

KIC 009427220

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})
009427220-01	OBS	No	0.513276	132.040601	5.2	0.910	10.7	1.4	2.53	6701	0.59	50744.44
009427220-02	OBS	No	1.026054	131.840620	32.7	3.867	8.7	9.9	2.53	6701	1.50	20150.96
009427220-03	OBS	No	199.864795	162.635263	255.1	10.992	8.2	6.4	2.53	6701	4.36	17.85
009427220-05	OBS	No	270.881246	198.999213	115.4	9.352	7.7	3.7	2.53	6701	2.81	11.90
009427220-06	OBS	No	53.437549	136.393920	287.1	2.103	7.1	7.0	2.53	6701	5.20	103.61
009427220-07	OBS	No	100.464522	162.450809	146.4	5.000	7.3	-1.0	2.53	6701	3.08	44.65

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009427220-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009427220-02	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT
009427220-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_UNCERTAIN
009427220-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
009427220-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009427220-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_NOFITS

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

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

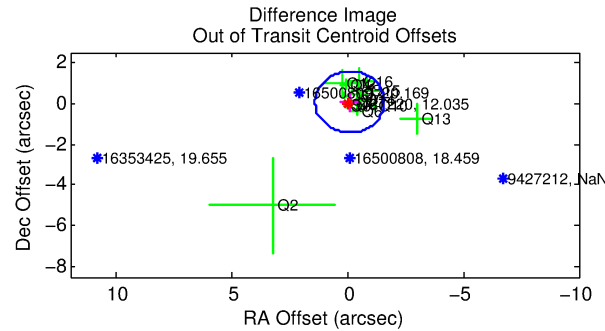
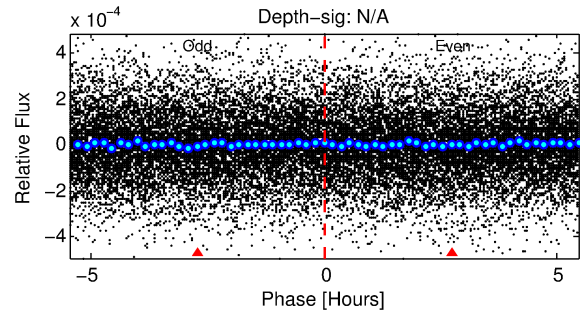
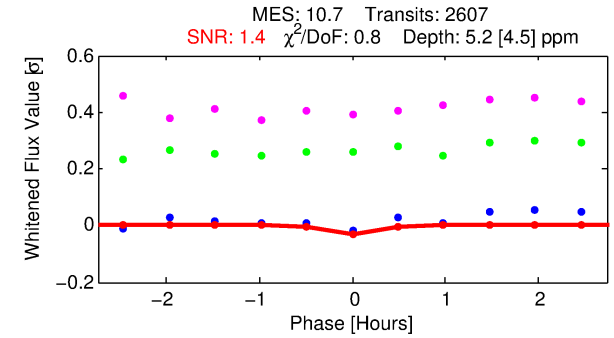
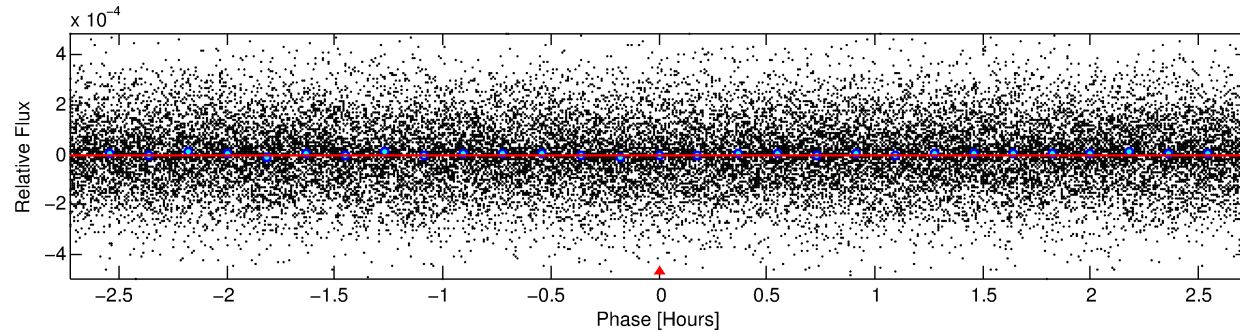
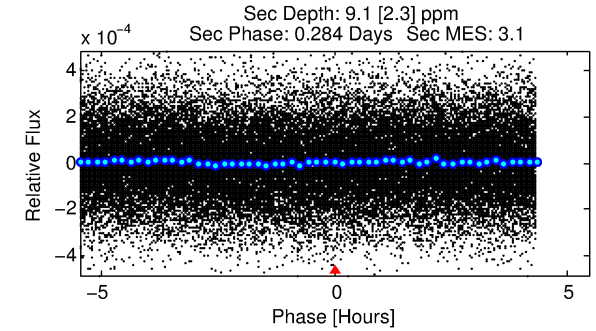
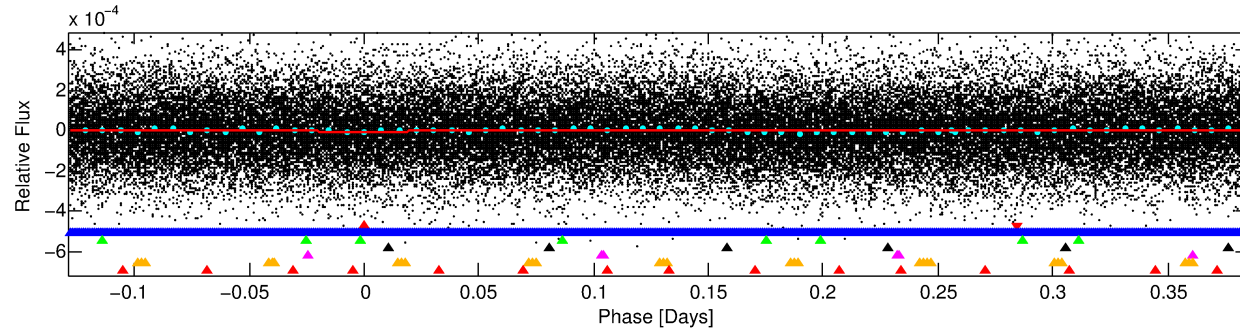
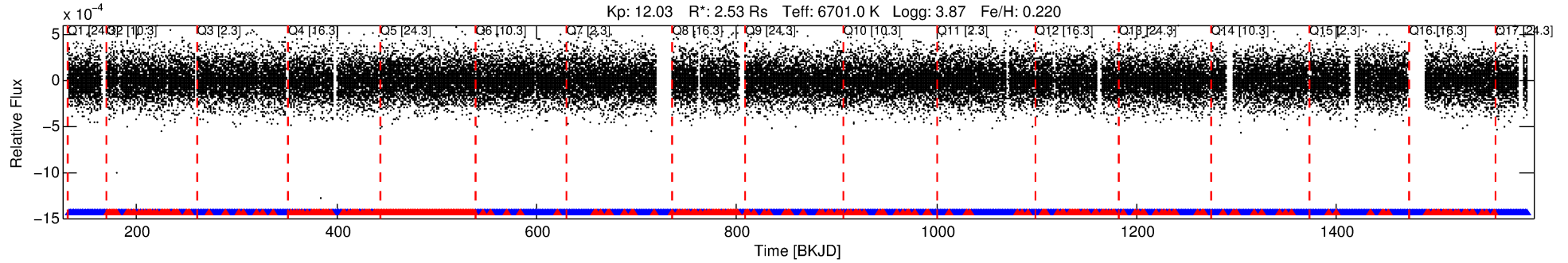
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009427220-01

No Significant Match Found

DV One-Page Summary

KIC: 9427220 Candidate: 1 of 7 Period: 0.513 d



DV Fit Results:

Period = 0.51328 [0.00006] d
Epoch = 132.0406 [0.0098] BKJD
Rp/R* = 0.0021 [0.0093]
a/R* = 4.30 [95.89]
b = 0.17 [135.53]
Seff = 50744.44 [29639.33]
Teff = 3827 [559] K
Rp = 0.59 [2.59] Re
a = 0.0151 [0.0056] AU
Ag = 3.30 [28.96] [0.08σ]
Teffp = 7974 [17477] K [0.24σ]

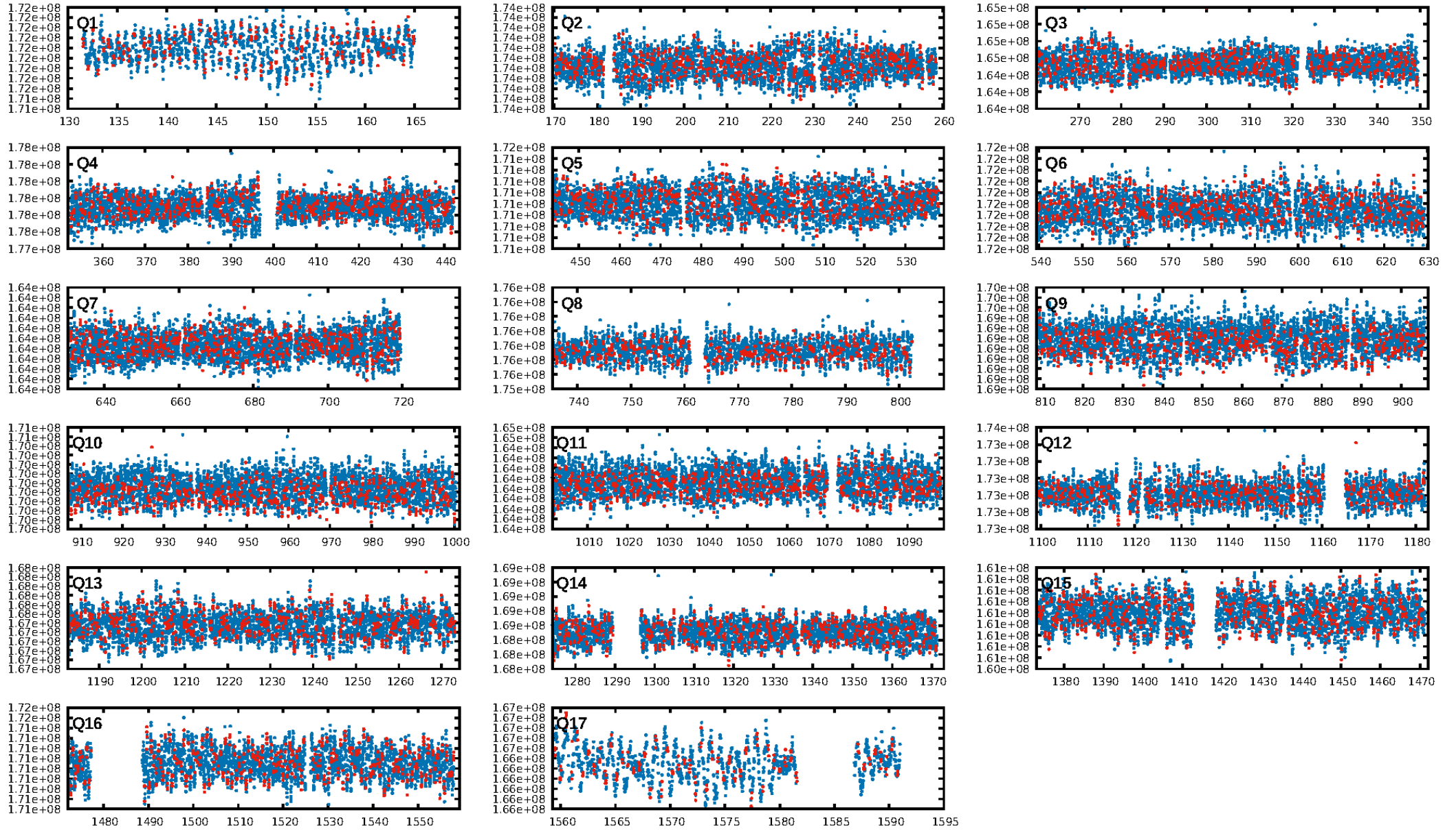
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 99.8% [3.10σ]
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: N/A
RollingBand-fgt: 0.82 [2048/2489]
GhostDiagnostic-chr: -0.9523
Centroid-sig: 54.0%
Centroid-so: 3.825 arcsec [0.60σ]
OotOffset-rm: 0.113 arcsec [0.23σ]
KicOffset-rm: 0.231 arcsec [0.56σ]
OotOffset-st: 4/2/4/3 [13]
KicOffset-st: 4/2/4/3 [13]
DiffImageQuality-fgm: 0.38 [5/13]
DiffImageOverlap-fno: 0.88 [15/17]

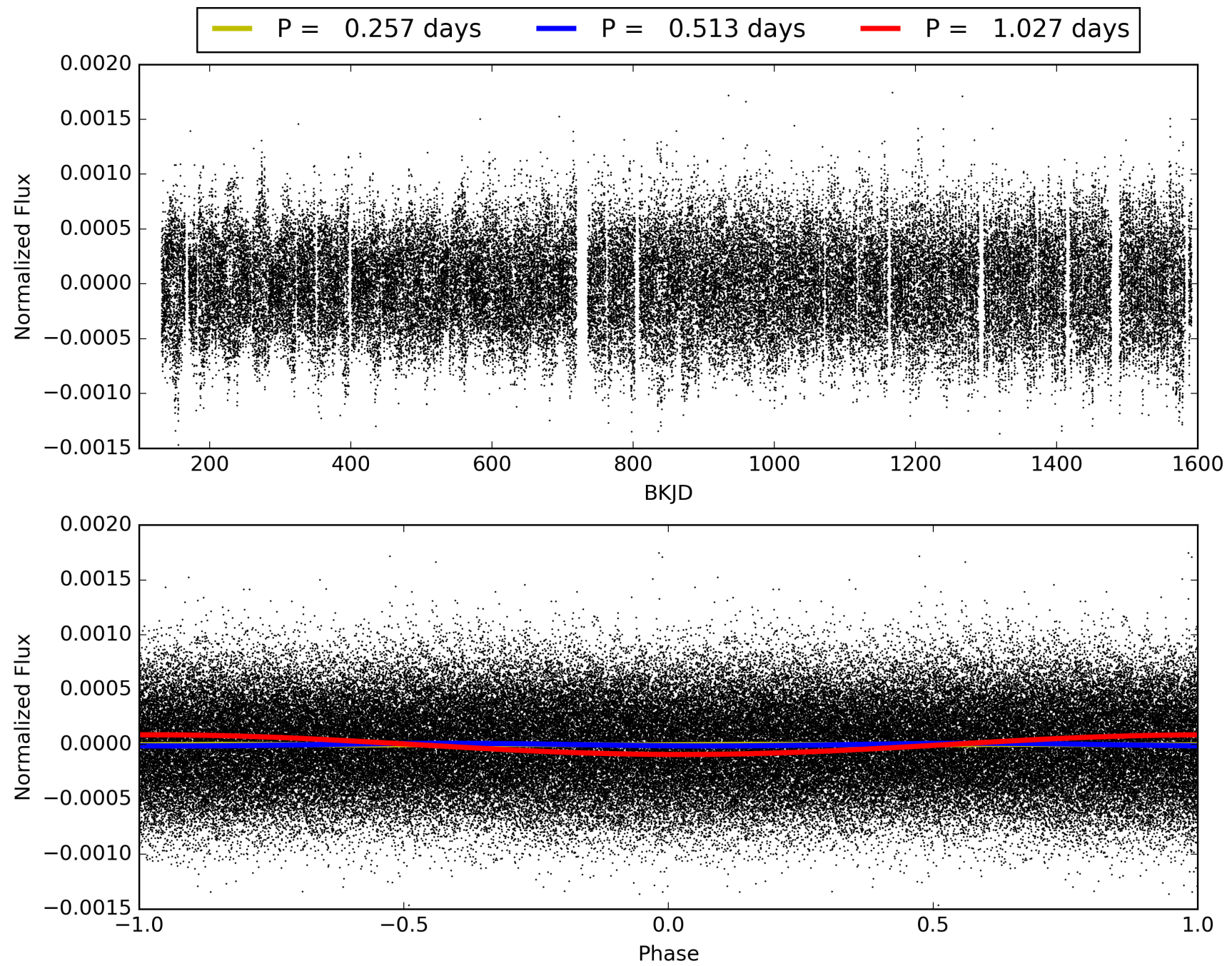
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 13:47:08 Z

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

TCE 009427220-01, PDC Light Curves

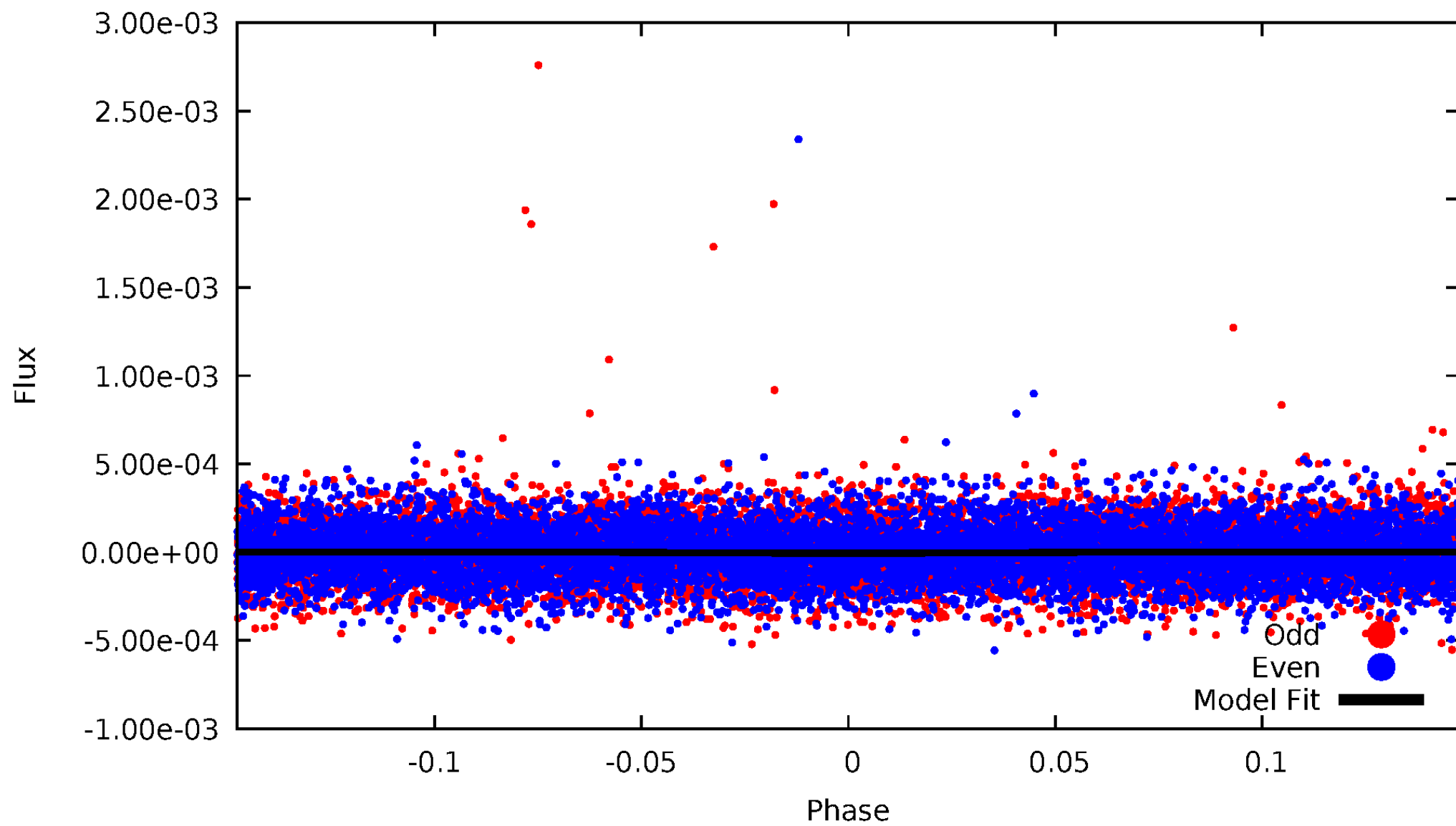


TCE 009427220-01



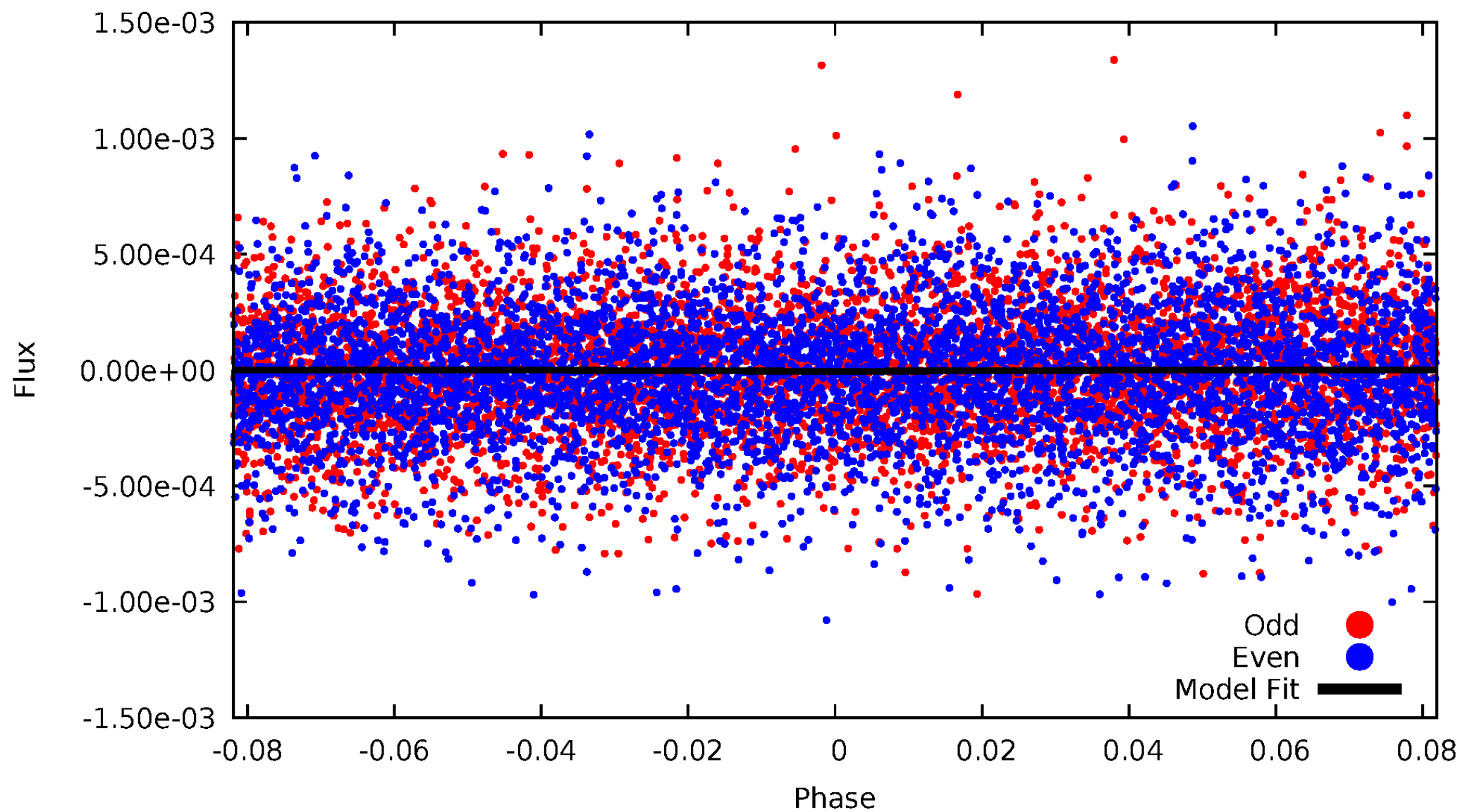
DV Odd/Even

TCE 009427220-01

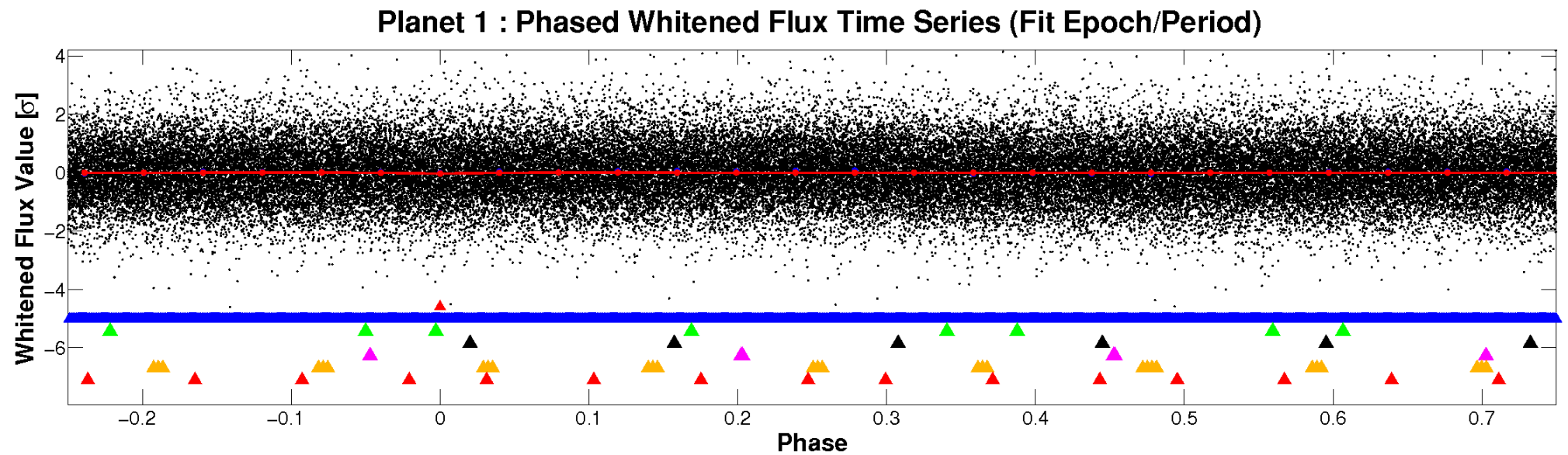
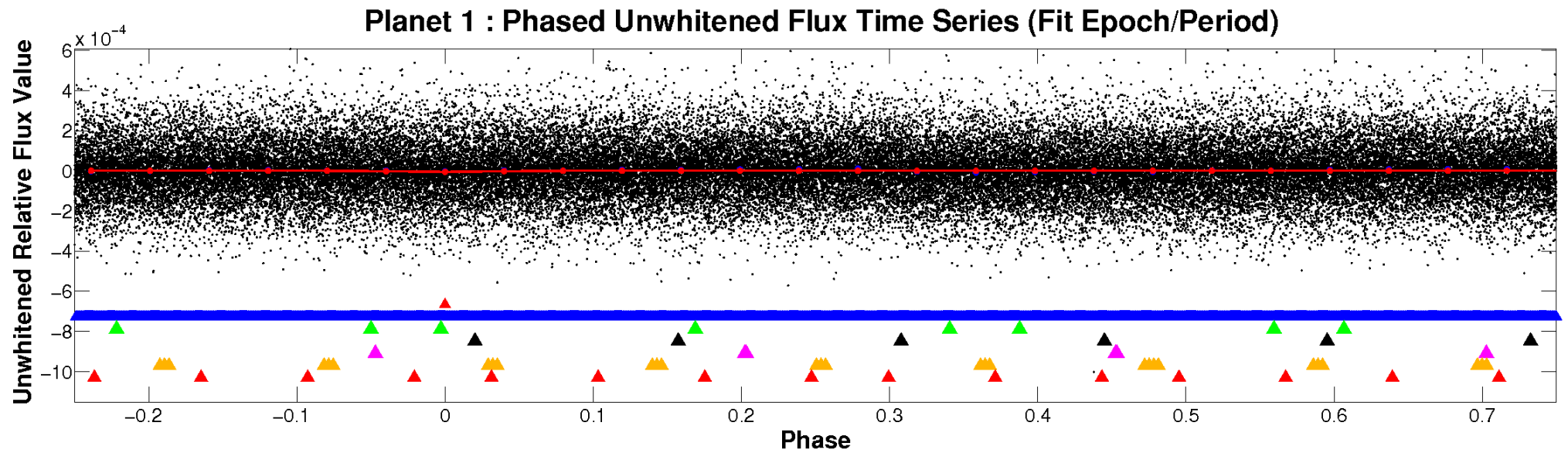


ALT Odd/Even

TCE 009427220-01

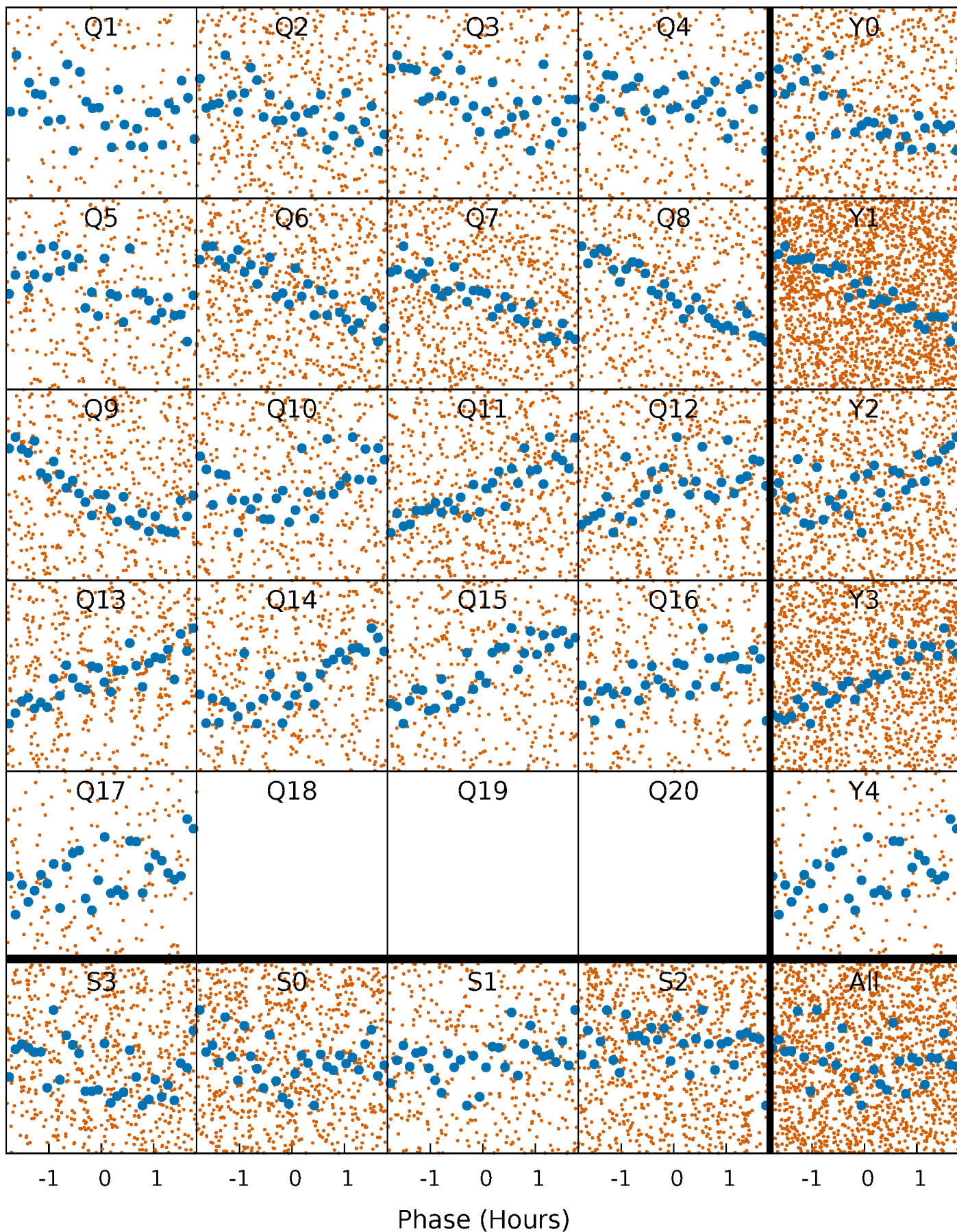


Non-Whitened Vs. Whitened Light Curve



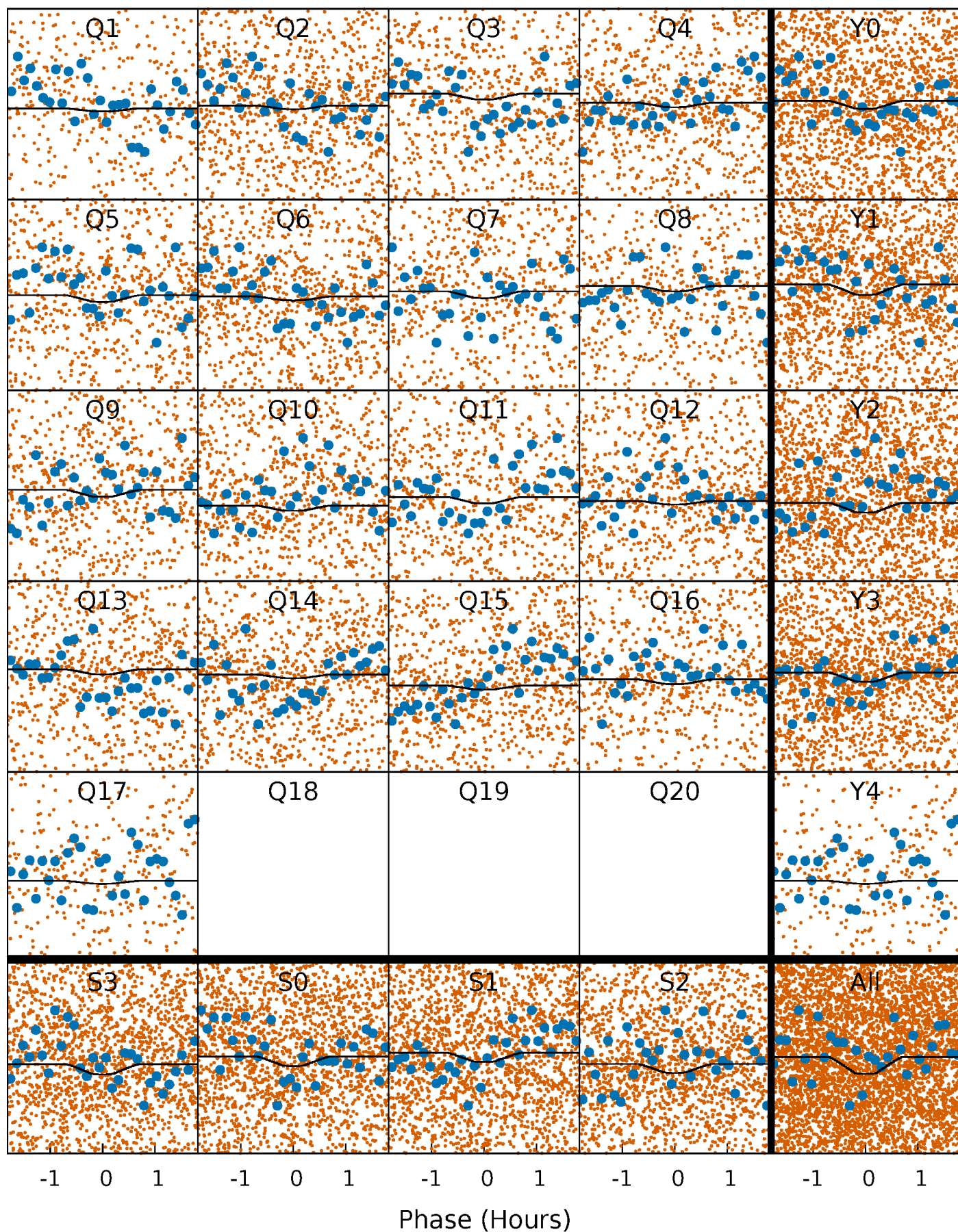
PDC Quarter-Phased Transit Curves

TCE 009427220-01 P= 0.513276 Days $T_0=132.040601$ (BKJD)



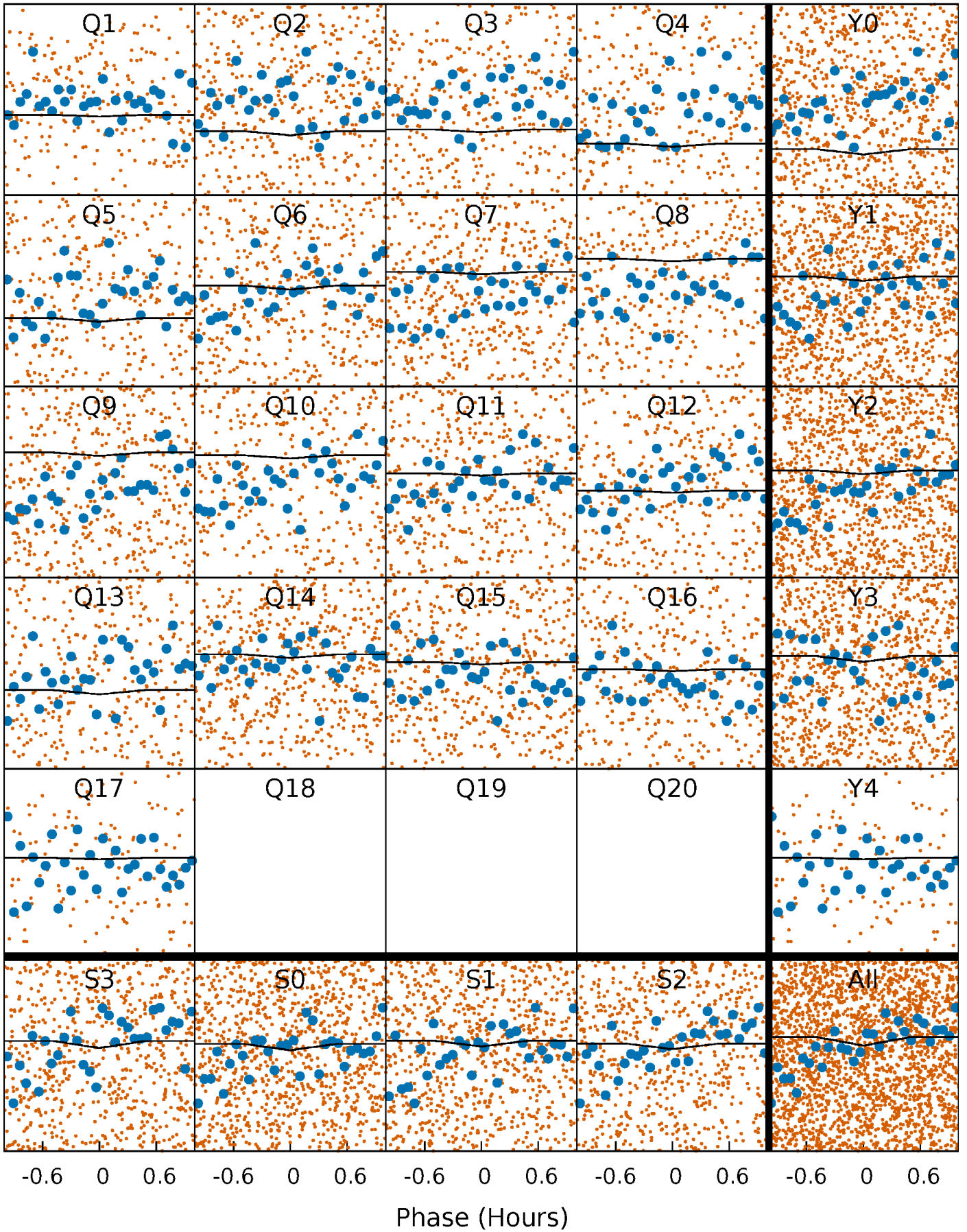
DV Quarter-Phased Transit Curves

TCE 009427220-01 P= 0.513276 Days $T_0=132.040601$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

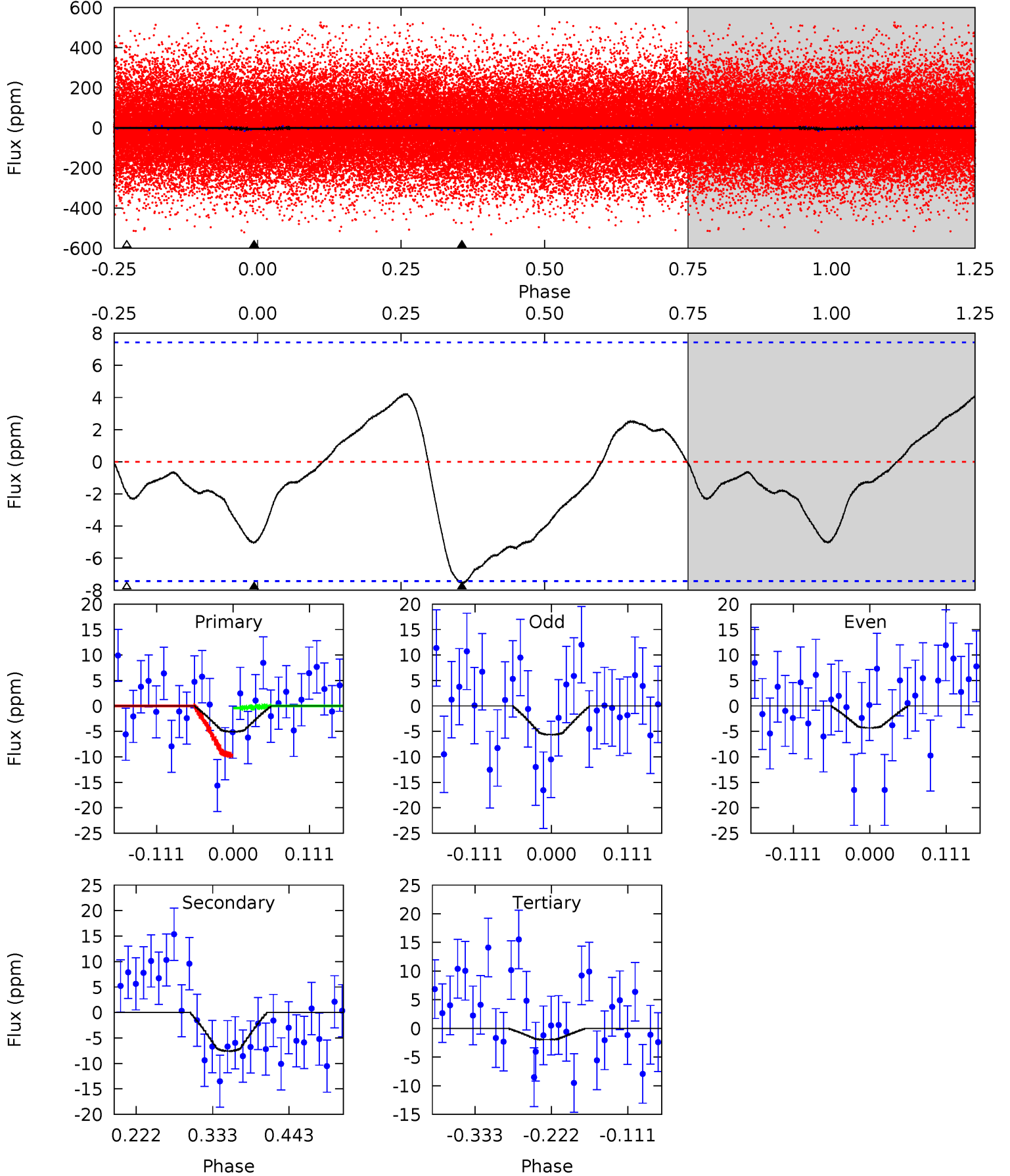
TCE 009427220-01 P= 0.513024 Days $T_0=132.013152$ (BKJD)



DV Model-Shift Uniqueness Test

009427220-01, P = 0.513276 Days, E = 131.014049 Days

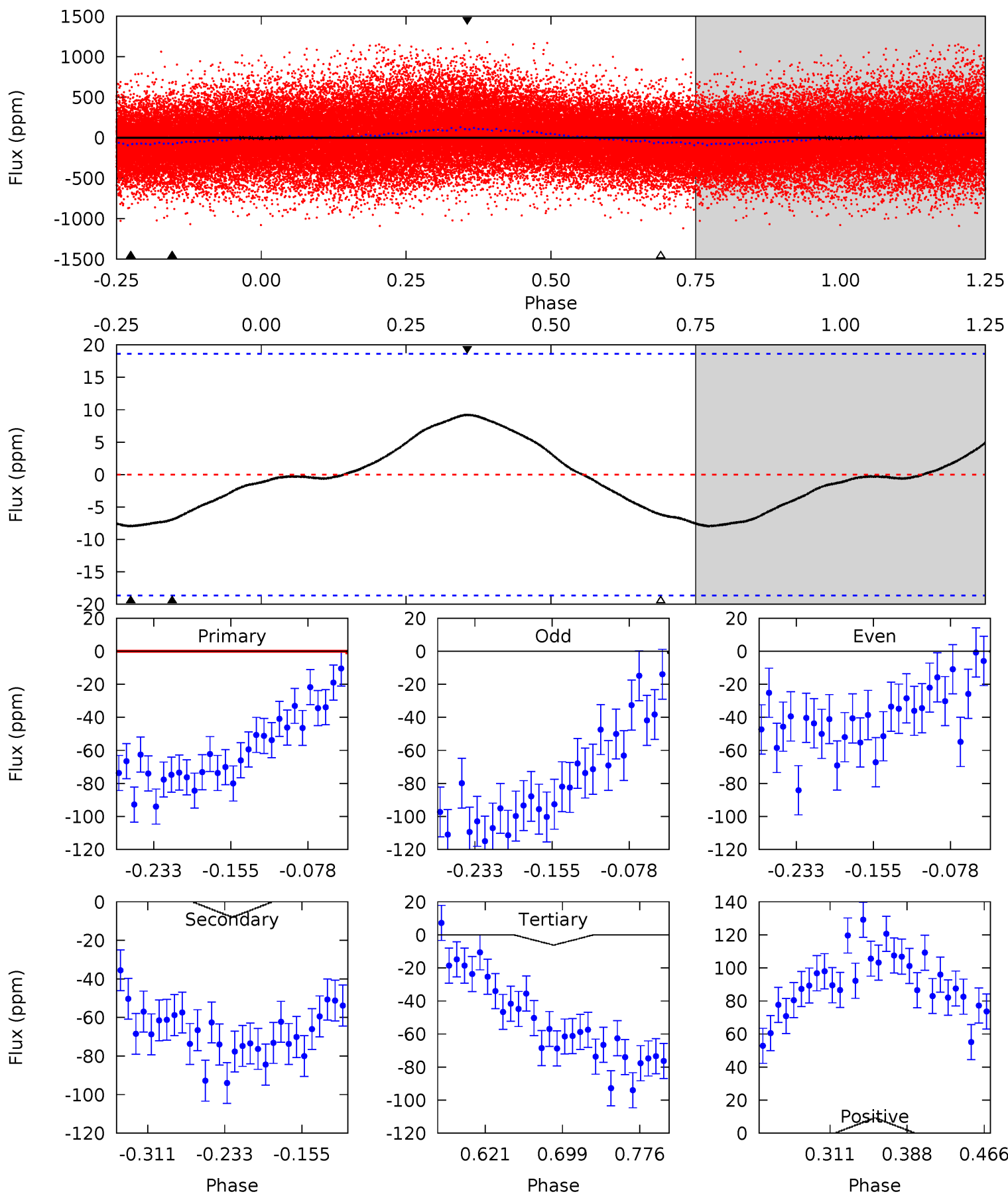
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
3.10	4.63	1.19	0	4.54	1.59	1.37	1.90	3.10	3.43	4.63	0.41	0.41	0.36	2.84



Alt Model-Shift Uniqueness Test

009427220-01, P = 0.513024 Days, E = 131.500128 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
1.72	1.97	1.53	2.29	4.62	1.76	1.16	0.19	-0.57	0.44	-0.31	1.83	2.54	0.54	1.62



Stellar Parameters For KIC 009427220

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	6701^{+185}_{-255}	$3.872^{+0.319}_{-0.147}$	$0.220^{+0.150}_{-0.300}$	$2.527^{+0.652}_{-1.060}$	$1.732^{+0.178}_{-0.386}$	$0.151^{+0.390}_{-0.063}$
	+3%/-4%	+8%/-4%	+68%/-136%	+26%/-42%	+10%/-22%	+258%/-42%
Source	PHO54	PHO54	PHO54	DSEP		

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

Secondary Eclipse Parameters for KIC 009427220-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	-8 ± 2	$1.89^{+1.93}_{-1.36}$	5243^{+439}_{-517}	-3184^{+10504}_{-1160}	$0.256^{+2.824}_{-0.196}$
Alt.	-8 ± 4	$1.82^{+2.01}_{-1.30}$	5282^{+390}_{-519}	-3157^{+10786}_{-1259}	$0.254^{+3.259}_{-0.205}$

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 $A_{obs} \gg 1.0$

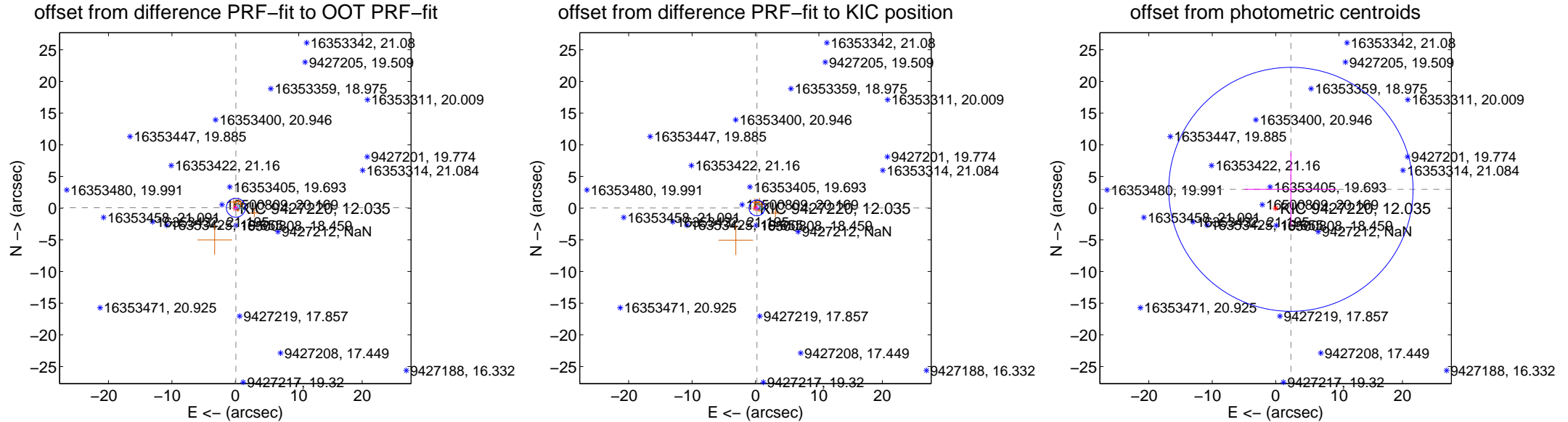
DV Centroid Data

Supplemental centroid analysis for 009427220-01. Kepler magnitude: 12.04. Transit SNR 1.44

There are 5 quarters with good PRF difference image offsets

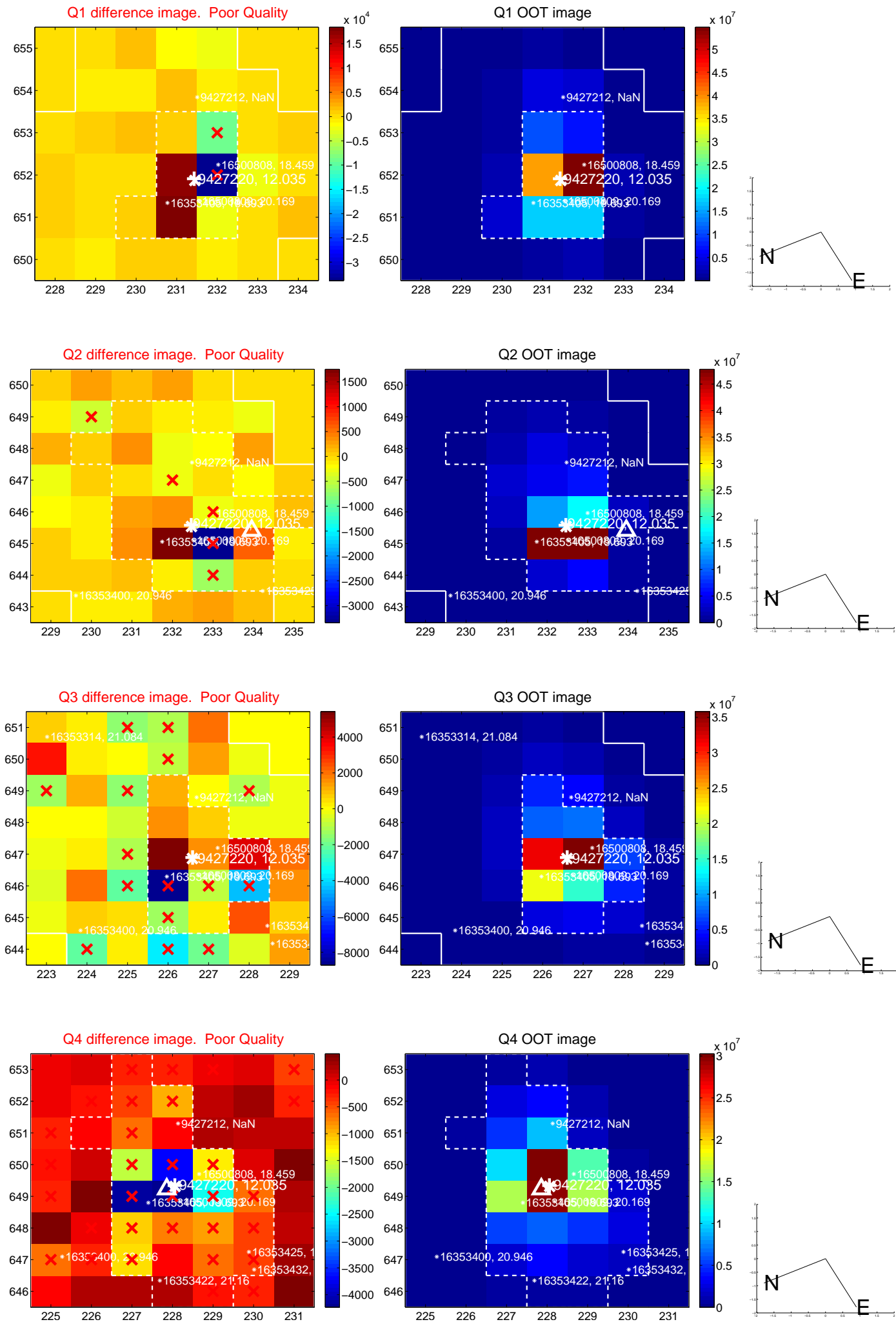
The direct PRF centroid is offset from the target star catalog position by about 0.15 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.113 ± 0.500	0.23	-0.088 ± 0.376	0.070 ± 0.425
PRF-fit source offset from KIC position	0.231 ± 0.414	0.56	-0.228 ± 0.375	0.038 ± 0.424
photometric centroid source offset	3.83 ± 6.42	0.60	-2.41 ± 7.27	2.97 ± 5.80

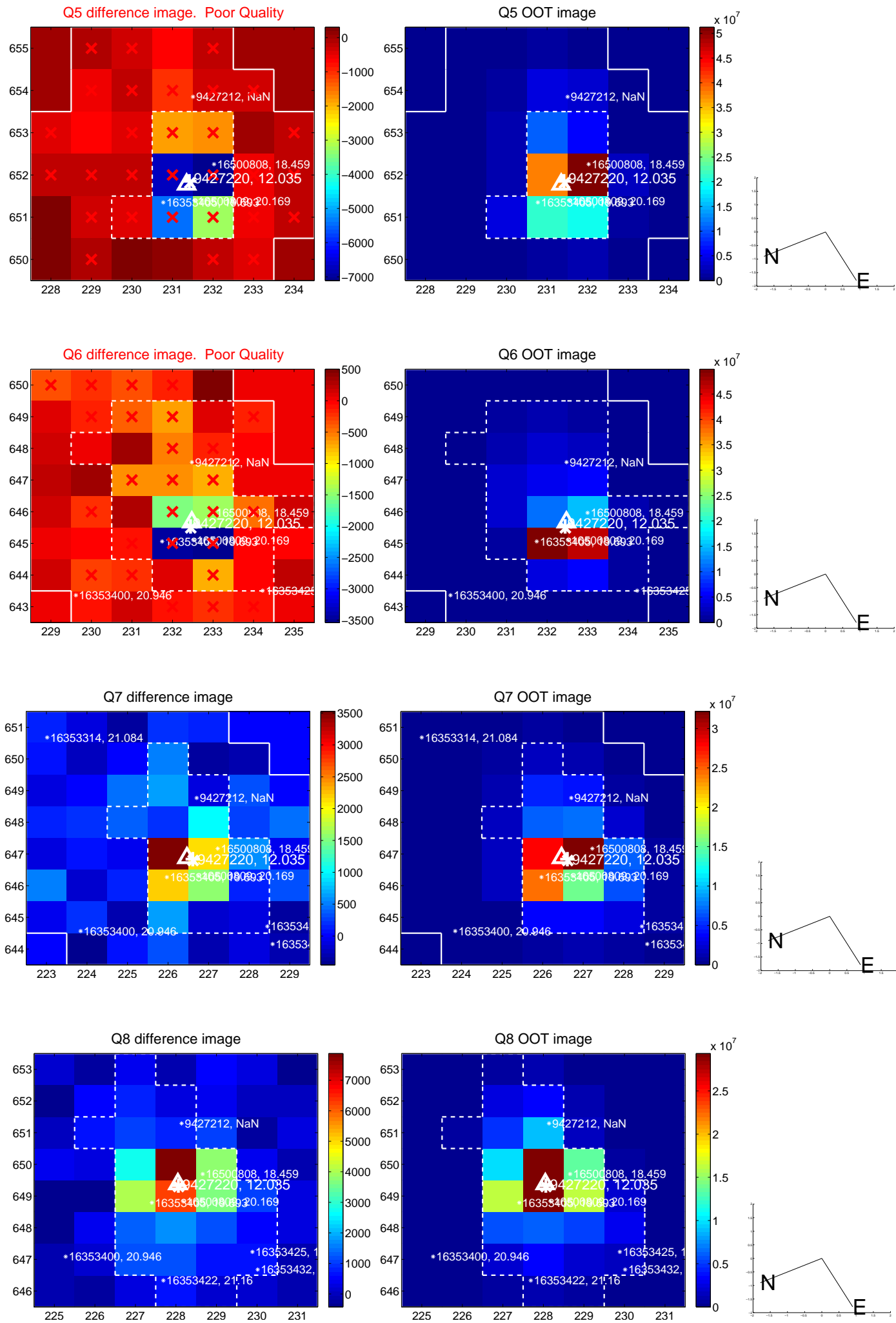


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

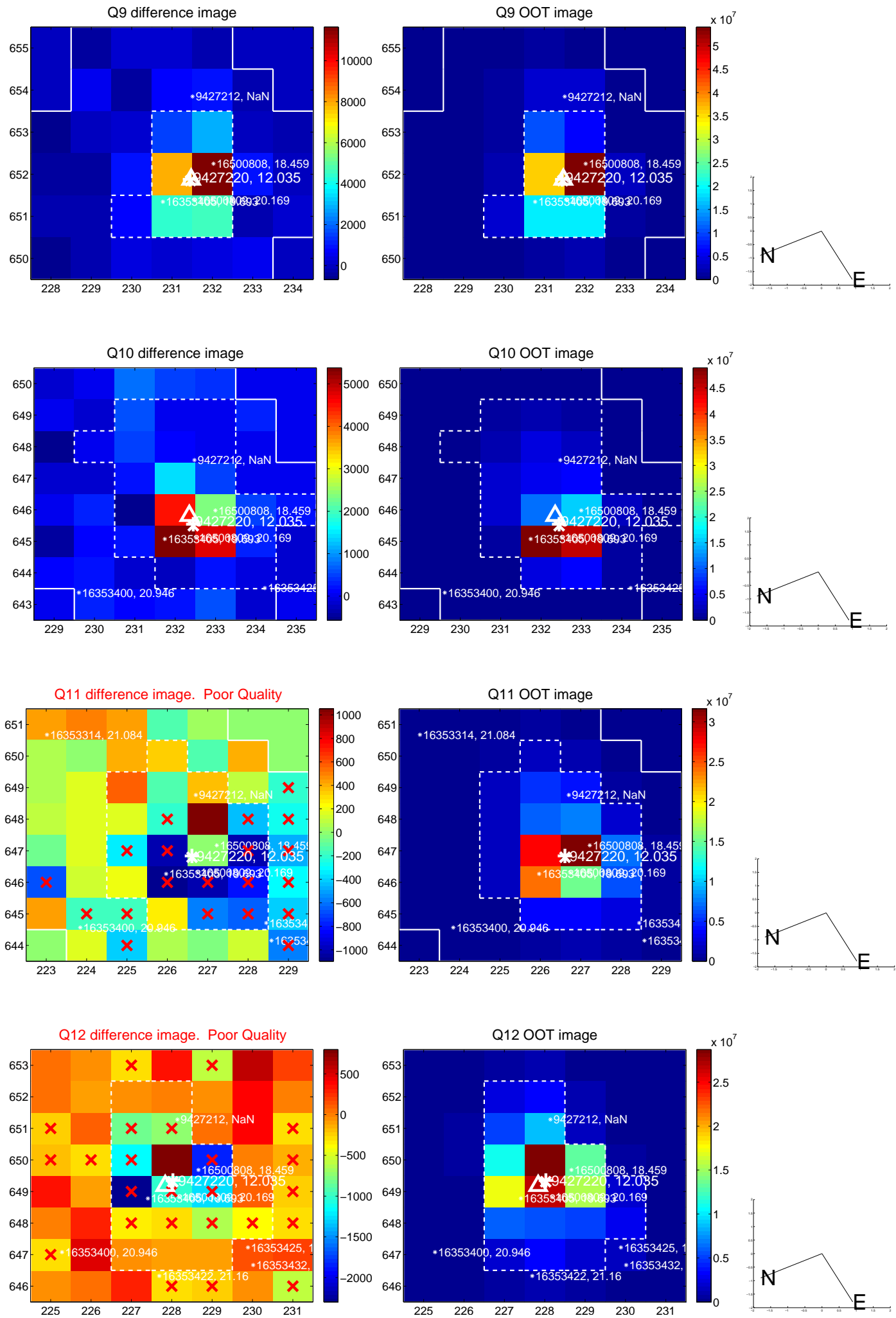
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



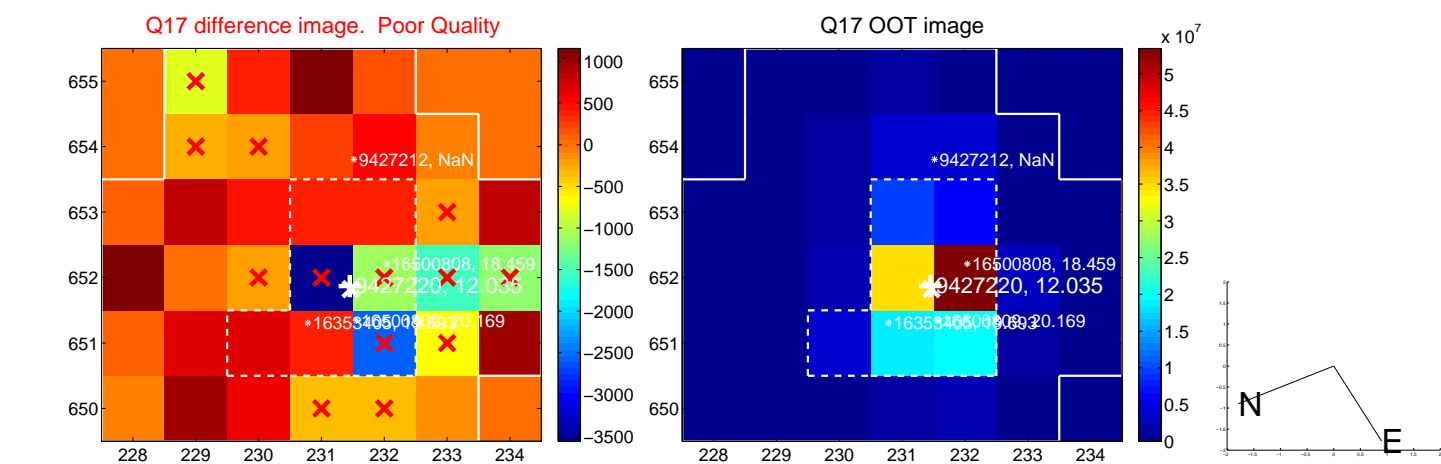
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



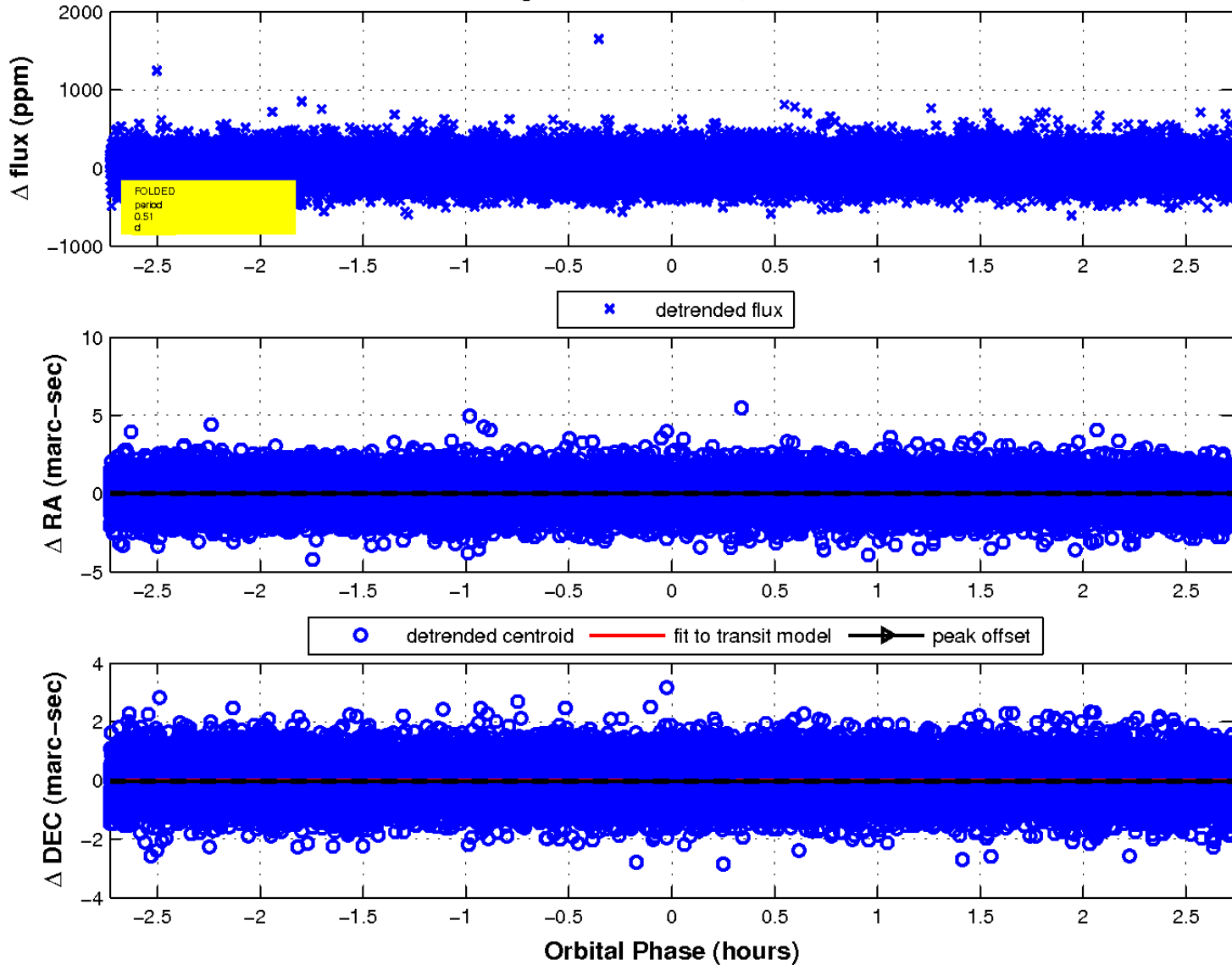
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



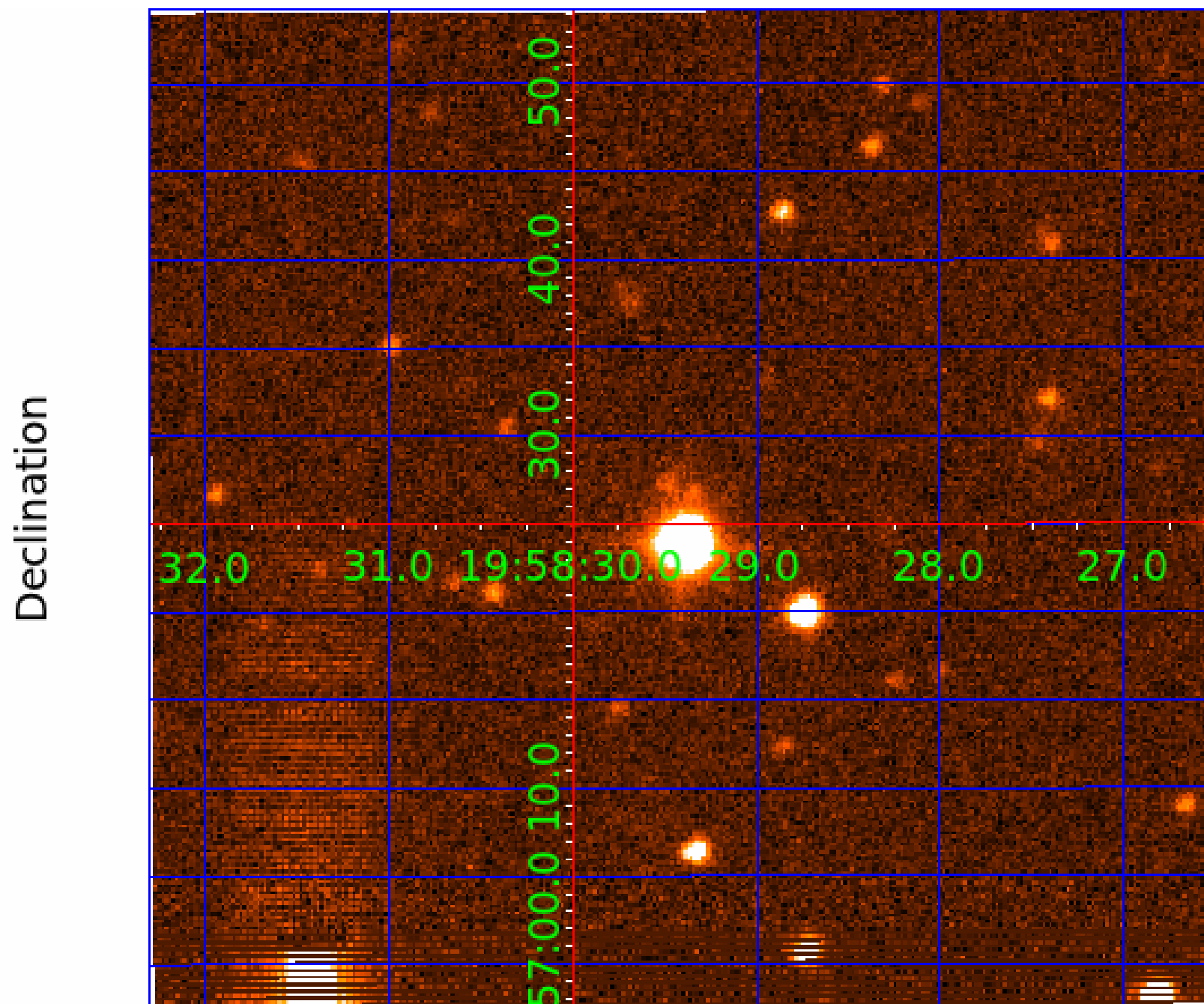
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



fluxWeightedCentroids, Planet 1 of 7



UKIRT Image



KIC 009427220

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})
009427220-01	OBS	No	0.513276	132.040601	5.2	0.910	10.7	1.4	2.53	6701	0.59	50744.44
009427220-02	OBS	No	1.026054	131.840620	32.7	3.867	8.7	9.9	2.53	6701	1.50	20150.96
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009427220-06	OBS	No	53.437549	136.393920	287.1	2.103	7.1	7.0	2.53	6701	5.20	103.61
009427220-07	OBS	No	100.464522	162.450809	146.4	5.000	7.3	-1.0	2.53	6701	3.08	44.65

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009427220-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009427220-02	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT
009427220-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_UNCERTAIN
009427220-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
009427220-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009427220-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_NOFITS

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

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

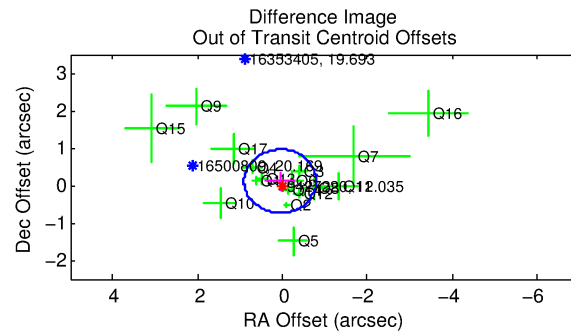
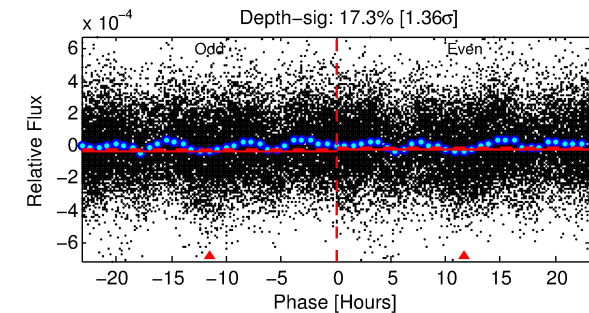
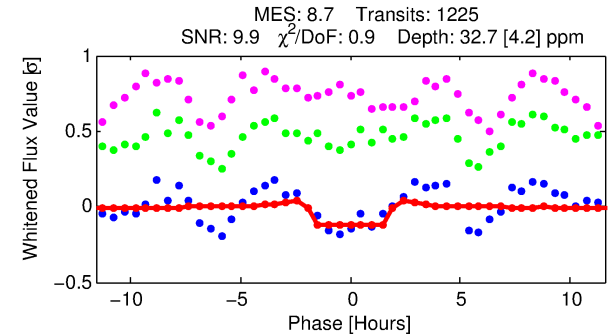
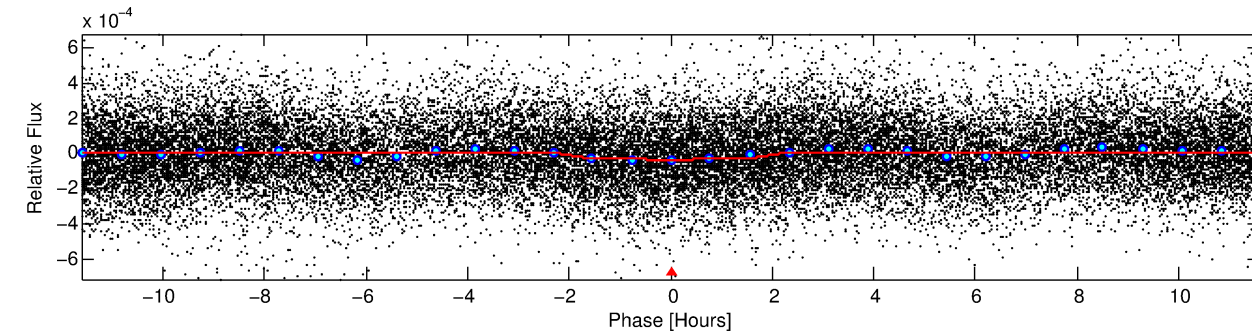
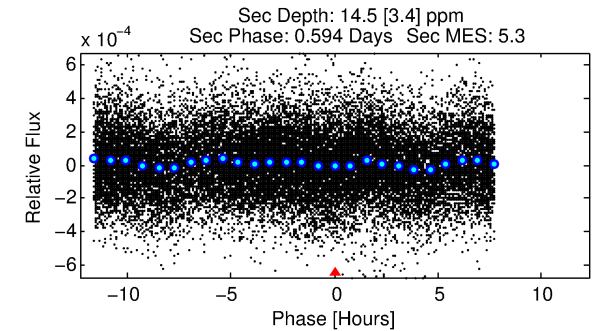
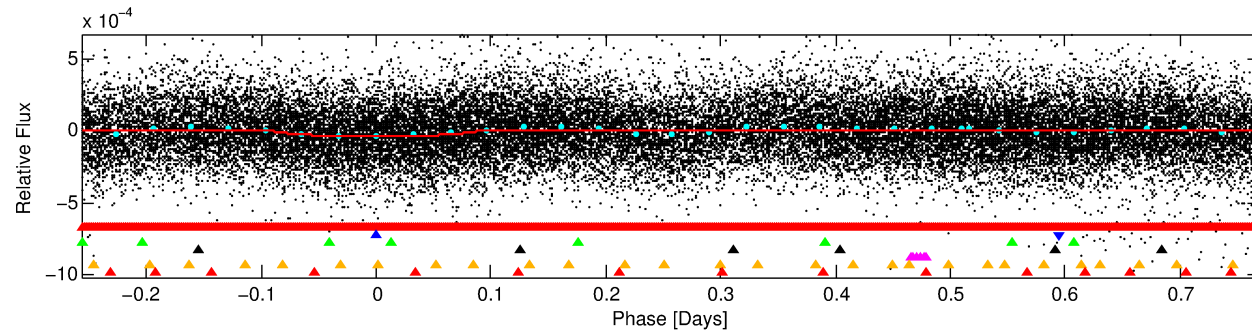
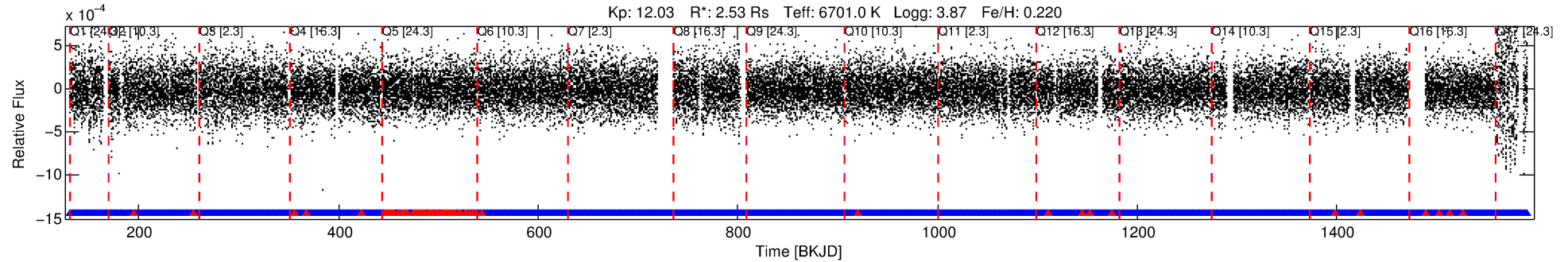
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009427220-02

No Significant Match Found

DV One-Page Summary

KIC: 9427220 Candidate: 2 of 7 Period: 1.026 d



DV Fit Results:

Period = 1.02605 [0.00001] d
Epoch = 131.8406 [0.0033] BKJD
Rp/R* = 0.0054 [0.0015]
a/R* = 1.89 [2.04]
b = 0.52 [2.10]
Seff = 20150.96 [11769.98]
Teq = 3038 [444] K
Rp = 1.50 [0.76] Re
a = 0.0239 [0.0089] AU
Ag = 2.04 [1.69] [0.62σ]
Teffp = 5616 [880] K [2.62σ]

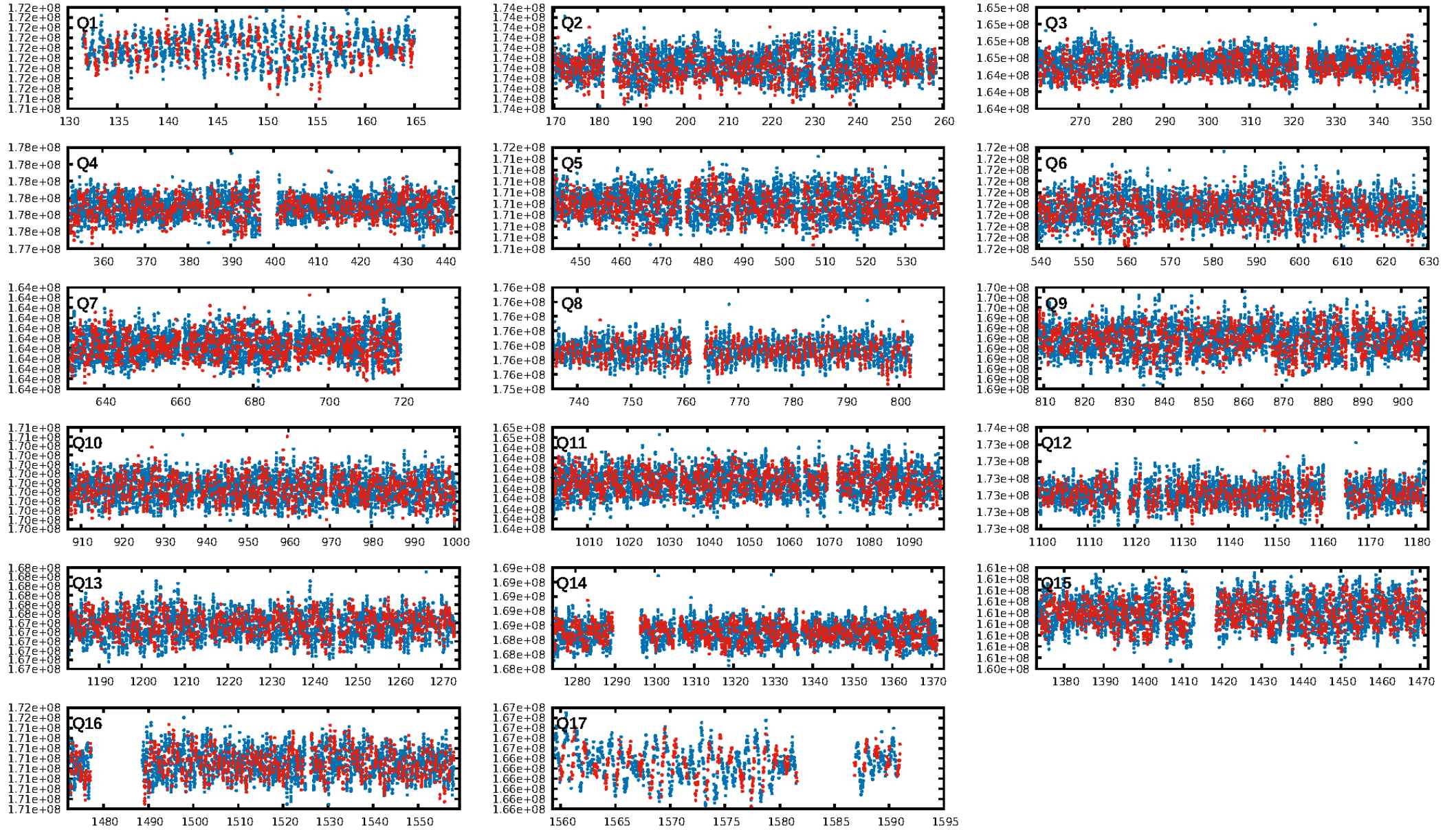
DV Diagnostic Results:

ShortPeriod-sig: 99.8% [3.10σ]
LongPeriod-sig: 100.0% [285.74σ]
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: N/A
RollingBand-fgt: 0.94 [1098/1166]
GhostDiagnostic-chr: 0.5462
Centroid-sig: 38.0%
Centroid-so: 0.607 arcsec [0.86σ]
OotOffset-rm: 0.123 arcsec [0.43σ]
KicOffset-rm: 0.122 arcsec [0.40σ]
OotOffset-st: 4/4/4/5 [17]
KicOffset-st: 4/4/4/5 [17]
DiffImageQuality-fgm: 0.82 [14/17]
DiffImageOverlap-fno: 0.00 [0/17]

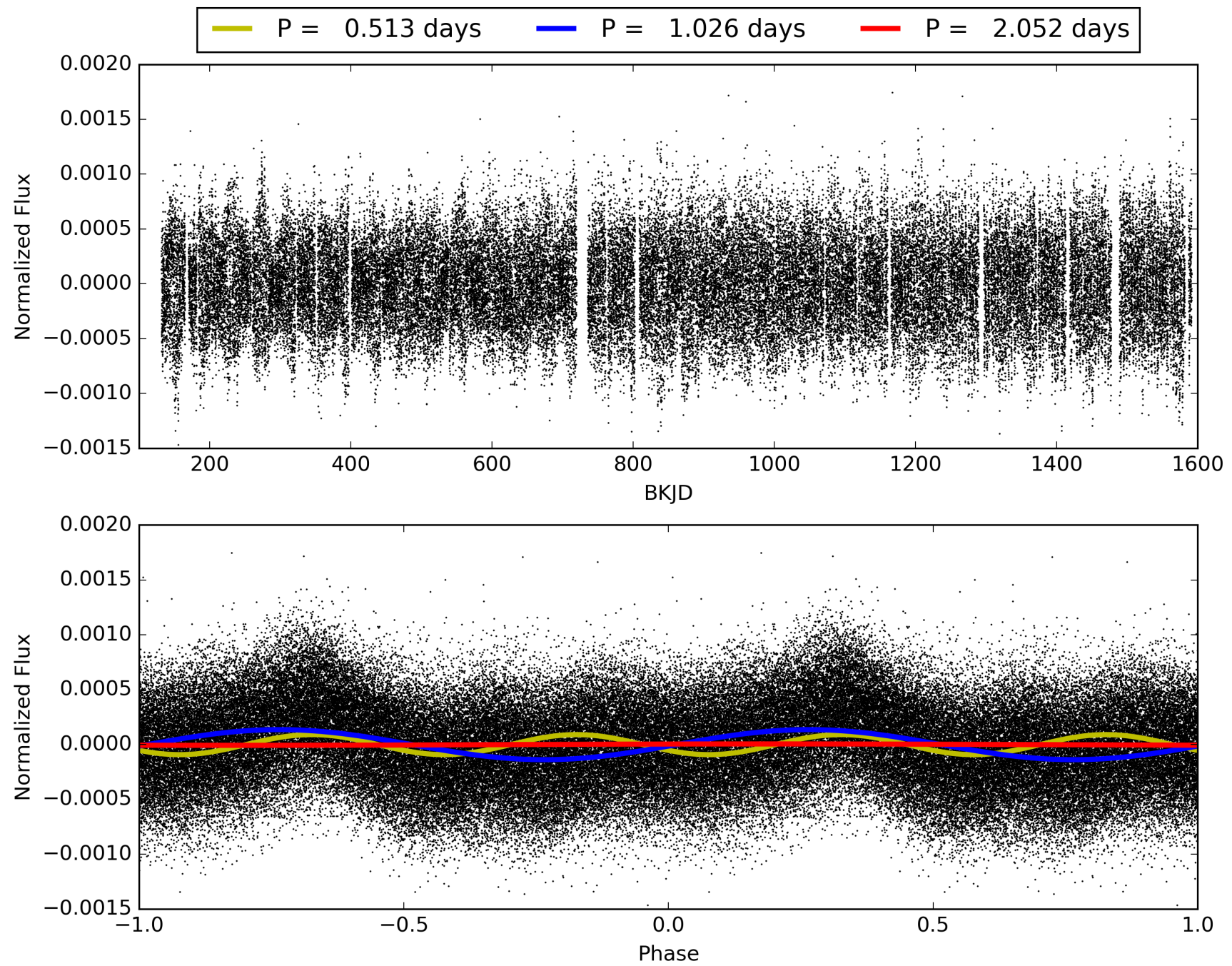
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 13:47:19 Z

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

TCE 009427220-02, PDC Light Curves

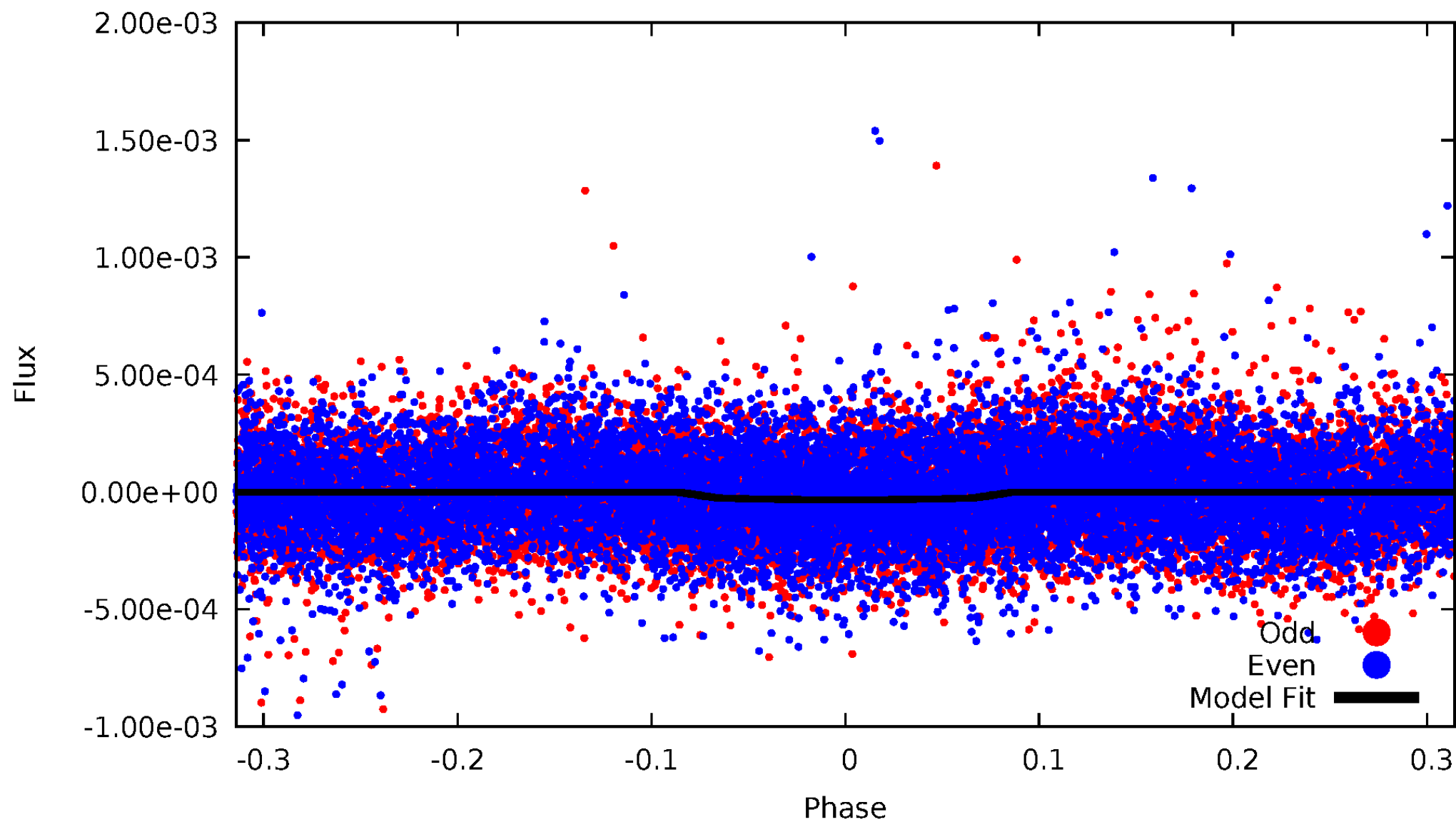


TCE 009427220-02



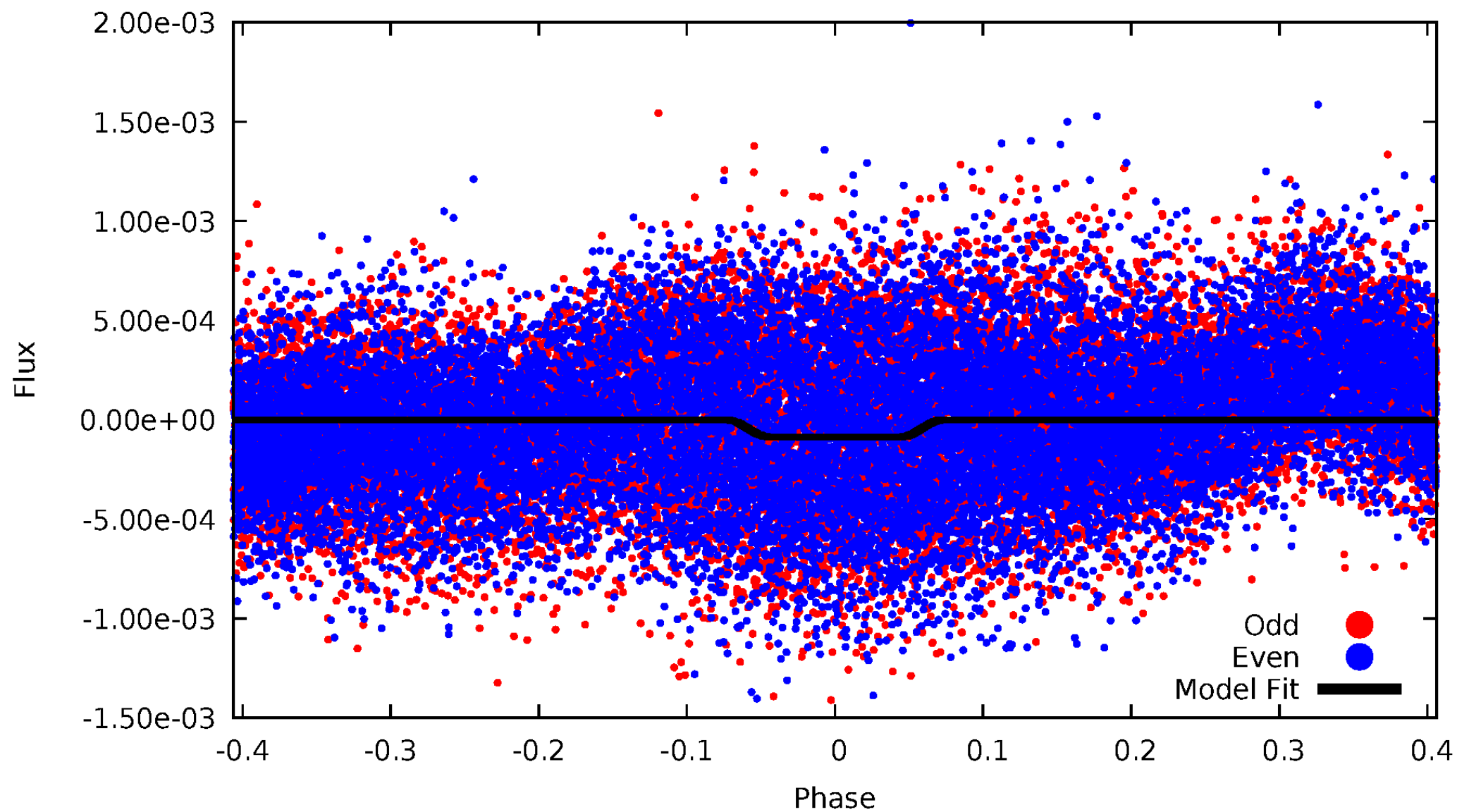
DV Odd/Even

TCE 009427220-02



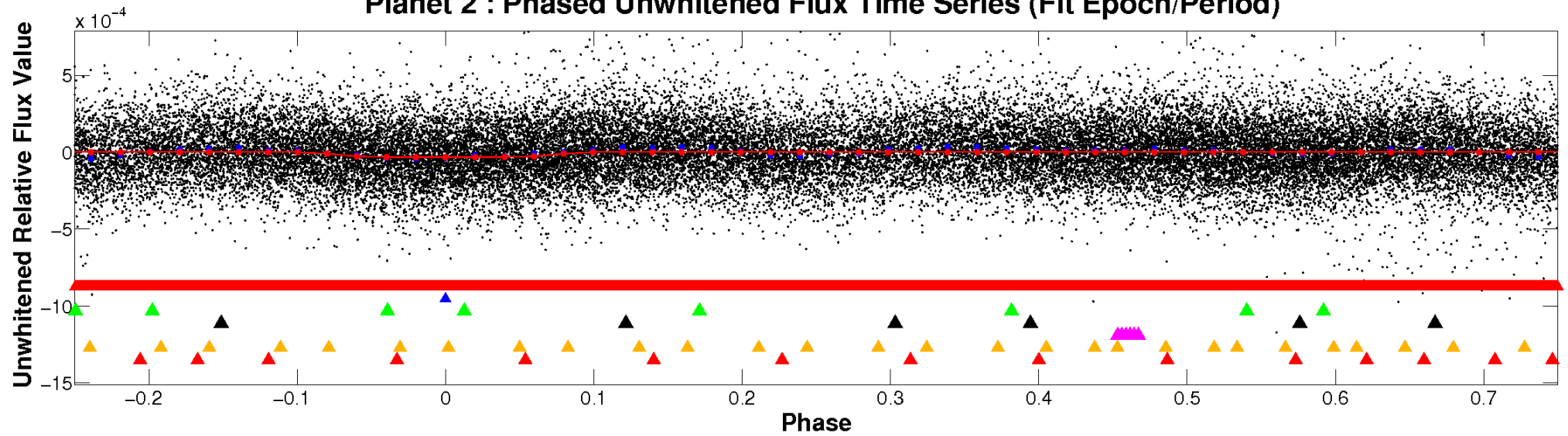
ALT Odd/Even

TCE 009427220-02

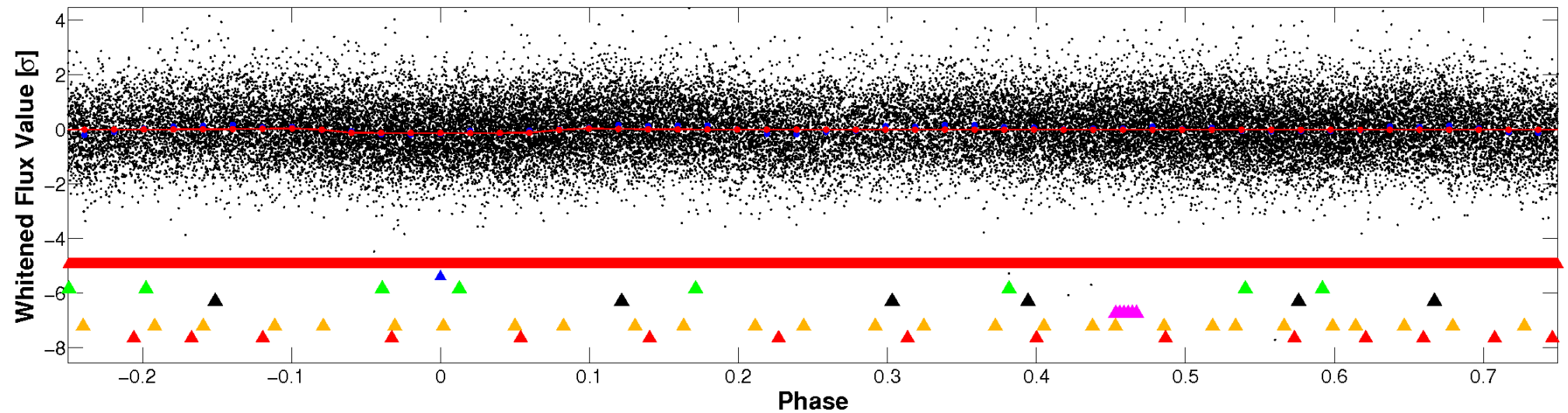


Non-Whitened Vs. Whitened Light Curve

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

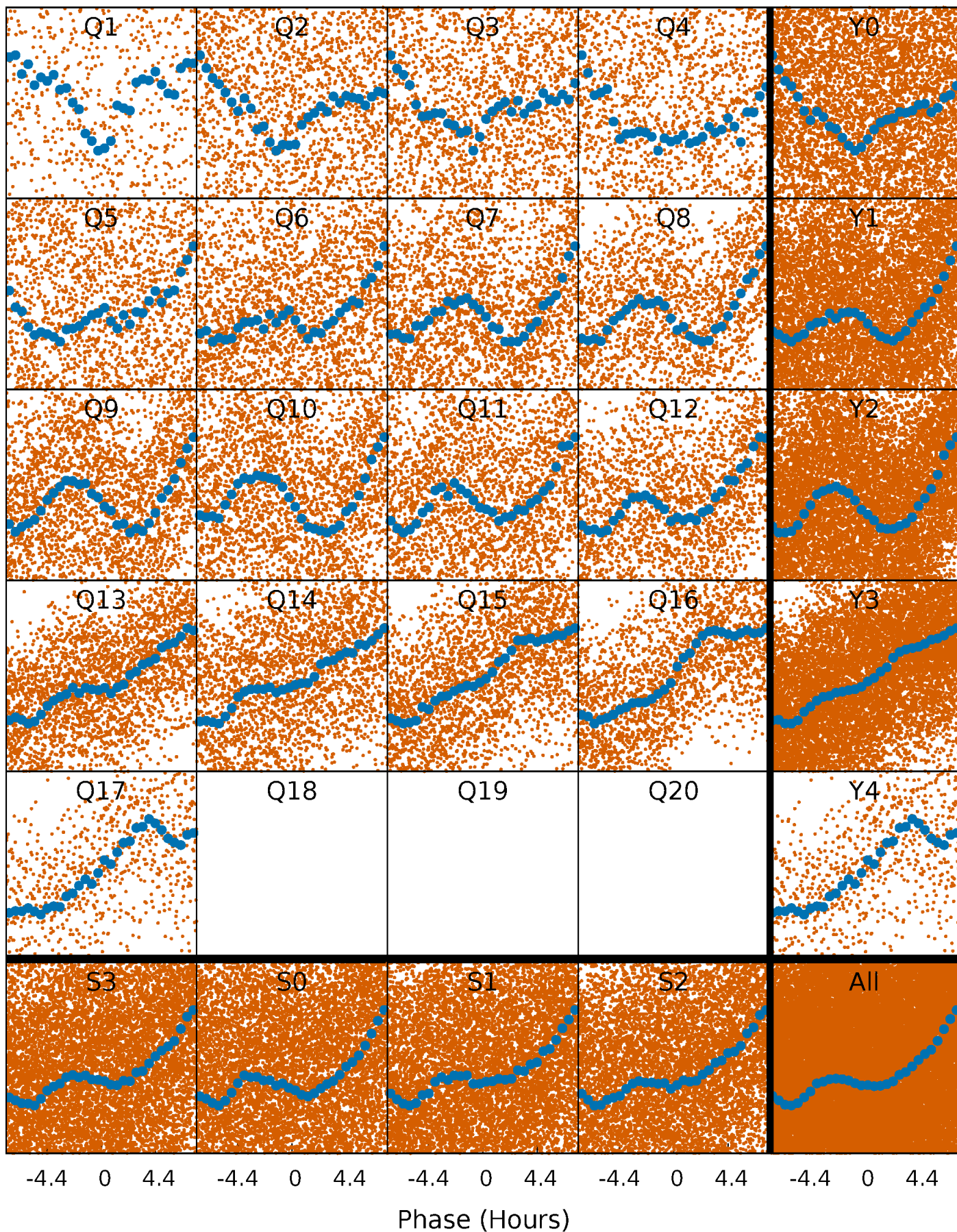


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



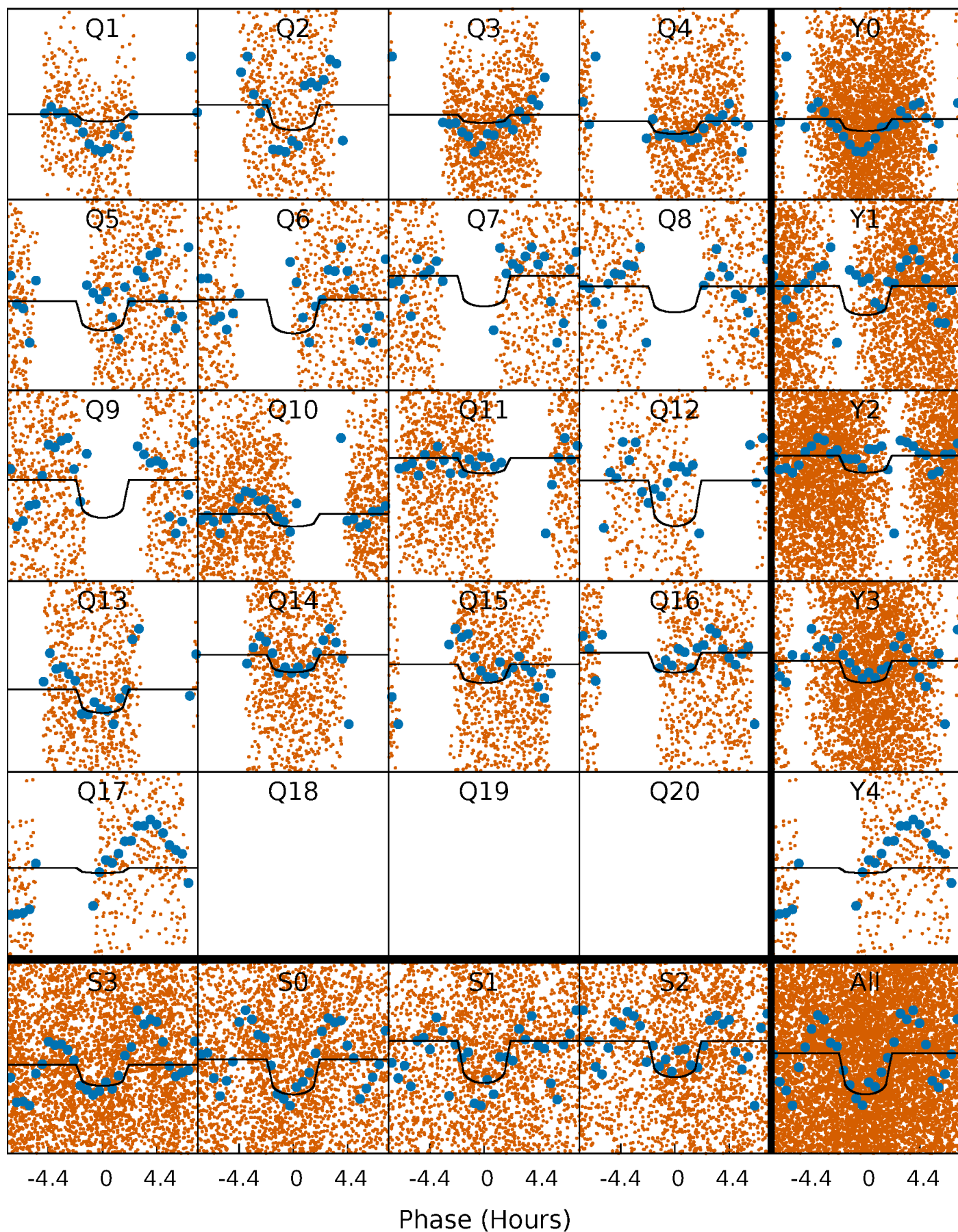
PDC Quarter-Phased Transit Curves

TCE 009427220-02 P= 1.026054 Days $T_0=131.840620$ (BKJD)



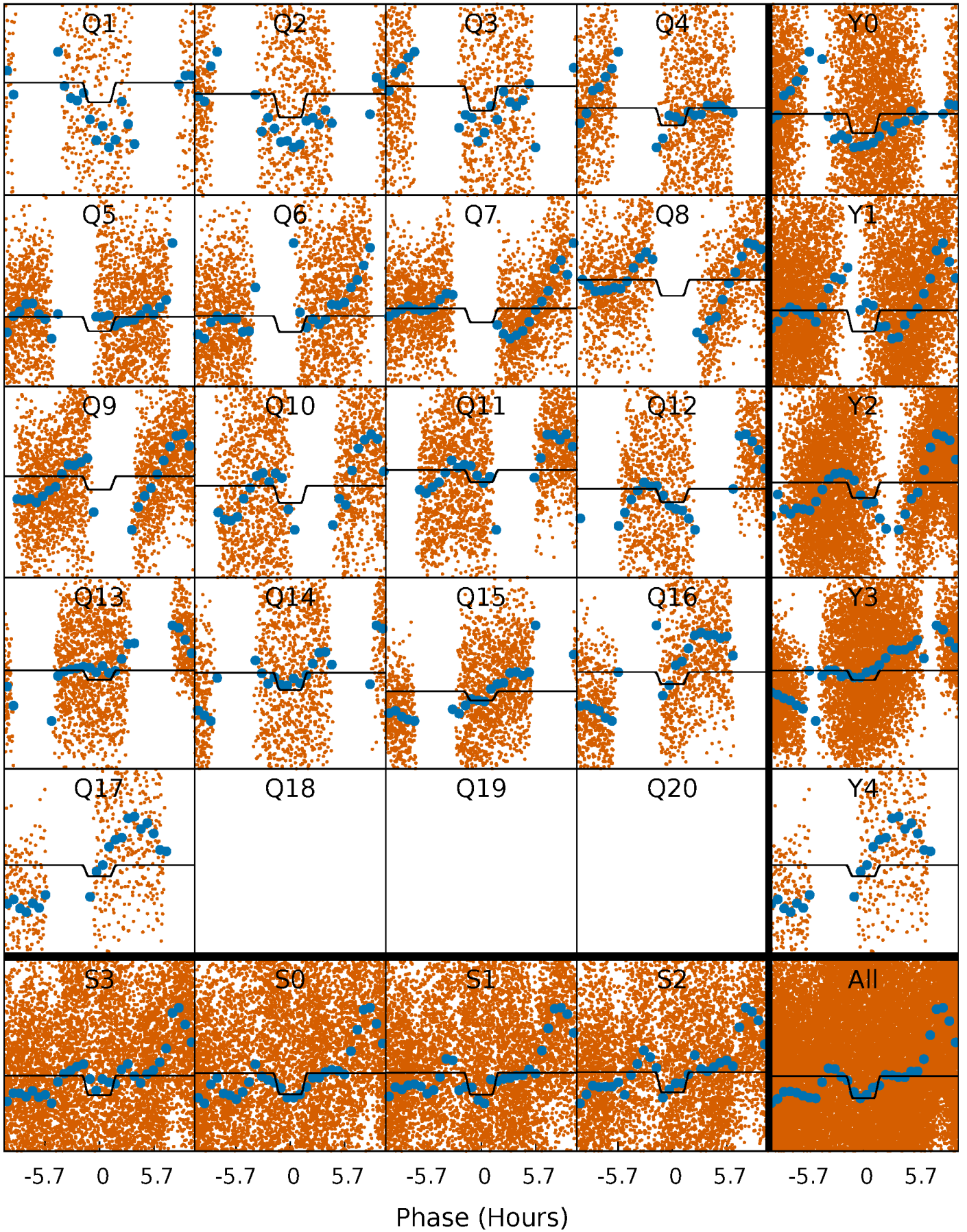
DV Quarter-Phased Transit Curves

TCE 009427220-02 P= 1.026054 Days $T_0=131.840620$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

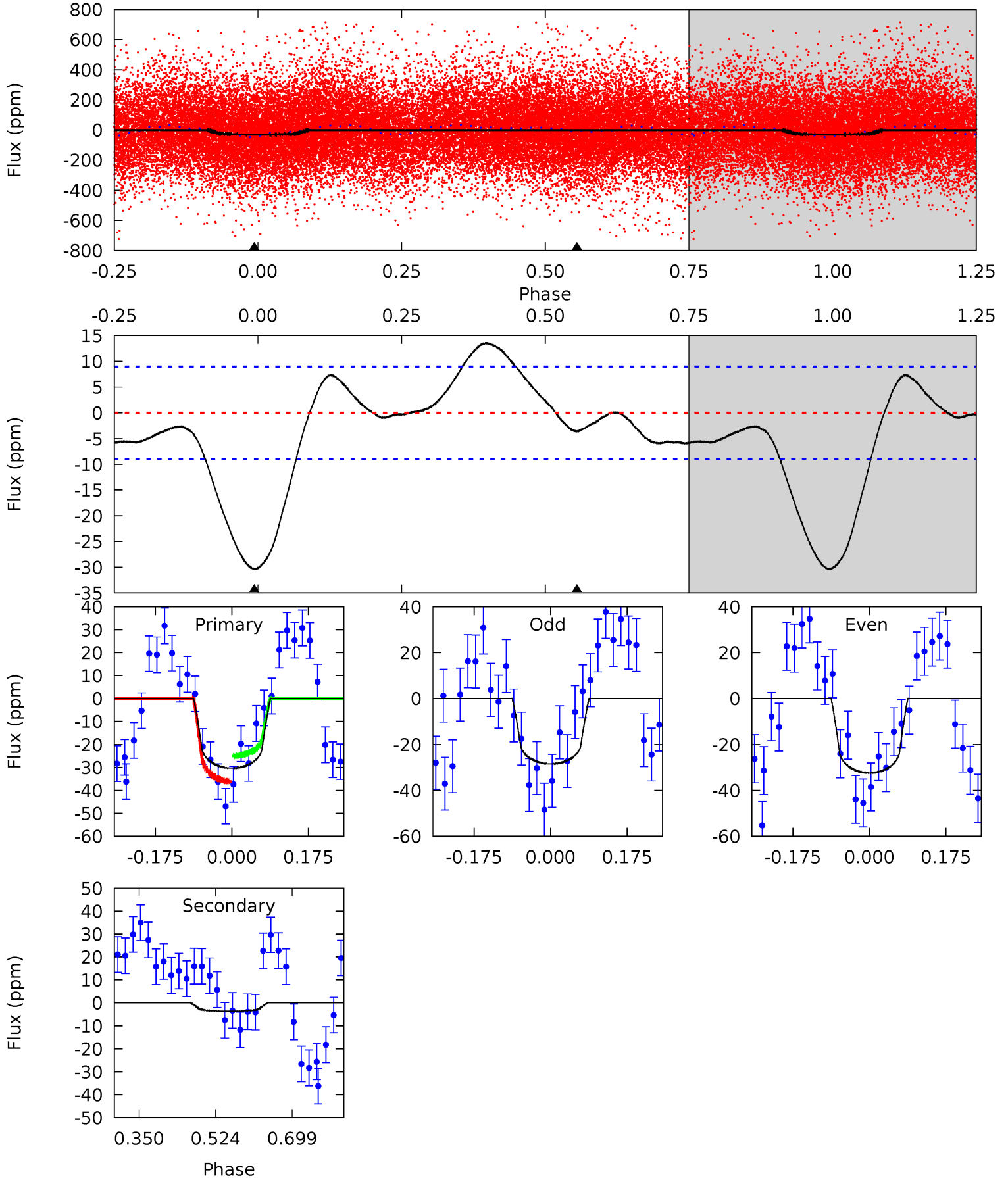
TCE 009427220-02 P= 1.026083 Days $T_0=131.802359$ (BKJD)



DV Model-Shift Uniqueness Test

009427220-02, P = 1.026054 Days, E = 130.814566 Days

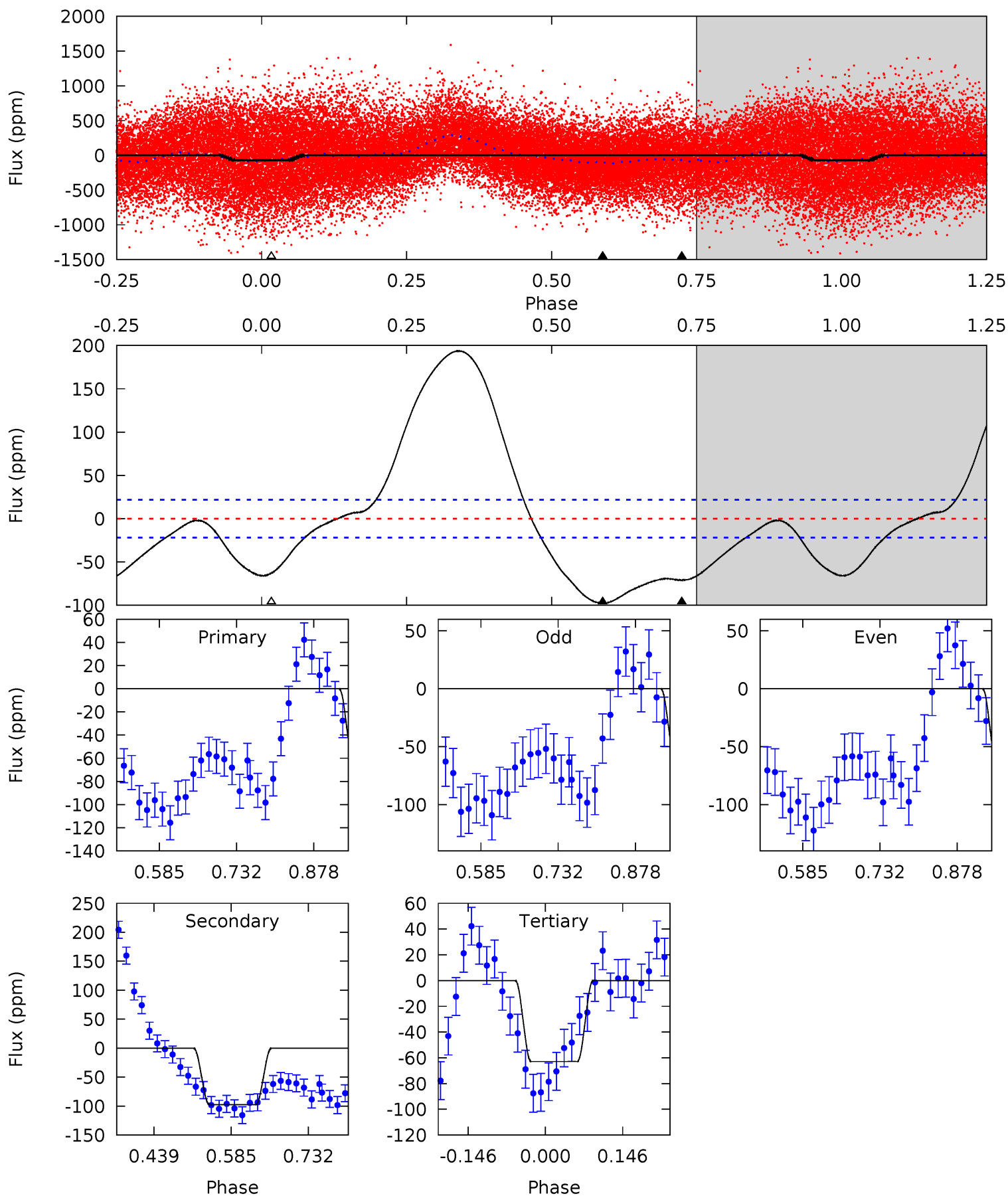
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
15.0	1.79	0	0	4.45	1.36	2.45	15.0	15.0	1.79	1.79	0.98	0.90	0.31	2.77



Alt Model-Shift Uniqueness Test

009427220-02, P = 1.026083 Days, E = 130.776276 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	20.0	12.9	0	4.48	1.45	16.9	1.66	14.6	7.08	20.0	0.74	0.88	0.67	1.34



Stellar Parameters For KIC 009427220

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	6701^{+185}_{-255}	$3.872^{+0.319}_{-0.147}$	$0.220^{+0.150}_{-0.300}$	$2.527^{+0.652}_{-1.060}$	$1.732^{+0.178}_{-0.386}$	$0.151^{+0.390}_{-0.063}$
	+3%/-4%	+8%/-4%	+68%/-136%	+26%/-42%	+10%/-22%	+258%/-42%
Source	PHO54	PHO54	PHO54	DSEP		

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

Secondary Eclipse Parameters for KIC 009427220-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	-4 ± 2	$1.40^{+0.52}_{-0.47}$	4210^{+315}_{-437}	3631^{+1026}_{-6908}	$0.537^{+0.781}_{-0.348}$
Alt.	-97 ± 5	$2.46^{+0.59}_{-0.60}$	4166^{+348}_{-403}	6729^{+891}_{-573}	$5.103^{+3.439}_{-1.835}$

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 $A_{obs} \gg 1.0$

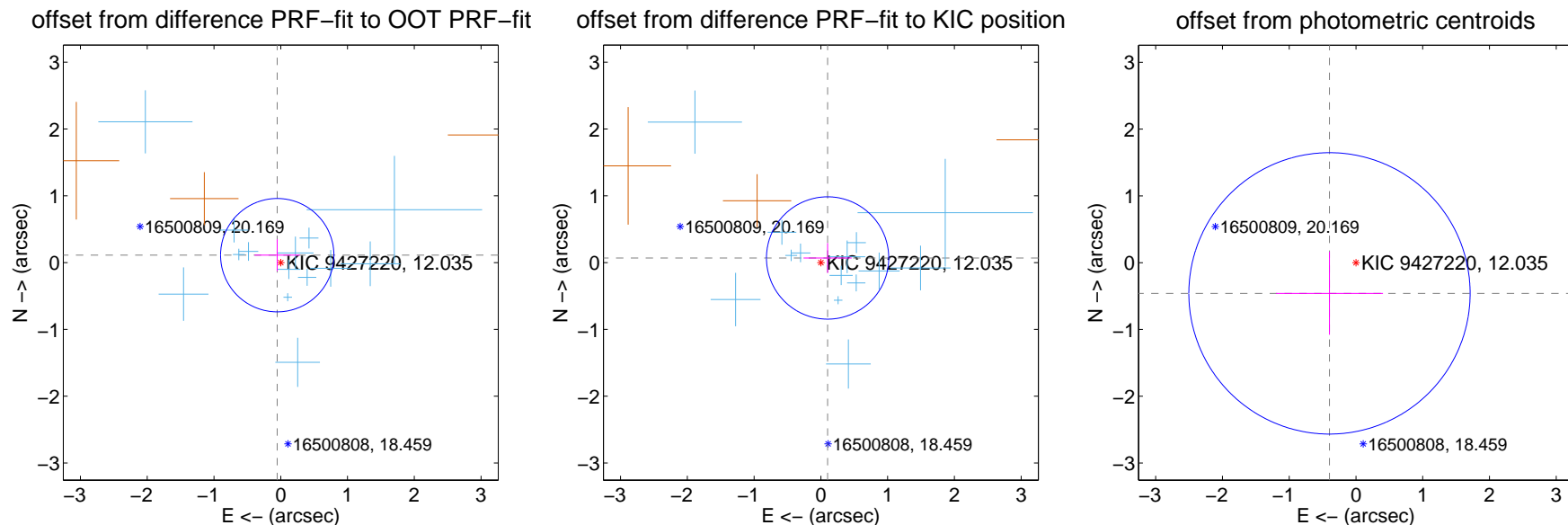
DV Centroid Data

Supplemental centroid analysis for 009427220-02. Kepler magnitude: 12.04. Transit SNR 9.86

There are 14 quarters with good PRF difference image offsets

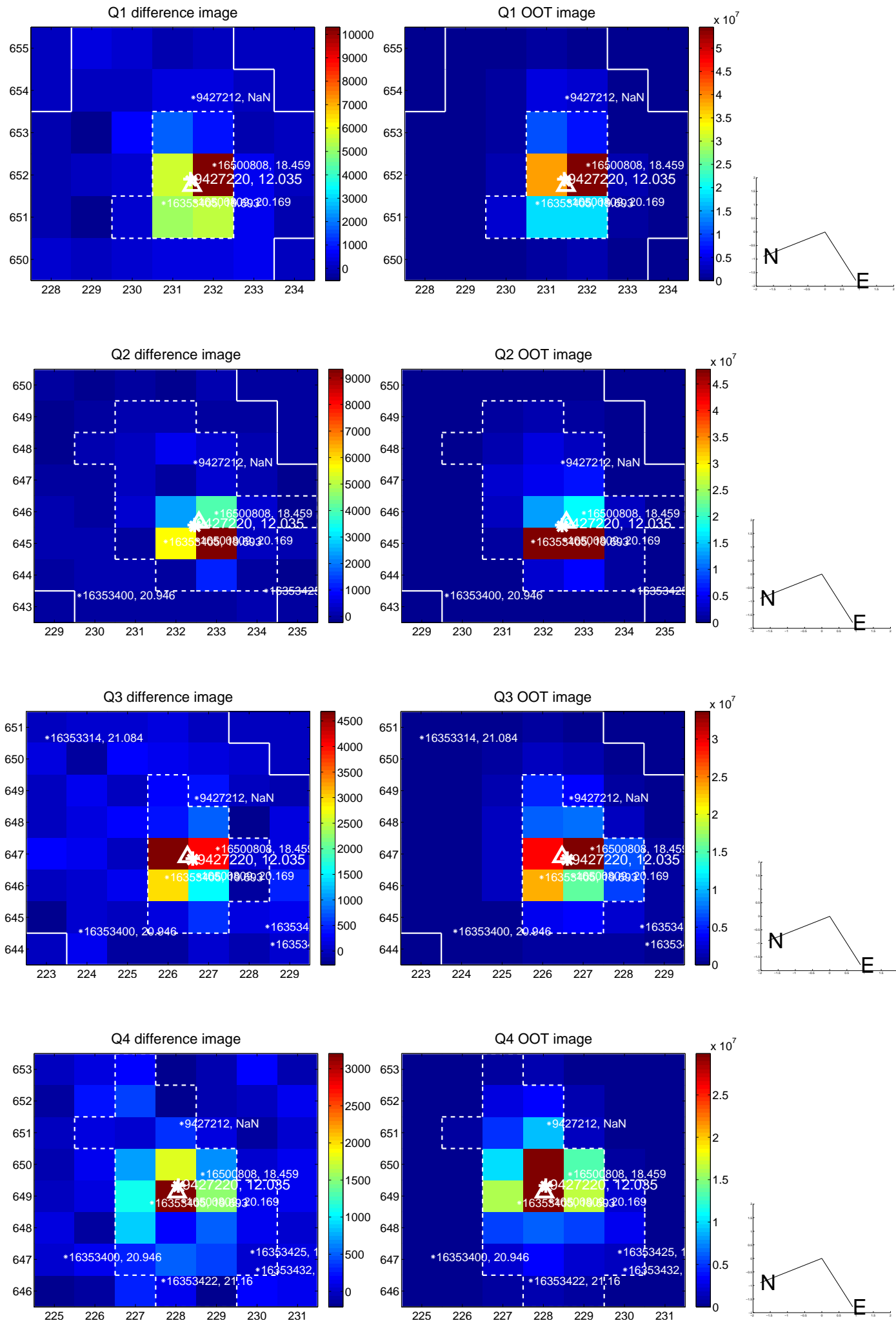
The direct PRF centroid is offset from the target star catalog position by about 0.19 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.123 ± 0.283	0.43	0.053 ± 0.339	0.111 ± 0.238
PRF-fit source offset from KIC position	0.122 ± 0.305	0.40	-0.101 ± 0.361	0.069 ± 0.224
photometric centroid source offset	0.61 ± 0.70	0.86	0.40 ± 0.80	-0.46 ± 0.62

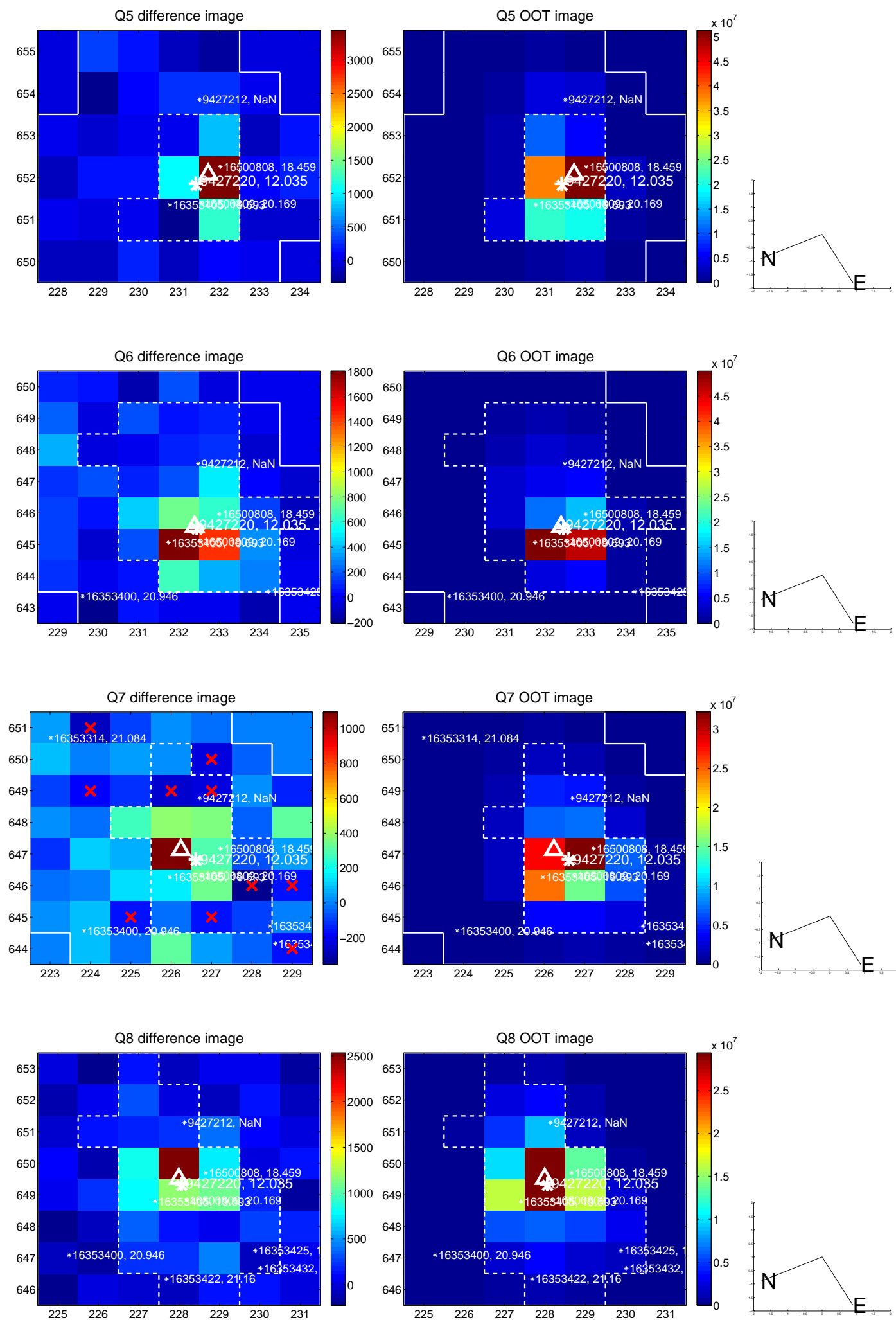


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

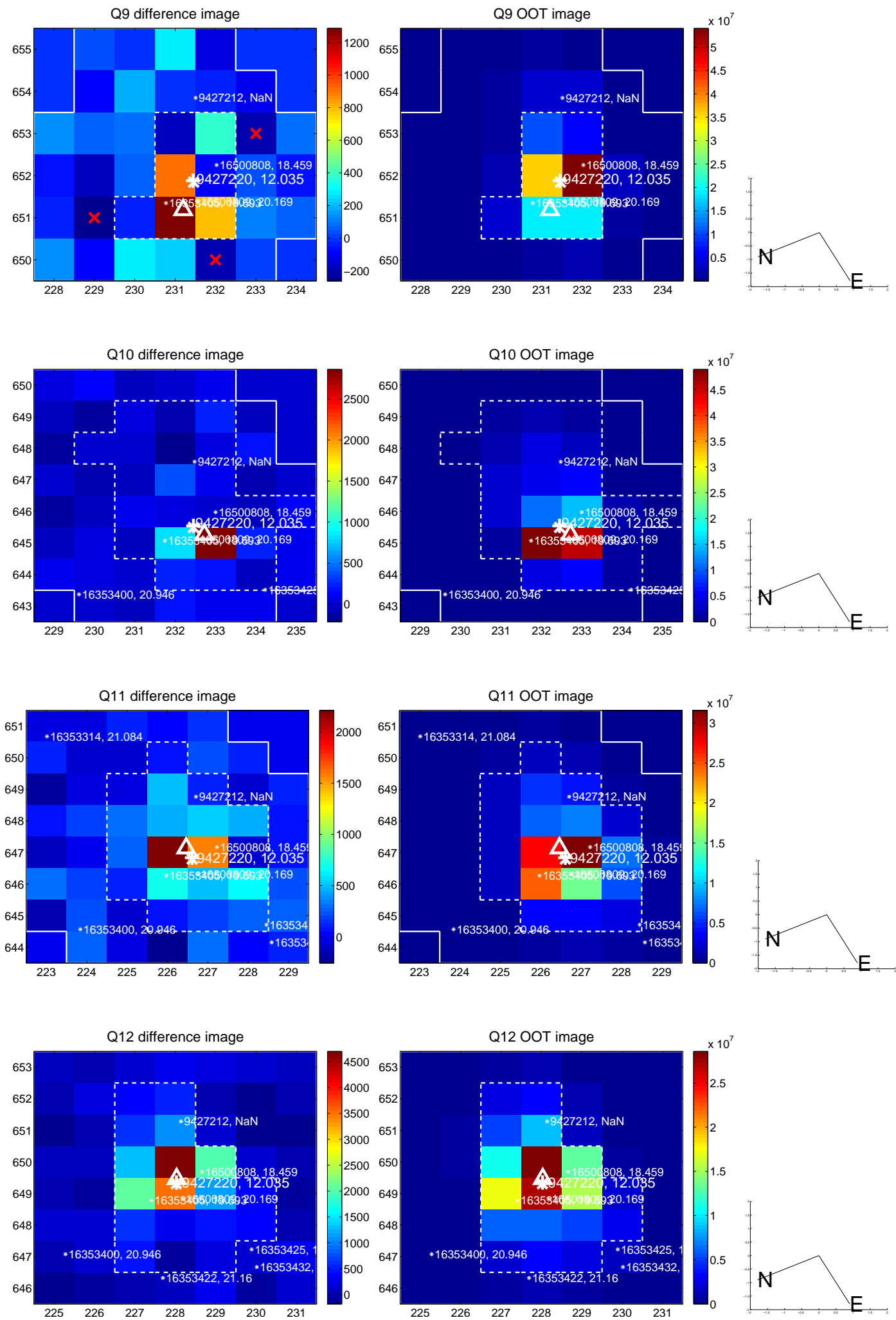
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



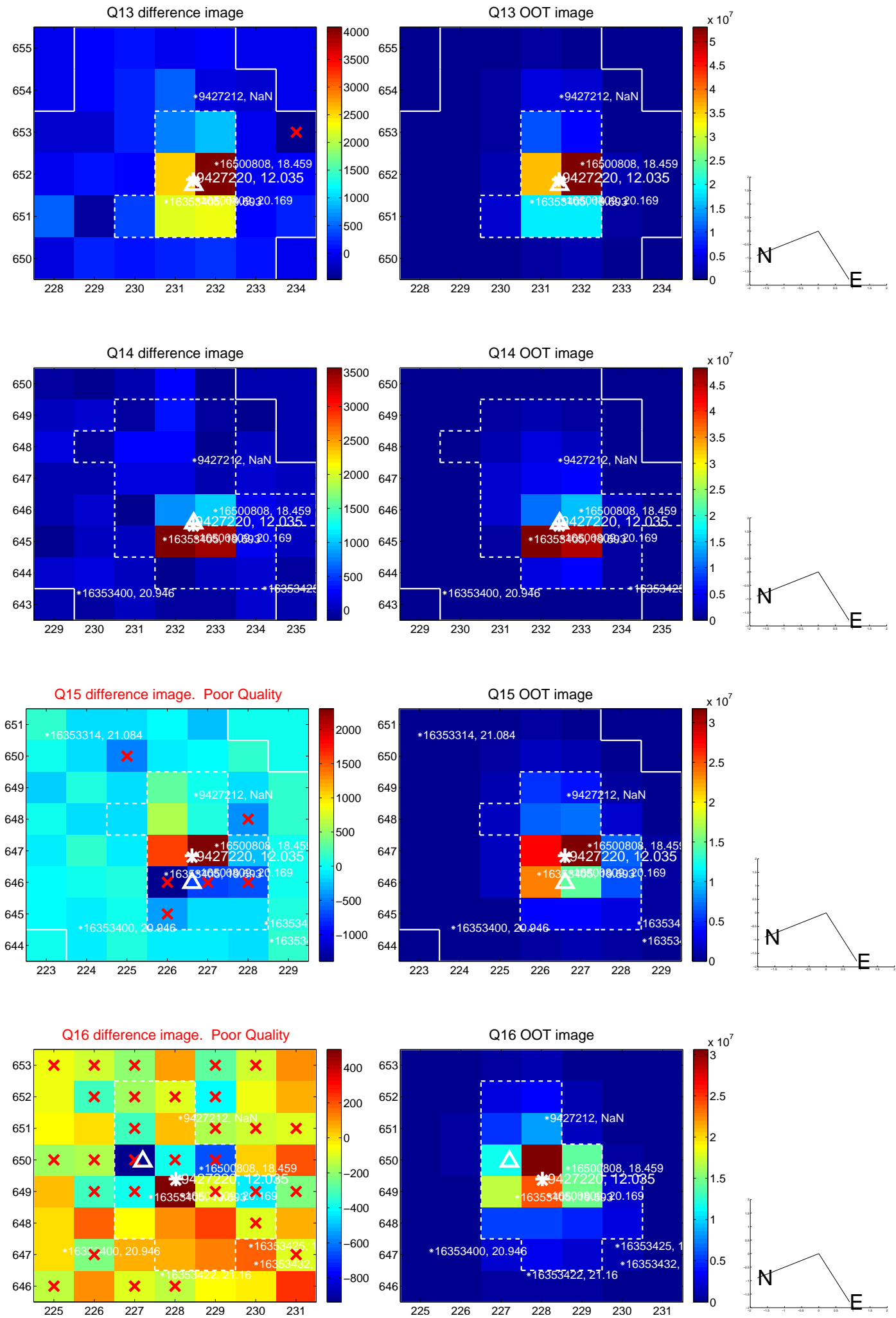
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



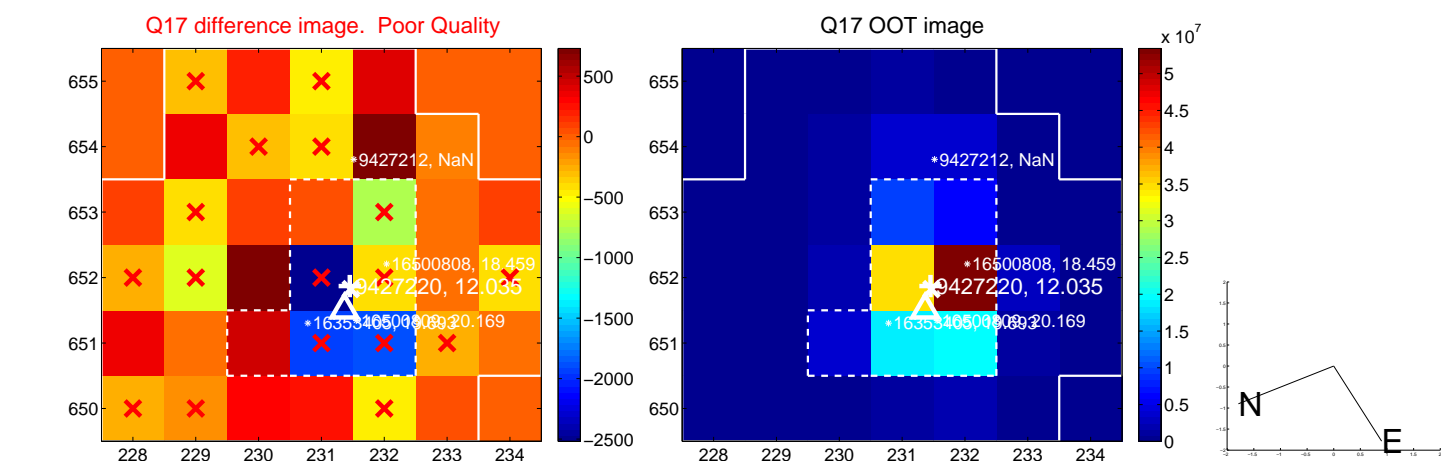
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



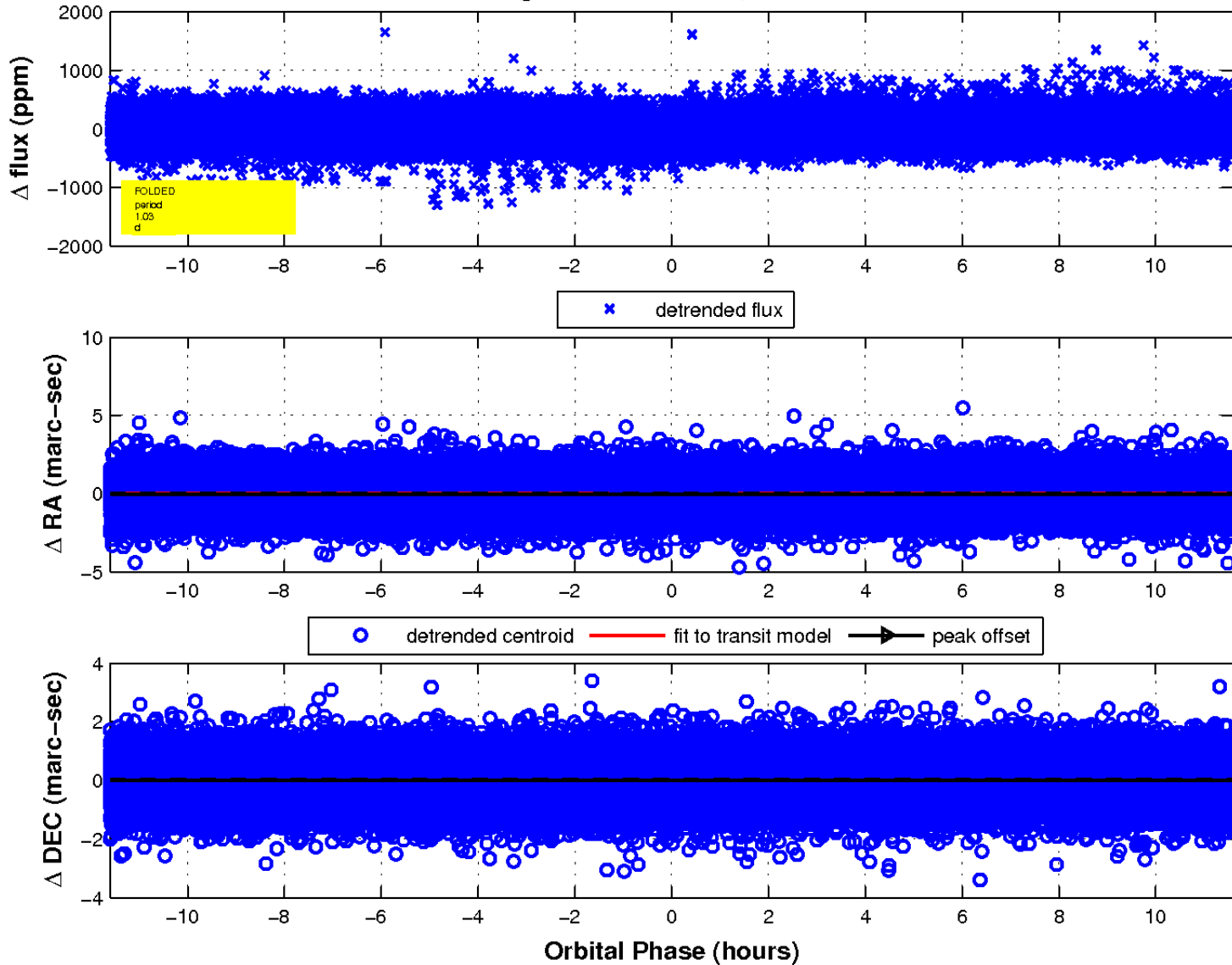
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



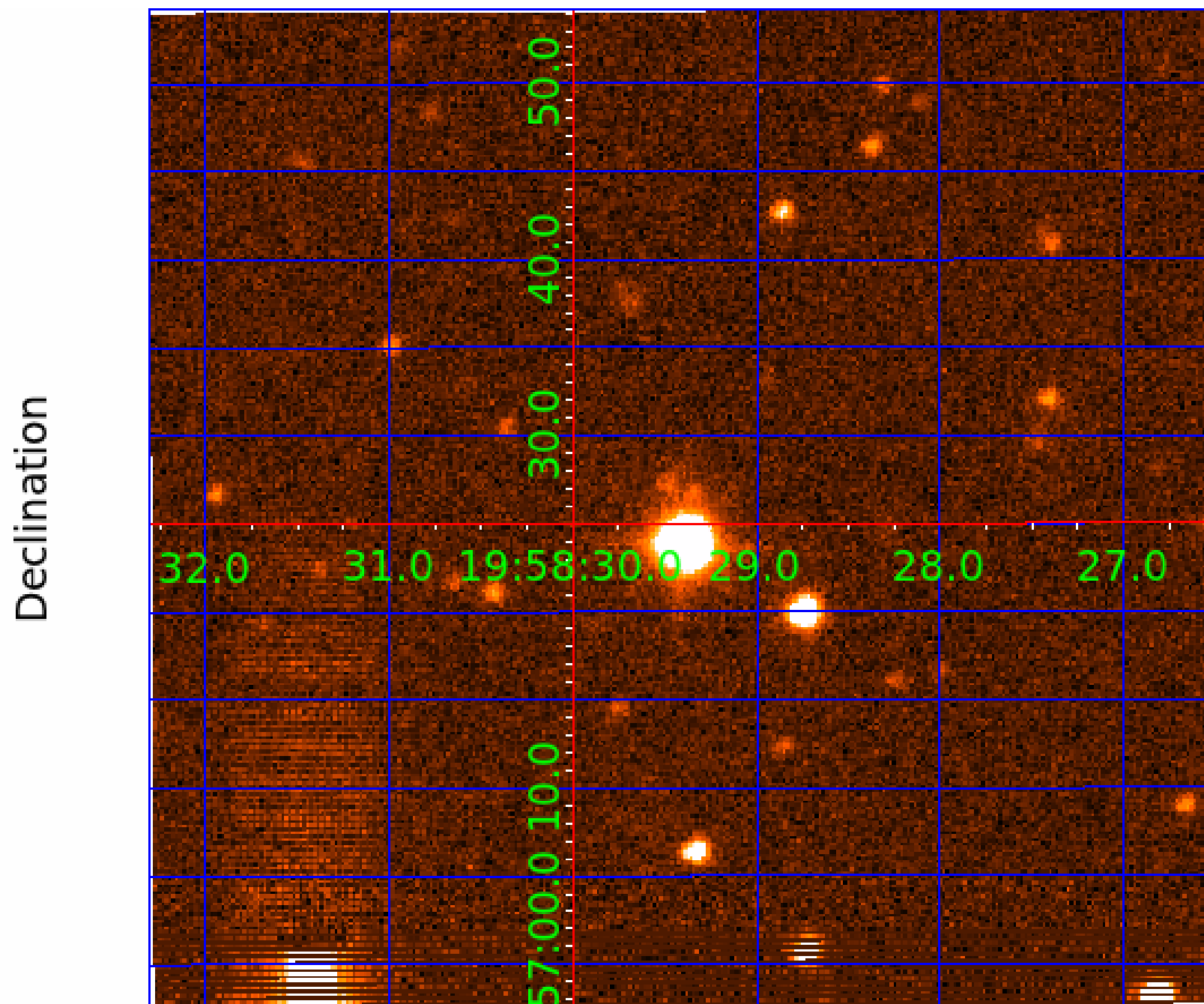
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



fluxWeightedCentroids, Planet 2 of 7



UKIRT Image



KIC 009427220

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})
009427220-01	OBS	No	0.513276	132.040601	5.2	0.910	10.7	1.4	2.53	6701	0.59	50744.44
009427220-02	OBS	No	1.026054	131.840620	32.7	3.867	8.7	9.9	2.53	6701	1.50	20150.96
009427220-03	OBS	No	199.864795	162.635263	255.1	10.992	8.2	6.4	2.53	6701	4.36	17.85
009427220-05	OBS	No	270.881246	198.999213	115.4	9.352	7.7	3.7	2.53	6701	2.81	11.90
009427220-06	OBS	No	53.437549	136.393920	287.1	2.103	7.1	7.0	2.53	6701	5.20	103.61
009427220-07	OBS	No	100.464522	162.450809	146.4	5.000	7.3	-1.0	2.53	6701	3.08	44.65

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009427220-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009427220-02	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT
009427220-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_UNCERTAIN
009427220-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
009427220-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009427220-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_NOFITS

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

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

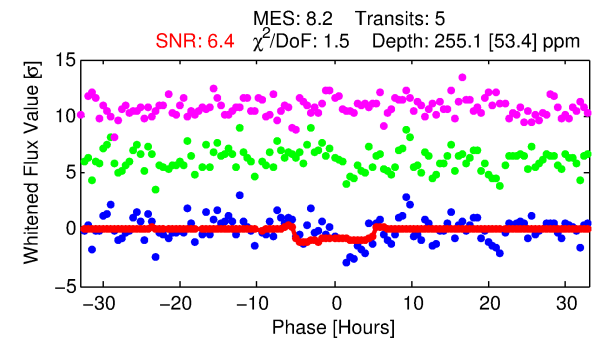
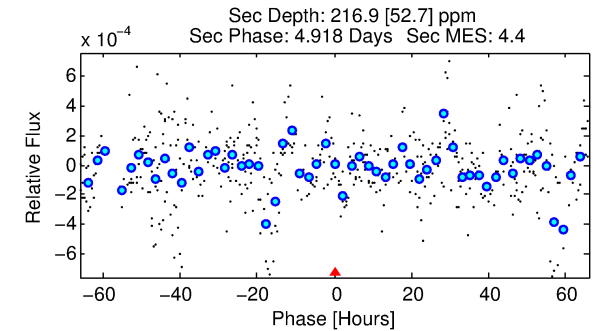
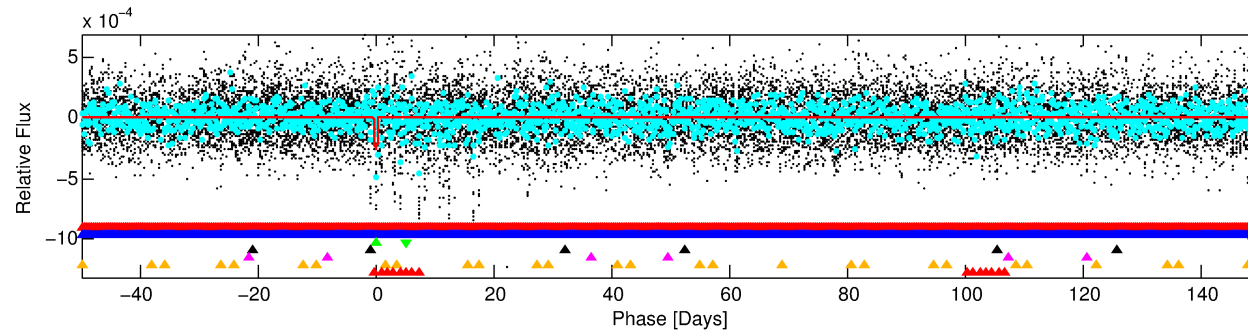
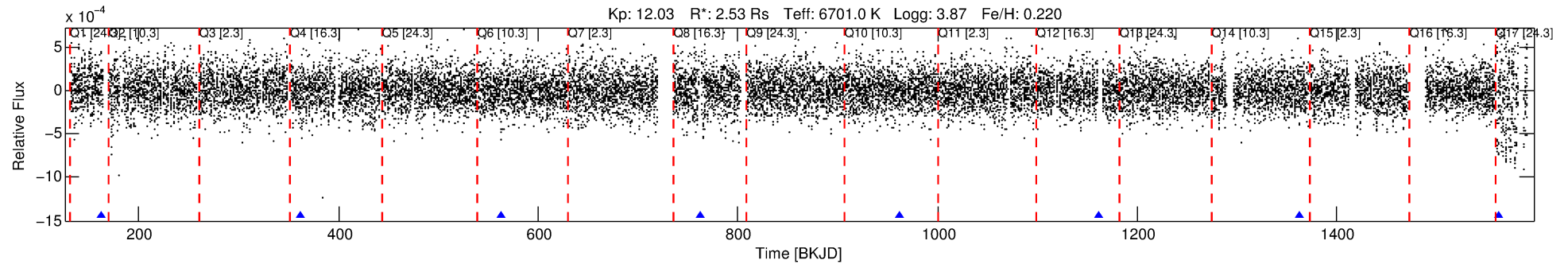
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009427220-03

No Significant Match Found

DV One-Page Summary

KIC: 9427220 Candidate: 3 of 7 Period: 199.865 d

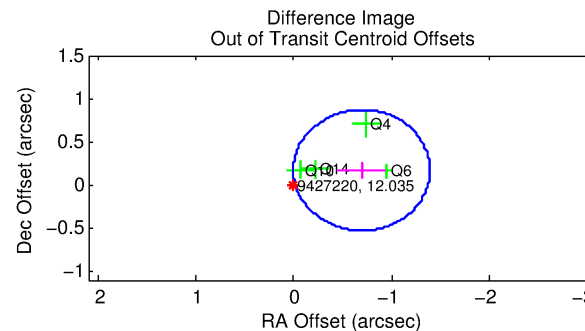
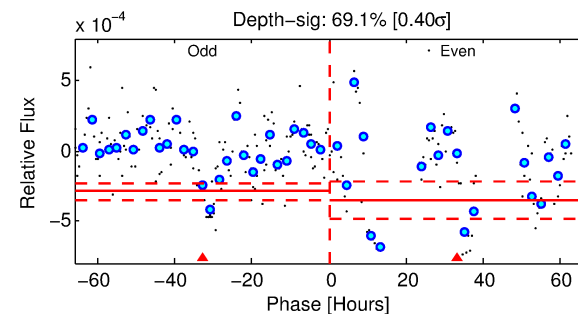
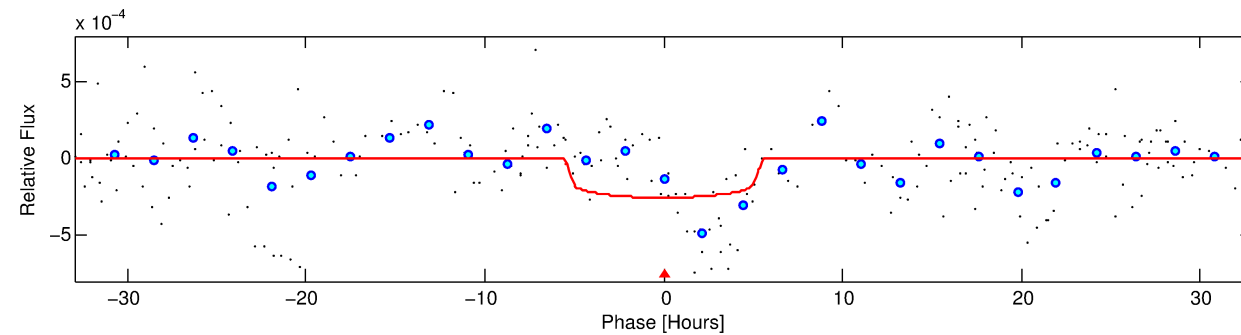


DV Fit Results:

Period = 199.86479 [0.00714] d
Epoch = 162.6353 [0.0373] BKJD
Rp/R* = 0.0158 [0.0091]
a/R* = 97.92 [308.36]
b = 0.73 [2.02]
Seff = 17.85 [10.42]
Teq = 524 [77] K
Rp = 4.36 [3.11] Re
a = 0.8040 [0.2988] AU
Ag = 4065.60 [5328.63] [0.76σ]
Teffp = 6470 [1930] K [3.08σ]

DV Diagnostic Results:

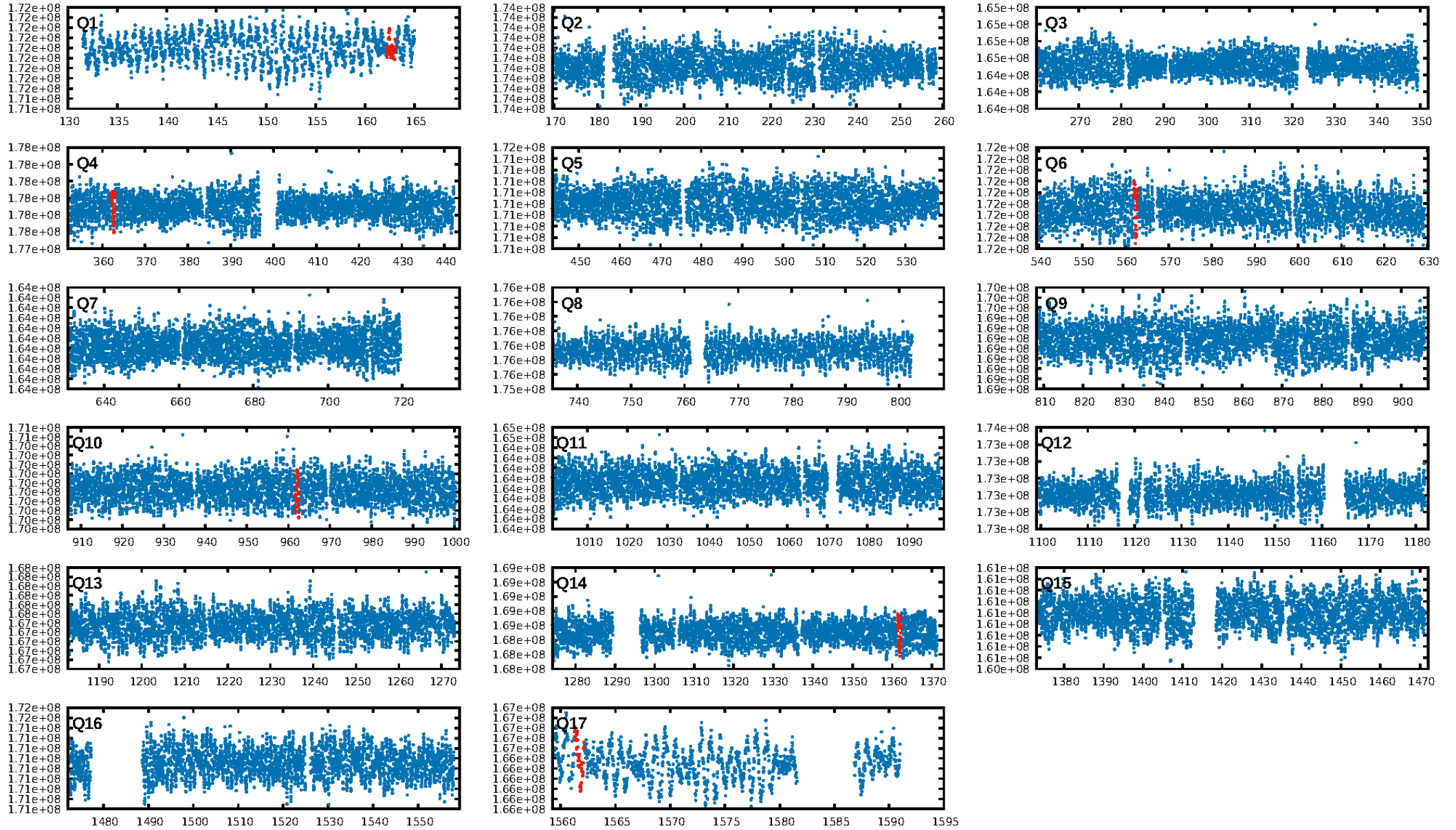
ShortPeriod-sig: 100.0% [197.56σ]
LongPeriod-sig: 100.0% [118.10σ]
ModelChiSquare2-sig: 5.6%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: N/A
RollingBand-fgt: 1.00 [4/4]
GhostDiagnostic-chr: -1.991
Centroid-sig: 4.7%
Centroid-so: 1.207 arcsec [1.45σ]
OotOffset-rm: 0.713 arcsec [3.06σ]
KicOffset-rm: 0.812 arcsec [3.30σ]
OotOffset-st: 3/0/1/0 [4]
KicOffset-st: 3/0/1/0 [4]
DiffImageQuality-fgm: 0.75 [3/4]
DiffImageOverlap-fno: 0.00 [0/5]



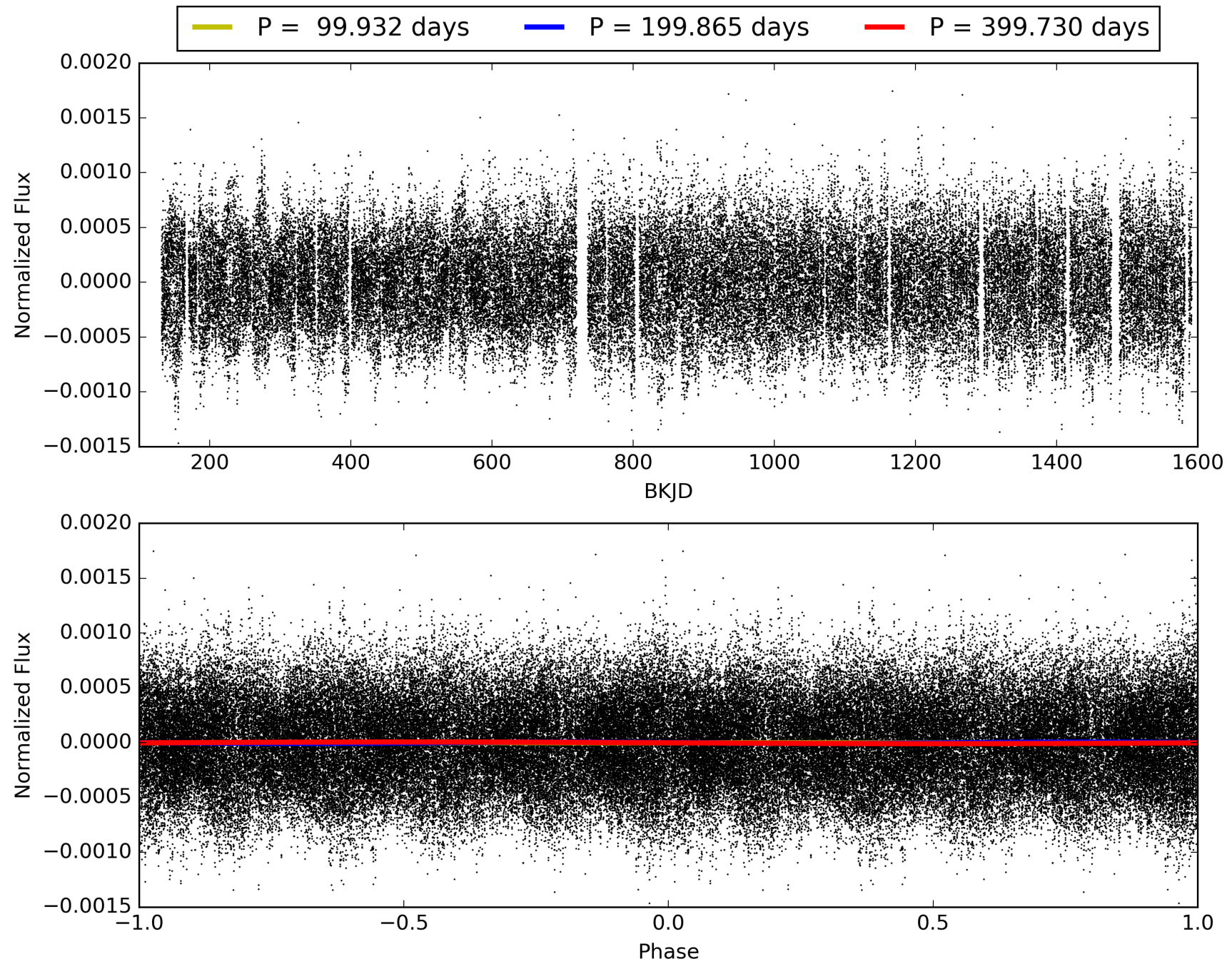
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 13:47:28 Z

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

TCE 009427220-03, PDC Light Curves

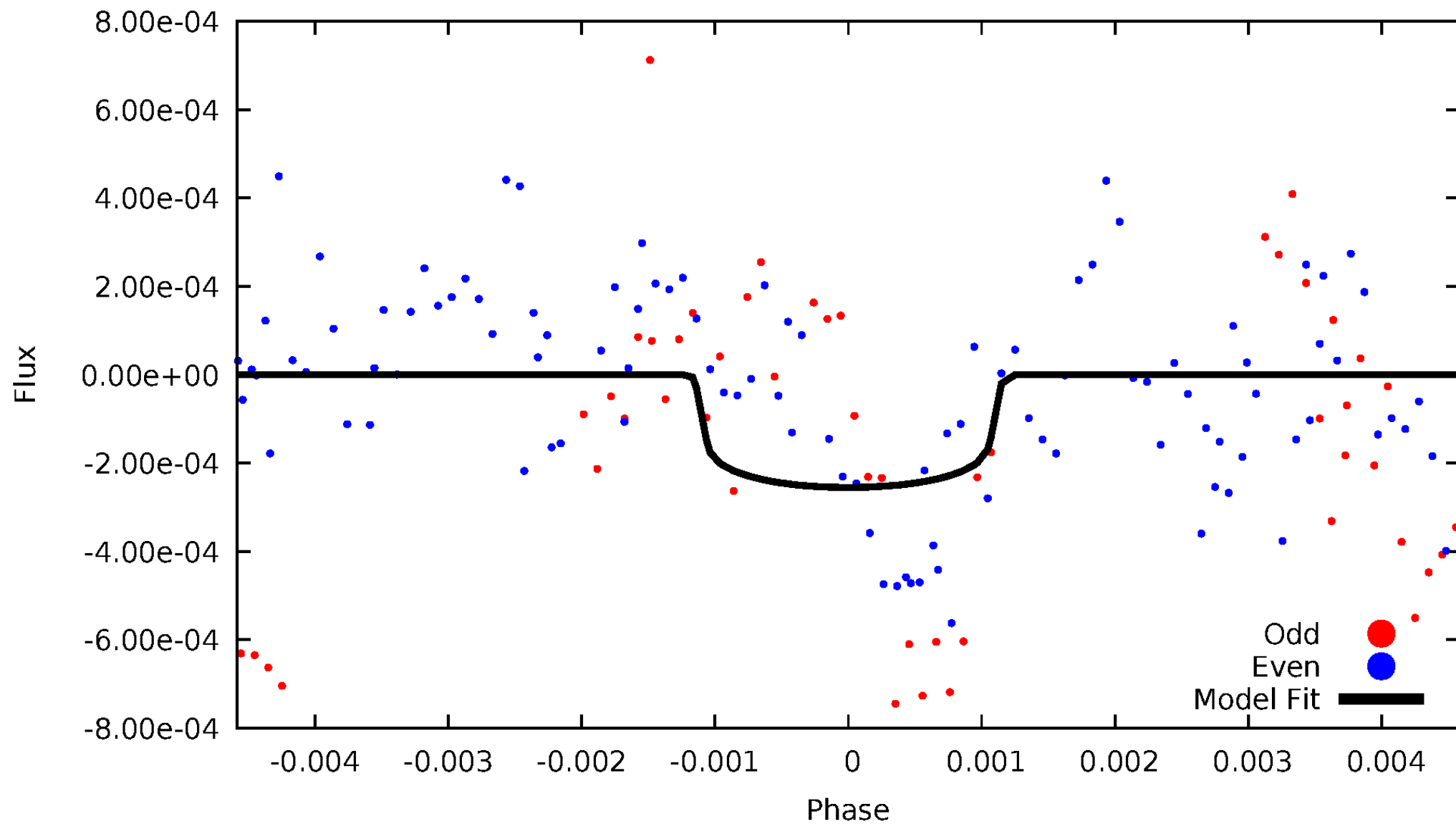


TCE 009427220-03



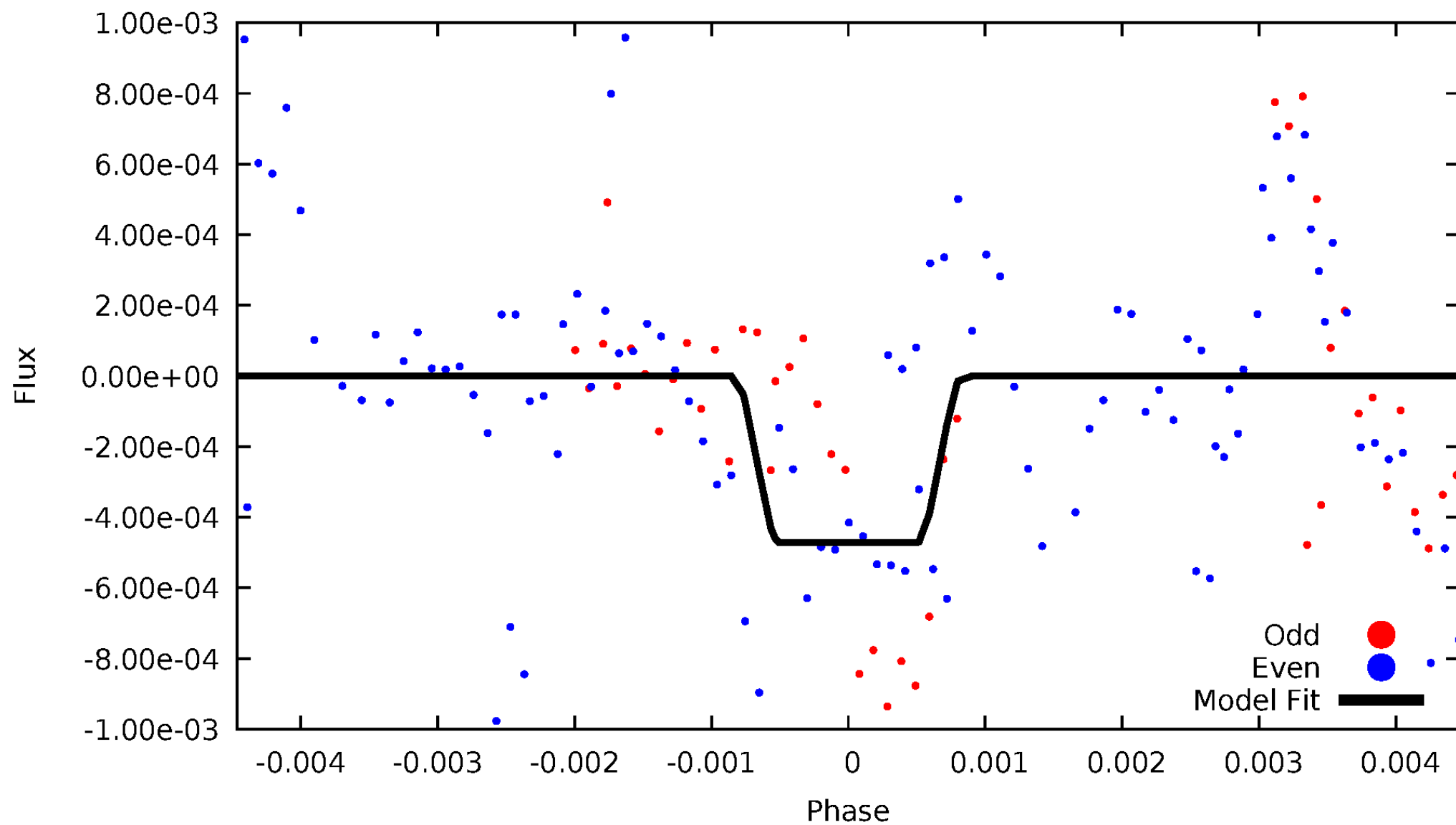
DV Odd/Even

TCE 009427220-03



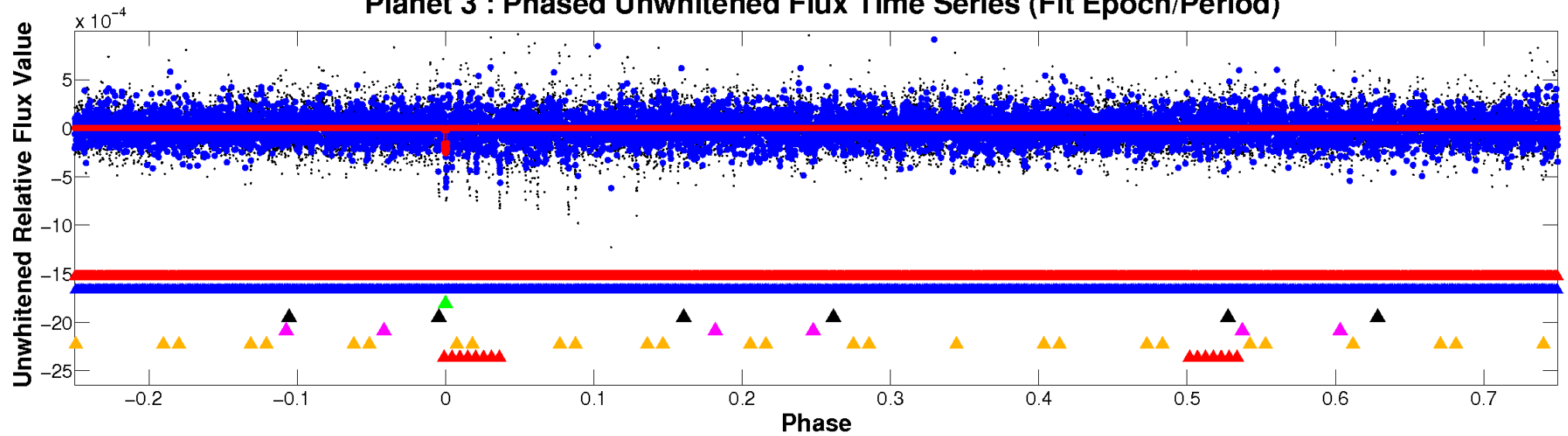
ALT Odd/Even

TCE 009427220-03

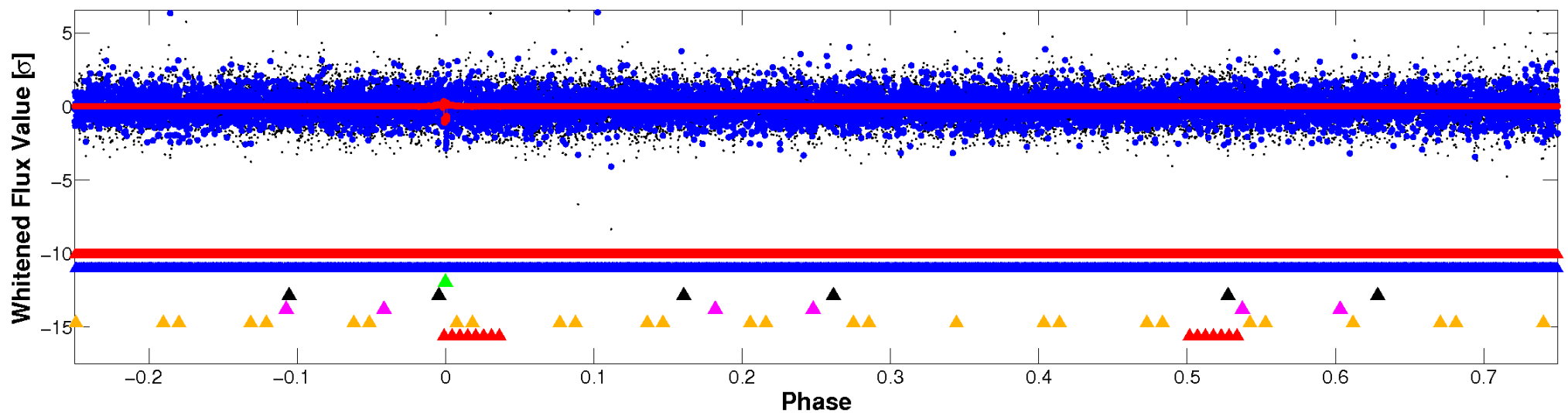


Non-Whitened Vs. Whitened Light Curve

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

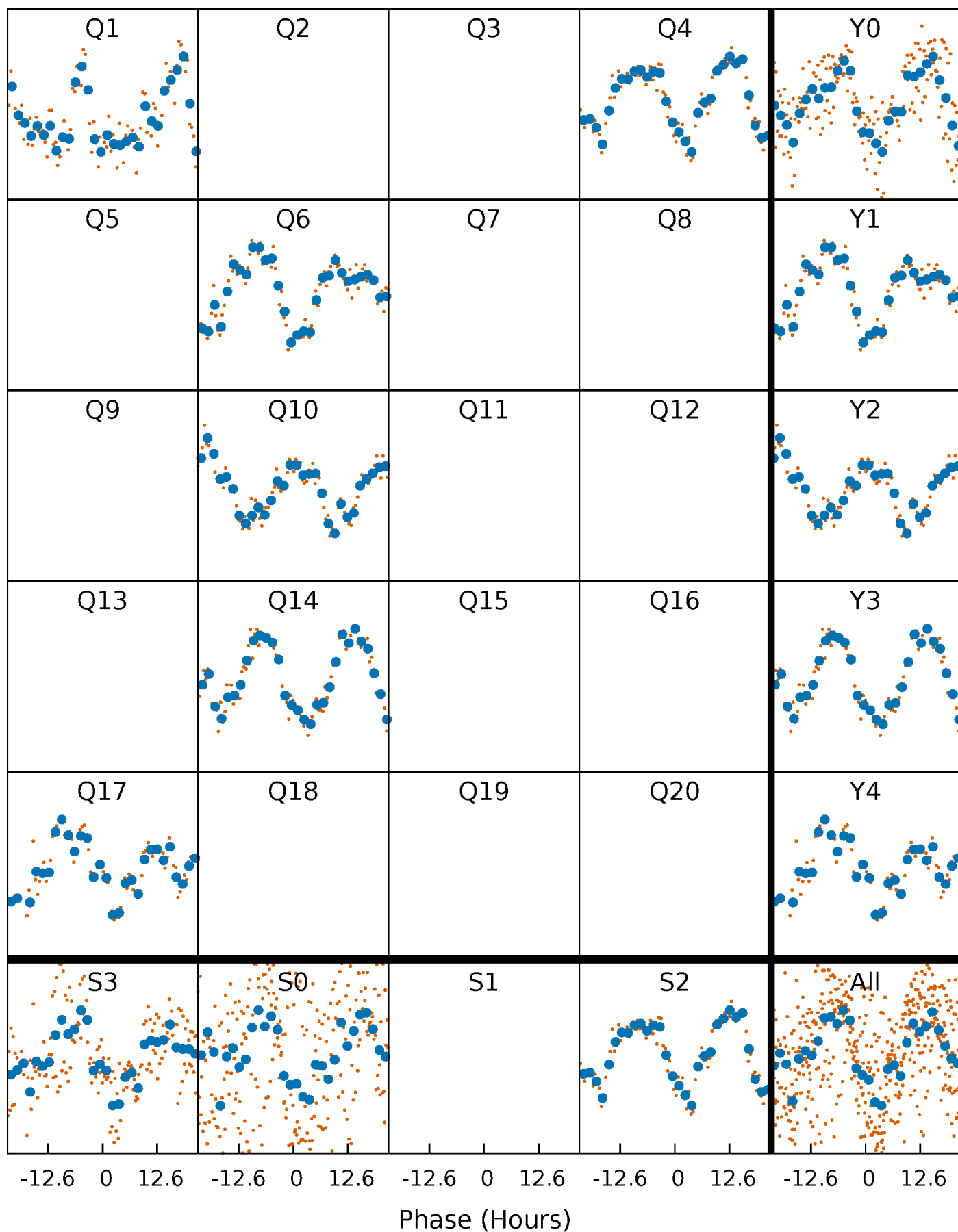


Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



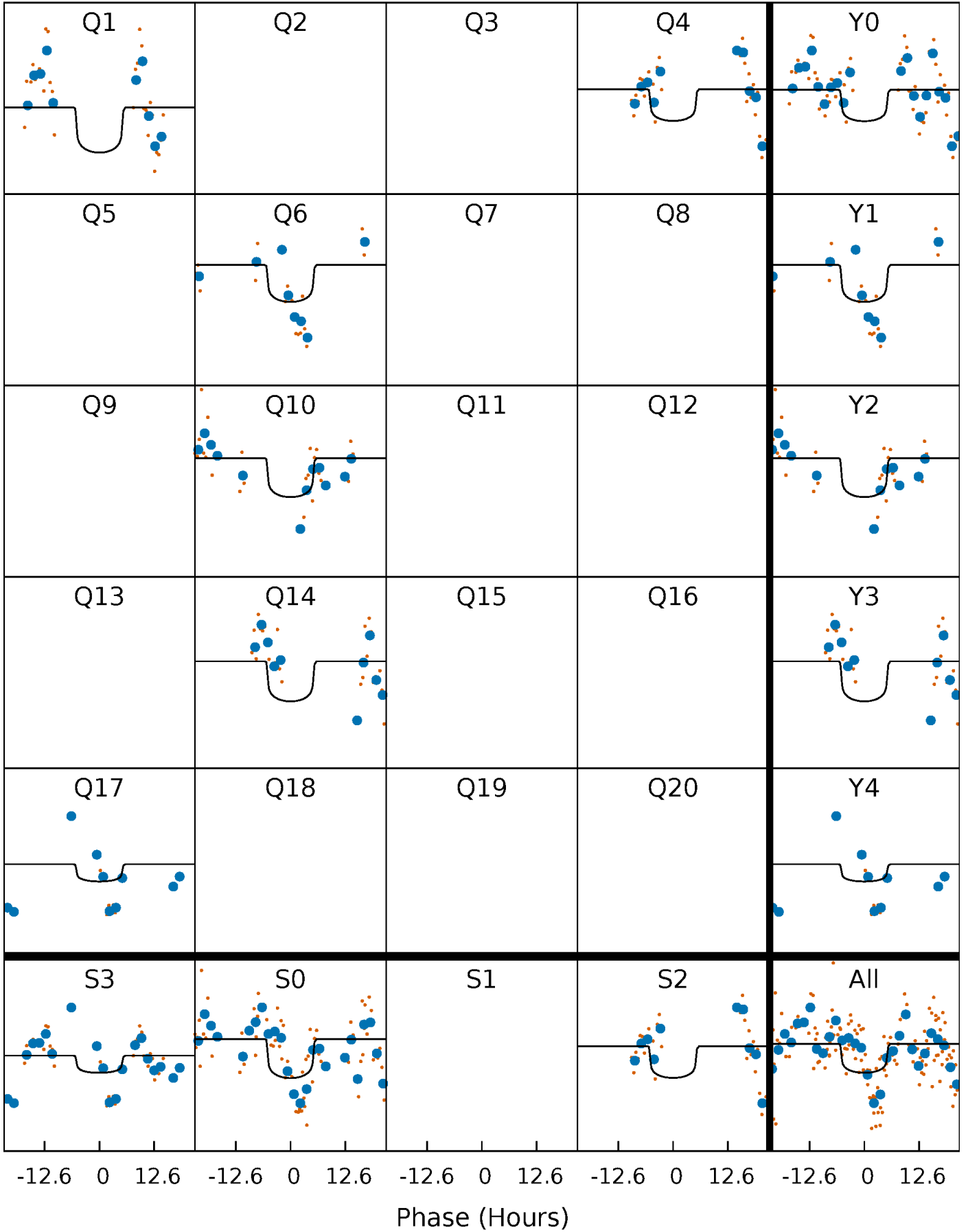
PDC Quarter-Phased Transit Curves

TCE 009427220-03 P=199.864795 Days $T_0=162.635263$ (BKJD)



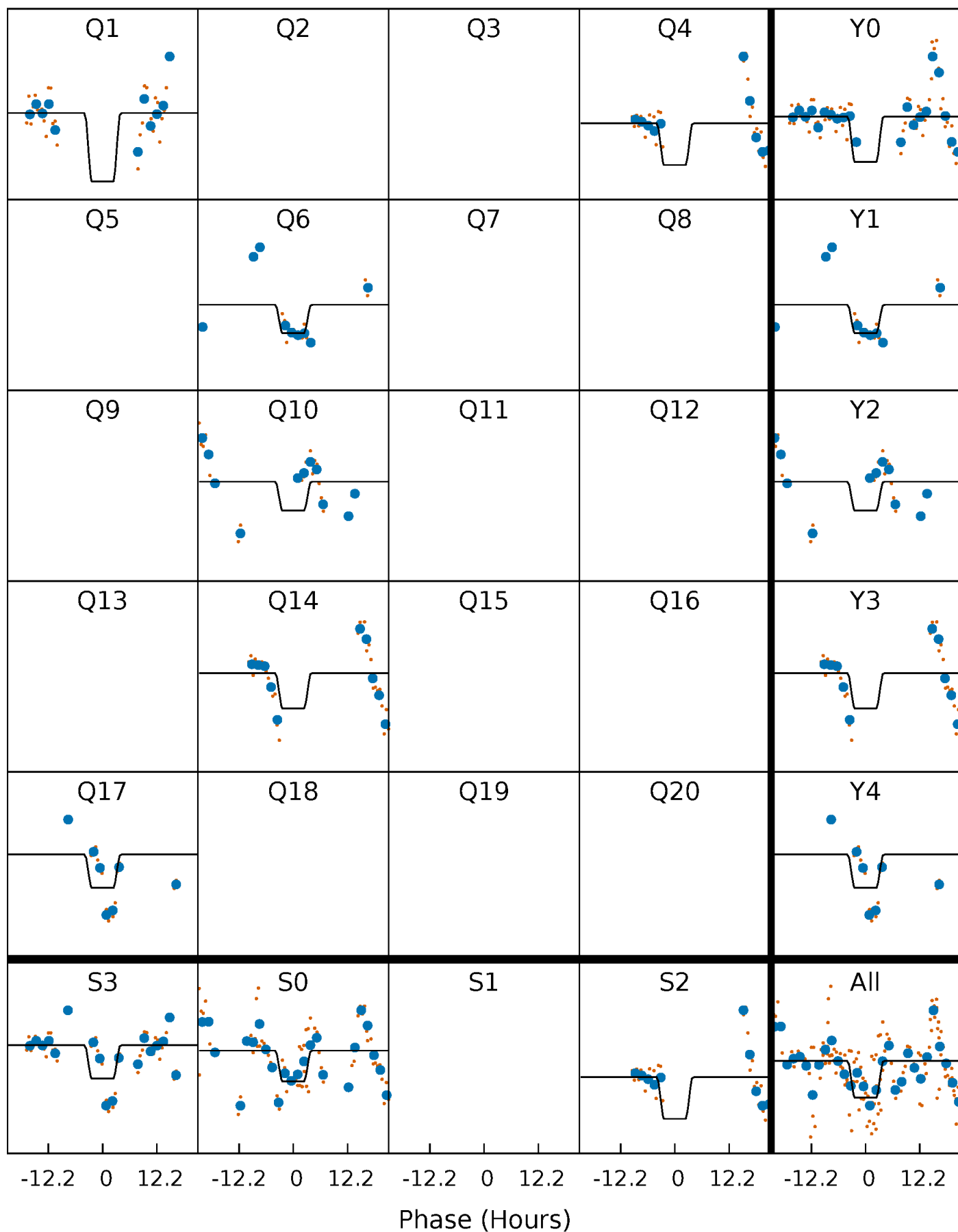
DV Quarter-Phased Transit Curves

TCE 009427220-03 P=199.864795 Days $T_0=162.635263$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

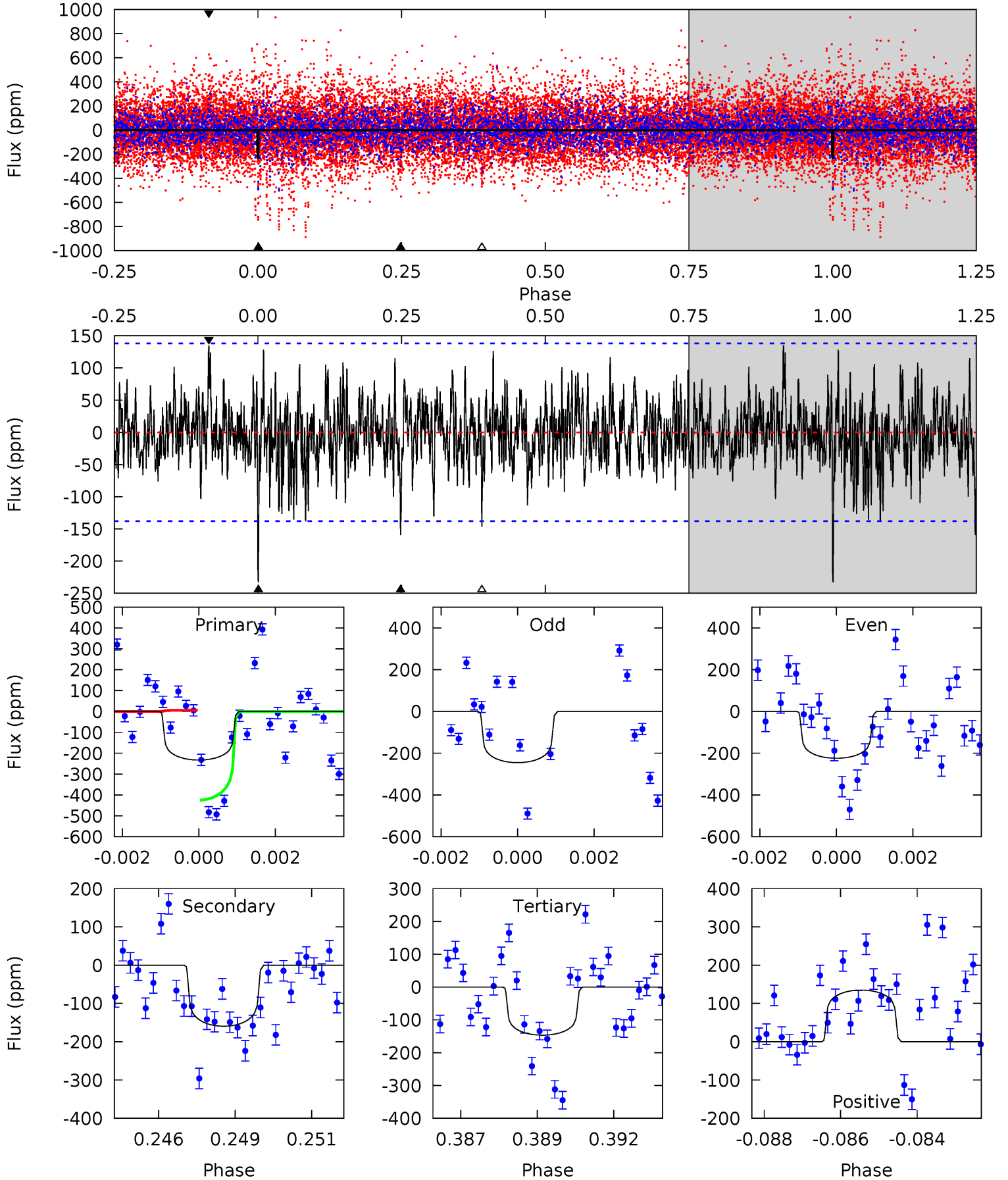
TCE 009427220-03 P=199.873520 Days $T_0=162.628628$ (BKJD)



DV Model-Shift Uniqueness Test

009427220-03, P = 199.864795 Days, E = 162.635263 Days

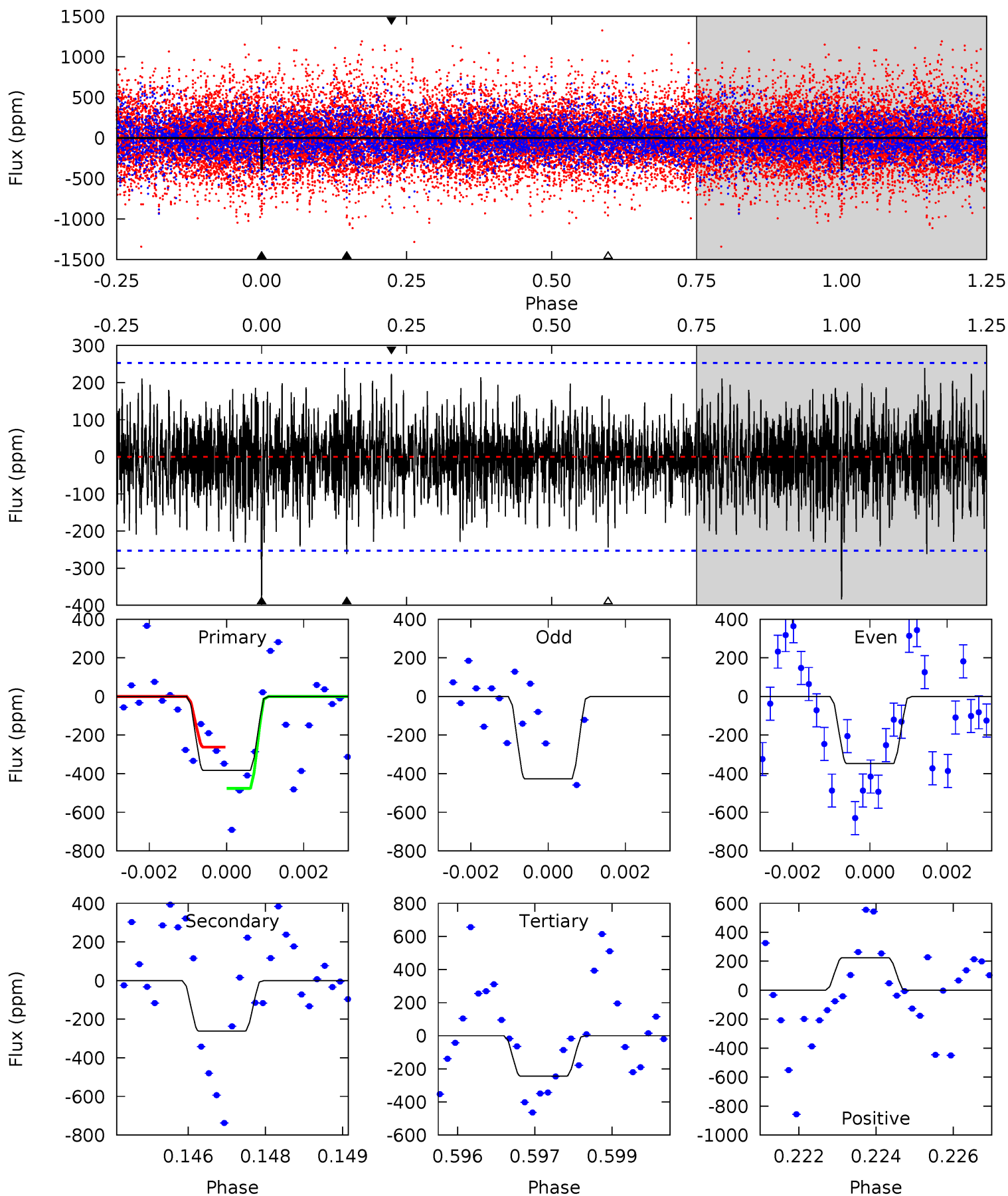
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.93	6.12	5.62	5.18	5.29	3.04	1.57	3.31	3.76	0.50	0.94	0.39	0.63	0.37	8.04



Alt Model-Shift Uniqueness Test

009427220-03, P = 199.873520 Days, E = 162.628628 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.13	5.55	5.17	4.75	5.36	3.15	1.59	2.97	3.38	0.38	0.80	0.85	1.18	0.38	2.23



Stellar Parameters For KIC 009427220

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	6701^{+185}_{-255}	$3.872^{+0.319}_{-0.147}$	$0.220^{+0.150}_{-0.300}$	$2.527^{+0.652}_{-1.060}$	$1.732^{+0.178}_{-0.386}$	$0.151^{+0.390}_{-0.063}$
	+3%/-4%	+8%/-4%	+68%/-136%	+26%/-42%	+10%/-22%	+258%/-42%
Source	PHO54	PHO54	PHO54	DSEP		

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

Secondary Eclipse Parameters for KIC 009427220-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	-159 ± 26	$4.14^{+2.55}_{-2.15}$	720^{+55}_{-86}	5810^{+2747}_{-1033}	3116^{+10221}_{-1859}
Alt.	-261 ± 47	$5.73^{+2.75}_{-2.48}$	721^{+54}_{-71}	5680^{+1889}_{-804}	2759^{+6085}_{-1506}

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

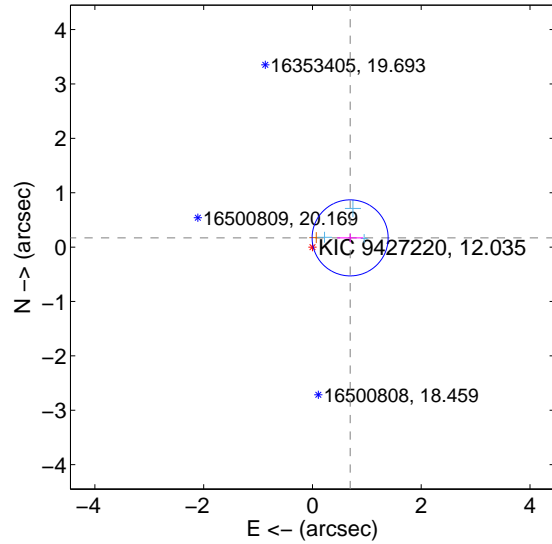
Supplemental centroid analysis for 009427220-03. Kepler magnitude: 12.04. Transit SNR 6.41

There are 3 quarters with good PRF difference image offsets

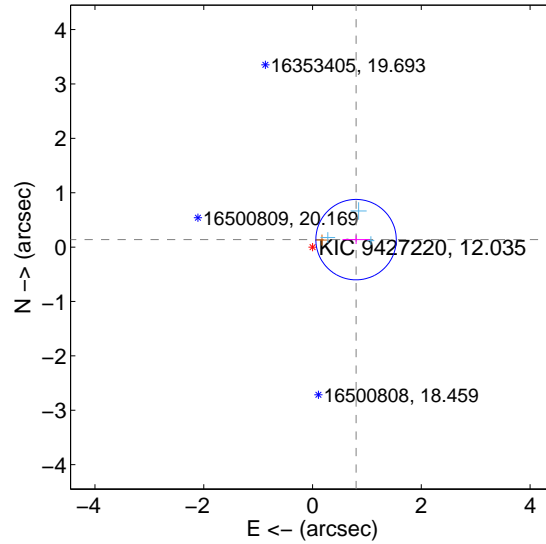
The direct PRF centroid is offset from the target star catalog position by about 0.06 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.713 \pm 0.233	3.06	-0.693 \pm 0.239	0.170 \pm 0.079
PRF-fit source offset from KIC position	0.812 \pm 0.246	3.30	-0.800 \pm 0.250	0.137 \pm 0.081
photometric centroid source offset	1.21 \pm 0.83	1.45	0.85 \pm 0.95	-0.85 \pm 0.70

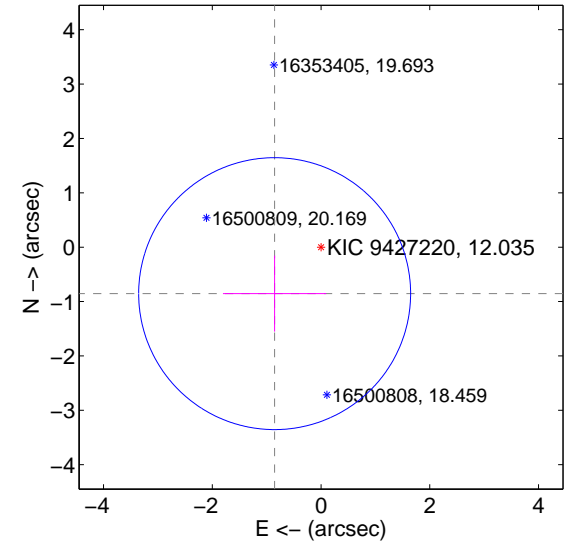
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

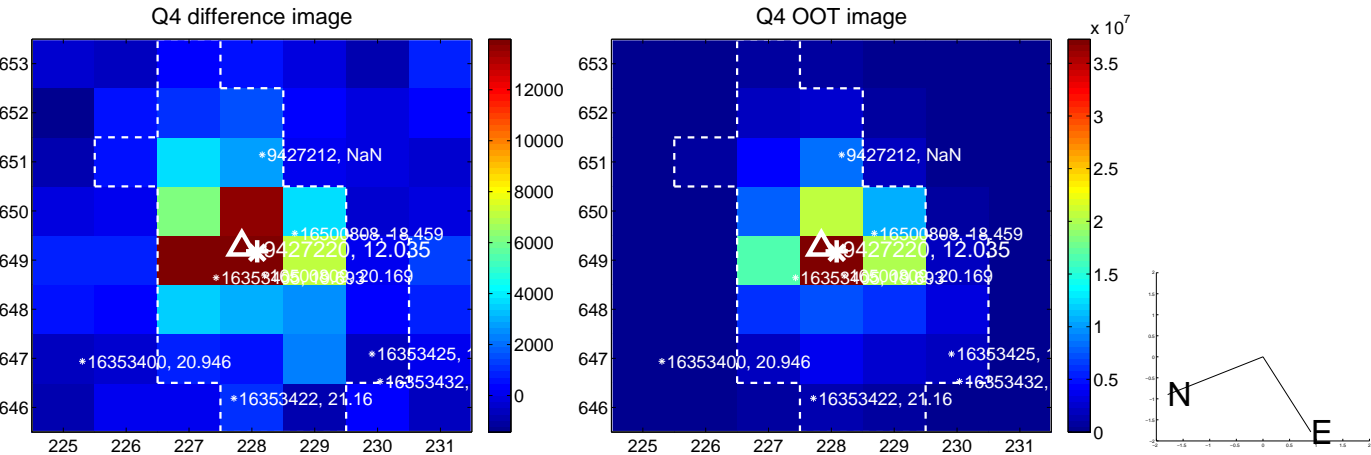
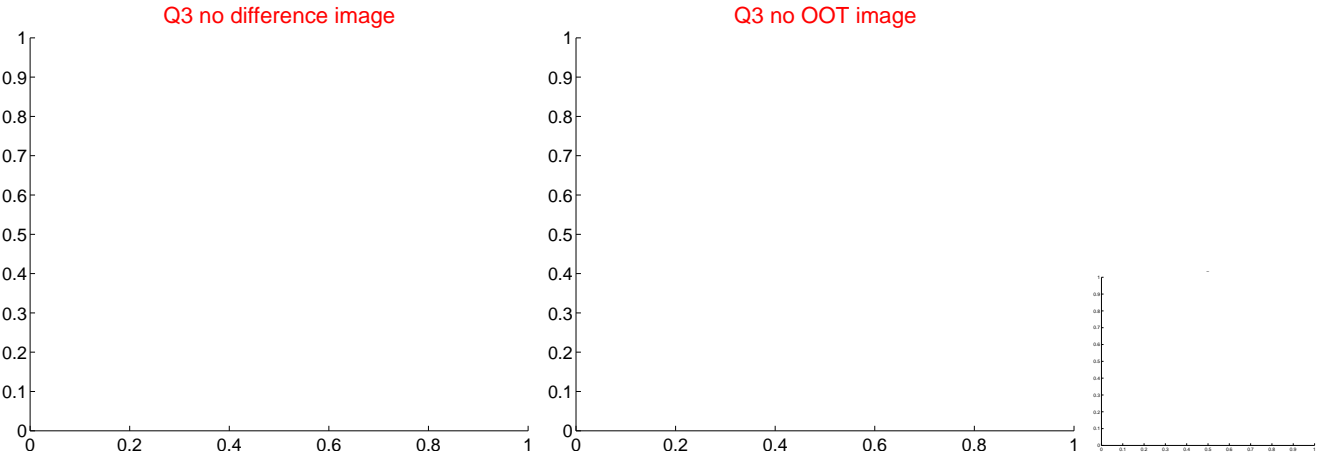
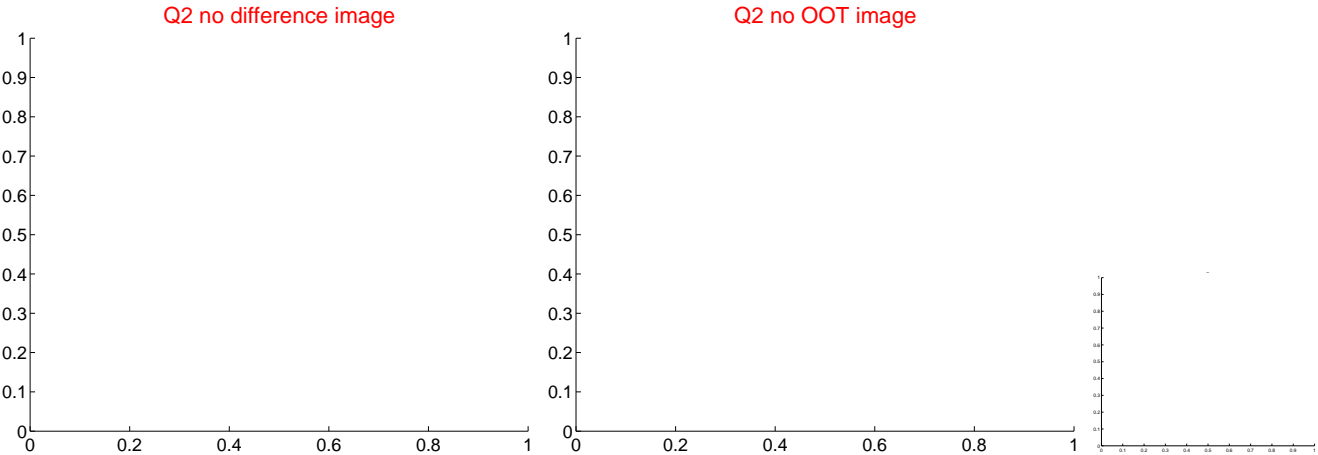
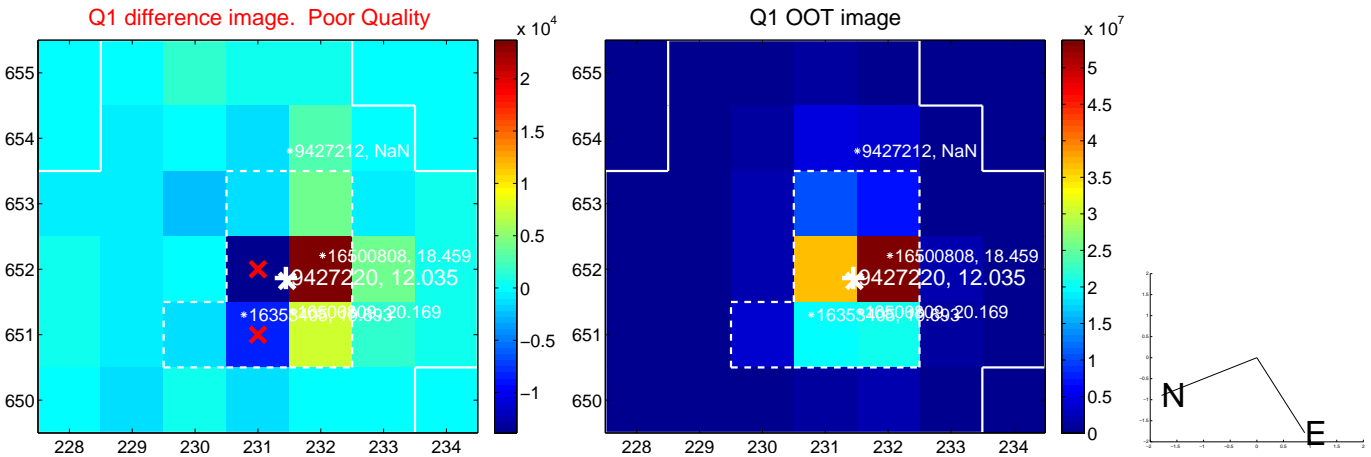


offset from photometric centroids

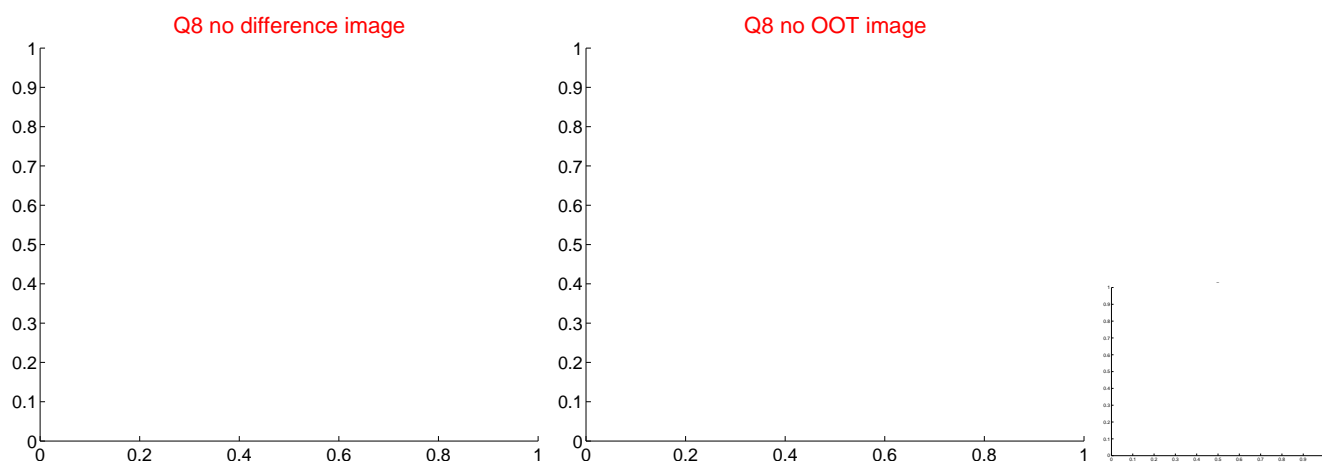
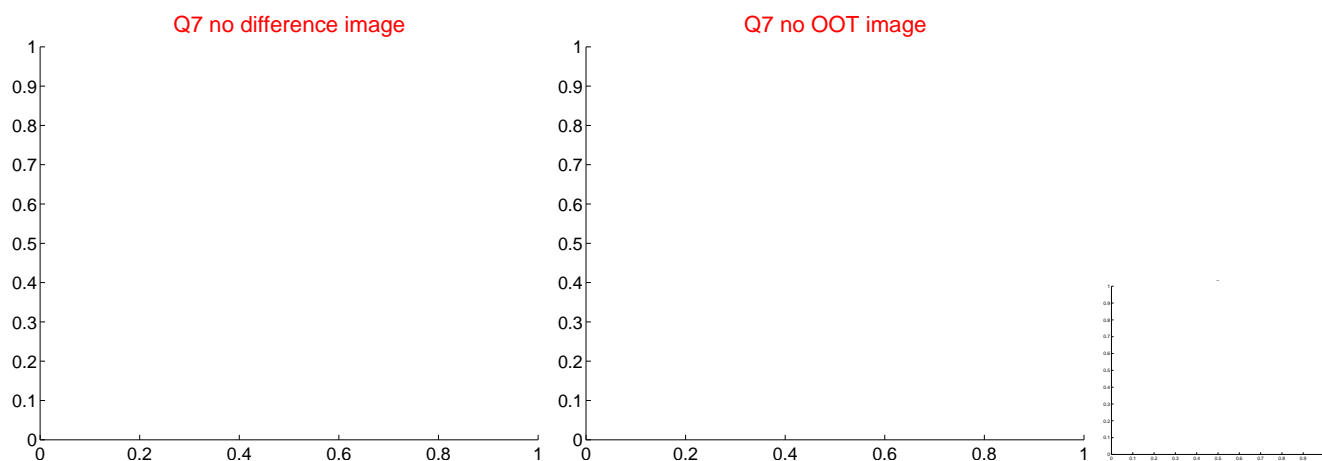
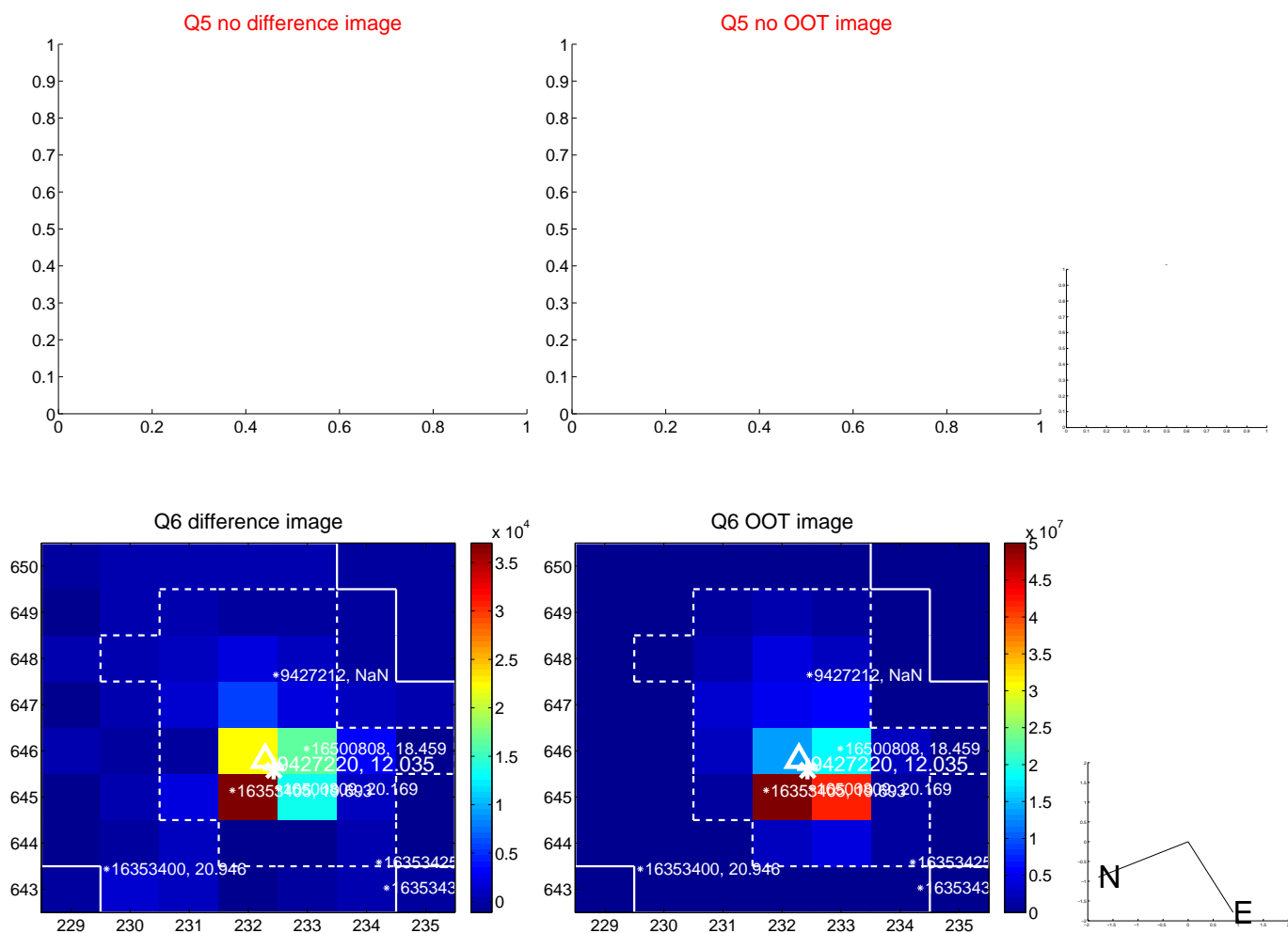


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

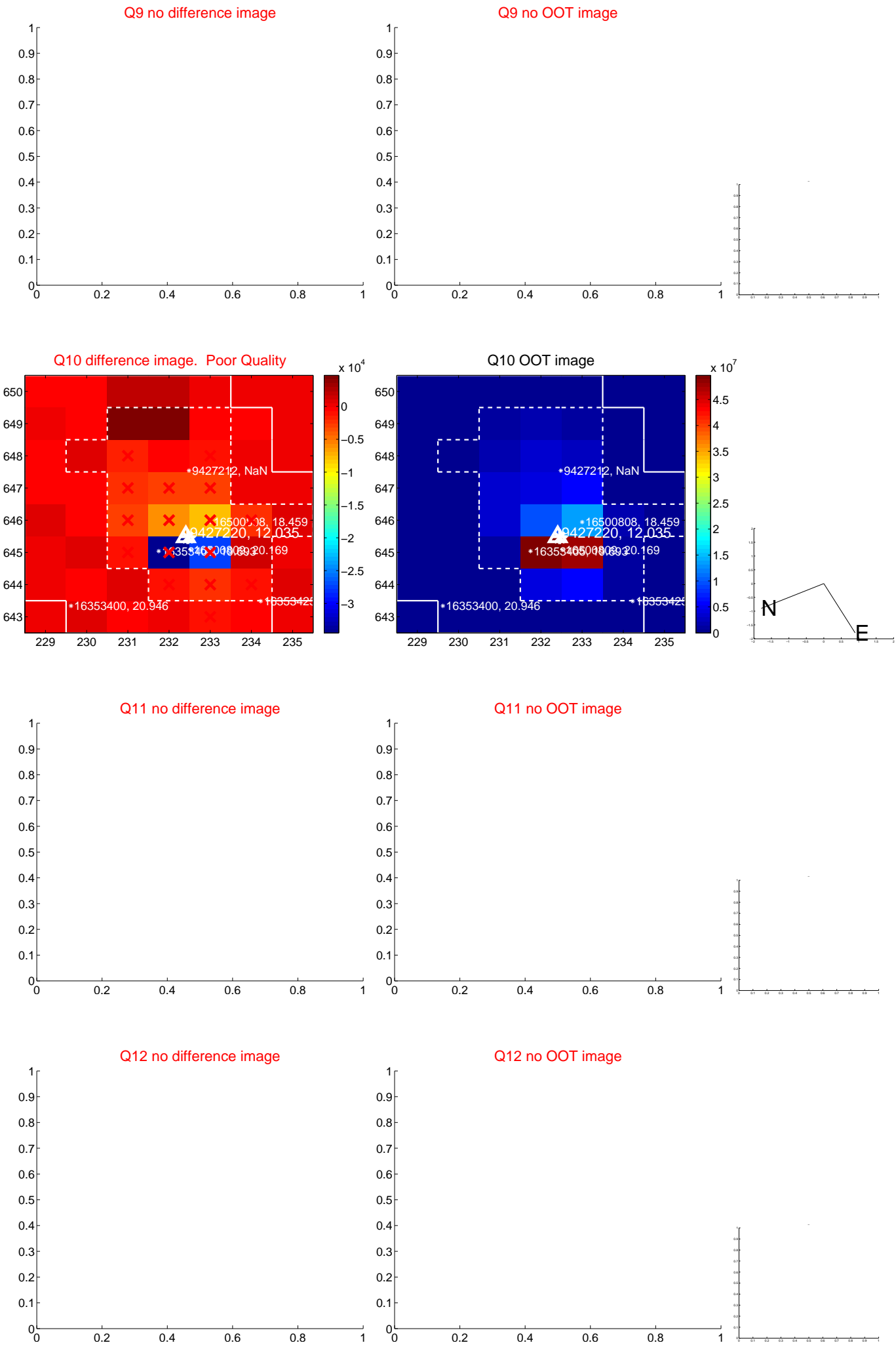
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



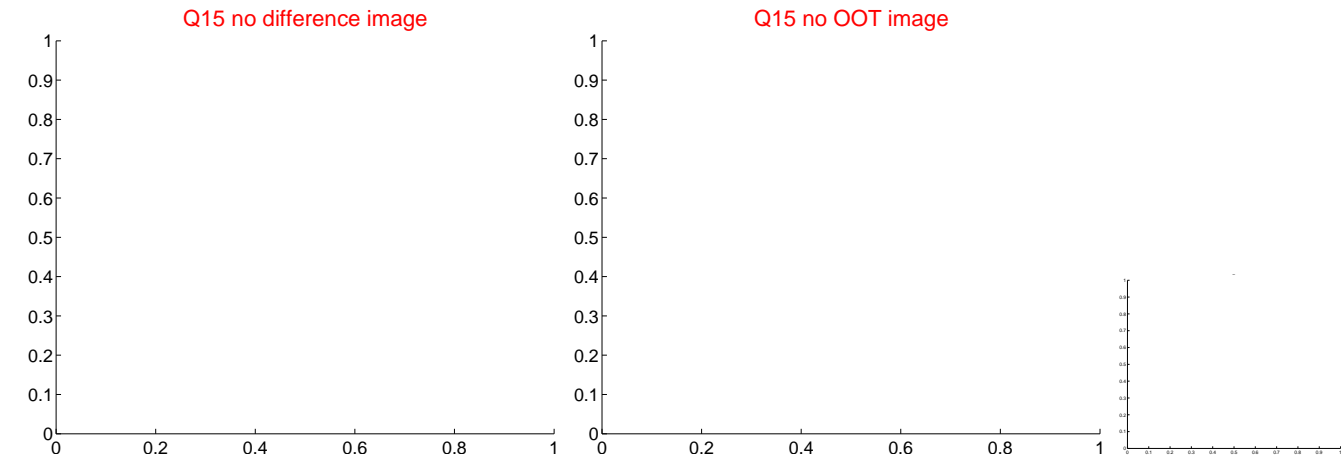
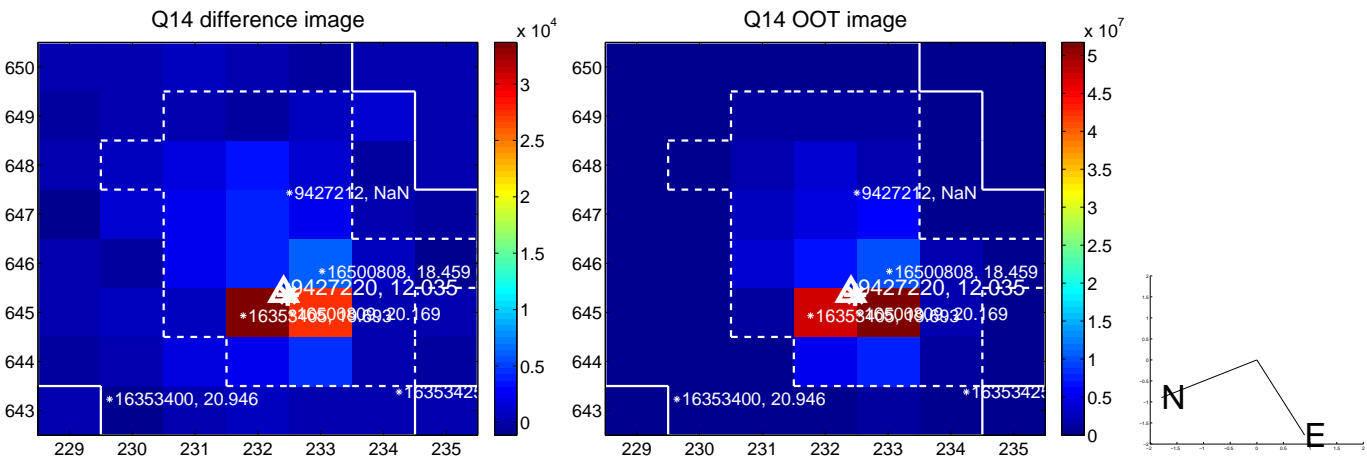
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value



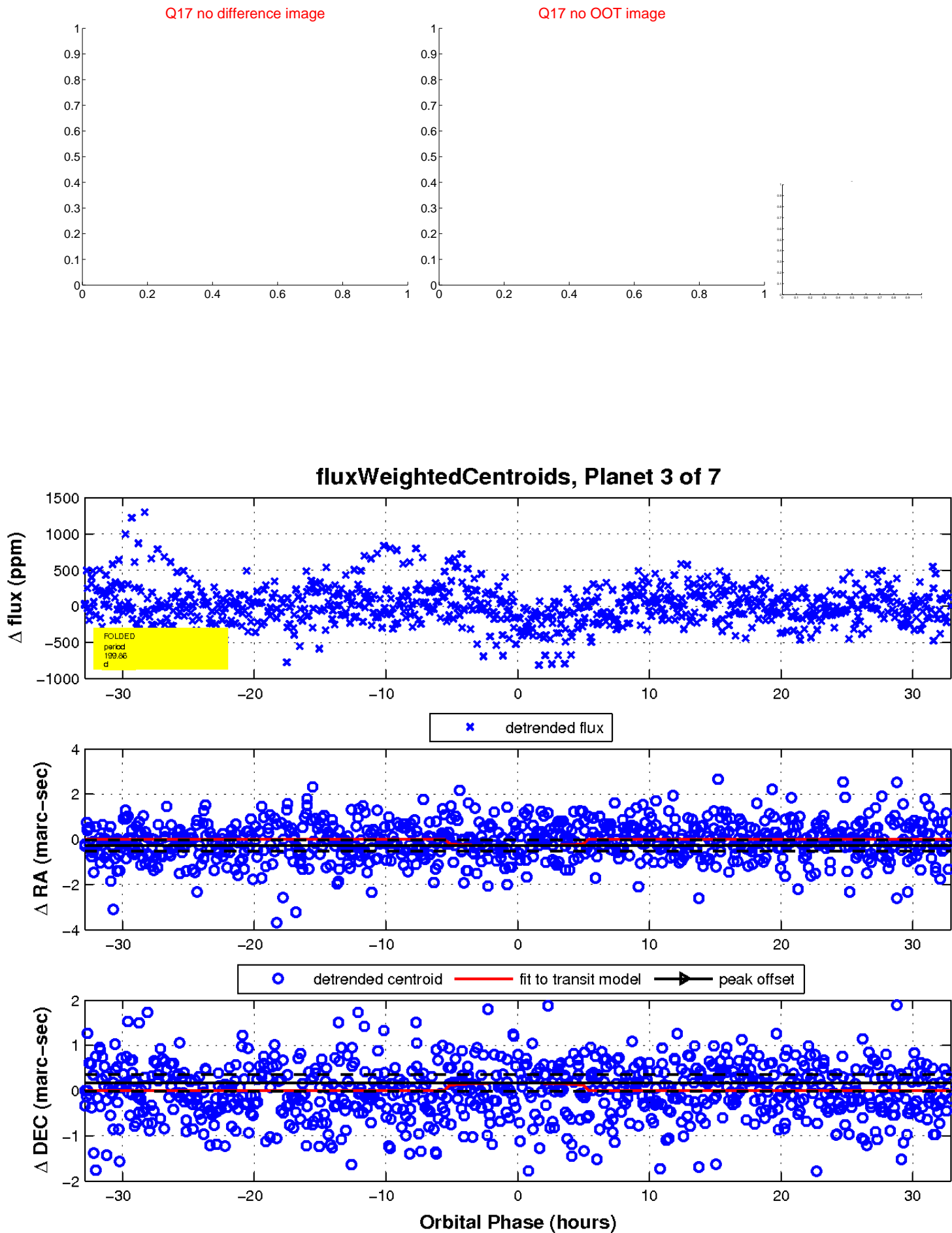
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



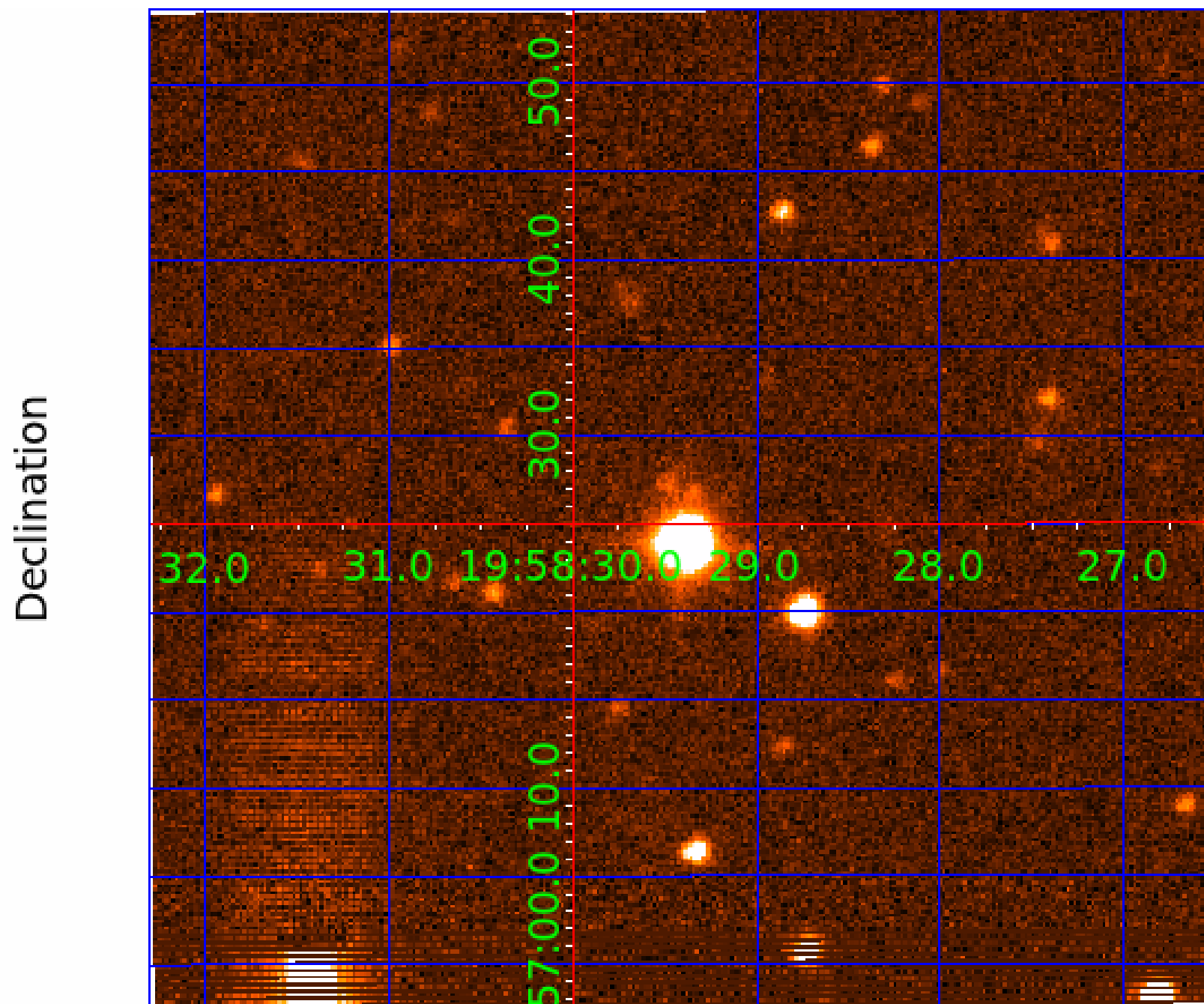
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



UKIRT Image



KIC 009427220

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})
009427220-01	OBS	No	0.513276	132.040601	5.2	0.910	10.7	1.4	2.53	6701	0.59	50744.44
009427220-02	OBS	No	1.026054	131.840620	32.7	3.867	8.7	9.9	2.53	6701	1.50	20150.96
009427220-03	OBS	No	199.864795	162.635263	255.1	10.992	8.2	6.4	2.53	6701	4.36	17.85
009427220-05	OBS	No	270.881246	198.999213	115.4	9.352	7.7	3.7	2.53	6701	2.81	11.90
009427220-06	OBS	No	53.437549	136.393920	287.1	2.103	7.1	7.0	2.53	6701	5.20	103.61
009427220-07	OBS	No	100.464522	162.450809	146.4	5.000	7.3	-1.0	2.53	6701	3.08	44.65

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009427220-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009427220-02	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT
009427220-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_UNCERTAIN
009427220-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
009427220-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009427220-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_NOFITS

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

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

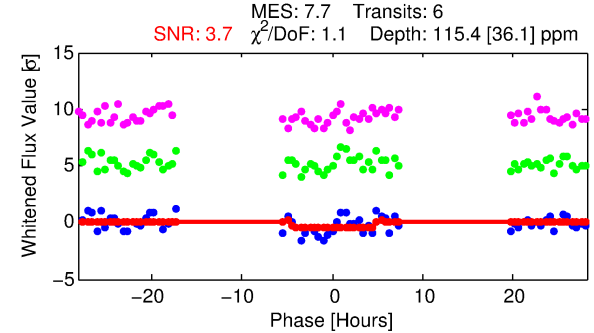
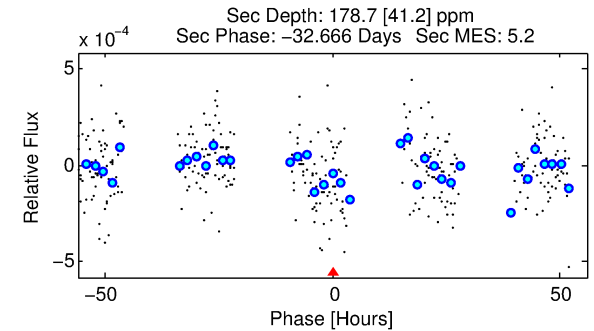
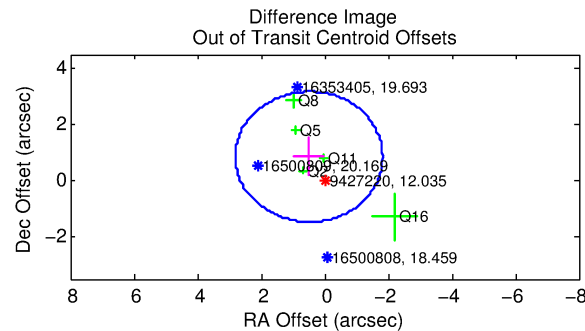
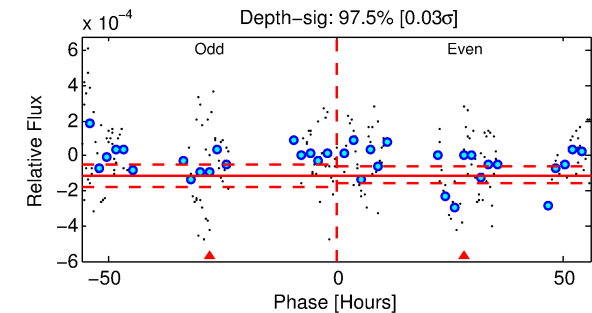
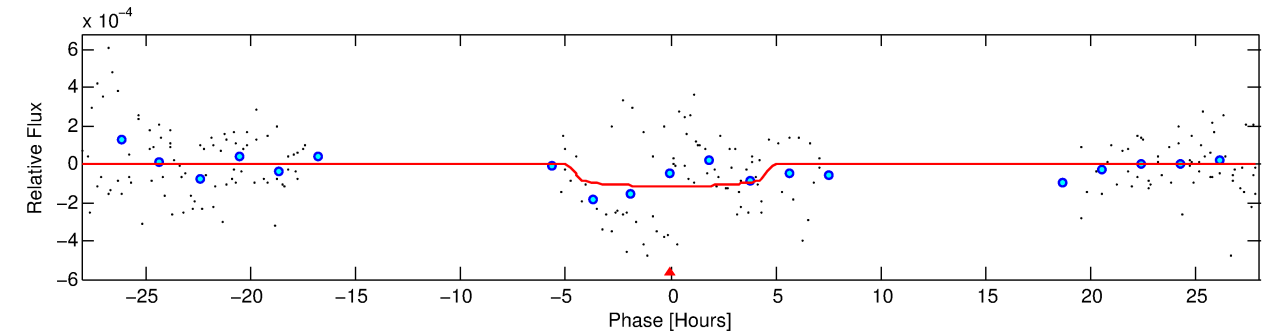
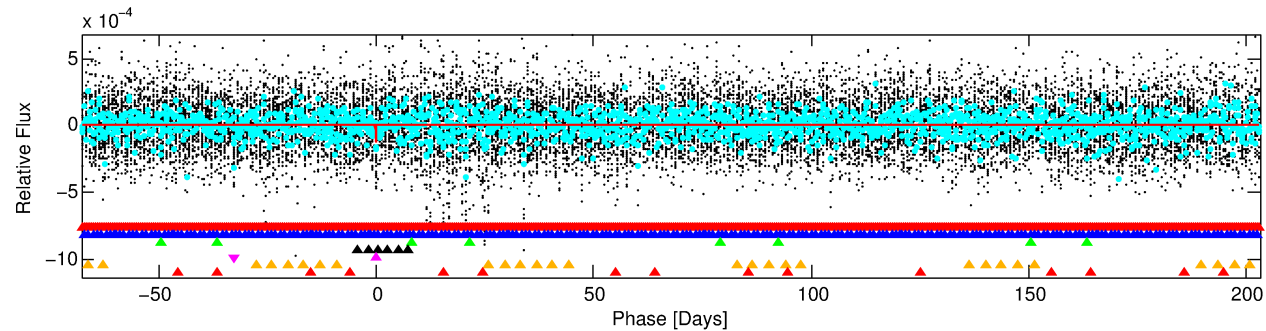
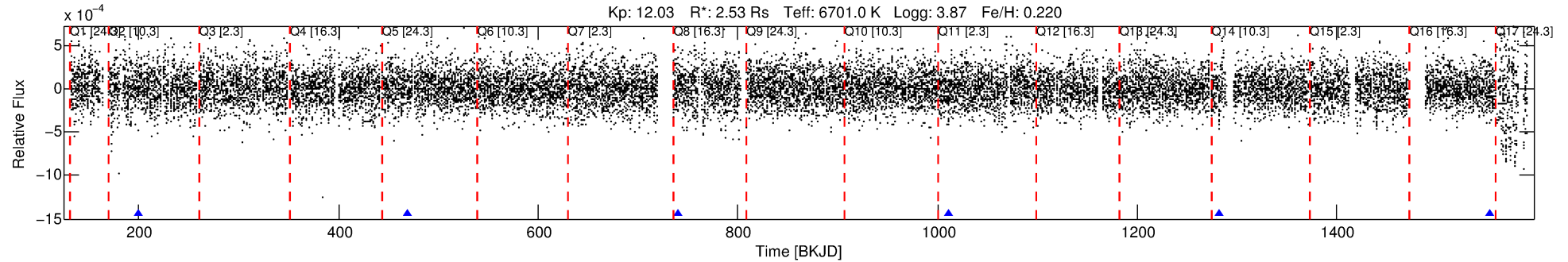
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009427220-05

No Significant Match Found

DV One-Page Summary

KIC: 9427220 Candidate: 5 of 7 Period: 270.881 d



DV Fit Results:

Period = 270.88125 [0.01776] d
Epoch = 198.9992 [0.0544] BKJD
Rp/R* = 0.0102 [0.0184]
a/R* = 190.99 [1919.94]
b = 0.52 [13.79]
Seff = 11.90 [6.95]
Teq = 474 [69] K
Rp = 2.81 [5.22] Re
a = 0.9847 [0.3660] AU
Ag = 12036.80 [44123.40] [0.27σ]
Teffp = 7669 [6951] K [1.04σ]

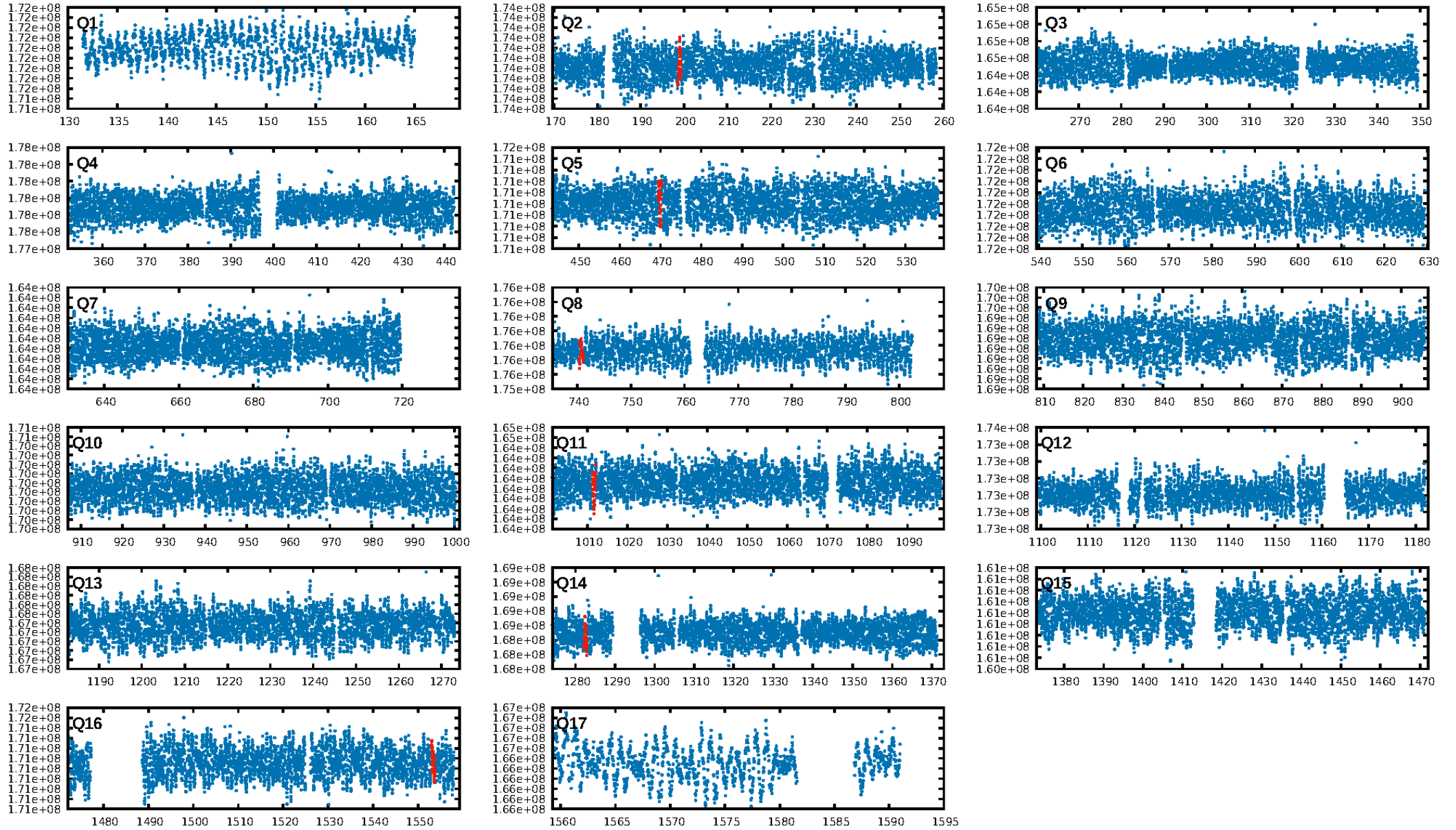
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [118.10σ]
LongPeriod-sig: 100.0% [5.63σ]
ModelChiSquare2-sig: 0.1%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: N/A
RollingBand-fgt: 1.00 [6/6]
GhostDiagnostic-chr: 0.3572
Centroid-sig: 61.6%
Centroid-so: 1.484 arcsec [0.57σ]
OotOffset-rm: 0.986 arcsec [1.27σ]
OotOffset-st: 1/1/2/1 [5]
KicOffset-rm: 0.892 arcsec [1.13σ]
KicOffset-st: 1/1/2/1 [5]
DiffImageQuality-fgm: 0.40 [2/5]
DiffImageOverlap-fno: 0.00 [0/5]

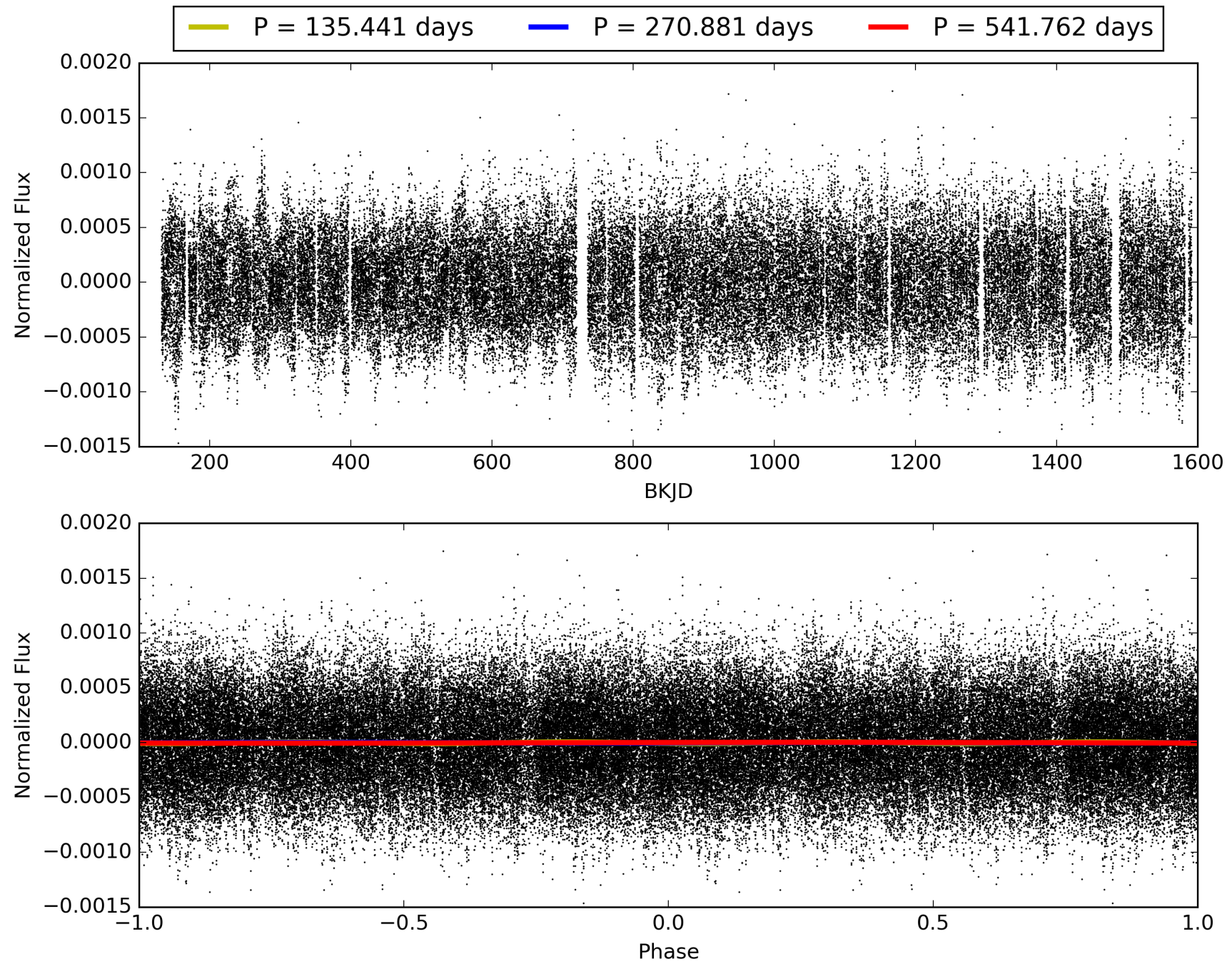
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 13:47:40 Z

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

TCE 009427220-05, PDC Light Curves

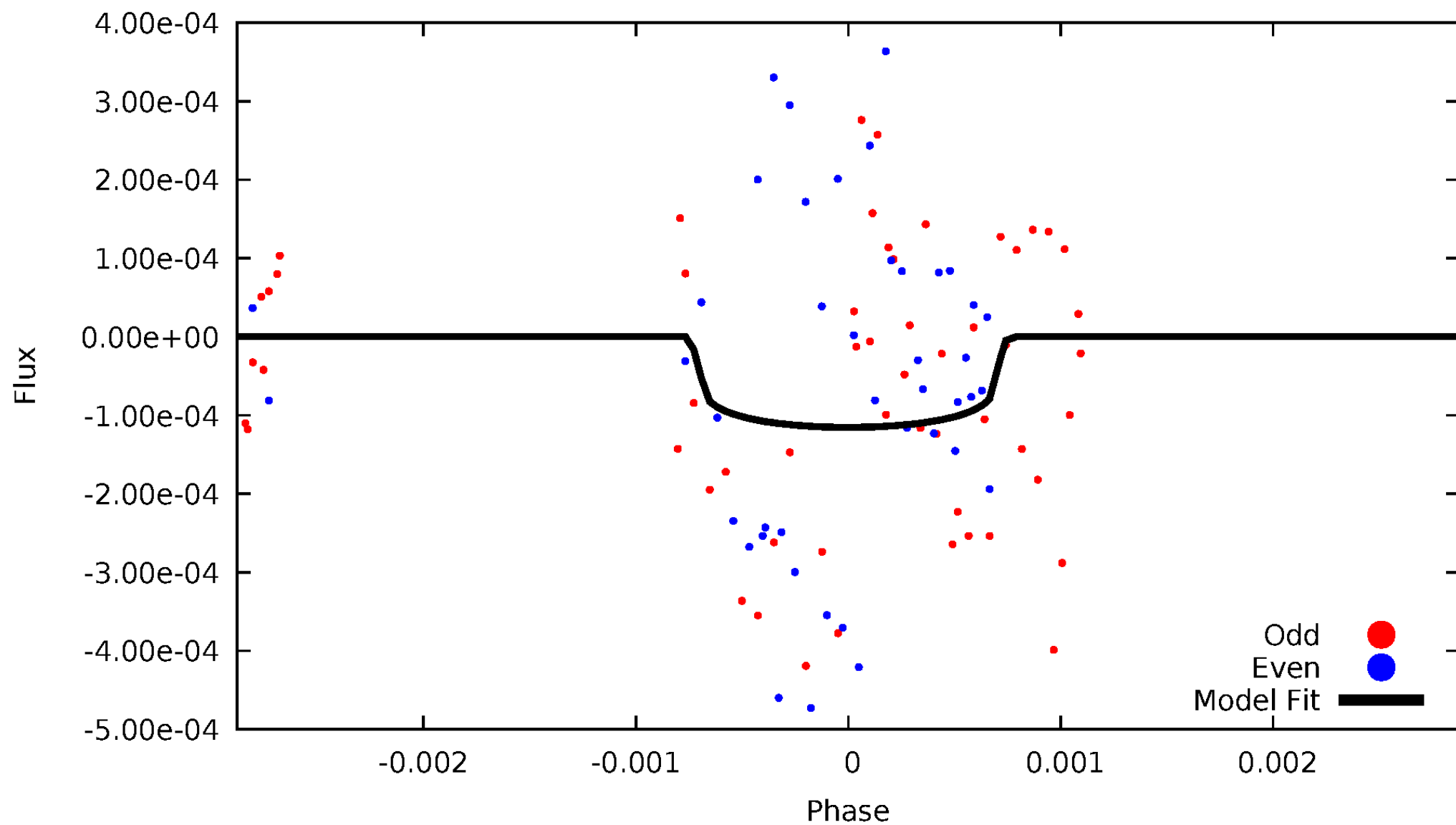


TCE 009427220-05



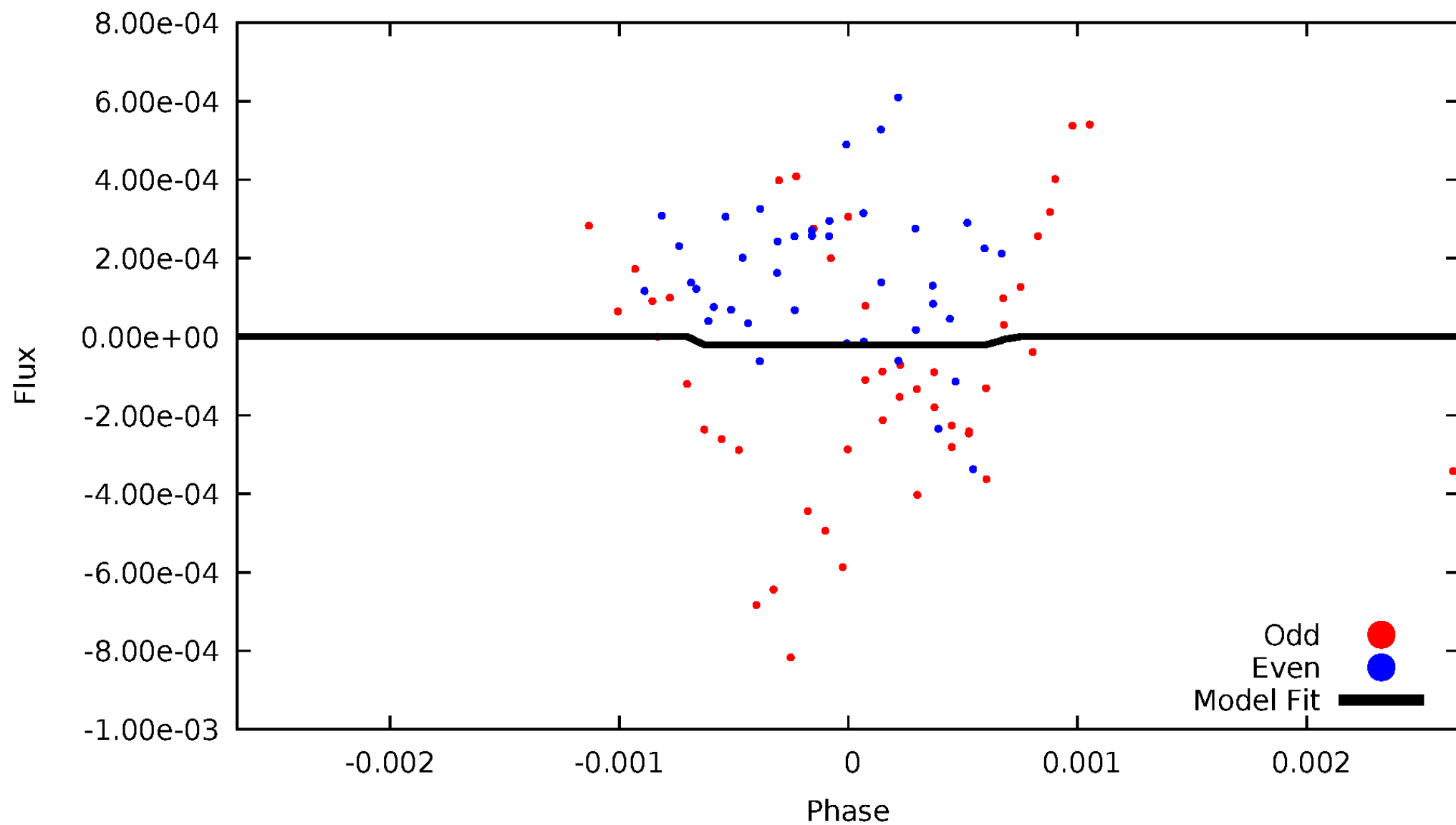
DV Odd/Even

TCE 009427220-05



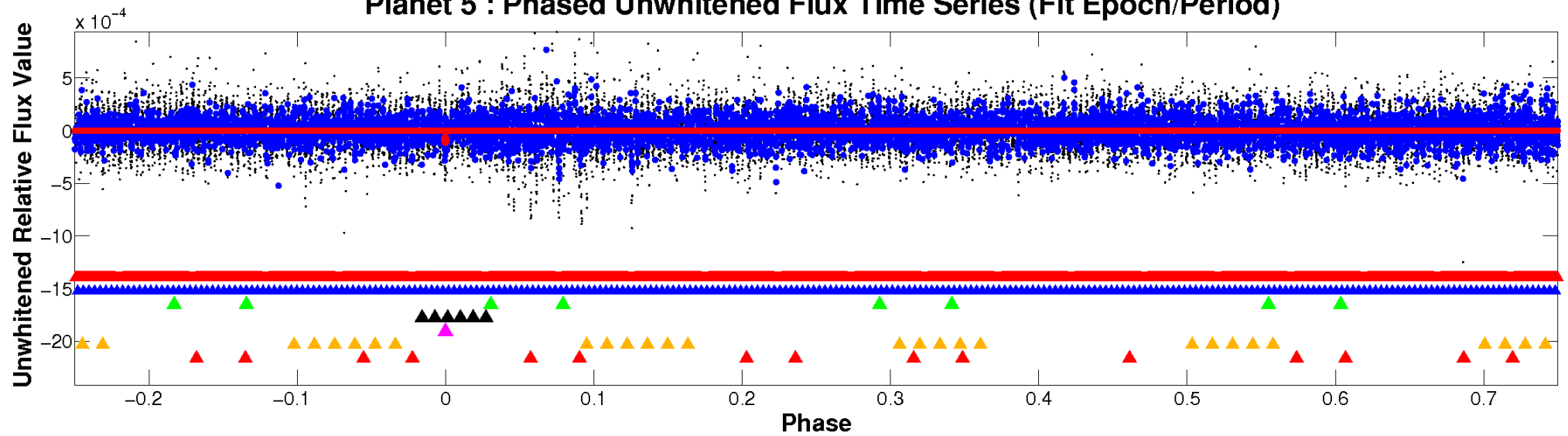
ALT Odd/Even

TCE 009427220-05

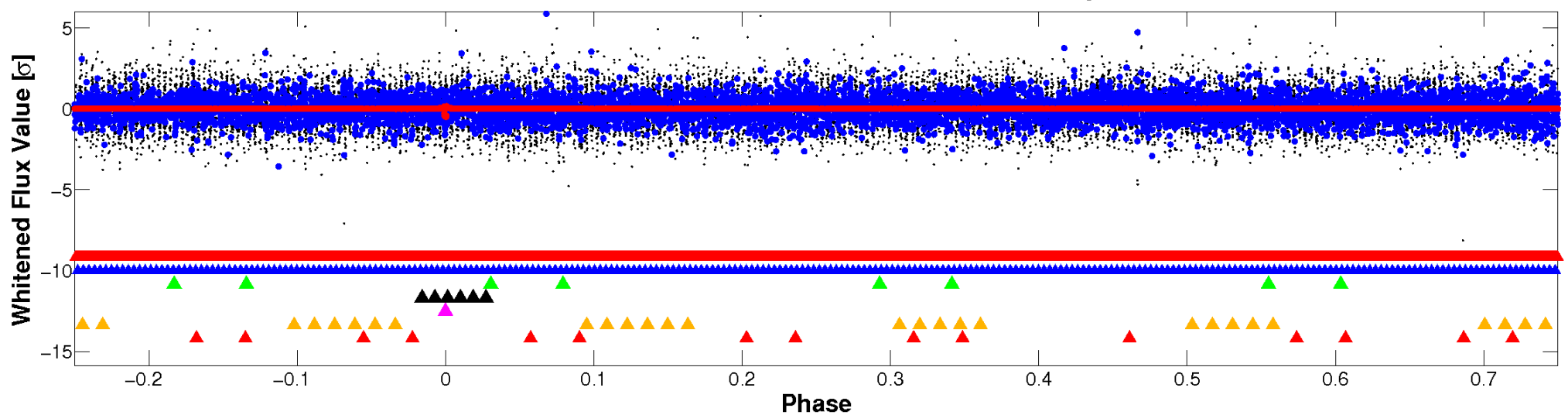


Non-Whitened Vs. Whitened Light Curve

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

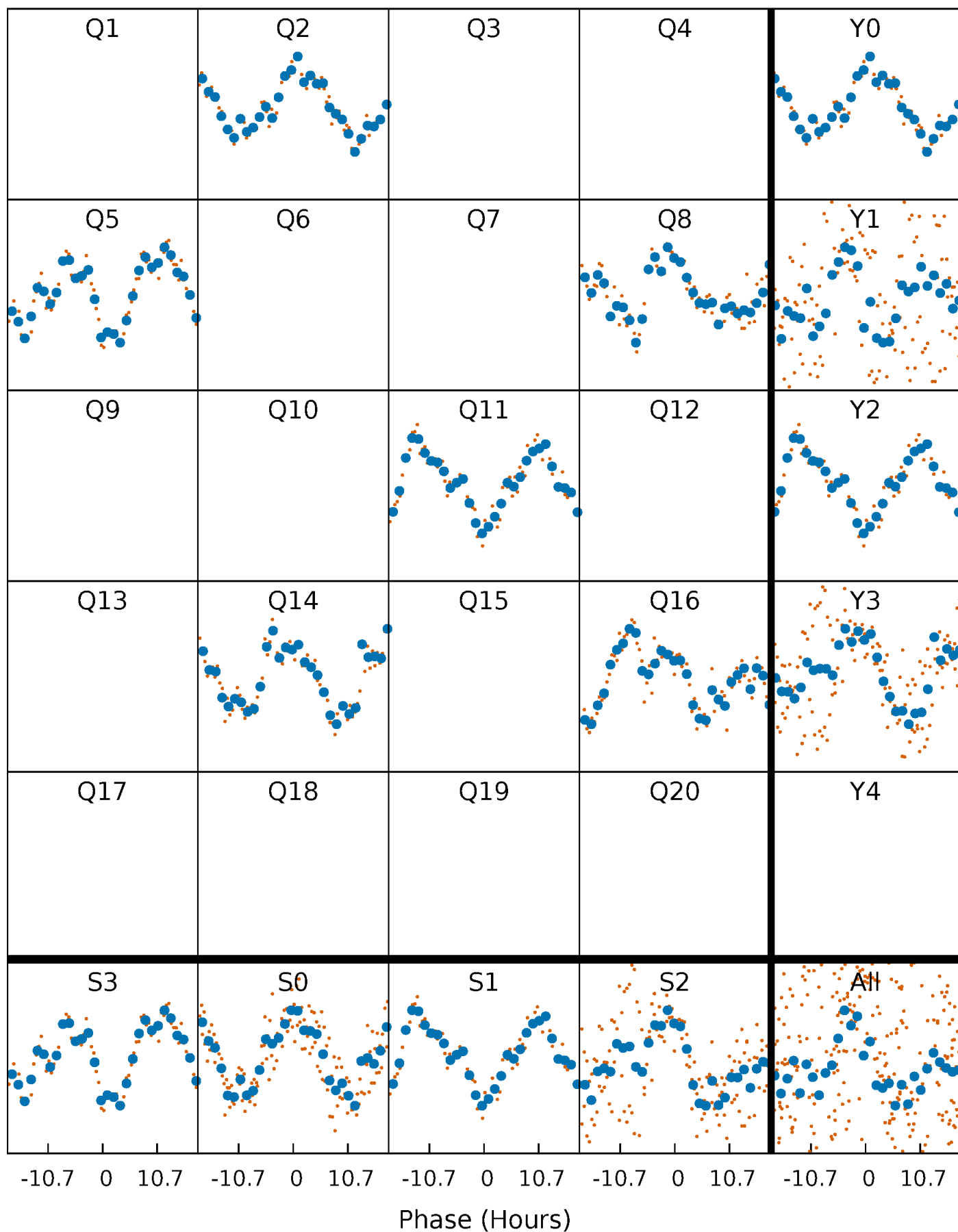


Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)



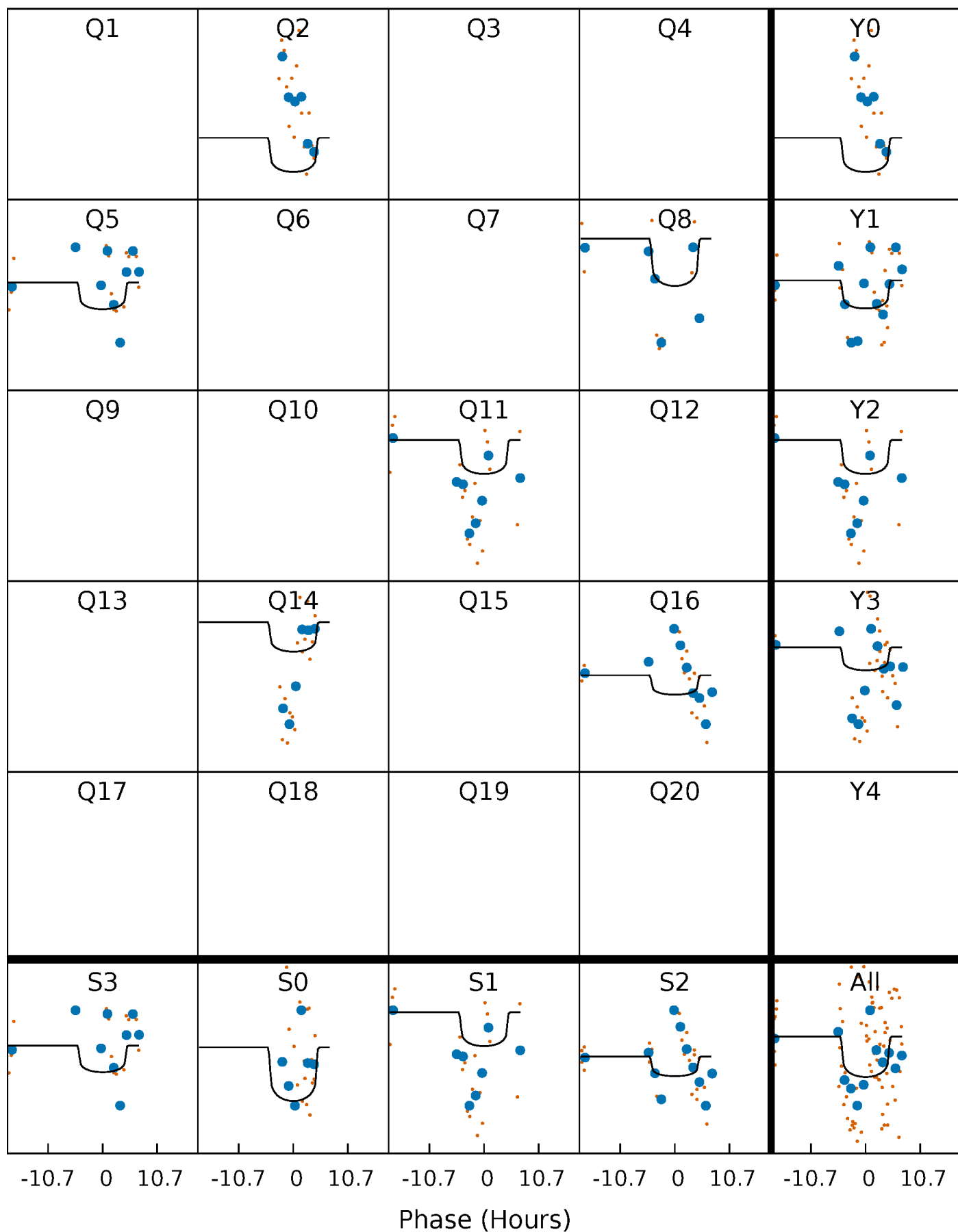
PDC Quarter-Phased Transit Curves

TCE 009427220-05 $P=270.881246$ Days $T_0=198.999213$ (BKJD)



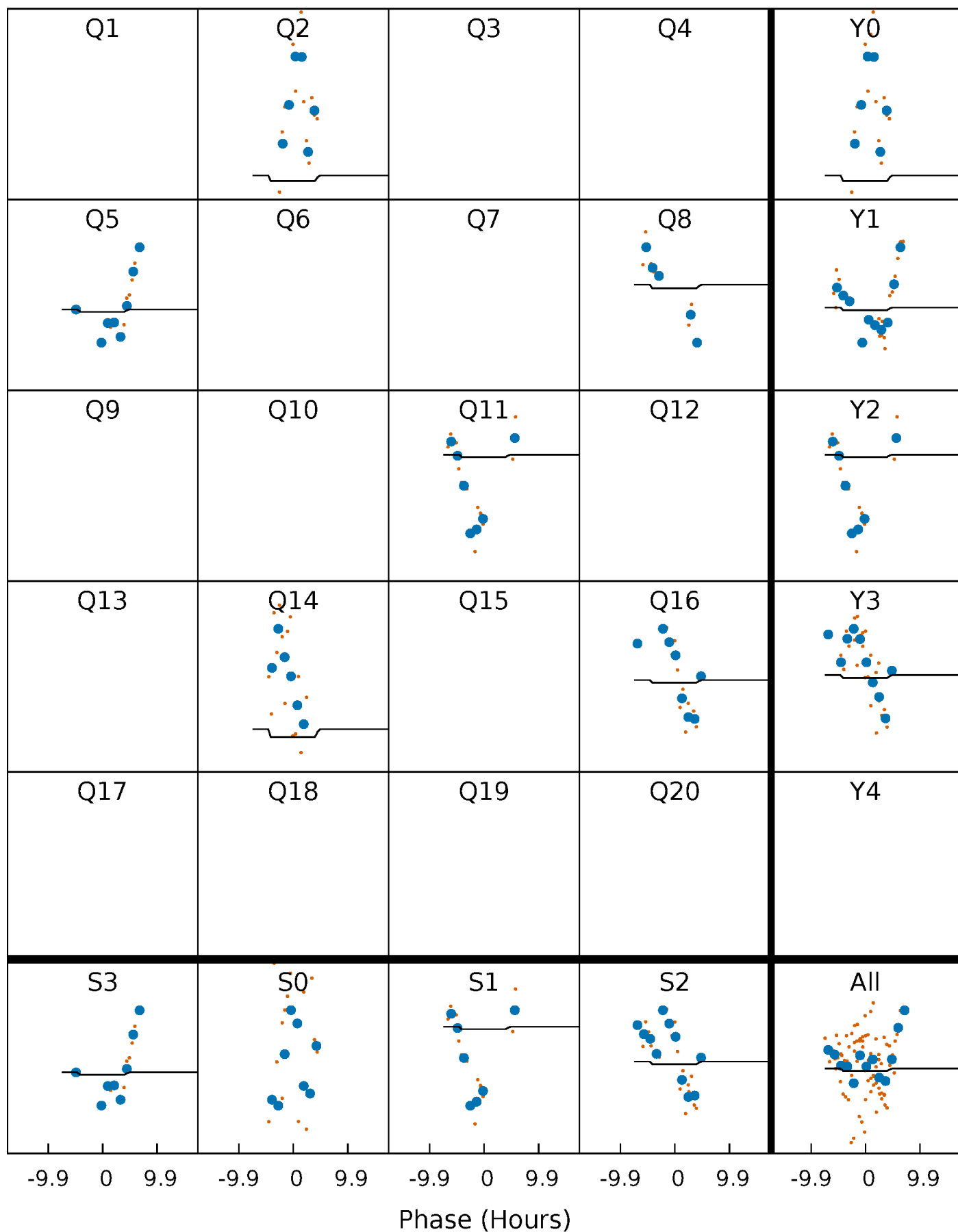
DV Quarter-Phased Transit Curves

TCE 009427220-05 $P=270.881246$ Days $T_0=198.999213$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

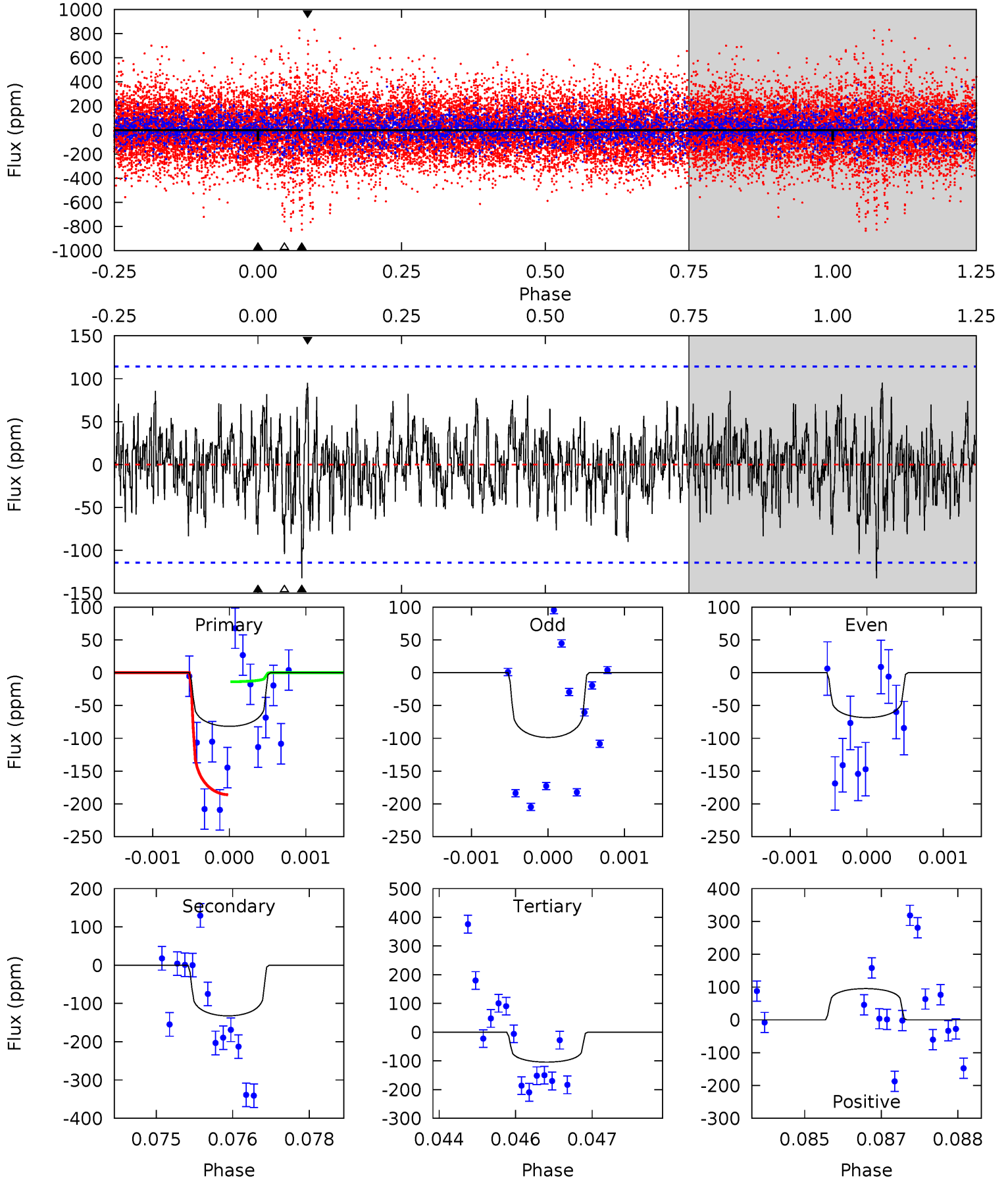
TCE 009427220-05 P=270.903224 Days $T_0=198.988186$ (BKJD)



DV Model-Shift Uniqueness Test

009427220-05, P = 270.881246 Days, E = 198.999213 Days

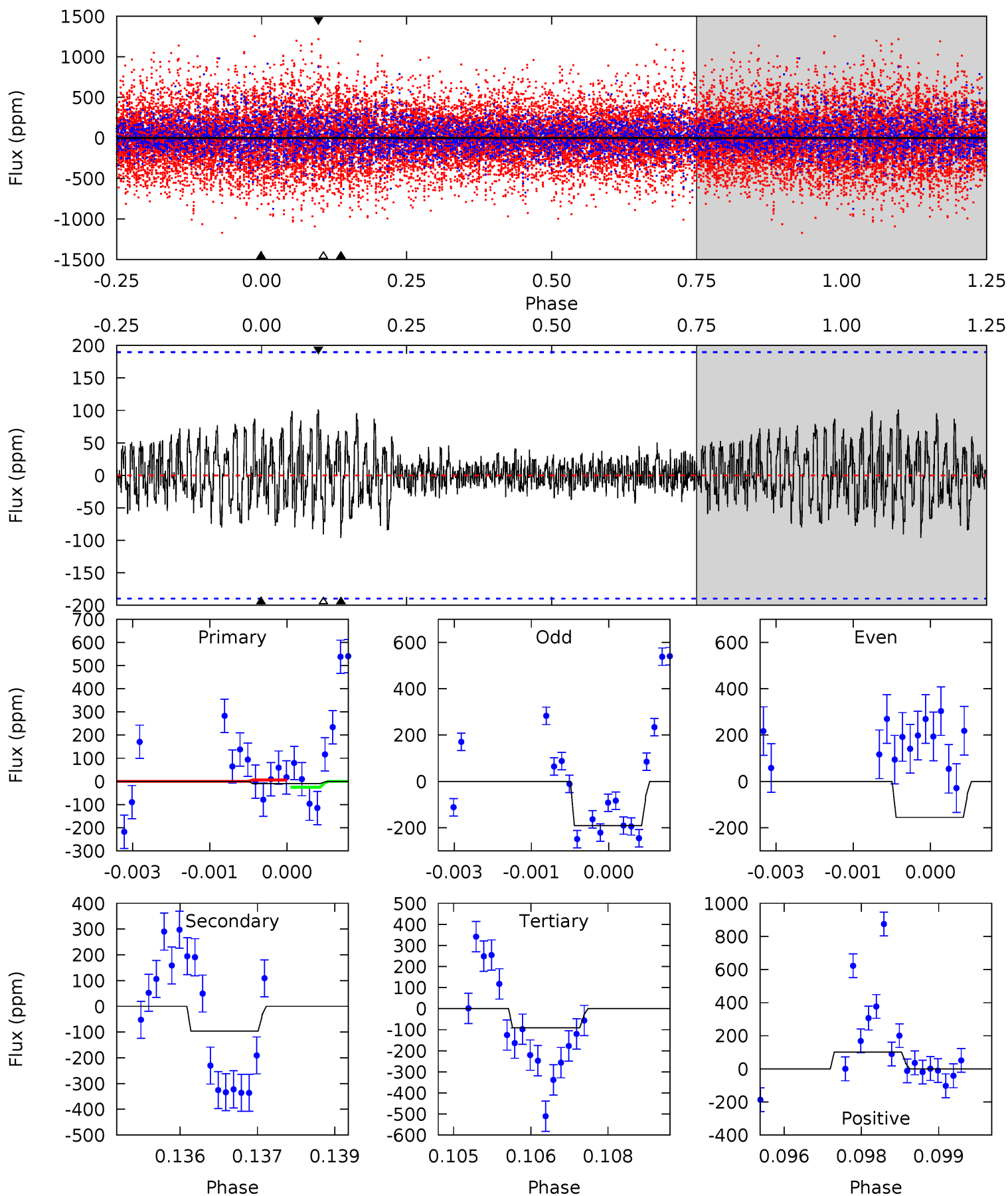
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
3.85	6.24	4.92	4.49	5.38	3.18	1.44	-1.06	-0.64	1.32	1.75	0.71	0.68	0.42	3.98



Alt Model-Shift Uniqueness Test

009427220-05, $P = 270.903224$ Days, $E = 198.988186$ Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0.26	2.73	2.58	2.88	5.39	3.19	0.80	-2.31	-2.62	0.16	-0.14	0.51	1.40	0.51	0.27



Stellar Parameters For KIC 009427220

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	6701^{+185}_{-255}	$3.872^{+0.319}_{-0.147}$	$0.220^{+0.150}_{-0.300}$	$2.527^{+0.652}_{-1.060}$	$1.732^{+0.178}_{-0.386}$	$0.151^{+0.390}_{-0.063}$
	+3%/-4%	+8%/-4%	+68%/-136%	+26%/-42%	+10%/-22%	+258%/-42%
Source	PHO54	PHO54	PHO54	DSEP		

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

Secondary Eclipse Parameters for KIC 009427220-05 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	-132 ± 21	$4.21^{+4.38}_{-2.81}$	651^{+48}_{-65}	5515^{+5867}_{-1309}	3976^{+32510}_{-3017}
Alt.	-96 ± 35	$3.71^{+3.97}_{-2.73}$	652^{+51}_{-63}	5479^{+6570}_{-1420}	3660^{+41239}_{-2965}

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 $A_{obs} \gg 1.0$

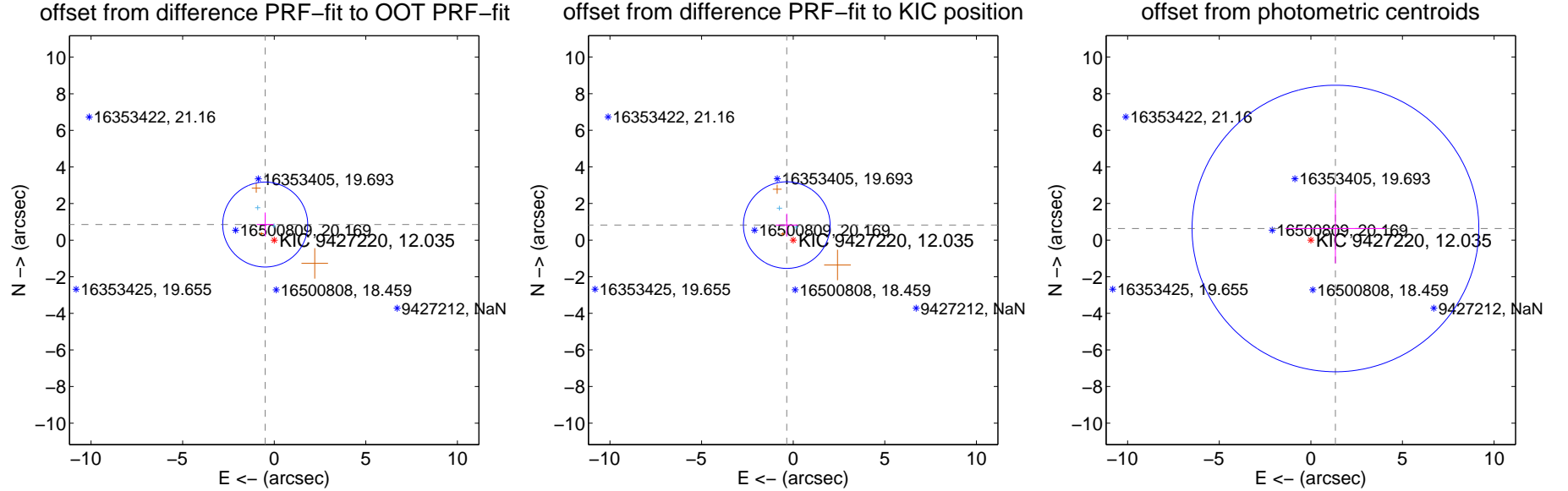
DV Centroid Data

Supplemental centroid analysis for 009427220-05. Kepler magnitude: 12.04. Transit SNR 3.70

There are 2 quarters with good PRF difference image offsets

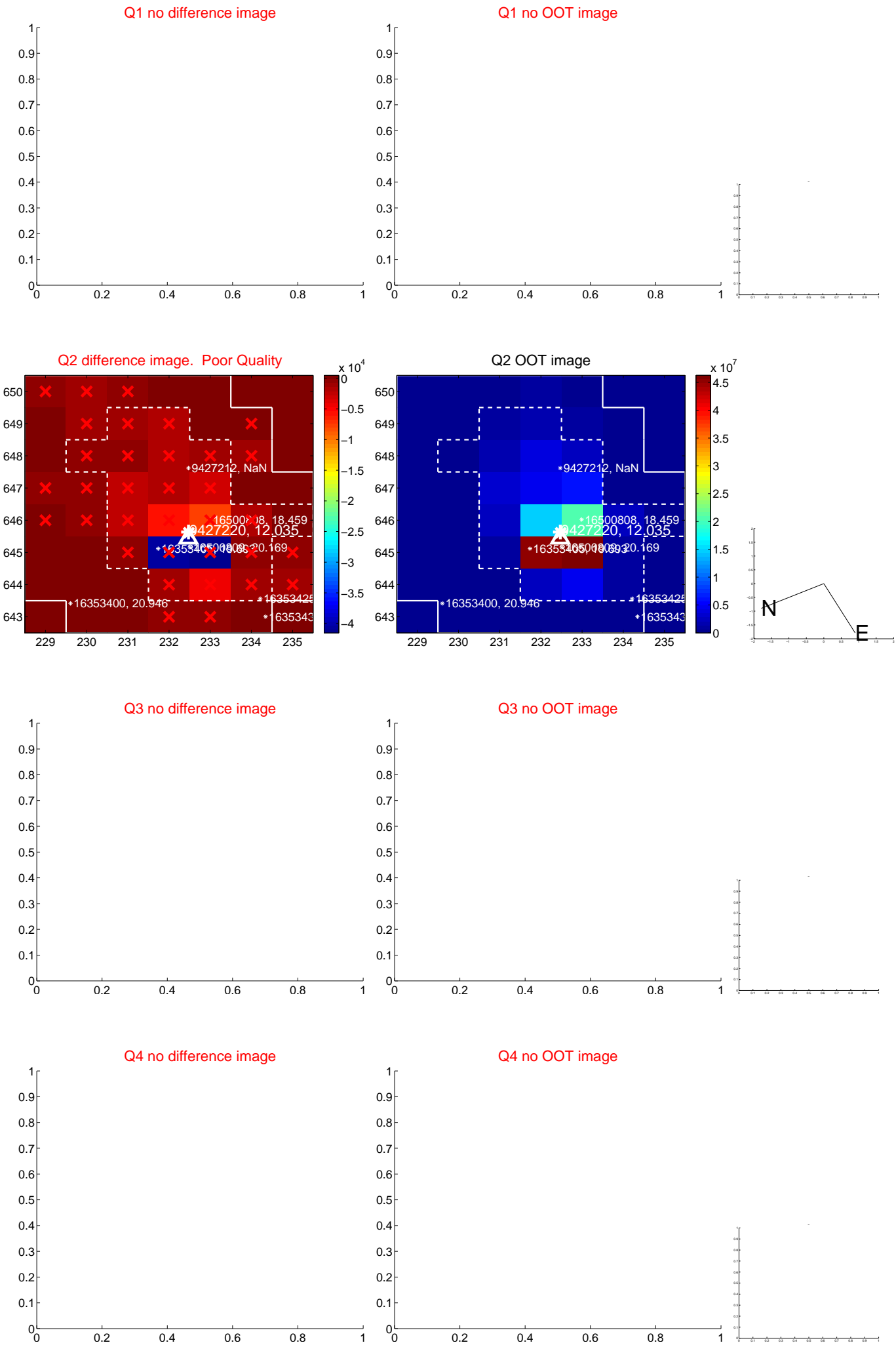
The direct PRF centroid is offset from the target star catalog position by about 0.22 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.986 ± 0.774	1.27	0.492 ± 0.457	0.854 ± 0.653
PRF-fit source offset from KIC position	0.892 ± 0.789	1.13	0.351 ± 0.598	0.820 ± 0.625
photometric centroid source offset	1.48 ± 2.61	0.57	-1.34 ± 2.74	0.63 ± 1.90

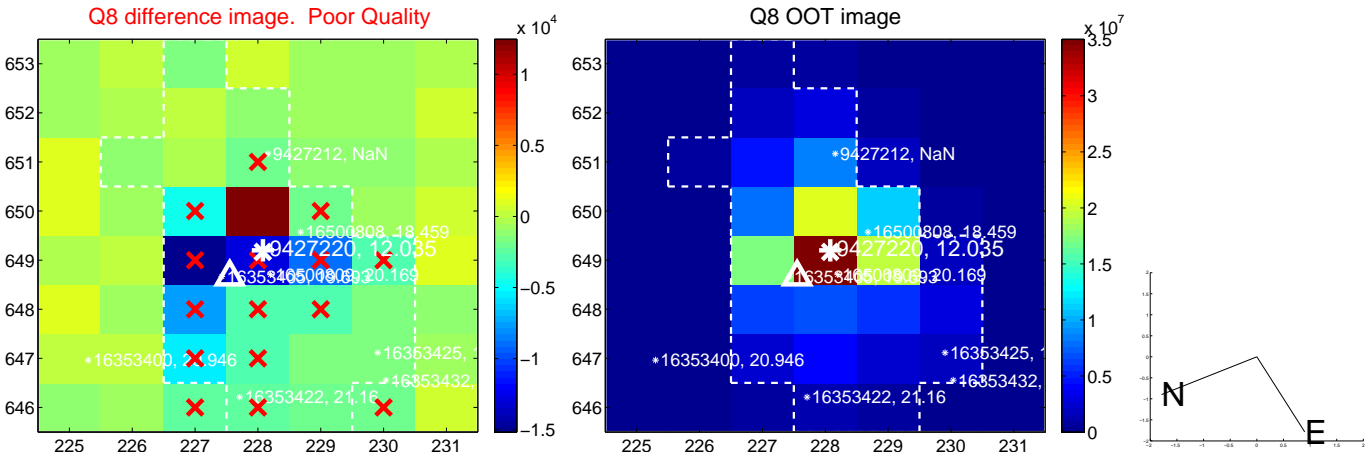
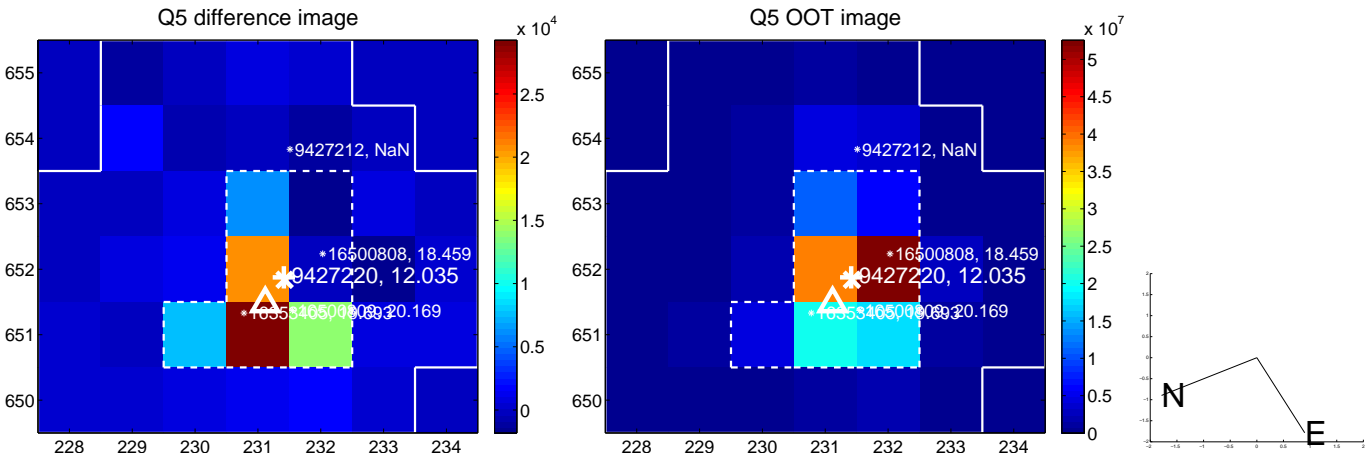


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

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



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



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

Q9 no difference image



Q9 no OOT image



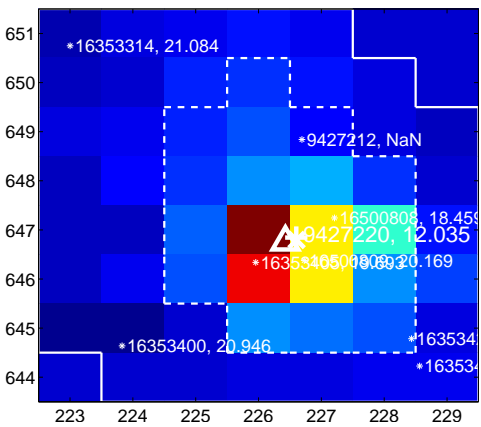
Q10 no difference image



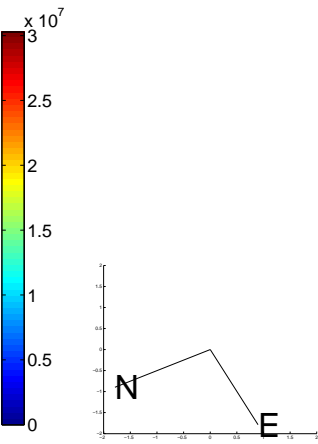
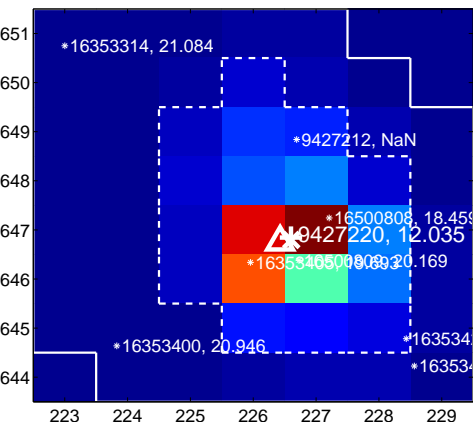
Q10 no OOT image



Q11 difference image



Q11 OOT image



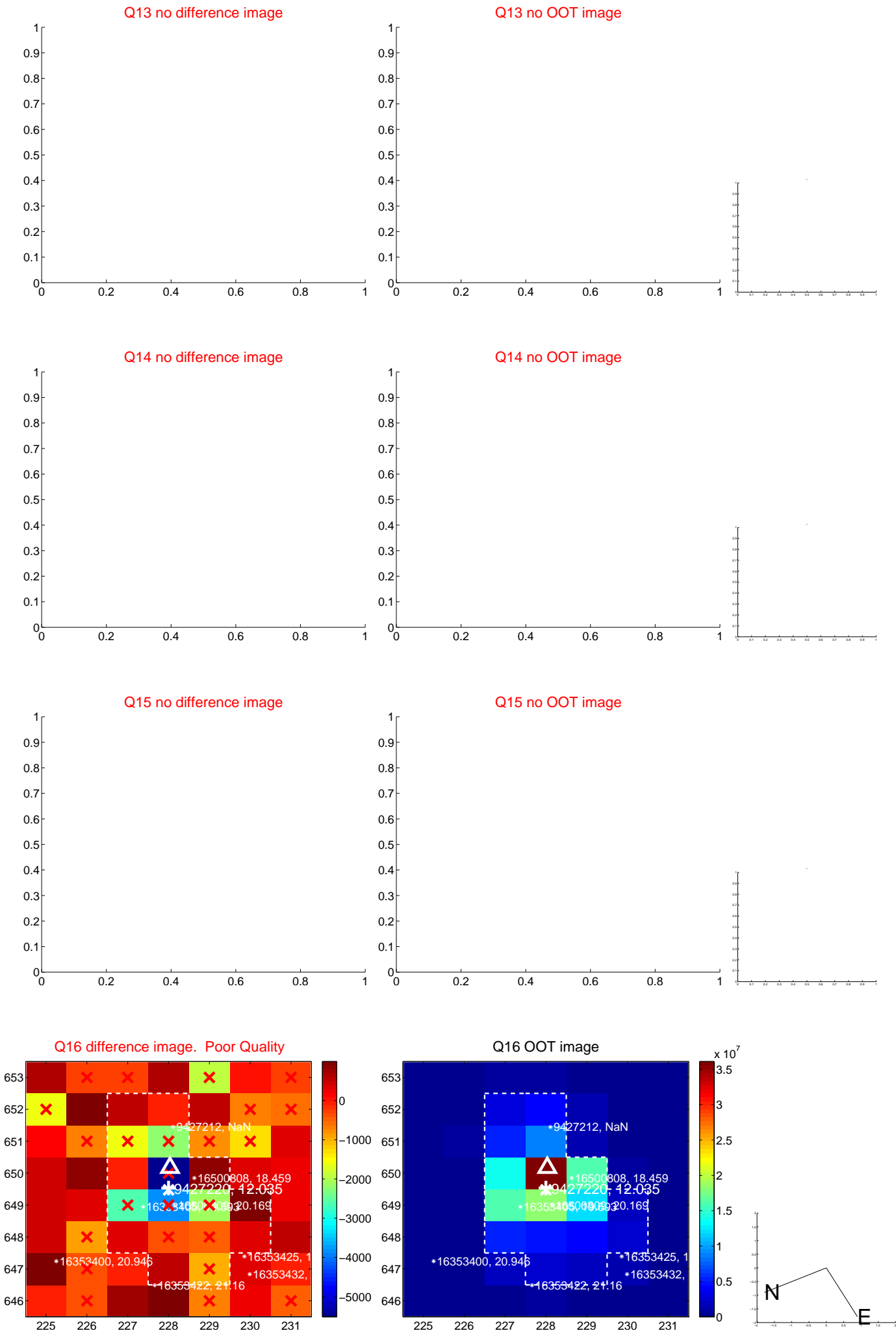
Q12 no difference image



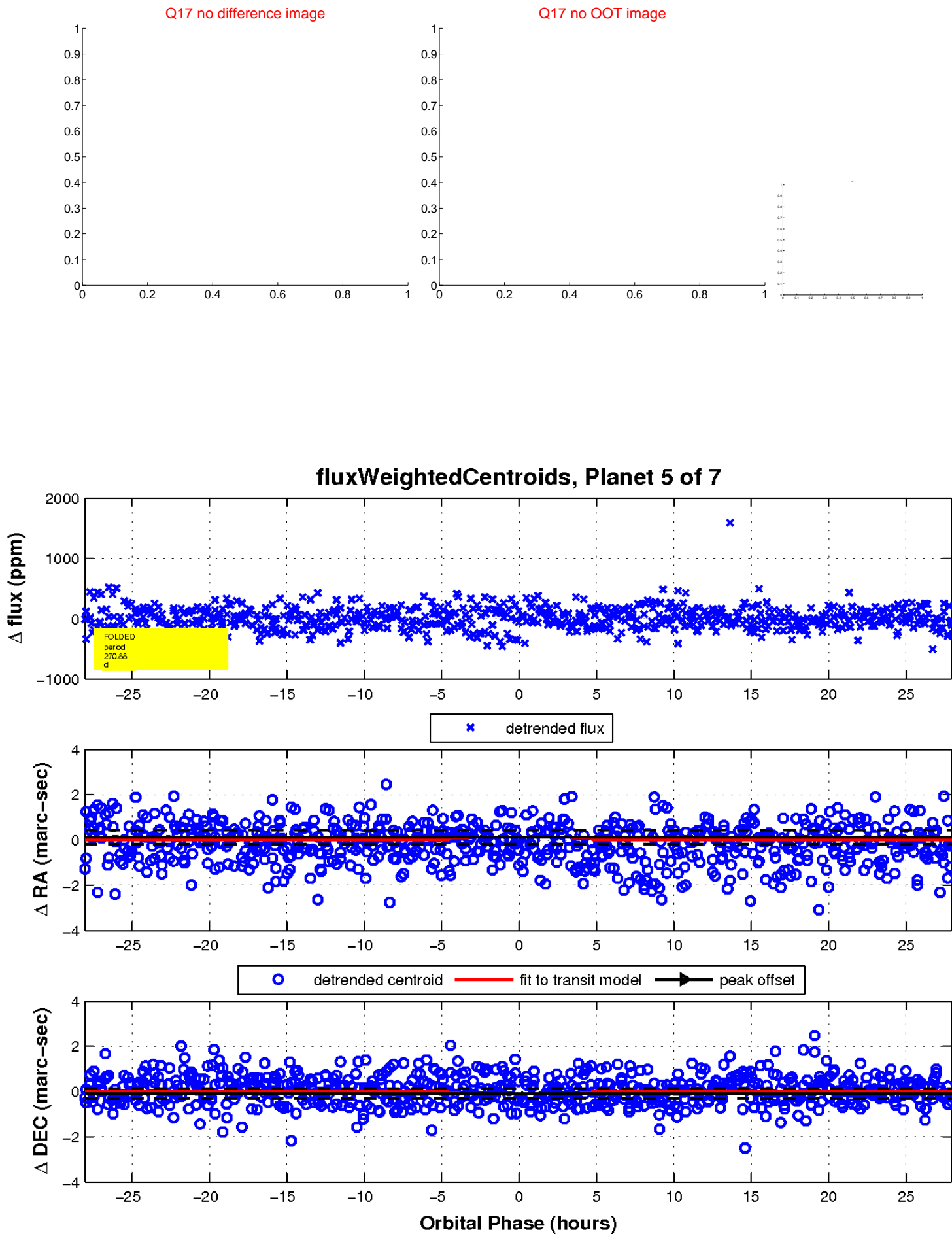
Q12 no OOT image



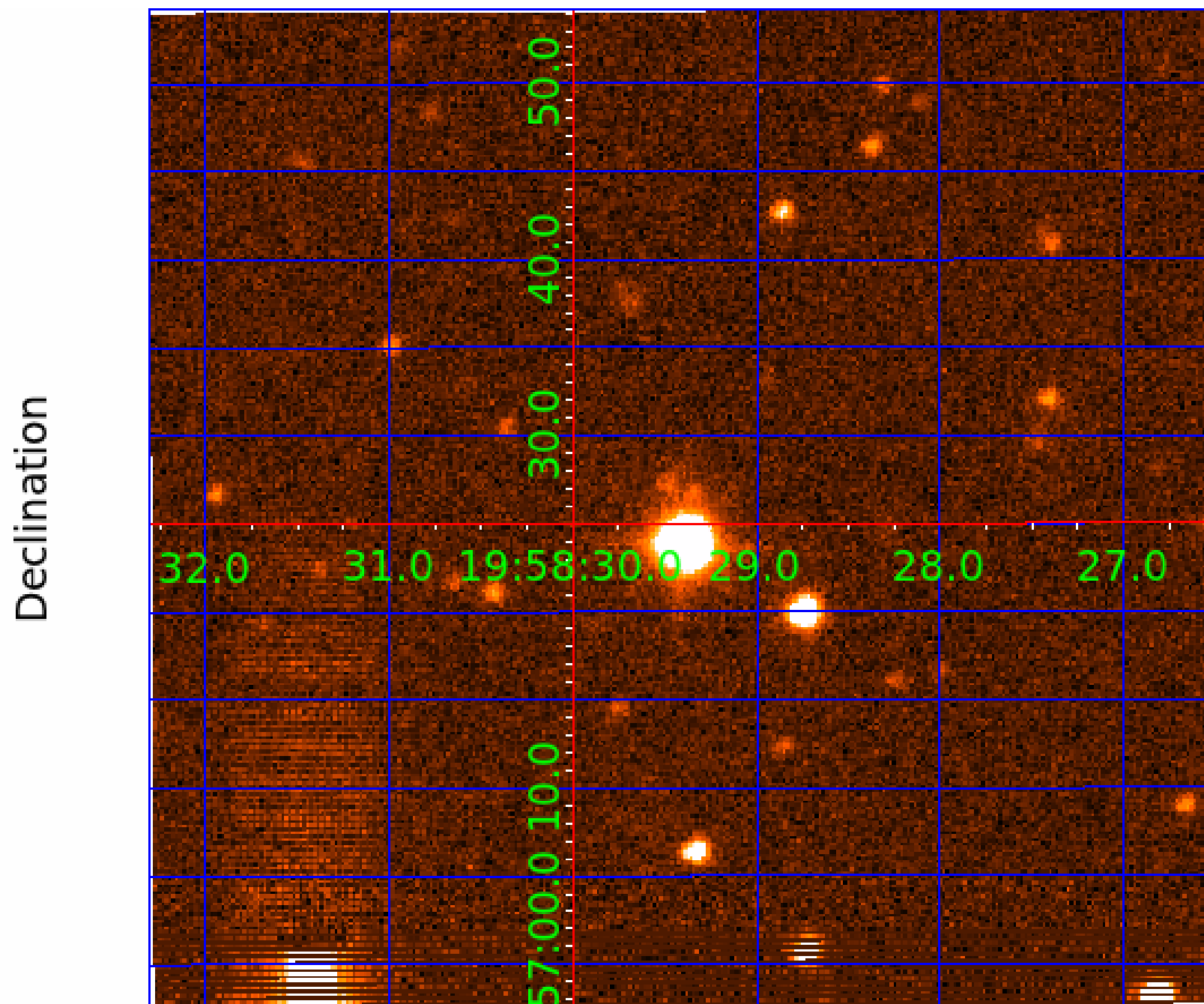
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



UKIRT Image



KIC 009427220

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})
009427220-01	OBS	No	0.513276	132.040601	5.2	0.910	10.7	1.4	2.53	6701	0.59	50744.44
009427220-02	OBS	No	1.026054	131.840620	32.7	3.867	8.7	9.9	2.53	6701	1.50	20150.96
009427220-03	OBS	No	199.864795	162.635263	255.1	10.992	8.2	6.4	2.53	6701	4.36	17.85
009427220-05	OBS	No	270.881246	198.999213	115.4	9.352	7.7	3.7	2.53	6701	2.81	11.90
009427220-06	OBS	No	53.437549	136.393920	287.1	2.103	7.1	7.0	2.53	6701	5.20	103.61
009427220-07	OBS	No	100.464522	162.450809	146.4	5.000	7.3	-1.0	2.53	6701	3.08	44.65

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009427220-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009427220-02	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT
009427220-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_UNCERTAIN
009427220-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
009427220-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009427220-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_NOFITS

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

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

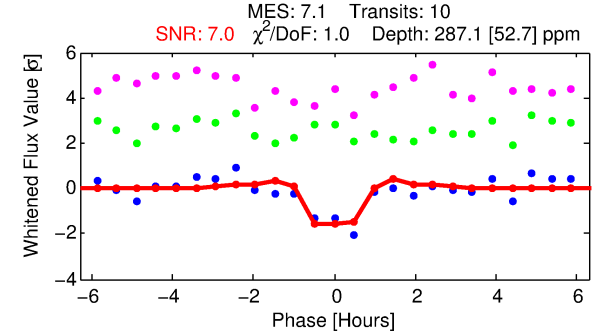
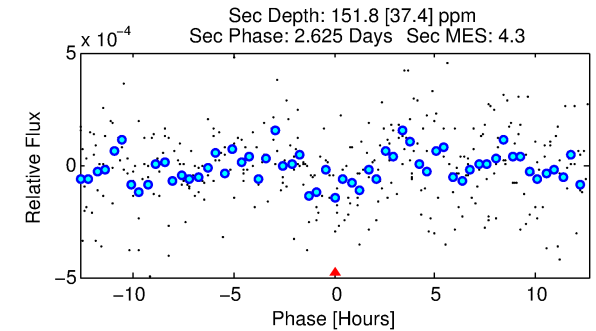
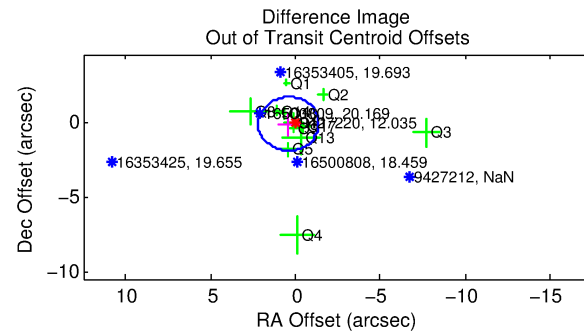
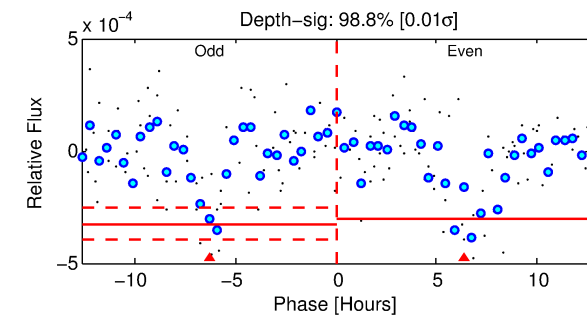
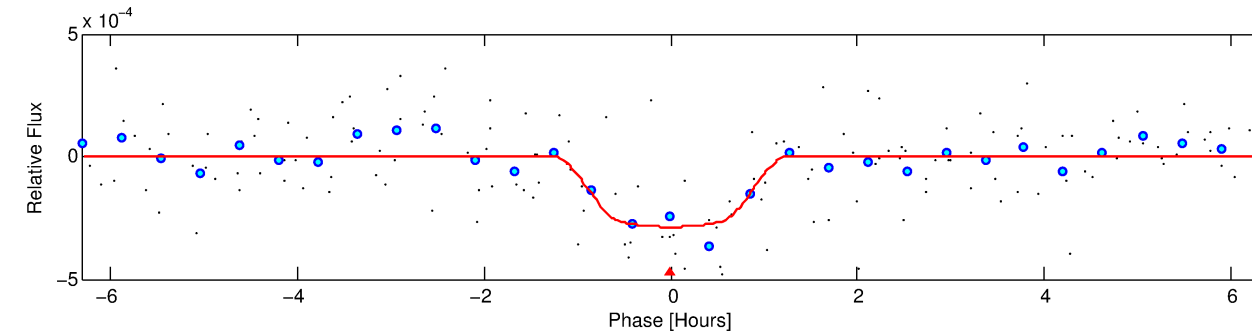
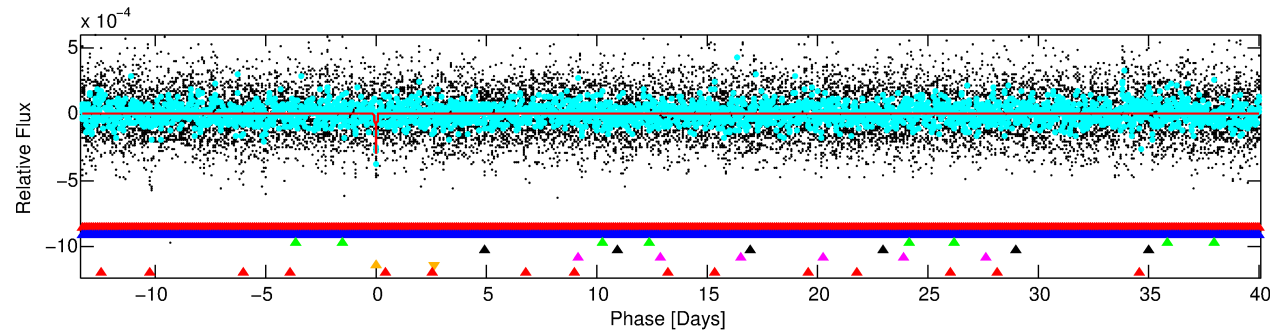
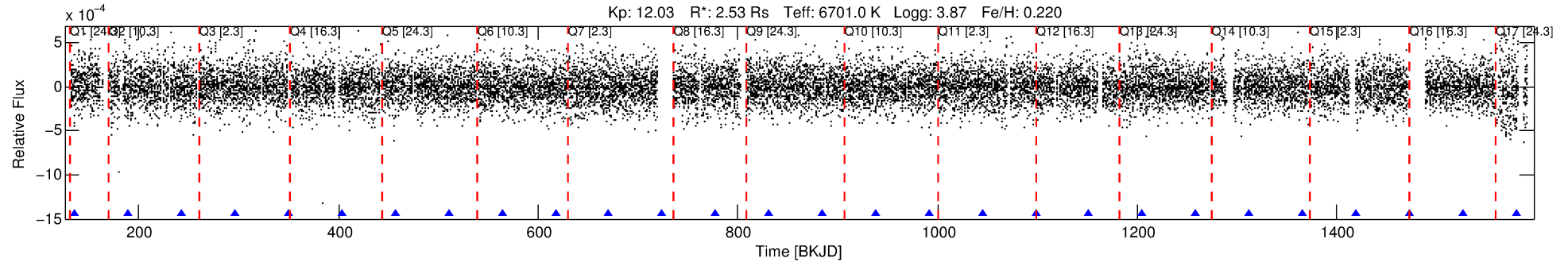
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009427220-06

No Significant Match Found

DV One-Page Summary

KIC: 9427220 Candidate: 6 of 7 Period: 53.438 d



DV Fit Results:

Period = 53.43755 [0.00034] d
Epoch = 136.3939 [0.0041] BKJD
Rp/R* = 0.0188 [0.0070]
a/R* = 77.47 [155.34]
b = 0.94 [0.26]
Seff = 103.61 [60.52]
Teq = 814 [119] K
Rp = 5.20 [2.92] Re
a = 0.3337 [0.1240] AU
Ag = 344.38 [333.35] [1.03σ]
Teffp = 5418 [1085] K [4.22σ]

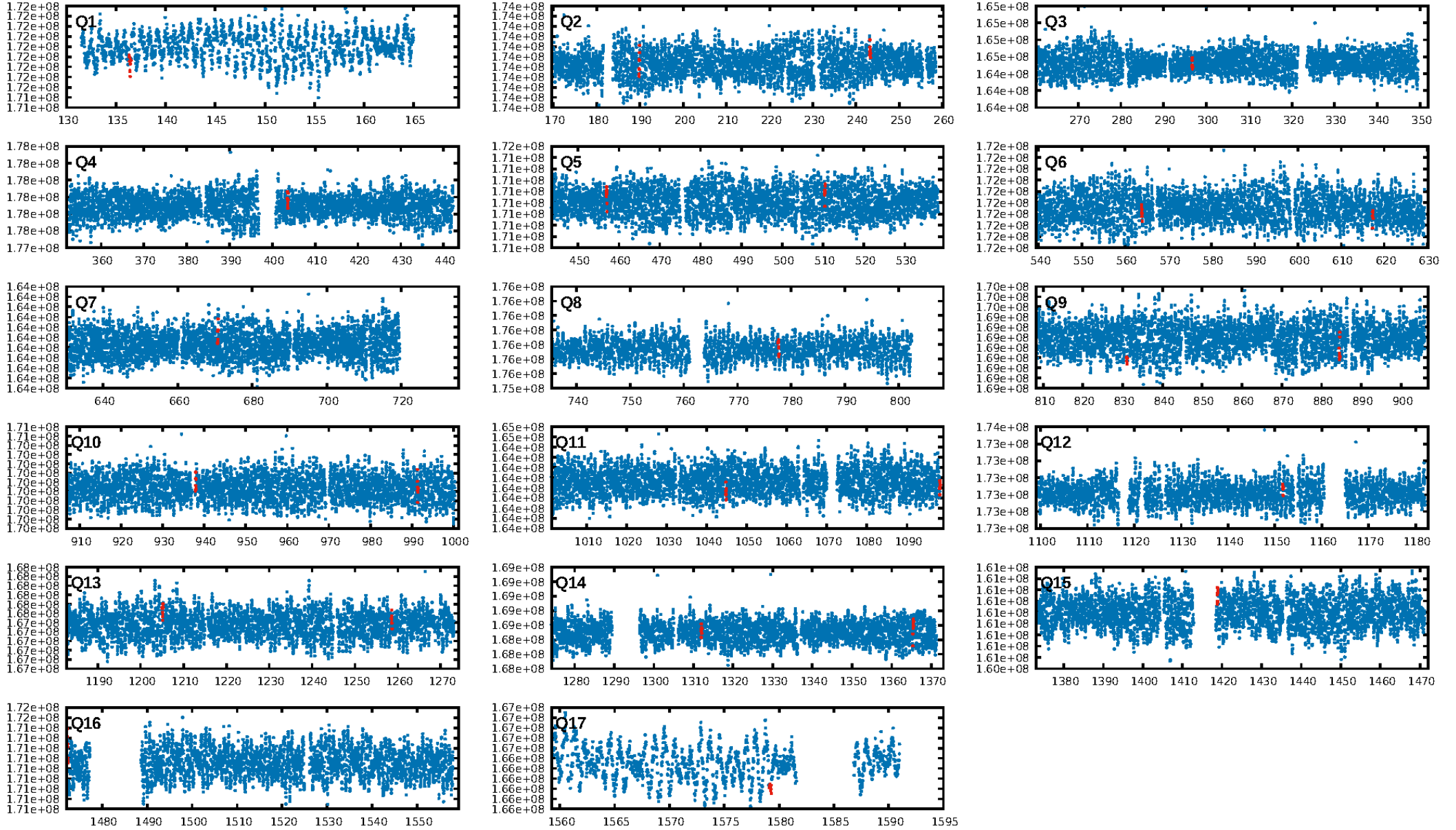
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [285.74σ]
LongPeriod-sig: 100.0% [208.07σ]
ModelChiSquare2-sig: 44.0%
ModelChiSquareGo-sig: 100.0%
Bootstrap-pfa: N/A
RollingBand-fgt: 1.00 [8/8]
GhostDiagnostic-chr: -0.3972
Centroid-sig: 19.7%
Centroid-so: 1.498 arcsec [1.67σ]
OotOffset-rm: 0.430 arcsec [0.72σ]
KicOffset-rm: 0.289 arcsec [0.45σ]
OotOffset-st: 3/2/2/5 [12]
KicOffset-st: 3/2/2/5 [12]
DiffImageQuality-fgm: 0.50 [6/12]
DiffImageOverlap-fno: 0.00 [0/15]

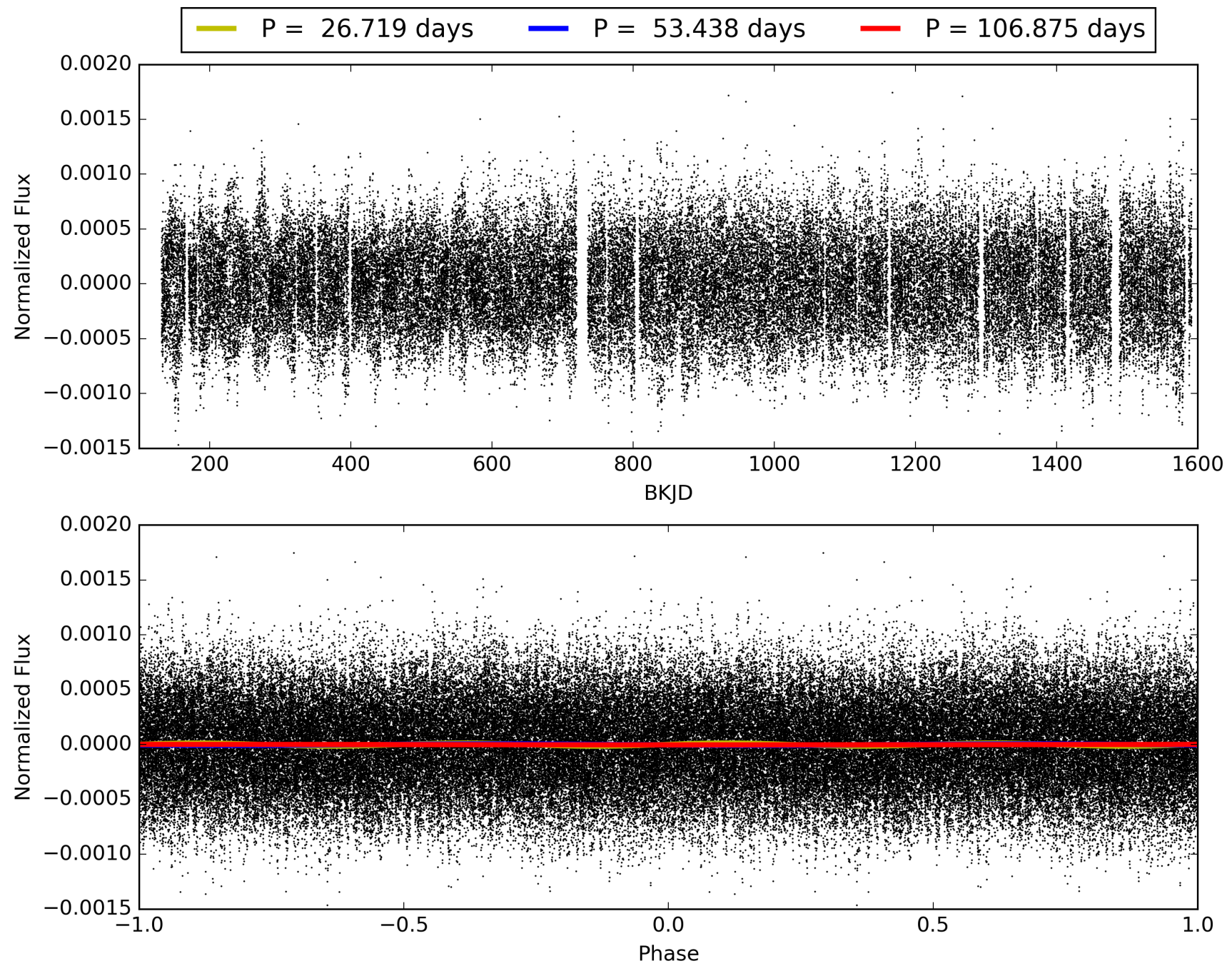
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 13:47:45 Z

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

TCE 009427220-06, PDC Light Curves

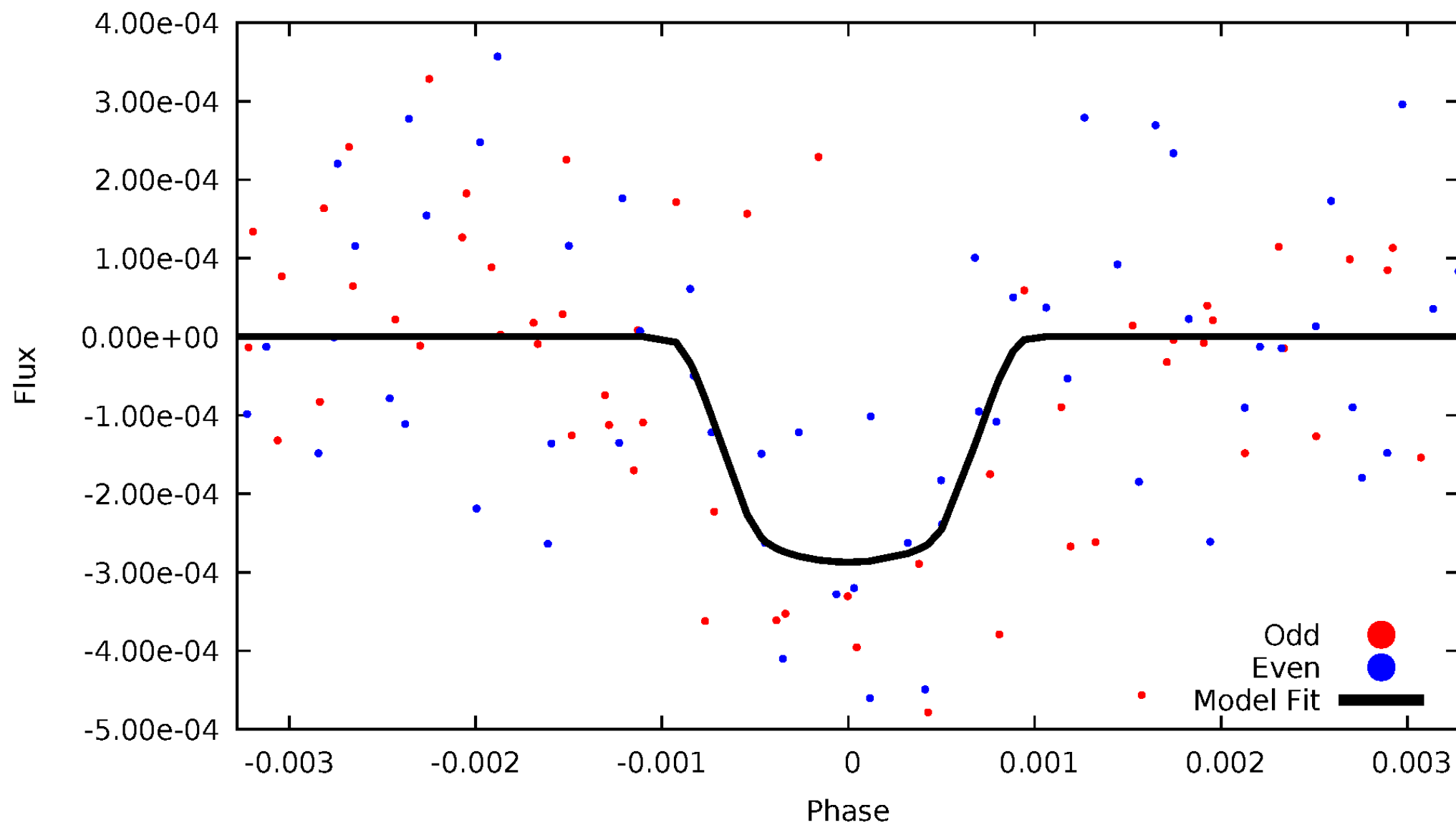


TCE 009427220-06



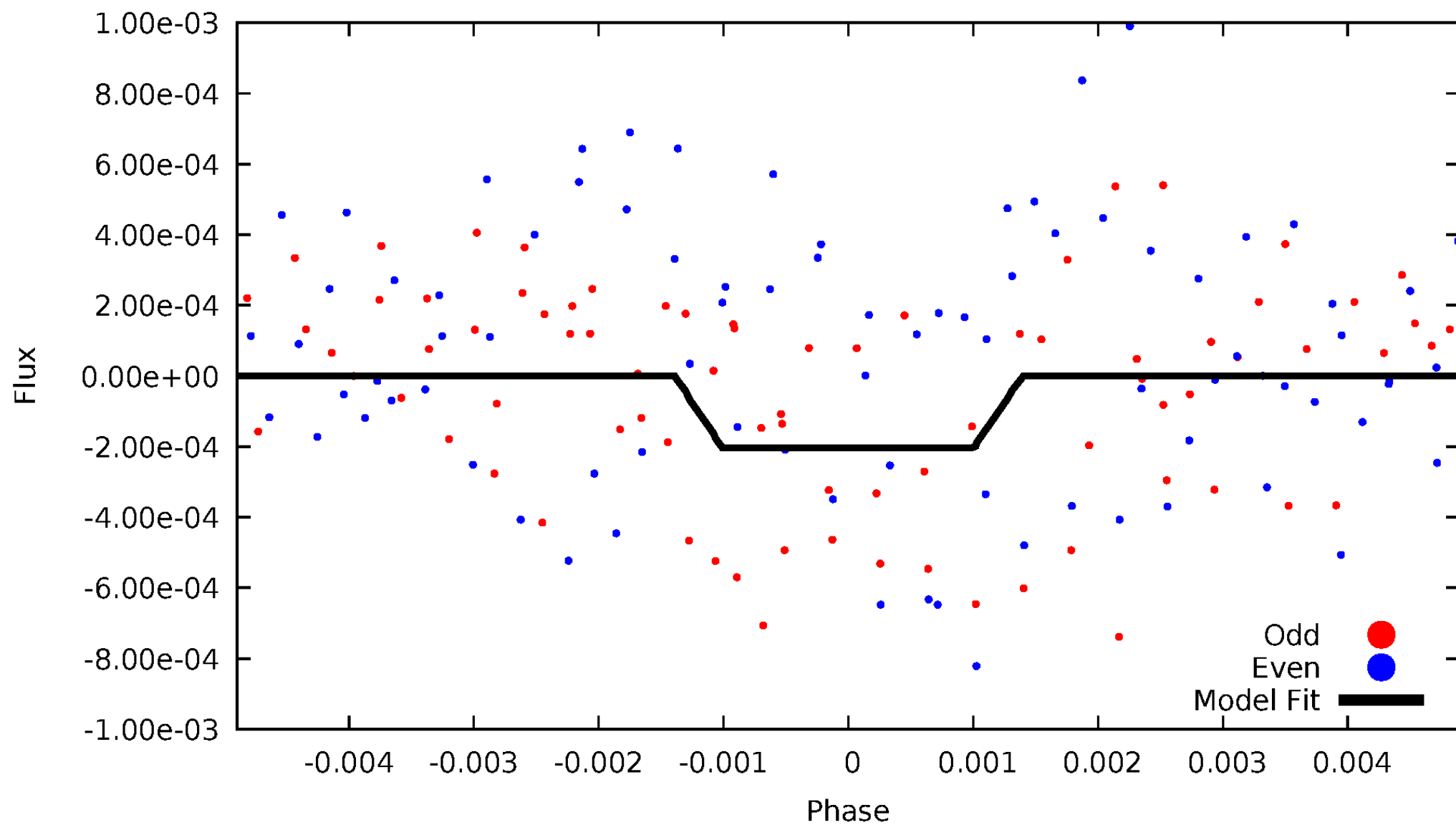
DV Odd/Even

TCE 009427220-06



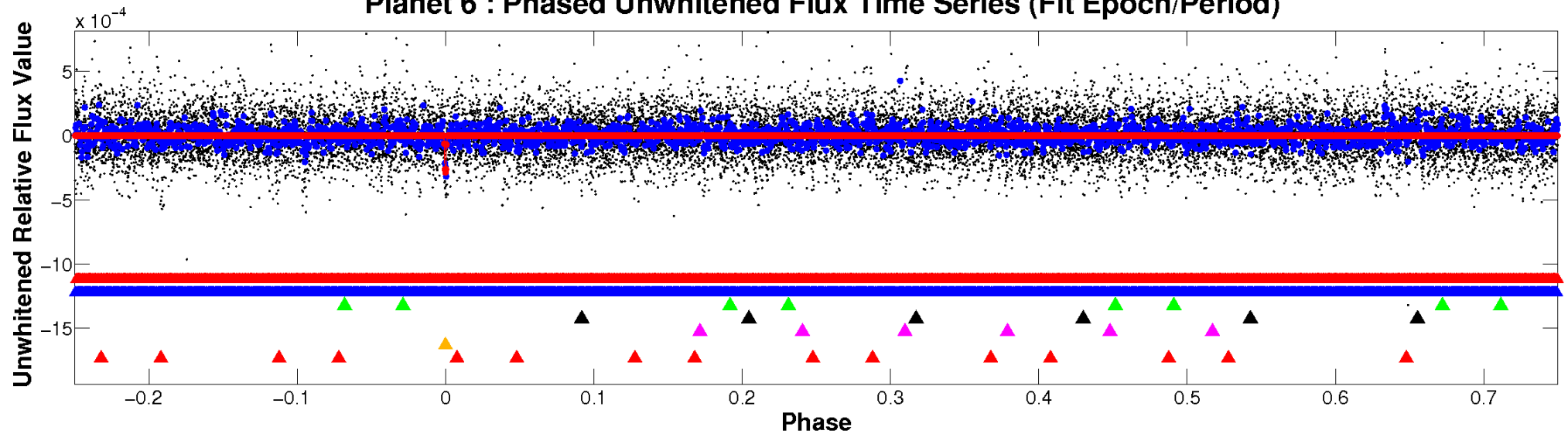
ALT Odd/Even

TCE 009427220-06

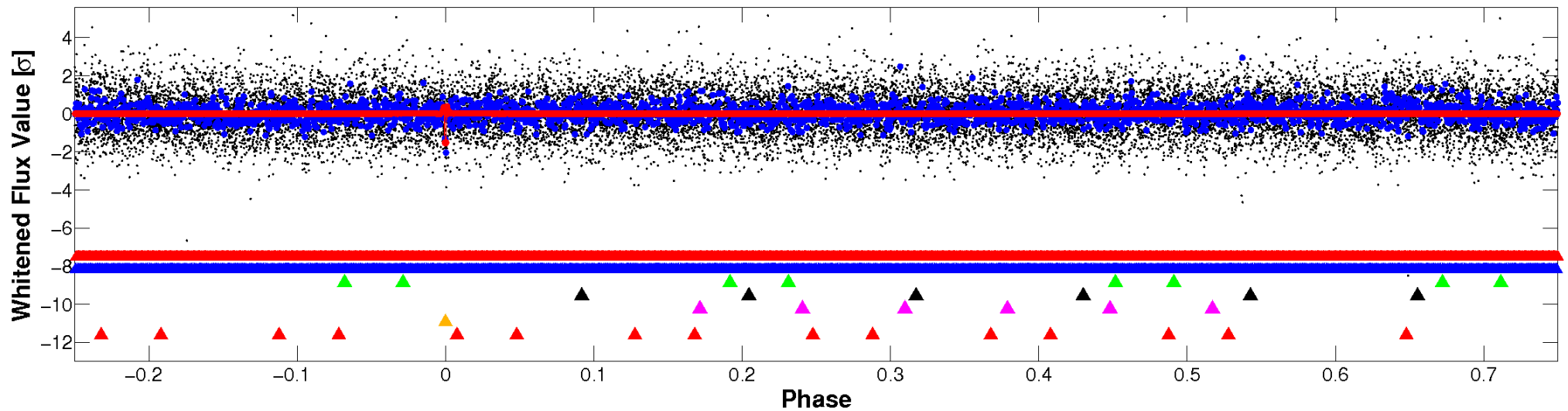


Non-Whitened Vs. Whitened Light Curve

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

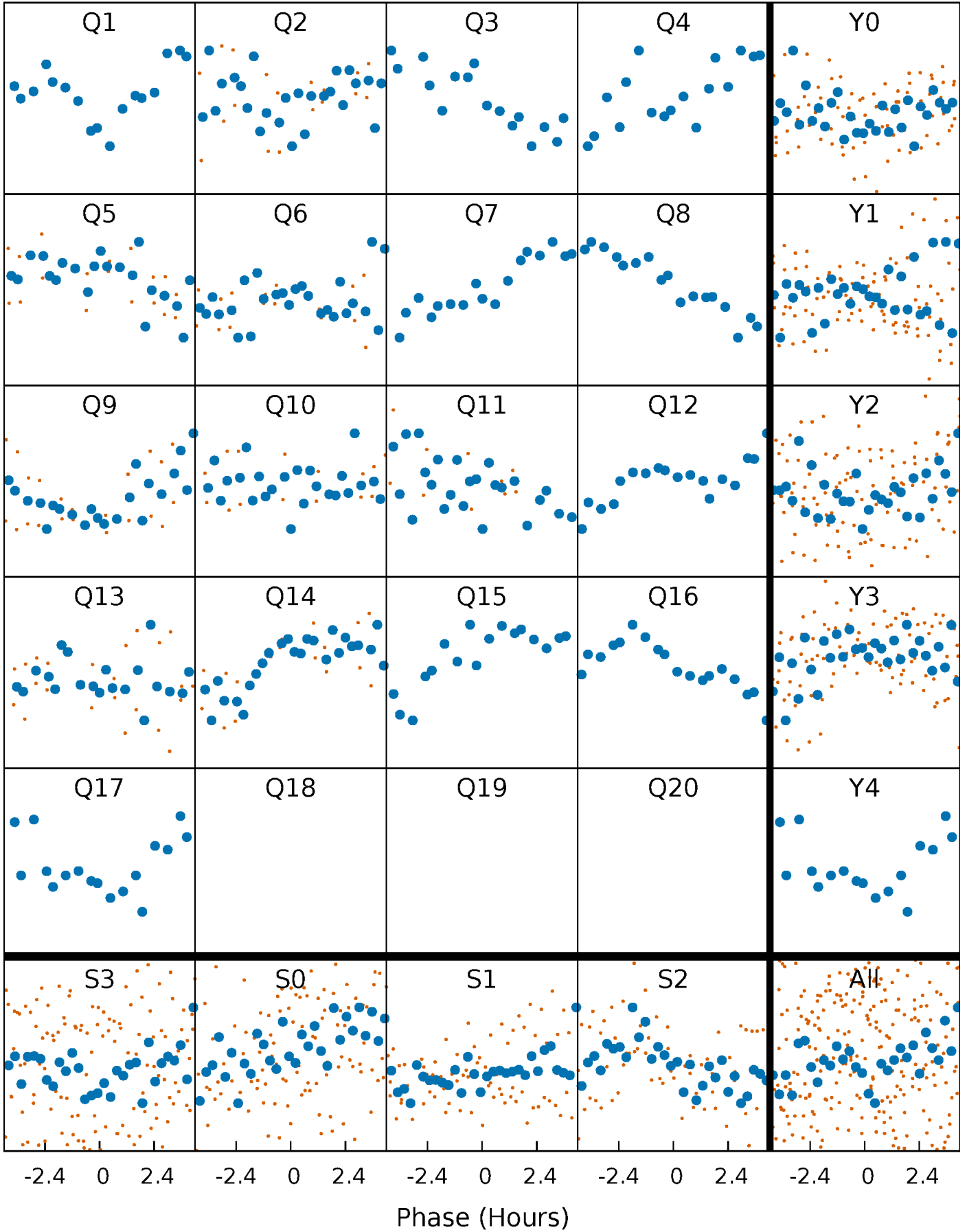


Planet 6 : Phased Whitened Flux Time Series (Fit Epoch/Period)



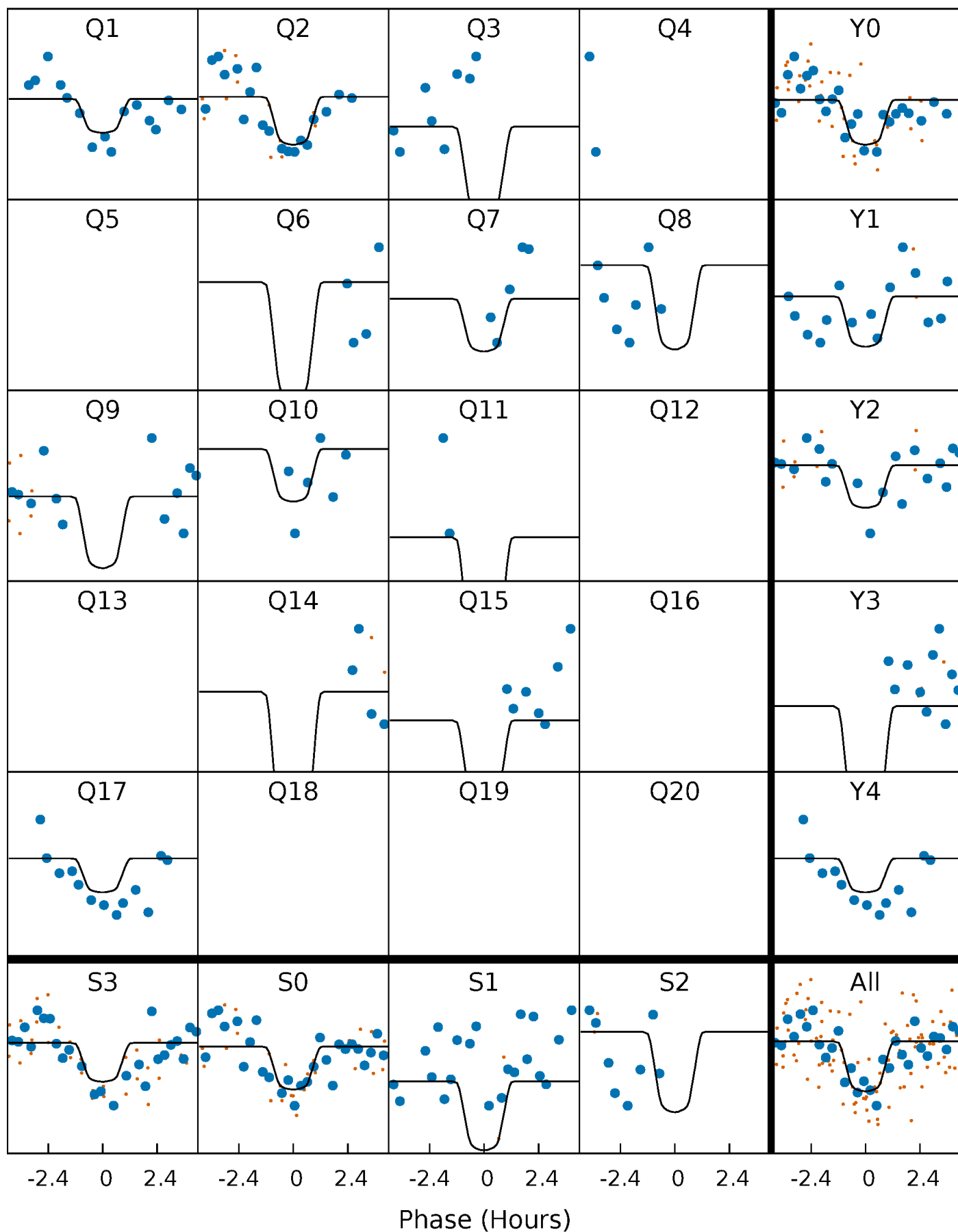
PDC Quarter-Phased Transit Curves

TCE 009427220-06 P= 53.437549 Days $T_0=136.393920$ (BKJD)



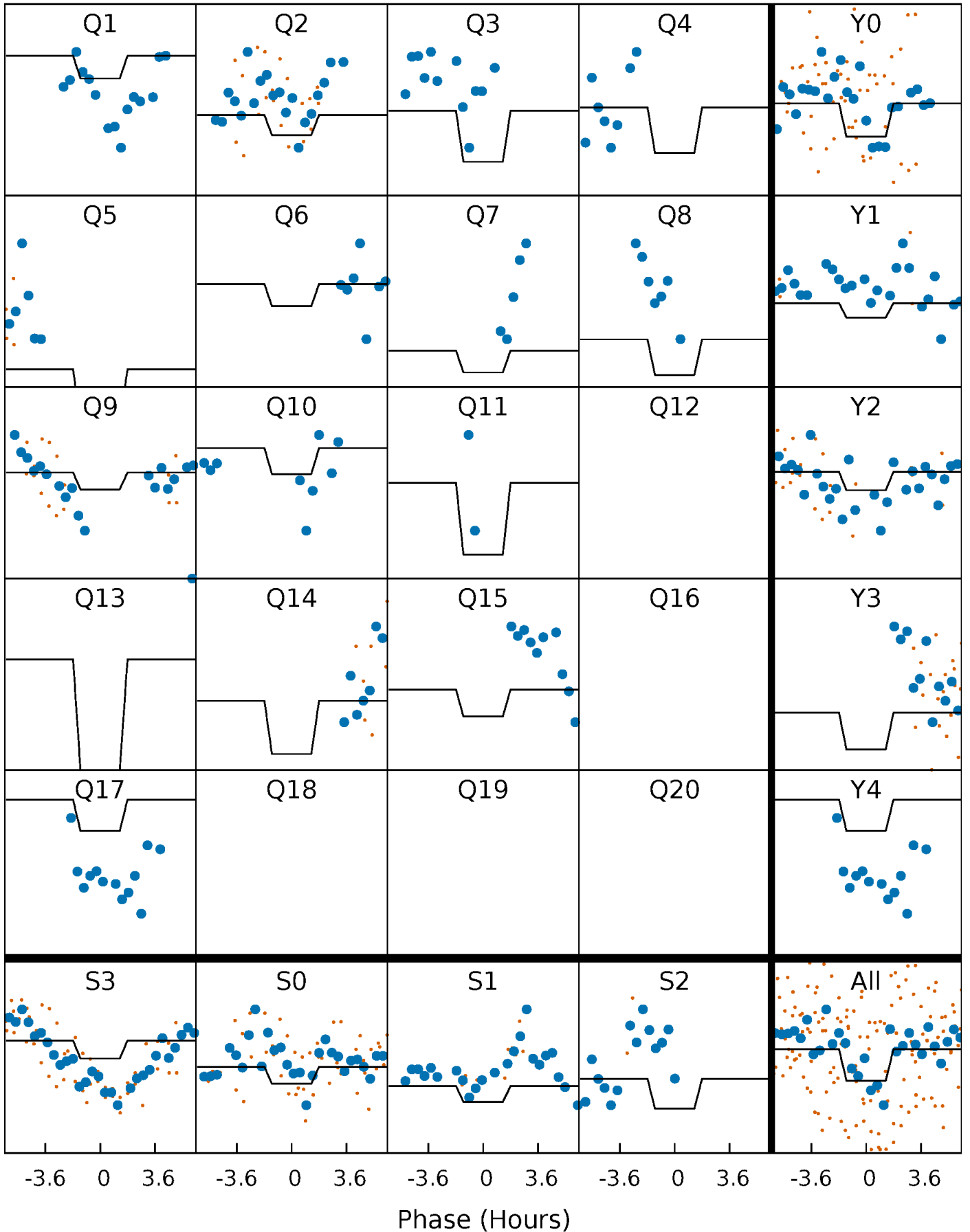
DV Quarter-Phased Transit Curves

TCE 009427220-06 P= 53.437549 Days $T_0=136.393920$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

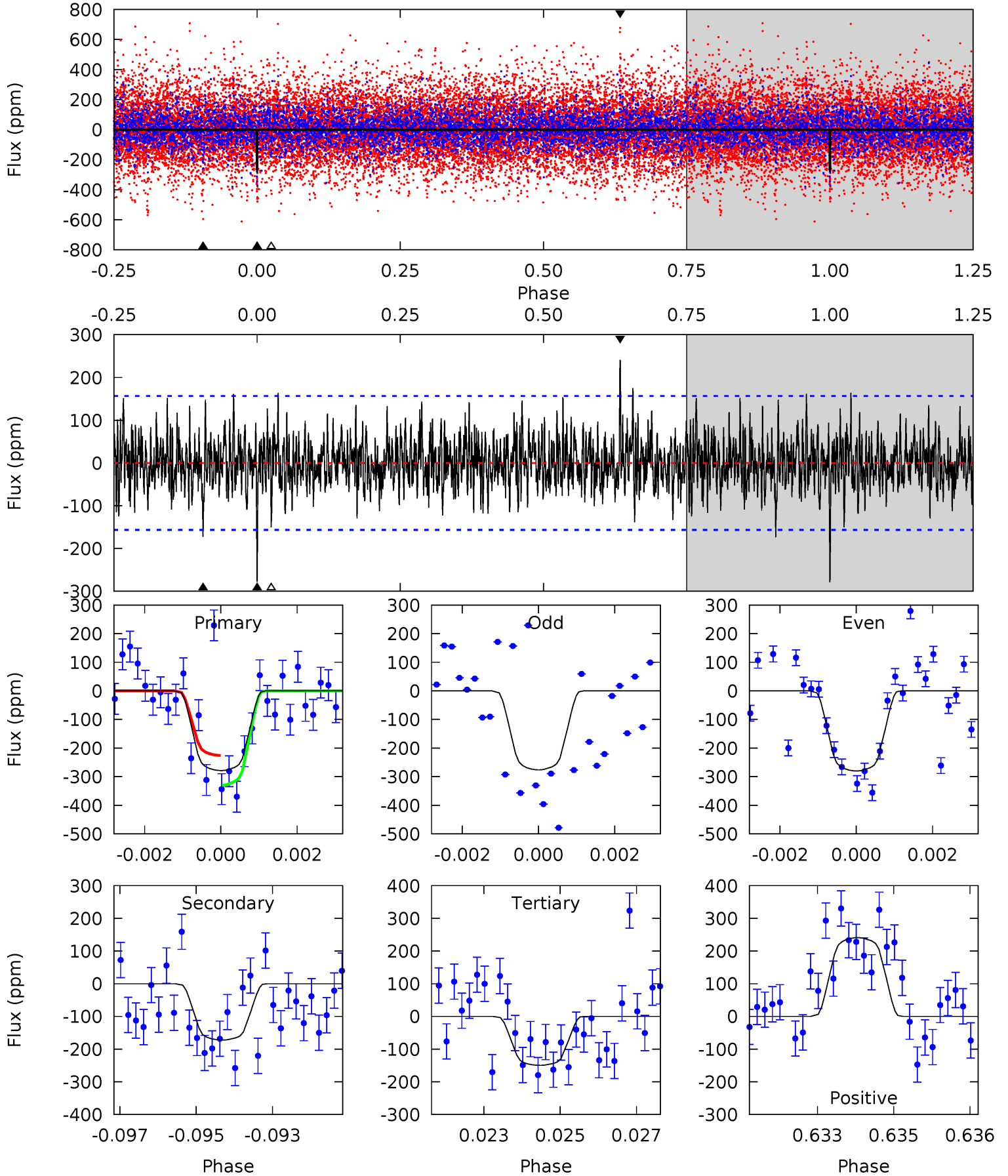
TCE 009427220-06 P= 53.437589 Days $T_0=136.361186$ (BKJD)



DV Model-Shift Uniqueness Test

009427220-06, P = 53.437549 Days, E = 82.956371 Days

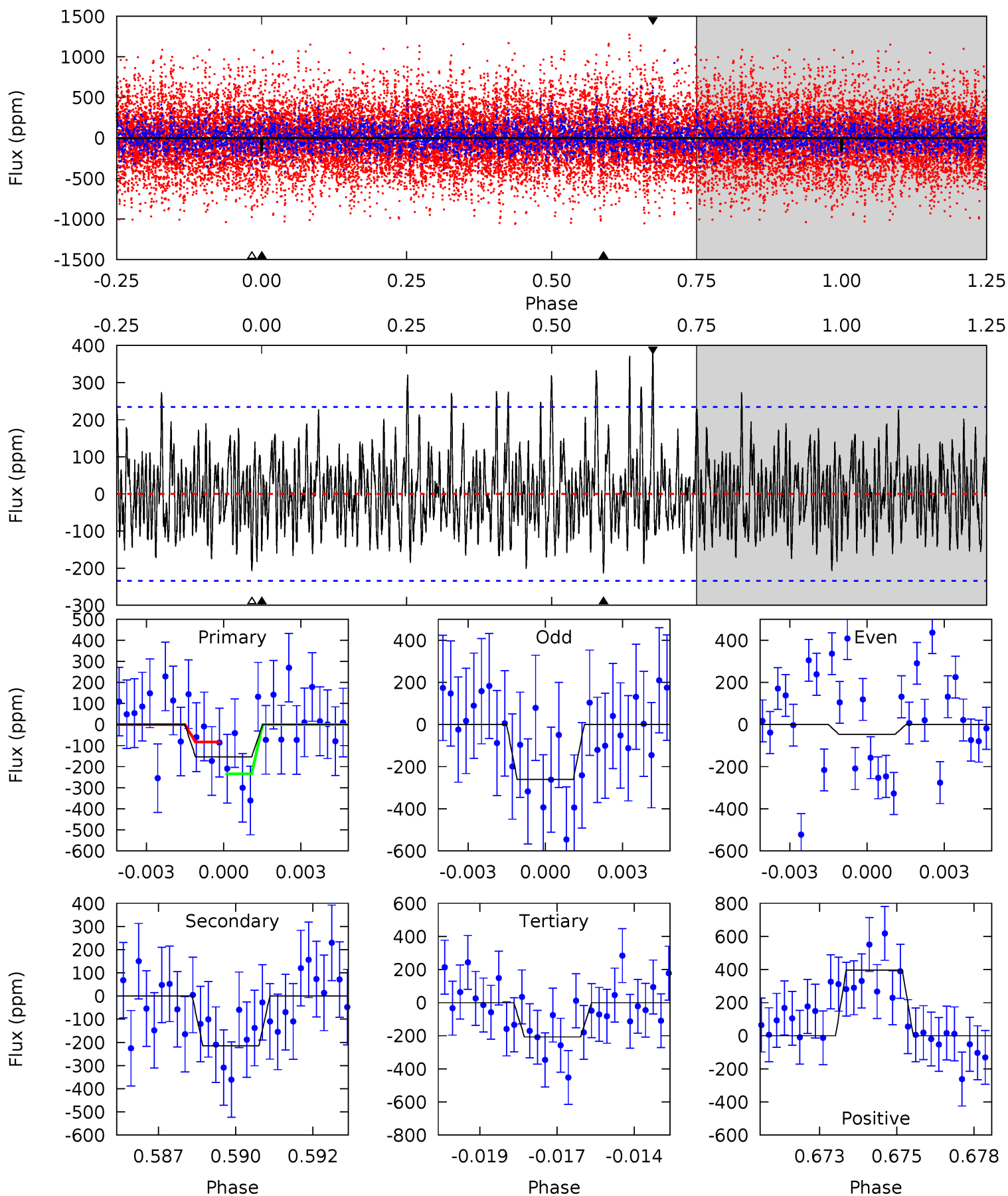
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.52	5.88	5.11	8.23	5.35	3.12	1.68	4.41	1.29	0.77	-2.35	0.06	0.84	0.46	1.78



Alt Model-Shift Uniqueness Test

009427220-06, P = 53.437589 Days, E = 82.923597 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
3.46	4.82	4.66	8.91	5.27	2.99	2.00	-1.20	-5.44	0.16	-4.09	2.40	1.96	0.65	1.70



Stellar Parameters For KIC 009427220

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	6701^{+185}_{-255}	$3.872^{+0.319}_{-0.147}$	$0.220^{+0.150}_{-0.300}$	$2.527^{+0.652}_{-1.060}$	$1.732^{+0.178}_{-0.386}$	$0.151^{+0.390}_{-0.063}$
	+3%/-4%	+8%/-4%	+68%/-136%	+26%/-42%	+10%/-22%	+258%/-42%
Source	PHO54	PHO54	PHO54	DSEP		

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

Secondary Eclipse Parameters for KIC 009427220-06 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	-172 ± 29	$4.90^{+2.12}_{-2.07}$	1114^{+89}_{-110}	5560^{+1653}_{-743}	433^{+803}_{-225}
Alt.	-214 ± 44	$3.83^{+2.17}_{-1.83}$	1117^{+87}_{-114}	6550^{+3313}_{-1196}	882^{+2274}_{-537}

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

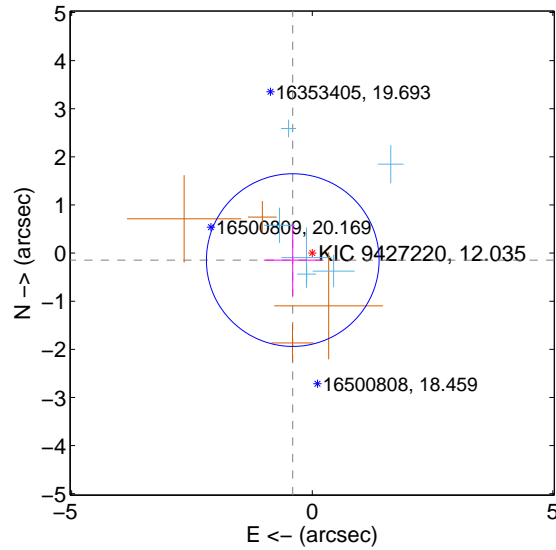
Supplemental centroid analysis for 009427220-06. Kepler magnitude: 12.04. Transit SNR 6.98

There are 6 quarters with good PRF difference image offsets

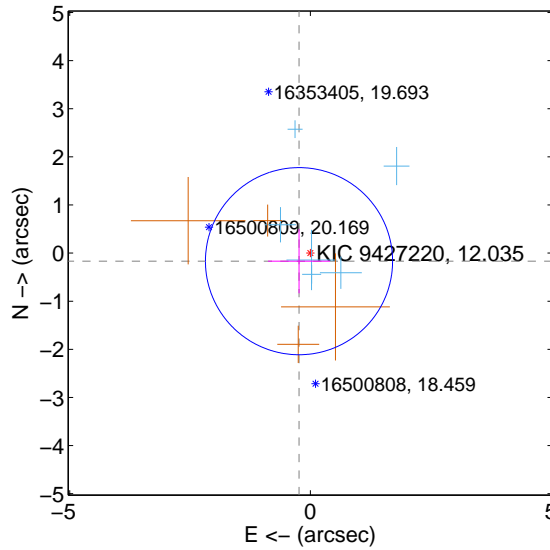
The direct PRF centroid is offset from the target star catalog position by about 0.19 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.430 ± 0.598	0.72	0.405 ± 0.600	-0.145 ± 0.745
PRF-fit source offset from KIC position	0.289 ± 0.648	0.45	0.235 ± 0.643	-0.168 ± 0.666
photometric centroid source offset	1.50 ± 0.90	1.67	-1.37 ± 0.92	-0.60 ± 0.76

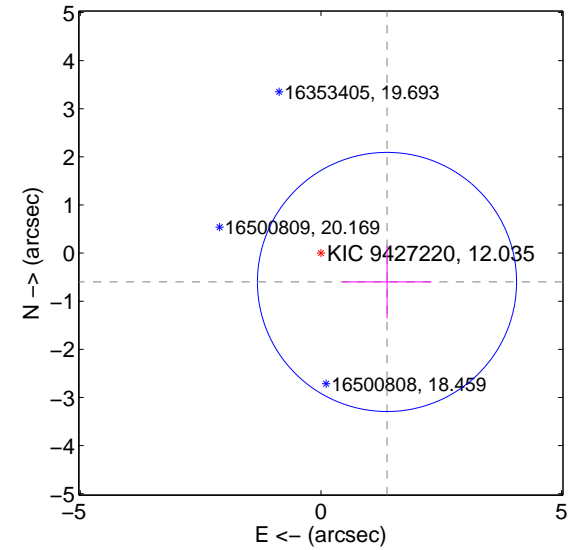
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

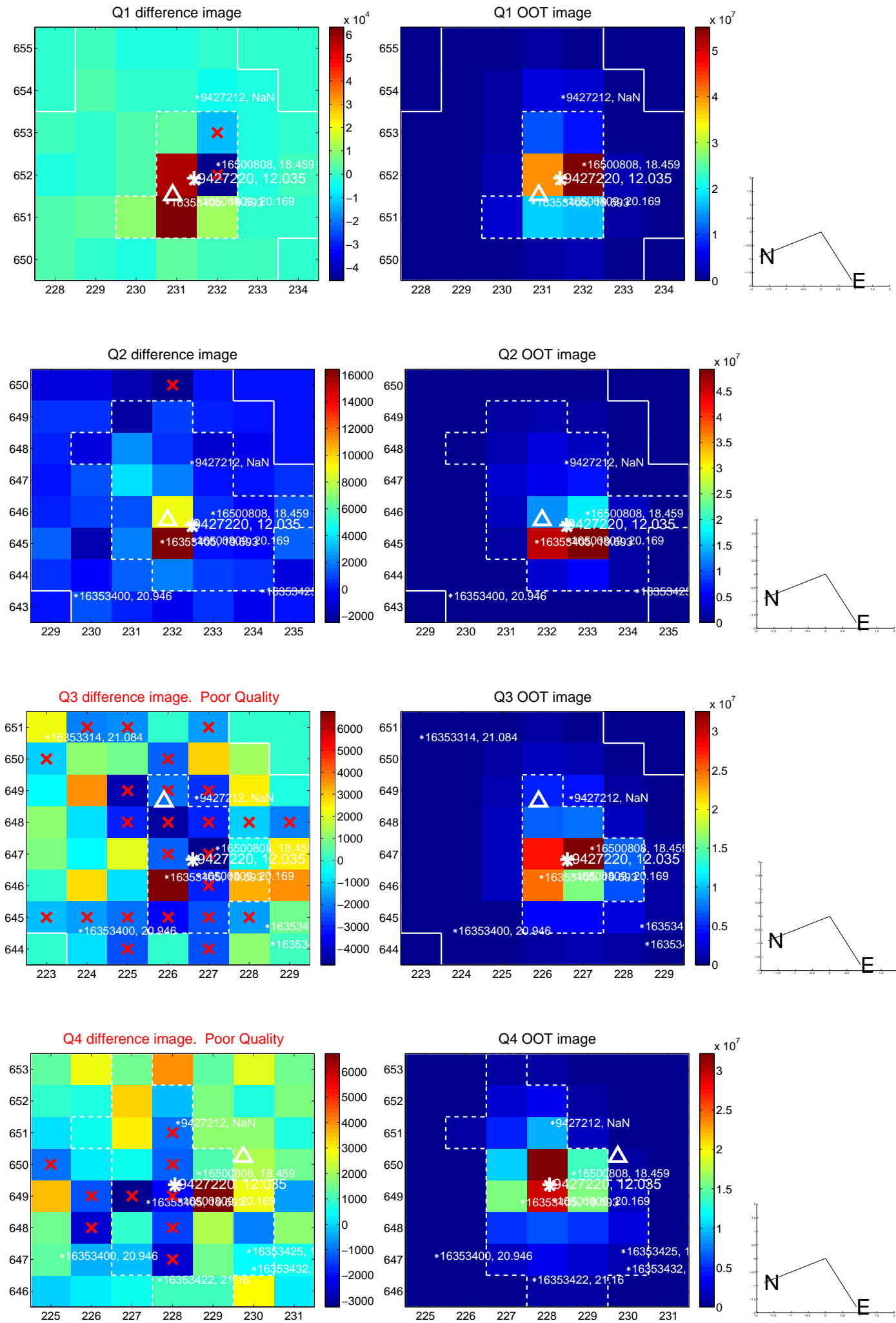


offset from photometric centroids

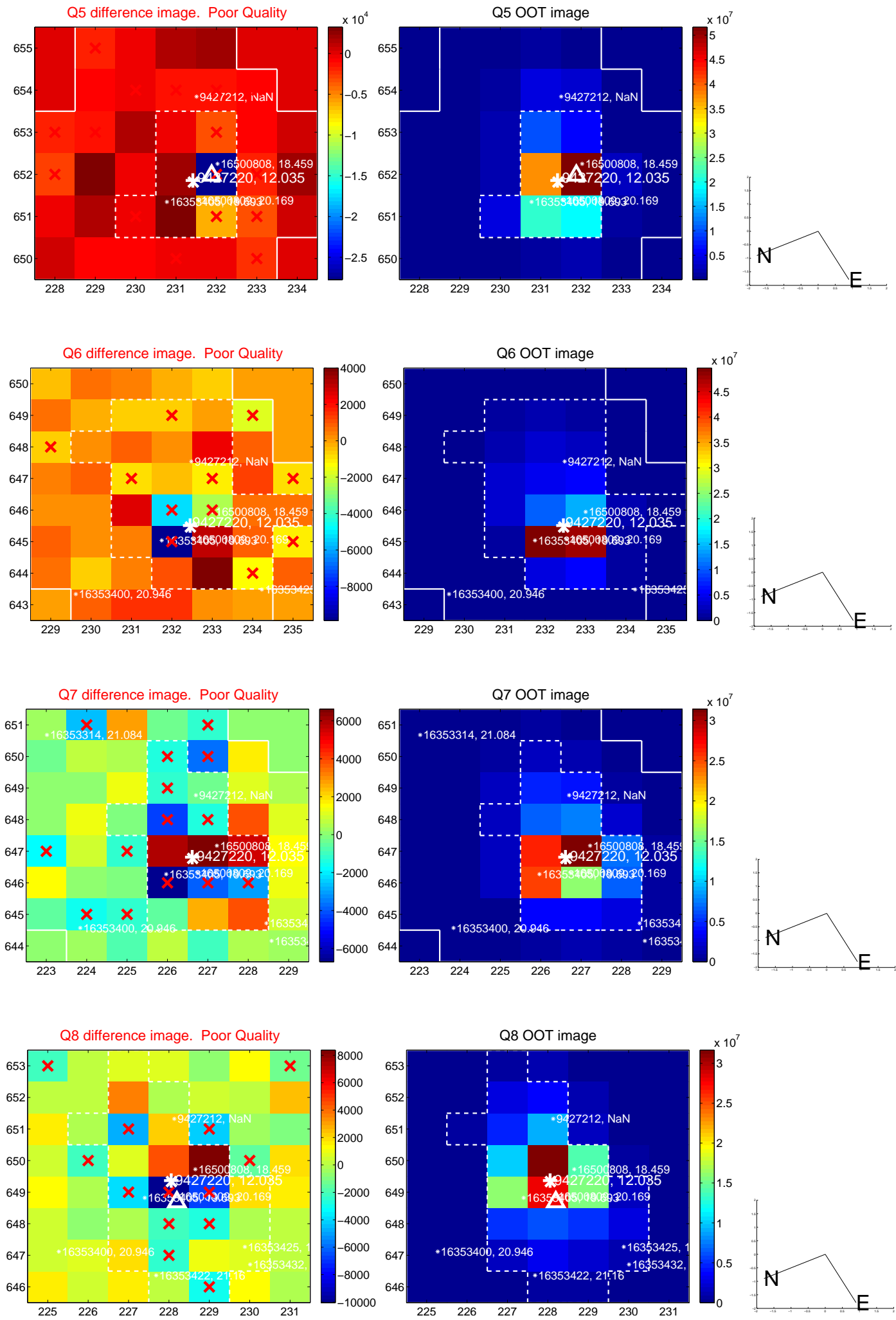


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

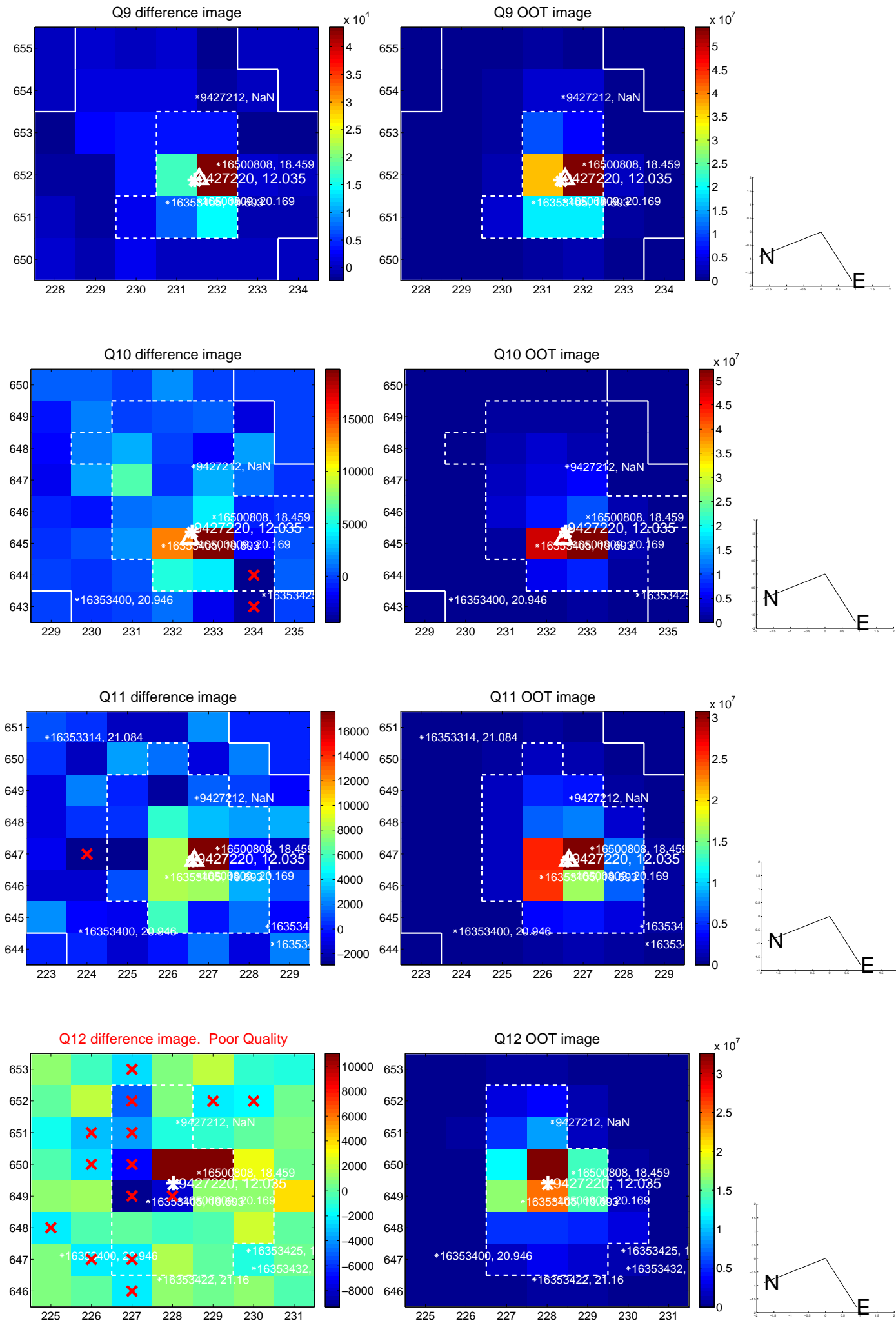
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



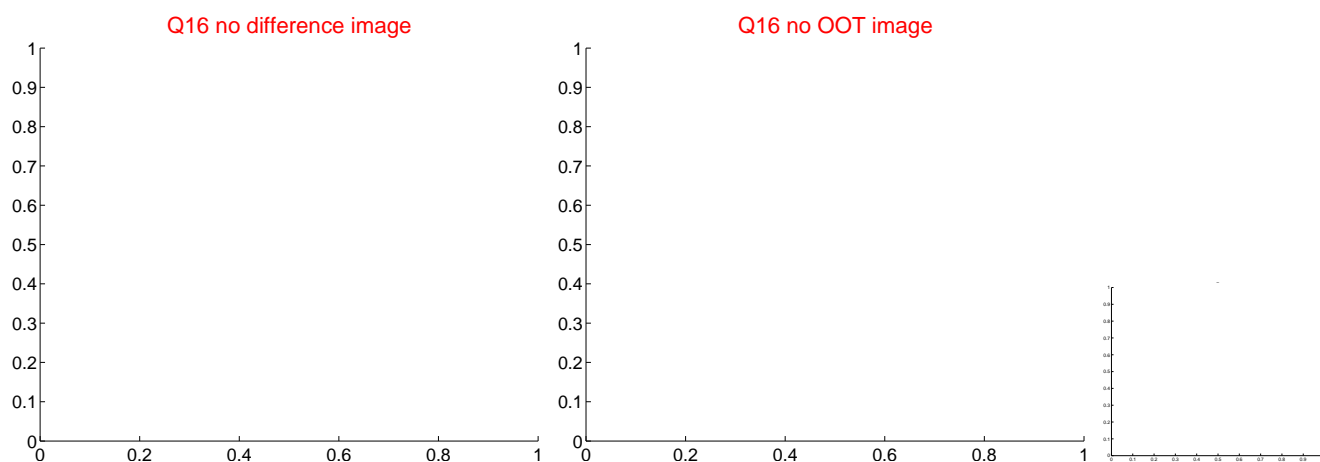
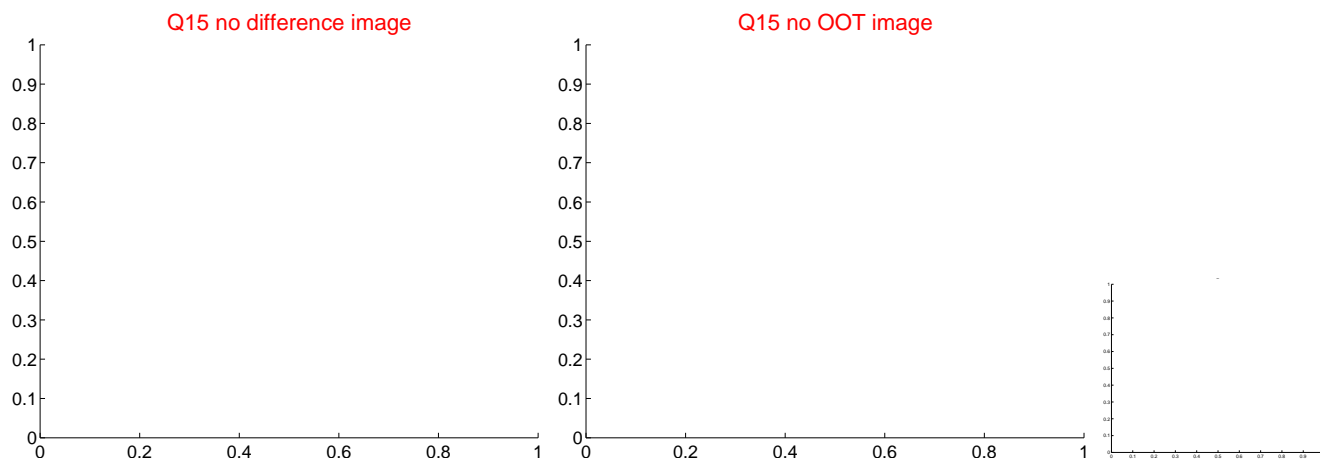
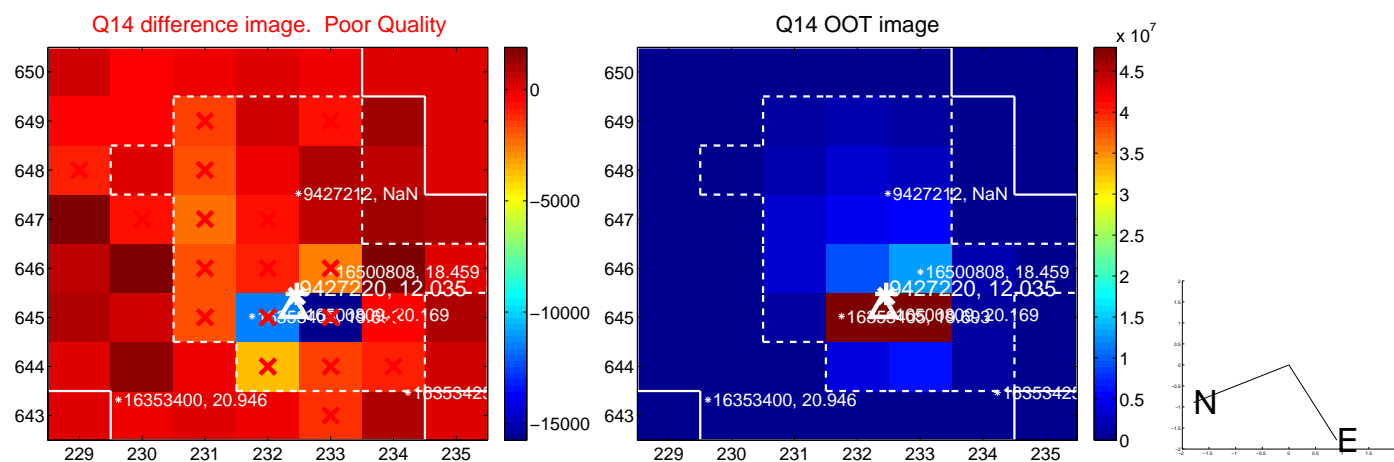
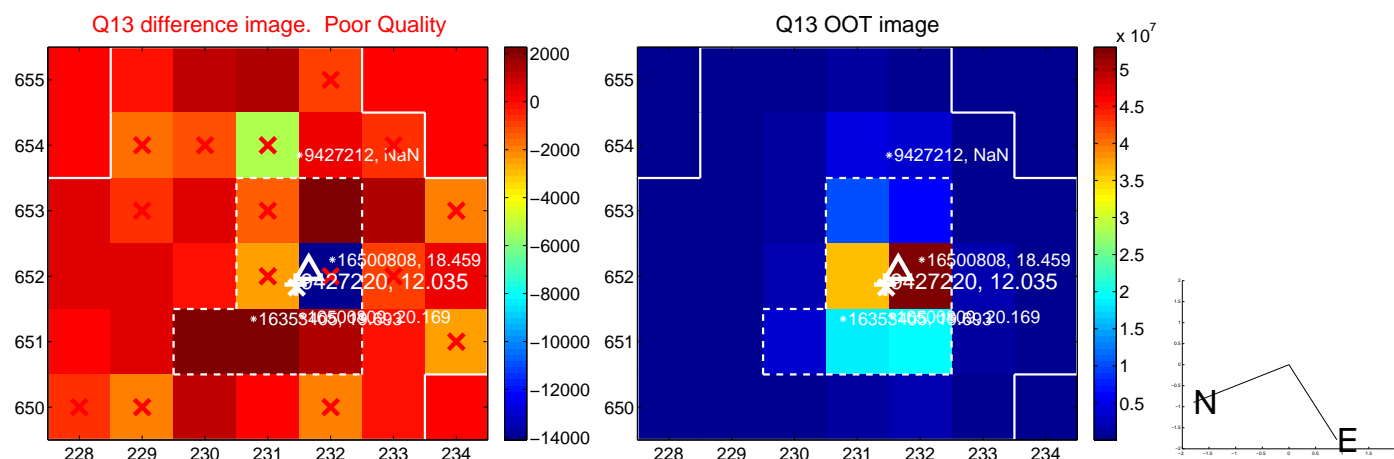
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



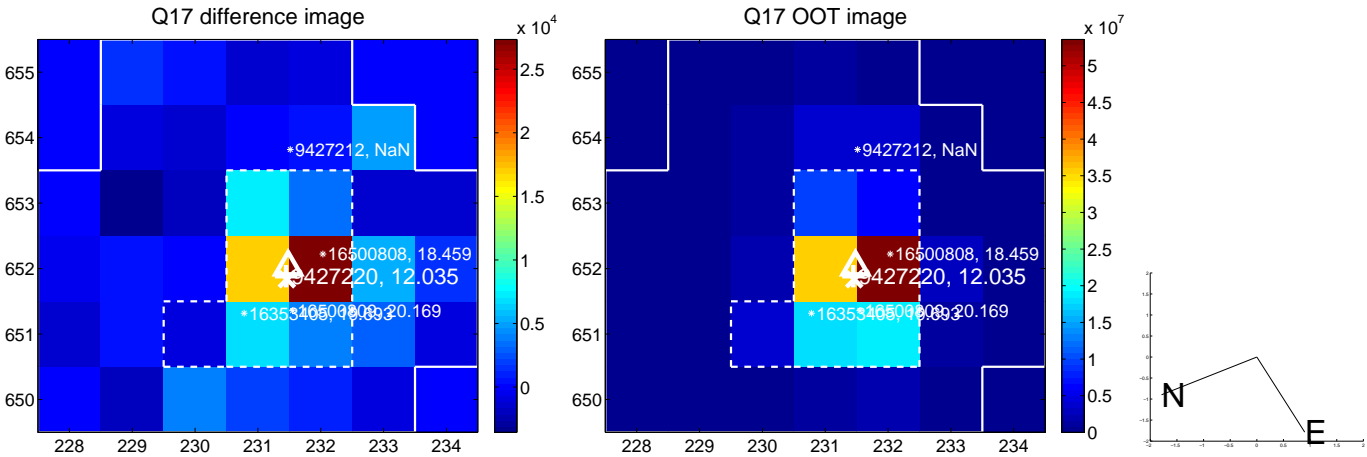
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



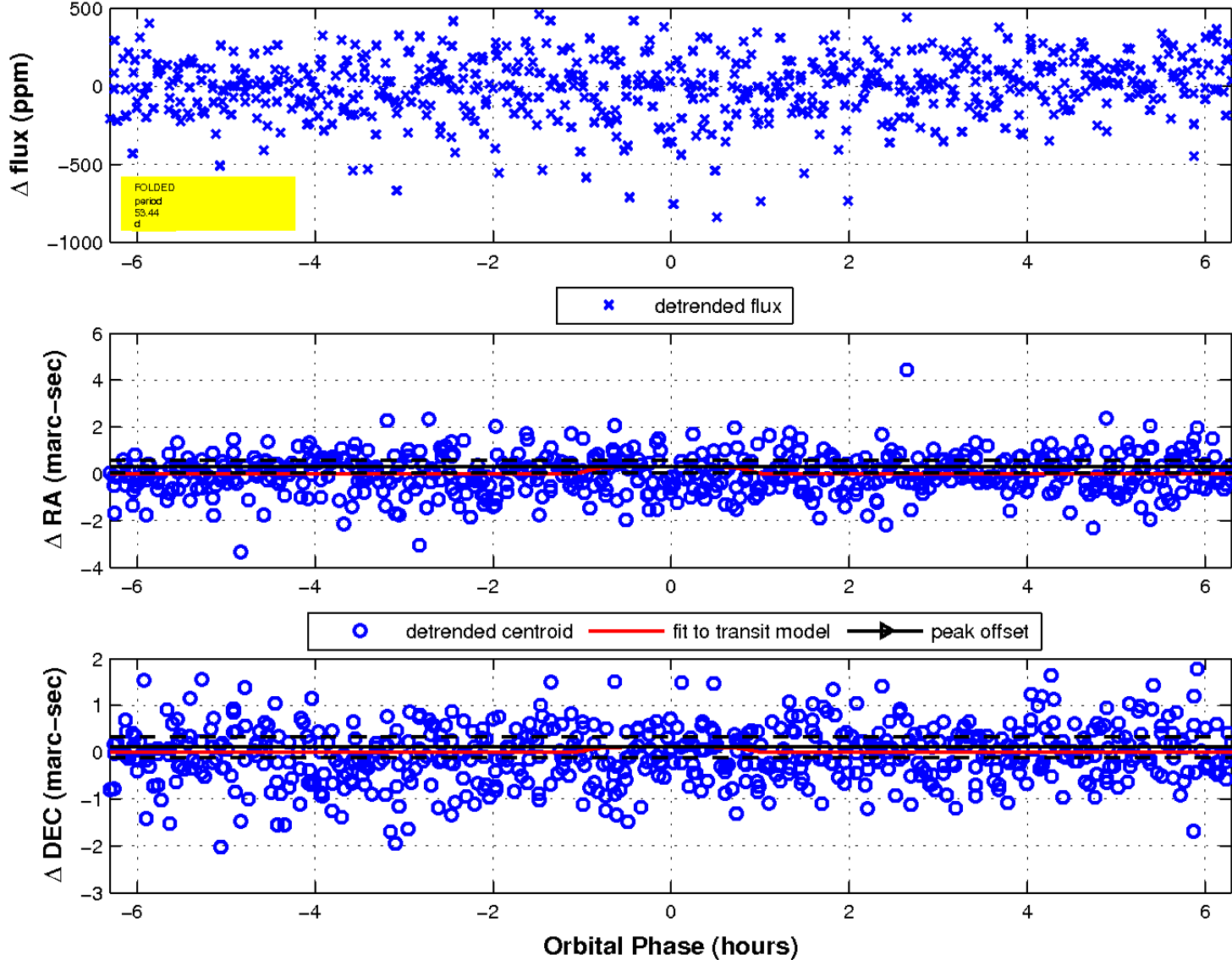
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



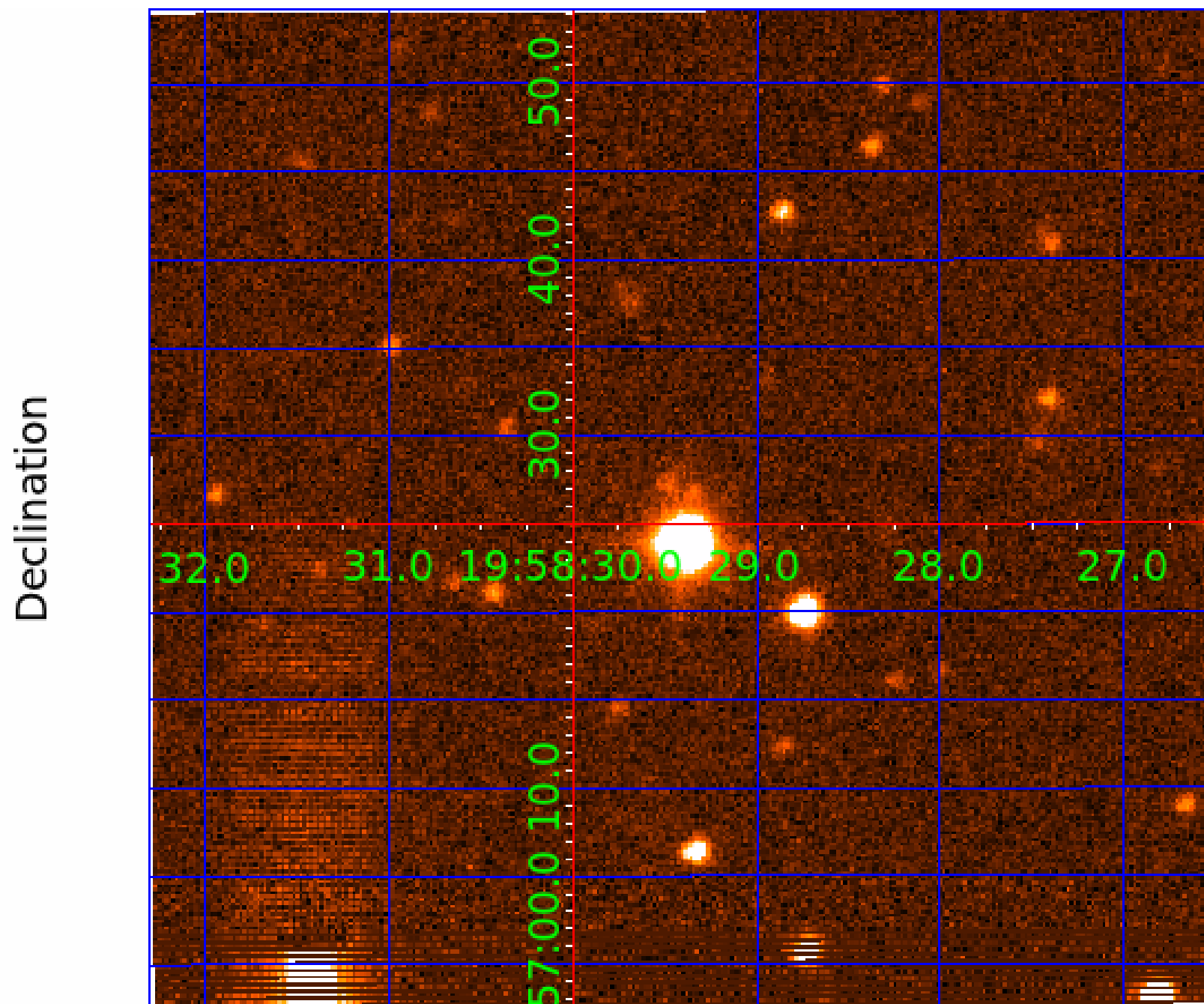
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



fluxWeightedCentroids, Planet 6 of 7



UKIRT Image



KIC 009427220

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})
009427220-01	OBS	No	0.513276	132.040601	5.2	0.910	10.7	1.4	2.53	6701	0.59	50744.44
009427220-02	OBS	No	1.026054	131.840620	32.7	3.867	8.7	9.9	2.53	6701	1.50	20150.96
009427220-03	OBS	No	199.864795	162.635263	255.1	10.992	8.2	6.4	2.53	6701	4.36	17.85
009427220-05	OBS	No	270.881246	198.999213	115.4	9.352	7.7	3.7	2.53	6701	2.81	11.90
009427220-06	OBS	No	53.437549	136.393920	287.1	2.103	7.1	7.0	2.53	6701	5.20	103.61
009427220-07	OBS	No	100.464522	162.450809	146.4	5.000	7.3	-1.0	2.53	6701	3.08	44.65

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009427220-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009427220-02	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT
009427220-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_UNCERTAIN
009427220-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
009427220-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009427220-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_NOFITS

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

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

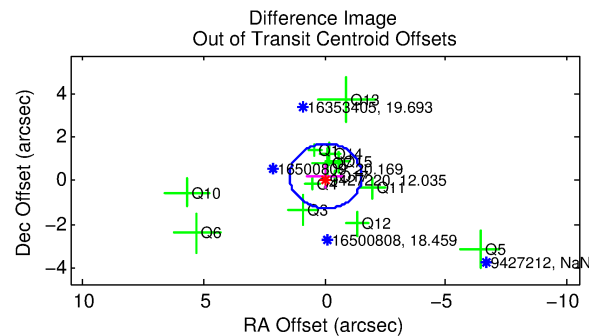
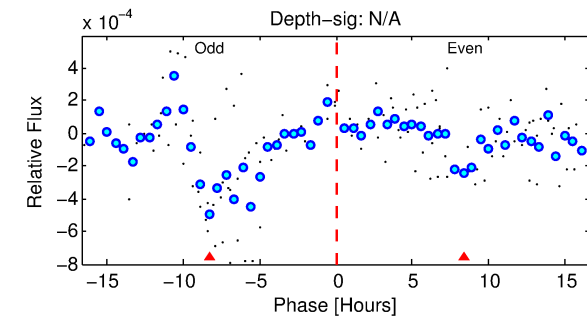
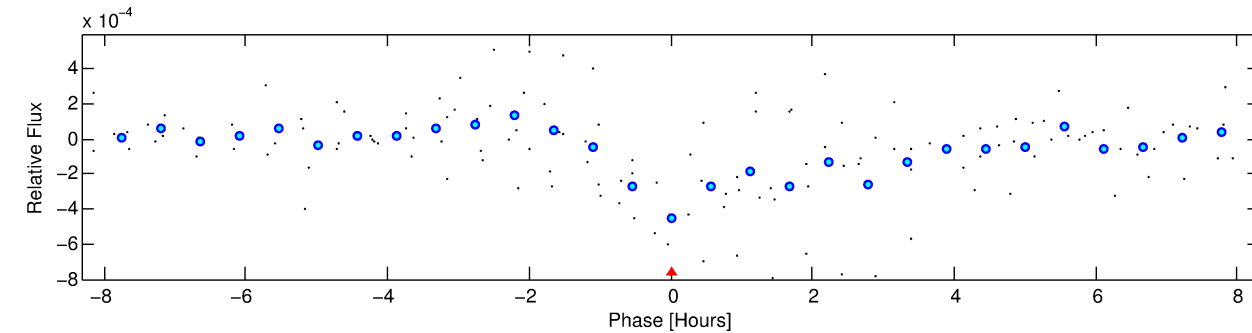
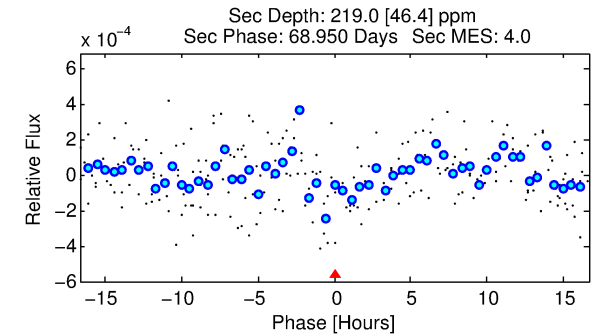
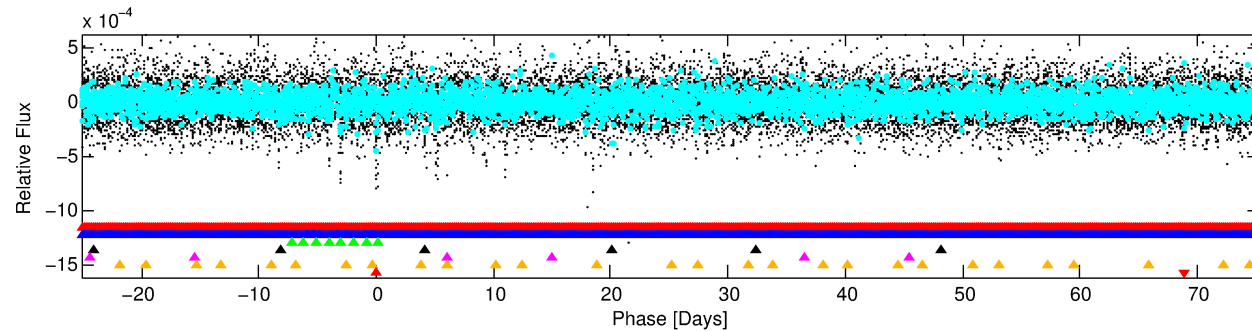
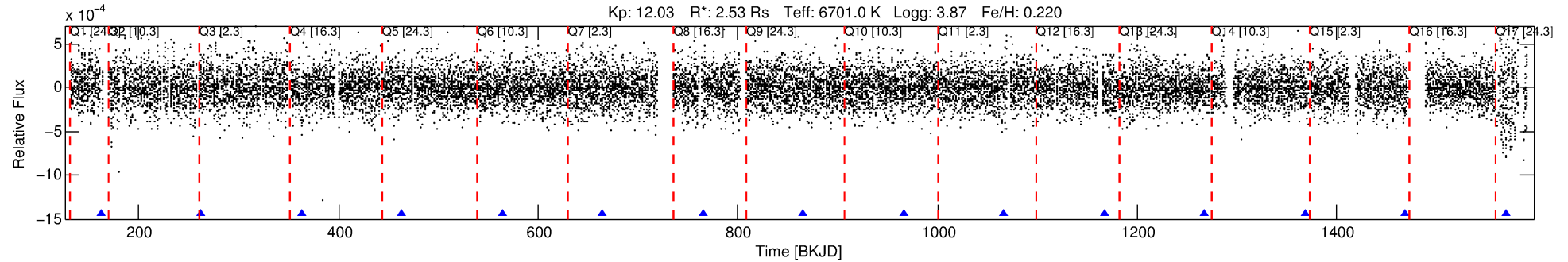
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009427220-07

No Significant Match Found

DV One-Page Summary

KIC: 9427220 Candidate: 7 of 7 Period: 100.465 d



TPS TCE Results:

Period = 100.46452 d
Epoch = 162.4508 BKJD

DV fit results are unavailable

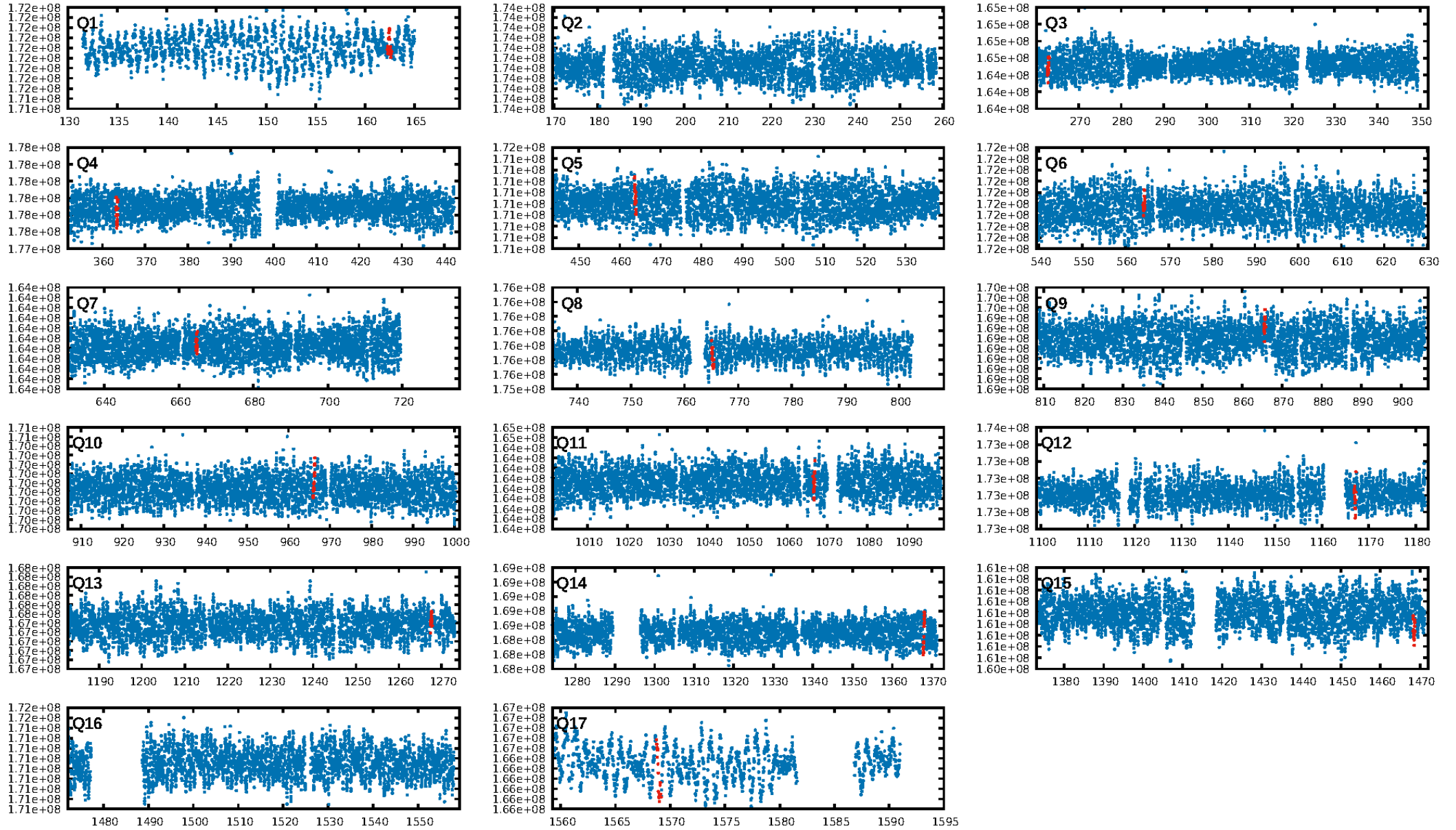
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [208.07 σ]
LongPeriod-sig: 100.0% [197.56 σ]
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: N/A
RollingBand-fgt: 1.00 [7/7]
GhostDiagnostic-chr: 2.799
Centroid-sig: 38.8%
Centroid-so: 0.500 arcsec [0.82 σ]
OotOffset-rm: 0.209 arcsec [0.42 σ]
KicOffset-rm: 0.254 arcsec [0.35 σ]
OotOffset-st: 3/4/2/4 [13]
KicOffset-st: 3/4/2/4 [13]
DiffImageQuality-fgm: 0.38 [5/13]
DiffImageOverlap-fno: 0.00 [0/15]

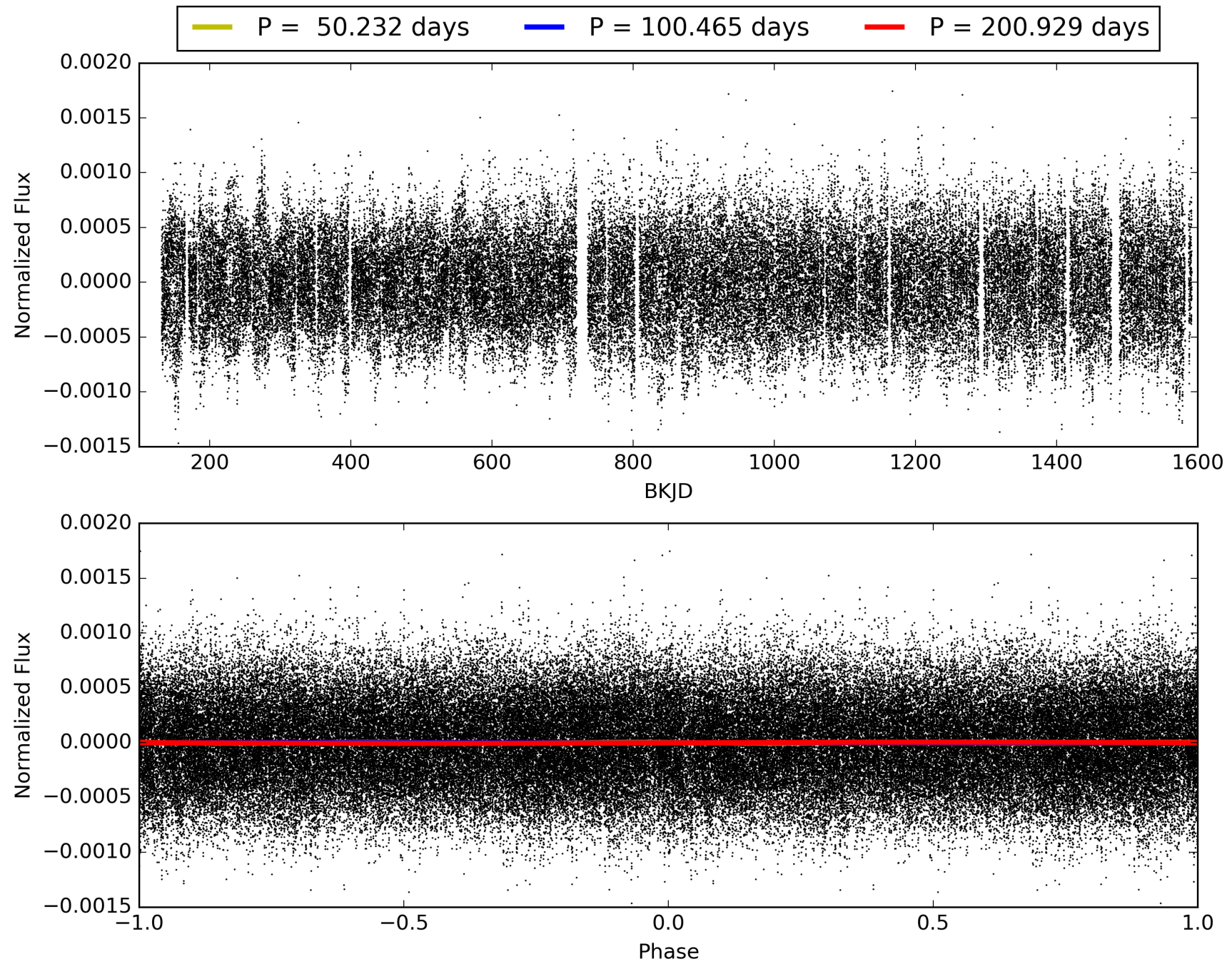
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 13:47:49 Z

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

TCE 009427220-07, PDC Light Curves

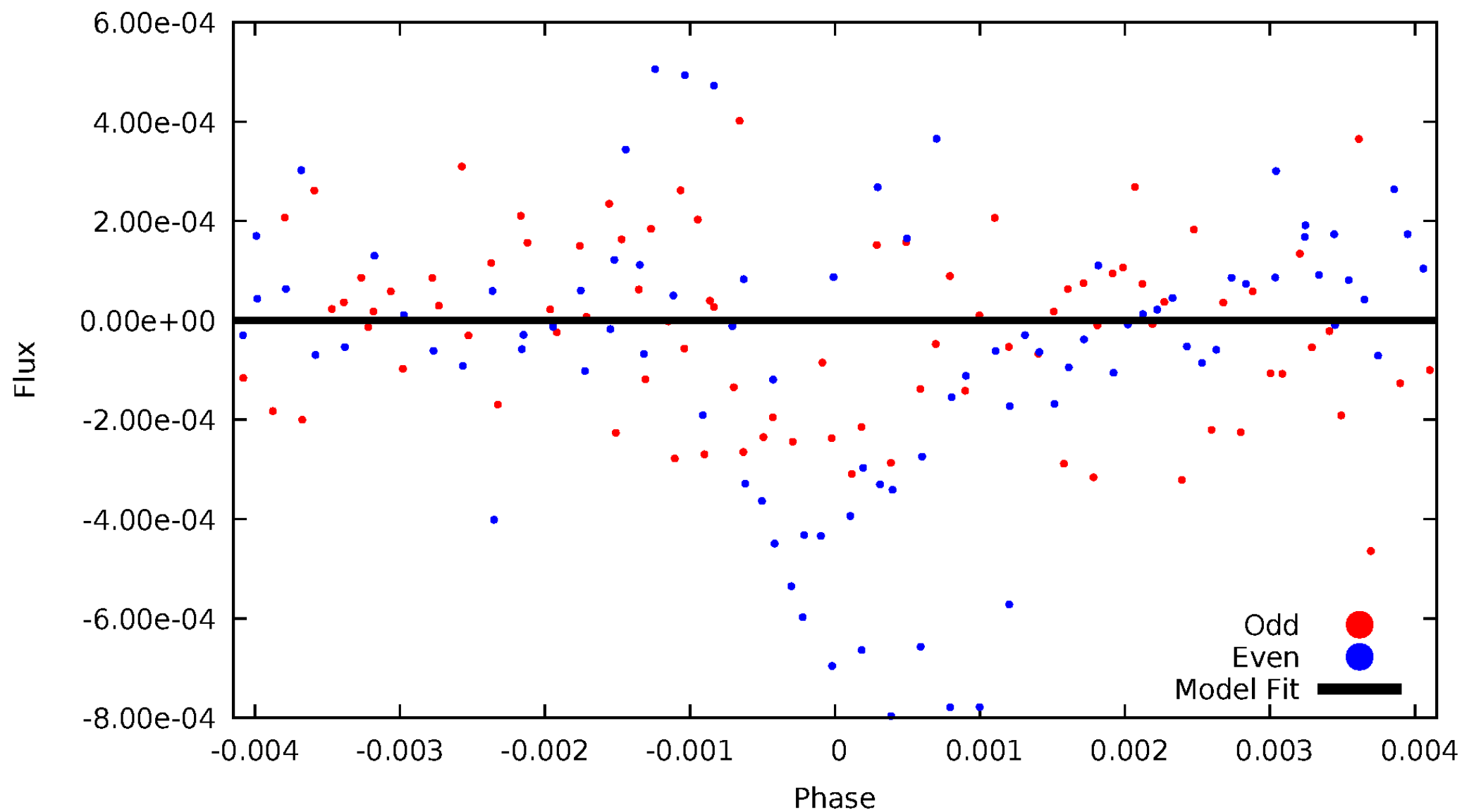


TCE 009427220-07



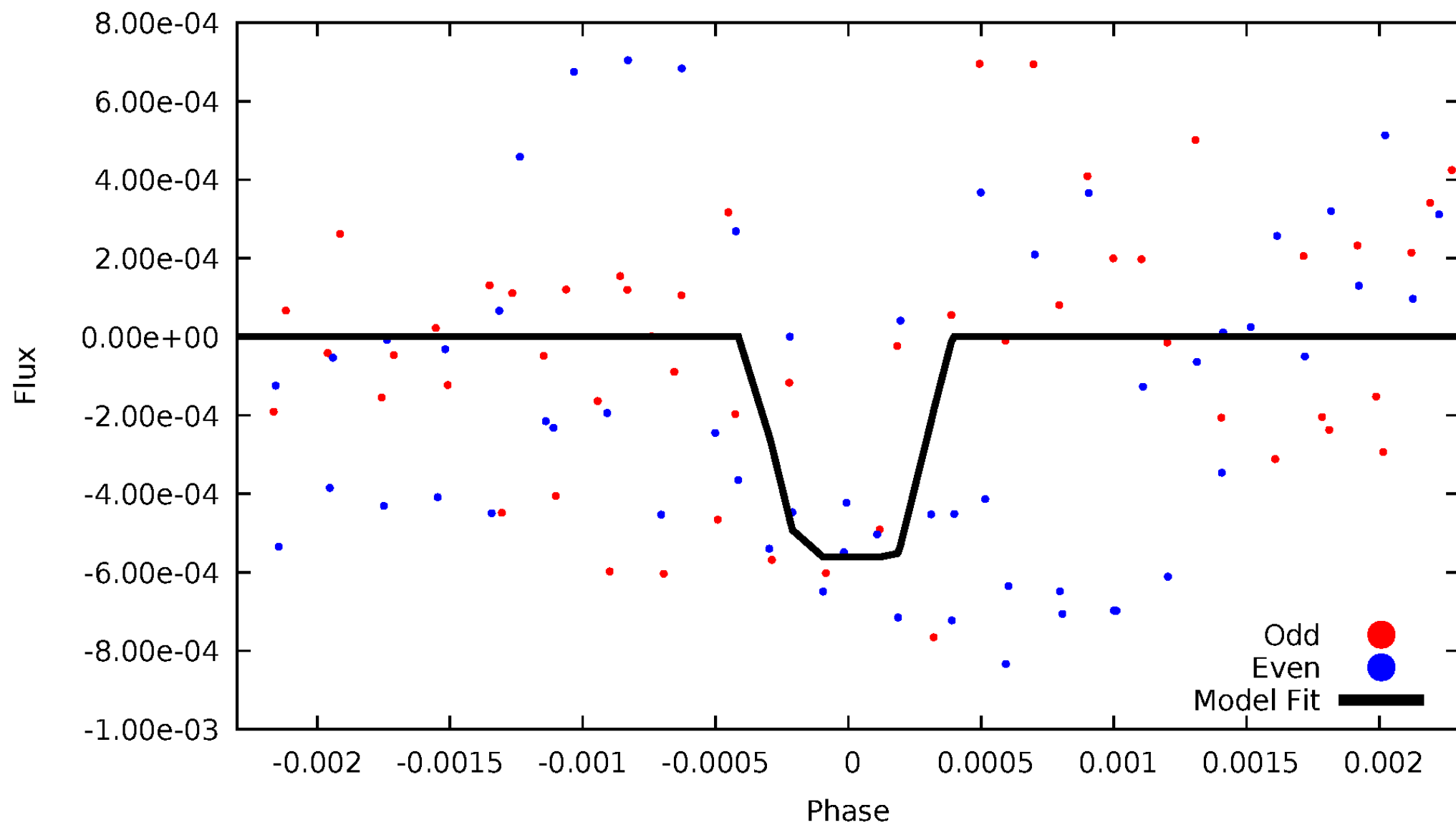
DV Odd/Even

TCE 009427220-07

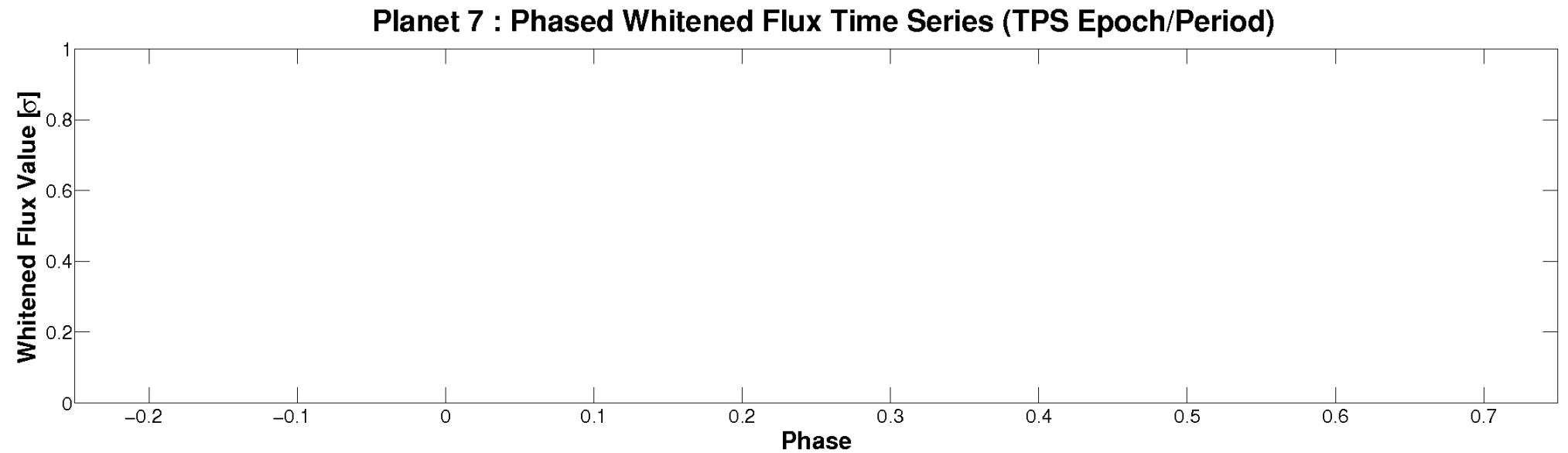
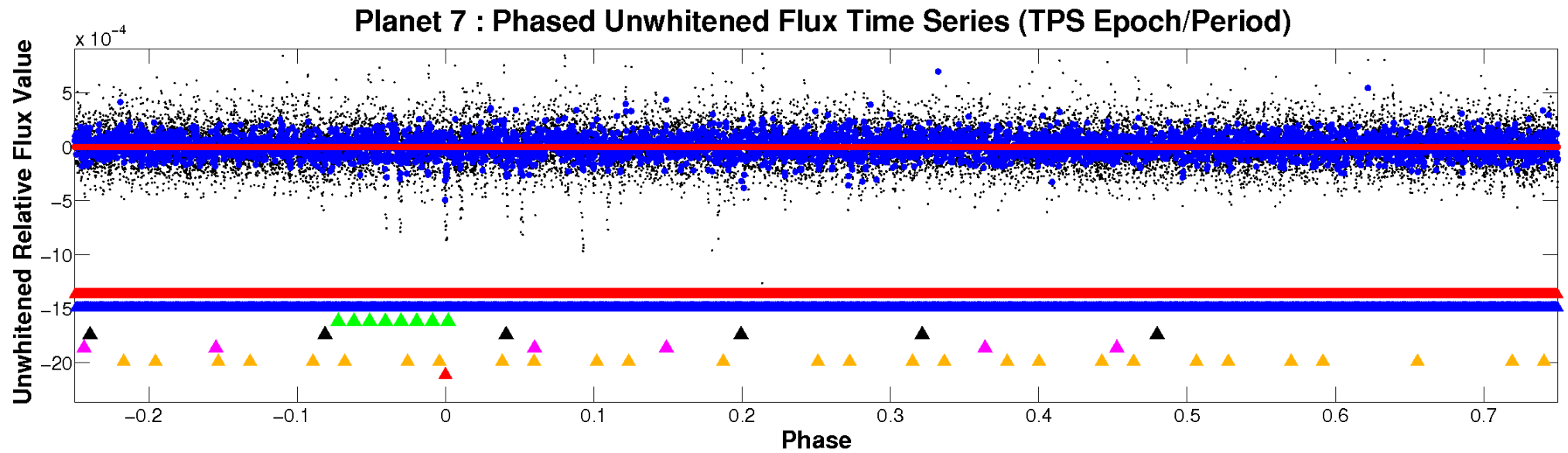


ALT Odd/Even

TCE 009427220-07

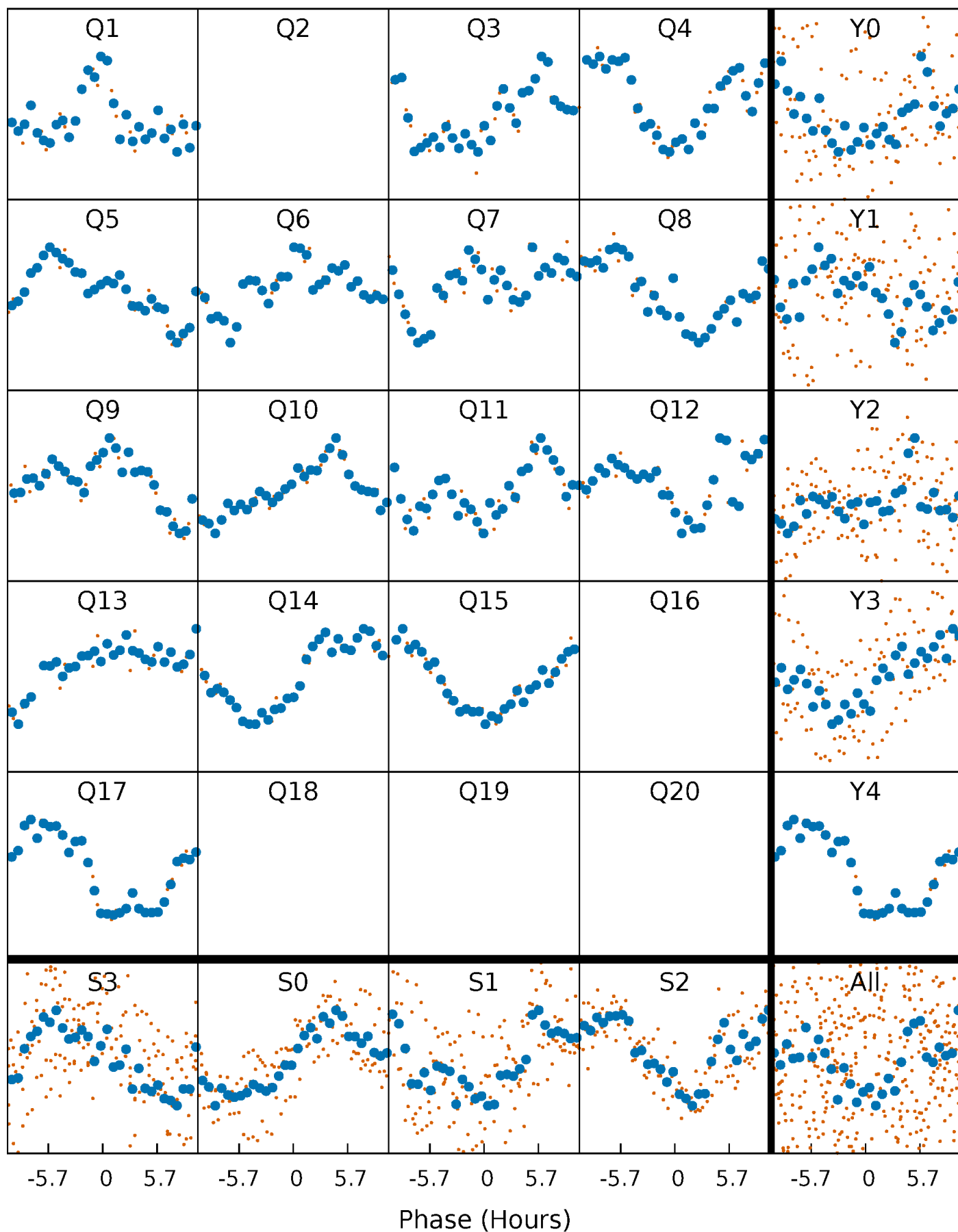


Non-Whitened Vs. Whitened Light Curve



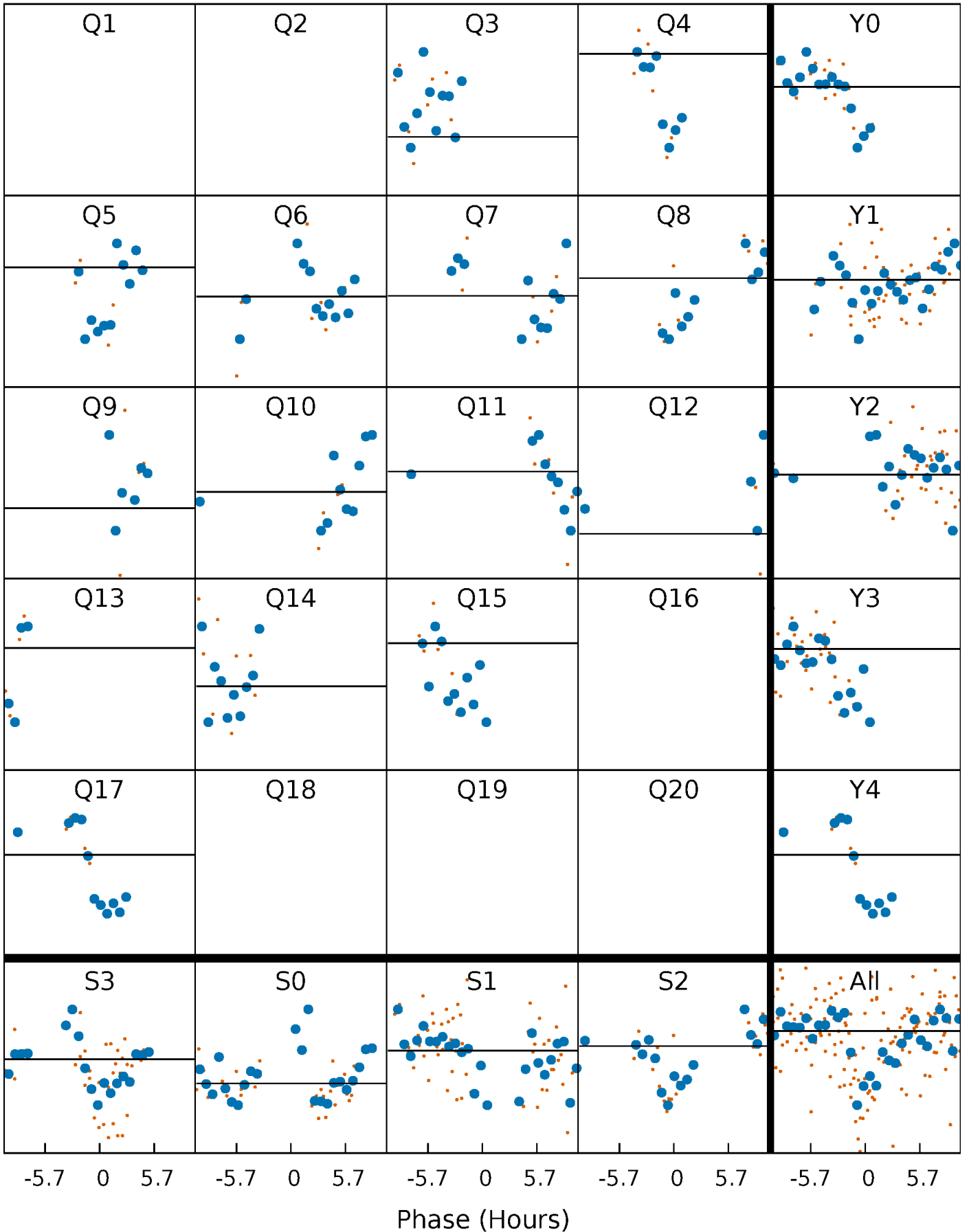
PDC Quarter-Phased Transit Curves

TCE 009427220-07 $P=100.464522$ Days $T_0=162.450809$ (BKJD)



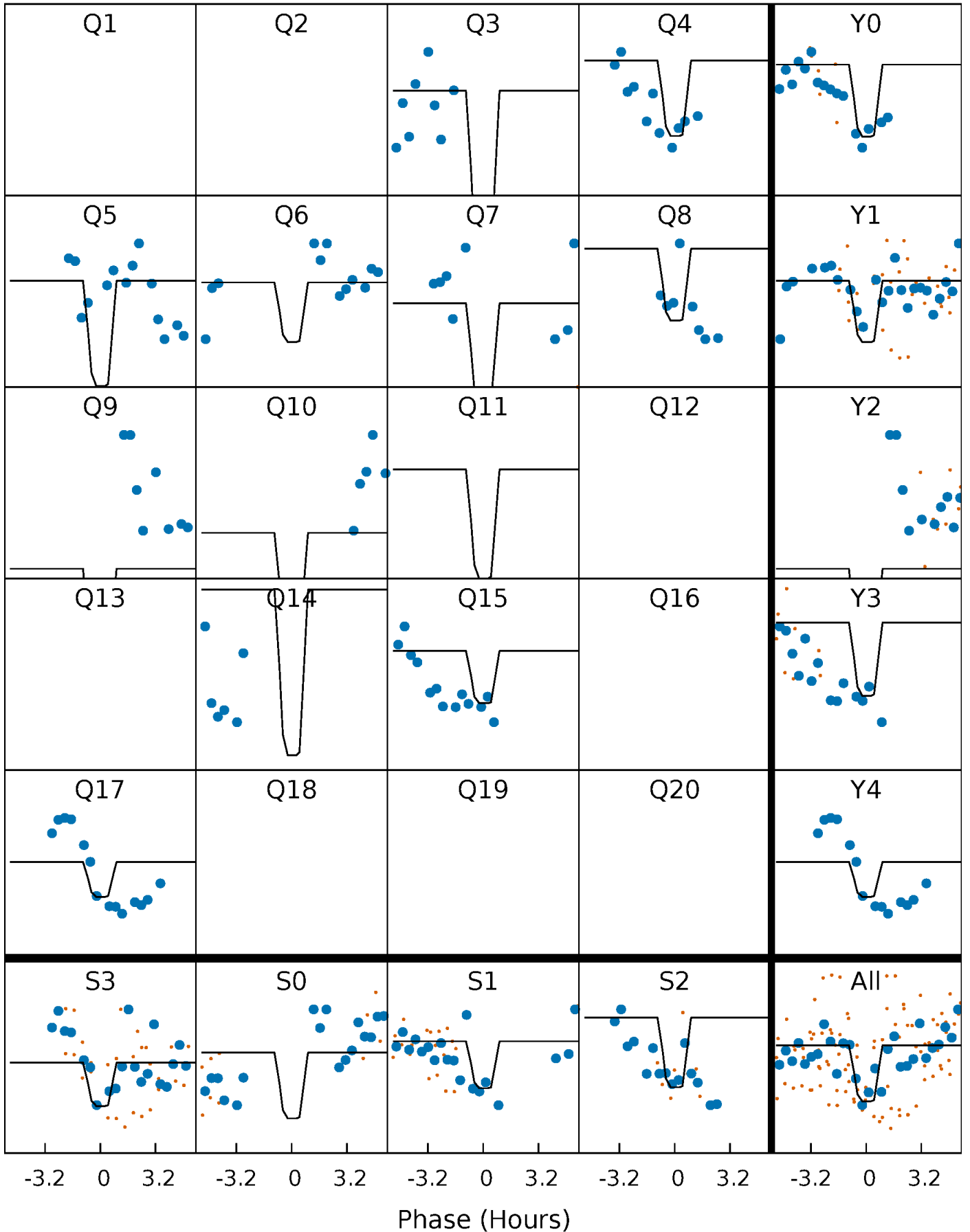
DV Quarter-Phased Transit Curves

TCE 009427220-07 $P=100.464522$ Days $T_0=162.450809$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

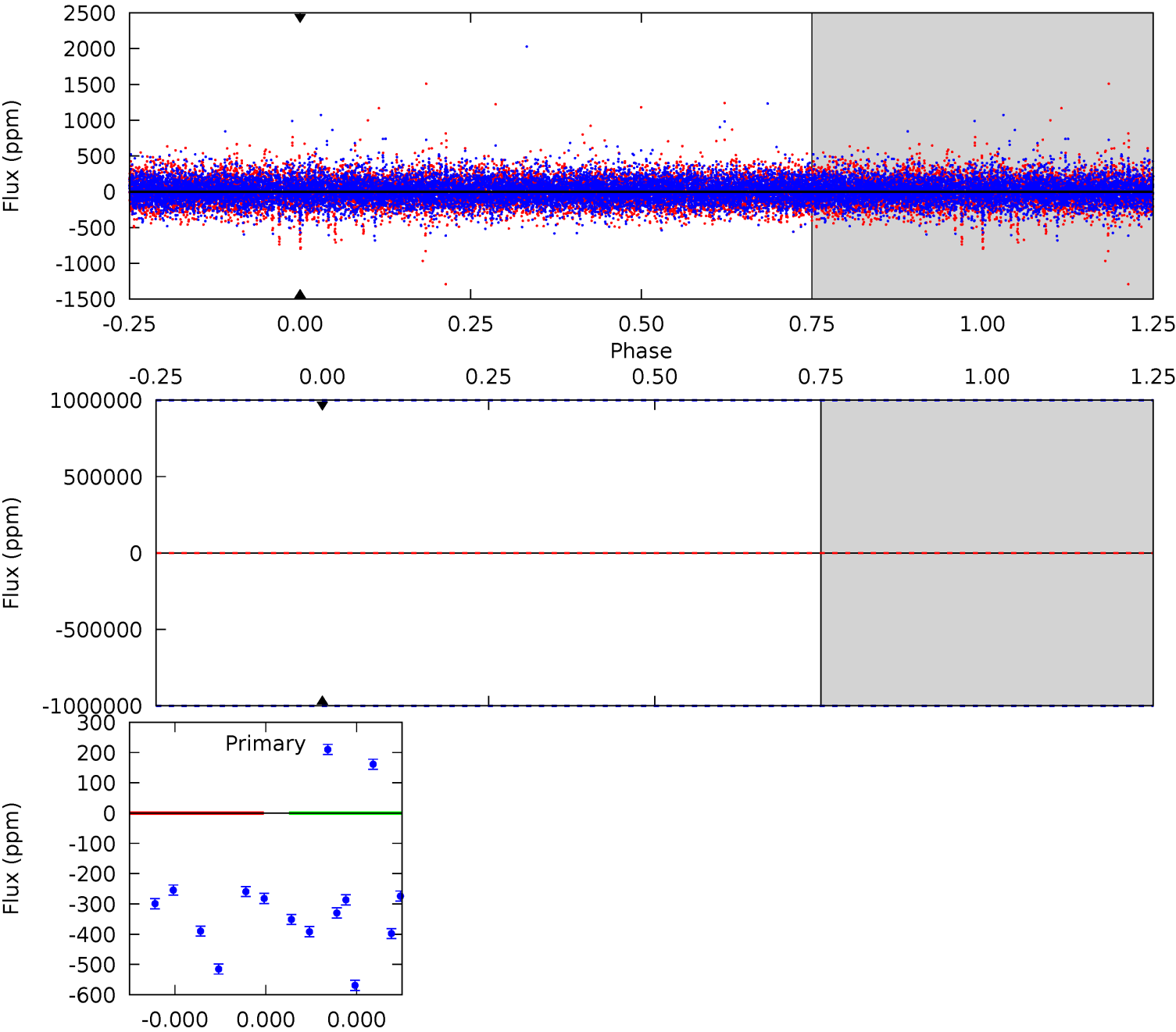
TCE 009427220-07 P=100.464522 Days $T_0=162.430125$ (BKJD)



DV Model-Shift Uniqueness Test

009427220-07, P = 100.464522 Days, E = 61.986287 Days

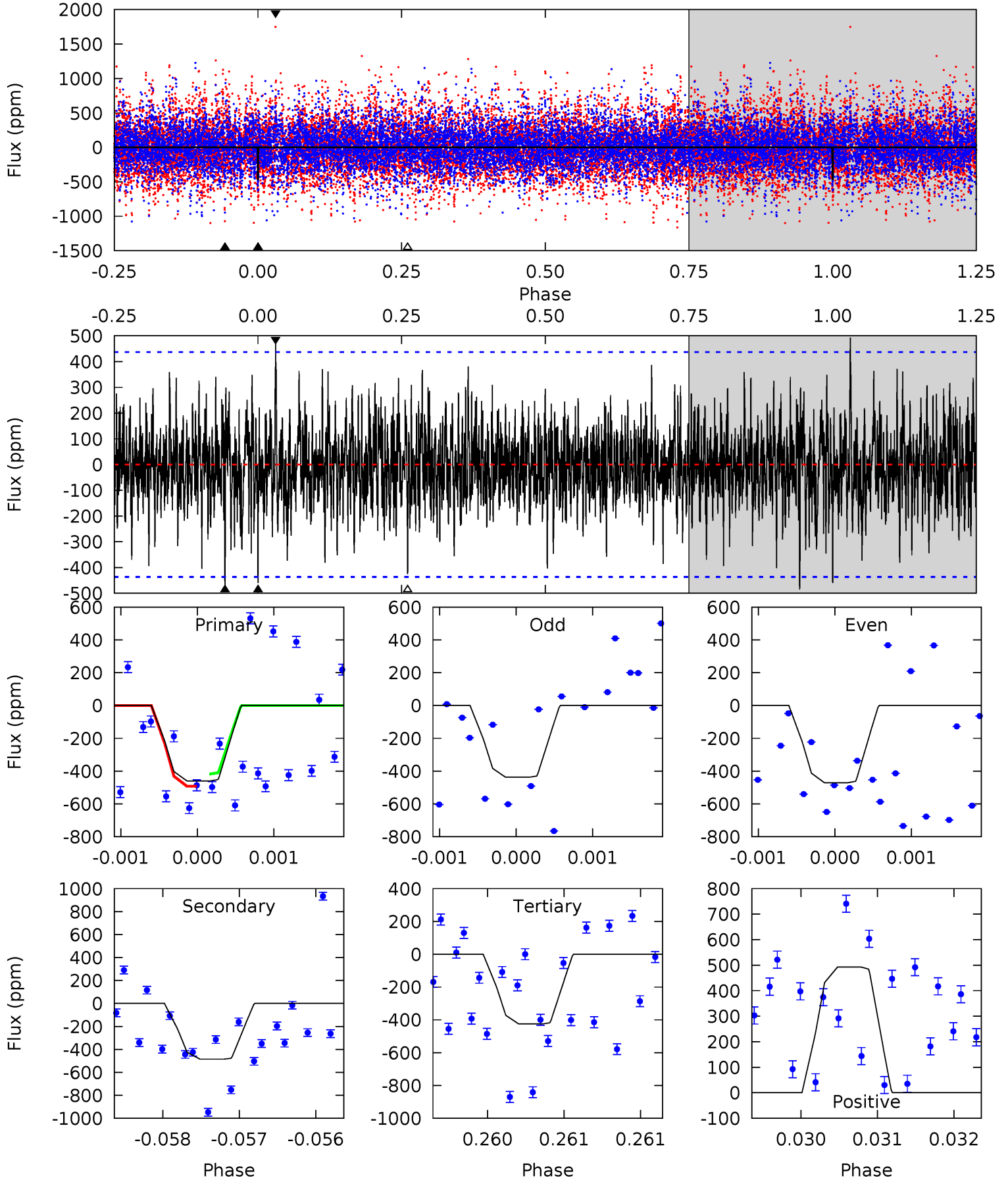
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



Alt Model-Shift Uniqueness Test

009427220-07, P = 100.464522 Days, E = 61.965603 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.81	6.13	5.37	6.22	5.52	3.39	1.51	0.44	-0.42	0.76	-0.09	0.20	0.92	0.50	0.47



Stellar Parameters For KIC 009427220

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	6701^{+185}_{-255}	$3.872^{+0.319}_{-0.147}$	$0.220^{+0.150}_{-0.300}$	$2.527^{+0.652}_{-1.060}$	$1.732^{+0.178}_{-0.386}$	$0.151^{+0.390}_{-0.063}$
	+3%/-4%	+8%/-4%	+68%/-136%	+26%/-42%	+10%/-22%	+258%/-42%
Source	PHO54	PHO54	PHO54	DSEP		

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

Secondary Eclipse Parameters for KIC 009427220-07 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	0 ± 1000000	$18.13^{+20.32}_{-12.95}$	904^{+74}_{-91}	-4525^{+43150}_{-24322}	$-350.718^{+102289.970}_{-62945.544}$
Alt.	-485 ± 79	$19.64^{+19.49}_{-13.31}$	907^{+68}_{-95}	3926^{+2379}_{-806}	176^{+1459}_{-132}

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 $A_{obs} \gg 1.0$

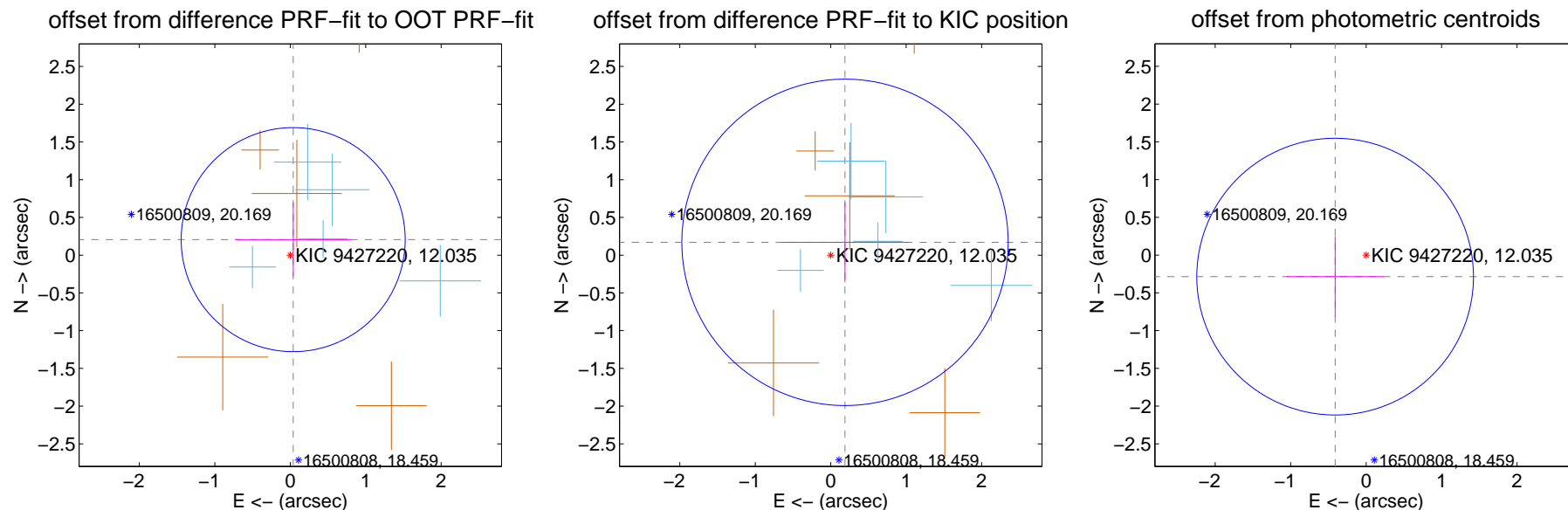
DV Centroid Data

Supplemental centroid analysis for 009427220-07. Kepler magnitude: 12.04. Transit SNR -1.00

There are 5 quarters with good PRF difference image offsets

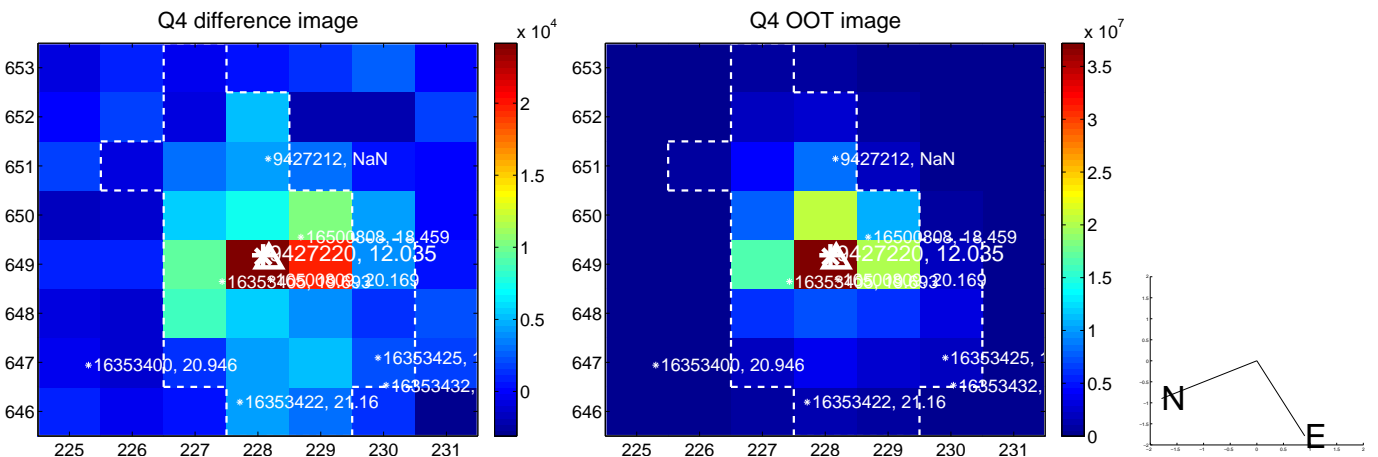
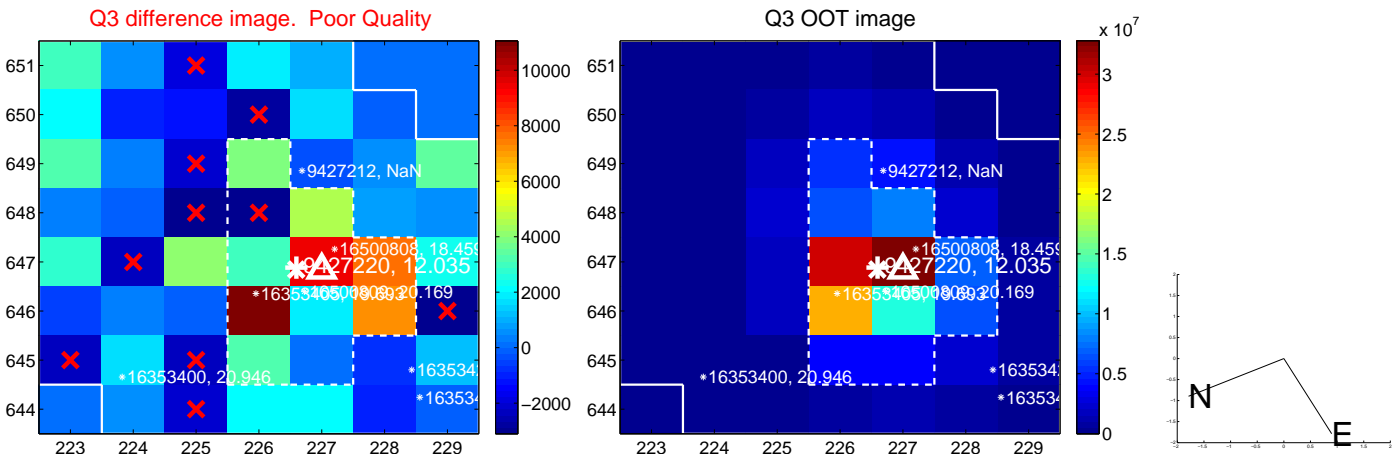
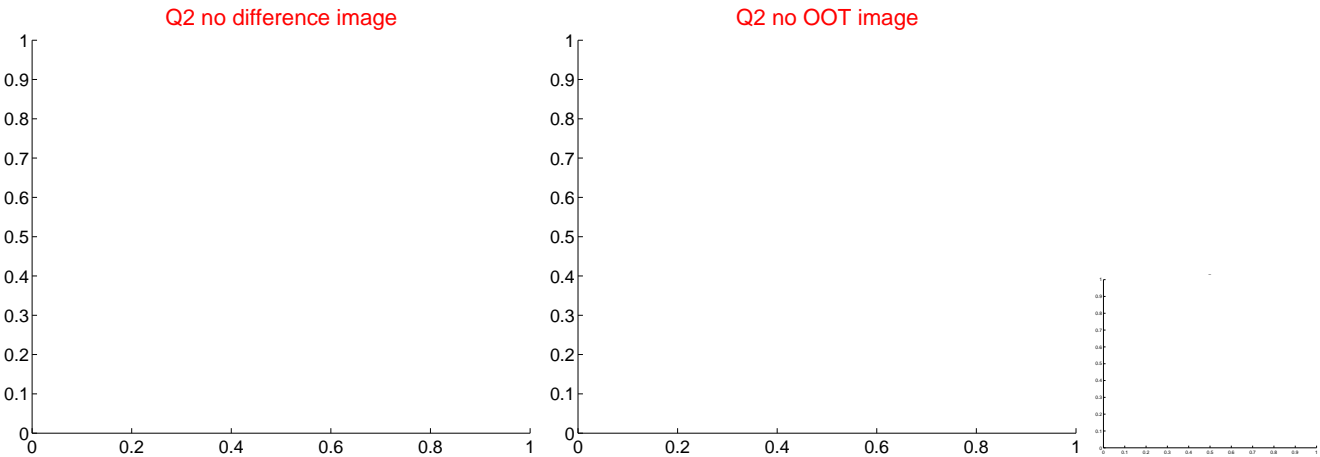
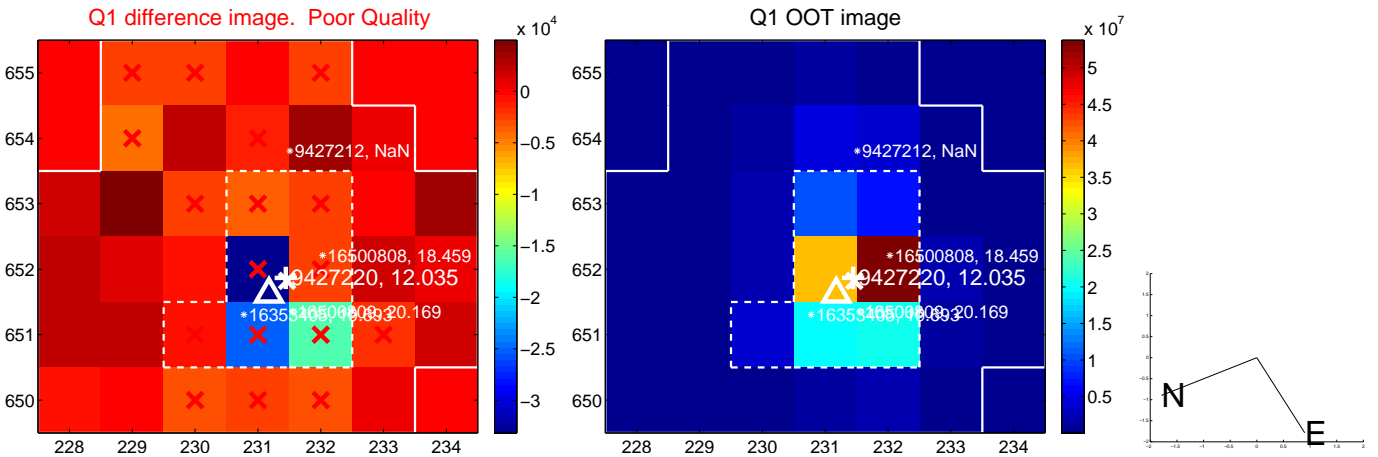
The direct PRF centroid is offset from the target star catalog position by about 0.19 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.209 ± 0.495	0.42	-0.039 ± 0.771	0.206 ± 0.486
PRF-fit source offset from KIC position	0.254 ± 0.721	0.35	-0.189 ± 0.848	0.170 ± 0.530
photometric centroid source offset	0.50 ± 0.61	0.82	0.41 ± 0.65	-0.29 ± 0.53

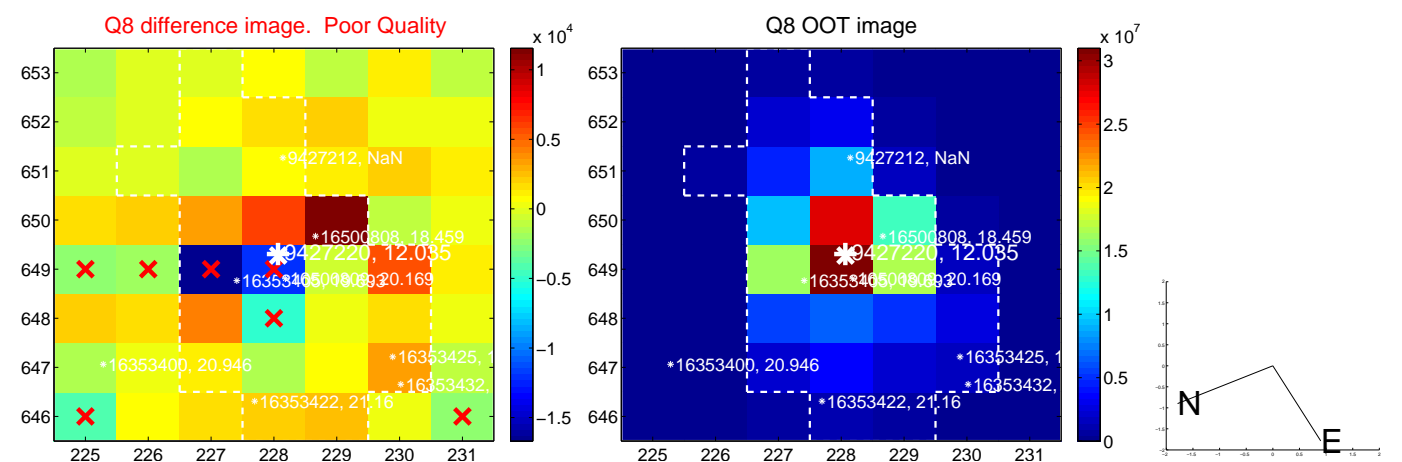
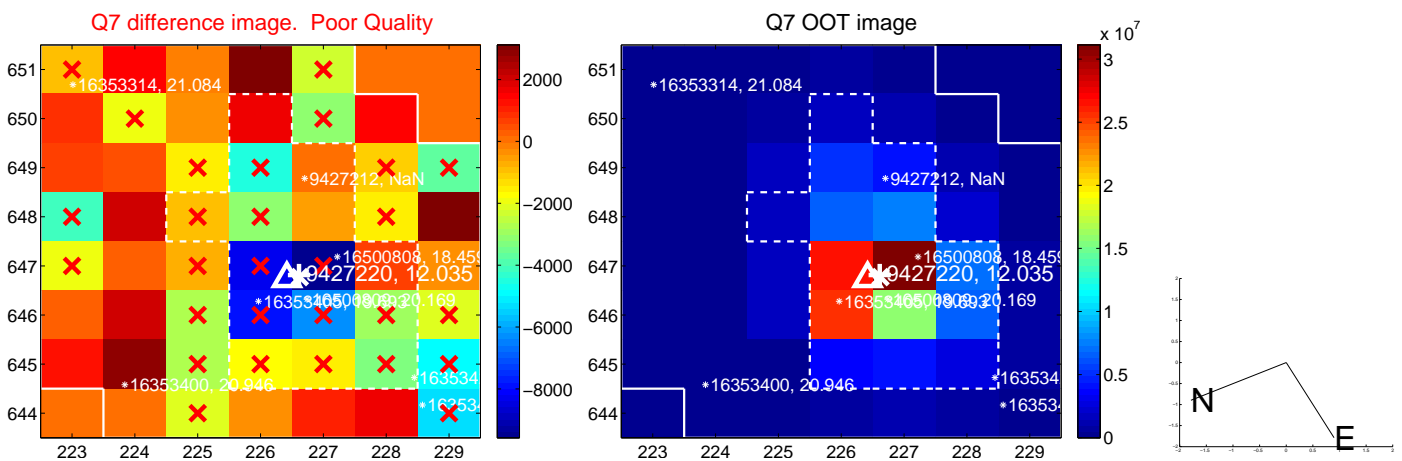
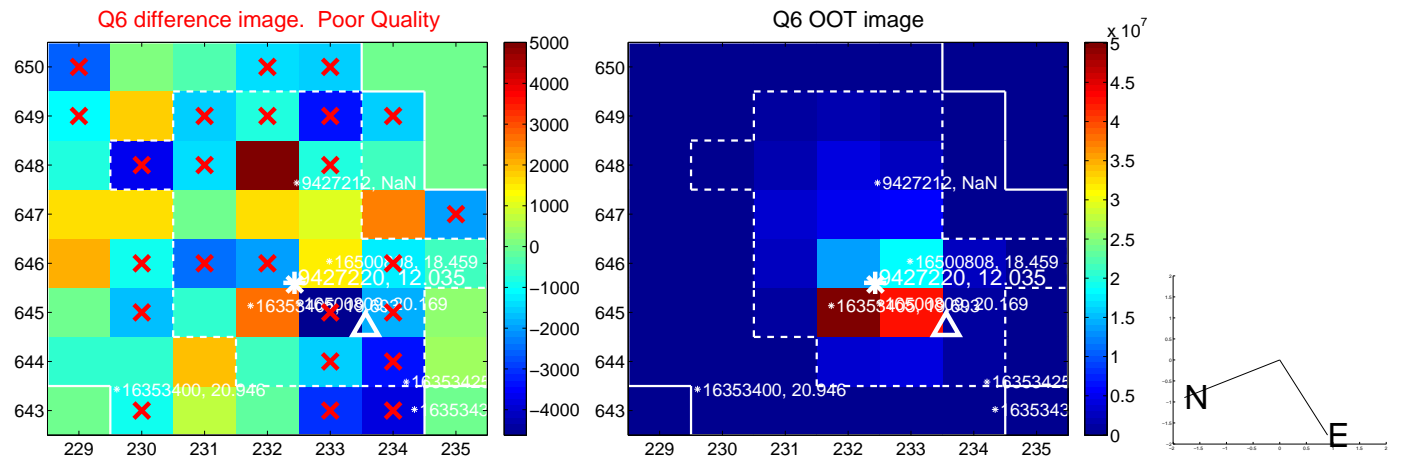
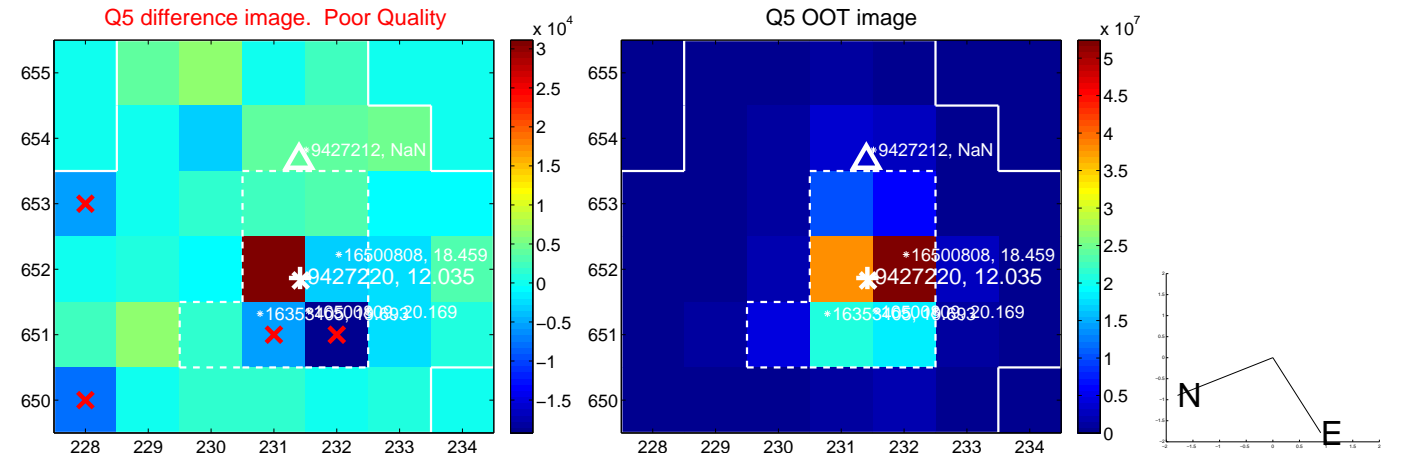


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

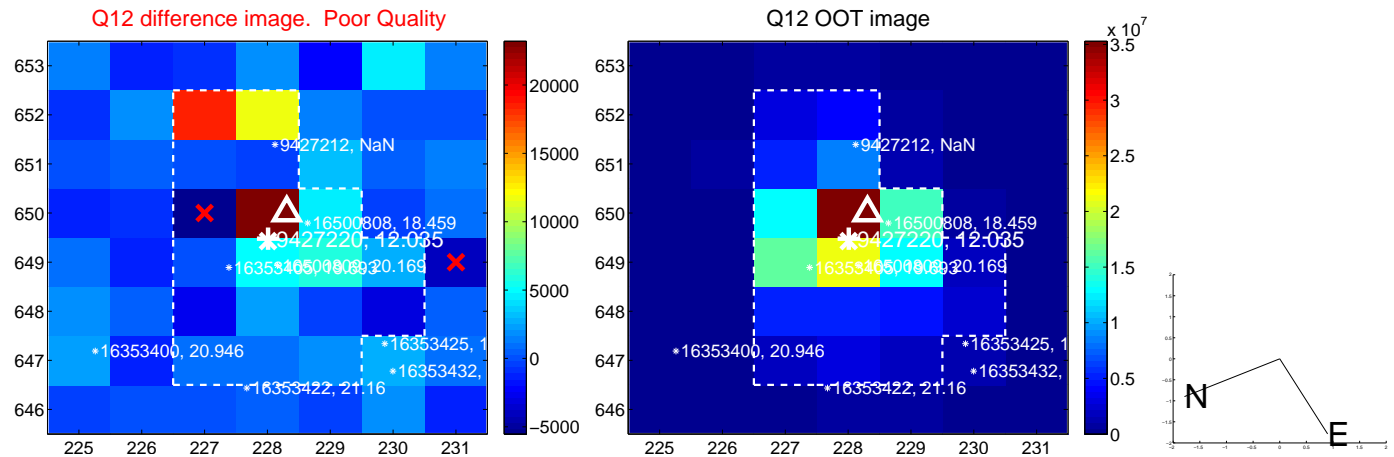
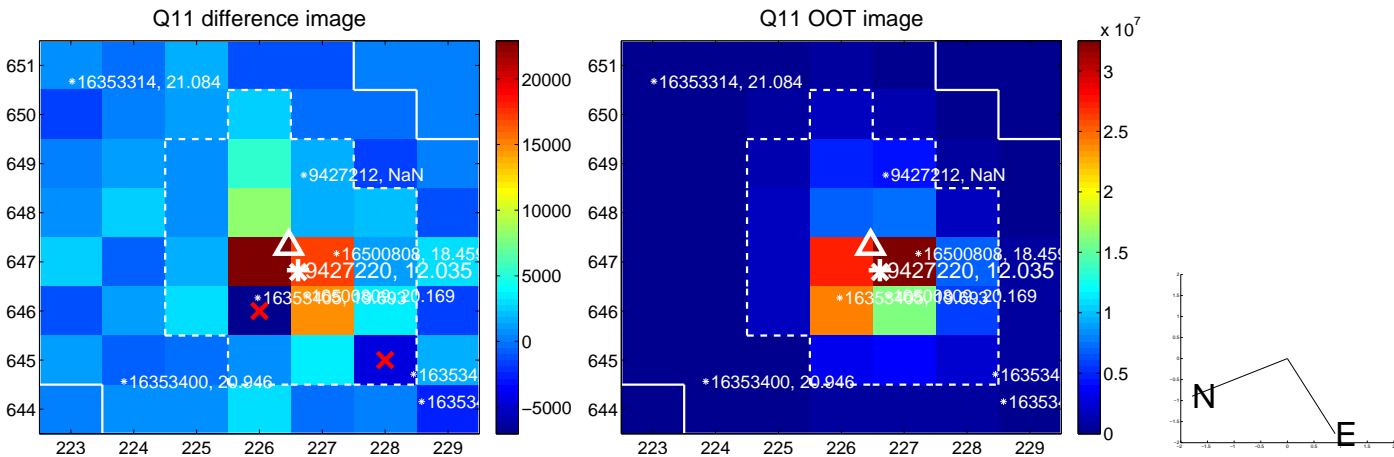
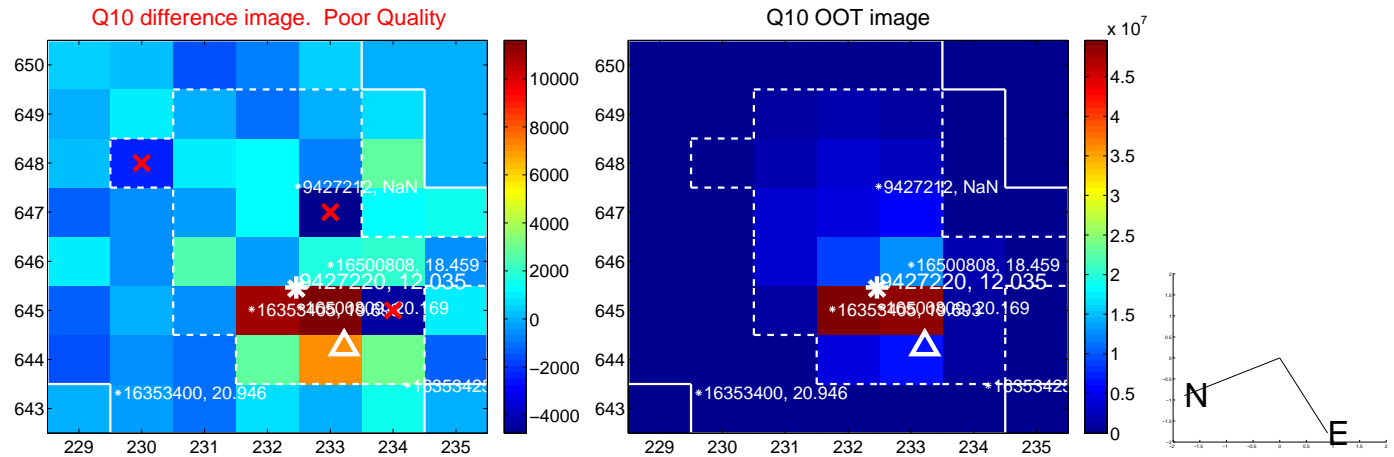
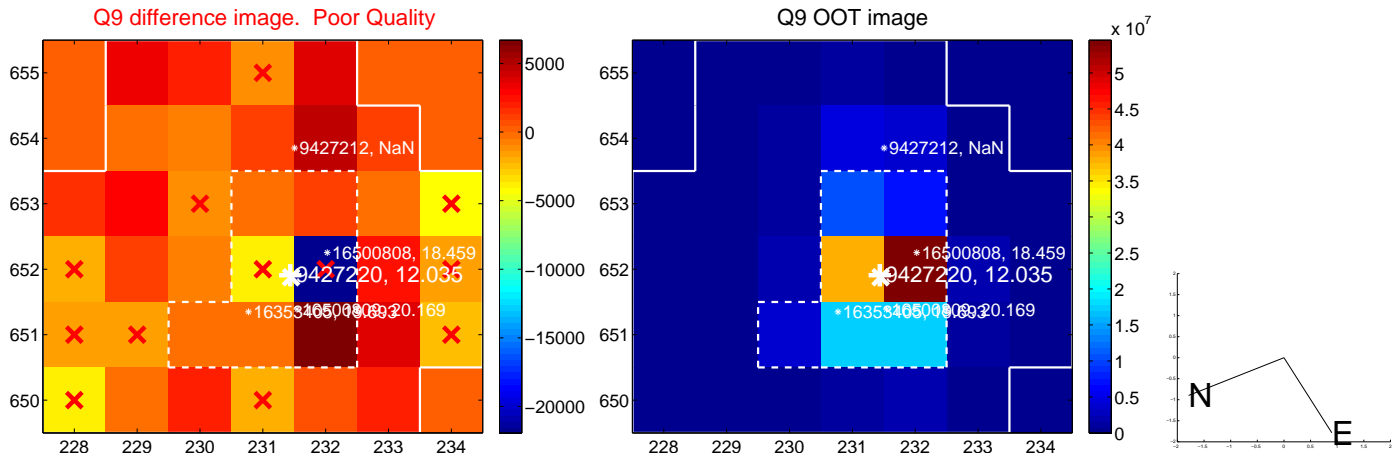
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



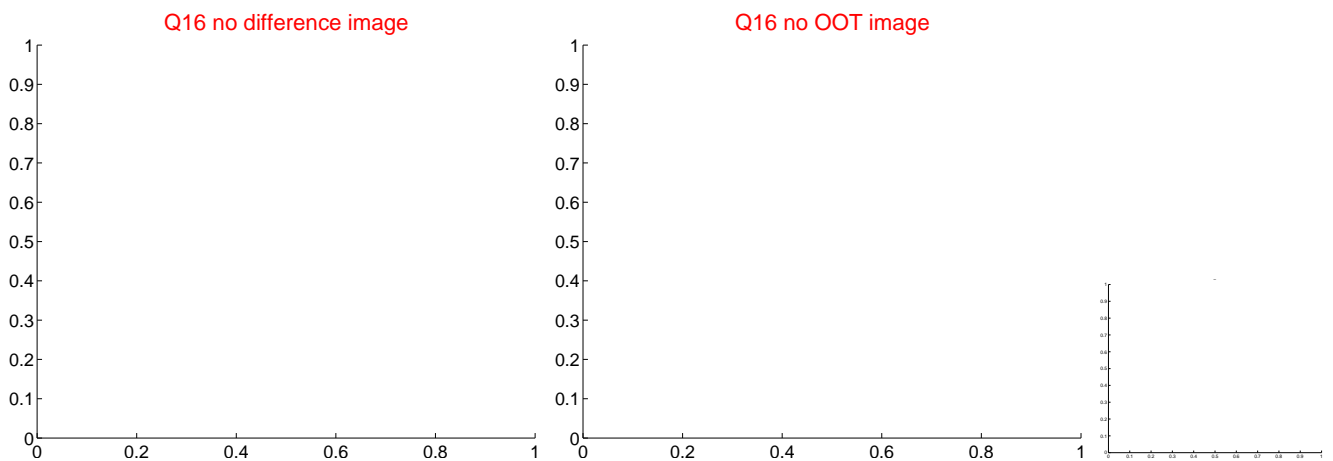
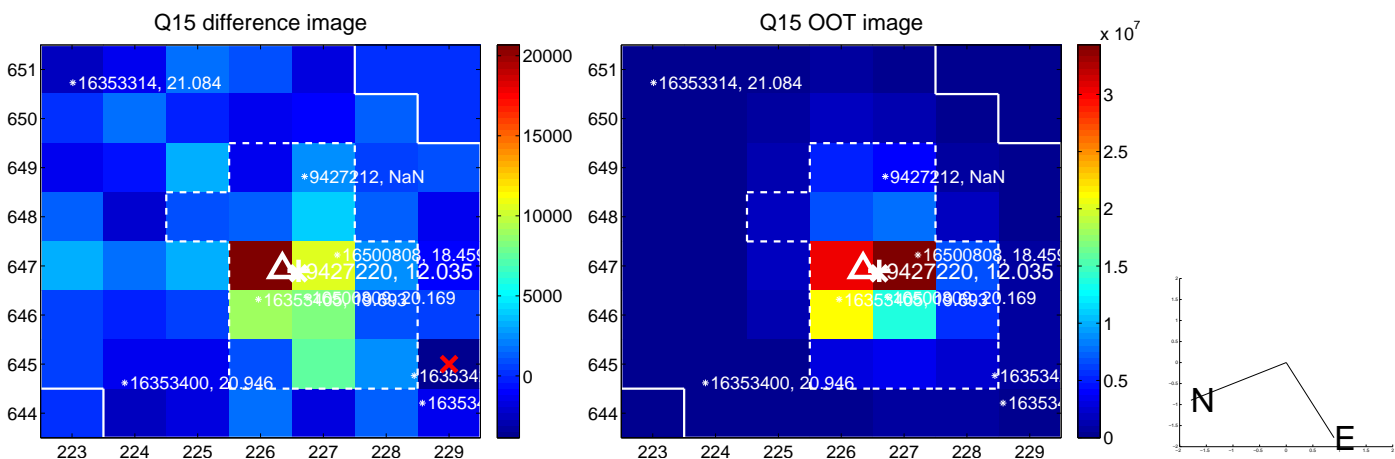
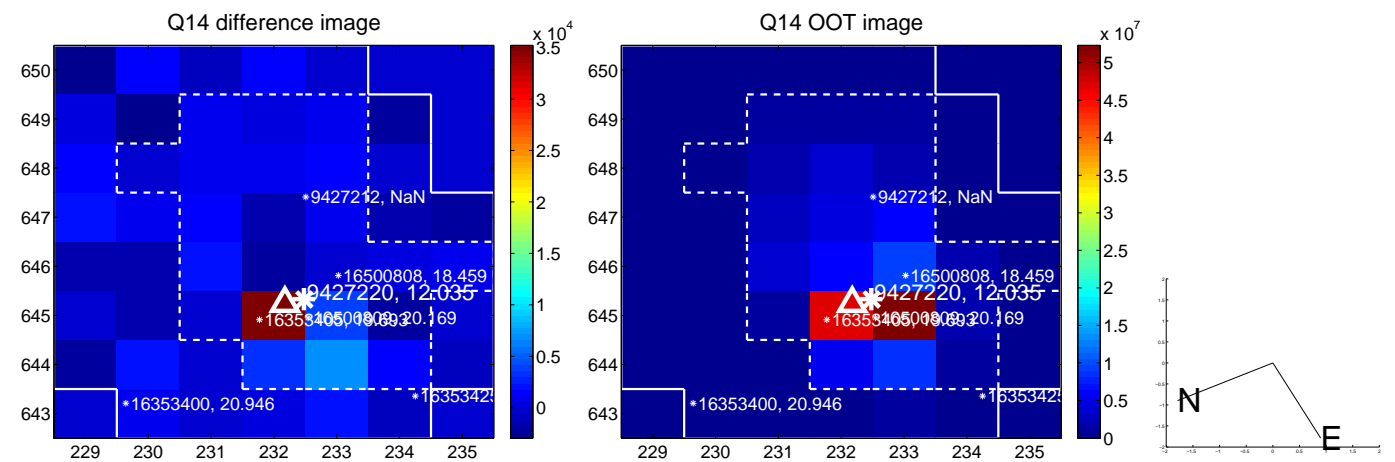
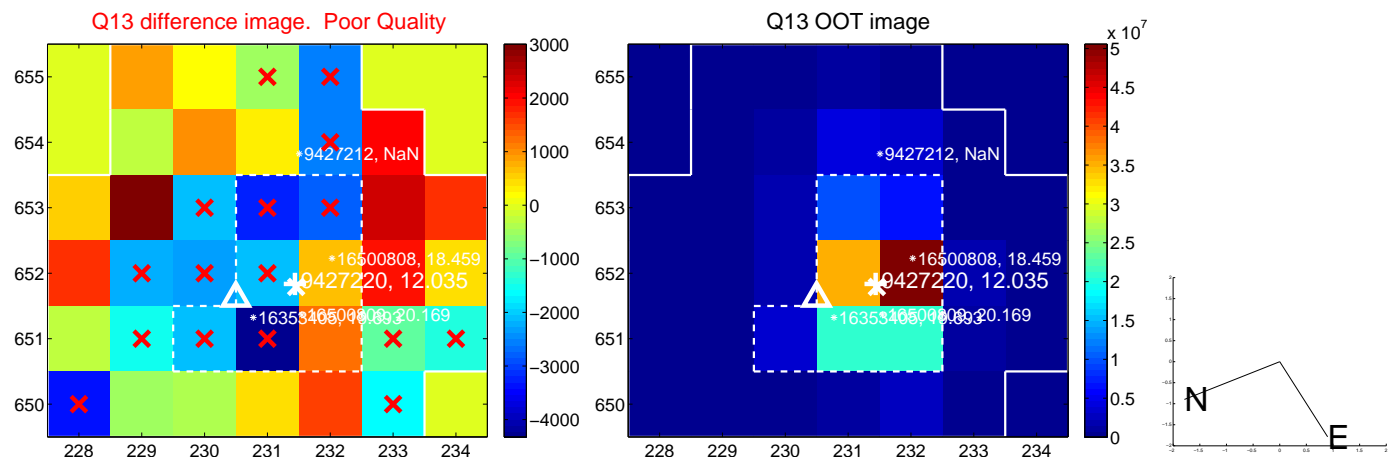
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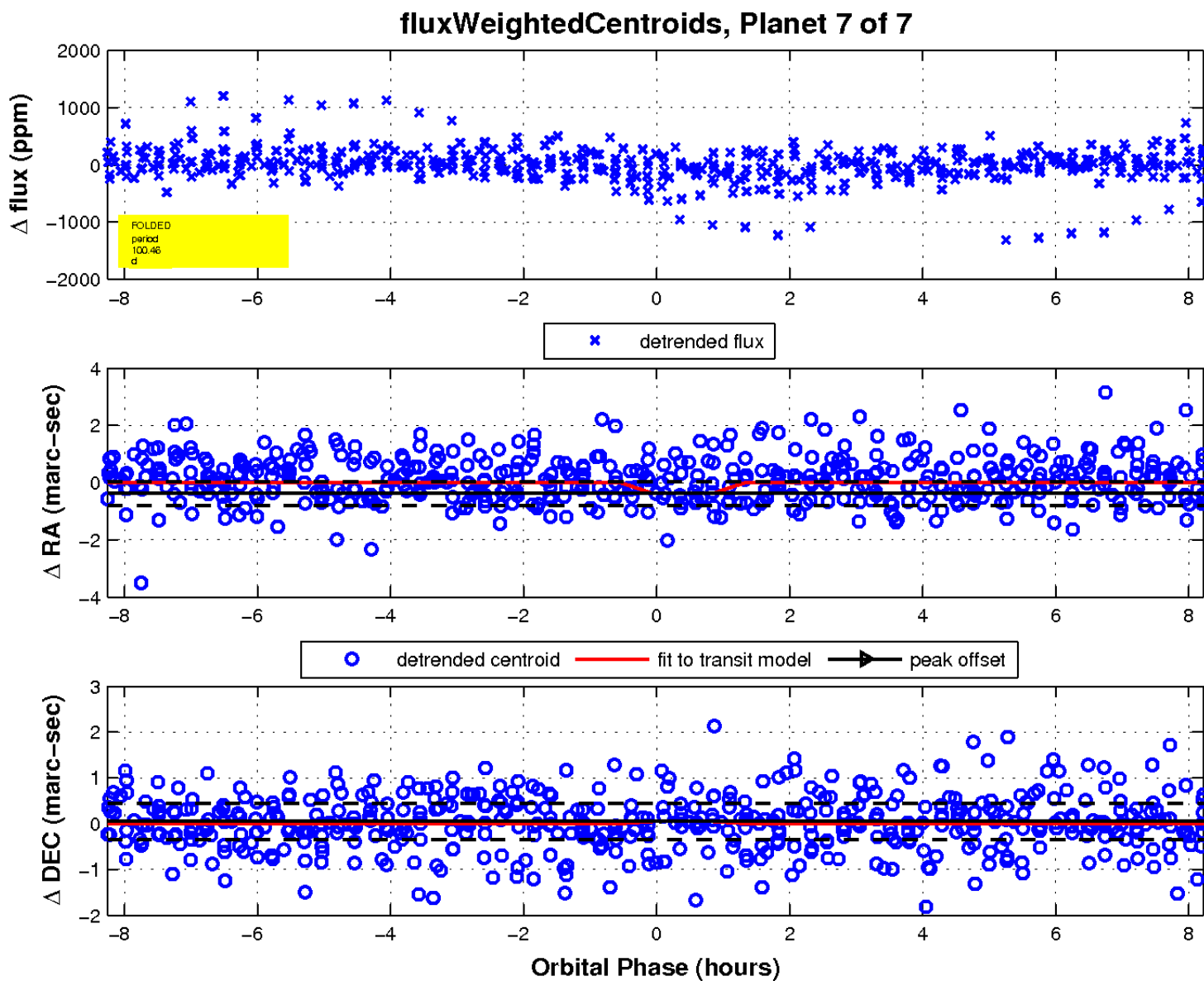
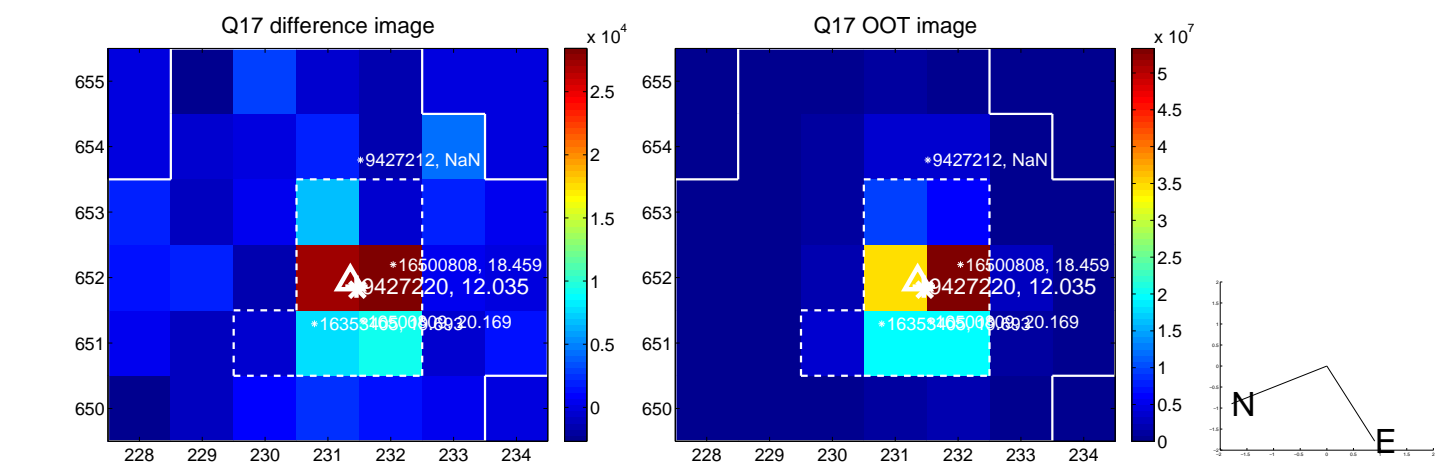
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



UKIRT Image

