

KIC 012109421

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})
012109421-01	OBS	No	0.577819	131.901468	14.1	3.752	11.6	8.9	3.36	6050	1.30	55018.13
012109421-02	OBS	No	42.187454	154.722827	319.7	1.599	8.4	9.6	3.36	6050	7.09	180.29

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
012109421-01	OBS	FP	0.00	1	0	0	1	LPP_DV—EPHEM_MATCH
012109421-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—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.

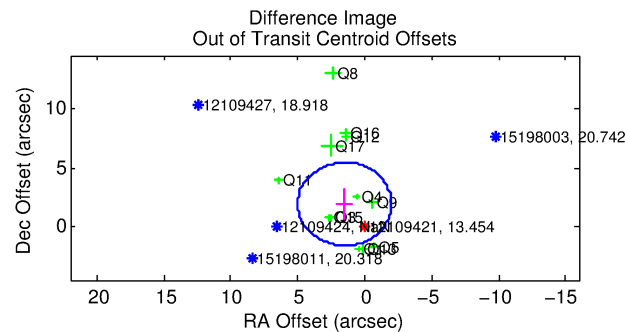
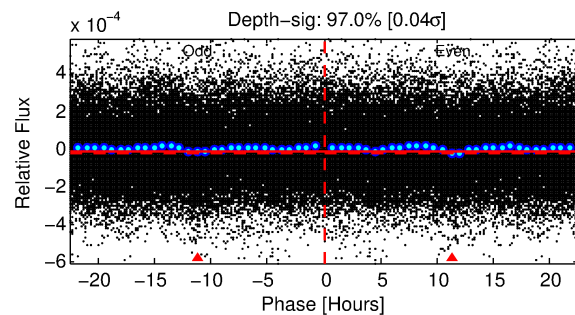
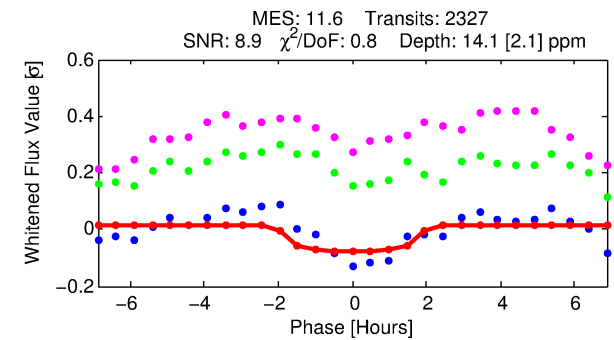
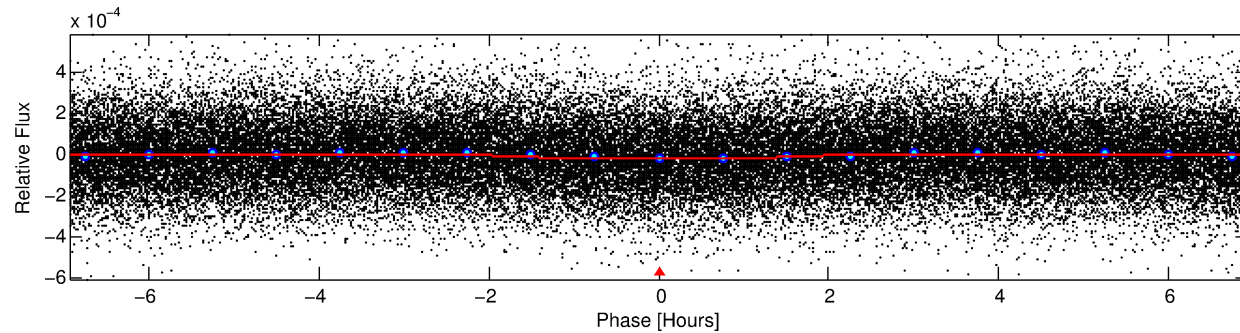
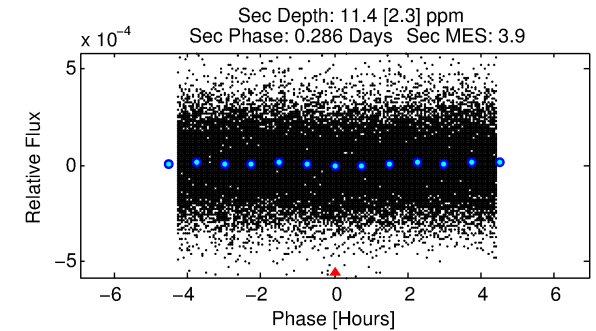
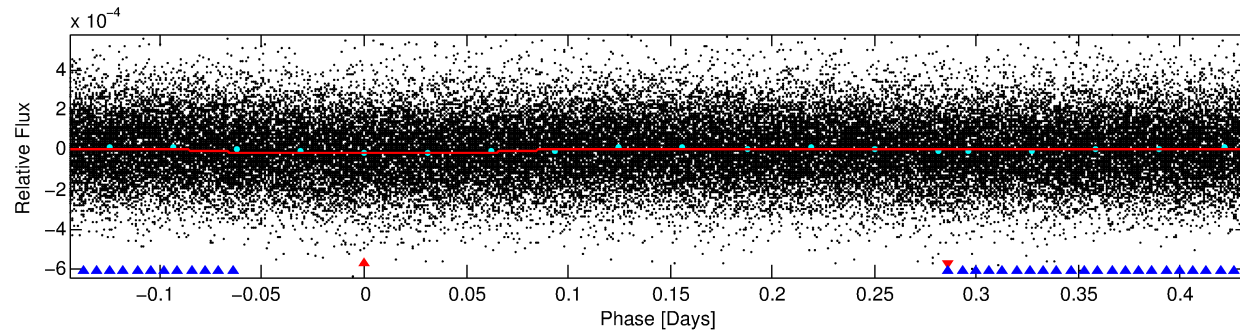
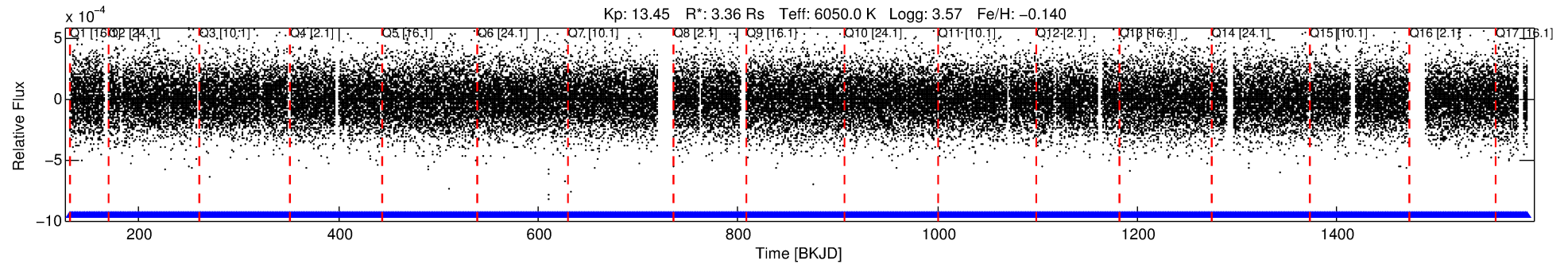
Ephemeris Match Information For 012109421-01

TCE (1)	KIC	Parent (2)	Parent KIC	$P_1:P_2$	Dist ($''$)	ΔRow	ΔCol	m_2	m_1	D_2/D_1	Mechanism	Flag	σ_P	σ_T
012109421-01	12109421	7514.01	12157983	1:1	76.8	-5	18	13.77	13.46	46.79	Direct-PRF	1	4.95	1.90

Notes: $P_1:P_2$ is the period ratio. Dist is the distance in arcseconds. ΔRow and ΔCol are the number of pixels apart in row and column. m_2 and m_1 are the magnitudes of the parent and child. D_2/D_1 is the parent's transit depth divided by the child's. σ_P and σ_T are the significance of the match in period and epoch. For a match to be considered significant $\sigma_P < 5.0$ and $\sigma_T < 5.0$. Matches which have σ_P and σ_T very close to this cutoff should receive extra scrutiny, especially if the period ratio is very large.

DV One-Page Summary

KIC: 12109421 Candidate: 1 of 2 Period: 0.578 d



DV Fit Results:

Period = 0.57782 [0.00001] d
Epoch = 131.9015 [0.0044] BKJD
Rp/R* = 0.0036 [0.0023]
a/R* = 1.25 [1.46]
b = 0.52 [4.49]
Seff = 55018.13 [34845.91]
Teq = 3905 [618] K
Rp = 1.30 [1.02] Re
a = 0.0157 [0.0062] AU
Ag = 0.91 [1.33] [-0.07σ]
Teffp = 5893 [1959] K [0.97σ]

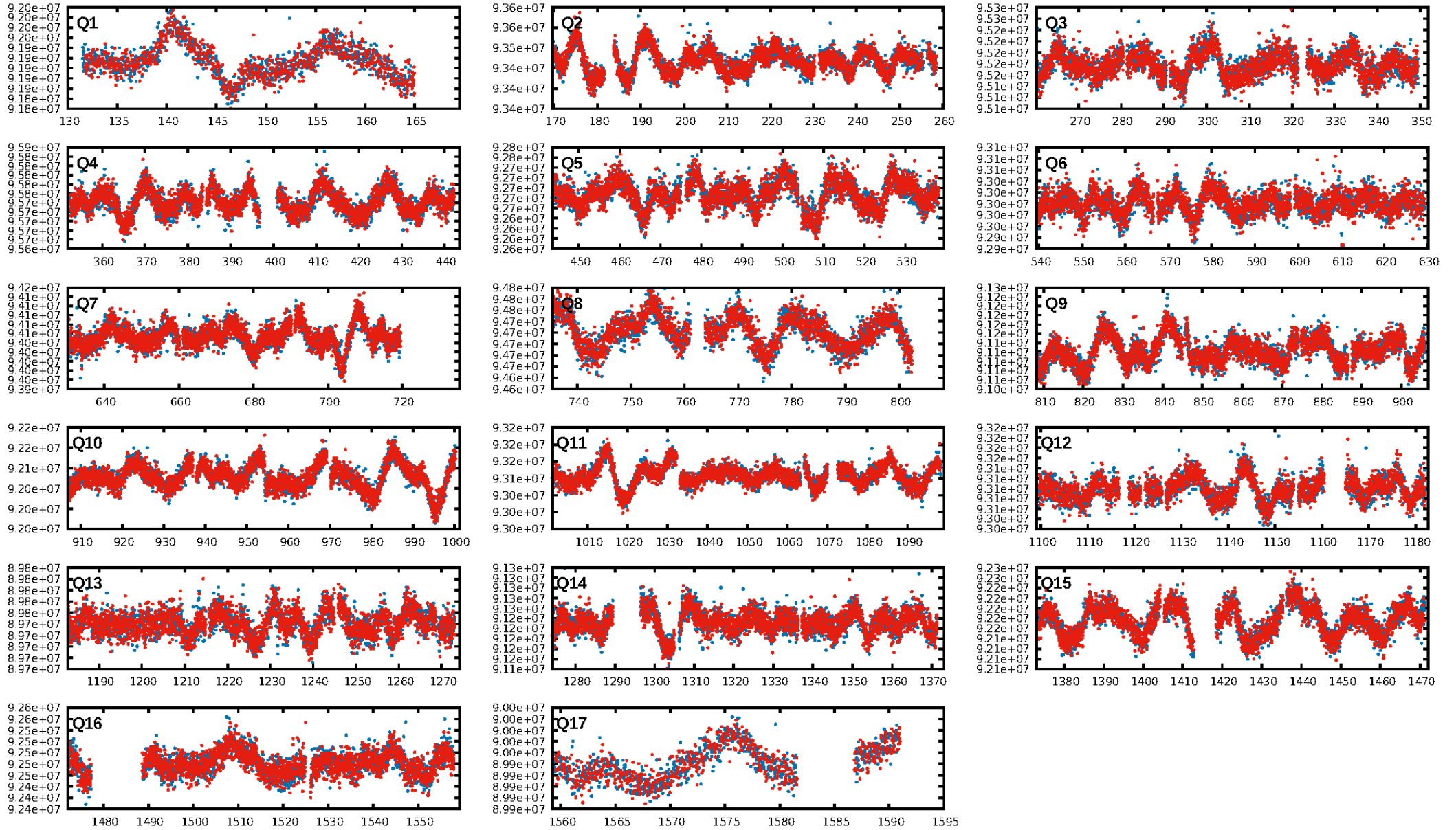
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 100.0% [244.87σ]
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: 1.19e-17
RollingBand-fgt: 1.00 [2222/2222]
GhostDiagnostic-chr: 0.3801
Centroid-sig: 5.2%
Centroid-so: 2.485 arcsec [2.02σ]
OotOffset-rm: 2.448 arcsec [2.09σ]
KicOffset-rm: 2.430 arcsec [2.09σ]
OotOffset-st: 0/3/4/5 [12]
KicOffset-st: 0/3/4/5 [12]
DiffImageQuality-fgm: 0.08 [1/12]
DiffImageOverlap-fno: 1.00 [17/17]

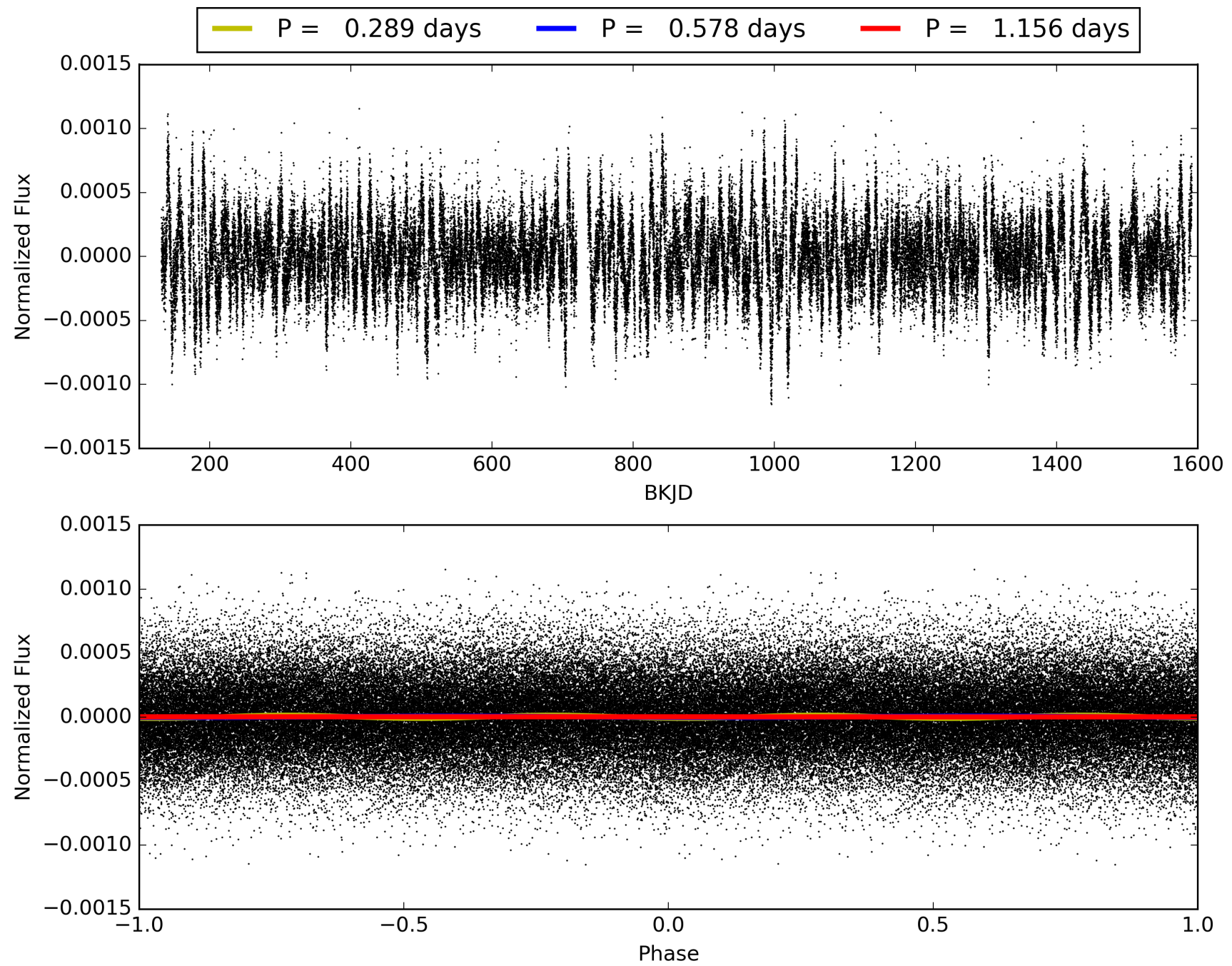
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 06:57:36 Z

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

TCE 012109421-01, PDC Light Curves

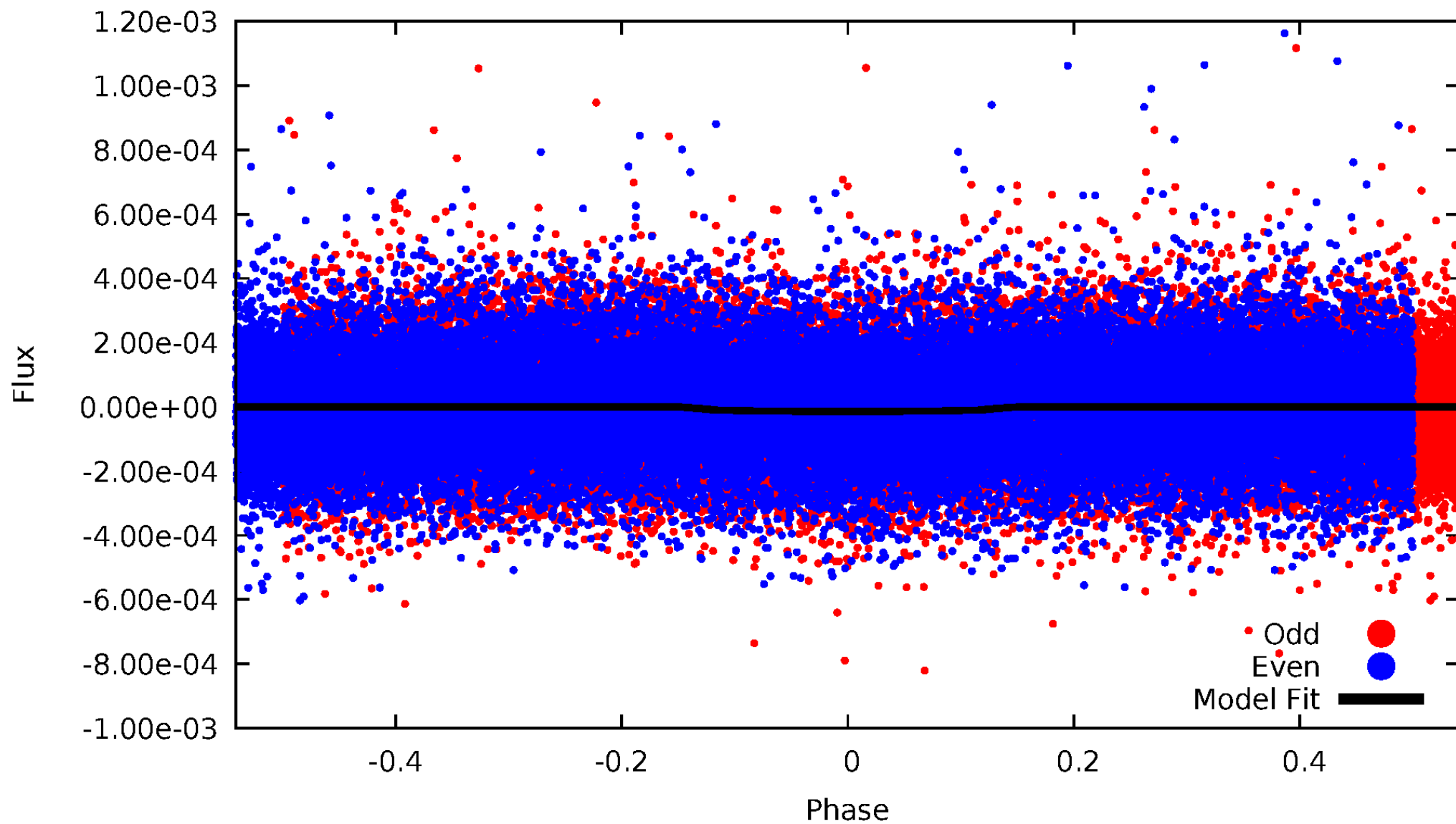


TCE 012109421-01



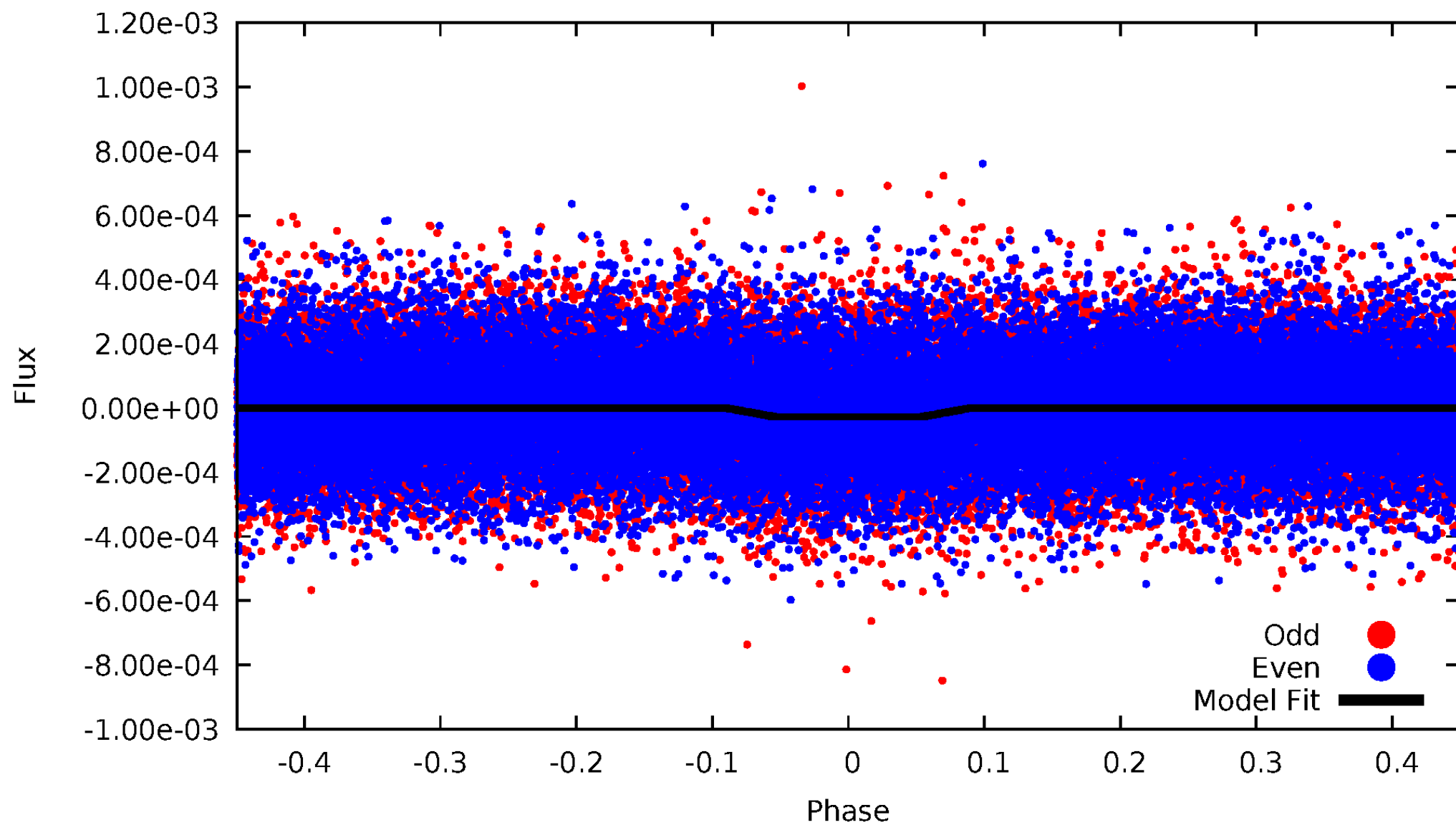
DV Odd/Even

TCE 012109421-01



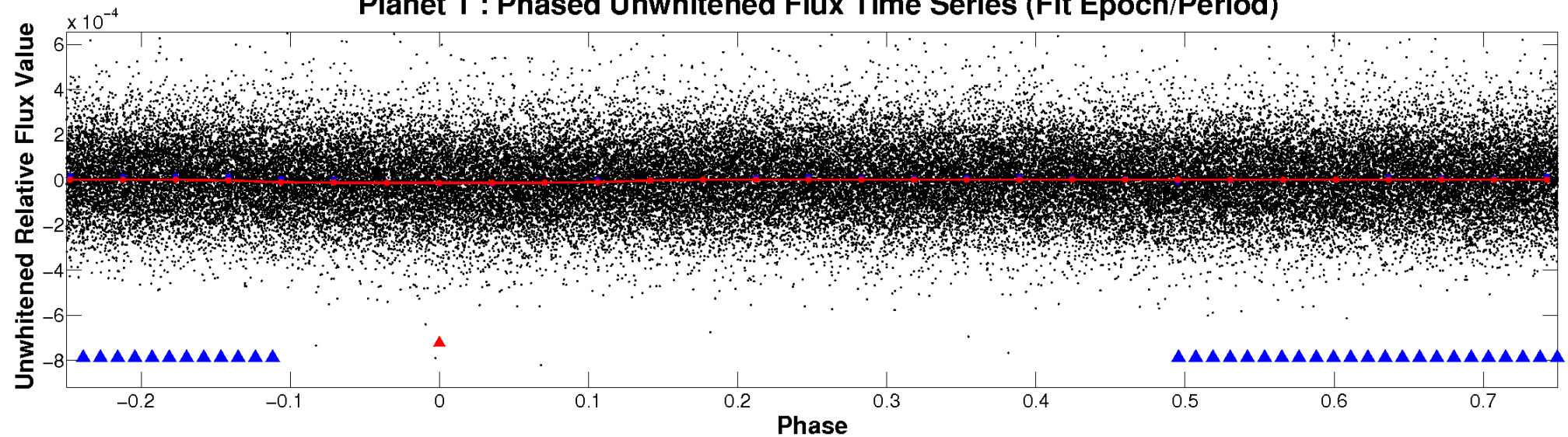
ALT Odd/Even

TCE 012109421-01

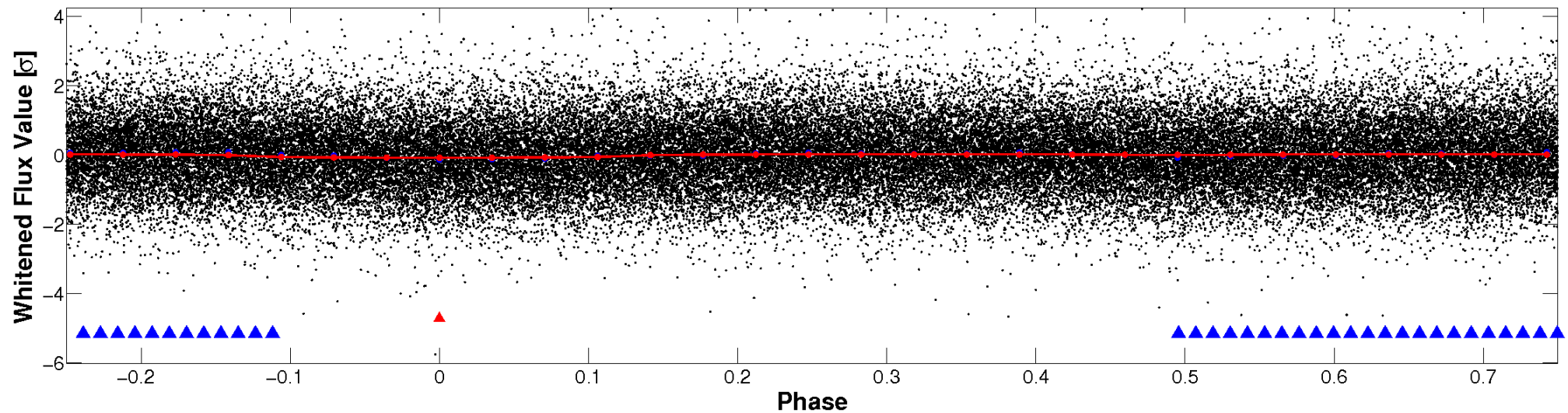


Non-Whitened Vs. Whitened Light Curve

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

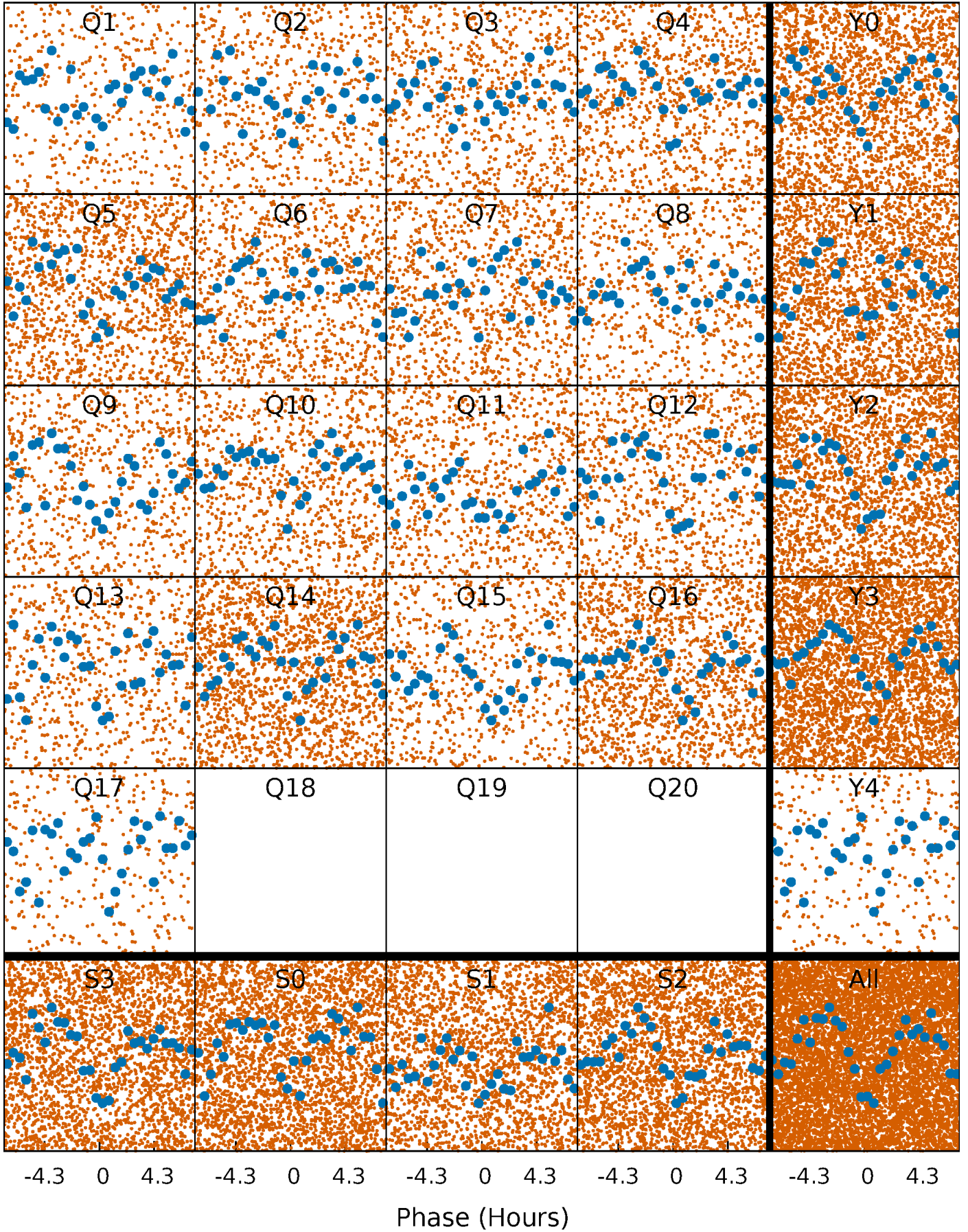


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



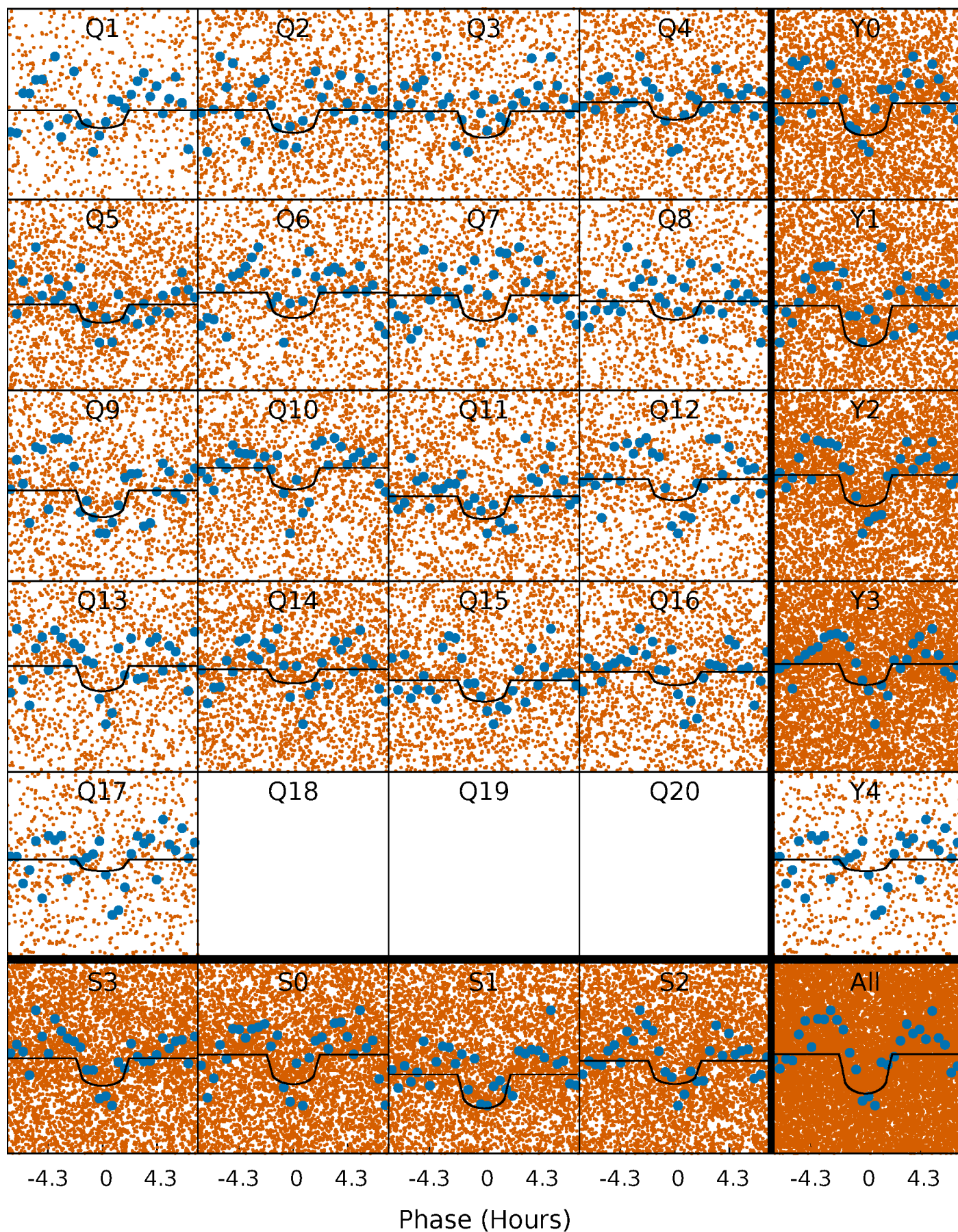
PDC Quarter-Phased Transit Curves

TCE 012109421-01 P= 0.577819 Days $T_0=131.901468$ (BKJD)



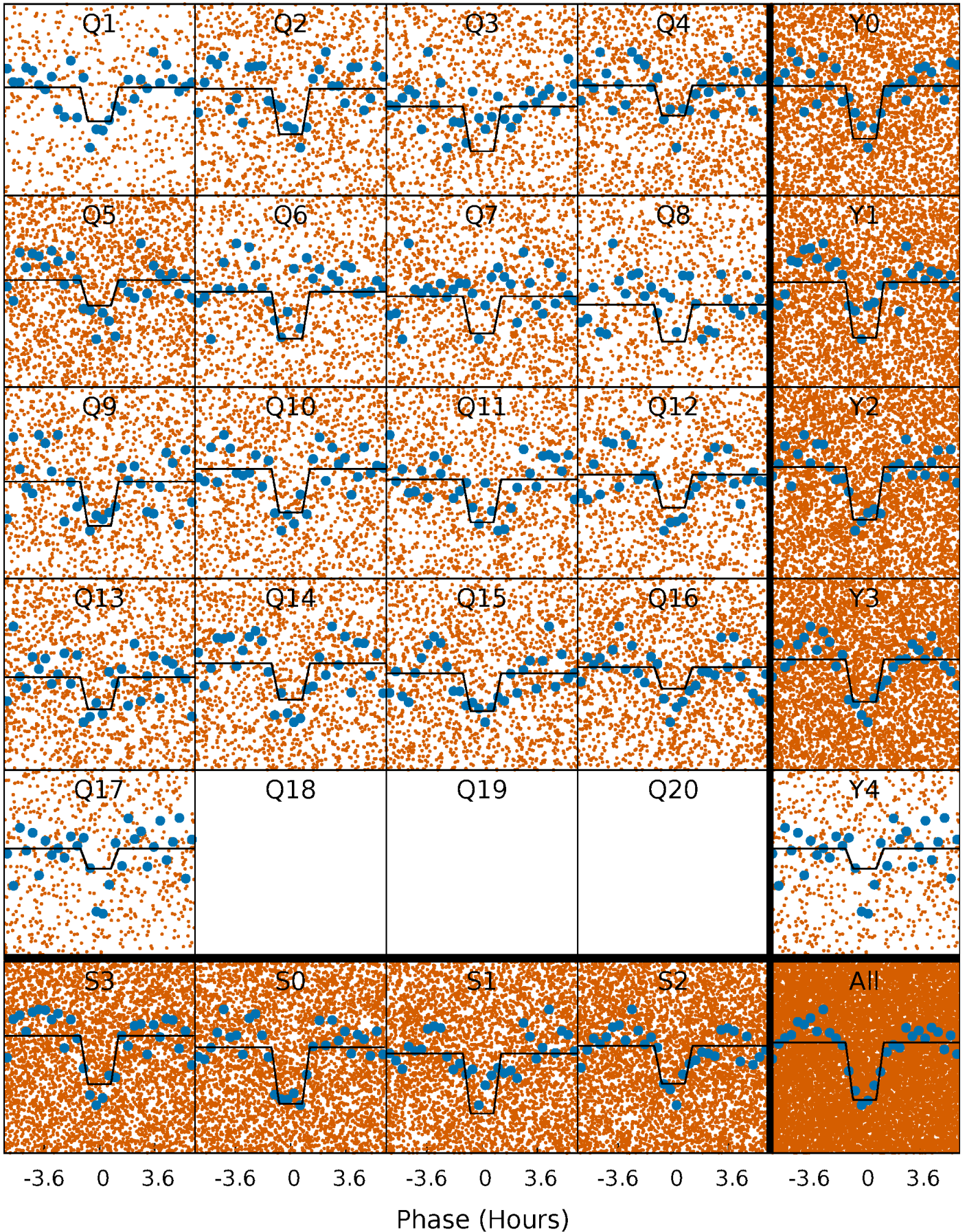
DV Quarter-Phased Transit Curves

TCE 012109421-01 P= 0.577819 Days $T_0=131.901468$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

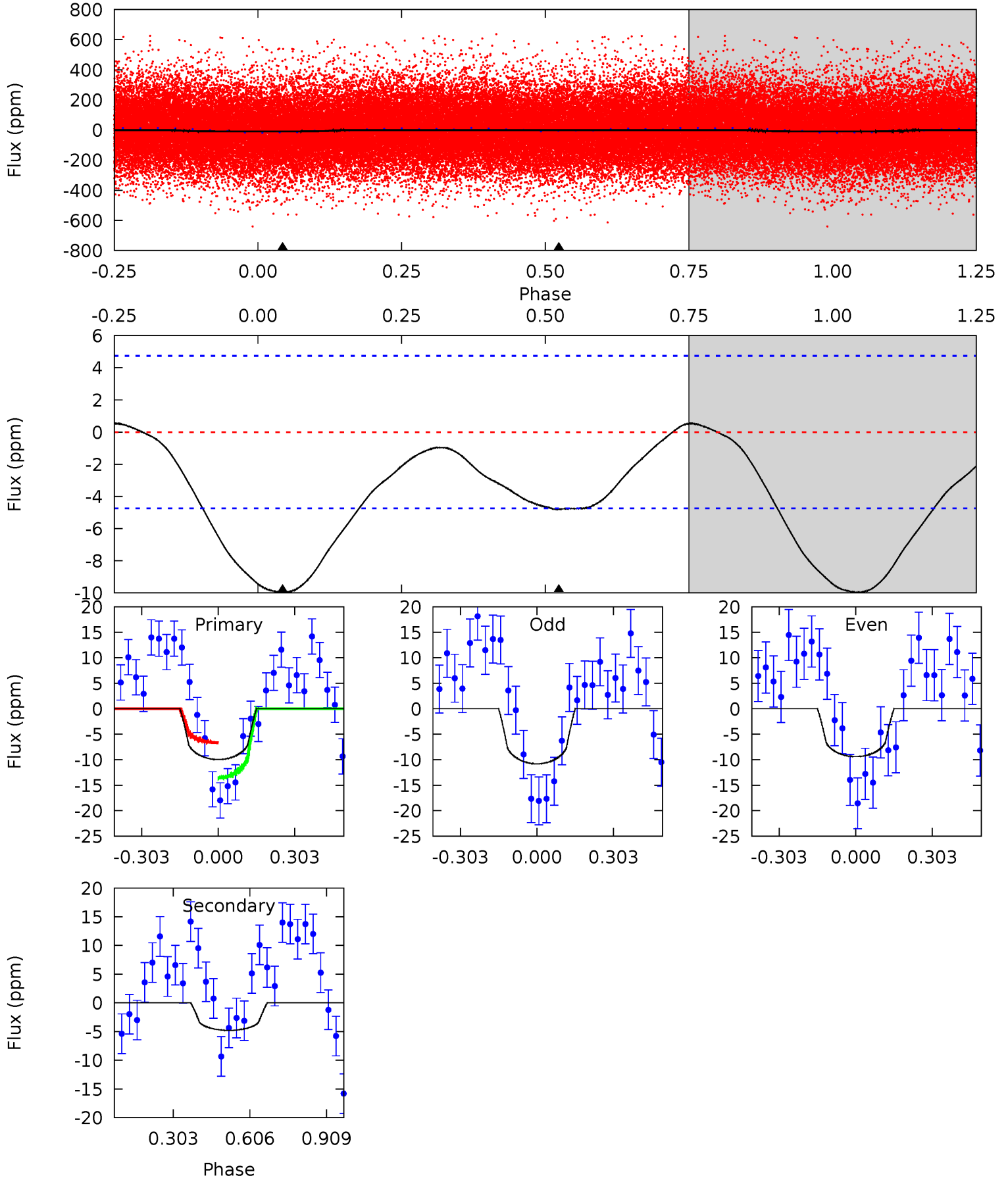
TCE 012109421-01 P= 0.577844 Days $T_0=131.880381$ (BKJD)



DV Model-Shift Uniqueness Test

012109421-01, P = 0.577819 Days, E = 131.323649 Days

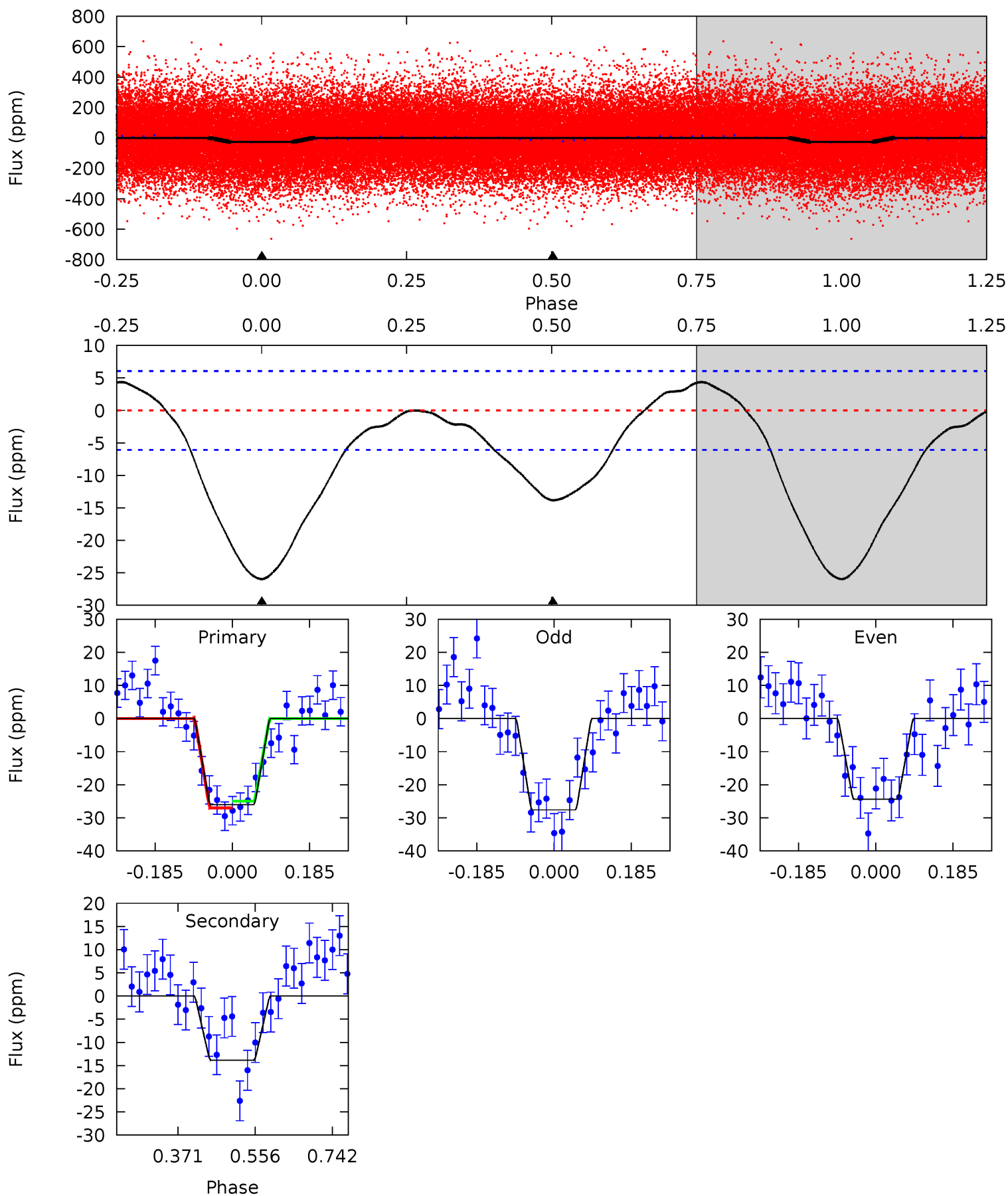
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.11	4.39	0	0	4.33	1.03	0.68	9.11	9.11	4.39	4.39	0.64	1.00	0.05	0



Alt Model-Shift Uniqueness Test

012109421-01, P = 0.577844 Days, E = 131.302537 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
19.0	10.1	0	0	4.43	1.32	1.70	19.0	19.0	10.1	10.1	1.17	1.02	0.14	0.75



Stellar Parameters For KIC 012109421

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	$M(M_{\odot})$	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	6050^{+180}_{-162}	$3.574^{+0.360}_{-0.120}$	$-0.140^{+0.350}_{-0.300}$	$3.361^{+0.617}_{-1.440}$	$1.545^{+0.174}_{-0.406}$	$0.057^{+0.183}_{-0.020}$
	+3%/-3%	+10%/-3%	+250%/-214%	+18%/-43%	+11%/-26%	+319%/-35%
Source	PHO1	FLK73	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 012109421-01 / KOI

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-5 ± 1	$1.24^{+0.85}_{-0.68}$	5371^{+355}_{-538}	3720^{+2801}_{-7827}	$0.409^{+1.565}_{-0.272}$
Alt.	-14 ± 1	$1.71^{+0.94}_{-0.81}$	5381^{+366}_{-544}	4597^{+2247}_{-7765}	$0.642^{+1.539}_{-0.378}$

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

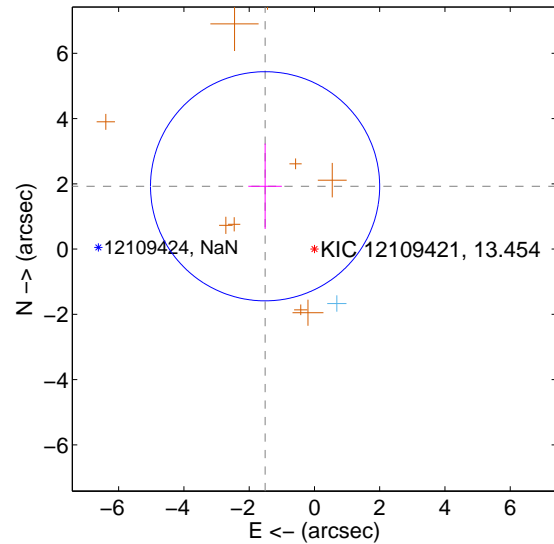
Supplemental centroid analysis for 012109421-01. Kepler magnitude: 13.45. Transit SNR 8.92

There are 1 quarters with good PRF difference image offsets

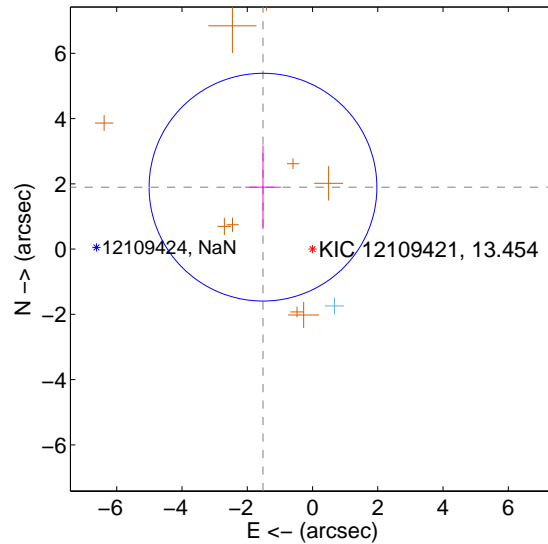
The direct PRF centroid is offset from the target star catalog position by about 0.06 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	2.448 ± 1.170	2.09	1.512 ± 0.515	1.925 ± 1.310
PRF-fit source offset from KIC position	2.430 ± 1.163	2.09	1.518 ± 0.549	1.898 ± 1.278
photometric centroid source offset	2.49 ± 1.23	2.02	2.40 ± 1.22	0.66 ± 1.40

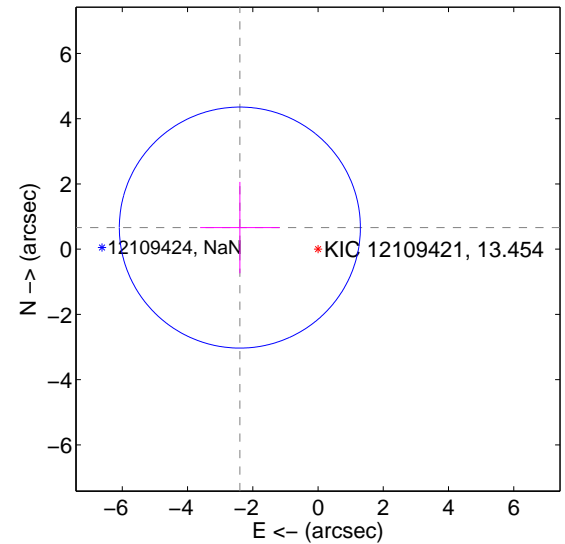
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

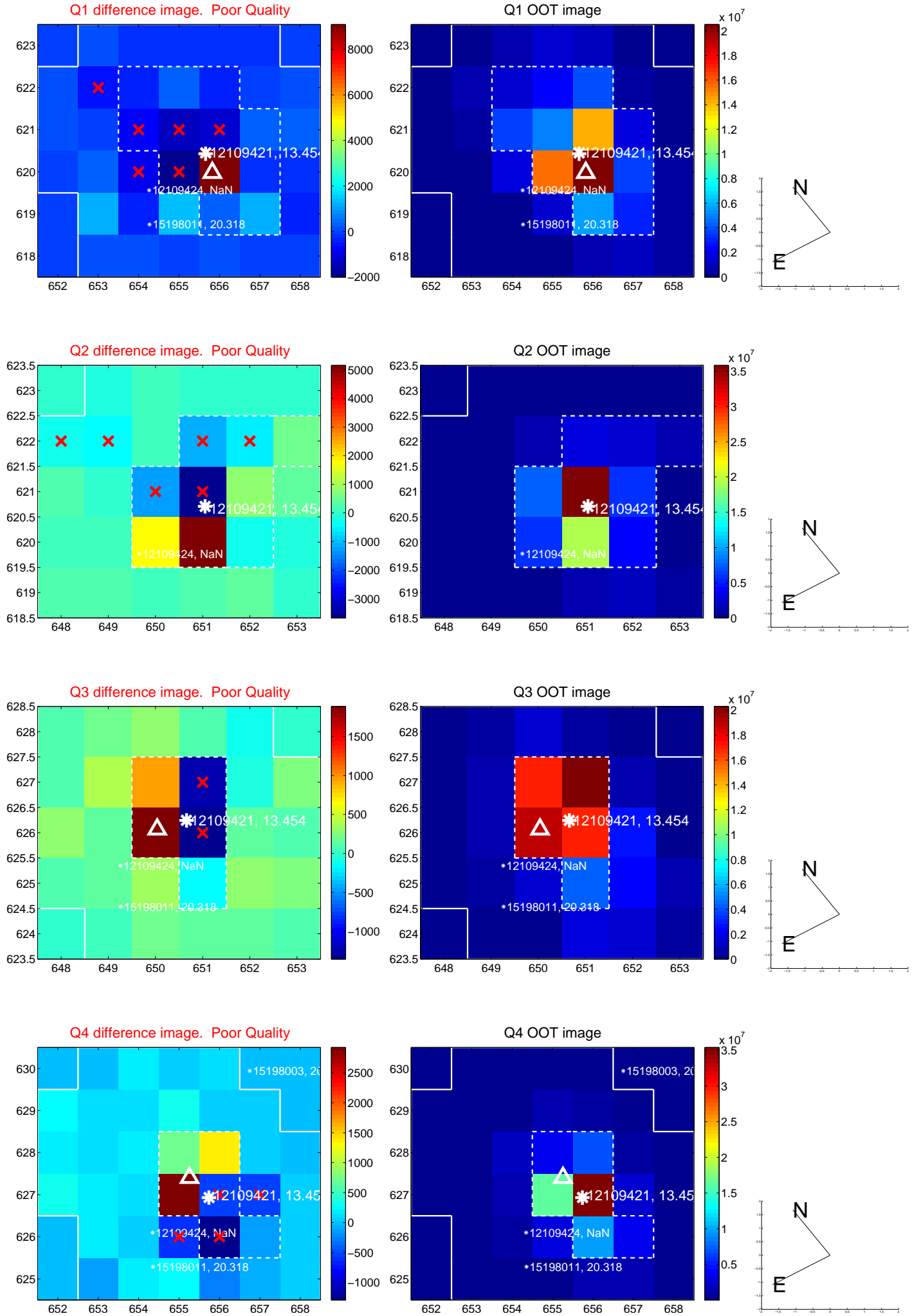


offset from photometric centroids

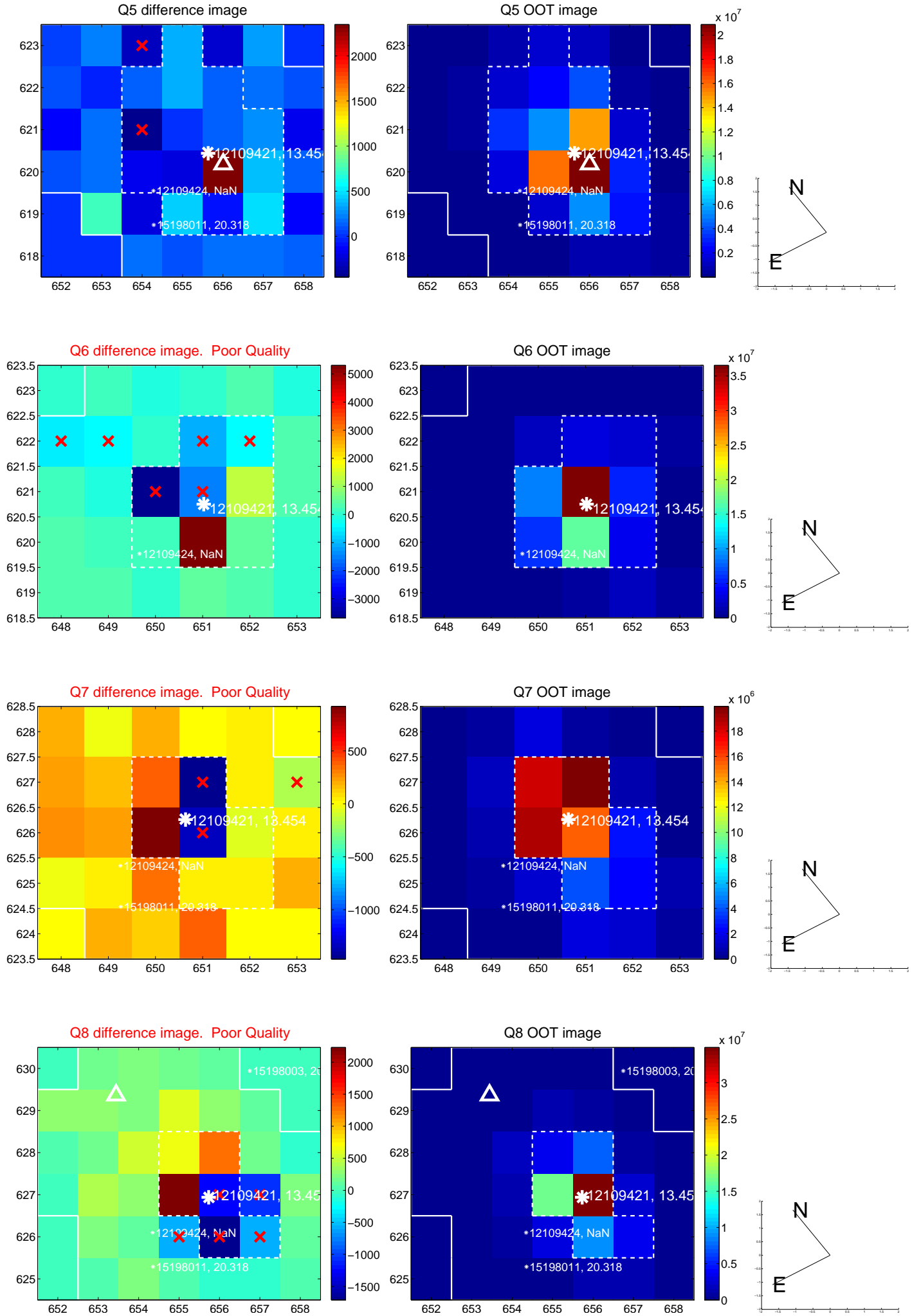


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

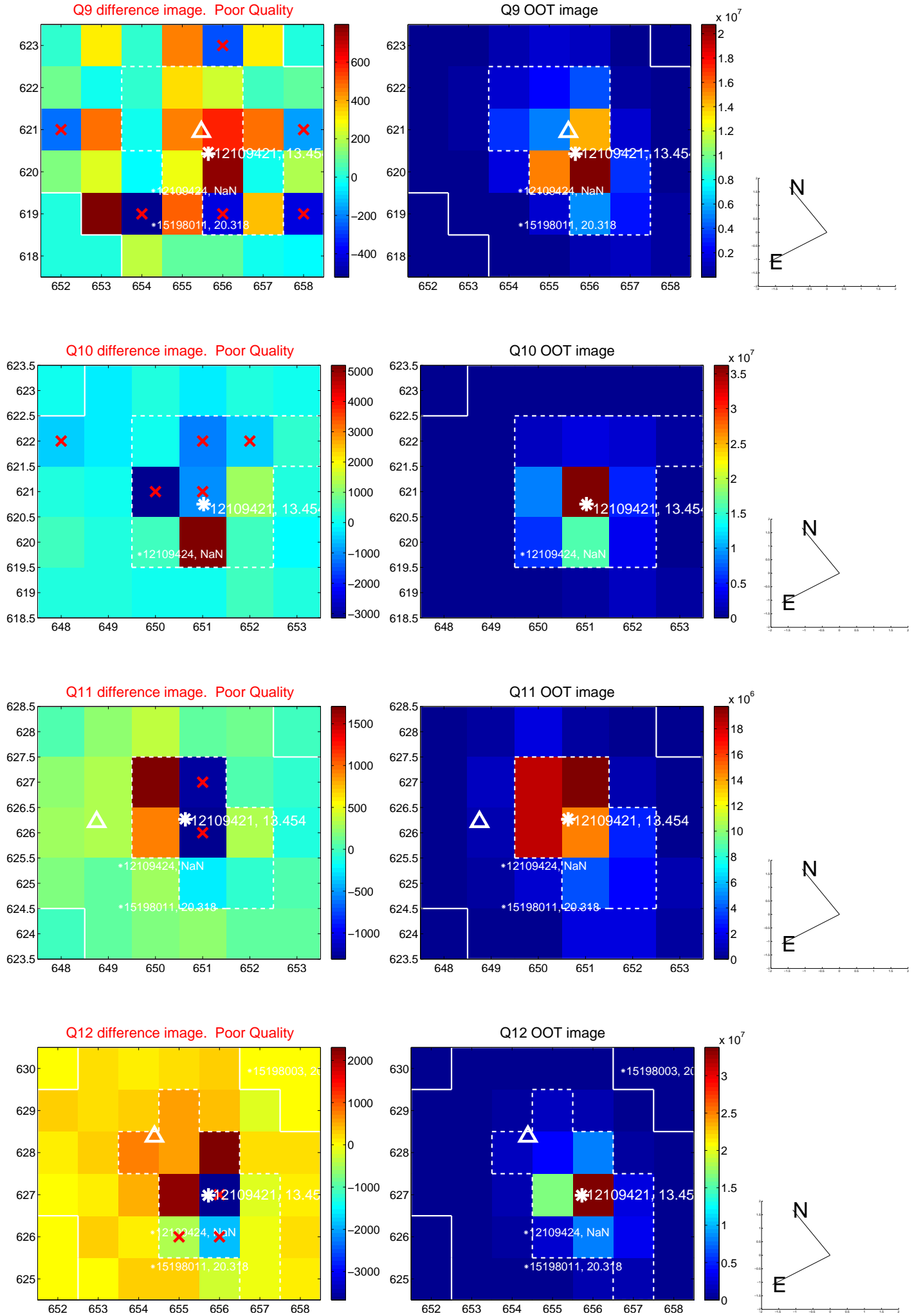
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



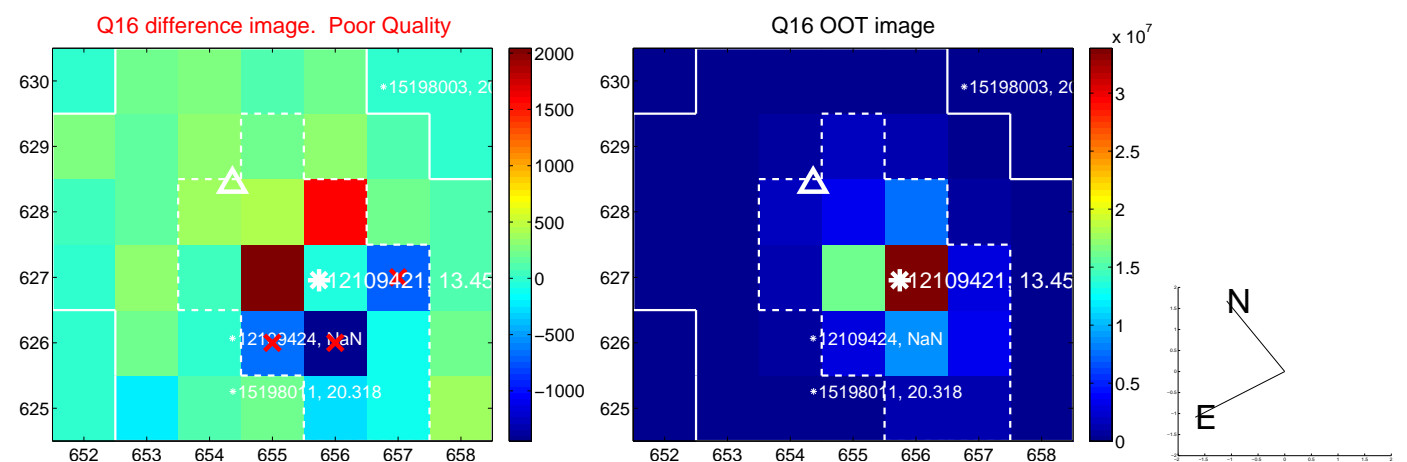
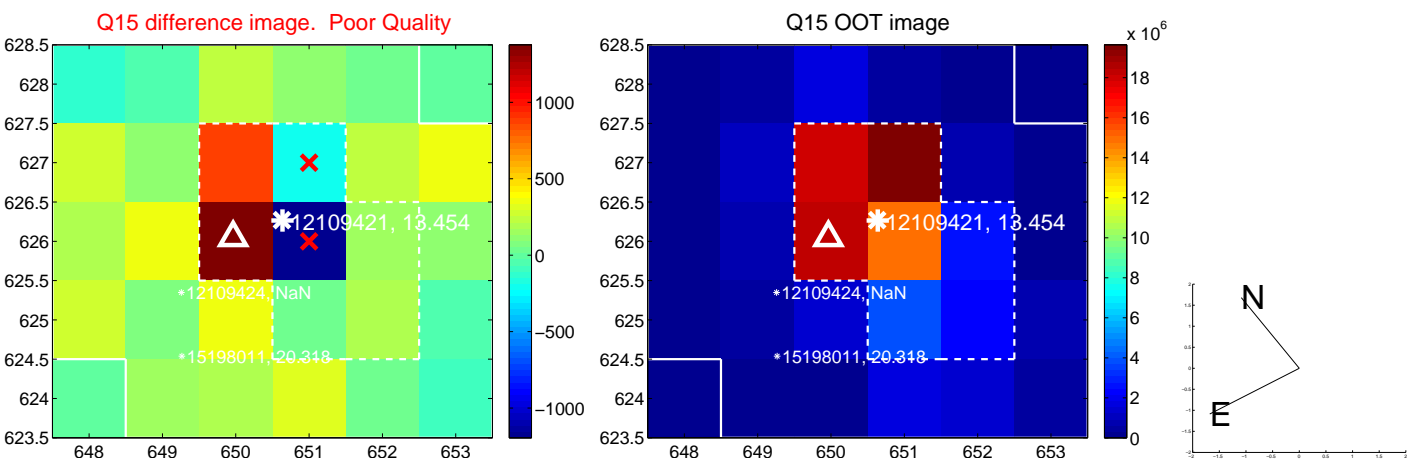
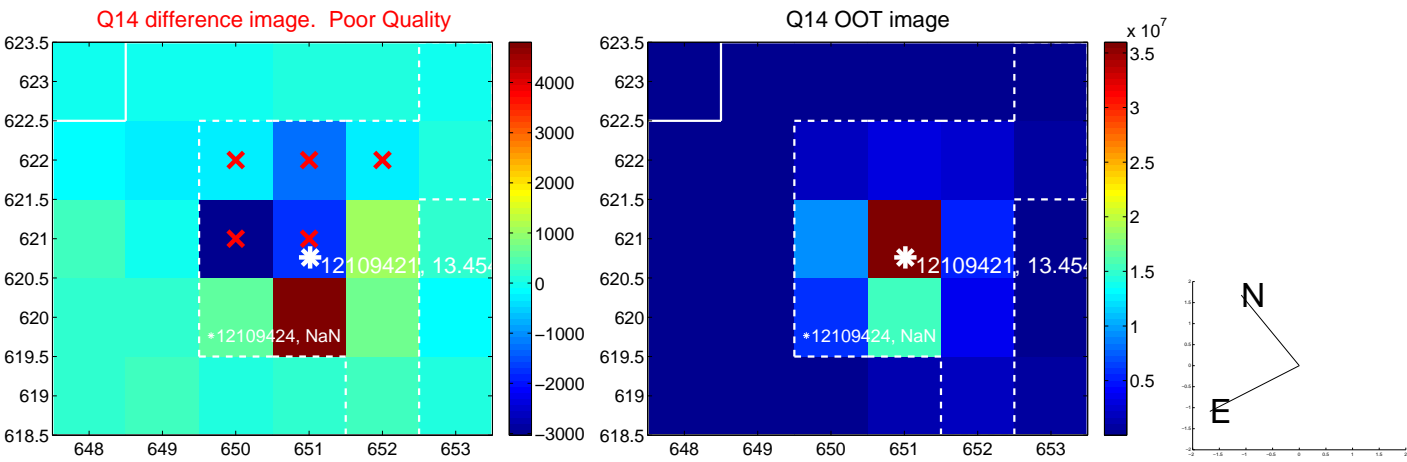
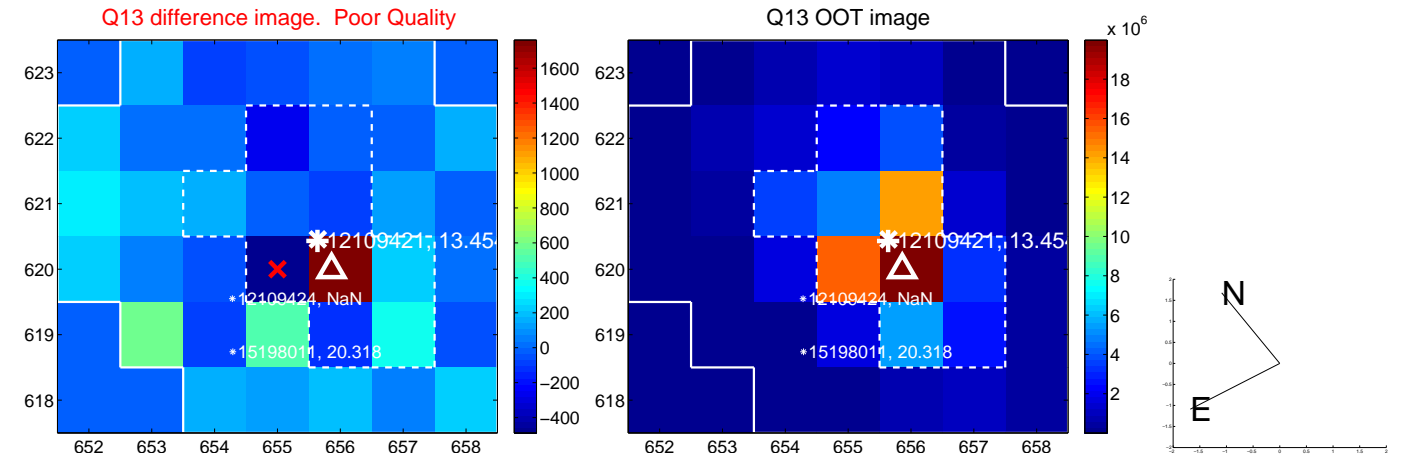
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



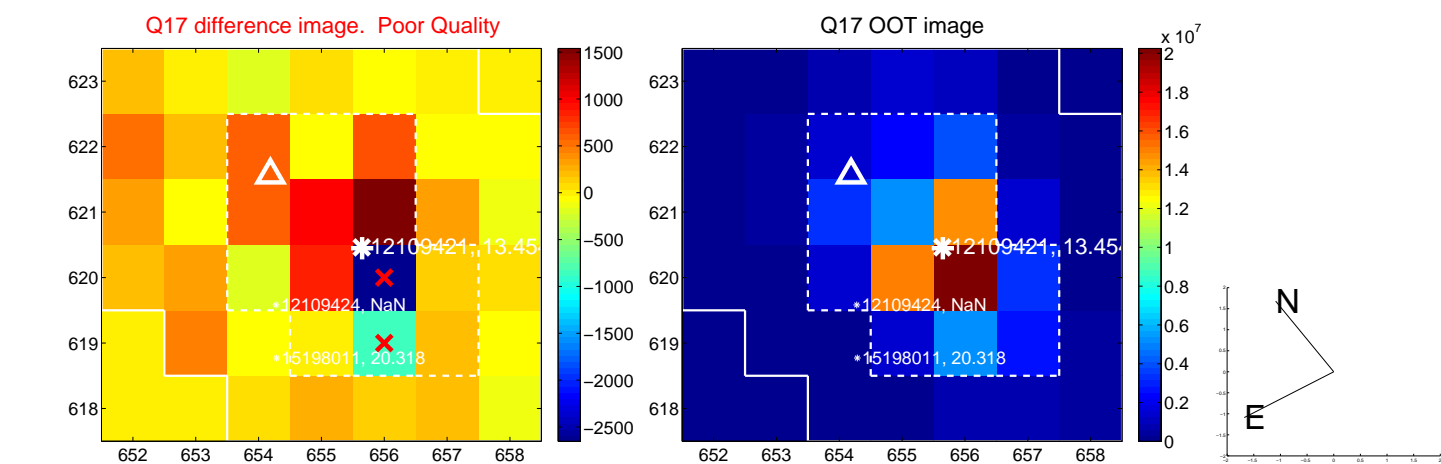
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



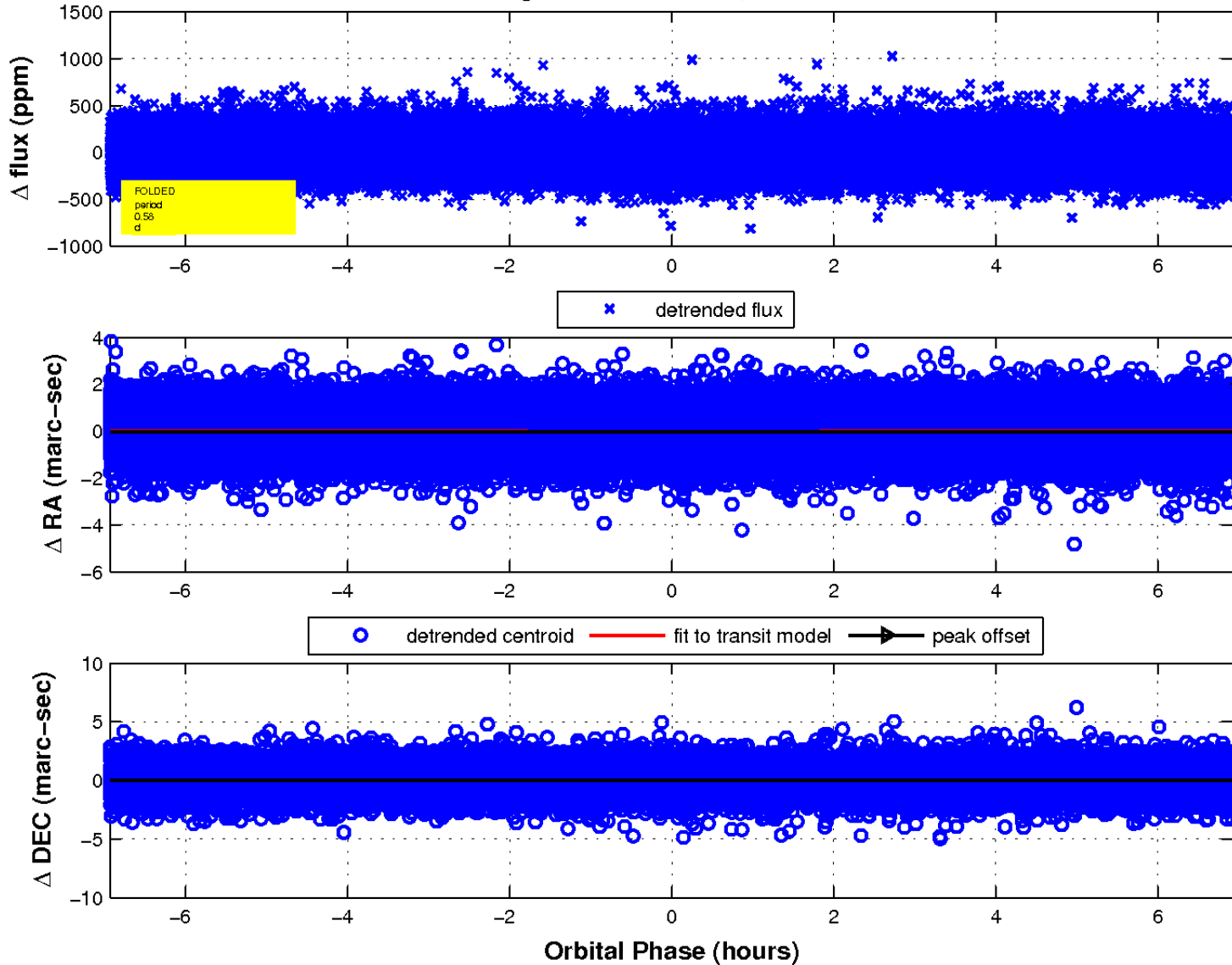
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

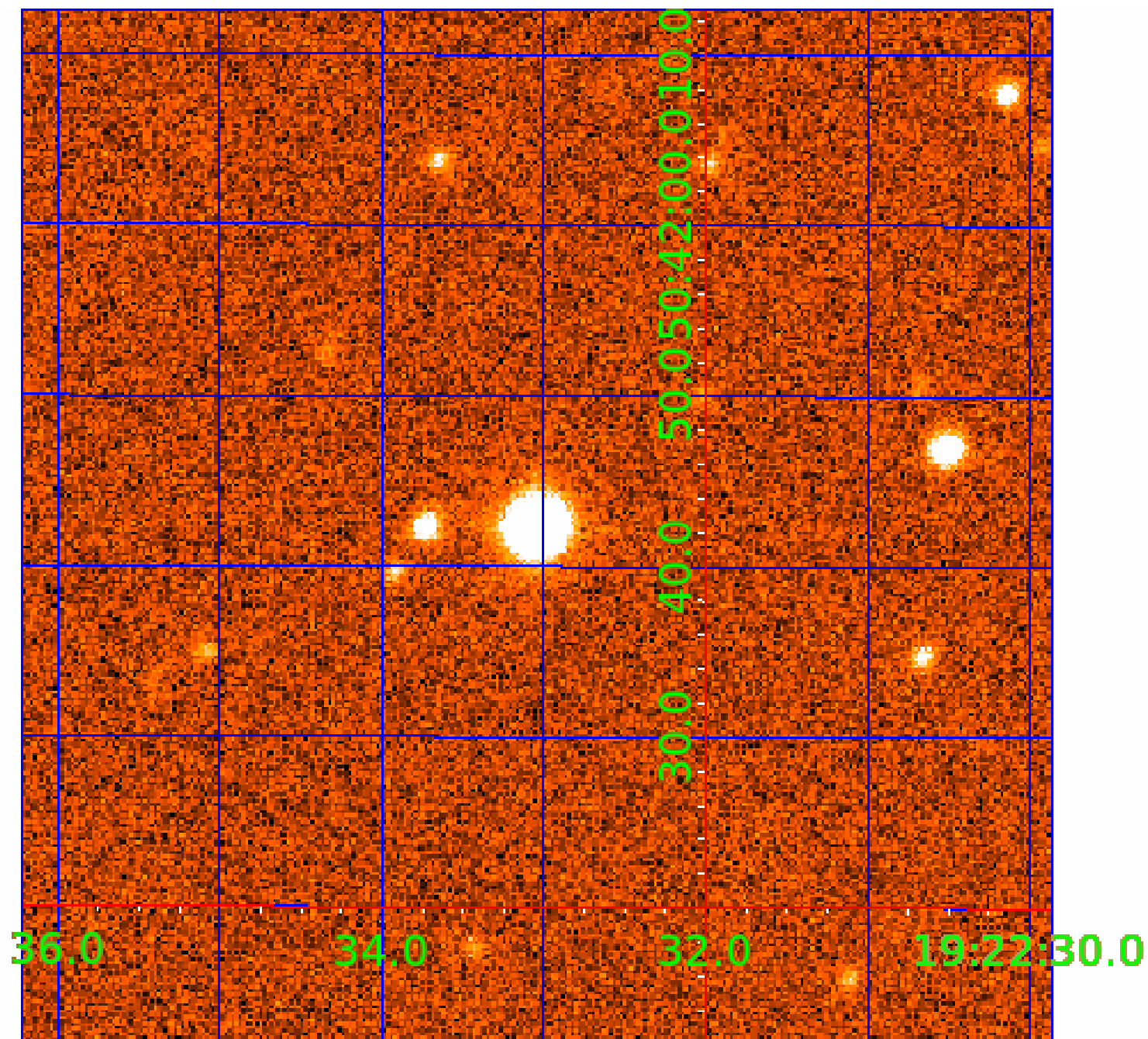


fluxWeightedCentroids, Planet 1 of 2



UKIRT Image

Declination



KIC 012109421

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})
012109421-01	OBS	No	0.577819	131.901468	14.1	3.752	11.6	8.9	3.36	6050	1.30	55018.13
012109421-02	OBS	No	42.187454	154.722827	319.7	1.599	8.4	9.6	3.36	6050	7.09	180.29

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
012109421-01	OBS	FP	0.00	1	0	0	1	LPP_DV—EPHEM_MATCH
012109421-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—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.

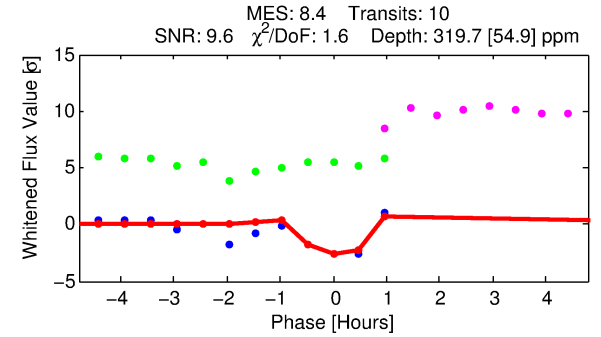
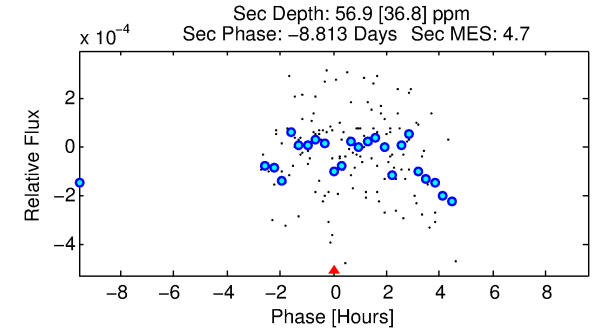
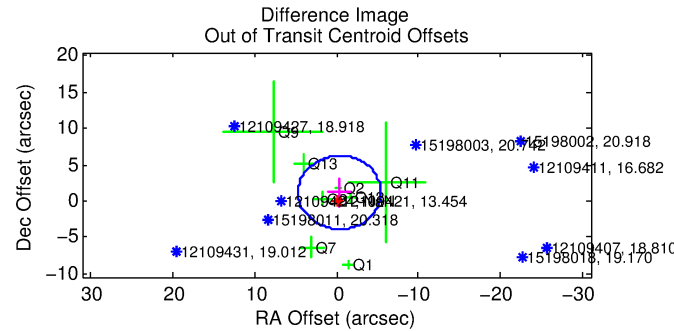
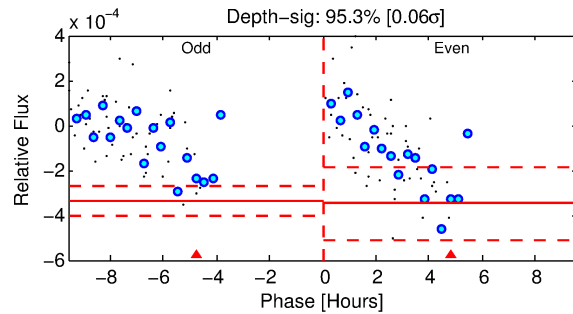
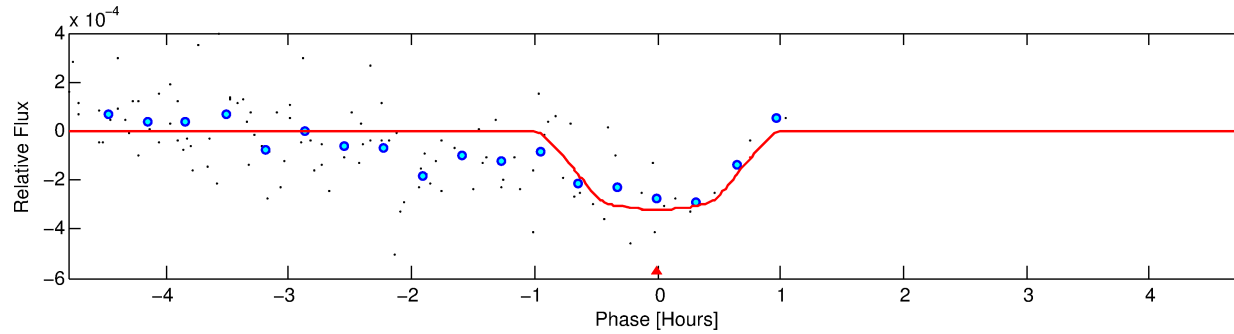
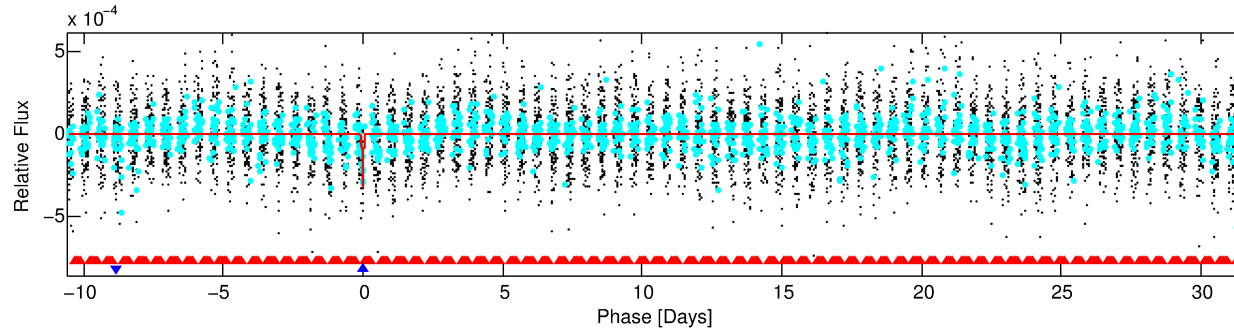
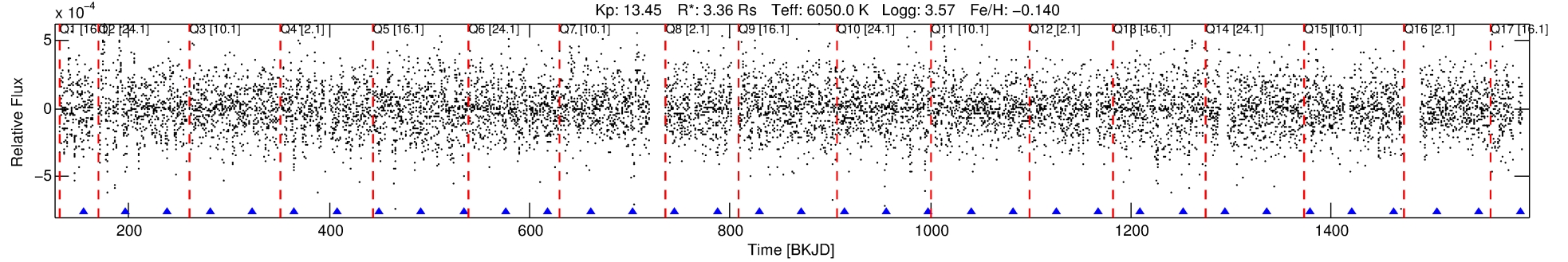
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 012109421-02

No Significant Match Found

DV One-Page Summary

KIC: 12109421 Candidate: 2 of 2 Period: 42.187 d



DV Fit Results:

Period = 42.18745 [0.00089] d
Epoch = 154.7228 [0.0039] BKJD
Rp/R* = 0.0193 [0.0133]
a/R* = 96.72 [338.37]
b = 0.90 [0.76]
Seff = 180.30 [114.19]
Teq = 934 [148] K
Rp = 7.09 [5.76] Re
a = 0.2742 [0.1090] AU
Ag = 46.87 [77.17] [0.59 σ]
Teffp = 3780 [1445] K [1.96 σ]

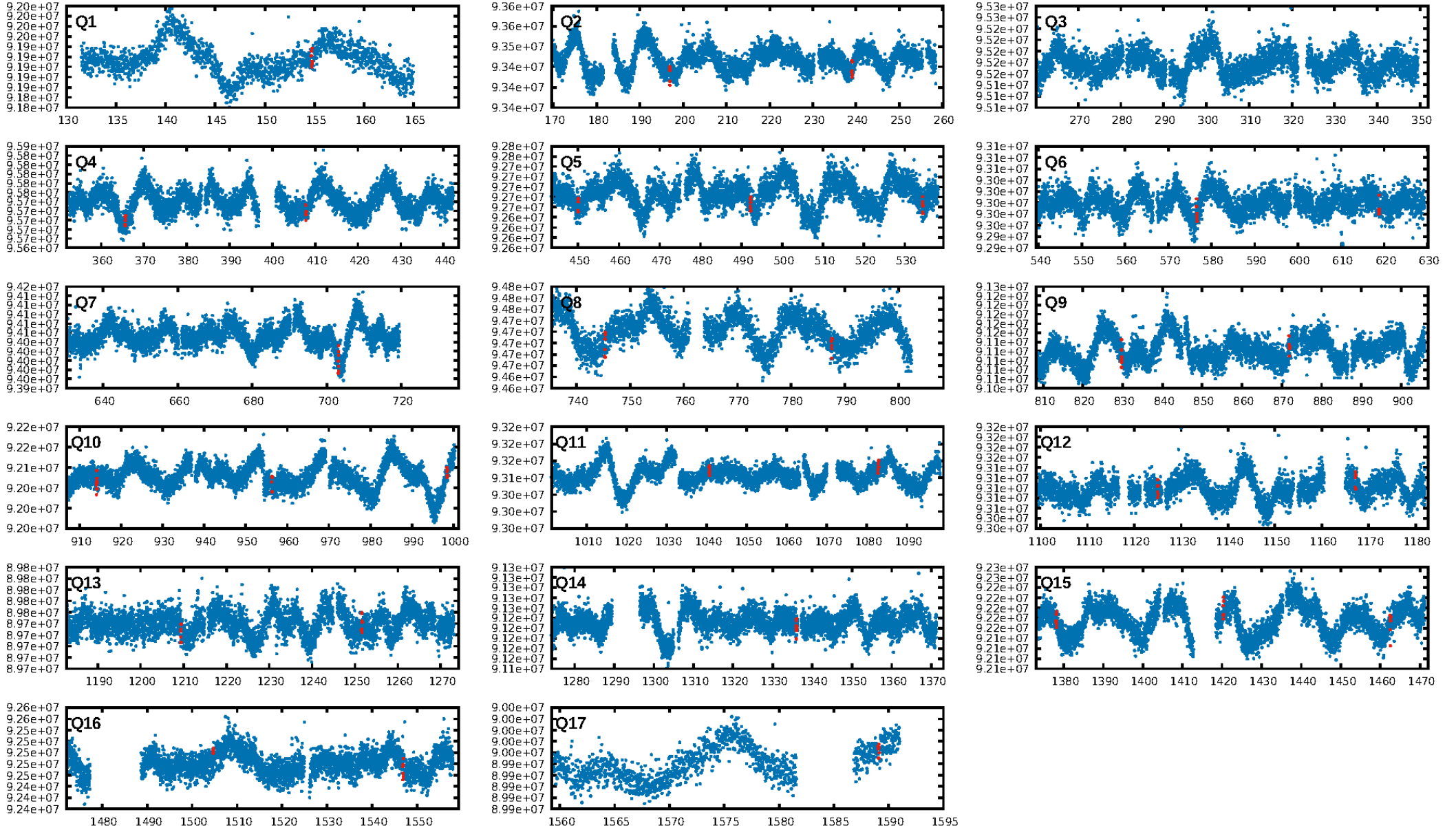
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [244.87 σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 44.7%
ModelChiSquareGof-sig: 99.7%
Bootstrap-pfa: 3.89e-09
RollingBand-fgt: 1.00 [9/9]
GhostDiagnostic-chr: -17.12
Centroid-sig: 36.3%
Centroid-so: 0.776 arcsec [1.00 σ]
OotOffset-rm: 1.220 arcsec [0.72 σ]
OotOffset-st: 1/2/2/3 [8]
KicOffset-rm: 1.164 arcsec [0.65 σ]
KicOffset-st: 1/2/2/3 [8]
DiffImageQuality-fgm: 0.12 [1/8]
DiffImageOverlap-fno: 0.00 [0/16]

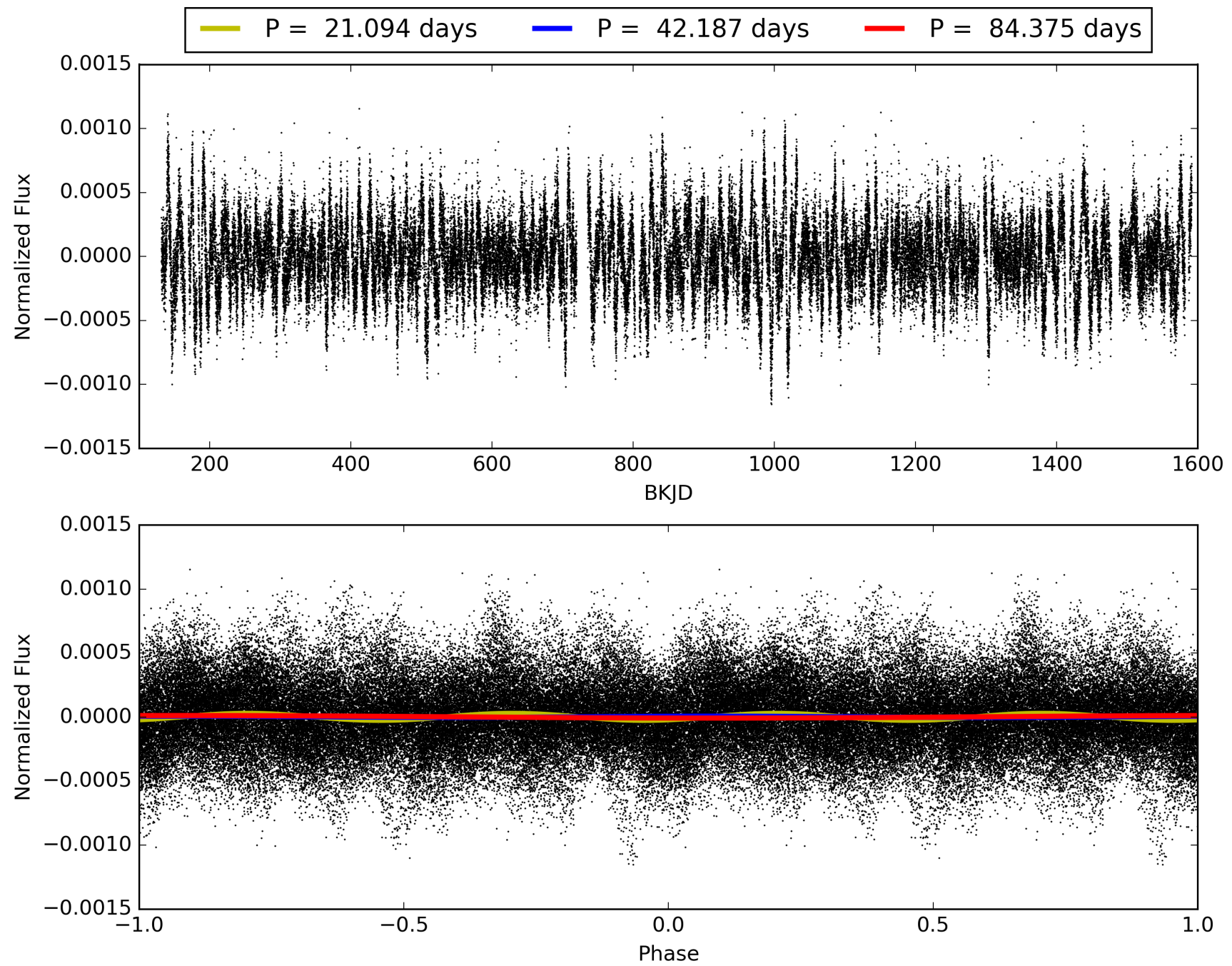
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 06:57:47 Z

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

TCE 012109421-02, PDC Light Curves

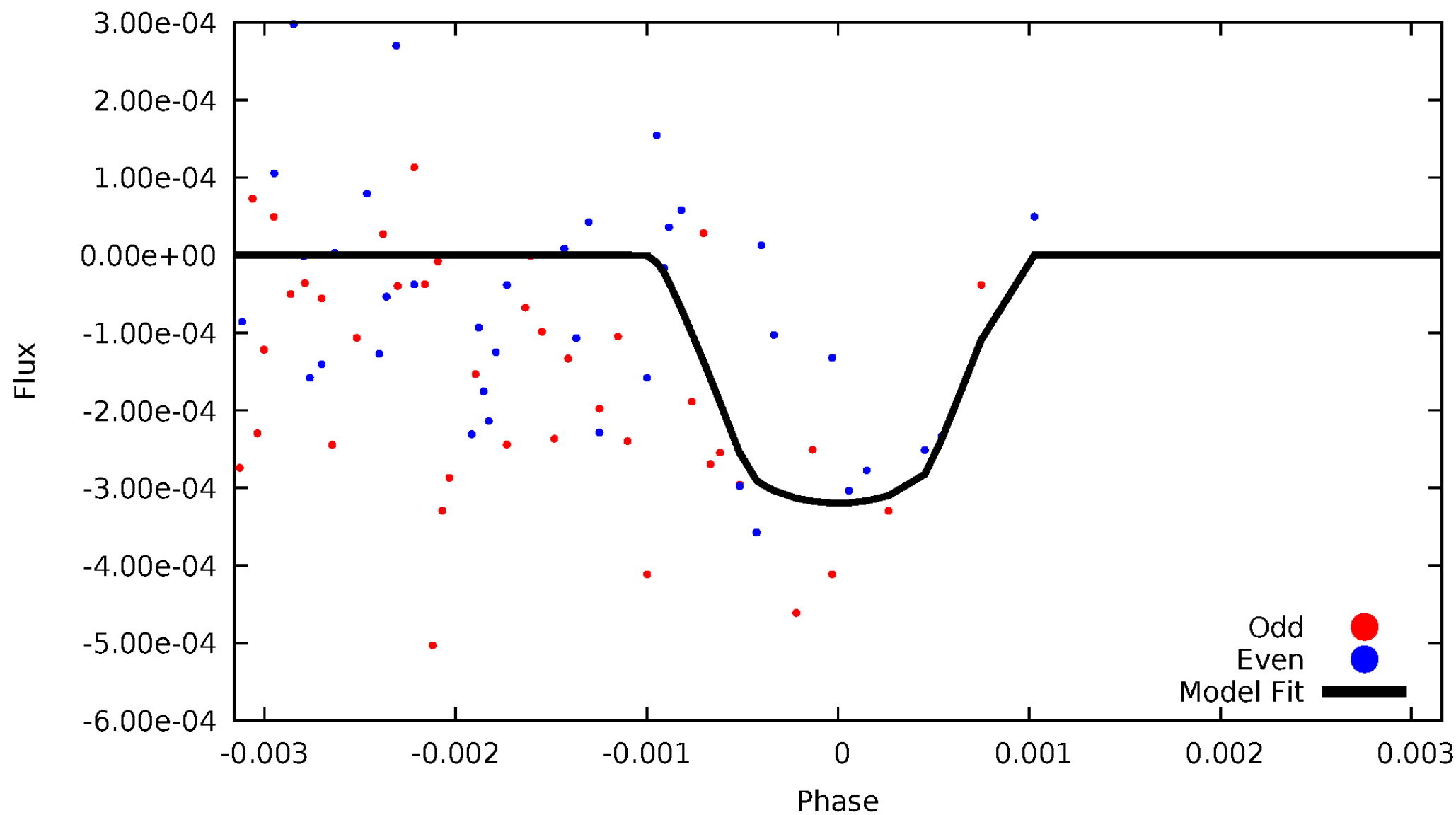


TCE 012109421-02



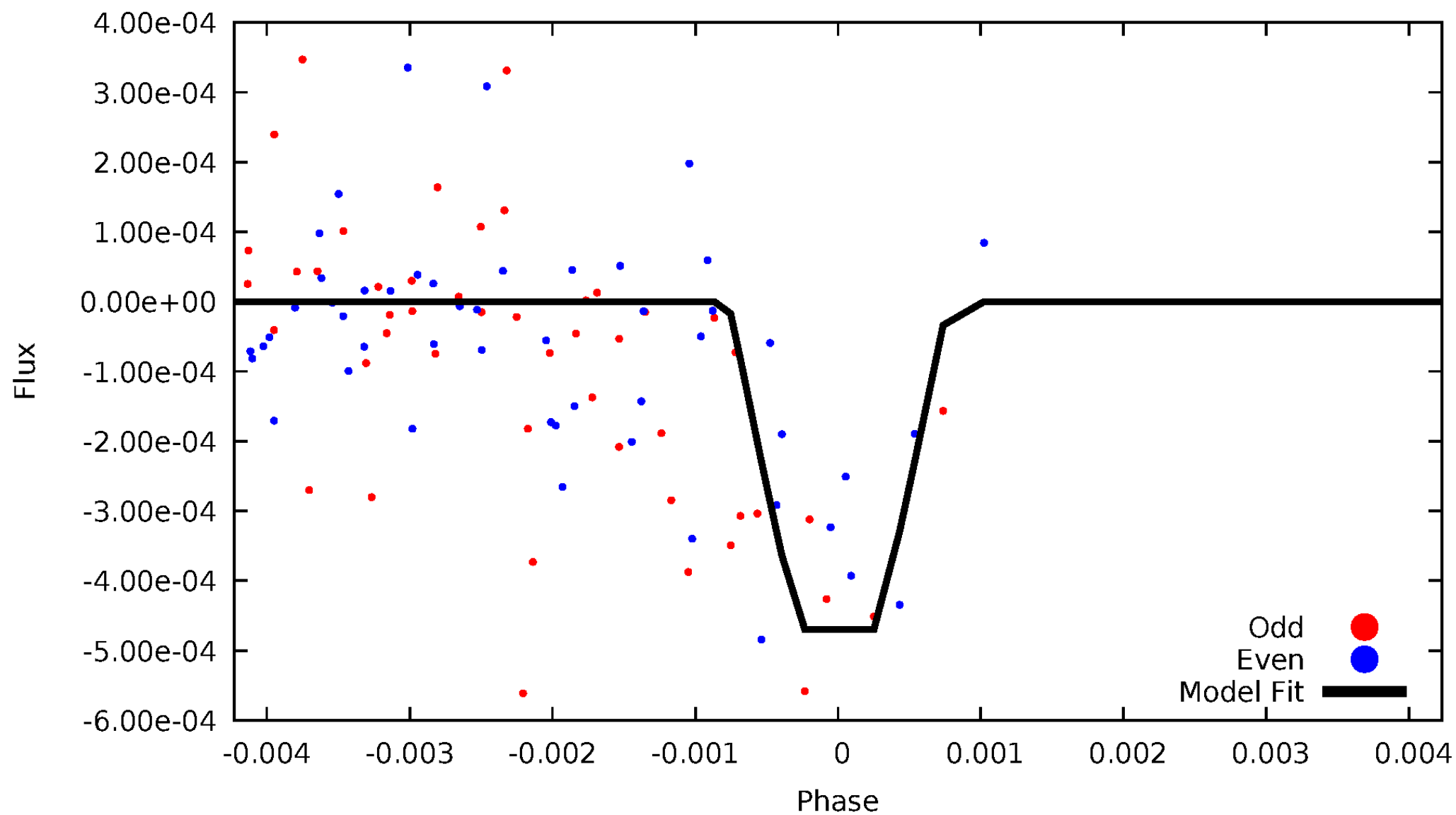
DV Odd/Even

TCE 012109421-02



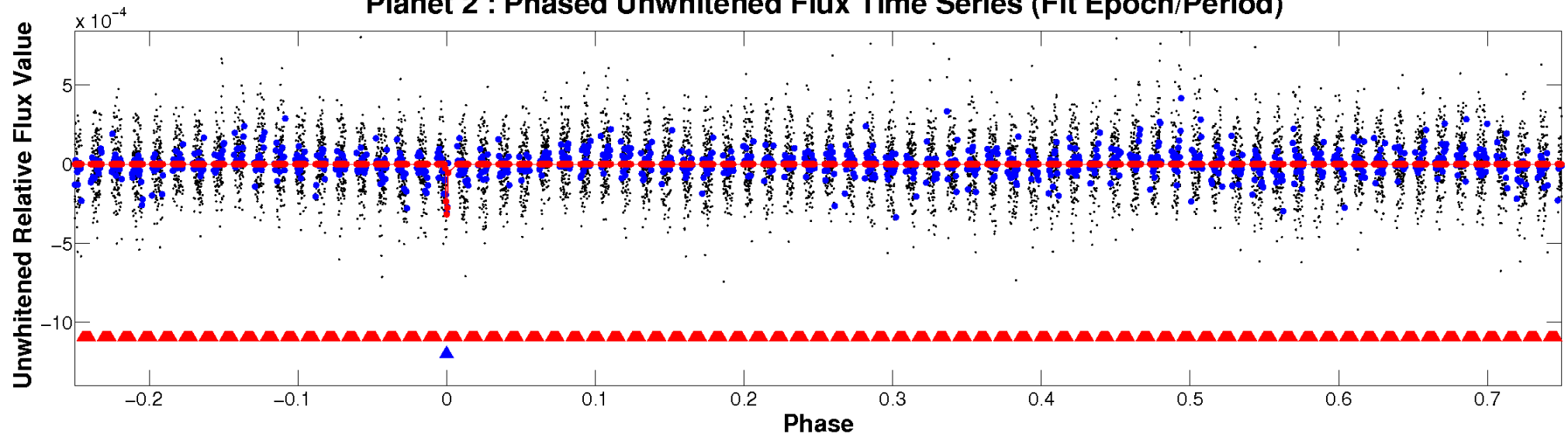
ALT Odd/Even

TCE 012109421-02

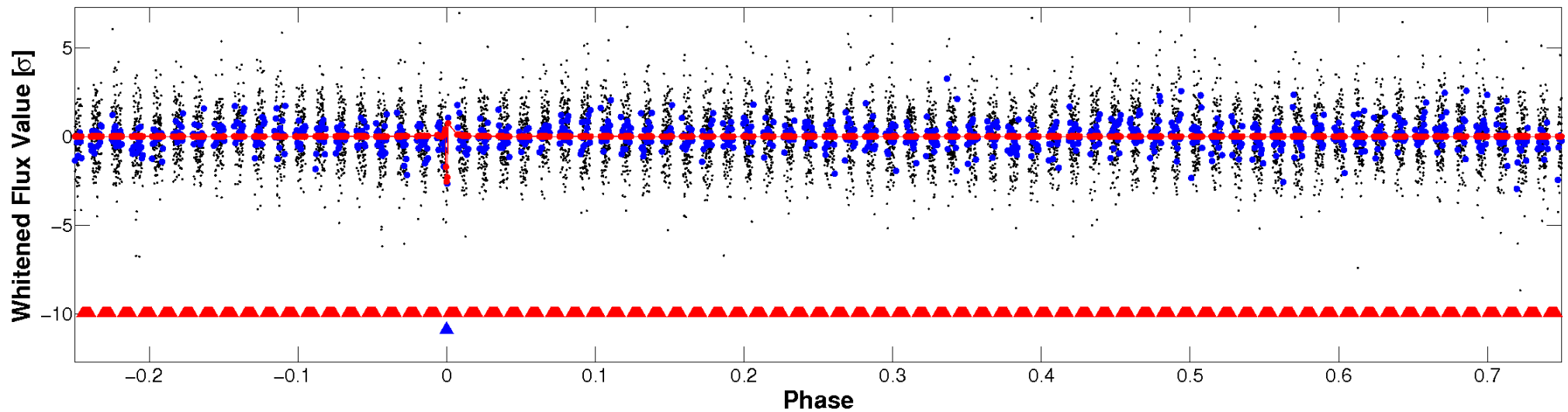


Non-Whitened Vs. Whitened Light Curve

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

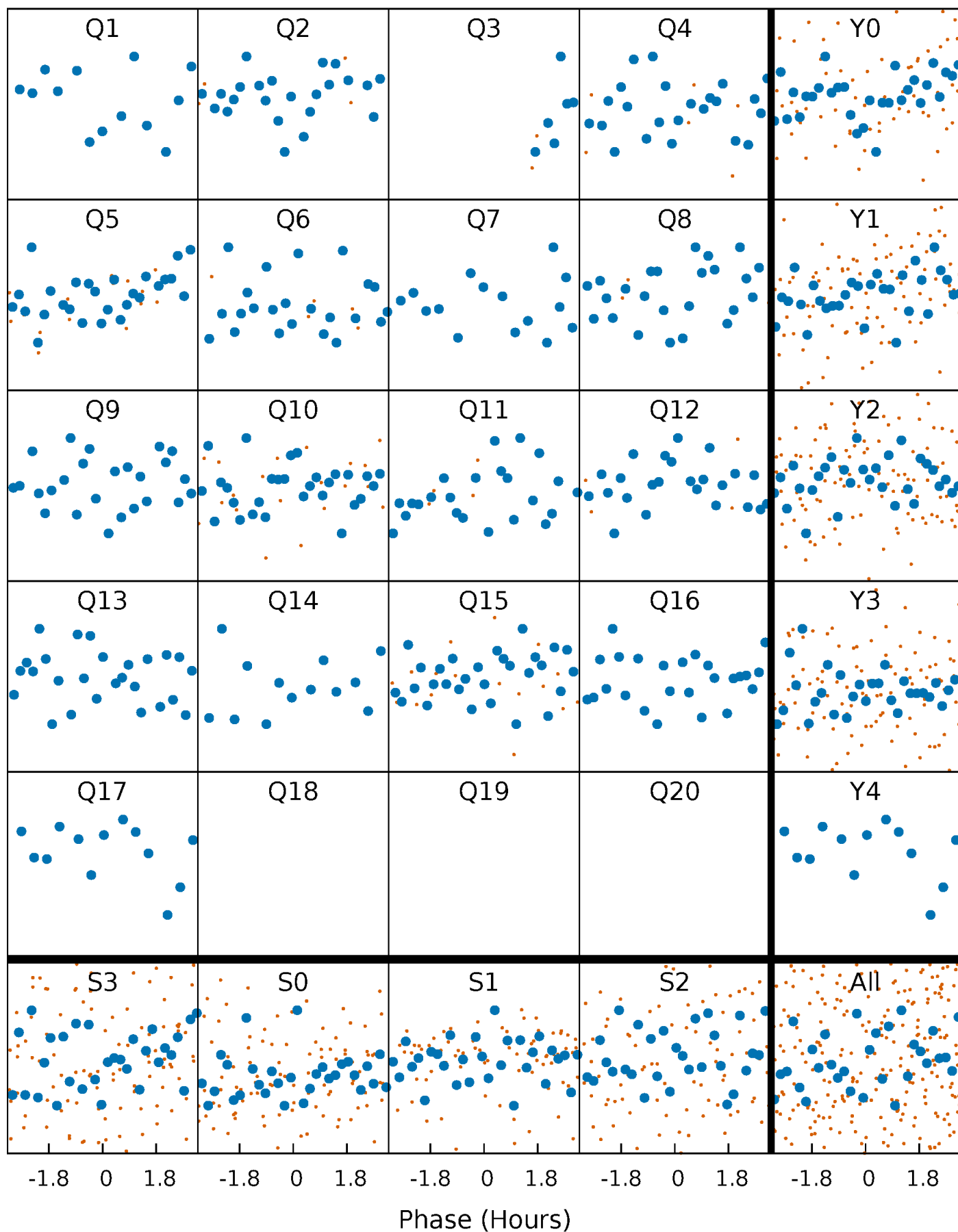


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



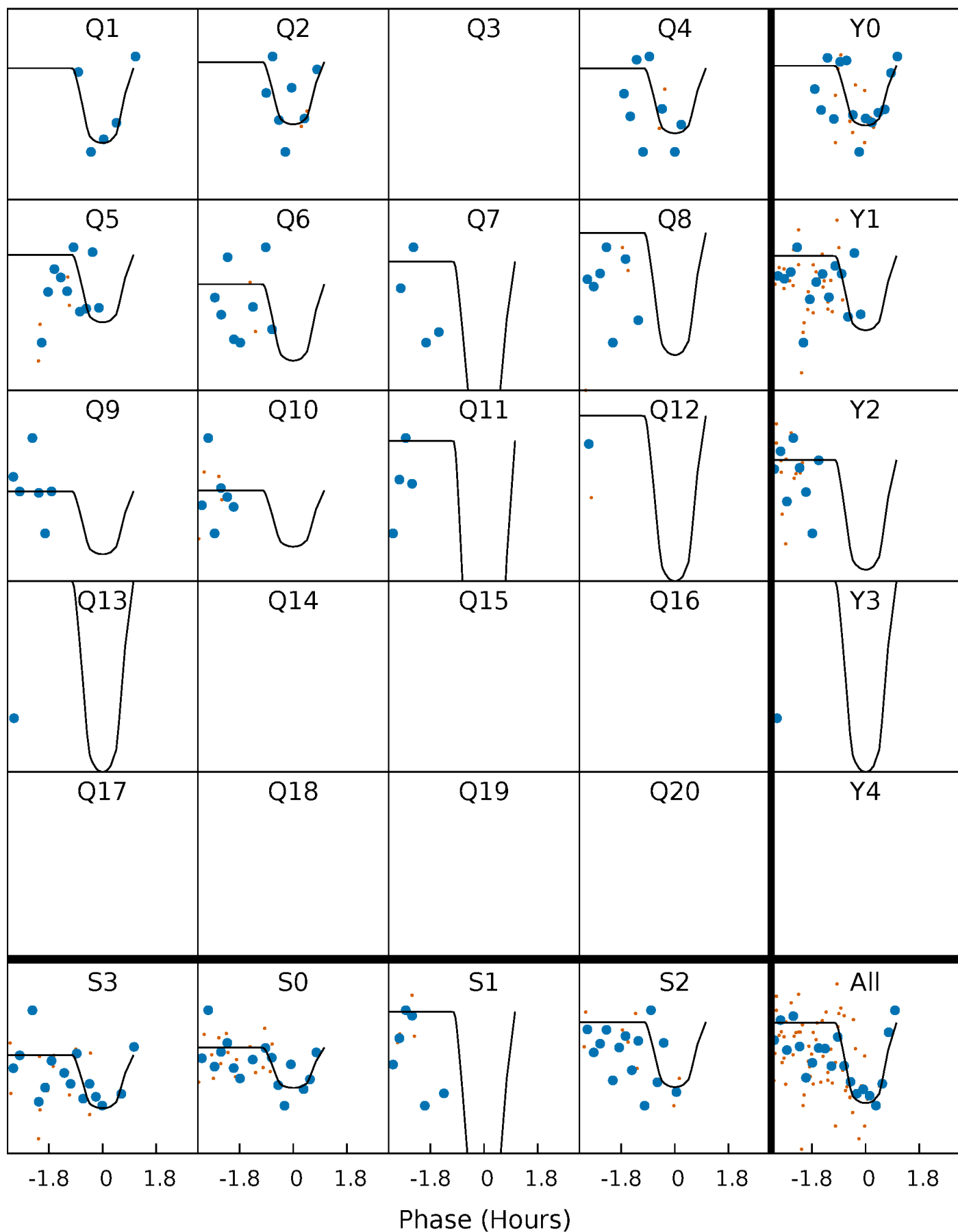
PDC Quarter-Phased Transit Curves

TCE 012109421-02 P= 42.187454 Days $T_0=154.722827$ (BKJD)



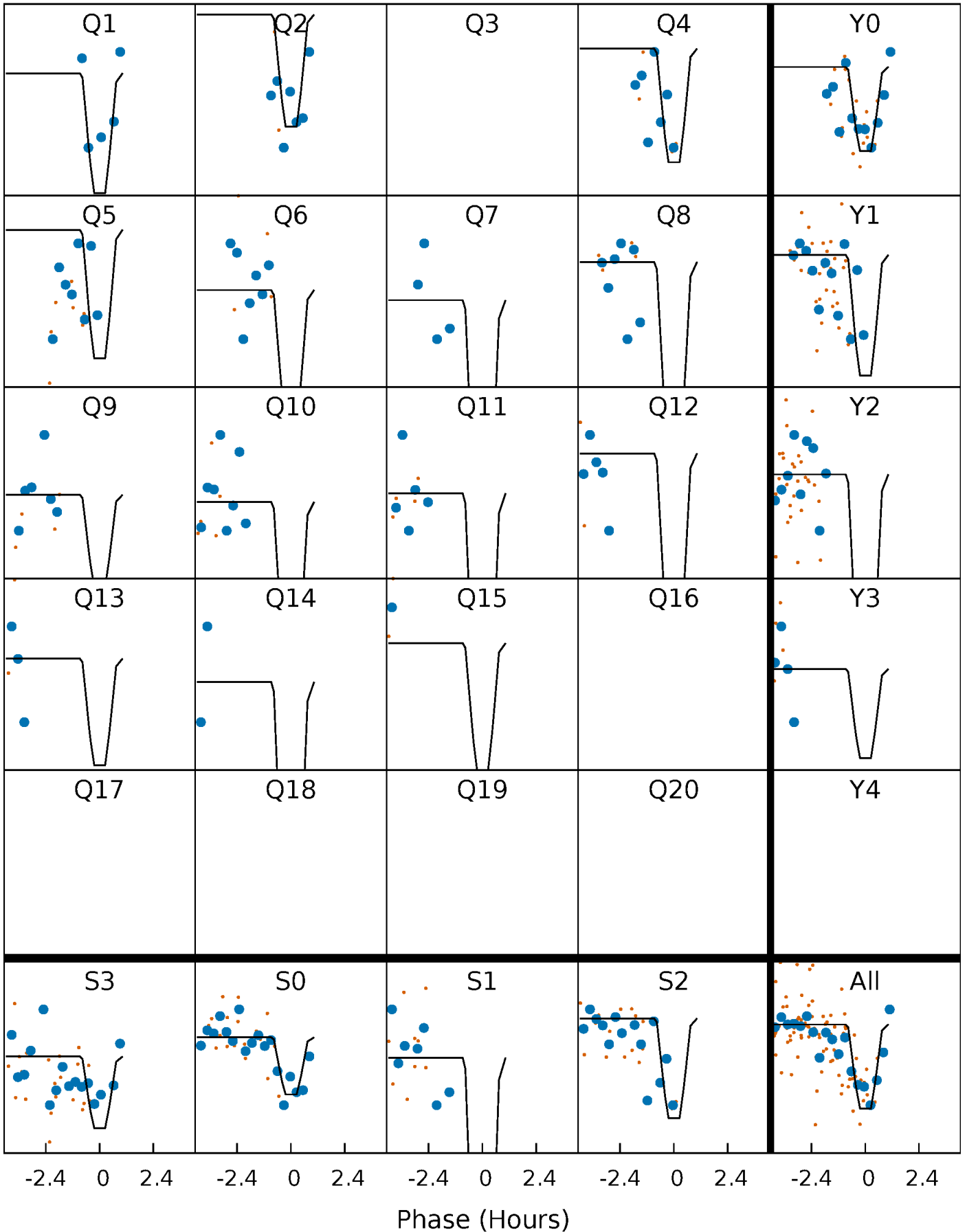
DV Quarter-Phased Transit Curves

TCE 012109421-02 P= 42.187454 Days $T_0=154.722827$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

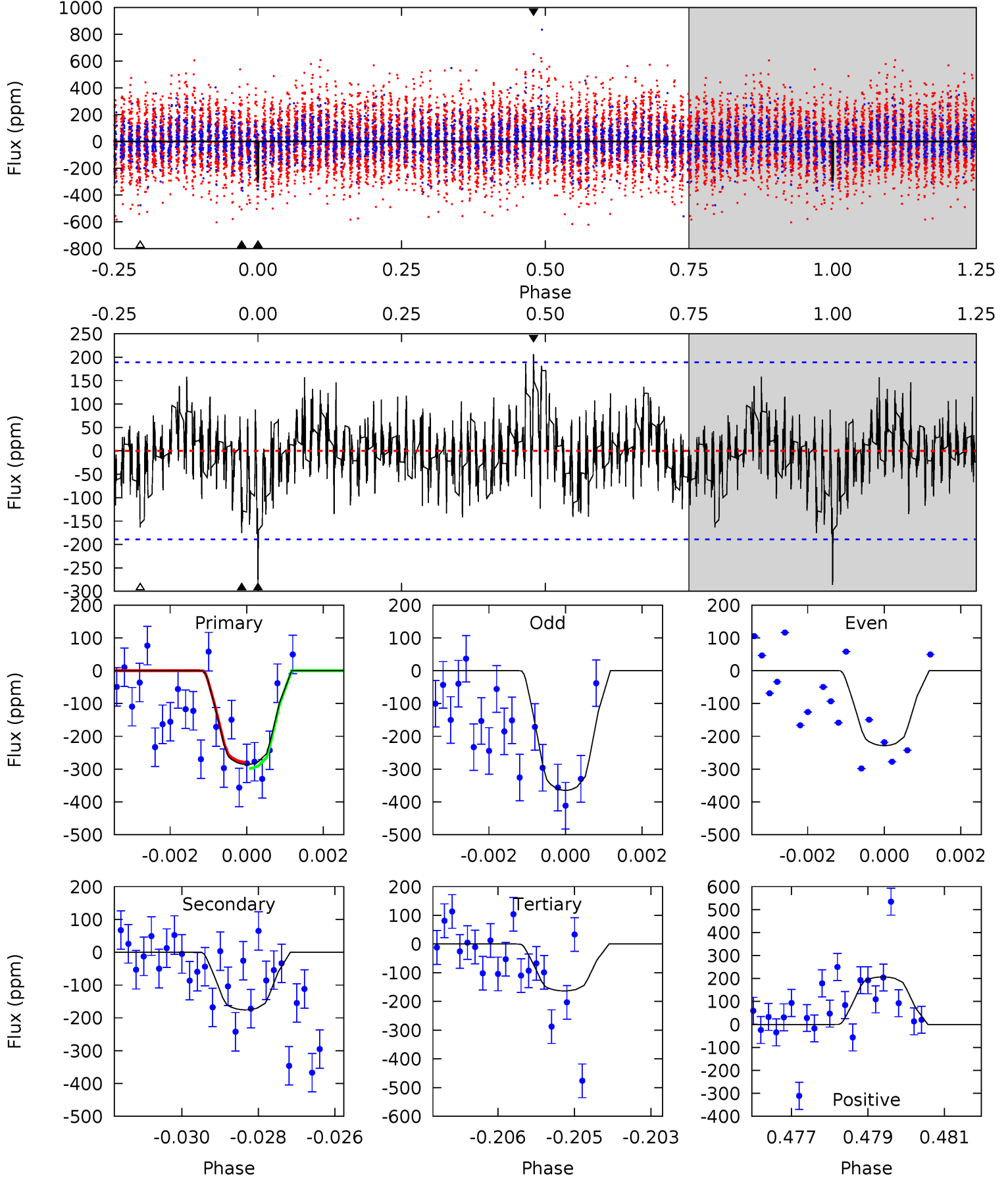
TCE 012109421-02 P= 42.187831 Days $T_0=154.723024$ (BKJD)



DV Model-Shift Uniqueness Test

012109421-02, P = 42.187454 Days, E = 112.535373 Days

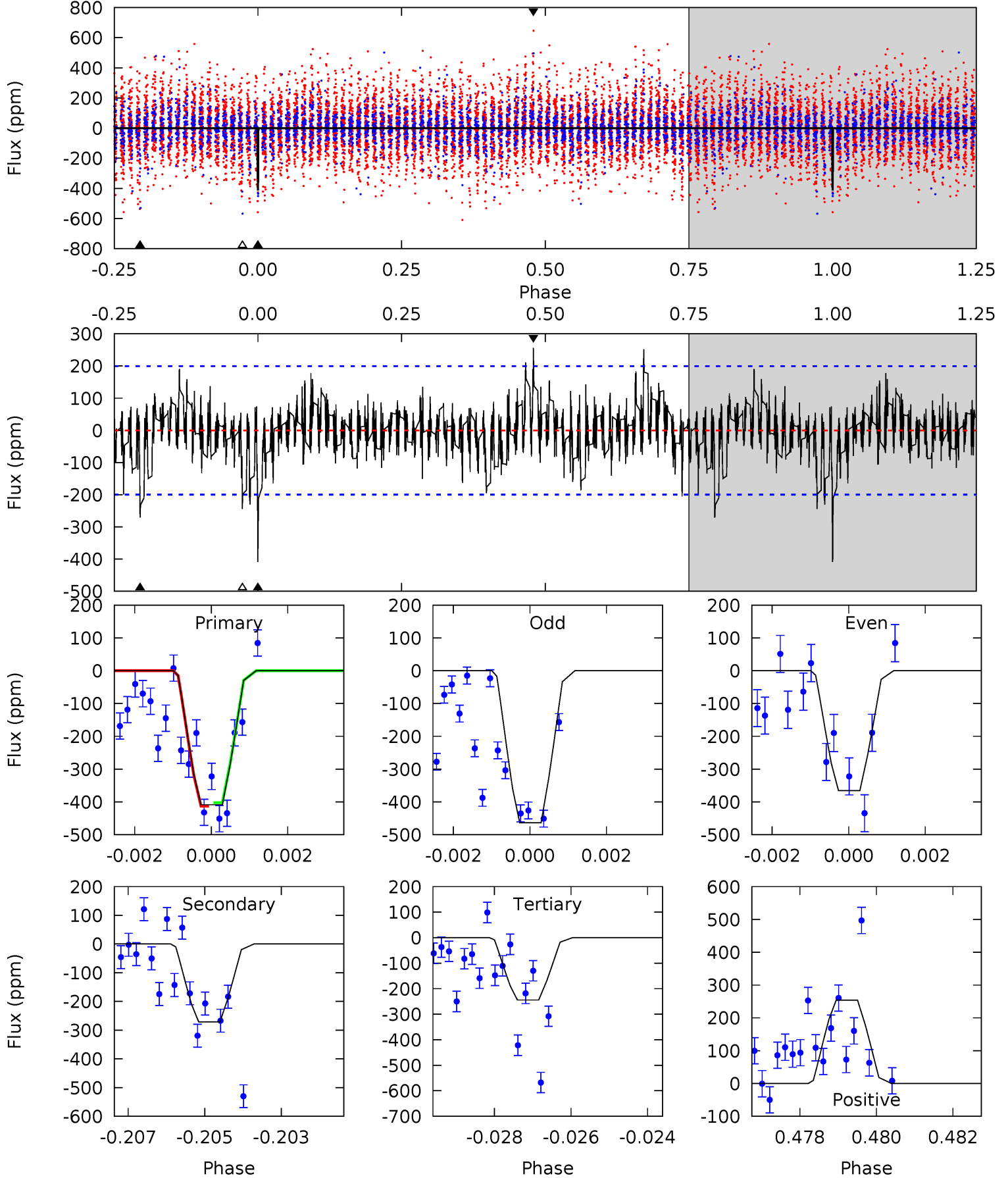
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.08	4.97	4.62	5.85	5.35	3.13	1.45	3.47	2.24	0.35	-0.88	1.91	0.86	0.42	0.23



Alt Model-Shift Uniqueness Test

012109421-02, P = 42.187831 Days, E = 112.535193 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.0	7.27	6.55	6.81	5.35	3.13	1.53	4.42	4.15	0.72	0.46	1.30	1.01	0.38	0.13



Stellar Parameters For KIC 012109421

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	$M(M_{\odot})$	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	6050^{+180}_{-162}	$3.574^{+0.360}_{-0.120}$	$-0.140^{+0.350}_{-0.300}$	$3.361^{+0.617}_{-1.440}$	$1.545^{+0.174}_{-0.406}$	$0.057^{+0.183}_{-0.020}$
	+3%/-3%	+10%/-3%	+250%/-214%	+18%/-43%	+11%/-26%	+319%/-35%
Source	PHO1	FLK73	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 012109421-02 / KOI

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-176 ± 35	$7.01^{+4.24}_{-3.98}$	1284^{+99}_{-130}	4952^{+2469}_{-844}	146^{+630}_{-93}
Alt.	-271 ± 37	$7.68^{+4.97}_{-4.07}$	1290^{+83}_{-131}	5234^{+2425}_{-935}	188^{+661}_{-119}

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

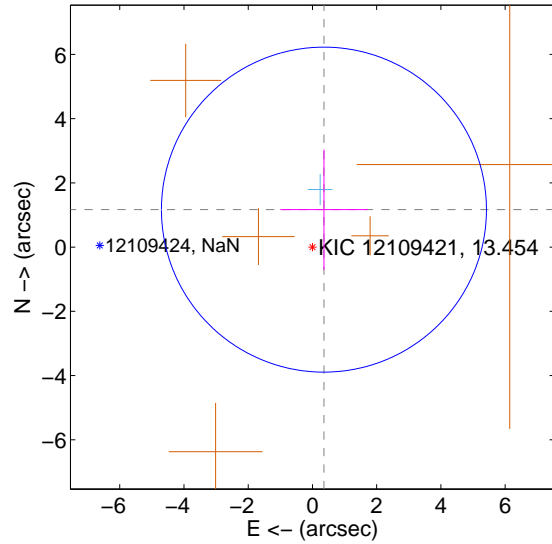
Supplemental centroid analysis for 012109421-02. Kepler magnitude: 13.45. Transit SNR 9.60

There are 1 quarters with good PRF difference image offsets

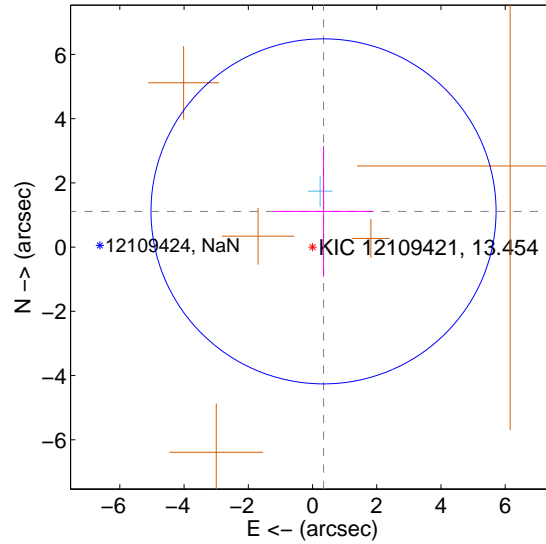
The direct PRF centroid is offset from the target star catalog position by about 0.10 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	1.220 ± 1.686	0.72	-0.358 ± 1.357	1.166 ± 1.875
PRF-fit source offset from KIC position	1.164 ± 1.790	0.65	-0.343 ± 1.556	1.112 ± 2.039
photometric centroid source offset	0.78 ± 0.78	1.00	-0.67 ± 0.75	0.39 ± 0.86

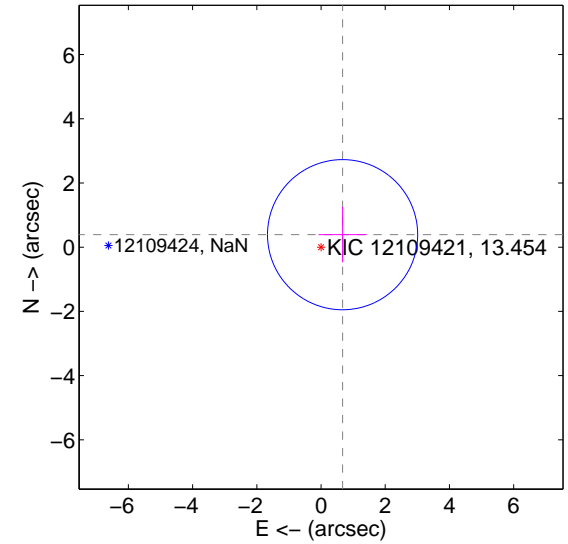
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

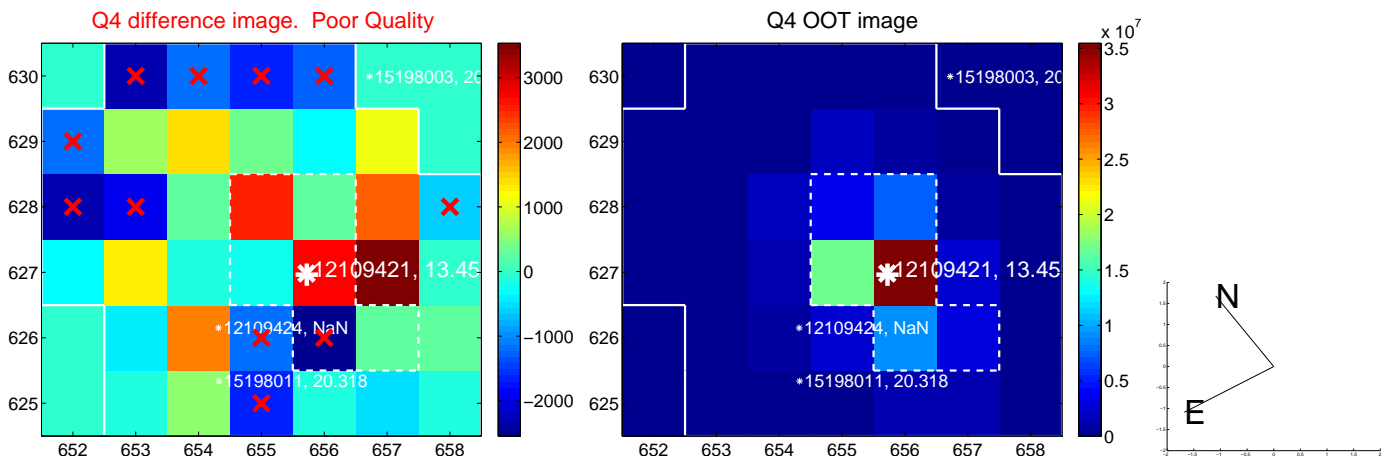
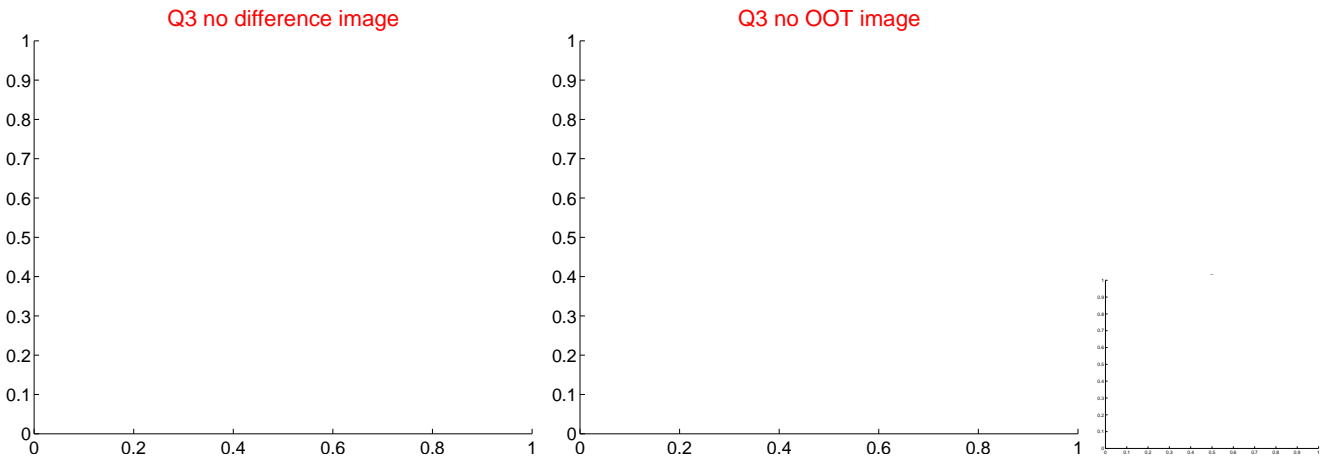
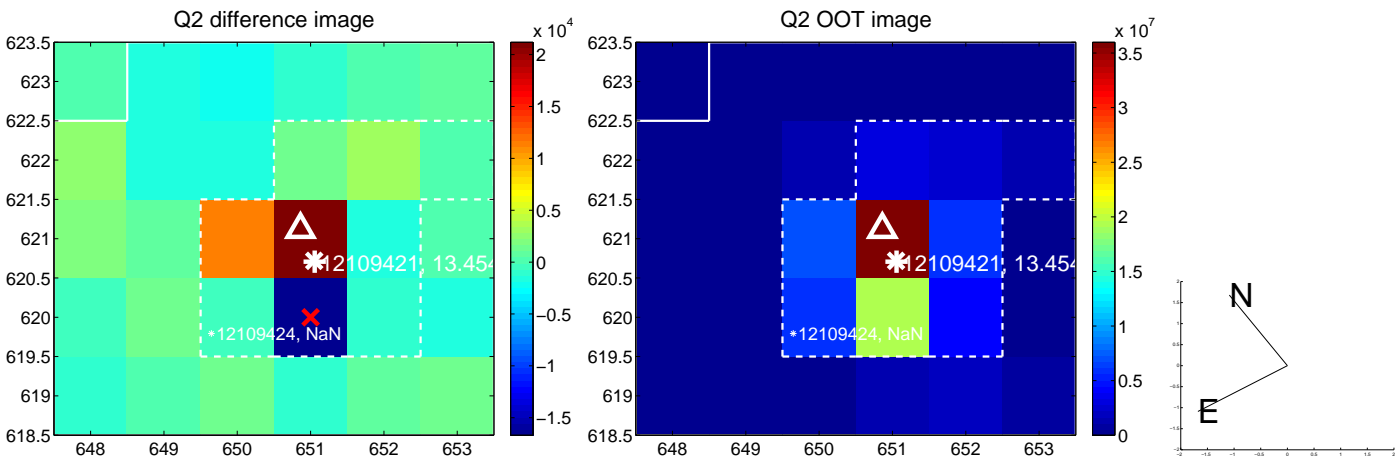
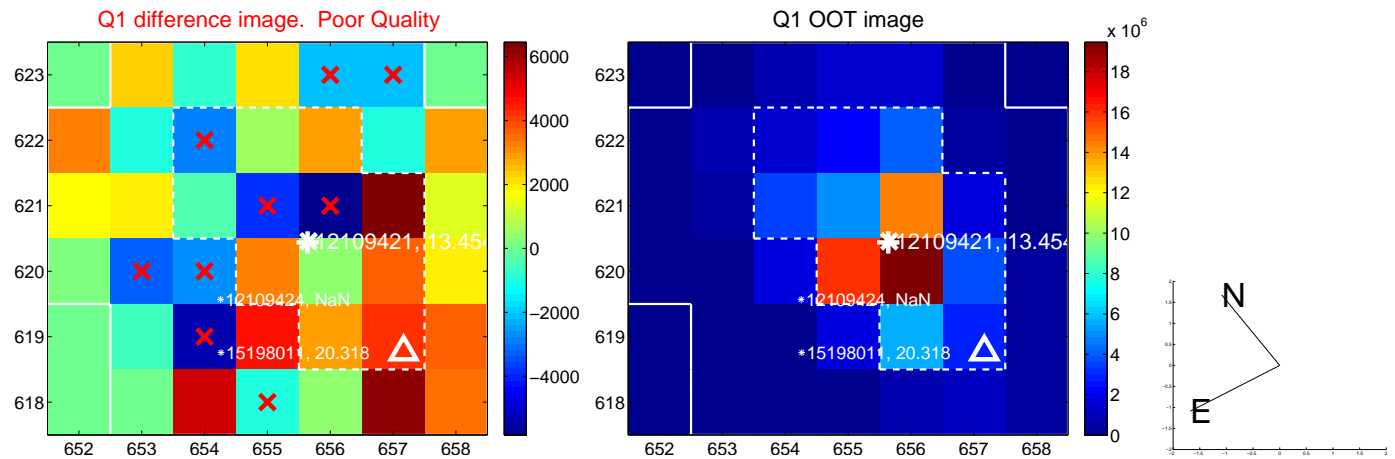


offset from photometric centroids

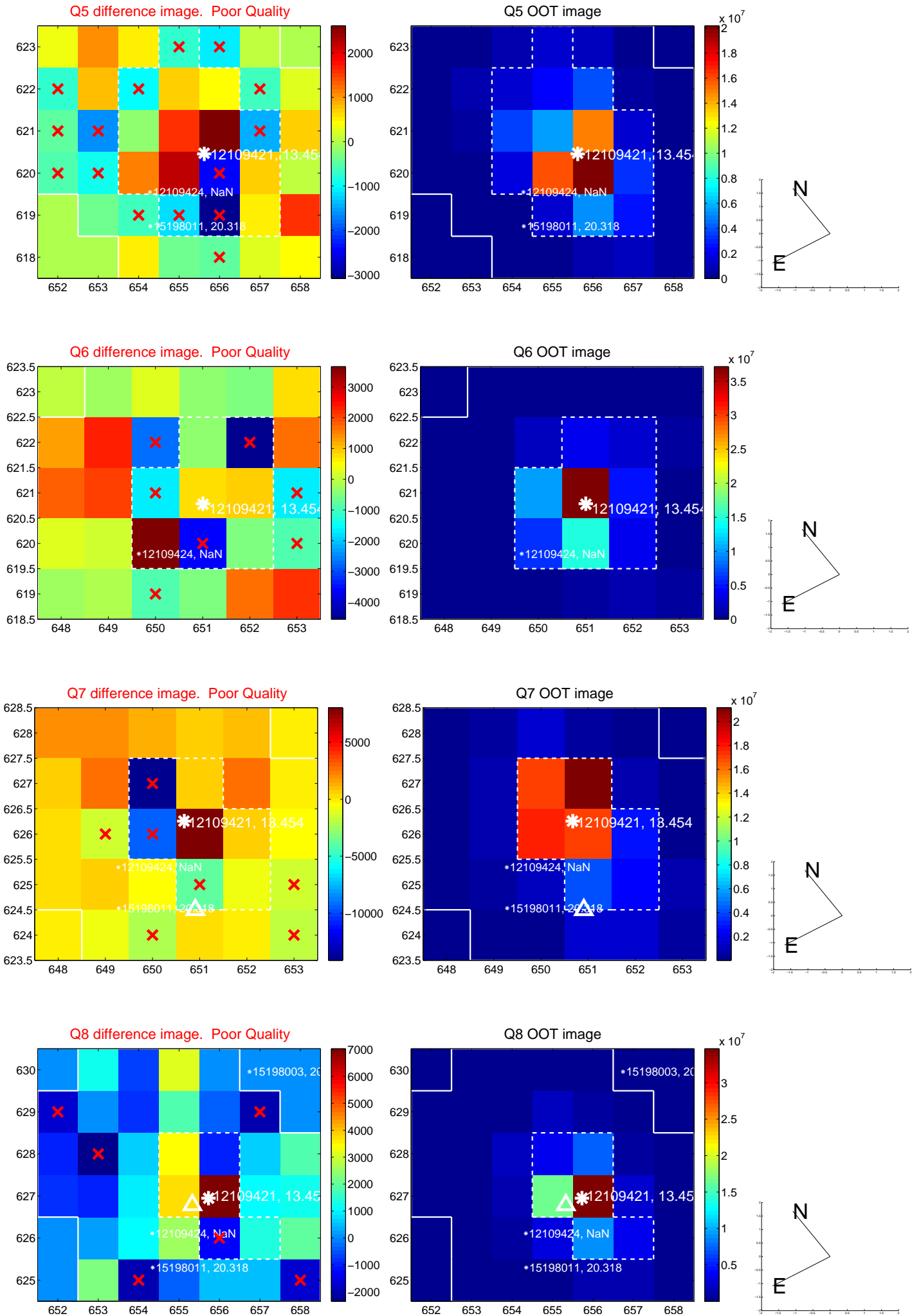


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

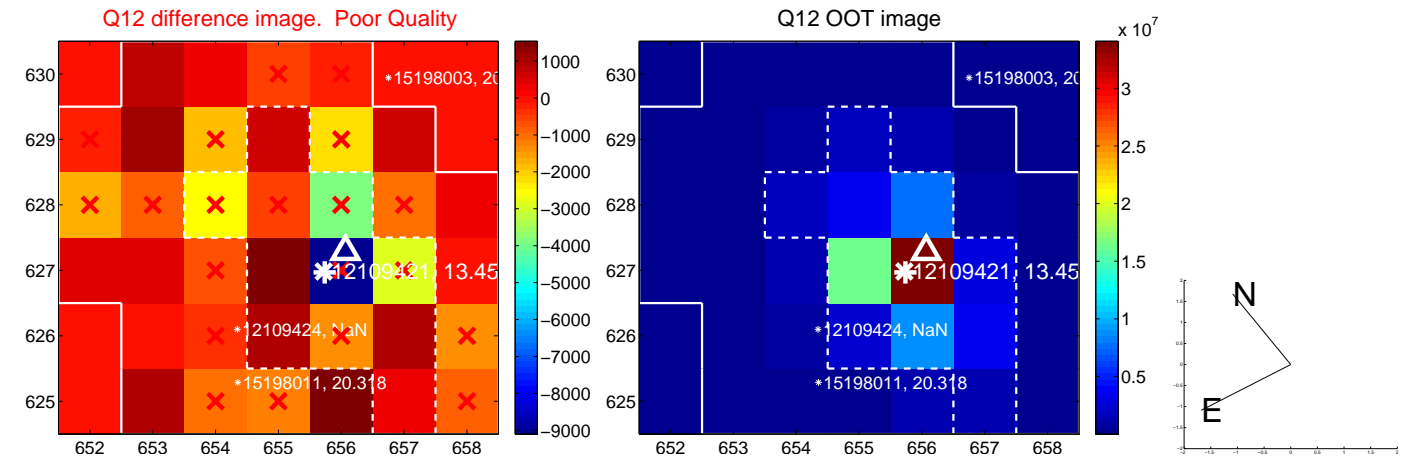
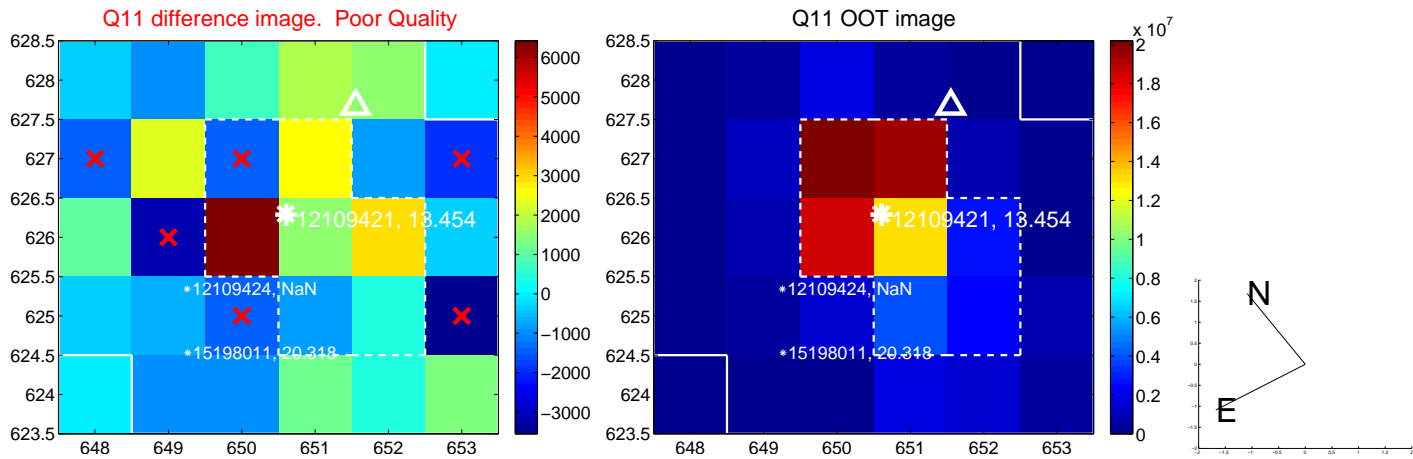
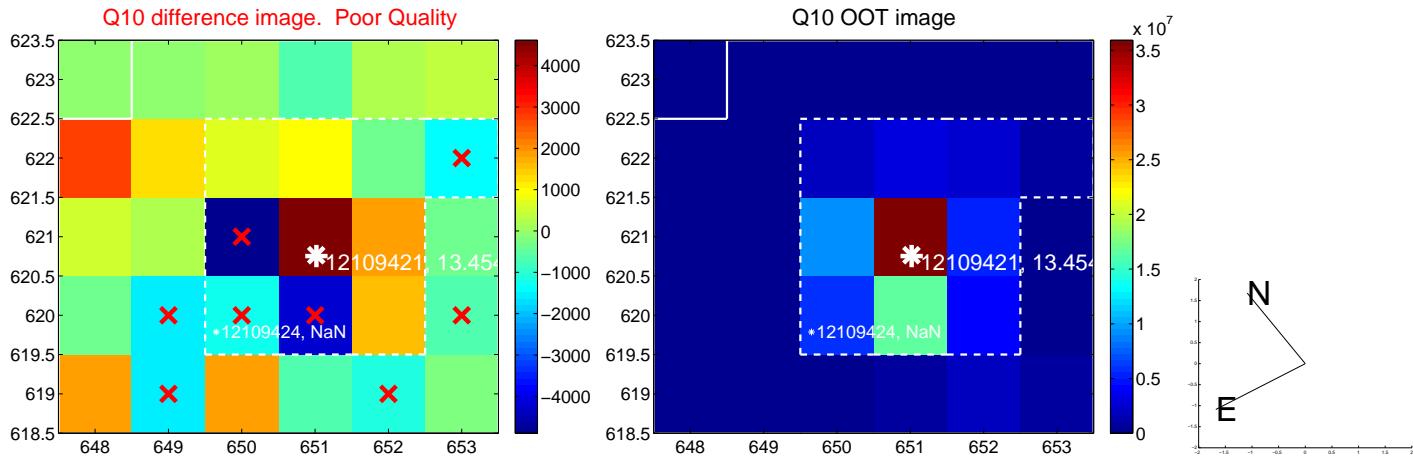
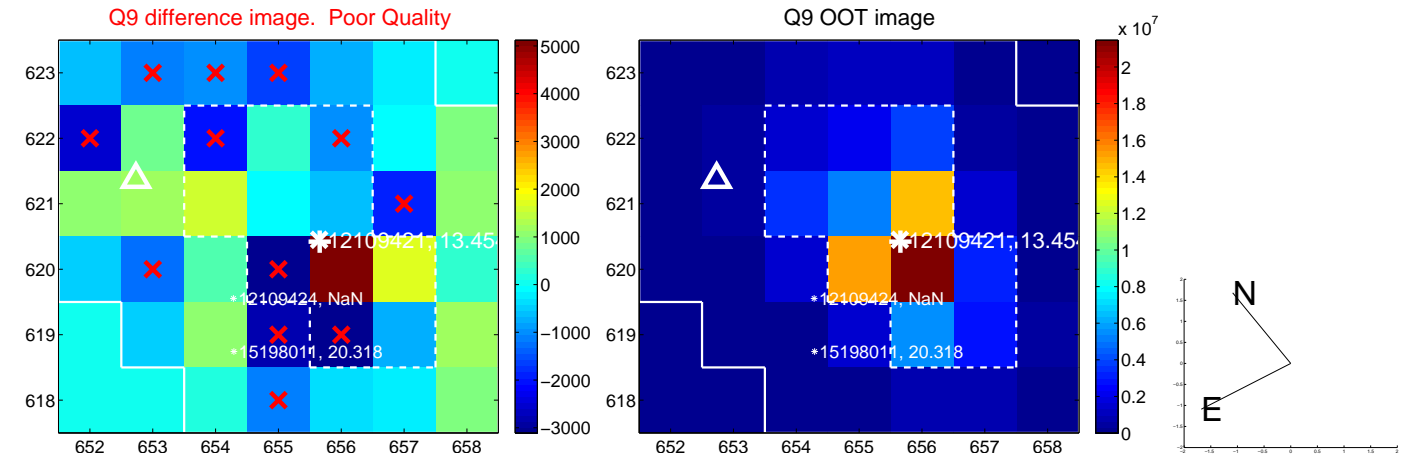
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



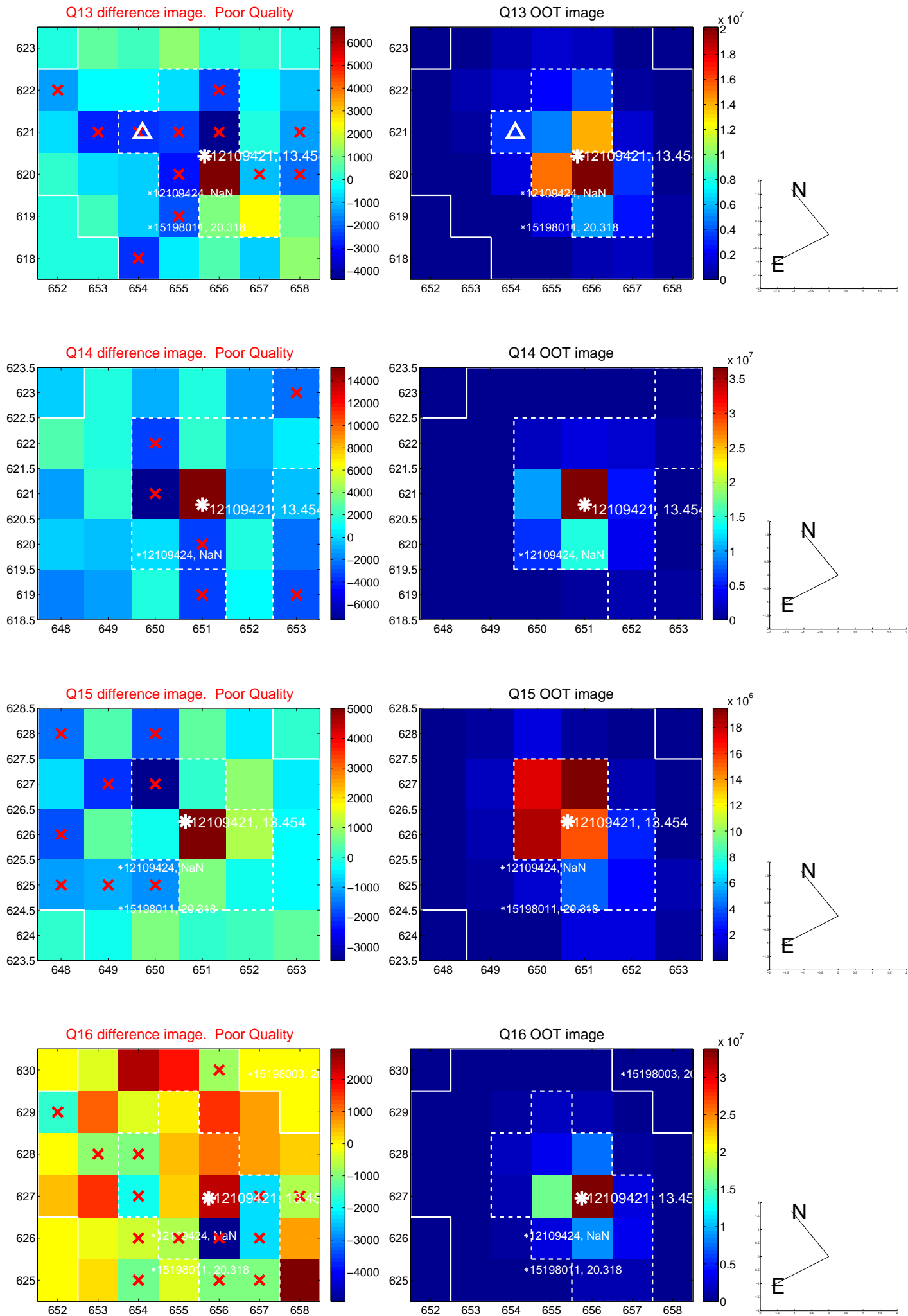
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



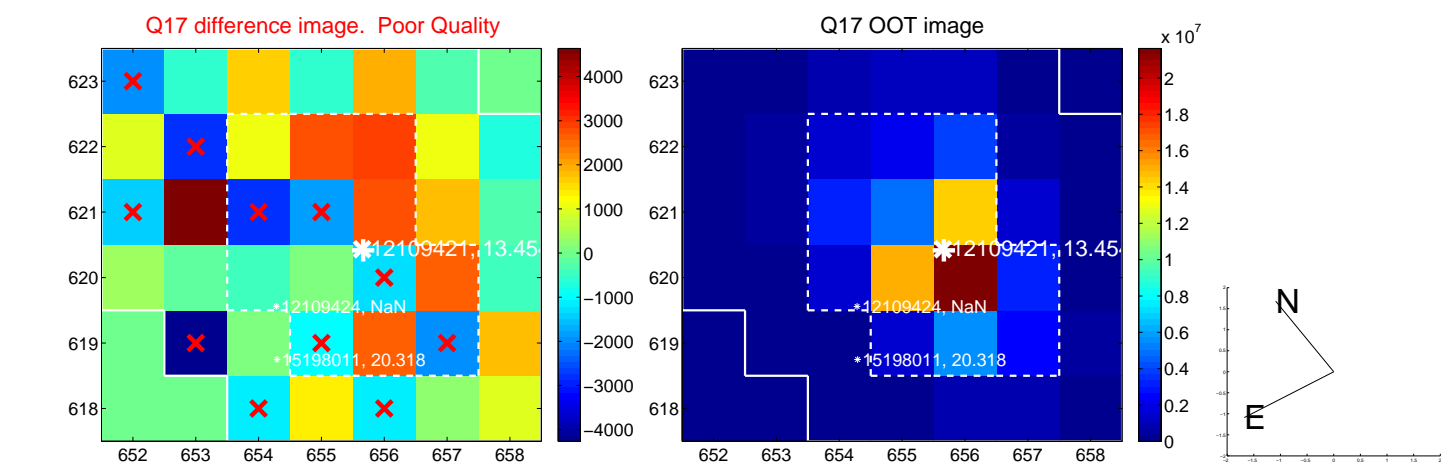
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



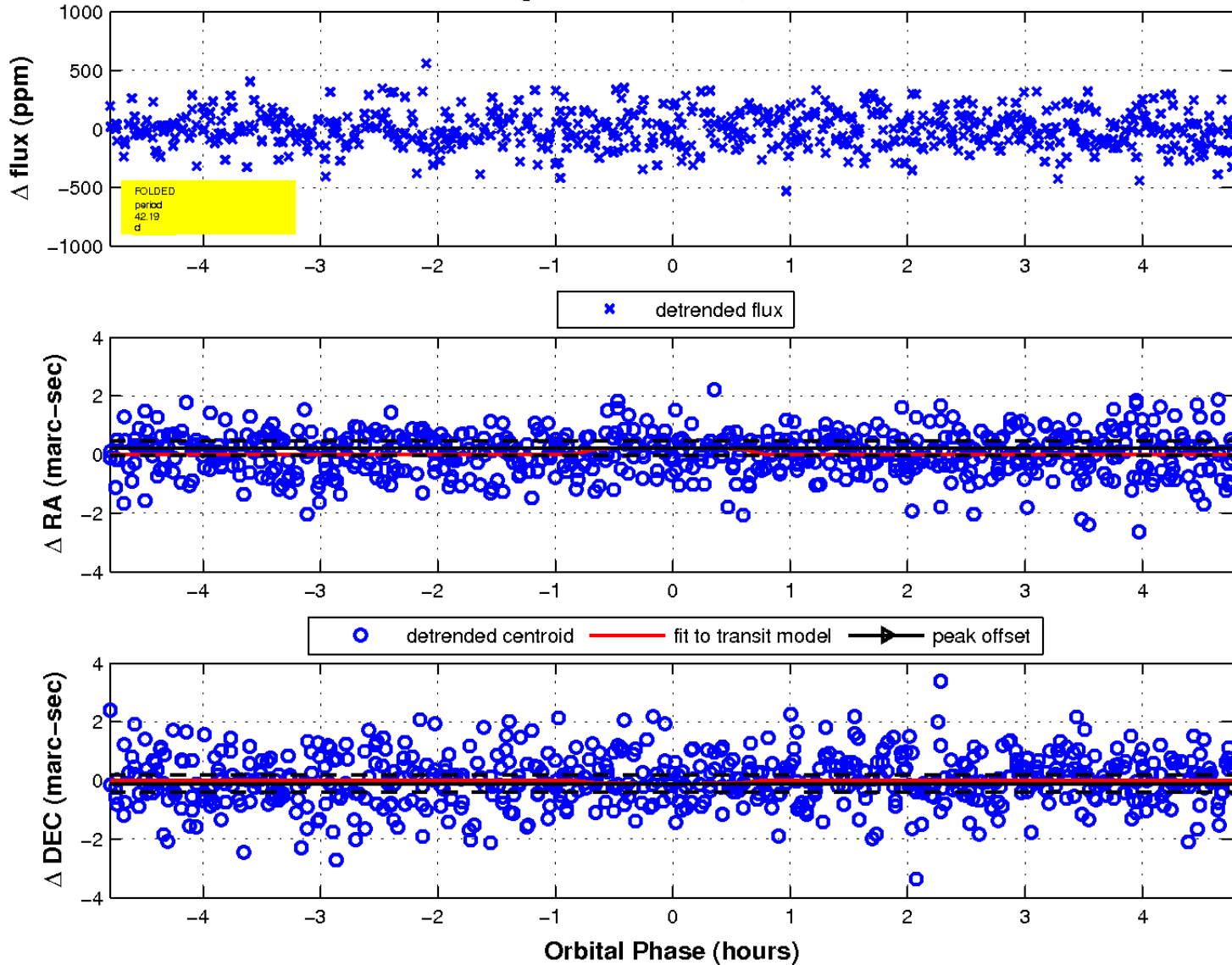
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

Declination

