

KIC 004376648

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})
004376648-01	OBS	No	0.521668	131.999628	63.6	1.753	8.2	8.0	1.86	7024	1.72	37778.75
004376648-02	OBS	No	0.521665	131.821686	102.9	2.008	9.8	9.2	1.86	7024	2.19	37779.04
004376648-03	OBS	No	168.888956	145.773100	4077.1	5.209	9.8	9.2	1.86	7024	14.16	16.99
004376648-04	OBS	No	24.301768	152.287360	540.9	5.002	9.5	3.4	1.86	7024	4.80	225.38
004376648-05	OBS	No	25.920856	139.493335	821.9	7.527	9.2	5.7	1.86	7024	5.65	206.81
004376648-06	OBS	No	40.096338	164.771975	2229.8	4.518	8.9	8.4	1.86	7024	12.09	115.60
004376648-07	OBS	No	190.833969	297.200532	2747.5	8.379	9.1	8.8	1.86	7024	9.99	14.44
004376648-08	OBS	No	85.043521	202.020398	111.8	3.500	8.8	-1.0	1.86	7024	1.99	42.42

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004376648-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_SATURATED
004376648-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—SAME_NTL_PERIOD—CENT_SATURATED
004376648-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
004376648-04	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED—HALO_GHOST
004376648-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
004376648-06	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED—HALO_GHOST
004376648-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
004376648-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED

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

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

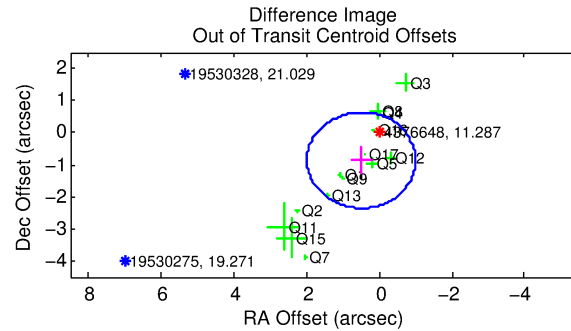
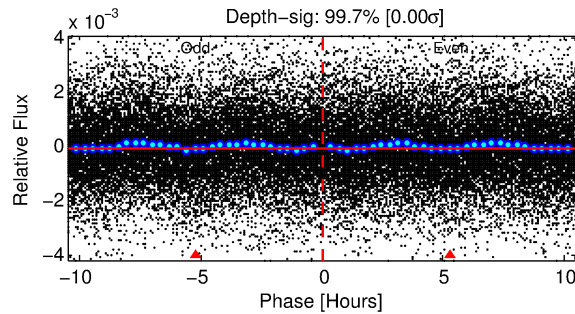
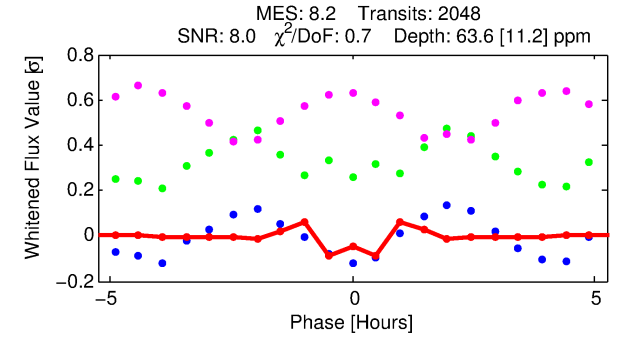
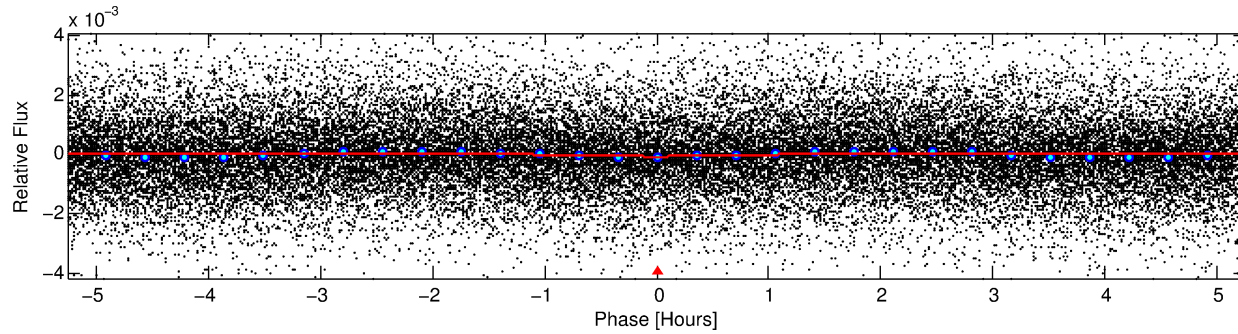
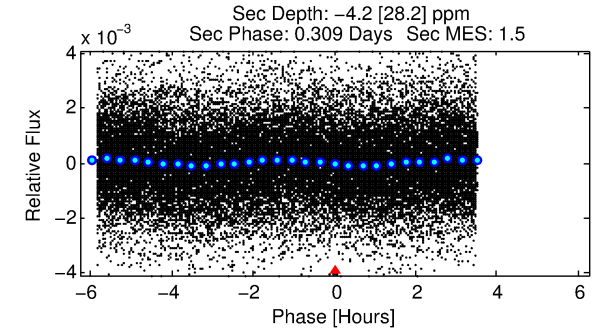
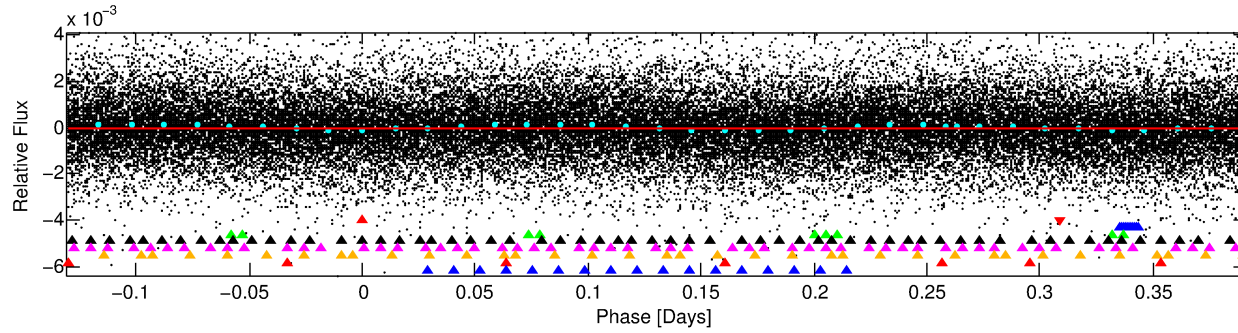
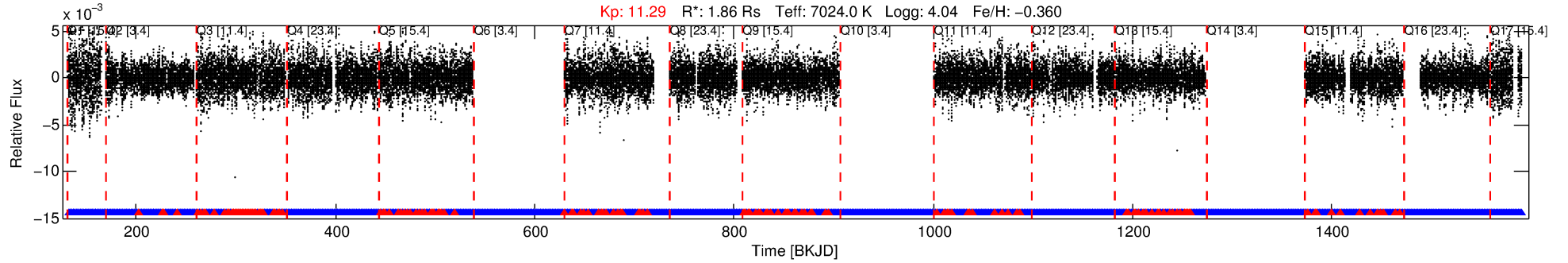
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 004376648-01

No Significant Match Found

DV One-Page Summary

KIC: 4376648 Candidate: 1 of 8 Period: 0.522 d



DV Fit Results:

Period = 0.52167 [0.00001] d
Epoch = 131.9996 [0.0011] BKJD
Rp/R* = 0.0085 [0.0018]
a/R* = 1.40 [0.80]
b = 0.90 [0.25]
Seff = 37778.75 [17444.72]
Teq = 3555 [410] K
Rp = 1.72 [0.66] Re
a = 0.0141 [0.0040] AU
Ag = N/A
Teffp = N/A

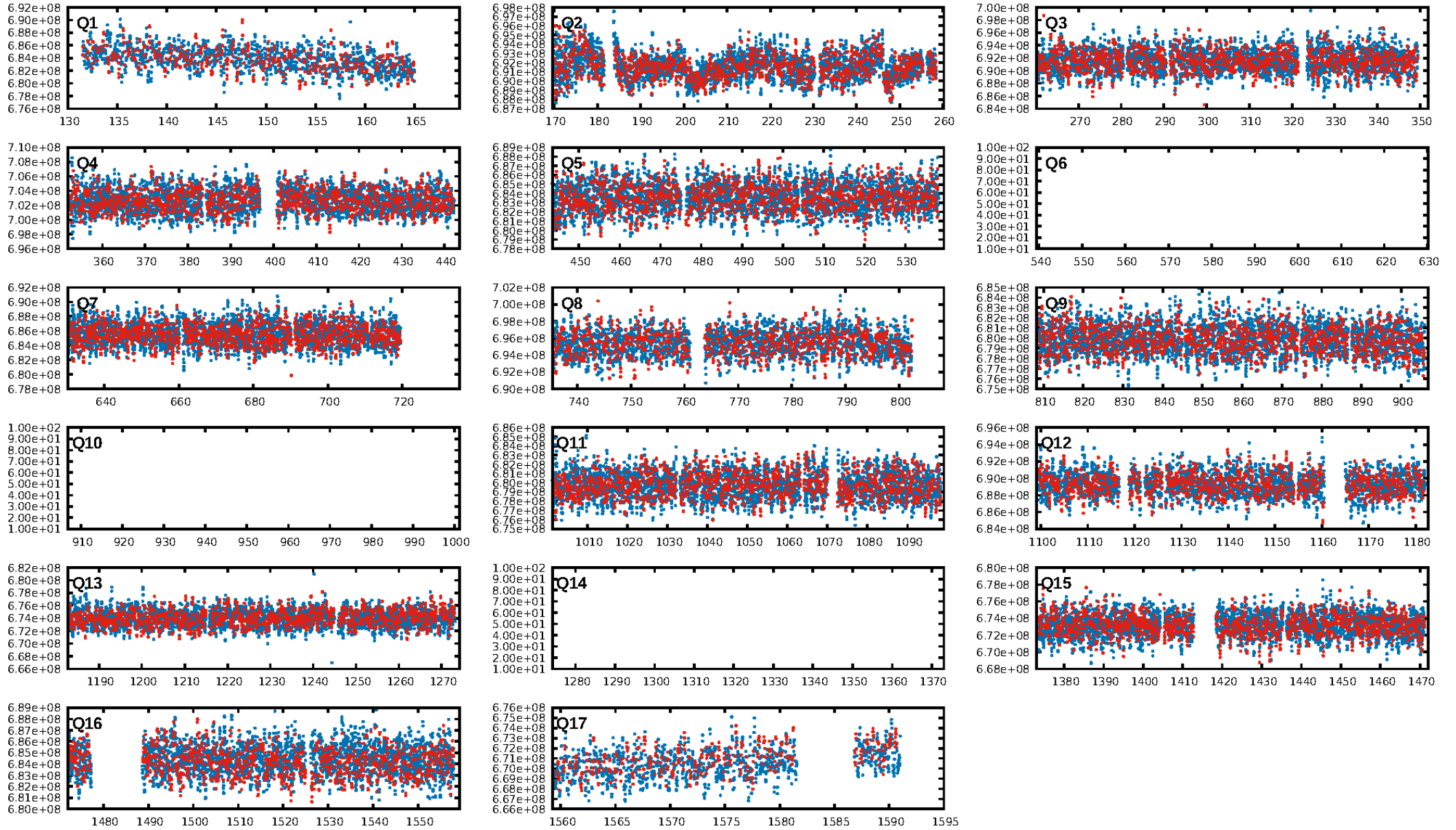
DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]
LongPeriod-sig: 100.0% [107.67σ]
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: N/A
RollingBand-fgt: 0.91 [1760/1932]
GhostDiagnostic-chr: 8.365
Centroid-sig: 0.0%
Centroid-so: 0.917 arcsec [3.62σ]
OotOffset-rm: 0.994 arcsec [2.00σ]
KicOffset-rm: 1.180 arcsec [2.50σ]
OotOffset-st: 1/4/4/5 [14]
KicOffset-st: 1/4/4/5 [14]
DiffImageQuality-fgm: 0.64 [9/14]
DiffImageOverlap-fno: 0.00 [0/14]

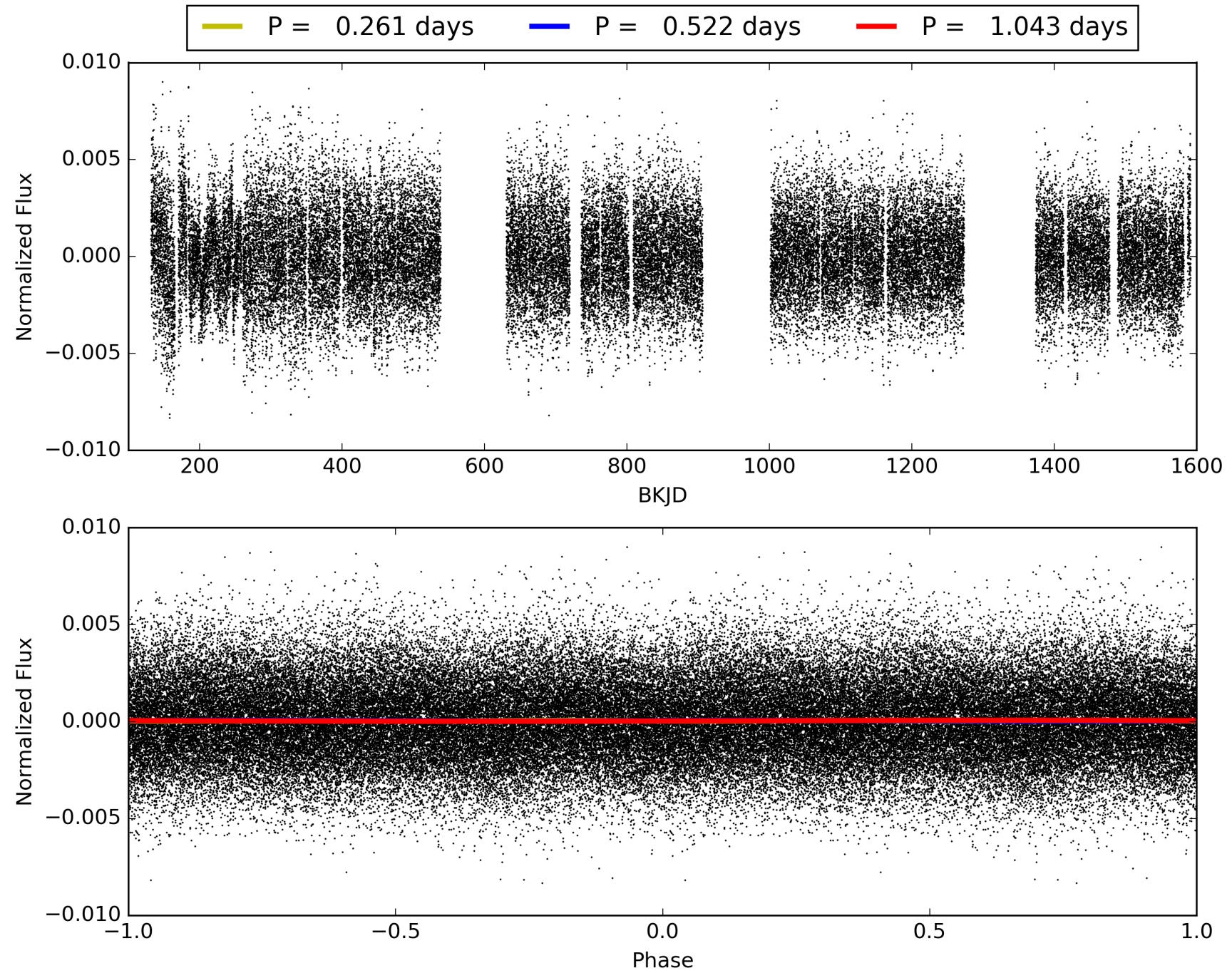
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 21:51:52 Z

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

TCE 004376648-01, PDC Light Curves

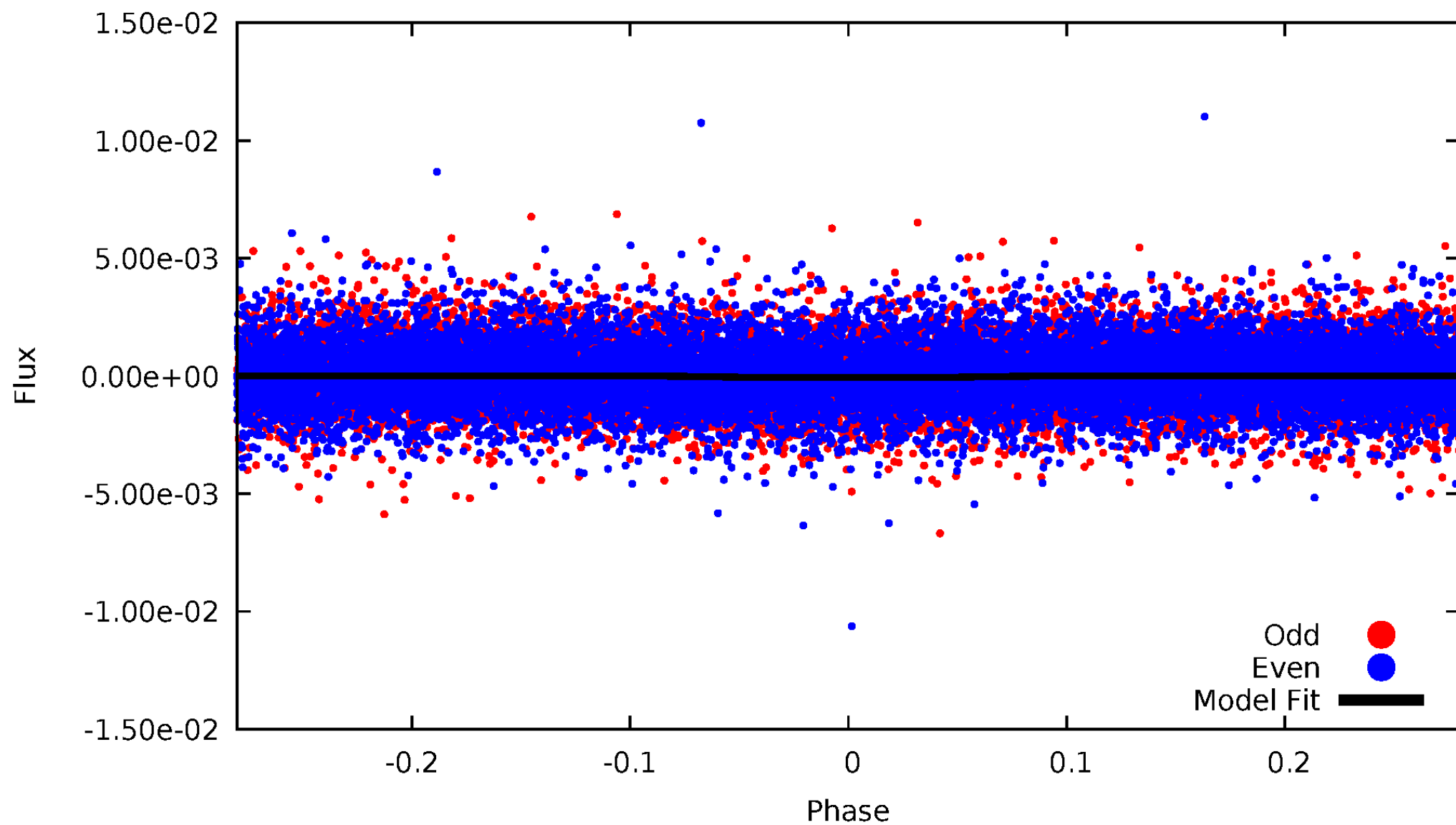


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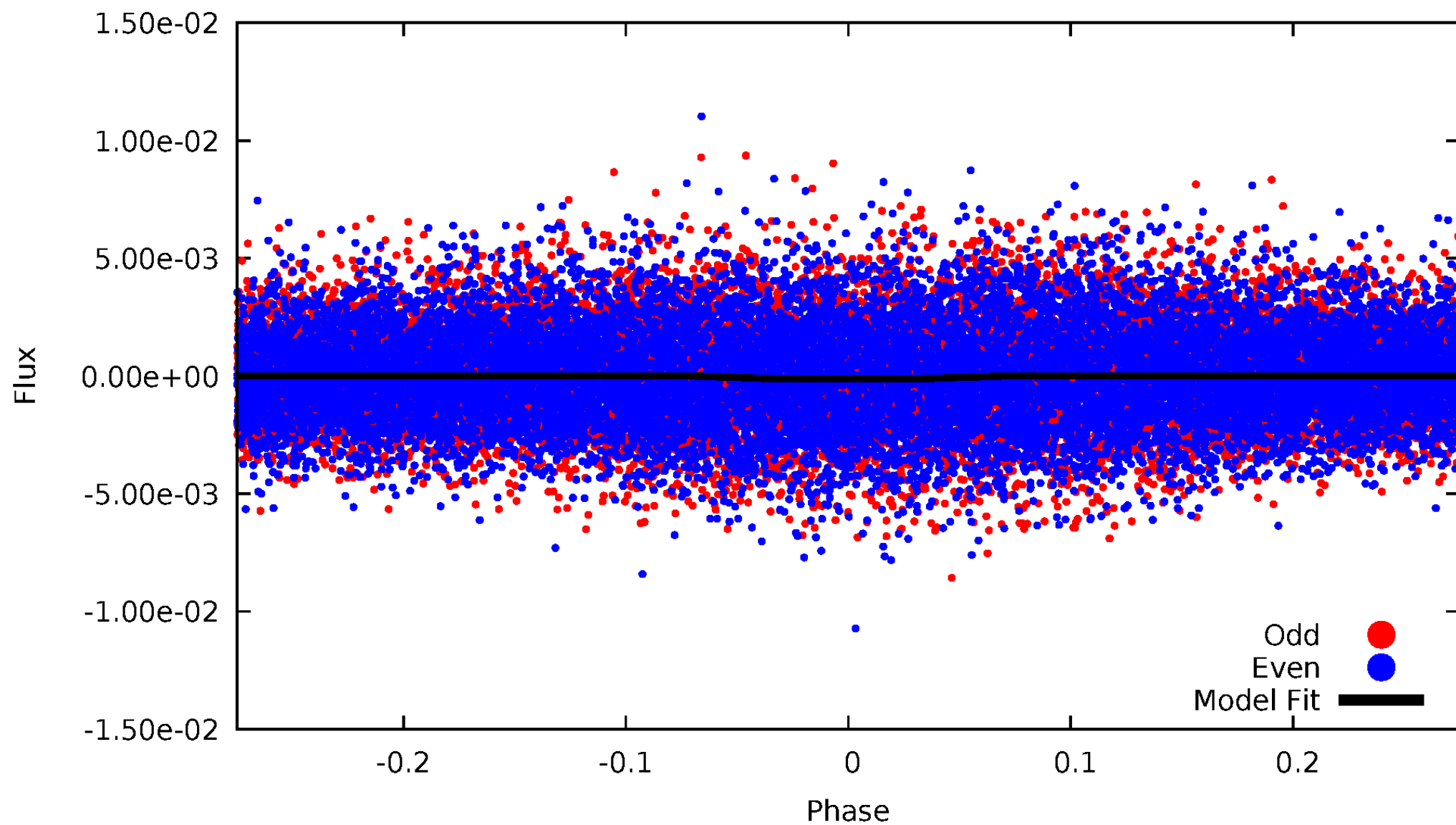
DV Odd/Even

TCE 004376648-01

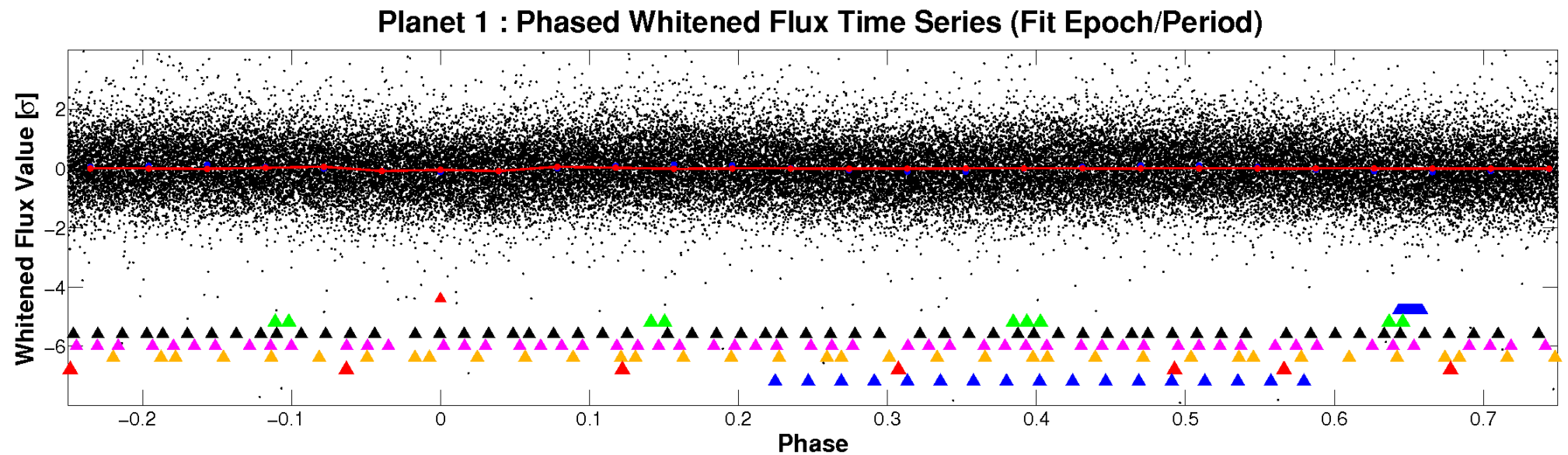
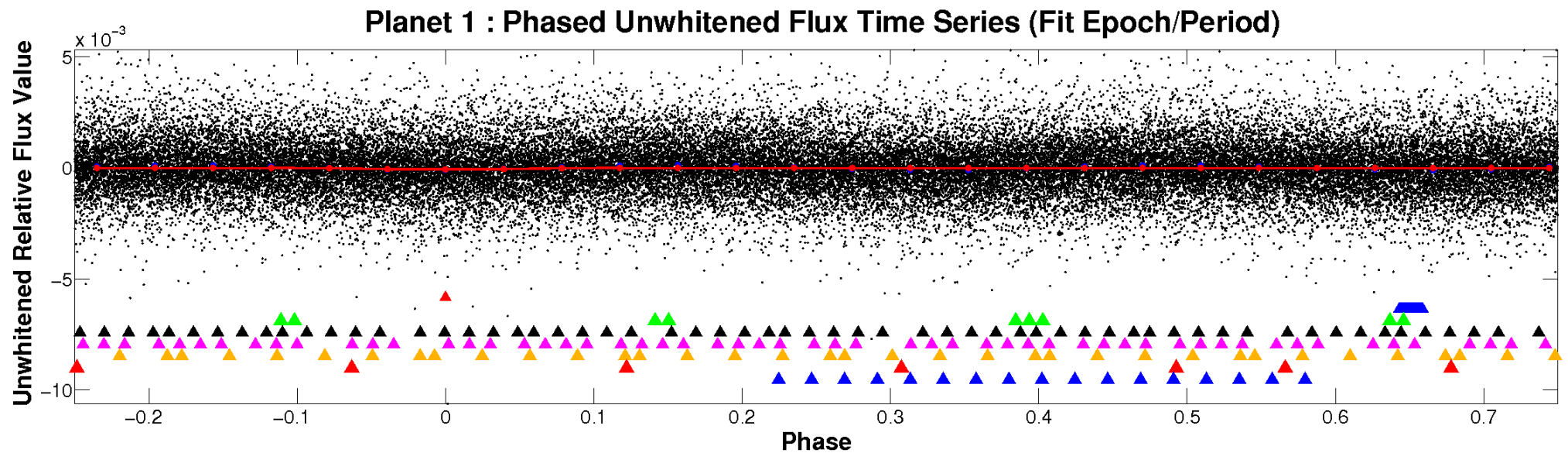


ALT Odd/Even

TCE 004376648-01

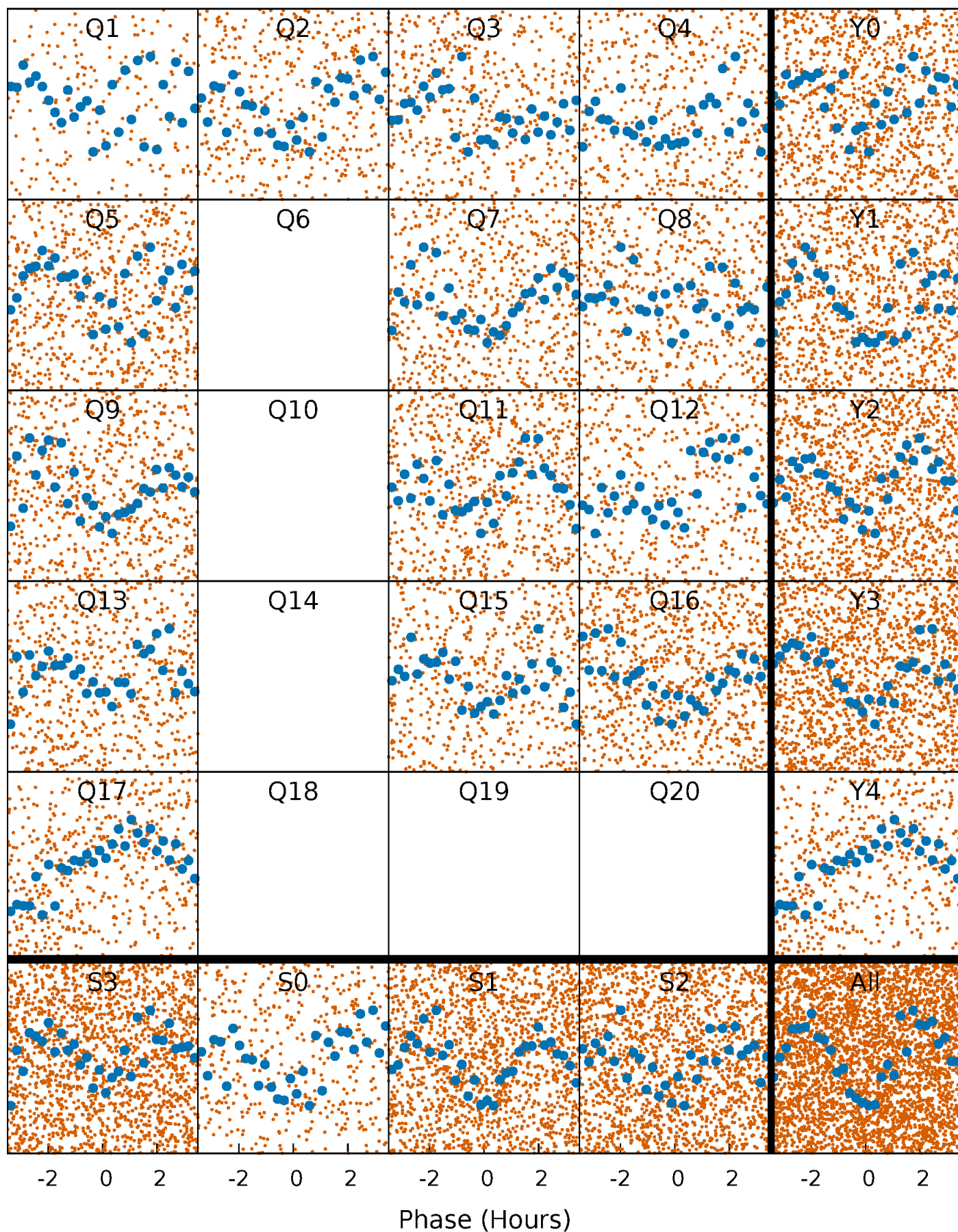


Non-Whitened Vs. Whitened Light Curve



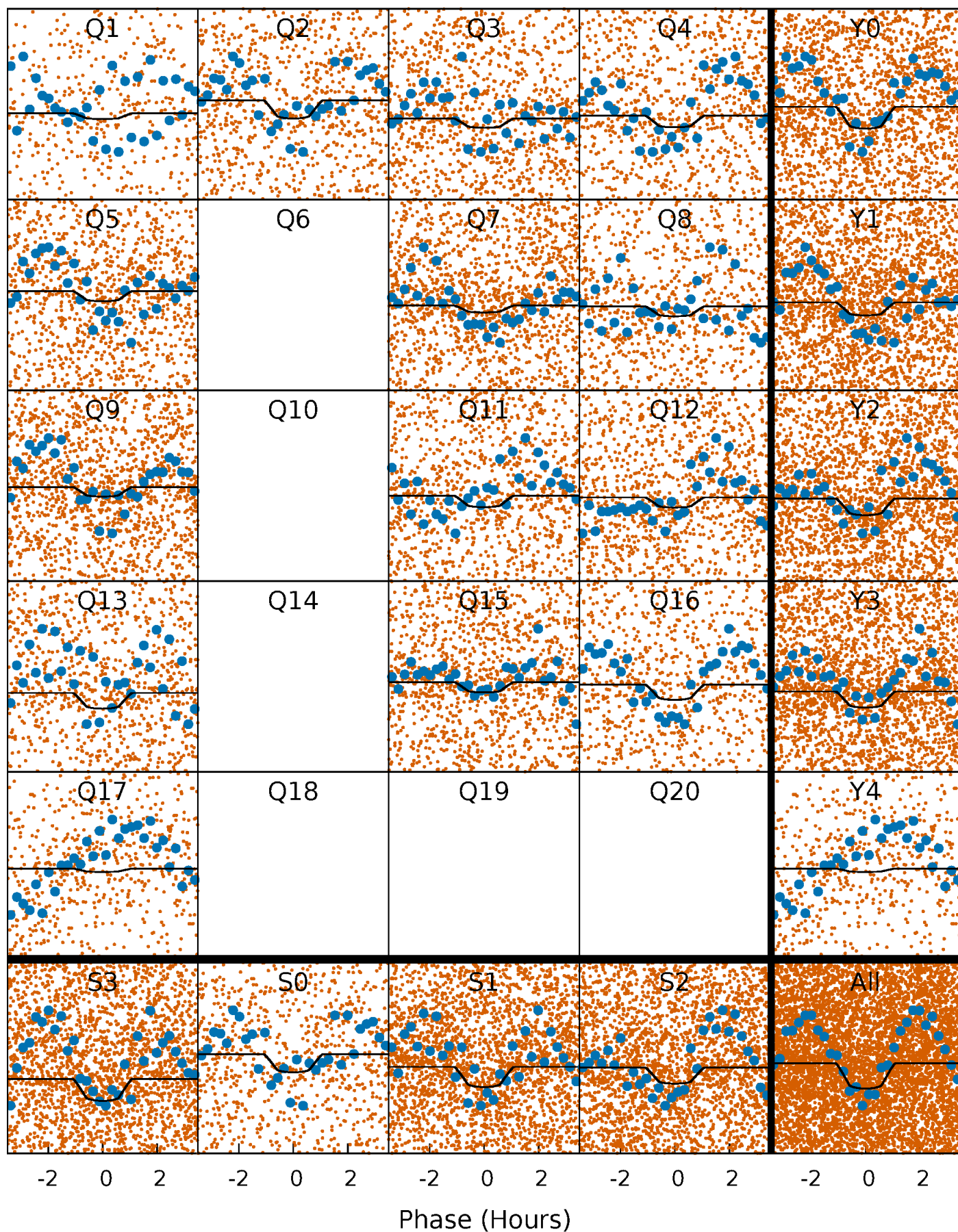
PDC Quarter-Phased Transit Curves

TCE 004376648-01 P= 0.521668 Days $T_0=131.999629$ (BKJD)



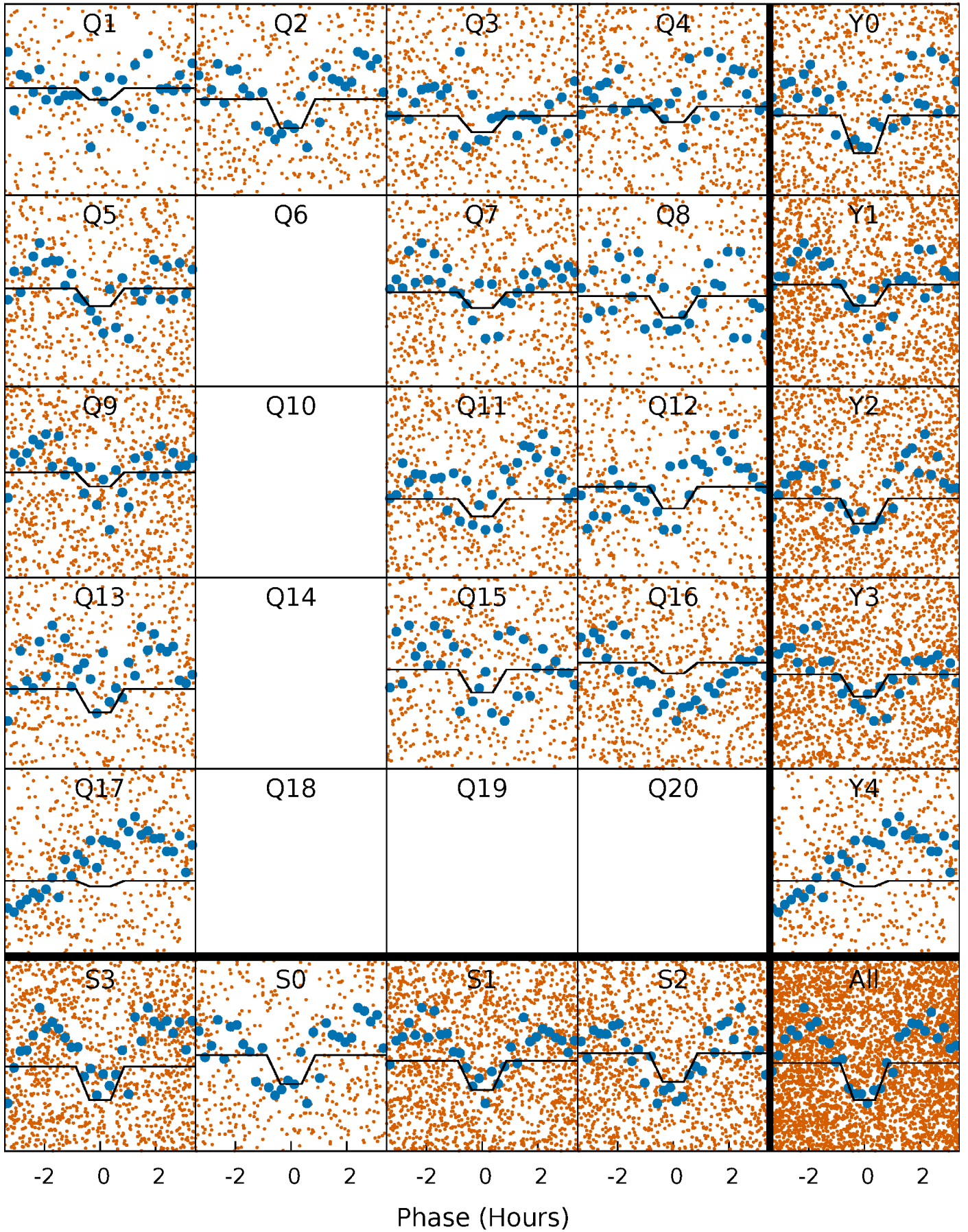
DV Quarter-Phased Transit Curves

TCE 004376648-01 P= 0.521668 Days $T_0=131.999629$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

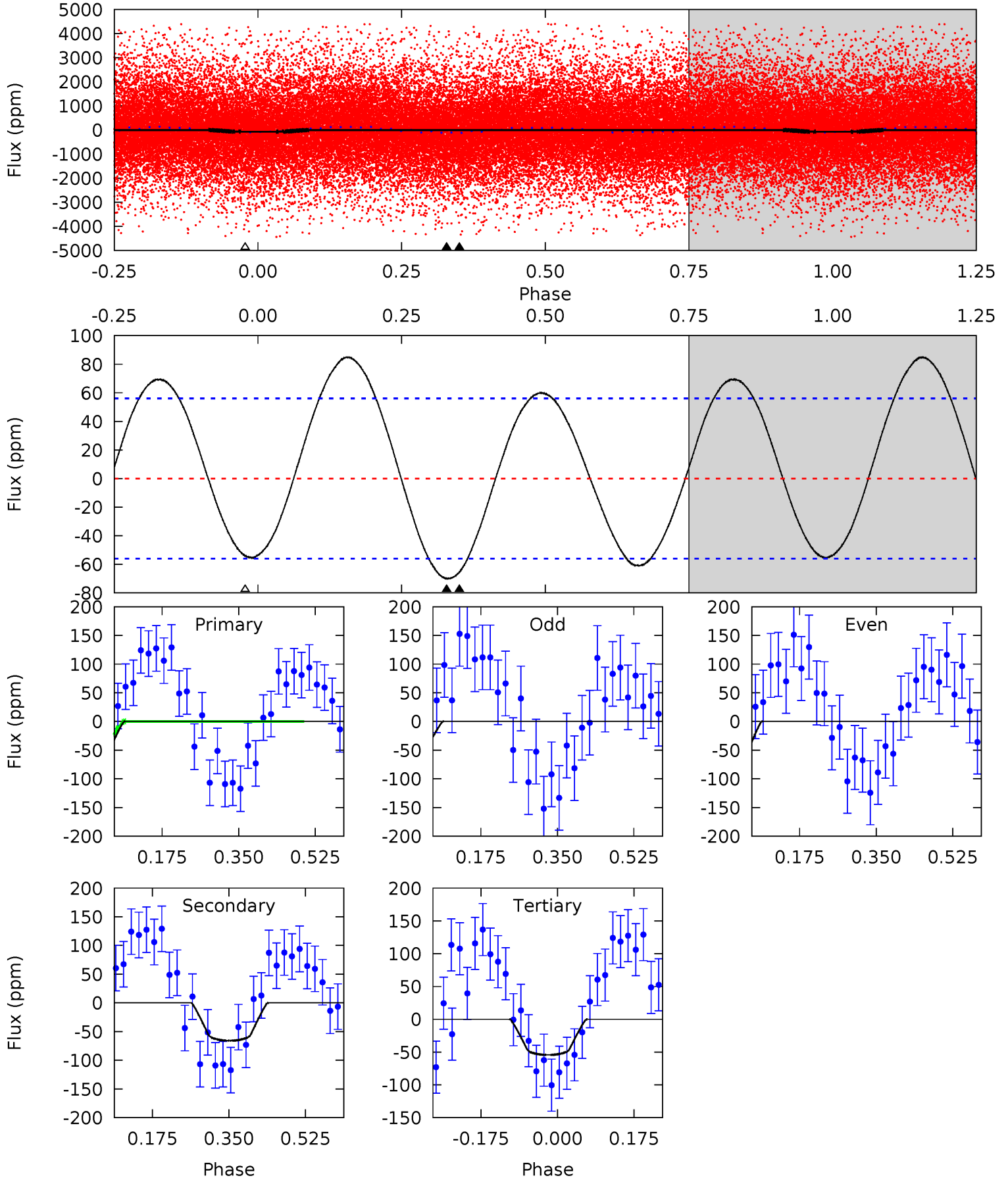
TCE 004376648-01 P= 0.521667 Days $T_0=131.999307$ (BKJD)



DV Model-Shift Uniqueness Test

004376648-01, P = 0.521668 Days, E = 131.477961 Days

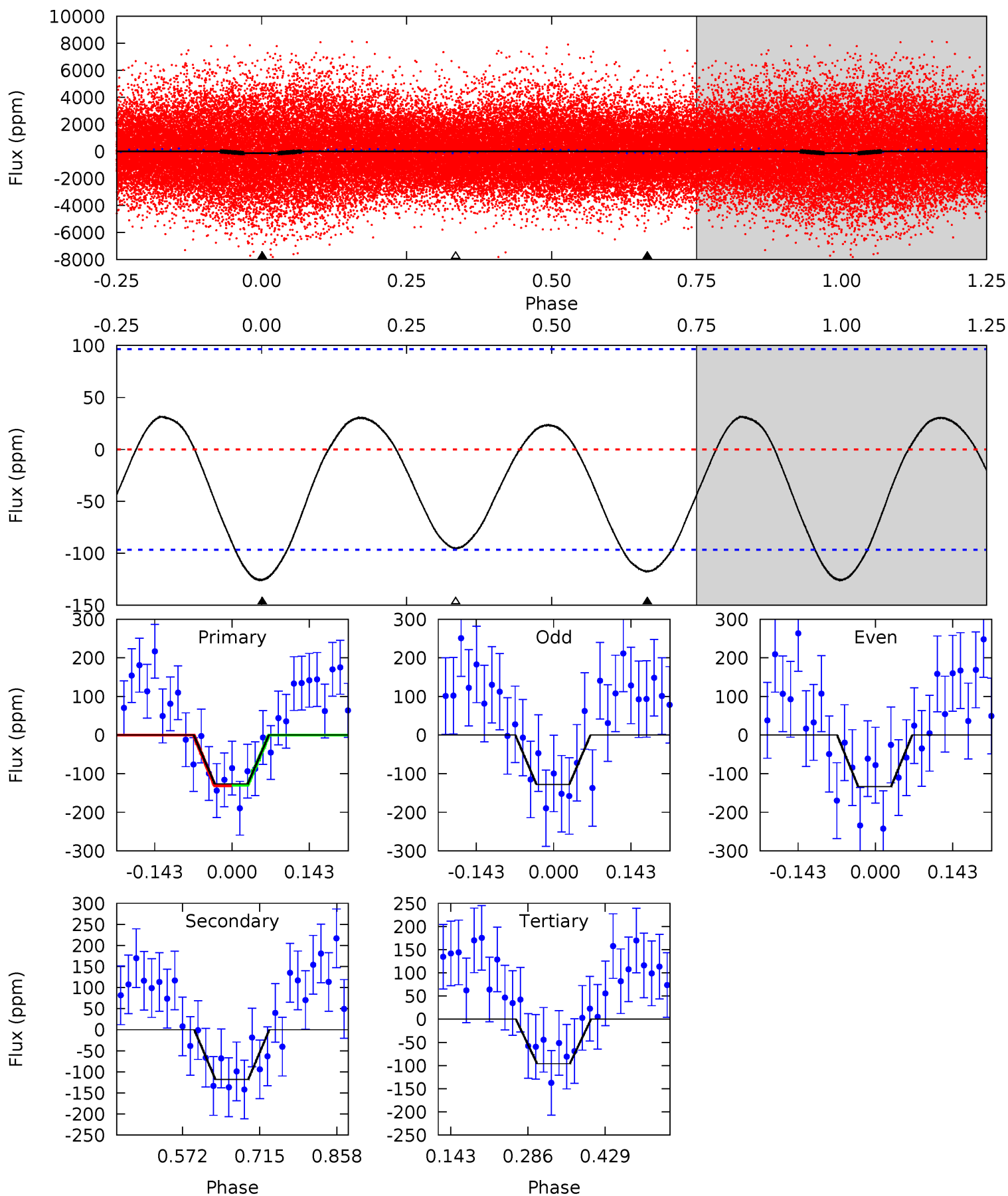
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.57	5.23	4.32	0	4.45	1.36	3.61	1.25	5.57	0.91	5.23	0.77	0.93	0.55	1.69



Alt Model-Shift Uniqueness Test

004376648-01, P = 0.521667 Days, E = 131.477640 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.89	5.49	4.46	0	4.49	1.46	2.10	1.43	5.89	1.03	5.49	0.13	0.63	0.20	0.04



Stellar Parameters For KIC 004376648

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	M (M_{\odot})	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	7024^{+164}_{-246}	$4.039^{+0.252}_{-0.168}$	$-0.360^{+0.300}_{-0.300}$	$1.857^{+0.478}_{-0.584}$	$1.378^{+0.202}_{-0.269}$	$0.303^{+0.486}_{-0.145}$
	+2%/-4%	+6%/-4%	+83%/-83%	+26%/-31%	+15%/-20%	+160%/-48%
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 004376648-01 / KOI

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-66 ± 13	$1.67^{+0.48}_{-0.44}$	4933^{+363}_{-444}	6580^{+1153}_{-806}	$2.506^{+2.171}_{-0.996}$
Alt.	-118 ± 22	$2.25^{+0.56}_{-0.52}$	4919^{+376}_{-426}	6583^{+922}_{-701}	$2.529^{+1.795}_{-0.942}$

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

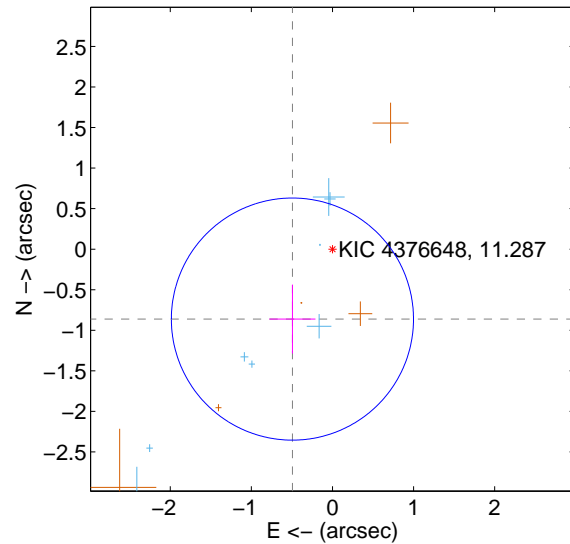
Supplemental centroid analysis for 004376648-01. **Kepler magnitude: 11.29.** Transit SNR 8.00

There are 9 quarters with good PRF difference image offsets

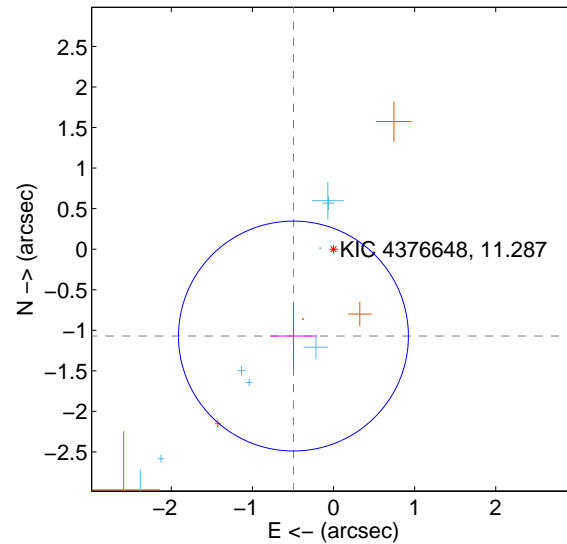
The direct PRF centroid is offset from the target star catalog position by about 0.20 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.994 ± 0.498	2.00	0.494 ± 0.284	-0.862 ± 0.426
PRF-fit source offset from KIC position	1.180 ± 0.473	2.50	0.494 ± 0.284	-1.071 ± 0.401
photometric centroid source offset	0.92 ± 0.25	3.62	0.83 ± 0.23	-0.40 ± 0.33

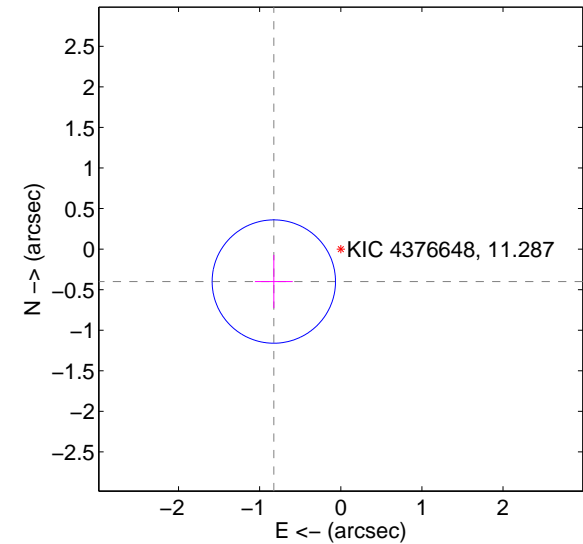
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

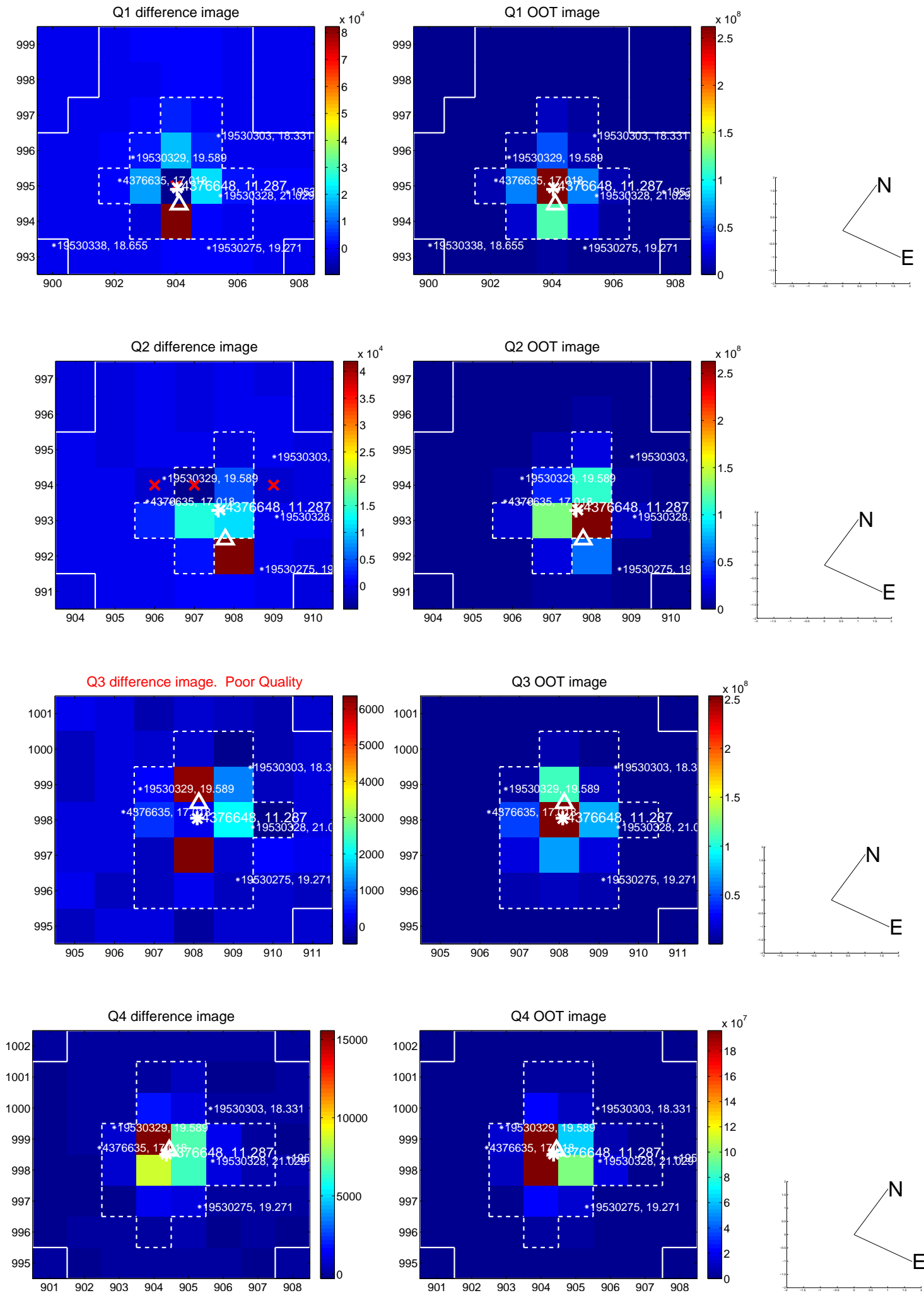


offset from photometric centroids

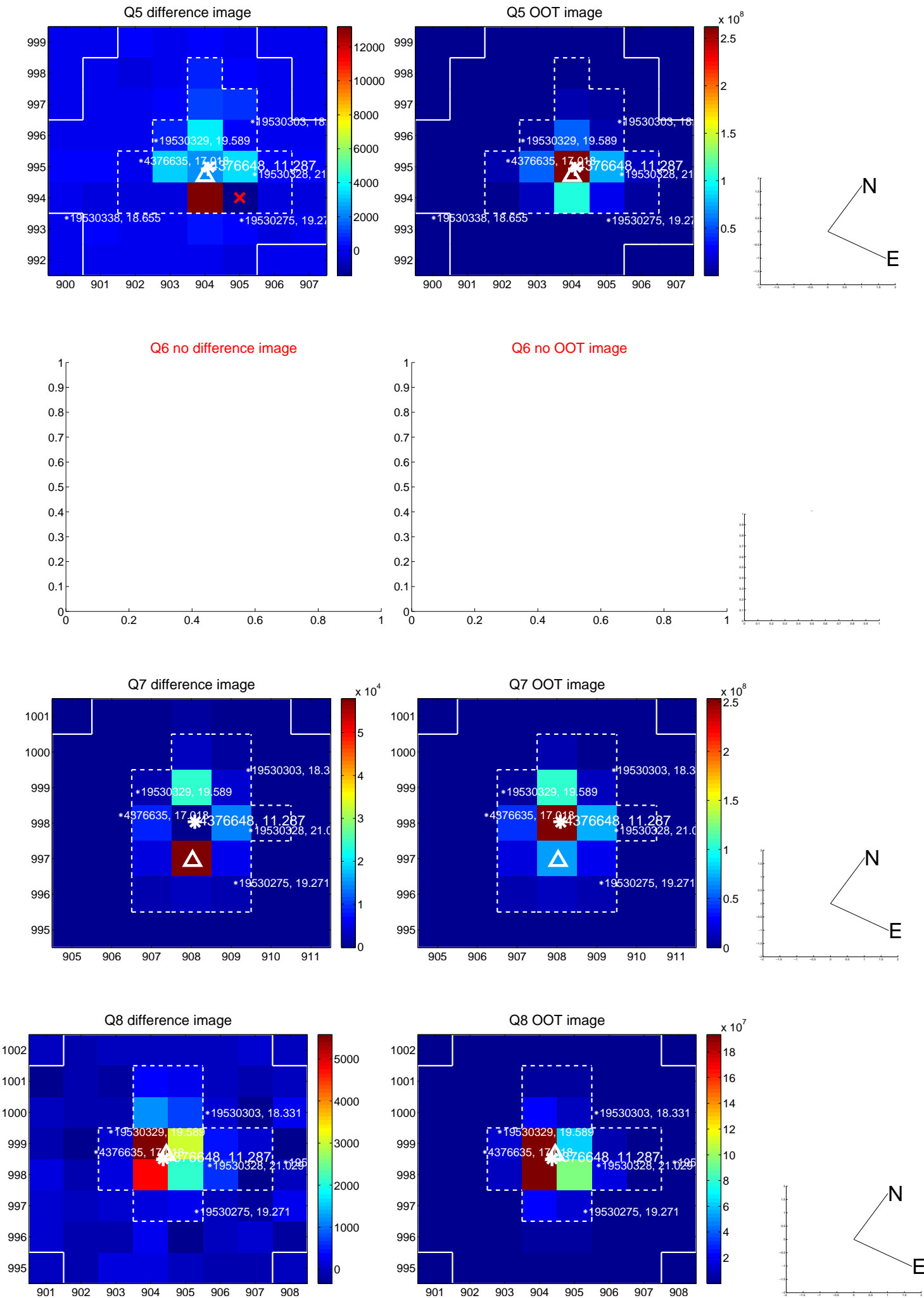


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

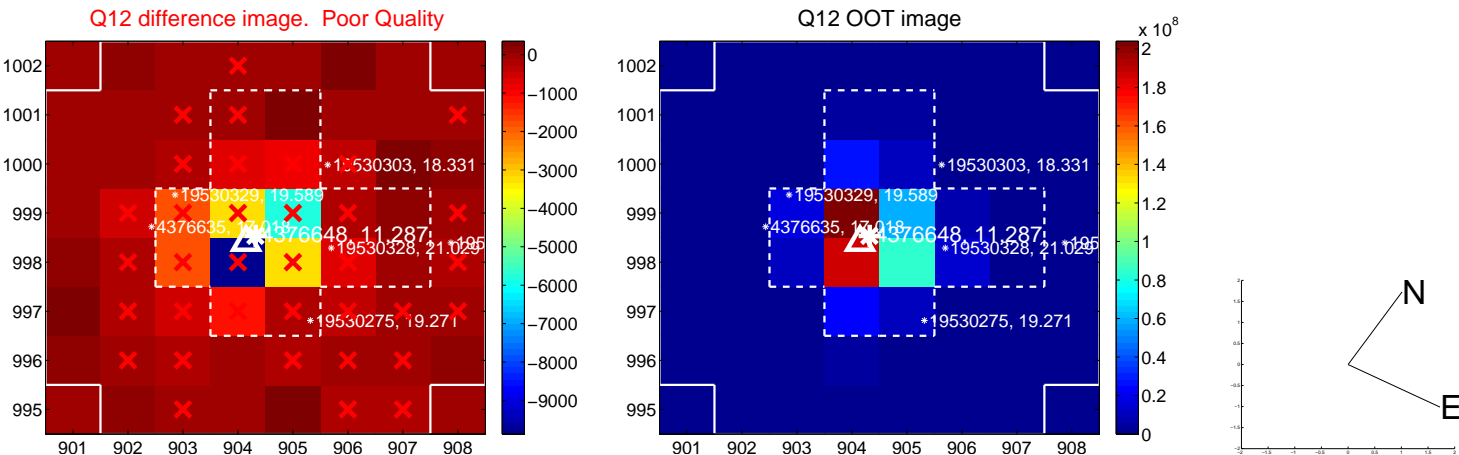
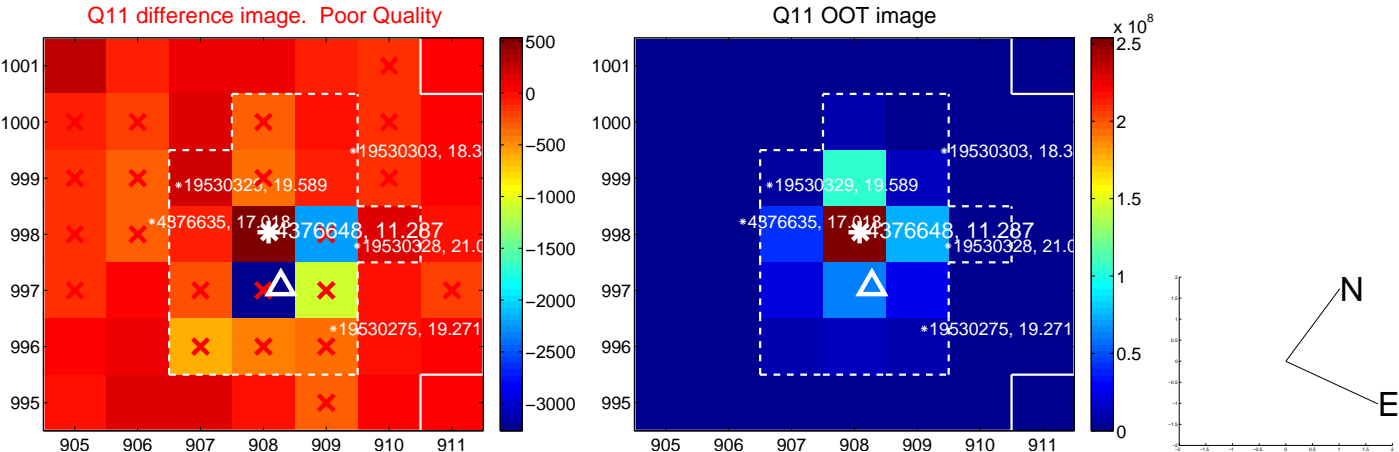
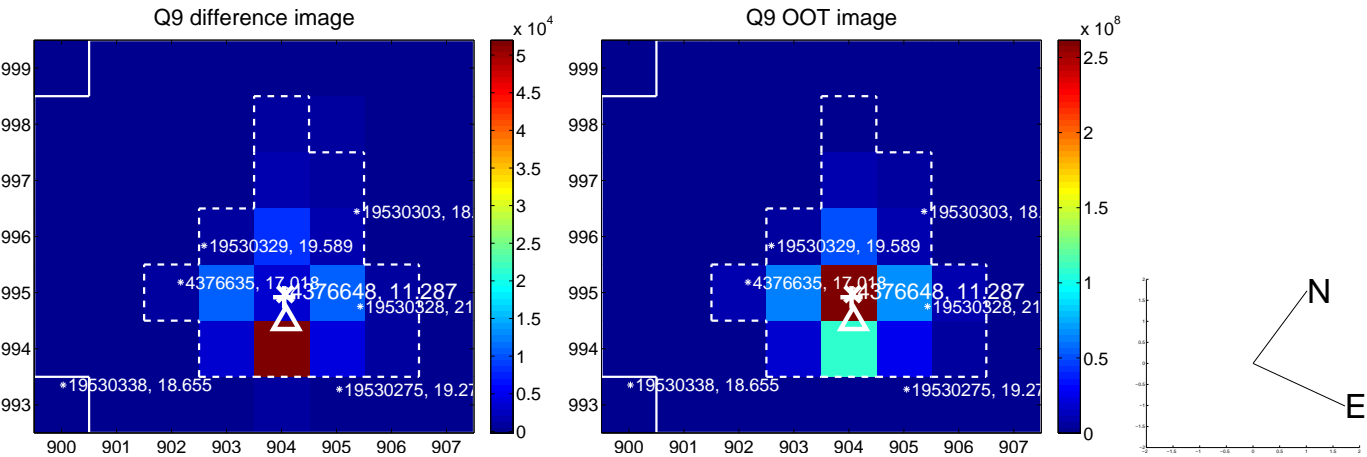
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



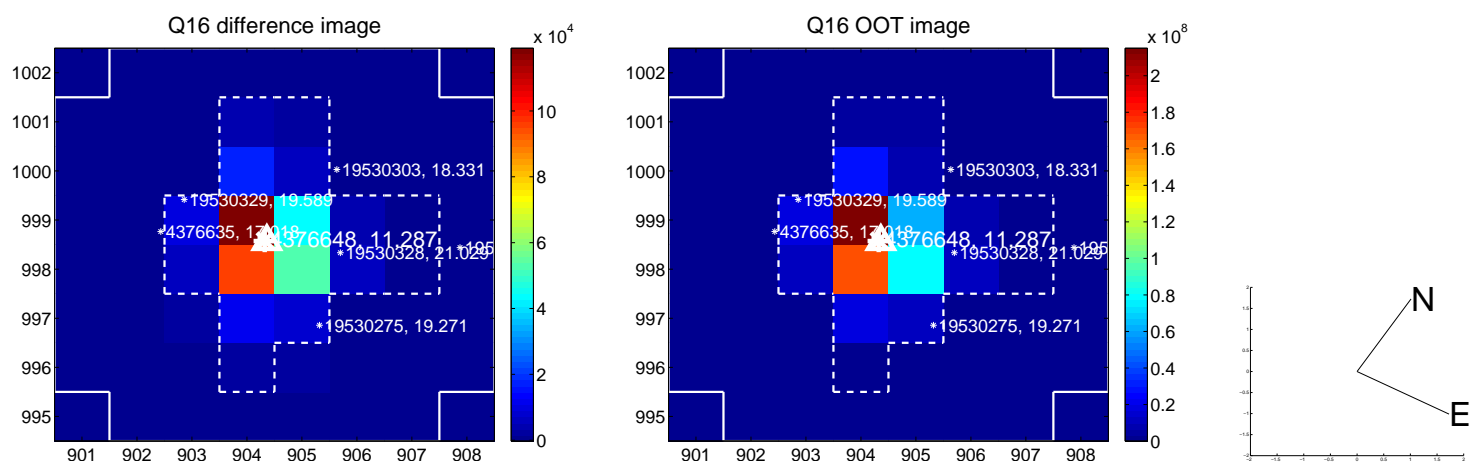
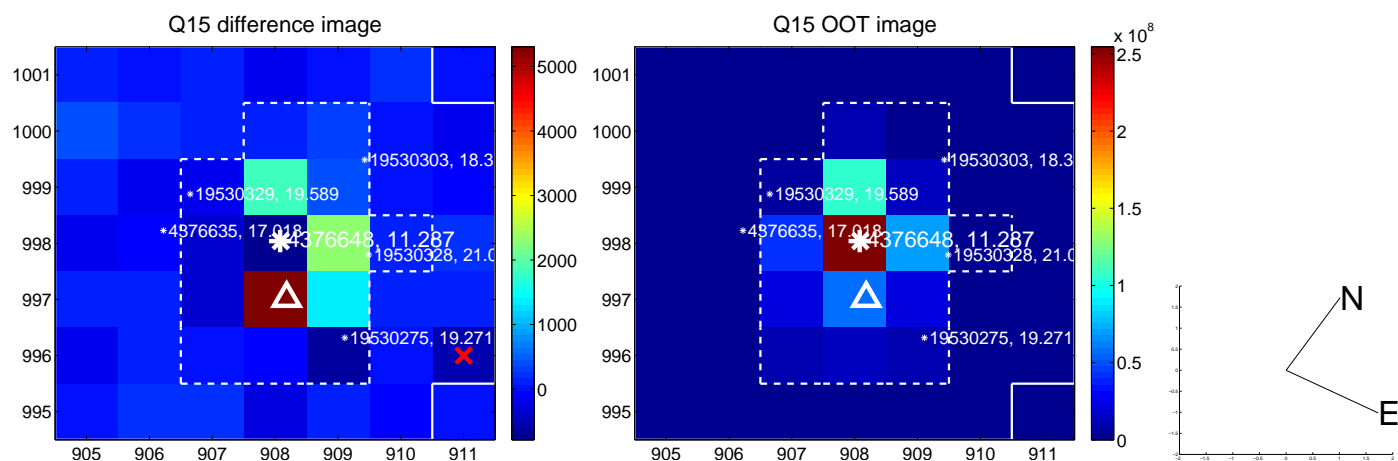
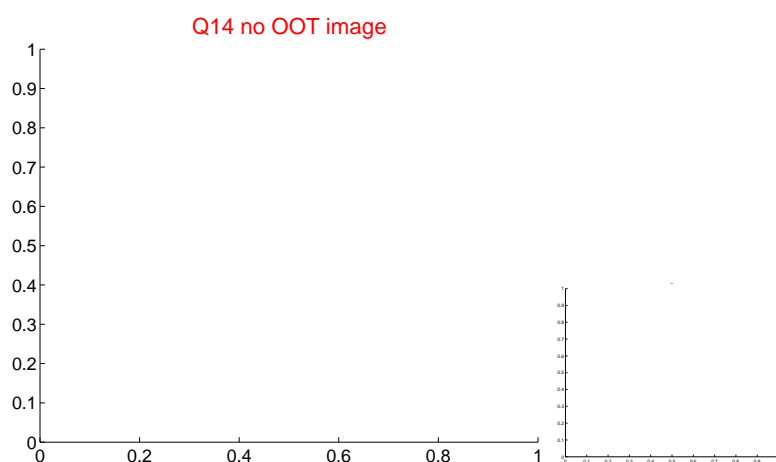
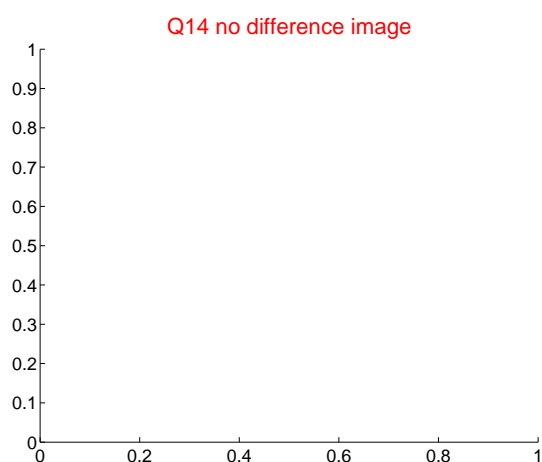
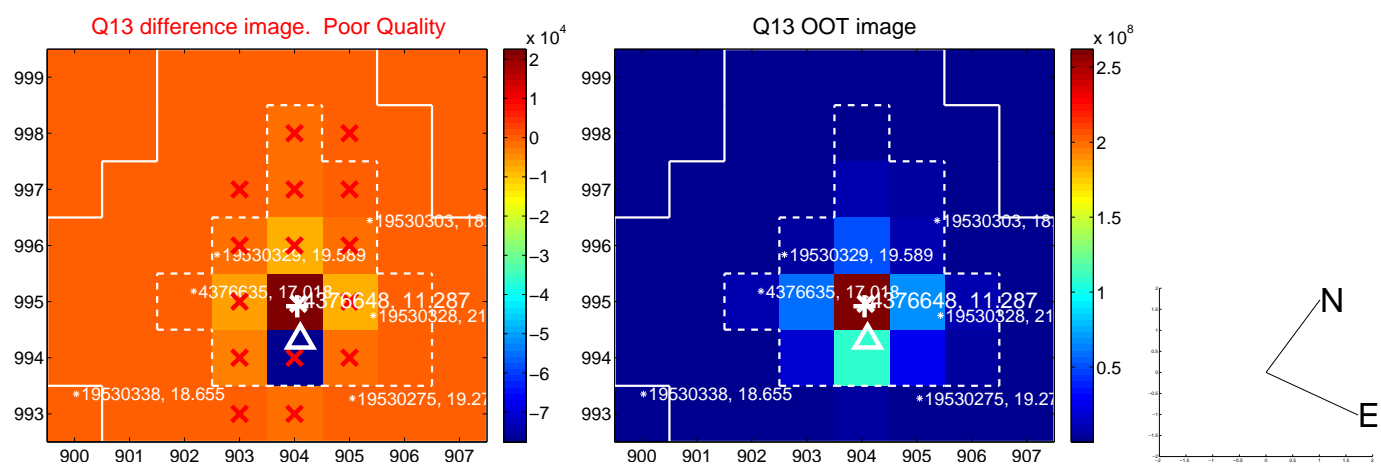
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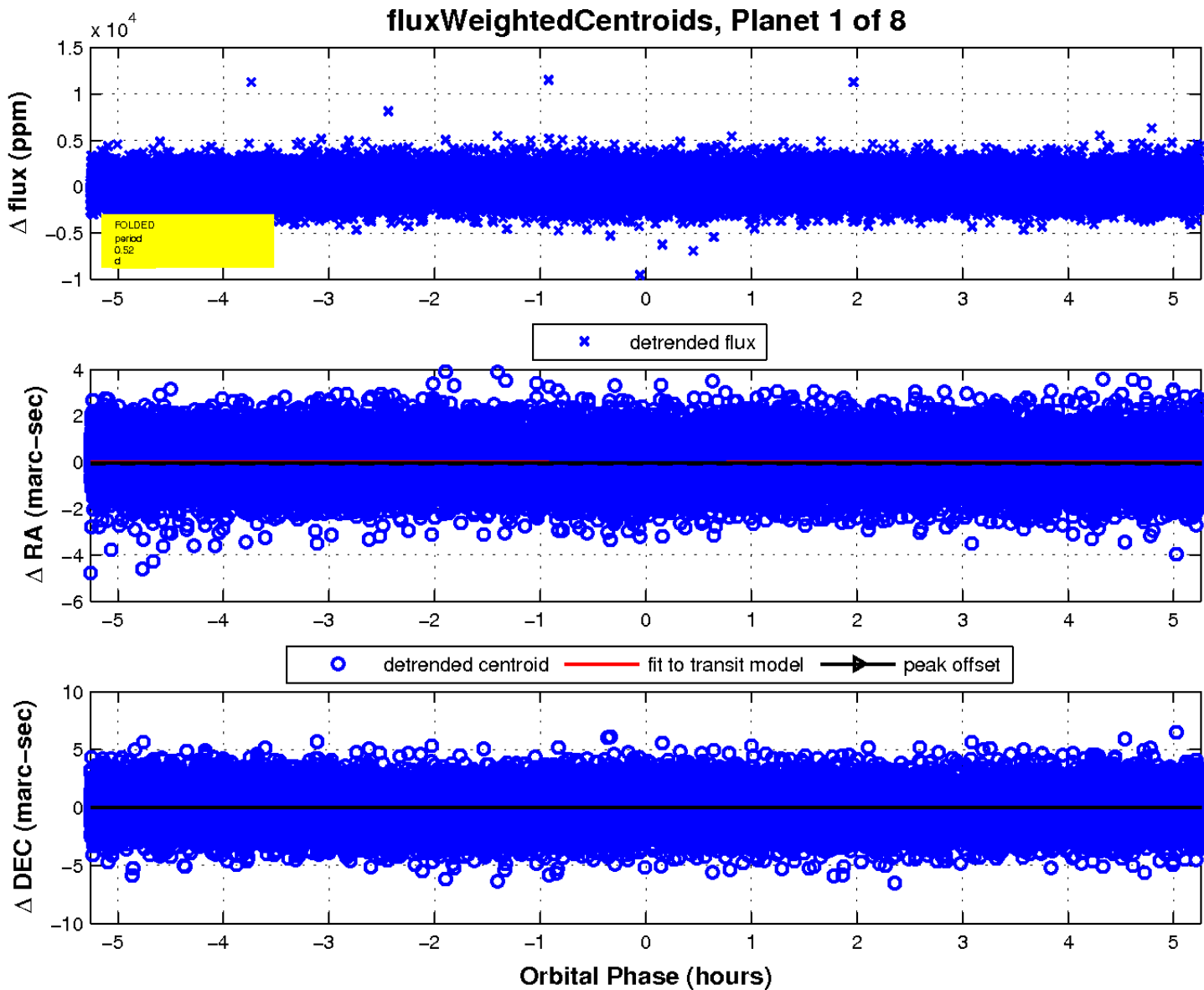
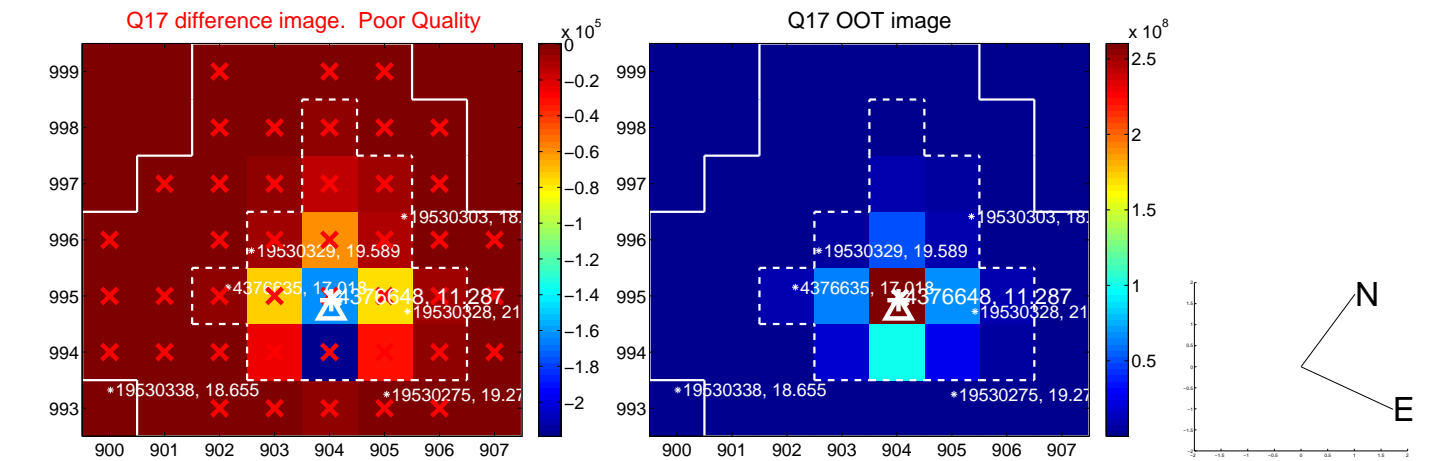
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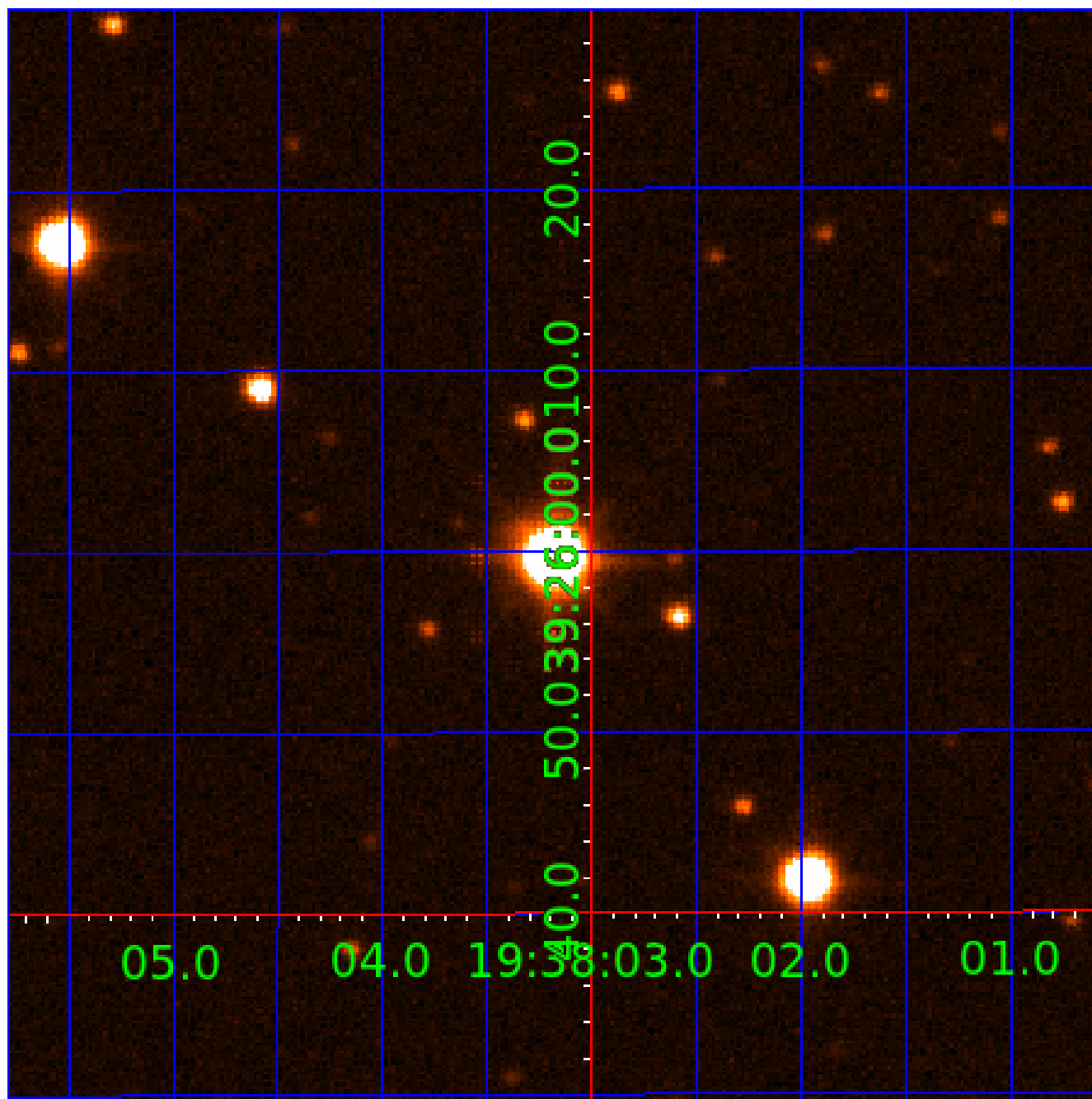


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 004376648

Q1-17 DR25 TCE Parameters

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004376648-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—SAME_NTL_PERIOD—CENT_SATURATED
004376648-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
004376648-04	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED—HALO_GHOST
004376648-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
004376648-06	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED—HALO_GHOST
004376648-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
004376648-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED

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

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

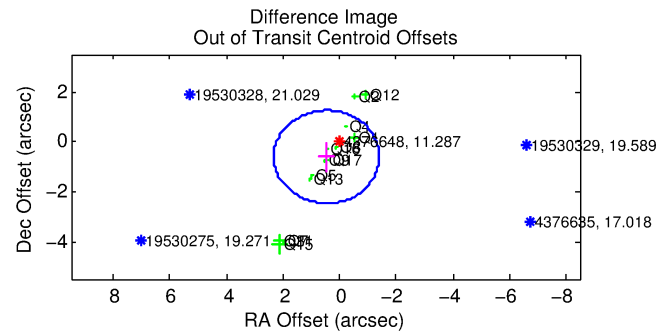
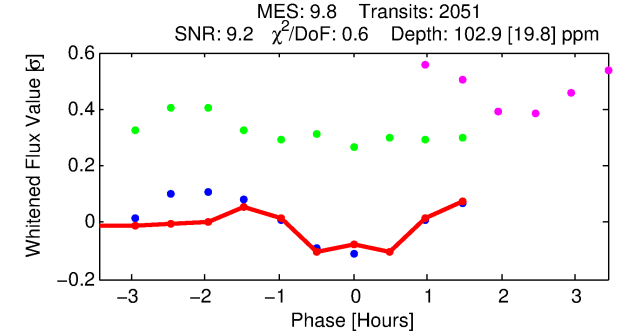
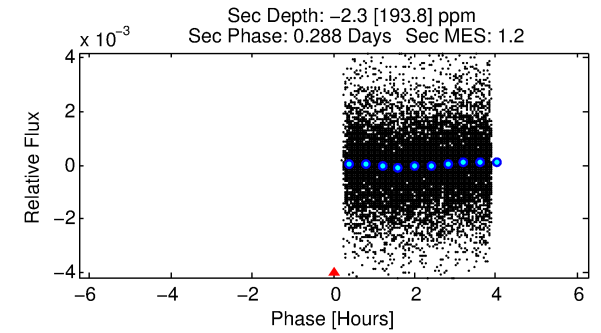
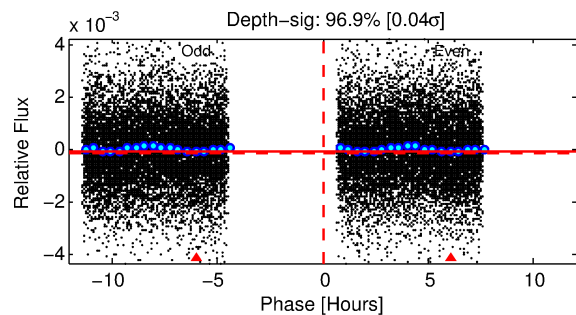
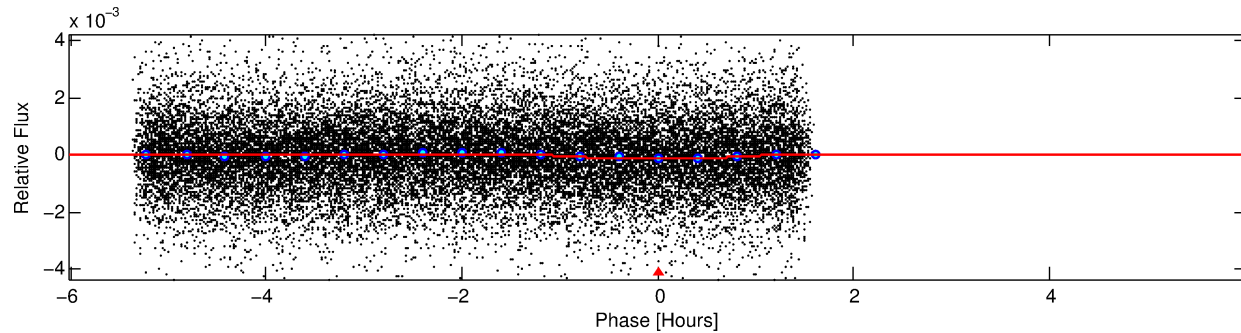
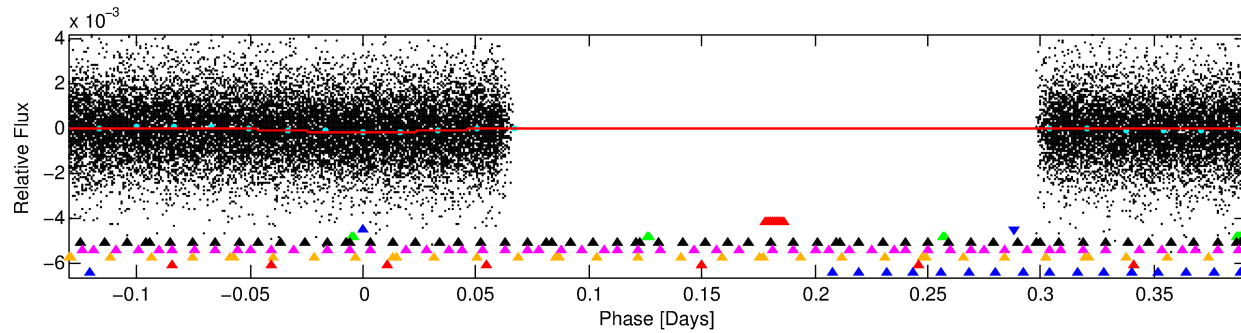
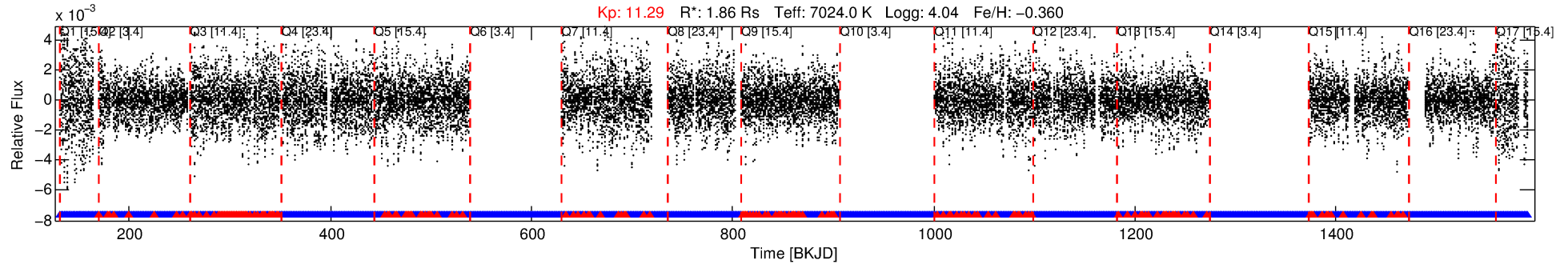
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 004376648-02

No Significant Match Found

DV One-Page Summary

KIC: 4376648 Candidate: 2 of 8 Period: 0.522 d



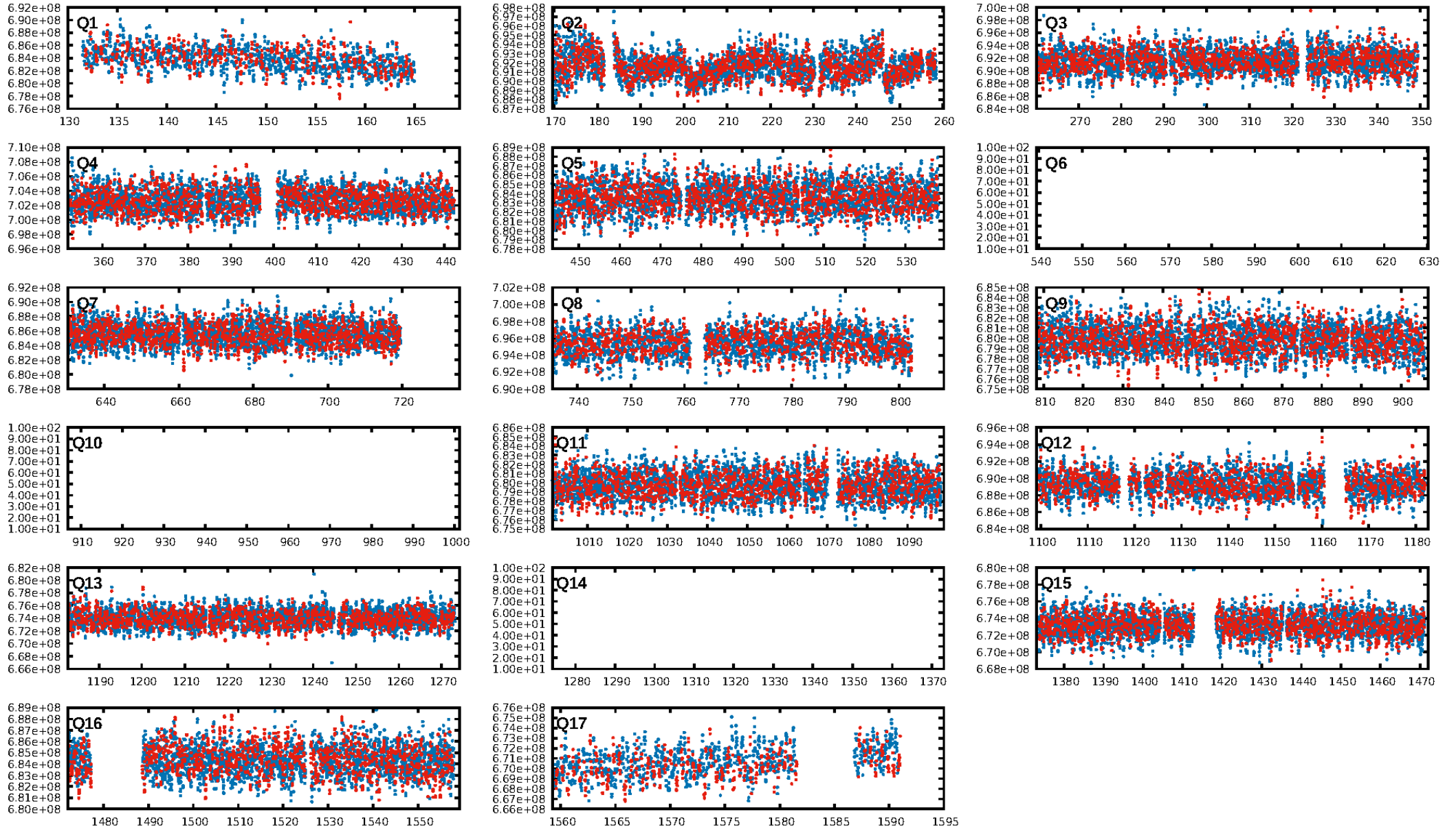
DV Fit Results:

Period = 0.52167 [0.00002] d
Epoch = 131.8217 [0.0012] BKJD
Rp/R* = 0.0108 [0.0027]
a/R* = 1.31 [0.77]
b = 0.90 [0.30]
Seff = 37779.04 [17444.85]
Teq = 3555 [410] K
Rp = 2.19 [0.88] Re
a = 0.0141 [0.0040] AU
Ag = N/A
Teffp = N/A

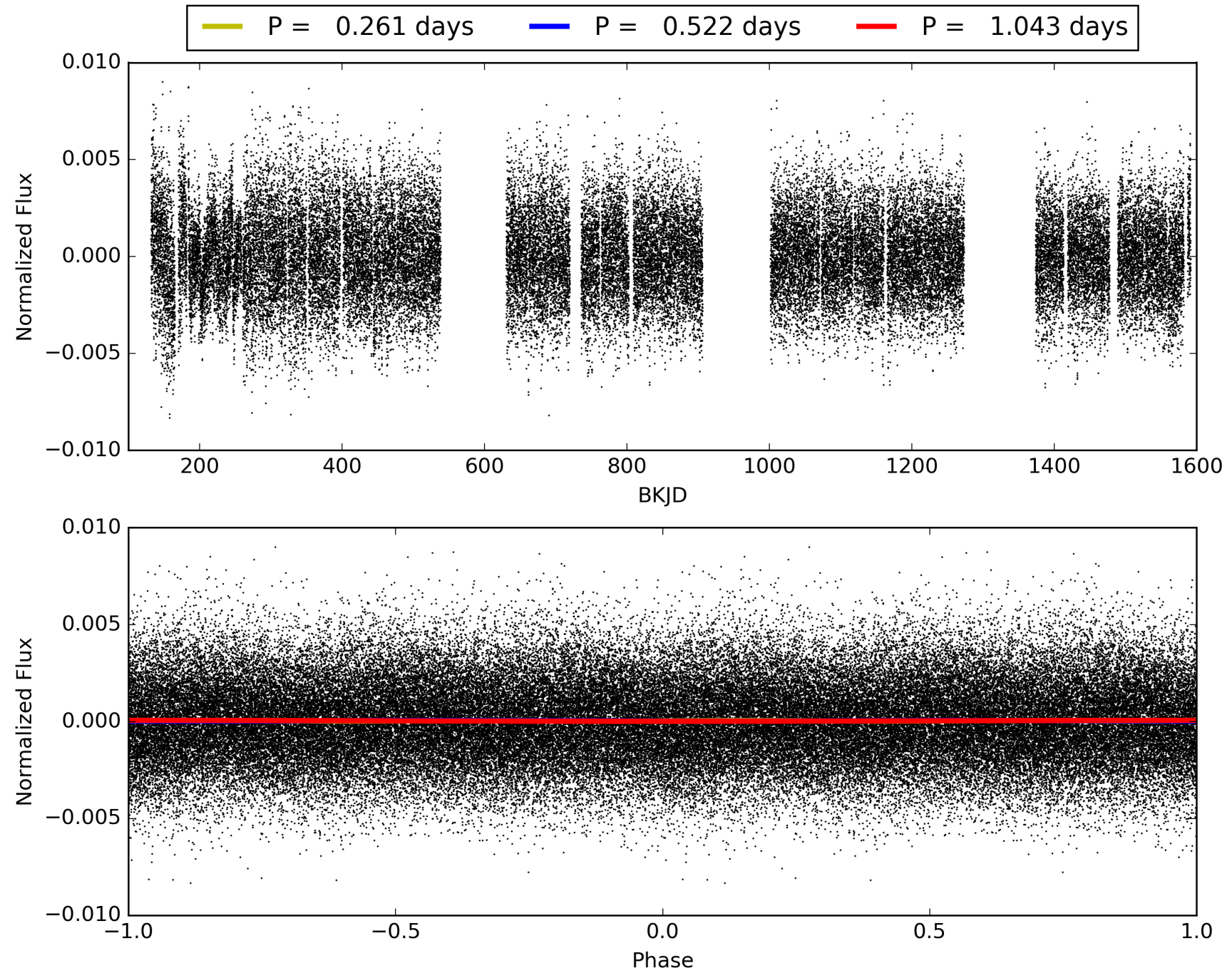
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 0.0% [0.00 σ]
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: N/A
RollingBand-fgt: 0.90 [1738/1936]
GhostDiagnostic-chr: 2.424
Centroid-sig: 0.1%
Centroid-so: 0.519 arcsec [3.05 σ]
OotOffset-rm: 0.770 arcsec [1.24 σ]
KicOffset-rm: 0.908 arcsec [1.48 σ]
OotOffset-st: 1/4/4/5 [14]
KicOffset-st: 1/4/4/5 [14]
DiffImageQuality-fgm: 0.57 [8/14]
DiffImageOverlap-fno: 0.00 [0/14]

TCE 004376648-02, PDC Light Curves

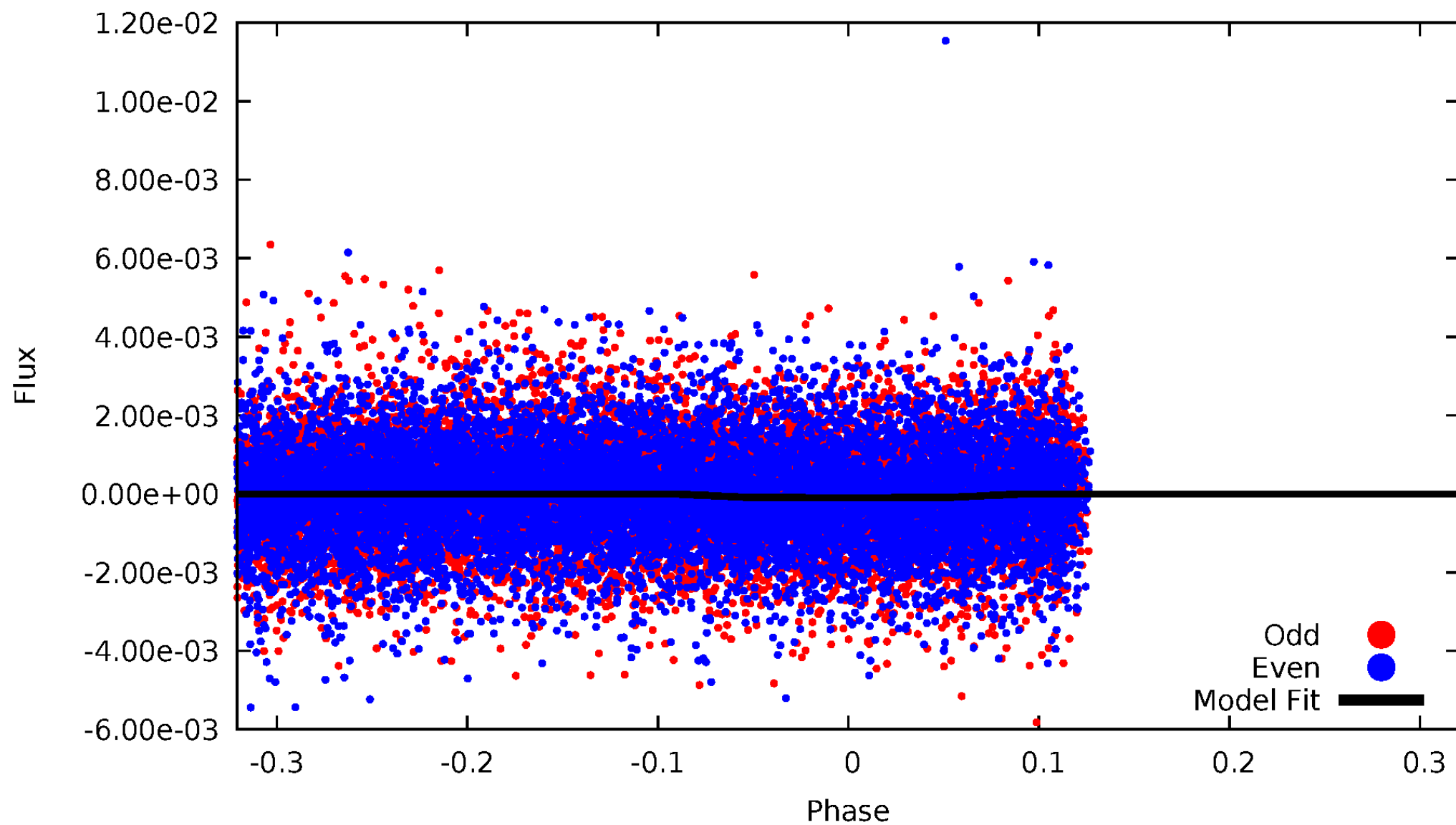


TCE 004376648-02



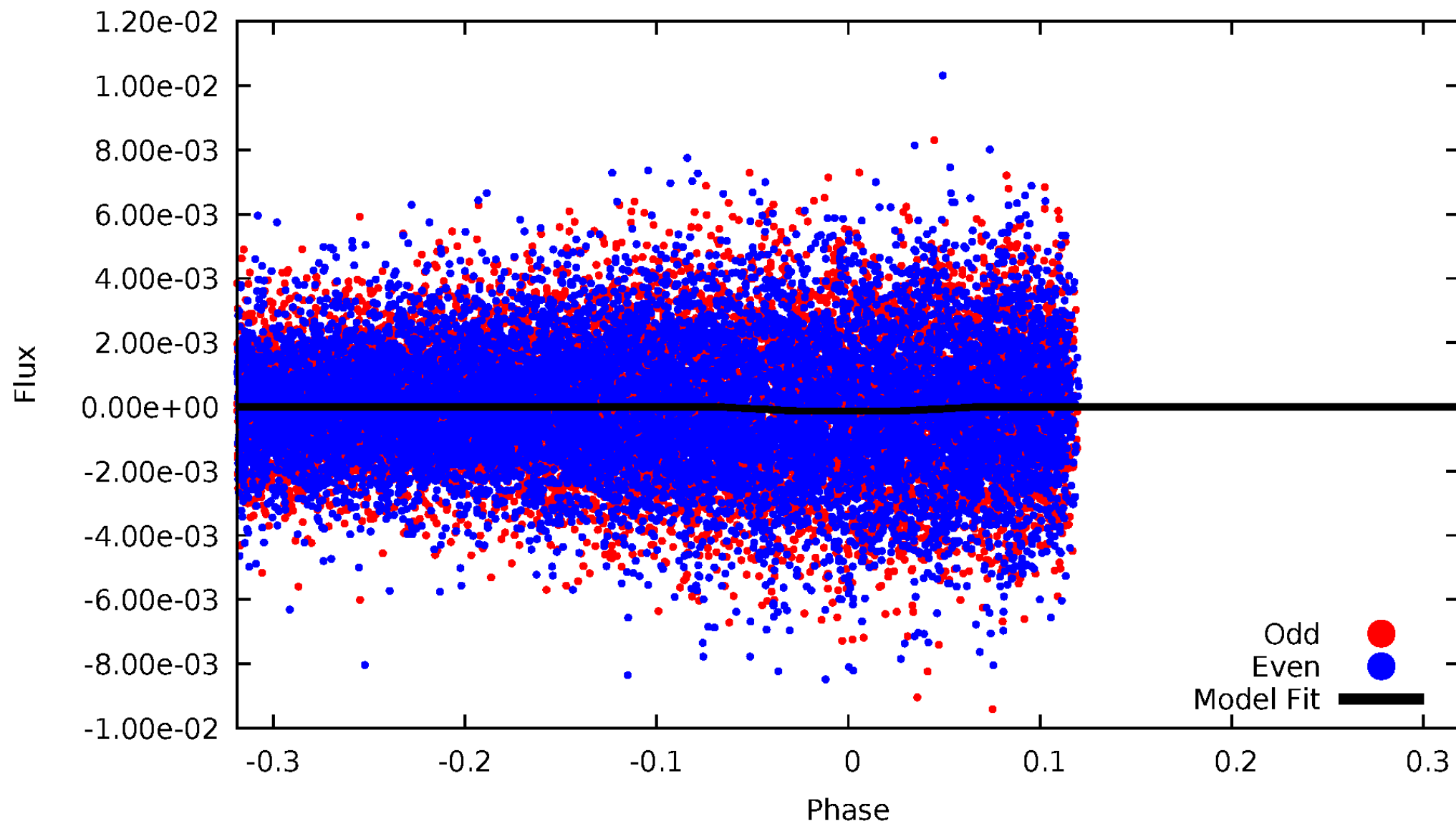
DV Odd/Even

TCE 004376648-02



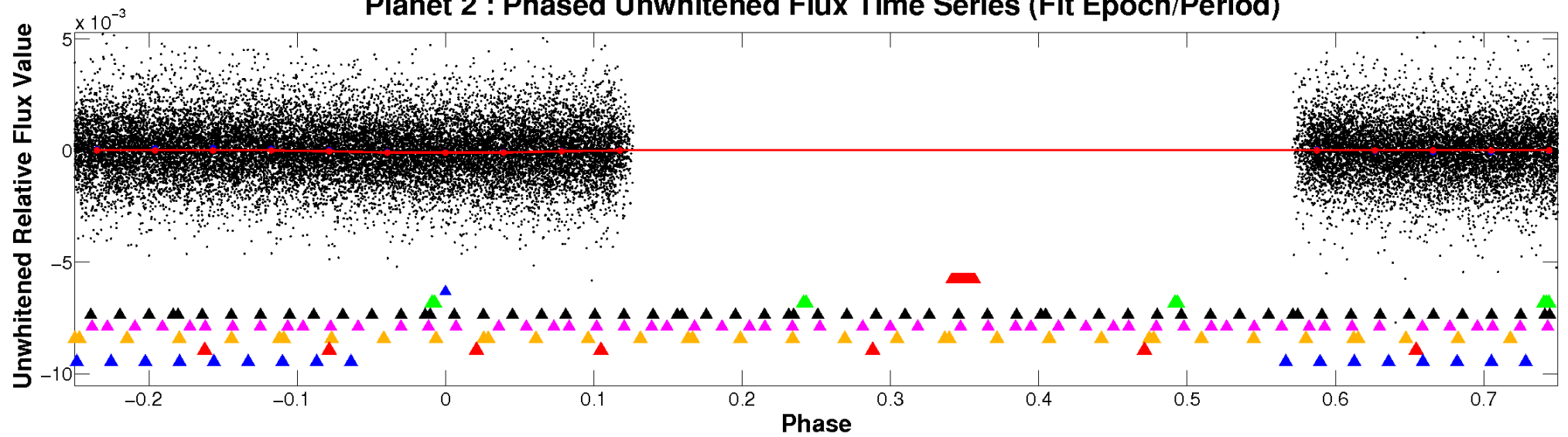
ALT Odd/Even

TCE 004376648-02

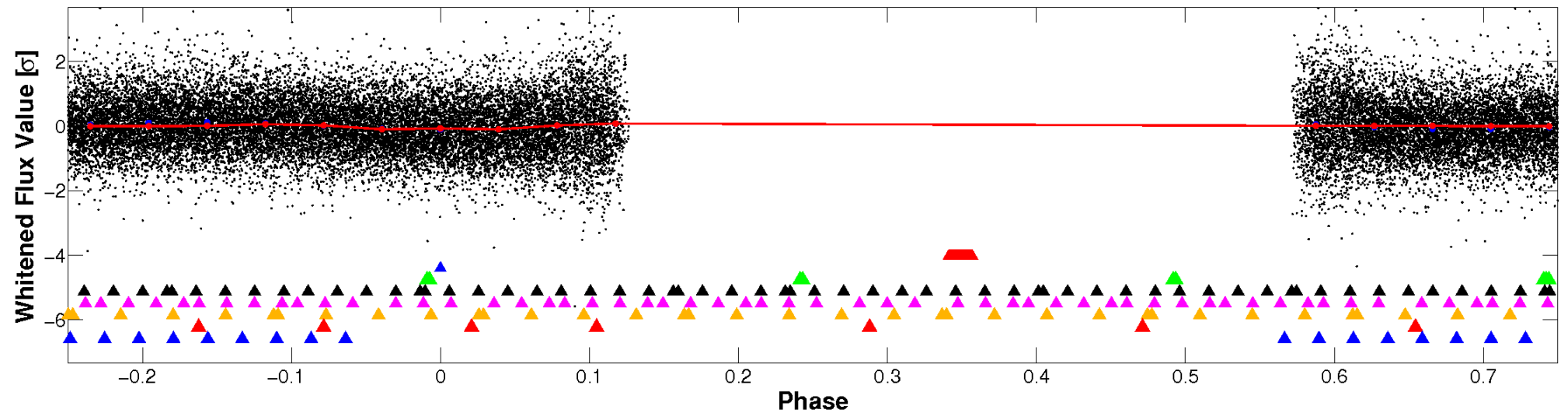


Non-Whitened Vs. Whitened Light Curve

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

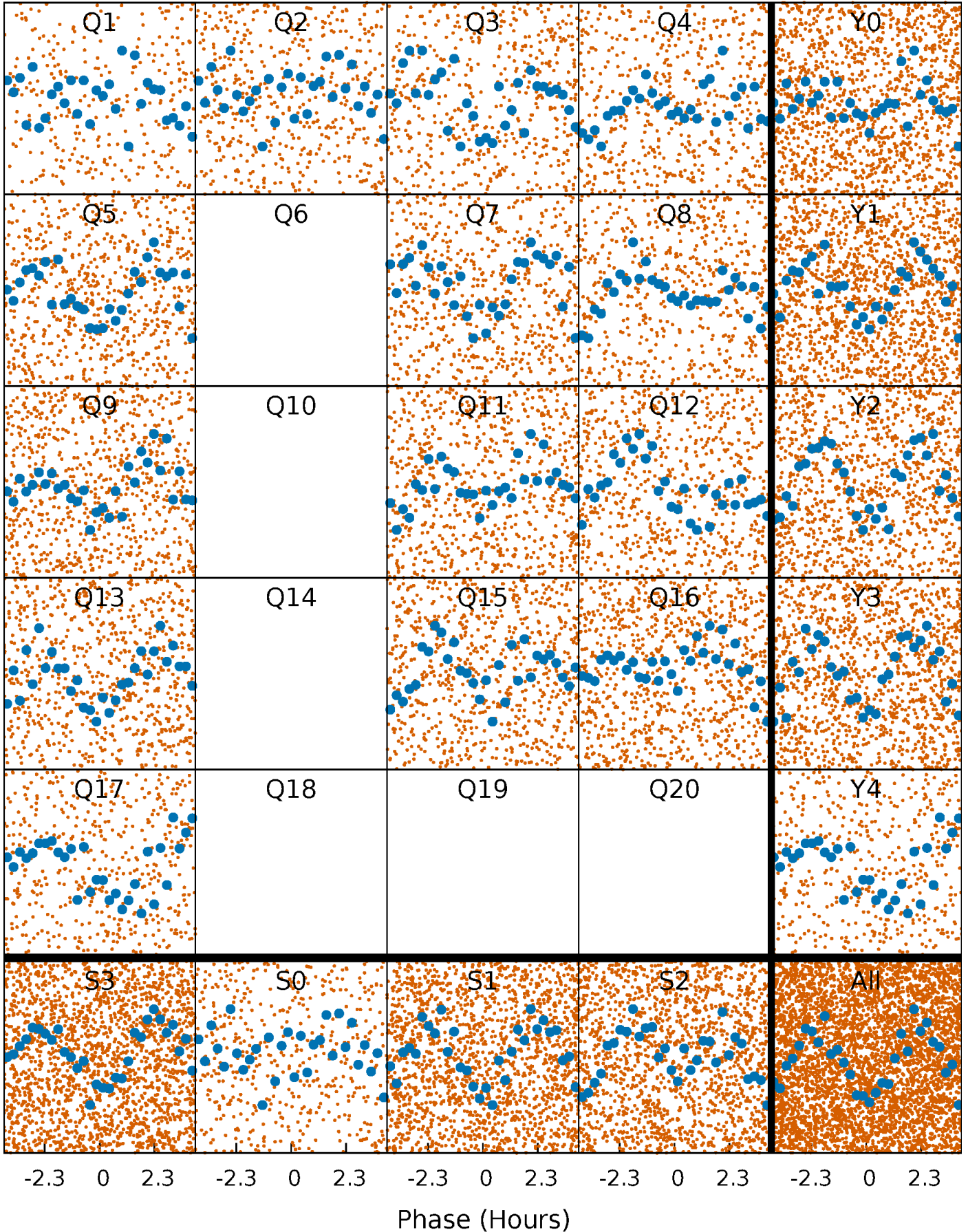


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



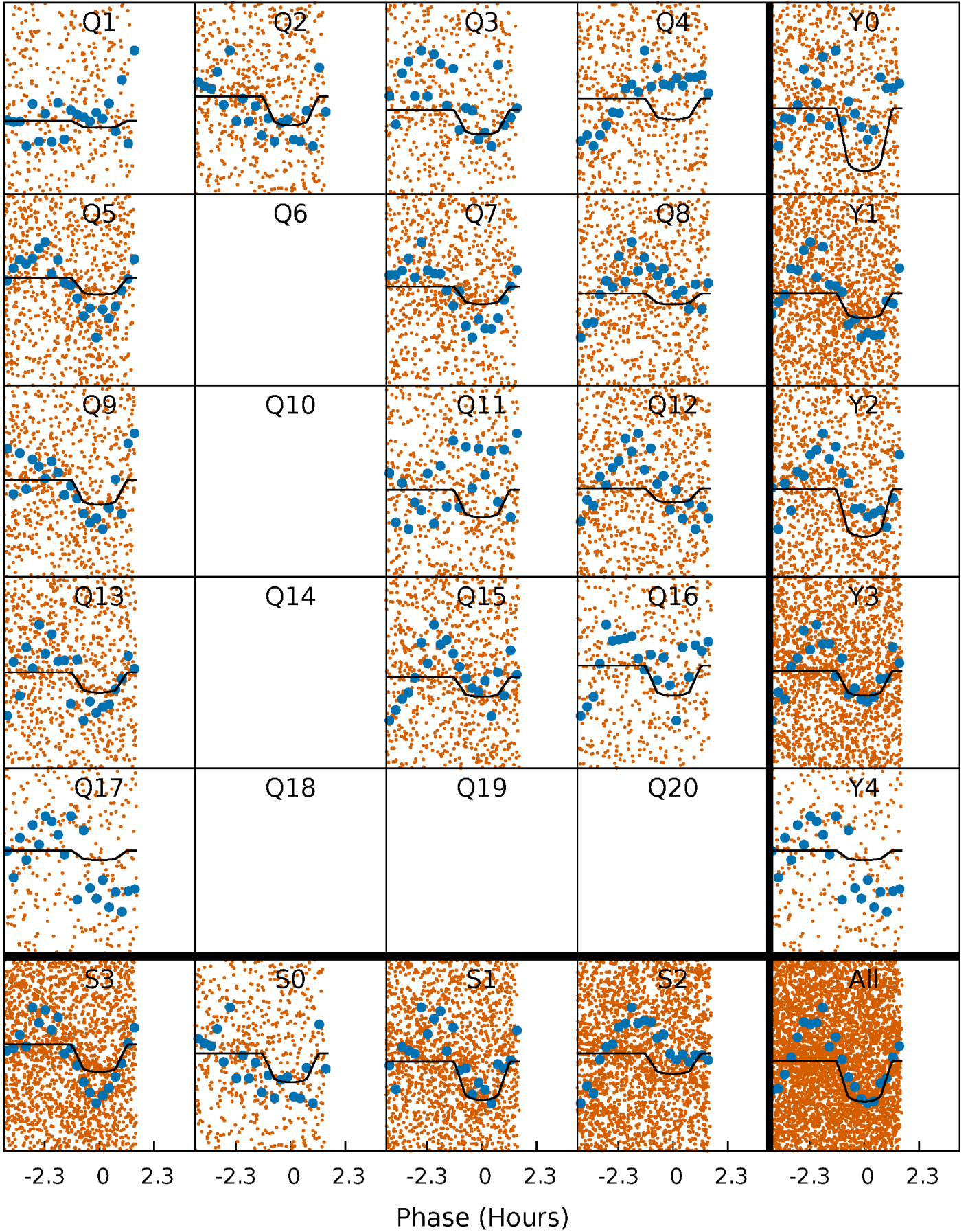
PDC Quarter-Phased Transit Curves

TCE 004376648-02 P= 0.521665 Days $T_0=131.821686$ (BKJD)



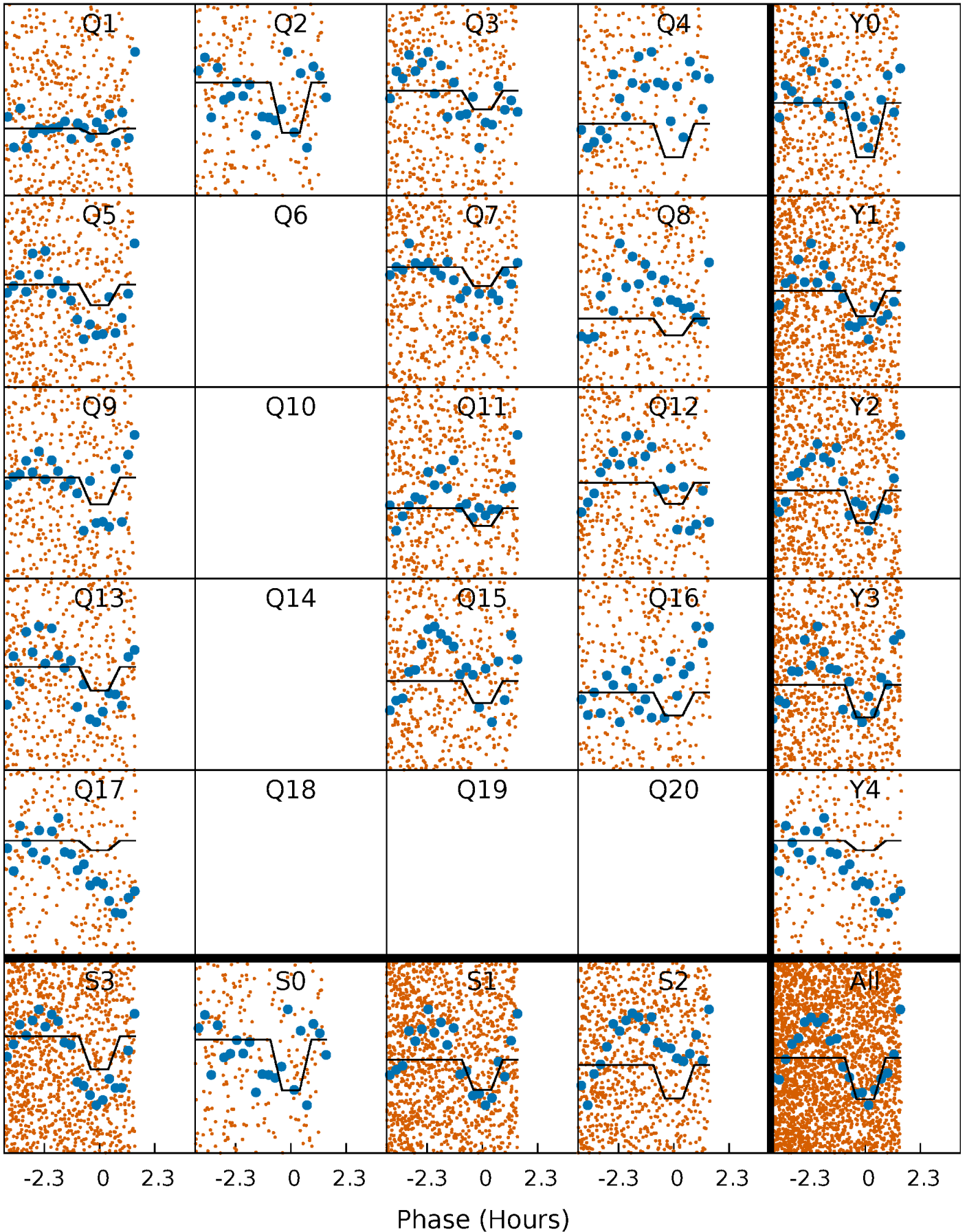
DV Quarter-Phased Transit Curves

TCE 004376648-02 P= 0.521665 Days $T_0=131.821686$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

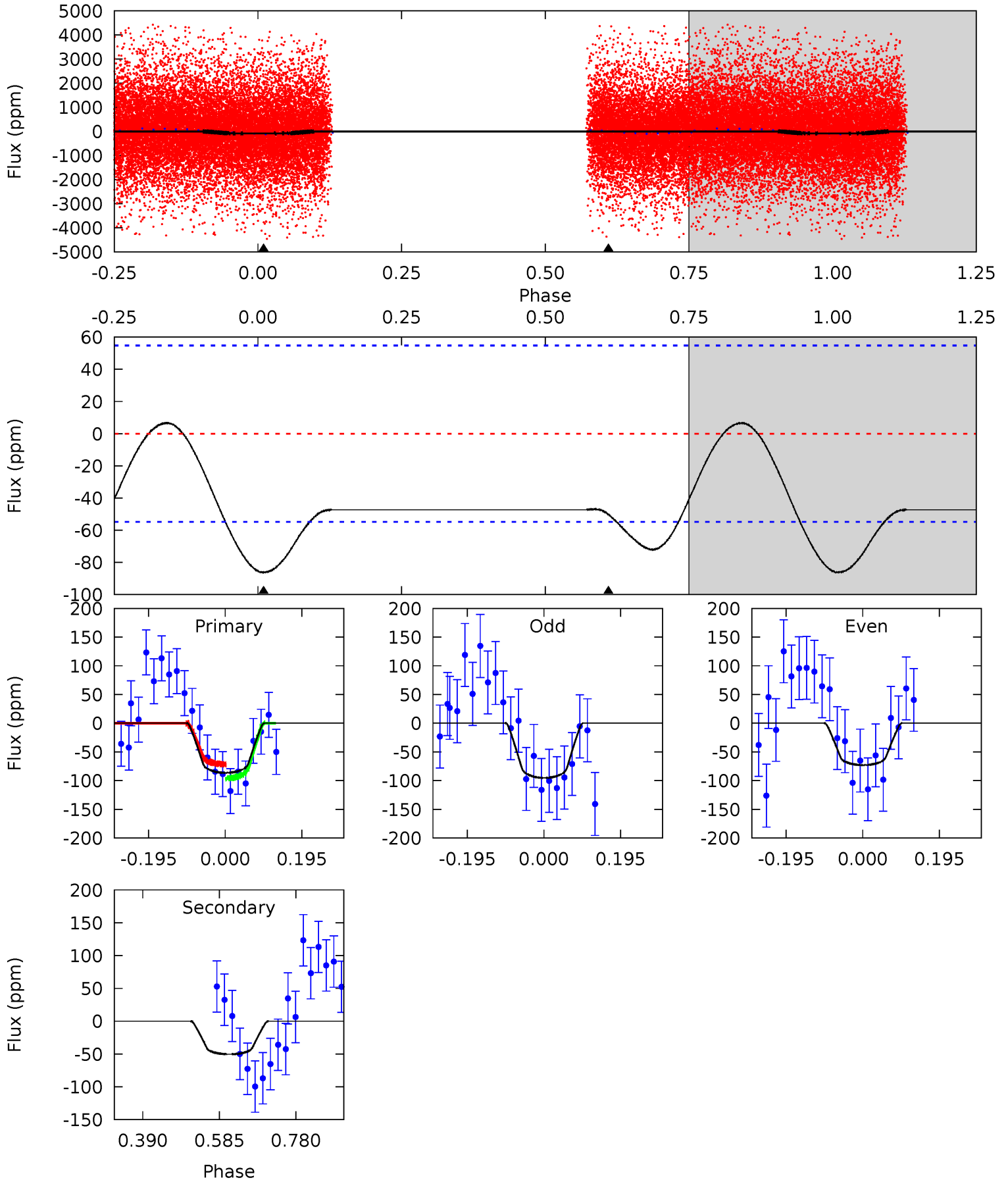
TCE 004376648-02 P= 0.521667 Days $T_0=131.822194$ (BKJD)



DV Model-Shift Uniqueness Test

004376648-02, P = 0.521665 Days, E = 131.300021 Days

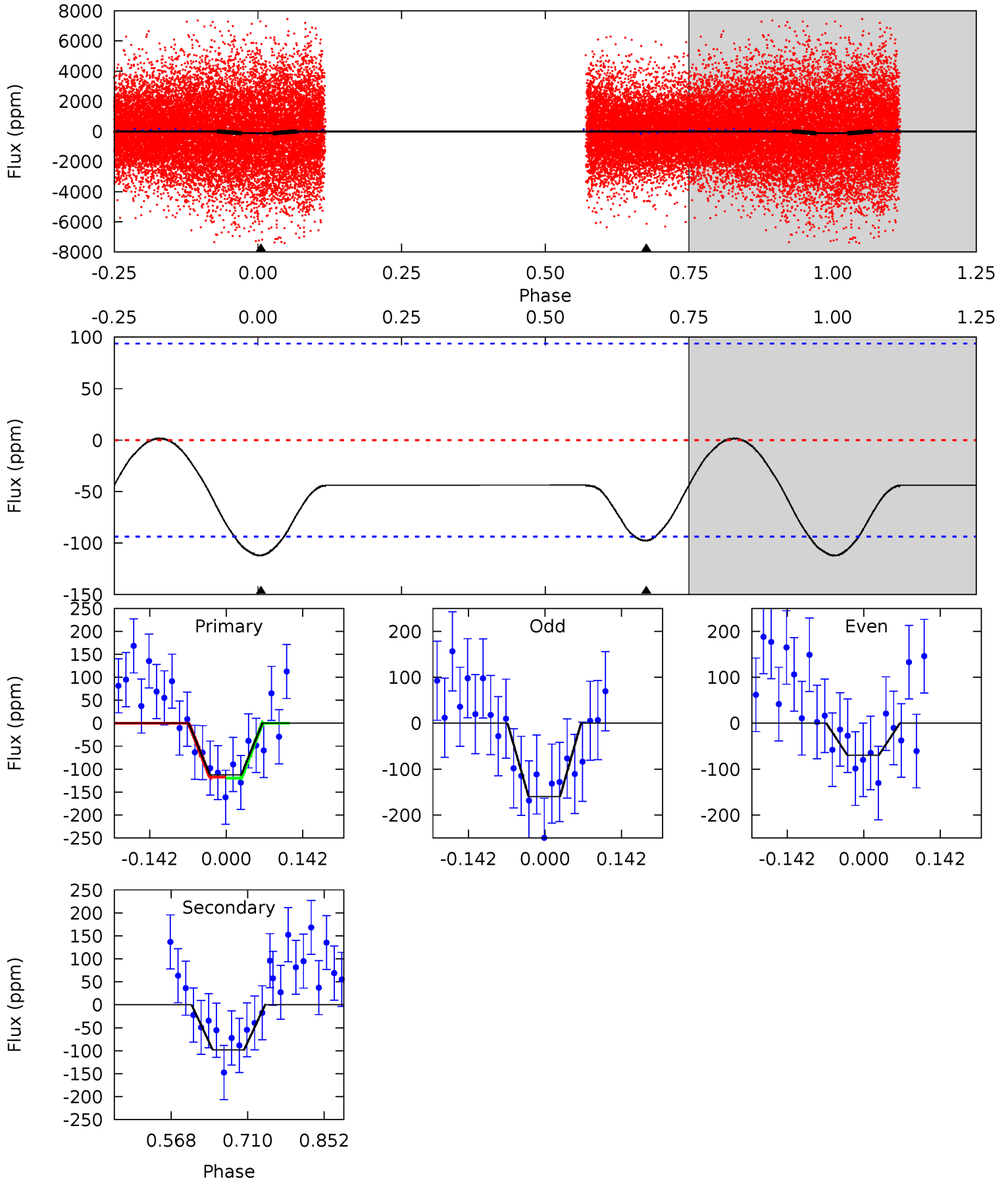
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.98	4.06	0	0	4.42	1.30	0.53	6.98	6.98	4.06	4.06	0.91	0.96	0.07	1.01



Alt Model-Shift Uniqueness Test

004376648-02, P = 0.521667 Days, E = 131.300527 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.40	4.70	0	0	4.49	1.47	0.16	5.40	5.40	4.70	4.70	2.17	1.04	0.02	0.05



Stellar Parameters For KIC 004376648

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	$M(M_{\odot})$	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	7024^{+164}_{-246}	$4.039^{+0.252}_{-0.168}$	$-0.360^{+0.300}_{-0.300}$	$1.857^{+0.478}_{-0.584}$	$1.378^{+0.202}_{-0.269}$	$0.303^{+0.486}_{-0.145}$
	+2%/-4%	+6%/-4%	+83%/-83%	+26%/-31%	+15%/-20%	+160%/-48%
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 004376648-02 / KOI

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-50 ± 12	$2.17^{+0.66}_{-0.67}$	4942^{+356}_{-422}	5217^{+1030}_{-798}	$1.139^{+1.206}_{-0.490}$
Alt.	-98 ± 21	$2.21^{+0.63}_{-0.65}$	4937^{+353}_{-421}	6277^{+1276}_{-890}	$2.160^{+2.079}_{-0.957}$

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

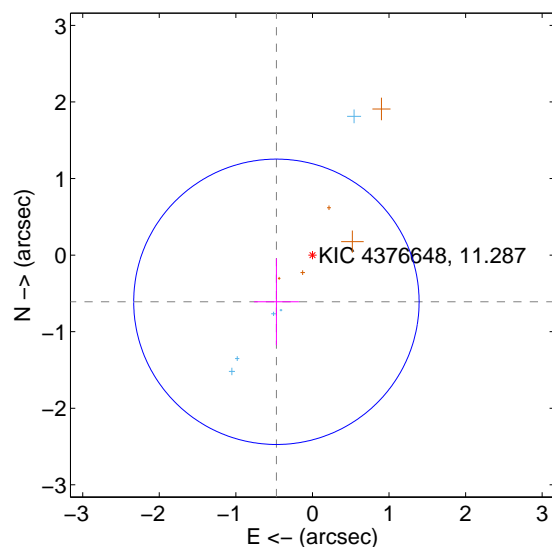
Supplemental centroid analysis for 004376648-02. **Kepler magnitude: 11.29.** Transit SNR 9.16

There are 8 quarters with good PRF difference image offsets

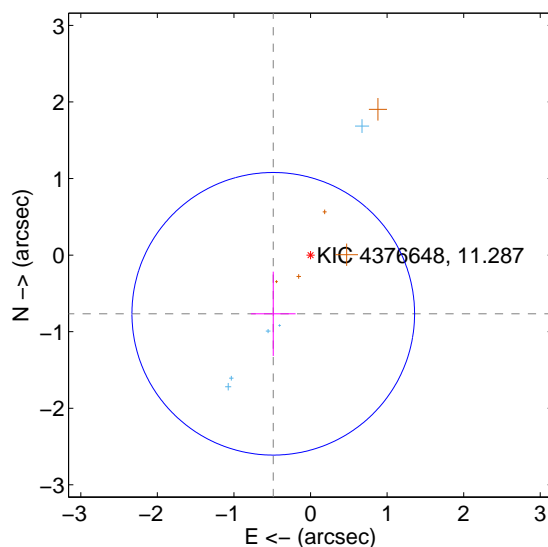
The direct PRF centroid is offset from the target star catalog position by about 0.20 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.770 ± 0.621	1.24	0.471 ± 0.293	-0.610 ± 0.566
PRF-fit source offset from KIC position	0.908 ± 0.615	1.48	0.487 ± 0.292	-0.767 ± 0.550
photometric centroid source offset	0.52 ± 0.17	3.05	0.37 ± 0.14	-0.37 ± 0.20

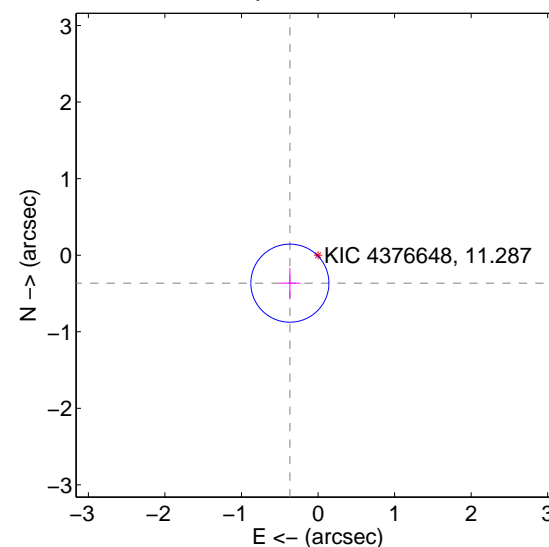
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

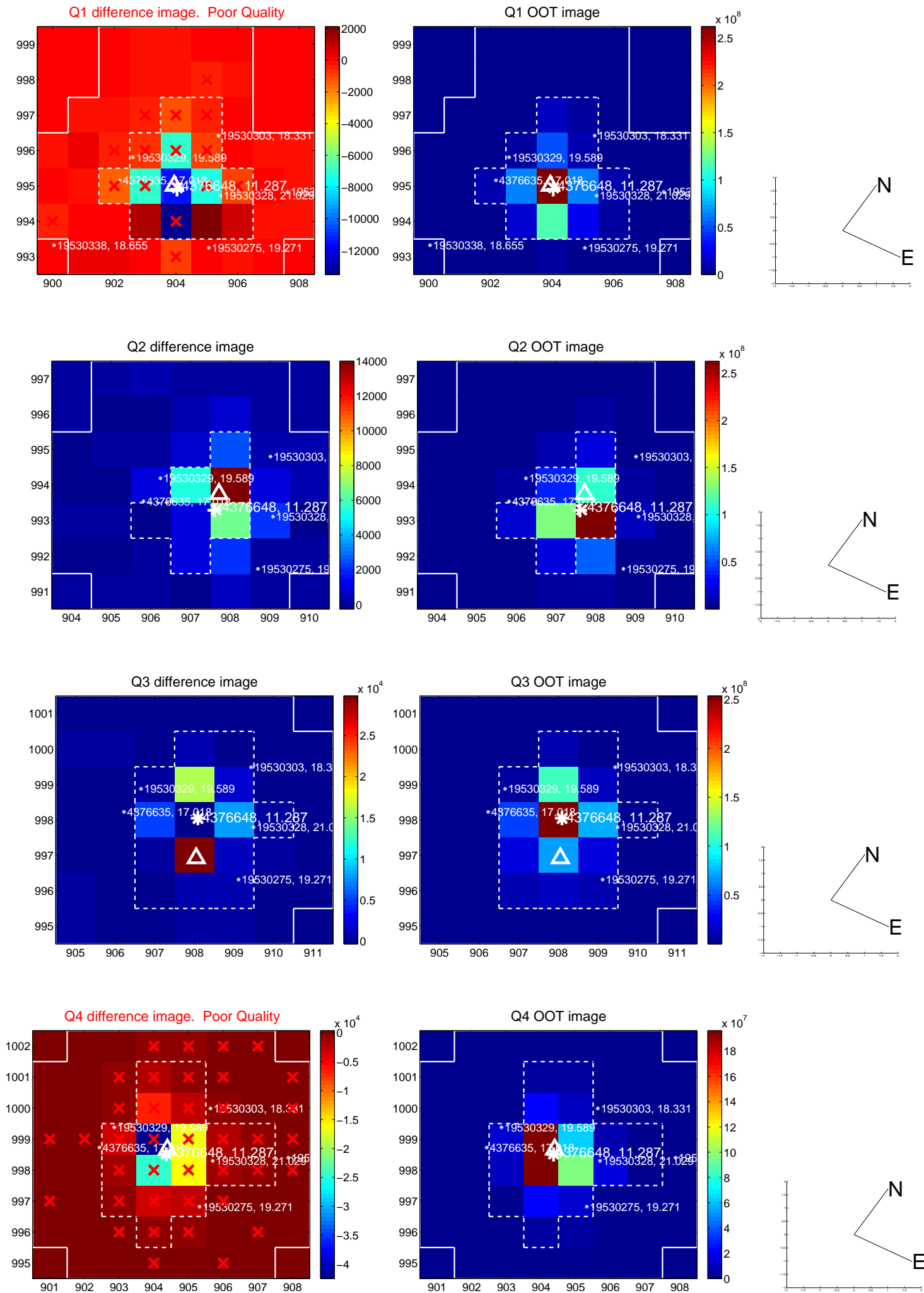


offset from photometric centroids

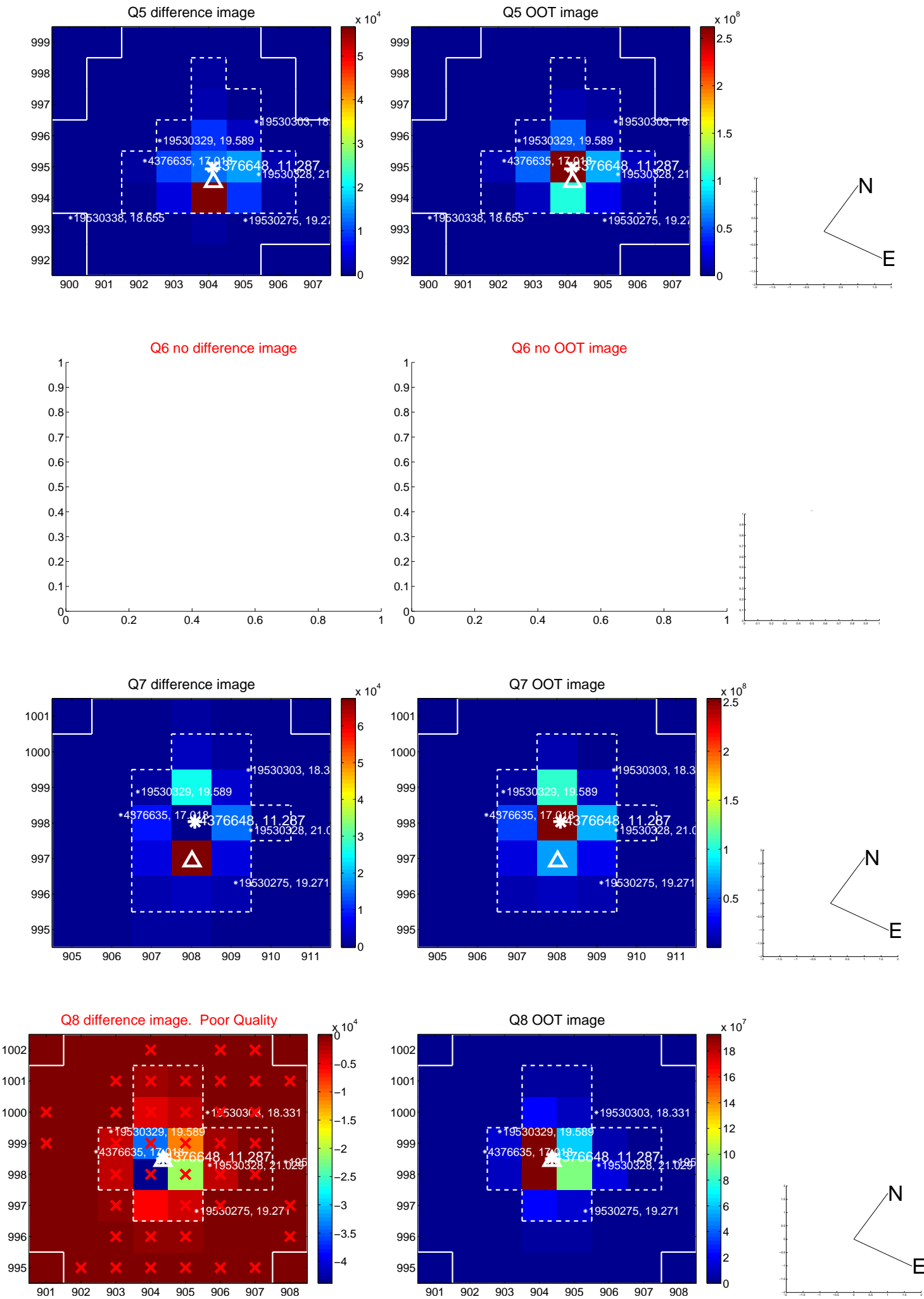


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

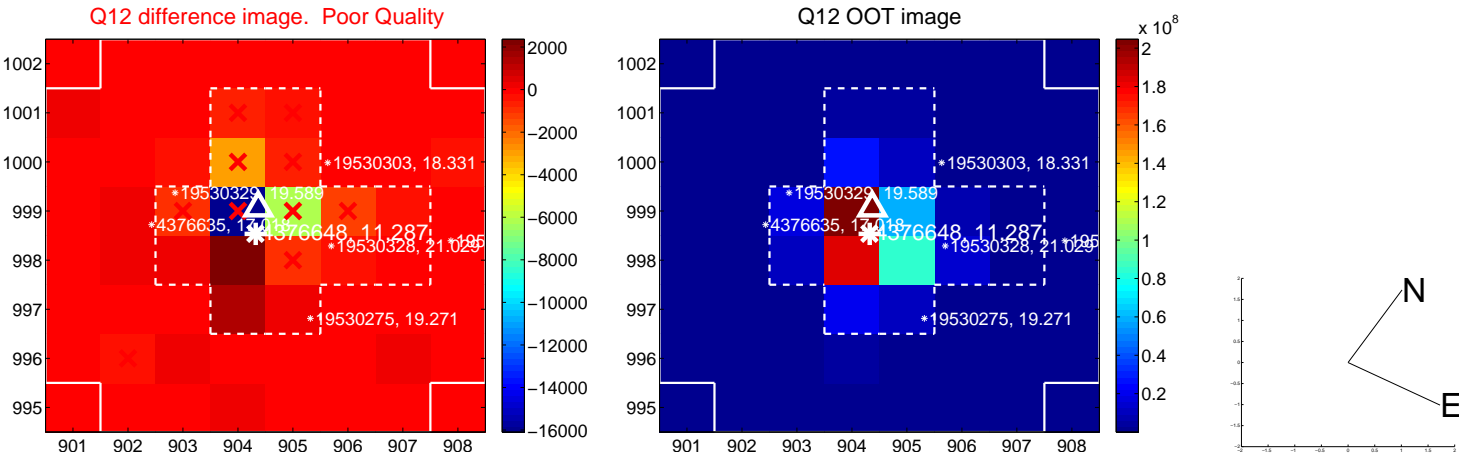
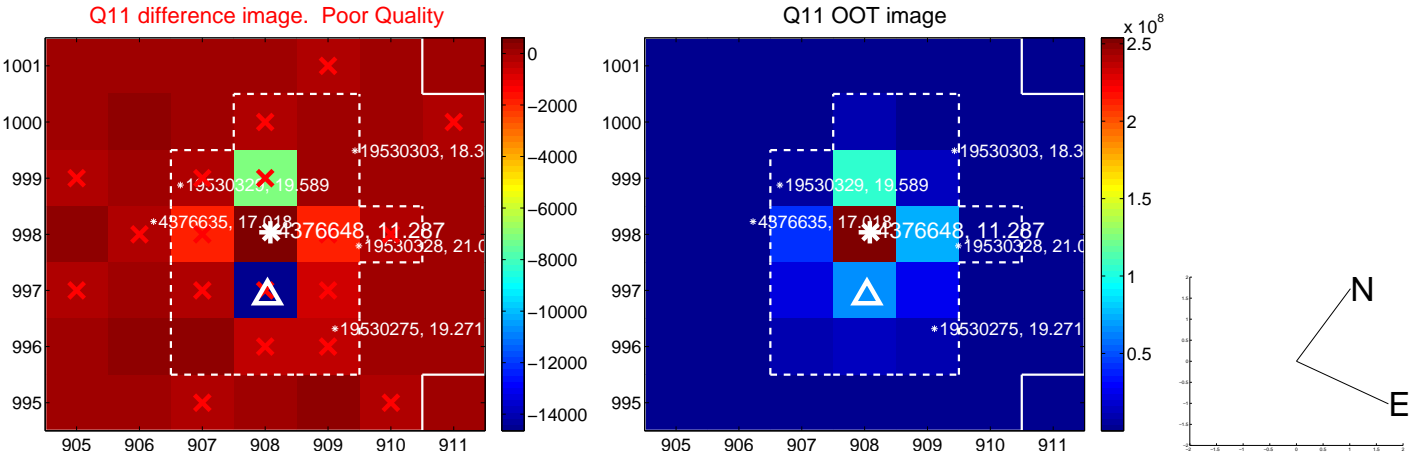
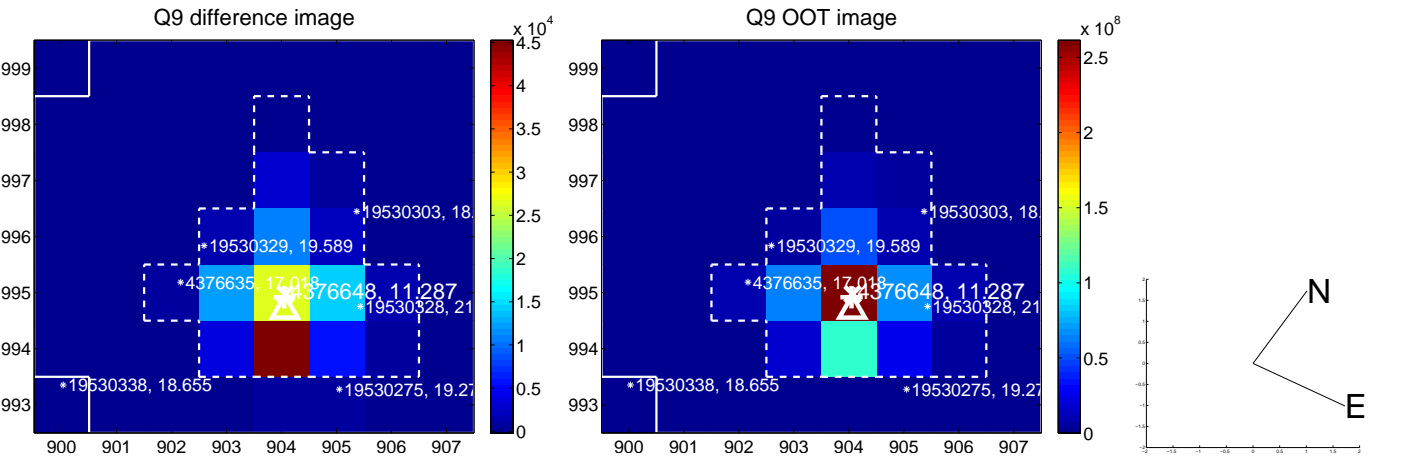
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



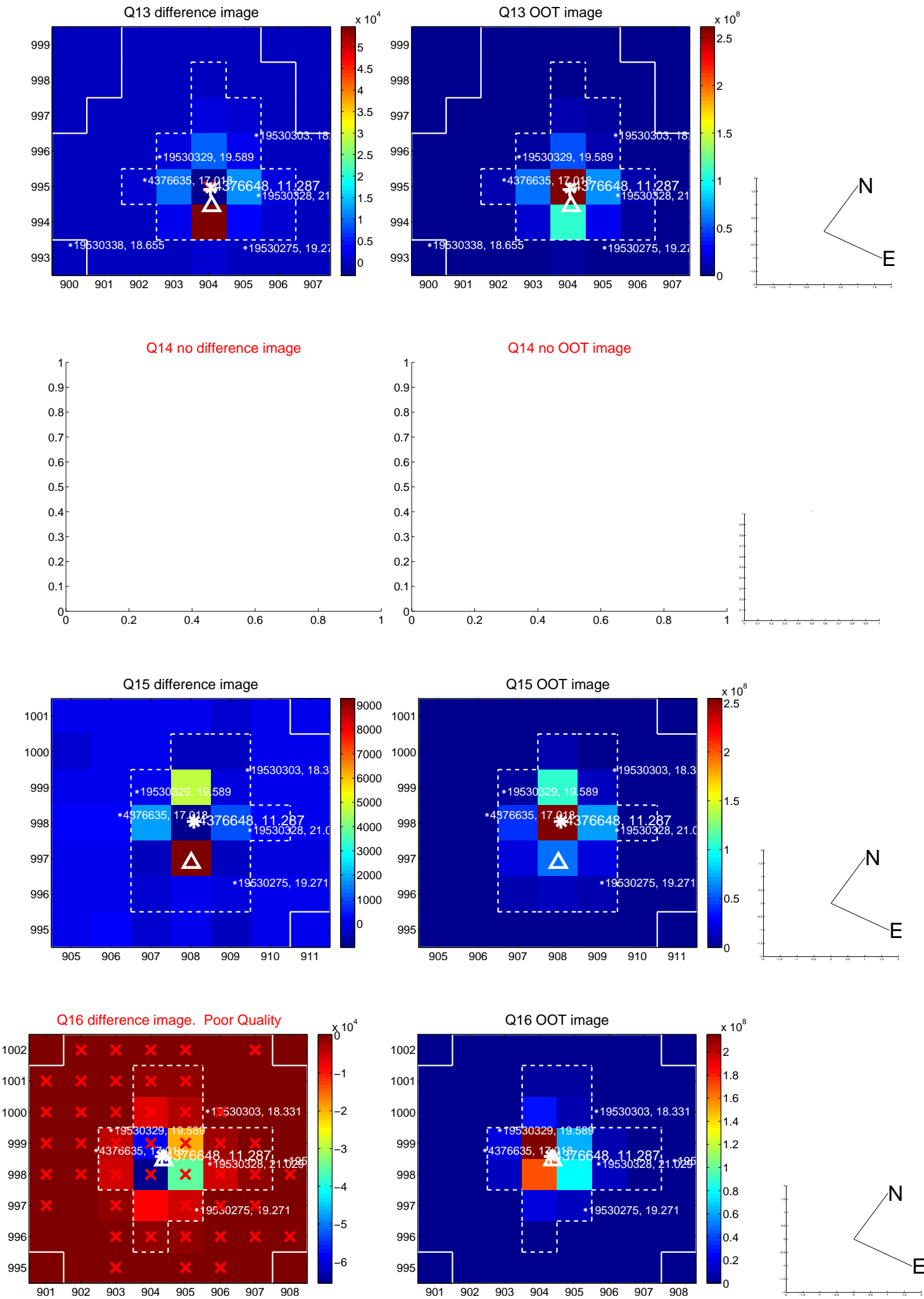
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



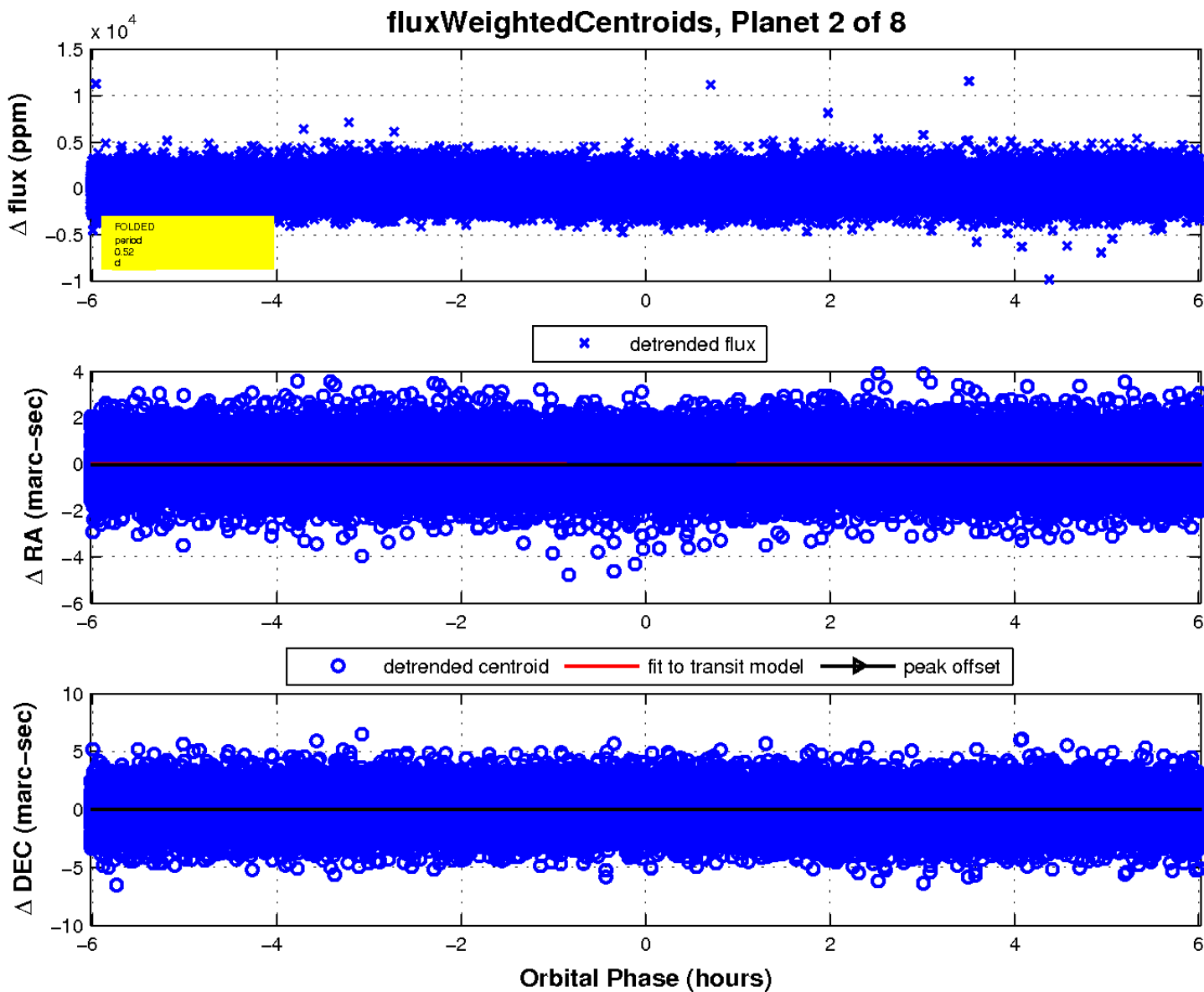
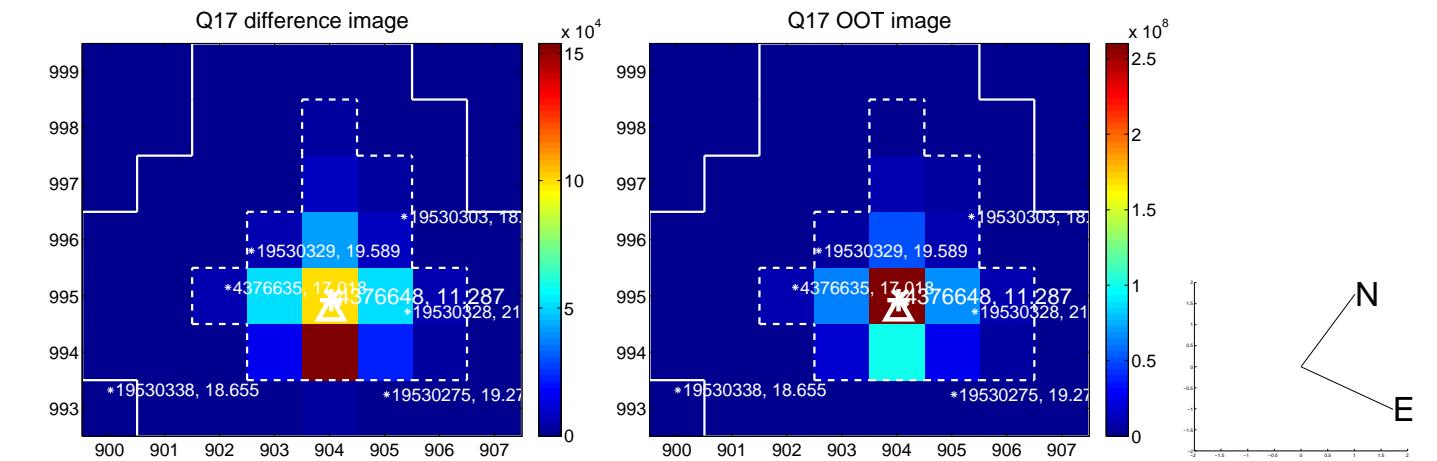
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

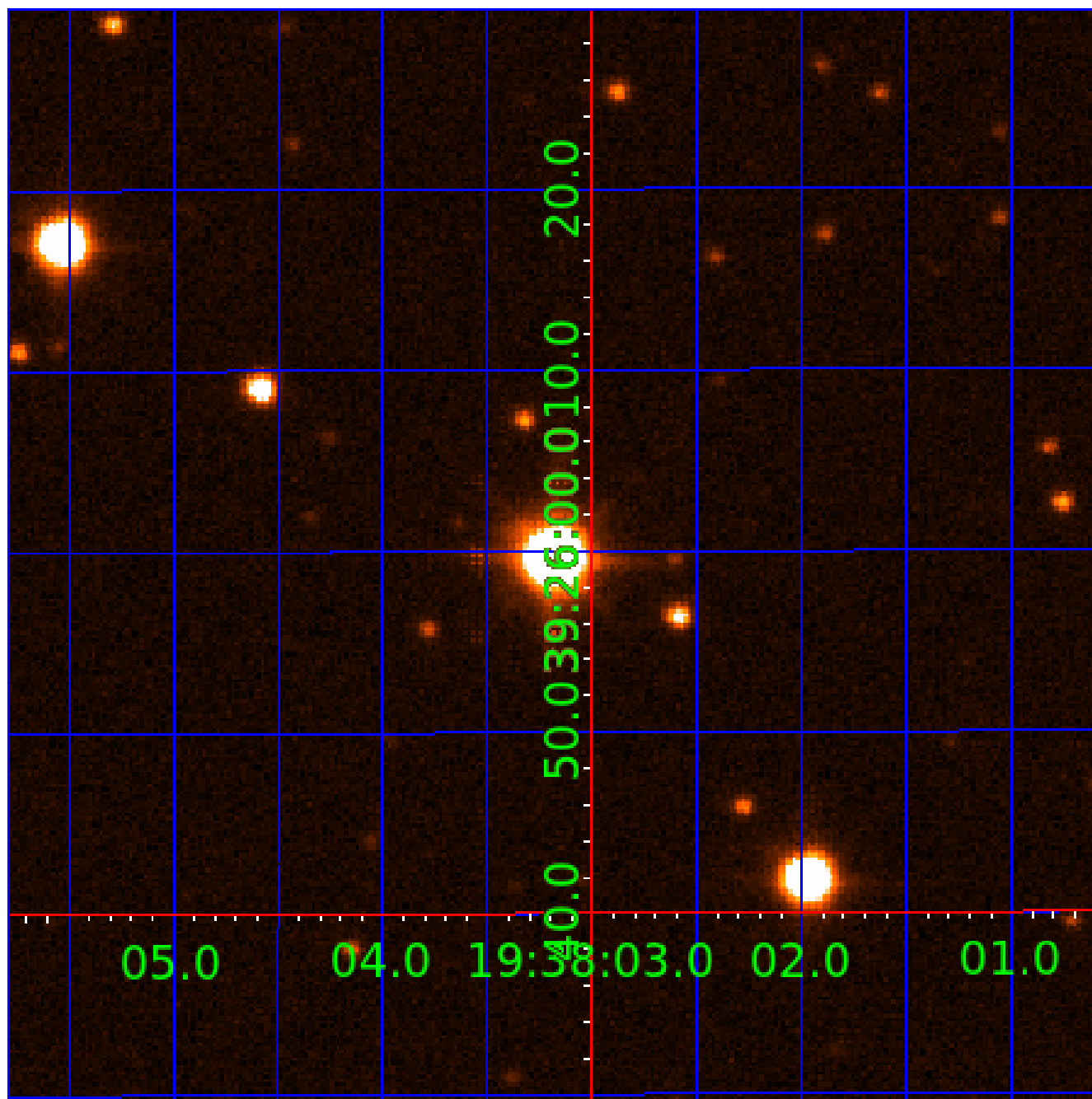


white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 004376648

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})
004376648-01	OBS	No	0.521668	131.999628	63.6	1.753	8.2	8.0	1.86	7024	1.72	37778.75
004376648-02	OBS	No	0.521665	131.821686	102.9	2.008	9.8	9.2	1.86	7024	2.19	37779.04
004376648-03	OBS	No	168.888956	145.773100	4077.1	5.209	9.8	9.2	1.86	7024	14.16	16.99
004376648-04	OBS	No	24.301768	152.287360	540.9	5.002	9.5	3.4	1.86	7024	4.80	225.38
004376648-05	OBS	No	25.920856	139.493335	821.9	7.527	9.2	5.7	1.86	7024	5.65	206.81
004376648-06	OBS	No	40.096338	164.771975	2229.8	4.518	8.9	8.4	1.86	7024	12.09	115.60
004376648-07	OBS	No	190.833969	297.200532	2747.5	8.379	9.1	8.8	1.86	7024	9.99	14.44
004376648-08	OBS	No	85.043521	202.020398	111.8	3.500	8.8	-1.0	1.86	7024	1.99	42.42

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004376648-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_SATURATED
004376648-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—SAME_NTL_PERIOD—CENT_SATURATED
004376648-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
004376648-04	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED—HALO_GHOST
004376648-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
004376648-06	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED—HALO_GHOST
004376648-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
004376648-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED

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

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

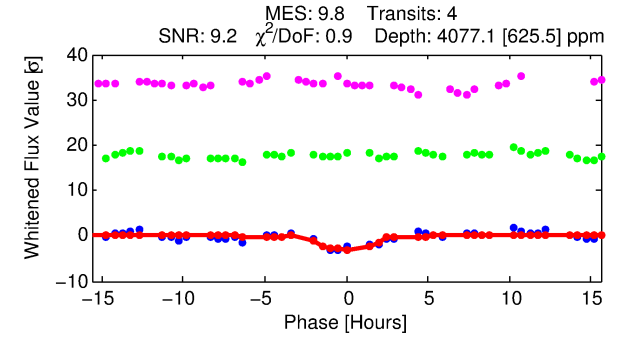
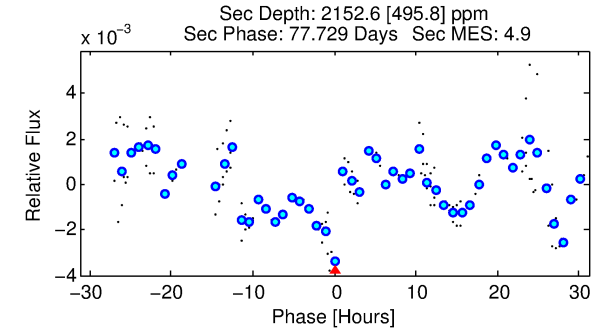
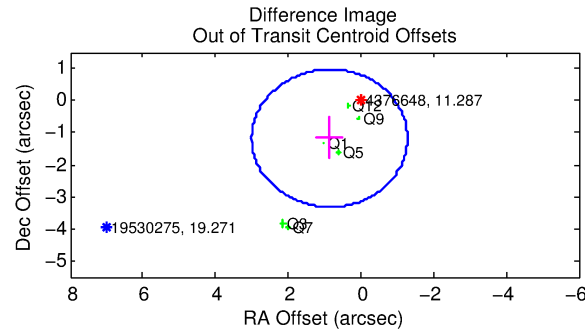
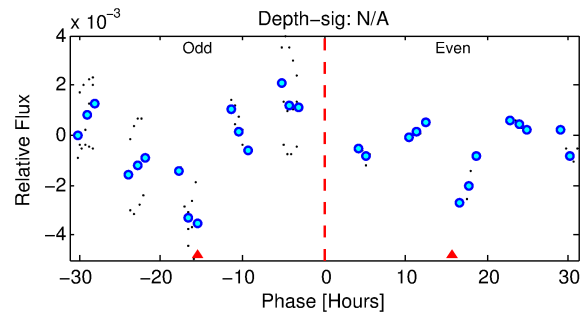
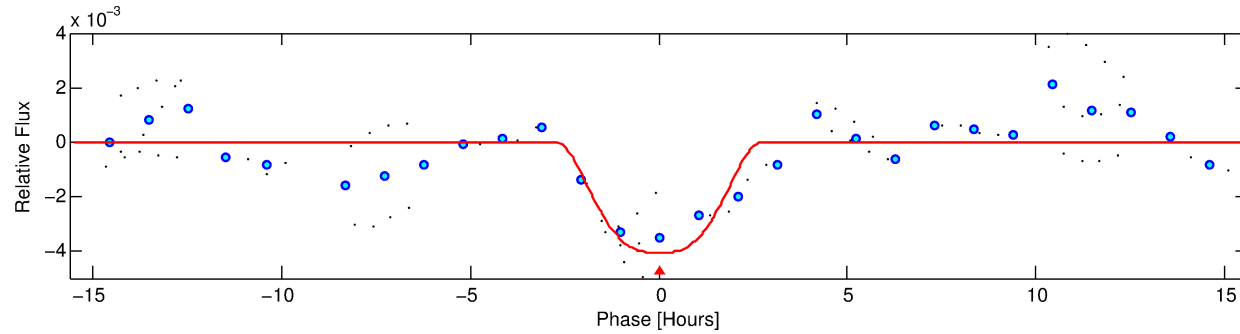
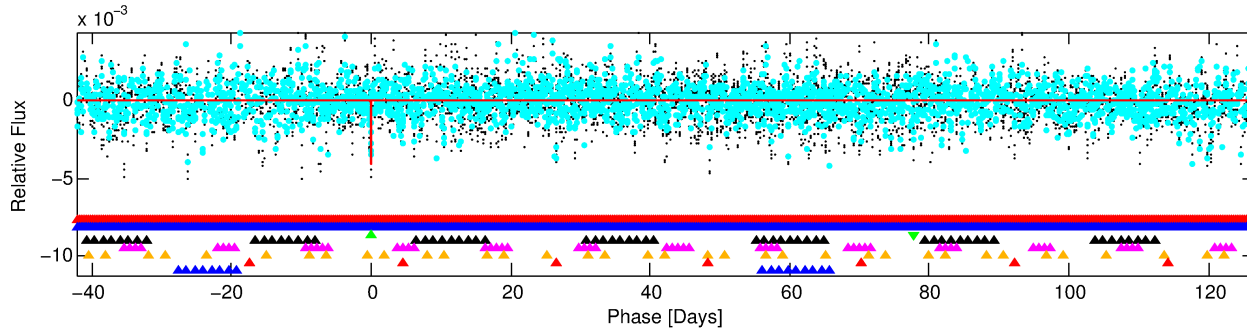
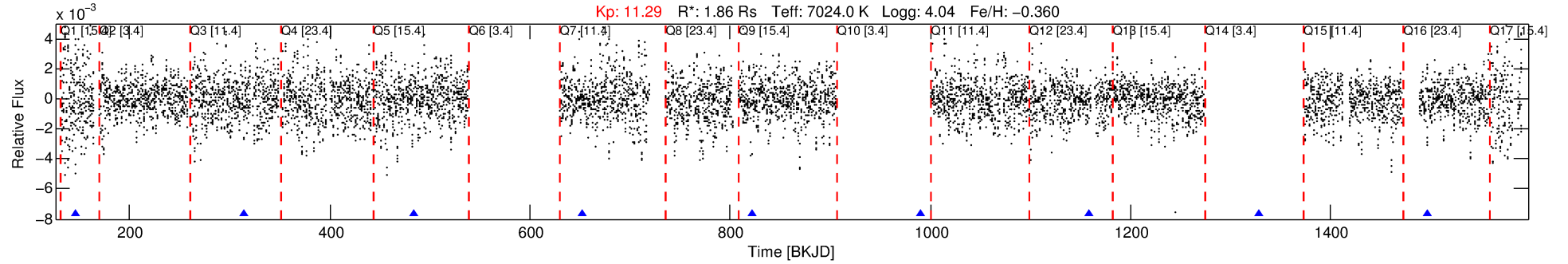
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 004376648-03

No Significant Match Found

DV One-Page Summary

KIC: 4376648 Candidate: 3 of 8 Period: 168.889 d



DV Fit Results:

Period = 168.88896 [0.00302] d
Epoch = 145.7731 [0.0107] BKJD
Rp/R* = 0.0699 [0.0070]
a/R* = 134.09 [21.06]
b = 0.92 [0.03]
Seff = 16.99 [7.85]
Teq = 518 [60] K
Rp = 14.16 [4.67] Re
a = 0.6652 [0.1898] AU
Ag = 2614.65 [1400.29] [1.87] σ
Teffp = 5724 [481] K [10.75] σ

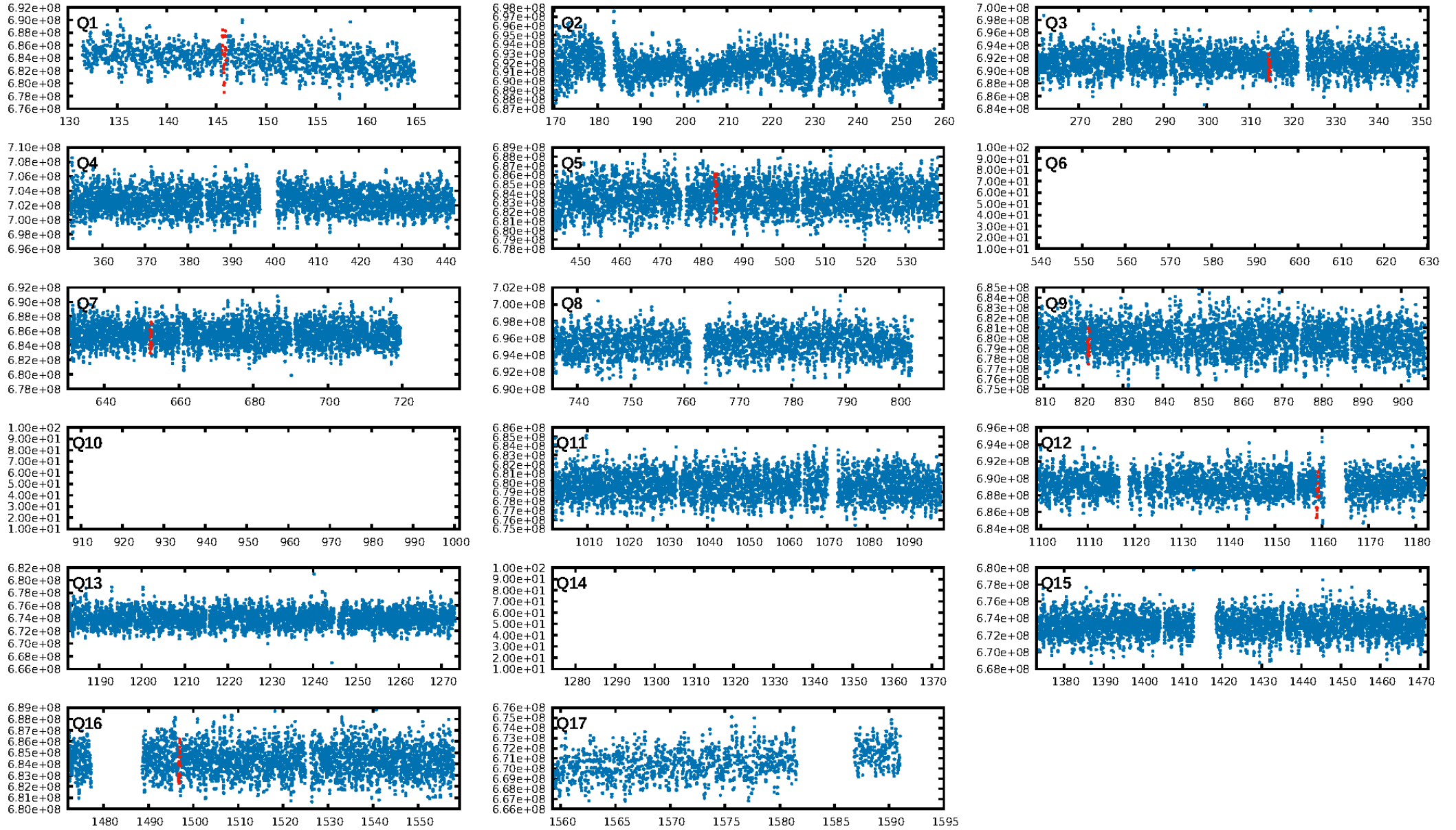
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [320.65] σ
LongPeriod-sig: 100.0% [53.38] σ
ModelChiSquare2-sig: 40.6%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: N/A
RollingBand-fgt: 1.00 [3/3]
GhostDiagnostic-chr: 1.925
Centroid-sig: 52.7%
Centroid-so: 0.250 arcsec [3.05] σ
OotOffset-rm: 1.461 arcsec [2.04] σ
KicOffset-rm: 1.633 arcsec [2.61] σ
OotOffset-st: 0/2/1/3 [6]
KicOffset-st: 0/2/1/3 [6]
DiffImageQuality-fgm: 0.83 [5/6]
DiffImageOverlap-fno: 0.00 [0/7]

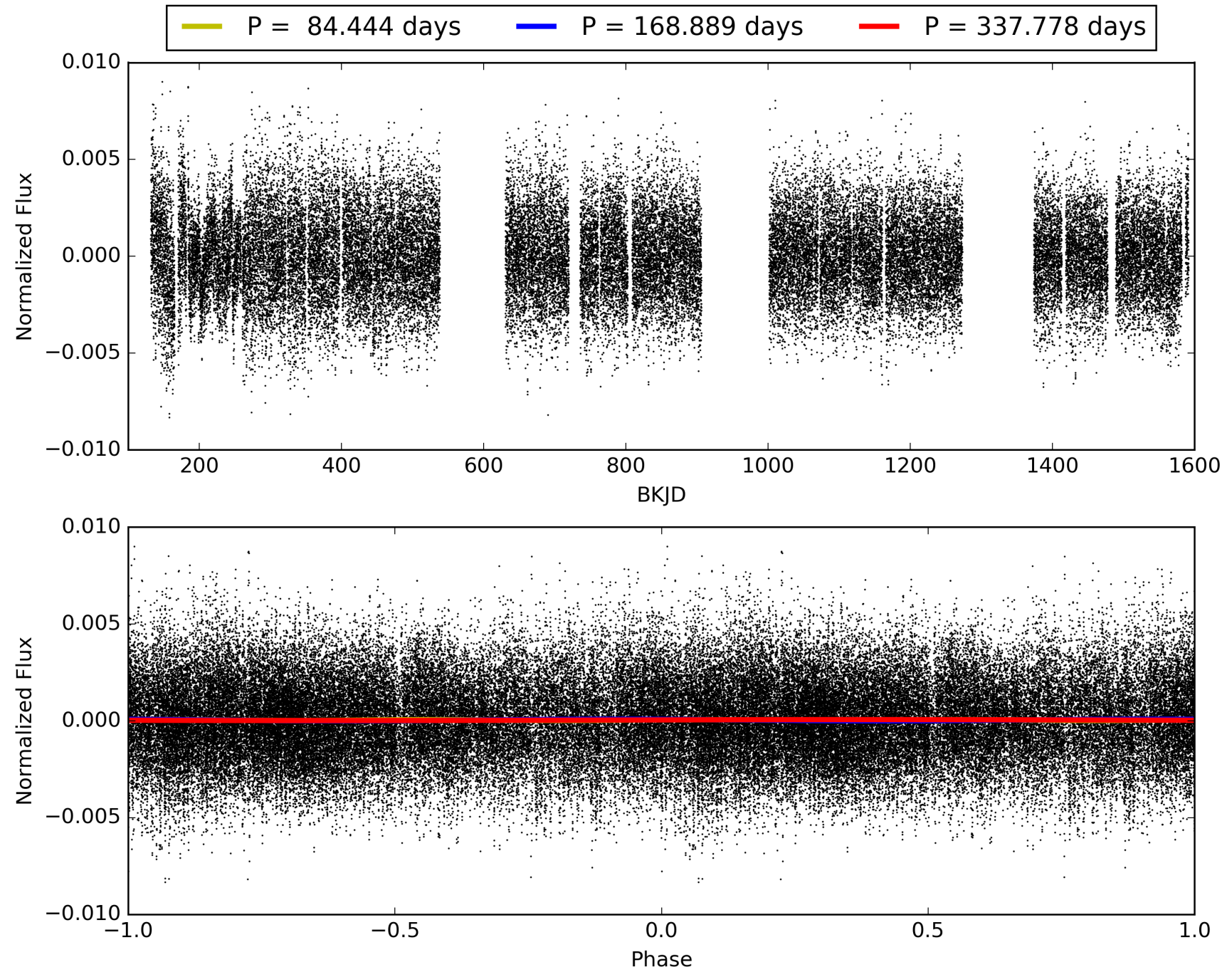
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 21:52:09 Z

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

TCE 004376648-03, PDC Light Curves

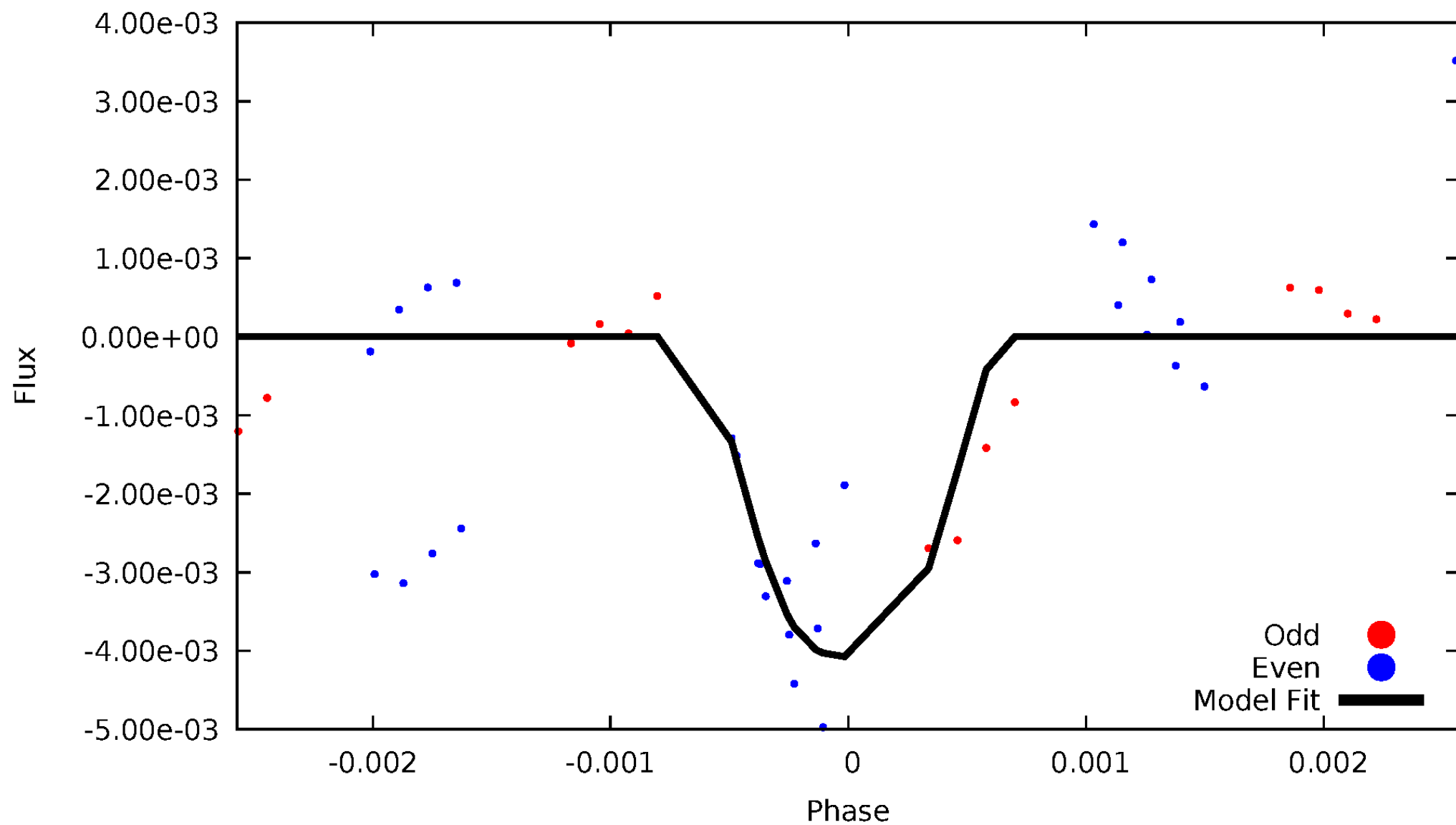


TCE 004376648-03



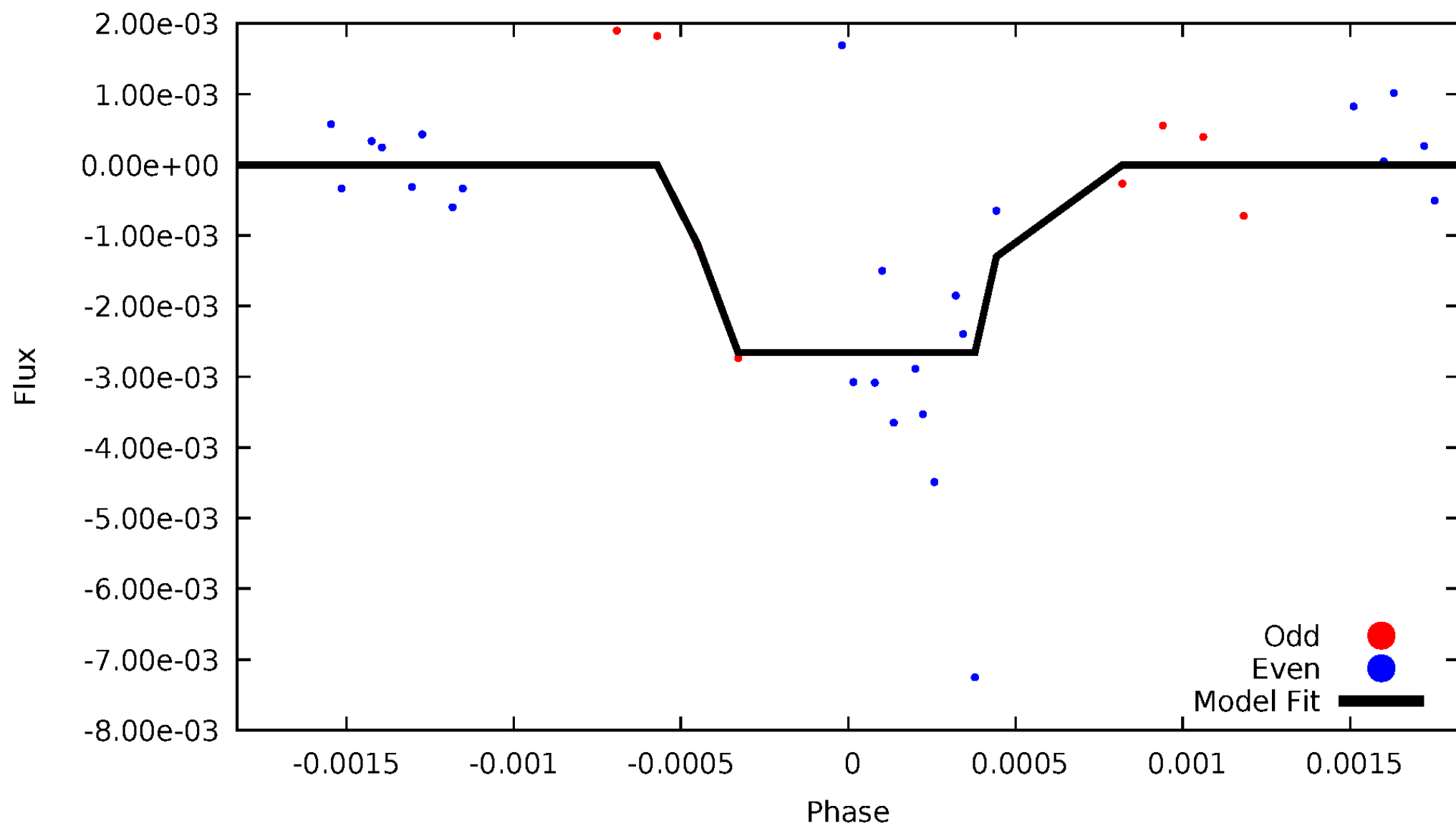
DV Odd/Even

TCE 004376648-03



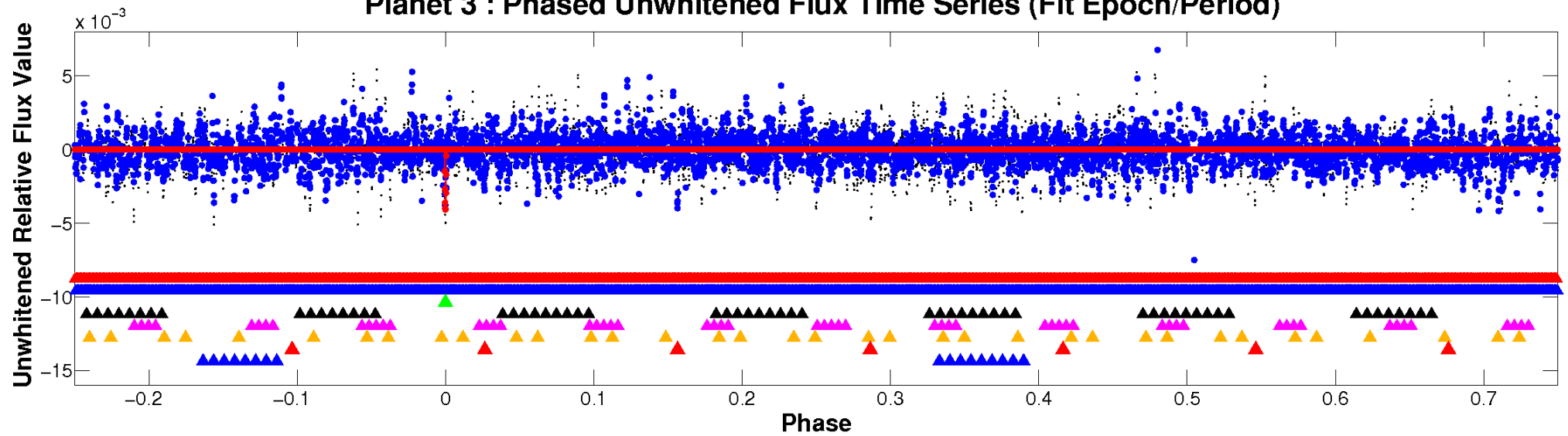
ALT Odd/Even

TCE 004376648-03

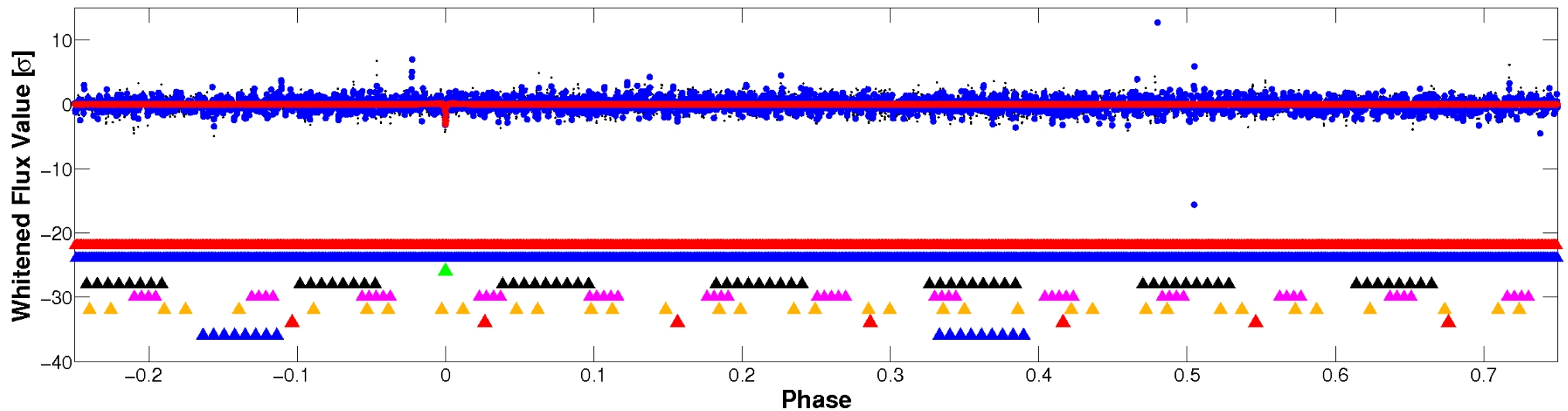


Non-Whitened Vs. Whitened Light Curve

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

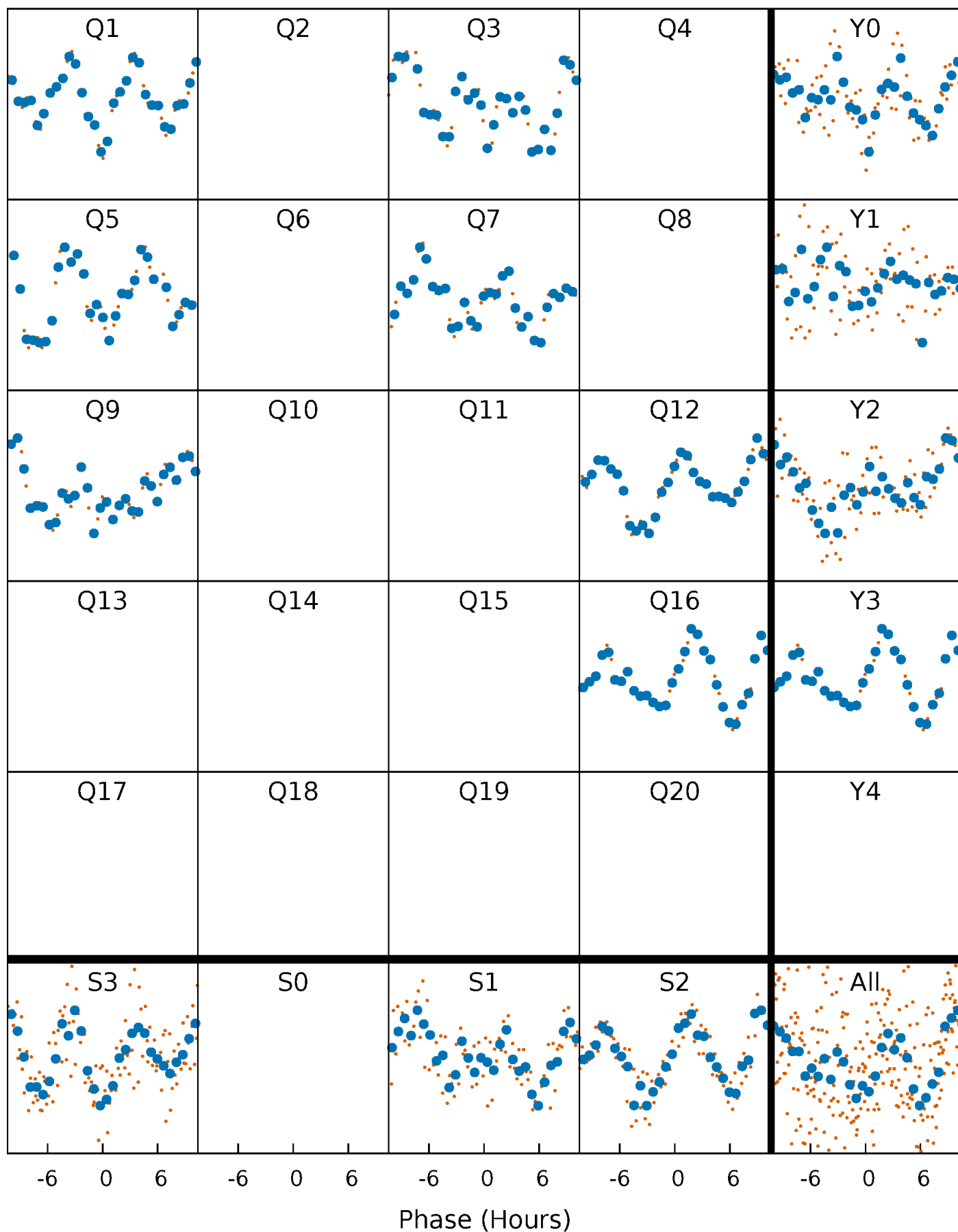


Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



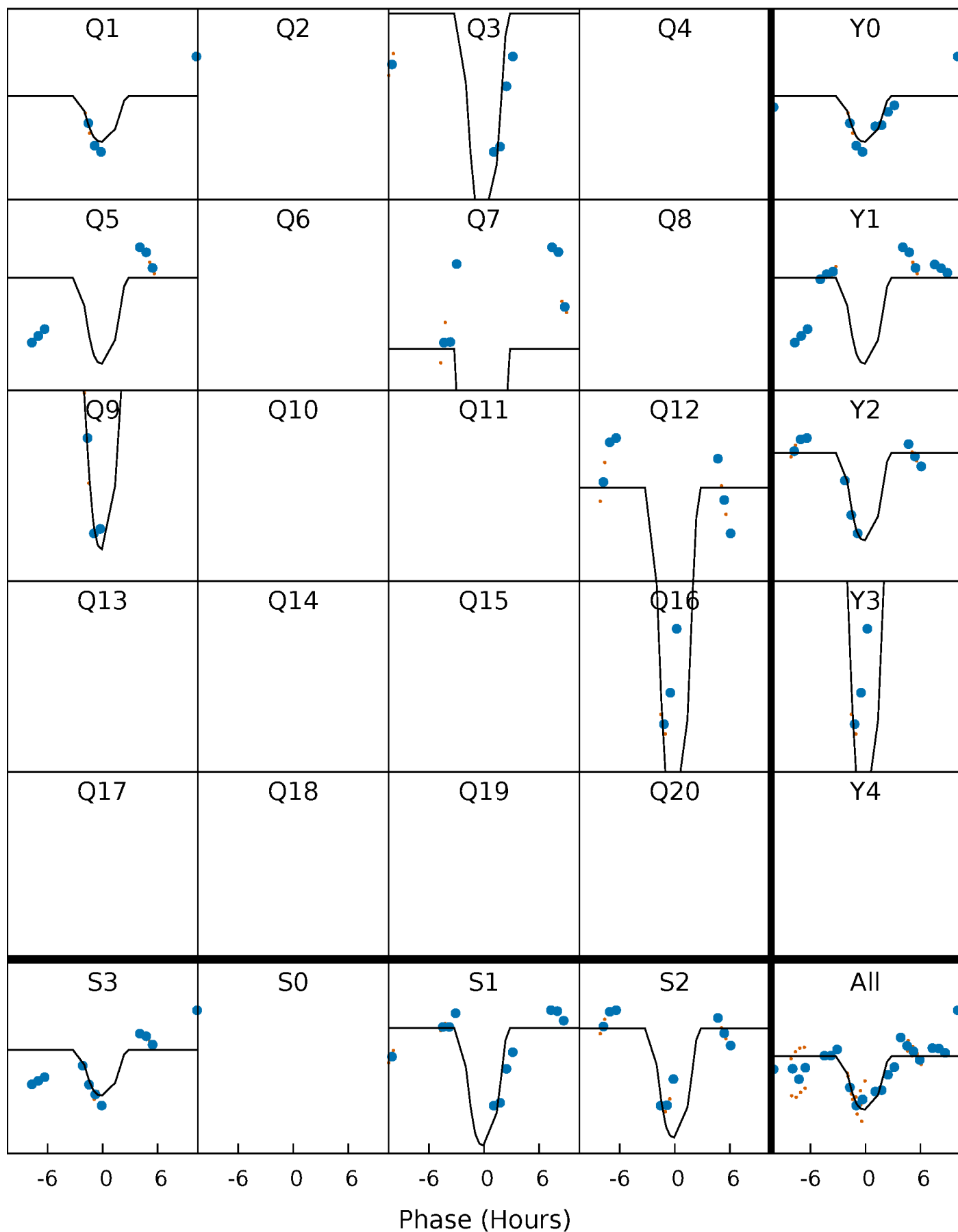
PDC Quarter-Phased Transit Curves

TCE 004376648-03 P=168.888956 Days $T_0=145.773100$ (BKJD)



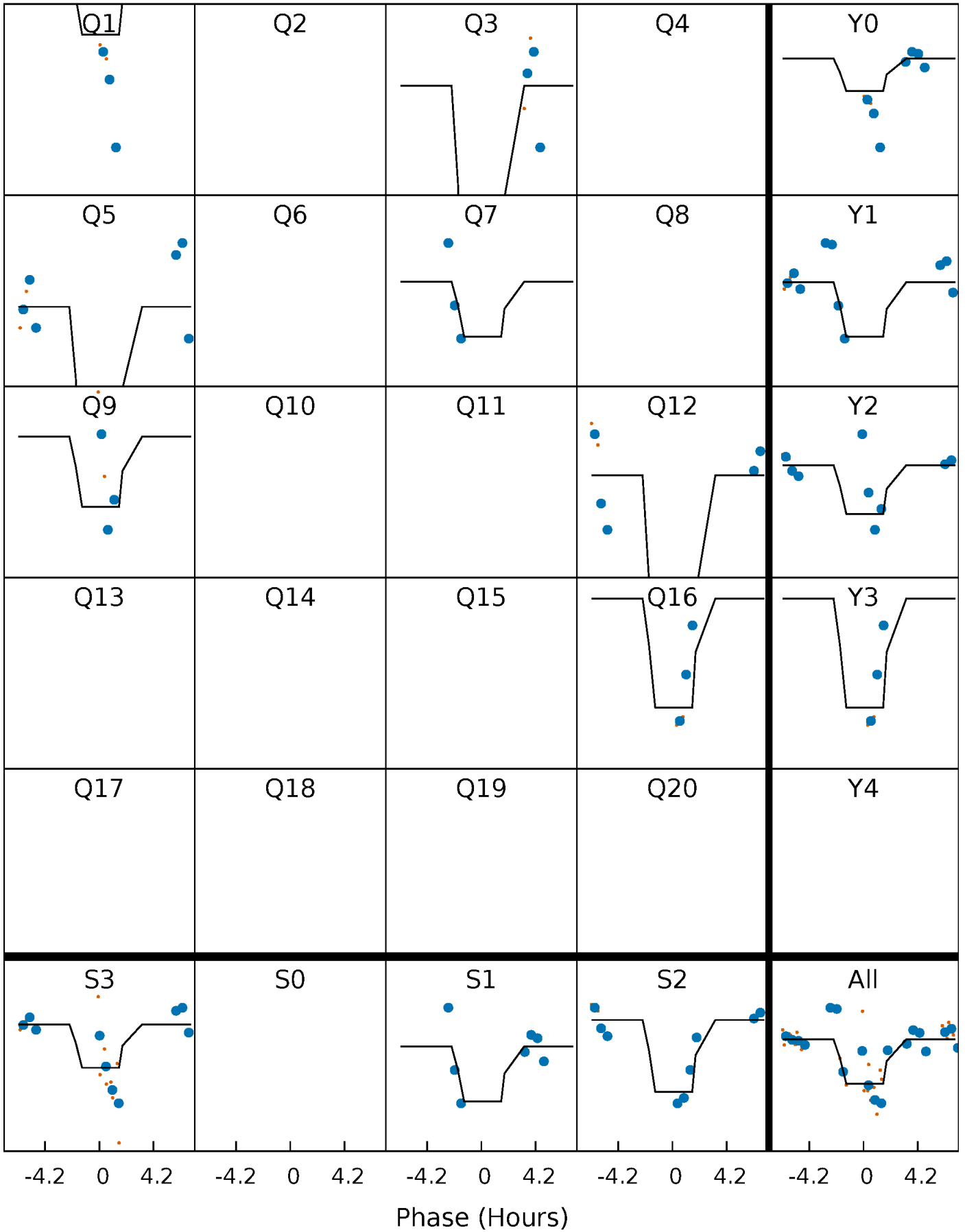
DV Quarter-Phased Transit Curves

TCE 004376648-03 $P=168.888956$ Days $T_0=145.773100$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

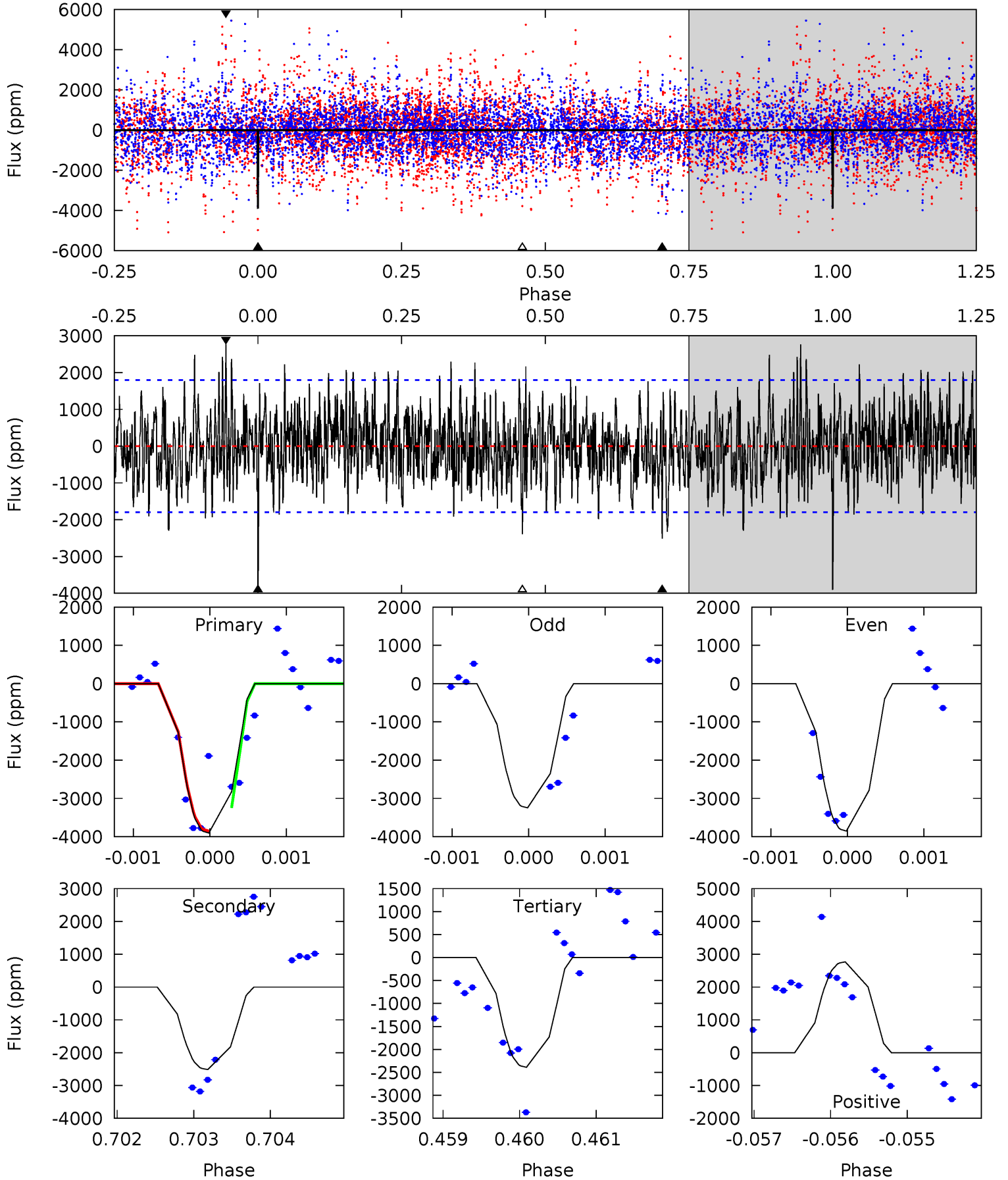
TCE 004376648-03 $P=168.889496$ Days $T_0=145.691374$ (BKJD)



DV Model-Shift Uniqueness Test

004376648-03, P = 168.888956 Days, E = 145.773100 Days

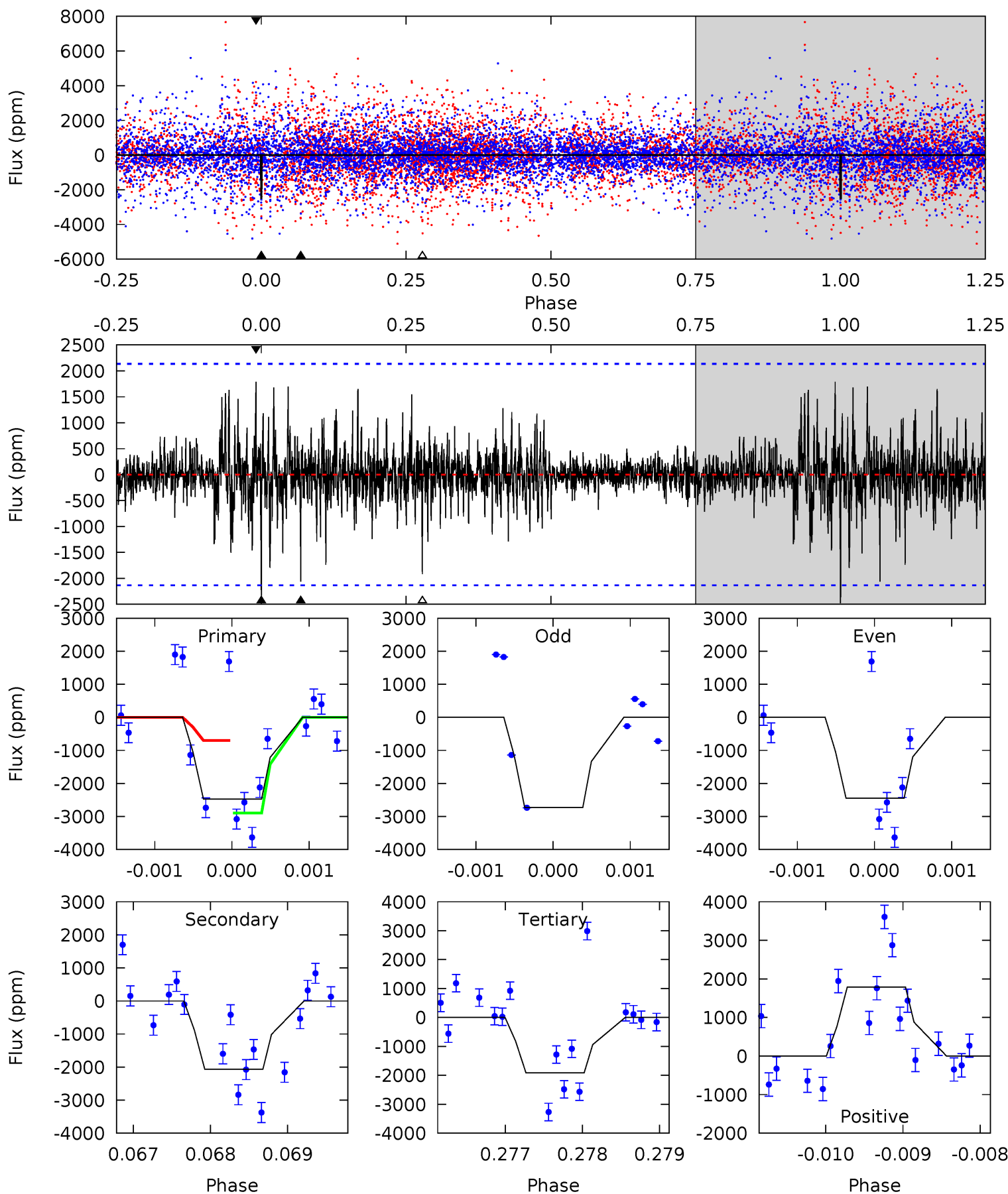
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.8	7.58	7.21	8.35	5.42	3.24	2.28	4.57	3.43	0.37	-0.77	0.74	0.95	0.41	0.76



Alt Model-Shift Uniqueness Test

004376648-03, P = 168.889496 Days, E = 145.691374 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.36	5.29	4.91	4.59	5.47	3.32	0.98	1.44	1.77	0.38	0.70	0.23	1.08	0.42	2.28



Stellar Parameters For KIC 004376648

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	M (M_{\odot})	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	7024^{+164}_{-246}	$4.039^{+0.252}_{-0.168}$	$-0.360^{+0.300}_{-0.300}$	$1.857^{+0.478}_{-0.584}$	$1.378^{+0.202}_{-0.269}$	$0.303^{+0.486}_{-0.145}$
	+2%/-4%	+6%/-4%	+83%/-83%	+26%/-31%	+15%/-20%	+160%/-48%
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 004376648-03 / KOI

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-2513 ± 332	$14.00^{+2.68}_{-2.50}$	719^{+50}_{-60}	5886^{+384}_{-351}	3118^{+1423}_{-991}
Alt.	-2064 ± 390	$10.12^{+2.32}_{-1.93}$	717^{+55}_{-56}	6539^{+660}_{-535}	4820^{+2651}_{-1770}

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

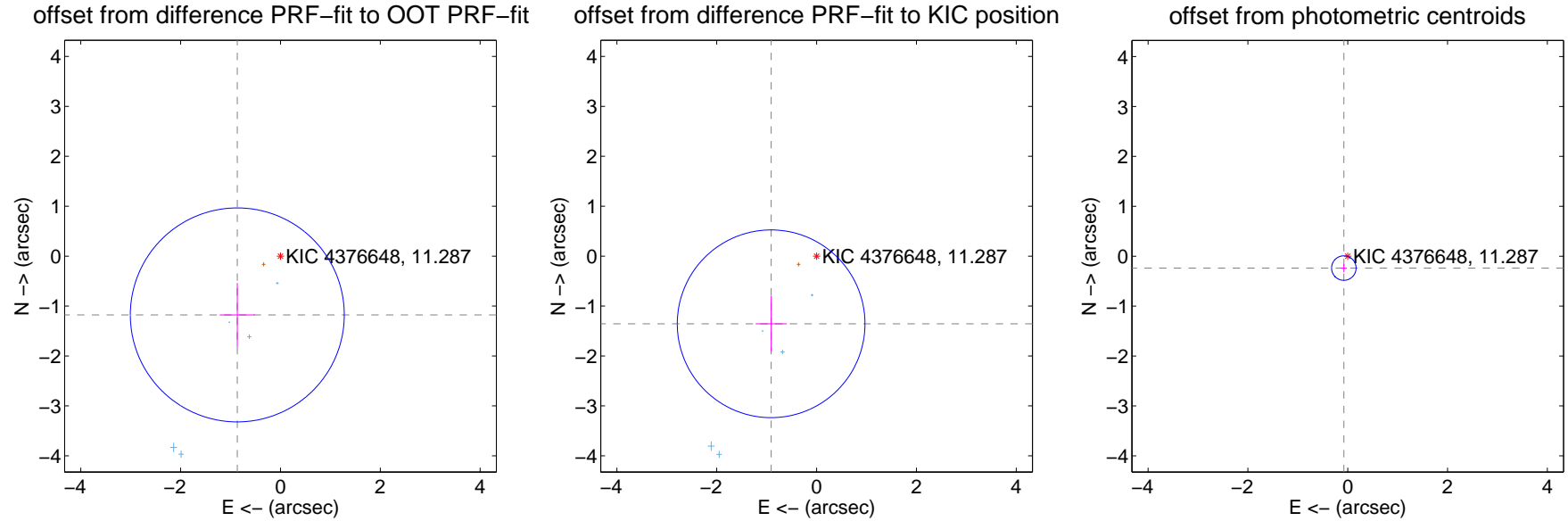
DV Centroid Data

Supplemental centroid analysis for 004376648-03. **Kepler magnitude: 11.29.** Transit SNR 9.25

There are 5 quarters with good PRF difference image offsets

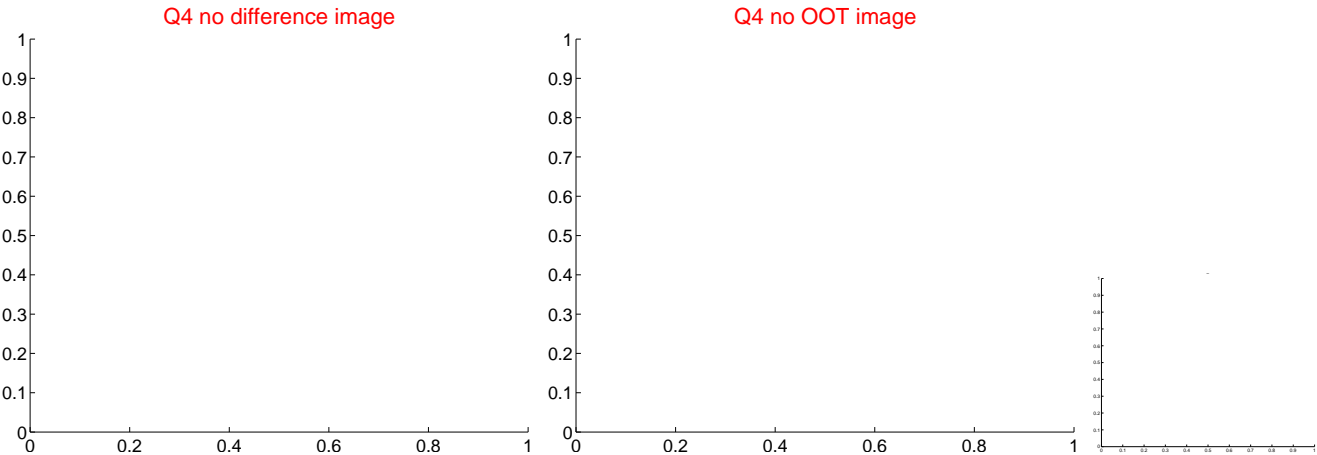
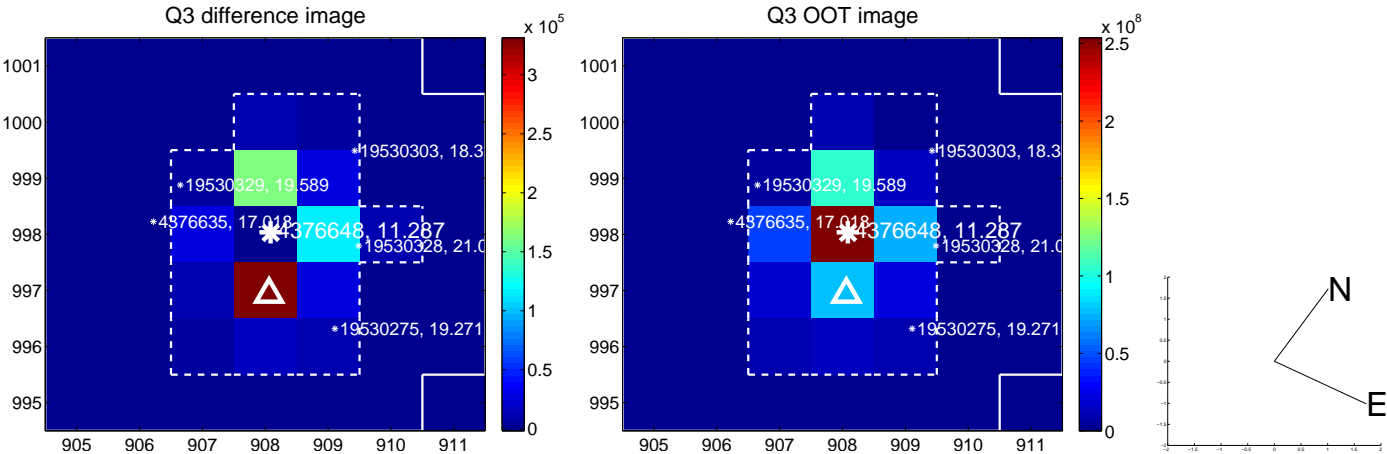
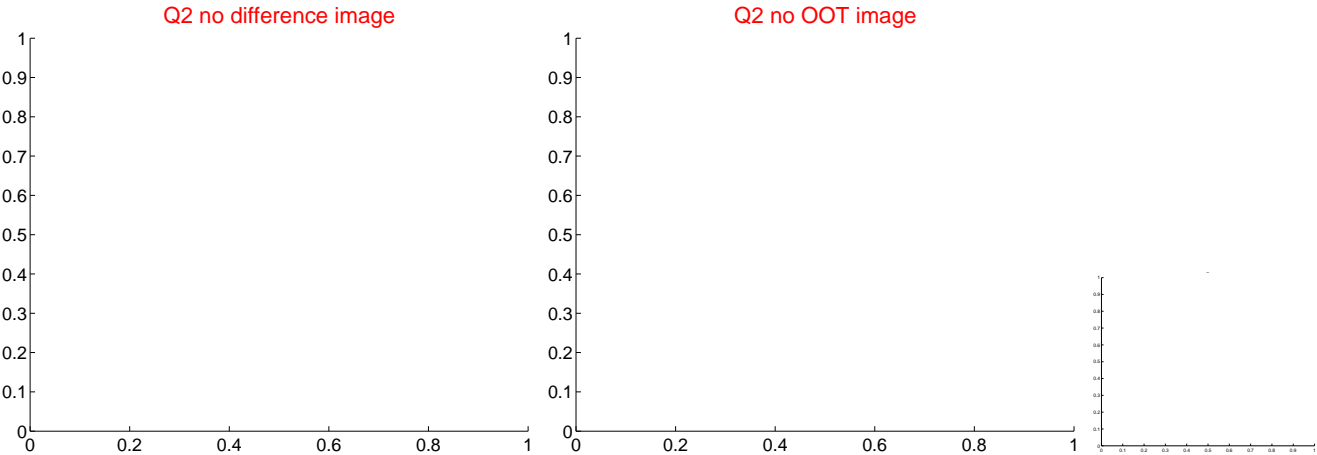
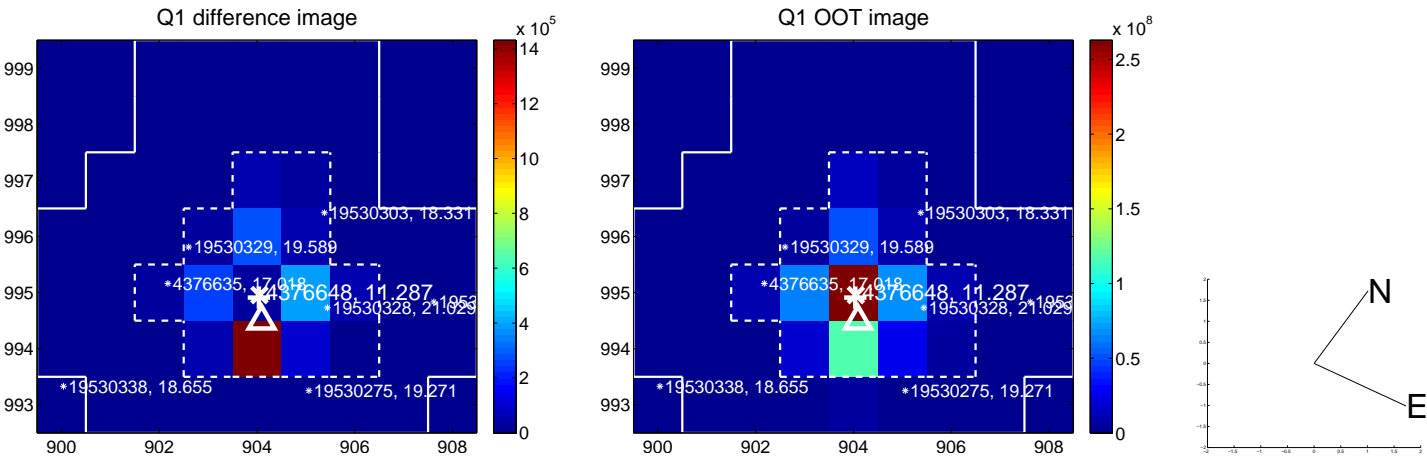
The direct PRF centroid is offset from the target star catalog position by about 0.03 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	1.461 ± 0.714	2.04	0.865 ± 0.352	-1.178 ± 0.638
PRF-fit source offset from KIC position	1.633 ± 0.627	2.61	0.911 ± 0.311	-1.355 ± 0.560
photometric centroid source offset	0.25 ± 0.08	3.05	0.08 ± 0.06	-0.24 ± 0.08

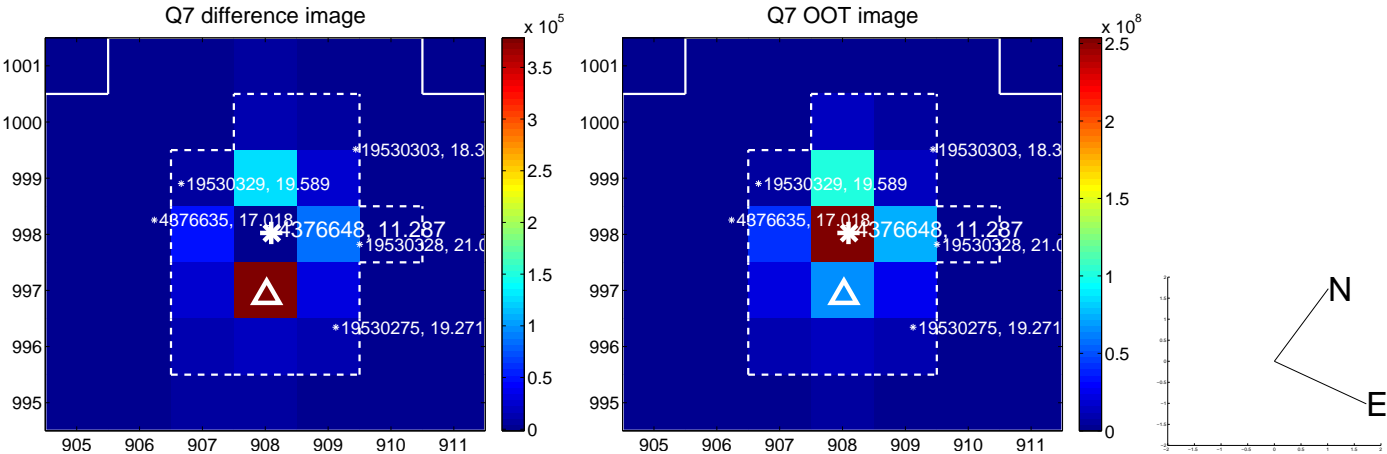
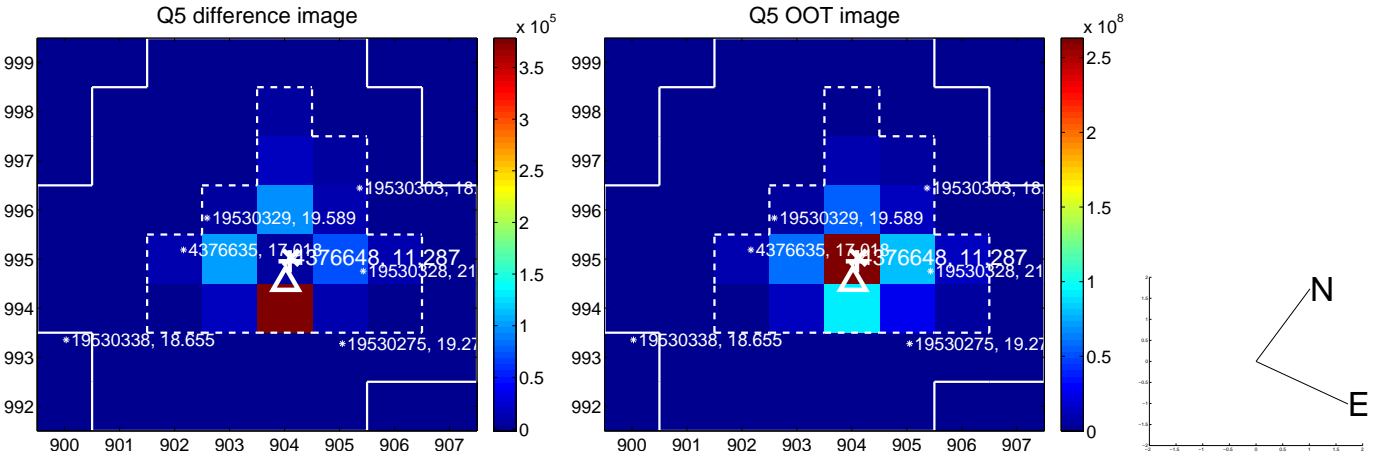


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

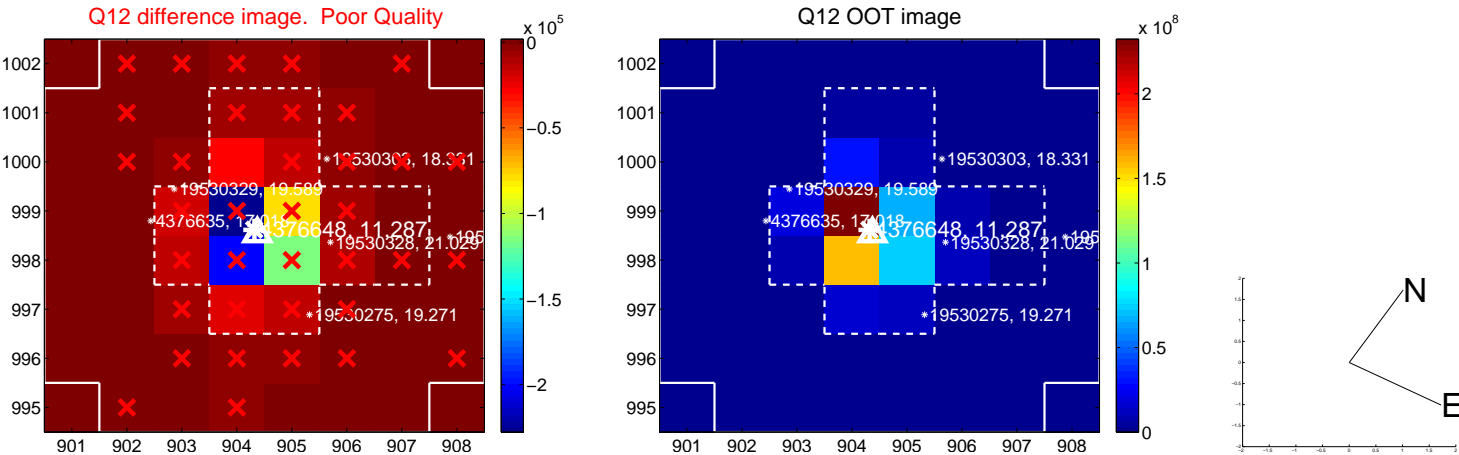
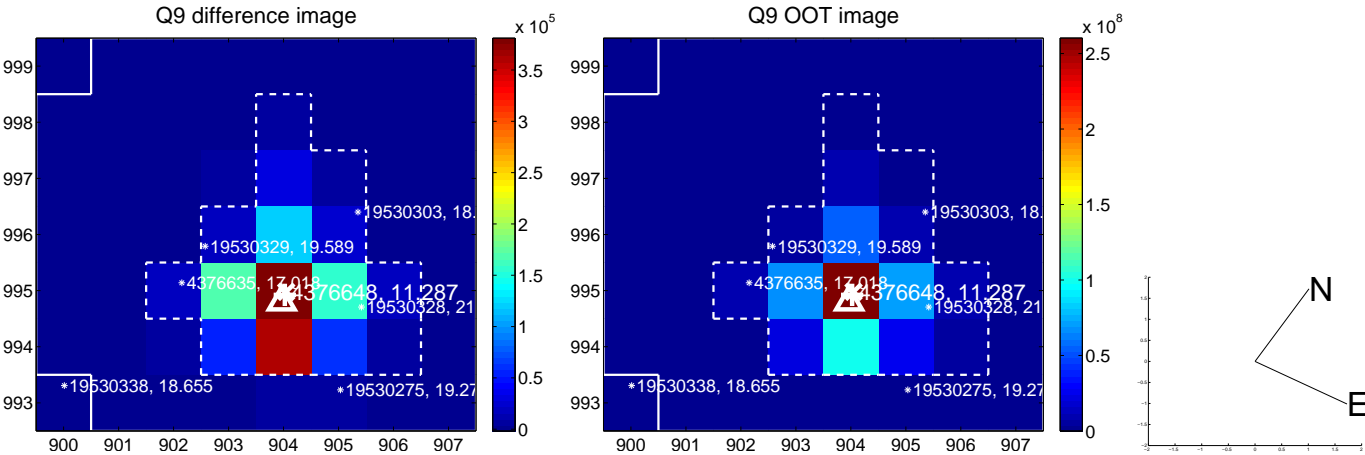
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



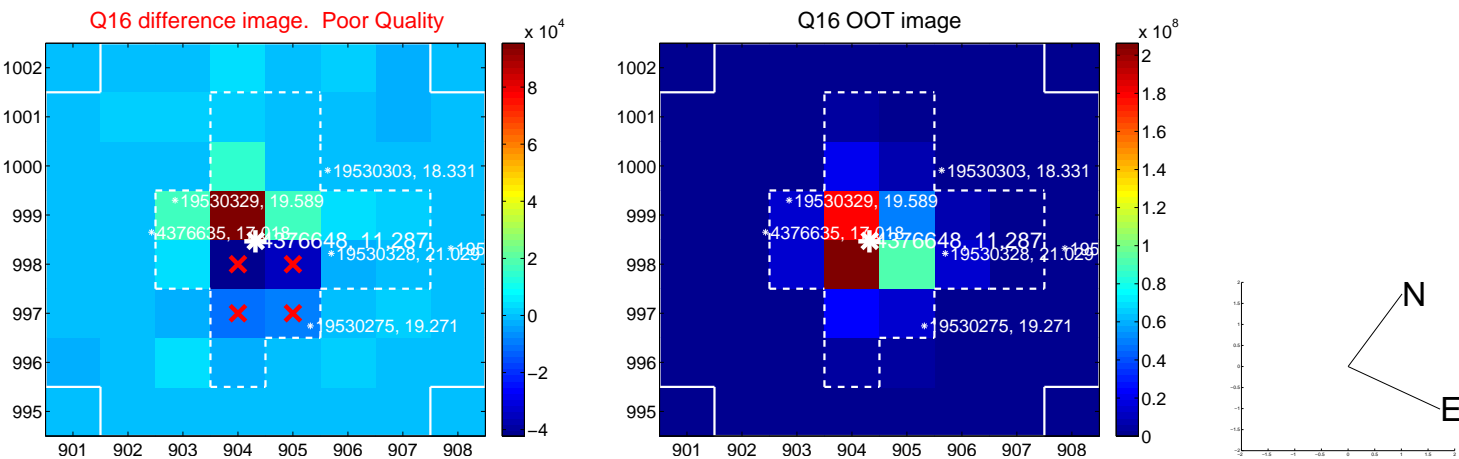
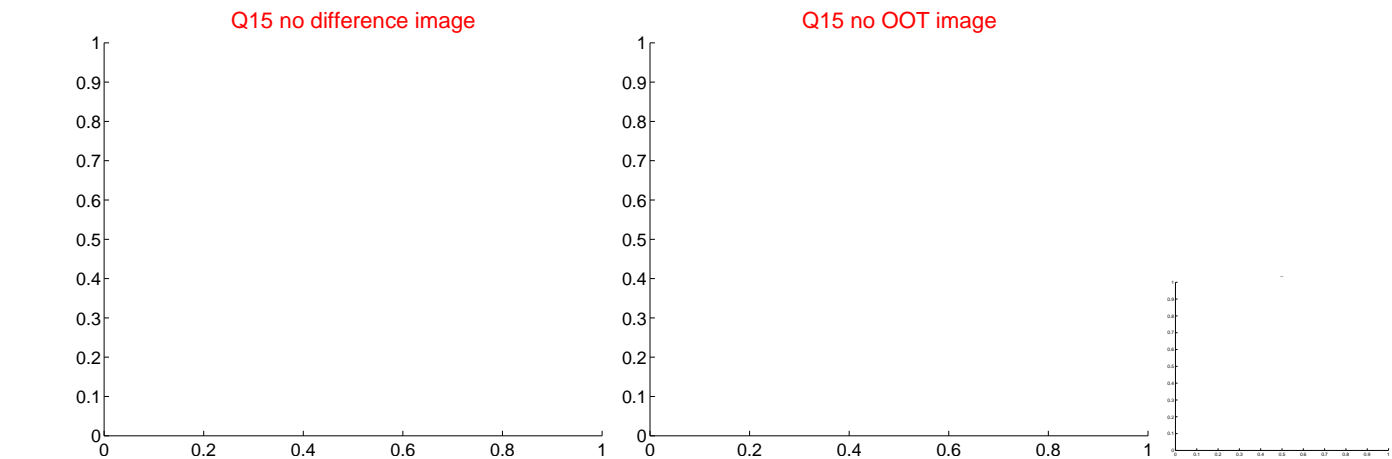
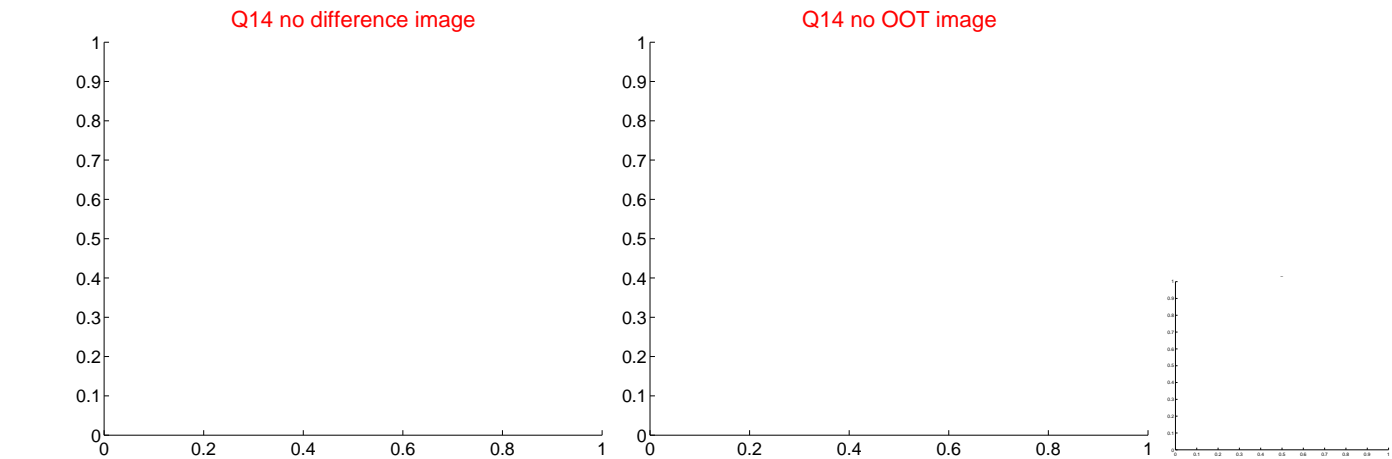
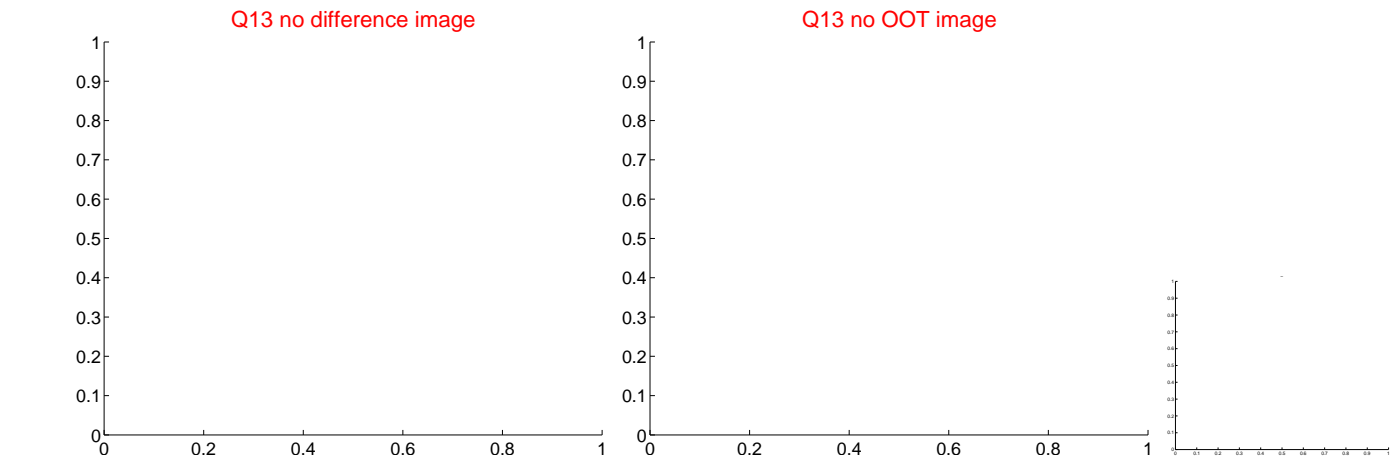
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



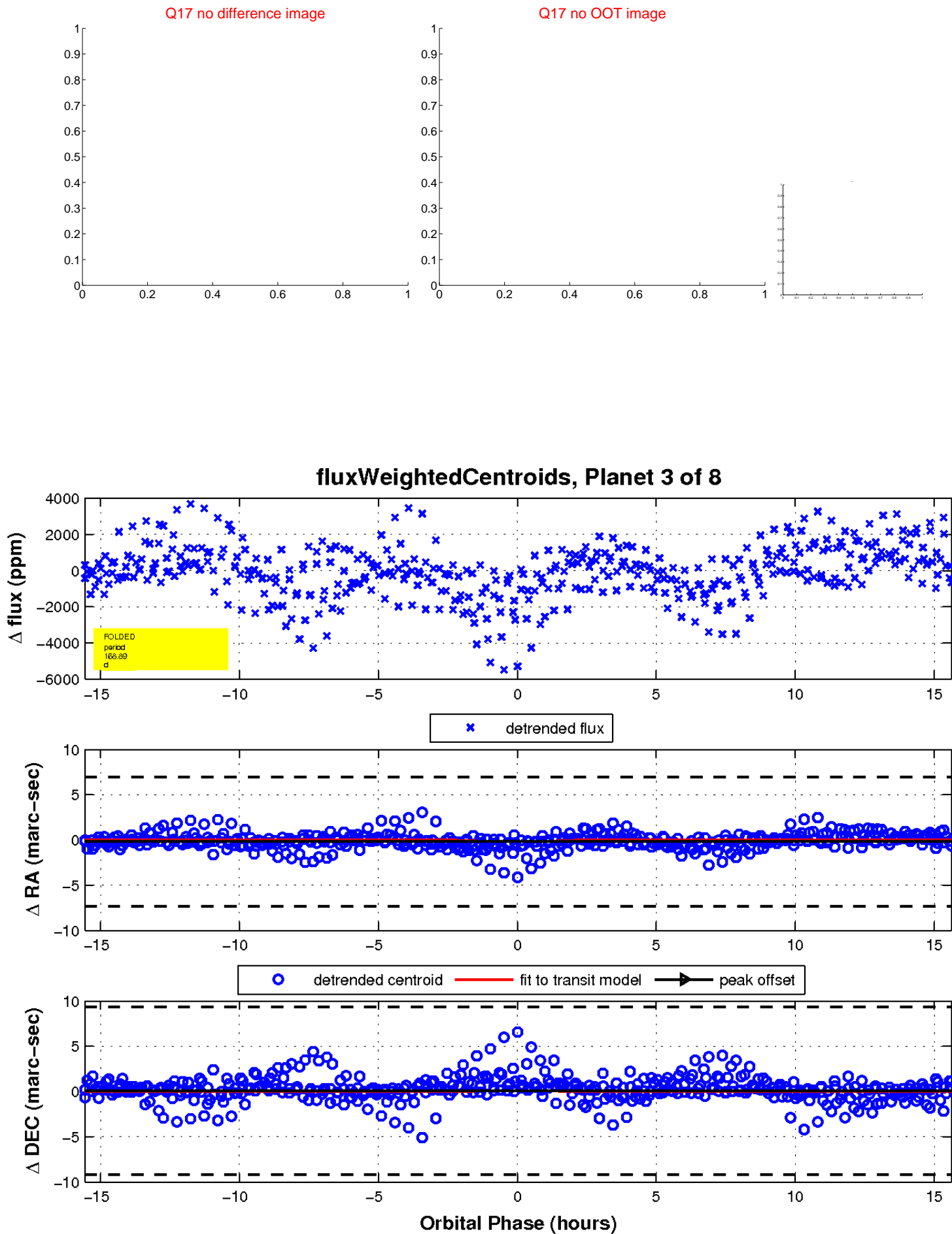
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

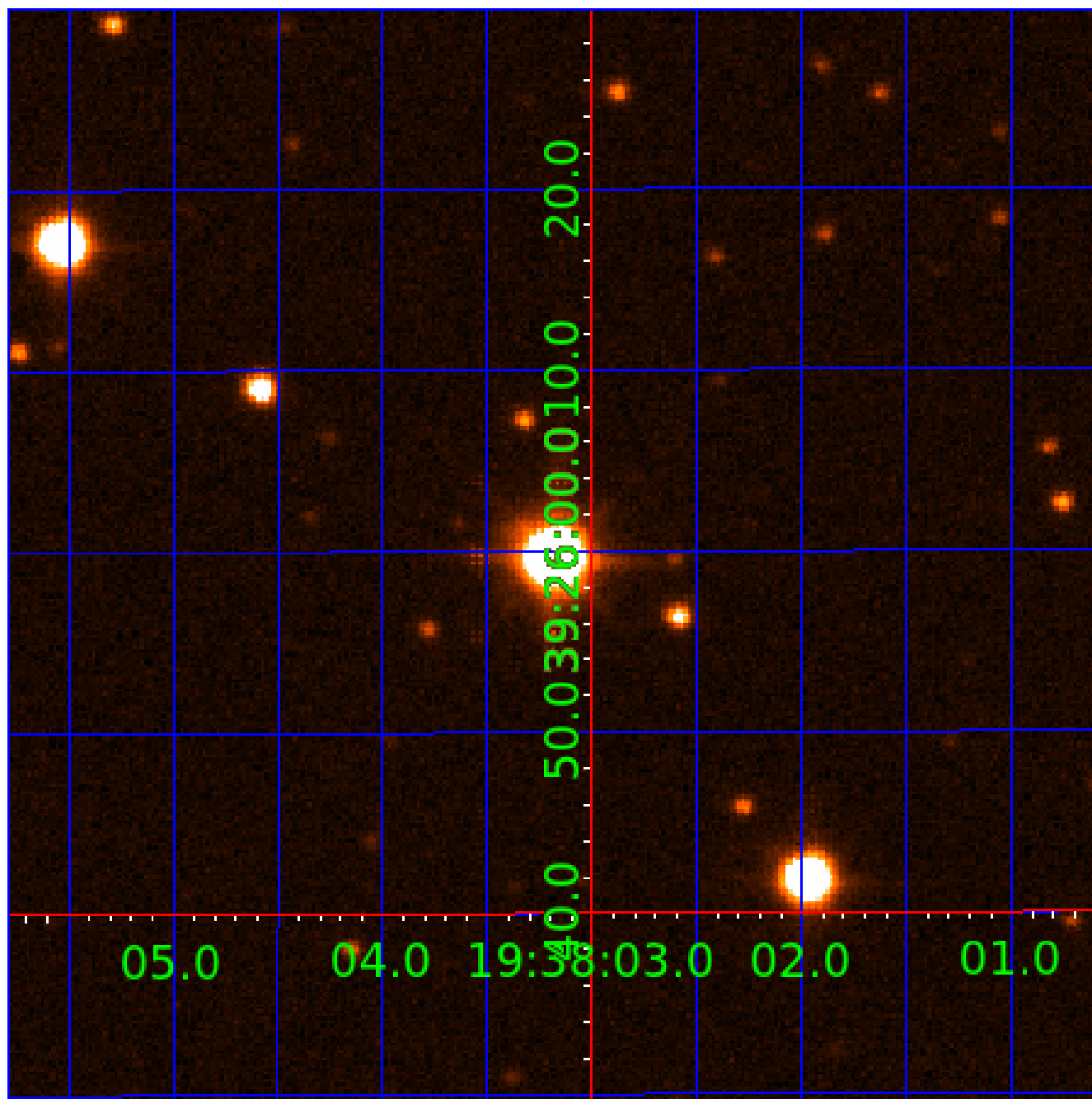


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 004376648

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})
004376648-01	OBS	No	0.521668	131.999628	63.6	1.753	8.2	8.0	1.86	7024	1.72	37778.75
004376648-02	OBS	No	0.521665	131.821686	102.9	2.008	9.8	9.2	1.86	7024	2.19	37779.04
004376648-03	OBS	No	168.888956	145.773100	4077.1	5.209	9.8	9.2	1.86	7024	14.16	16.99
004376648-04	OBS	No	24.301768	152.287360	540.9	5.002	9.5	3.4	1.86	7024	4.80	225.38
004376648-05	OBS	No	25.920856	139.493335	821.9	7.527	9.2	5.7	1.86	7024	5.65	206.81
004376648-06	OBS	No	40.096338	164.771975	2229.8	4.518	8.9	8.4	1.86	7024	12.09	115.60
004376648-07	OBS	No	190.833969	297.200532	2747.5	8.379	9.1	8.8	1.86	7024	9.99	14.44
004376648-08	OBS	No	85.043521	202.020398	111.8	3.500	8.8	-1.0	1.86	7024	1.99	42.42

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004376648-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_SATURATED
004376648-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—SAME_NTL_PERIOD—CENT_SATURATED
004376648-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
004376648-04	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED—HALO_GHOST
004376648-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
004376648-06	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED—HALO_GHOST
004376648-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
004376648-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED

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

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

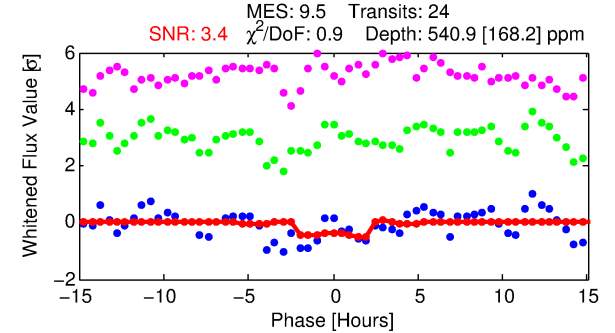
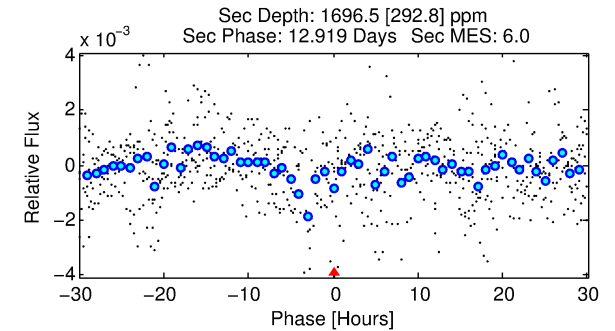
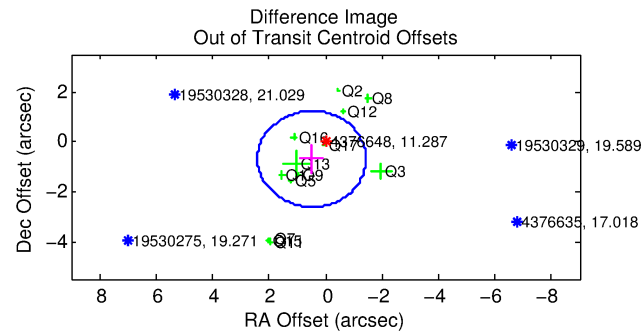
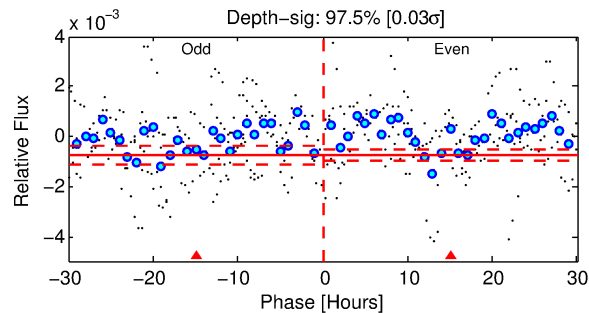
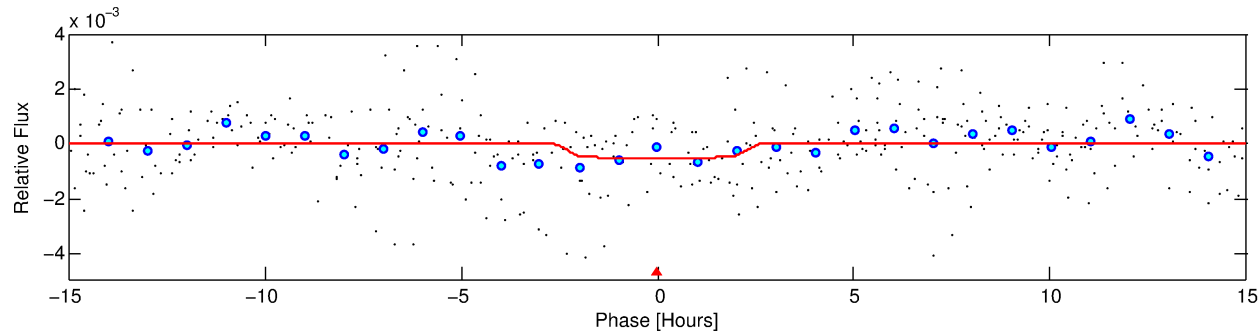
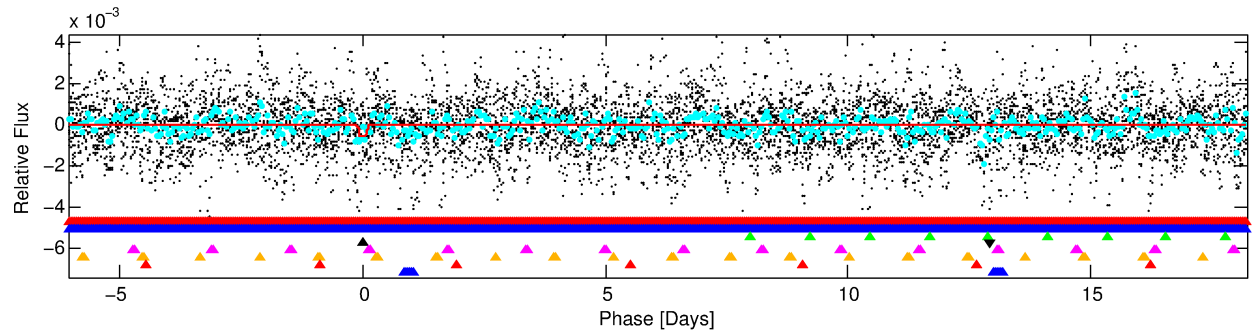
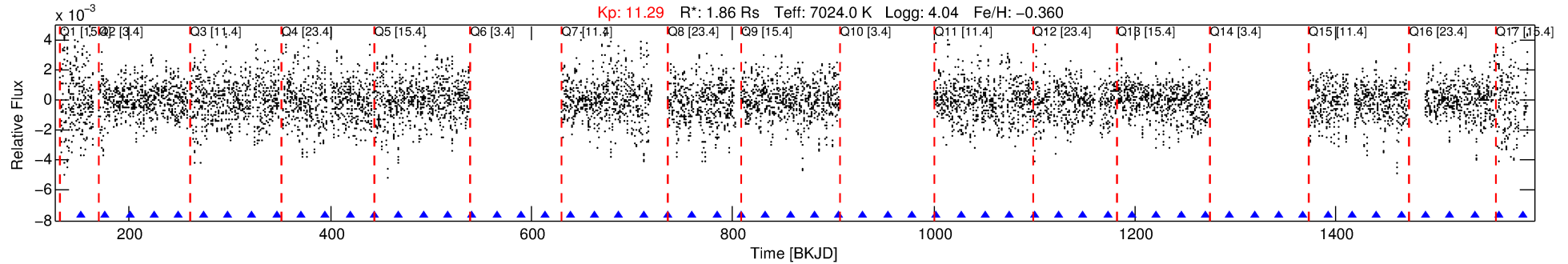
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 004376648-04

No Significant Match Found

DV One-Page Summary

KIC: 4376648 Candidate: 4 of 8 Period: 24.302 d



DV Fit Results:

Period = 24.30177 [0.00054] d
Epoch = 152.2874 [0.0179] BKJD
Rp/R* = 0.0237 [0.0112]
a/R* = 22.80 [56.84]
b = 0.82 [1.01]
Seff = 225.38 [104.07]
Teq = 988 [114] K
Rp = 4.80 [2.73] Re
a = 0.1827 [0.0521] AU
Ag = 1352.70 [1433.02] [0.94 σ]
Teffp = 9264 [2255] K [3.66 σ]

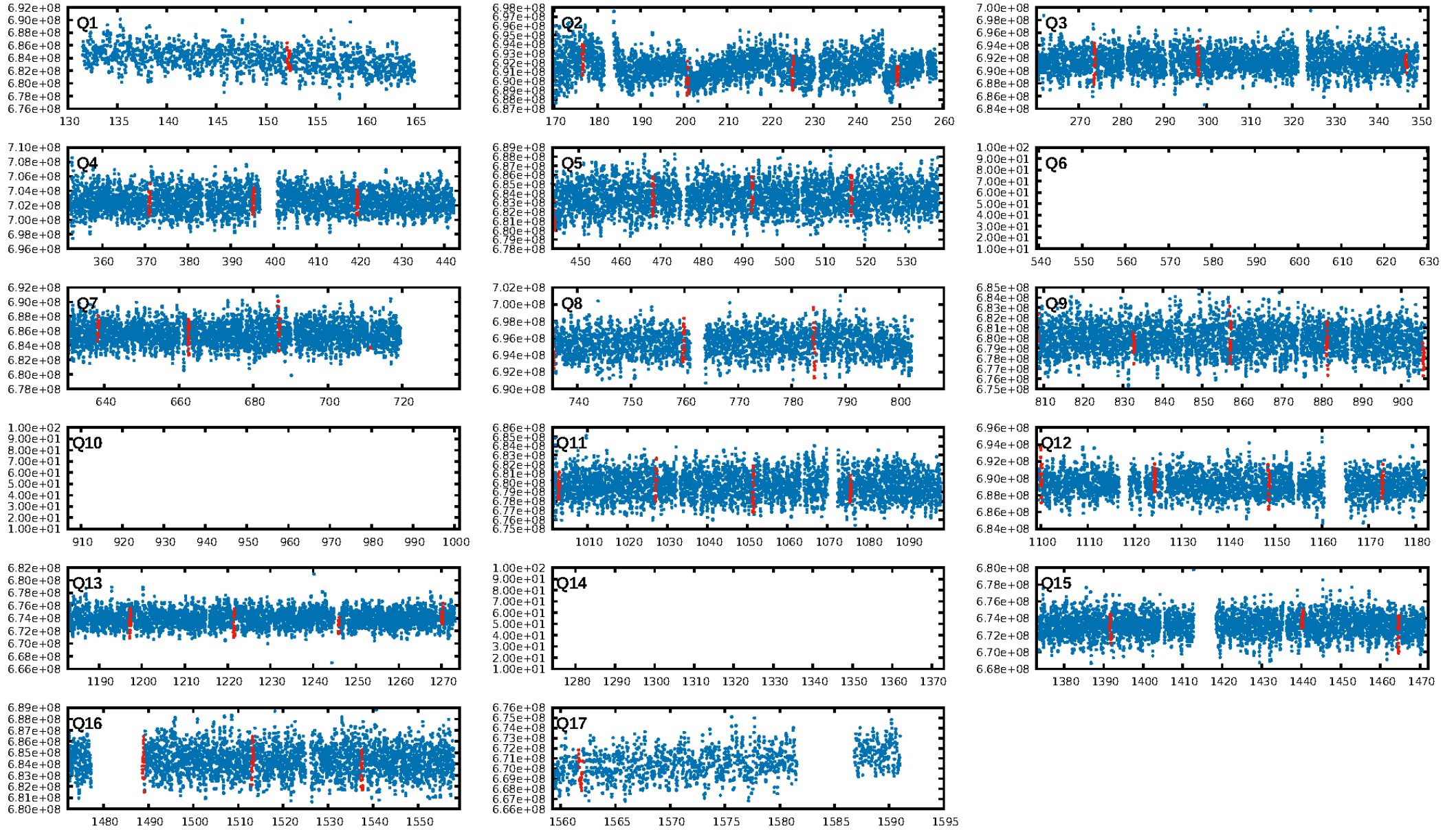
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [107.67 σ]
LongPeriod-sig: 100.0% [4.30 σ]
ModelChiSquare2-sig: 3.8%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: N/A
RollingBand-fgt: 1.00 [24/24]
GhostDiagnostic-chr: -0.17
Centroid-sig: 11.4%
Centroid-so: 0.128 arcsec [0.94 σ]
OotOffset-rm: 0.848 arcsec [1.32 σ]
KicOffset-rm: 0.970 arcsec [1.68 σ]
OotOffset-st: 1/4/3/5 [13]
KicOffset-st: 1/4/3/5 [13]
DiffImageQuality-fgm: 0.54 [7/13]
DiffImageOverlap-fno: 0.00 [0/14]

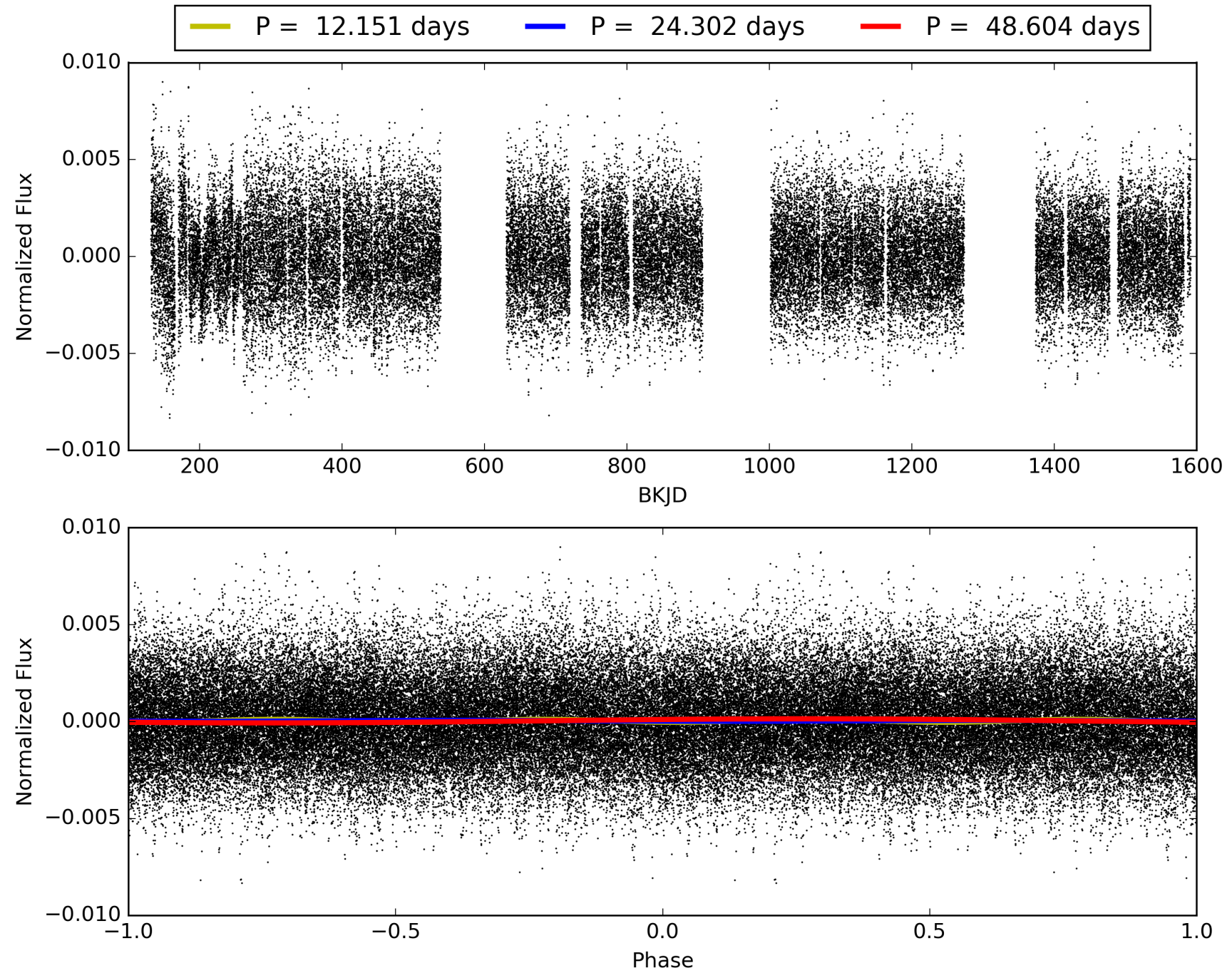
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 21:52:13 Z

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

TCE 004376648-04, PDC Light Curves

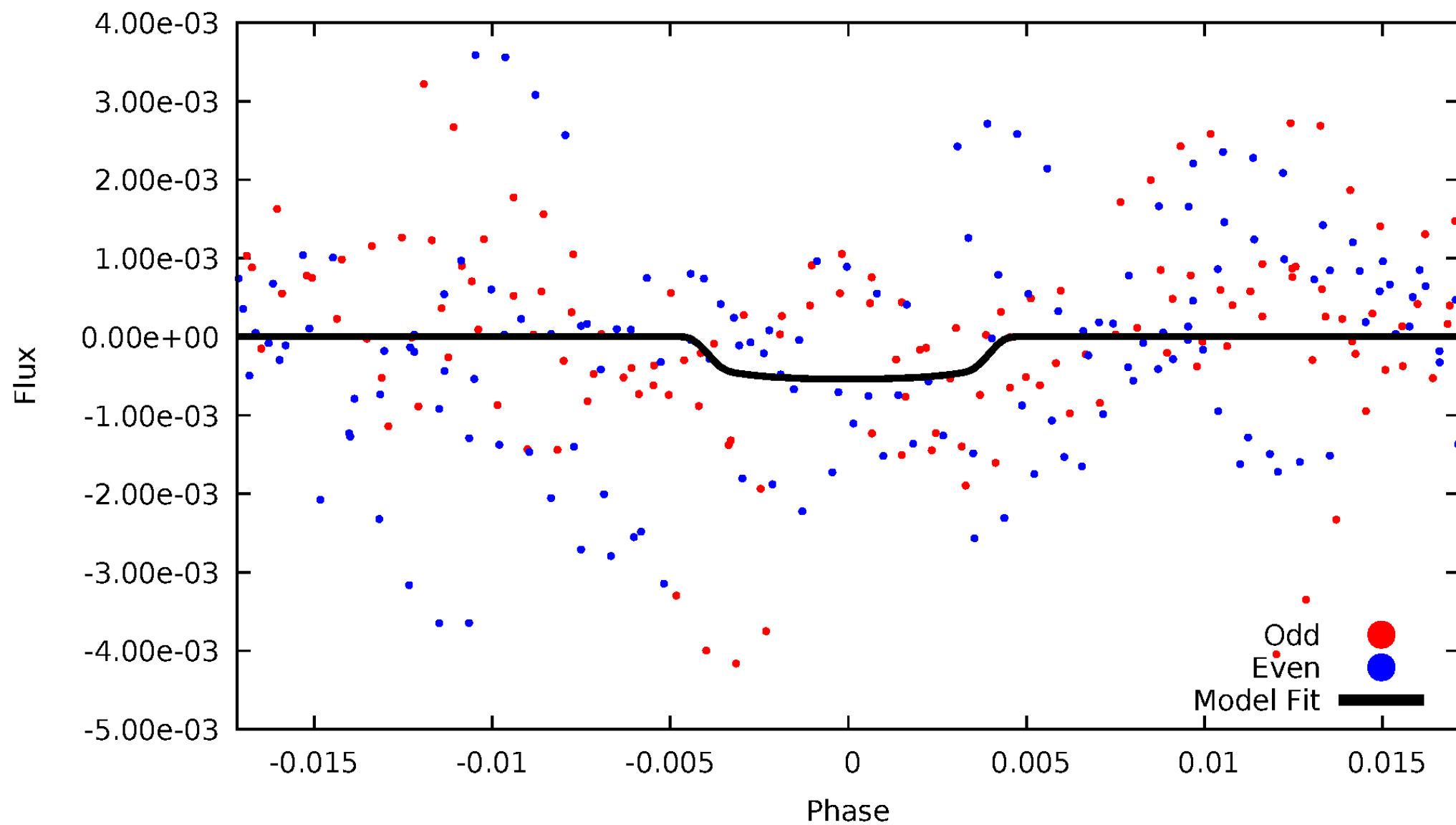


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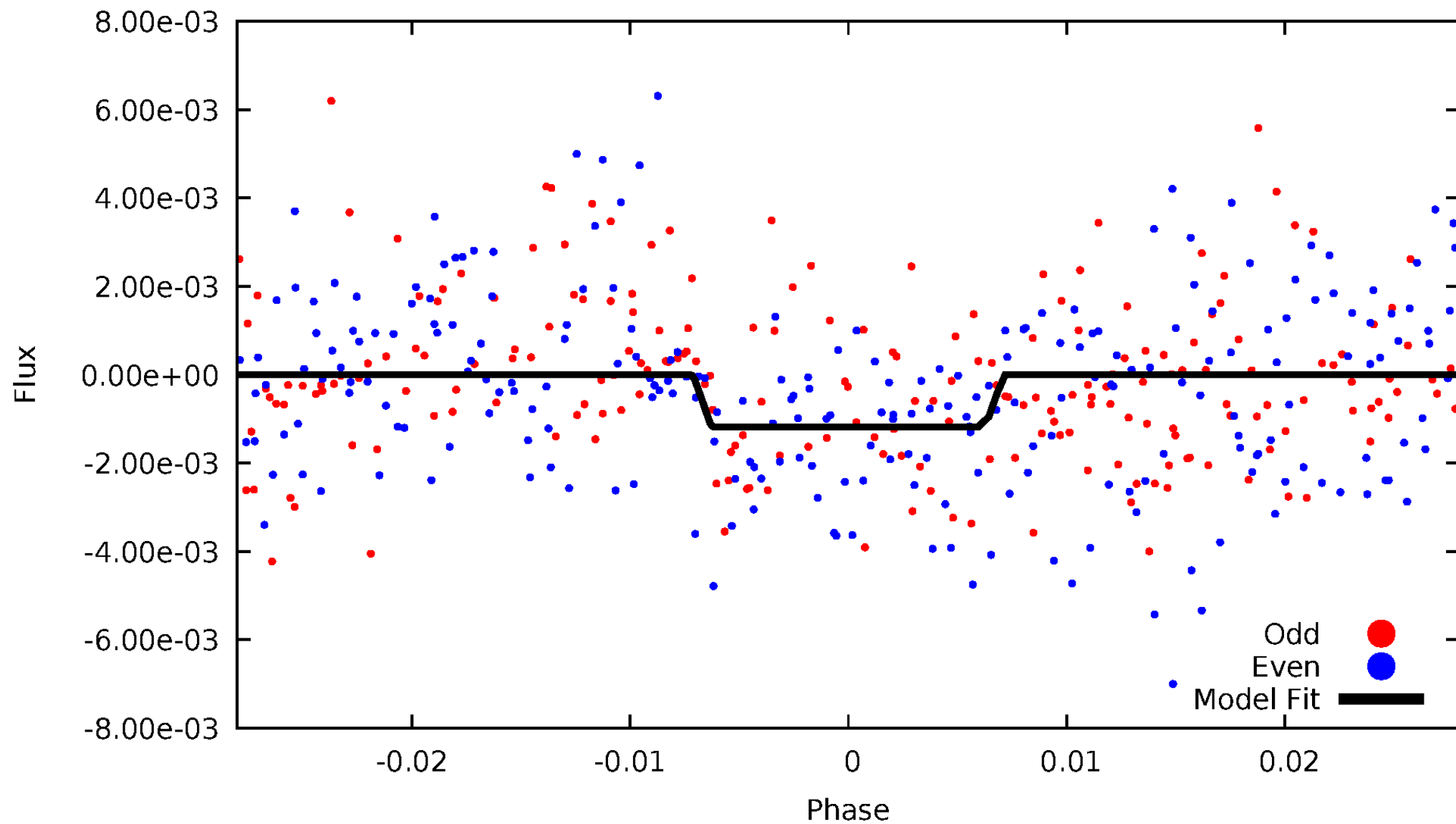
DV Odd/Even

TCE 004376648-04



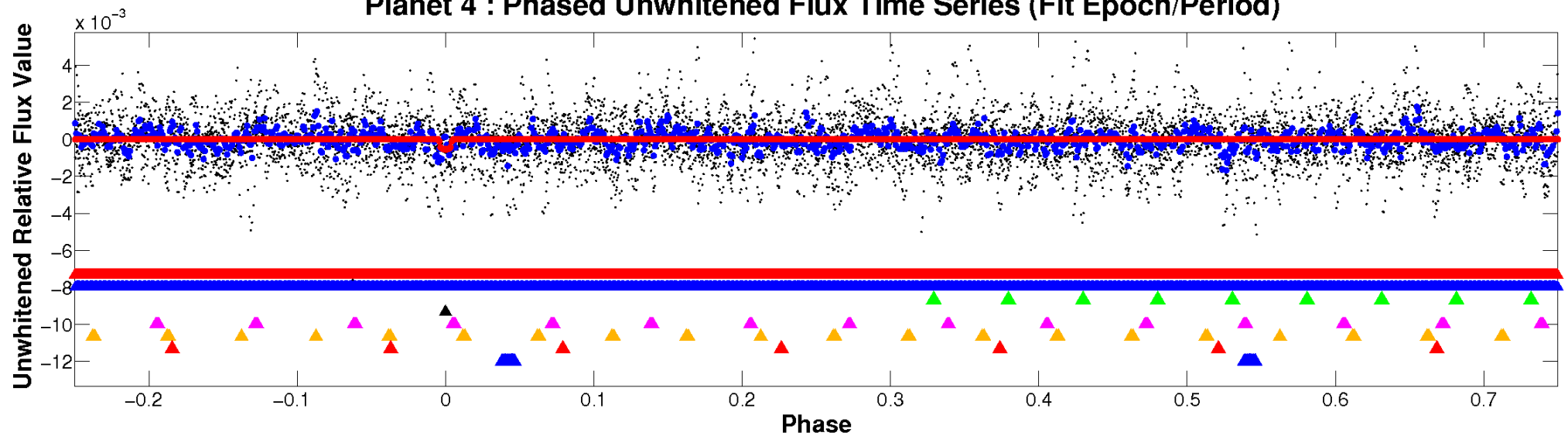
ALT Odd/Even

TCE 004376648-04

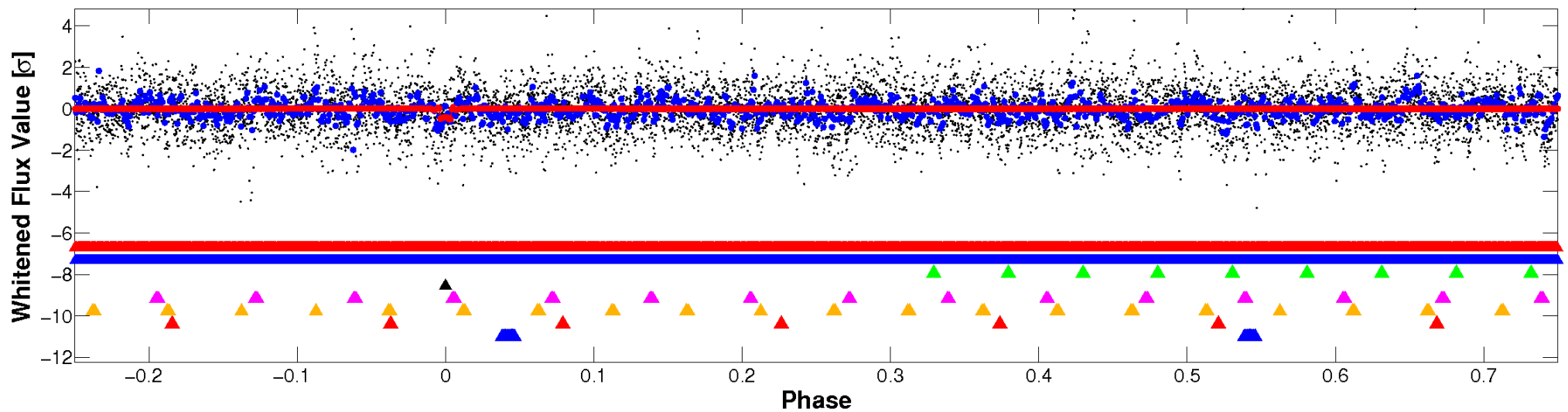


Non-Whitened Vs. Whitened Light Curve

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

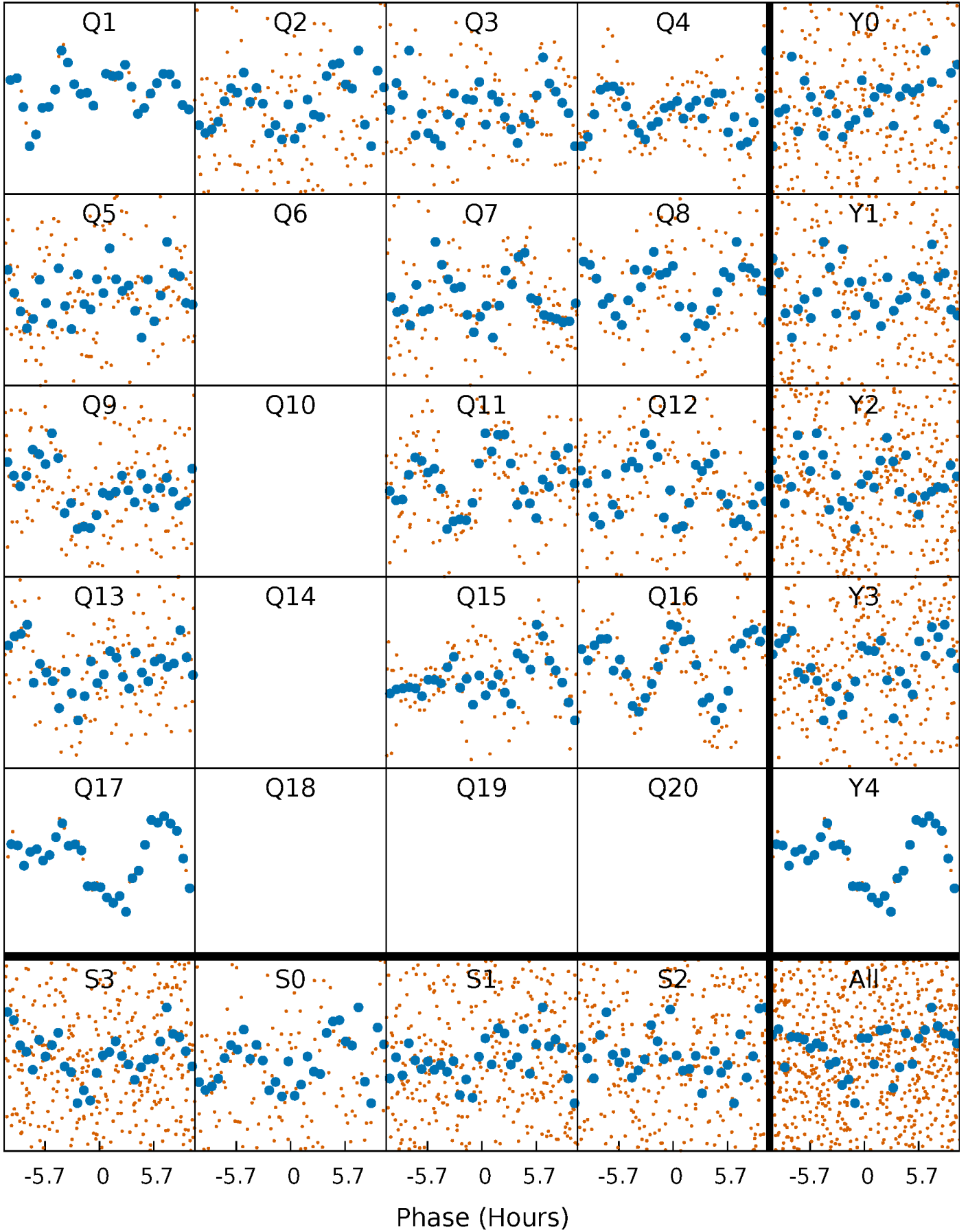


Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



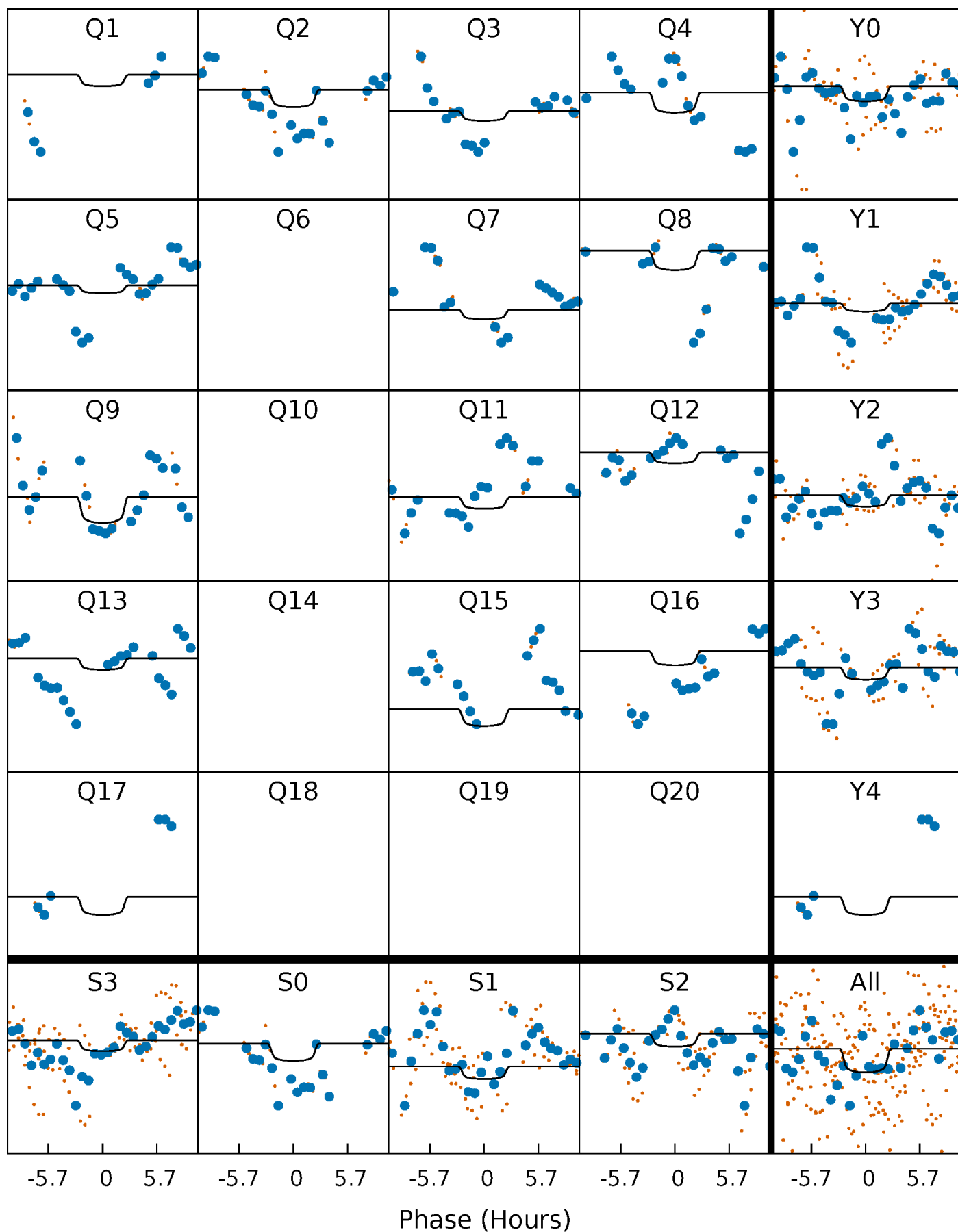
PDC Quarter-Phased Transit Curves

TCE 004376648-04 P= 24.301768 Days $T_0=152.287360$ (BKJD)



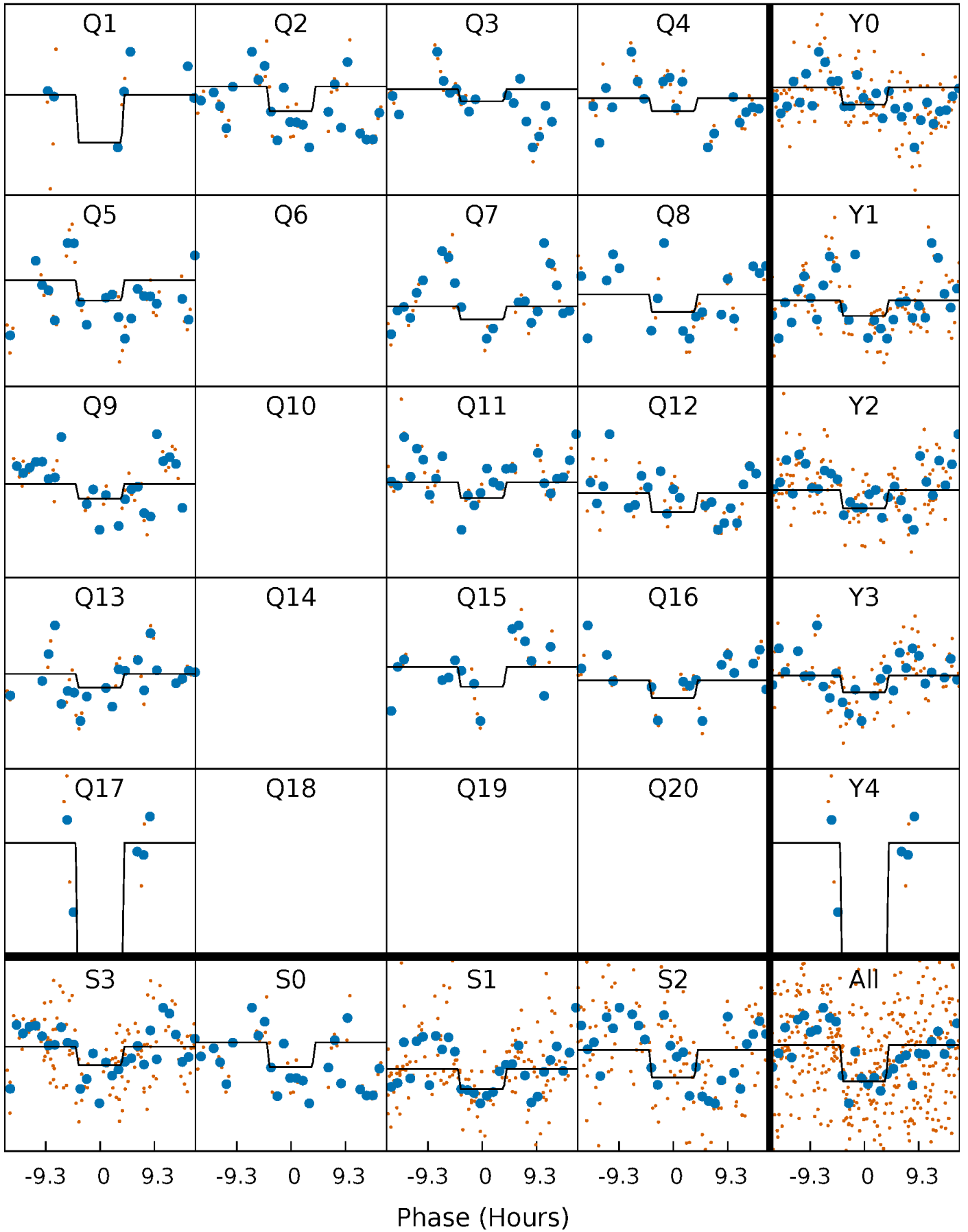
DV Quarter-Phased Transit Curves

TCE 004376648-04 P= 24.301768 Days $T_0=152.287360$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

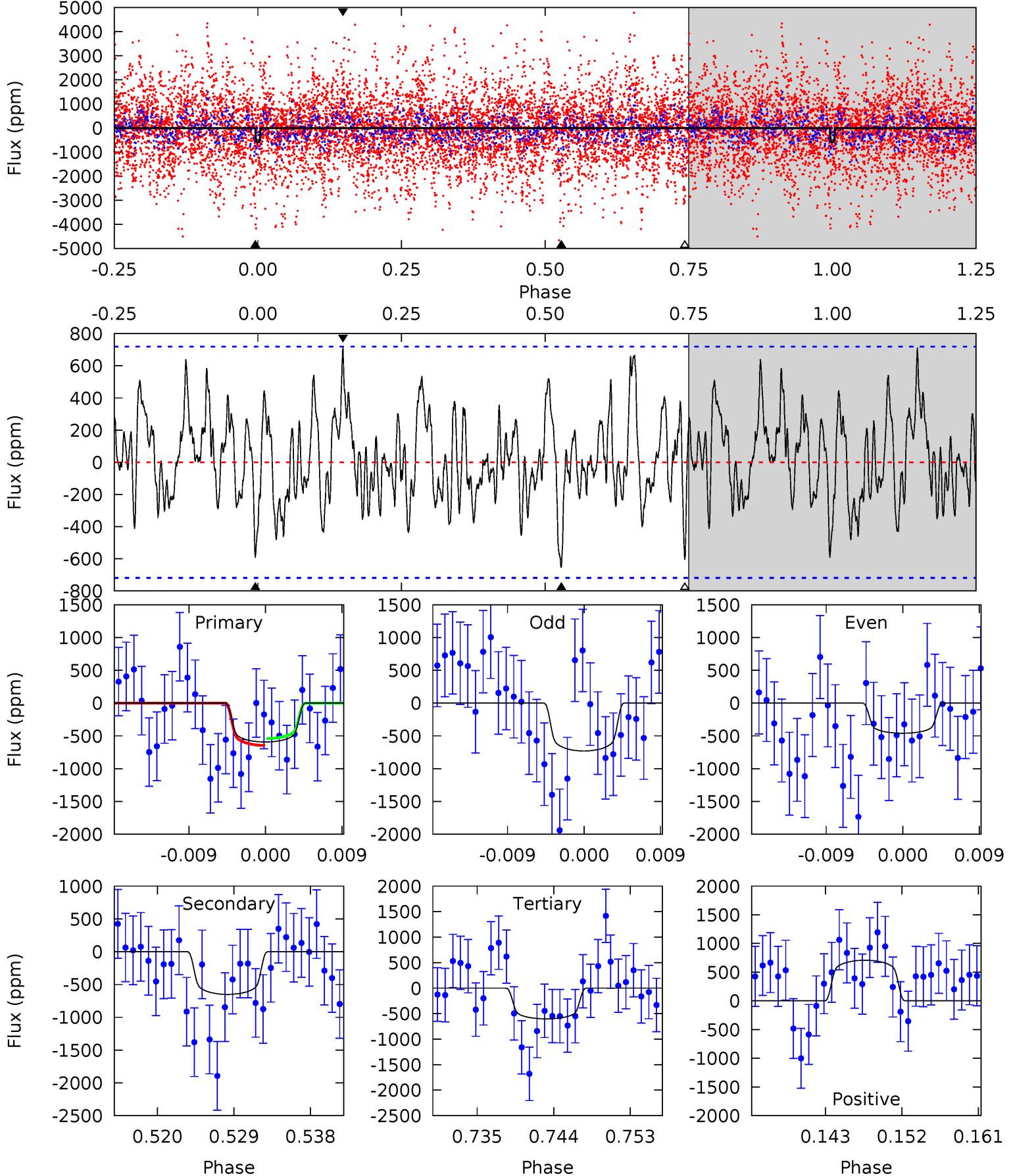
TCE 004376648-04 P= 24.300146 Days $T_0=152.342086$ (BKJD)



DV Model-Shift Uniqueness Test

004376648-04, P = 24.301768 Days, E = 127.985592 Days

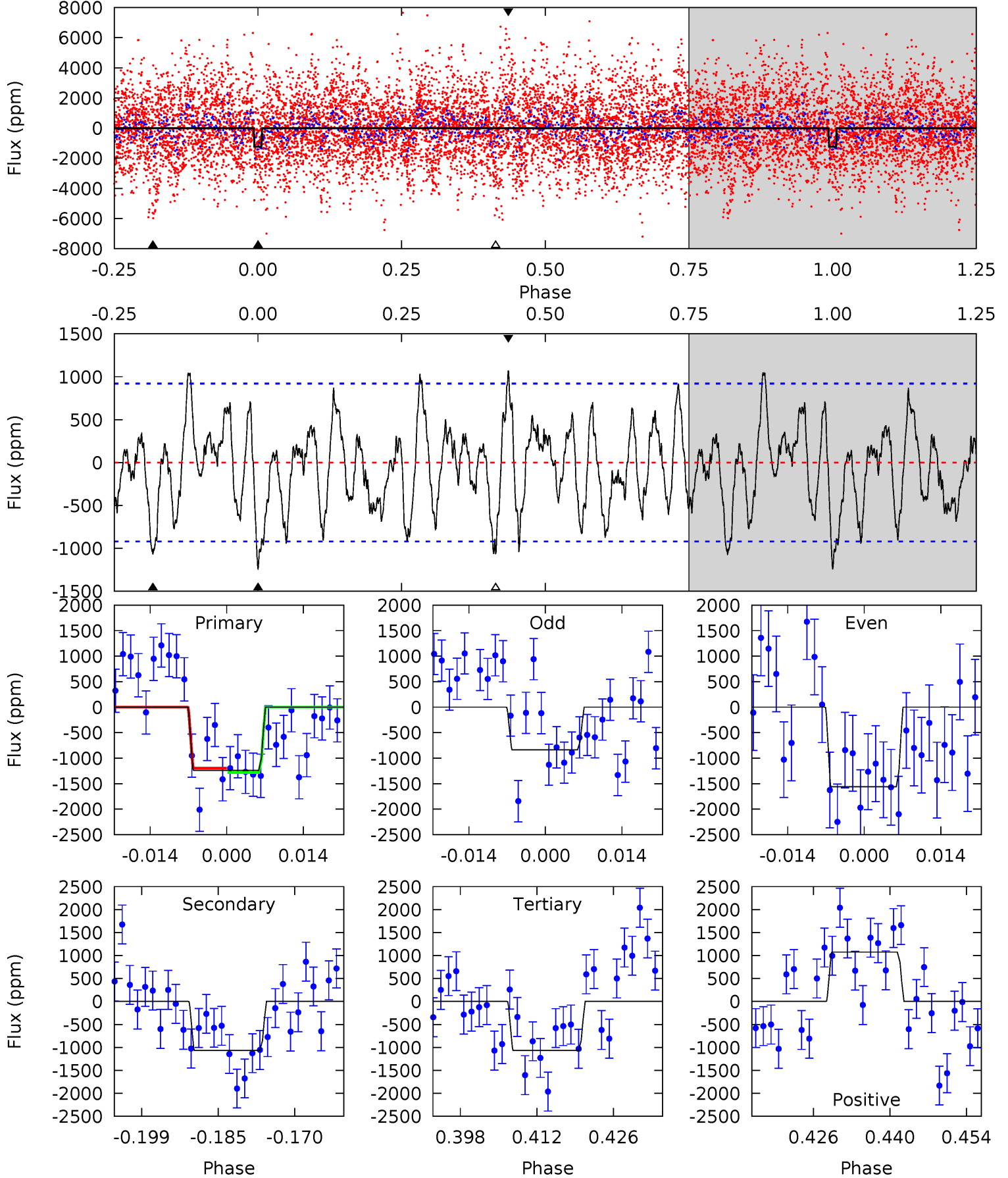
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
4.16	4.57	4.23	4.97	5.05	2.61	1.66	-0.07	-0.80	0.34	-0.40	0.96	1.93	0.52	0.37



Alt Model-Shift Uniqueness Test

004376648-04, P = 24.300146 Days, E = 128.041940 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.67	5.76	5.75	5.79	4.96	2.45	2.29	0.92	0.89	0.00	-0.03	1.94	0.90	0.46	0.23



Stellar Parameters For KIC 004376648

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	$M(M_{\odot})$	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	7024^{+164}_{-246}	$4.039^{+0.252}_{-0.168}$	$-0.360^{+0.300}_{-0.300}$	$1.857^{+0.478}_{-0.584}$	$1.378^{+0.202}_{-0.269}$	$0.303^{+0.486}_{-0.145}$
	+2%/-4%	+6%/-4%	+83%/-83%	+26%/-31%	+15%/-20%	+160%/-48%
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 004376648-04 / KOI

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-651 ± 143	$4.70^{+2.53}_{-2.20}$	1368^{+104}_{-115}	7275^{+3716}_{-1490}	553^{+1305}_{-333}
Alt.	-1068 ± 186	$6.77^{+2.71}_{-2.32}$	1371^{+97}_{-121}	6763^{+1769}_{-976}	423^{+555}_{-208}

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 $A_{obs} \gg 1.0$

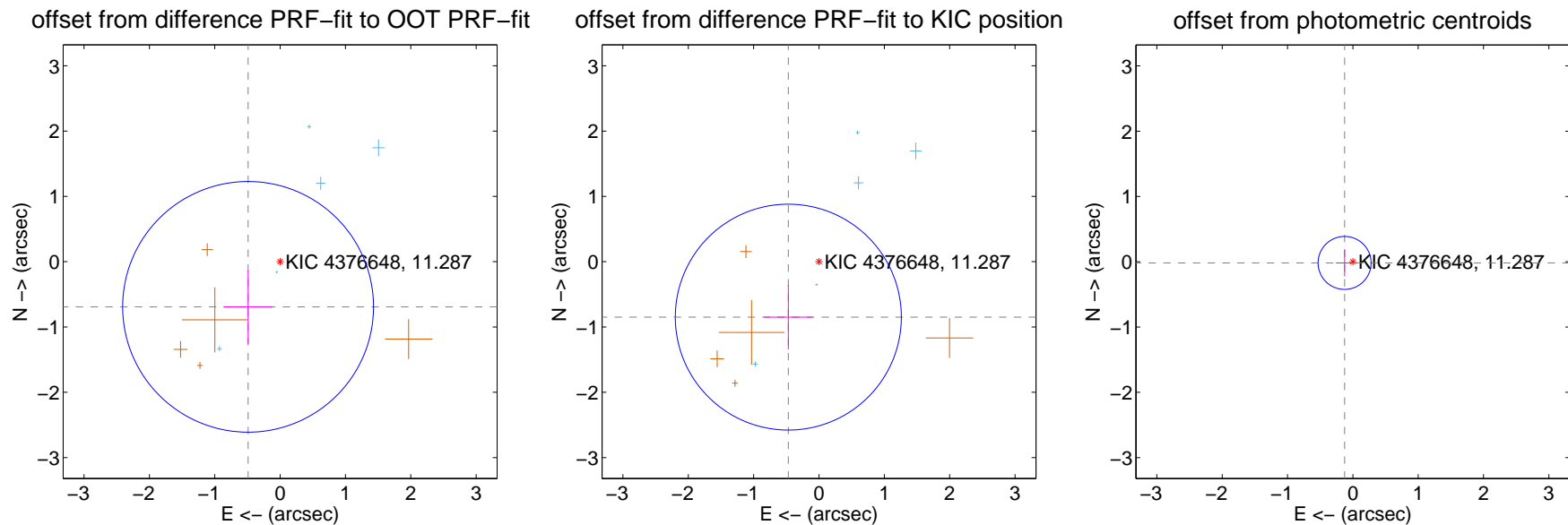
DV Centroid Data

Supplemental centroid analysis for 004376648-04. **Kepler magnitude: 11.29.** Transit SNR 3.45

There are 7 quarters with good PRF difference image offsets

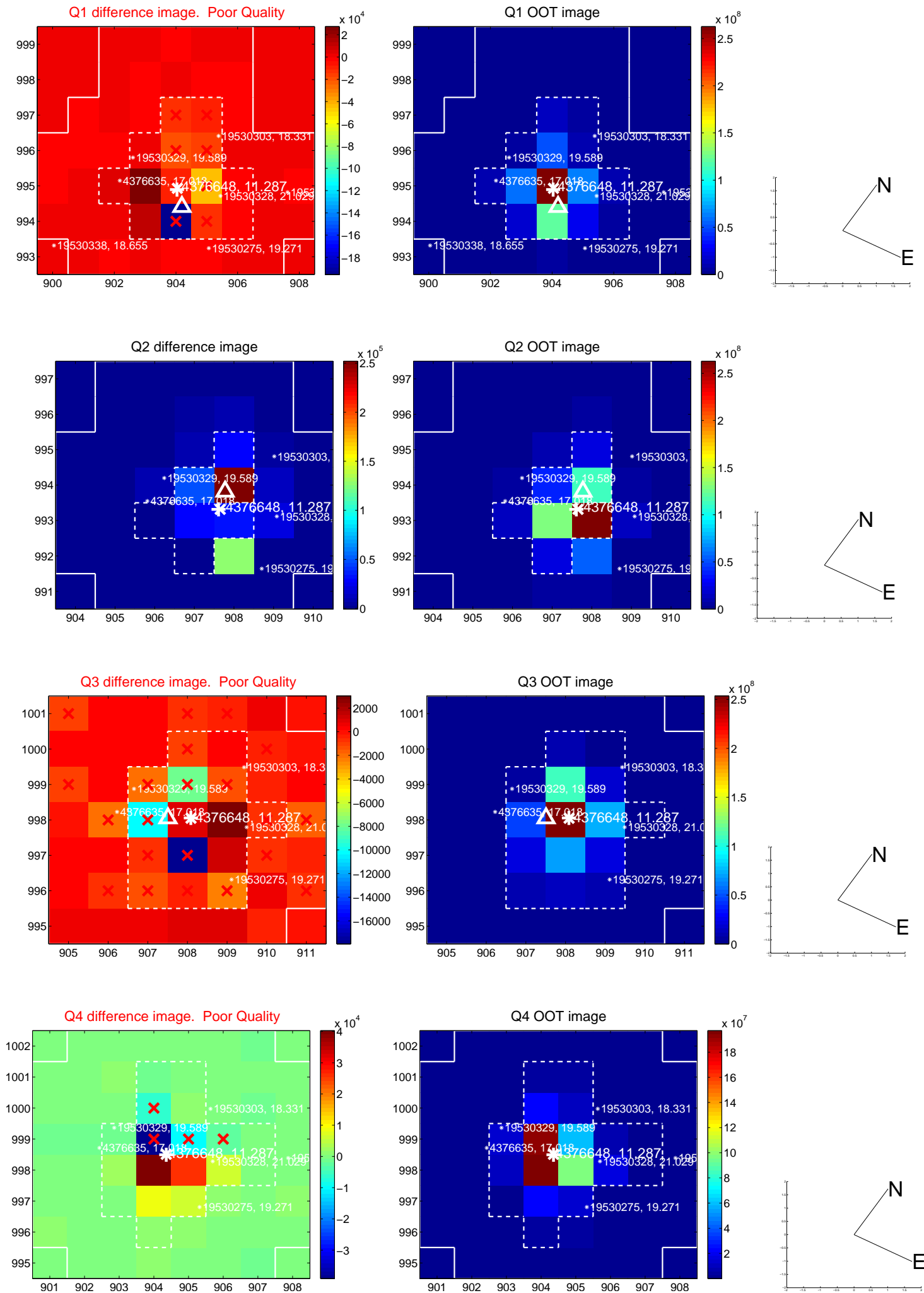
The direct PRF centroid is offset from the target star catalog position by about 0.19 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.848 ± 0.640	1.32	0.490 ± 0.375	-0.692 ± 0.563
PRF-fit source offset from KIC position	0.970 ± 0.577	1.68	0.469 ± 0.371	-0.849 ± 0.495
photometric centroid source offset	0.13 ± 0.14	0.94	0.13 ± 0.13	-0.02 ± 0.21

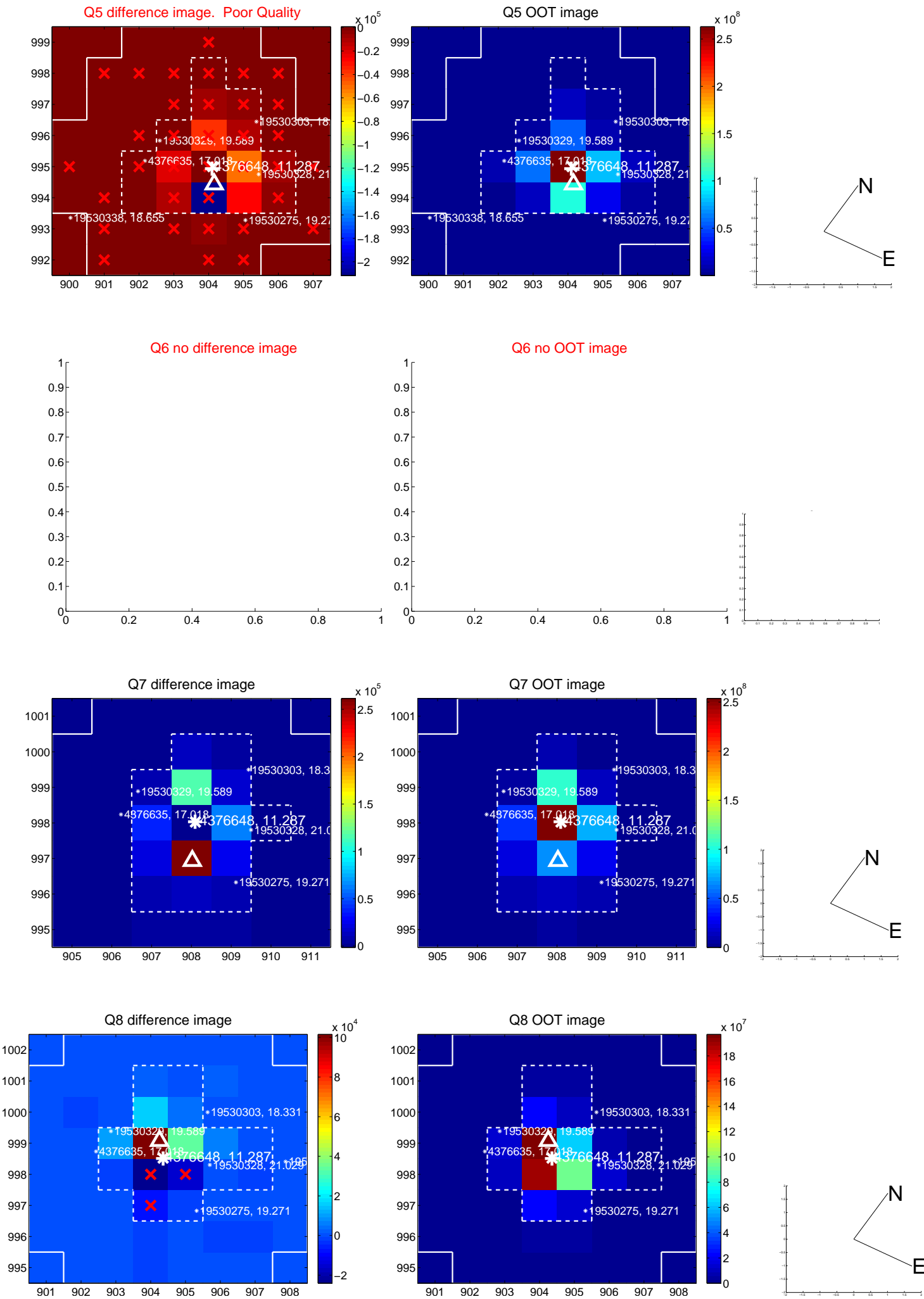


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

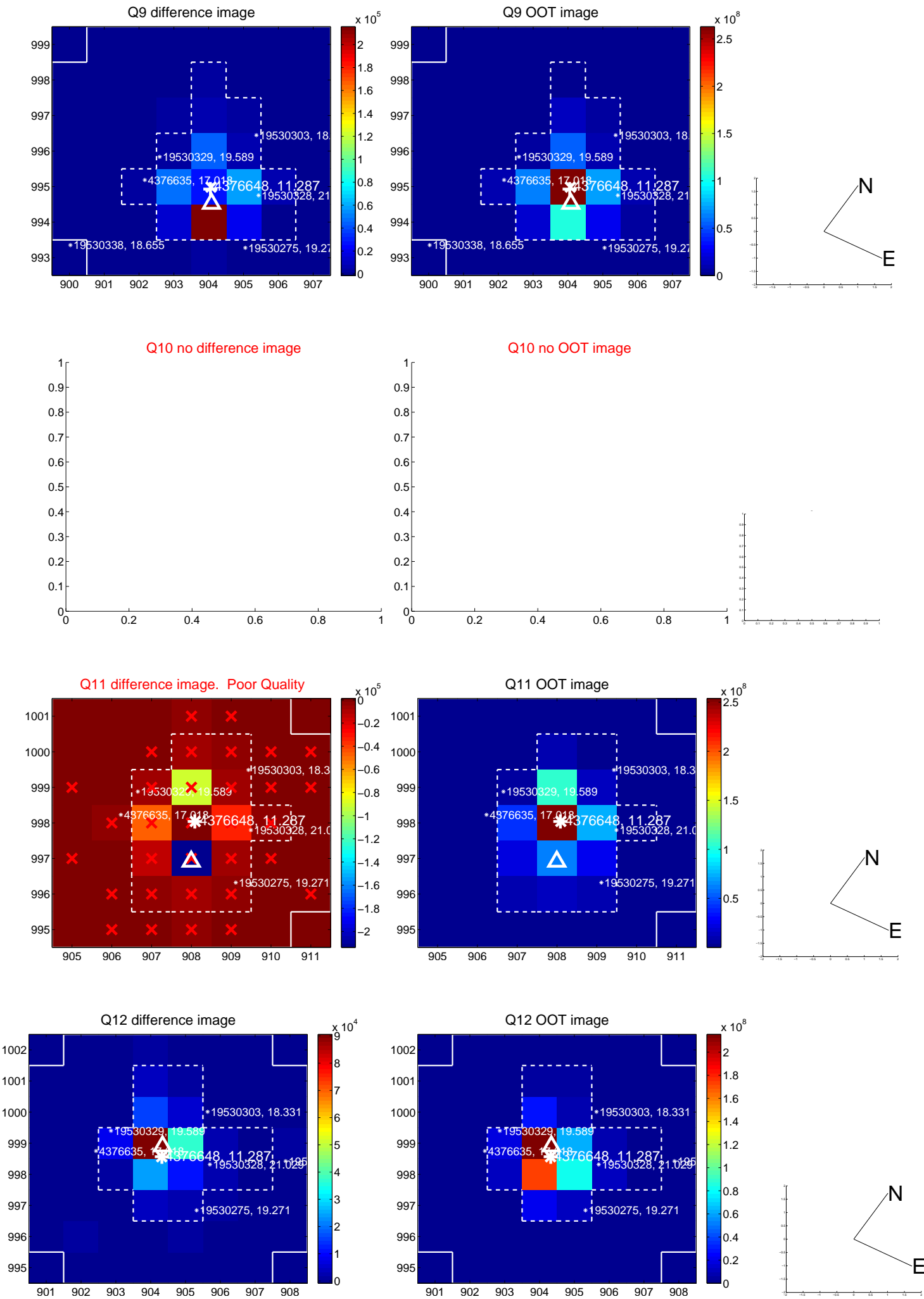
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



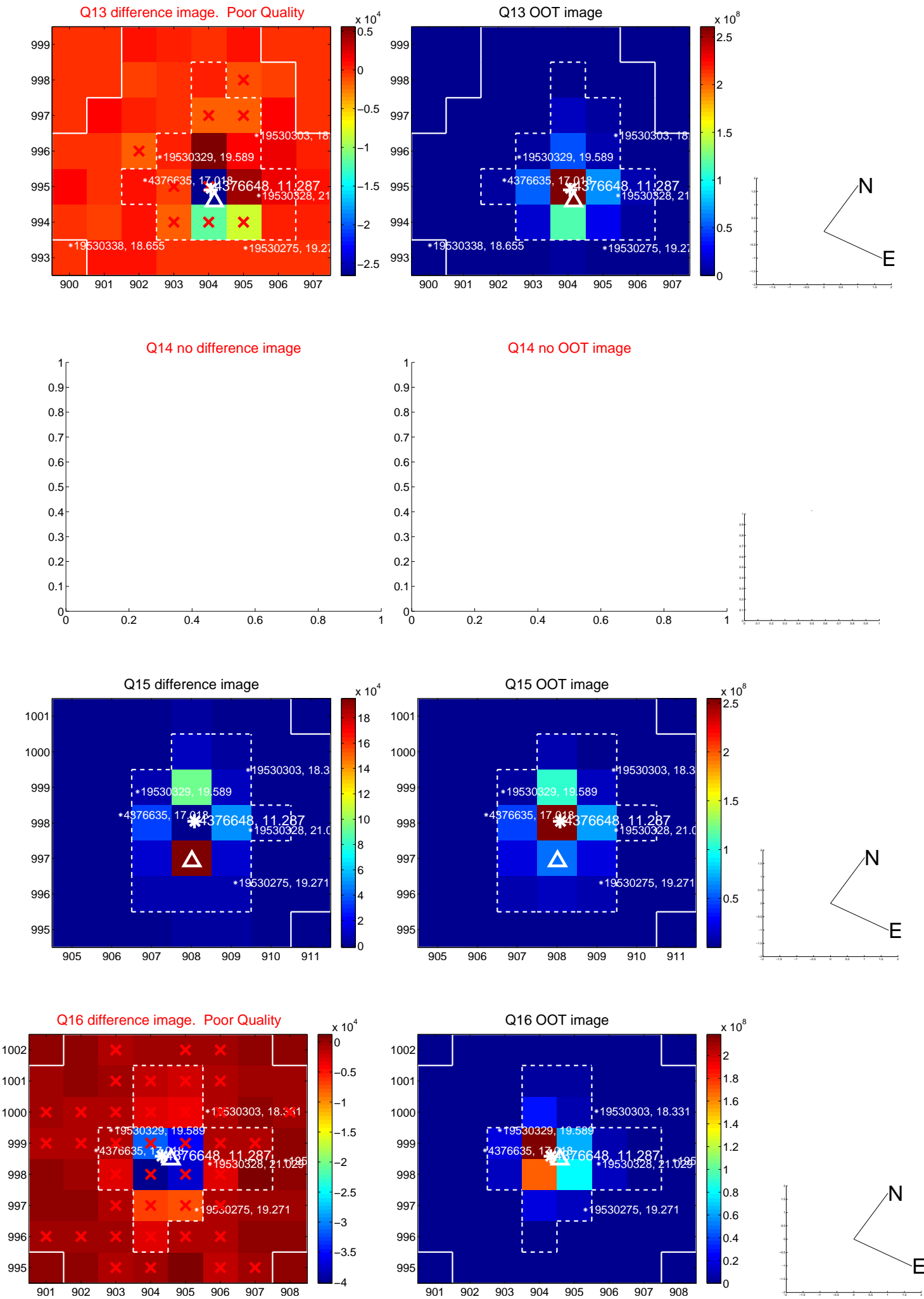
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



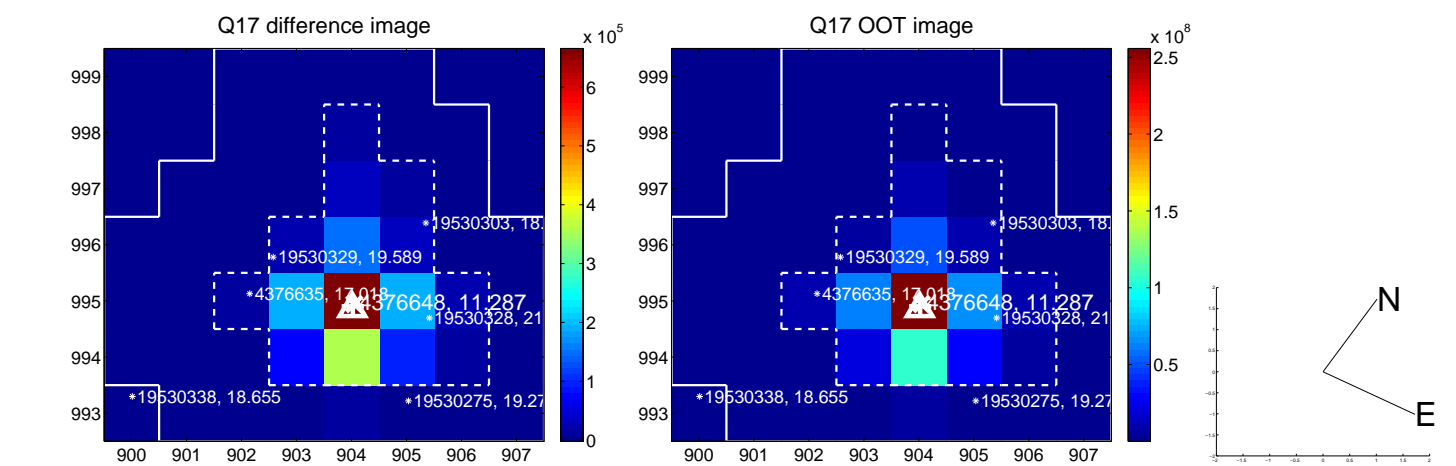
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



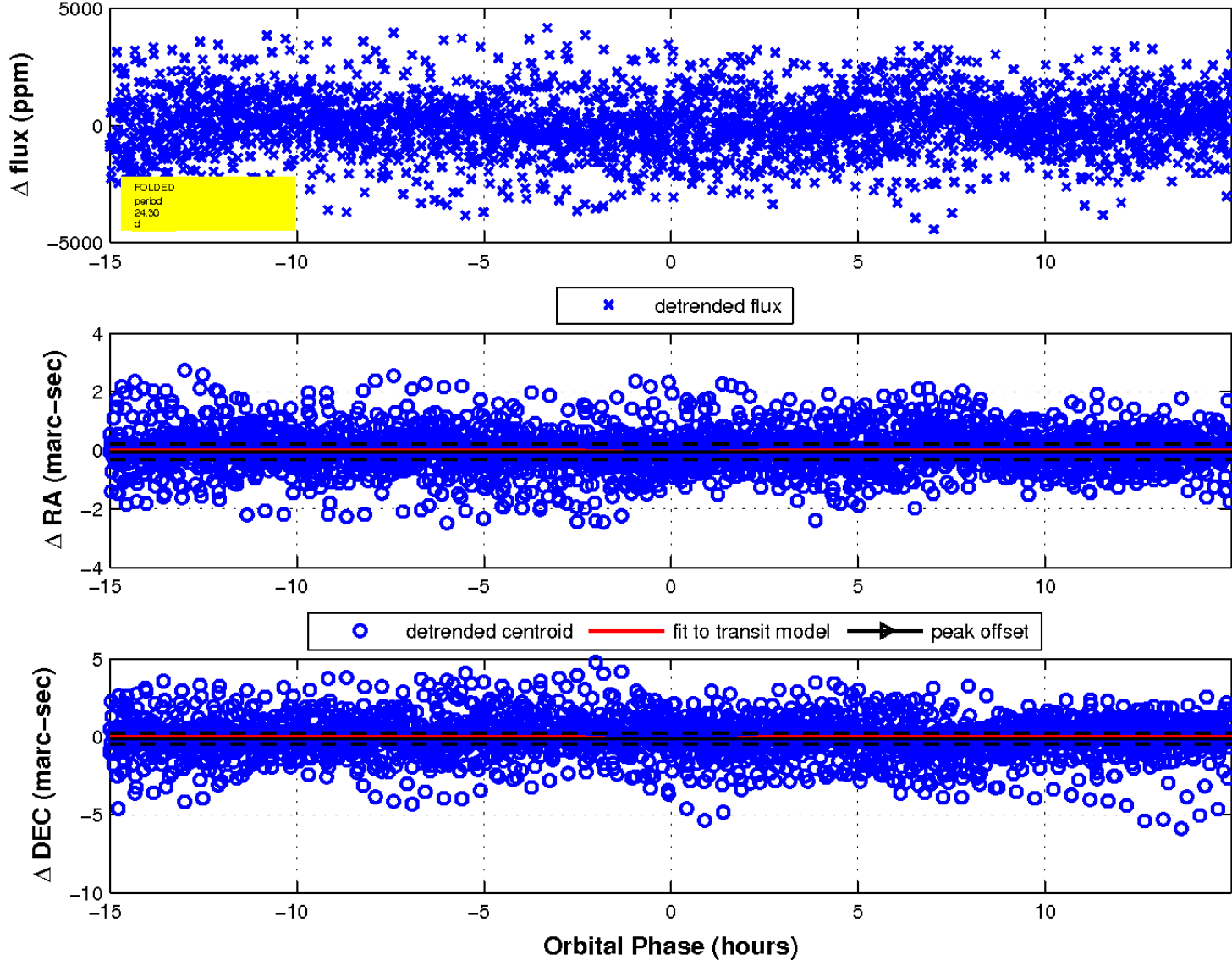
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

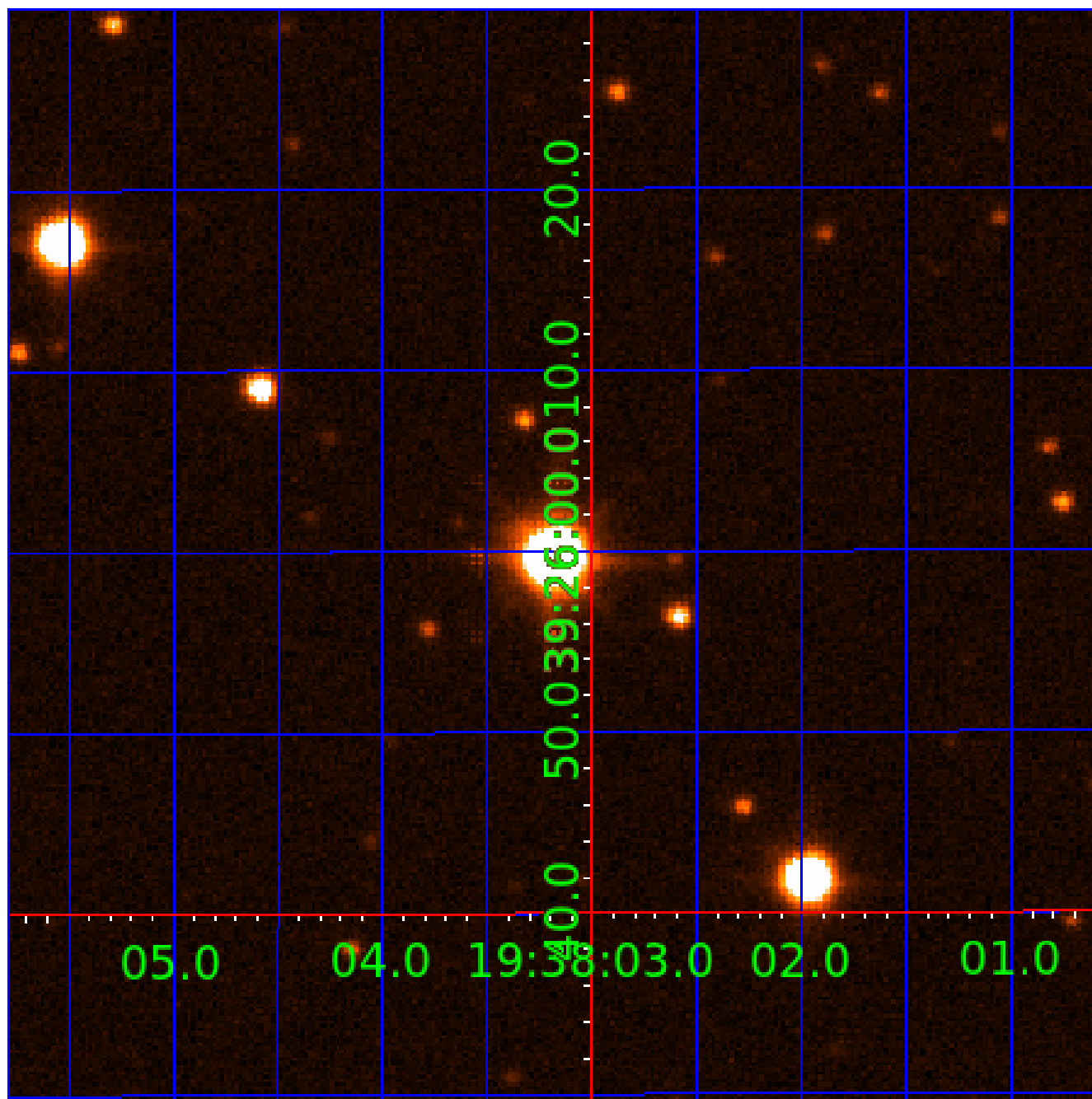


fluxWeightedCentroids, Planet 4 of 8



UKIRT Image

Declination



KIC 004376648

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})
004376648-01	OBS	No	0.521668	131.999628	63.6	1.753	8.2	8.0	1.86	7024	1.72	37778.75
004376648-02	OBS	No	0.521665	131.821686	102.9	2.008	9.8	9.2	1.86	7024	2.19	37779.04
004376648-03	OBS	No	168.888956	145.773100	4077.1	5.209	9.8	9.2	1.86	7024	14.16	16.99
004376648-04	OBS	No	24.301768	152.287360	540.9	5.002	9.5	3.4	1.86	7024	4.80	225.38
004376648-05	OBS	No	25.920856	139.493335	821.9	7.527	9.2	5.7	1.86	7024	5.65	206.81
004376648-06	OBS	No	40.096338	164.771975	2229.8	4.518	8.9	8.4	1.86	7024	12.09	115.60
004376648-07	OBS	No	190.833969	297.200532	2747.5	8.379	9.1	8.8	1.86	7024	9.99	14.44
004376648-08	OBS	No	85.043521	202.020398	111.8	3.500	8.8	-1.0	1.86	7024	1.99	42.42

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004376648-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_SATURATED
004376648-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—SAME_NTL_PERIOD—CENT_SATURATED
004376648-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
004376648-04	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED—HALO_GHOST
004376648-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
004376648-06	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED—HALO_GHOST
004376648-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
004376648-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED

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

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

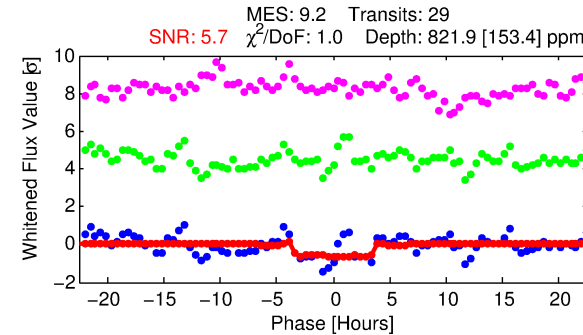
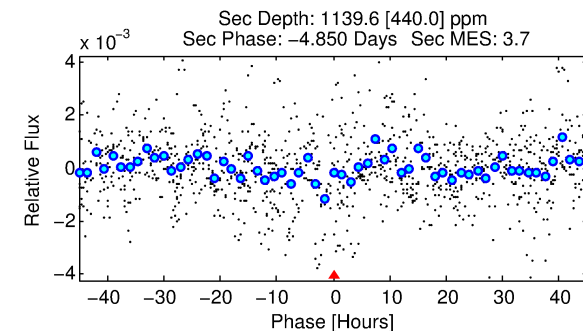
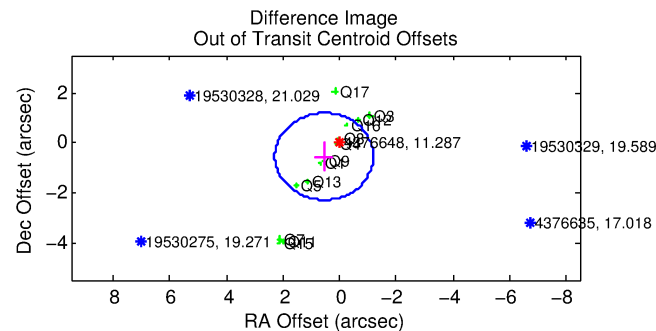
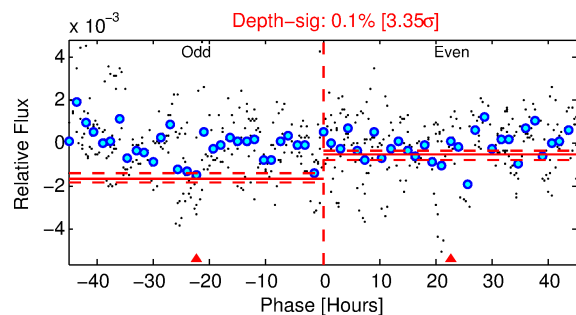
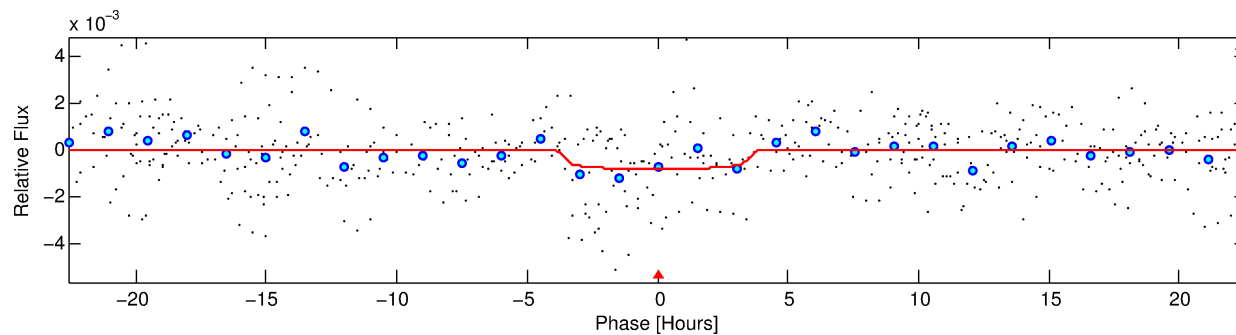
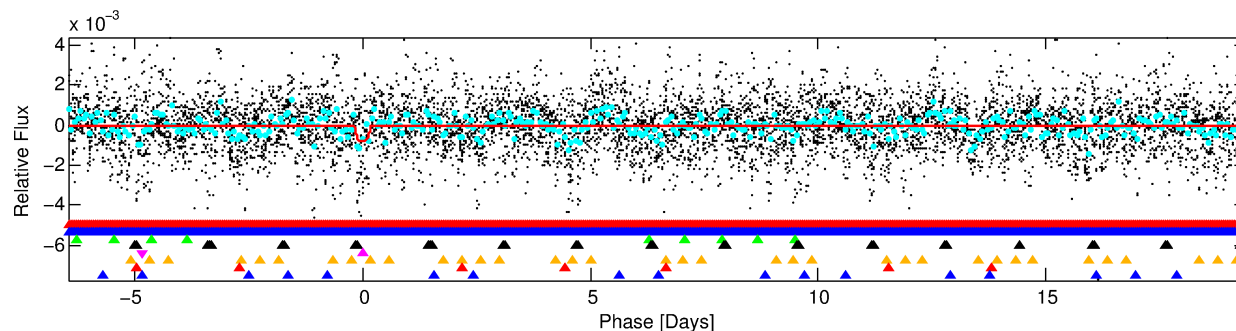
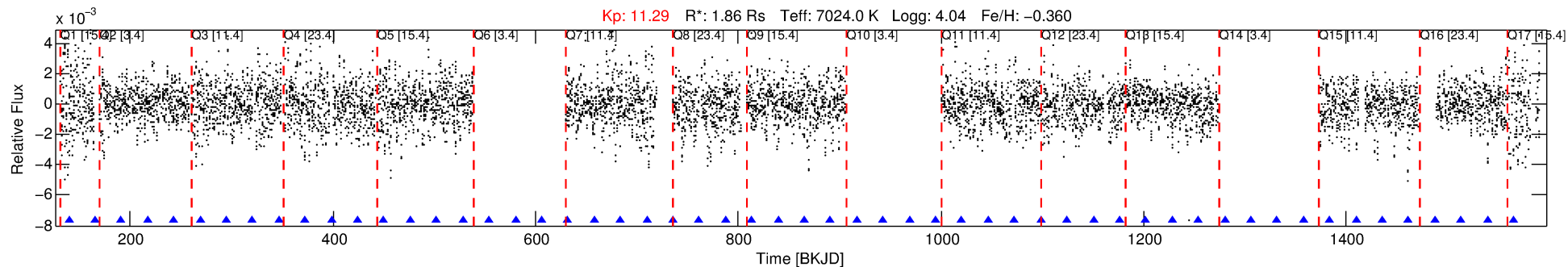
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 004376648-05

No Significant Match Found

DV One-Page Summary

KIC: 4376648 Candidate: 5 of 8 Period: 25.921 d



DV Fit Results:

Period = 25.92086 [0.00067] d
Epoch = 139.4933 [0.0227] BKJD
Rp/R* = 0.0279 [0.0107]
a/R* = 20.88 [44.62]
b = 0.65 [1.89]
Seff = 206.81 [95.50]
Teq = 967 [112] K
Rp = 5.65 [2.80] Re
a = 0.1907 [0.0544] AU
Ag = 714.67 [690.53] [1.03 σ]
Teffp = 7730 [1684] K [4.01 σ]

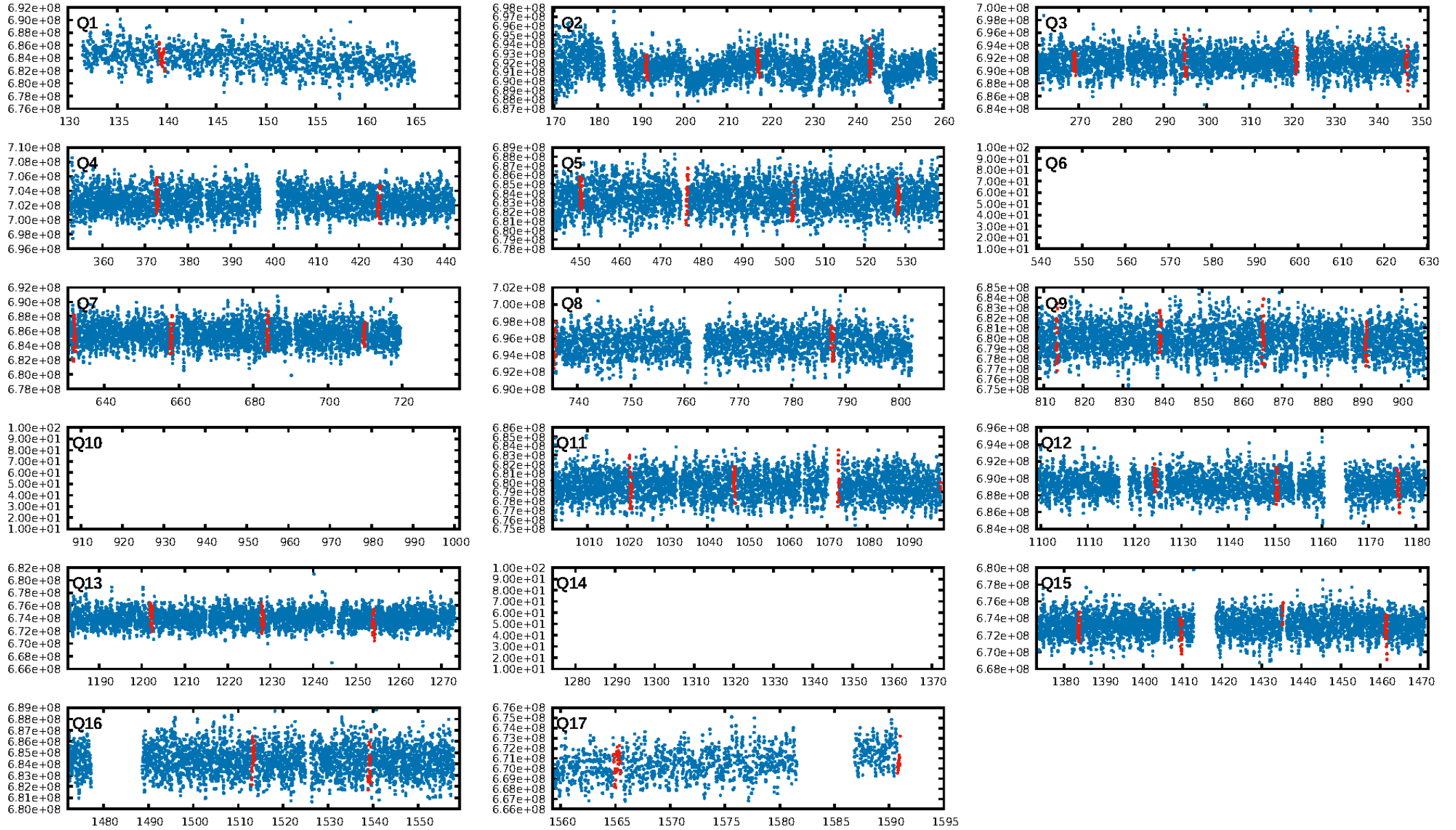
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [4.30 σ]
LongPeriod-sig: 100.0% [38.75 σ]
ModelChiSquare2-sig: 0.0%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: N/A
RollingBand-fgt: 1.00 [27/27]
GhostDiagnostic-chr: 0.3581
Centroid-sig: 6.8%
Centroid-so: 0.275 arcsec [2.13 σ]
OotOffset-rm: 0.782 arcsec [1.35 σ]
OotOffset-st: 0/4/4/5 [13]
KicOffset-rm: 0.997 arcsec [1.68 σ]
KicOffset-st: 0/4/4/5 [13]
DiffImageQuality-fgm: 0.31 [4/13]
DiffImageOverlap-fno: 0.00 [0/14]

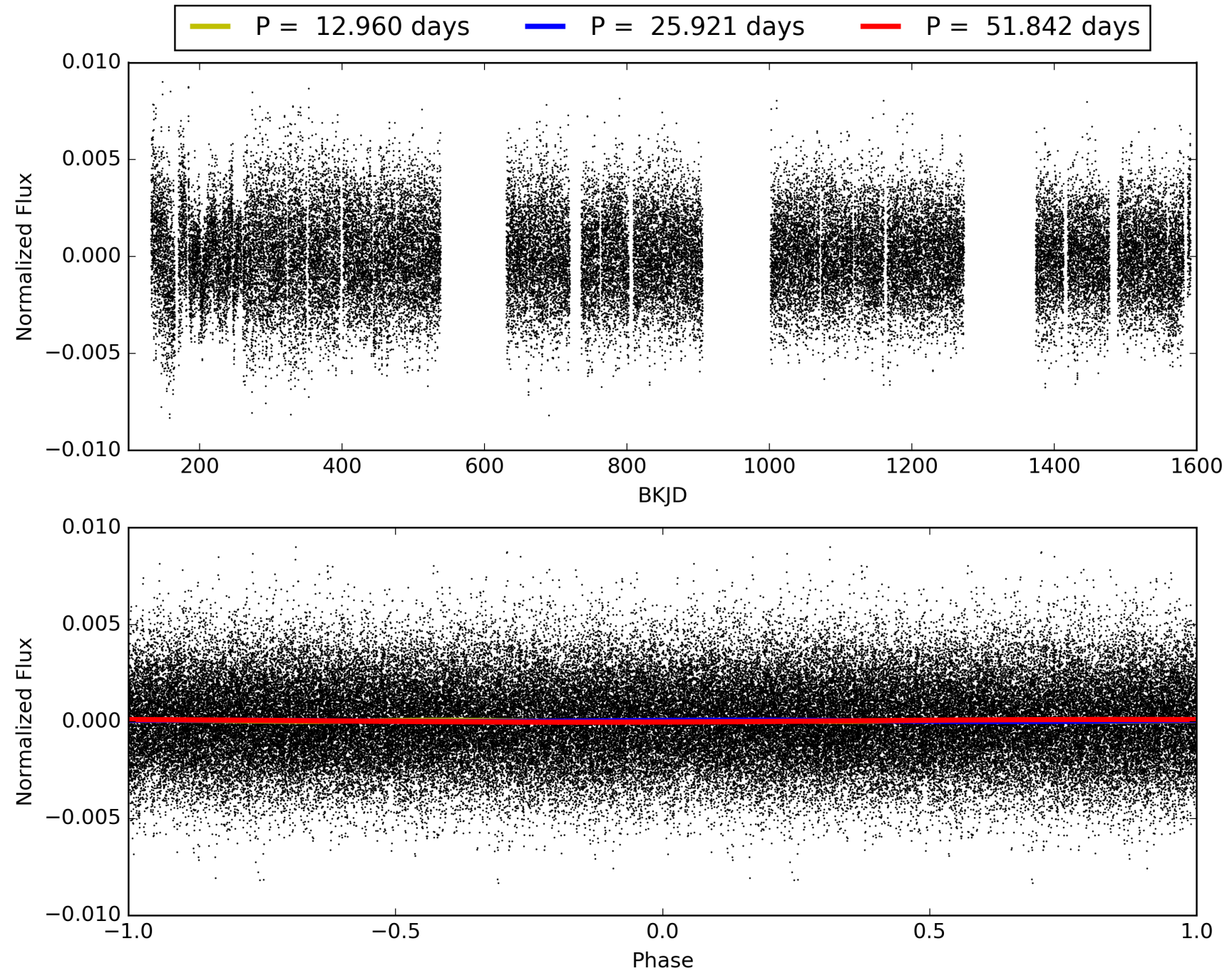
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 21:52:16 Z

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

TCE 004376648-05, PDC Light Curves

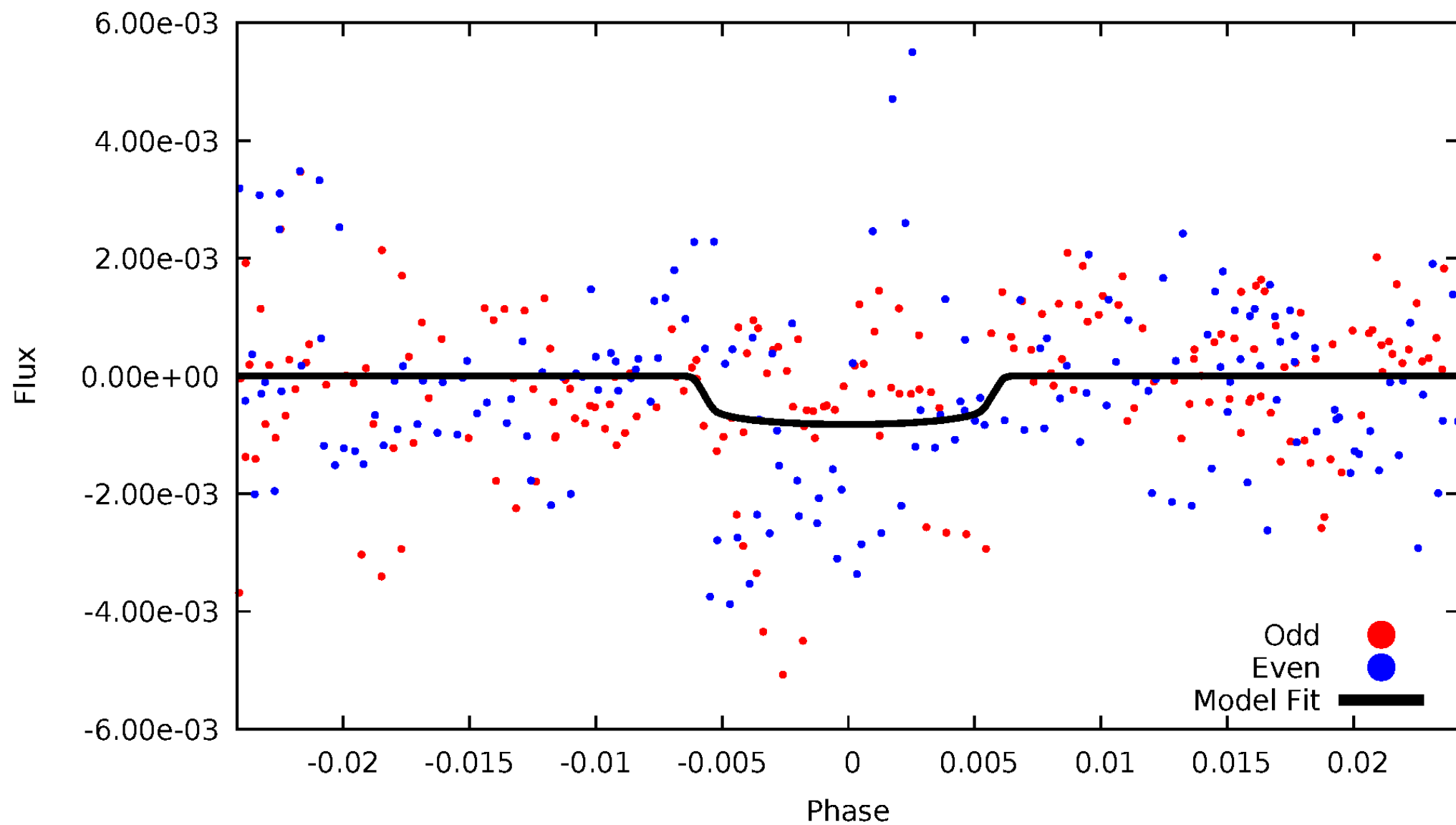


TCE 004376648-05



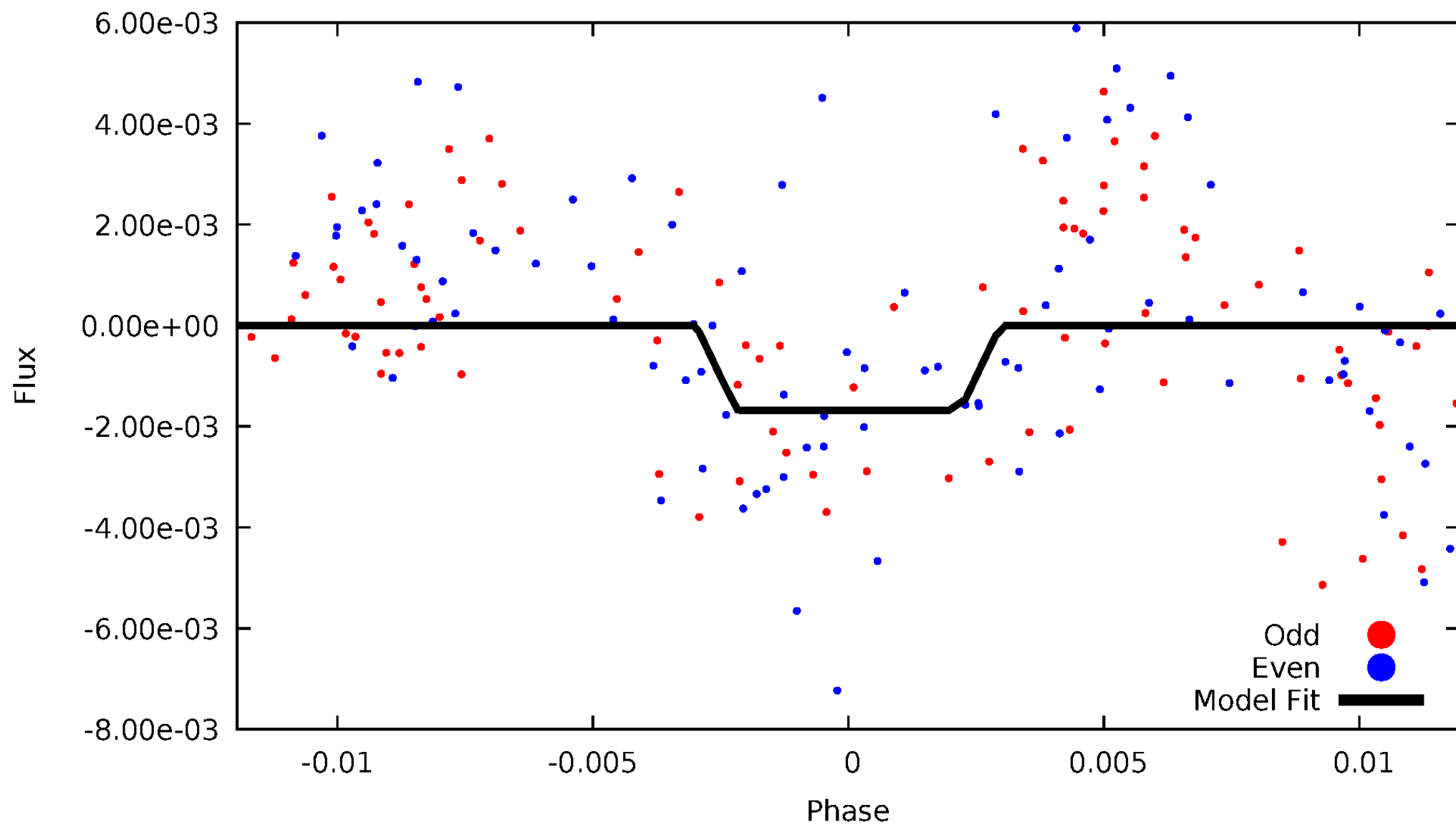
DV Odd/Even

TCE 004376648-05



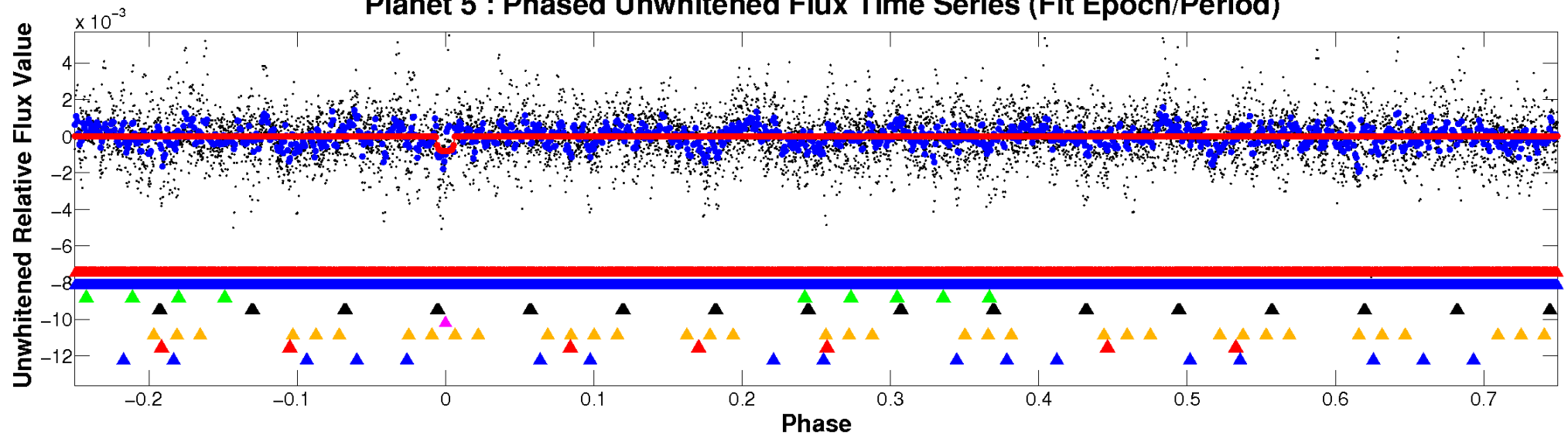
ALT Odd/Even

TCE 004376648-05

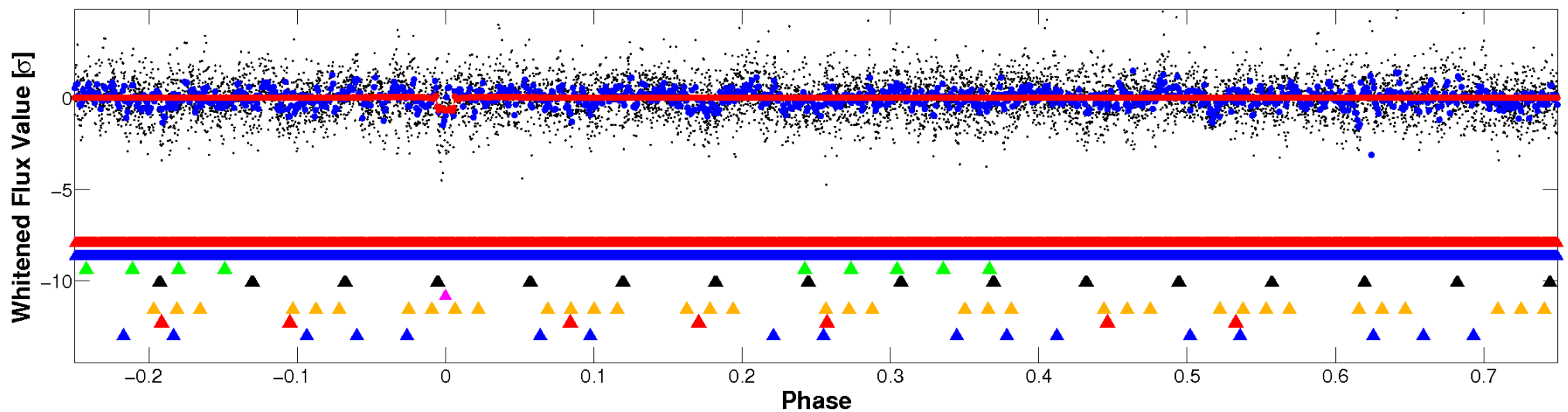


Non-Whitened Vs. Whitened Light Curve

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

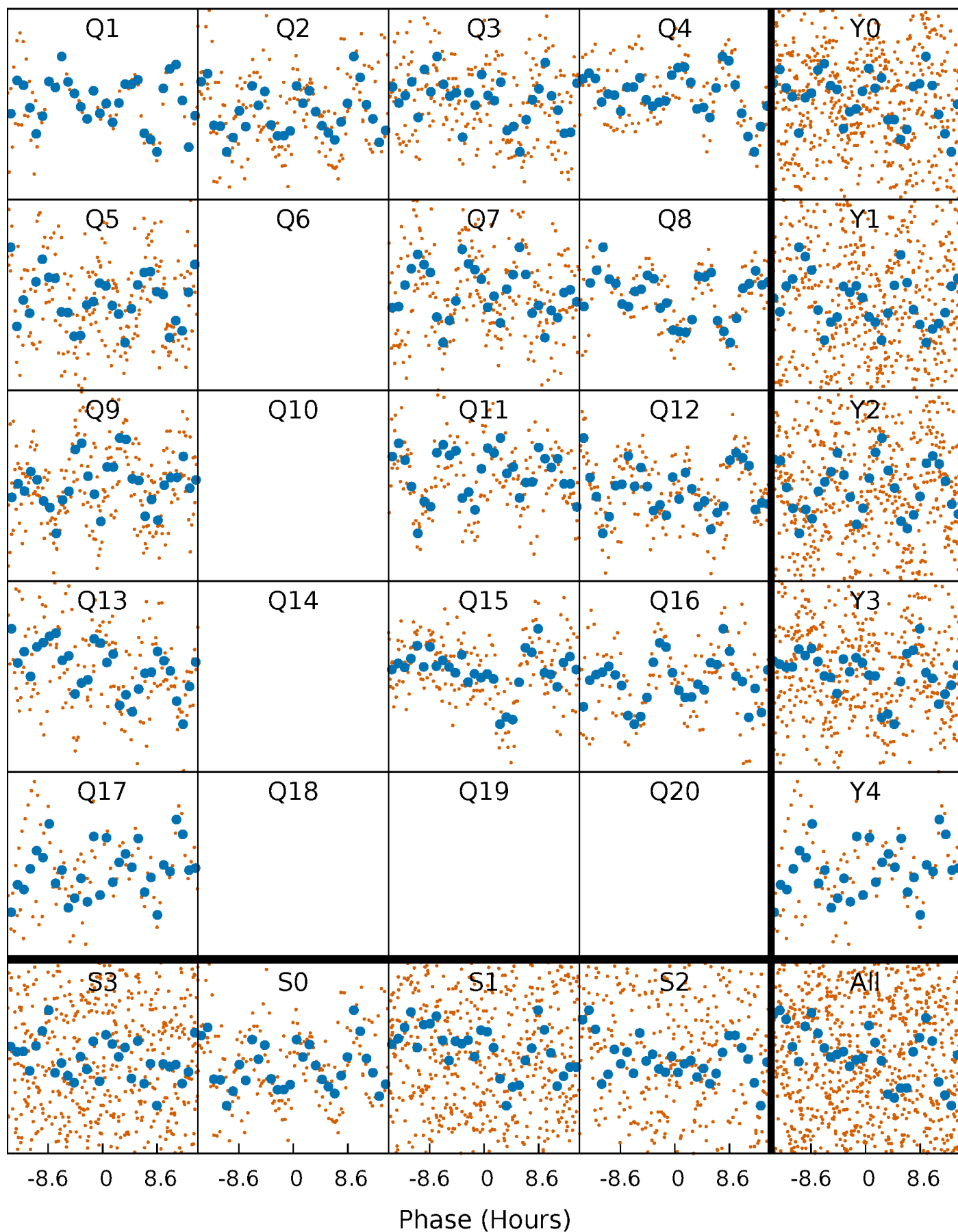


Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)



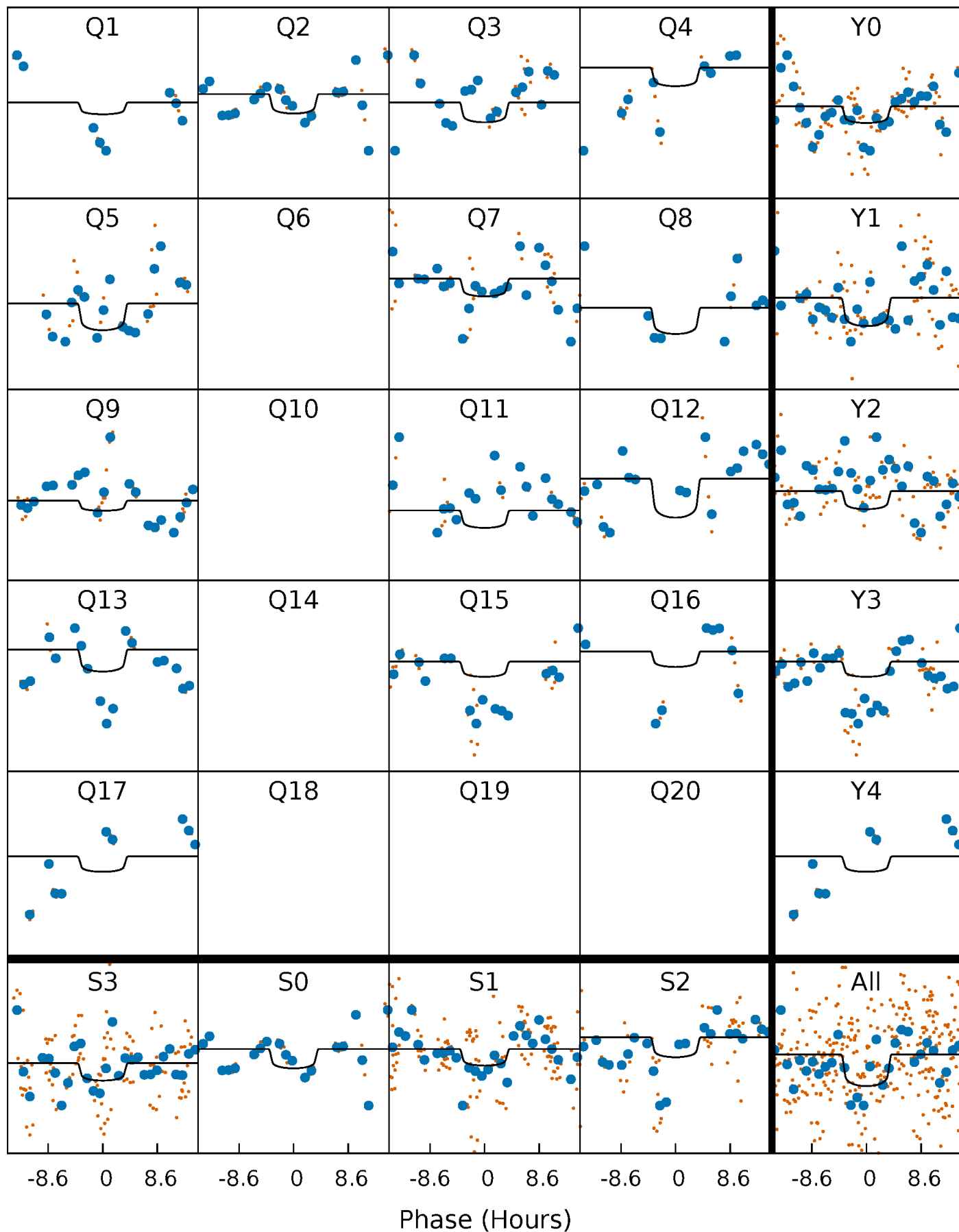
PDC Quarter-Phased Transit Curves

TCE 004376648-05 $P = 25.920856$ Days $T_0 = 139.493335$ (BKJD)



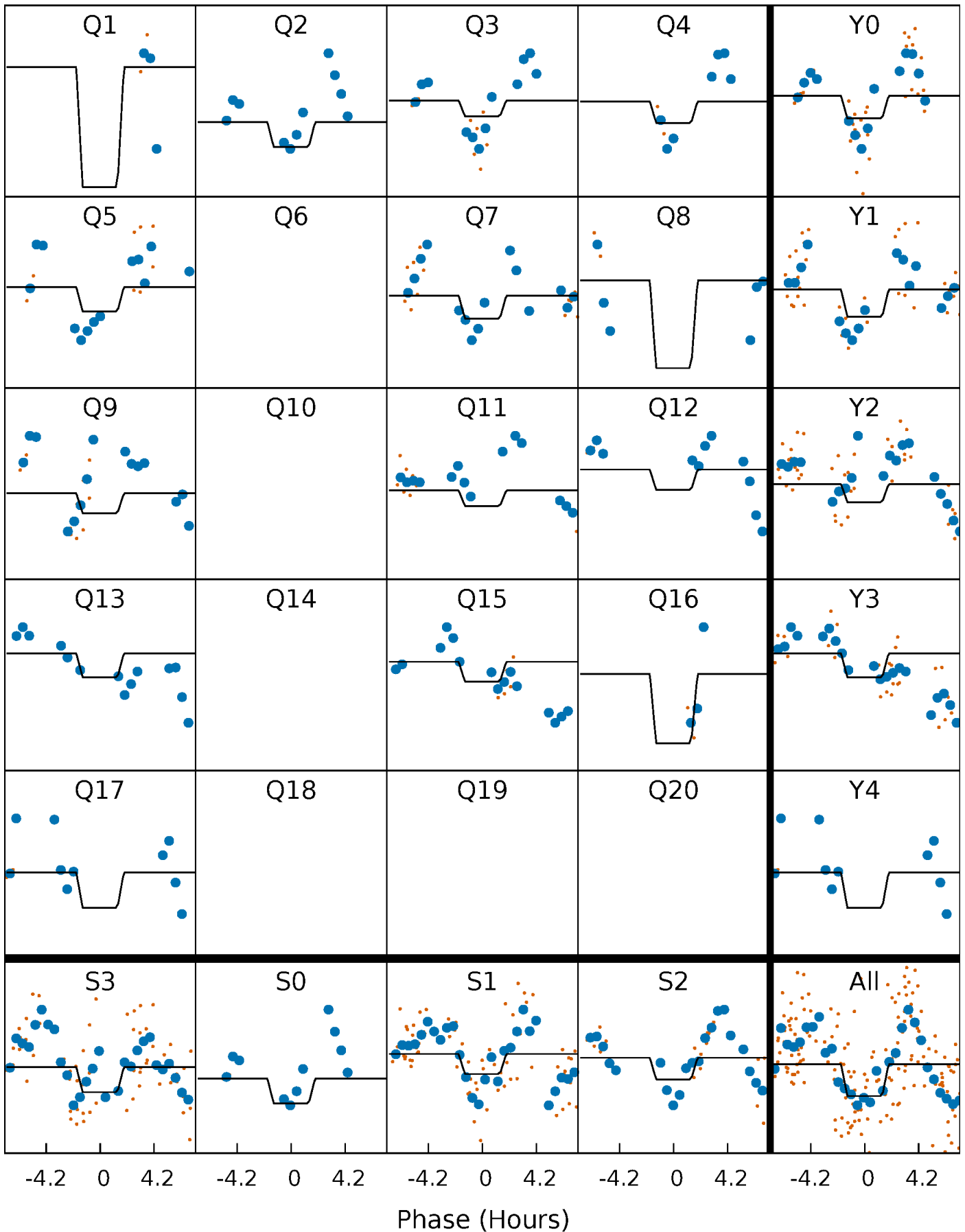
DV Quarter-Phased Transit Curves

TCE 004376648-05 P= 25.920856 Days $T_0=139.493335$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

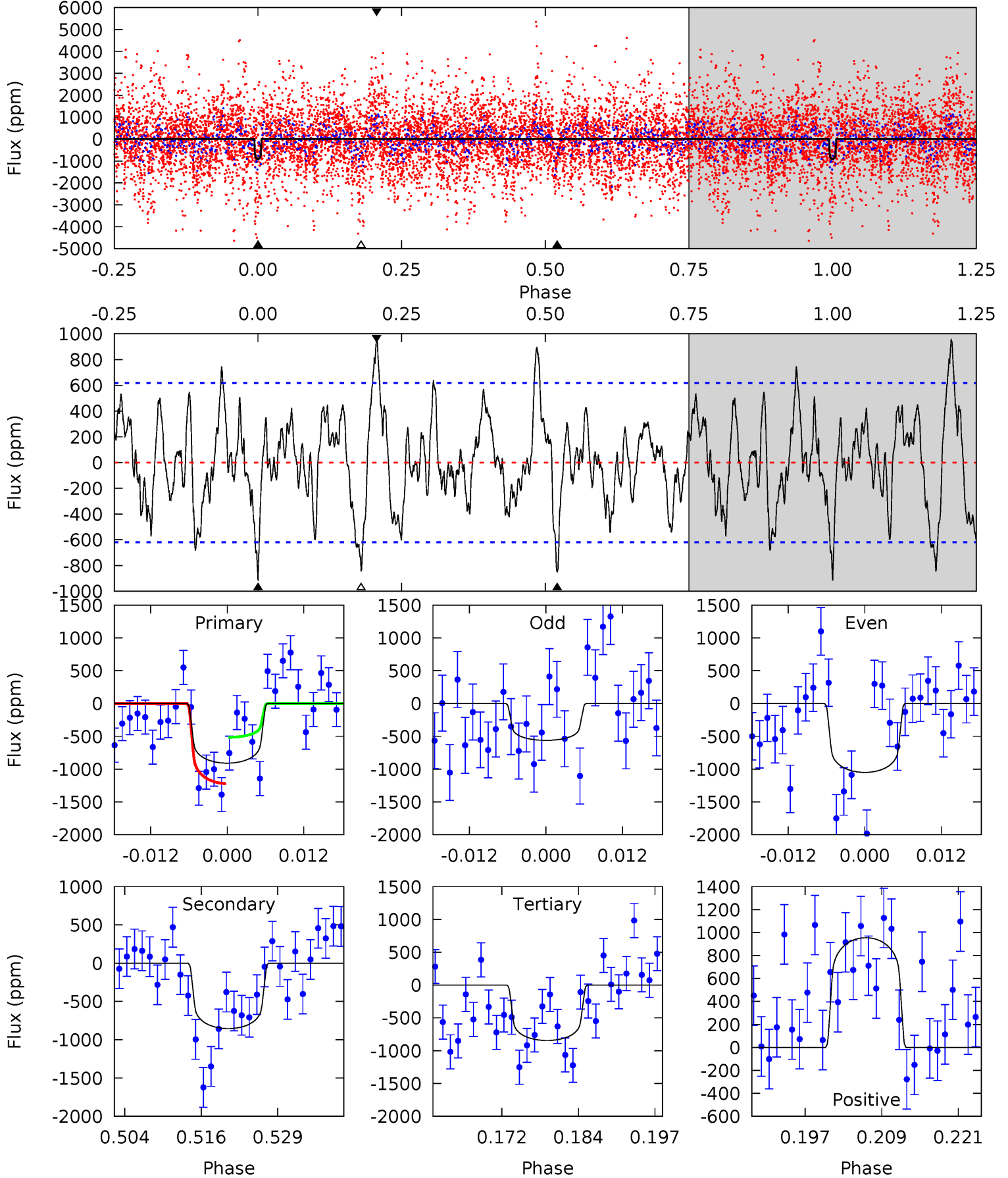
TCE 004376648-05 P= 25.911340 Days $T_0=139.819754$ (BKJD)



DV Model-Shift Uniqueness Test

004376648-05, P = 25.920856 Days, E = 113.572479 Days

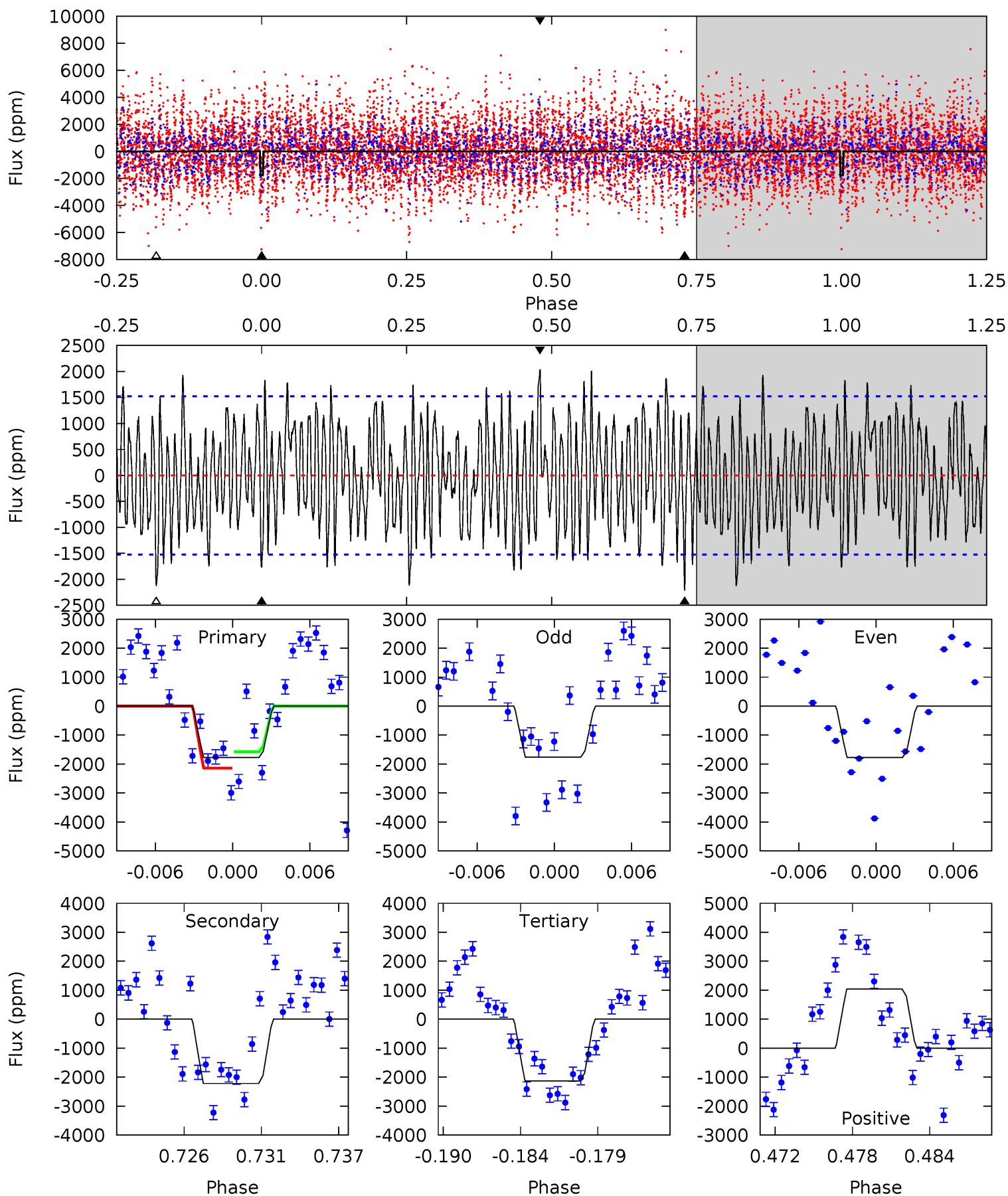
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.33	6.89	6.81	7.70	4.99	2.50	2.44	0.52	-0.36	0.08	-0.81	1.98	1.27	0.51	2.85



Alt Model-Shift Uniqueness Test

004376648-05, P = 25.911340 Days, E = 113.908414 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.96	7.47	7.16	6.88	5.13	2.76	2.87	-1.20	-0.92	0.31	0.59	0.02	1.00	0.48	0.91



Stellar Parameters For KIC 004376648

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	$M(M_{\odot})$	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	7024^{+164}_{-246}	$4.039^{+0.252}_{-0.168}$	$-0.360^{+0.300}_{-0.300}$	$1.857^{+0.478}_{-0.584}$	$1.378^{+0.202}_{-0.269}$	$0.303^{+0.486}_{-0.145}$
	+2%/-4%	+6%/-4%	+83%/-83%	+26%/-31%	+15%/-20%	+160%/-48%
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 004376648-05 / KOI

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-854 ± 124	$5.61^{+2.52}_{-2.34}$	1342^{+99}_{-115}	7063^{+2691}_{-1128}	557^{+998}_{-305}
Alt.	-2219 ± 297	$8.12^{+2.70}_{-2.31}$	1344^{+99}_{-113}	7548^{+1759}_{-988}	662^{+657}_{-279}

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 $A_{obs} \gg 1.0$

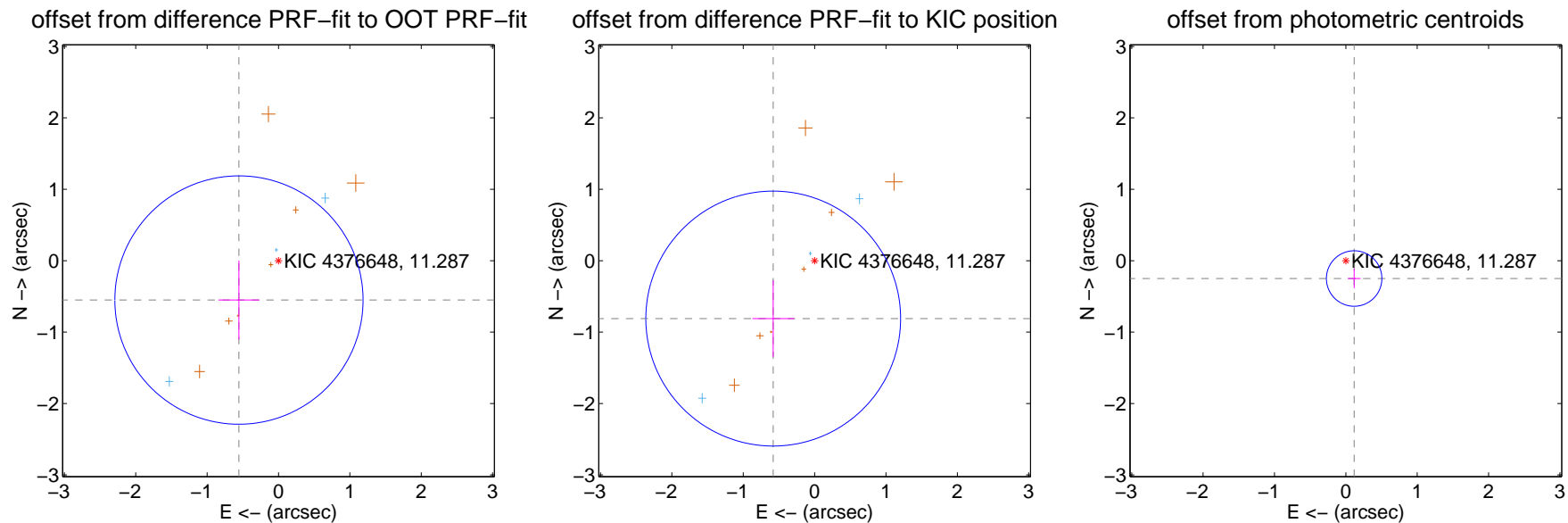
DV Centroid Data

Supplemental centroid analysis for 004376648-05. **Kepler magnitude: 11.29.** Transit SNR 5.67

There are 4 quarters with good PRF difference image offsets

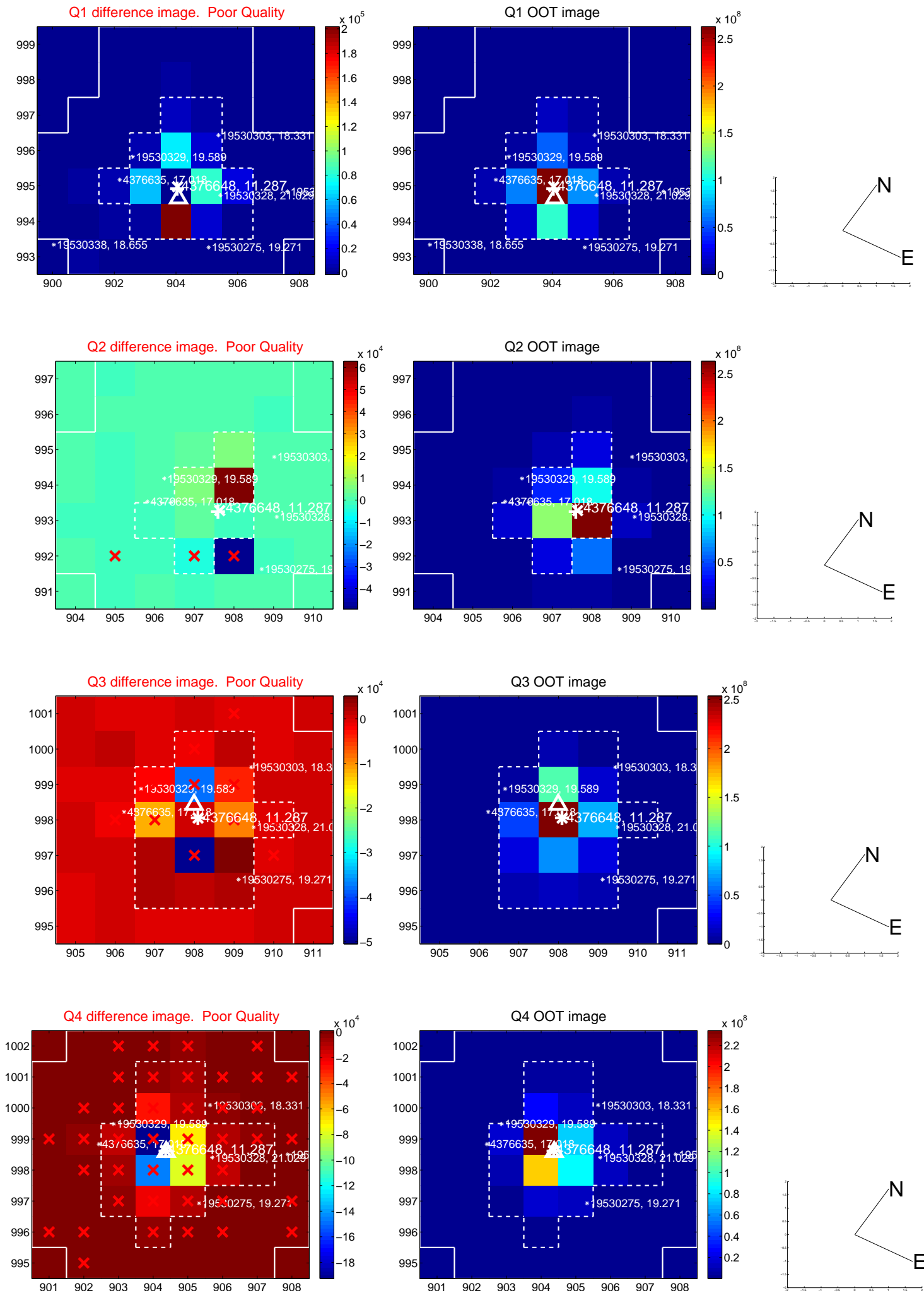
The direct PRF centroid is offset from the target star catalog position by about 0.19 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.782 ± 0.580	1.35	0.554 ± 0.288	-0.551 ± 0.554
PRF-fit source offset from KIC position	0.997 ± 0.595	1.68	0.580 ± 0.293	-0.811 ± 0.536
photometric centroid source offset	0.28 ± 0.13	2.13	-0.12 ± 0.09	-0.25 ± 0.14

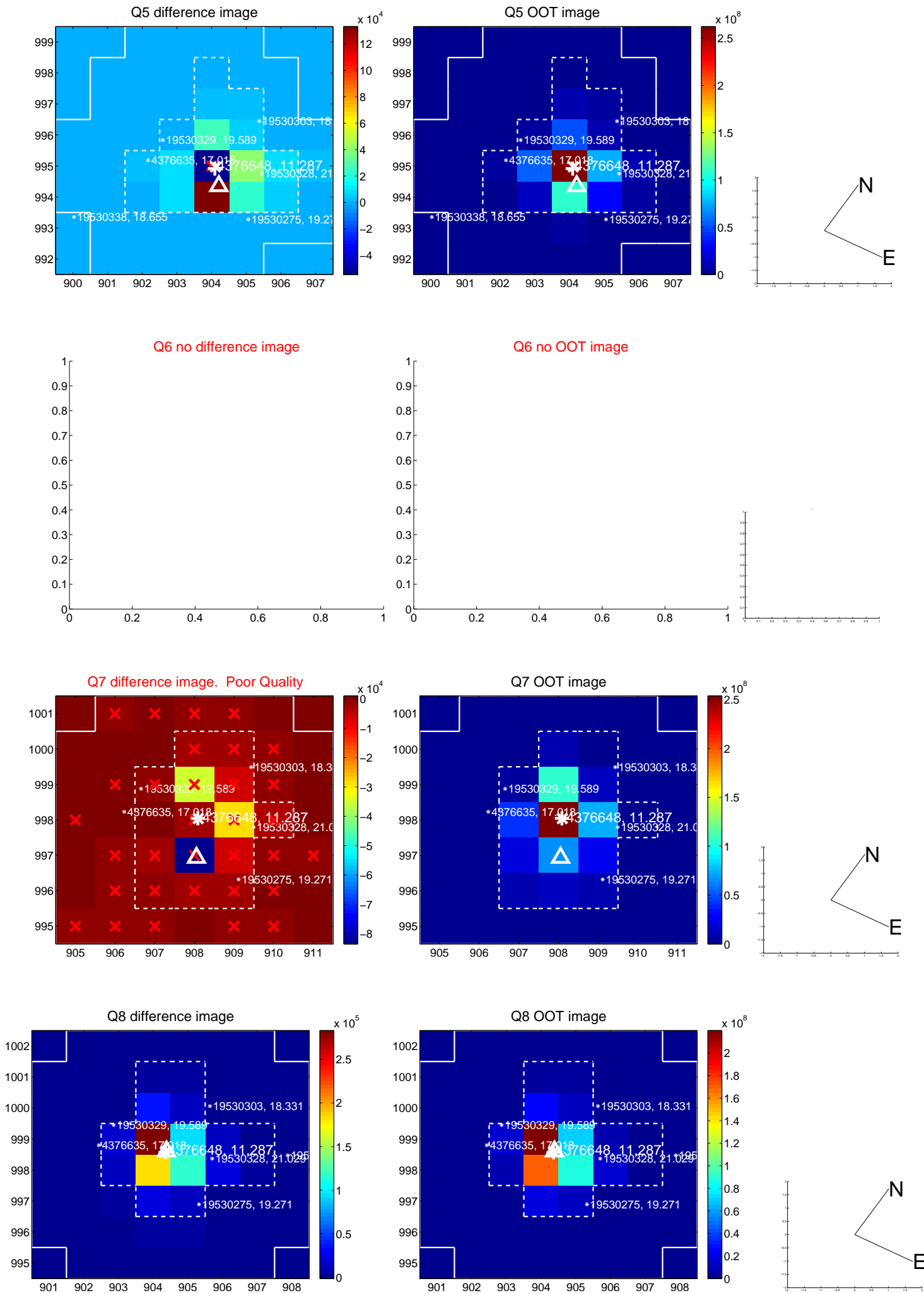


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

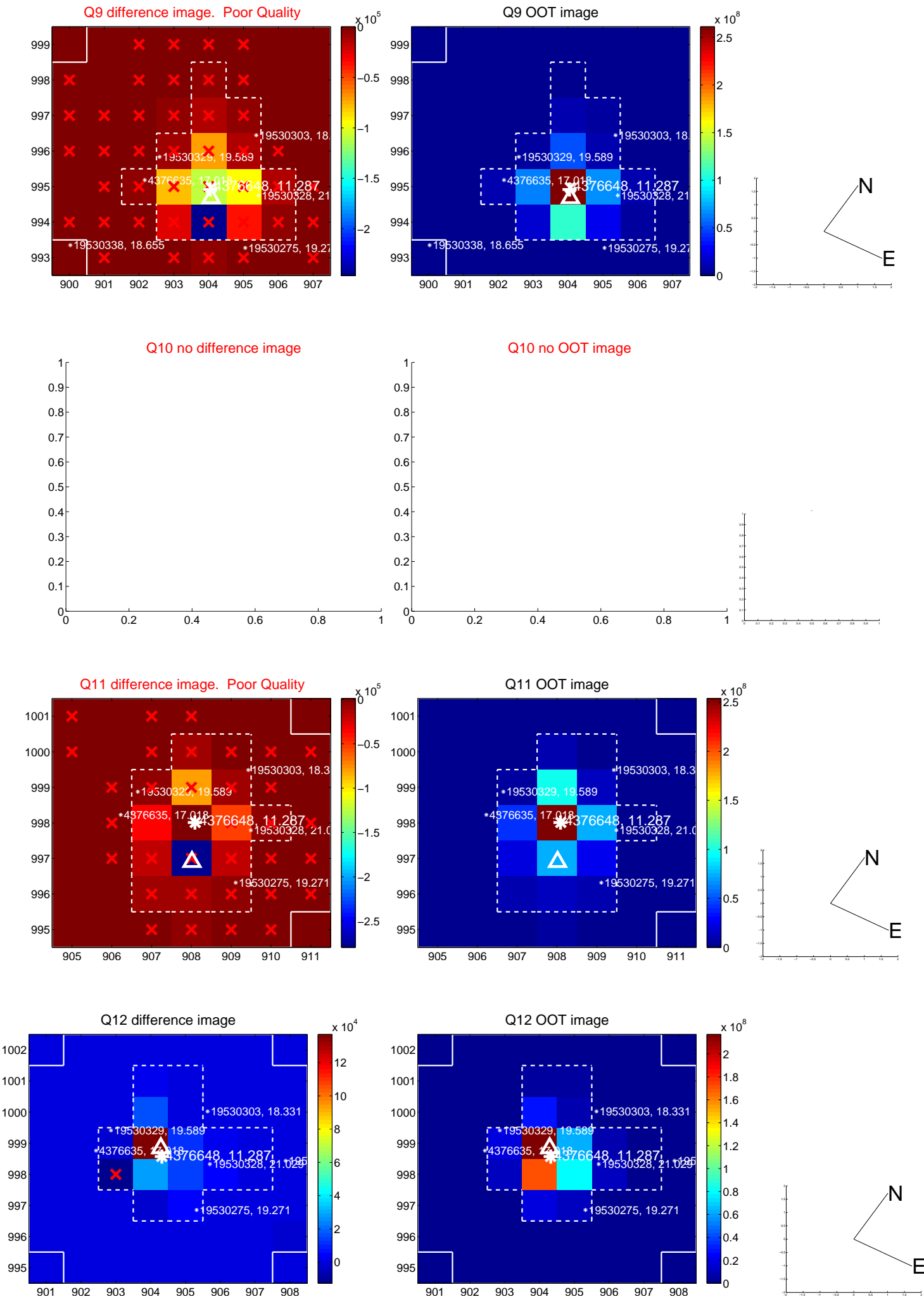
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



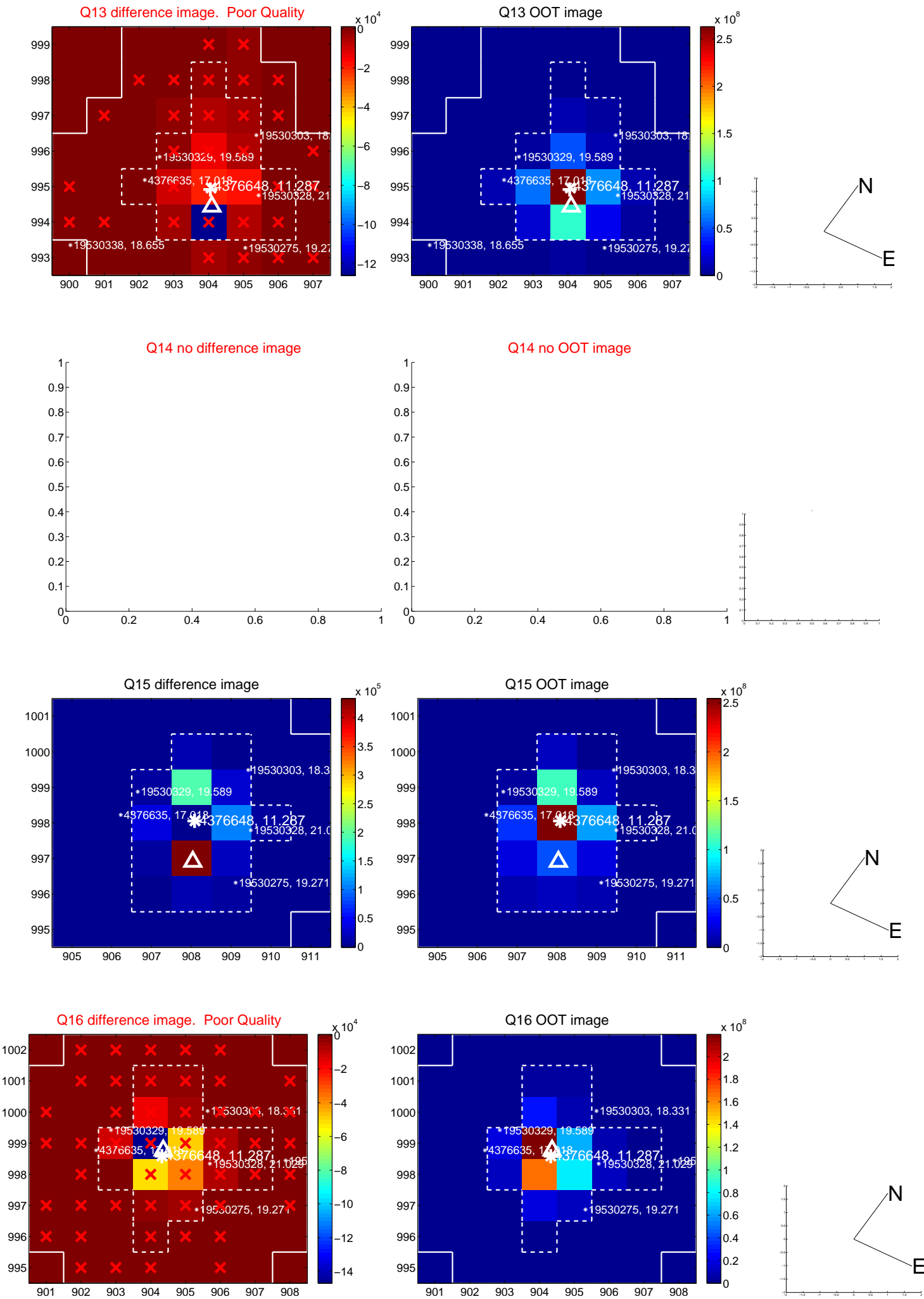
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



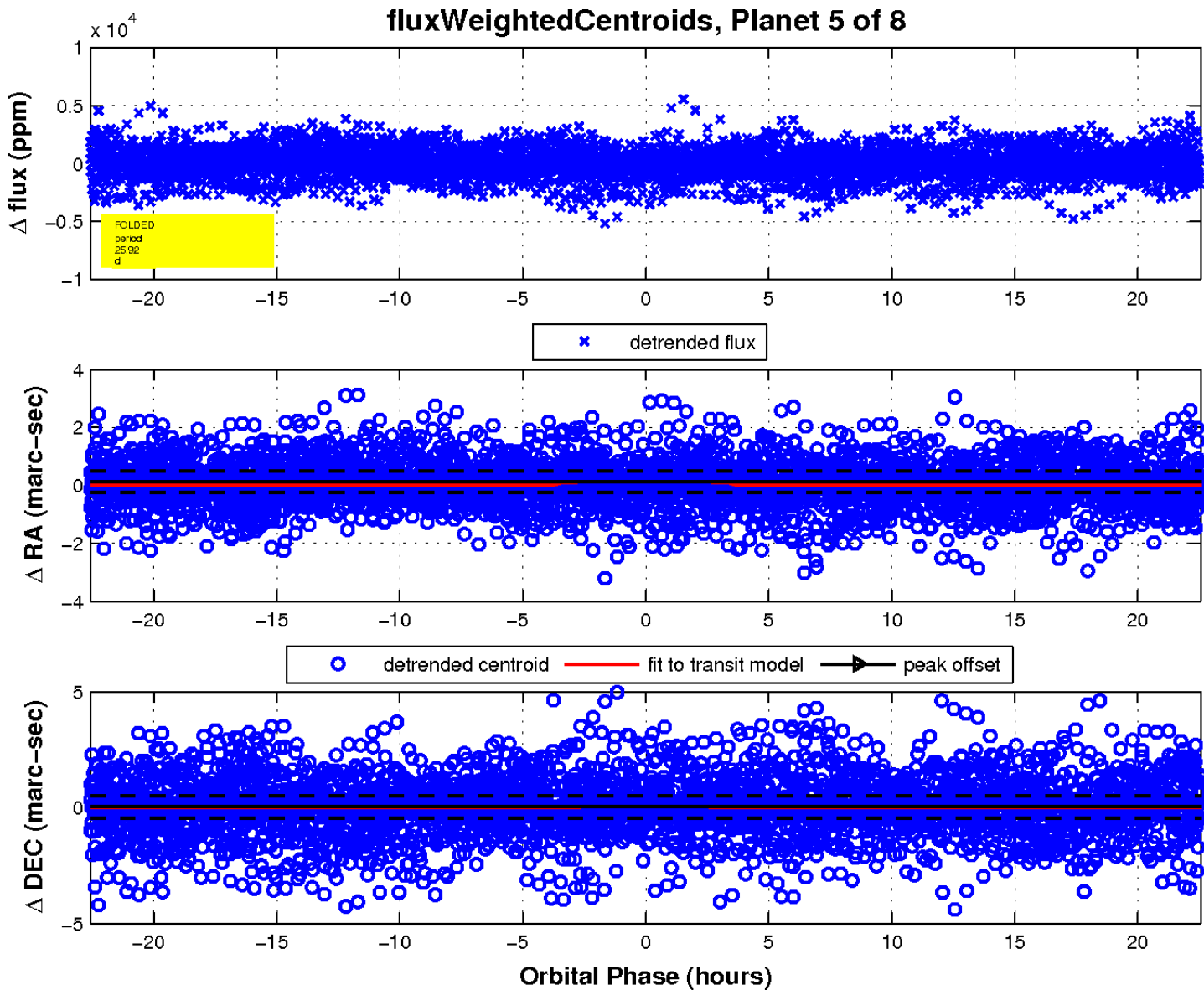
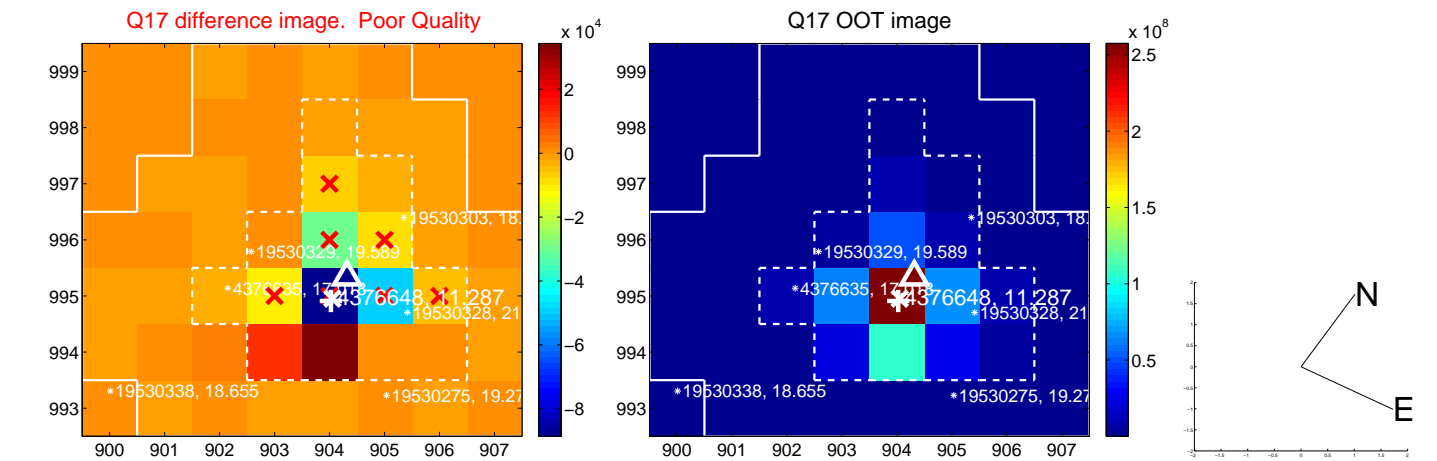
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

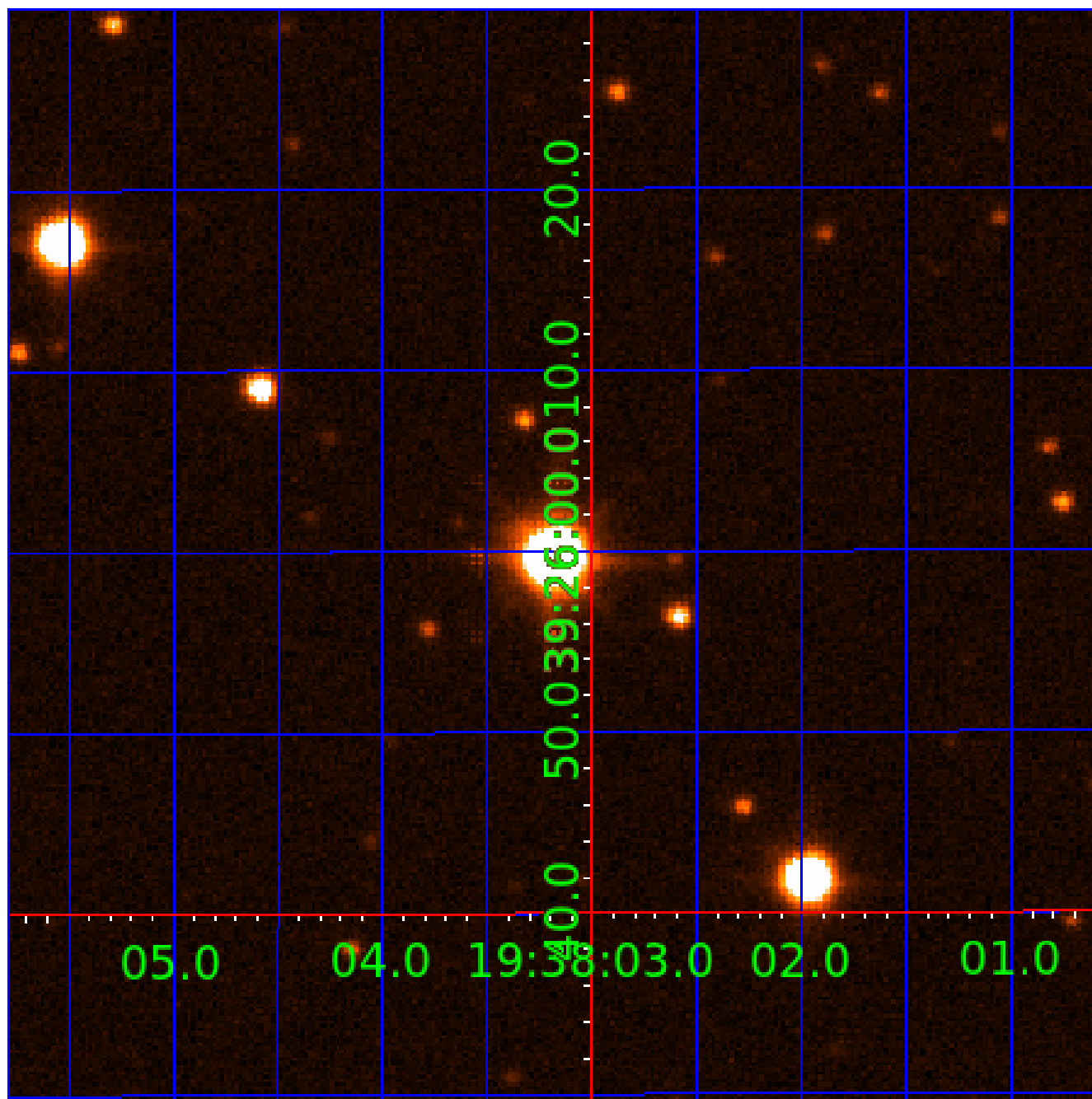


white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 004376648

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})
004376648-01	OBS	No	0.521668	131.999628	63.6	1.753	8.2	8.0	1.86	7024	1.72	37778.75
004376648-02	OBS	No	0.521665	131.821686	102.9	2.008	9.8	9.2	1.86	7024	2.19	37779.04
004376648-03	OBS	No	168.888956	145.773100	4077.1	5.209	9.8	9.2	1.86	7024	14.16	16.99
004376648-04	OBS	No	24.301768	152.287360	540.9	5.002	9.5	3.4	1.86	7024	4.80	225.38
004376648-05	OBS	No	25.920856	139.493335	821.9	7.527	9.2	5.7	1.86	7024	5.65	206.81
004376648-06	OBS	No	40.096338	164.771975	2229.8	4.518	8.9	8.4	1.86	7024	12.09	115.60
004376648-07	OBS	No	190.833969	297.200532	2747.5	8.379	9.1	8.8	1.86	7024	9.99	14.44
004376648-08	OBS	No	85.043521	202.020398	111.8	3.500	8.8	-1.0	1.86	7024	1.99	42.42

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004376648-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_SATURATED
004376648-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—SAME_NTL_PERIOD—CENT_SATURATED
004376648-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
004376648-04	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED—HALO_GHOST
004376648-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
004376648-06	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED—HALO_GHOST
004376648-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
004376648-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED

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

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

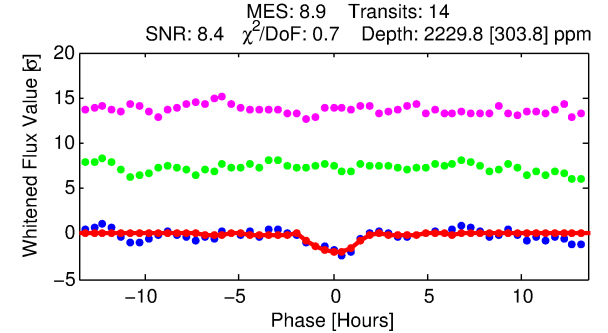
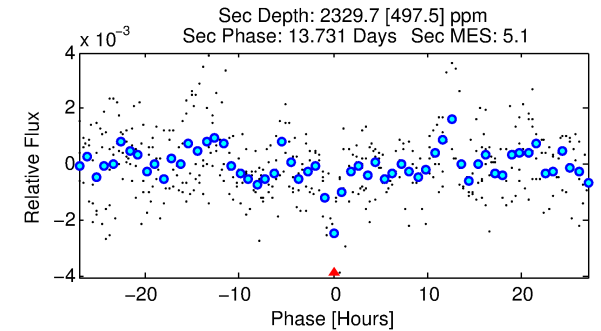
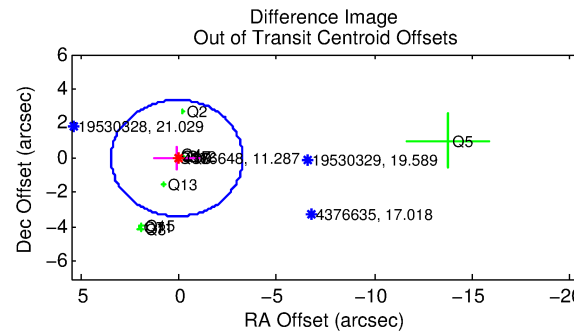
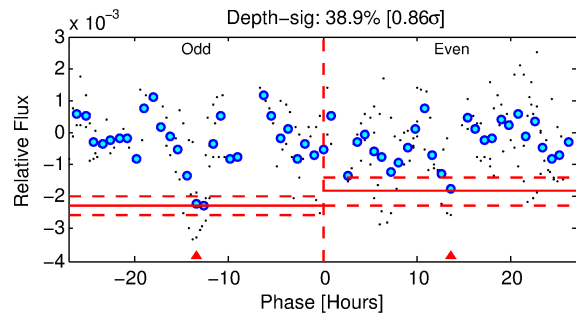
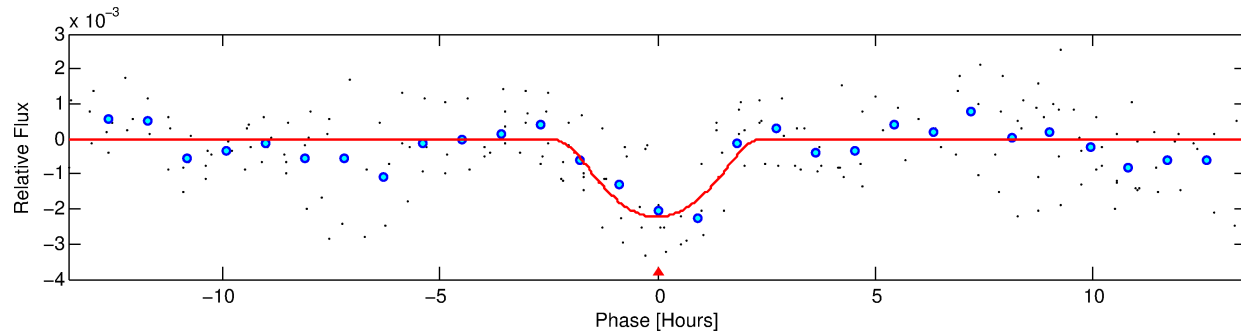
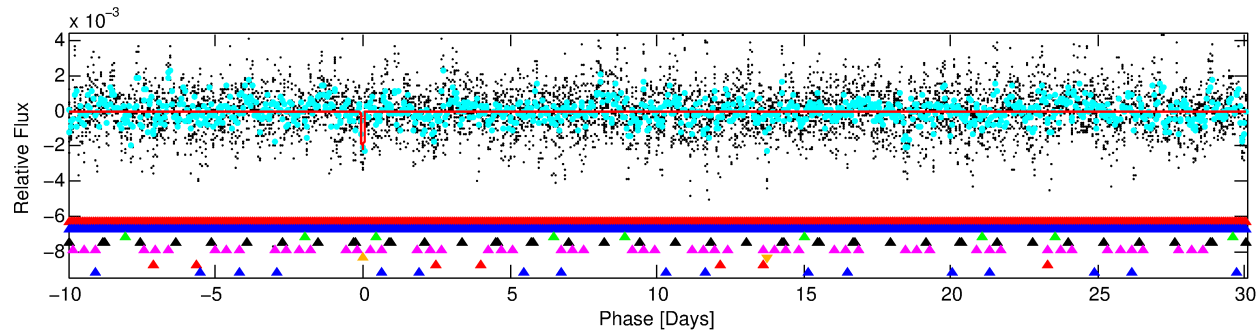
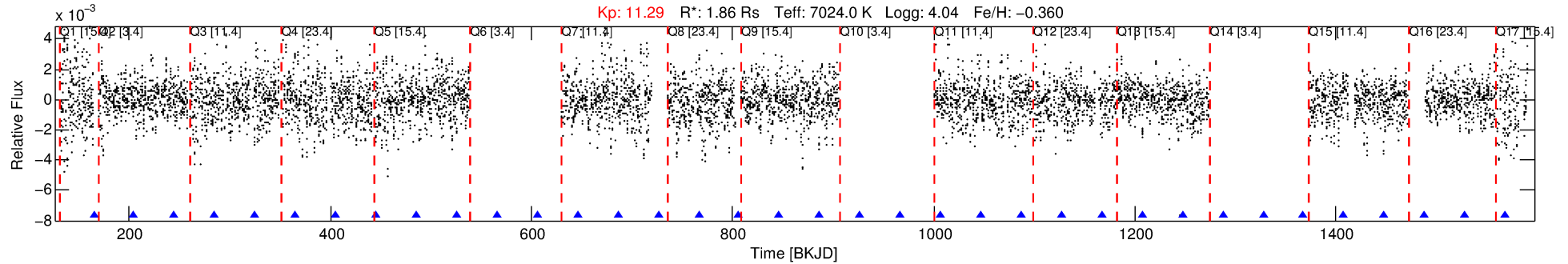
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 004376648-06

No Significant Match Found

DV One-Page Summary

KIC: 4376648 Candidate: 6 of 8 Period: 40.096 d



DV Fit Results:

Period = 40.09634 [0.00051] d
Epoch = 164.7720 [0.0113] BKJD
Rp/R* = 0.0597 [0.0331]
a/R* = 29.46 [7.39]
b = 0.97 [0.07]
Seff = 115.60 [53.38]
Teq = 836 [97] K
Rp = 12.09 [7.71] Re
a = 0.2551 [0.0728] AU
Ag = 570.42 [691.56] [0.82 σ]
Teffp = 6318 [1798] K [3.04 σ]

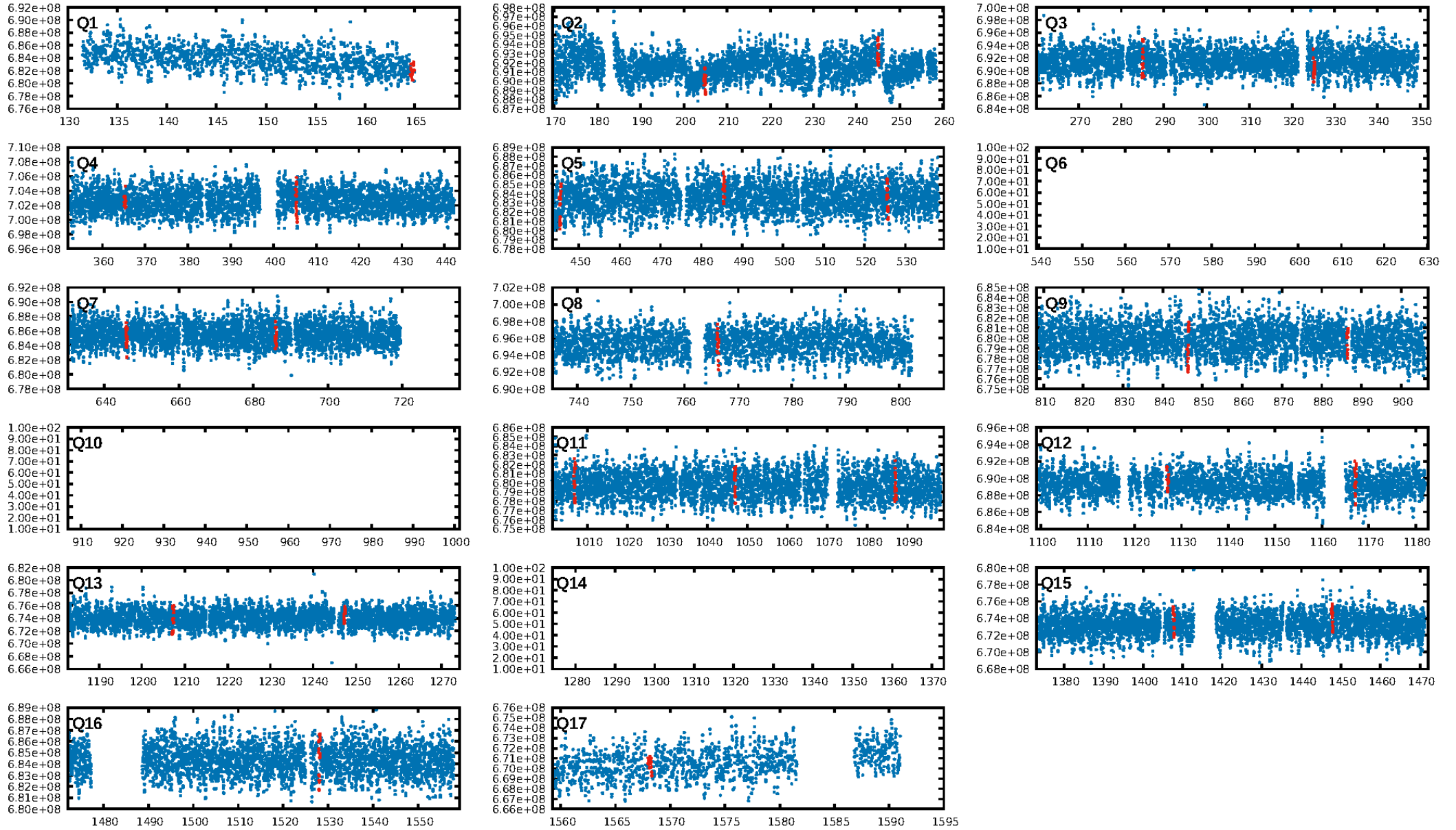
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [38.75 σ]
LongPeriod-sig: 100.0% [188.76 σ]
ModelChiSquare2-sig: 44.7%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: N/A
RollingBand-fgt: 1.00 [14/14]
GhostDiagnostic-chr: 0.03006
Centroid-sig: 80.6%
Centroid-so: 0.254 arcsec [2.71 σ]
OotOffset-rm: 0.091 arcsec [0.08 σ]
OotOffset-st: 1/4/4/3 [12]
KicOffset-rm: 0.131 arcsec [0.11 σ]
KicOffset-st: 1/4/4/3 [12]
DiffImageQuality-fgm: 0.50 [6/12]
DiffImageOverlap-fno: 0.00 [0/12]

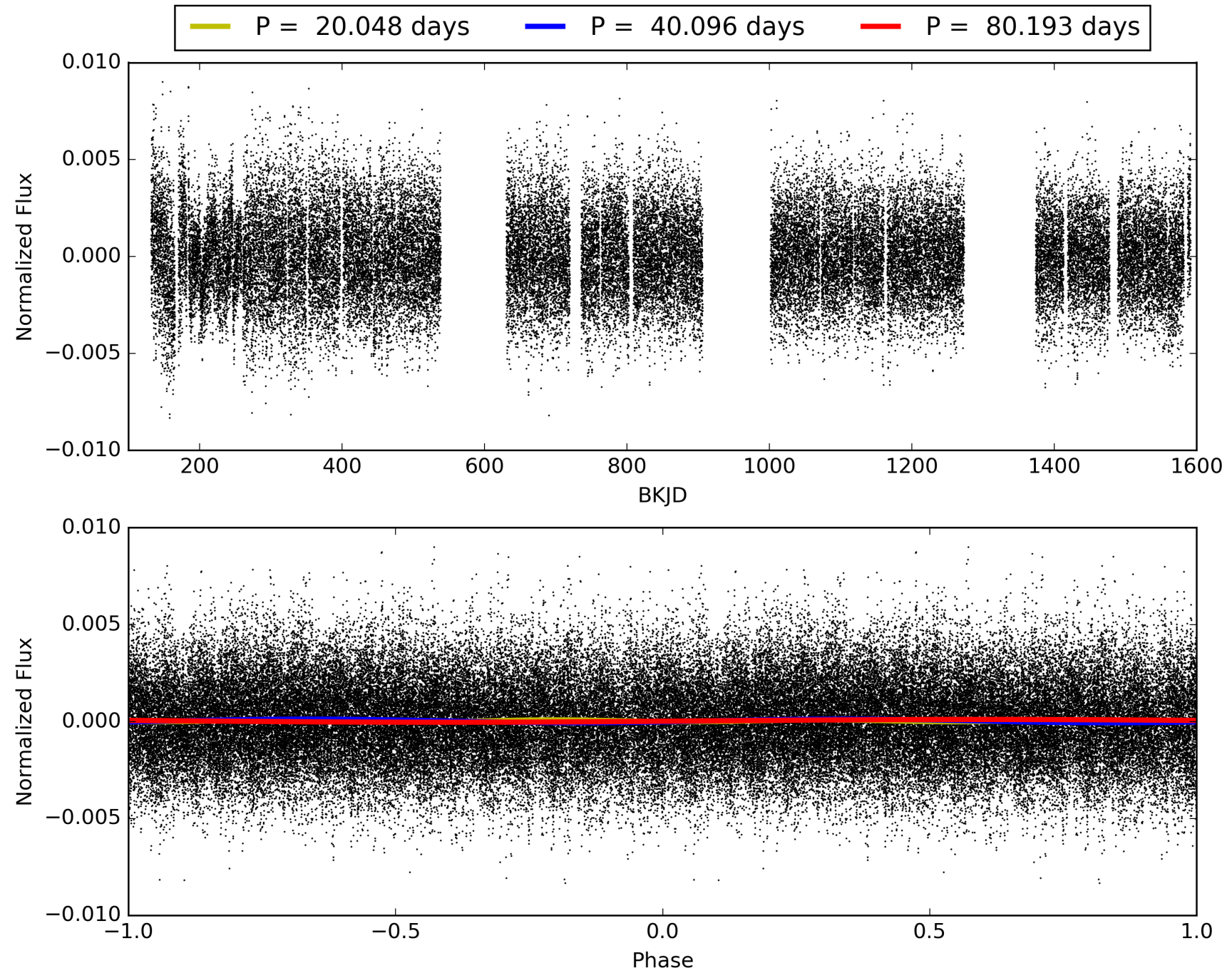
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 21:52:19 Z

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

TCE 004376648-06, PDC Light Curves

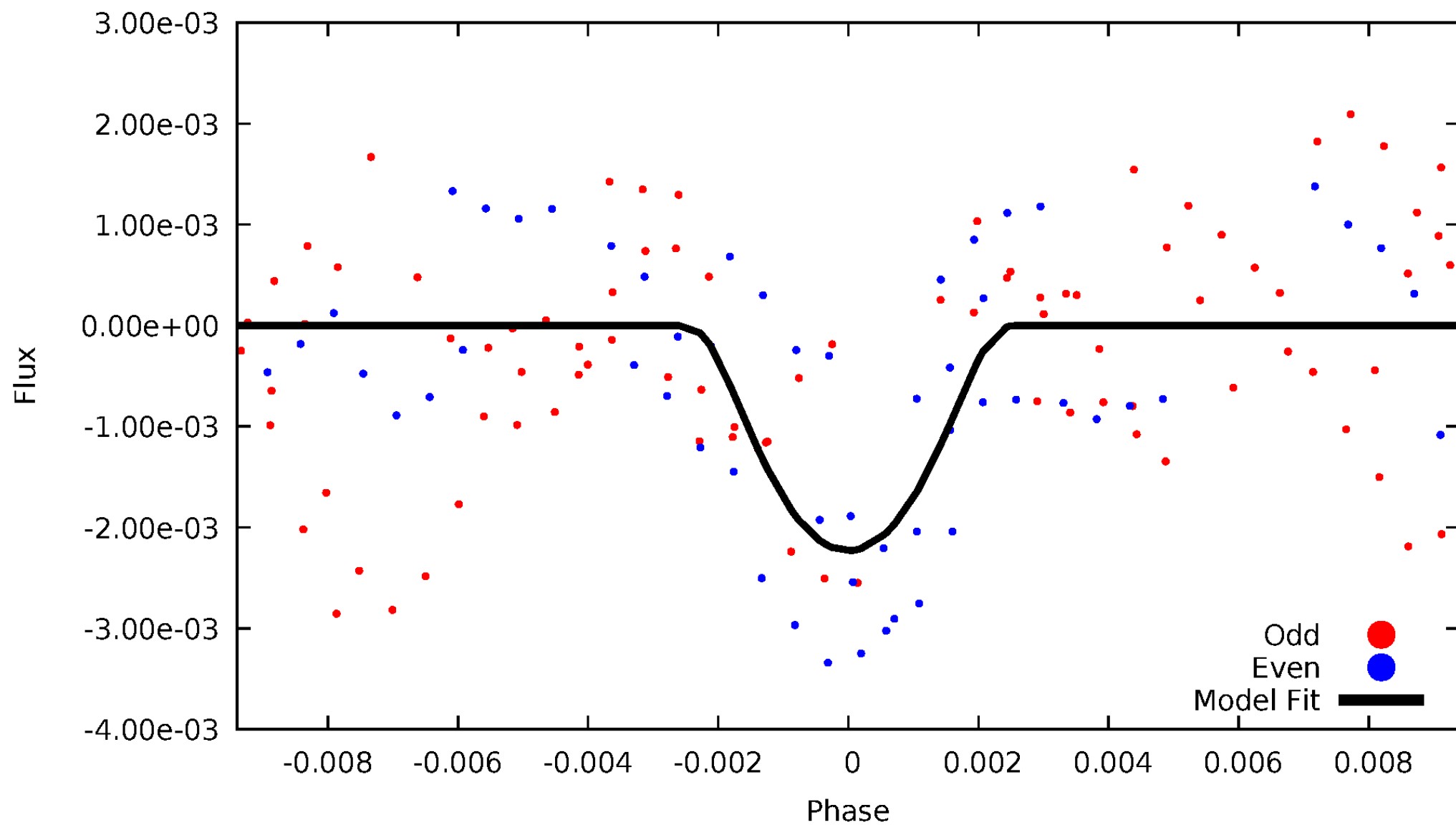


TCE 004376648-06



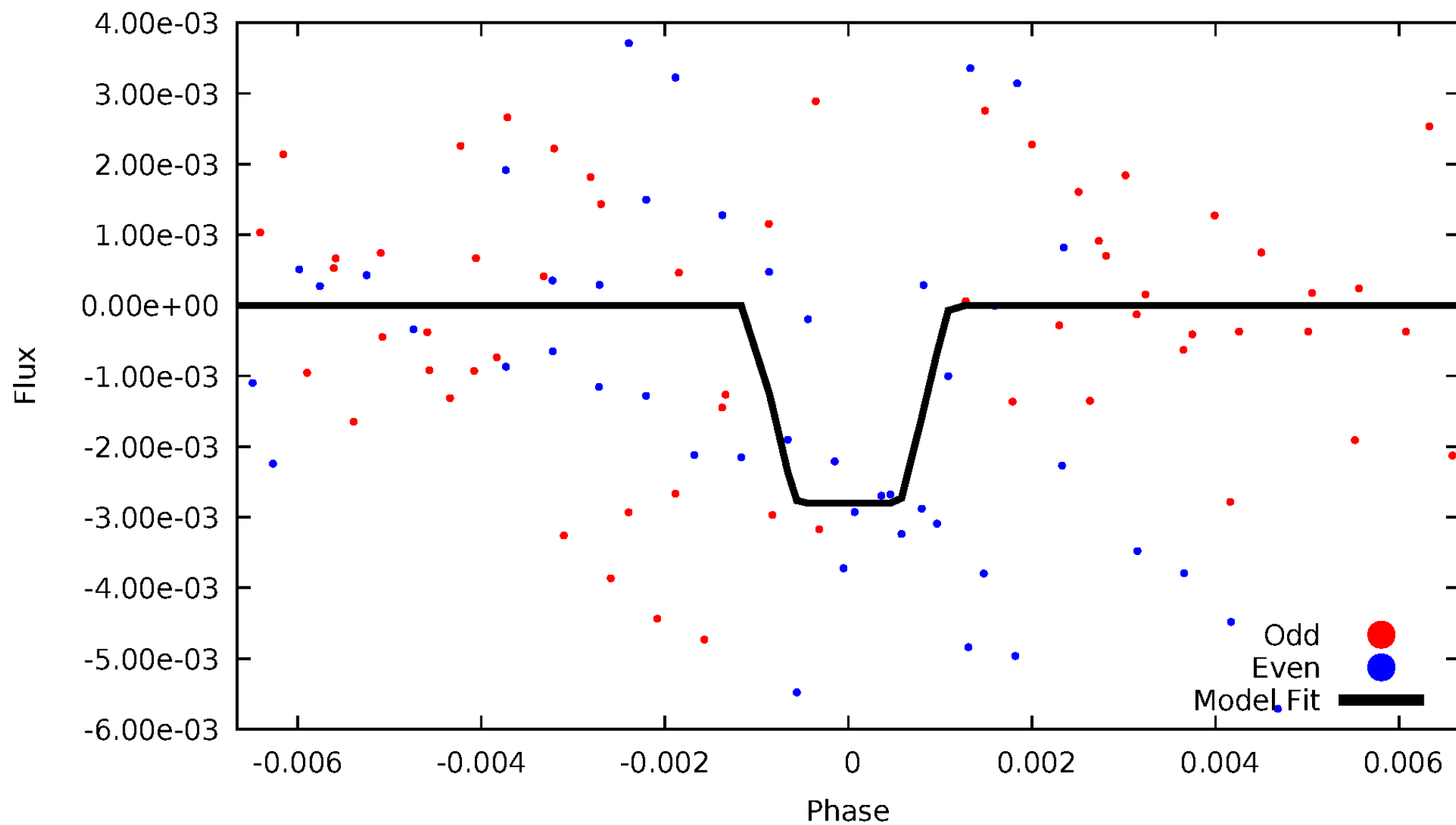
DV Odd/Even

TCE 004376648-06



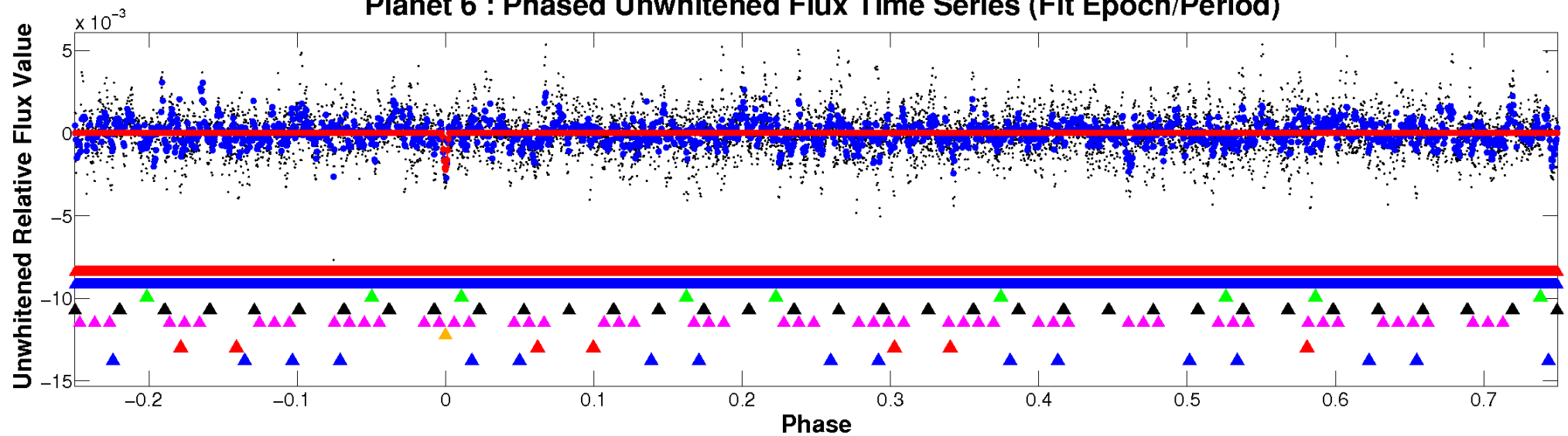
ALT Odd/Even

TCE 004376648-06

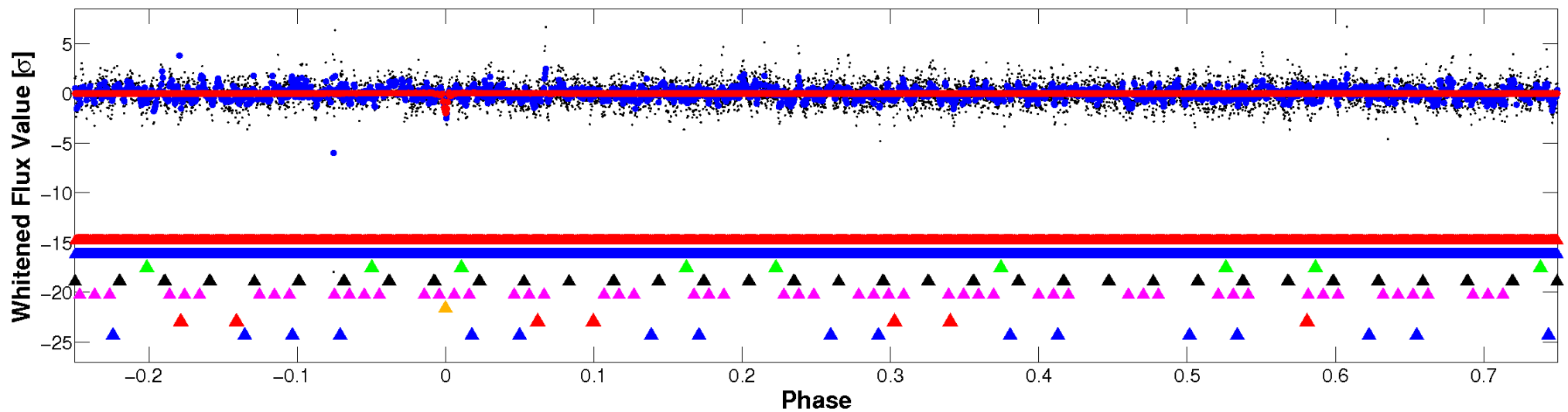


Non-Whitened Vs. Whitened Light Curve

Planet 6 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

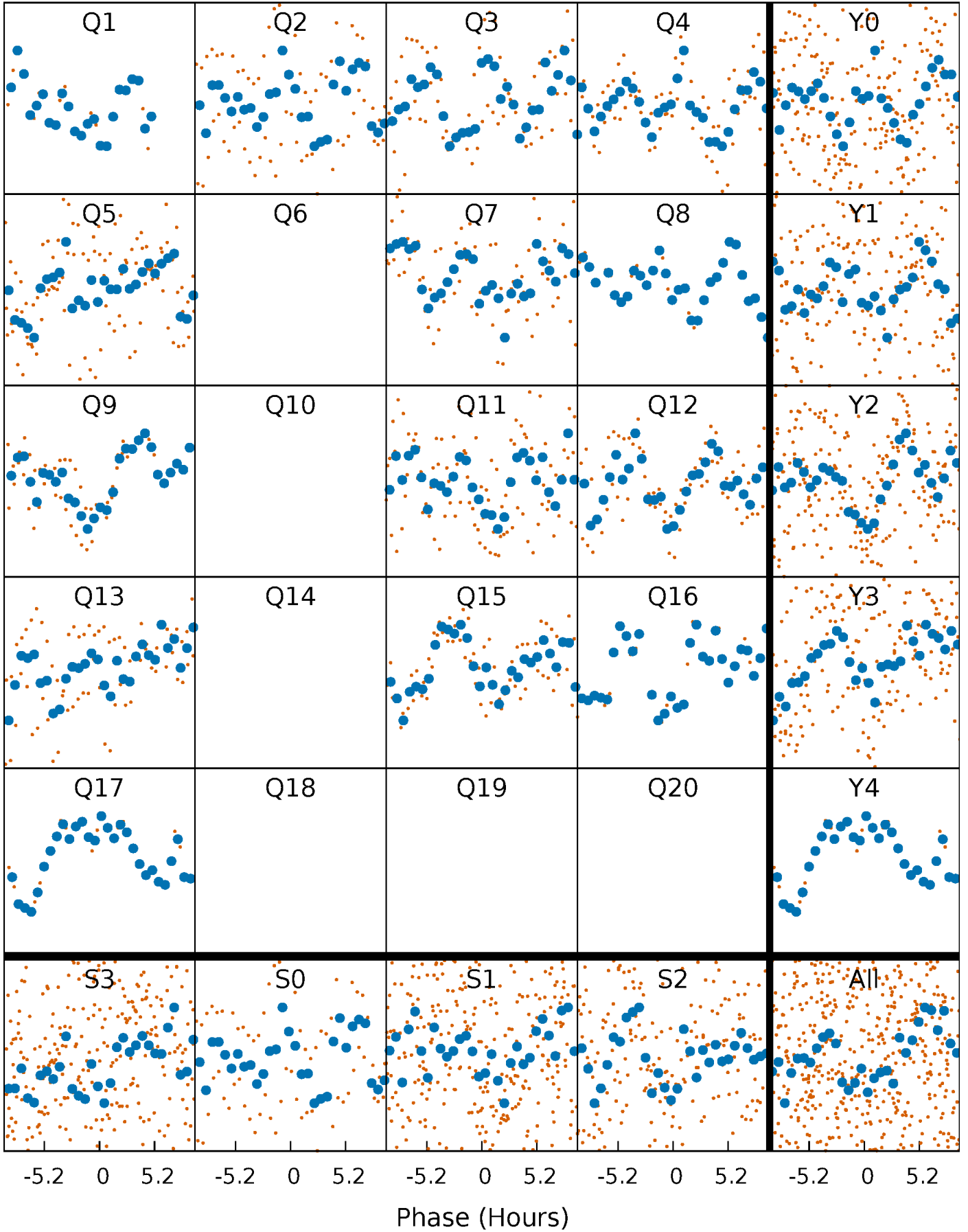


Planet 6 : Phased Whitened Flux Time Series (Fit Epoch/Period)



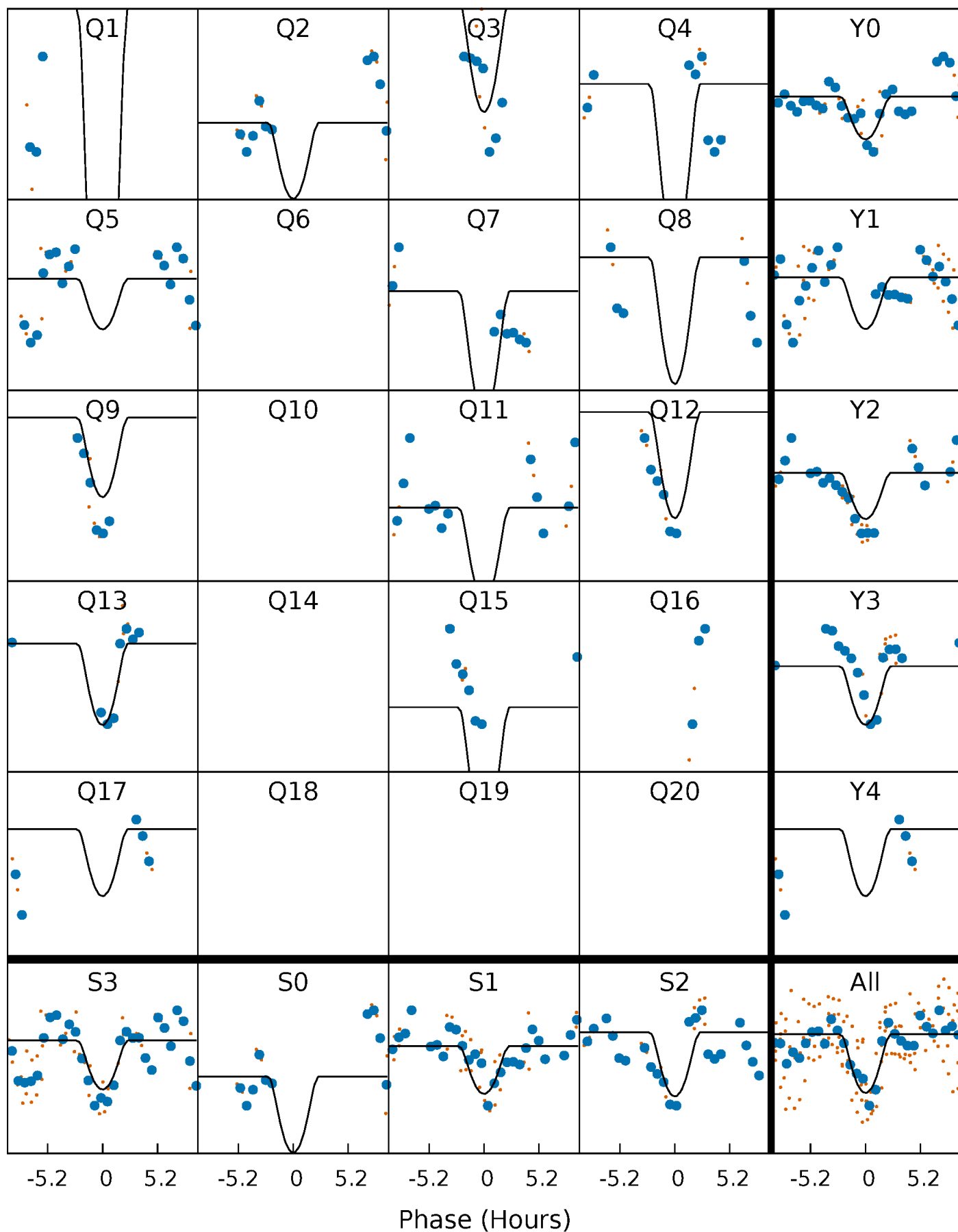
PDC Quarter-Phased Transit Curves

TCE 004376648-06 $P = 40.096338$ Days $T_0 = 164.771975$ (BKJD)



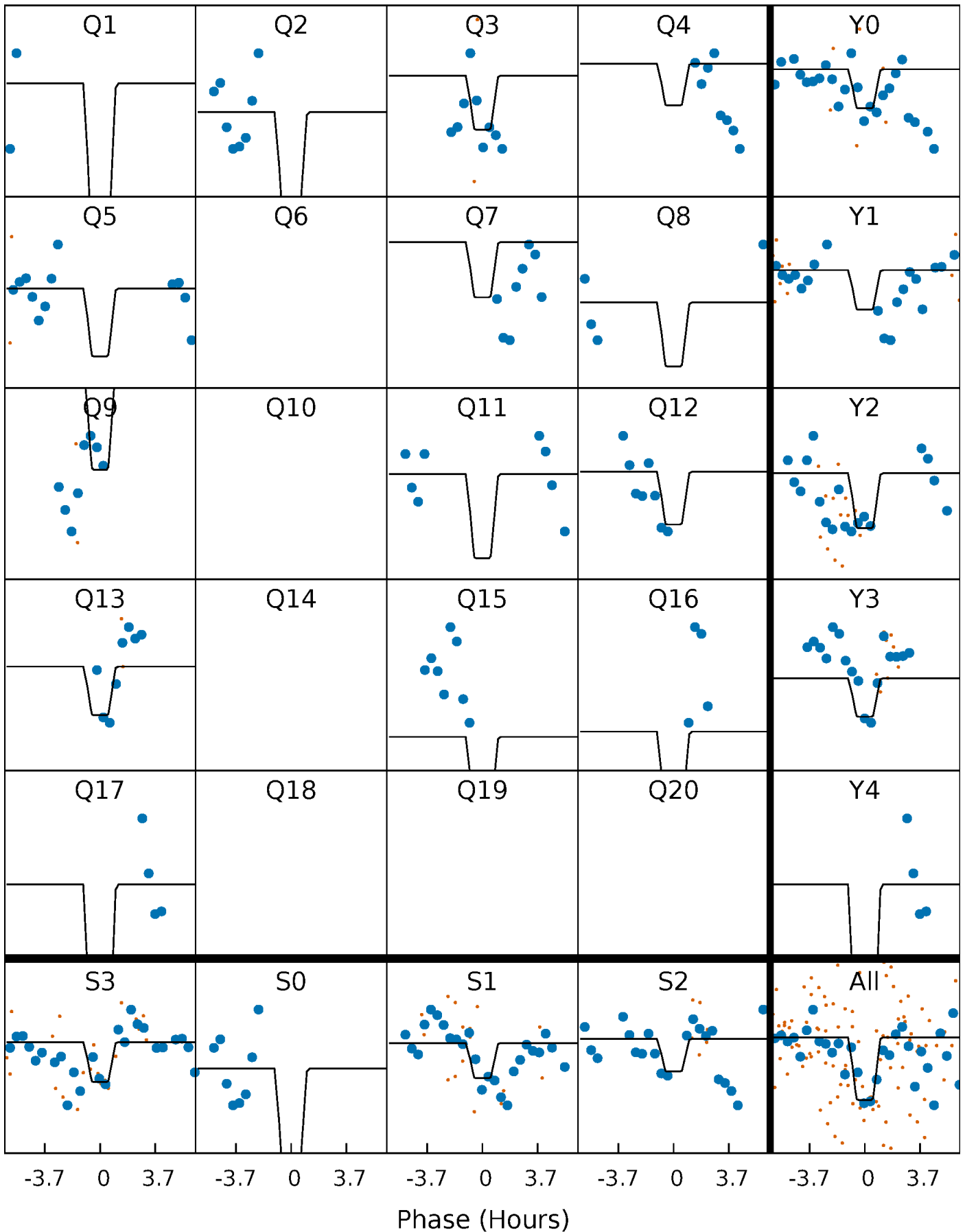
DV Quarter-Phased Transit Curves

TCE 004376648-06 P= 40.096338 Days $T_0=164.771975$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

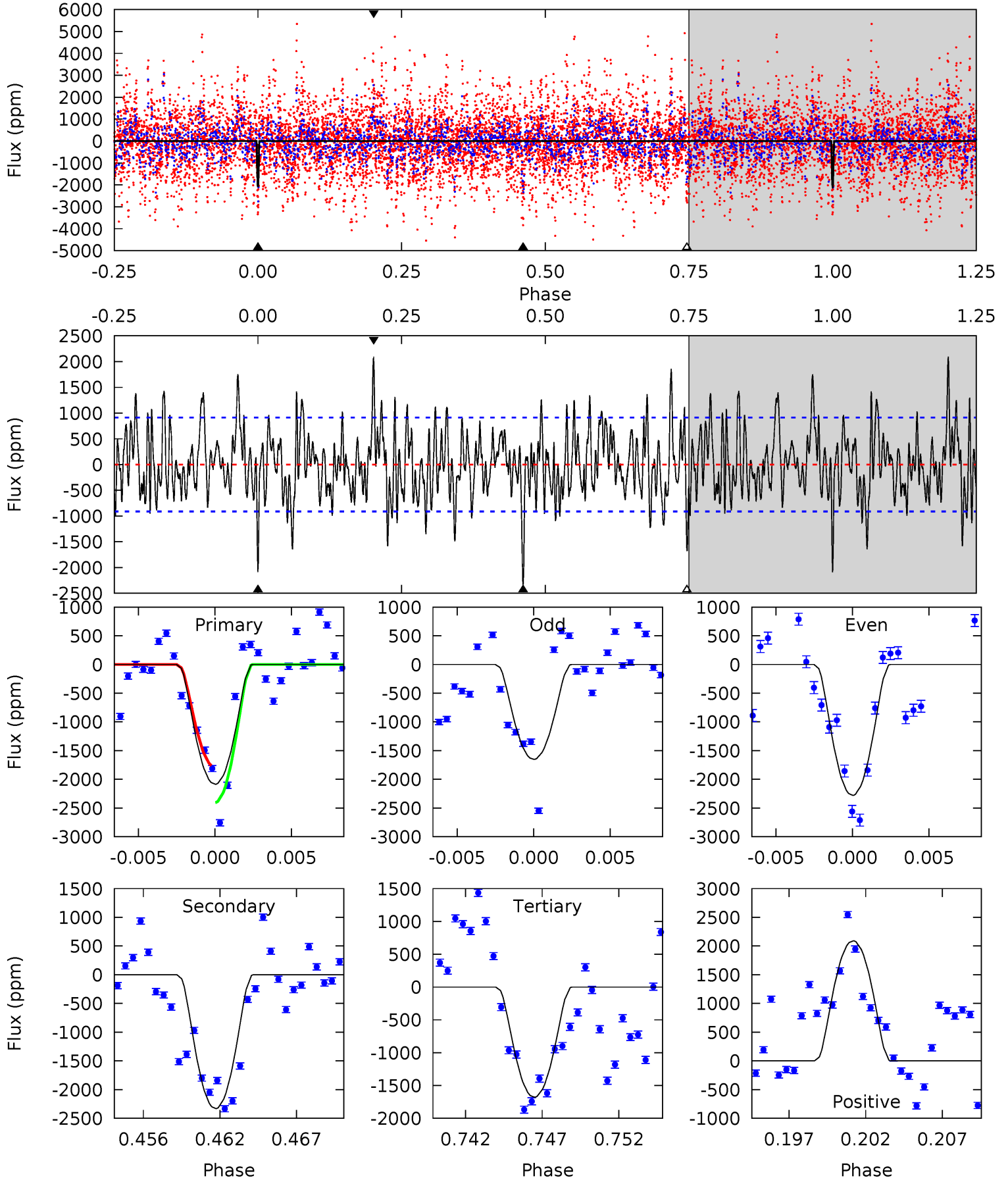
TCE 004376648-06 P= 40.096979 Days $T_0=164.774349$ (BKJD)



DV Model-Shift Uniqueness Test

004376648-06, P = 40.096338 Days, E = 124.675637 Days

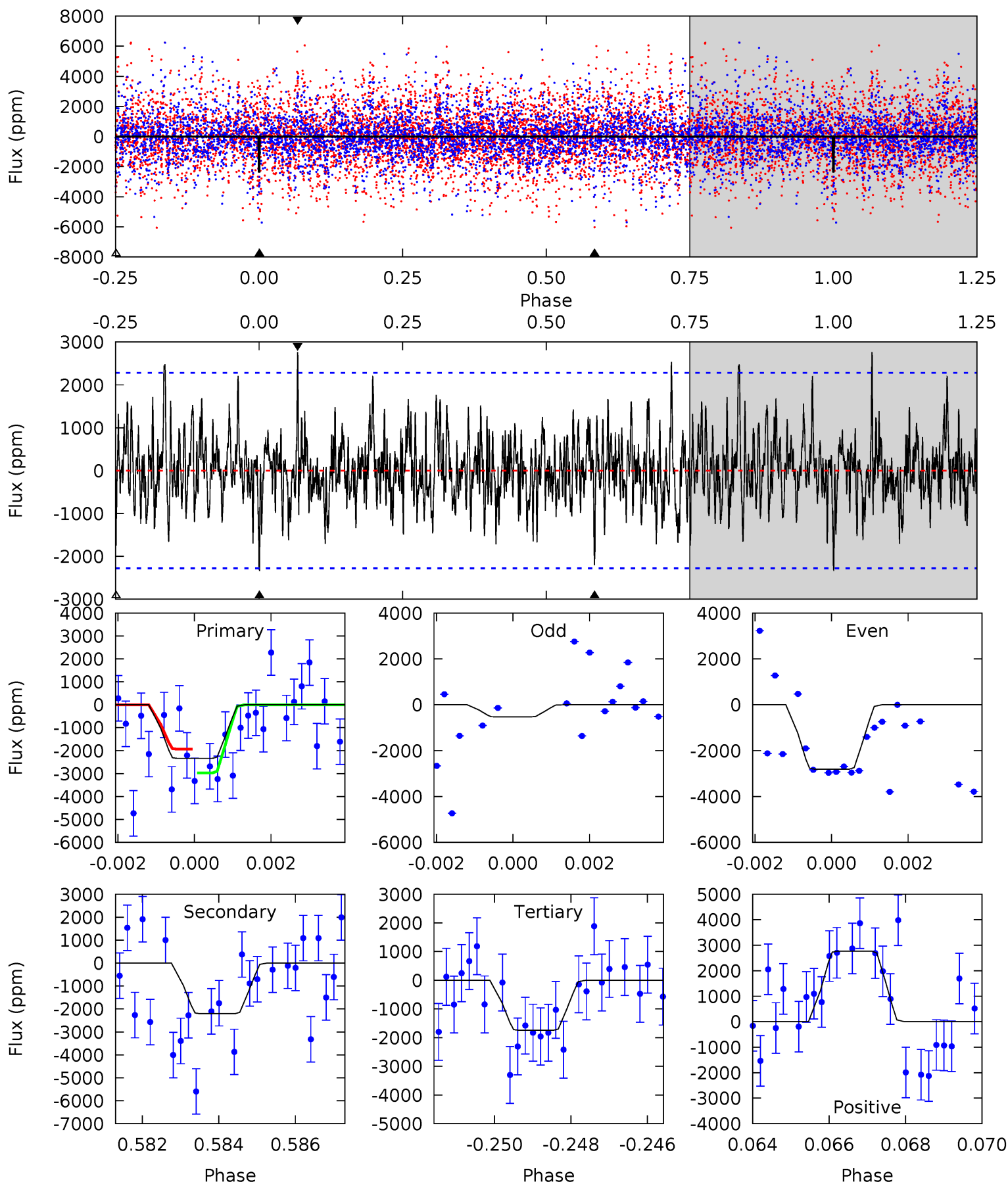
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.8	13.2	9.49	11.8	5.15	2.80	3.22	2.30	-0.03	3.69	1.36	1.69	0.64	0.47	1.83



Alt Model-Shift Uniqueness Test

004376648-06, P = 40.096979 Days, E = 124.677370 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.47	5.16	4.08	6.47	5.33	3.10	1.54	1.39	-0.99	1.08	-1.31	2.11	0.79	0.54	1.21



Stellar Parameters For KIC 004376648

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	$M(M_{\odot})$	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	7024^{+164}_{-246}	$4.039^{+0.252}_{-0.168}$	$-0.360^{+0.300}_{-0.300}$	$1.857^{+0.478}_{-0.584}$	$1.378^{+0.202}_{-0.269}$	$0.303^{+0.486}_{-0.145}$
	+2%/-4%	+6%/-4%	+83%/-83%	+26%/-31%	+15%/-20%	+160%/-48%
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 004376648-06 / KOI

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-2332 ± 177	$12.10^{+7.28}_{-6.24}$	1159^{+90}_{-104}	6212^{+3060}_{-1127}	591^{+1913}_{-367}
Alt.	-2204 ± 427	$10.40^{+6.92}_{-5.92}$	1159^{+84}_{-101}	6575^{+4377}_{-1420}	721^{+3046}_{-469}

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 $A_{obs} \gg 1.0$

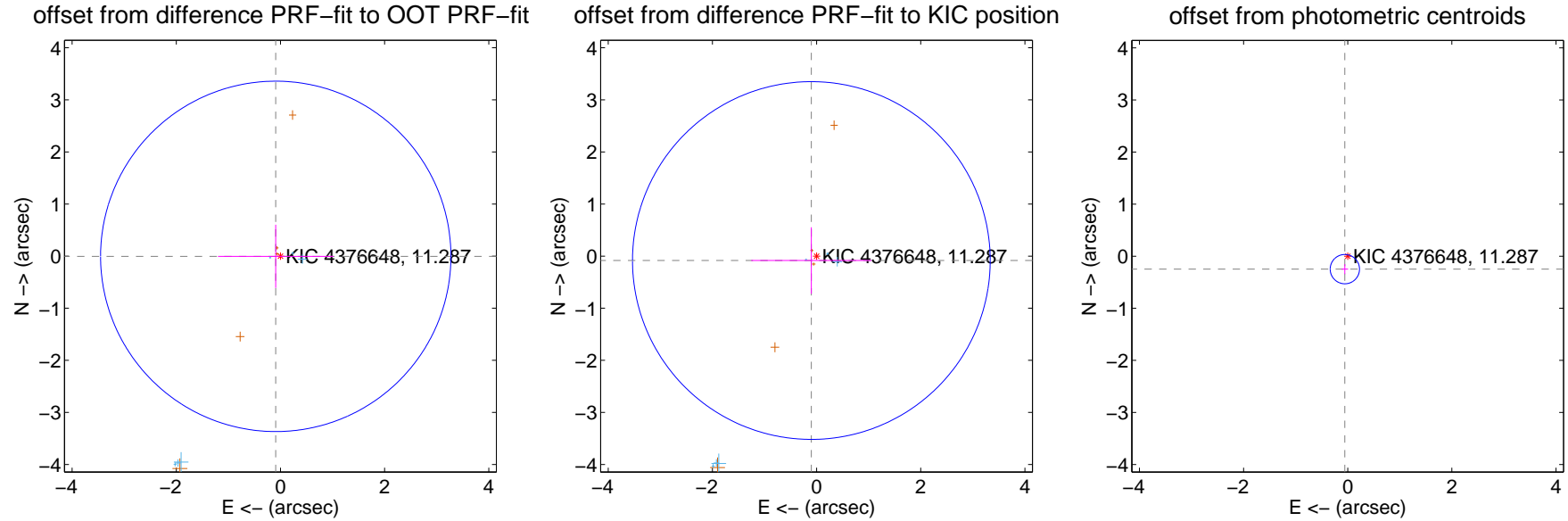
DV Centroid Data

Supplemental centroid analysis for 004376648-06. **Kepler magnitude: 11.29.** Transit SNR 8.41

There are 6 quarters with good PRF difference image offsets

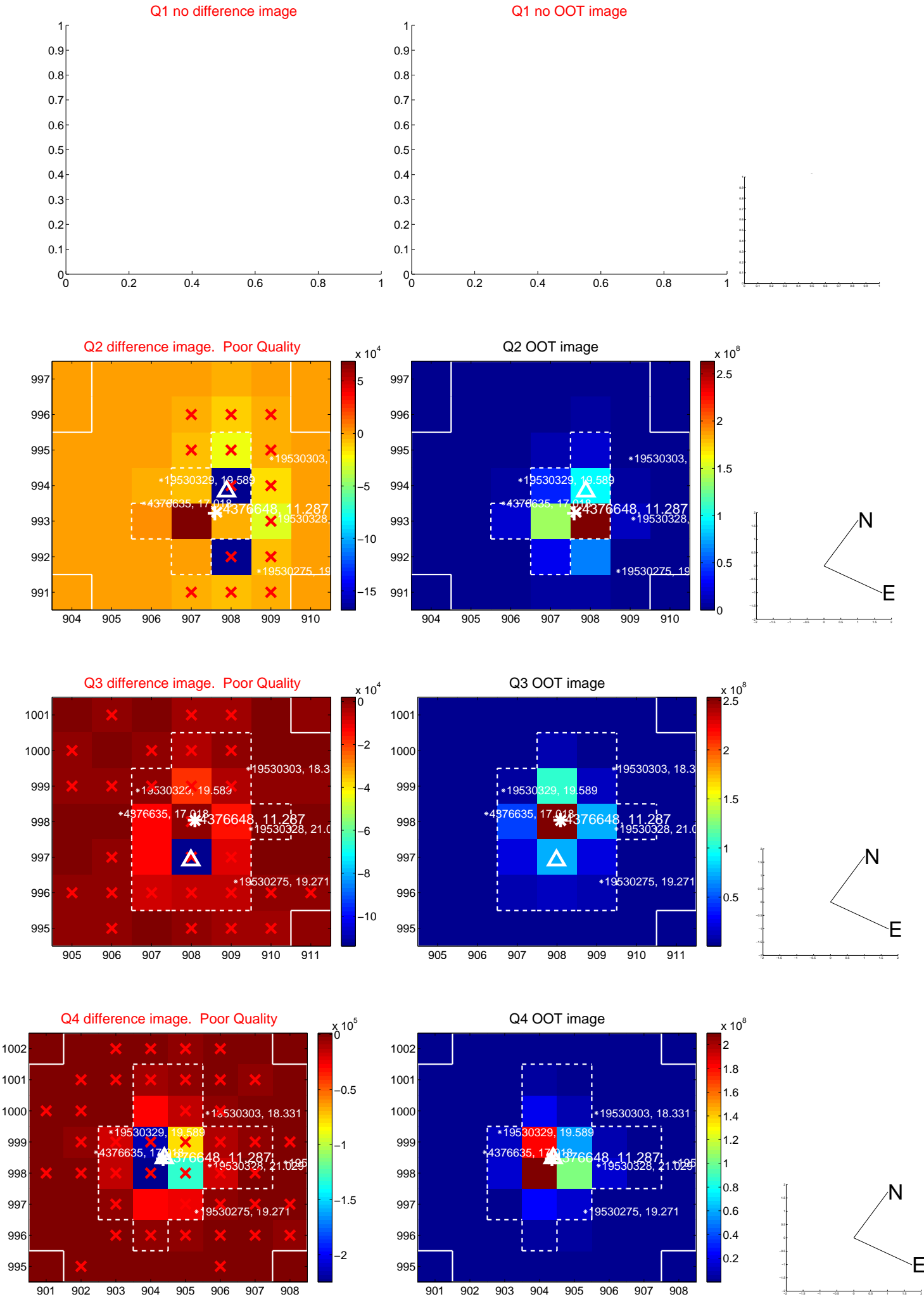
The direct PRF centroid is offset from the target star catalog position by about 0.20 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.091 ± 1.121	0.08	0.090 ± 1.110	-0.005 ± 0.607
PRF-fit source offset from KIC position	0.131 ± 1.145	0.11	0.100 ± 1.155	-0.084 ± 0.639
photometric centroid source offset	0.25 ± 0.09	2.71	0.06 ± 0.06	-0.25 ± 0.10

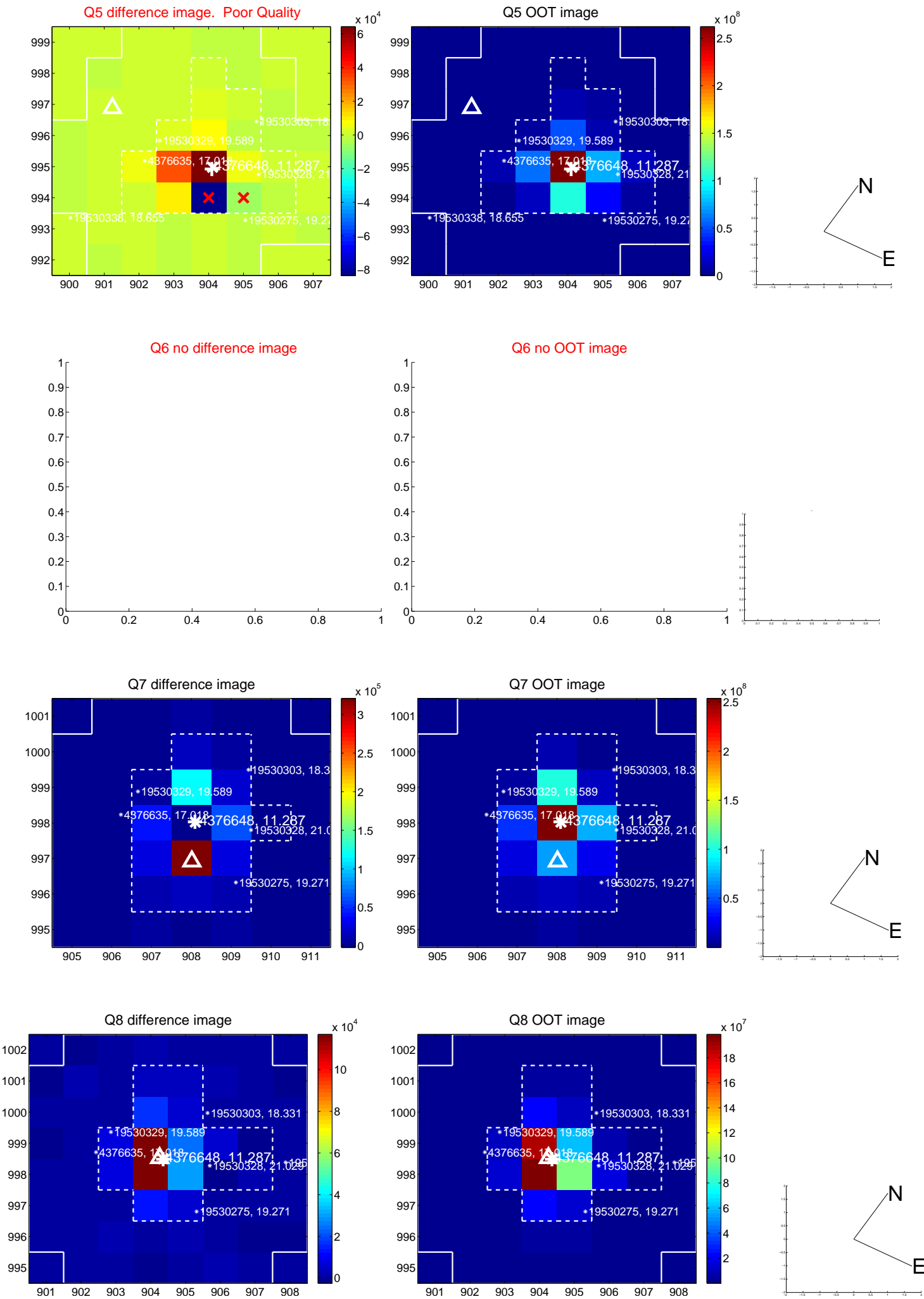


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

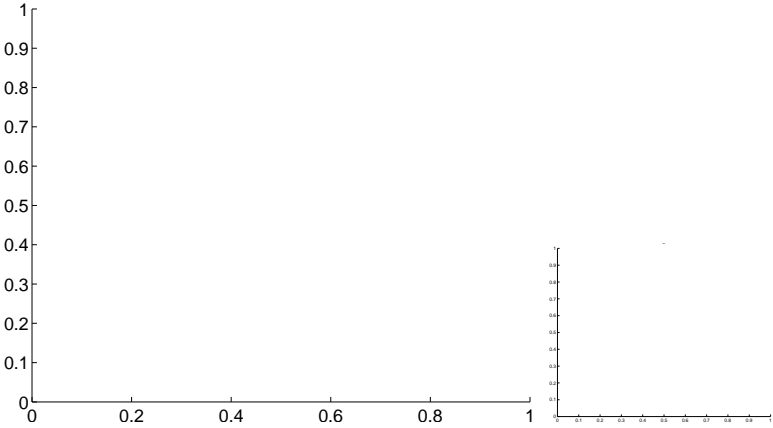


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.

Q9 no difference image



Q9 no OOT image



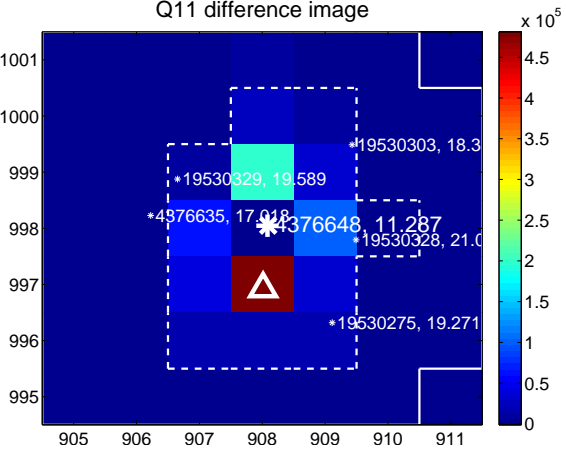
Q10 no difference image



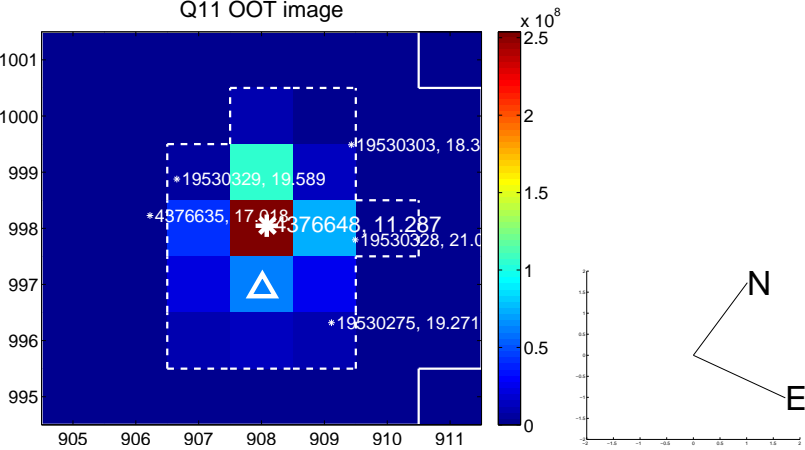
Q10 no OOT image



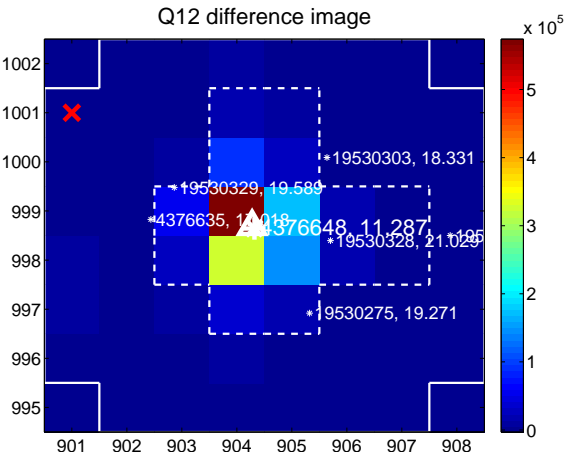
Q11 difference image



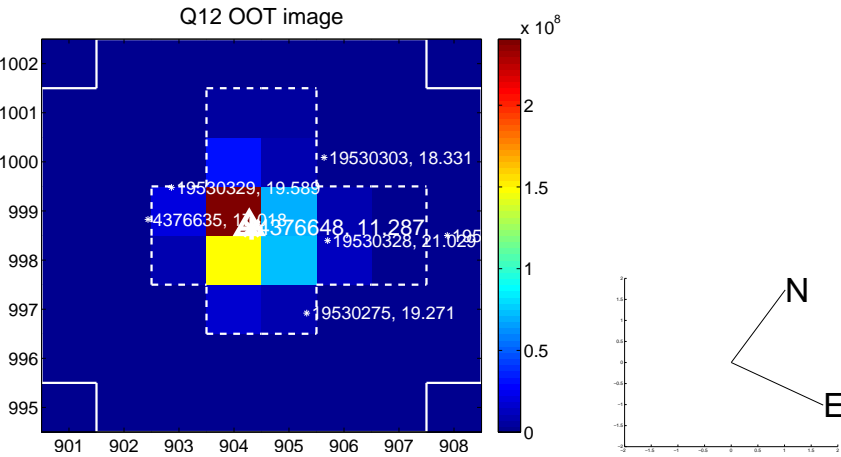
Q11 OOT image



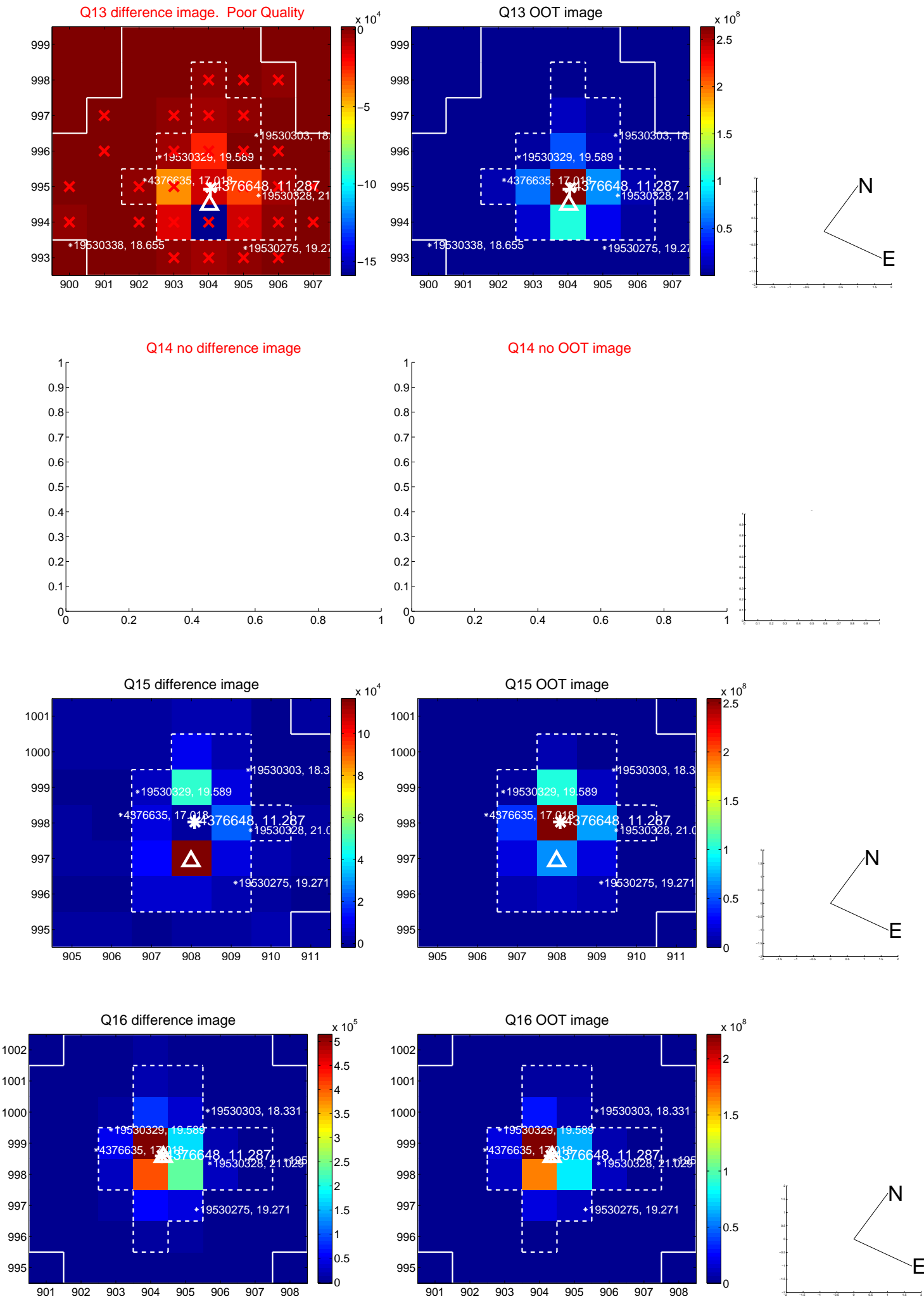
Q12 difference image



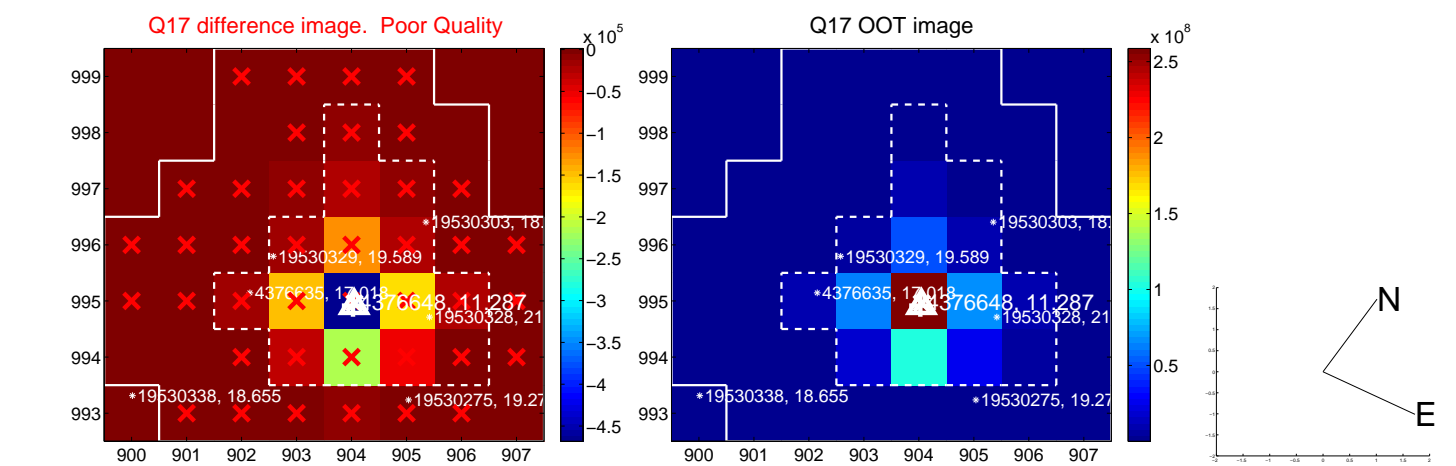
Q12 OOT image



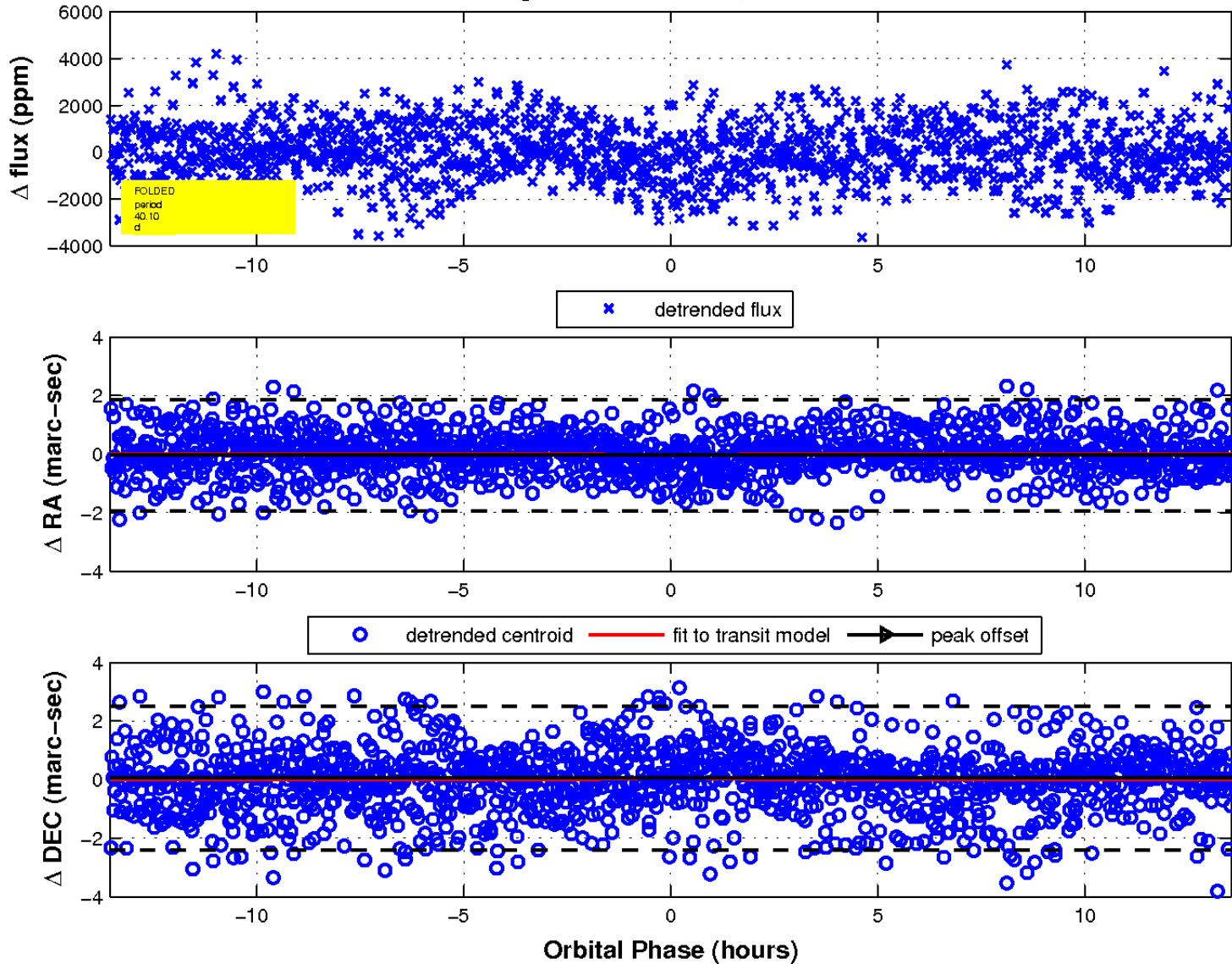
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

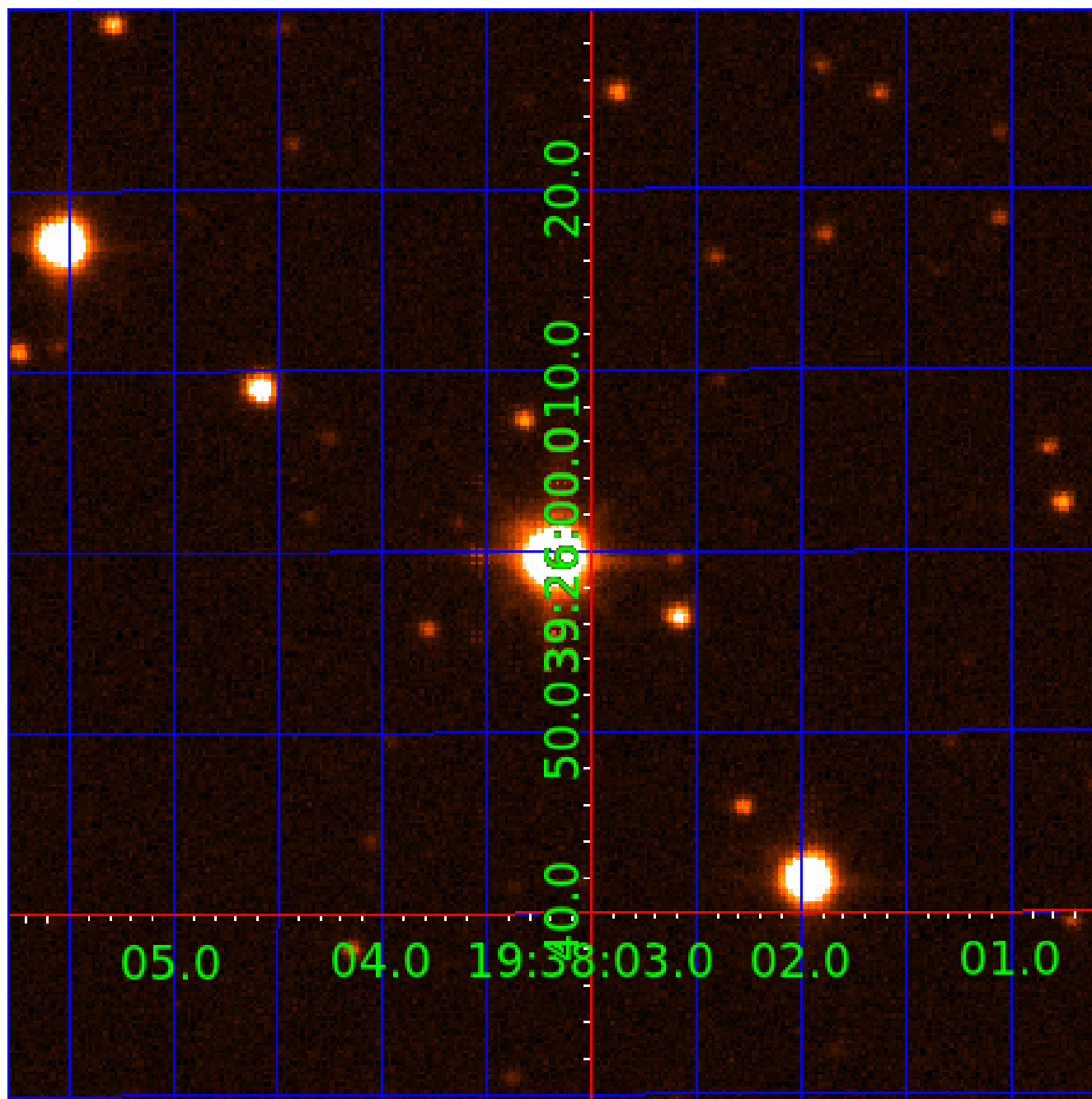


fluxWeightedCentroids, Planet 6 of 8



UKIRT Image

Declination



KIC 004376648

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})
004376648-01	OBS	No	0.521668	131.999628	63.6	1.753	8.2	8.0	1.86	7024	1.72	37778.75
004376648-02	OBS	No	0.521665	131.821686	102.9	2.008	9.8	9.2	1.86	7024	2.19	37779.04
004376648-03	OBS	No	168.888956	145.773100	4077.1	5.209	9.8	9.2	1.86	7024	14.16	16.99
004376648-04	OBS	No	24.301768	152.287360	540.9	5.002	9.5	3.4	1.86	7024	4.80	225.38
004376648-05	OBS	No	25.920856	139.493335	821.9	7.527	9.2	5.7	1.86	7024	5.65	206.81
004376648-06	OBS	No	40.096338	164.771975	2229.8	4.518	8.9	8.4	1.86	7024	12.09	115.60
004376648-07	OBS	No	190.833969	297.200532	2747.5	8.379	9.1	8.8	1.86	7024	9.99	14.44
004376648-08	OBS	No	85.043521	202.020398	111.8	3.500	8.8	-1.0	1.86	7024	1.99	42.42

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004376648-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_SATURATED
004376648-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—SAME_NTL_PERIOD—CENT_SATURATED
004376648-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
004376648-04	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED—HALO_GHOST
004376648-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
004376648-06	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED—HALO_GHOST
004376648-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
004376648-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED

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

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

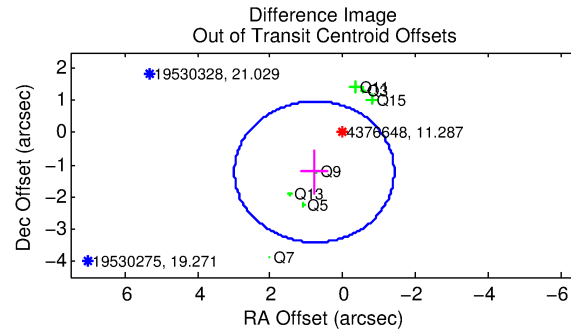
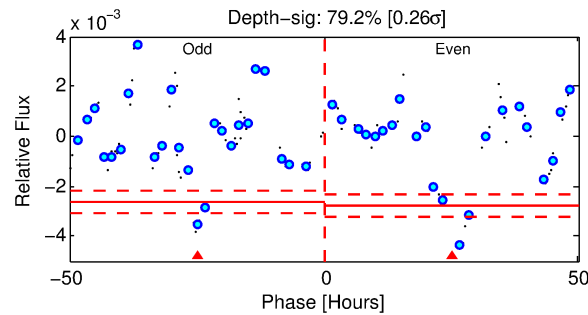
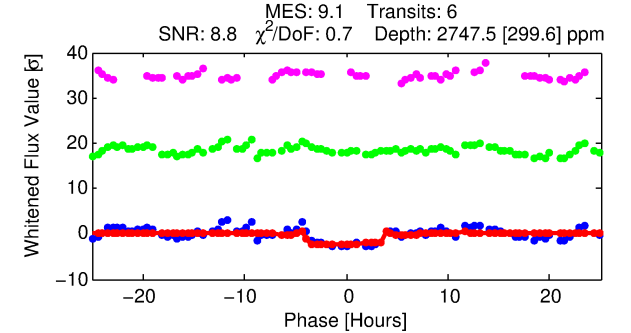
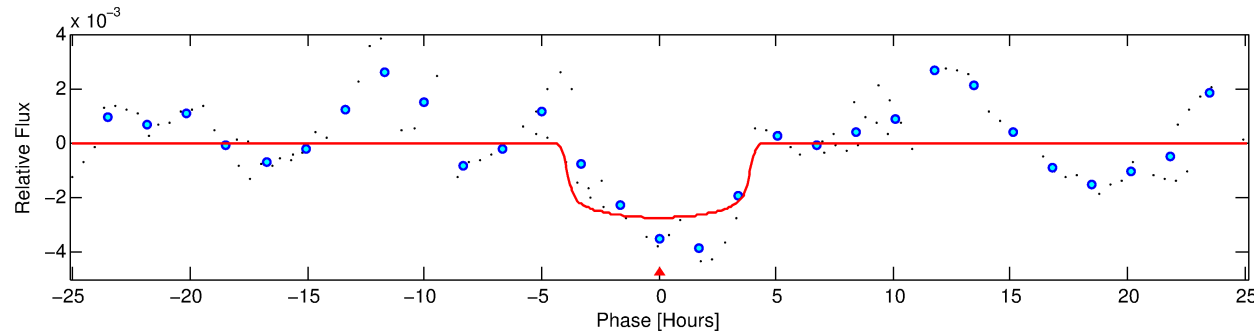
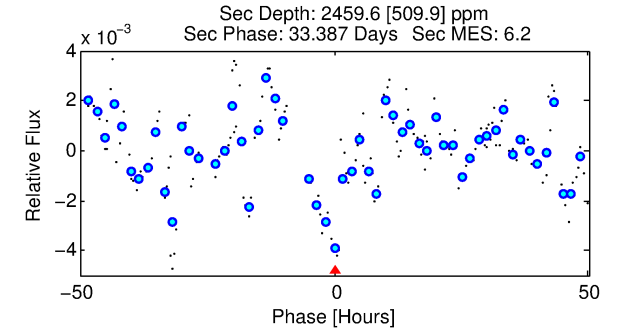
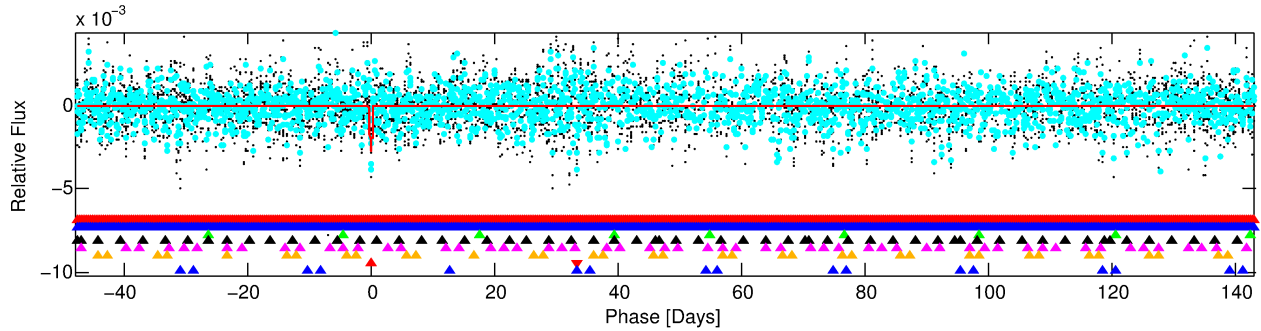
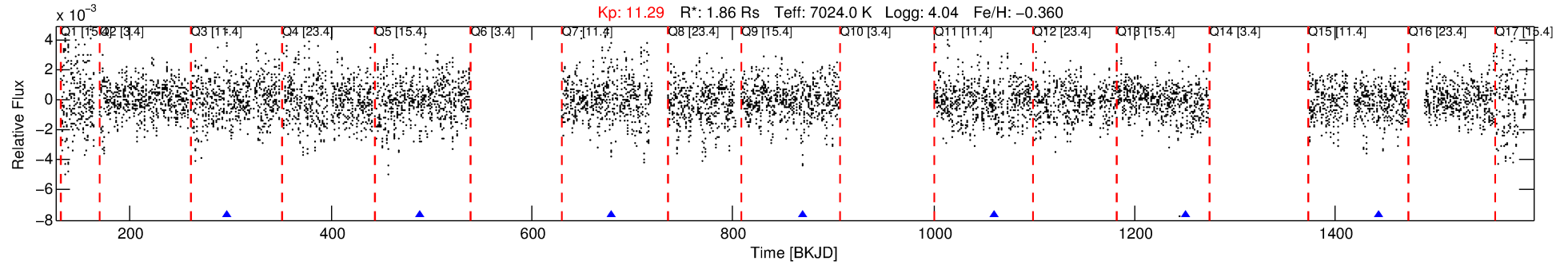
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 004376648-07

No Significant Match Found

DV One-Page Summary

KIC: 4376648 Candidate: 7 of 8 Period: 190.834 d



DV Fit Results:

Period = 190.83397 [0.00200] d
Epoch = 297.2005 [0.0125] BKJD
Rp/R* = 0.0493 [0.0117]
a/R* = 168.51 [218.72]
b = 0.40 [2.76]
Seff = 14.44 [6.67]
Teq = 497 [57] K
Rp = 10.00 [3.94] Re
a = 0.7217 [0.2059] AU
Ag = 7053.78 [4790.55] [1.47 σ]
Teffp = 7043 [944] K [6.92 σ]

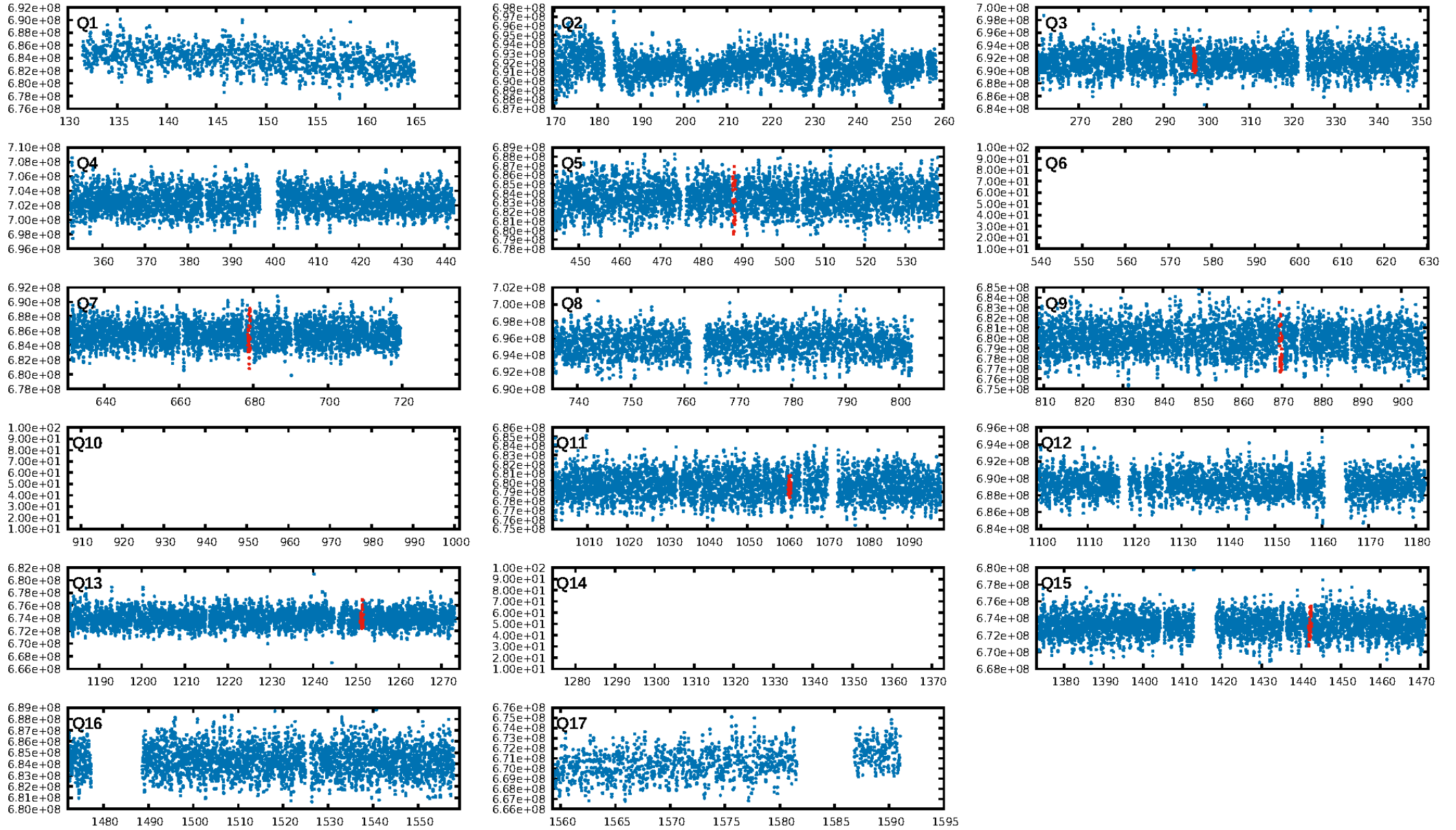
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [53.38 σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 54.7%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: N/A
RollingBand-fgt: 1.00 [6/6]
GhostDiagnostic-chr: -0.7361
Centroid-sig: 0.0%
Centroid-so: 0.791 arcsec [3.49 σ]
OotOffset-rm: 1.451 arcsec [1.98 σ]
KicOffset-rm: 1.680 arcsec [2.09 σ]
OotOffset-st: 0/4/0/3 [7]
KicOffset-st: 0/4/0/3 [7]
DiffImageQuality-fgm: 0.43 [3/7]
DiffImageOverlap-fno: 0.00 [0/7]

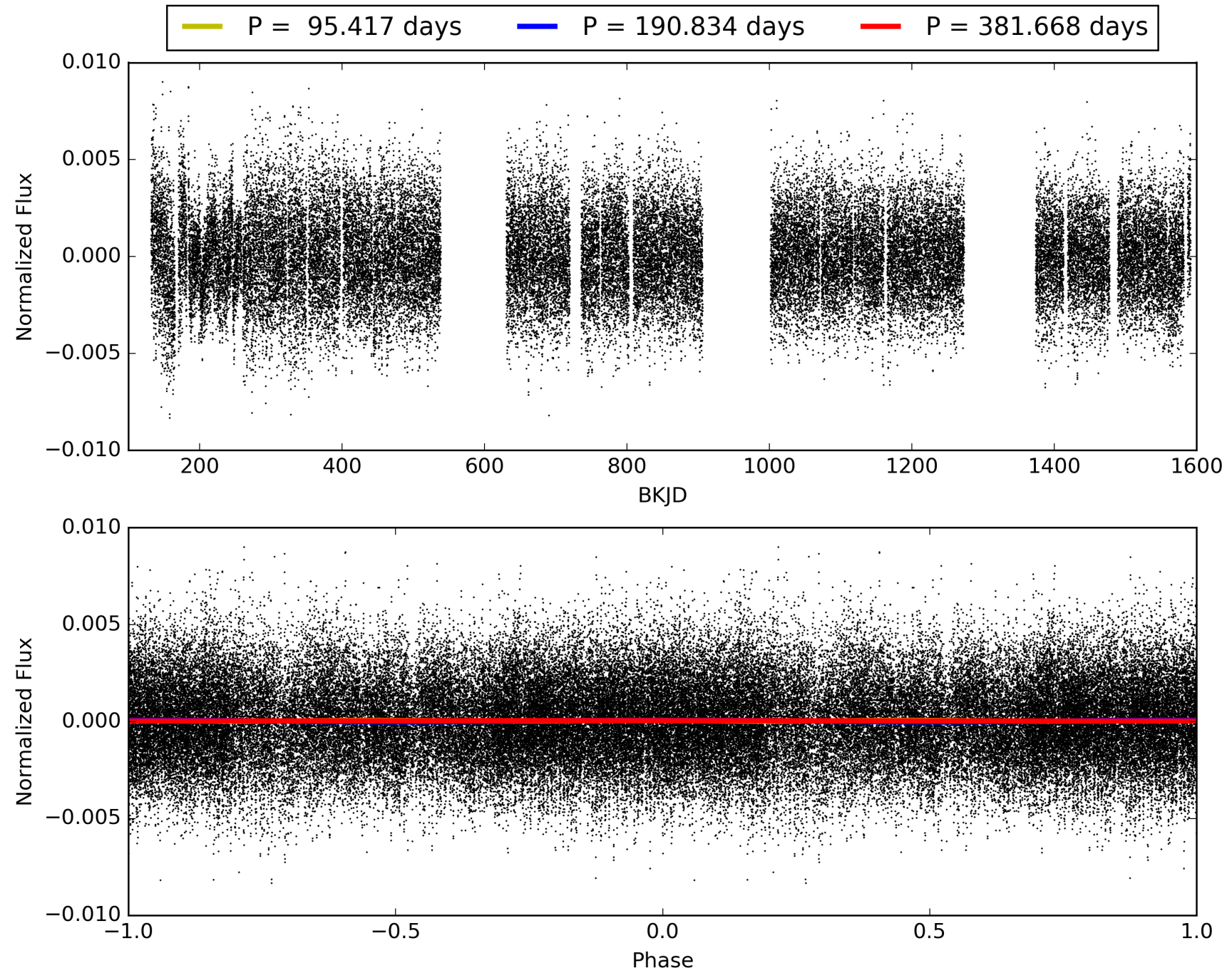
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 21:52:23 Z

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

TCE 004376648-07, PDC Light Curves

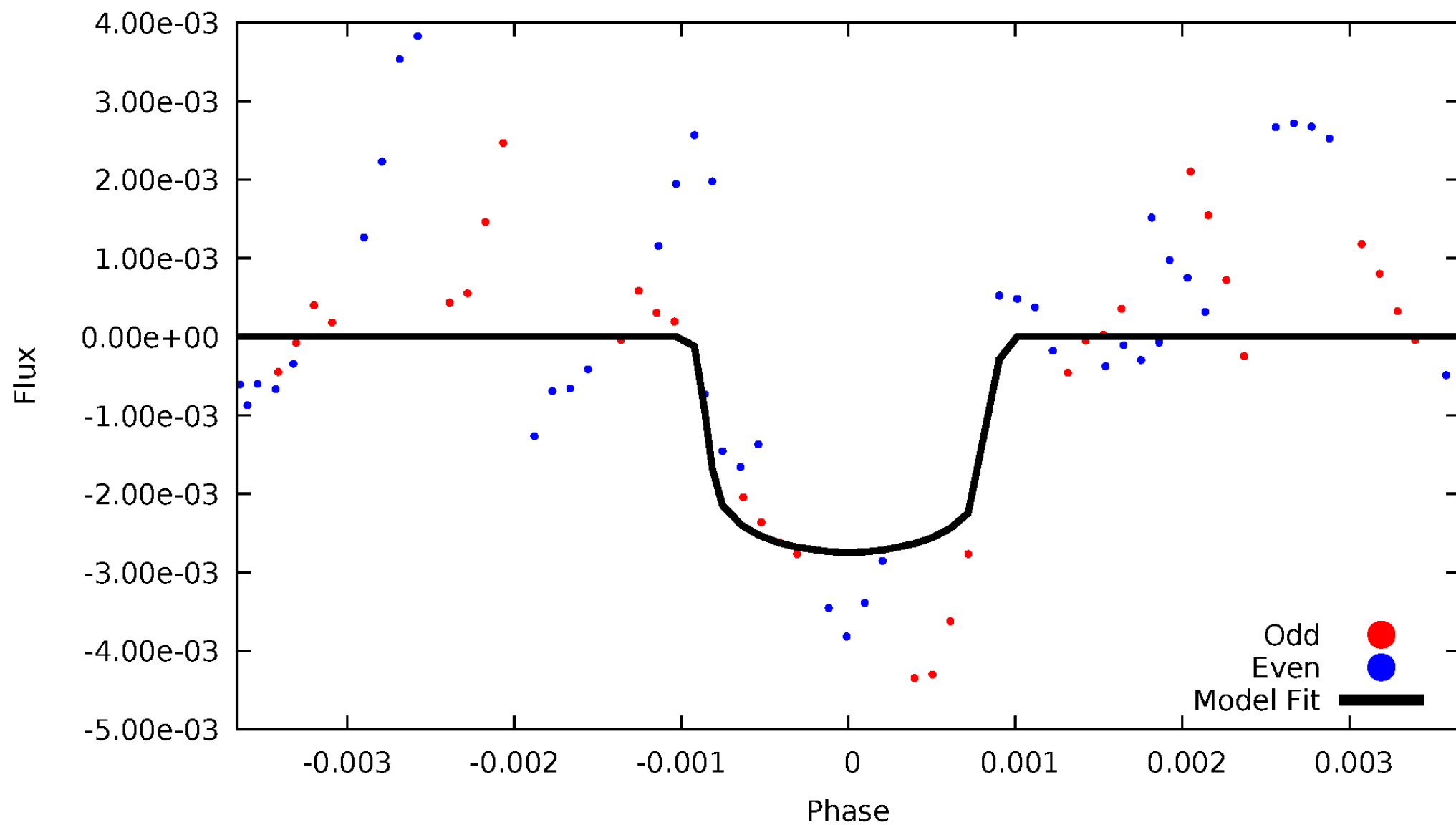


TCE 004376648-07



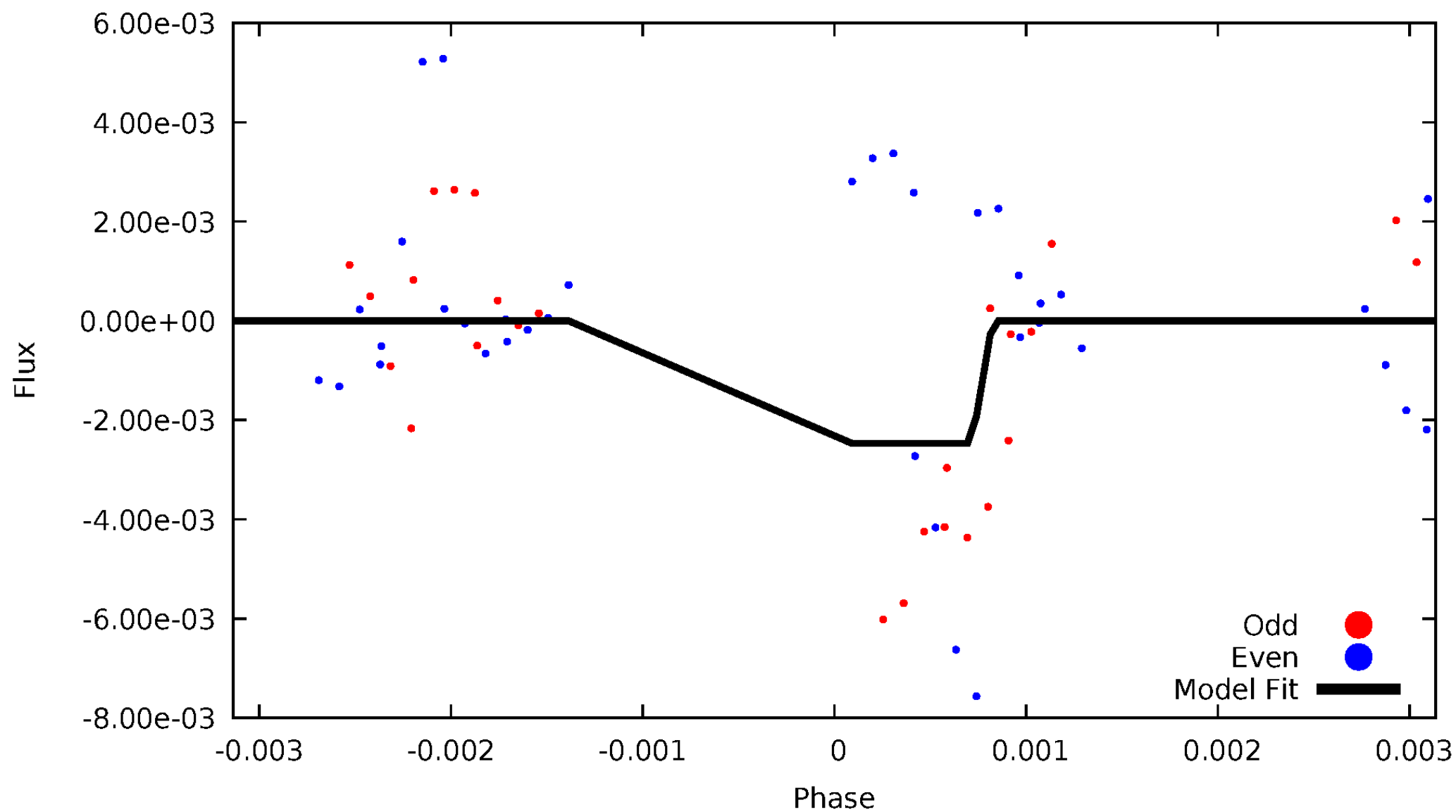
DV Odd/Even

TCE 004376648-07



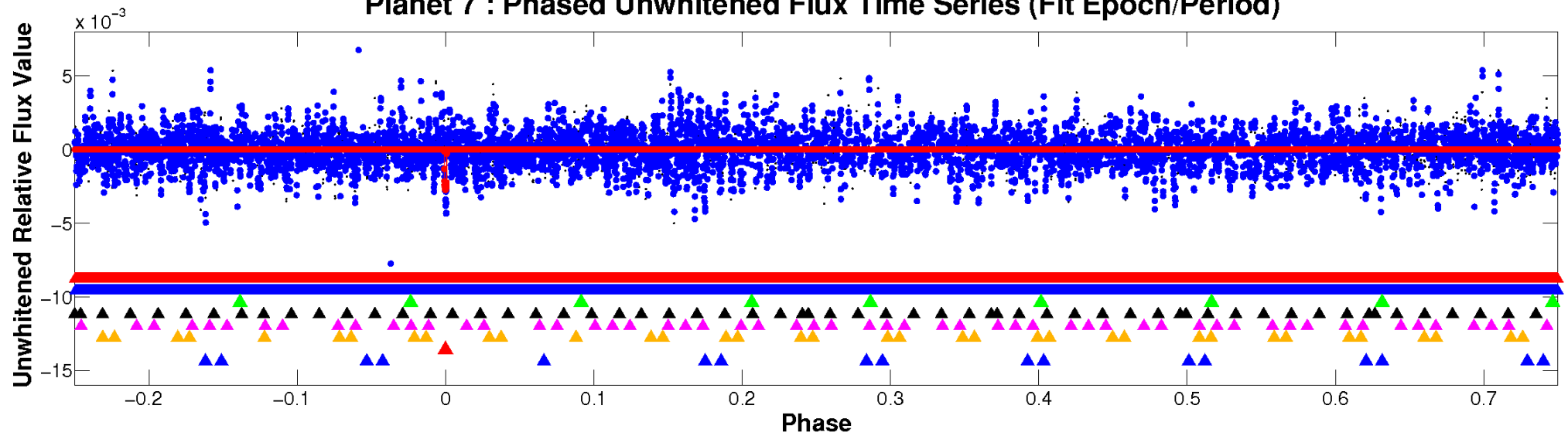
ALT Odd/Even

TCE 004376648-07

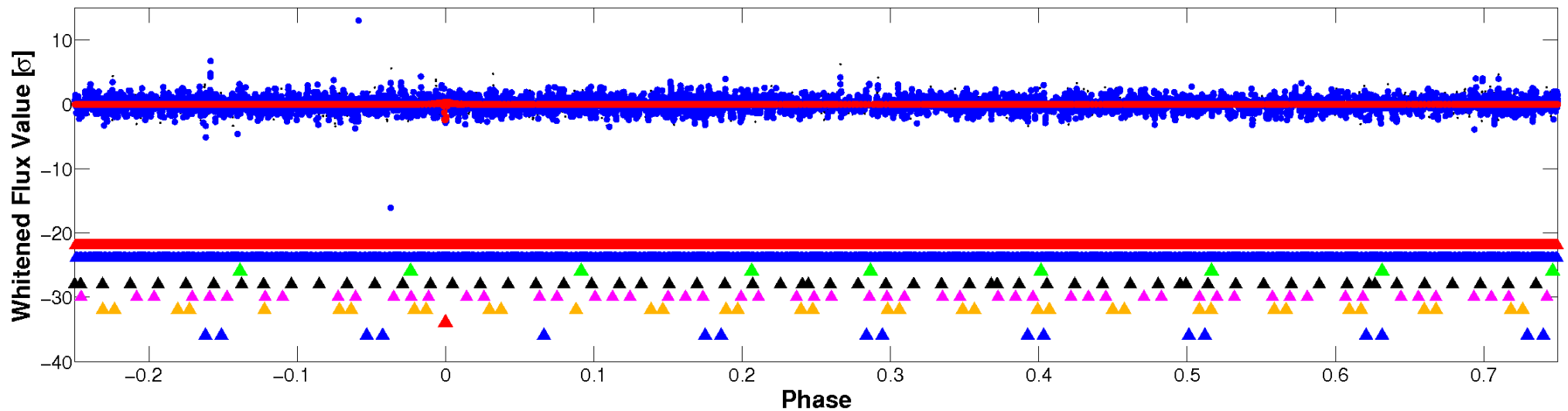


Non-Whitened Vs. Whitened Light Curve

Planet 7 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

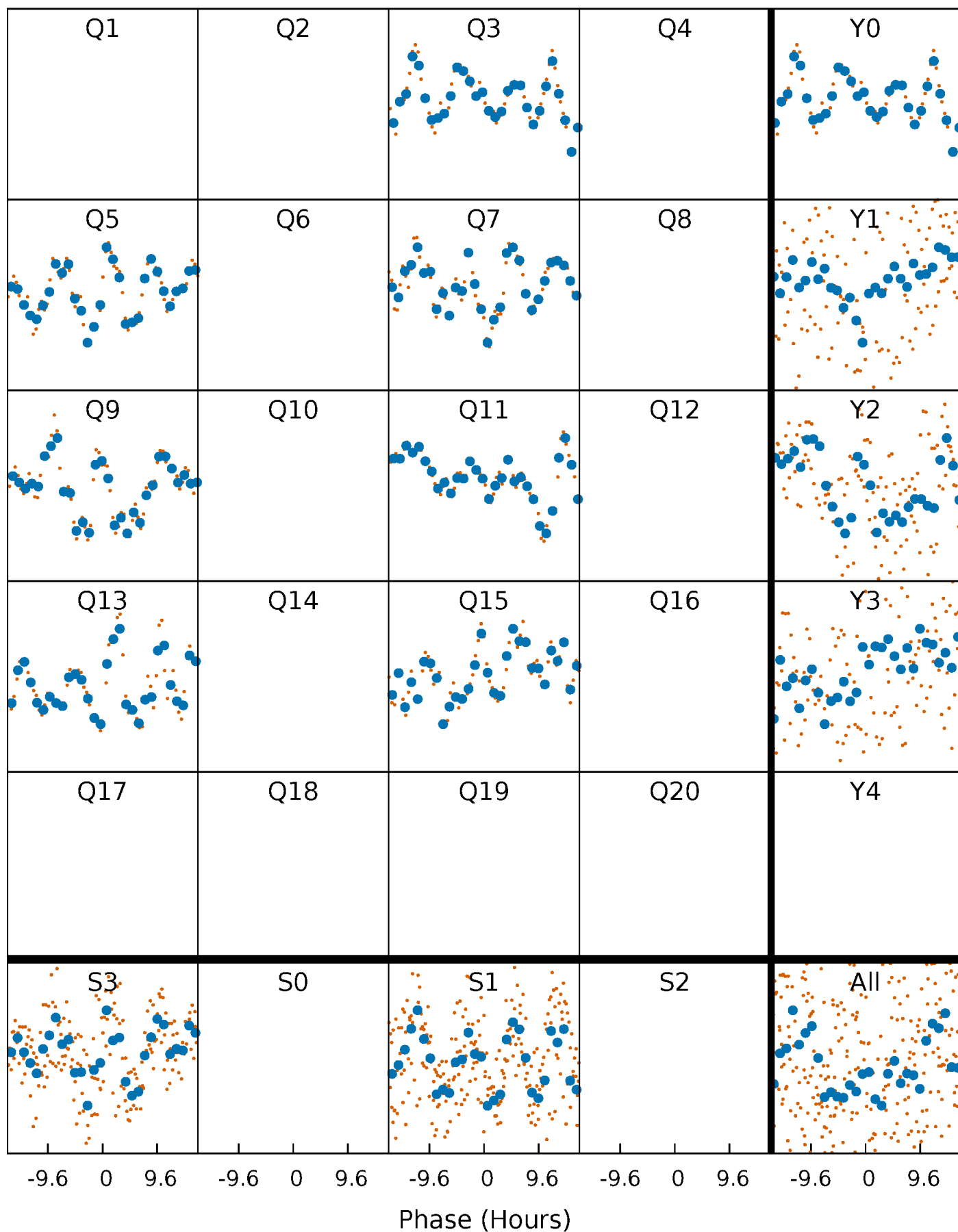


Planet 7 : Phased Whitened Flux Time Series (Fit Epoch/Period)



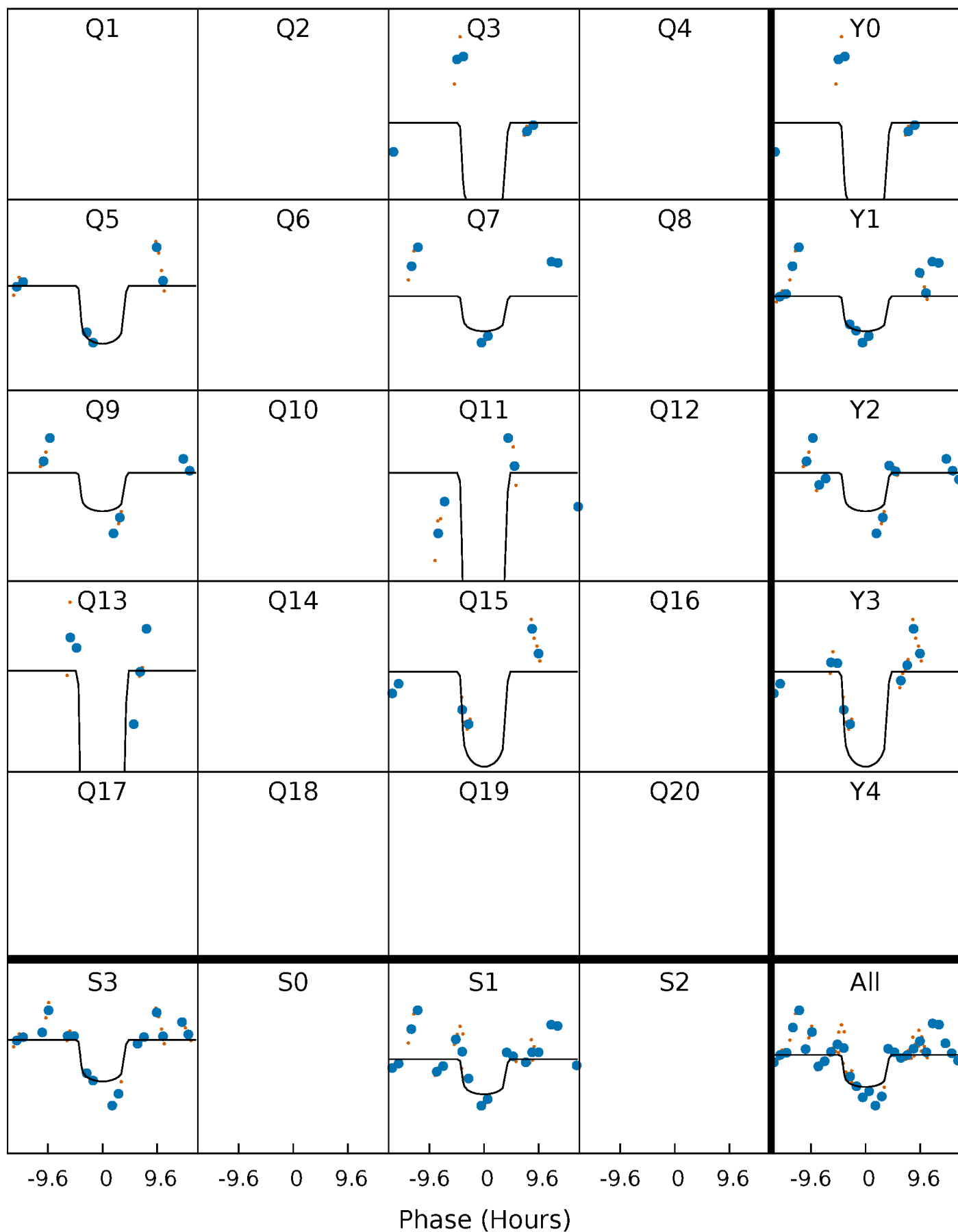
PDC Quarter-Phased Transit Curves

TCE 004376648-07 $P=190.833969$ Days $T_0=297.200532$ (BKJD)



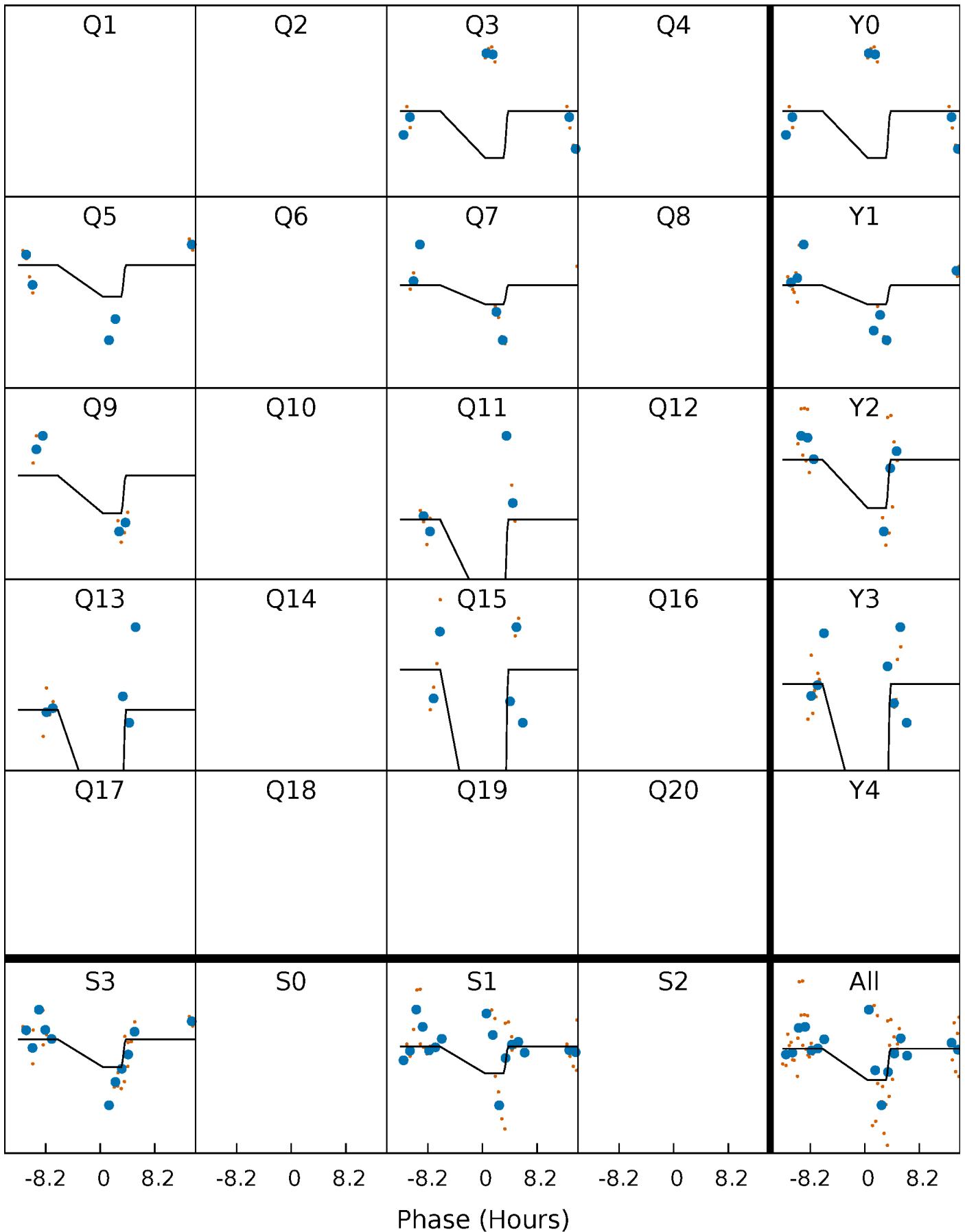
DV Quarter-Phased Transit Curves

TCE 004376648-07 $P=190.833969$ Days $T_0=297.200532$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

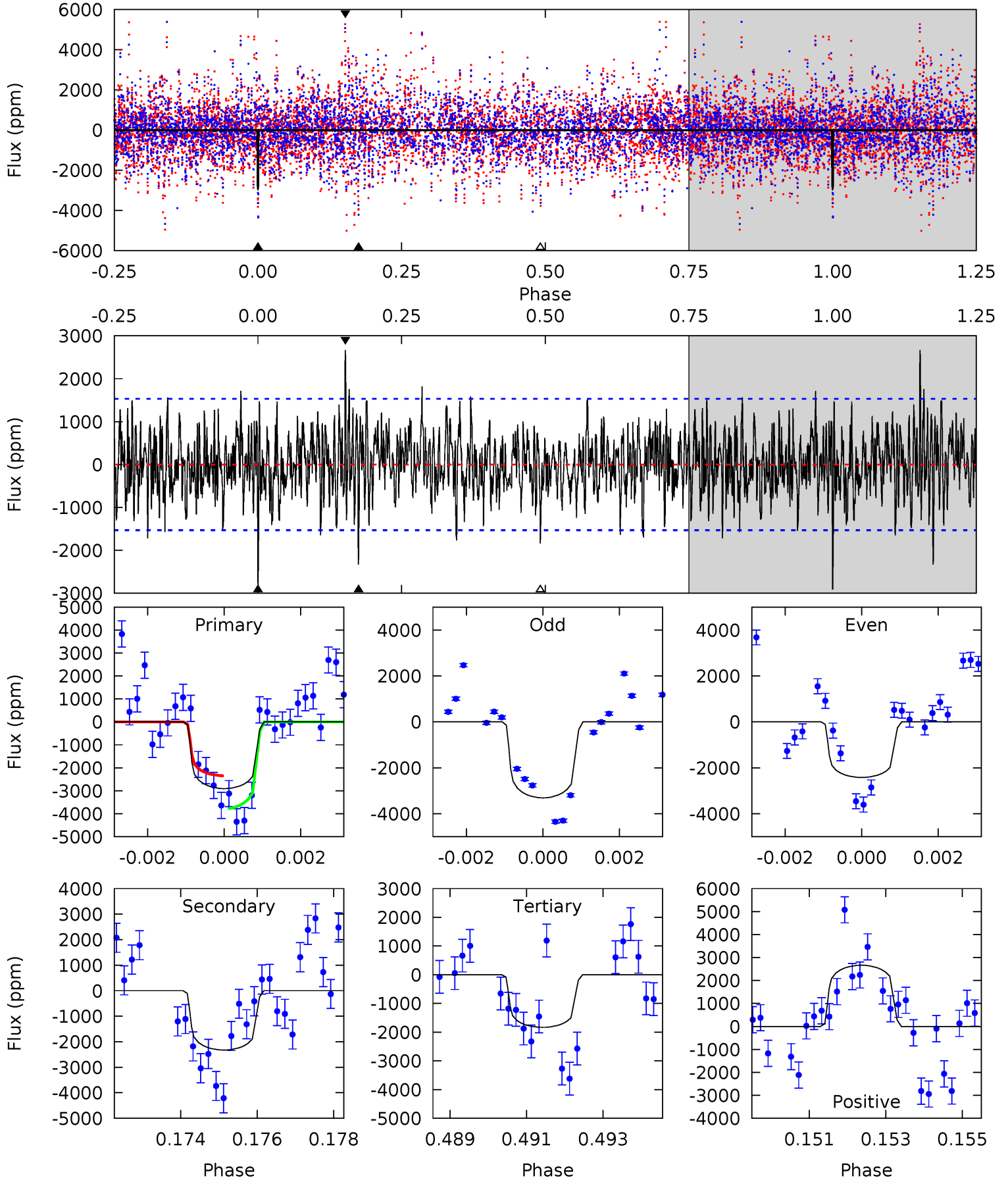
TCE 004376648-07 $P=190.900020$ Days $T_0=296.965923$ (BKJD)



DV Model-Shift Uniqueness Test

004376648-07, P = 190.833969 Days, E = 106.366563 Days

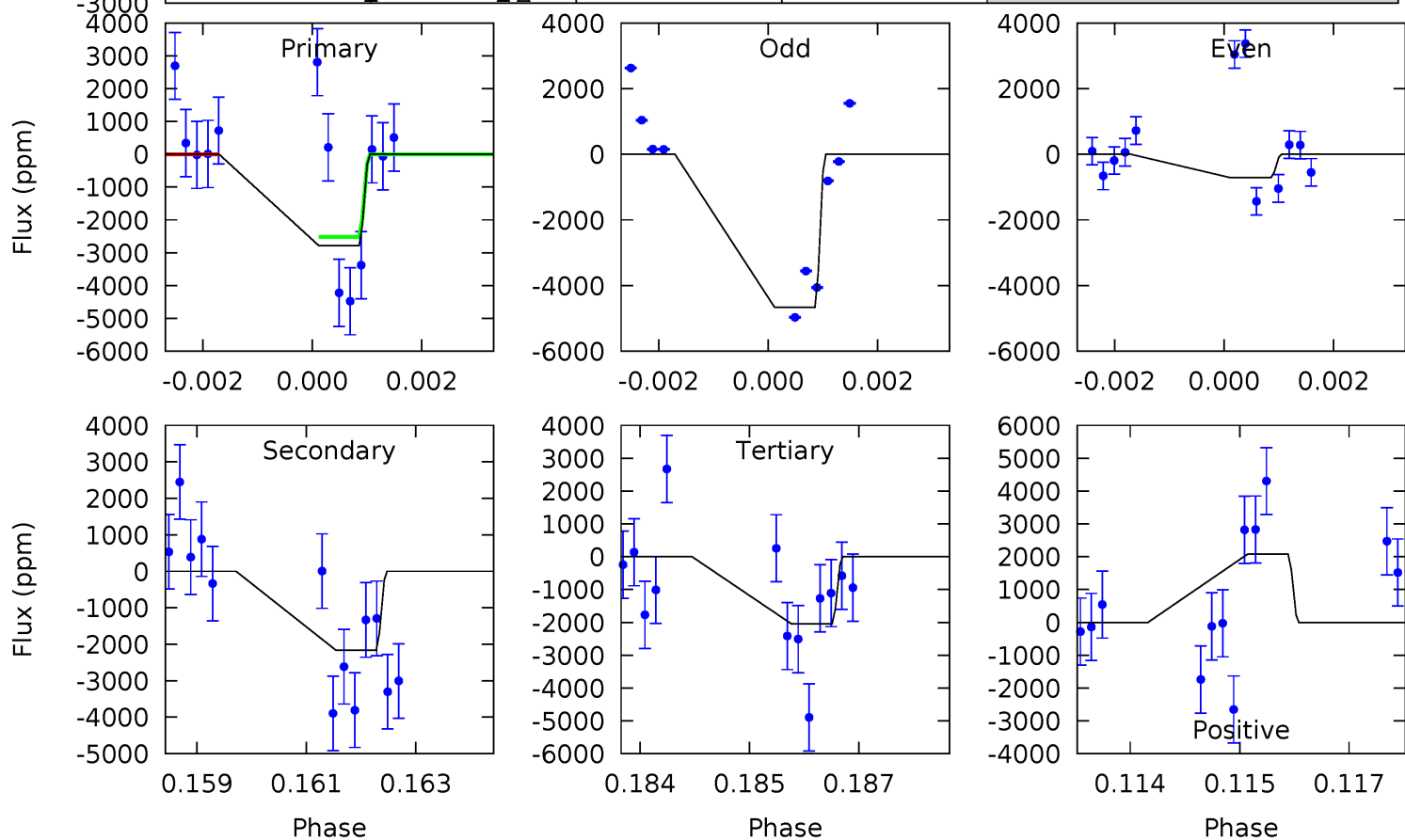
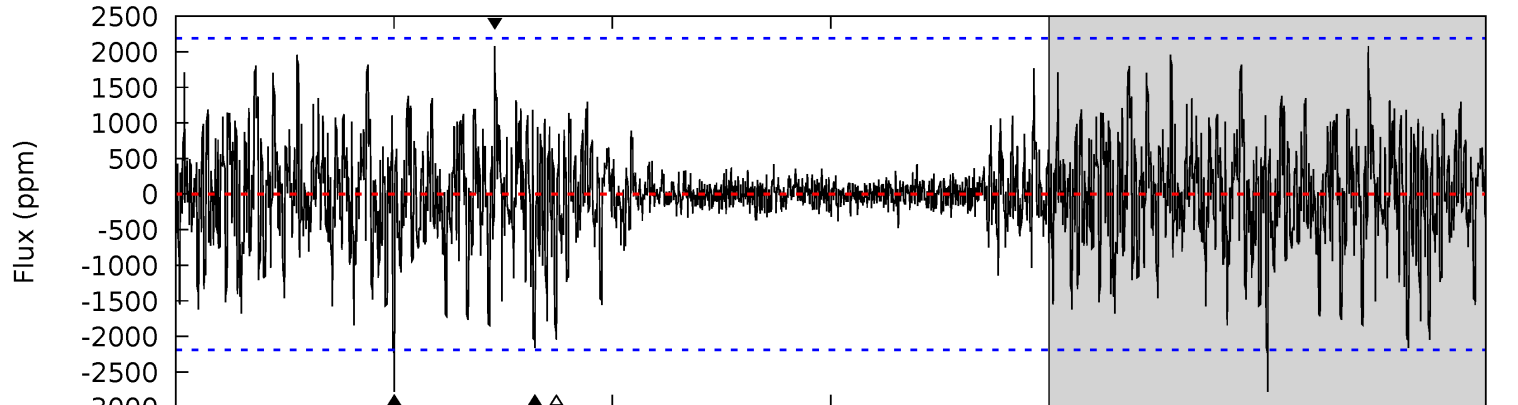
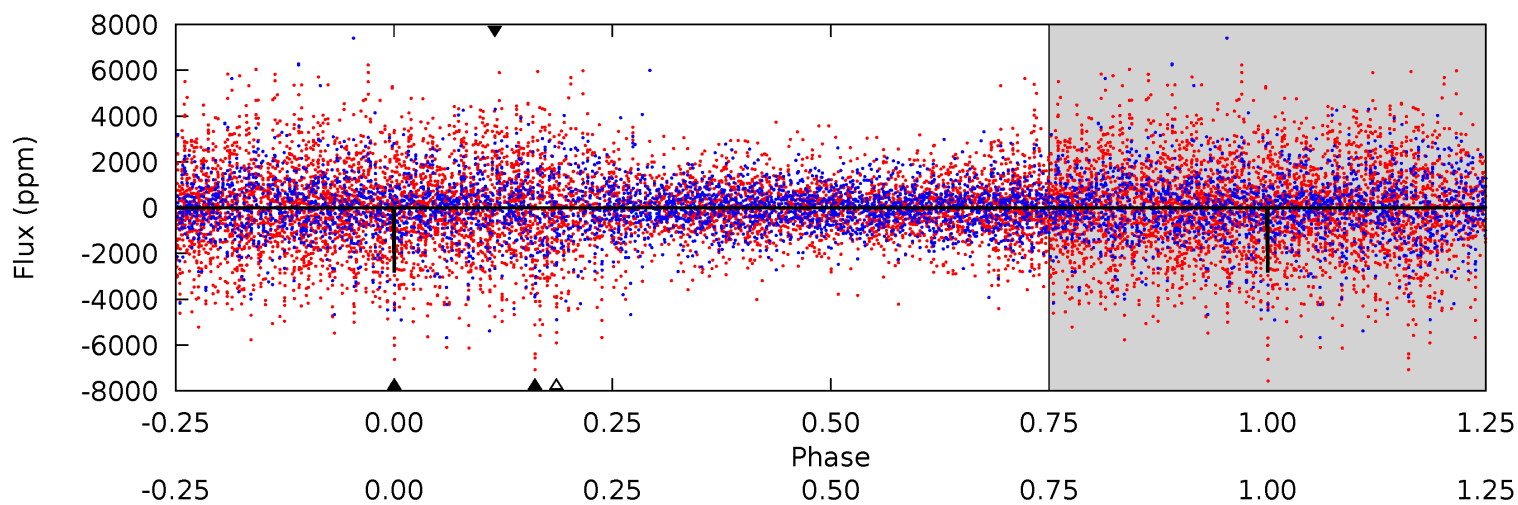
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.1	8.10	6.38	9.28	5.33	3.10	2.08	3.75	0.85	1.72	-1.18	1.53	0.64	0.48	2.42



Alt Model-Shift Uniqueness Test

004376648-07, P = 190.900020 Days, E = 106.065903 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.81	5.29	5.02	5.08	5.36	3.15	1.24	1.79	1.72	0.27	0.21	4.95	0.63	0.43	0



Stellar Parameters For KIC 004376648

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	M (M_{\odot})	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	7024^{+164}_{-246}	$4.039^{+0.252}_{-0.168}$	$-0.360^{+0.300}_{-0.300}$	$1.857^{+0.478}_{-0.584}$	$1.378^{+0.202}_{-0.269}$	$0.303^{+0.486}_{-0.145}$
	+2%/-4%	+6%/-4%	+83%/-83%	+26%/-31%	+15%/-20%	+160%/-48%
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 004376648-07 / KOI

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-2326 ± 287	$9.76^{+3.03}_{-2.60}$	691^{+51}_{-58}	6948^{+1190}_{-837}	6986^{+6367}_{-2952}
Alt.	-2160 ± 408	$9.82^{+3.18}_{-2.75}$	688^{+53}_{-59}	6728^{+1239}_{-784}	6264^{+6039}_{-2689}

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 $A_{obs} \gg 1.0$

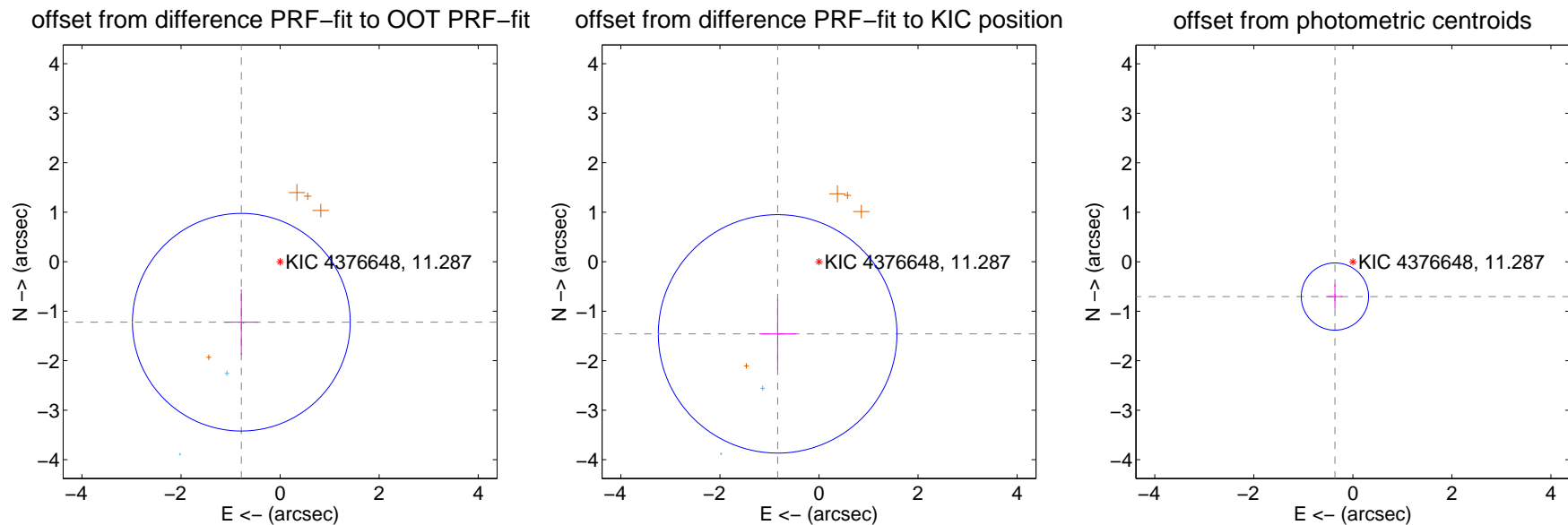
DV Centroid Data

Supplemental centroid analysis for 004376648-07. **Kepler magnitude: 11.29.** Transit SNR 8.82

There are 3 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	1.451 ± 0.733	1.98	0.783 ± 0.339	-1.222 ± 0.663
PRF-fit source offset from KIC position	1.680 ± 0.803	2.09	0.835 ± 0.373	-1.458 ± 0.719
photometric centroid source offset	0.79 ± 0.23	3.49	0.36 ± 0.15	-0.70 ± 0.24



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.

Q1 no difference image



Q1 no OOT image



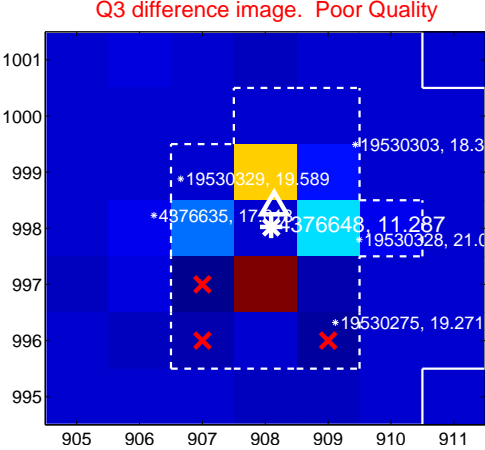
Q2 no difference image



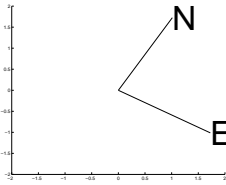
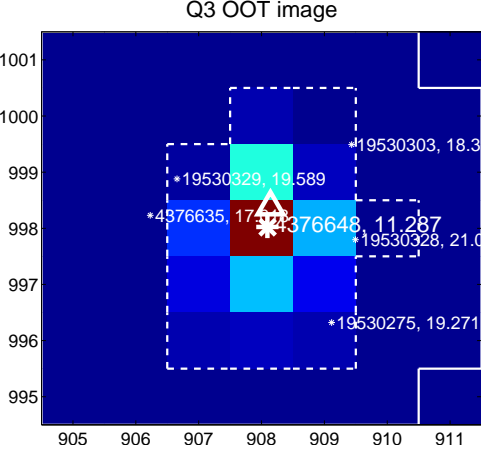
Q2 no OOT image



Q3 difference image. Poor Quality



Q3 OOT image



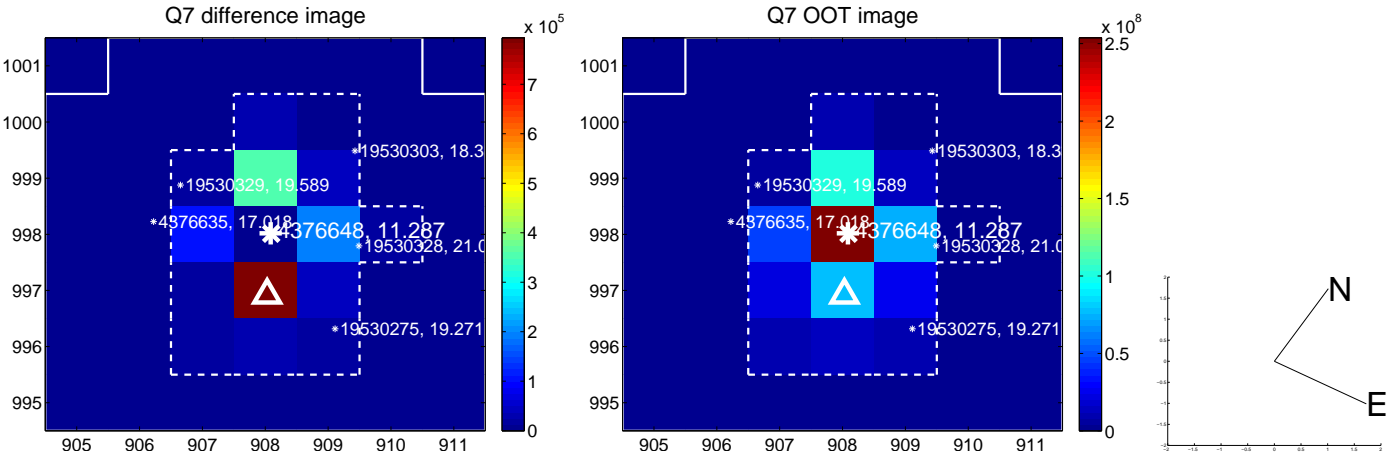
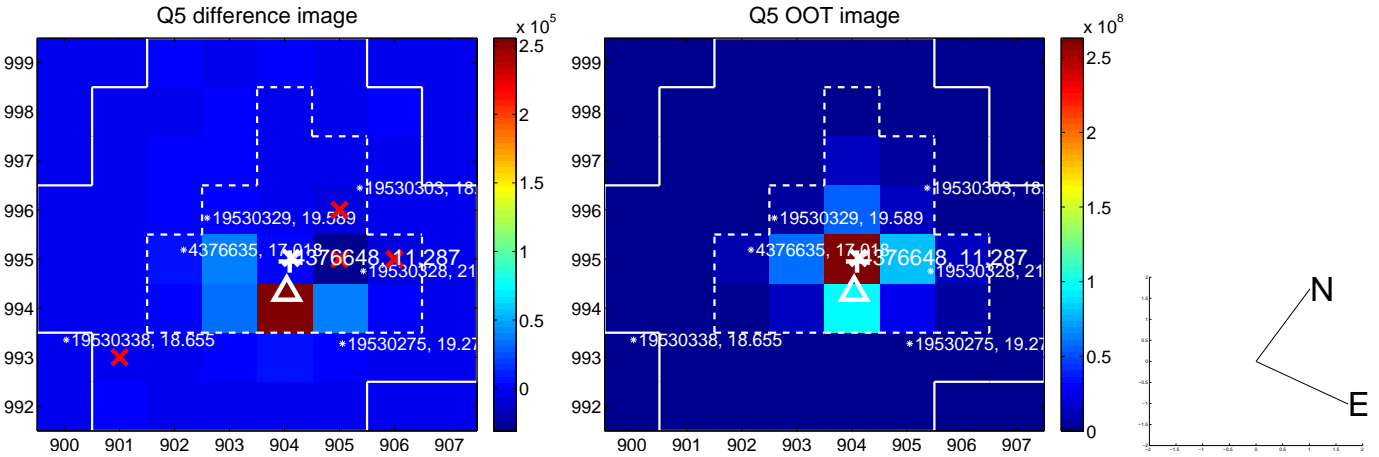
Q4 no difference image



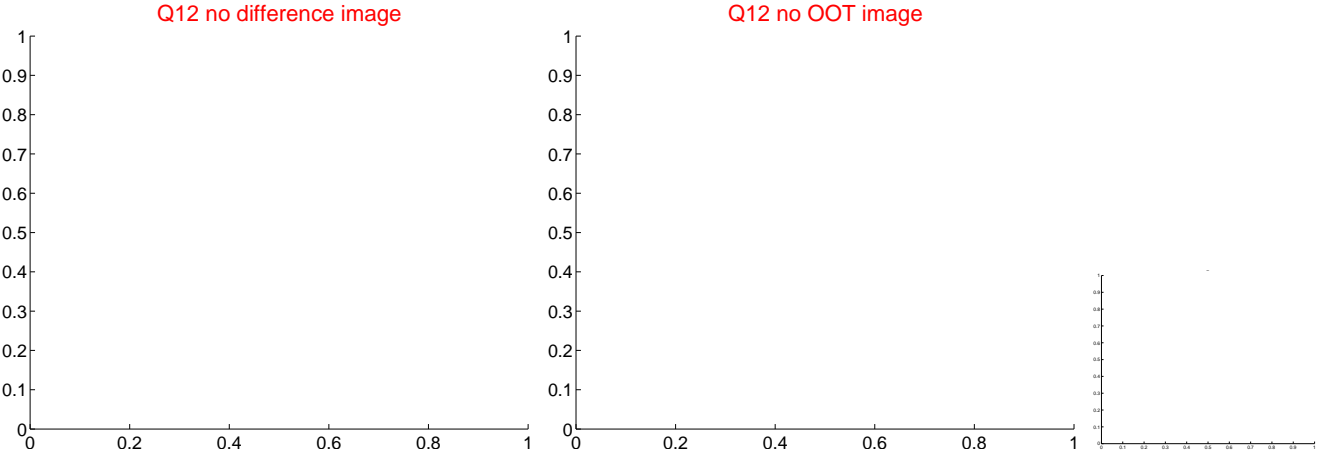
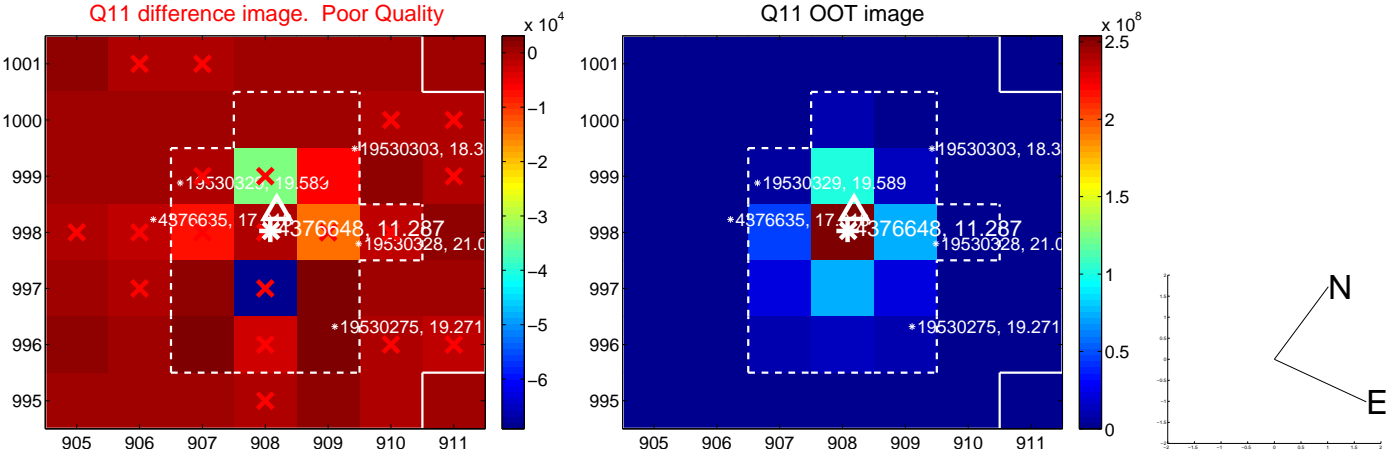
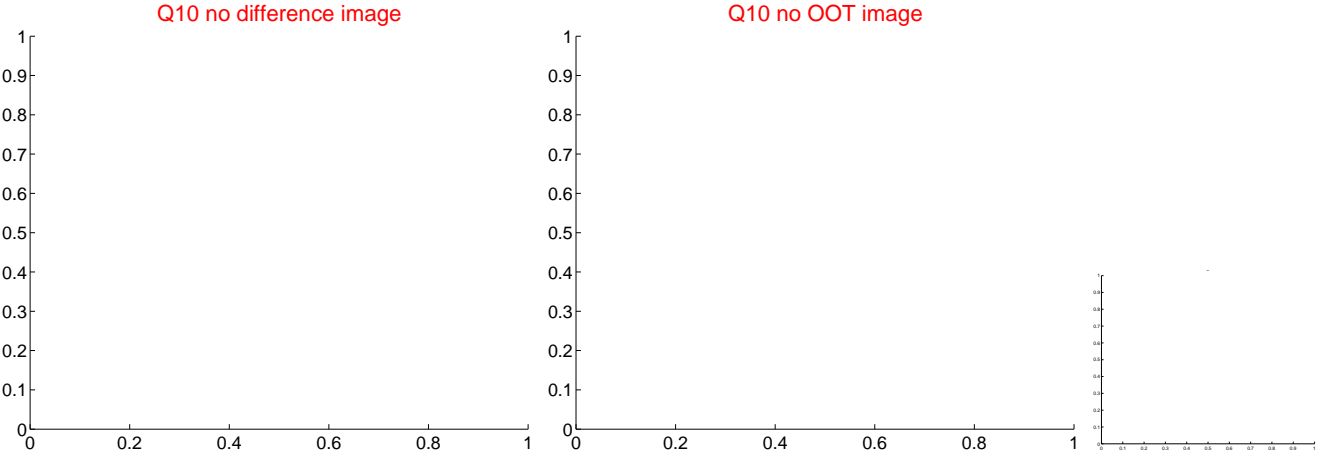
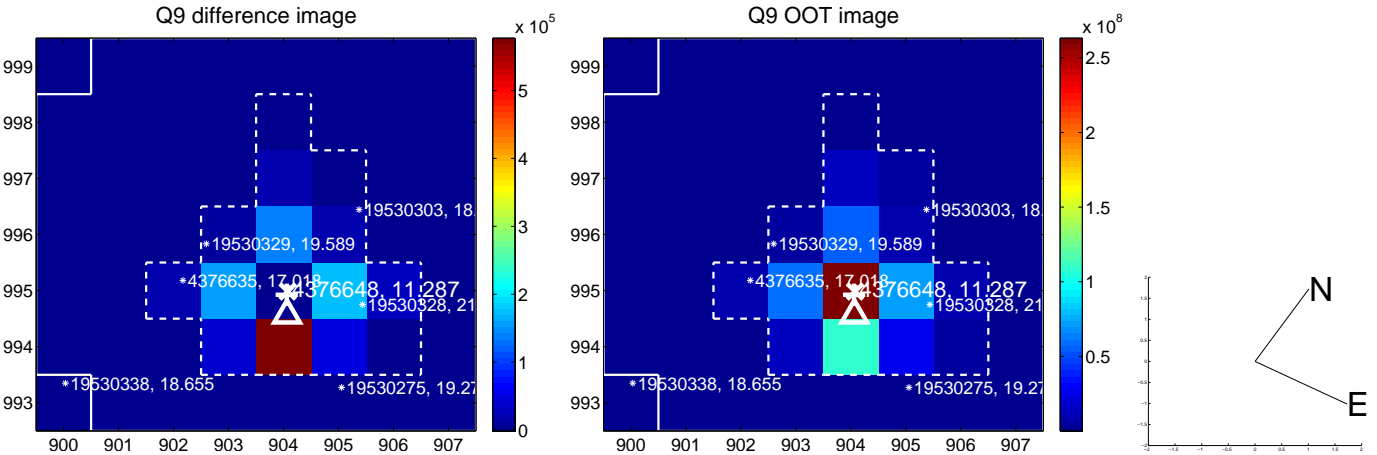
Q4 no OOT image



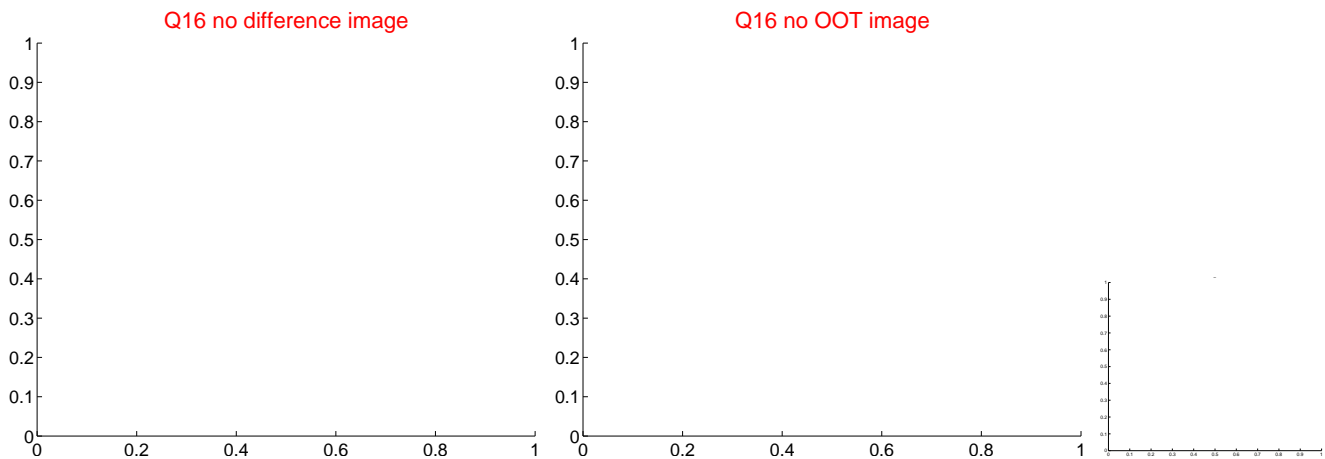
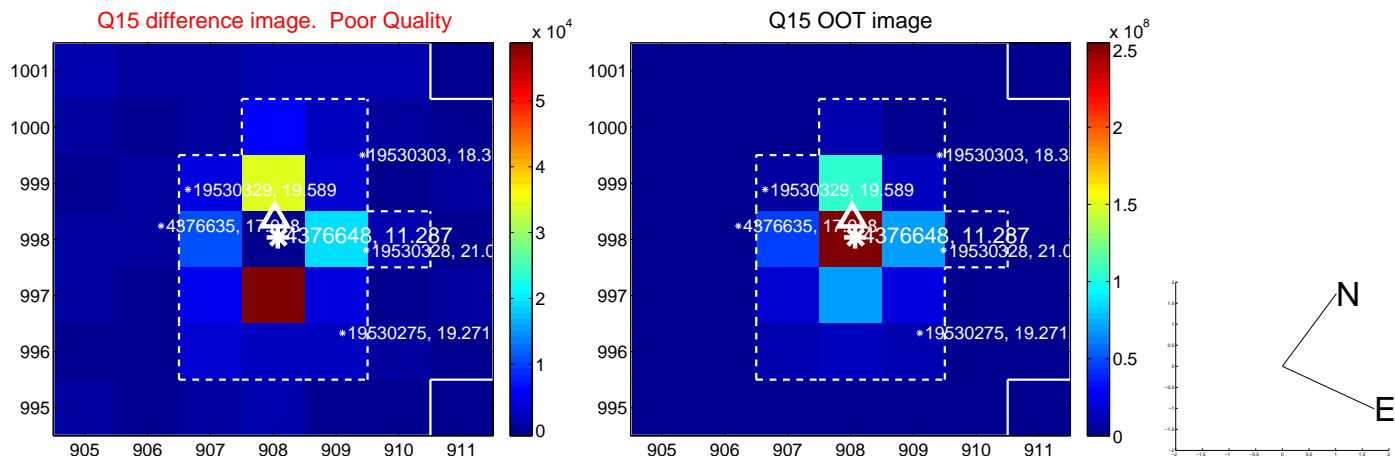
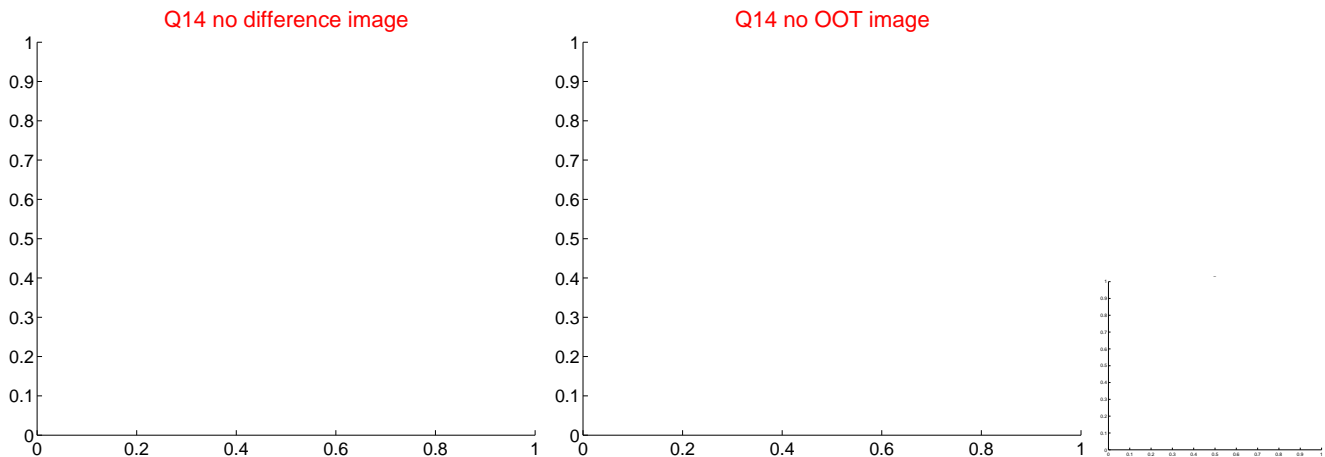
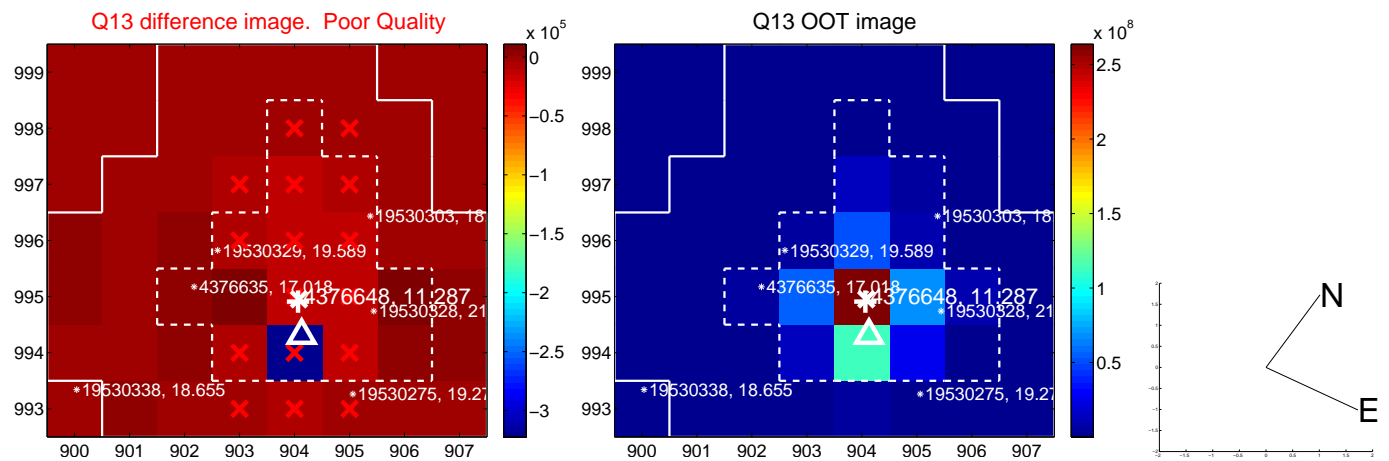
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



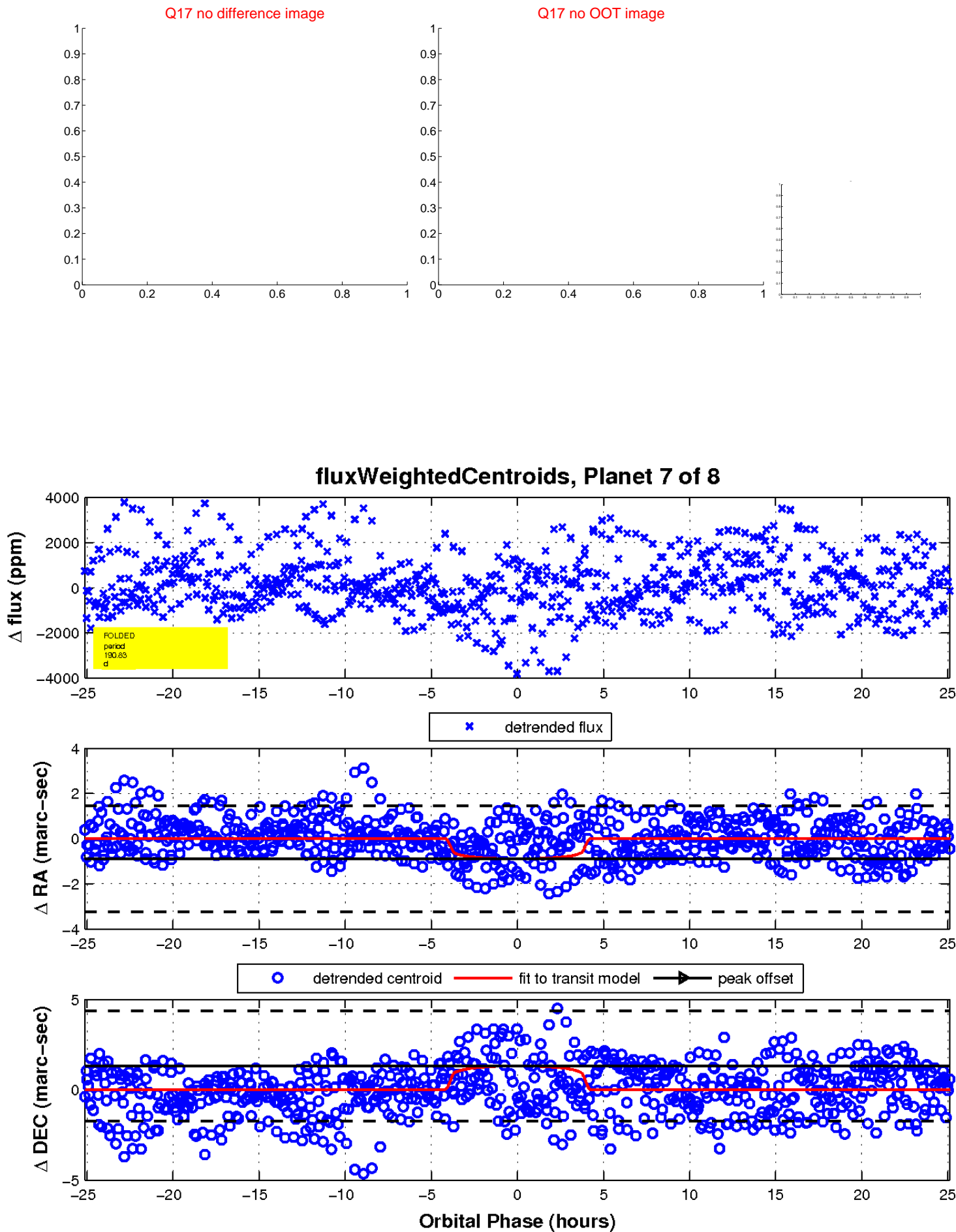
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

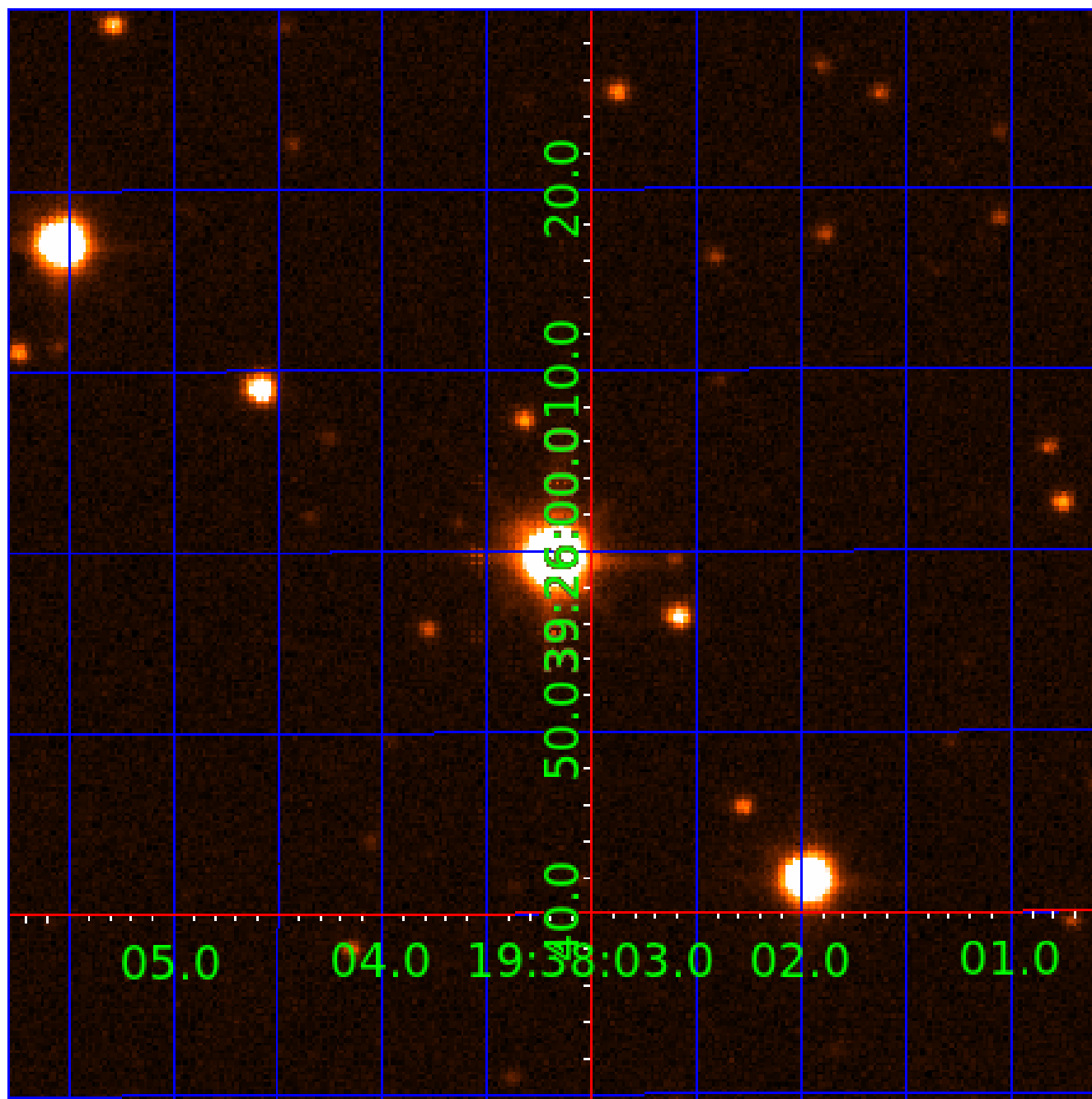


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 004376648

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})
004376648-01	OBS	No	0.521668	131.999628	63.6	1.753	8.2	8.0	1.86	7024	1.72	37778.75
004376648-02	OBS	No	0.521665	131.821686	102.9	2.008	9.8	9.2	1.86	7024	2.19	37779.04
004376648-03	OBS	No	168.888956	145.773100	4077.1	5.209	9.8	9.2	1.86	7024	14.16	16.99
004376648-04	OBS	No	24.301768	152.287360	540.9	5.002	9.5	3.4	1.86	7024	4.80	225.38
004376648-05	OBS	No	25.920856	139.493335	821.9	7.527	9.2	5.7	1.86	7024	5.65	206.81
004376648-06	OBS	No	40.096338	164.771975	2229.8	4.518	8.9	8.4	1.86	7024	12.09	115.60
004376648-07	OBS	No	190.833969	297.200532	2747.5	8.379	9.1	8.8	1.86	7024	9.99	14.44
004376648-08	OBS	No	85.043521	202.020398	111.8	3.500	8.8	-1.0	1.86	7024	1.99	42.42

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004376648-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_SATURATED
004376648-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—SAME_NTL_PERIOD—CENT_SATURATED
004376648-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
004376648-04	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED—HALO_GHOST
004376648-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
004376648-06	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED—HALO_GHOST
004376648-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
004376648-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED

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

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

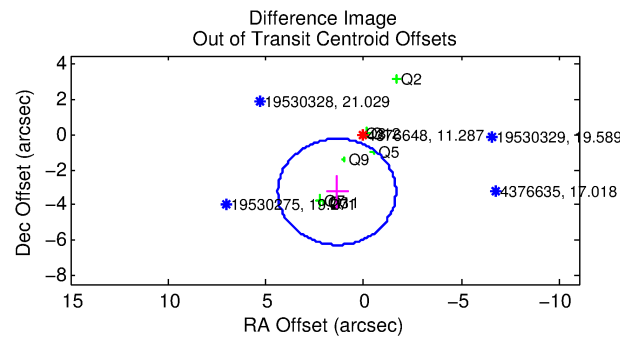
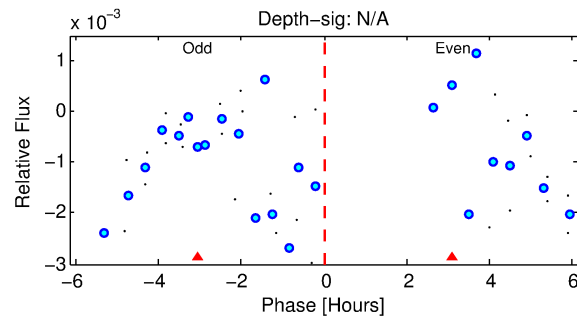
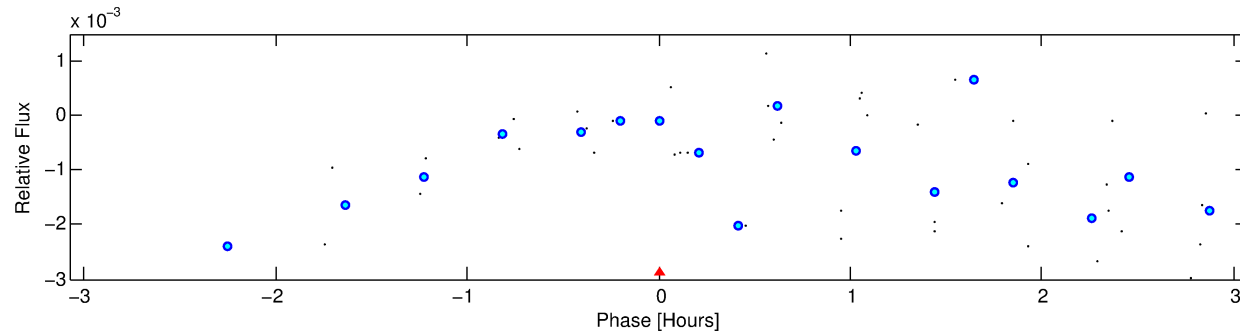
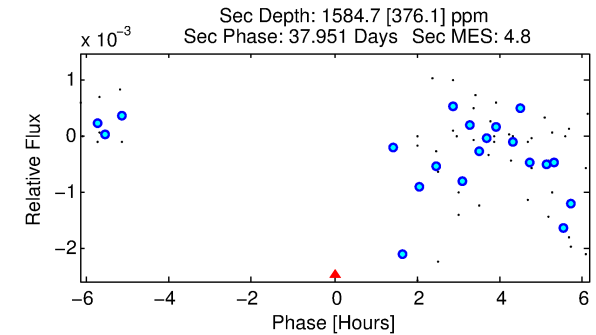
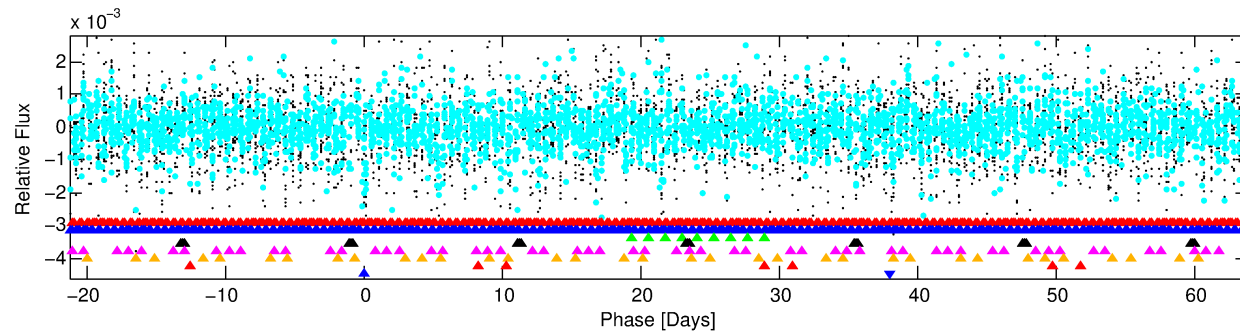
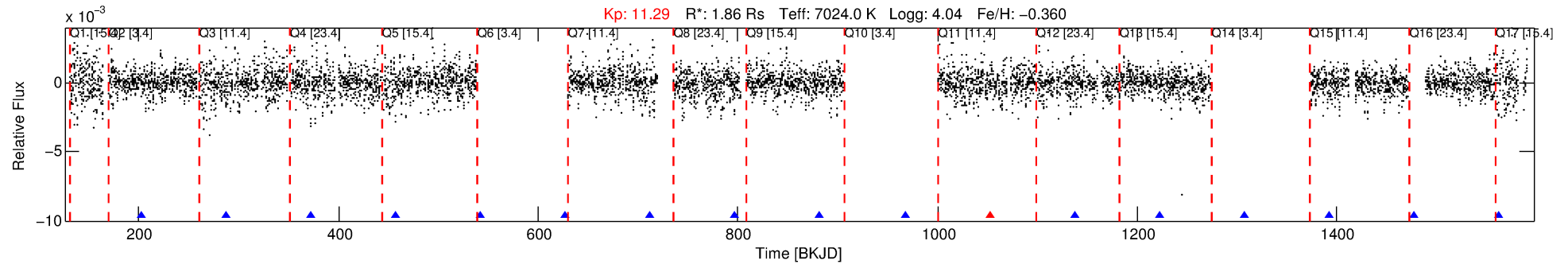
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 004376648-08

No Significant Match Found

DV One-Page Summary

KIC: 4376648 Candidate: 8 of 8 Period: 85.044 d



TPS TCE Results:

Period = 85.04352 d
Epoch = 202.0204 BKJD

DV fit results are unavailable

DV Diagnostic Results:

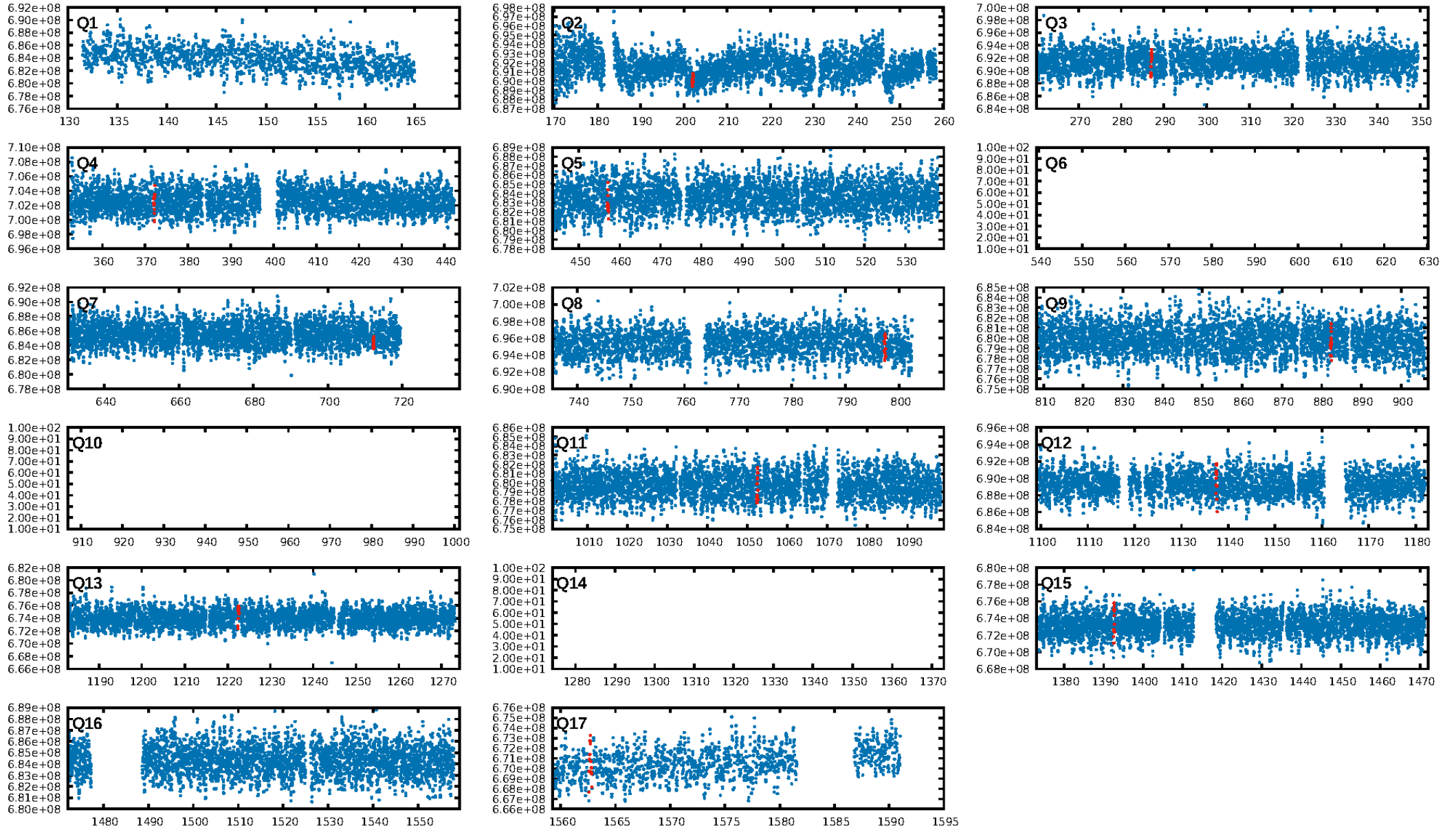
ShortPeriod-sig: 100.0% [188.76 σ]
LongPeriod-sig: 100.0% [320.65 σ]
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: N/A
RollingBand-fgt: 0.86 [6/7]
GhostDiagnostic-chr: 1.053

Centroid-sig: 3.8%
Centroid-so: 2.497 arcsec [1.86 σ]
OotOffset-rm: 3.537 arcsec [3.51 σ]
KicOffset-rm: 3.566 arcsec [3.54 σ]
OotOffset-st: 1/3/2/2 [8]
KicOffset-st: 1/3/2/2 [8]
DiffImageQuality-fgm: 0.62 [5/8]
DiffImageOverlap-fno: 0.00 [0/8]

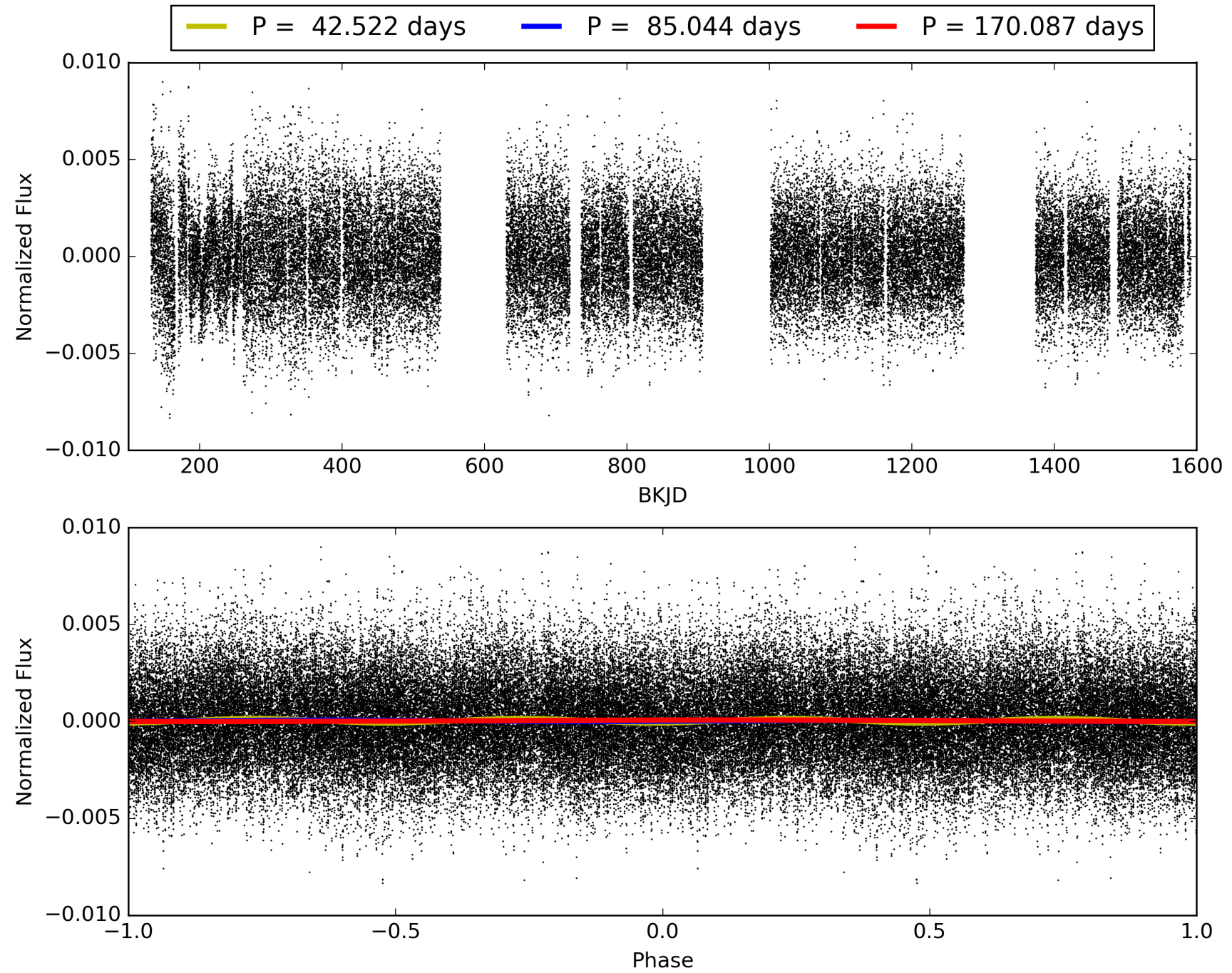
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 21:52:27 Z

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

TCE 004376648-08, PDC Light Curves

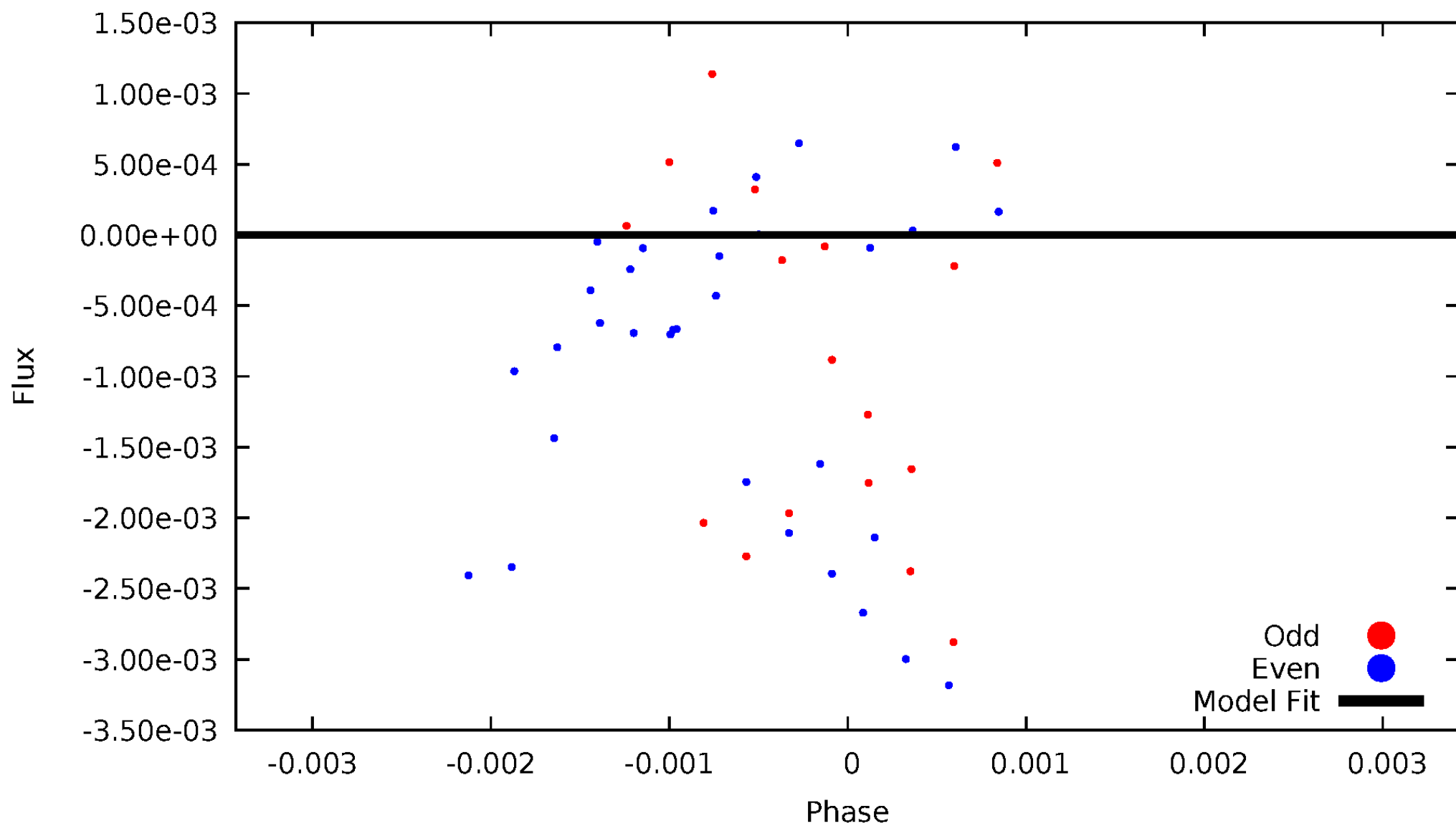


TCE 004376648-08



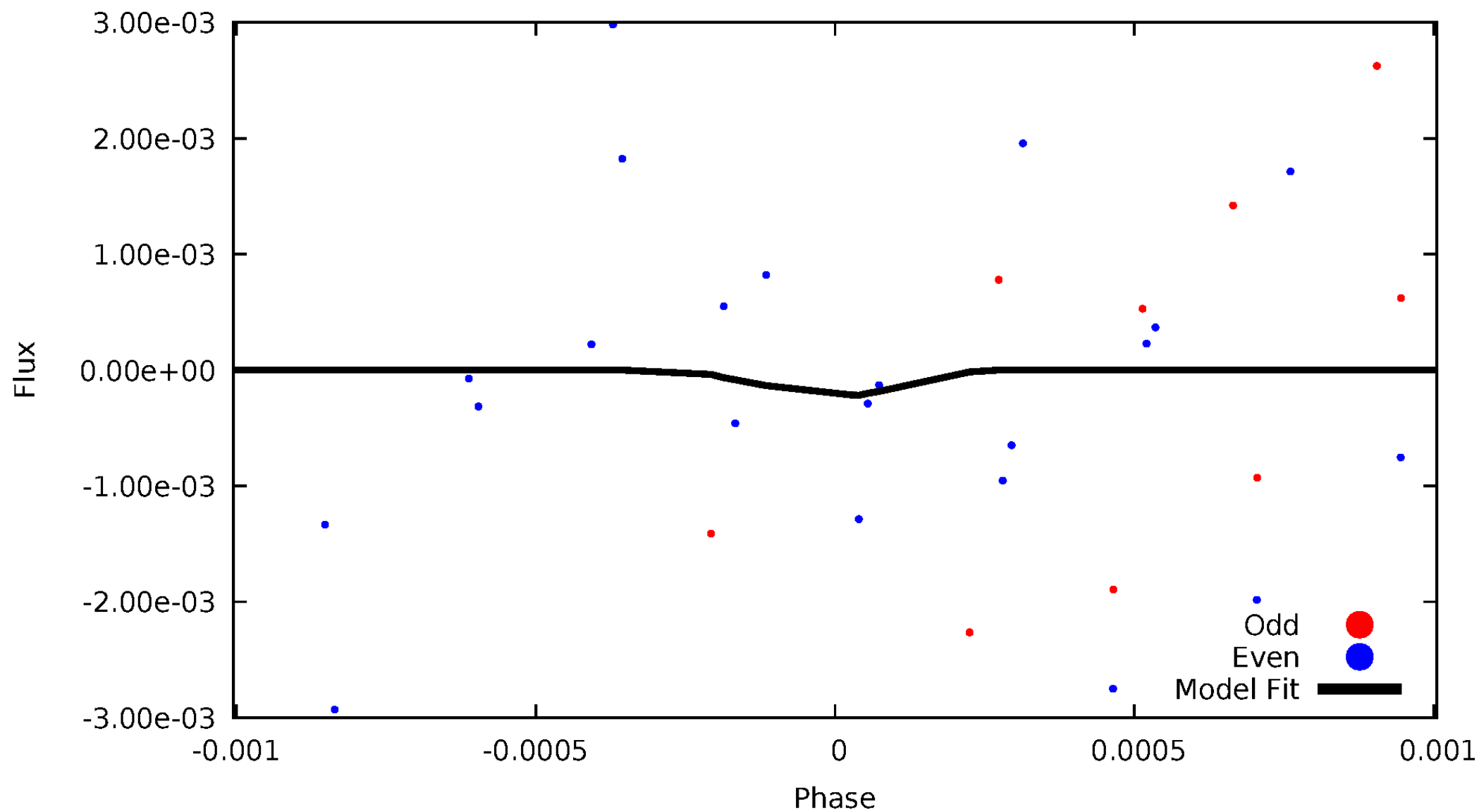
DV Odd/Even

TCE 004376648-08



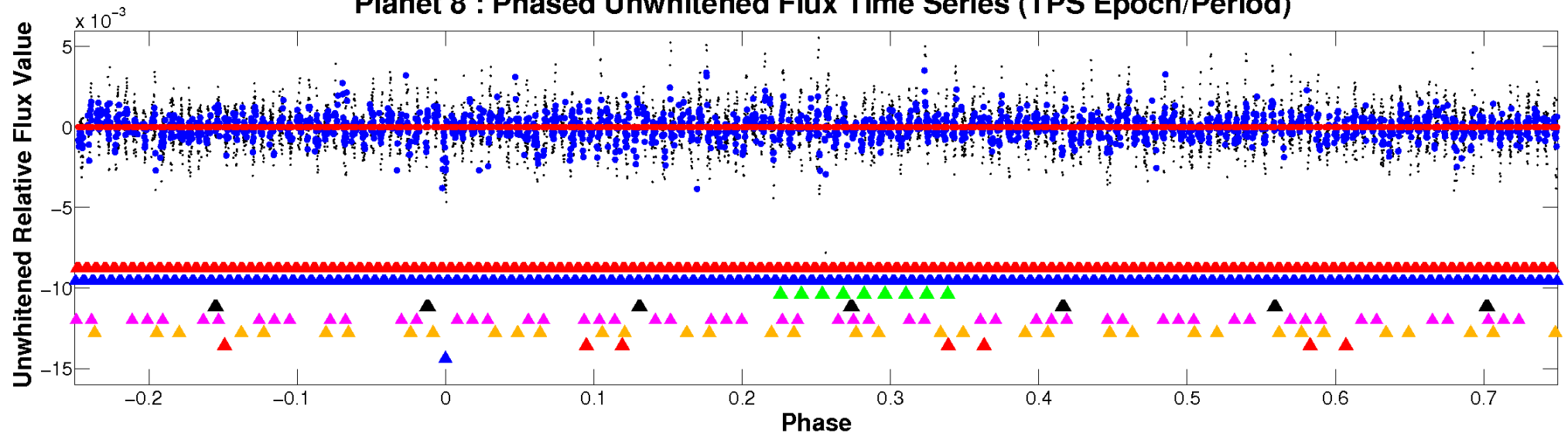
ALT Odd/Even

TCE 004376648-08

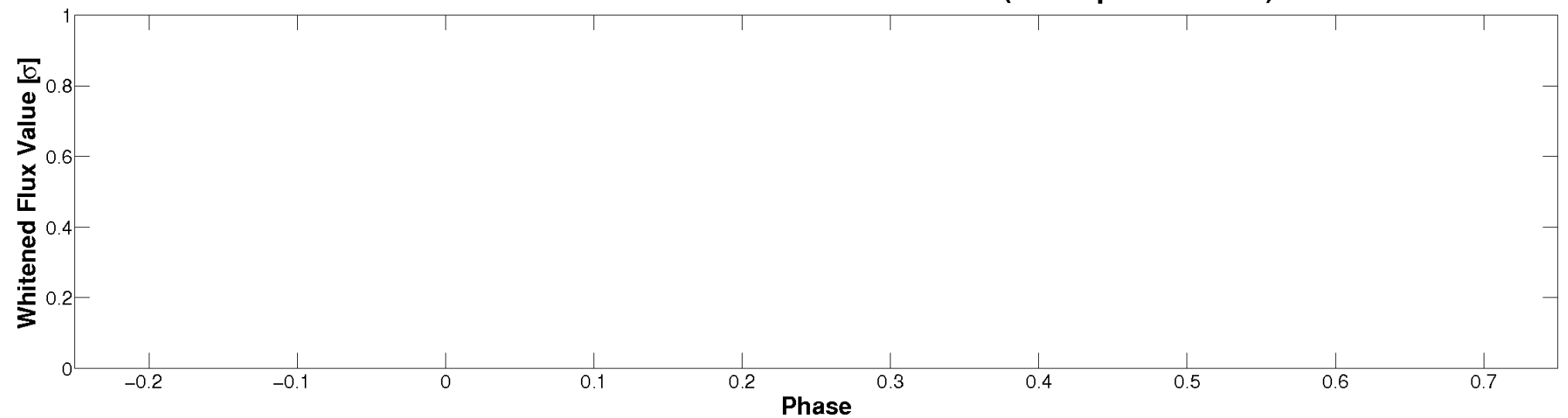


Non-Whitened Vs. Whitened Light Curve

Planet 8 : Phased Unwhitened Flux Time Series (TPS Epoch/Period)

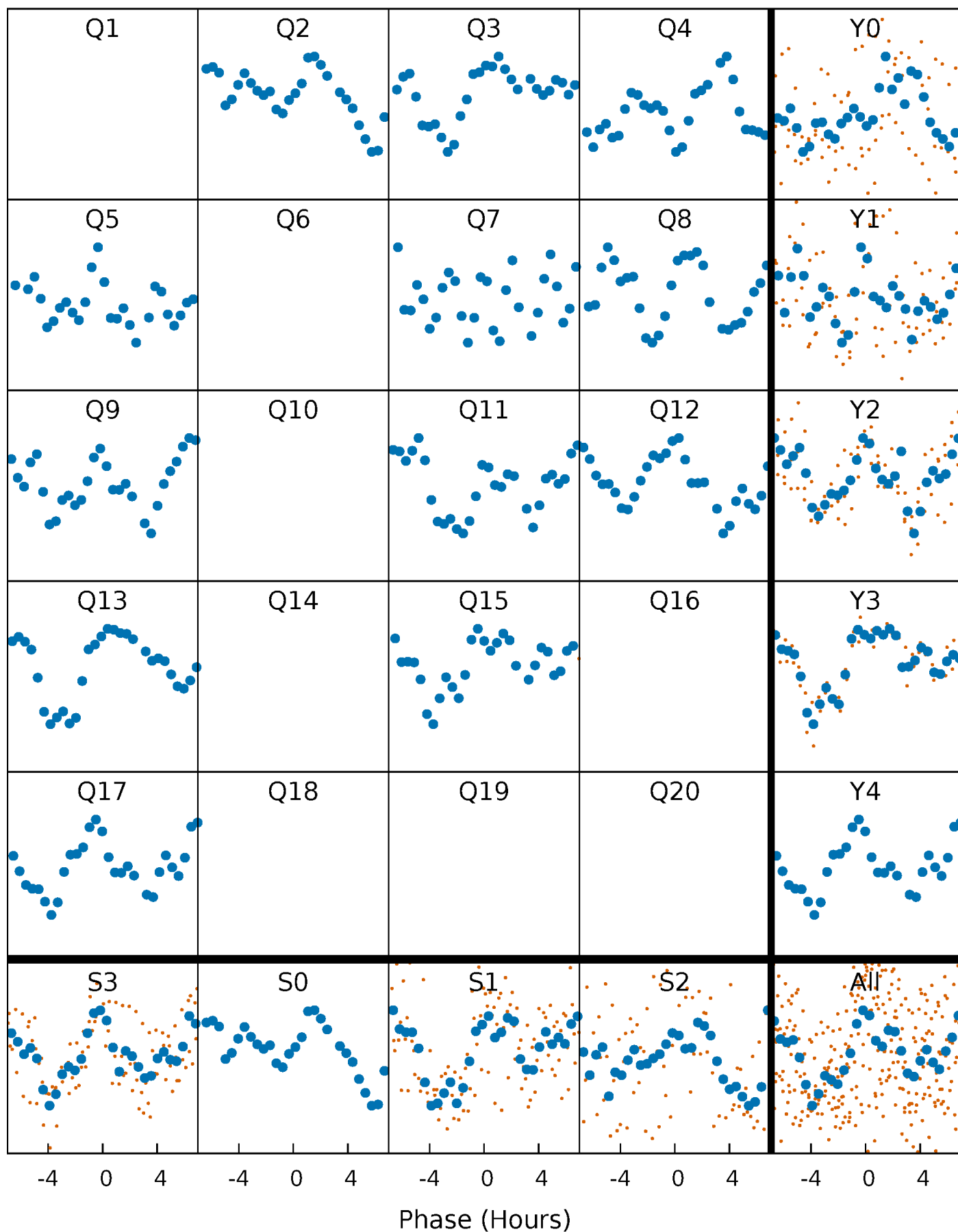


Planet 8 : Phased Whitened Flux Time Series (TPS Epoch/Period)



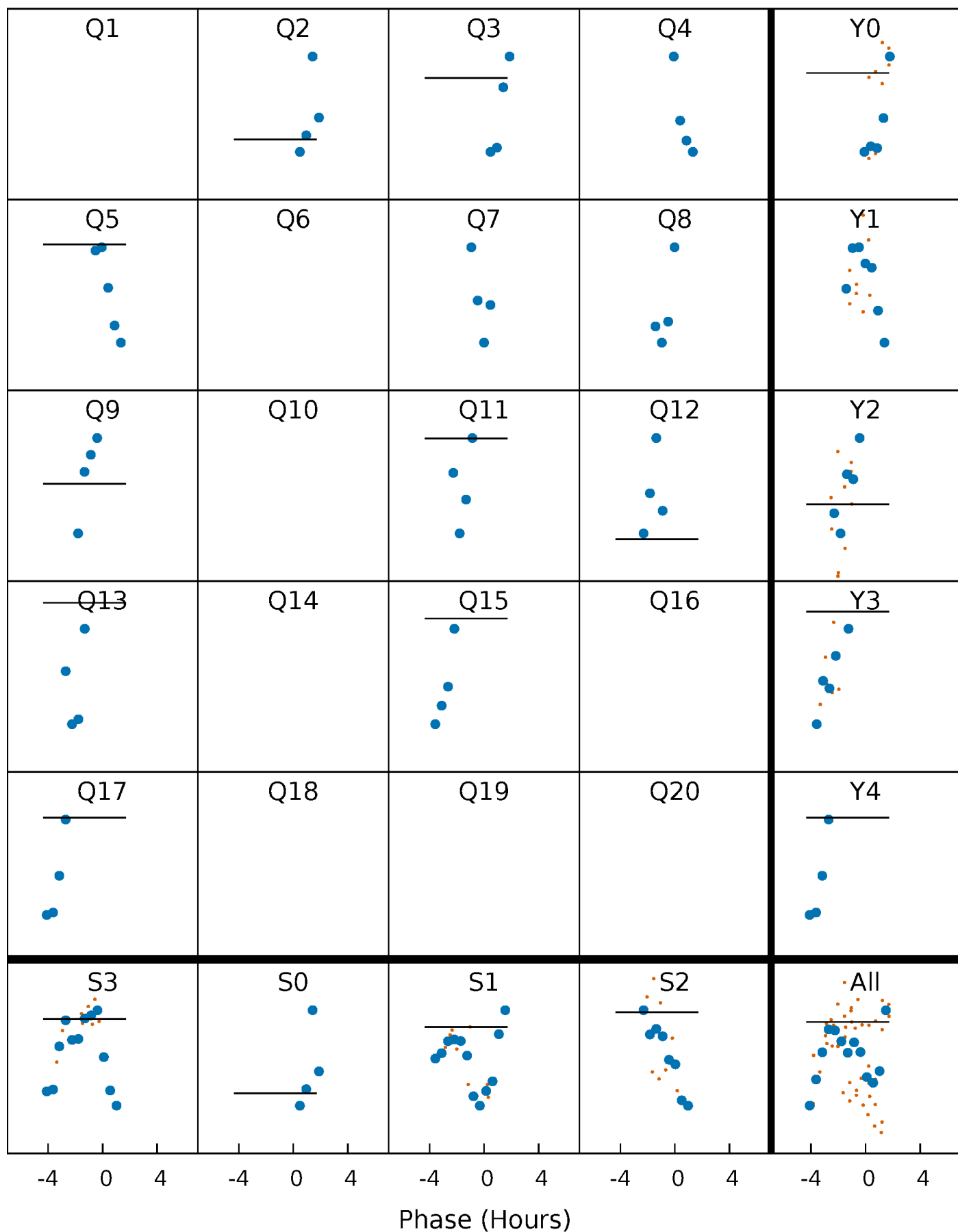
PDC Quarter-Phased Transit Curves

TCE 004376648-08 $P = 85.043521$ Days $T_0 = 202.020398$ (BKJD)



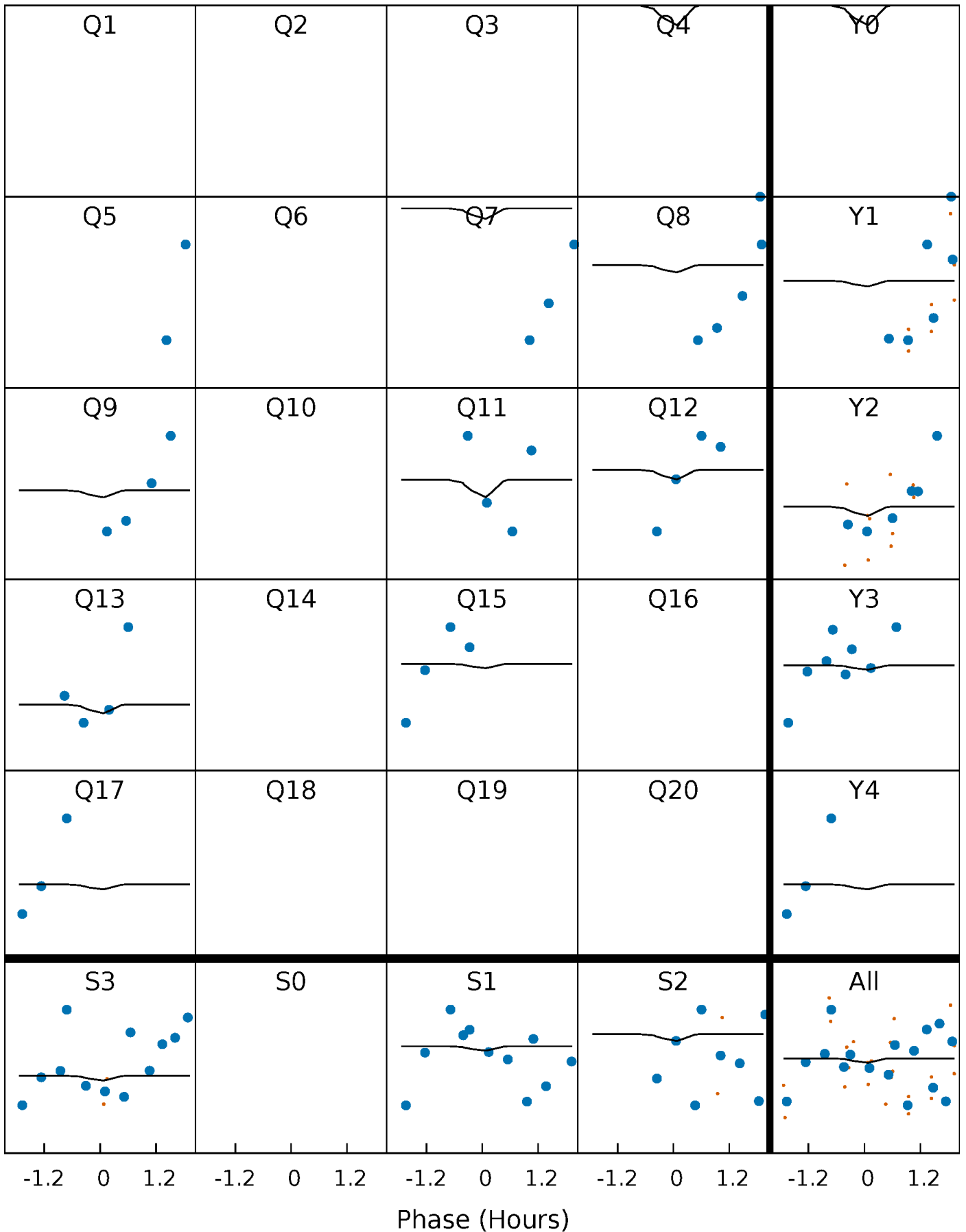
DV Quarter-Phased Transit Curves

TCE 004376648-08 $P = 85.043521$ Days $T_0 = 202.020398$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

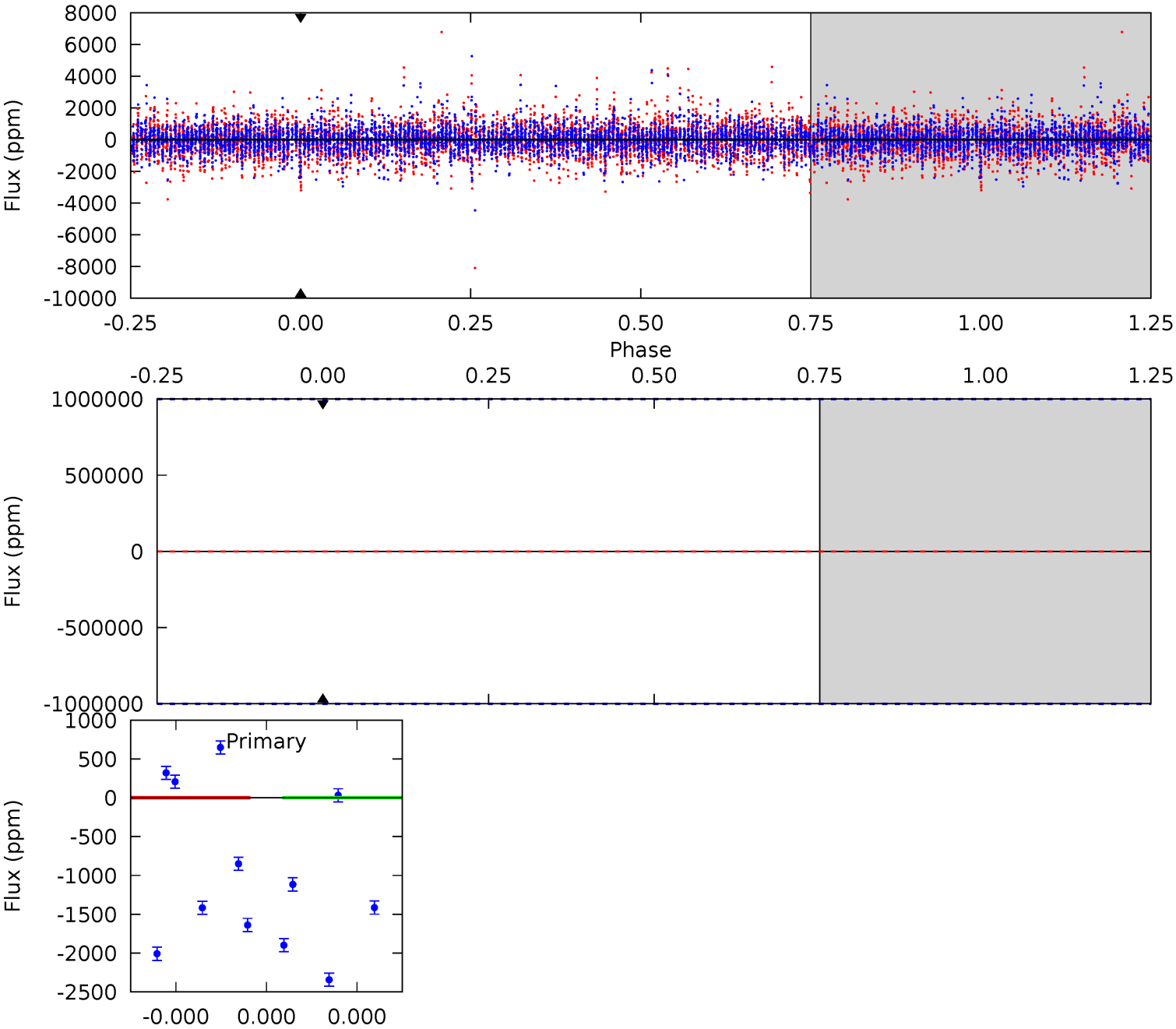
TCE 004376648-08 $P = 85.043521$ Days $T_0 = 201.932496$ (BKJD)



DV Model-Shift Uniqueness Test

004376648-08, P = 85.043521 Days, E = 116.976877 Days

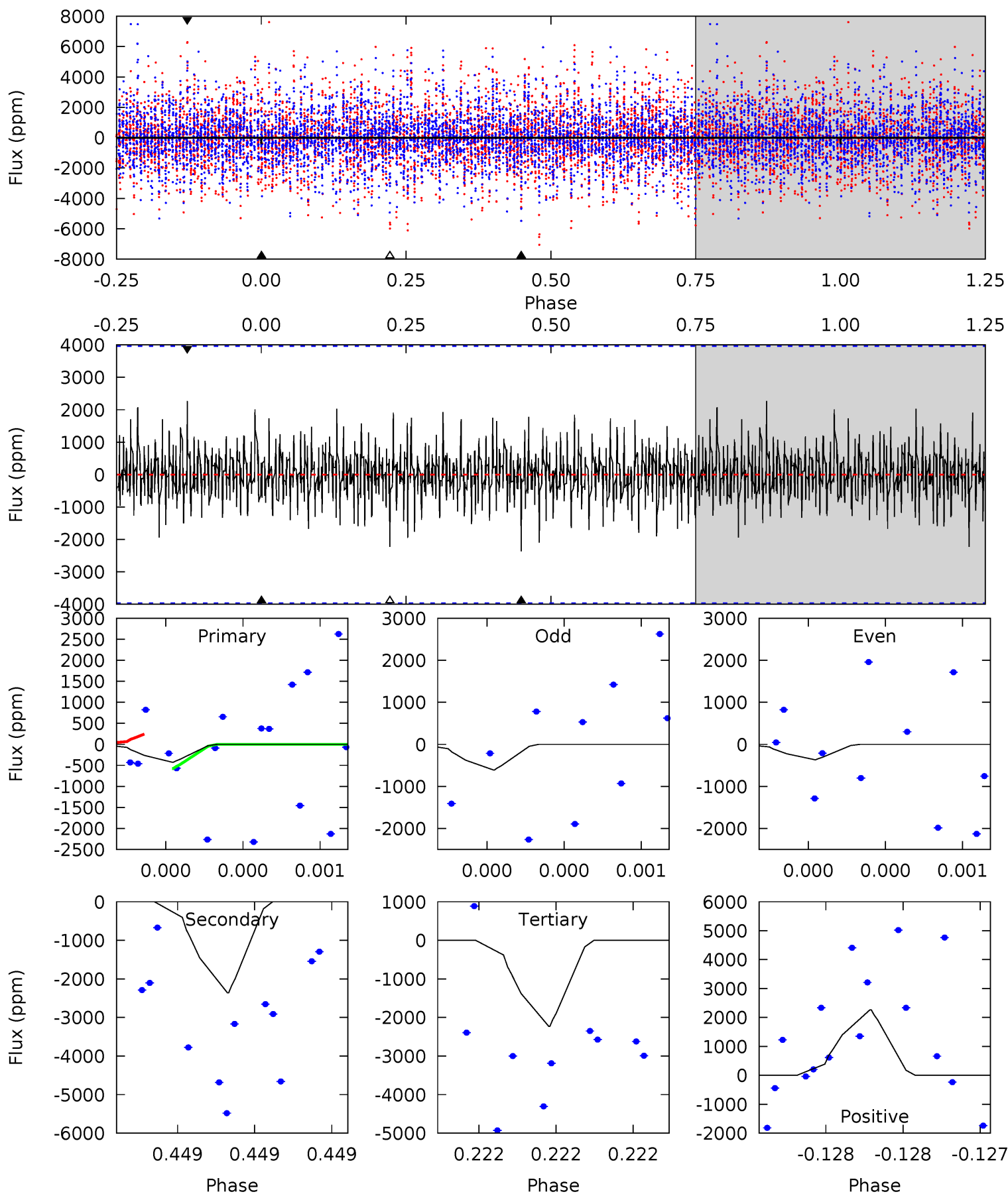
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



Alt Model-Shift Uniqueness Test

004376648-08, P = 85.043521 Days, E = 116.888975 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0.60	3.34	3.15	3.20	5.61	3.53	0.87	-2.55	-2.60	0.19	0.14	0.13	0.88	0.49	0.22



Stellar Parameters For KIC 004376648

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	$M(M_{\odot})$	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	7024^{+164}_{-246}	$4.039^{+0.252}_{-0.168}$	$-0.360^{+0.300}_{-0.300}$	$1.857^{+0.478}_{-0.584}$	$1.378^{+0.202}_{-0.269}$	$0.303^{+0.486}_{-0.145}$
	+2%/-4%	+6%/-4%	+83%/-83%	+26%/-31%	+15%/-20%	+160%/-48%
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 004376648-08 / KOI

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	0 ± 1000000	$14.12^{+15.15}_{-9.76}$	904^{+67}_{-84}	-4740^{+43028}_{-29707}	$-331.690^{+95733.371}_{-87455.015}$
Alt.	-2364 ± 708	$15.55^{+14.87}_{-11.03}$	901^{+70}_{-70}	5493^{+5731}_{-1308}	947^{+9387}_{-716}

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

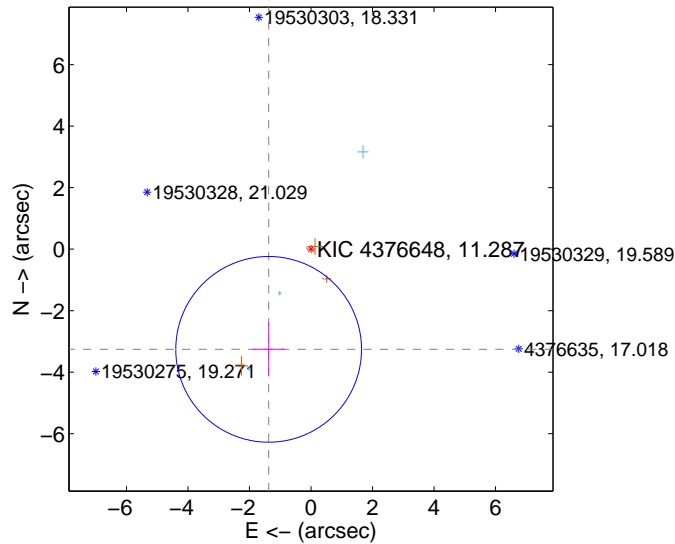
Supplemental centroid analysis for 004376648-08. **Kepler magnitude: 11.29.** Transit SNR -1.00

There are 5 quarters with good PRF difference image offsets

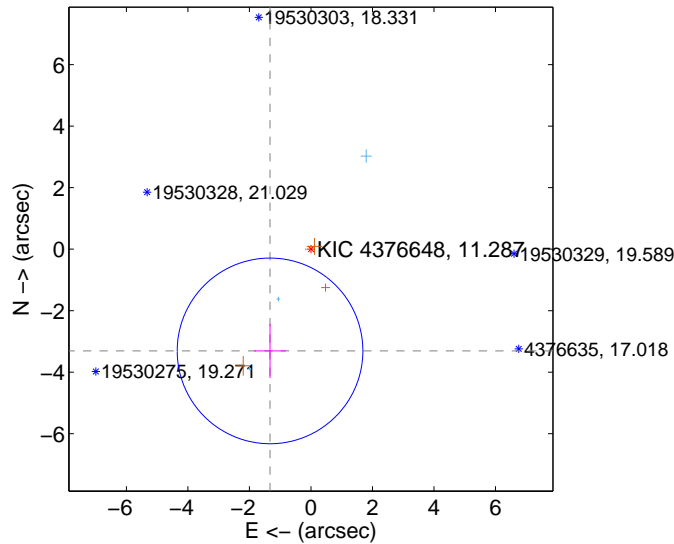
The direct PRF centroid is offset from the target star catalog position by about 0.02 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	3.537 ± 1.007	3.51	1.377 ± 0.527	-3.258 ± 0.881
PRF-fit source offset from KIC position	3.566 ± 1.006	3.54	1.330 ± 0.518	-3.309 ± 0.884
photometric centroid source offset	2.50 ± 1.34	1.86	1.87 ± 1.22	-1.65 ± 1.48

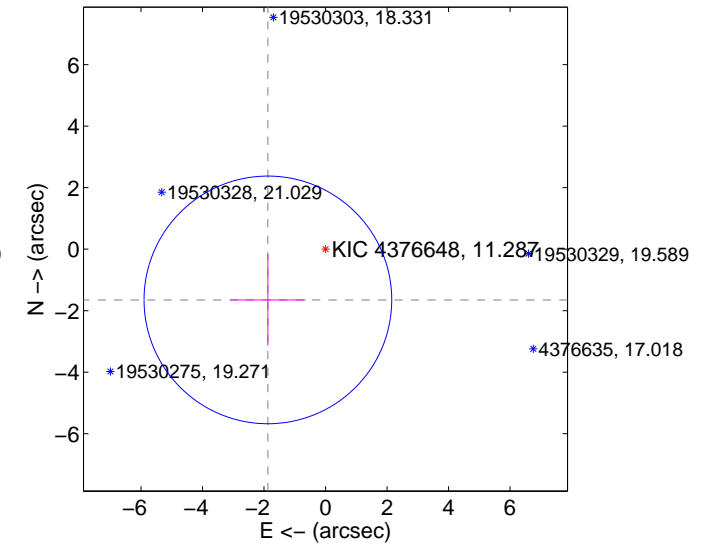
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

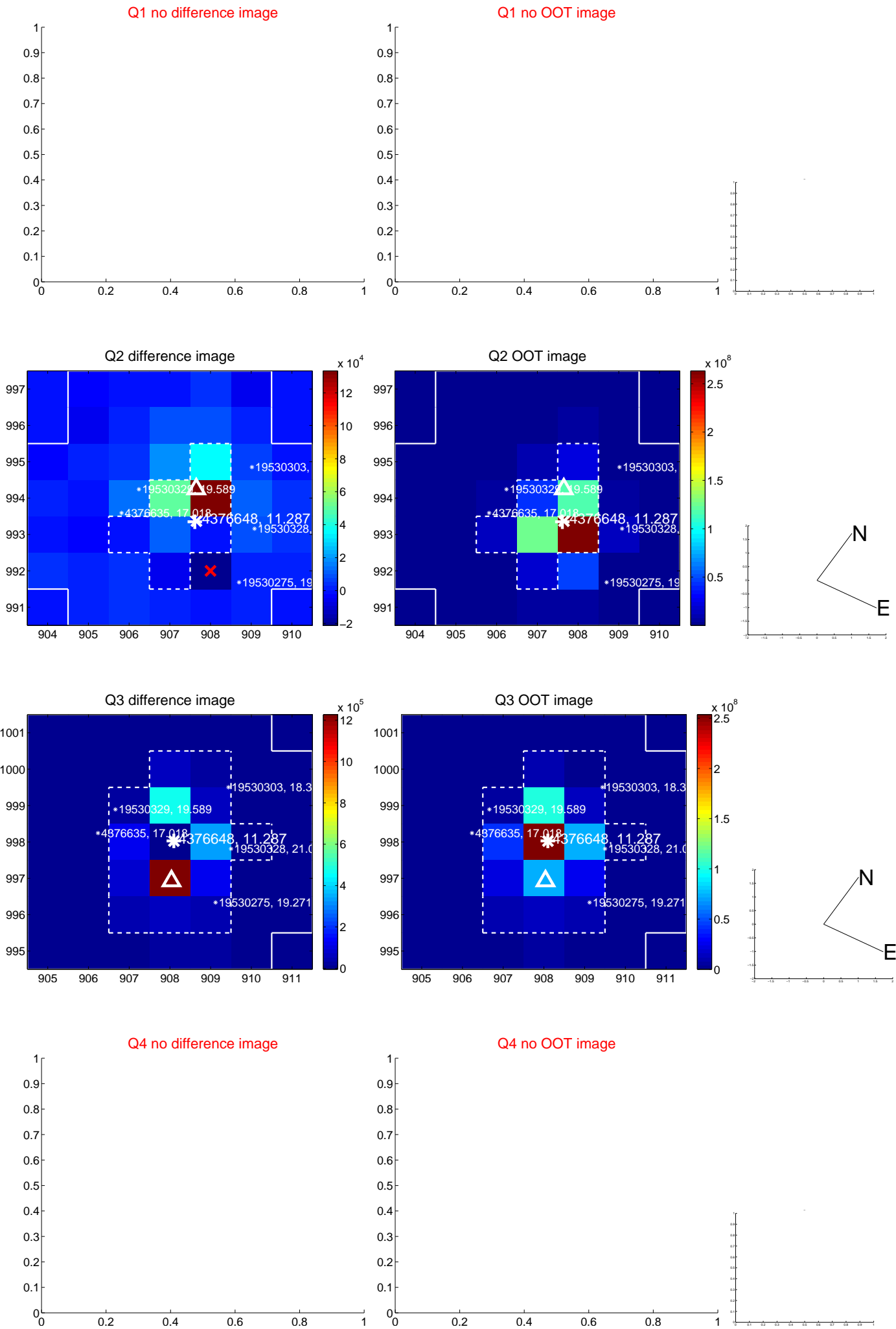


offset from photometric centroids

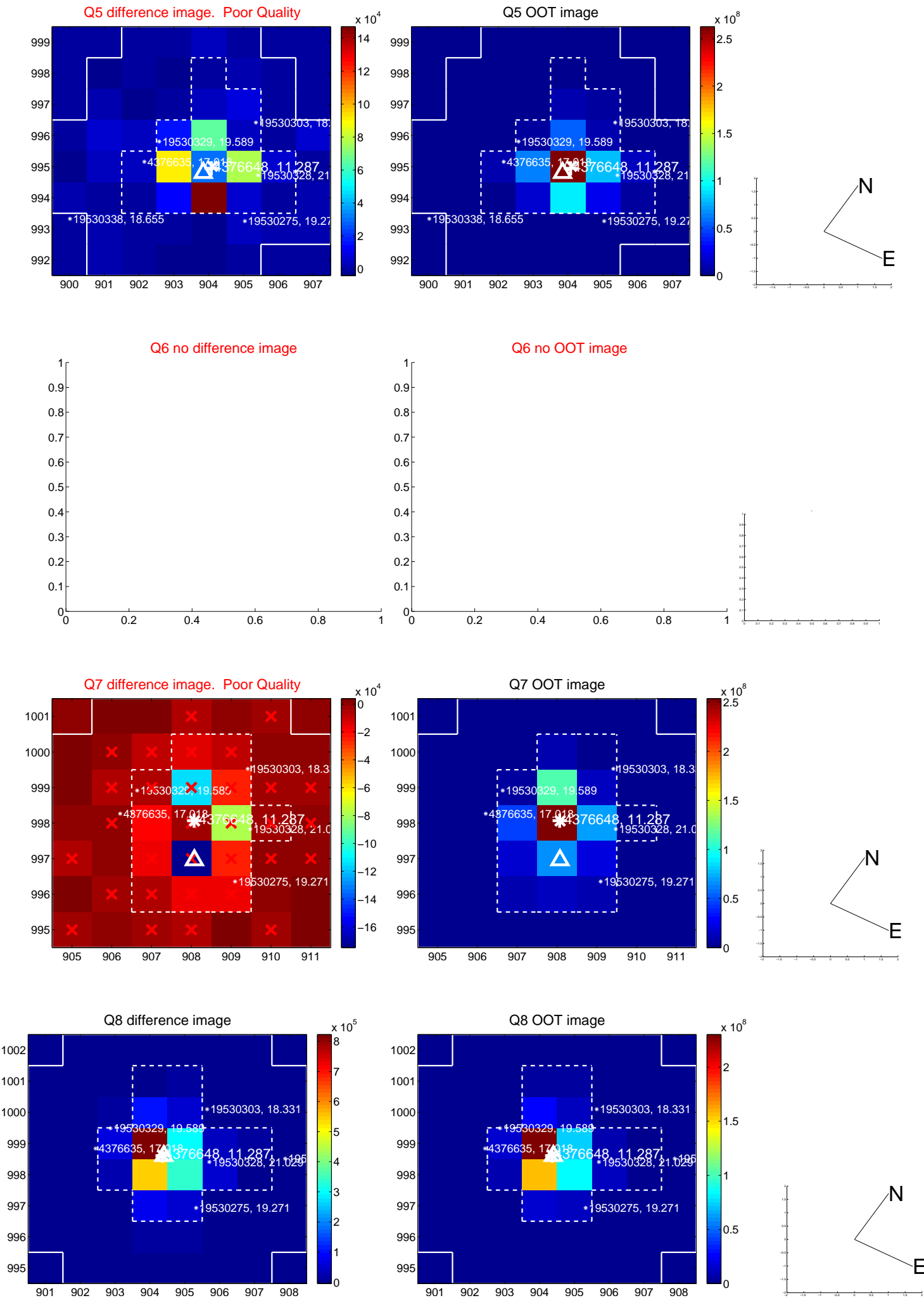


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

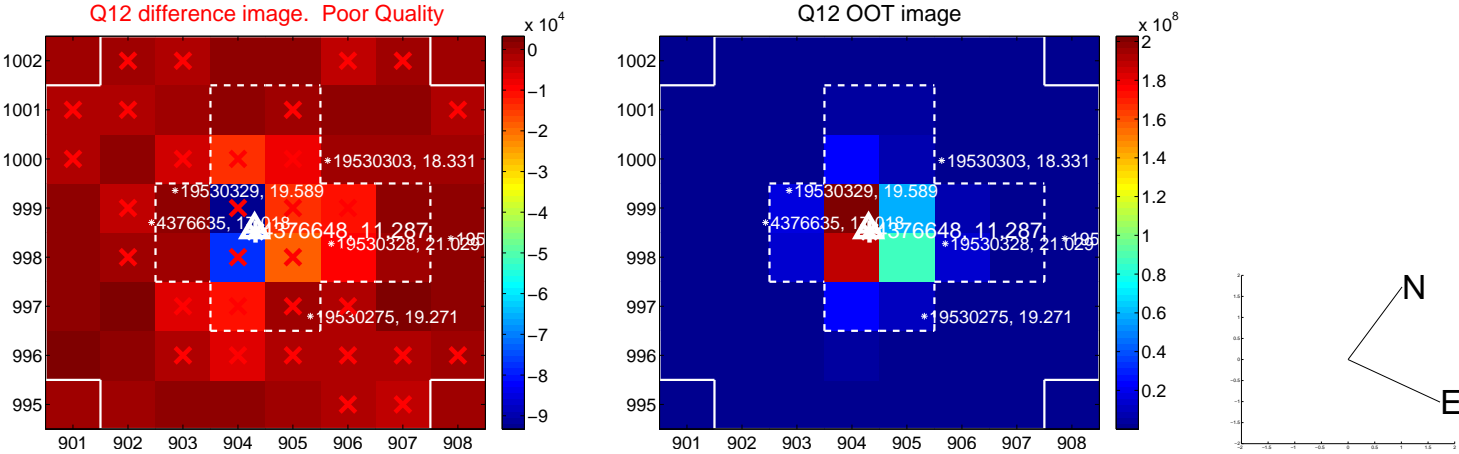
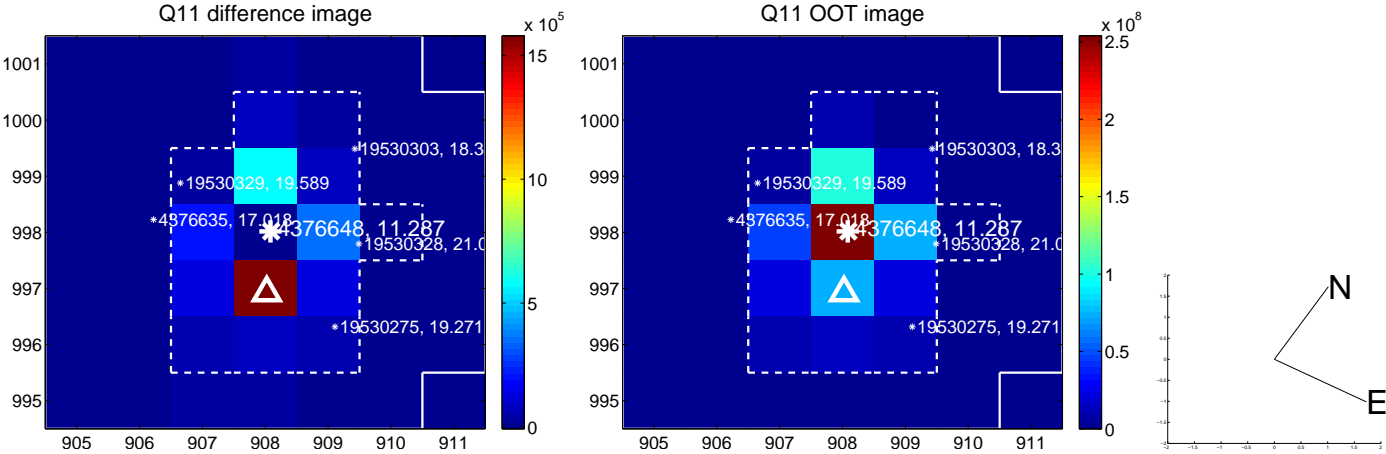
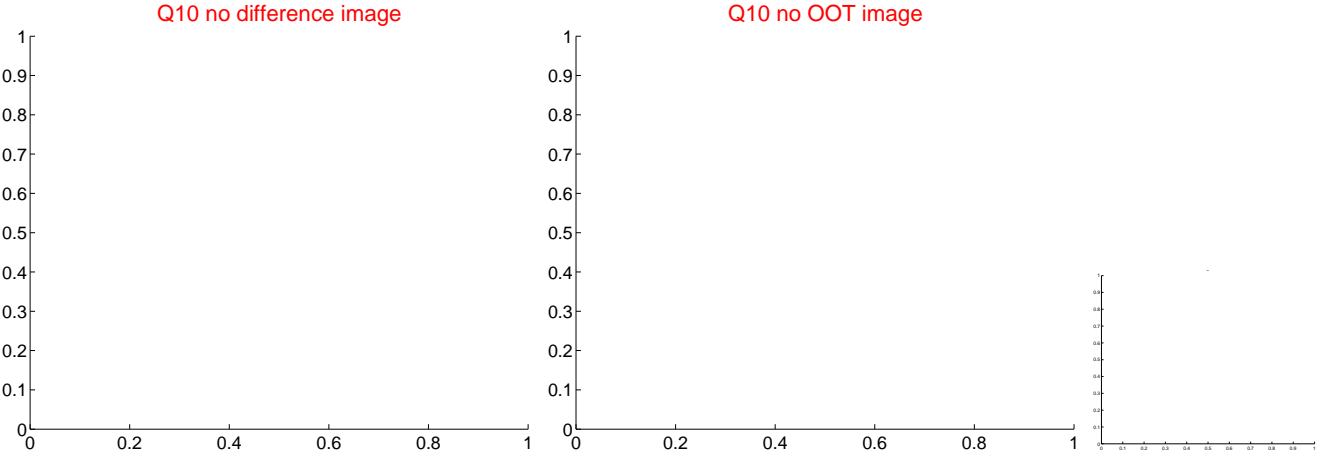
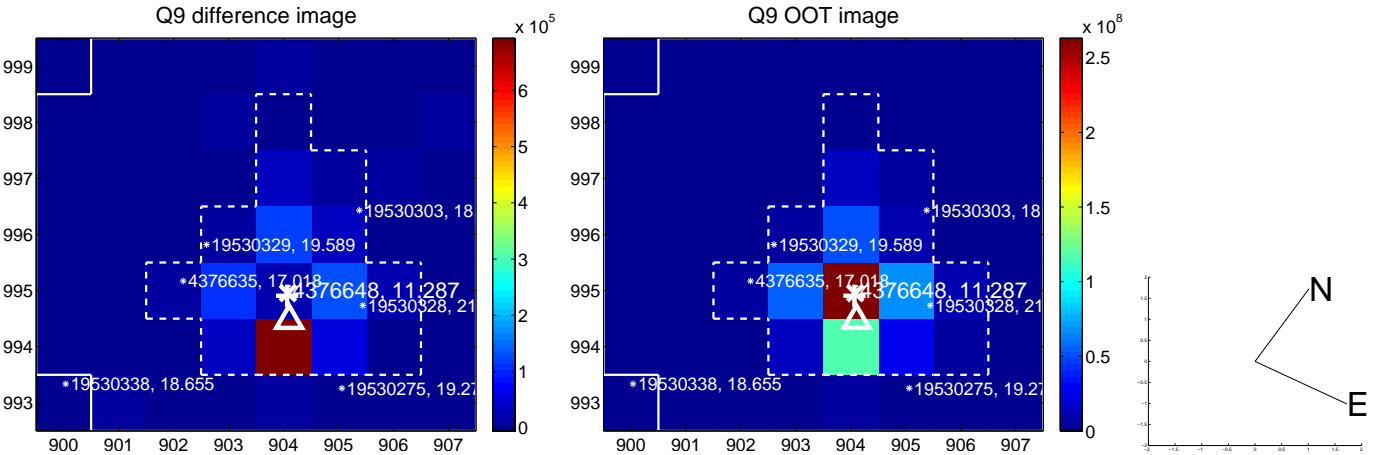
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



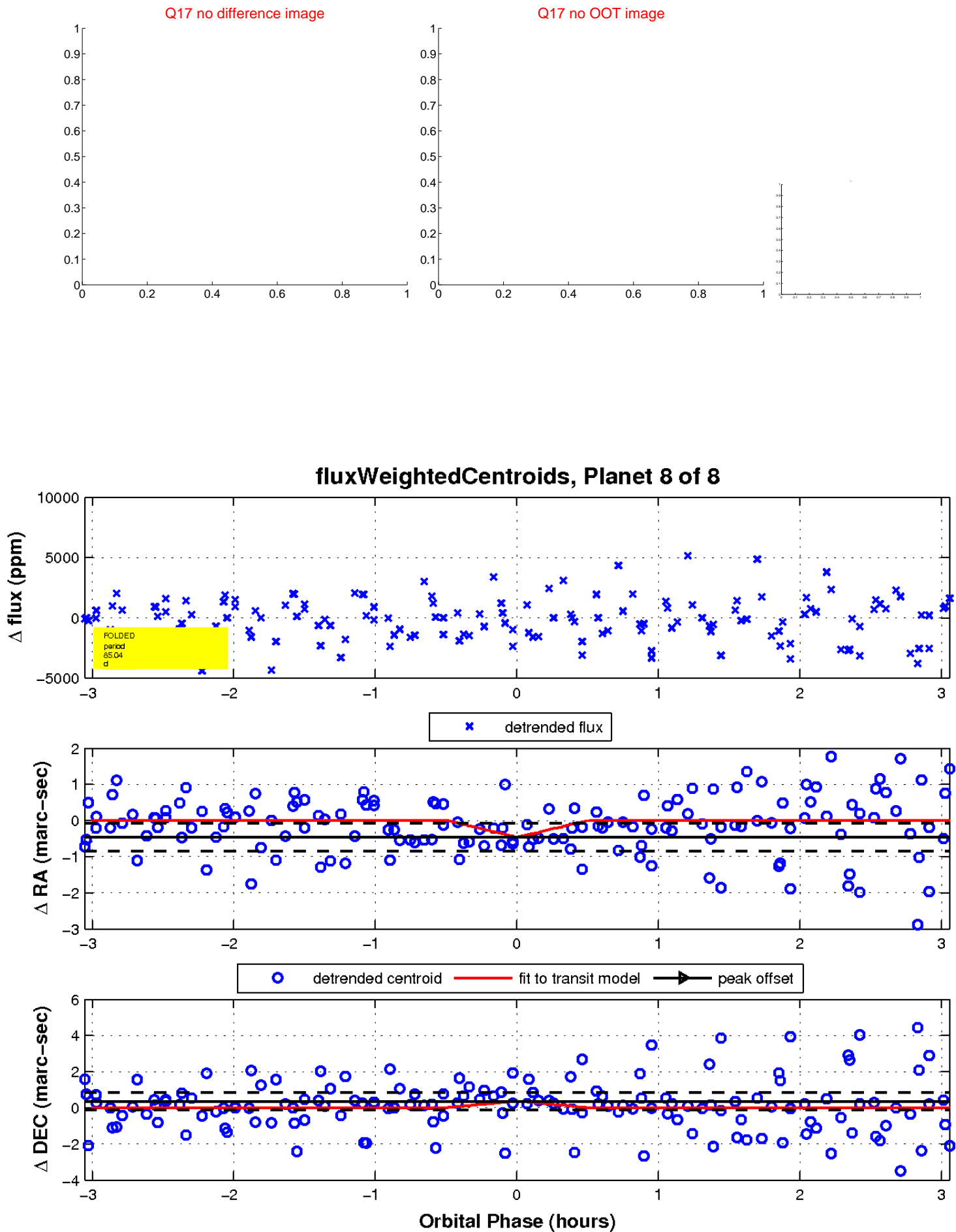
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



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



UKIRT Image

Declination

