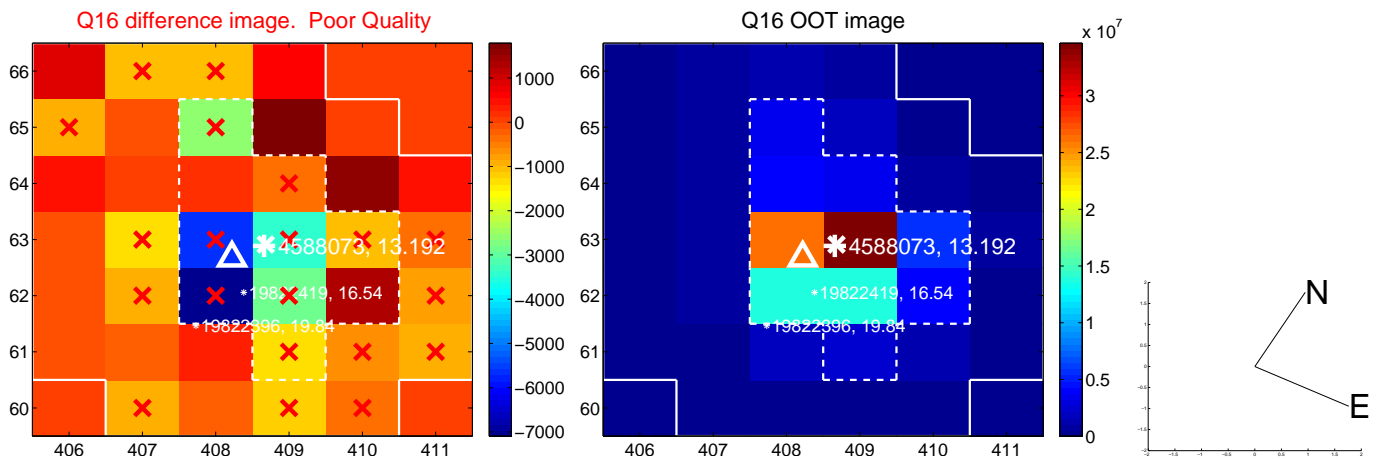
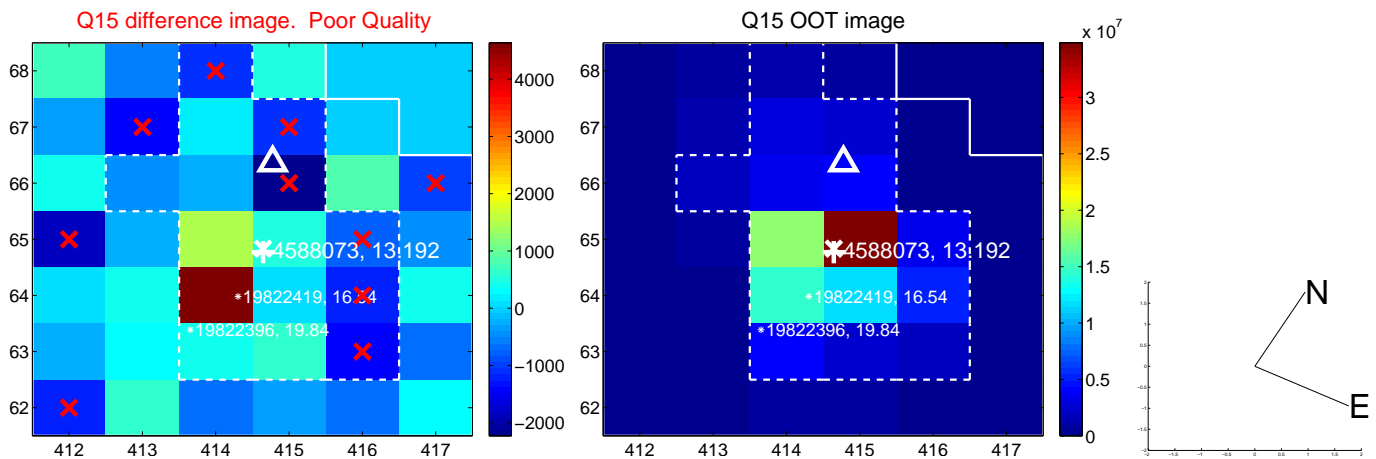
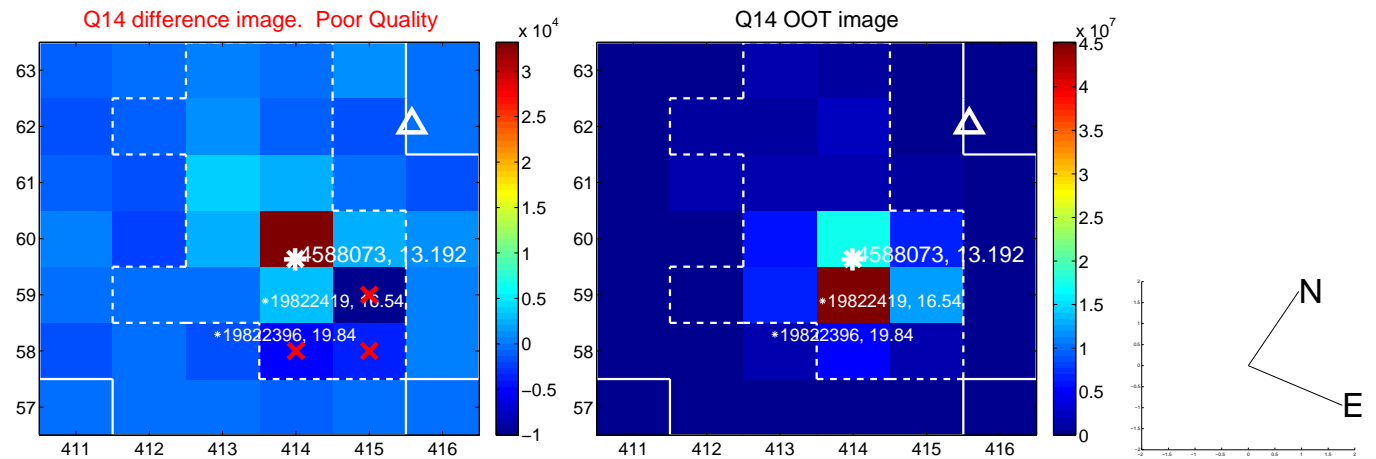
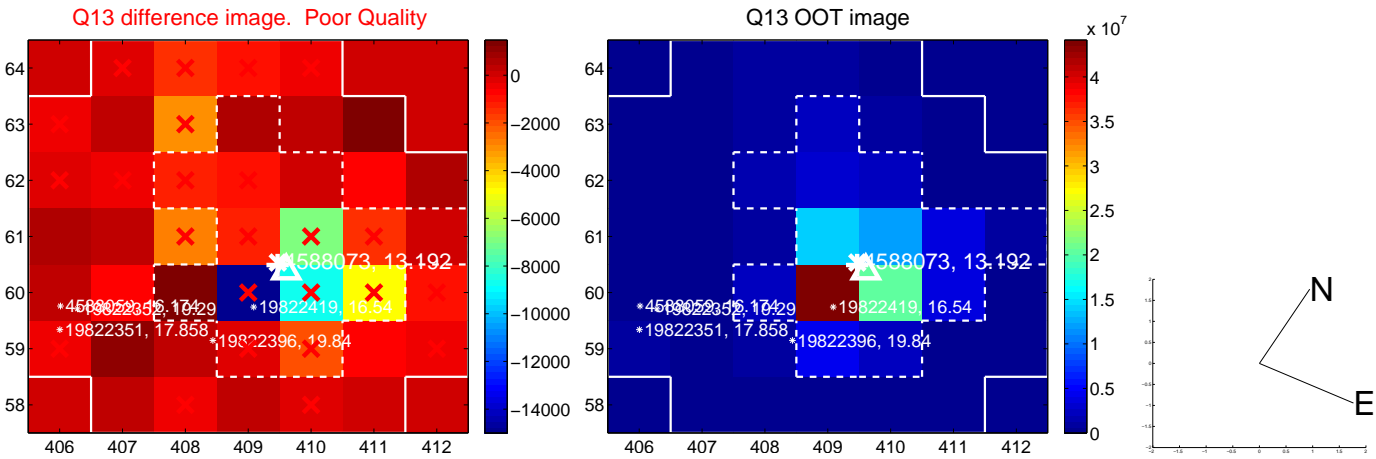
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



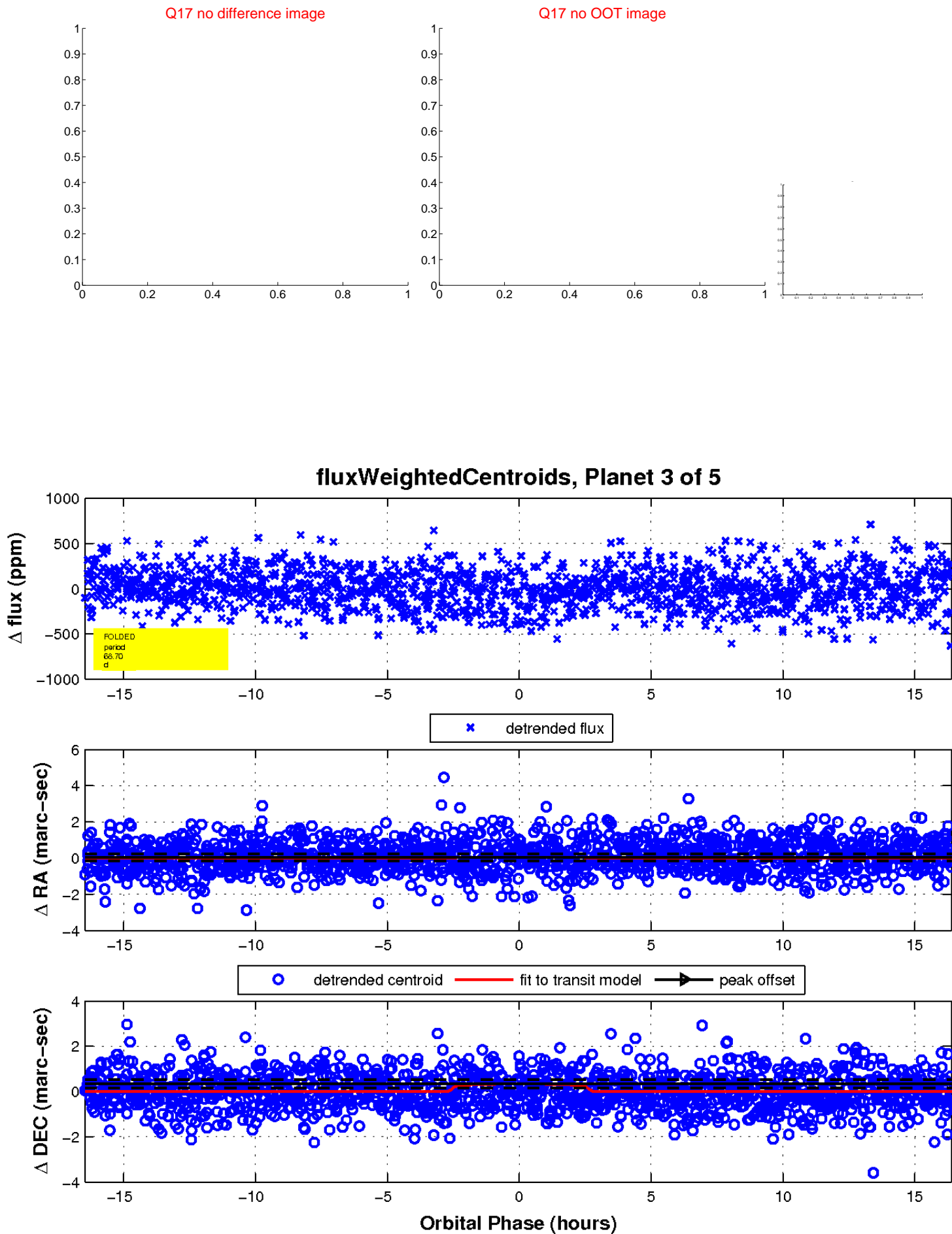
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

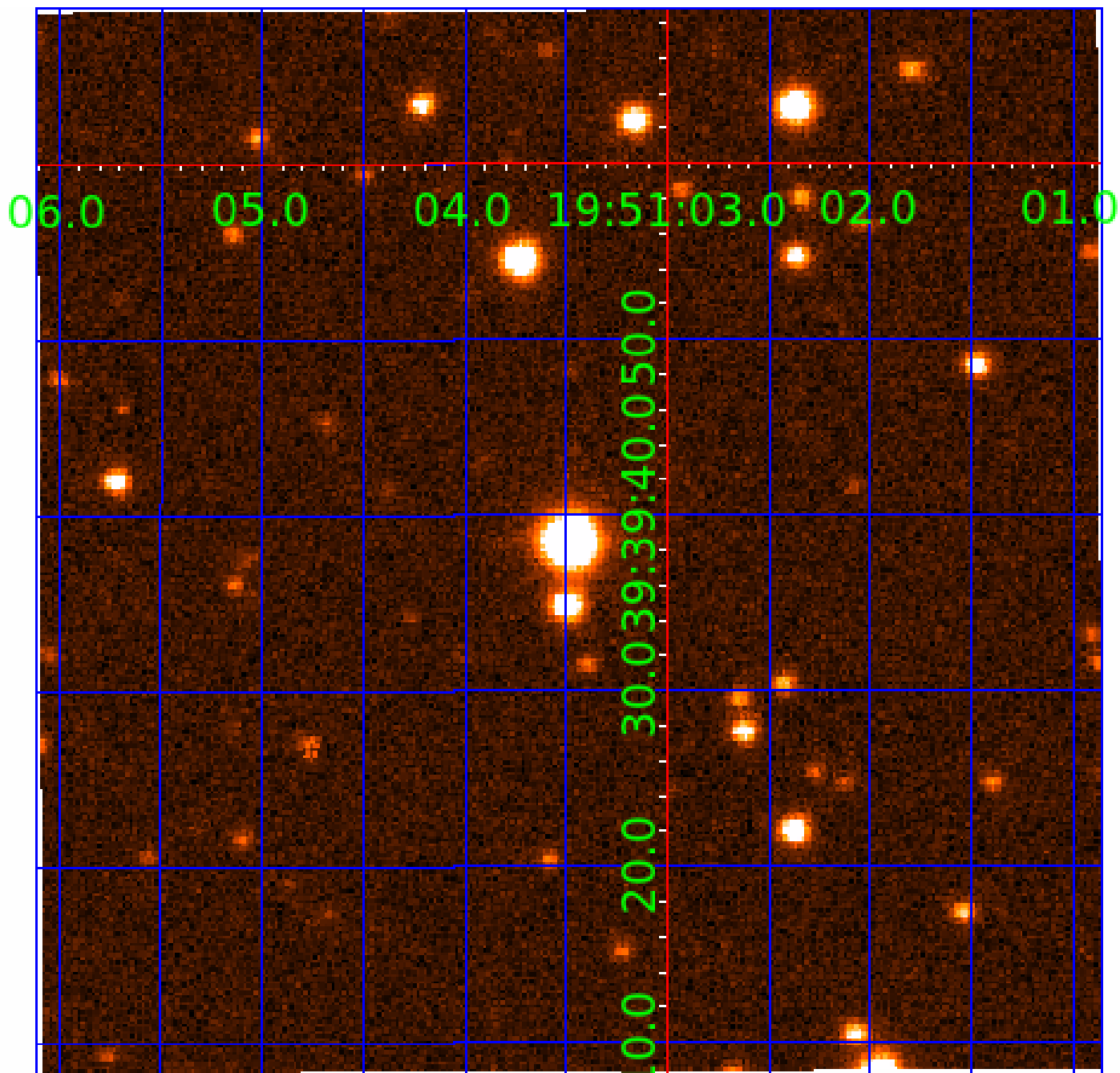


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 004588073

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})
004588073-01	OBS	No	2.263957	132.290732	32.2	9.427	9.1	8.2	2.49	7372	1.64	10276.89
004588073-02	OBS	No	389.281254	335.318420	387.4	4.598	8.2	6.0	2.49	7372	6.51	10.75
004588073-03	OBS	No	68.700947	139.714768	211.0	5.489	8.0	7.1	2.49	7372	4.10	108.58
004588073-04	OBS	No	488.804855	251.079617	476.1	3.252	7.6	8.4	2.49	7372	5.95	7.93
004588073-05	OBS	No	19.149293	146.585028	158.8	1.963	7.6	7.5	2.49	7372	3.58	596.32

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004588073-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
004588073-02	OBS	FP	0.00	1	0	0	0	LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
004588073-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004588073-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
004588073-05	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

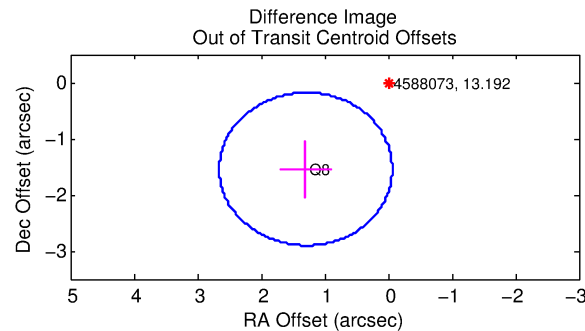
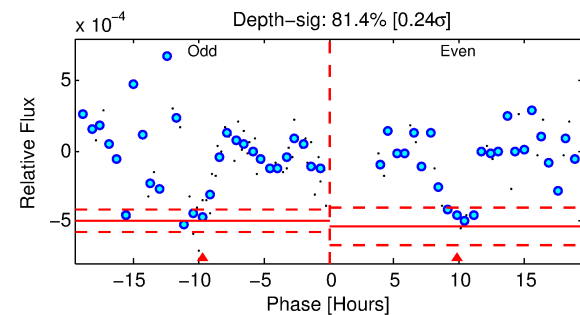
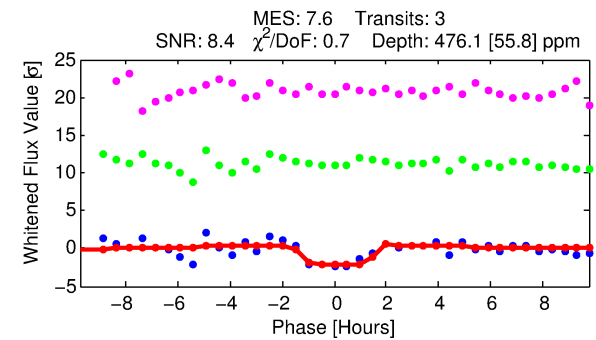
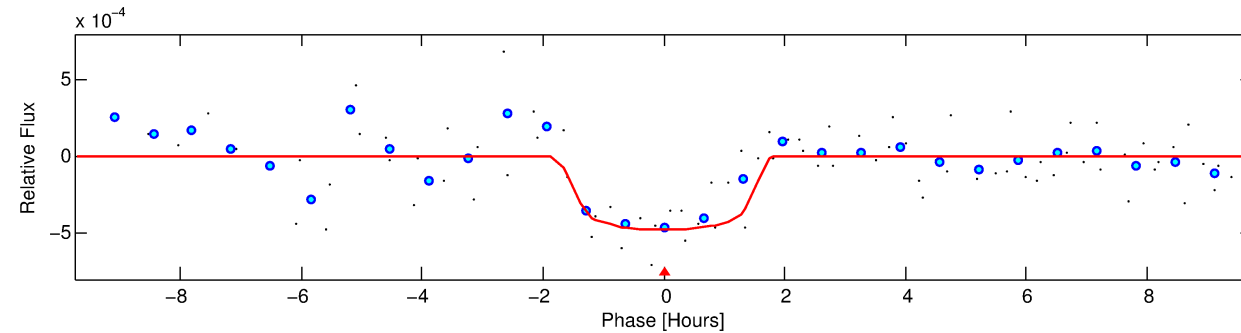
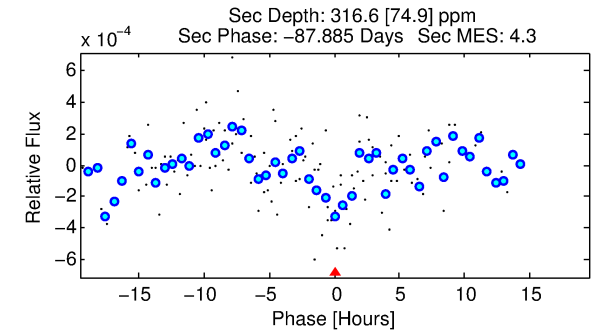
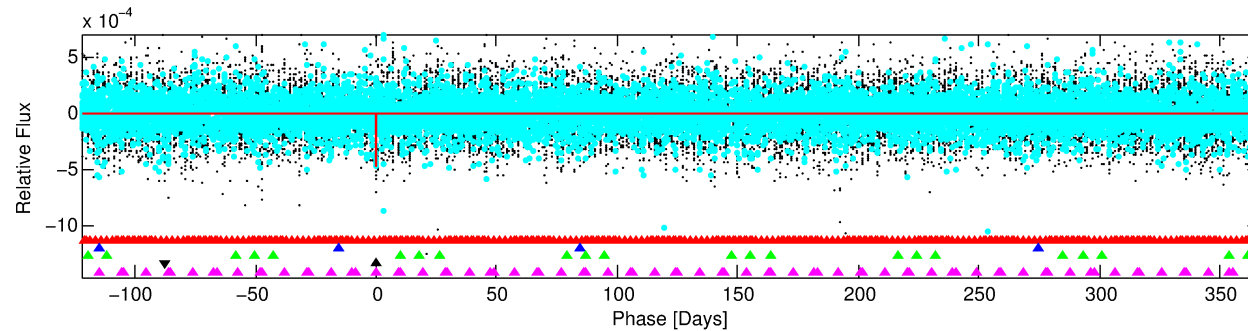
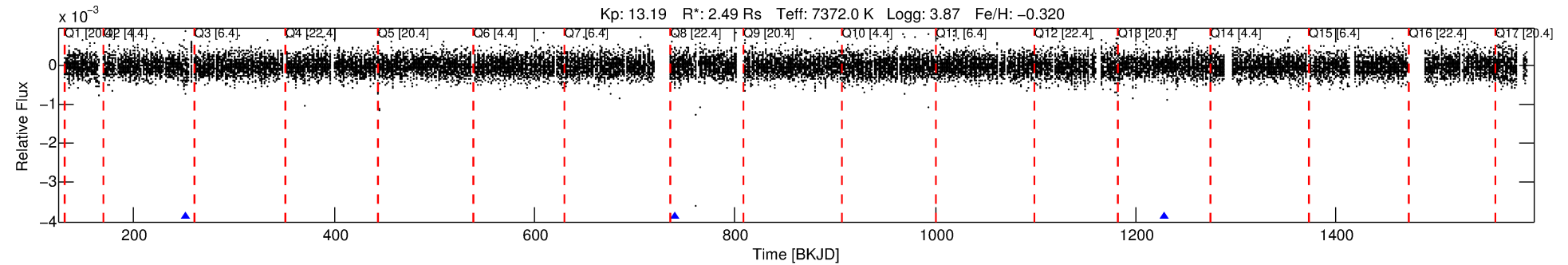
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 004588073-04

No Significant Match Found

DV One-Page Summary

KIC: 4588073 Candidate: 4 of 5 Period: 488.805 d



DV Fit Results:

Period = 488.80486 [0.00580] d
Epoch = 251.0796 [0.0074] BKJD
Rp/R* = 0.0219 [0.0139]
a/R* = 759.50 [2783.14]
b = 0.78 [1.87]
Seff = 7.93 [4.94]
Teq = 428 [67] K
Rp = 5.95 [4.43] Re
a = 1.4363 [0.5396] AU
Ag = 10160.25 [14465.83] [0.70σ]
Teffp = 6643 [2162] K [2.87σ]

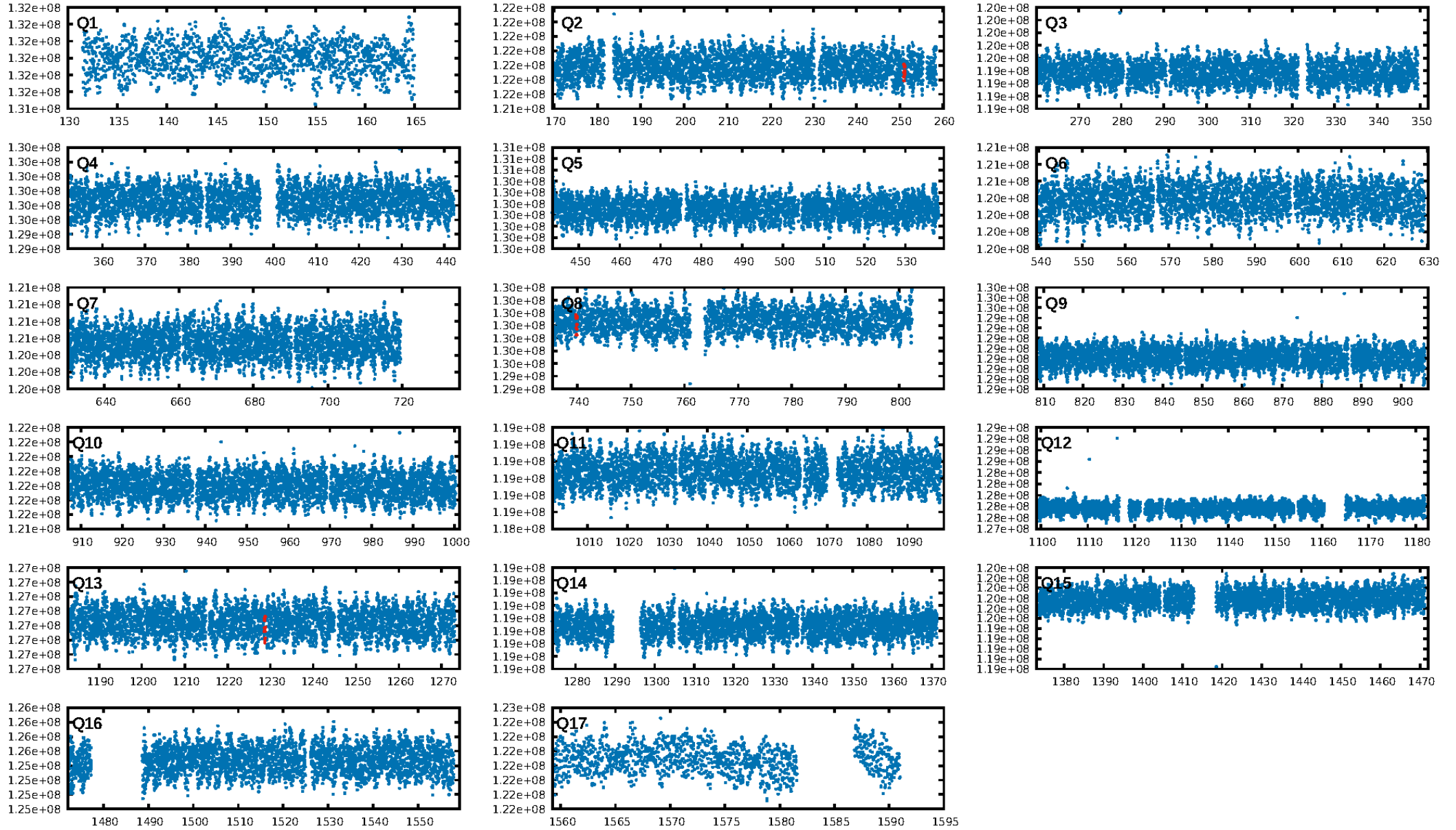
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [424.13σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 56.4%
ModelChiSquareGoF-sig: 99.9%
Bootstrap-pfa: 3.11e-08
RollingBand-fgt: 1.00 [3/3]
GhostDiagnostic-chr: 1.781
Centroid-sig: 9.7%
Centroid-so: 1.290 arcsec [0.95σ]
OotOffset-rm: 2.015 arcsec [4.44σ]
KicOffset-rm: 2.167 arcsec [4.74σ]
OotOffset-st: 0/0/1/0 [1]
KicOffset-st: 0/0/1/0 [1]
DiffImageQuality-fgm: 1.00 [1/1]
DiffImageOverlap-fno: 0.50 [1/2]

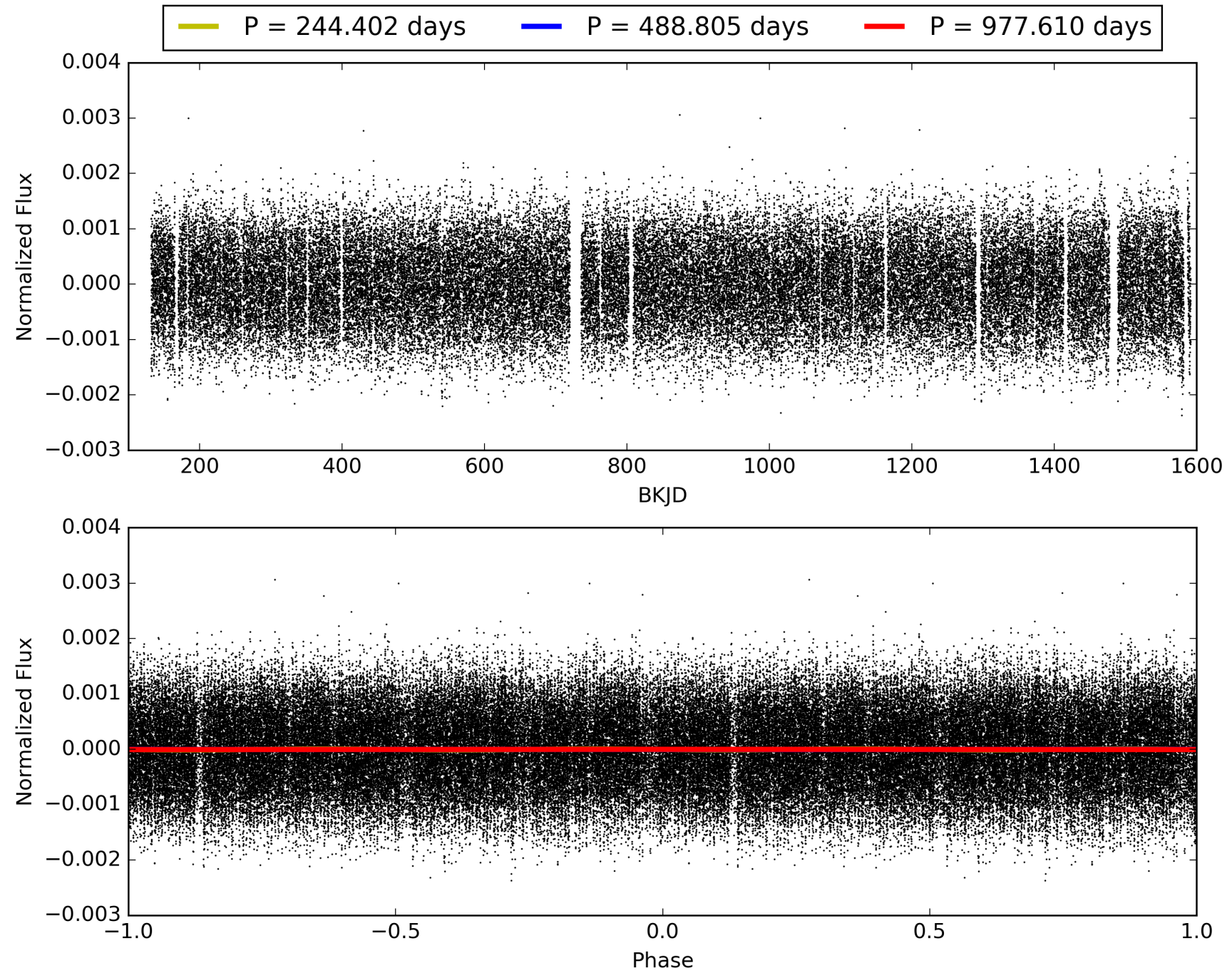
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 00:27:07 Z

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

TCE 004588073-04, PDC Light Curves

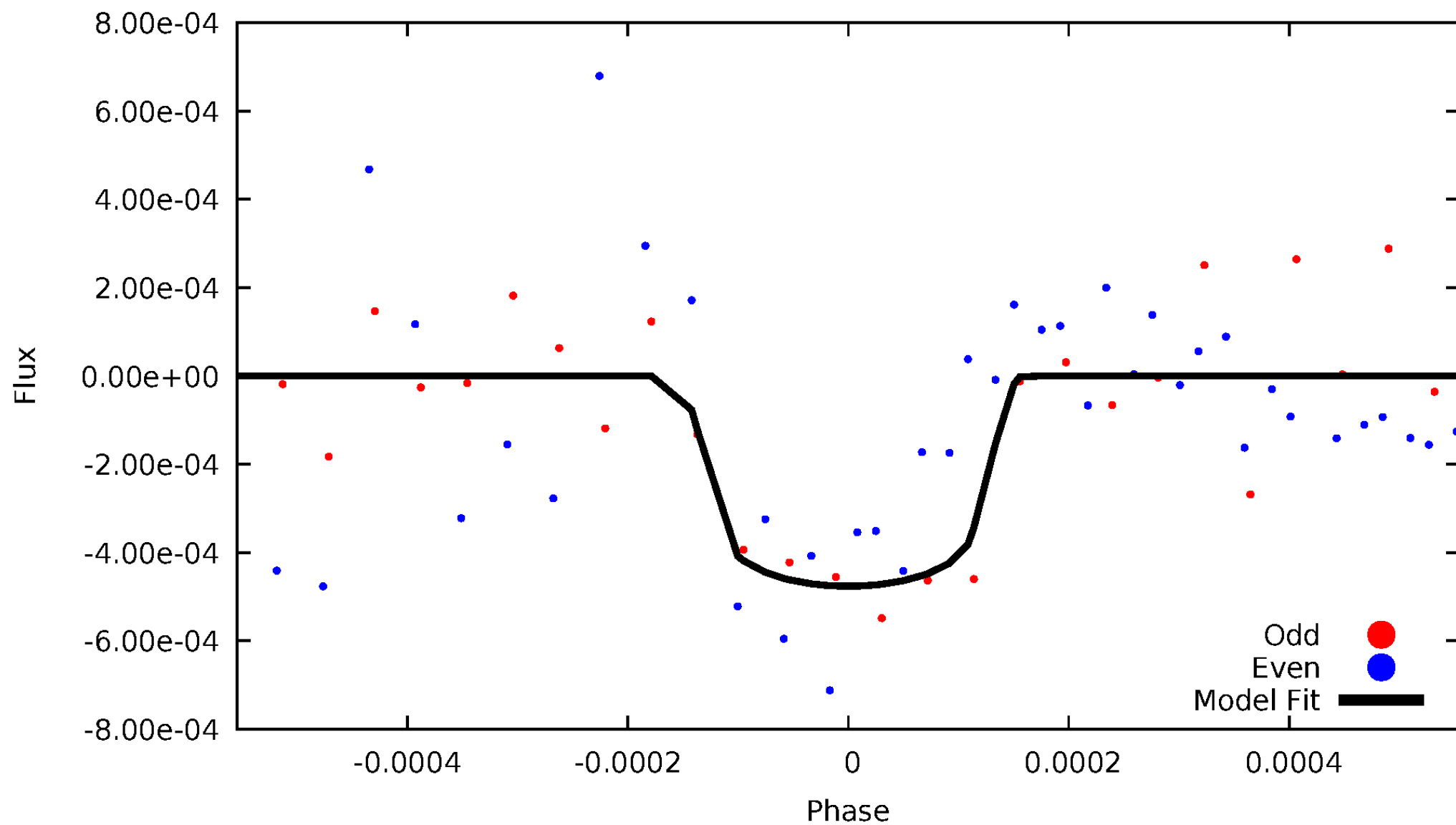


TCE 004588073-04



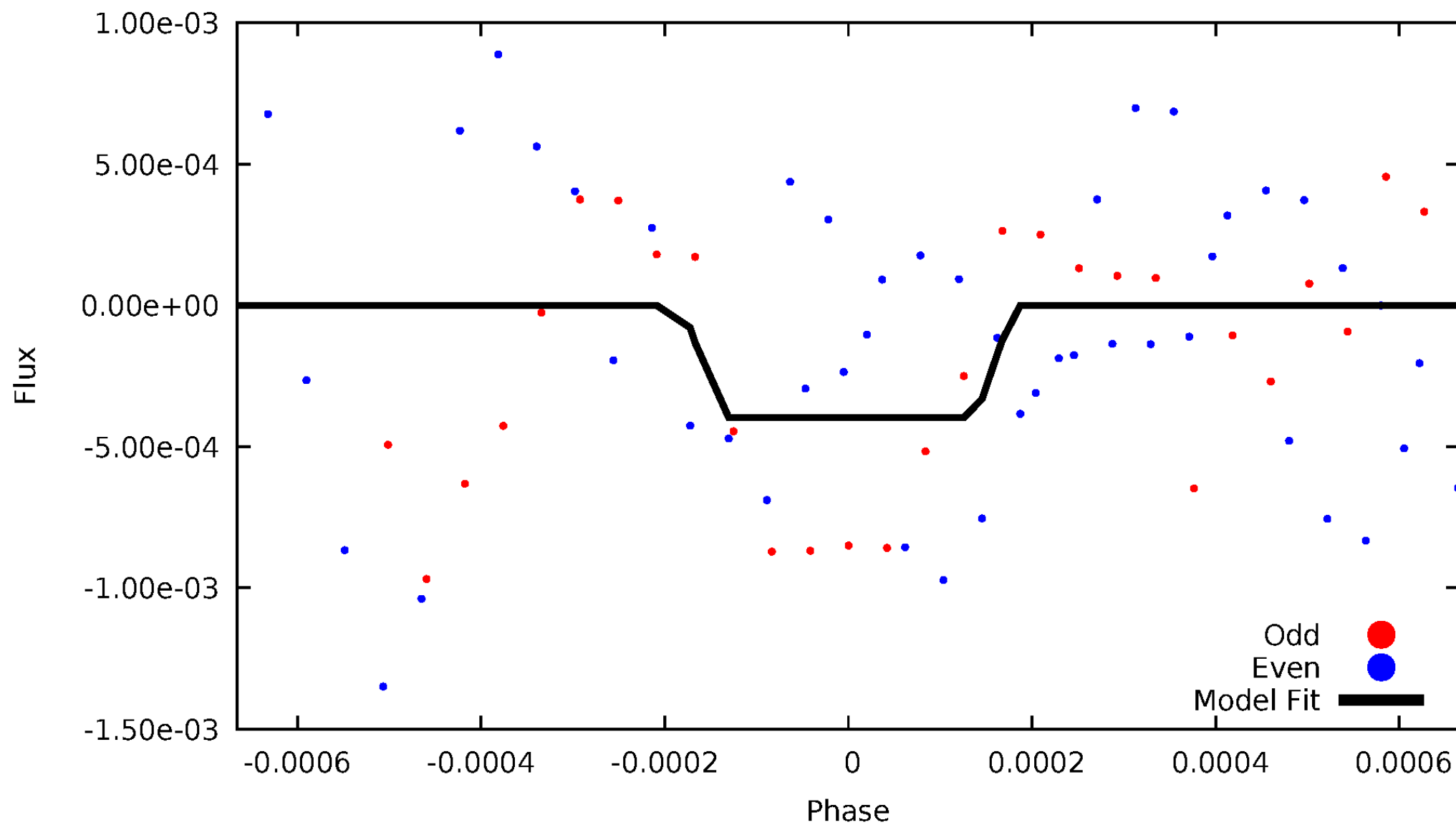
DV Odd/Even

TCE 004588073-04



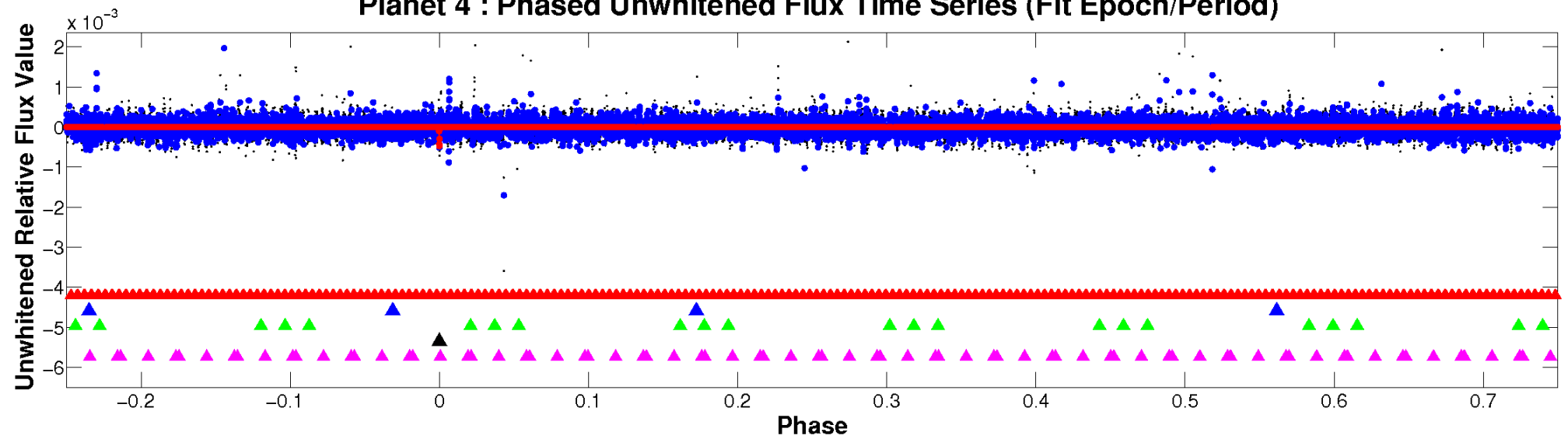
ALT Odd/Even

TCE 004588073-04

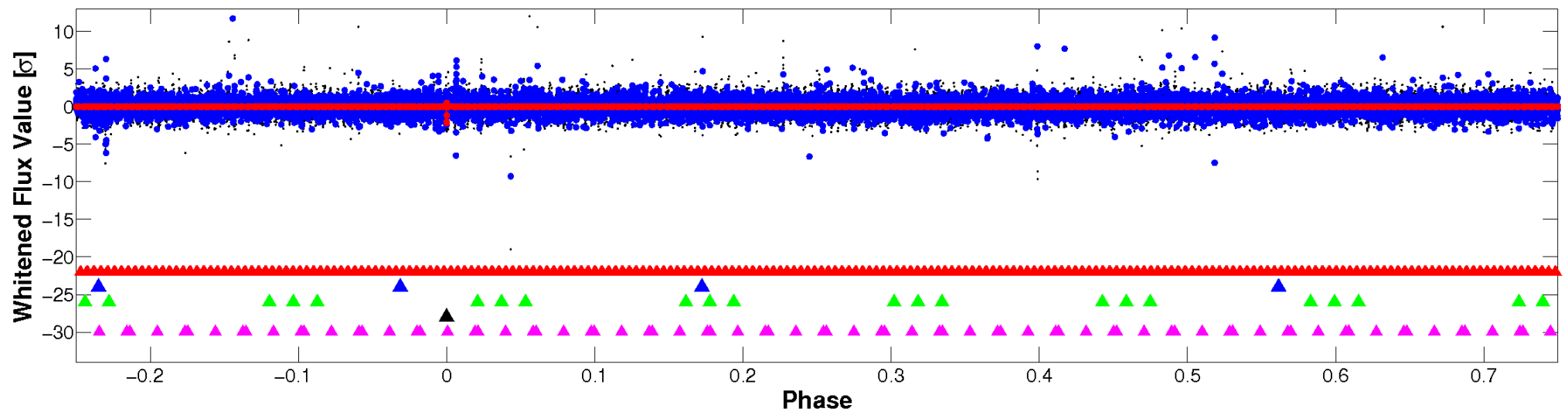


Non-Whitened Vs. Whitened Light Curve

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

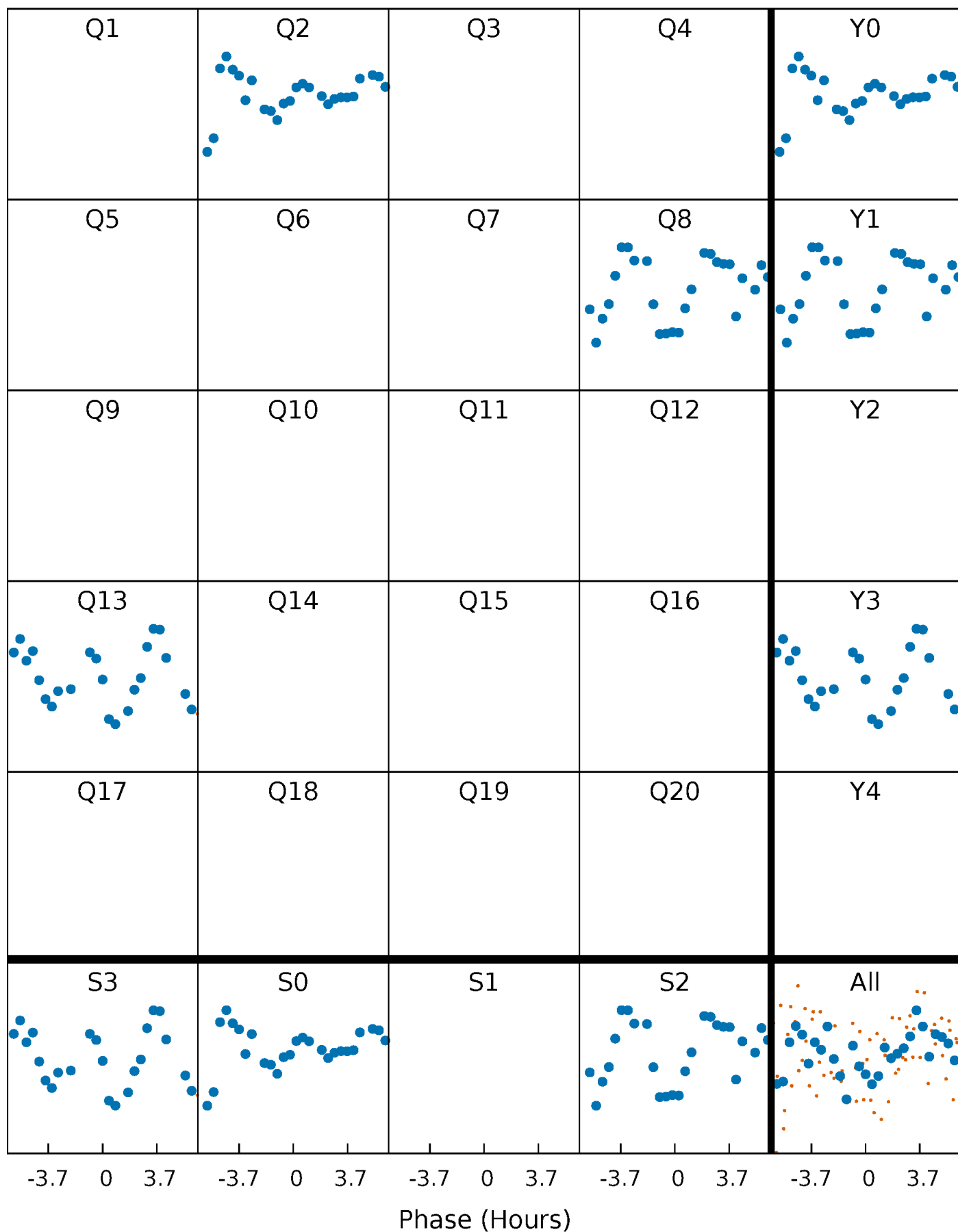


Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



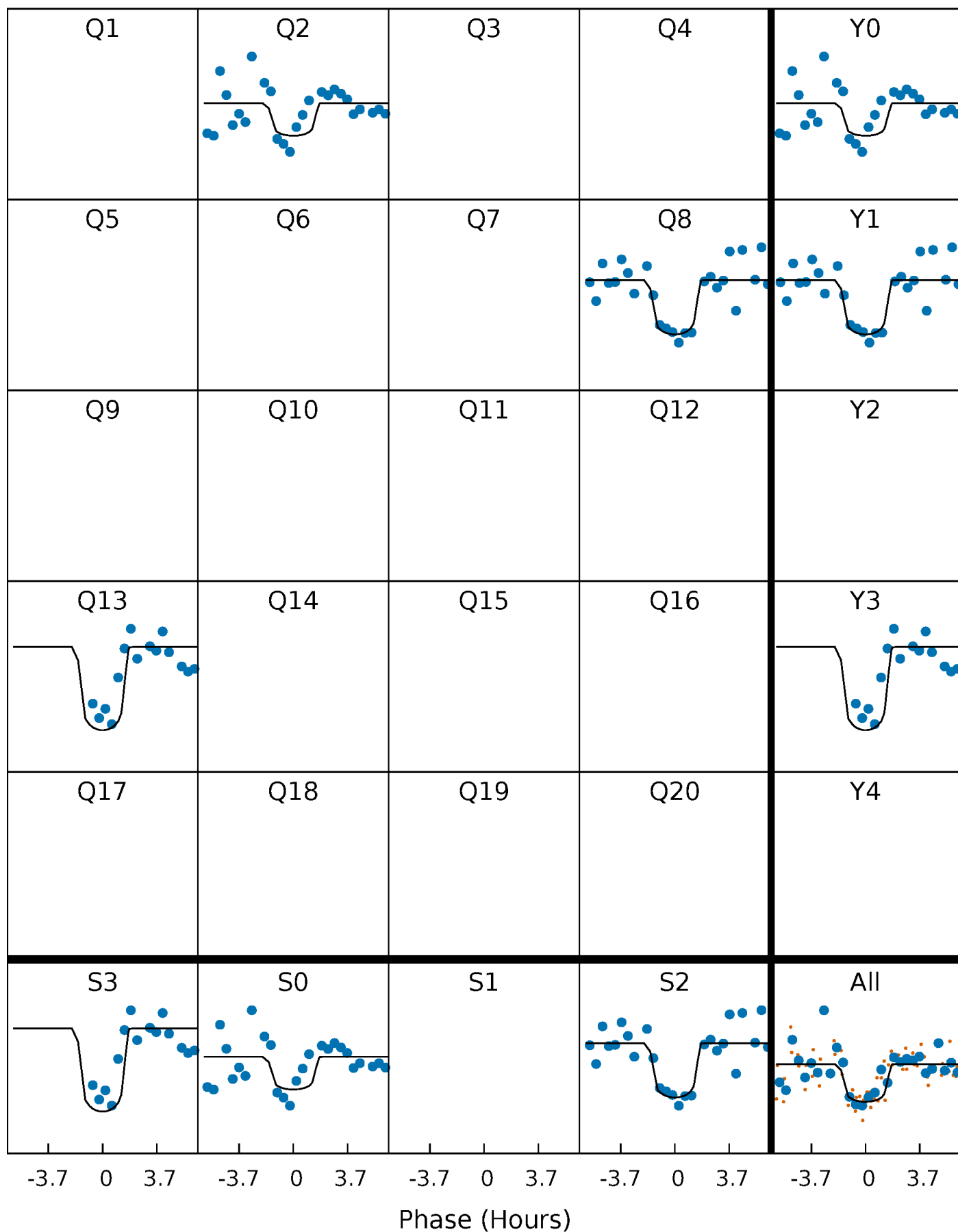
PDC Quarter-Phased Transit Curves

TCE 004588073-04 P=488.804855 Days $T_0=251.079618$ (BKJD)



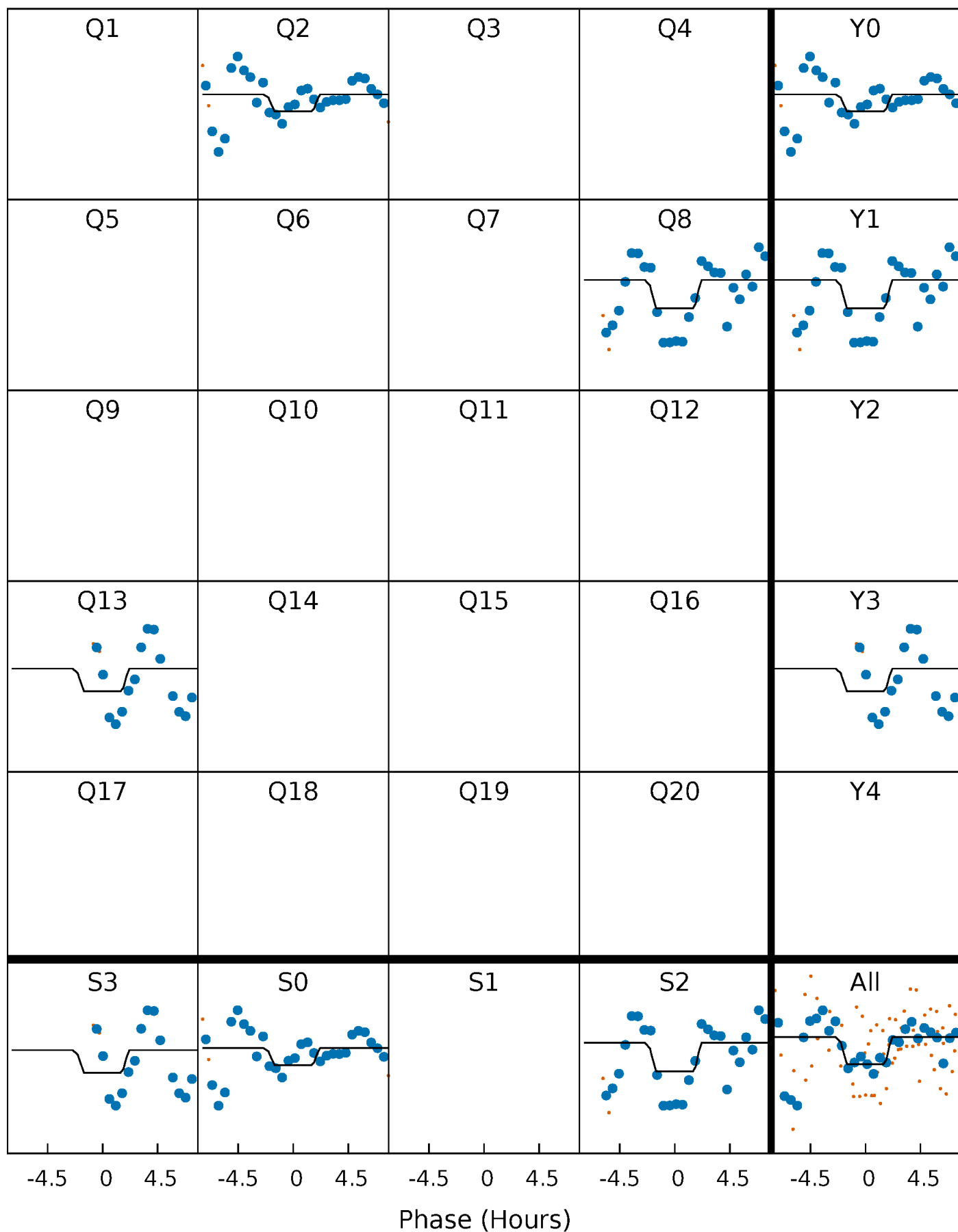
DV Quarter-Phased Transit Curves

TCE 004588073-04 P=488.804855 Days $T_0=251.079618$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

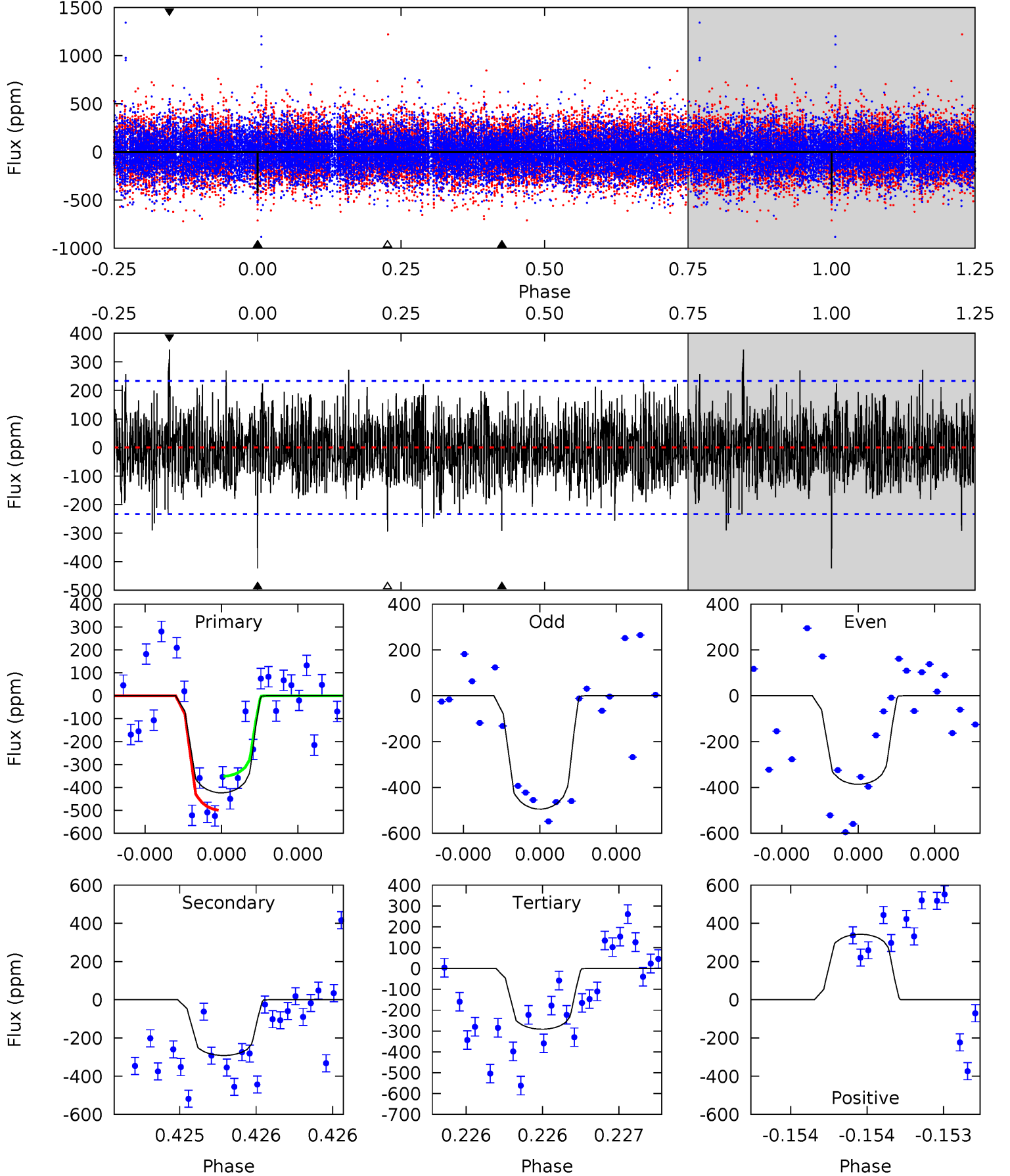
TCE 004588073-04 P=488.804811 Days $T_0=251.073855$ (BKJD)



DV Model-Shift Uniqueness Test

004588073-04, P = 488.804855 Days, E = 251.079618 Days

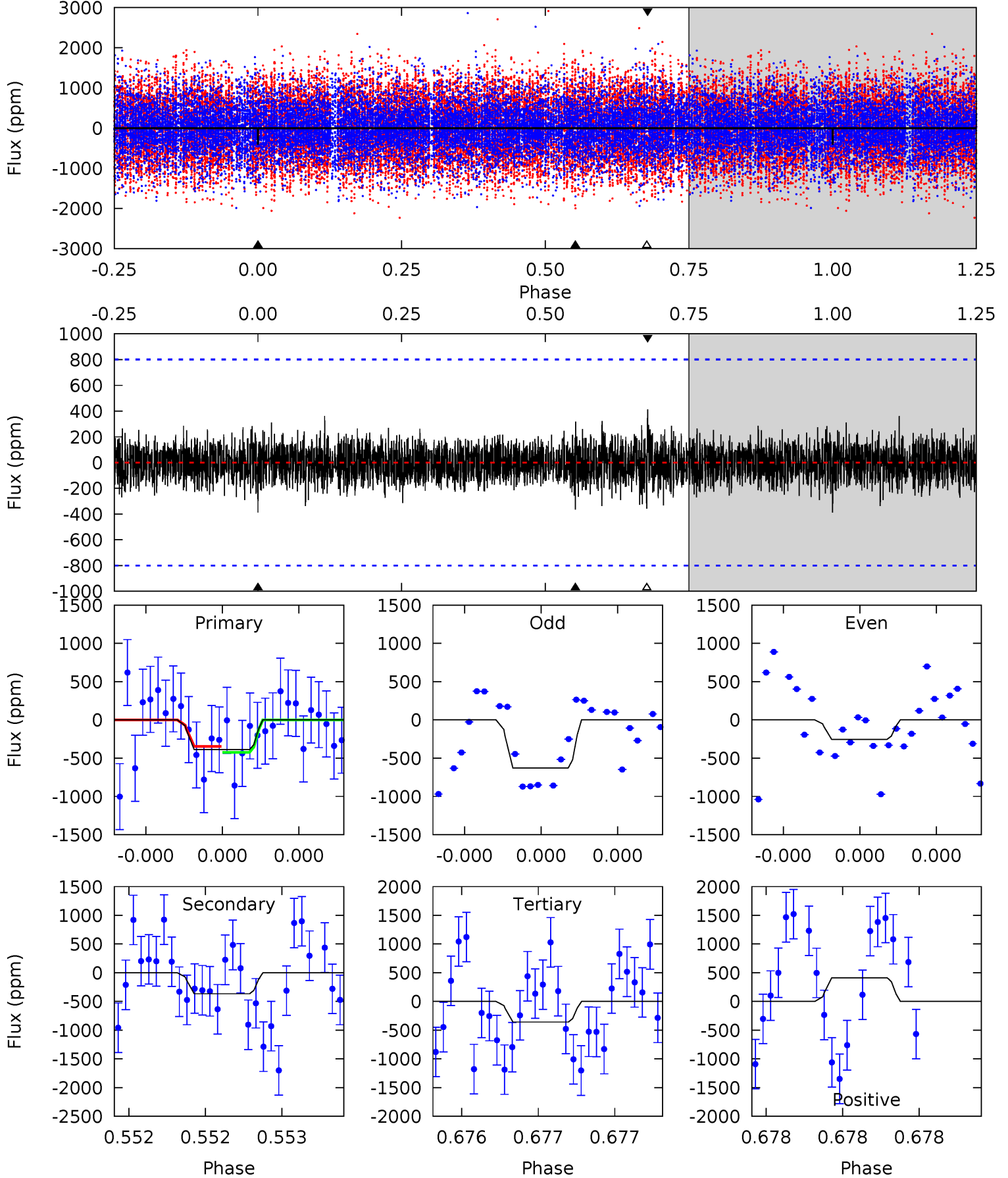
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.3	7.08	7.07	8.32	5.66	3.62	1.75	3.21	1.96	0.00	-1.24	1.24	1.01	0.45	1.78



Alt Model-Shift Uniqueness Test

004588073-04, P = 488.804811 Days, E = 251.073855 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
2.73	2.57	2.52	2.91	5.63	3.57	0.60	0.20	-0.18	0.05	-0.33	1.26	1.20	0.52	0.27



Stellar Parameters For KIC 004588073

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	7372^{+230}_{-307}	$3.865^{+0.352}_{-0.117}$	$-0.320^{+0.250}_{-0.350}$	$2.487^{+0.525}_{-0.974}$	$1.650^{+0.170}_{-0.396}$	$0.151^{+0.426}_{-0.053}$
	+3%/-4%	+9%/-3%	+78%/-109%	+21%/-39%	+10%/-24%	+282%/-35%
Source	KIC0	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 004588073-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	-291 ± 41	$5.73^{+3.72}_{-3.27}$	581^{+45}_{-60}	6286^{+3769}_{-1205}	10512^{+43082}_{-6812}
Alt.	-366 ± 142	$5.19^{+4.16}_{-2.89}$	579^{+47}_{-61}	6806^{+5330}_{-1711}	14603^{+57201}_{-10584}

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

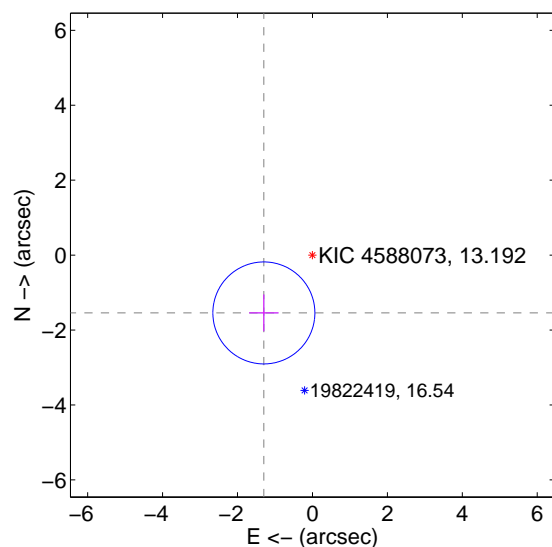
Supplemental centroid analysis for 004588073-04. Kepler magnitude: 13.19. Transit SNR 8.43

There are 1 quarters with good PRF difference image offsets

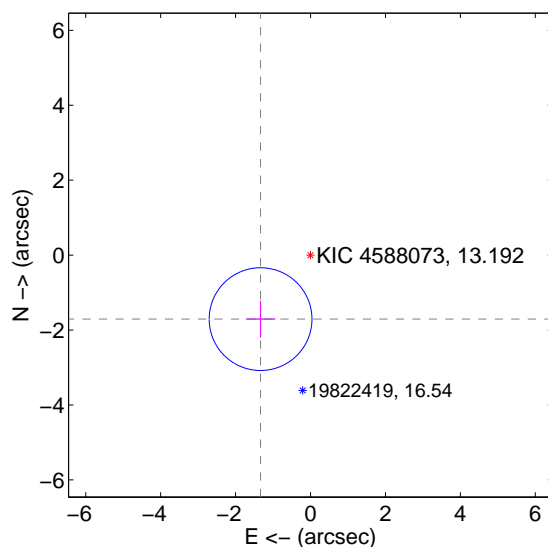
The direct PRF centroid is offset from the target star catalog position by about 0.17 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	2.015 ± 0.454	4.44	1.296 ± 0.393	-1.543 ± 0.492
PRF-fit source offset from KIC position	2.167 ± 0.457	4.74	1.333 ± 0.393	-1.708 ± 0.492
photometric centroid source offset	1.29 ± 1.36	0.95	-0.44 ± 1.40	1.21 ± 1.36

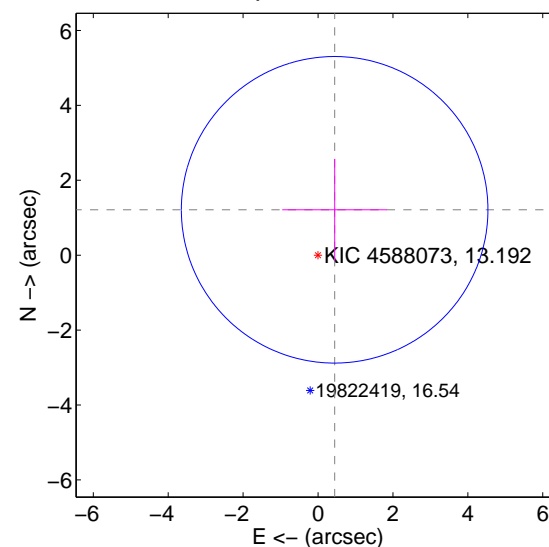
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

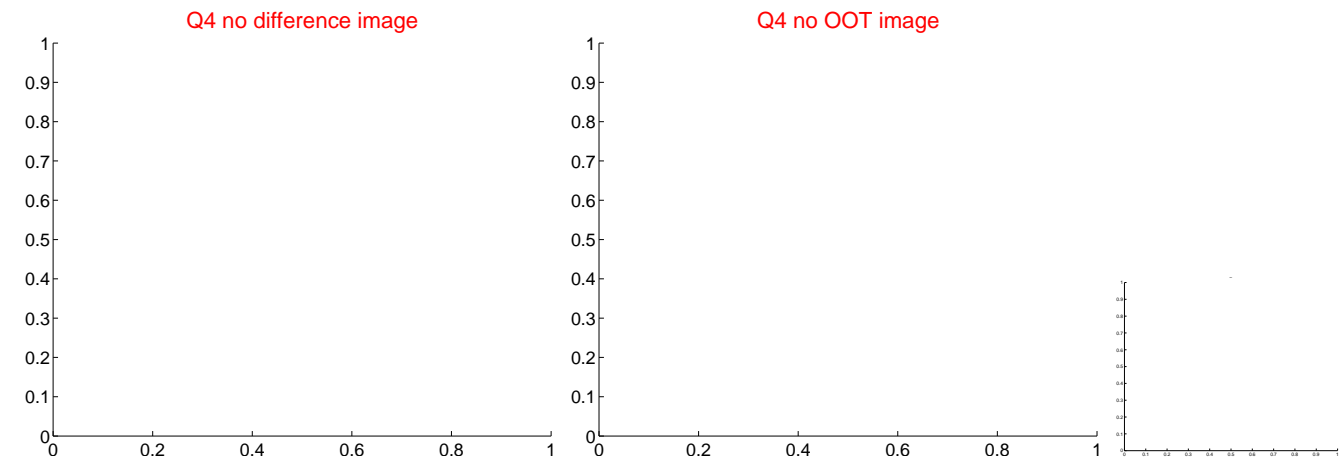
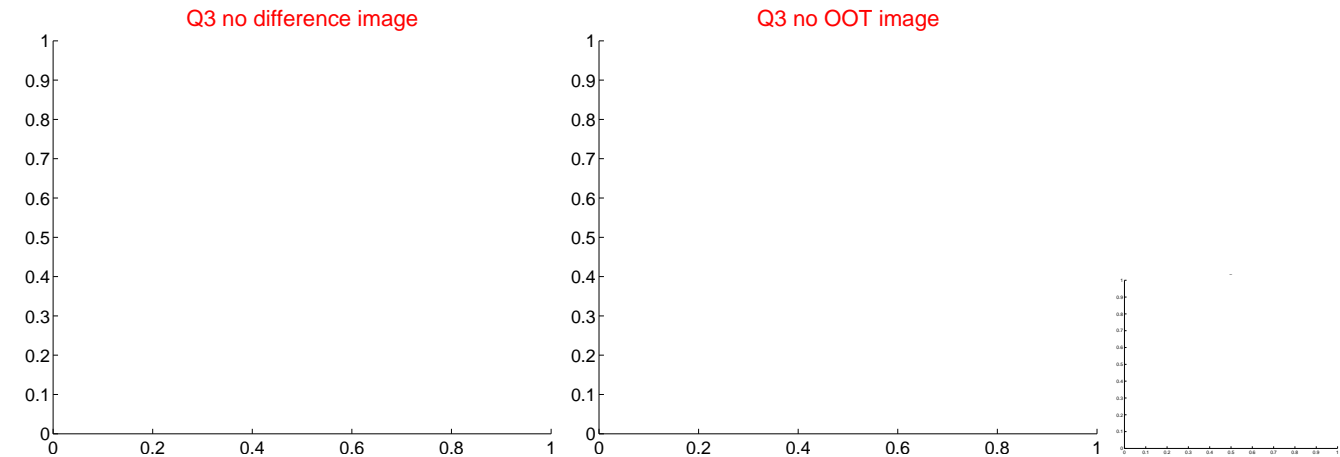
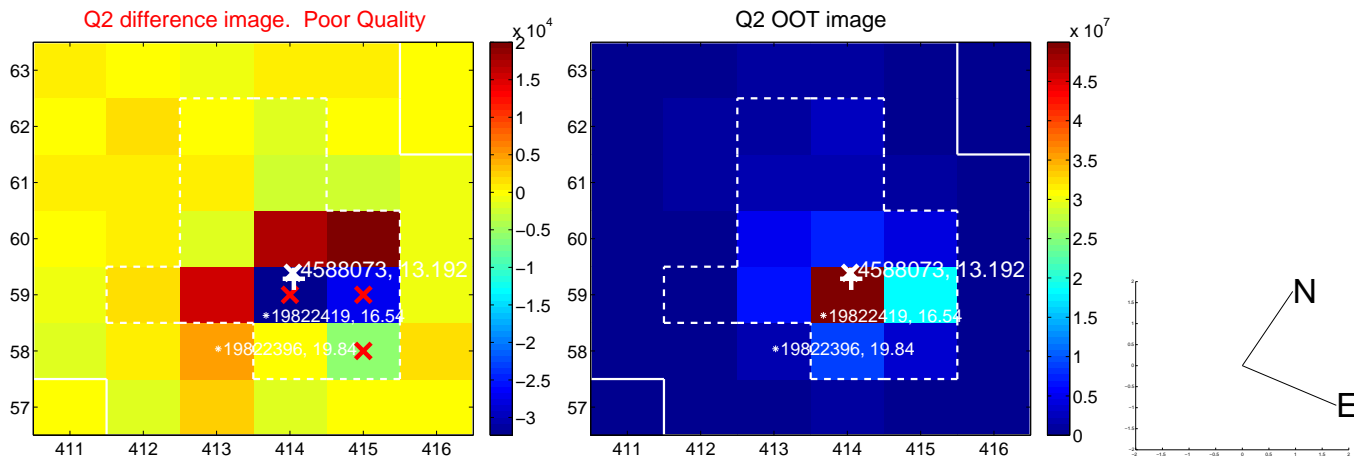
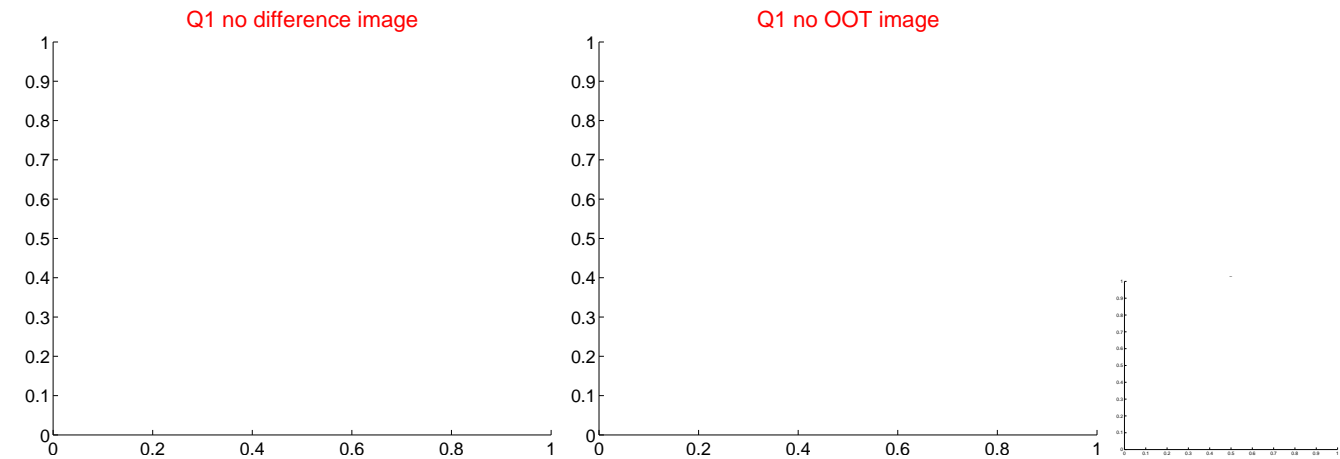


offset from photometric centroids

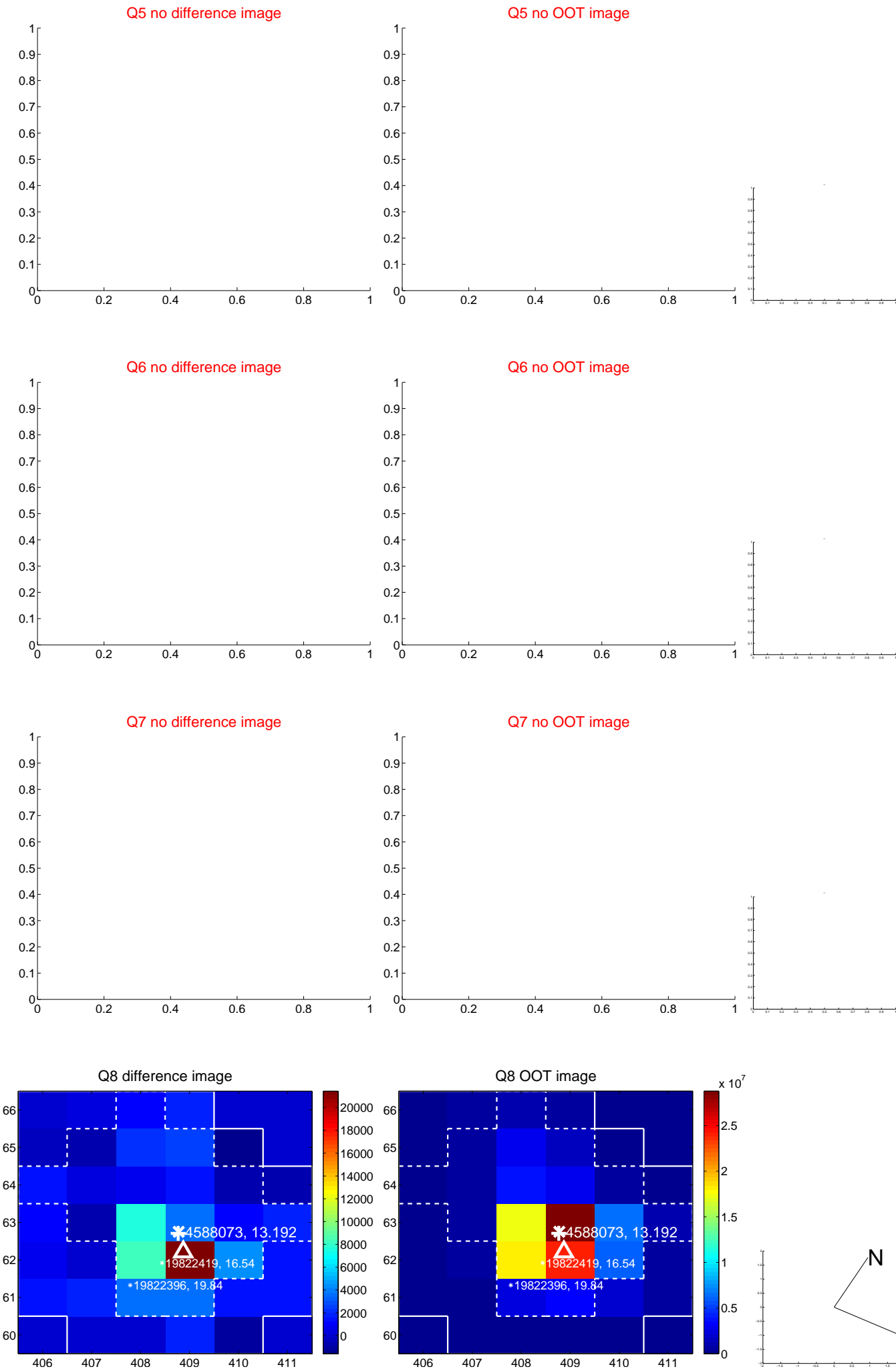


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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



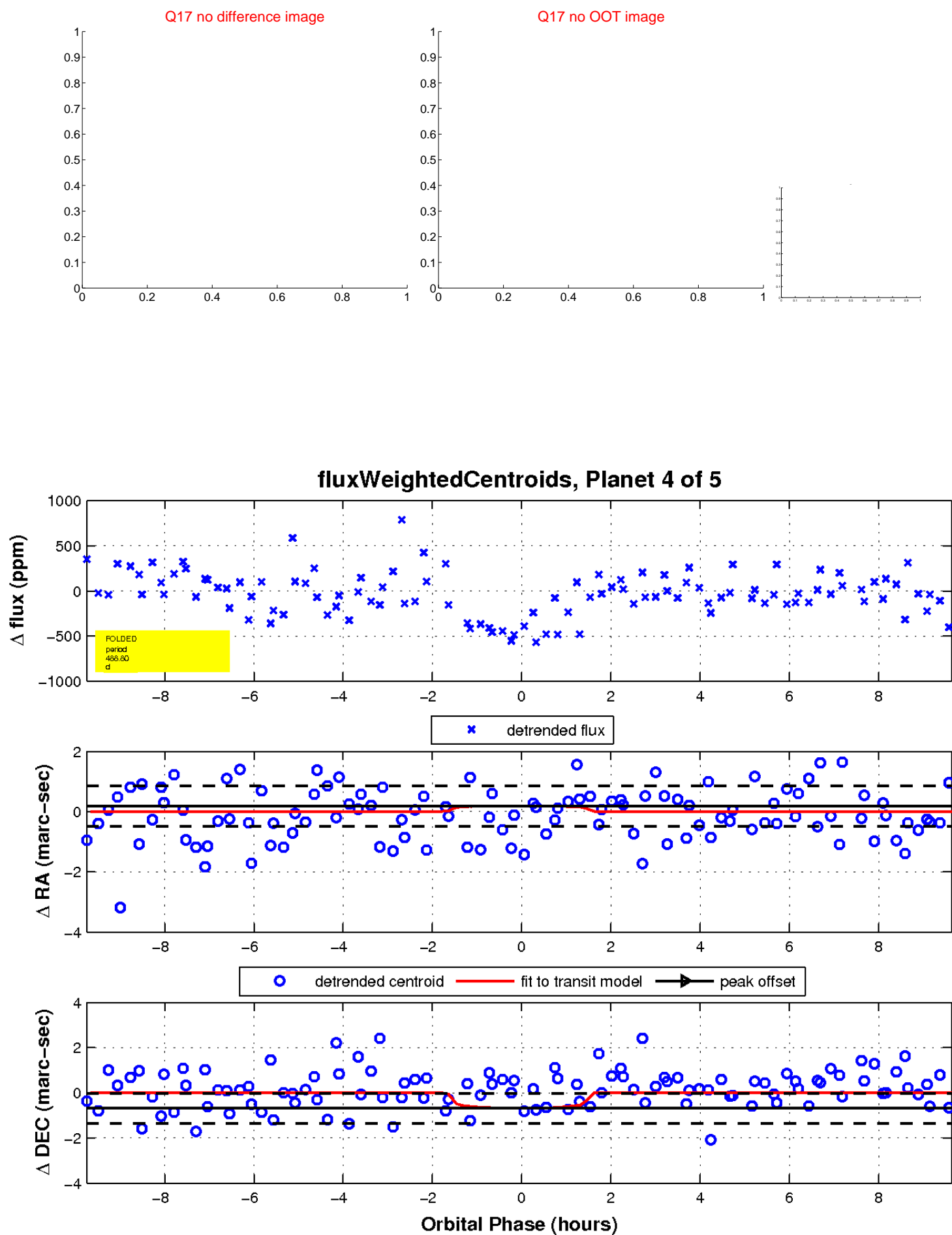
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

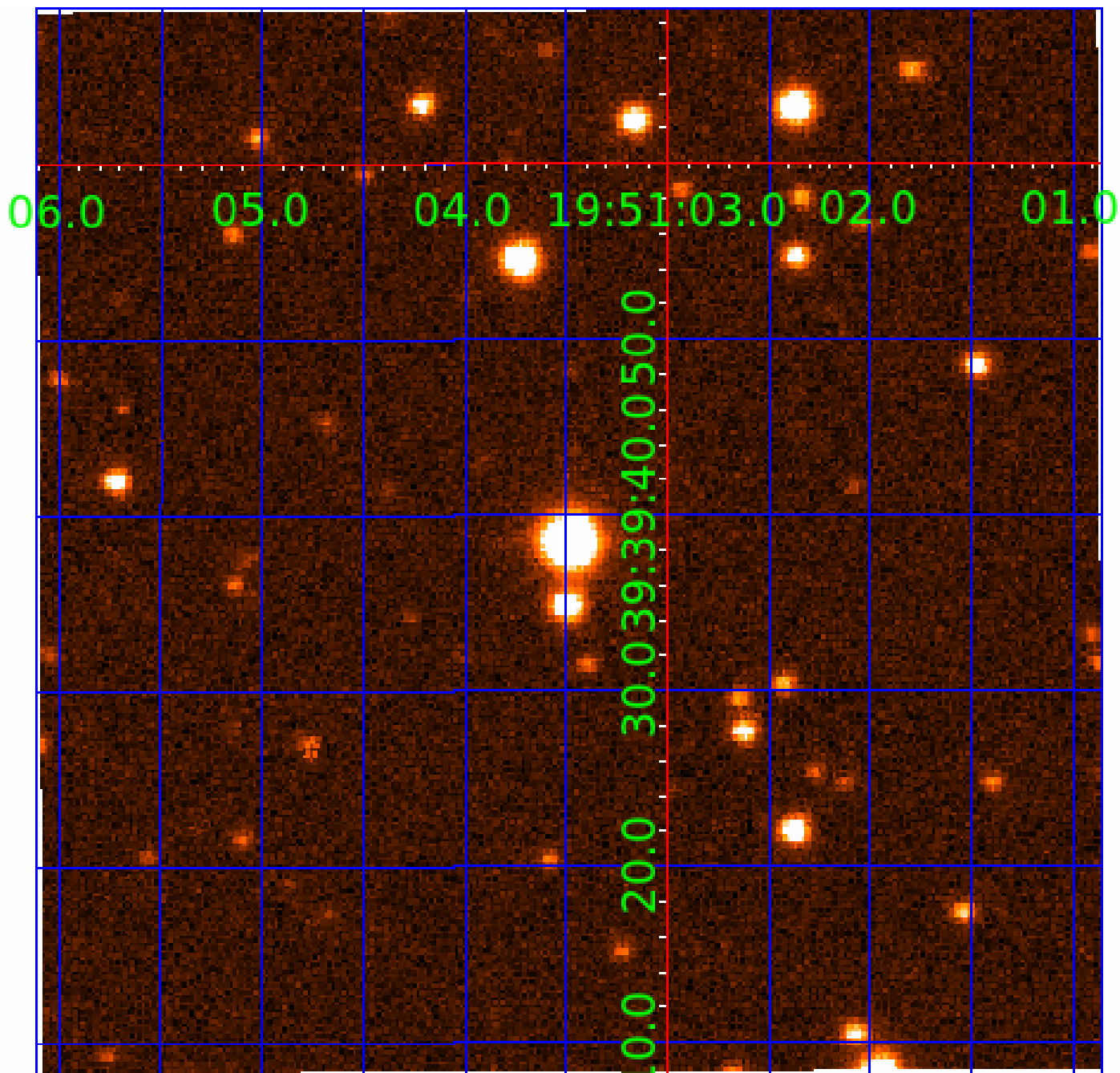


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 004588073

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})
004588073-01	OBS	No	2.263957	132.290732	32.2	9.427	9.1	8.2	2.49	7372	1.64	10276.89
004588073-02	OBS	No	389.281254	335.318420	387.4	4.598	8.2	6.0	2.49	7372	6.51	10.75
004588073-03	OBS	No	68.700947	139.714768	211.0	5.489	8.0	7.1	2.49	7372	4.10	108.58
004588073-04	OBS	No	488.804855	251.079617	476.1	3.252	7.6	8.4	2.49	7372	5.95	7.93
004588073-05	OBS	No	19.149293	146.585028	158.8	1.963	7.6	7.5	2.49	7372	3.58	596.32

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004588073-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
004588073-02	OBS	FP	0.00	1	0	0	0	LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
004588073-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004588073-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
004588073-05	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

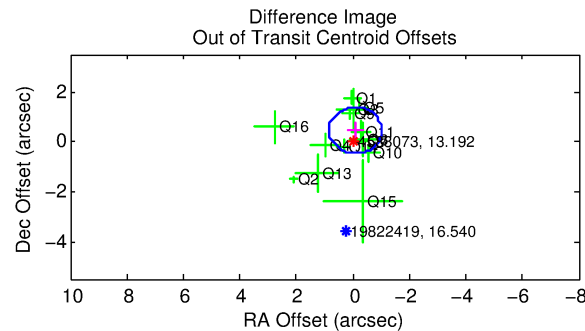
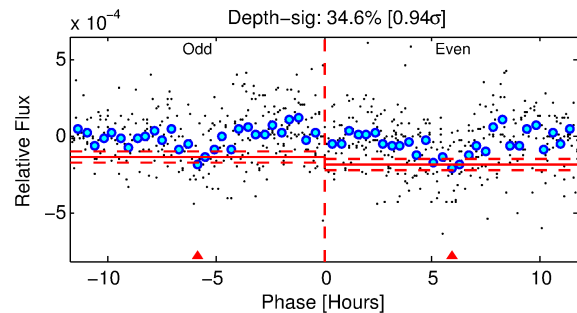
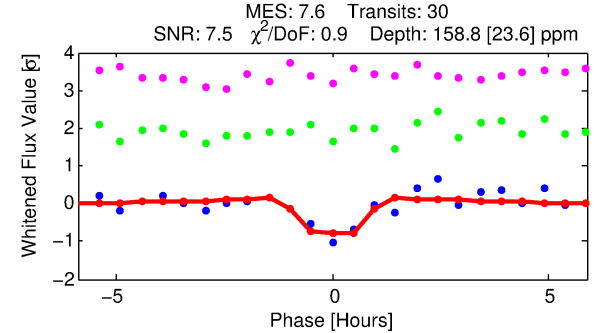
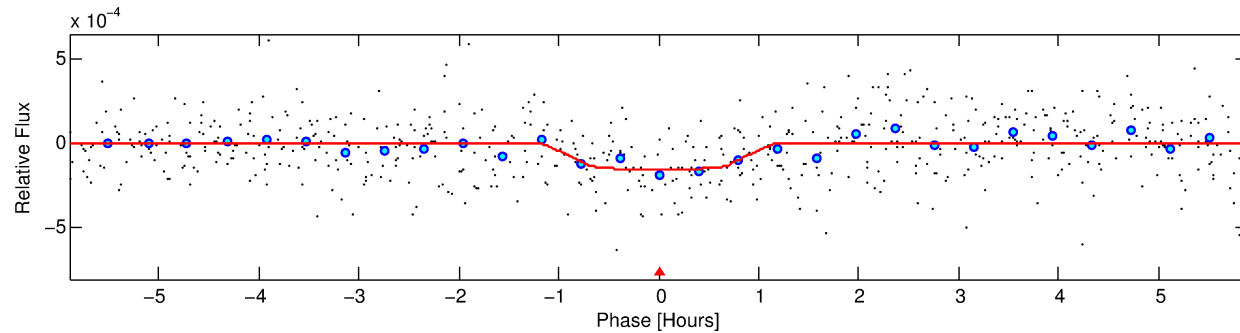
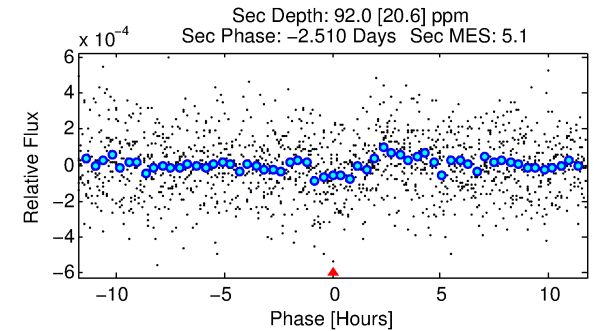
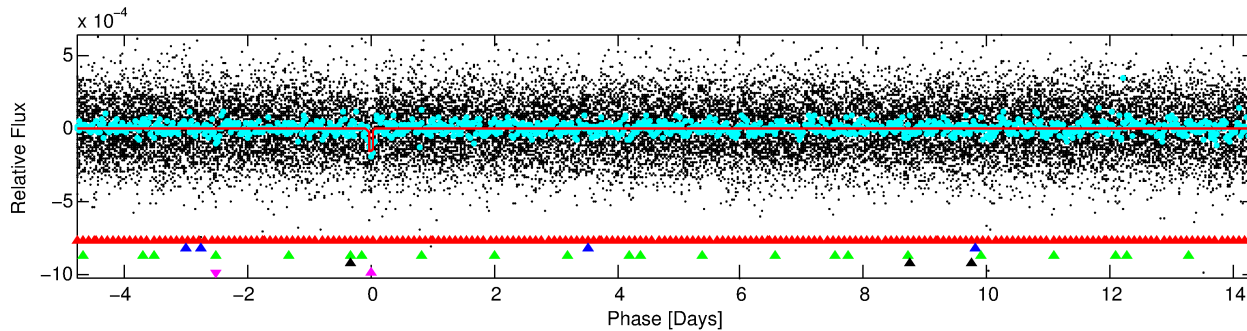
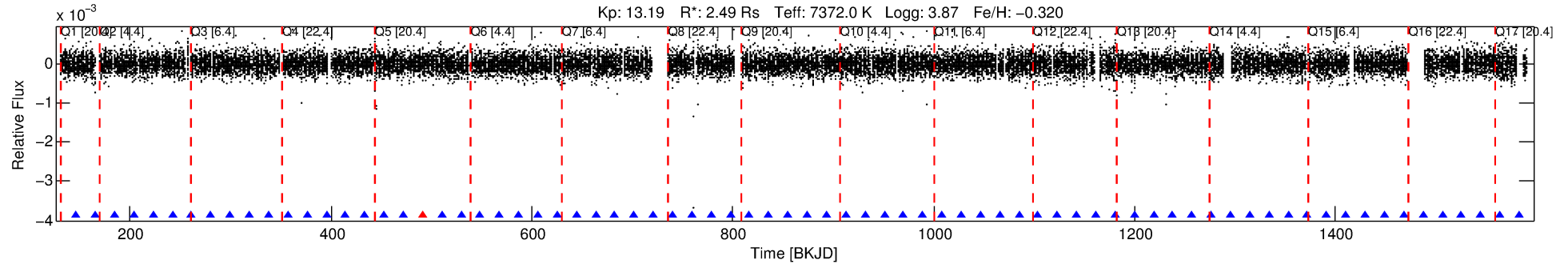
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 004588073-05

No Significant Match Found

DV One-Page Summary

KIC: 4588073 Candidate: 5 of 5 Period: 19.149 d



DV Fit Results:

Period = 19.14929 [0.00016] d
Epoch = 146.5850 [0.0061] BKJD
Rp/R* = 0.0132 [0.0120]
a/R* = 38.78 [211.62]
b = 0.87 [1.55]
Seff = 596.32 [371.39]
Teq = 1260 [196] K
Rp = 3.58 [3.54] Re
a = 0.1657 [0.0622] AU
Ag = 108.65 [209.55] [0.51σ]
Teffp = 6290 [2894] K [1.73σ]

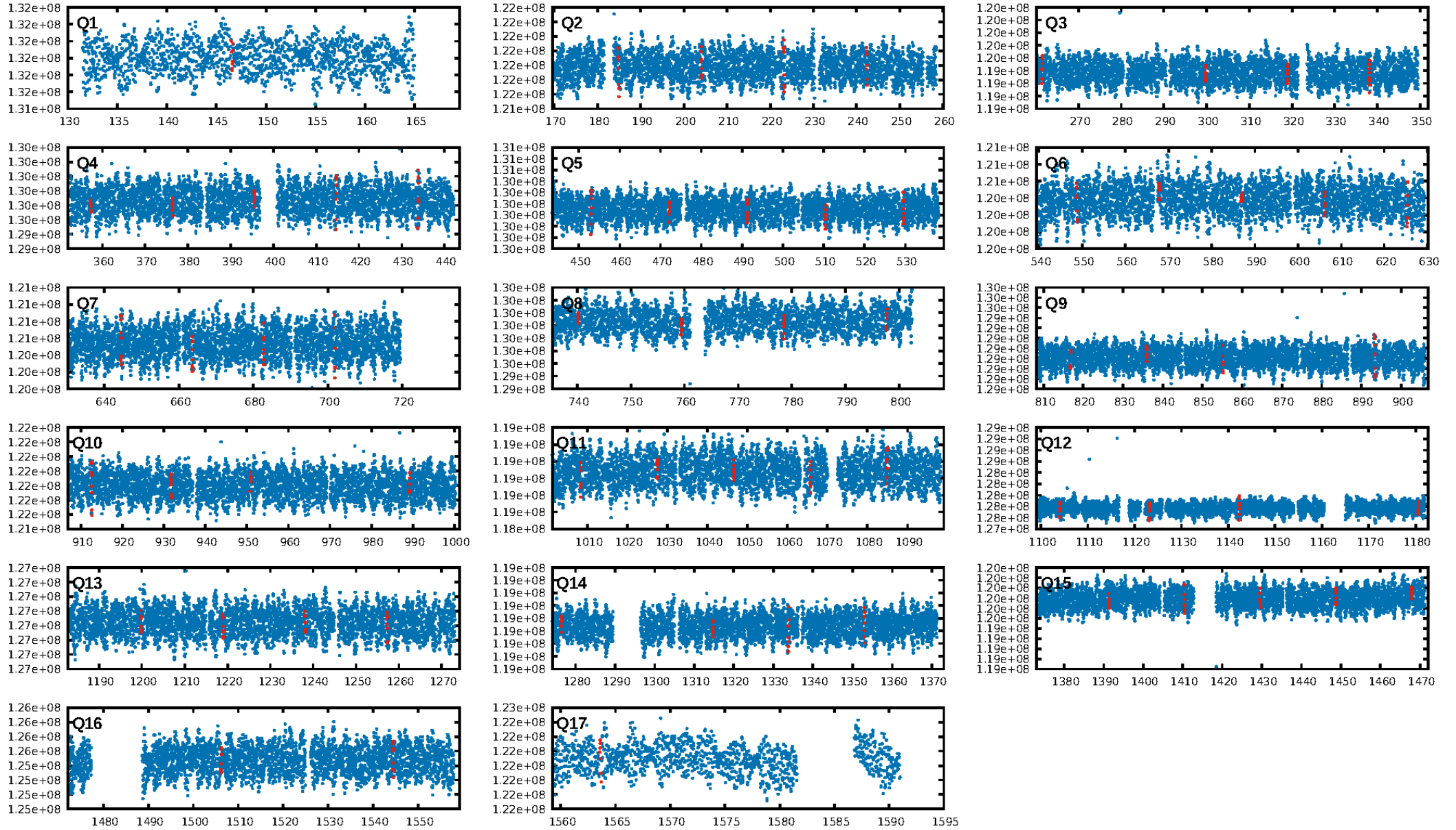
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [42.08σ]
LongPeriod-sig: 100.0% [204.01σ]
ModelChiSquare2-sig: 91.8%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 6.70e-10
RollingBand-fgt: 0.97 [28/29]
GhostDiagnostic-chr: 0.766
Centroid-sig: 33.8%
Centroid-so: 1.193 arcsec [1.11σ]
OotOffset-rm: 0.463 arcsec [1.49σ]
KicOffset-rm: 0.314 arcsec [1.00σ]
OotOffset-st: 4/4/2/4 [14]
KicOffset-st: 4/4/2/4 [14]
DiffImageQuality-fgm: 0.57 [8/14]
DiffImageOverlap-fno: 1.00 [17/17]

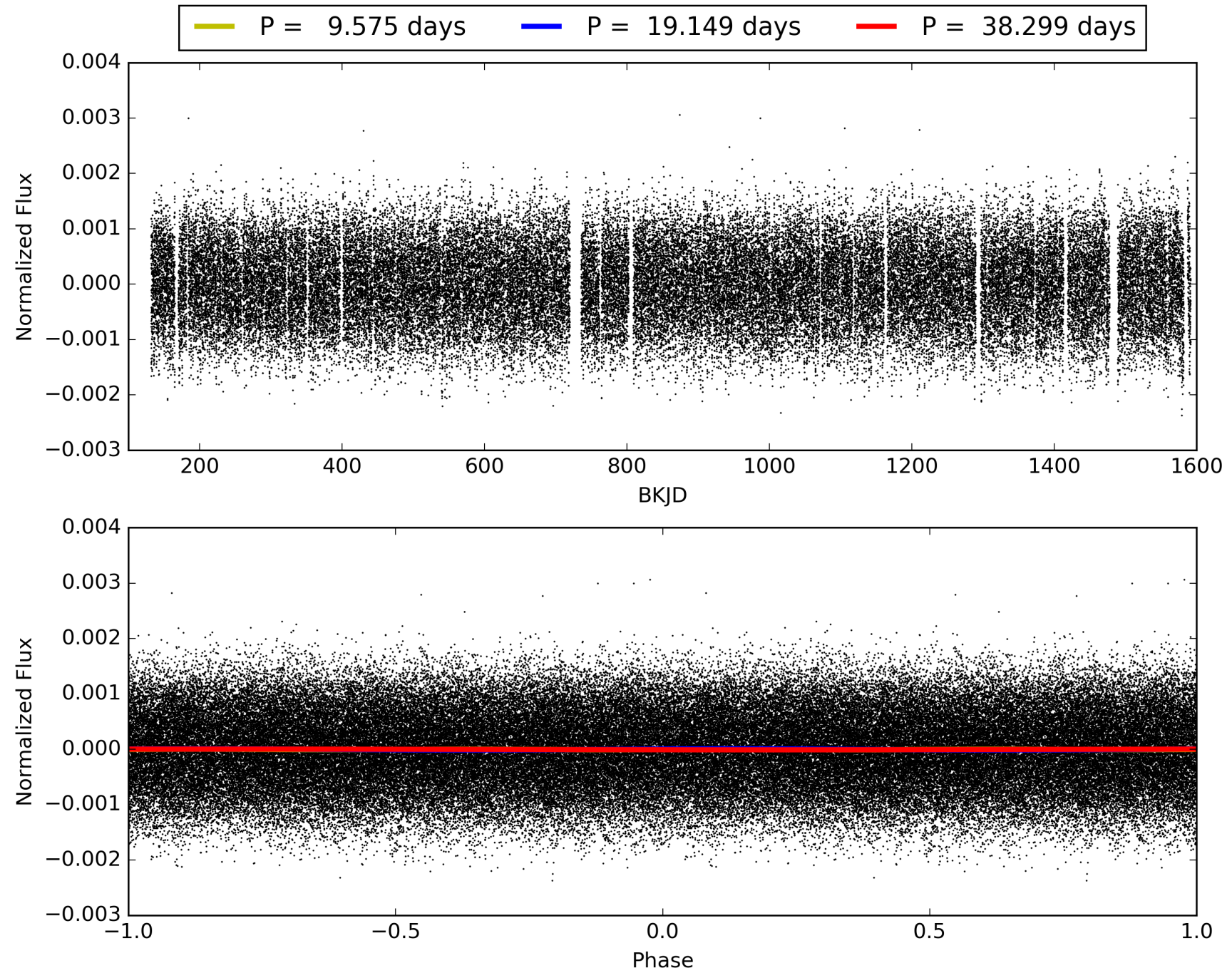
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 00:27:12 Z

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

TCE 004588073-05, PDC Light Curves

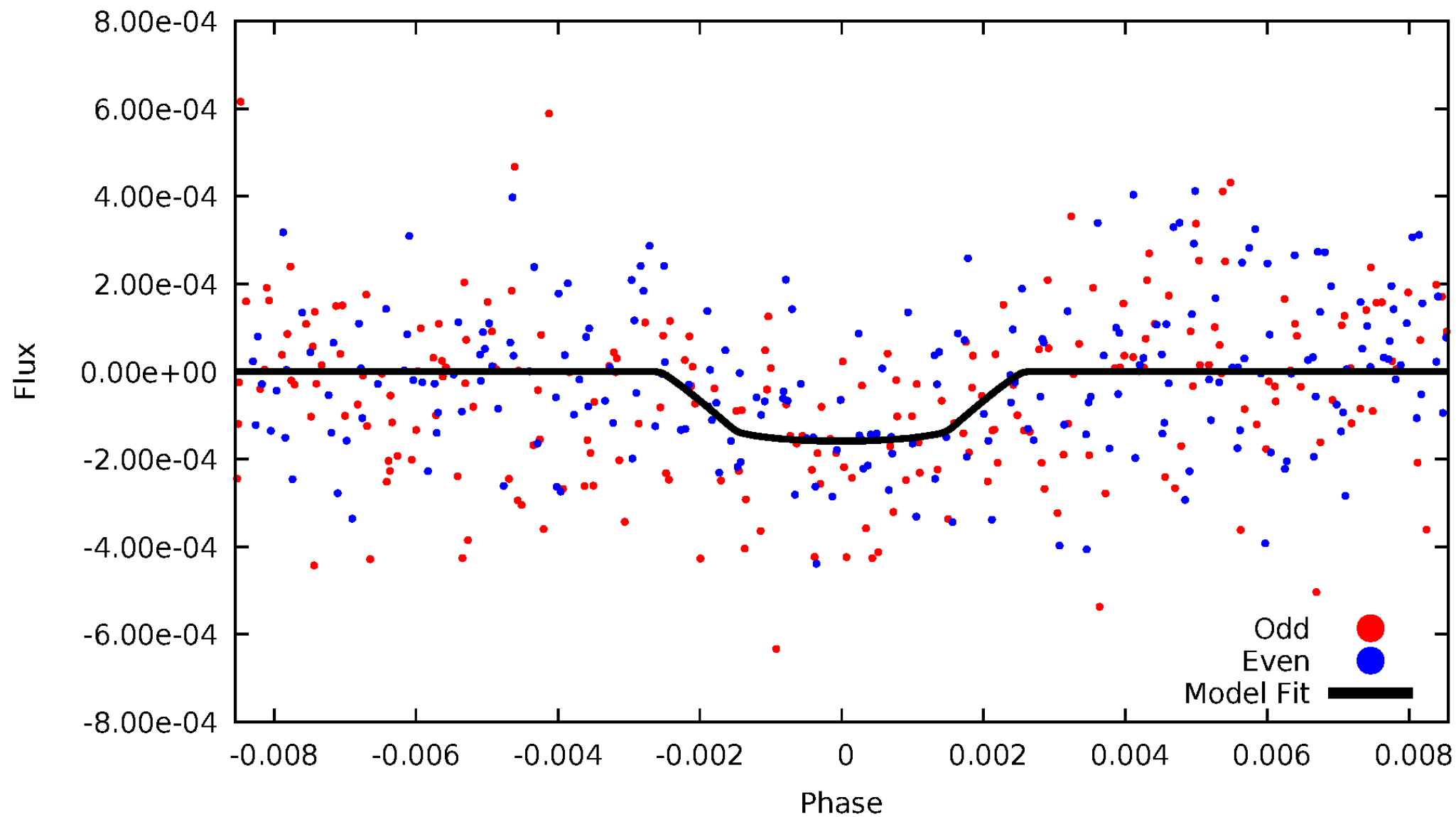


TCE 004588073-05



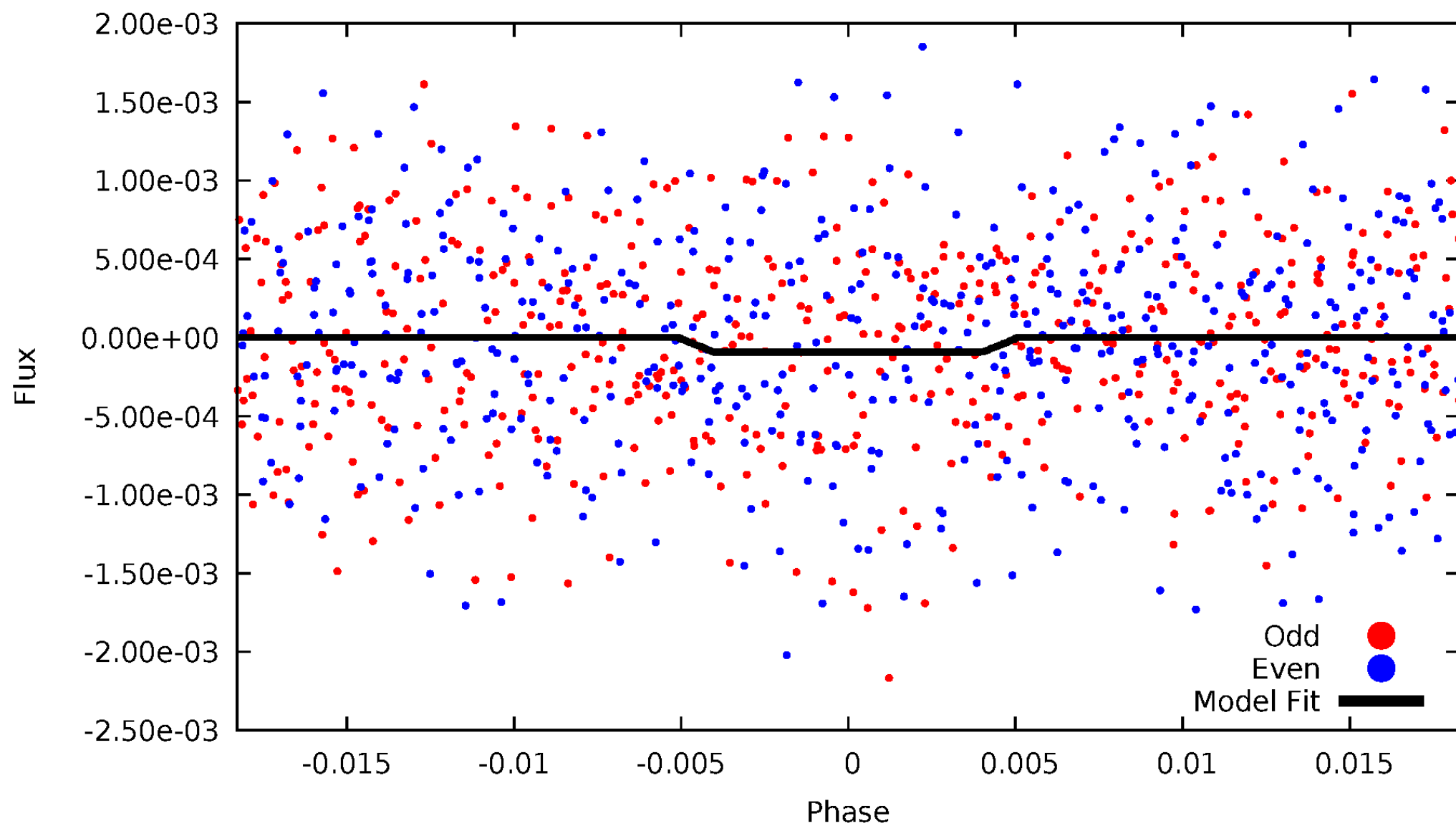
DV Odd/Even

TCE 004588073-05



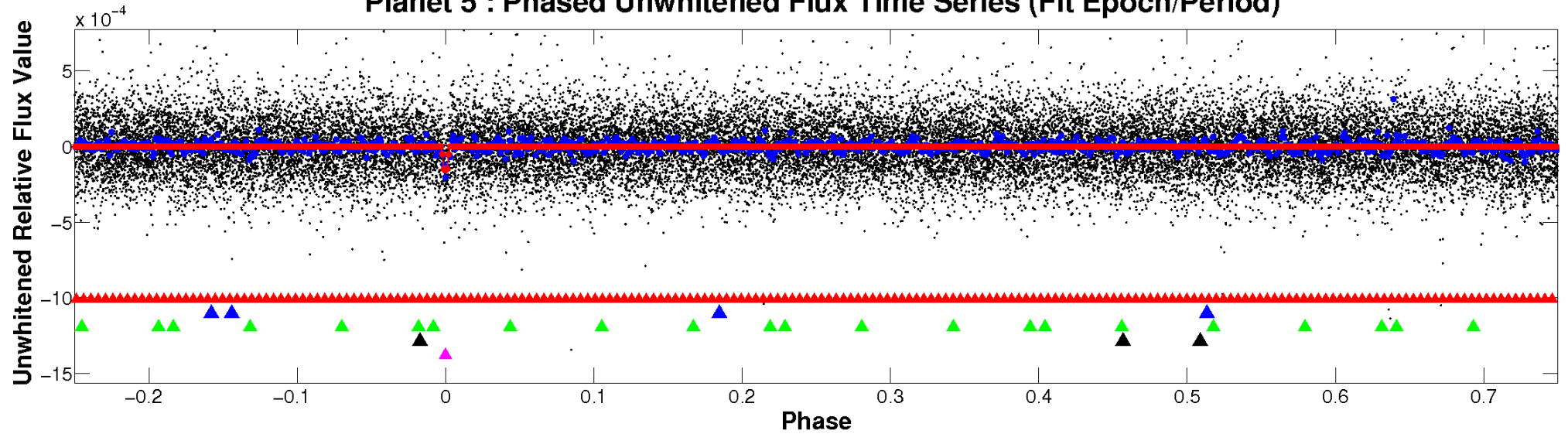
ALT Odd/Even

TCE 004588073-05

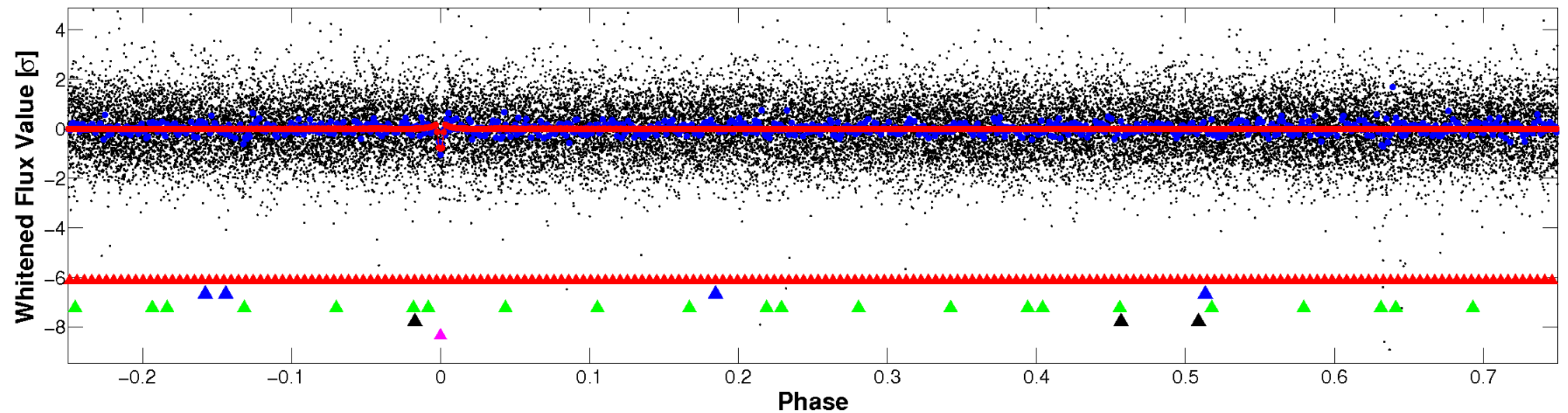


Non-Whitened Vs. Whitened Light Curve

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

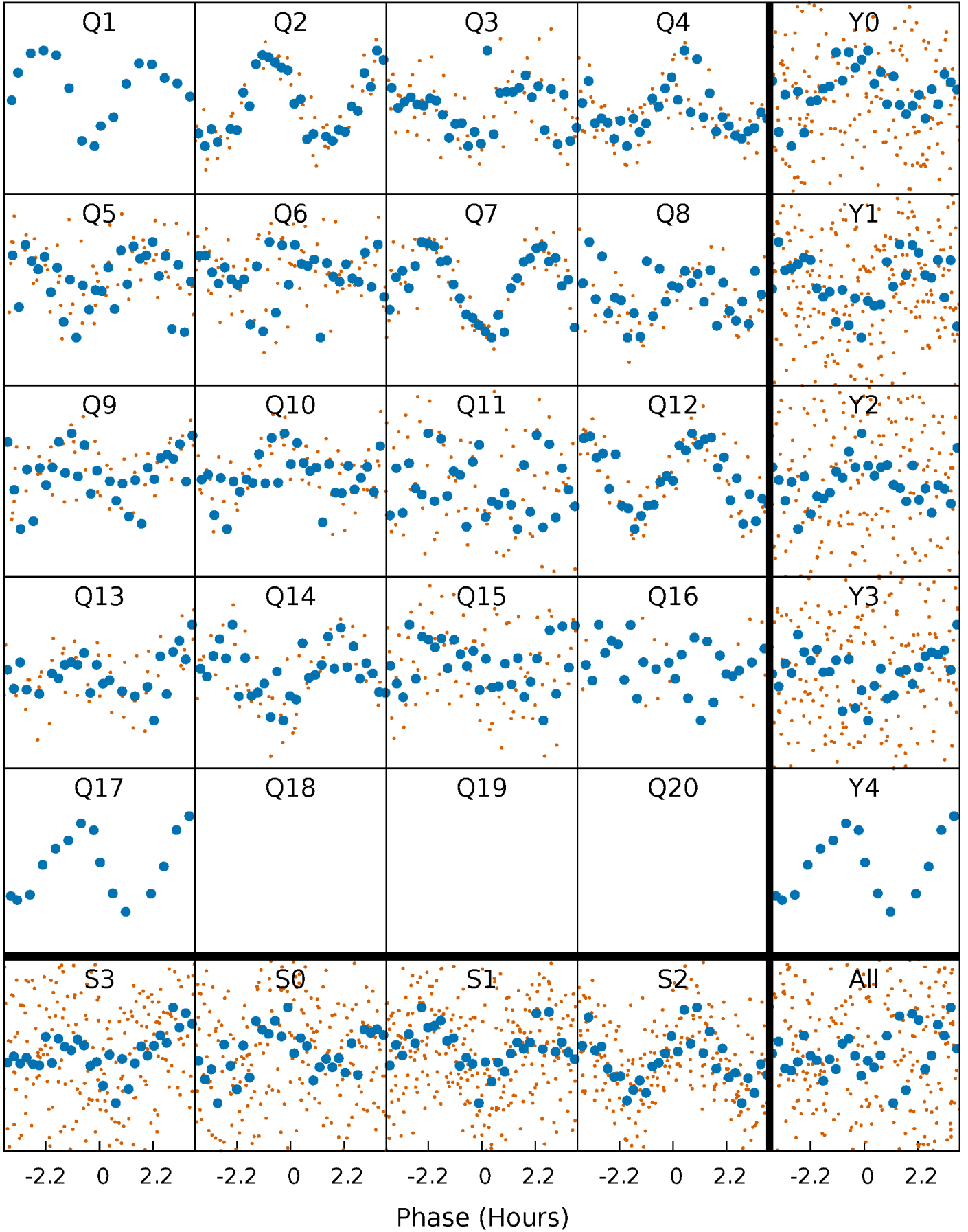


Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)



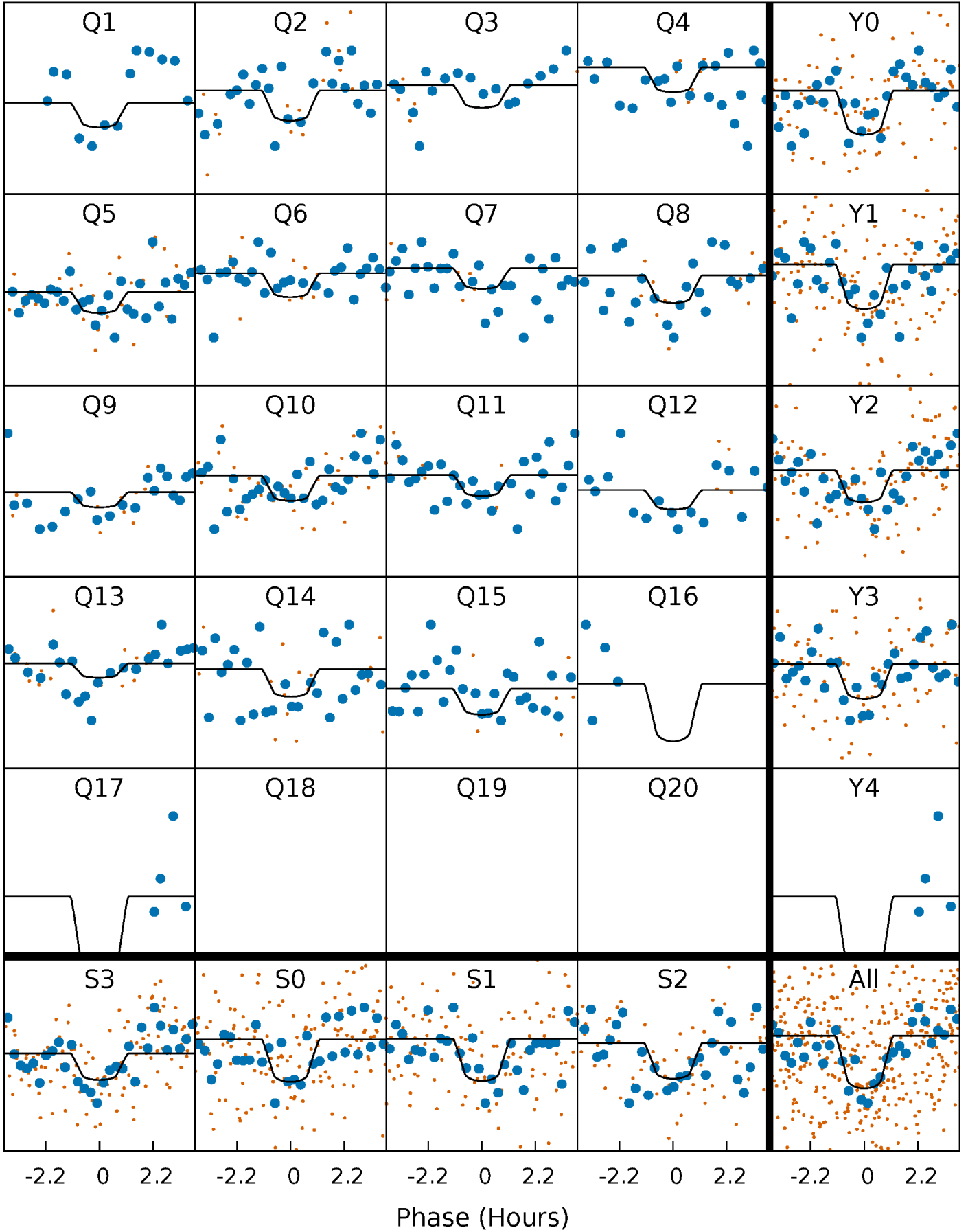
PDC Quarter-Phased Transit Curves

TCE 004588073-05 P= 19.149293 Days $T_0=146.585028$ (BKJD)



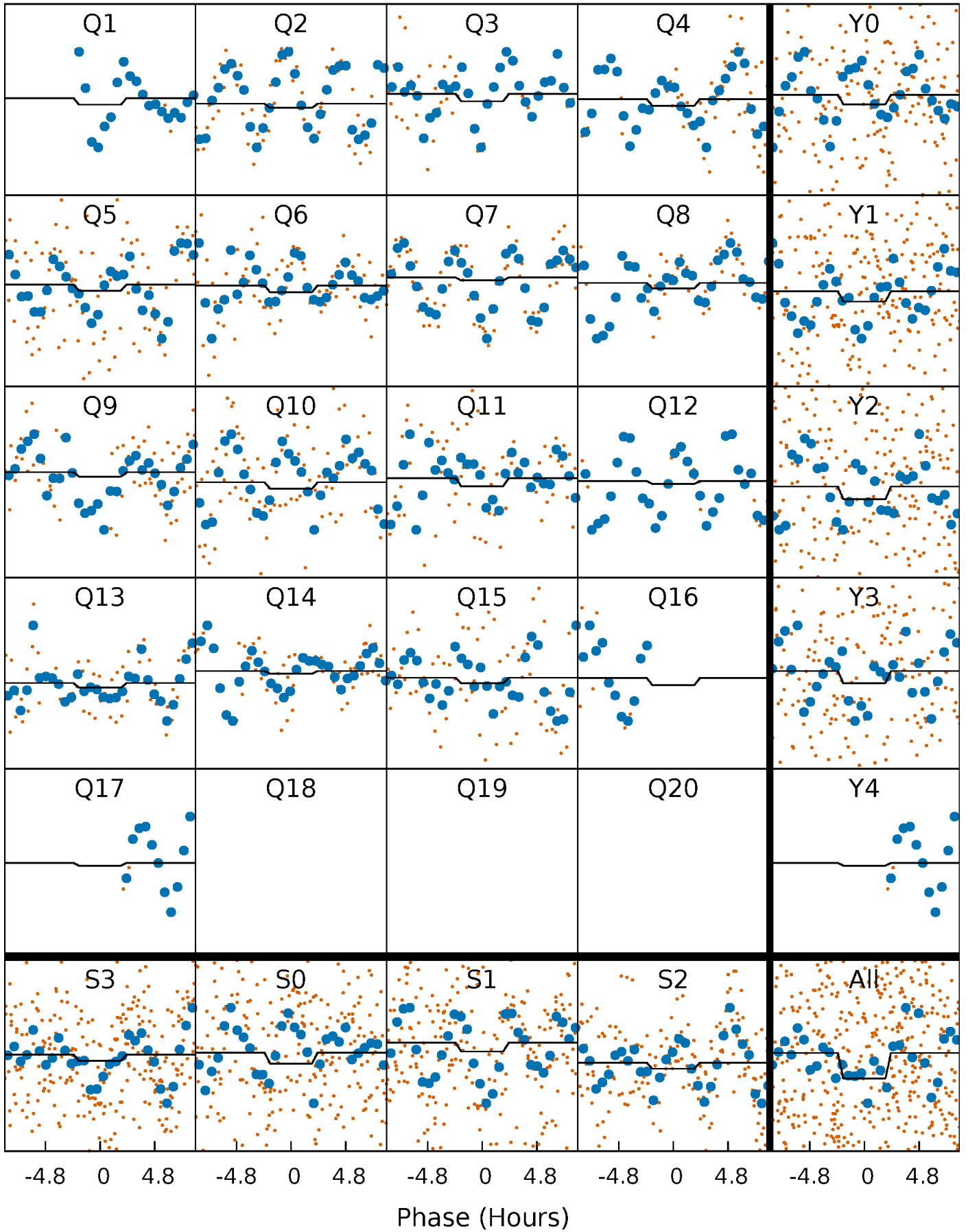
DV Quarter-Phased Transit Curves

TCE 004588073-05 P= 19.149293 Days $T_0=146.585028$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

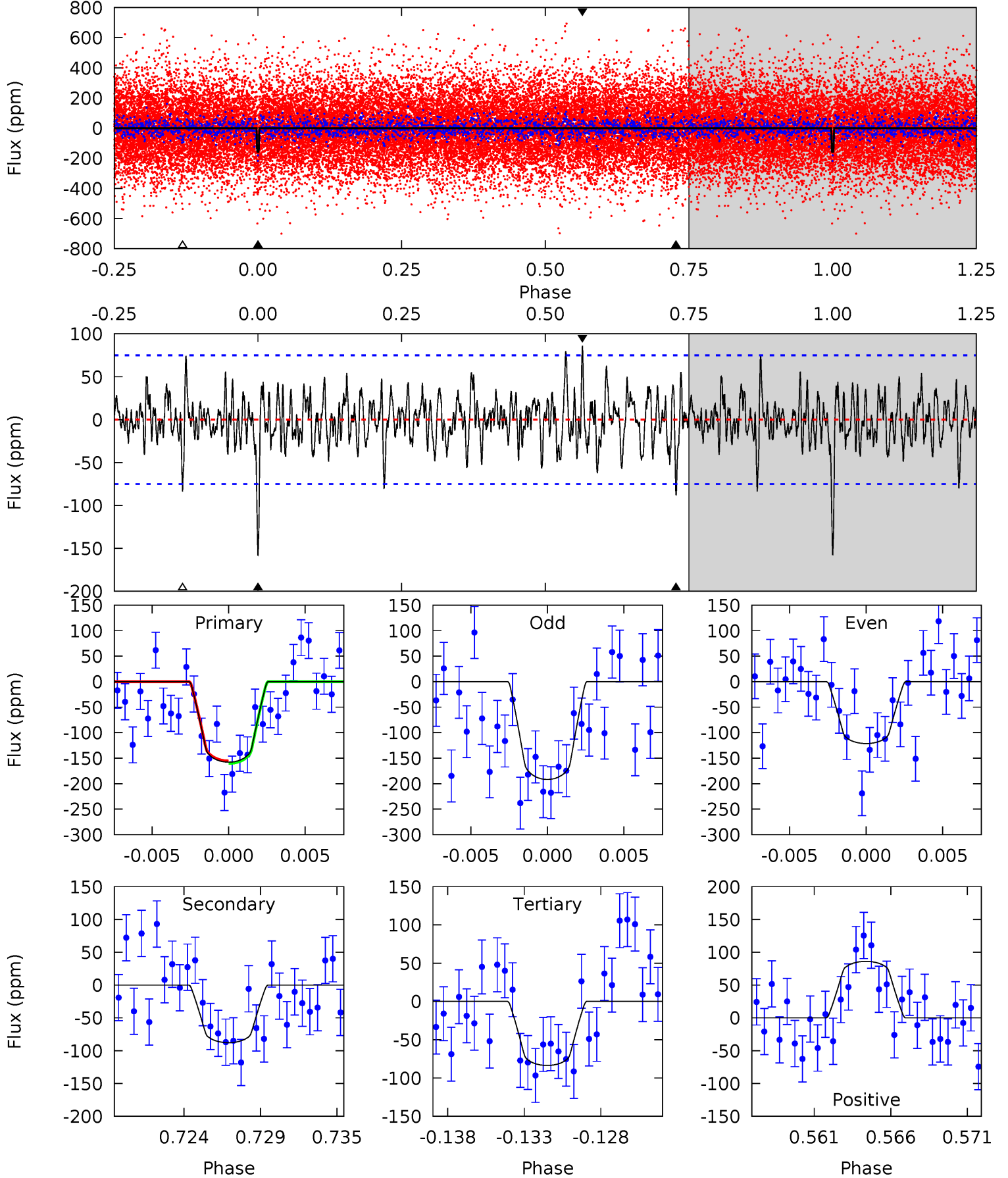
TCE 004588073-05 P= 19.149414 Days $T_0=146.578880$ (BKJD)



DV Model-Shift Uniqueness Test

004588073-05, P = 19.149293 Days, E = 127.435735 Days

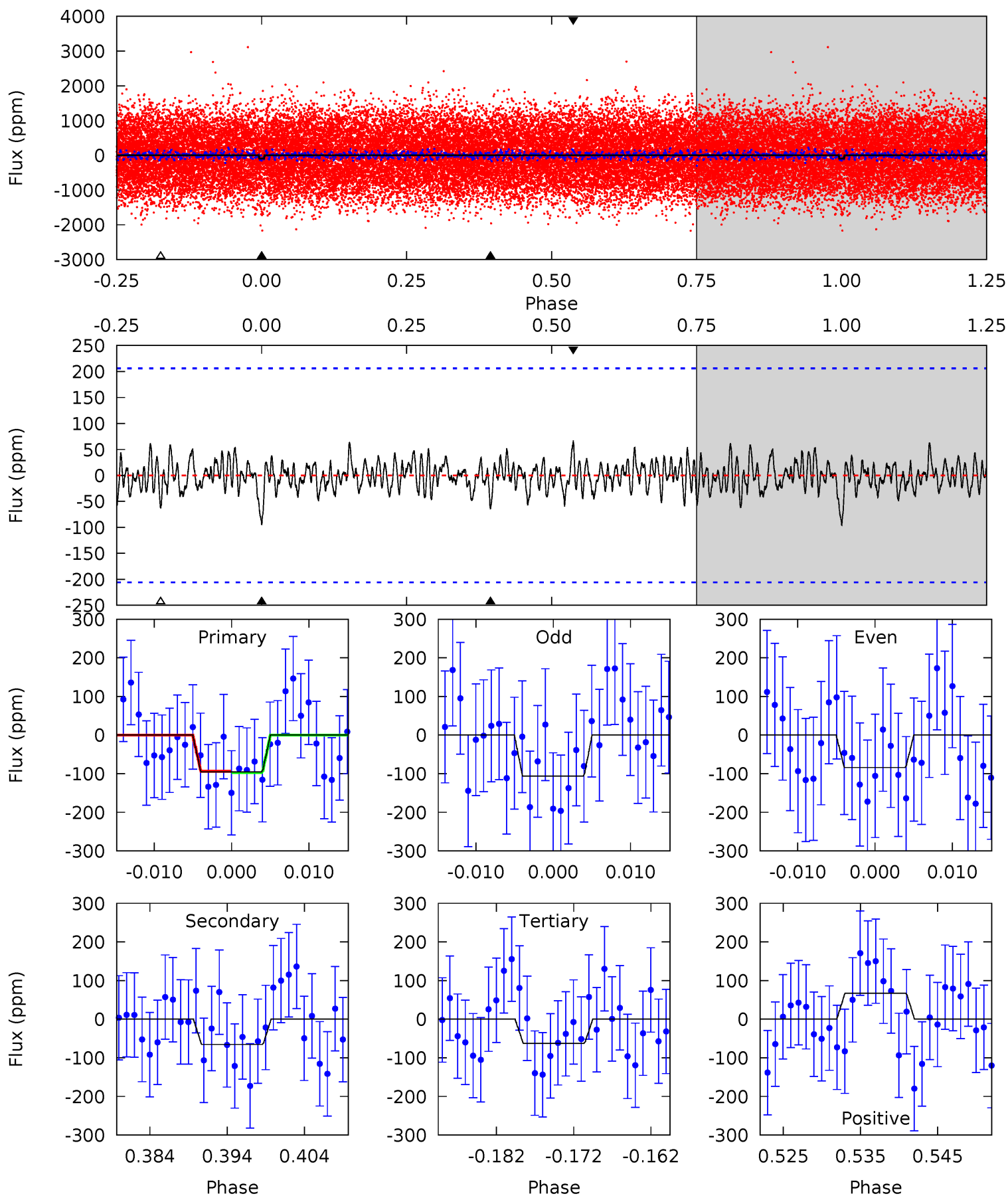
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.9	6.04	5.75	5.92	5.15	2.80	1.60	5.10	4.93	0.29	0.12	2.43	0.94	0.35	0.17



Alt Model-Shift Uniqueness Test

004588073-05, P = 19.149414 Days, E = 127.429466 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
2.33	1.60	1.52	1.64	5.02	2.57	0.56	0.81	0.69	0.07	-0.04	0.27	2.02	0.41	0.04



Stellar Parameters For KIC 004588073

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	7372^{+230}_{-307}	$3.865^{+0.352}_{-0.117}$	$-0.320^{+0.250}_{-0.350}$	$2.487^{+0.525}_{-0.974}$	$1.650^{+0.170}_{-0.396}$	$0.151^{+0.426}_{-0.053}$
	+3%/-4%	+9%/-3%	+78%/-109%	+21%/-39%	+10%/-24%	+282%/-35%
Source	KIC0	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 004588073-05 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	-88 ± 15	$3.69^{+3.19}_{-2.22}$	1718^{+132}_{-171}	5822^{+4133}_{-1357}	97^{+486}_{-69}
Alt.	-65 ± 41	$3.25^{+3.00}_{-2.15}$	1718^{+130}_{-187}	5524^{+4997}_{-1557}	82^{+658}_{-68}

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 $A_{obs} \gg 1.0$

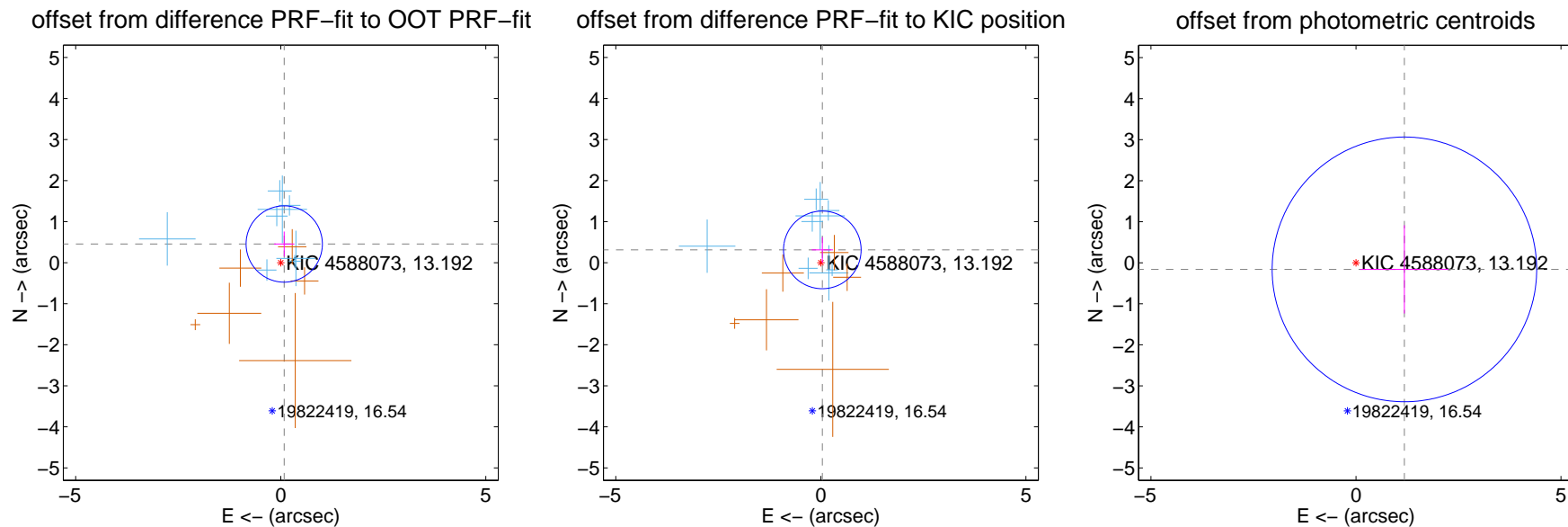
DV Centroid Data

Supplemental centroid analysis for 004588073-05. Kepler magnitude: 13.19. Transit SNR 7.54

There are 8 quarters with good PRF difference image offsets

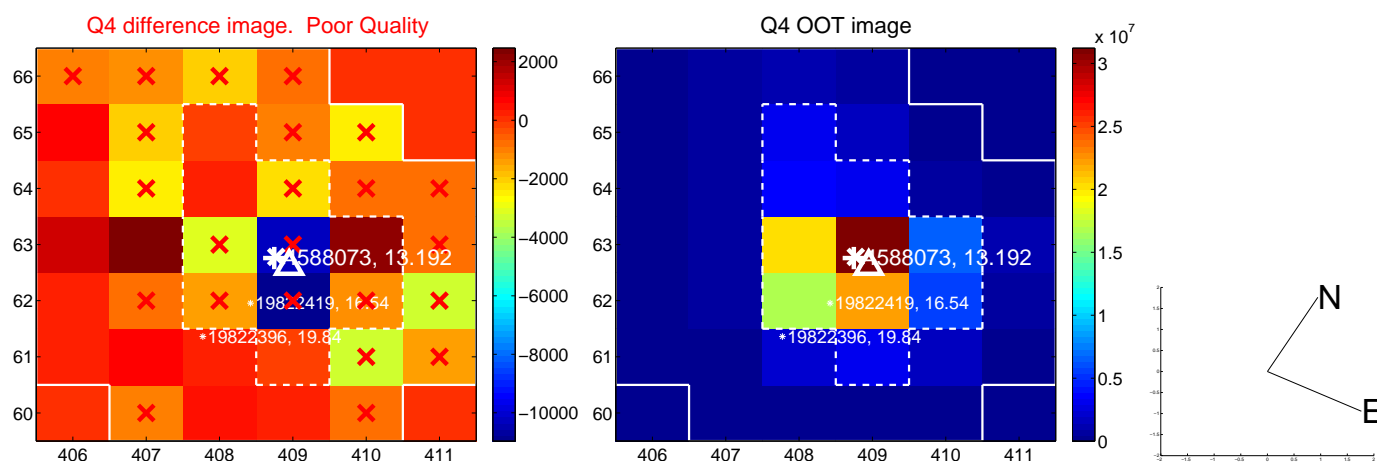
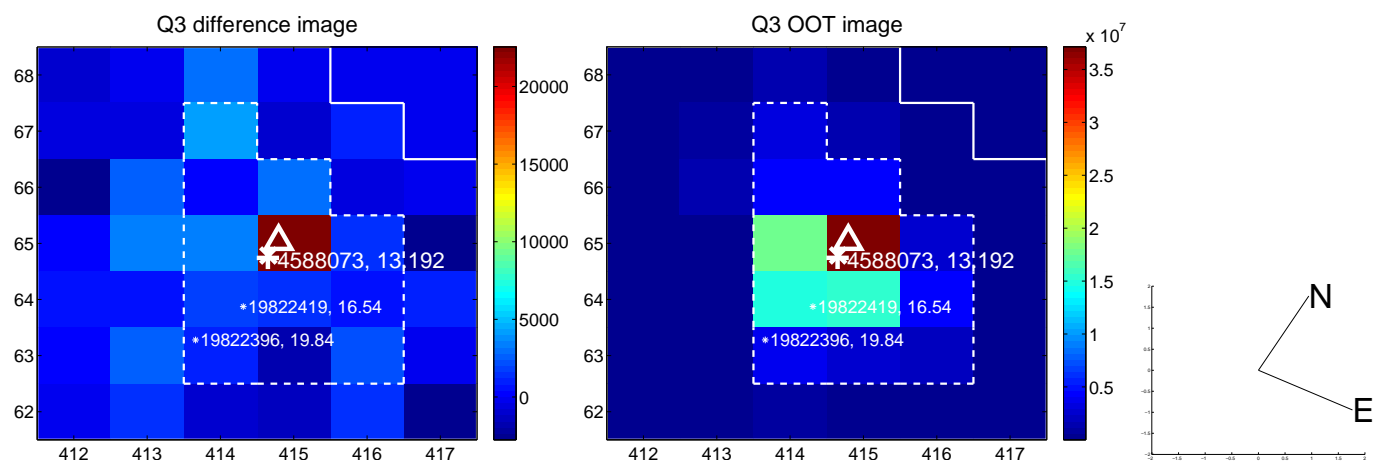
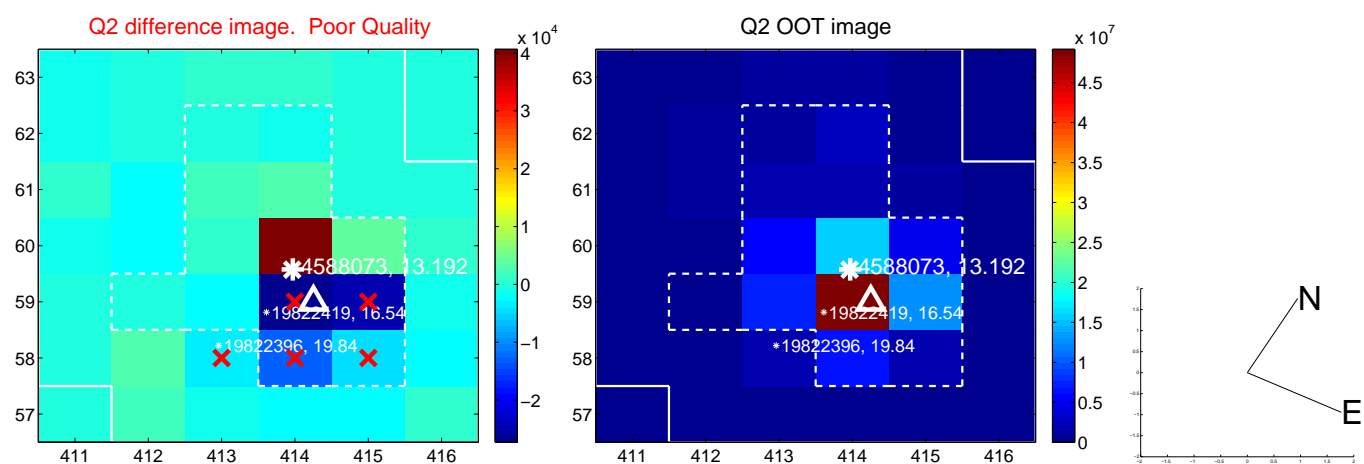
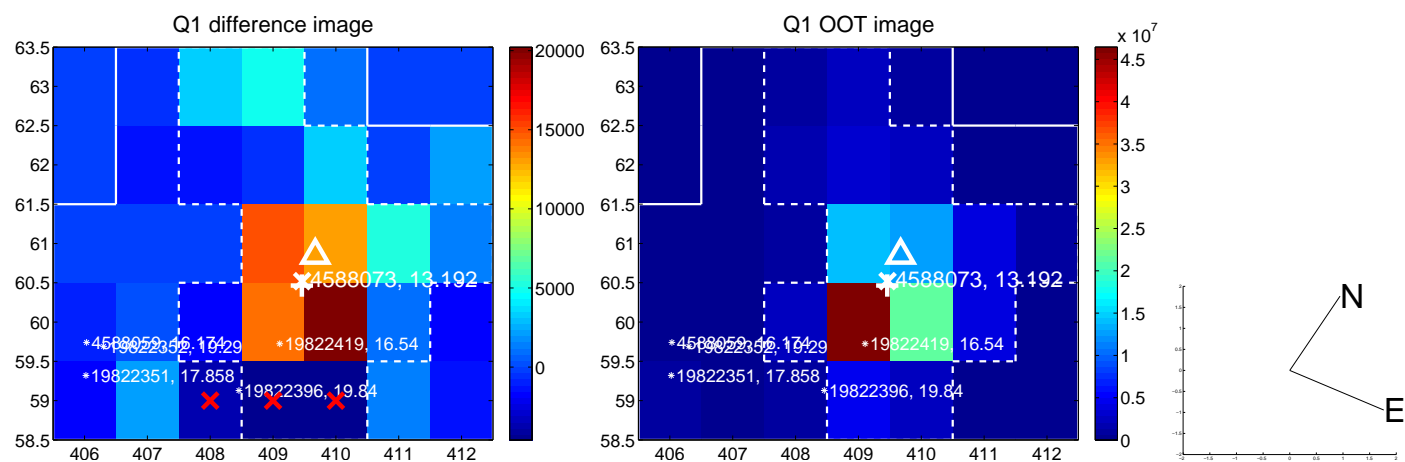
The direct PRF centroid is offset from the target star catalog position by about 0.18 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.463 ± 0.310	1.49	-0.085 ± 0.248	0.455 ± 0.305
PRF-fit source offset from KIC position	0.314 ± 0.315	1.00	-0.035 ± 0.259	0.312 ± 0.311
photometric centroid source offset	1.19 ± 1.08	1.11	-1.18 ± 1.08	-0.16 ± 1.08

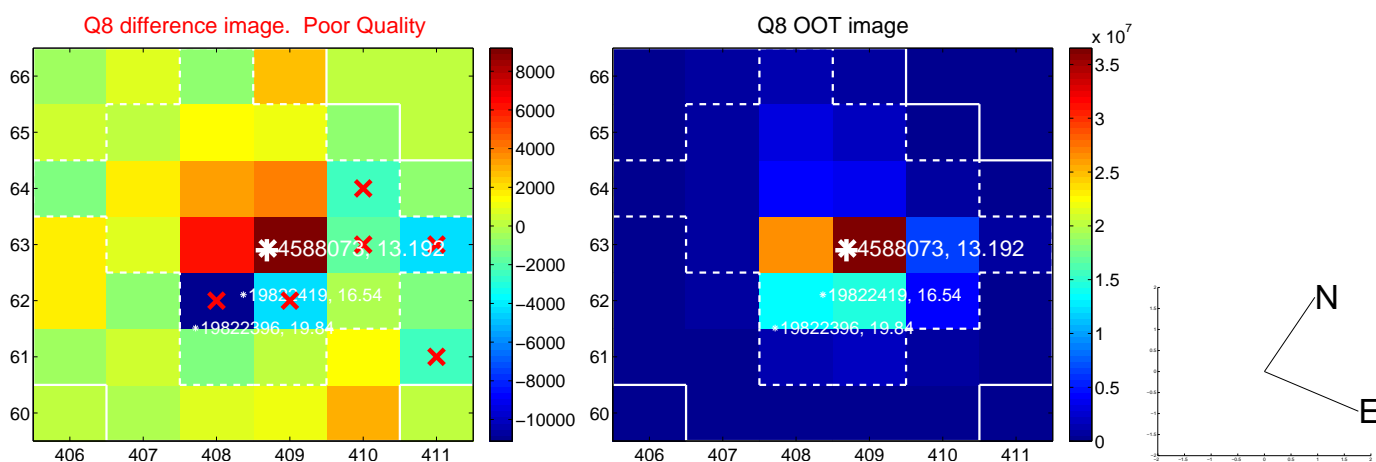
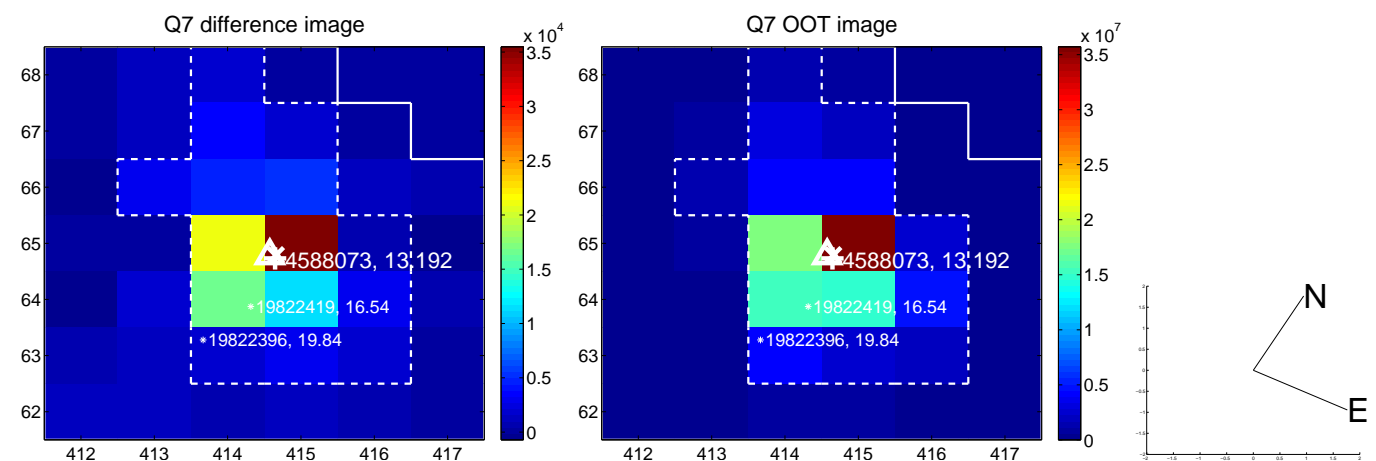
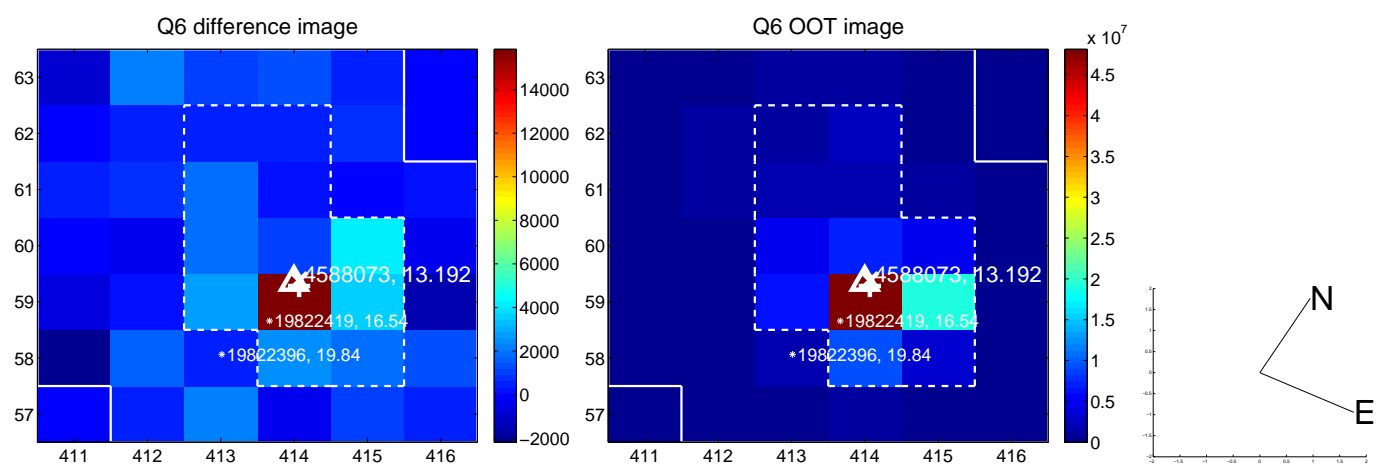
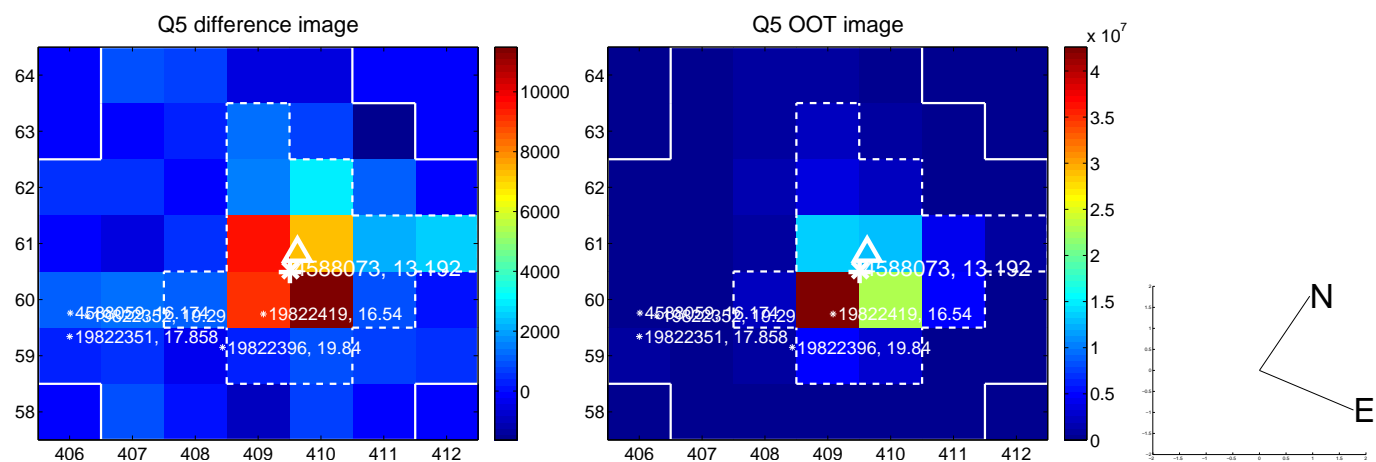


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

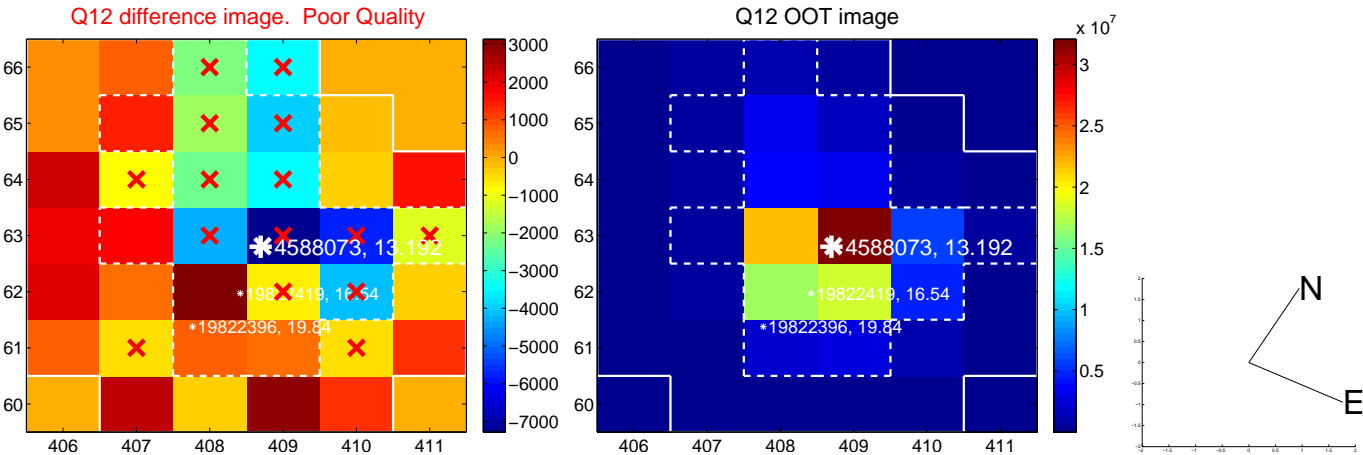
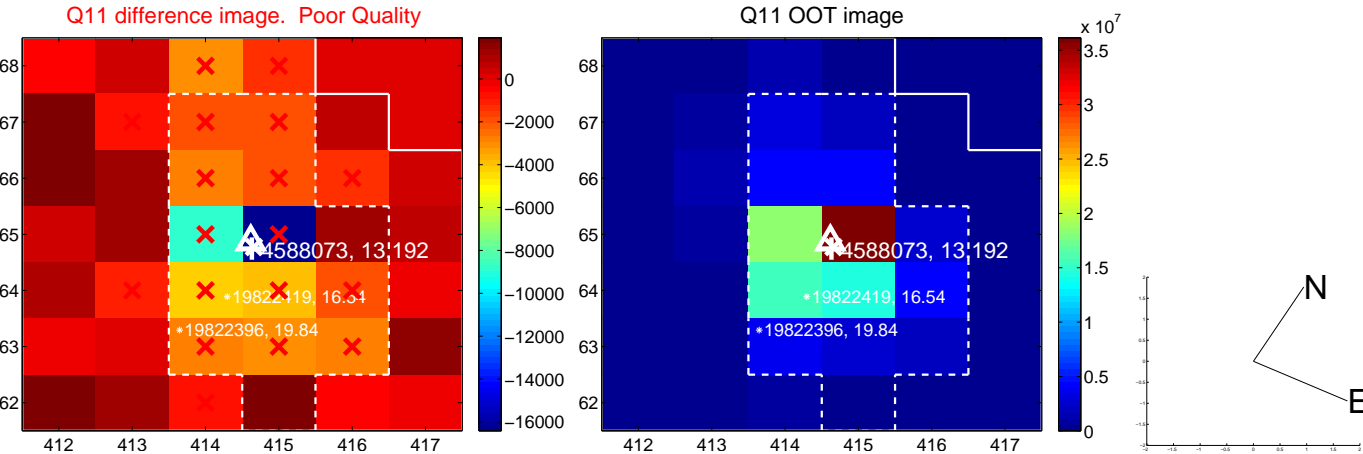
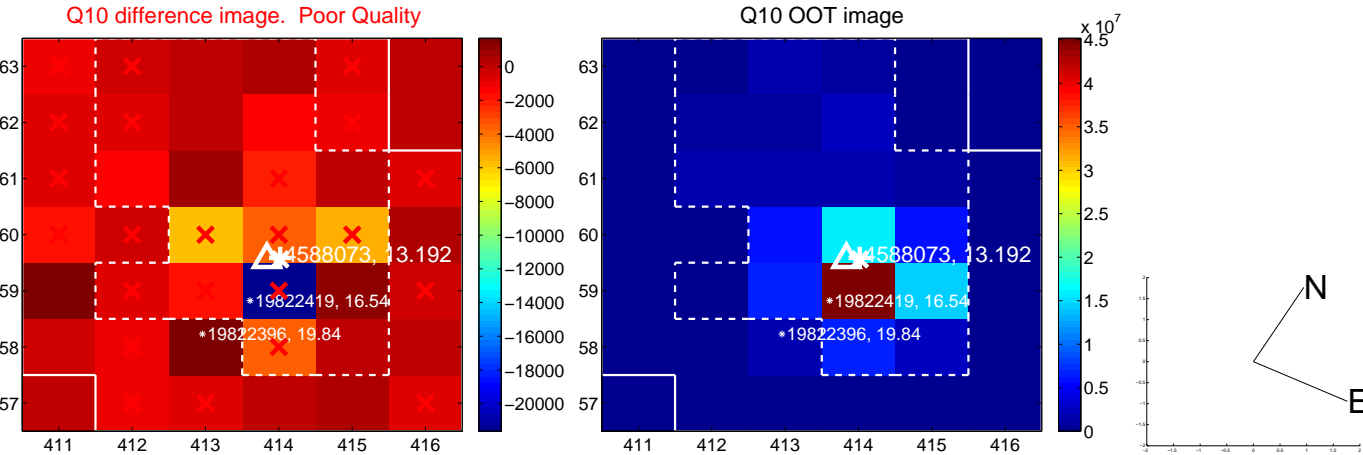
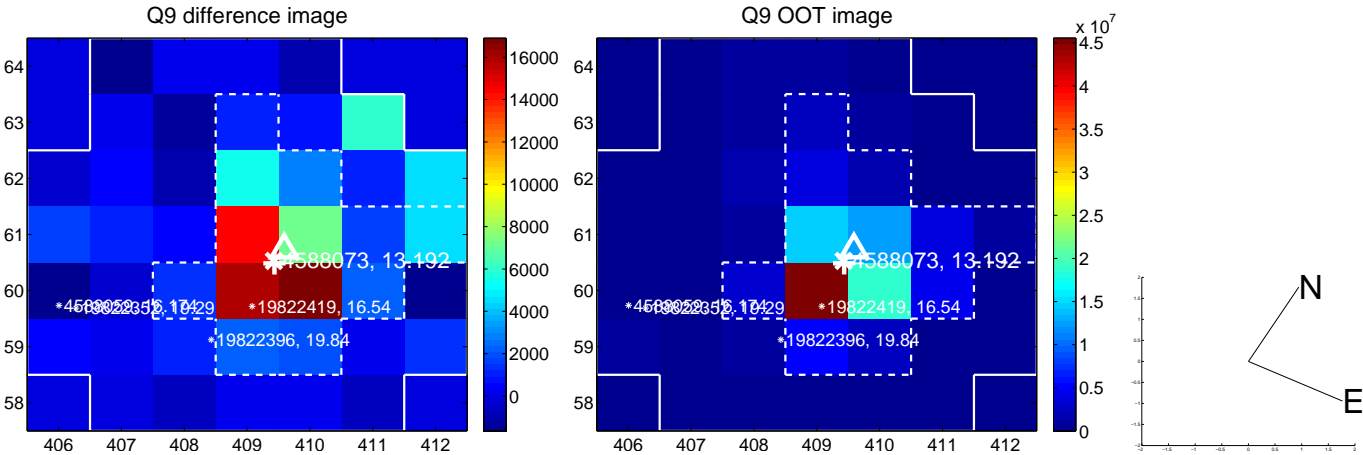
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



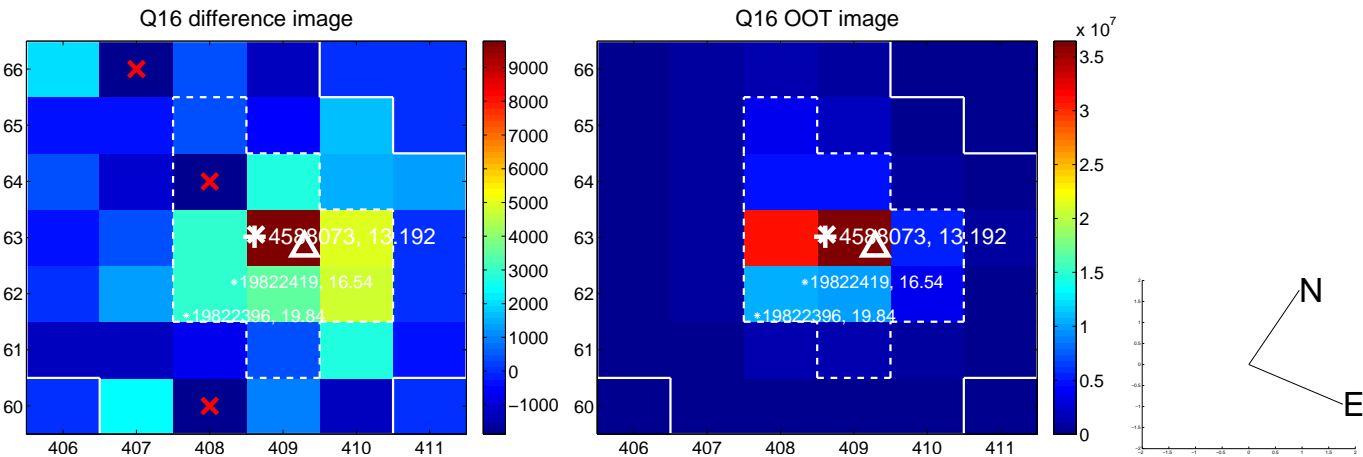
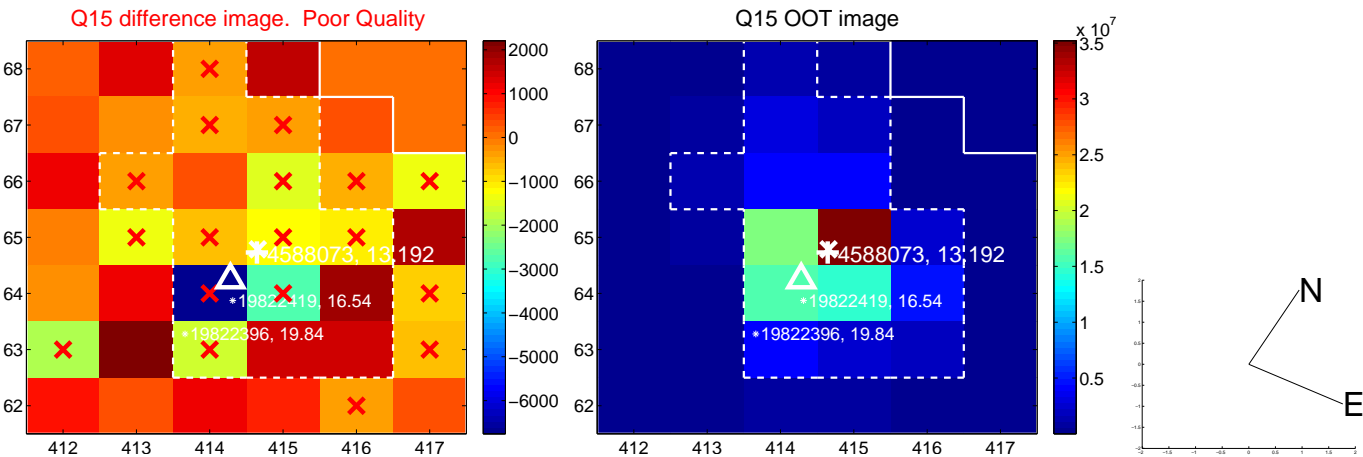
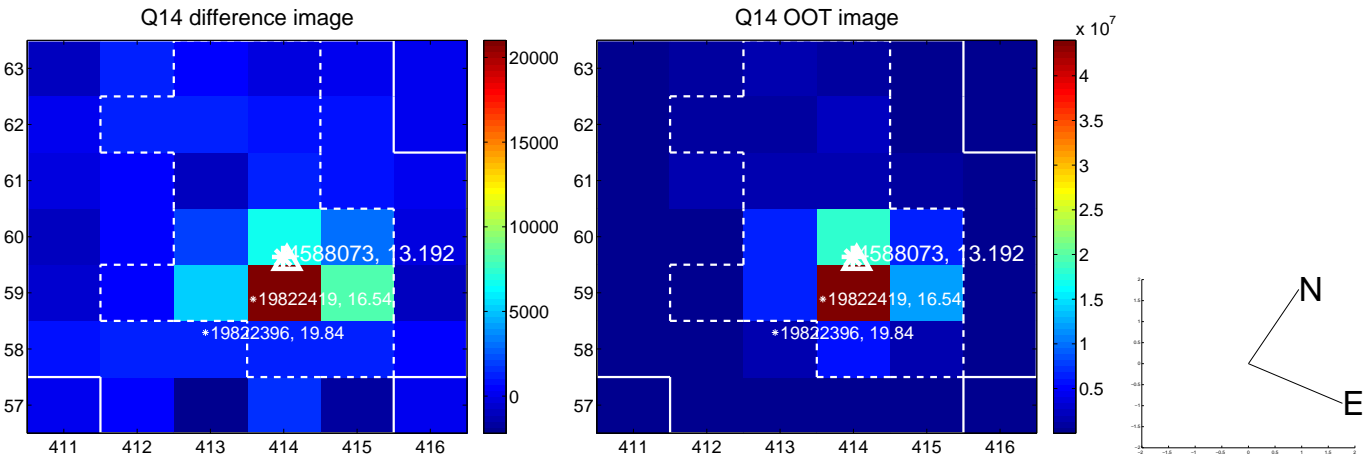
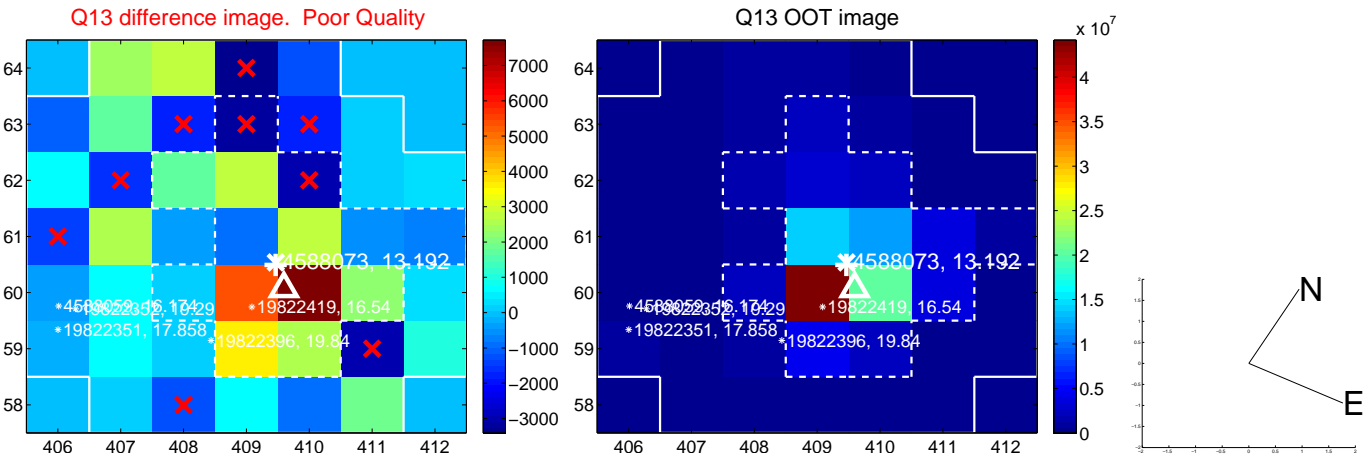
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



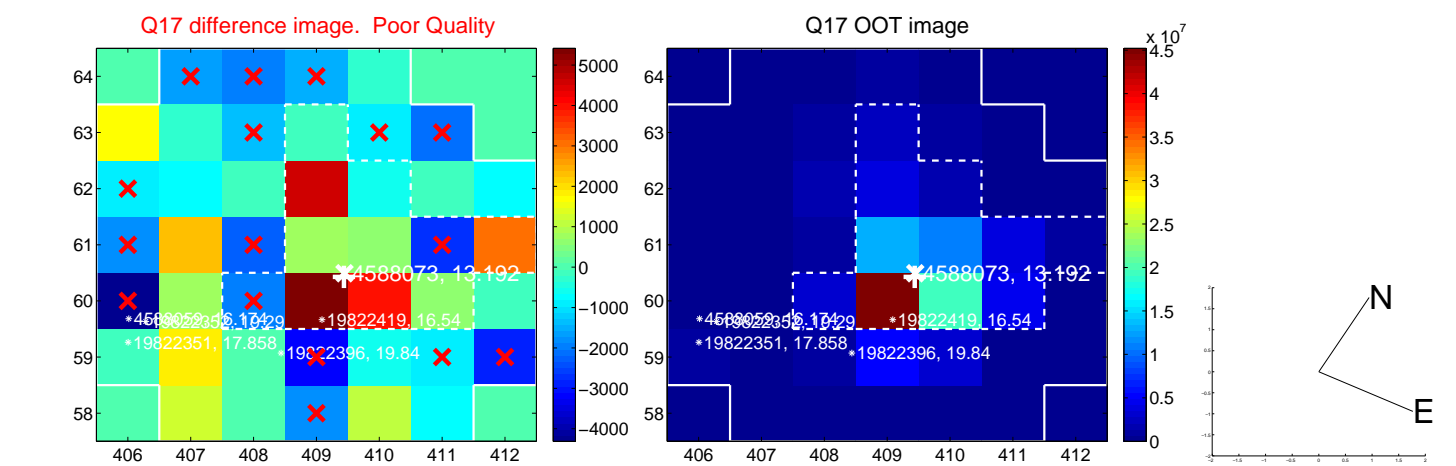
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



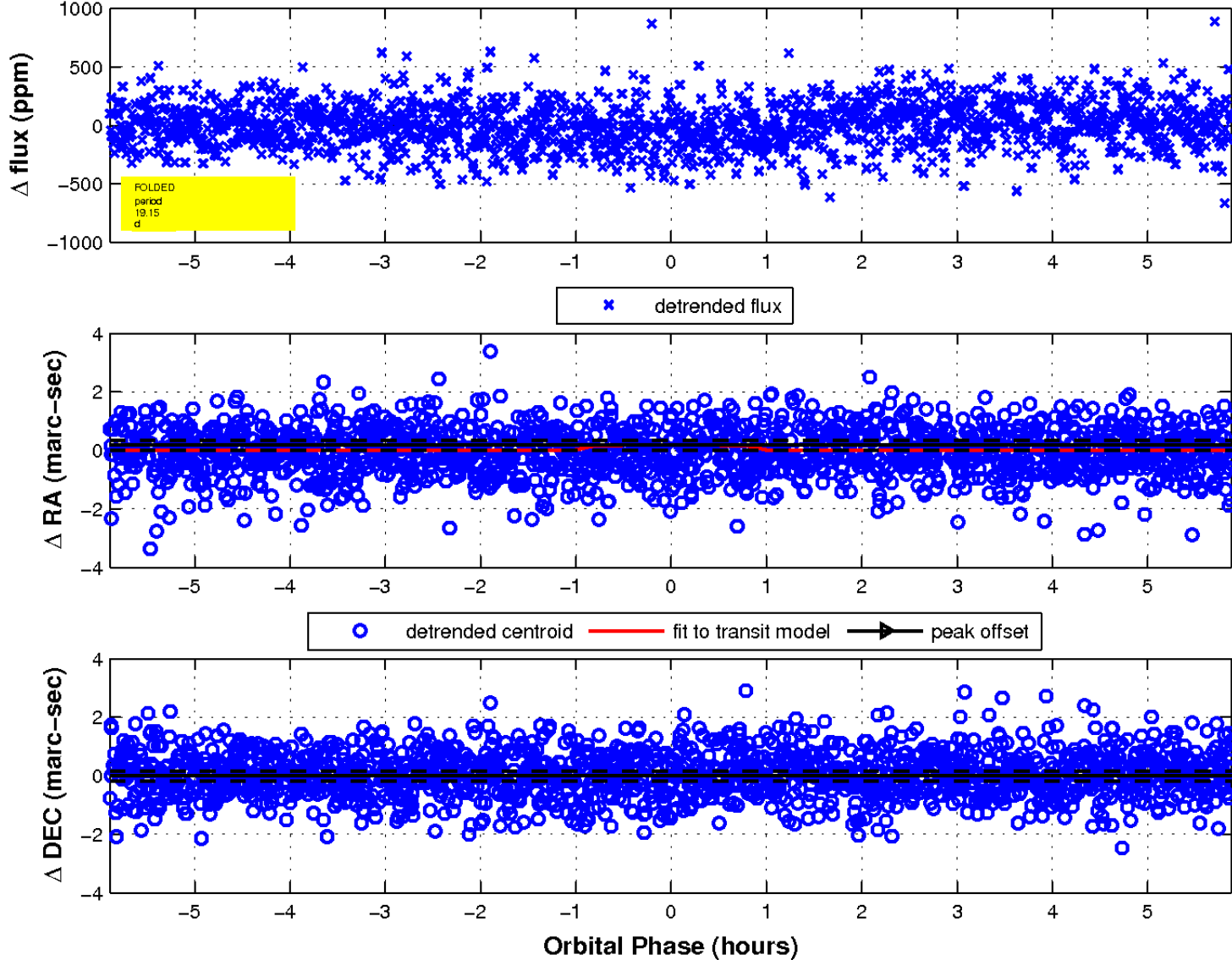
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



fluxWeightedCentroids, Planet 5 of 5



UKIRT Image

Declination

