

KIC 009407581

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})
009407581-01	OBS	No	402.206945	210.128388	2265.3	3.720	12.7	7.0	0.38	3569	1.81	0.03
009407581-02	OBS	No	381.350559	404.500998	1592.7	5.764	12.8	5.9	0.38	3569	1.58	0.04
009407581-03	OBS	No	568.684013	364.474874	1698.3	8.382	12.6	5.4	0.38	3569	1.55	0.02
009407581-04	OBS	No	414.517175	255.857169	2328.1	5.254	12.7	7.1	0.38	3569	2.02	0.03
009407581-05	OBS	No	494.727668	157.177644	2587.8	14.592	11.3	7.5	0.38	3569	1.94	0.03
009407581-06	OBS	No	549.668579	360.735504	3048.6	9.899	11.4	9.2	0.38	3569	2.07	0.02

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009407581-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009407581-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
009407581-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009407581-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
009407581-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
009407581-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—MOD_NONUNIQ_DV—MOD_POS_DV—CENT_FEW_DIFFS

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

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

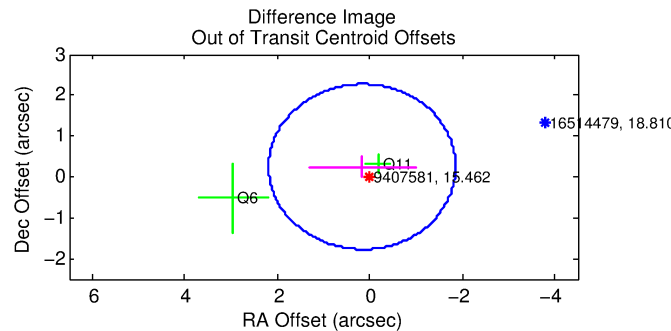
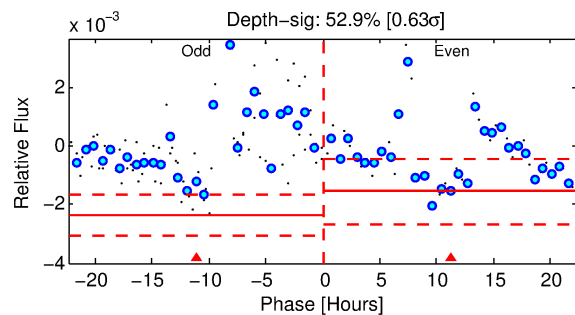
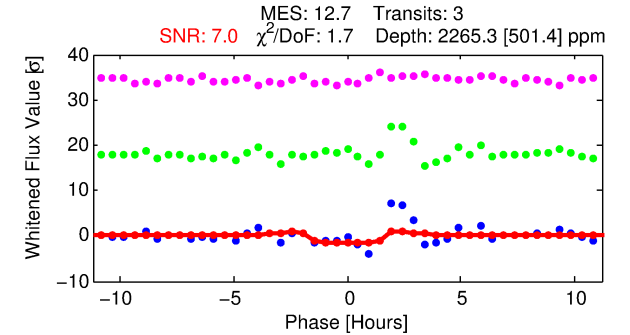
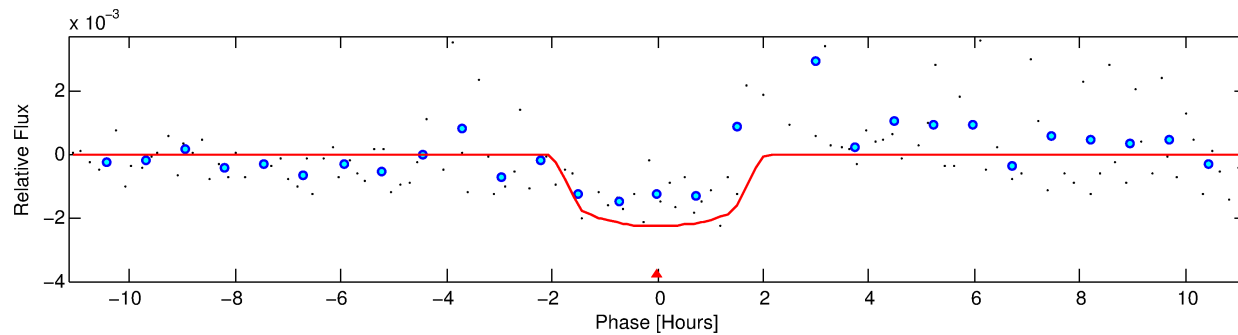
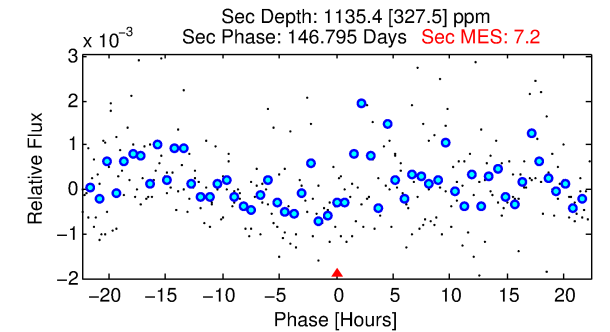
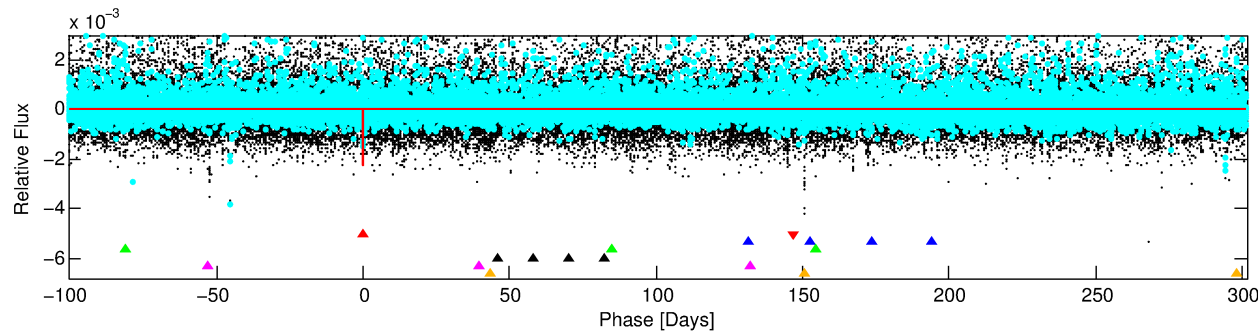
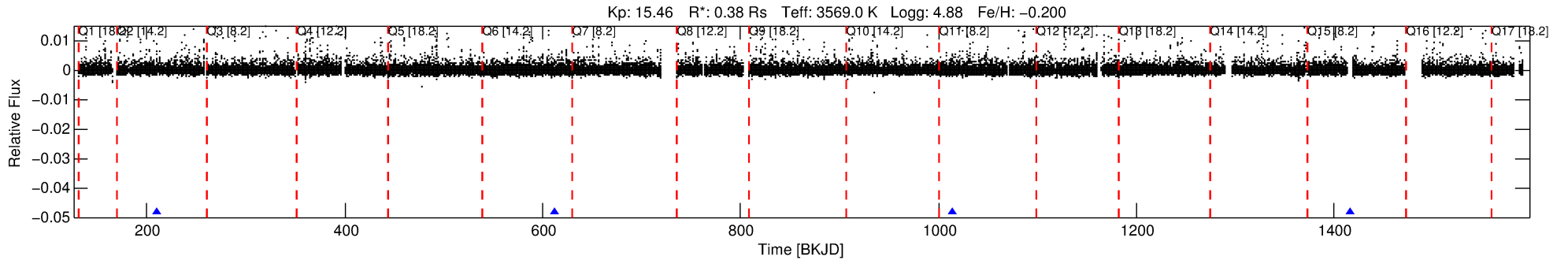
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009407581-01

No Significant Match Found

DV One-Page Summary

KIC: 9407581 Candidate: 1 of 6 Period: 402.207 d



DV Fit Results:

Period = 402.20695 [0.00613] d
Epoch = 210.1284 [0.0088] BKJD
Rp/R* = 0.0439 [0.0443]
a/R* = 807.11 [3651.15]
b = 0.37 [10.66]
Seff = 0.03 [0.00]
Teq = 110 [4] K
Rp = 1.81 [1.84] Re
a = 0.7810 [0.0674] AU
Ag = 116074.57 [236604.93] [0.49σ]
Teffp = 3126 [1592] K [1.90σ]

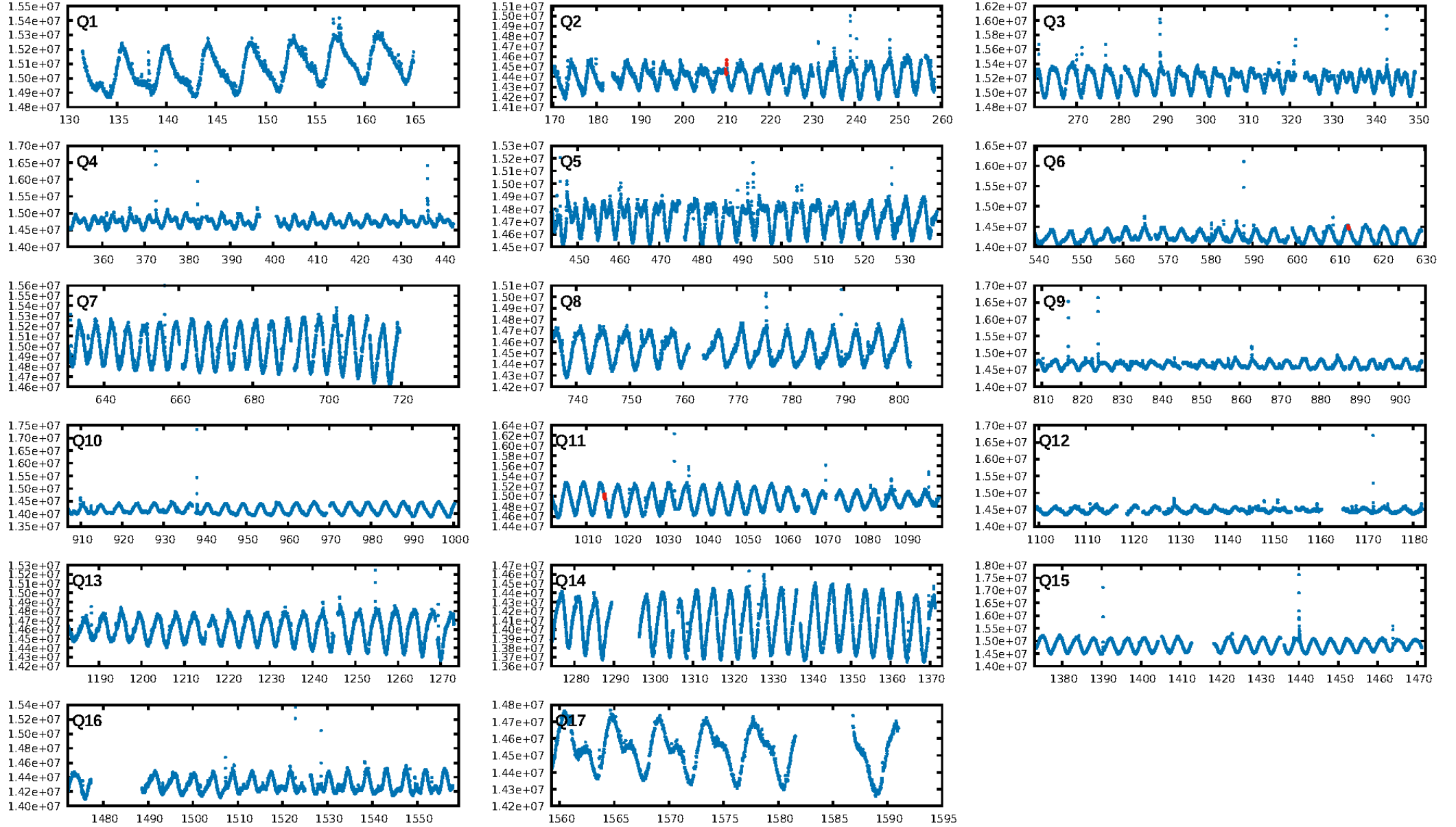
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [72.97σ]
LongPeriod-sig: 100.0% [45.89σ]
ModelChiSquare2-sig: 56.7%
ModelChiSquareGof-sig: 36.5%
Bootstrap-pfa: 1.31e-12
RollingBand-fgt: 1.00 [3/3]
GhostDiagnostic-chr: 5.396
Centroid-sig: 6.9%
Centroid-so: 1.348 arcsec [1.71σ]
OotOffset-rm: 0.298 arcsec [0.44σ]
KicOffset-rm: 0.149 arcsec [0.20σ]
OotOffset-st: 1/1/0/0 [2]
KicOffset-st: 1/1/0/0 [2]
DiffImageQuality-fgm: 0.50 [1/2]
DiffImageOverlap-fno: 1.00 [3/3]

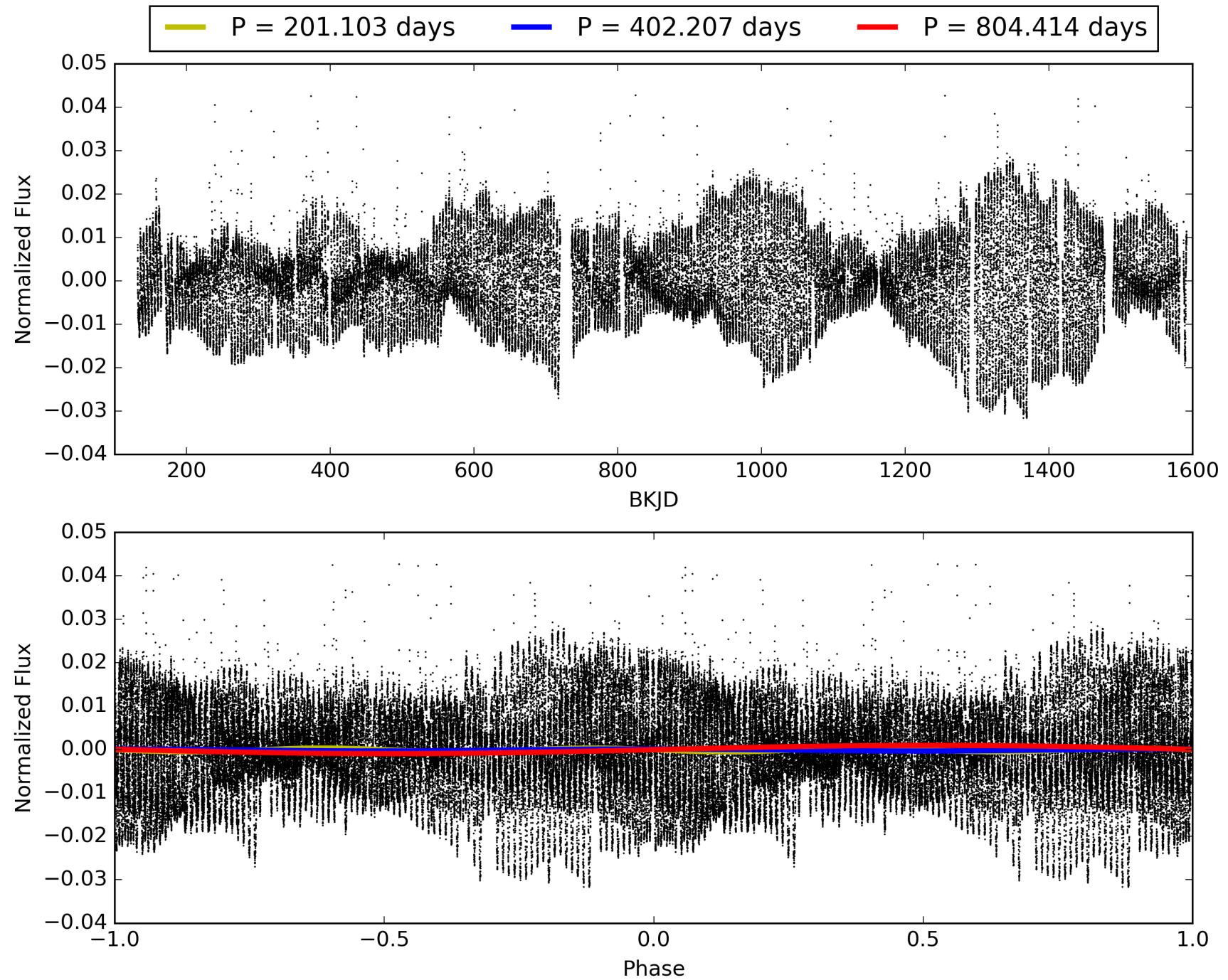
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 17:34:41 Z

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

TCE 009407581-01, PDC Light Curves

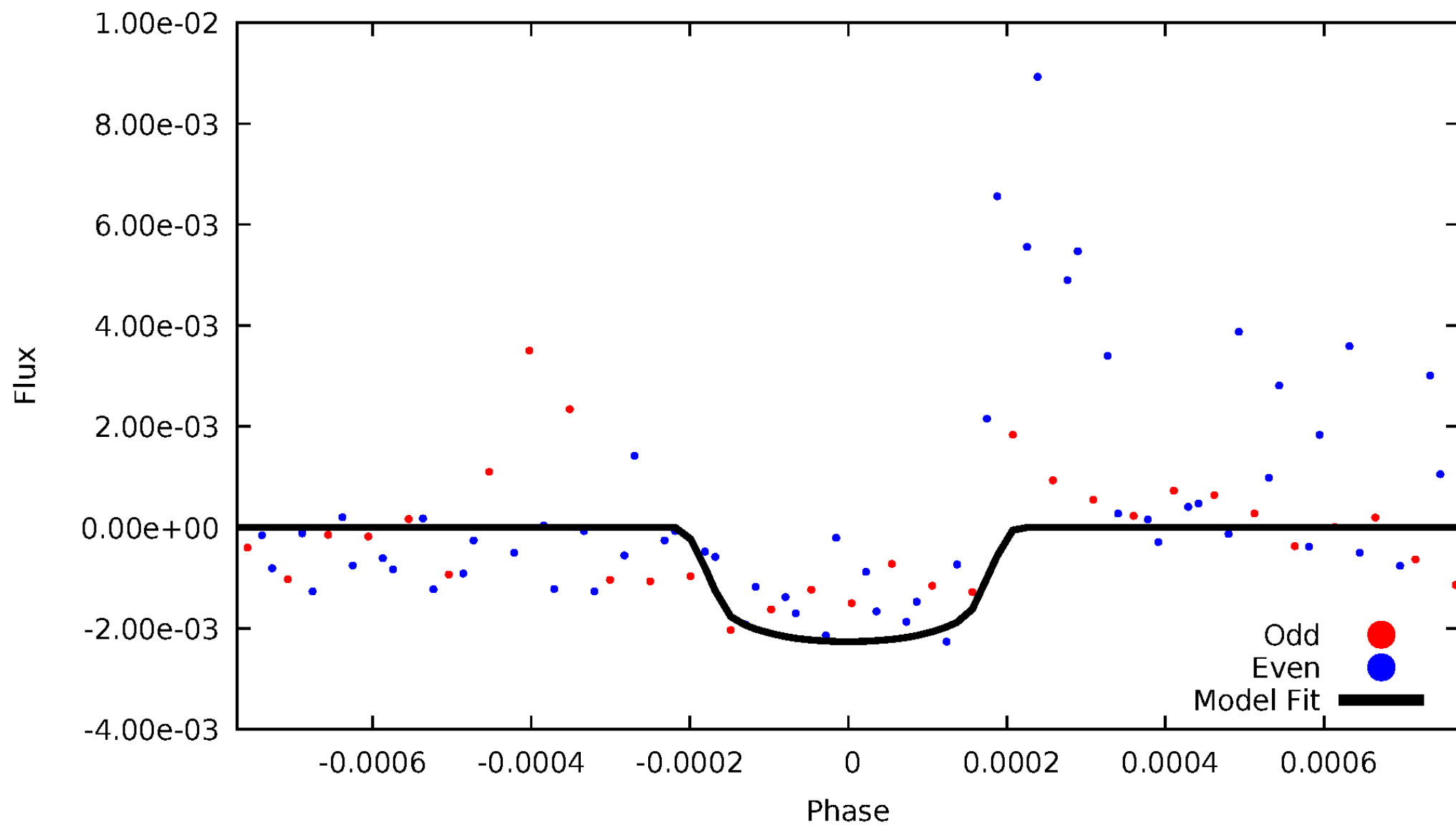


TCE 009407581-01



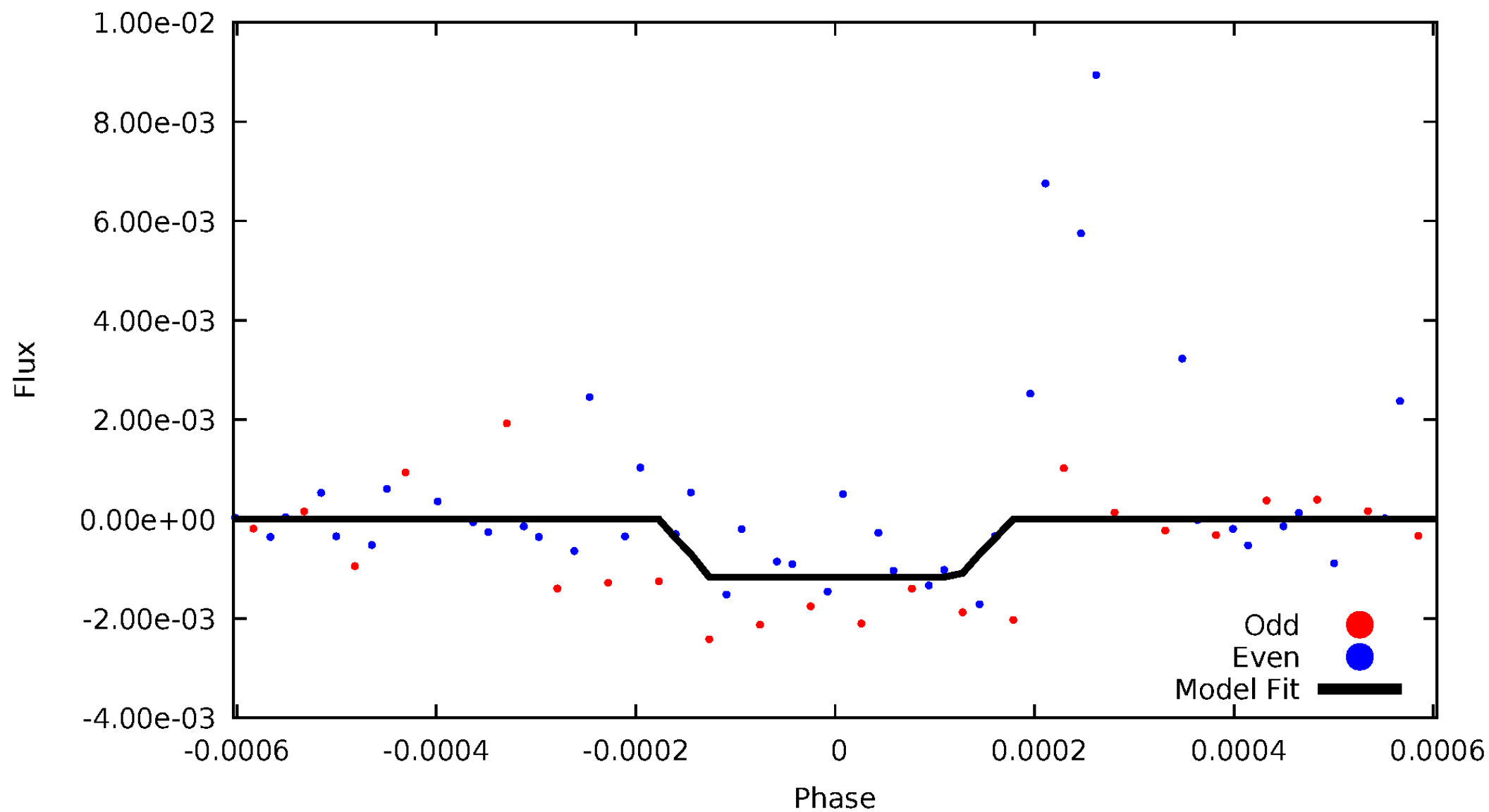
DV Odd/Even

TCE 009407581-01



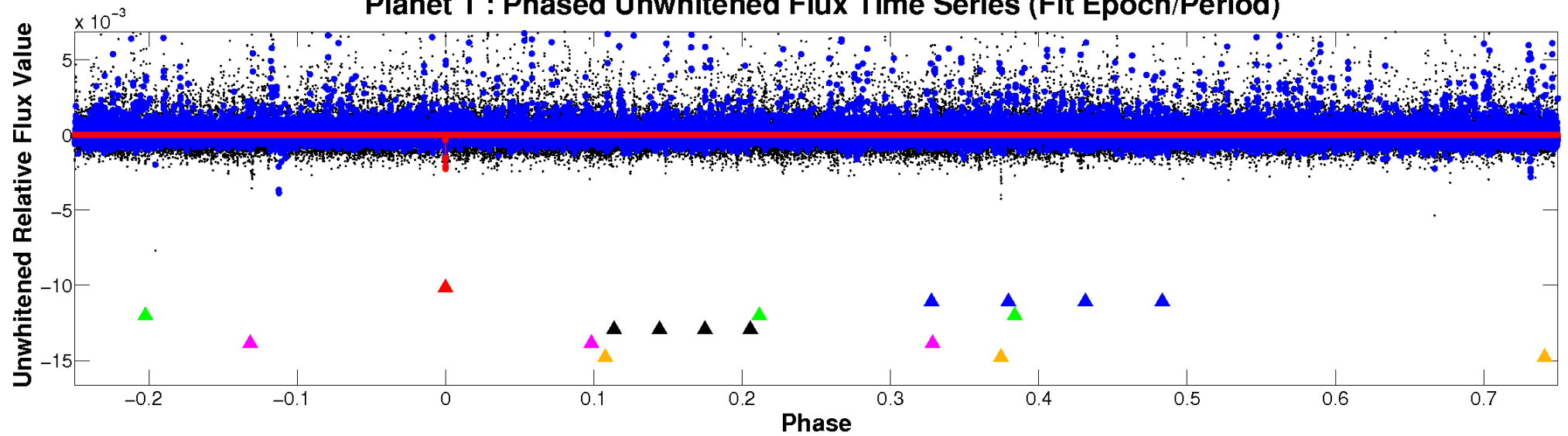
ALT Odd/Even

TCE 009407581-01

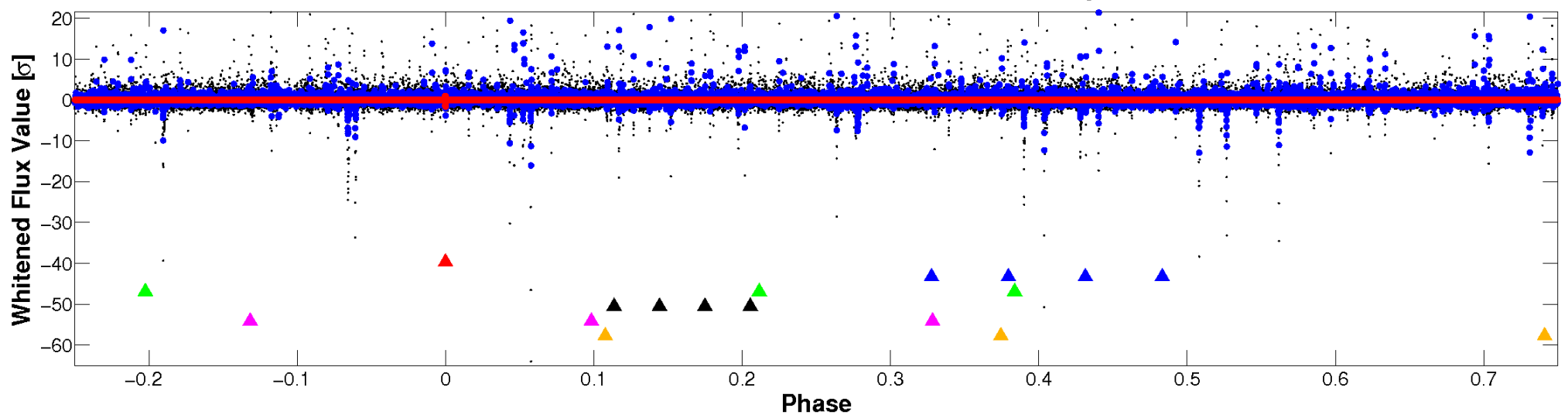


Non-Whitened Vs. Whitened Light Curve

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

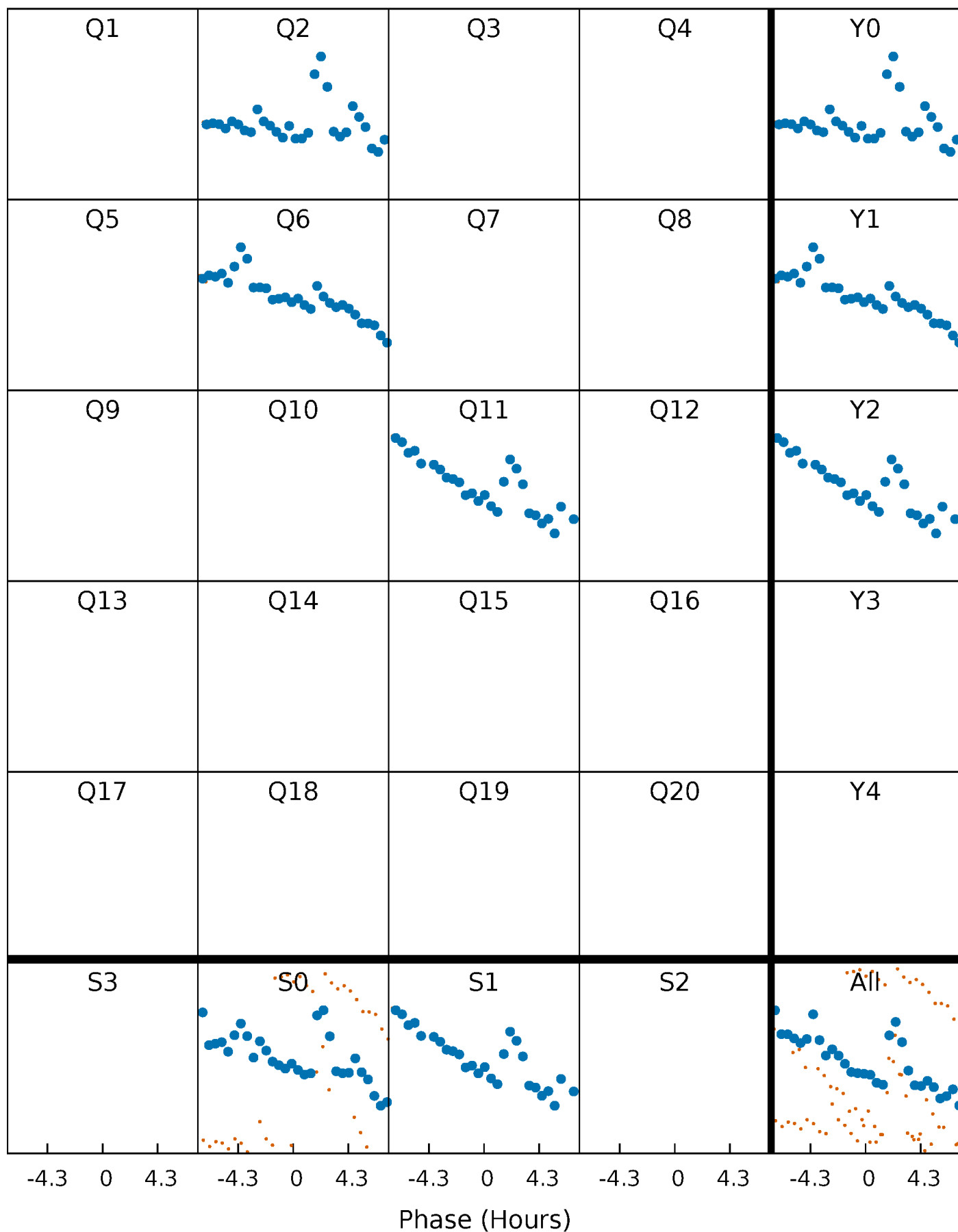


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



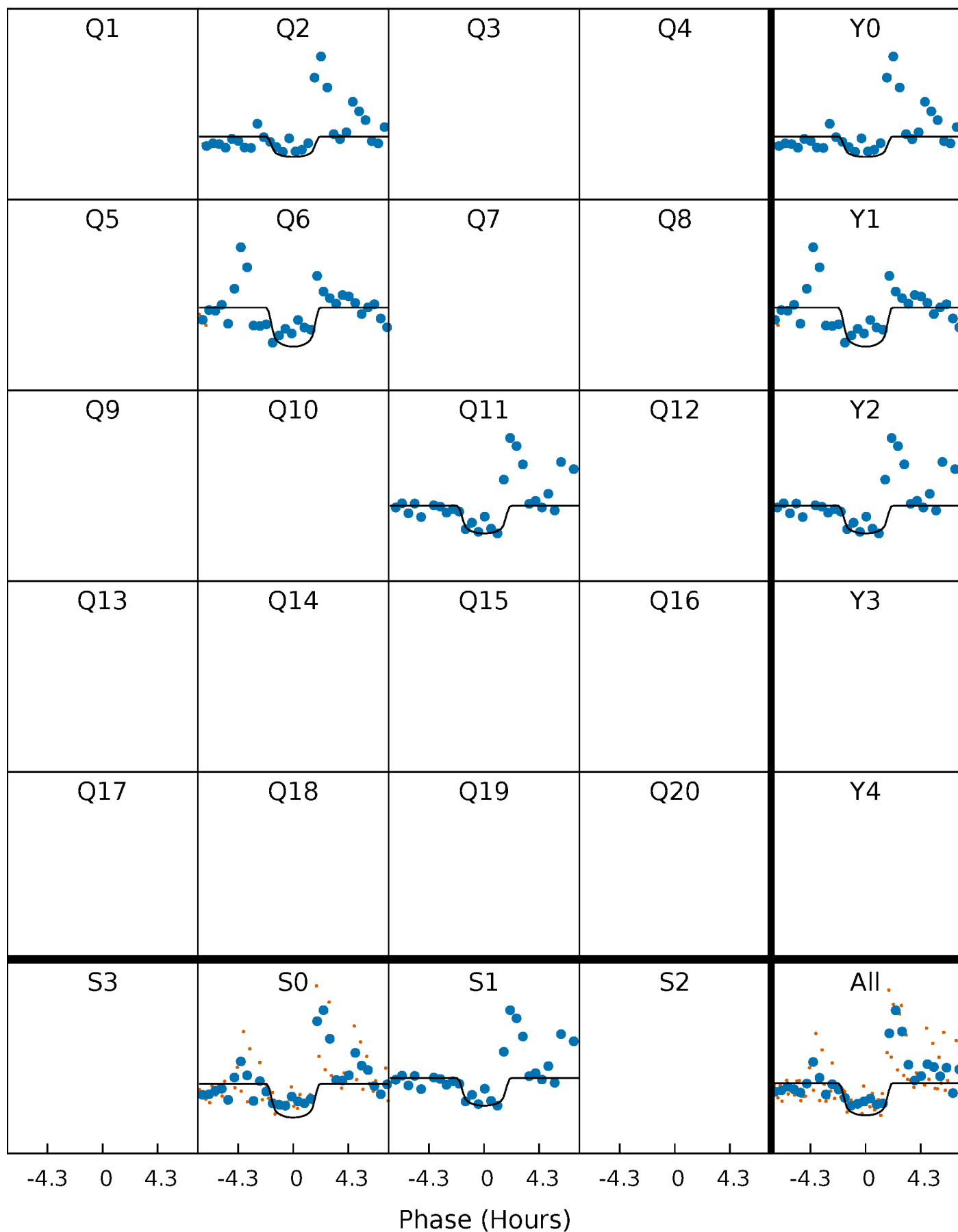
PDC Quarter-Phased Transit Curves

TCE 009407581-01 P=402.206945 Days $T_0=210.128388$ (BKJD)



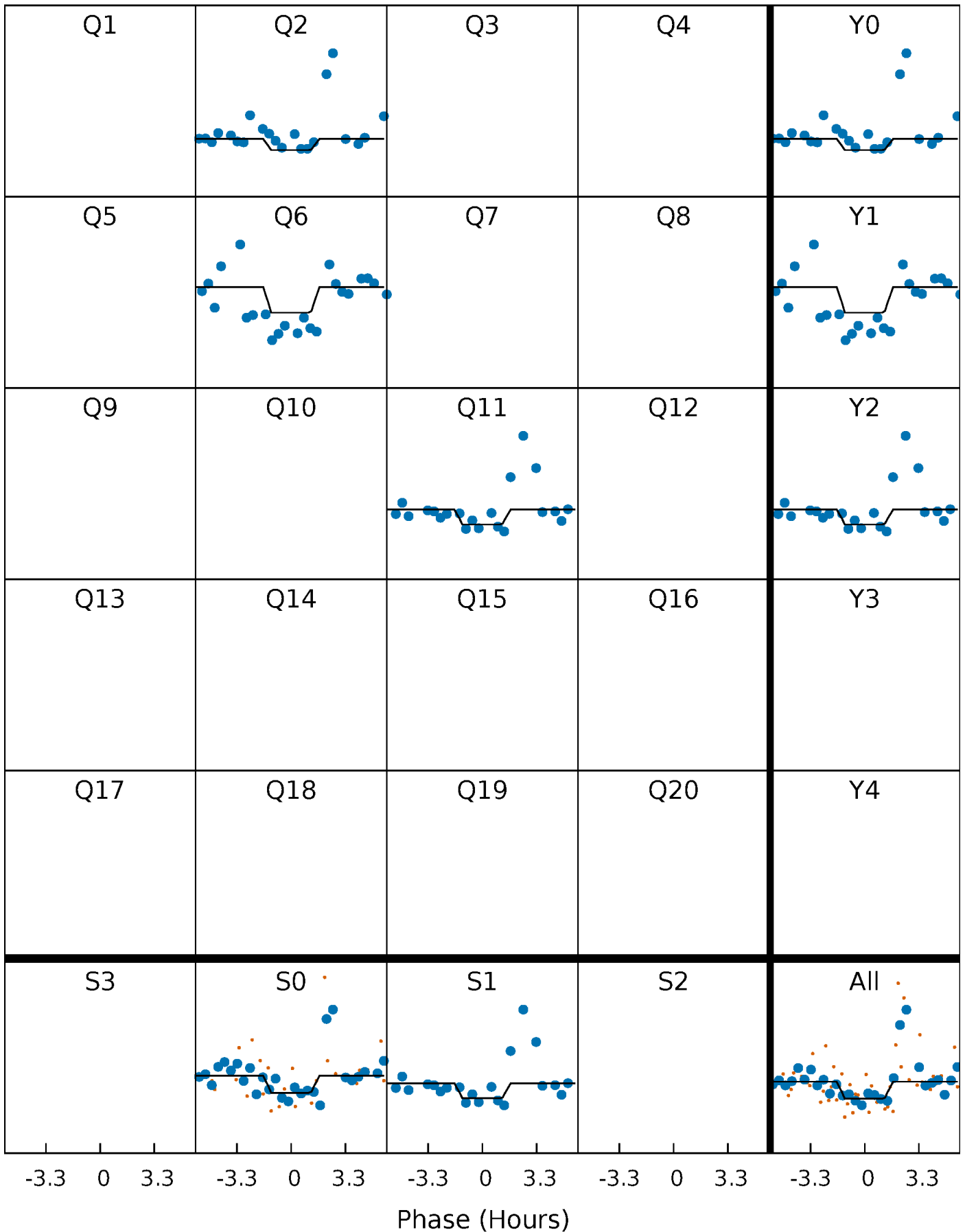
DV Quarter-Phased Transit Curves

TCE 009407581-01 P=402.206945 Days $T_0=210.128388$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

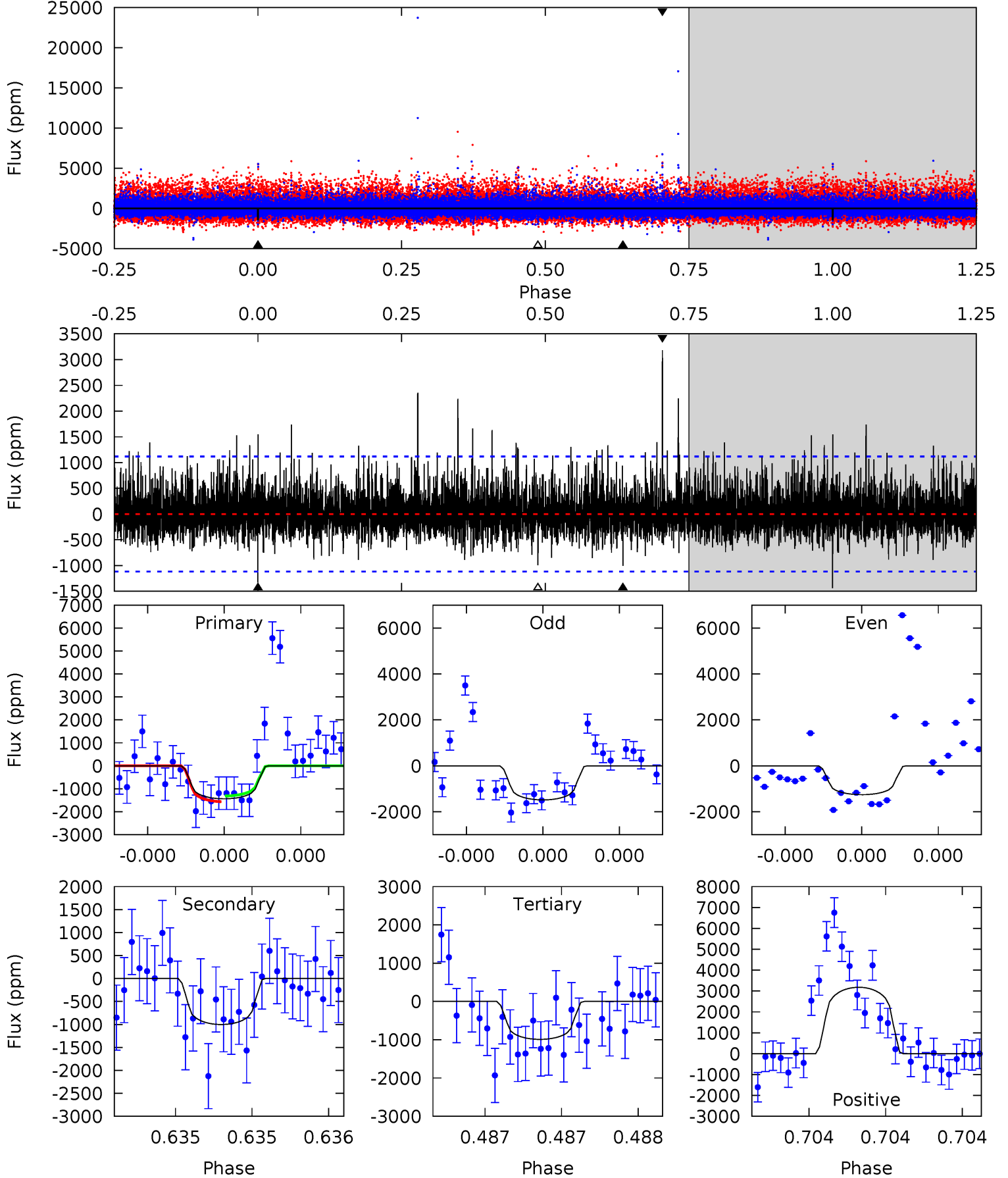
TCE 009407581-01 P=402.207384 Days $T_0=210.119062$ (BKJD)



DV Model-Shift Uniqueness Test

009407581-01, P = 402.206945 Days, E = 210.128388 Days

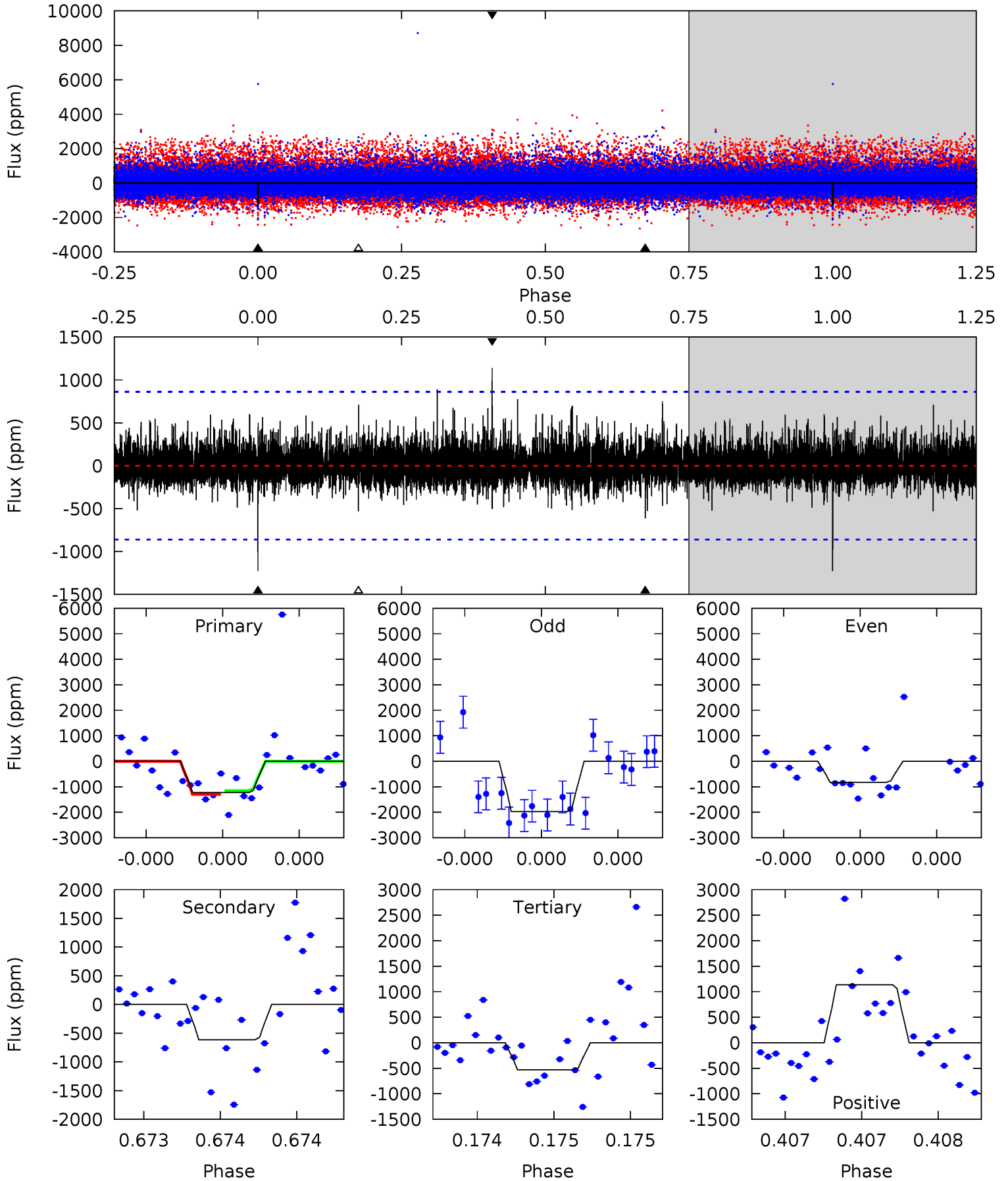
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.22	5.04	4.98	16.0	5.62	3.55	1.65	2.24	-8.77	0.06	-11.0	0.41	0.90	0.69	0.64



Alt Model-Shift Uniqueness Test

009407581-01, P = 402.207384 Days, E = 210.119062 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.04	4.03	3.48	7.46	5.65	3.60	0.96	4.56	0.58	0.55	-3.44	3.47	1.00	0.48	0.51



Stellar Parameters For KIC 009407581

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	3569^{+57}_{-64}	$4.877^{+0.049}_{-0.036}$	$-0.200^{+0.100}_{-0.100}$	$0.378^{+0.035}_{-0.044}$	$0.395^{+0.042}_{-0.052}$	$10.290^{+2.639}_{-1.753}$
	+2%/-2%	+1%/-1%	+50%/-50%	+9%/-12%	+11%/-13%	+26%/-17%
Source	PHO2	PHO2	PHO2	DSEP		

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

Secondary Eclipse Parameters for KIC 009407581-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	-1001 ± 199	$2.20^{+1.56}_{-1.34}$	153^{+4}_{-4}	3014^{+1132}_{-390}	$65803^{+398284}_{-43003}$
Alt.	-614 ± 152	$1.92^{+1.65}_{-1.26}$	152^{+4}_{-4}	2934^{+1252}_{-425}	$53620^{+446433}_{-36812}$

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 $A_{obs} \gg 1.0$

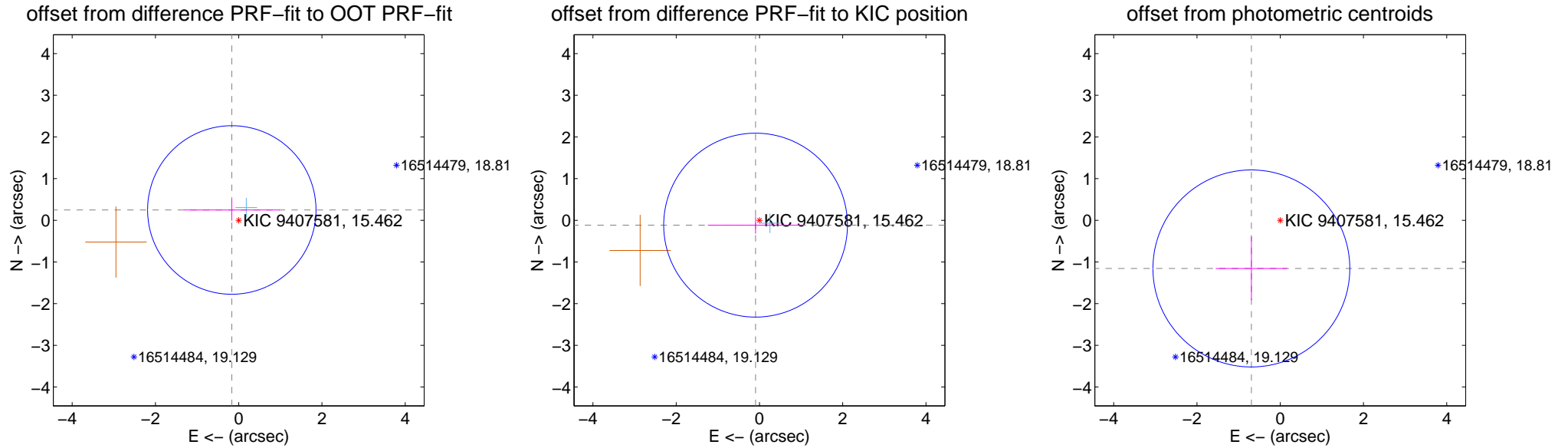
DV Centroid Data

Supplemental centroid analysis for 009407581-01. Kepler magnitude: 15.46. Transit SNR 7.00

There are 1 quarters with good PRF difference image offsets

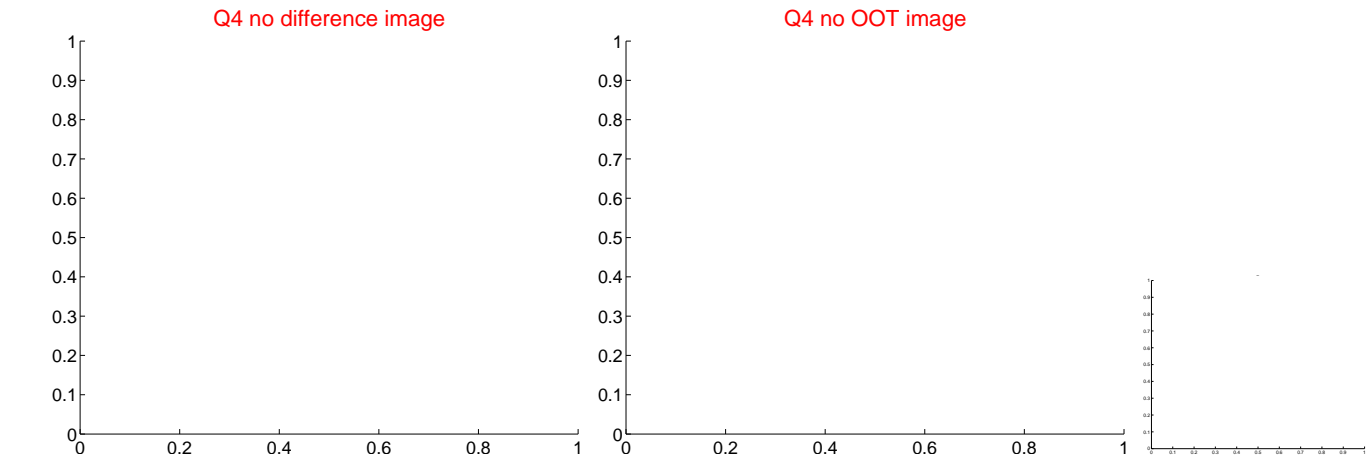
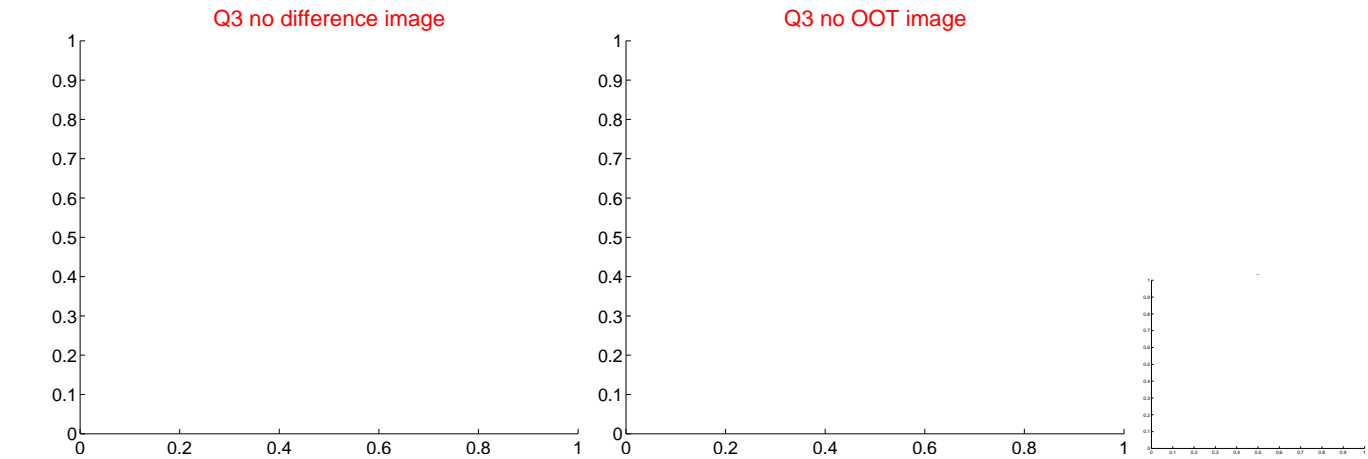
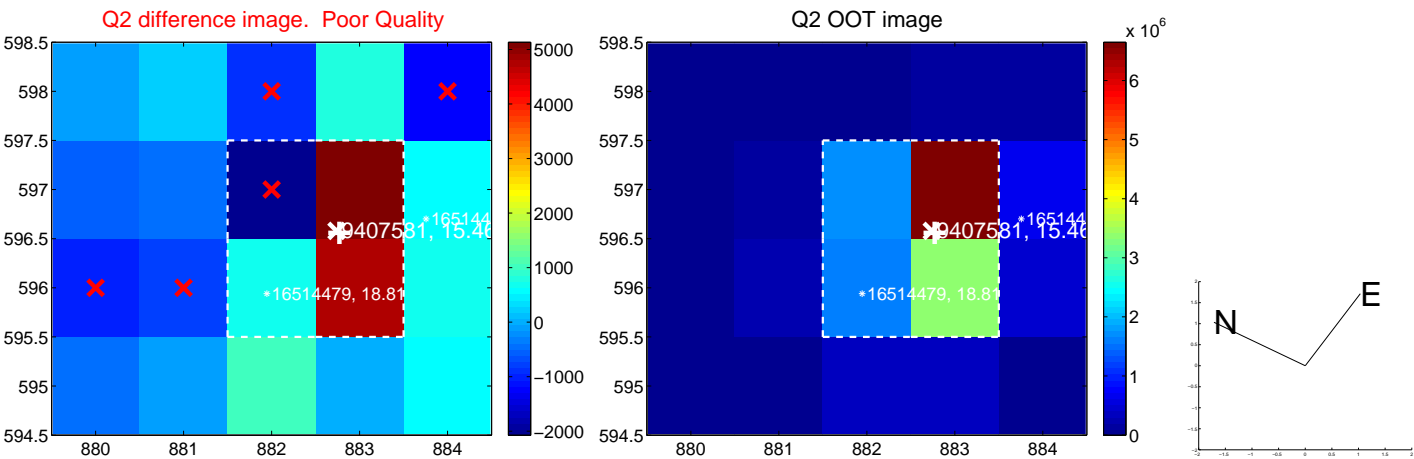
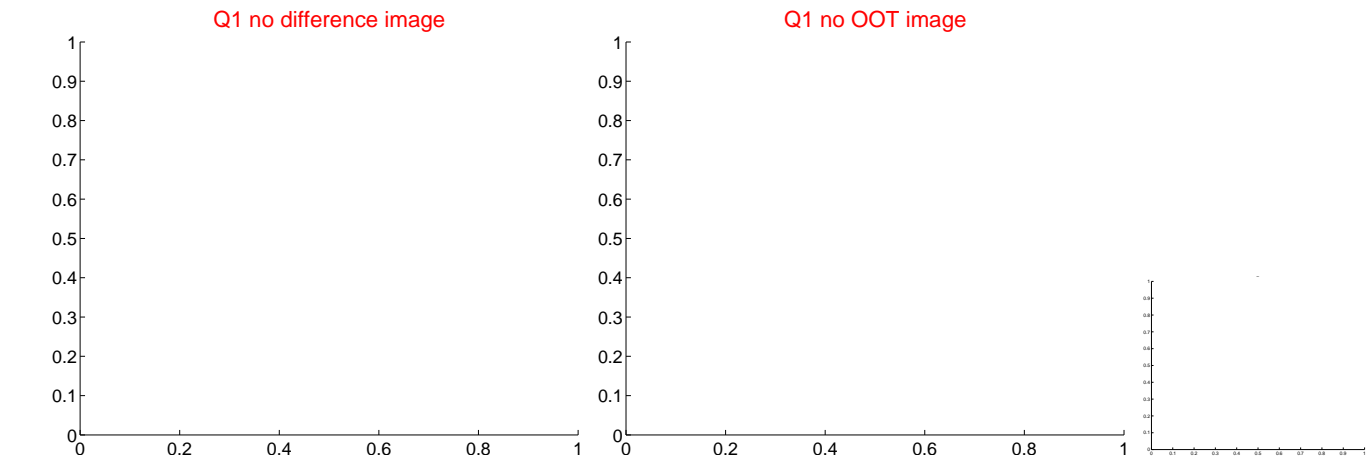
The direct PRF centroid is offset from the target star catalog position by about 0.38 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.298 ± 0.674	0.44	0.166 ± 1.151	0.248 ± 0.255
PRF-fit source offset from KIC position	0.149 ± 0.736	0.20	0.093 ± 1.146	-0.116 ± 0.206
photometric centroid source offset	1.35 ± 0.79	1.71	0.69 ± 0.86	-1.16 ± 0.76

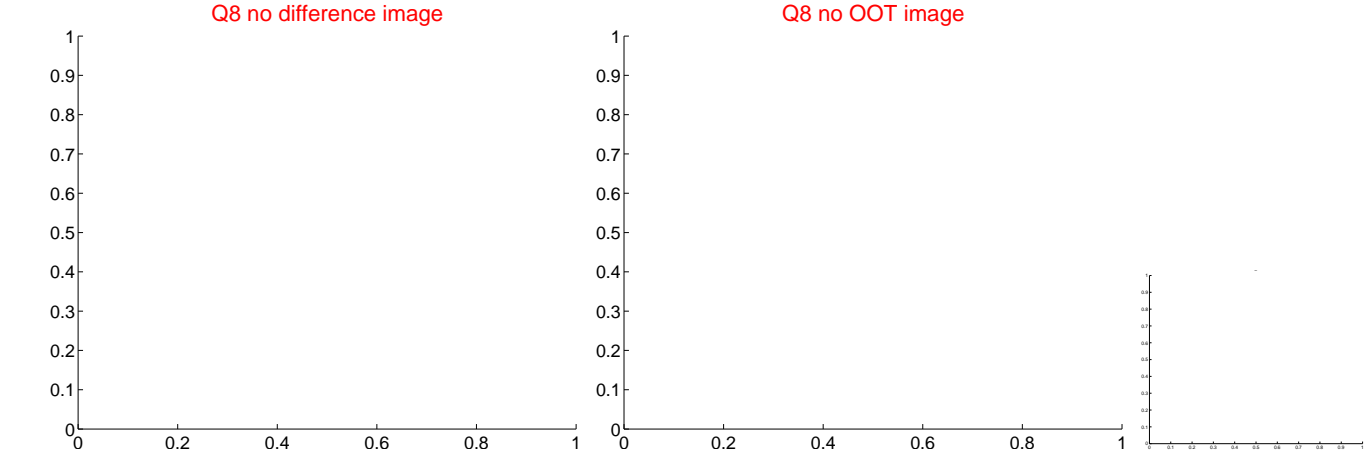
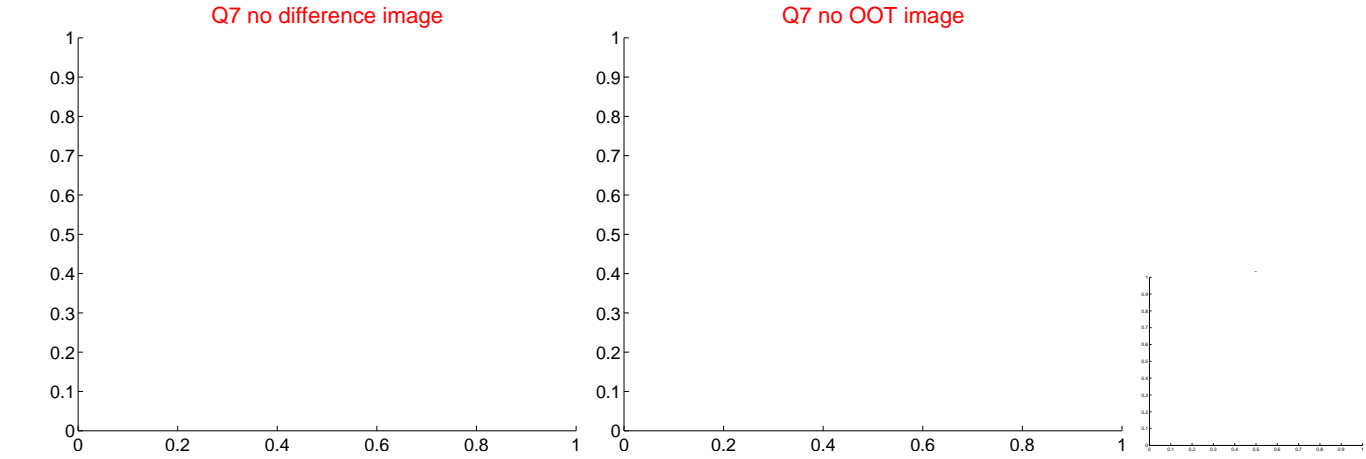
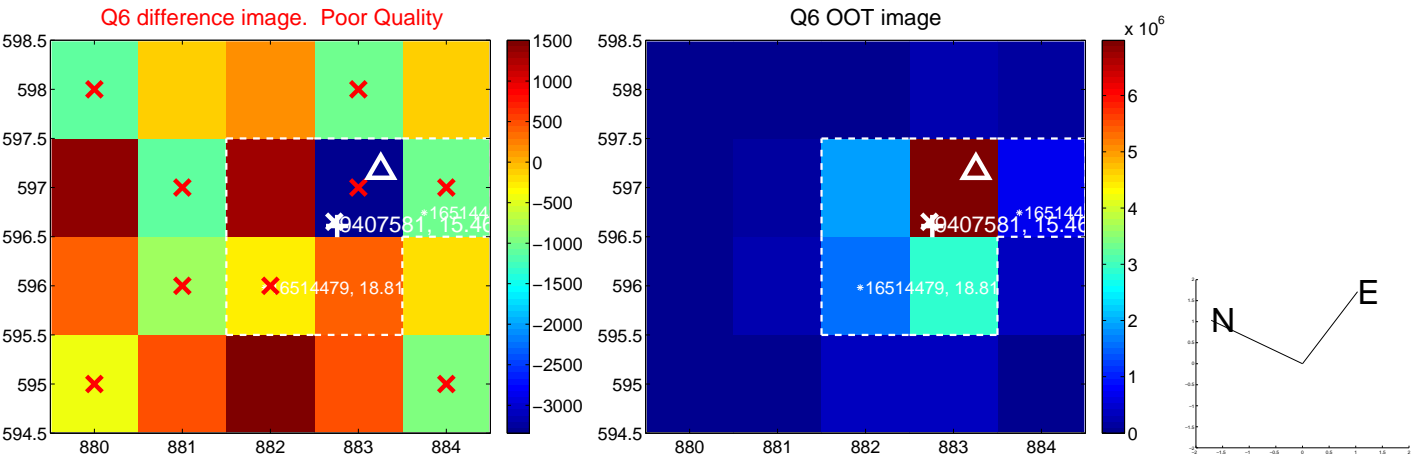
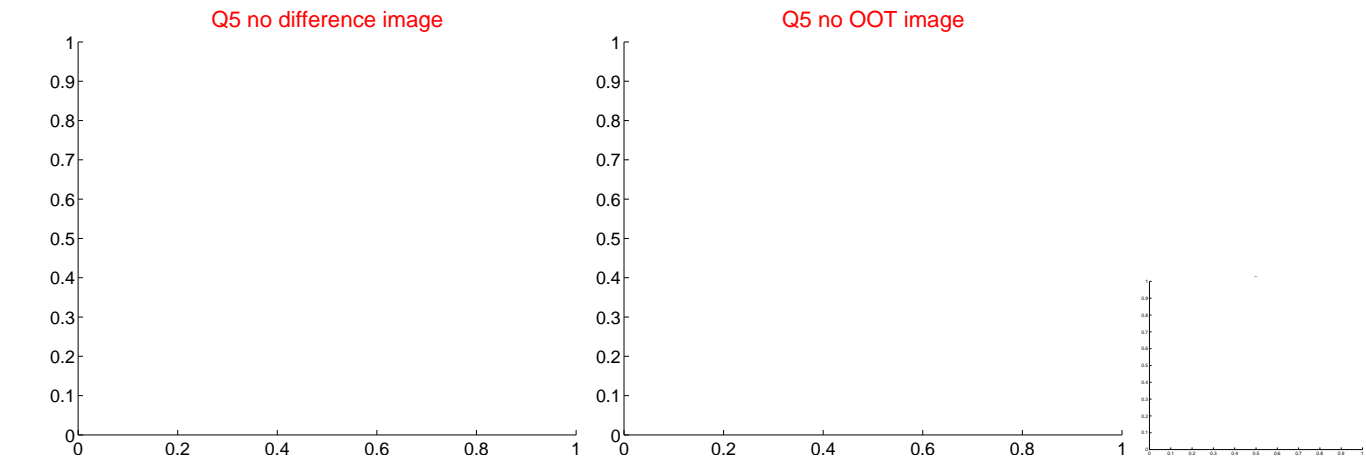


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

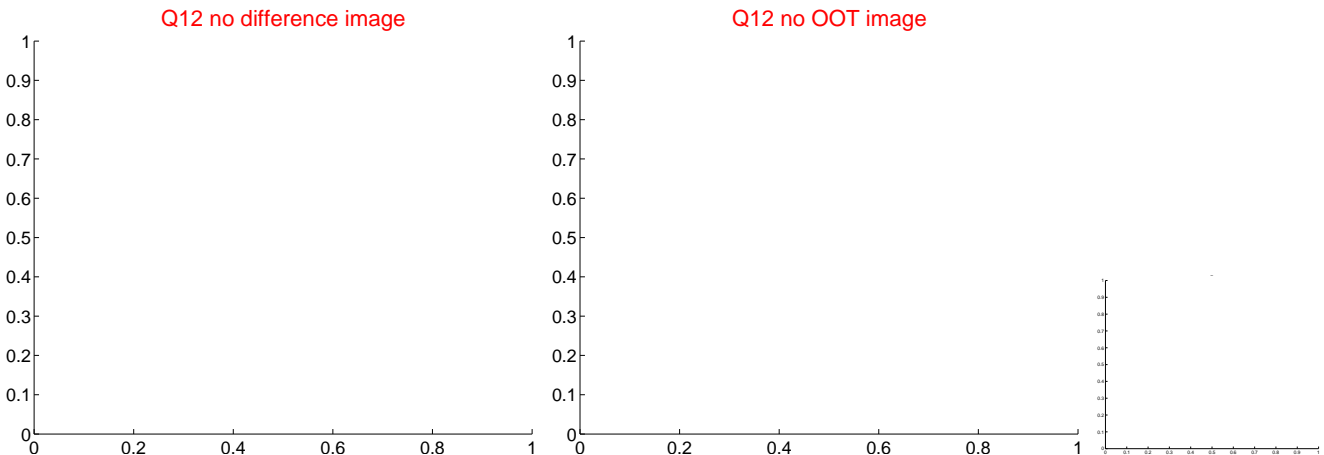
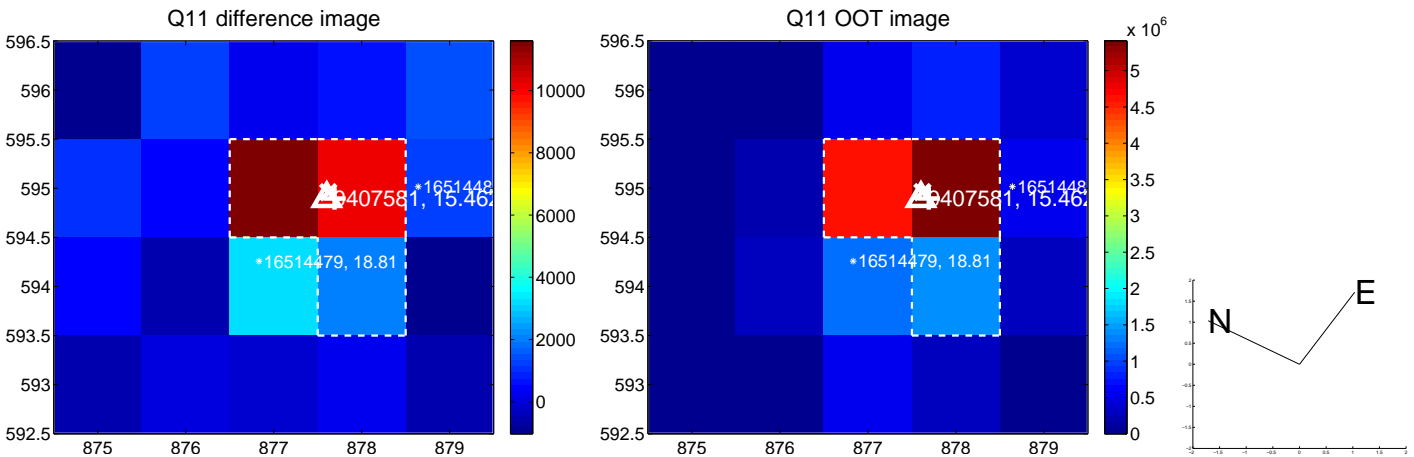
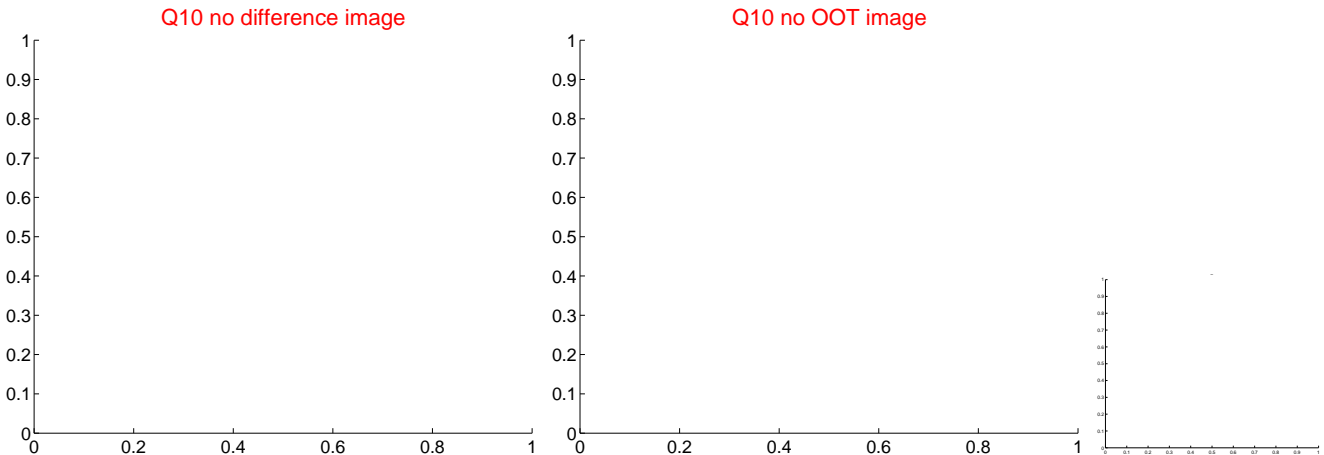
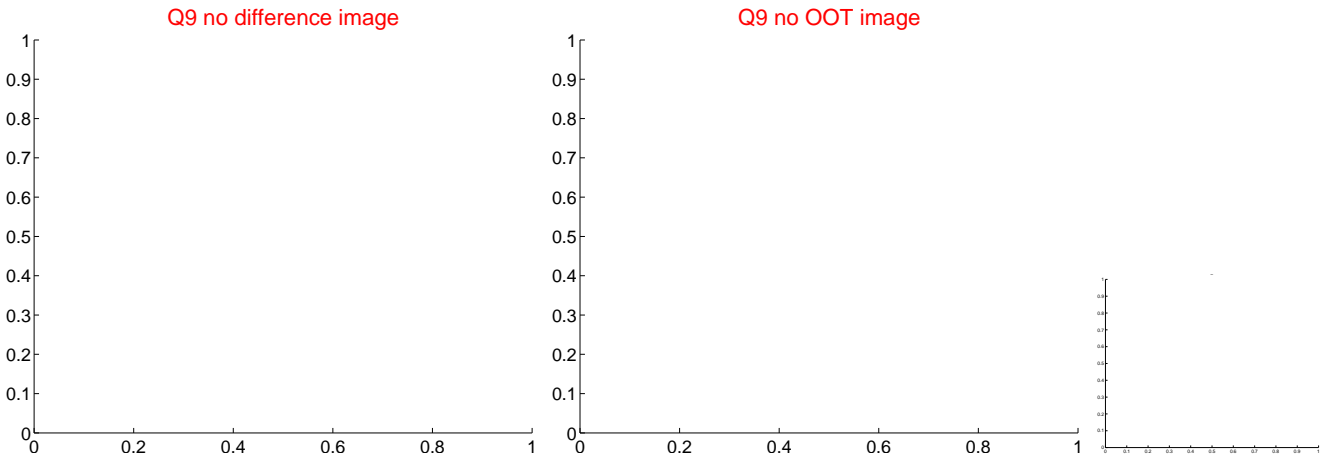
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



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



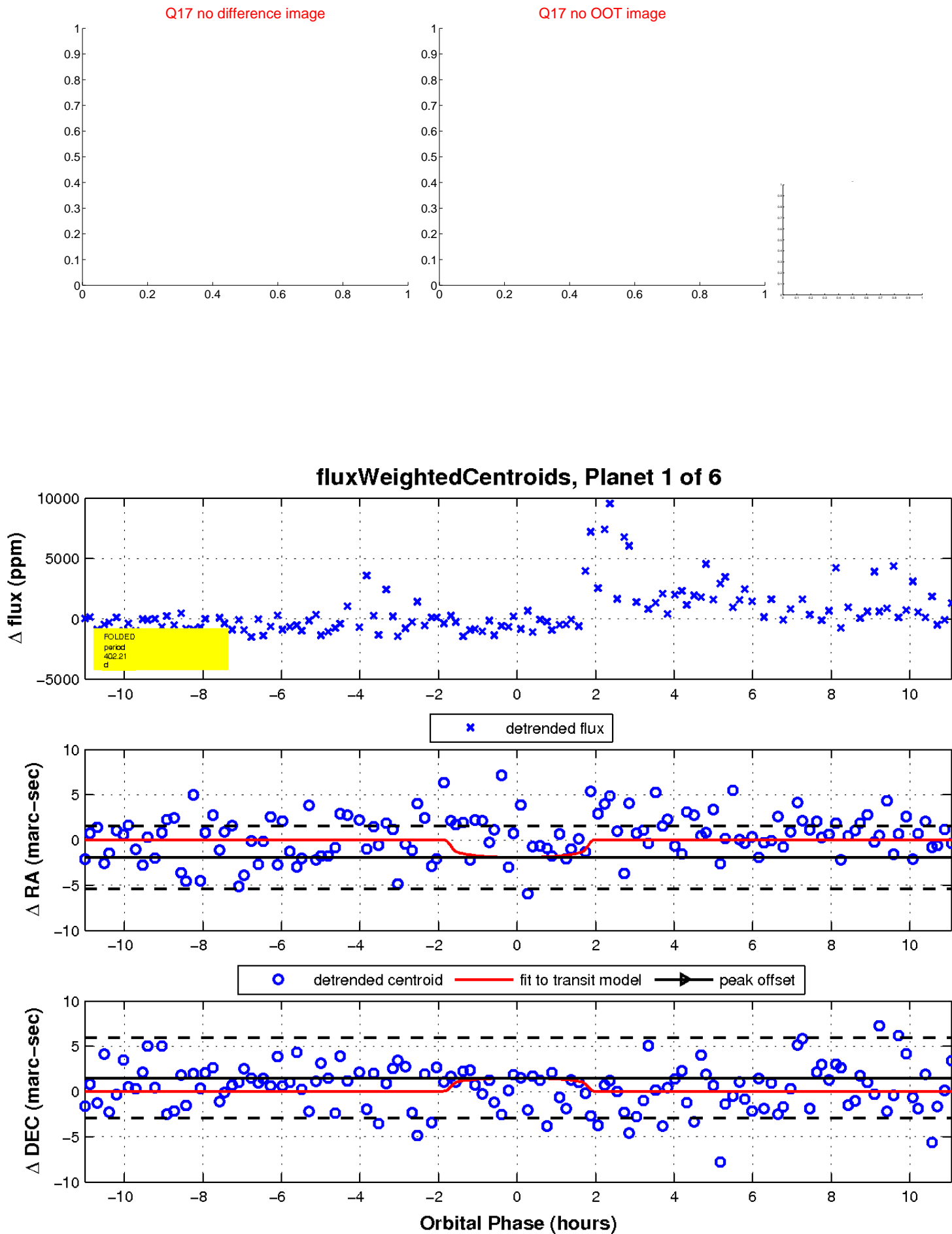
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value



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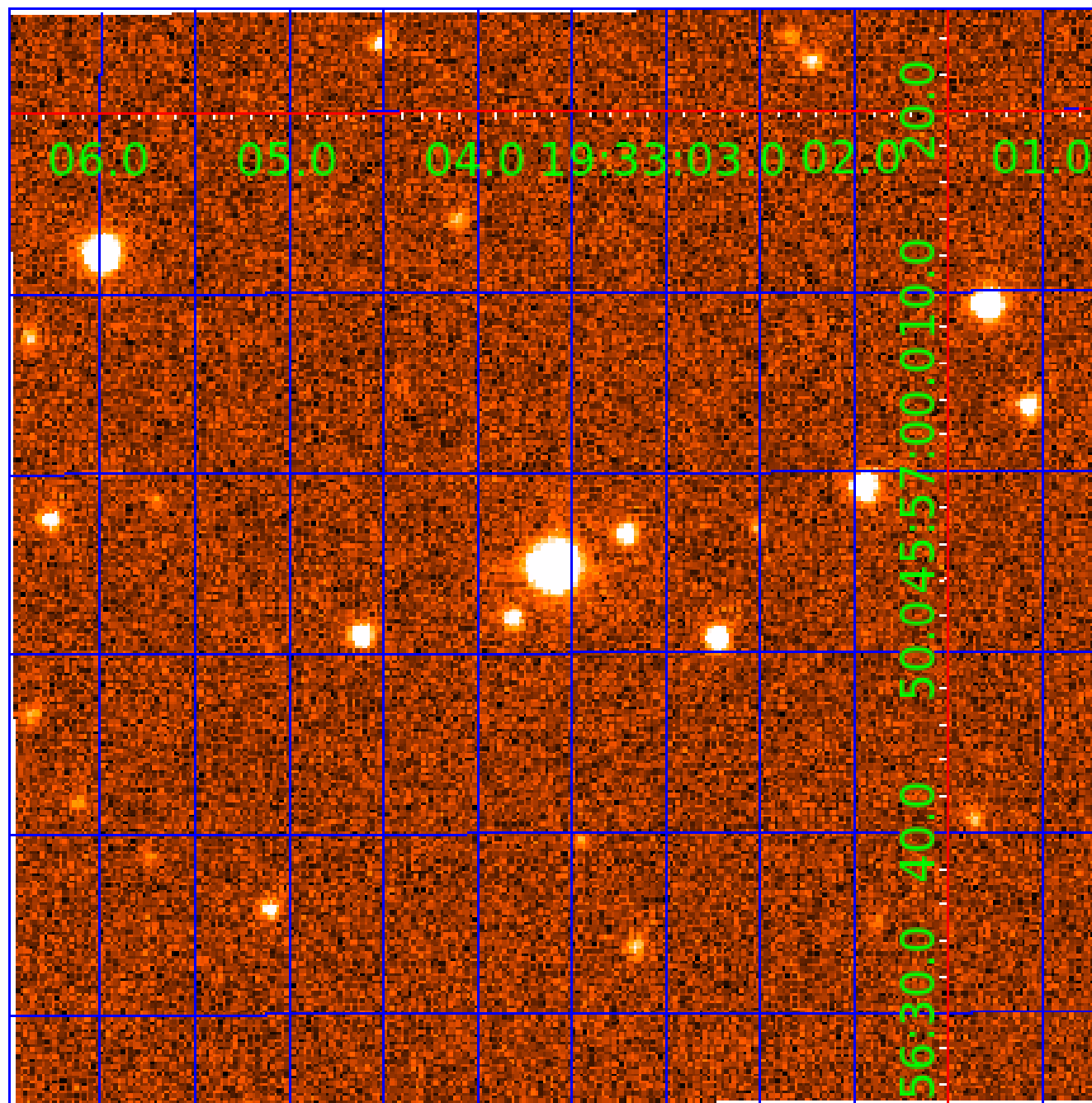


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 009407581

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})
009407581-01	OBS	No	402.206945	210.128388	2265.3	3.720	12.7	7.0	0.38	3569	1.81	0.03
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009407581-03	OBS	No	568.684013	364.474874	1698.3	8.382	12.6	5.4	0.38	3569	1.55	0.02
009407581-04	OBS	No	414.517175	255.857169	2328.1	5.254	12.7	7.1	0.38	3569	2.02	0.03
009407581-05	OBS	No	494.727668	157.177644	2587.8	14.592	11.3	7.5	0.38	3569	1.94	0.03
009407581-06	OBS	No	549.668579	360.735504	3048.6	9.899	11.4	9.2	0.38	3569	2.07	0.02

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
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009407581-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
009407581-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009407581-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
009407581-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
009407581-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—MOD_NONUNIQ_DV—MOD_POS_DV—CENT_FEW_DIFFS

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

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

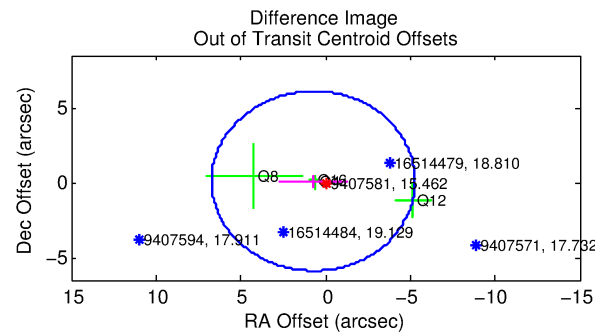
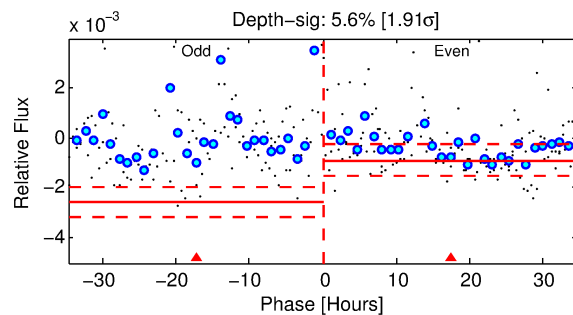
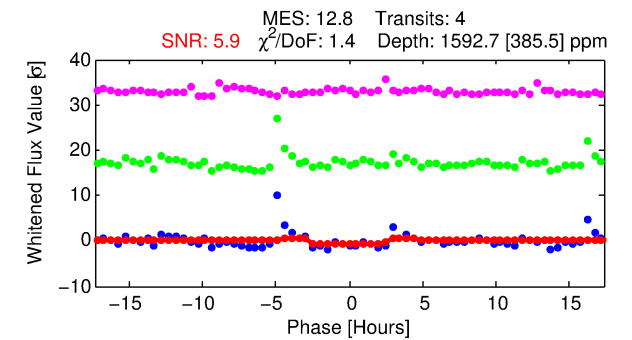
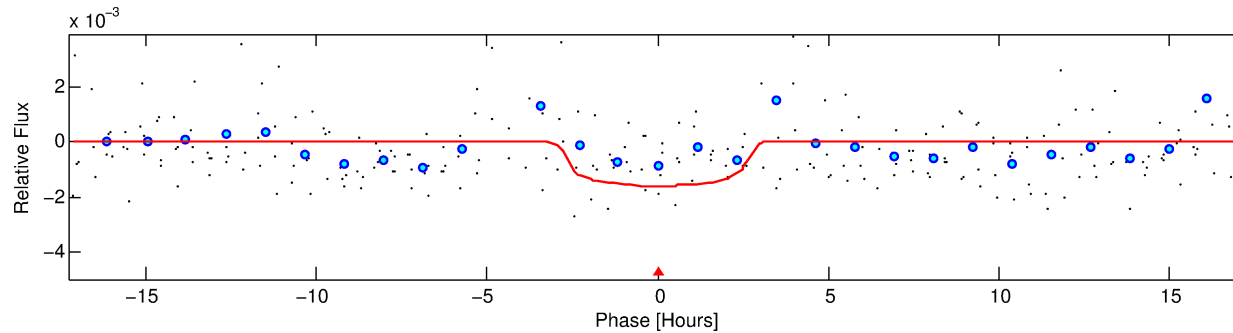
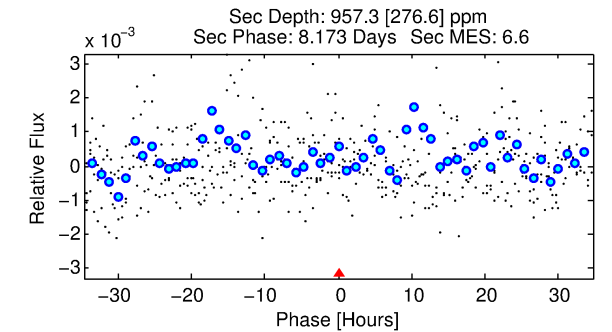
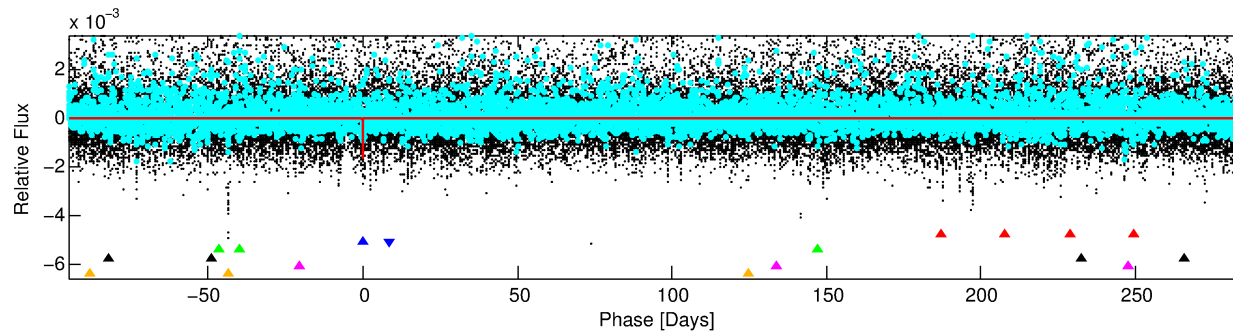
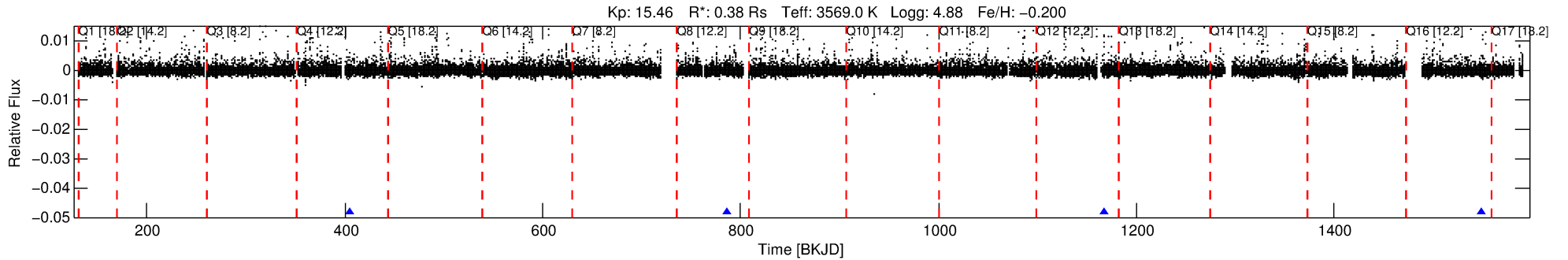
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009407581-02

No Significant Match Found

DV One-Page Summary

KIC: 9407581 Candidate: 2 of 6 Period: 381.351 d



DV Fit Results:

Period = 381.35056 [0.00695] d
Epoch = 404.5010 [0.0139] BKJD
Rp/R* = 0.0382 [0.0188]
a/R* = 420.24 [858.74]
b = 0.62 [2.01]
Seff = 0.04 [0.00]
Teq = 111 [4] K
Rp = 1.58 [0.80] Re
a = 0.7538 [0.0650] AU
Ag = 120478.79 [124064.15] [0.97σ]
Teffp = 3212 [824] K [3.76σ]

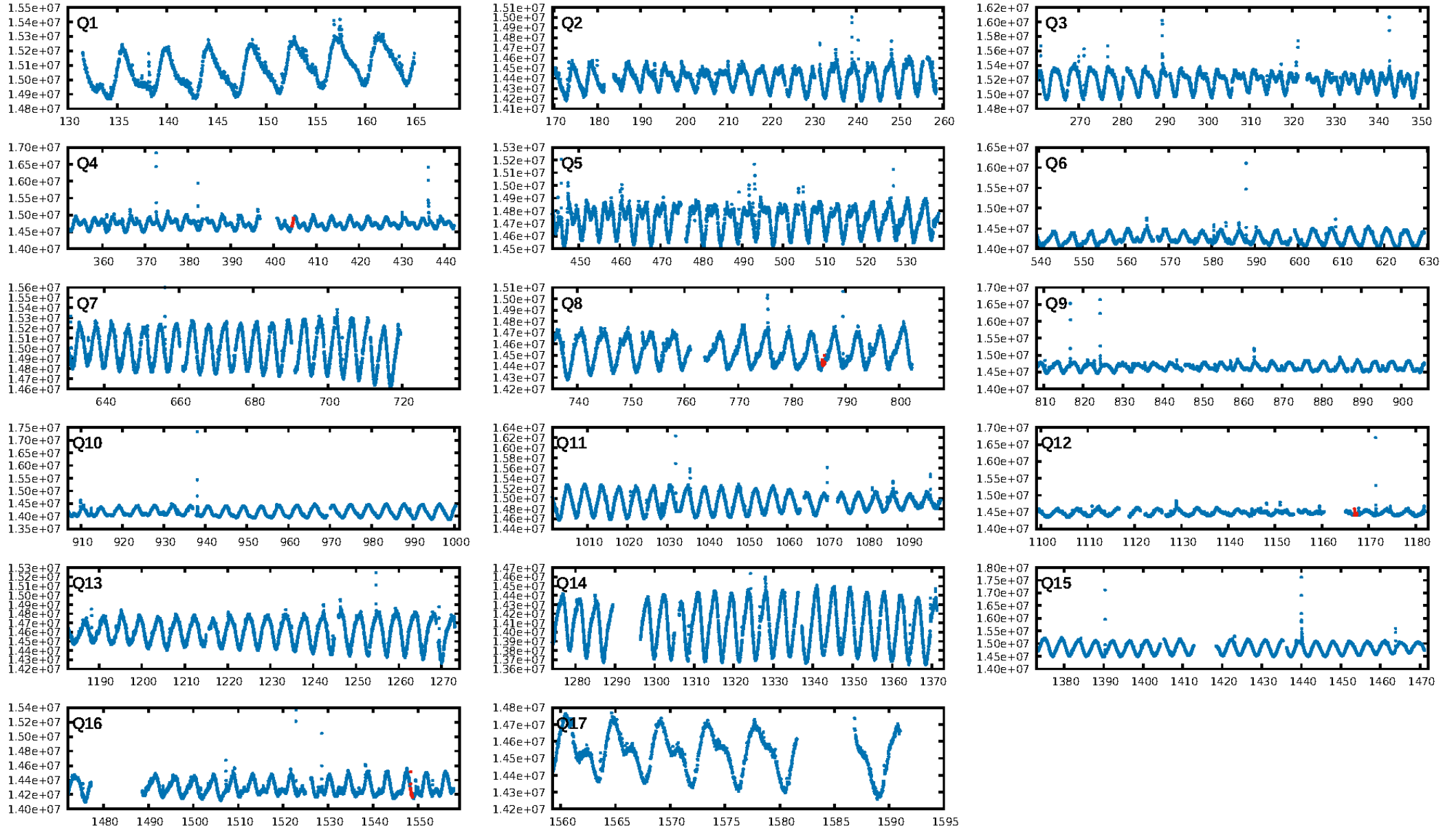
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 100.0% [72.97σ]
ModelChiSquare2-sig: 4.0%
ModelChiSquareGof-sig: 93.0%
Bootstrap-pfa: 9.21e-12
RollingBand-fgt: 1.00 [4/4]
GhostDiagnostic-chr: 5.847
Centroid-sig: 60.9%
Centroid-so: 0.855 arcsec [0.80σ]
OotOffset-rm: 0.728 arcsec [0.36σ]
KicOffset-rm: 0.784 arcsec [0.49σ]
OotOffset-st: 0/0/4/0 [4]
KicOffset-st: 0/0/4/0 [4]
DiffImageQuality-fgm: 0.50 [2/4]
DiffImageOverlap-fno: 1.00 [4/4]

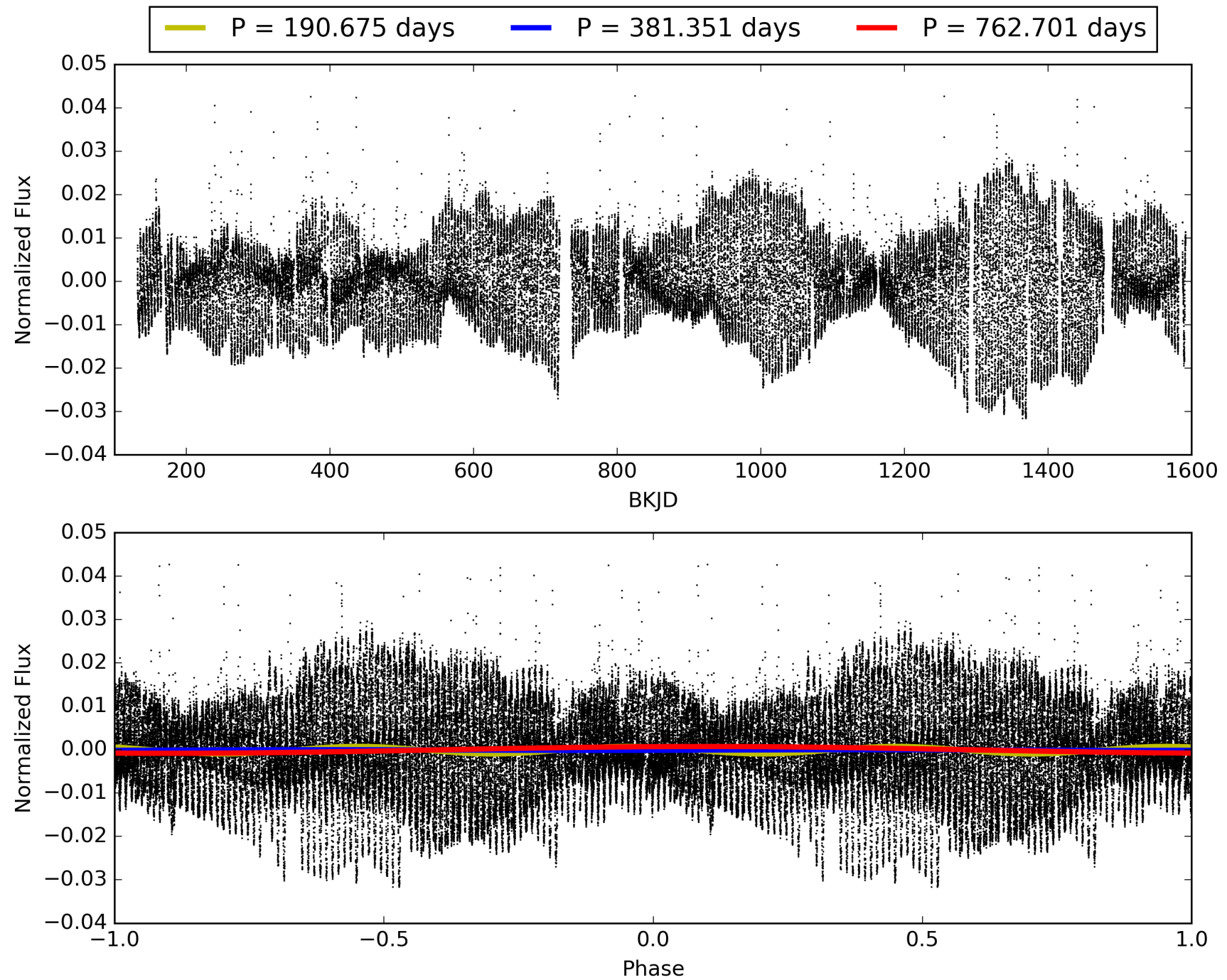
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 17:34:53 Z

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

TCE 009407581-02, PDC Light Curves

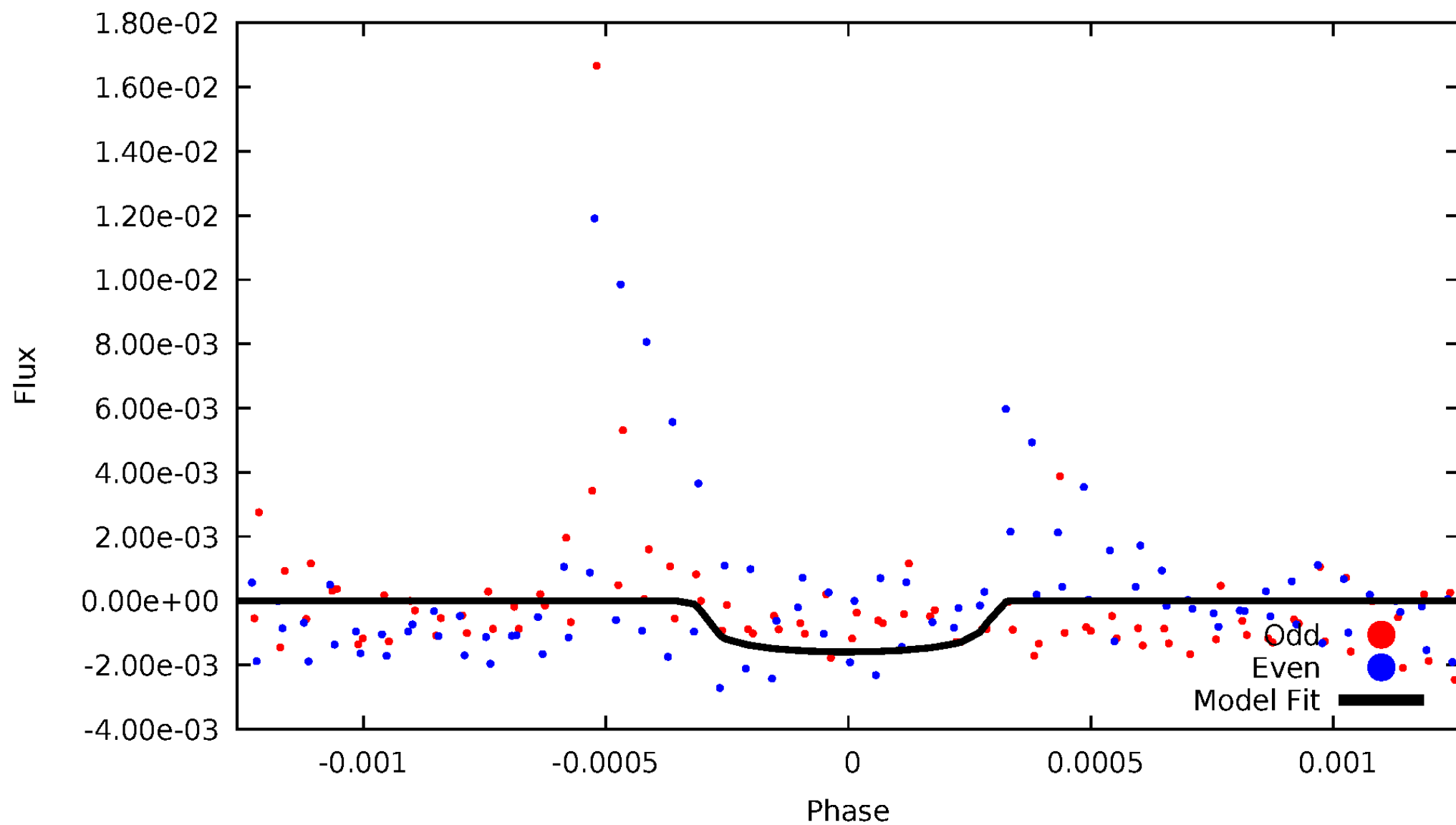


TCE 009407581-02



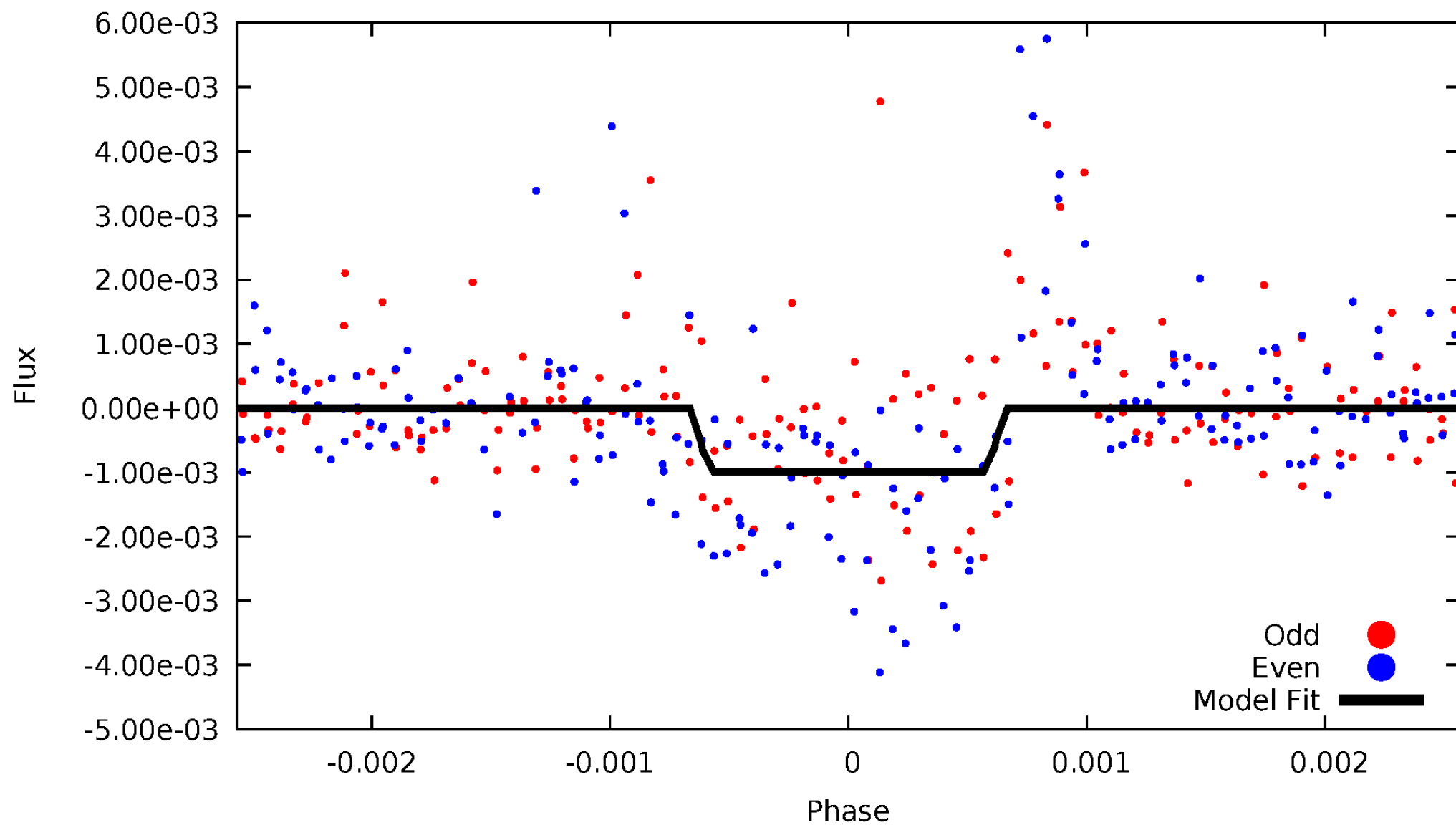
DV Odd/Even

TCE 009407581-02



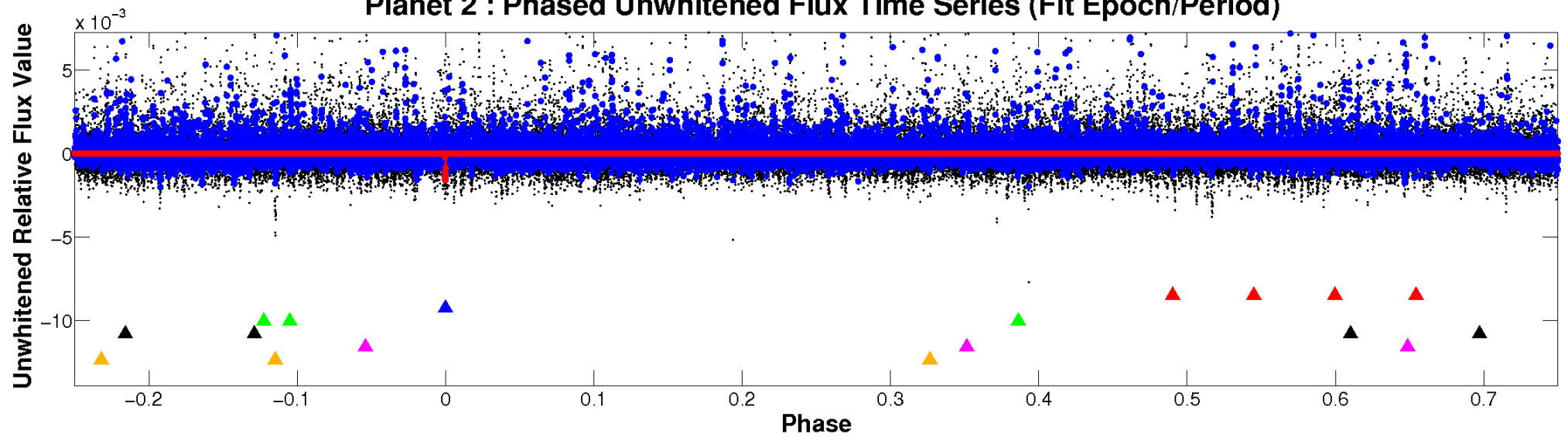
ALT Odd/Even

TCE 009407581-02

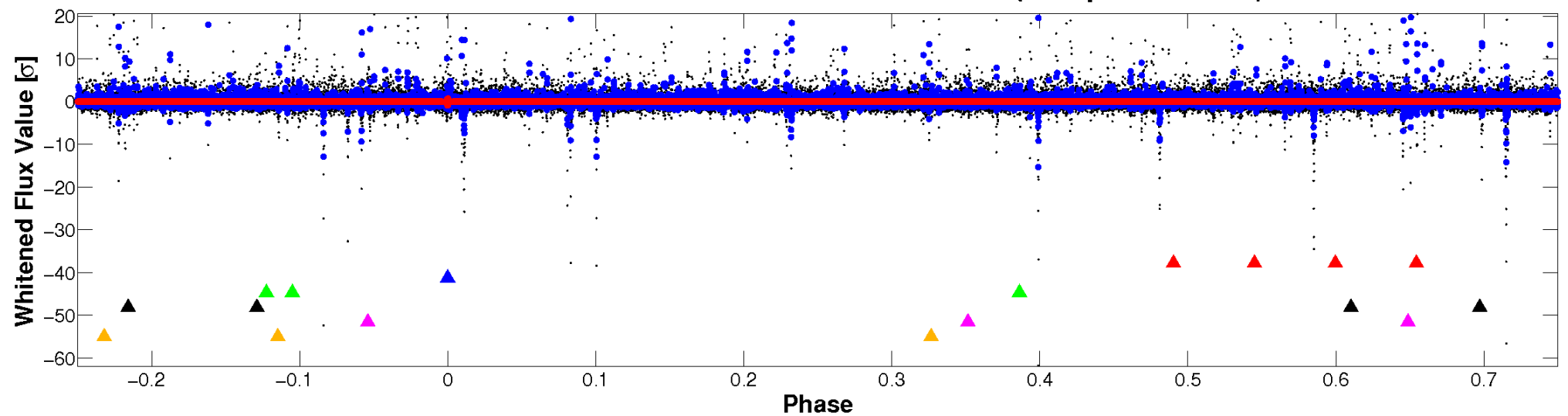


Non-Whitened Vs. Whitened Light Curve

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

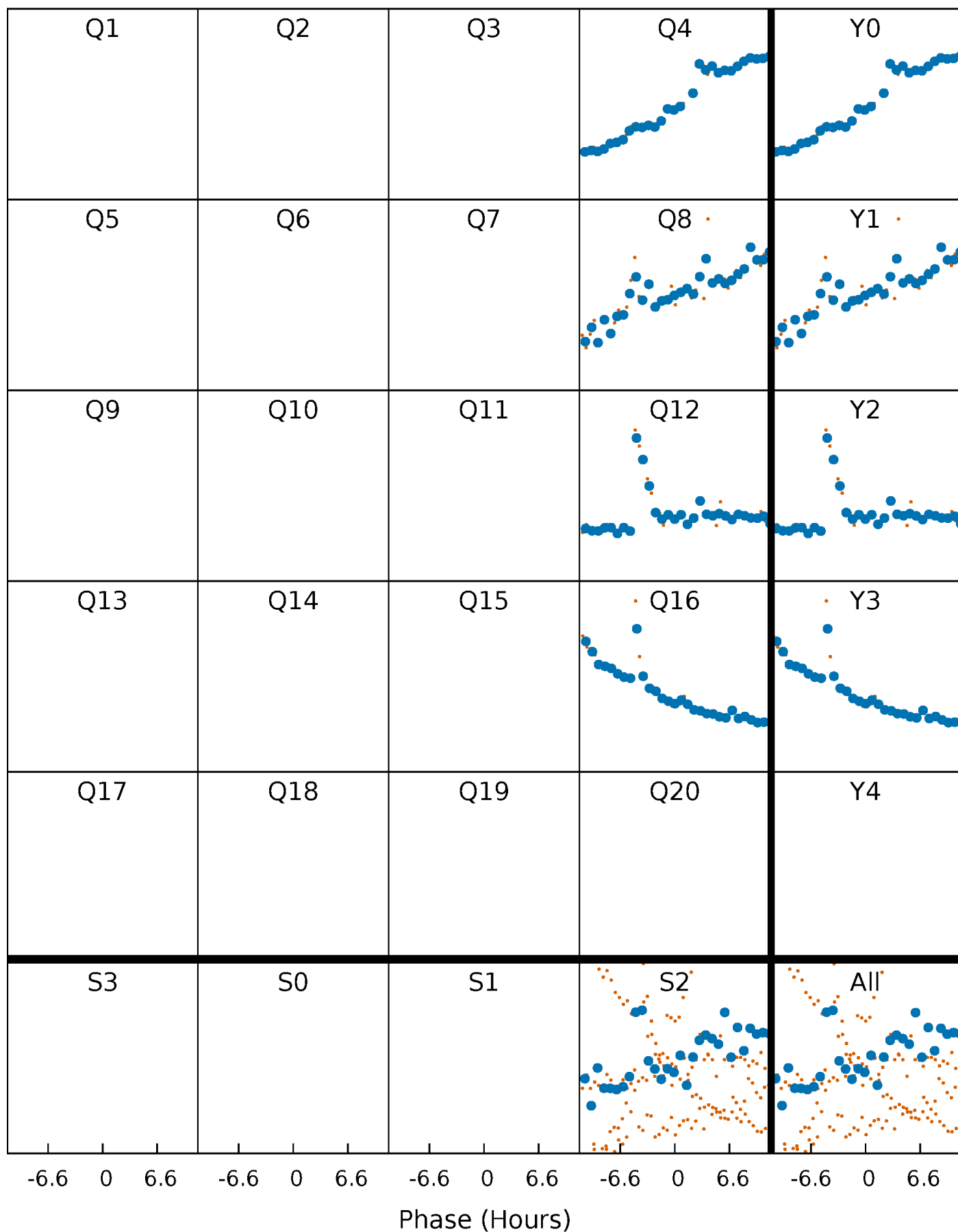


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



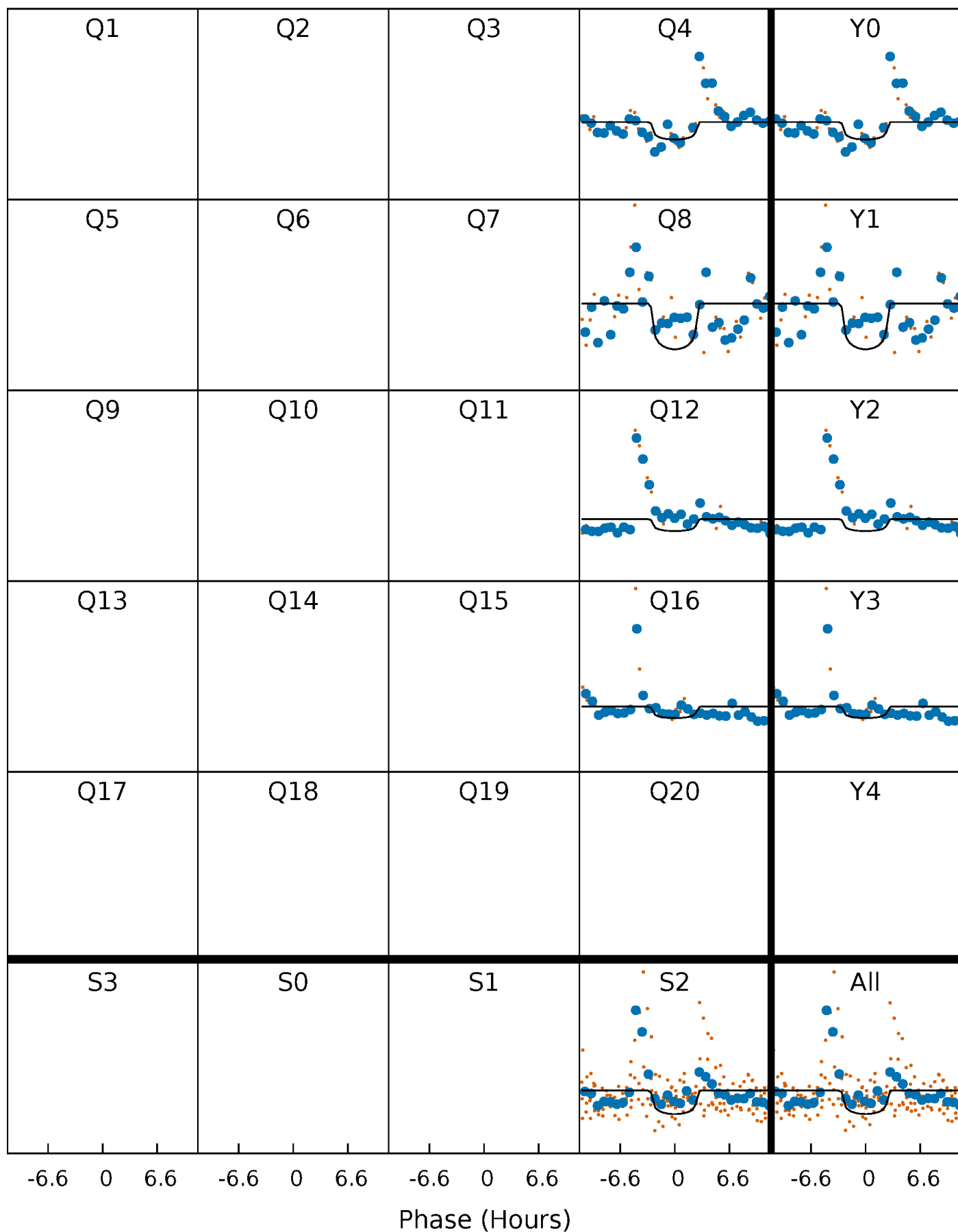
PDC Quarter-Phased Transit Curves

TCE 009407581-02 $P=381.350559$ Days $T_0=404.500998$ (BKJD)



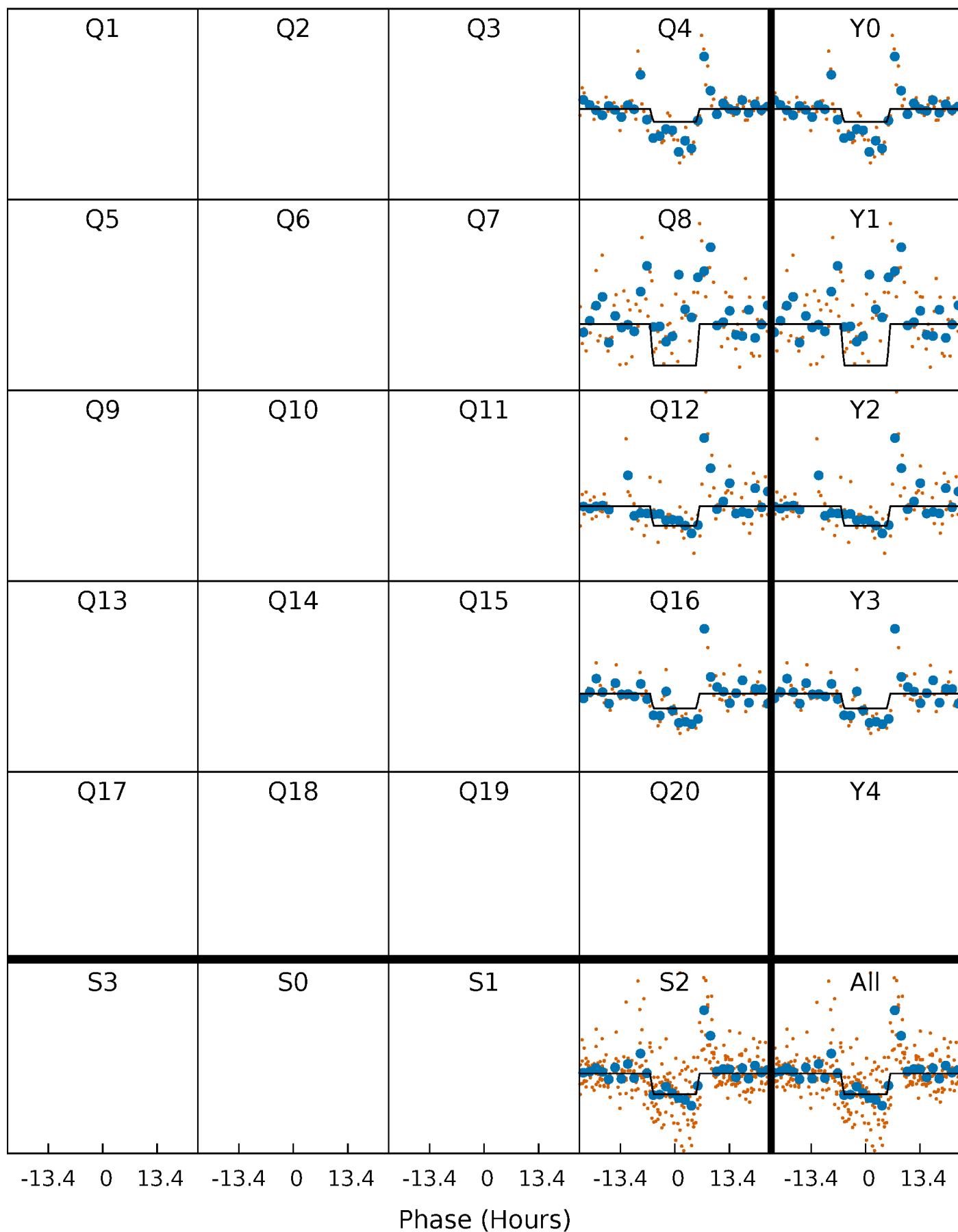
DV Quarter-Phased Transit Curves

TCE 009407581-02 $P=381.350559$ Days $T_0=404.500998$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

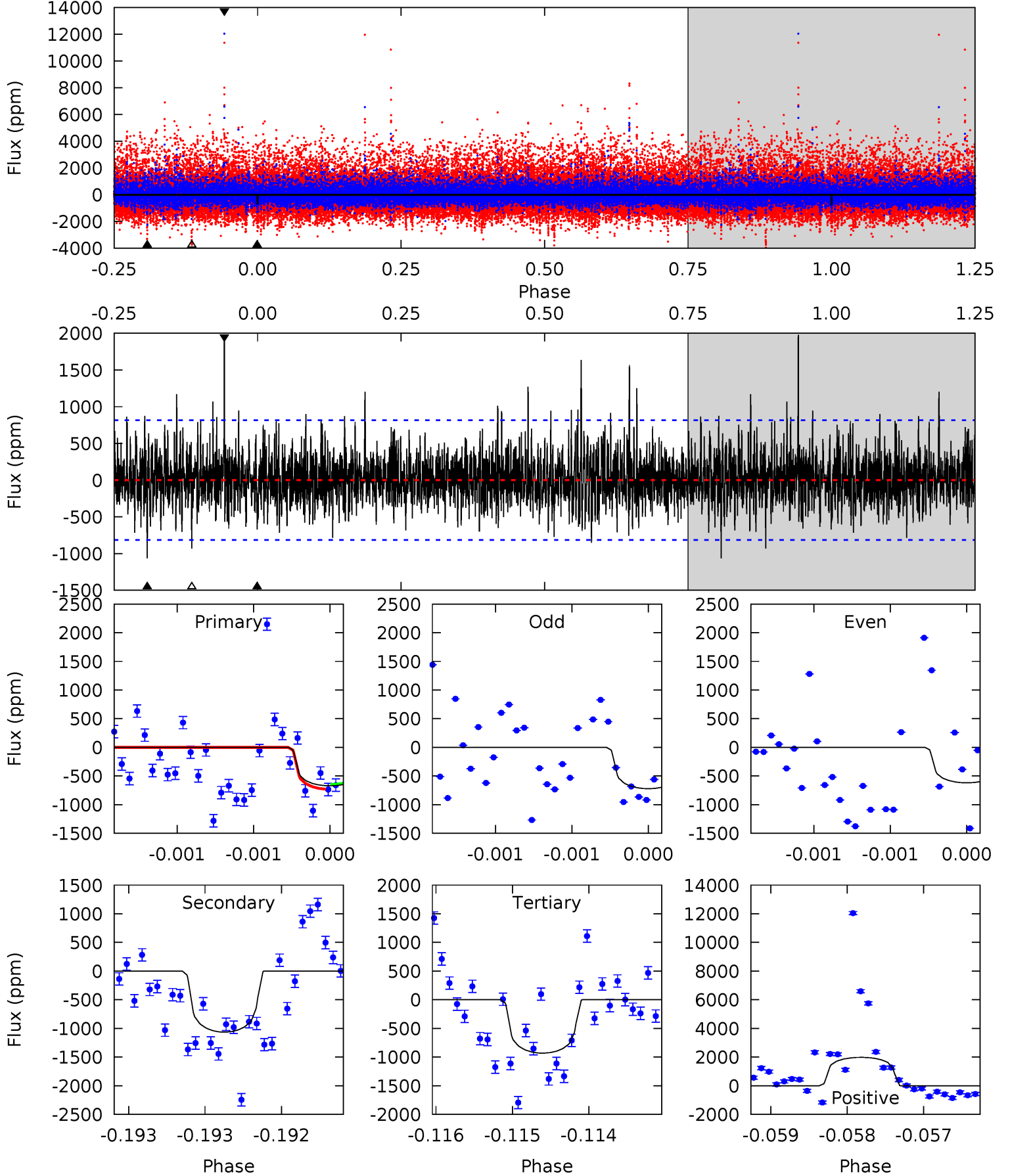
TCE 009407581-02 $P=381.617166$ Days $T_0=404.349762$ (BKJD)



DV Model-Shift Uniqueness Test

009407581-02, P = 381.350559 Days, E = 23.150439 Days

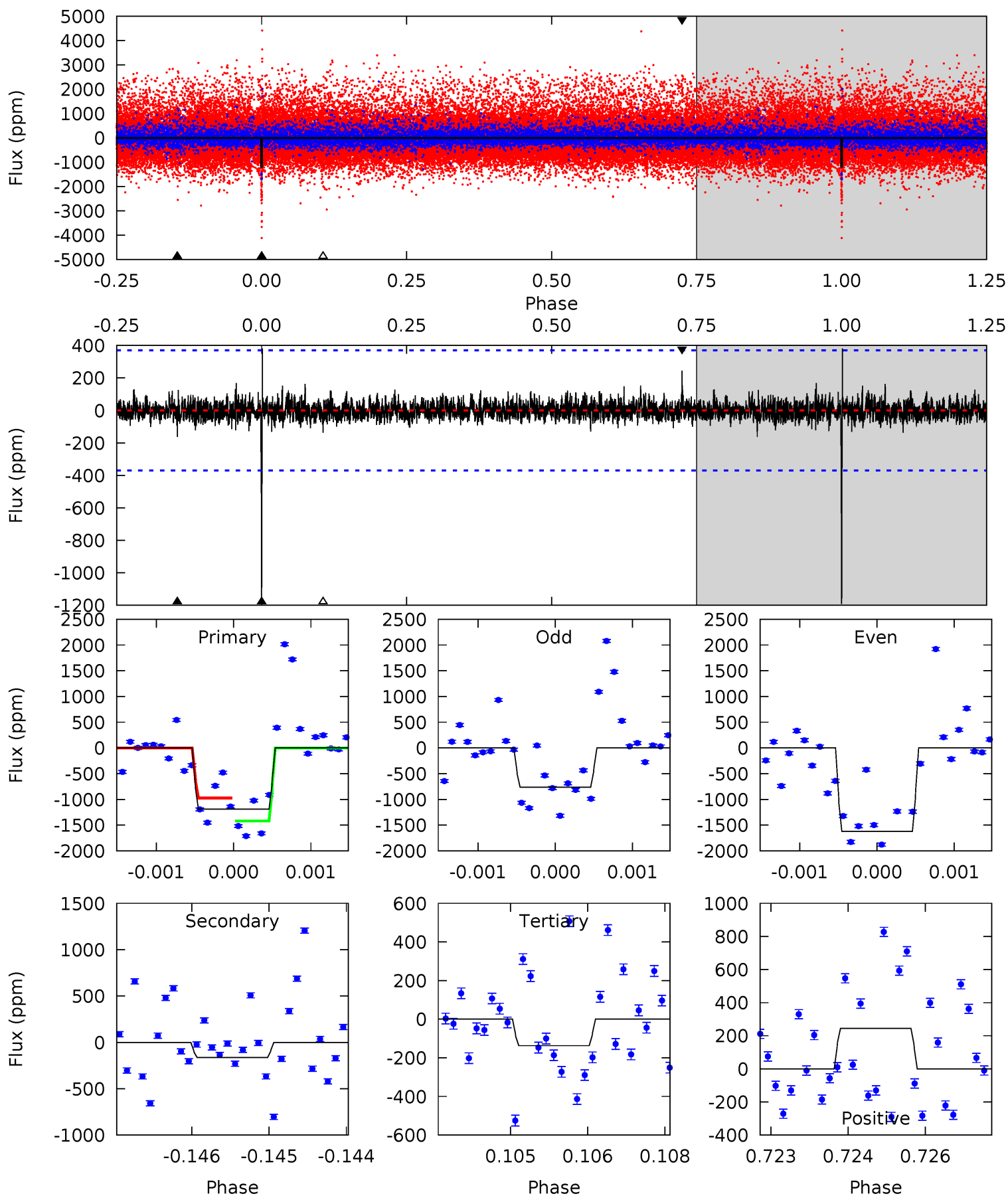
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
4.55	7.21	6.31	13.4	5.53	3.41	1.91	-1.76	-8.86	0.91	-6.20	0.30	0.96	0.65	0.28



Alt Model-Shift Uniqueness Test

009407581-02, P = 381.617166 Days, E = 22.732596 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
17.4	2.39	2.01	3.57	5.41	3.23	0.55	15.4	13.9	0.39	-1.18	6.14	0.99	0.24	3.29



Stellar Parameters For KIC 009407581

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	3569^{+57}_{-64}	$4.877^{+0.049}_{-0.036}$	$-0.200^{+0.100}_{-0.100}$	$0.378^{+0.035}_{-0.044}$	$0.395^{+0.042}_{-0.052}$	$10.290^{+2.639}_{-1.753}$
	+2%/-2%	+1%/-1%	+50%/-50%	+9%/-12%	+11%/-13%	+26%/-17%
Source	PHO2	PHO2	PHO2	DSEP		

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

Secondary Eclipse Parameters for KIC 009407581-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	A_{obs}
DV	-1065 ± 148	$1.60^{+0.73}_{-0.75}$	156^{+3}_{-4}	3371^{+798}_{-379}	$130164^{+323481}_{-71105}$
Alt.	-163 ± 68	$1.38^{+0.74}_{-0.73}$	155^{+4}_{-4}	2694^{+607}_{-324}	25940^{+86900}_{-16657}

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

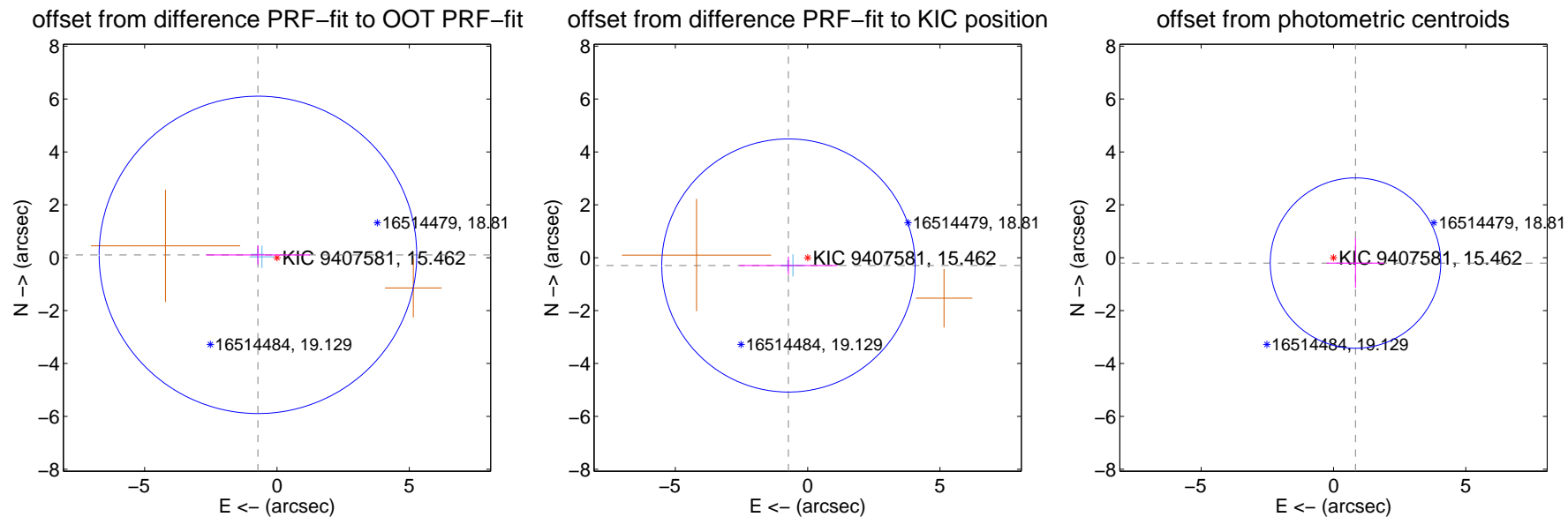
DV Centroid Data

Supplemental centroid analysis for 009407581-02. Kepler magnitude: 15.46. Transit SNR 5.93

There are 2 quarters with good PRF difference image offsets

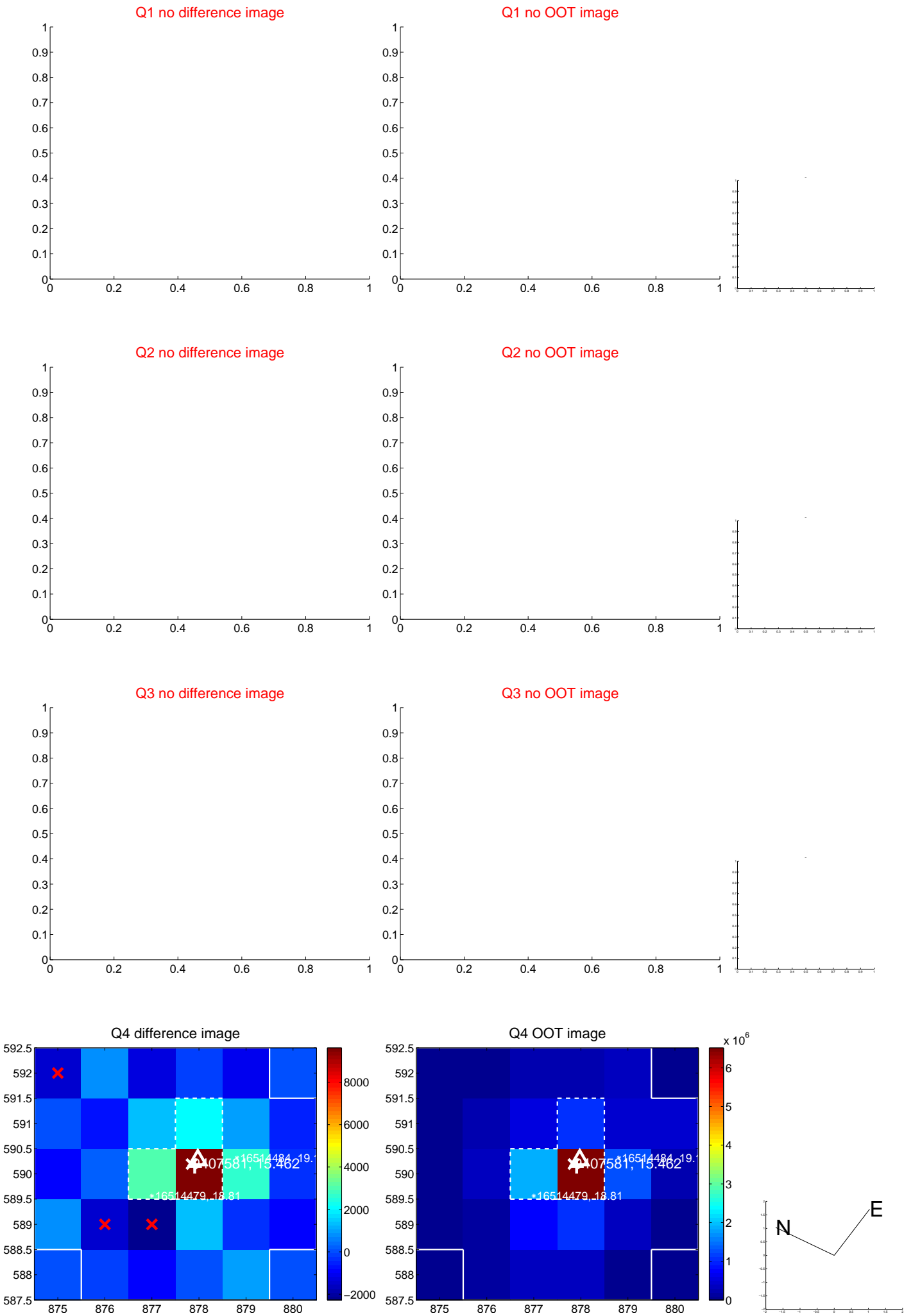
The direct PRF centroid is offset from the target star catalog position by about 0.43 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.728 ± 2.000	0.36	0.720 ± 1.969	0.107 ± 0.363
PRF-fit source offset from KIC position	0.784 ± 1.595	0.49	0.726 ± 1.852	-0.295 ± 0.333
photometric centroid source offset	0.86 ± 1.07	0.80	-0.83 ± 1.08	-0.20 ± 0.94

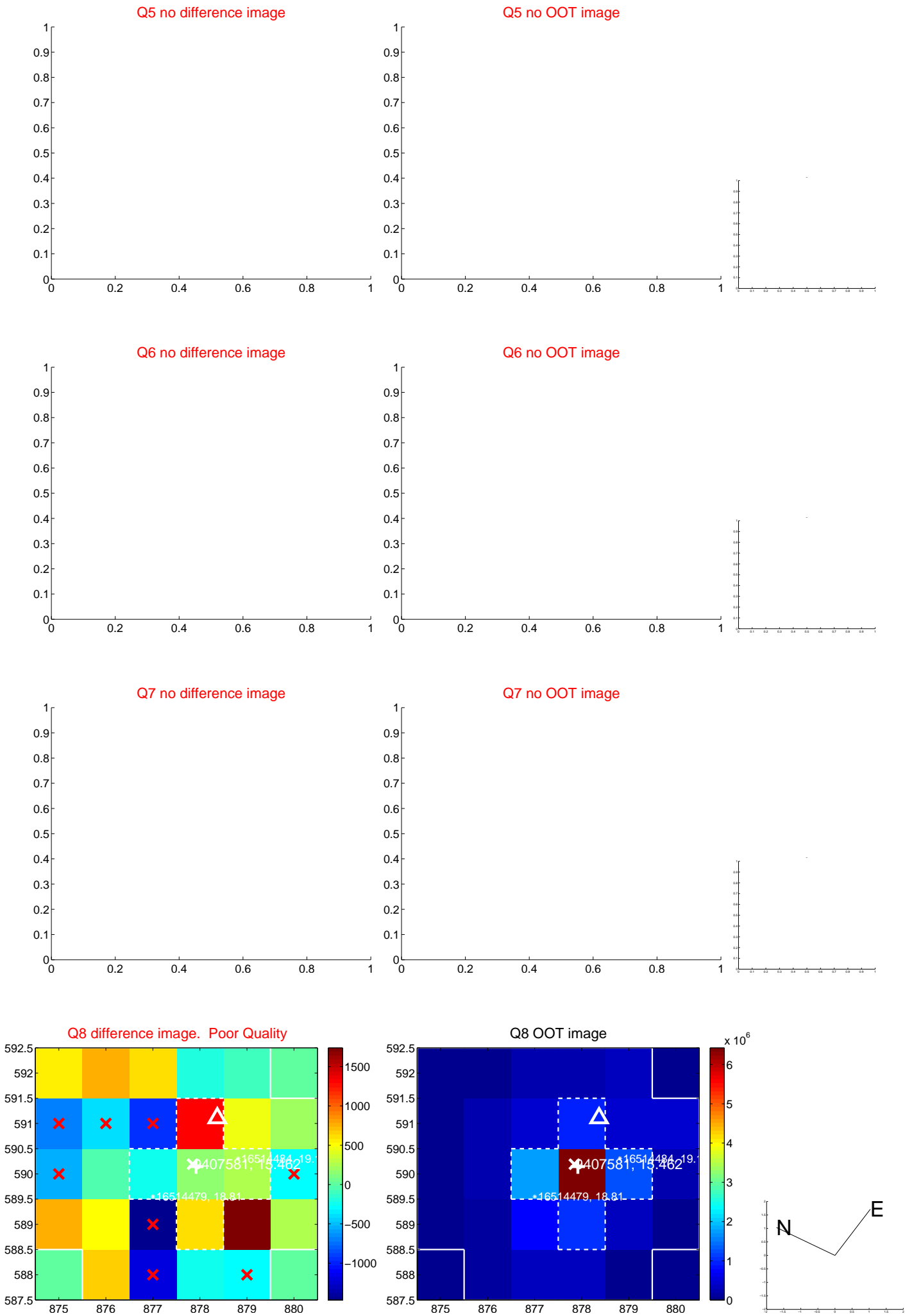


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

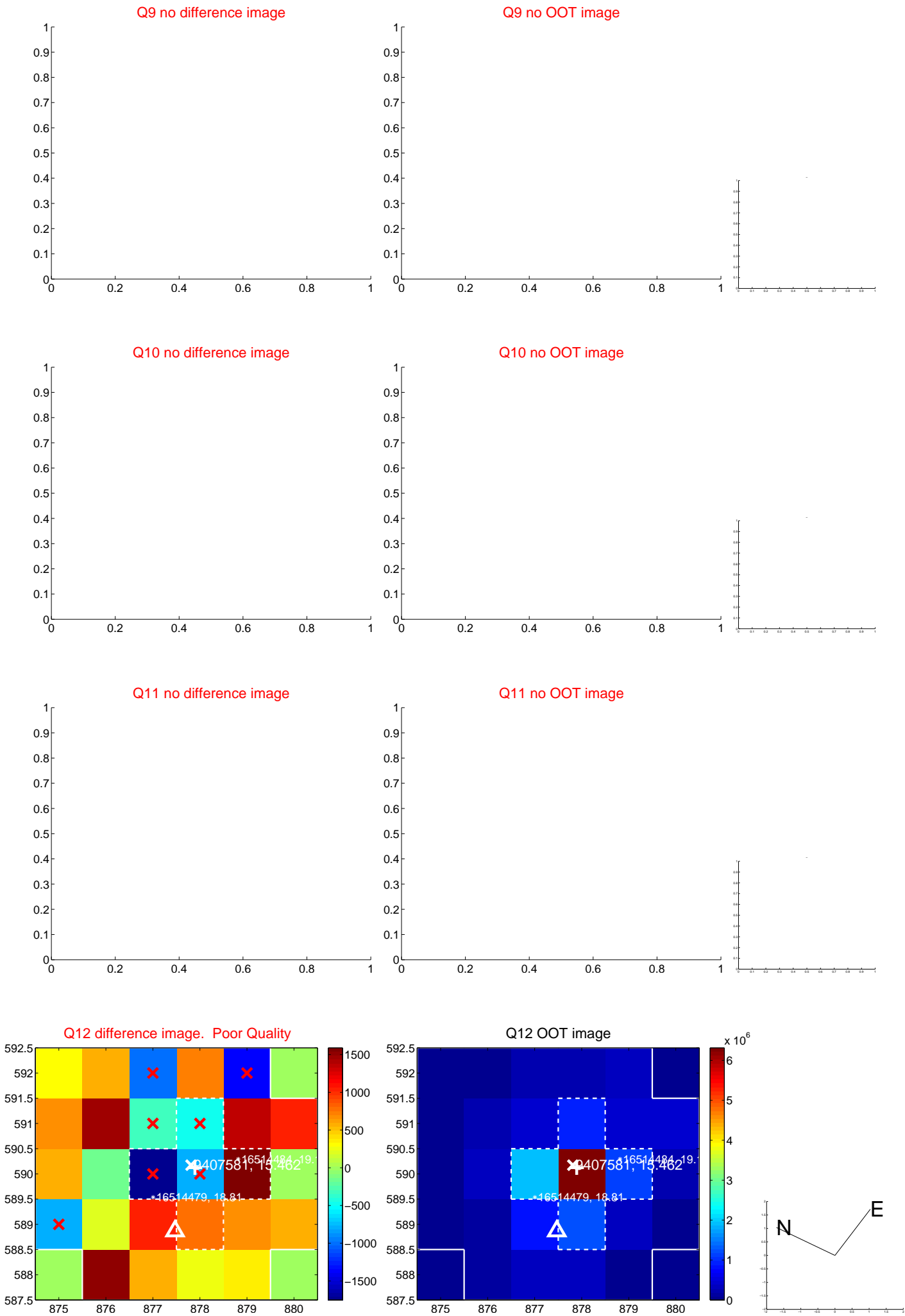
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



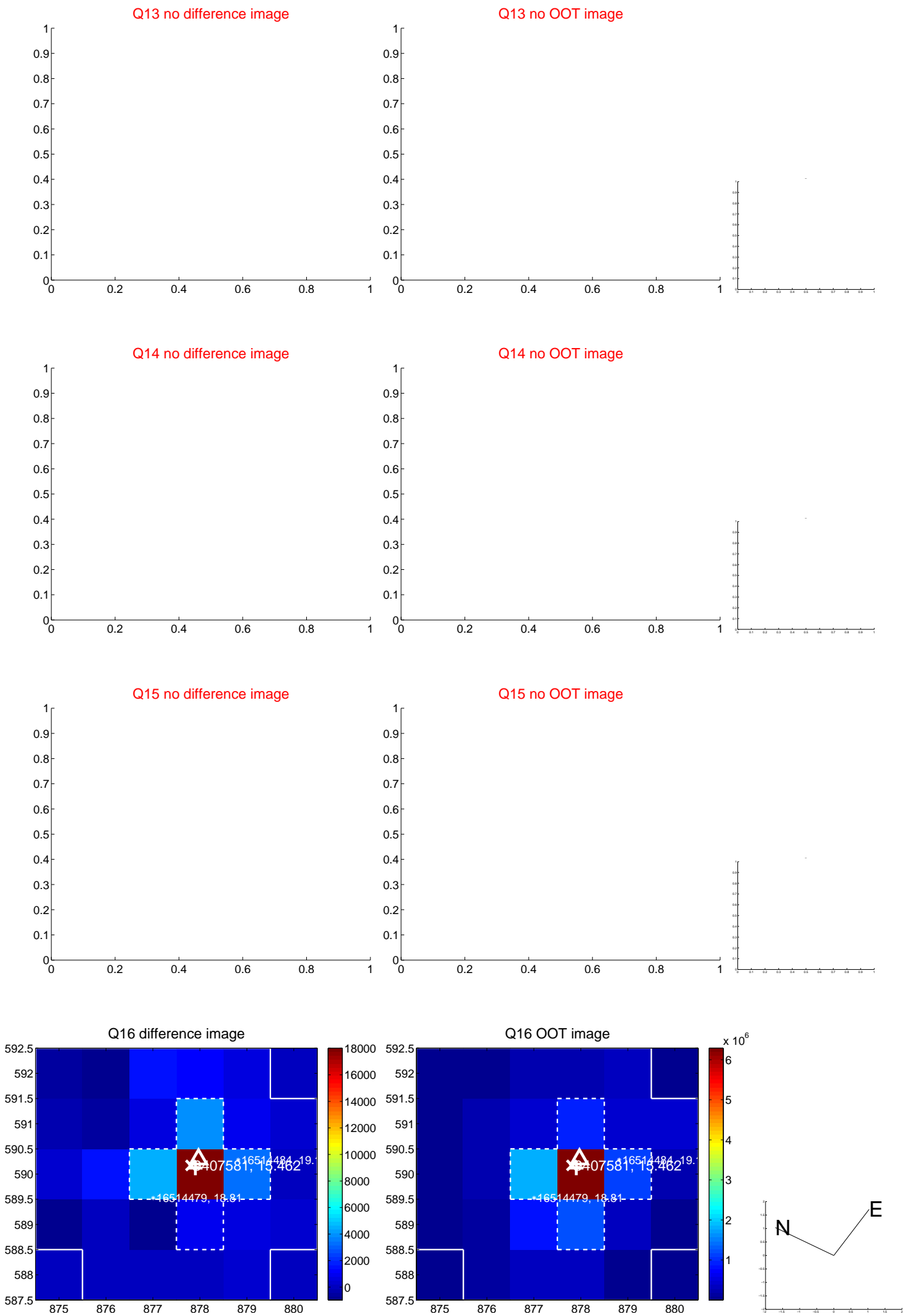
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



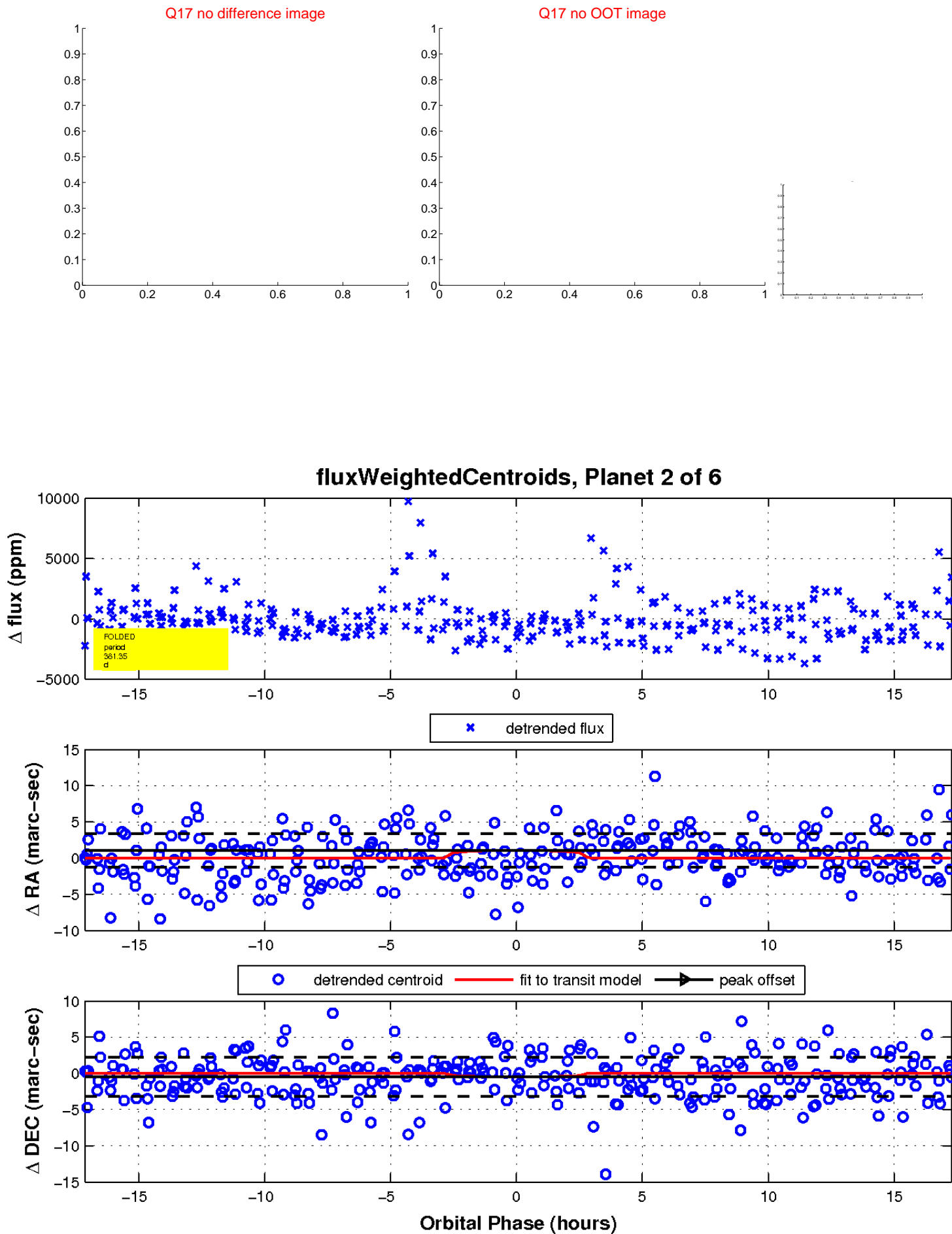
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

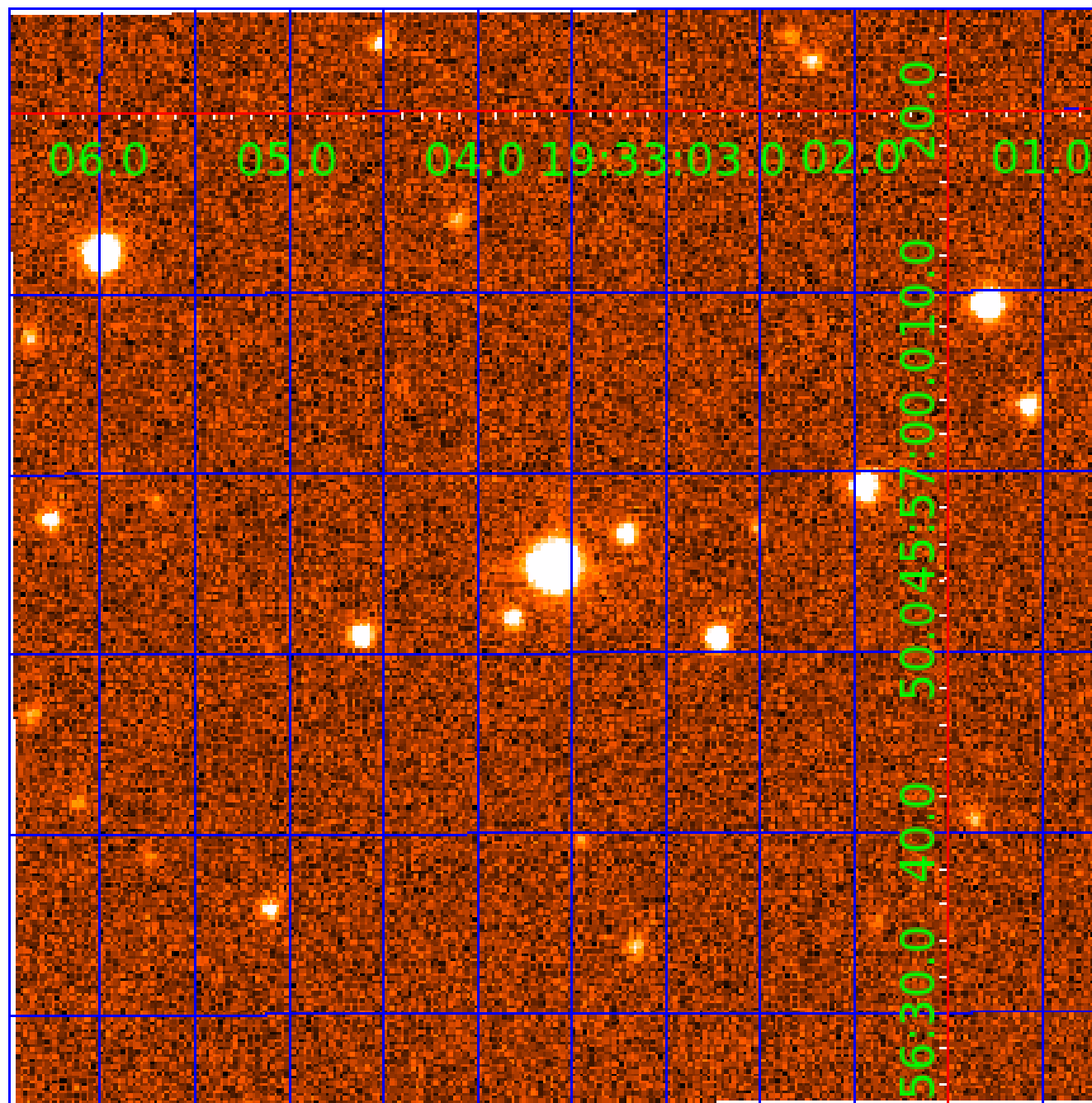


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 009407581

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})
009407581-01	OBS	No	402.206945	210.128388	2265.3	3.720	12.7	7.0	0.38	3569	1.81	0.03
009407581-02	OBS	No	381.350559	404.500998	1592.7	5.764	12.8	5.9	0.38	3569	1.58	0.04
009407581-03	OBS	No	568.684013	364.474874	1698.3	8.382	12.6	5.4	0.38	3569	1.55	0.02
009407581-04	OBS	No	414.517175	255.857169	2328.1	5.254	12.7	7.1	0.38	3569	2.02	0.03
009407581-05	OBS	No	494.727668	157.177644	2587.8	14.592	11.3	7.5	0.38	3569	1.94	0.03
009407581-06	OBS	No	549.668579	360.735504	3048.6	9.899	11.4	9.2	0.38	3569	2.07	0.02

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009407581-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009407581-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
009407581-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009407581-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
009407581-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
009407581-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—MOD_NONUNIQ_DV—MOD_POS_DV—CENT_FEW_DIFFS

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

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

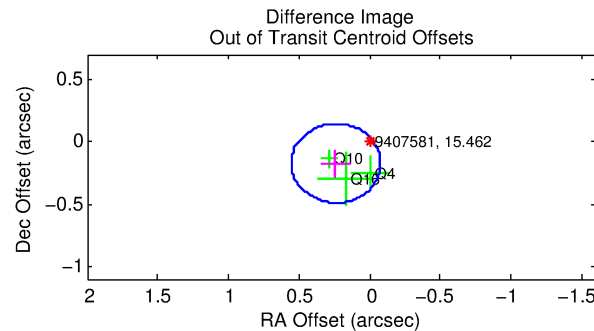
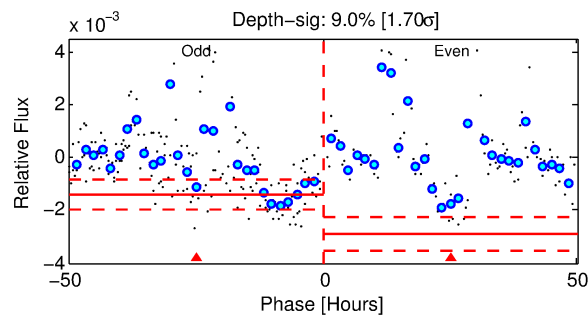
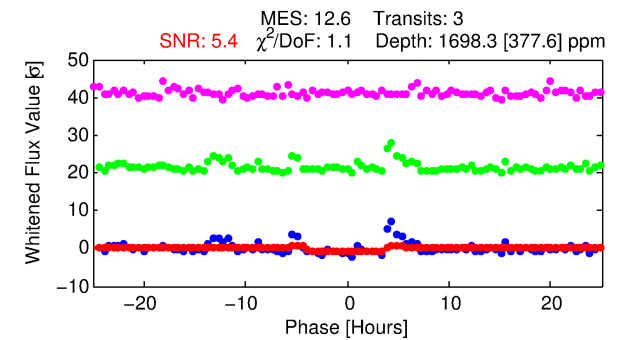
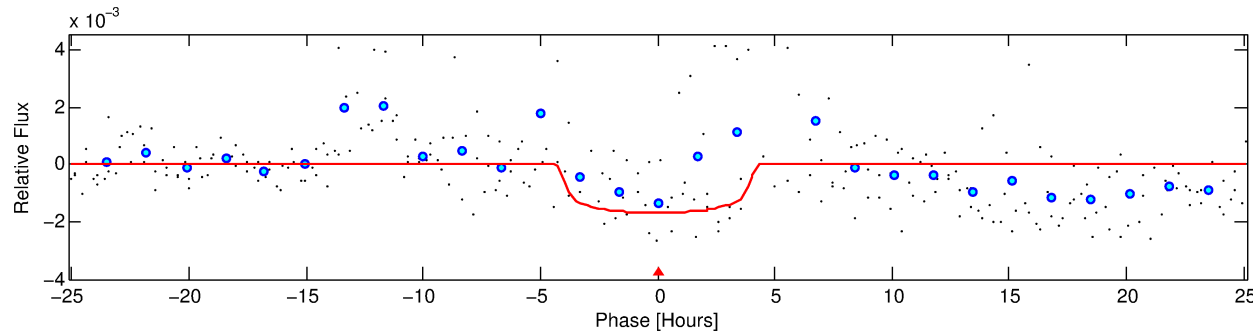
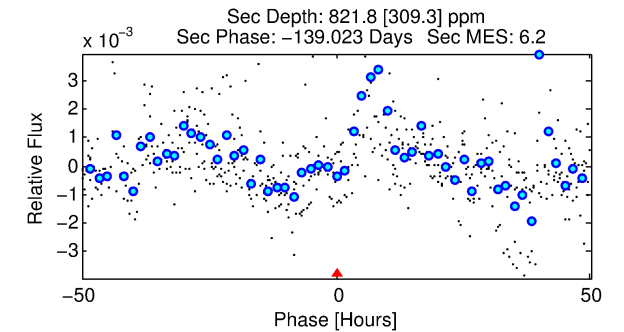
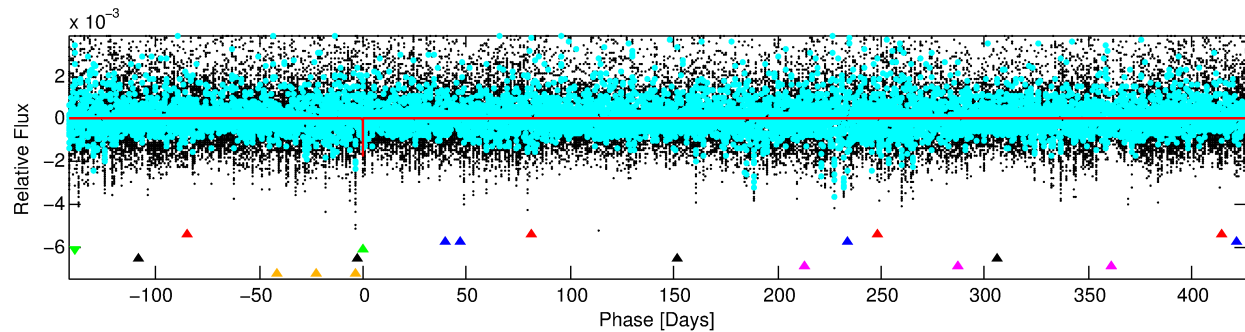
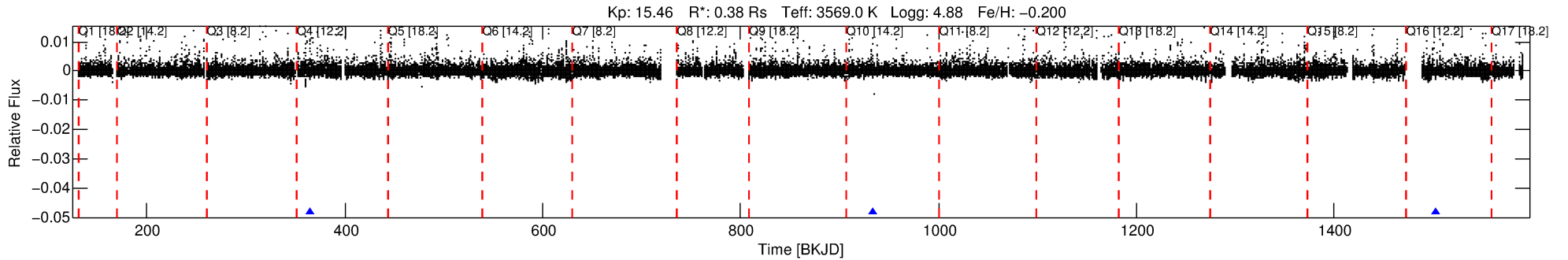
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009407581-03

No Significant Match Found

DV One-Page Summary

KIC: 9407581 Candidate: 3 of 6 Period: 568.684 d



DV Fit Results:

Period = 568.68401 [0.01027] d
Epoch = 364.4749 [0.0123] BKJD
Rp/R* = 0.0376 [0.0274]
a/R* = 524.00 [1687.89]
b = 0.23 [13.02]
Seff = 0.02 [0.00]
Teq = 98 [3] K
Rp = 1.55 [1.15] Re
a = 0.9839 [0.0848] AU
Ag = 181499.16 [273719.47] [0.66σ]
Teffp = 3114 [1173] K [2.57σ]

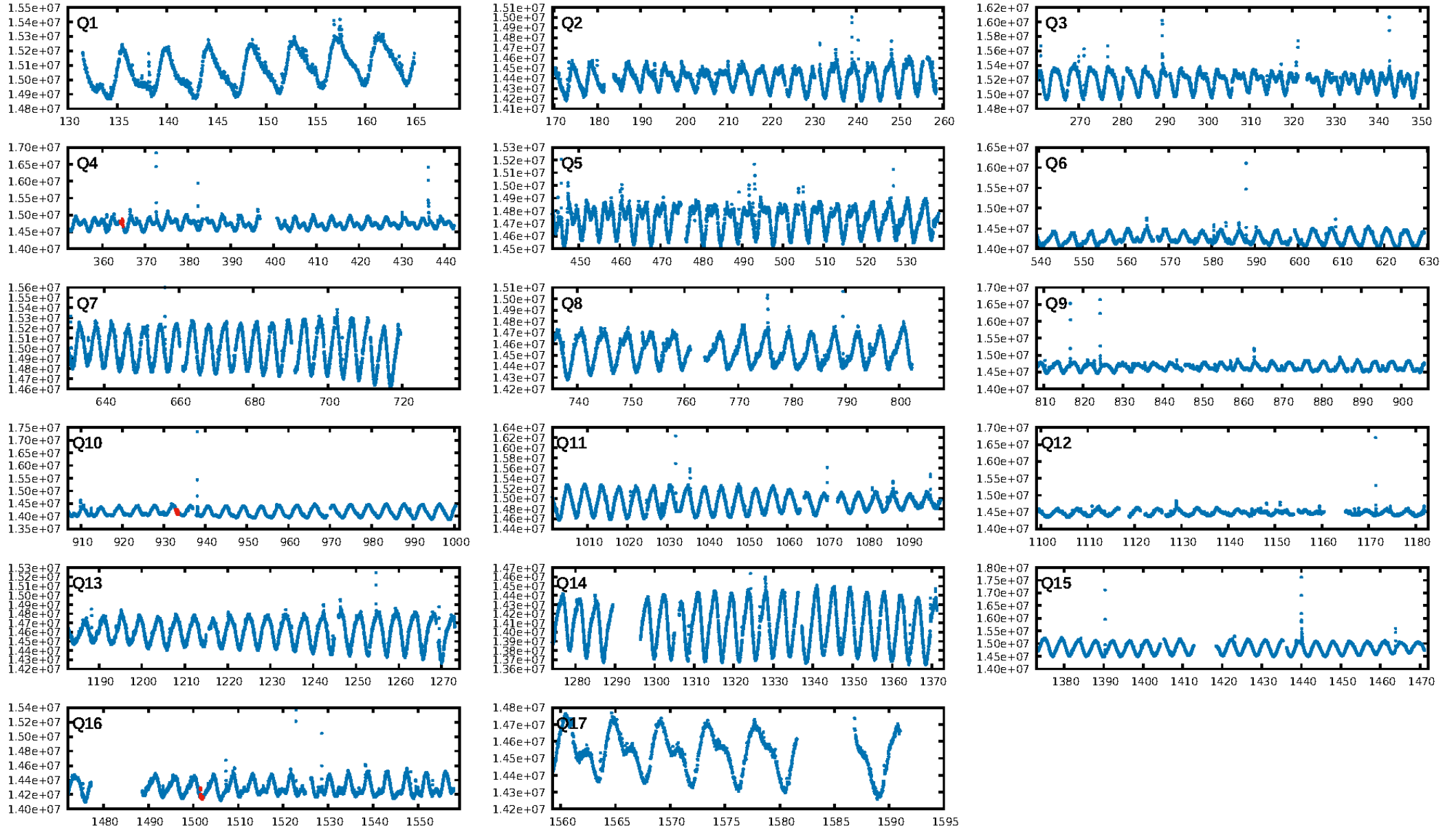
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [35.18σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 36.1%
ModelChiSquareGof-sig: 96.6%
Bootstrap-pfa: 8.34e-11
RollingBand-fgt: 1.00 [3/3]
GhostDiagnostic-chr: -0.4423
Centroid-sig: 68.2%
Centroid-so: 0.975 arcsec [1.13σ]
OotOffset-rm: 0.296 arcsec [2.80σ]
KicOffset-rm: 0.451 arcsec [3.04σ]
OotOffset-st: 1/0/2/0 [3]
KicOffset-st: 1/0/2/0 [3]
DiffImageQuality-fgm: 0.67 [2/3]
DiffImageOverlap-fno: 1.00 [3/3]

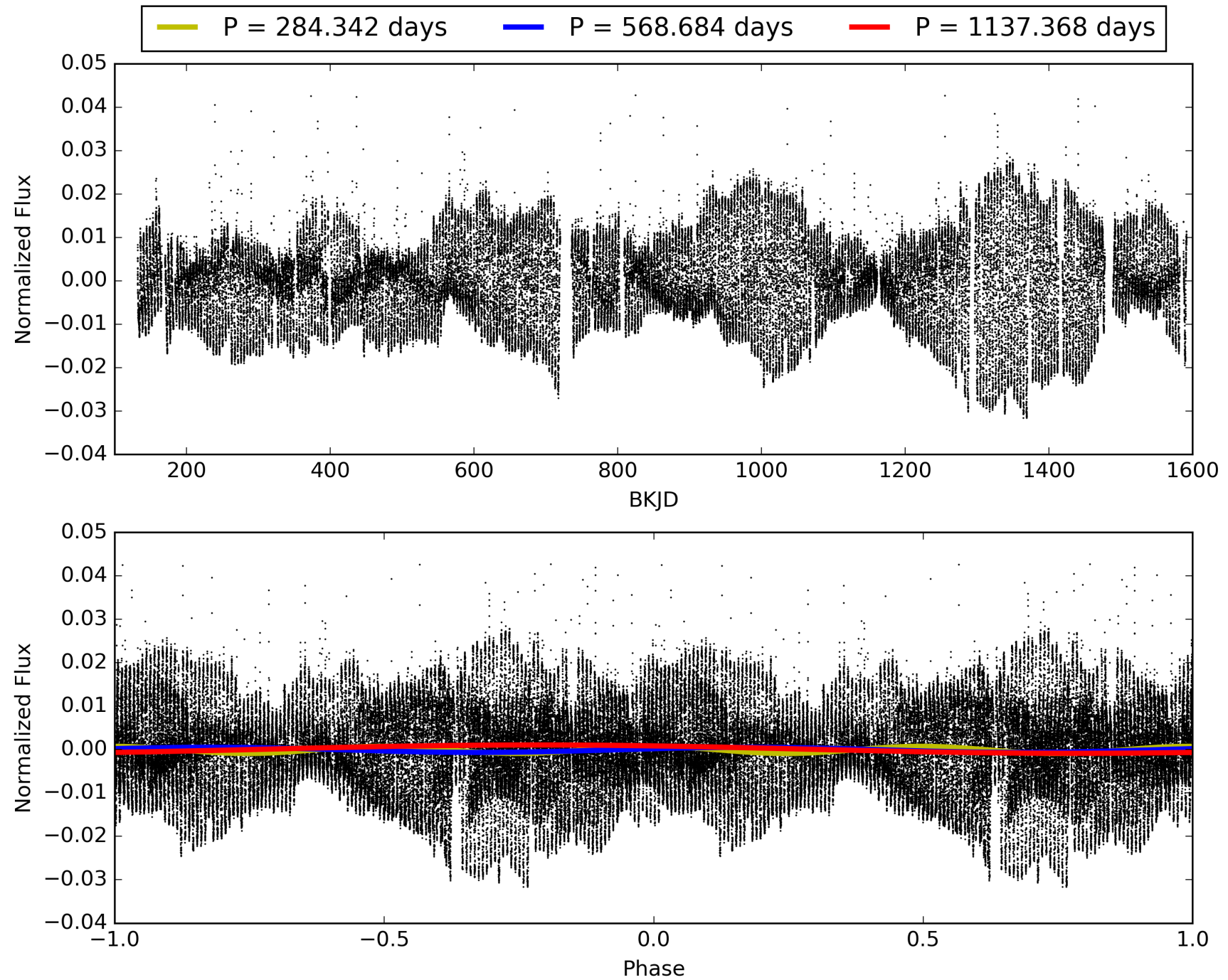
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 17:35:05 Z

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

TCE 009407581-03, PDC Light Curves

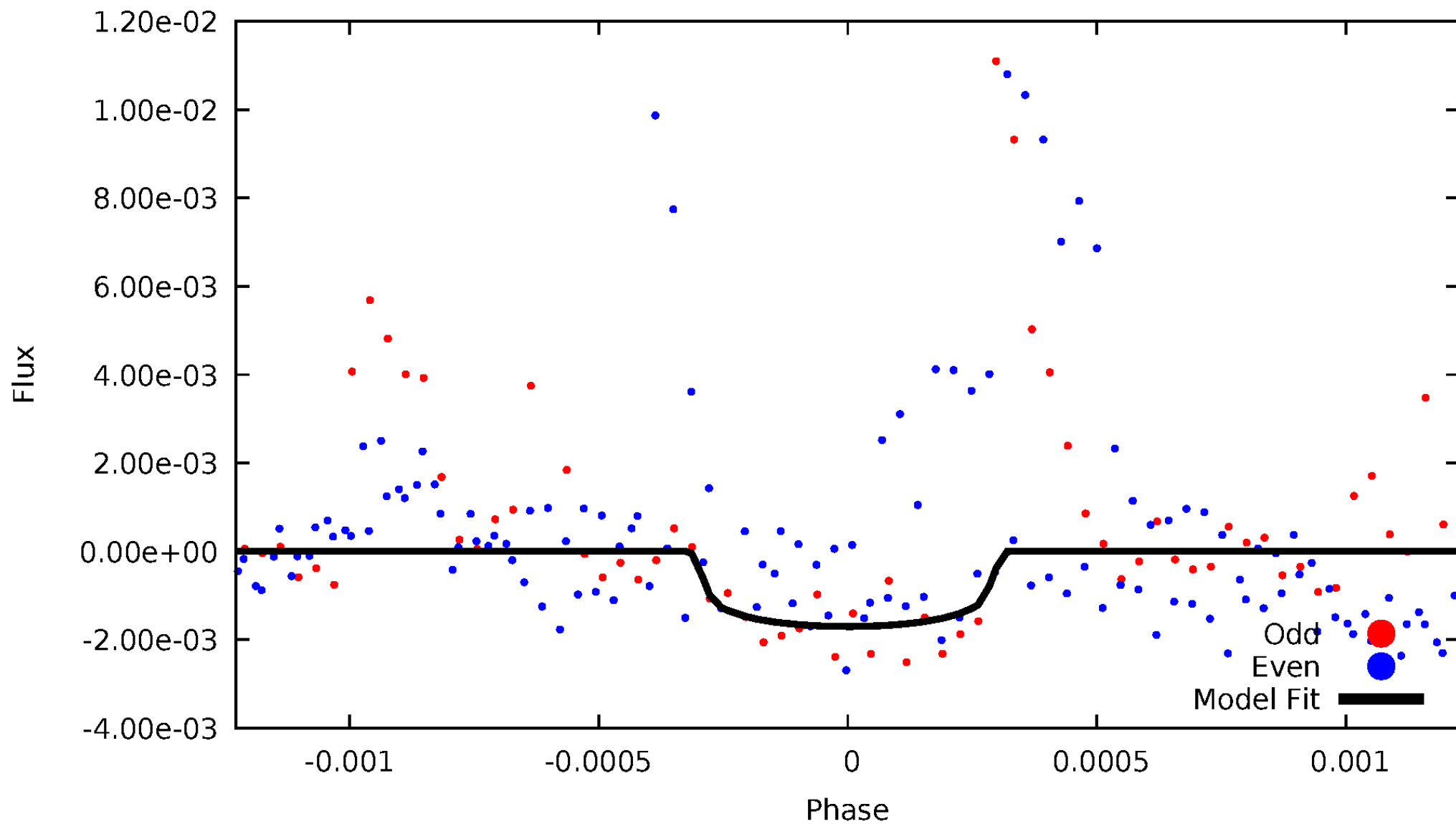


TCE 009407581-03



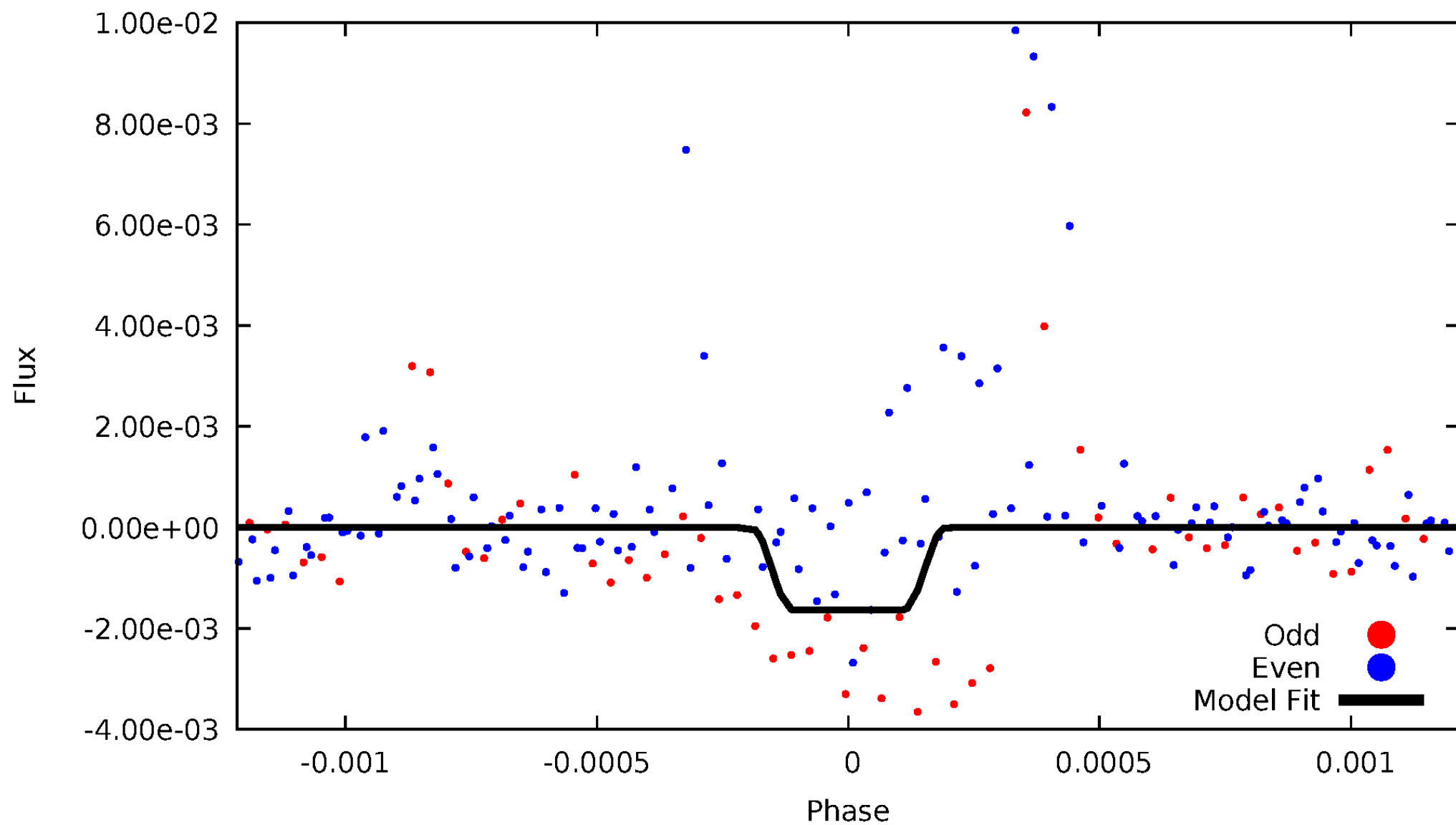
DV Odd/Even

TCE 009407581-03



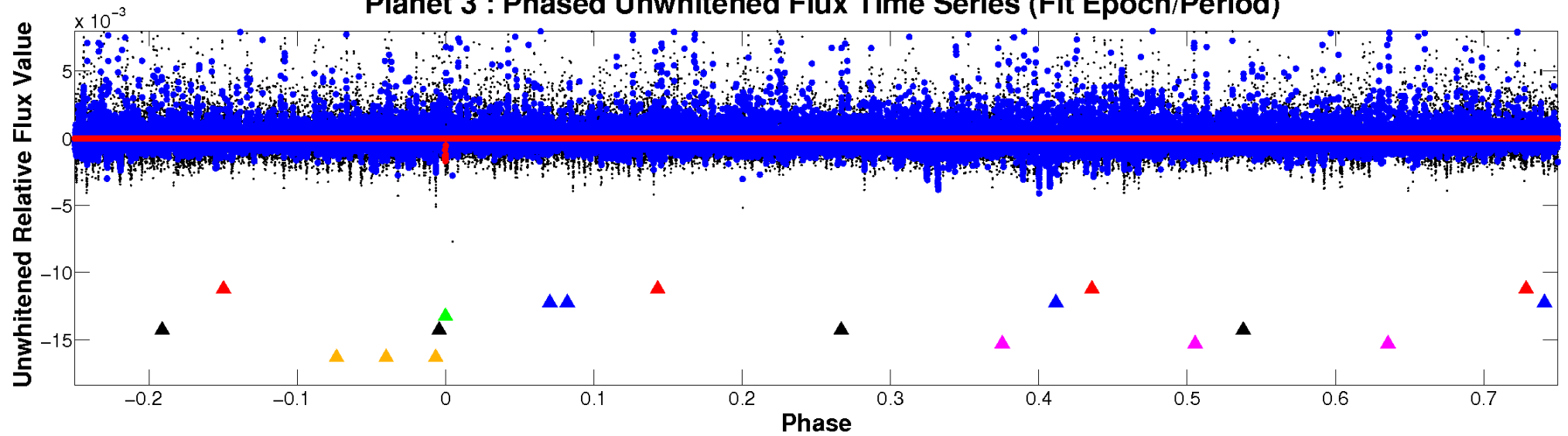
ALT Odd/Even

TCE 009407581-03

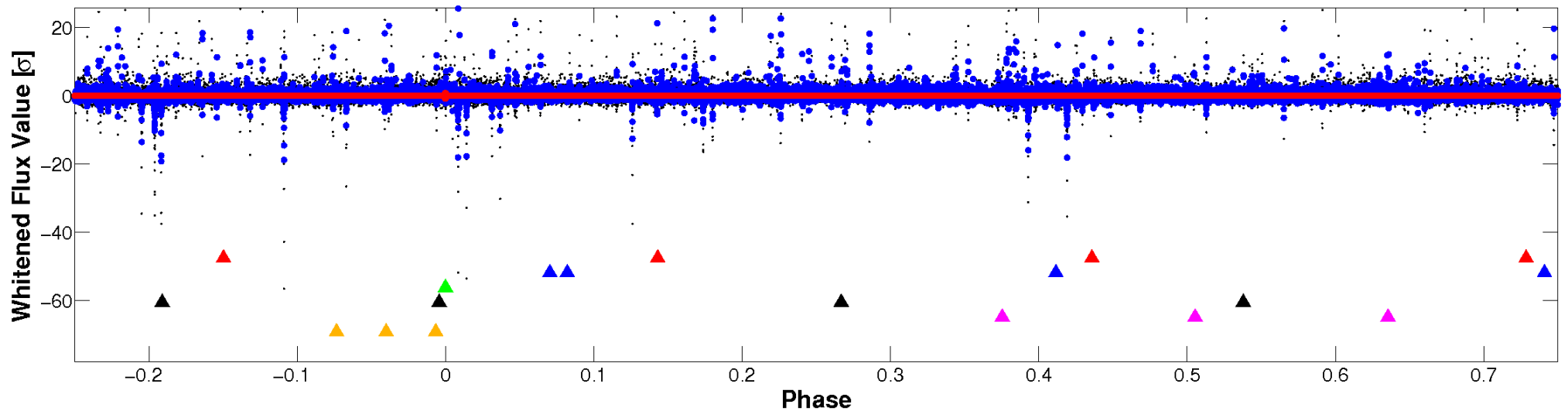


Non-Whitened Vs. Whitened Light Curve

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

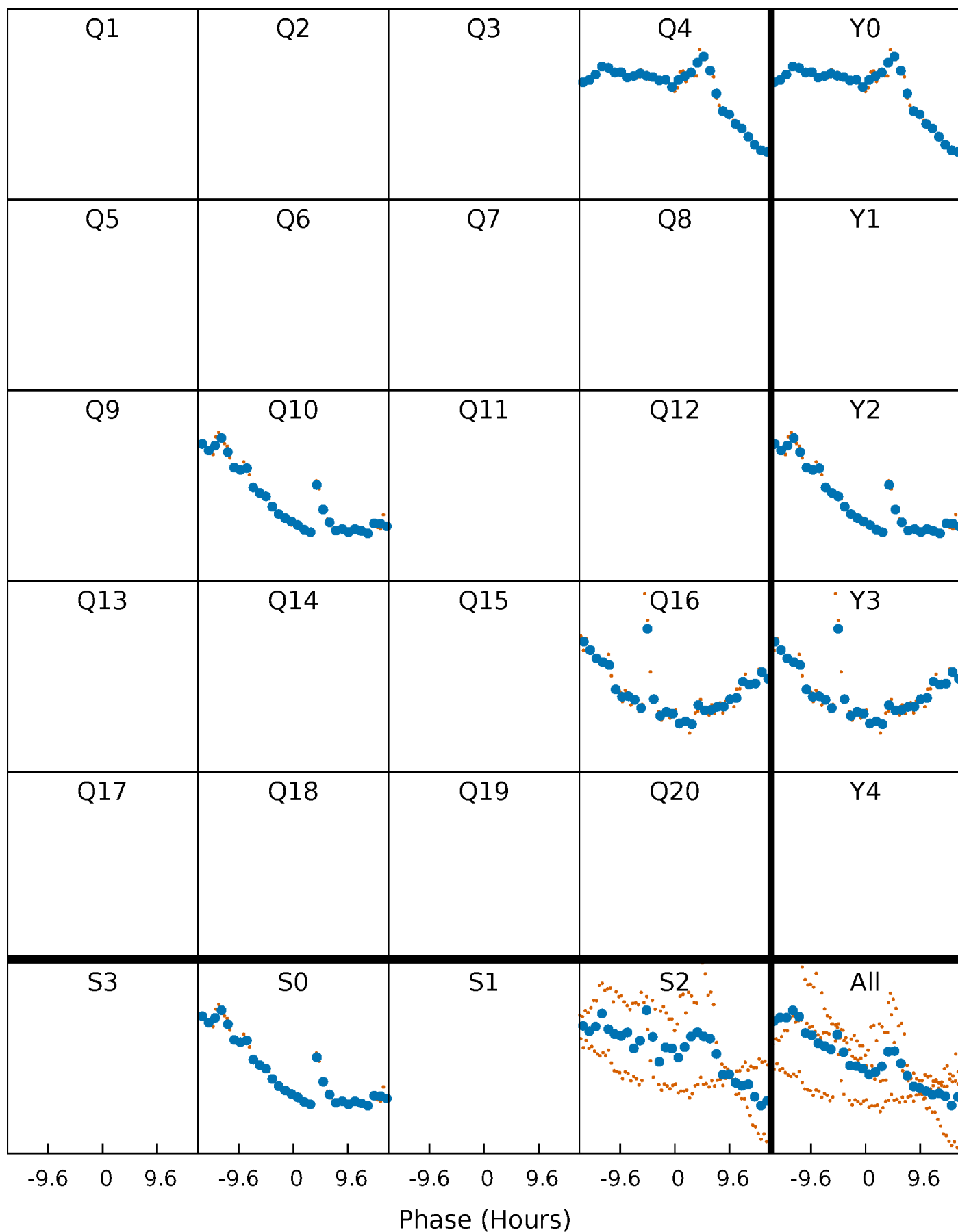


Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



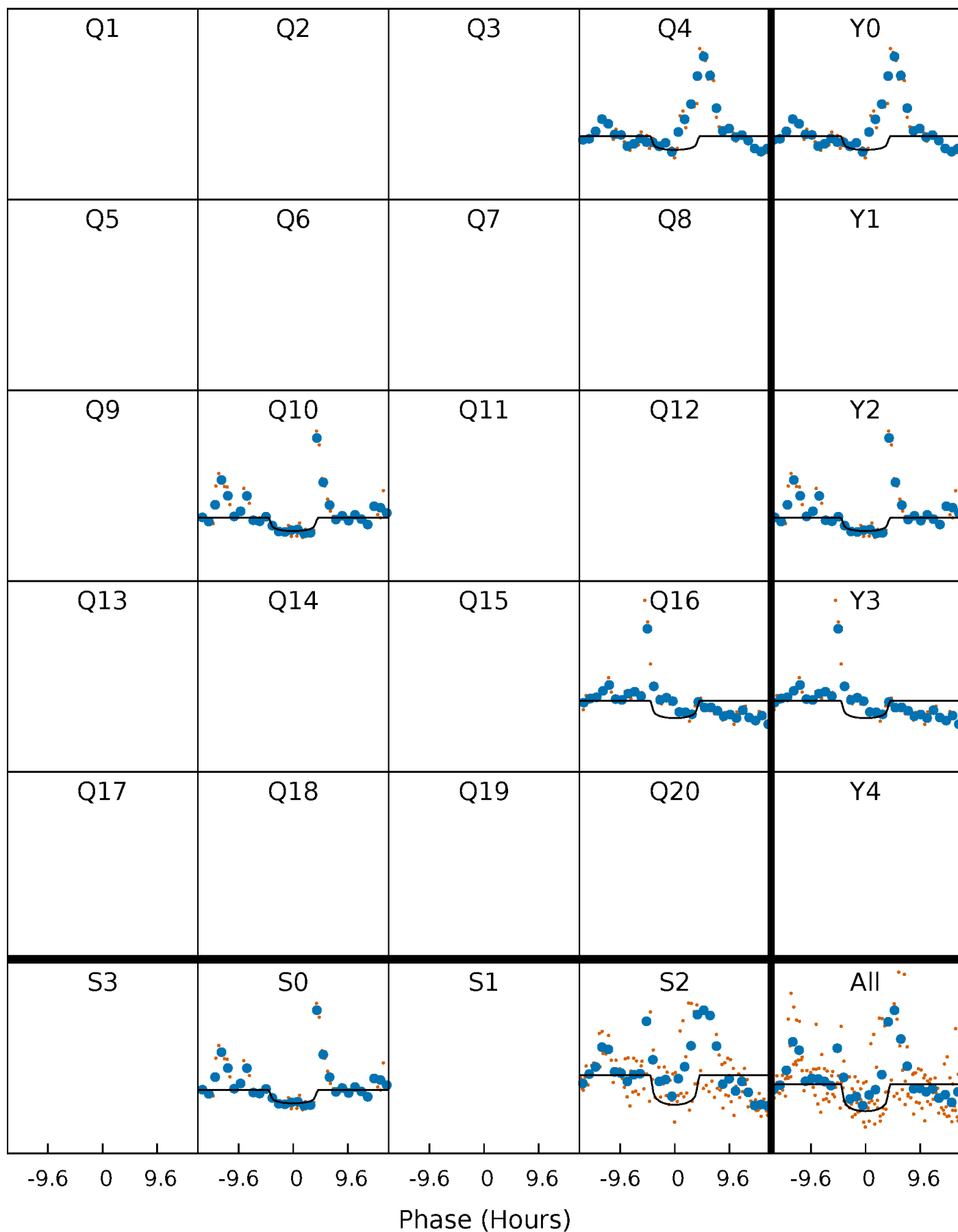
PDC Quarter-Phased Transit Curves

TCE 009407581-03 $P=568.684013$ Days $T_0=364.474874$ (BKJD)



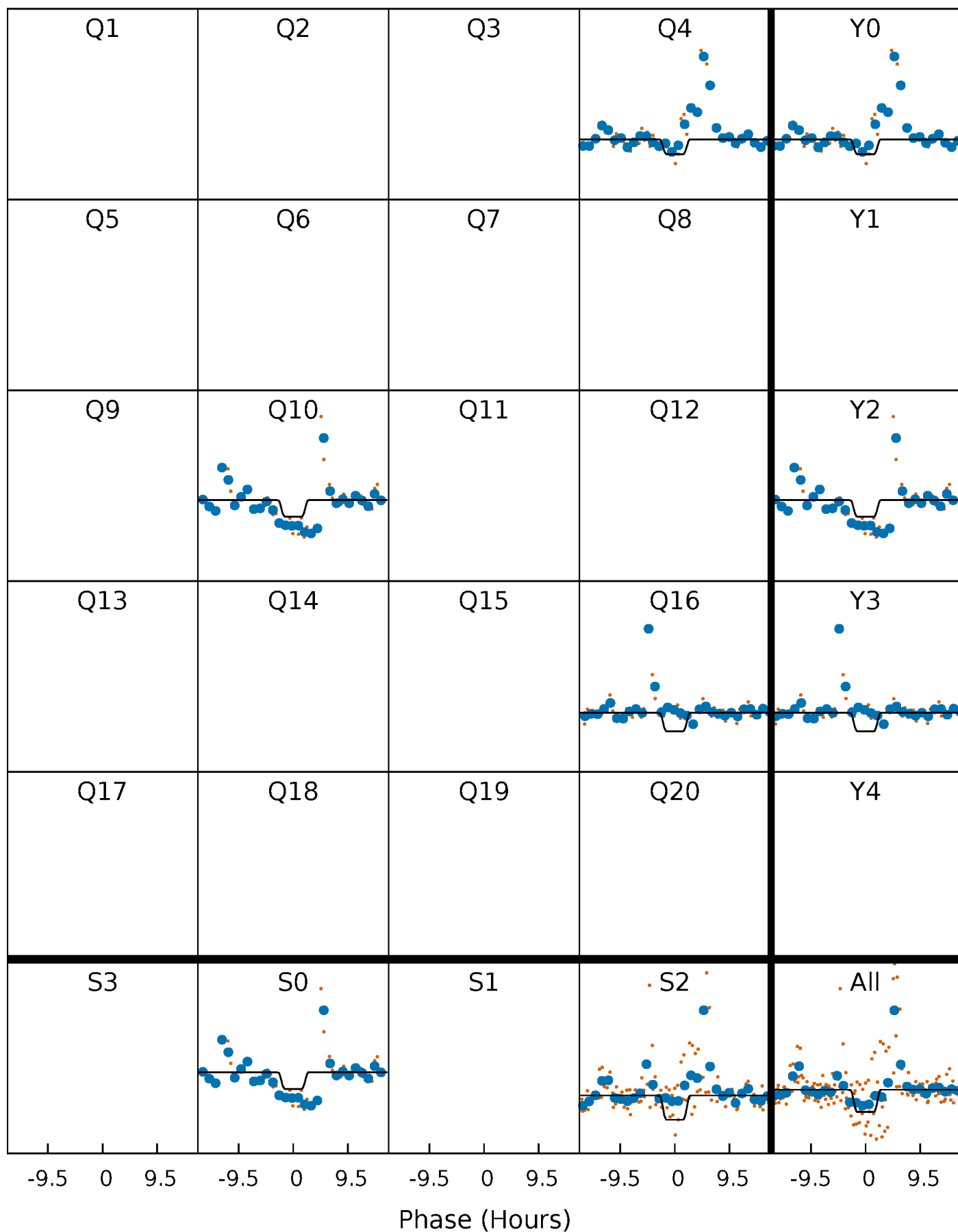
DV Quarter-Phased Transit Curves

TCE 009407581-03 $P=568.684013$ Days $T_0=364.474874$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

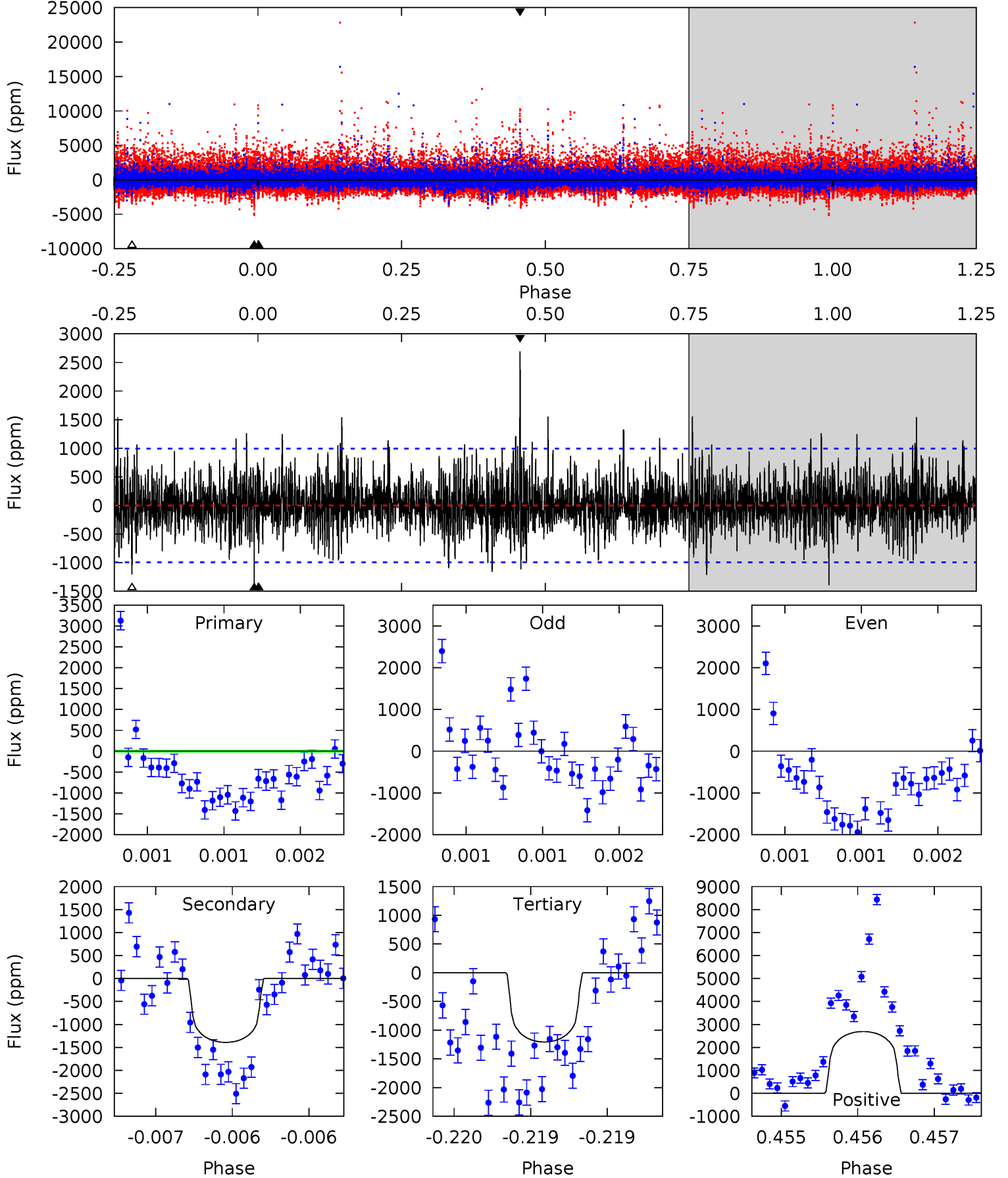
TCE 009407581-03 P=568.679597 Days $T_0=364.468040$ (BKJD)



DV Model-Shift Uniqueness Test

009407581-03, P = 568.684013 Days, E = 364.474874 Days

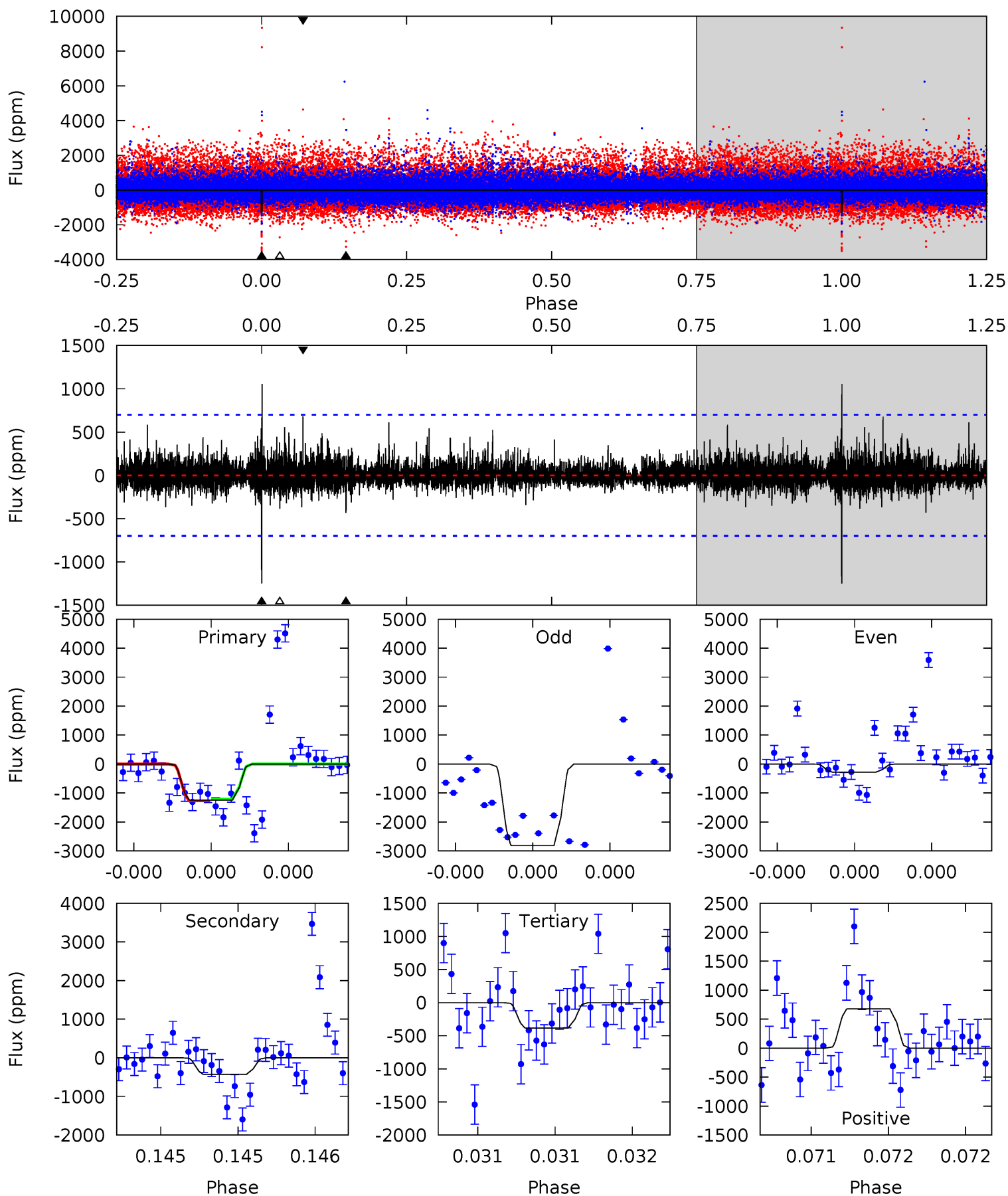
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
4.66	7.75	6.72	15.0	5.53	3.41	1.90	-2.06	-10.3	1.03	-7.24	2.88	1.04	0.66	1.29



Alt Model-Shift Uniqueness Test

009407581-03, P = 568.679597 Days, E = 364.468040 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.0	3.46	3.08	5.45	5.61	3.54	0.79	6.93	4.56	0.38	-1.99	8.96	2.81	0.46	0.24



Stellar Parameters For KIC 009407581

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	M (M_{\odot})	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	3569^{+57}_{-64}	$4.877^{+0.049}_{-0.036}$	$-0.200^{+0.100}_{-0.100}$	$0.378^{+0.035}_{-0.044}$	$0.395^{+0.042}_{-0.052}$	$10.290^{+2.639}_{-1.753}$
	+2%/-2%	+1%/-1%	+50%/-50%	+9%/-12%	+11%/-13%	+26%/-17%
Source	PHO2	PHO2	PHO2	DSEP		

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

Secondary Eclipse Parameters for KIC 009407581-03 / KOI

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-1392 ± 180	$1.69^{+0.99}_{-0.97}$	136^{+3}_{-4}	3438^{+1161}_{-434}	$254762^{+1120912}_{-153333}$
Alt.	-431 ± 125	$1.75^{+1.15}_{-0.95}$	136^{+4}_{-3}	2865^{+779}_{-367}	$74515^{+282785}_{-49155}$

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

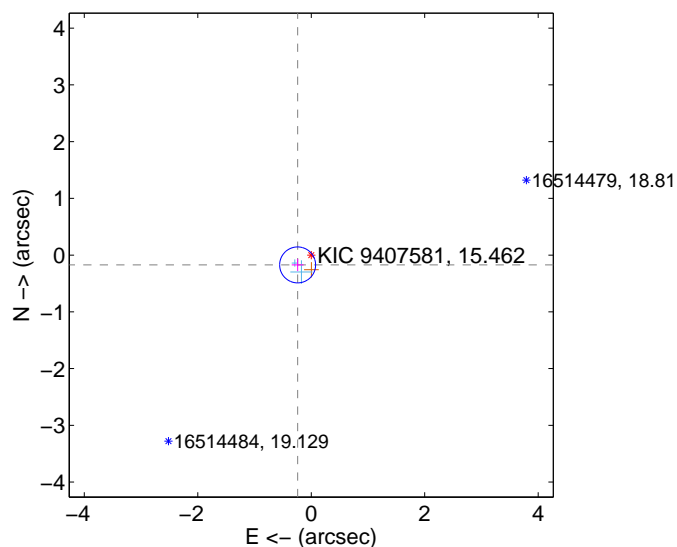
Supplemental centroid analysis for 009407581-03. Kepler magnitude: 15.46. Transit SNR 5.41

There are 2 quarters with good PRF difference image offsets

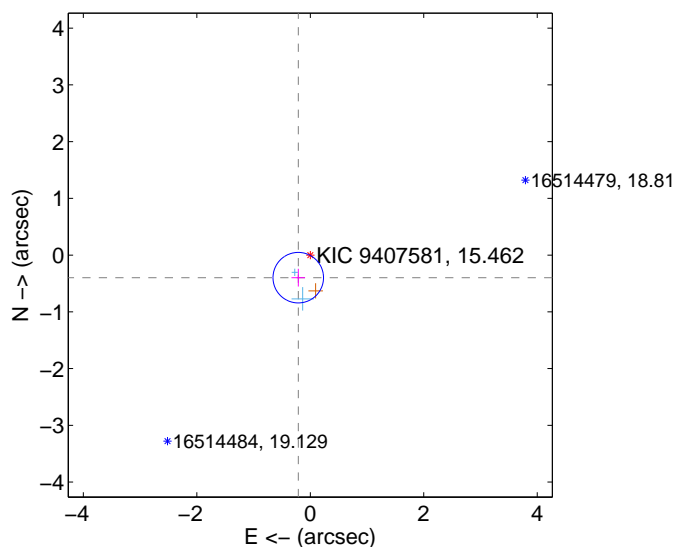
The direct PRF centroid is offset from the target star catalog position by about 0.47 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.296 ± 0.106	2.80	0.240 ± 0.104	-0.173 ± 0.108
PRF-fit source offset from KIC position	0.451 ± 0.148	3.04	0.212 ± 0.119	-0.398 ± 0.156
photometric centroid source offset	0.97 ± 0.86	1.13	-0.65 ± 0.99	-0.73 ± 0.75

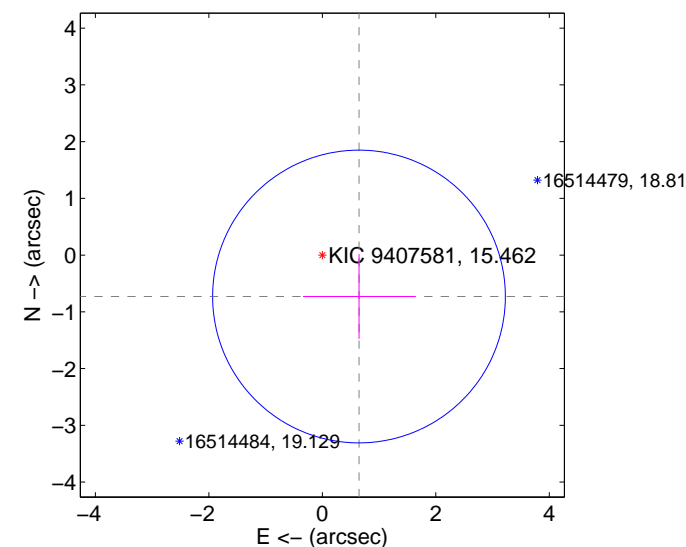
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

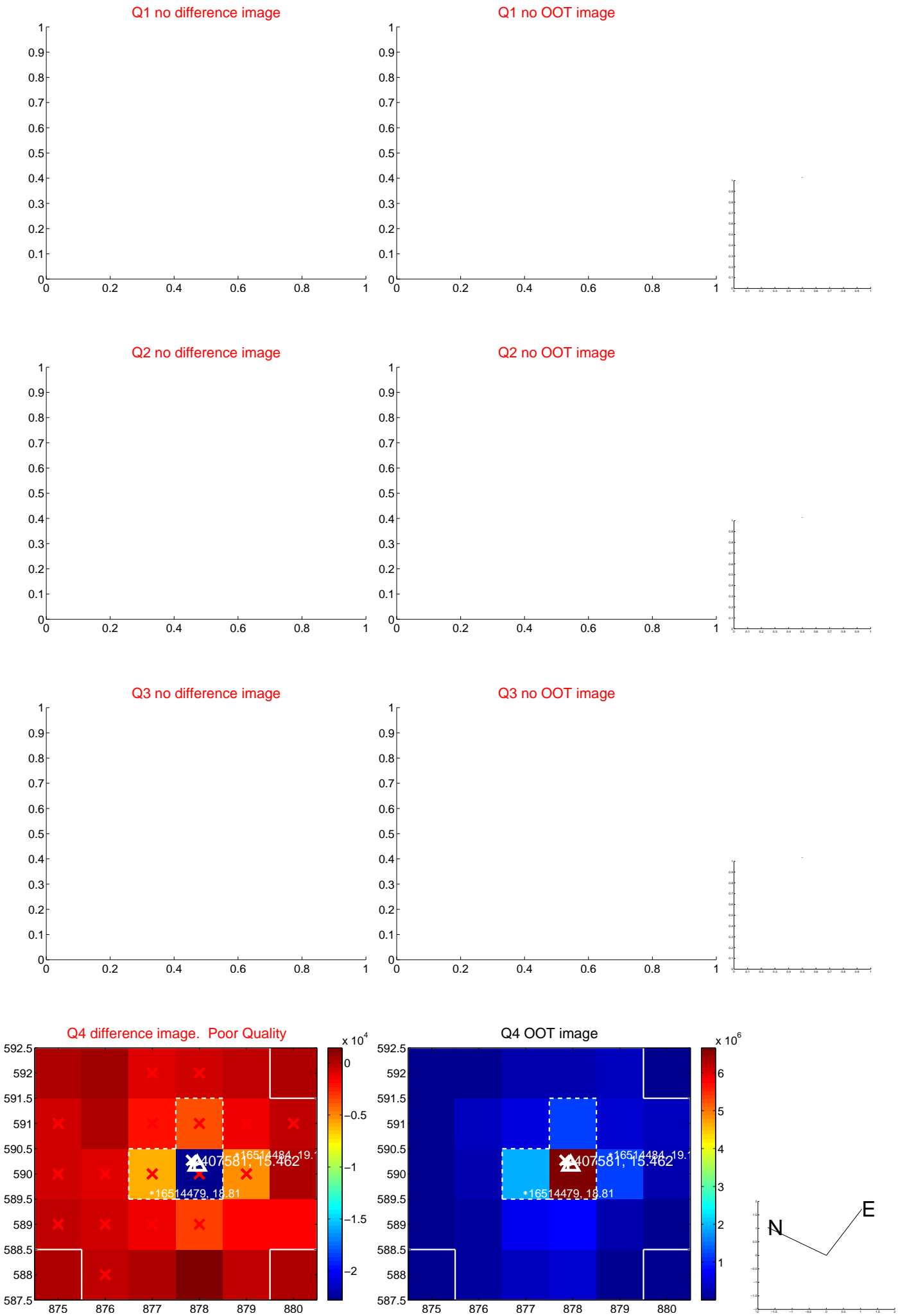


offset from photometric centroids



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.

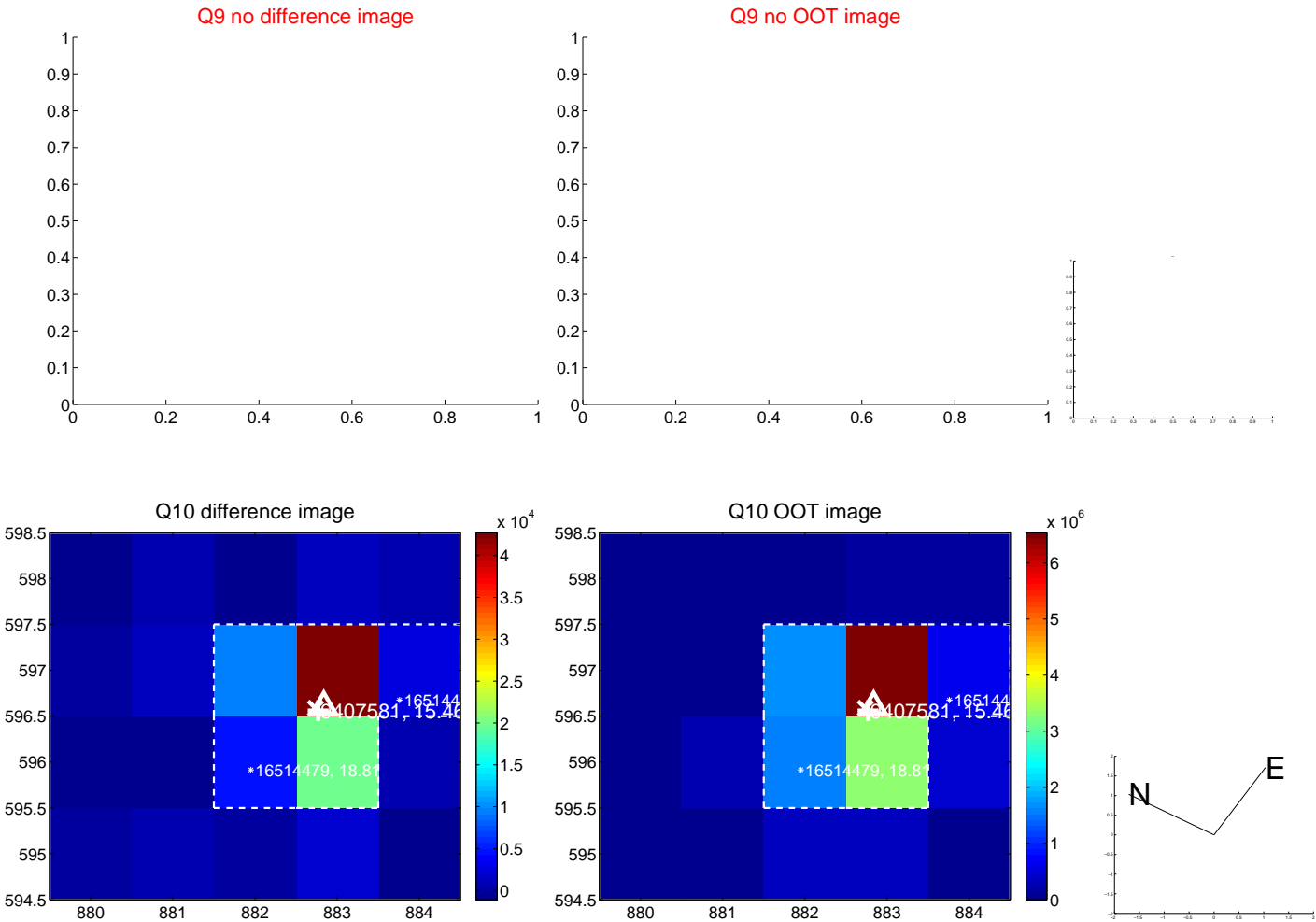
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



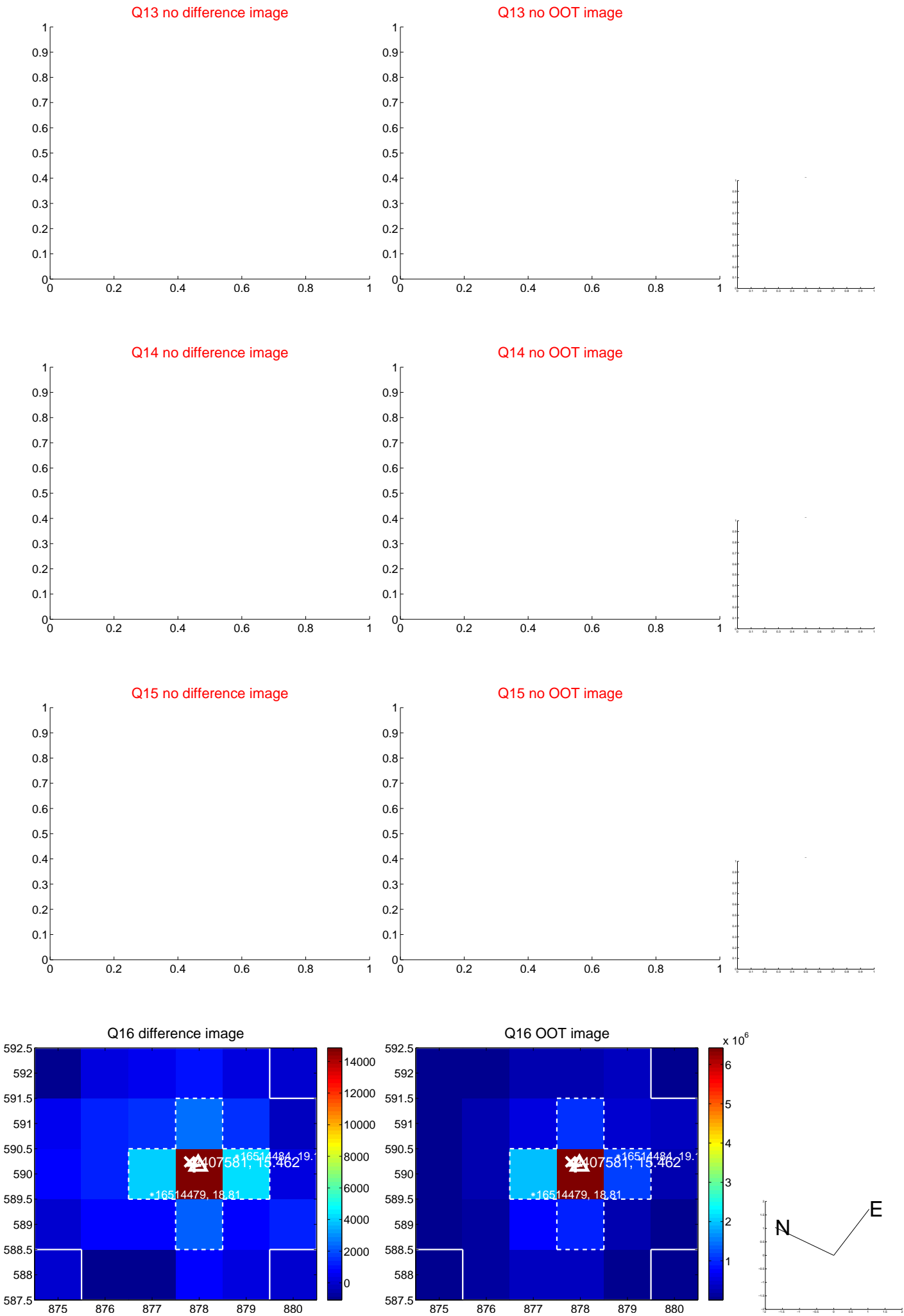
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



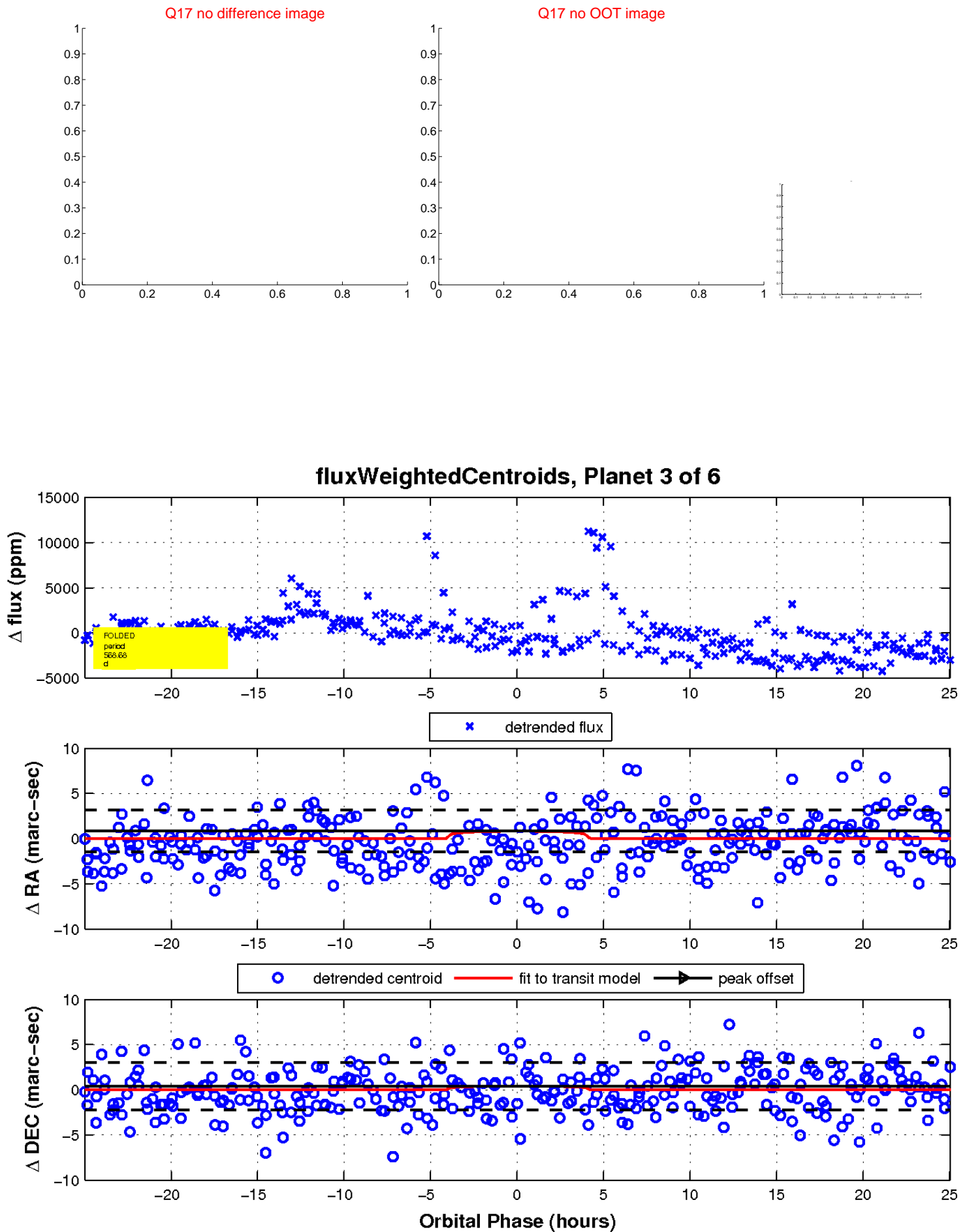
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

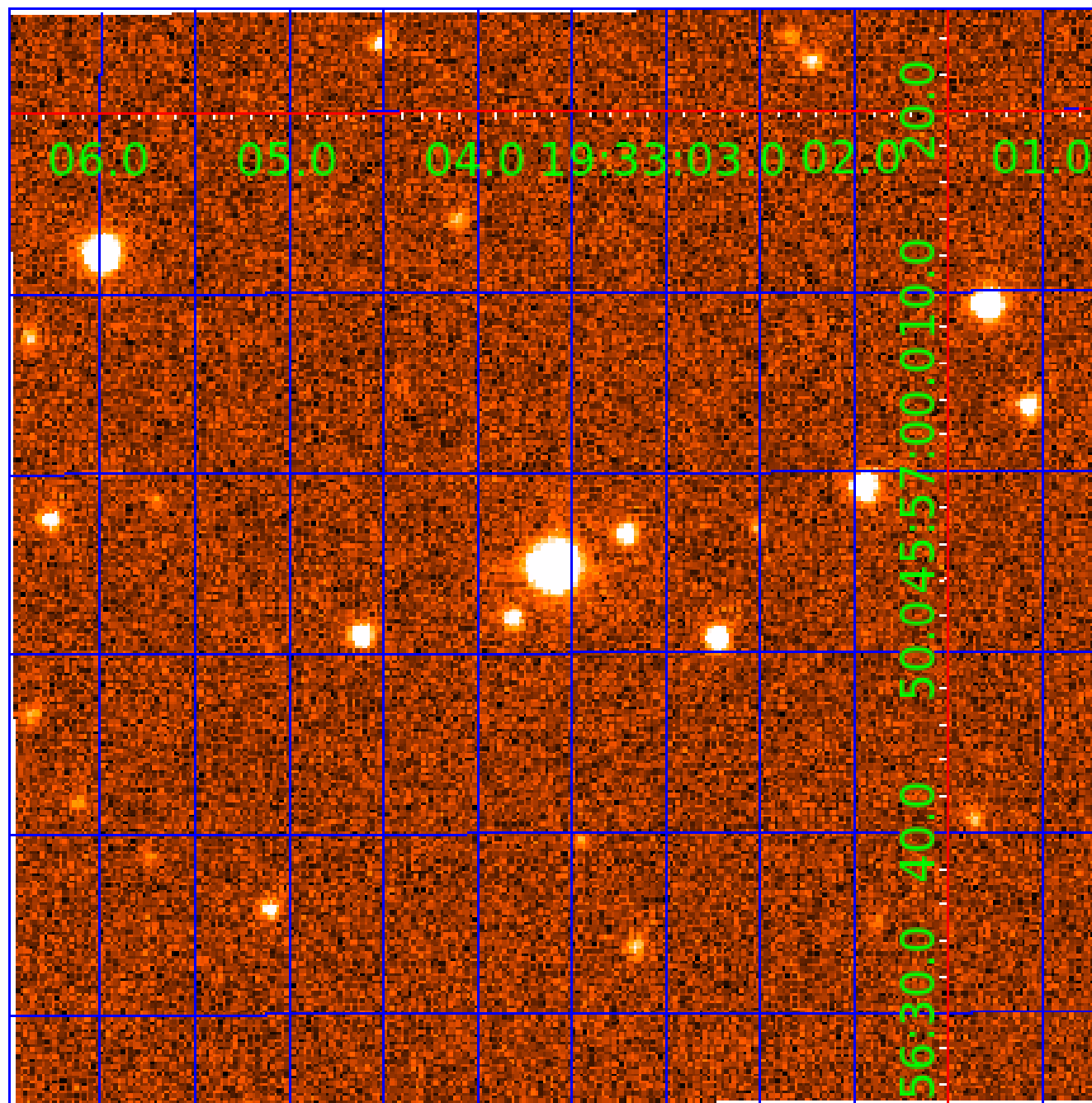


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 009407581

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})
009407581-01	OBS	No	402.206945	210.128388	2265.3	3.720	12.7	7.0	0.38	3569	1.81	0.03
009407581-02	OBS	No	381.350559	404.500998	1592.7	5.764	12.8	5.9	0.38	3569	1.58	0.04
009407581-03	OBS	No	568.684013	364.474874	1698.3	8.382	12.6	5.4	0.38	3569	1.55	0.02
009407581-04	OBS	No	414.517175	255.857169	2328.1	5.254	12.7	7.1	0.38	3569	2.02	0.03
009407581-05	OBS	No	494.727668	157.177644	2587.8	14.592	11.3	7.5	0.38	3569	1.94	0.03
009407581-06	OBS	No	549.668579	360.735504	3048.6	9.899	11.4	9.2	0.38	3569	2.07	0.02

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009407581-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009407581-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
009407581-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009407581-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
009407581-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
009407581-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—MOD_NONUNIQ_DV—MOD_POS_DV—CENT_FEW_DIFFS

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

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

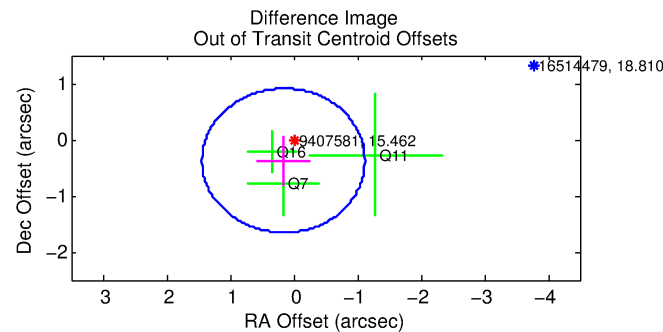
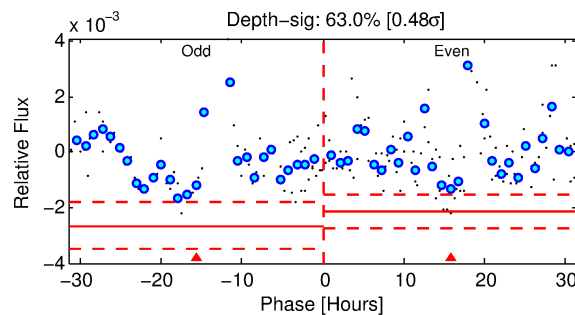
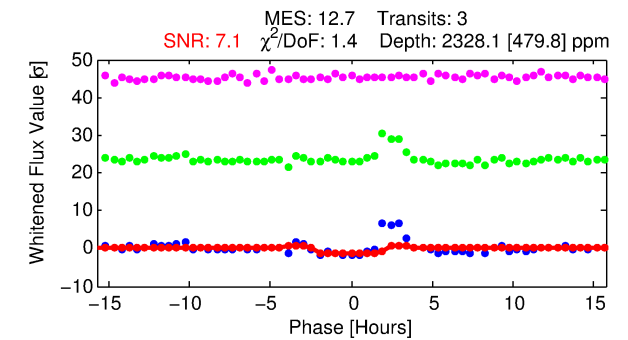
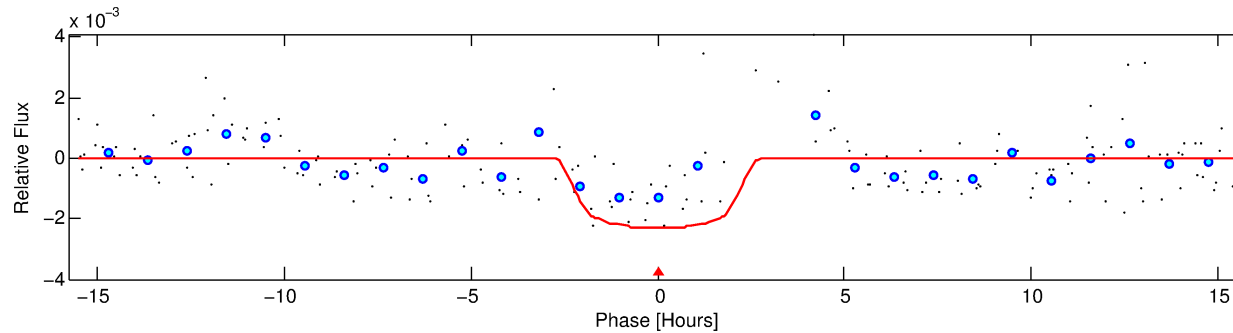
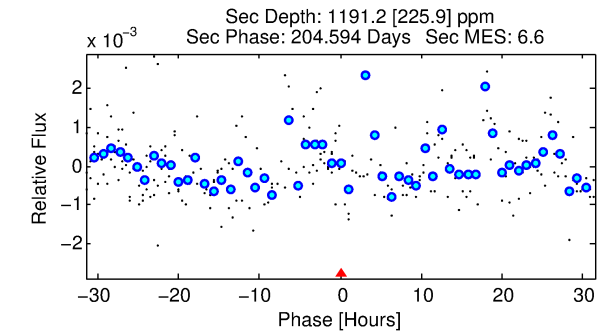
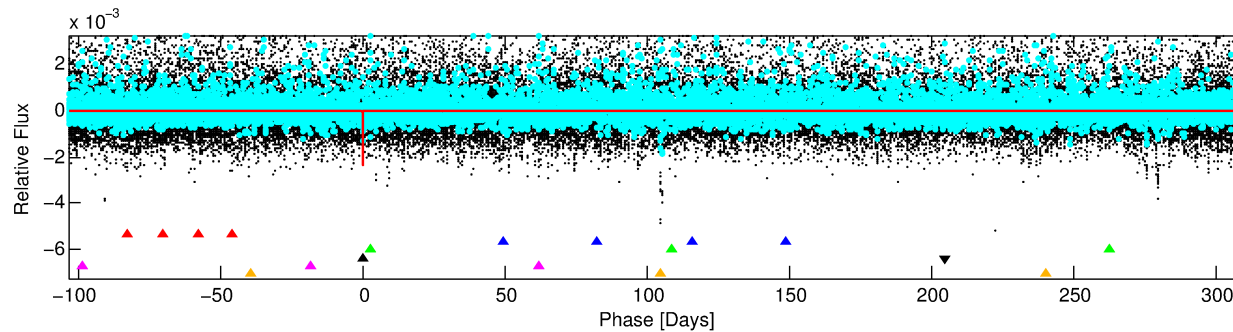
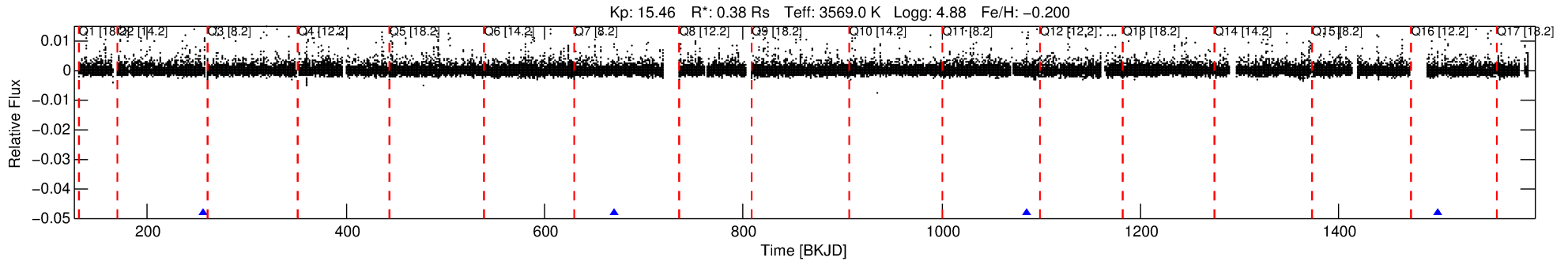
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009407581-04

No Significant Match Found

DV One-Page Summary

KIC: 9407581 Candidate: 4 of 6 Period: 414.517 d



DV Fit Results:

Period = 414.51718 [0.00857] d
Epoch = 255.8572 [0.0186] BKJD
Rp/R* = 0.0490 [0.0150]
a/R* = 409.46 [495.42]
b = 0.80 [0.53]
Seff = 0.03 [0.00]
Teq = 108 [4] K
Rp = 2.02 [0.66] Re
a = 0.7969 [0.0687] AU
Ag = 102034.29 [66341.37] [1.54σ]
Teffp = 2997 [483] K [5.98σ]

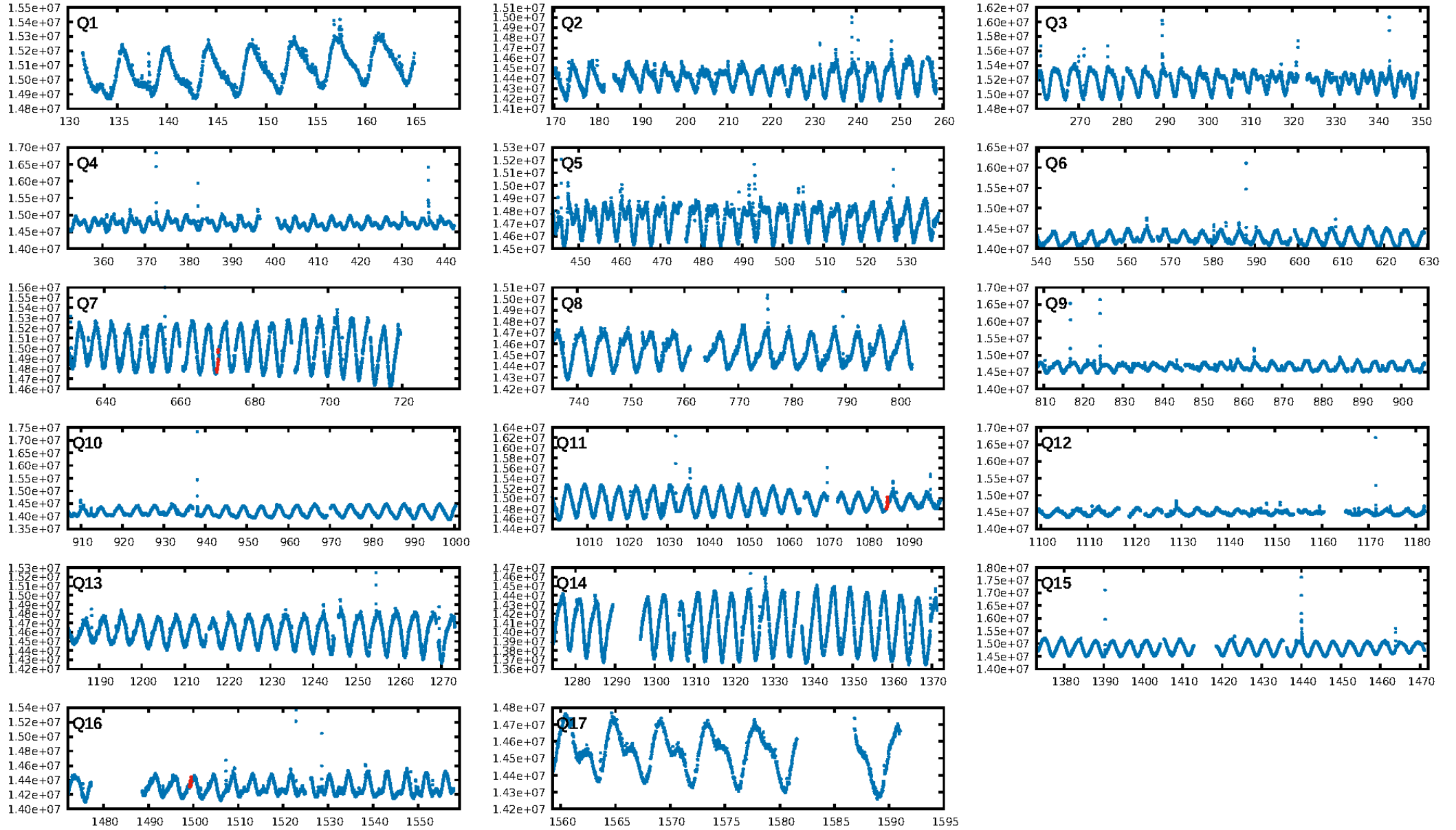
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [45.89σ]
LongPeriod-sig: 100.0% [124.12σ]
ModelChiSquare2-sig: 9.0%
ModelChiSquareGof-sig: 91.4%
Bootstrap-pfa: 1.92e-11
RollingBand-fgt: 1.00 [3/3]
GhostDiagnostic-chr: 3.681
Centroid-sig: 11.9%
Centroid-so: 0.347 arcsec [0.46σ]
OotOffset-rm: 0.406 arcsec [0.95σ]
KicOffset-rm: 0.804 arcsec [1.87σ]
OotOffset-st: 0/2/1/0 [3]
KicOffset-st: 0/2/1/0 [3]
DiffImageQuality-fgm: 0.67 [2/3]
DiffImageOverlap-fno: 1.00 [3/3]

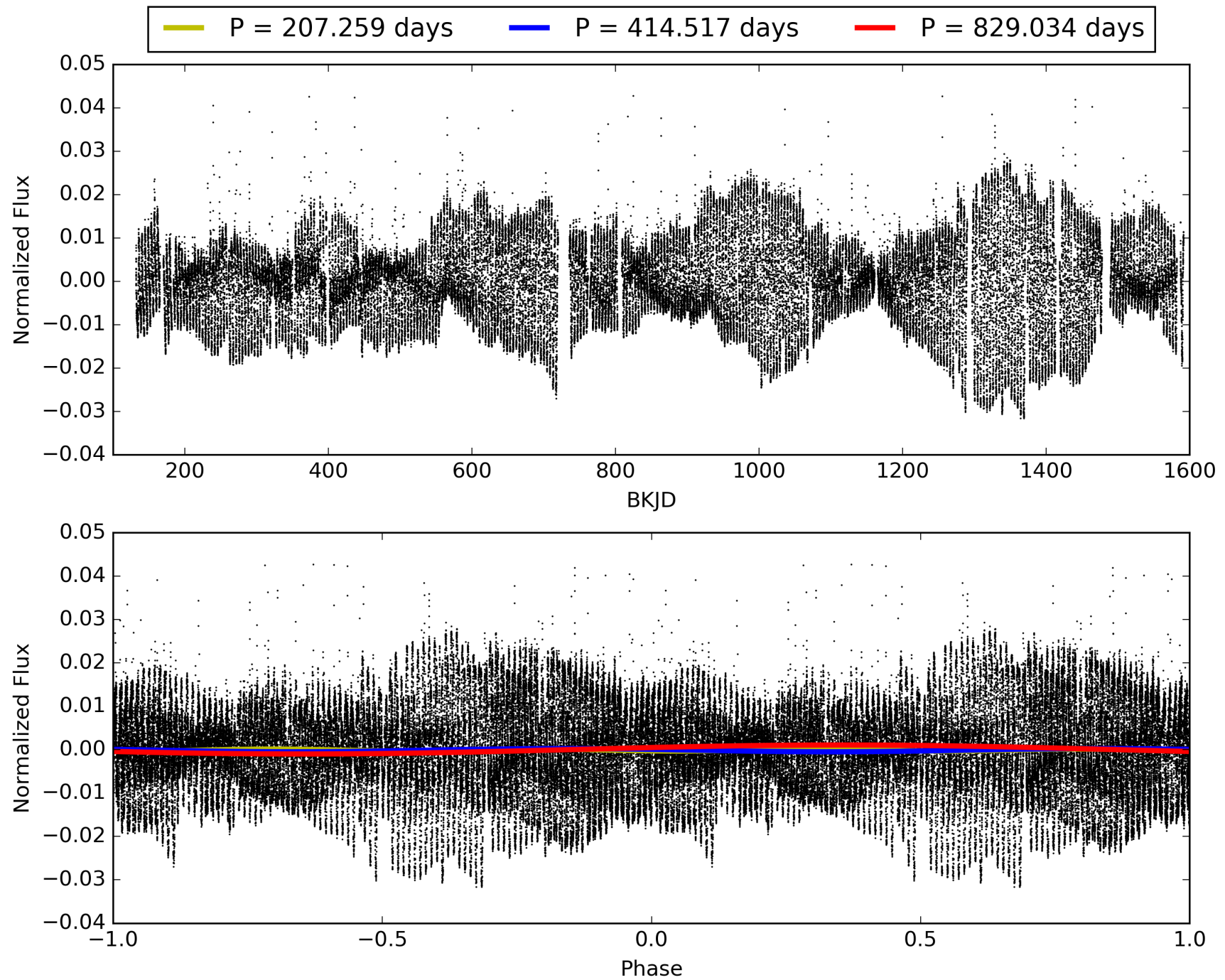
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 17:35:19 Z

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

TCE 009407581-04, PDC Light Curves

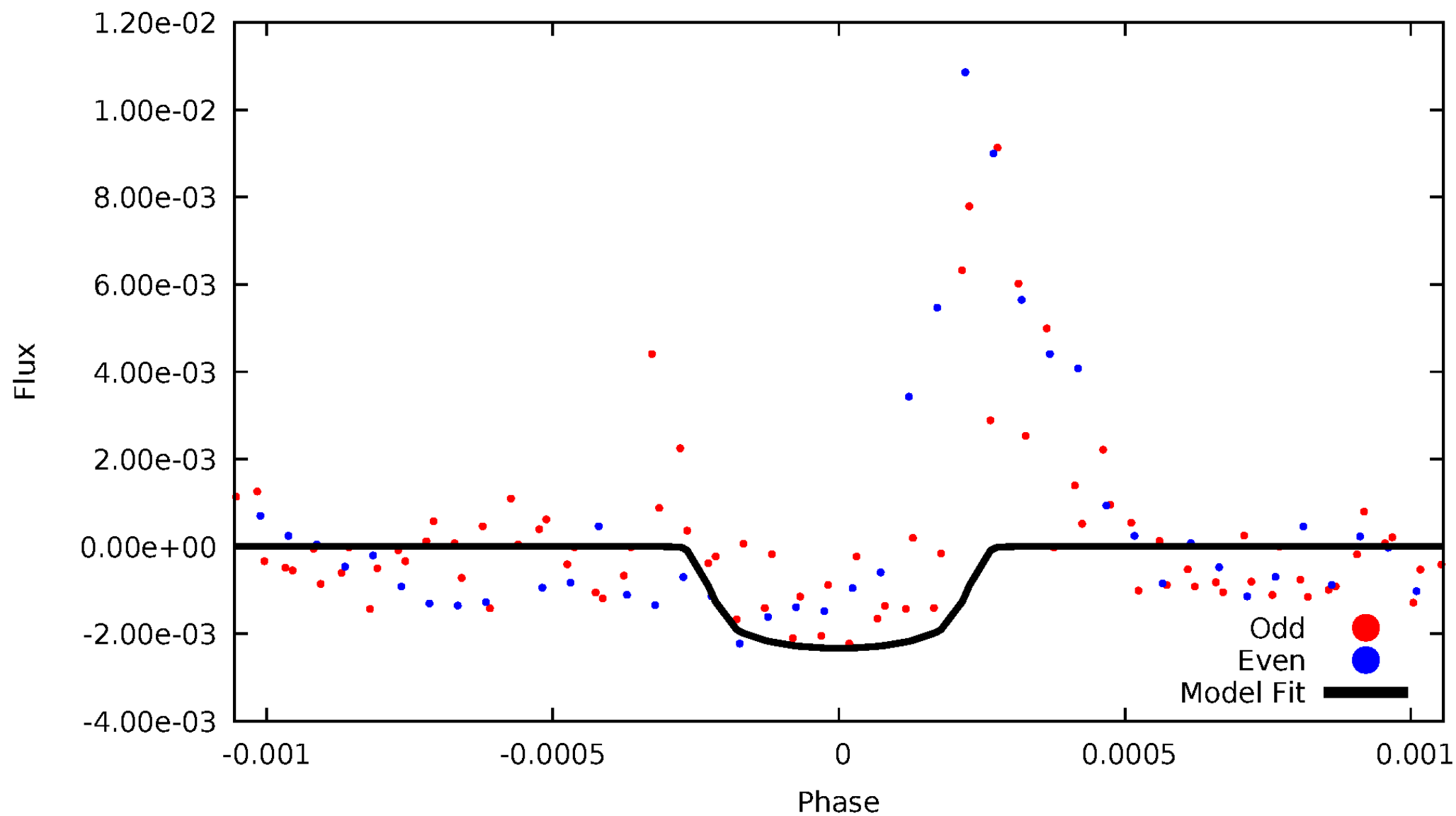


TCE 009407581-04



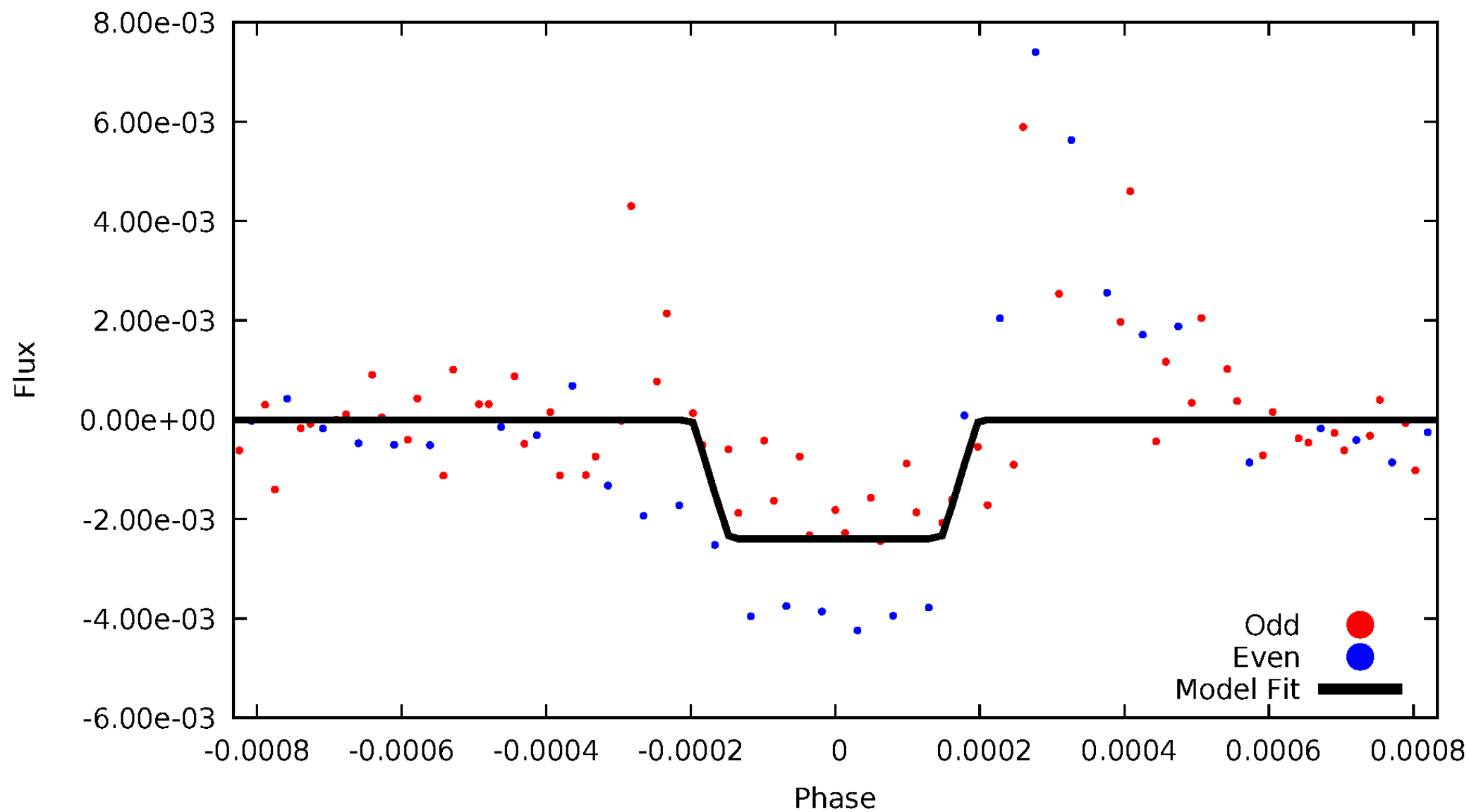
DV Odd/Even

TCE 009407581-04



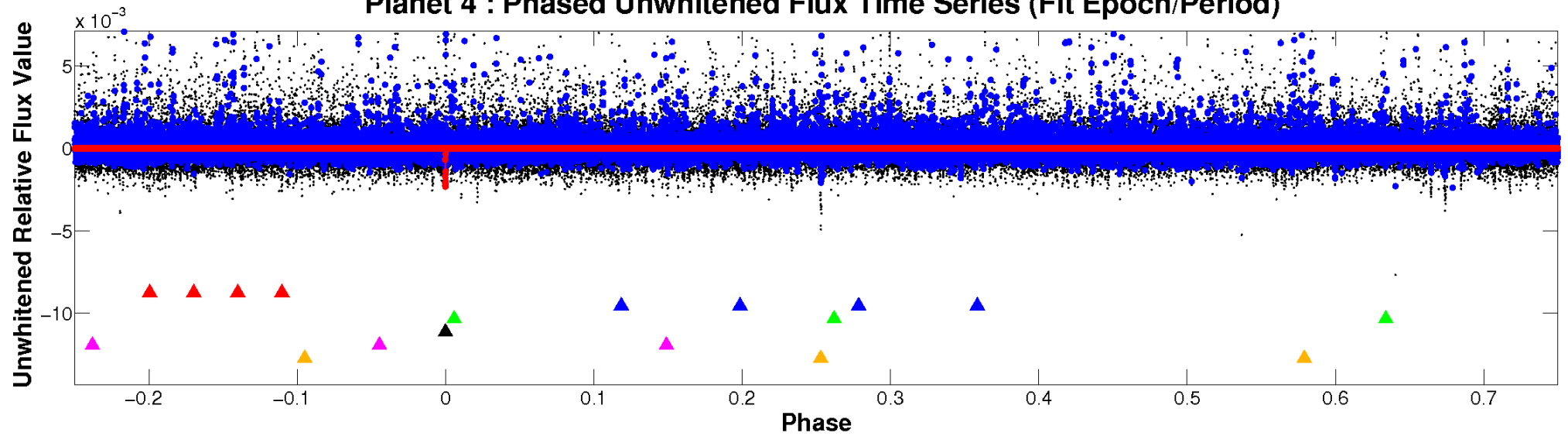
ALT Odd/Even

TCE 009407581-04

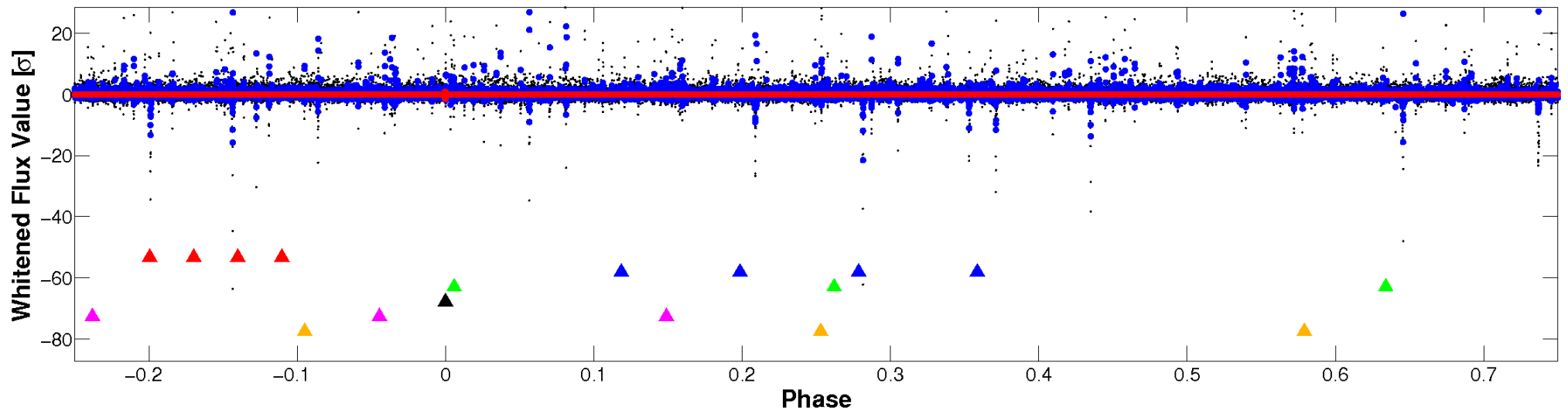


Non-Whitened Vs. Whitened Light Curve

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

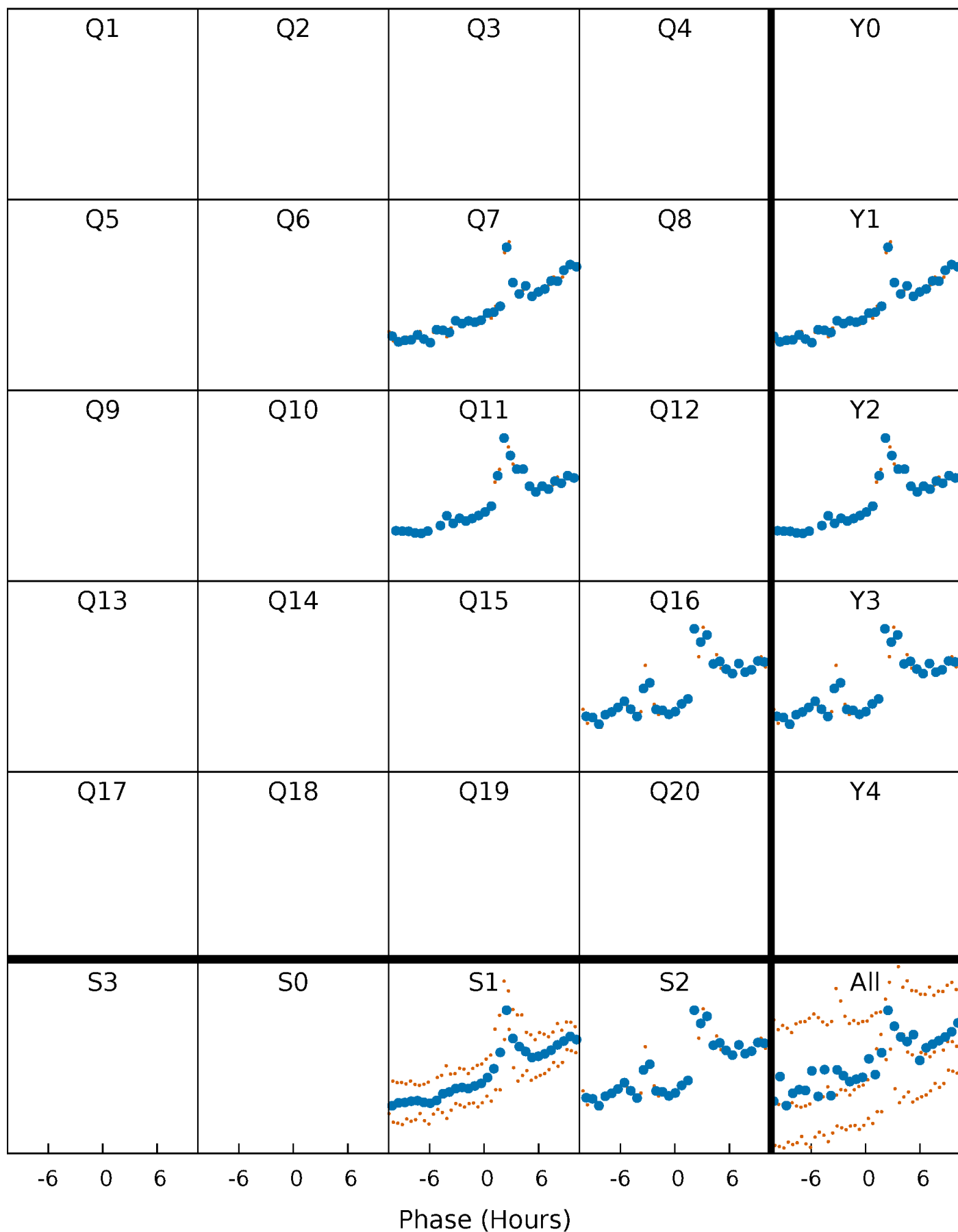


Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



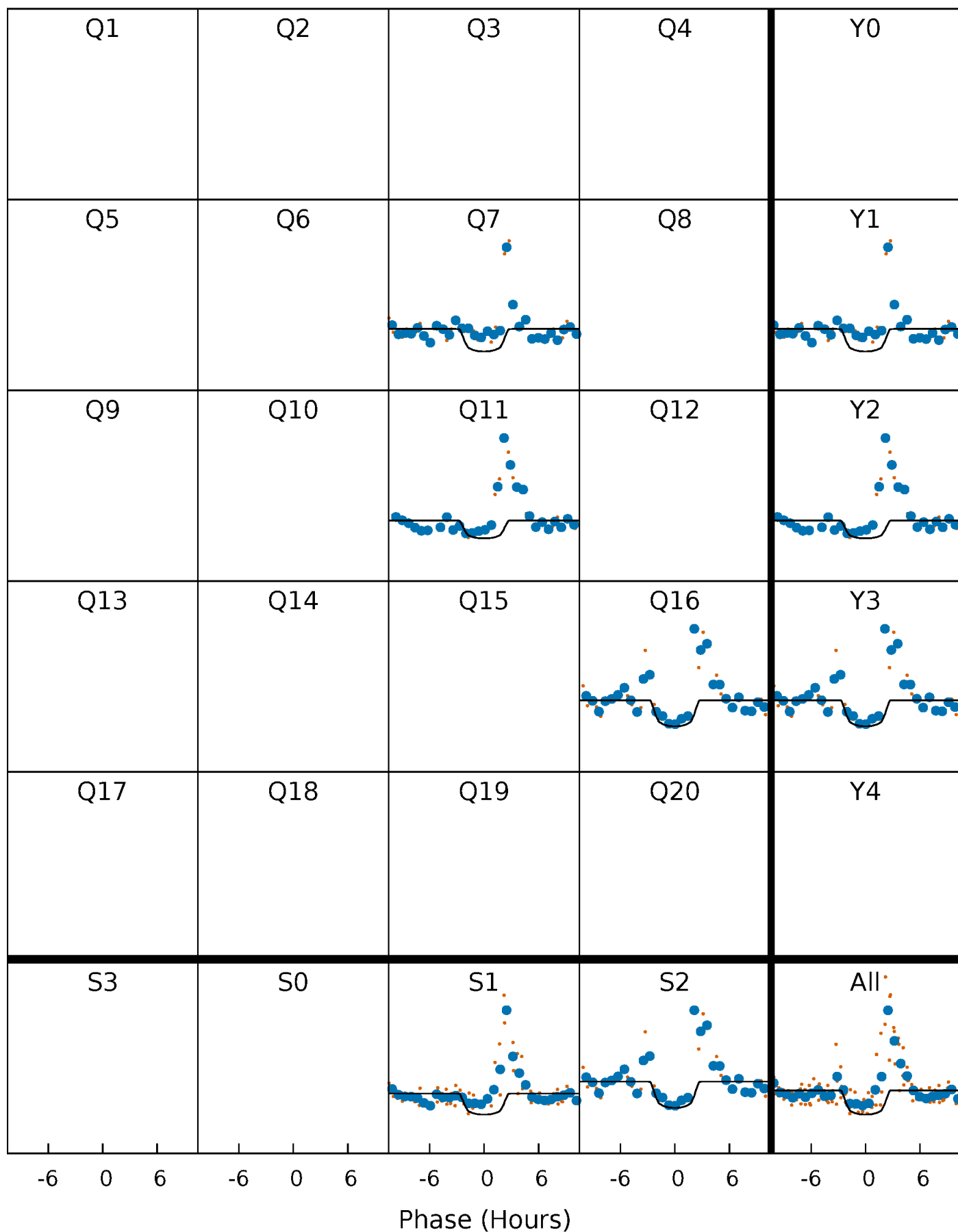
PDC Quarter-Phased Transit Curves

TCE 009407581-04 $P=414.517175$ Days $T_0=255.857169$ (BKJD)



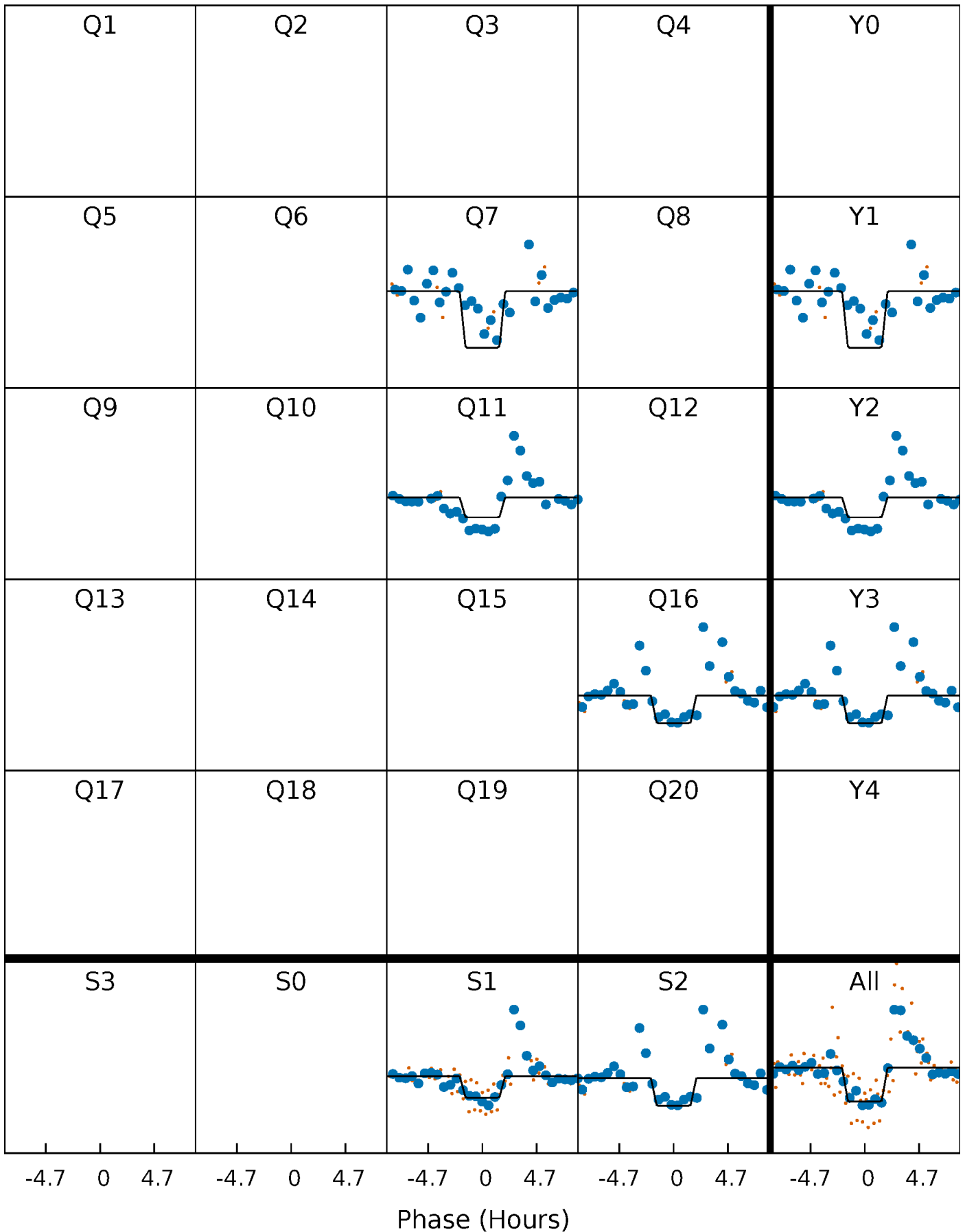
DV Quarter-Phased Transit Curves

TCE 009407581-04 $P=414.517175$ Days $T_0=255.857169$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

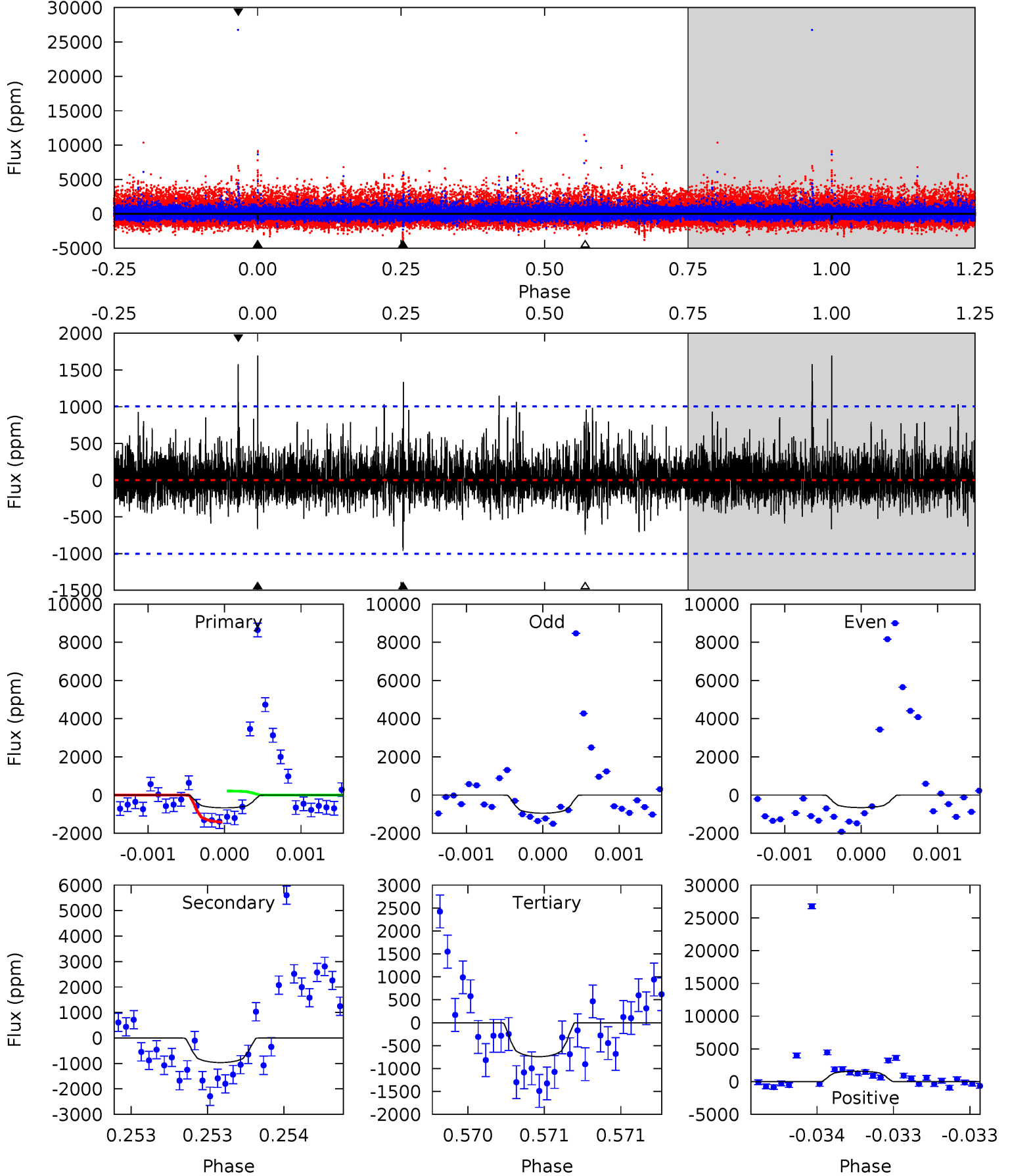
TCE 009407581-04 $P=414.522009$ Days $T_0=255.824272$ (BKJD)



DV Model-Shift Uniqueness Test

009407581-04, P = 414.517175 Days, E = 255.857169 Days

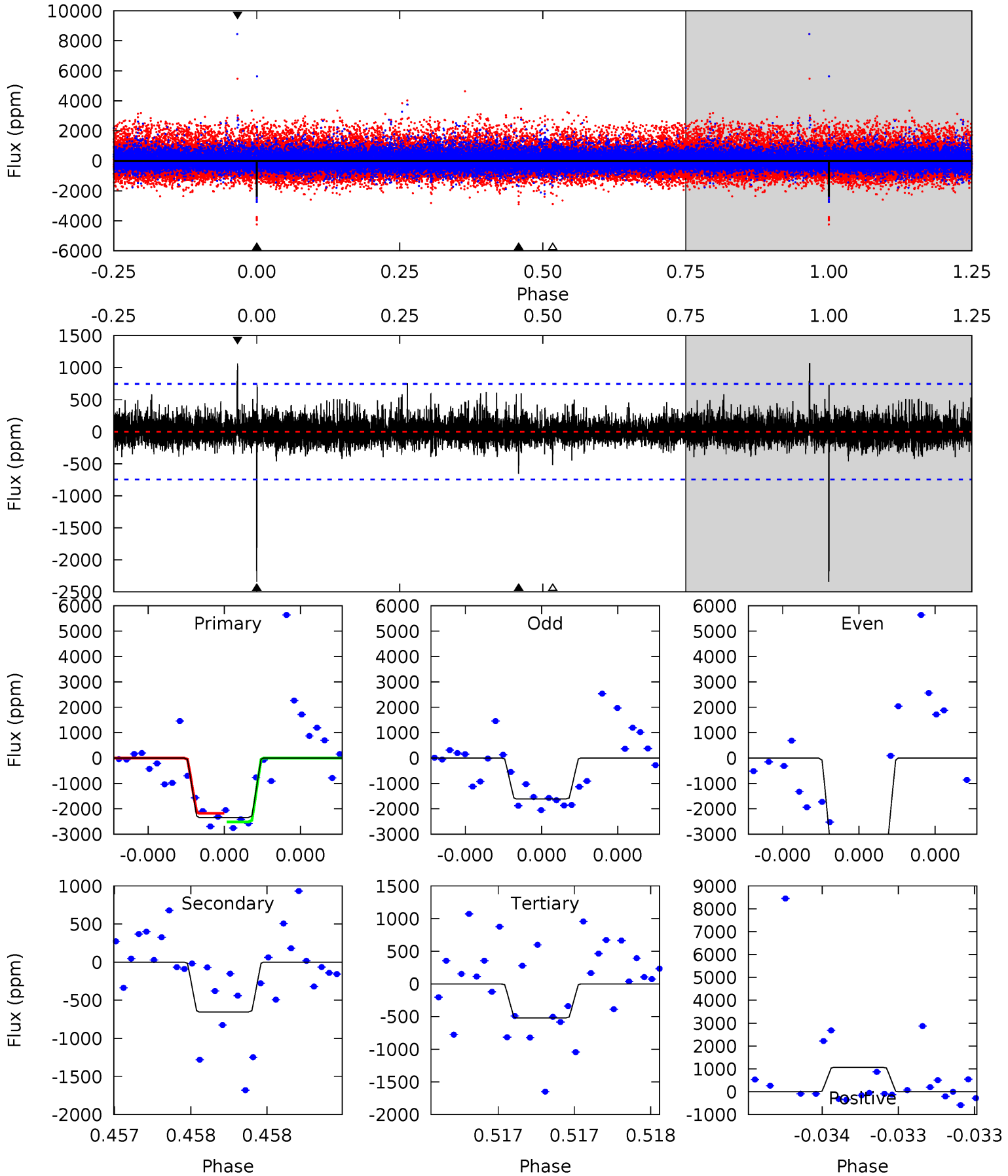
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
3.70	5.33	4.10	8.74	5.55	3.44	1.16	-0.40	-5.04	1.24	-3.41	0.61	2.77	0.64	3.35



Alt Model-Shift Uniqueness Test

009407581-04, P = 414.522009 Days, E = 255.824272 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
17.6	4.92	3.92	7.99	5.61	3.53	0.98	13.7	9.60	1.00	-3.08	7.58	1.14	0.31	1.27



Stellar Parameters For KIC 009407581

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	3569^{+57}_{-64}	$4.877^{+0.049}_{-0.036}$	$-0.200^{+0.100}_{-0.100}$	$0.378^{+0.035}_{-0.044}$	$0.395^{+0.042}_{-0.052}$	$10.290^{+2.639}_{-1.753}$
	+2%/-2%	+1%/-1%	+50%/-50%	+9%/-12%	+11%/-13%	+26%/-17%
Source	PHO2	PHO2	PHO2	DSEP		

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

Secondary Eclipse Parameters for KIC 009407581-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	-964 ± 181	$2.00^{+0.63}_{-0.62}$	151^{+4}_{-4}	3103^{+392}_{-255}	84217^{+94959}_{-37612}
Alt.	-654 ± 133	$2.00^{+0.67}_{-0.62}$	151^{+4}_{-4}	2945^{+343}_{-241}	58219^{+61957}_{-27227}

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

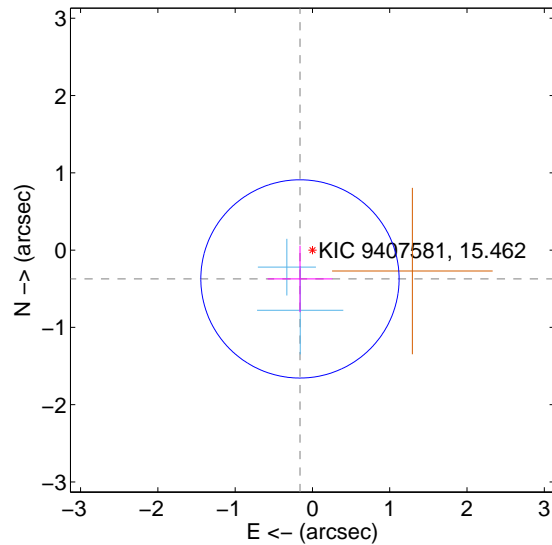
Supplemental centroid analysis for 009407581-04. Kepler magnitude: 15.46. Transit SNR 7.07

There are 2 quarters with good PRF difference image offsets

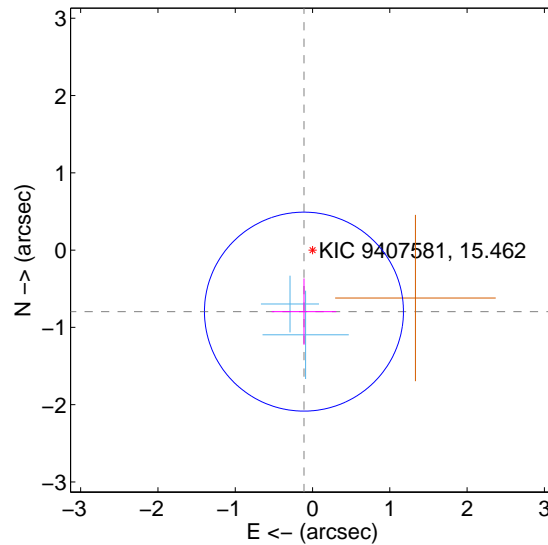
The direct PRF centroid is offset from the target star catalog position by about 0.48 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.406 ± 0.427	0.95	0.161 ± 0.418	-0.373 ± 0.429
PRF-fit source offset from KIC position	0.804 ± 0.429	1.87	0.111 ± 0.418	-0.796 ± 0.429
photometric centroid source offset	0.35 ± 0.75	0.46	-0.15 ± 0.87	0.31 ± 0.73

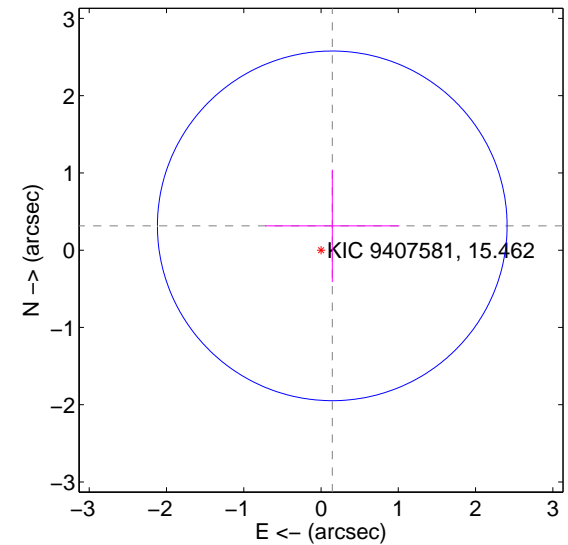
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



offset from photometric centroids

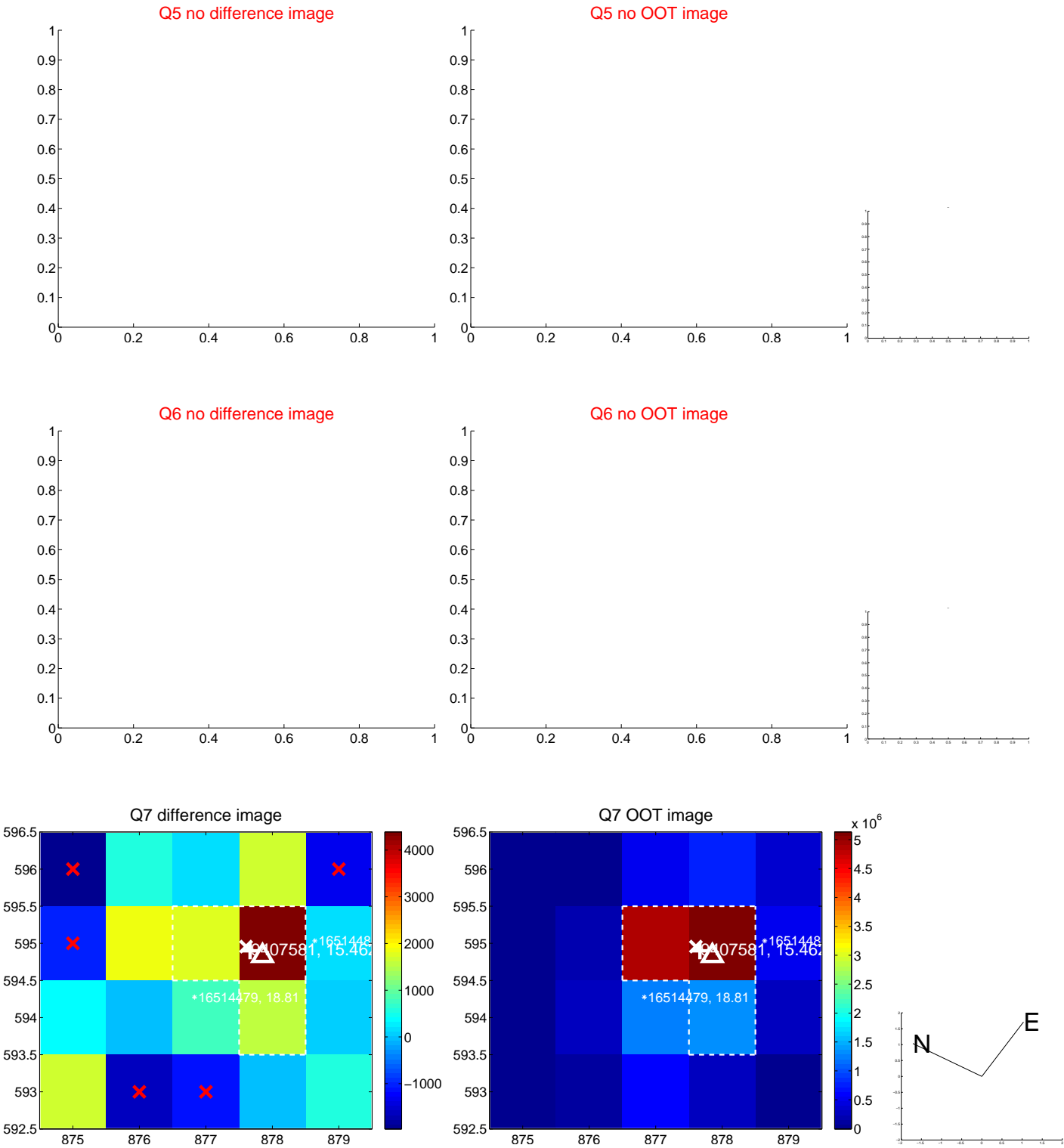


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

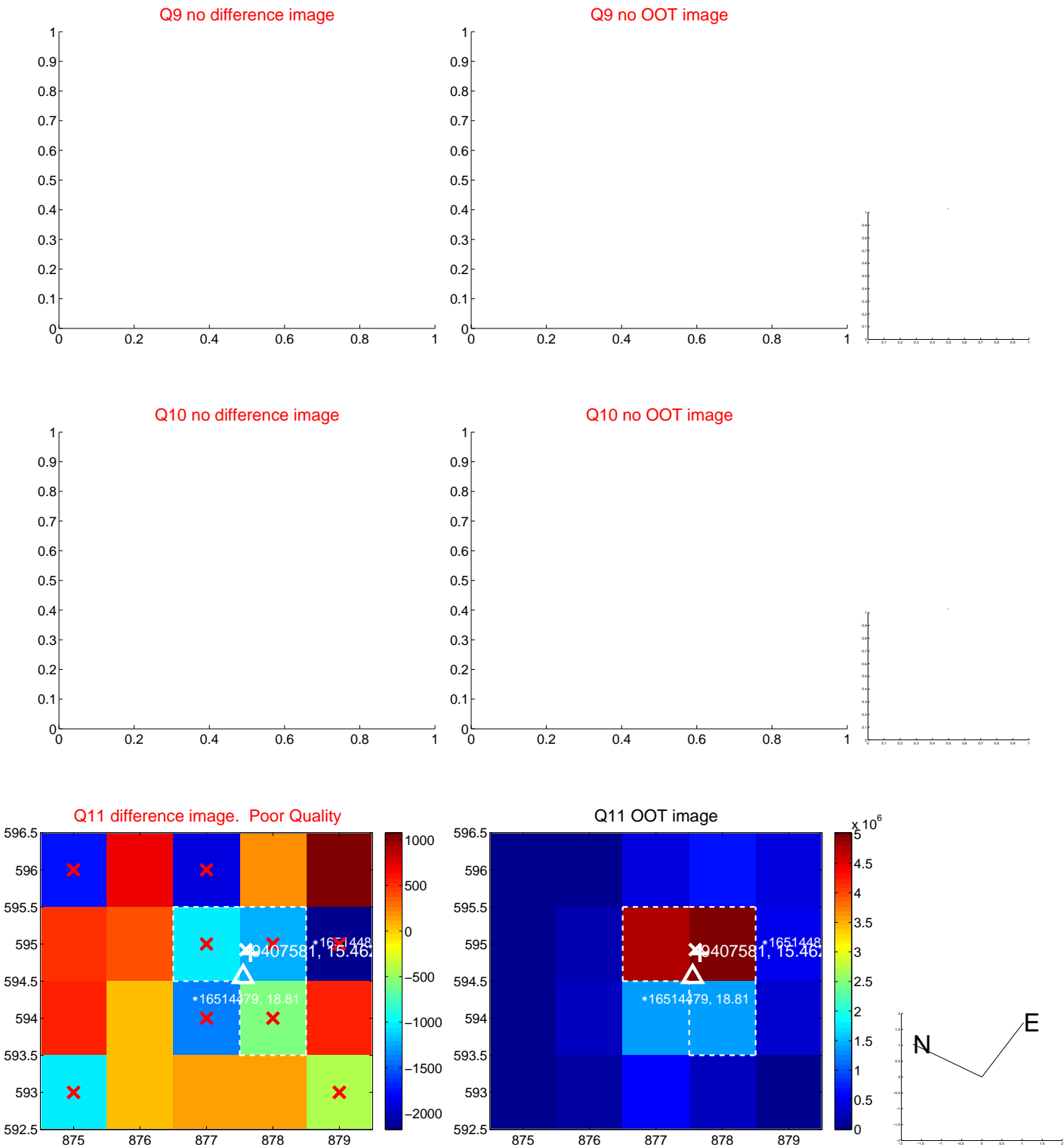
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



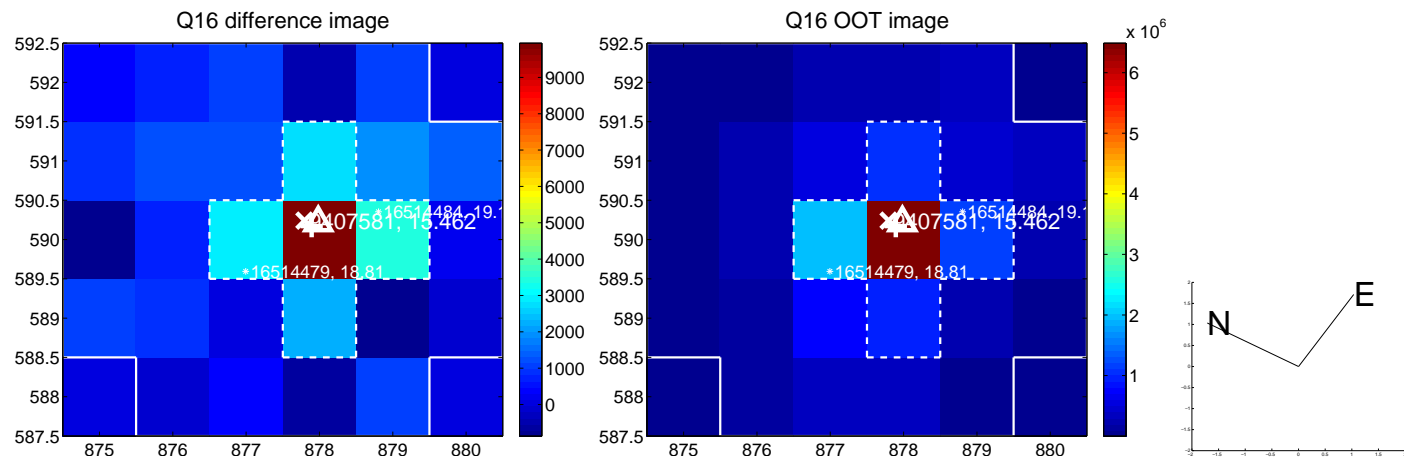
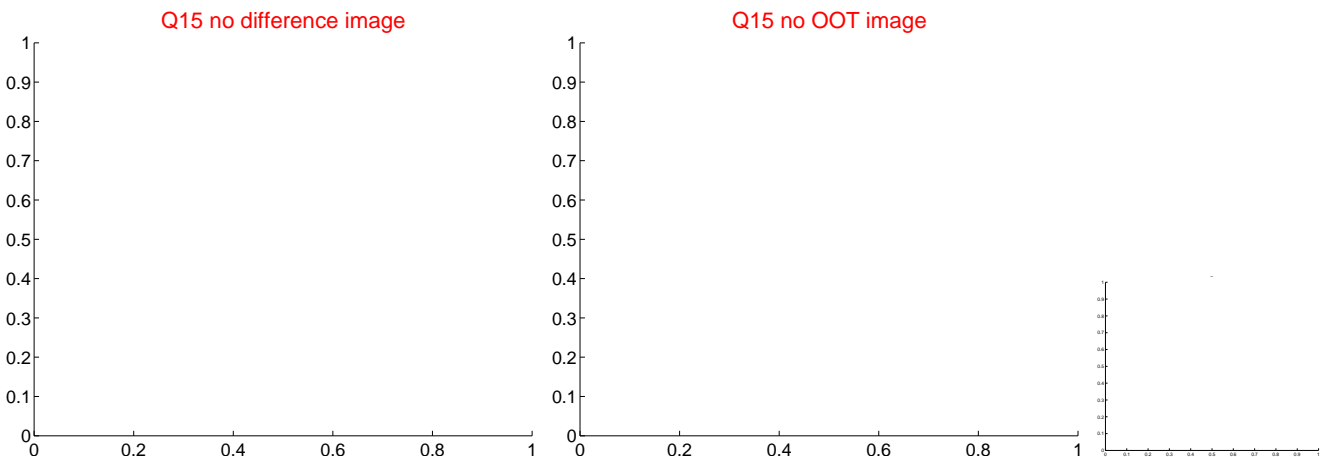
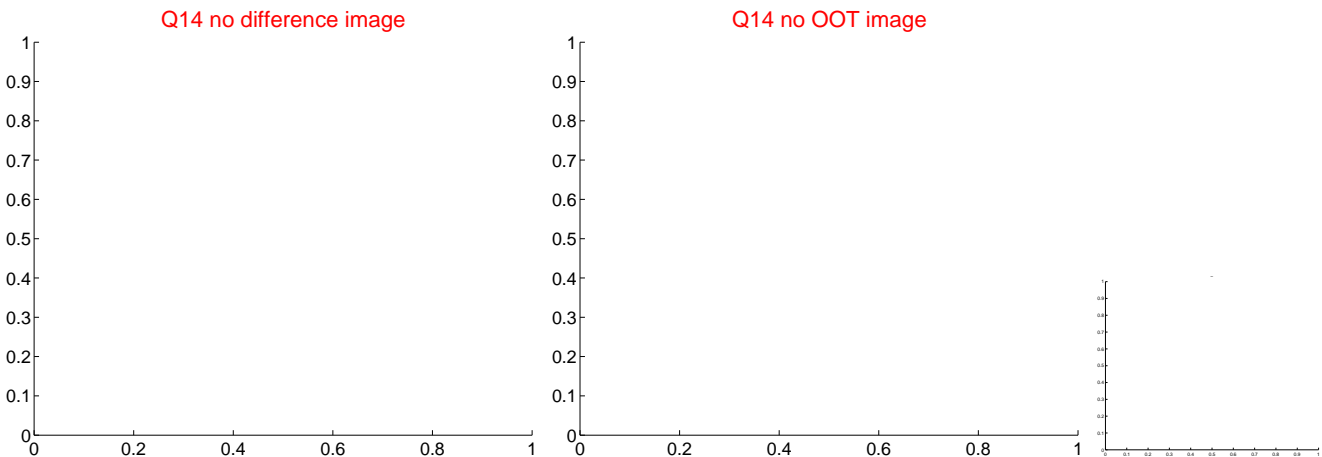
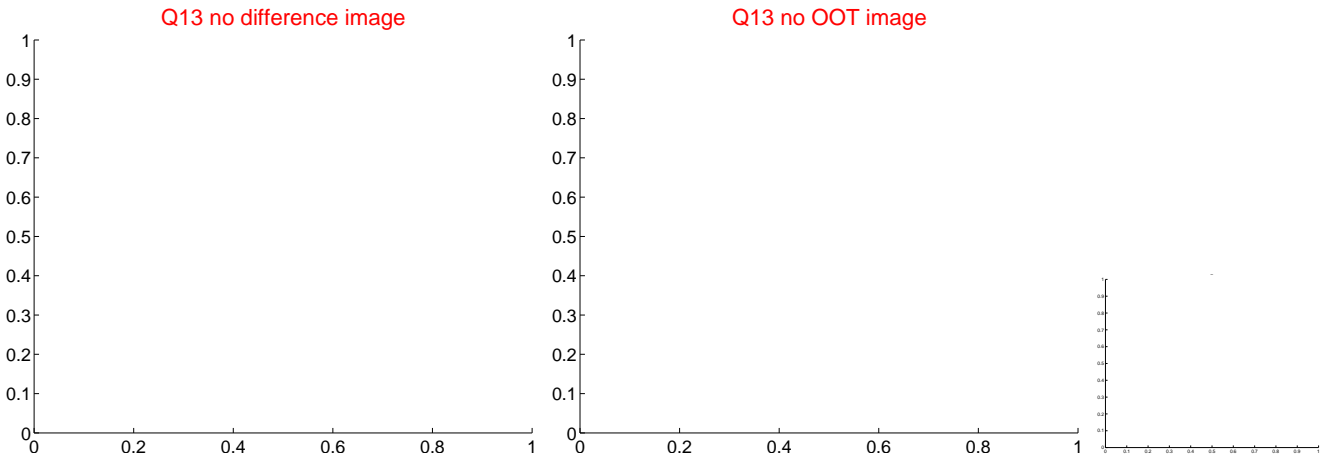
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



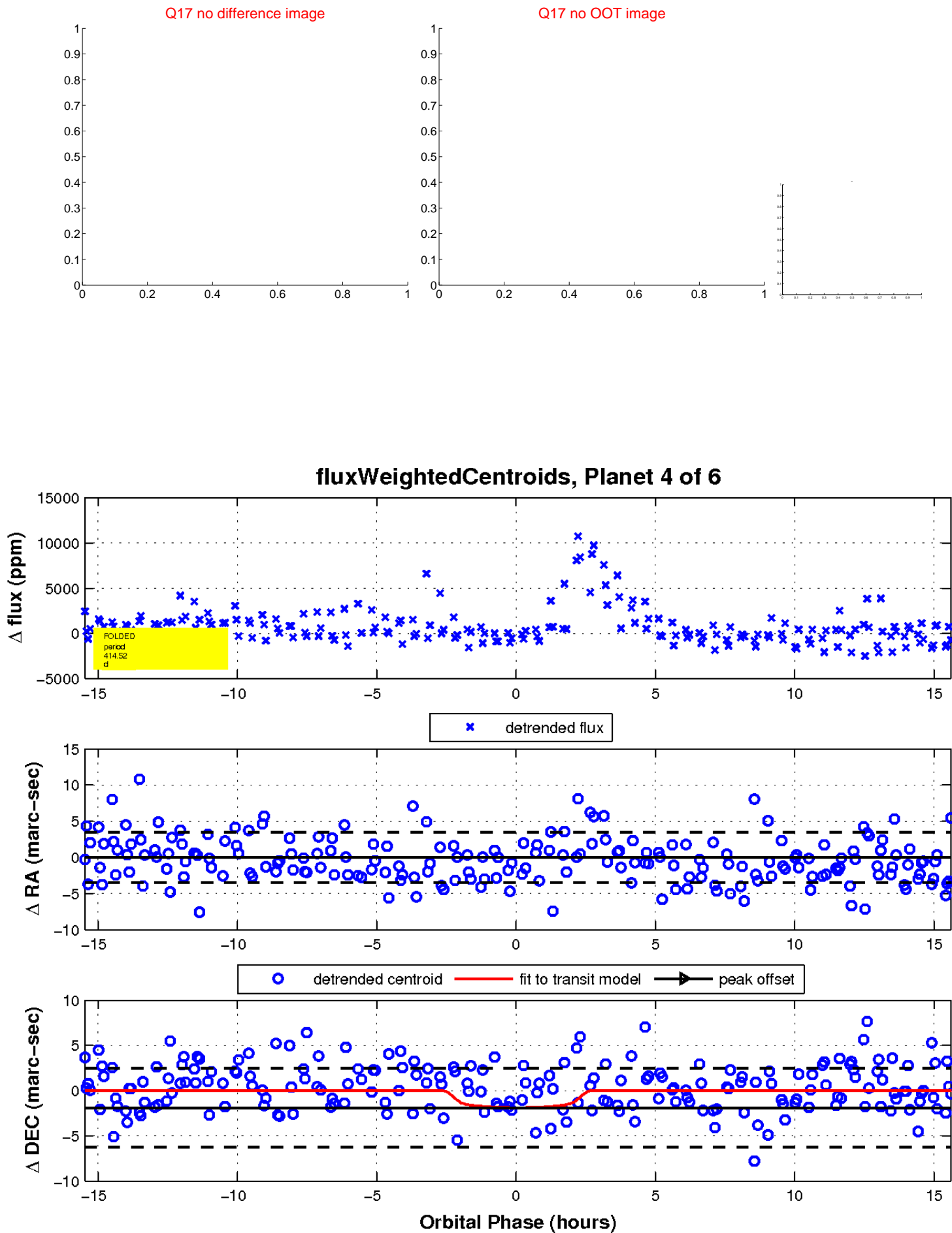
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.



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

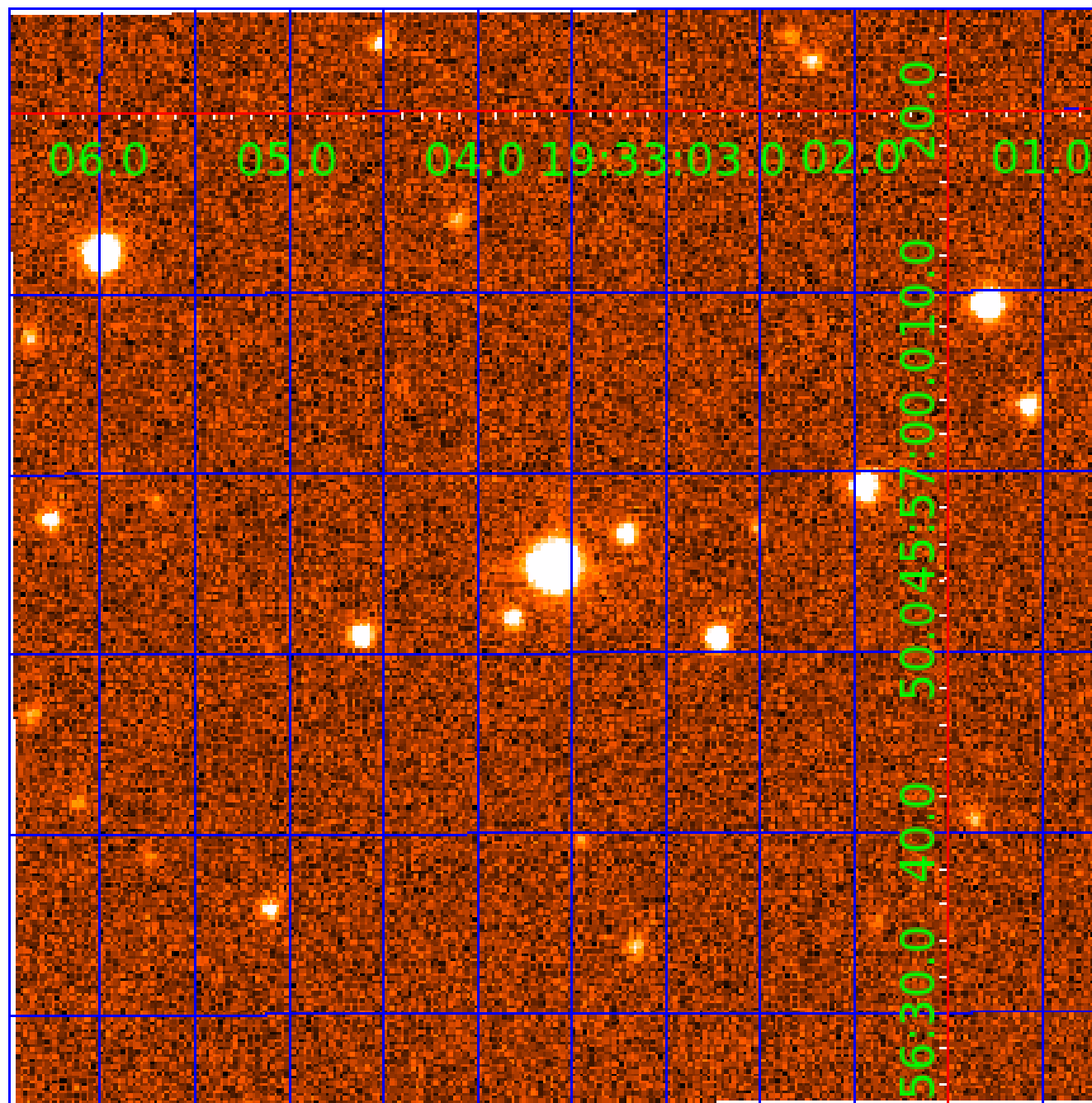


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 009407581

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})
009407581-01	OBS	No	402.206945	210.128388	2265.3	3.720	12.7	7.0	0.38	3569	1.81	0.03
009407581-02	OBS	No	381.350559	404.500998	1592.7	5.764	12.8	5.9	0.38	3569	1.58	0.04
009407581-03	OBS	No	568.684013	364.474874	1698.3	8.382	12.6	5.4	0.38	3569	1.55	0.02
009407581-04	OBS	No	414.517175	255.857169	2328.1	5.254	12.7	7.1	0.38	3569	2.02	0.03
009407581-05	OBS	No	494.727668	157.177644	2587.8	14.592	11.3	7.5	0.38	3569	1.94	0.03
009407581-06	OBS	No	549.668579	360.735504	3048.6	9.899	11.4	9.2	0.38	3569	2.07	0.02

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009407581-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009407581-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
009407581-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009407581-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
009407581-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
009407581-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—MOD_NONUNIQ_DV—MOD_POS_DV—CENT_FEW_DIFFS

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

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

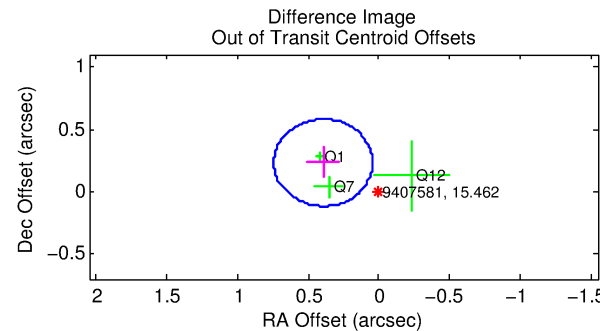
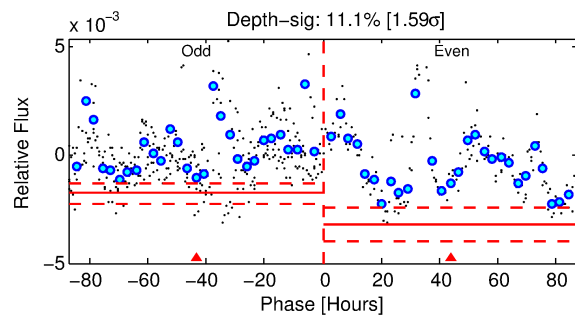
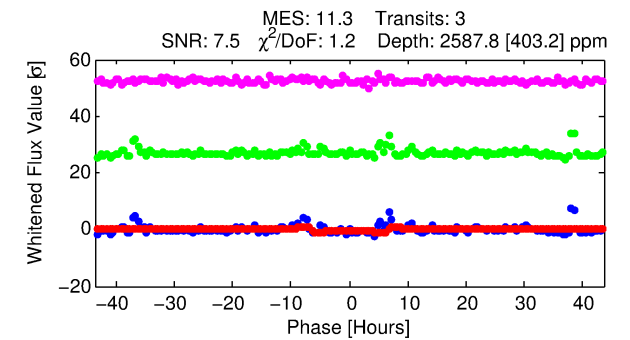
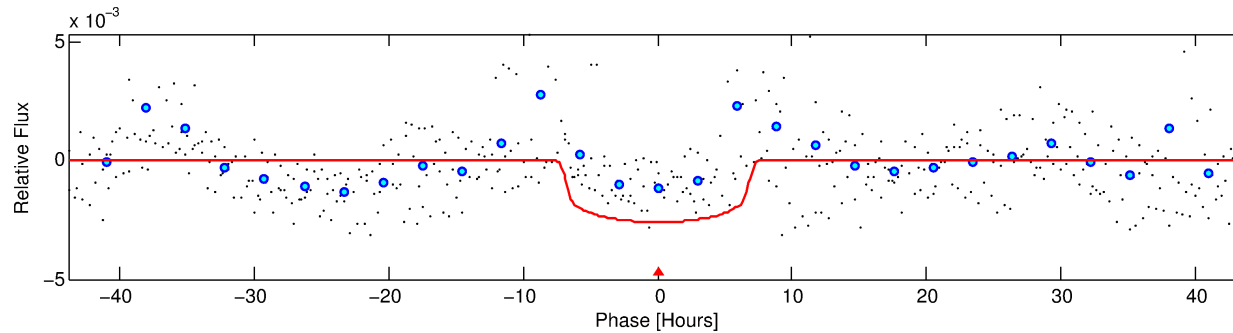
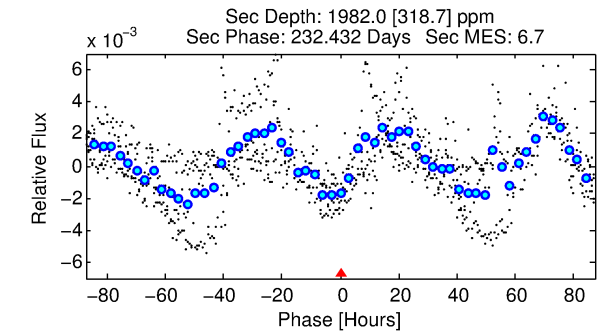
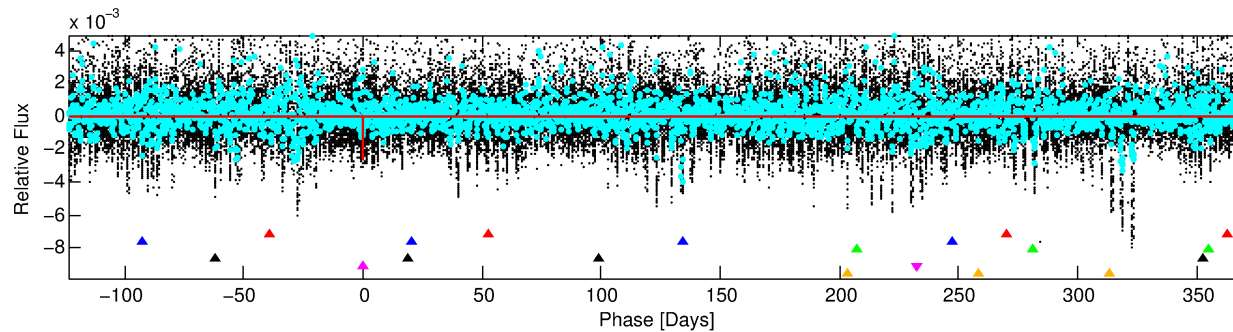
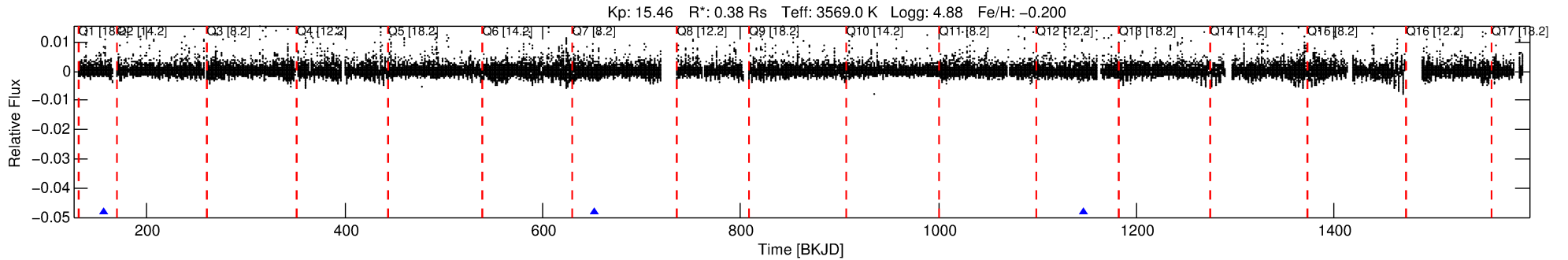
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009407581-05

No Significant Match Found

DV One-Page Summary

KIC: 9407581 Candidate: 5 of 6 Period: 494.728 d



DV Fit Results:

Period = 494.72767 [0.00810] d
Epoch = 157.1776 [0.0101] BKJD
Rp/R* = 0.0471 [0.0076]
a/R* = 250.60 [144.21]
b = 0.40 [1.21]
Seff = 0.03 [0.00]
Teq = 102 [3] K
Rp = 1.94 [0.39] Re
a = 0.8966 [0.0773] AU
Ag = 232576.33 [87594.69] [2.66σ]
Teffp = 3471 [319] K [10.55σ]

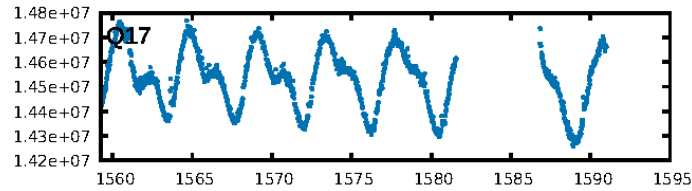
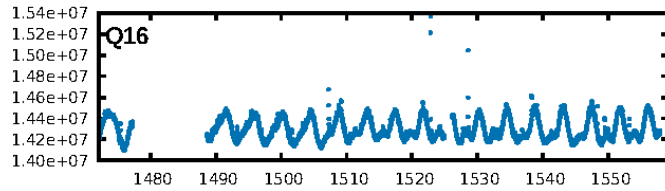
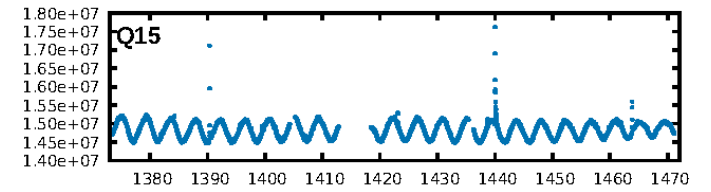
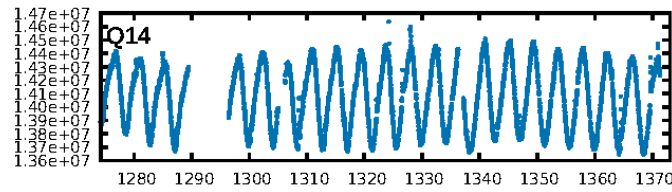
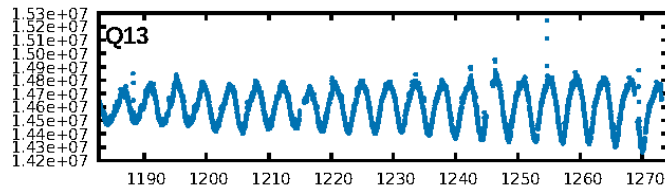
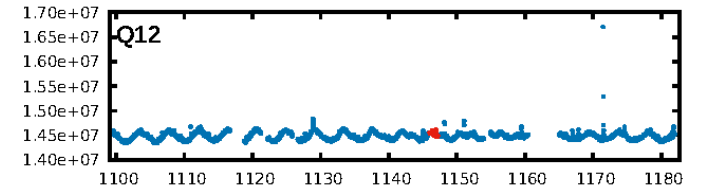
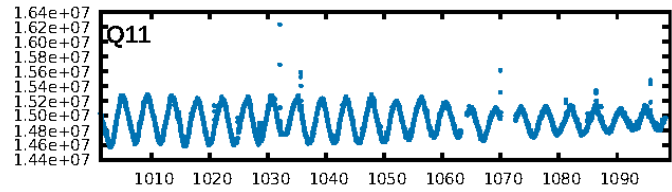
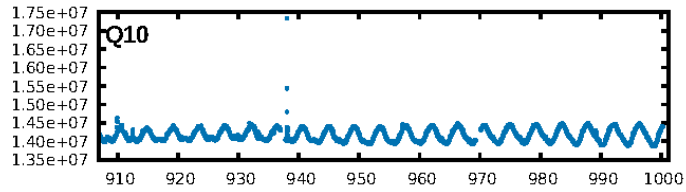
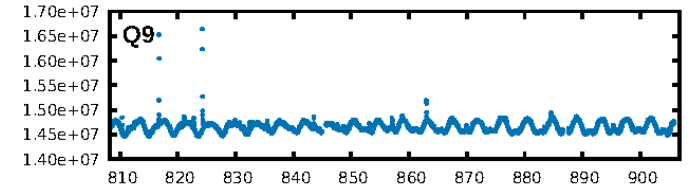
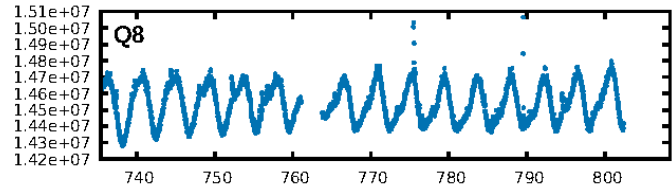
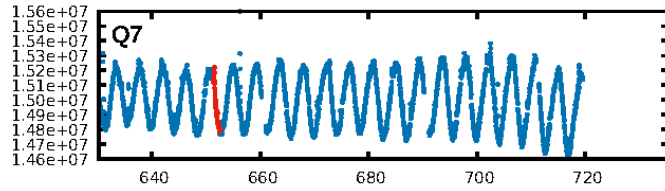
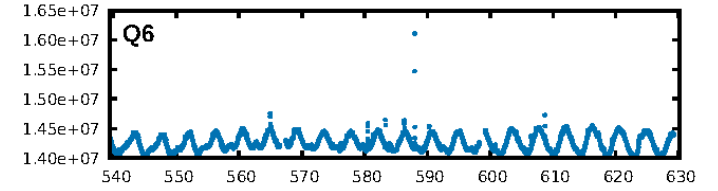
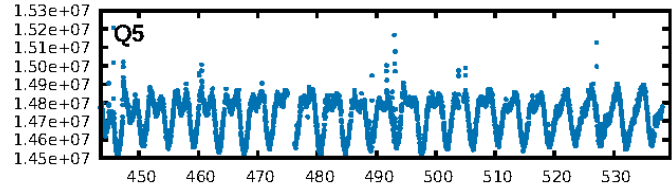
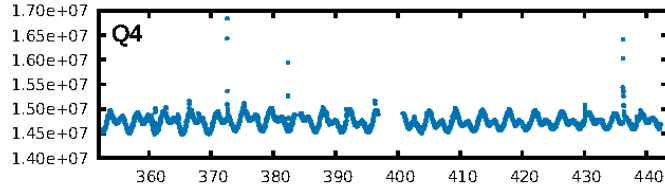
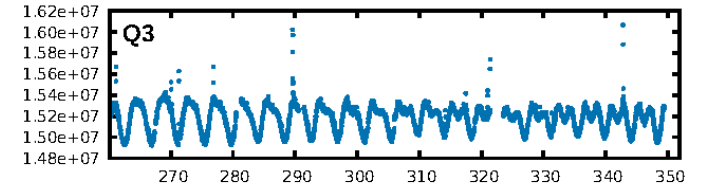
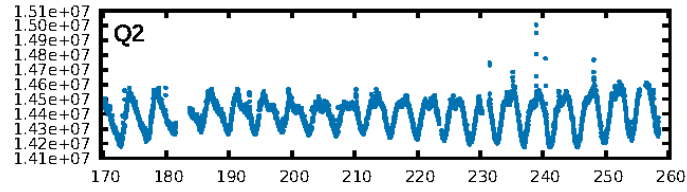
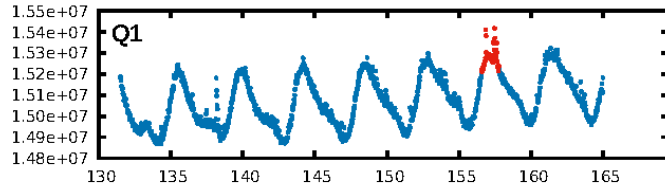
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [124.12σ]
LongPeriod-sig: 100.0% [74.78σ]
ModelChiSquare2-sig: 84.4%
ModelChiSquareGof-sig: 99.7%
Bootstrap-pfa: 1.39e-09
RollingBand-fgt: 1.00 [2/2]
GhostDiagnostic-chr: -947.6
Centroid-sig: 55.8%
Centroid-so: 0.868 arcsec [1.64σ]
OotOffset-rm: 0.458 arcsec [3.93σ]
KicOffset-rm: 0.547 arcsec [3.07σ]
OotOffset-st: 0/1/1/1 [3]
KicOffset-st: 0/1/1/1 [3]
DiffImageQuality-fgm: 0.33 [1/3]
DiffImageOverlap-fno: 1.00 [3/3]

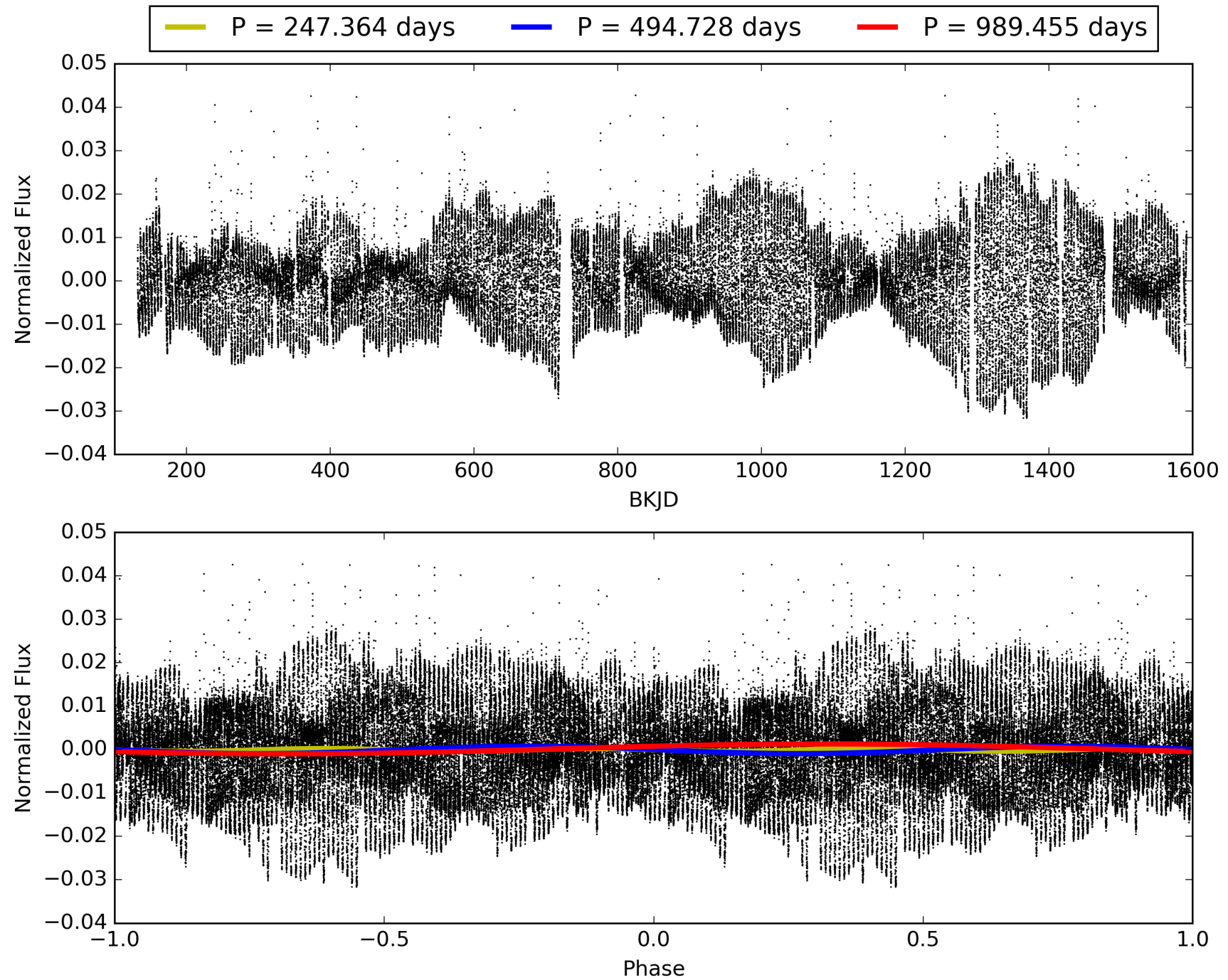
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 17:35:28 Z

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

TCE 009407581-05, PDC Light Curves

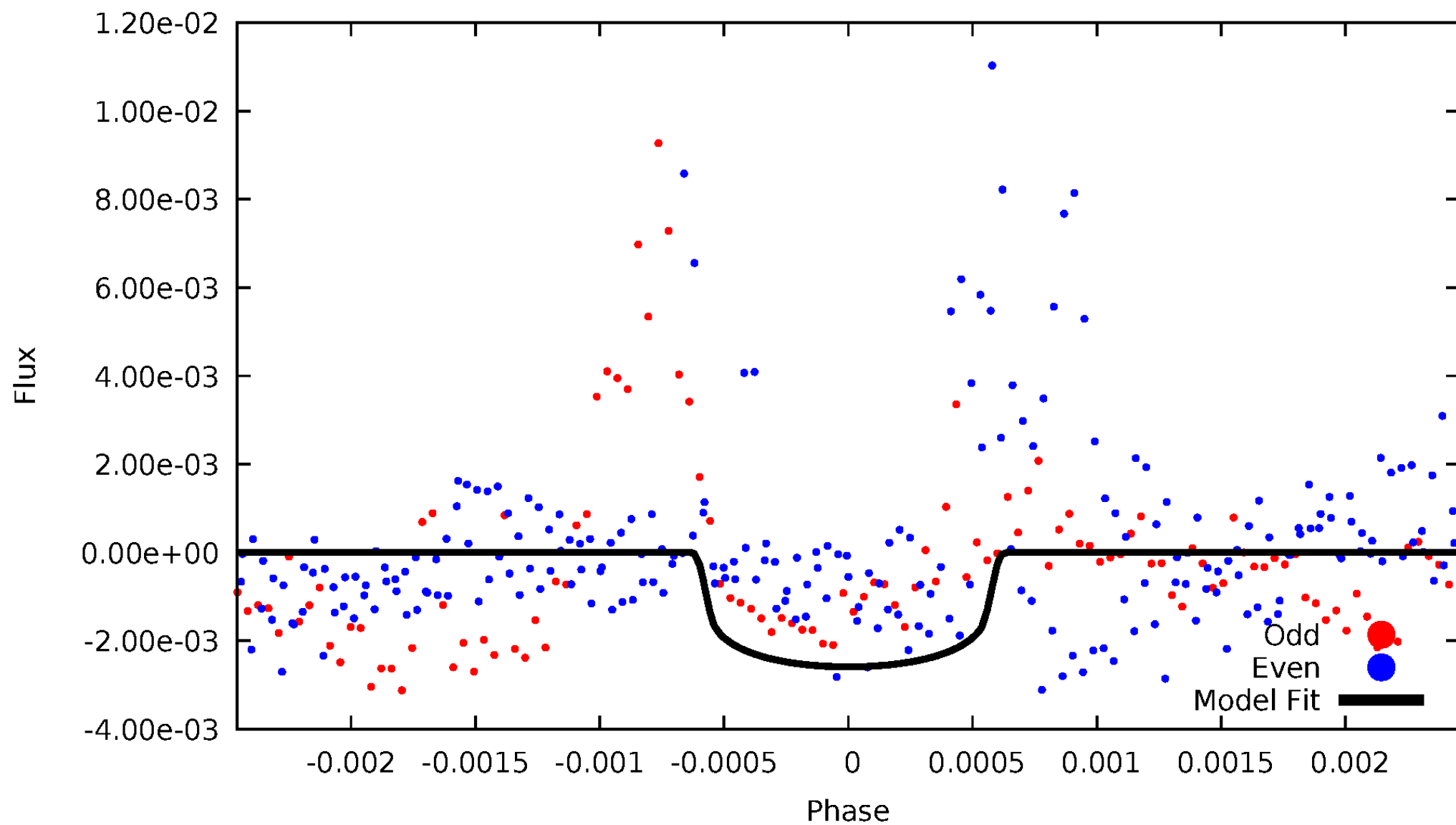


TCE 009407581-05



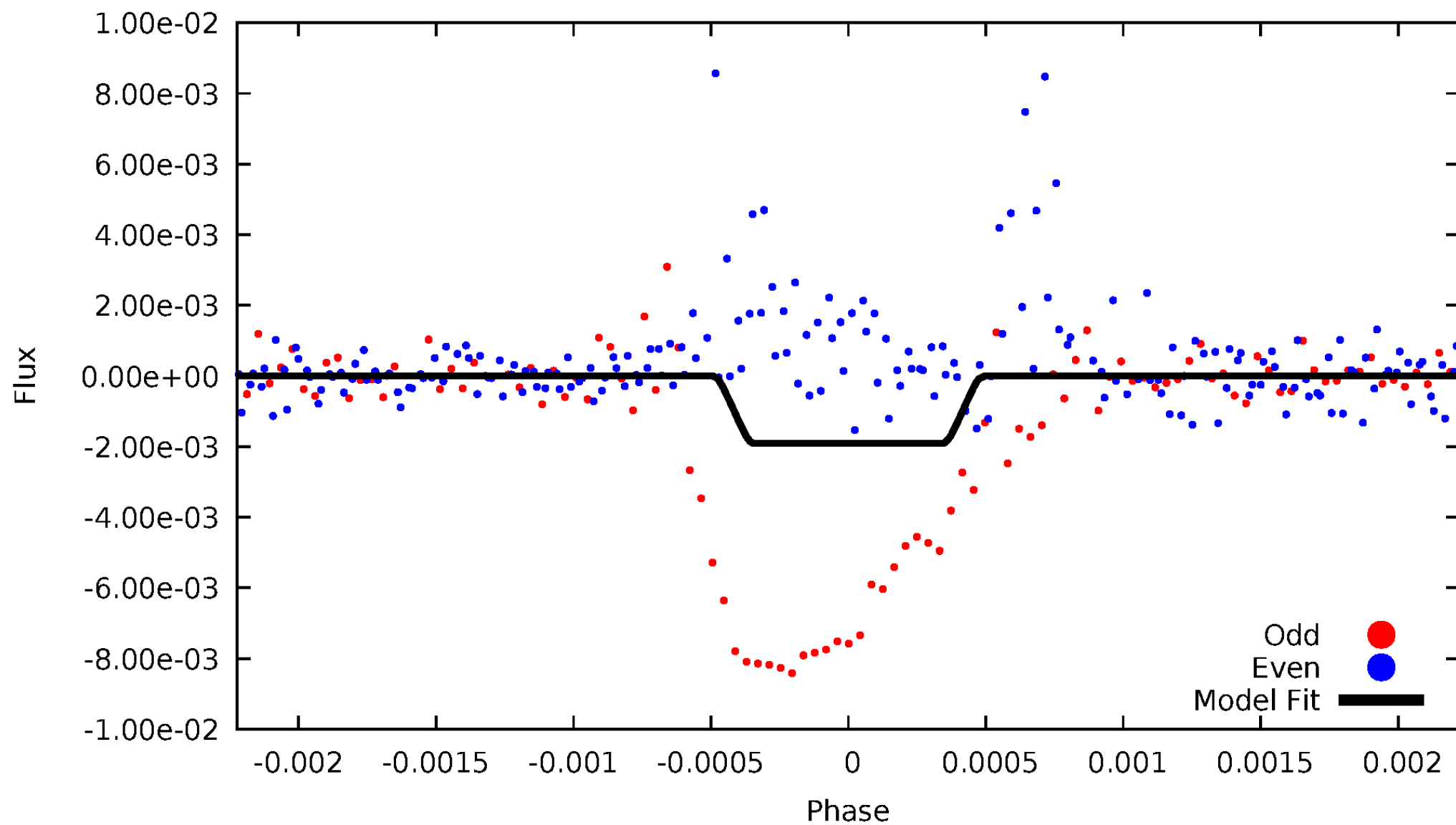
DV Odd/Even

TCE 009407581-05



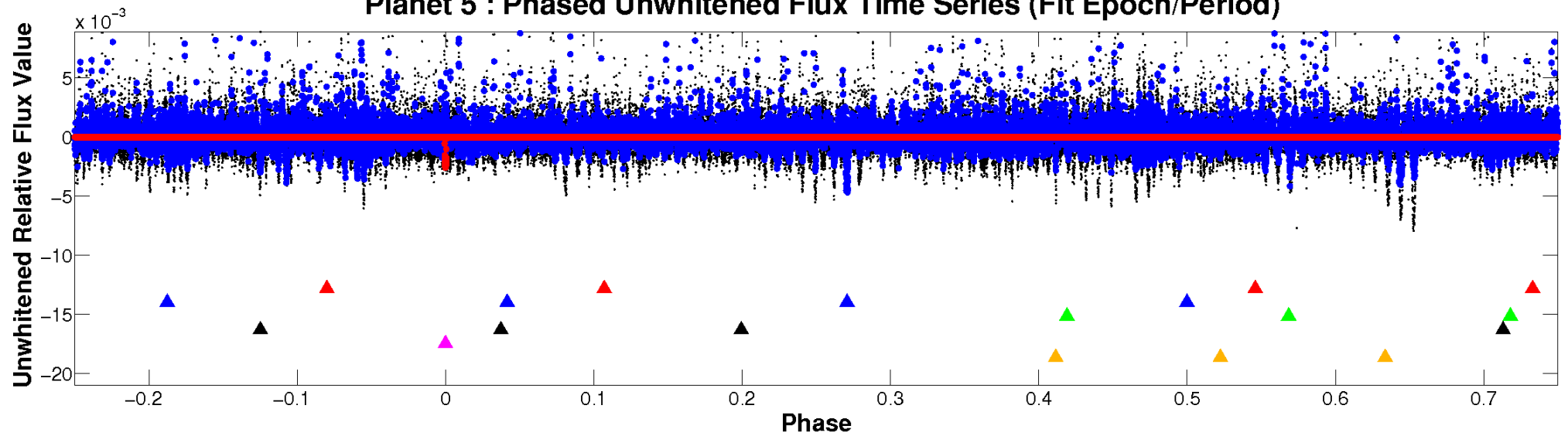
ALT Odd/Even

TCE 009407581-05

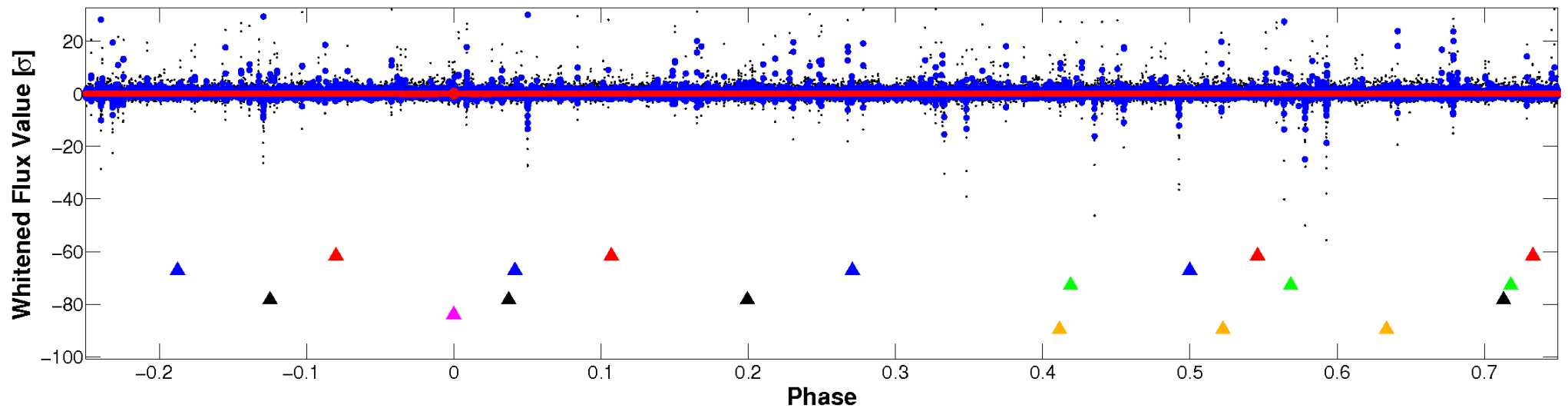


Non-Whitened Vs. Whitened Light Curve

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

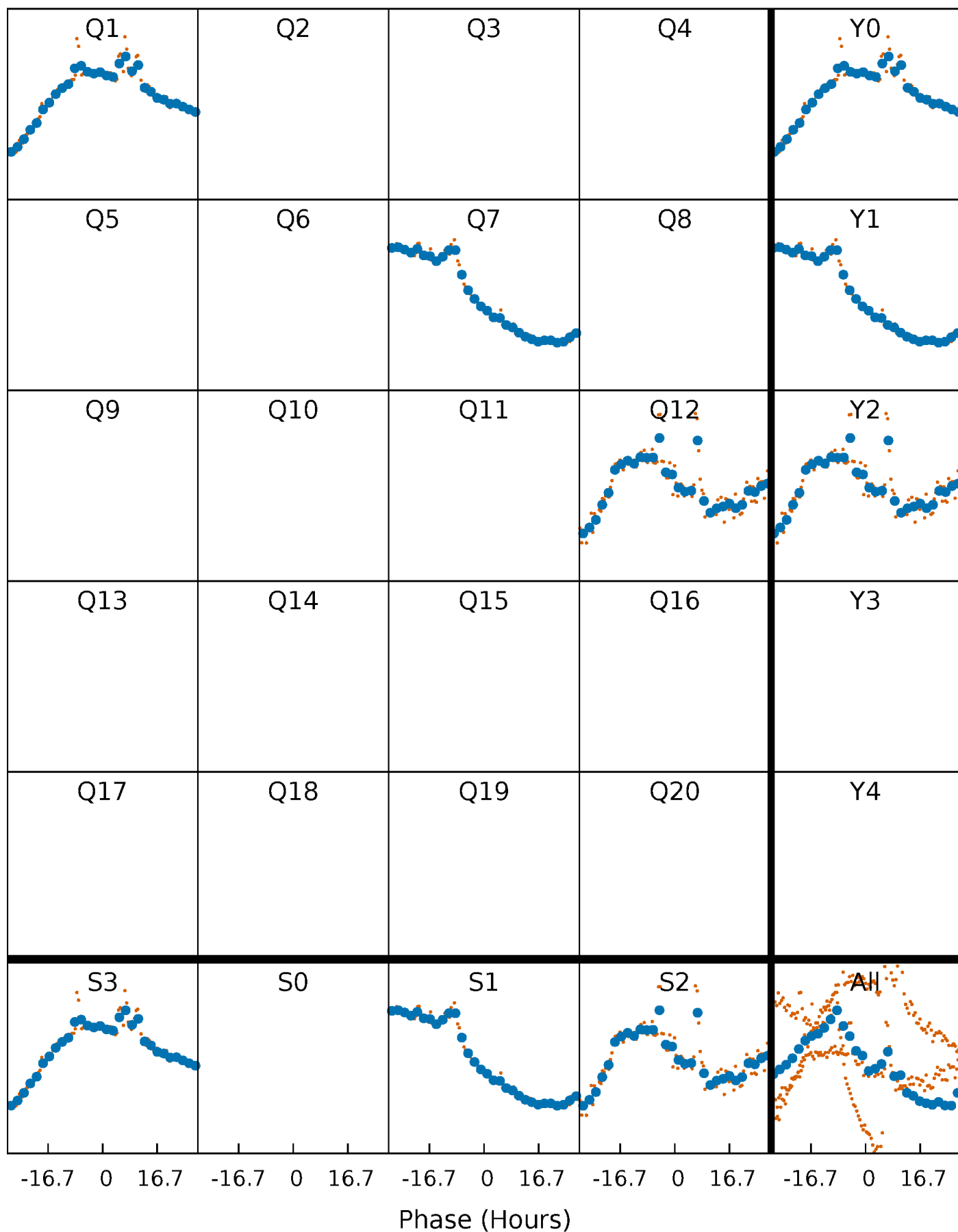


Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)



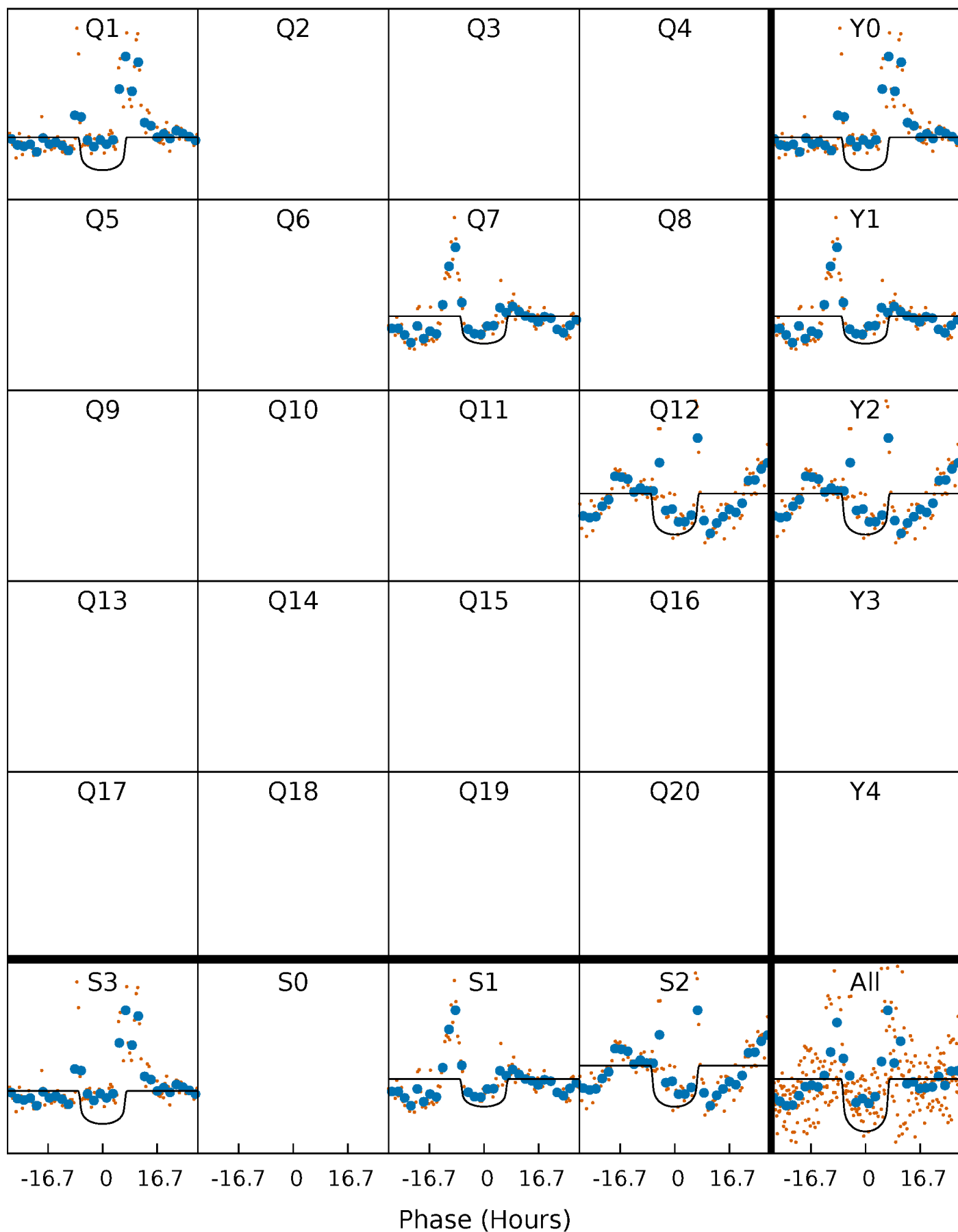
PDC Quarter-Phased Transit Curves

TCE 009407581-05 $P=494.727668$ Days $T_0=157.177644$ (BKJD)



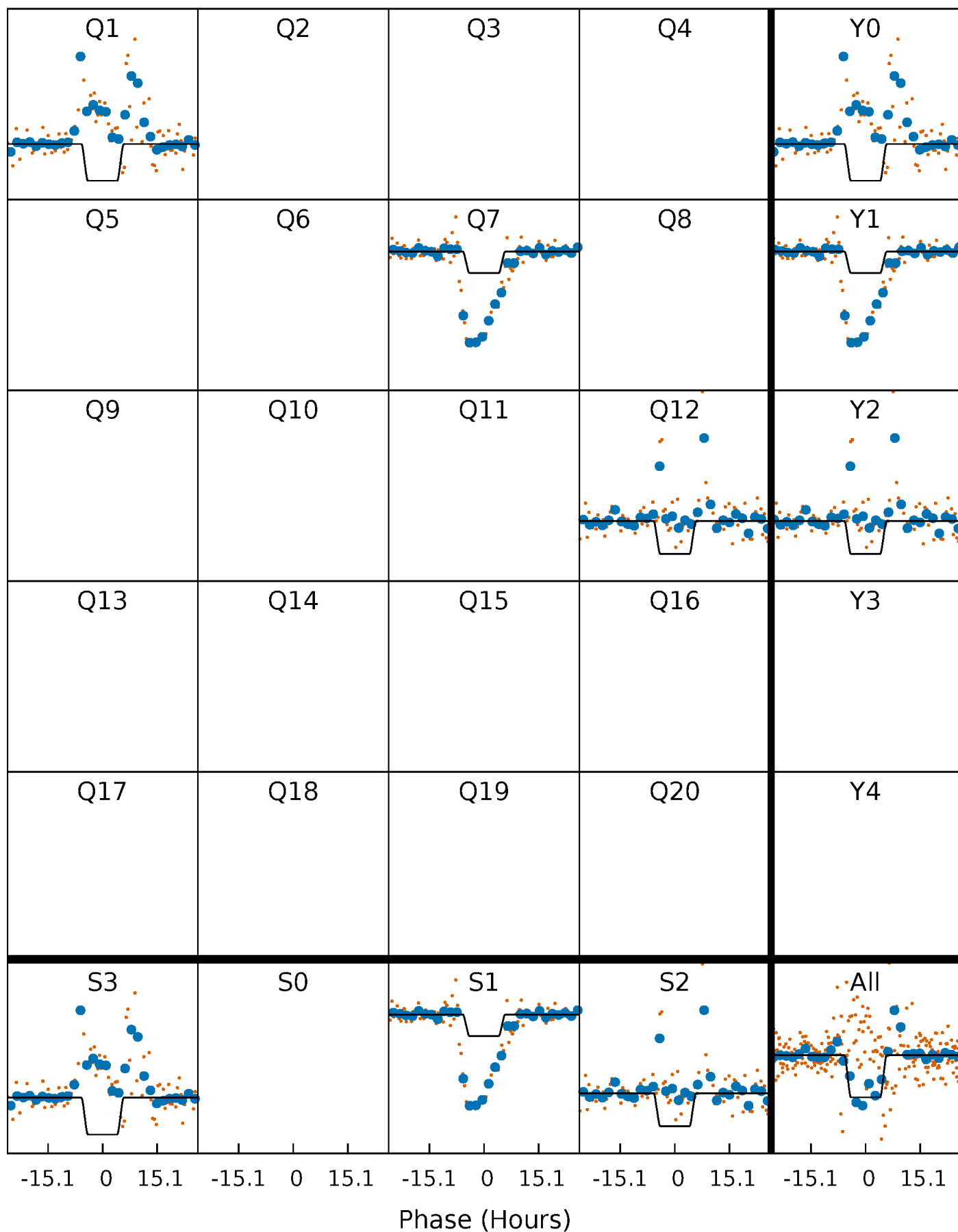
DV Quarter-Phased Transit Curves

TCE 009407581-05 $P=494.727668$ Days $T_0=157.177644$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

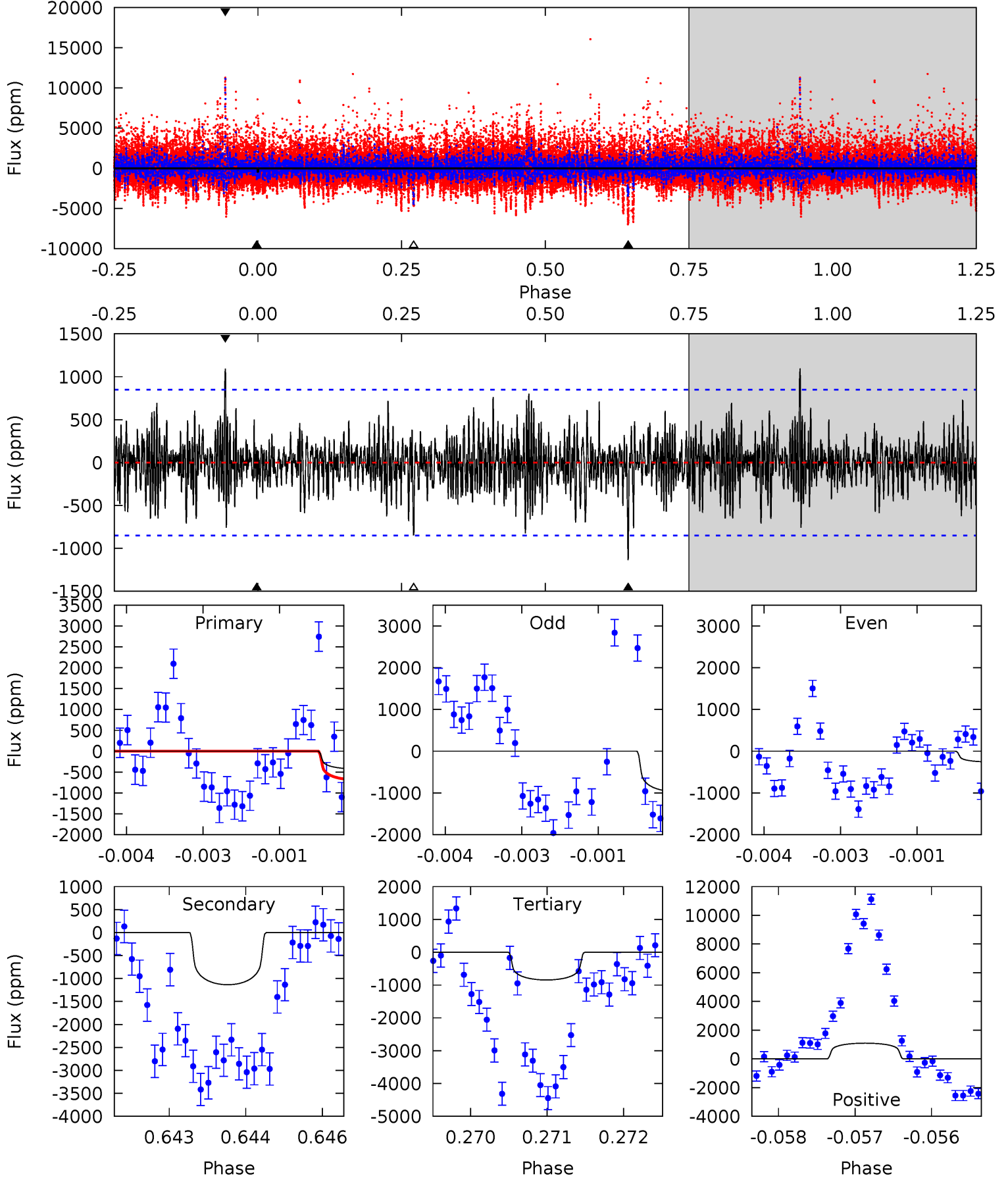
TCE 009407581-05 $P=494.744166$ Days $T_0=157.109778$ (BKJD)



DV Model-Shift Uniqueness Test

009407581-05, P = 494.727668 Days, E = 157.177644 Days

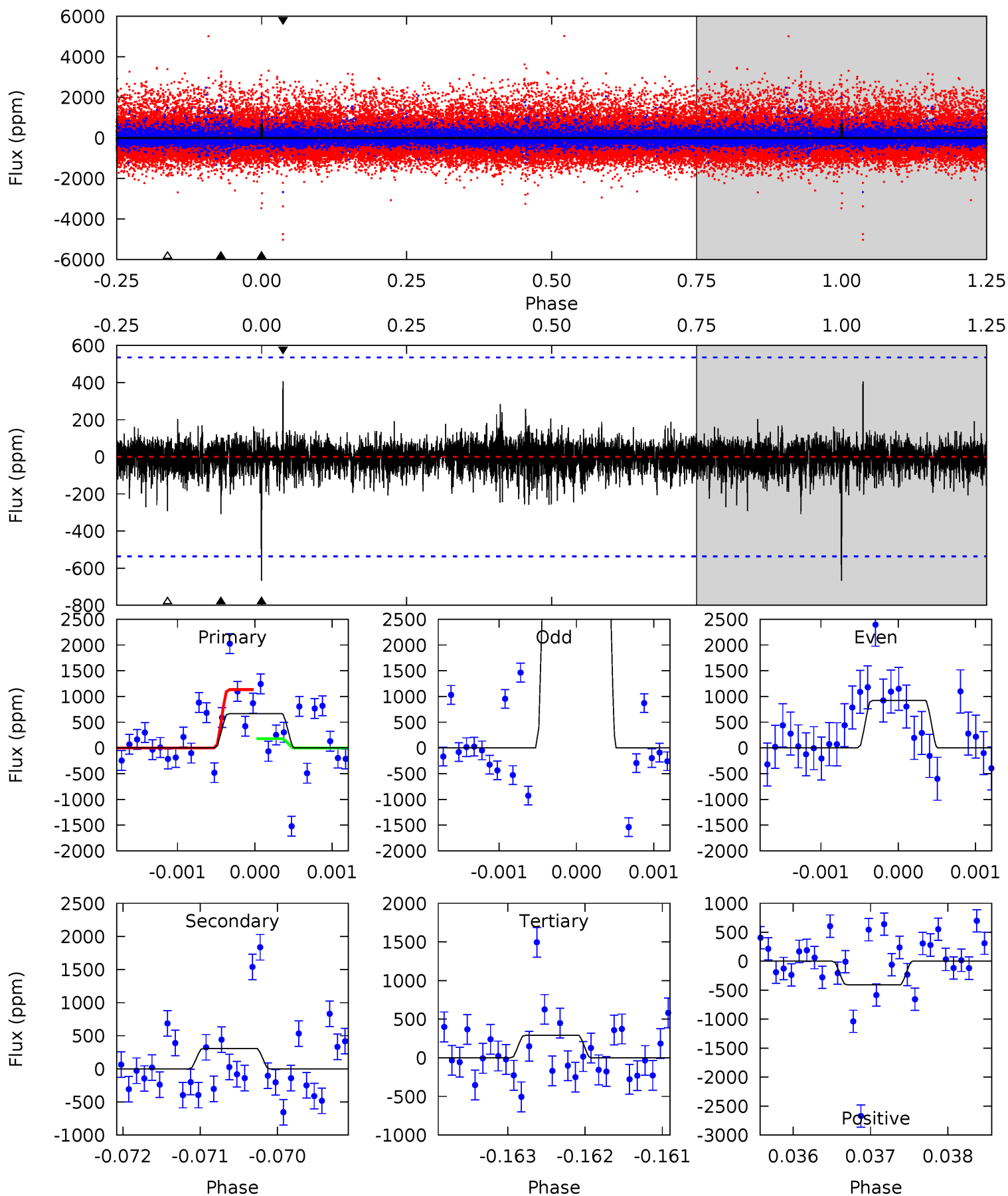
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
2.70	7.23	5.38	6.96	5.41	3.22	1.51	-2.68	-4.27	1.85	0.26	1.59	0.64	0.49	1.68



Alt Model-Shift Uniqueness Test

009407581-05, P = 494.744166 Days, E = 157.109778 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.78	3.13	2.97	4.14	5.46	3.30	0.58	3.82	2.64	0.16	-1.01	34.2	-3.76	0.38	4.78



Stellar Parameters For KIC 009407581

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	3569^{+57}_{-64}	$4.877^{+0.049}_{-0.036}$	$-0.200^{+0.100}_{-0.100}$	$0.378^{+0.035}_{-0.044}$	$0.395^{+0.042}_{-0.052}$	$10.290^{+2.639}_{-1.753}$
	+2%/-2%	+1%/-1%	+50%/-50%	+9%/-12%	+11%/-13%	+26%/-17%
Source	PHO2	PHO2	PHO2	DSEP		

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

Secondary Eclipse Parameters for KIC 009407581-05 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	-1136 ± 157	$1.95^{+0.35}_{-0.33}$	143^{+4}_{-4}	3223^{+198}_{-165}	133931^{+62909}_{-39004}
Alt.	-308 ± 98	$1.79^{+0.36}_{-0.31}$	142^{+4}_{-4}	2734^{+182}_{-168}	42262^{+23721}_{-16086}

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

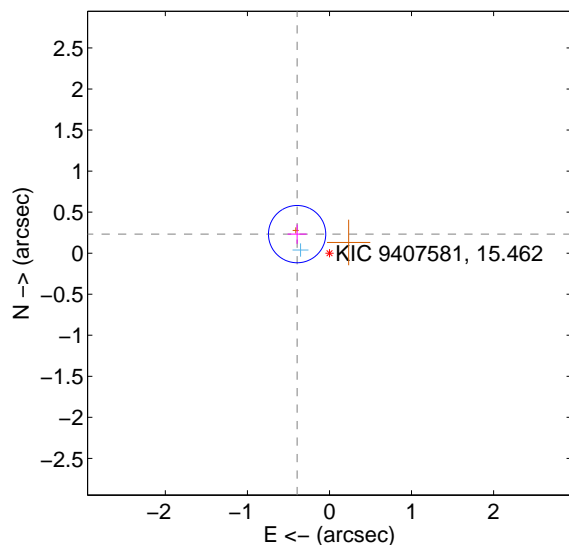
Supplemental centroid analysis for 009407581-05. Kepler magnitude: 15.46. Transit SNR 7.50

There are 1 quarters with good PRF difference image offsets

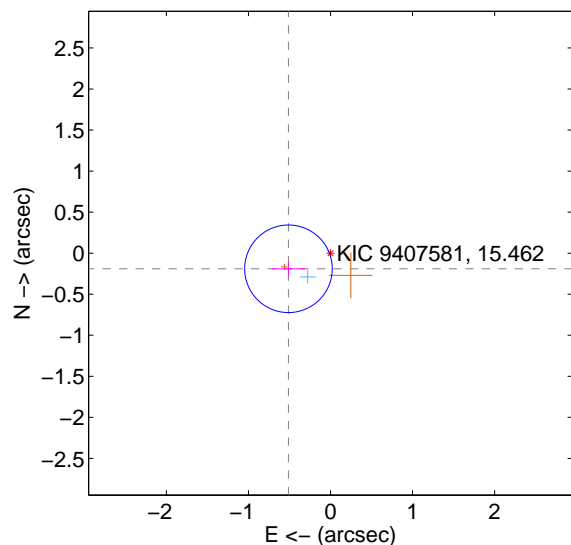
The direct PRF centroid is offset from the target star catalog position by about 0.40 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.458 ± 0.116	3.93	0.394 ± 0.116	0.232 ± 0.118
PRF-fit source offset from KIC position	0.547 ± 0.178	3.07	0.512 ± 0.201	-0.190 ± 0.081
photometric centroid source offset	0.87 ± 0.53	1.64	-0.63 ± 0.58	-0.59 ± 0.47

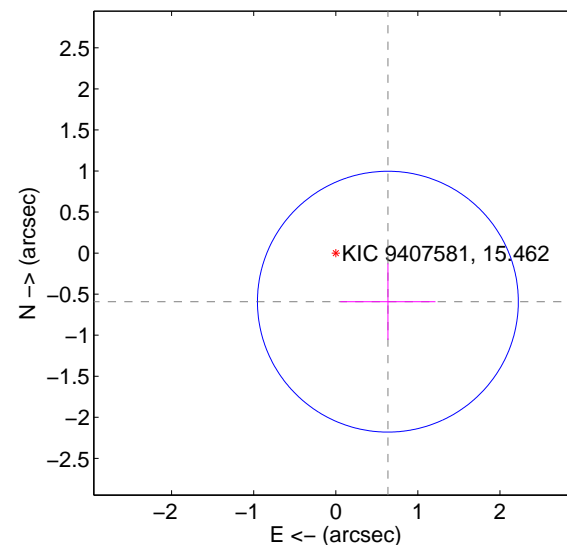
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

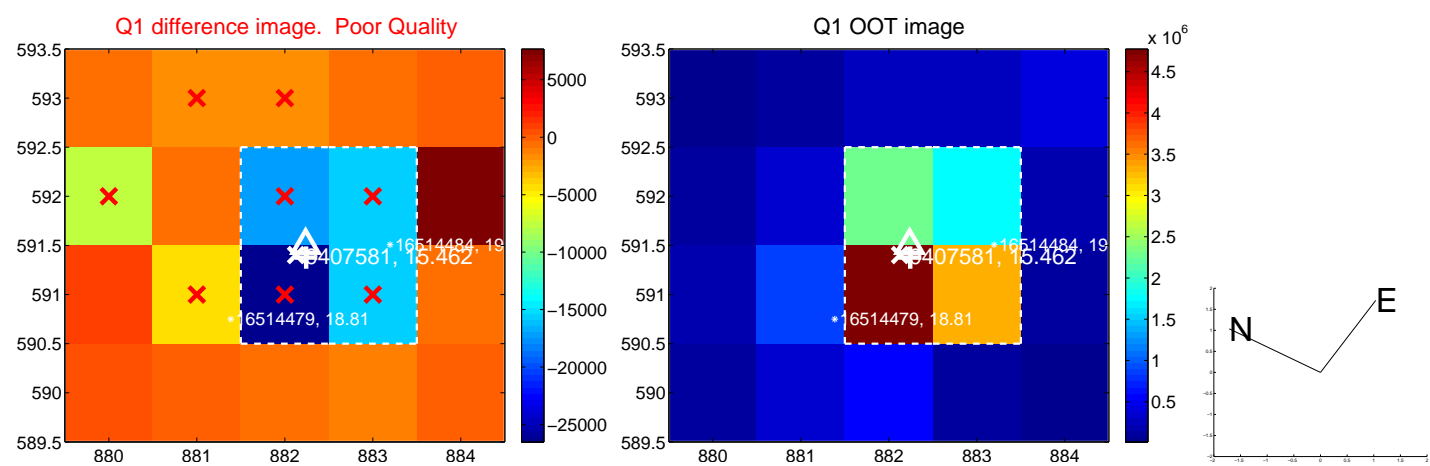


offset from photometric centroids



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.

Q5 no difference image



Q5 no OOT image



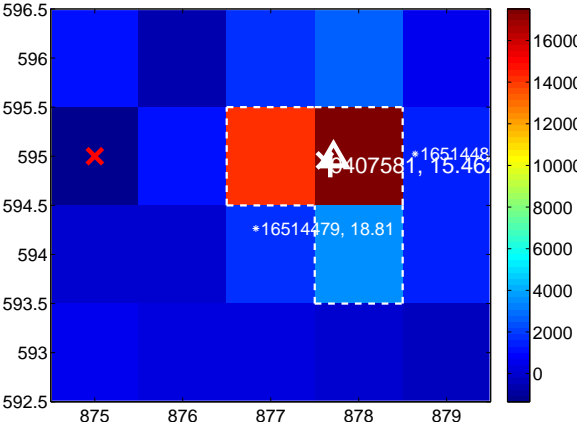
Q6 no difference image



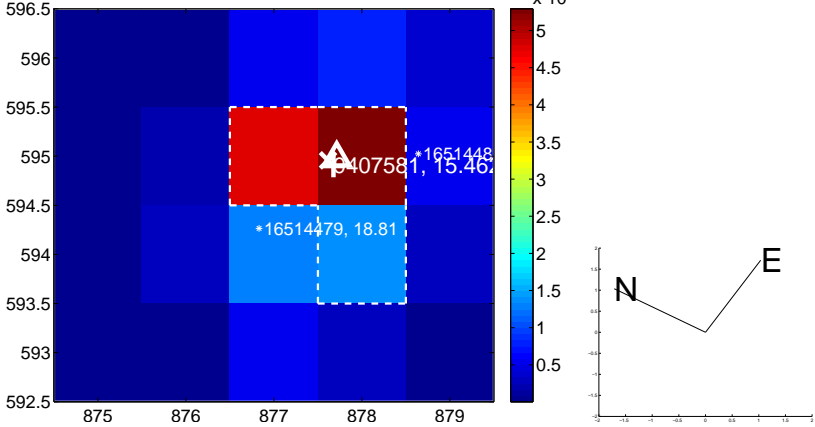
Q6 no OOT image



Q7 difference image



Q7 OOT image



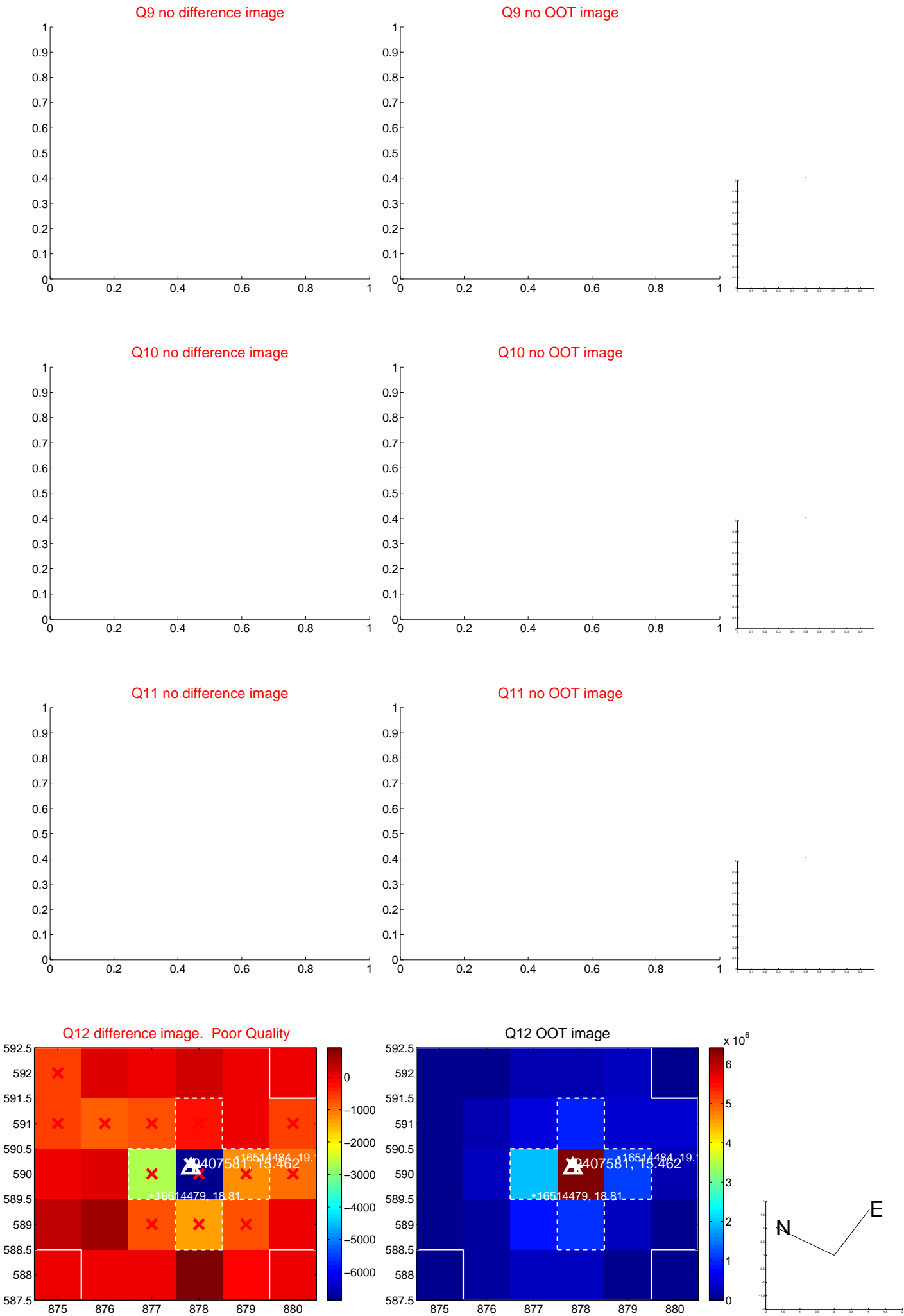
Q8 no difference image



Q8 no OOT image



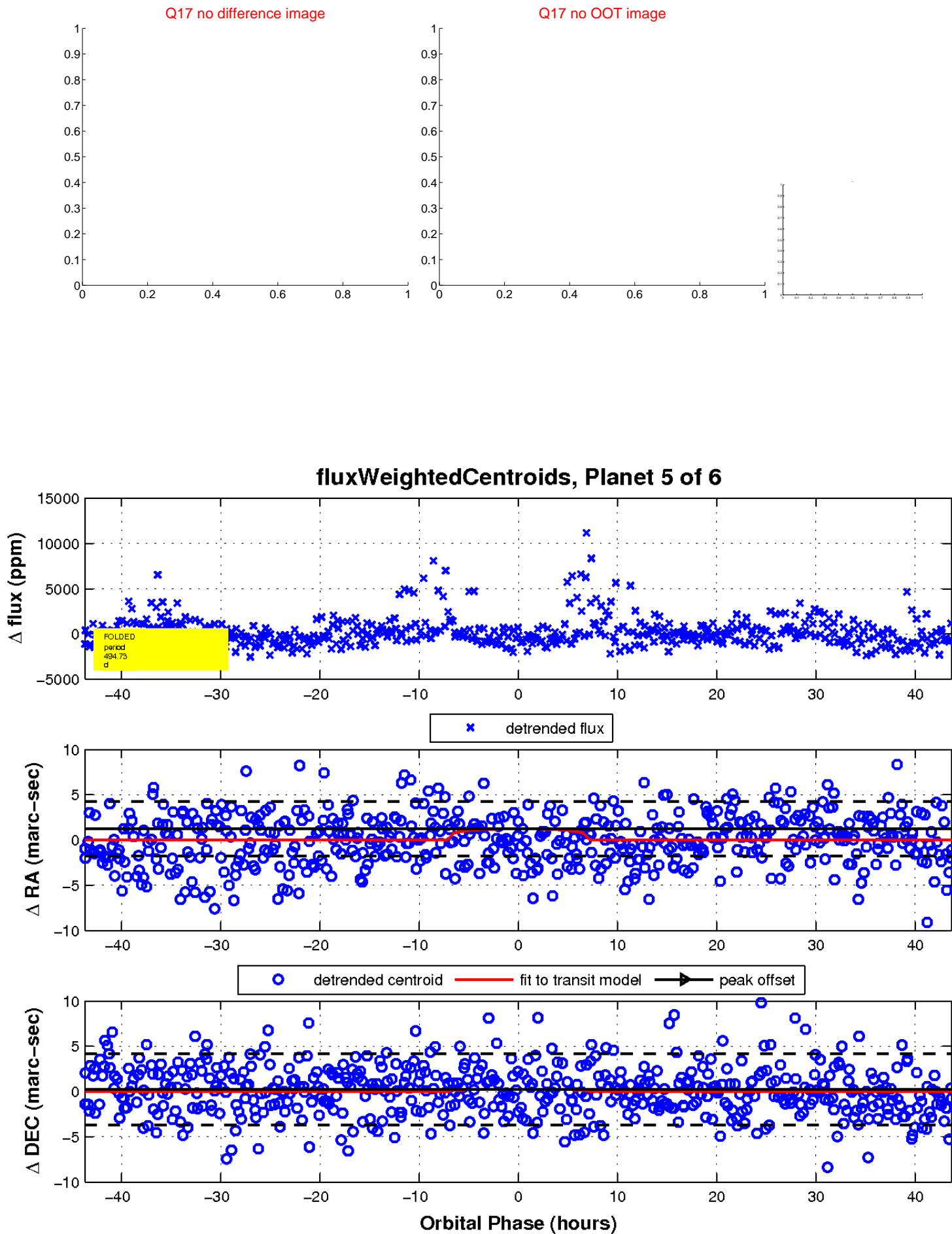
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



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

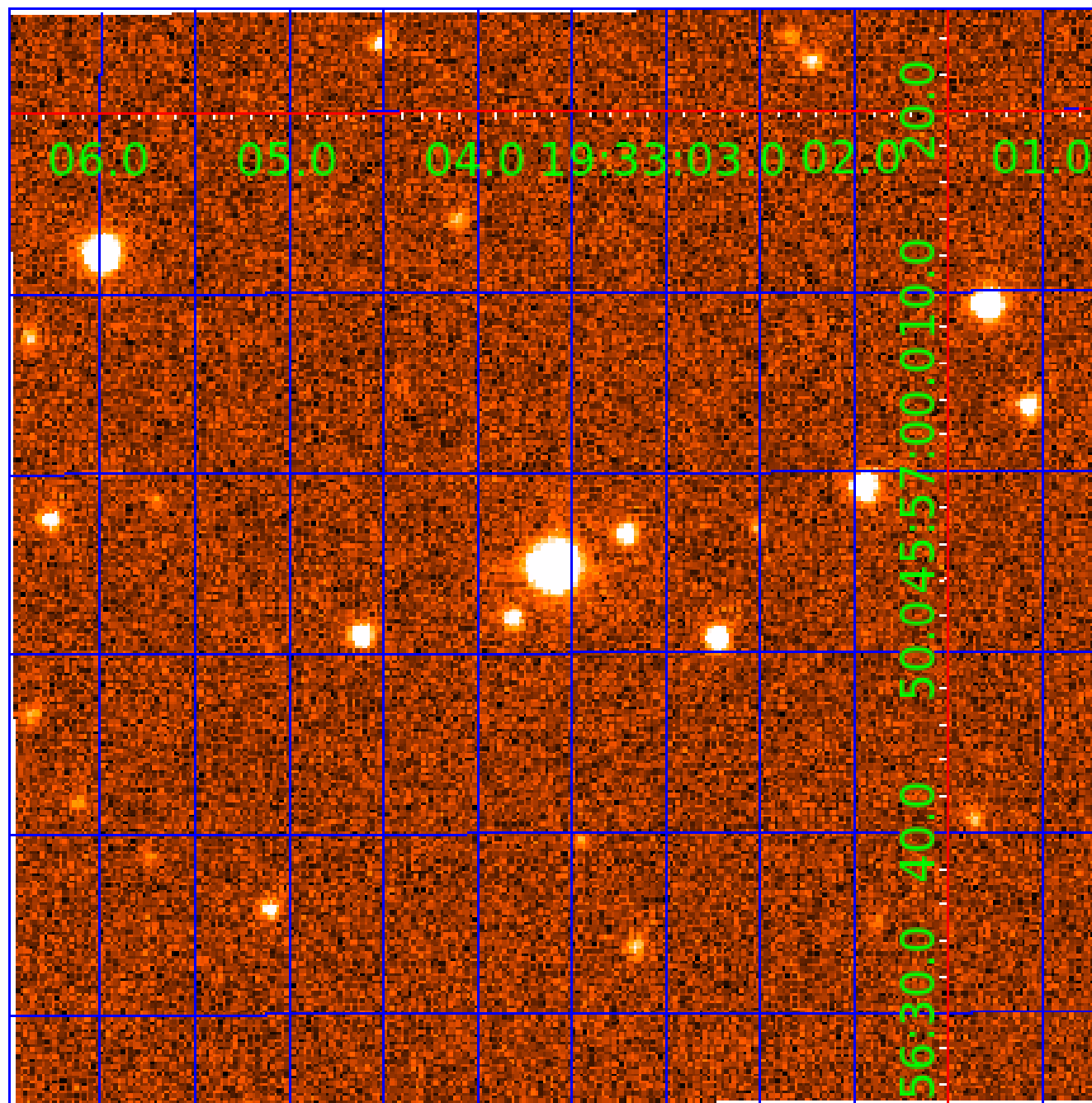


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 009407581

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})
009407581-01	OBS	No	402.206945	210.128388	2265.3	3.720	12.7	7.0	0.38	3569	1.81	0.03
009407581-02	OBS	No	381.350559	404.500998	1592.7	5.764	12.8	5.9	0.38	3569	1.58	0.04
009407581-03	OBS	No	568.684013	364.474874	1698.3	8.382	12.6	5.4	0.38	3569	1.55	0.02
009407581-04	OBS	No	414.517175	255.857169	2328.1	5.254	12.7	7.1	0.38	3569	2.02	0.03
009407581-05	OBS	No	494.727668	157.177644	2587.8	14.592	11.3	7.5	0.38	3569	1.94	0.03
009407581-06	OBS	No	549.668579	360.735504	3048.6	9.899	11.4	9.2	0.38	3569	2.07	0.02

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009407581-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009407581-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
009407581-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009407581-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
009407581-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
009407581-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—MOD_NONUNIQ_DV—MOD_POS_DV—CENT_FEW_DIFFS

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

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

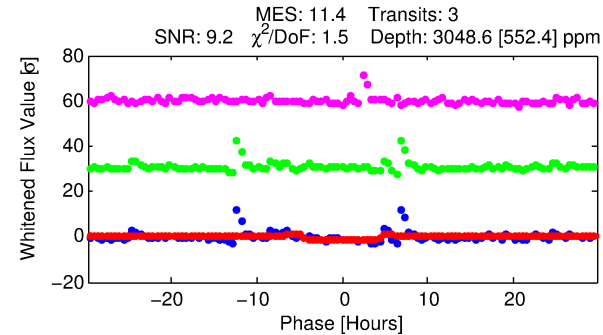
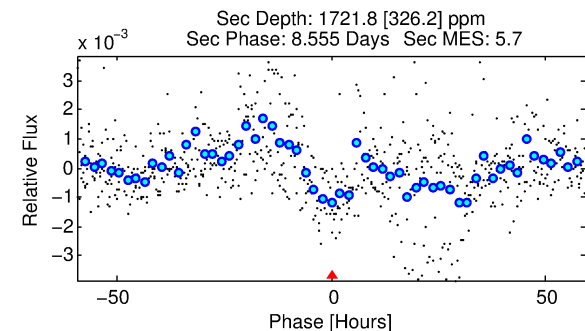
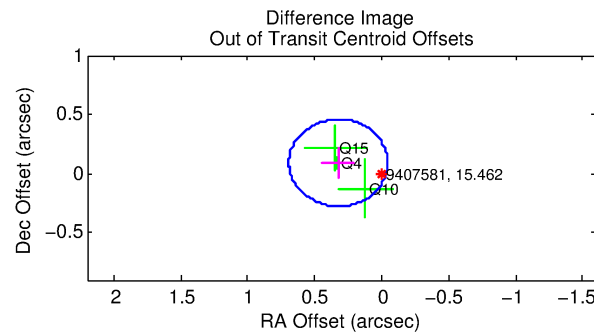
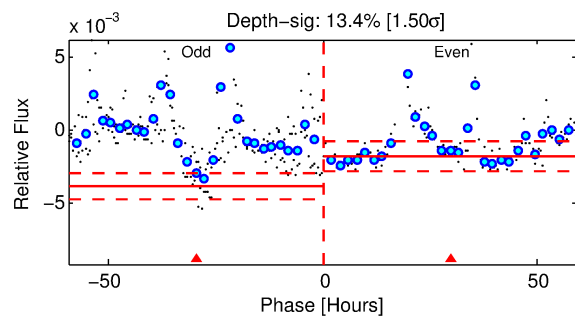
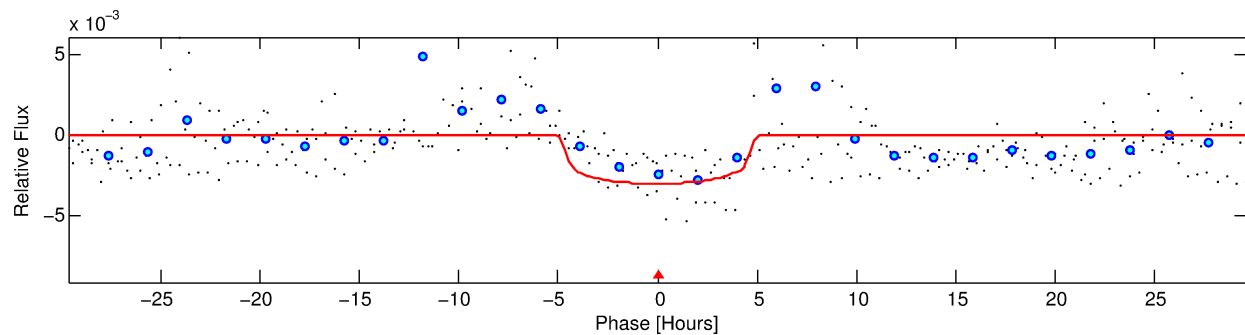
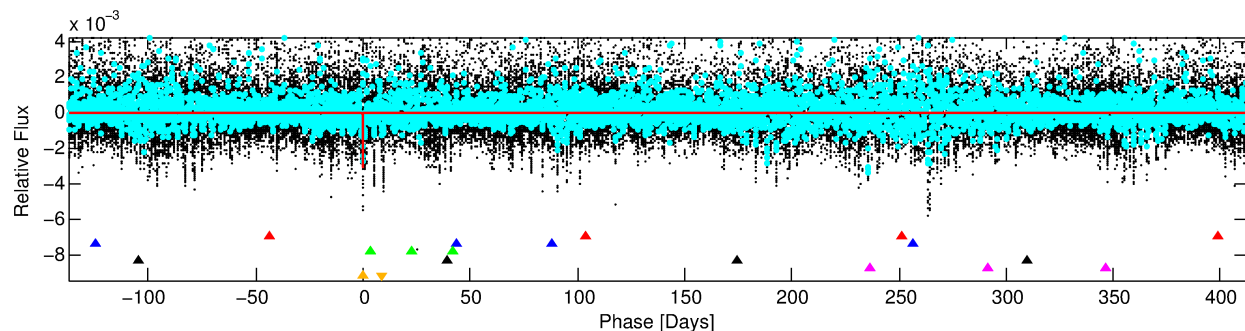
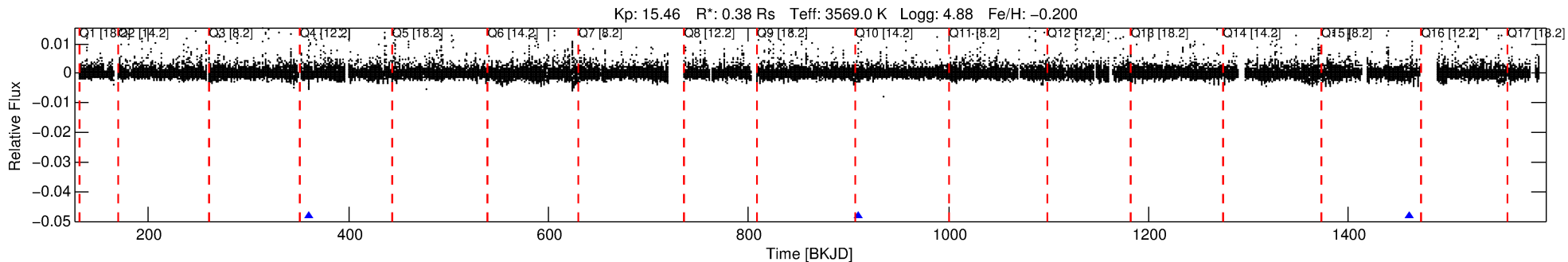
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009407581-06

No Significant Match Found

DV One-Page Summary

KIC: 9407581 Candidate: 6 of 6 Period: 549.669 d



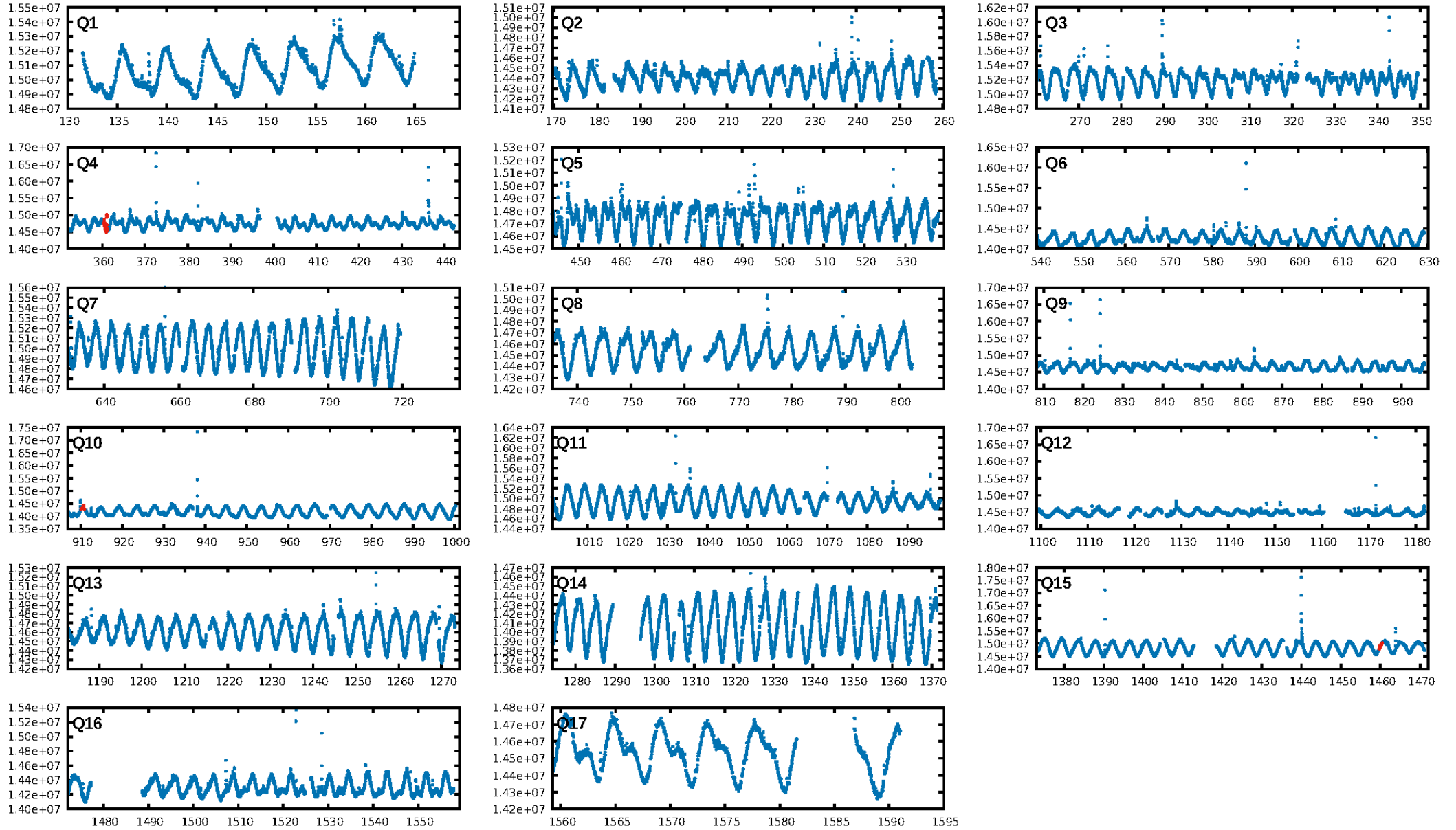
DV Fit Results:

Period = 549.66858 [0.00813] d
Epoch = 360.7355 [0.0126] BKJD
Rp/R* = 0.0503 [0.0163]
a/R* = 441.07 [591.73]
b = 0.15 [8.85]
Seff = 0.02 [0.00]
Teq = 99 [3] K
Rp = 2.07 [0.72] Re
a = 0.9618 [0.0829] AU
Ag = 203919.98 [139726.97] [1.46 σ]
Teffp = 3243 [552] K [5.70 σ]

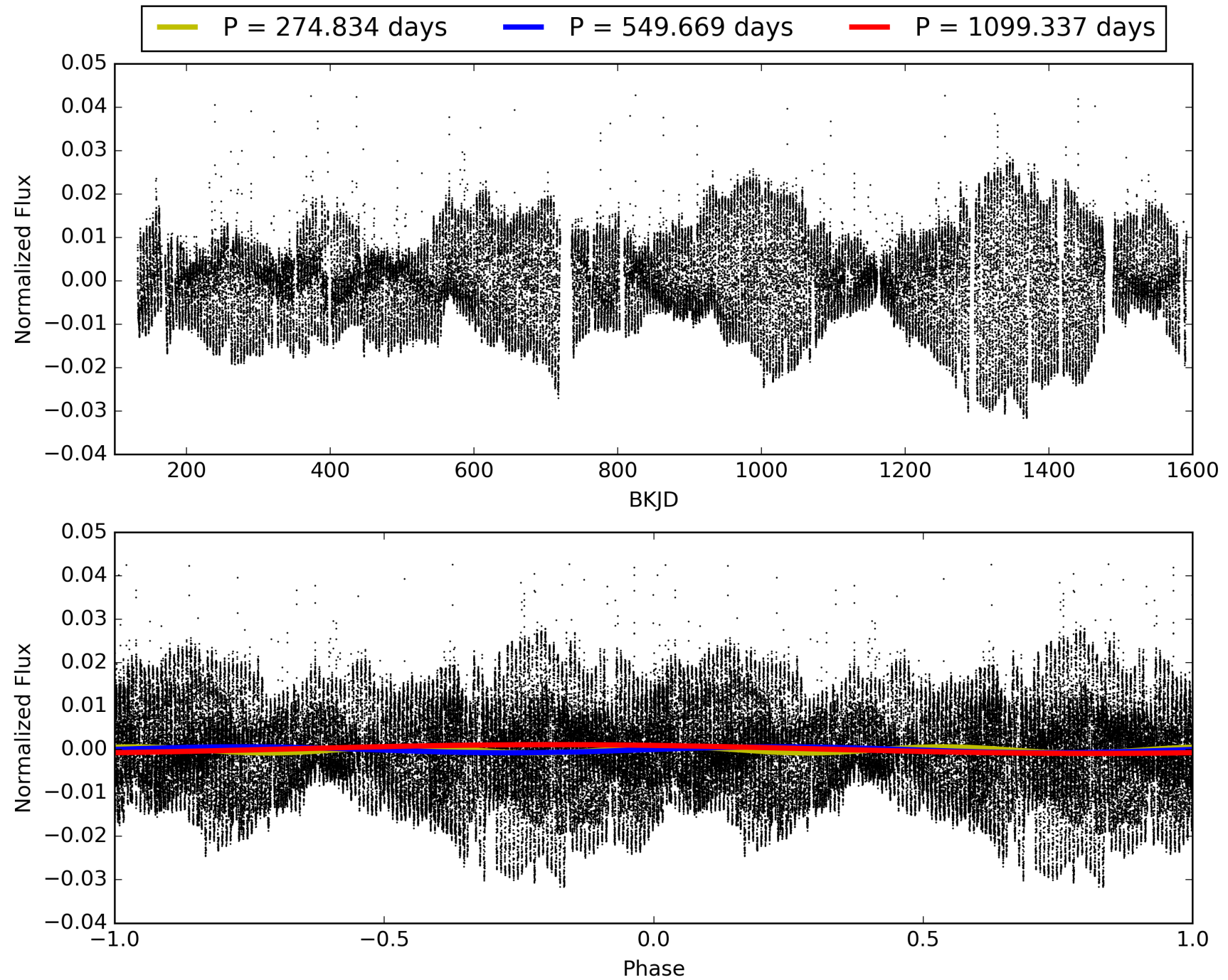
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [74.78 σ]
LongPeriod-sig: 100.0% [35.18 σ]
ModelChiSquare2-sig: 0.0%
ModelChiSquareGof-sig: 74.4%
Bootstrap-pfa: 1.16e-09
RollingBand-fgt: 1.00 [3/3]
GhostDiagnostic-chr: 0.3846
Centroid-sig: 0.5%
Centroid-so: 0.170 arcsec [0.38 σ]
OotOffset-rm: 0.337 arcsec [2.75 σ]
KicOffset-rm: 0.363 arcsec [2.94 σ]
OotOffset-st: 1/1/1/0 [3]
KicOffset-st: 1/1/1/0 [3]
DiffImageQuality-fgm: 0.33 [1/3]
DiffImageOverlap-fno: 1.00 [3/3]

TCE 009407581-06, PDC Light Curves

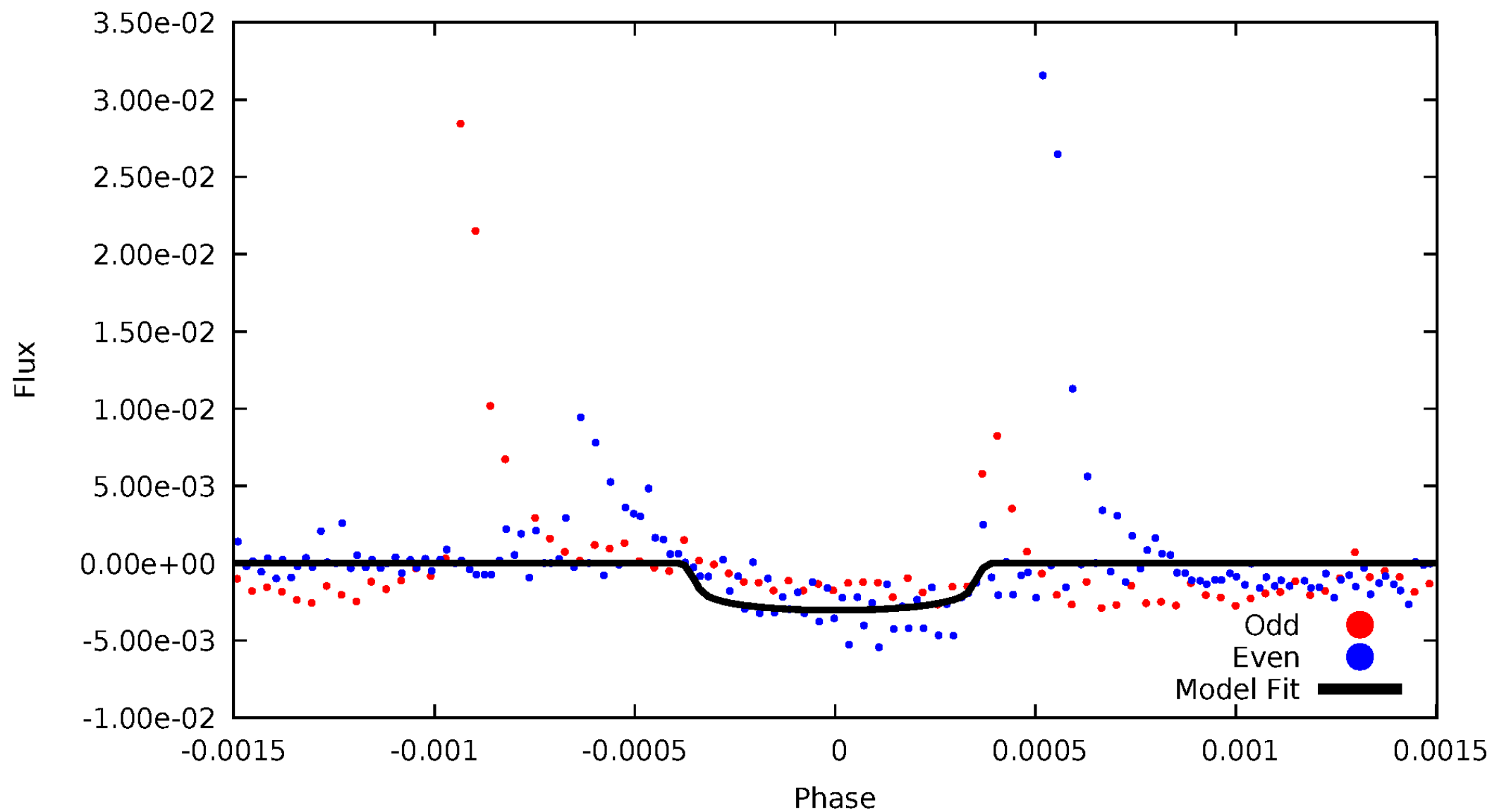


TCE 009407581-06



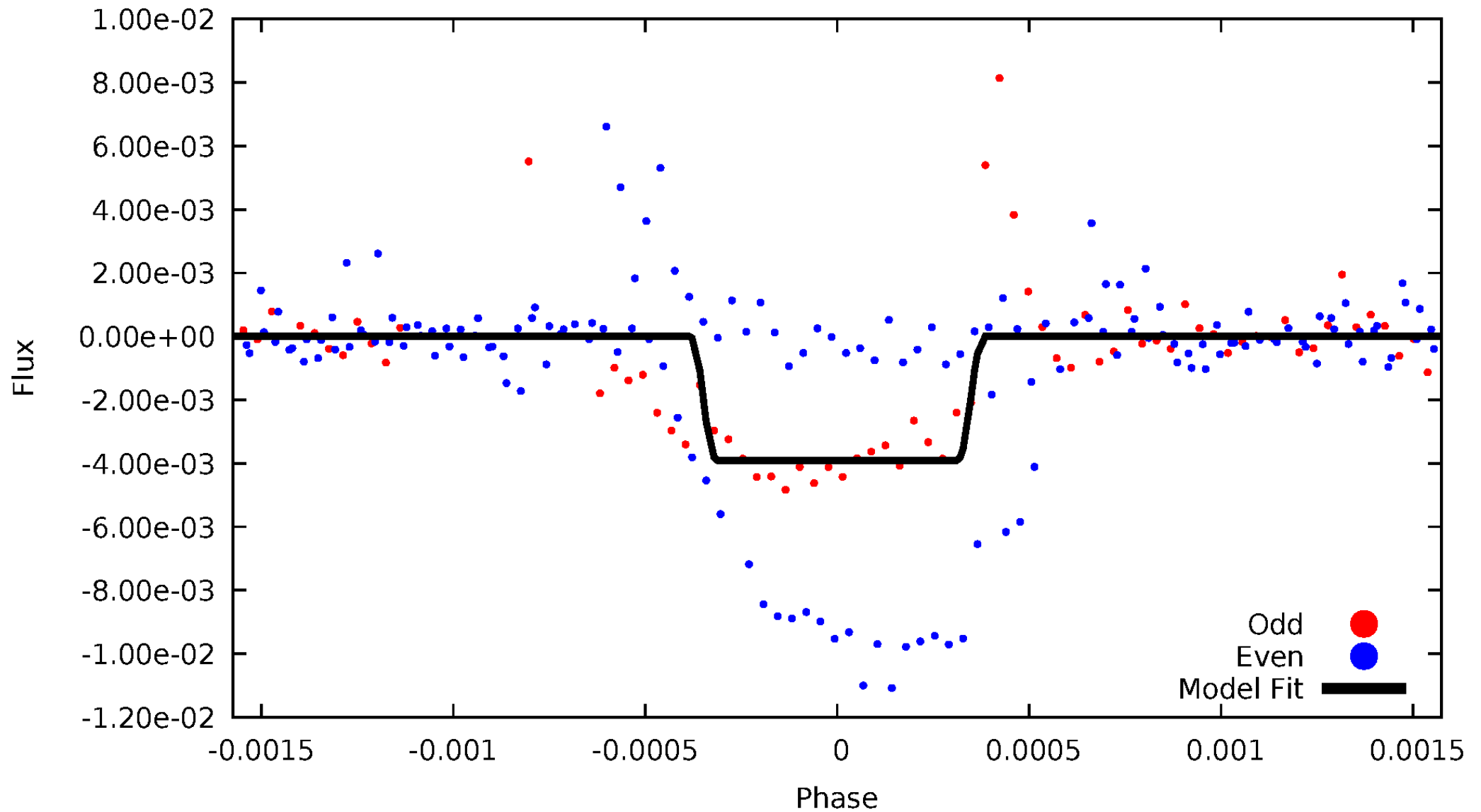
DV Odd/Even

TCE 009407581-06



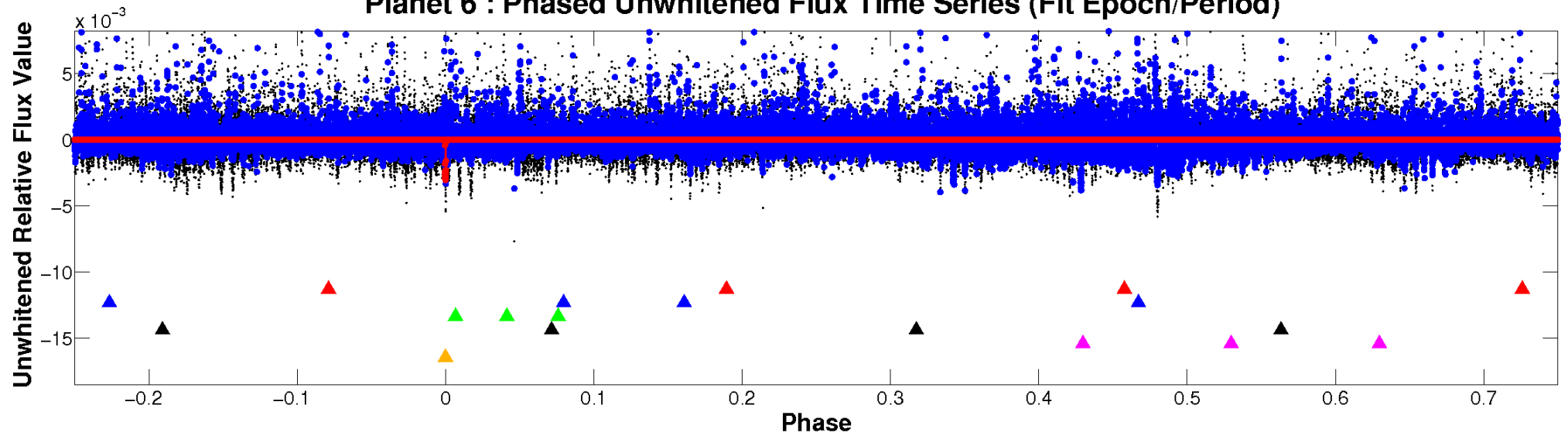
ALT Odd/Even

TCE 009407581-06

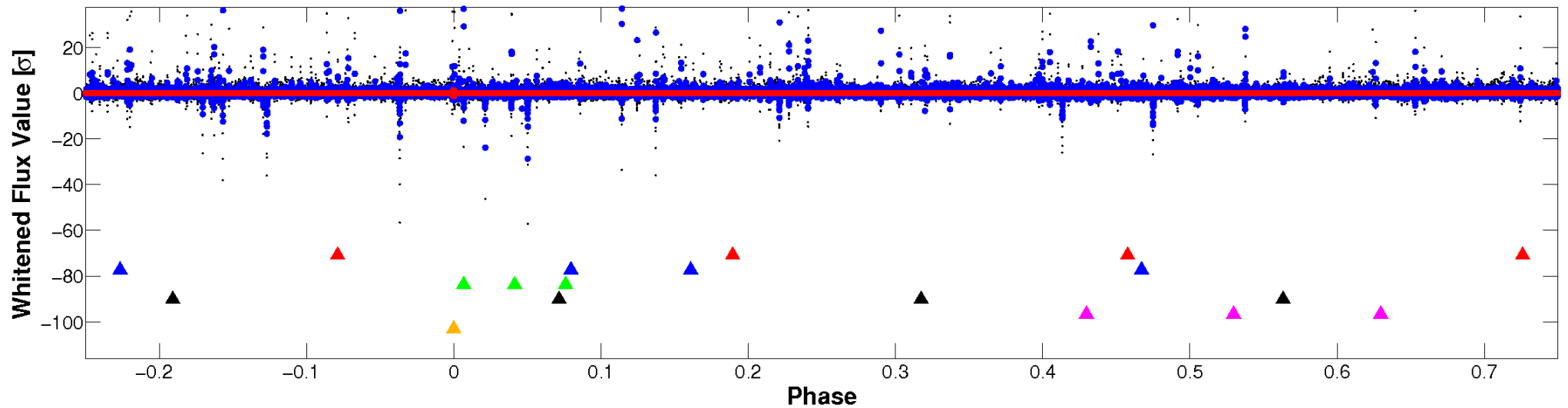


Non-Whitened Vs. Whitened Light Curve

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

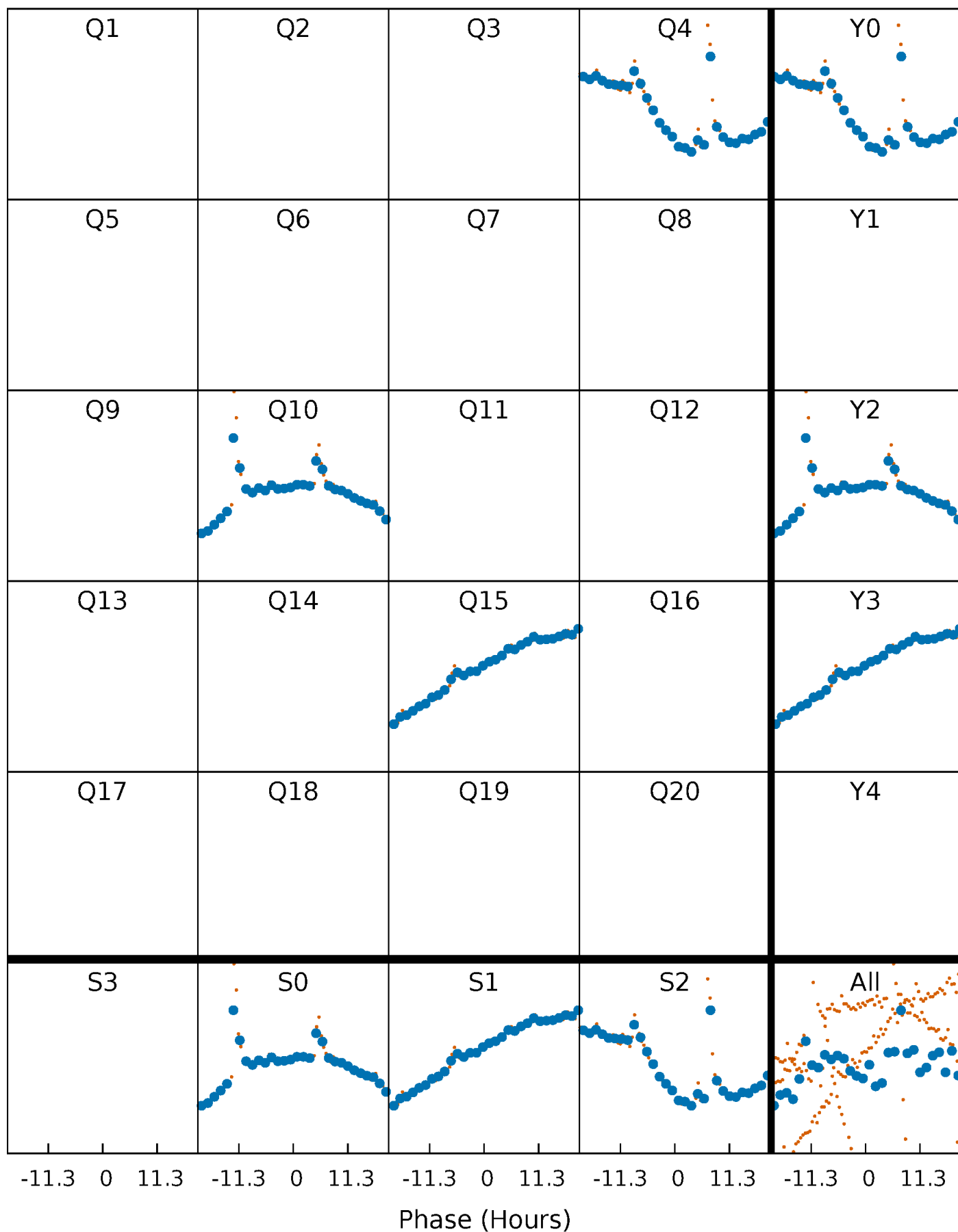


Planet 6 : Phased Whitened Flux Time Series (Fit Epoch/Period)



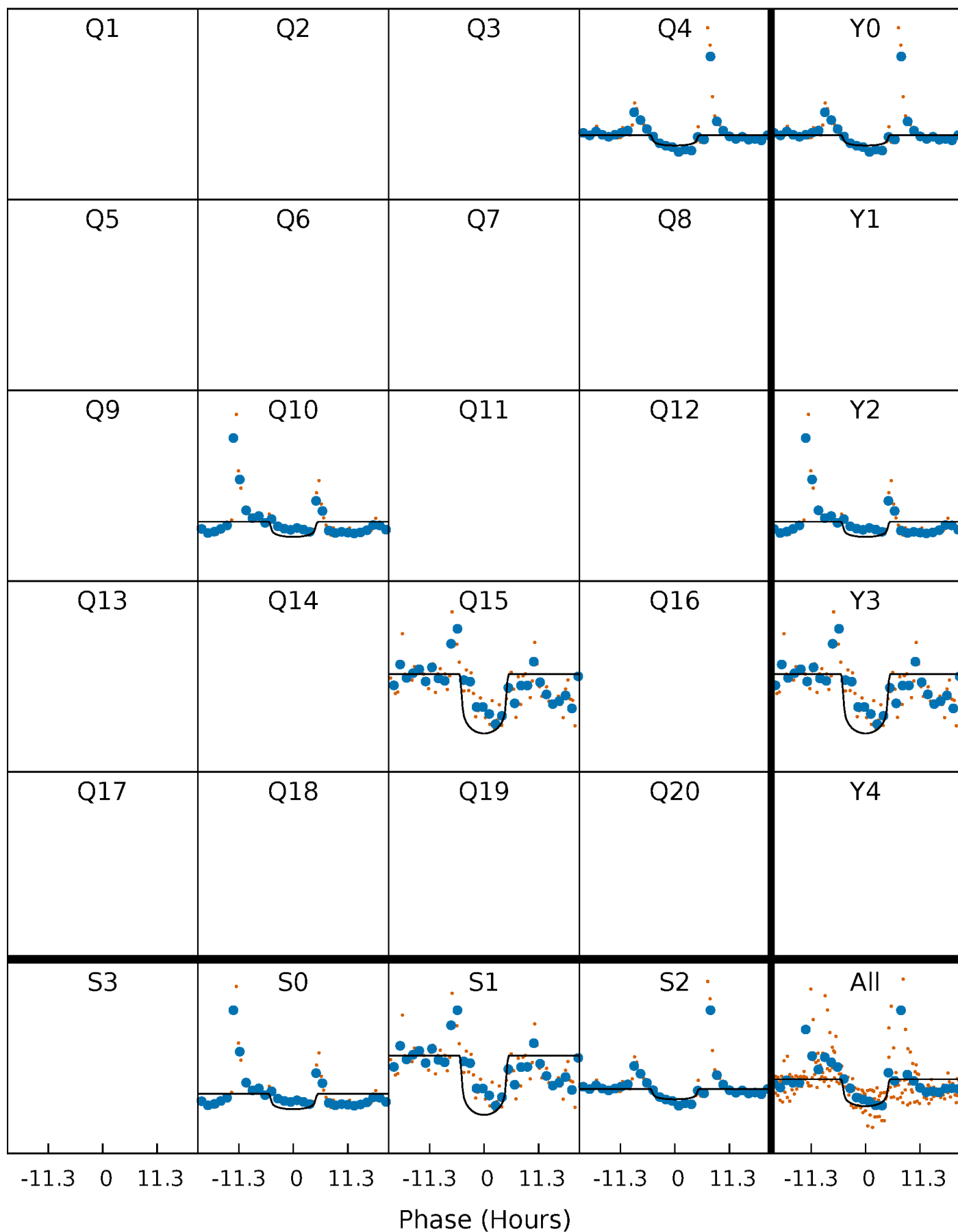
PDC Quarter-Phased Transit Curves

TCE 009407581-06 P=549.668579 Days $T_0=360.735504$ (BKJD)



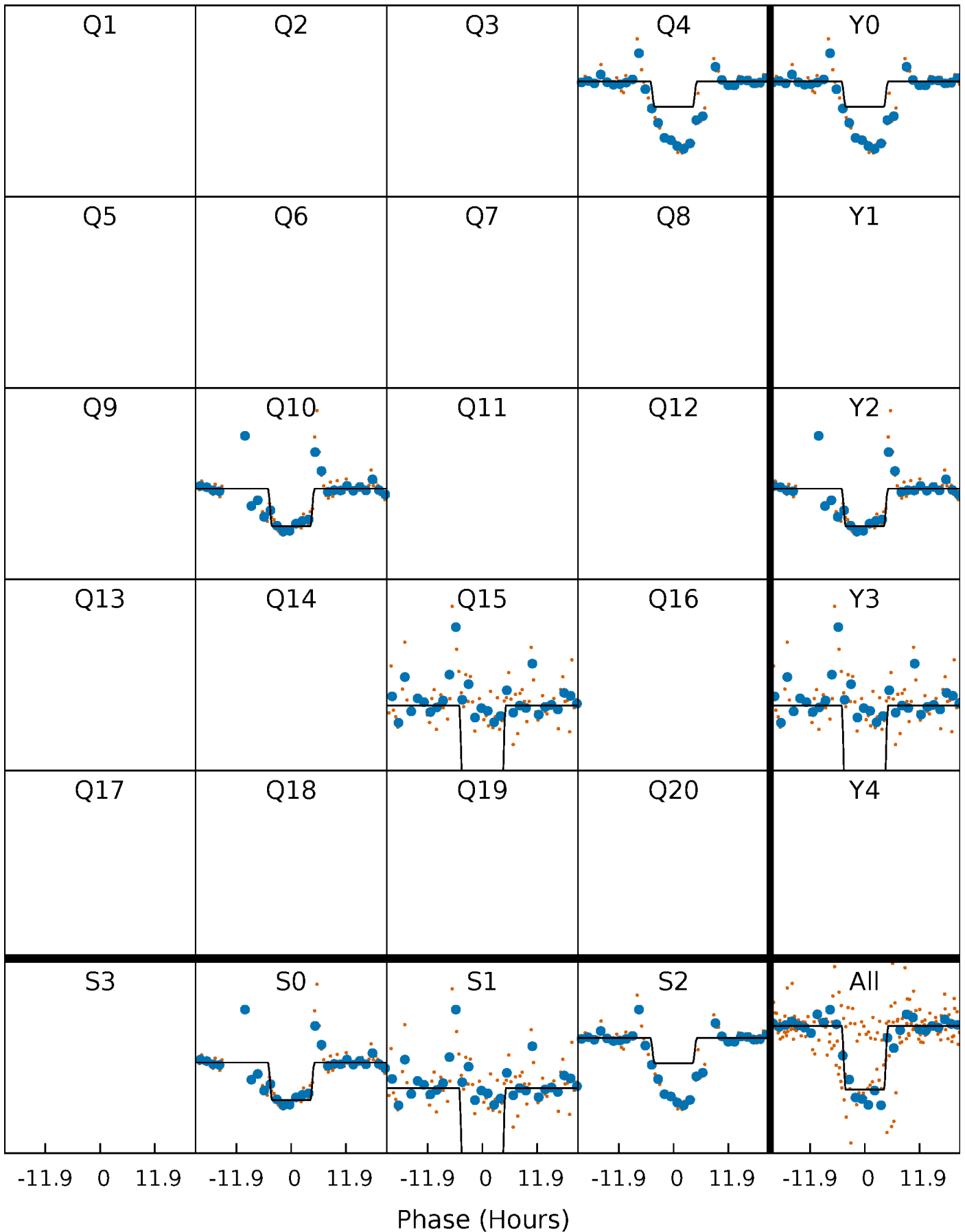
DV Quarter-Phased Transit Curves

TCE 009407581-06 $P=549.668579$ Days $T_0=360.735504$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

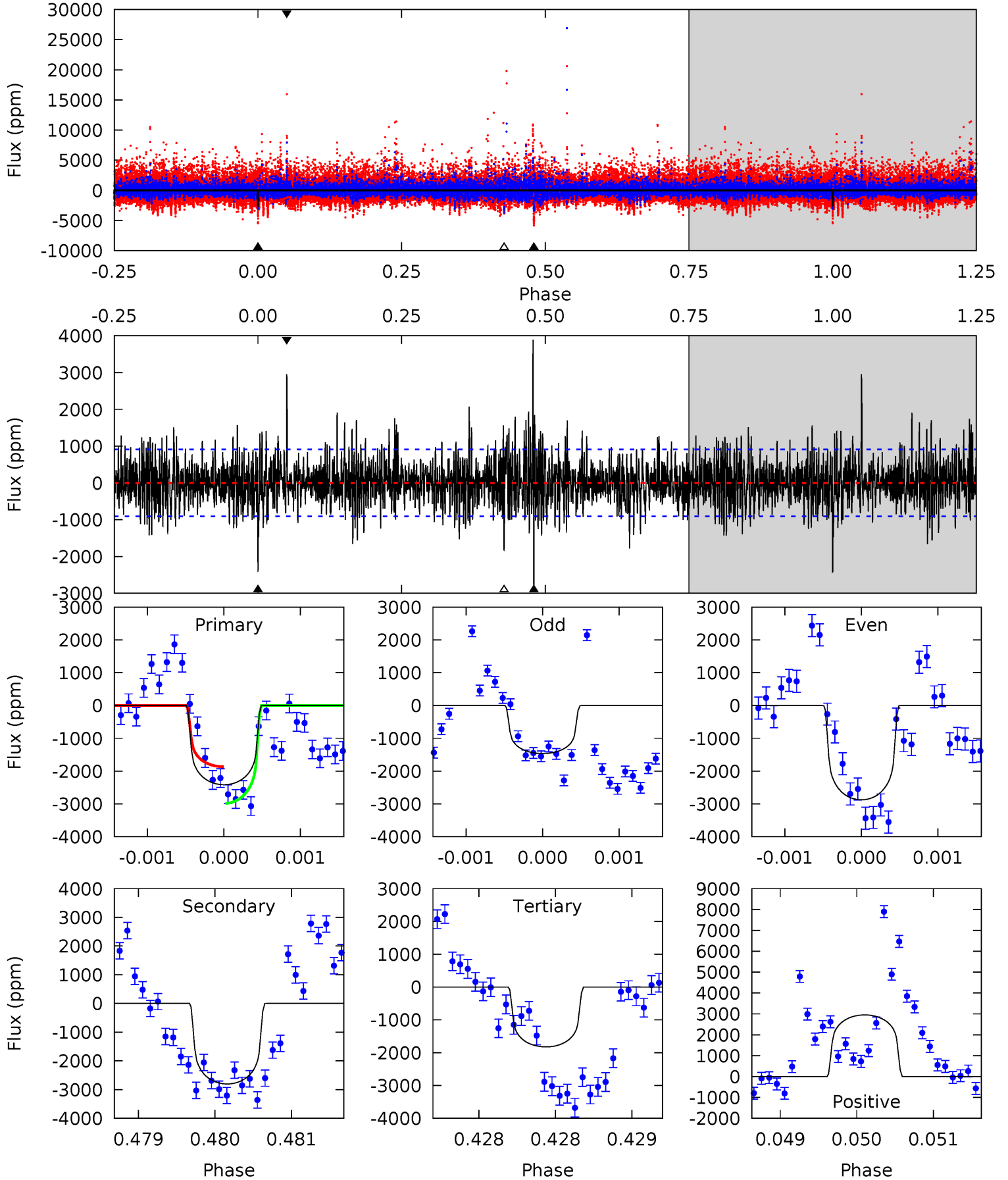
TCE 009407581-06 P=549.676386 Days $T_0=360.717118$ (BKJD)



DV Model-Shift Uniqueness Test

009407581-06, P = 549.668579 Days, E = 360.735504 Days

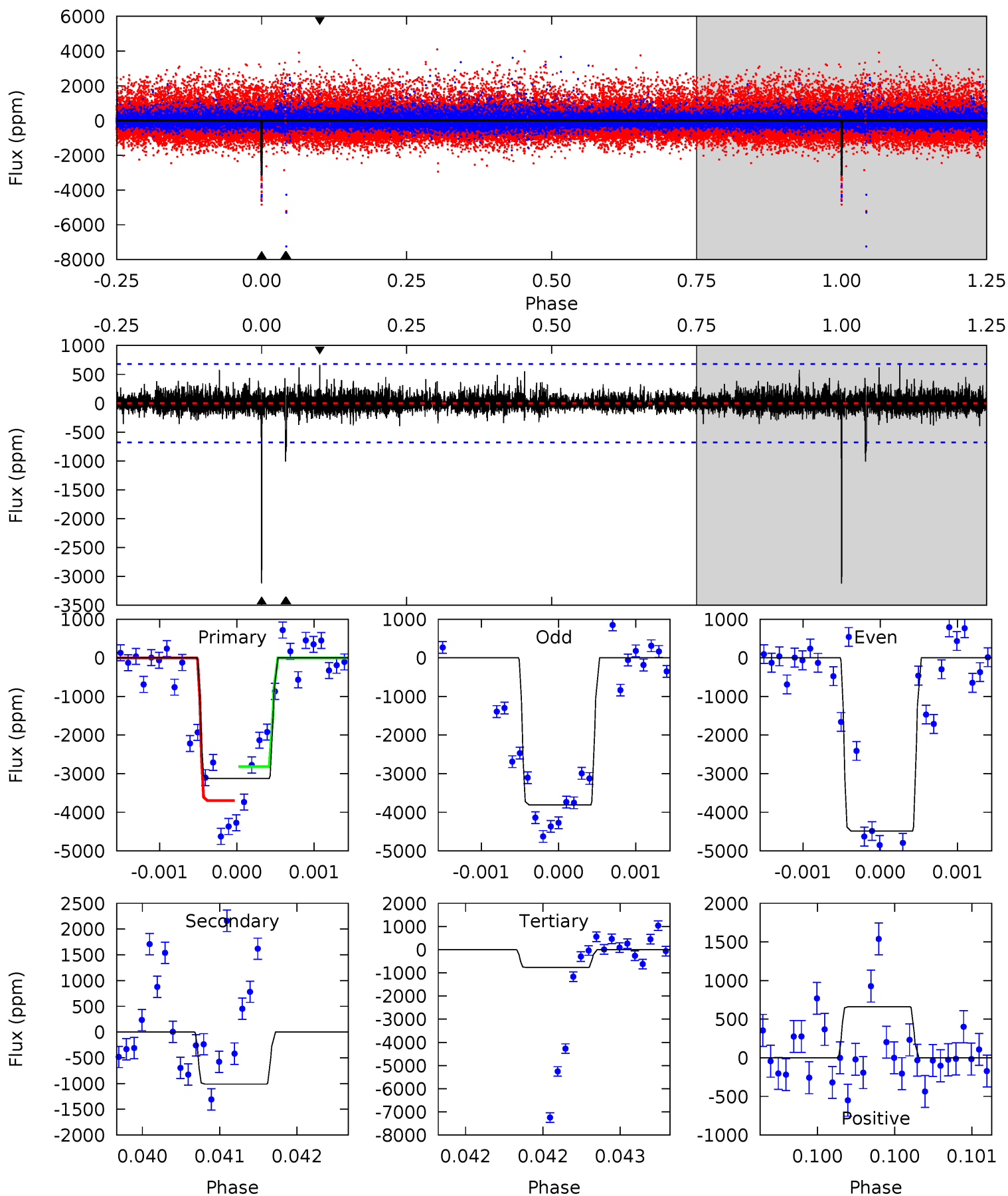
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
14.6	16.9	11.0	17.8	5.49	3.35	3.17	3.57	-3.23	5.92	-0.89	2.62	1.35	0.58	3.37



Alt Model-Shift Uniqueness Test

009407581-06, P = 549.676386 Days, E = 360.717118 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
25.3	8.17	6.21	5.36	5.50	3.37	0.79	19.1	19.9	1.96	2.81	3.49	1.14	0.17	0



Stellar Parameters For KIC 009407581

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	3569^{+57}_{-64}	$4.877^{+0.049}_{-0.036}$	$-0.200^{+0.100}_{-0.100}$	$0.378^{+0.035}_{-0.044}$	$0.395^{+0.042}_{-0.052}$	$10.290^{+2.639}_{-1.753}$
	+2%/-2%	+1%/-1%	+50%/-50%	+9%/-12%	+11%/-13%	+26%/-17%
Source	PHO2	PHO2	PHO2	DSEP		

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

Secondary Eclipse Parameters for KIC 009407581-06 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	A_{obs}
DV	-2805 ± 166	$2.03^{+0.72}_{-0.66}$	137^{+3}_{-4}	3630^{+535}_{-310}	$343038^{+409254}_{-148786}$
Alt.	-1010 ± 124	$2.55^{+0.71}_{-0.65}$	137^{+3}_{-4}	2907^{+265}_{-183}	77290^{+66215}_{-29267}

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

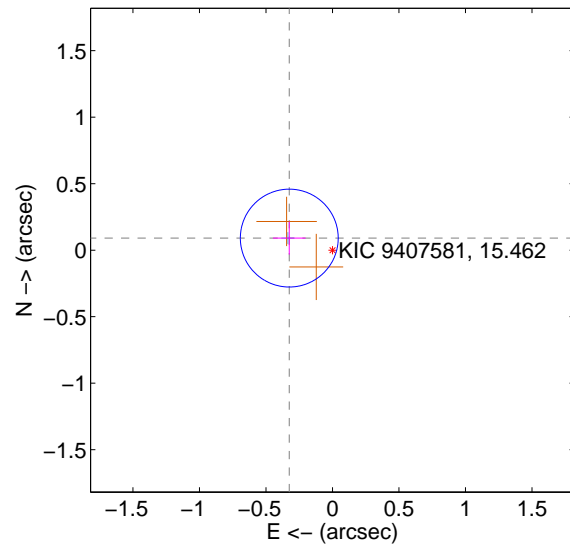
Supplemental centroid analysis for 009407581-06. Kepler magnitude: 15.46. Transit SNR 9.17

There are 1 quarters with good PRF difference image offsets

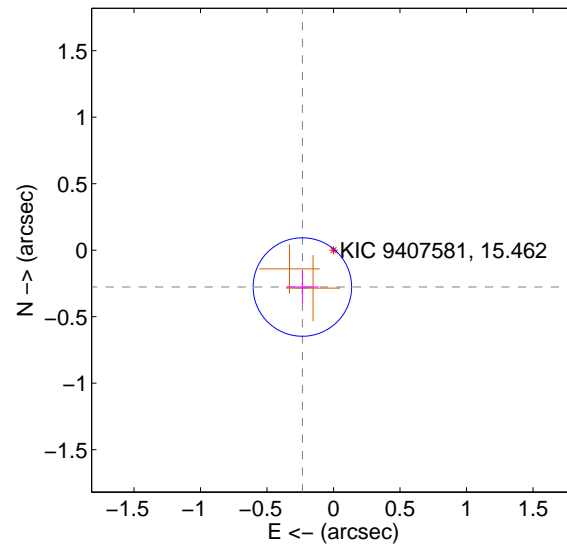
The direct PRF centroid is offset from the target star catalog position by about 0.36 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.337 ± 0.123	2.75	0.325 ± 0.123	0.091 ± 0.124
PRF-fit source offset from KIC position	0.363 ± 0.123	2.94	0.234 ± 0.123	-0.277 ± 0.124
photometric centroid source offset	0.17 ± 0.45	0.38	0.11 ± 0.53	0.13 ± 0.39

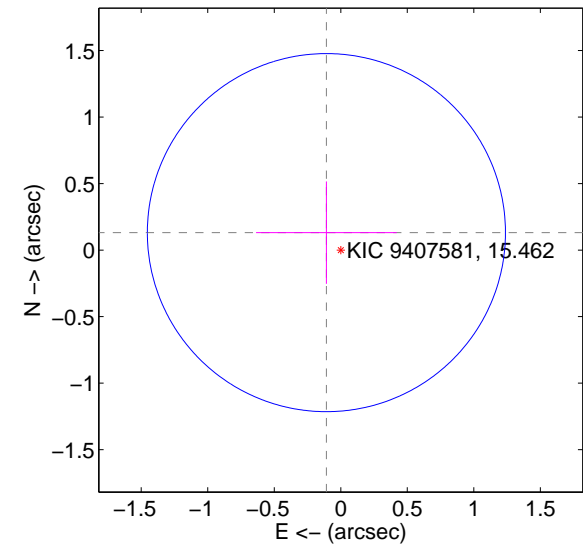
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

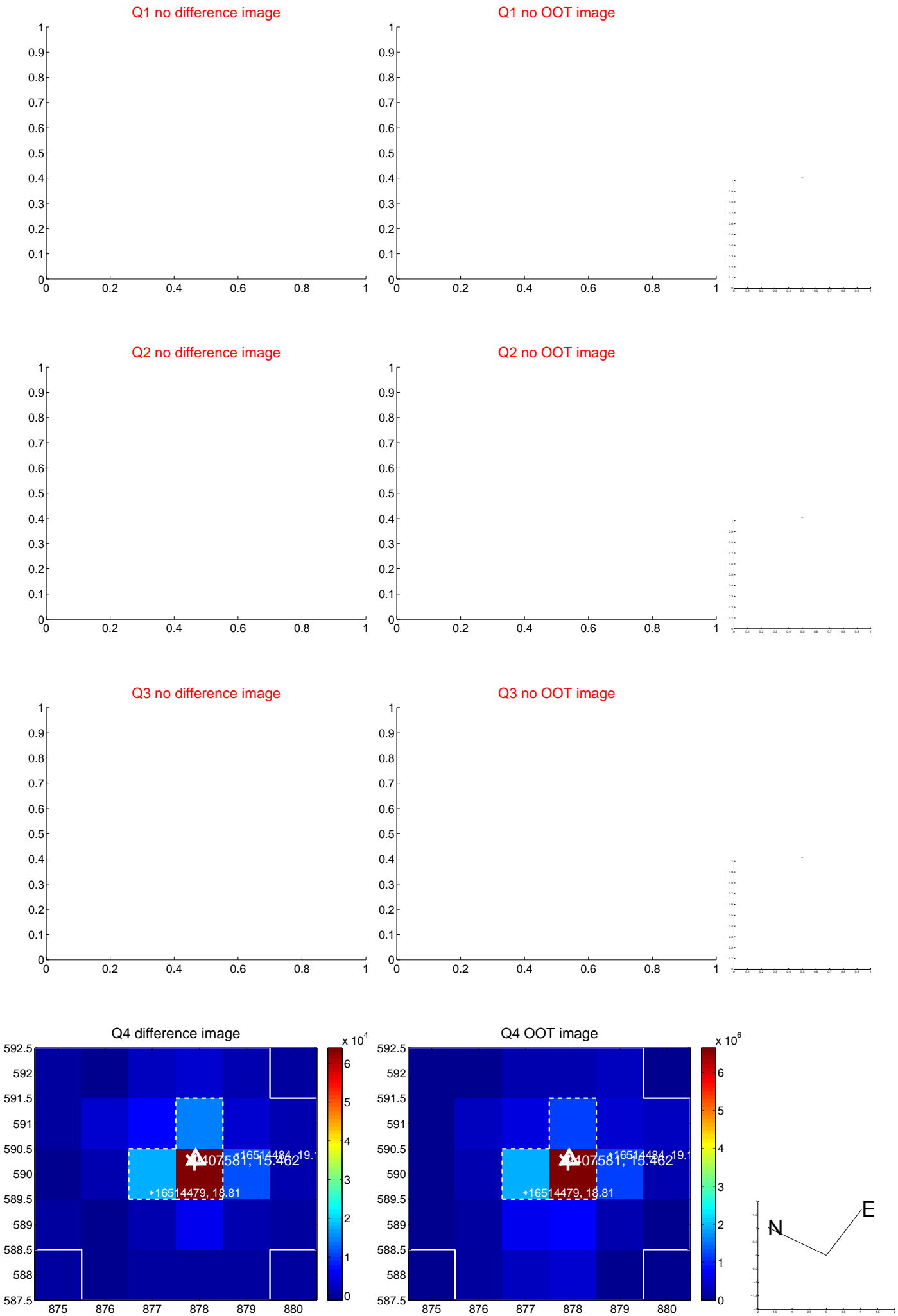


offset from photometric centroids



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.

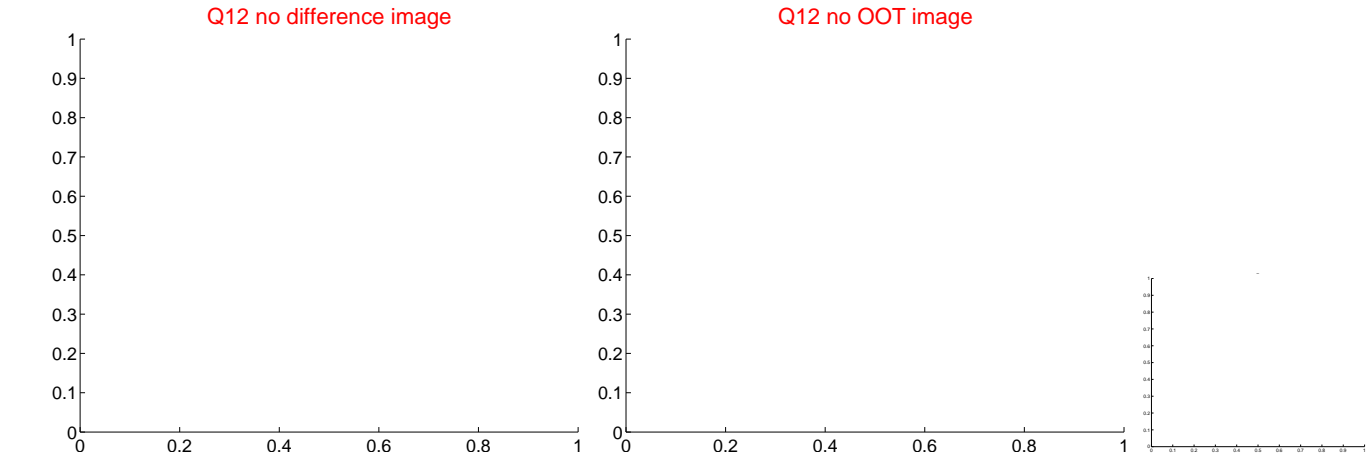
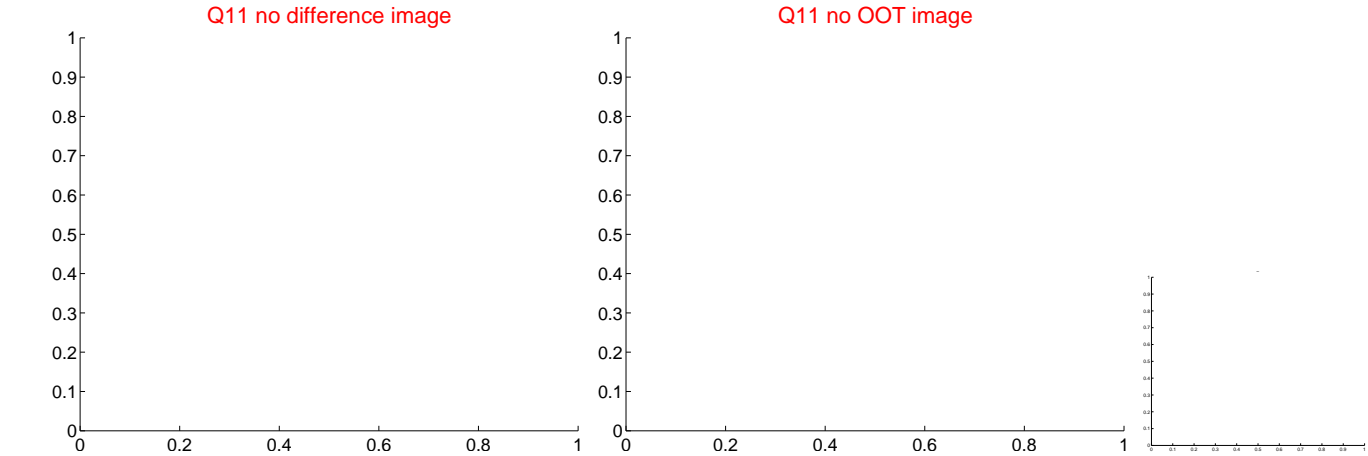
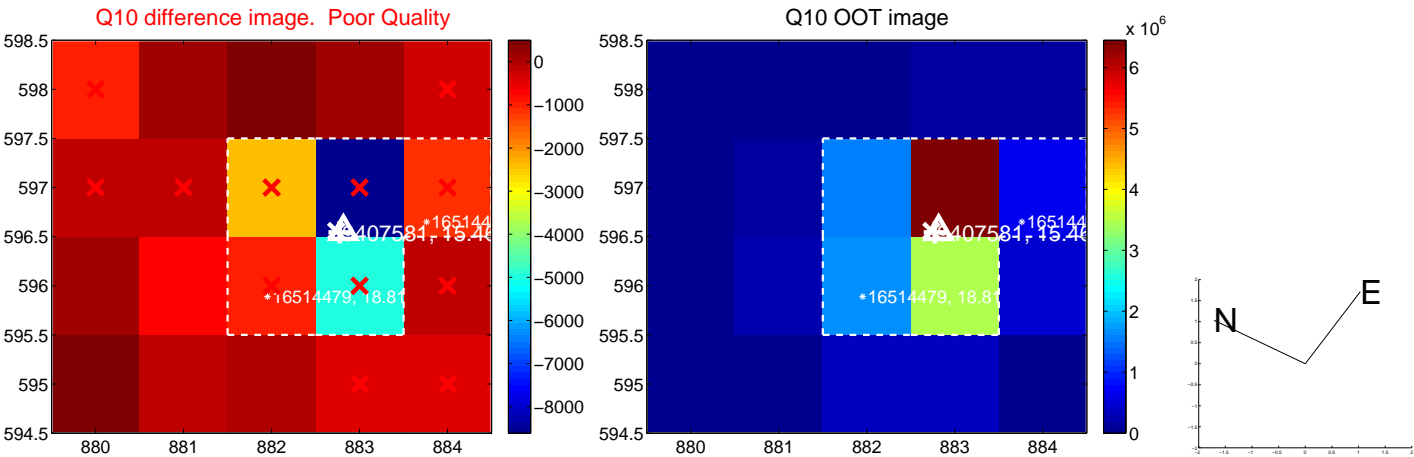
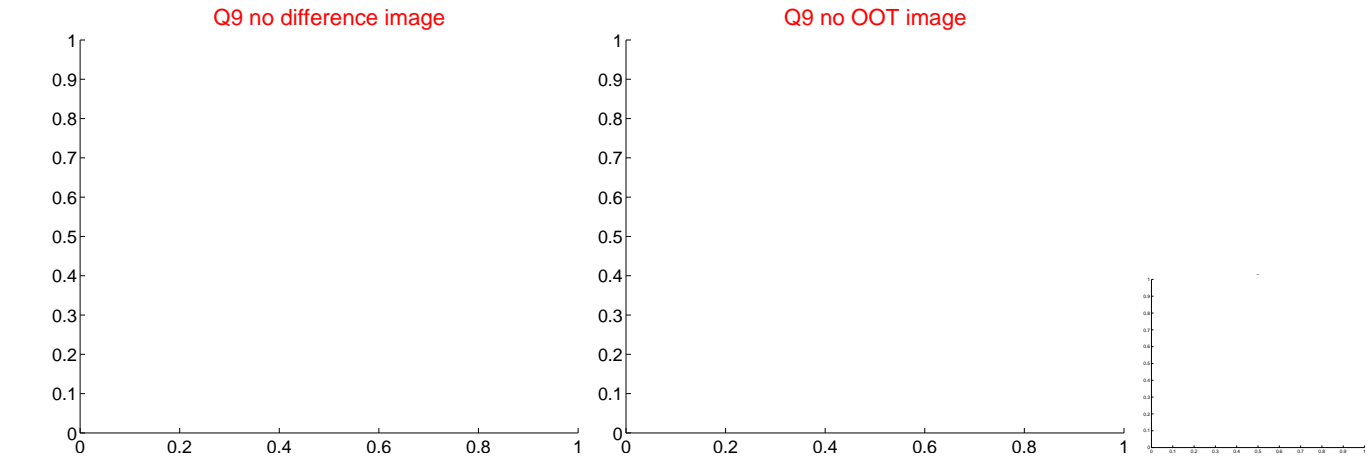
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



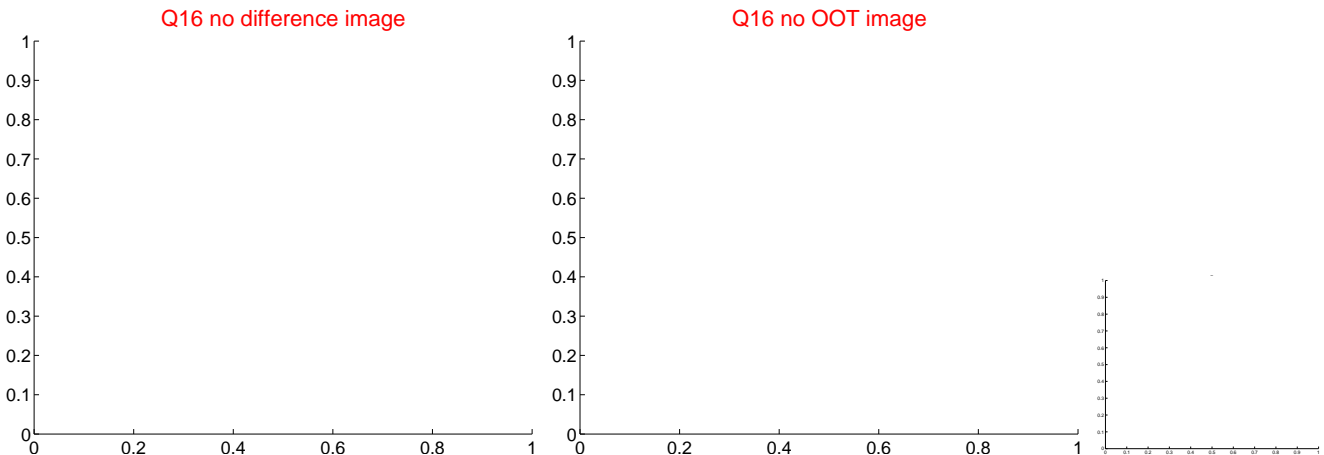
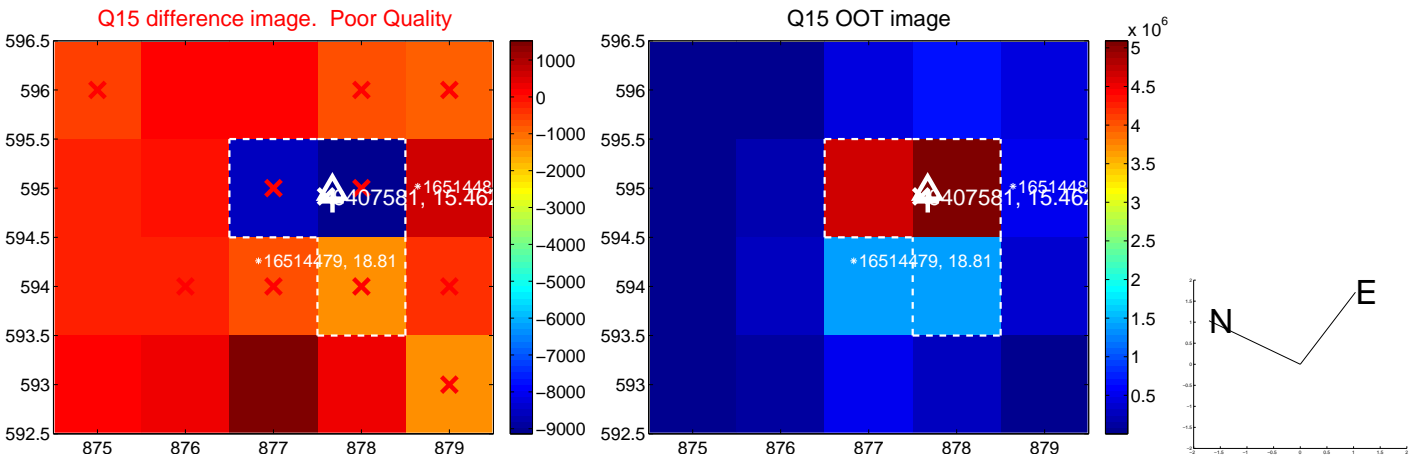
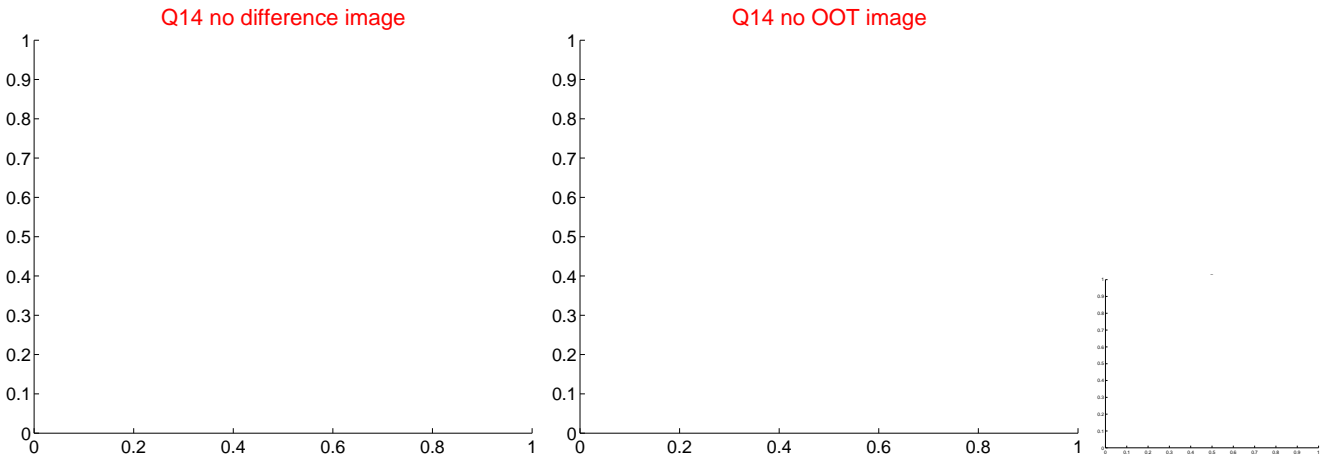
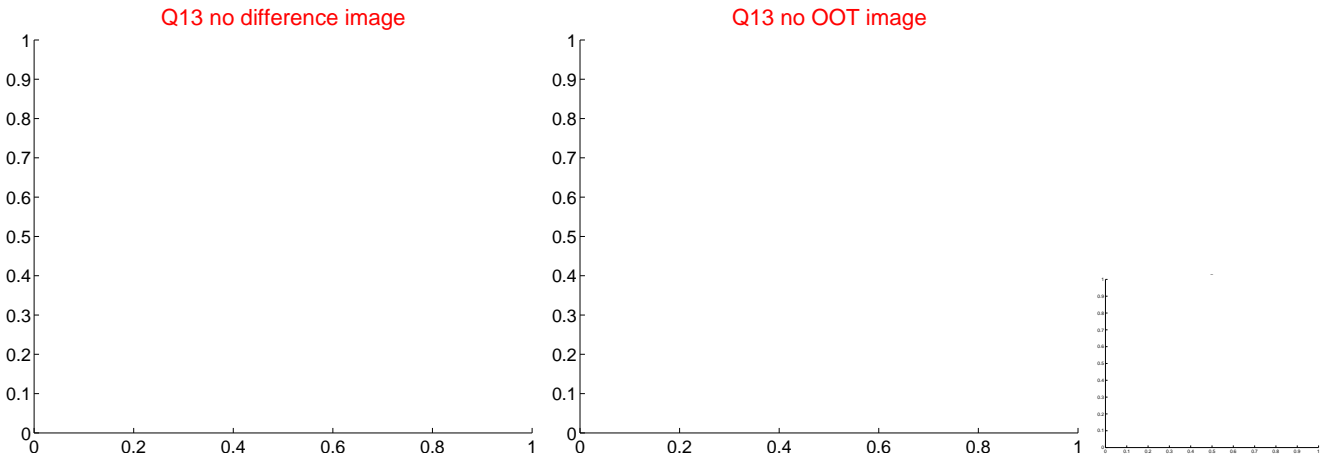
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



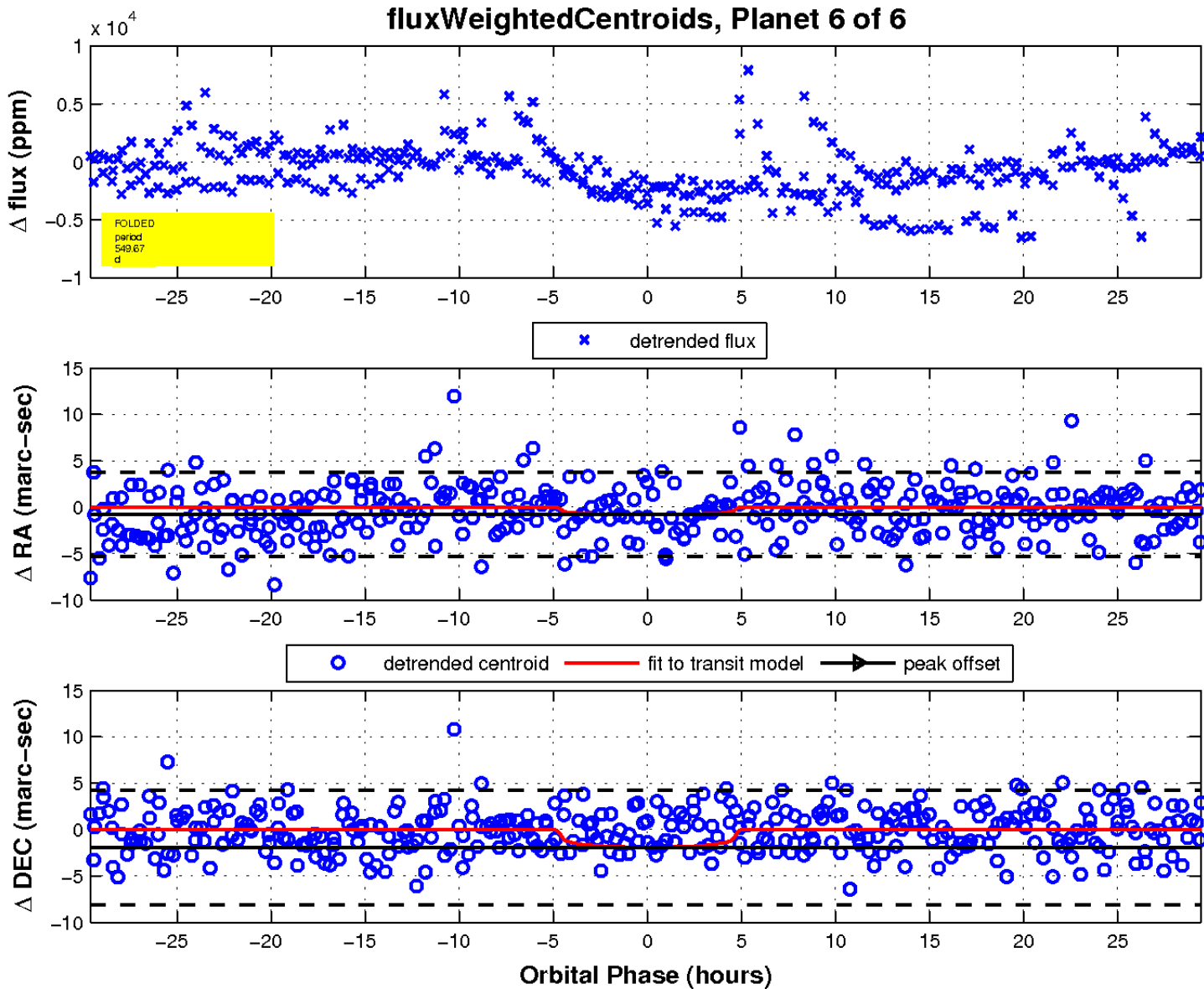
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value



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

Q17 no difference image

Q17 no OOT image



UKIRT Image

Declination

