

KIC 009022166

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})
009022166-01	OBS	2175.01	26.847584	142.169436	251.4	10.137	23.1	25.1	1.99	5508	3.31	97.11
009022166-02	OBS	2175.02	72.382673	179.498513	354.0	8.304	19.3	19.6	1.99	5508	4.27	25.88

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009022166-01	OBS	PC	0.99	0	0	0	0	NO_COMMENT
009022166-02	OBS	FP	0.00	0	1	0	0	DEPTH_ODDEVEN_ALT

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

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

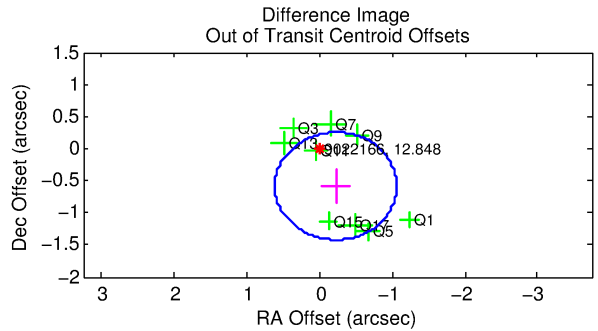
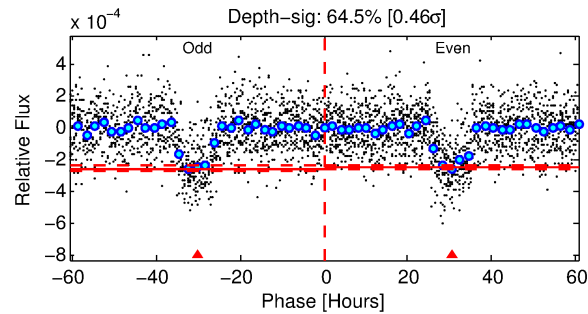
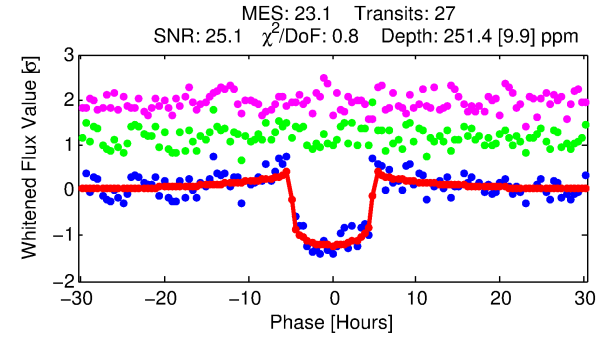
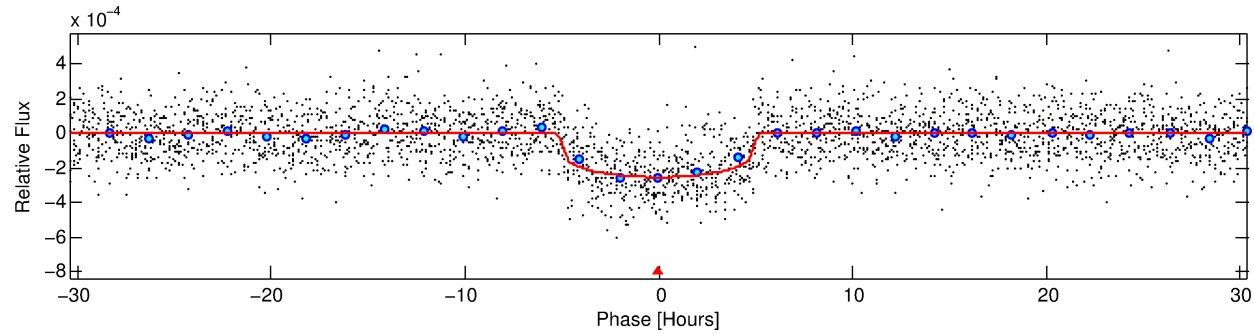
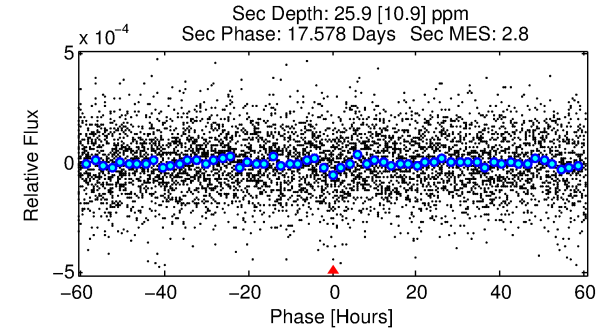
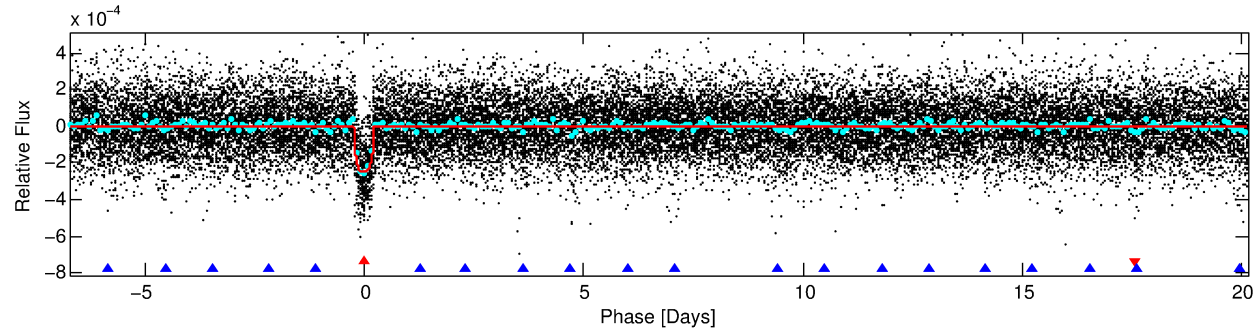
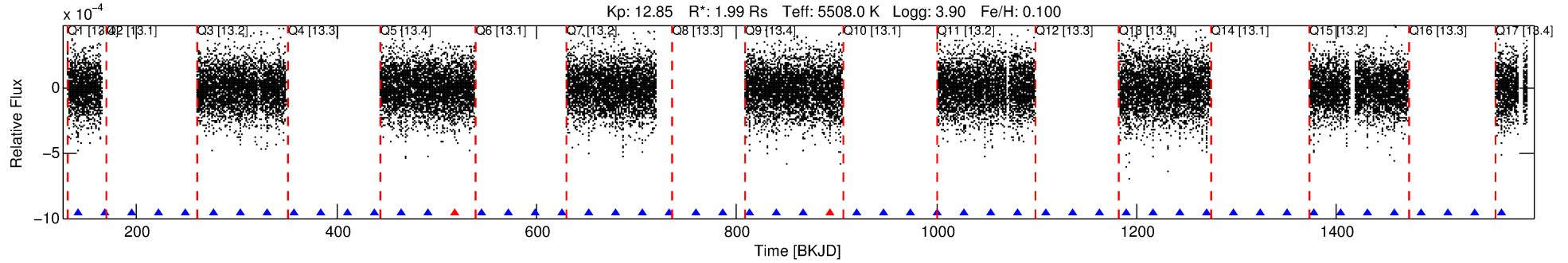
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009022166-01

No Significant Match Found

DV One-Page Summary

KIC: 9022166 Candidate: 1 of 2 Period: 26.848 d
KOI: K02175.01 Name: Kepler-368b Corr: 0.993



DV Fit Results:

Period = 26.84758 [0.00017] d
Epoch = 142.1694 [0.0053] BKJD
Rp/R* = 0.0152 [0.0035]
a/R* = 15.91 [14.43]
b = 0.64 [0.84]
Seff = 97.11 [34.37]
Teq = 800 [71] K
Rp = 3.31 [1.13] Re
a = 0.1832 [0.0416] AU
Ag = 43.80 [31.04] [1.38σ]
Teffp = 3184 [497] K [4.75σ]

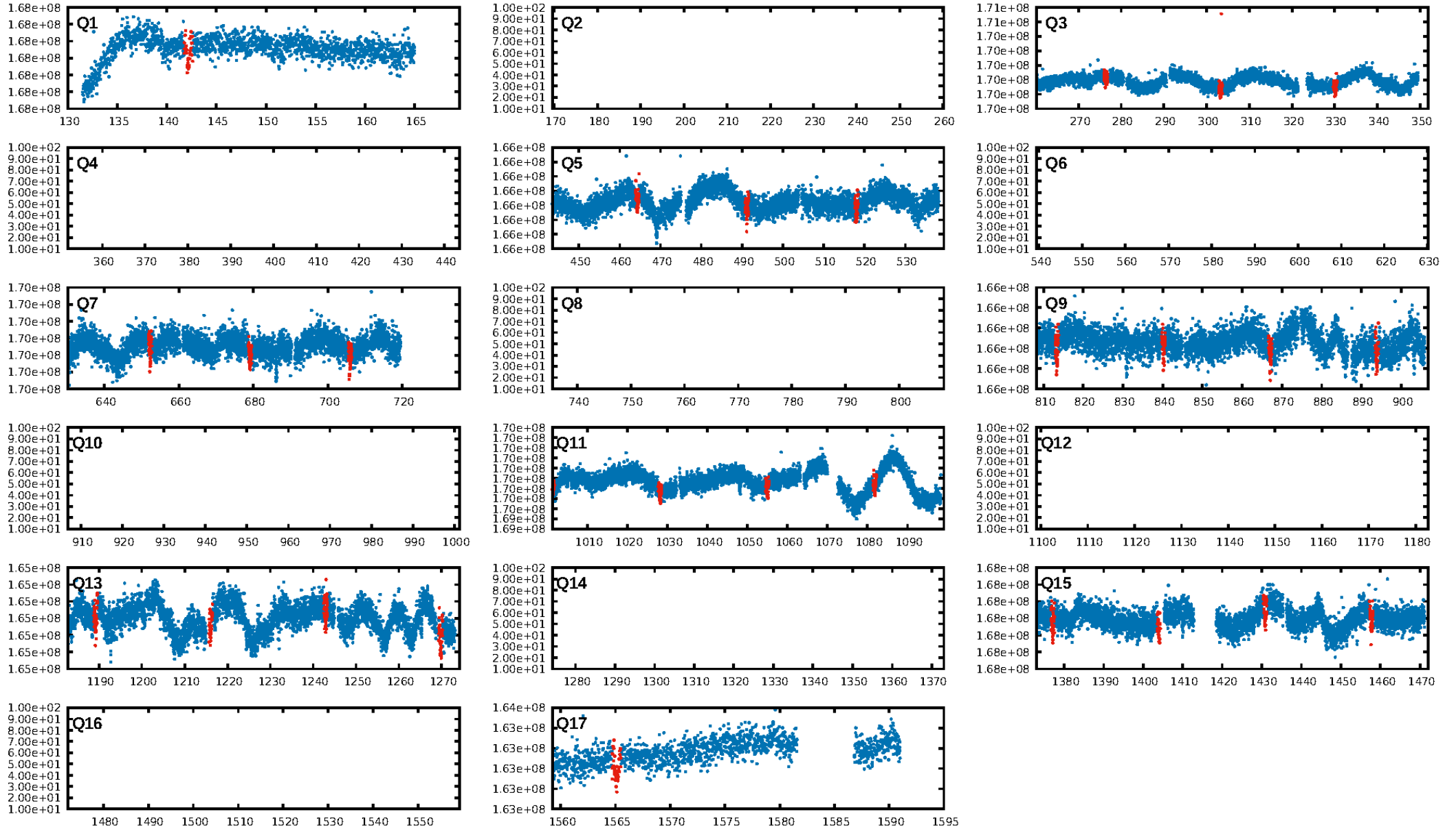
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 100.0% [83.40σ]
ModelChiSquare2-sig: 42.6%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 3.59e-111
RollingBand-fgt: 0.92 [23/25]
GhostDiagnostic-chr: -68.86
Centroid-sig: 3.2%
Centroid-so: 0.285 arcsec [0.96σ]
OotOffset-rm: 0.626 arcsec [2.24σ]
OotOffset-st: 0/4/0/5 [9]
KicOffset-rm: 0.808 arcsec [2.95σ]
KicOffset-st: 0/4/0/5 [9]
DiffImageQuality-fgm: 1.00 [9/9]
DiffImageOverlap-fno: 1.00 [9/9]

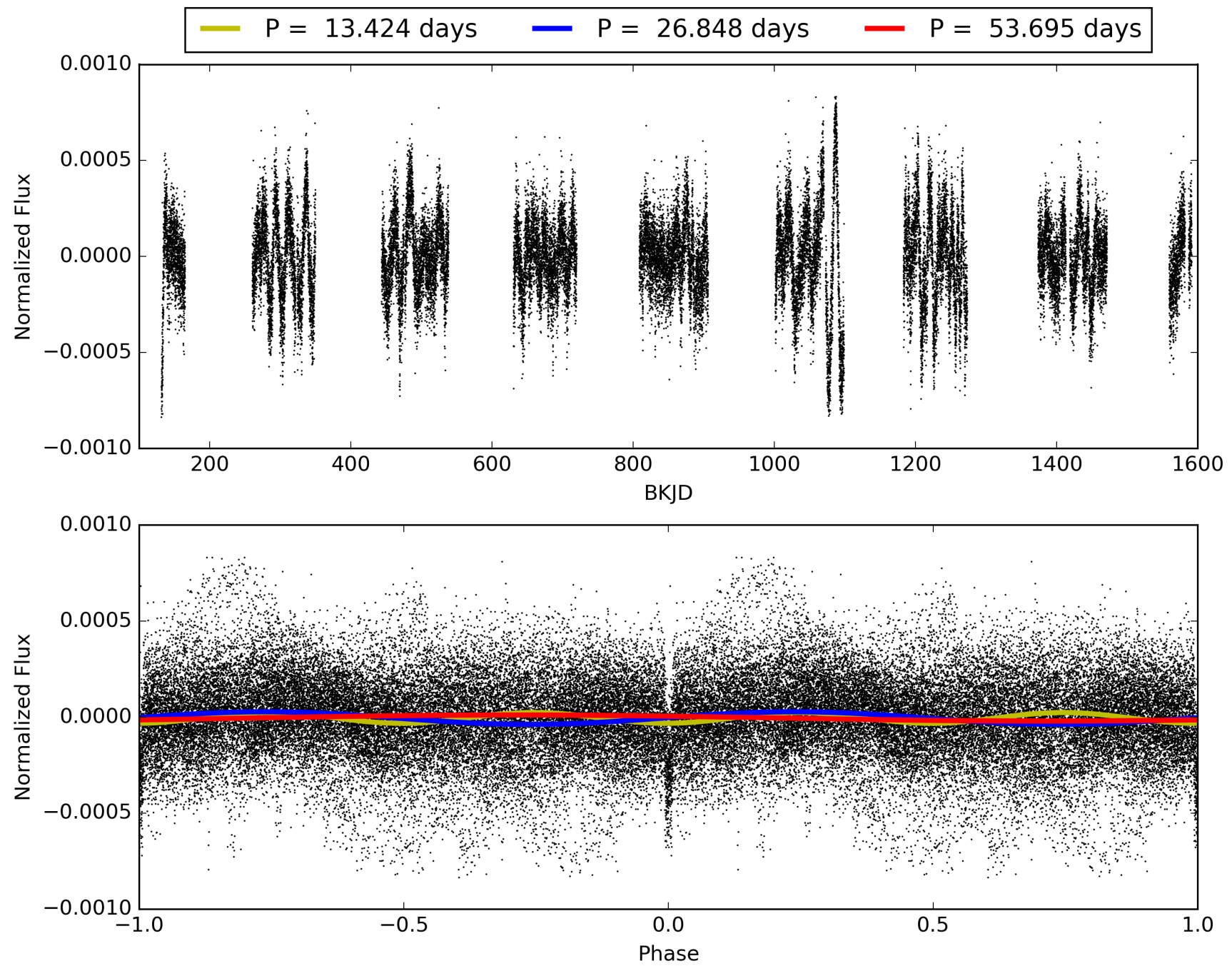
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 16:32:36 Z

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

TCE 009022166-01, PDC Light Curves

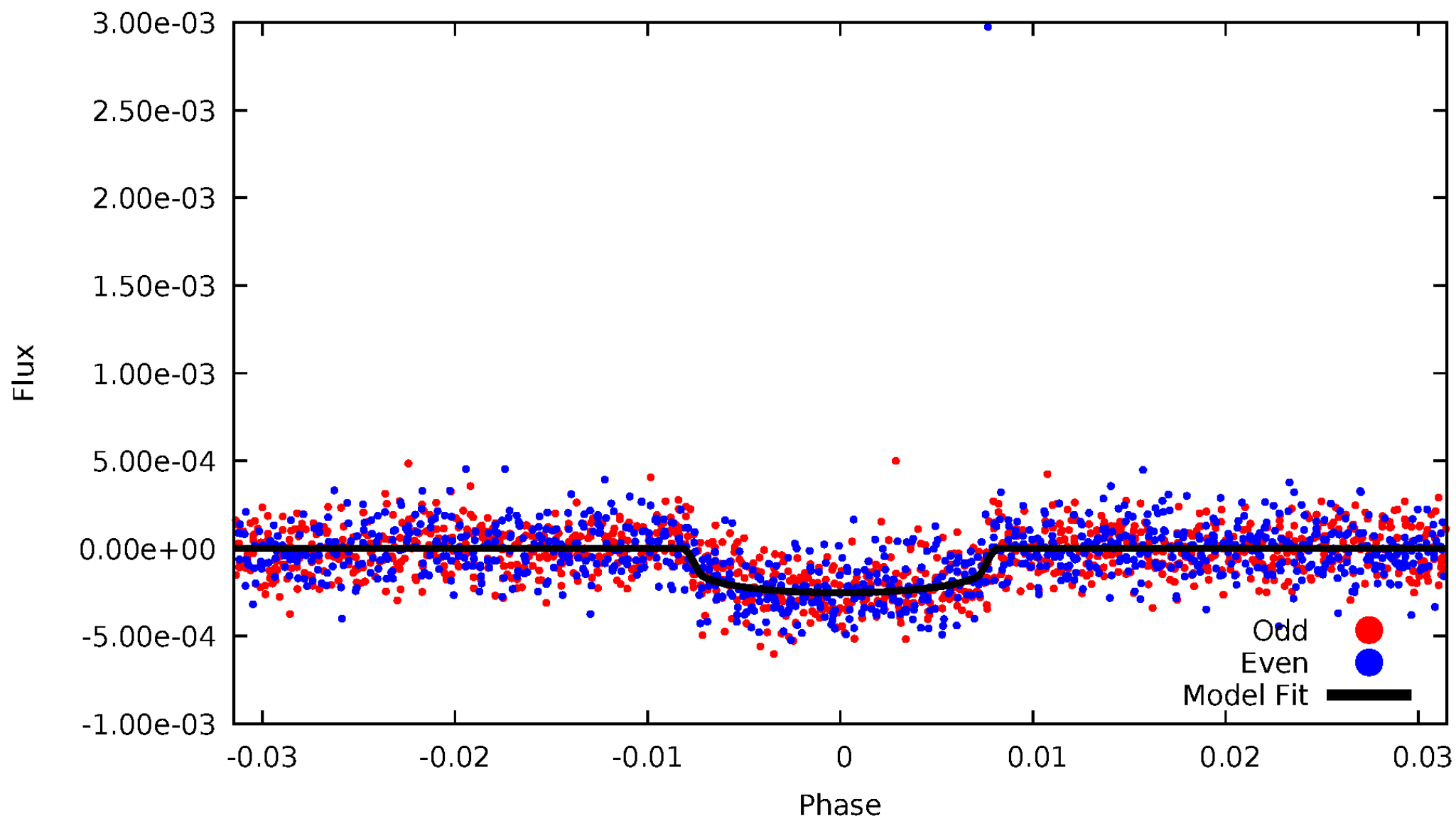


TCE 009022166-01



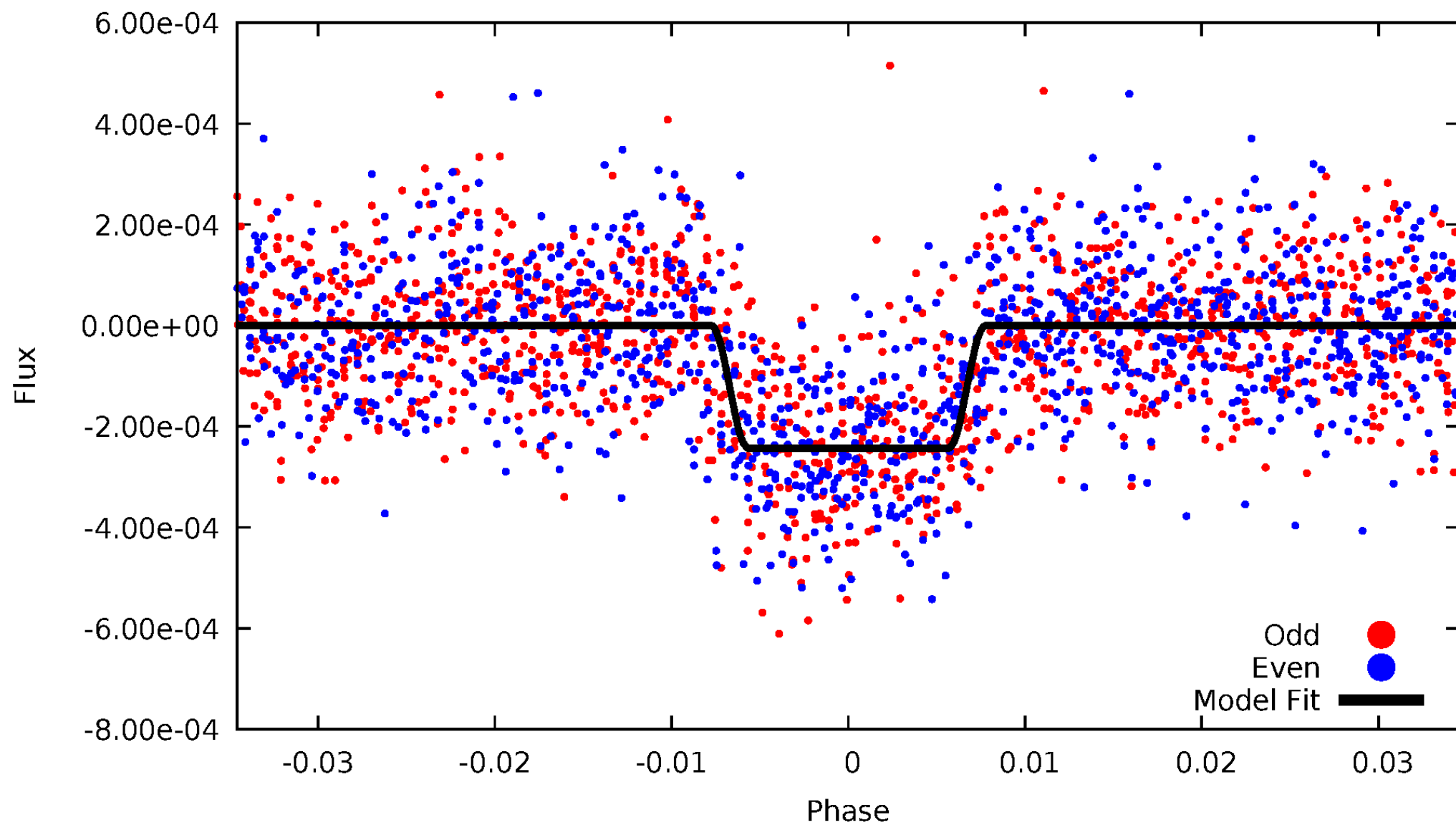
DV Odd/Even

TCE 009022166-01

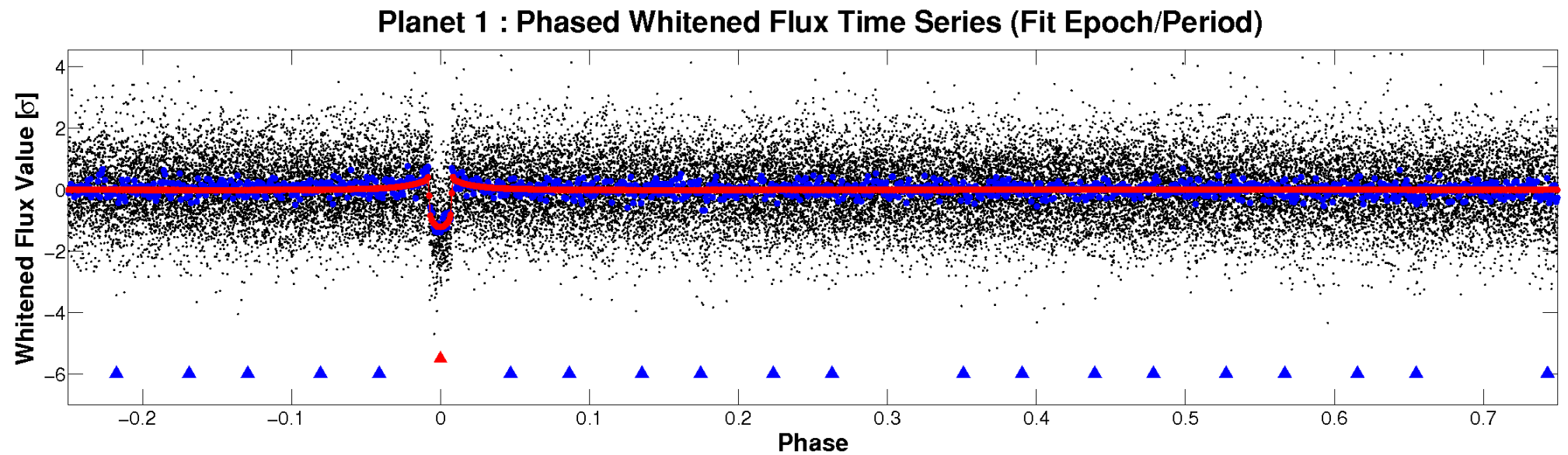
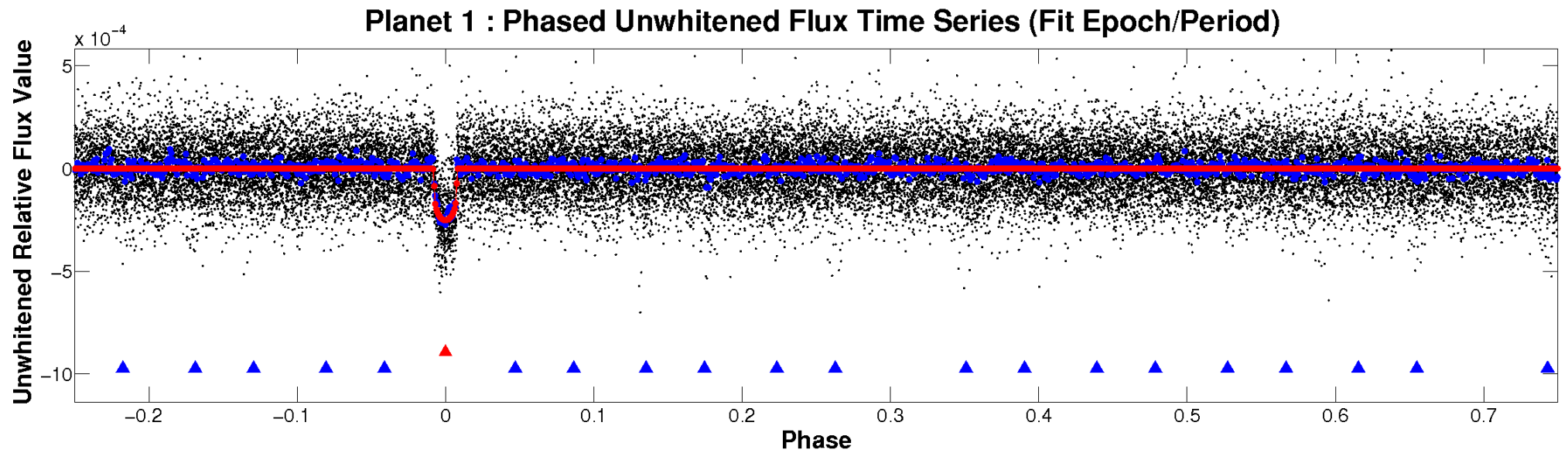


ALT Odd/Even

TCE 009022166-01

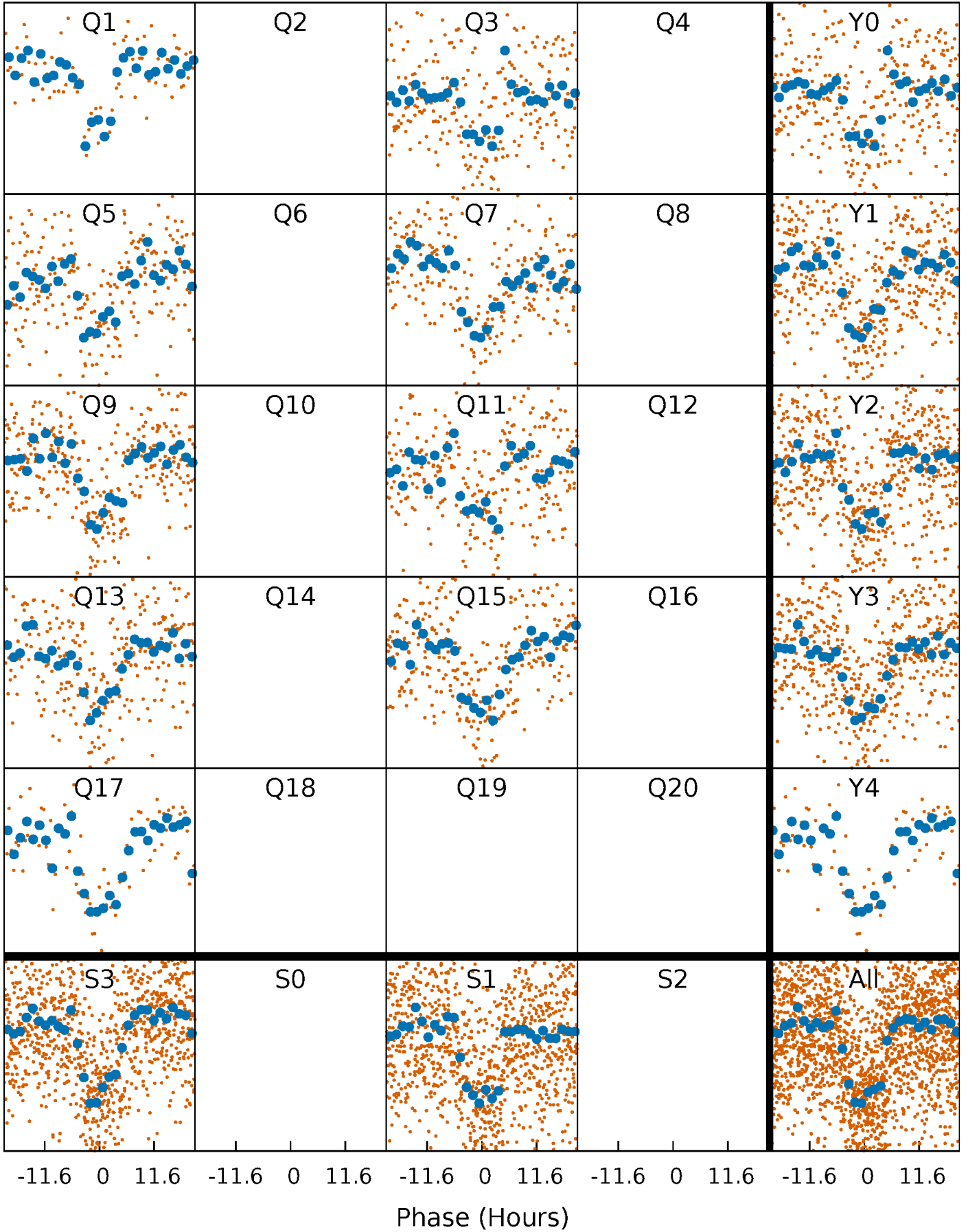


Non-Whitened Vs. Whitened Light Curve



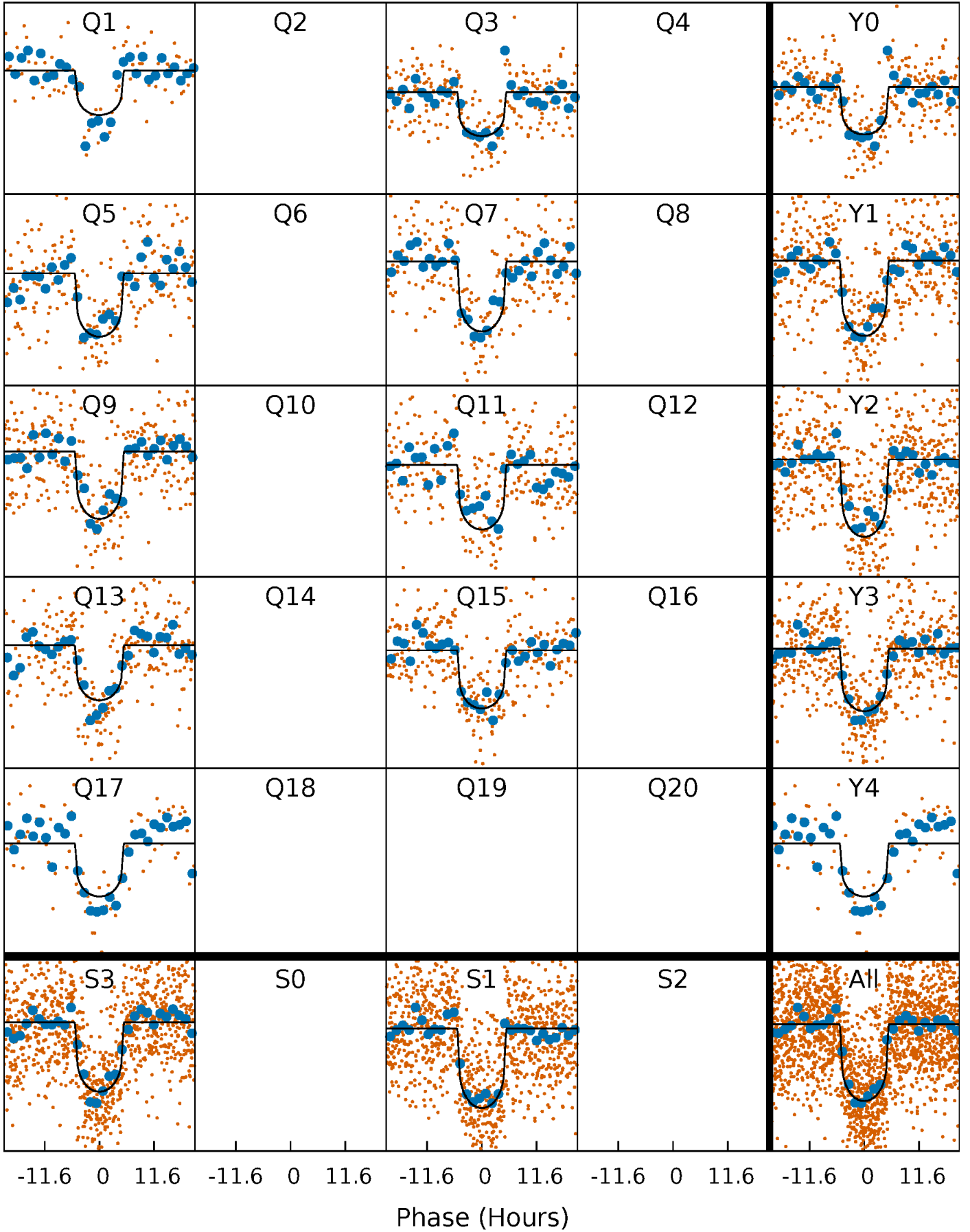
PDC Quarter-Phased Transit Curves

TCE 009022166-01 P= 26.847584 Days $T_0=142.169436$ (BKJD)



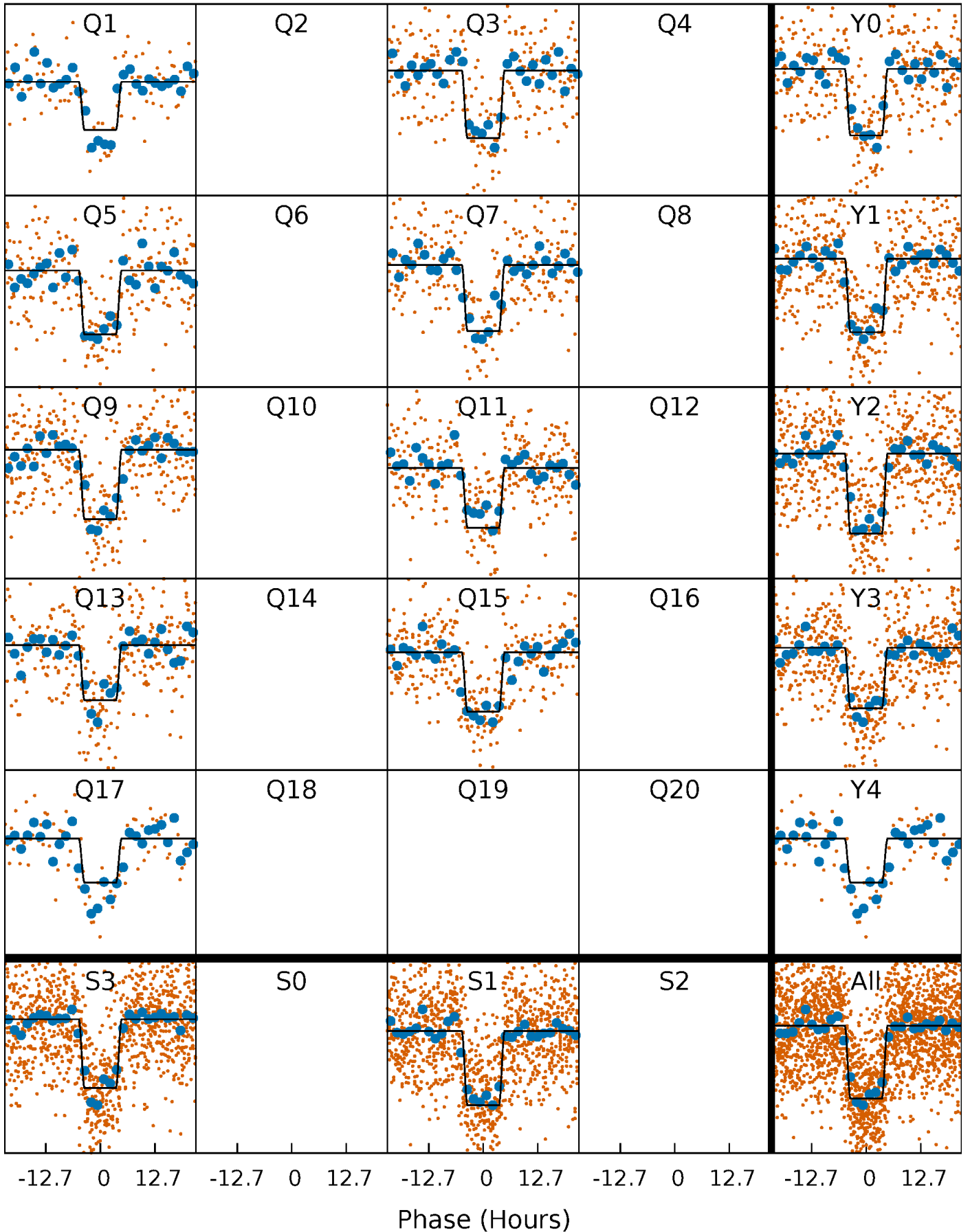
DV Quarter-Phased Transit Curves

TCE 009022166-01 P= 26.847584 Days $T_0=142.169436$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

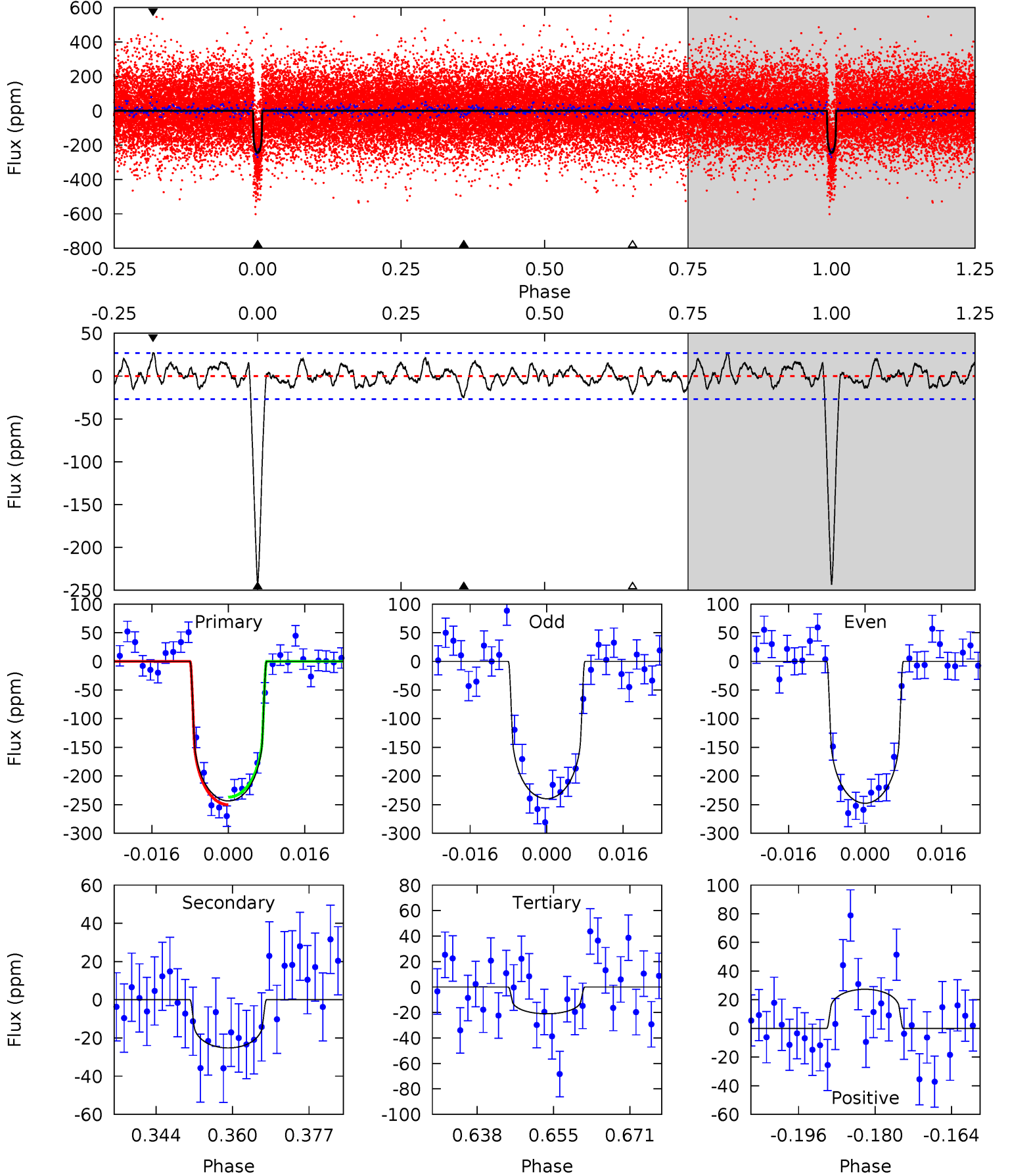
TCE 009022166-01 P= 26.848238 Days $T_0=142.156712$ (BKJD)



DV Model-Shift Uniqueness Test

009022166-01, P = 26.847584 Days, E = 115.321852 Days

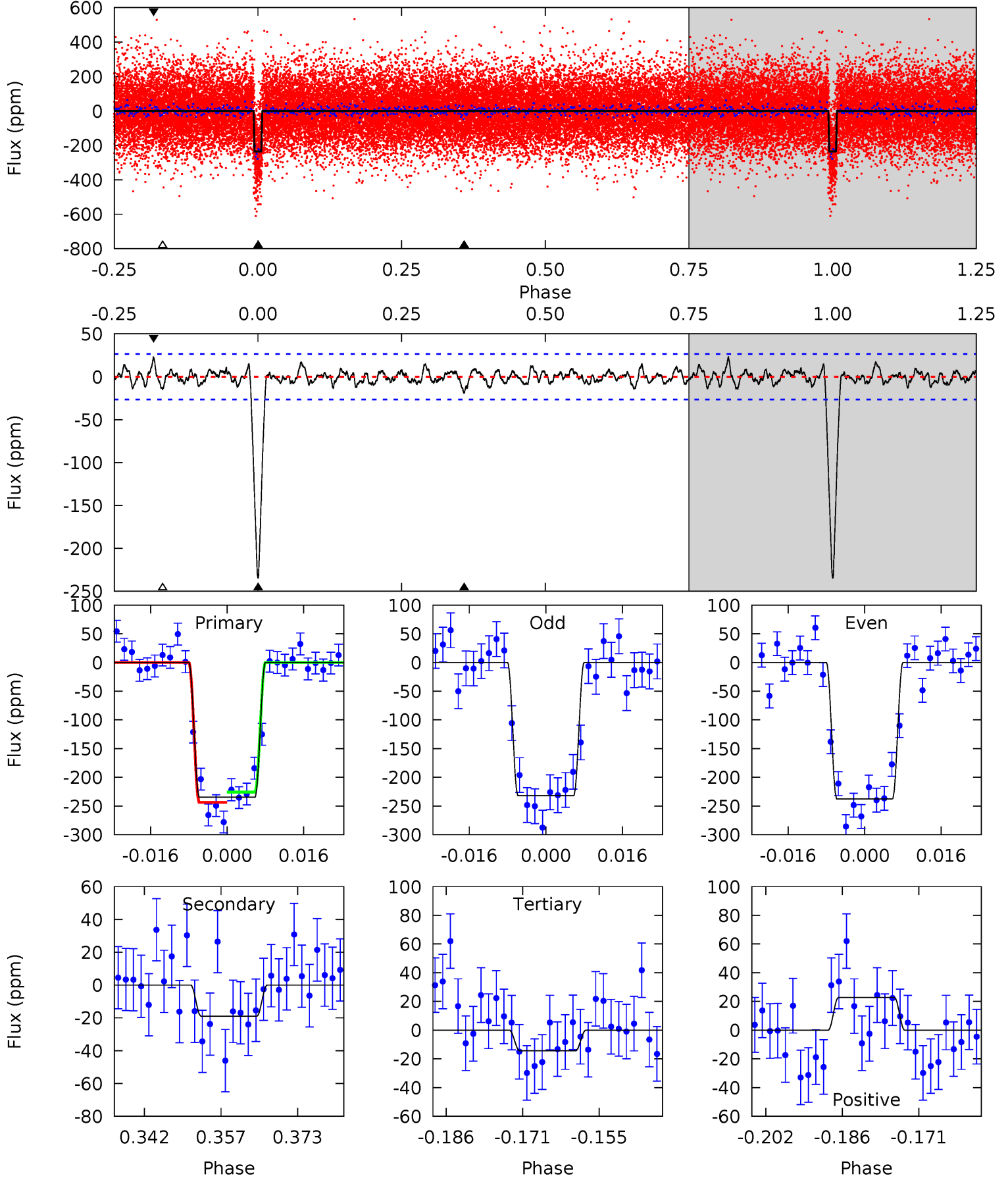
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
44.7	4.62	3.85	5.01	4.93	2.40	1.54	40.8	39.6	0.78	-0.38	0.73	0.98	0.10	1.20



Alt Model-Shift Uniqueness Test

009022166-01, P = 26.848238 Days, E = 115.308474 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
43.8	3.54	2.68	4.25	4.94	2.42	1.11	41.1	39.5	0.85	-0.72	0.52	1.00	0.09	1.68



Stellar Parameters For KIC 009022166

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	5508^{+110}_{-1}	$3.897^{+0.195}_{-0.090}$	$0.100^{+0.150}_{-0.150}$	$1.988^{+0.340}_{-0.510}$	$1.136^{+0.127}_{-0.175}$	$0.204^{+0.250}_{-0.059}$
	+2%/-0%	+5%/-2%	+150%/-150%	+17%/-26%	+11%/-15%	+123%/-29%
Source	SPE58	SPE58	SPE58	DSEP		

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

Secondary Eclipse Parameters for KIC 009022166-01 / KOI 2175.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	-25 ± 5	$3.16^{+0.82}_{-0.80}$	1098^{+57}_{-74}	3582^{+372}_{-272}	47^{+38}_{-20}
Alt.	-19 ± 5	$3.28^{+0.87}_{-0.81}$	1096^{+64}_{-68}	3391^{+315}_{-270}	32^{+28}_{-14}

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 $A_{obs} \gg 1.0$

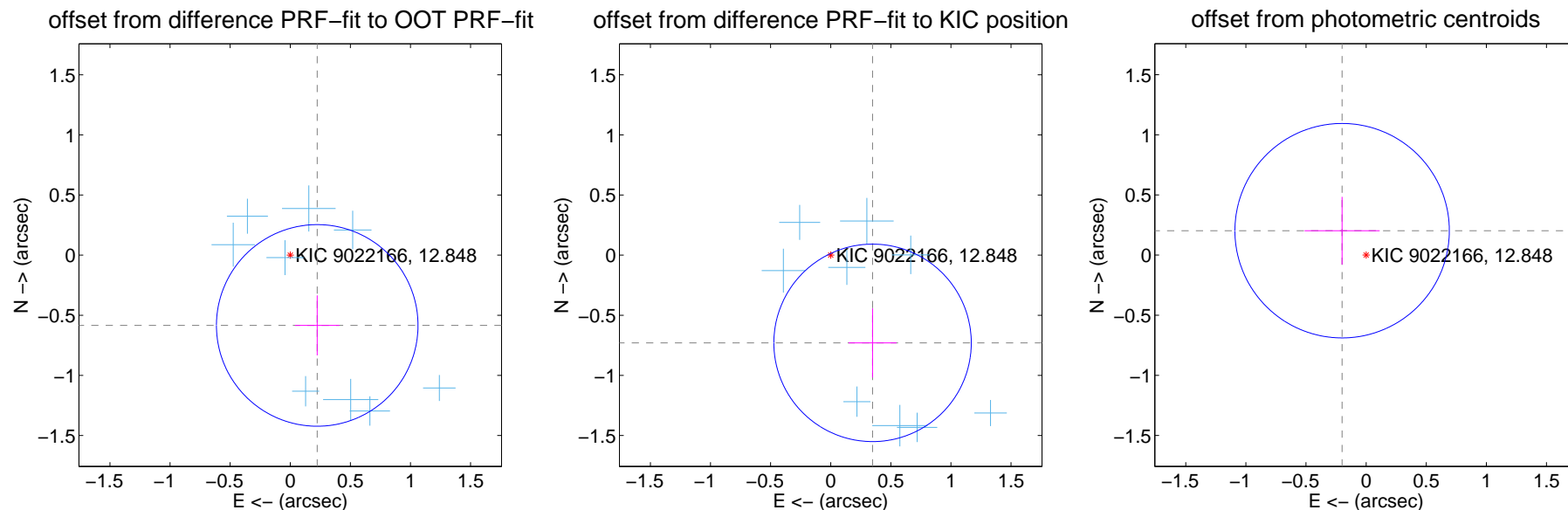
DV Centroid Data

Supplemental centroid analysis for 009022166-01. Kepler magnitude: 12.85. Transit SNR 25.15

There are 9 quarters with good PRF difference image offsets

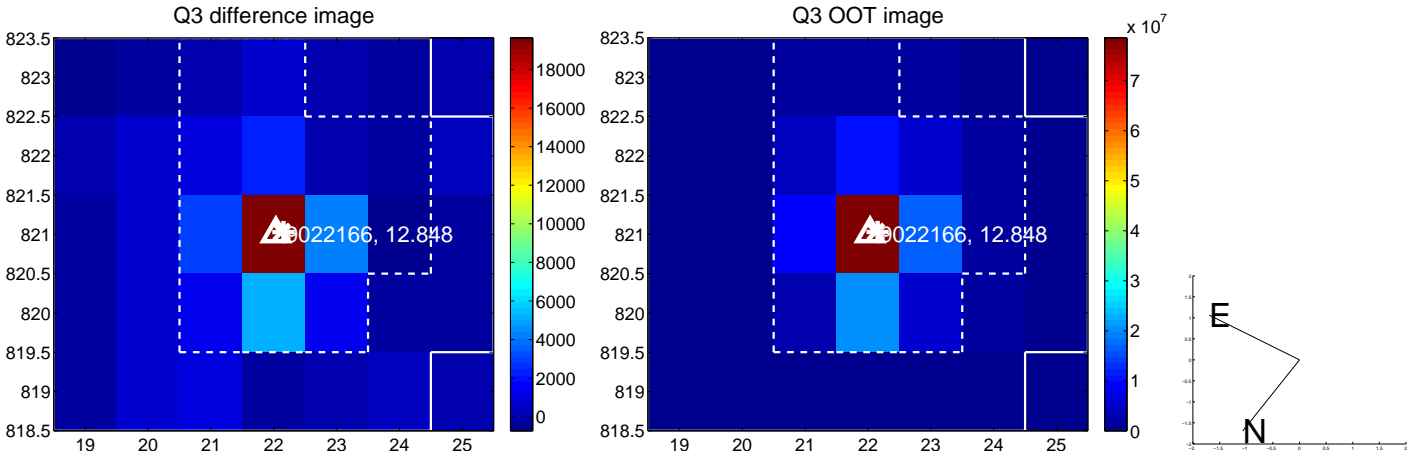
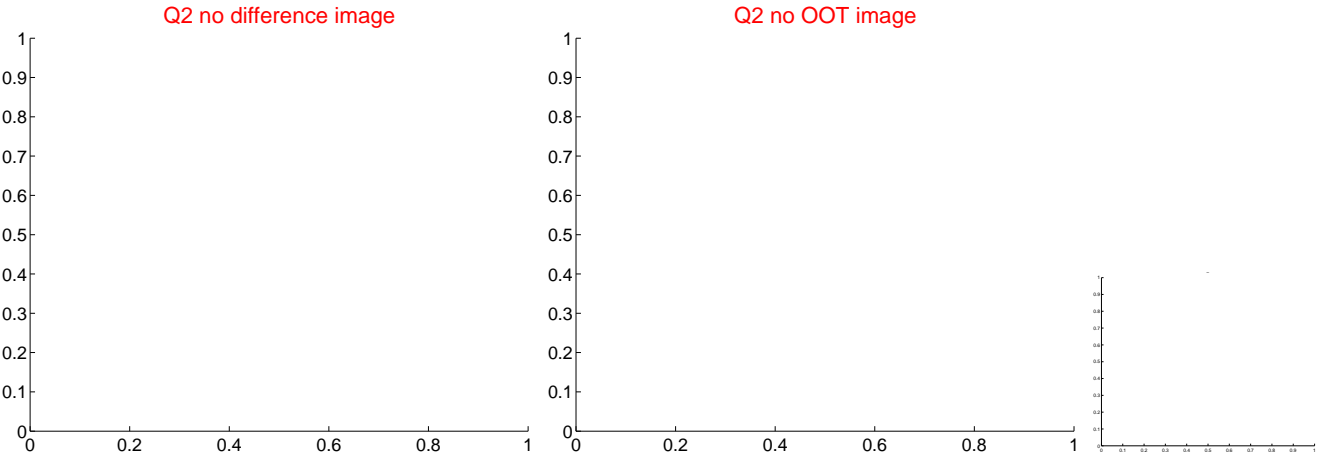
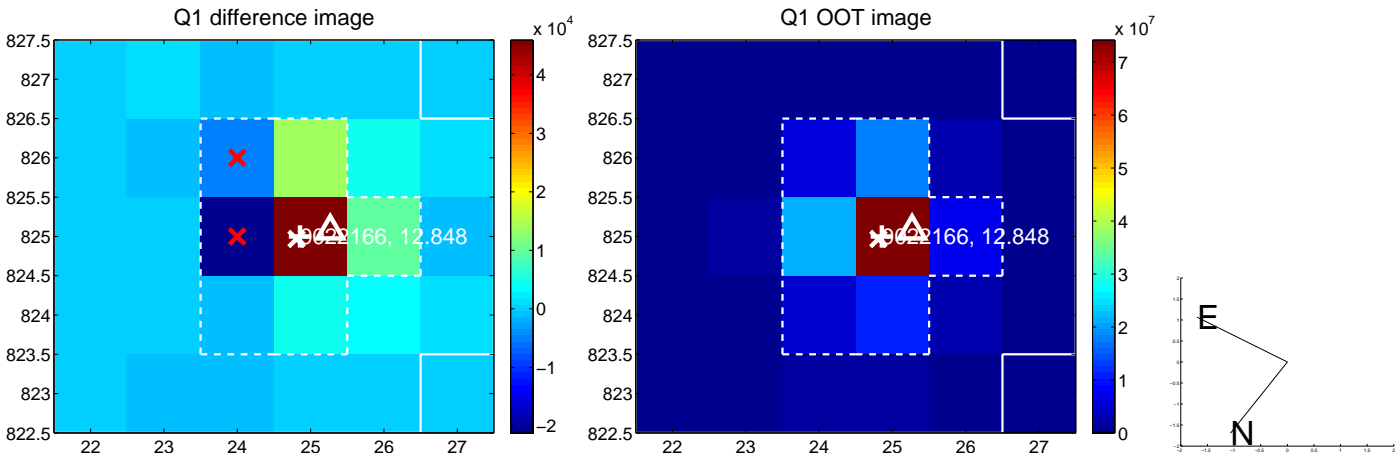
The direct PRF centroid is offset from the target star catalog position by about 0.23 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.626 ± 0.279	2.24	-0.224 ± 0.185	-0.584 ± 0.250
PRF-fit source offset from KIC position	0.808 ± 0.274	2.95	-0.348 ± 0.199	-0.730 ± 0.288
photometric centroid source offset	0.28 ± 0.30	0.96	0.20 ± 0.31	0.20 ± 0.28

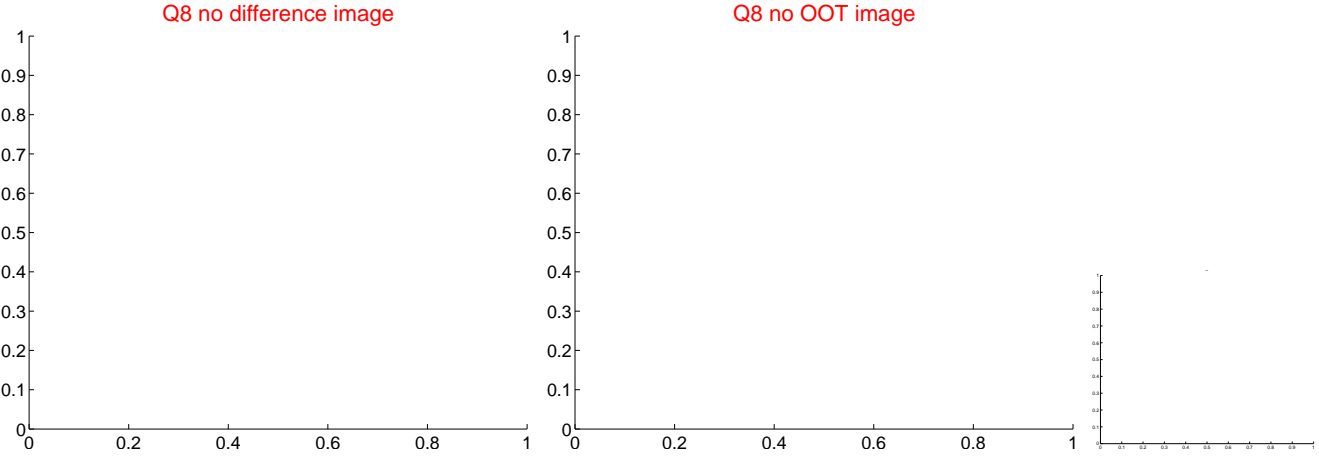
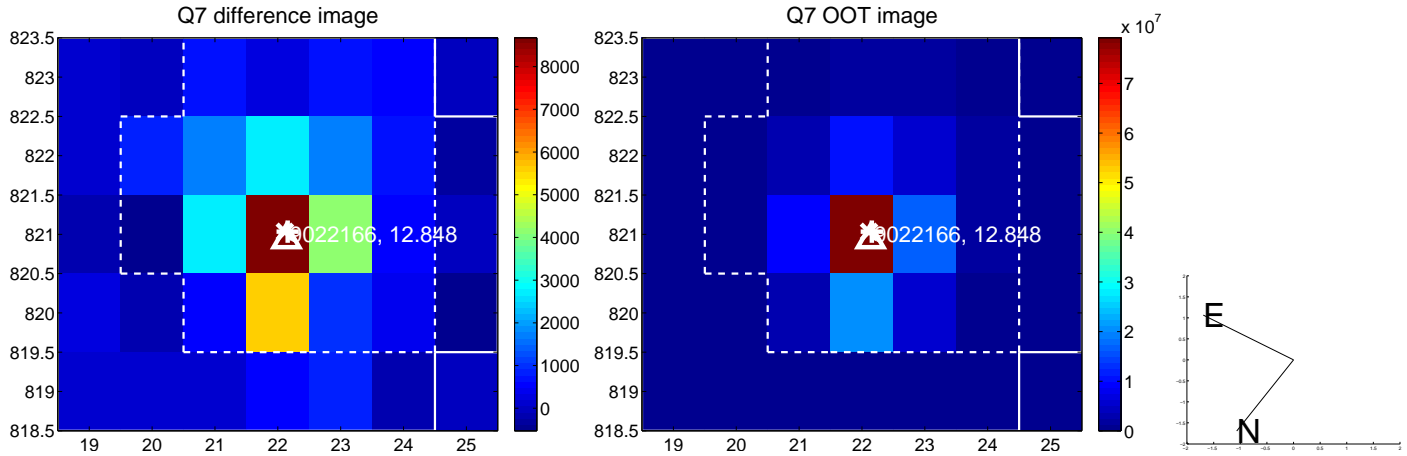
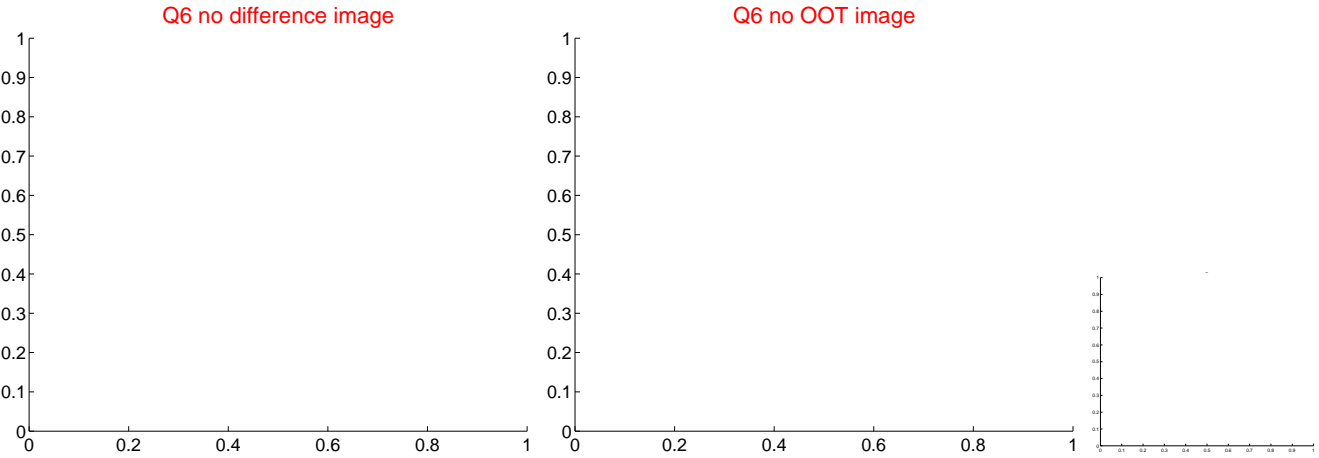
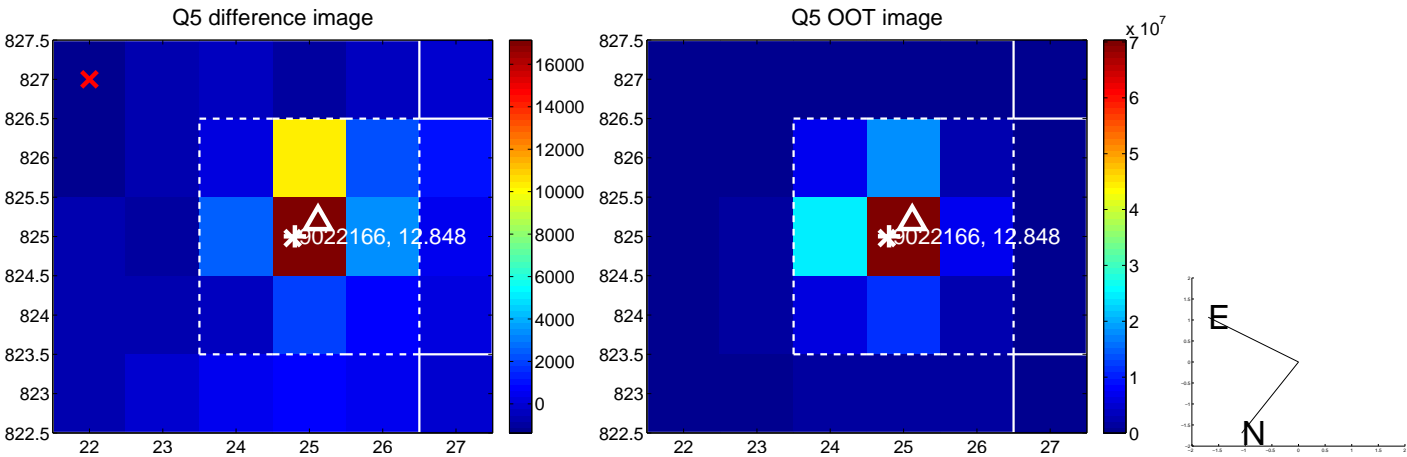


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

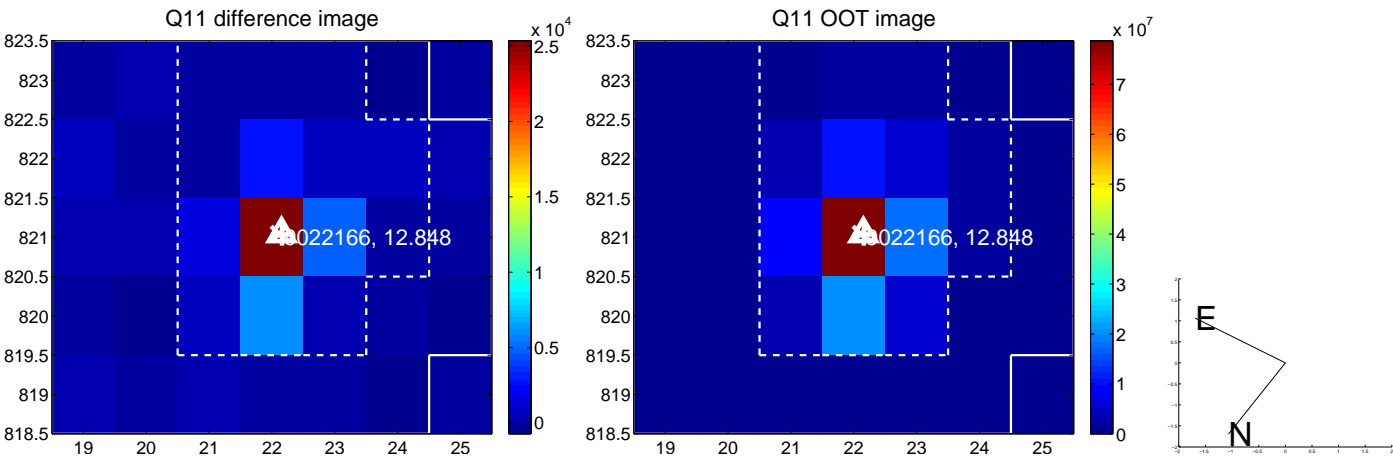
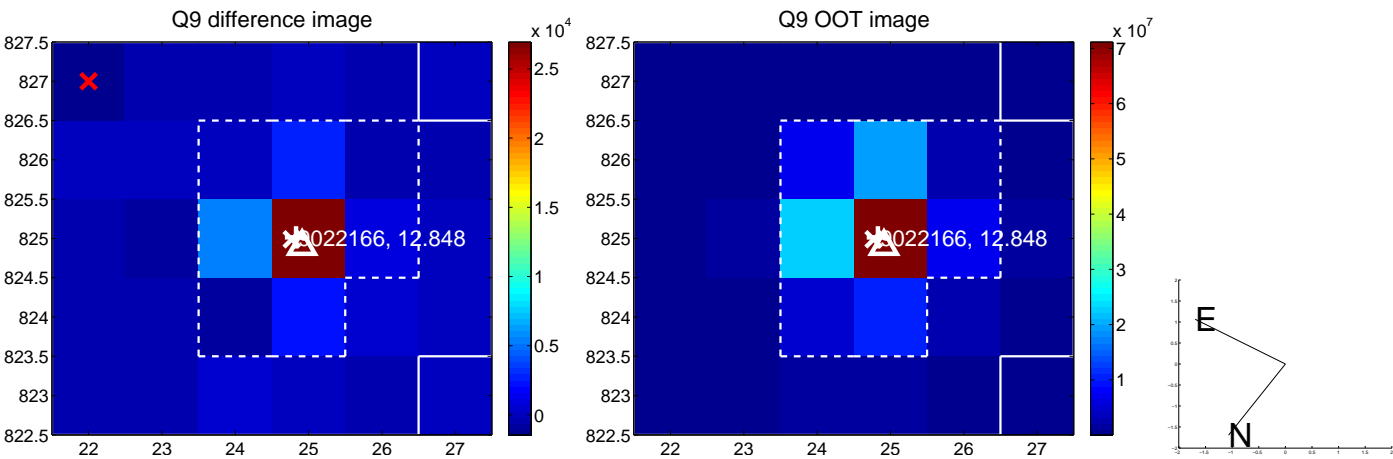
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



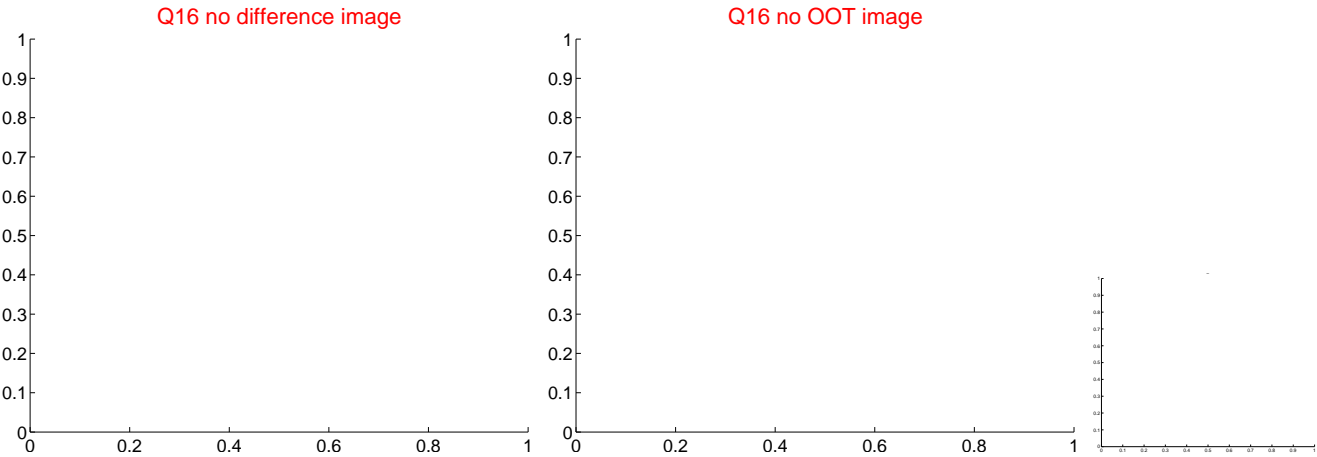
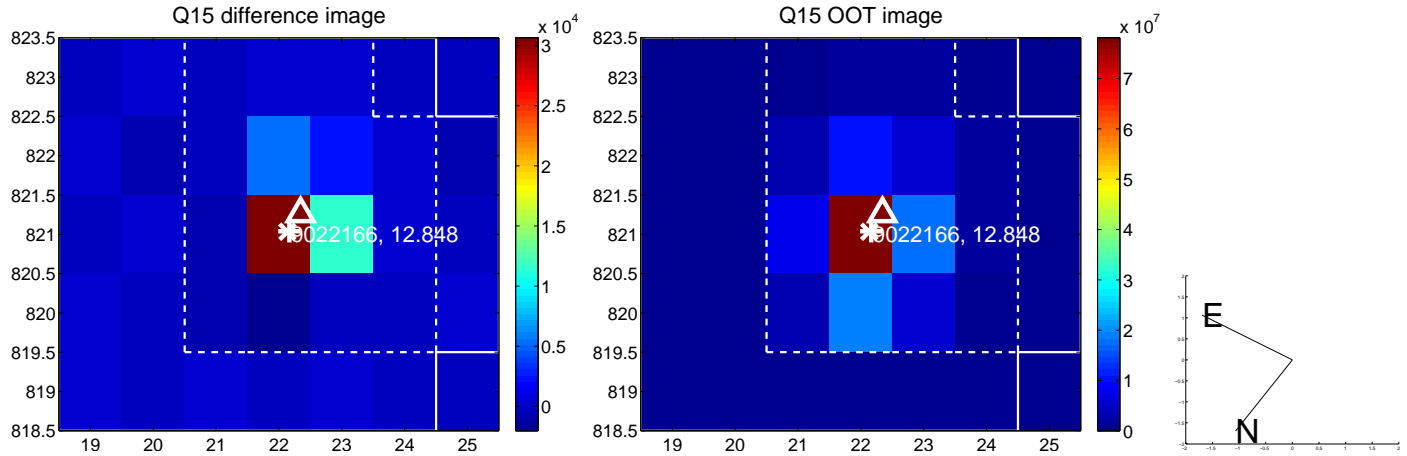
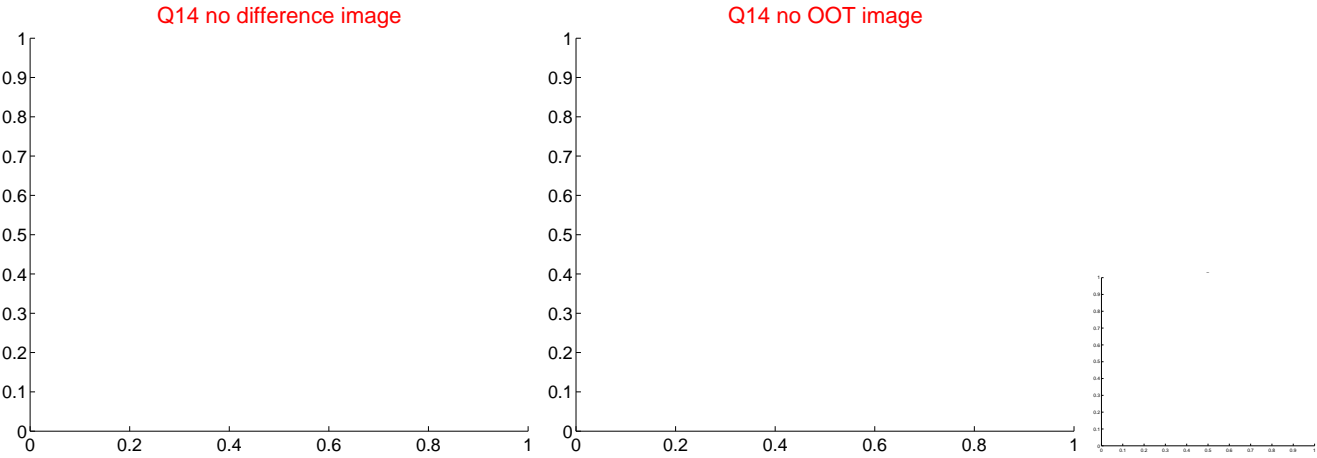
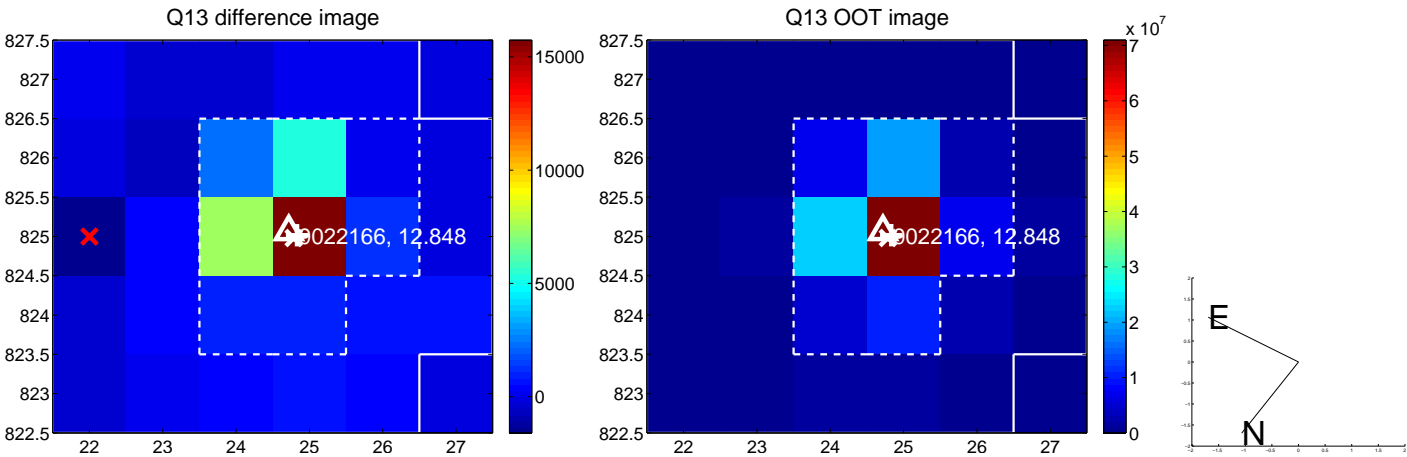
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



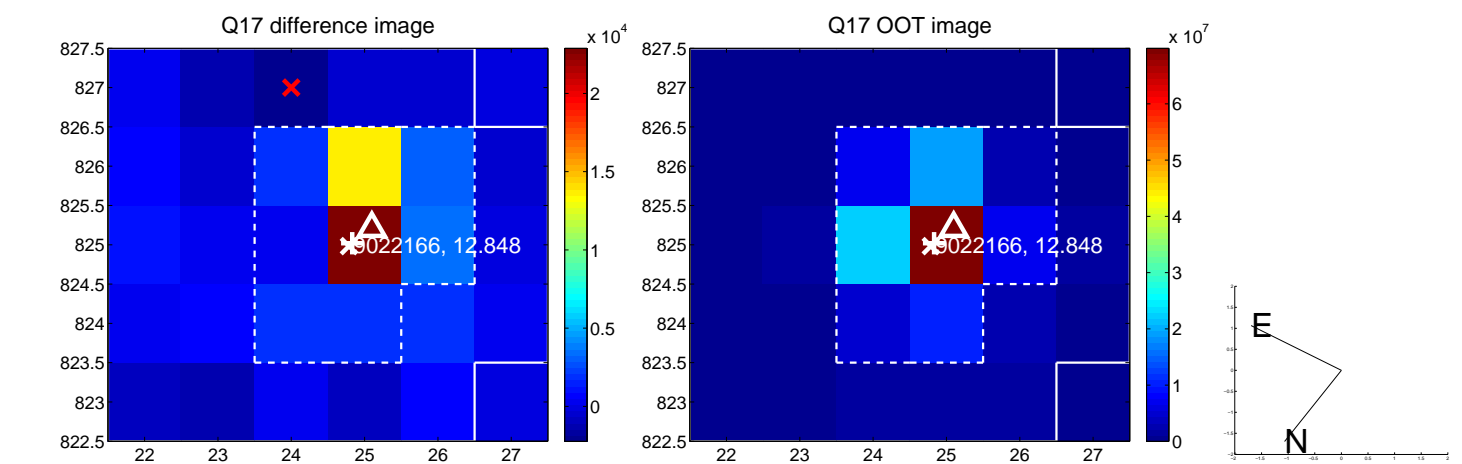
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



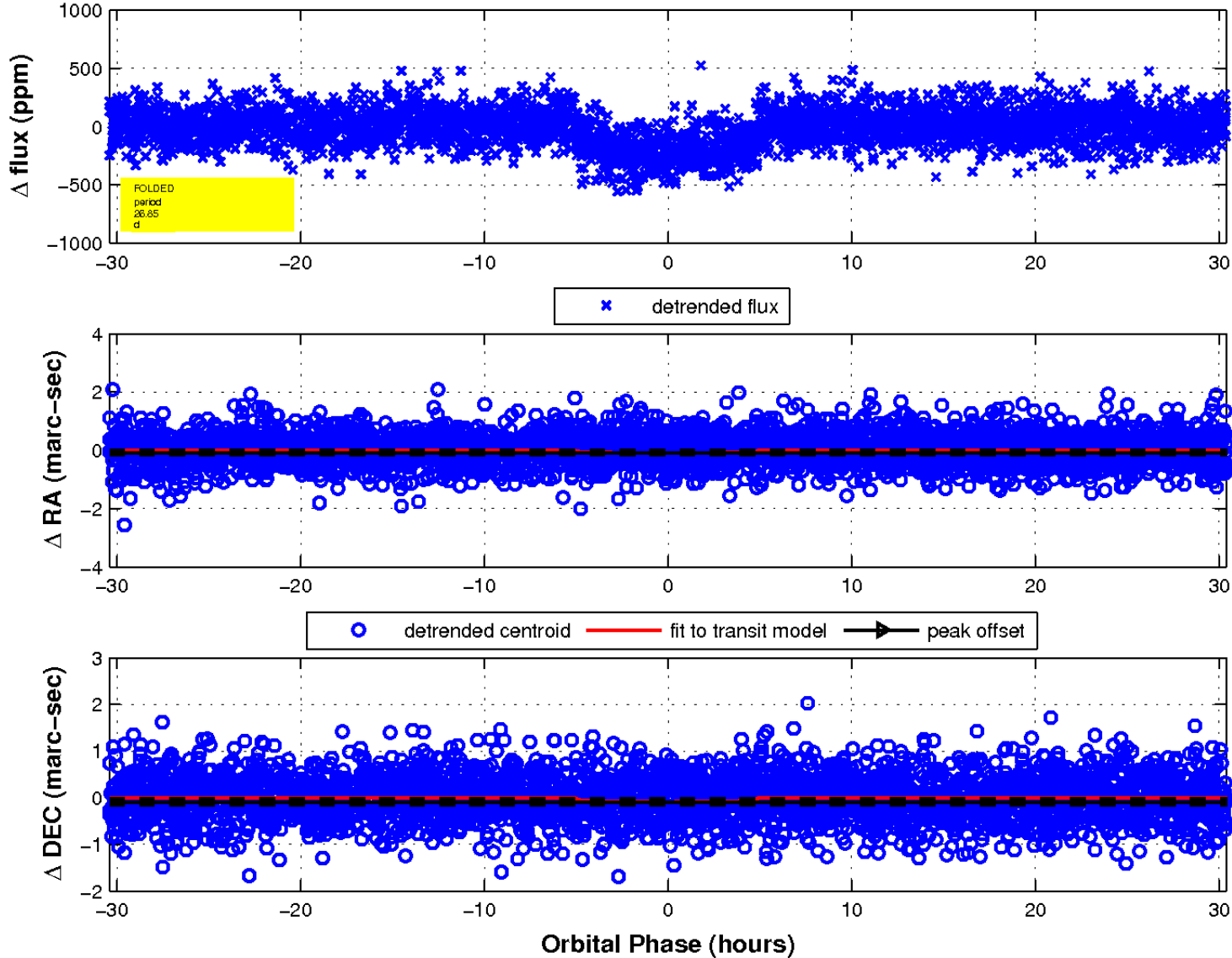
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



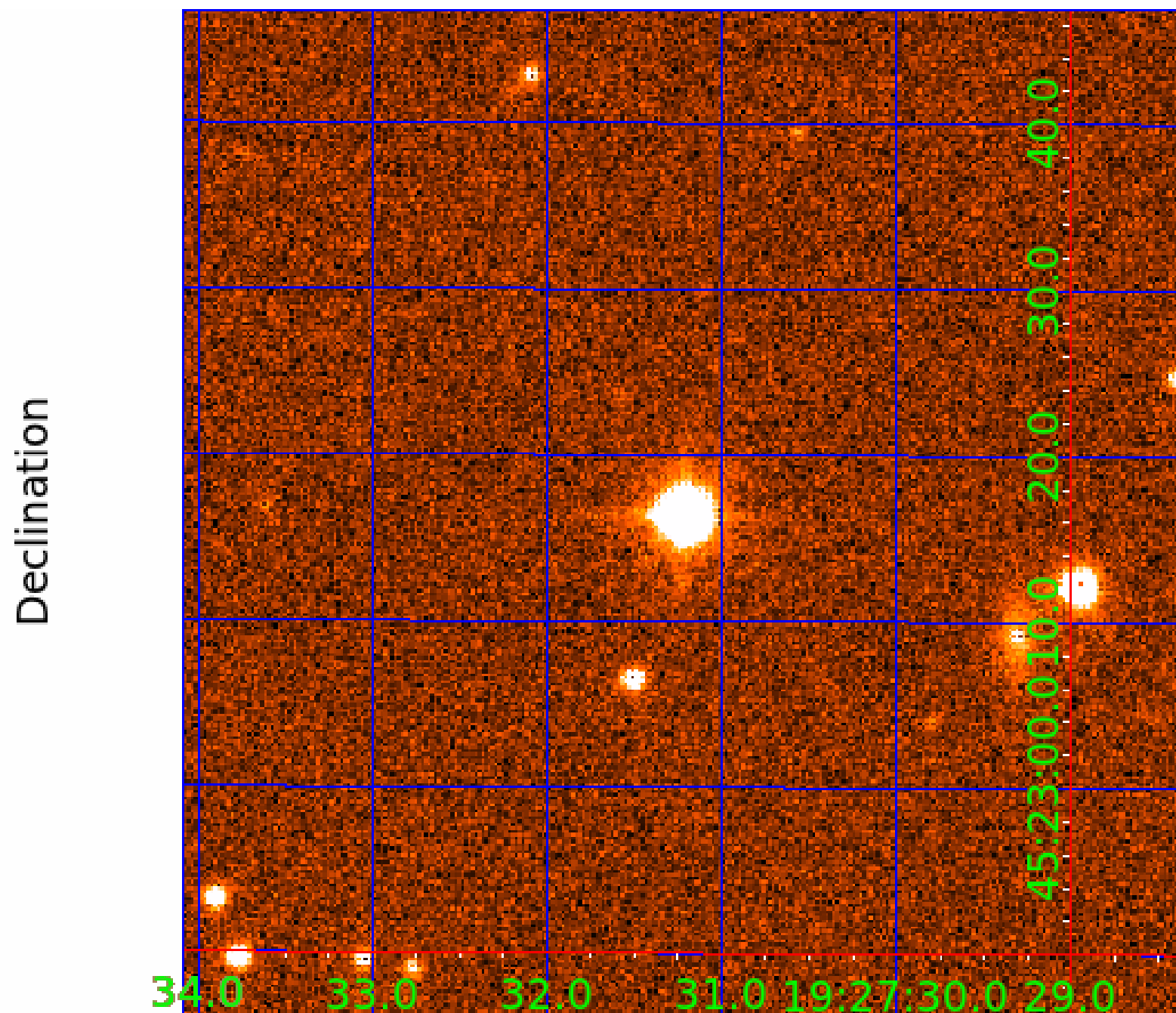
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



fluxWeightedCentroids, Planet 1 of 2



UKIRT Image



KIC 009022166

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})
009022166-01	OBS	2175.01	26.847584	142.169436	251.4	10.137	23.1	25.1	1.99	5508	3.31	97.11
009022166-02	OBS	2175.02	72.382673	179.498513	354.0	8.304	19.3	19.6	1.99	5508	4.27	25.88

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009022166-01	OBS	PC	0.99	0	0	0	0	NO_COMMENT
009022166-02	OBS	FP	0.00	0	1	0	0	DEPTH_ODDEVEN_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.

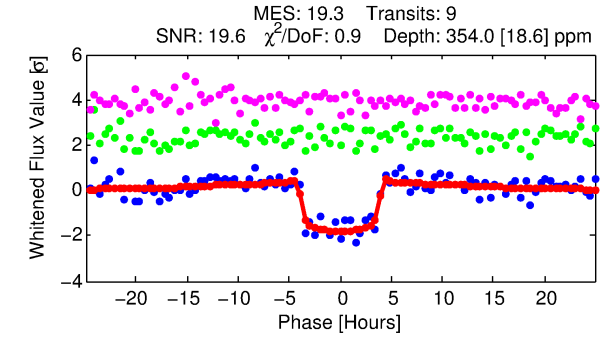
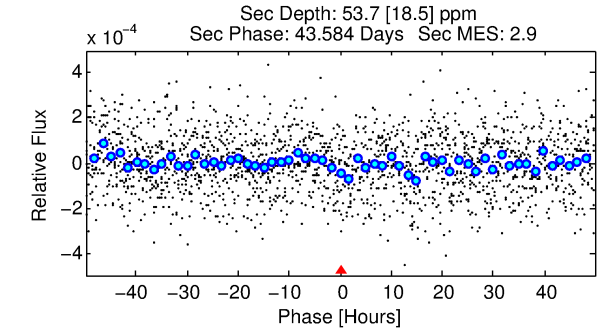
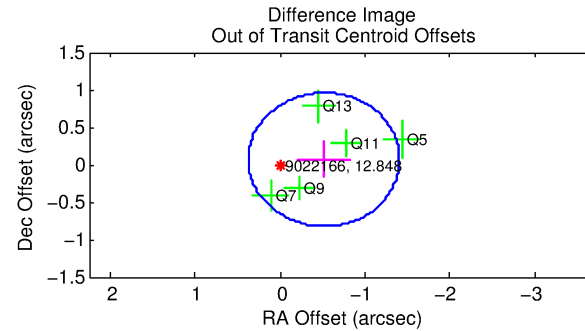
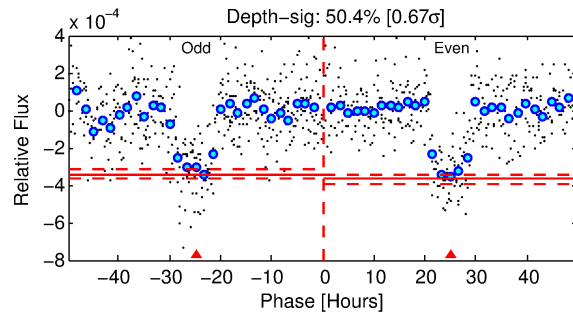
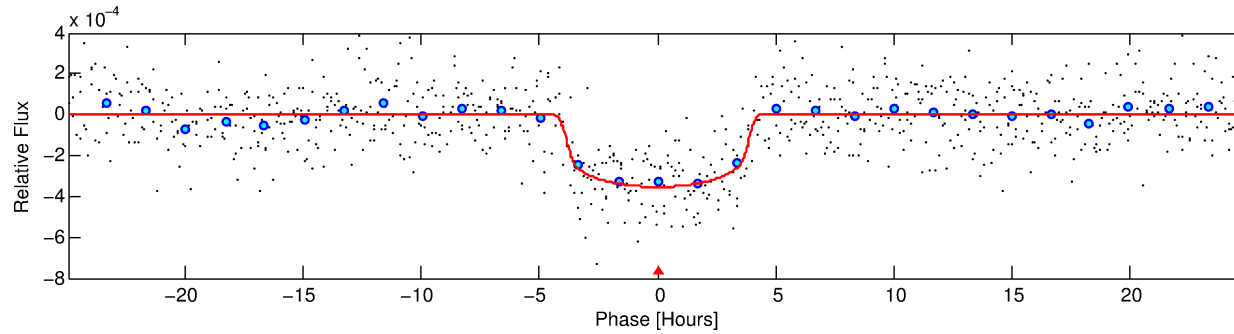
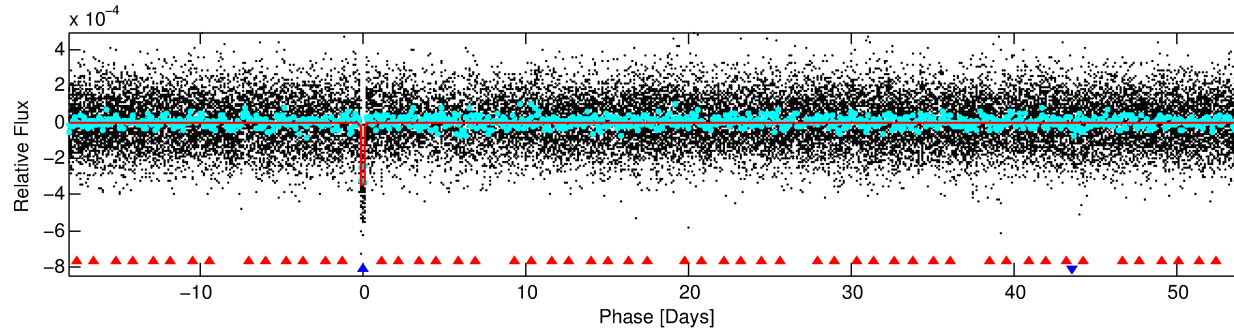
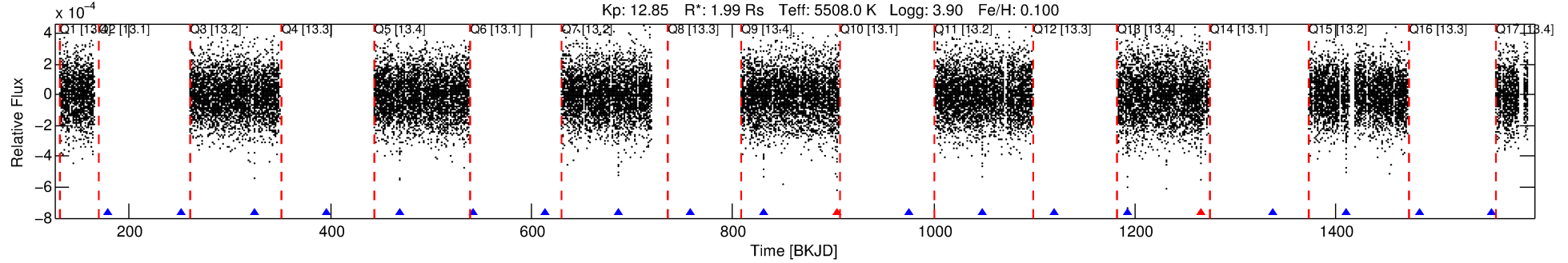
Ephemeris Match Information For 009022166-02

No Significant Match Found

DV One-Page Summary

KIC: 9022166 Candidate: 2 of 2 Period: 72.383 d
KOI: K02175.02 Name: Kepler-368c Corr: 0.970

Kp: 12.85 R*: 1.99 Rs Teff: 5508.0 K Logg: 3.90 Fe/H: 0.100



DV Fit Results:

Period = 72.38267 [0.00069] d
Epoch = 179.4985 [0.0075] BKJD
Rp/R* = 0.0197 [0.0024]
a/R* = 38.41 [19.70]
b = 0.84 [0.18]
Seff = 25.88 [9.16]
Teq = 575 [51] K
Rp = 4.27 [1.22] Re
a = 0.3549 [0.0806] AU
Ag = 204.55 [111.78] [1.82σ]
Teffp = 3363 [363] K [7.61σ]

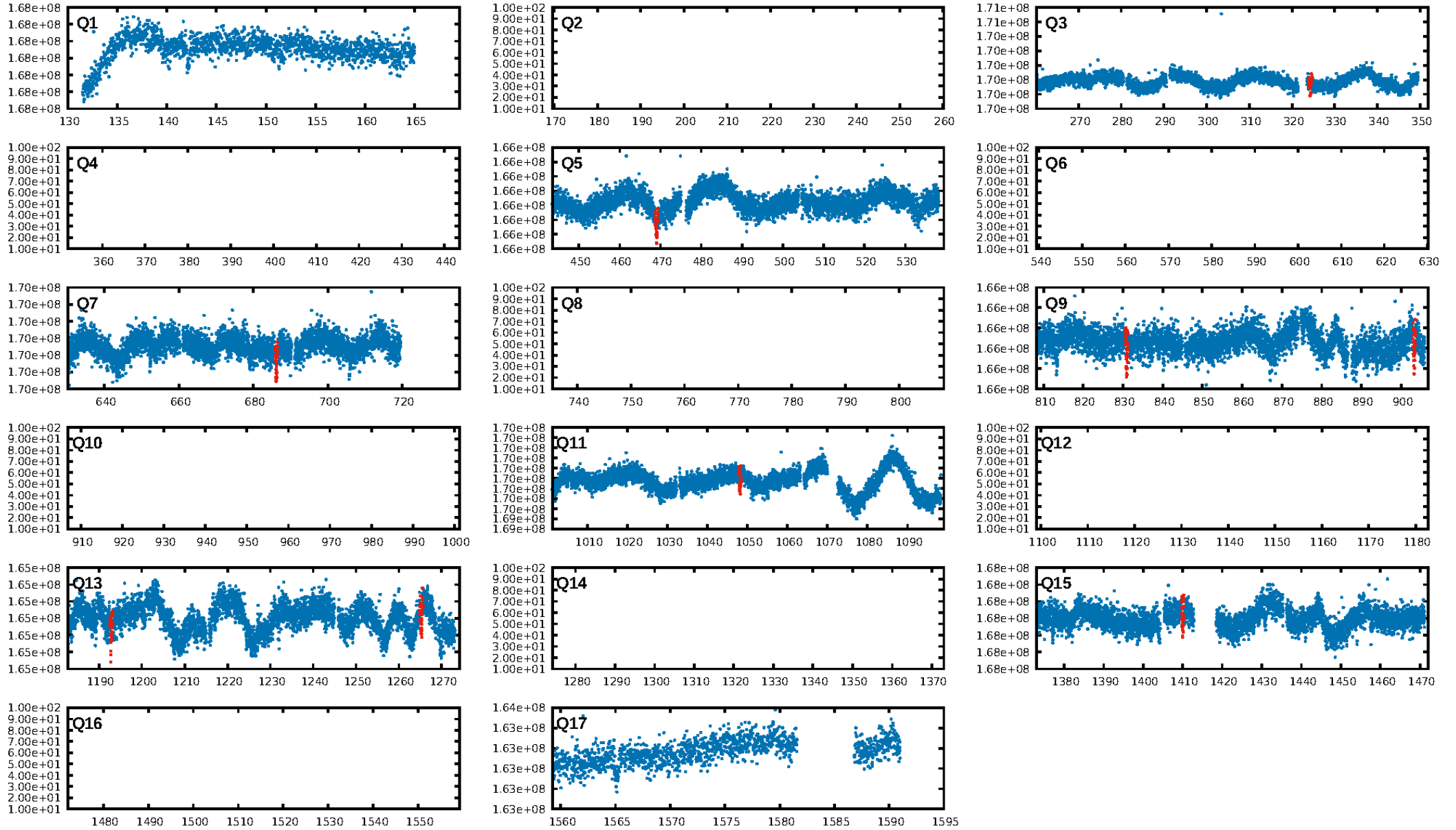
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [83.40σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 39.2%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 1.32e-76
RollingBand-fgt: 0.78 [7/9]
GhostDiagnostic-chr: 2.423
Centroid-sig: 97.0%
Centroid-so: 0.278 arcsec [0.65σ]
OotOffset-rm: 0.523 arcsec [1.76σ]
OotOffset-st: 0/2/0/3 [5]
KicOffset-rm: 0.656 arcsec [2.31σ]
KicOffset-st: 0/2/0/3 [5]
DiffImageQuality-fgm: 1.00 [5/5]
DiffImageOverlap-fno: 1.00 [5/5]

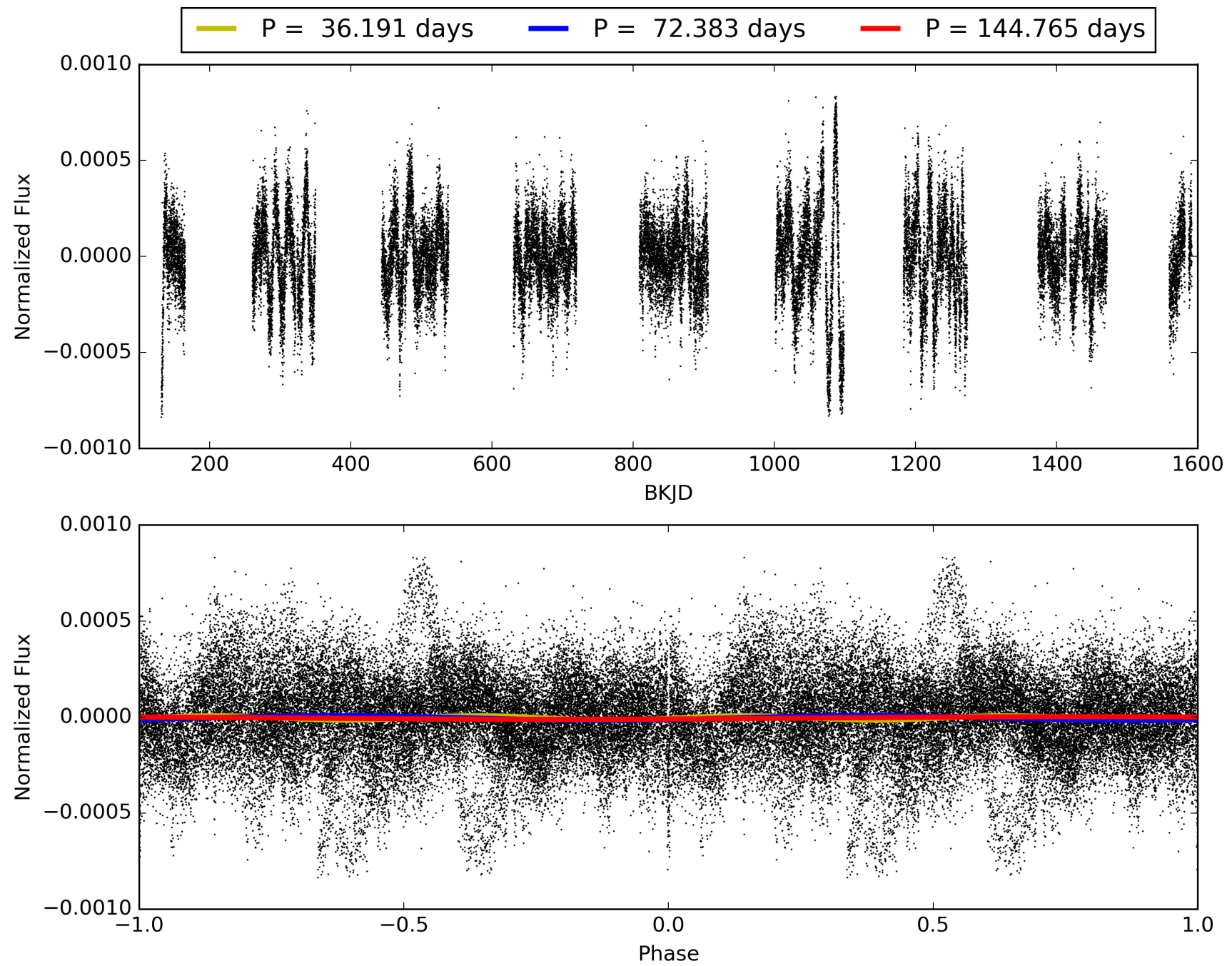
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 16:32:41 Z

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

TCE 009022166-02, PDC Light Curves

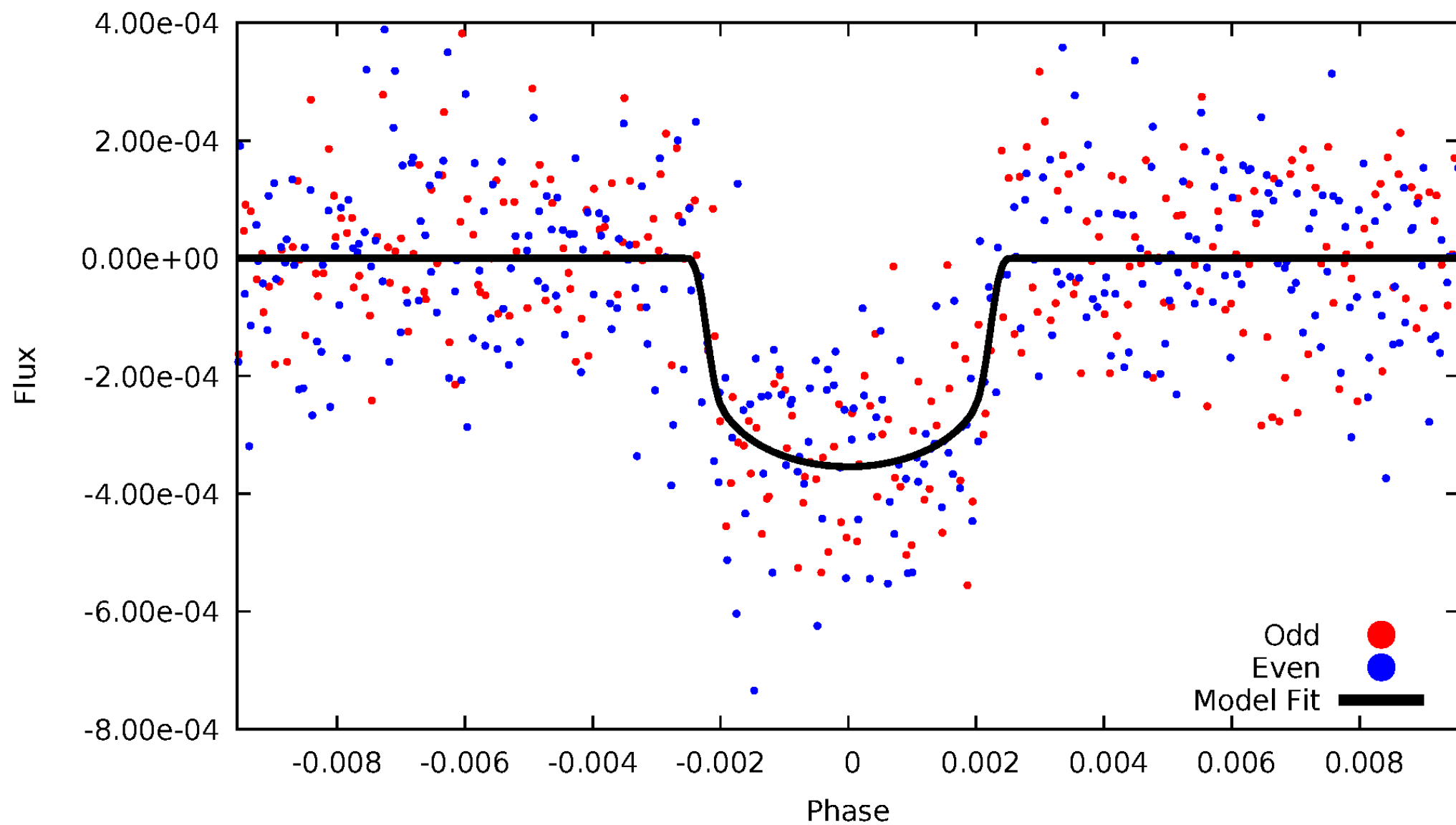


TCE 009022166-02



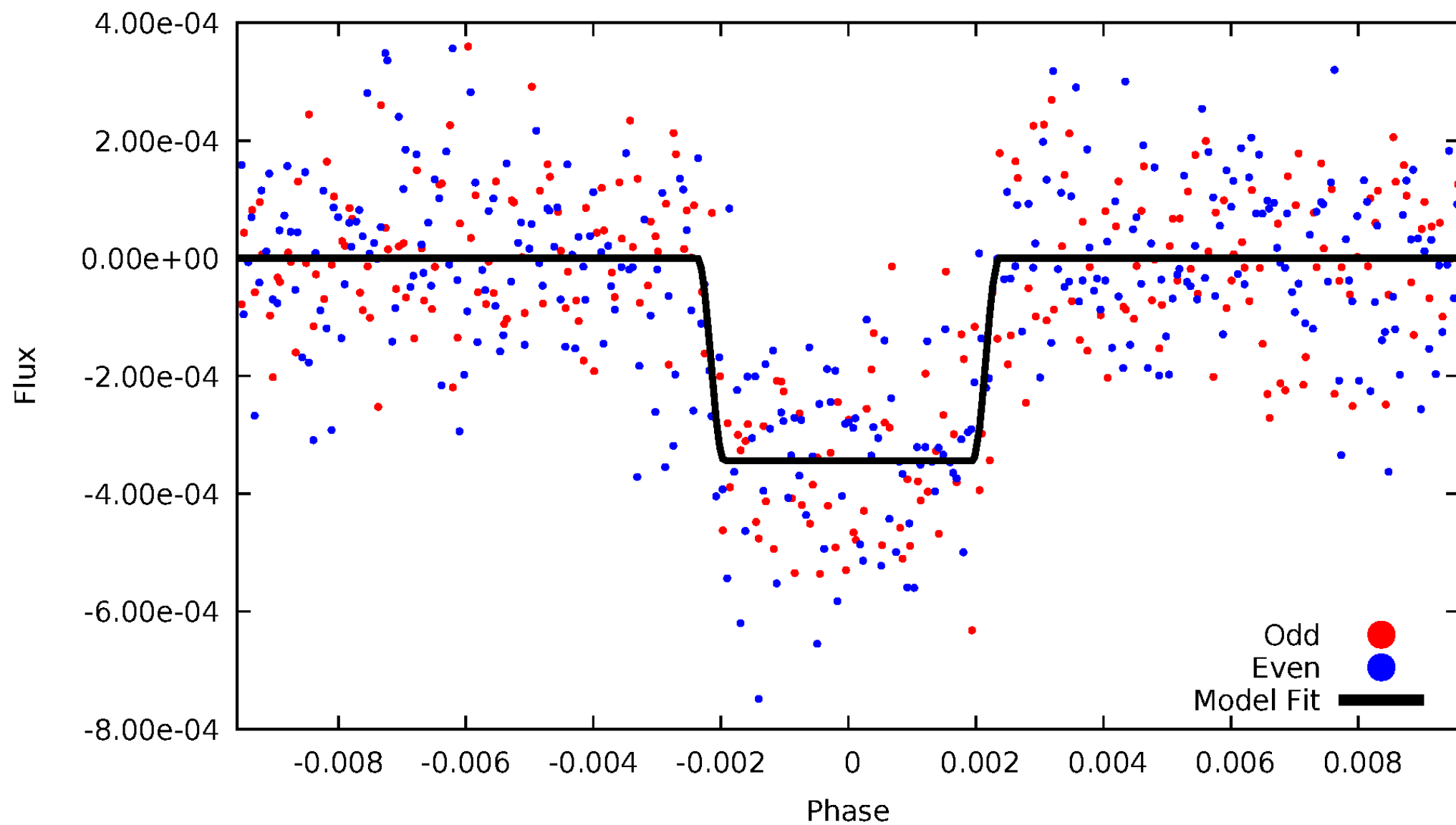
DV Odd/Even

TCE 009022166-02



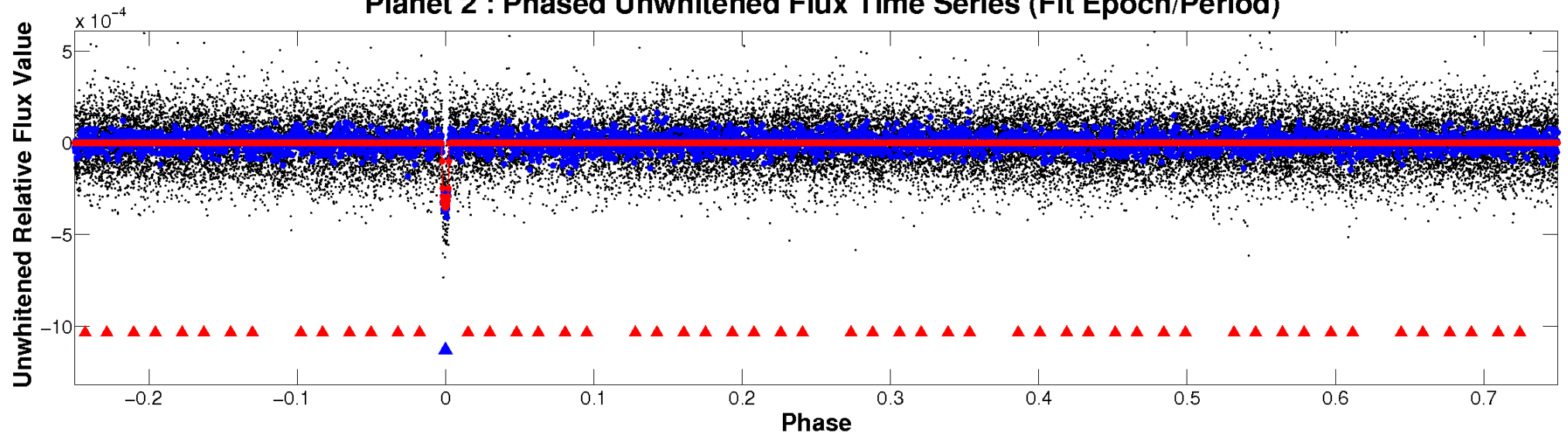
ALT Odd/Even

TCE 009022166-02

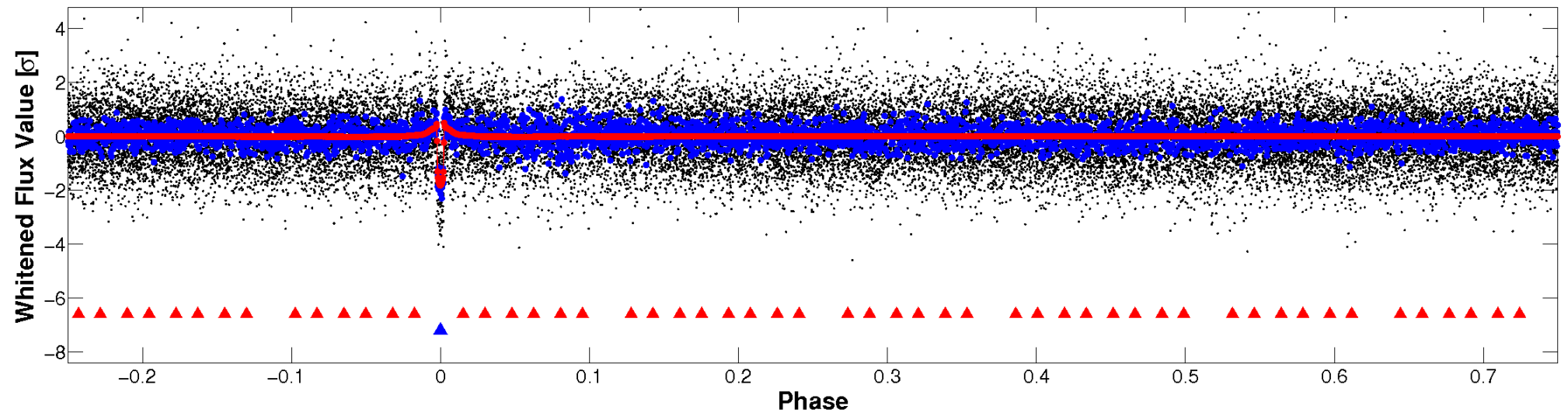


Non-Whitened Vs. Whitened Light Curve

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

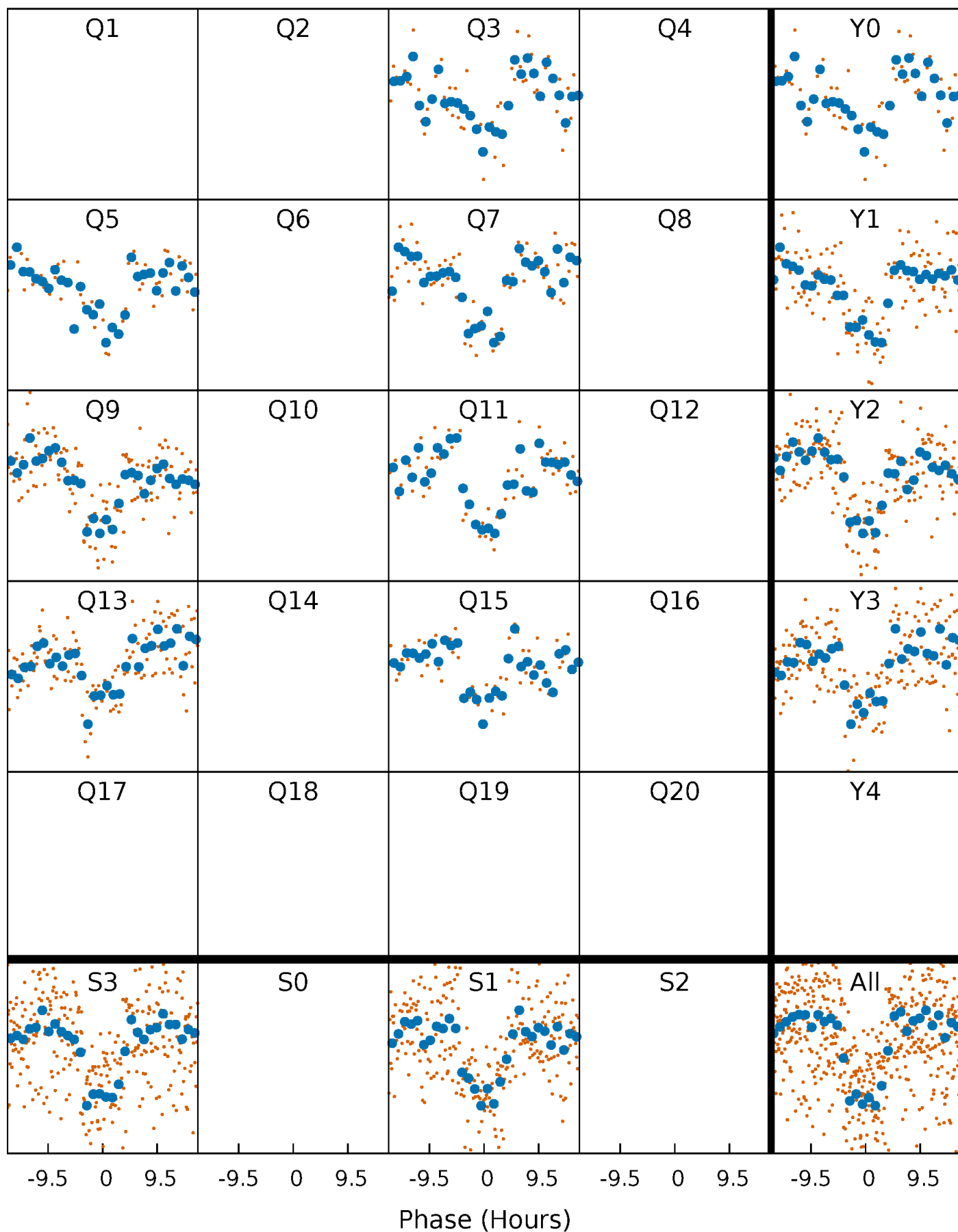


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



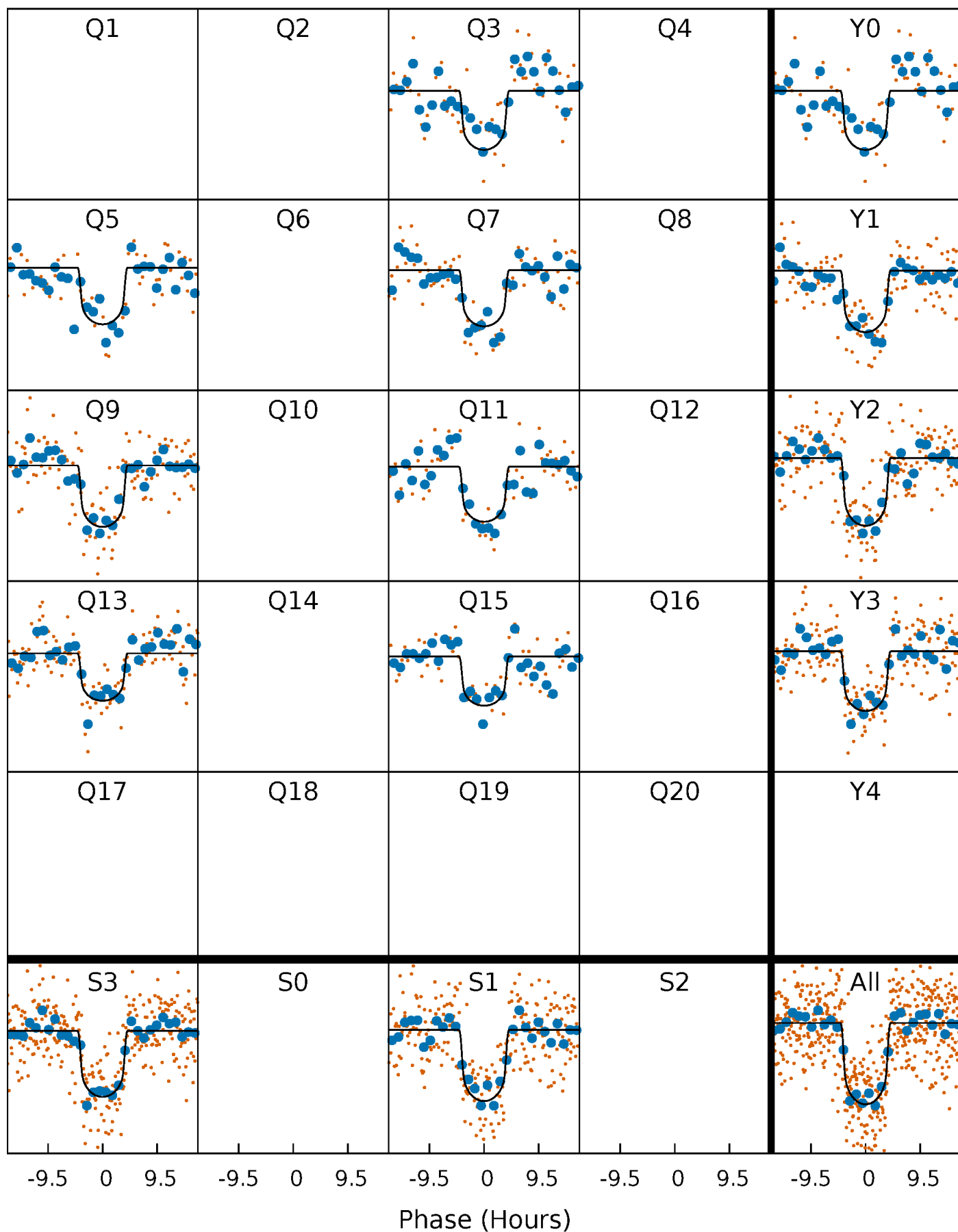
PDC Quarter-Phased Transit Curves

TCE 009022166-02 P= 72.382673 Days $T_0=179.498513$ (BKJD)



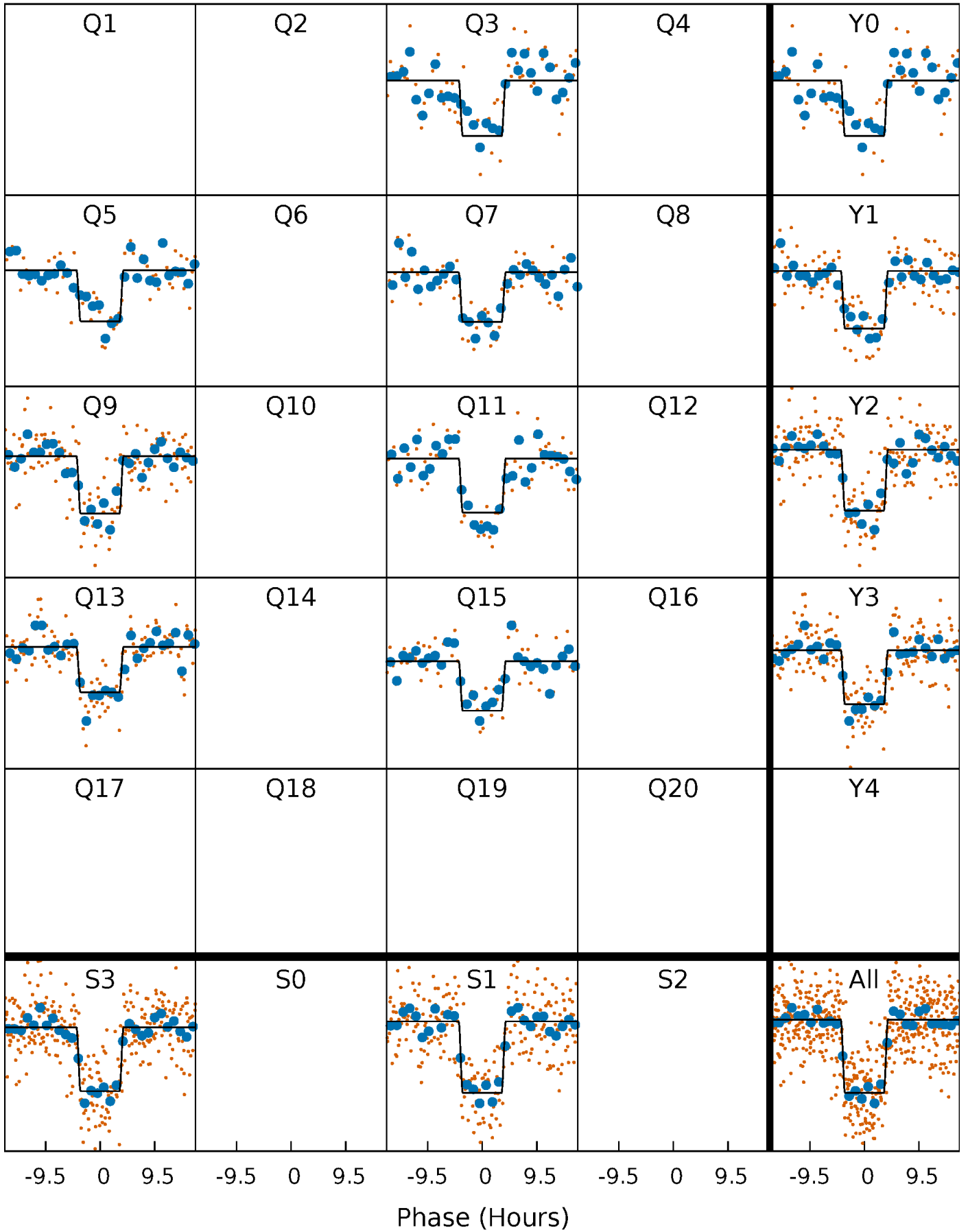
DV Quarter-Phased Transit Curves

TCE 009022166-02 P= 72.382673 Days $T_0=179.498513$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

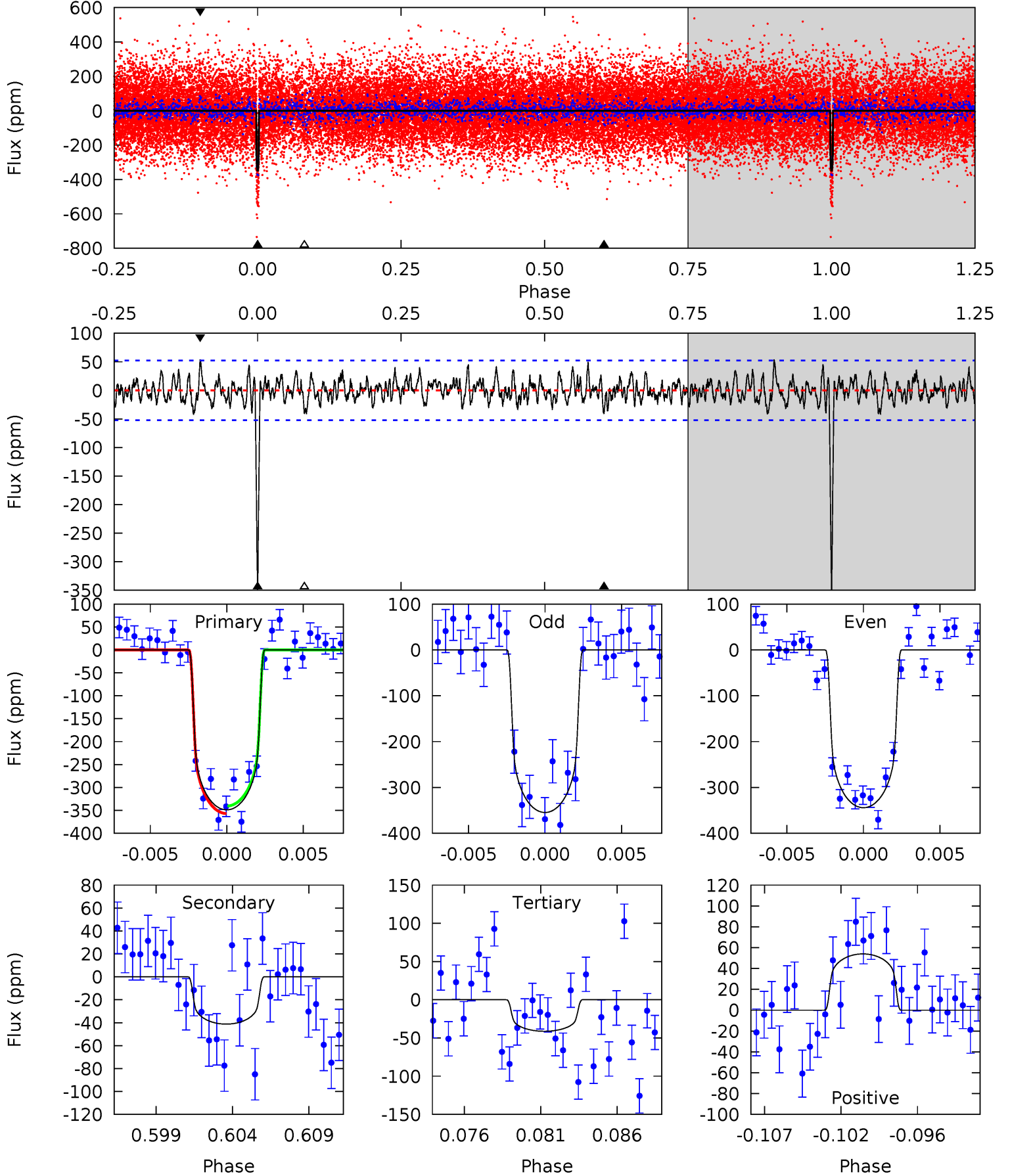
TCE 009022166-02 P= 72.381476 Days $T_0=179.510822$ (BKJD)



DV Model-Shift Uniqueness Test

009022166-02, $P = 72.382673$ Days, $E = 107.115840$ Days

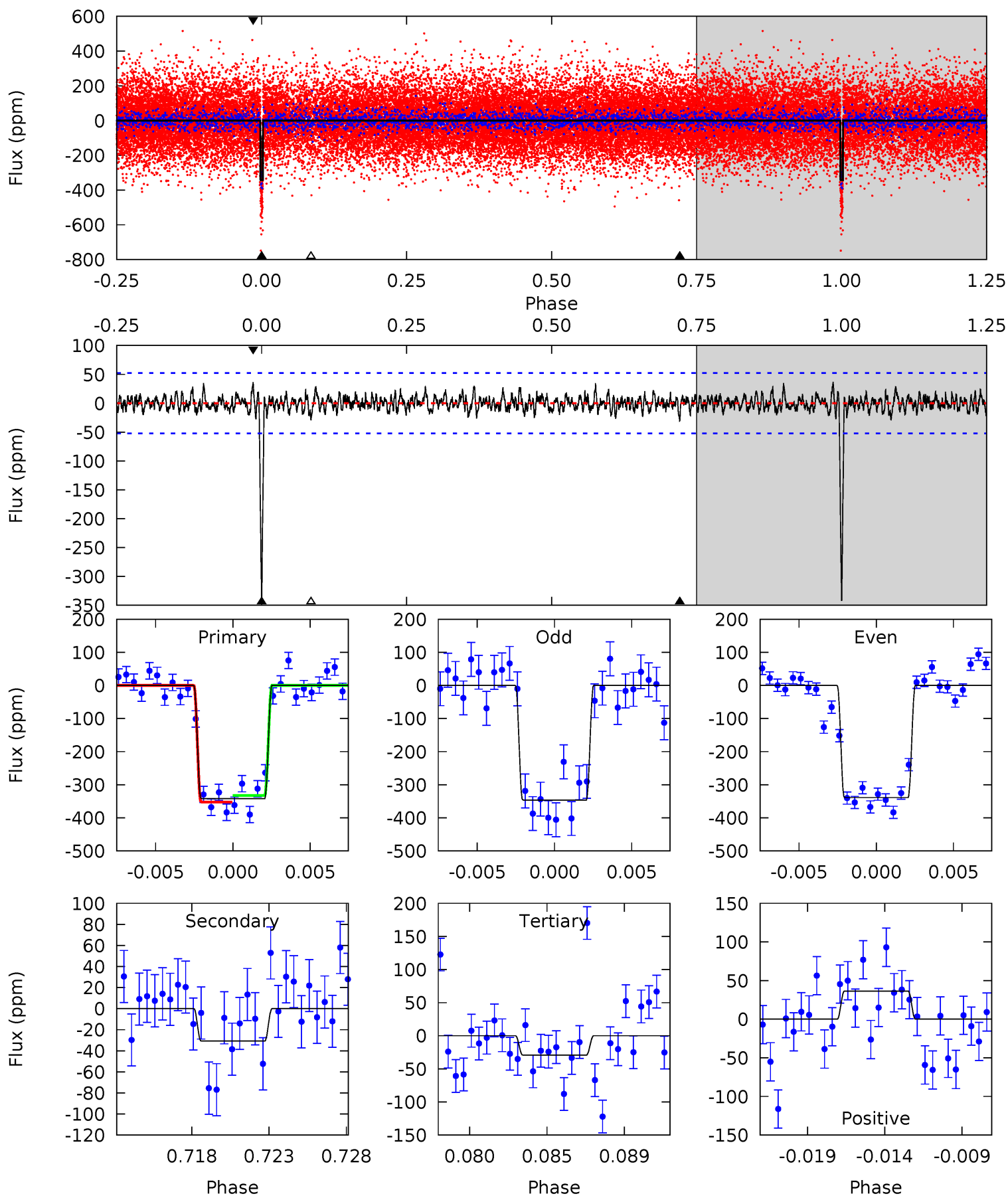
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
34.3	4.06	4.06	5.31	5.15	2.80	1.54	30.3	29.0	0.00	-1.25	0.51	0.97	0.13	0.81



Alt Model-Shift Uniqueness Test

009022166-02, P = 72.381476 Days, E = 107.129346 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
33.8	3.04	2.89	3.60	5.17	2.83	0.98	30.9	30.2	0.15	-0.56	0.36	0.96	0.10	0.98



Stellar Parameters For KIC 009022166

	$T_{\text{eff}} (K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	5508^{+110}_{-1}	$3.897^{+0.195}_{-0.090}$	$0.100^{+0.150}_{-0.150}$	$1.988^{+0.340}_{-0.510}$	$1.136^{+0.127}_{-0.175}$	$0.204^{+0.250}_{-0.059}$
	+2%/-0%	+5%/-2%	+150%/-150%	+17%/-26%	+11%/-15%	+123%/-29%
Source	SPE58	SPE58	SPE58	DSEP		

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

Secondary Eclipse Parameters for KIC 009022166-02 / KOI 2175.02

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	A_{obs}
DV	-41 ± 10	$4.14^{+0.74}_{-0.71}$	789^{+45}_{-53}	3563^{+235}_{-199}	165^{+83}_{-55}
Alt.	-31 ± 10	$3.90^{+0.69}_{-0.72}$	789^{+41}_{-51}	3470^{+262}_{-241}	141^{+85}_{-54}

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

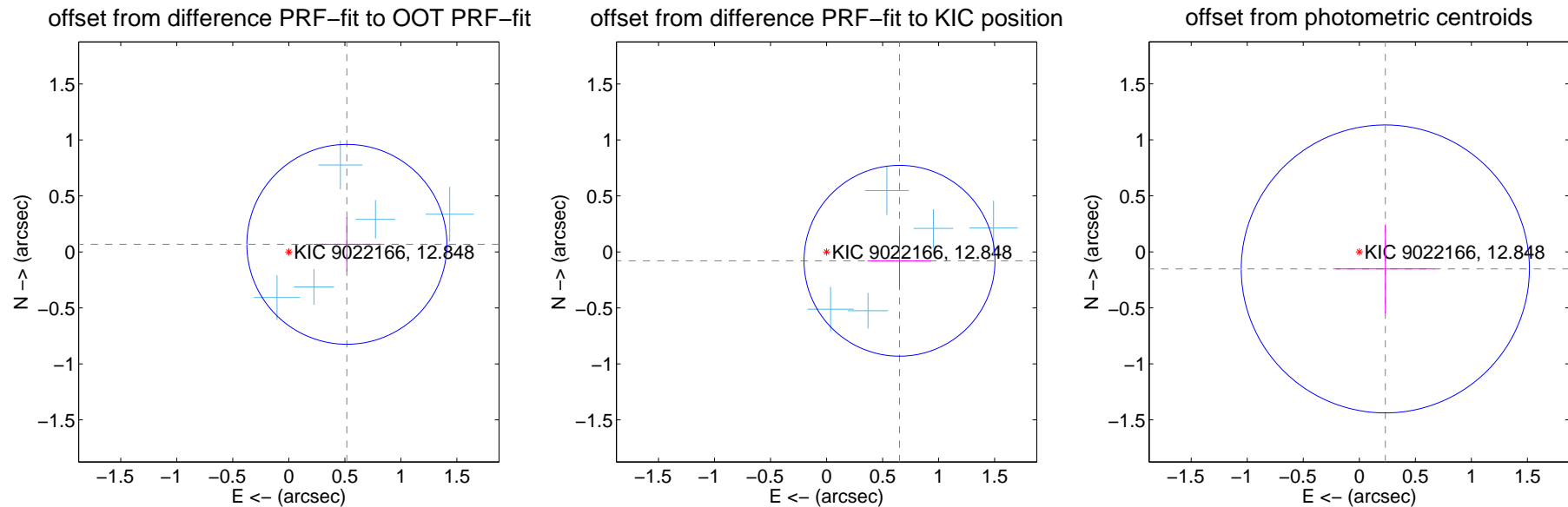
DV Centroid Data

Supplemental centroid analysis for 009022166-02. Kepler magnitude: 12.85. Transit SNR 19.56

There are 5 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.24 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.523 ± 0.298	1.76	-0.518 ± 0.298	0.068 ± 0.242
PRF-fit source offset from KIC position	0.656 ± 0.284	2.31	-0.651 ± 0.285	-0.079 ± 0.250
photometric centroid source offset	0.28 ± 0.43	0.65	-0.23 ± 0.44	-0.15 ± 0.40

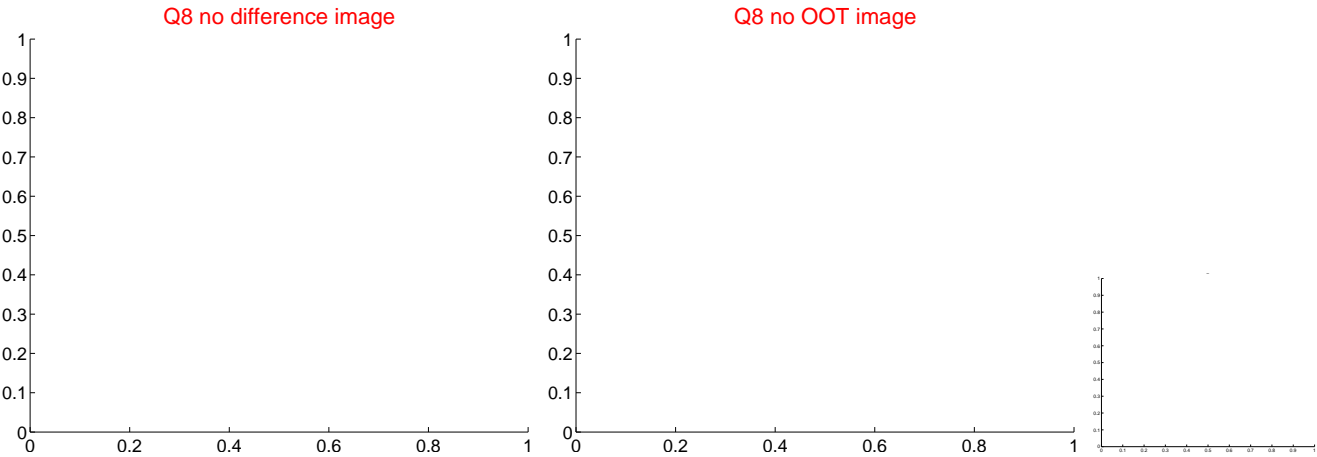
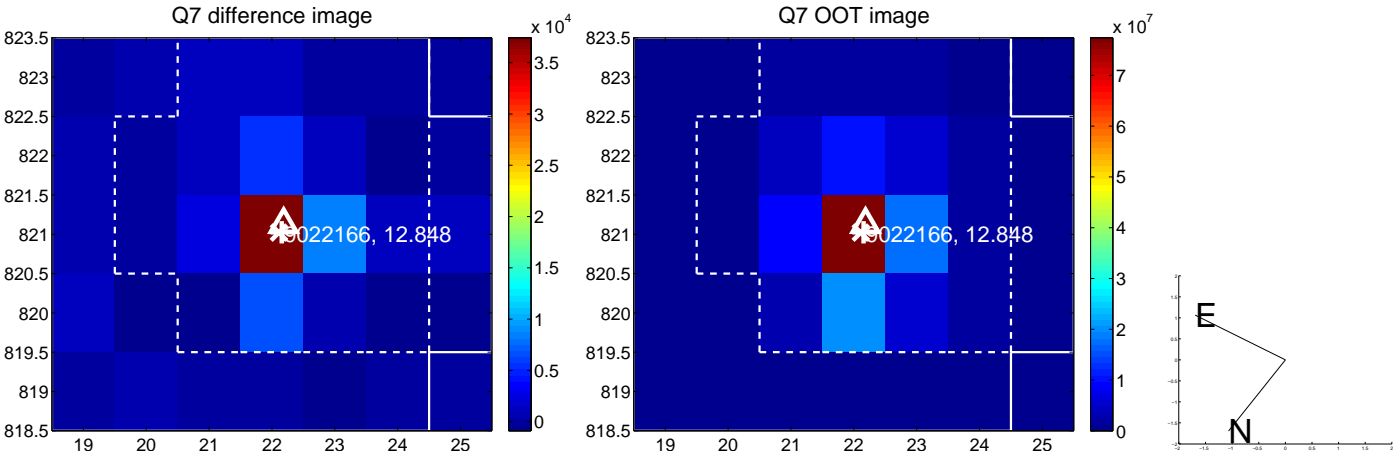
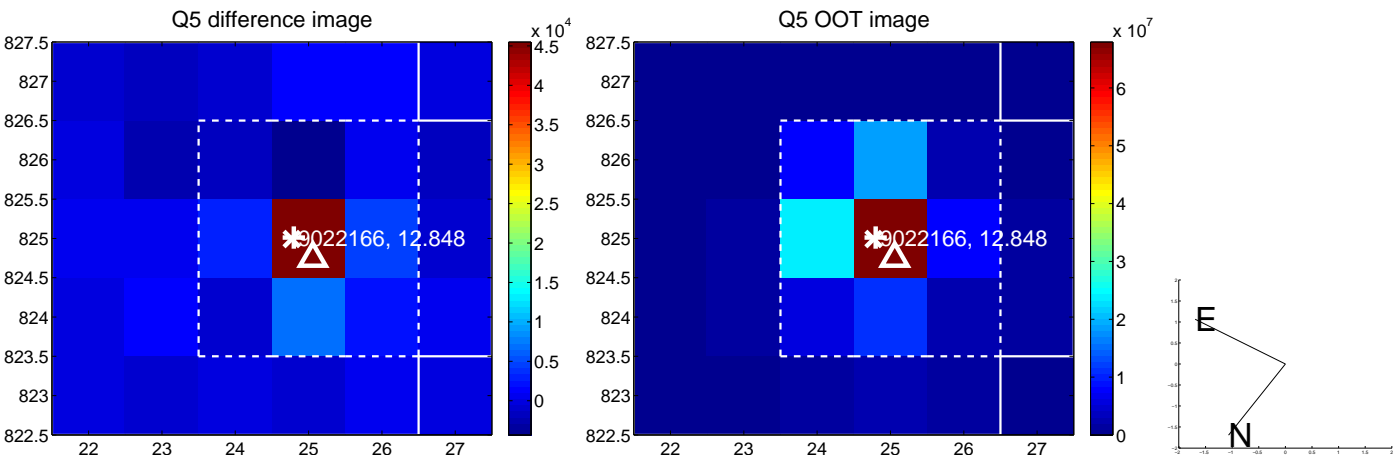


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

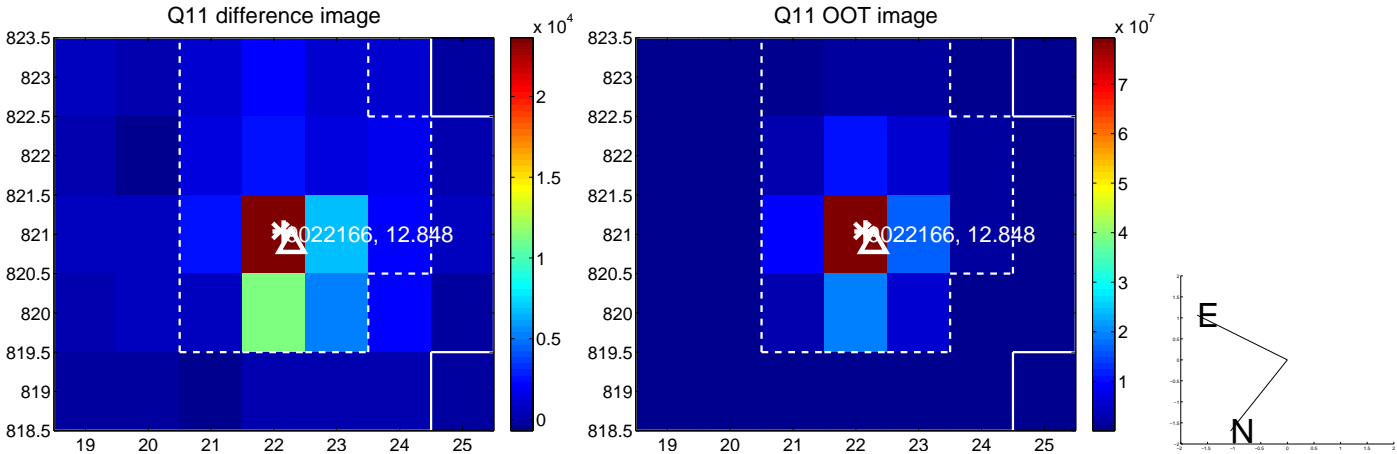
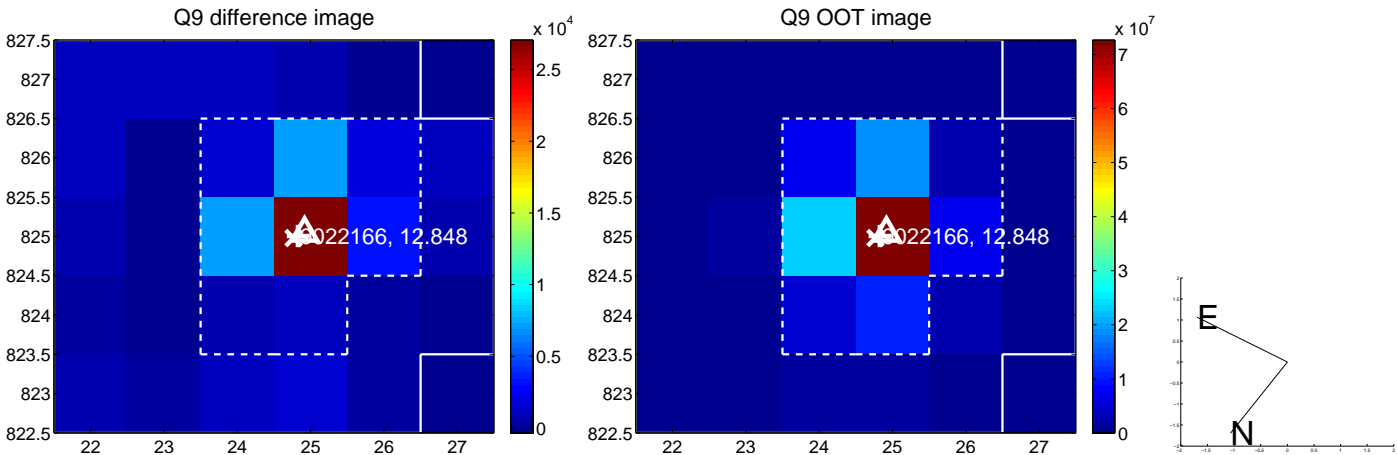
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



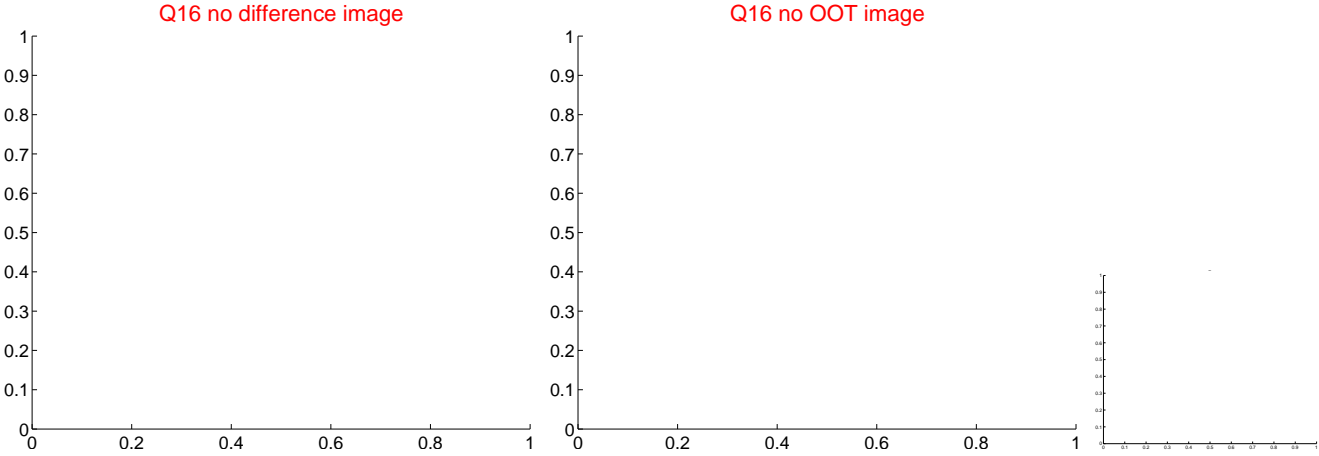
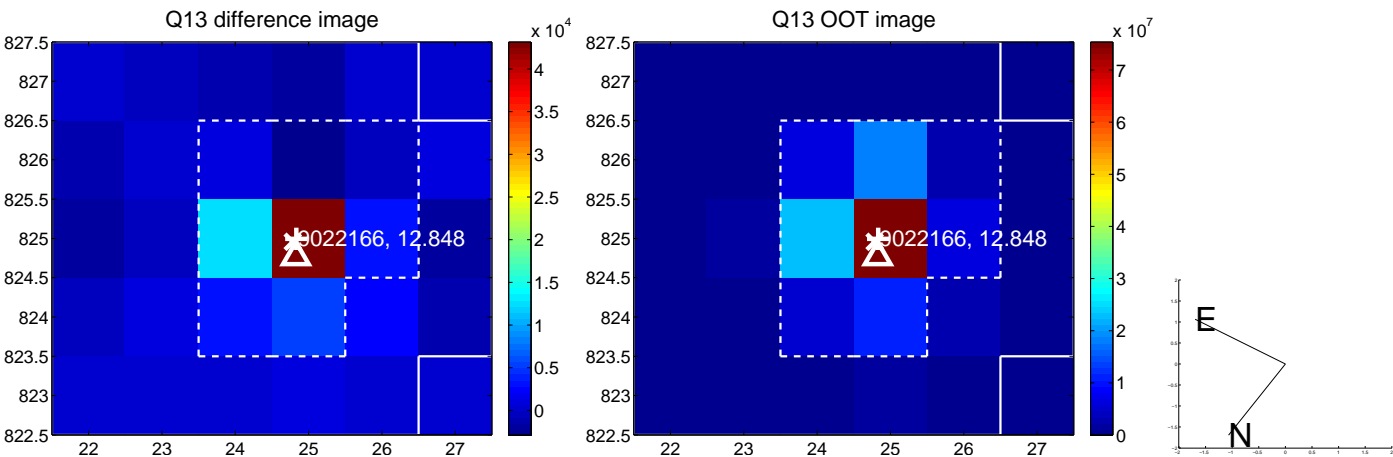
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



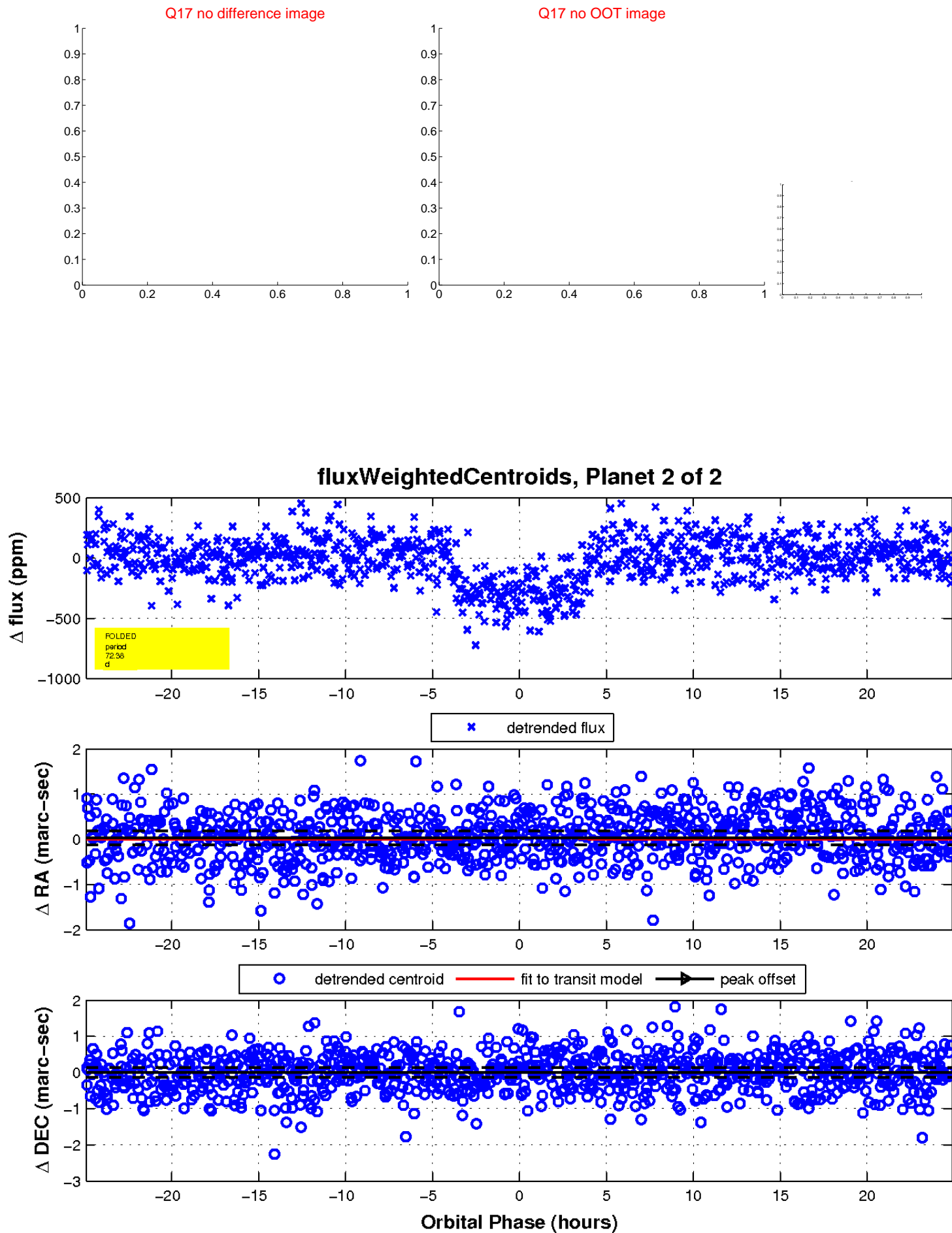
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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UKIRT Image

