

KIC 009665503

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})
009665503-01	OBS	7221.01	11.568034	137.334558	414018.4	3.500	11420.1	-1.0	0.65	5290	35.36	36.76
009665503-02	OBS	No	11.567979	133.331728	144567.3	4.556	3722.9	2447.9	0.65	5290	36.52	36.76
009665503-03	OBS	No	5.784115	131.790252	39892.8	15.000	916.9	-1.0	0.65	5290	12.79	92.64
009665503-04	OBS	No	143.501148	230.166355	1568.3	15.793	10.2	9.5	0.65	5290	4.96	1.28

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009665503-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_ALT—MOD_ODDEVEN_ALT—HAS_SEC_TCE—CENT_NOFITS
009665503-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE—CENT_KIC_POS
009665503-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_POS_ALT—RESIDUAL_TCE—CENT_NOFITS
009665503-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS

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

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

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

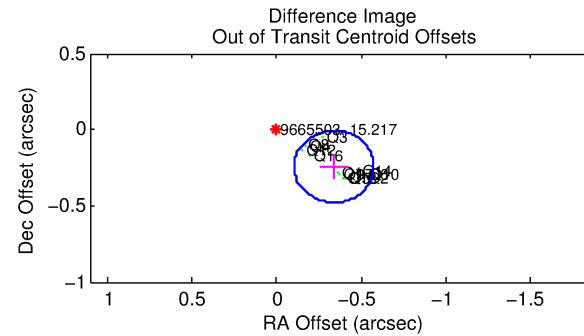
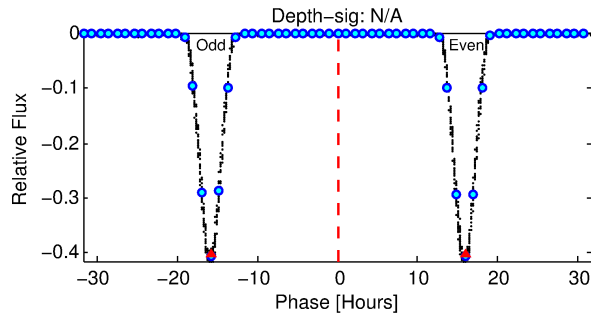
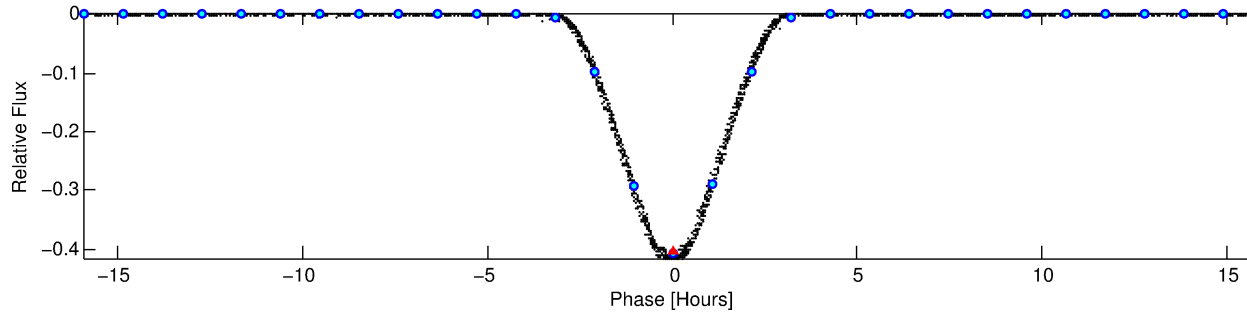
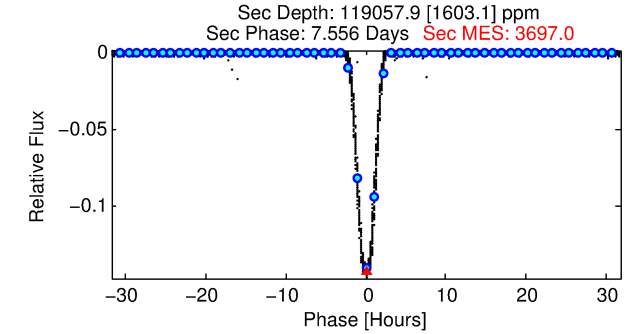
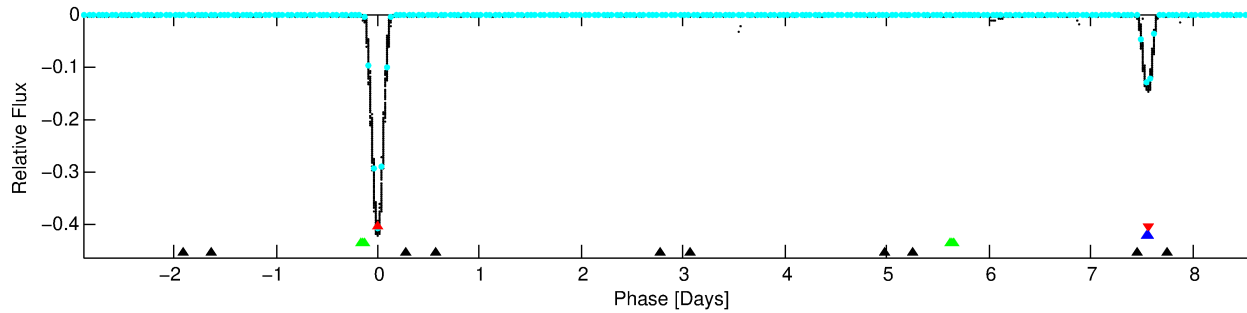
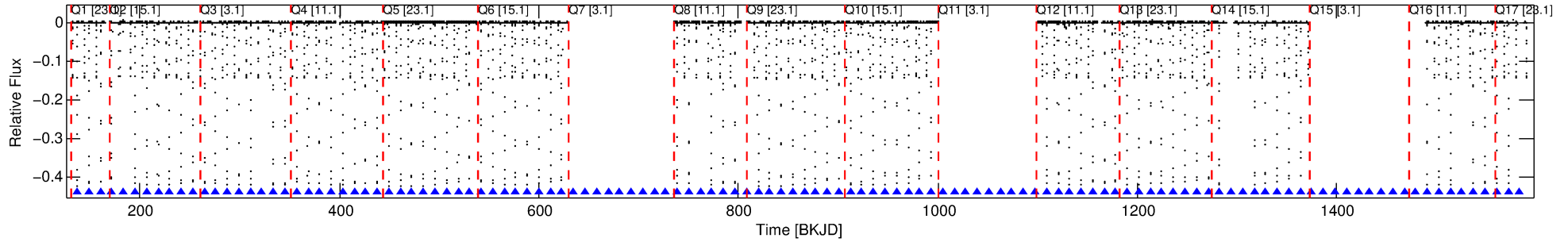
Ephemeris Match Information For 009665503-01

No Significant Match Found

DV One-Page Summary

KIC: 9665503 Candidate: 1 of 4 Period: 11.568 d
KOI: K07221.01 Corr: 0.763

Kp: 15.22 R*: 0.65 Rs Teff: 5290.0 K Logg: 4.67 Fe/H: -0.680



TPS TCE Results:

Period = 11.56803 d
Epoch = 137.3346 BKJD

DV fit results are unavailable

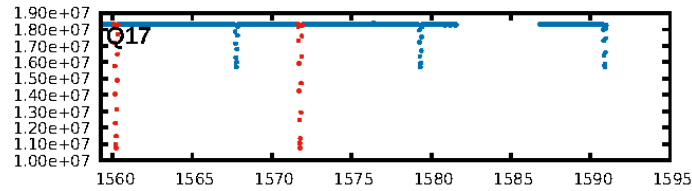
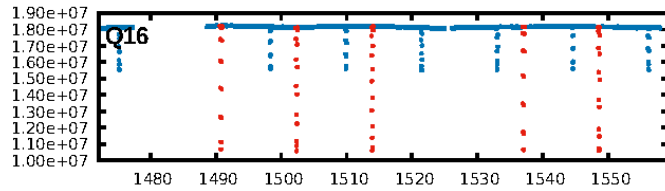
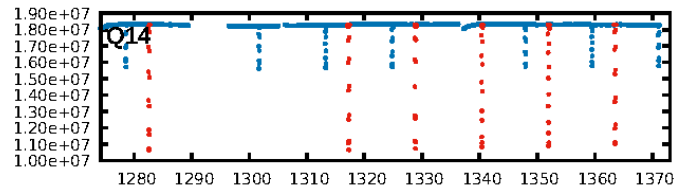
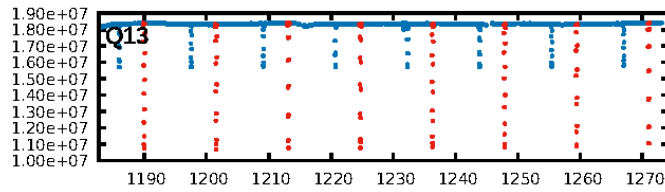
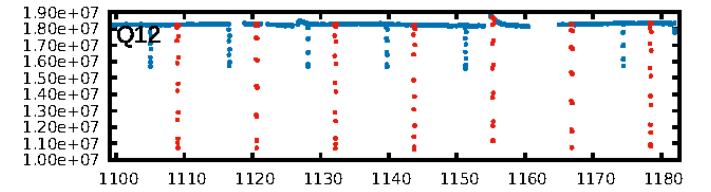
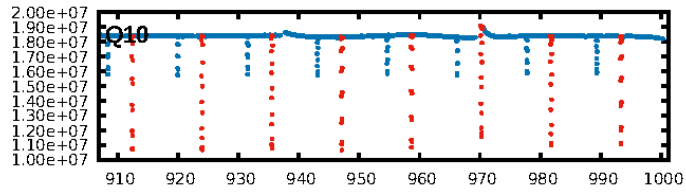
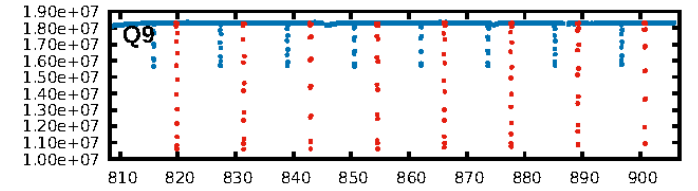
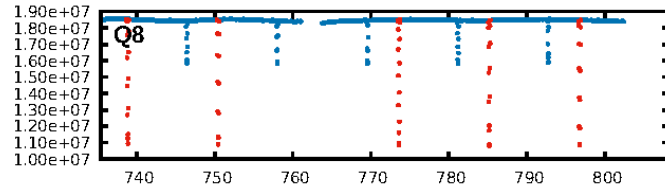
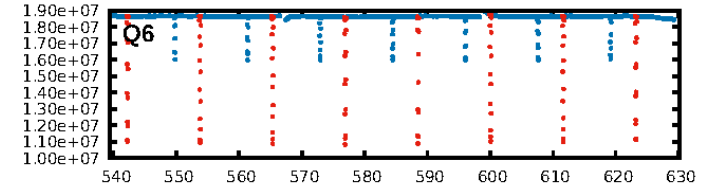
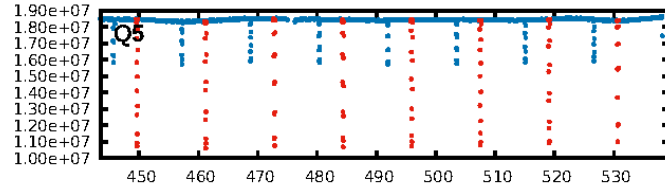
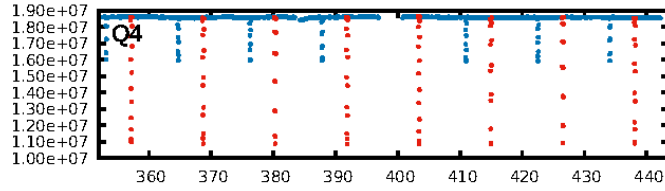
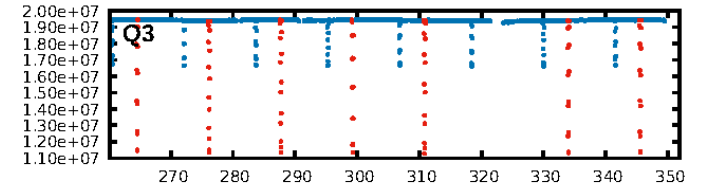
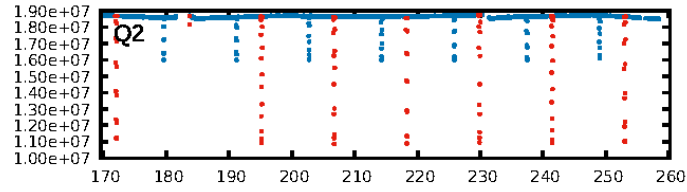
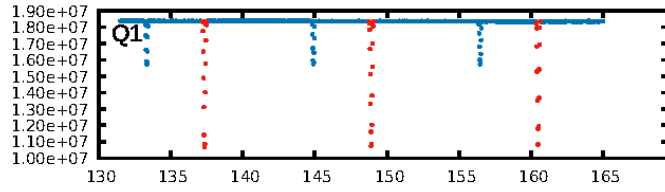
DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00 σ]
LongPeriod-sig: 100.0% [195.75 σ]
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: N/A
RollingBand-fgt: 1.00 [86/86]
GhostDiagnostic-chr: 4.544
Centroid-sig: N/A
Centroid-so: 0.117 arcsec [158.77 σ]
OotOffset-rm: 0.417 arcsec [5.31 σ]
KicOffset-rm: 0.077 arcsec [1.14 σ]
OotOffset-st: 4/1/4/5 [14]
KicOffset-st: 4/1/4/5 [14]
DiffImageQuality-fgm: 1.00 [14/14]
DiffImageOverlap-fno: 0.00 [0/14]

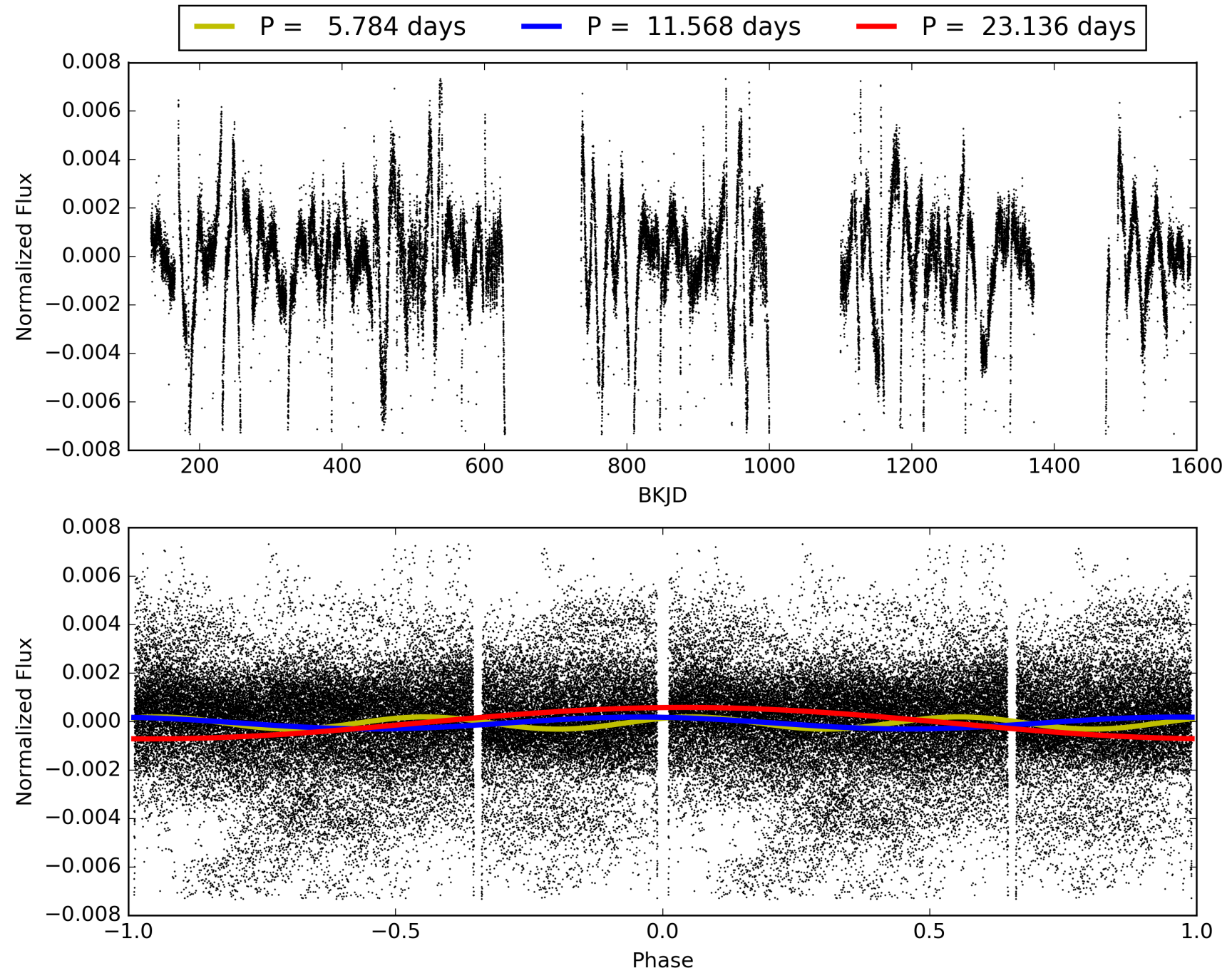
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 07:46:02 Z

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

TCE 009665503-01, PDC Light Curves

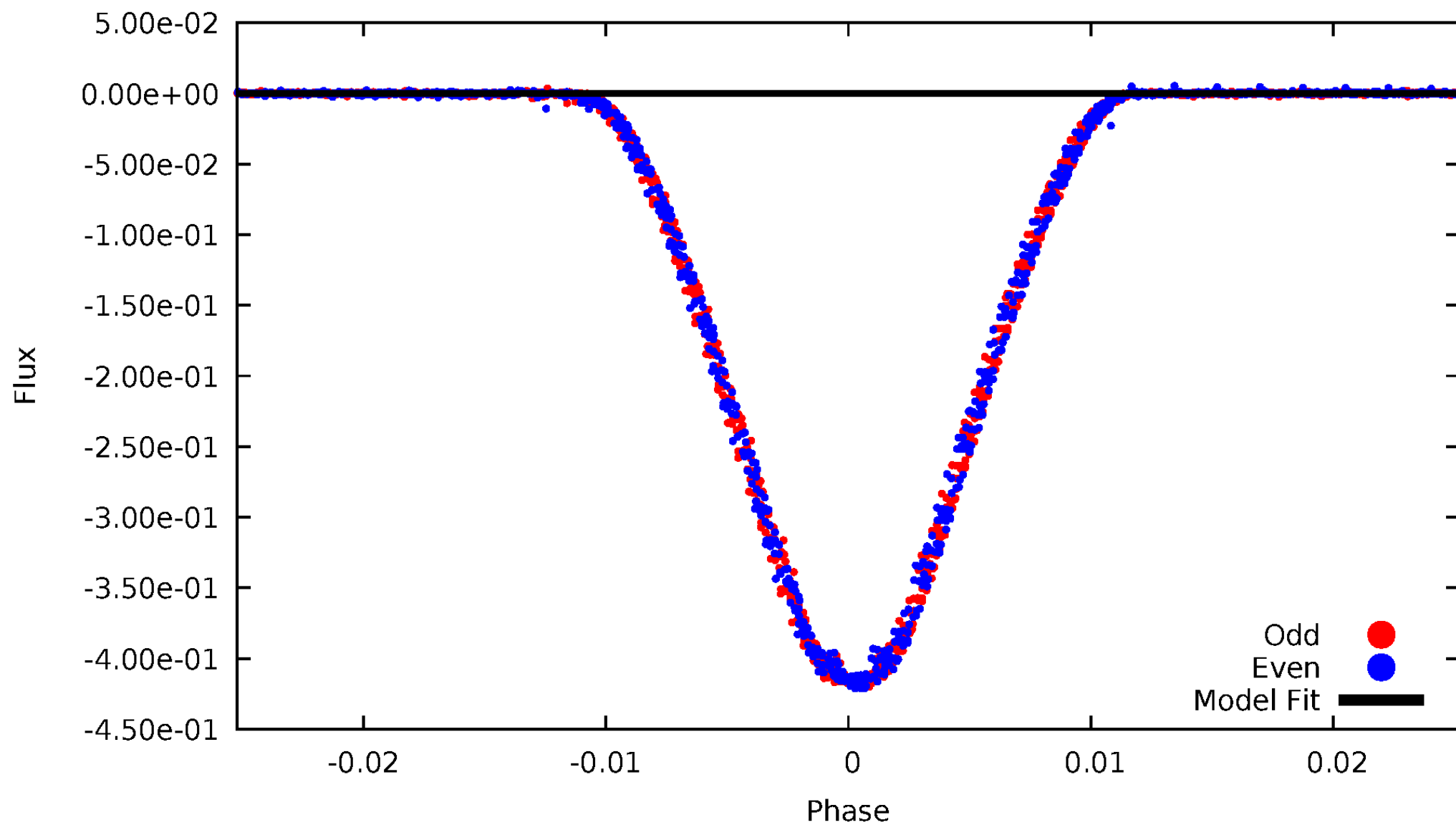


TCE 009665503-01



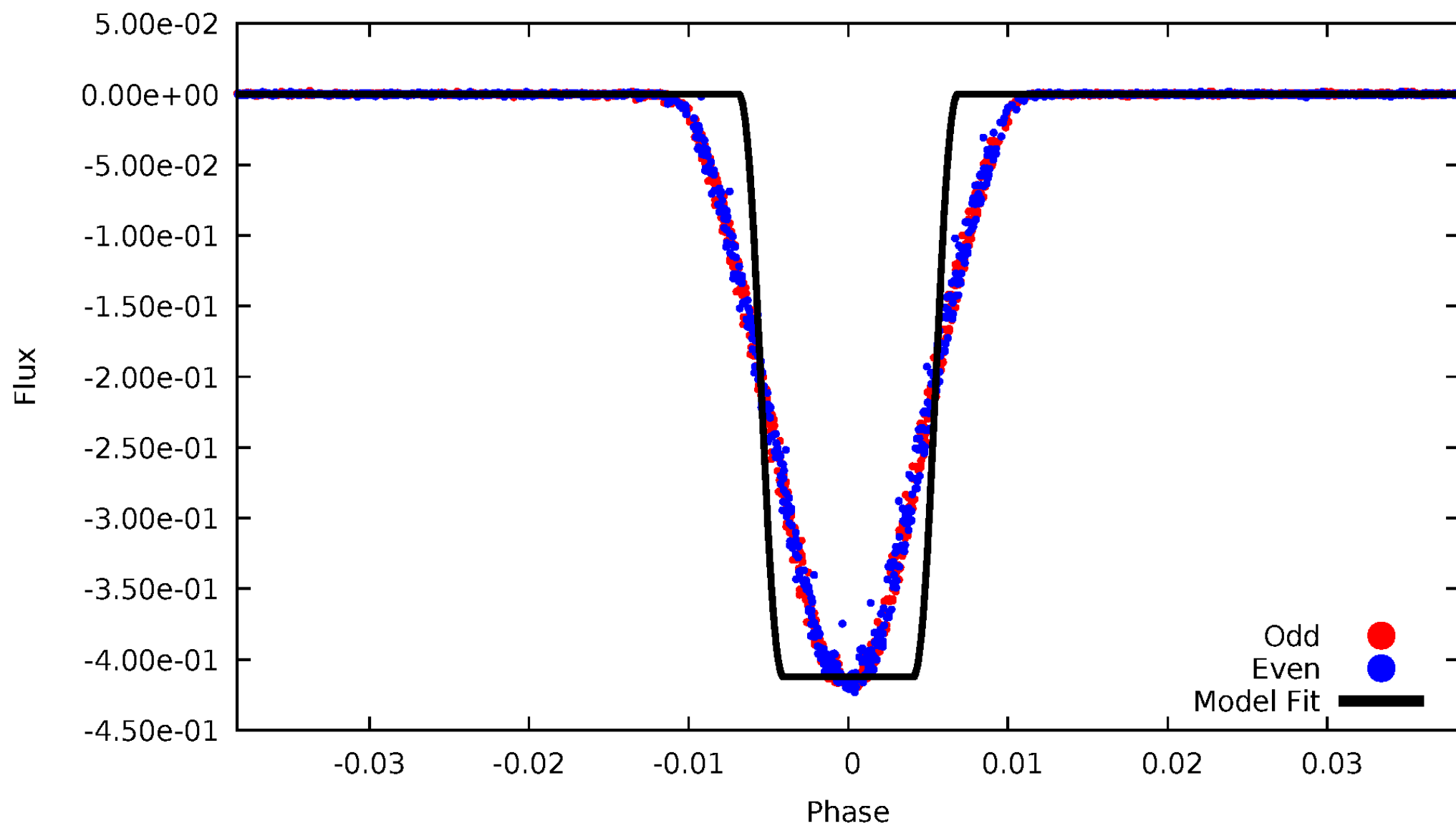
DV Odd/Even

TCE 009665503-01



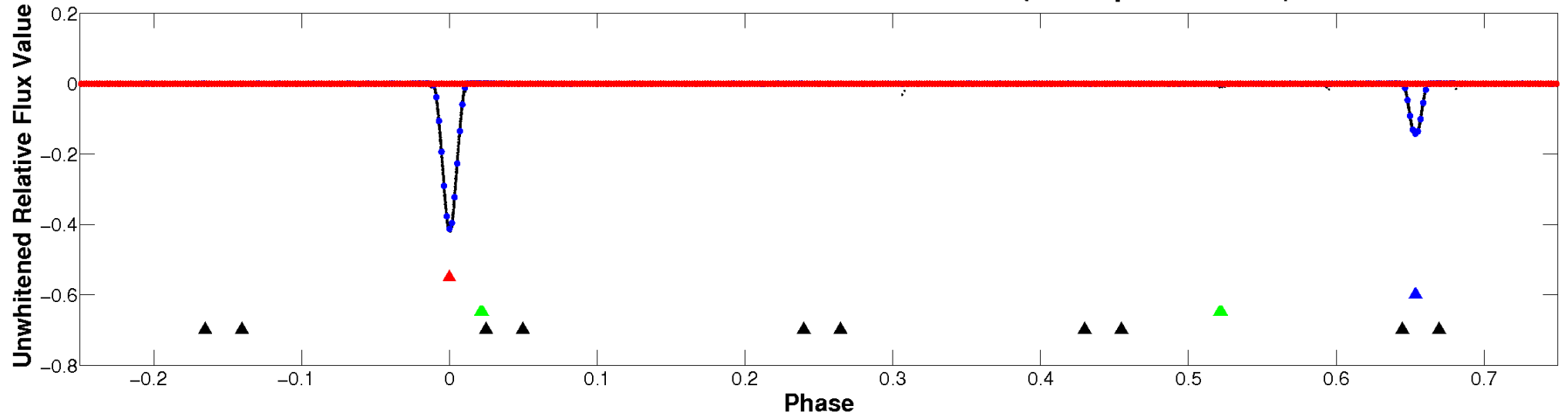
ALT Odd/Even

TCE 009665503-01



Non-Whitened Vs. Whitened Light Curve

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

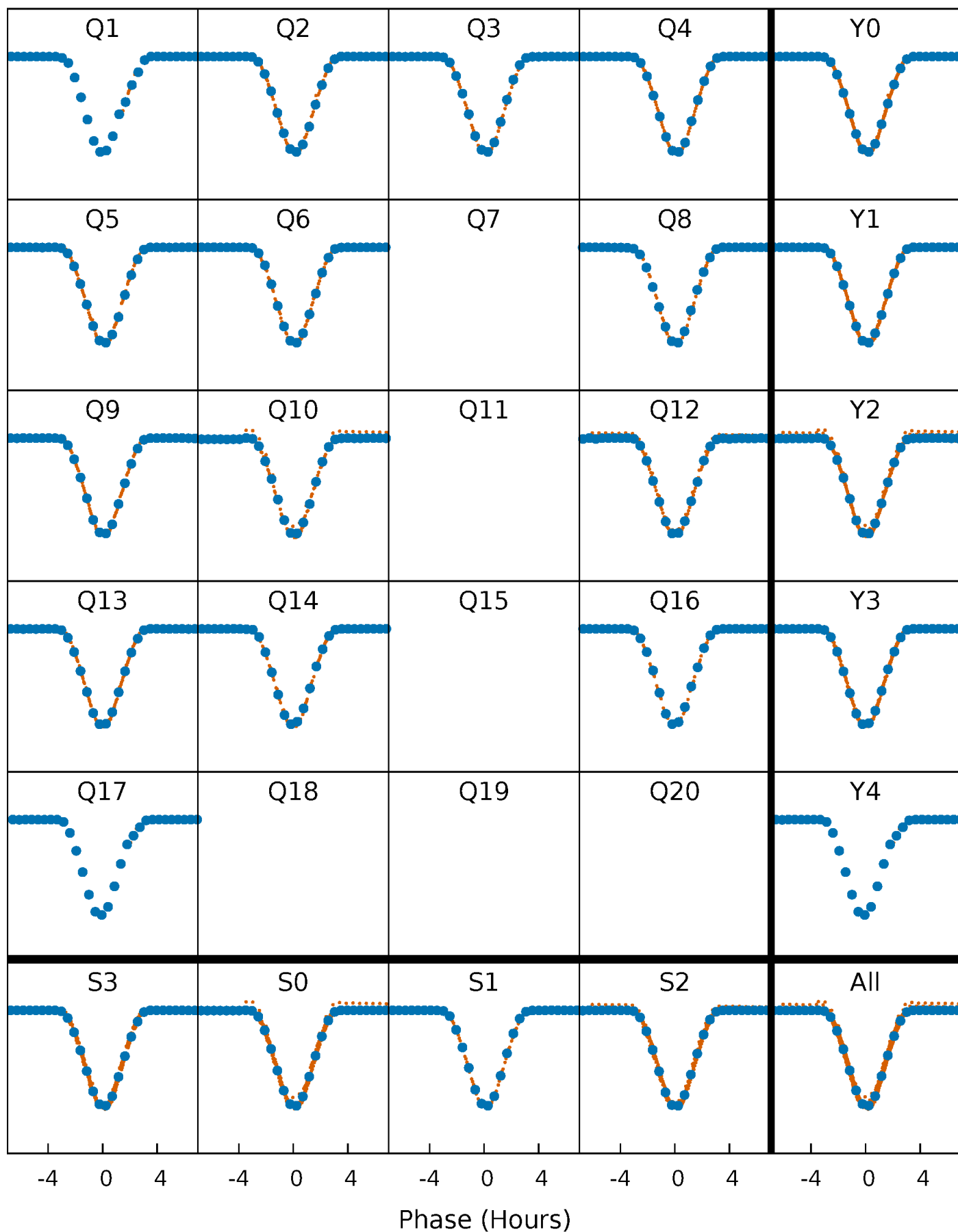


Planet 1 : Phased Whitened Flux Time Series (TPS Epoch/Period)



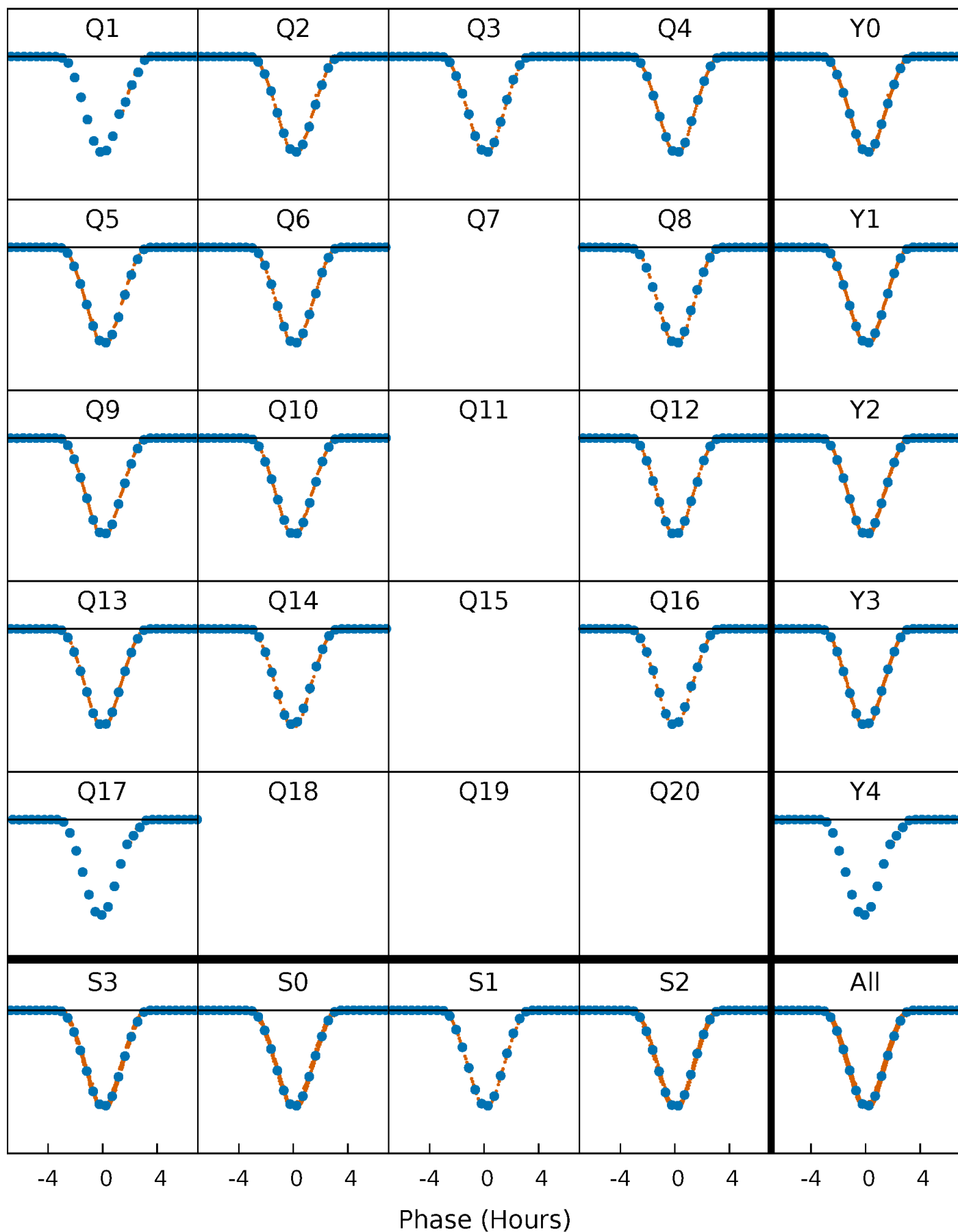
PDC Quarter-Phased Transit Curves

TCE 009665503-01 P= 11.568034 Days $T_0=137.334558$ (BKJD)



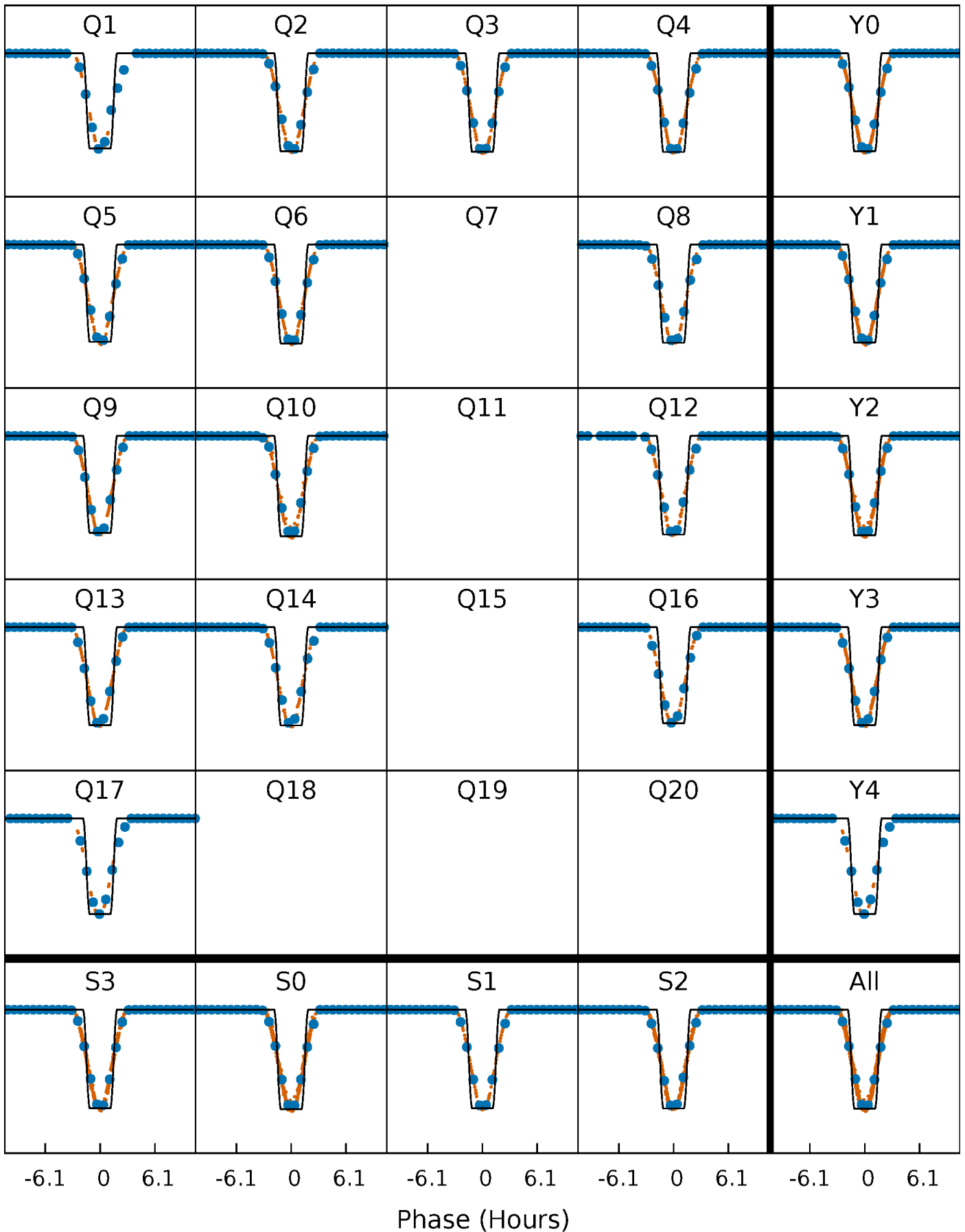
DV Quarter-Phased Transit Curves

TCE 009665503-01 P= 11.568034 Days $T_0=137.334558$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

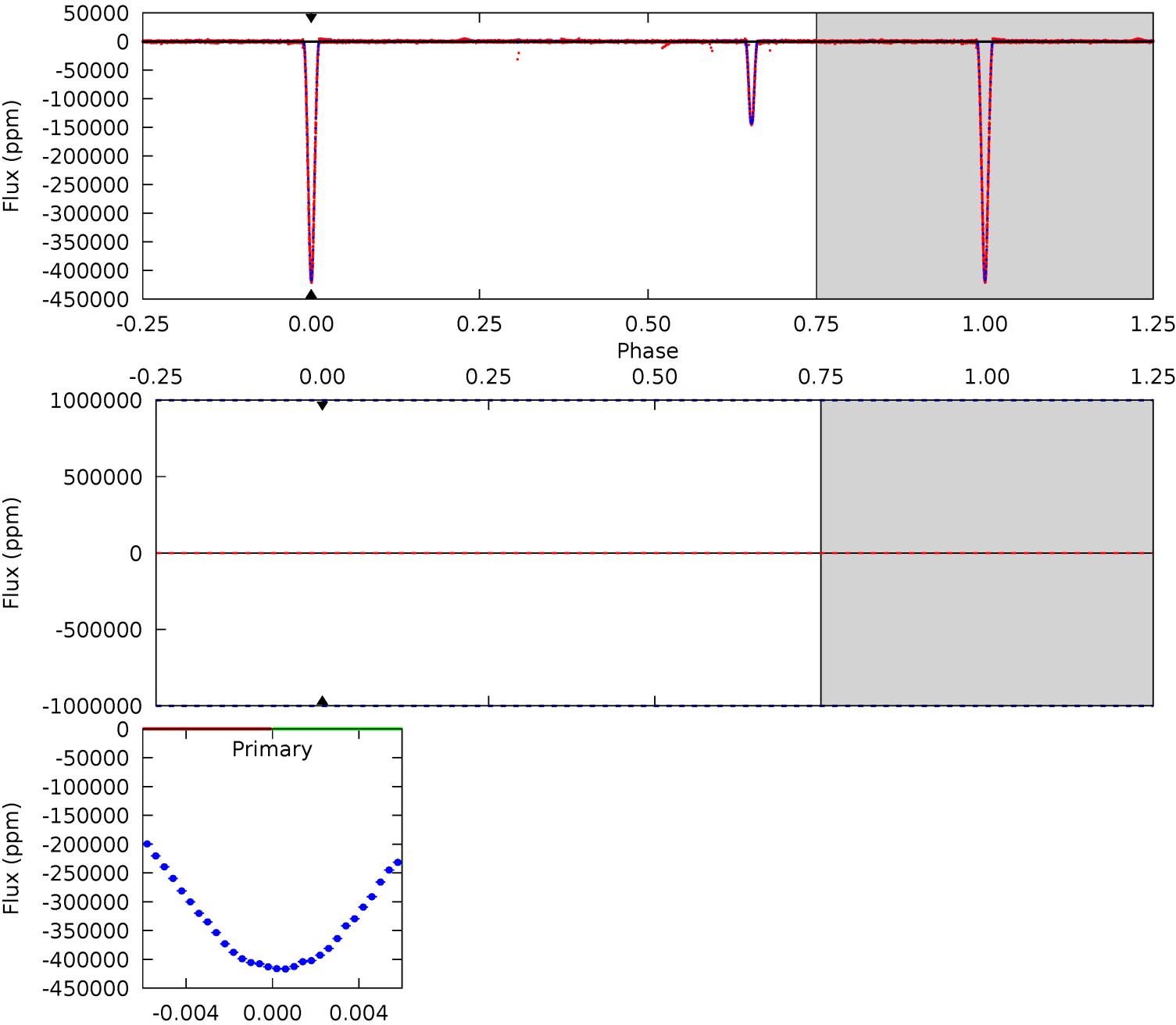
TCE 009665503-01 P= 11.568034 Days $T_0=137.337646$ (BKJD)



DV Model-Shift Uniqueness Test

009665503-01, P = 11.568034 Days, E = 125.766524 Days

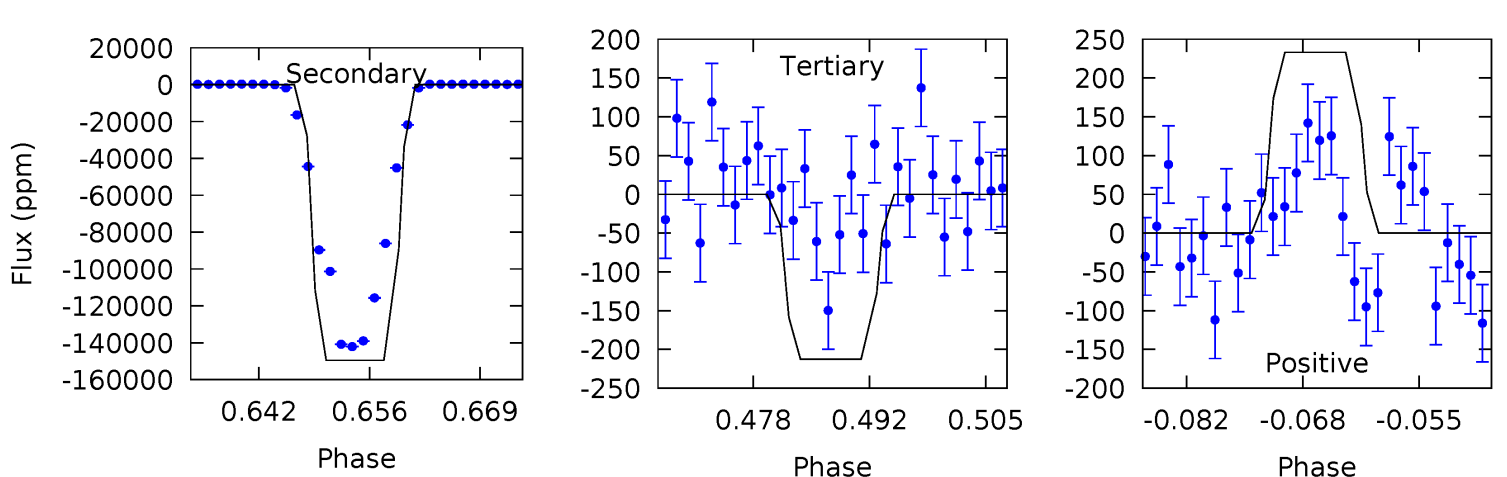
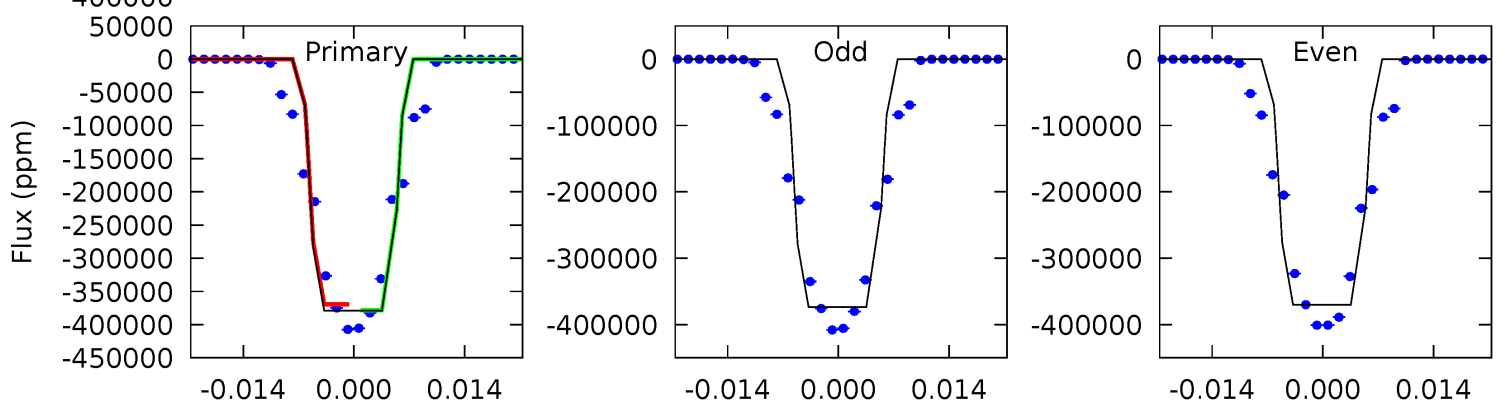
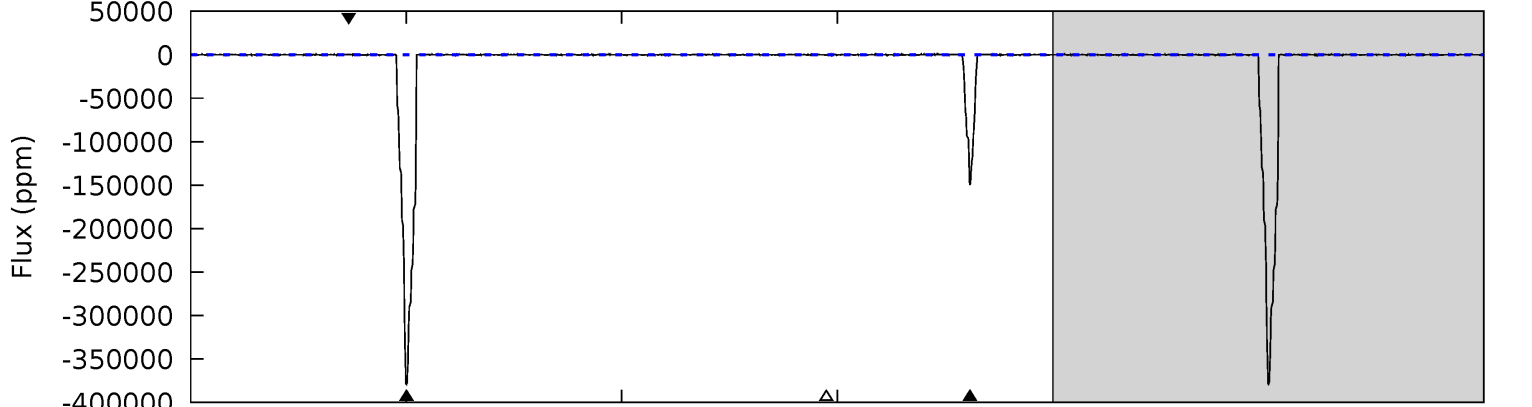
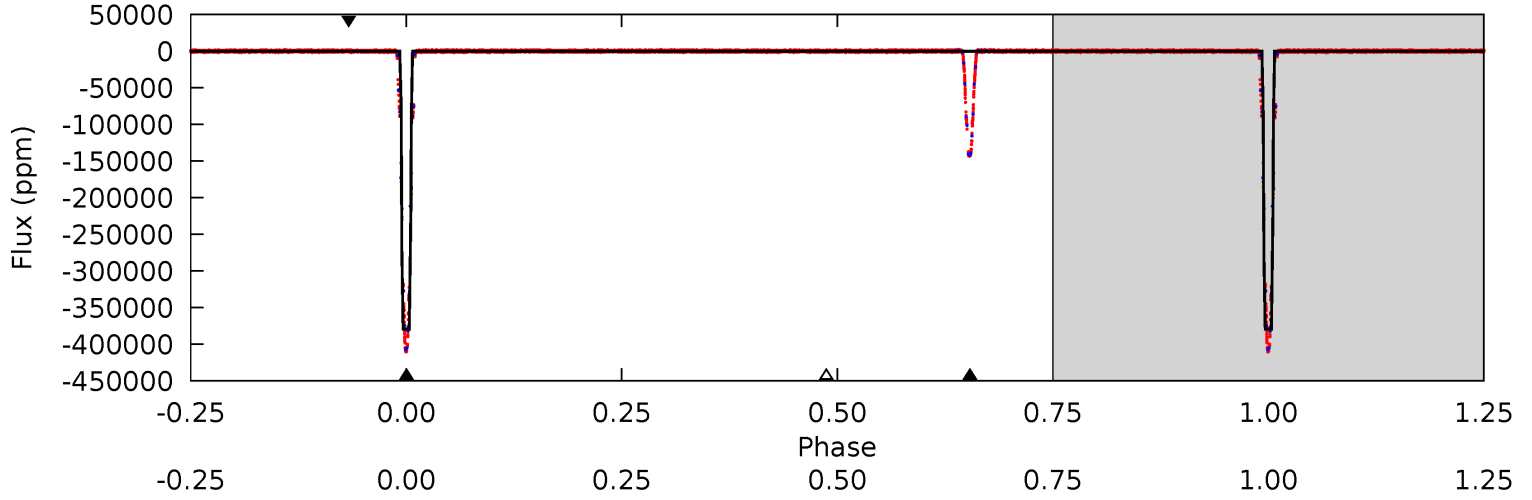
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



Alt Model-Shift Uniqueness Test

009665503-01, P = 11.568034 Days, E = 125.769612 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6877	2712	3.85	4.23	4.97	2.47	1.20	6873	6873	2708	2708	31.0	1.00	0.00	0



Stellar Parameters For KIC 009665503

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	$M(M_{\odot})$	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	5290^{+159}_{-143}	$4.669^{+0.028}_{-0.083}$	$-0.680^{+0.300}_{-0.300}$	$0.648^{+0.085}_{-0.039}$	$0.723^{+0.062}_{-0.068}$	$3.750^{+0.433}_{-0.988}$
	+3%/-3%	+1%/-2%	+44%/-44%	+13%/-6%	+9%/-9%	+12%/-26%
Source	PHO1	KIC0	KIC0	DSEP		

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

Secondary Eclipse Parameters for KIC 009665503-01 / KOI 7221.01

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	0 ± 1000000	$35.89^{+7.95}_{-7.63}$	889^{+35}_{-32}	-1911^{+6453}_{-2399}	$-0.290^{+389.256}_{-316.669}$
Alt.	-149504 ± 55	$46.26^{+7.75}_{-8.14}$	888^{+33}_{-28}	4445^{+338}_{-249}	360^{+163}_{-94}

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

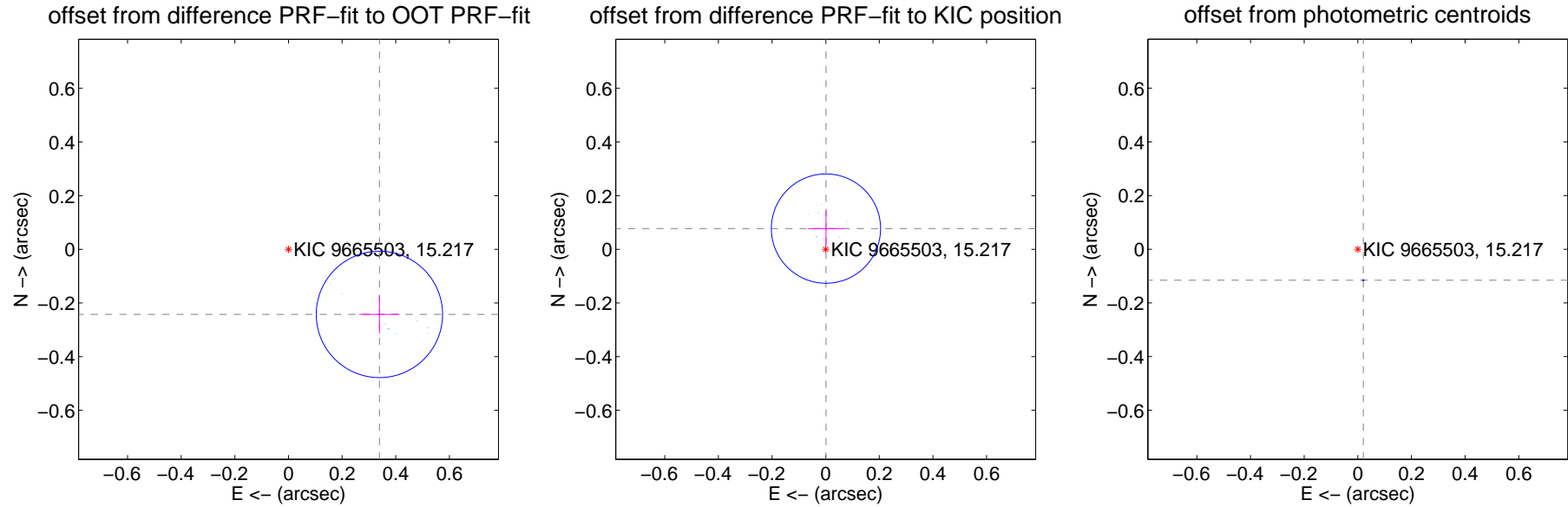
DV Centroid Data

Supplemental centroid analysis for 009665503-01. Kepler magnitude: 15.22. Transit SNR -1.00

There are 14 quarters with good PRF difference image offsets

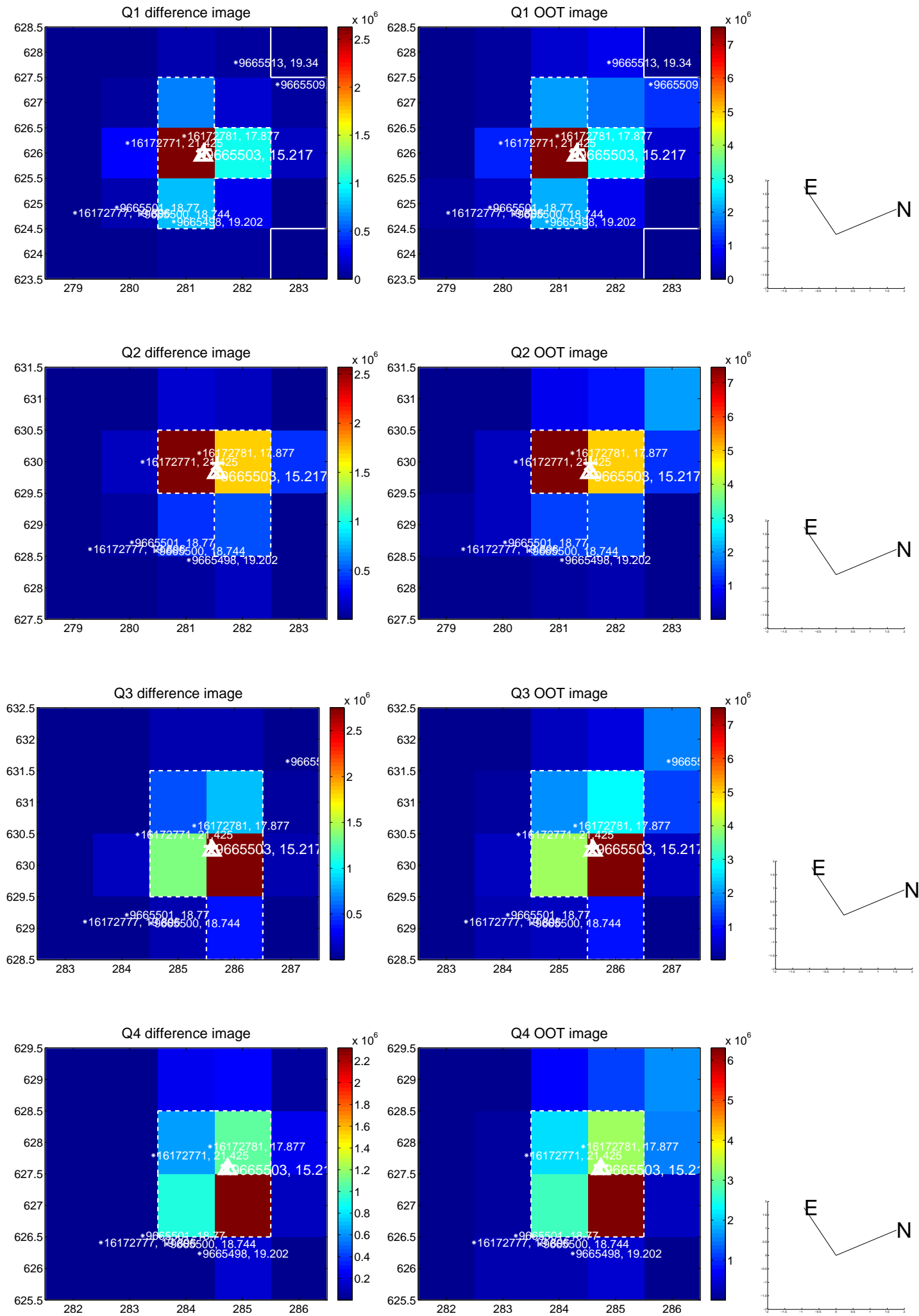
The direct PRF centroid is offset from the target star catalog position by about 0.53 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.417 ± 0.079	5.31	-0.339 ± 0.075	-0.243 ± 0.071
PRF-fit source offset from KIC position	0.077 ± 0.068	1.14	-0.001 ± 0.067	0.077 ± 0.068
photometric centroid source offset	0.12 ± 0.00	158.77	-0.02 ± 0.00	-0.12 ± 0.00

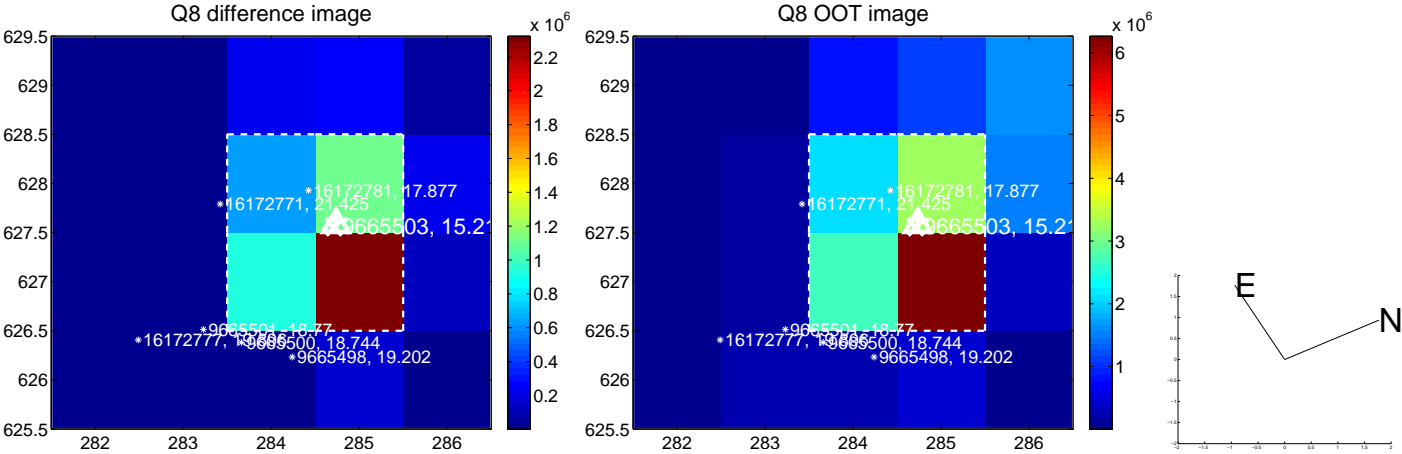
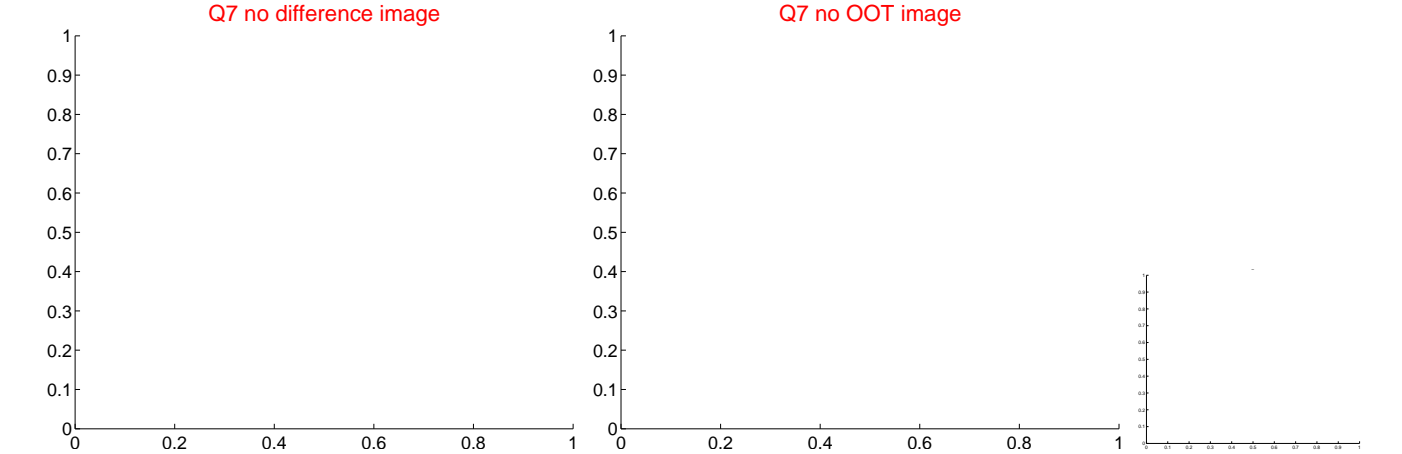
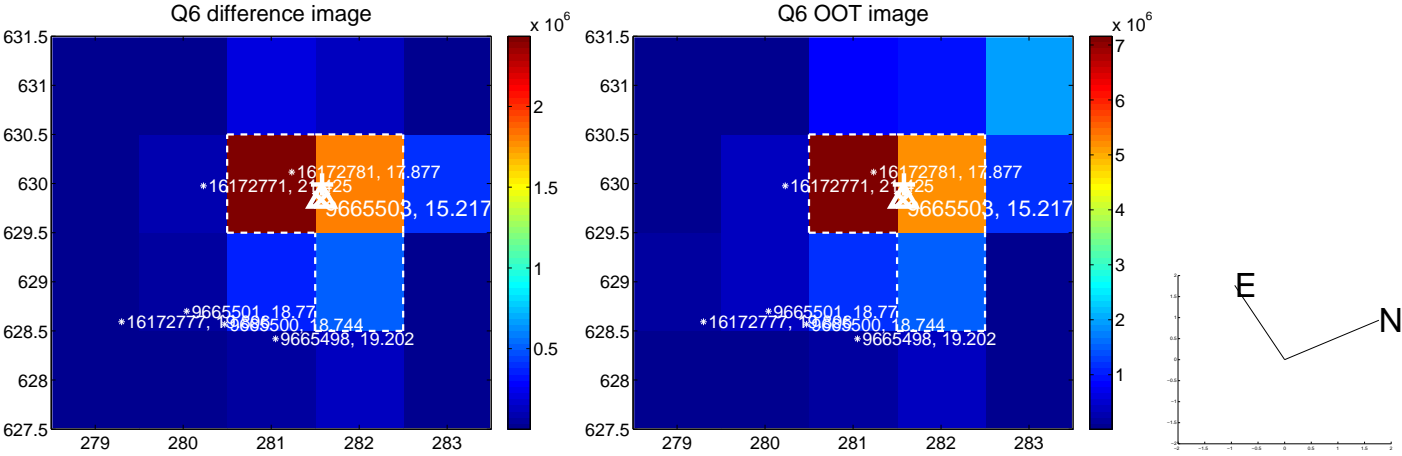
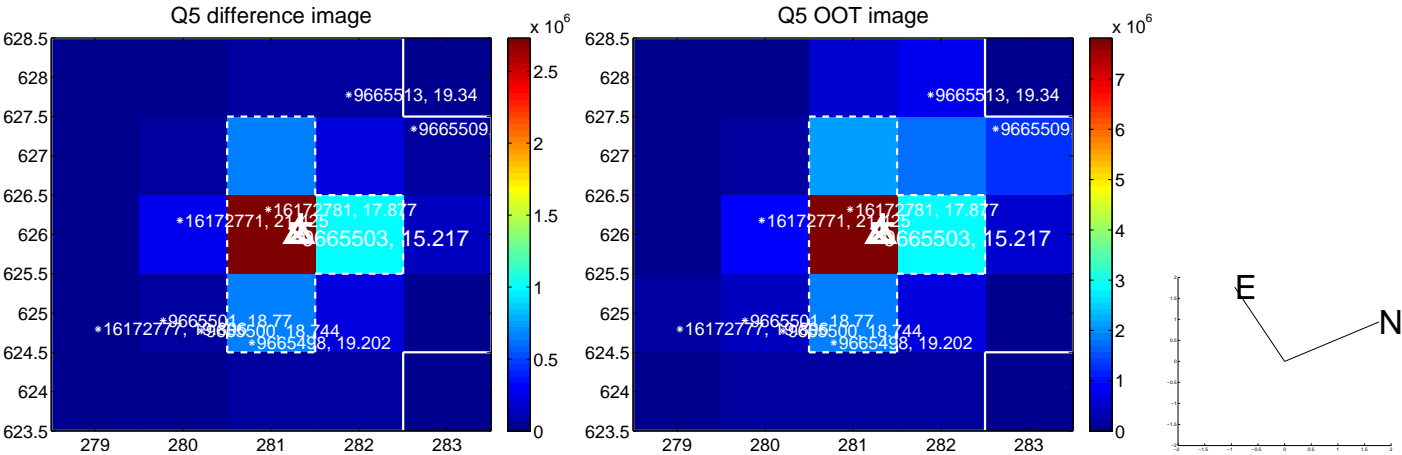


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

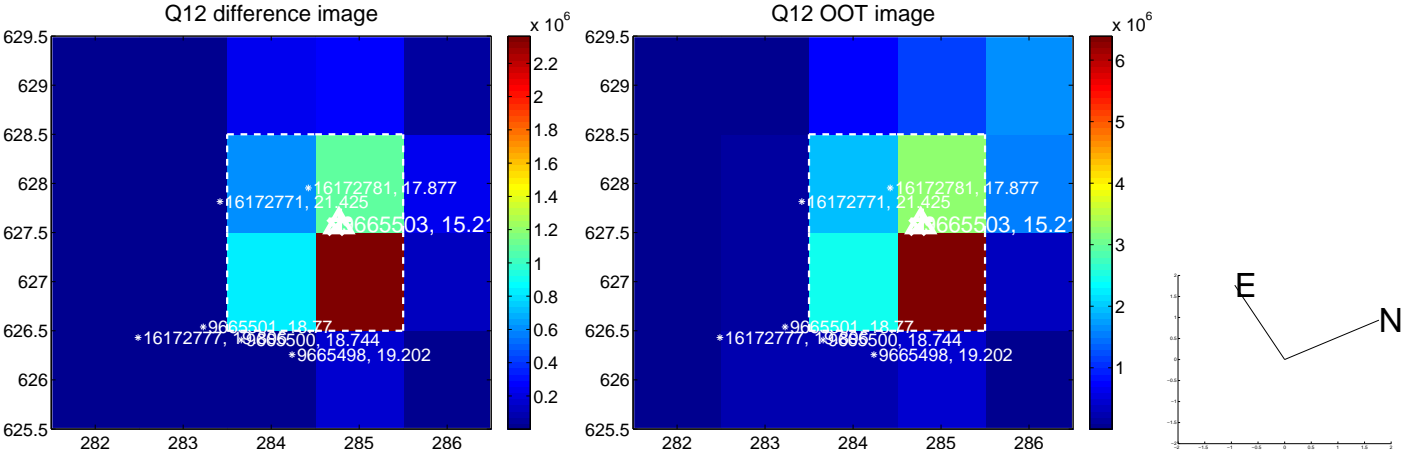
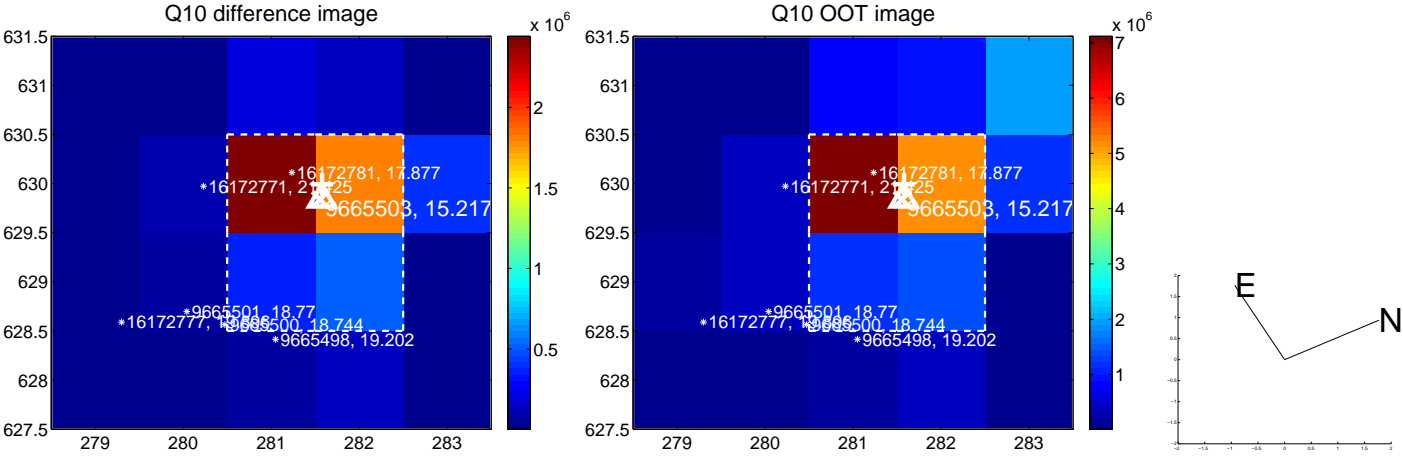
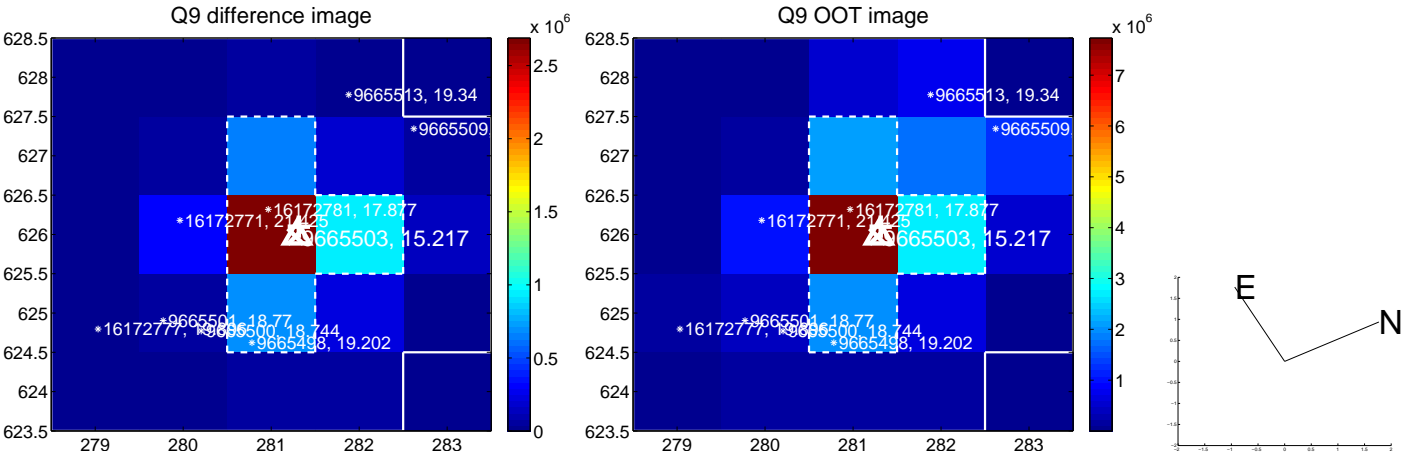
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



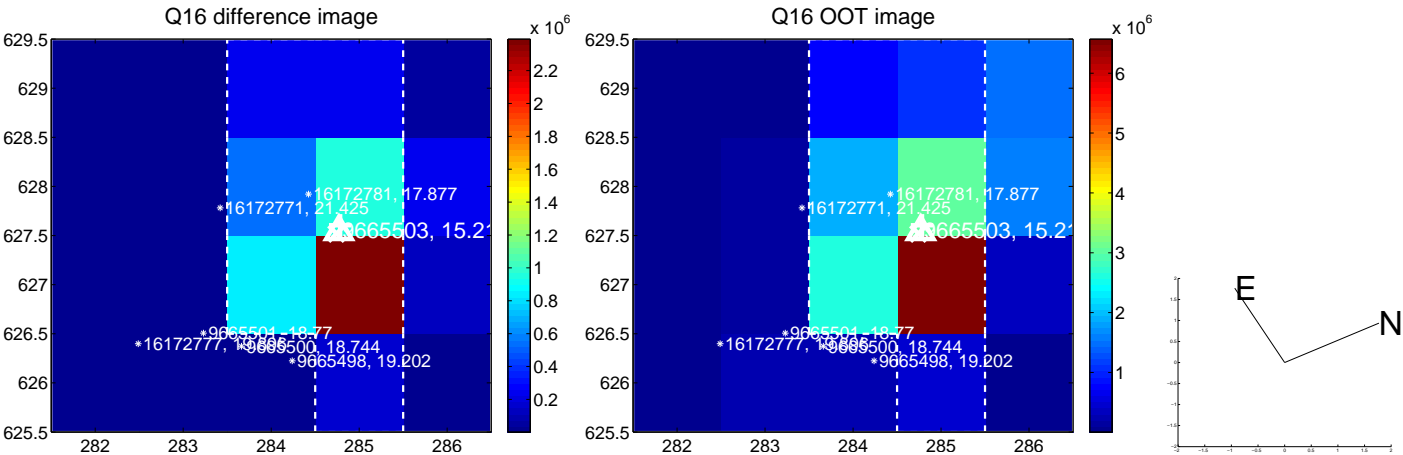
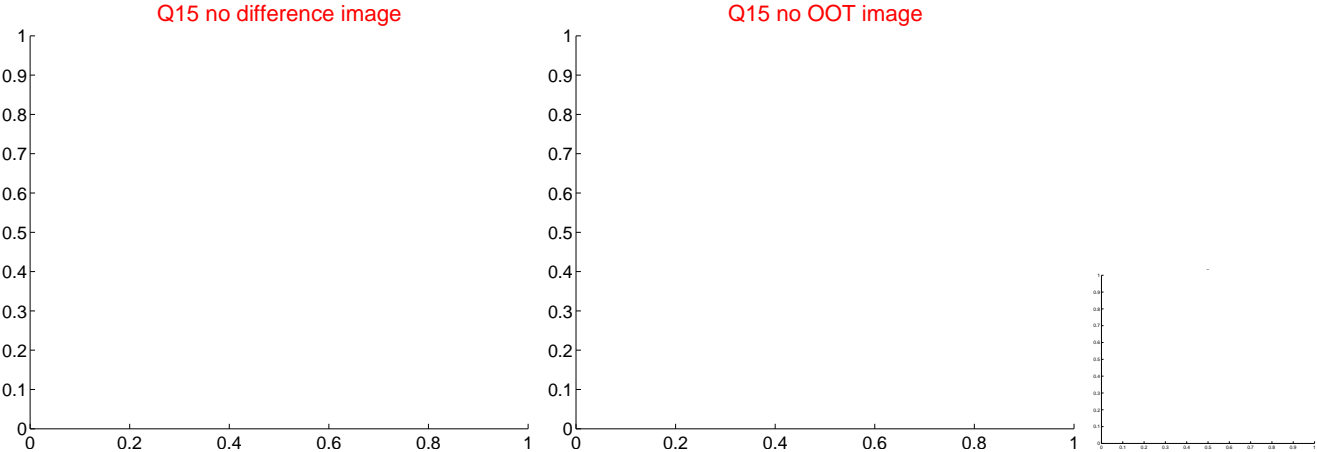
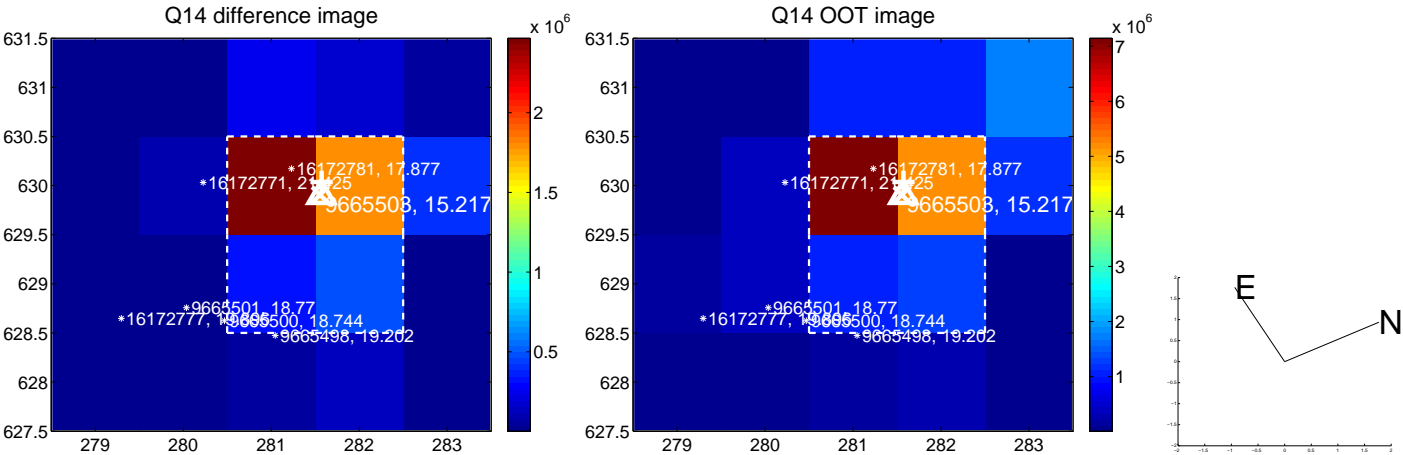
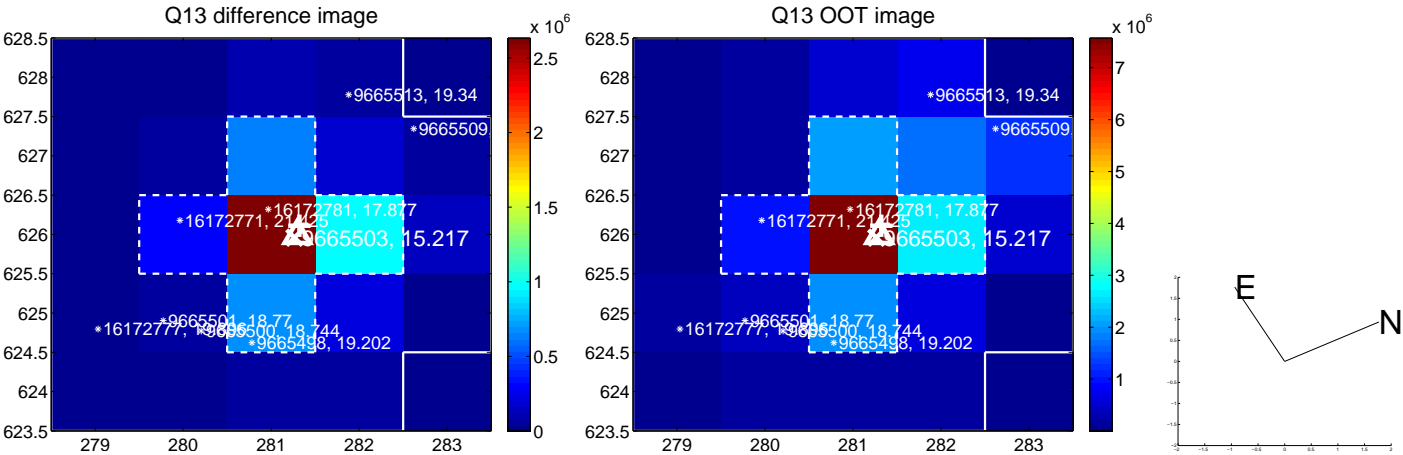
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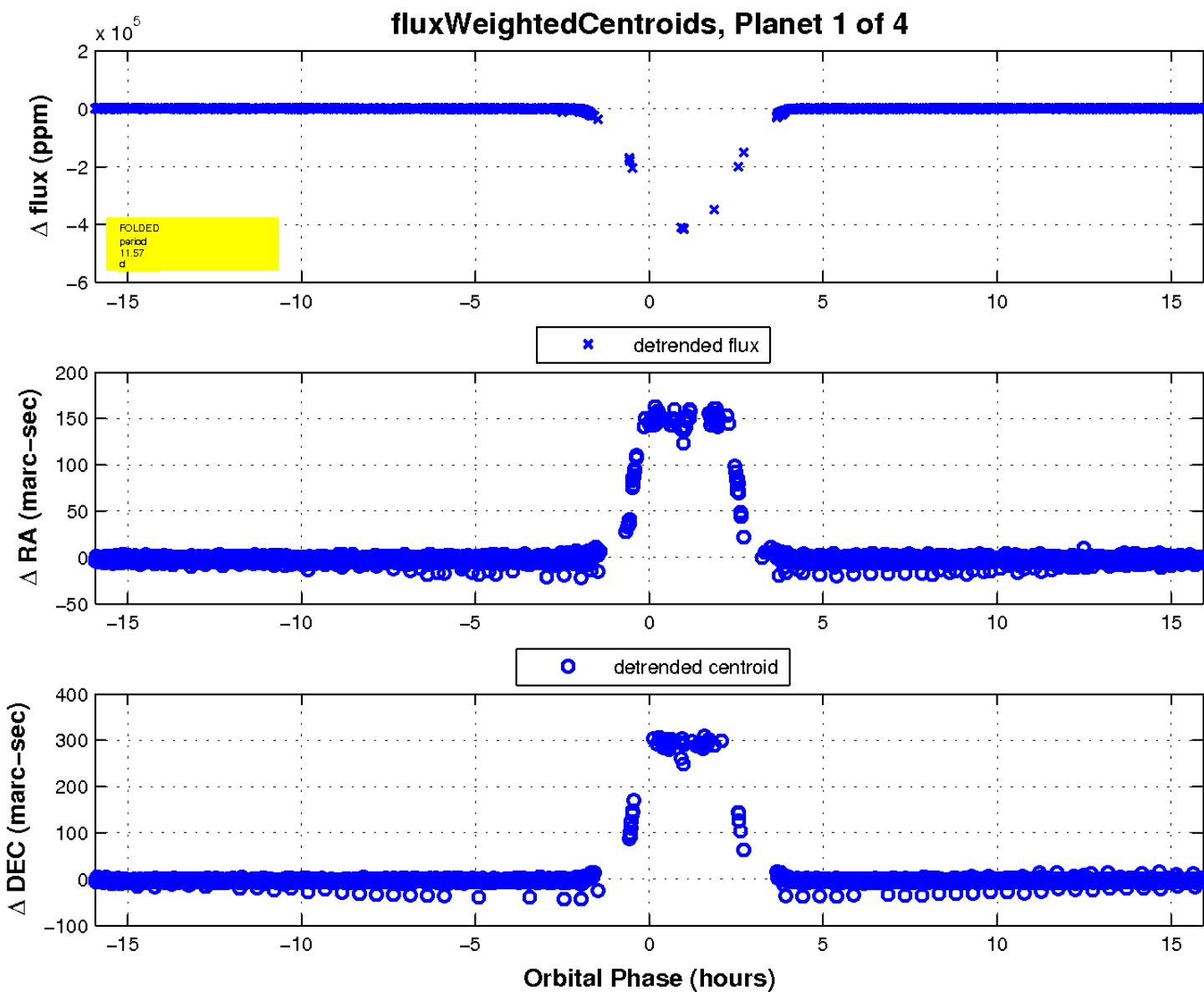
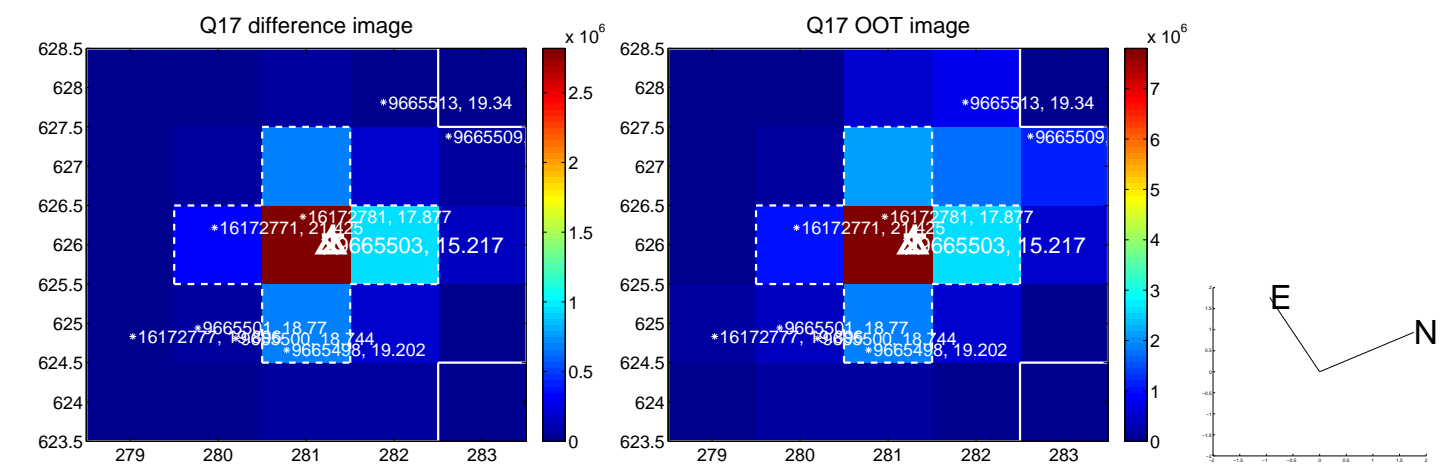
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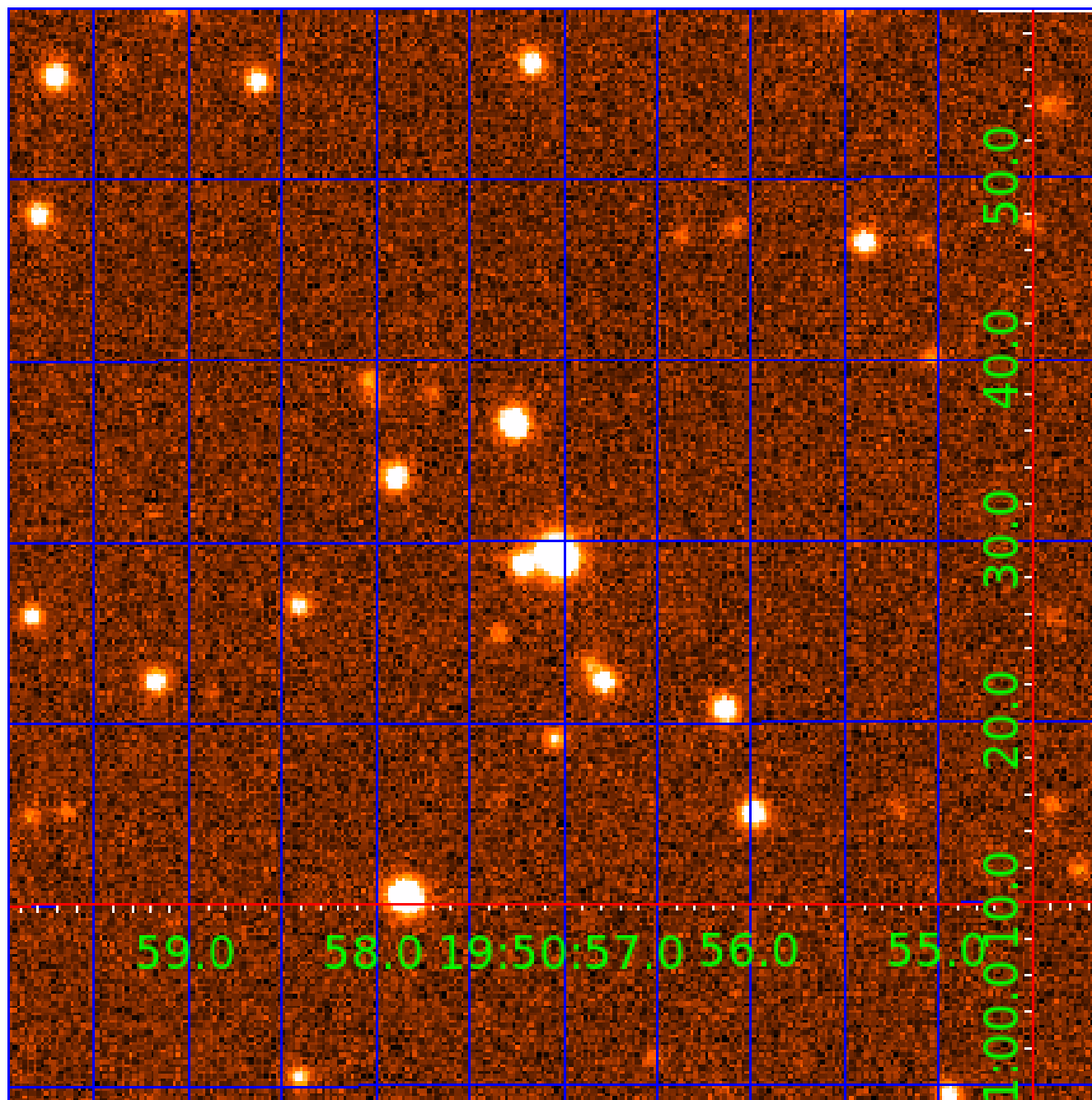


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 009665503

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})
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Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
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009665503-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE—CENT_KIC_POS
009665503-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_POS_ALT—RESIDUAL_TCE—CENT_NOFITS
009665503-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS

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

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

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

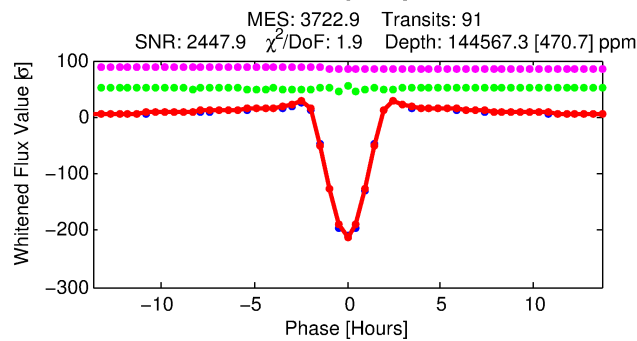
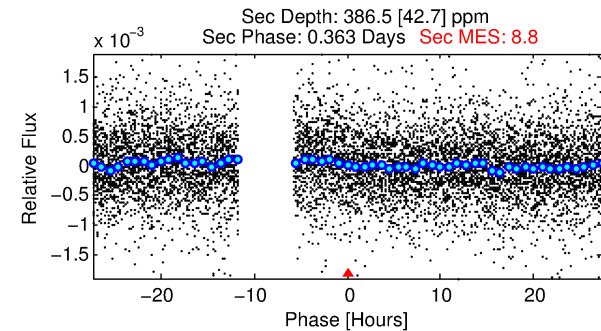
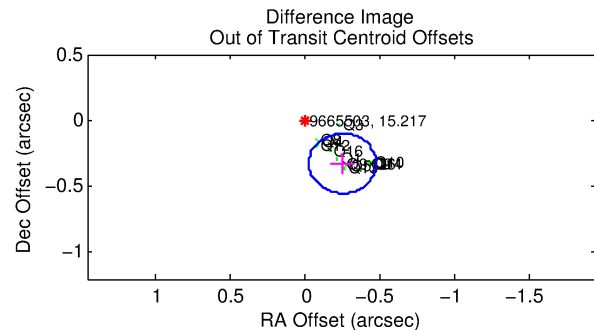
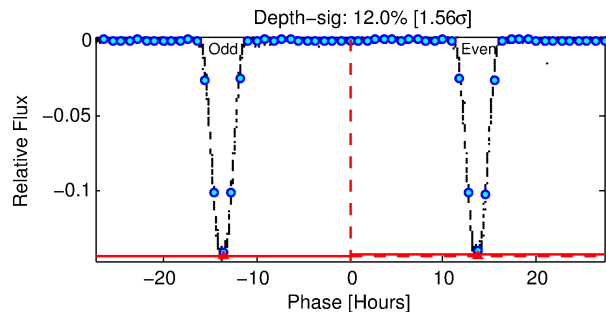
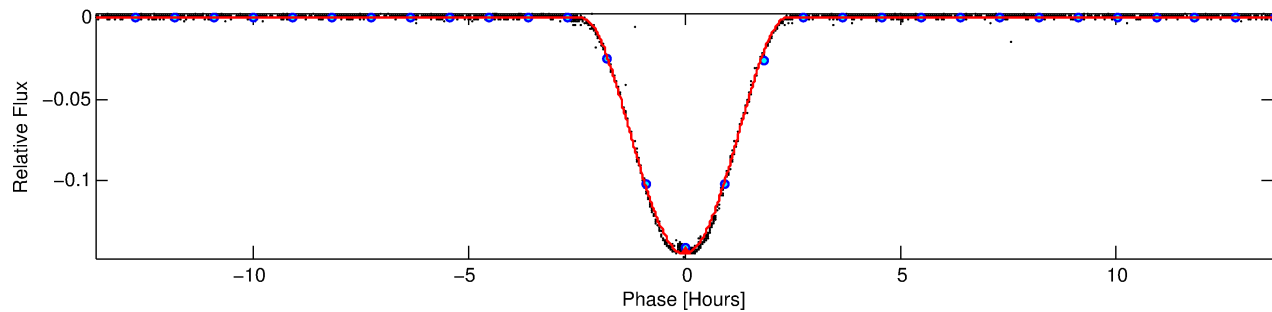
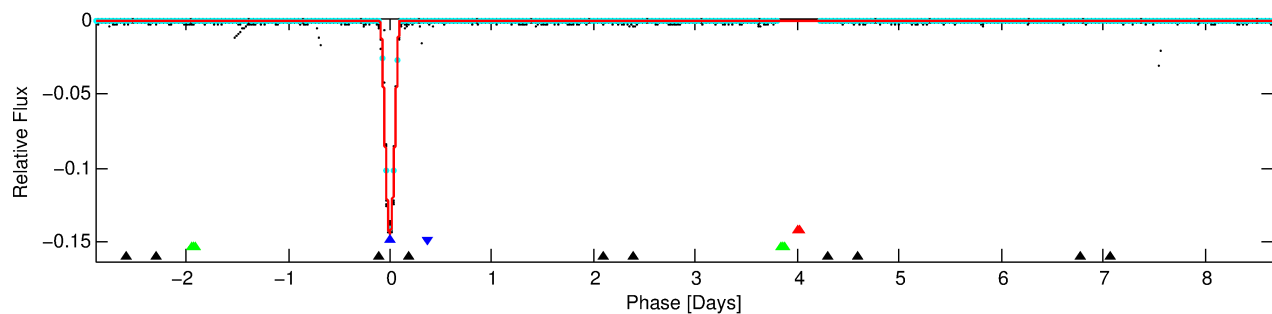
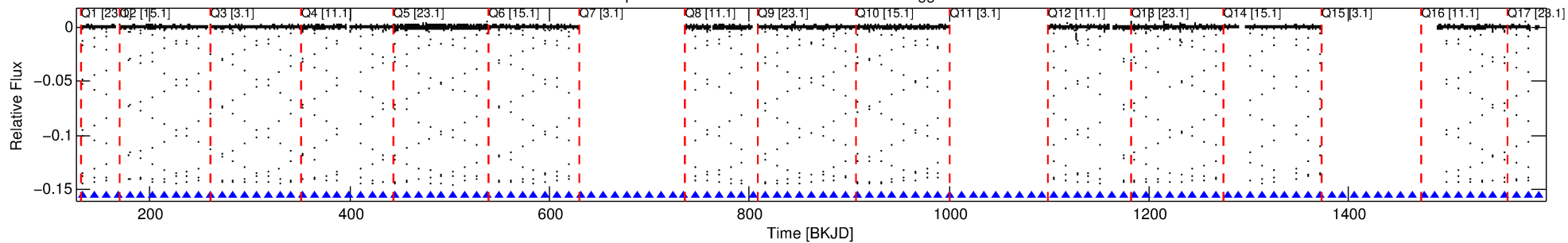
Ephemeris Match Information For 009665503-02

No Significant Match Found

DV One-Page Summary

KIC: 9665503 Candidate: 2 of 4 Period: 11.568 d
KOI: K07221 Corr: No Ephemeris Match

Kp: 15.22 R*: 0.65 Rs Teff: 5290.0 K Logg: 4.67 Fe/H: -0.680



DV Fit Results:

Period = 11.56798 [0.00000] d
Epoch = 133.3317 [0.0000] BKJD
Rp/R* = 0.5165 [0.1310]
a/R* = 23.75 [0.57]
b = 0.90 [0.18]
Seff = 36.76 [7.20]
Teq = 628 [31] K
Rp = 36.52 [10.43] Re
a = 0.0895 [0.0097] AU
Ag = 1.28 [0.69] [0.40σ]
Teffp = 1032 [137] K [2.87σ]

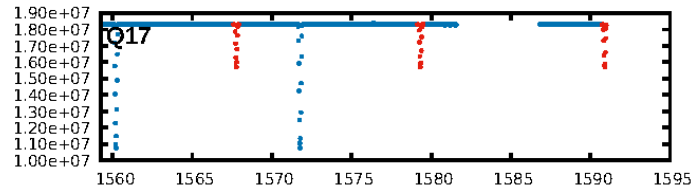
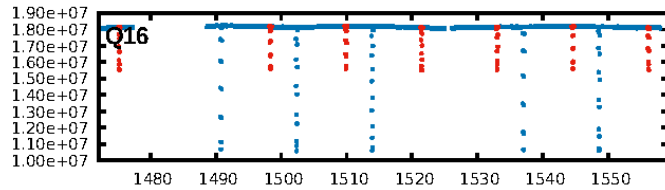
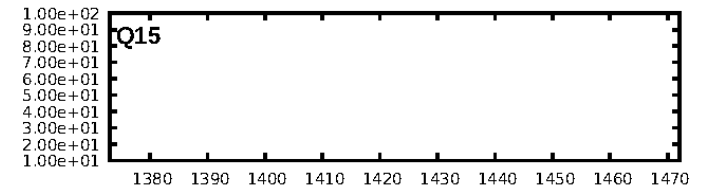
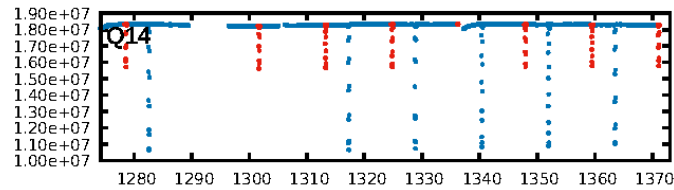
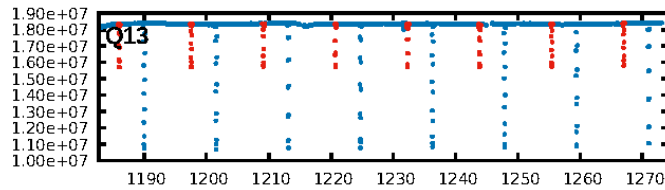
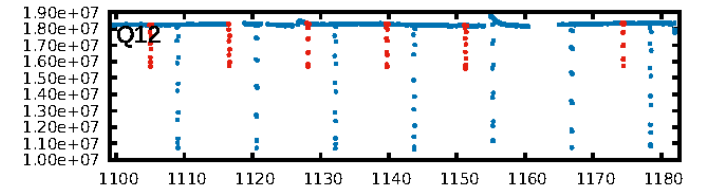
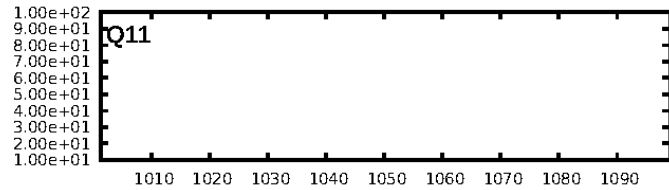
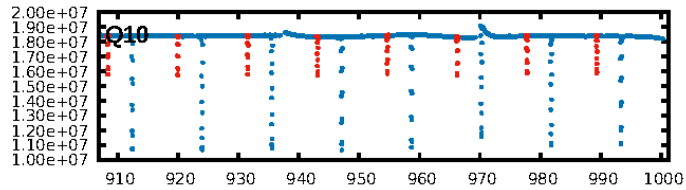
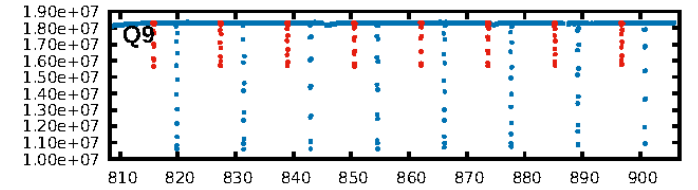
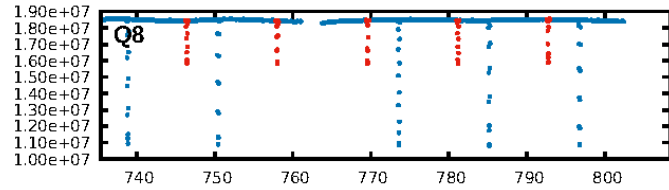
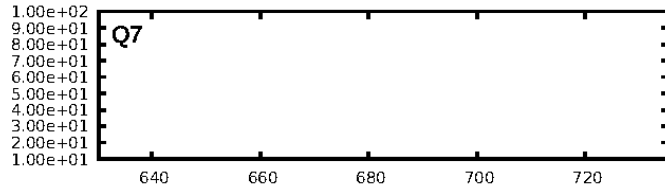
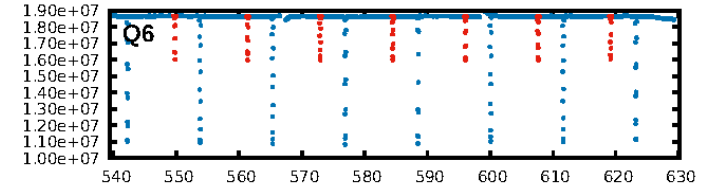
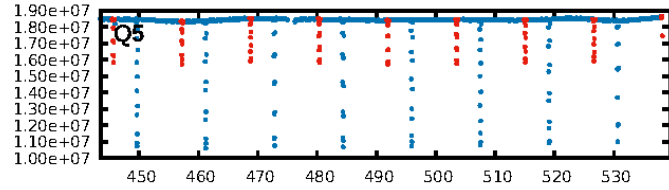
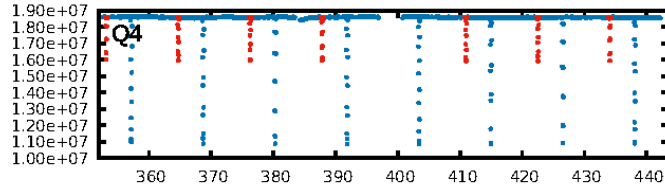
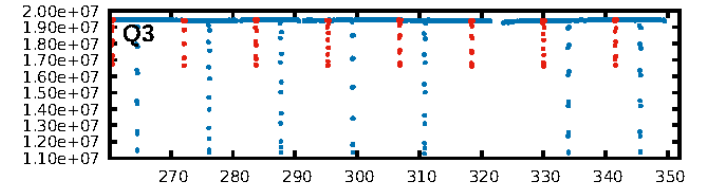
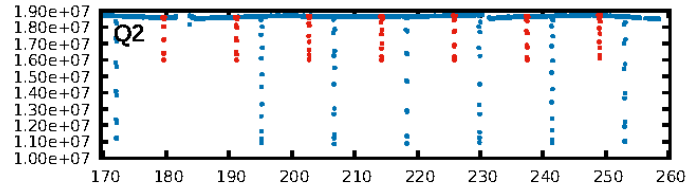
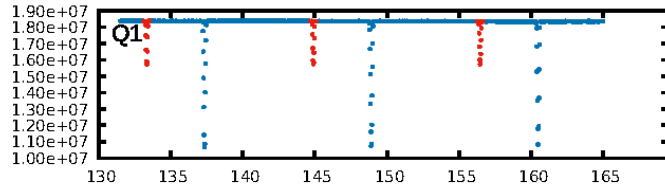
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [8.85σ]
LongPeriod-sig: 0.0% [0.00σ]
ModelChiSquare2-sig: 0.0%
ModelChiSquareGof-sig: 0.0%
Bootstrap-pfa: 0.00e+00
RollingBand-fgt: 1.00 [86/86]
GhostDiagnostic-chr: 4.749
Centroid-sig: N/A
Centroid-so: 0.055 arcsec [25.24σ]
OotOffset-rm: 0.414 arcsec [5.51σ]
KicOffset-rm: 0.117 arcsec [1.73σ]
OotOffset-st: 4/1/4/5 [14]
KicOffset-st: 4/1/4/5 [14]
DiffImageQuality-fgm: 1.00 [14/14]
DiffImageOverlap-fno: 1.00 [14/14]

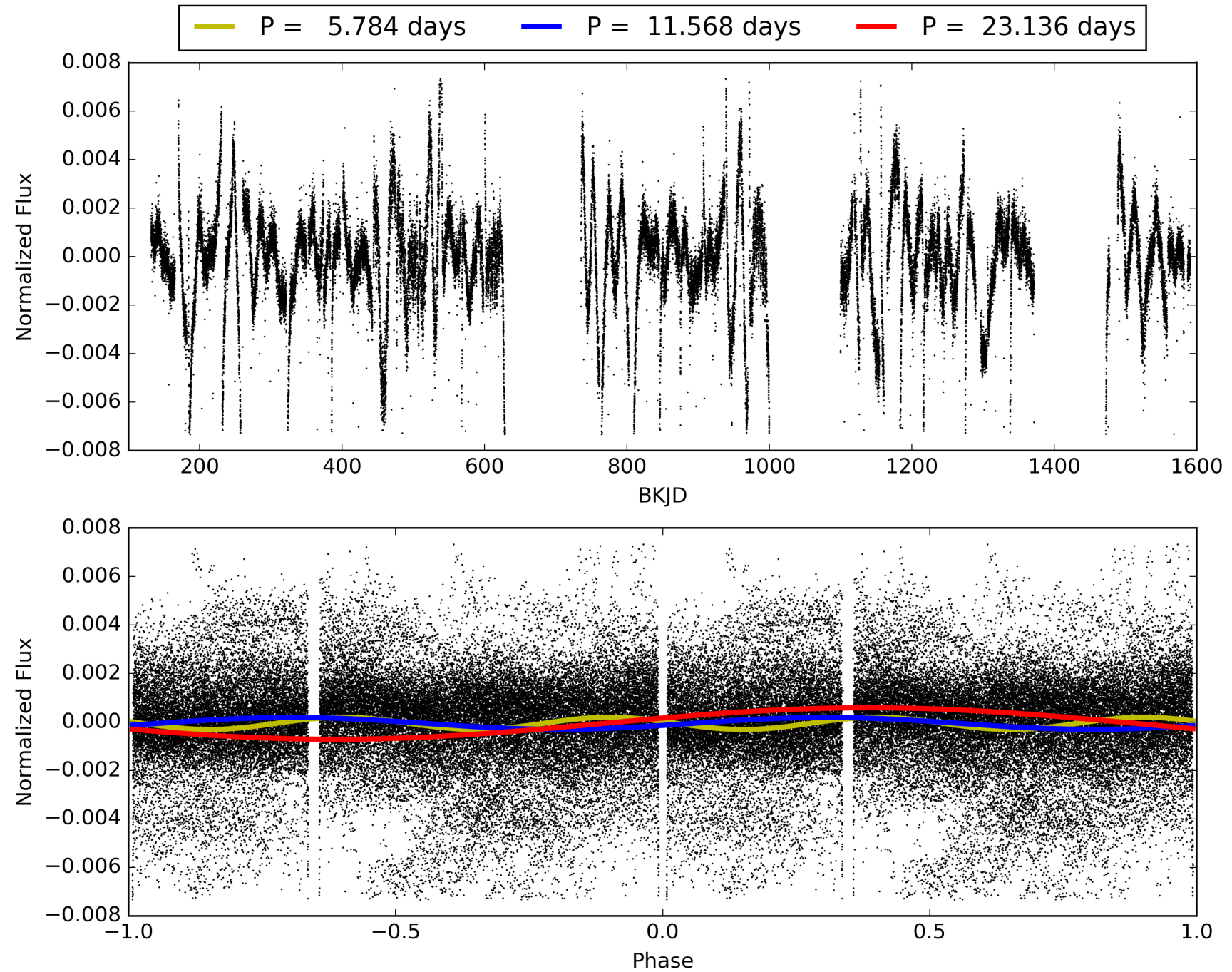
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 07:46:06 Z

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

TCE 009665503-02, PDC Light Curves

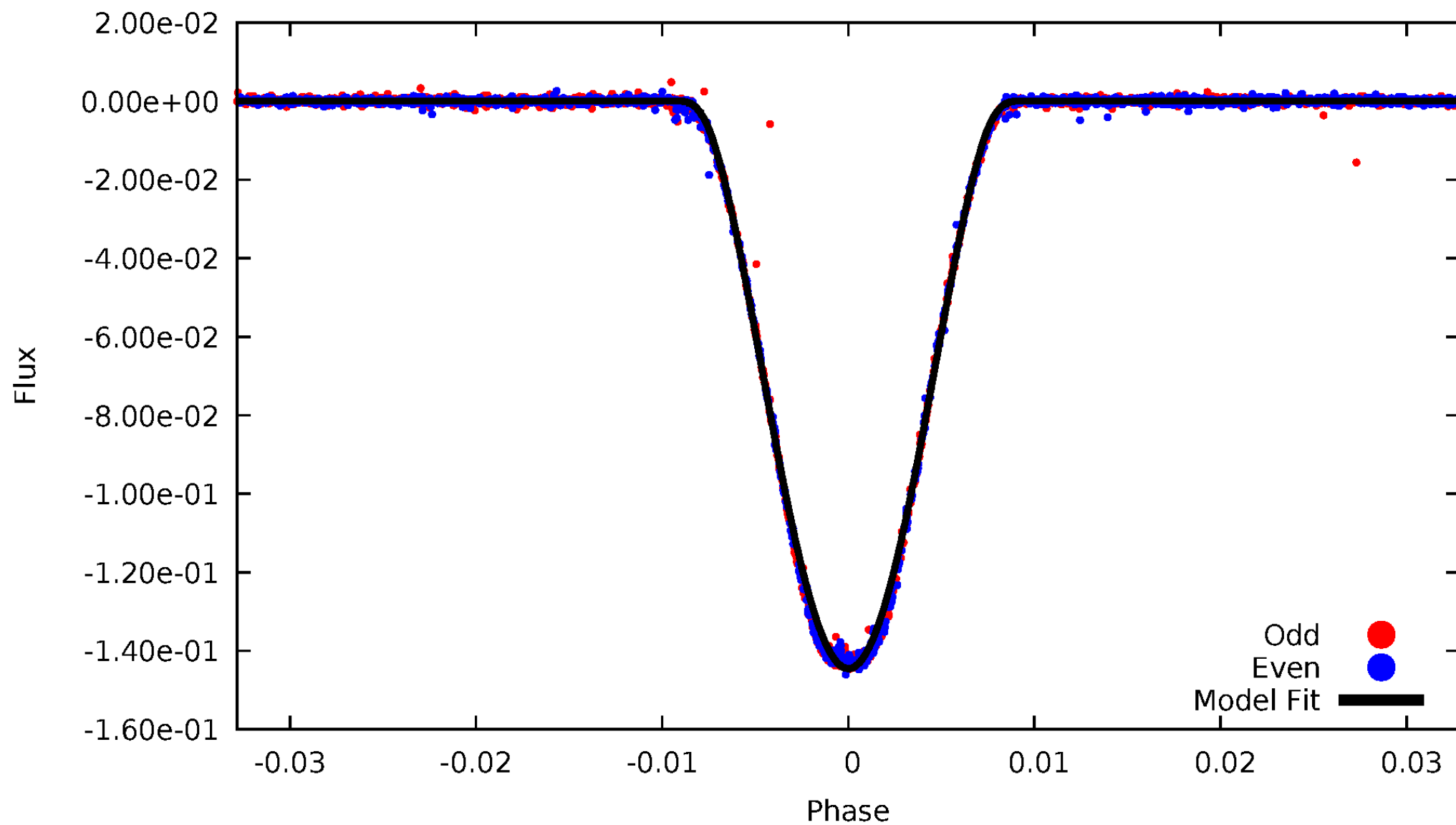


TCE 009665503-02



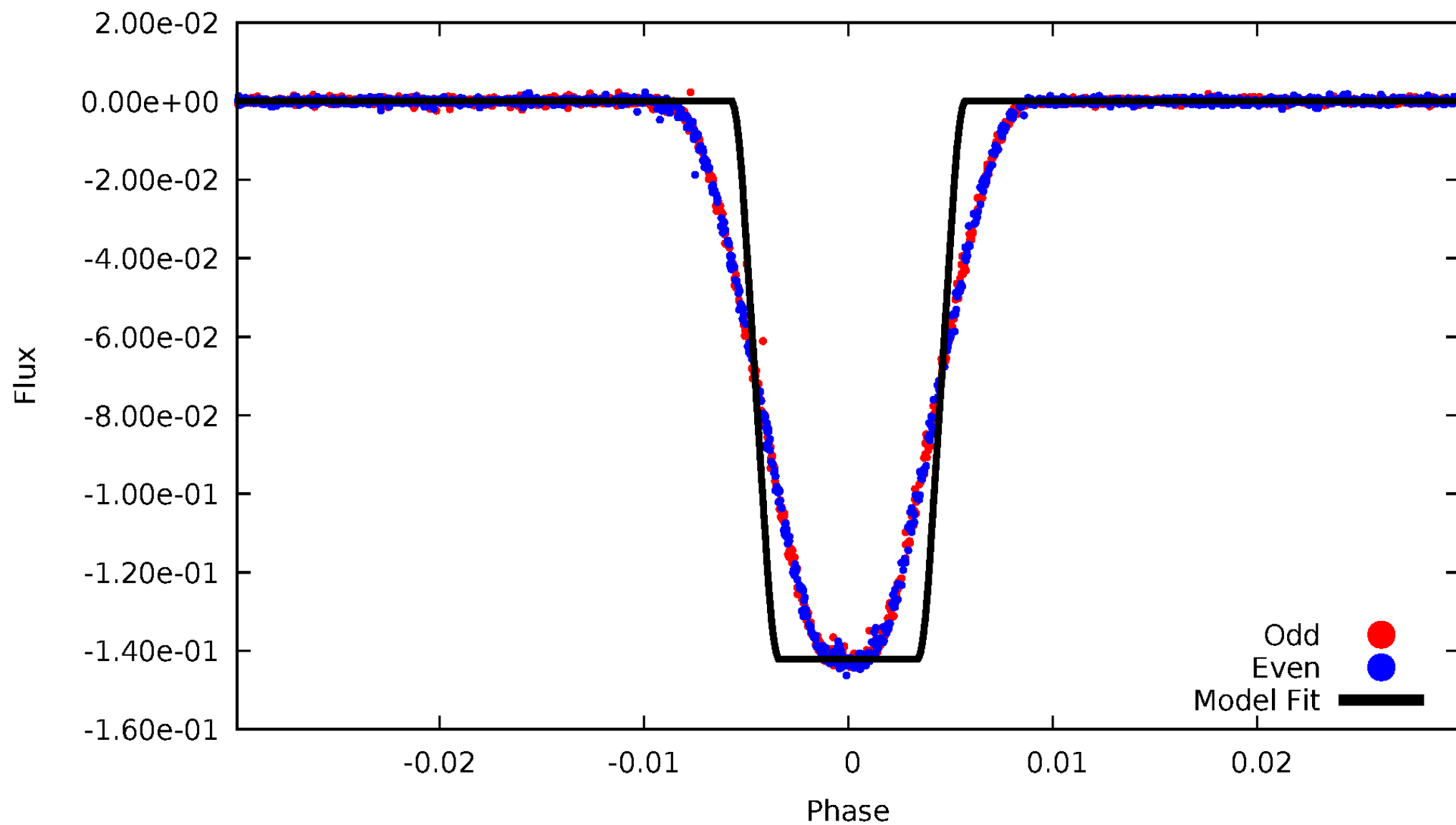
DV Odd/Even

TCE 009665503-02



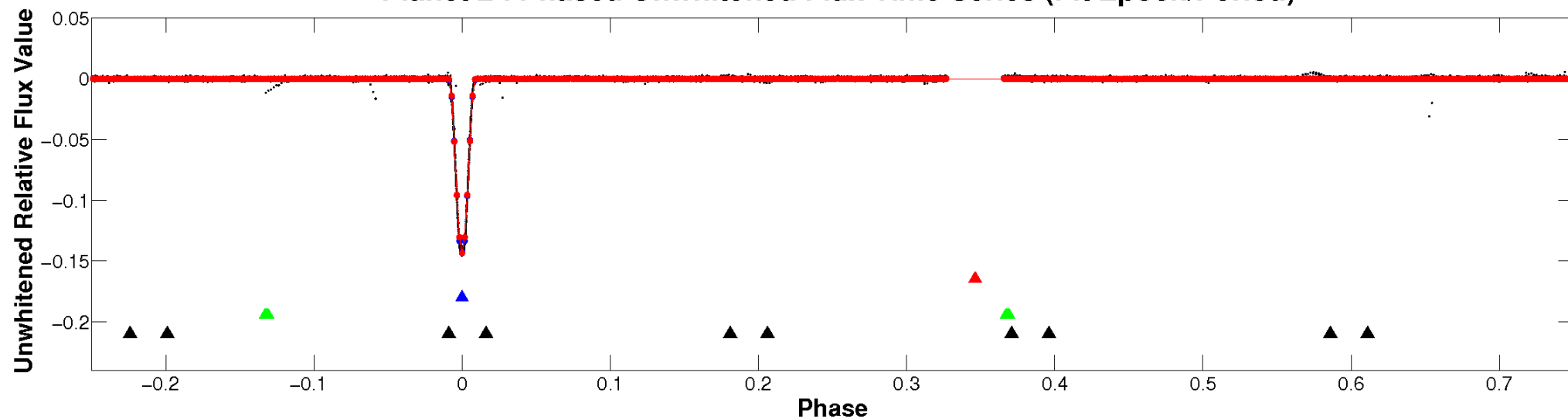
ALT Odd/Even

TCE 009665503-02

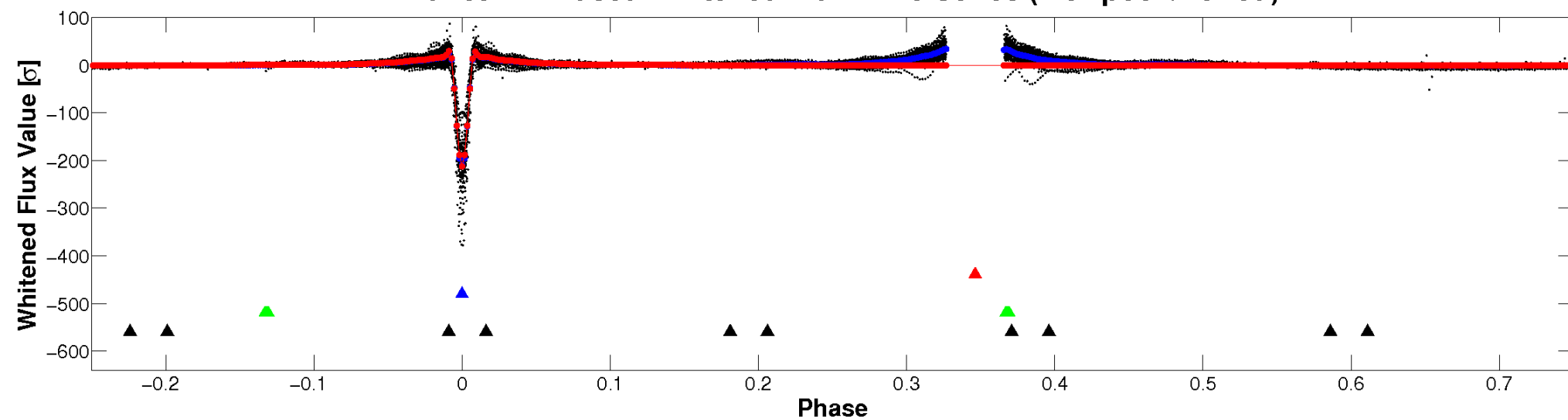


Non-Whitened Vs. Whitened Light Curve

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

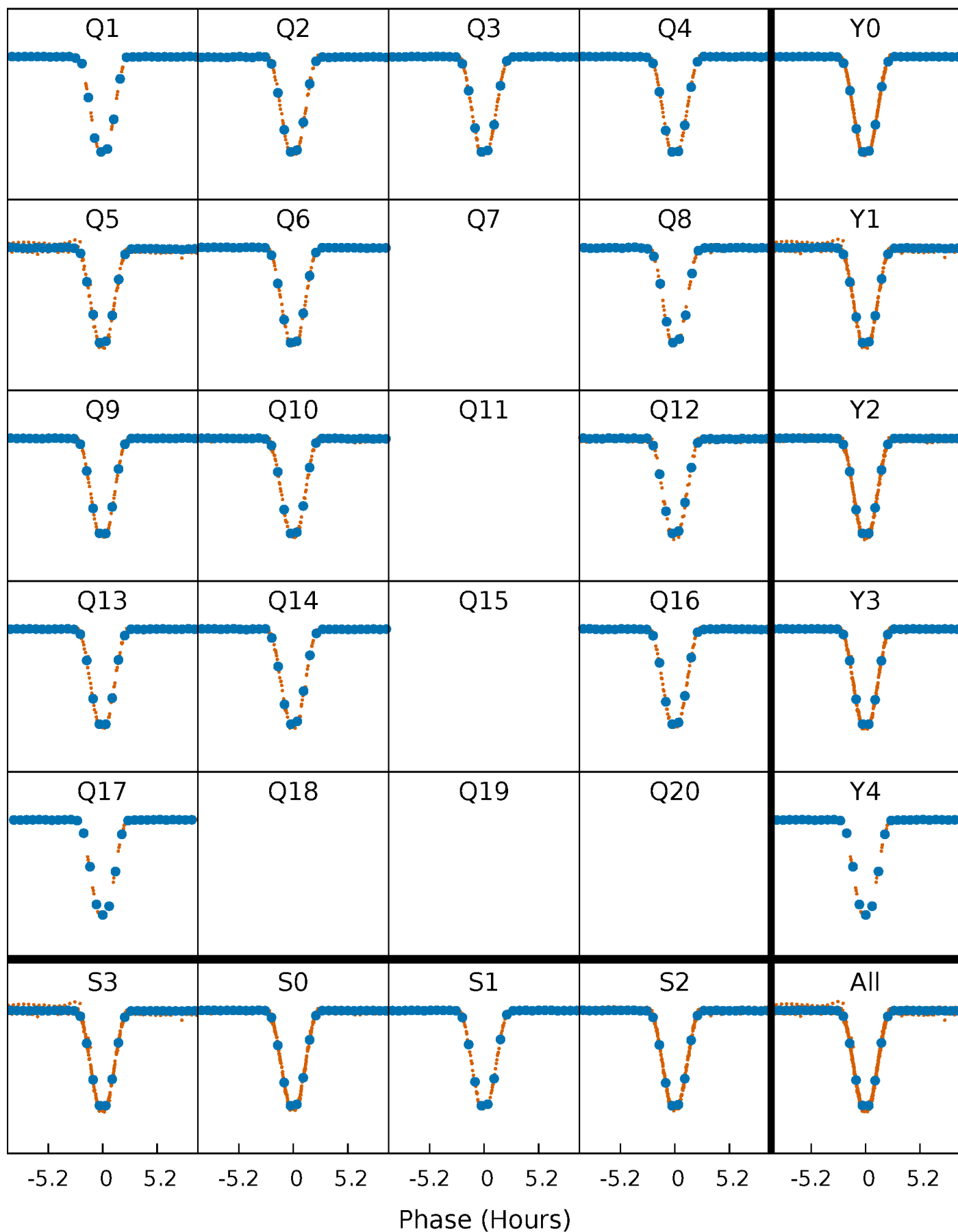


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



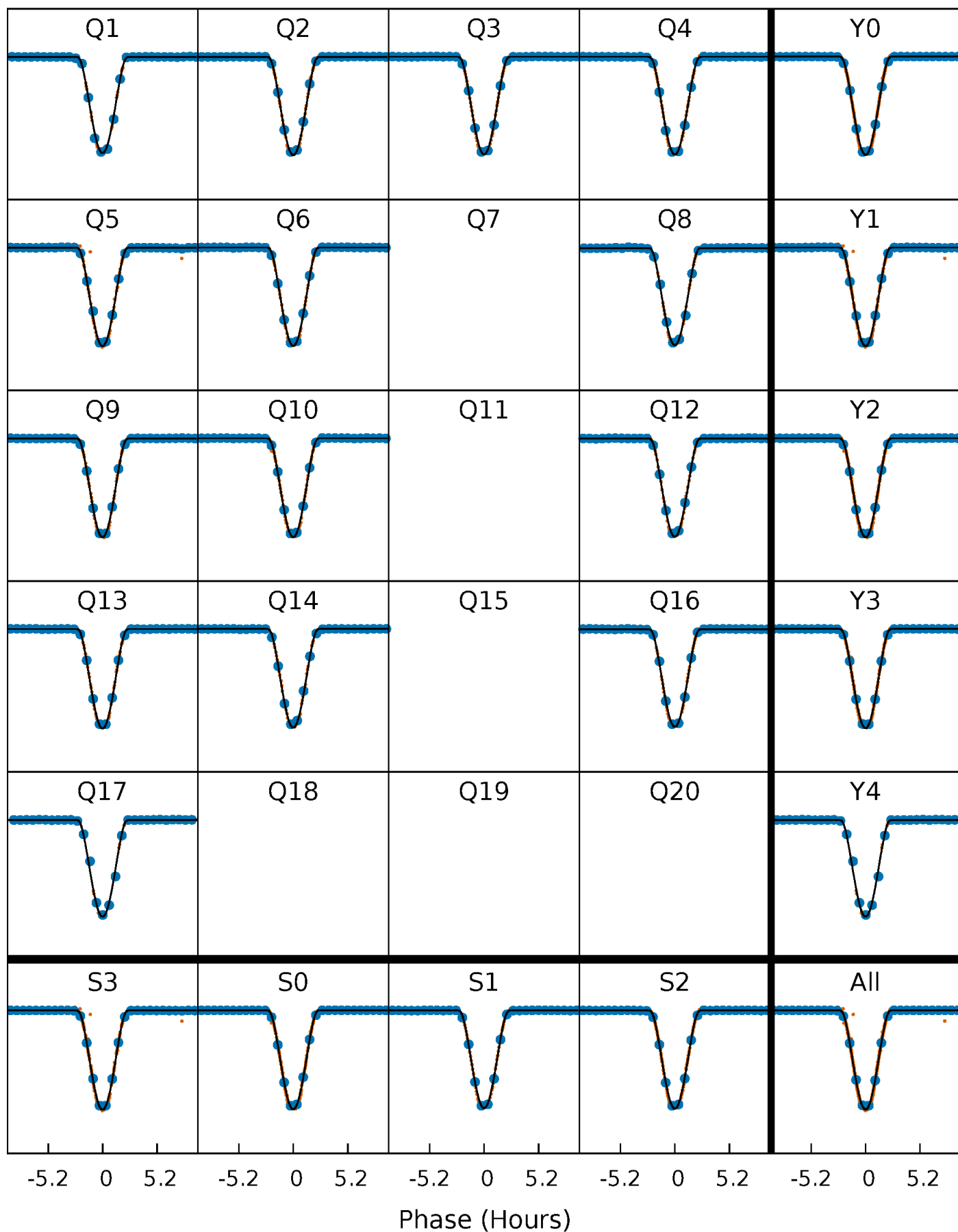
PDC Quarter-Phased Transit Curves

TCE 009665503-02 P= 11.567979 Days $T_0=133.331728$ (BKJD)



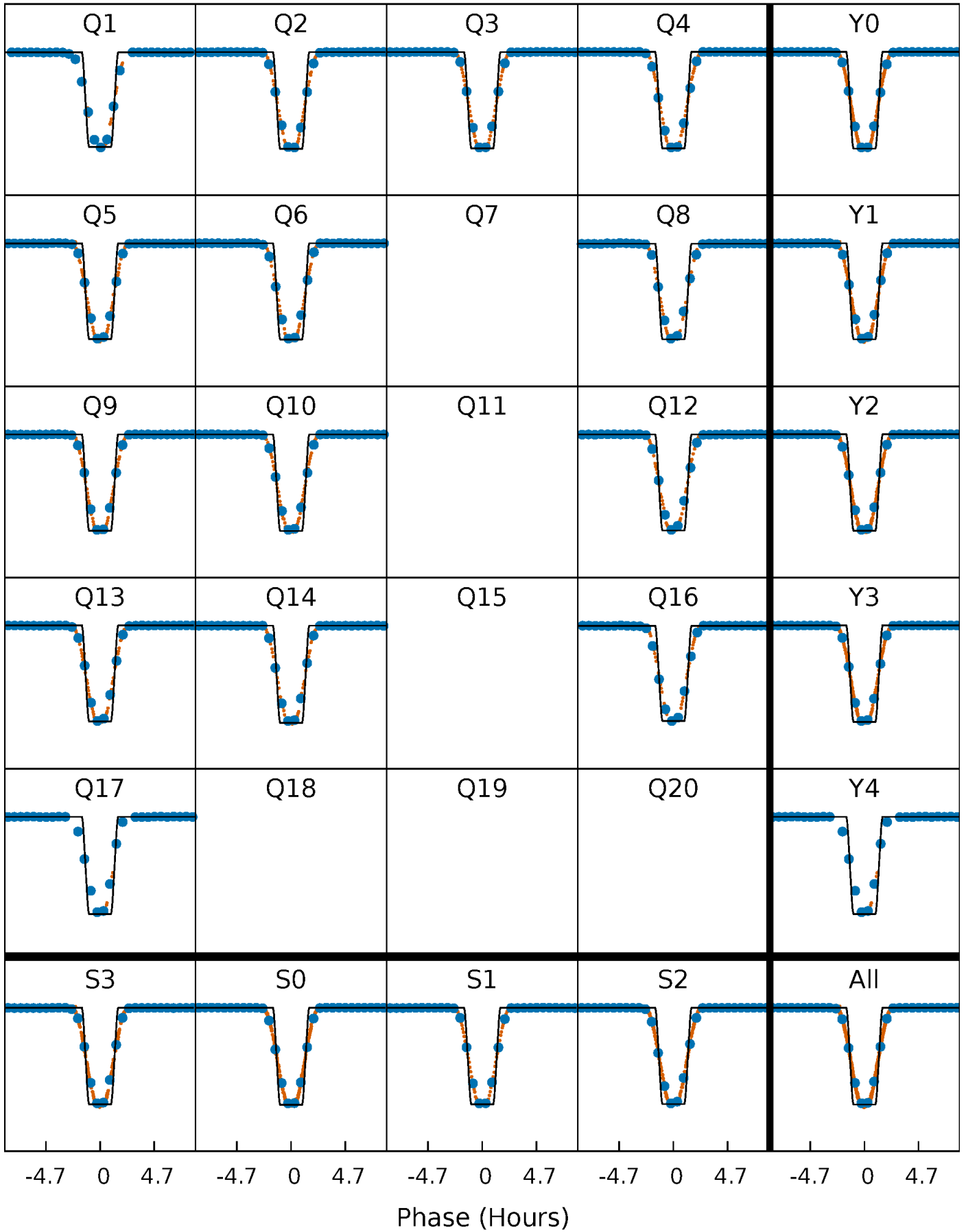
DV Quarter-Phased Transit Curves

TCE 009665503-02 P= 11.567979 Days $T_0=133.331728$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

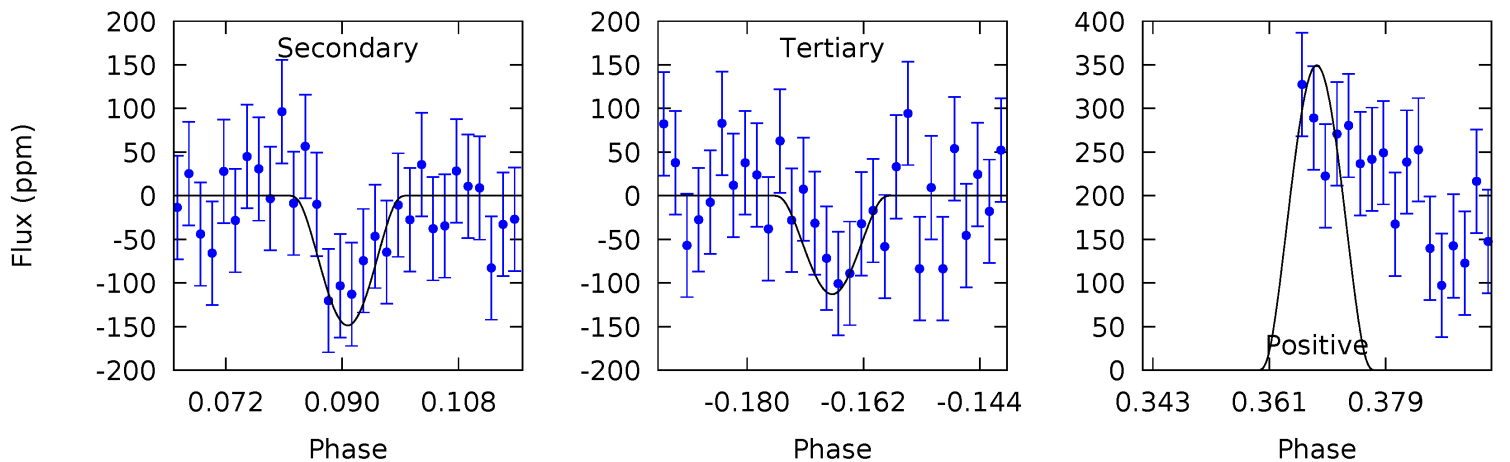
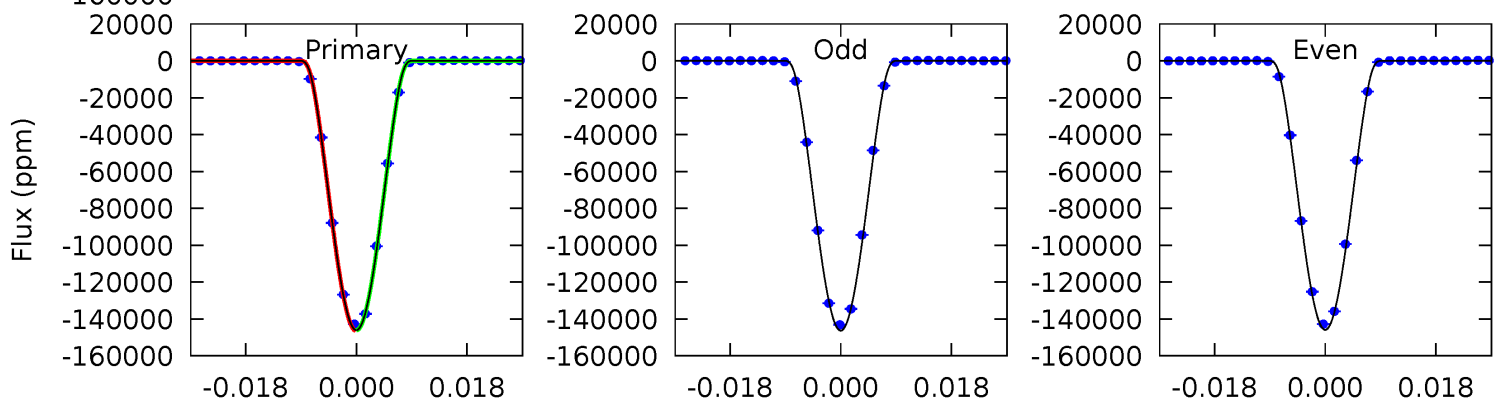
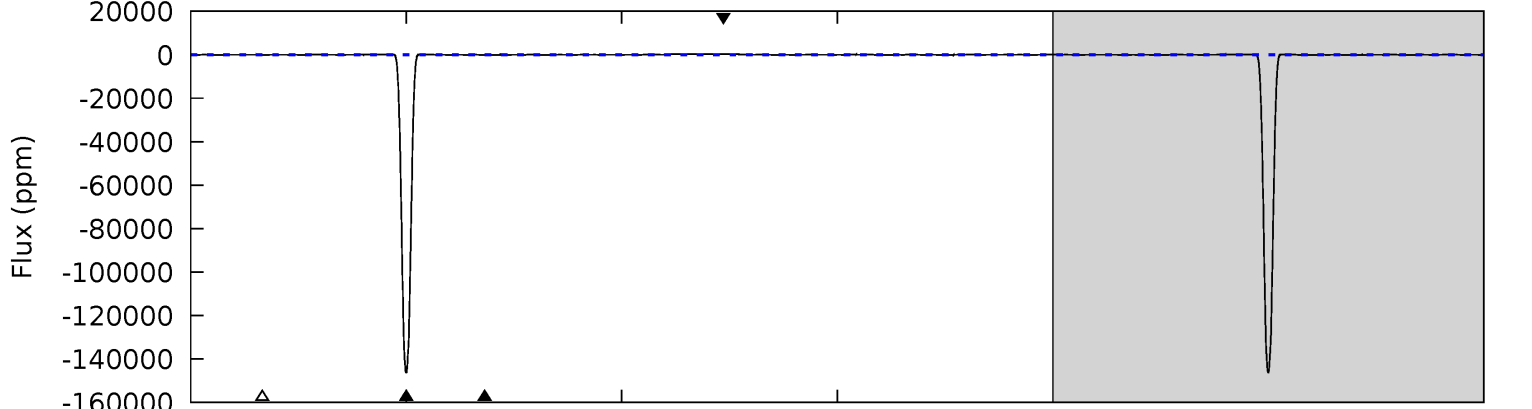
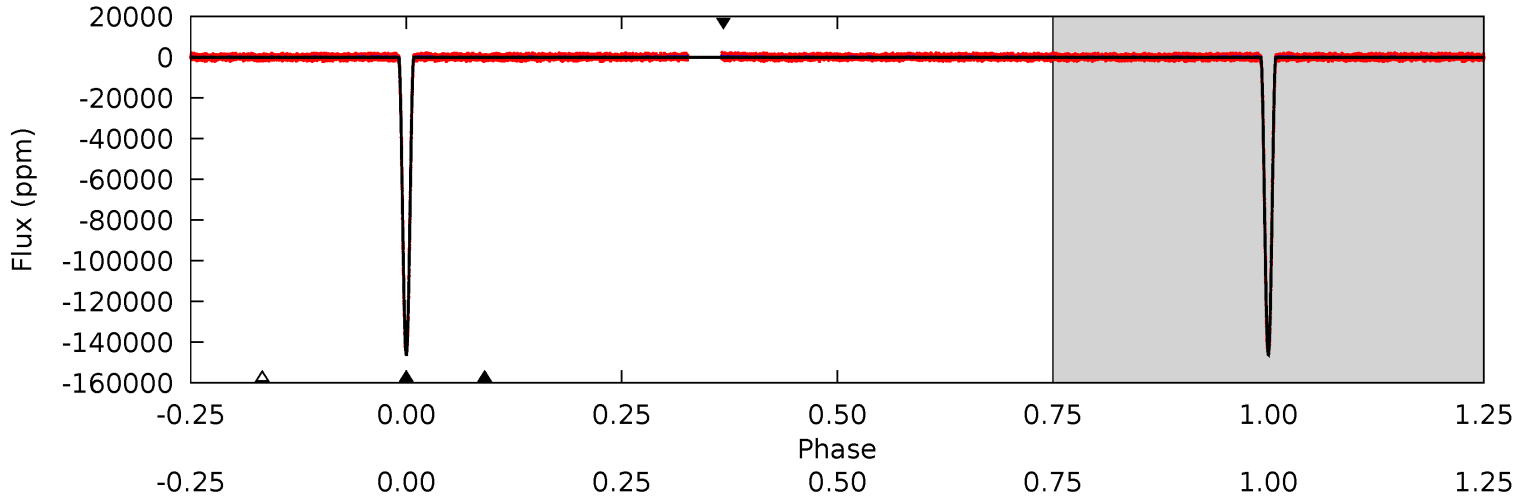
TCE 009665503-02 P= 11.567996 Days $T_0=133.330747$ (BKJD)



DV Model-Shift Uniqueness Test

009665503-02, P = 11.567979 Days, E = 121.763749 Days

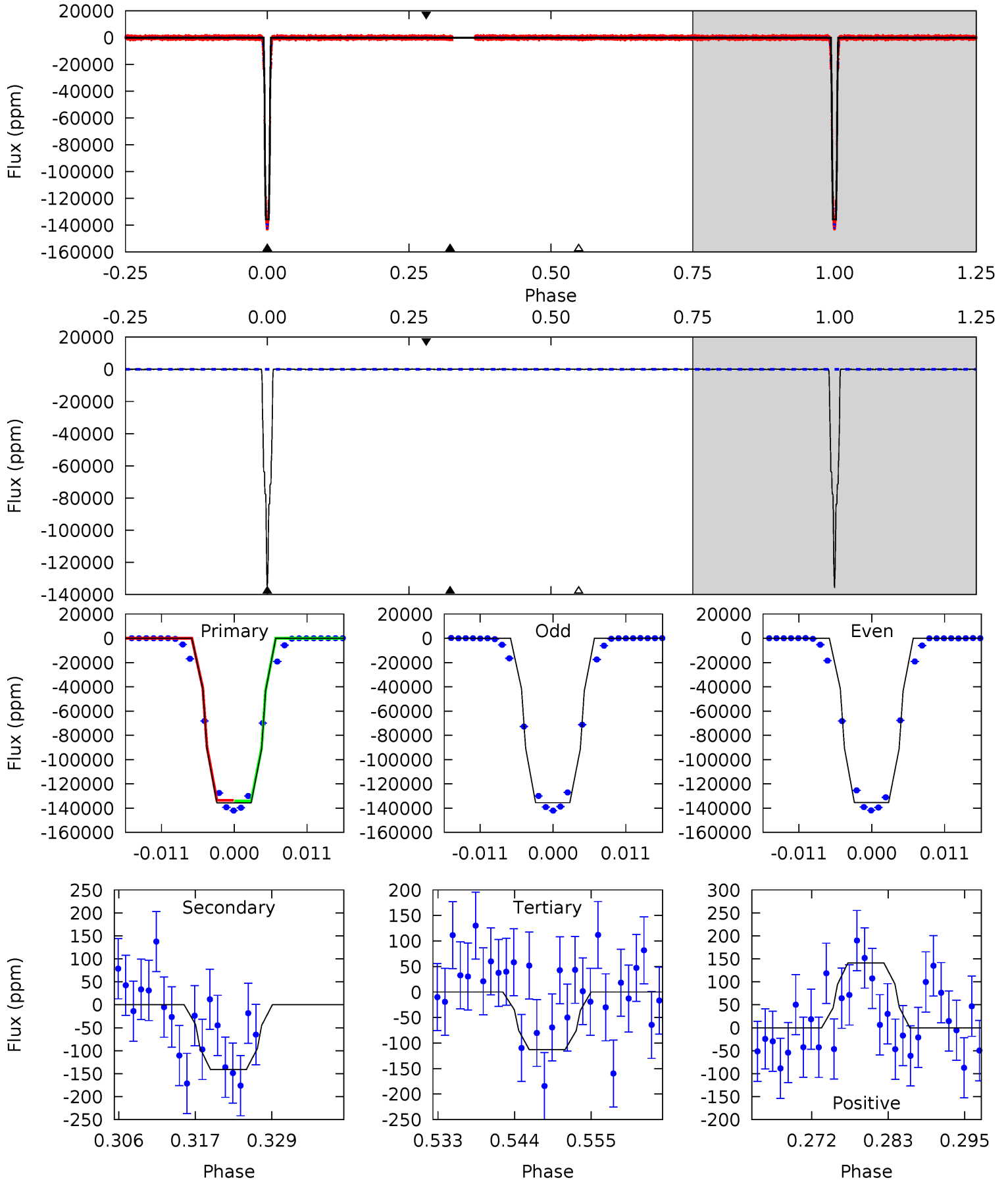
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7630	7.76	5.89	18.2	4.91	2.37	4.25	7624	7612	1.87	-10.5	11.4	0.99	0.00	0



Alt Model-Shift Uniqueness Test

009665503-02, P = 11.567996 Days, E = 121.762751 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
4085	4.24	3.39	4.25	5.00	2.53	1.17	4081	4080	0.84	-0.01	0.84	1.00	0.00	0



Stellar Parameters For KIC 009665503

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	$M(M_{\odot})$	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	5290^{+159}_{-143}	$4.669^{+0.028}_{-0.083}$	$-0.680^{+0.300}_{-0.300}$	$0.648^{+0.085}_{-0.039}$	$0.723^{+0.062}_{-0.068}$	$3.750^{+0.433}_{-0.988}$
	+3%/-3%	+1%/-2%	+44%/-44%	+13%/-6%	+9%/-9%	+12%/-26%
Source	PHO1	KIC0	KIC0	DSEP		

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

Secondary Eclipse Parameters for KIC 009665503-02 / KOI

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-149 ± 19	$37.02^{+9.81}_{-9.58}$	888^{+35}_{-30}	1683^{+199}_{-2995}	$0.473^{+0.422}_{-0.181}$
Alt.	-141 ± 33	$26.75^{+10.55}_{-8.99}$	889^{+34}_{-30}	1851^{+242}_{-249}	$0.792^{+1.197}_{-0.391}$

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 $A_{obs} \gg 1.0$

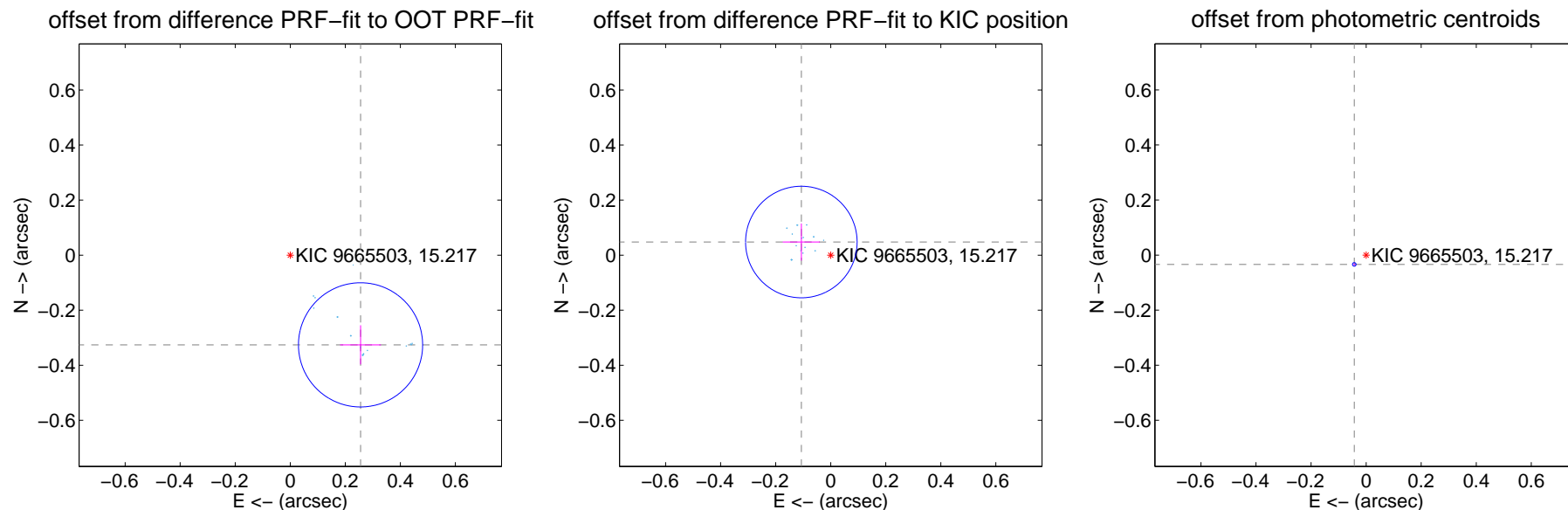
DV Centroid Data

Supplemental centroid analysis for 009665503-02. Kepler magnitude: 15.22. Transit SNR 2447.87

There are 14 quarters with good PRF difference image offsets

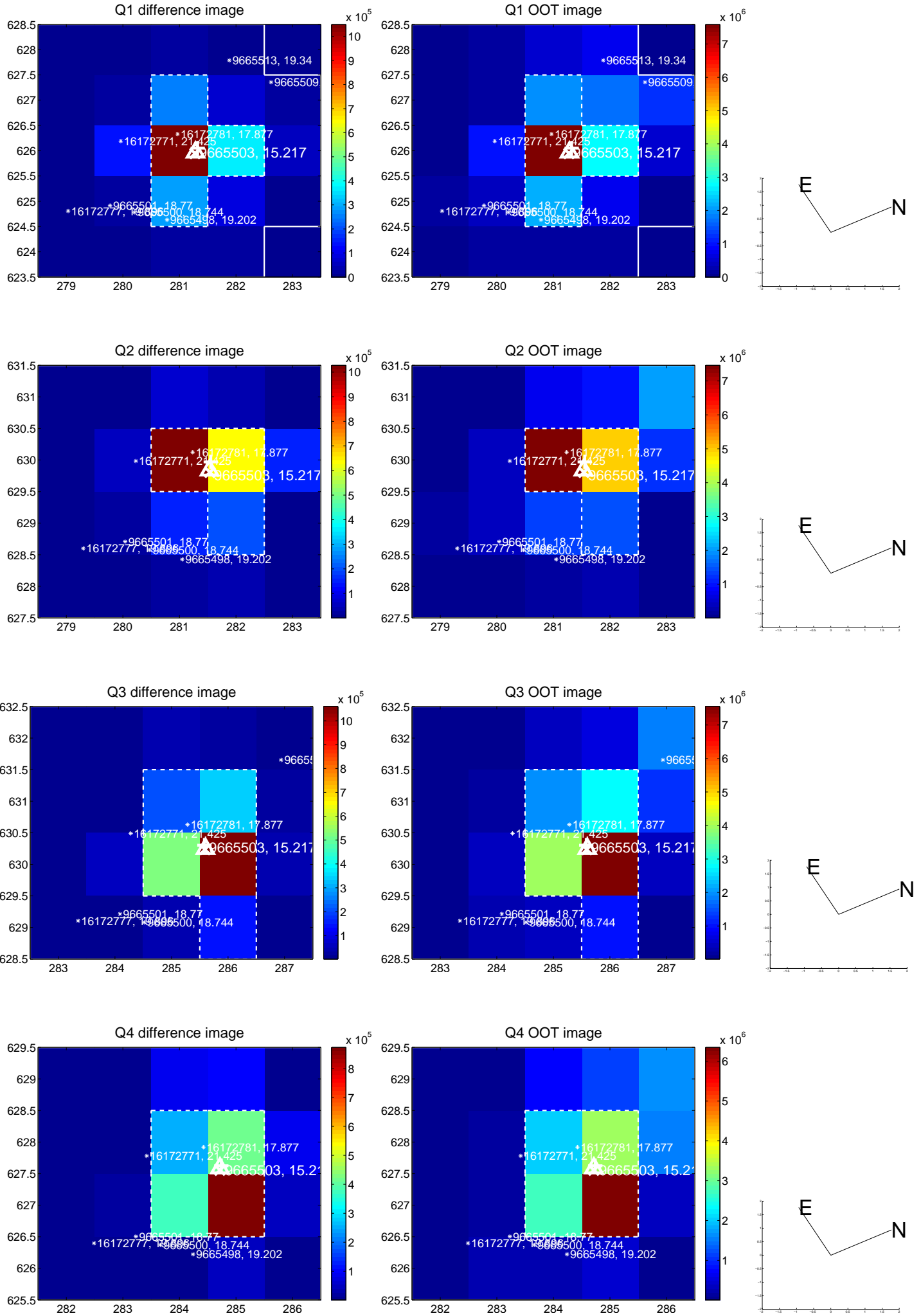
The direct PRF centroid is offset from the target star catalog position by about 0.53 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.414 ± 0.075	5.51	-0.255 ± 0.074	-0.326 ± 0.071
PRF-fit source offset from KIC position	0.117 ± 0.068	1.73	0.107 ± 0.067	0.048 ± 0.067
photometric centroid source offset	0.05 ± 0.00	25.24	0.04 ± 0.00	-0.03 ± 0.00

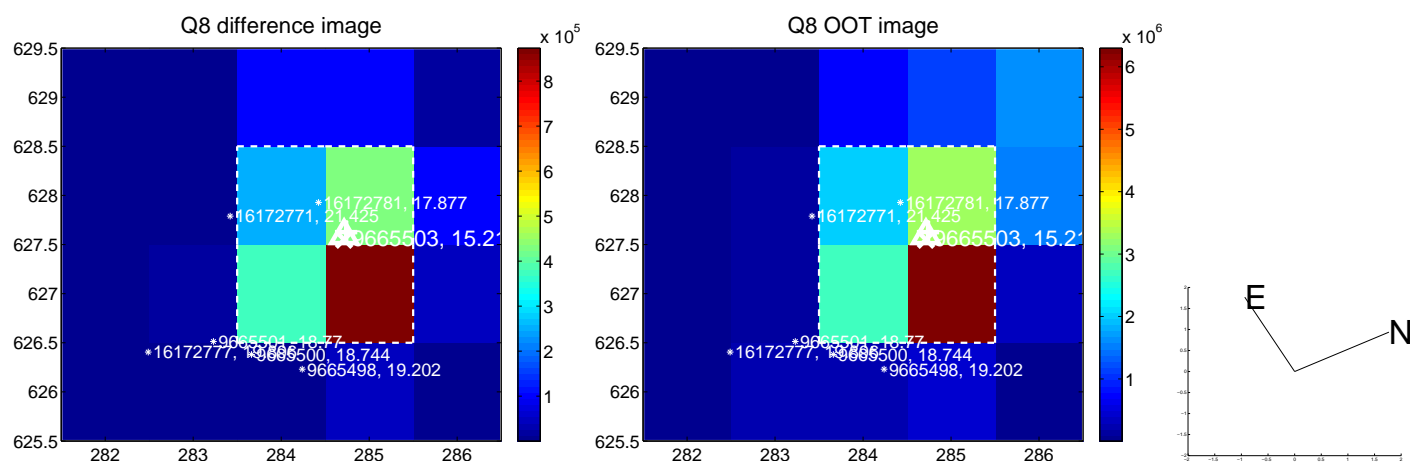
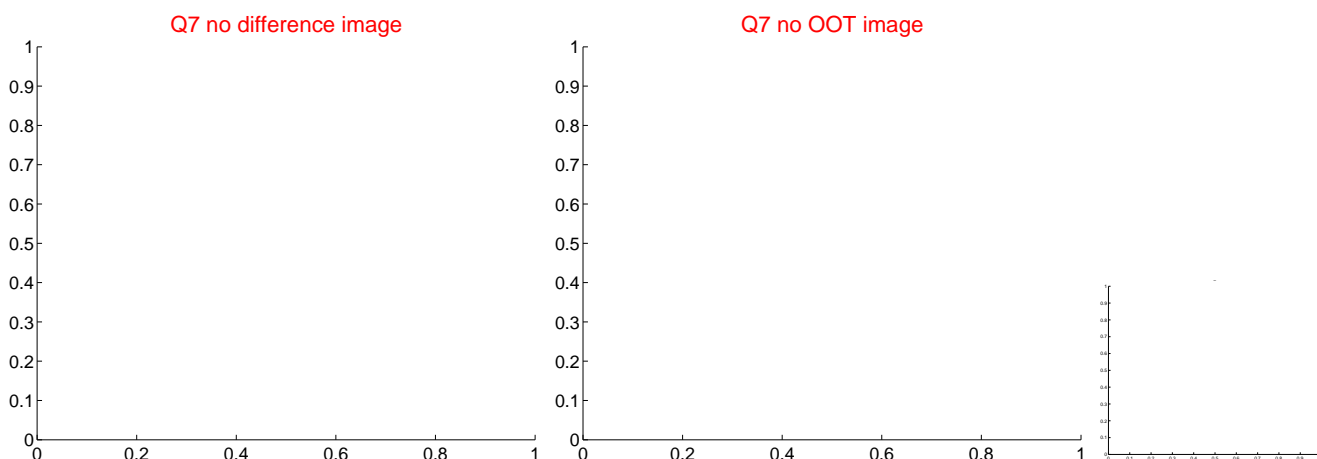
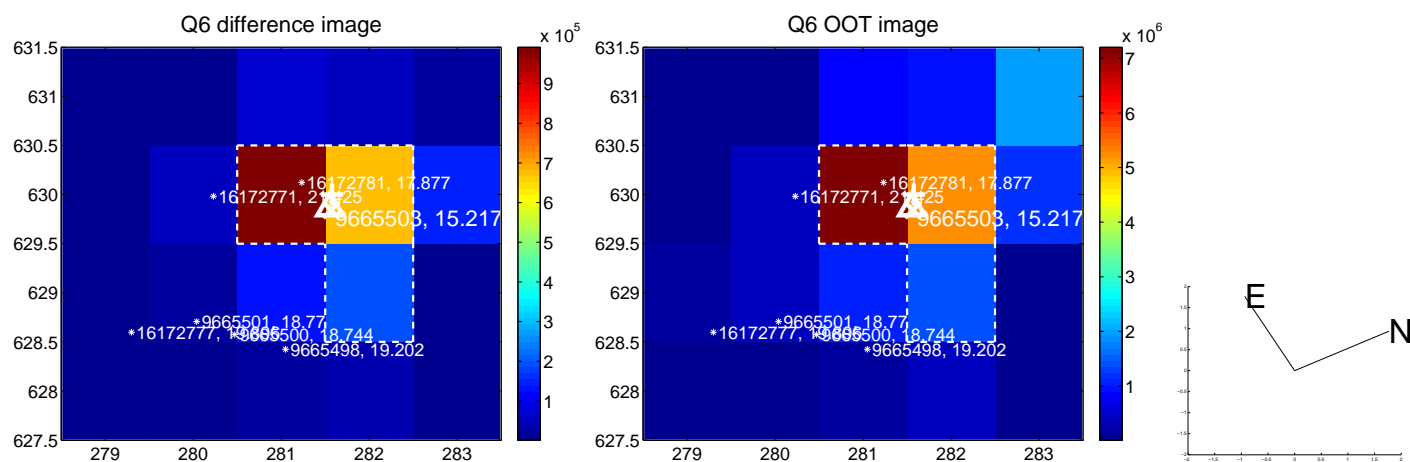
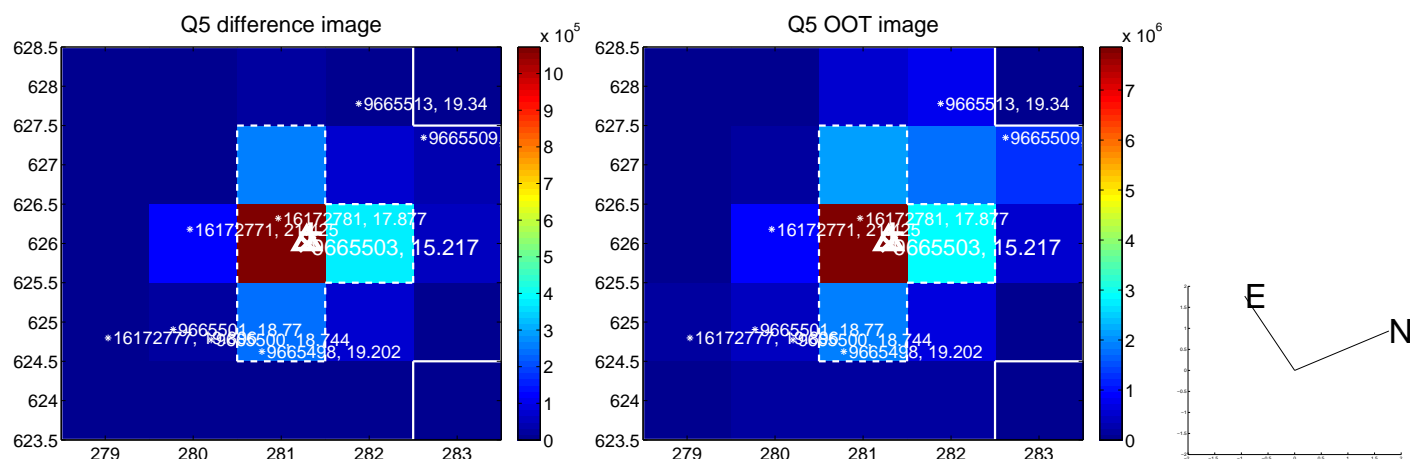


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

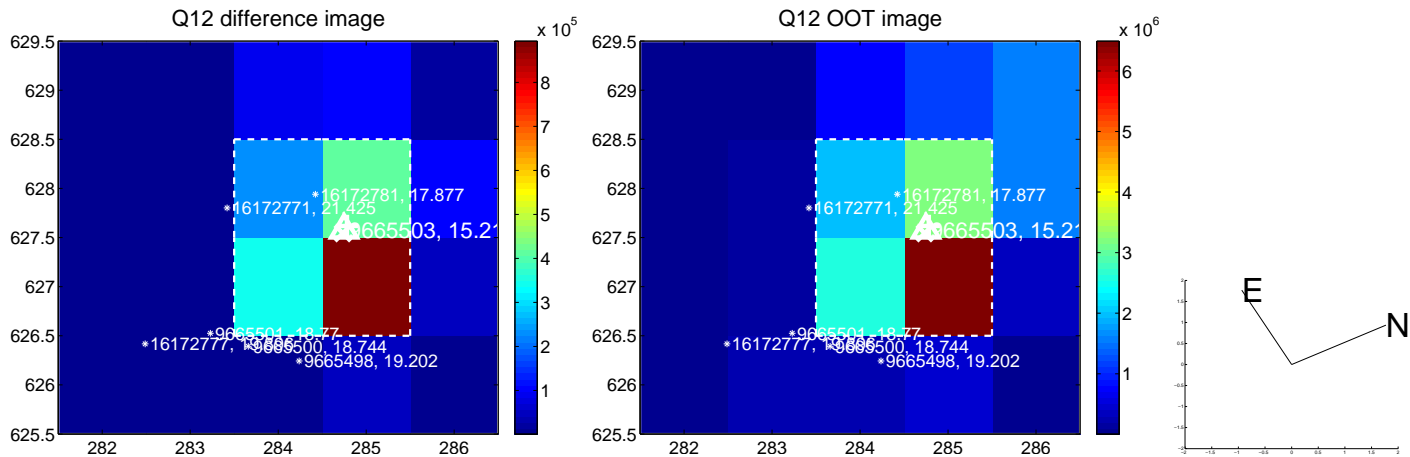
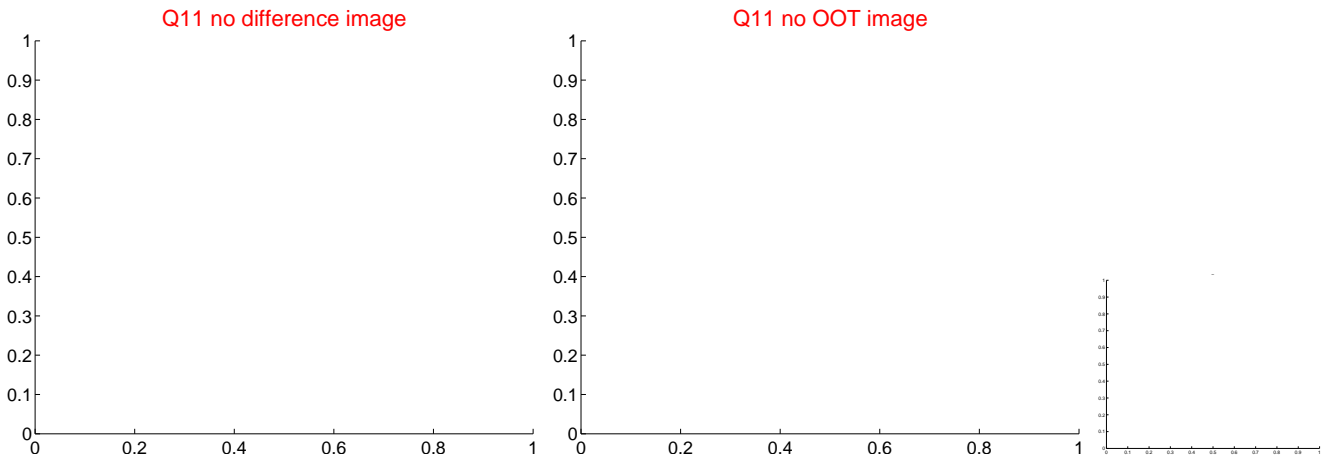
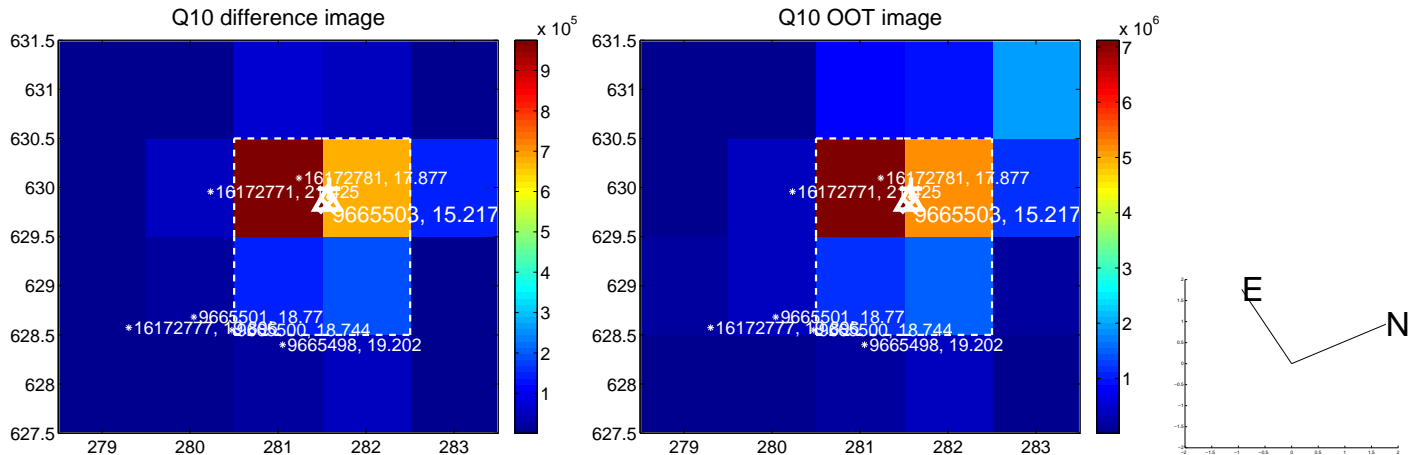
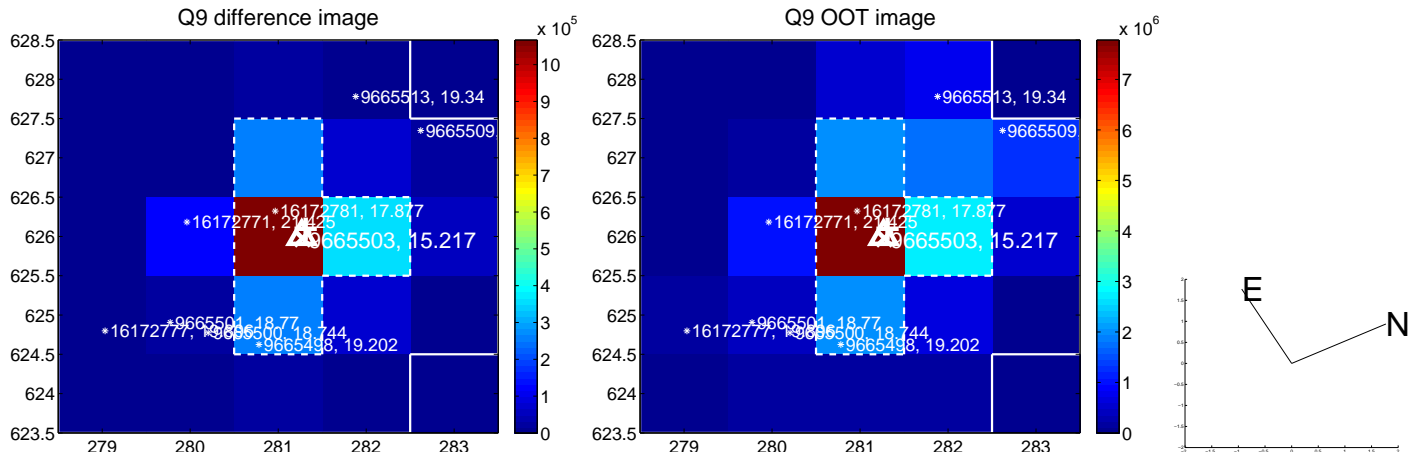
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



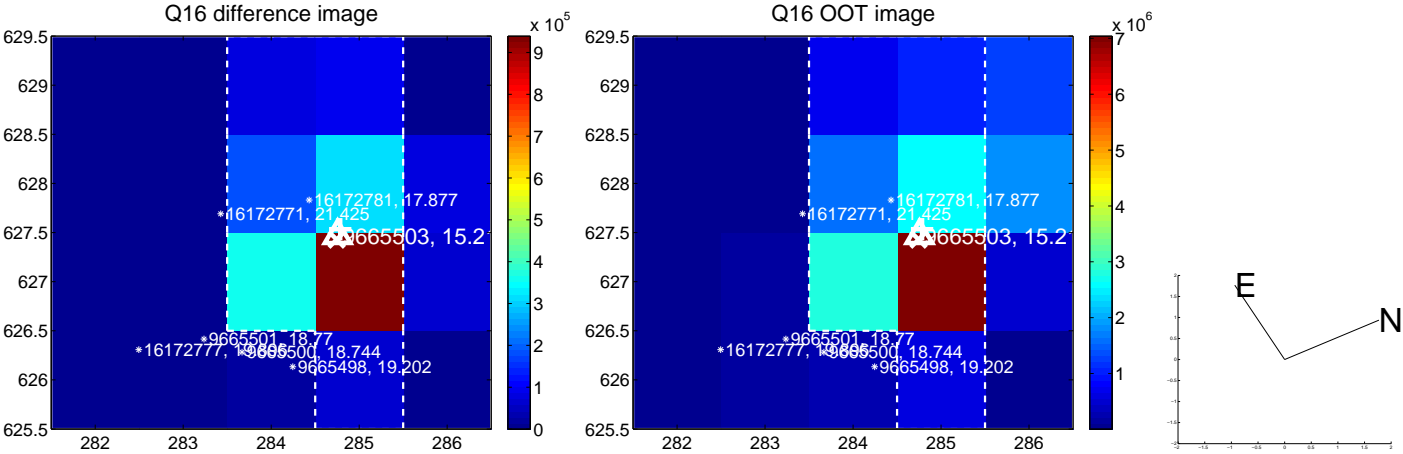
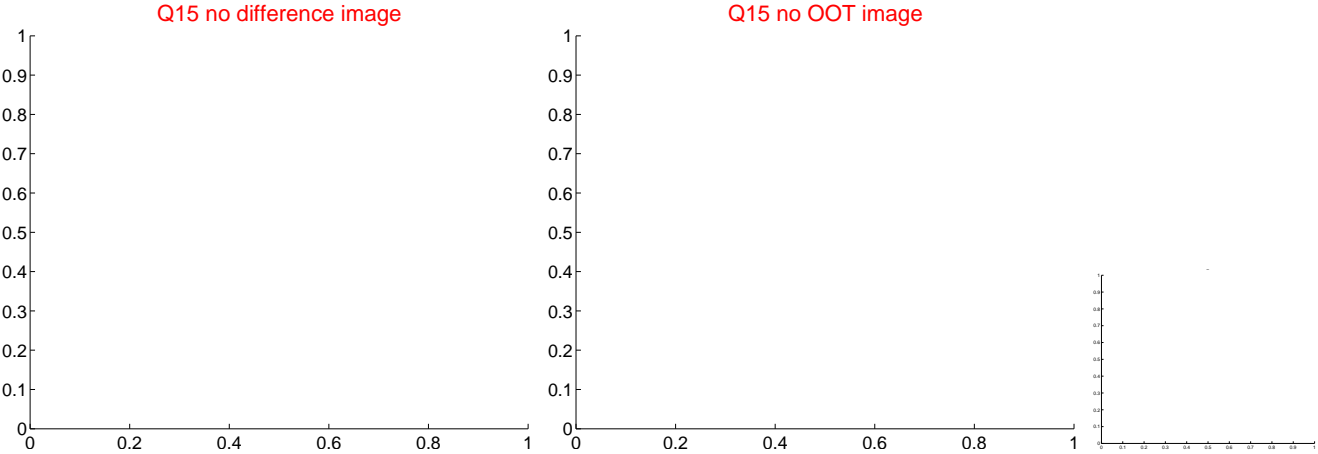
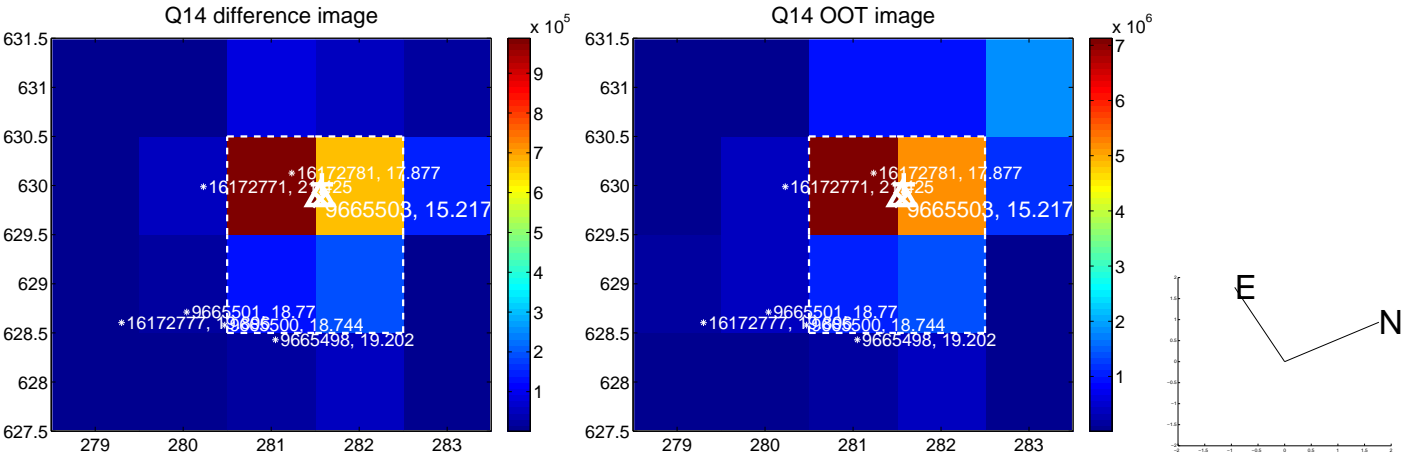
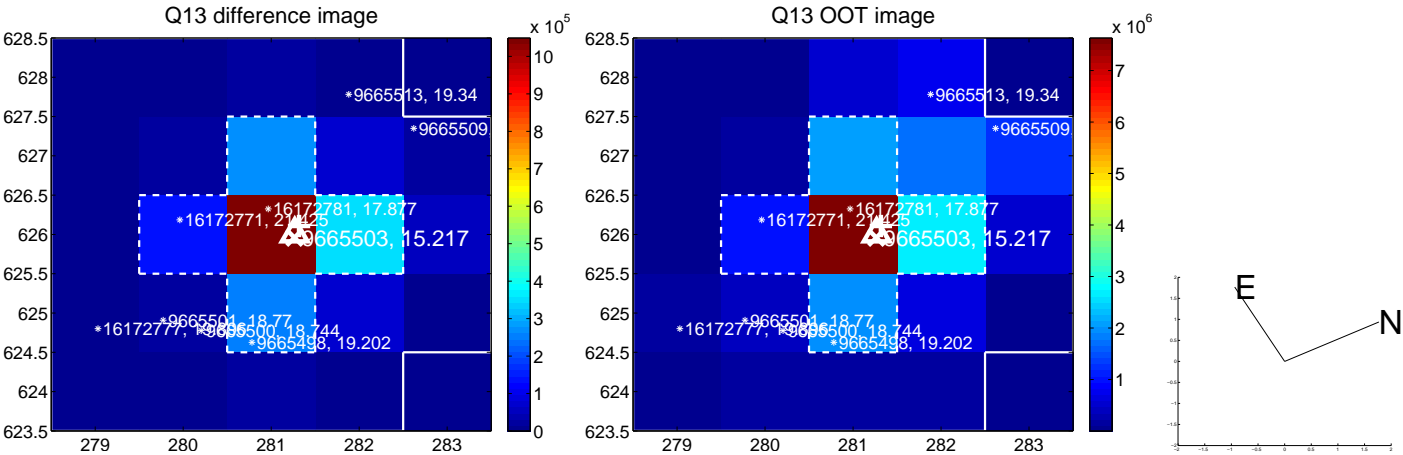
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



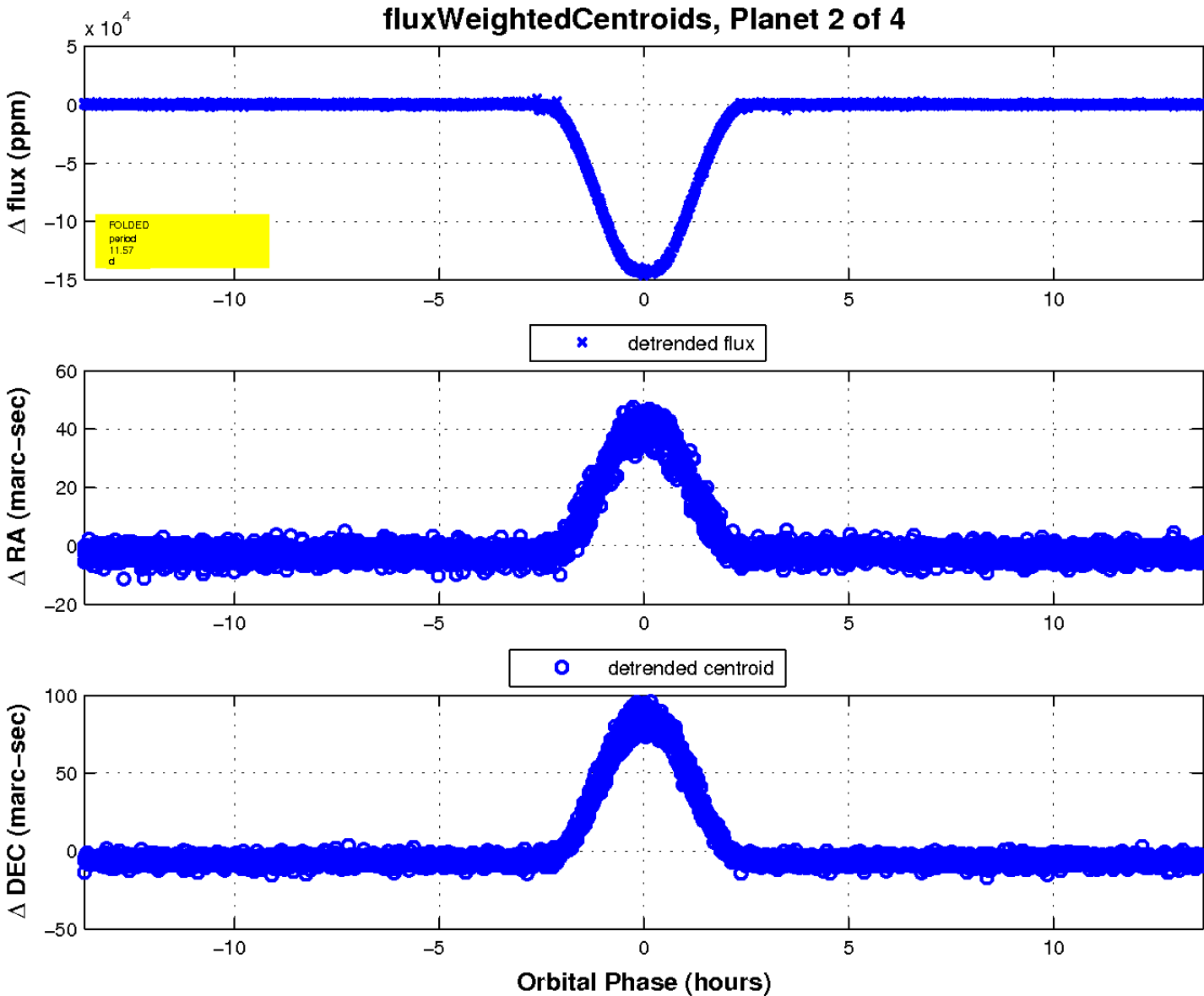
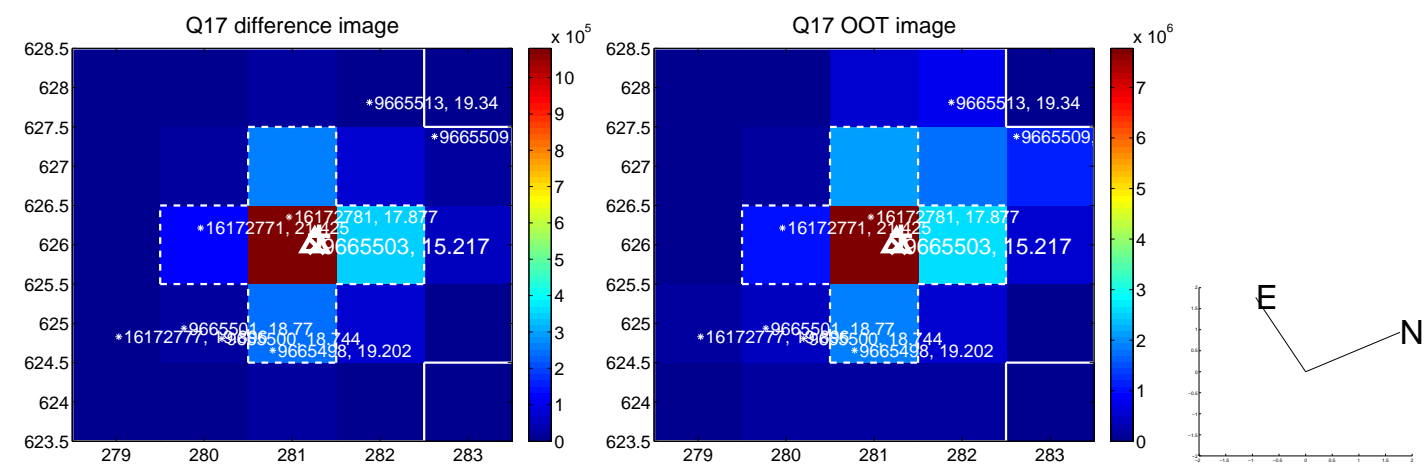
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

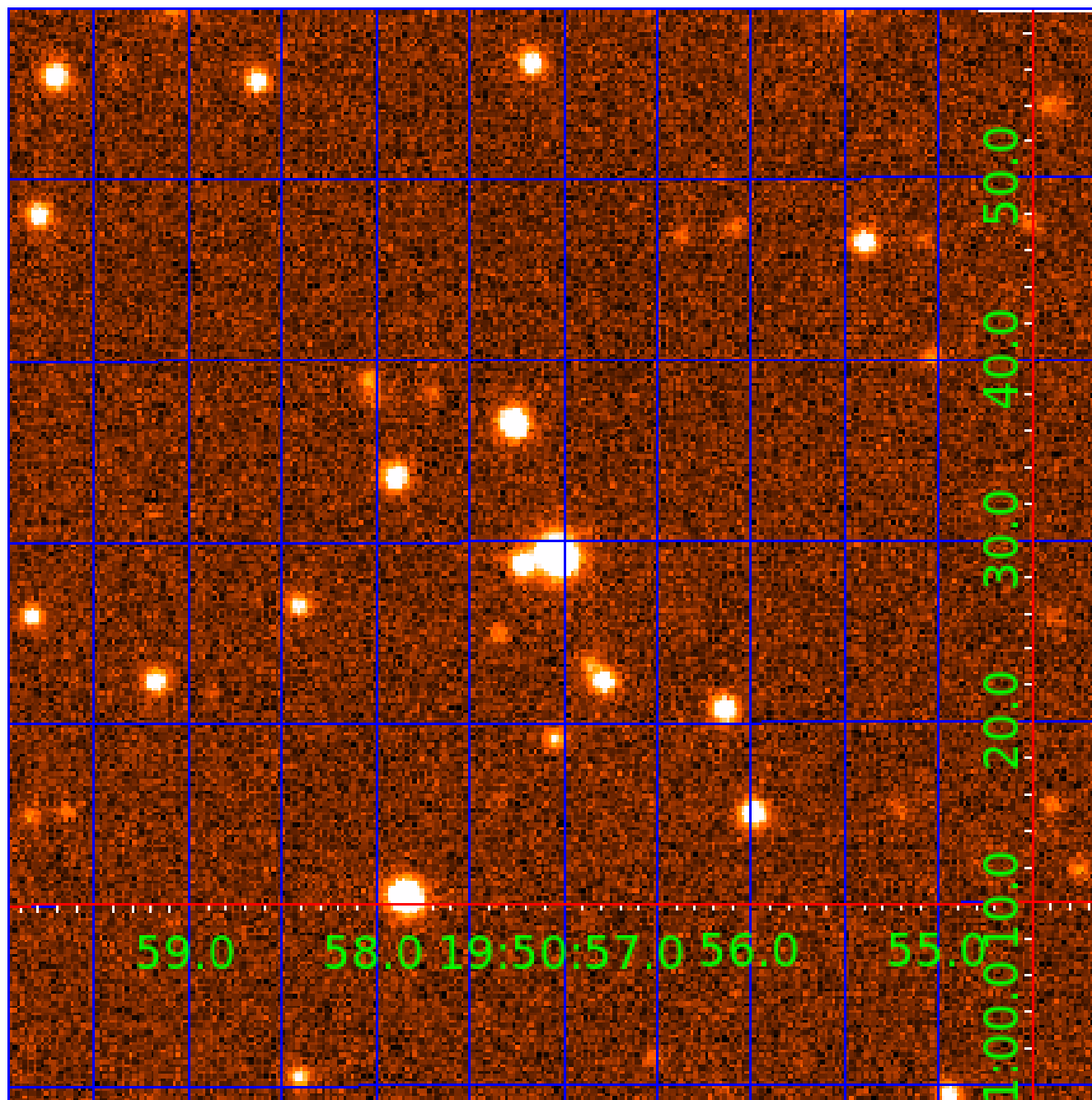


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 009665503

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})
009665503-01	OBS	7221.01	11.568034	137.334558	414018.4	3.500	11420.1	-1.0	0.65	5290	35.36	36.76
009665503-02	OBS	No	11.567979	133.331728	144567.3	4.556	3722.9	2447.9	0.65	5290	36.52	36.76
009665503-03	OBS	No	5.784115	131.790252	39892.8	15.000	916.9	-1.0	0.65	5290	12.79	92.64
009665503-04	OBS	No	143.501148	230.166355	1568.3	15.793	10.2	9.5	0.65	5290	4.96	1.28

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009665503-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_ALT—MOD_ODDEVEN_ALT—HAS_SEC_TCE—CENT_NOFITS
009665503-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE—CENT_KIC_POS
009665503-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_POS_ALT—RESIDUAL_TCE—CENT_NOFITS
009665503-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS

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

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

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

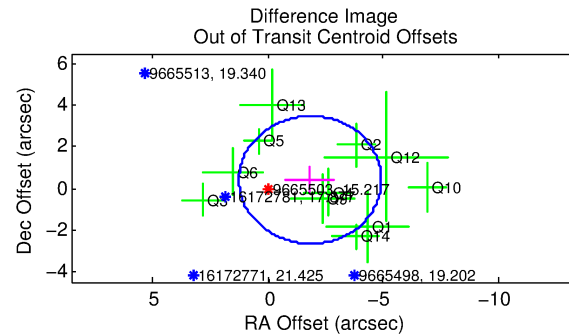
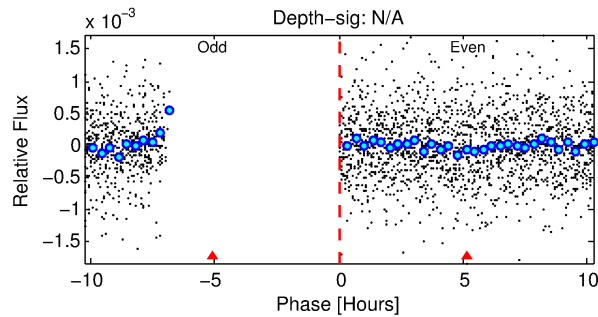
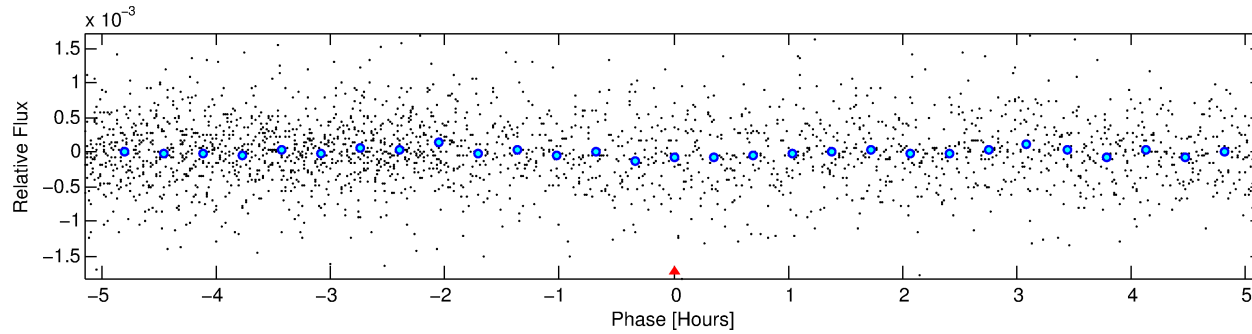
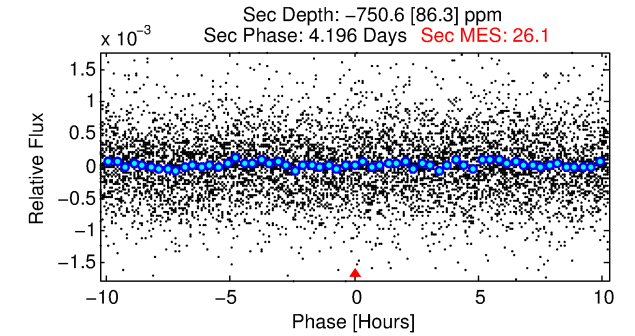
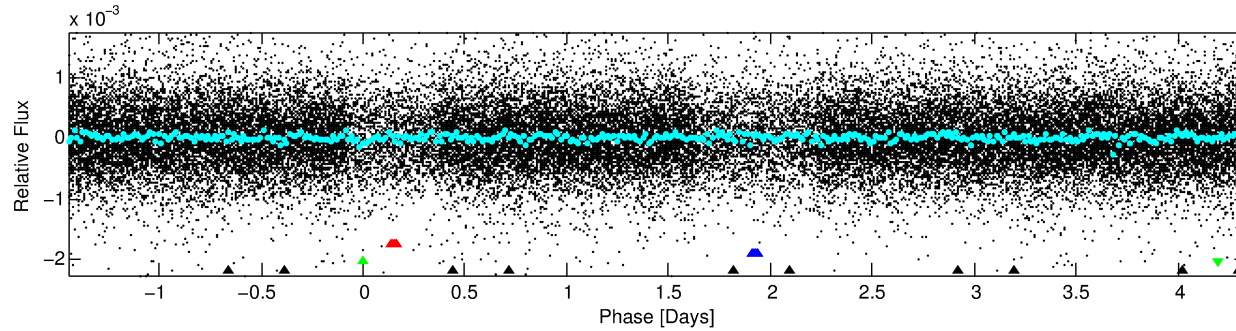
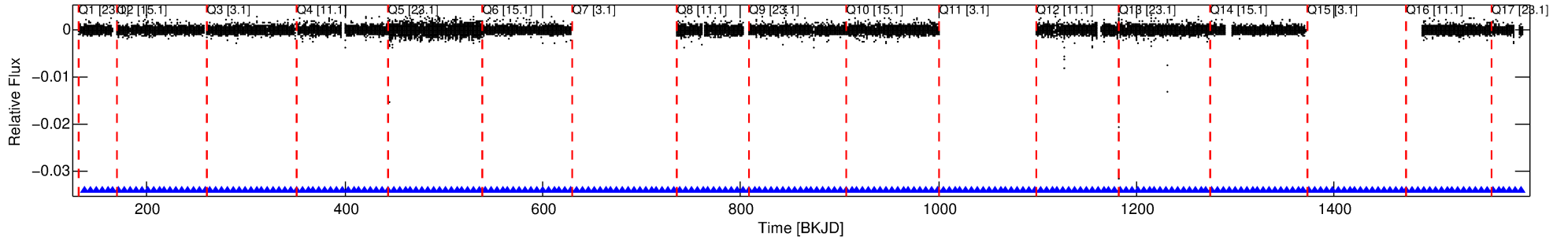
Ephemeris Match Information For 009665503-03

No Significant Match Found

DV One-Page Summary

KIC: 9665503 Candidate: 3 of 4 Period: 5.784 d
KOI: K07221 Corr: No Ephemeris Match

Kp: 15.22 R*: 0.65 Rs Teff: 5290.0 K Logg: 4.67 Fe/H: -0.680



TPS TCE Results:

Period = 5.78411 d
Epoch = 131.7903 BKJD

DV fit results are unavailable

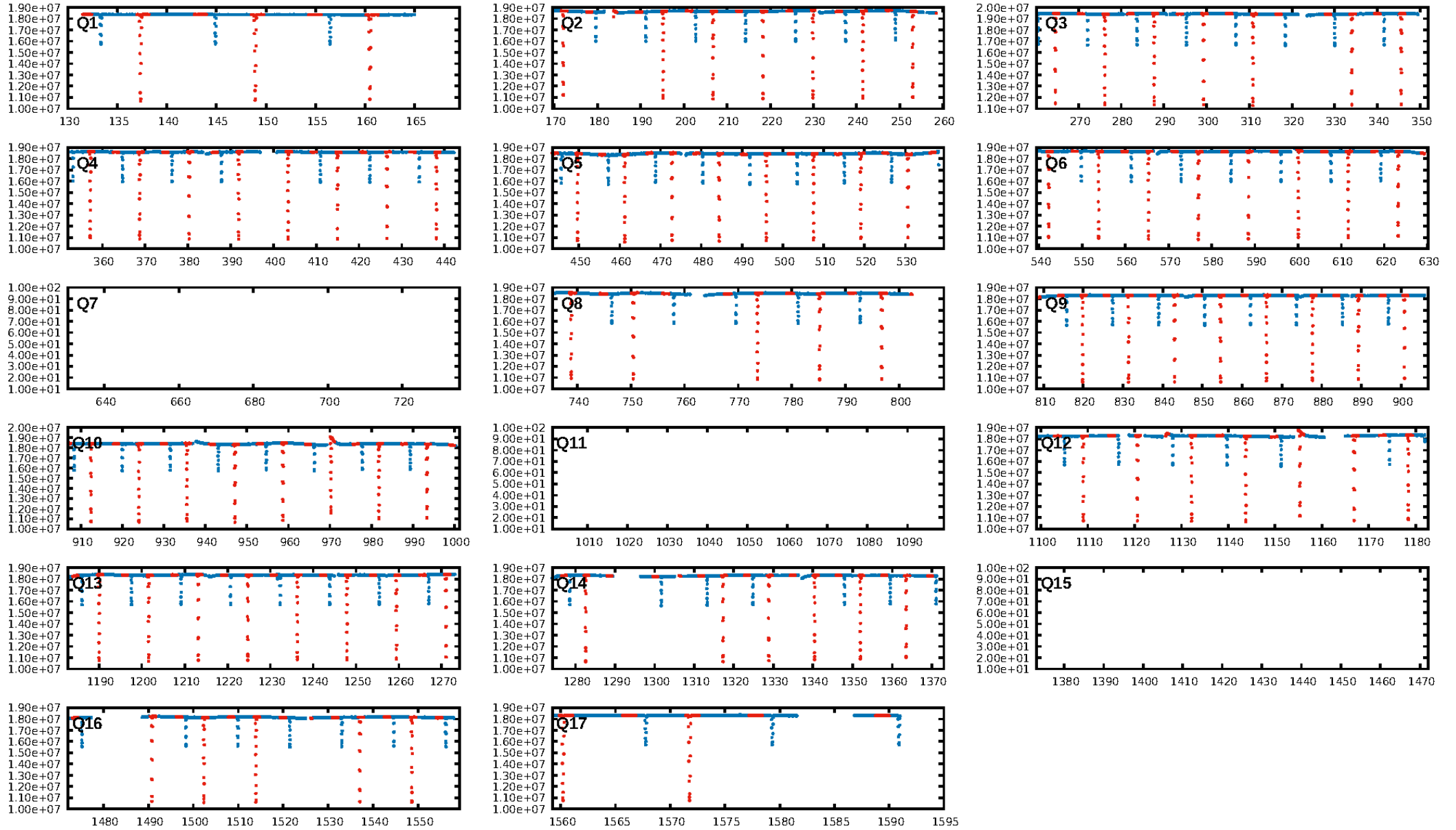
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 100.0% [8.85σ]
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: 0.00e+00
RollingBand-fgt: 1.00 [87/87]
GhostDiagnostic-chr: 0.8338
Centroid-sig: N/A
Centroid-so: 4.868 arcsec [2.03σ]
OotOffset-rm: 1.880 arcsec [1.83σ]
KicOffset-rm: 1.596 arcsec [1.63σ]
OotOffset-st: 4/1/2/4 [11]
KicOffset-st: 4/1/2/4 [11]
DiffImageQuality-fgm: 0.09 [1/11]
DiffImageOverlap-fno: 1.00 [14/14]

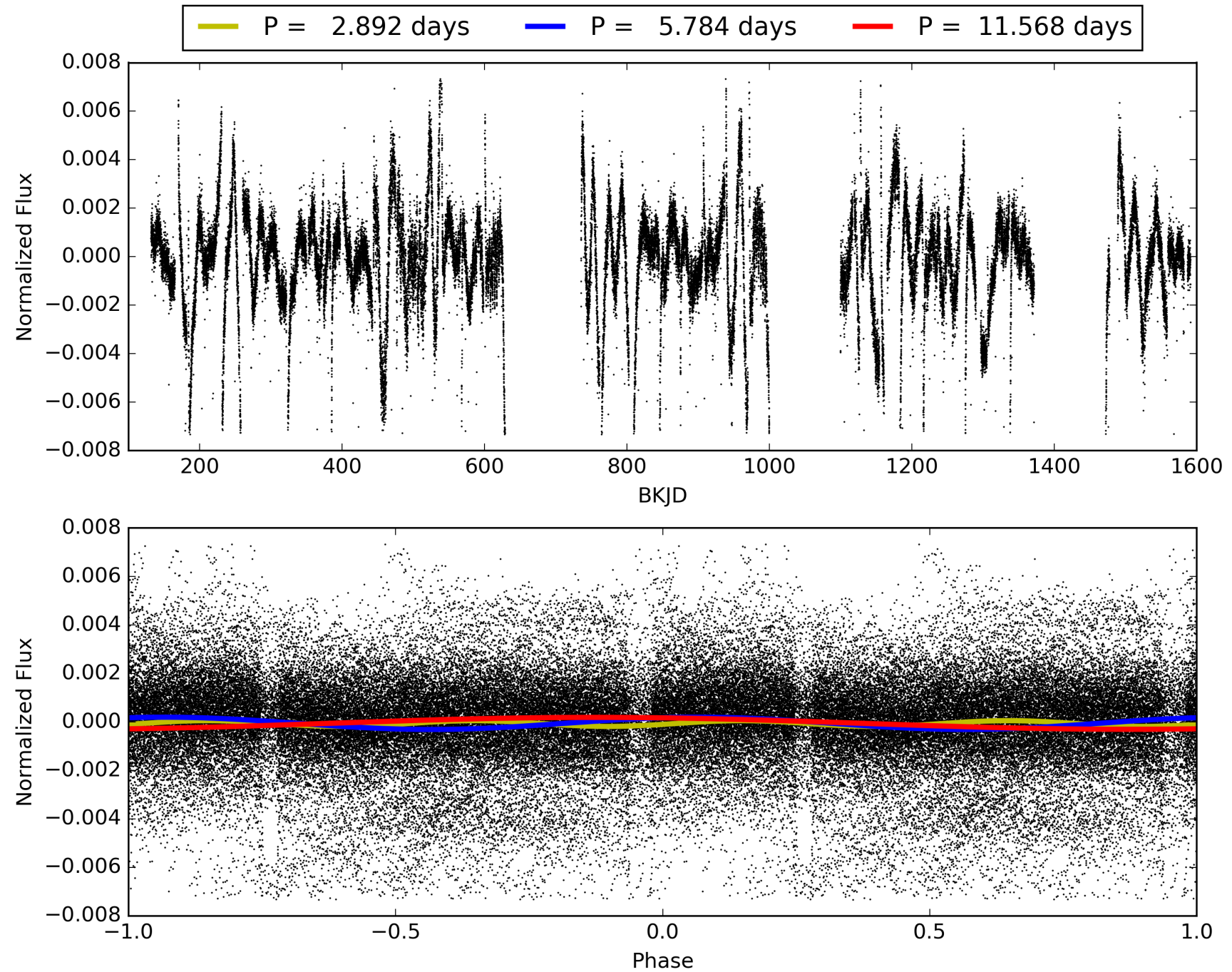
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 07:46:10 Z

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

TCE 009665503-03, PDC Light Curves

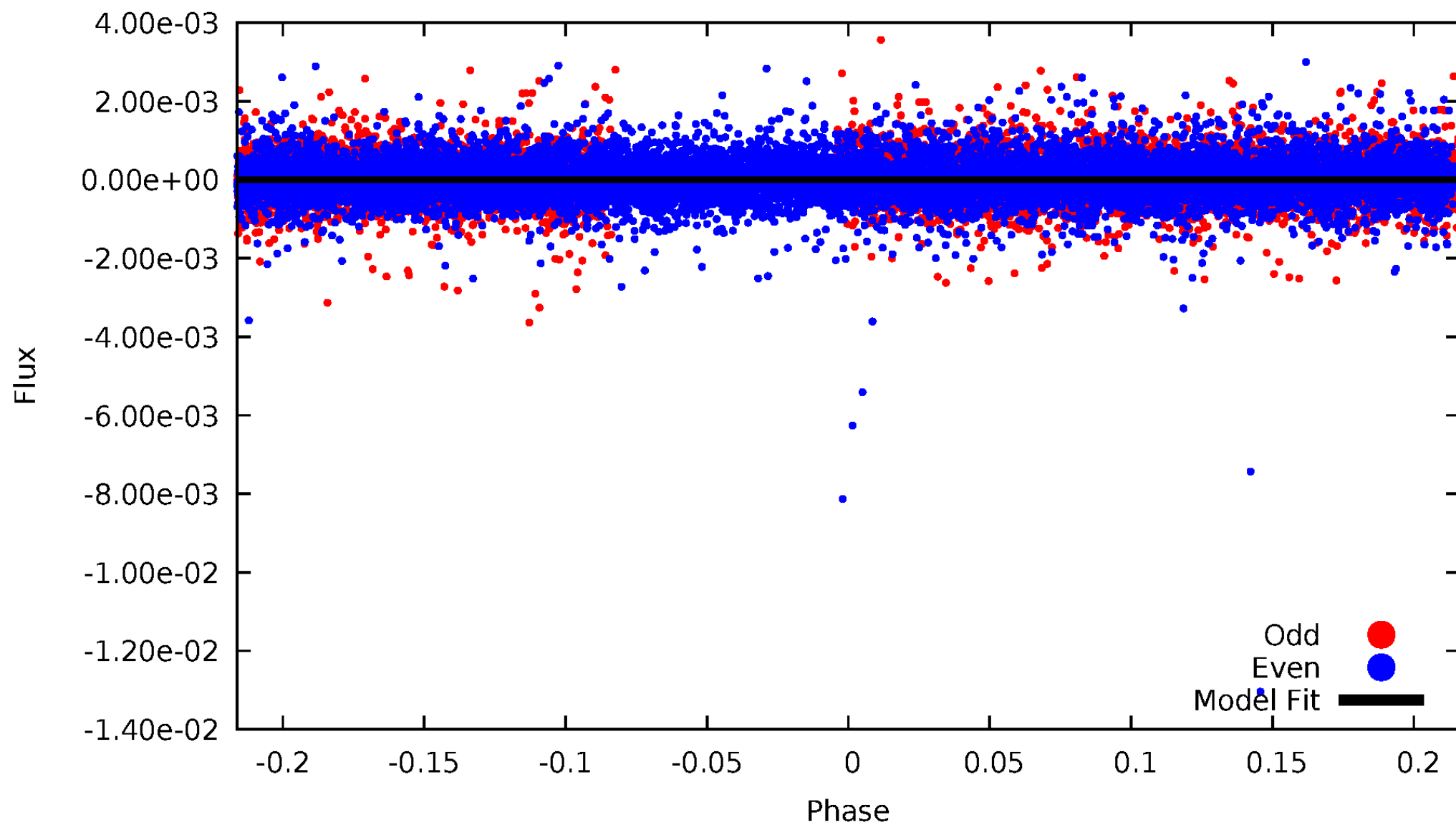


TCE 009665503-03



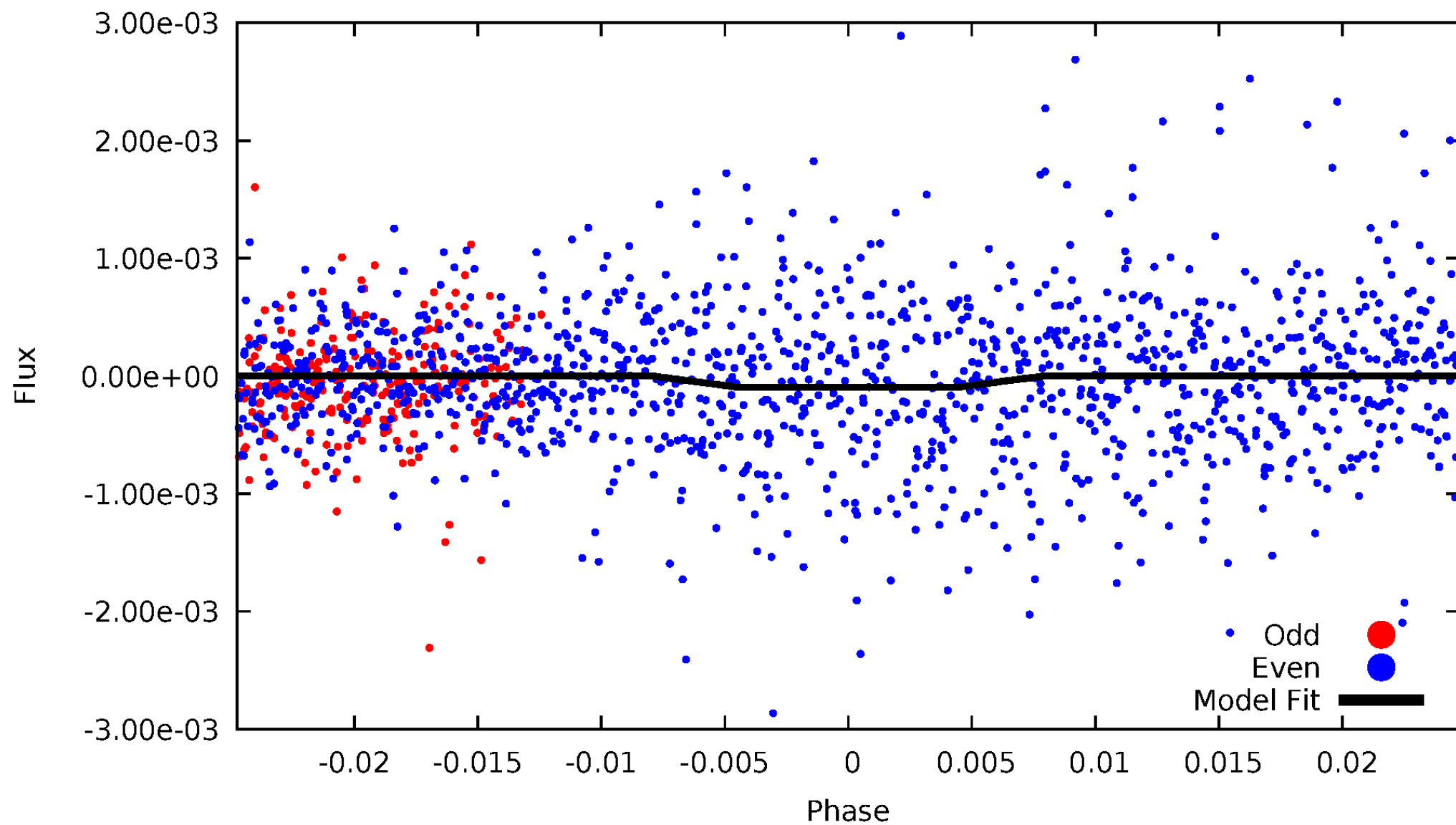
DV Odd/Even

TCE 009665503-03



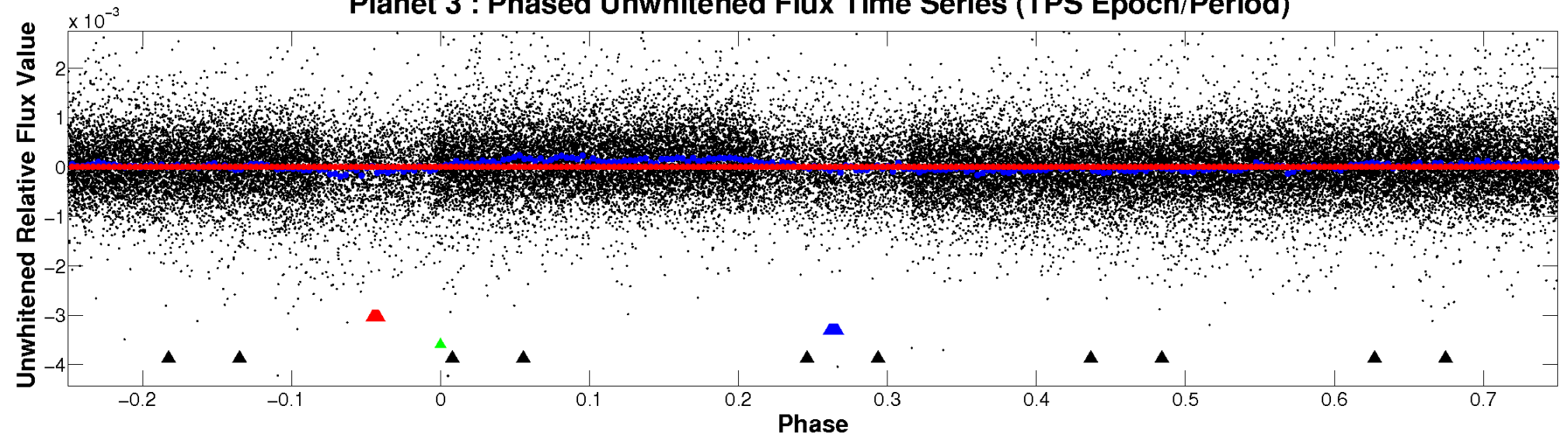
ALT Odd/Even

TCE 009665503-03

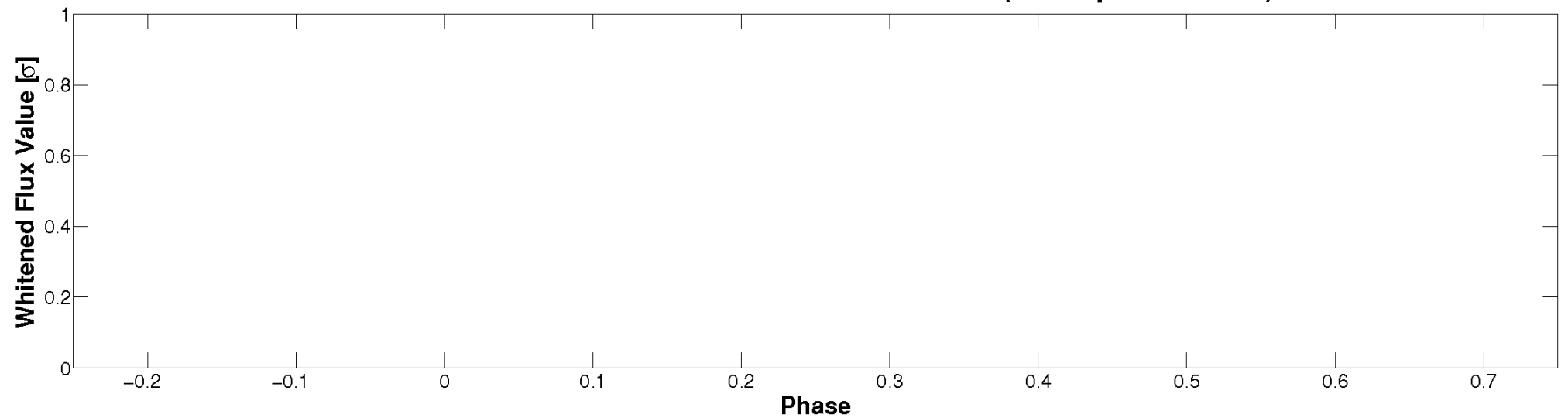


Non-Whitened Vs. Whitened Light Curve

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

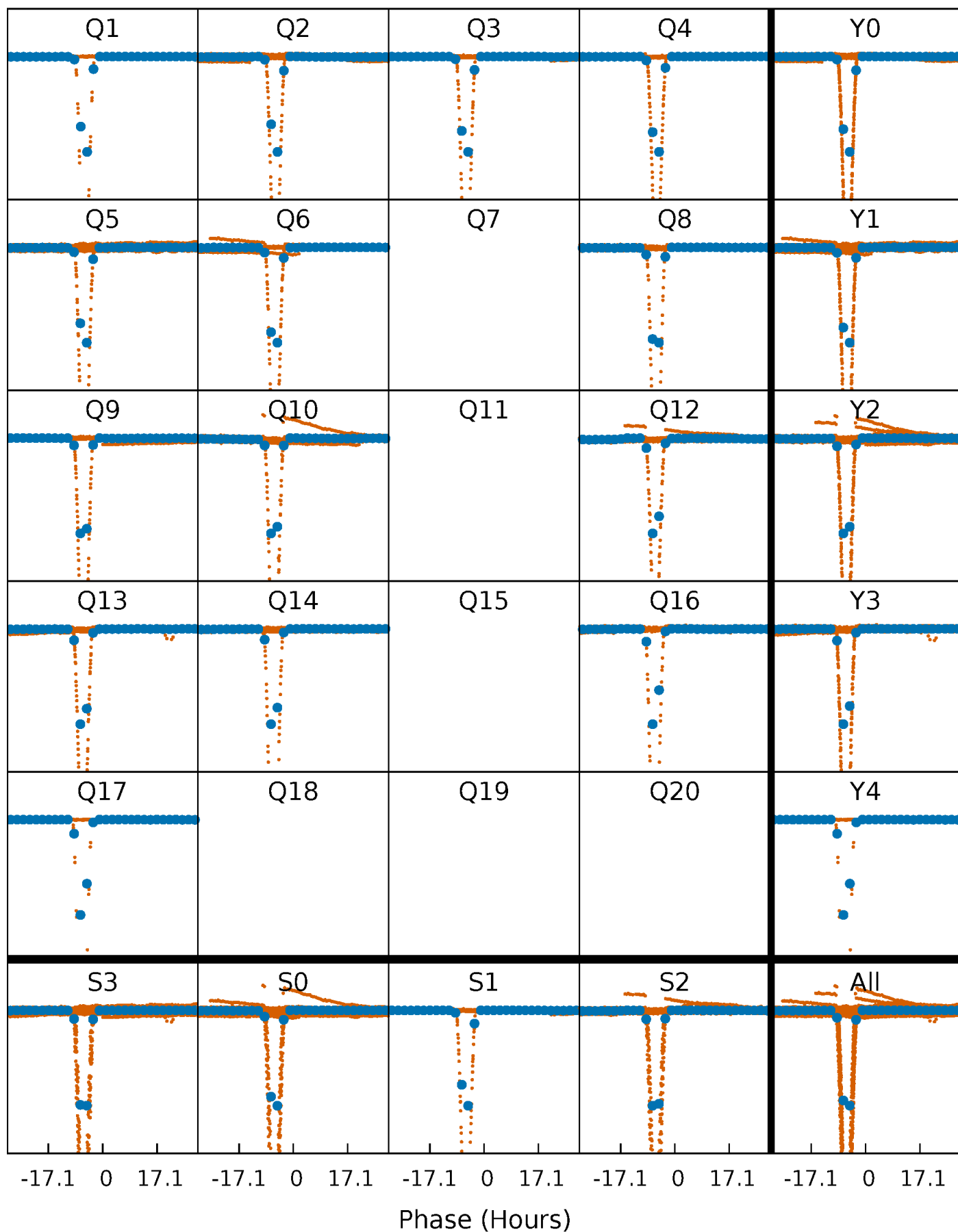


Planet 3 : Phased Whitened Flux Time Series (TPS Epoch/Period)



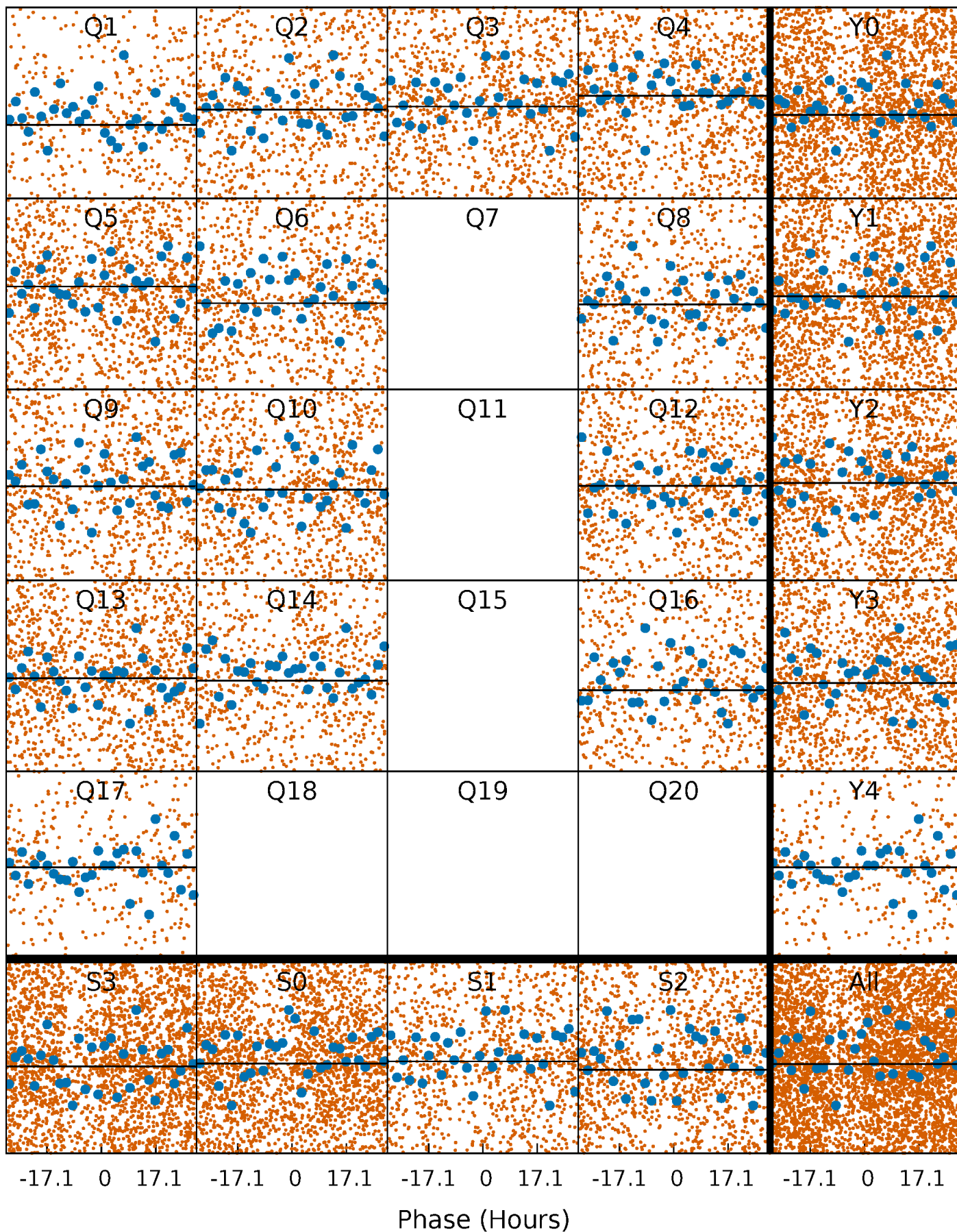
PDC Quarter-Phased Transit Curves

TCE 009665503-03 P= 5.784115 Days $T_0=131.790253$ (BKJD)



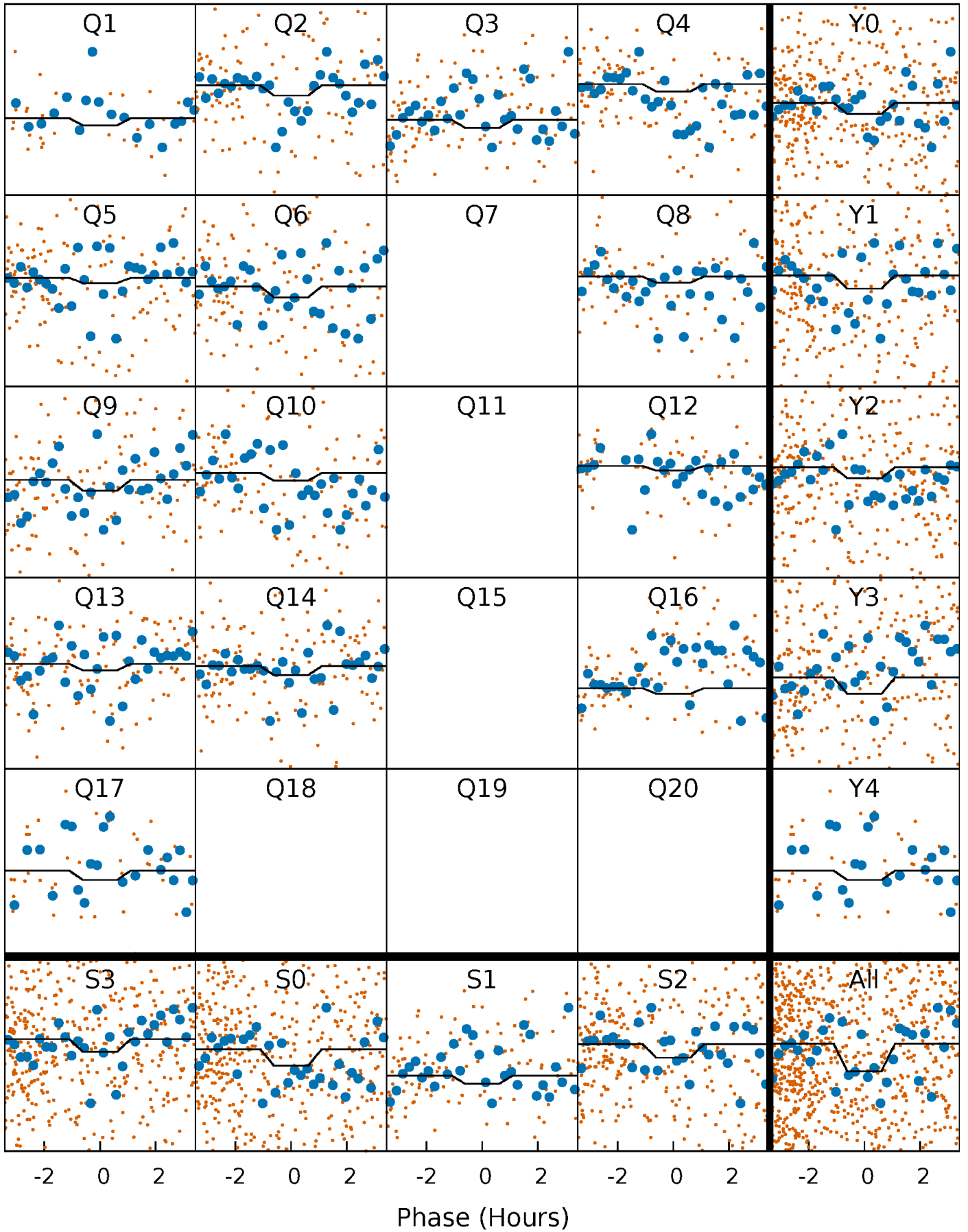
DV Quarter-Phased Transit Curves

TCE 009665503-03 P= 5.784115 Days $T_0=131.790253$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

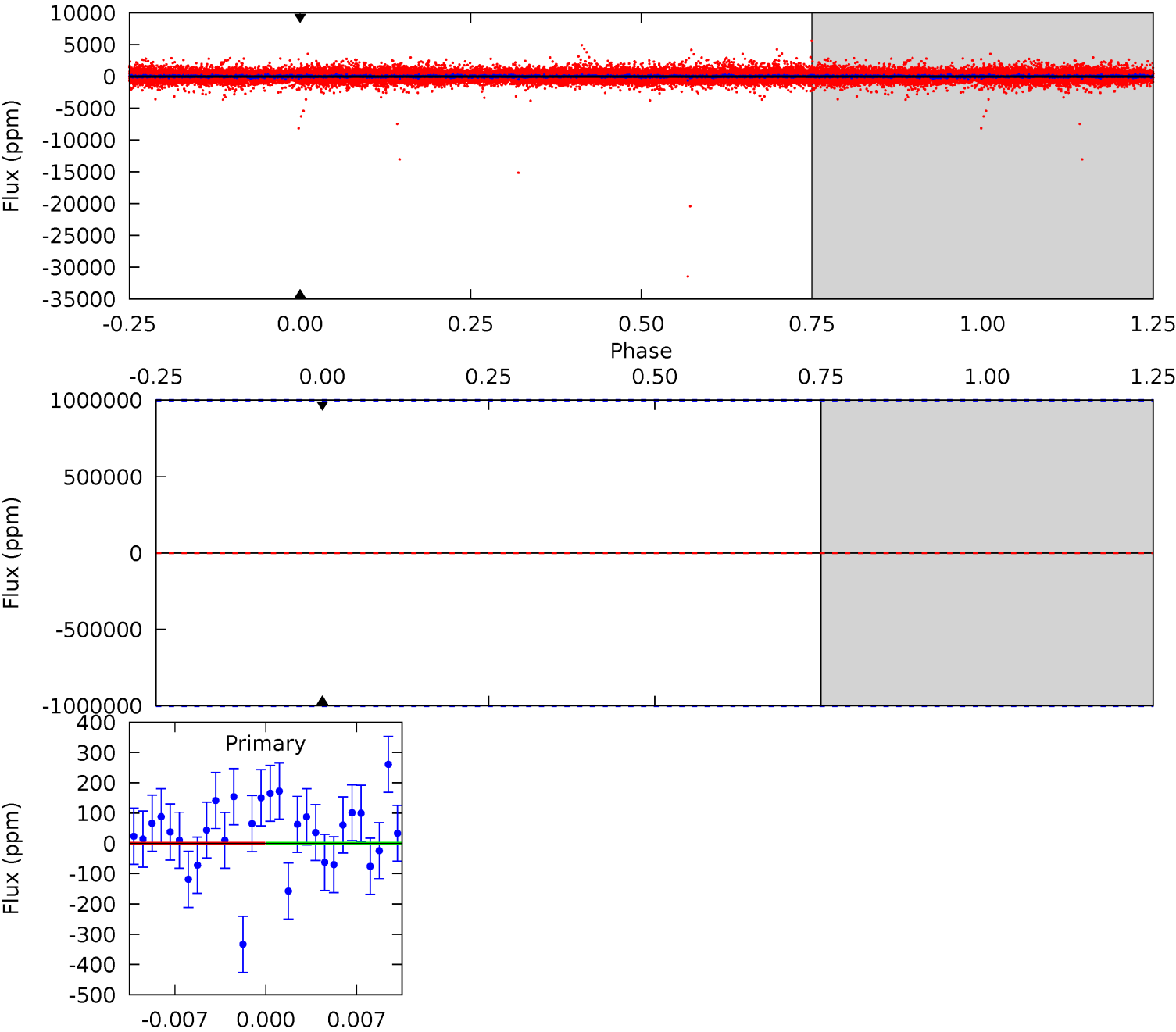
TCE 009665503-03 P= 5.784115 Days $T_0=137.175526$ (BKJD)



DV Model-Shift Uniqueness Test

009665503-03, P = 5.784115 Days, E = 126.006138 Days

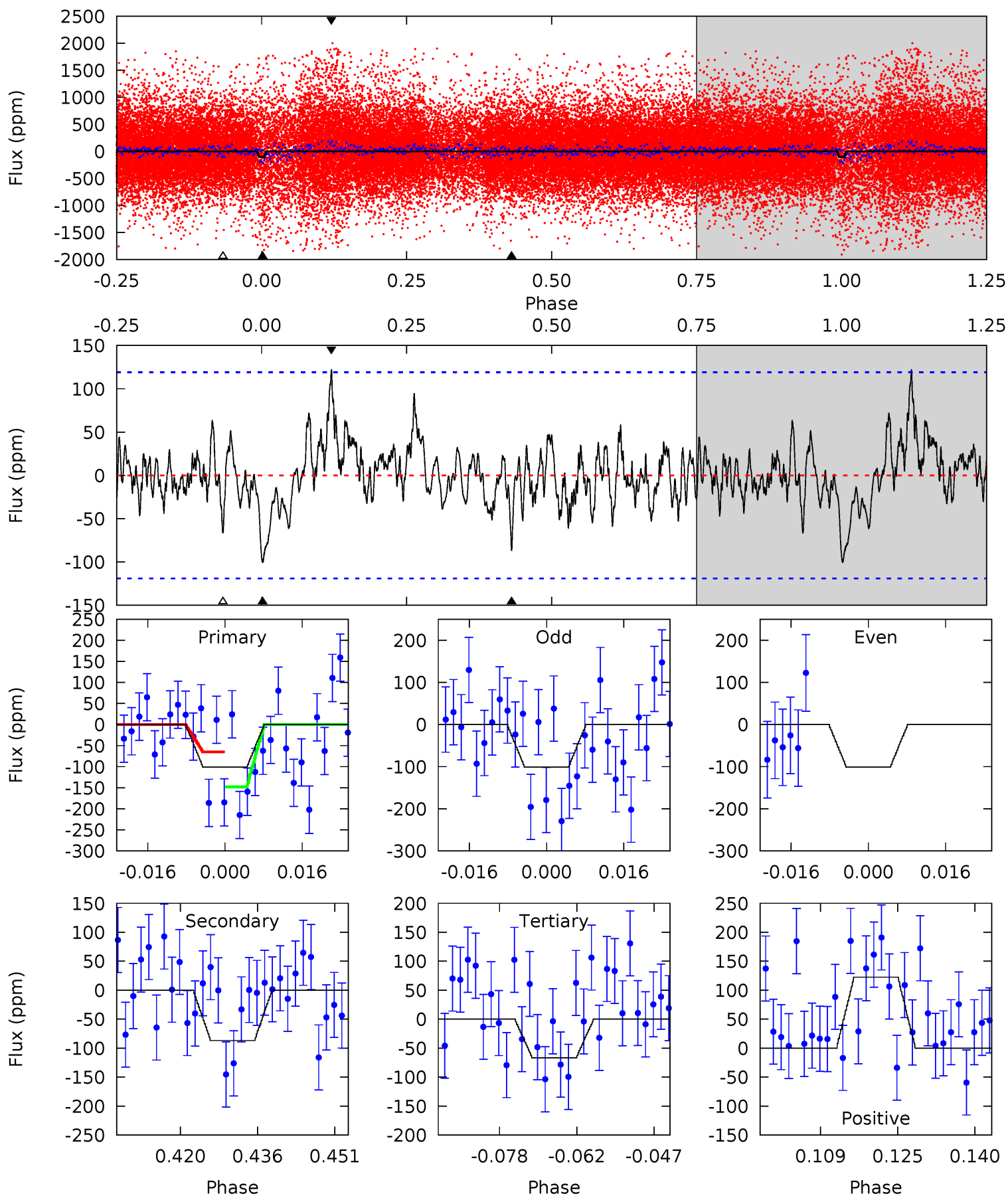
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



Alt Model-Shift Uniqueness Test

009665503-03, P = 5.784115 Days, E = 131.391411 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
4.20	3.61	2.78	5.09	4.94	2.42	1.18	1.42	-0.89	0.83	-1.48	0	1.21	0.55	1.72



Stellar Parameters For KIC 009665503

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	$M(M_{\odot})$	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	5290^{+159}_{-143}	$4.669^{+0.028}_{-0.083}$	$-0.680^{+0.300}_{-0.300}$	$0.648^{+0.085}_{-0.039}$	$0.723^{+0.062}_{-0.068}$	$3.750^{+0.433}_{-0.988}$
	+3%/-3%	+1%/-2%	+44%/-44%	+13%/-6%	+9%/-9%	+12%/-26%
Source	PHO1	KIC0	KIC0	DSEP		

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

Secondary Eclipse Parameters for KIC 009665503-03 / KOI

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	0 ± 1000000	$13.16^{+6.98}_{-6.41}$	1116^{+44}_{-36}	2307^{+5098}_{-9637}	$1.791^{+1216.214}_{-1186.302}$
Alt.	-87 ± 24	$5.03^{+5.14}_{-3.60}$	1119^{+42}_{-35}	2687^{+1220}_{-500}	$6.141^{+64.564}_{-4.834}$

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

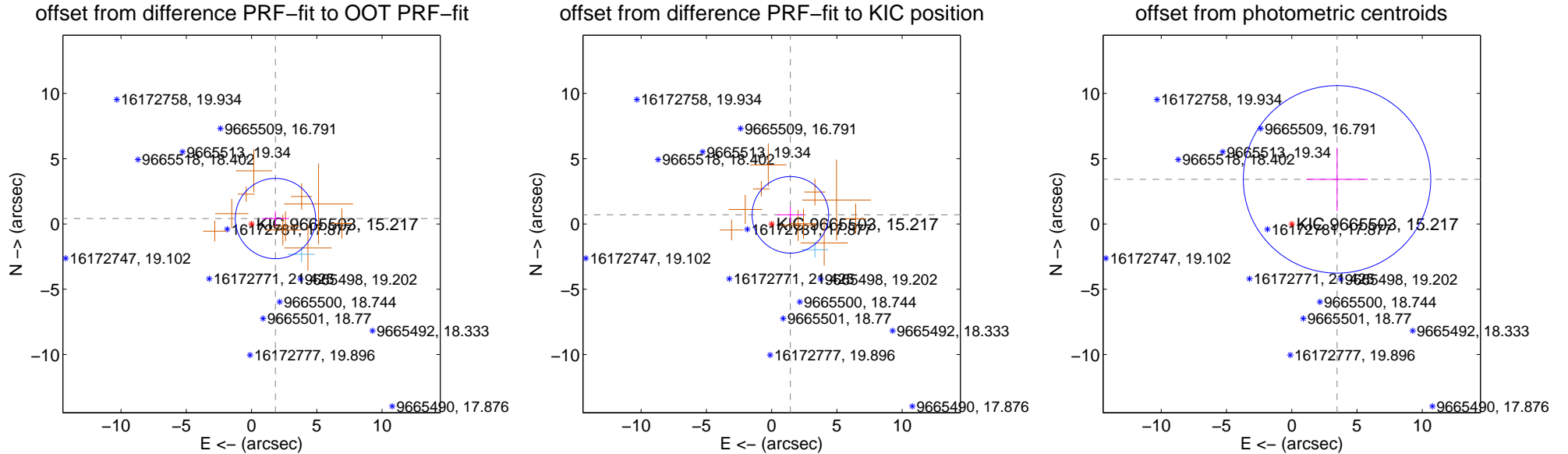
DV Centroid Data

Supplemental centroid analysis for 009665503-03. Kepler magnitude: 15.22. Transit SNR -1.00

There are 1 quarters with good PRF difference image offsets

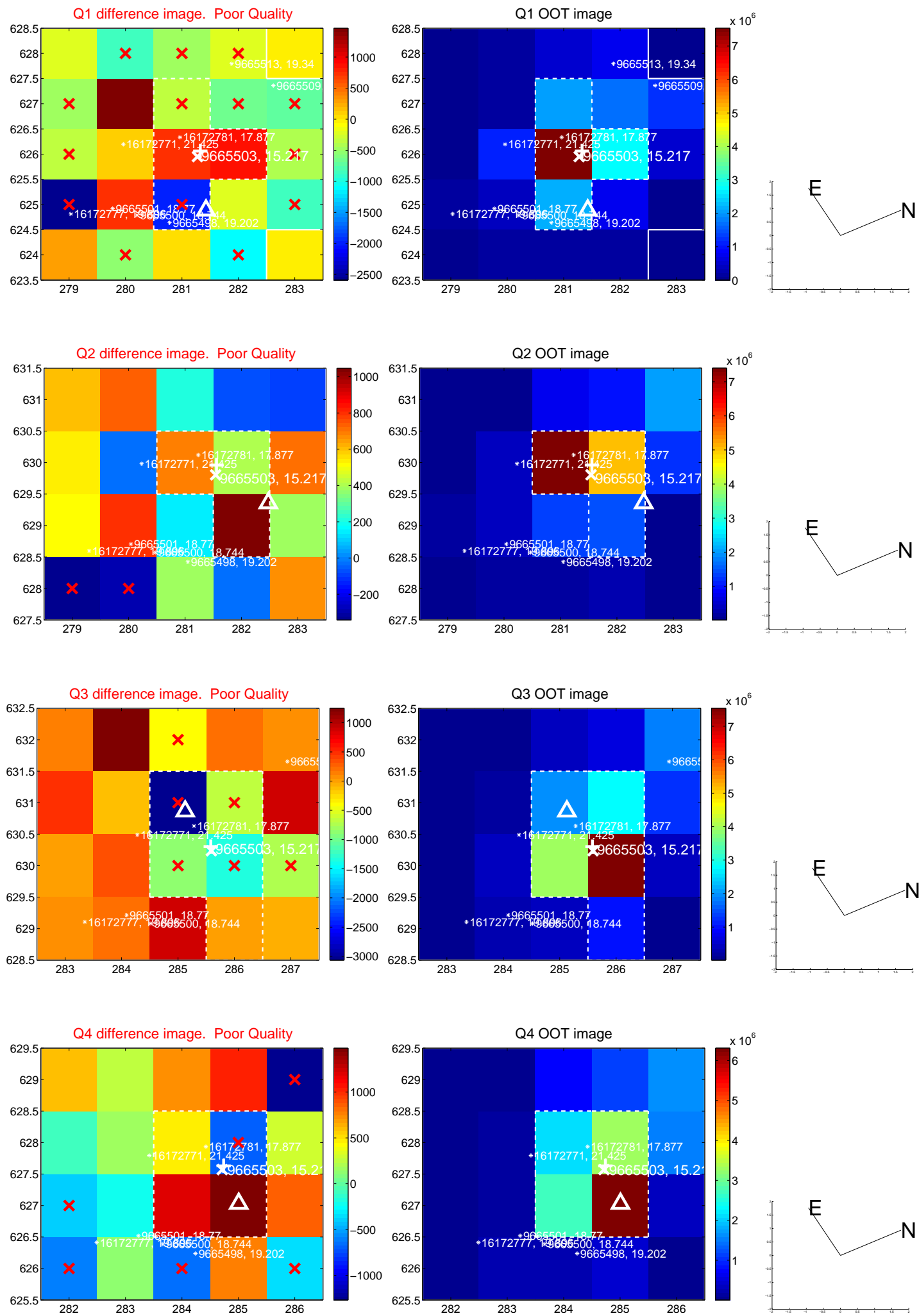
The direct PRF centroid is offset from the target star catalog position by about 0.62 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	1.880 ± 1.025	1.83	-1.833 ± 1.043	0.415 ± 0.588
PRF-fit source offset from KIC position	1.596 ± 0.977	1.63	-1.435 ± 1.045	0.699 ± 0.618
photometric centroid source offset	4.87 ± 2.39	2.03	-3.47 ± 2.36	3.41 ± 2.43

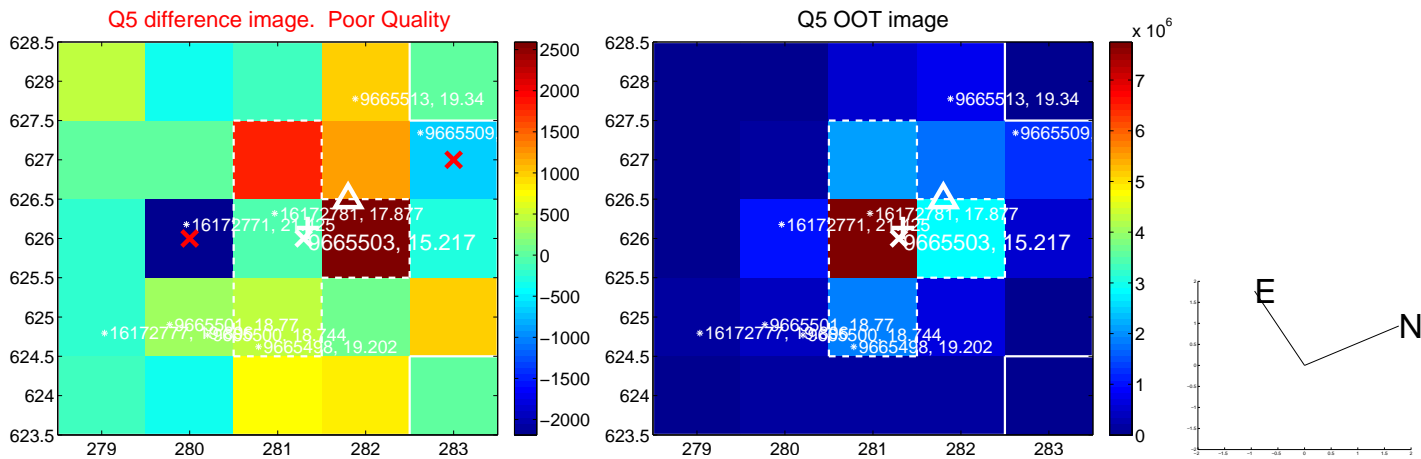


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

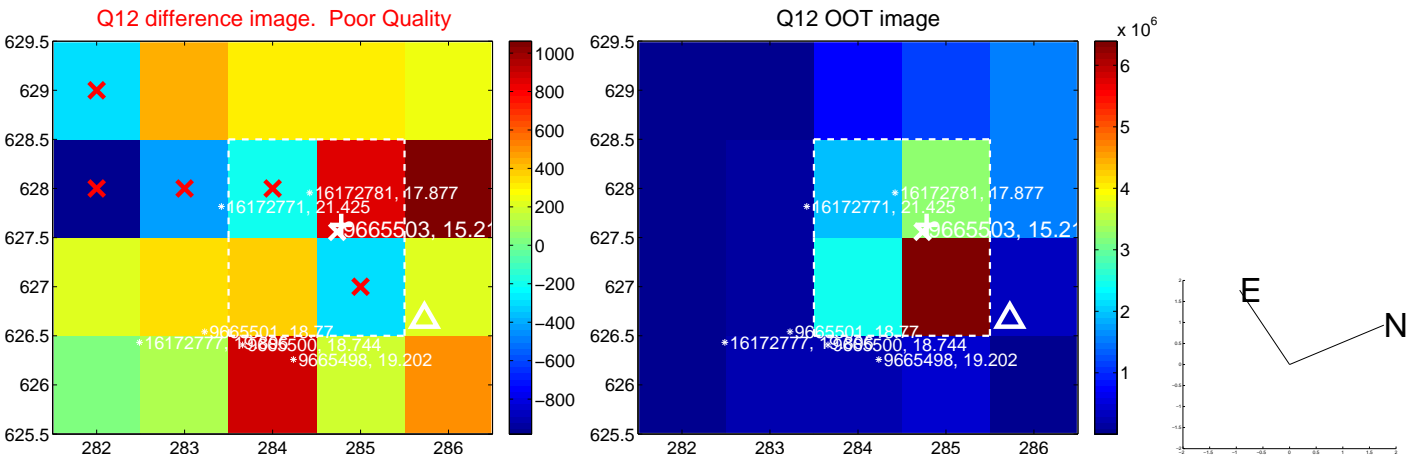
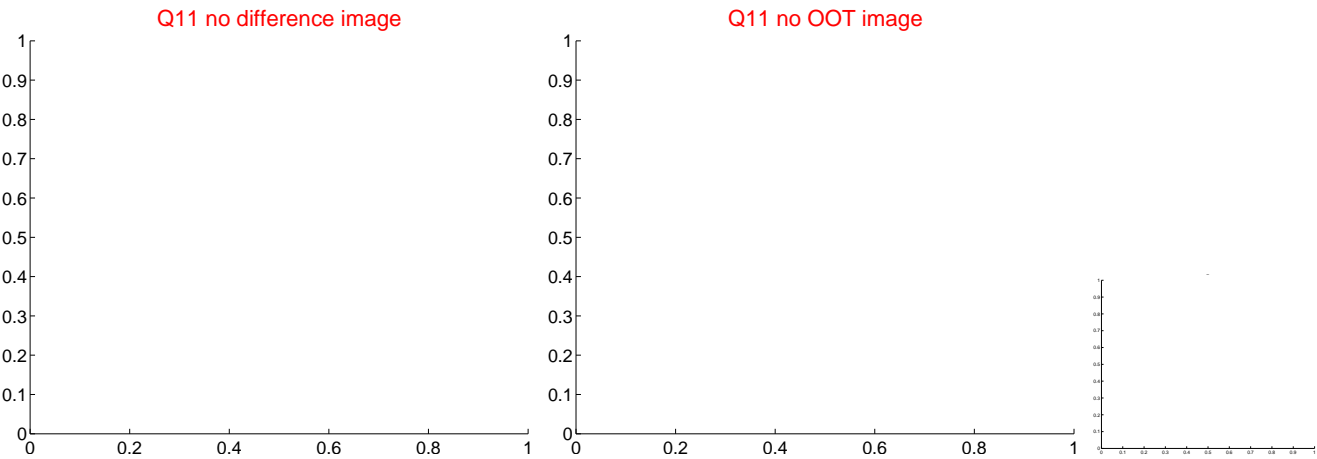
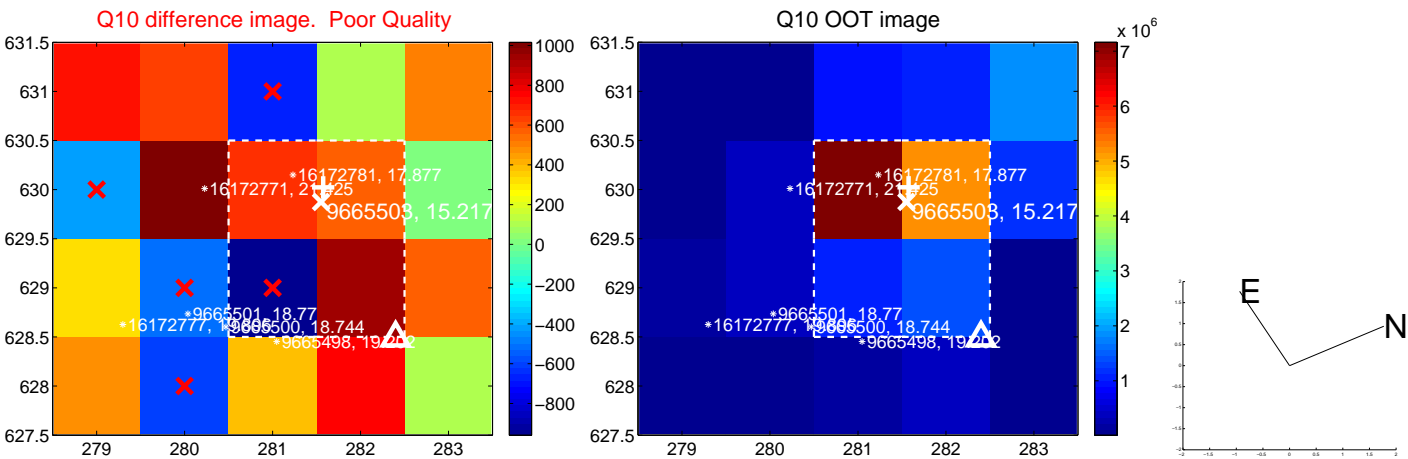
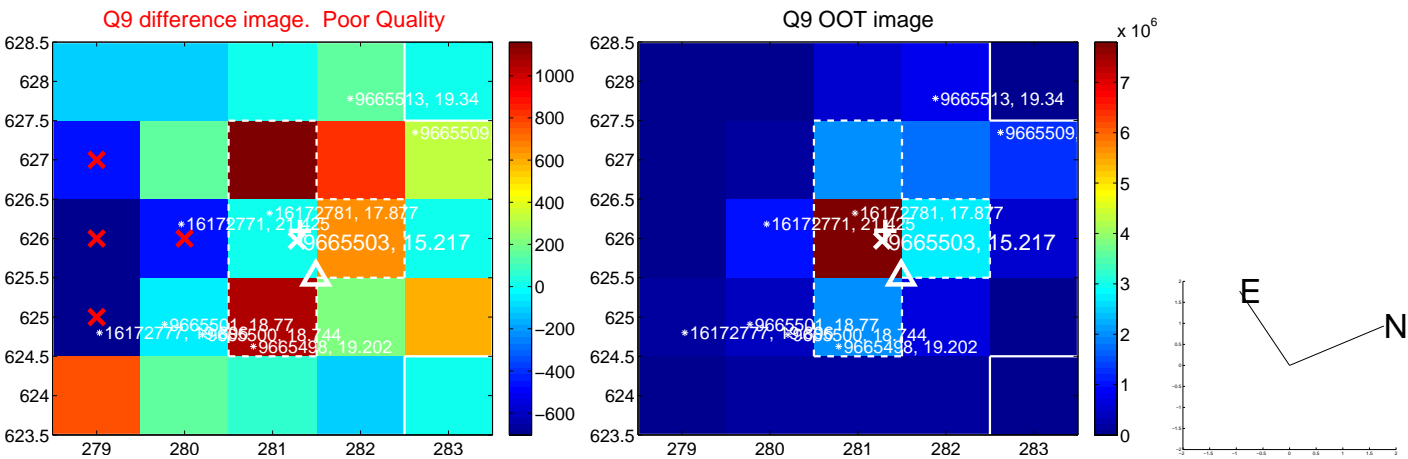
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



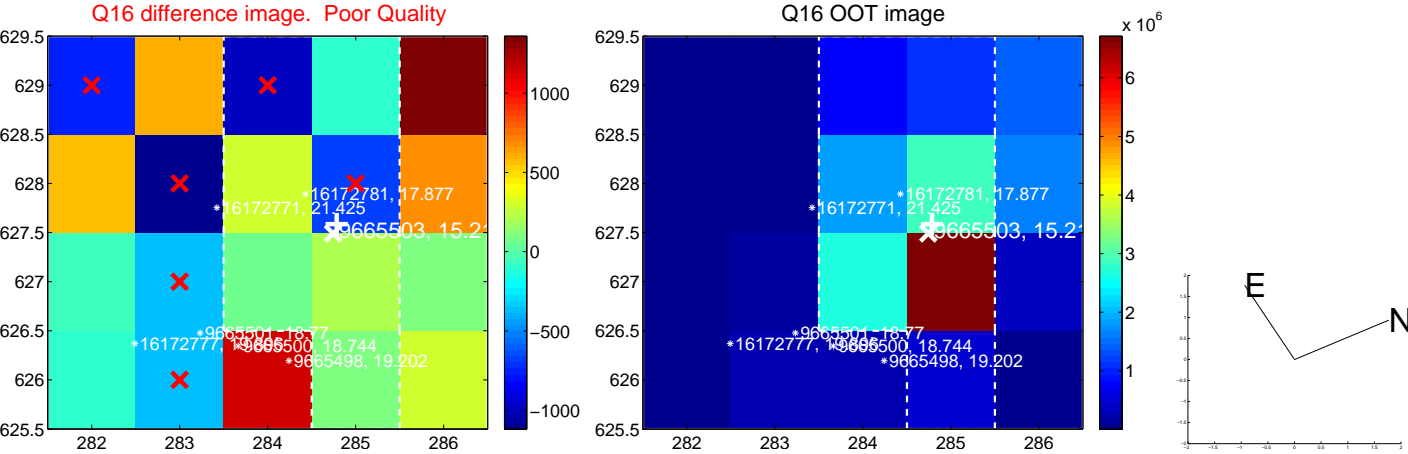
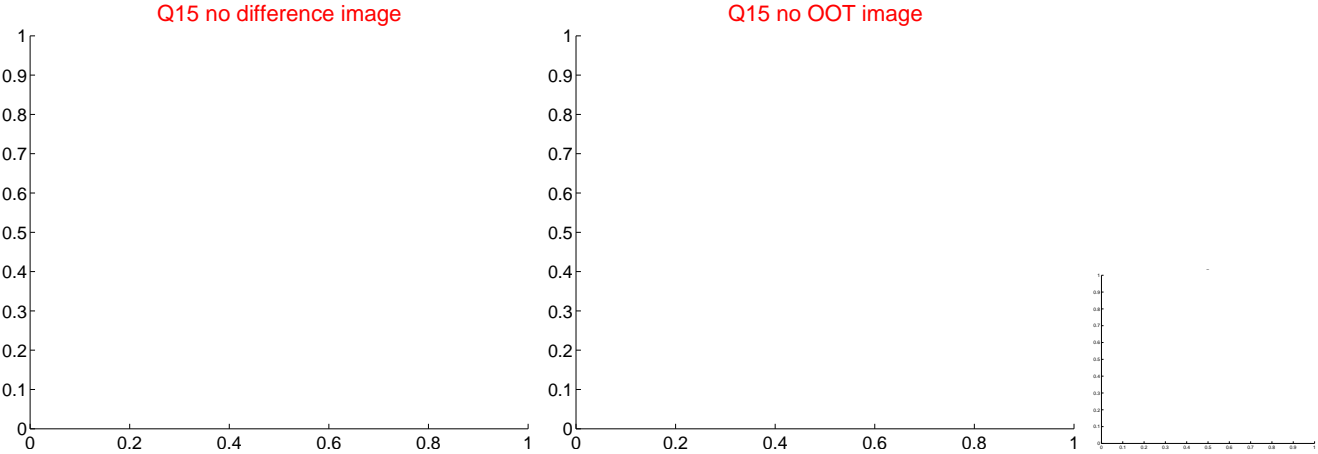
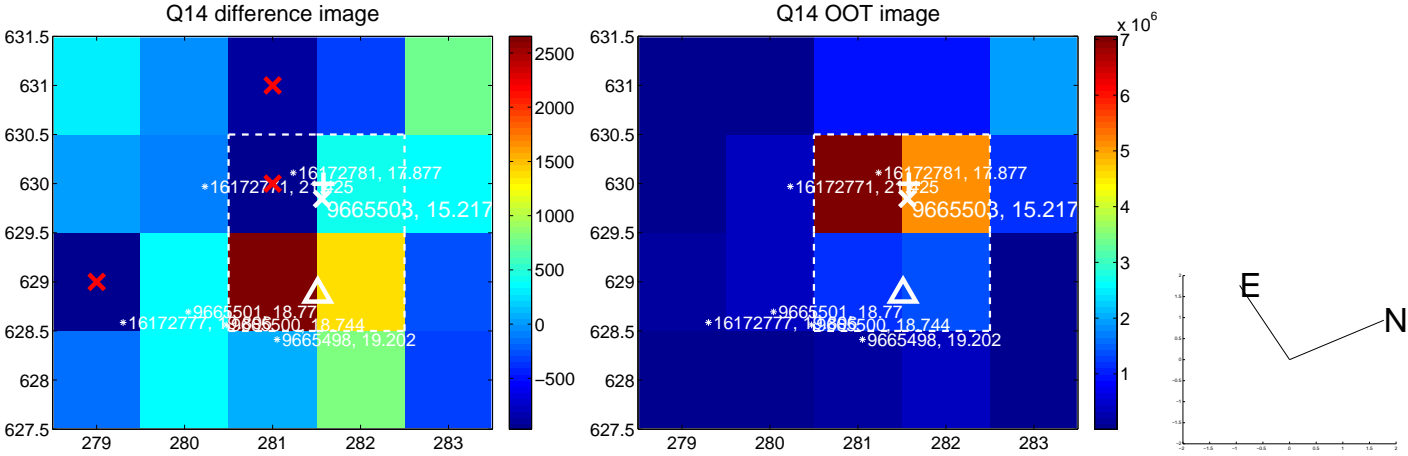
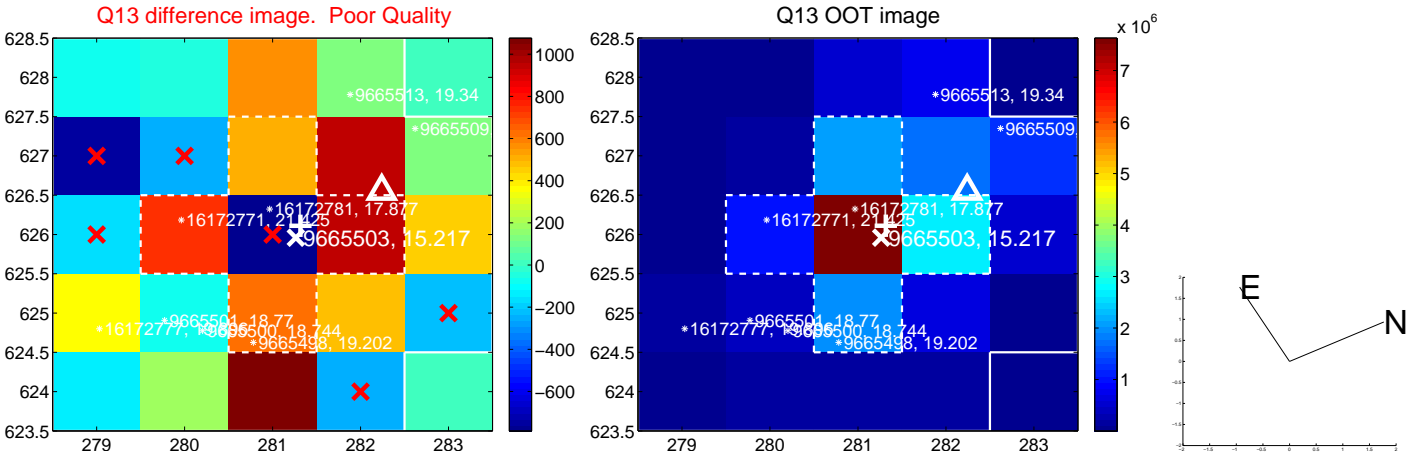
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

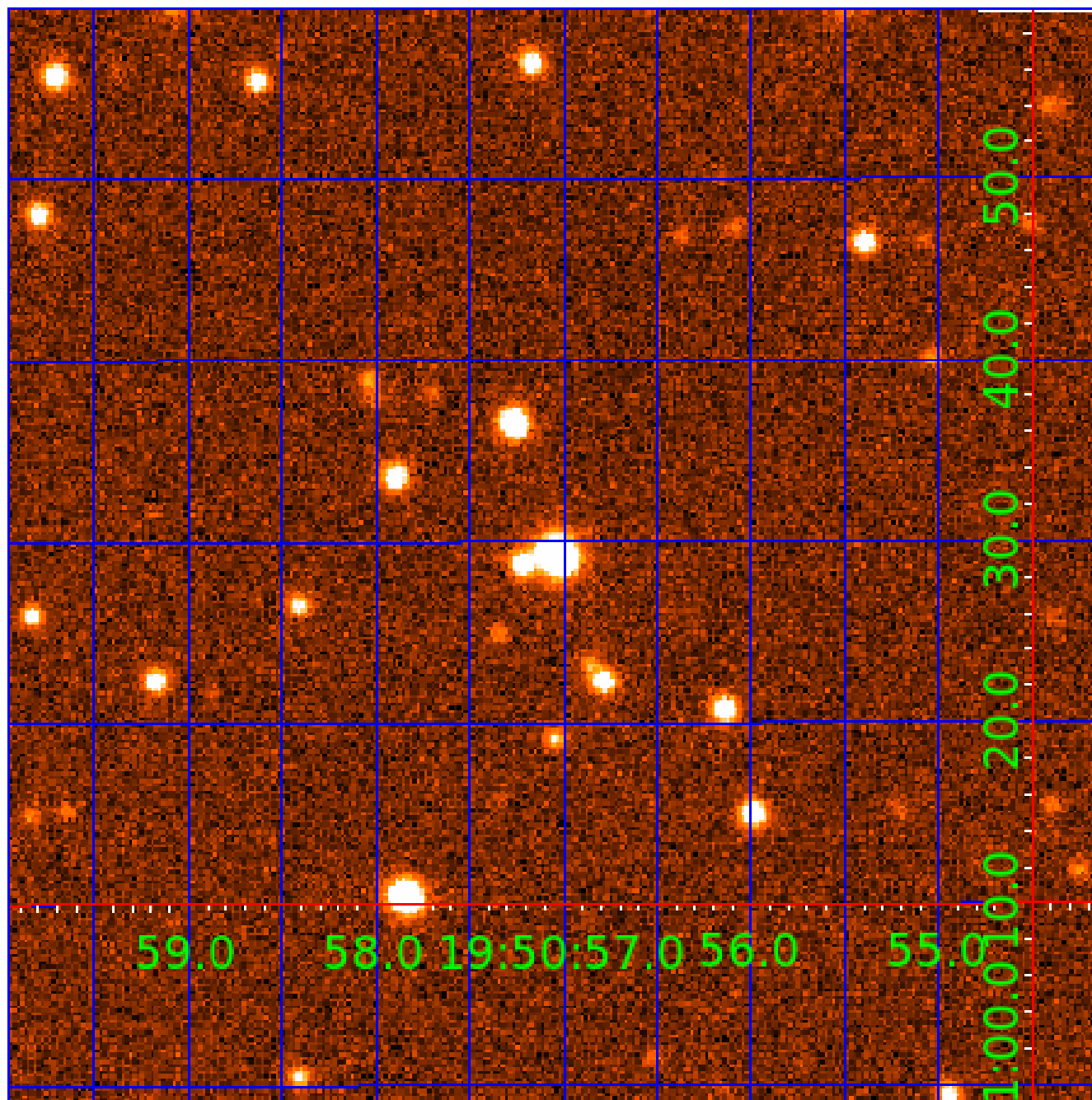


white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 009665503

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})
009665503-01	OBS	7221.01	11.568034	137.334558	414018.4	3.500	11420.1	-1.0	0.65	5290	35.36	36.76
009665503-02	OBS	No	11.567979	133.331728	144567.3	4.556	3722.9	2447.9	0.65	5290	36.52	36.76
009665503-03	OBS	No	5.784115	131.790252	39892.8	15.000	916.9	-1.0	0.65	5290	12.79	92.64
009665503-04	OBS	No	143.501148	230.166355	1568.3	15.793	10.2	9.5	0.65	5290	4.96	1.28

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009665503-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_ALT—MOD_ODDEVEN_ALT—HAS_SEC_TCE—CENT_NOFITS
009665503-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE—CENT_KIC_POS
009665503-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_POS_ALT—RESIDUAL_TCE—CENT_NOFITS
009665503-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS

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

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

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

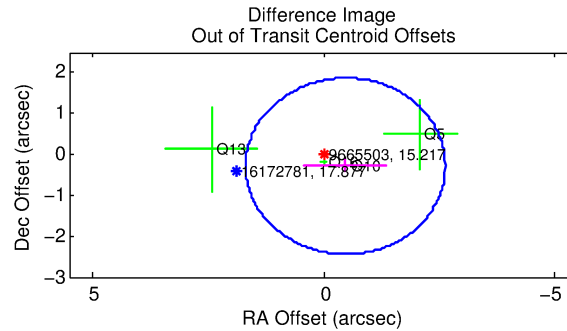
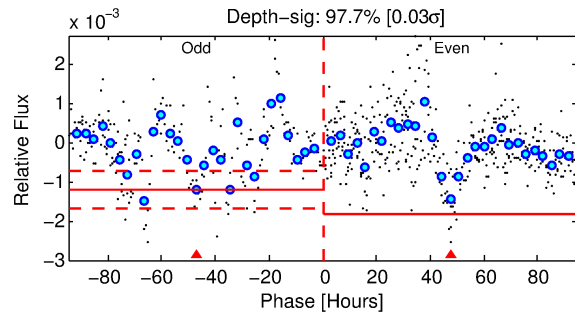
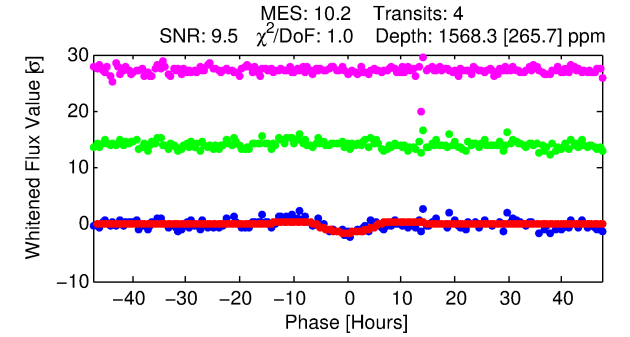
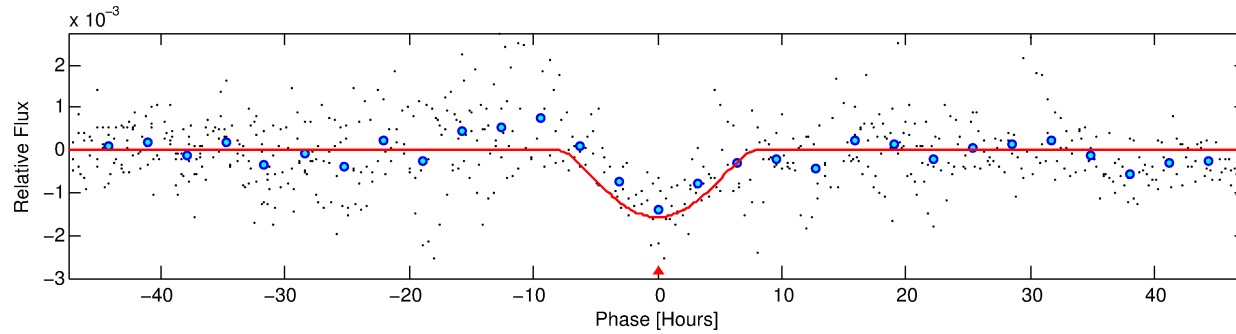
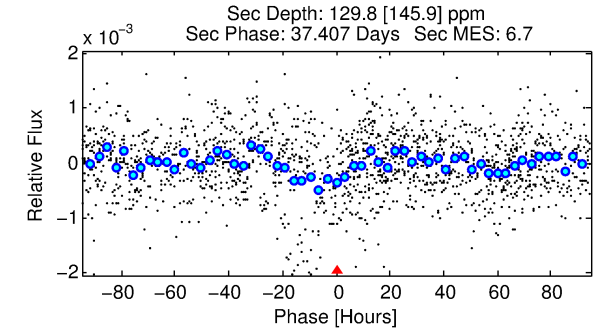
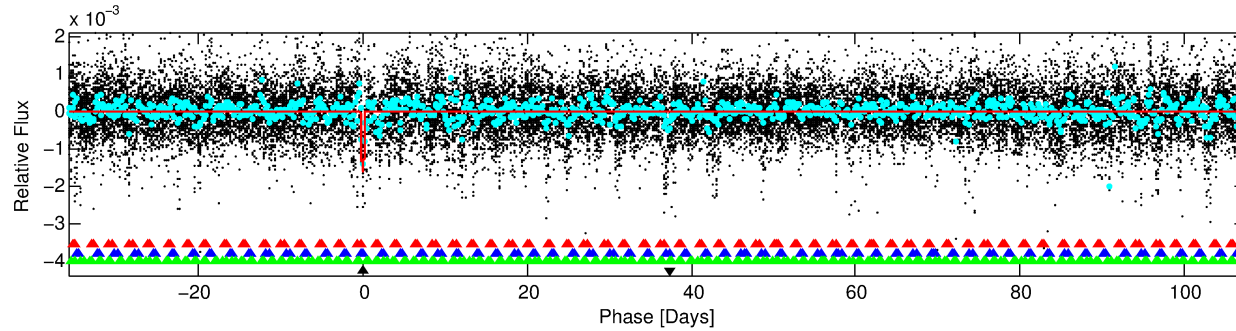
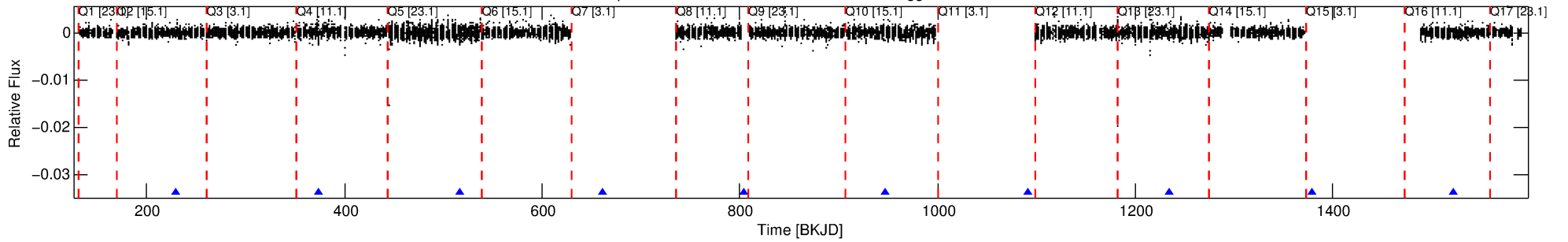
Ephemeris Match Information For 009665503-04

No Significant Match Found

DV One-Page Summary

KIC: 9665503 Candidate: 4 of 4 Period: 143.501 d
KOI: K07221 Corr: No Ephemeris Match

Kp: 15.22 R*: 0.65 Rs Teff: 5290.0 K Logg: 4.67 Fe/H: -0.680



DV Fit Results:

Period = 143.50115 [0.00595] d
Epoch = 230.1664 [0.0346] BKJD
Rp/R* = 0.0702 [0.2318]
a/R* = 26.53 [19.39]
b = 1.00 [0.32]
Seff = 1.28 [0.25]
Teq = 271 [13] K
Rp = 4.96 [16.40] Re
a = 0.4797 [0.0519] AU
Ag = 667.23 [4472.03] [0.15σ]
Teffp = 2131 [3571] K [0.52σ]

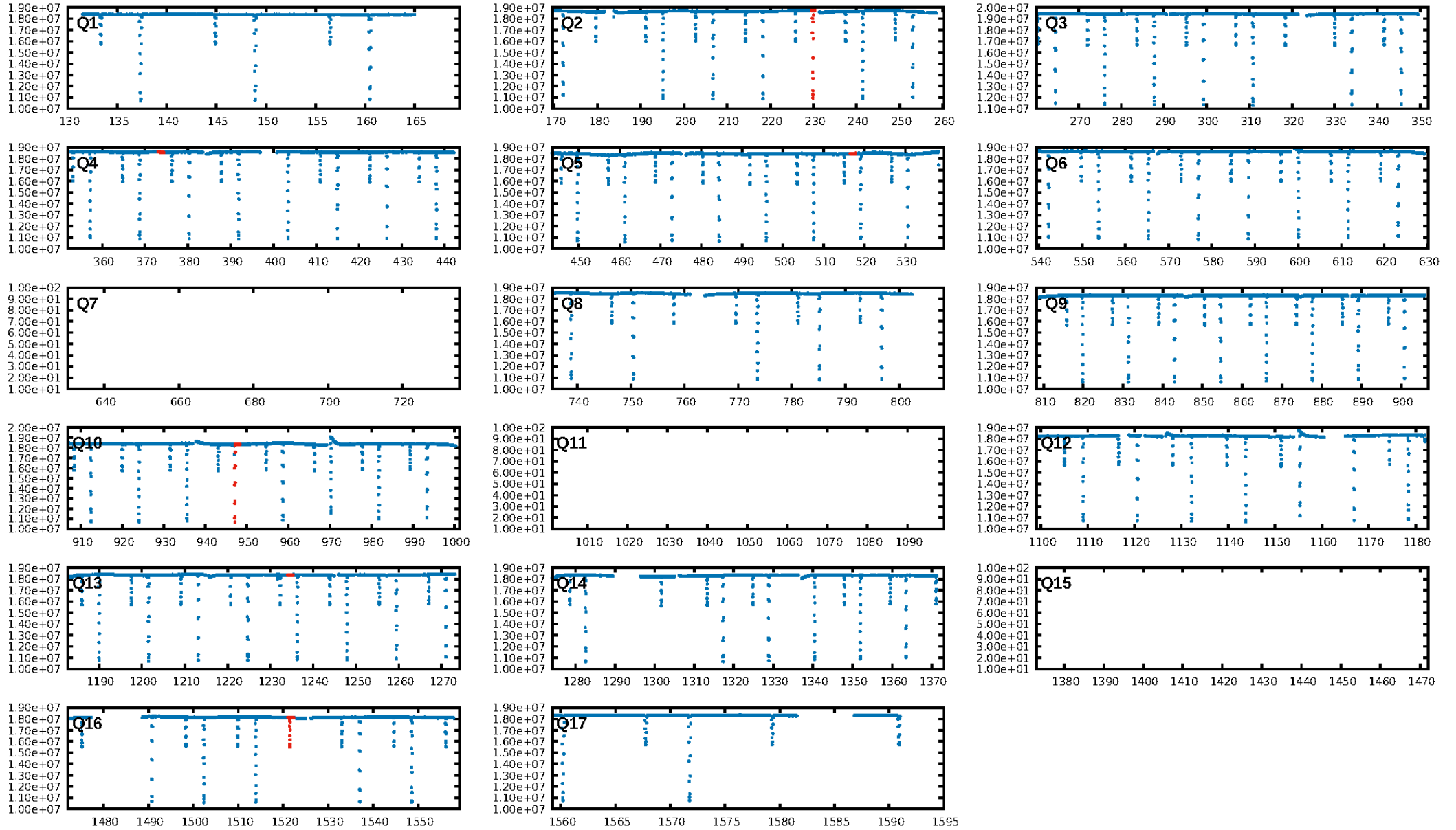
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [195.75σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 1.4%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 1.11e-11
RollingBand-fgt: 1.00 [4/4]
GhostDiagnostic-chr: -1.143
Centroid-sig: N/A
Centroid-so: 0.798 arcsec [1.82σ]
OotOffset-rm: 0.554 arcsec [0.77σ]
KicOffset-rm: 0.099 arcsec [0.26σ]
OotOffset-st: 1/0/1/2 [4]
KicOffset-st: 1/0/1/2 [4]
DiffImageQuality-figm: 0.25 [1/4]
DiffImageOverlap-fno: 0.50 [2/4]

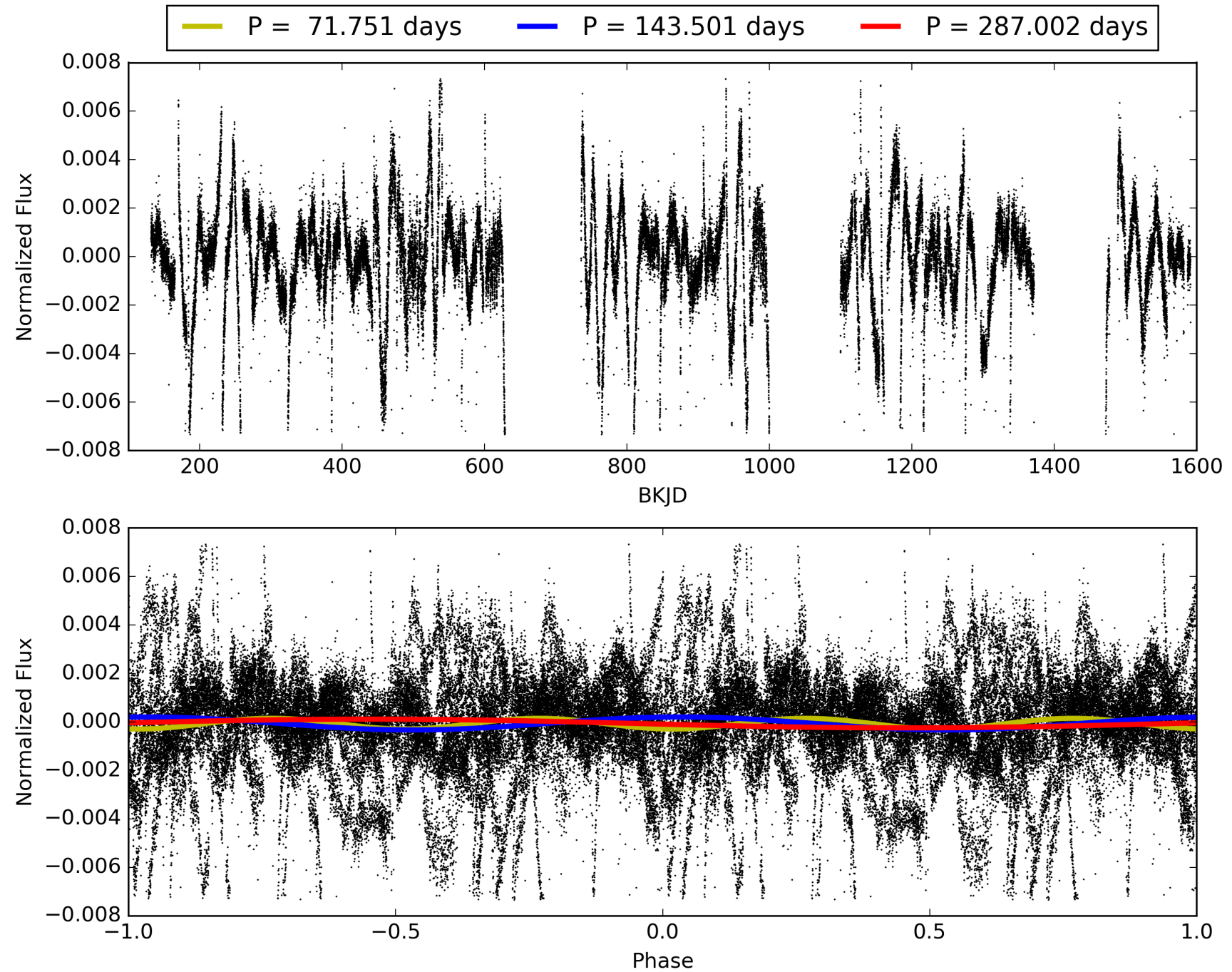
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 07:46:16 Z

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

TCE 009665503-04, PDC Light Curves

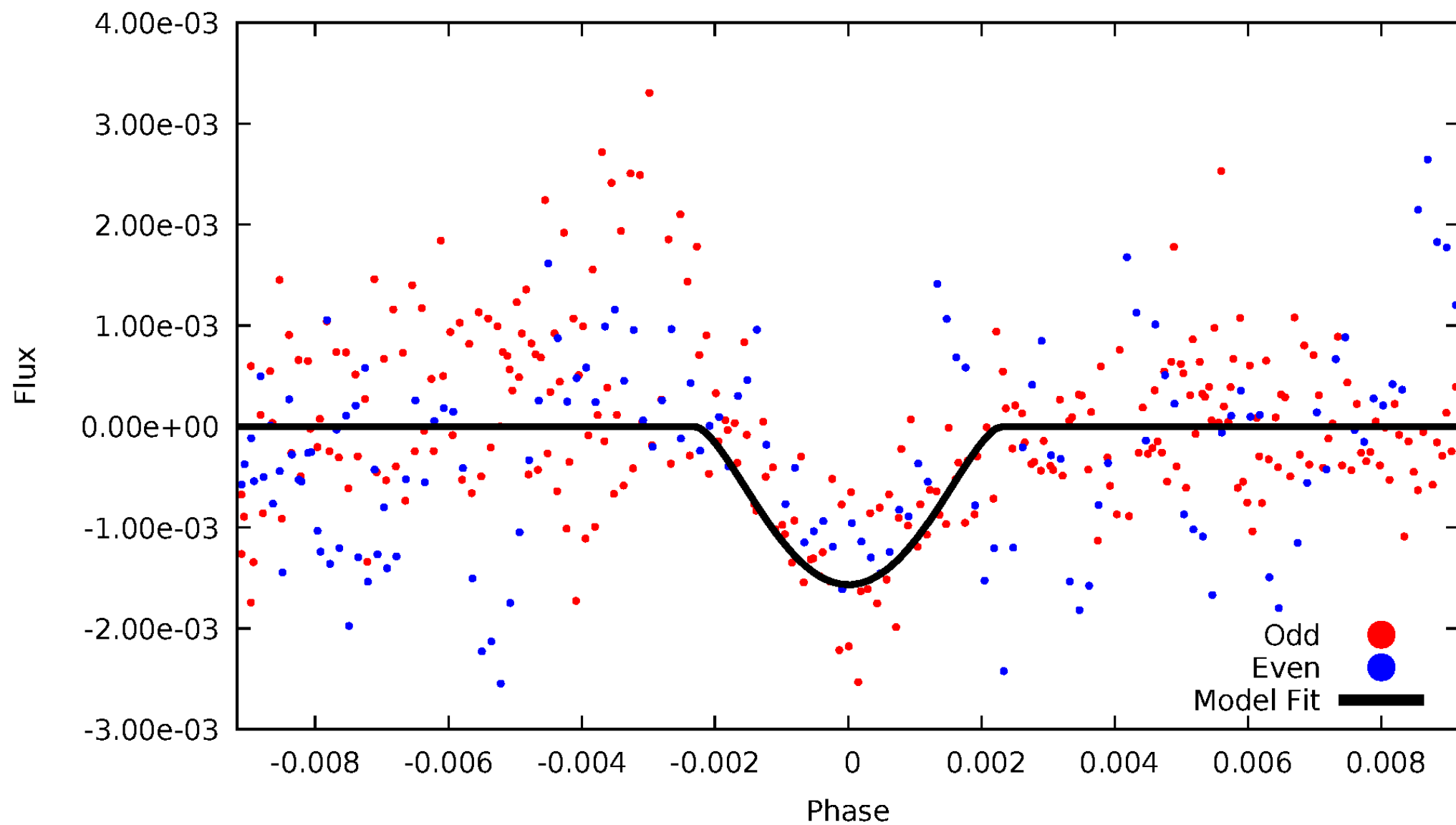


TCE 009665503-04



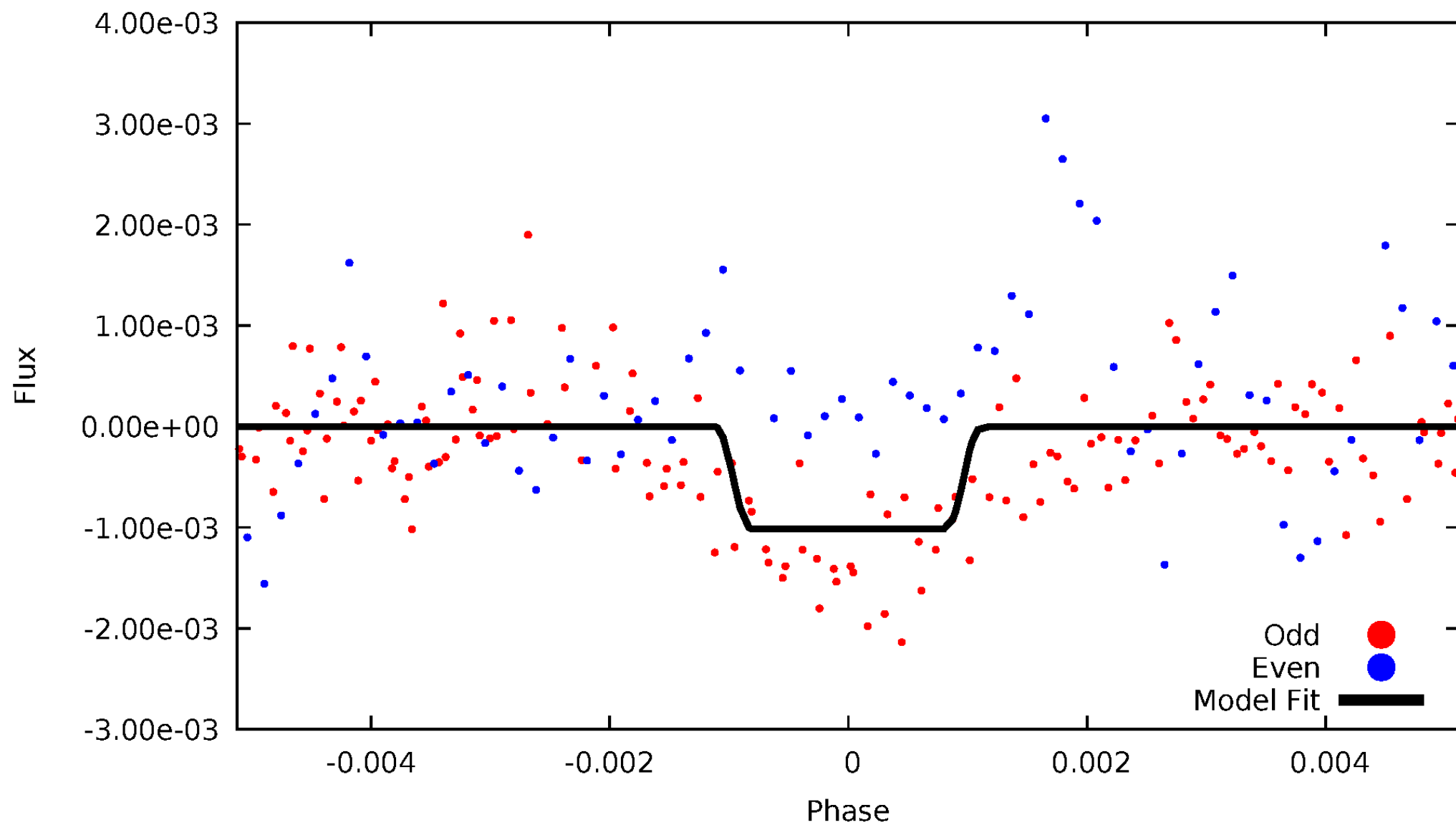
DV Odd/Even

TCE 009665503-04



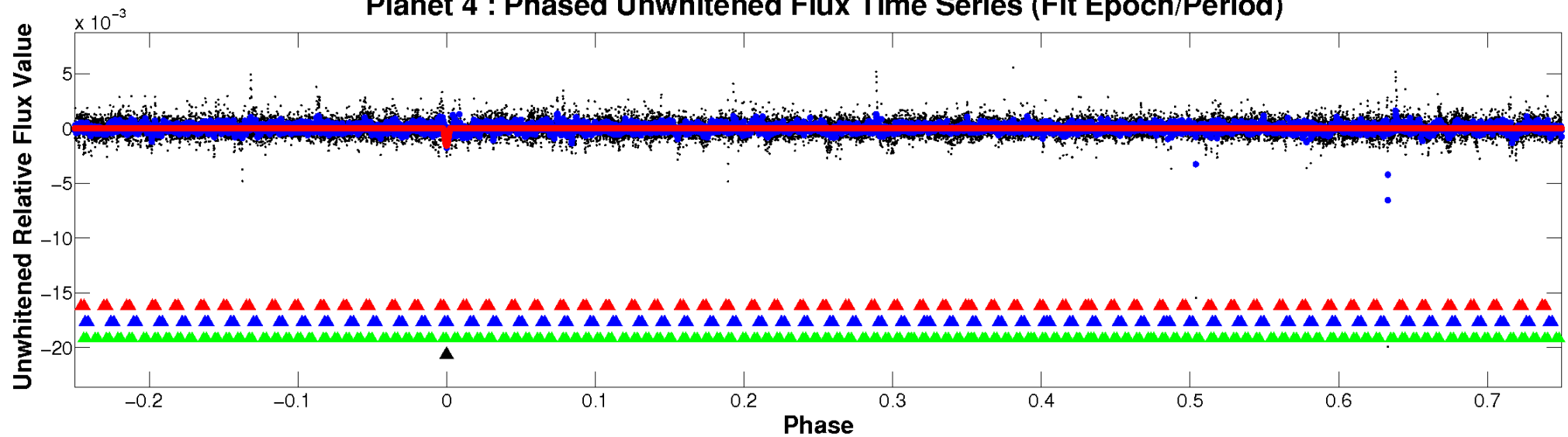
ALT Odd/Even

TCE 009665503-04

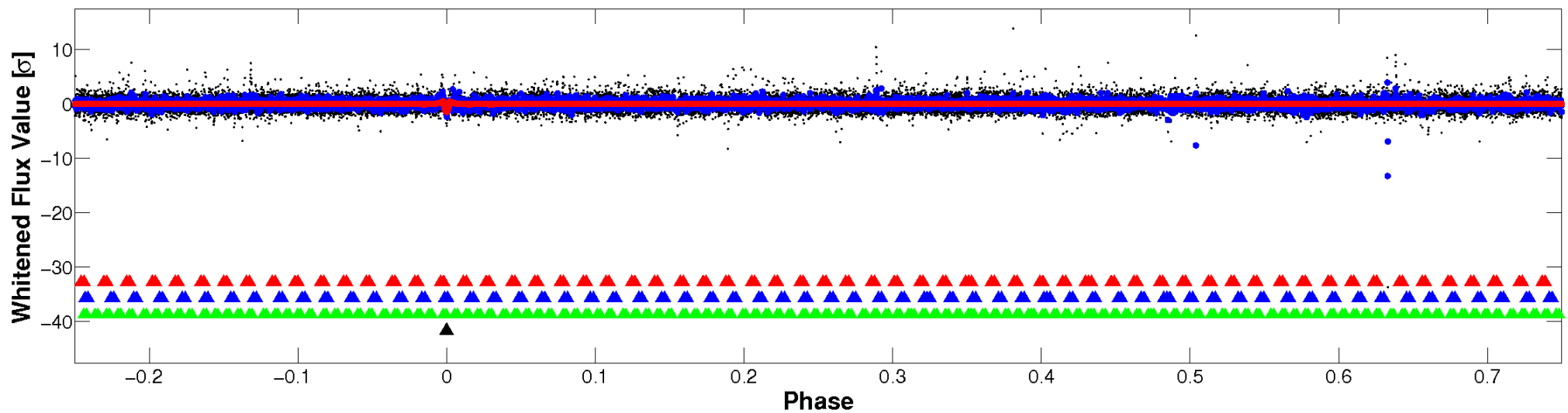


Non-Whitened Vs. Whitened Light Curve

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



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



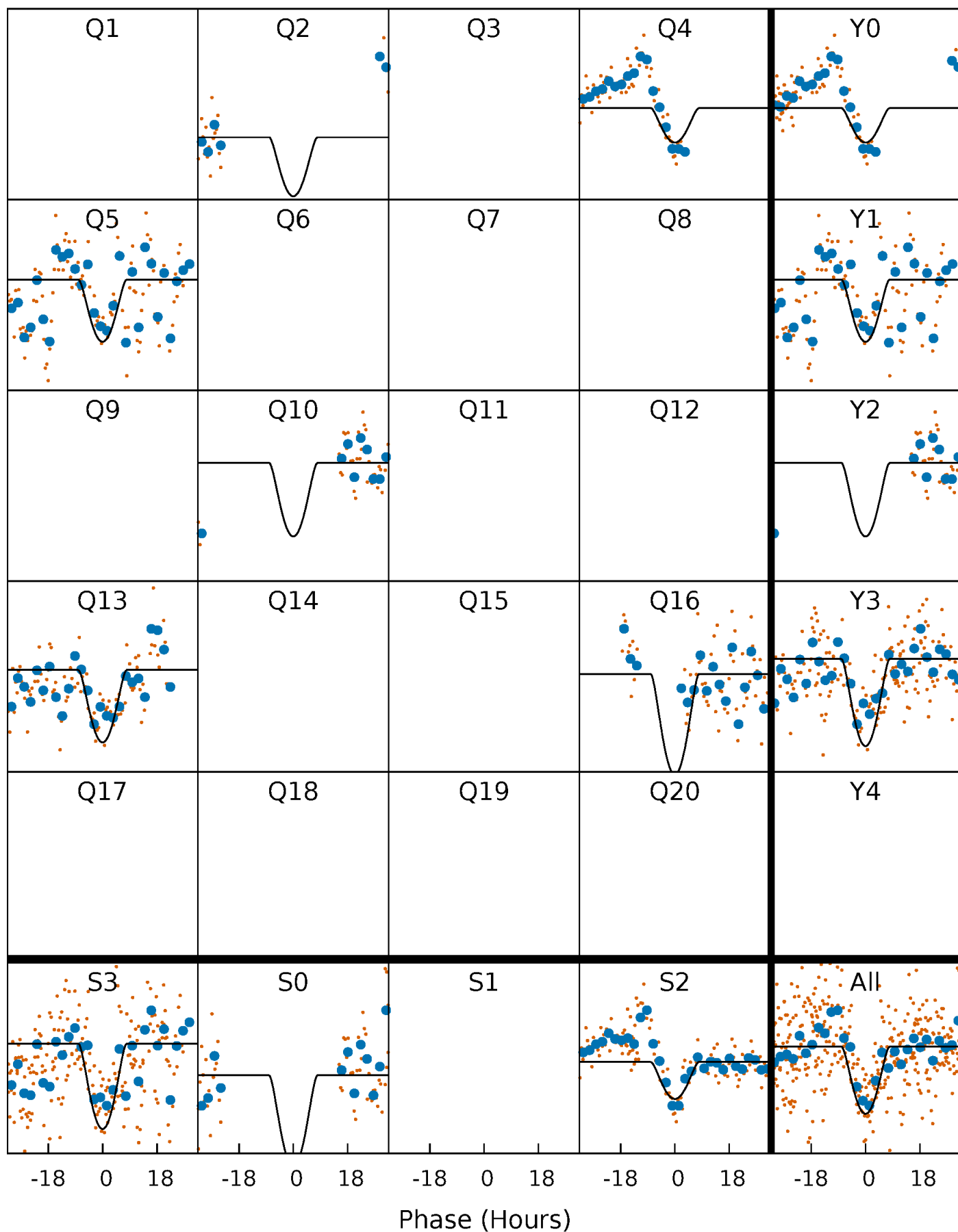
PDC Quarter-Phased Transit Curves

TCE 009665503-04 $P=143.501148$ Days $T_0=230.166355$ (BKJD)



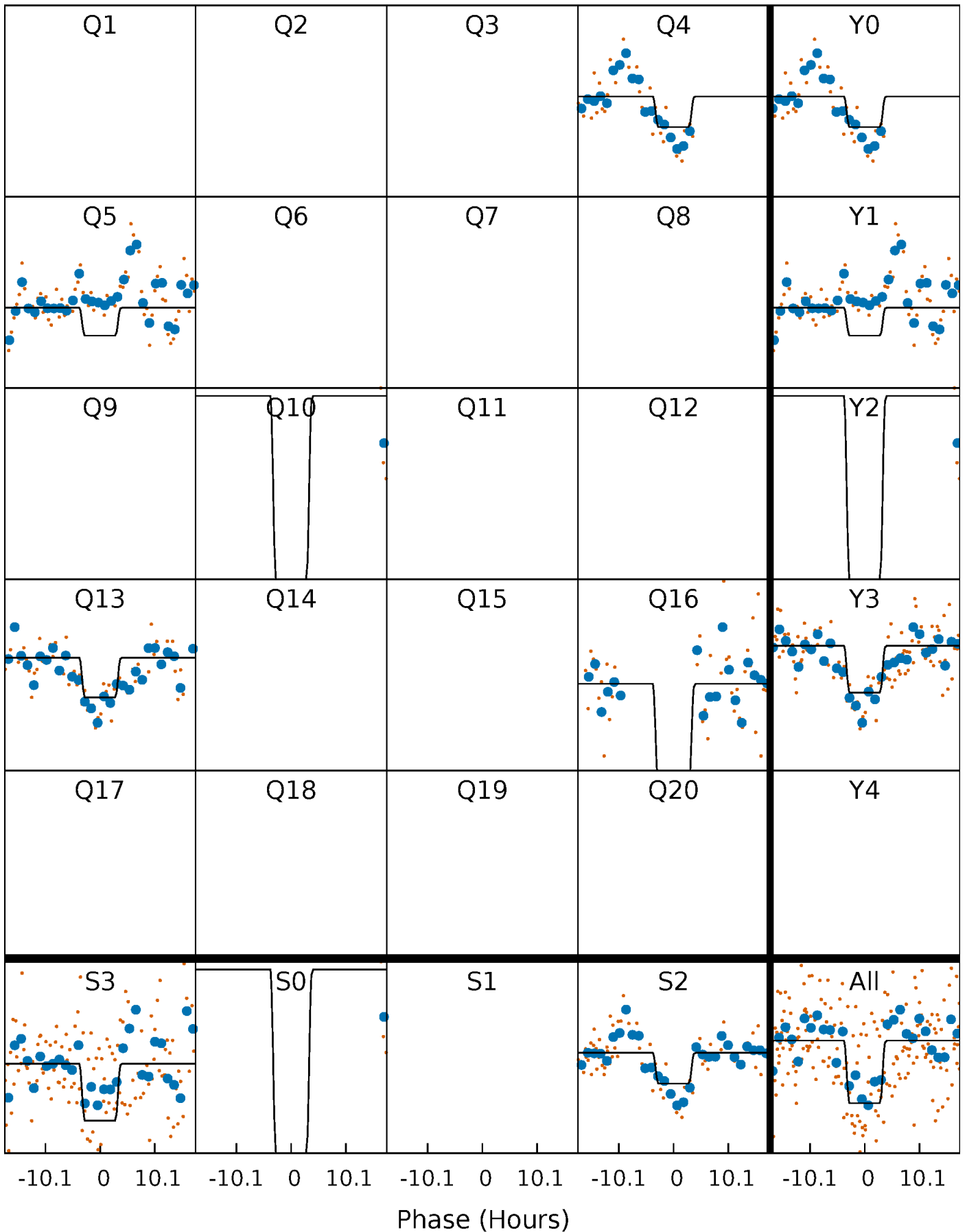
DV Quarter-Phased Transit Curves

TCE 009665503-04 P=143.501148 Days $T_0=230.166355$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

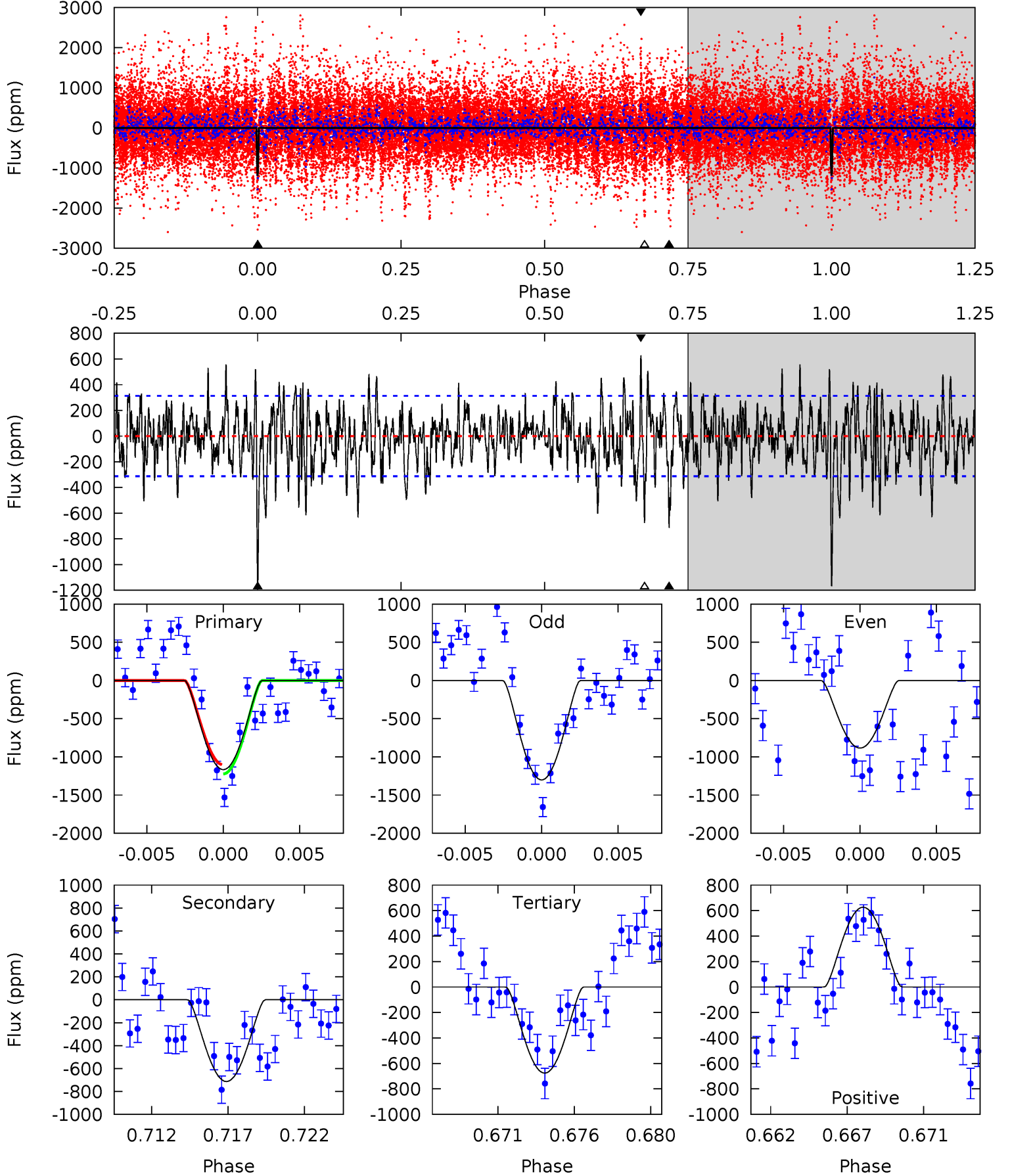
TCE 009665503-04 P=143.498081 Days $T_0=230.126474$ (BKJD)



DV Model-Shift Uniqueness Test

009665503-04, $P = 143.501148$ Days, $E = 86.665207$ Days

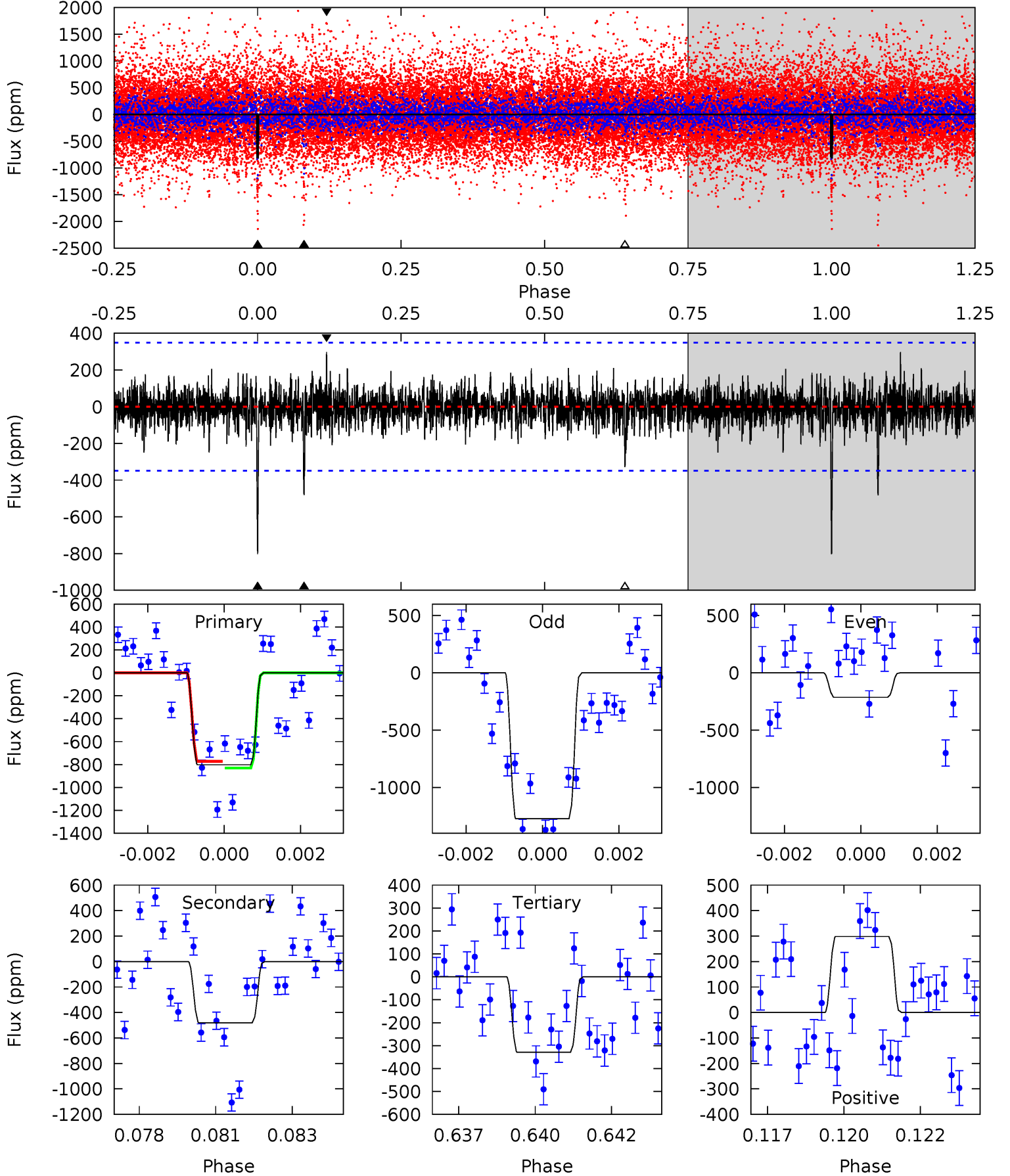
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
19.3	11.8	11.2	10.3	5.17	2.84	3.08	8.12	8.94	0.62	1.44	3.18	1.05	0.35	1.00



Alt Model-Shift Uniqueness Test

009665503-04, P = 143.498081 Days, E = 86.628393 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.2	7.31	5.00	4.53	5.30	3.05	1.03	7.19	7.67	2.31	2.78	7.39	0.65	0.27	0.44



Stellar Parameters For KIC 009665503

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	5290^{+159}_{-143}	$4.669^{+0.028}_{-0.083}$	$-0.680^{+0.300}_{-0.300}$	$0.648^{+0.085}_{-0.039}$	$0.723^{+0.062}_{-0.068}$	$3.750^{+0.433}_{-0.988}$
	+3%/-3%	+1%/-2%	+44%/-44%	+13%/-6%	+9%/-9%	+12%/-26%
Source	PHO1	KIC0	KIC0	DSEP		

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

Secondary Eclipse Parameters for KIC 009665503-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	A_{obs}
DV	-713 ± 61	$13.05^{+11.68}_{-9.28}$	383^{+15}_{-12}	2794^{+1266}_{-432}	538^{+6068}_{-393}
Alt.	-481 ± 66	$12.53^{+11.80}_{-8.64}$	382^{+15}_{-13}	2660^{+1088}_{-396}	393^{+3656}_{-289}

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

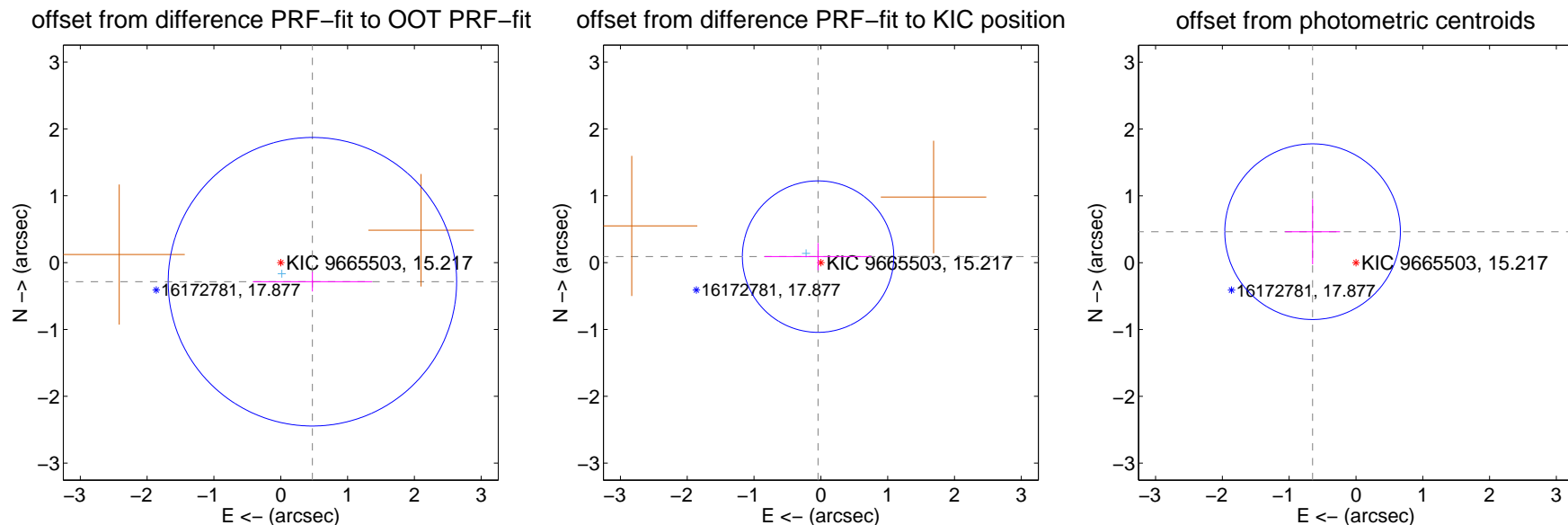
DV Centroid Data

Supplemental centroid analysis for 009665503-04. Kepler magnitude: 15.22. Transit SNR 9.53

There are 1 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.39 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.554 ± 0.720	0.77	-0.474 ± 0.893	-0.286 ± 0.146
PRF-fit source offset from KIC position	0.099 ± 0.378	0.26	0.042 ± 0.802	0.089 ± 0.202
photometric centroid source offset	0.80 ± 0.44	1.82	0.65 ± 0.41	0.46 ± 0.49

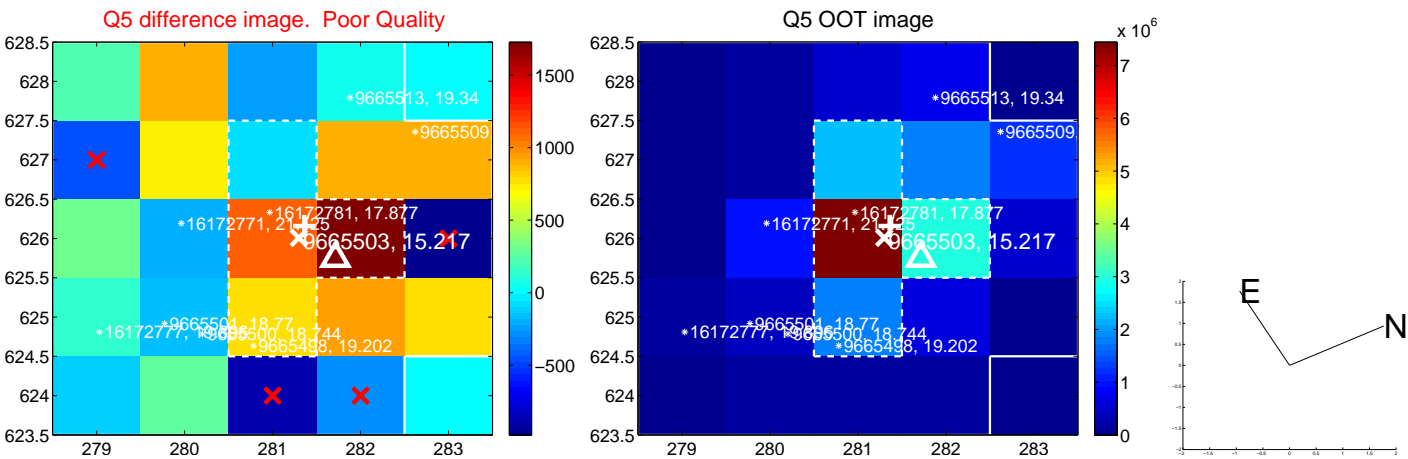


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

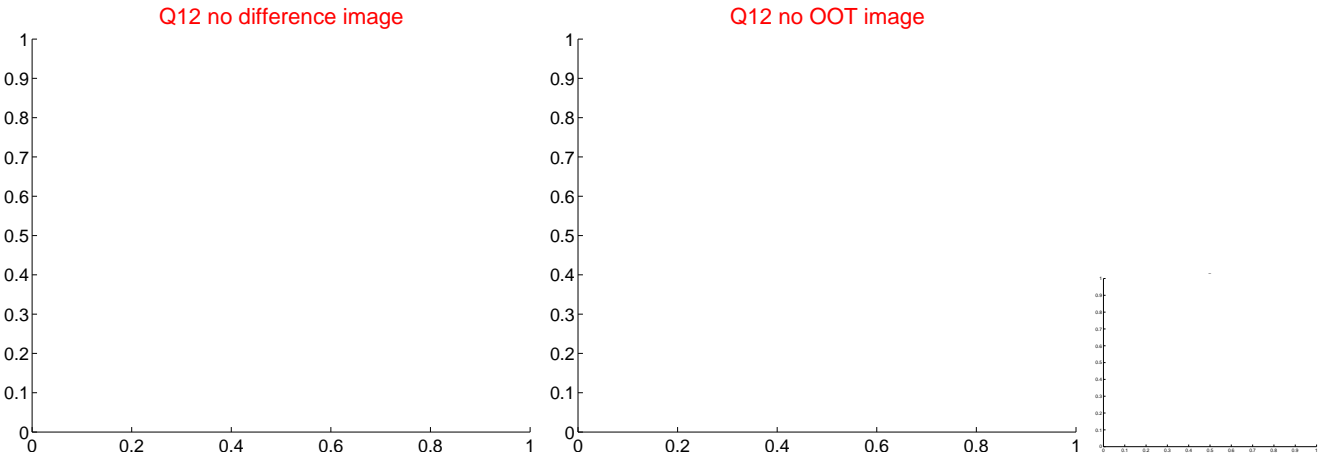
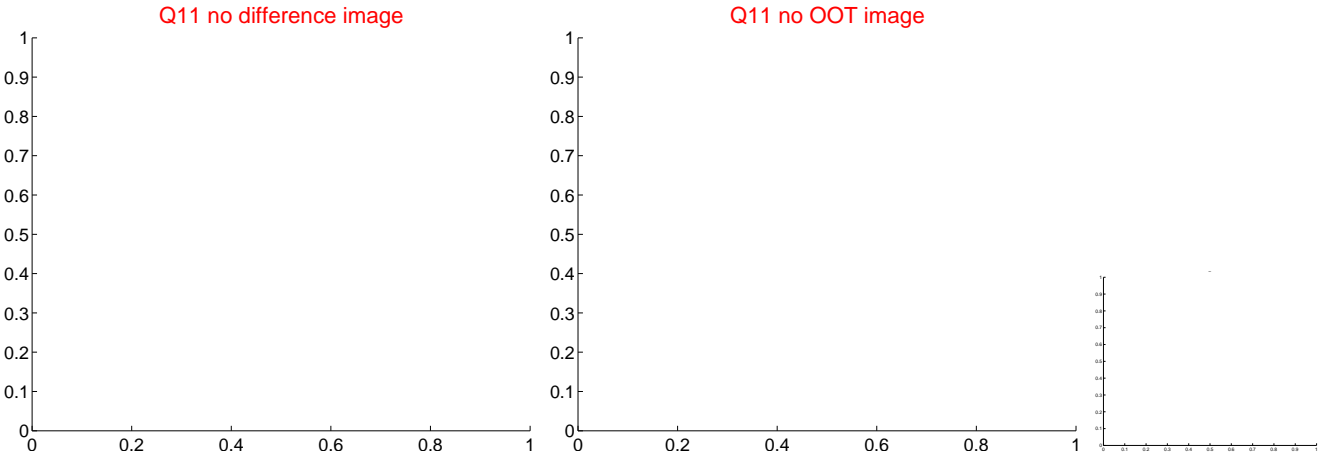
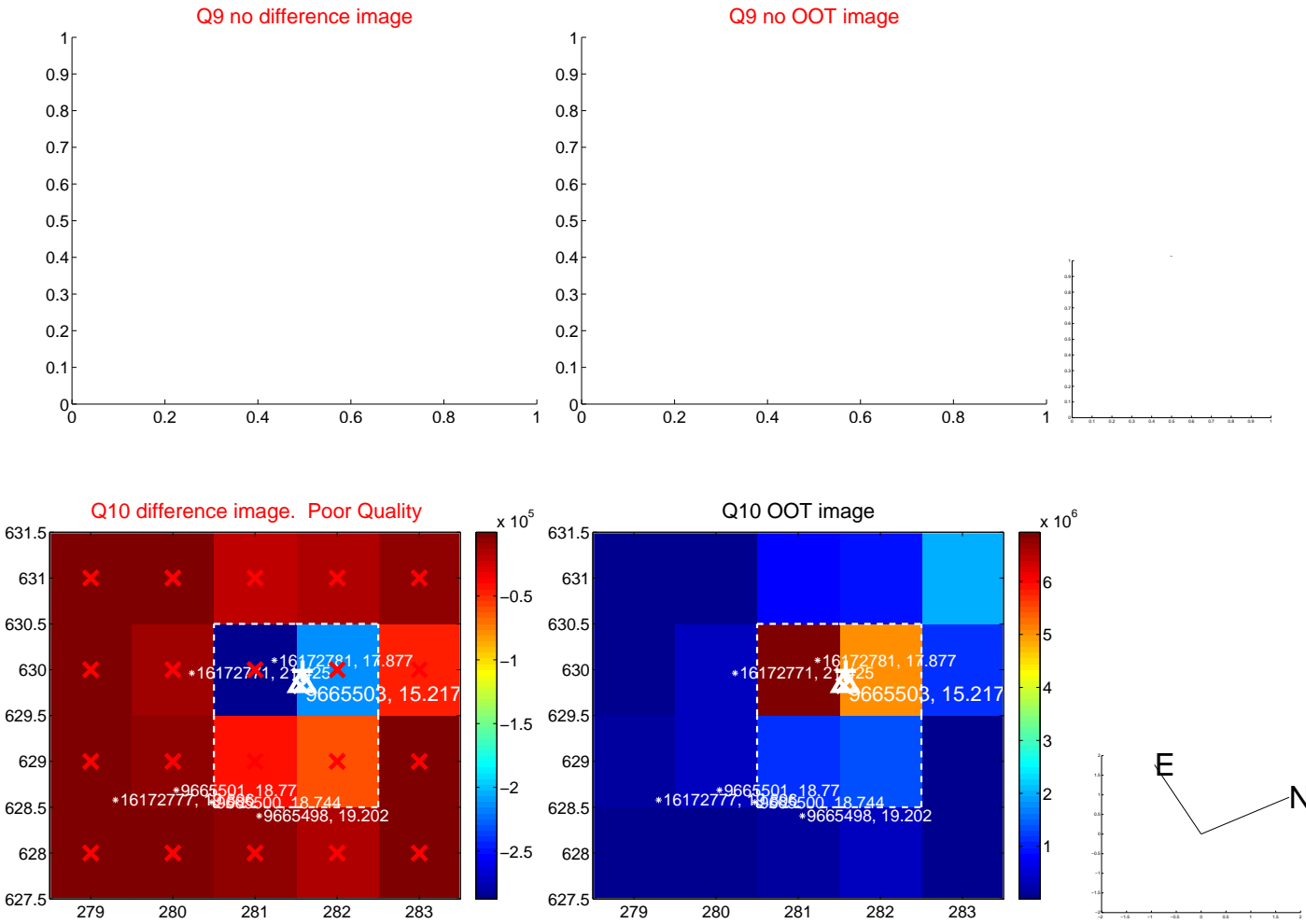
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



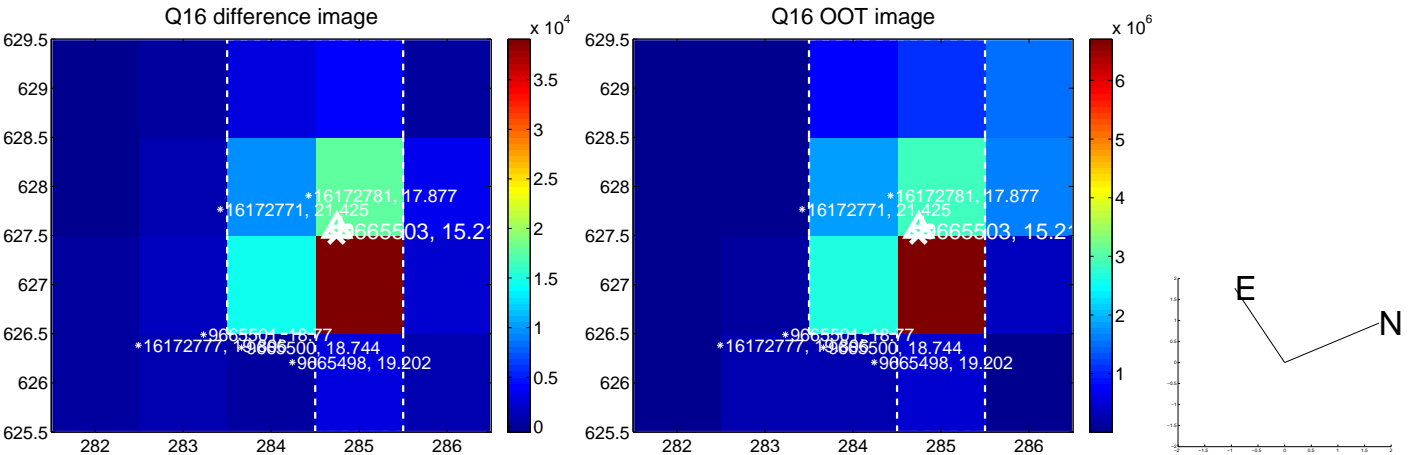
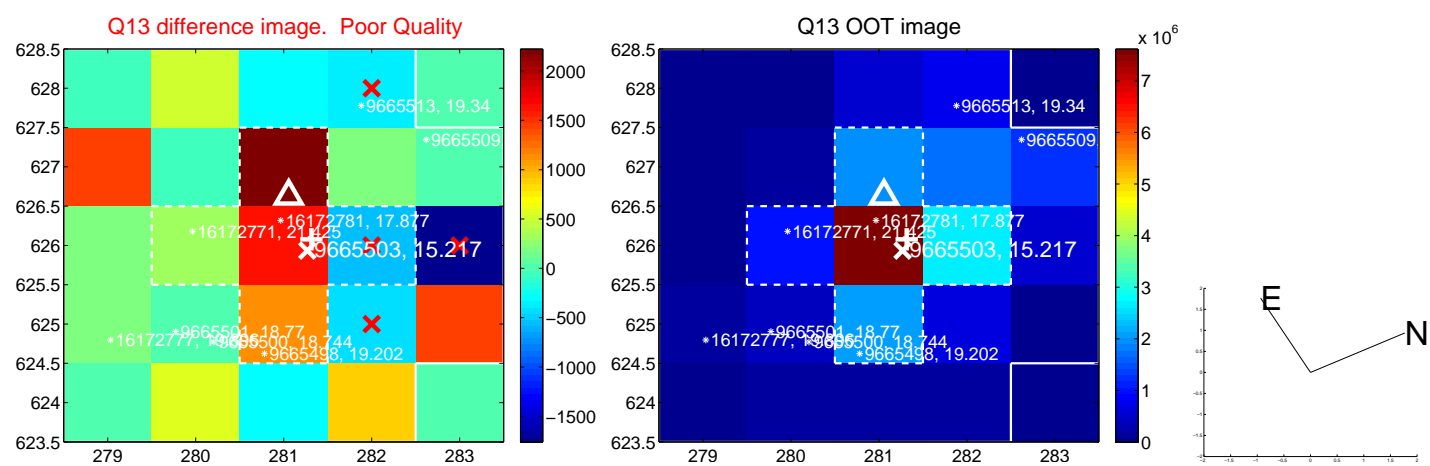
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



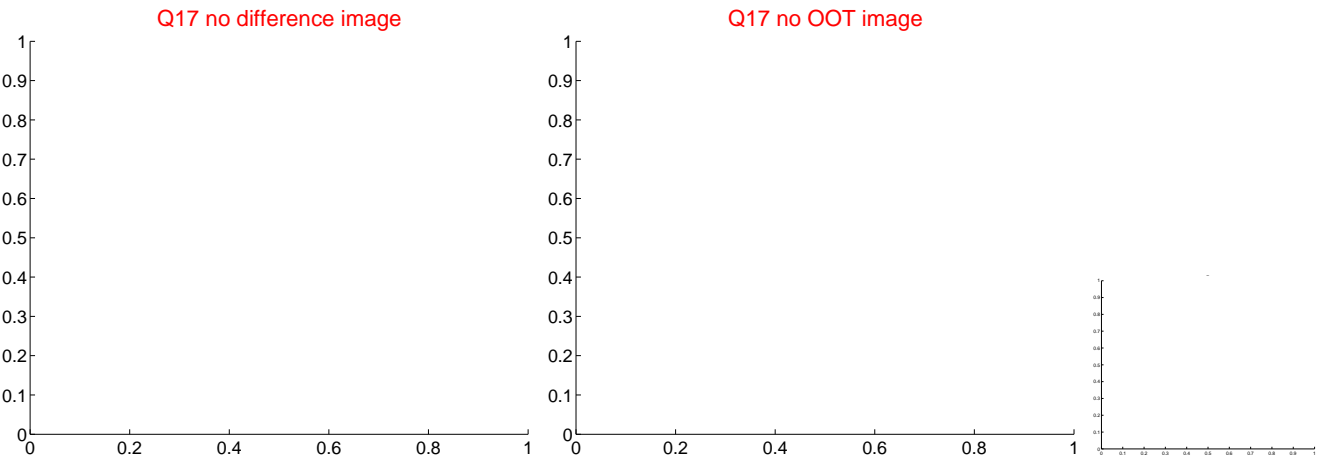
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



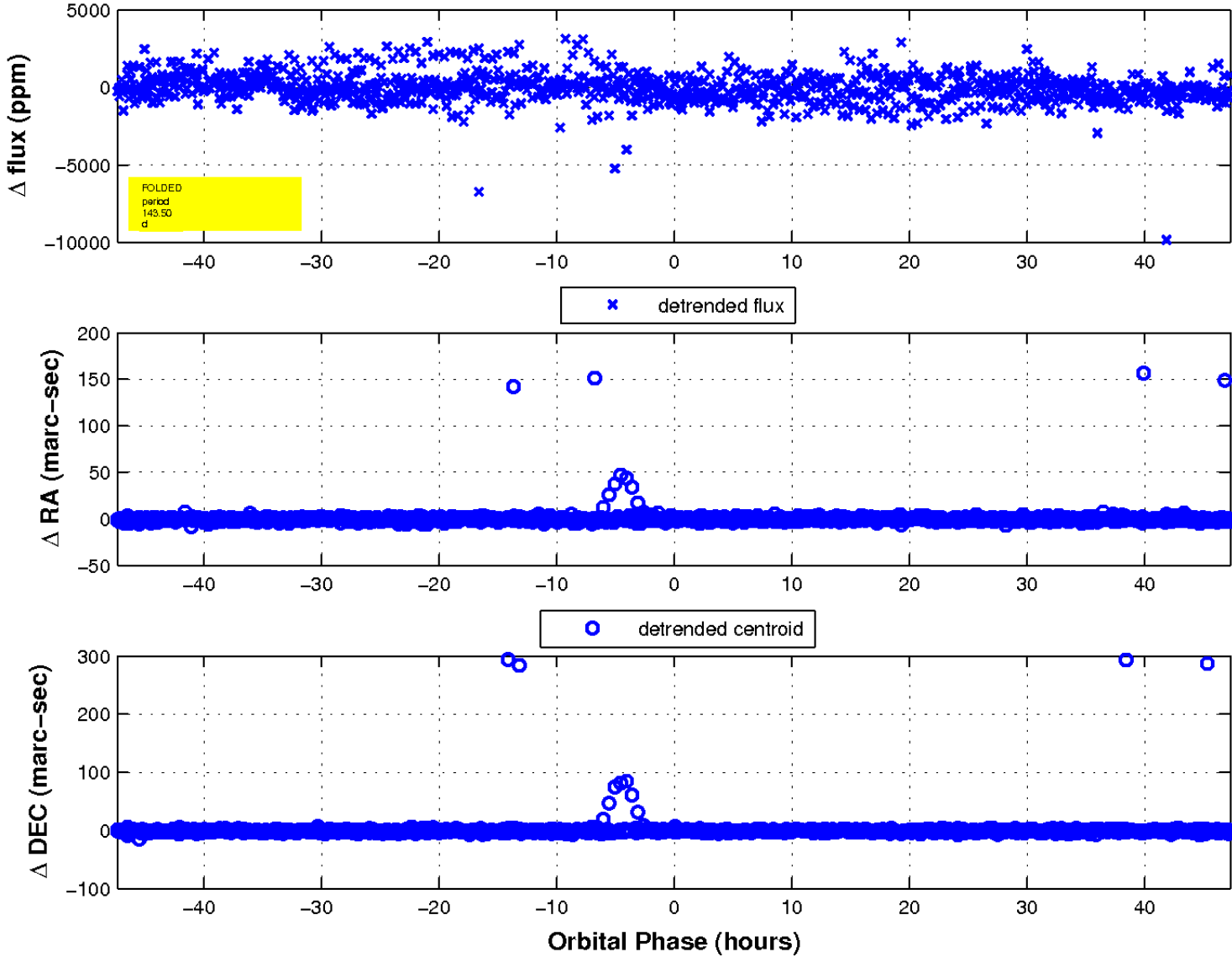
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



fluxWeightedCentroids, Planet 4 of 4



UKIRT Image

Declination

