

KIC 004381016

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})
004381016-01	OBS	No	0.584472	132.024394	59.0	1.965	9.1	10.7	3.21	7226	2.90	89790.00
004381016-02	OBS	No	153.212522	204.793506	586.0	6.509	7.4	7.4	3.21	7226	9.32	53.52

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004381016-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
004381016-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT

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

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

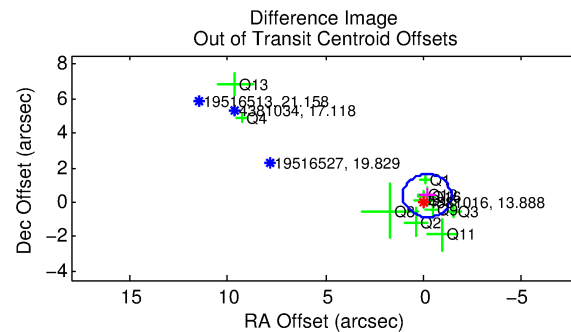
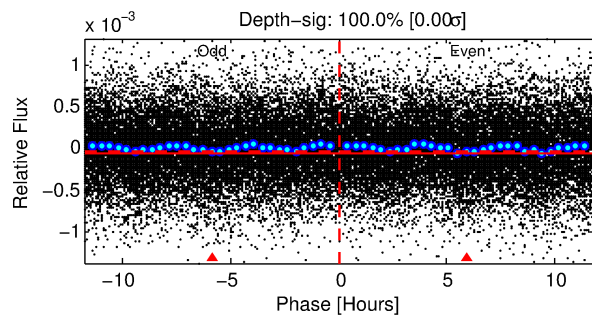
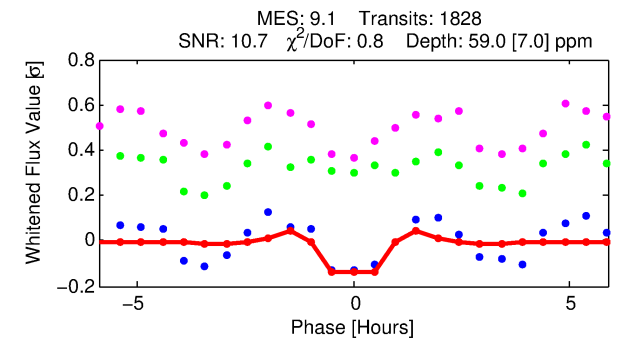
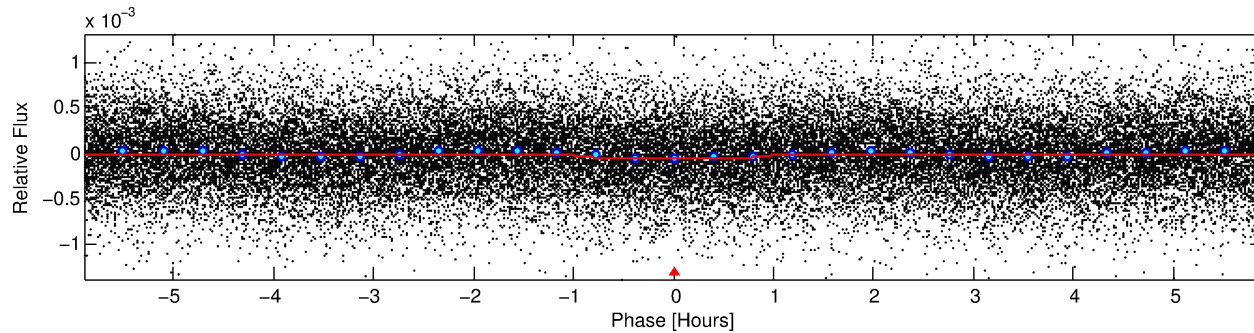
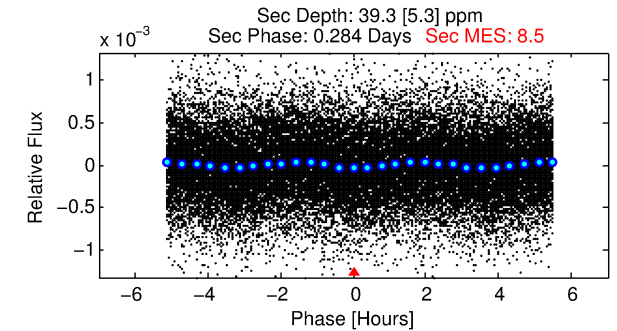
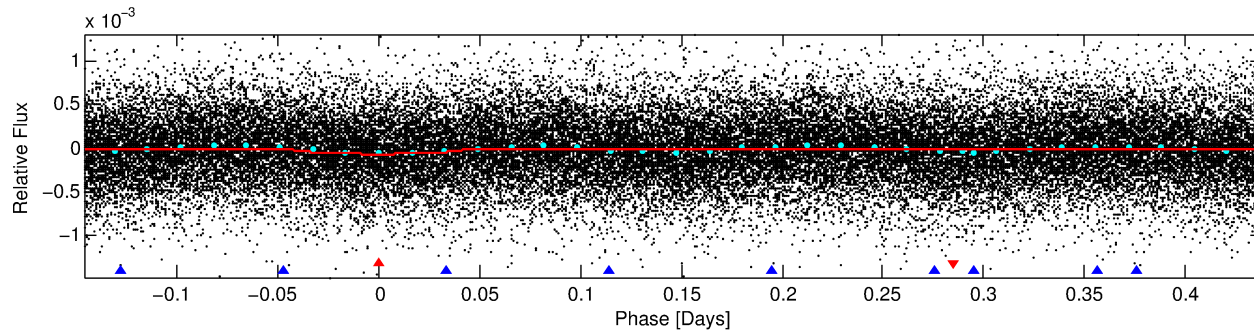
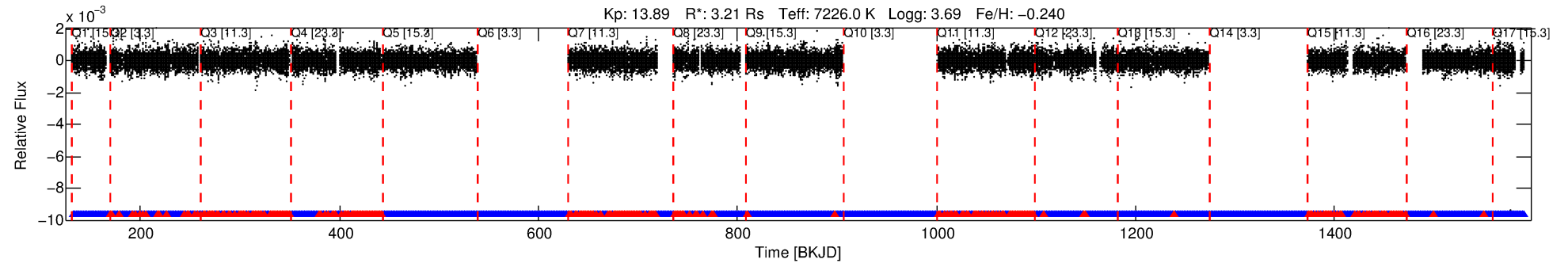
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 004381016-01

No Significant Match Found

DV One-Page Summary

KIC: 4381016 Candidate: 1 of 2 Period: 0.584 d



DV Fit Results:

Period = 0.58447 [0.00001] d
Epoch = 132.0244 [0.0016] BKJD
Rp/R* = 0.0083 [0.0024]
a/R* = 1.40 [1.11]
b = 0.90 [0.35]
Seff = 89790.00 [76905.06]
Teq = 4414 [945] K
Rp = 2.89 [1.77] Re
a = 0.0167 [0.0087] AU
Ag = 0.72 [0.74] [-0.37σ]
Teffp = 6293 [970] K [1.39σ]

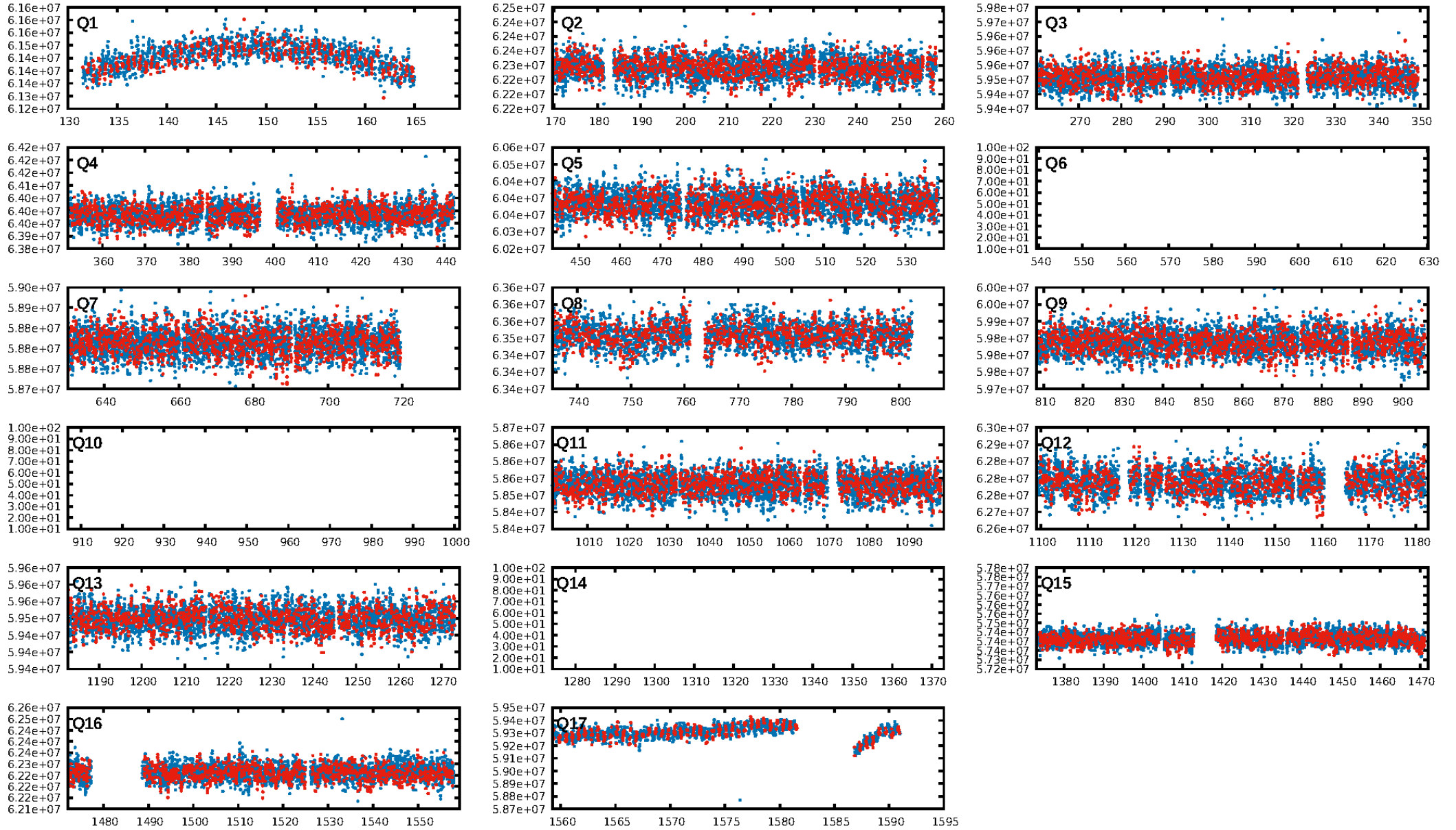
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 100.0% [538.72σ]
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: 4.22e-17
RollingBand-fgt: 0.80 [1387/1725]
GhostDiagnostic-chr: 1.456
Centroid-sig: 6.7%
Centroid-so: 1.034 arcsec [1.32σ]
OotOffset-rm: 0.421 arcsec [1.02σ]
KicOffset-rm: 0.430 arcsec [0.81σ]
OotOffset-st: 1/3/4/3 [11]
KicOffset-st: 1/3/4/3 [11]
DiffImageQuality-fgm: 0.64 [7/11]
DiffImageOverlap-fno: 1.00 [14/14]

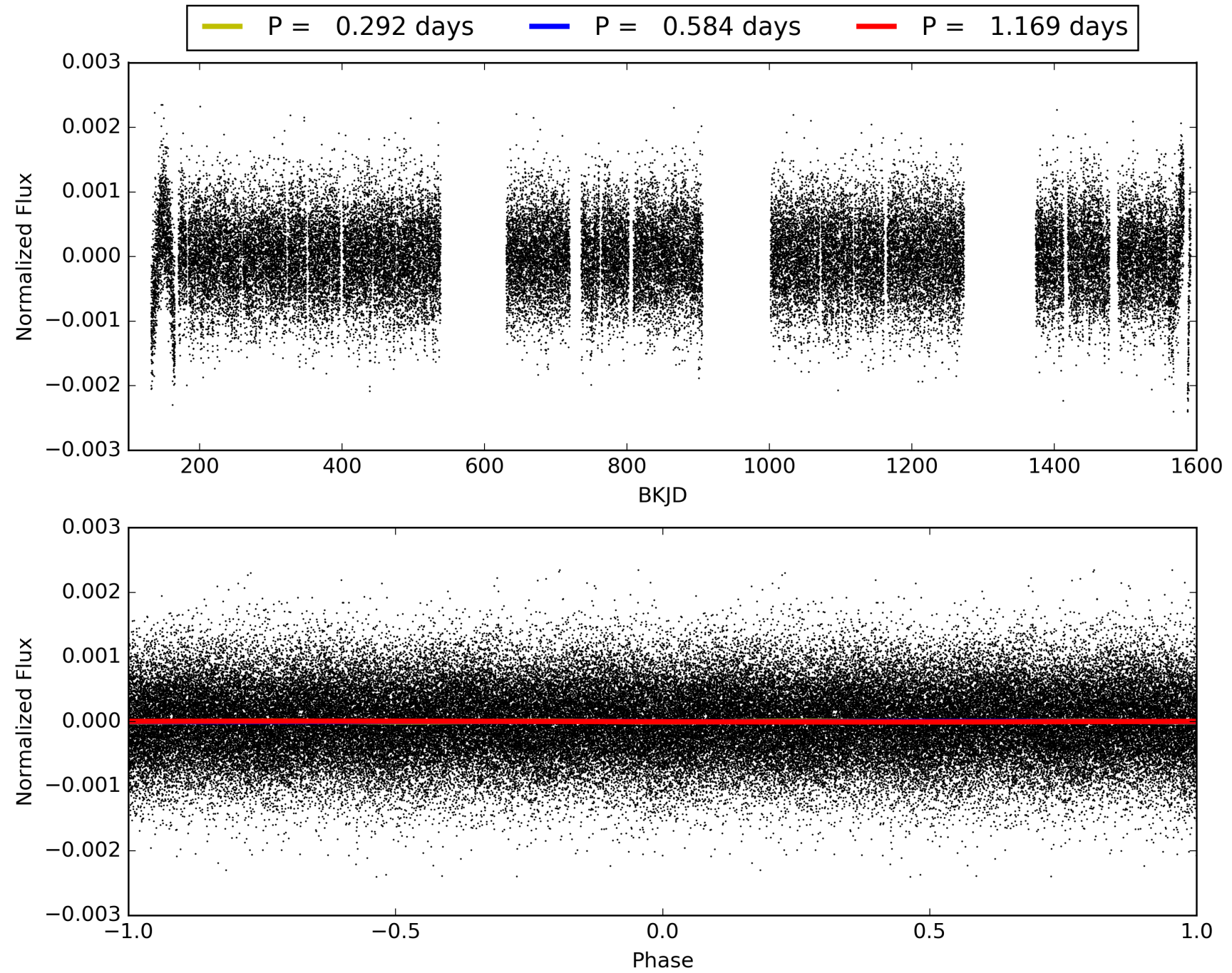
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:21:17 Z

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

TCE 004381016-01, PDC Light Curves

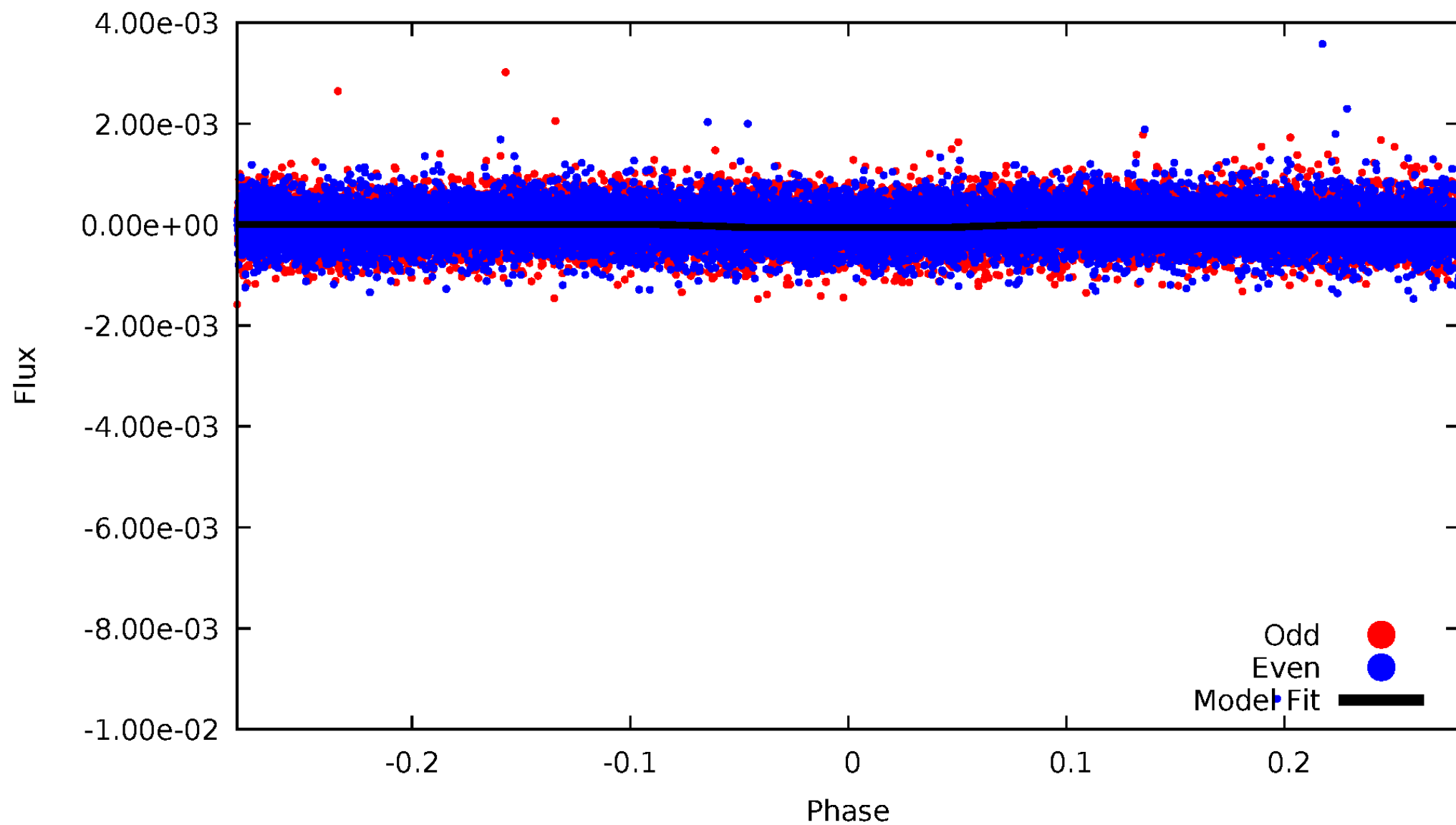


TCE 004381016-01



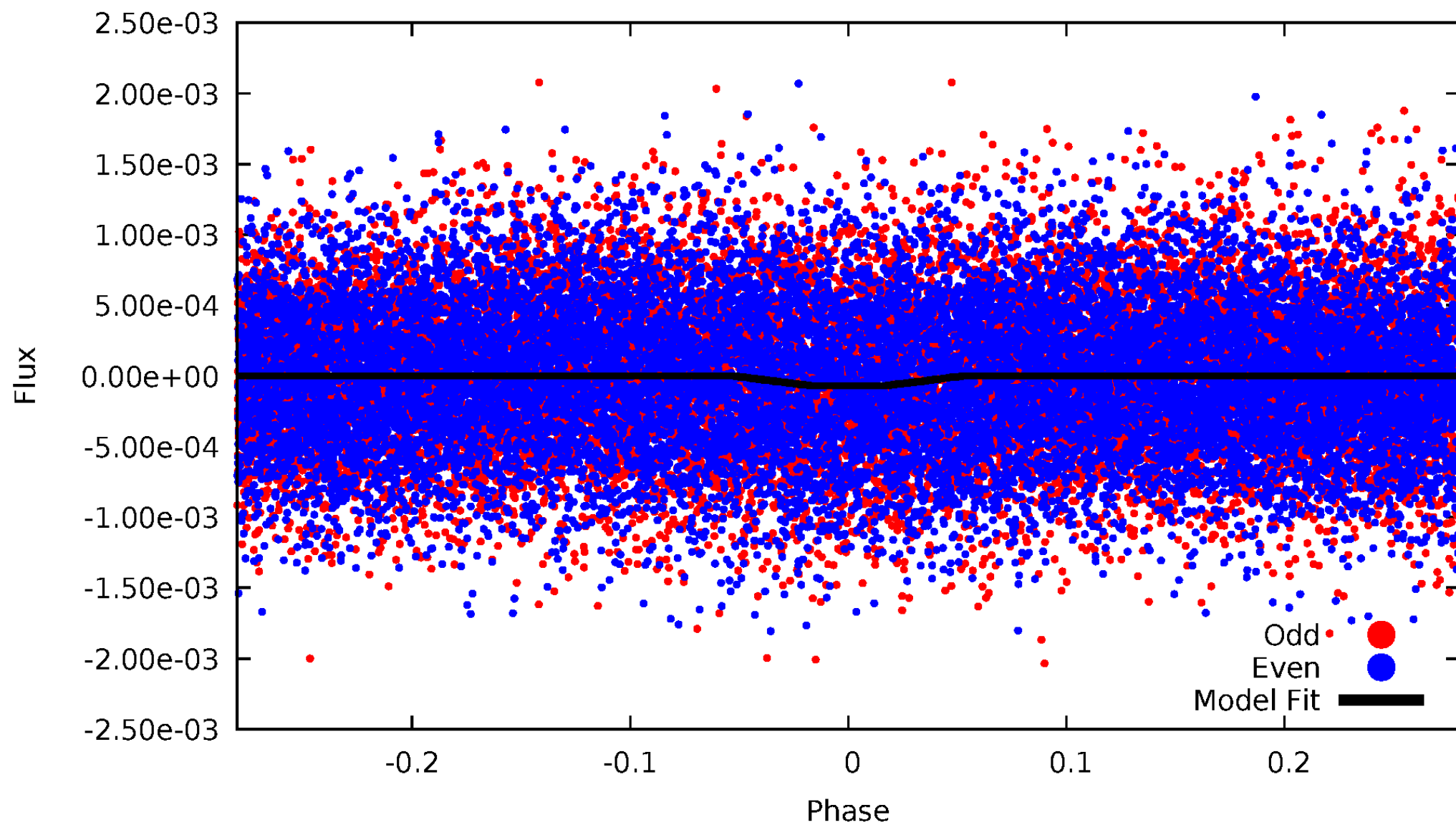
DV Odd/Even

TCE 004381016-01



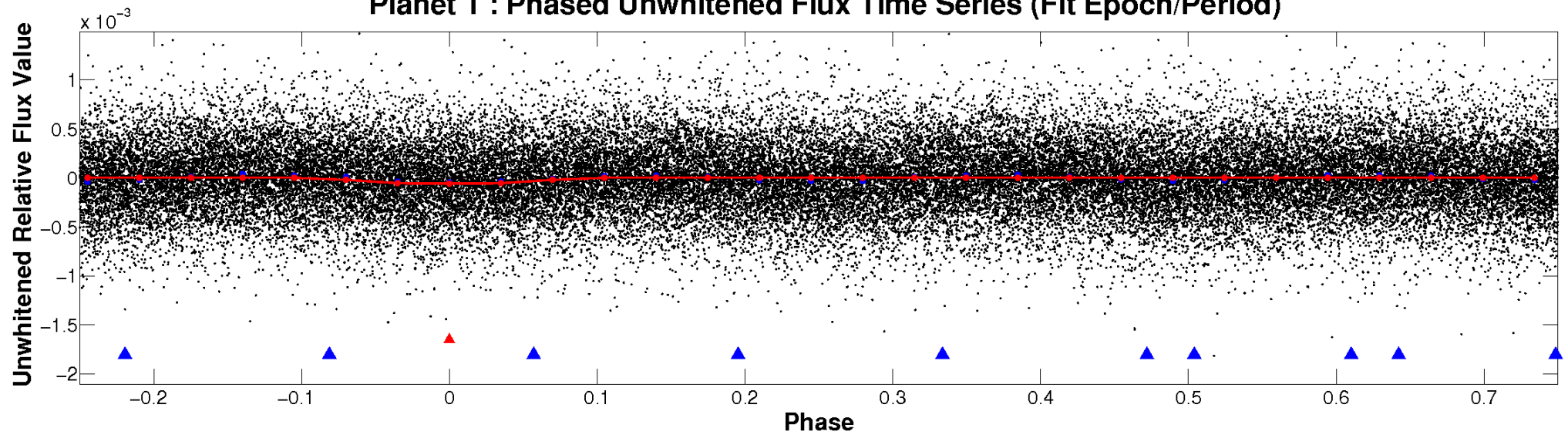
ALT Odd/Even

TCE 004381016-01

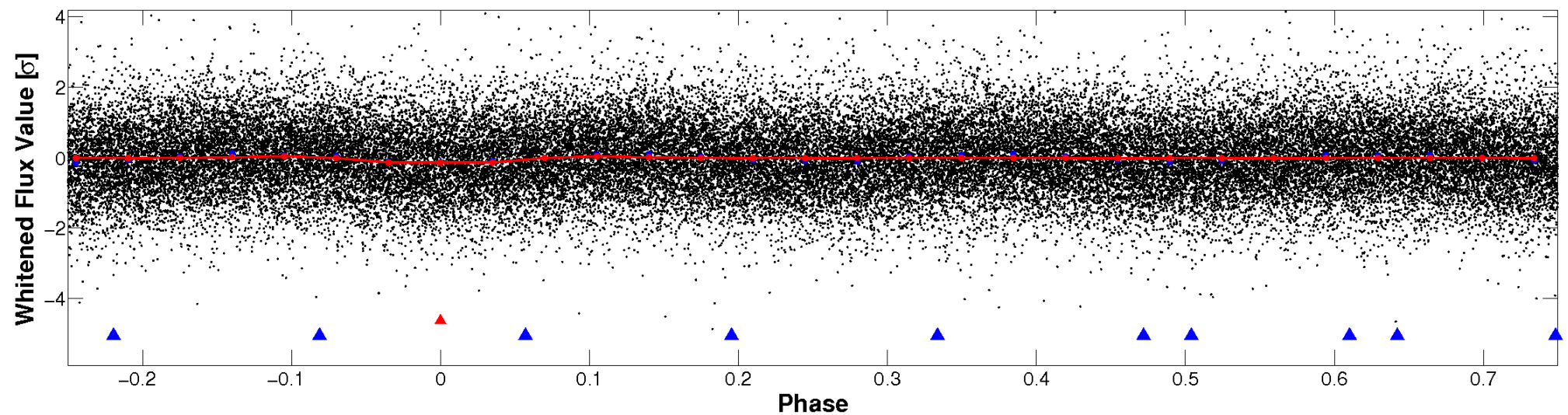


Non-Whitened Vs. Whitened Light Curve

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

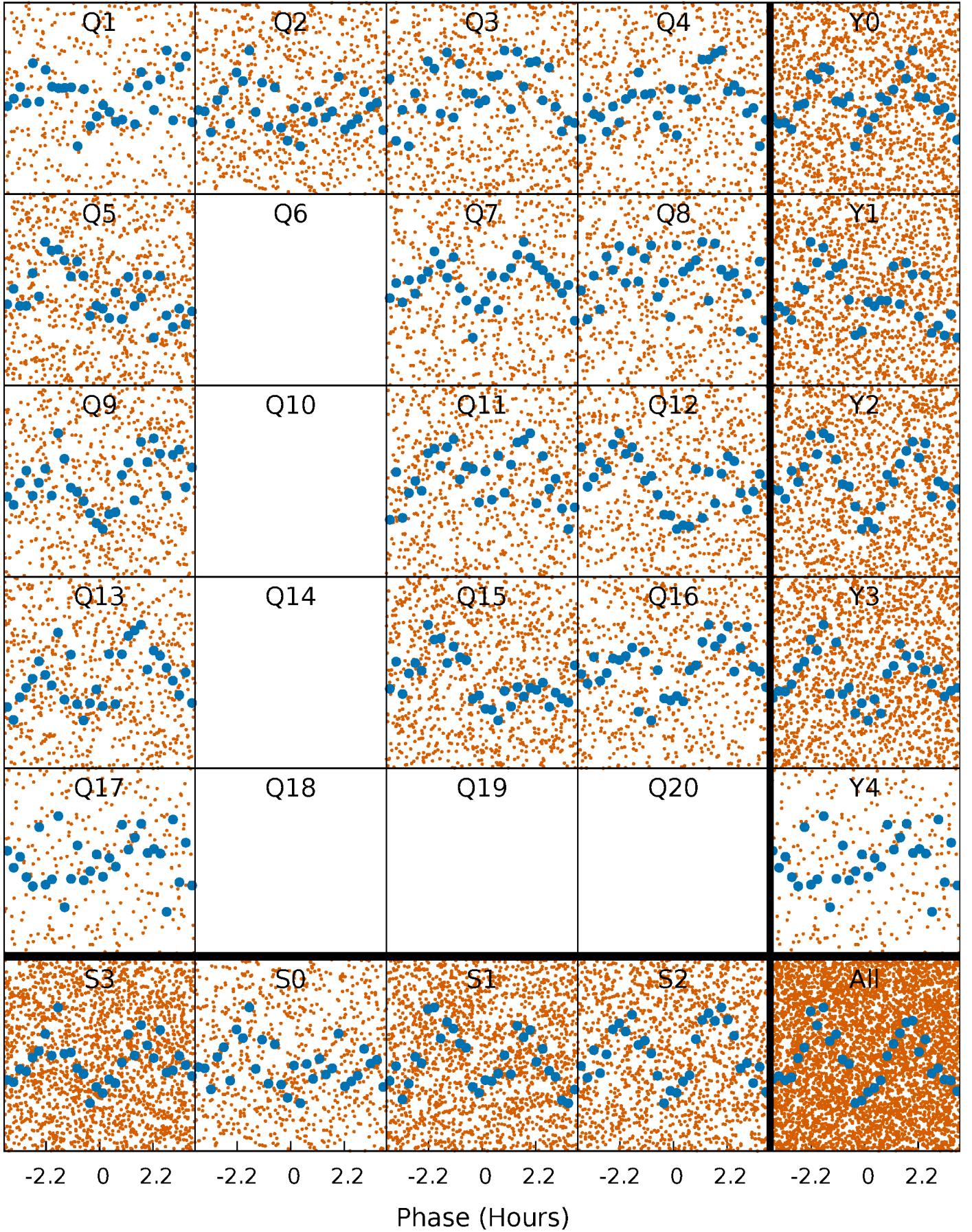


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



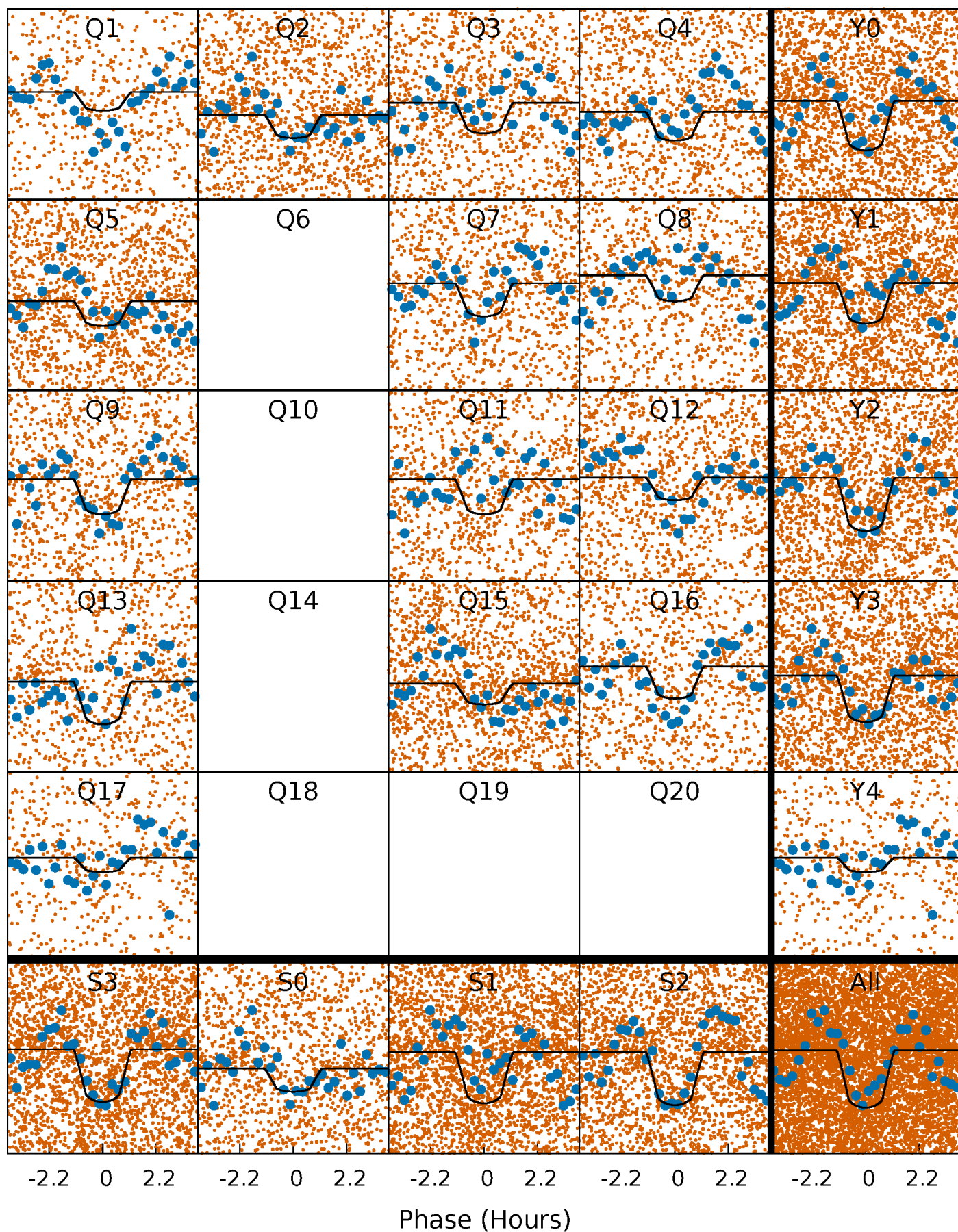
PDC Quarter-Phased Transit Curves

TCE 004381016-01 P= 0.584472 Days $T_0=132.024394$ (BKJD)



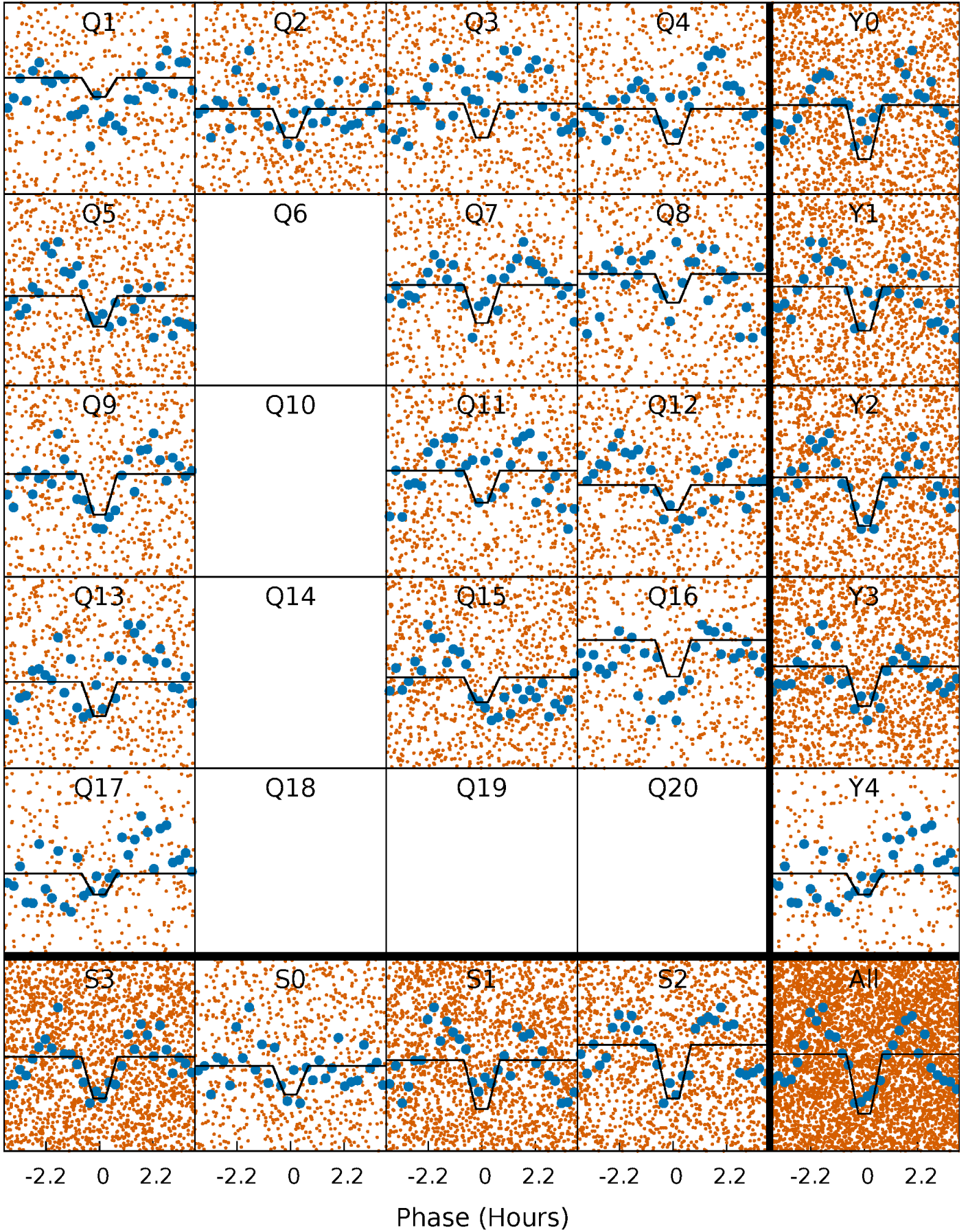
DV Quarter-Phased Transit Curves

TCE 004381016-01 P= 0.584472 Days $T_0=132.024394$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

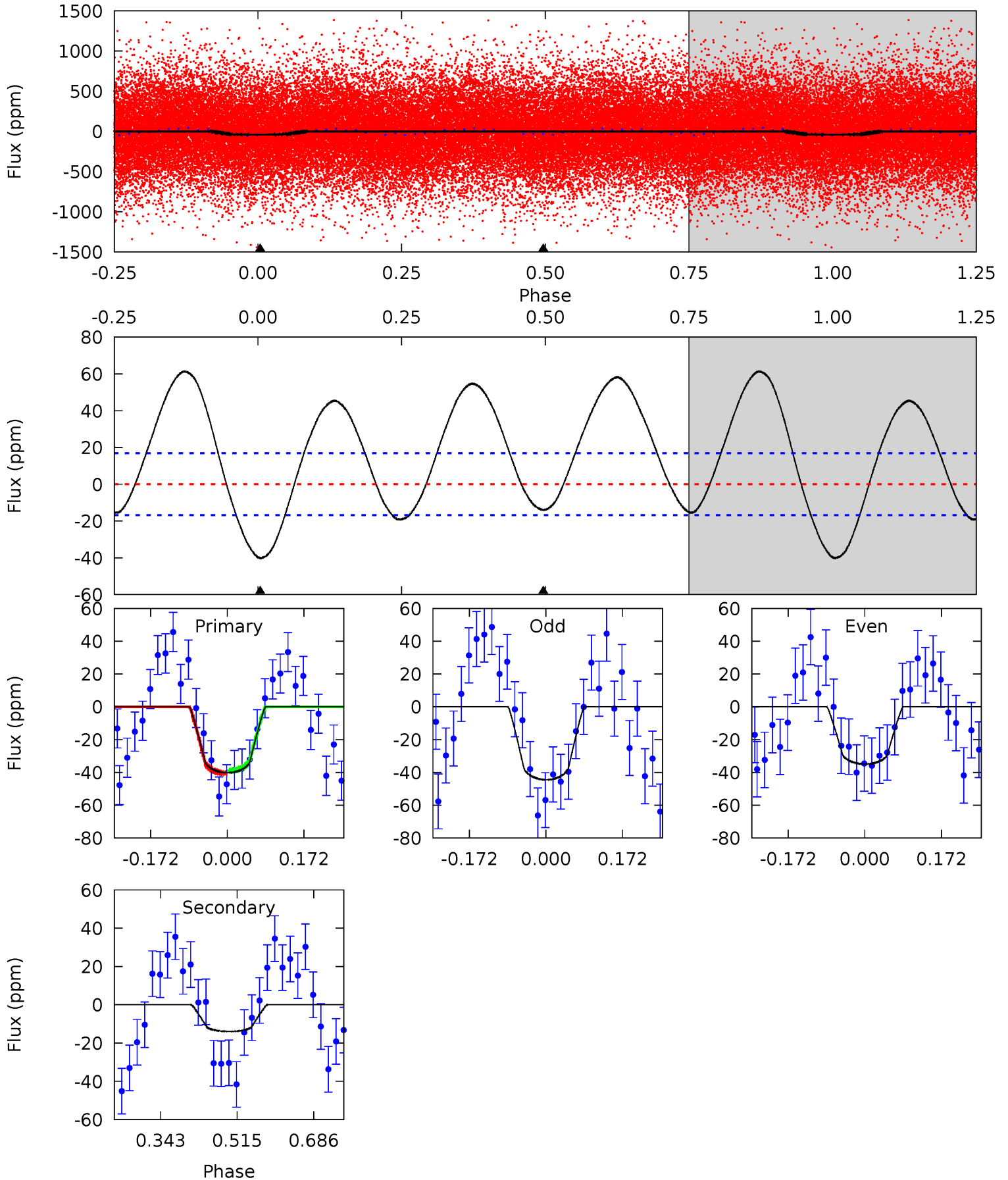
TCE 004381016-01 P= 0.584472 Days $T_0=132.024394$ (BKJD)



DV Model-Shift Uniqueness Test

004381016-01, P = 0.584472 Days, E = 131.439922 Days

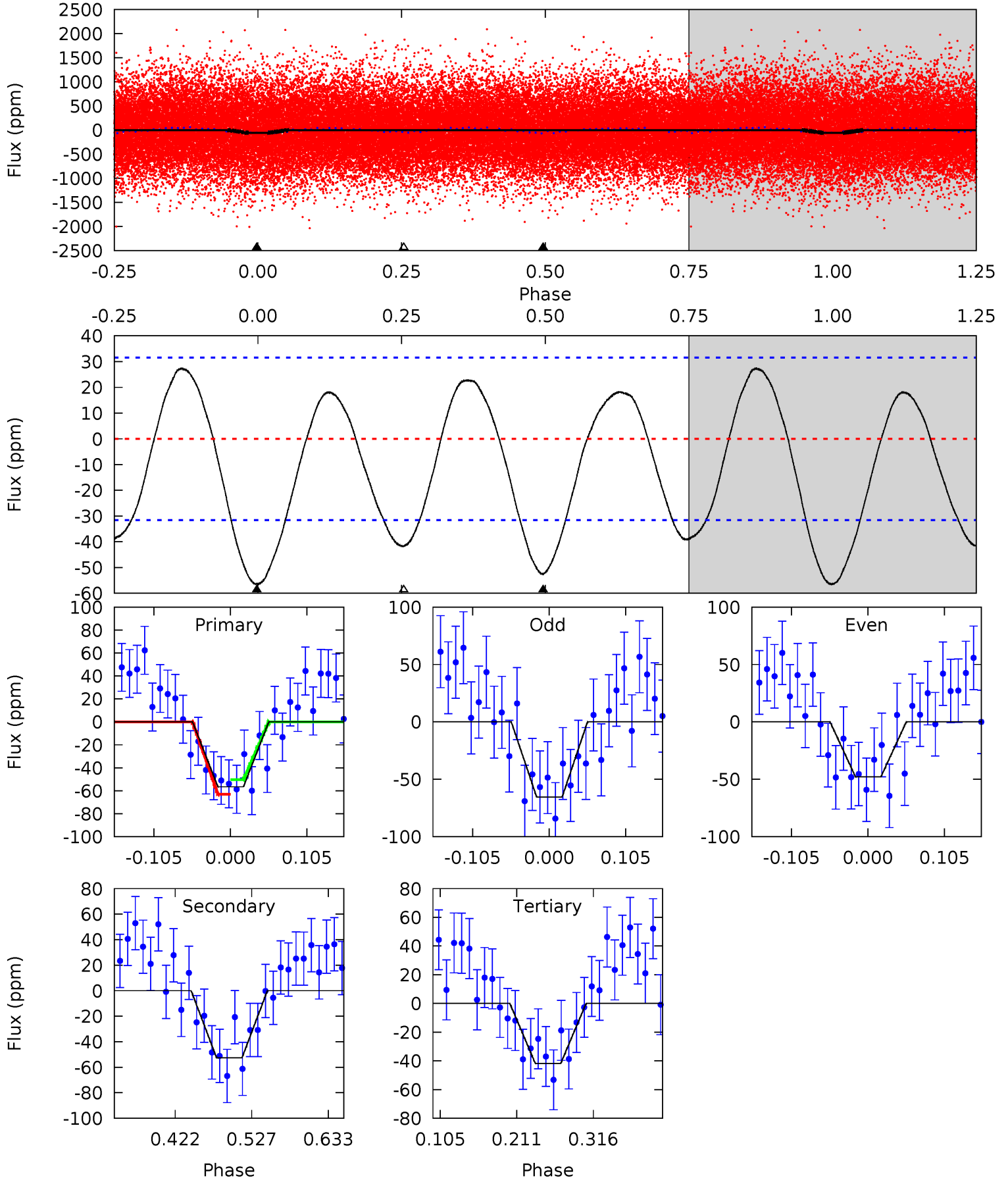
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.6	3.69	0	0	4.45	1.37	4.41	10.6	10.6	3.69	3.69	1.26	1.21	0.60	0.20



Alt Model-Shift Uniqueness Test

004381016-01, P = 0.584472 Days, E = 131.439922 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.17	7.59	6.03	0	4.55	1.62	3.33	2.14	8.17	1.56	7.59	1.27	1.27	0.33	0.90



Stellar Parameters For KIC 004381016

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	$M(M_{\odot})$	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	7226^{+226}_{-302}	$3.688^{+0.495}_{-0.082}$	$-0.240^{+0.250}_{-0.350}$	$3.211^{+0.406}_{-1.725}$	$1.836^{+0.179}_{-0.536}$	$0.078^{+0.415}_{-0.022}$
	+3%/-4%	+13%/-2%	+104%/-146%	+13%/-54%	+10%/-29%	+532%/-29%
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 004381016-01 / KOI

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-14 ± 4	$2.58^{+1.04}_{-0.91}$	5976^{+426}_{-719}	2689^{+2432}_{-7061}	$0.307^{+0.472}_{-0.154}$
Alt.	-53 ± 7	$2.60^{+0.97}_{-0.98}$	5971^{+401}_{-855}	6217^{+1750}_{-1151}	$1.234^{+1.762}_{-0.609}$

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 $A_{obs} \gg 1.0$

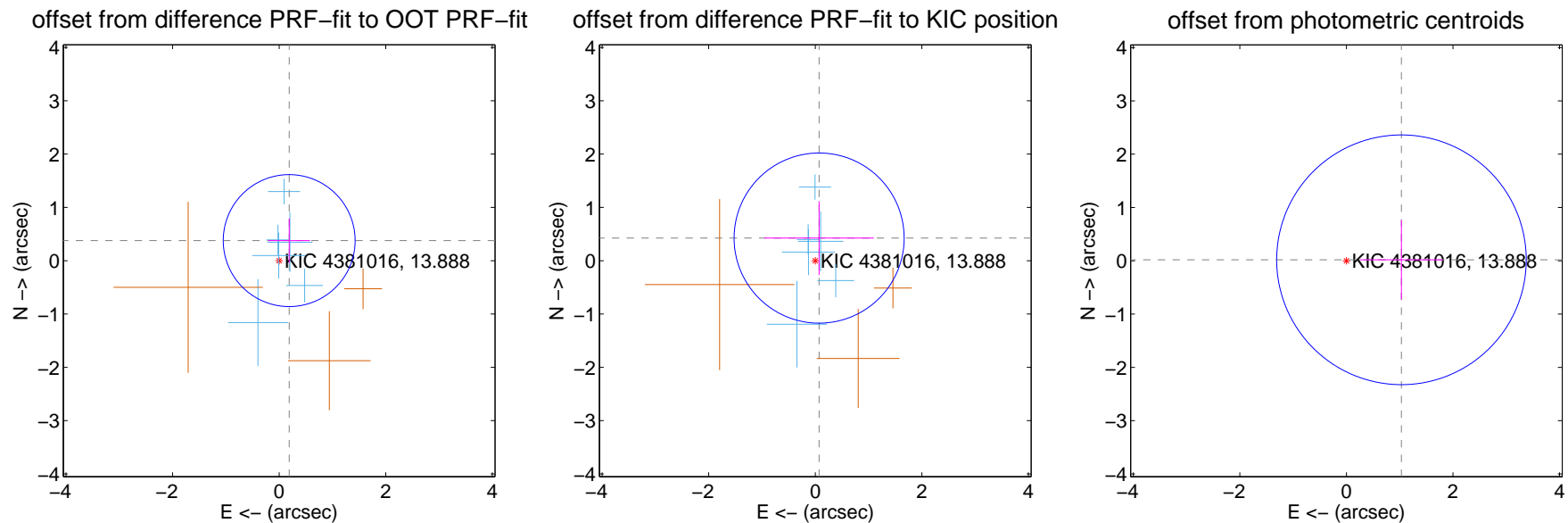
DV Centroid Data

Supplemental centroid analysis for 004381016-01. Kepler magnitude: 13.89. Transit SNR 10.68

There are 7 quarters with good PRF difference image offsets

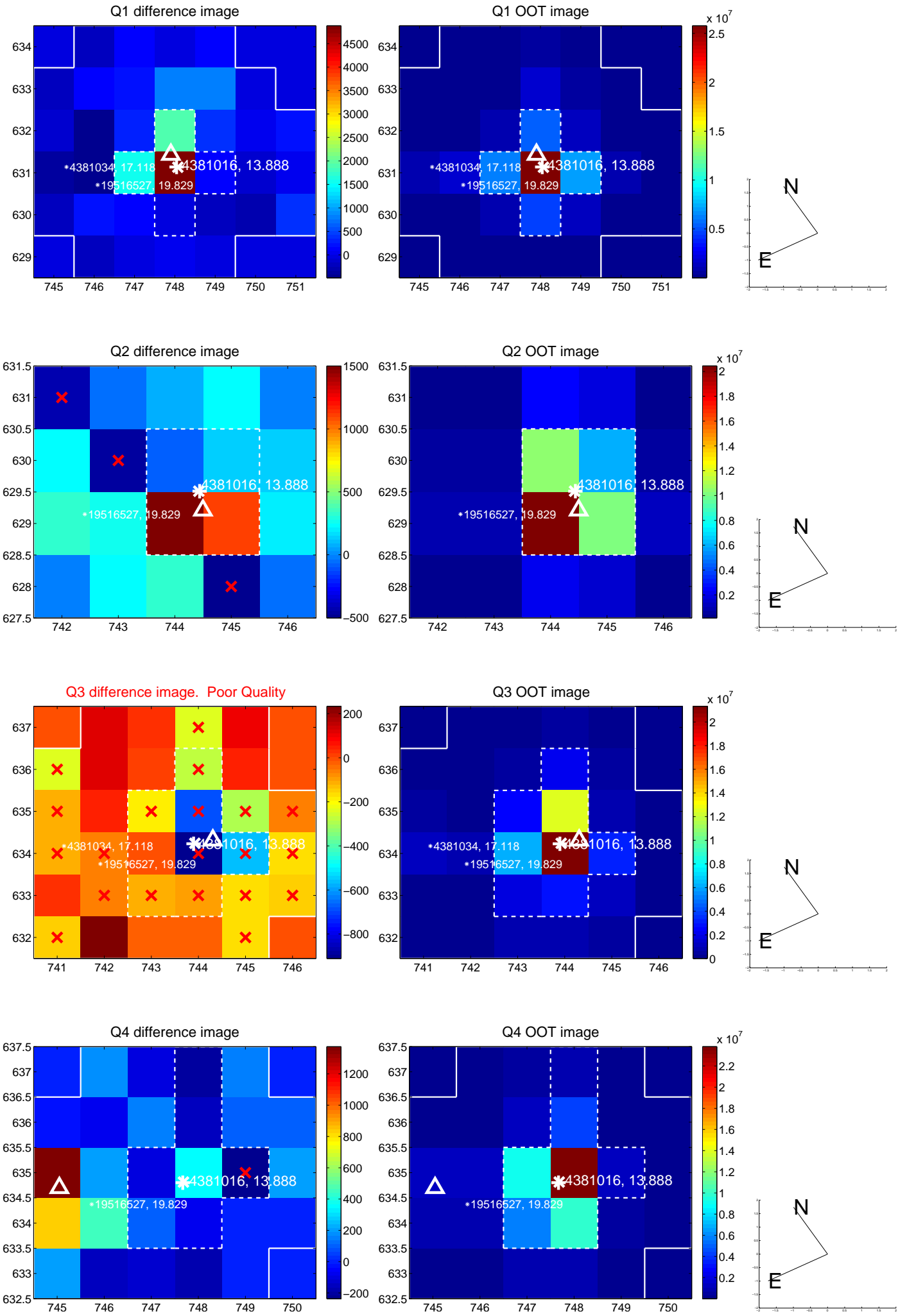
The direct PRF centroid is offset from the target star catalog position by about 0.10 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.421 ± 0.413	1.02	-0.188 ± 0.392	0.377 ± 0.417
PRF-fit source offset from KIC position	0.430 ± 0.532	0.81	-0.072 ± 1.027	0.424 ± 0.692
photometric centroid source offset	1.03 ± 0.78	1.32	-1.03 ± 0.78	0.02 ± 0.74

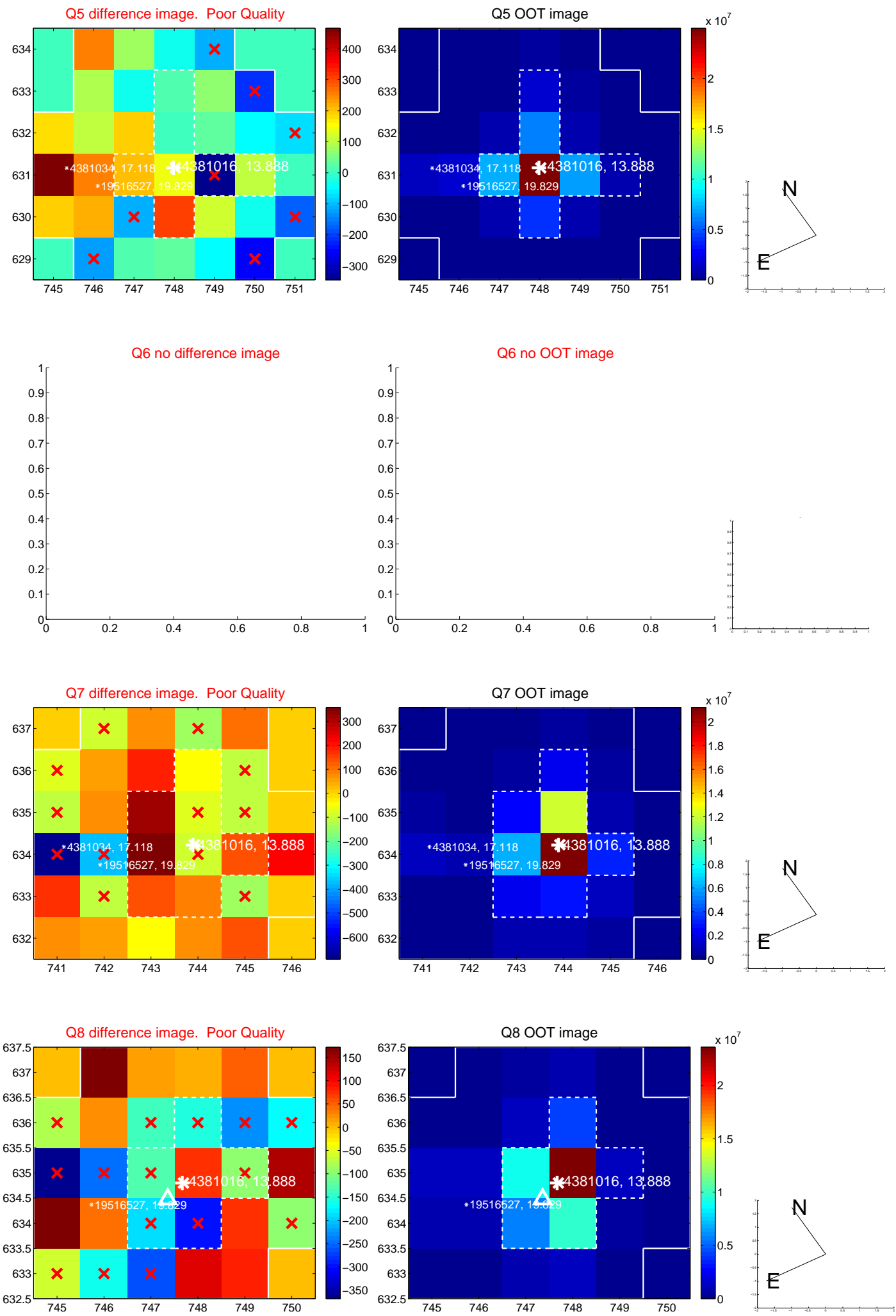


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

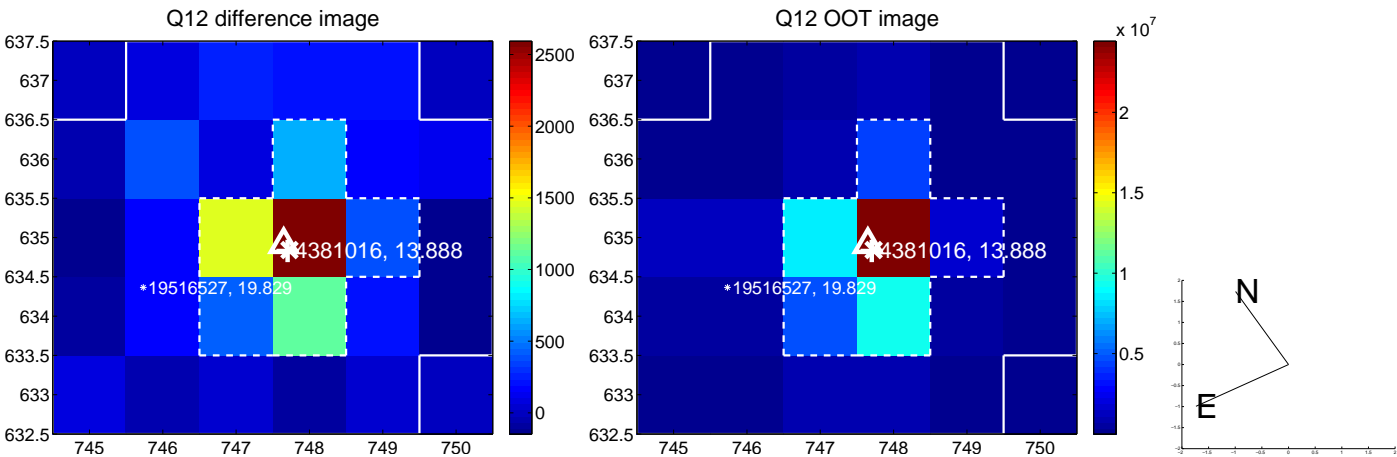
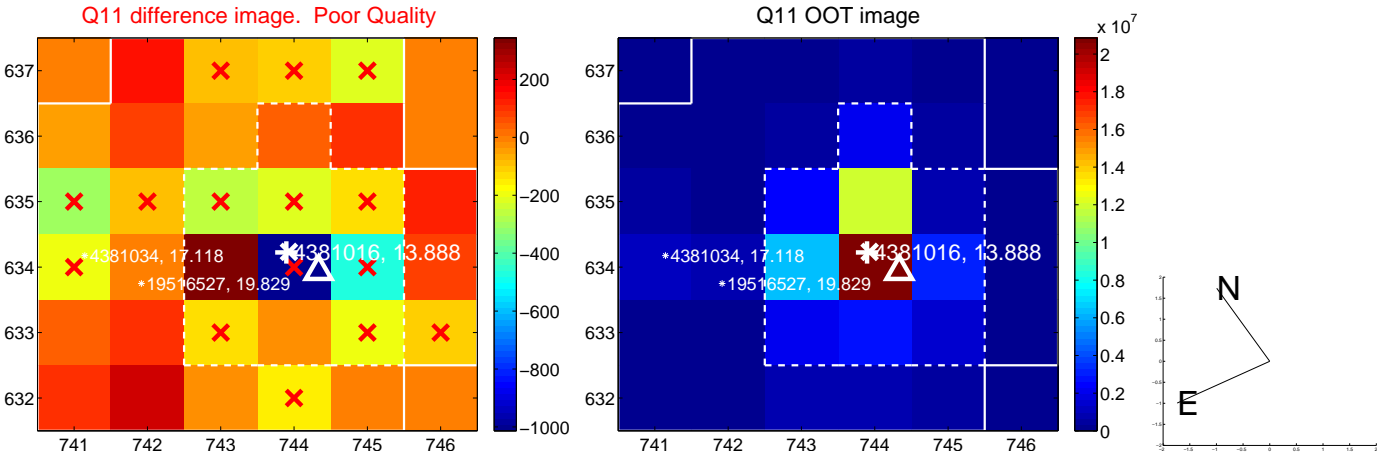
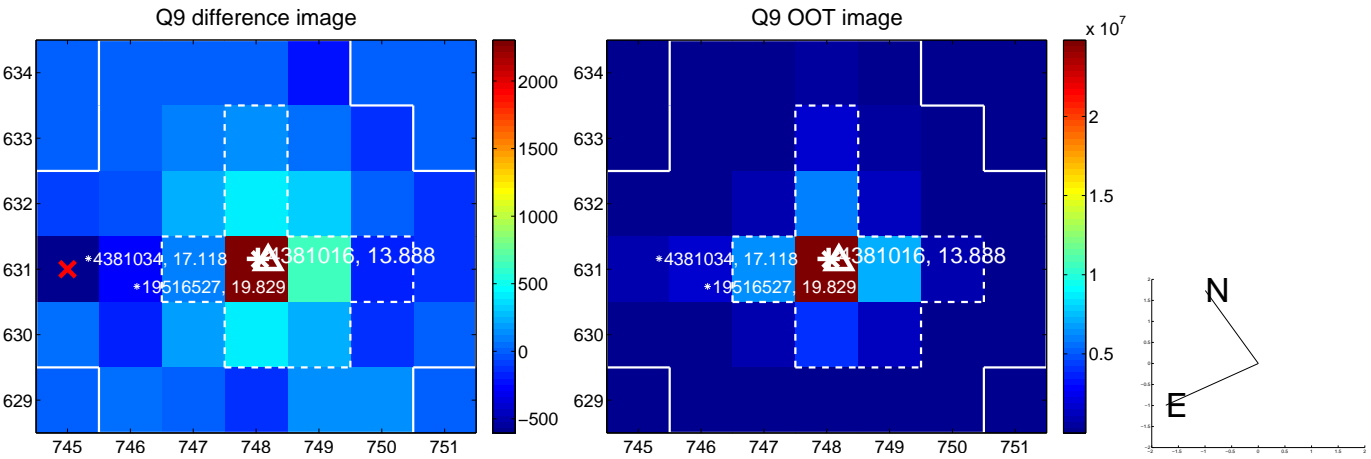
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



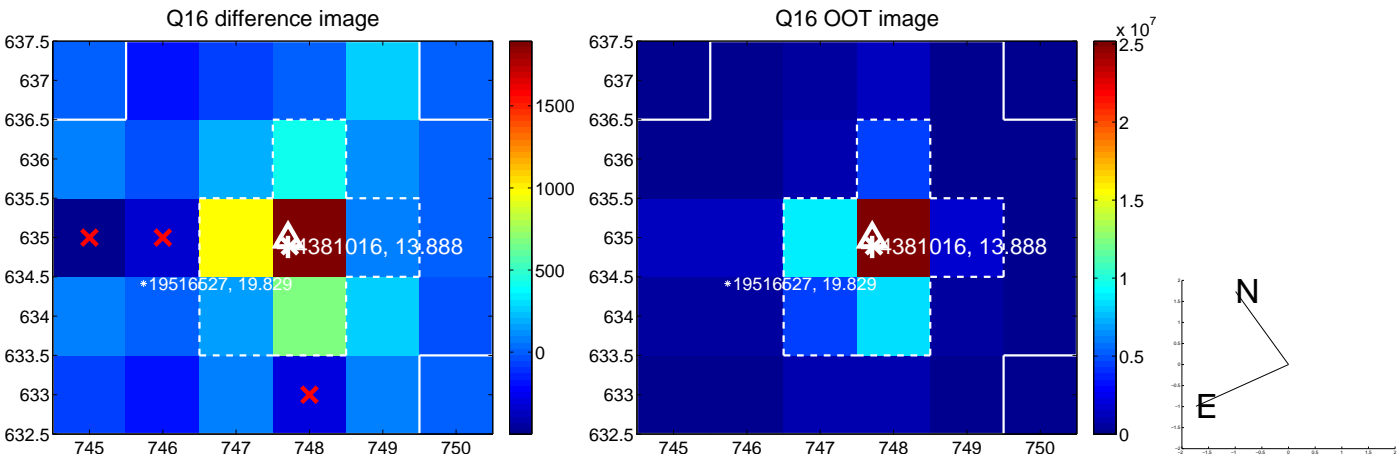
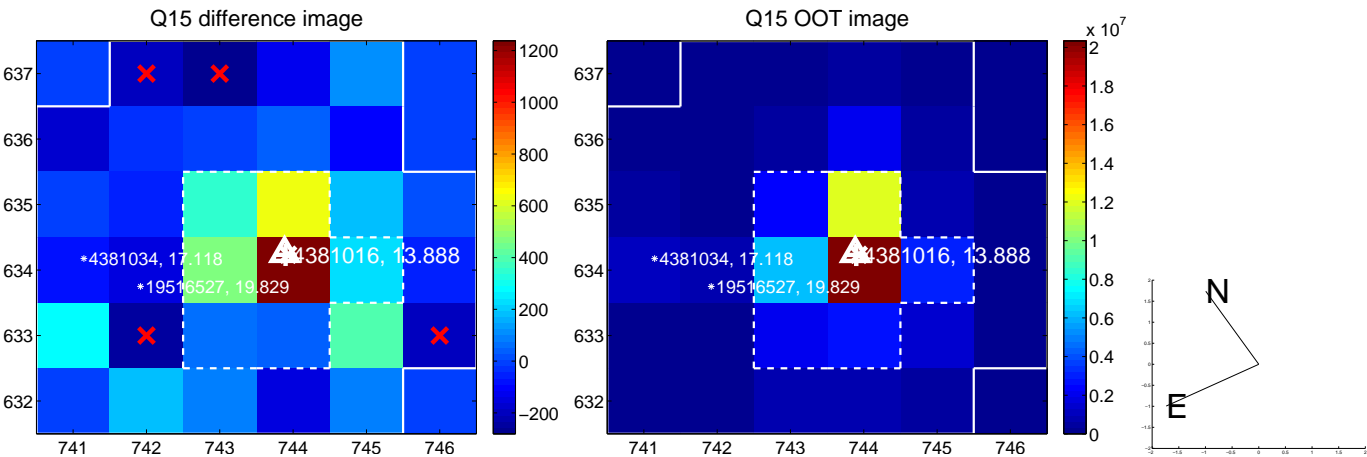
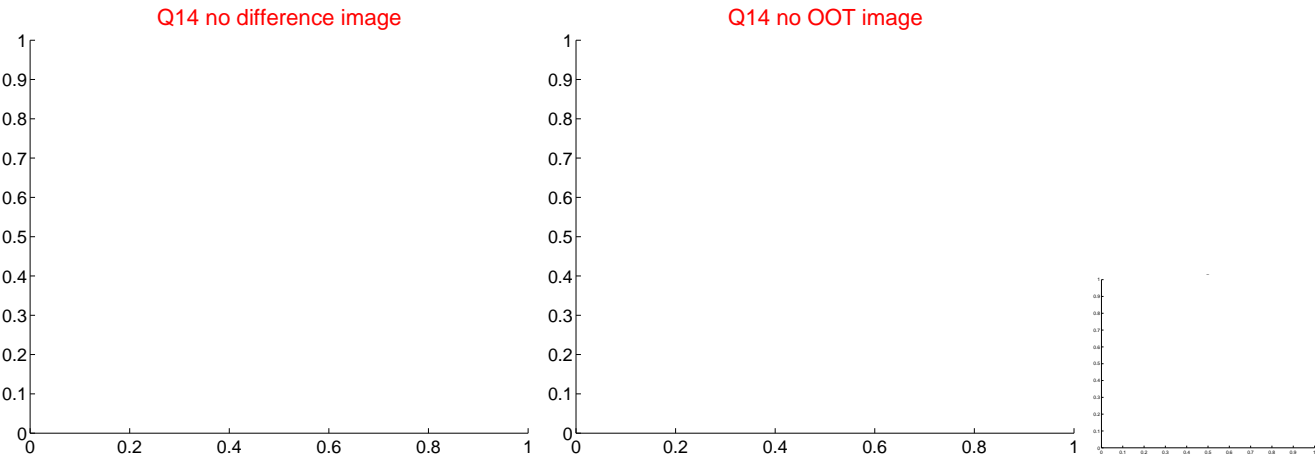
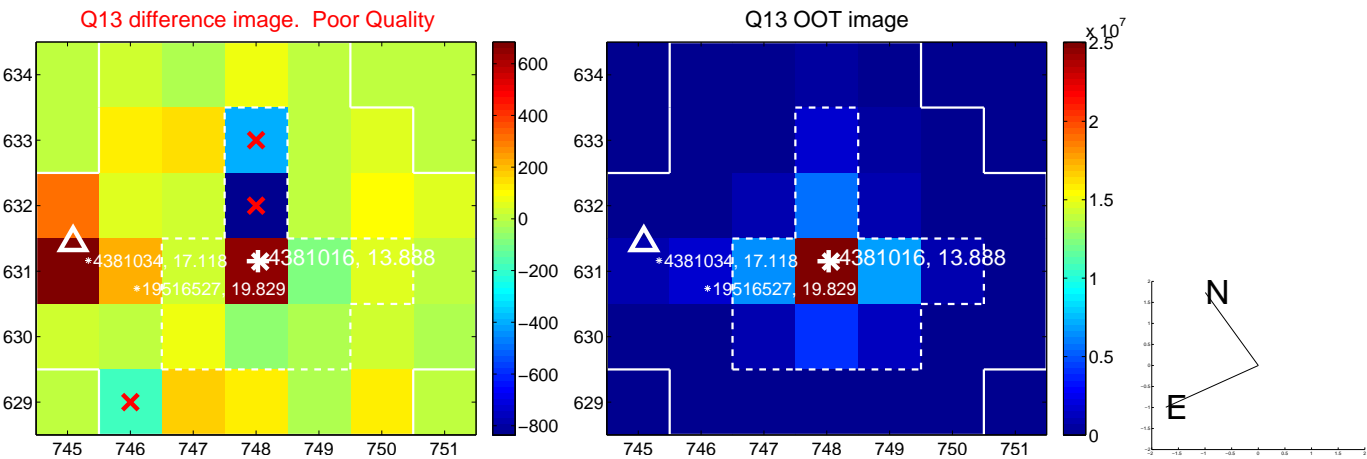
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



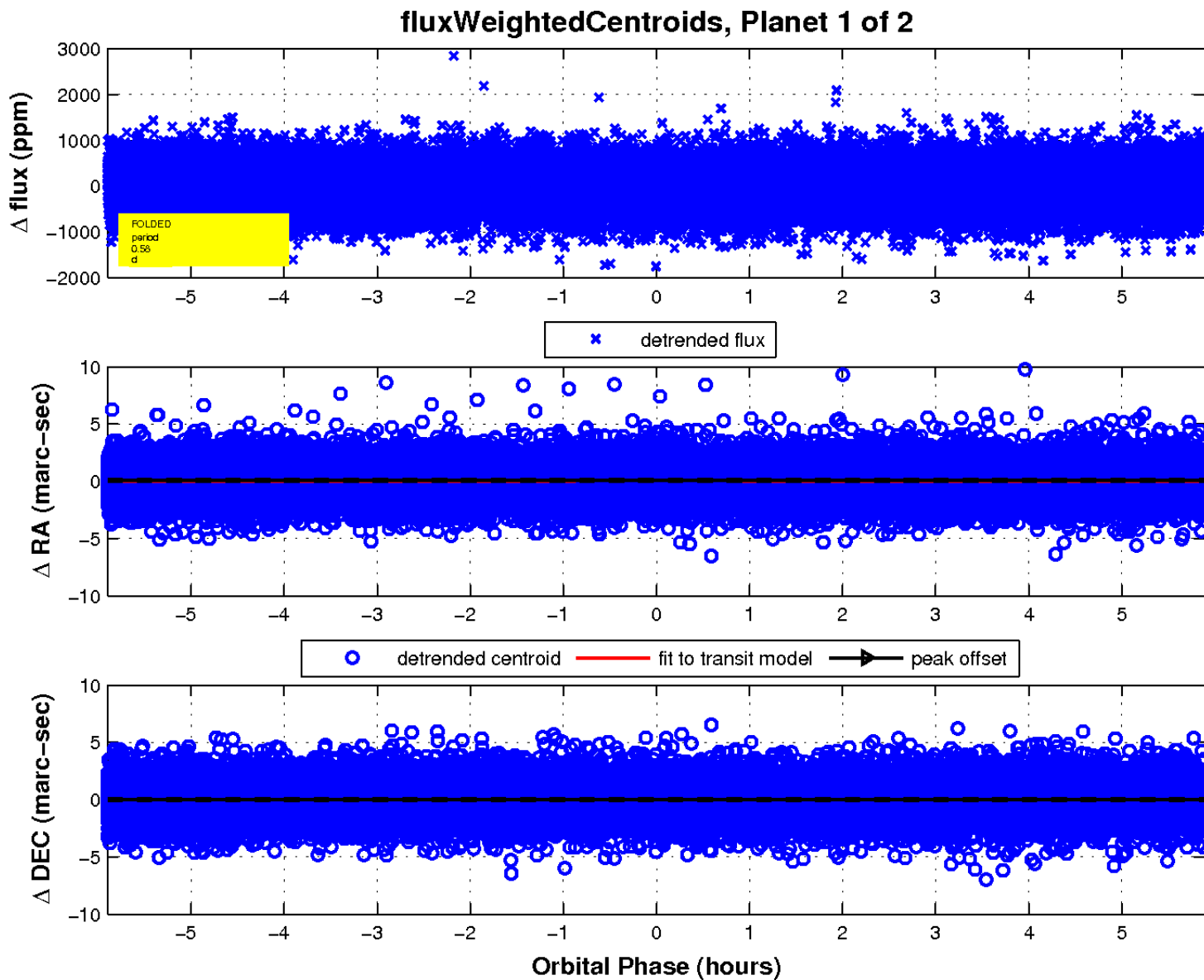
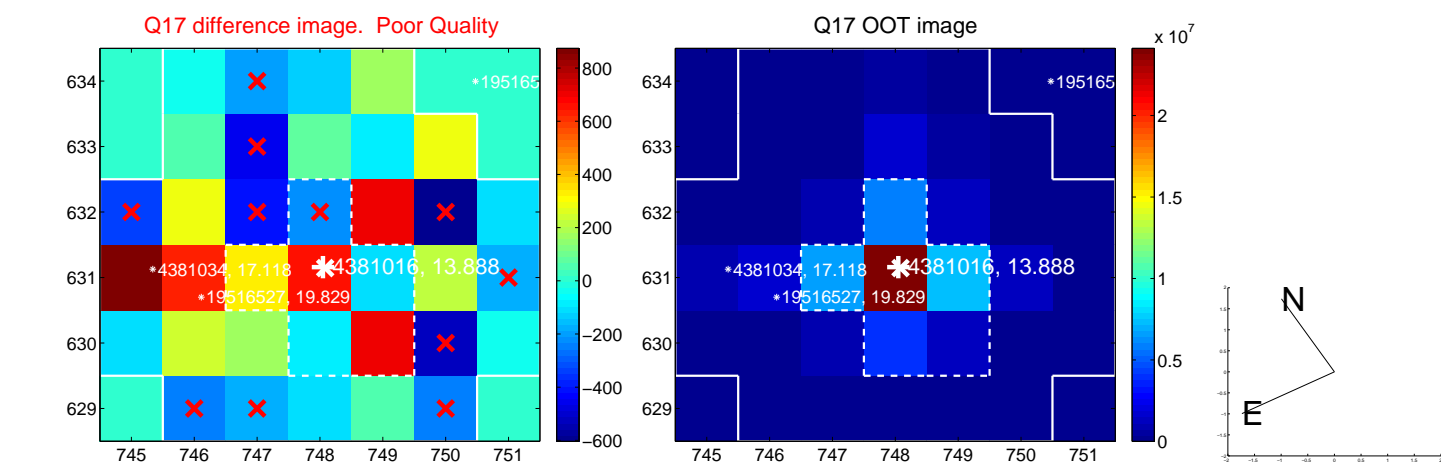
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

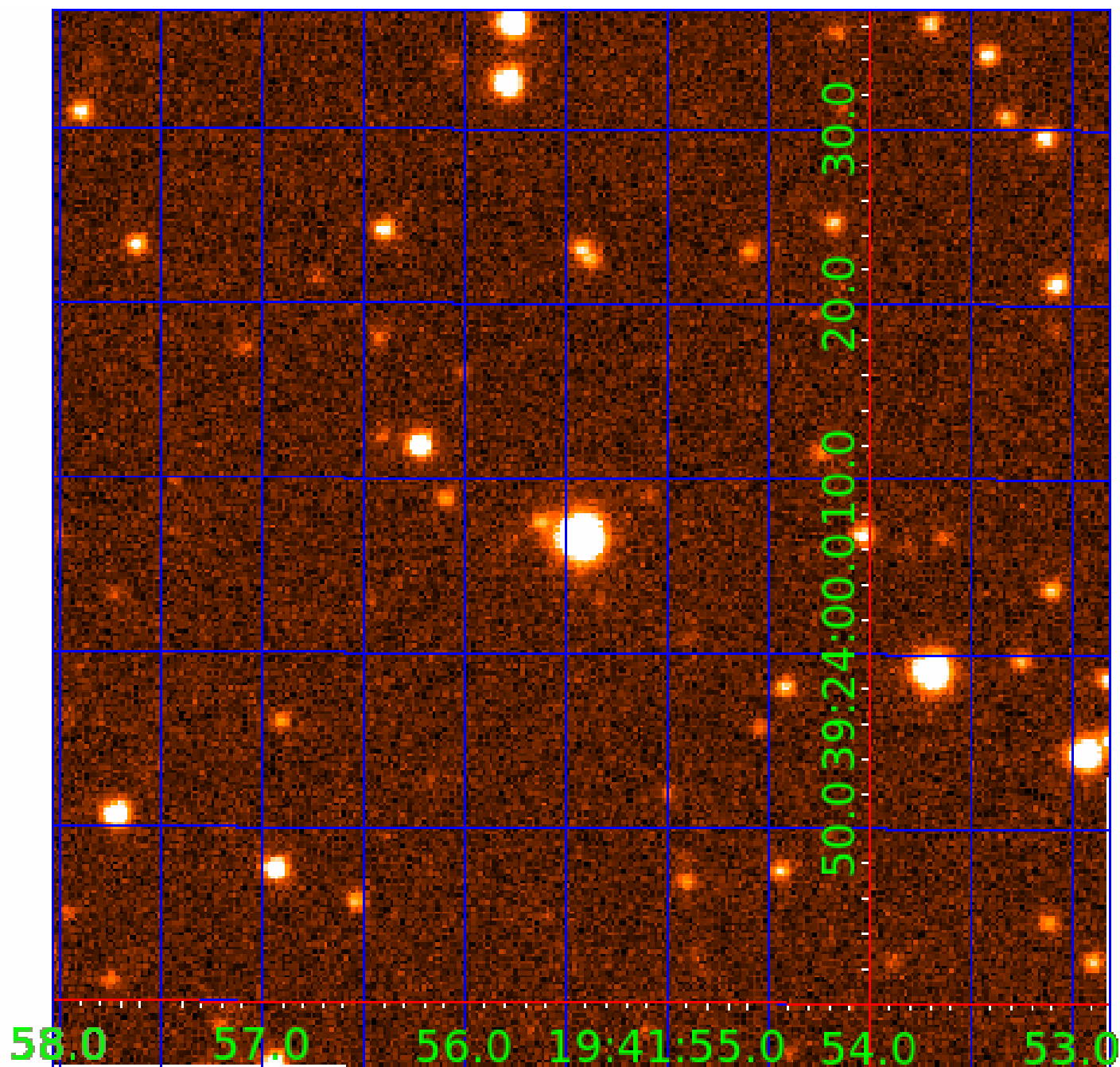


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 004381016

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})
004381016-01	OBS	No	0.584472	132.024394	59.0	1.965	9.1	10.7	3.21	7226	2.90	89790.00
004381016-02	OBS	No	153.212522	204.793506	586.0	6.509	7.4	7.4	3.21	7226	9.32	53.52

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004381016-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
004381016-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT

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

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

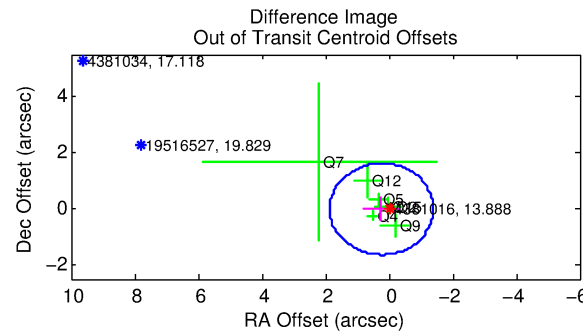
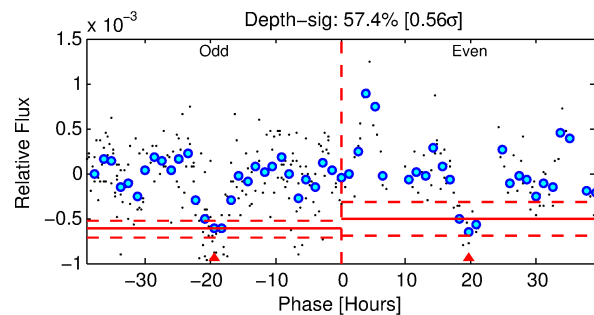
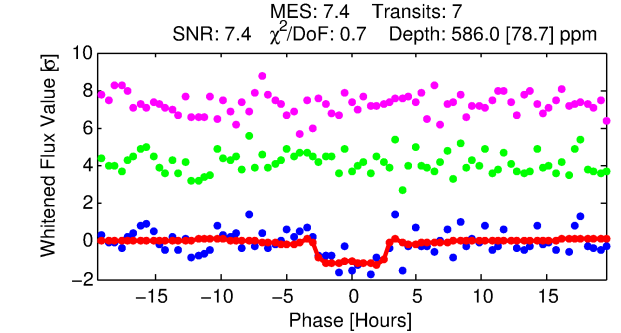
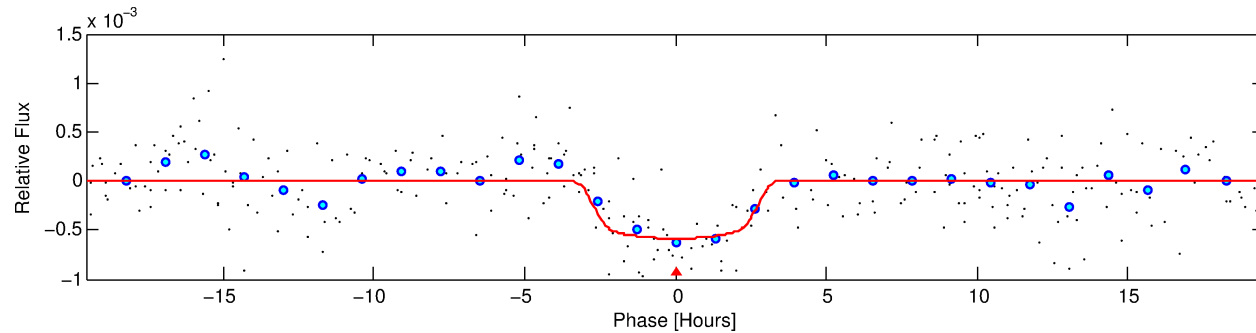
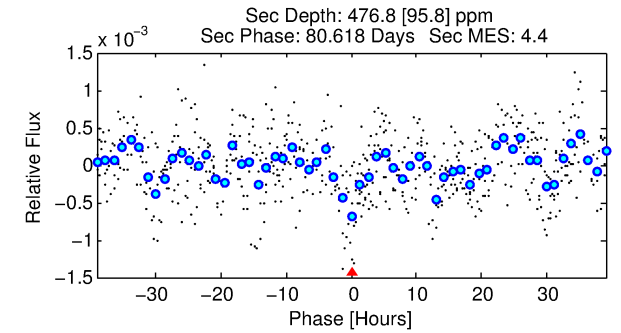
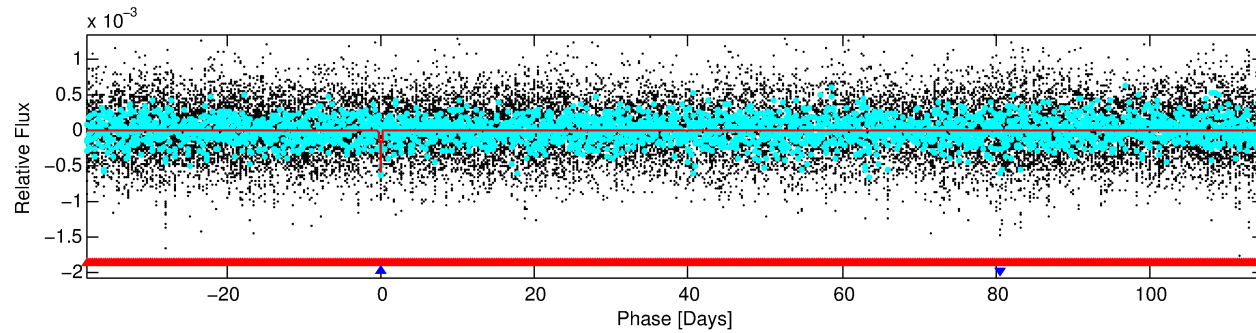
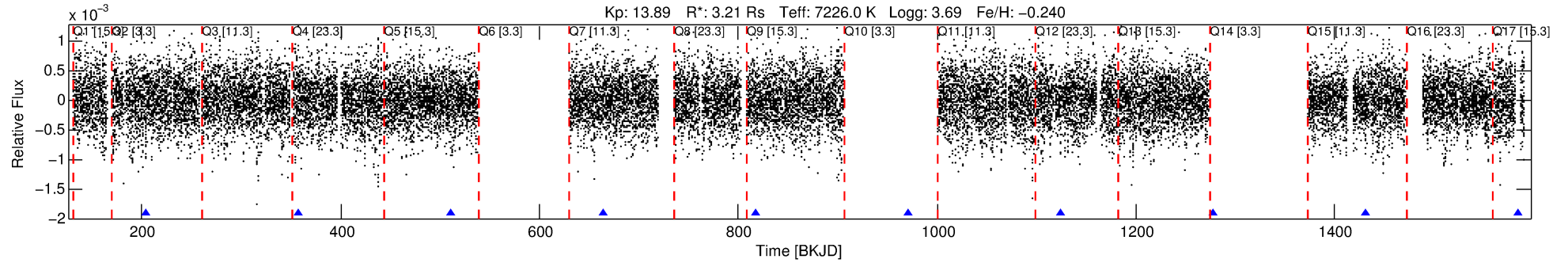
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 004381016-02

No Significant Match Found

DV One-Page Summary

KIC: 4381016 Candidate: 2 of 2 Period: 153.213 d



DV Fit Results:

Period = 153.21252 [0.00261] d
Epoch = 204.7935 [0.0117] BKJD
Rp/R* = 0.0266 [0.0026]
a/R* = 80.19 [27.52]
b = 0.92 [0.06]
Seff = 53.52 [45.84]
Teff = 690 [148] K
Rp = 9.32 [5.09] Re
a = 0.6860 [0.3582] AU
Ag = 1419.87 [1256.68] [1.13σ]
Teffp = 6546 [532] K [10.61σ]

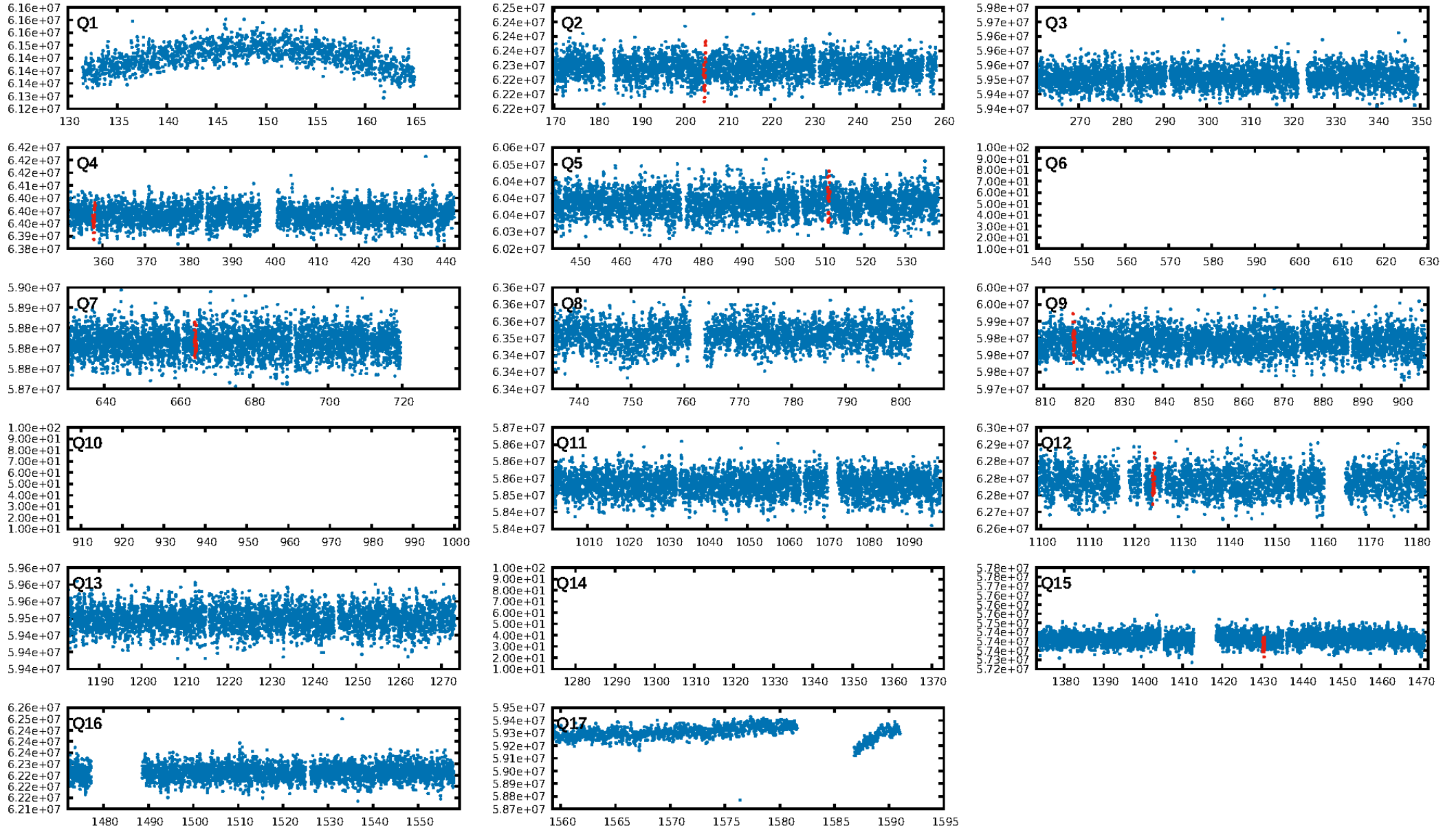
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [538.72σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 84.7%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 8.44e-10
RollingBand-fgt: 1.00 [7/7]
GhostDiagnostic-chr: 1.049
Centroid-sig: 22.2%
Centroid-so: 1.199 arcsec [1.42σ]
OotOffset-rm: 0.237 arcsec [0.44σ]
KicOffset-rm: 0.463 arcsec [0.85σ]
OotOffset-st: 1/2/2/2 [7]
KicOffset-st: 1/2/2/2 [7]
DiffImageQuality-fgm: 0.86 [6/7]
DiffImageOverlap-fno: 0.00 [0/7]

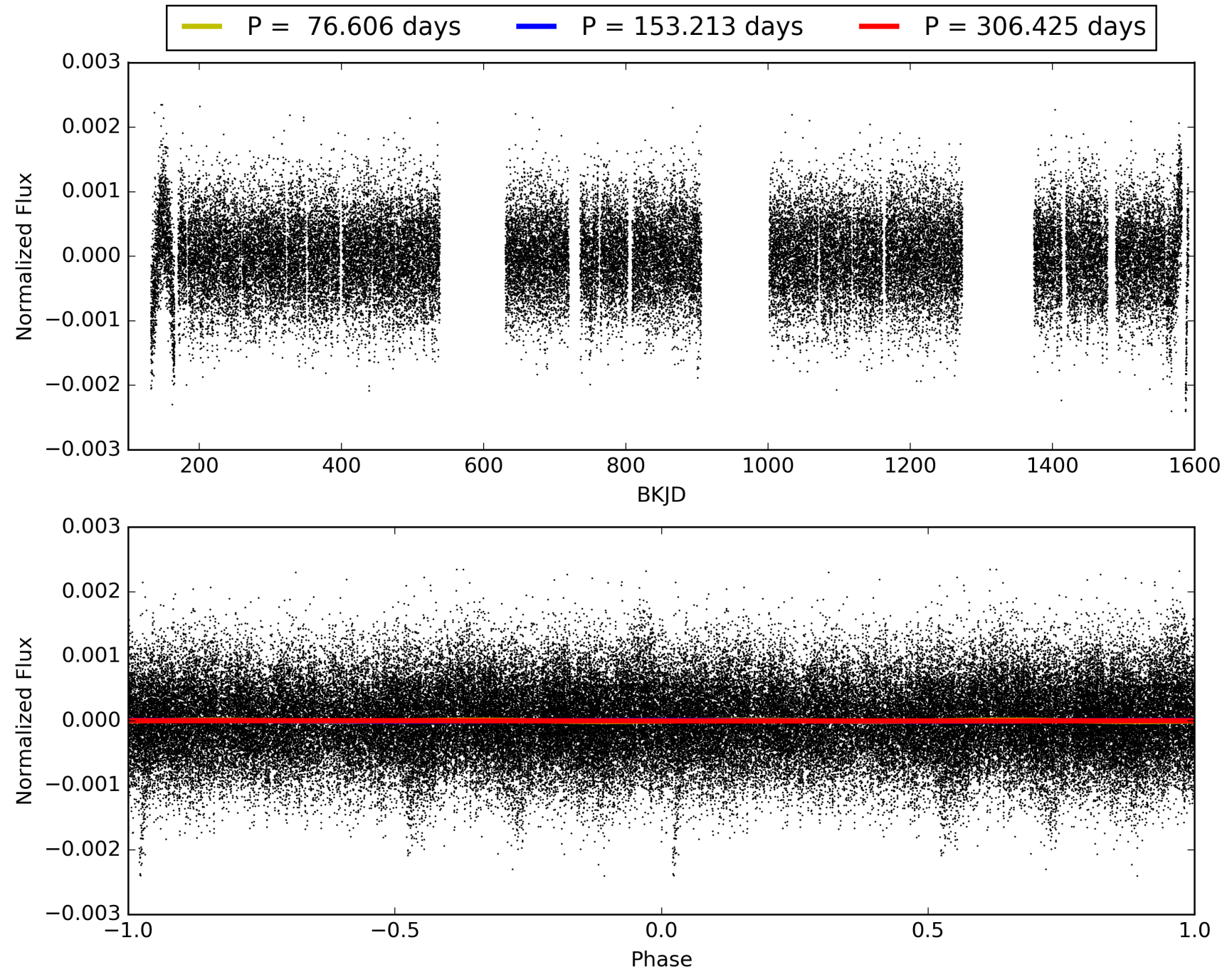
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:21:26 Z

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

TCE 004381016-02, PDC Light Curves

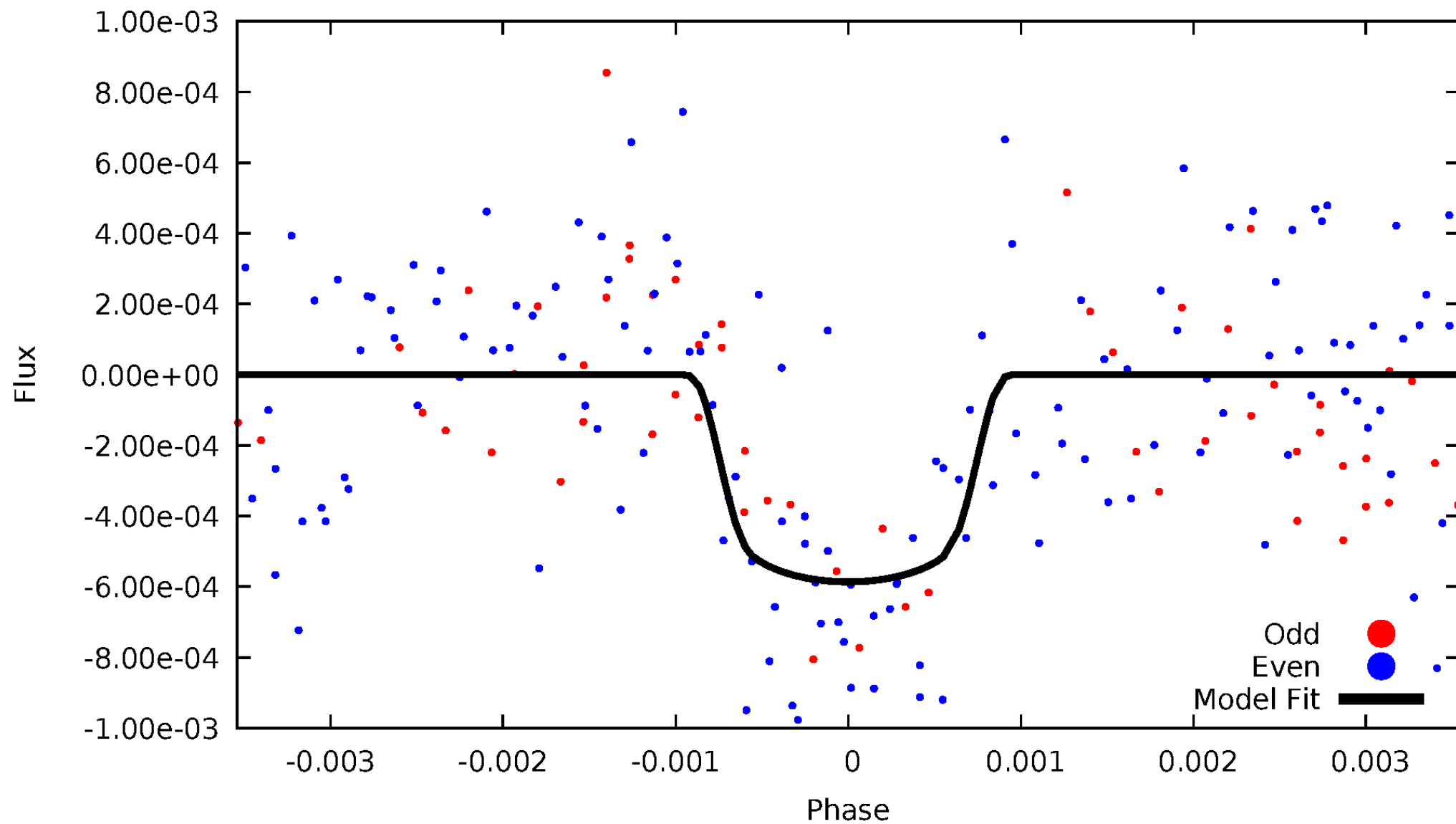


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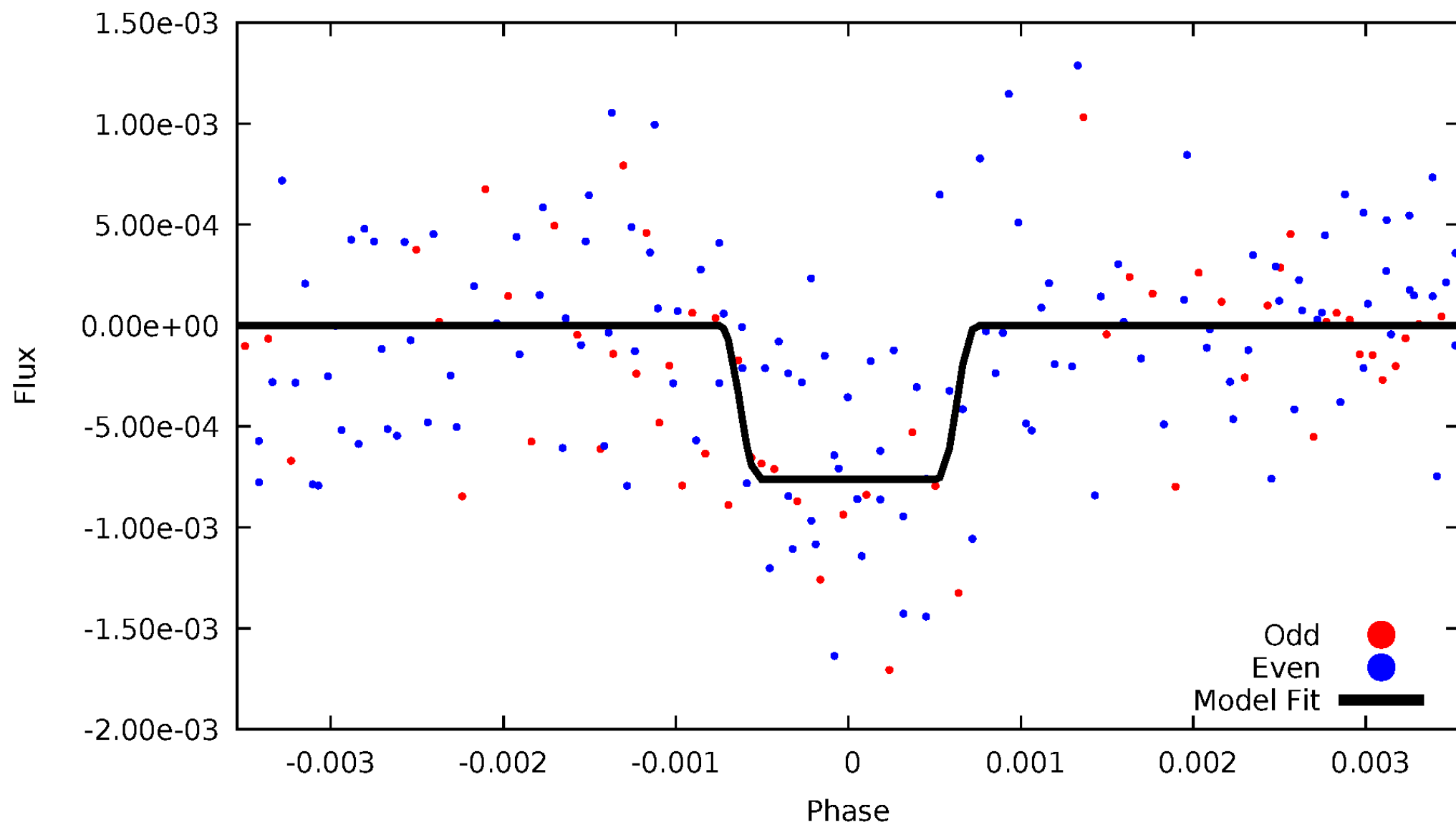
DV Odd/Even

TCE 004381016-02



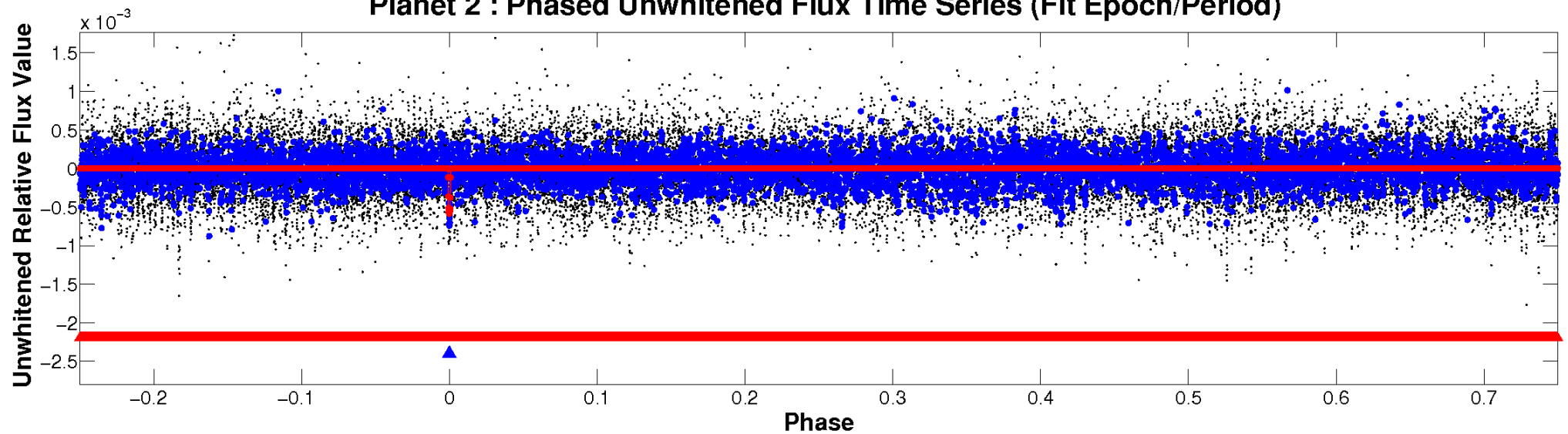
ALT Odd/Even

TCE 004381016-02

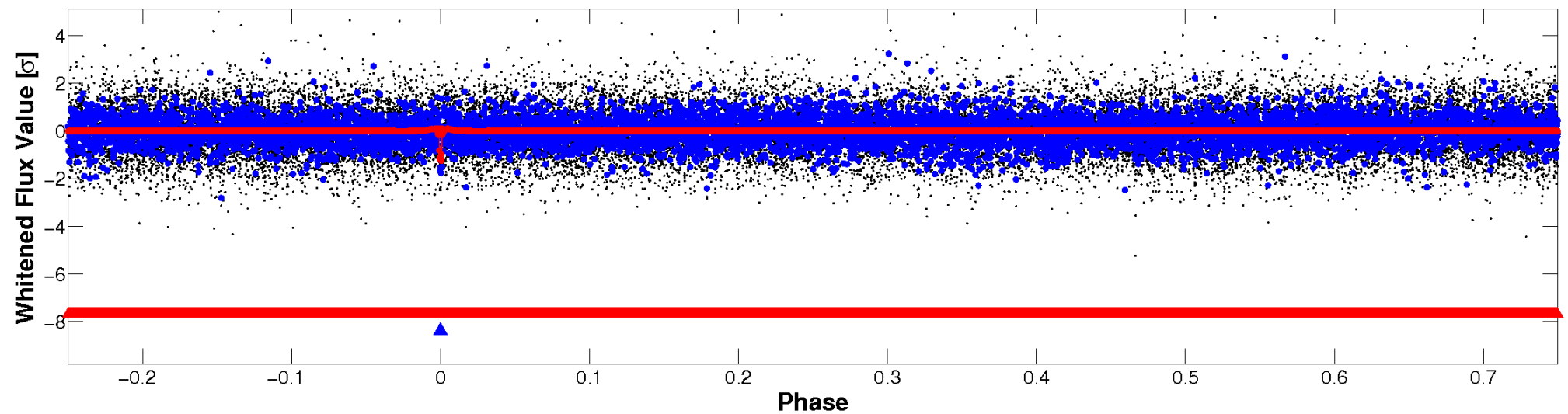


Non-Whitened Vs. Whitened Light Curve

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

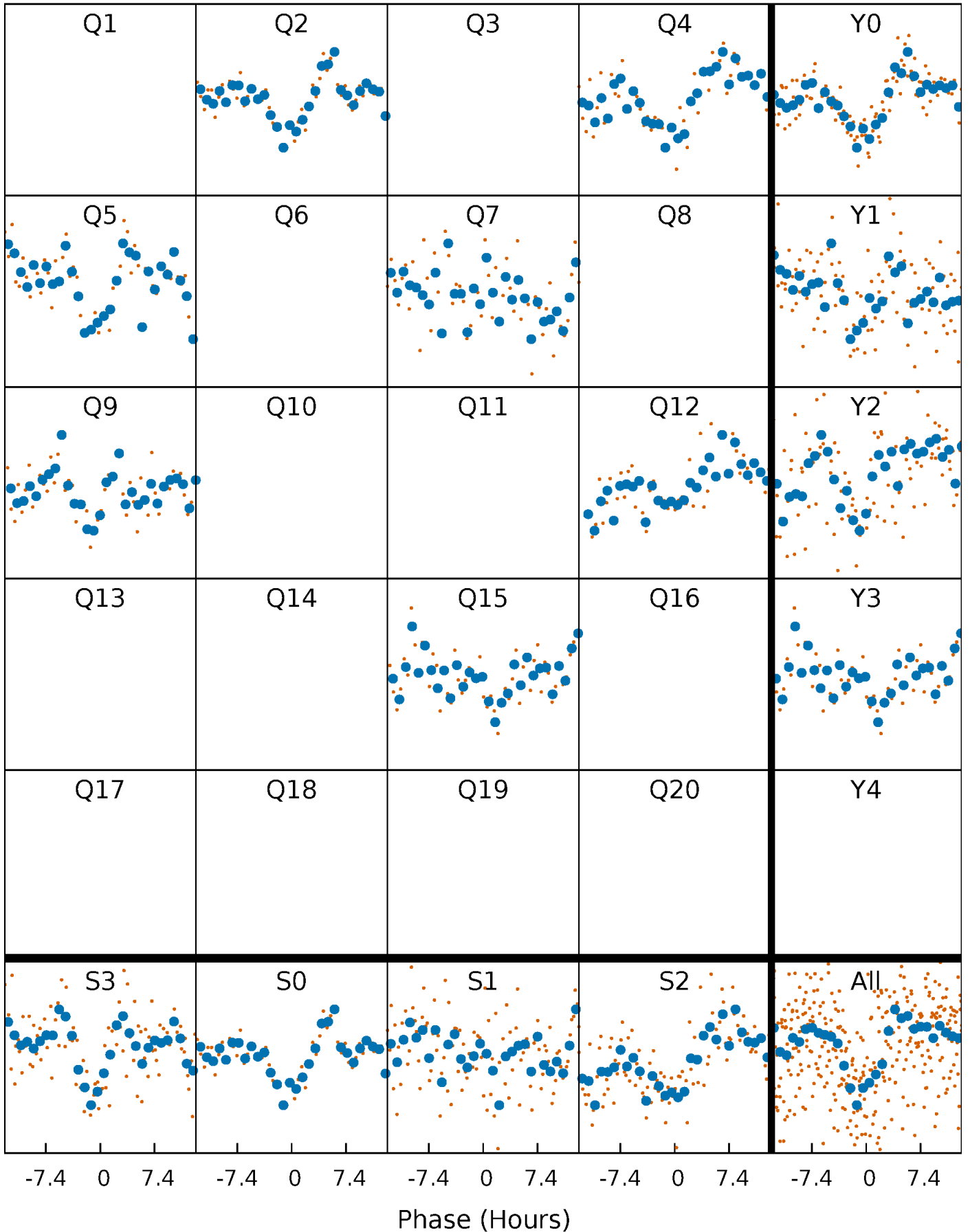


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



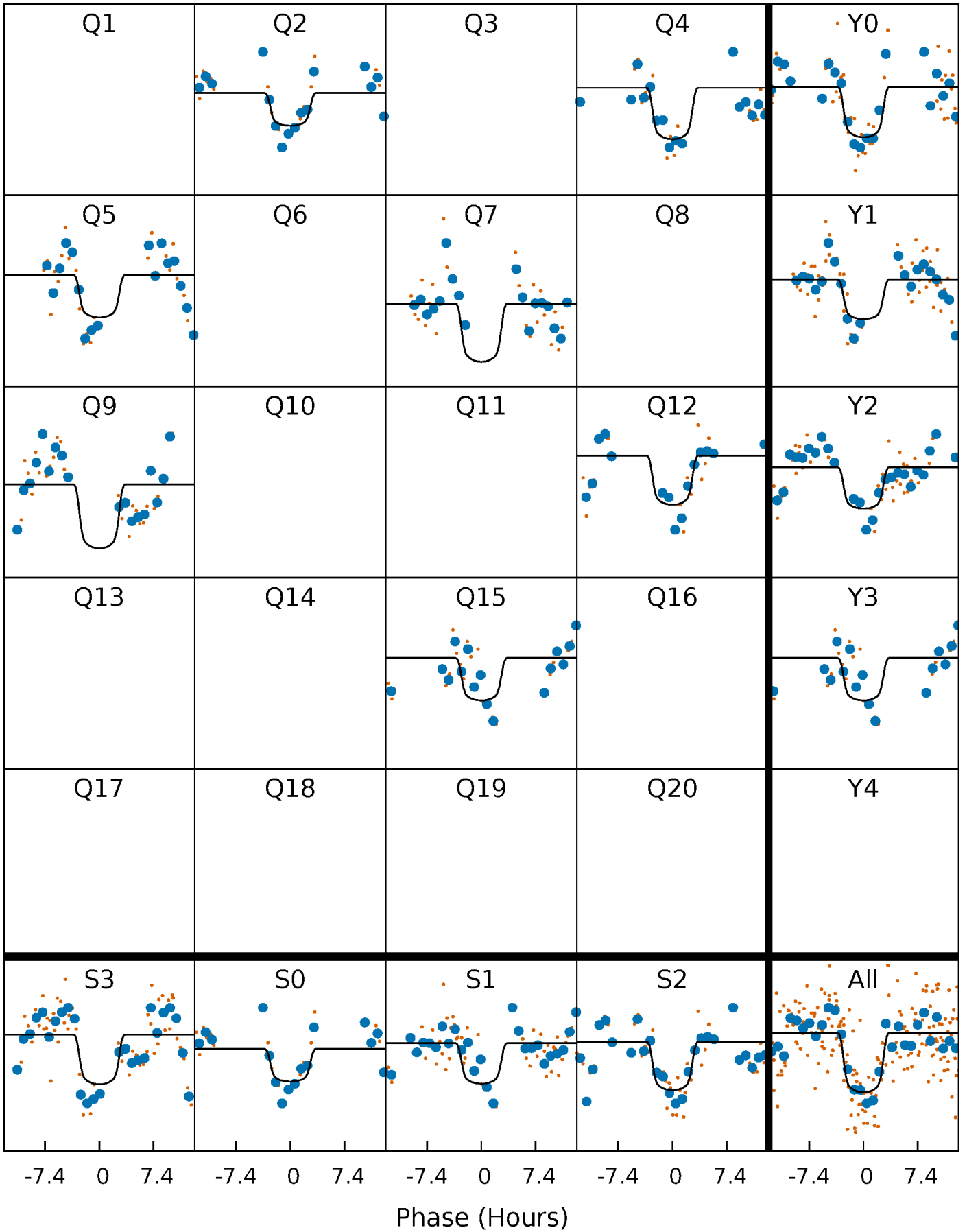
PDC Quarter-Phased Transit Curves

TCE 004381016-02 P=153.212522 Days $T_0=204.793506$ (BKJD)



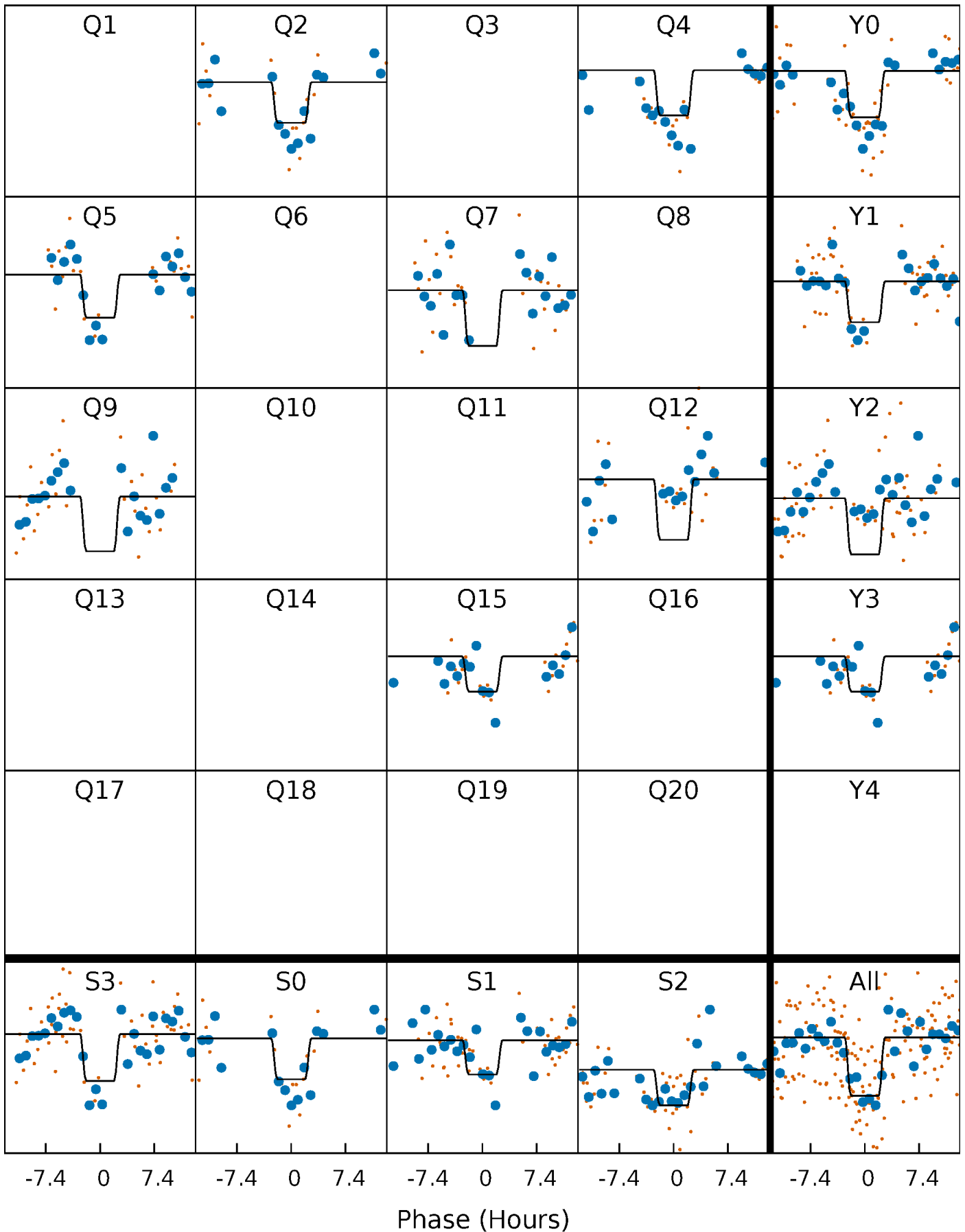
DV Quarter-Phased Transit Curves

TCE 004381016-02 P=153.212522 Days $T_0=204.793506$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

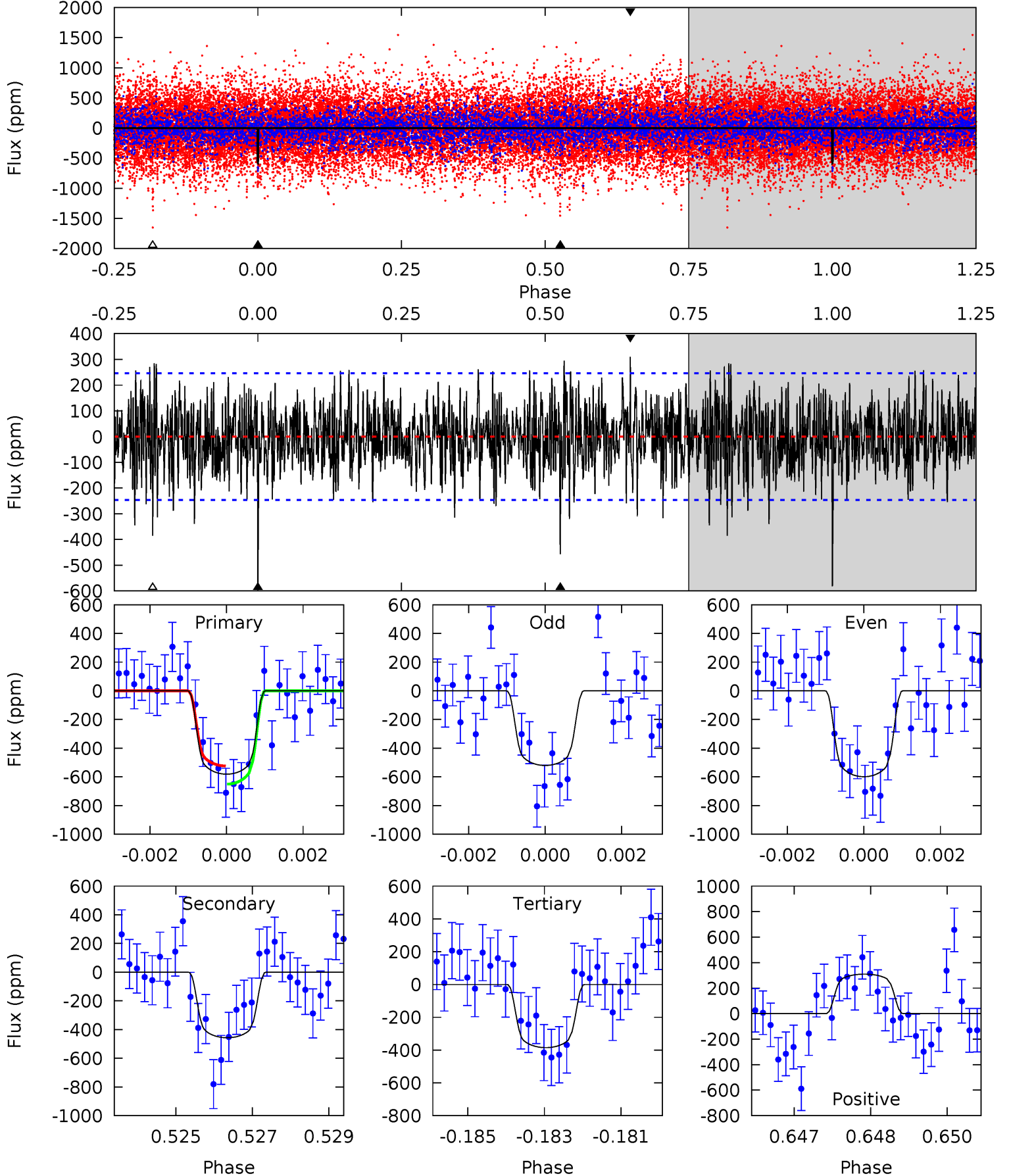
TCE 004381016-02 P=153.218410 Days $T_0=204.761124$ (BKJD)



DV Model-Shift Uniqueness Test

004381016-02, $P = 153.212522$ Days, $E = 51.580984$ Days

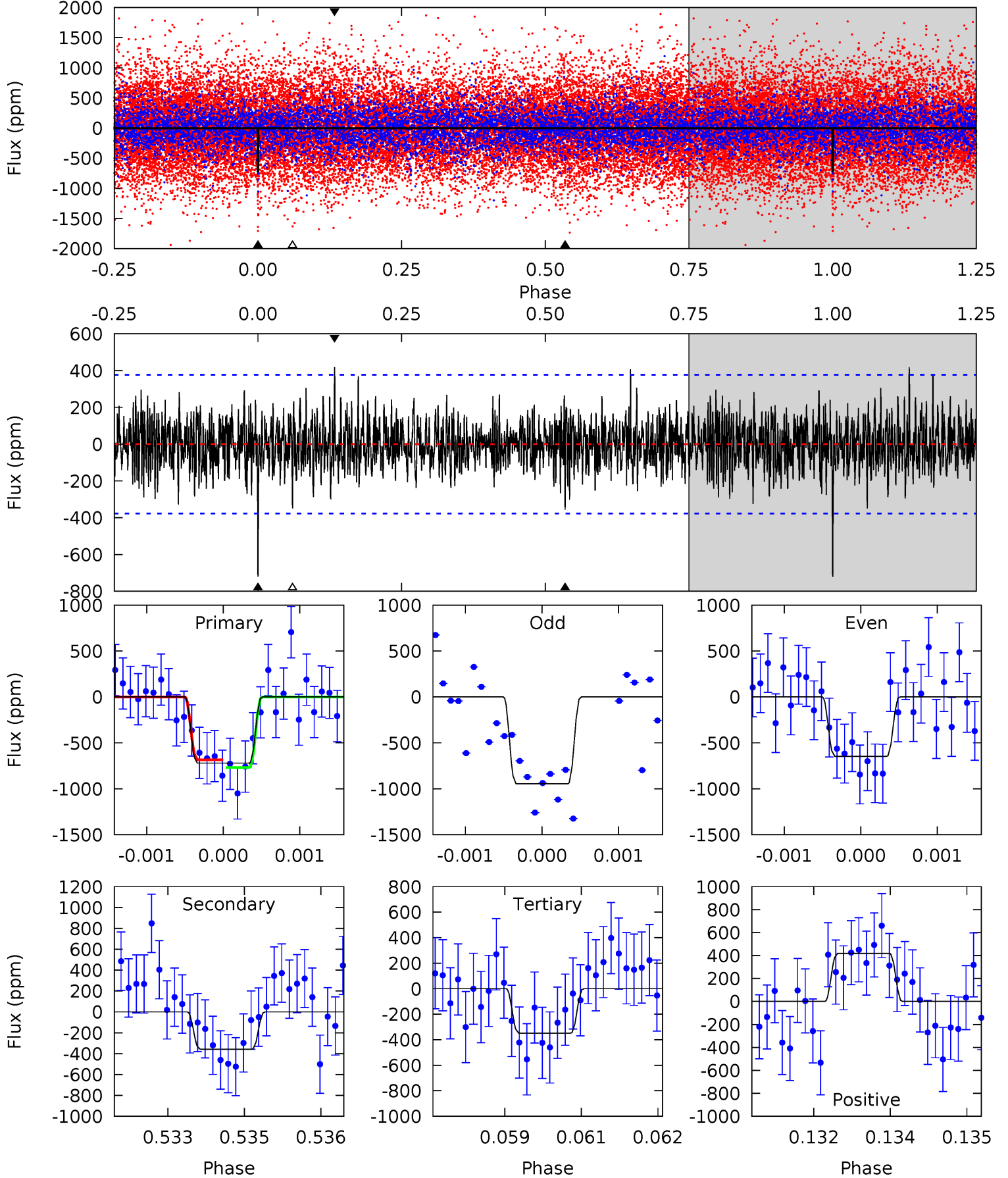
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.6	9.92	8.36	6.72	5.34	3.11	2.23	4.25	5.89	1.56	3.20	0.73	0.90	0.35	1.36



Alt Model-Shift Uniqueness Test

004381016-02, P = 153.218410 Days, E = 51.542714 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	5.09	4.97	5.97	5.38	3.18	1.50	5.31	4.31	0.12	-0.88	1.93	0.90	0.37	0.59



Stellar Parameters For KIC 004381016

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	$M(M_{\odot})$	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	7226^{+226}_{-302}	$3.688^{+0.495}_{-0.082}$	$-0.240^{+0.250}_{-0.350}$	$3.211^{+0.406}_{-1.725}$	$1.836^{+0.179}_{-0.536}$	$0.078^{+0.415}_{-0.022}$
	+3%/-4%	+13%/-2%	+104%/-146%	+13%/-54%	+10%/-29%	+532%/-29%
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 004381016-02 / KOI

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-457 ± 46	$8.67^{+1.63}_{-2.28}$	931^{+64}_{-121}	6365^{+439}_{-387}	1570^{+1209}_{-472}
Alt.	-357 ± 70	$8.97^{+1.71}_{-2.30}$	928^{+74}_{-103}	5897^{+452}_{-436}	1143^{+830}_{-368}

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

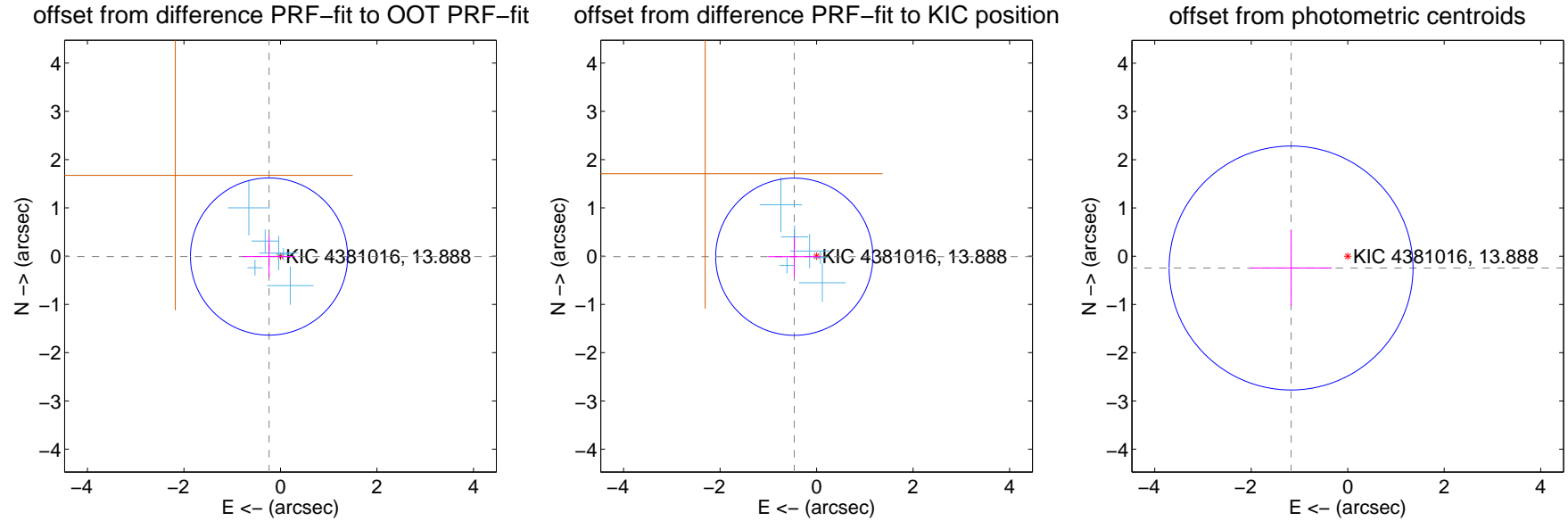
DV Centroid Data

Supplemental centroid analysis for 004381016-02. Kepler magnitude: 13.89. Transit SNR 7.45

There are 6 quarters with good PRF difference image offsets

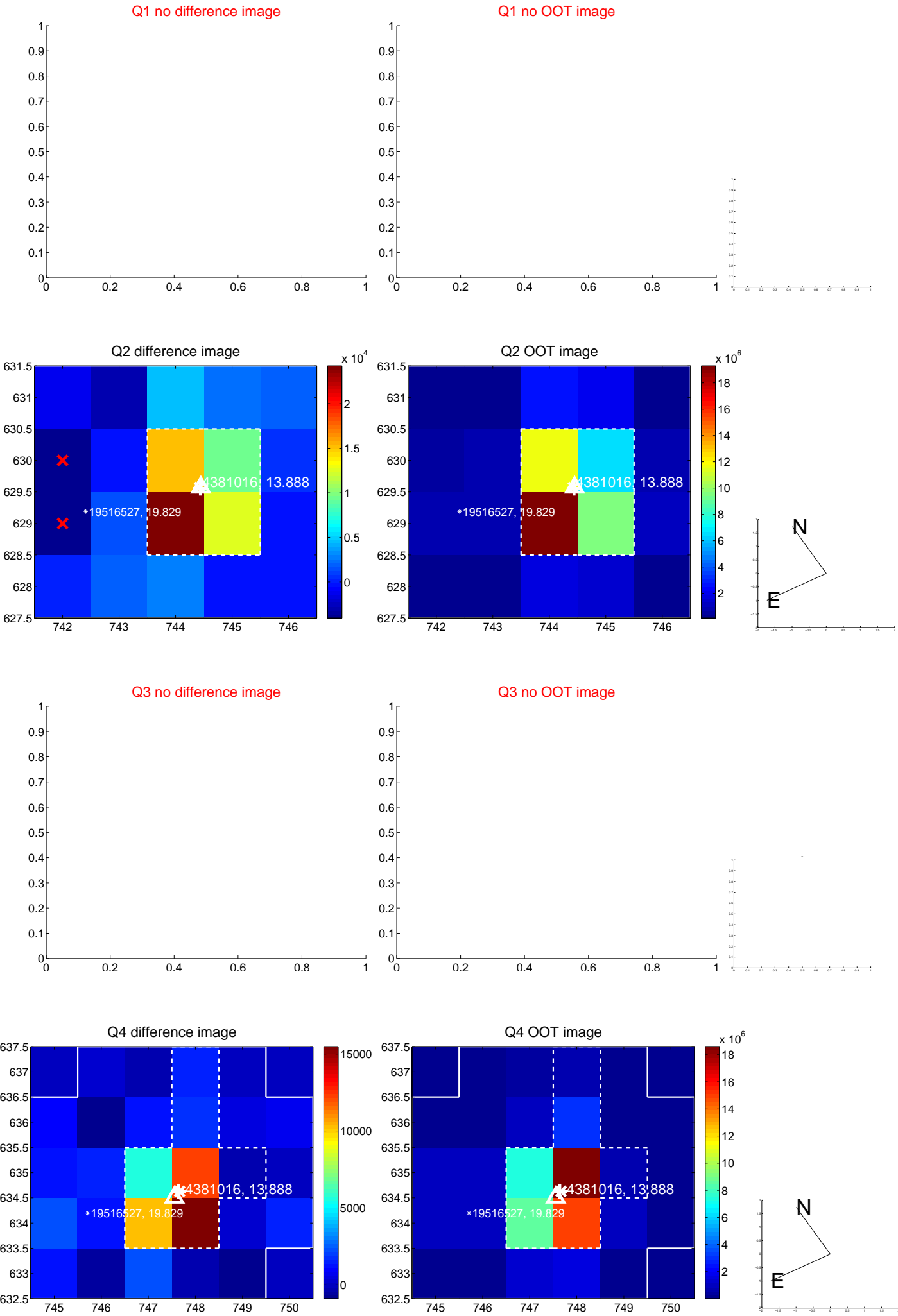
The direct PRF centroid is offset from the target star catalog position by about 0.11 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.237 ± 0.543	0.44	0.237 ± 0.543	-0.009 ± 0.422
PRF-fit source offset from KIC position	0.463 ± 0.543	0.85	0.462 ± 0.543	-0.012 ± 0.422
photometric centroid source offset	1.20 ± 0.84	1.42	1.17 ± 0.84	-0.24 ± 0.79

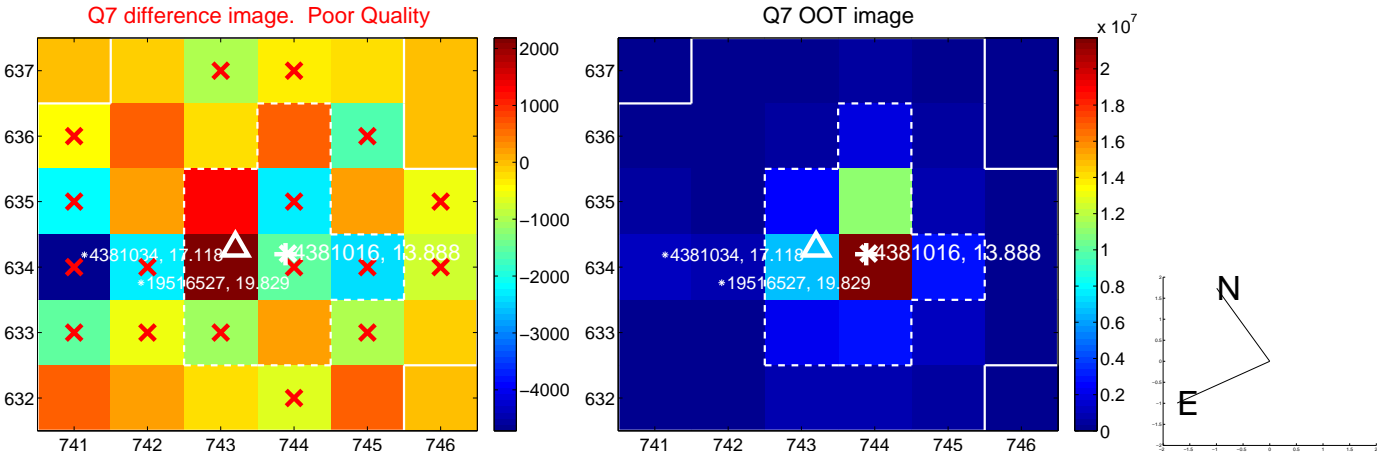
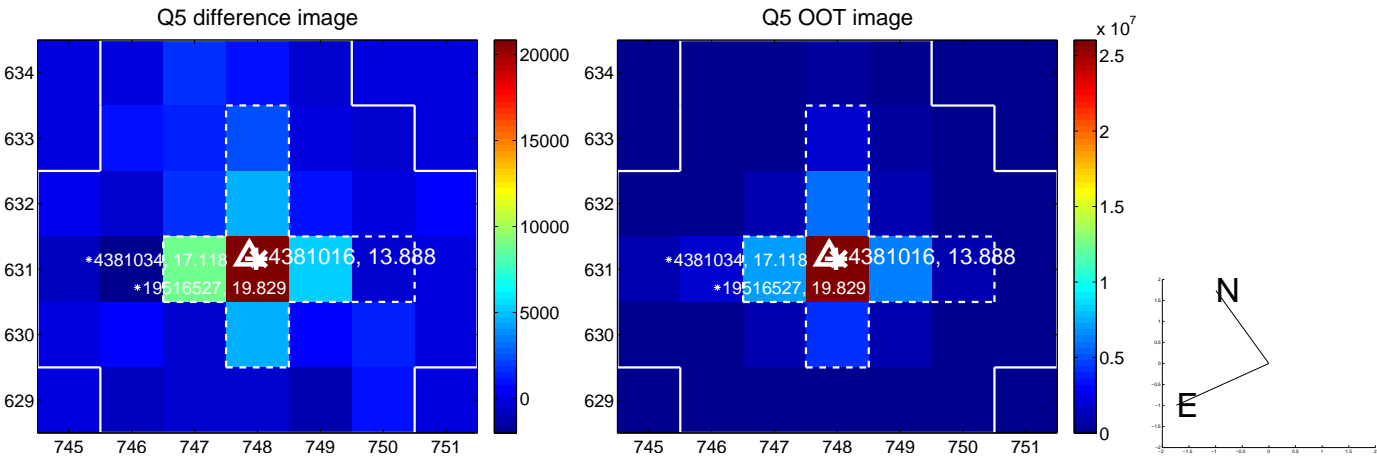


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

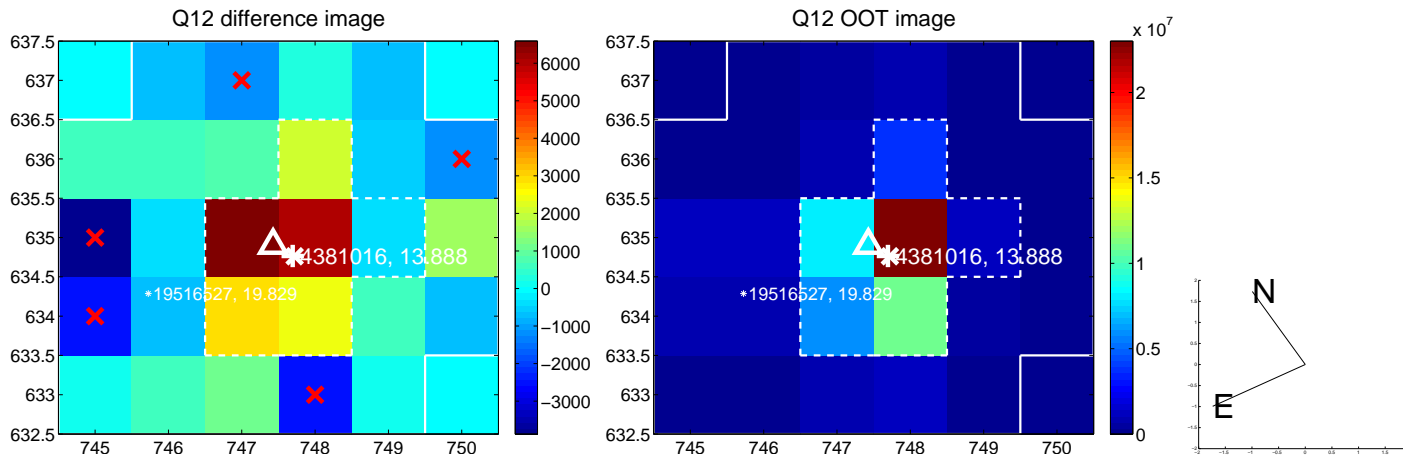
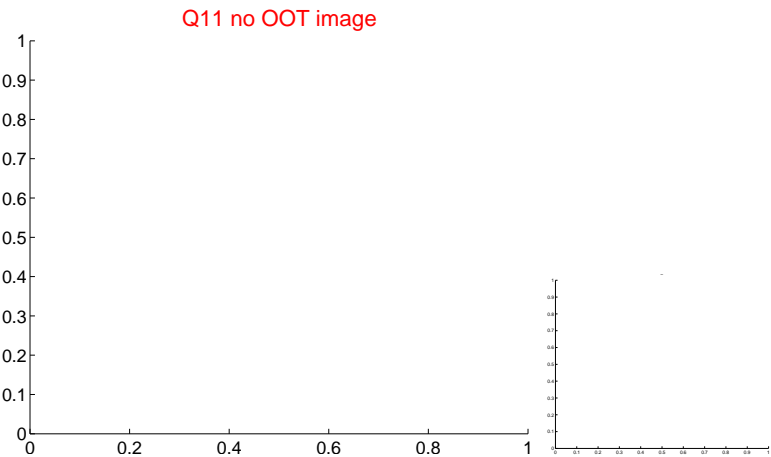
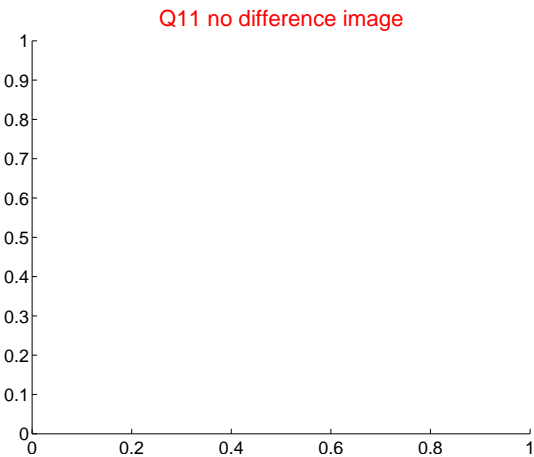
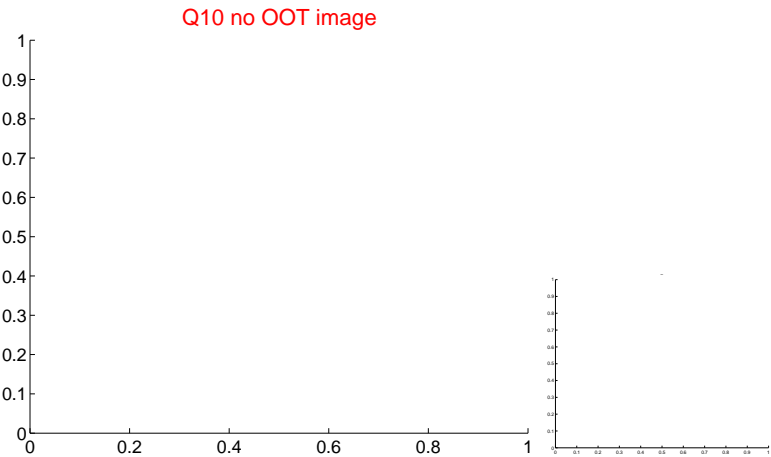
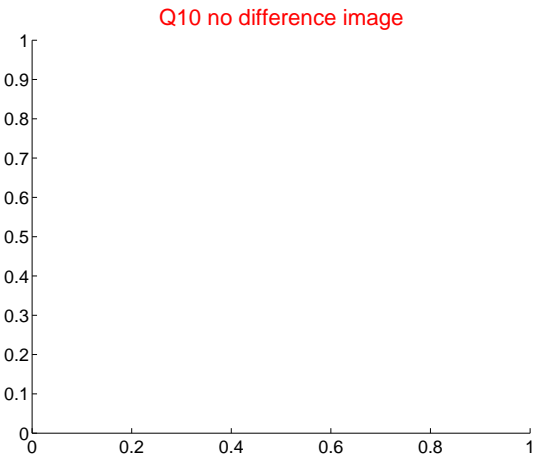
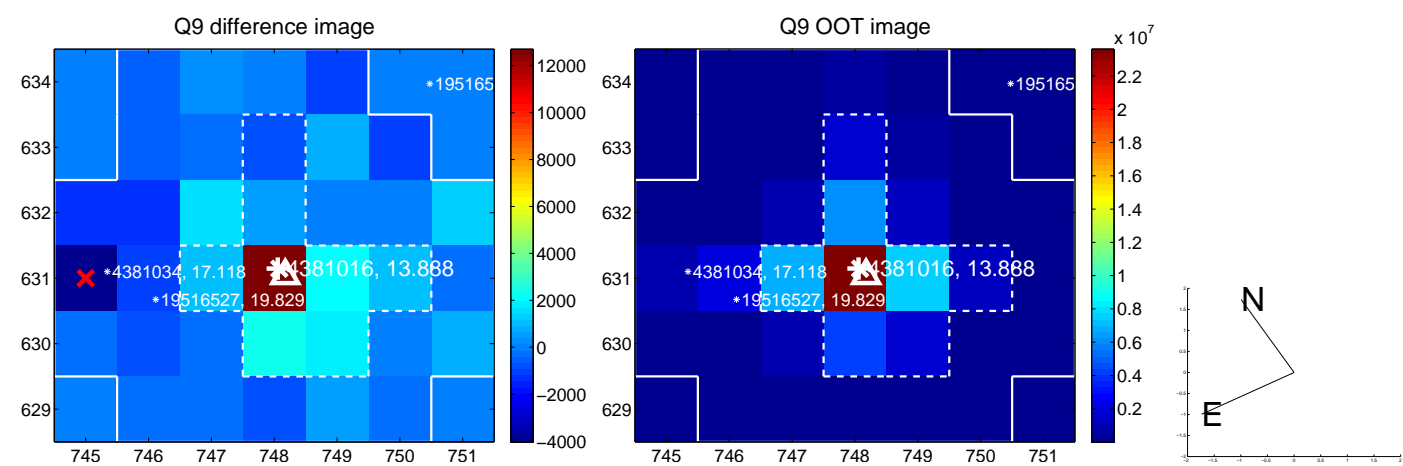
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



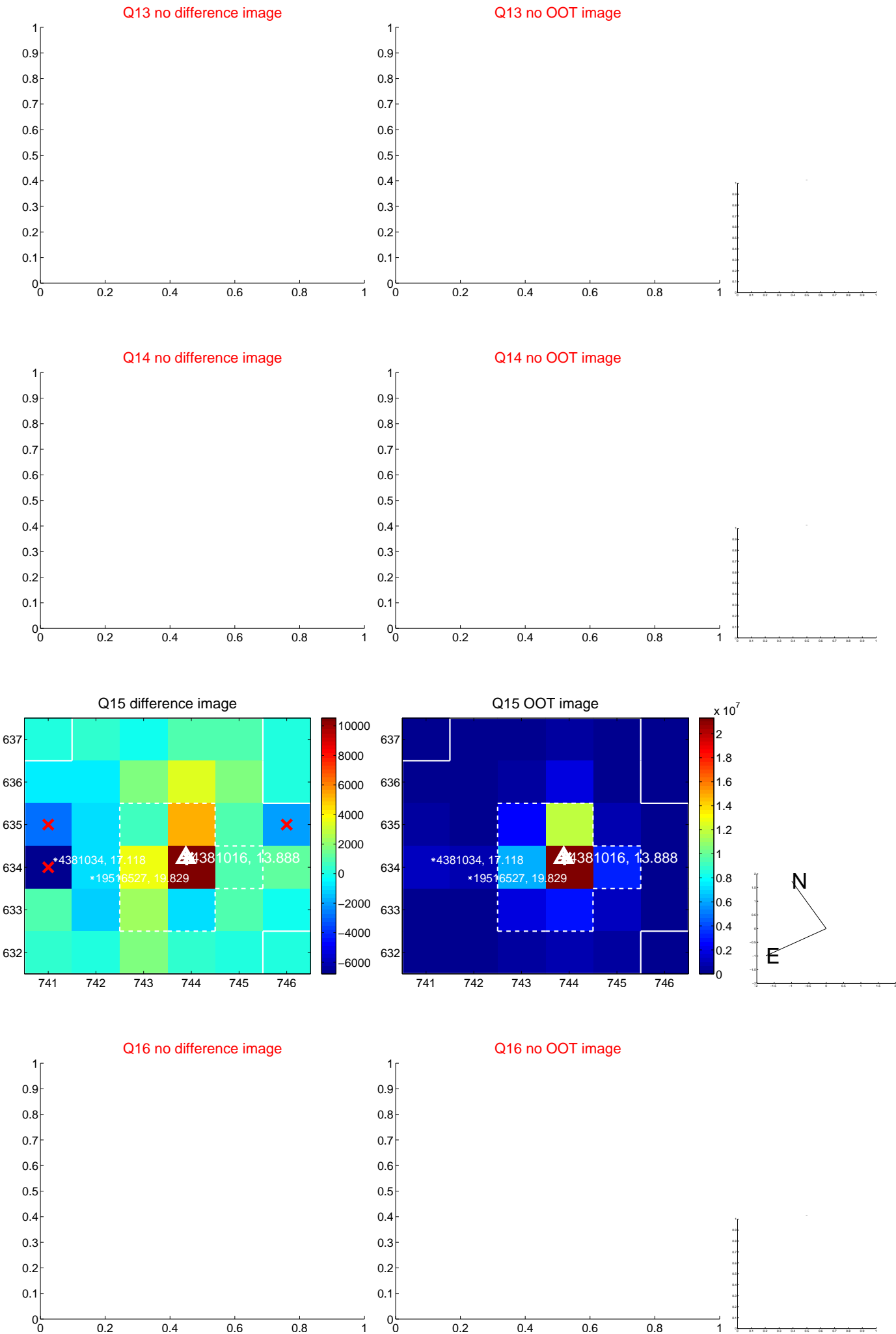
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



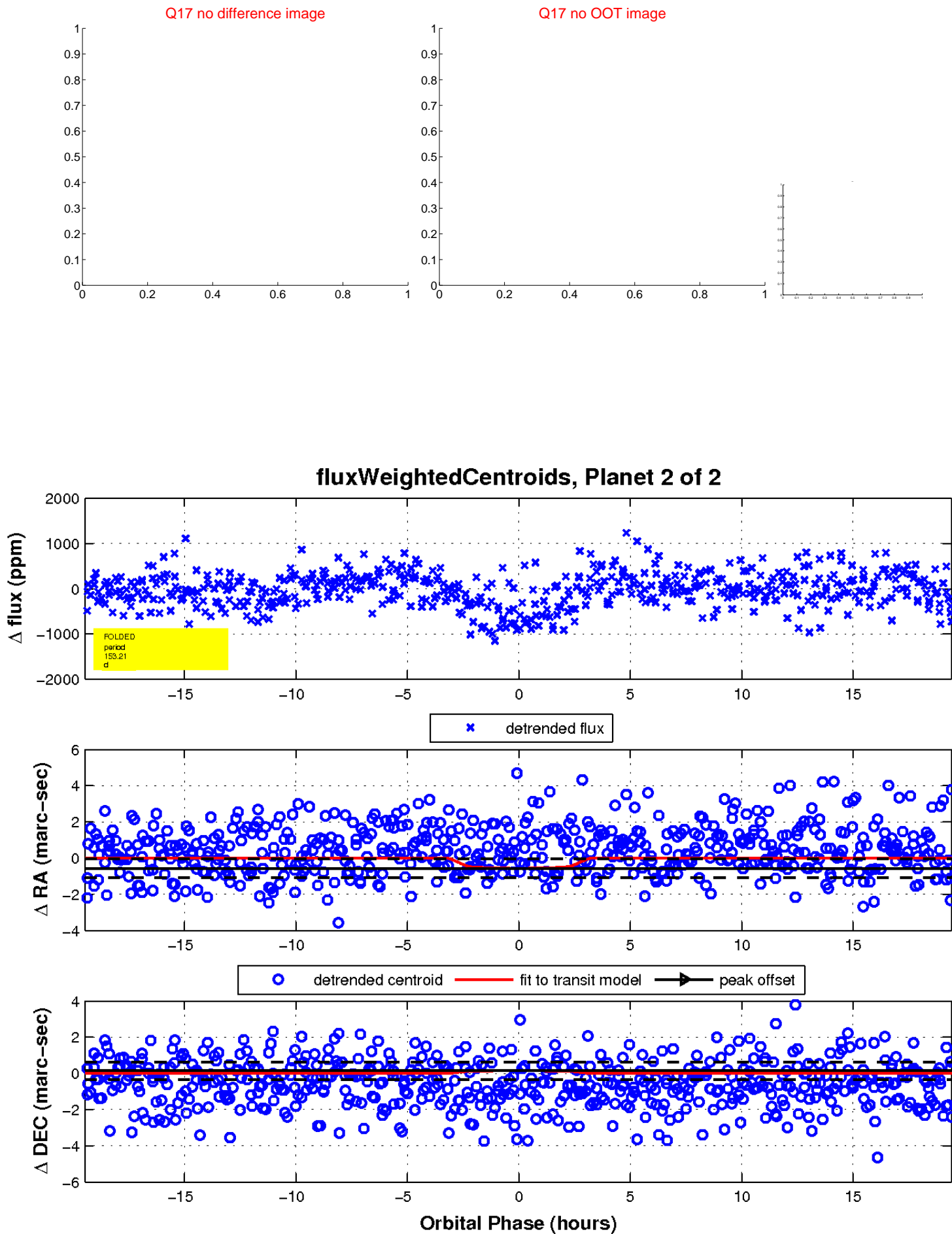
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



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



UKIRT Image

