

KIC 009655978

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})
009655978-01	OBS	No	0.790847	132.126952	7.7	5.396	8.3	2.7	1.79	6913	0.50	17404.94
009655978-02	OBS	No	16.235630	138.265724	386.9	1.218	12.1	12.3	1.79	6913	3.57	309.63
009655978-03	OBS	No	28.195177	151.520769	156.1	7.092	10.4	7.5	1.79	6913	2.37	148.33
009655978-04	OBS	No	38.789059	135.956139	327.0	2.285	10.4	9.7	1.79	6913	3.65	96.94

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009655978-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT
009655978-02	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009655978-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_TRACKER—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009655978-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—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.

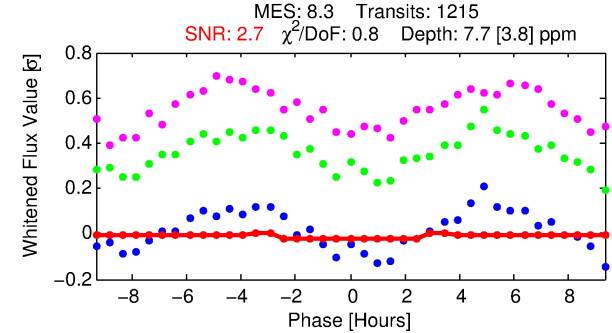
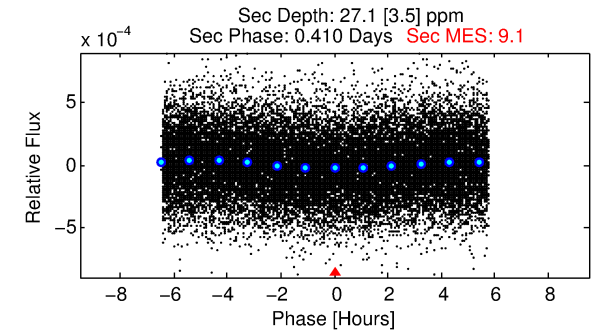
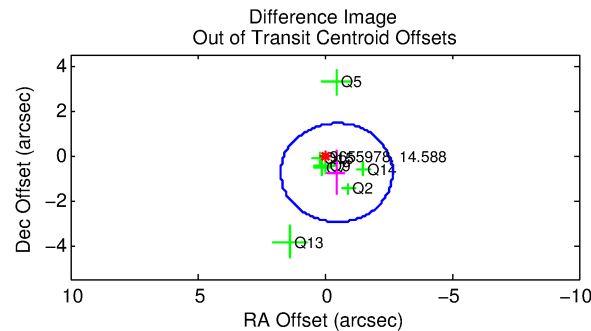
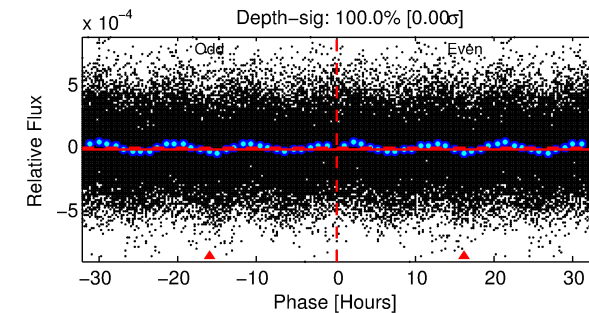
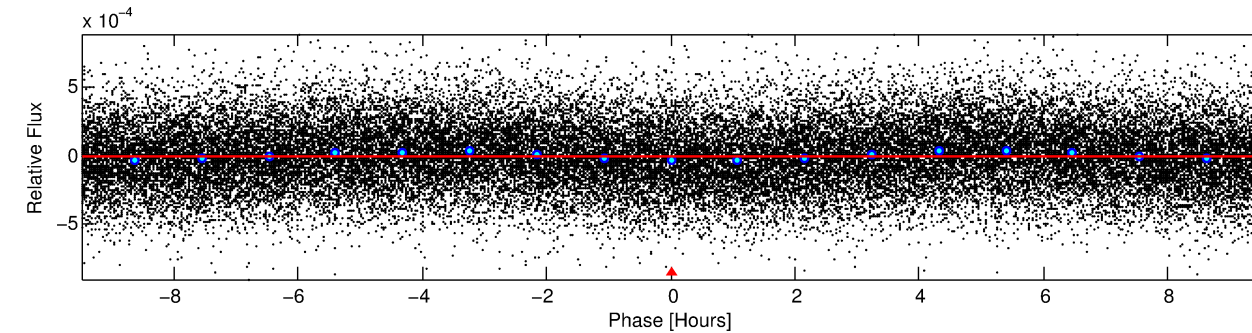
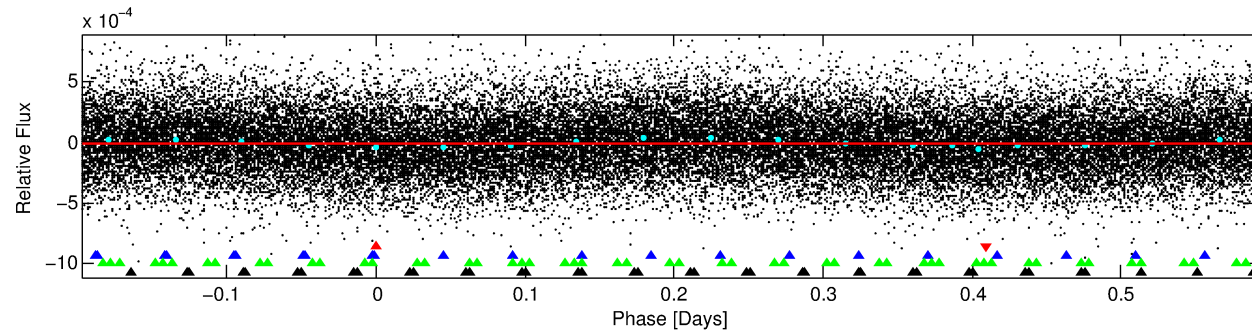
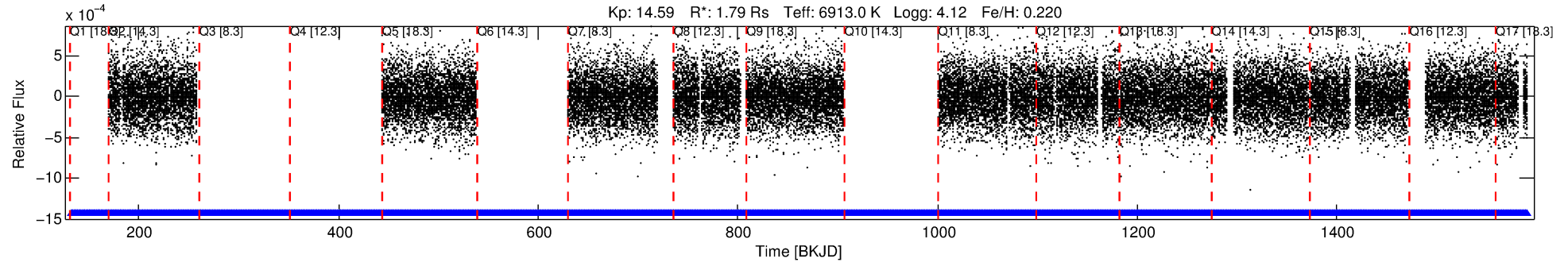
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009655978-01

No Significant Match Found

DV One-Page Summary

KIC: 9655978 Candidate: 1 of 4 Period: 0.791 d



DV Fit Results:

Period = 0.79085 [0.00005] d
Epoch = 132.1270 [0.0183] BKJD
Rp/R* = 0.0026 [0.0101]
a/R* = 1.28 [11.21]
b = 0.10 [220.71]
Seff = 17404.94 [7046.19]
Teq = 2929 [296] K
Rp = 0.50 [1.98] Re
a = 0.0194 [0.0050] AU
Ag = 22.25 [175.52] [0.12σ]
Teffp = 9835 [19379] K [0.36σ]

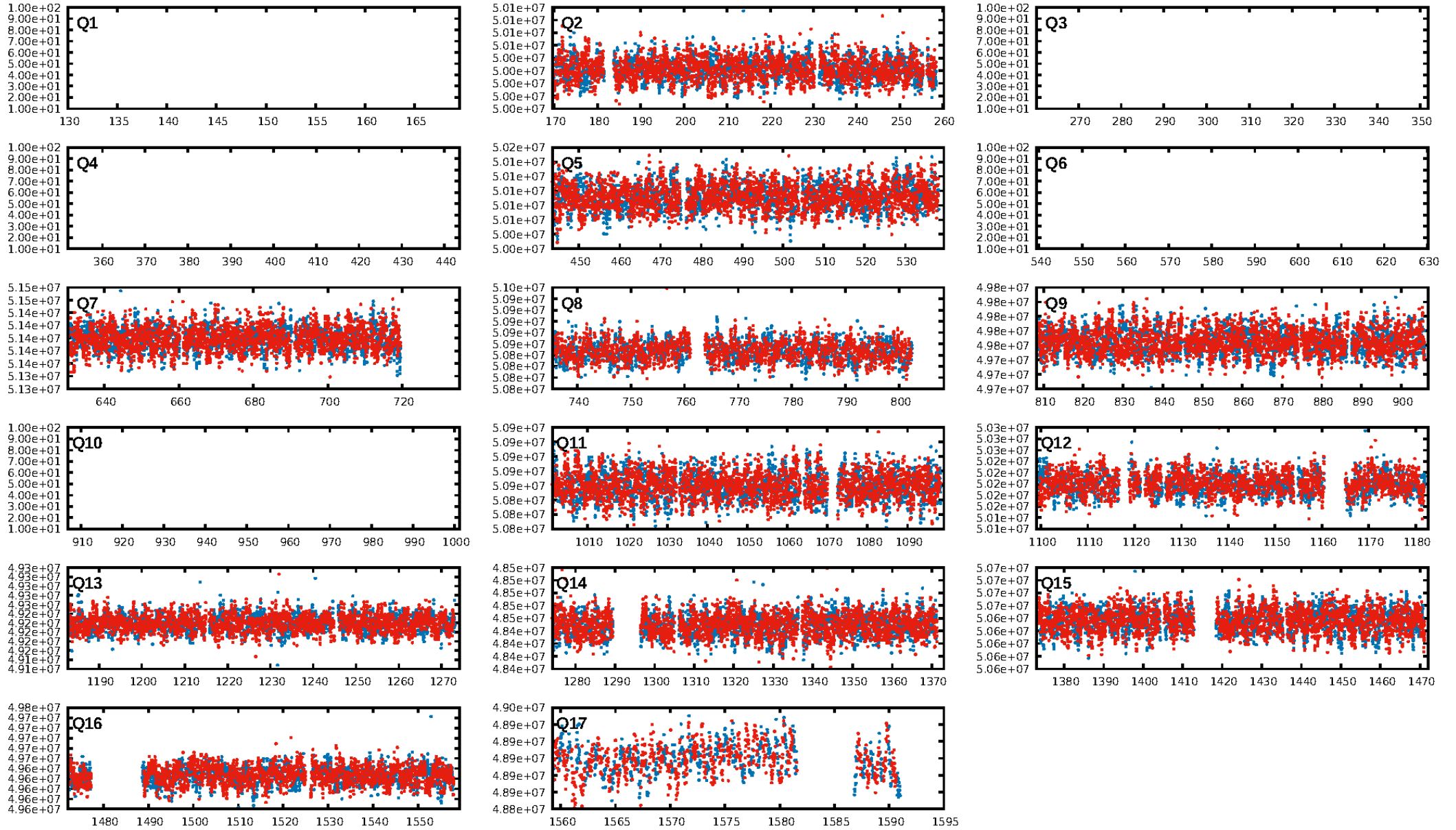
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 100.0% [67.01σ]
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: 2.15e-07
RollingBand-fgt: 1.00 [1182/1182]
GhostDiagnostic-chr: 1.006
Centroid-sig: 35.4%
Centroid-so: 4.148 arcsec [1.15σ]
OotOffset-rm: 0.900 arcsec [1.23σ]
OotOffset-st: 2/2/0/3 [7]
KicOffset-rm: 0.906 arcsec [1.51σ]
KicOffset-st: 2/2/0/3 [7]
DiffImageQuality-fgm: 0.57 [4/7]
DiffImageOverlap-fno: 1.00 [12/12]

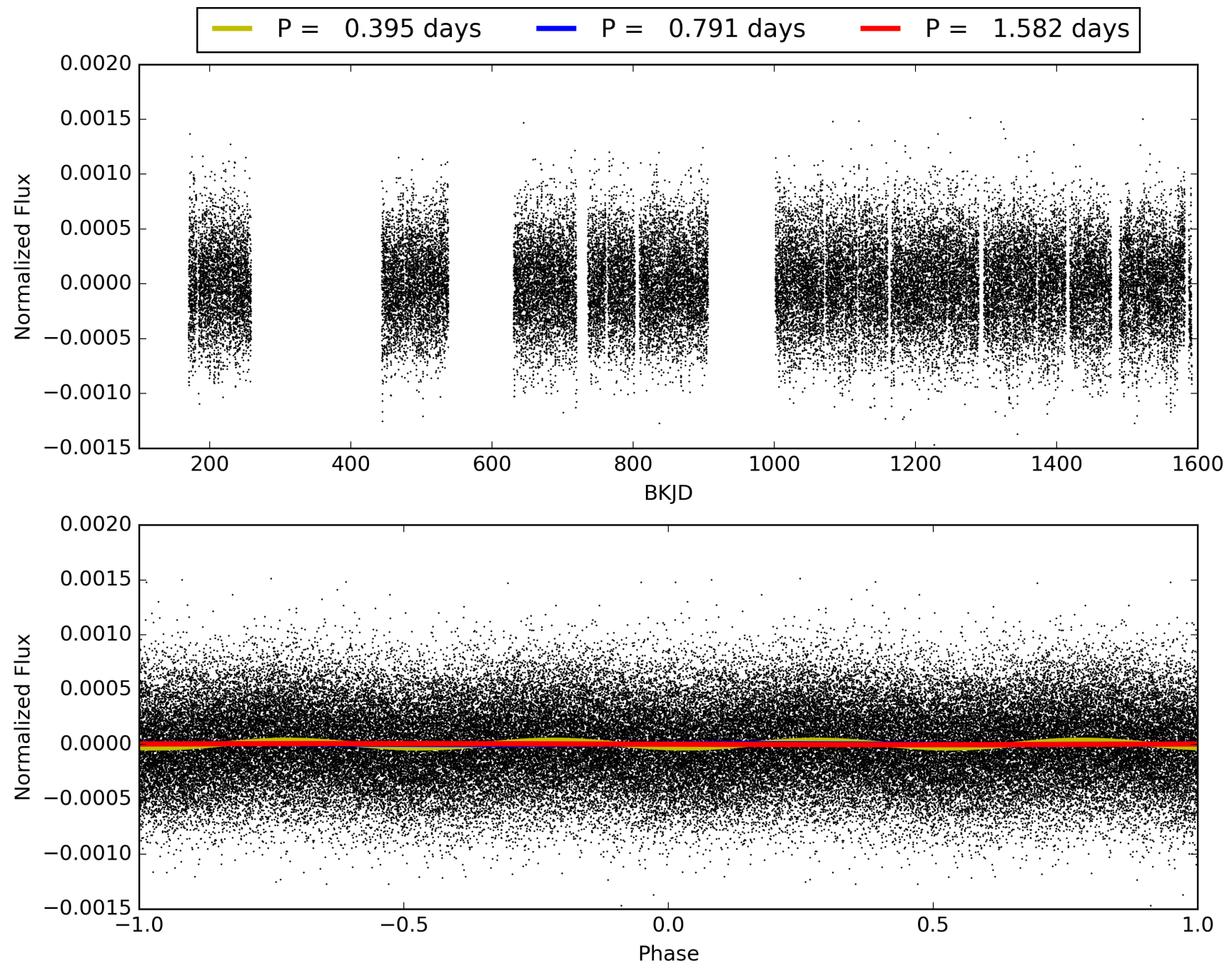
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:45:39 Z

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

TCE 009655978-01, PDC Light Curves

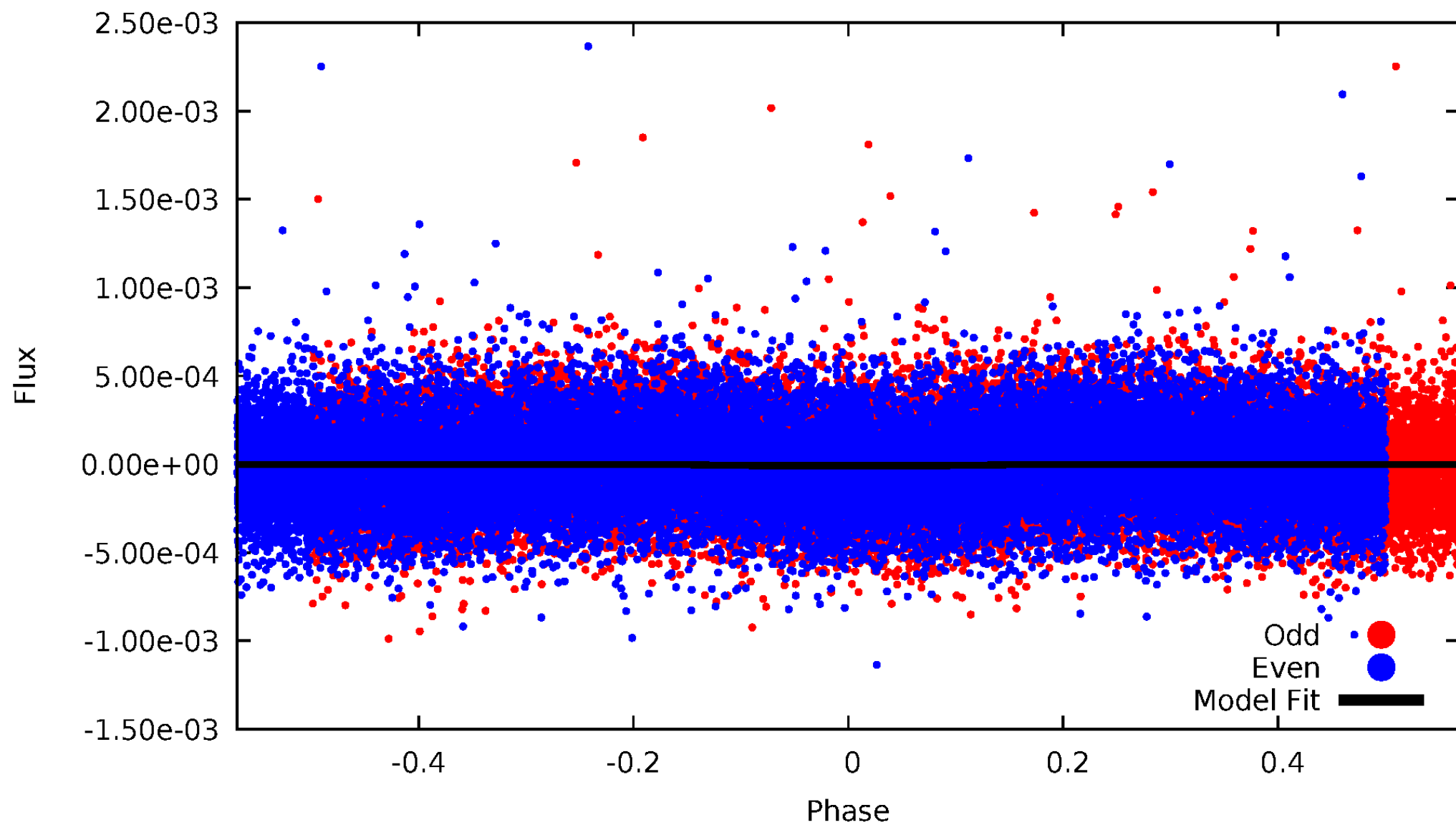


TCE 009655978-01



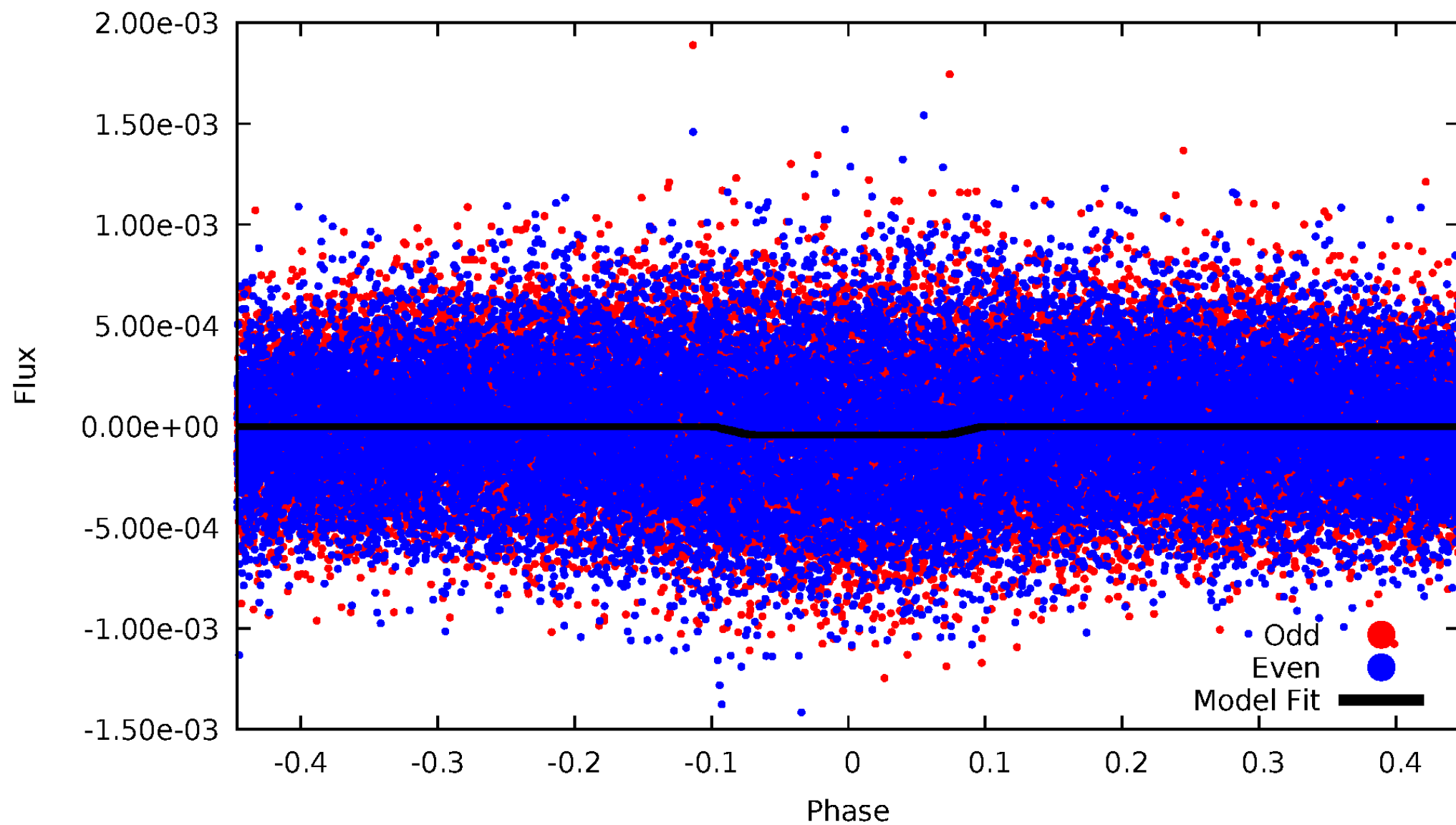
DV Odd/Even

TCE 009655978-01



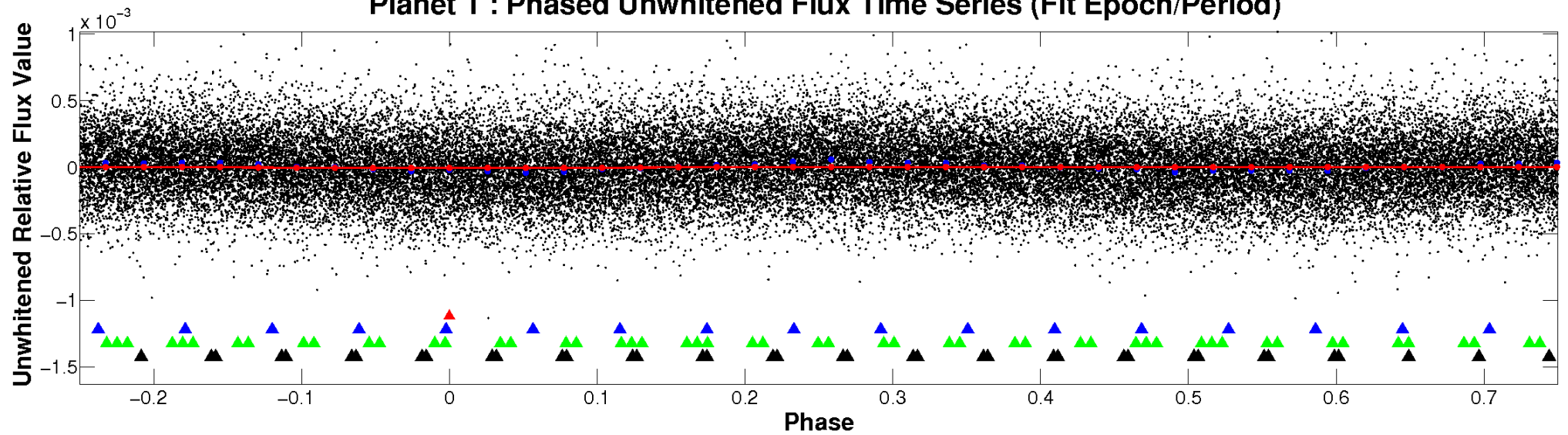
ALT Odd/Even

TCE 009655978-01

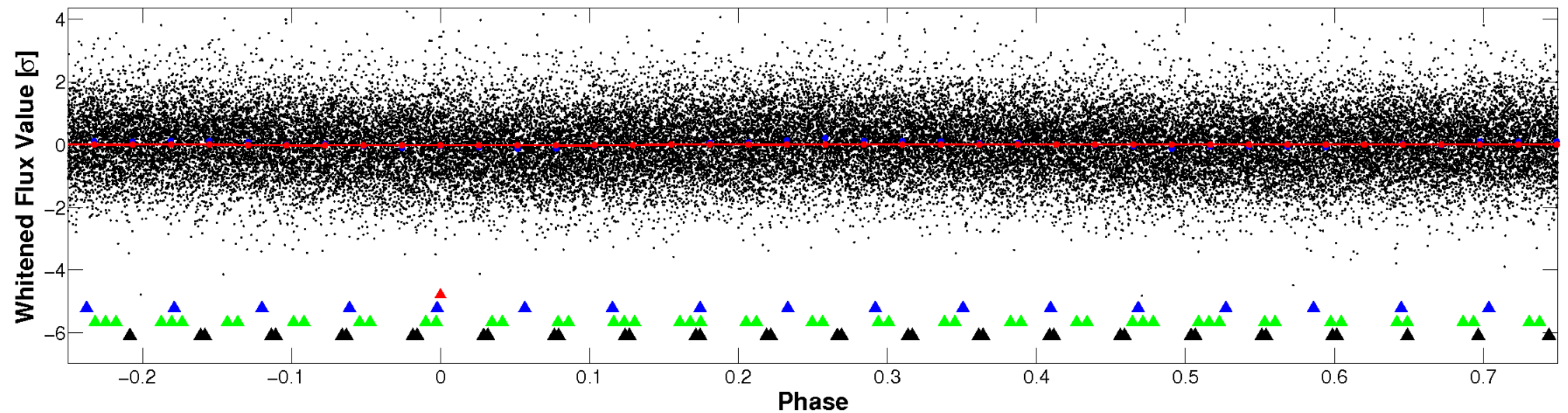


Non-Whitened Vs. Whitened Light Curve

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

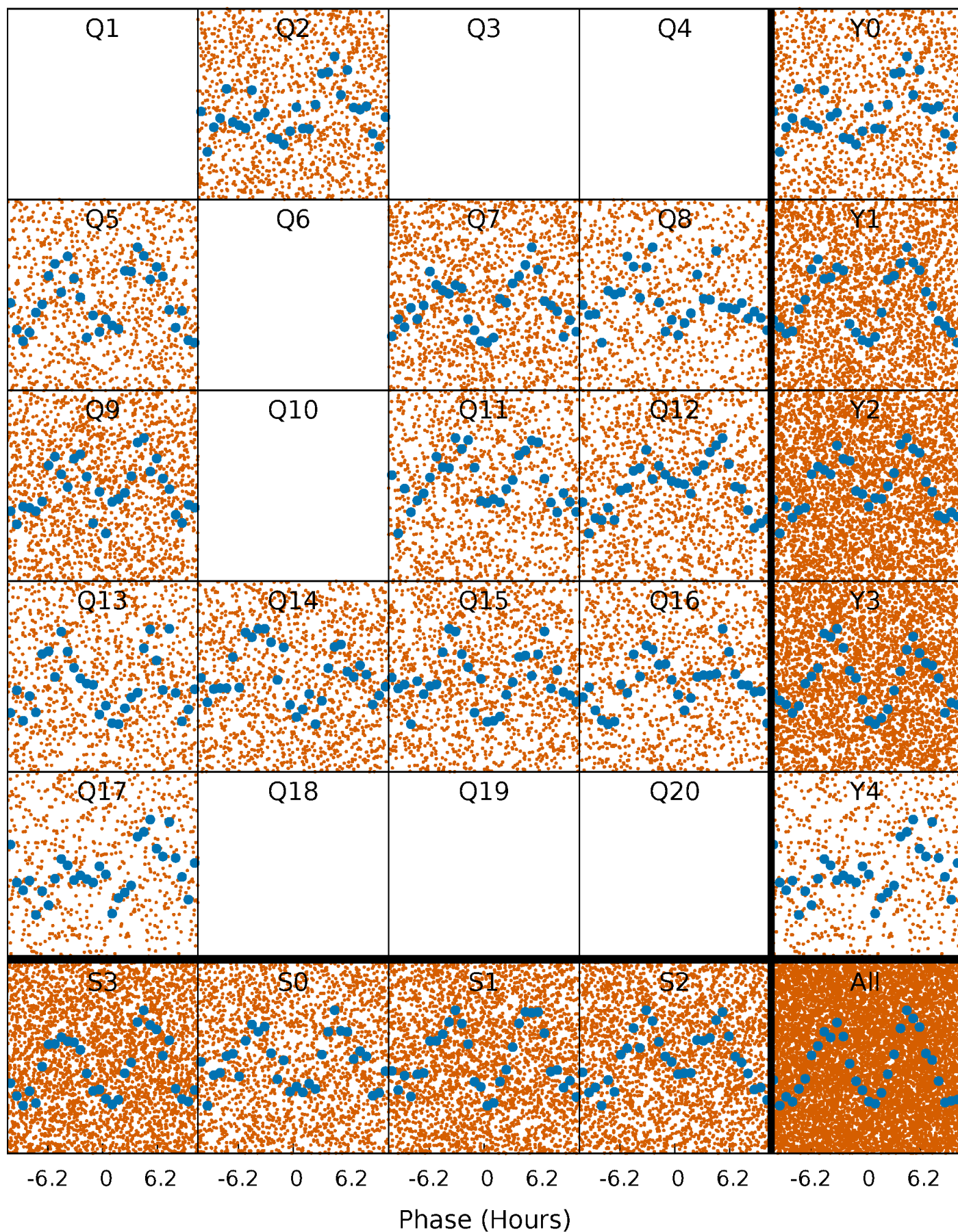


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



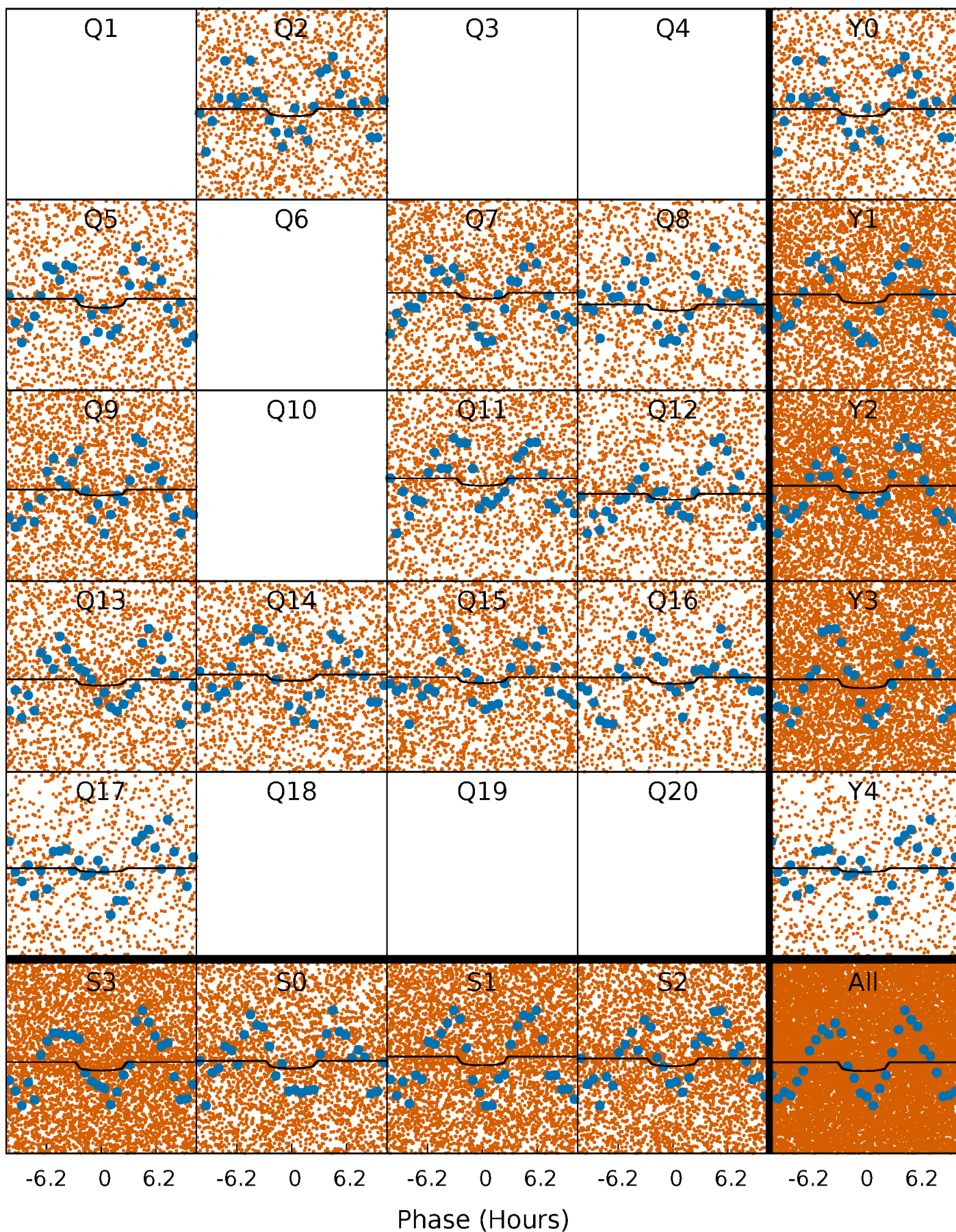
PDC Quarter-Phased Transit Curves

TCE 009655978-01 P= 0.790847 Days $T_0=132.126952$ (BKJD)



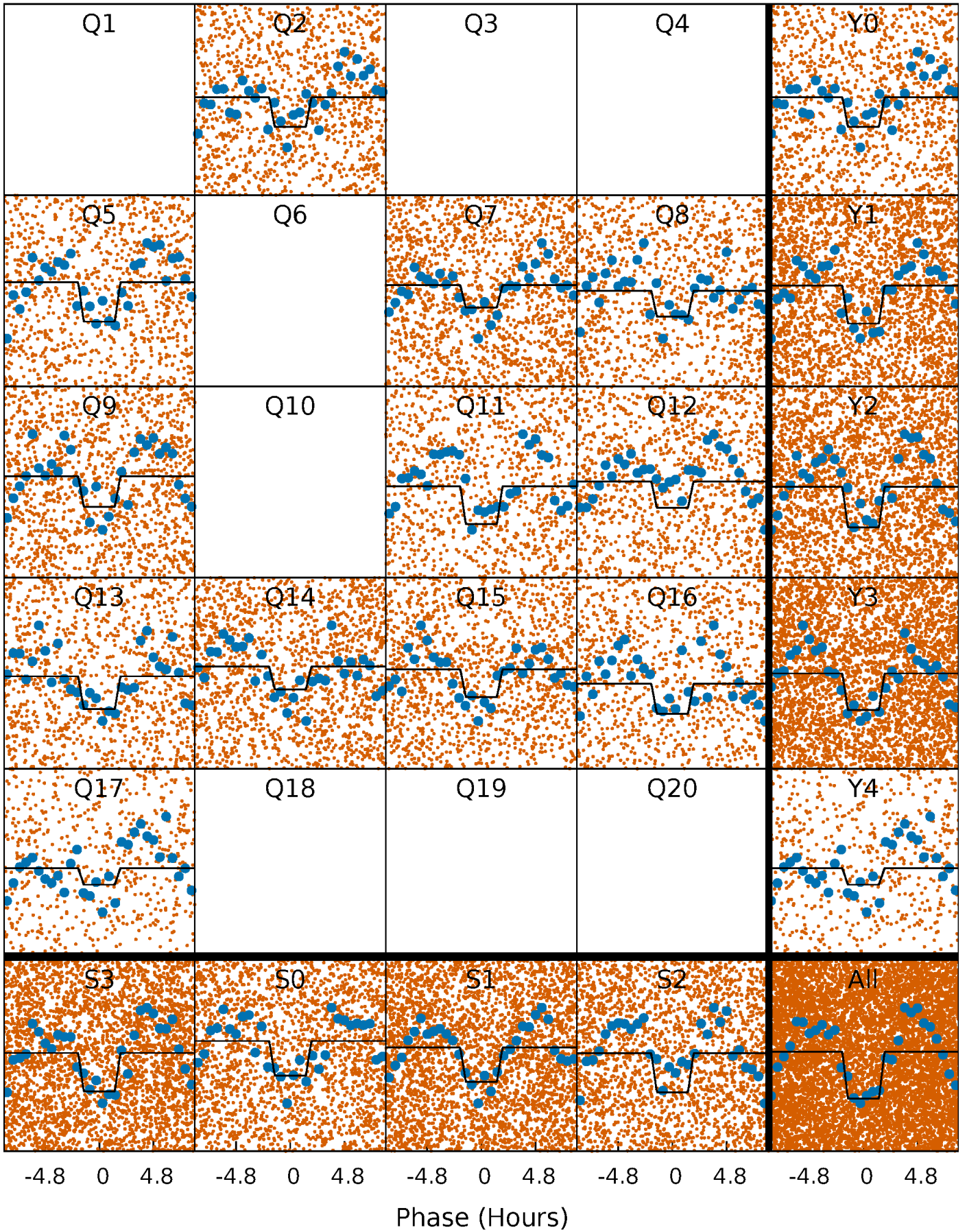
DV Quarter-Phased Transit Curves

TCE 009655978-01 P= 0.790847 Days $T_0=132.126952$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

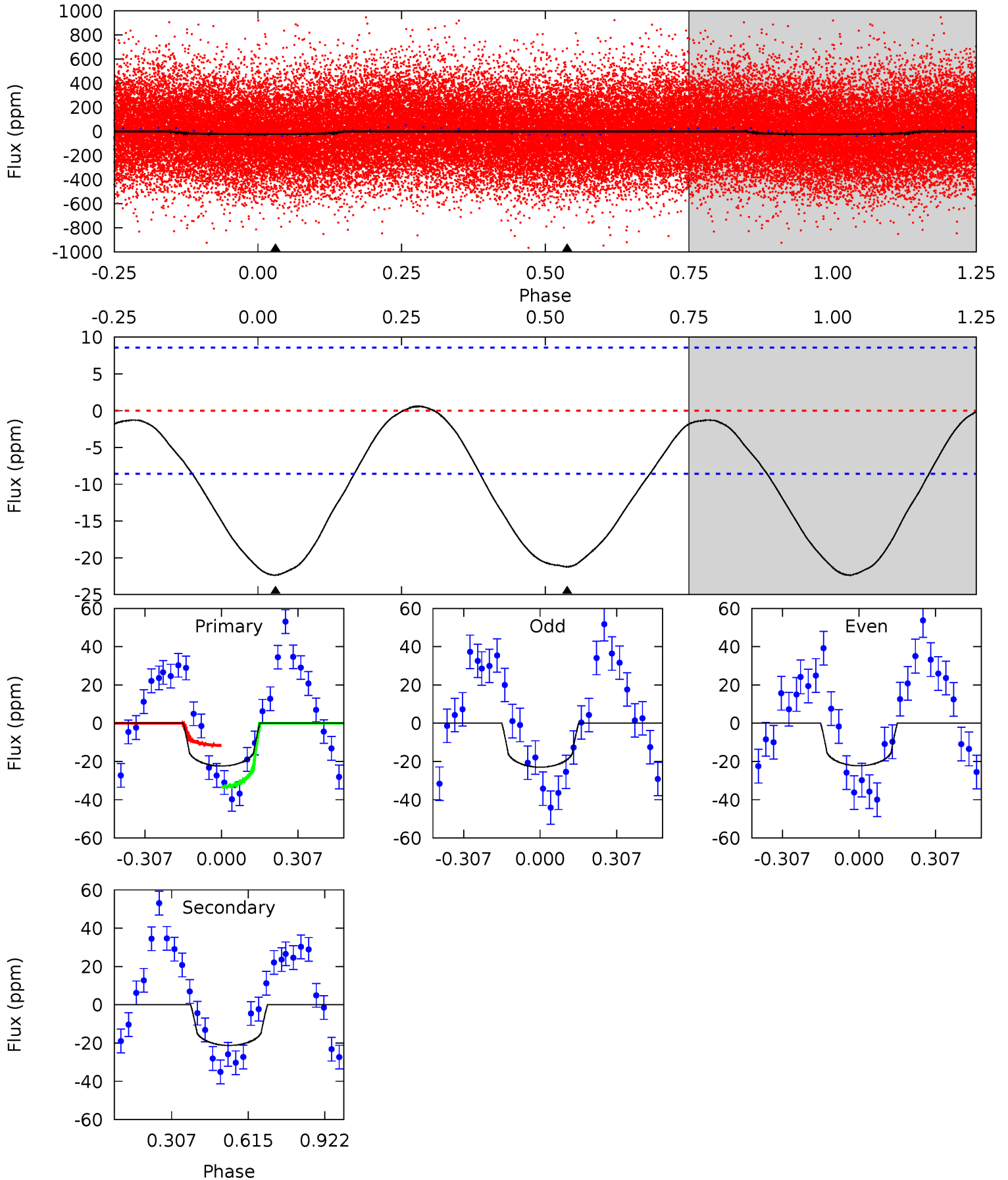
TCE 009655978-01 P= 0.790915 Days $T_0=132.073527$ (BKJD)



DV Model-Shift Uniqueness Test

009655978-01, P = 0.790847 Days, E = 132.126952 Days

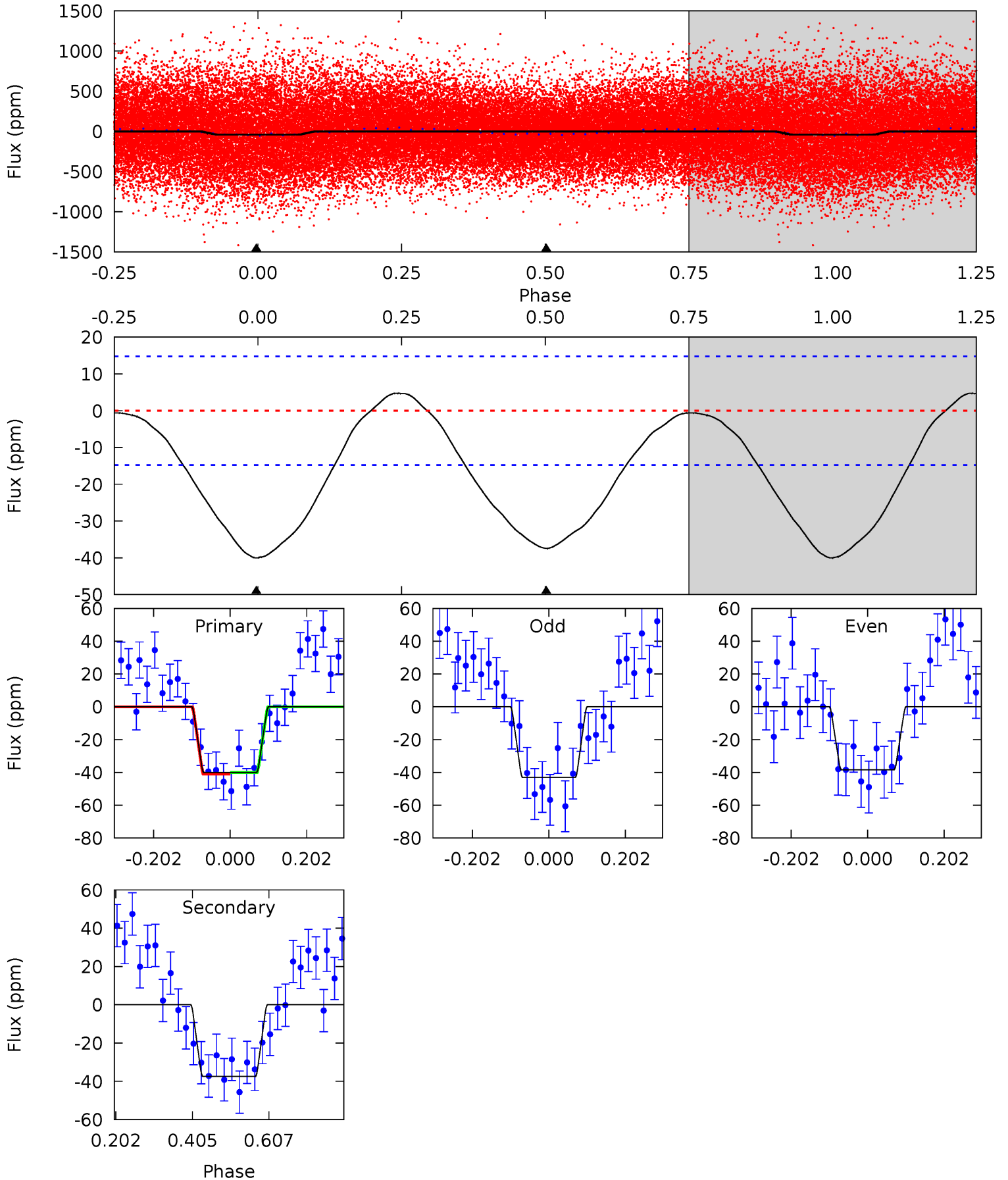
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.3	10.7	0	0	4.32	1.02	0.44	11.3	11.3	10.7	10.7	0.19	0.97	0.03	5.53



Alt Model-Shift Uniqueness Test

009655978-01, P = 0.790915 Days, E = 132.073527 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.0	11.2	0	0	4.41	1.27	0.77	12.0	12.0	11.2	11.2	0.69	0.92	0.11	0.14



Stellar Parameters For KIC 009655978

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	6913^{+192}_{-312}	$4.125^{+0.128}_{-0.192}$	$0.220^{+0.150}_{-0.350}$	$1.790^{+0.566}_{-0.378}$	$1.560^{+0.208}_{-0.254}$	$0.383^{+0.254}_{-0.207}$
	+3%/-5%	+3%/-5%	+68%/-159%	+32%/-21%	+13%/-16%	+66%/-54%
Source	PHO54	PHO54	PHO54	DSEP		

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

Secondary Eclipse Parameters for KIC 009655978-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	A_{obs}
DV	-21 ± 2	$1.56^{+1.70}_{-1.11}$	4118^{+301}_{-296}	5066^{+5271}_{-1931}	$1.735^{+18.646}_{-1.345}$
Alt.	-37 ± 3	$2.00^{+1.74}_{-1.25}$	4115^{+340}_{-294}	5089^{+4066}_{-1443}	$1.864^{+12.056}_{-1.304}$

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

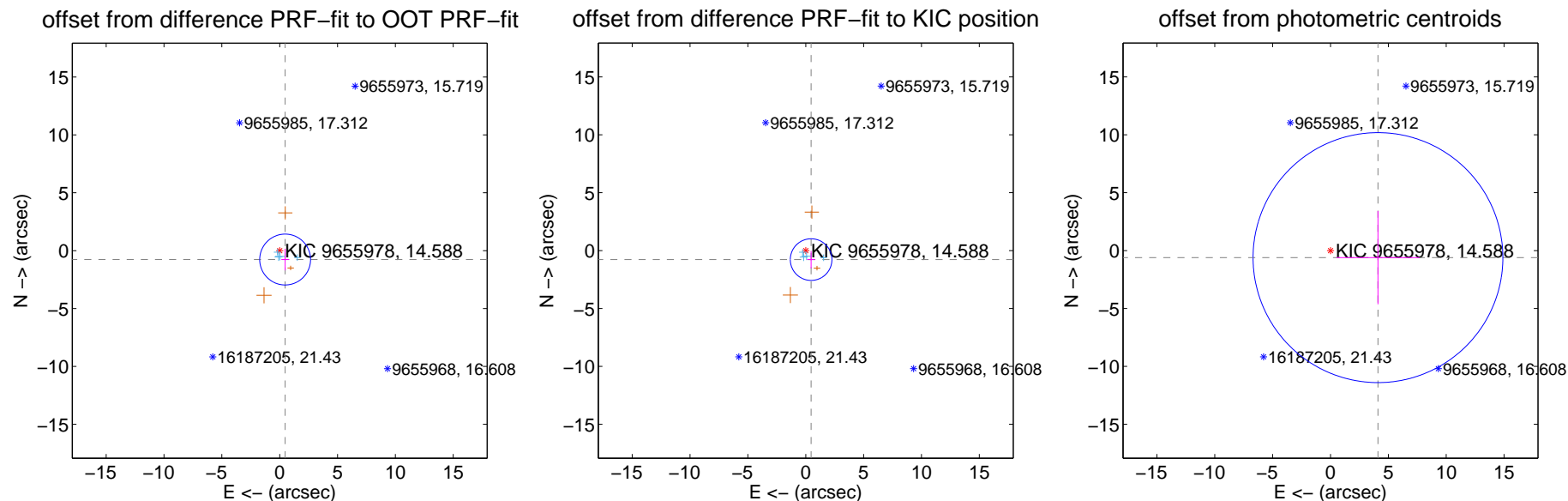
DV Centroid Data

Supplemental centroid analysis for 009655978-01. Kepler magnitude: 14.59. Transit SNR 2.75

There are 4 quarters with good PRF difference image offsets

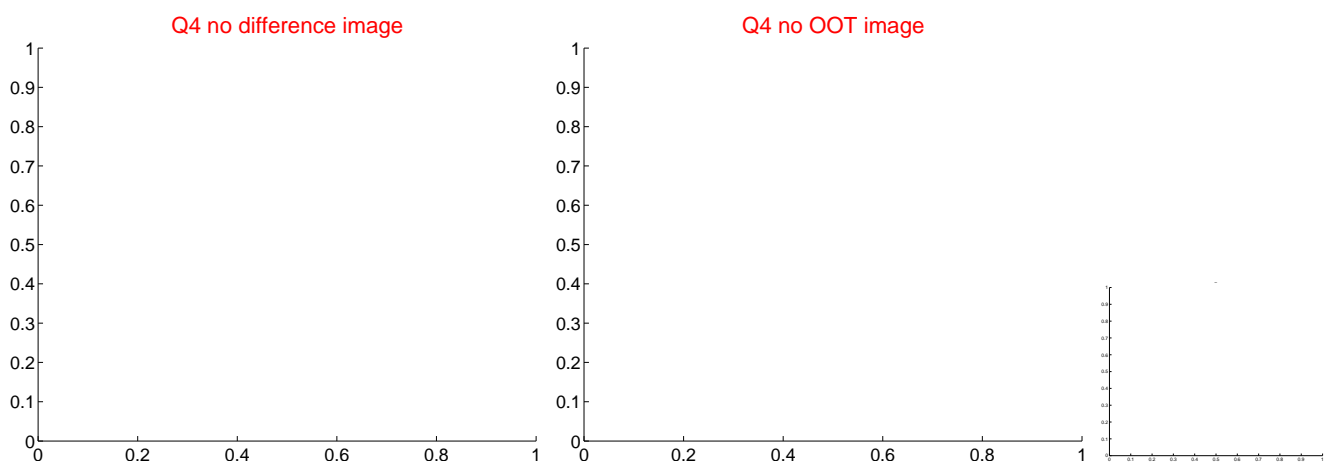
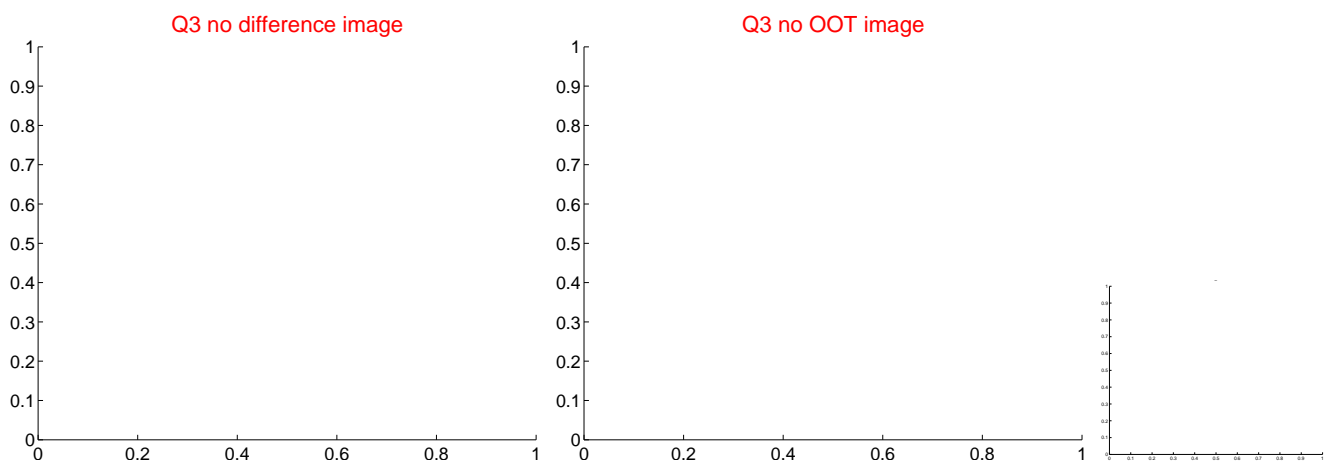
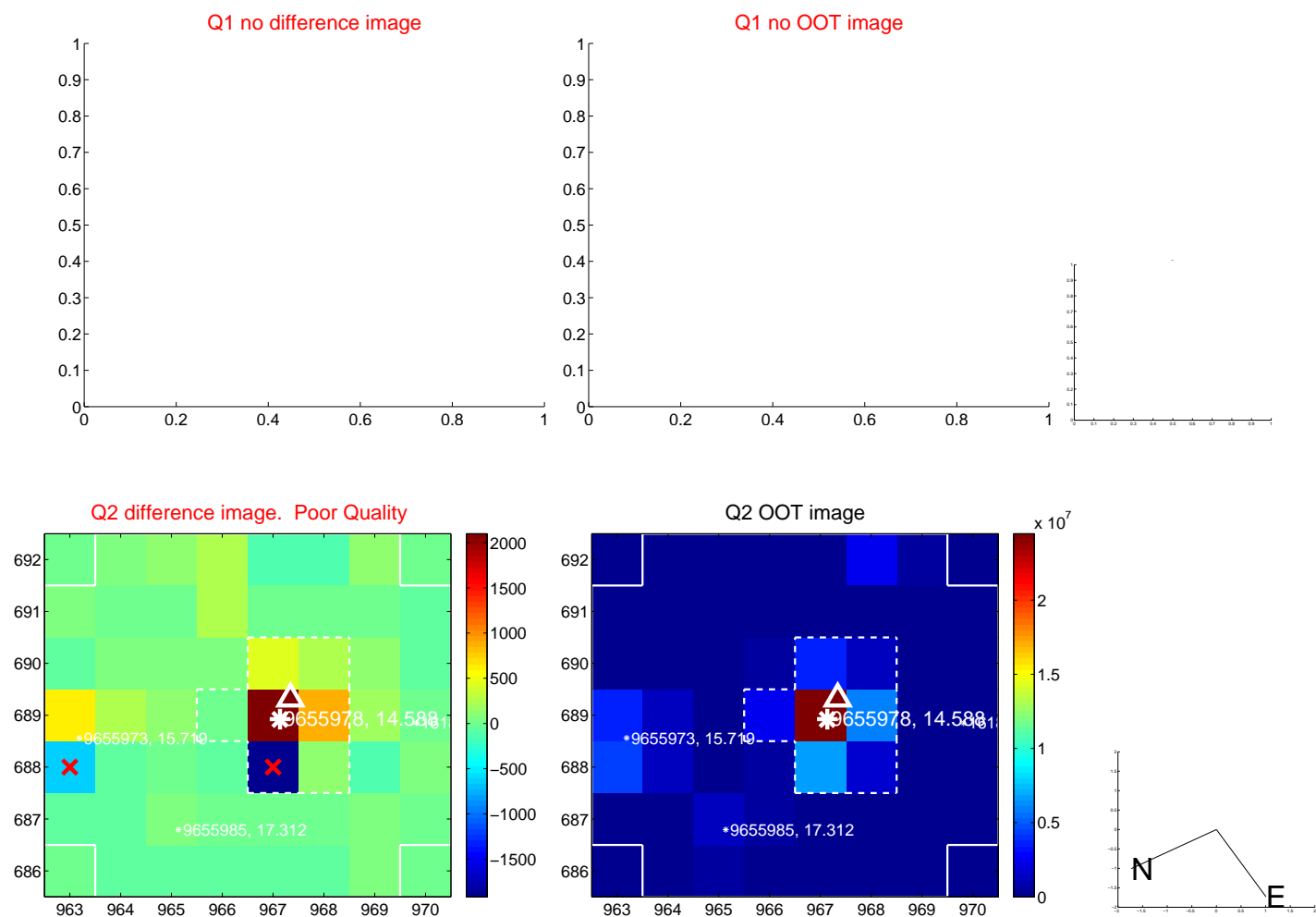
The direct PRF centroid is offset from the target star catalog position by about 0.08 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.900 ± 0.732	1.23	-0.470 ± 0.329	-0.767 ± 0.937
PRF-fit source offset from KIC position	0.906 ± 0.599	1.51	-0.463 ± 0.336	-0.779 ± 0.744
photometric centroid source offset	4.15 ± 3.60	1.15	-4.10 ± 3.59	-0.61 ± 4.03

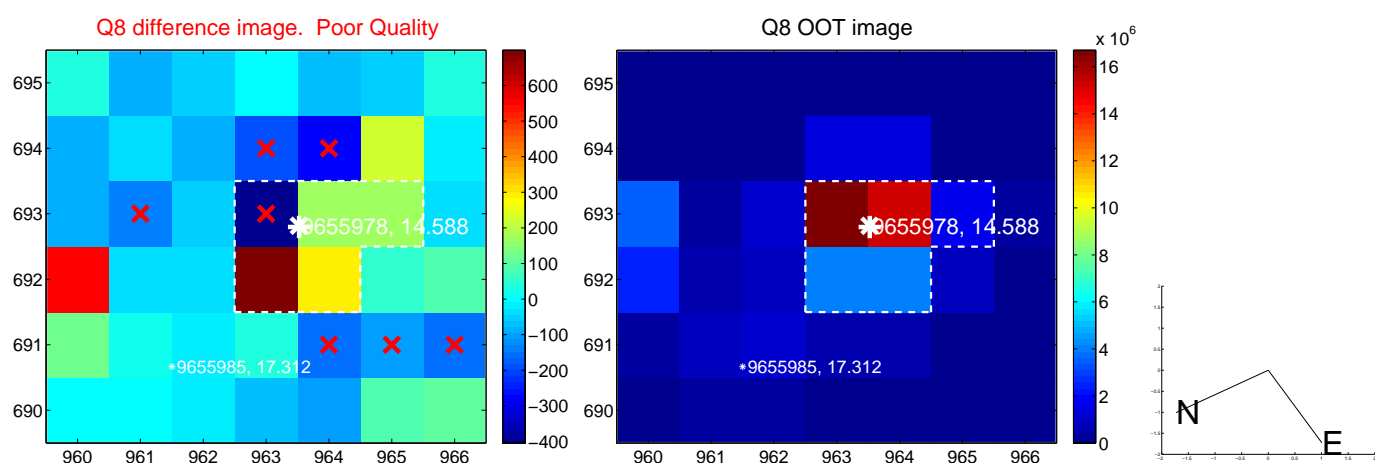
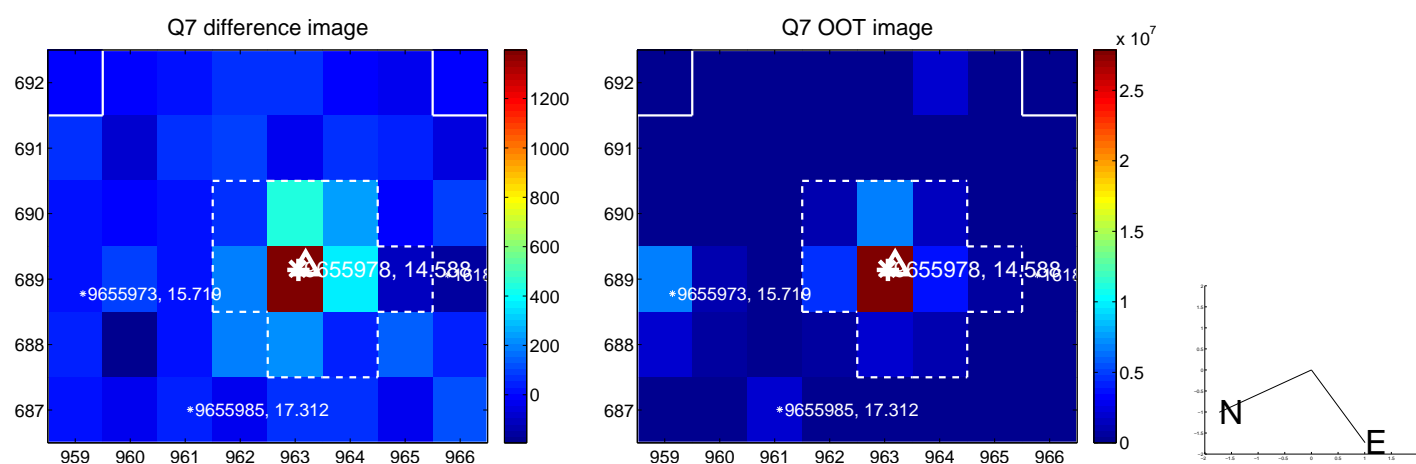
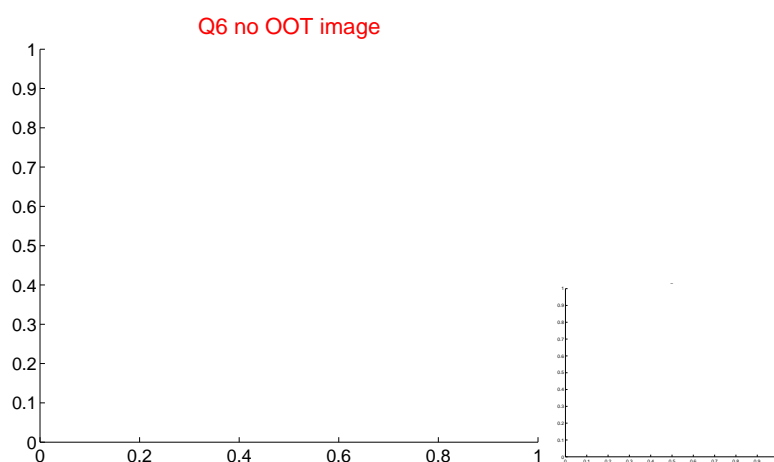
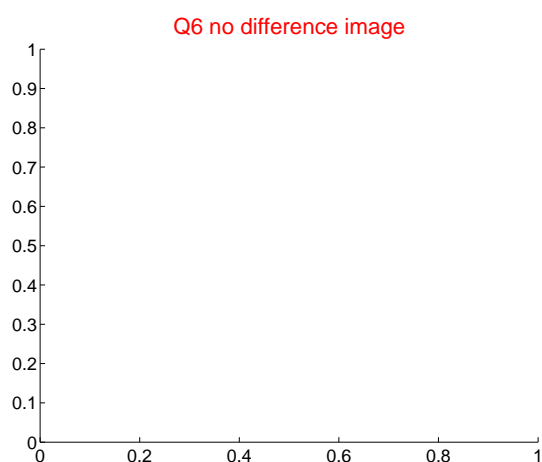
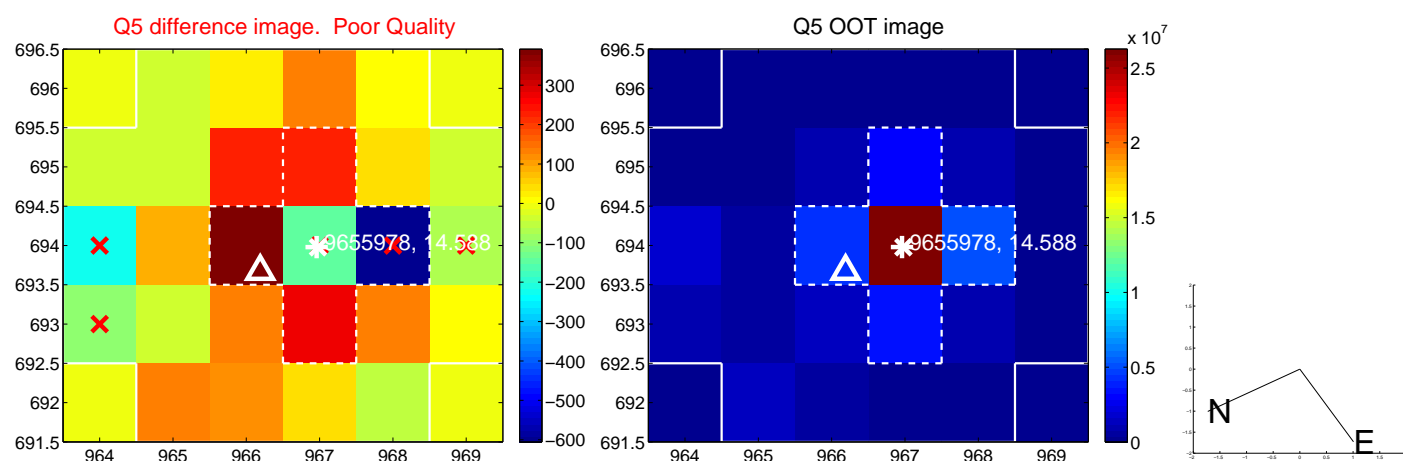


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

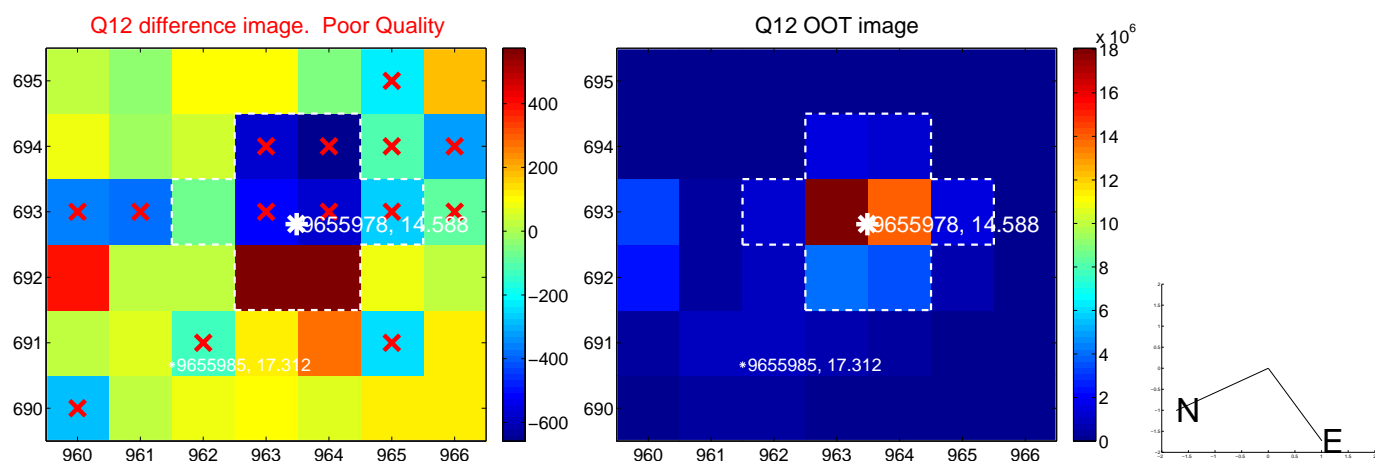
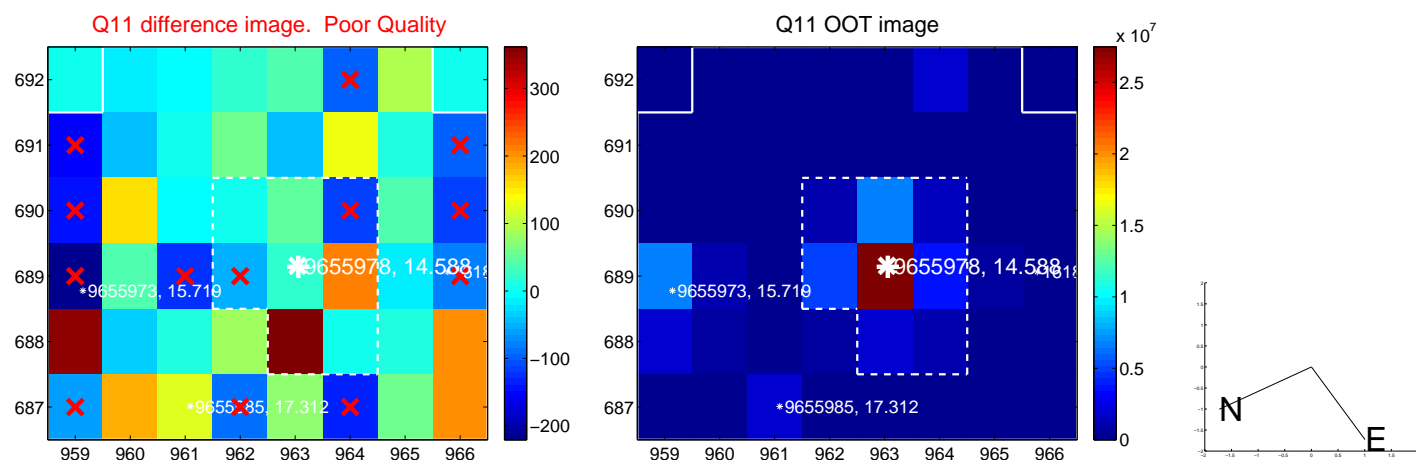
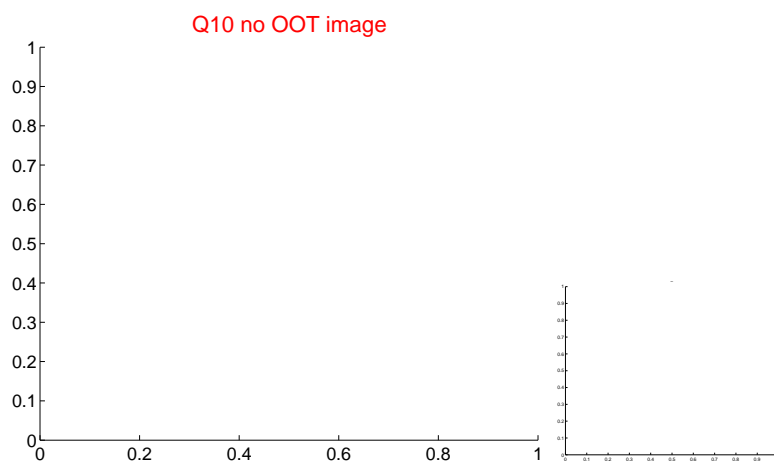
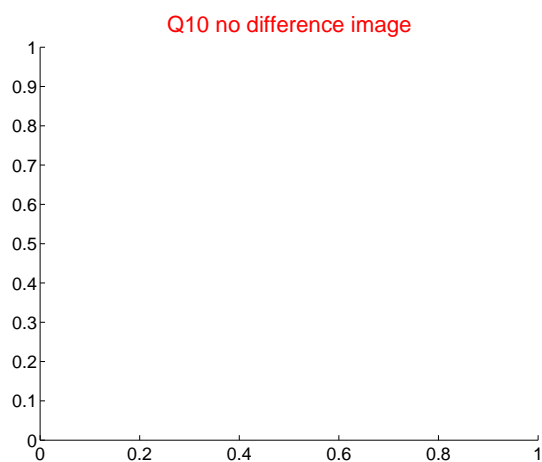
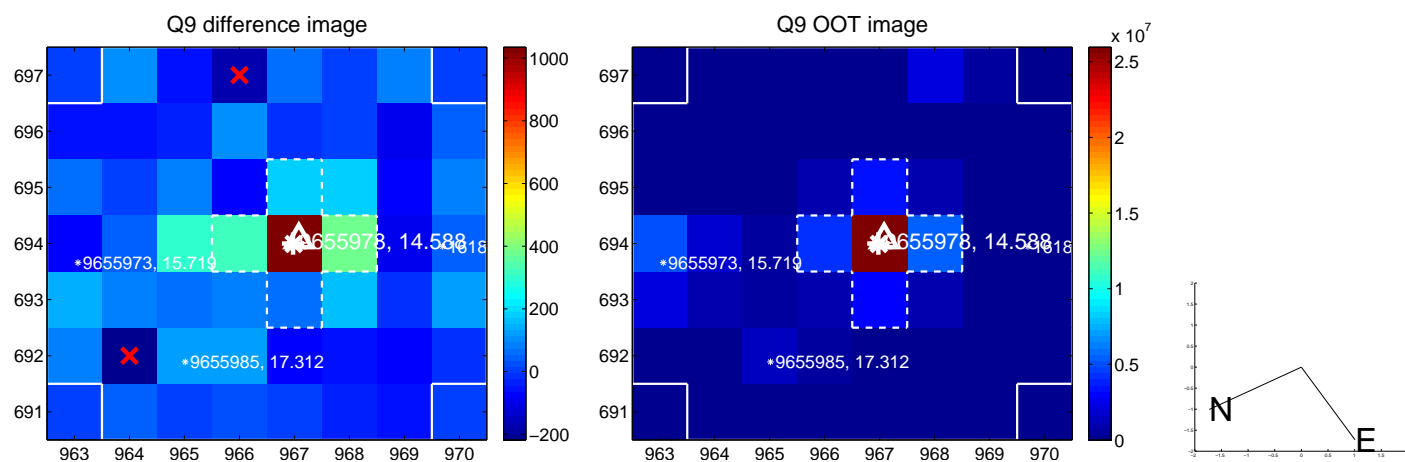
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value



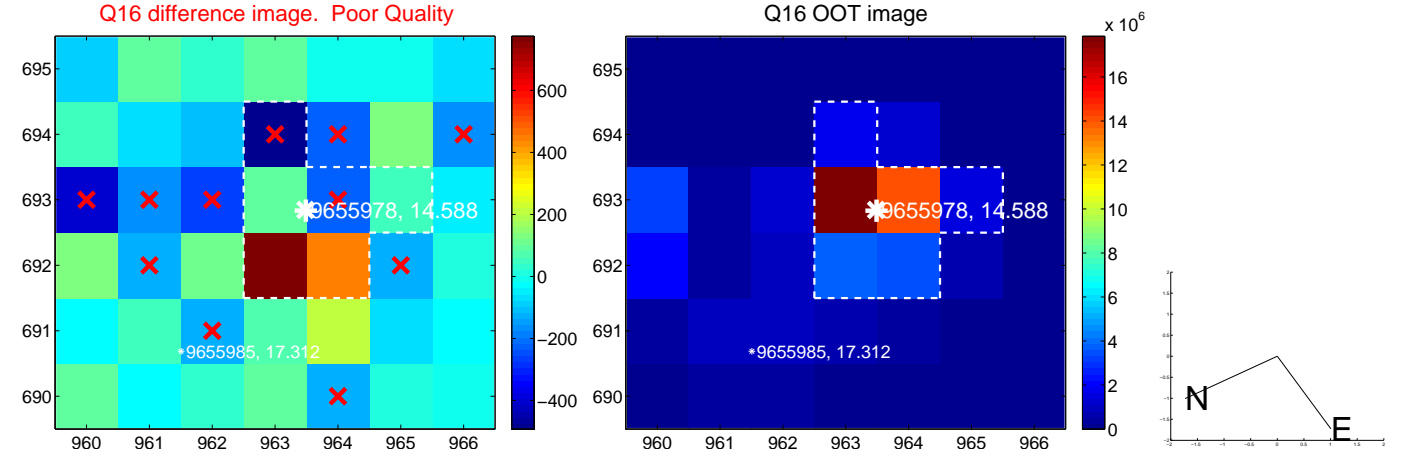
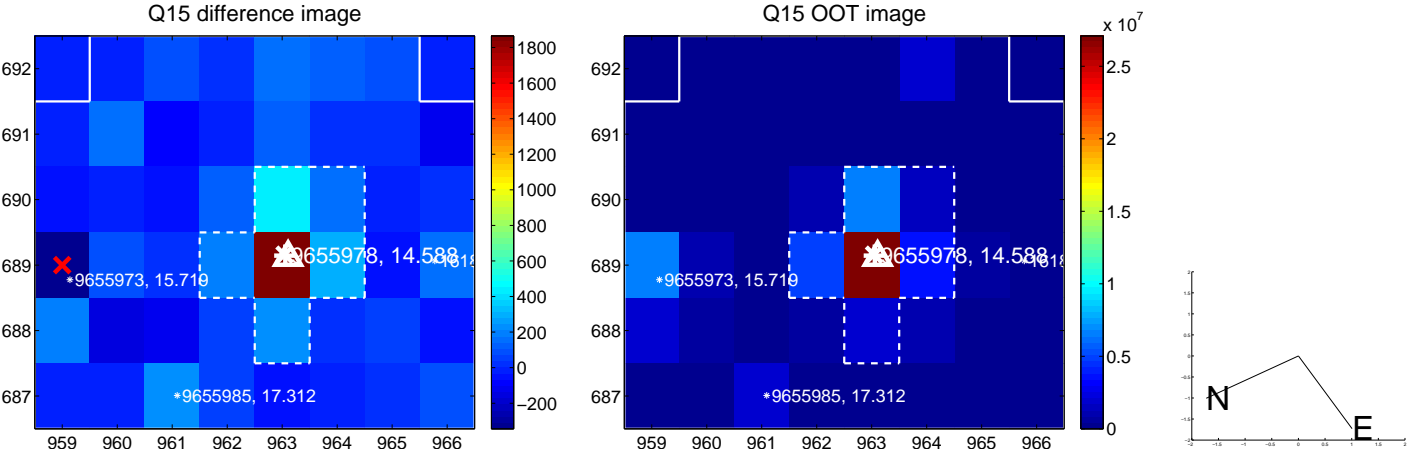
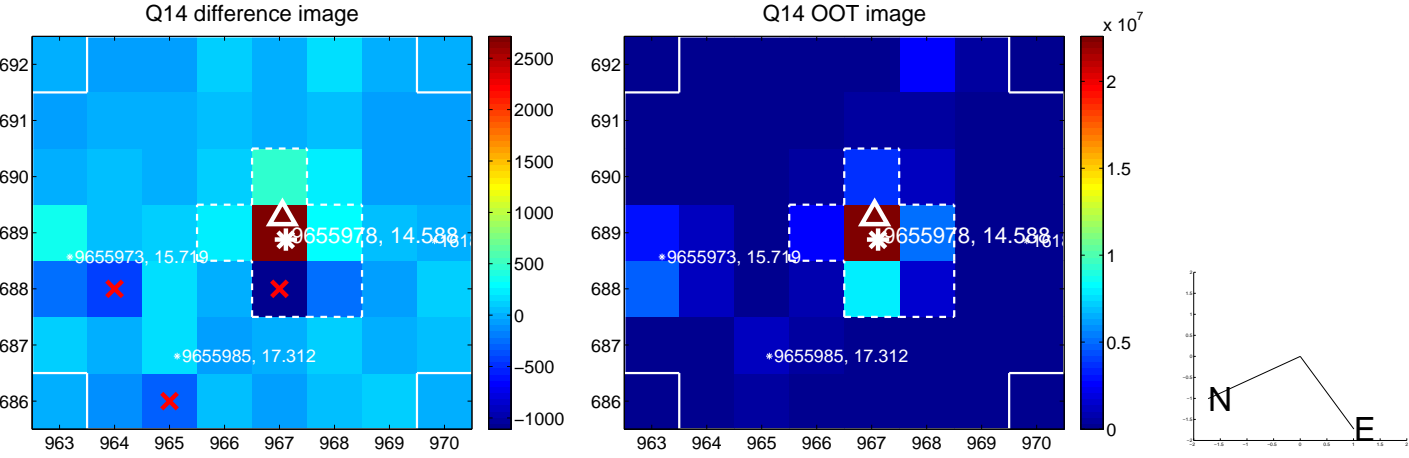
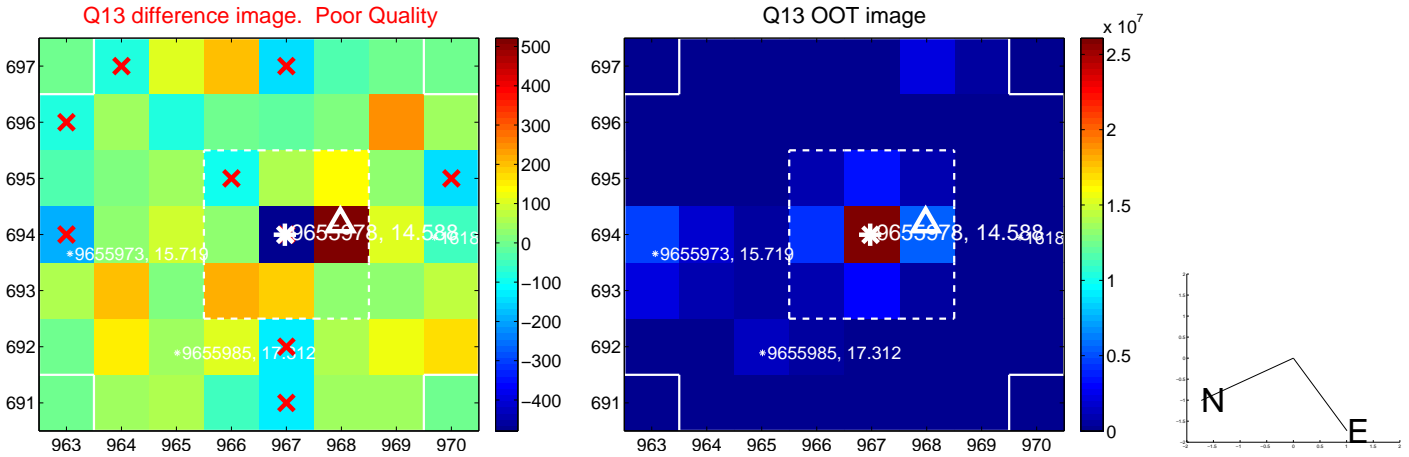
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



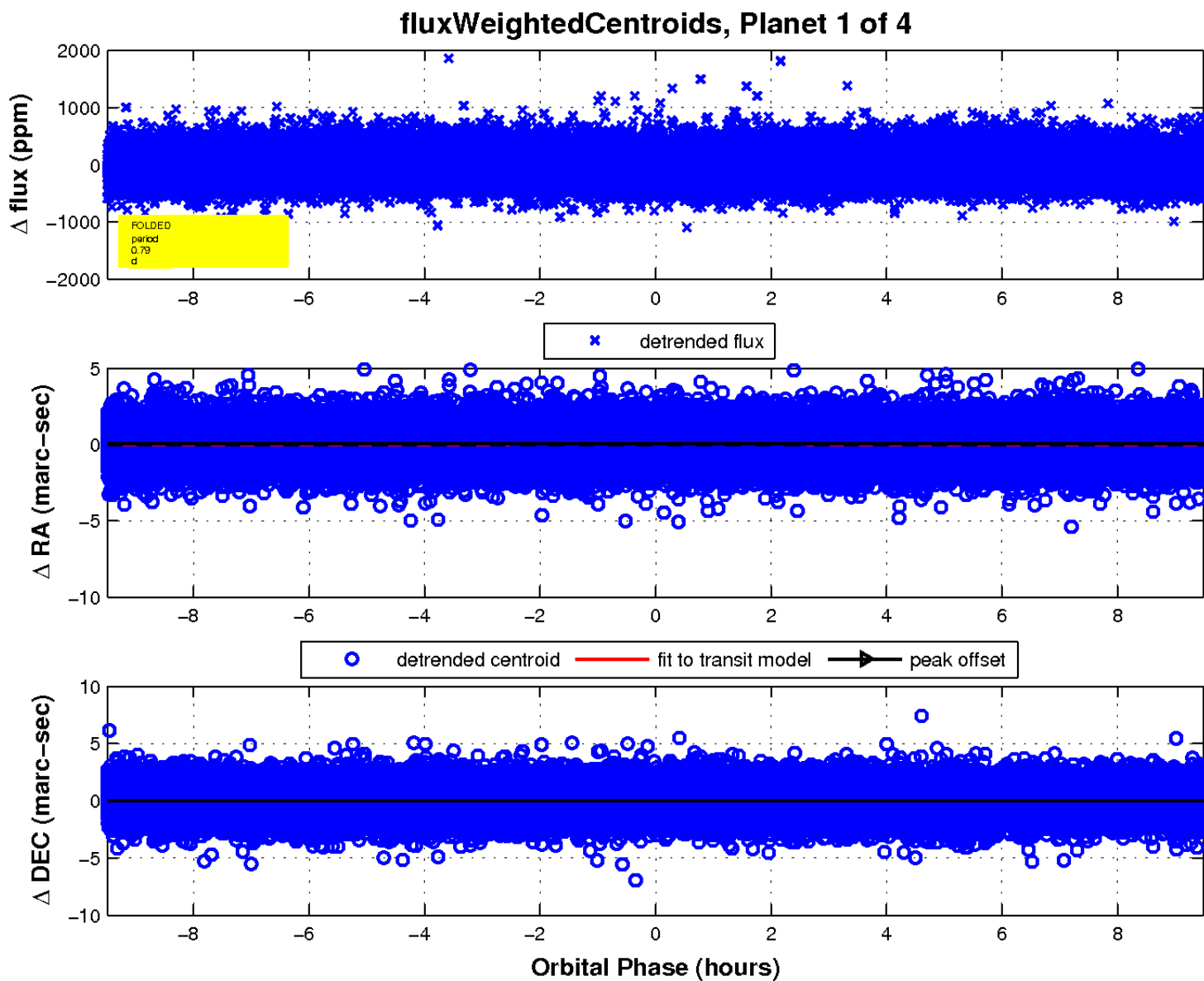
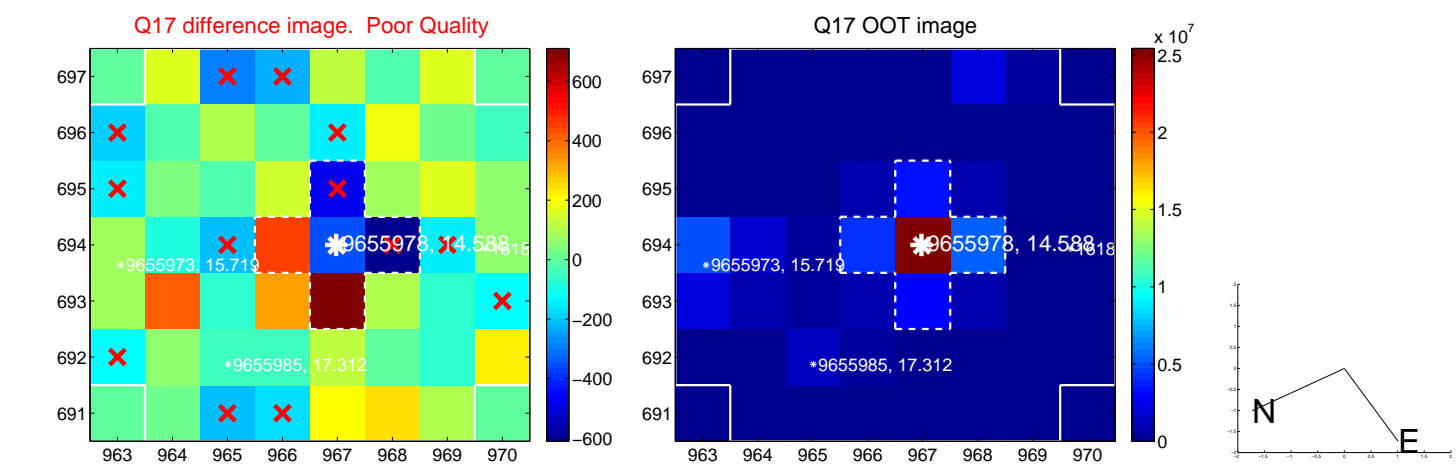
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

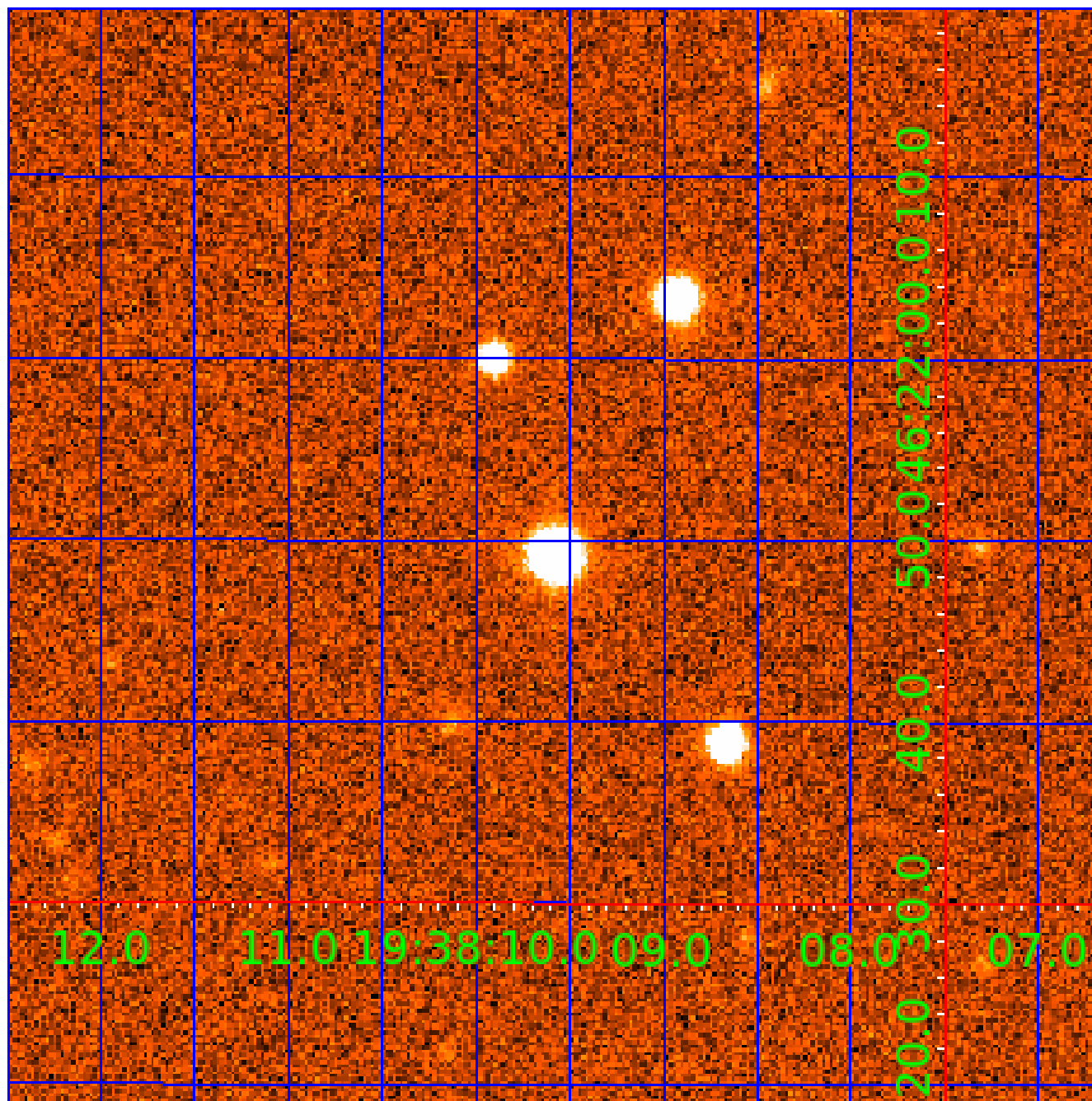


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 009655978

Q1-17 DR25 TCE Parameters

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009655978-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_TRACKER—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009655978-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—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.

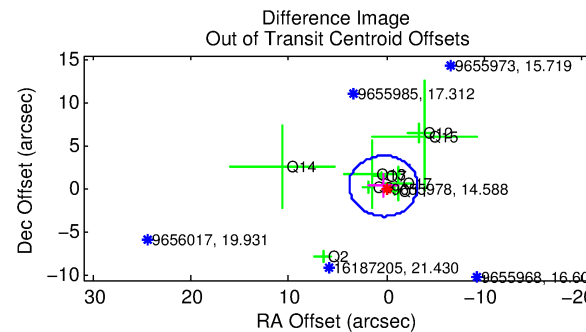
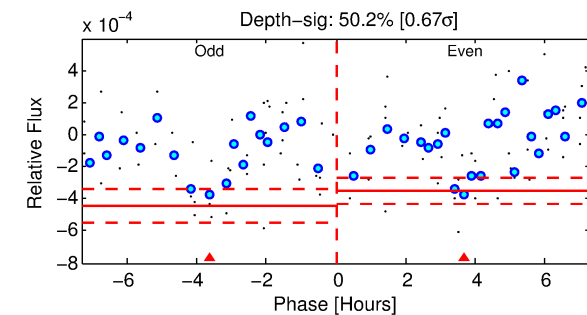
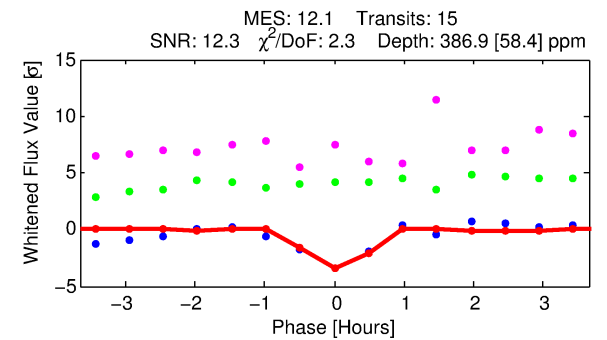
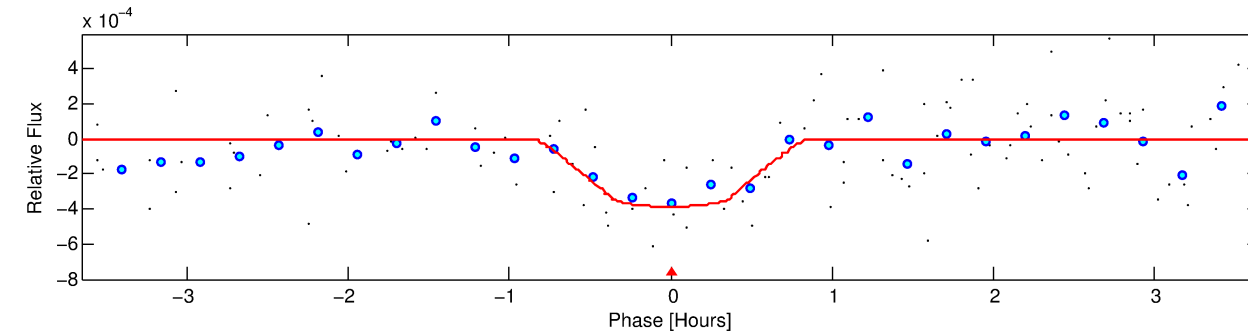
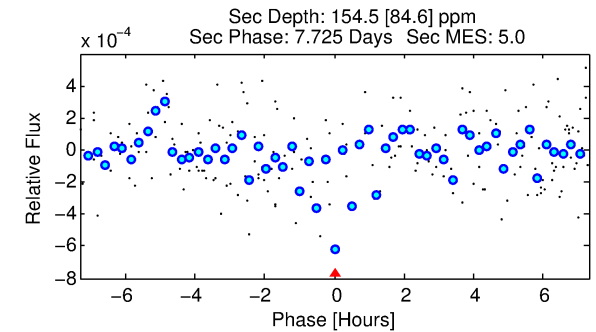
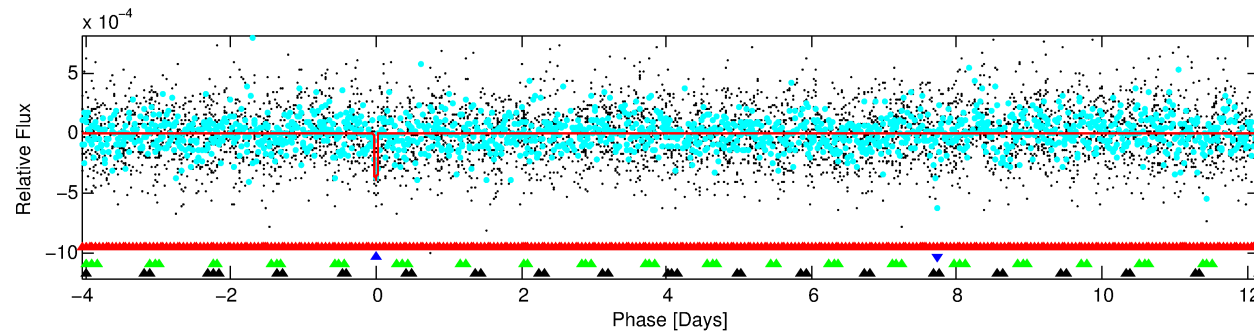
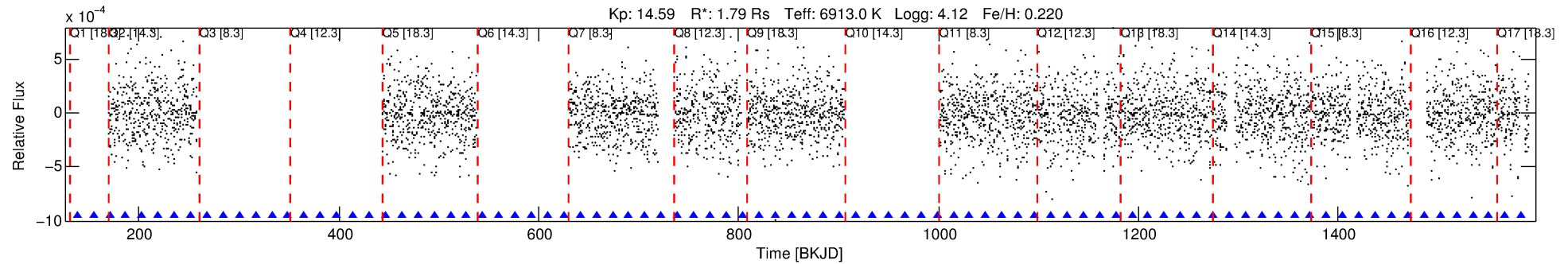
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009655978-02

No Significant Match Found

DV One-Page Summary

KIC: 9655978 Candidate: 2 of 4 Period: 16.236 d



DV Fit Results:

Period = 16.23563 [0.00016] d
Epoch = 138.2657 [0.0078] BKJD
Rp/R* = 0.0183 [0.0289]
a/R* = 103.18 [895.82]
b = 0.10 [85.33]
Seff = 309.63 [125.35]
Teff = 1070 [108] K
Rp = 3.57 [5.75] Re
a = 0.1455 [0.0374] AU
Ag = 141.07 [455.23] [0.31σ]
Teffp = 5699 [4576] K [1.01σ]

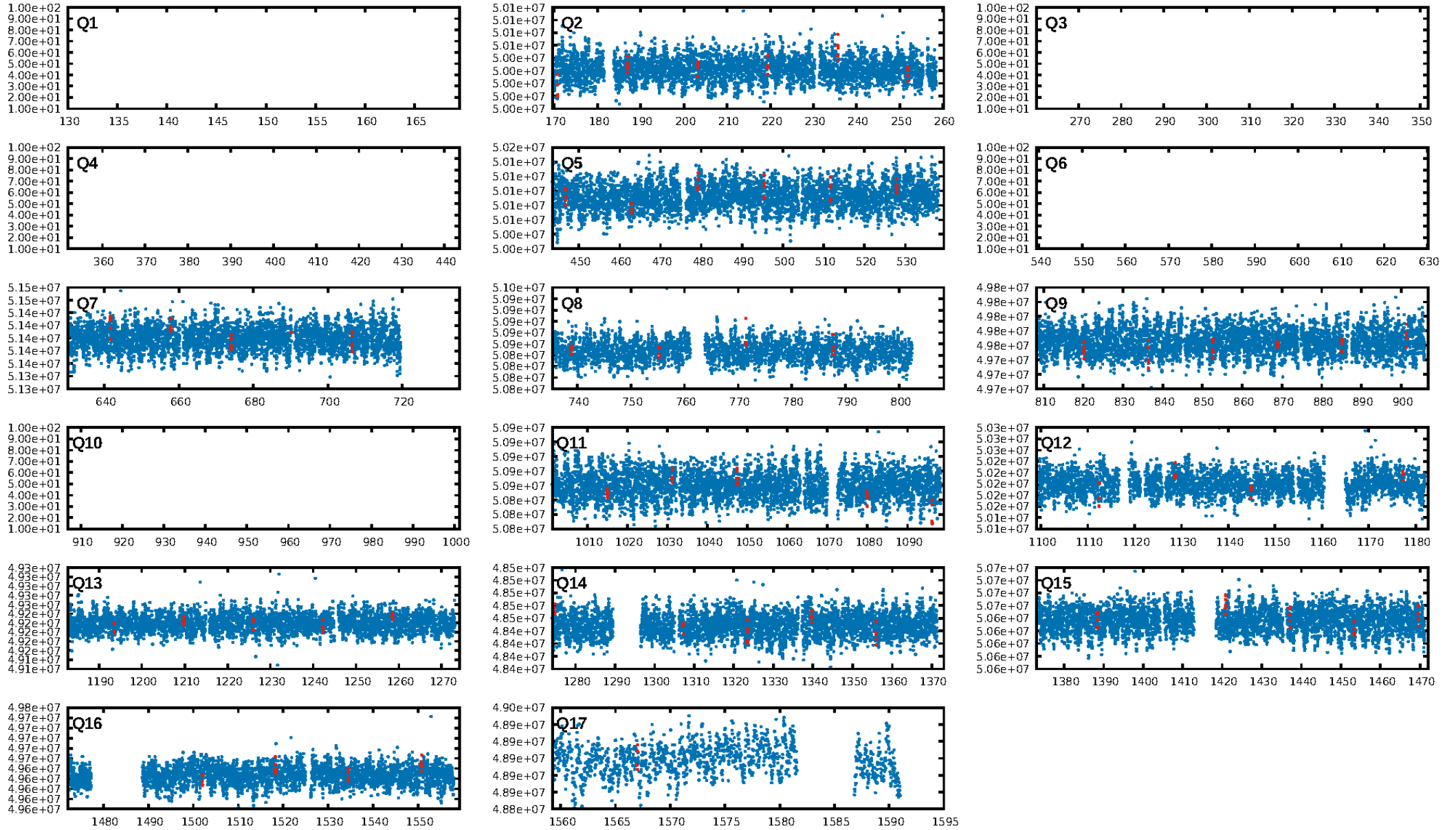
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [67.01σ]
LongPeriod-sig: 100.0% [39.89σ]
ModelChiSquare2-sig: 5.2%
ModelChiSquareGof-sig: 67.4%
Bootstrap-pfa: 8.93e-12
RollingBand-fgt: 1.00 [15/15]
GhostDiagnostic-chr: 0.6091
Centroid-sig: 99.7%
Centroid-so: 0.191 arcsec [0.24σ]
OotOffset-rm: 0.494 arcsec [0.42σ]
KicOffset-rm: 0.525 arcsec [0.50σ]
OotOffset-st: 2/3/1/3 [9]
KicOffset-st: 2/3/1/3 [9]
DiffImageQuality-fgm: 0.11 [1/9]
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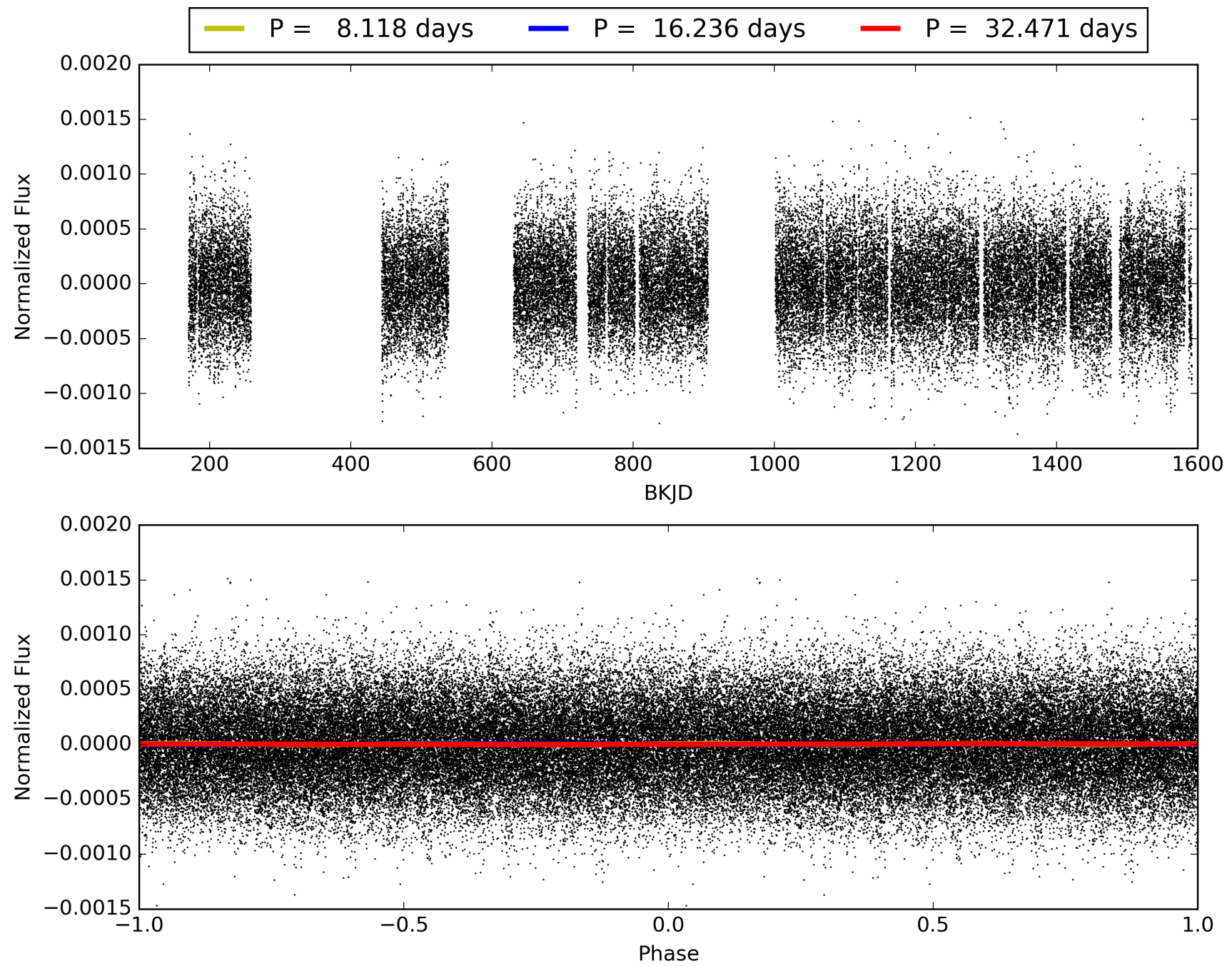
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This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

TCE 009655978-02, PDC Light Curves

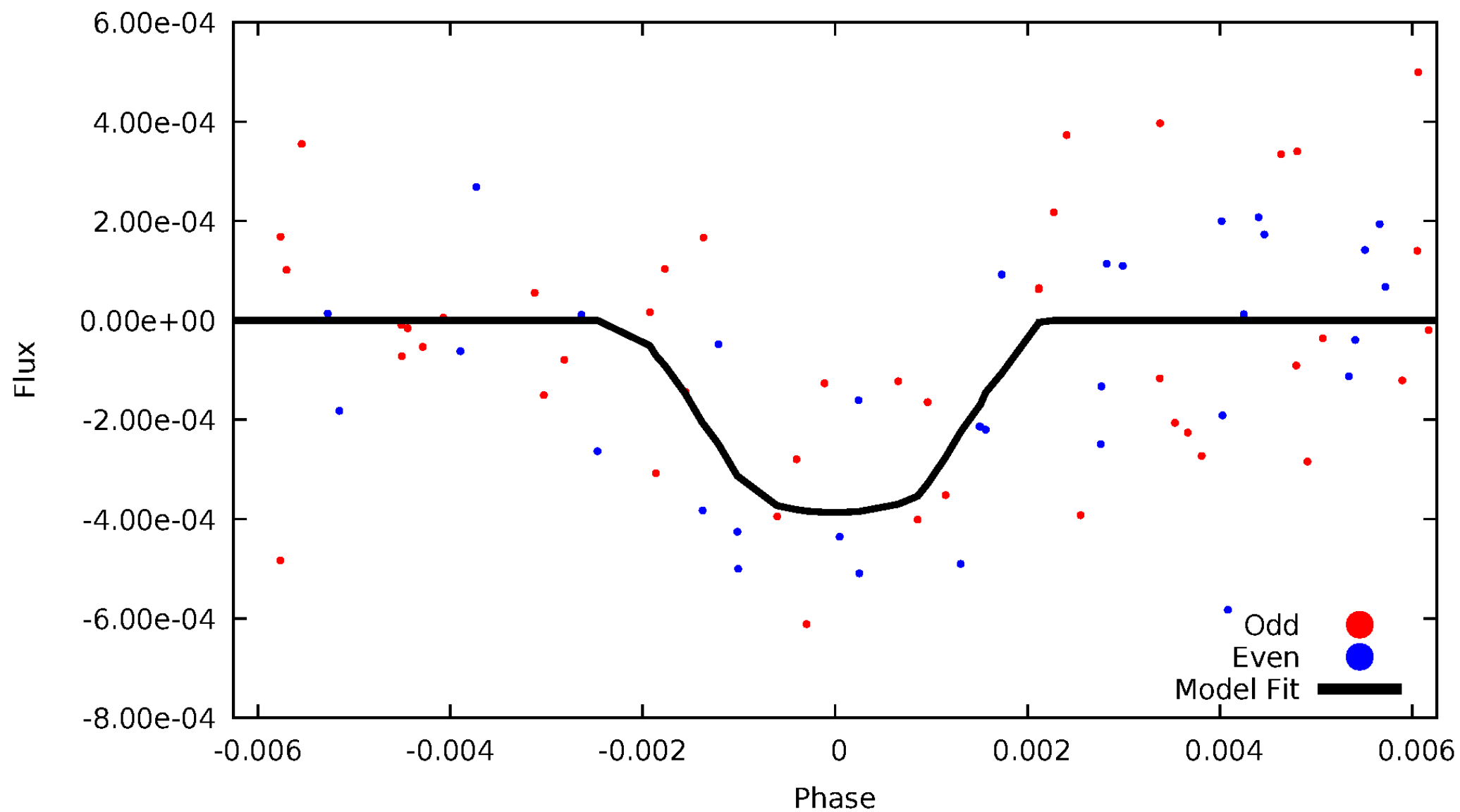


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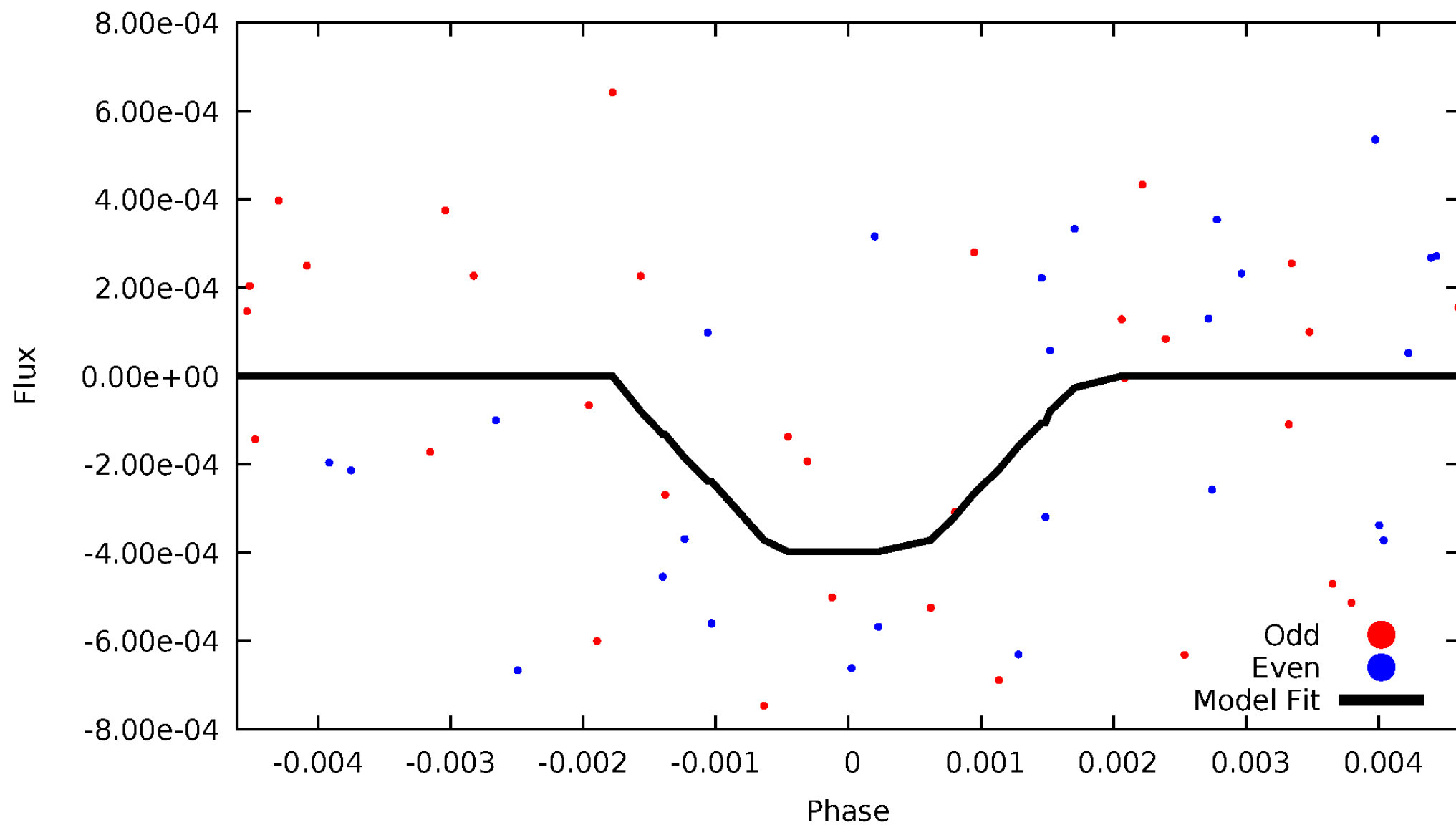
DV Odd/Even

TCE 009655978-02



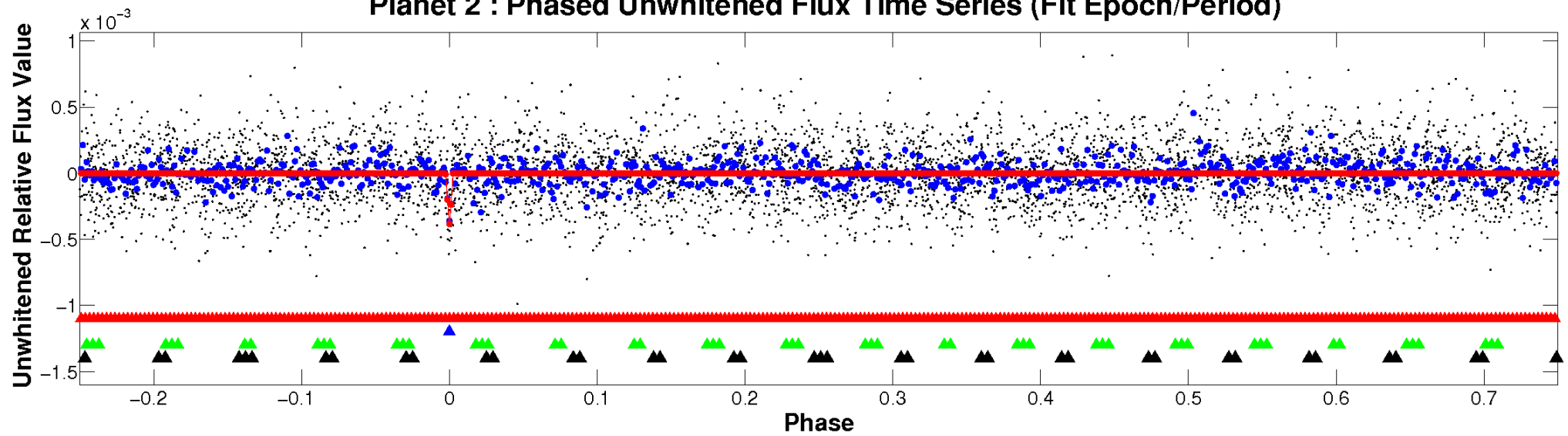
ALT Odd/Even

TCE 009655978-02

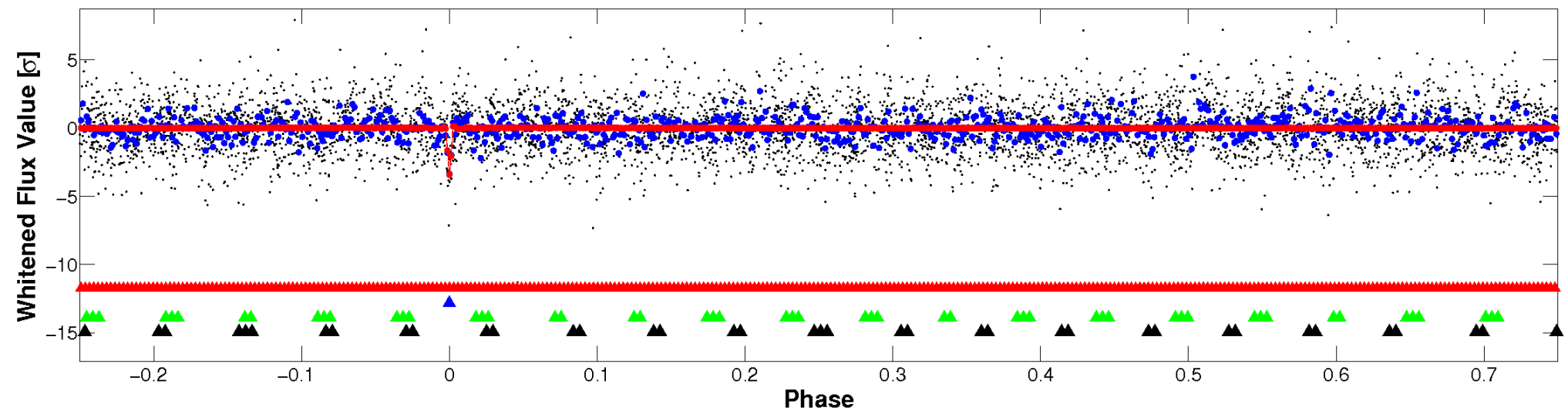


Non-Whitened Vs. Whitened Light Curve

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

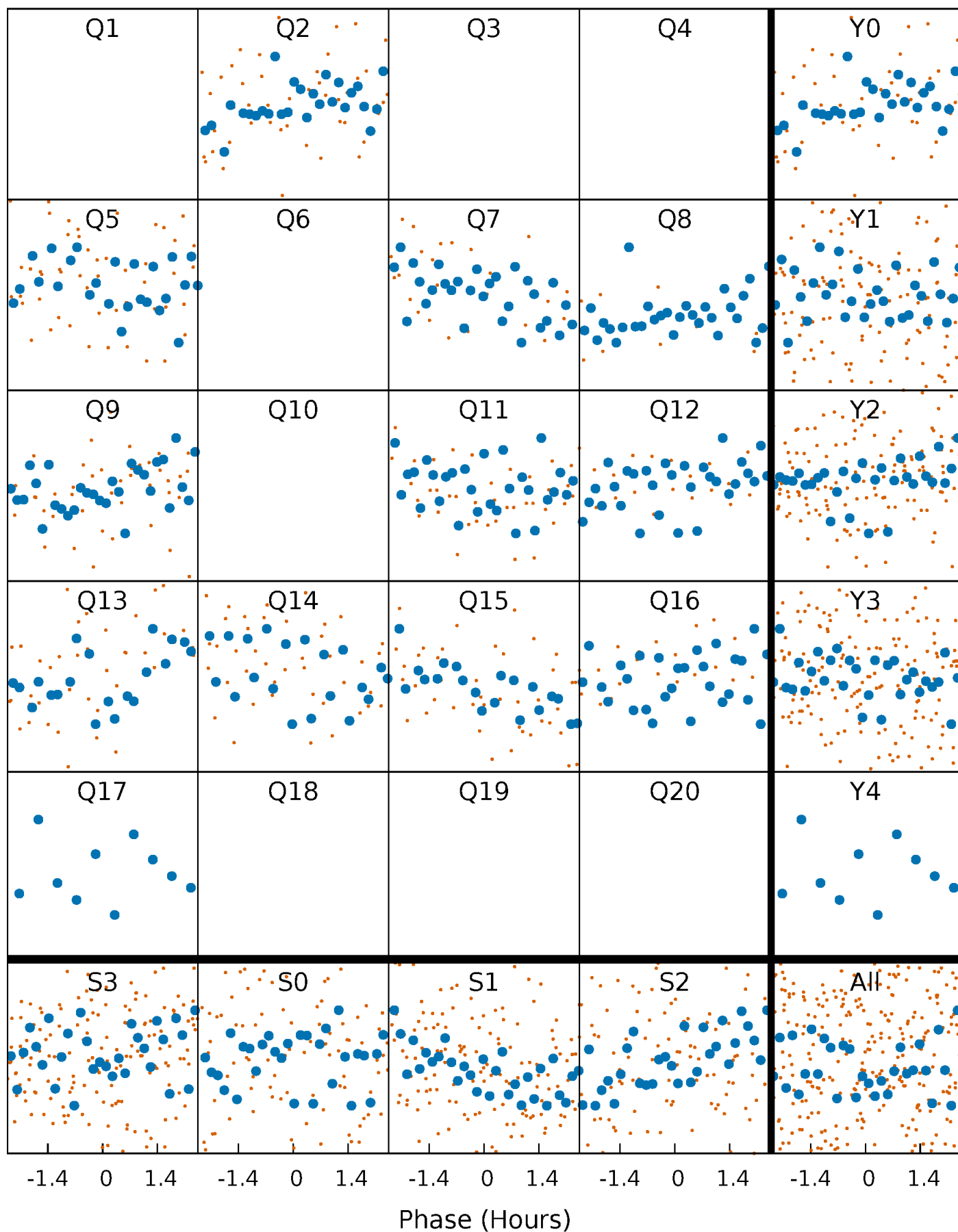


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



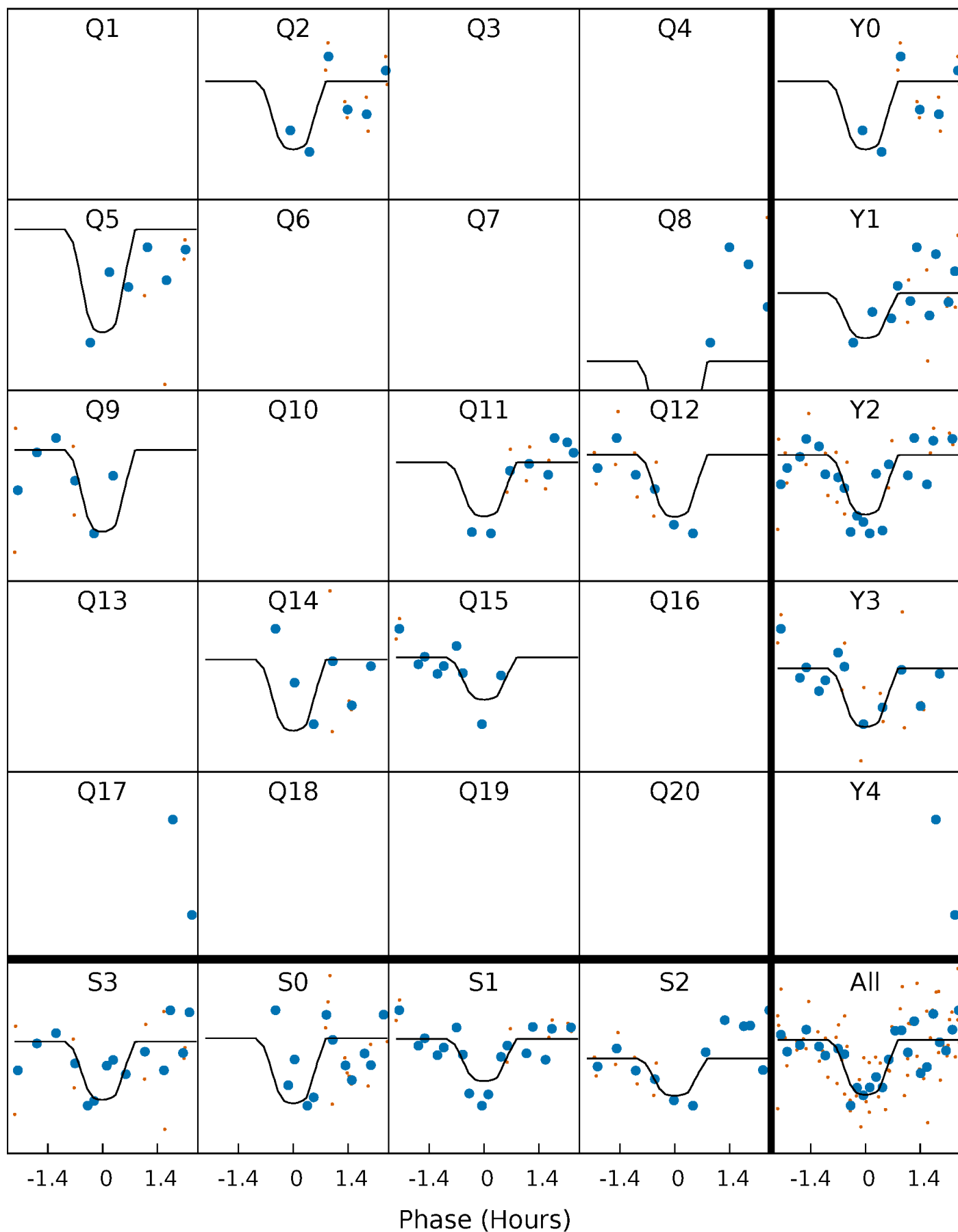
PDC Quarter-Phased Transit Curves

TCE 009655978-02 P= 16.235630 Days $T_0=138.265724$ (BKJD)



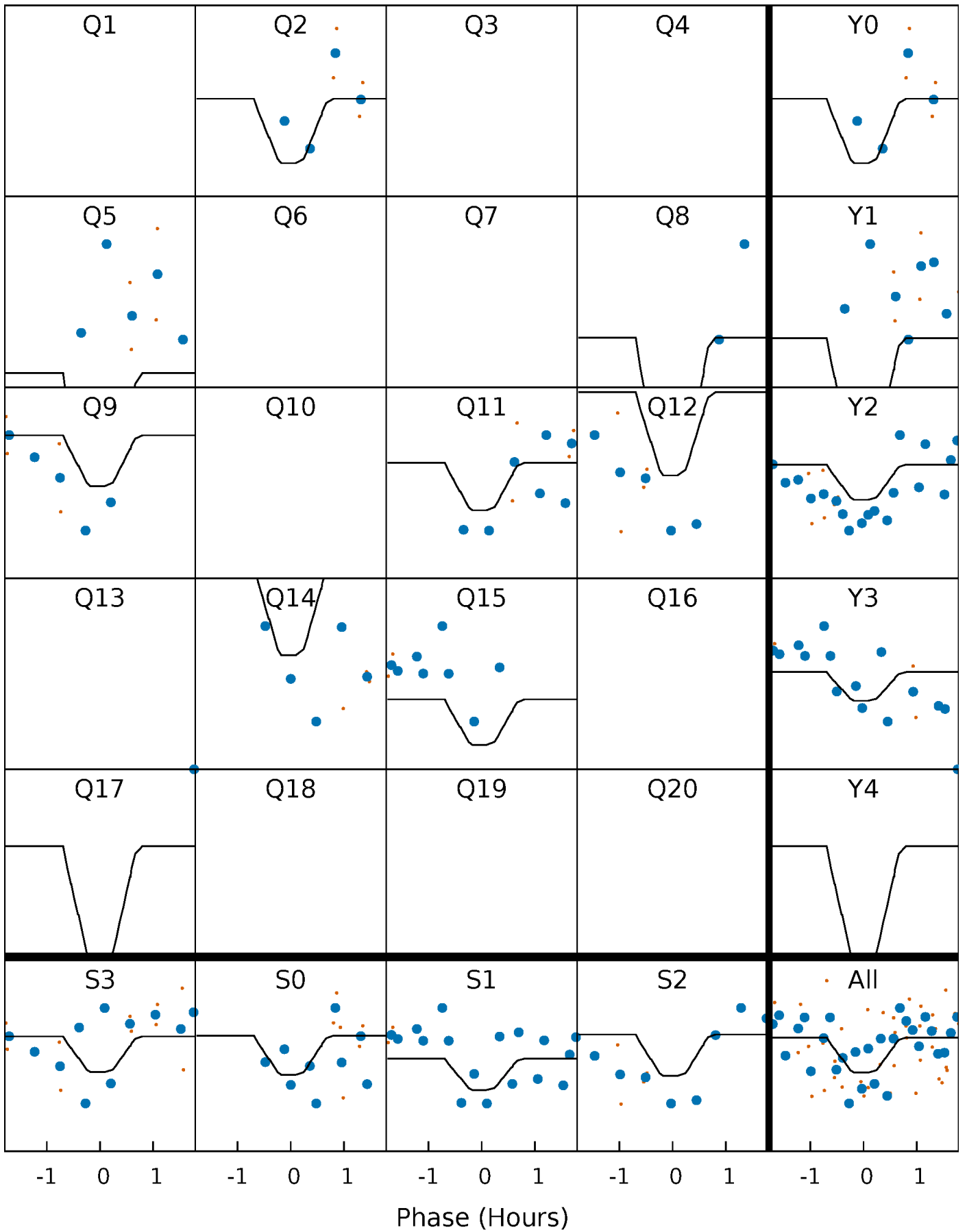
DV Quarter-Phased Transit Curves

TCE 009655978-02 P= 16.235630 Days $T_0=138.265724$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

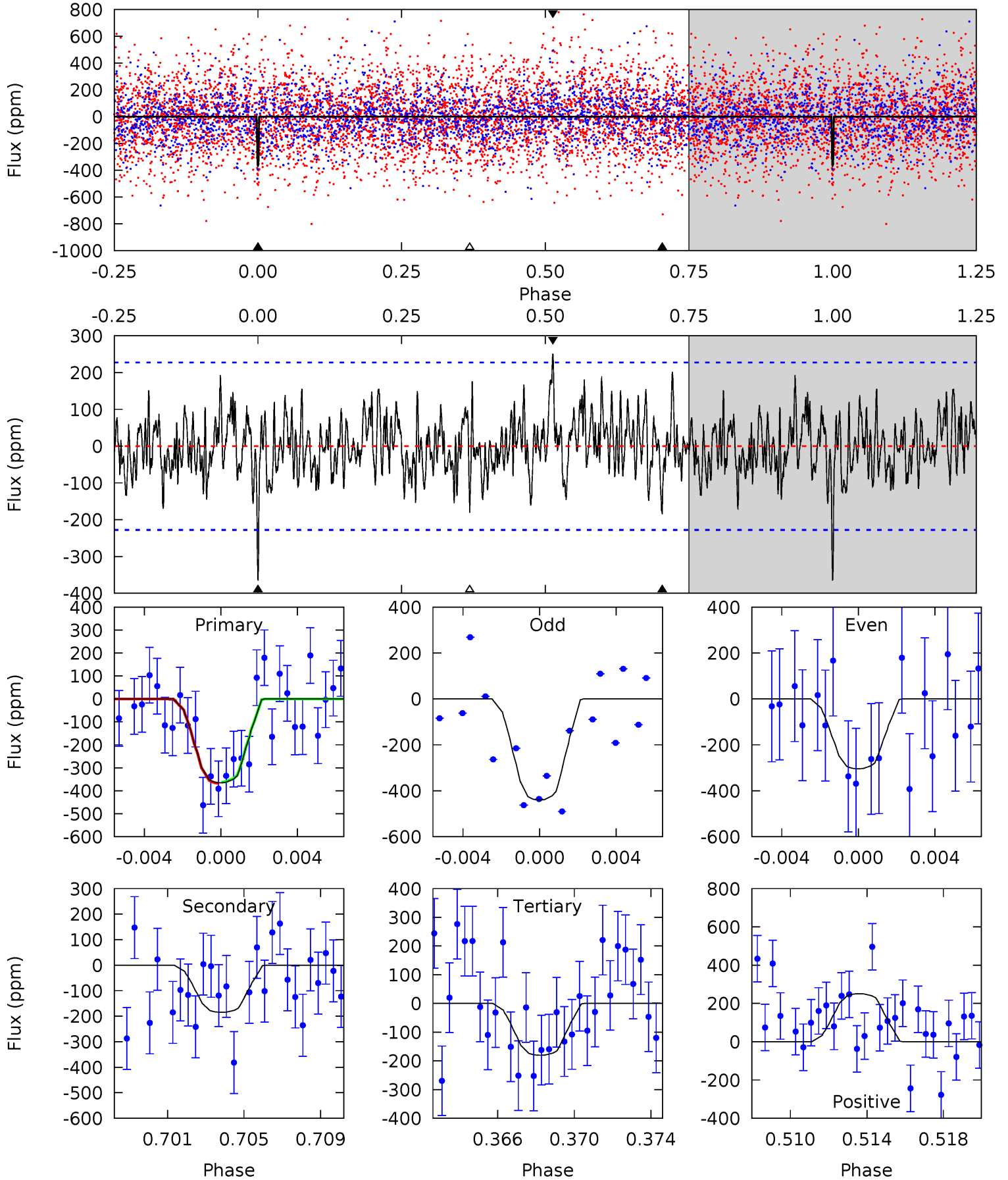
TCE 009655978-02 P= 16.235620 Days $T_0=138.266671$ (BKJD)



DV Model-Shift Uniqueness Test

009655978-02, P = 16.235630 Days, E = 138.265724 Days

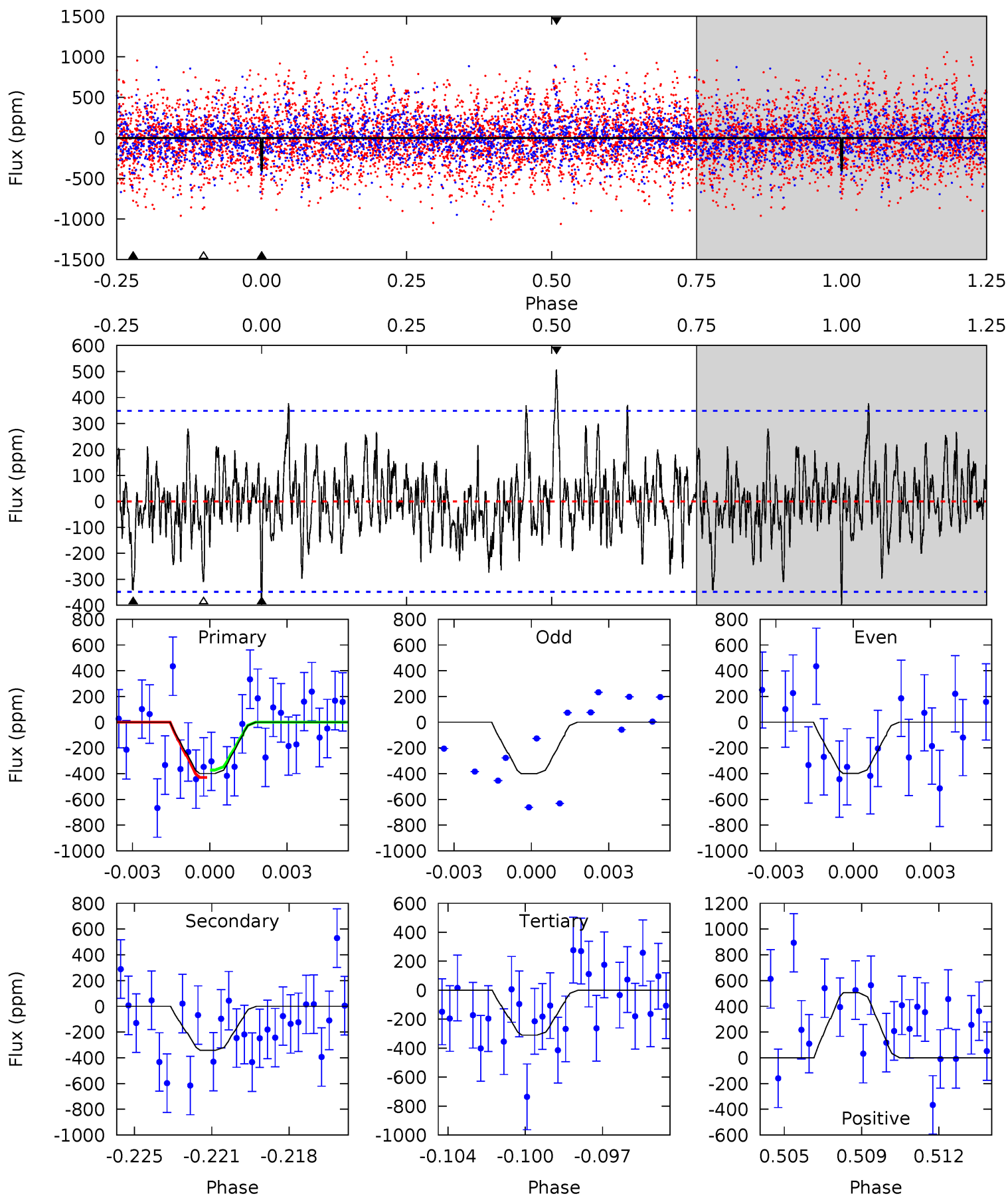
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.35	4.22	4.12	5.73	5.20	2.88	1.55	4.22	2.61	0.10	-1.51	1.56	1.02	0.41	0.05



Alt Model-Shift Uniqueness Test

009655978-02, P = 16.235620 Days, E = 138.266671 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.99	5.13	4.66	7.61	5.23	2.92	1.63	1.33	-1.62	0.48	-2.47	0.02	0.58	0.56	0.43



Stellar Parameters For KIC 009655978

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	M (M_{\odot})	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	6913^{+192}_{-312}	$4.125^{+0.128}_{-0.192}$	$0.220^{+0.150}_{-0.350}$	$1.790^{+0.566}_{-0.378}$	$1.560^{+0.208}_{-0.254}$	$0.383^{+0.254}_{-0.207}$
	+3%/-5%	+3%/-5%	+68%/-159%	+32%/-21%	+13%/-16%	+66%/-54%
Source	PHO54	PHO54	PHO54	DSEP		

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

Secondary Eclipse Parameters for KIC 009655978-02 / KOI

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-185 ± 44	$5.69^{+5.16}_{-3.79}$	1495^{+118}_{-96}	4785^{+3868}_{-1020}	64^{+540}_{-47}
Alt.	-342 ± 67	$5.72^{+5.07}_{-3.93}$	1500^{+113}_{-102}	5428^{+5508}_{-1205}	116^{+1029}_{-84}

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 $A_{obs} \gg 1.0$

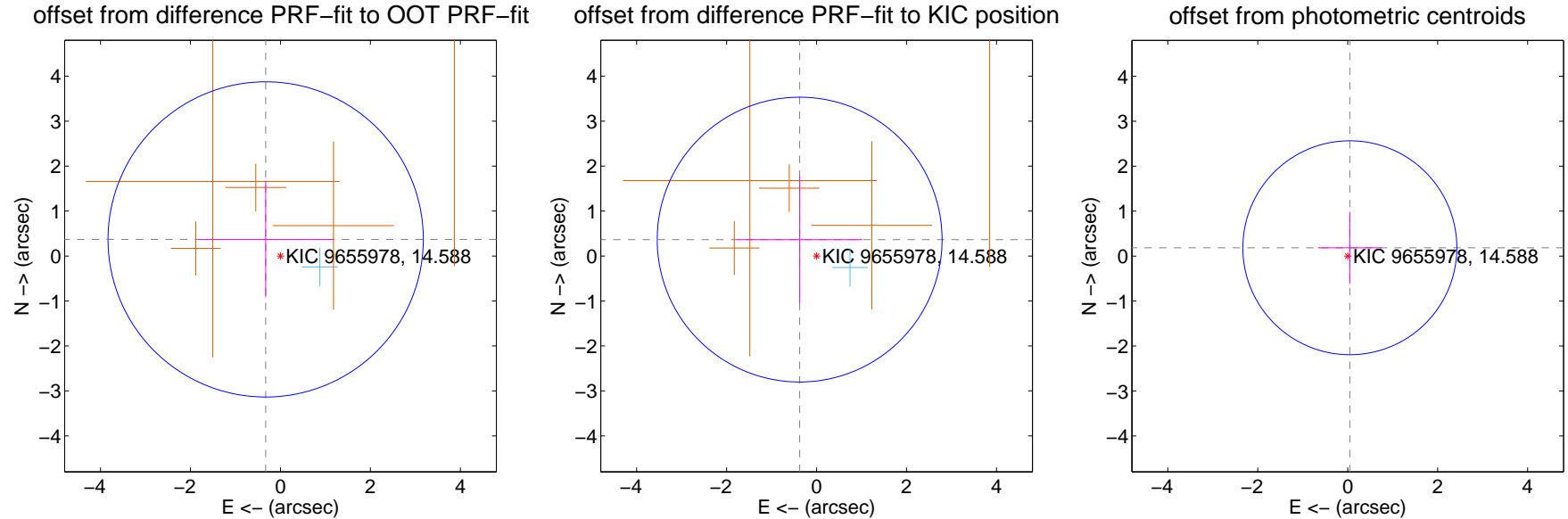
DV Centroid Data

Supplemental centroid analysis for 009655978-02. Kepler magnitude: 14.59. Transit SNR 12.29

There are 1 quarters with good PRF difference image offsets

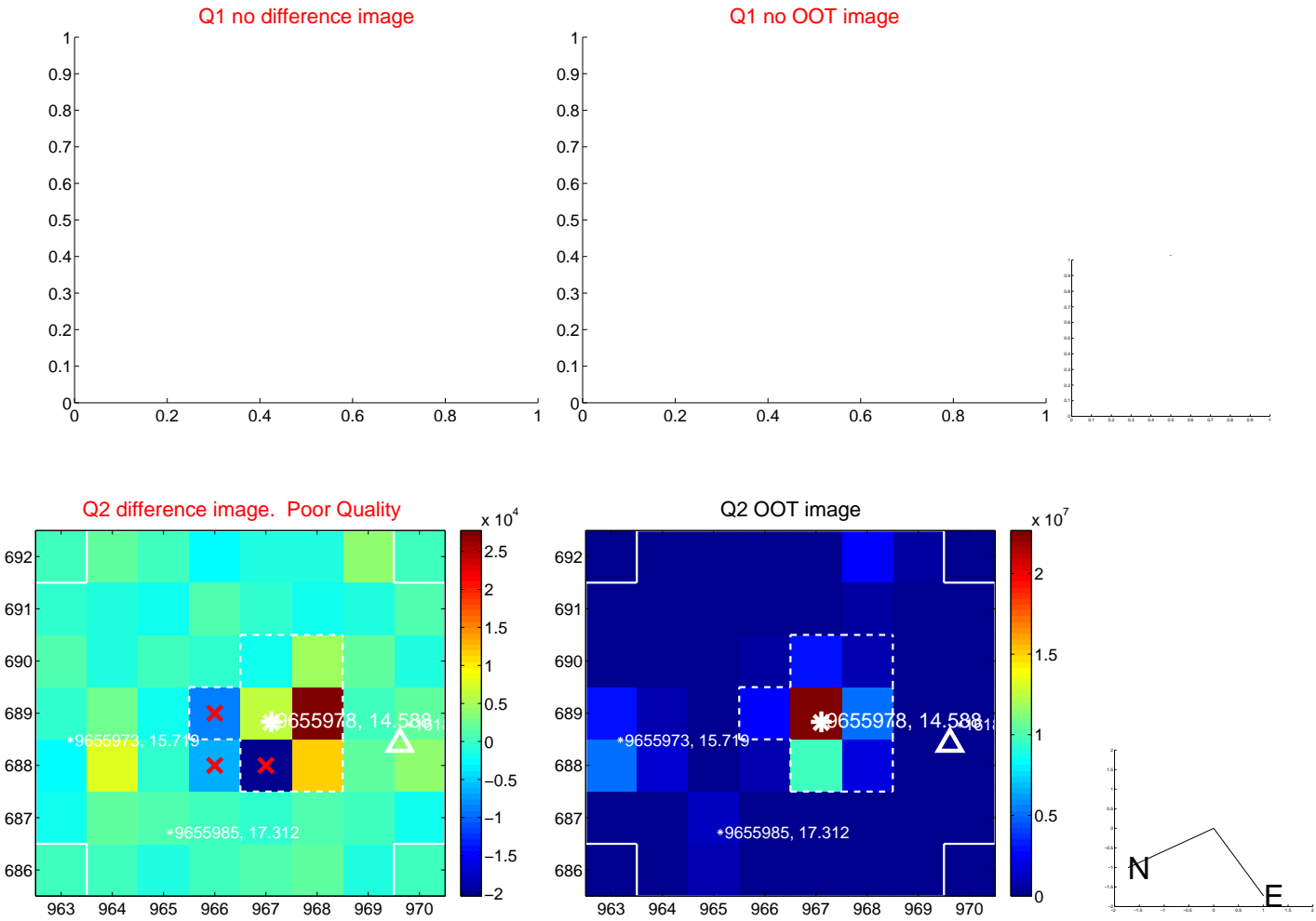
The direct PRF centroid is offset from the target star catalog position by about 0.05 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.494 ± 1.168	0.42	0.329 ± 1.511	0.369 ± 1.284
PRF-fit source offset from KIC position	0.525 ± 1.056	0.50	0.377 ± 1.398	0.365 ± 1.414
photometric centroid source offset	0.19 ± 0.79	0.24	-0.05 ± 0.71	0.19 ± 0.80

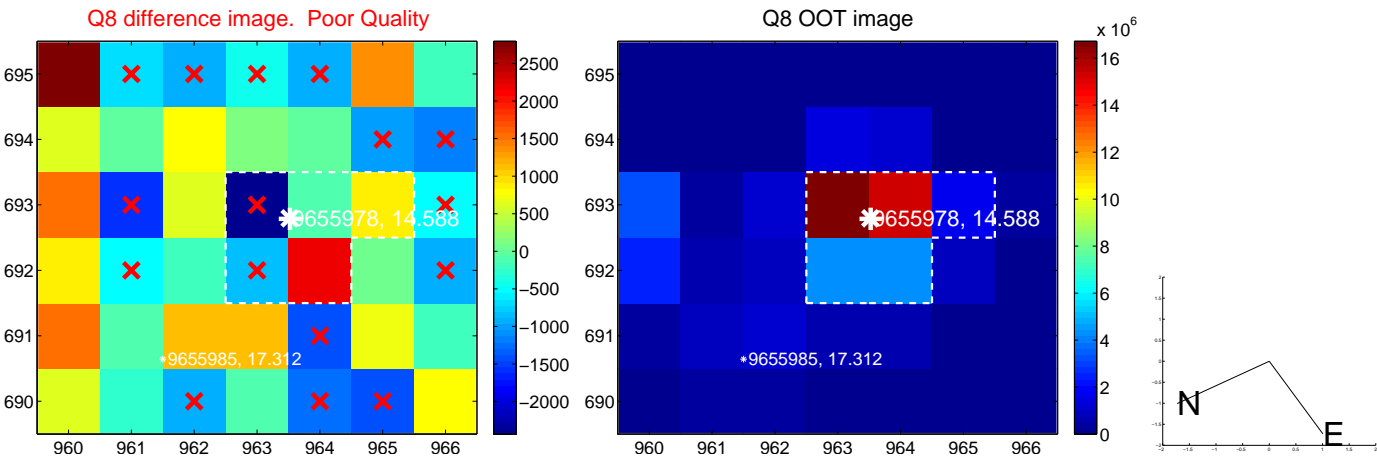
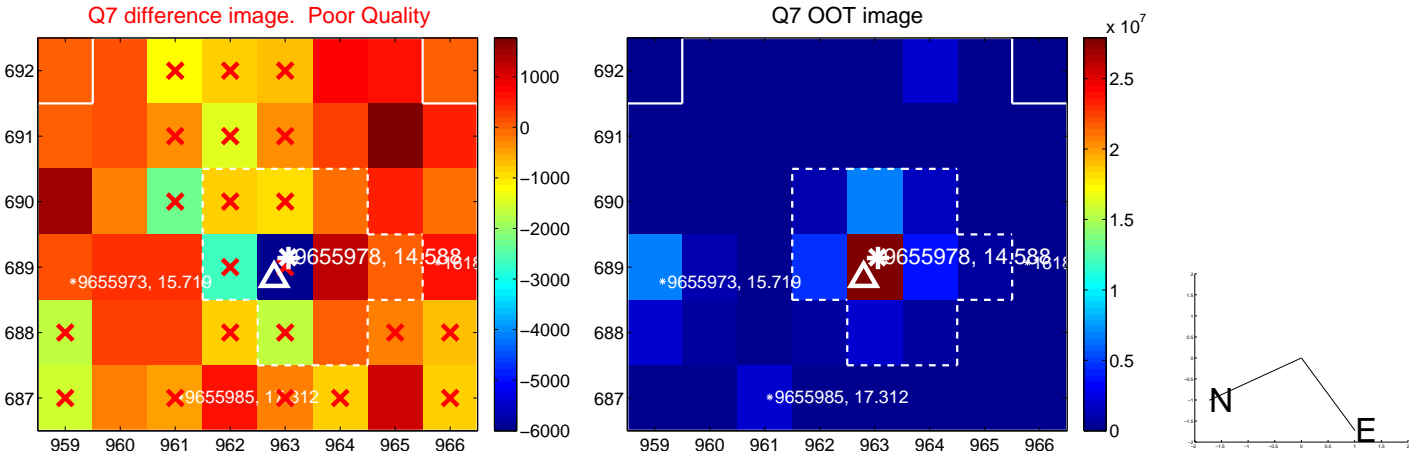
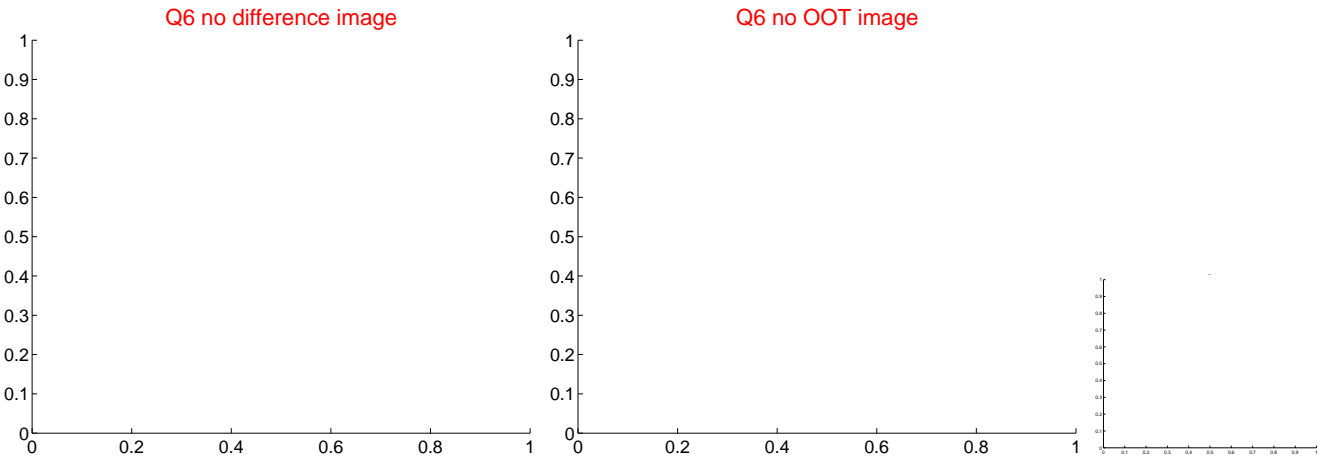
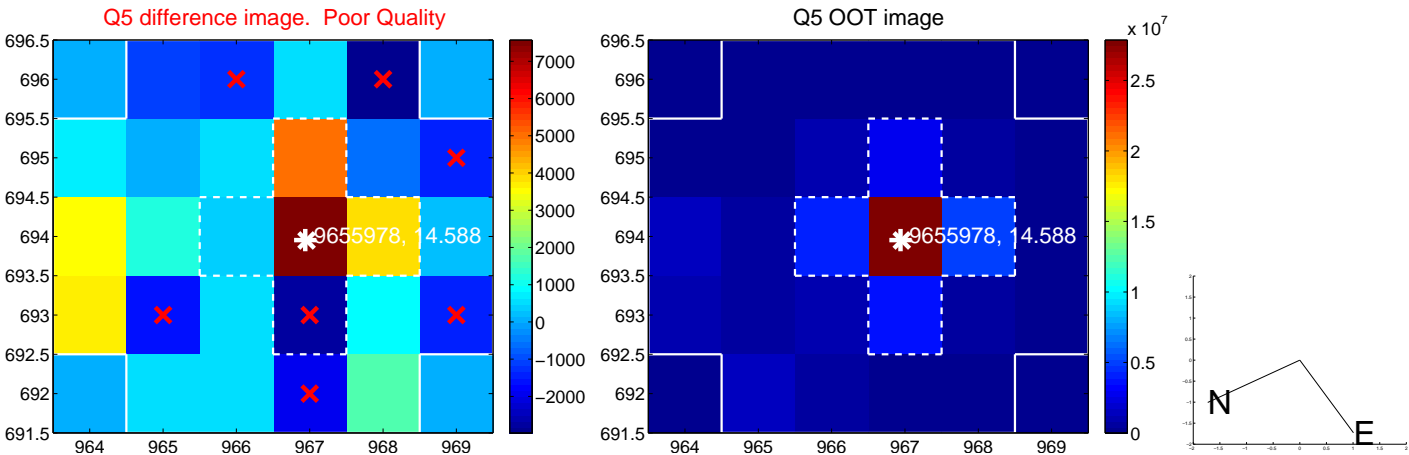


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

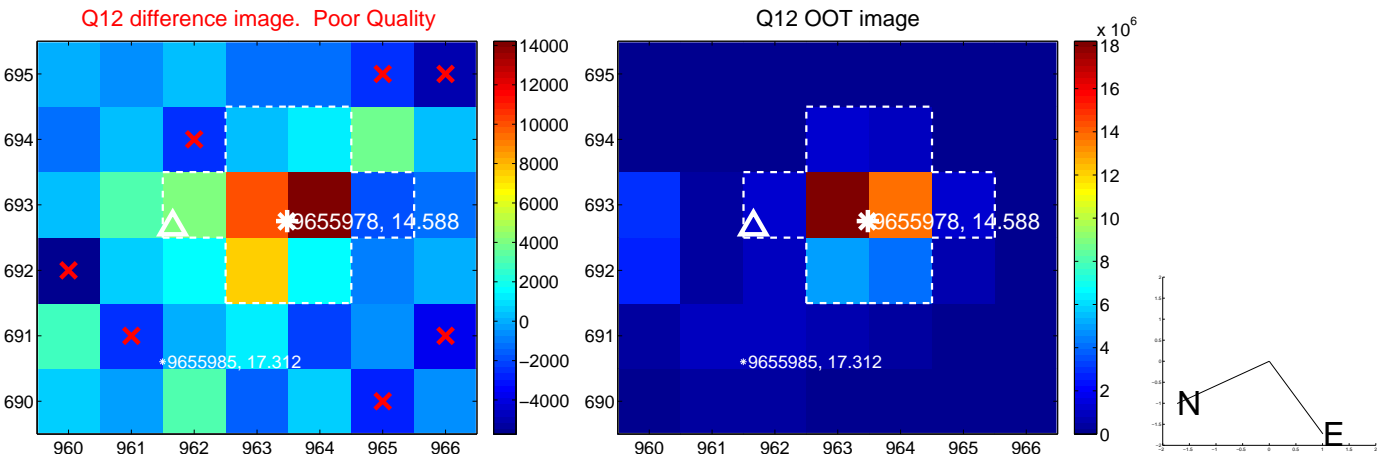
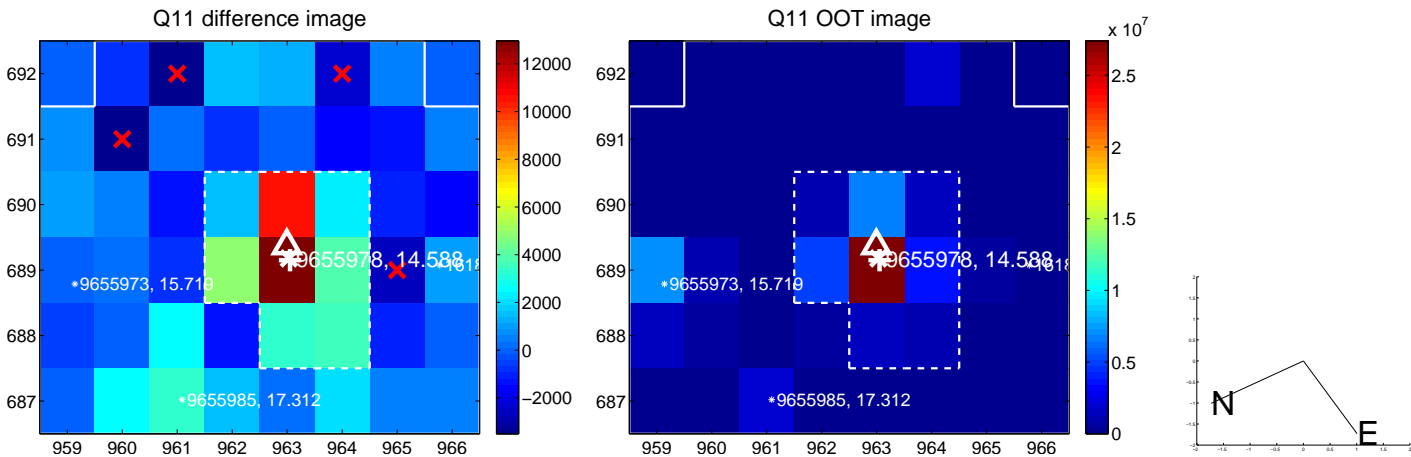
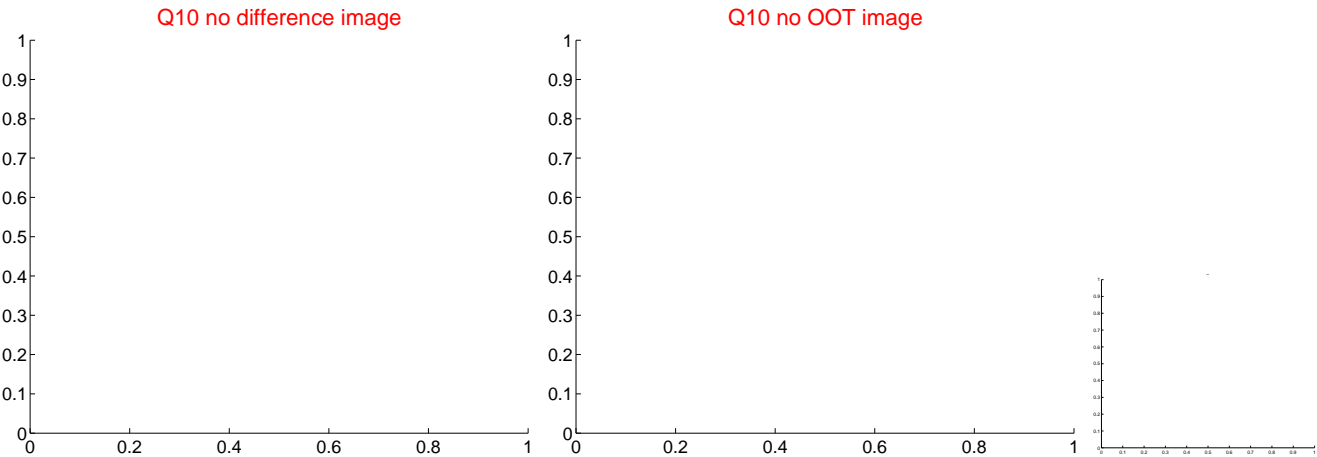
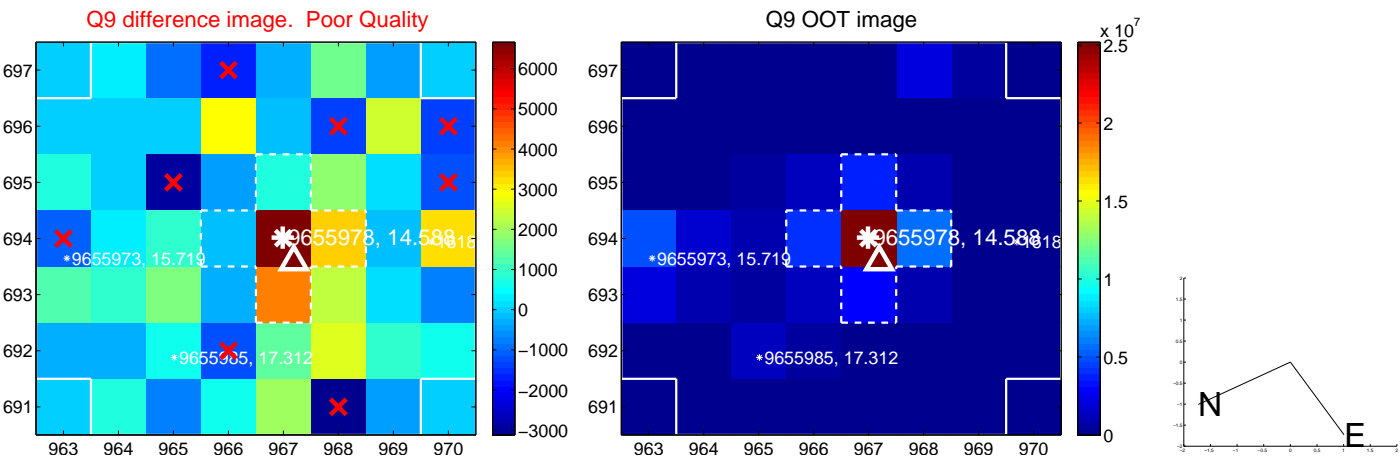
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



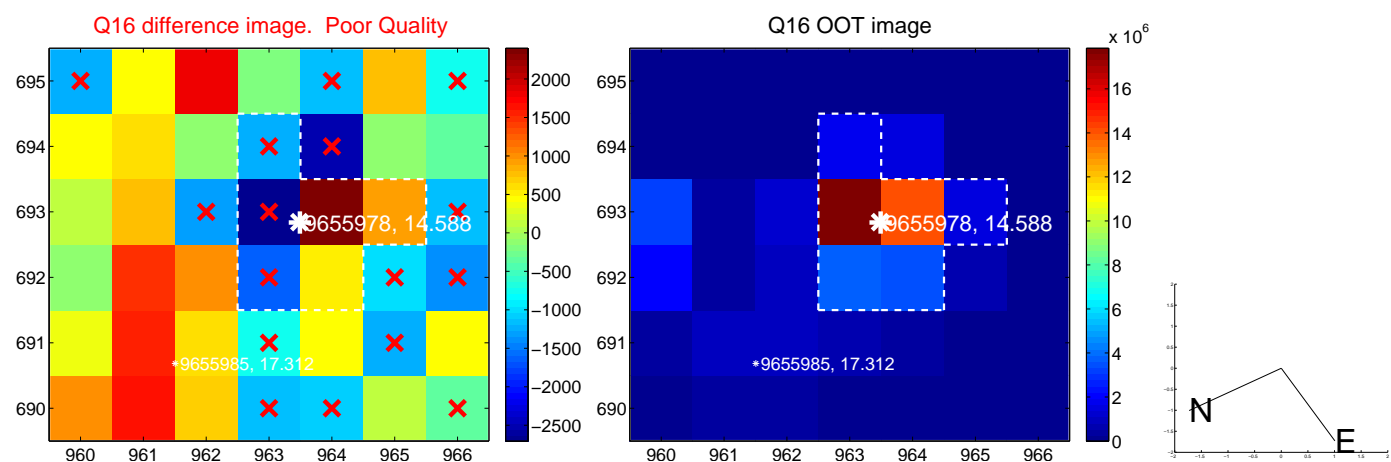
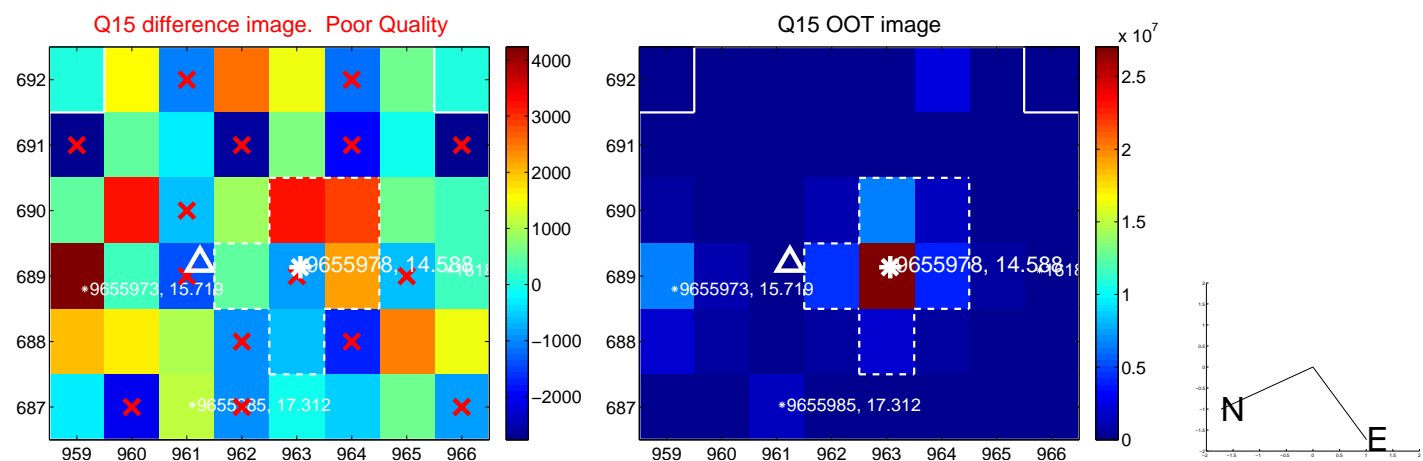
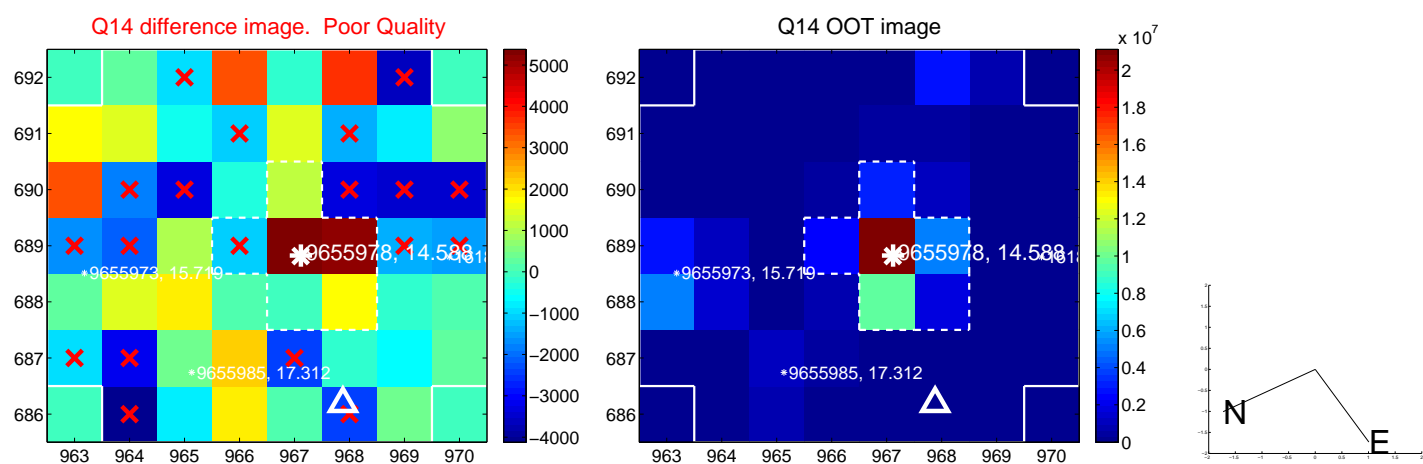
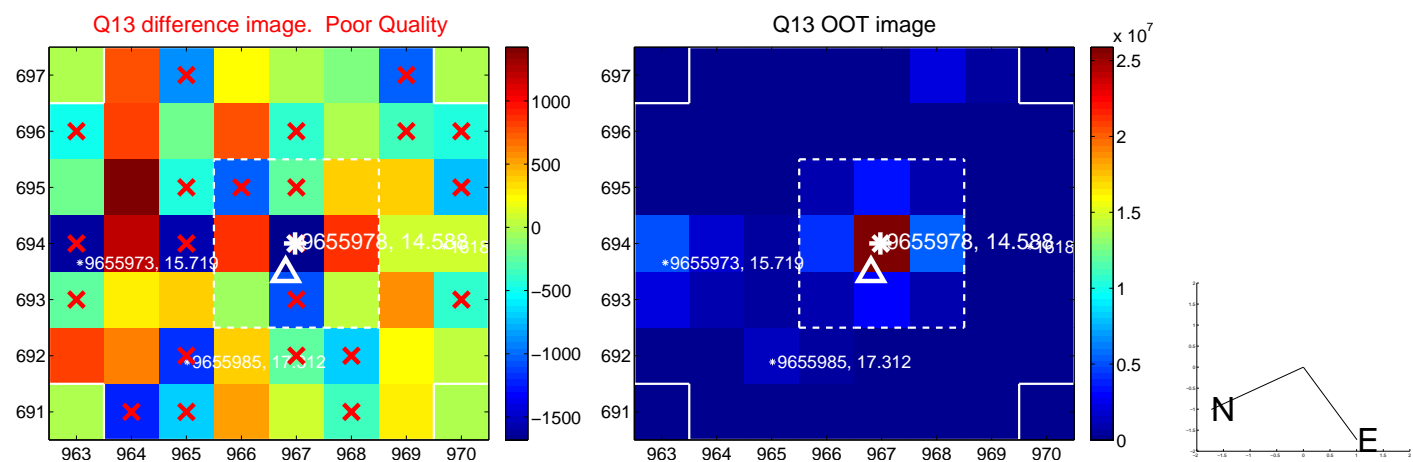
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



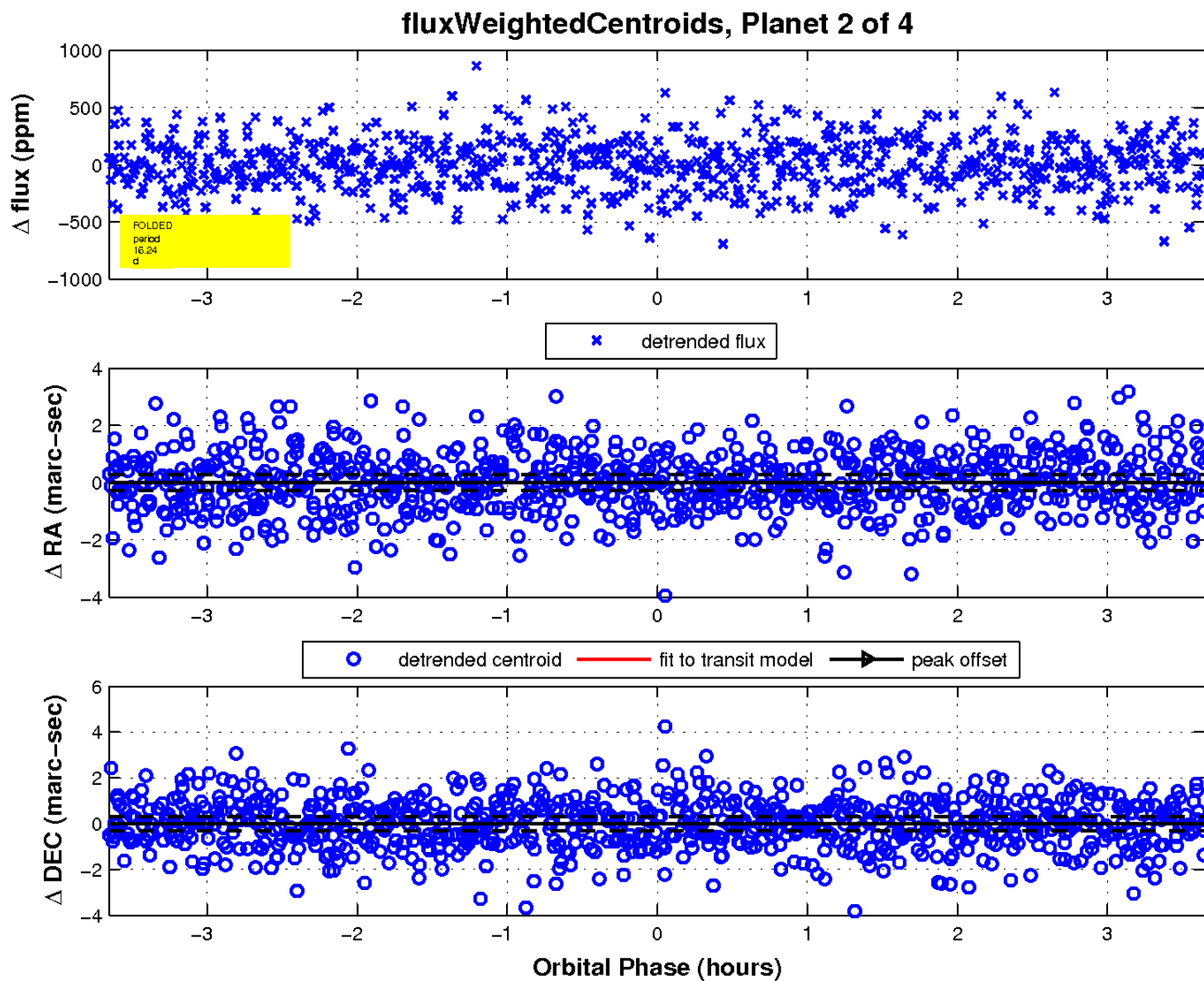
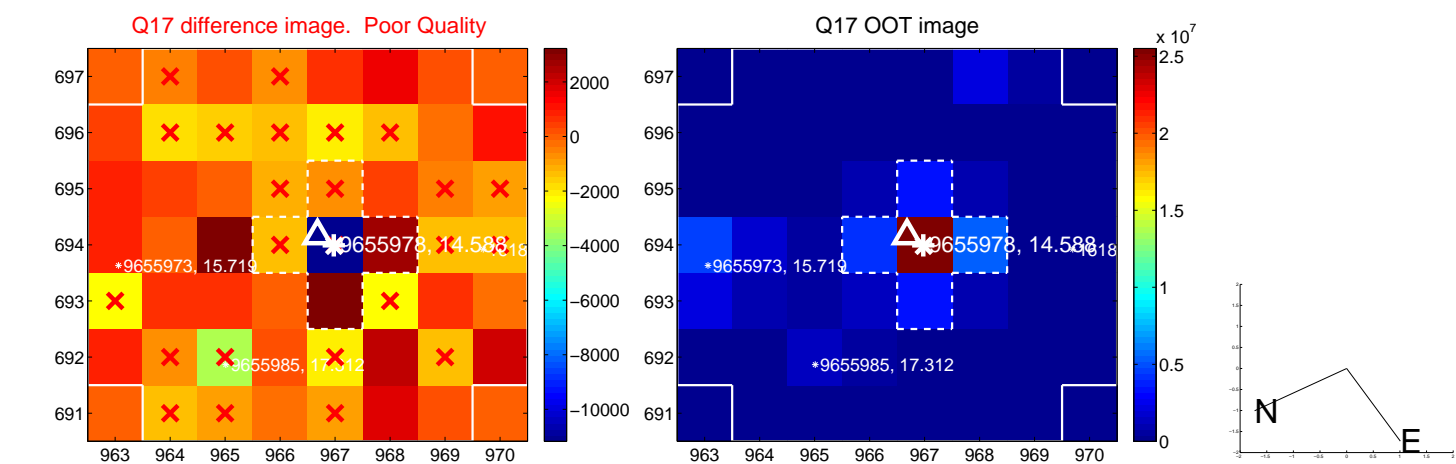
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

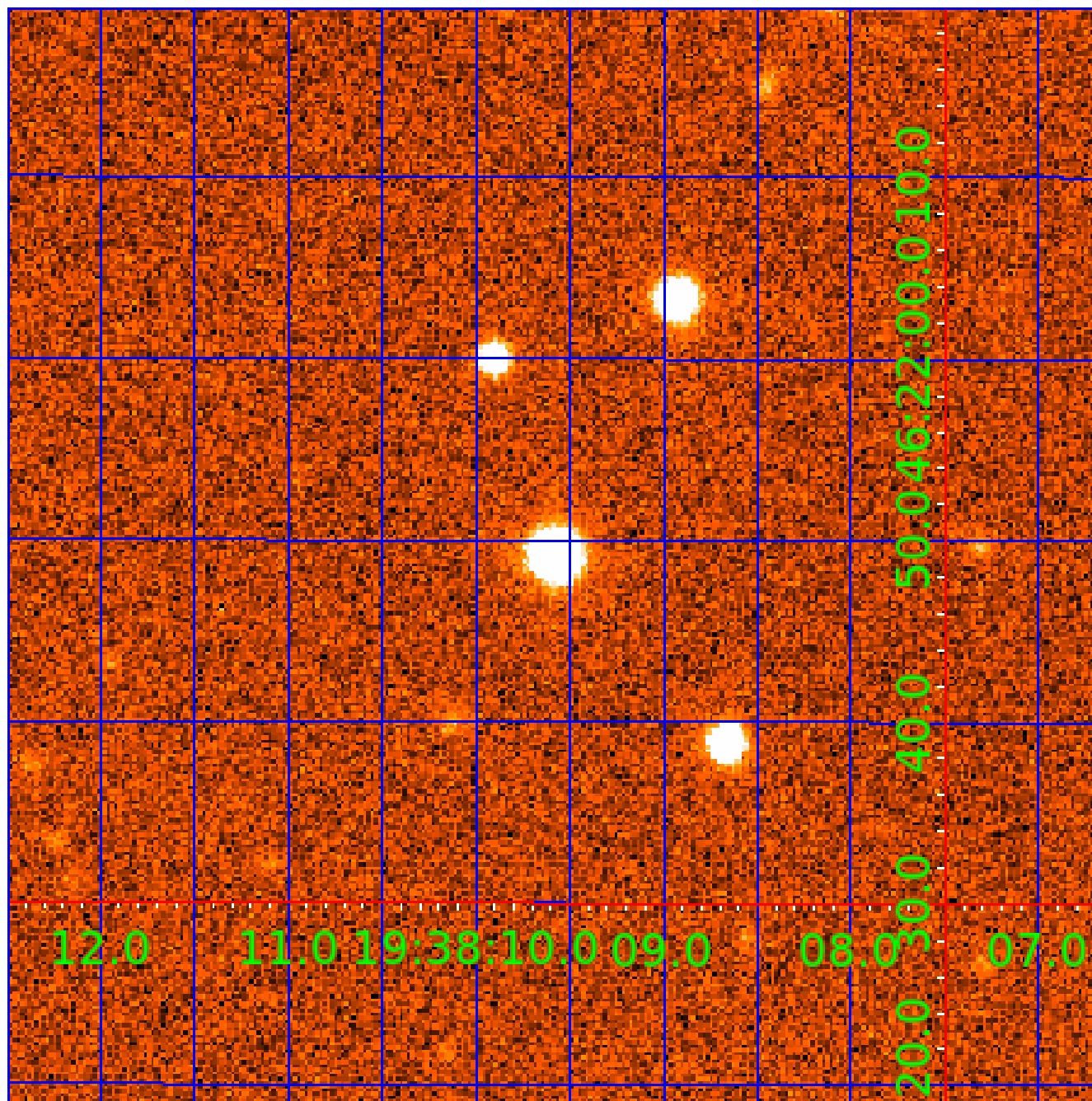


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 009655978

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})
009655978-01	OBS	No	0.790847	132.126952	7.7	5.396	8.3	2.7	1.79	6913	0.50	17404.94
009655978-02	OBS	No	16.235630	138.265724	386.9	1.218	12.1	12.3	1.79	6913	3.57	309.63
009655978-03	OBS	No	28.195177	151.520769	156.1	7.092	10.4	7.5	1.79	6913	2.37	148.33
009655978-04	OBS	No	38.789059	135.956139	327.0	2.285	10.4	9.7	1.79	6913	3.65	96.94

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009655978-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT
009655978-02	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009655978-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_TRACKER—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009655978-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—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.

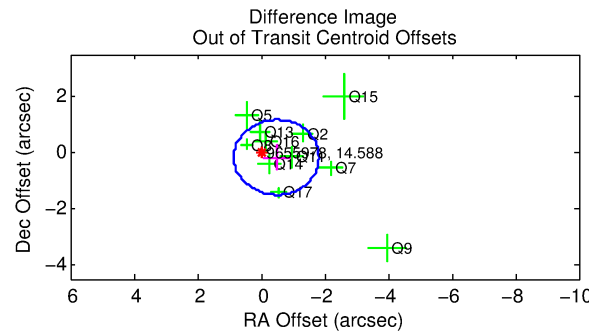
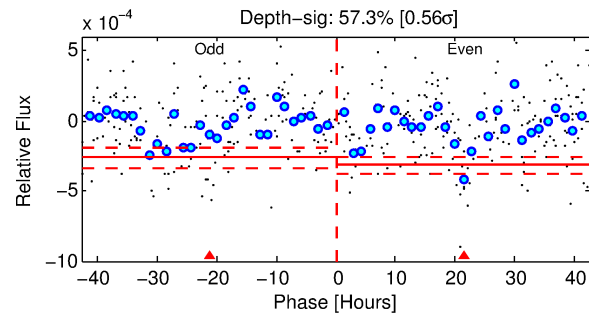
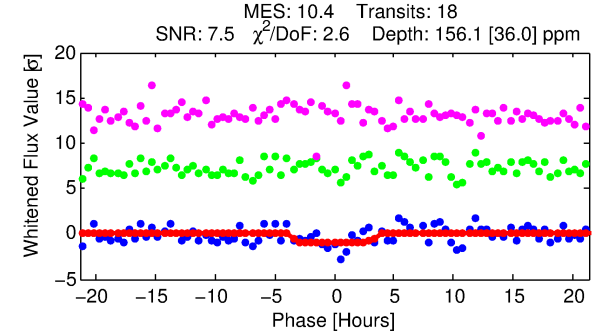
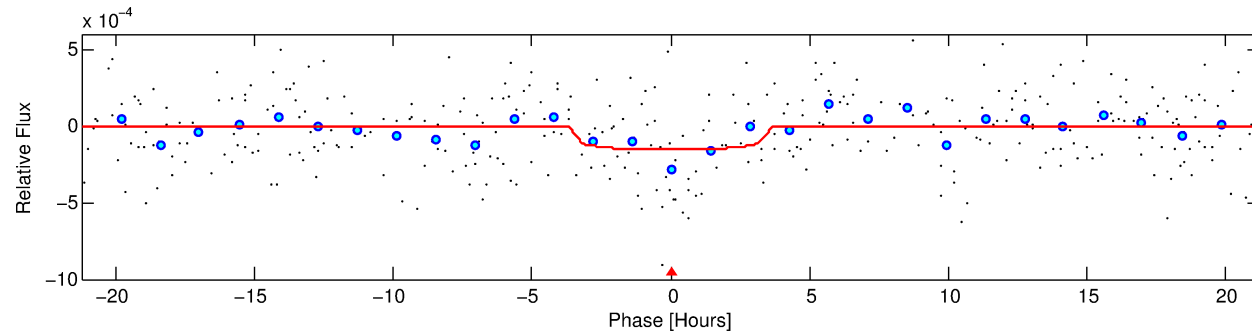
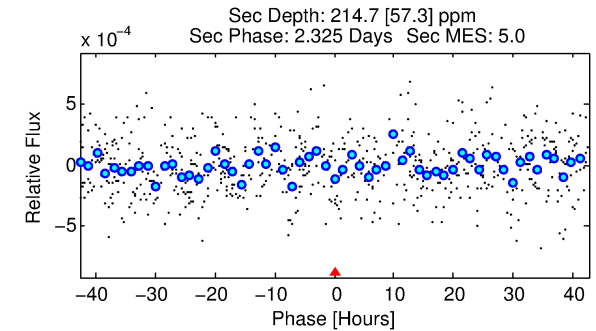
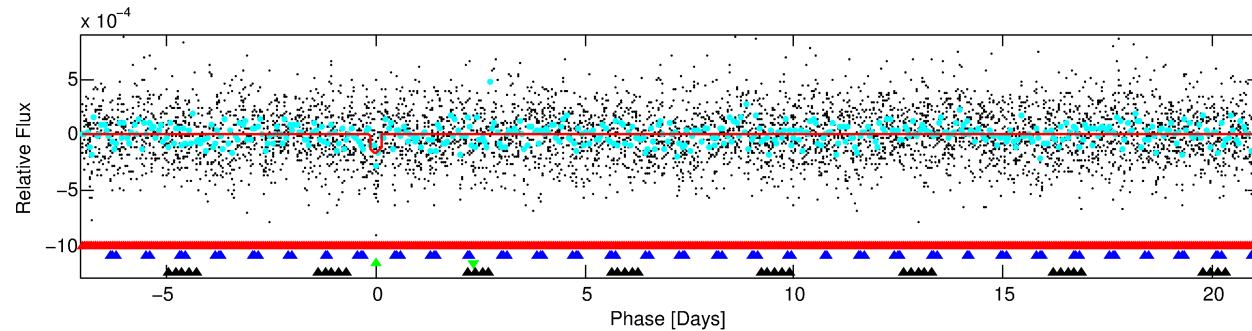
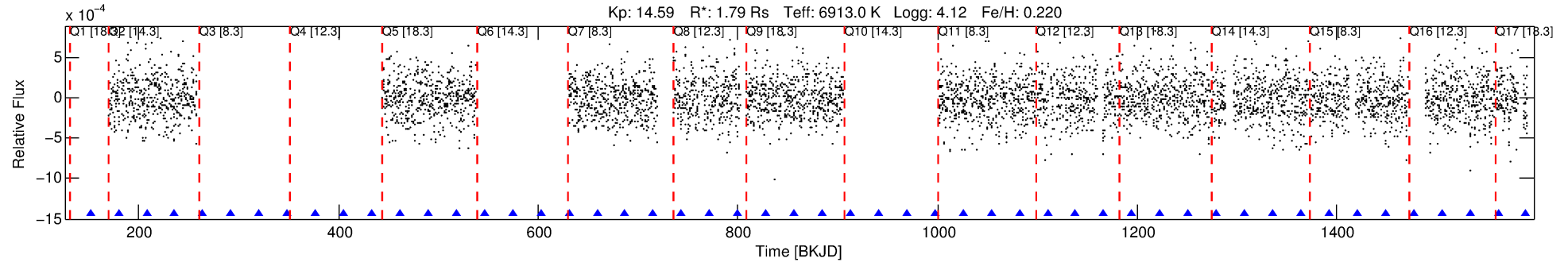
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009655978-03

No Significant Match Found

DV One-Page Summary

KIC: 9655978 Candidate: 3 of 4 Period: 28.195 d



DV Fit Results:

Period = 28.19518 [0.00183] d
Epoch = 151.5208 [0.0600] BKJD
Rp/R* = 0.0121 [0.0157]
a/R* = 23.52 [174.15]
b = 0.65 [6.55]
Seff = 148.33 [60.05]
Teq = 890 [90] K
Rp = 2.37 [3.16] Re
a = 0.2102 [0.0541] AU
Ag = 930.29 [2447.59] [0.38σ]
Teffp = 7599 [4962] K [1.35σ]

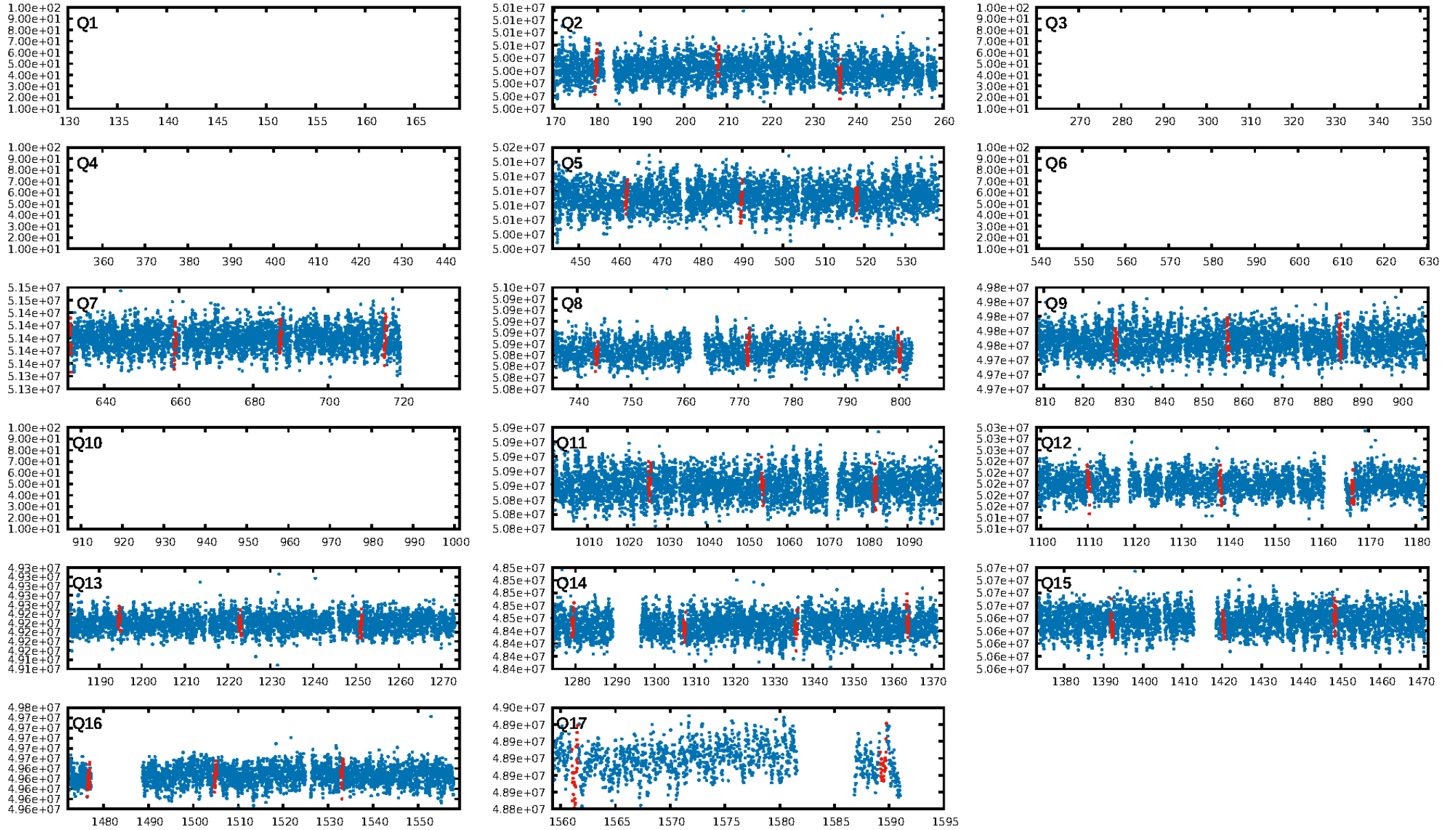
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [39.89σ]
LongPeriod-sig: 100.0% [34.12σ]
ModelChiSquare2-sig: 0.0%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 4.28e-10
RollingBand-fgt: 1.00 [18/18]
GhostDiagnostic-chr: -3.536
Centroid-sig: 1.0%
Centroid-so: 1.934 arcsec [1.97σ]
OotOffset-rm: 0.514 arcsec [1.15σ]
KicOffset-rm: 0.509 arcsec [1.11σ]
OotOffset-st: 2/3/2/4 [11]
KicOffset-st: 2/3/2/4 [11]
DiffImageQuality-fgm: 0.64 [7/11]
DiffImageOverlap-fno: 0.00 [0/12]

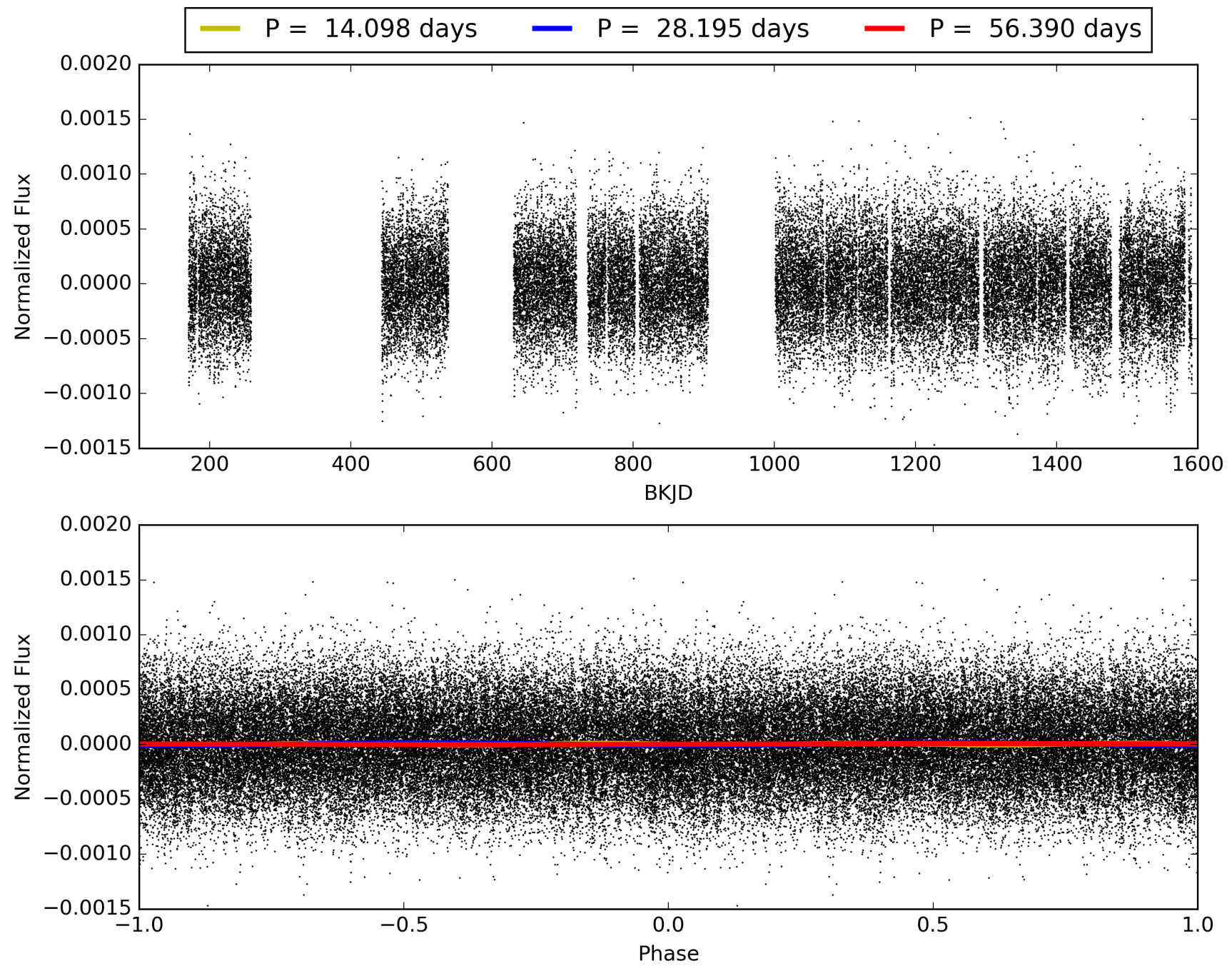
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:45:52 Z

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

TCE 009655978-03, PDC Light Curves

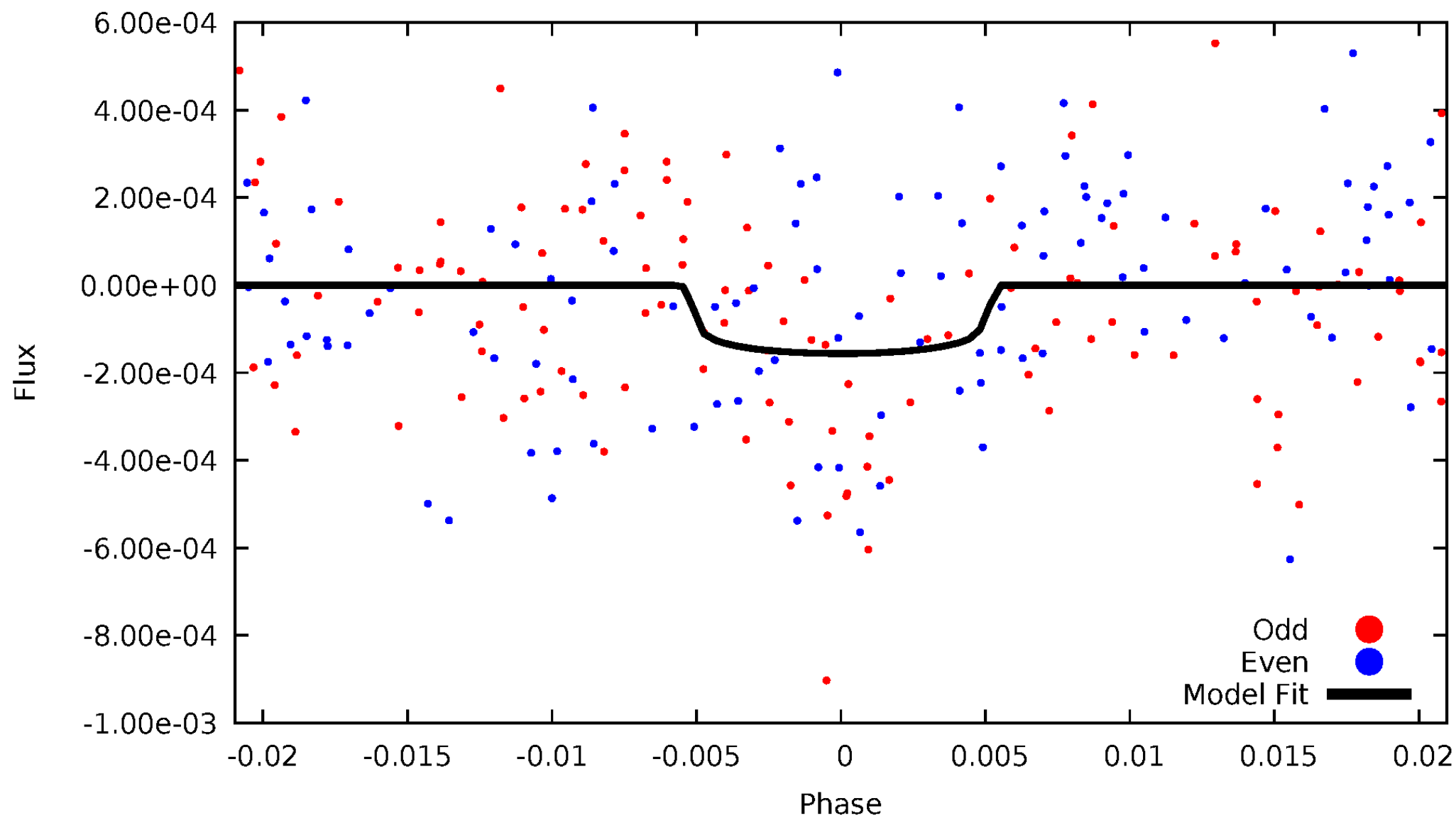


TCE 009655978-03



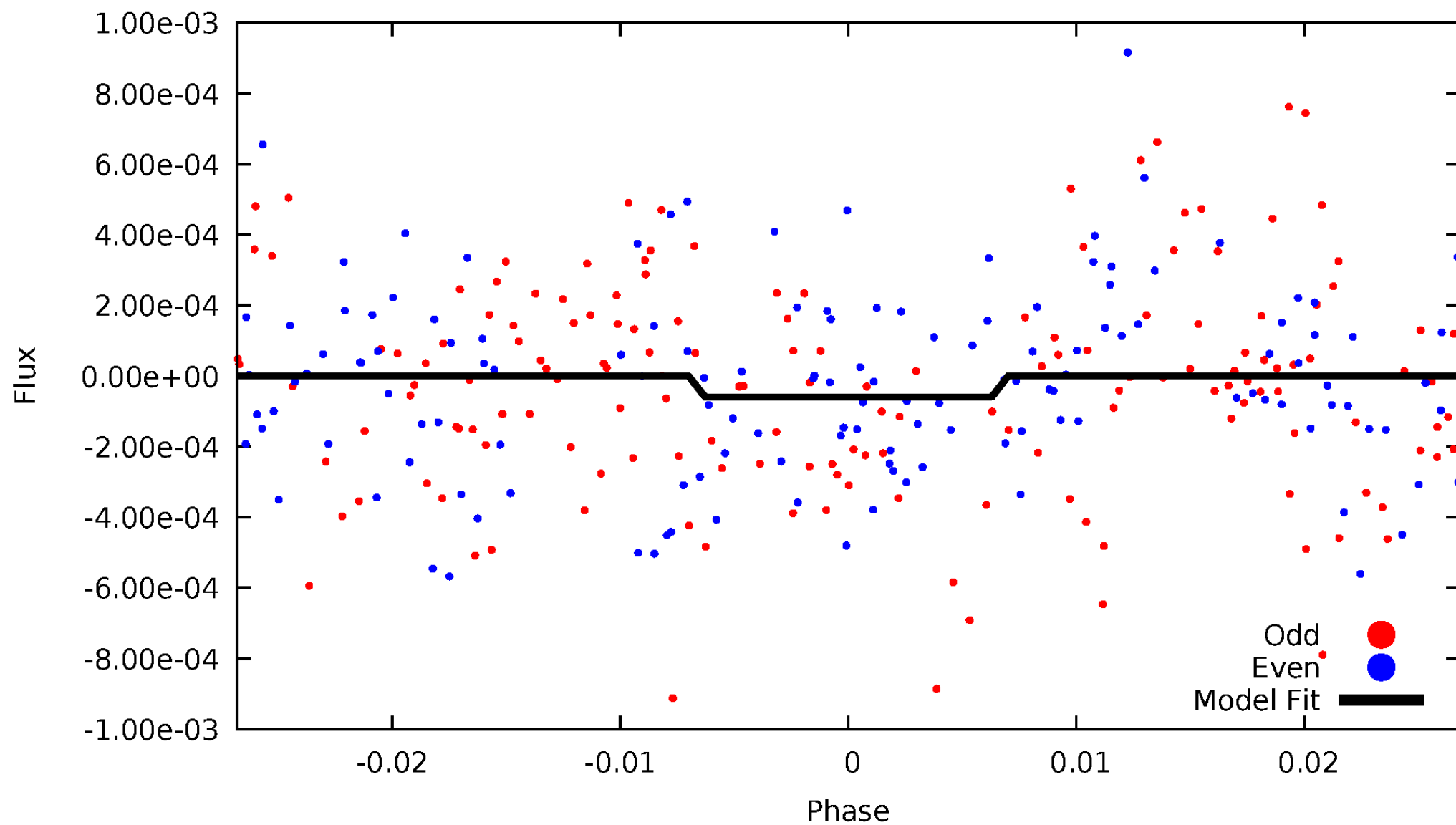
DV Odd/Even

TCE 009655978-03



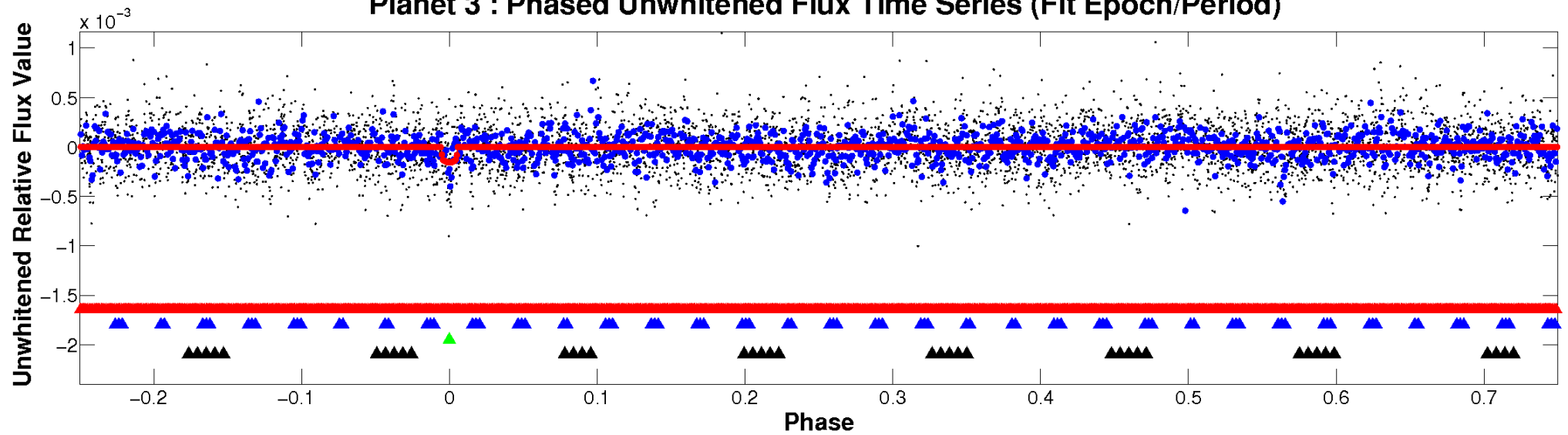
ALT Odd/Even

TCE 009655978-03

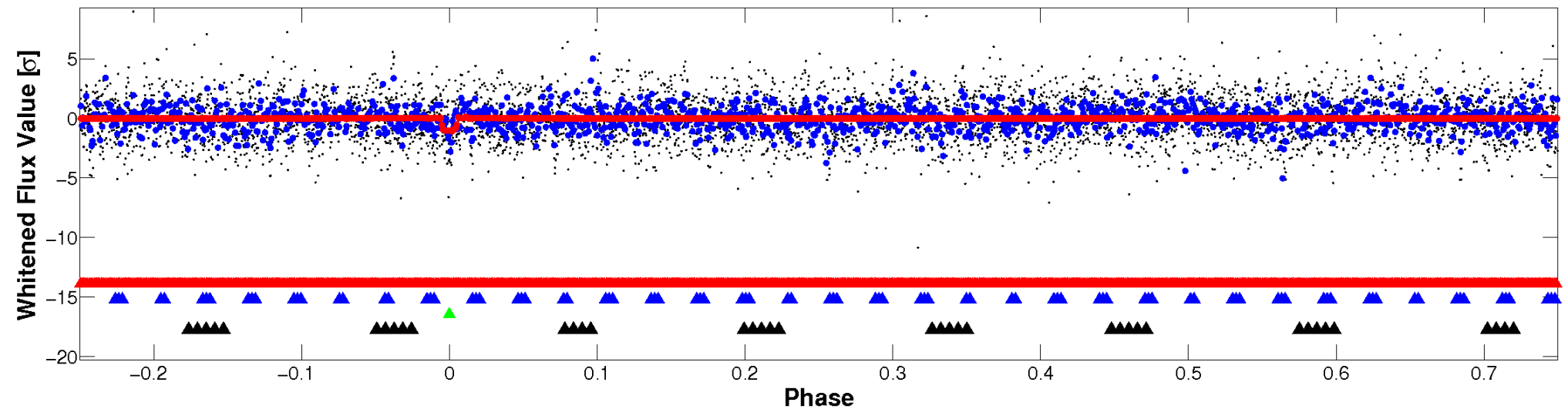


Non-Whitened Vs. Whitened Light Curve

Planet 3 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

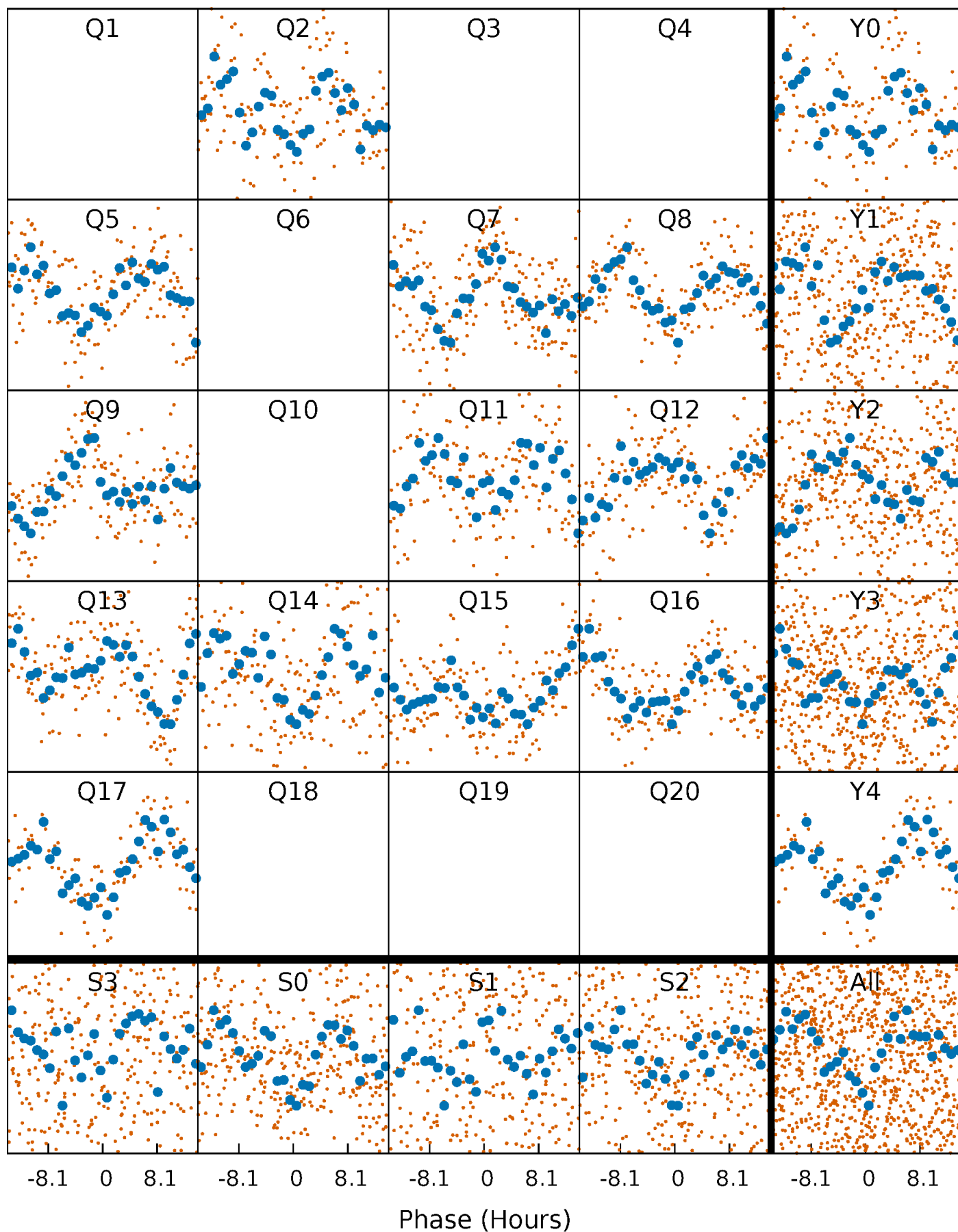


Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



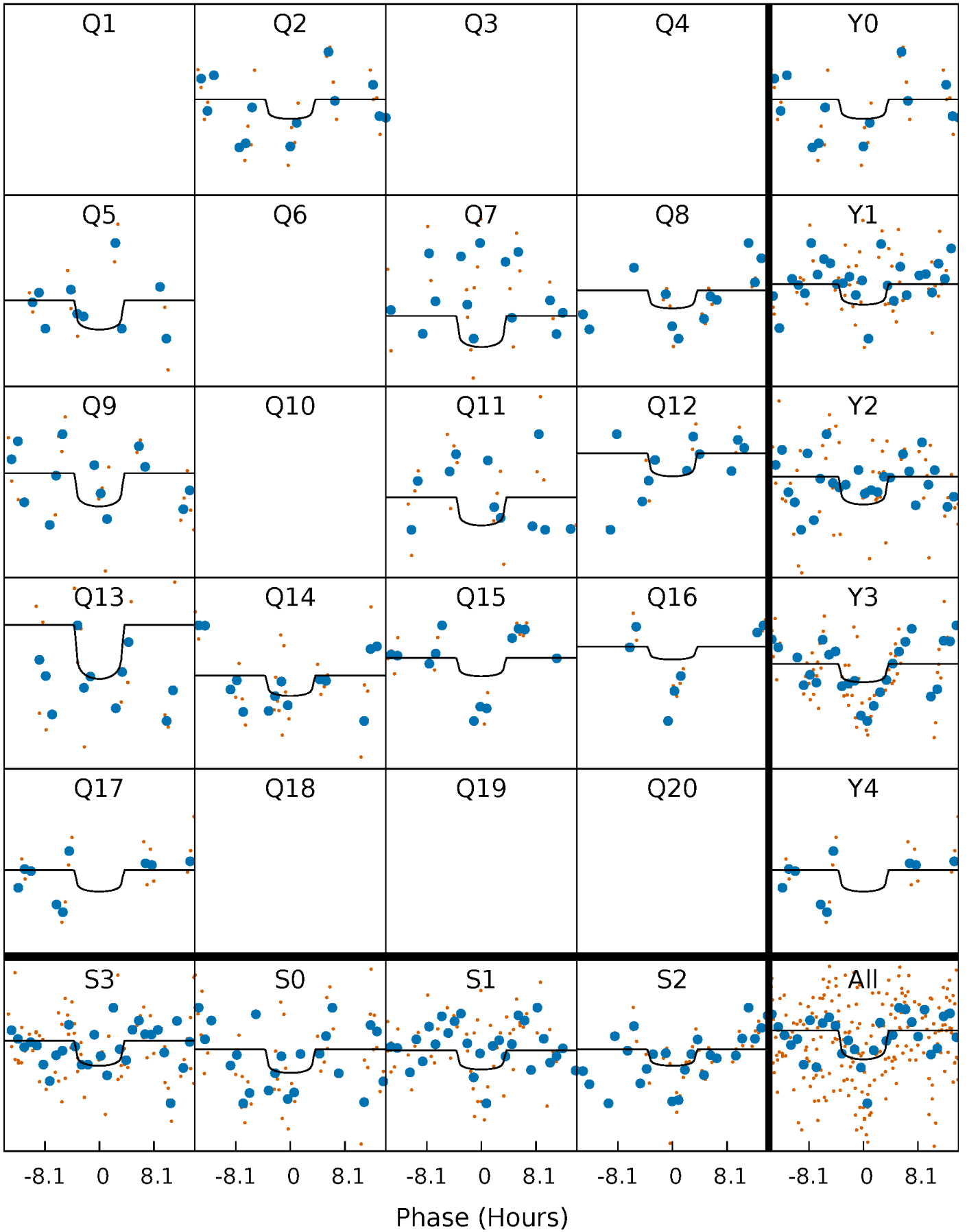
PDC Quarter-Phased Transit Curves

TCE 009655978-03 P= 28.195177 Days $T_0=151.520769$ (BKJD)



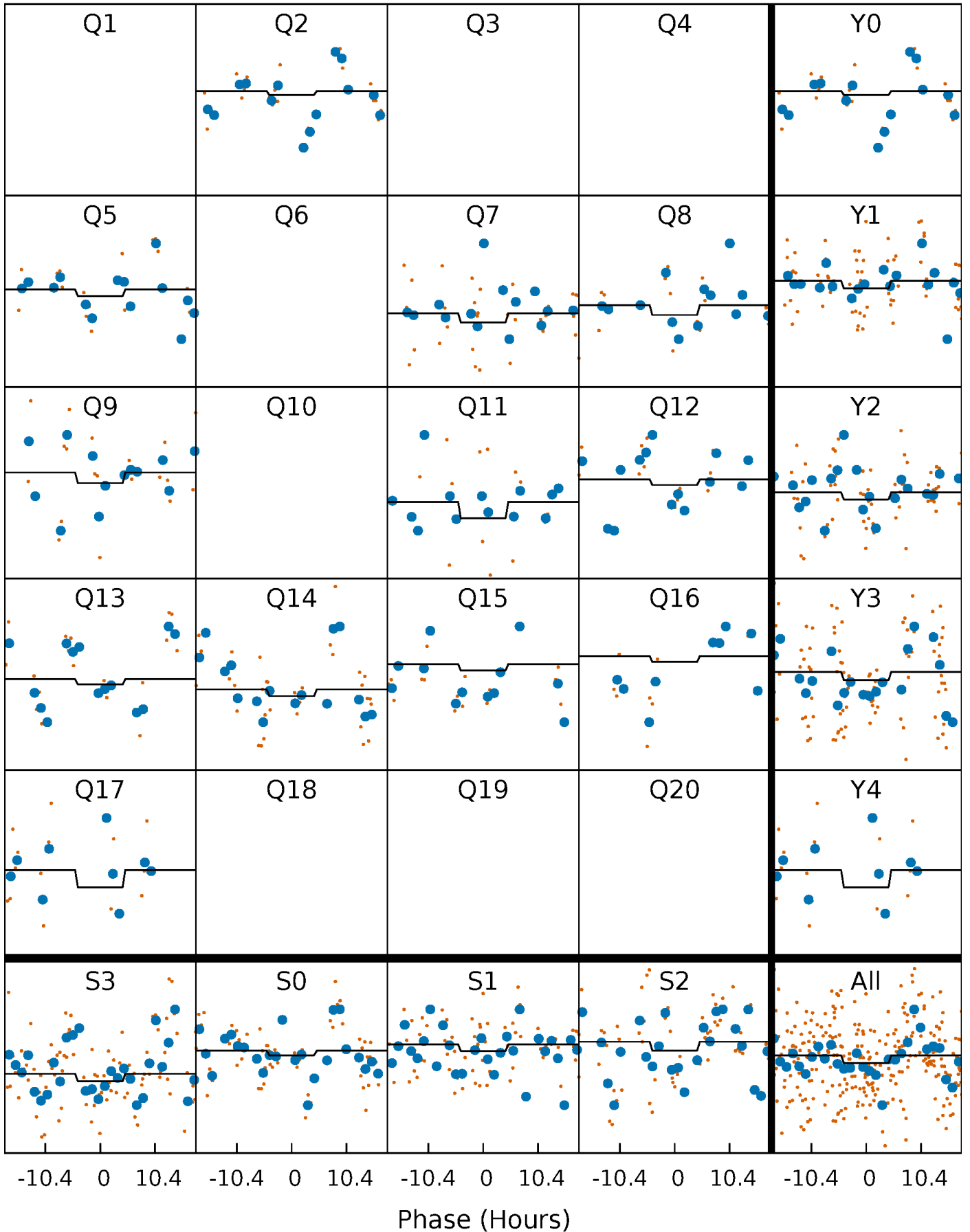
DV Quarter-Phased Transit Curves

TCE 009655978-03 P= 28.195177 Days $T_0=151.520769$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

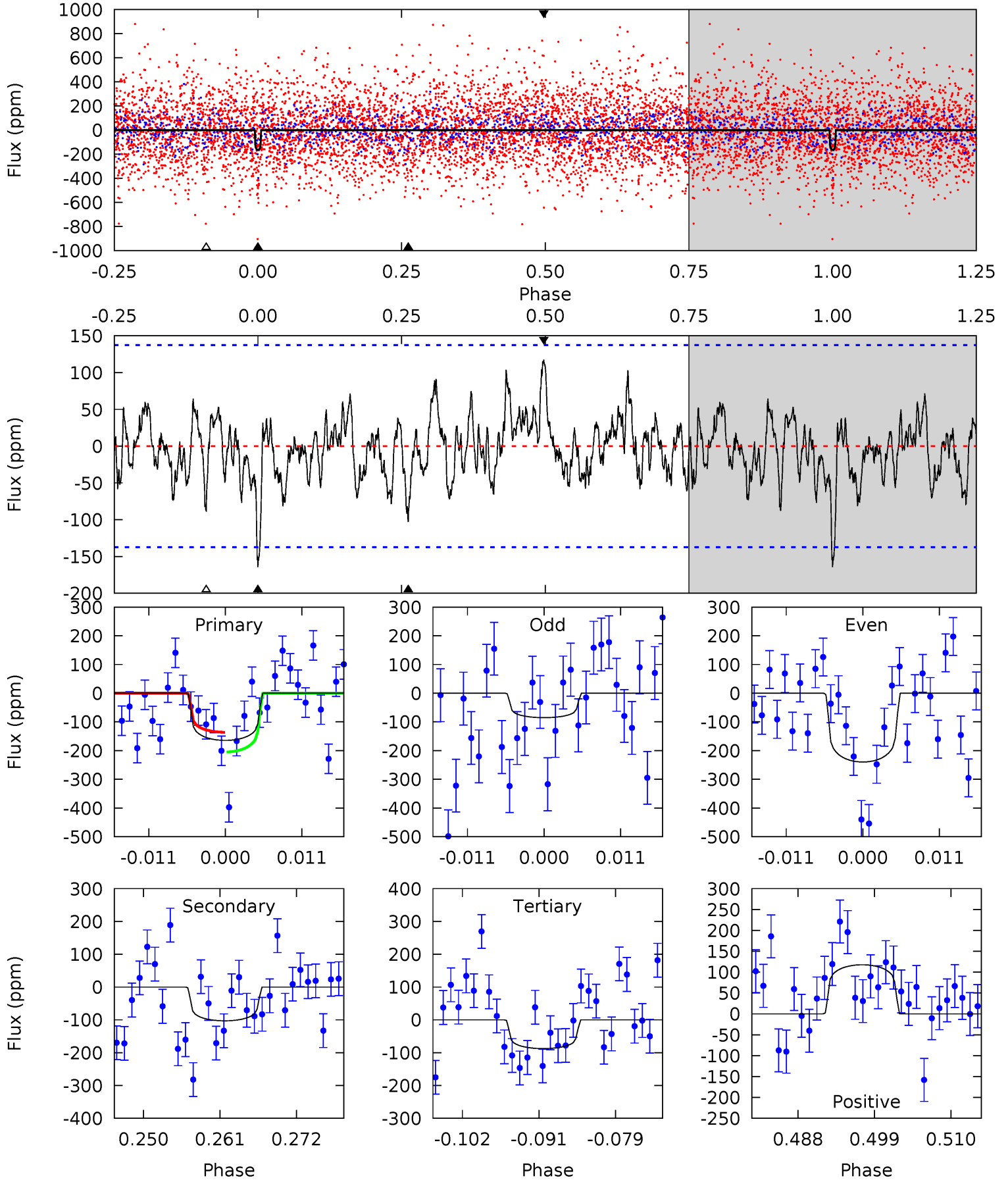
TCE 009655978-03 $P = 28.202258$ Days $T_0 = 151.377121$ (BKJD)



DV Model-Shift Uniqueness Test

009655978-03, P = 28.195177 Days, E = 151.520769 Days

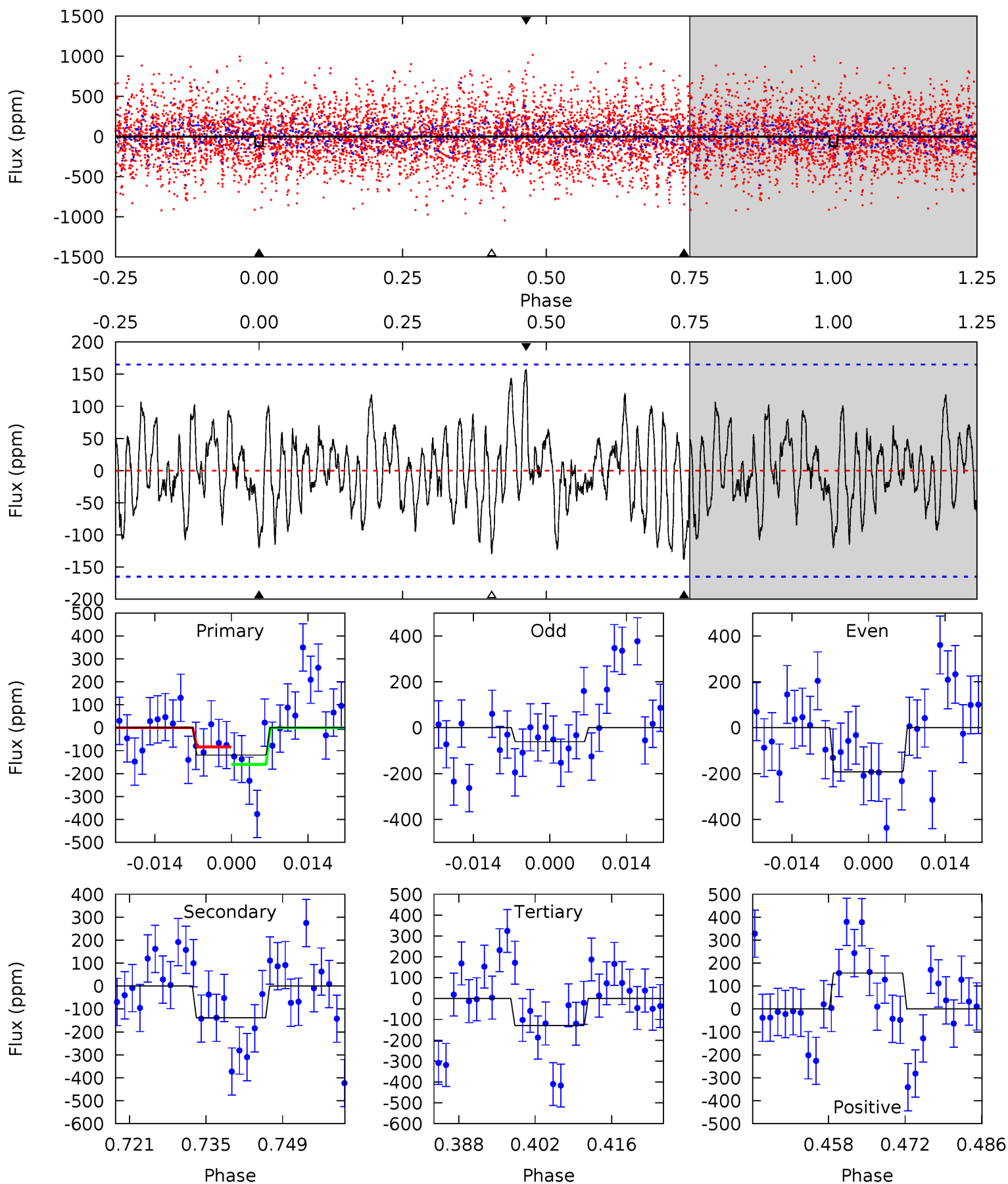
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.98	3.75	3.19	4.28	5.00	2.53	1.31	2.80	1.70	0.56	-0.54	2.84	0.99	0.42	1.24



Alt Model-Shift Uniqueness Test

009655978-03, P = 28.202258 Days, E = 151.377121 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
3.60	4.17	3.90	4.72	4.96	2.46	1.58	-0.30	-1.12	0.27	-0.55	1.97	1.36	0.53	1.16



Stellar Parameters For KIC 009655978

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	M (M_{\odot})	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	6913^{+192}_{-312}	$4.125^{+0.128}_{-0.192}$	$0.220^{+0.150}_{-0.350}$	$1.790^{+0.566}_{-0.378}$	$1.560^{+0.208}_{-0.254}$	$0.383^{+0.254}_{-0.207}$
	+3%/-5%	+3%/-5%	+68%/-159%	+32%/-21%	+13%/-16%	+66%/-54%
Source	PHO54	PHO54	PHO54	DSEP		

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

Secondary Eclipse Parameters for KIC 009655978-03 / KOI

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-103 ± 27	$3.33^{+2.80}_{-2.22}$	1252^{+89}_{-81}	5259^{+4627}_{-1143}	214^{+1578}_{-153}
Alt.	-139 ± 33	$2.78^{+2.78}_{-1.81}$	1245^{+94}_{-77}	6111^{+5994}_{-1544}	397^{+3082}_{-292}

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

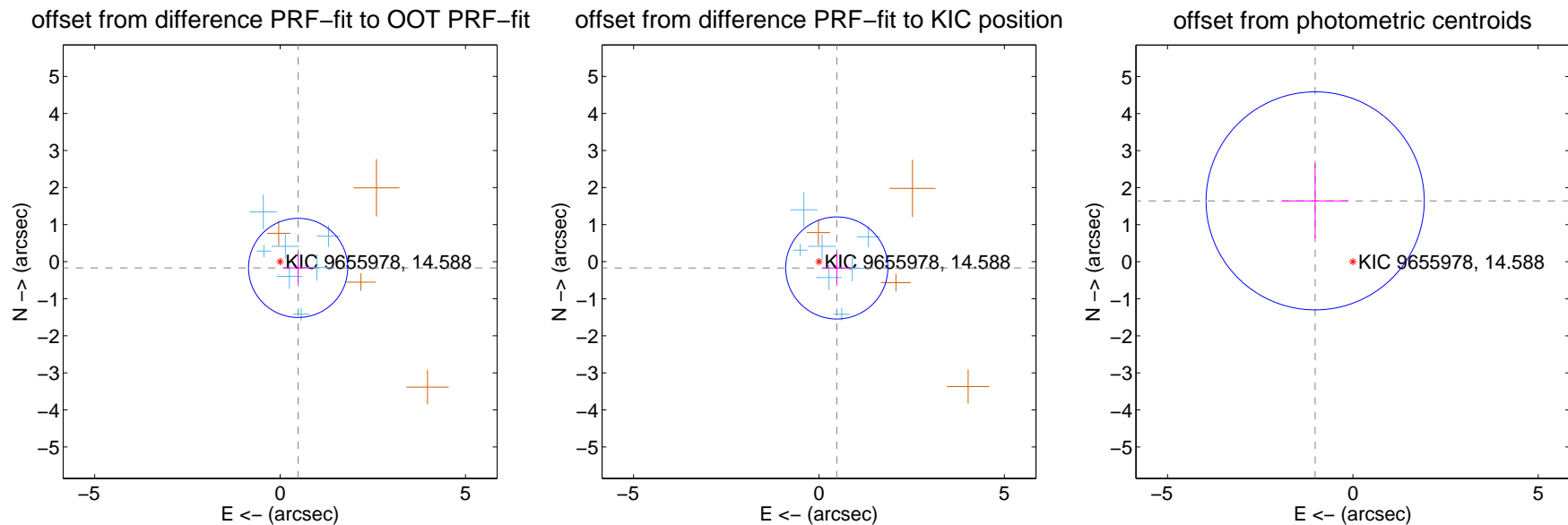
DV Centroid Data

Supplemental centroid analysis for 009655978-03. Kepler magnitude: 14.59. Transit SNR 7.53

There are 7 quarters with good PRF difference image offsets

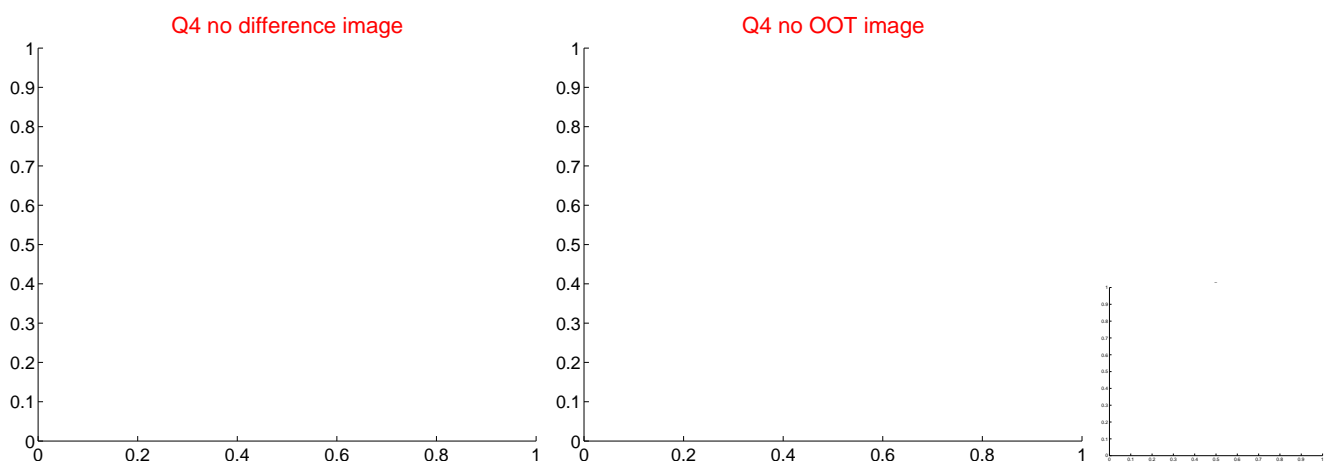
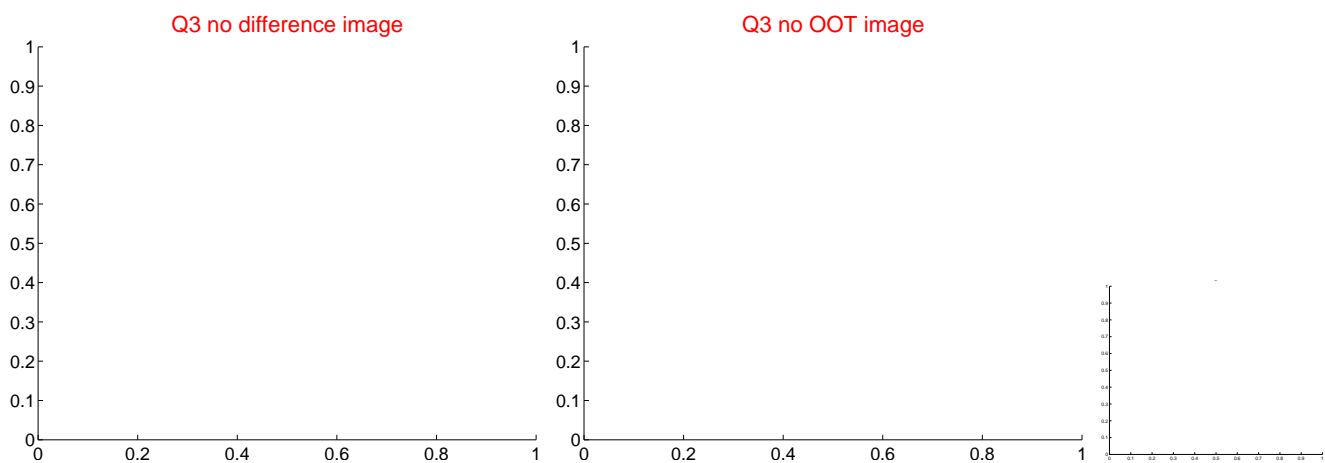
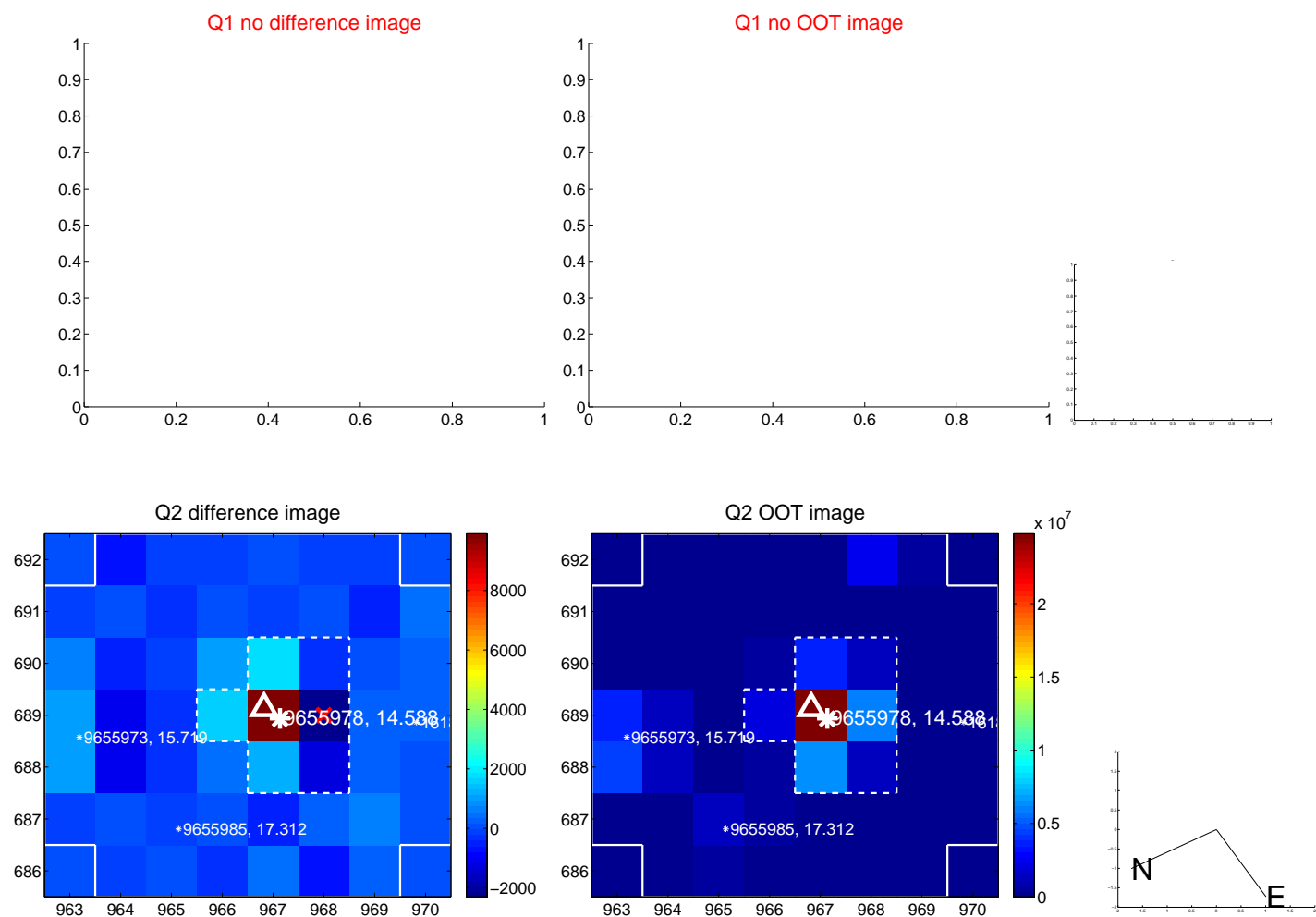
The direct PRF centroid is offset from the target star catalog position by about 0.05 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.514 ± 0.446	1.15	-0.486 ± 0.403	-0.168 ± 0.407
PRF-fit source offset from KIC position	0.509 ± 0.459	1.11	-0.480 ± 0.383	-0.169 ± 0.425
photometric centroid source offset	1.93 ± 0.98	1.97	1.02 ± 0.90	1.64 ± 1.01

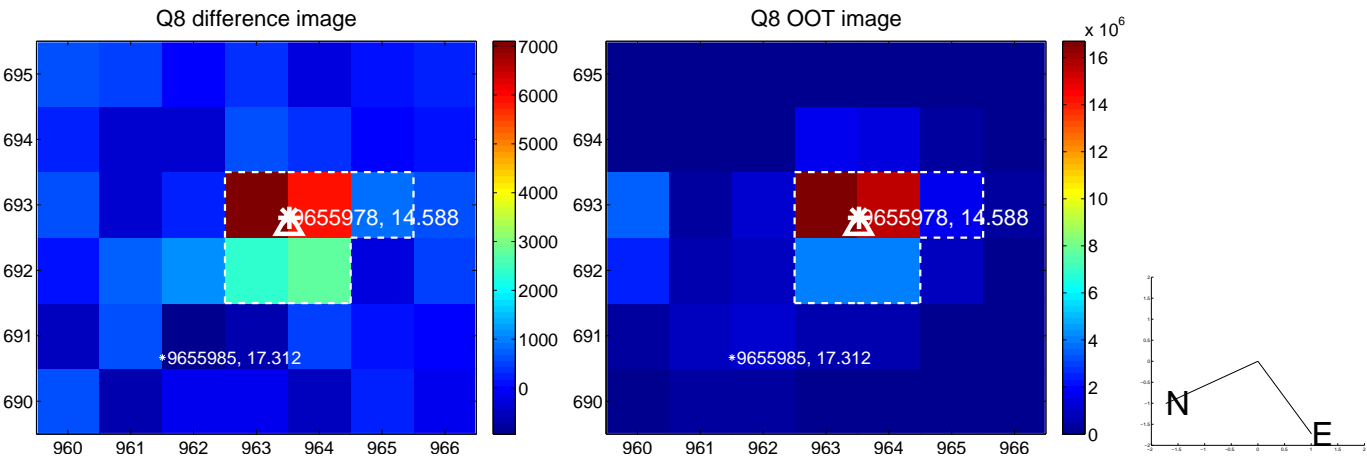
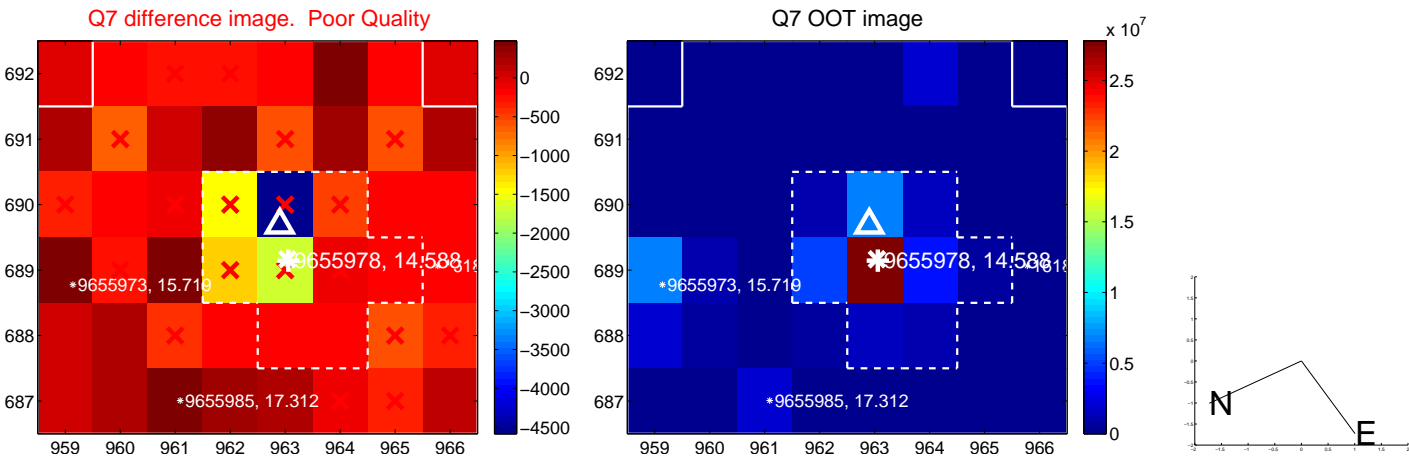
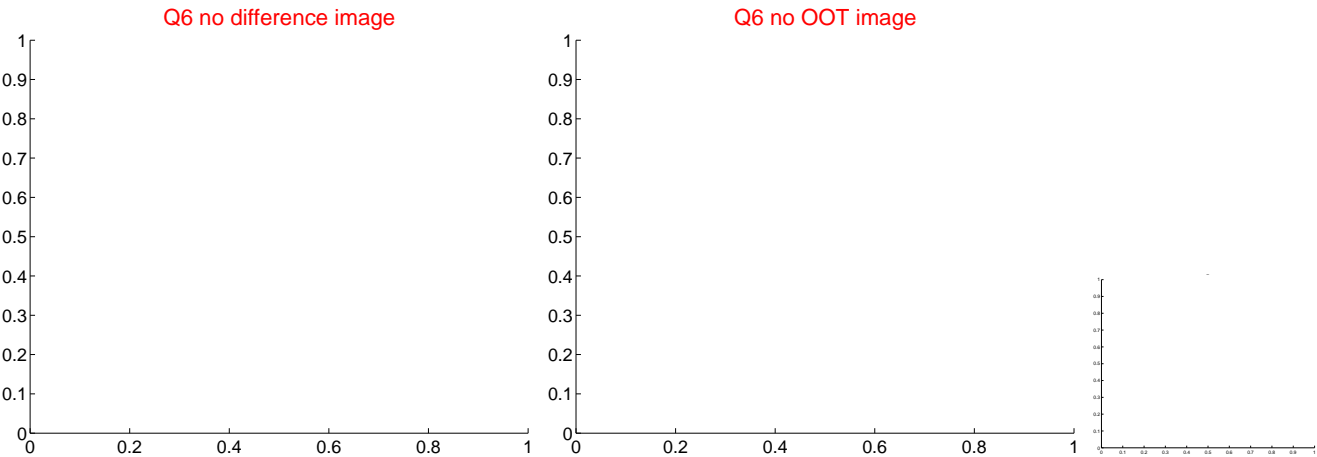
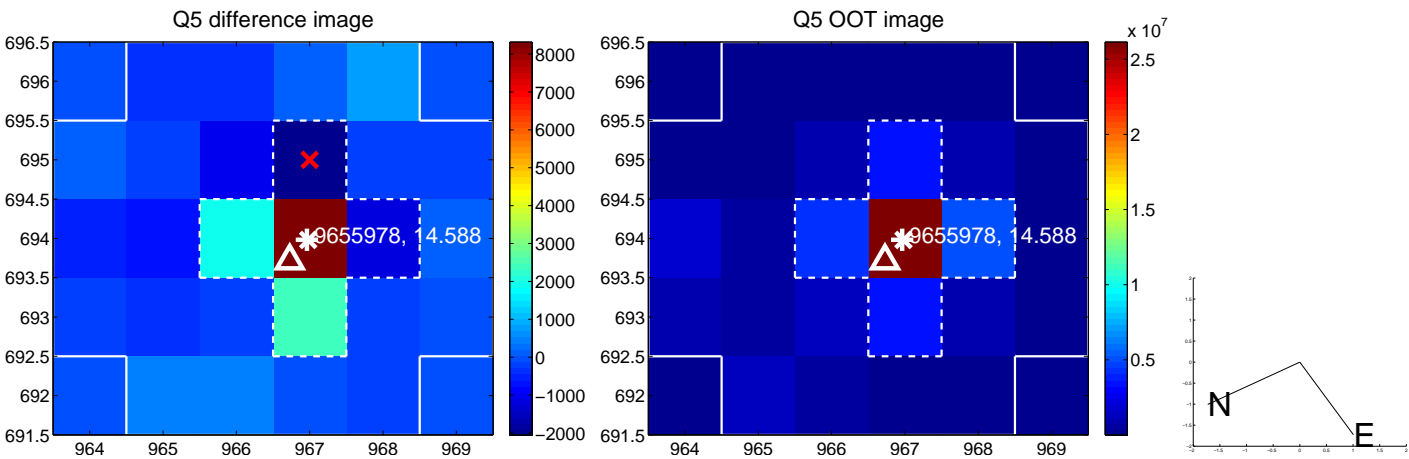


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

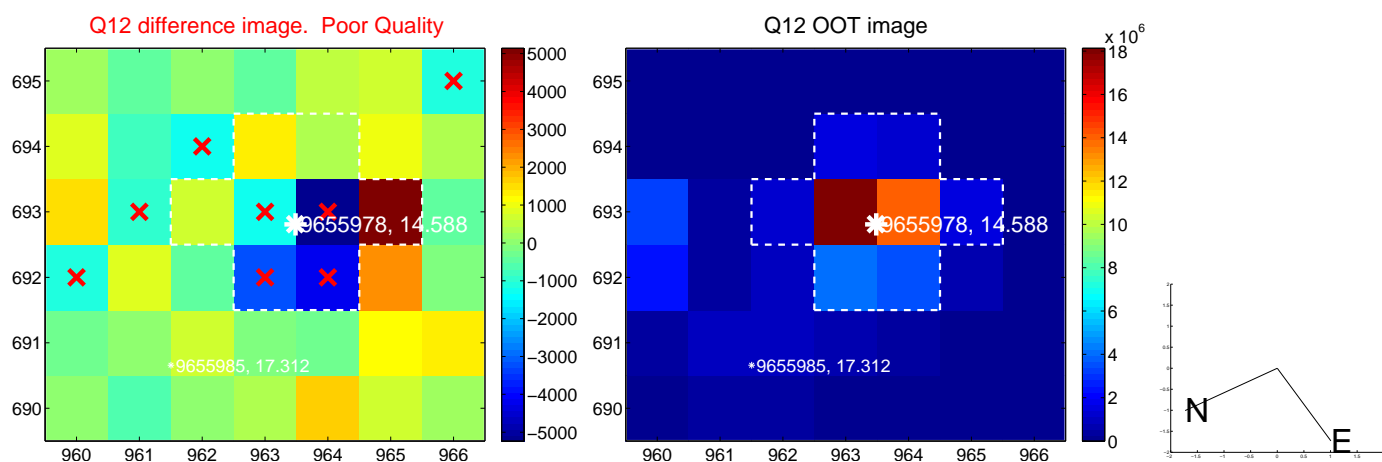
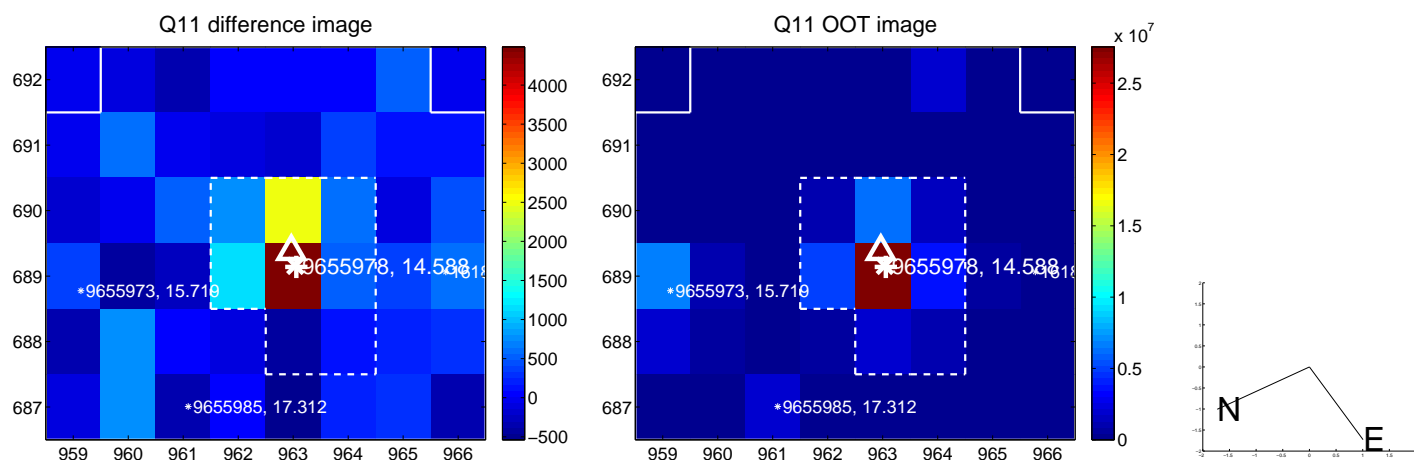
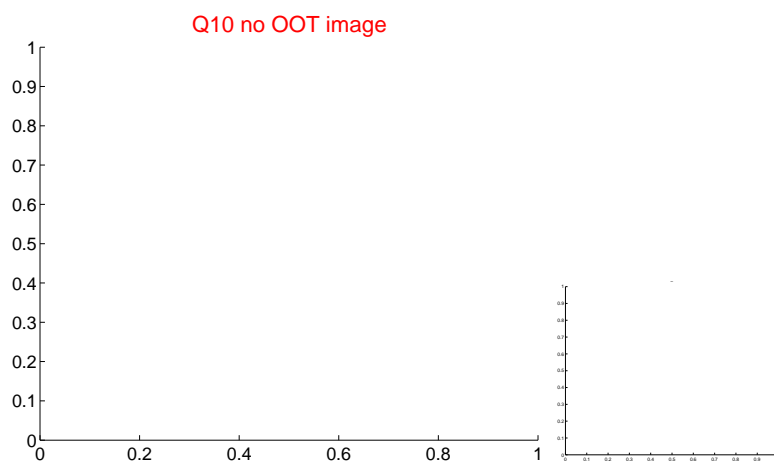
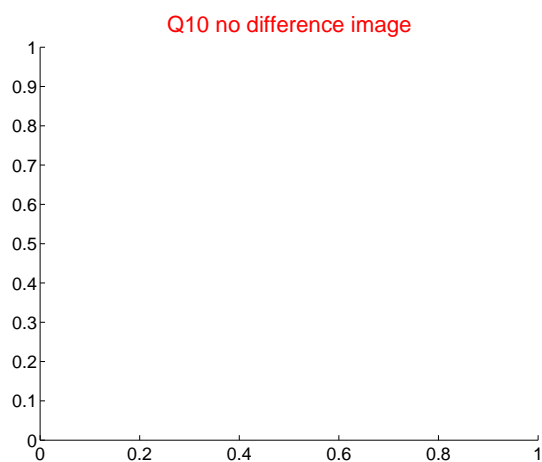
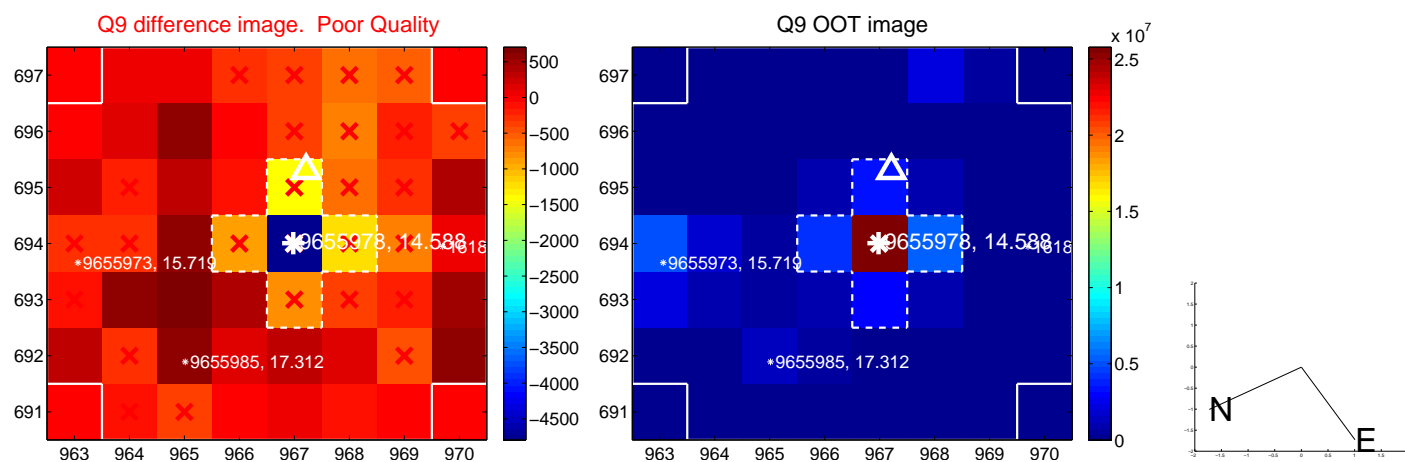
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value



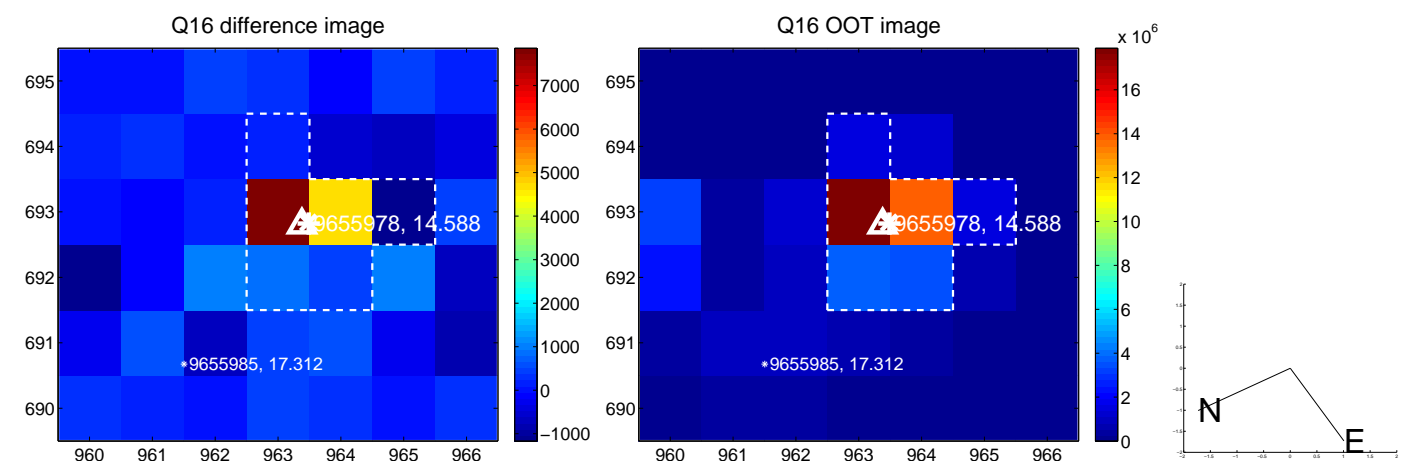
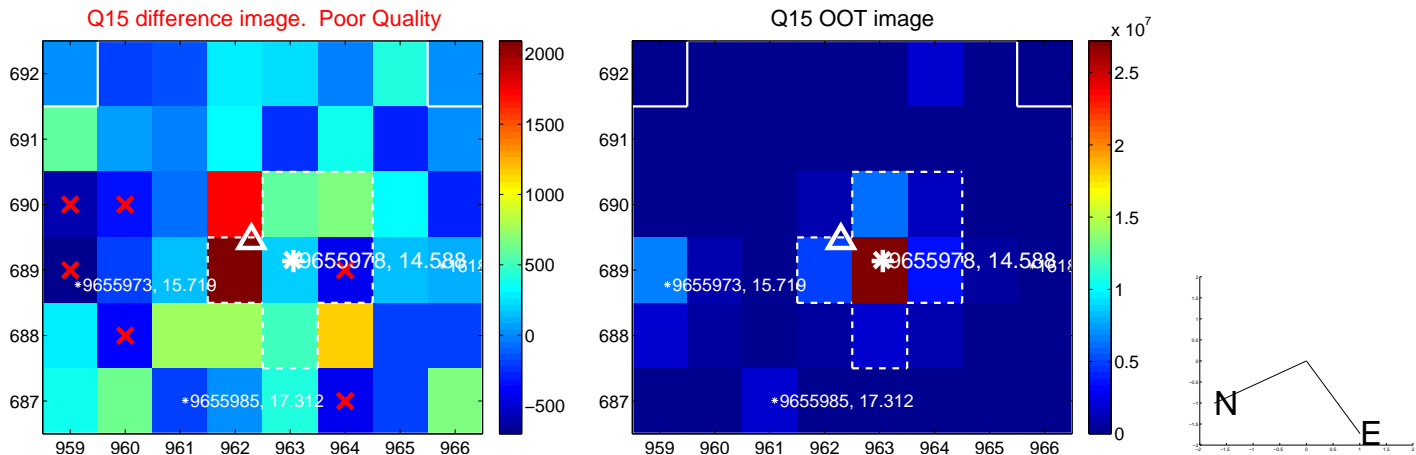
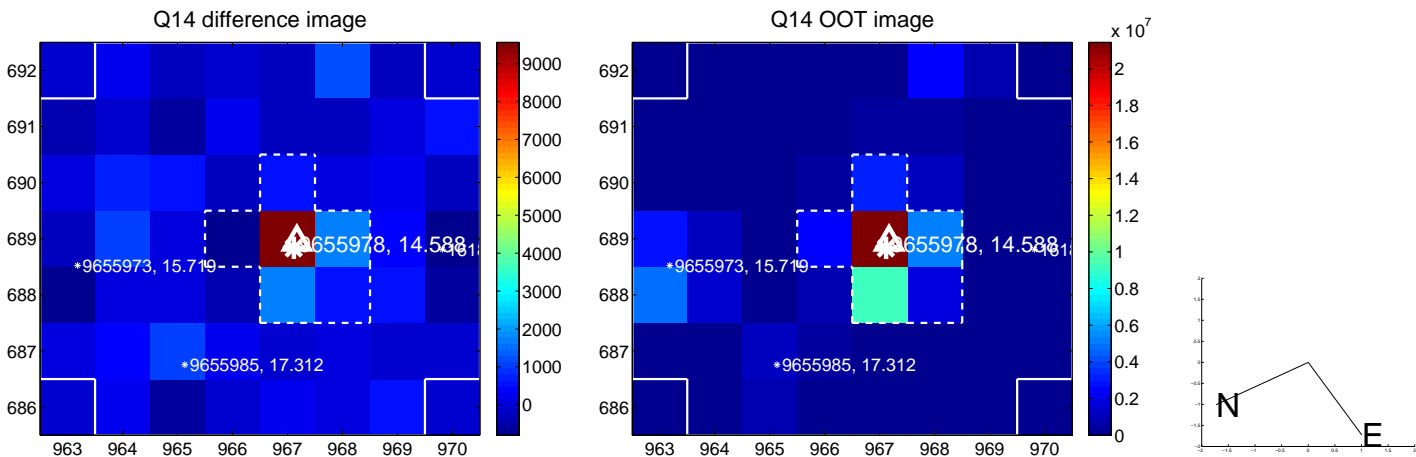
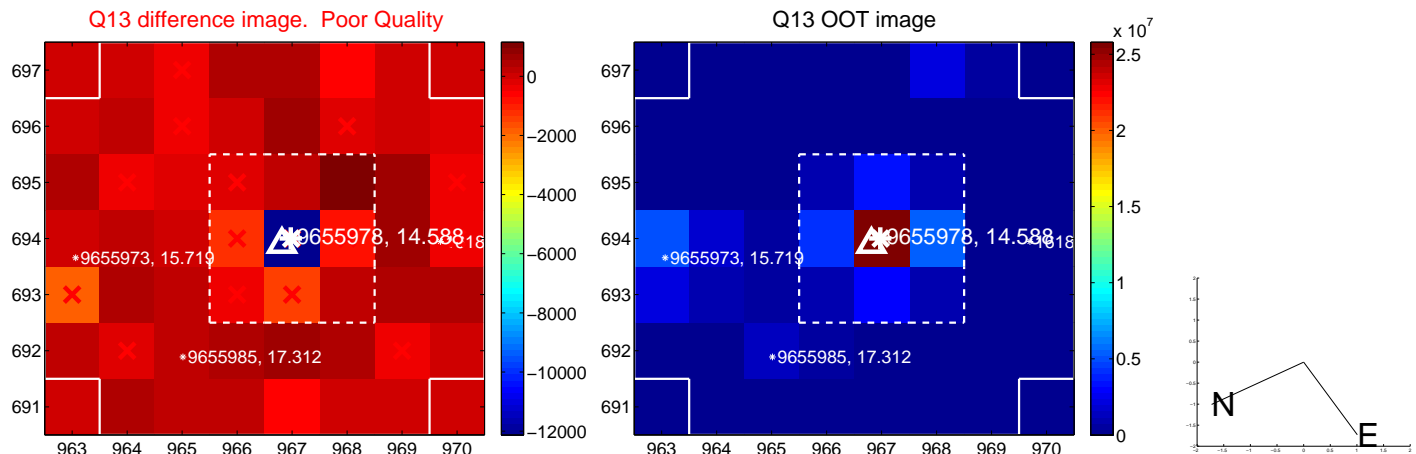
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



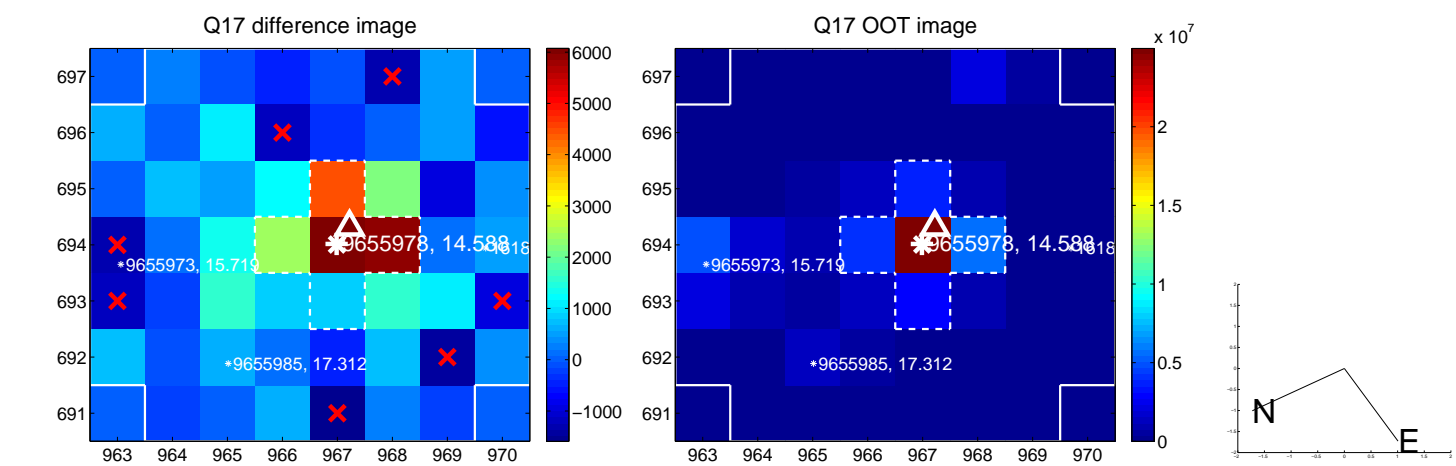
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



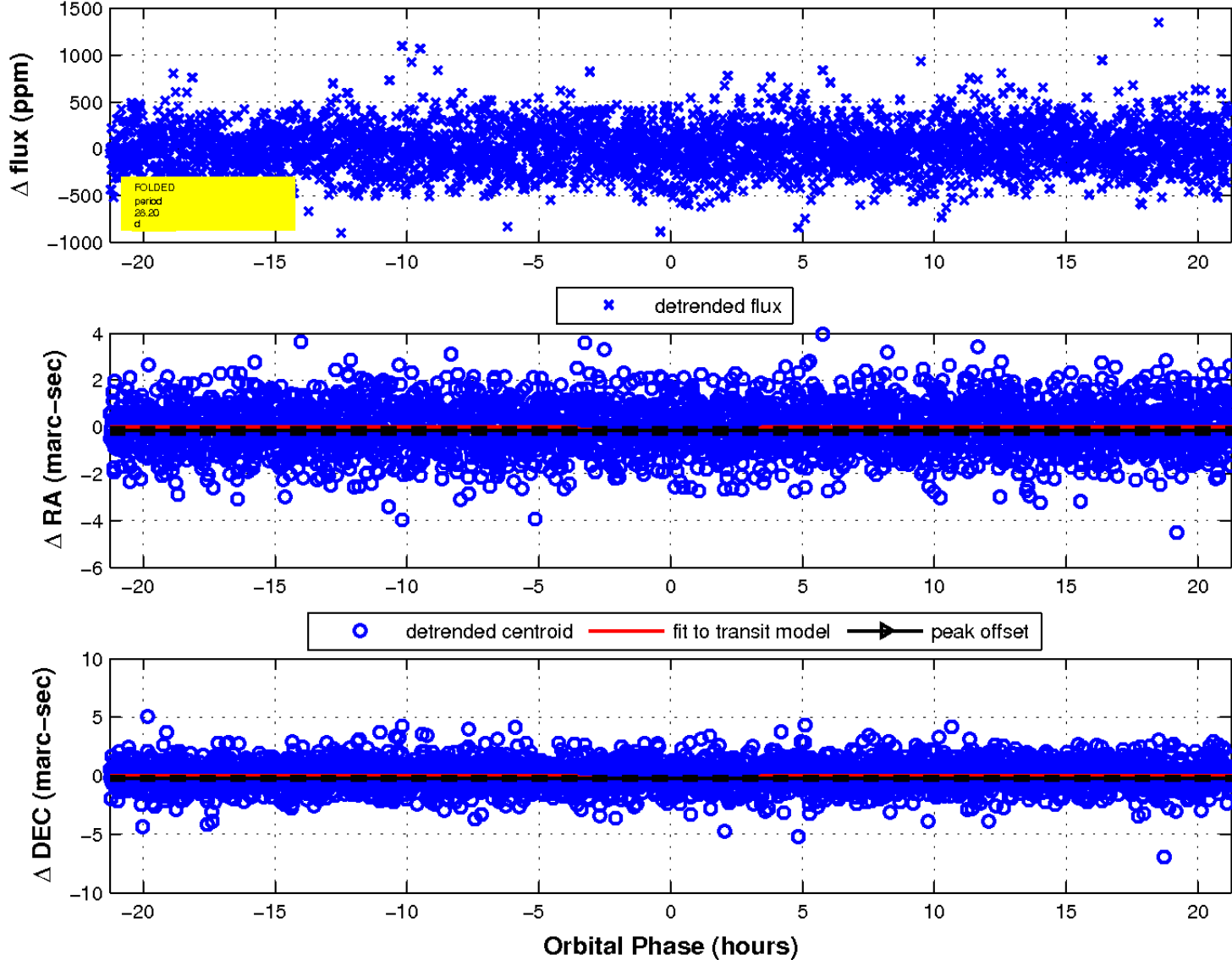
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

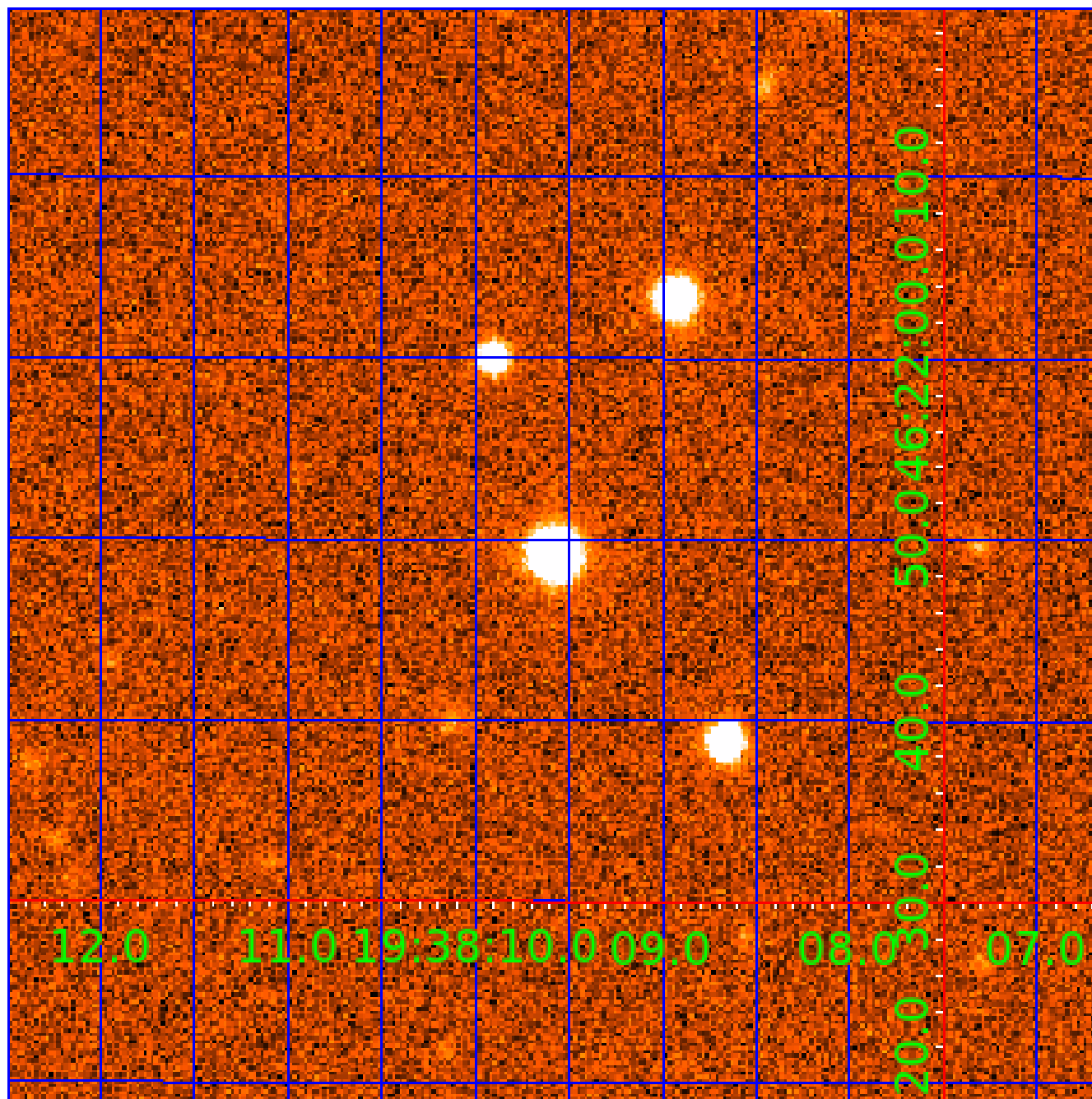


fluxWeightedCentroids, Planet 3 of 4



UKIRT Image

Declination



KIC 009655978

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})
009655978-01	OBS	No	0.790847	132.126952	7.7	5.396	8.3	2.7	1.79	6913	0.50	17404.94
009655978-02	OBS	No	16.235630	138.265724	386.9	1.218	12.1	12.3	1.79	6913	3.57	309.63
009655978-03	OBS	No	28.195177	151.520769	156.1	7.092	10.4	7.5	1.79	6913	2.37	148.33
009655978-04	OBS	No	38.789059	135.956139	327.0	2.285	10.4	9.7	1.79	6913	3.65	96.94

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009655978-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT
009655978-02	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009655978-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_TRACKER—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009655978-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—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.

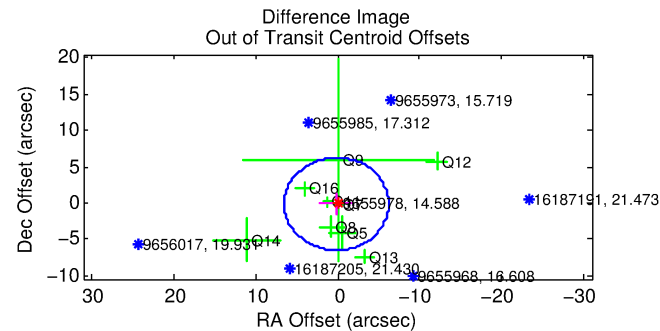
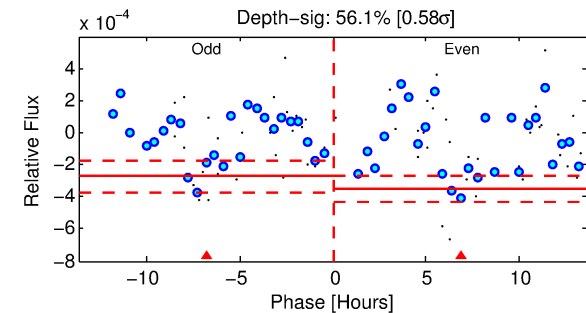
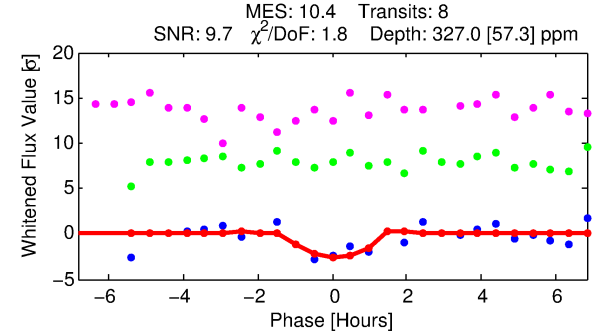
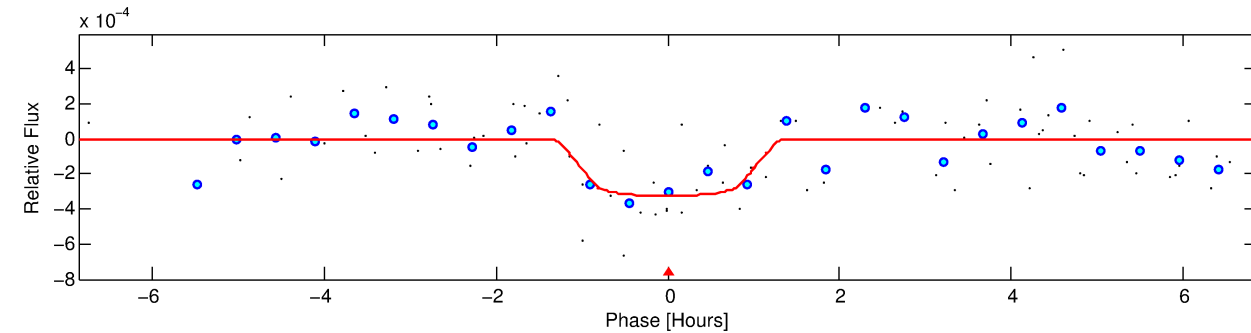
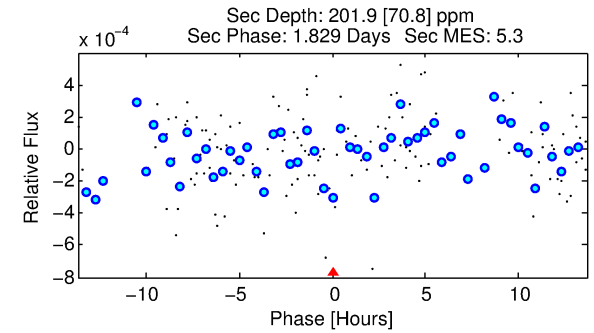
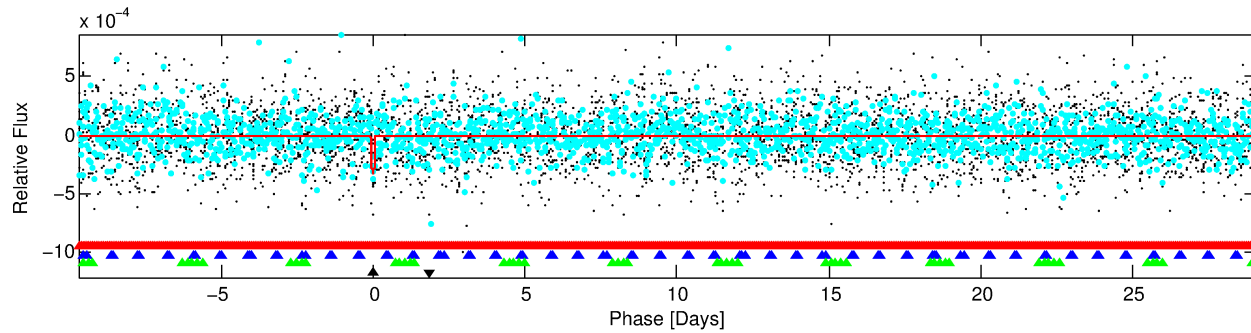
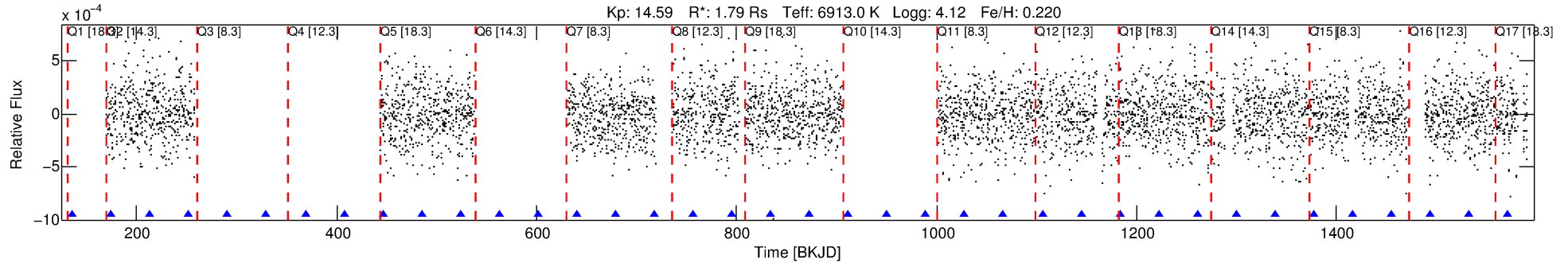
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009655978-04

No Significant Match Found

DV One-Page Summary

KIC: 9655978 Candidate: 4 of 4 Period: 38.789 d



DV Fit Results:

Period = 38.78906 [0.00046] d
Epoch = 135.9561 [0.0130] BKJD
Rp/R* = 0.0187 [0.0173]
a/R* = 73.89 [395.67]
b = 0.84 [1.84]
Seff = 96.94 [39.25]
Teq = 800 [81] K
Rp = 3.64 [3.57] Re
a = 0.2601 [0.0669] AU
Ag = 565.40 [1086.64] [0.52σ]
Teffp = 6032 [2859] K [1.83σ]

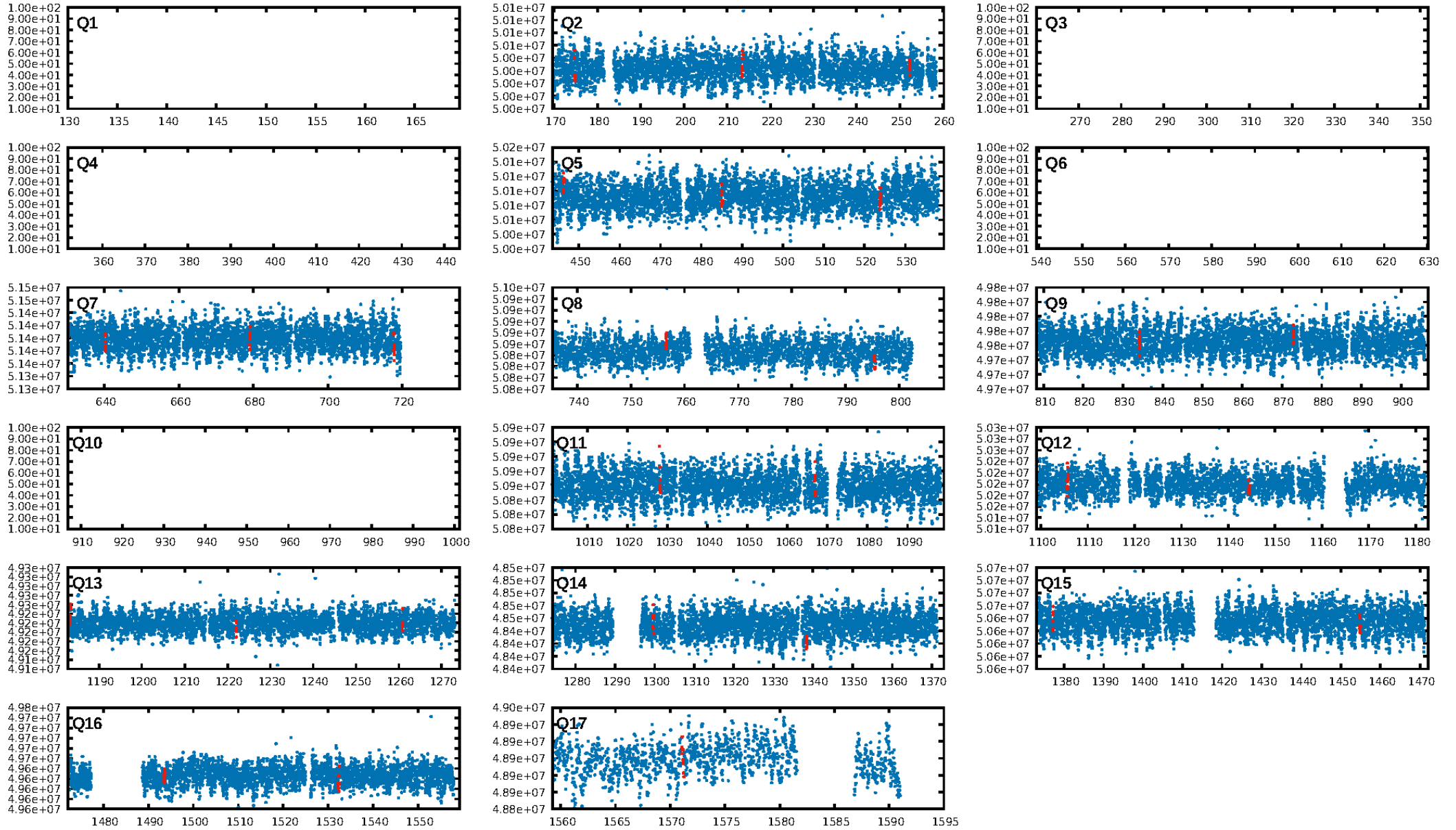
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [34.12σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 12.5%
ModelChiSquareGof-sig: 97.3%
Bootstrap-pfa: 8.34e-09
RollingBand-fgt: 1.00 [7/7]
GhostDiagnostic-chr: -5.288
Centroid-sig: 8.8%
Centroid-so: 1.500 arcsec [1.64σ]
OotOffset-rm: 0.233 arcsec [0.11σ]
OotOffset-st: 1/2/3/3 [9]
KicOffset-rm: 0.281 arcsec [0.13σ]
KicOffset-st: 1/2/3/3 [9]
DiffImageQuality-fgm: 0.11 [1/9]
DiffImageOverlap-fno: 0.08 [1/12]

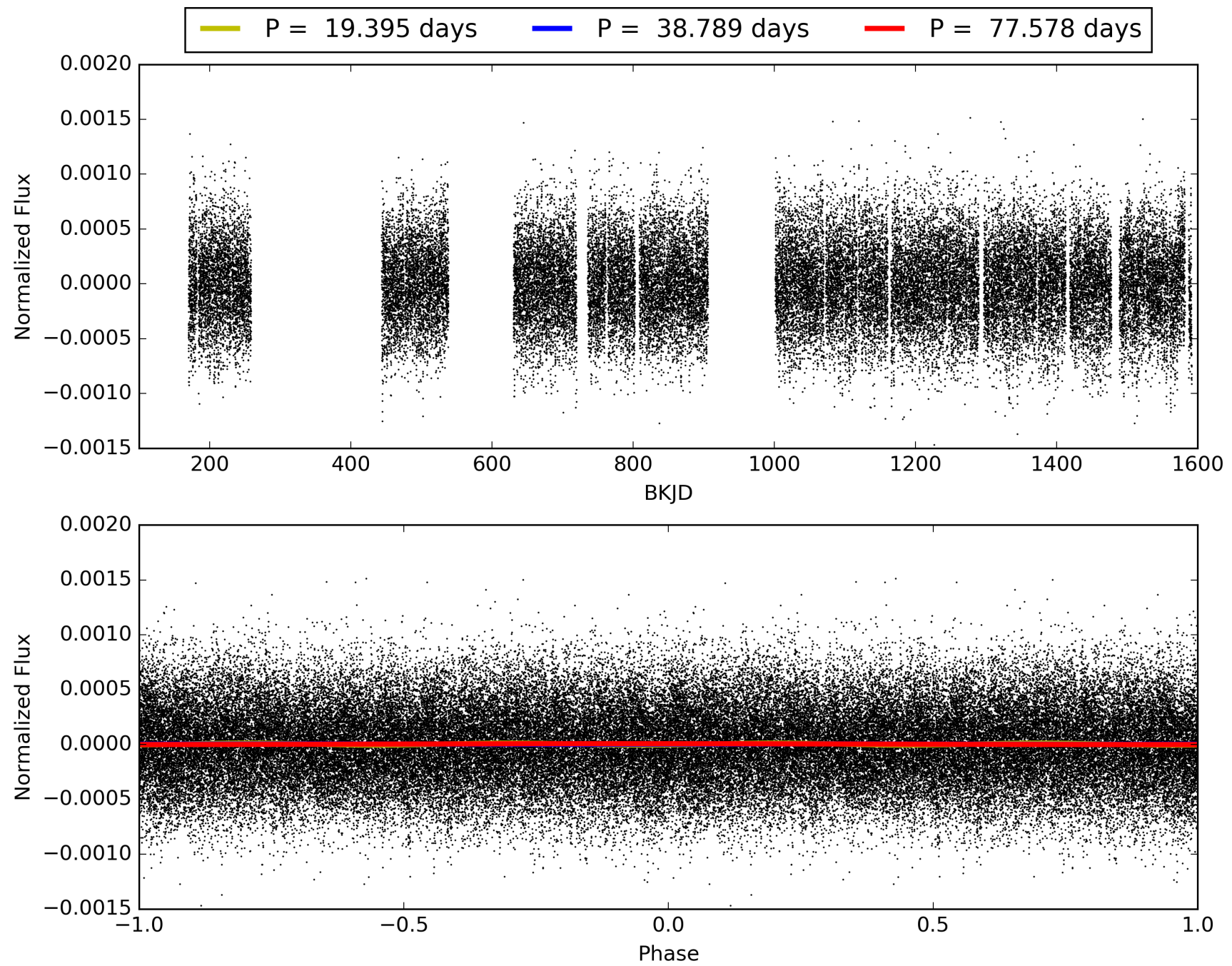
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:45:55 Z

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

TCE 009655978-04, PDC Light Curves

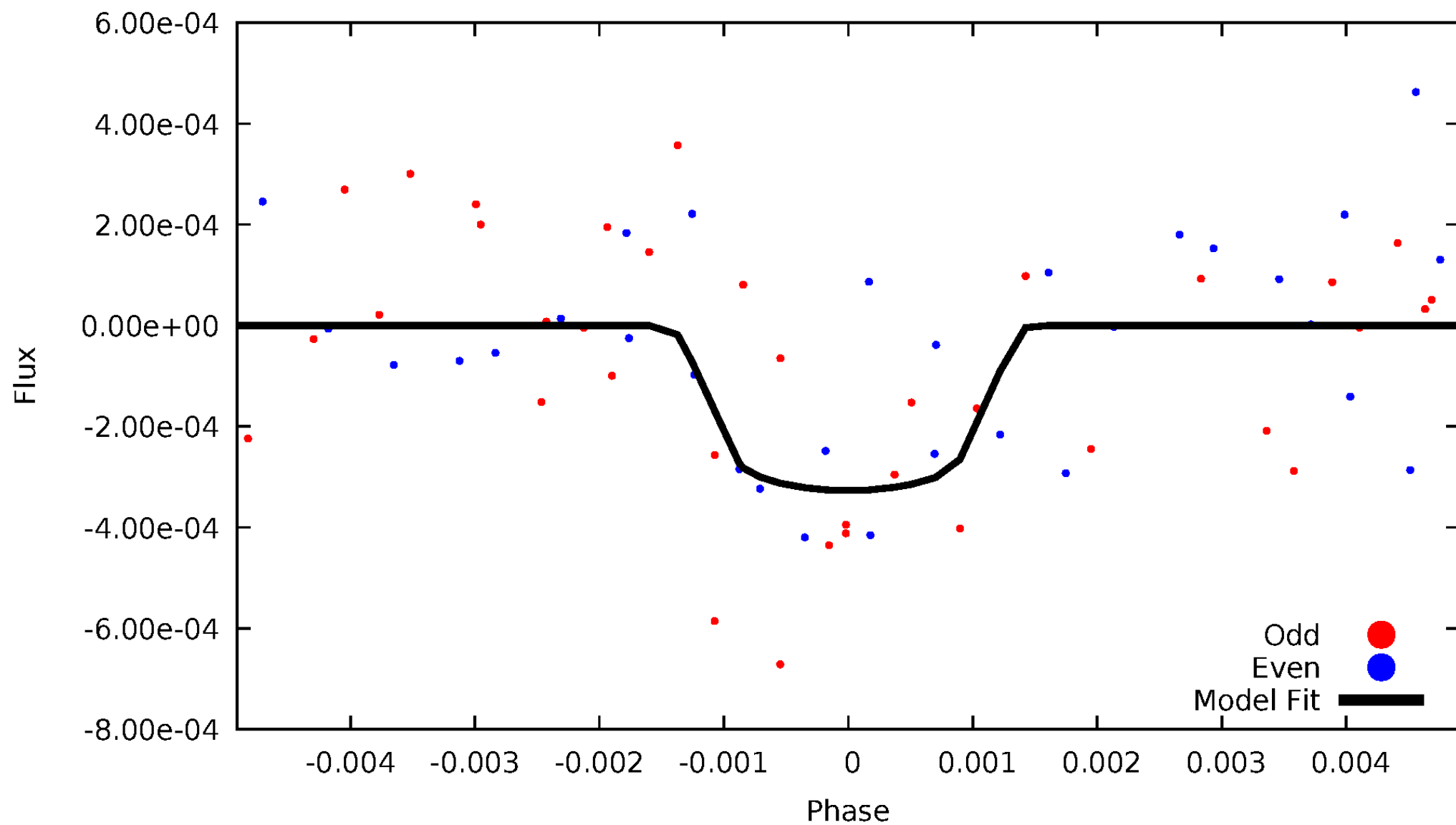


TCE 009655978-04



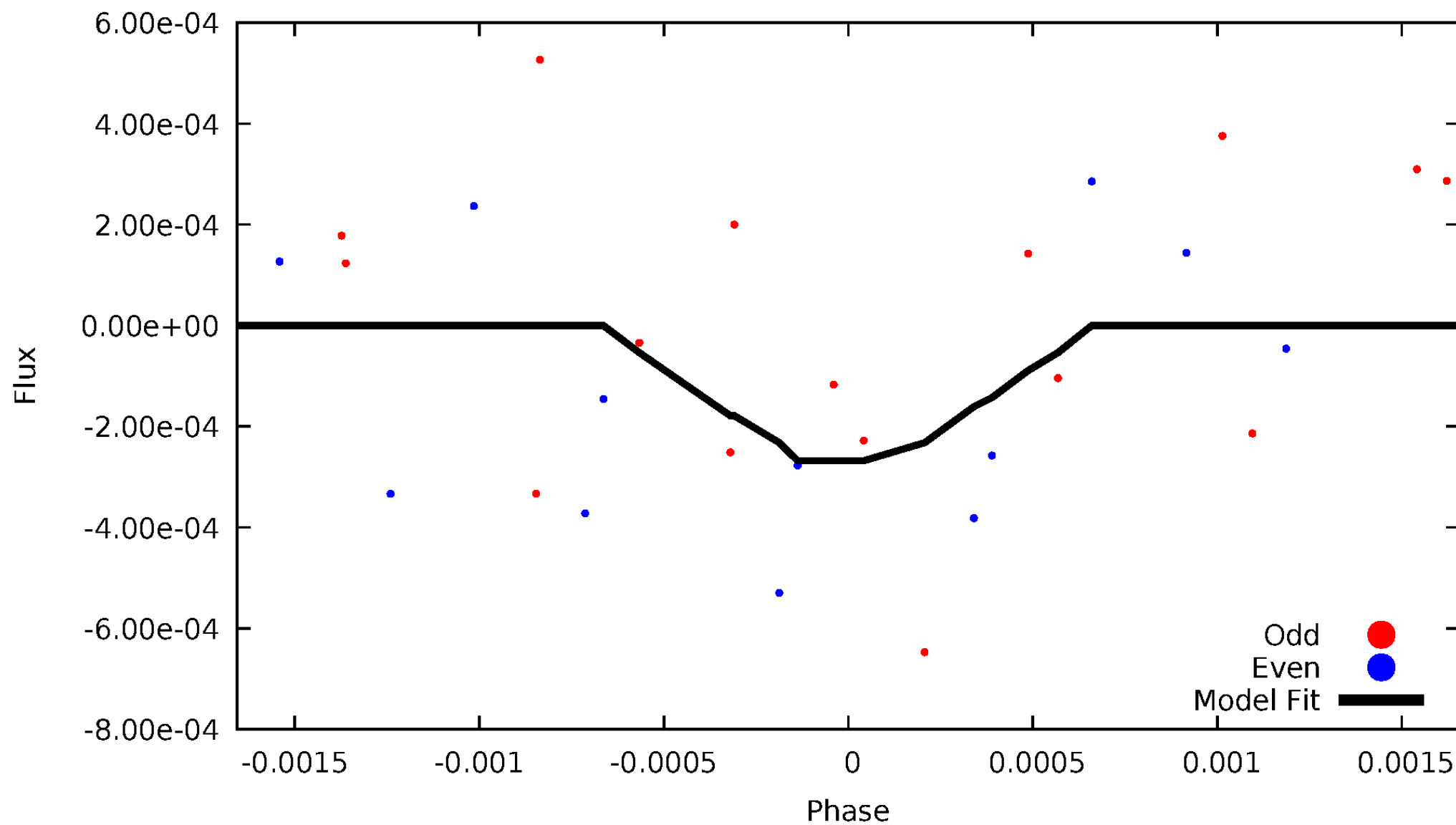
DV Odd/Even

TCE 009655978-04



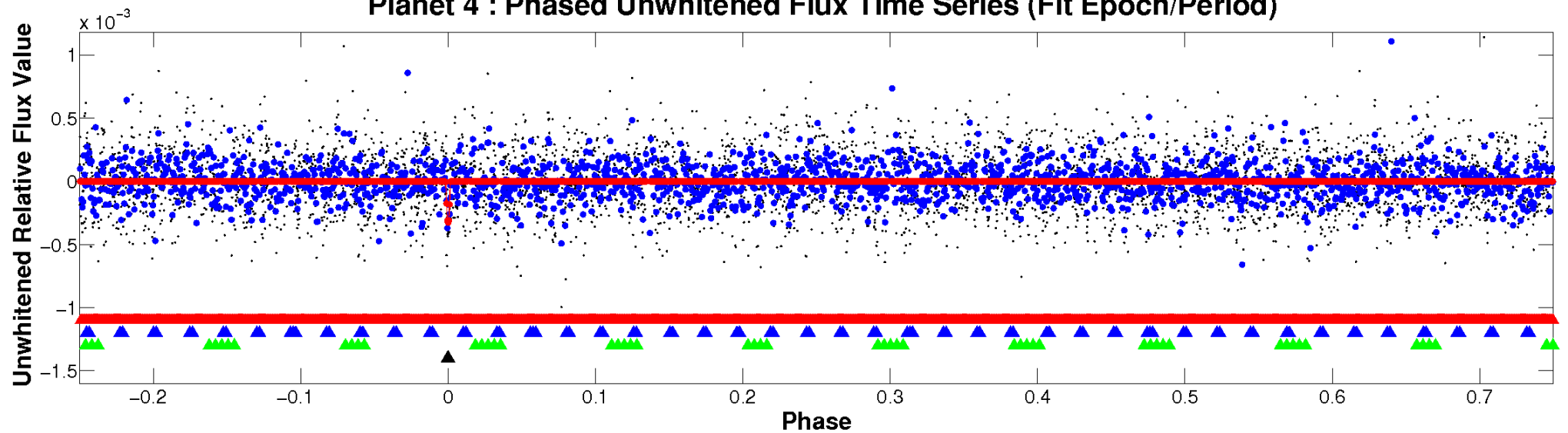
ALT Odd/Even

TCE 009655978-04

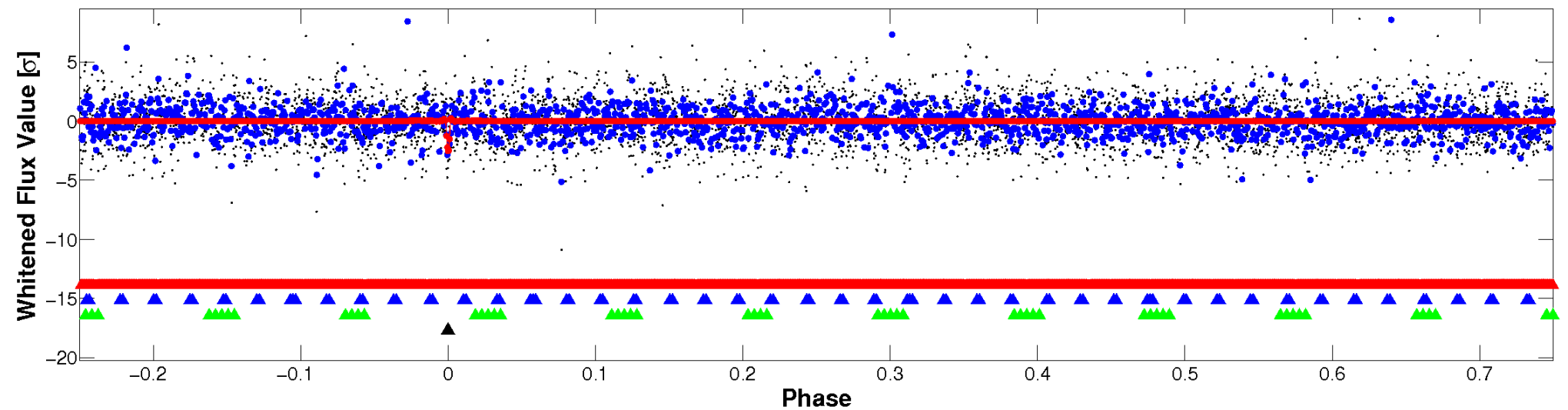


Non-Whitened Vs. Whitened Light Curve

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

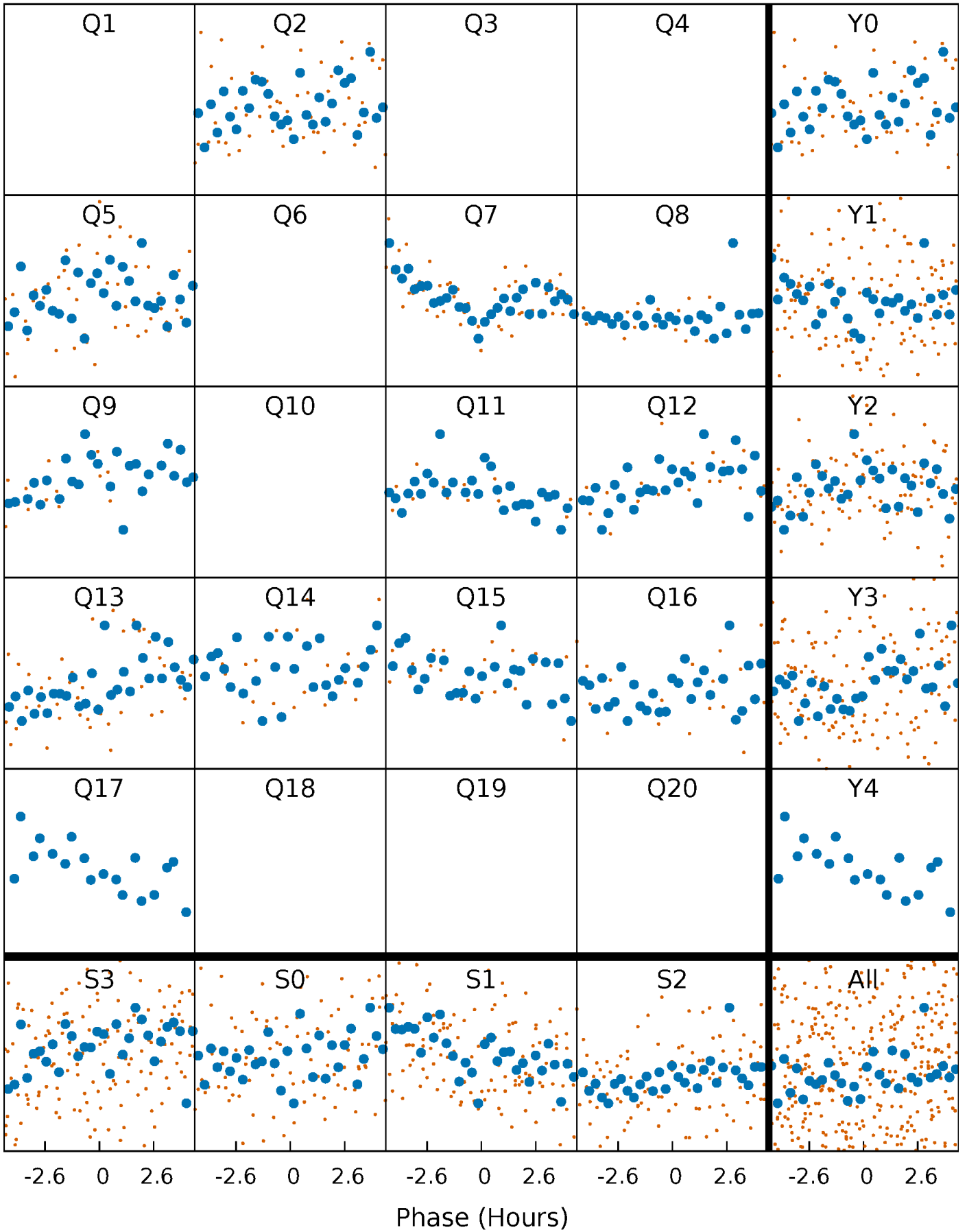


Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



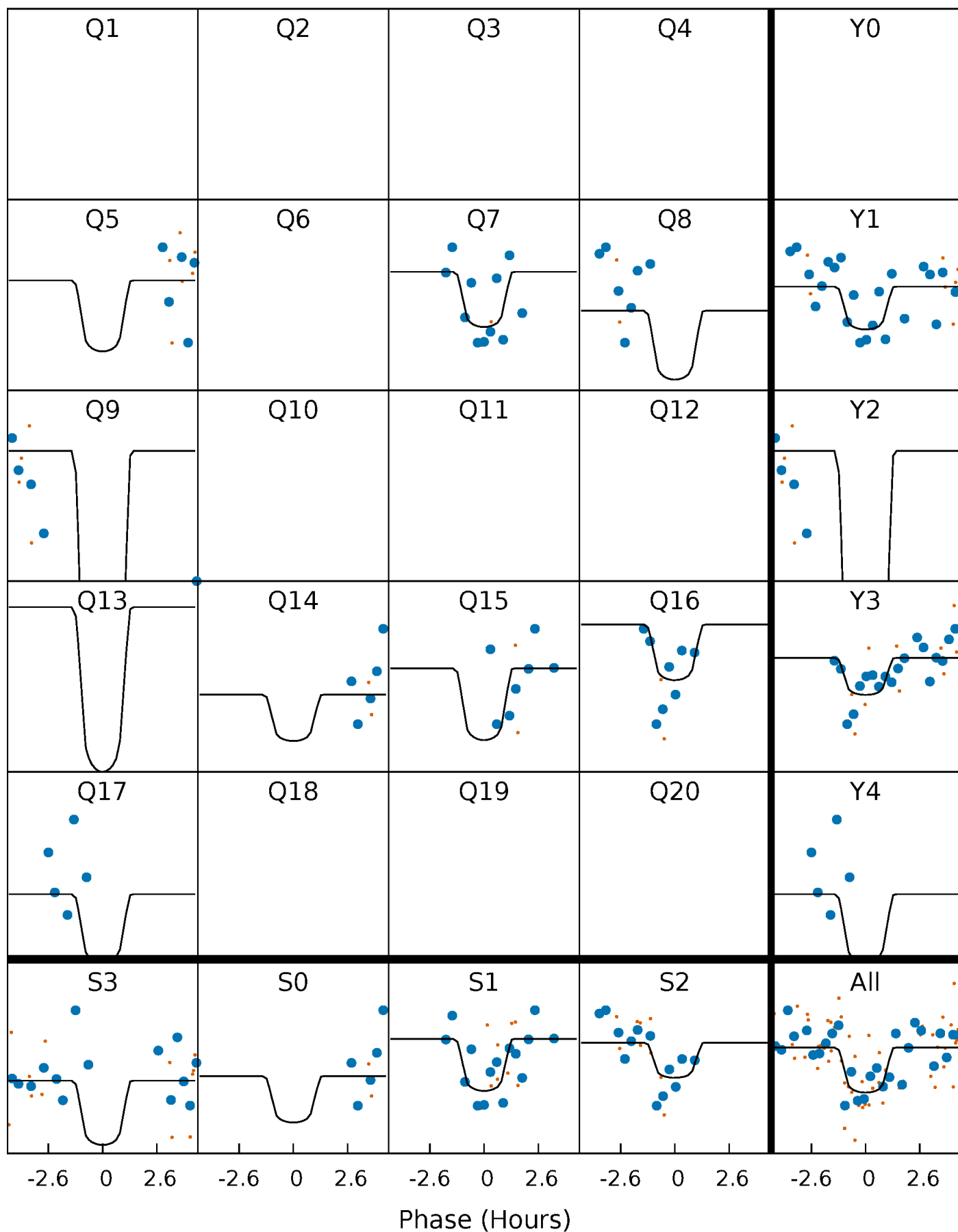
PDC Quarter-Phased Transit Curves

TCE 009655978-04 P= 38.789059 Days $T_0=135.956139$ (BKJD)



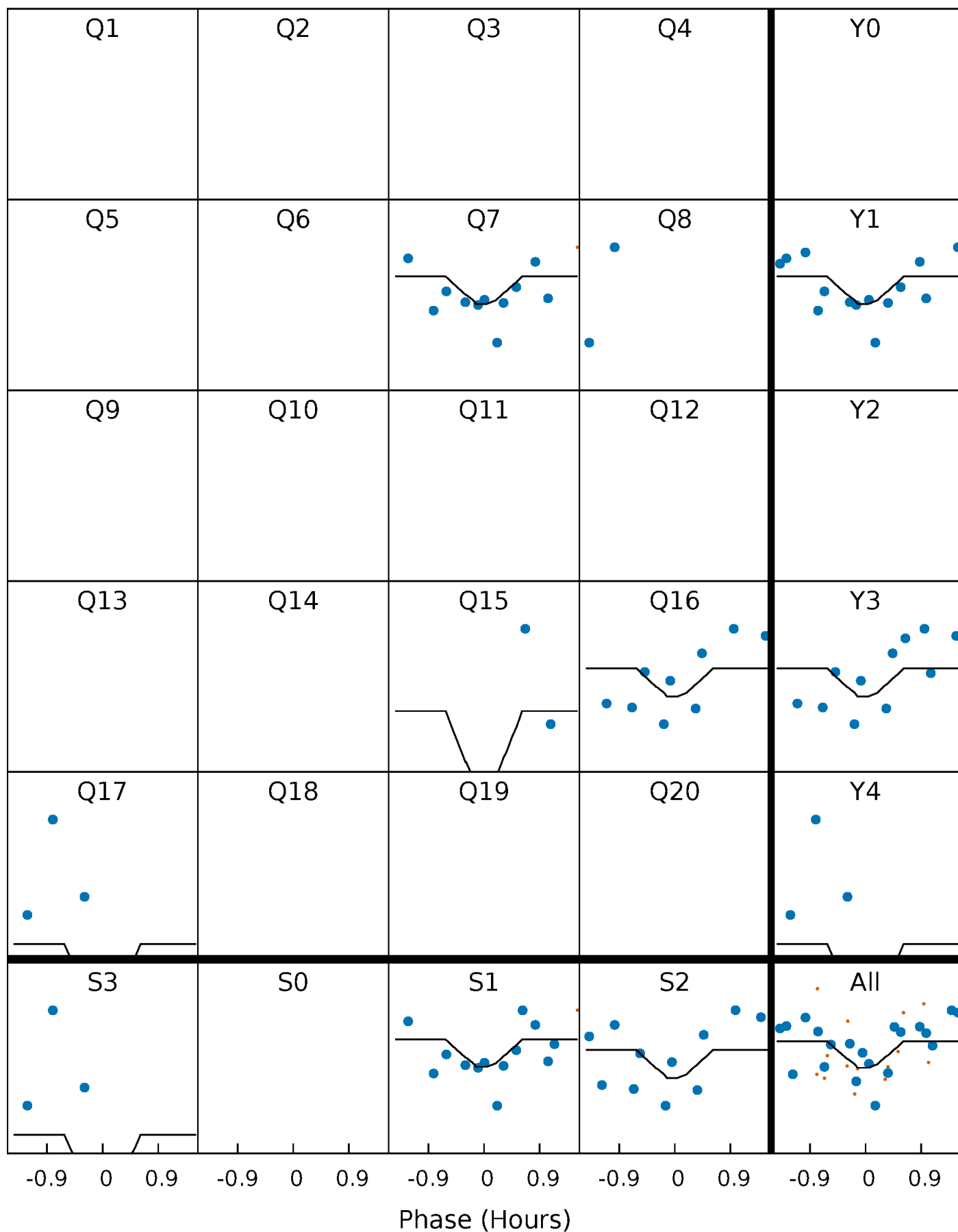
DV Quarter-Phased Transit Curves

TCE 009655978-04 P= 38.789059 Days $T_0=135.956139$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

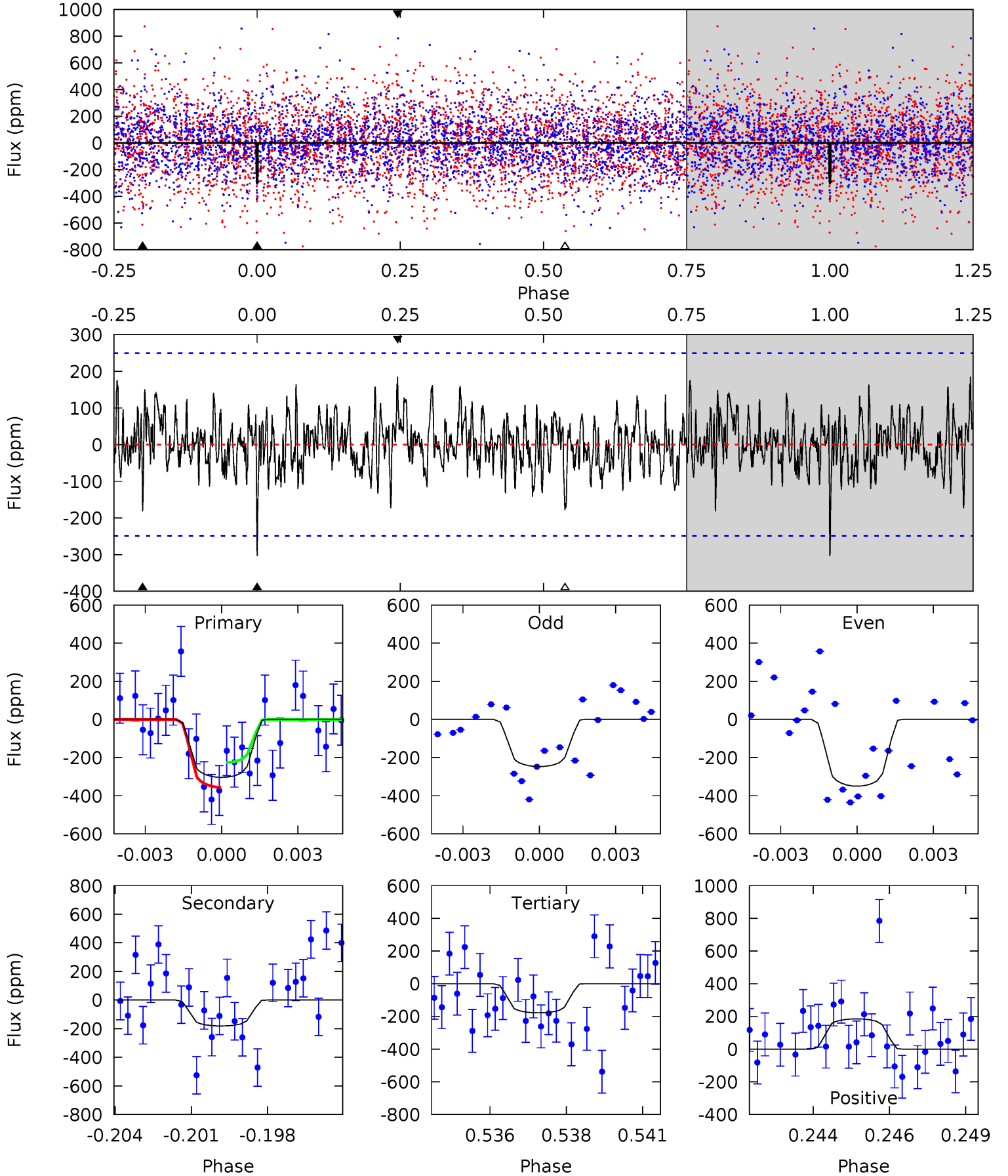
TCE 009655978-04 P= 38.788512 Days $T_0=135.955600$ (BKJD)



DV Model-Shift Uniqueness Test

009655978-04, P = 38.789059 Days, E = 135.956139 Days

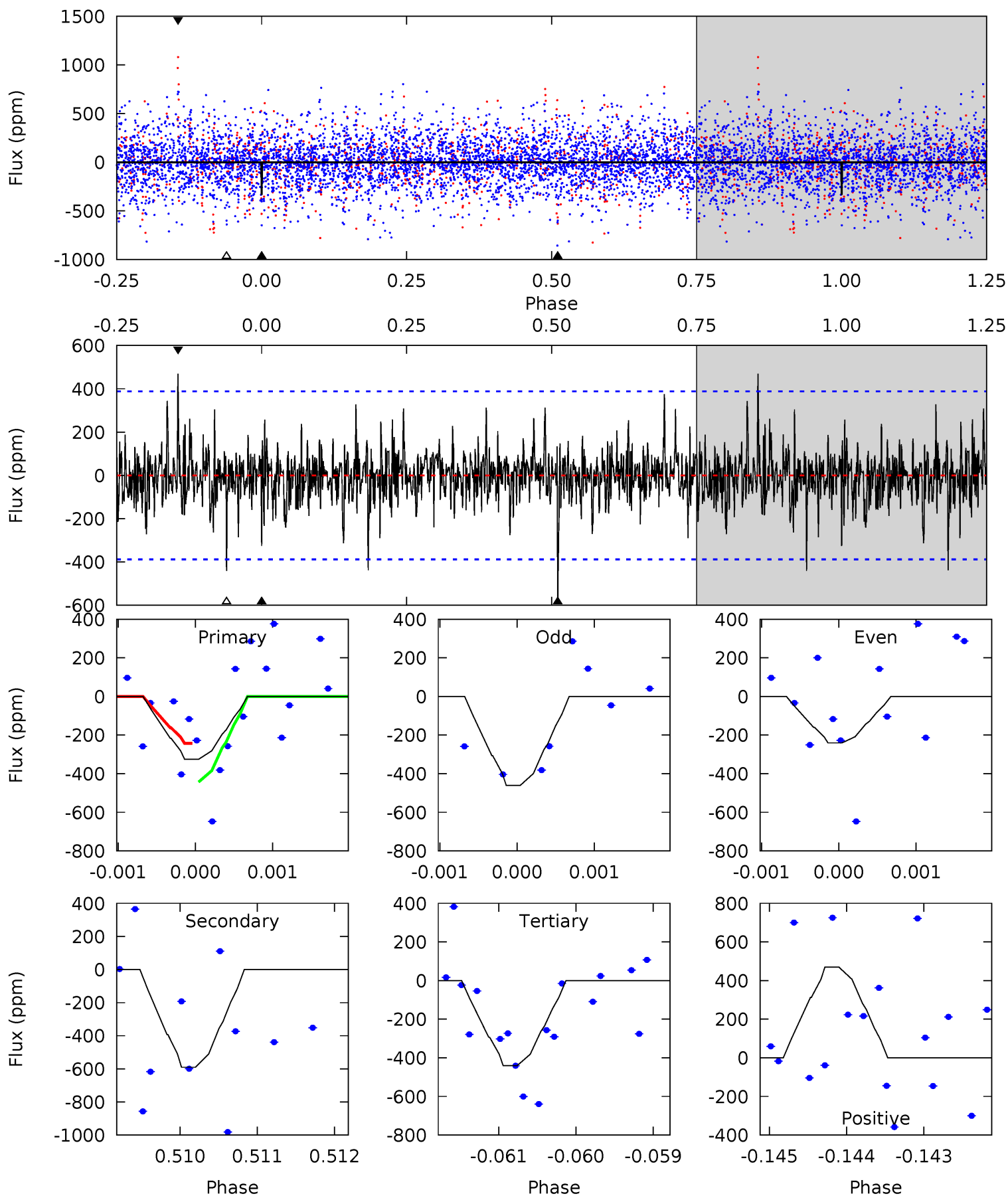
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.43	3.83	3.77	3.91	5.27	3.00	1.24	2.66	2.52	0.06	-0.08	1.08	0.83	0.38	1.34



Alt Model-Shift Uniqueness Test

009655978-04, P = 38.788512 Days, E = 135.955600 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
4.57	8.30	6.18	6.59	5.45	3.30	1.36	-1.62	-2.03	2.11	1.70	1.51	1.15	0.44	1.38



Stellar Parameters For KIC 009655978

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	6913^{+192}_{-312}	$4.125^{+0.128}_{-0.192}$	$0.220^{+0.150}_{-0.350}$	$1.790^{+0.566}_{-0.378}$	$1.560^{+0.208}_{-0.254}$	$0.383^{+0.254}_{-0.207}$
	+3%/-5%	+3%/-5%	+68%/-159%	+32%/-21%	+13%/-16%	+66%/-54%
Source	PHO54	PHO54	PHO54	DSEP		

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

Secondary Eclipse Parameters for KIC 009655978-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	A_{obs}
DV	-181 ± 47	$4.35^{+3.27}_{-2.58}$	1123^{+78}_{-72}	5334^{+3230}_{-1075}	328^{+1707}_{-220}
Alt.	-590 ± 71	$4.12^{+3.09}_{-2.62}$	1124^{+85}_{-79}	7497^{+8551}_{-1878}	1248^{+8307}_{-830}

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

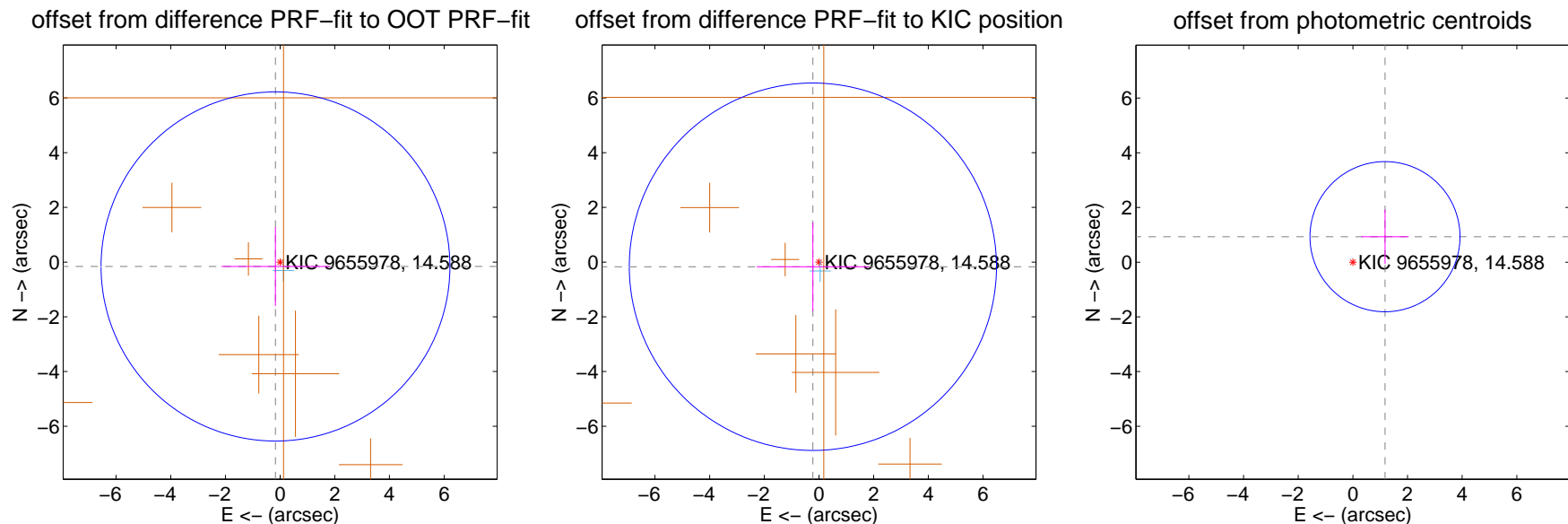
DV Centroid Data

Supplemental centroid analysis for 009655978-04. Kepler magnitude: 14.59. Transit SNR 9.69

There are 1 quarters with good PRF difference image offsets

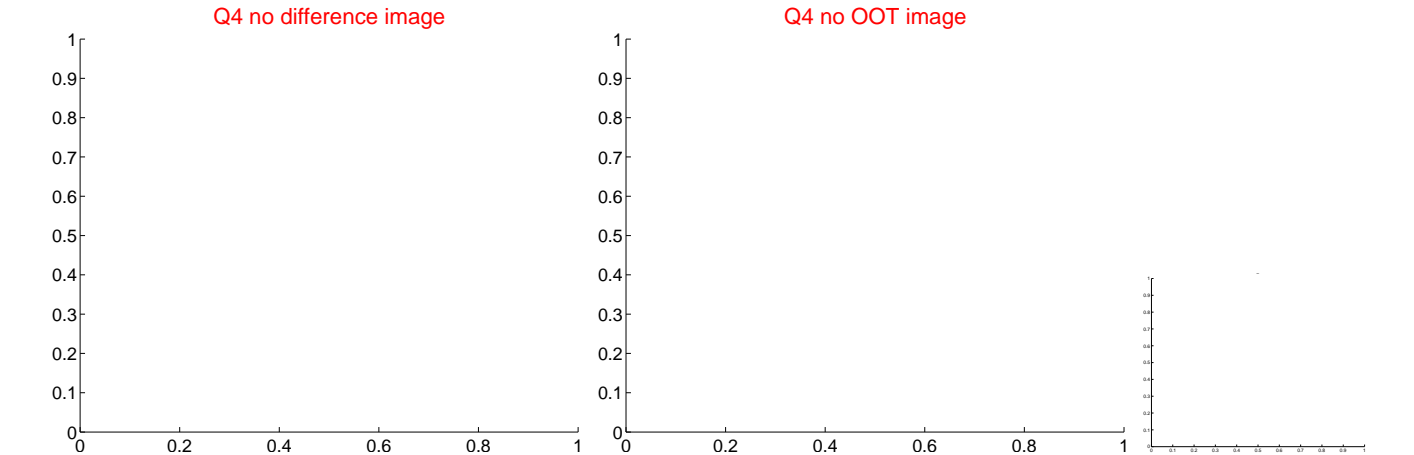
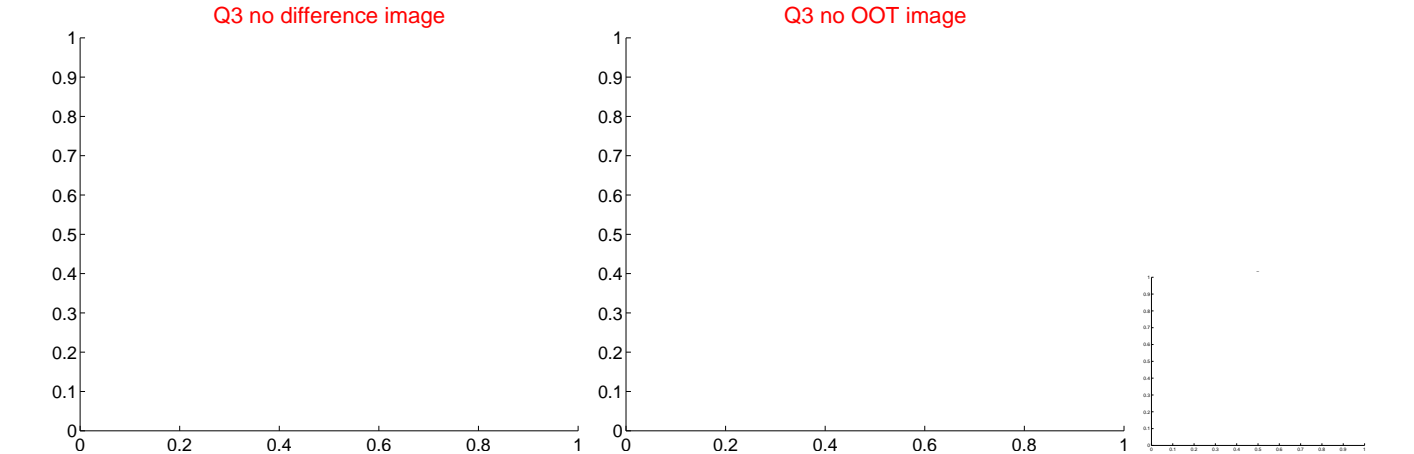
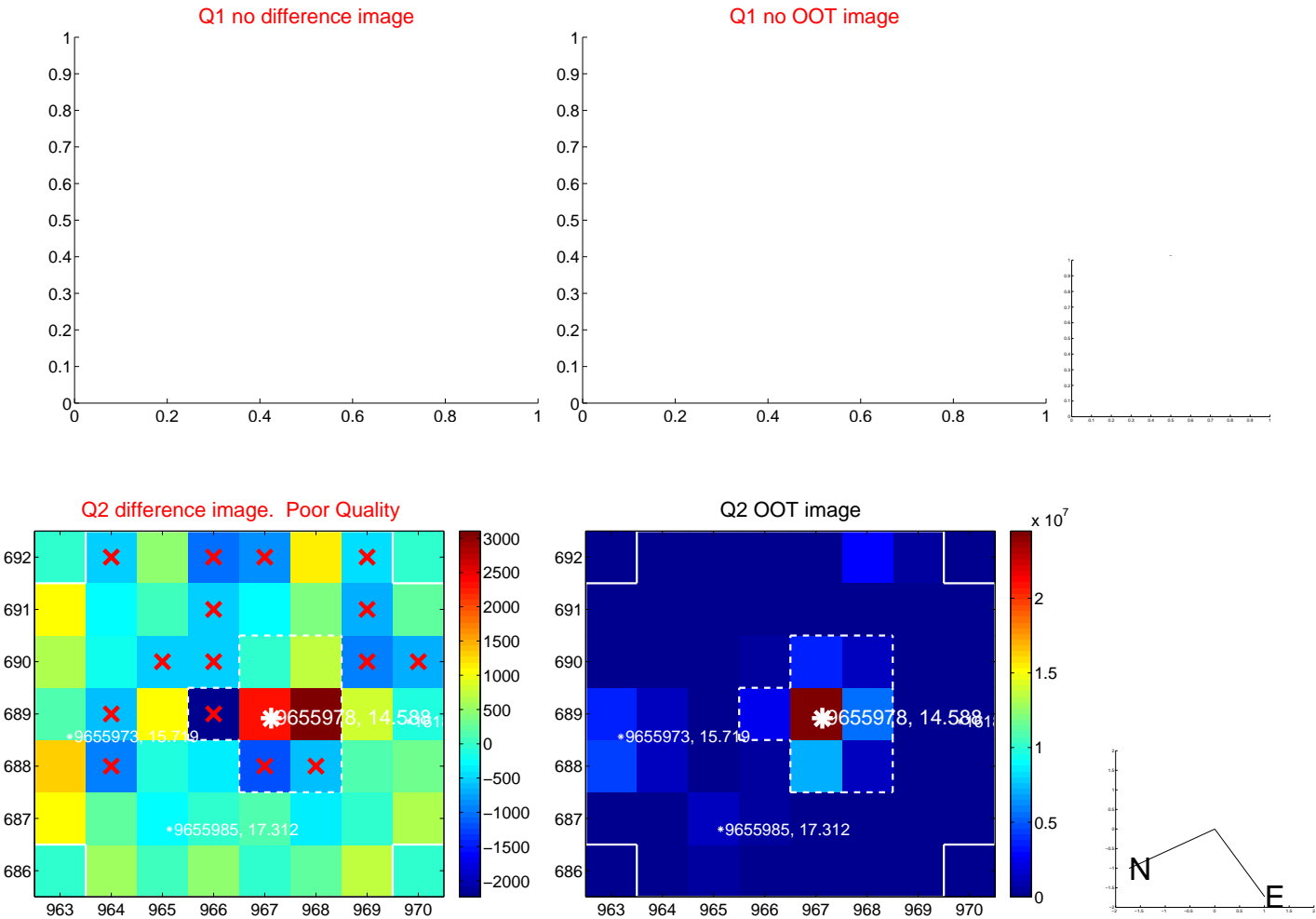
The direct PRF centroid is offset from the target star catalog position by about 0.04 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.233 ± 2.127	0.11	0.169 ± 1.979	-0.160 ± 1.441
PRF-fit source offset from KIC position	0.281 ± 2.239	0.13	0.223 ± 2.053	-0.170 ± 1.617
photometric centroid source offset	1.50 ± 0.91	1.64	-1.18 ± 0.87	0.93 ± 0.99

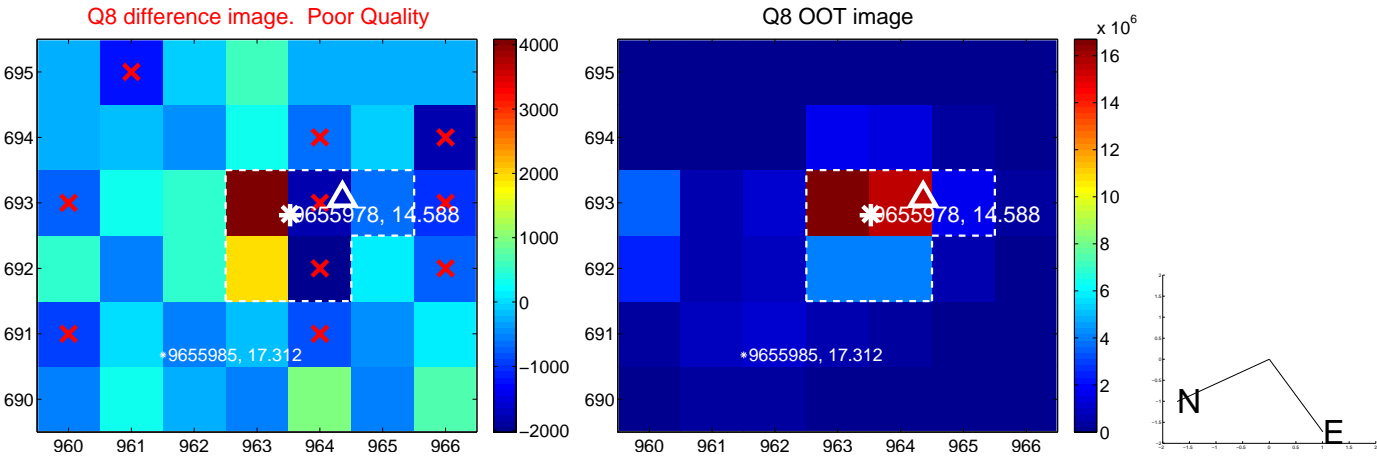
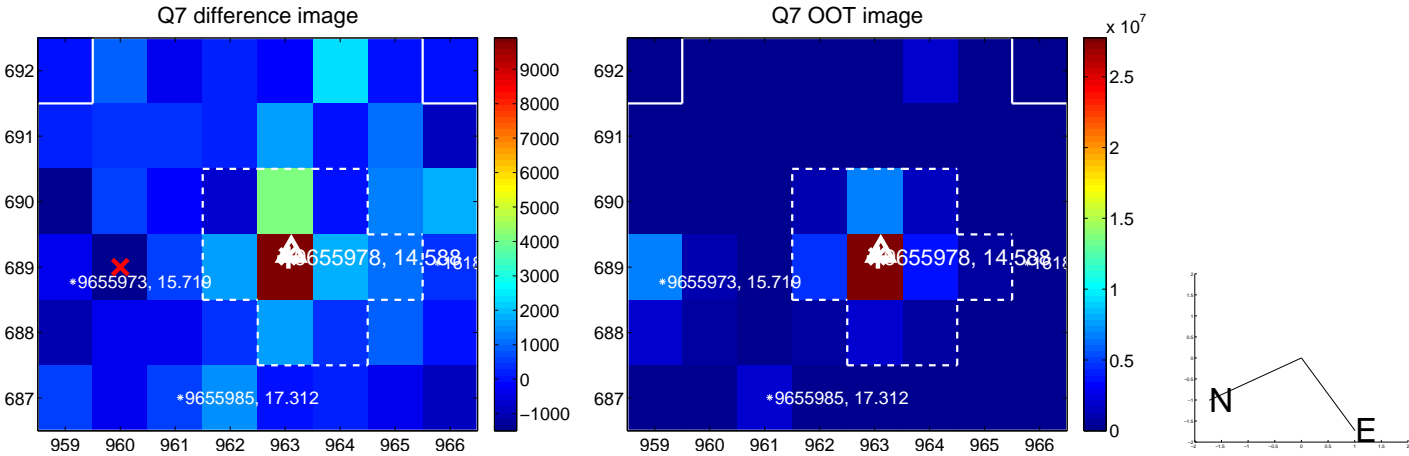
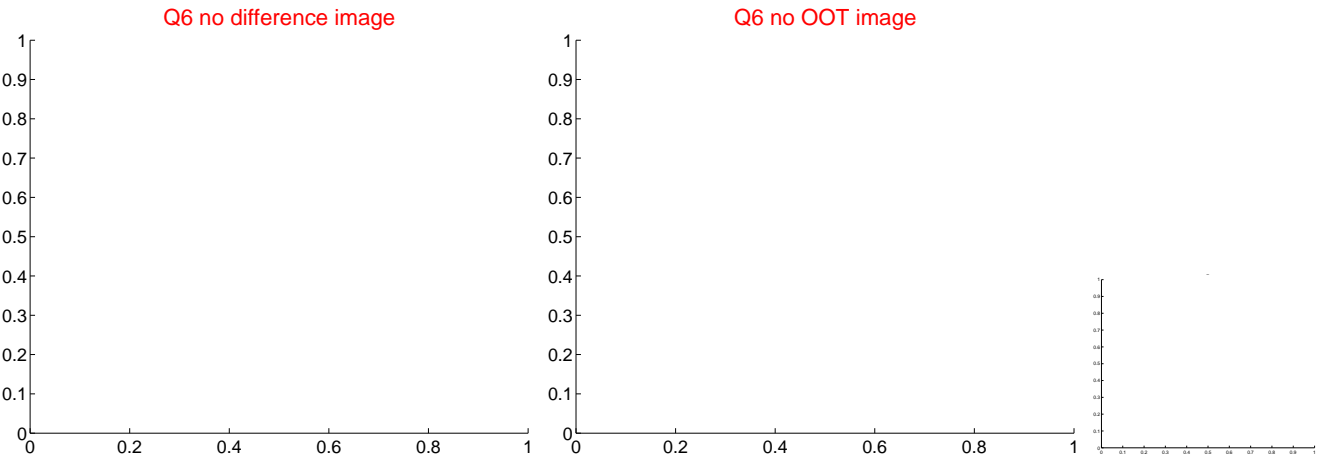
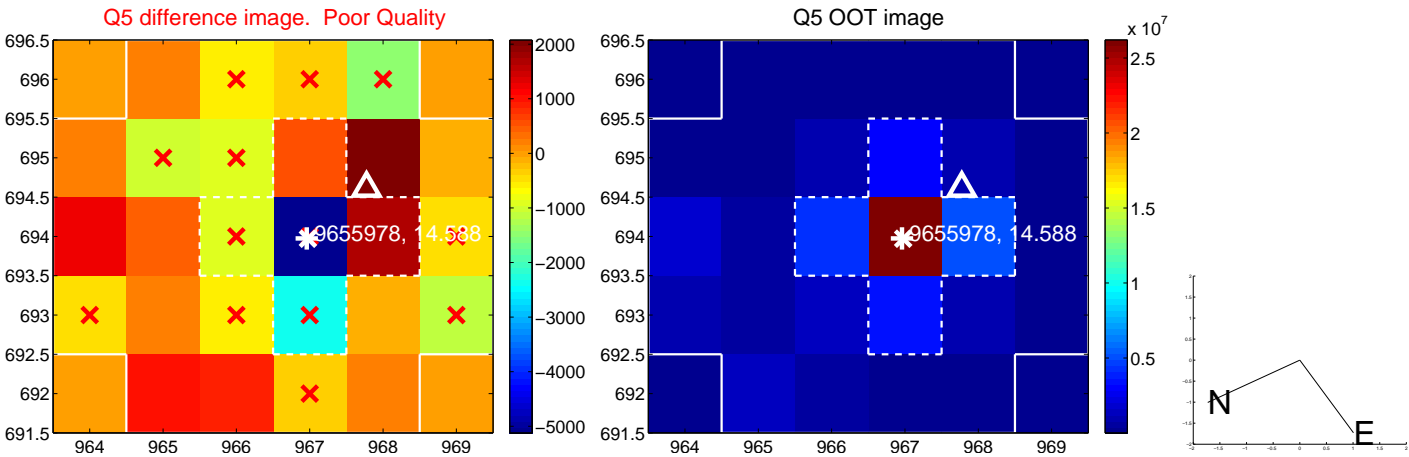


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

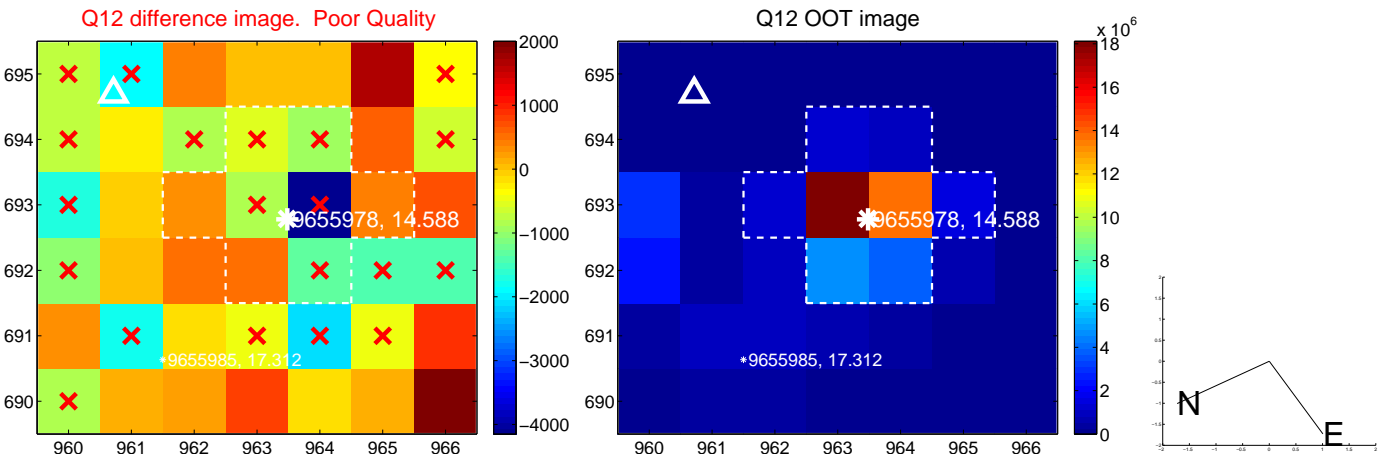
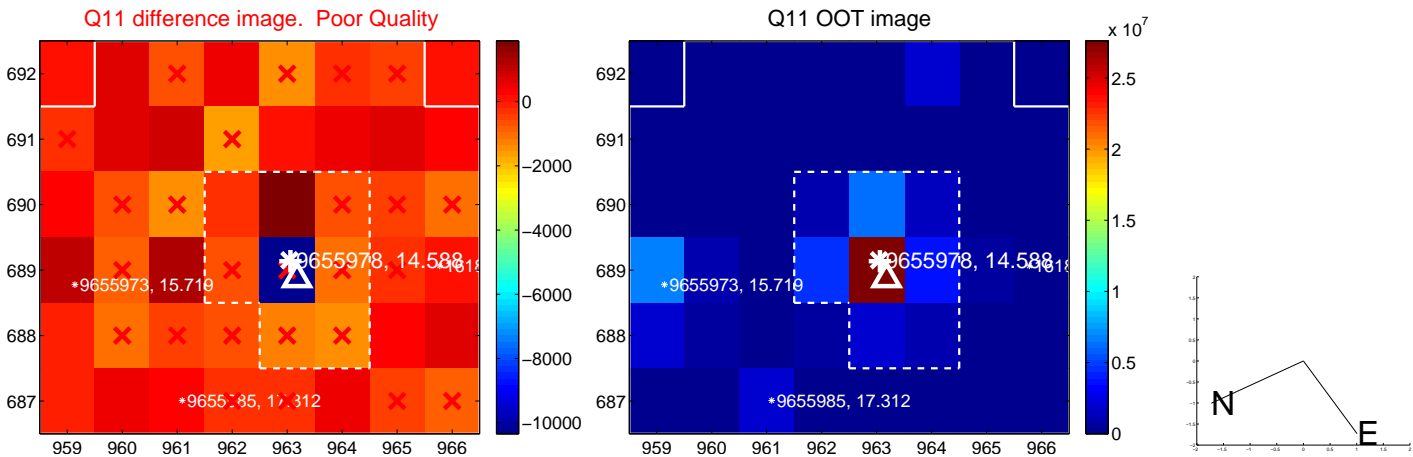
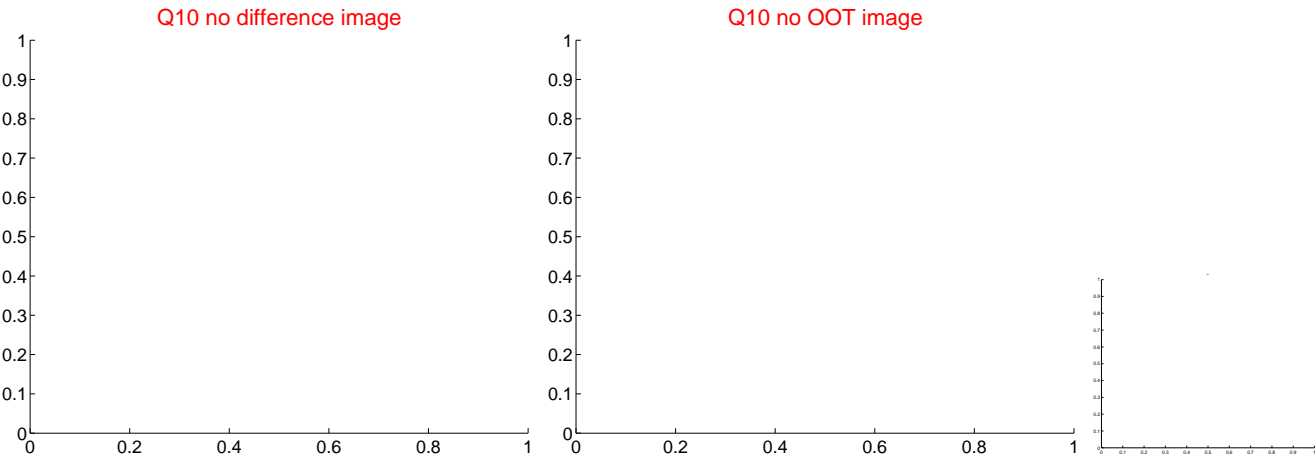
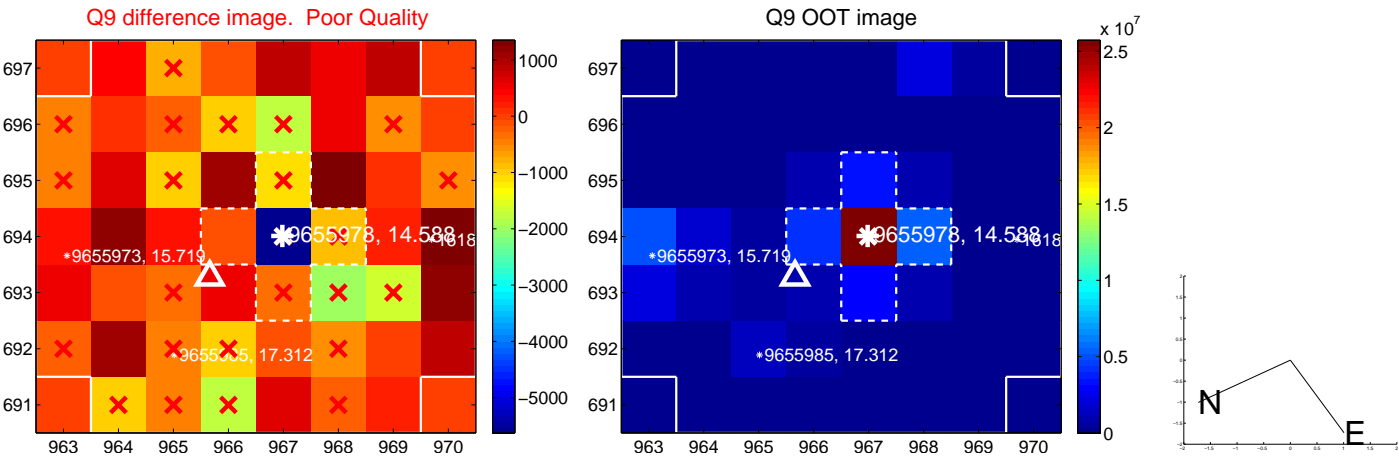
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



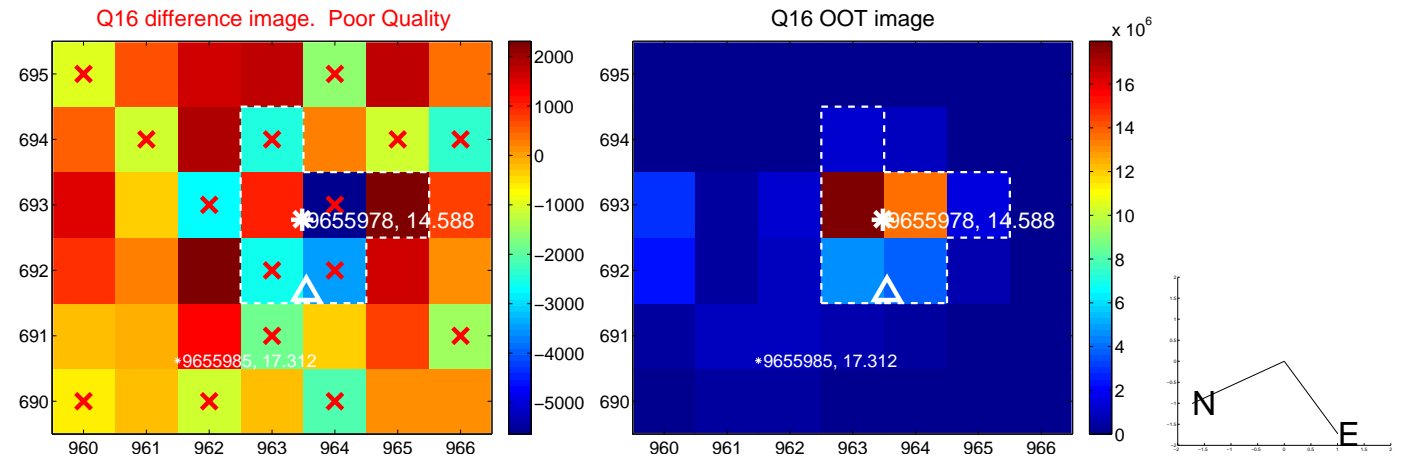
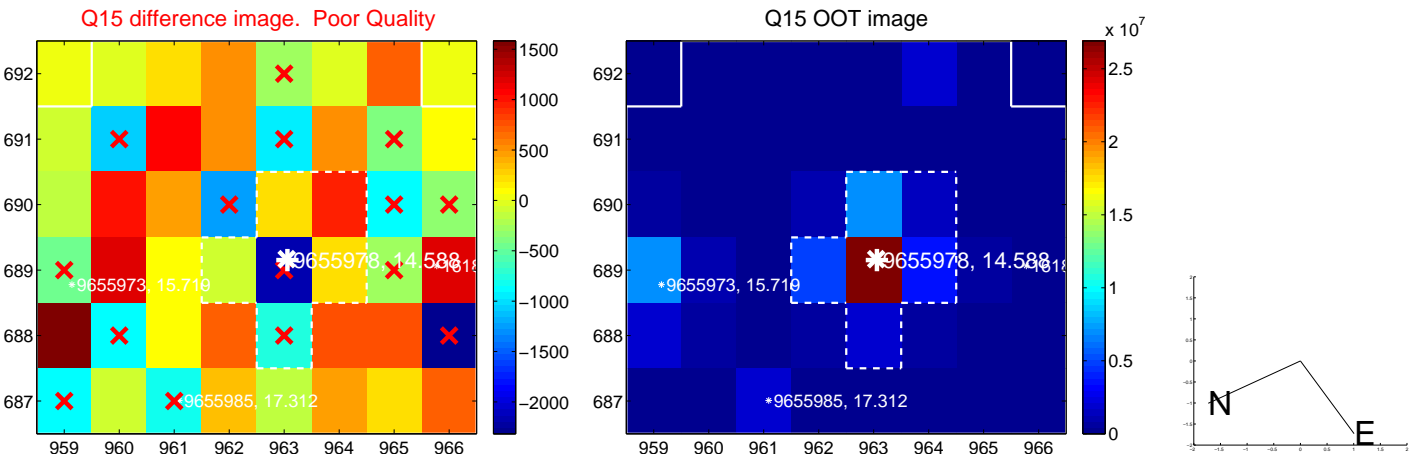
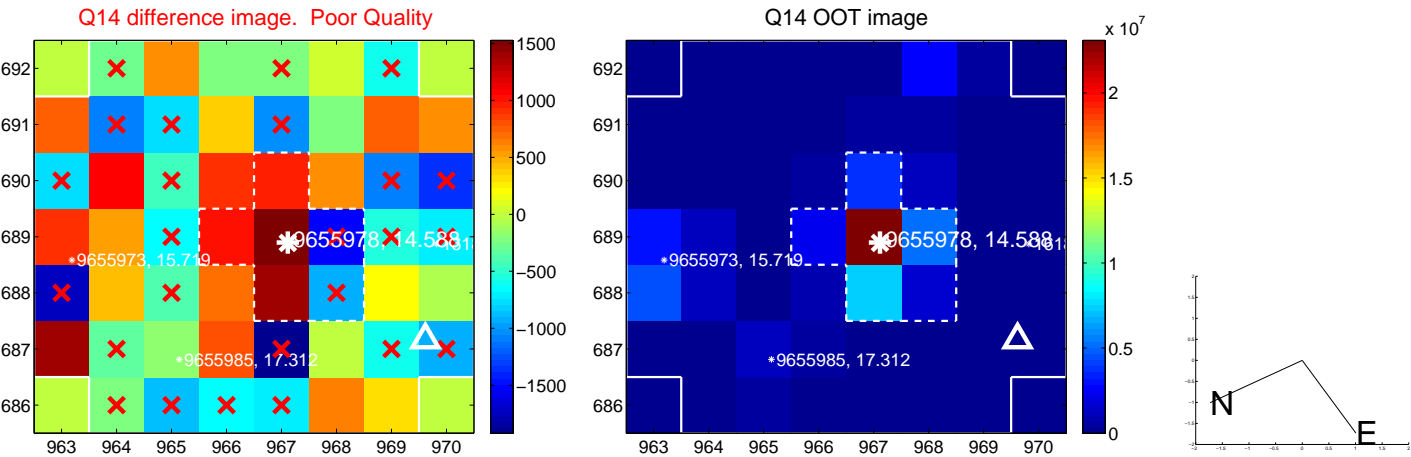
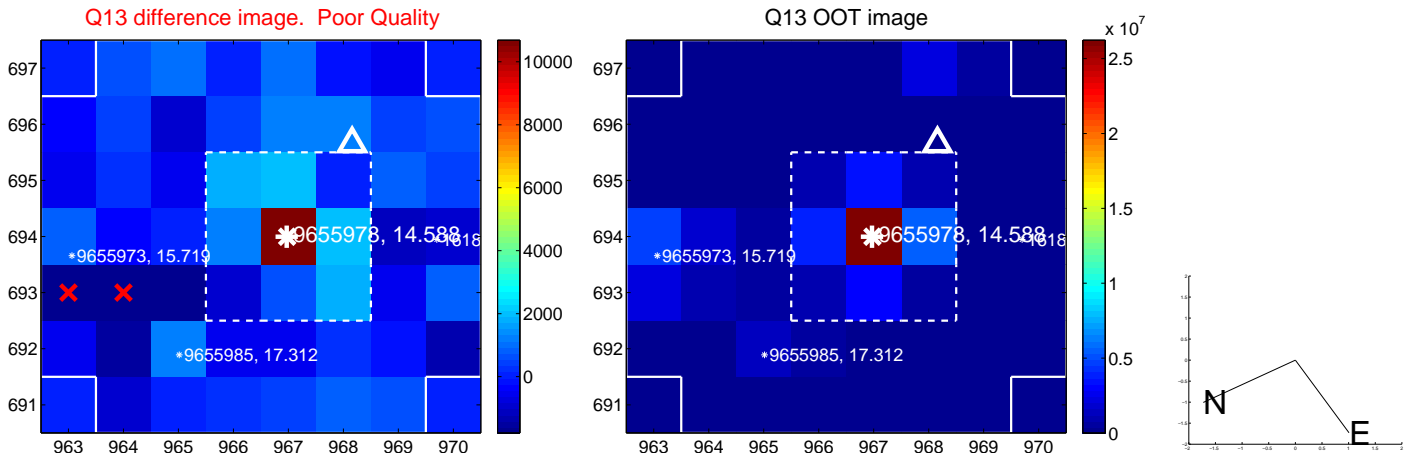
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

