

# KIC 009350690

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009350690-01	OBS	No	0.811326	131.944924	45.2	4.915	9.3	6.6	1.20	6363	0.86	6188.51
009350690-02	OBS	No	54.193534	174.050632	490.0	6.713	11.0	5.3	1.20	6363	2.99	22.83
009350690-03	OBS	No	134.244903	231.808236	1148.6	8.671	10.7	8.2	1.20	6363	5.18	6.81
009350690-04	OBS	No	92.438309	154.417683	1112.1	9.954	9.6	7.2	1.20	6363	7.58	11.20

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009350690-01	OBS	FP	0.00	1	0	1	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_RESOLVED_OFFSET
009350690-02	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_RESOLVED_OFFSET
009350690-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—CENT_FEW_DIFFS
009350690-04	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_RESOLVED_OFFSET

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

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

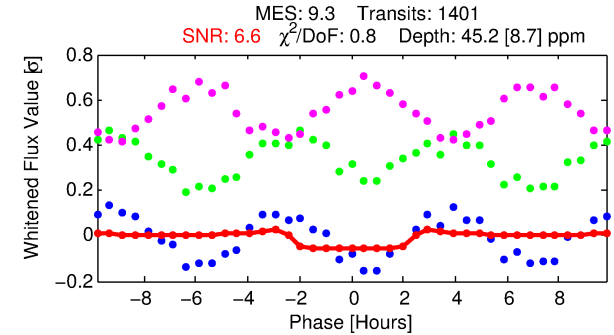
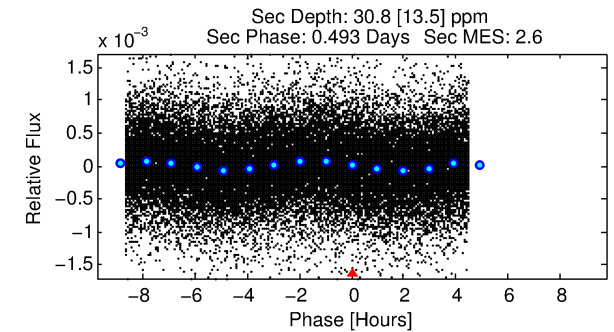
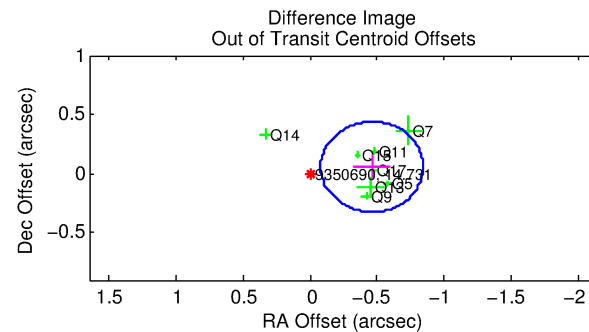
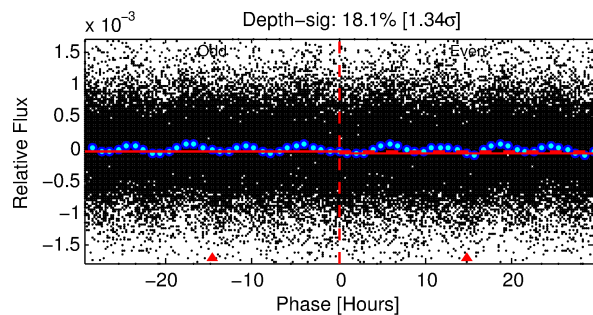
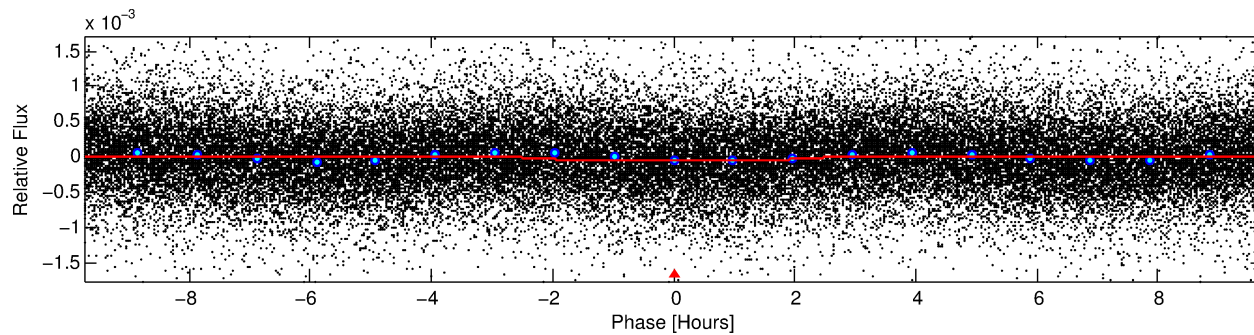
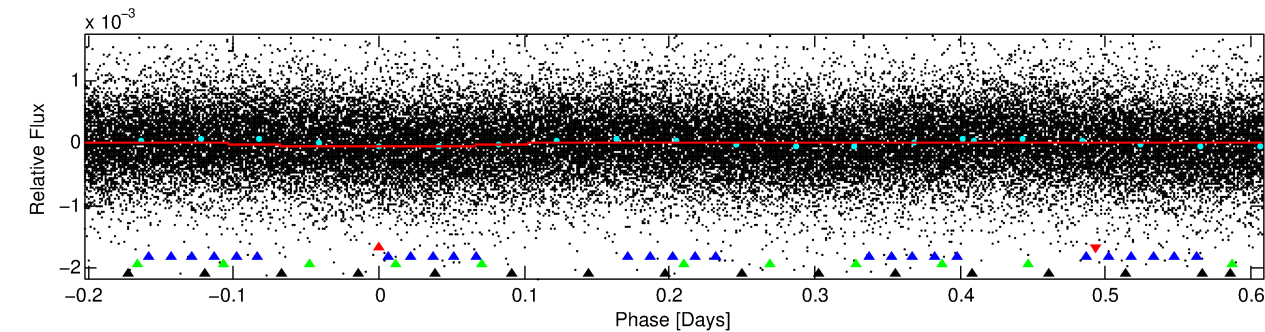
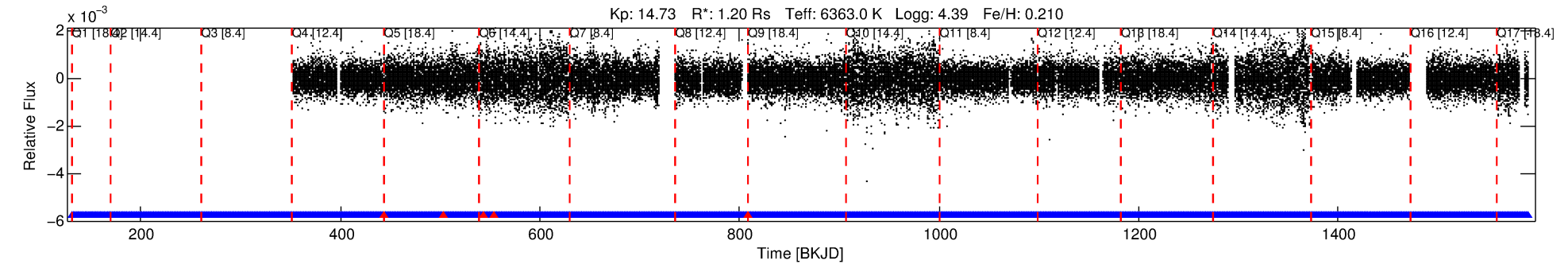
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009350690-01

No Significant Match Found

# DV One-Page Summary

KIC: 9350690 Candidate: 1 of 4 Period: 0.811 d



## DV Fit Results:

Period = 0.81133 [0.00002] d  
Epoch = 131.9449 [0.0049] BKJD  
Rp/R\* = 0.0066 [0.0050]  
a/R\* = 1.22 [1.58]  
b = 0.72 [2.66]  
Seff = 6188.51 [2589.42]  
Teff = 2262 [237] K  
Rp = 0.87 [0.72] Re  
a = 0.0185 [0.0051] AU  
Ag = 7.72 [12.57] [0.53 $\sigma$ ]  
Teffp = 5828 [2315] K [1.53 $\sigma$ ]

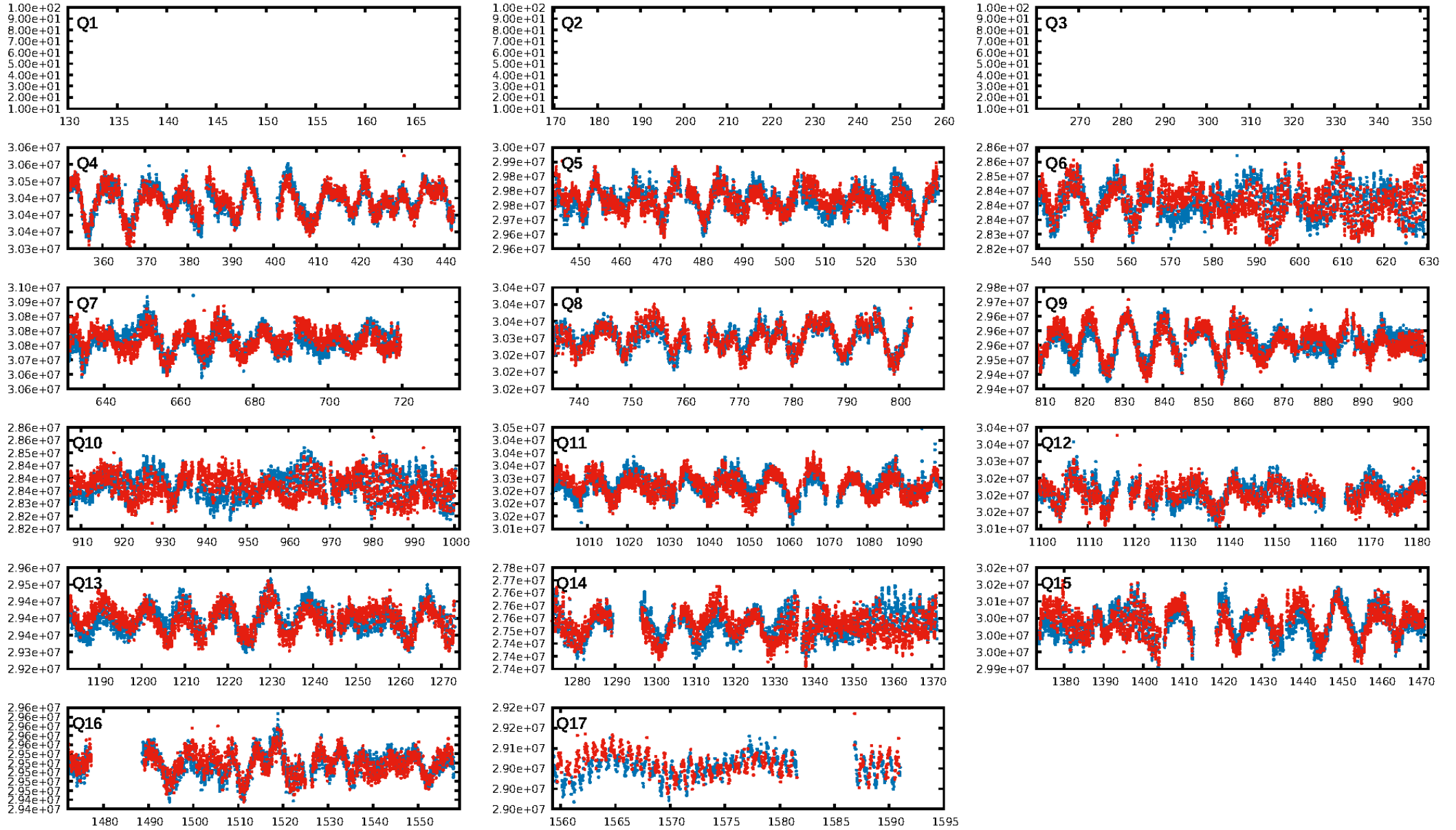
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [154.00 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 2.66e-20  
RollingBand-fgt: 1.00 [1364/1369]  
GhostDiagnostic-chr: -0.5657  
Centroid-sig: 0.0%  
Centroid-so: 6.049 arcsec [6.96 $\sigma$ ]  
OotOffset-rm: 0.464 arcsec [3.65 $\sigma$ ]  
KicOffset-rm: 5.764 arcsec [56.17 $\sigma$ ]  
OotOffset-st: 1/3/0/4 [8]  
KicOffset-st: 1/3/0/4 [8]  
DiffImageQuality-fgm: 0.50 [4/8]  
DiffImageOverlap-fno: 1.00 [14/14]

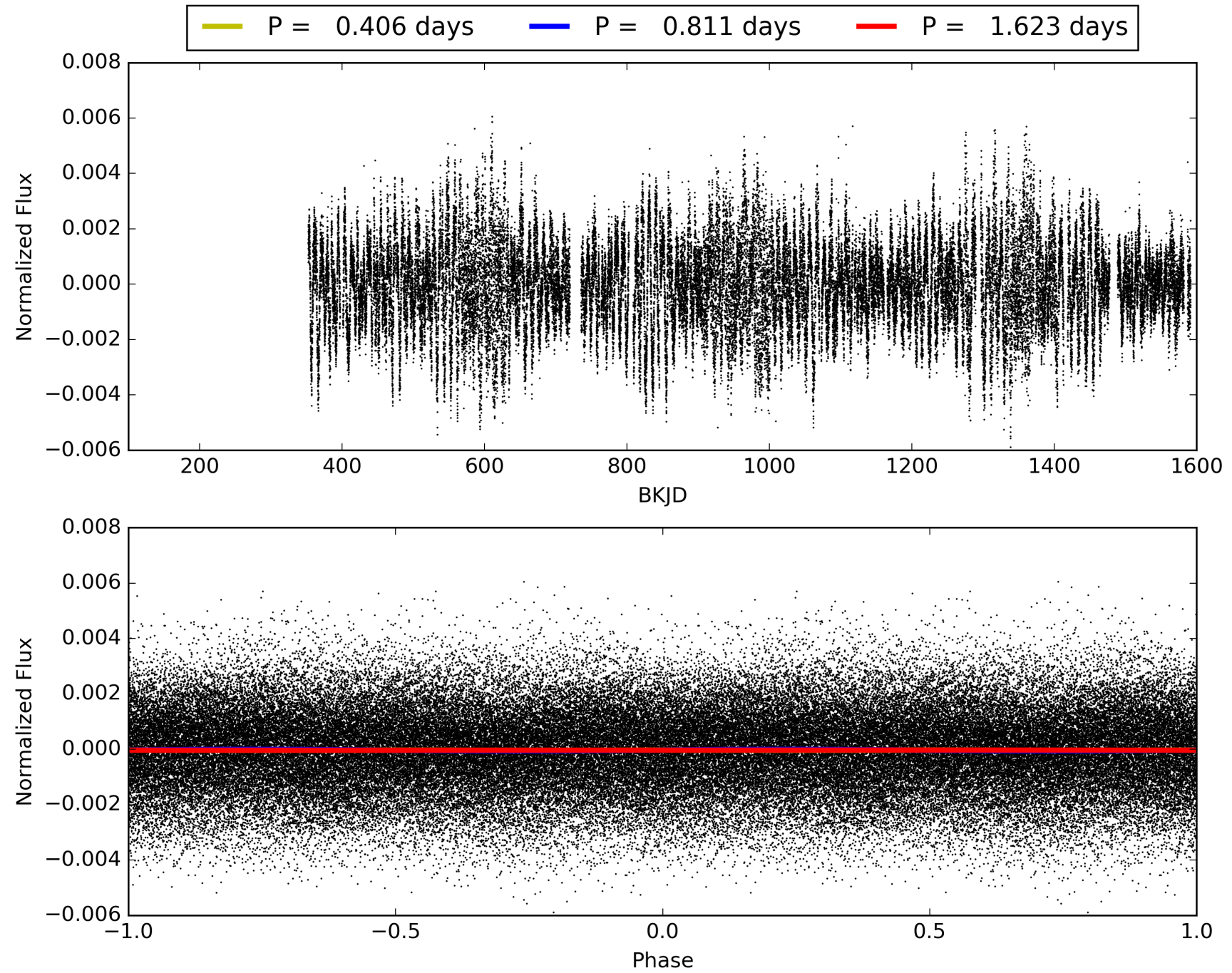
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 17:12:01 Z

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

# TCE 009350690-01, PDC Light Curves



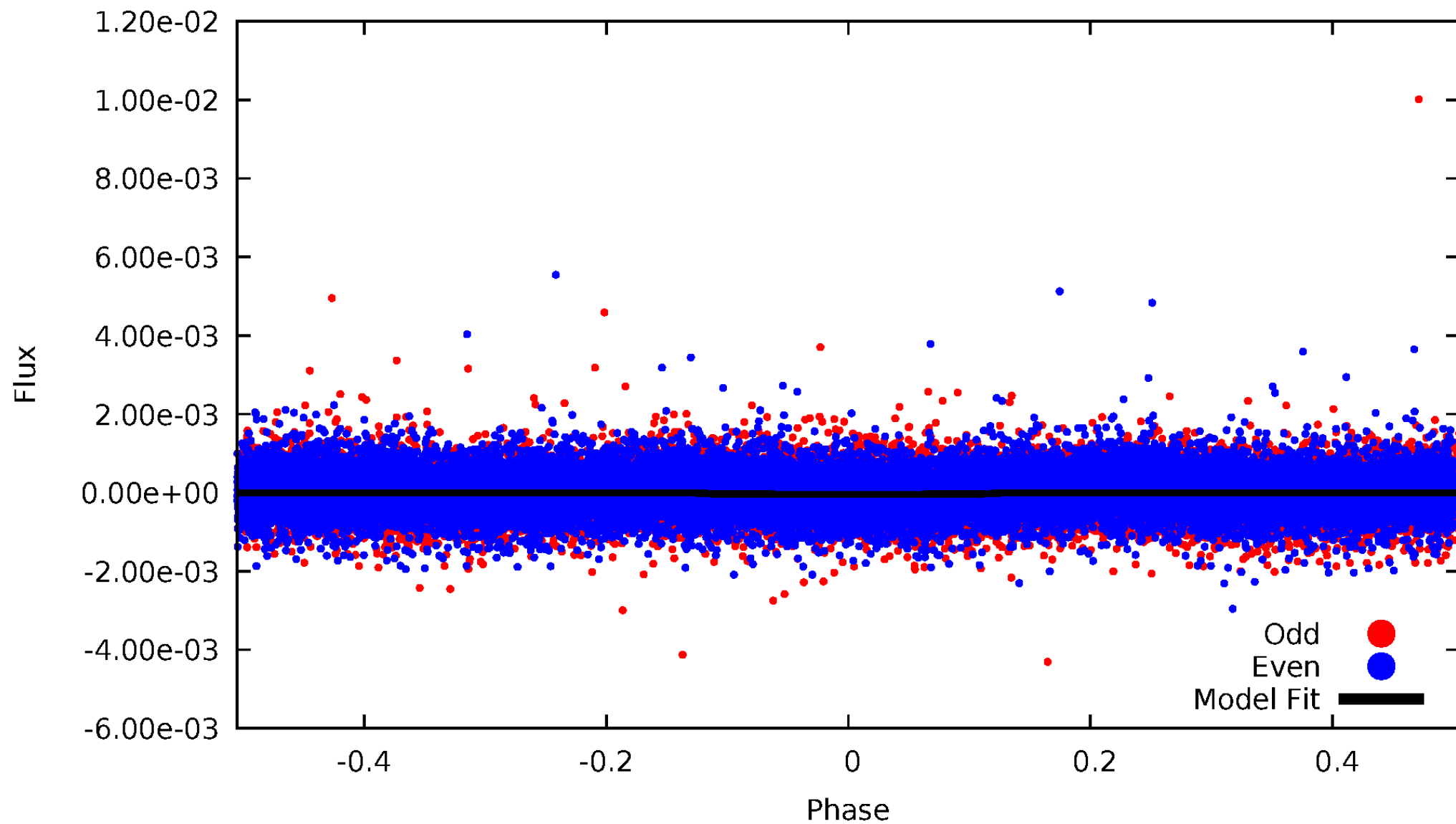
TCE 009350690-01





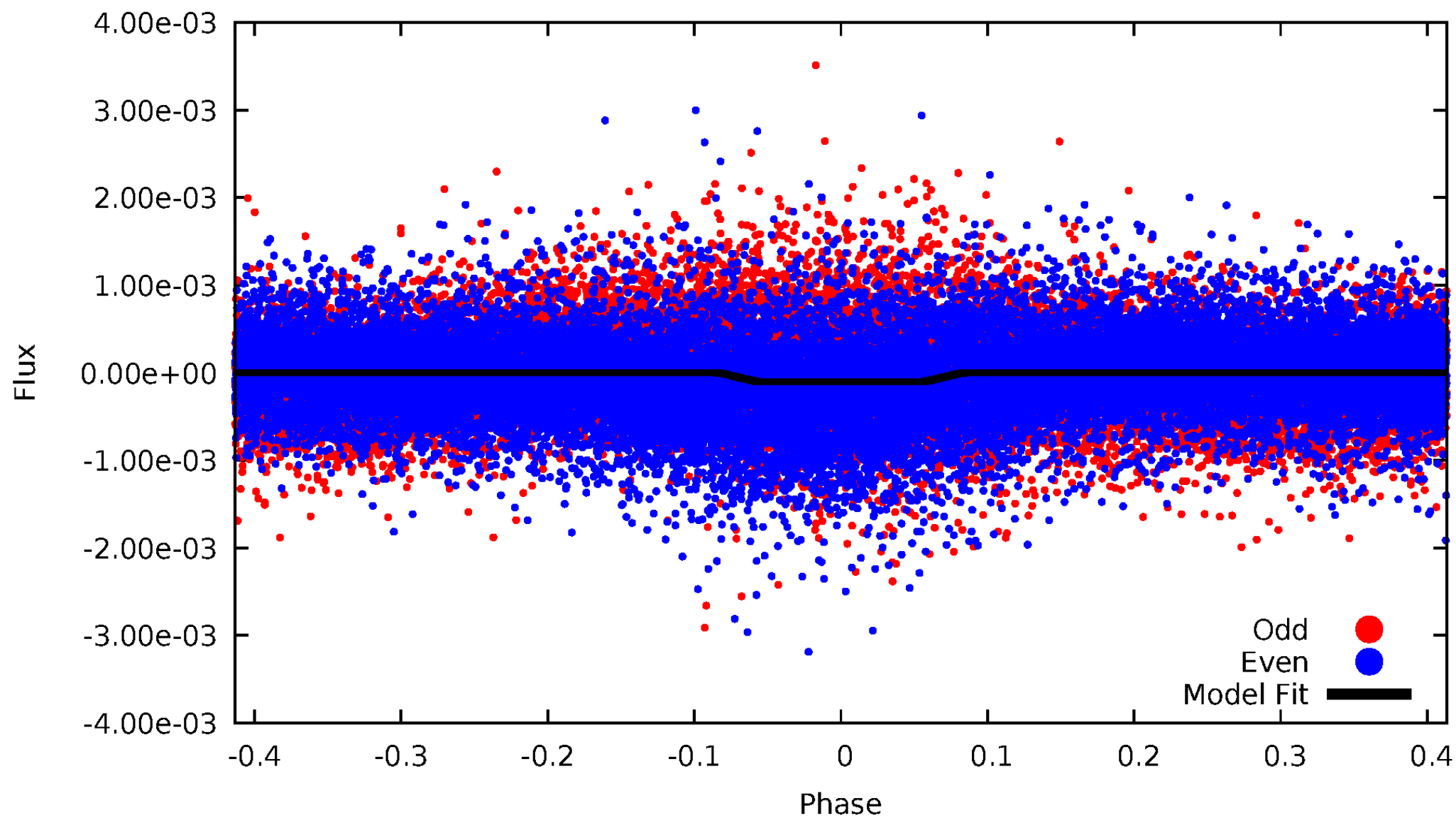
# DV Odd/Even

TCE 009350690-01

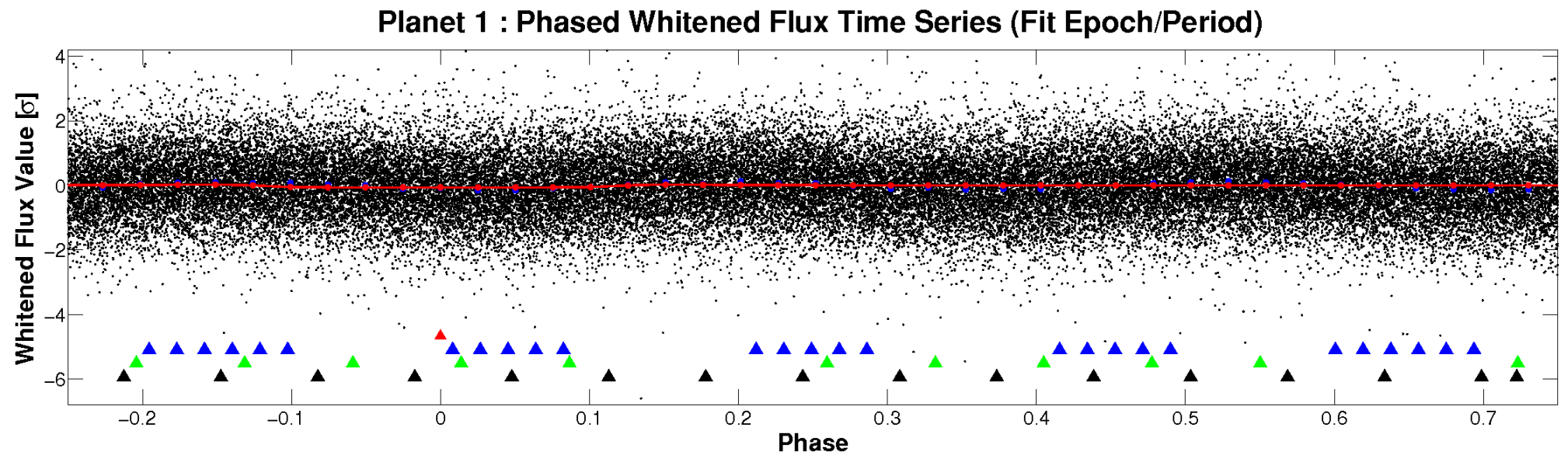
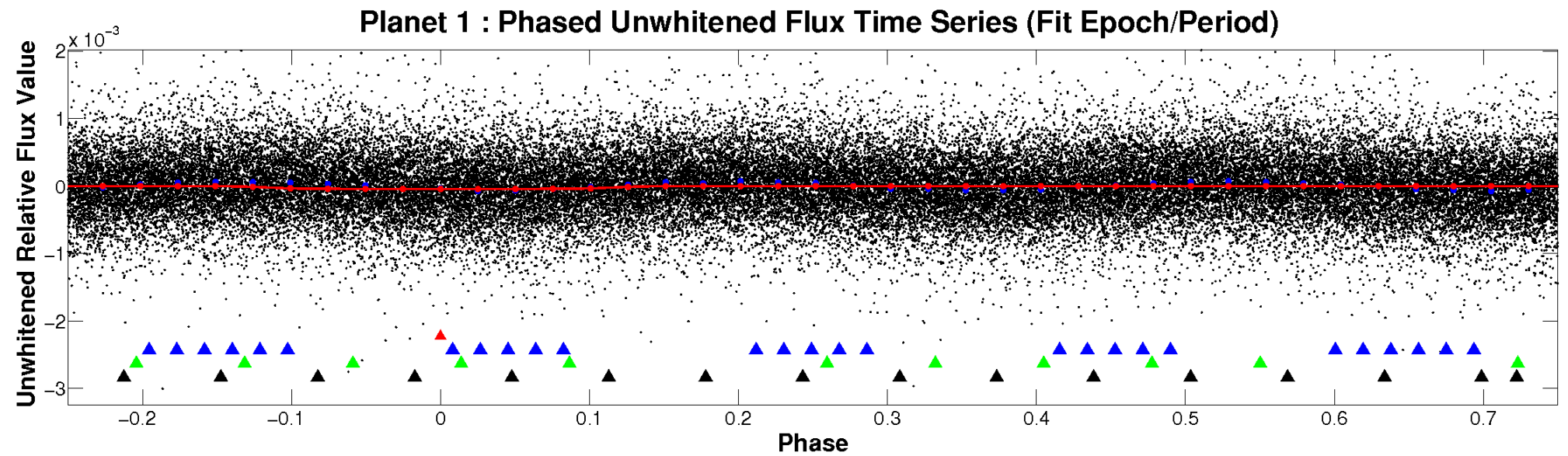


# ALT Odd/Even

TCE 009350690-01

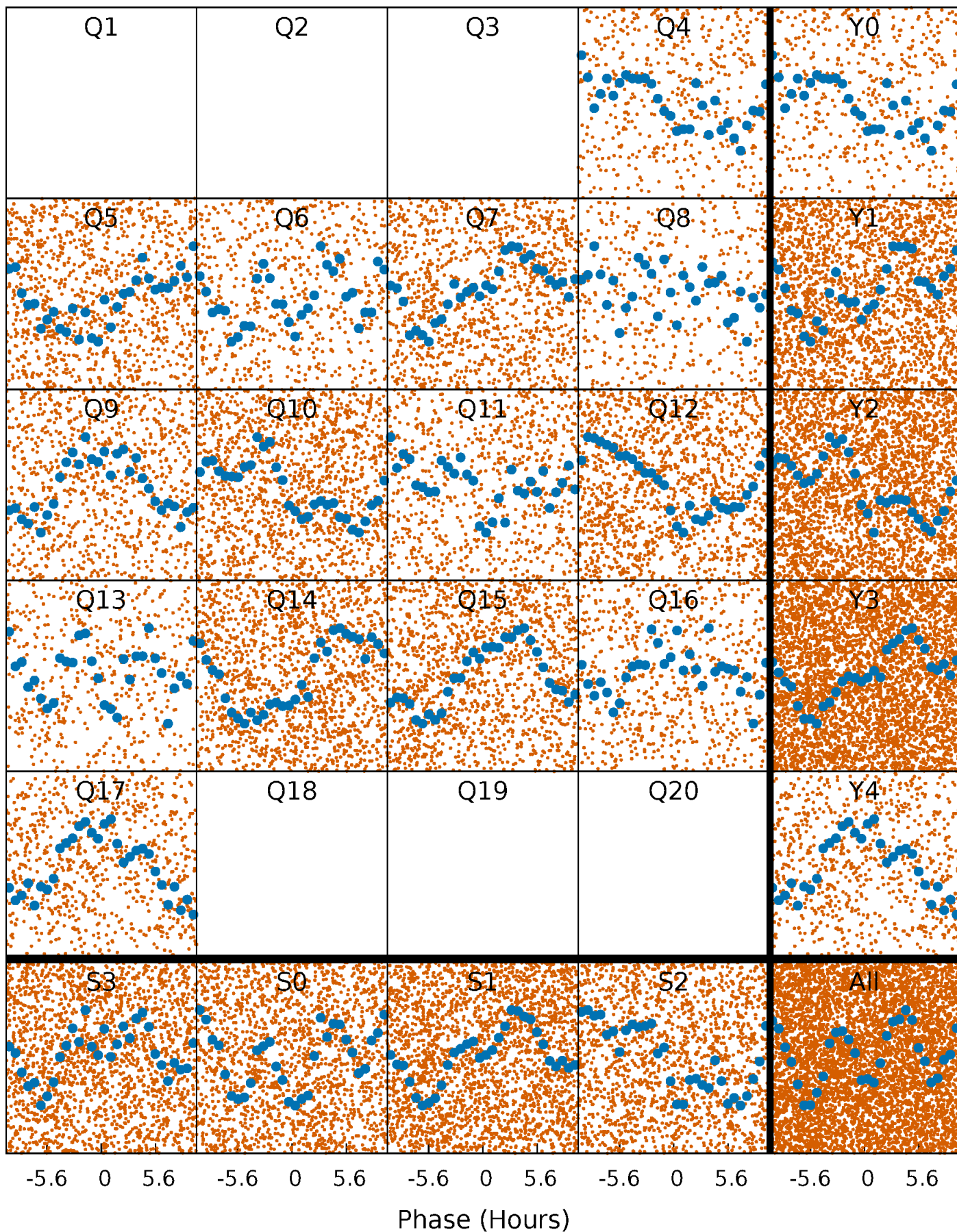


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

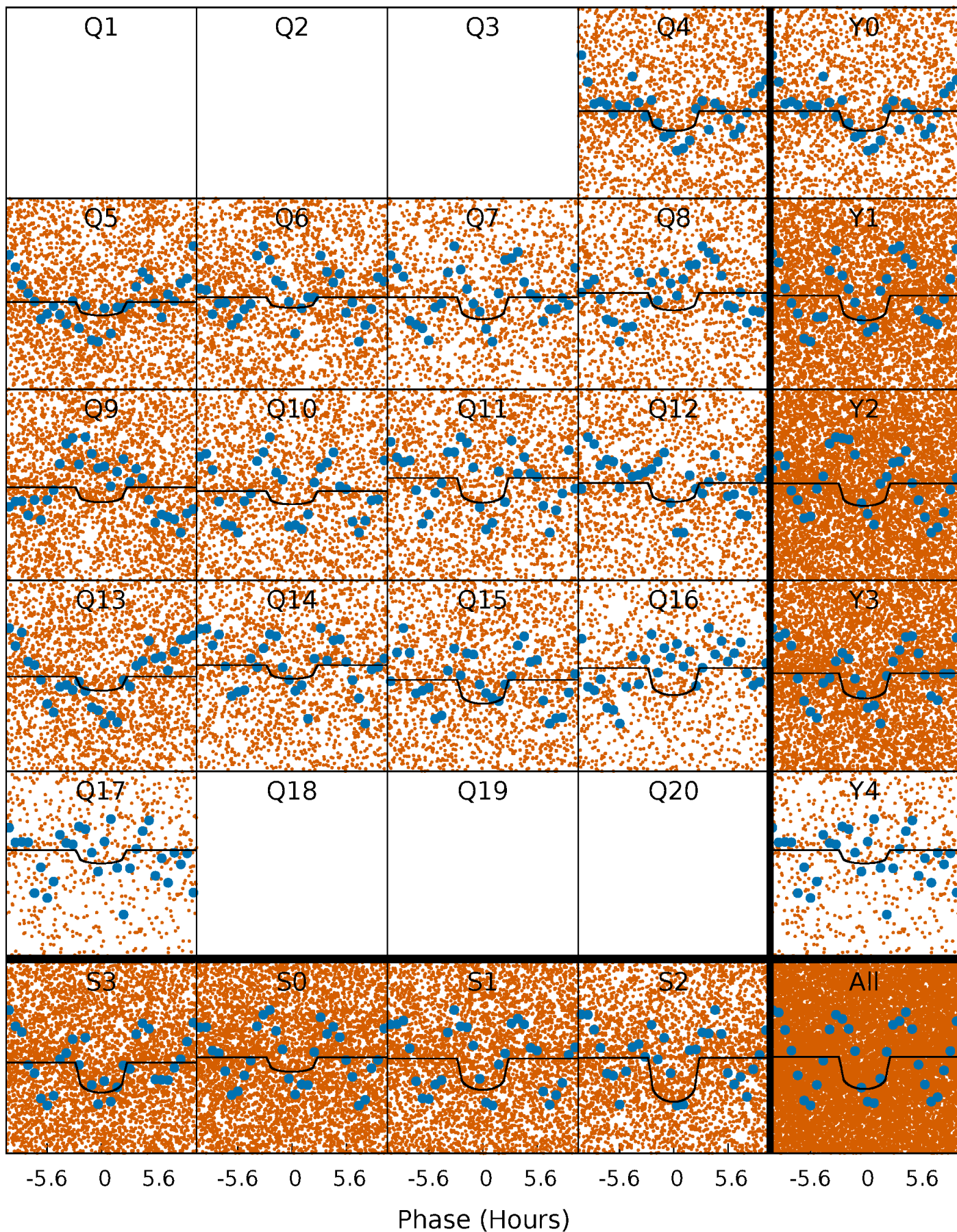
TCE 009350690-01 P= 0.811326 Days  $T_0=131.944924$  (BKJD)





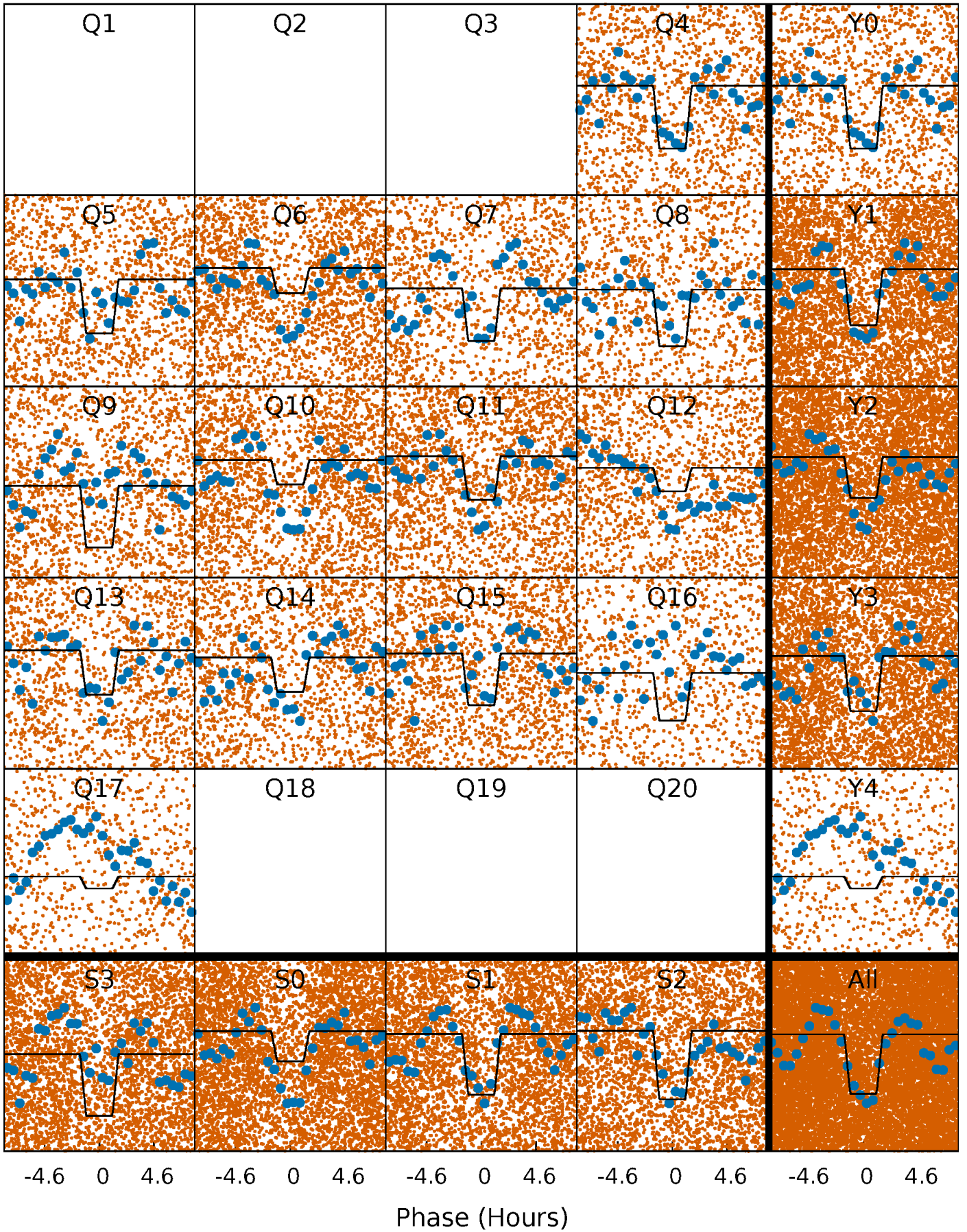
# DV Quarter-Phased Transit Curves

TCE 009350690-01   P= 0.811326 Days    $T_0=131.944924$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 009350690-01 P= 0.811355 Days  $T_0=131.941463$  (BKJD)

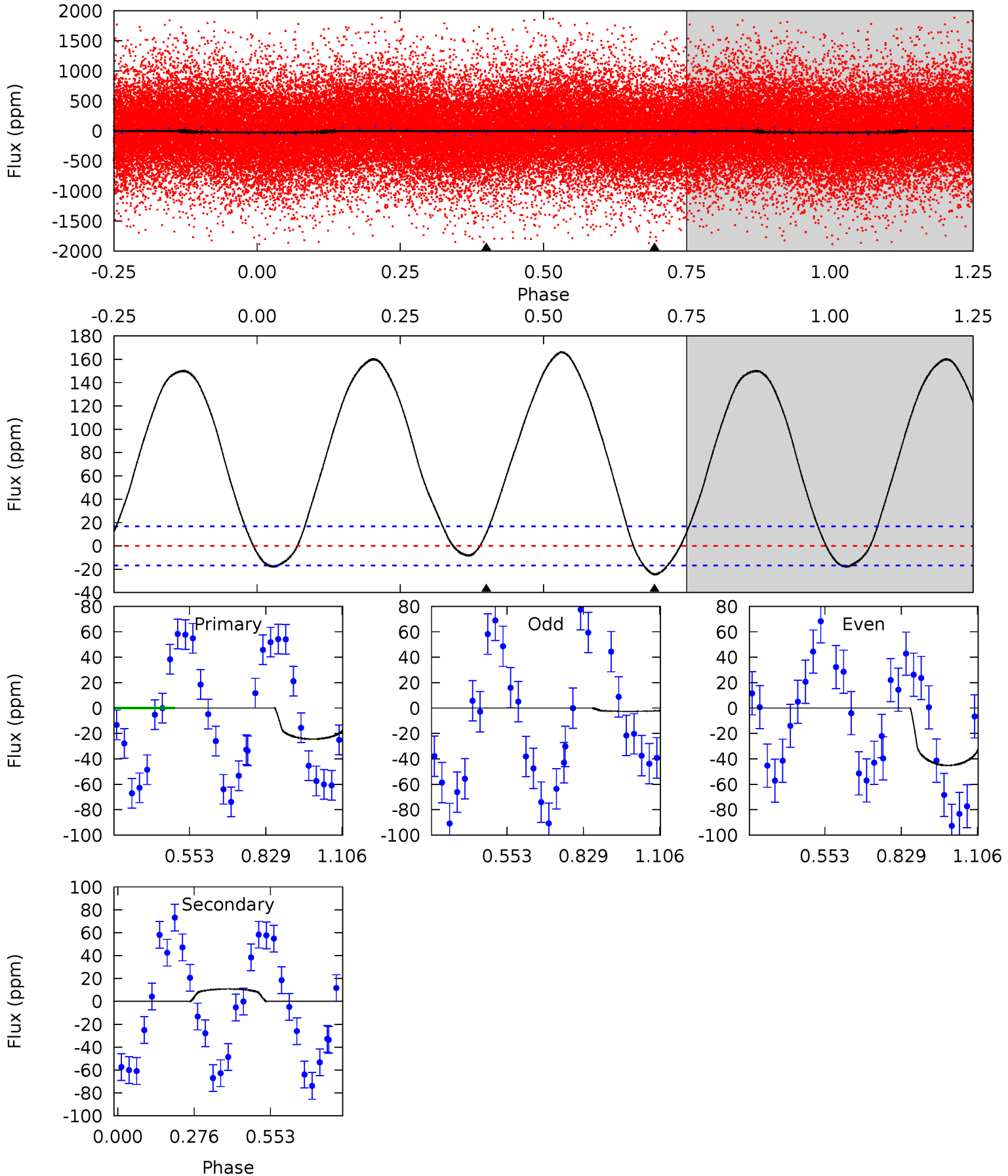




# DV Model-Shift Uniqueness Test

009350690-01, P = 0.811326 Days, E = 131.944924 Days

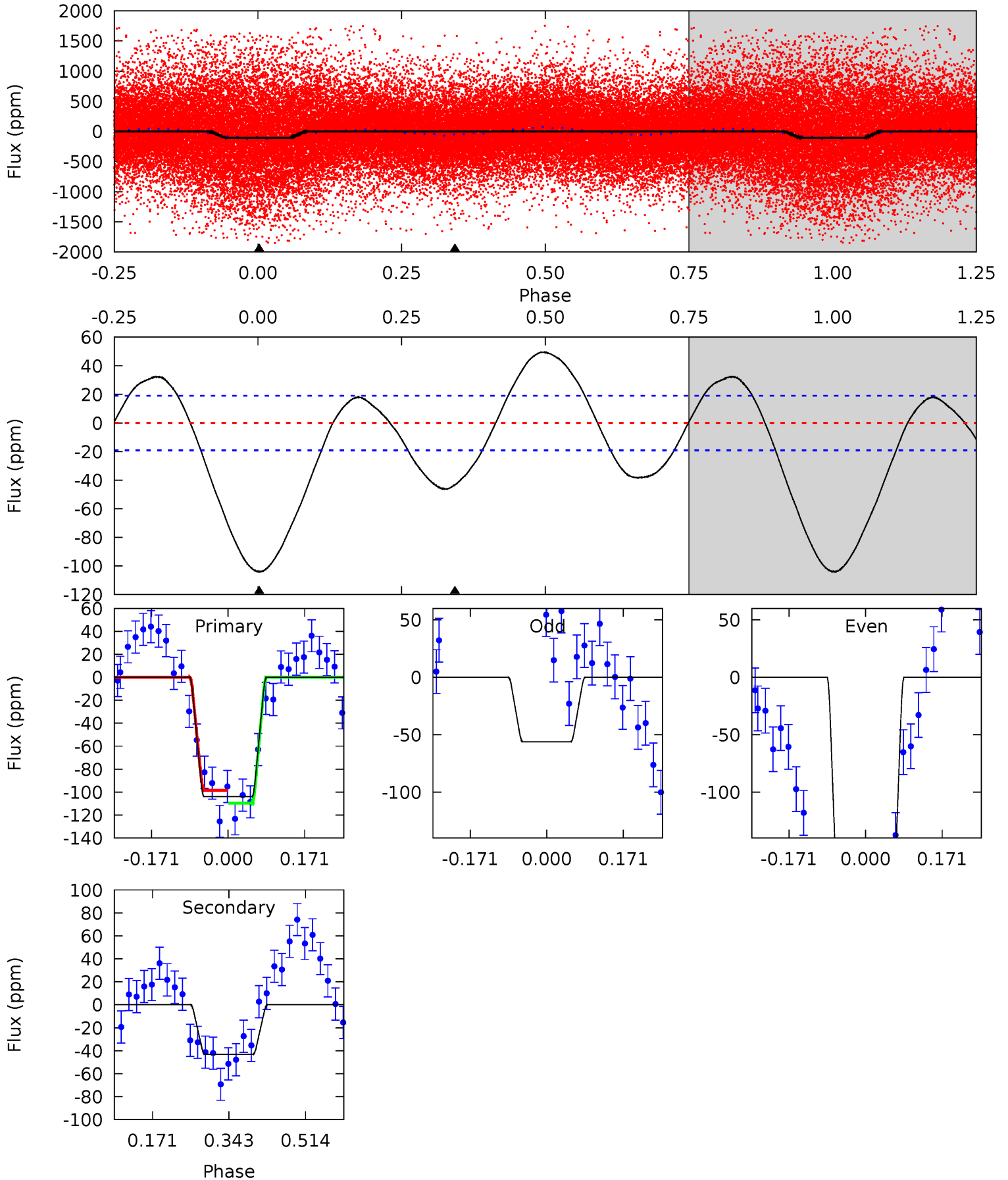
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.32	-2.81	0	0	4.35	1.09	7.16	6.32	6.32	-2.81	-2.81	5.48	1.09	0.87	6.19



# Alt Model-Shift Uniqueness Test

009350690-01, P = 0.811355 Days, E = 131.941463 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
24.2	10.1	0	0	4.45	1.37	6.58	24.2	24.2	10.1	10.1	23.0	1.08	0.32	1.29





### Stellar Parameters For KIC 009350690

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6363^{+177}_{-243}$	$4.386^{+0.052}_{-0.208}$	$0.210^{+0.150}_{-0.350}$	$1.198^{+0.401}_{-0.125}$	$1.273^{+0.163}_{-0.182}$	$1.044^{+0.303}_{-0.560}$
	+3%/-4%	+1%/-5%	+71%/-167%	+33%/-10%	+13%/-14%	+29%/-54%
Source	KIC0	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 009350690-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$11 \pm 4$	$0.96^{+0.74}_{-0.56}$	$3239^{+248}_{-167}$	$-4571^{+685}_{-2249}$	$-1.910^{+1.362}_{-9.802}$
Alt.	$-43 \pm 4$	$1.45^{+0.74}_{-0.65}$	$3222^{+244}_{-163}$	$5008^{+1649}_{-844}$	$3.715^{+8.305}_{-2.084}$

$T_{max}$  = 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  $A_{obs} \gg 1.0$

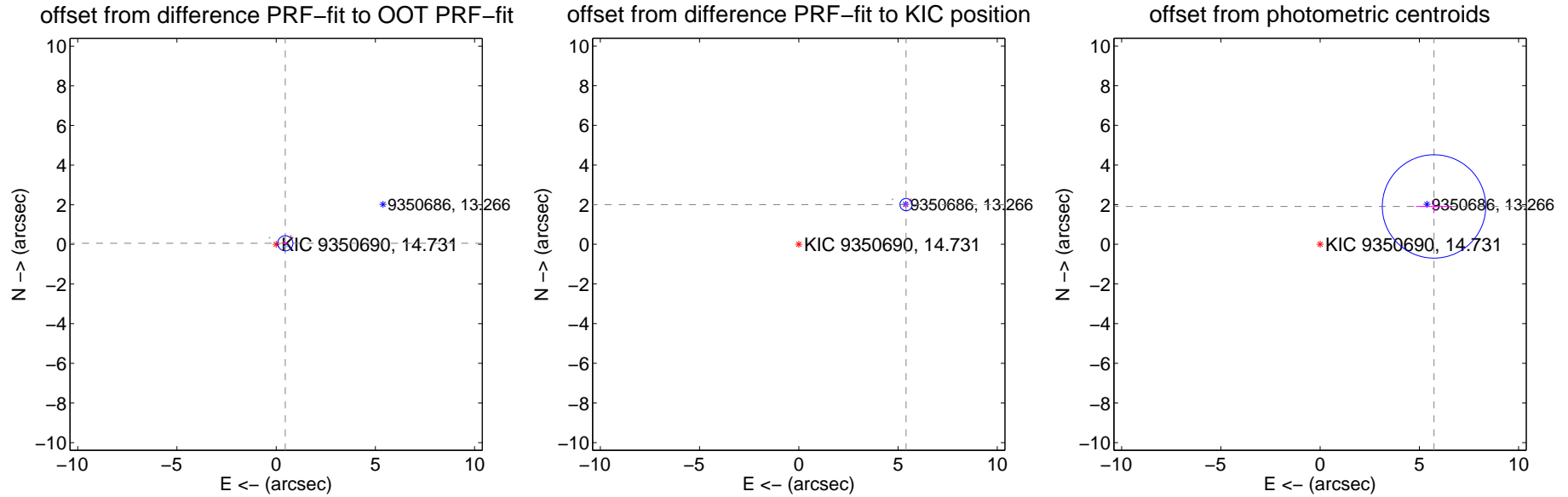
## DV Centroid Data

Supplemental centroid analysis for 009350690-01. Kepler magnitude: 14.73. Transit SNR 6.59

There are 4 quarters with good PRF difference image offsets

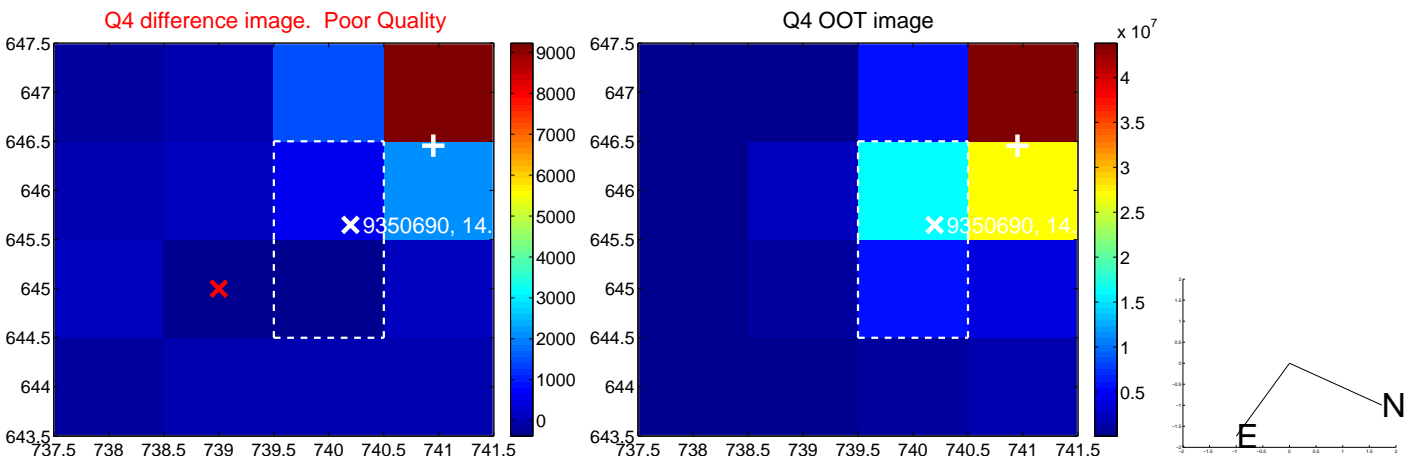
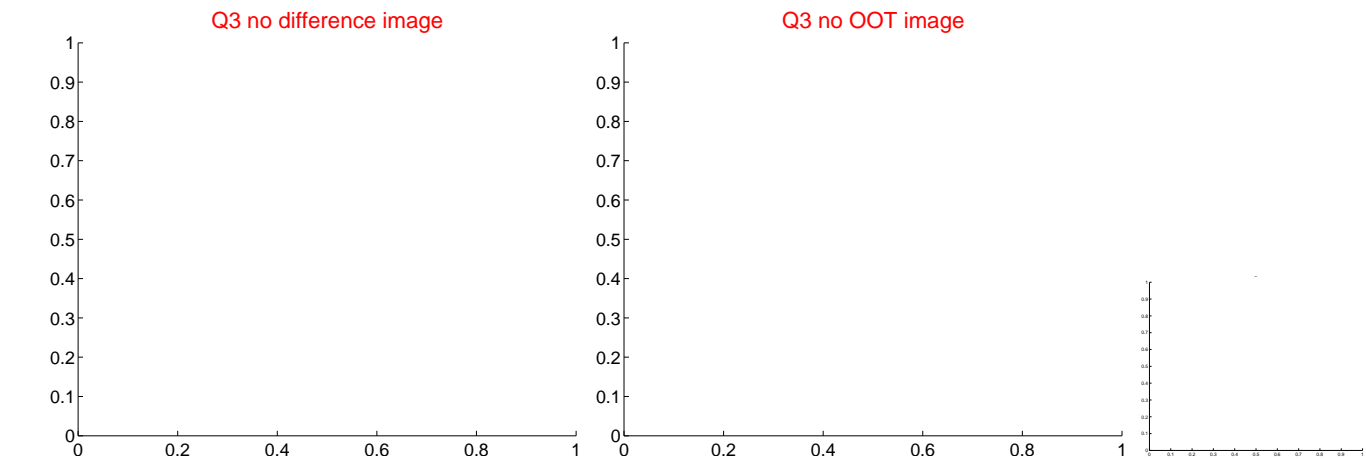
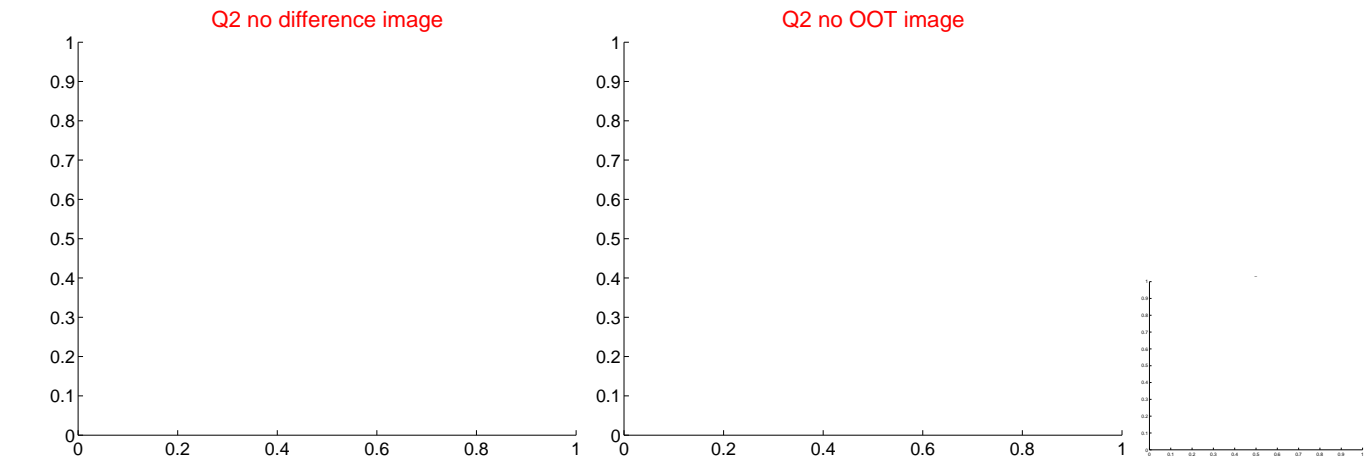
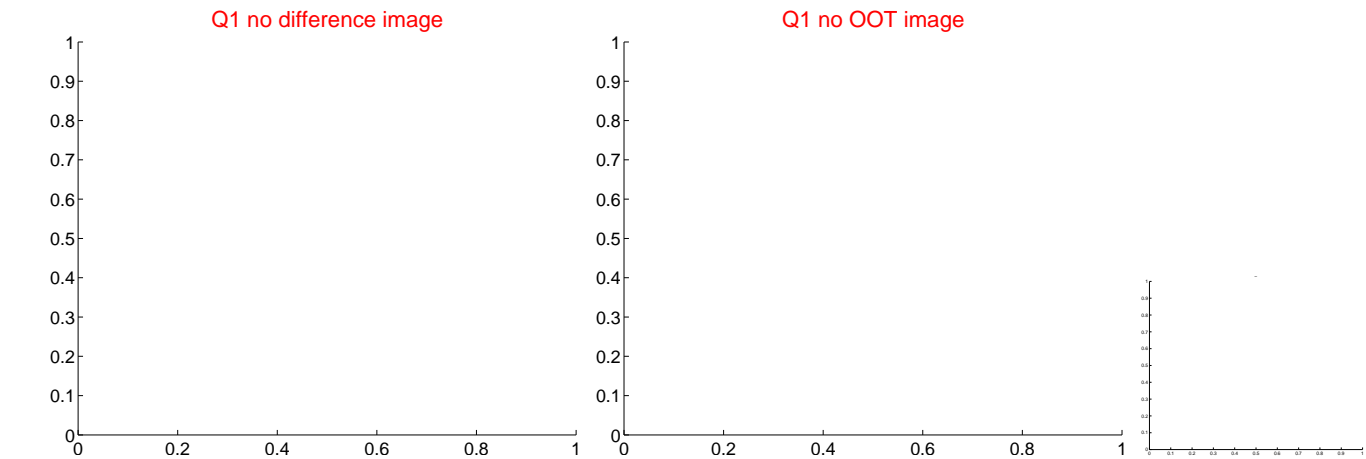
The OOT PRF centroid is offset from the target star catalog position by about 5.38 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.464 \pm 0.127$	3.65	$-0.461 \pm 0.132$	$0.057 \pm 0.101$
PRF-fit source offset from KIC position	$5.764 \pm 0.103$	56.17	$-5.405 \pm 0.111$	$2.003 \pm 0.077$
photometric centroid source offset	$6.05 \pm 0.87$	6.96	$-5.74 \pm 0.91$	$1.91 \pm 0.34$

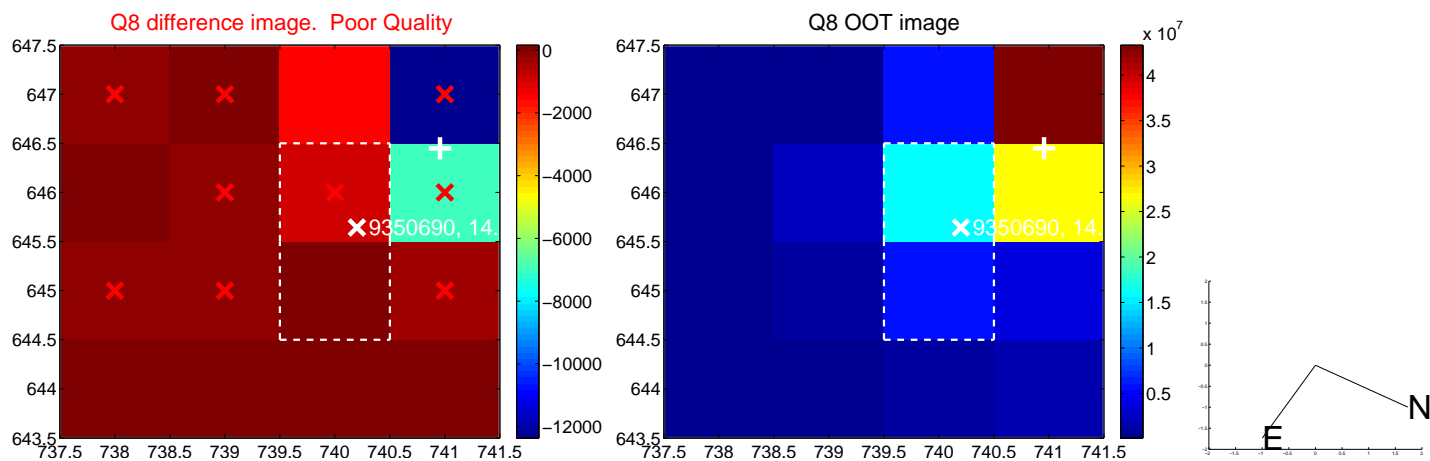
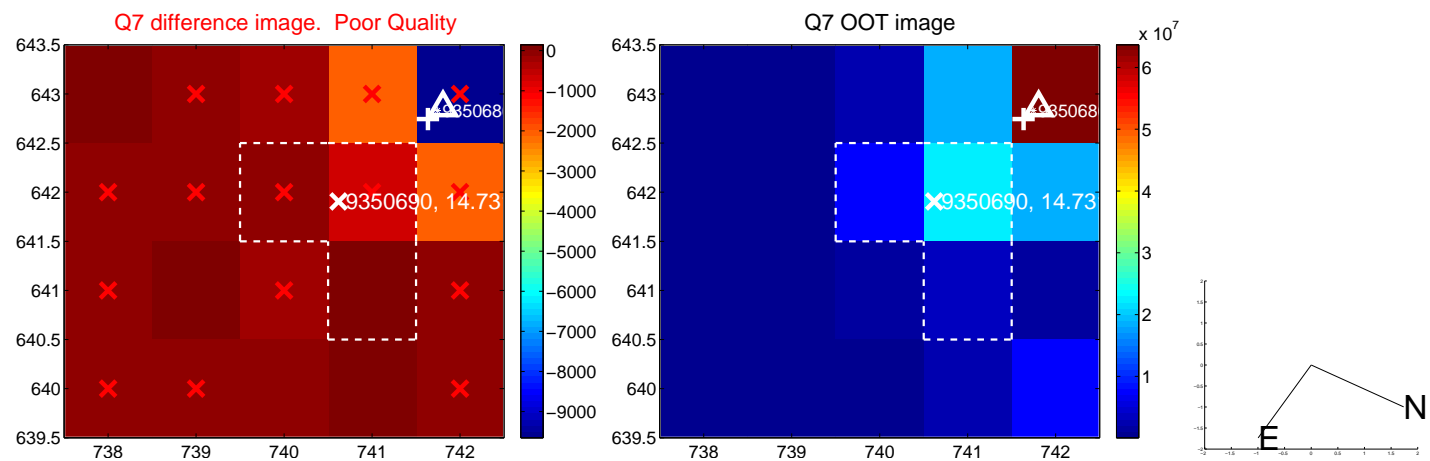
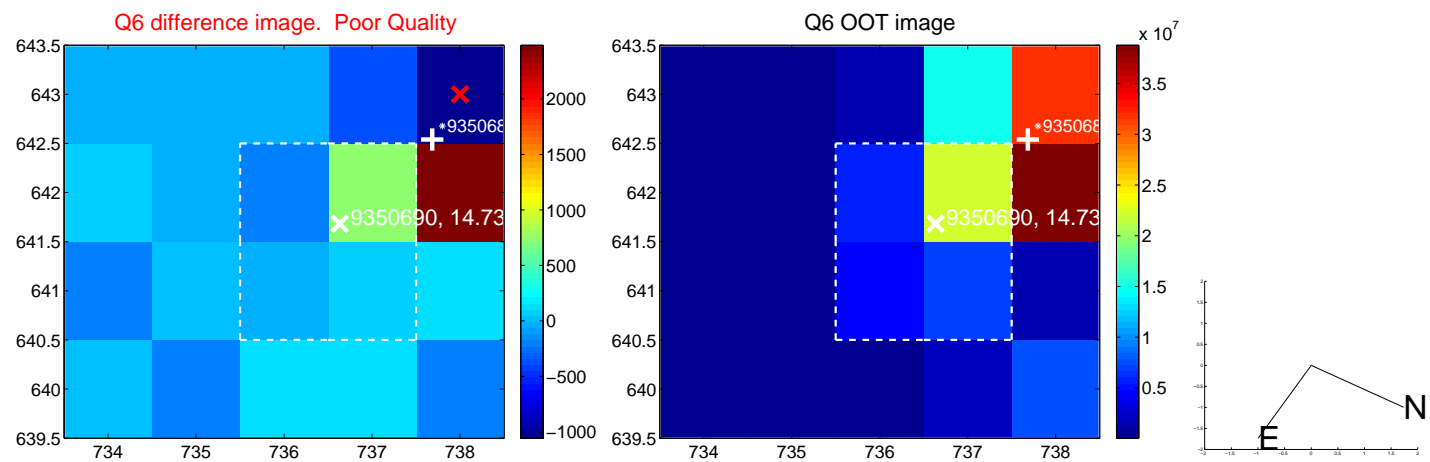
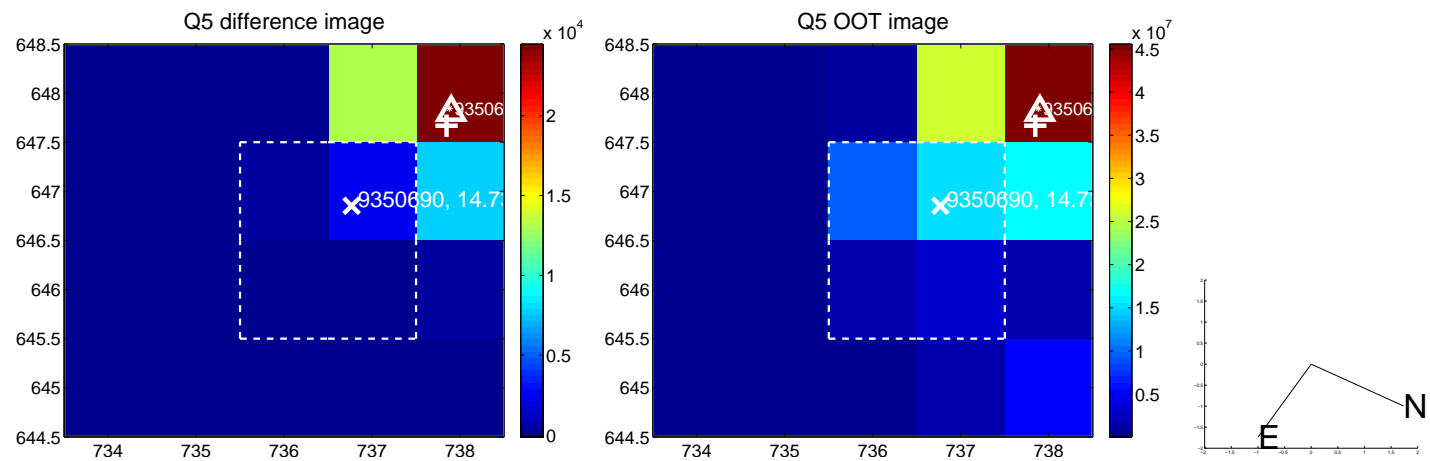


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

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

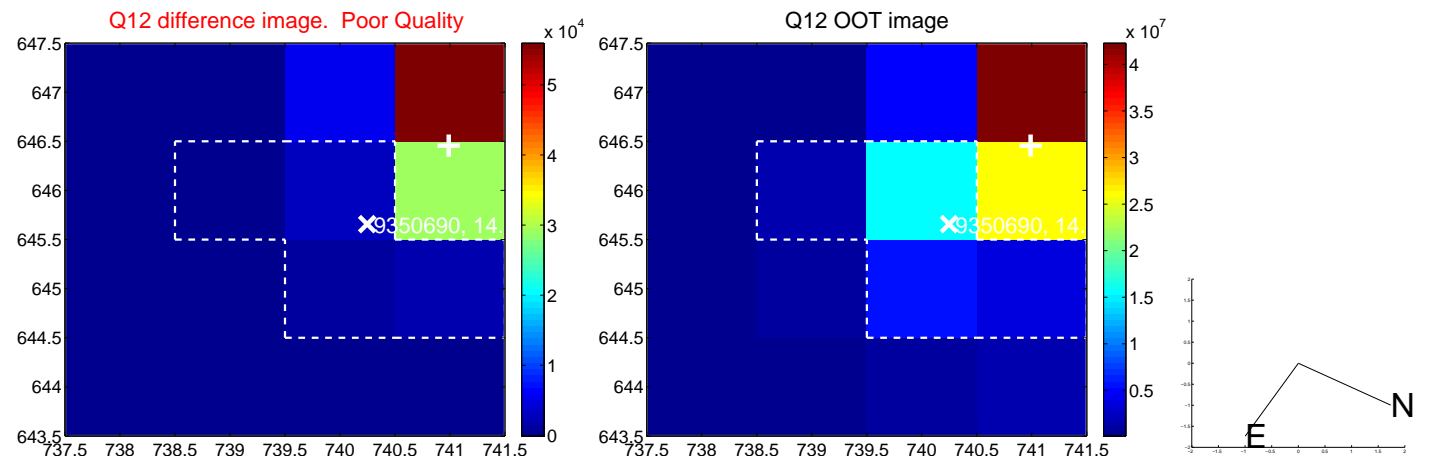
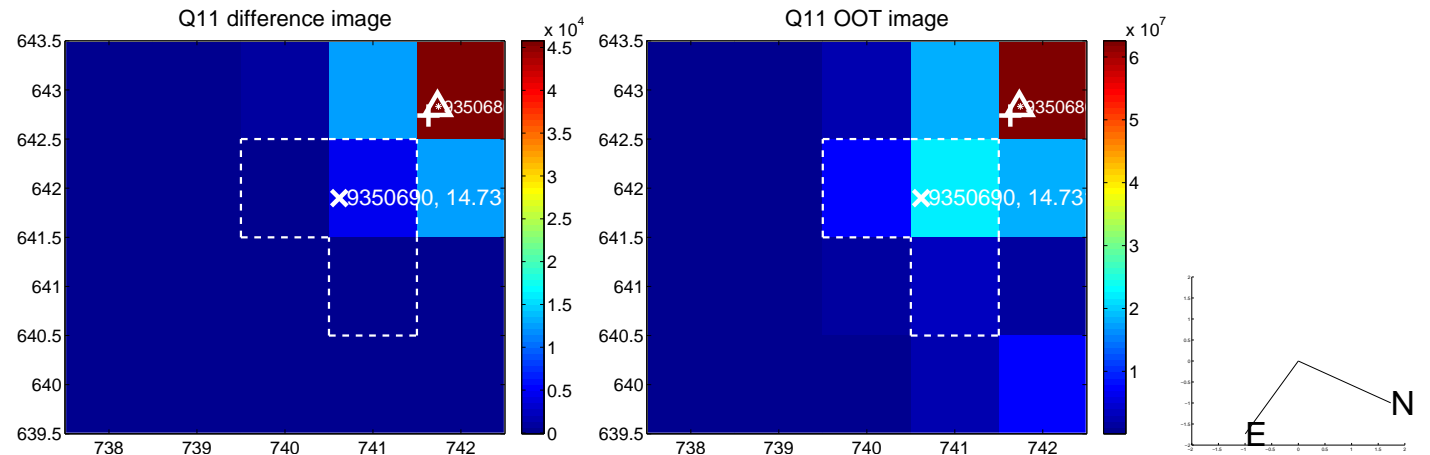
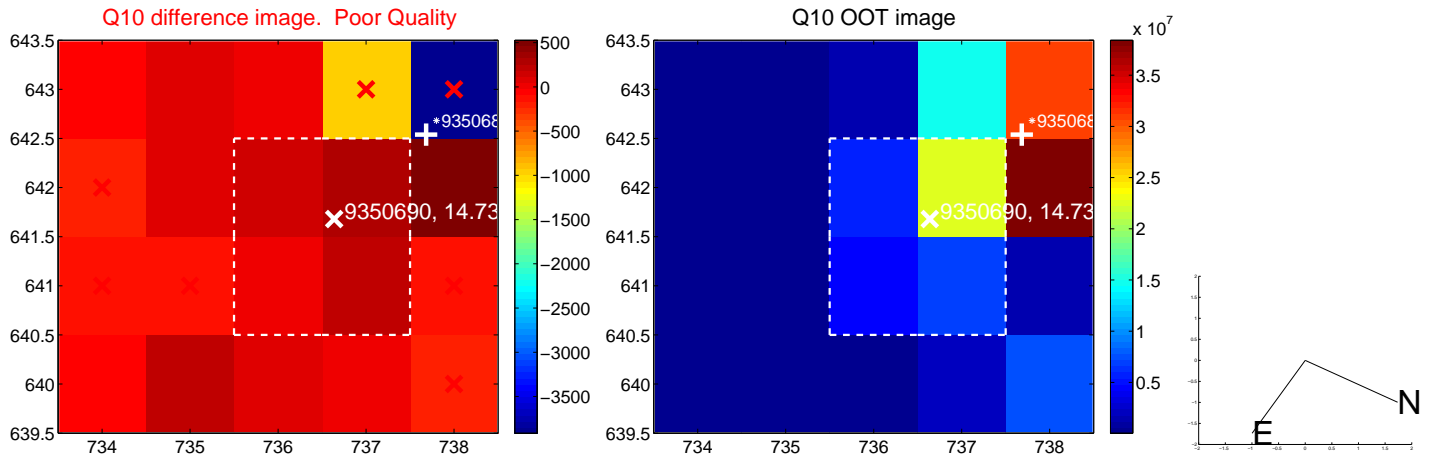
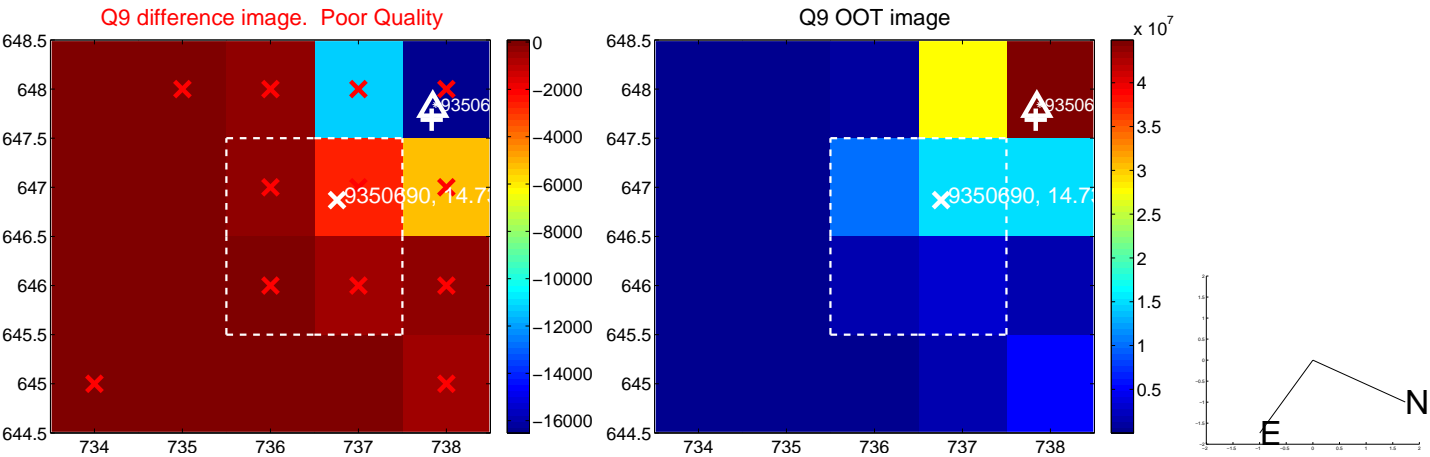


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

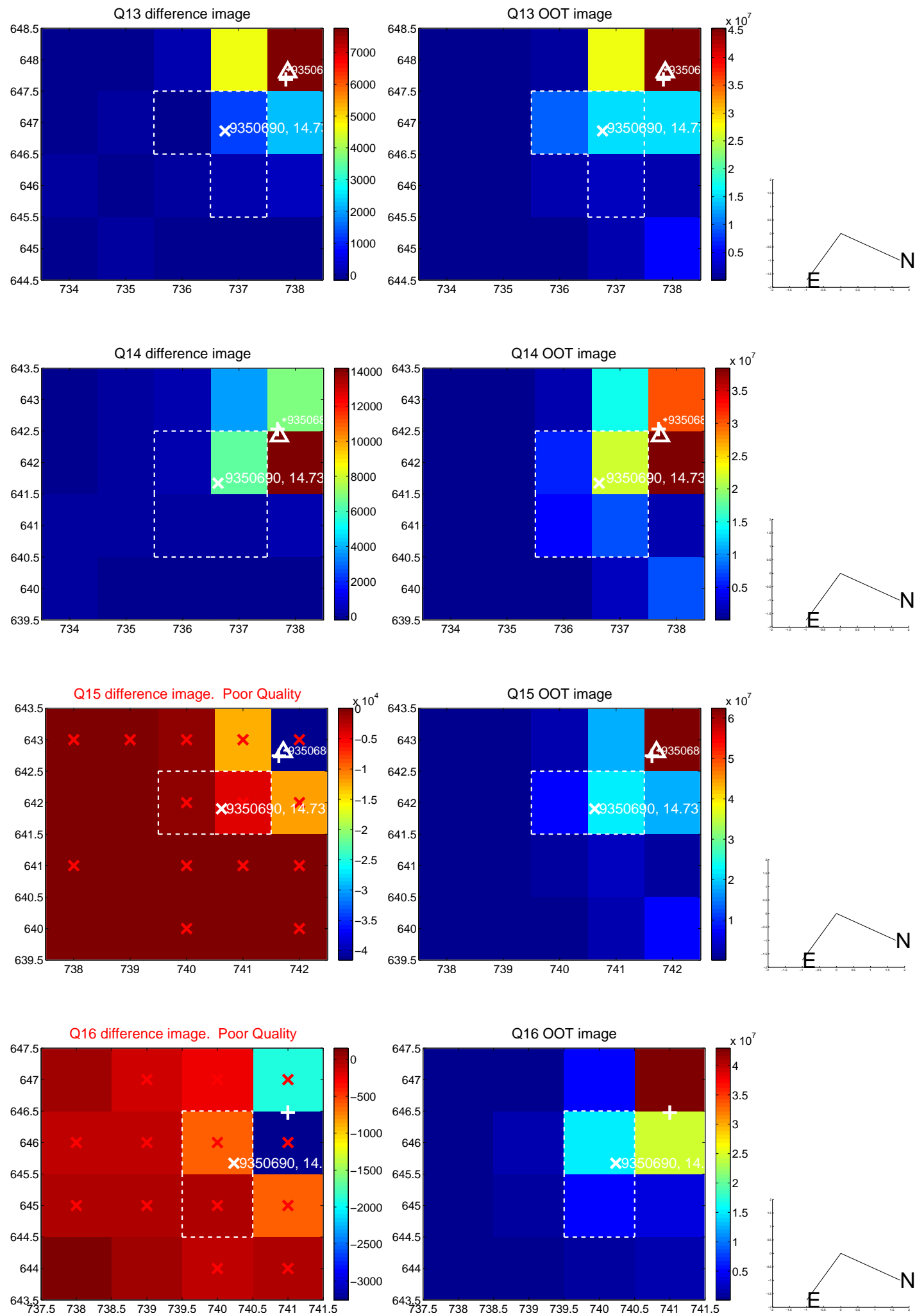




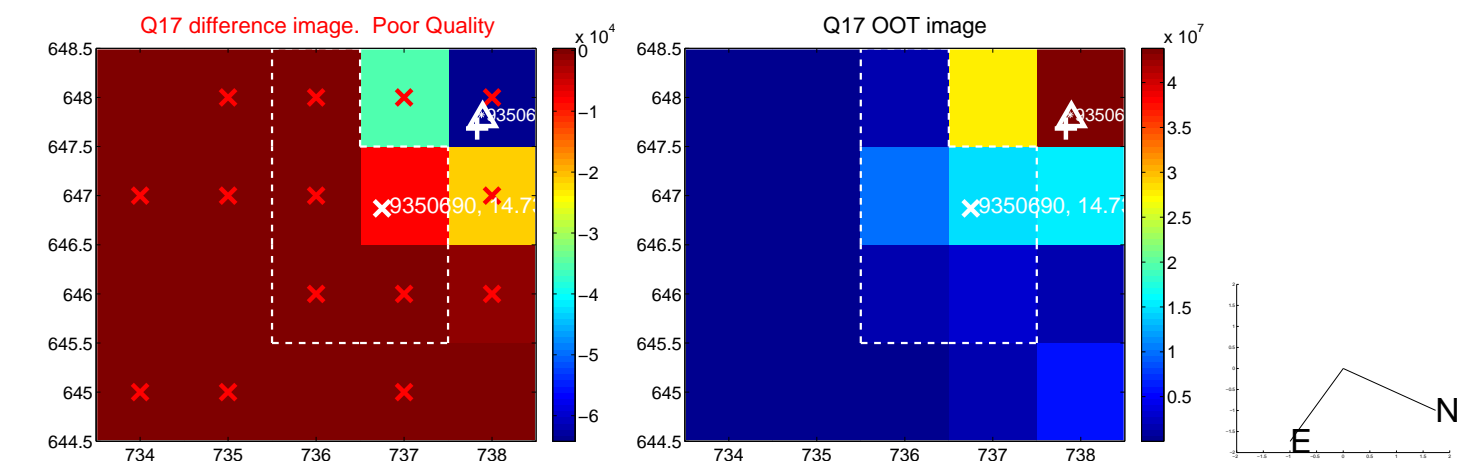
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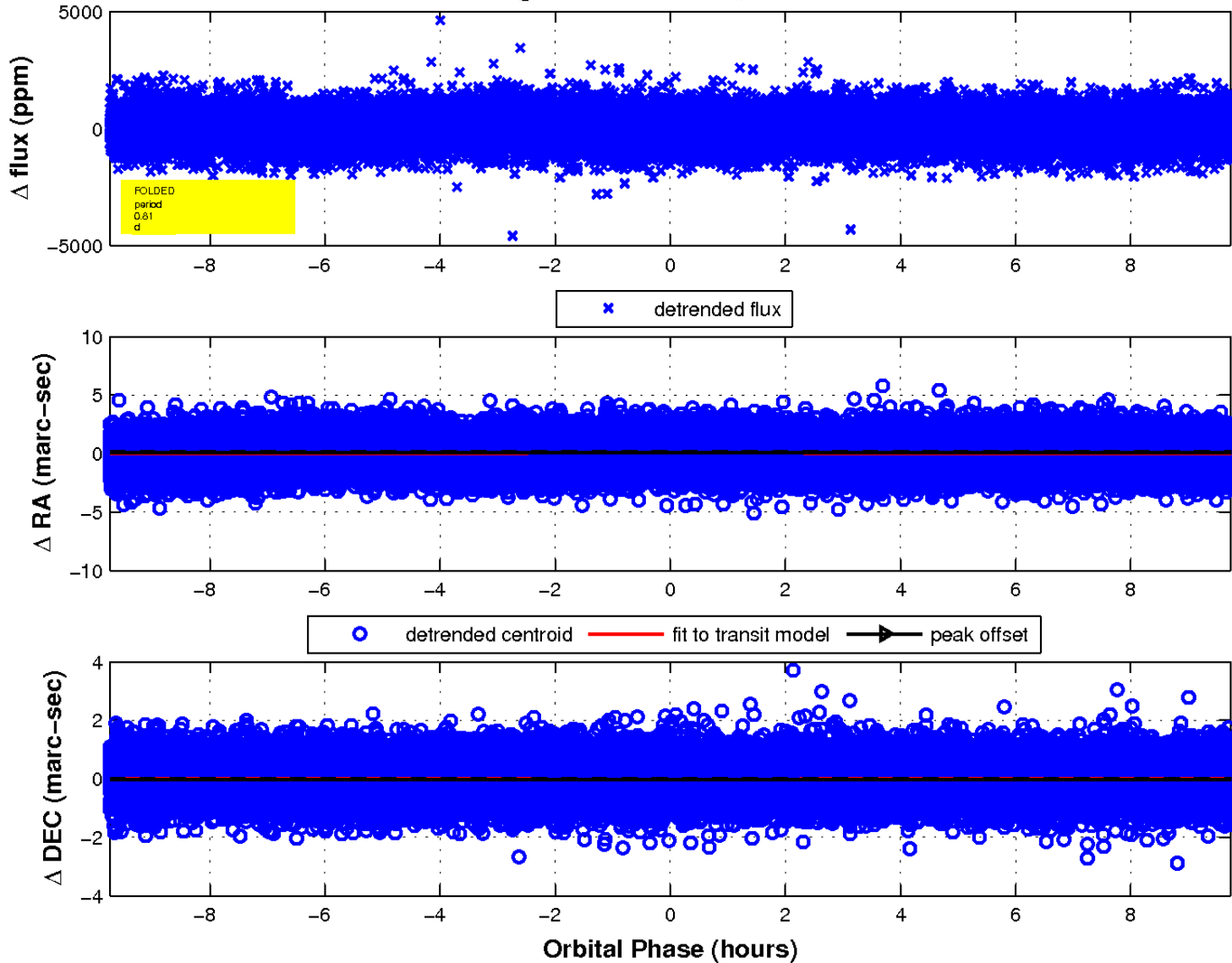
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

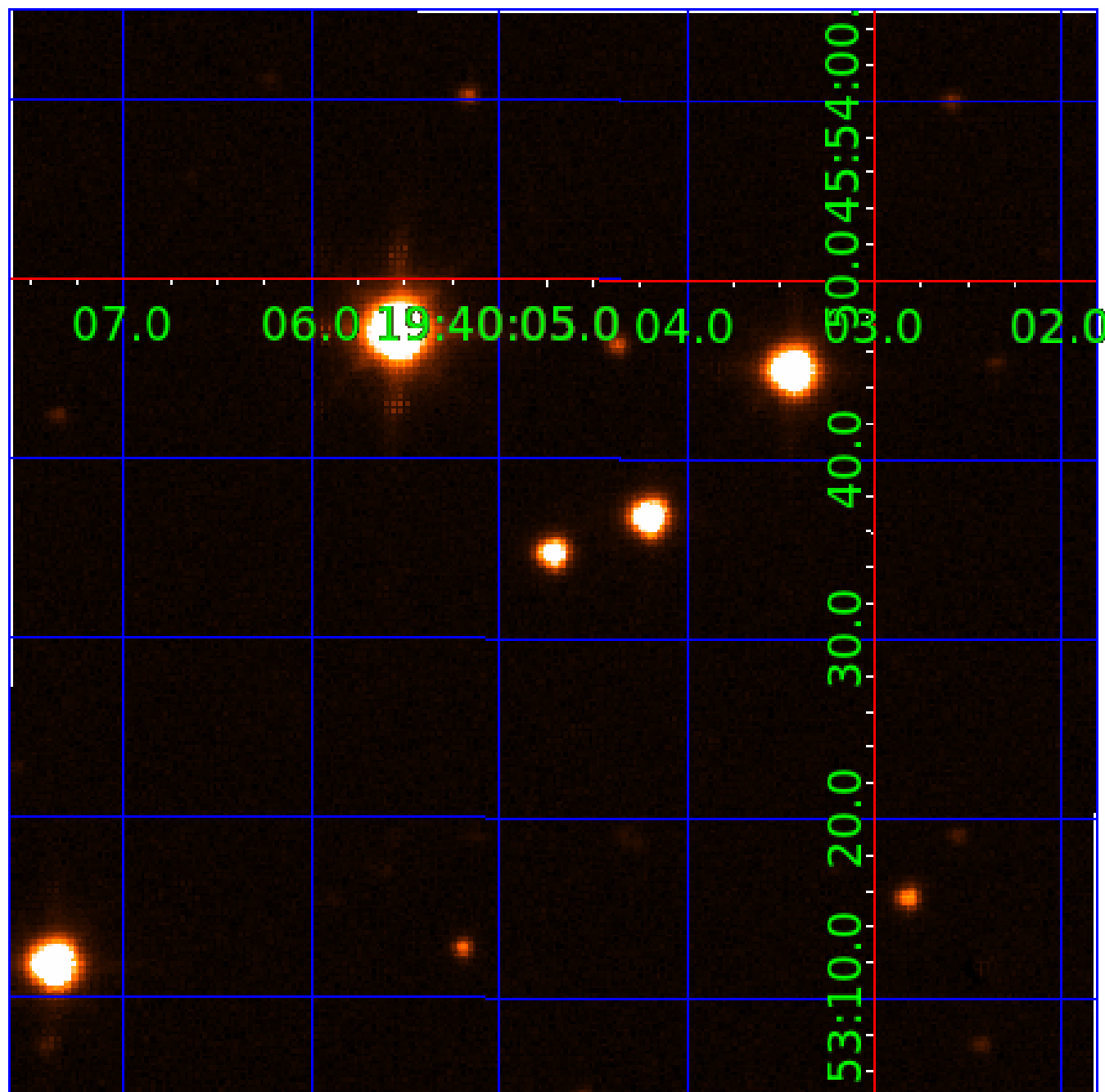


fluxWeightedCentroids, Planet 1 of 4



UKIRT Image

Declination





# KIC 009350690

## Q1-17 DR25 TCE Parameters

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009350690-02	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_RESOLVED_OFFSET
009350690-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—CENT_FEW_DIFFS
009350690-04	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_RESOLVED_OFFSET

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

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

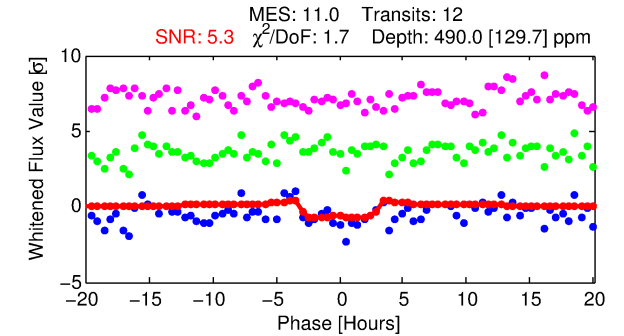
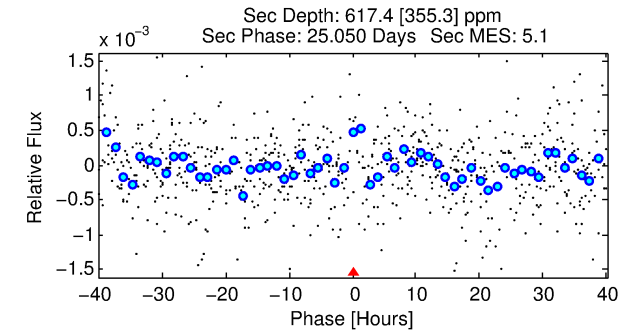
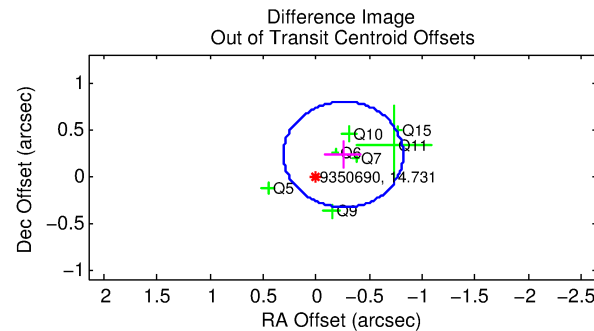
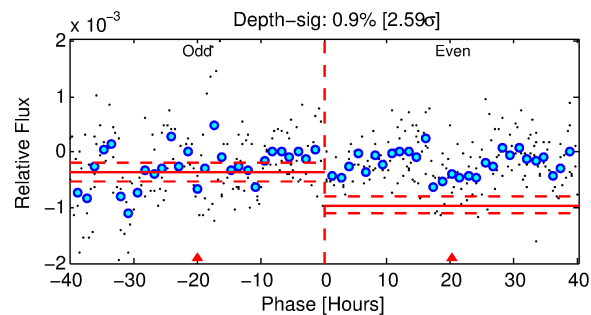
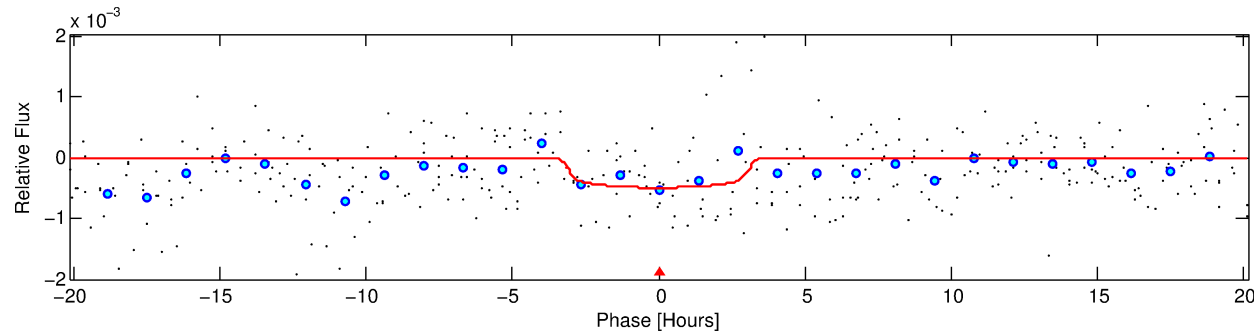
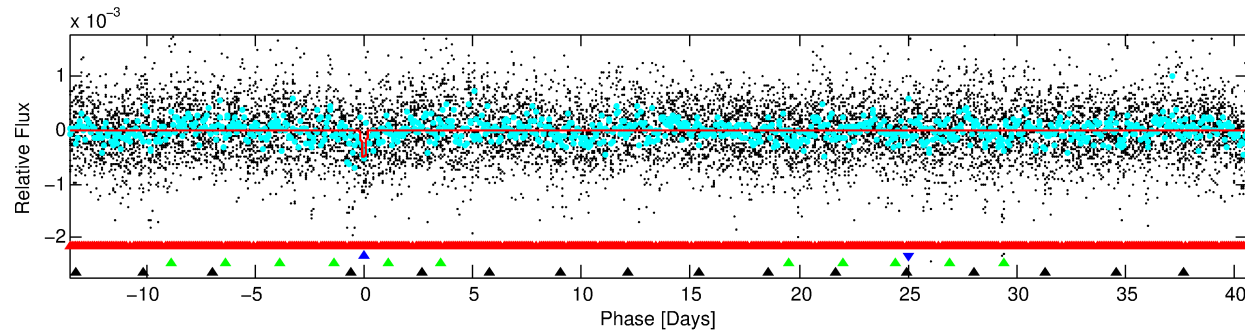
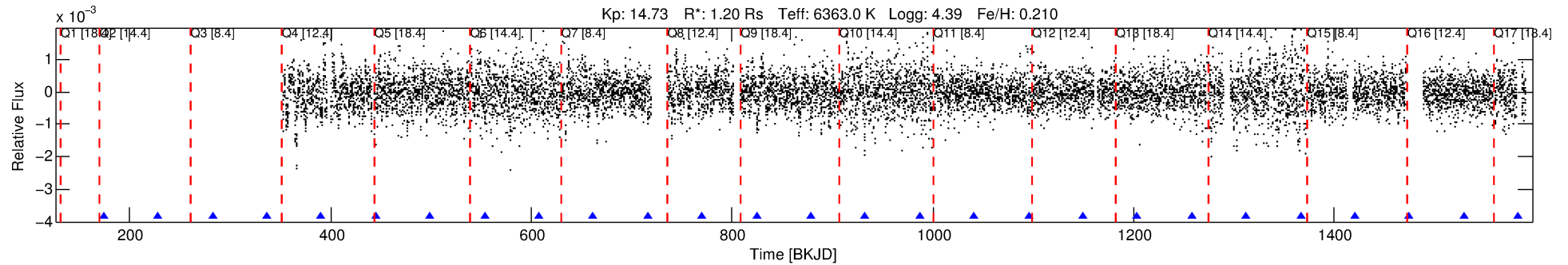
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009350690-02

No Significant Match Found

# DV One-Page Summary

KIC: 9350690 Candidate: 2 of 4 Period: 54.194 d



## DV Fit Results:

Period = 54.19353 [0.00223] d  
Epoch = 174.0506 [0.0354] BKJD  
Rp/R\* = 0.0229 [0.0090]  
a/R\* = 36.15 [66.17]  
b = 0.84 [0.65]  
Seff = 22.83 [9.55]  
Teq = 557 [58] K  
Rp = 2.99 [1.55] Re  
a = 0.3038 [0.0834] AU  
Ag = 3512.77 [3699.32] [0.95 $\sigma$ ]  
Teff = 6635 [1643] K [3.70 $\sigma$ ]

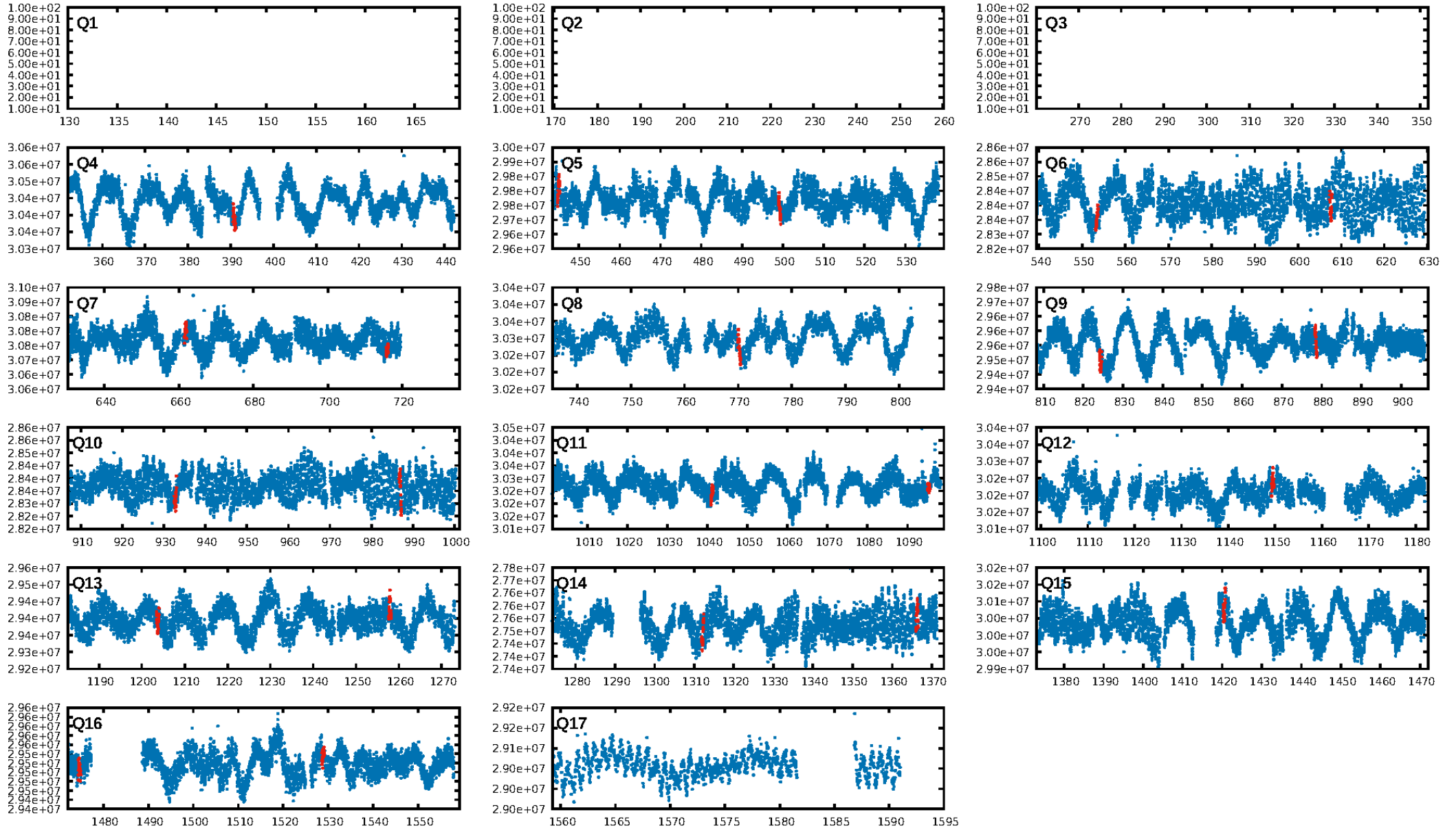
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [154.00 $\sigma$ ]  
LongPeriod-sig: 100.0% [76.46 $\sigma$ ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 1.82e-22  
RollingBand-fgt: 1.00 [12/12]  
GhostDiagnostic-chr: 0.8279  
Centroid-sig: 0.0%  
Centroid-so: 2.288 arcsec [3.19 $\sigma$ ]  
OotOffset-rm: 0.343 arcsec [1.83 $\sigma$ ]  
KicOffset-rm: 5.693 arcsec [32.56 $\sigma$ ]  
OotOffset-st: 2/3/0/2 [7]  
KicOffset-st: 2/3/0/2 [7]  
DiffImageQuality-fgm: 0.71 [5/7]  
DiffImageOverlap-fno: 0.00 [0/13]

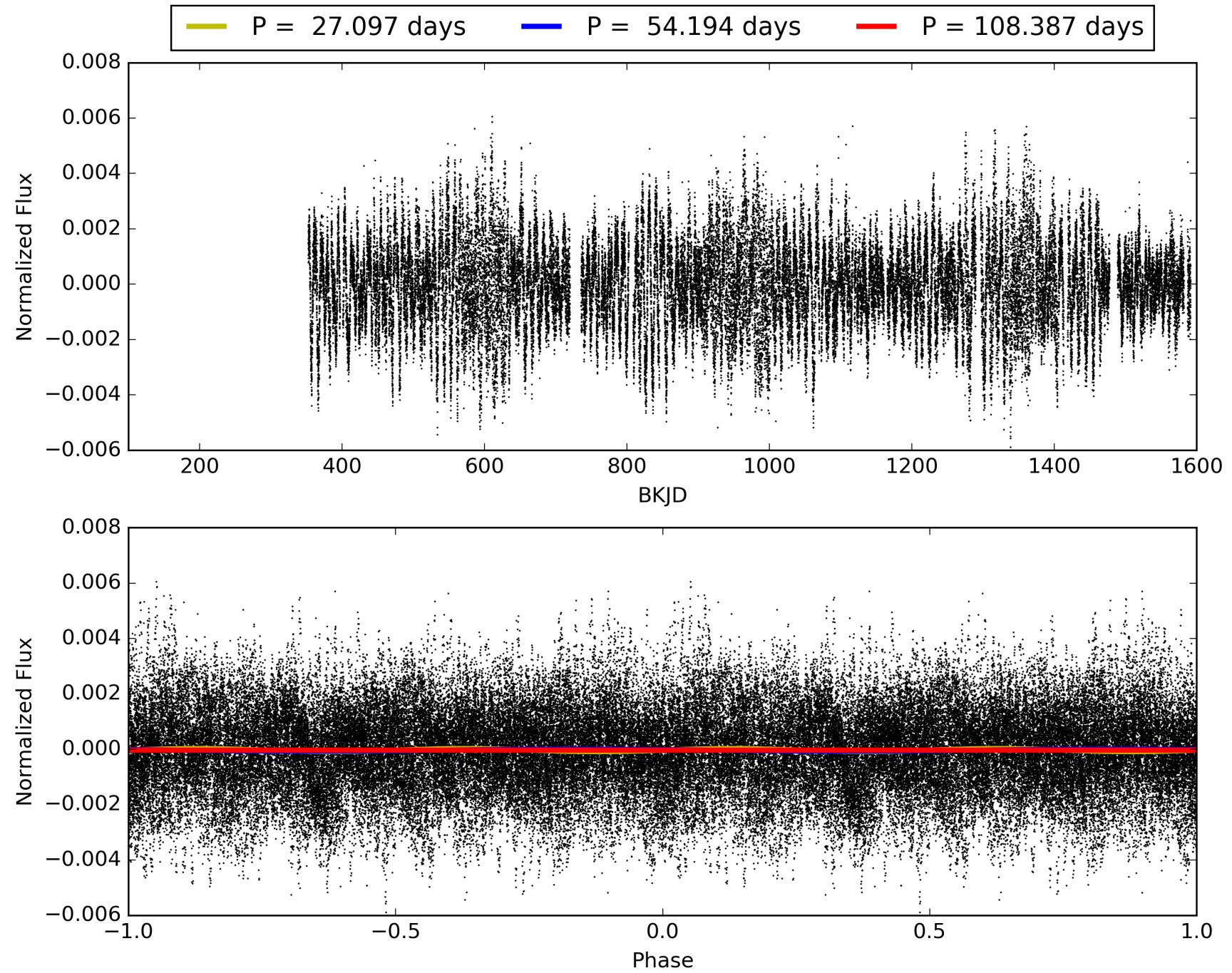
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 17:12:11 Z

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

# TCE 009350690-02, PDC Light Curves

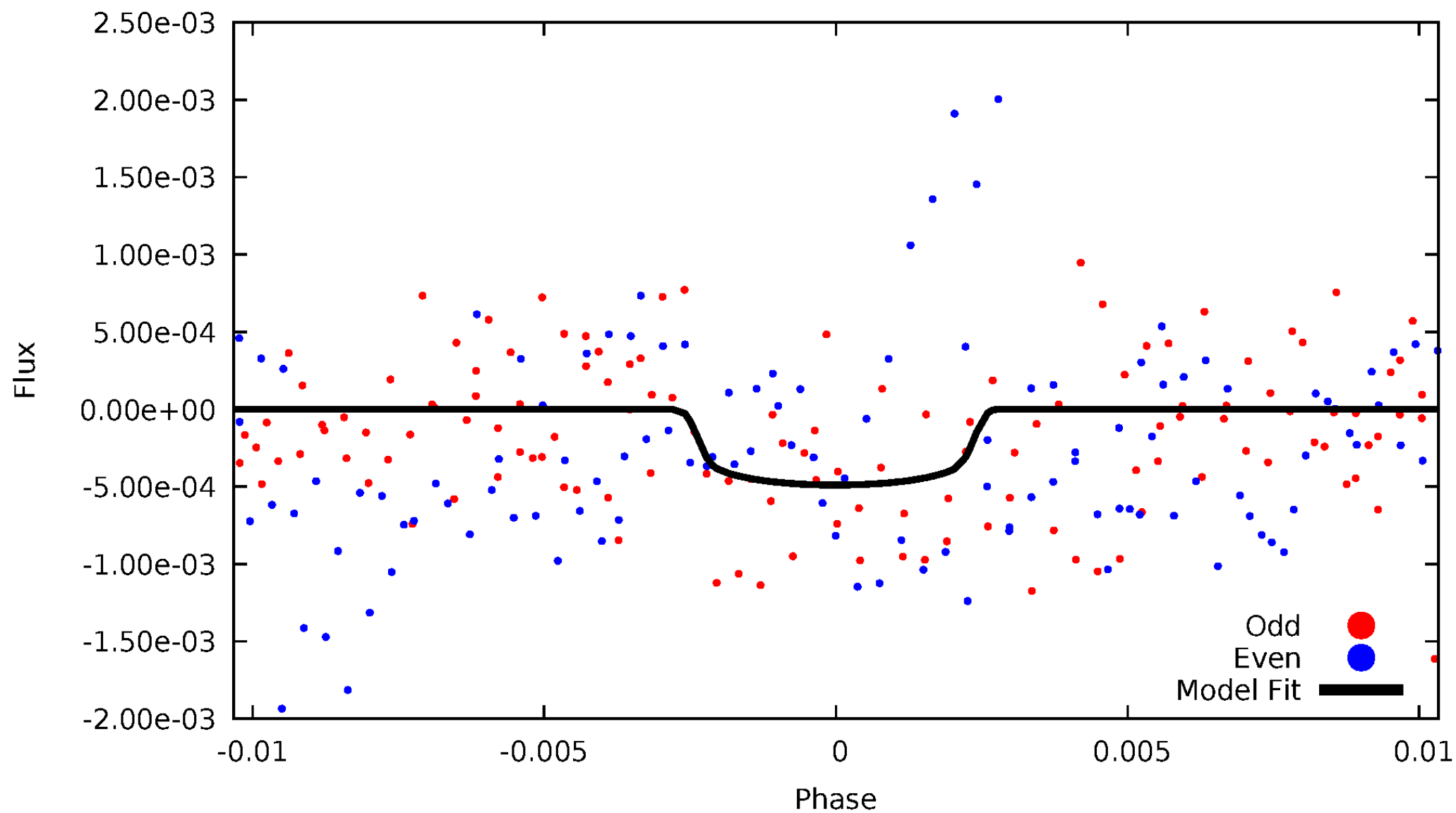


# TCE 009350690-02



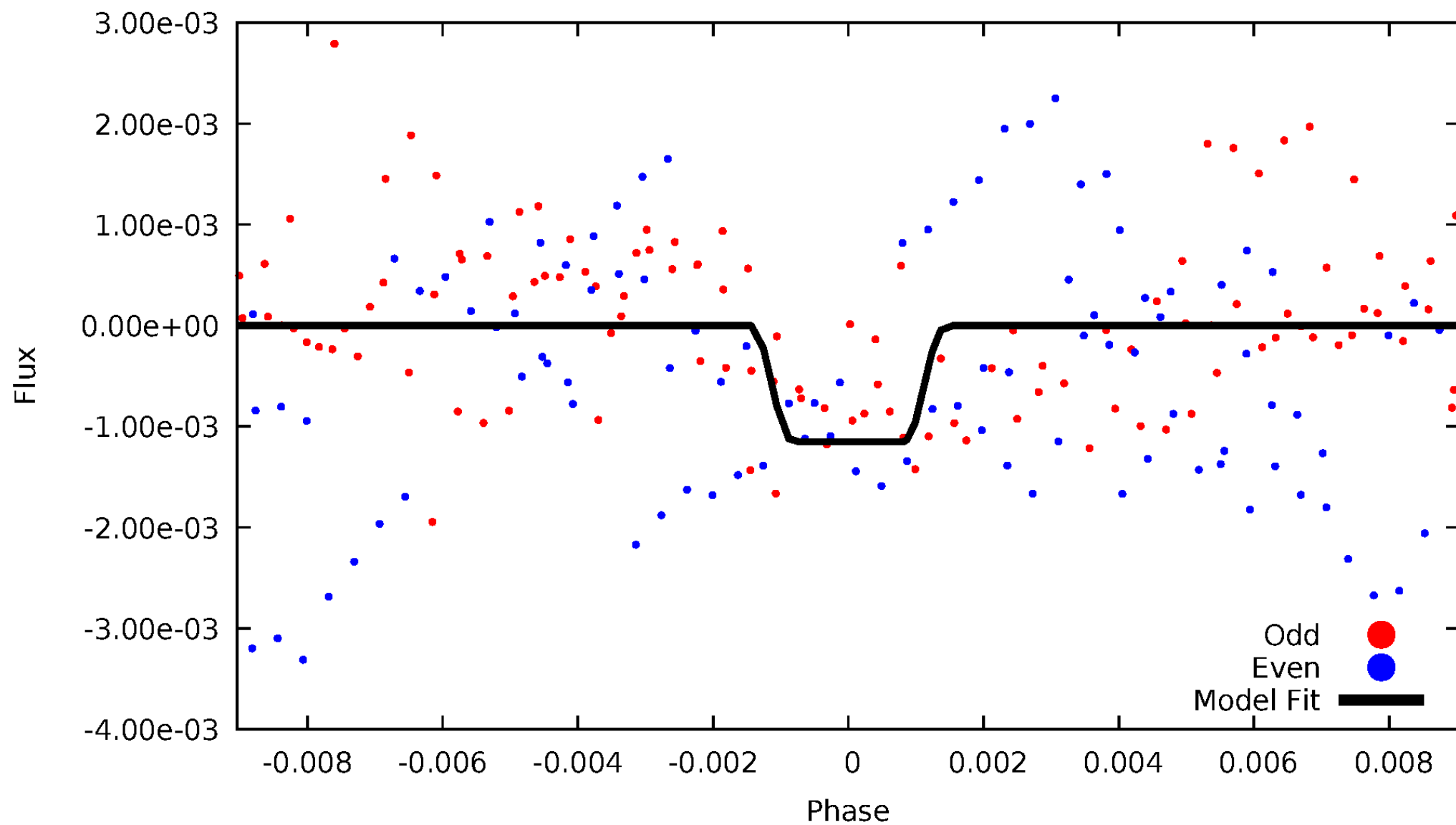
# DV Odd/Even

TCE 009350690-02



# ALT Odd/Even

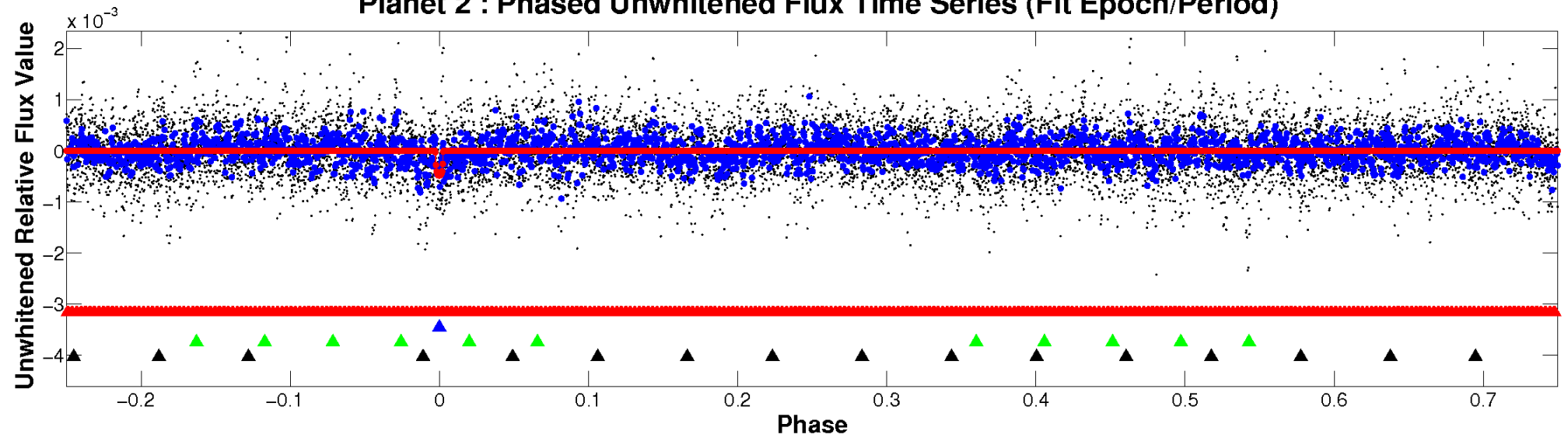
TCE 009350690-02



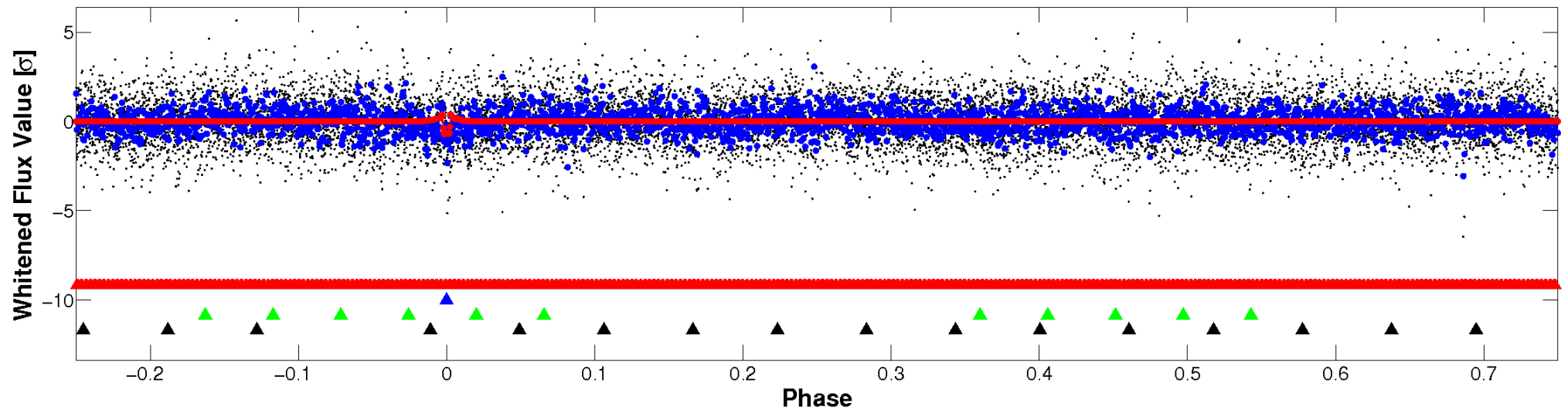


# Non-Whitened Vs. Whitened Light Curve

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

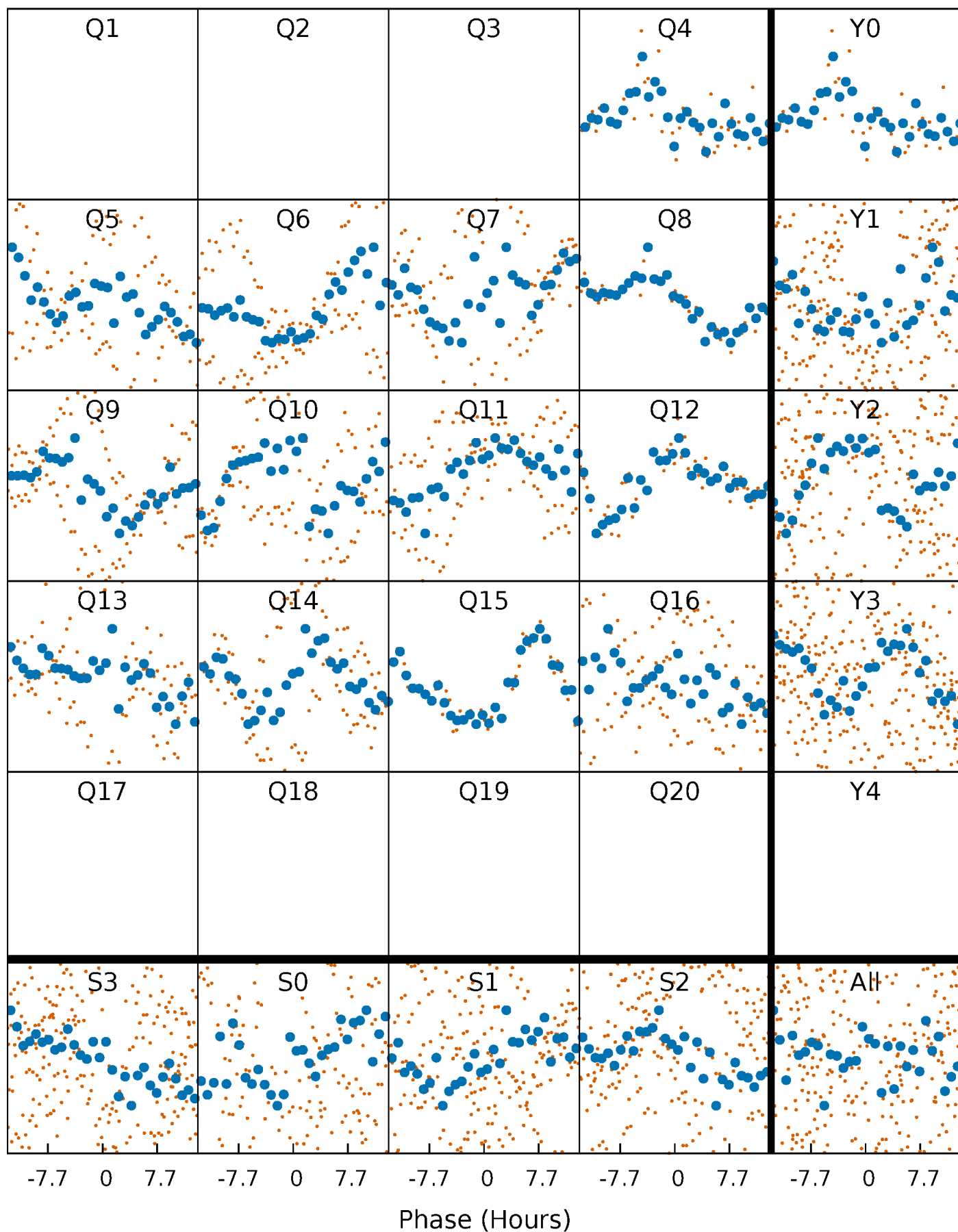


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



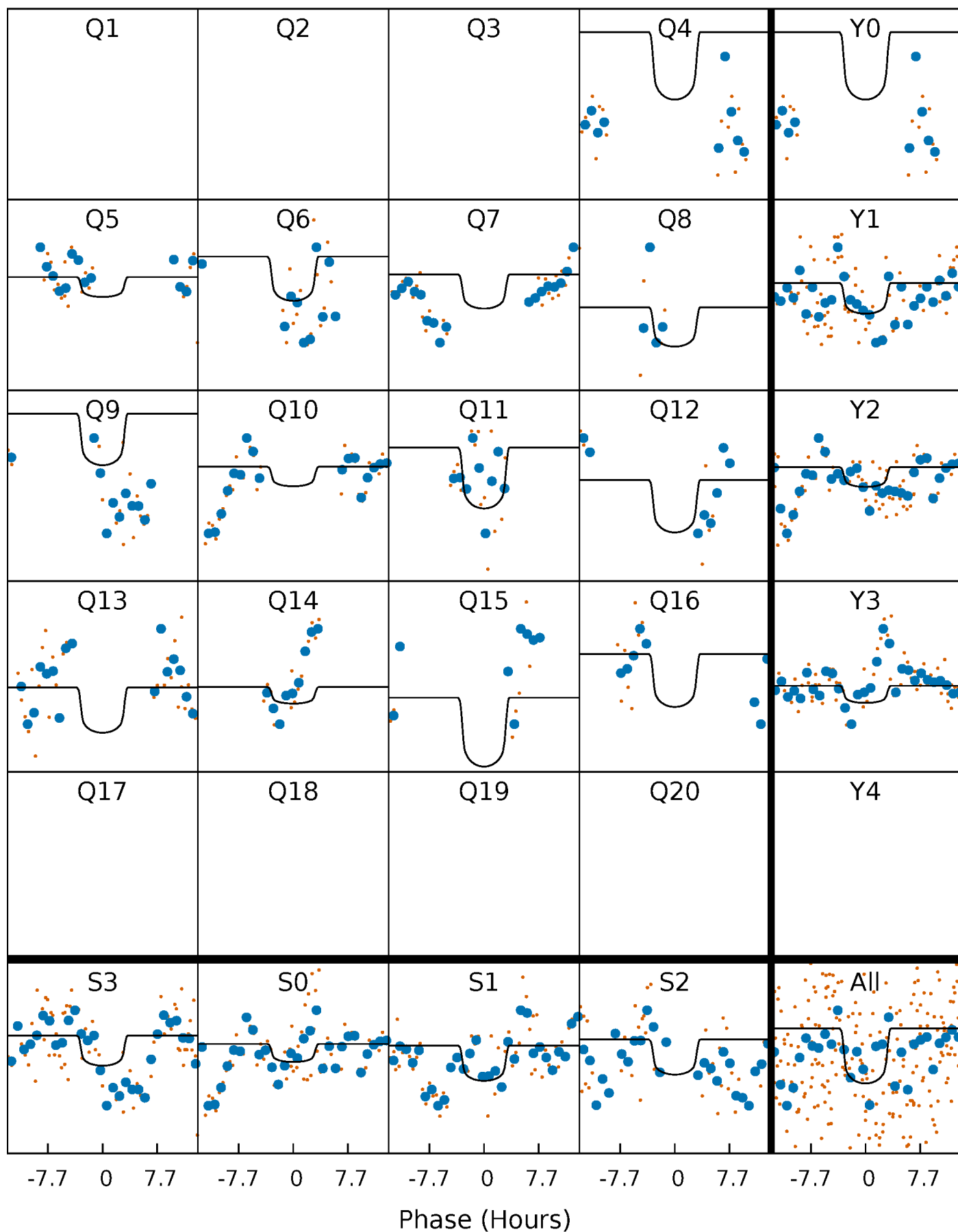
# PDC Quarter-Phased Transit Curves

TCE 009350690-02   P= 54.193534 Days    $T_0=174.050632$  (BKJD)



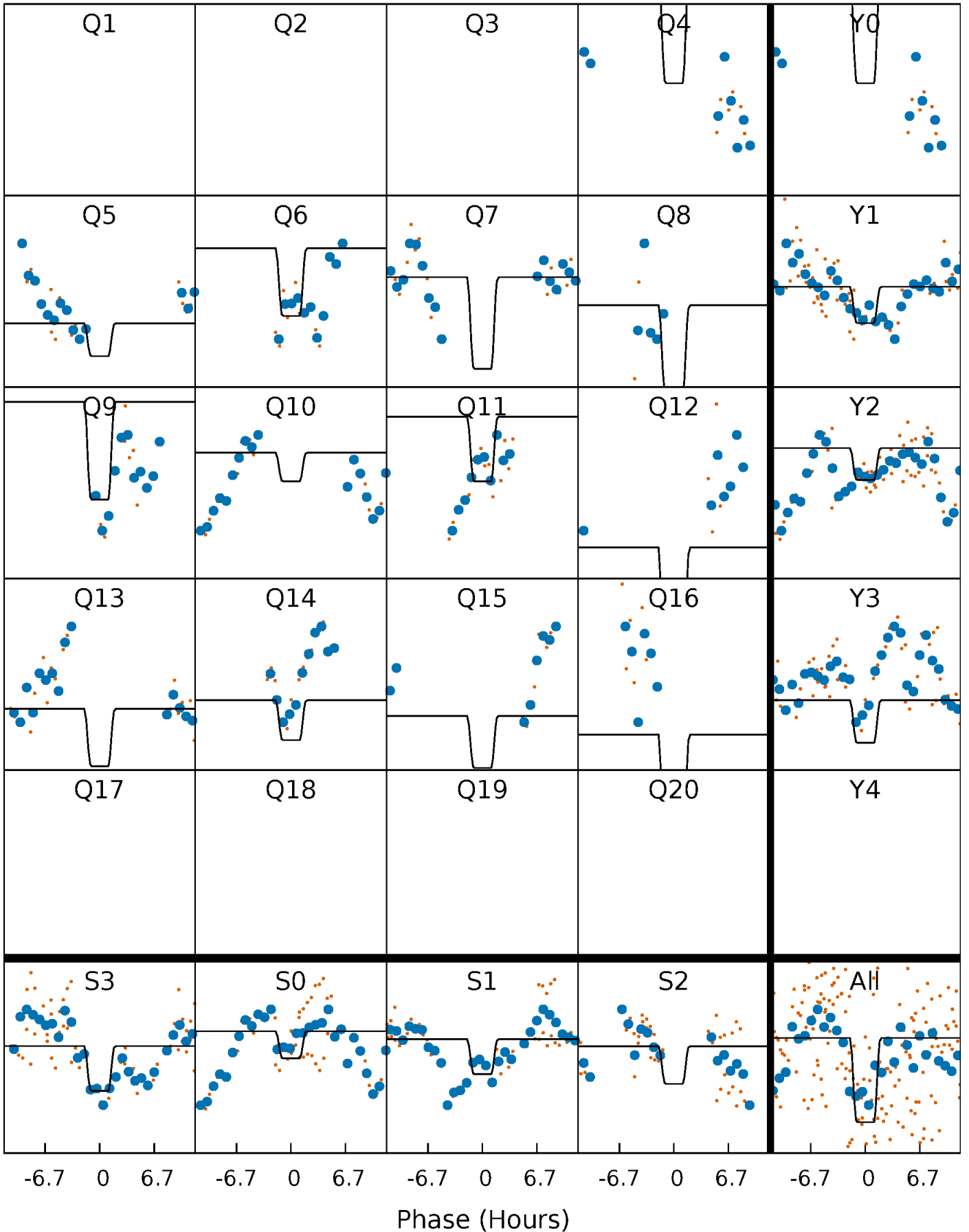
# DV Quarter-Phased Transit Curves

TCE 009350690-02   P= 54.193534 Days    $T_0=174.050632$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

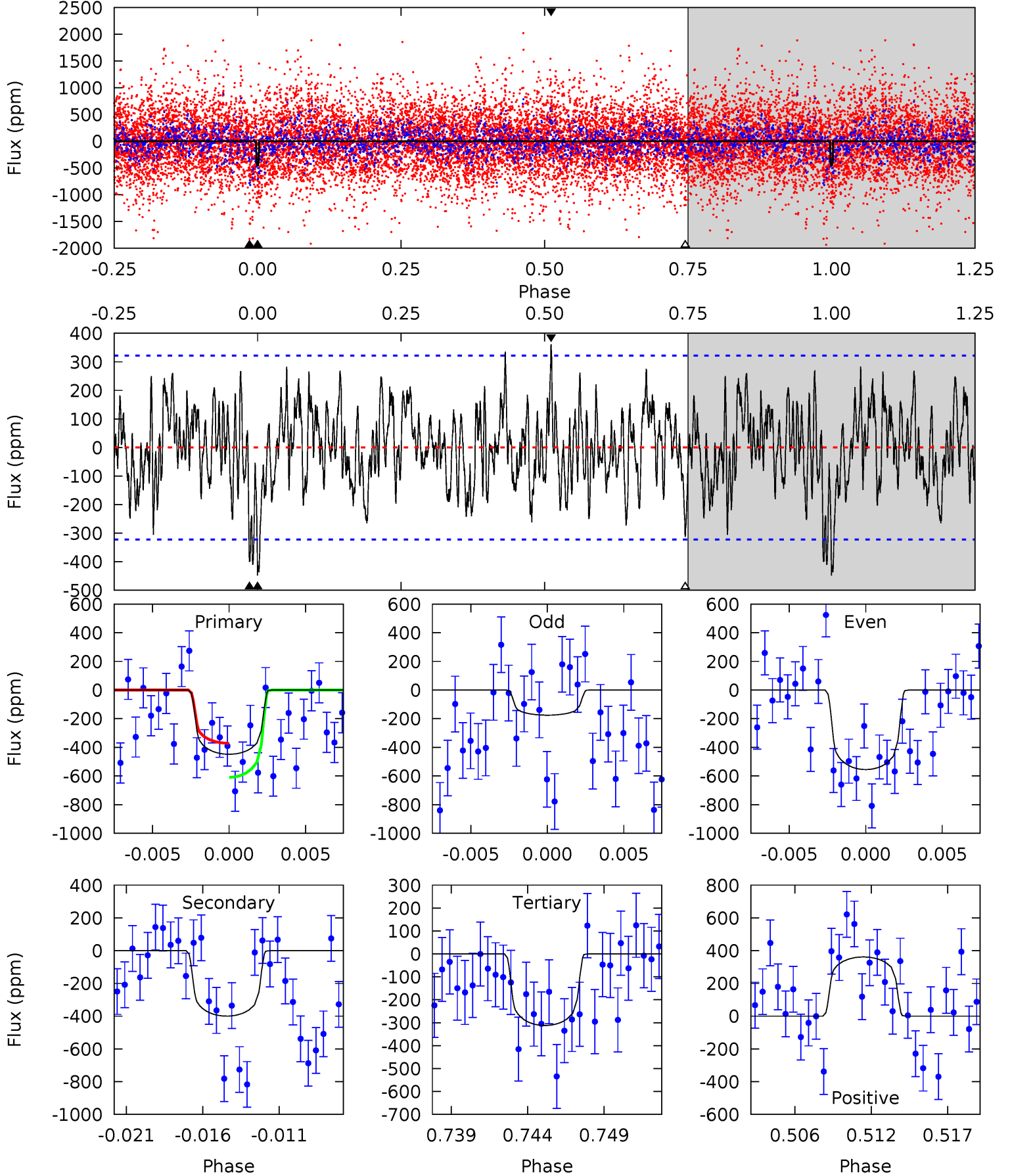
TCE 009350690-02     $P = 54.188595$  Days     $T_0 = 174.103349$  (BKJD)



# DV Model-Shift Uniqueness Test

009350690-02,  $P = 54.193534$  Days,  $E = 174.050632$  Days

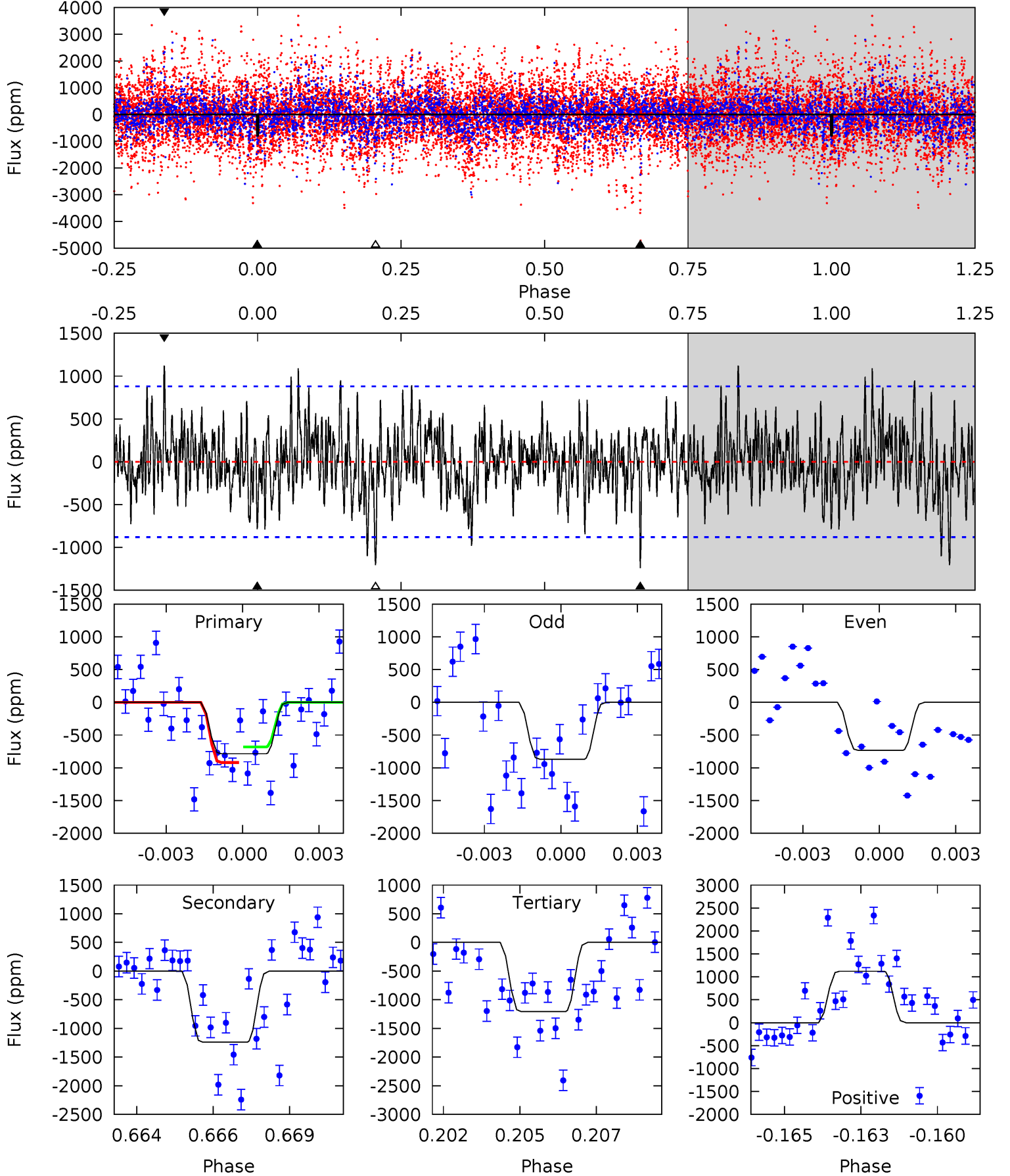
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.17	6.39	4.99	5.78	5.15	2.79	1.88	2.18	1.39	1.40	0.61	3.08	0.62	0.45	1.90



# Alt Model-Shift Uniqueness Test

009350690-02, P = 54.188595 Days, E = 174.103349 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
4.71	7.43	7.22	6.72	5.28	3.01	1.86	-2.50	-2.01	0.21	0.71	0.39	0.67	0.47	0.72



### Stellar Parameters For KIC 009350690

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6363^{+177}_{-243}$	$4.386^{+0.052}_{-0.208}$	$0.210^{+0.150}_{-0.350}$	$1.198^{+0.401}_{-0.125}$	$1.273^{+0.163}_{-0.182}$	$1.044^{+0.303}_{-0.560}$
	+3%/-4%	+1%/-5%	+71%/-167%	+33%/-10%	+13%/-14%	+29%/-54%
Source	KIC0	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 009350690-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-400 \pm 63$	$3.13^{+1.35}_{-1.21}$	$793^{+62}_{-42}$	$5900^{+1714}_{-860}$	$2026^{+3082}_{-1073}$
Alt.	$-1239 \pm 167$	$4.67^{+1.43}_{-1.27}$	$791^{+59}_{-37}$	$6423^{+1234}_{-745}$	$2833^{+2578}_{-1205}$

$T_{max}$  = 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  $A_{obs} \gg 1.0$



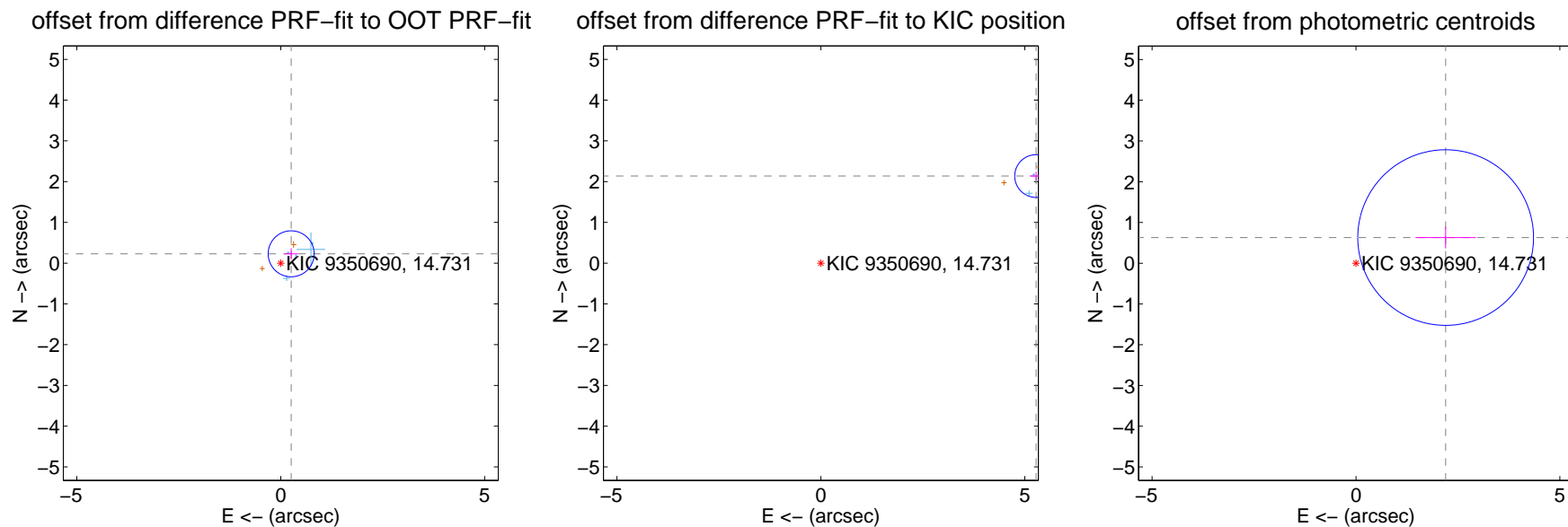
## DV Centroid Data

Supplemental centroid analysis for 009350690-02. Kepler magnitude: 14.73. Transit SNR 5.26

There are 5 quarters with good PRF difference image offsets

The OOT PRF centroid is offset from the target star catalog position by about 5.29 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.343 \pm 0.188$	1.83	$-0.256 \pm 0.167$	$0.229 \pm 0.135$
PRF-fit source offset from KIC position	$5.693 \pm 0.175$	32.56	$-5.277 \pm 0.162$	$2.137 \pm 0.108$
photometric centroid source offset	$2.29 \pm 0.72$	3.19	$-2.20 \pm 0.74$	$0.63 \pm 0.26$



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- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

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

Q1 no difference image



Q1 no OOT image



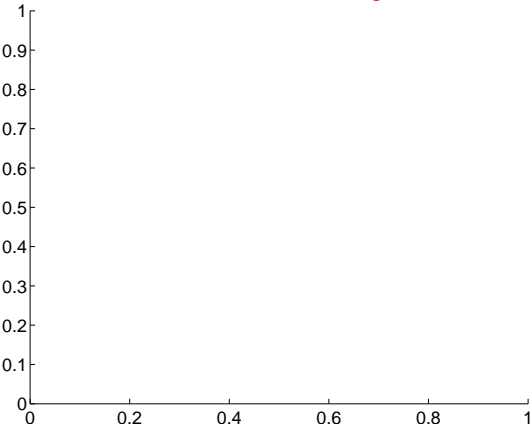
Q2 no difference image



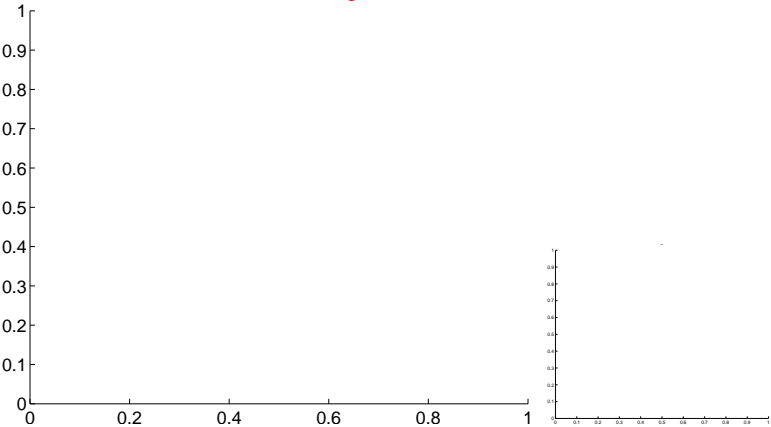
Q2 no OOT image



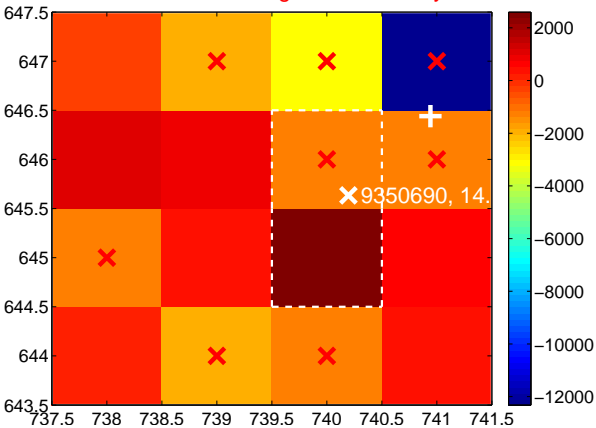
Q3 no difference image



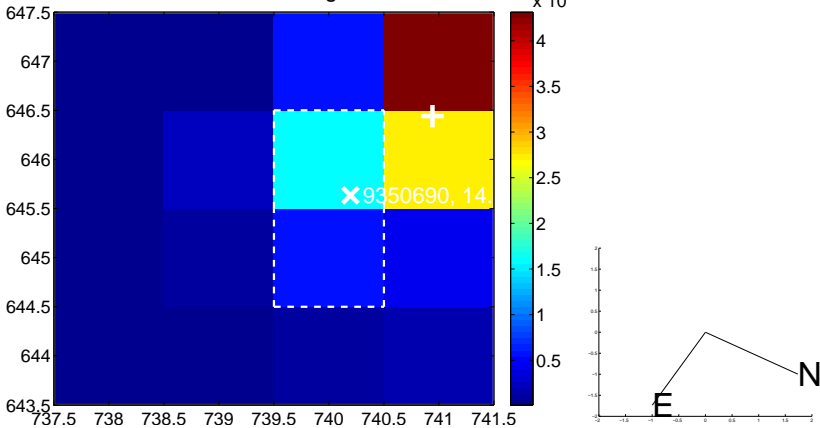
Q3 no OOT image



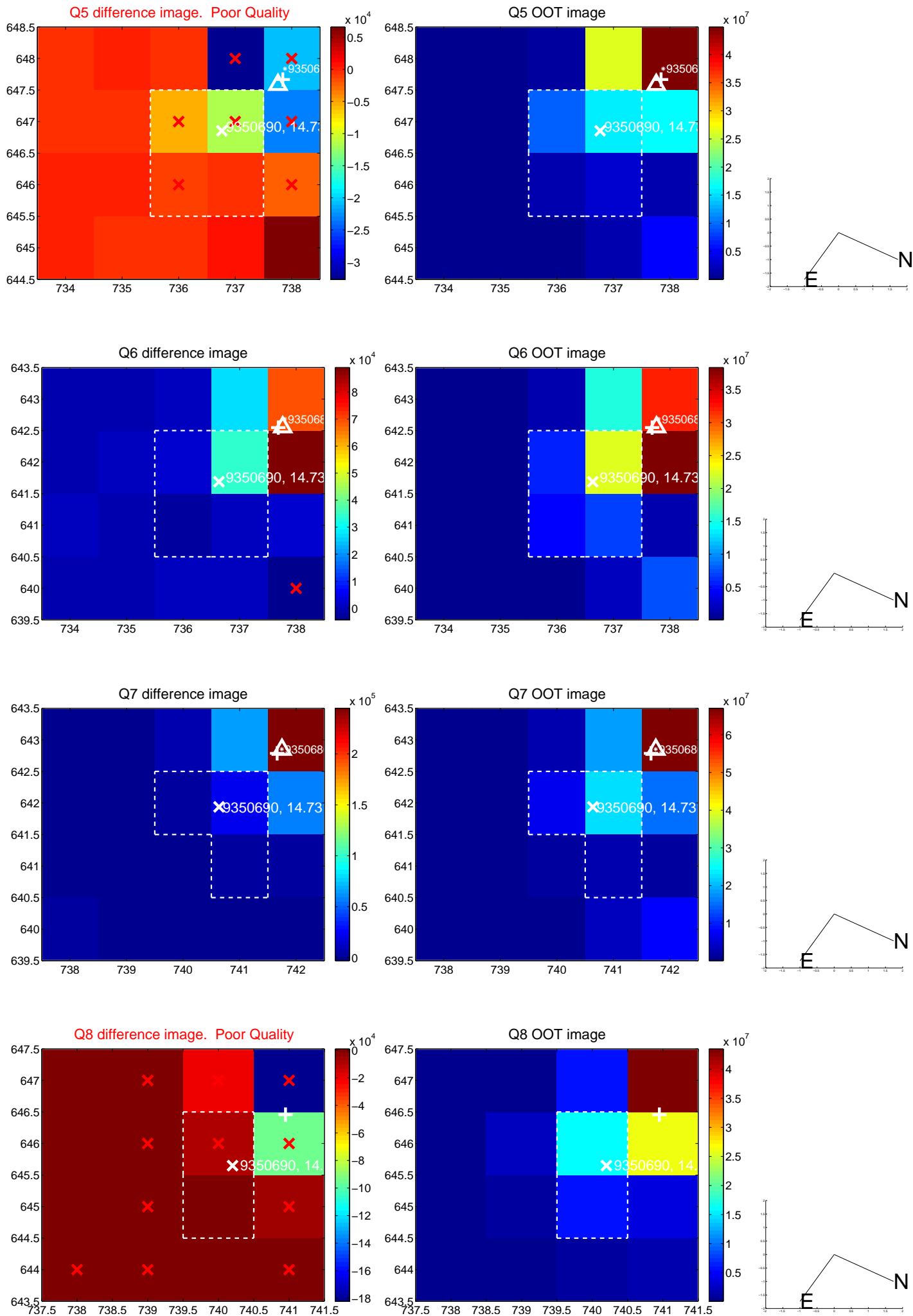
Q4 difference image. Poor Quality



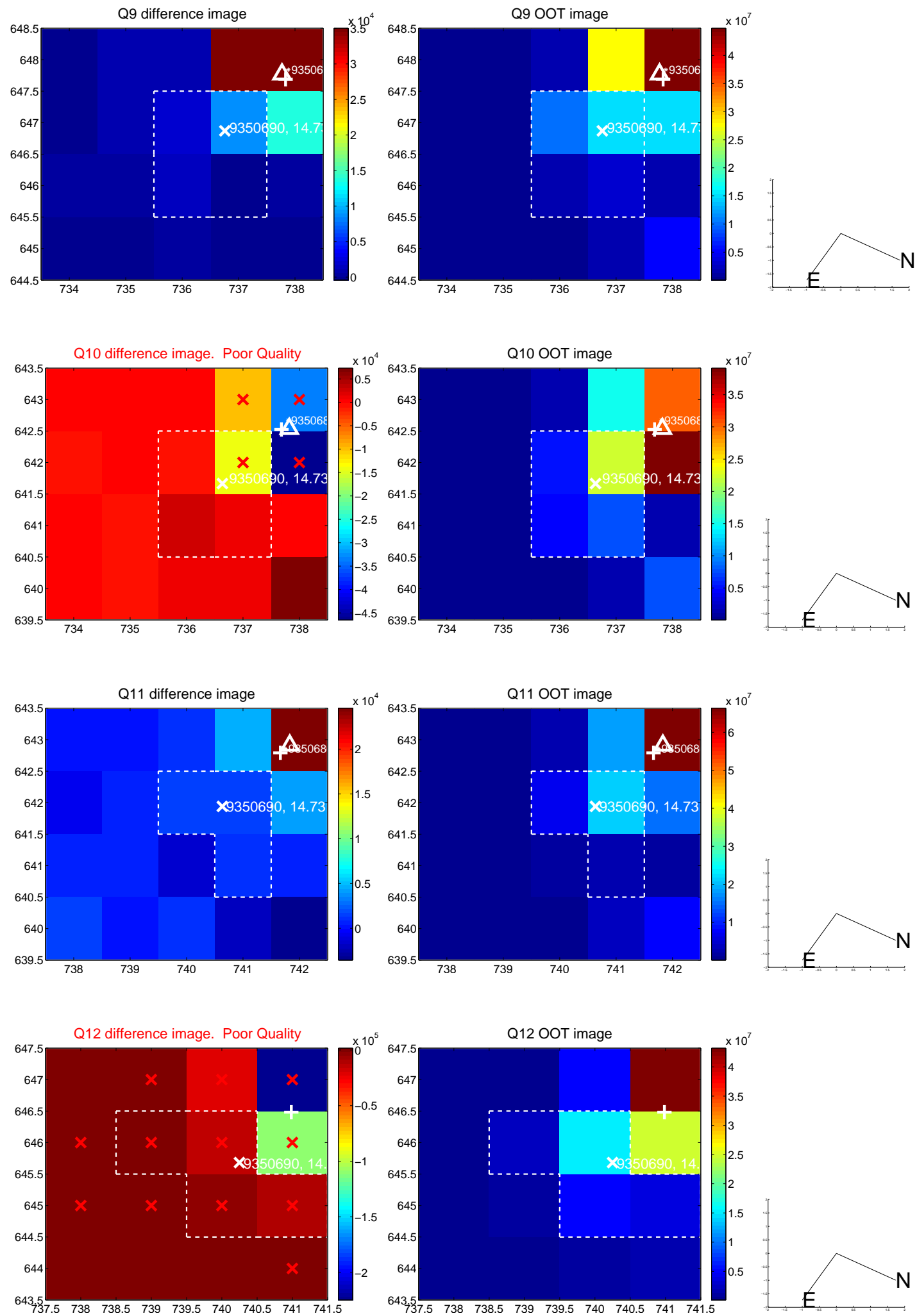
Q4 OOT image



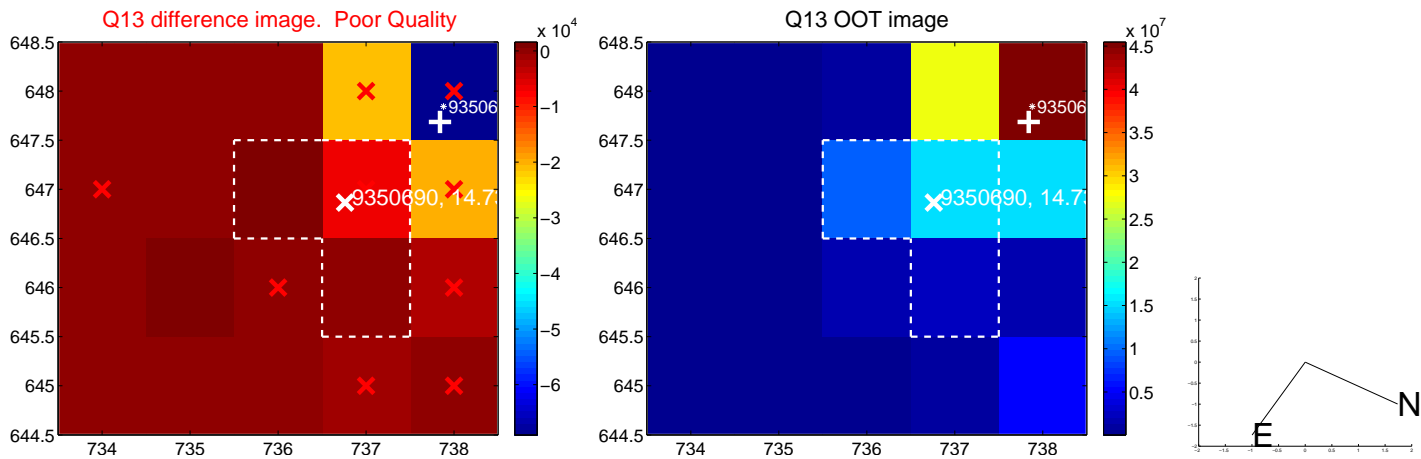
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



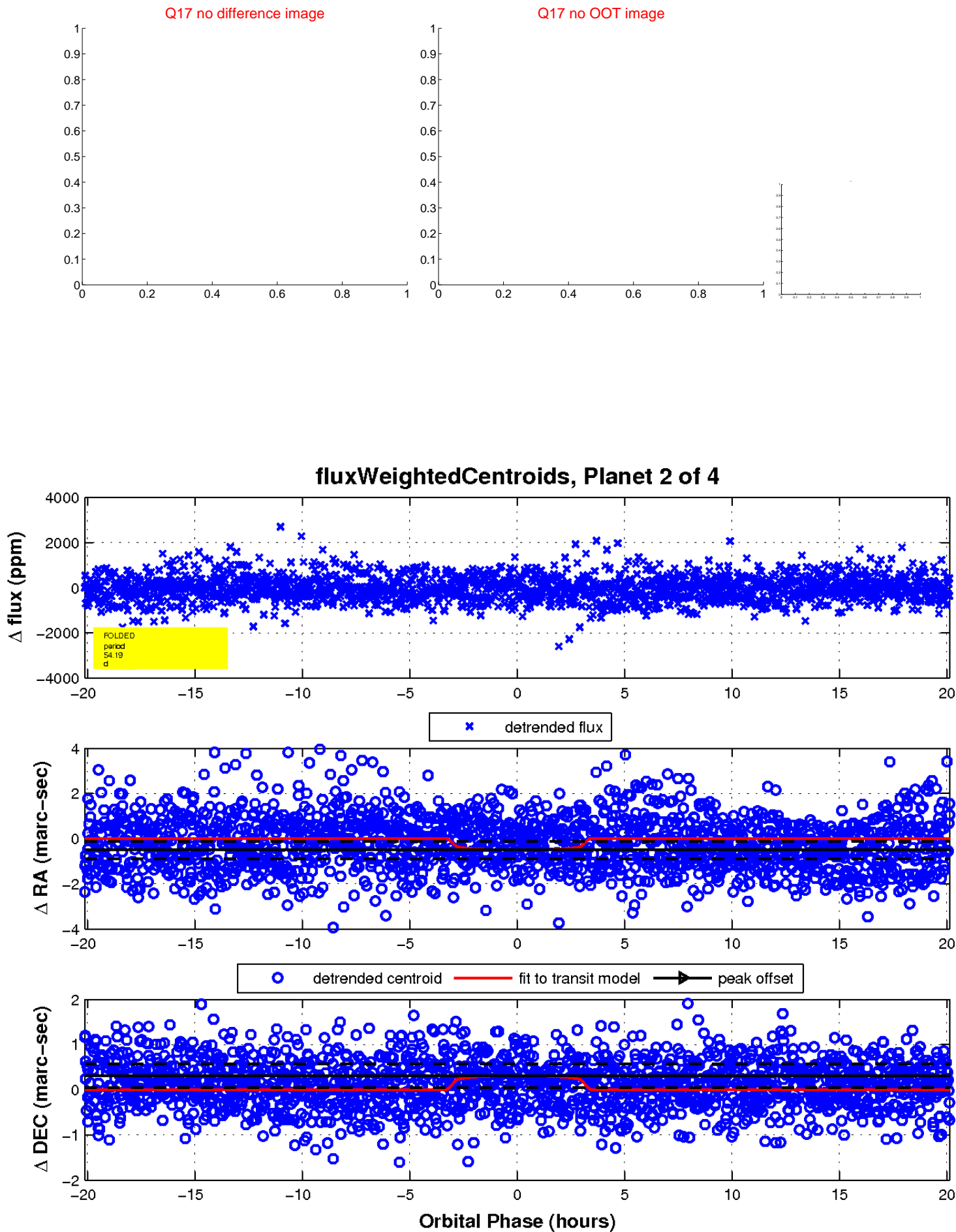
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



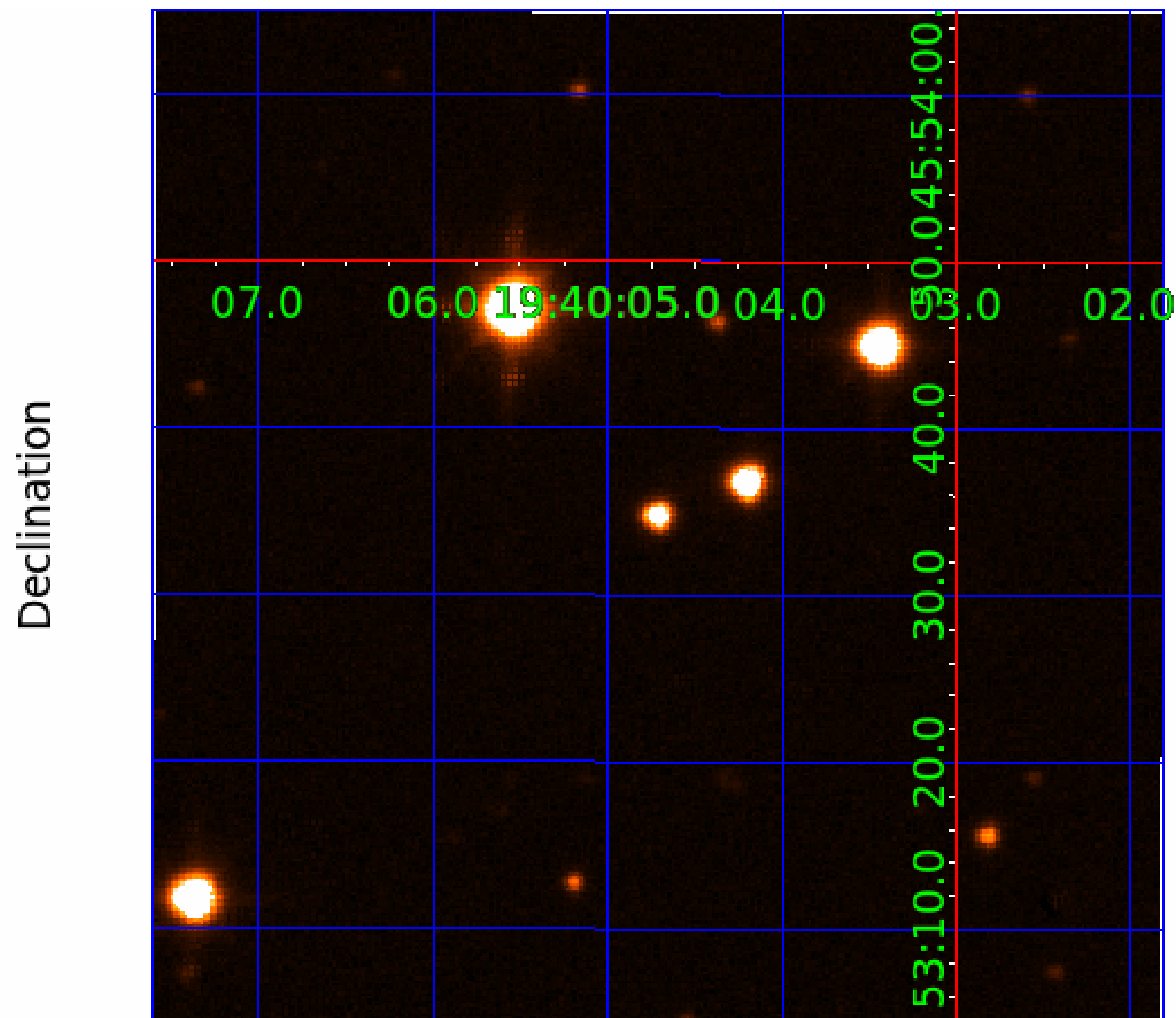
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image





# KIC 009350690

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009350690-01	OBS	No	0.811326	131.944924	45.2	4.915	9.3	6.6	1.20	6363	0.86	6188.51
009350690-02	OBS	No	54.193534	174.050632	490.0	6.713	11.0	5.3	1.20	6363	2.99	22.83
009350690-03	OBS	No	134.244903	231.808236	1148.6	8.671	10.7	8.2	1.20	6363	5.18	6.81
009350690-04	OBS	No	92.438309	154.417683	1112.1	9.954	9.6	7.2	1.20	6363	7.58	11.20

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009350690-01	OBS	FP	0.00	1	0	1	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_RESOLVED_OFFSET
009350690-02	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_RESOLVED_OFFSET
009350690-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—CENT_FEW_DIFFS
009350690-04	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_RESOLVED_OFFSET

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

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

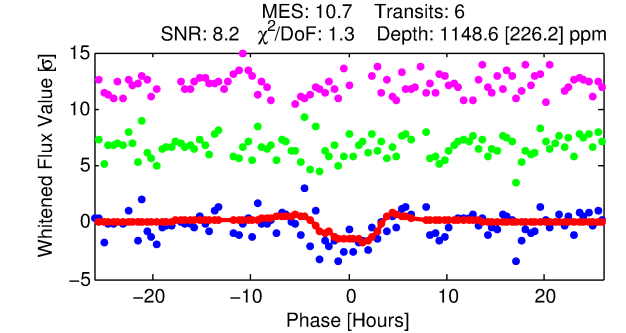
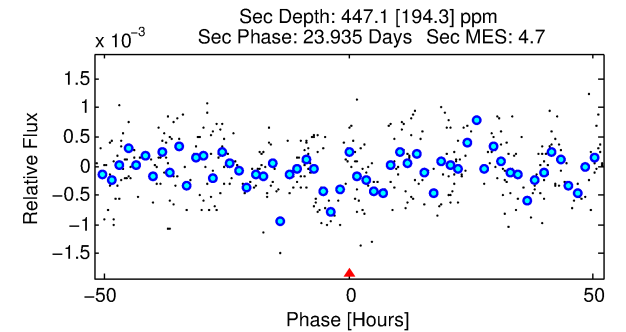
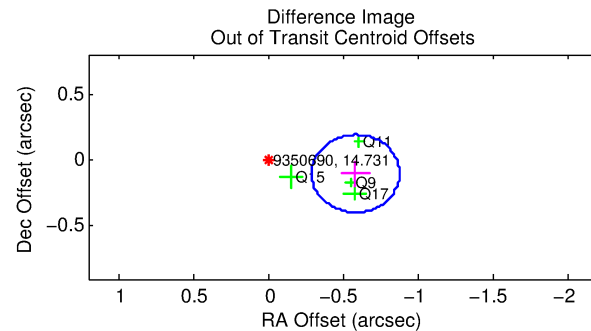
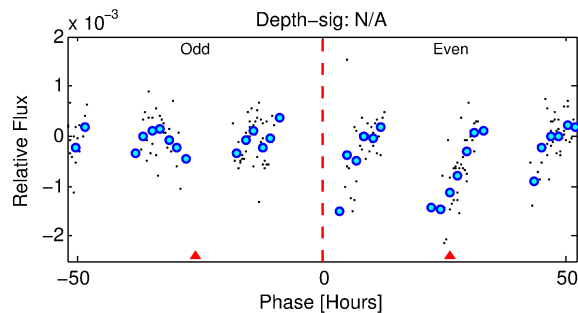
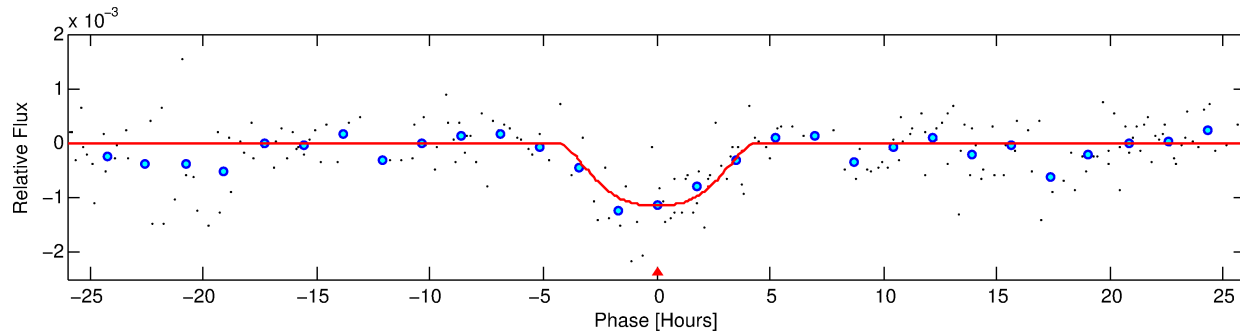
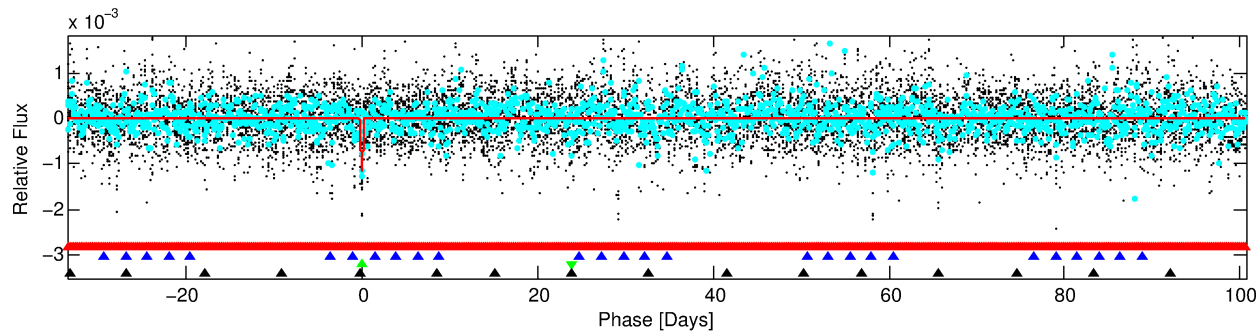
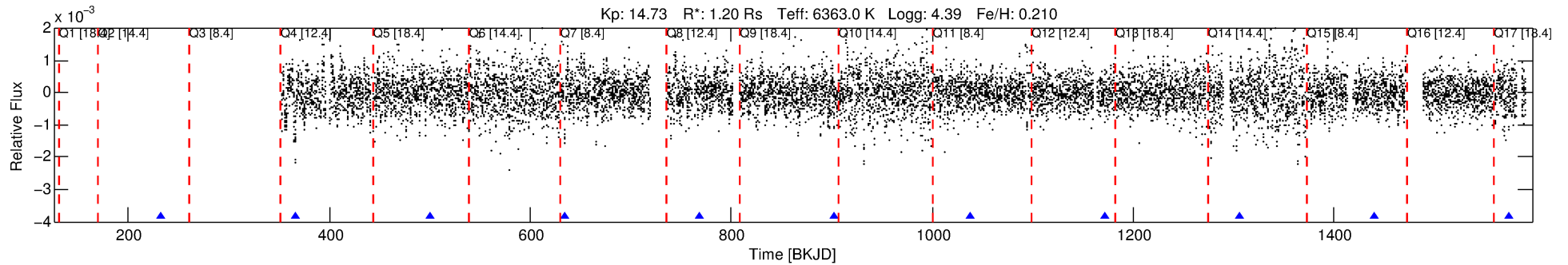
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009350690-03

No Significant Match Found

# DV One-Page Summary

KIC: 9350690 Candidate: 3 of 4 Period: 134.245 d



## DV Fit Results:

Period = 134.24490 [0.00502] d  
Epoch = 231.8082 [0.0404] BKJD  
Rp/R\* = 0.0396 [0.0052]  
a/R\* = 47.68 [9.22]  
b = 0.96 [0.02]  
Seff = 6.81 [2.85]  
Teq = 412 [43] K  
Rp = 5.18 [1.86] Re  
a = 0.5562 [0.1526] AU  
Ag = 2837.49 [1816.51] [1.56σ]  
Teff = 4649 [617] K [6.86σ]

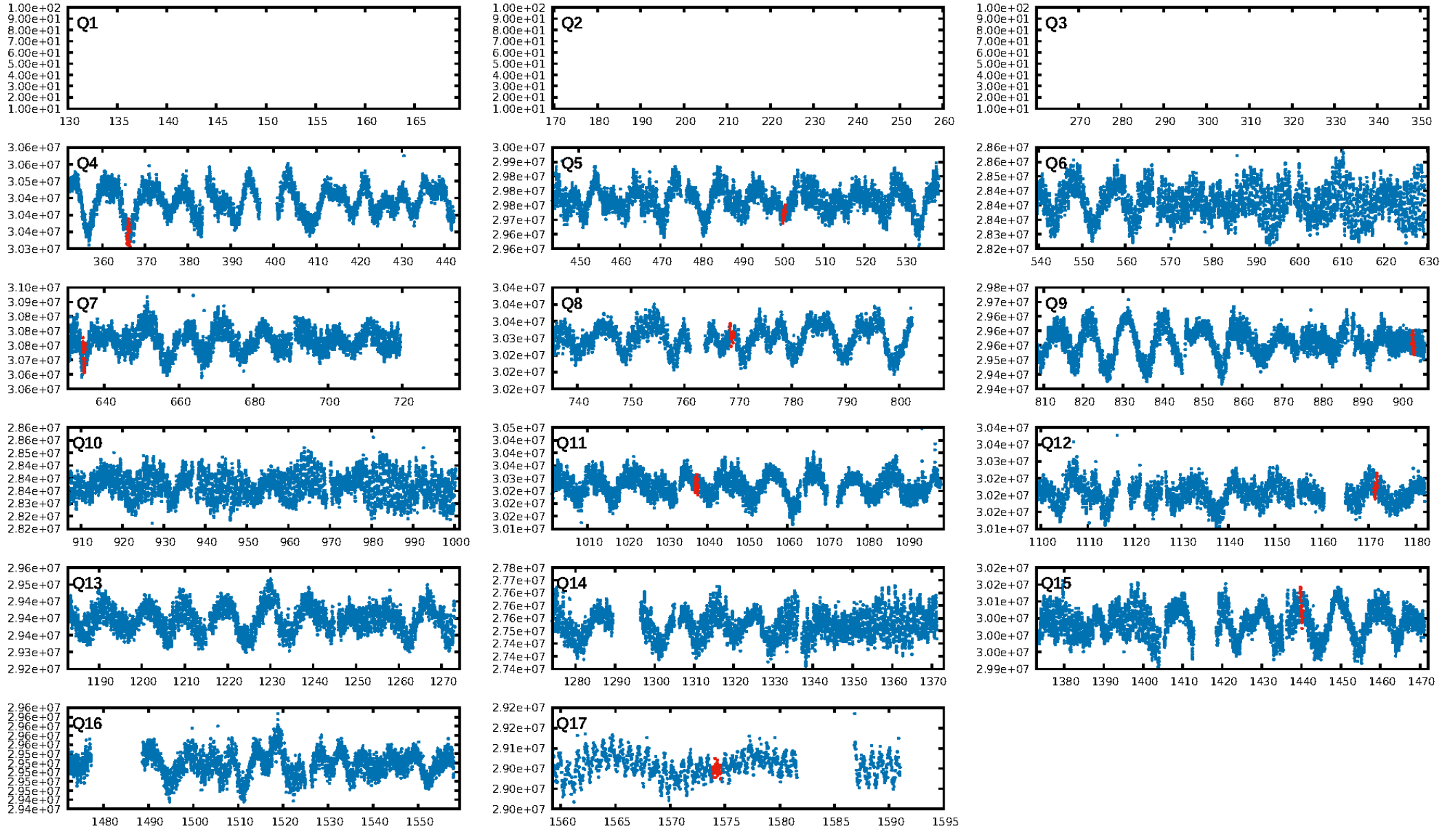
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [76.01σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 12.5%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 8.44e-15  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: -0.6577  
Centroid-sig: 0.4%  
Centroid-so: 2.371 arcsec [4.63σ]  
OotOffset-rm: 0.595 arcsec [6.07σ]  
KicOffset-rm: 5.834 arcsec [51.95σ]  
OotOffset-st: 0/2/0/2 [4]  
KicOffset-st: 0/2/0/2 [4]  
DiffImageQuality-fgm: 0.25 [1/4]  
DiffImageOverlap-fno: 0.00 [0/7]

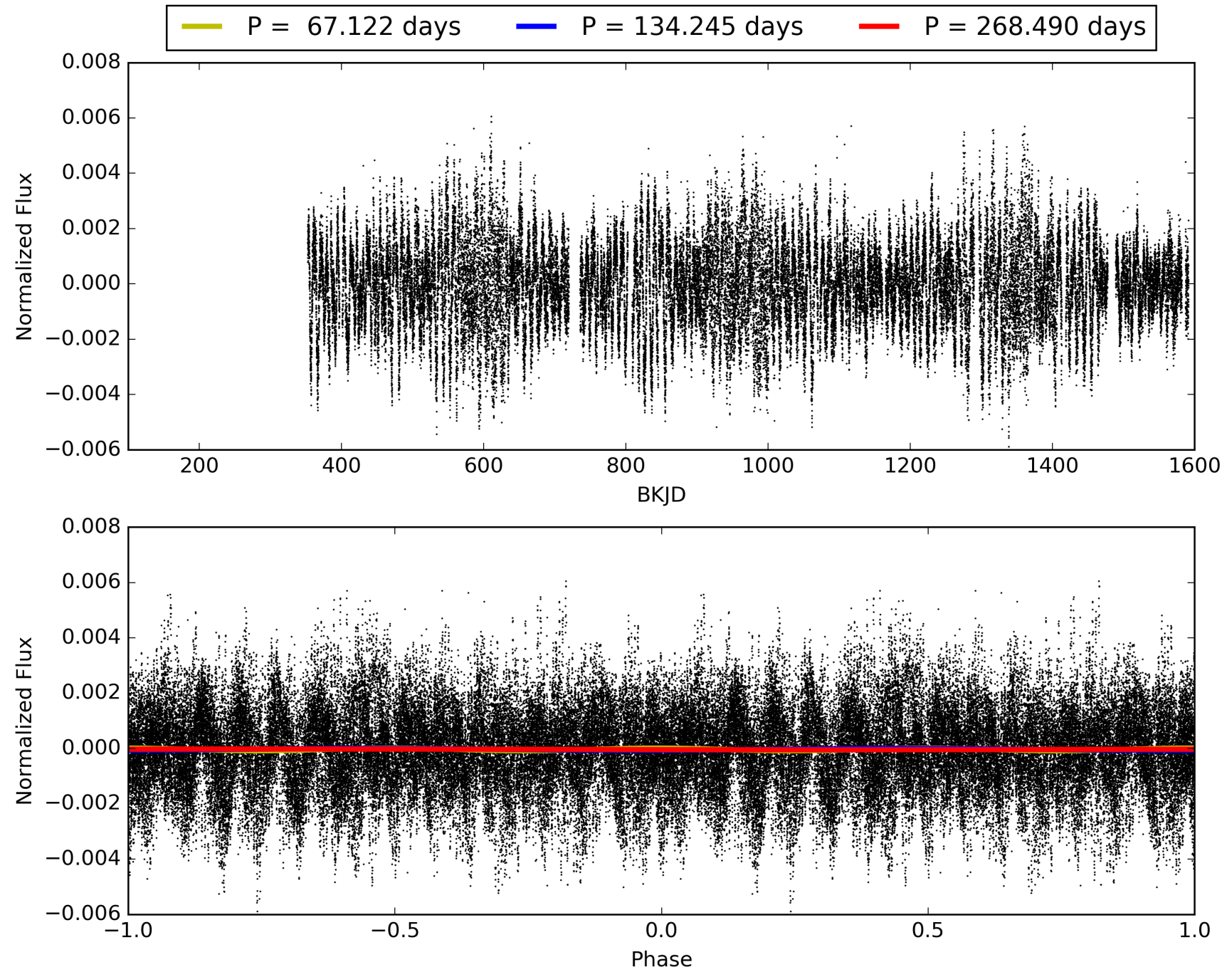
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 17:12:15 Z

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

# TCE 009350690-03, PDC Light Curves

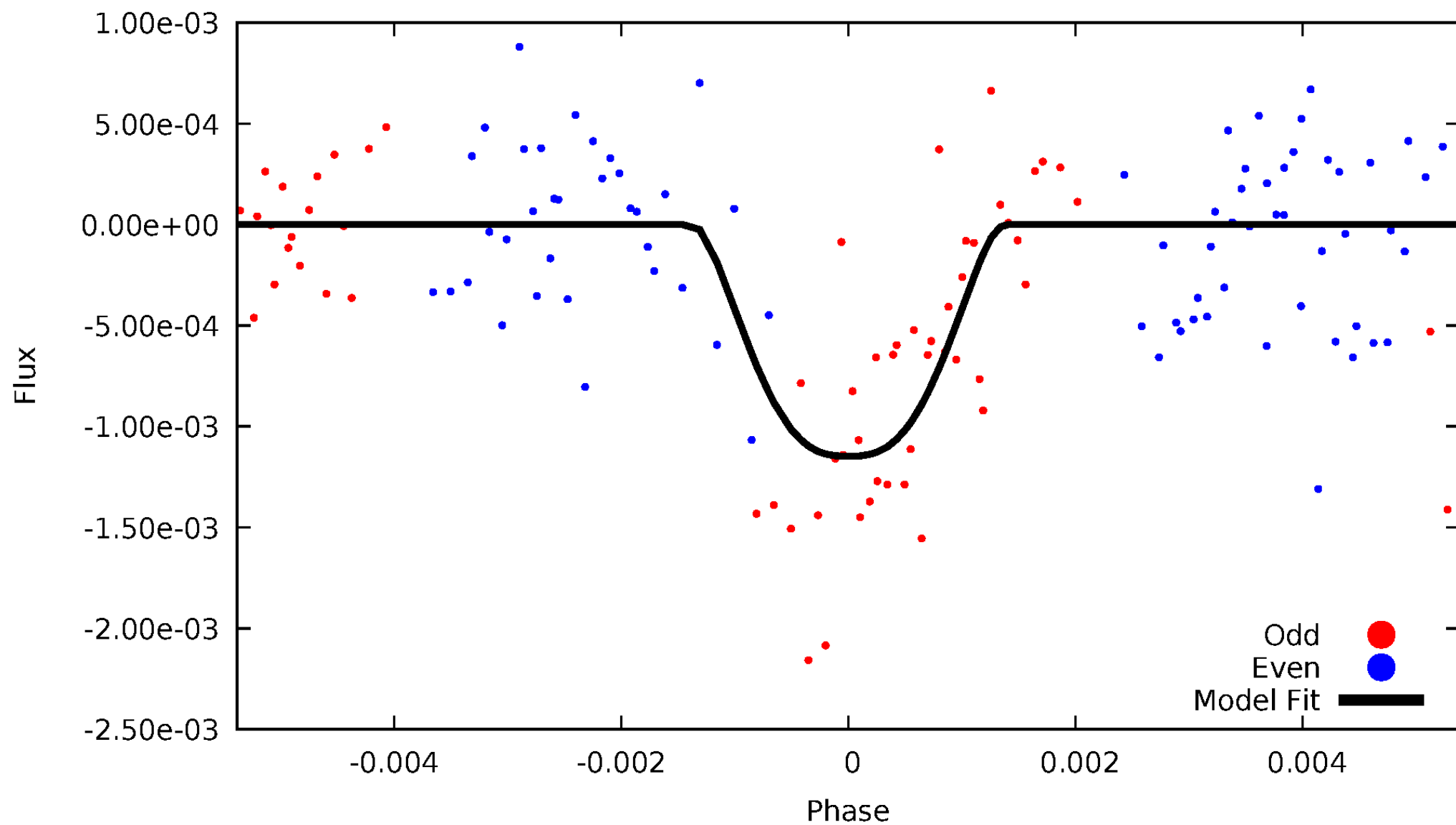


# TCE 009350690-03



# DV Odd/Even

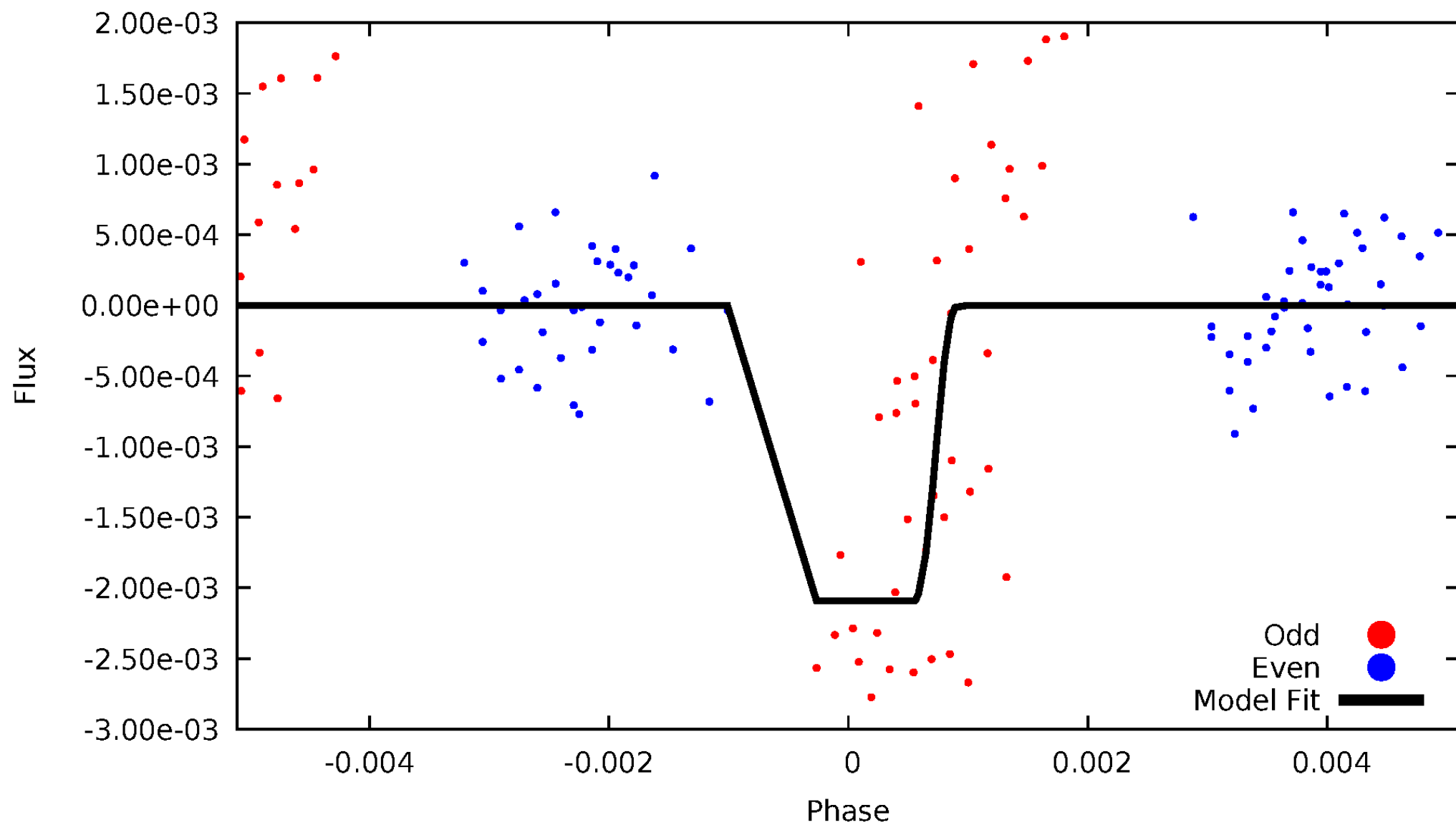
TCE 009350690-03





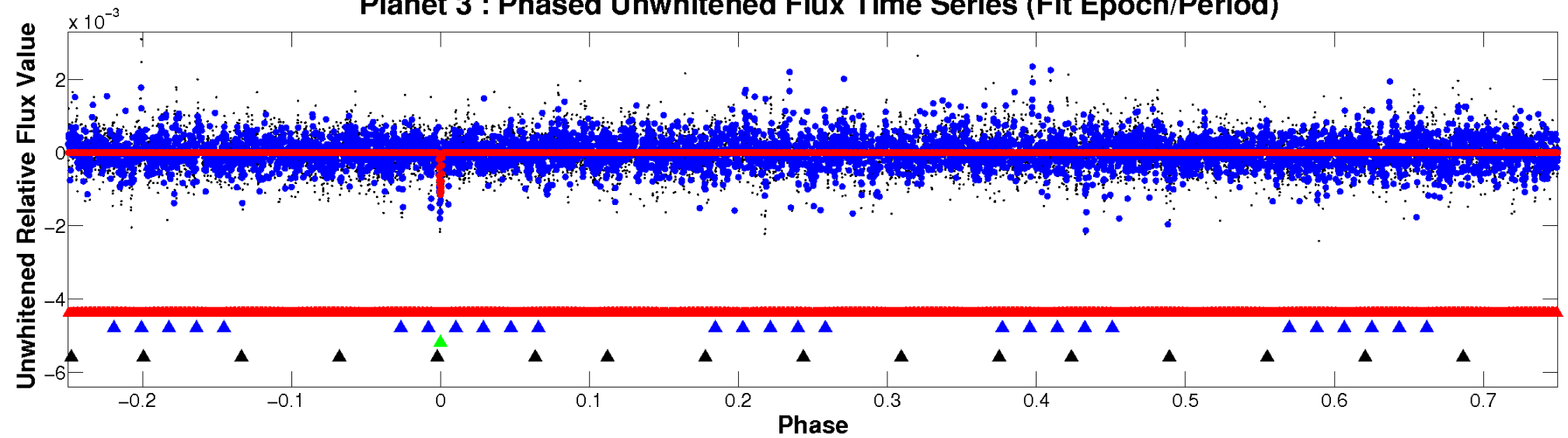
# ALT Odd/Even

TCE 009350690-03

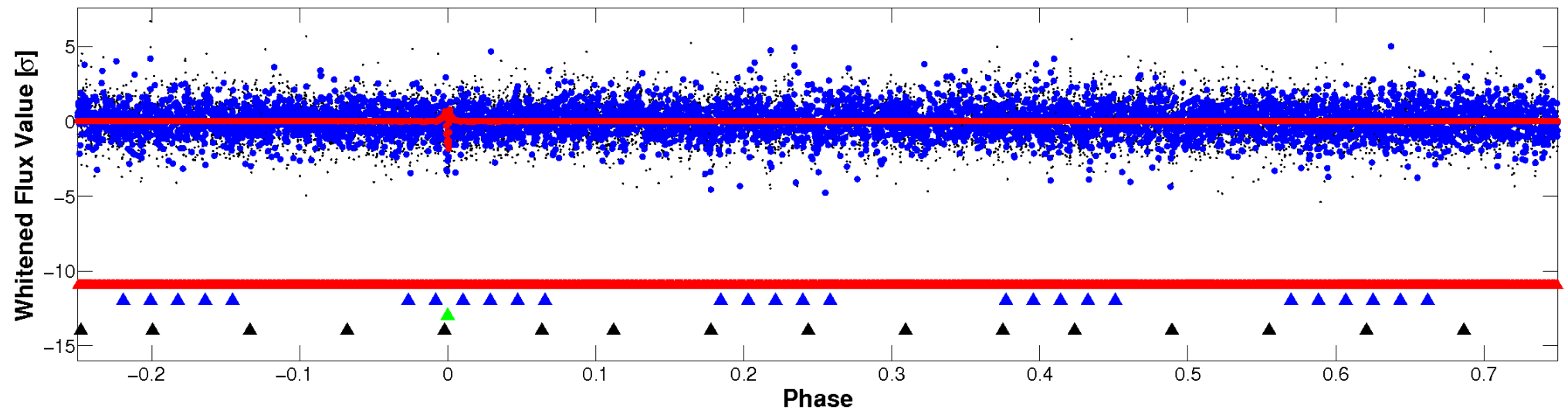


# Non-Whitened Vs. Whitened Light Curve

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

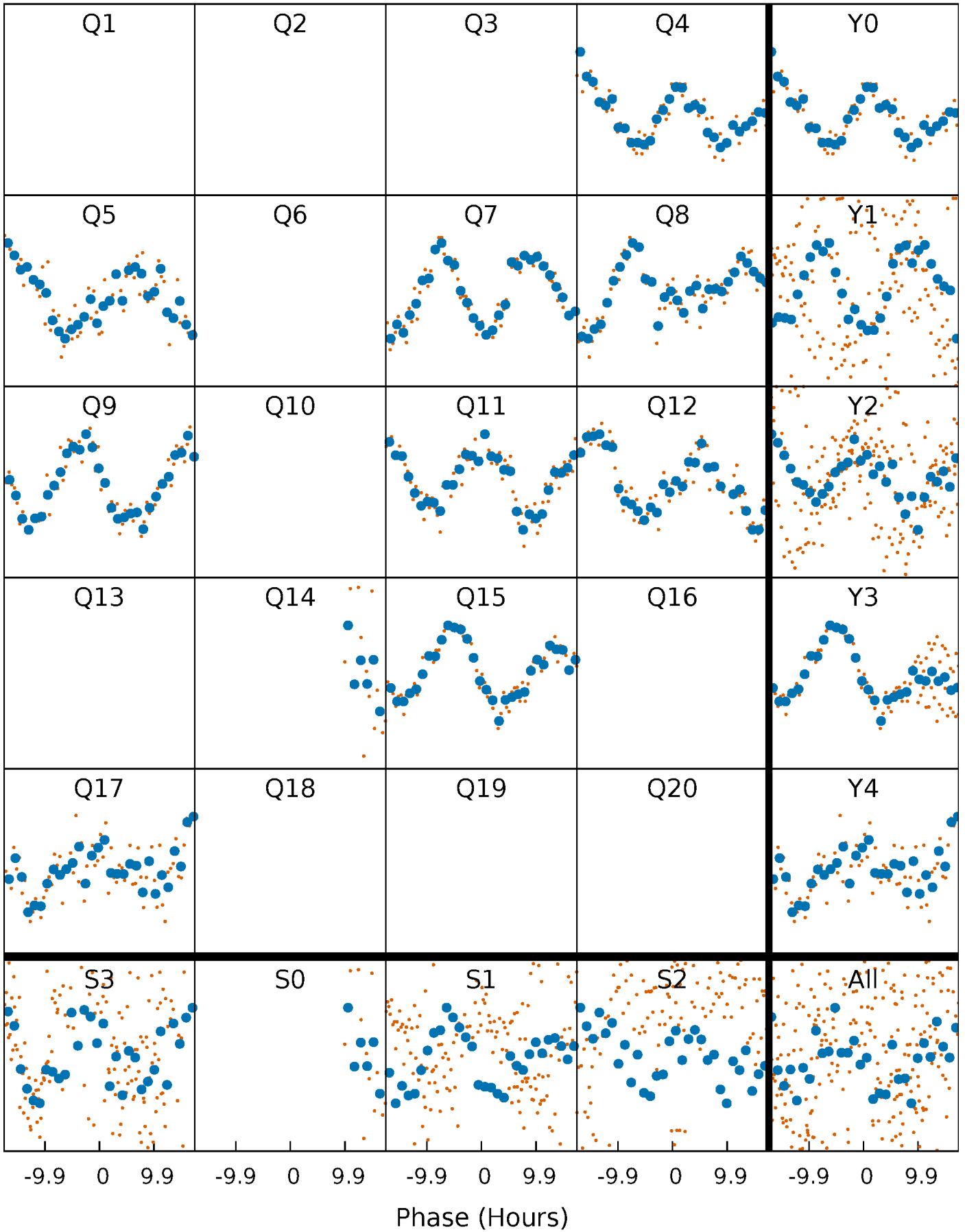


Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



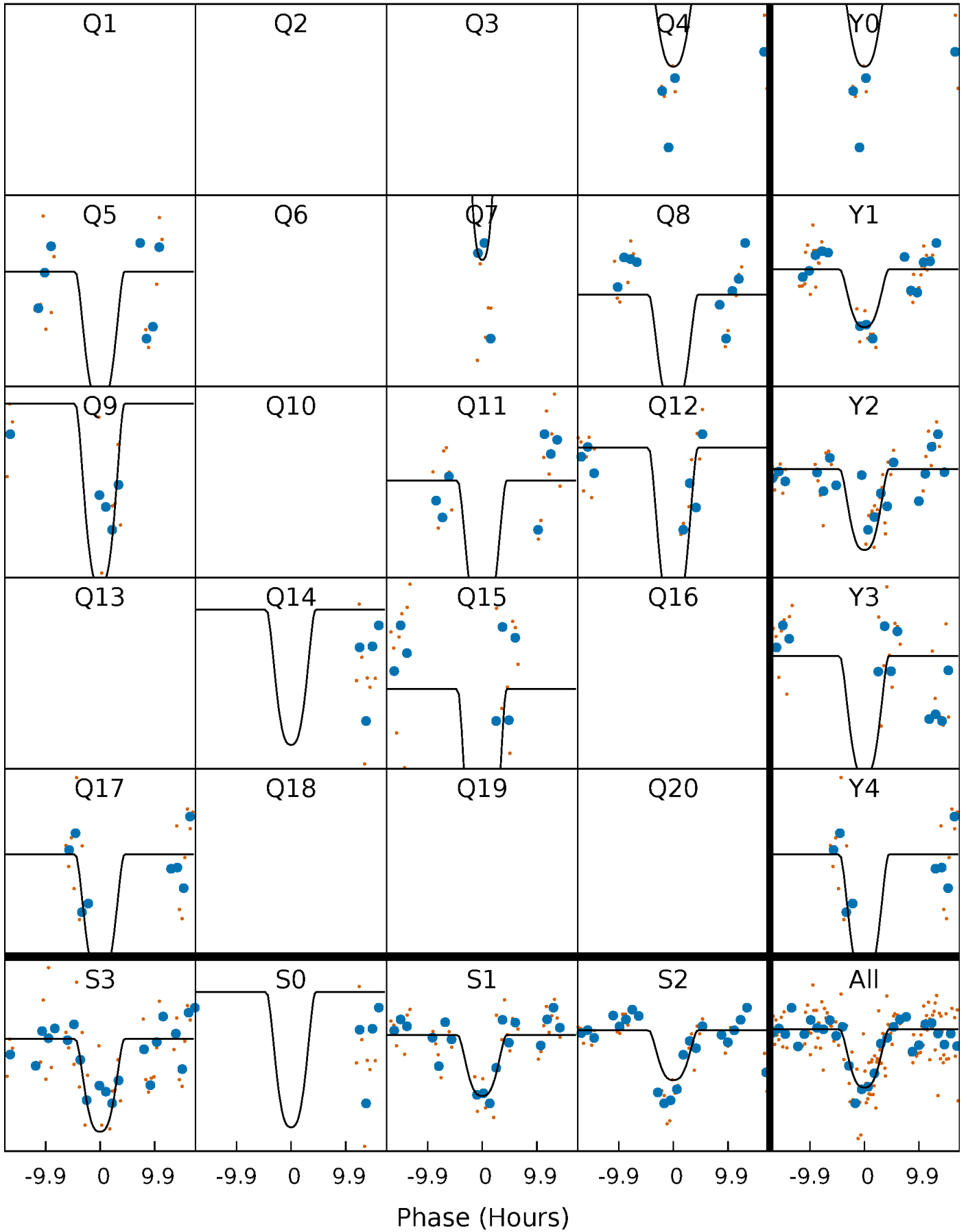
# PDC Quarter-Phased Transit Curves

TCE 009350690-03     $P=134.244903$  Days     $T_0=231.808236$  (BKJD)



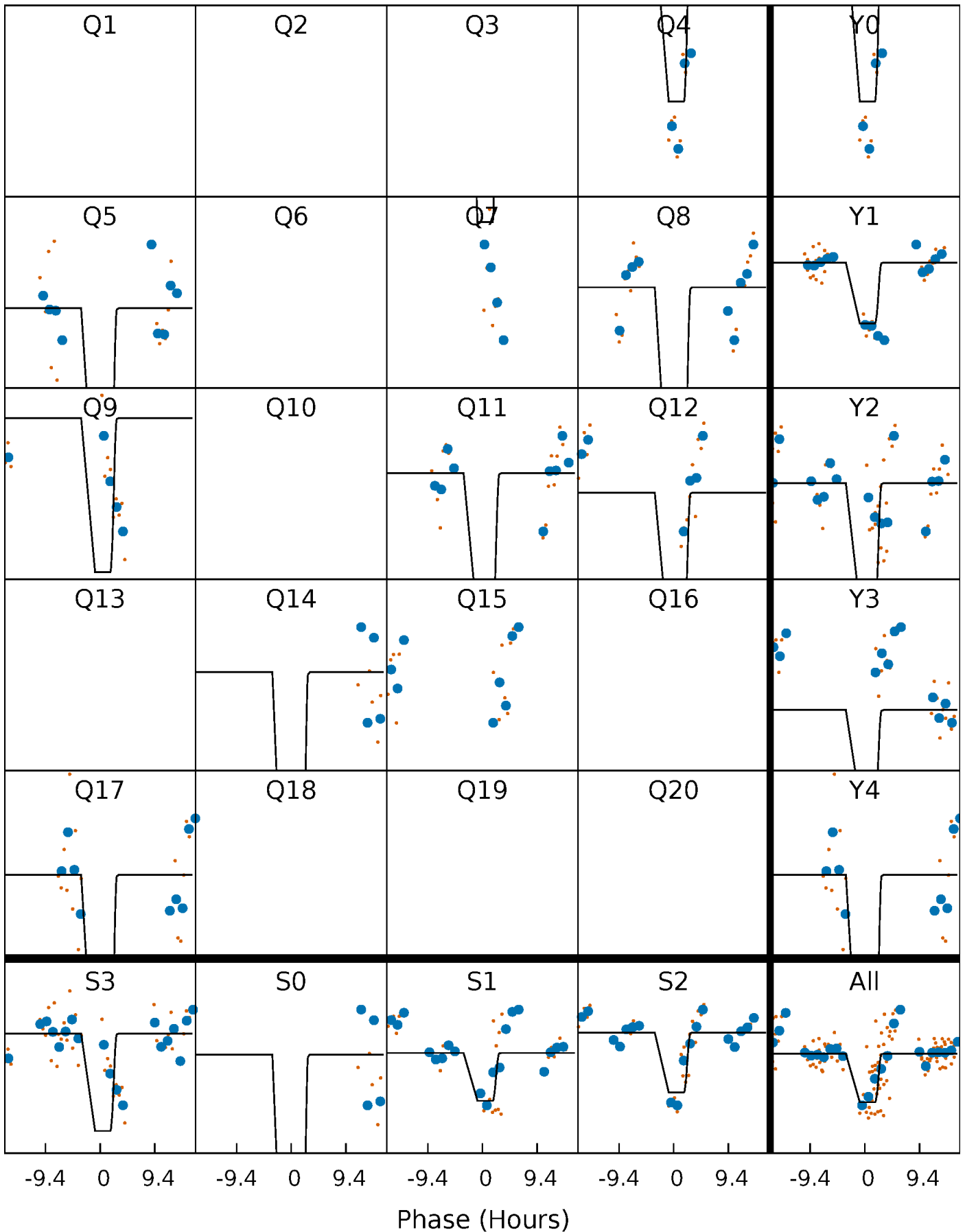
# DV Quarter-Phased Transit Curves

TCE 009350690-03   P=134.244903 Days    $T_0=231.808236$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

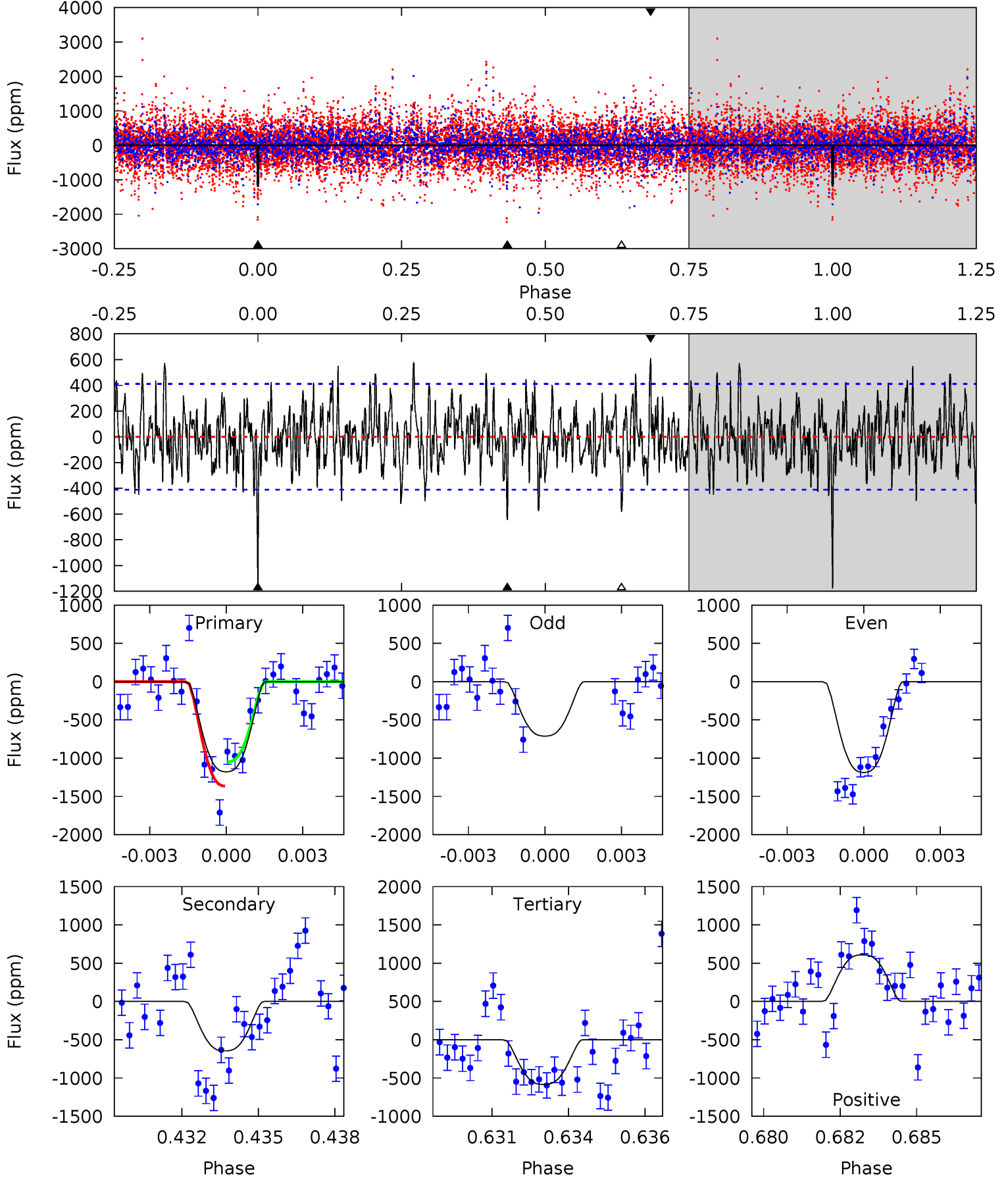
TCE 009350690-03     $P=134.257629$  Days     $T_0=231.722441$  (BKJD)



# DV Model-Shift Uniqueness Test

009350690-03, P = 134.244903 Days, E = 231.808236 Days

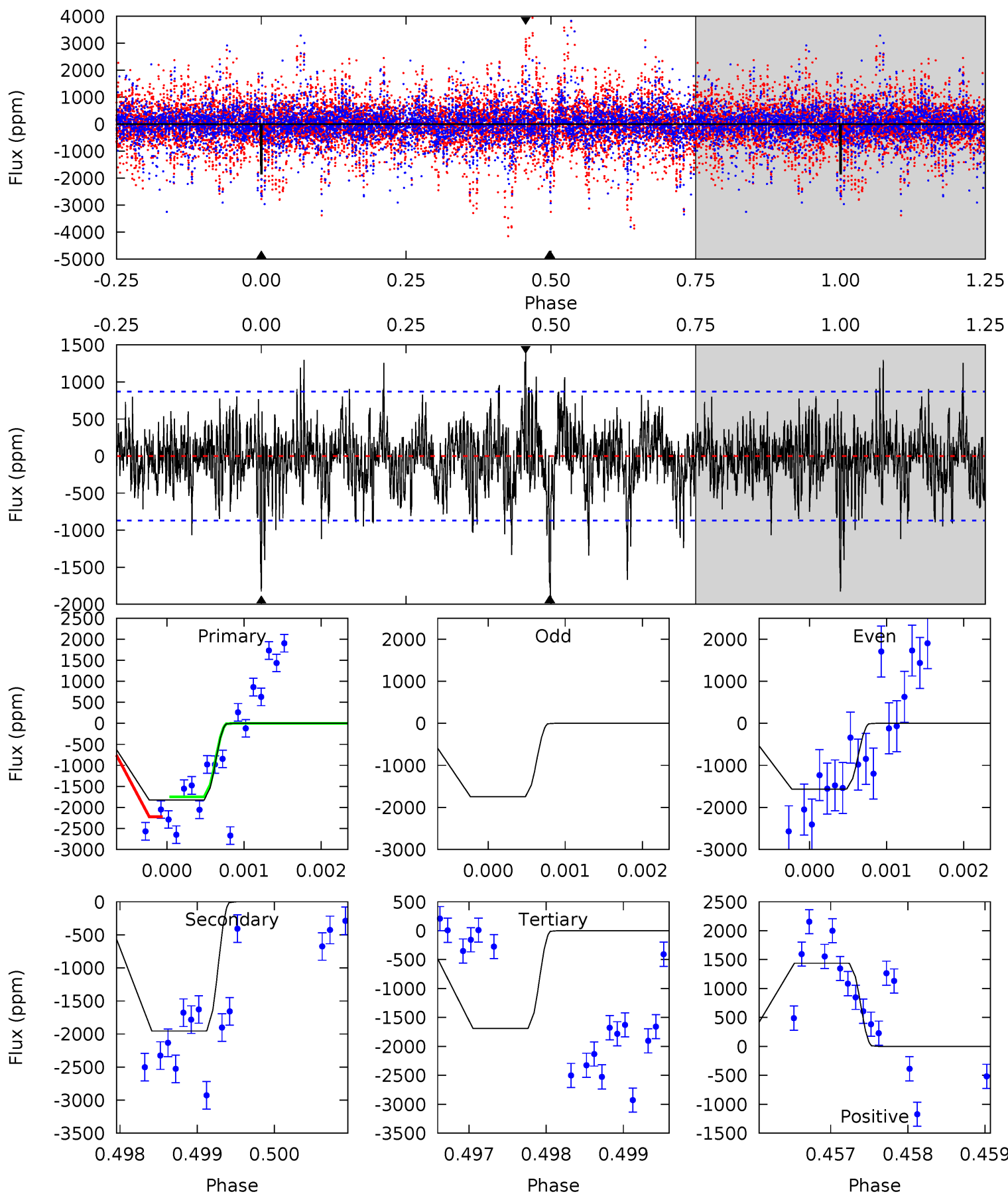
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
15.1	8.29	7.48	7.82	5.27	3.00	2.36	7.63	7.30	0.81	0.47	1.78	1.04	0.34	1.94



# Alt Model-Shift Uniqueness Test

009350690-03, P = 134.257629 Days, E = 231.722441 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.4	12.2	10.5	8.96	5.43	3.25	2.12	0.84	2.42	1.63	3.22	0.76	1.46	0.42	0.83





### Stellar Parameters For KIC 009350690

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6363^{+177}_{-243}$	$4.386^{+0.052}_{-0.208}$	$0.210^{+0.150}_{-0.350}$	$1.198^{+0.401}_{-0.125}$	$1.273^{+0.163}_{-0.182}$	$1.044^{+0.303}_{-0.560}$
	+3%/-4%	+1%/-5%	+71%/-167%	+33%/-10%	+13%/-14%	+29%/-54%
Source	KIC0	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 009350690-03 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-646 \pm 78$	$5.37^{+1.04}_{-0.80}$	$587^{+48}_{-30}$	$5149^{+396}_{-336}$	$3648^{+1501}_{-1094}$
Alt.	$-1954 \pm 160$	$6.28^{+1.10}_{-0.90}$	$588^{+43}_{-30}$	$6194^{+483}_{-344}$	$8281^{+2809}_{-2184}$

$T_{max}$  = 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  $A_{obs} \gg 1.0$

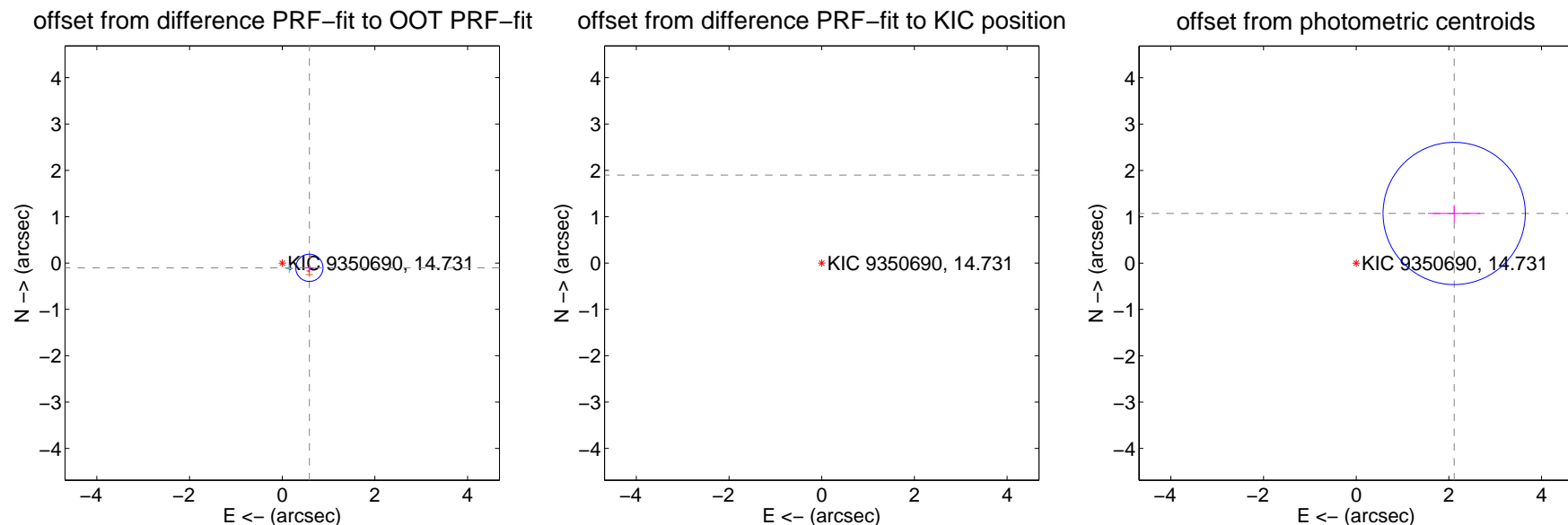
## DV Centroid Data

Supplemental centroid analysis for 009350690-03. Kepler magnitude: 14.73. Transit SNR 8.19

There are 1 quarters with good PRF difference image offsets

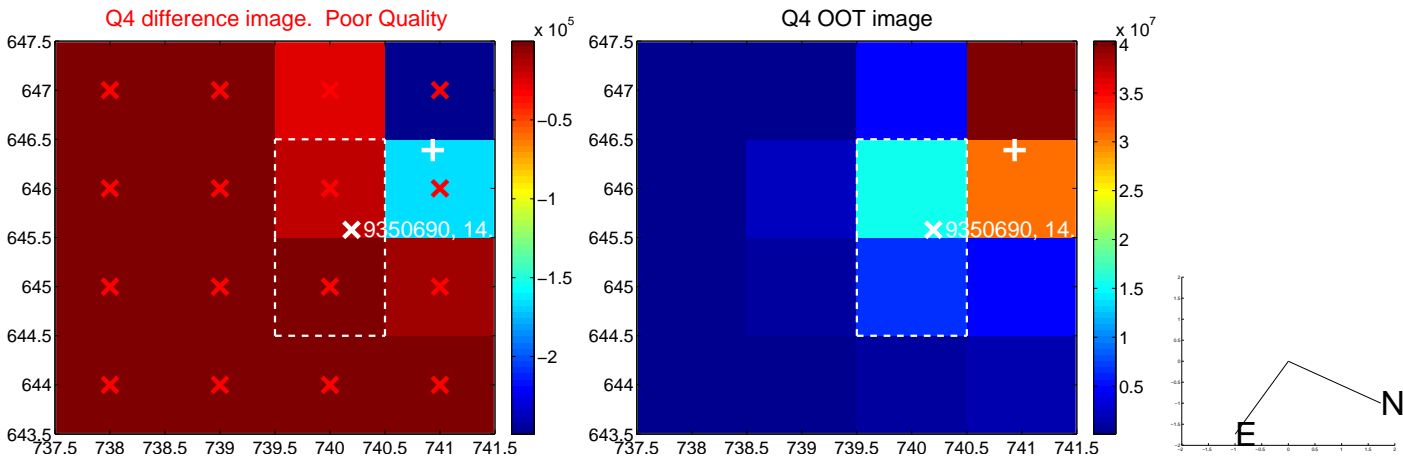
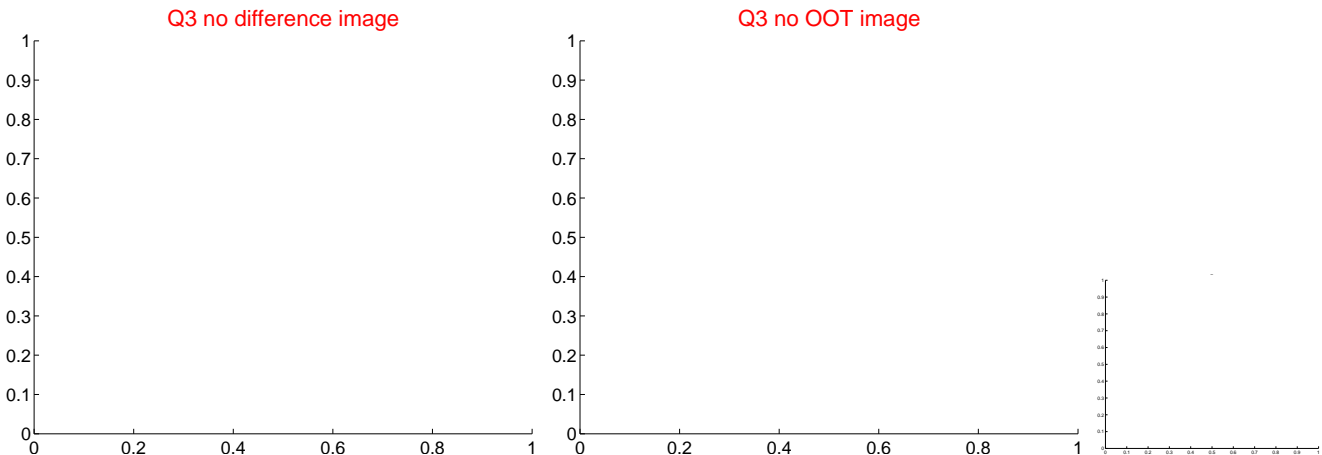
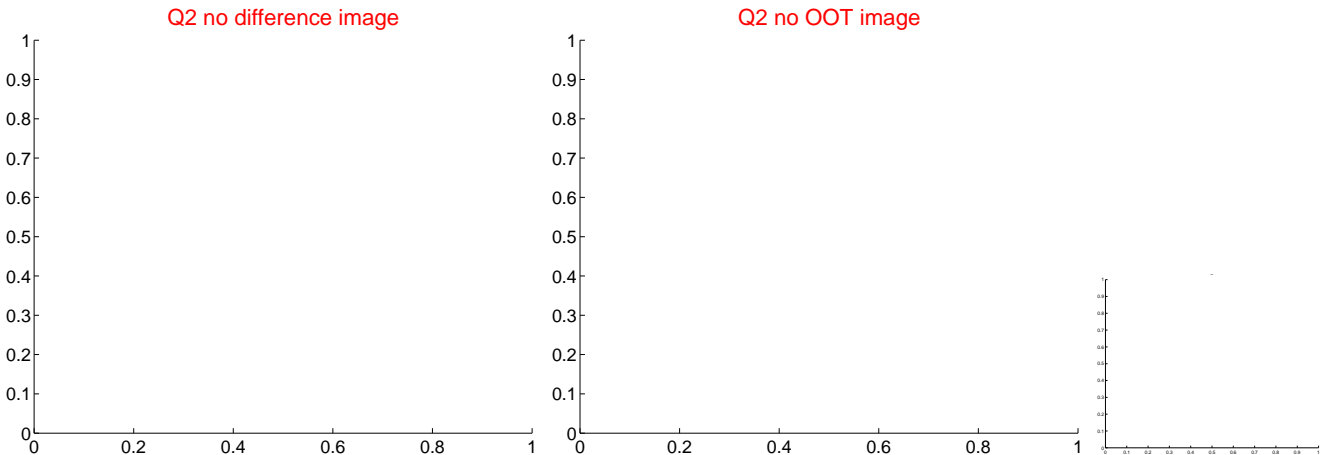
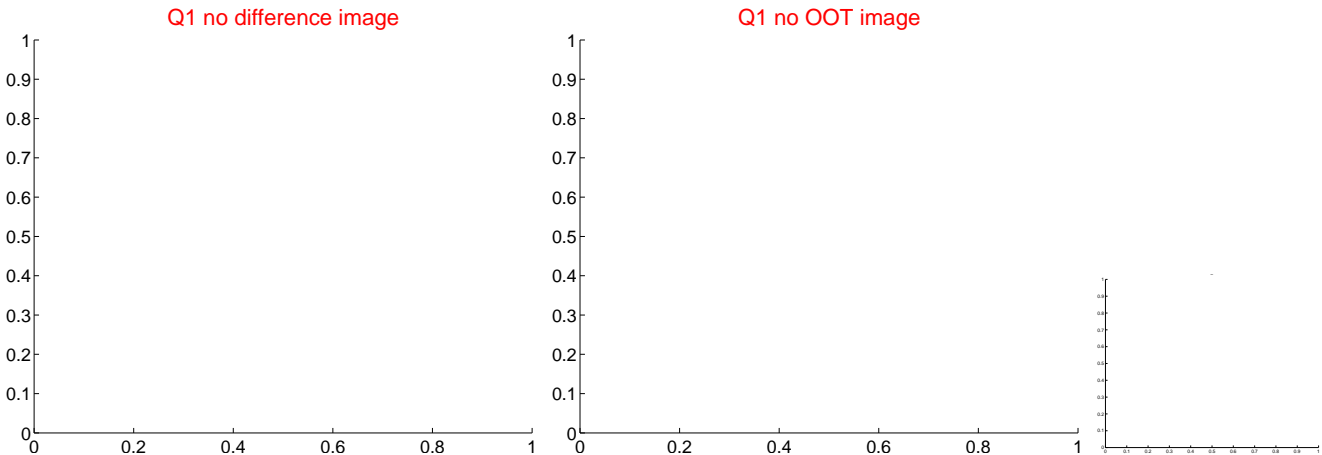
The OOT PRF centroid is offset from the target star catalog position by about 5.38 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.595 \pm 0.098$	6.07	$-0.586 \pm 0.098$	$-0.103 \pm 0.092$
PRF-fit source offset from KIC position	$5.834 \pm 0.112$	51.95	$-5.517 \pm 0.107$	$1.897 \pm 0.078$
photometric centroid source offset	$2.37 \pm 0.51$	4.63	$-2.11 \pm 0.57$	$1.07 \pm 0.18$

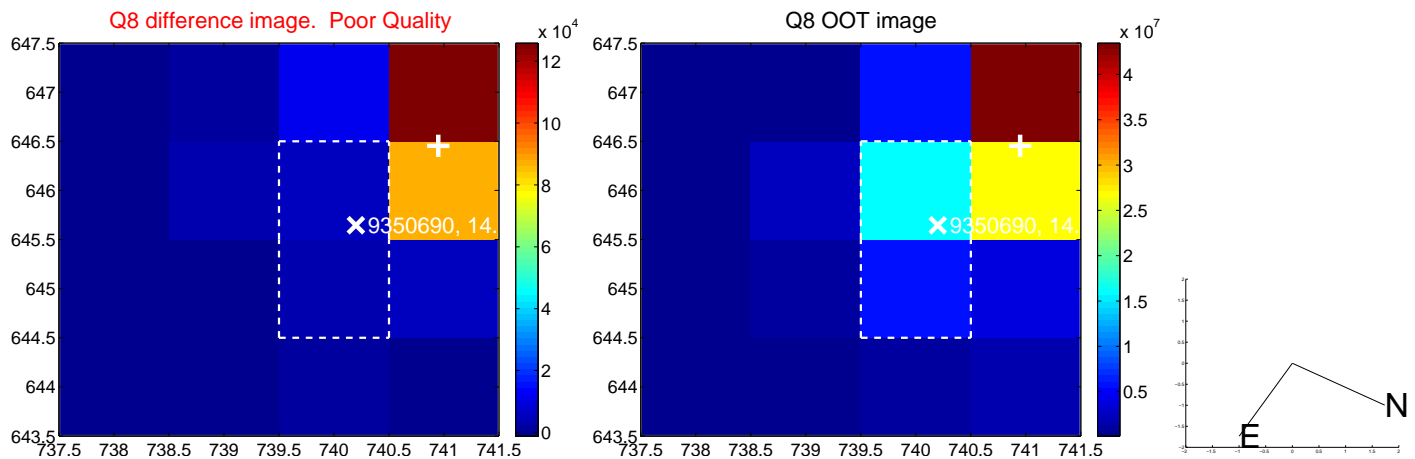
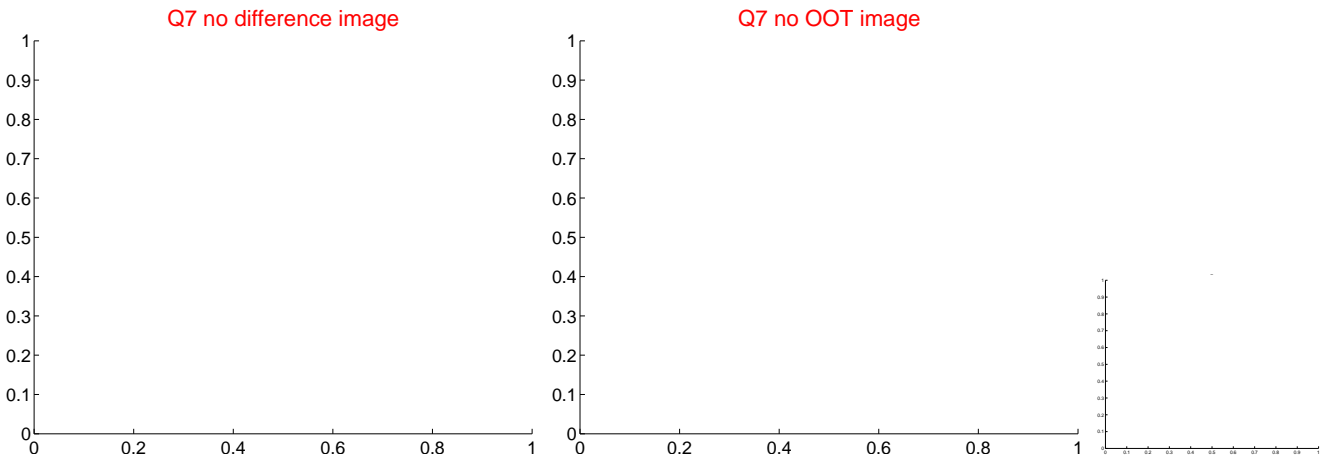
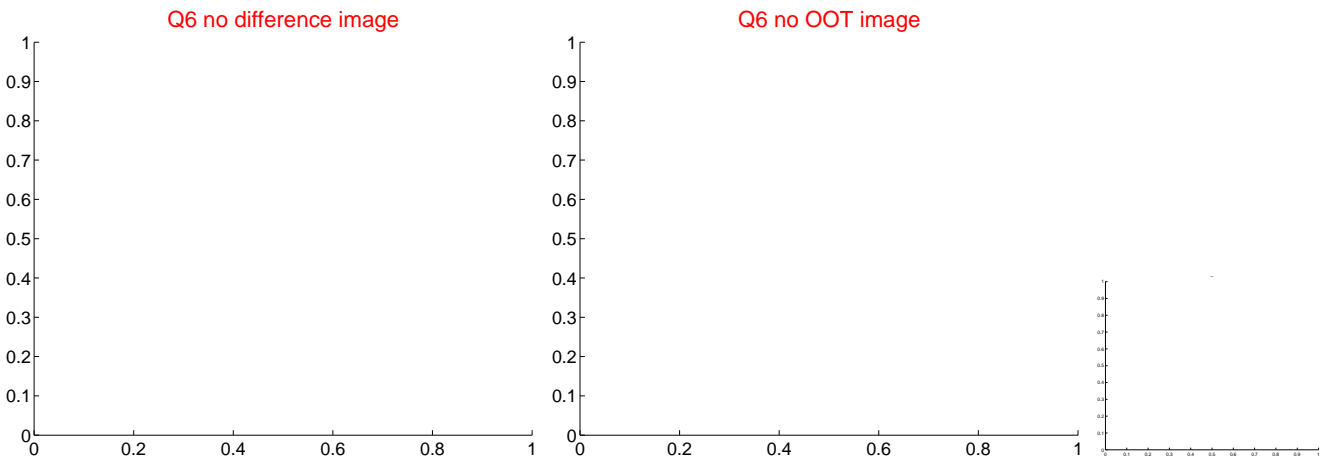
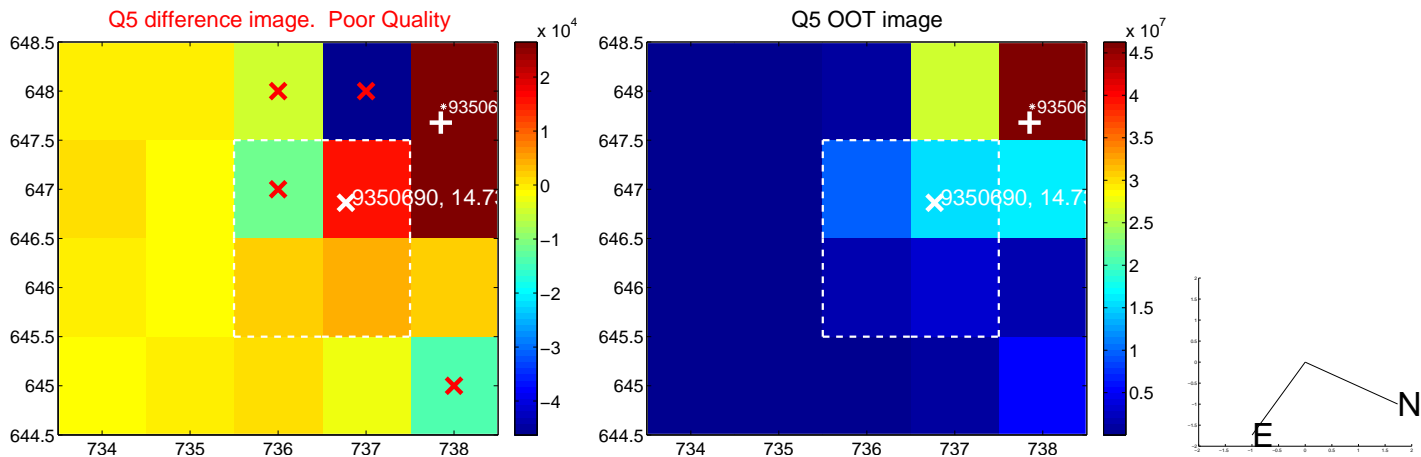


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

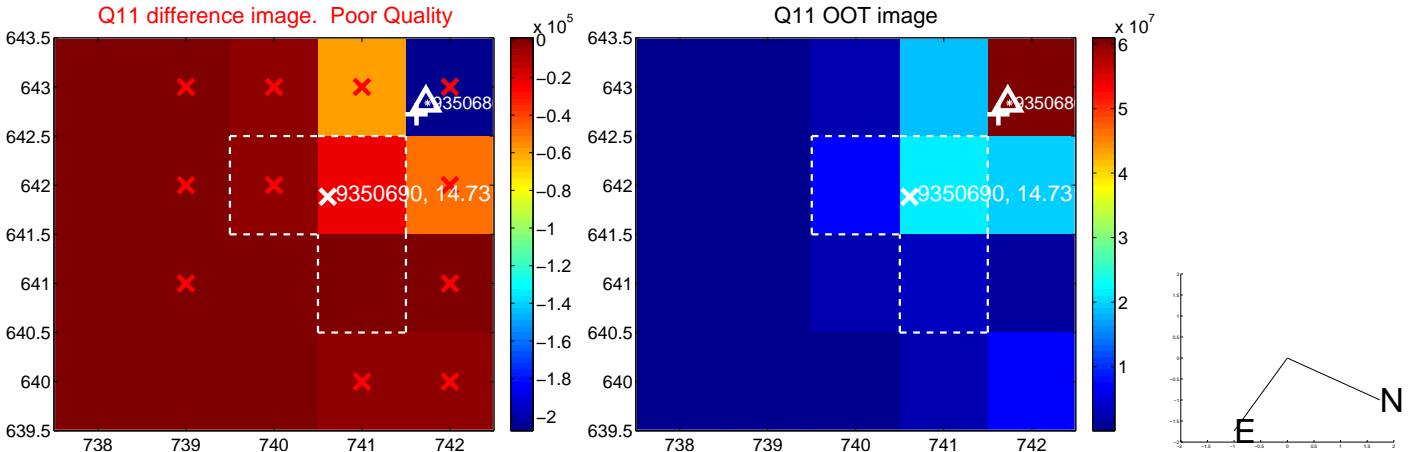
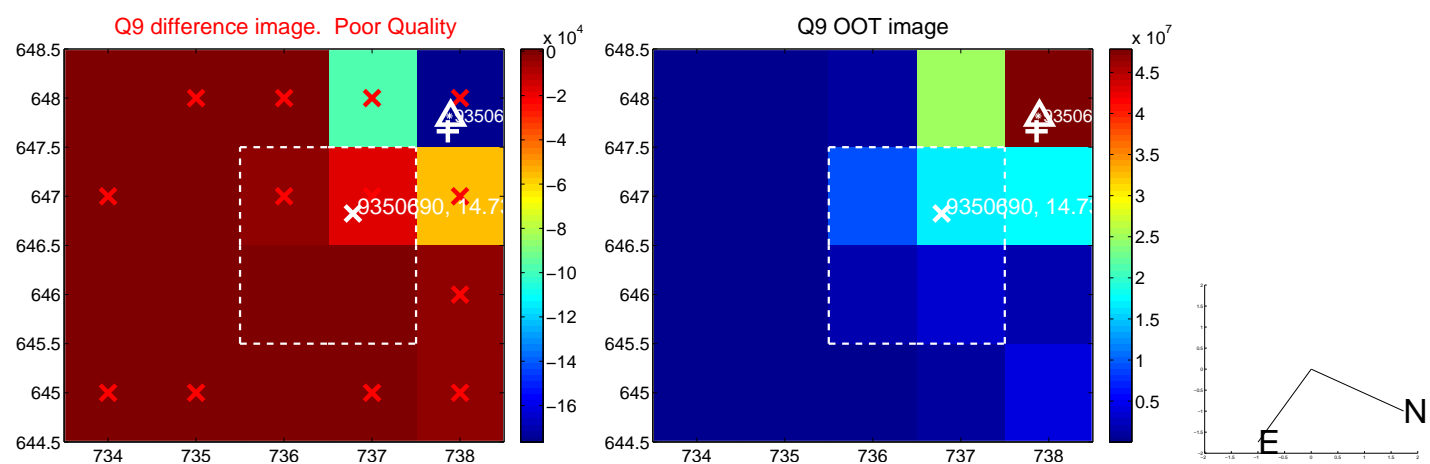
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



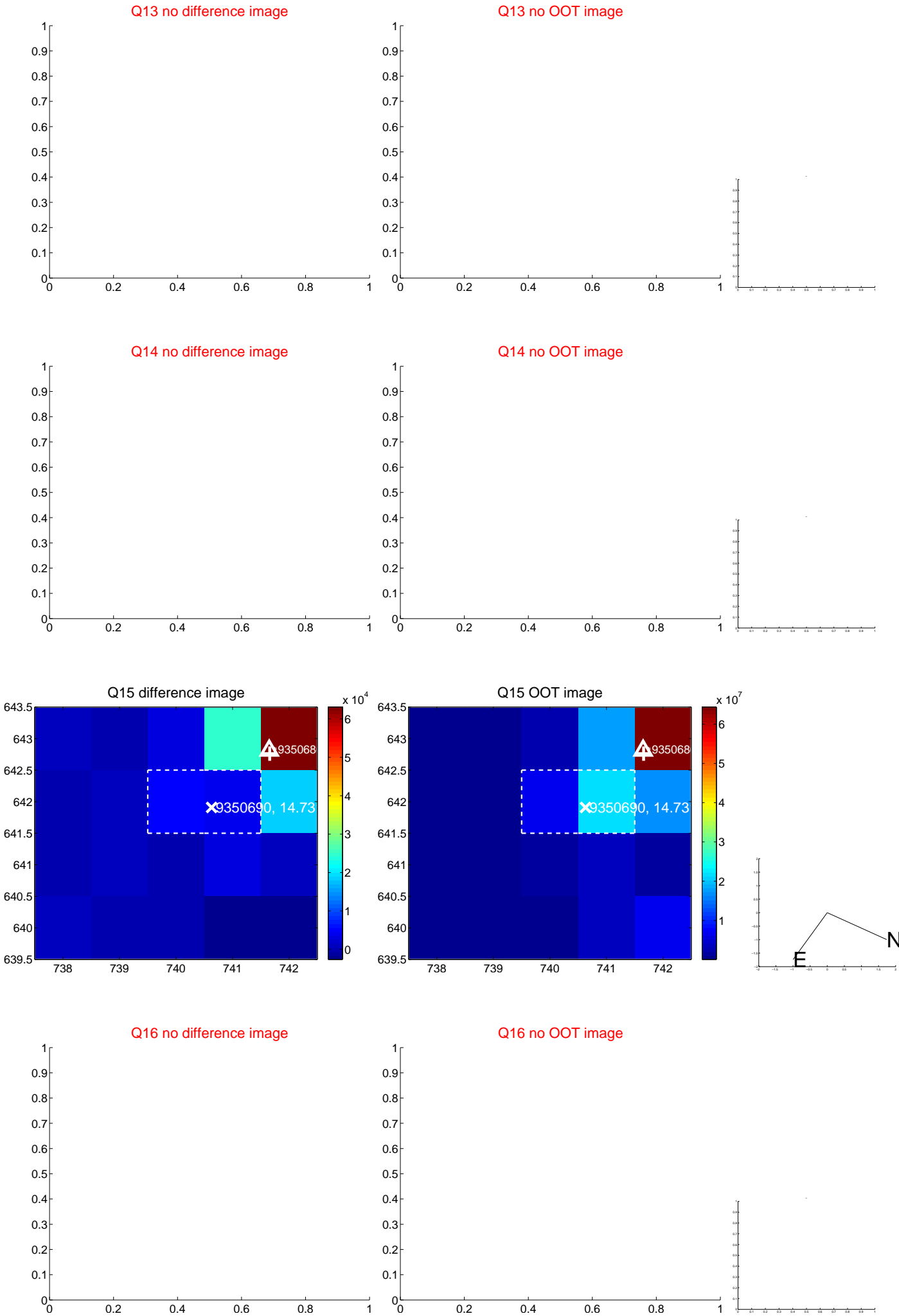
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



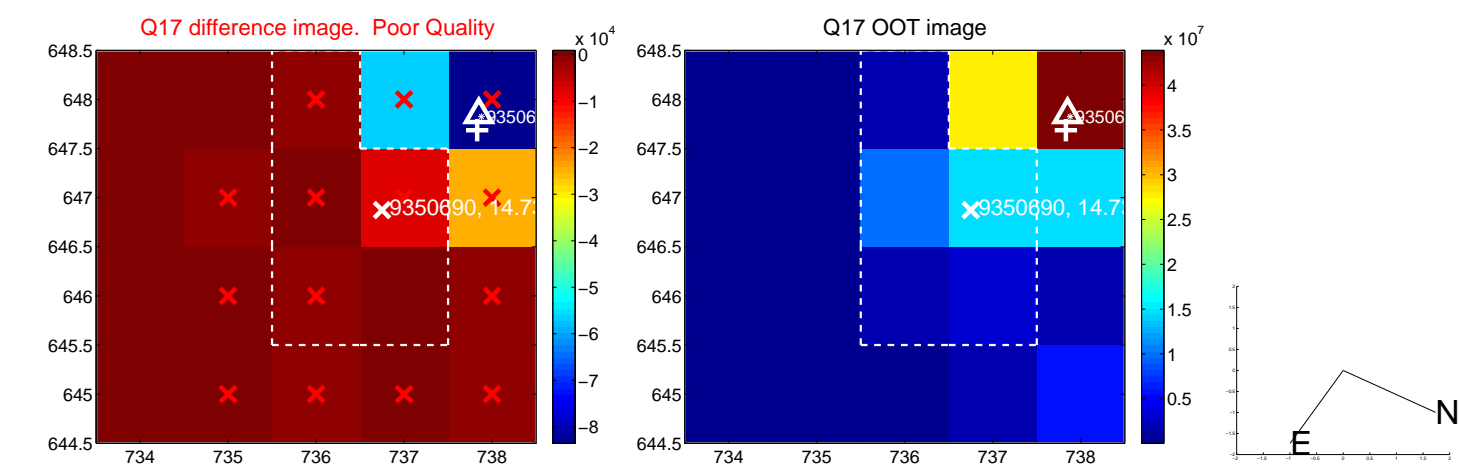
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



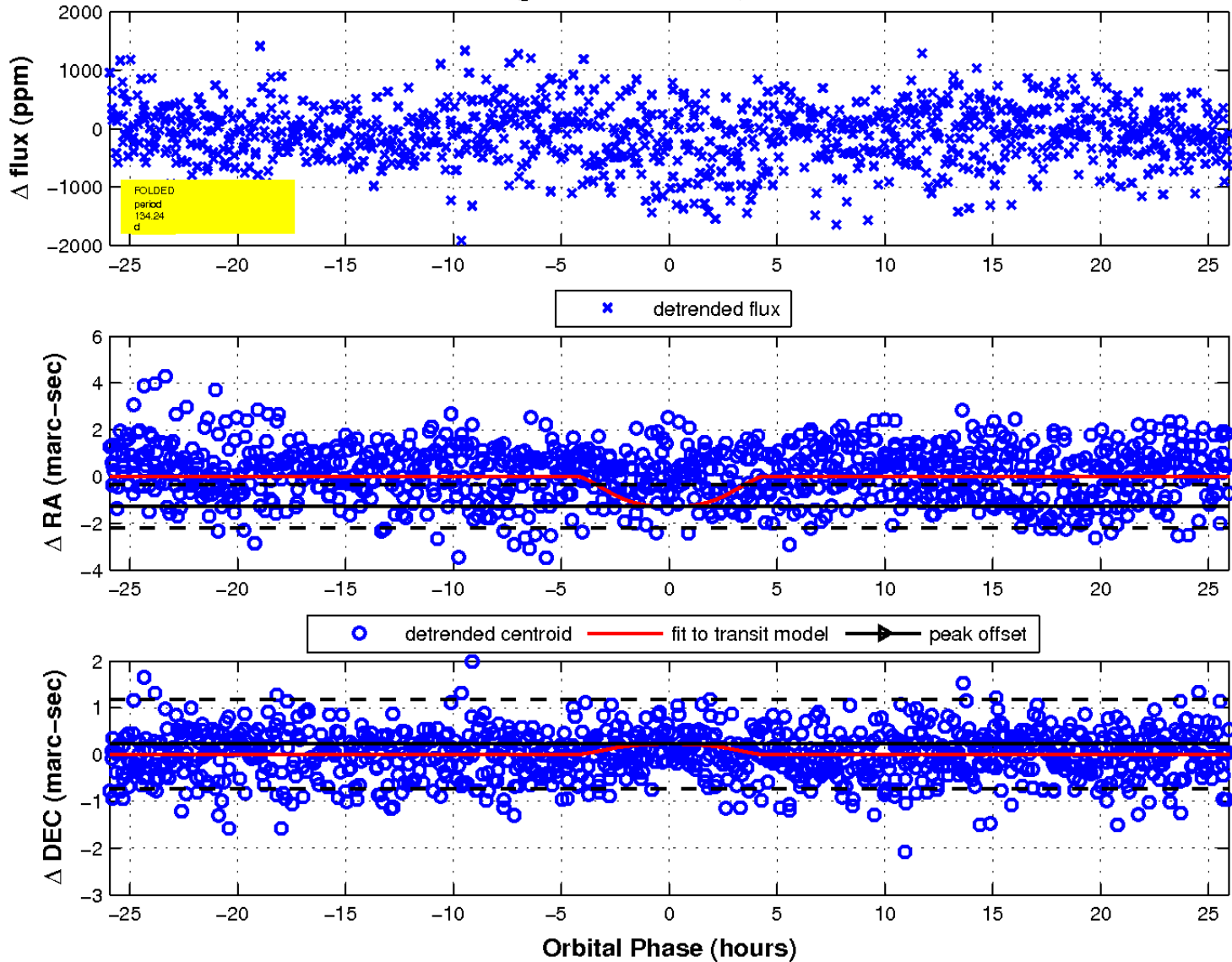
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



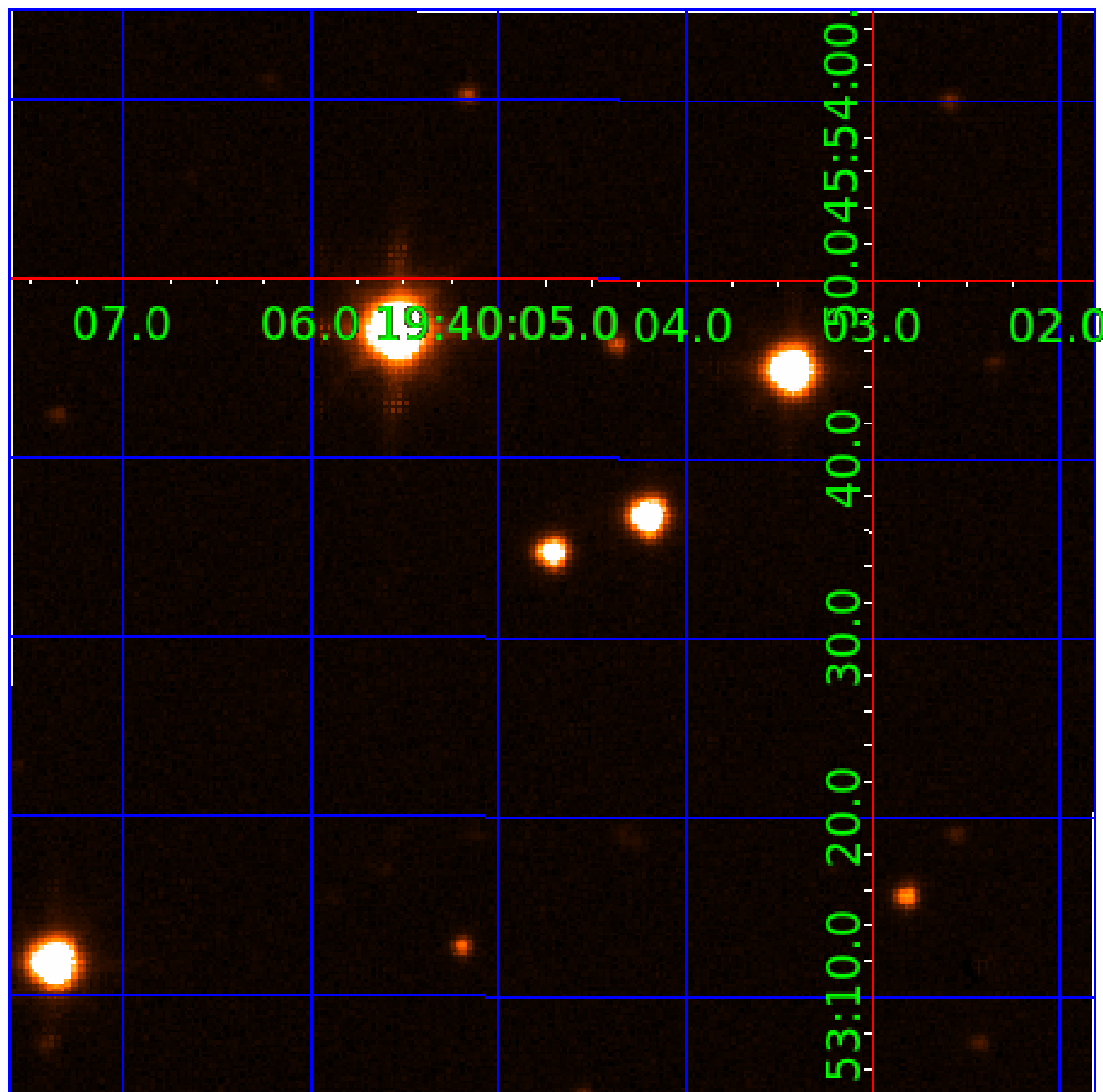
fluxWeightedCentroids, Planet 3 of 4





UKIRT Image

Declination



# KIC 009350690

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009350690-01	OBS	No	0.811326	131.944924	45.2	4.915	9.3	6.6	1.20	6363	0.86	6188.51
009350690-02	OBS	No	54.193534	174.050632	490.0	6.713	11.0	5.3	1.20	6363	2.99	22.83
009350690-03	OBS	No	134.244903	231.808236	1148.6	8.671	10.7	8.2	1.20	6363	5.18	6.81
009350690-04	OBS	No	92.438309	154.417683	1112.1	9.954	9.6	7.2	1.20	6363	7.58	11.20

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009350690-01	OBS	FP	0.00	1	0	1	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_RESOLVED_OFFSET
009350690-02	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_RESOLVED_OFFSET
009350690-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—CENT_FEW_DIFFS
009350690-04	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_RESOLVED_OFFSET

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

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

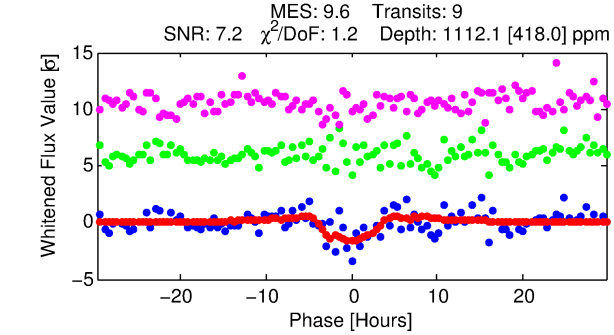
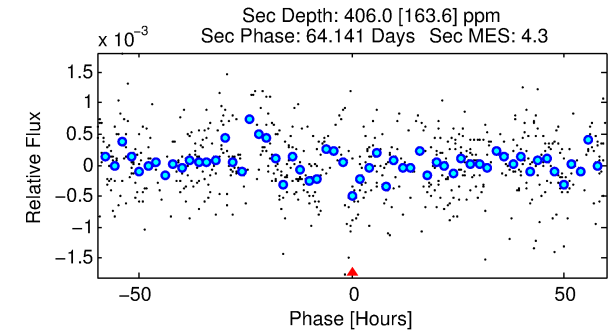
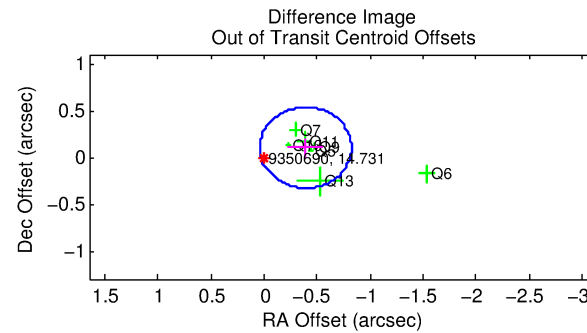
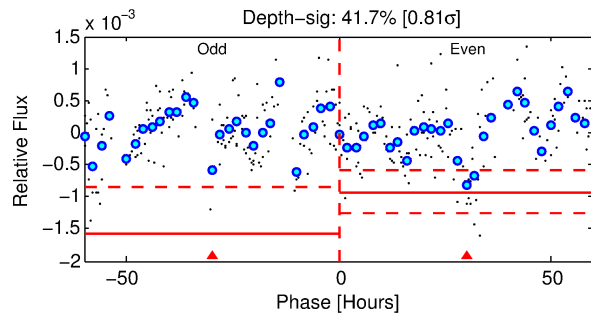
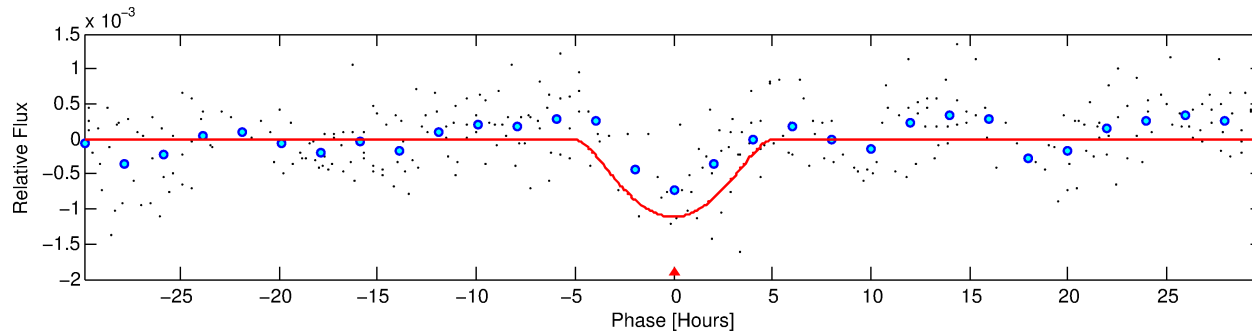
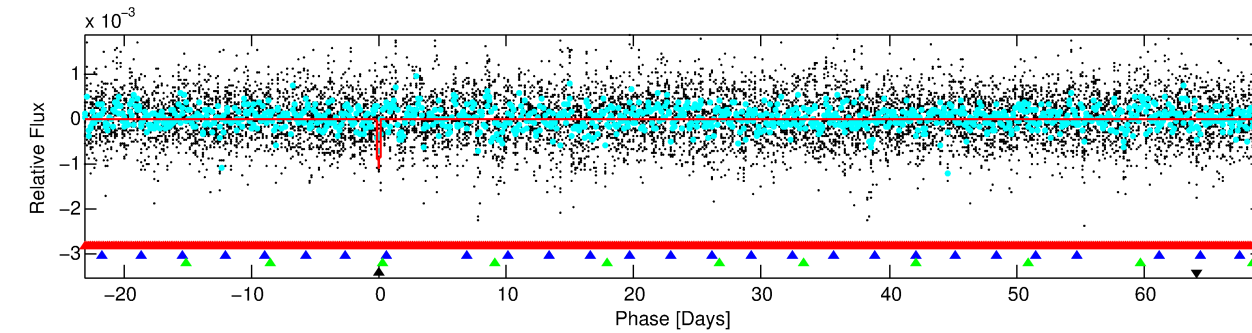
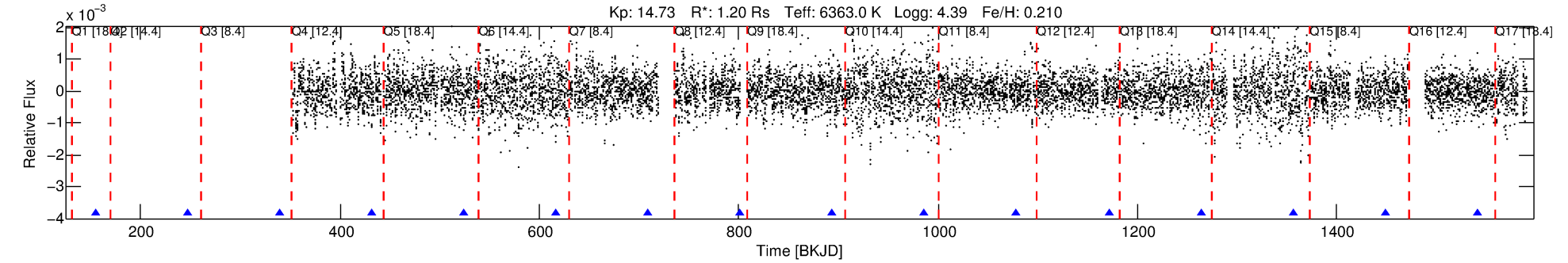
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009350690-04

No Significant Match Found

# DV One-Page Summary

KIC: 9350690 Candidate: 4 of 4 Period: 92.438 d



## DV Fit Results:

Period = 92.43831 [0.00525] d  
Epoch = 154.4177 [0.0525] BKJD  
Rp/R\* = 0.0580 [0.2085]  
a/R\* = 24.59 [19.93]  
b = 1.00 [0.31]  
Seff = 11.20 [4.69]  
Teq = 467 [49] K  
Rp = 7.58 [27.37] Re  
a = 0.4337 [0.1190] AU  
Ag = 731.16 [5272.64] [0.14 $\sigma$ ]  
Teffp = 3751 [6754] K [0.49 $\sigma$ ]

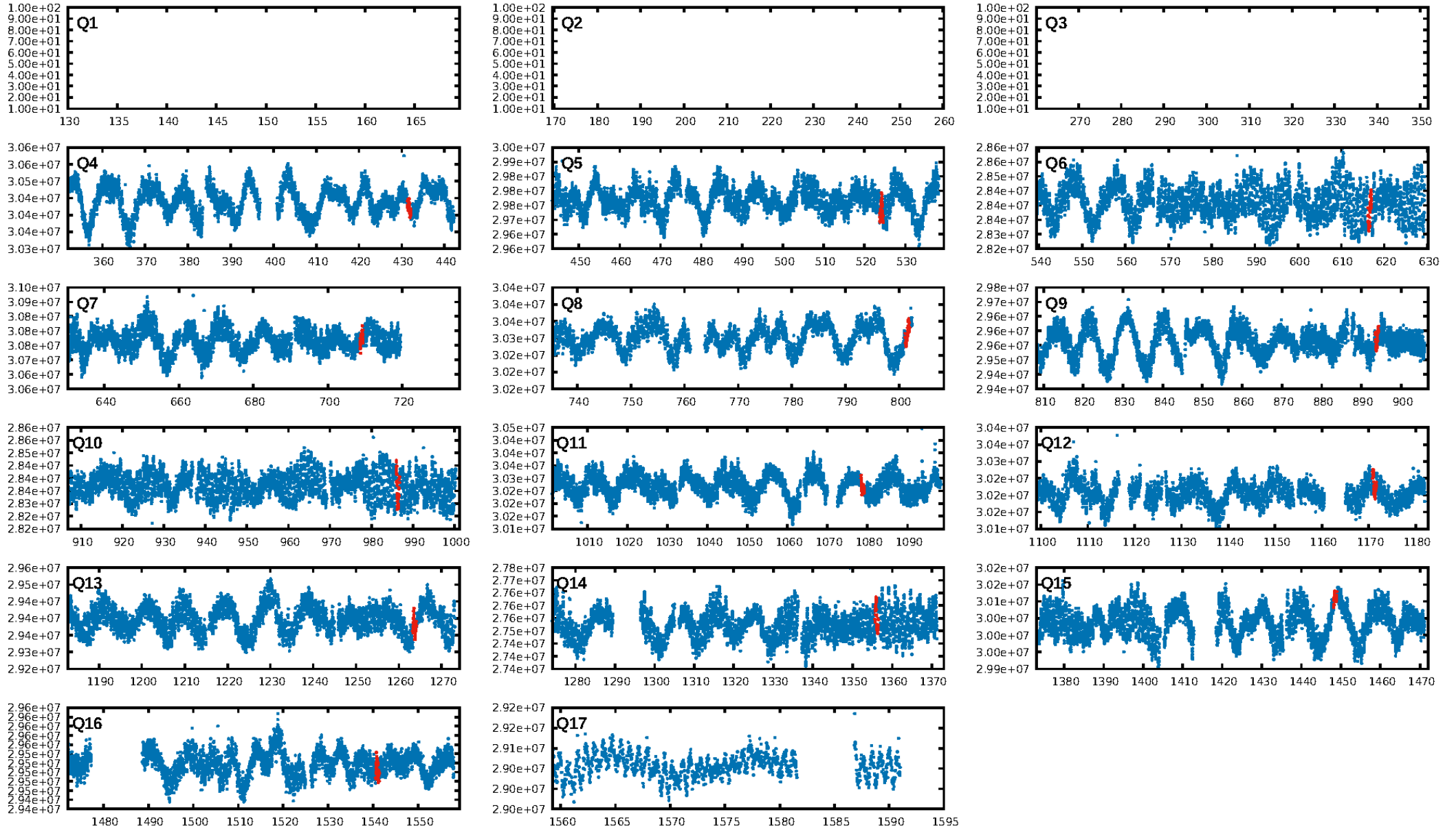
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [76.46 $\sigma$ ]  
LongPeriod-sig: 100.0% [76.01 $\sigma$ ]  
ModelChiSquare2-sig: 75.7%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 3.48e-13  
RollingBand-fgt: 1.00 [9/9]  
GhostDiagnostic-chr: -10.41  
Centroid-sig: 0.8%  
Centroid-so: 3.406 arcsec [7.27 $\sigma$ ]  
OotOffset-rm: 0.404 arcsec [2.80 $\sigma$ ]  
KicOffset-rm: 5.791 arcsec [32.94 $\sigma$ ]  
OotOffset-st: 2/2/0/3 [7]  
KicOffset-st: 2/2/0/3 [7]  
DiffImageQuality-fgm: 0.71 [5/7]  
DiffImageOverlap-fno: 0.00 [0/13]

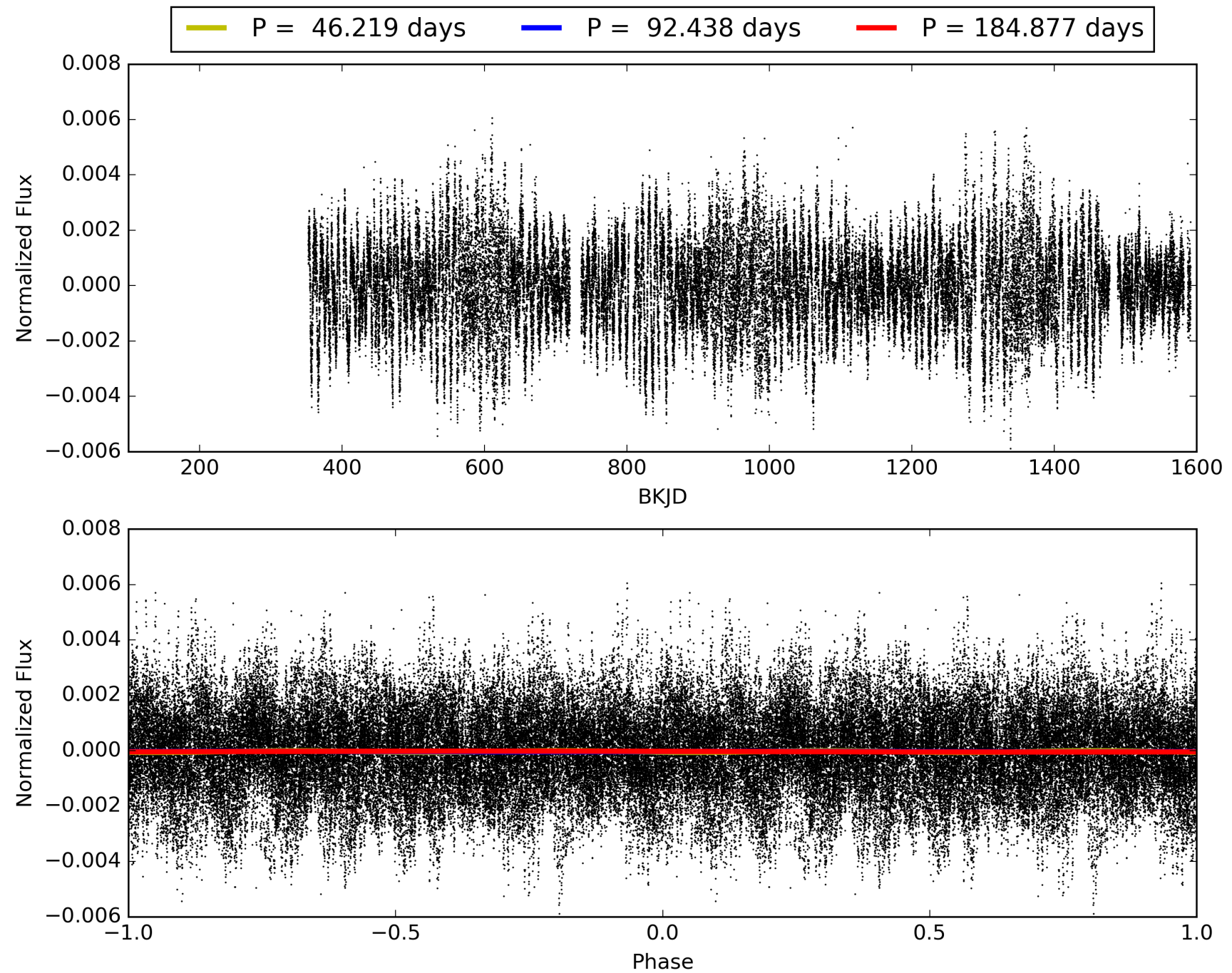
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 17:12:18 Z

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

# TCE 009350690-04, PDC Light Curves

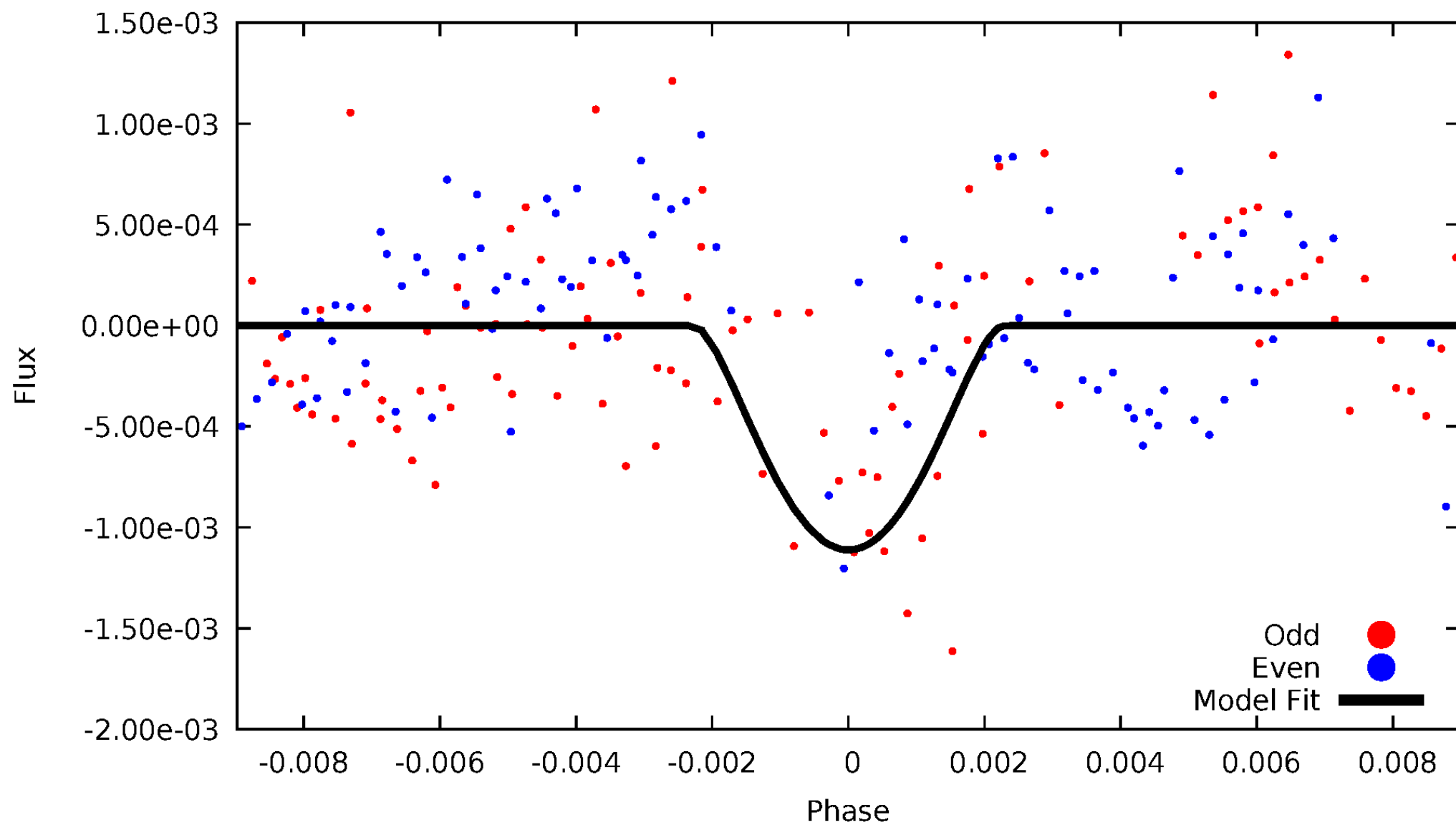


# TCE 009350690-04



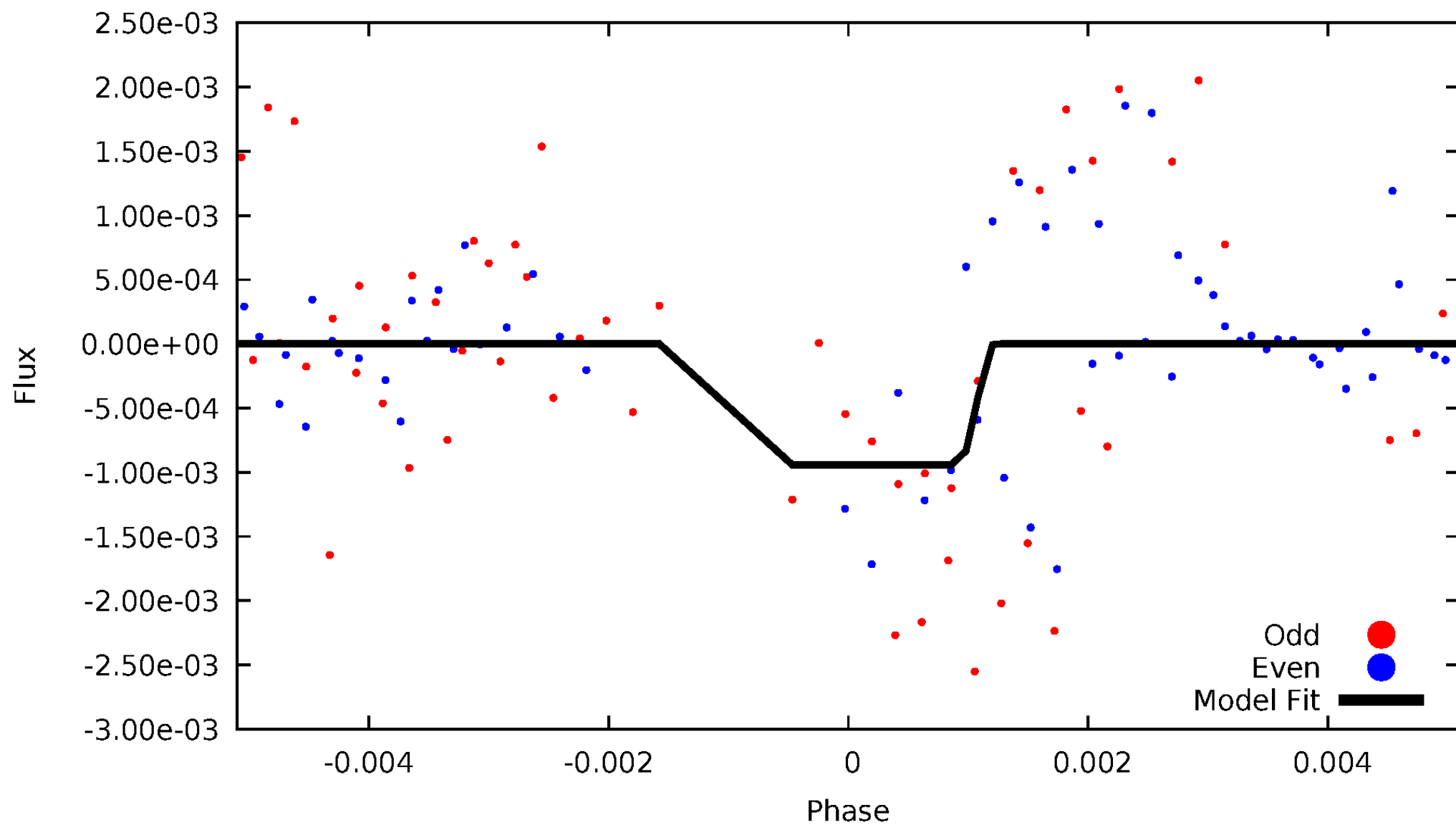
# DV Odd/Even

TCE 009350690-04



# ALT Odd/Even

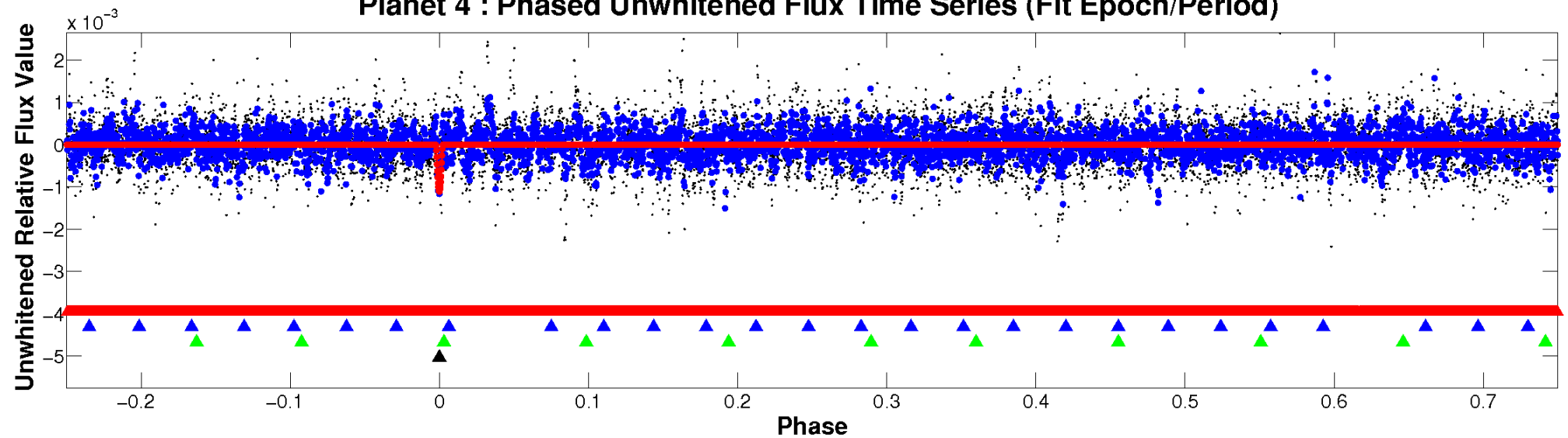
TCE 009350690-04



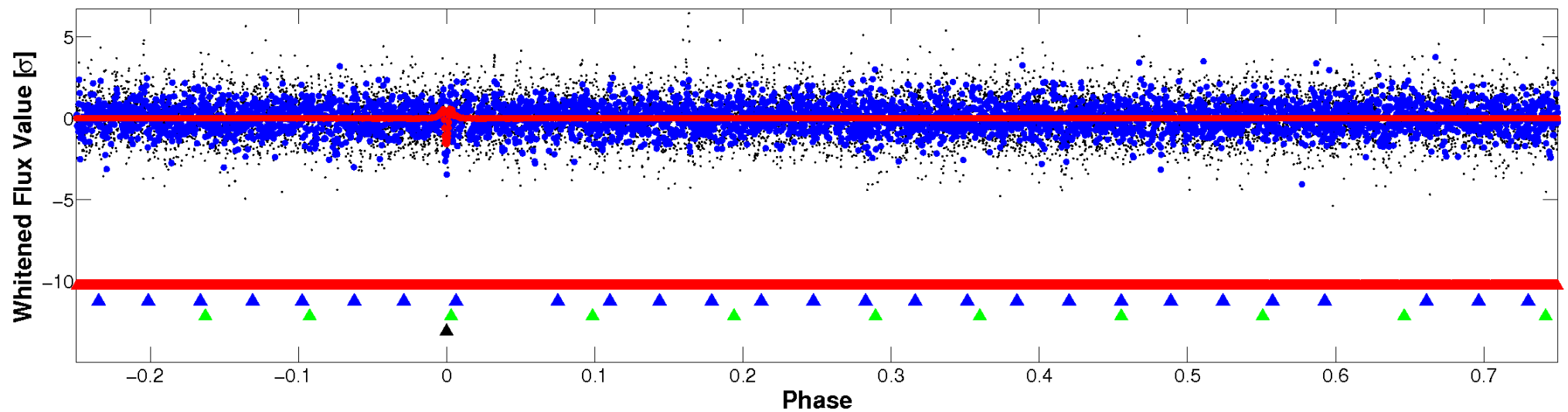


# Non-Whitened Vs. Whitened Light Curve

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

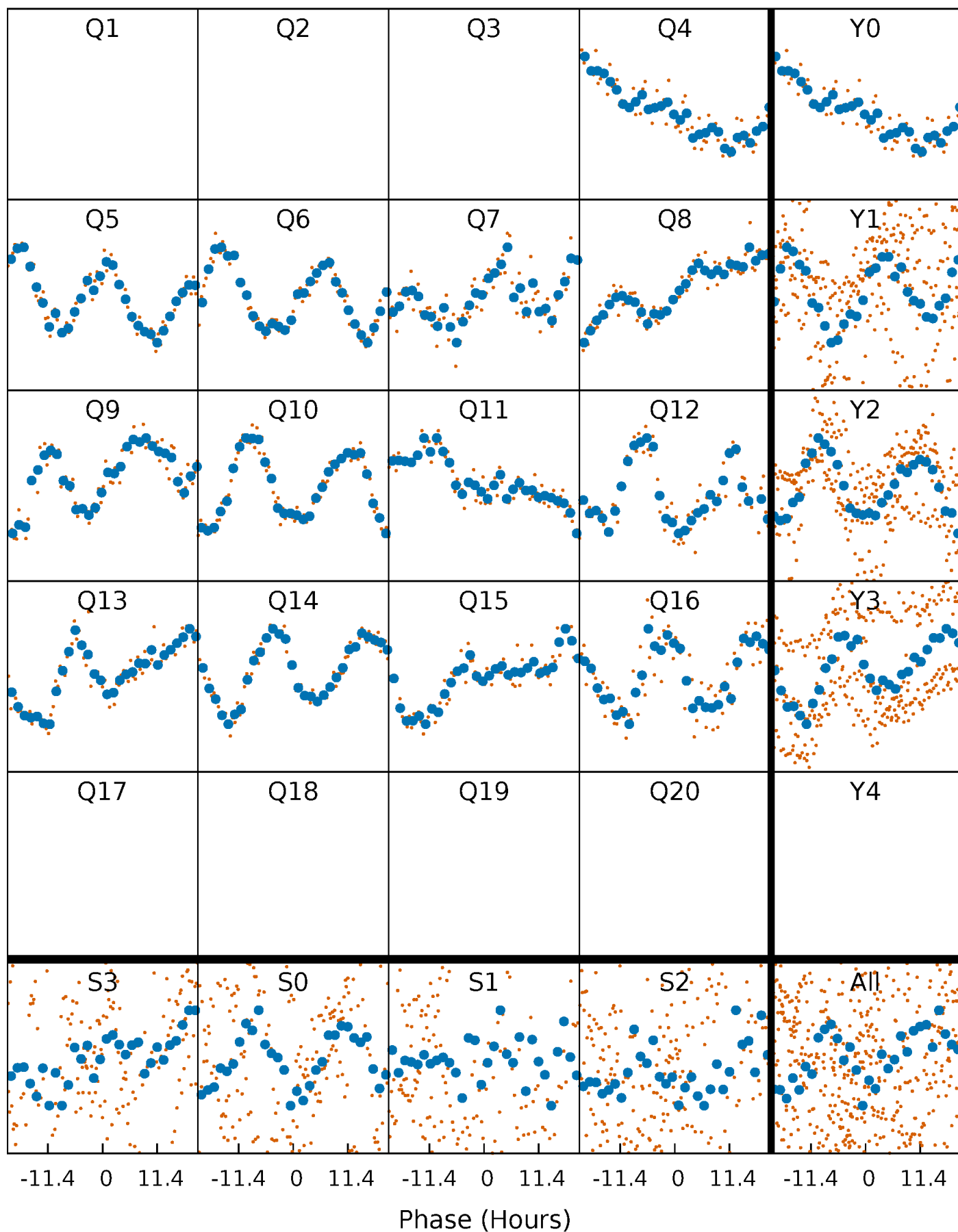


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



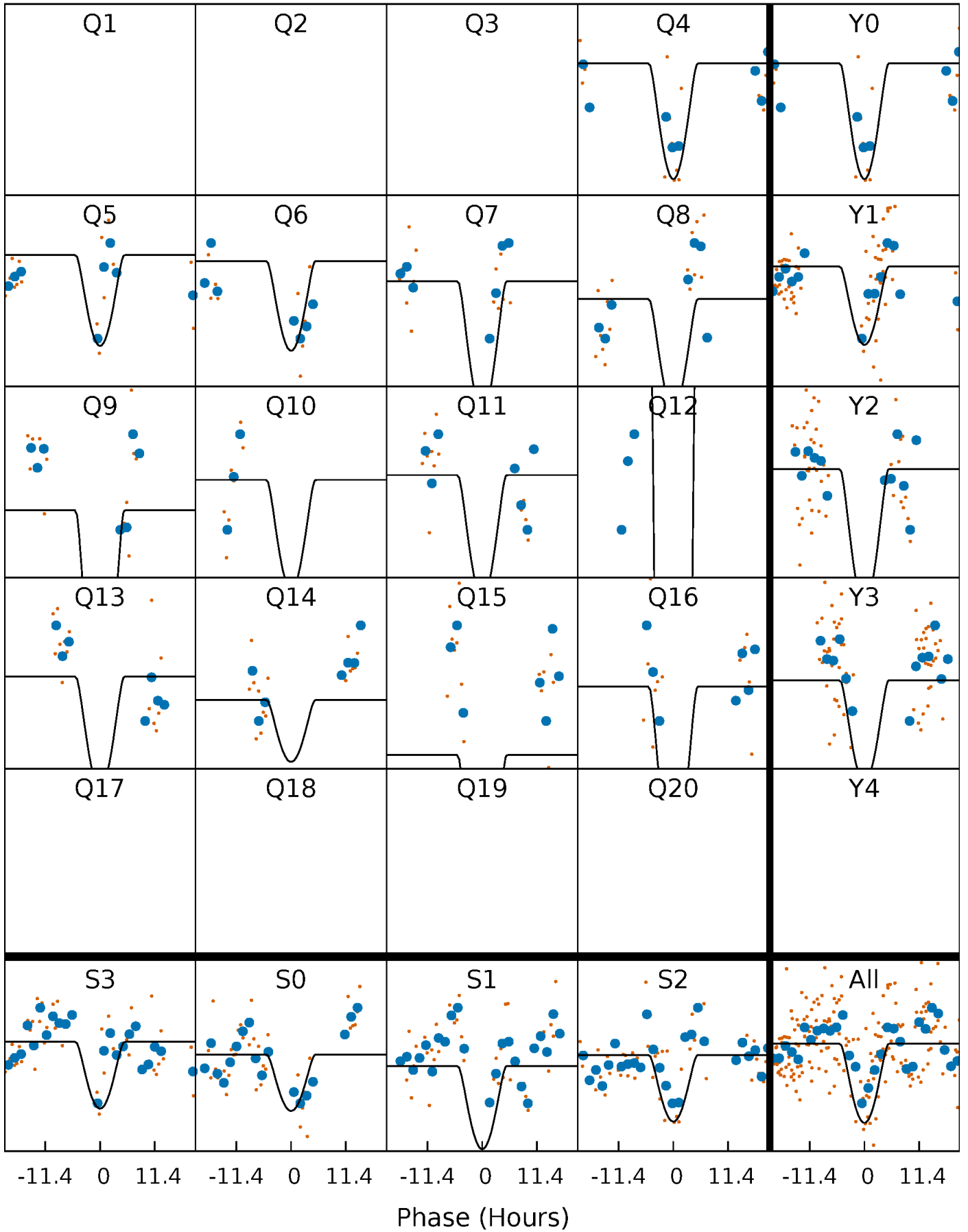
# PDC Quarter-Phased Transit Curves

TCE 009350690-04   P= 92.438309 Days    $T_0=154.417683$  (BKJD)



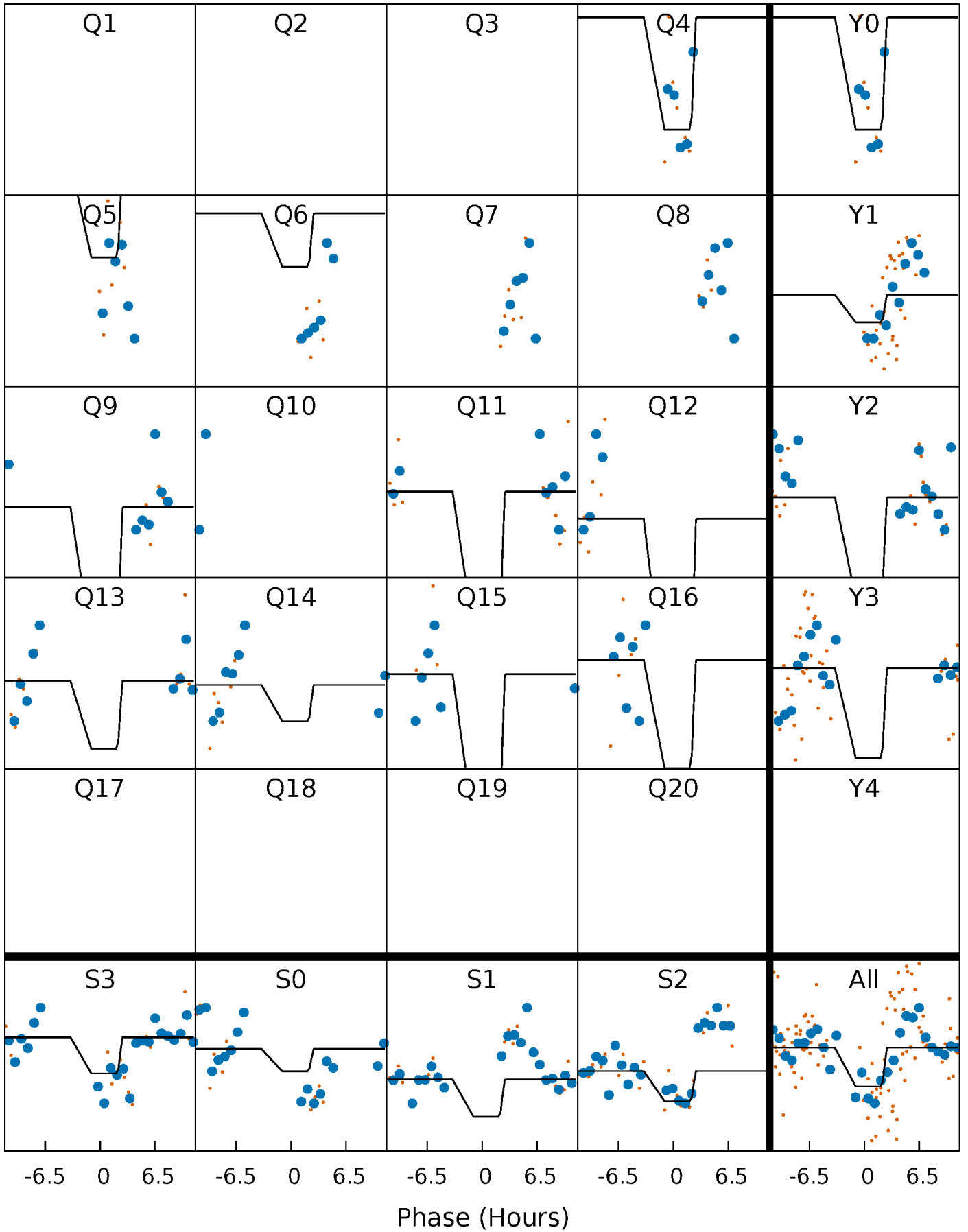
# DV Quarter-Phased Transit Curves

TCE 009350690-04     $P = 92.438309$  Days     $T_0 = 154.417683$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

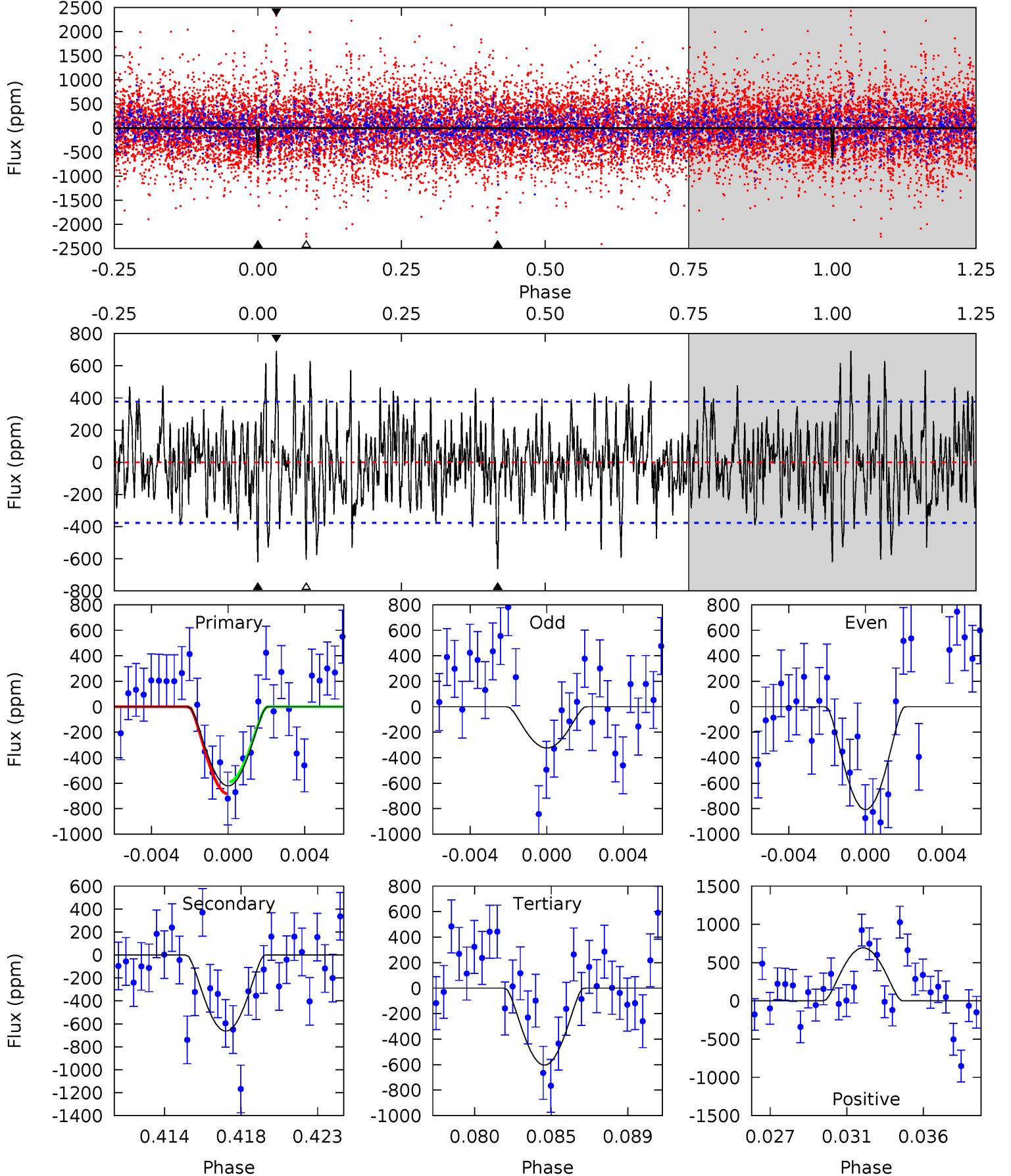
TCE 009350690-04     $P = 92.445033$  Days     $T_0 = 154.366727$  (BKJD)



# DV Model-Shift Uniqueness Test

009350690-04, P = 92.438309 Days, E = 154.417683 Days

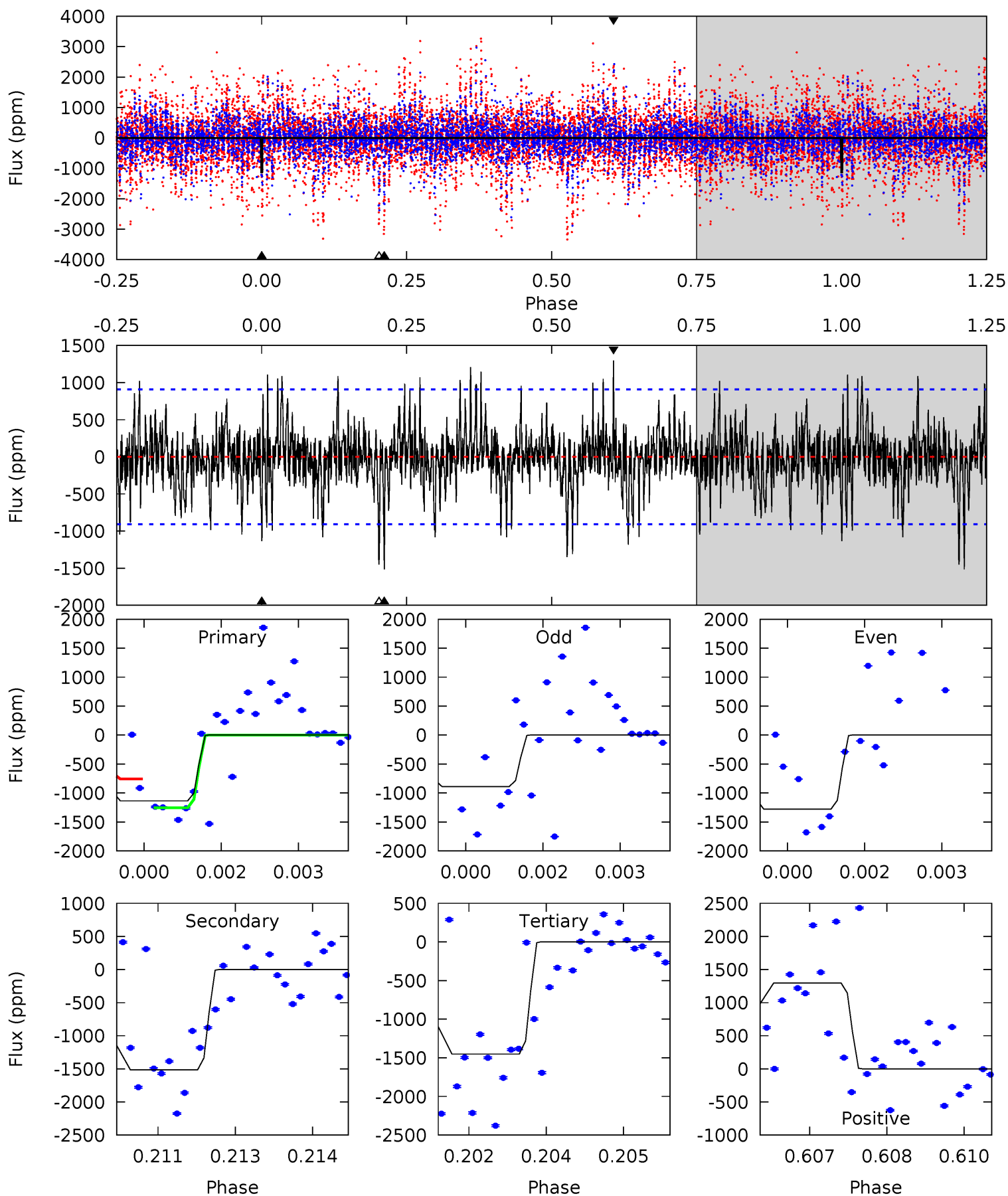
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.54	9.12	8.30	9.53	5.18	2.84	2.62	0.24	-0.99	0.82	-0.41	3.29	0.98	0.51	0.61



# Alt Model-Shift Uniqueness Test

009350690-04, P = 92.445033 Days, E = 154.366727 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.73	8.96	8.59	7.68	5.38	3.17	1.86	-1.87	-0.95	0.37	1.28	1.10	0.91	0.46	0.94



### Stellar Parameters For KIC 009350690

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6363^{+177}_{-243}$	$4.386^{+0.052}_{-0.208}$	$0.210^{+0.150}_{-0.350}$	$1.198^{+0.401}_{-0.125}$	$1.273^{+0.163}_{-0.182}$	$1.044^{+0.303}_{-0.560}$
	+3%/-4%	+1%/-5%	+71%/-167%	+33%/-10%	+13%/-14%	+29%/-54%
Source	KIC0	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 009350690-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-663 \pm 73$	$23.17^{+22.60}_{-16.23}$	$666^{+47}_{-31}$	$3114^{+1572}_{-522}$	$123^{+1242}_{-92}$
Alt.	$-1513 \pm 169$	$20.44^{+20.31}_{-14.46}$	$664^{+52}_{-35}$	$3676^{+2214}_{-700}$	$371^{+3949}_{-282}$

$T_{max}$  = 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  $A_{obs} \gg 1.0$



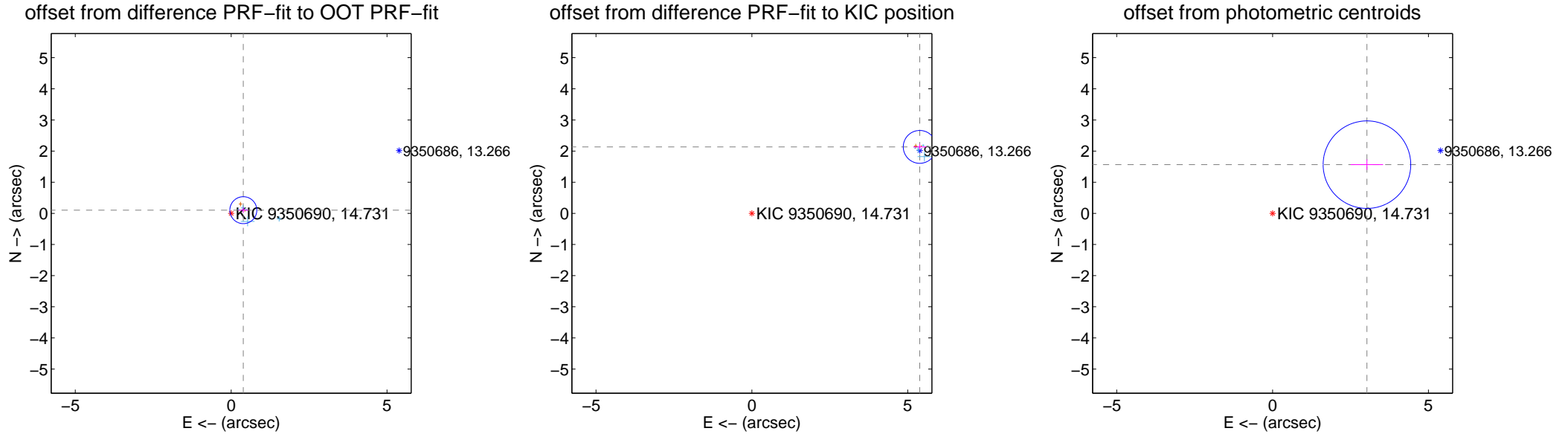
## DV Centroid Data

Supplemental centroid analysis for 009350690-04. Kepler magnitude: 14.73. Transit SNR 7.17

There are 5 quarters with good PRF difference image offsets

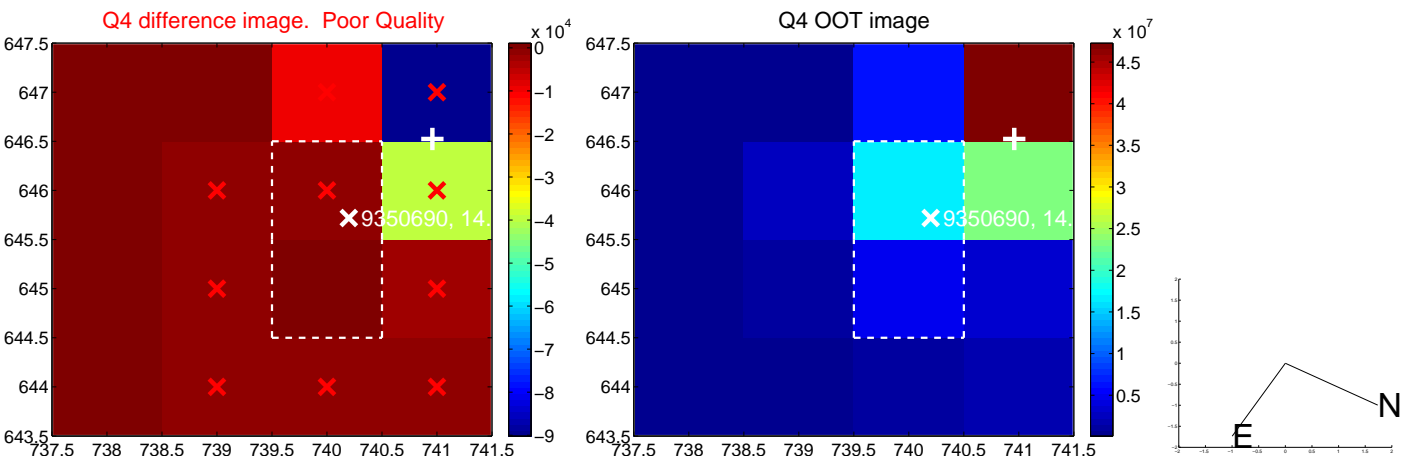
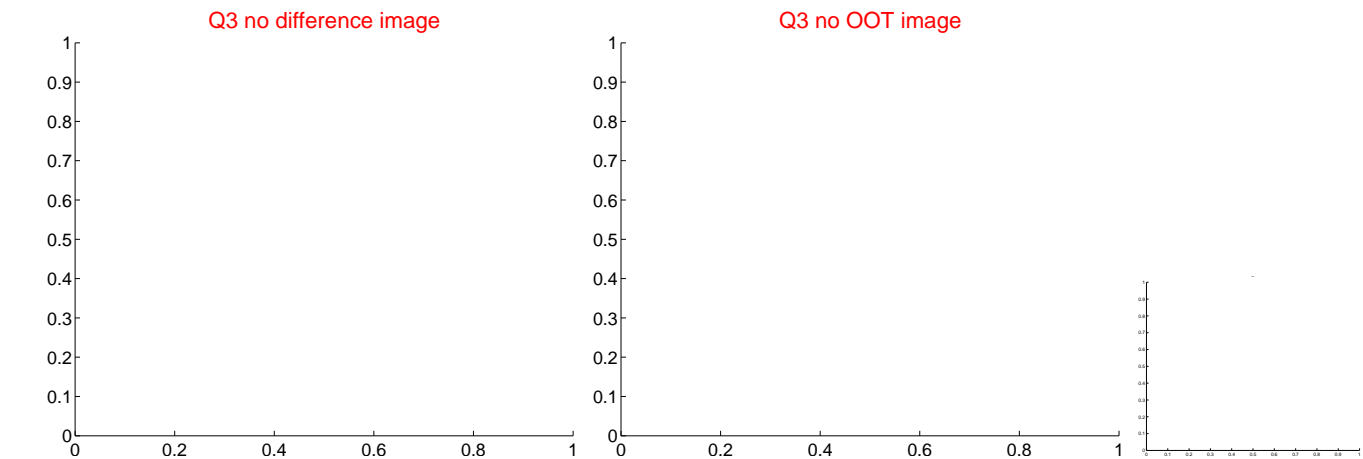
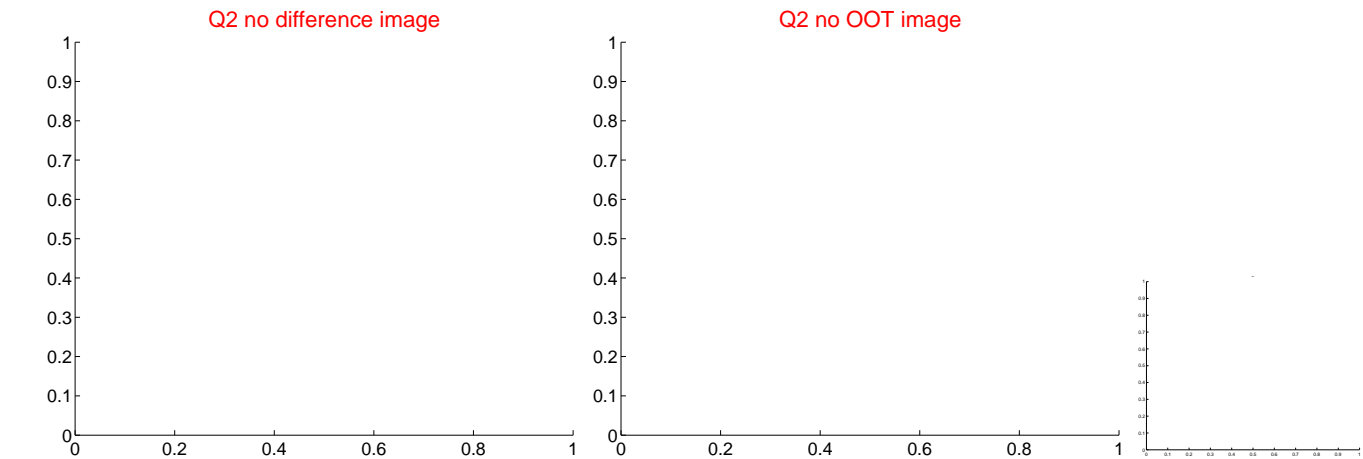
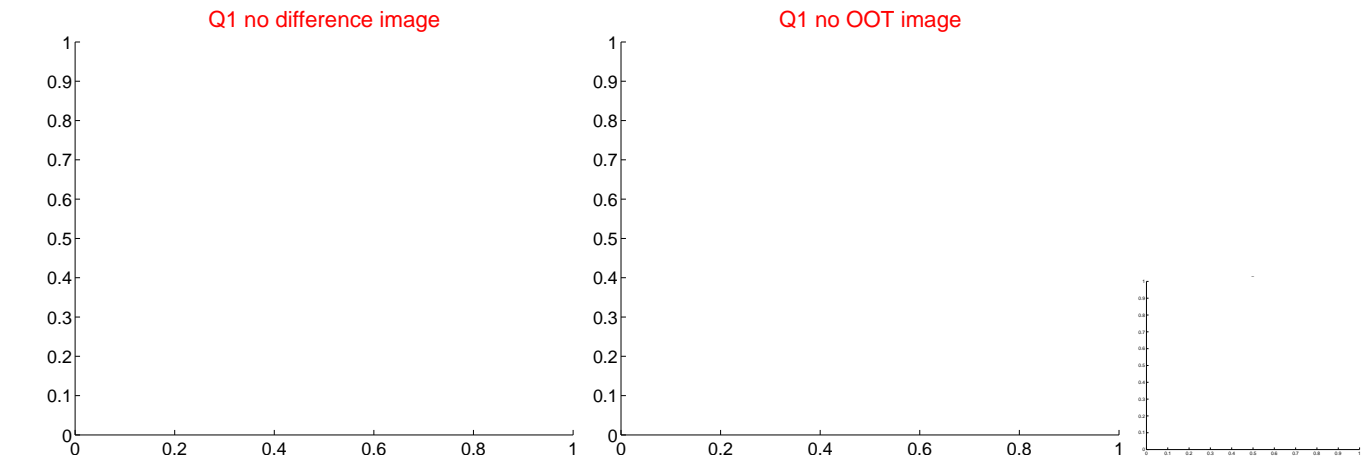
The OOT PRF centroid is offset from the target star catalog position by about 5.42 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.404 \pm 0.144$	2.80	$-0.391 \pm 0.156$	$0.102 \pm 0.091$
PRF-fit source offset from KIC position	$5.791 \pm 0.176$	32.94	$-5.384 \pm 0.205$	$2.134 \pm 0.091$
photometric centroid source offset	$3.41 \pm 0.47$	7.27	$-3.03 \pm 0.52$	$1.56 \pm 0.17$

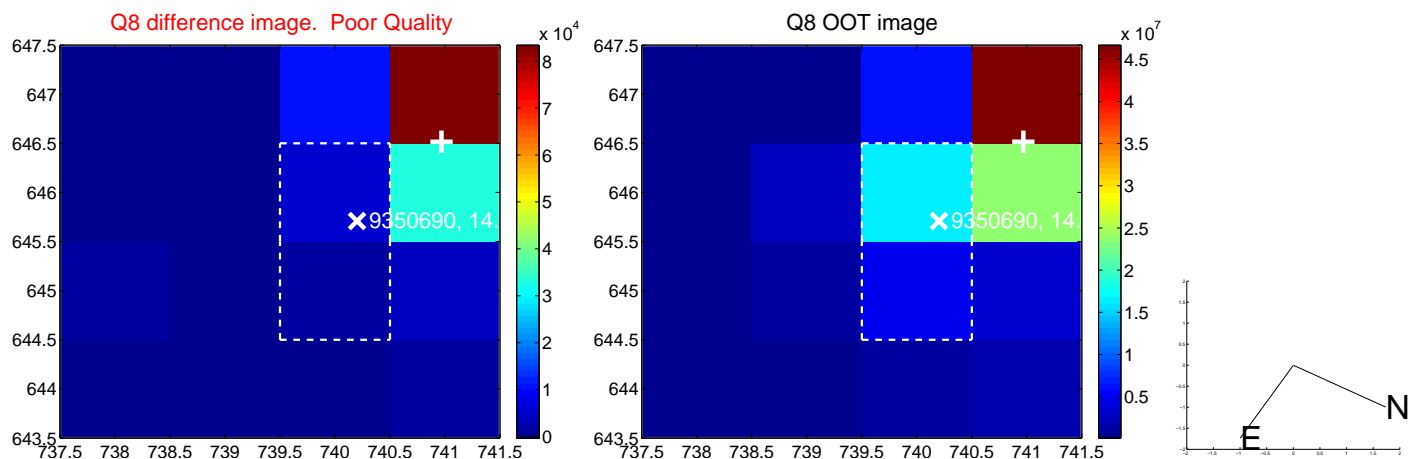
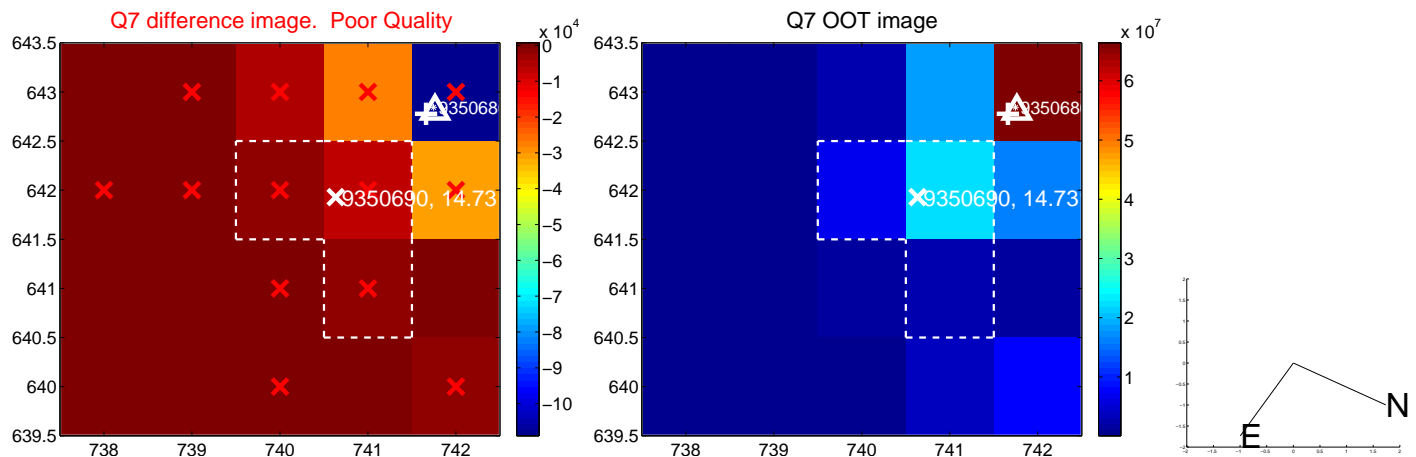
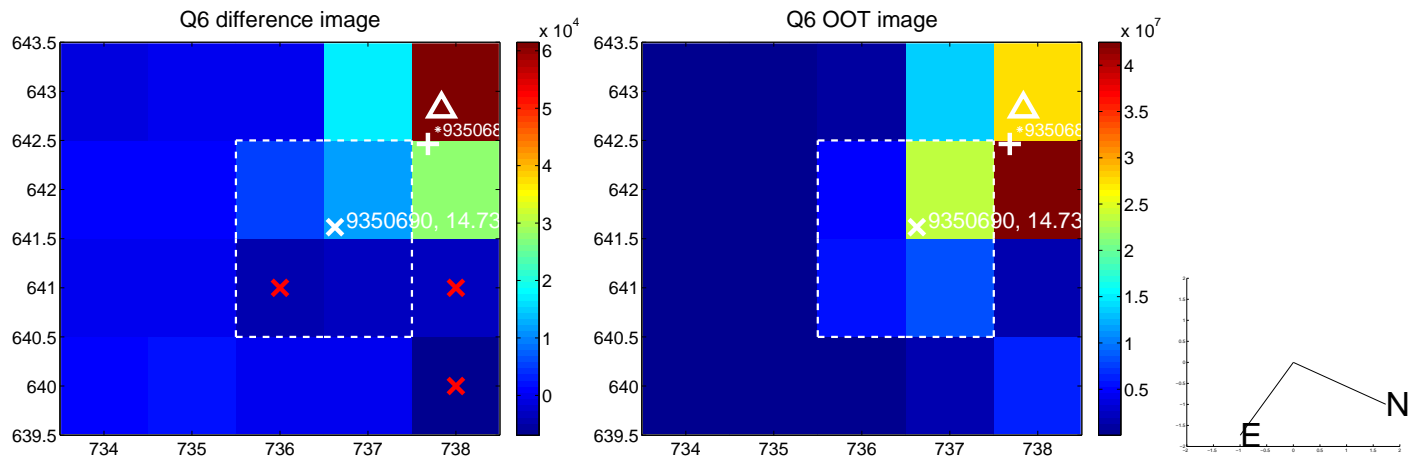
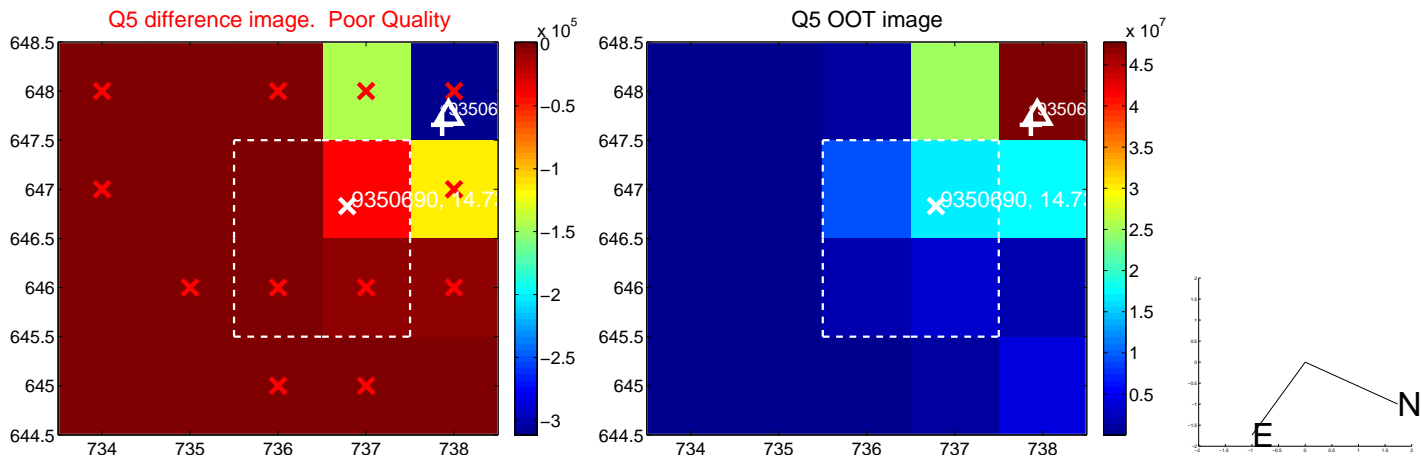


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

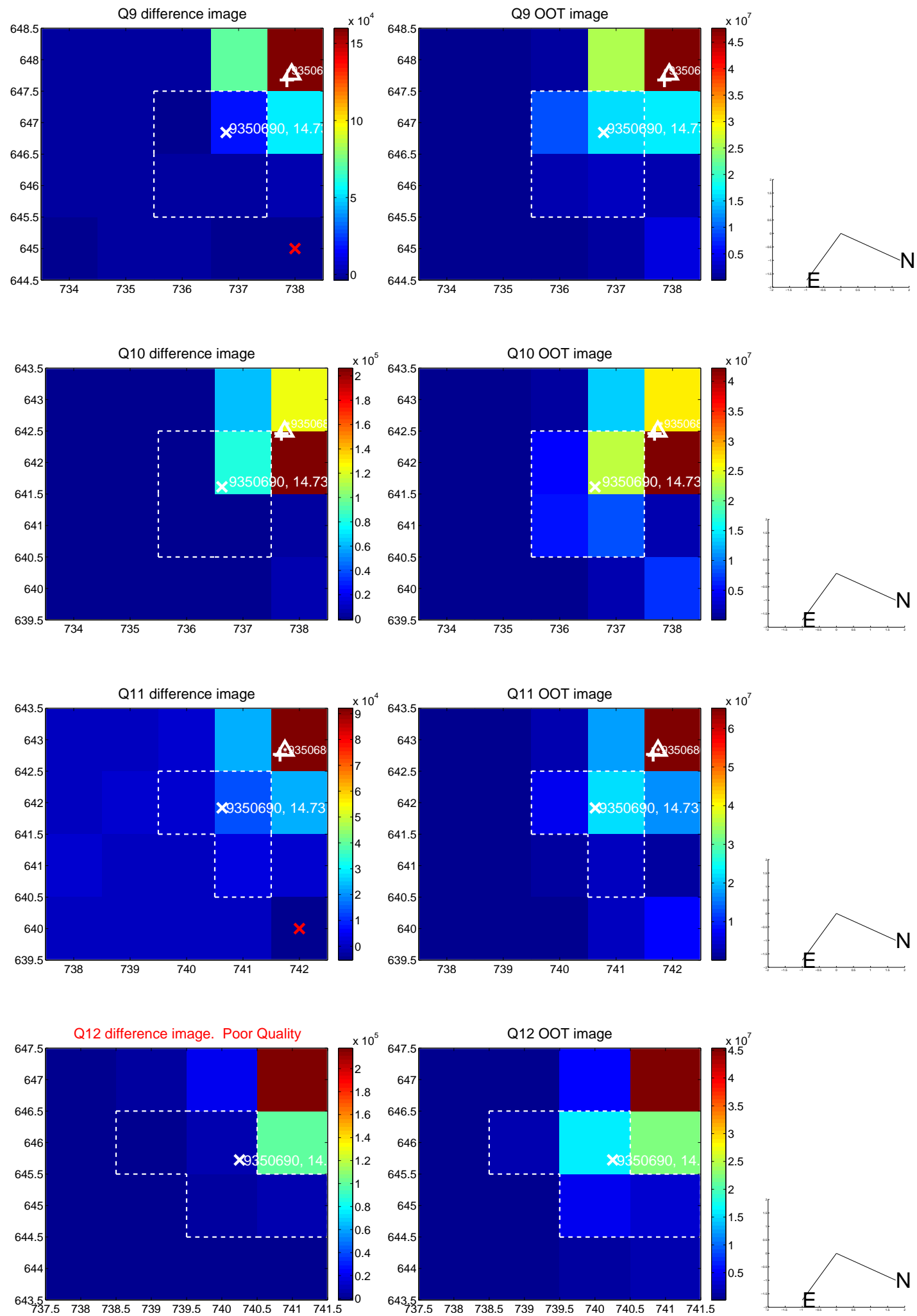
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



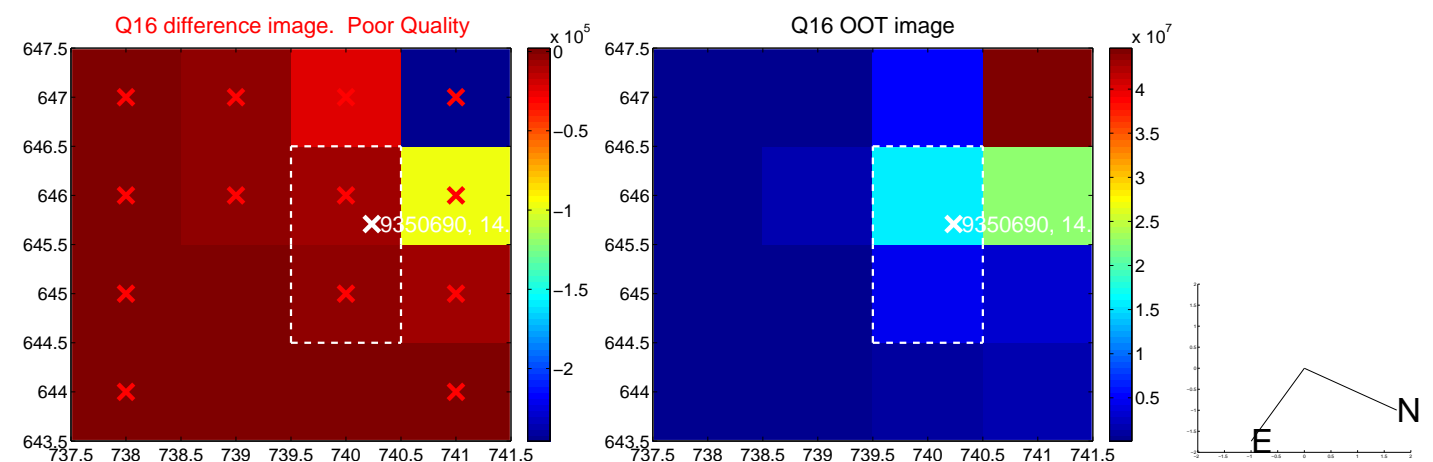
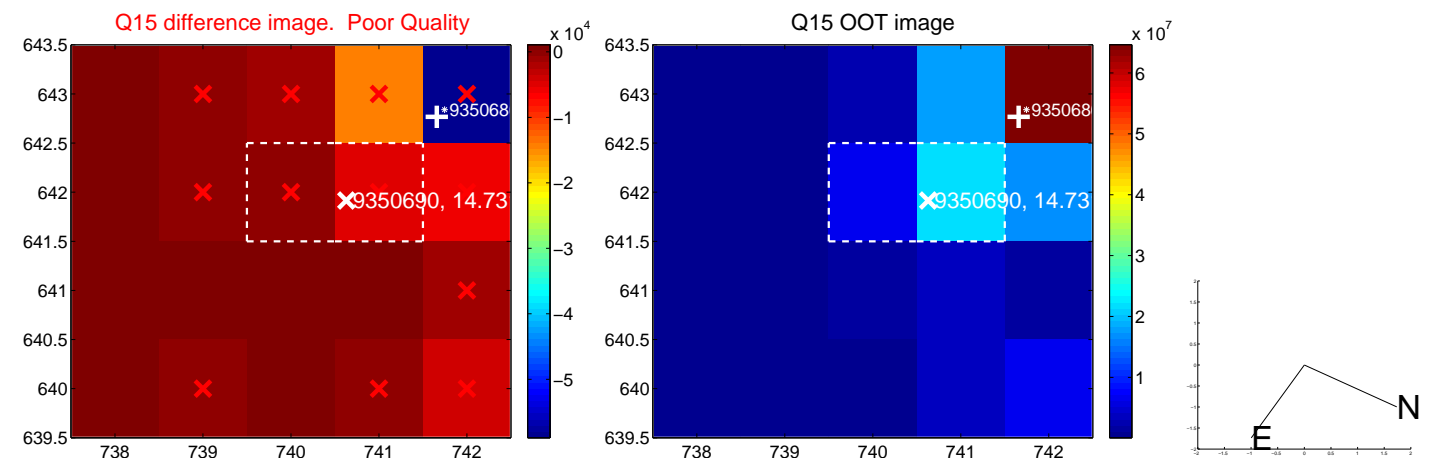
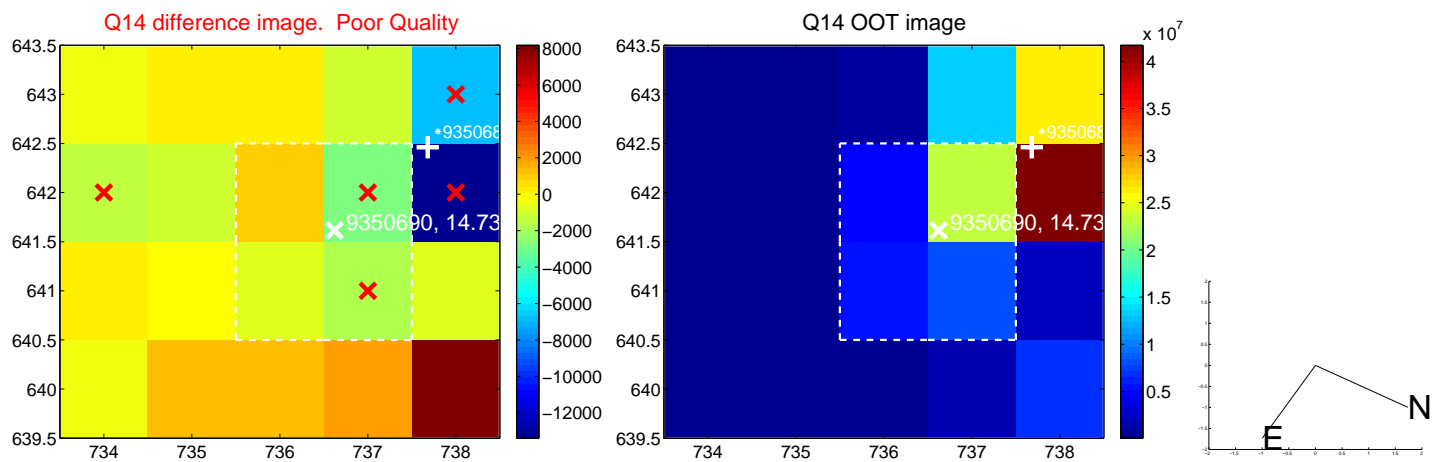
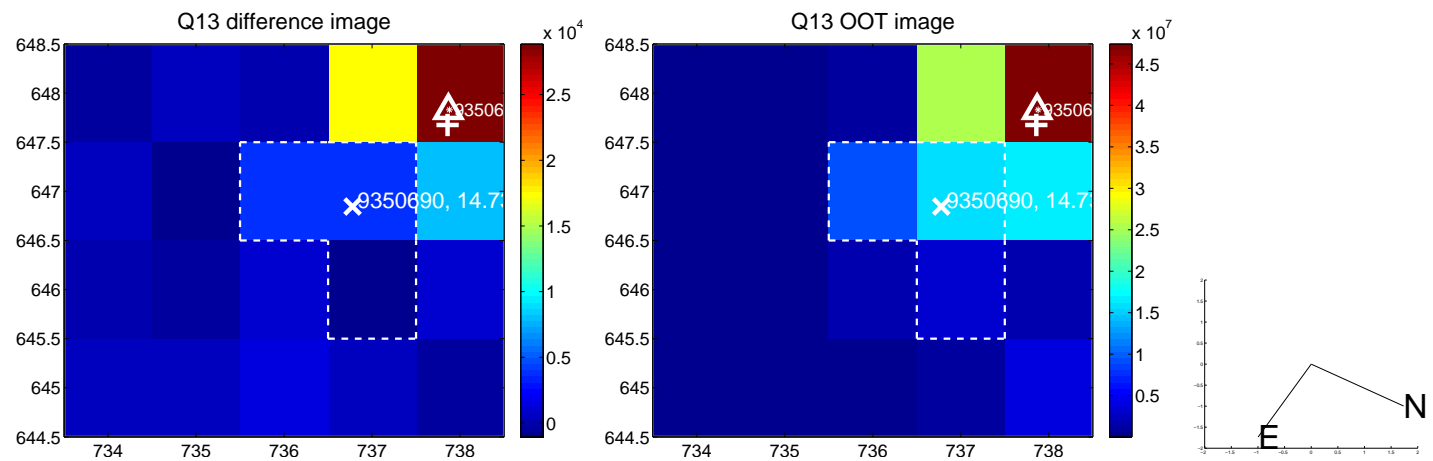
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



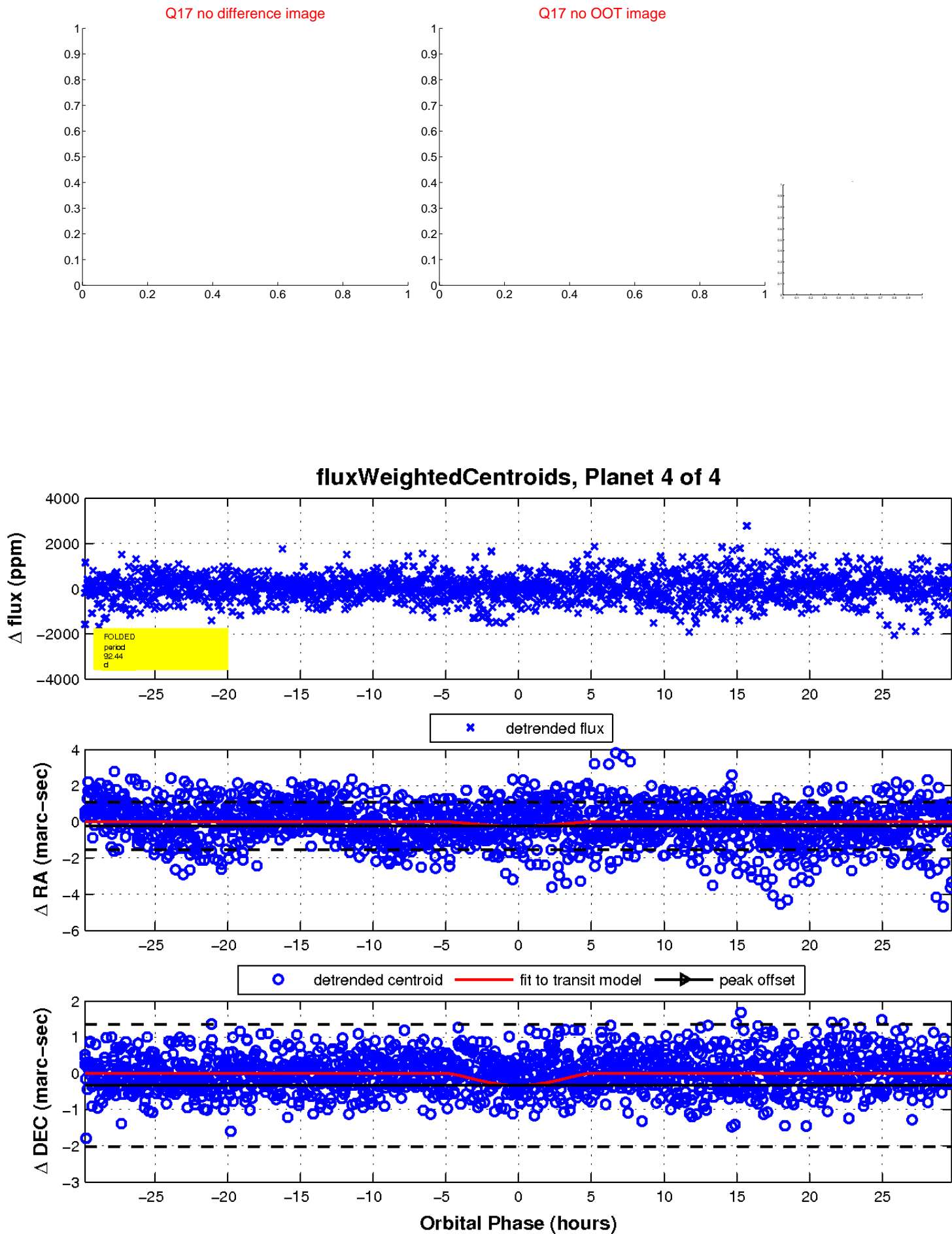
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



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



UKIRT Image

Declination

