

# KIC 009178929

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009178929-01	OBS	No	0.972242	131.947460	14.6	5.740	9.0	10.0	2.03	7547	0.79	23098.03
009178929-02	OBS	No	32.775948	163.551851	204.1	1.468	7.8	9.4	2.03	7547	3.25	212.10
009178929-03	OBS	No	91.127024	221.944621	189.9	2.868	7.8	8.3	2.03	7547	3.16	54.25

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009178929-01	OBS	FP	0.00	1	0	0	0	LPP_DV
009178929-02	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—MOD_NONUNIQ_ALT
009178929-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—CENT_FEW_DIFFS—HALO_GHOST

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

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

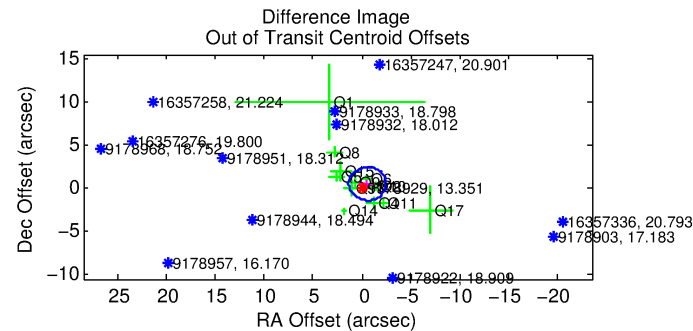
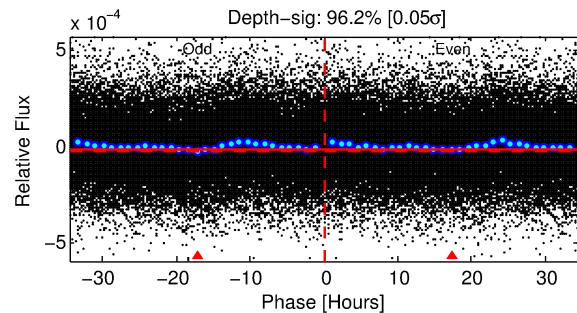
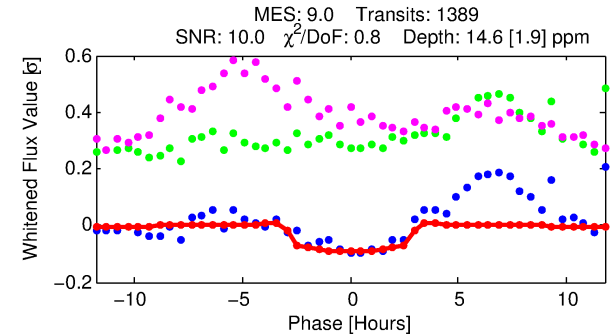
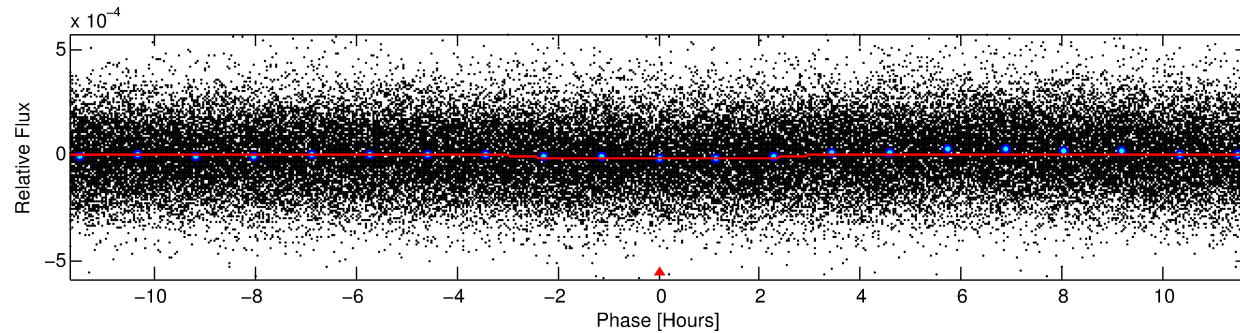
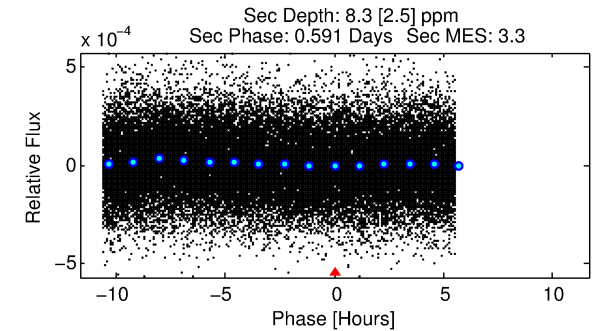
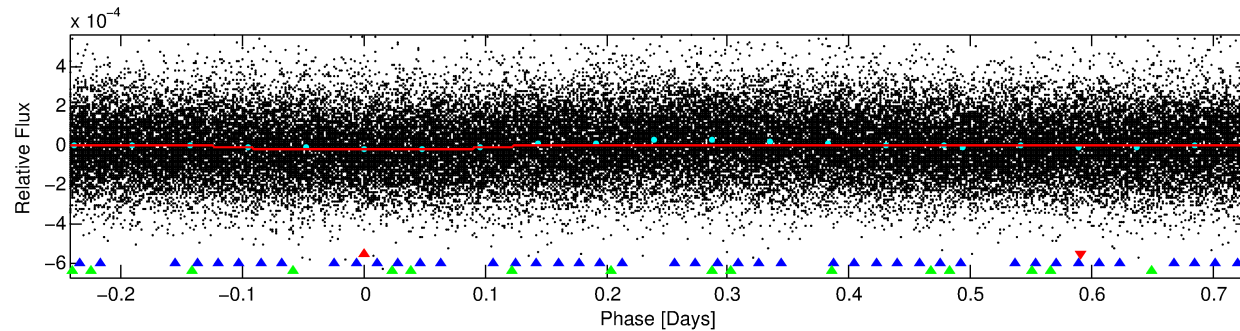
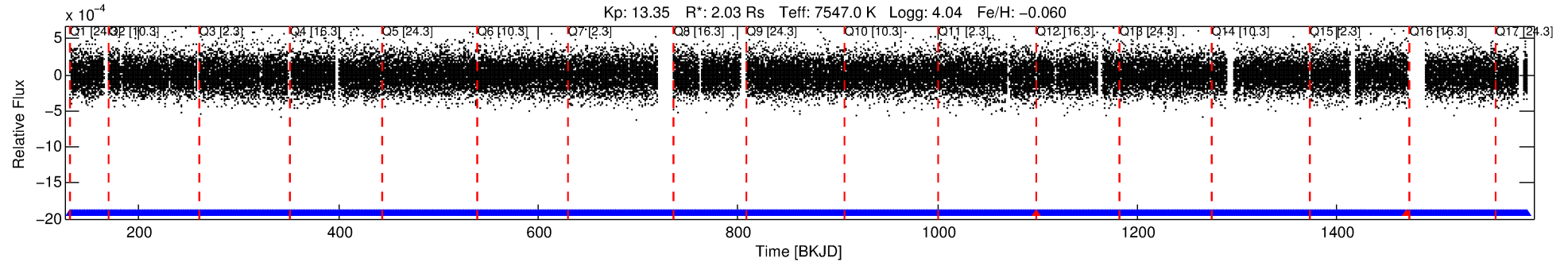
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 009178929-01

No Significant Match Found

# DV One-Page Summary

KIC: 9178929 Candidate: 1 of 3 Period: 0.972 d



## DV Fit Results:

Period = 0.97224 [0.00001] d  
Epoch = 131.9475 [0.0059] BKJD  
Rp/R\* = 0.0036 [0.0035]  
a/R\* = 1.44 [4.49]  
b = 0.04 [164.38]  
Seff = 23098.03 [8152.25]  
Teq = 3144 [277] K  
Rp = 0.79 [0.81] Re  
a = 0.0228 [0.0049] AU  
Ag = 3.81 [7.75] [0.36σ]  
Teffp = 6792 [3422] K [1.06σ]

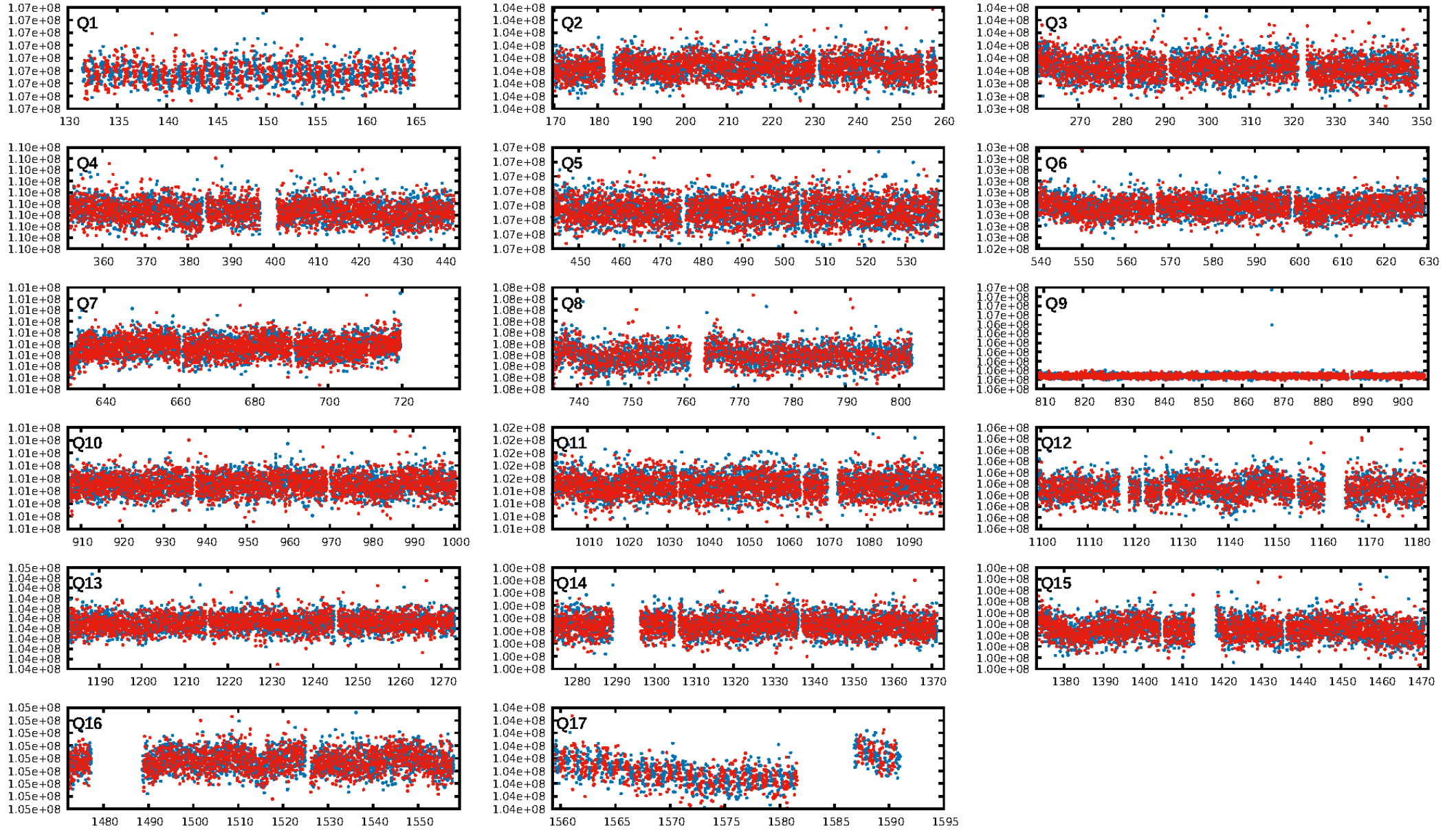
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [128.83σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
**Bootstrap-pfa: 2.54e-12**  
RollingBand-fgt: 1.00 [1324/1326]  
GhostDiagnostic-chr: 2.691  
Centroid-sig: 90.0%  
Centroid-so: 0.525 arcsec [0.32σ]  
OotOffset-rm: 0.736 arcsec [1.15σ]  
OotOffset-st: 4/2/2/5 [13]  
KicOffset-rm: 0.645 arcsec [1.03σ]  
KicOffset-st: 4/2/2/5 [13]  
DiffImageQuality-fgm: 0.54 [7/13]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 15:27:00 Z

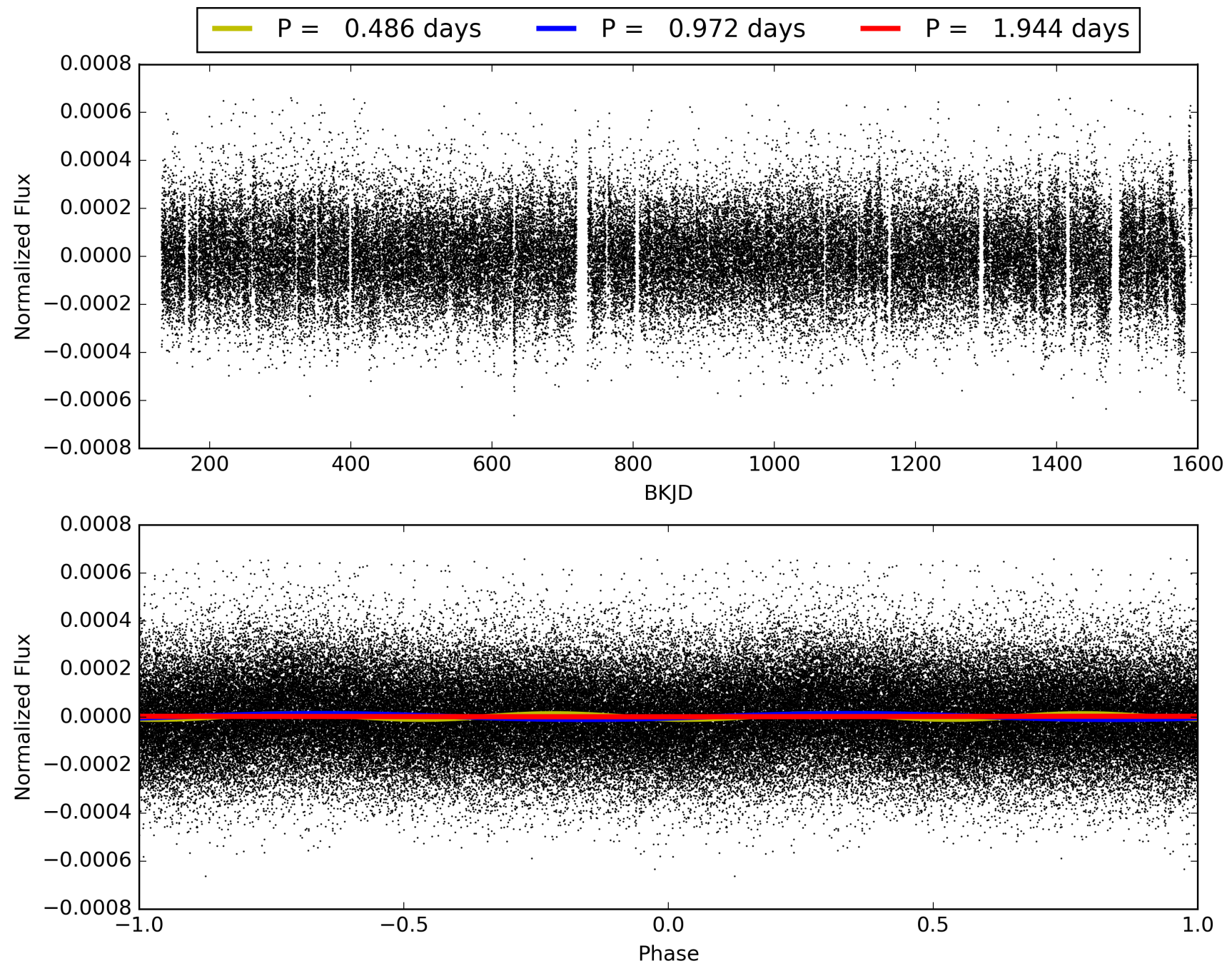
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 009178929-01, PDC Light Curves





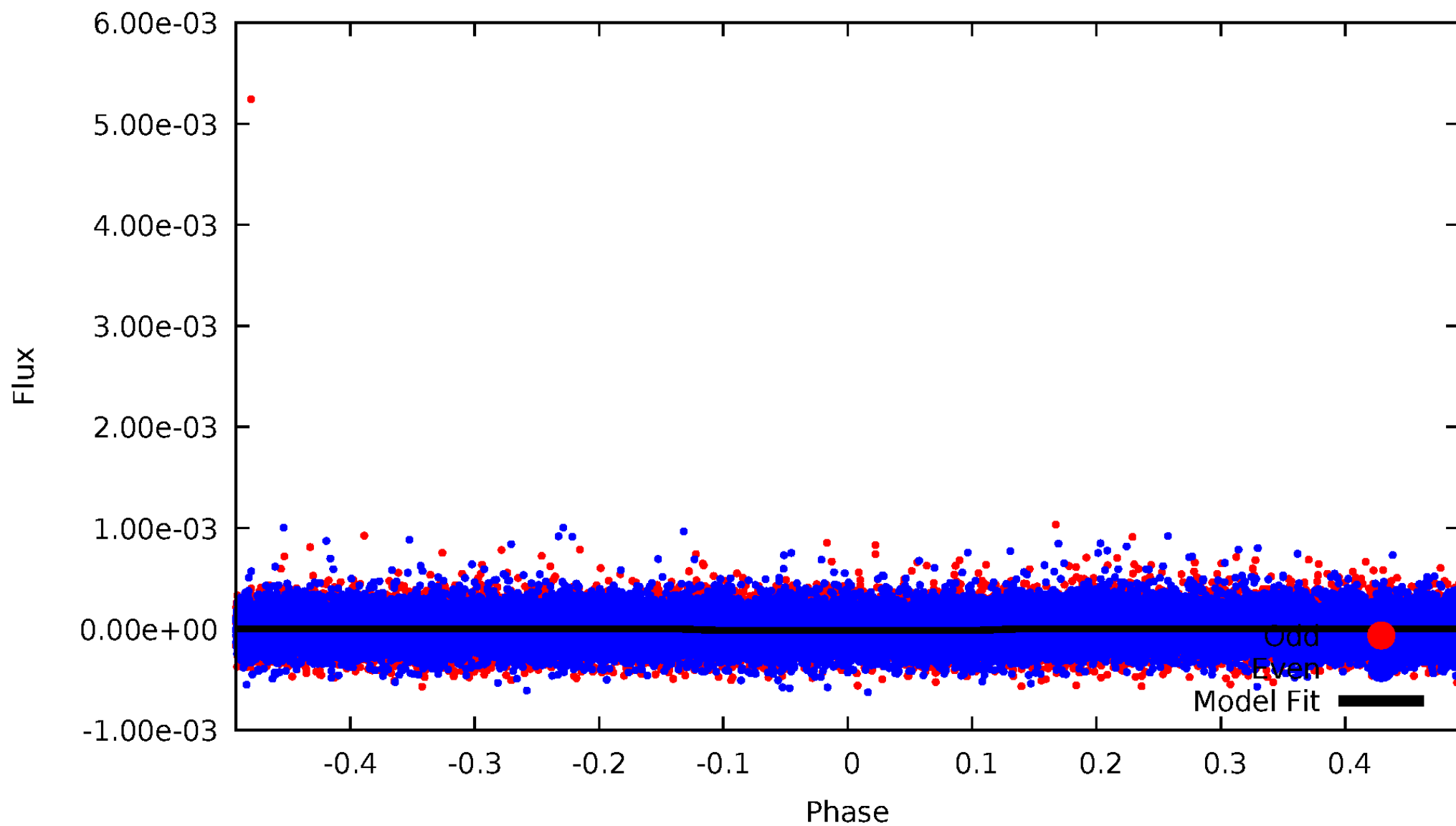
TCE 009178929-01





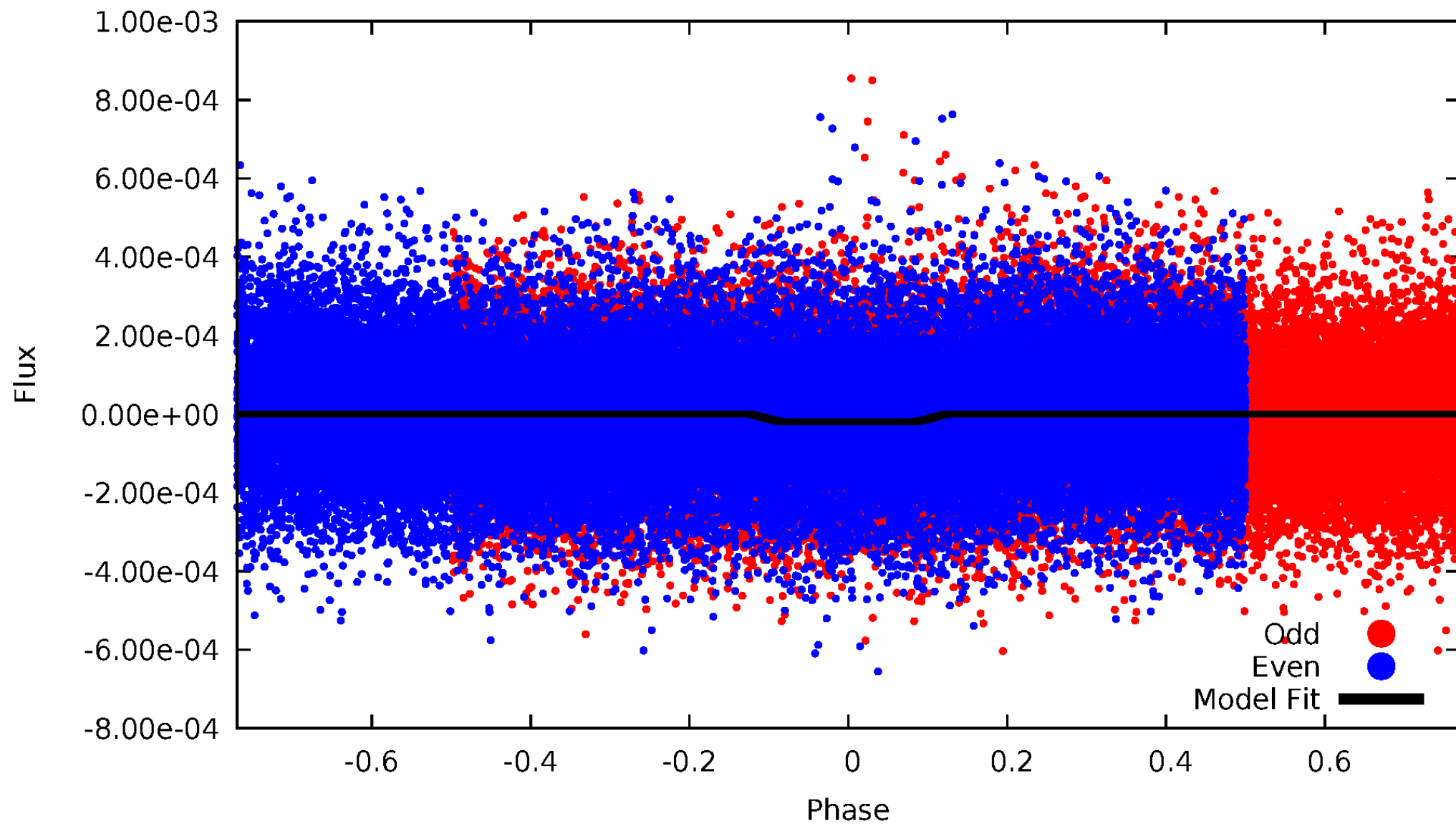
# DV Odd/Even

TCE 009178929-01



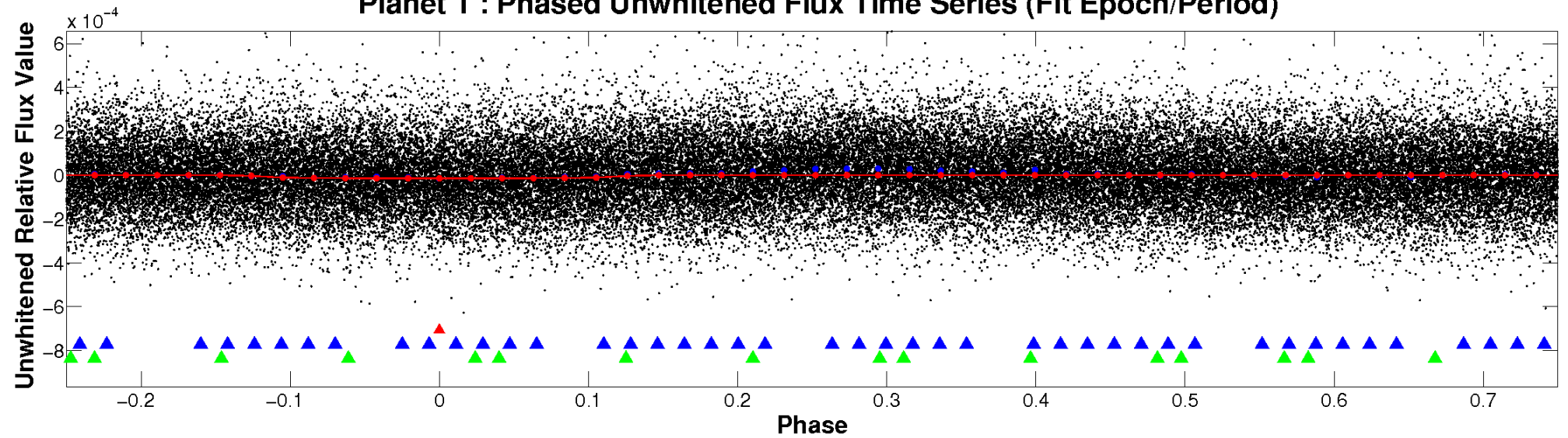
# ALT Odd/Even

TCE 009178929-01

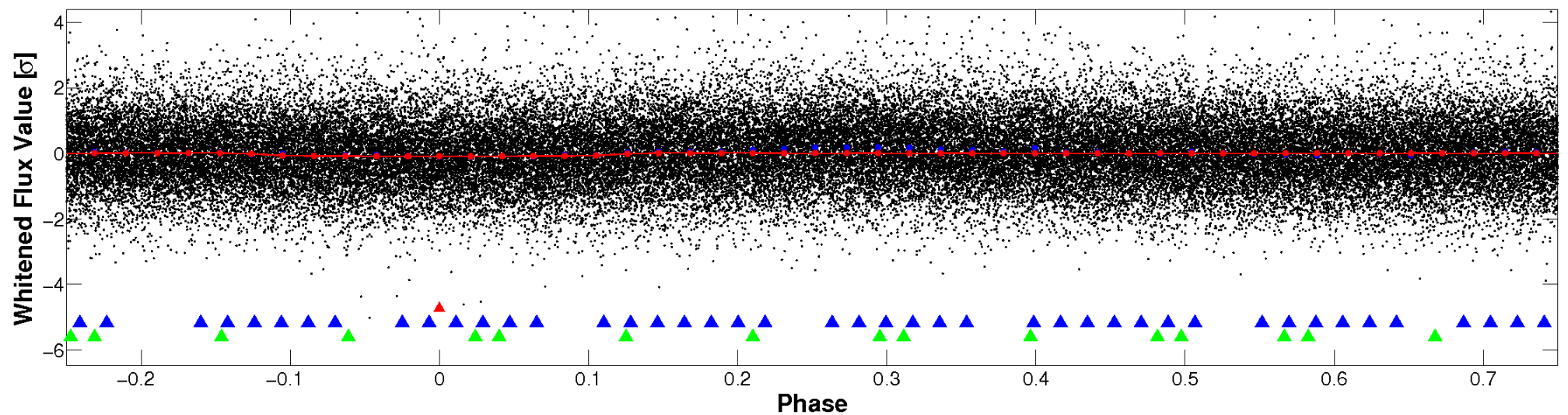


# Non-Whitened Vs. Whitened Light Curve

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



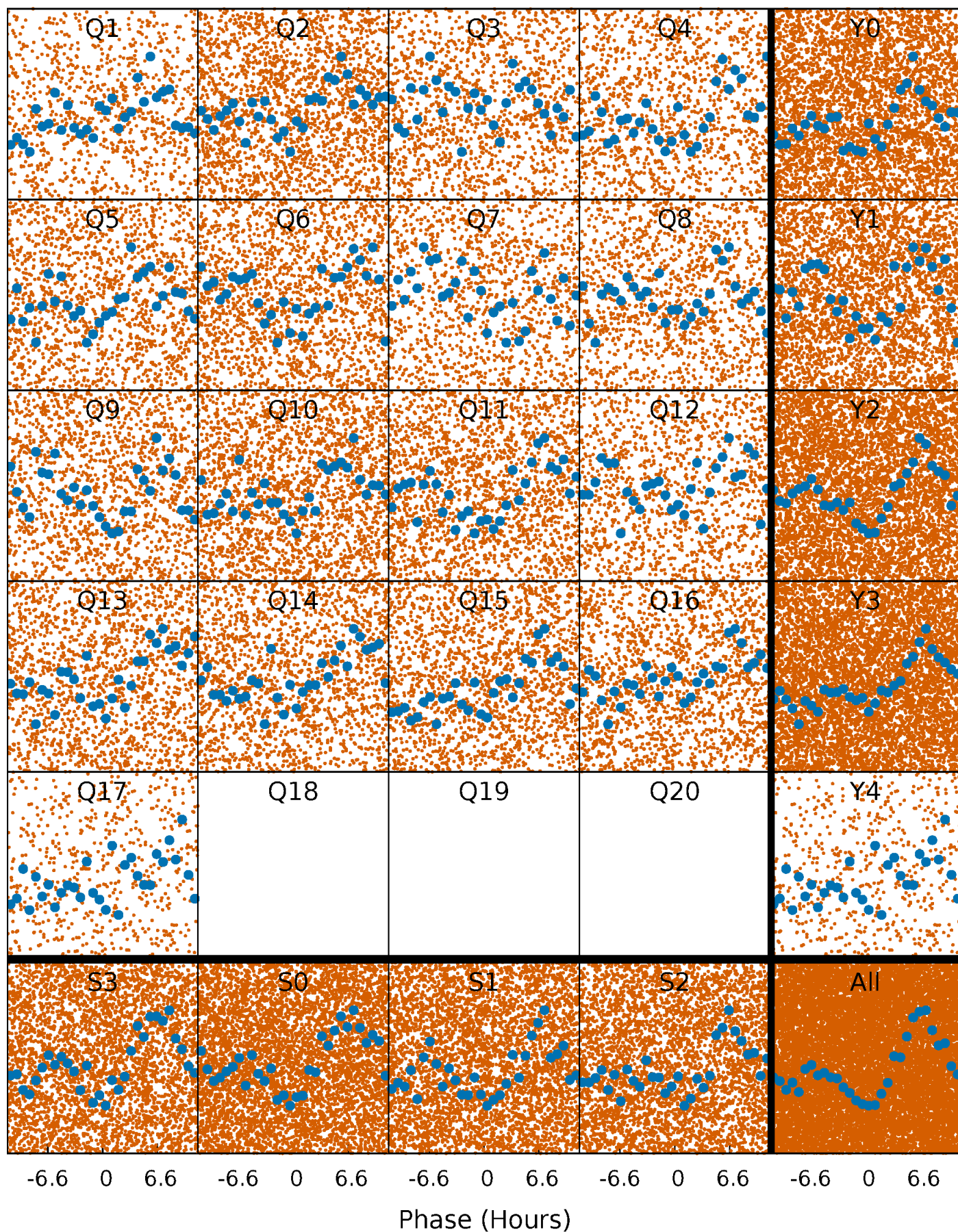
## Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)





# PDC Quarter-Phased Transit Curves

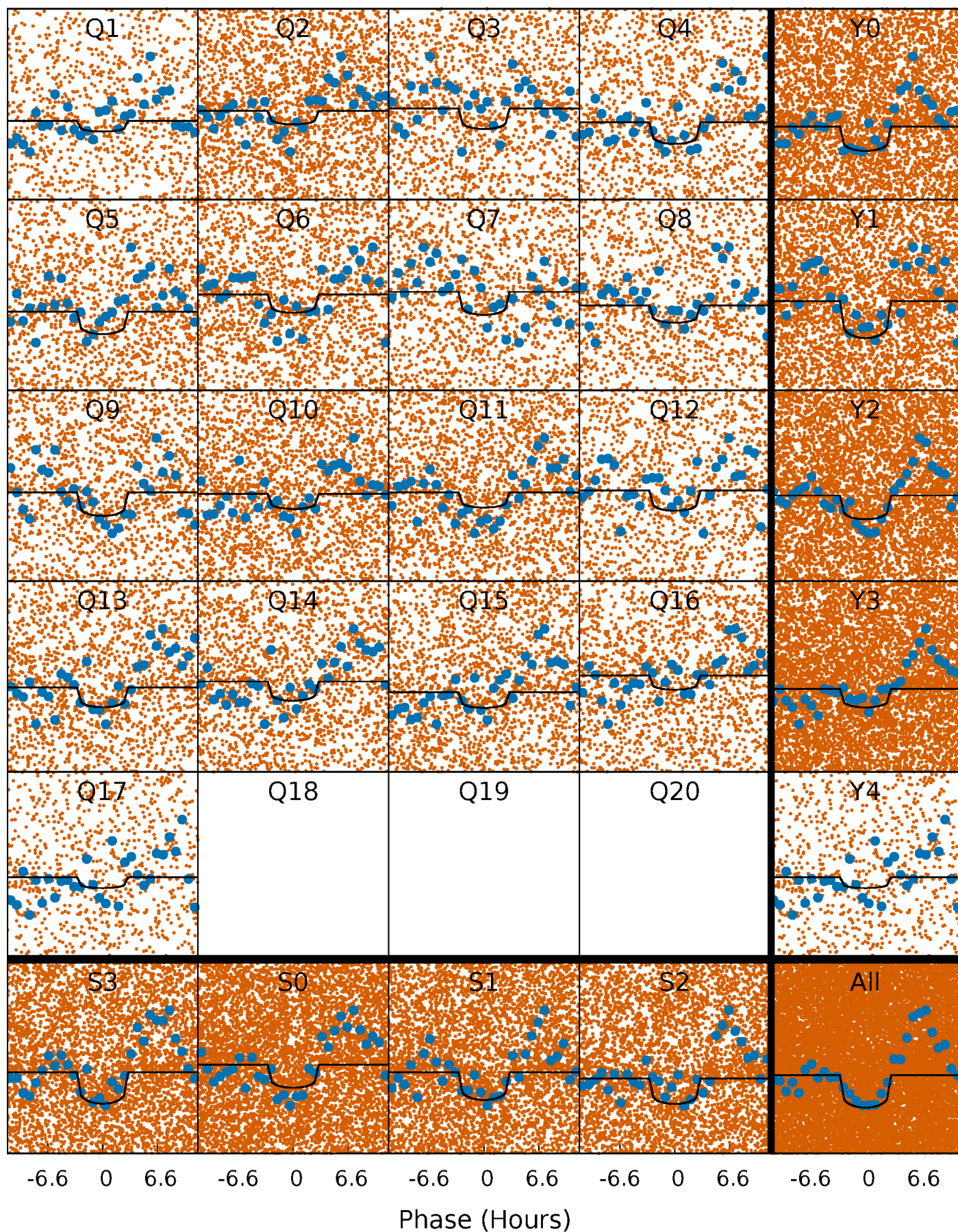
TCE 009178929-01 P= 0.972242 Days  $T_0=131.947460$  (BKJD)





# DV Quarter-Phased Transit Curves

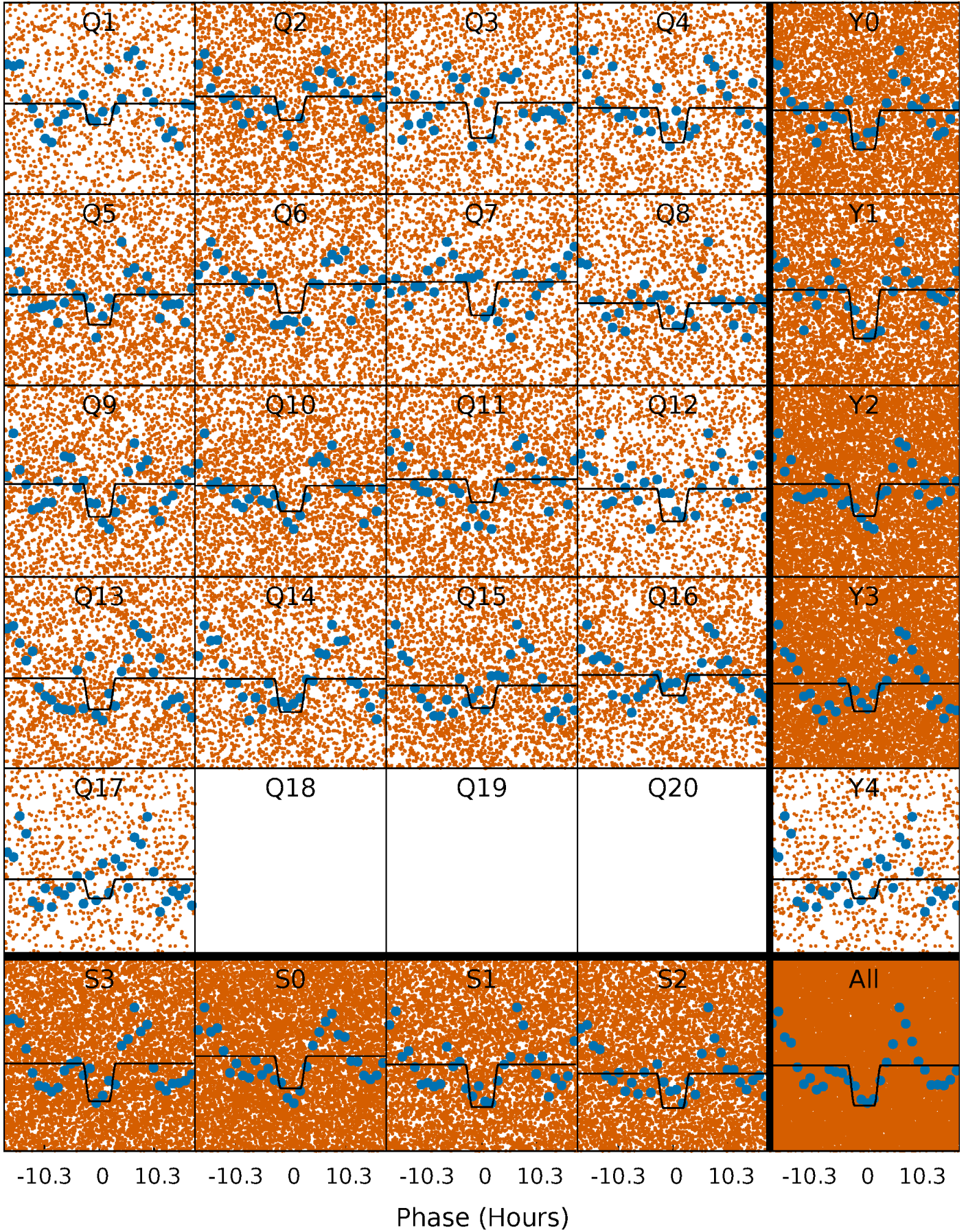
TCE 009178929-01 P= 0.972242 Days  $T_0=131.947460$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

TCE 009178929-01 P= 0.972269 Days  $T_0=131.911547$  (BKJD)

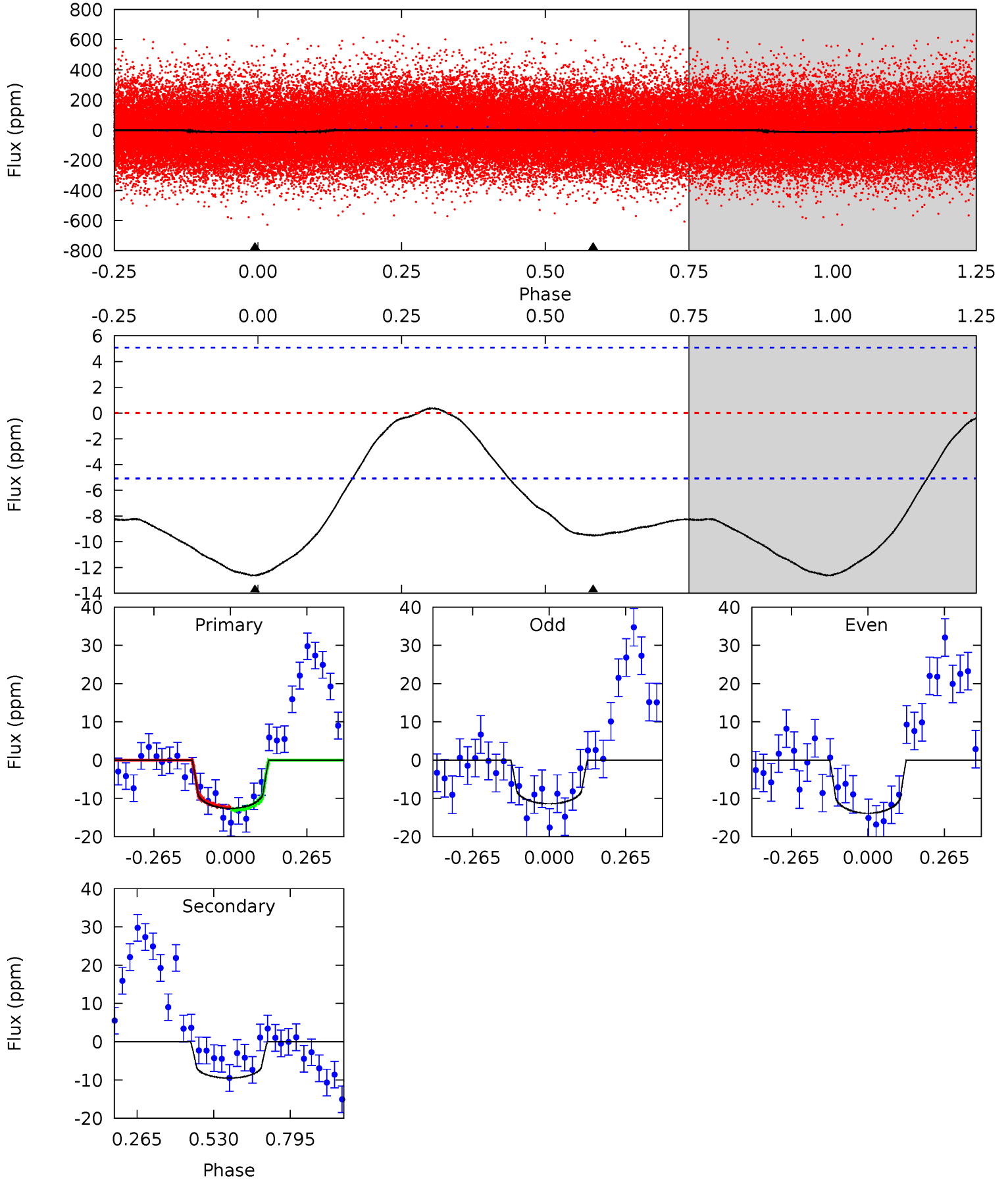




# DV Model-Shift Uniqueness Test

009178929-01, P = 0.972242 Days, E = 130.975218 Days

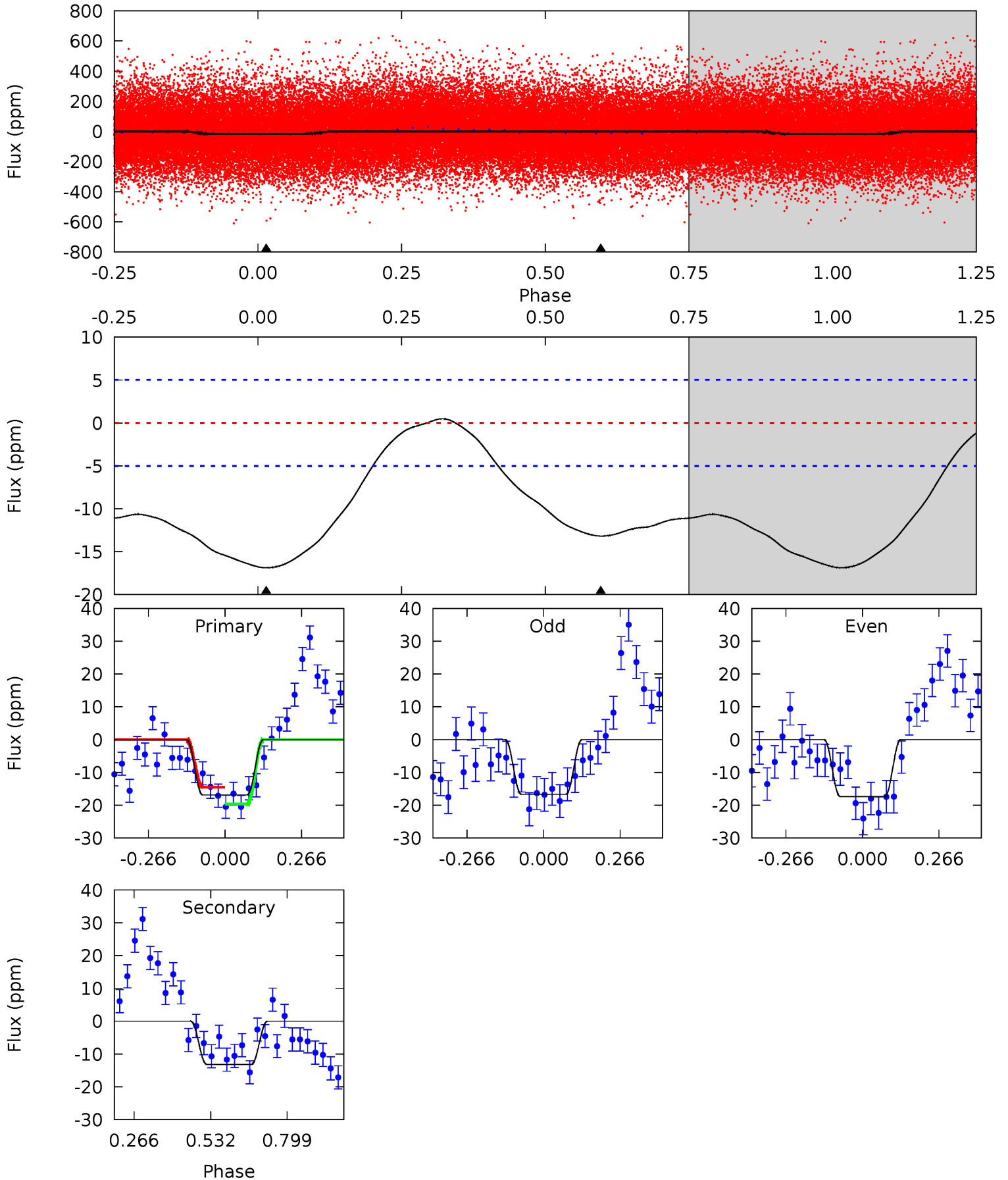
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.8	8.15	0	0	4.36	1.11	0.25	10.8	10.8	8.15	8.15	1.07	0.89	0.03	0.29



# Alt Model-Shift Uniqueness Test

009178929-01, P = 0.972269 Days, E = 130.939278 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
14.6	11.4	0	0	4.35	1.11	0.34	14.6	14.6	11.4	11.4	0.28	1.03	0.03	2.25



### Stellar Parameters For KIC 009178929

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7547^{+209}_{-314}$	$4.045^{+0.170}_{-0.153}$	$-0.060^{+0.200}_{-0.350}$	$2.032^{+0.517}_{-0.517}$	$1.669^{+0.212}_{-0.282}$	$0.280^{+0.283}_{-0.121}$
	+3%/-4%	+4%/-4%	+333%/-583%	+25%/-25%	+13%/-17%	+101%/-43%
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 009178929-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-10 \pm 1$	$0.88^{+0.76}_{-0.57}$	$4373^{+322}_{-315}$	$6346^{+6981}_{-1874}$	$3.446^{+25.407}_{-2.503}$
Alt.	$-13 \pm 1$	$1.02^{+0.80}_{-0.60}$	$4391^{+331}_{-293}$	$6452^{+5321}_{-1718}$	$3.725^{+17.670}_{-2.611}$

$T_{\text{max}}$  = Theoretical Maximum Planetary Temperature  
 $T_{\text{obs}}$  = Observed Planetary Temperature (Assuming  $A=0.3$ )  
 $A_{\text{obs}}$  = Observed Albedo (Assuming  $T=0$ )

If a secondary eclipse is present, the system is likely an EB if  $T_{\text{obs}} \gg T_{\text{max}}$  AND  $A_{\text{obs}} \gg 1.0$



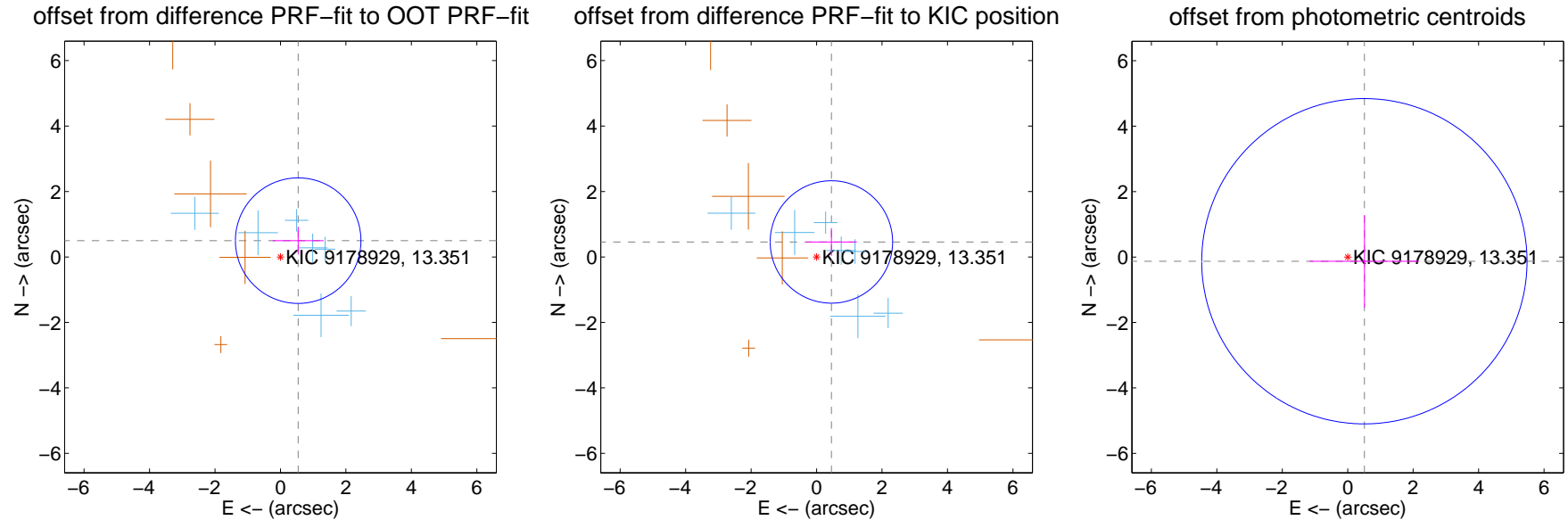
## DV Centroid Data

Supplemental centroid analysis for 009178929-01. Kepler magnitude: 13.35. Transit SNR 10.02

There are 7 quarters with good PRF difference image offsets

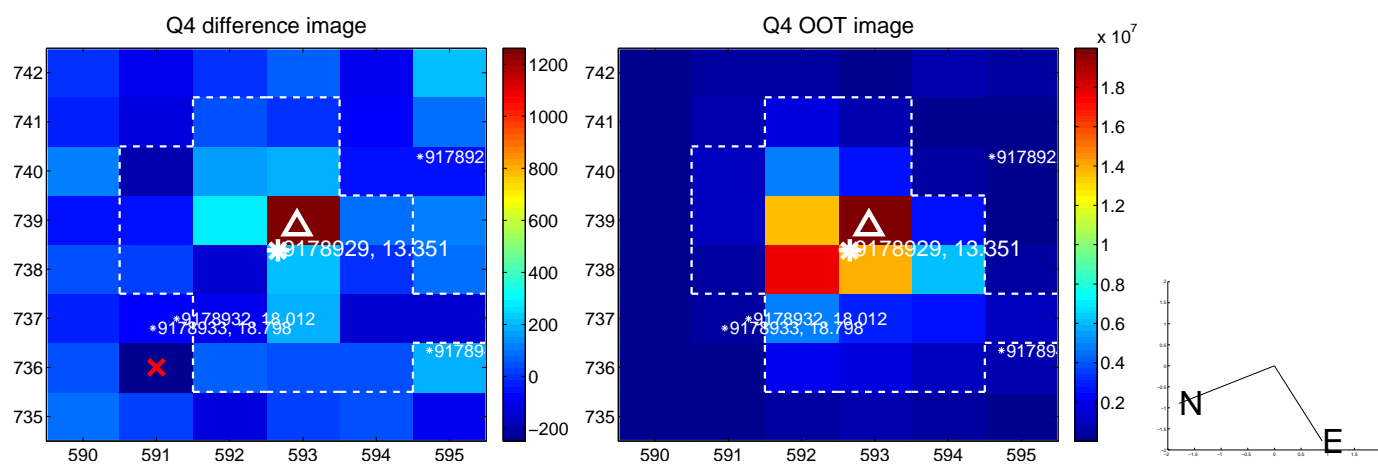
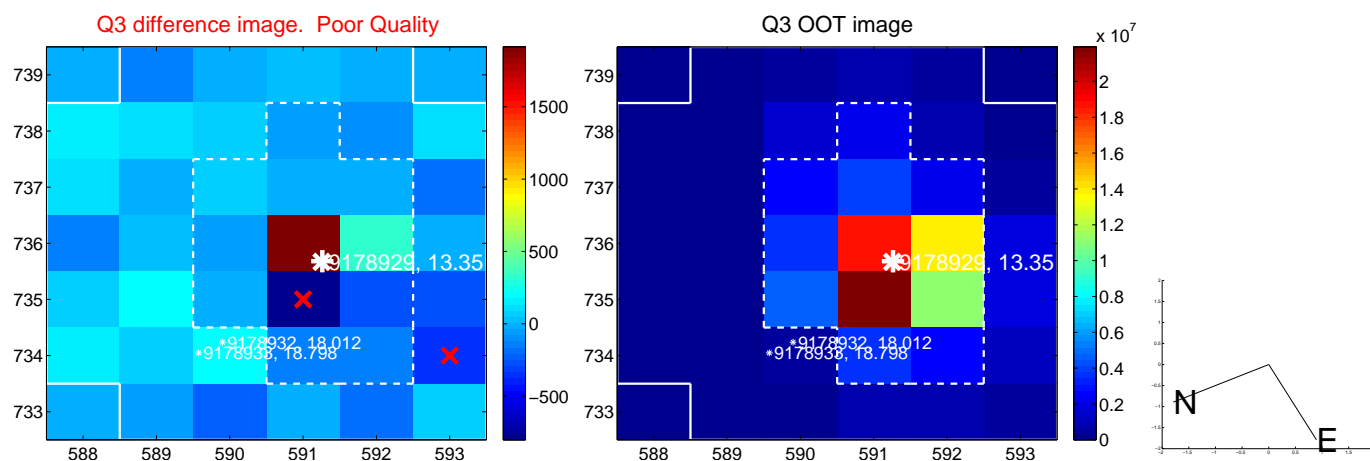
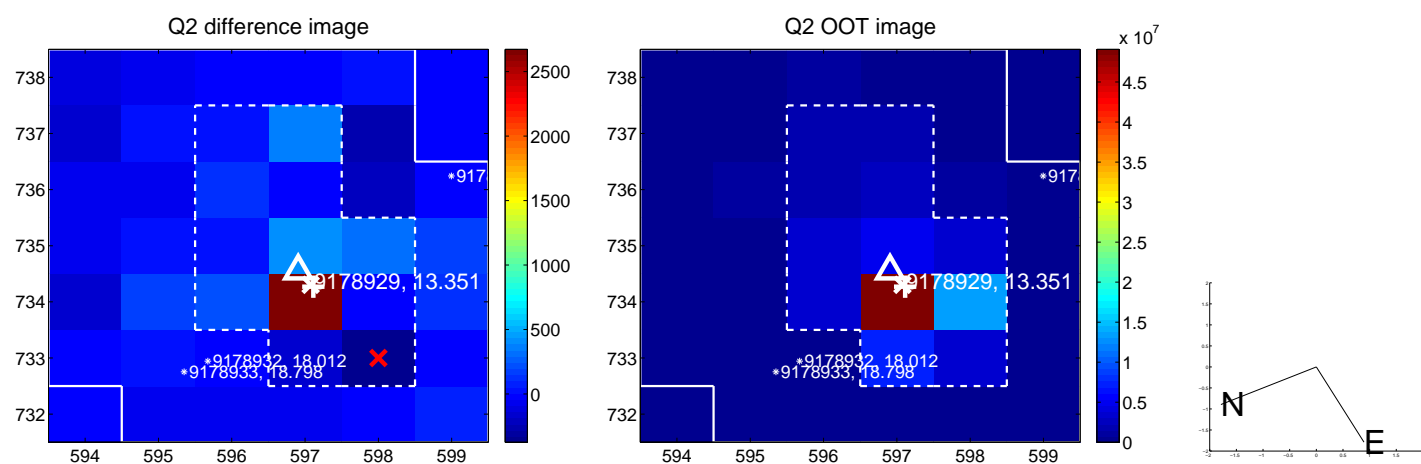
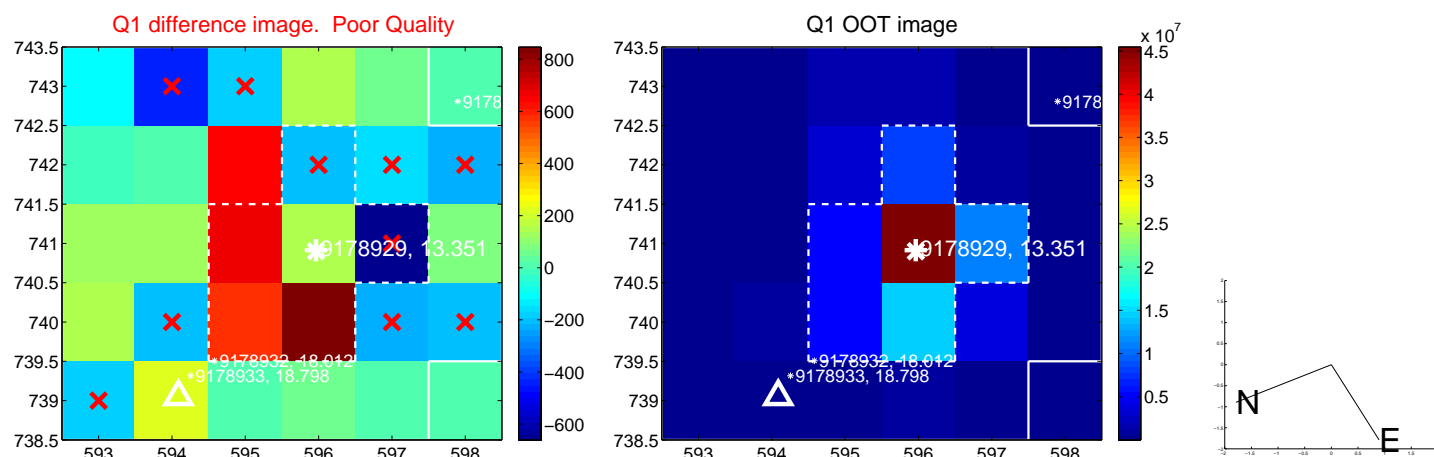
The direct PRF centroid is offset from the target star catalog position by about 0.07 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.736 \pm 0.639$	1.15	$-0.541 \pm 0.777$	$0.499 \pm 0.422$
PRF-fit source offset from KIC position	$0.645 \pm 0.623$	1.03	$-0.453 \pm 0.777$	$0.459 \pm 0.422$
photometric centroid source offset	$0.52 \pm 1.66$	0.32	$-0.51 \pm 1.67$	$-0.13 \pm 1.41$

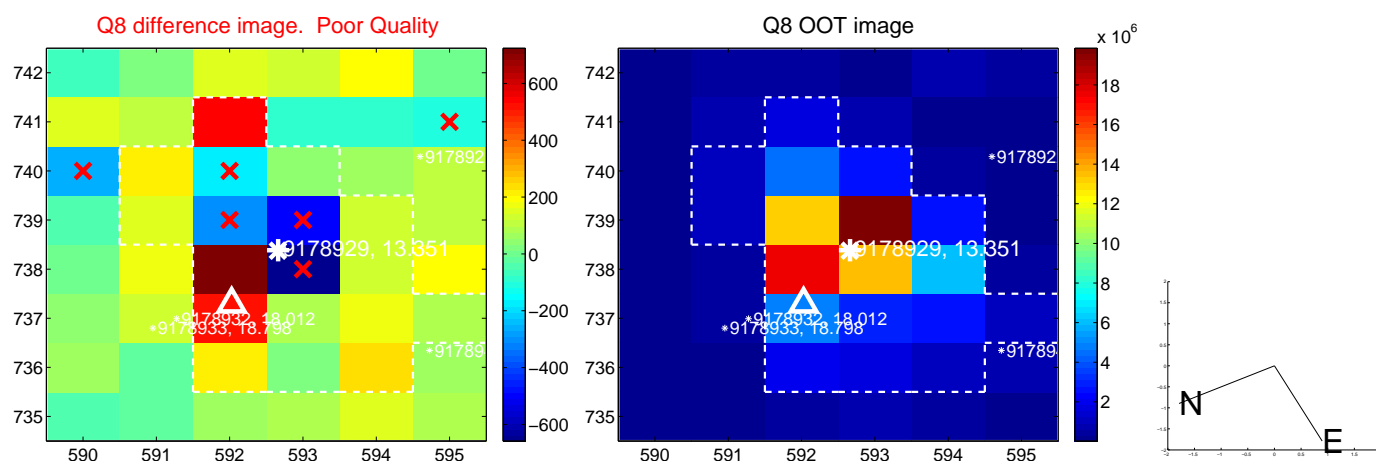
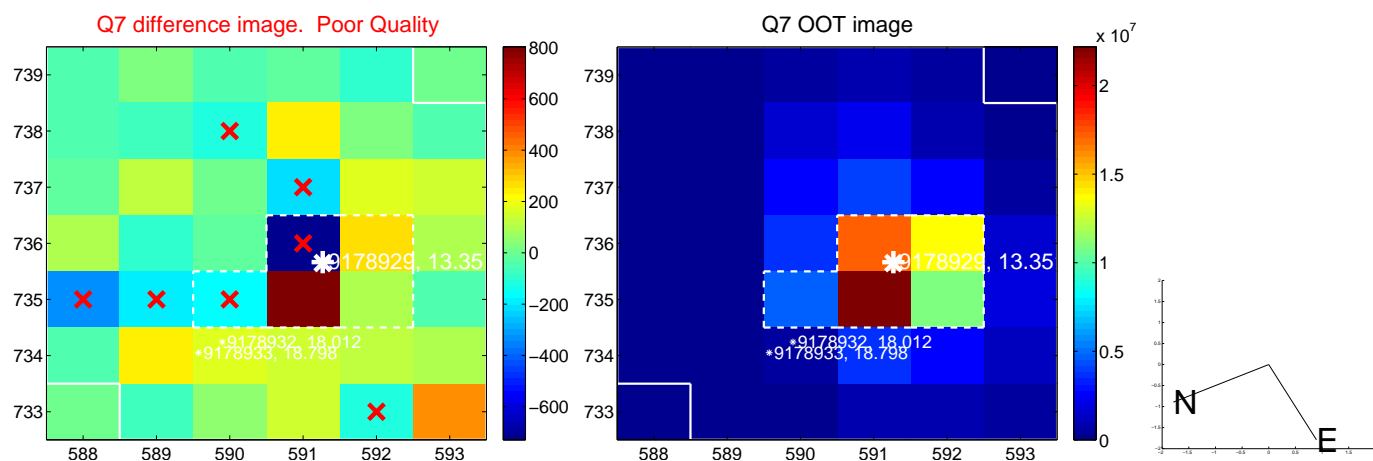
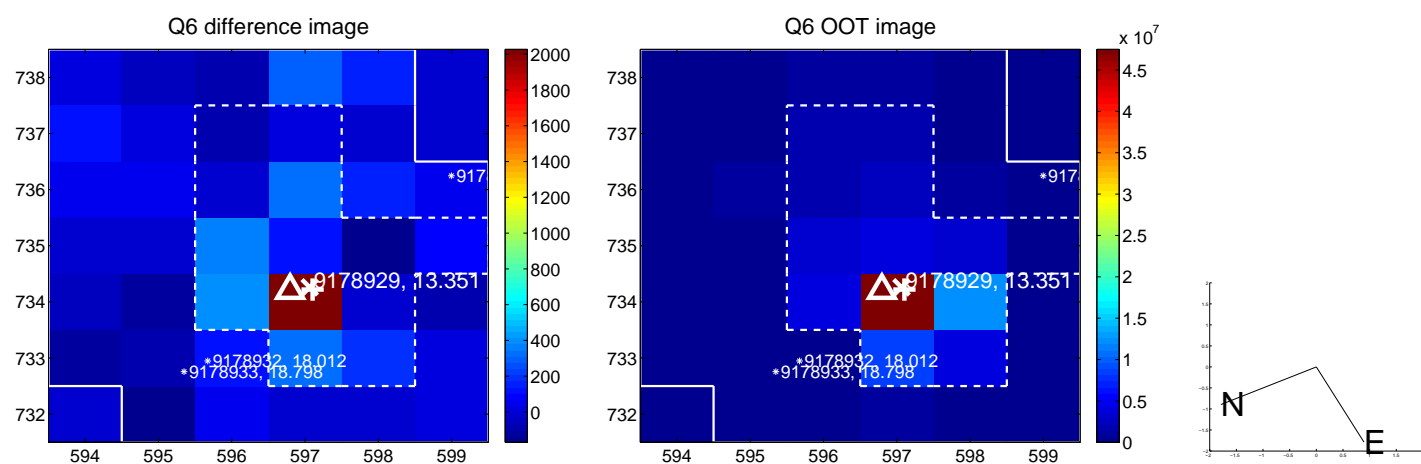
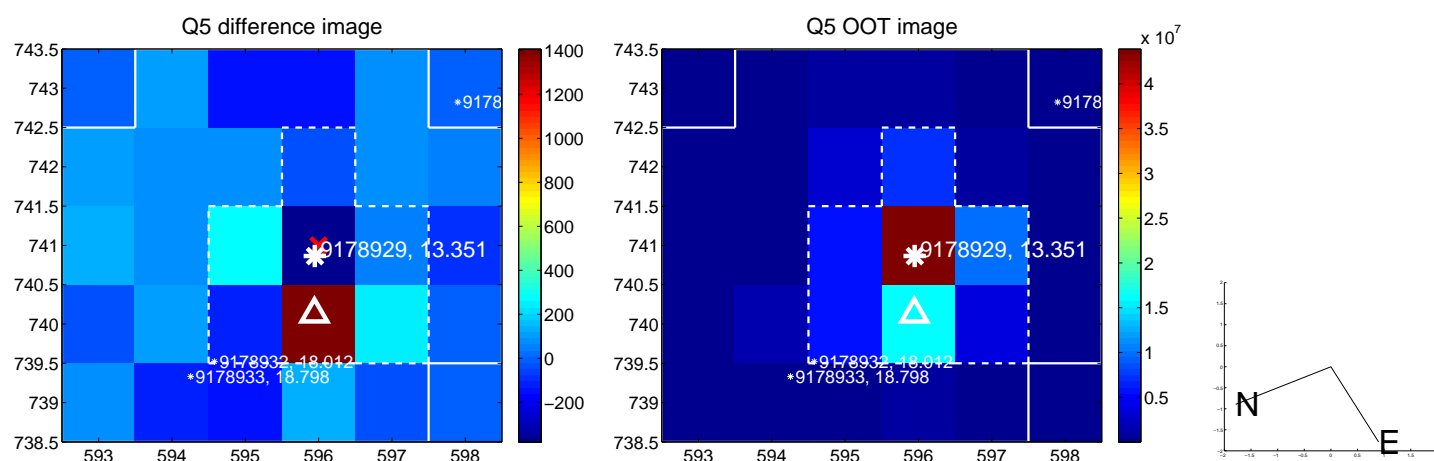


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

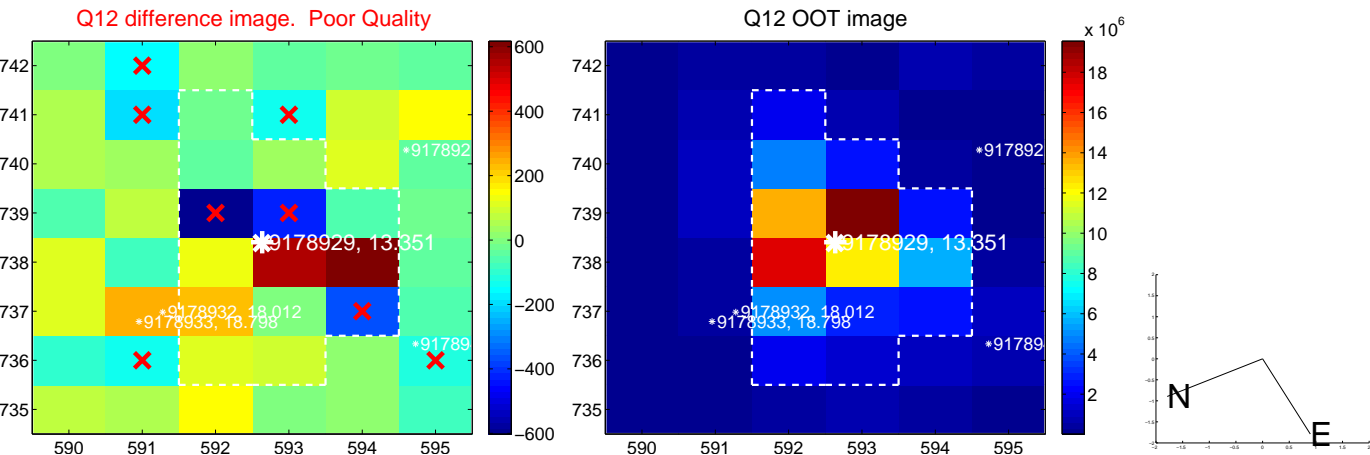
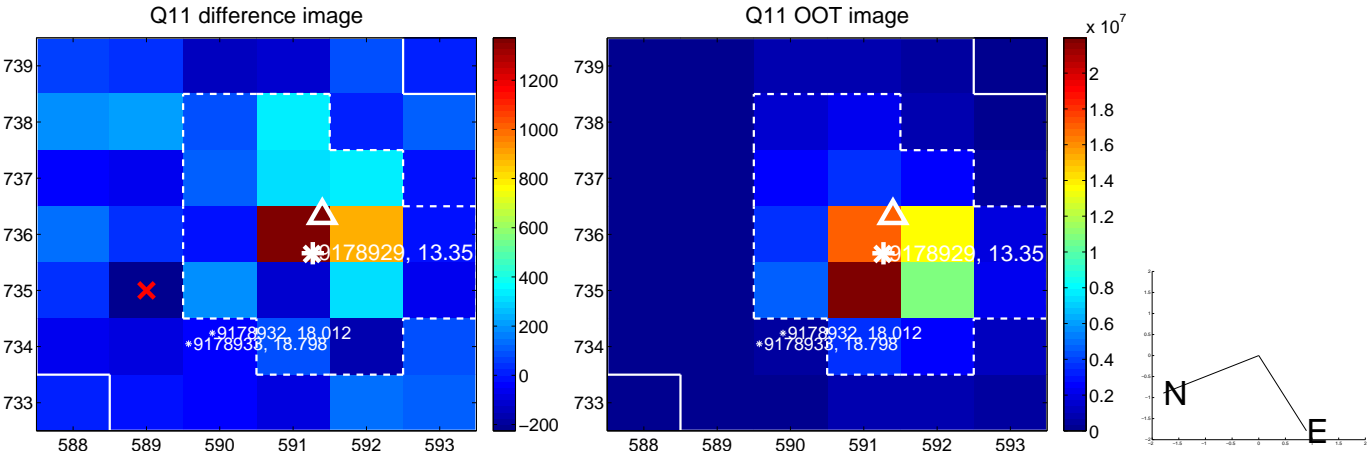
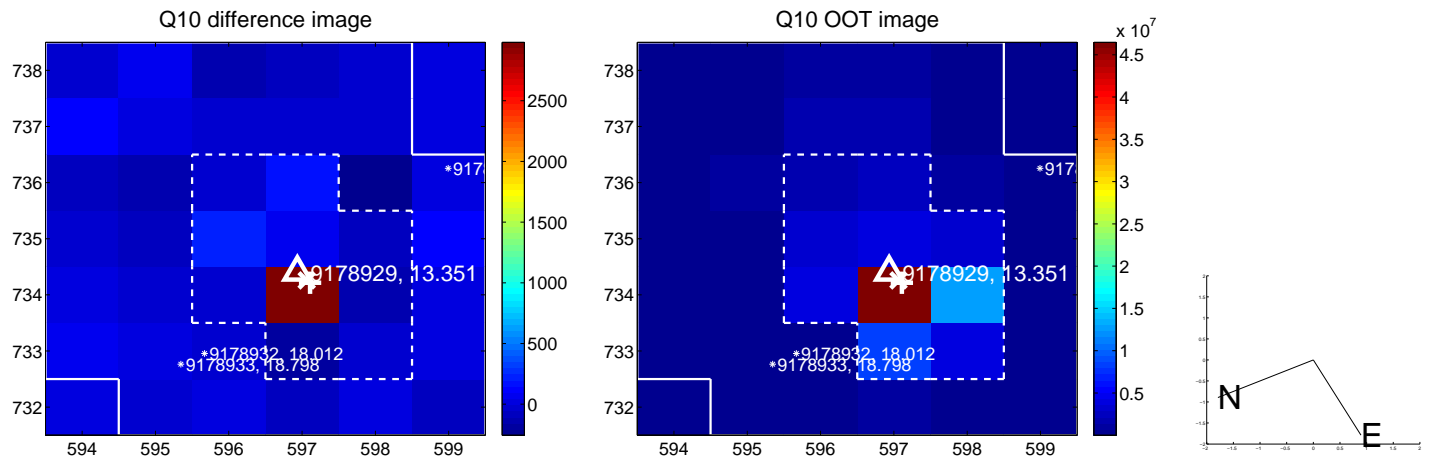
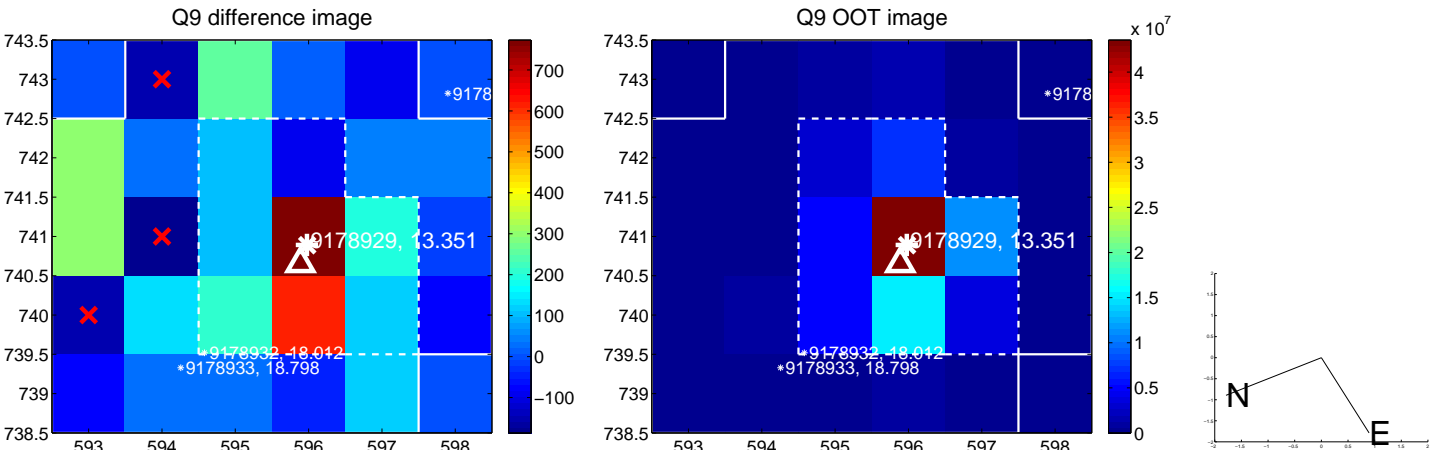


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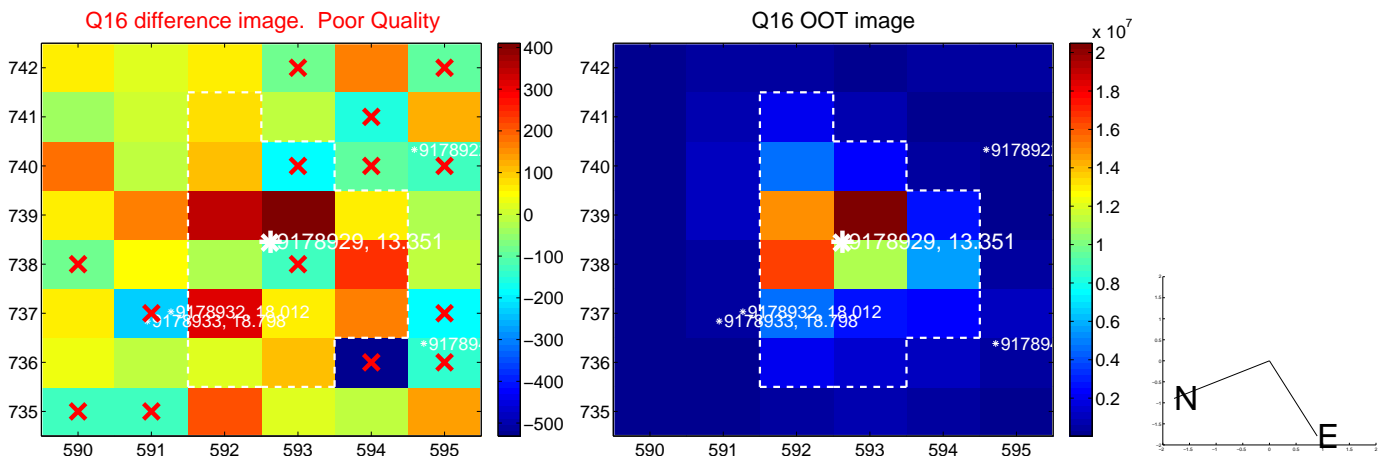
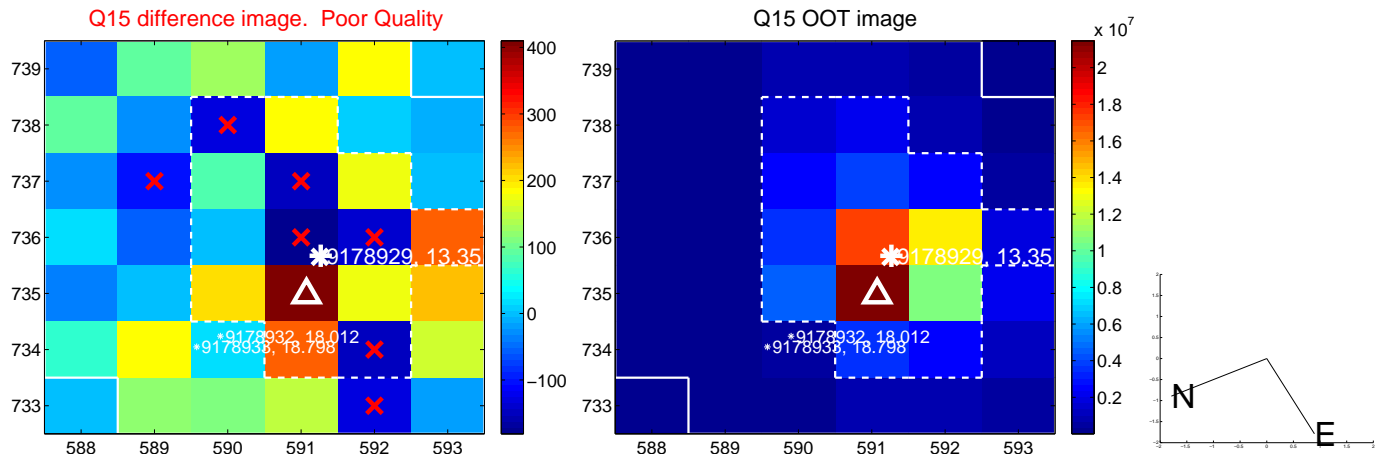
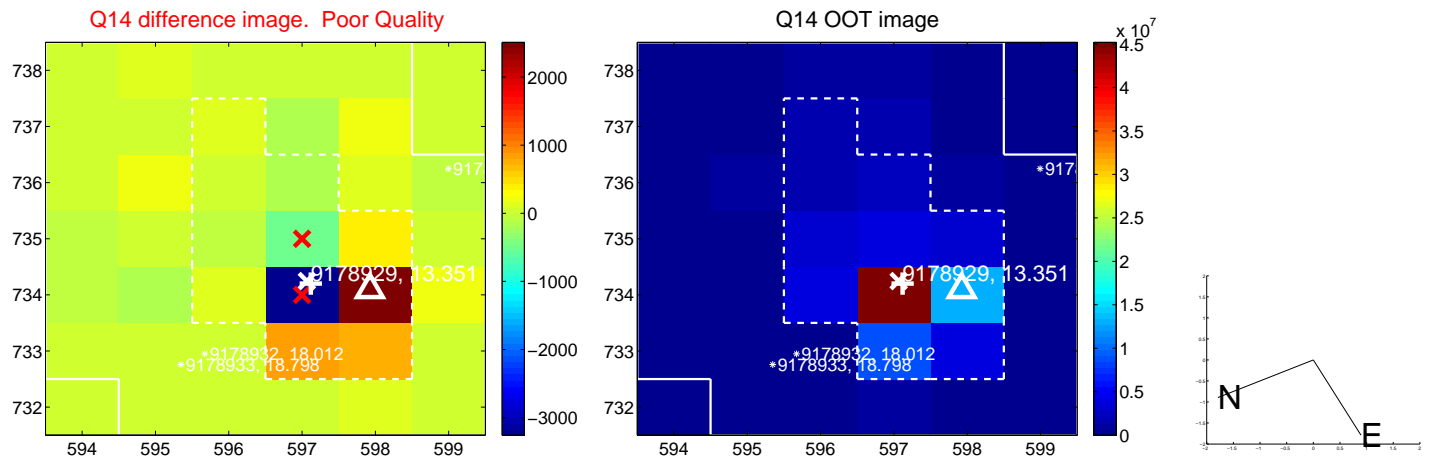
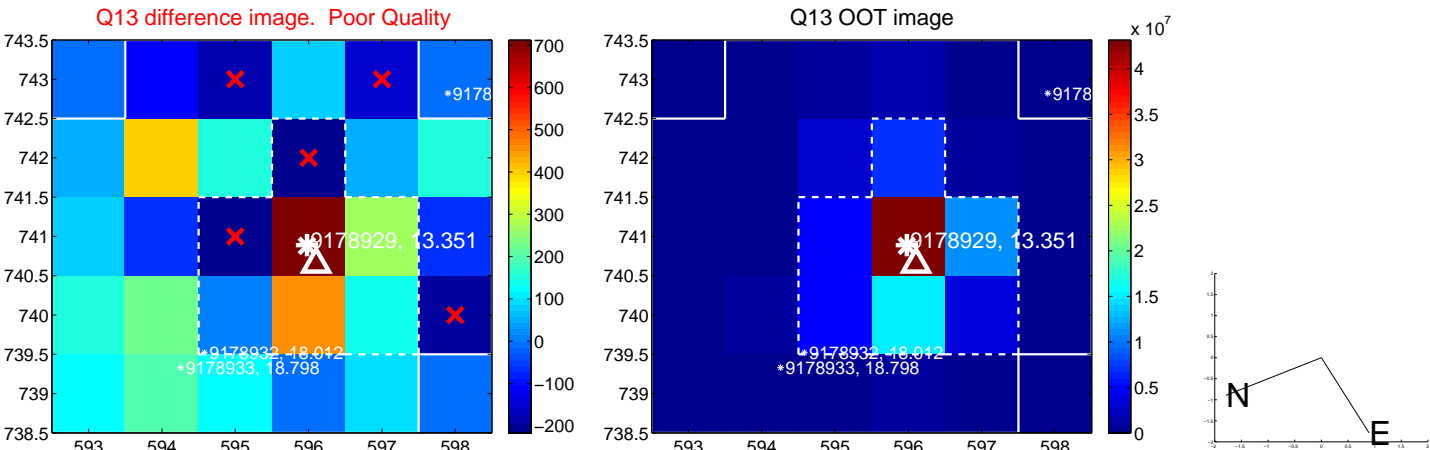




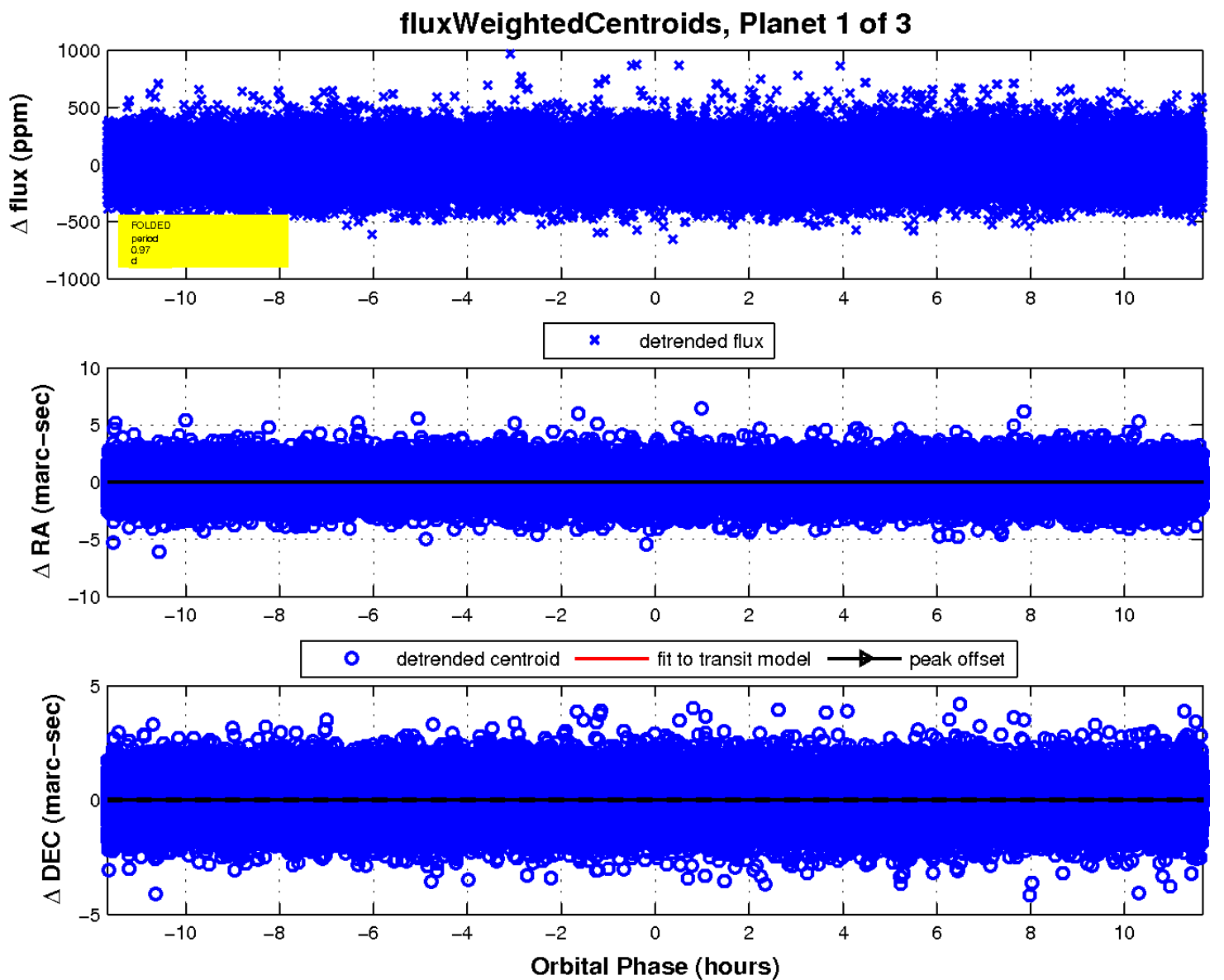
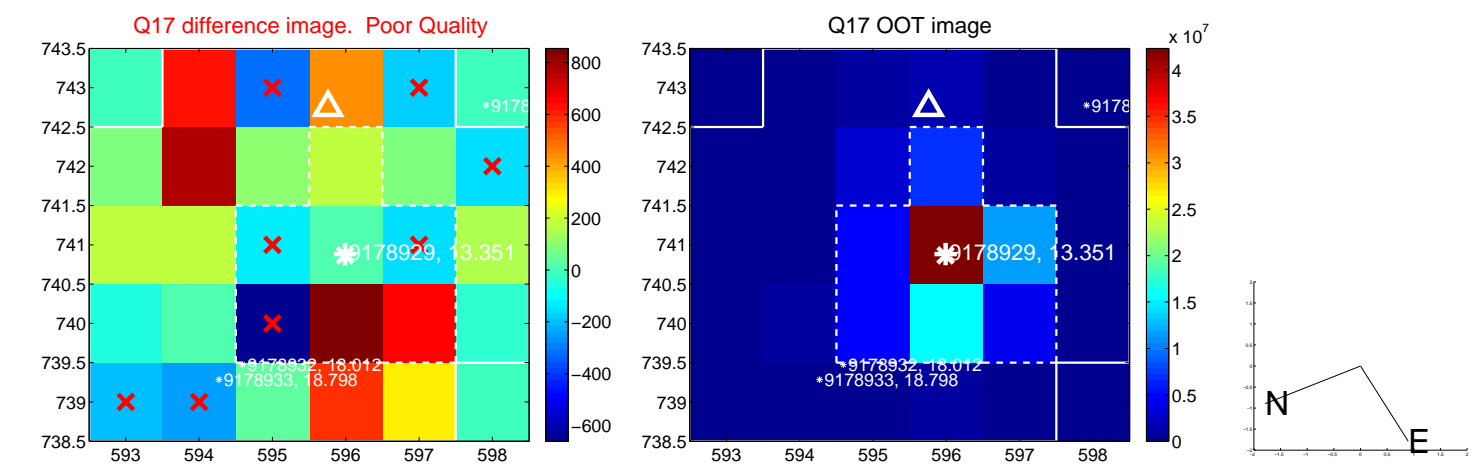
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

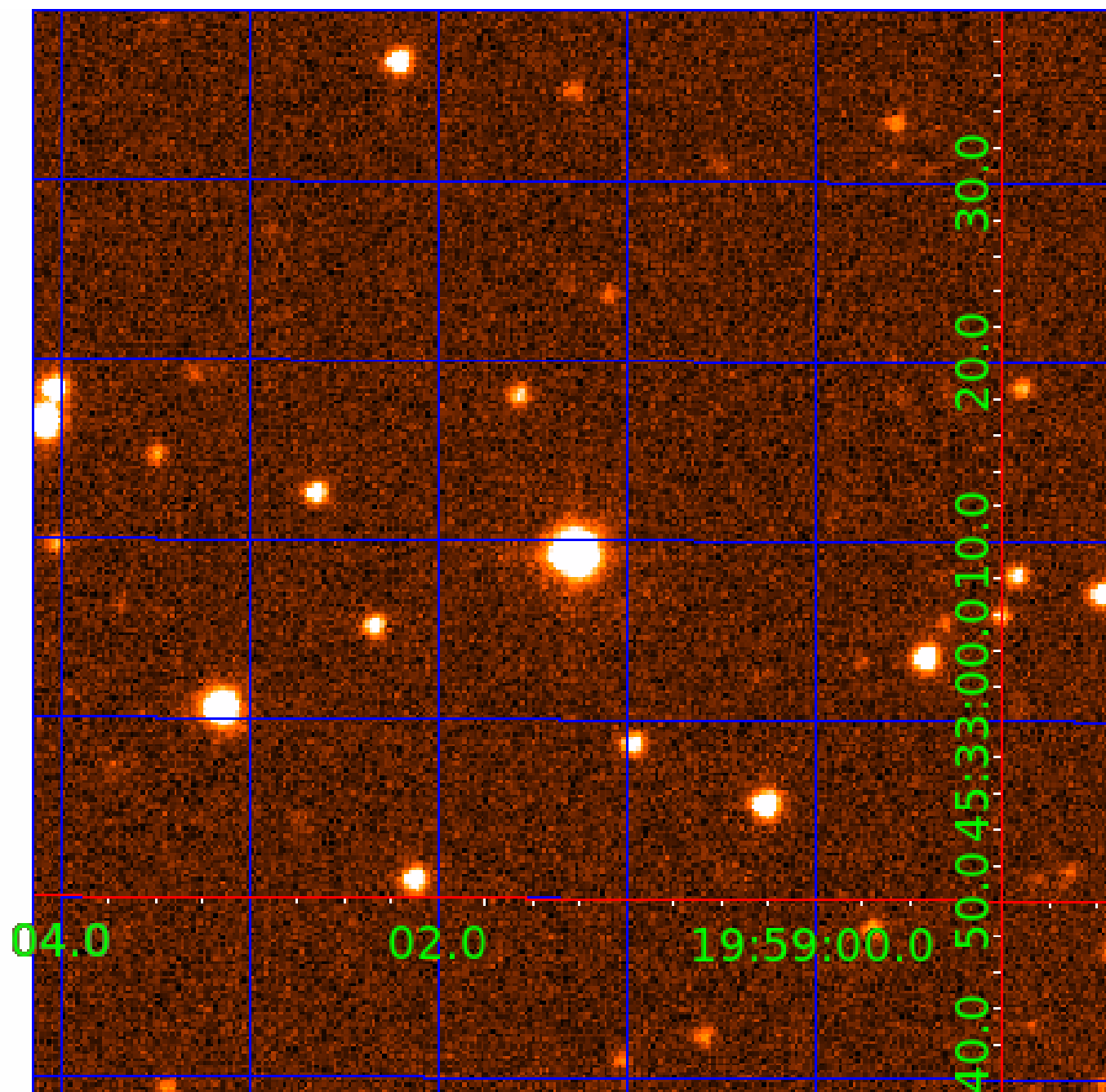


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 009178929

## Q1-17 DR25 TCE Parameters

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## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
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009178929-02	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—MOD_NONUNIQ_ALT
009178929-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—CENT_FEW_DIFFS—HALO_GHOST

**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.

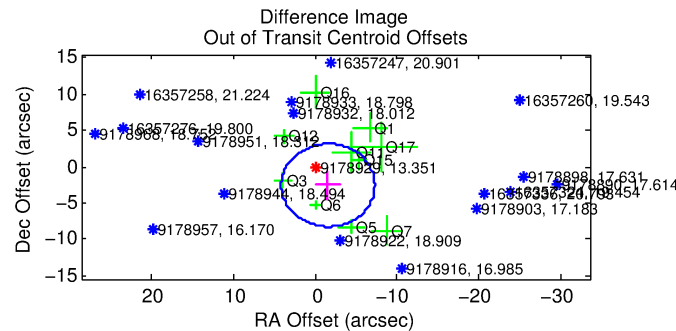
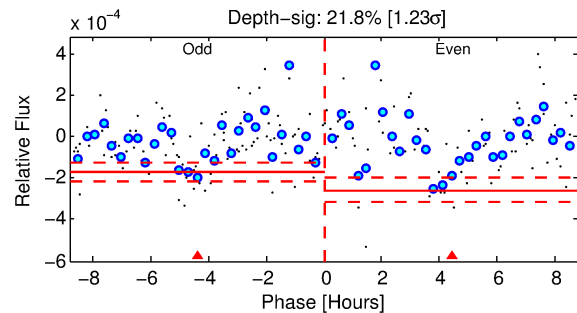
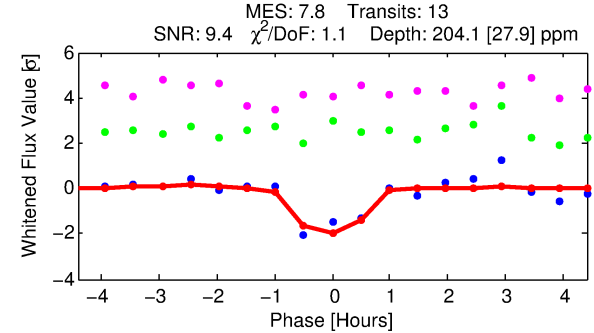
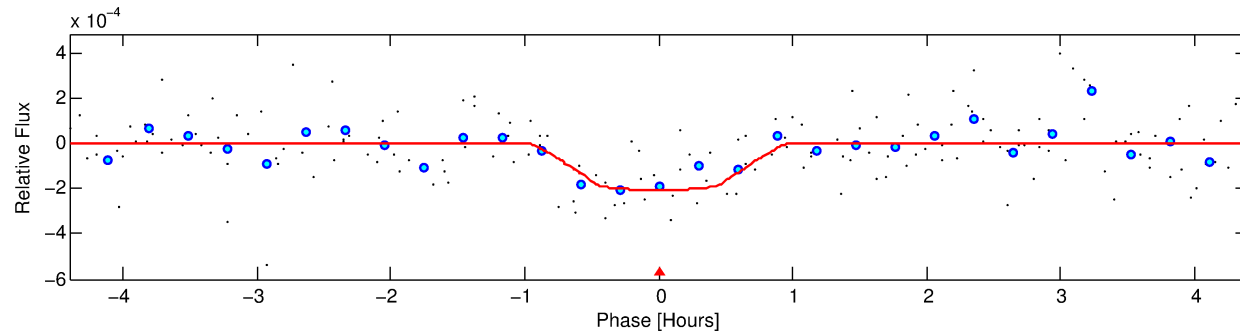
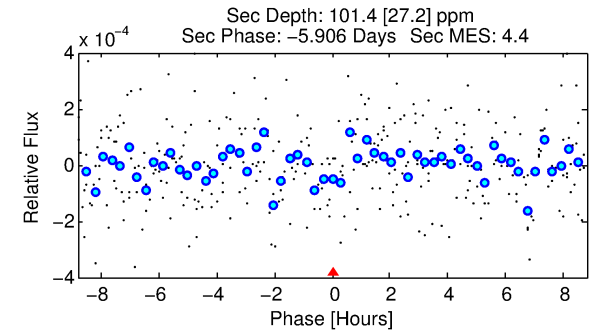
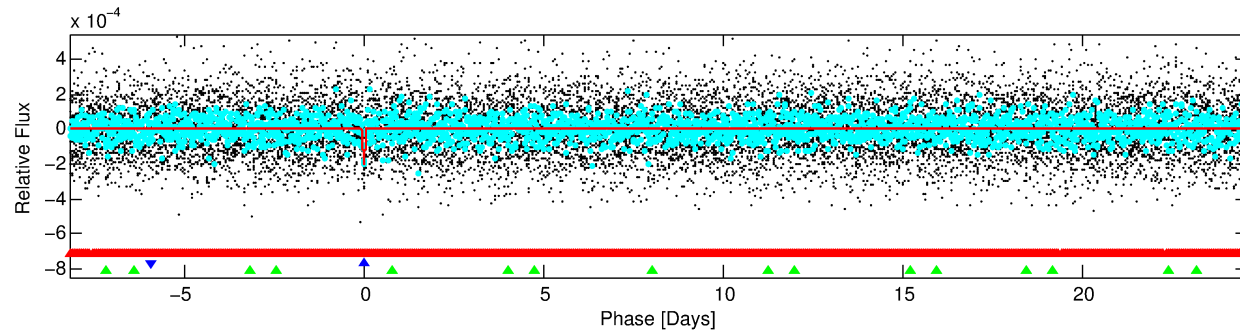
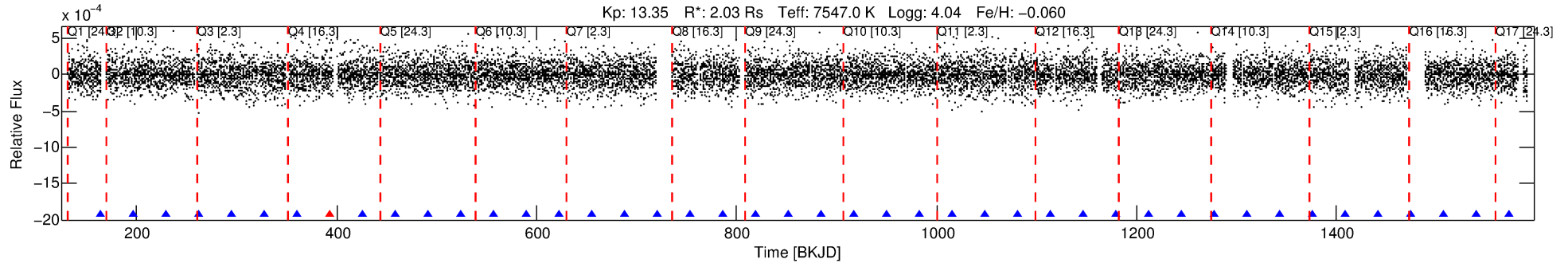
## Ephemeris Match Information For 009178929-02

No Significant Match Found



# DV One-Page Summary

KIC: 9178929 Candidate: 2 of 3 Period: 32.776 d



## DV Fit Results:

Period = 32.77595 [0.00022] d  
Epoch = 163.5519 [0.0054] BKJD  
Rp/R\* = 0.0146 [0.0088]  
a/R\* = 98.94 [386.92]  
b = 0.83 [1.44]  
Seff = 212.10 [74.86]  
Teq = 973 [86] K  
Rp = 3.25 [2.11] Re  
a = 0.2379 [0.0509] AU  
Ag = 299.46 [379.41] [0.79σ]  
Teffp = 6259 [1939] K [2.72σ]

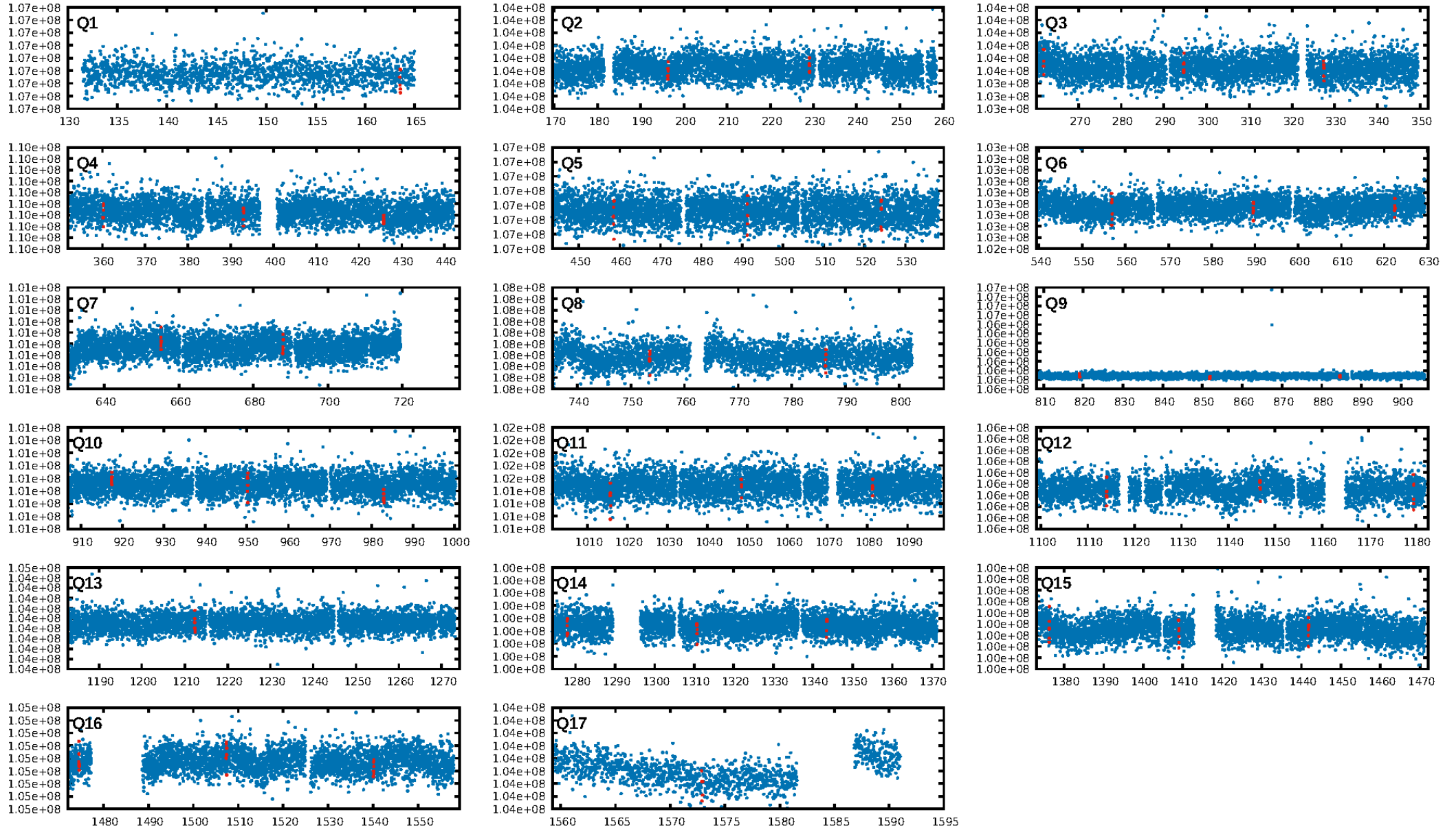
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [128.83σ]  
LongPeriod-sig: 100.0% [434.71σ]  
ModelChiSquare2-sig: 55.2%  
ModelChiSquareGof-sig: 95.8%  
**Bootstrap-pfa: 1.39e-09**  
RollingBand-fgt: 0.92 [11/12]  
GhostDiagnostic-chr: 1.473  
Centroid-sig: 22.4%  
Centroid-so: 1.594 arcsec [1.14σ]  
OotOffset-rm: 3.016 arcsec [1.58σ]  
KicOffset-rm: 3.070 arcsec [1.49σ]  
OotOffset-st: 1/4/2/3 [10]  
KicOffset-st: 1/4/2/3 [10]  
DiffImageQuality-fgm: 0.00 [0/10]  
DiffImageOverlap-fno: 0.65 [11/17]

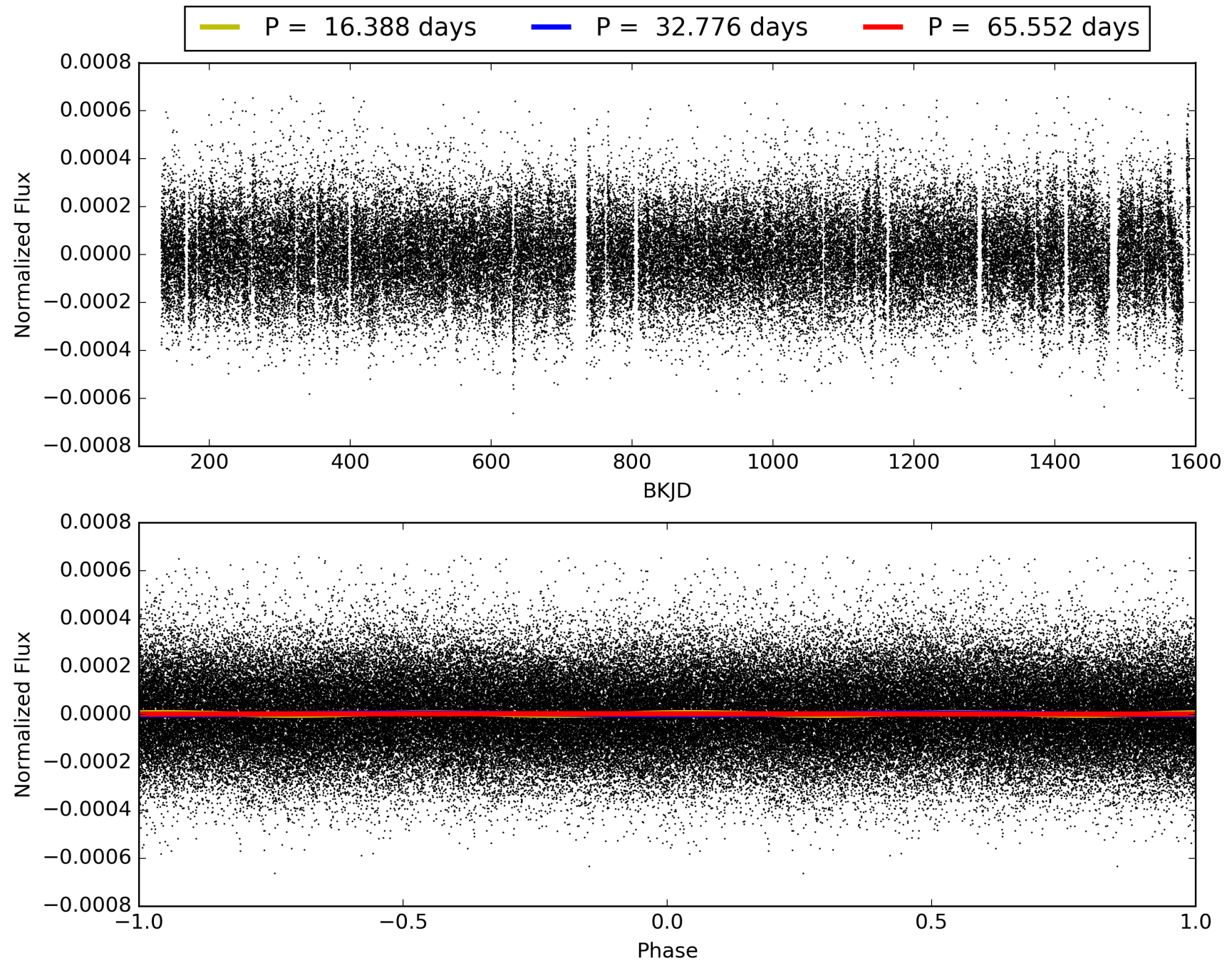
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 15:27:12 Z

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

# TCE 009178929-02, PDC Light Curves

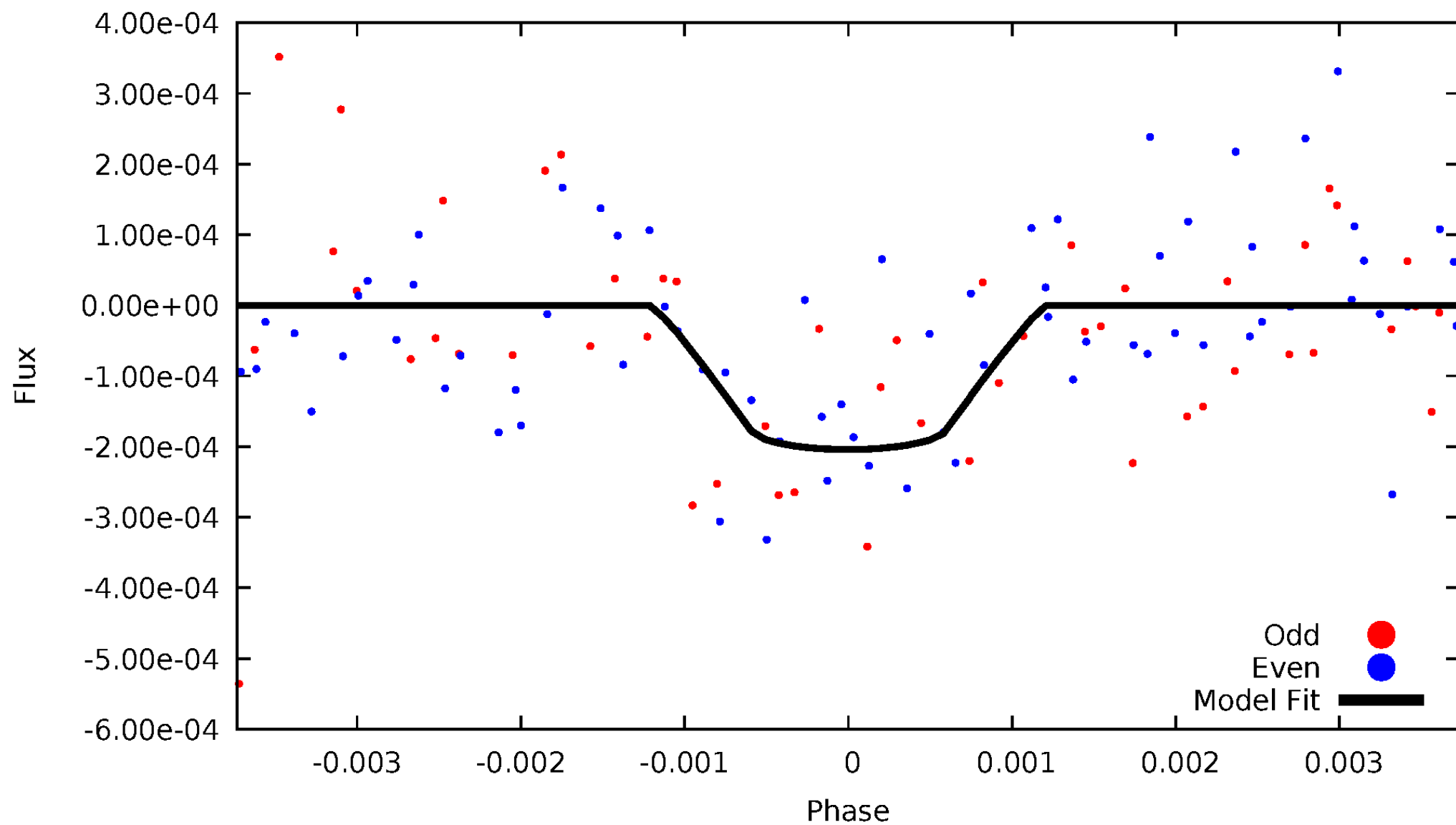


TCE 009178929-02



# DV Odd/Even

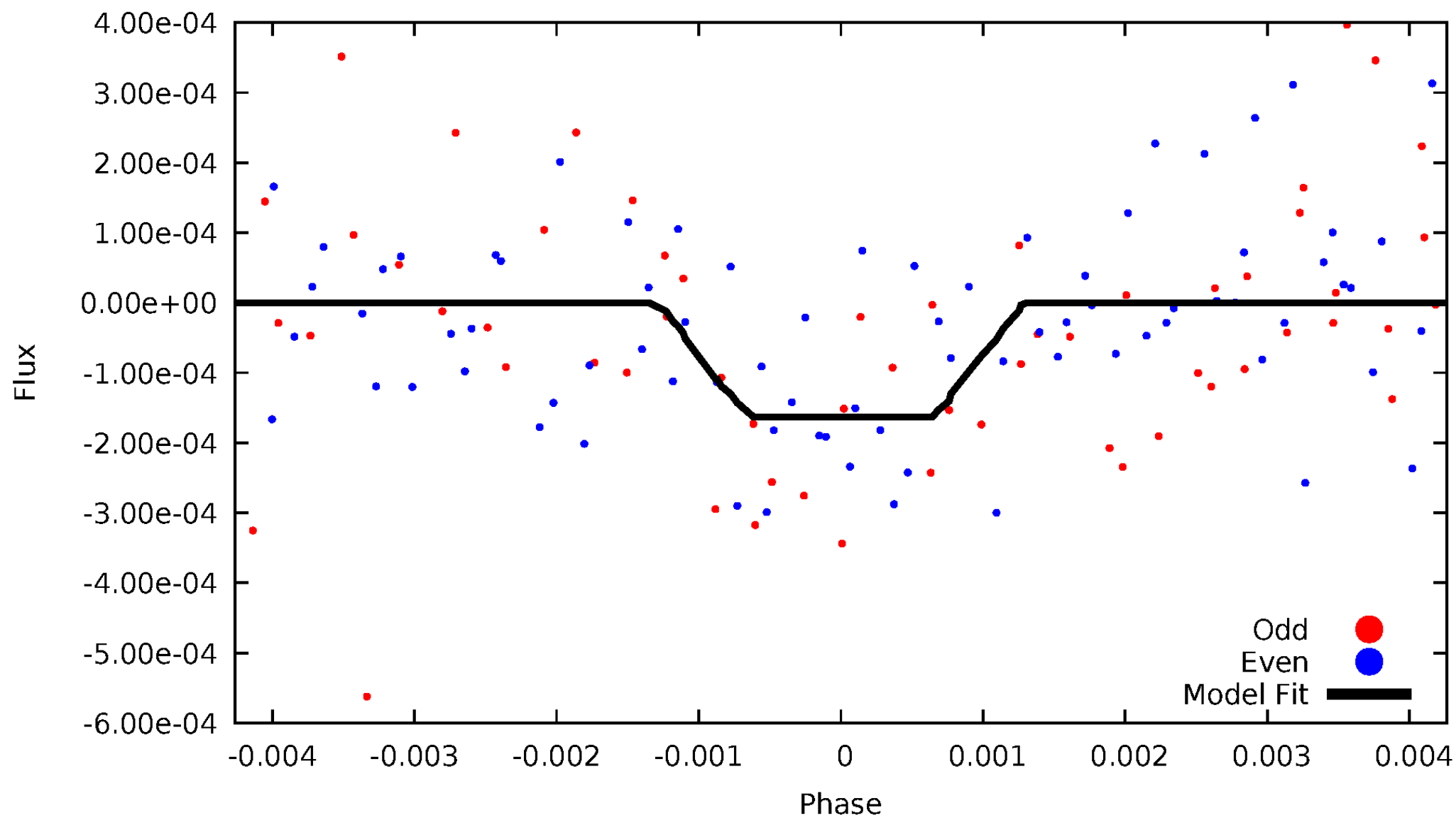
TCE 009178929-02





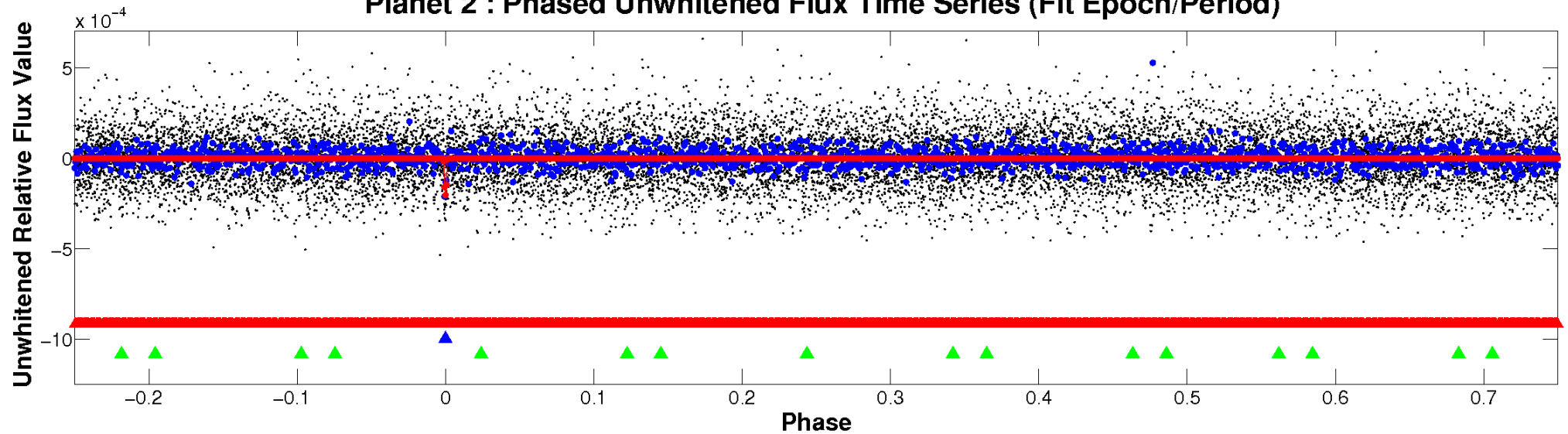
# ALT Odd/Even

TCE 009178929-02

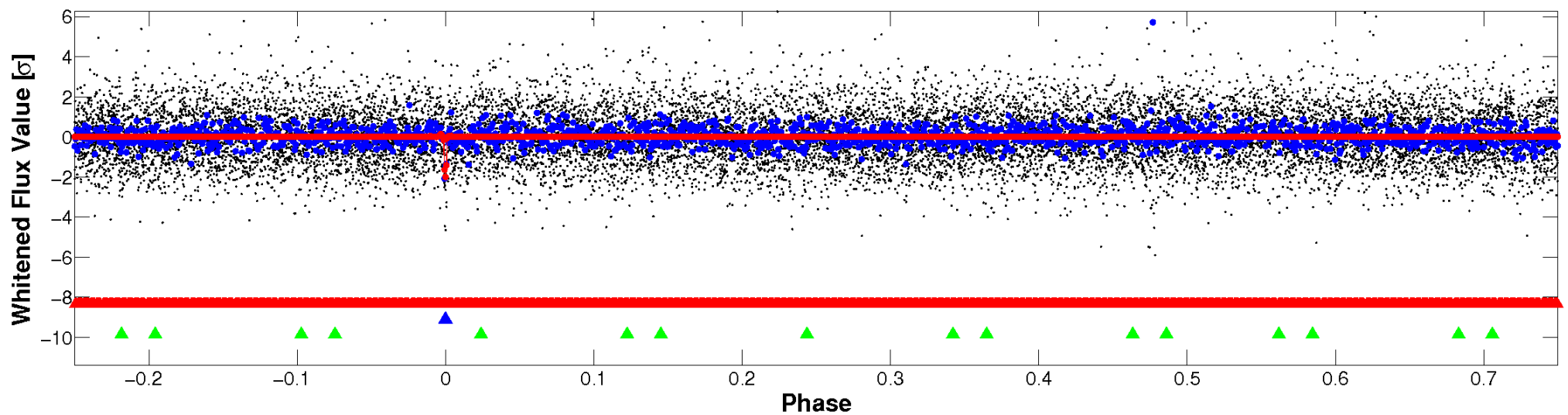


# Non-Whitened Vs. Whitened Light Curve

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

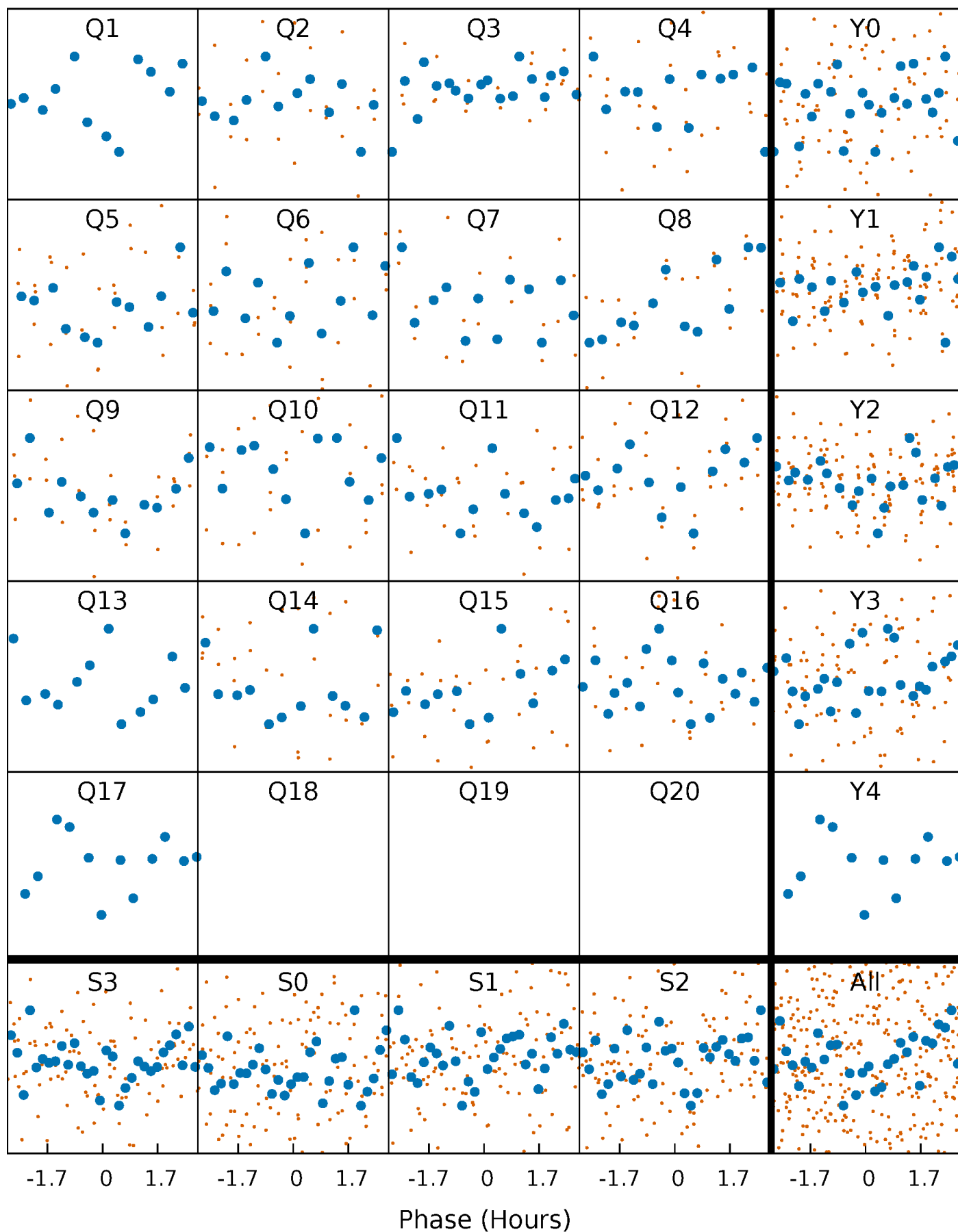


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



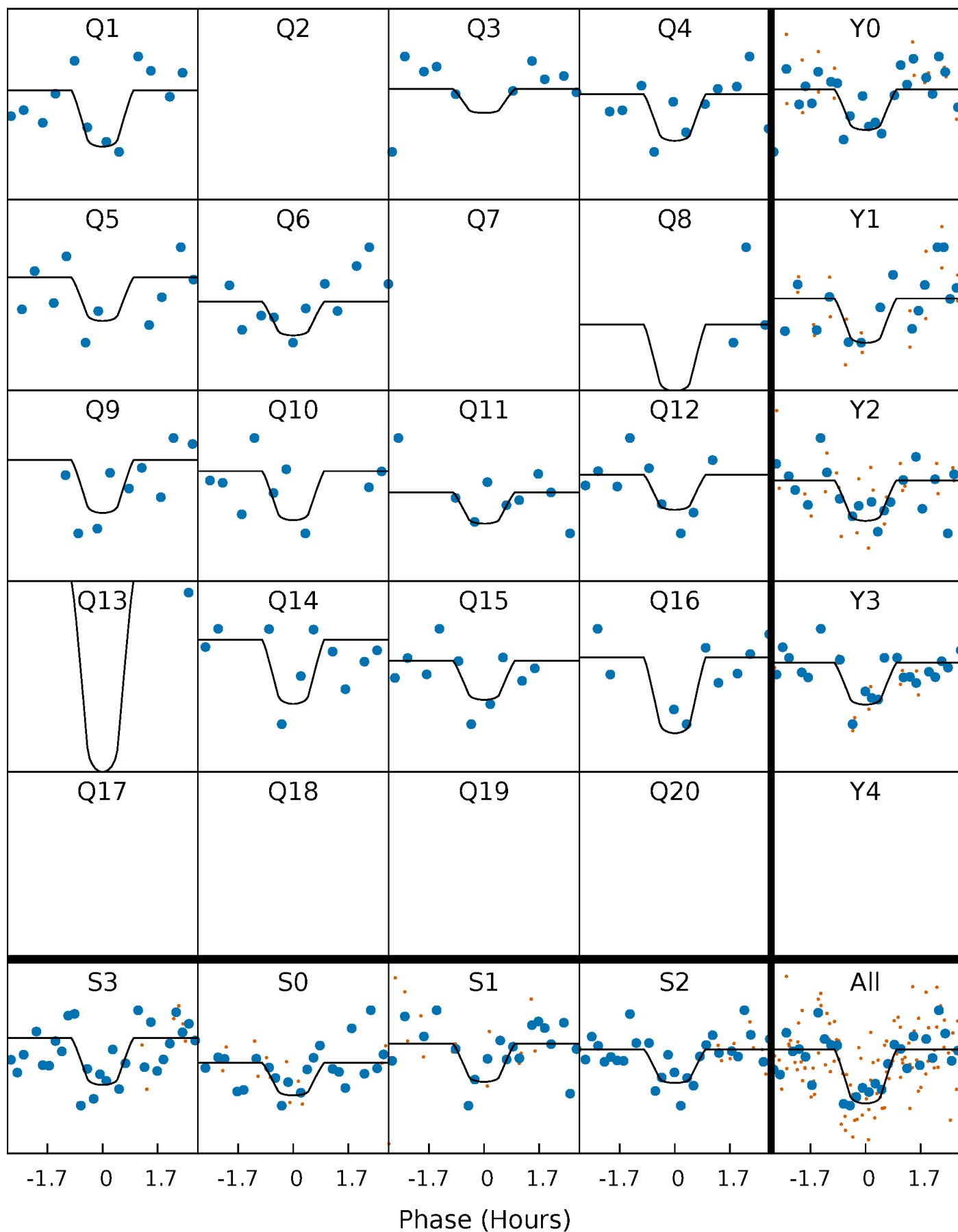
# PDC Quarter-Phased Transit Curves

TCE 009178929-02 P= 32.775948 Days  $T_0=163.551851$  (BKJD)



# DV Quarter-Phased Transit Curves

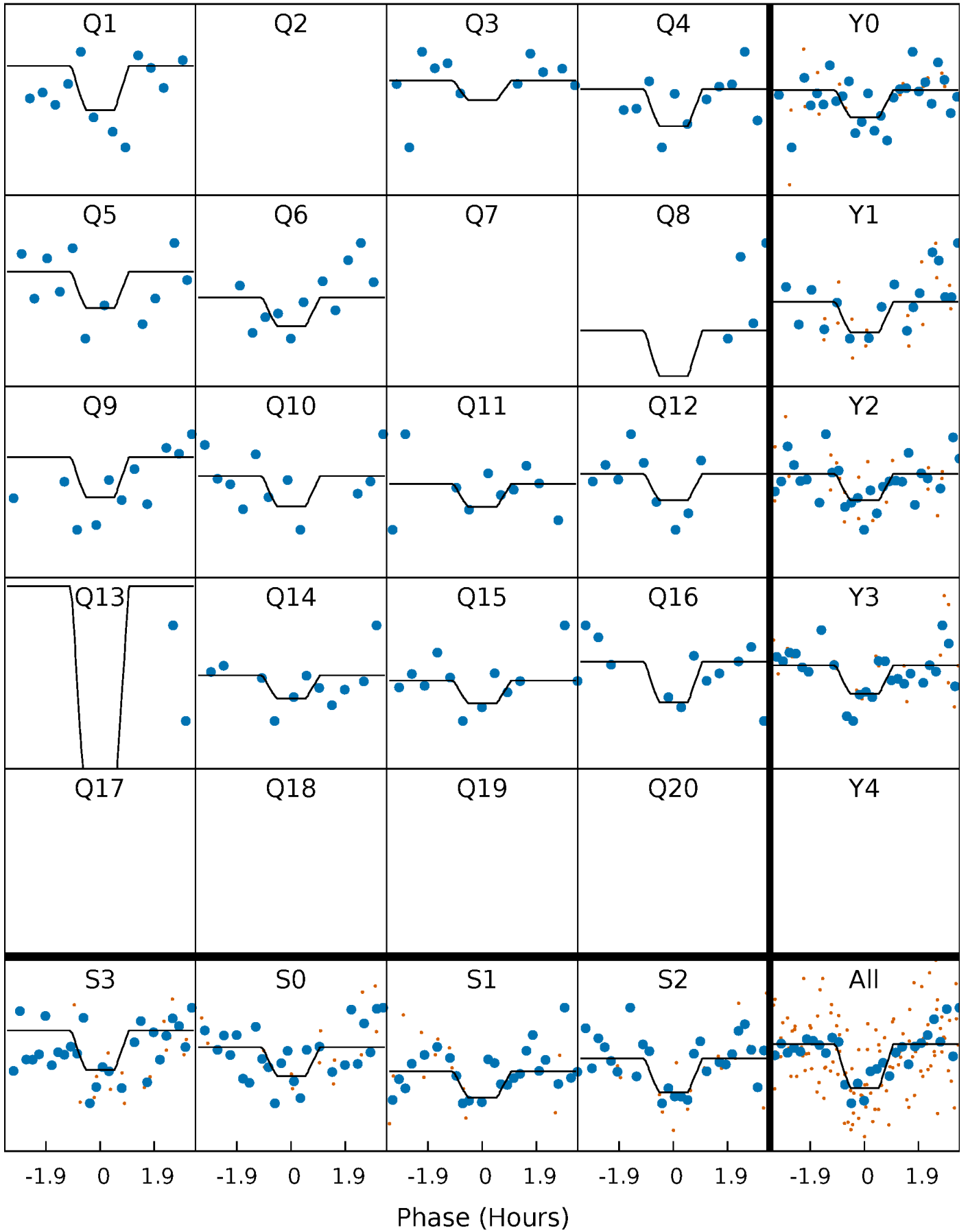
TCE 009178929-02 P= 32.775948 Days  $T_0=163.551851$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

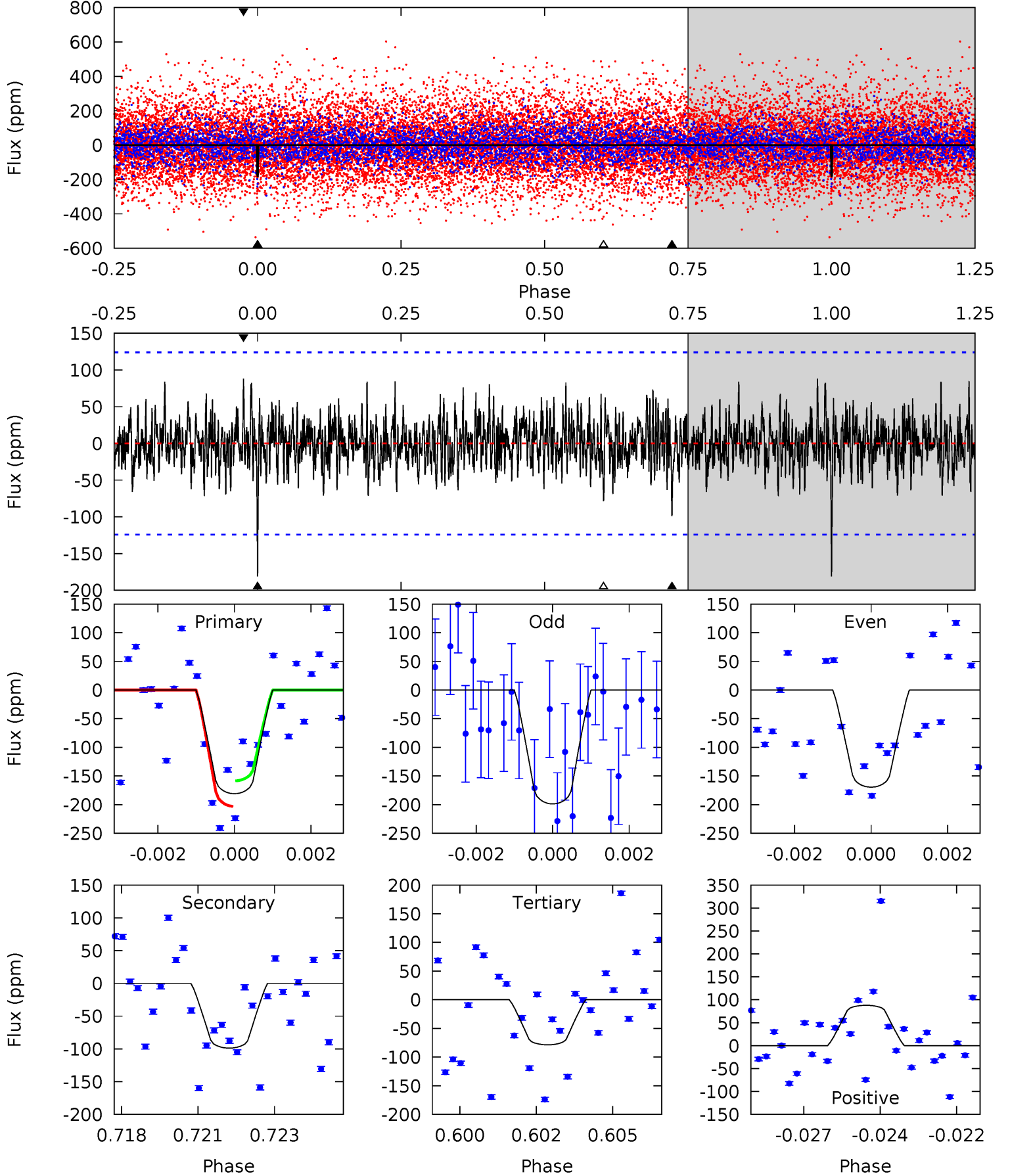
TCE 009178929-02   P= 32.776526 Days    $T_0=163.537443$  (BKJD)



# DV Model-Shift Uniqueness Test

009178929-02,  $P = 32.775948$  Days,  $E = 130.775903$  Days

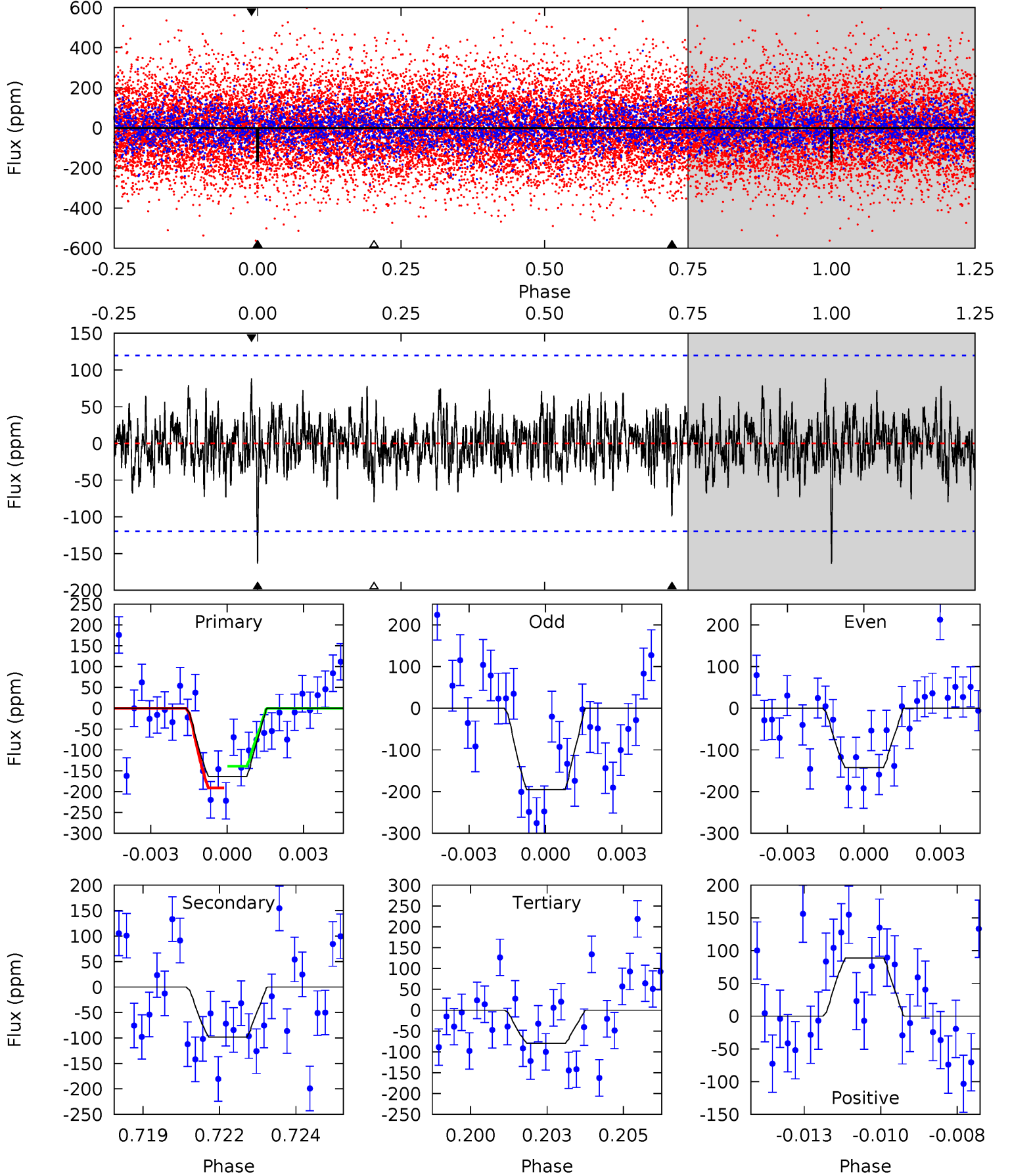
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.72	4.22	3.35	3.75	5.29	3.03	1.13	4.36	3.97	0.86	0.46	0.62	1.09	0.33	0.95



# Alt Model-Shift Uniqueness Test

009178929-02,  $P = 32.776526$  Days,  $E = 130.760917$  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
7.21	4.34	3.52	3.91	5.29	3.02	1.16	3.69	3.31	0.82	0.43	1.15	1.04	0.35	1.16



### Stellar Parameters For KIC 009178929

	$T_{\text{eff}} (K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7547^{+209}_{-314}$	$4.045^{+0.170}_{-0.153}$	$-0.060^{+0.200}_{-0.350}$	$2.032^{+0.517}_{-0.517}$	$1.669^{+0.212}_{-0.282}$	$0.280^{+0.283}_{-0.121}$
	+3%/-4%	+4%/-4%	+333%/-583%	+25%/-25%	+13%/-17%	+101%/-43%
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 009178929-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-99 \pm 23$	$3.45^{+1.96}_{-1.87}$	$1353^{+101}_{-101}$	$5837^{+3370}_{-1074}$	$249^{+1042}_{-152}$
Alt.	$-98 \pm 23$	$2.93^{+2.02}_{-1.61}$	$1360^{+86}_{-101}$	$6273^{+4632}_{-1306}$	$340^{+1549}_{-222}$

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



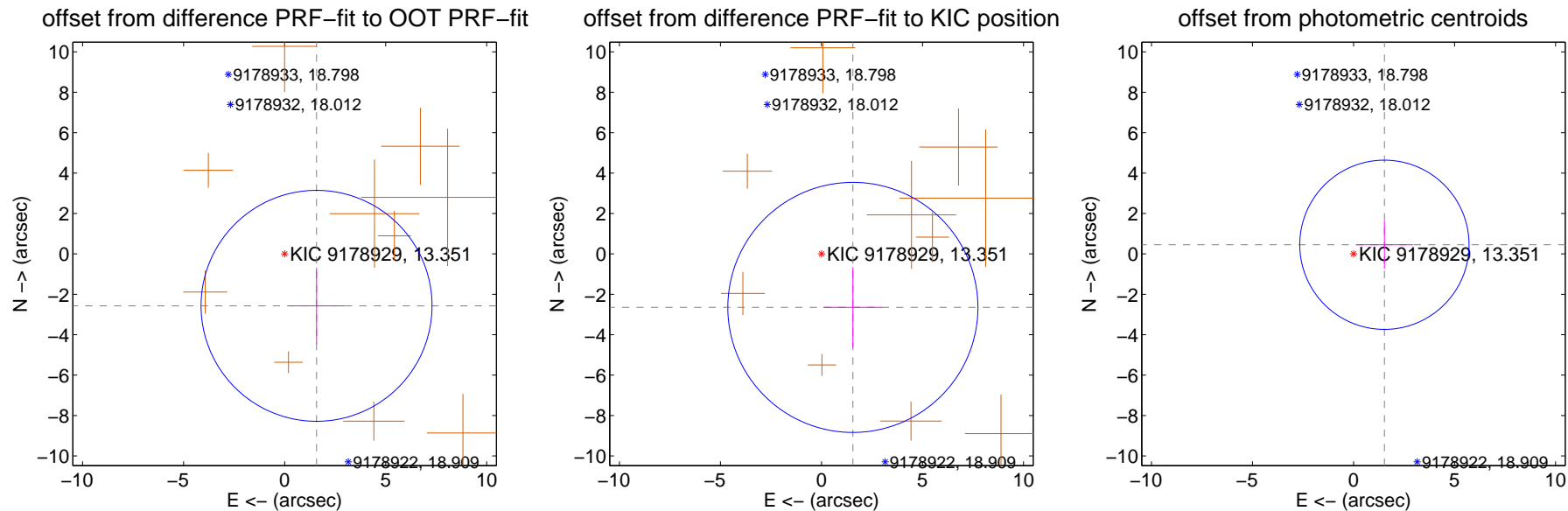
## DV Centroid Data

Supplemental centroid analysis for 009178929-02. Kepler magnitude: 13.35. Transit SNR 9.40

There are 0 quarters with good PRF difference image offsets

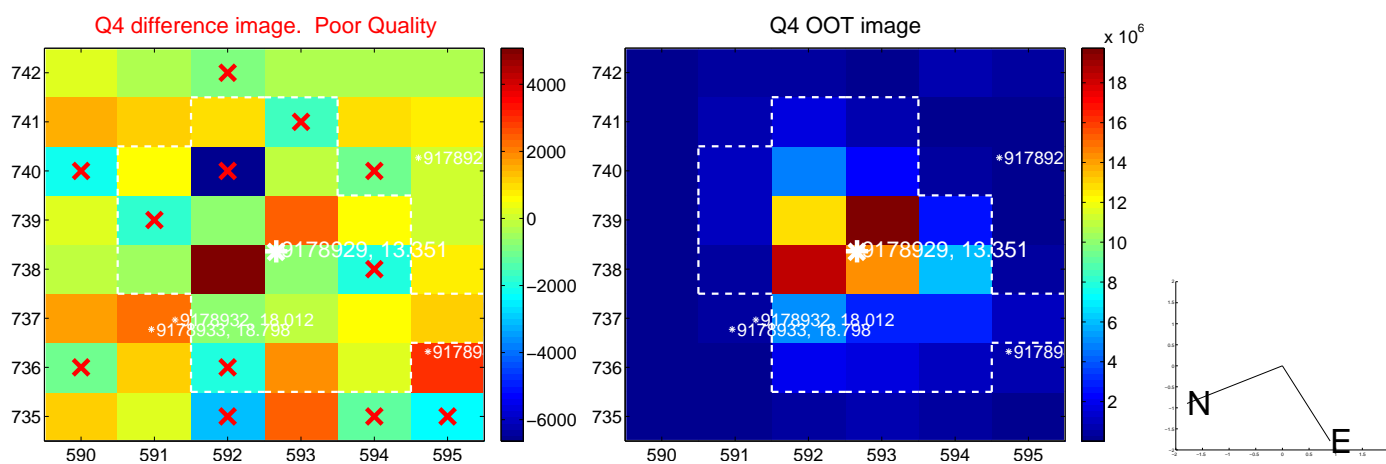
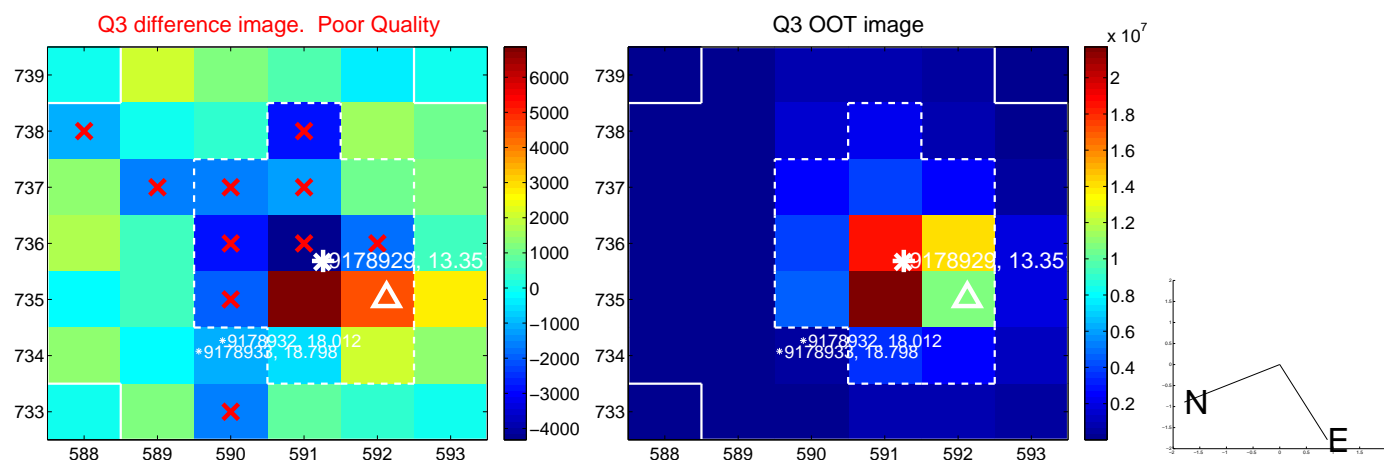
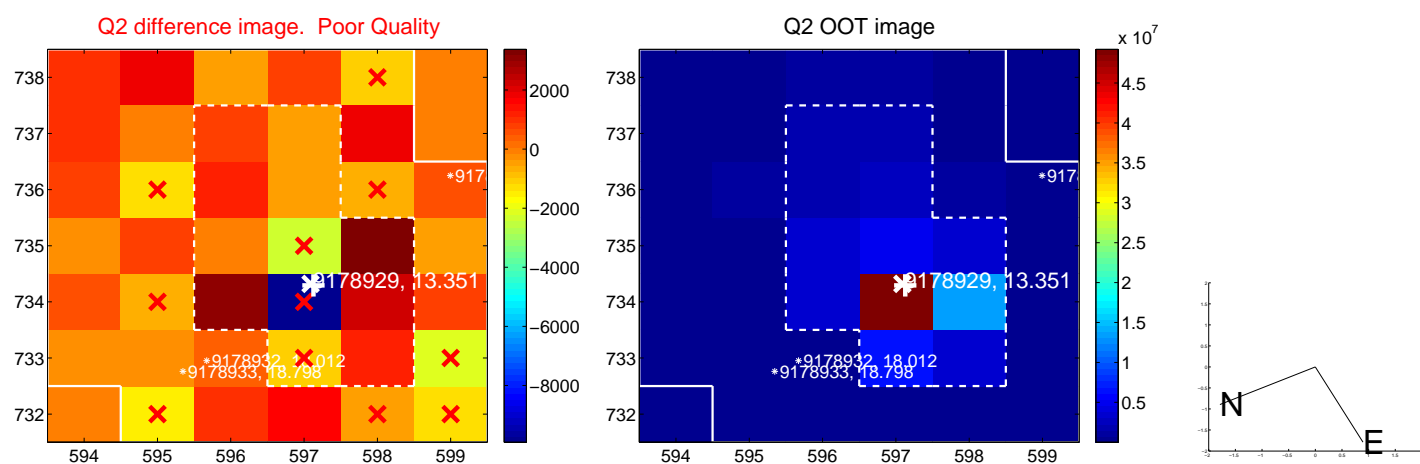
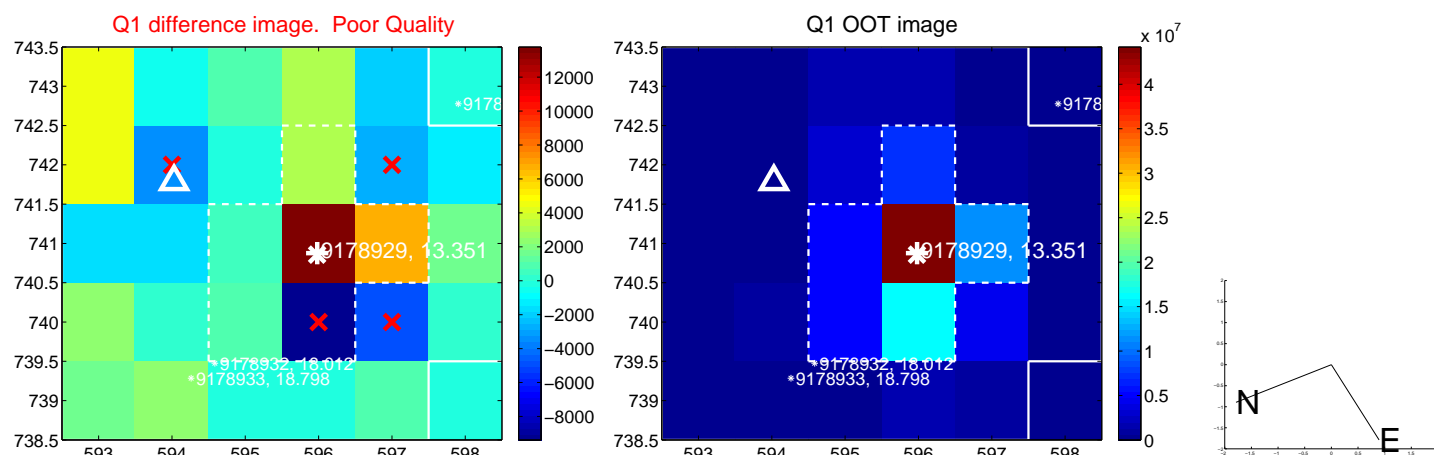
The direct PRF centroid is offset from the target star catalog position by about 0.07 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$3.016 \pm 1.905$	1.58	$-1.579 \pm 1.397$	$-2.570 \pm 1.881$
PRF-fit source offset from KIC position	$3.070 \pm 2.063$	1.49	$-1.553 \pm 1.460$	$-2.648 \pm 1.988$
photometric centroid source offset	$1.59 \pm 1.40$	1.14	$-1.53 \pm 1.41$	$0.45 \pm 1.19$

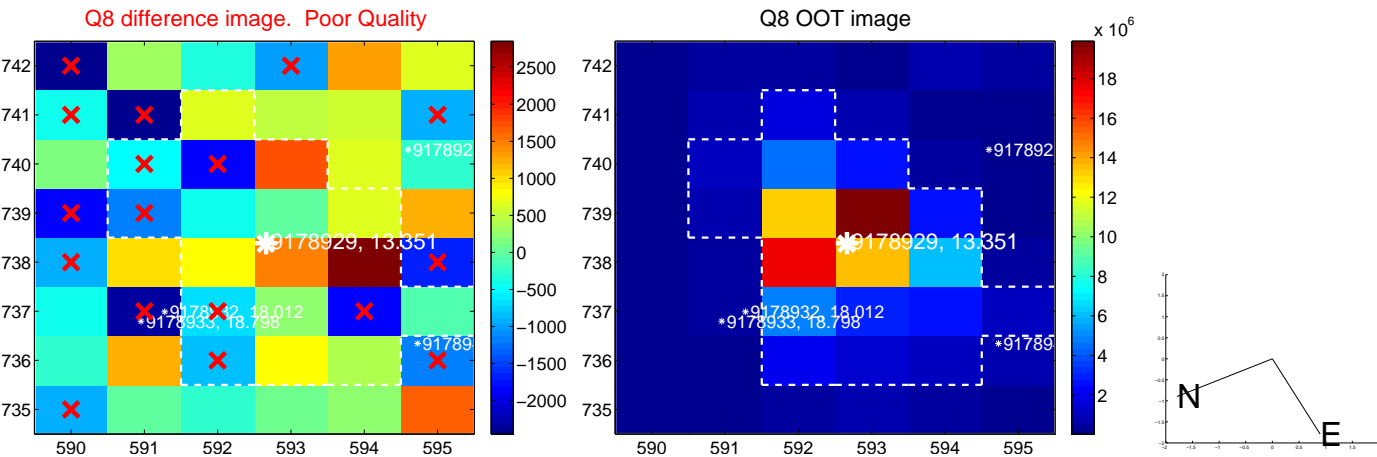
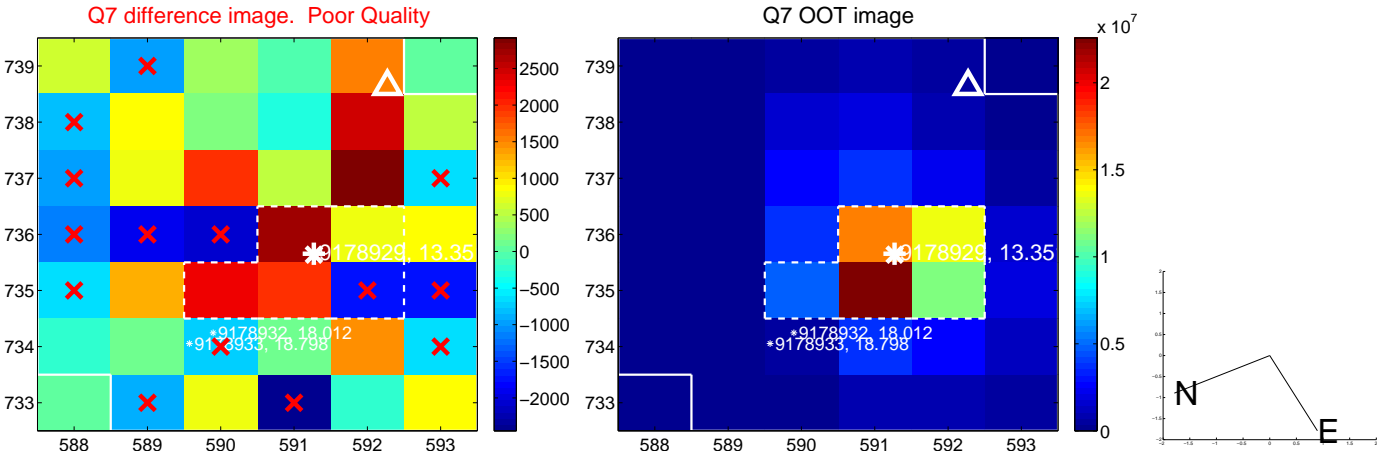
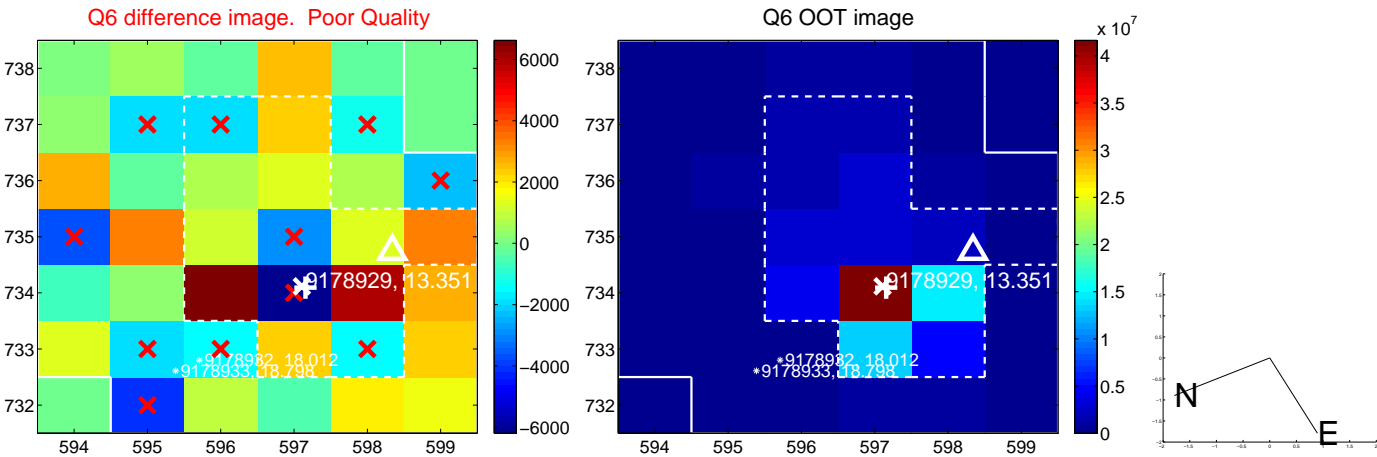
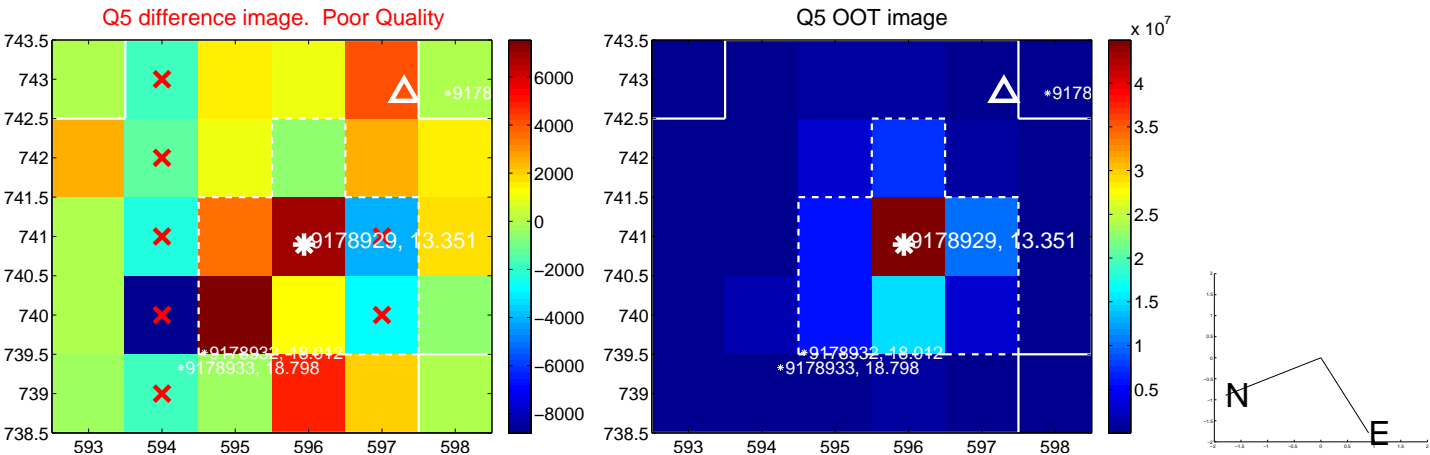


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

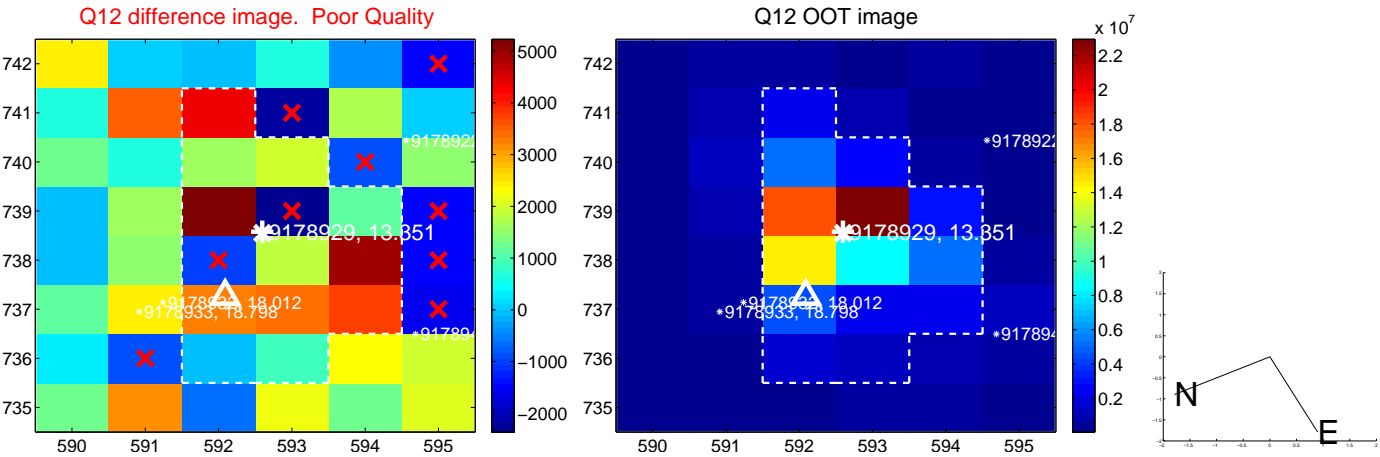
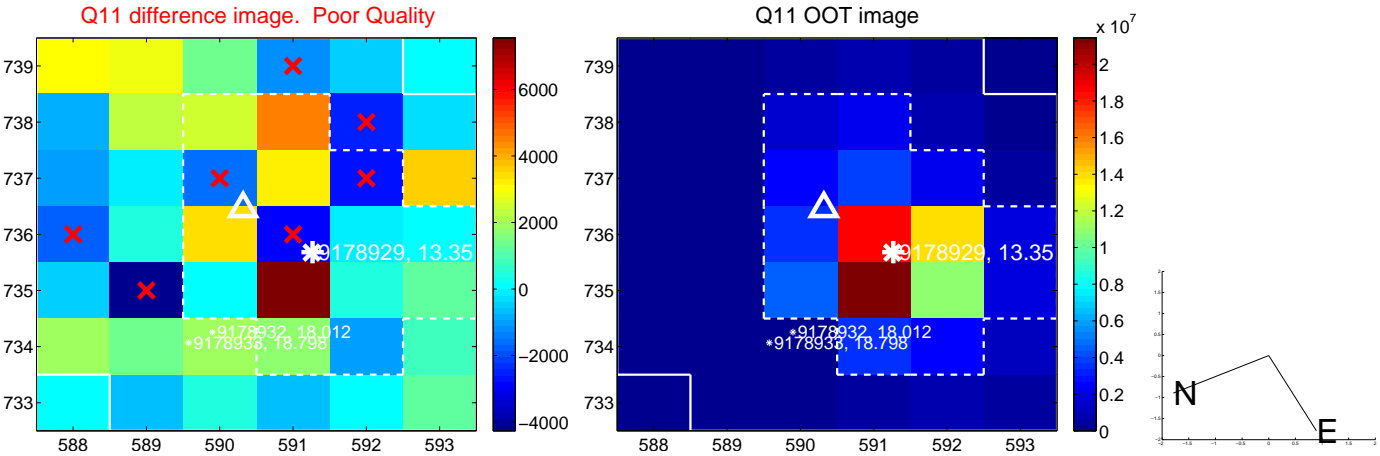
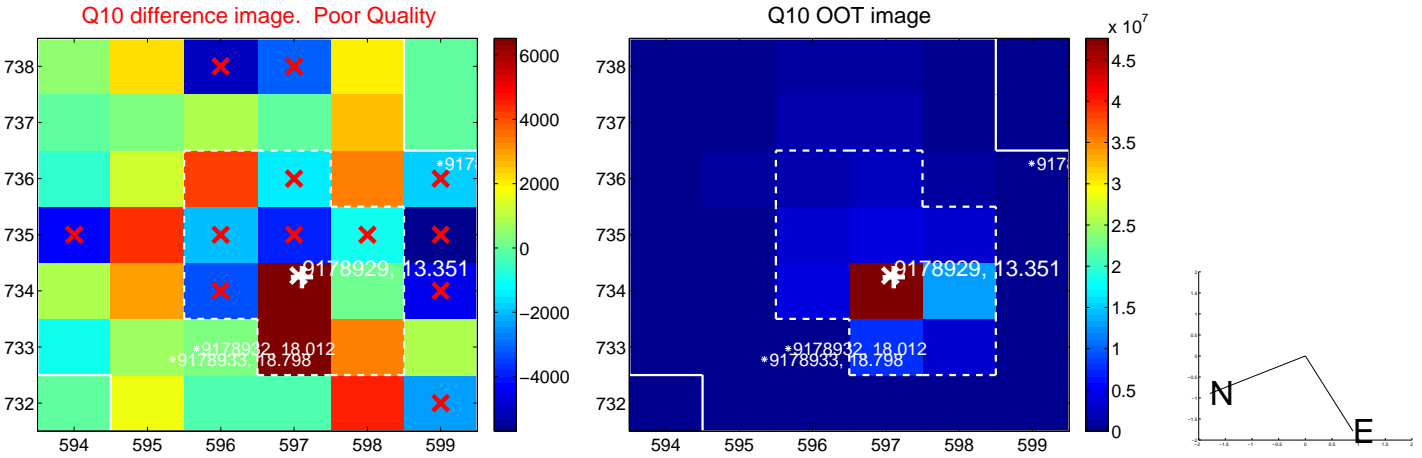
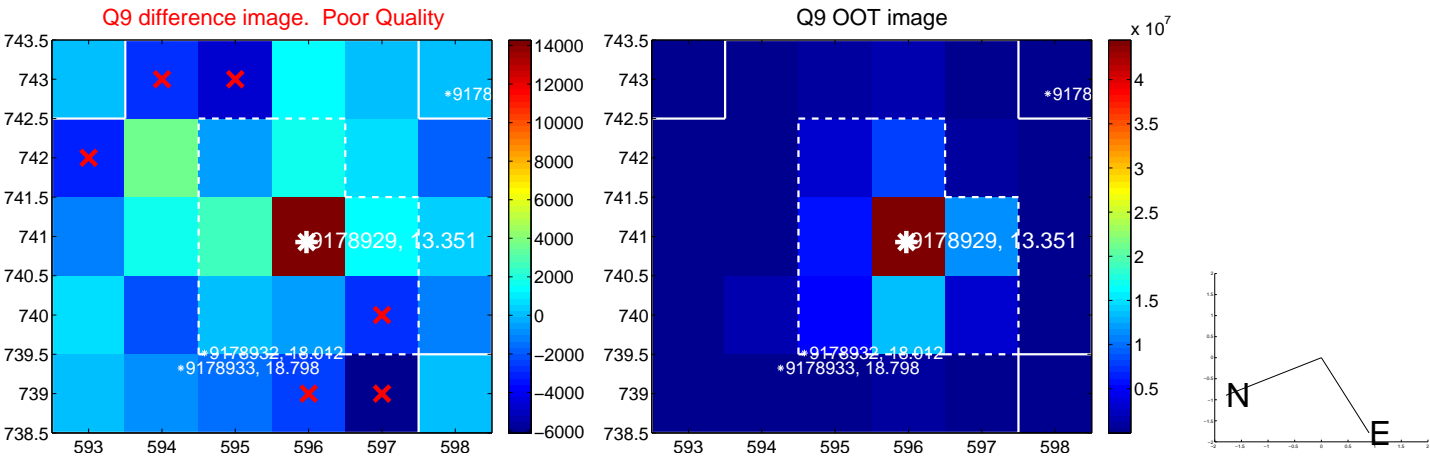
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



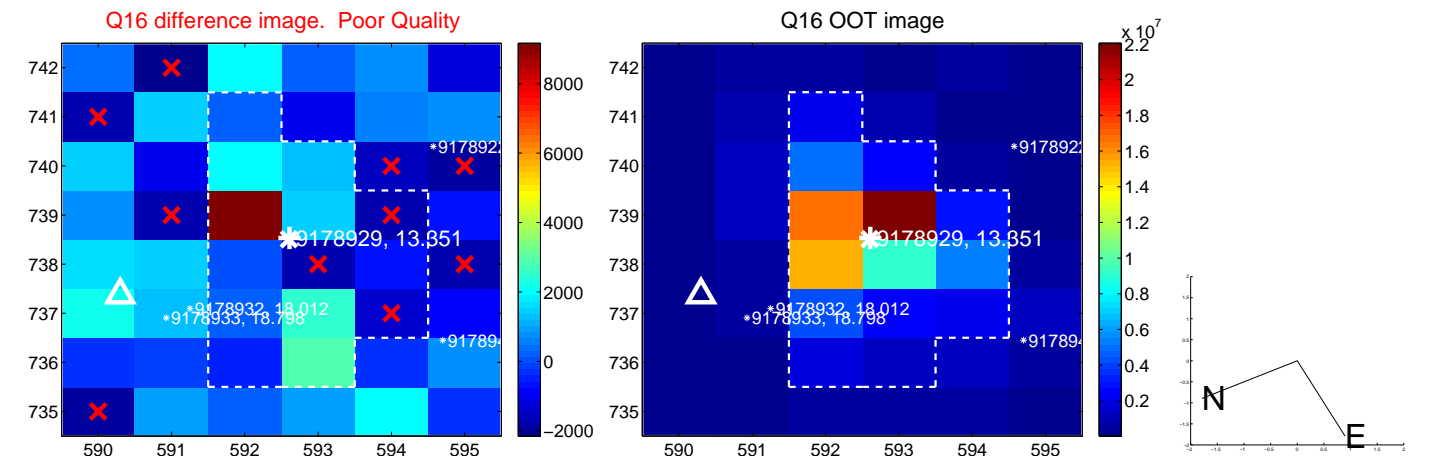
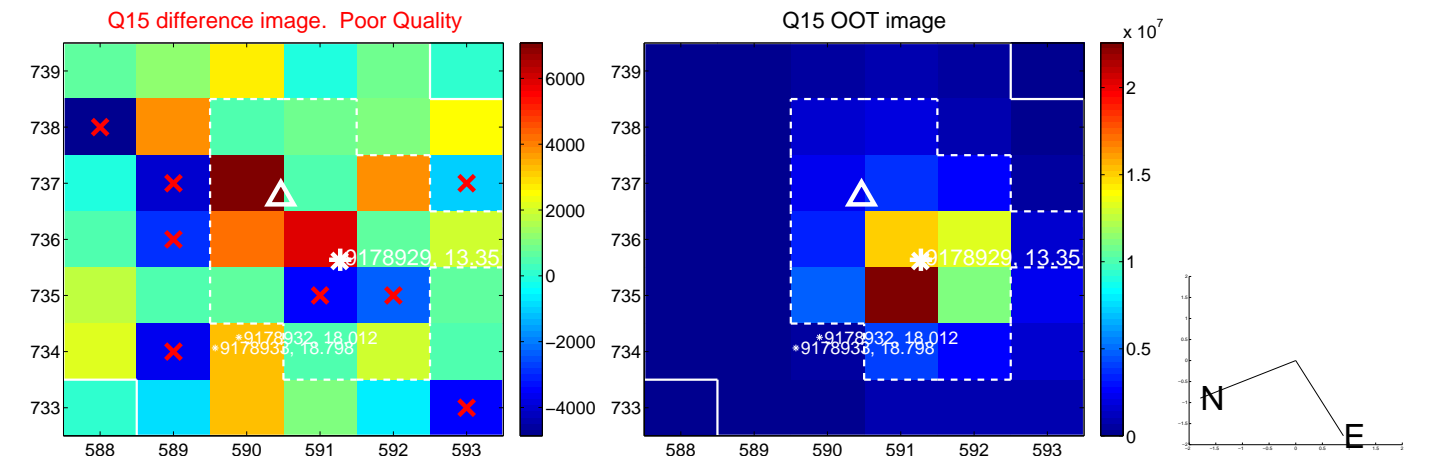
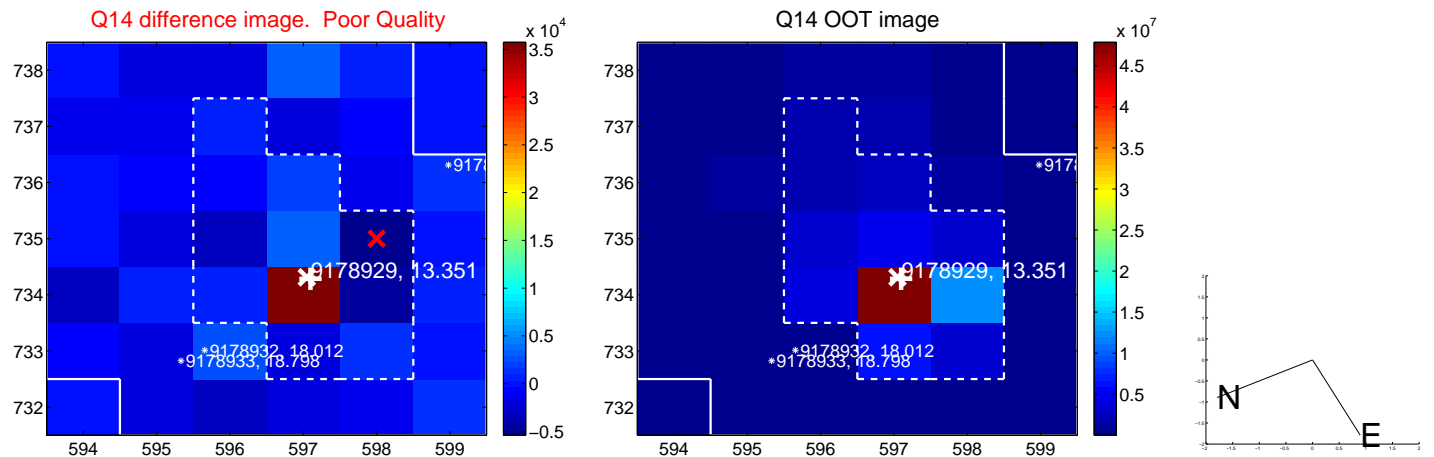
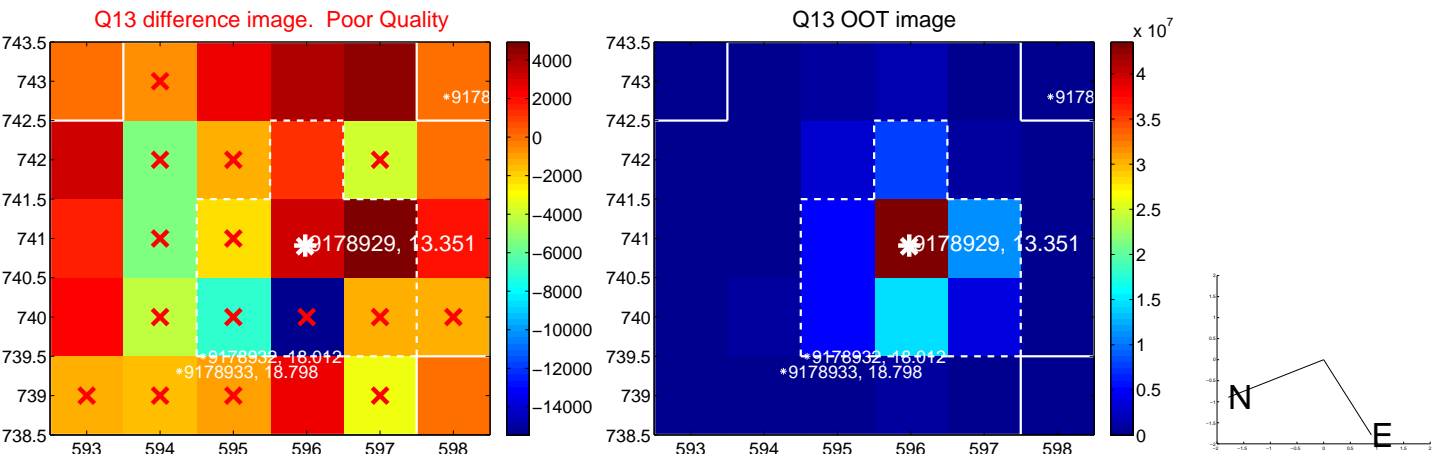
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

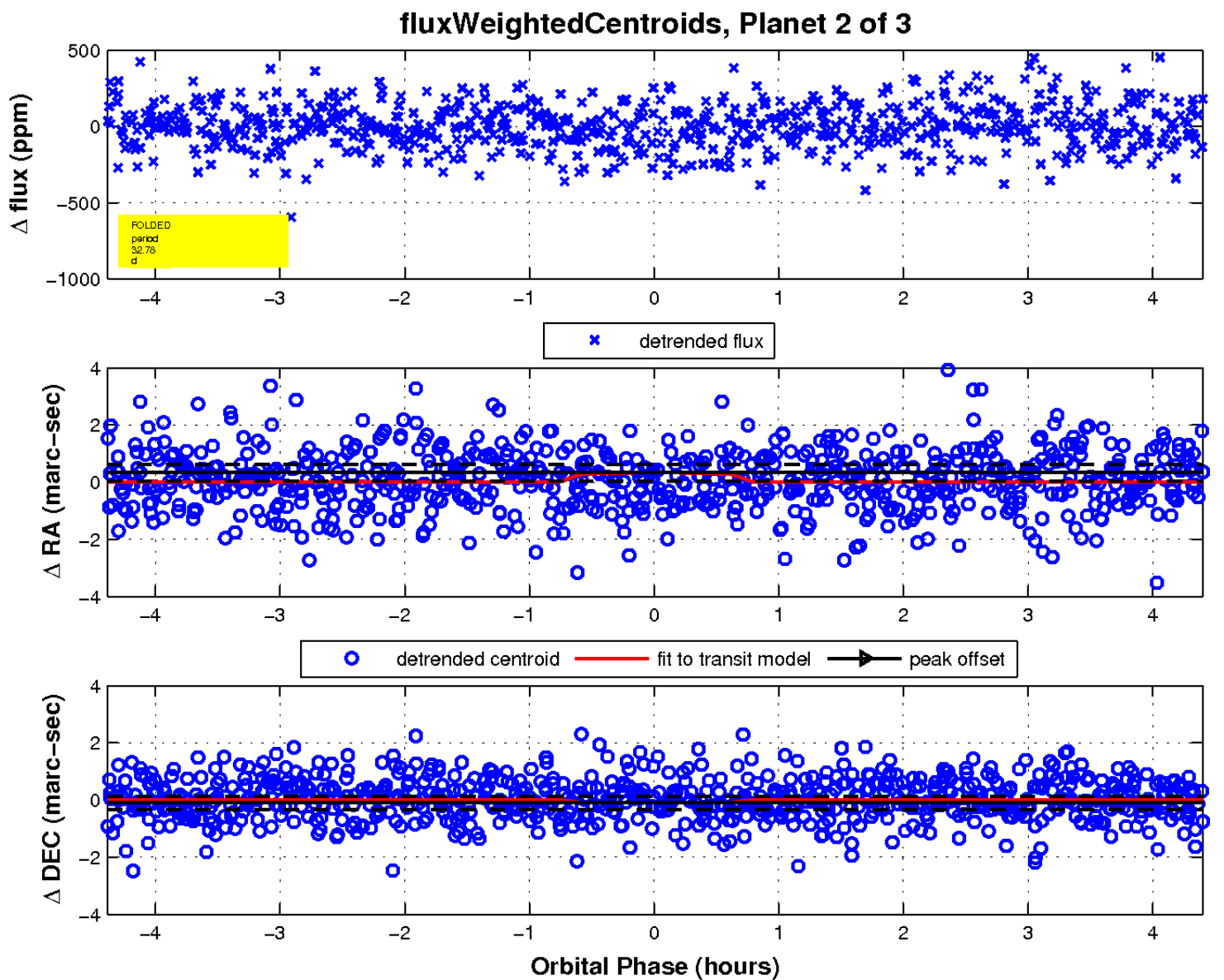
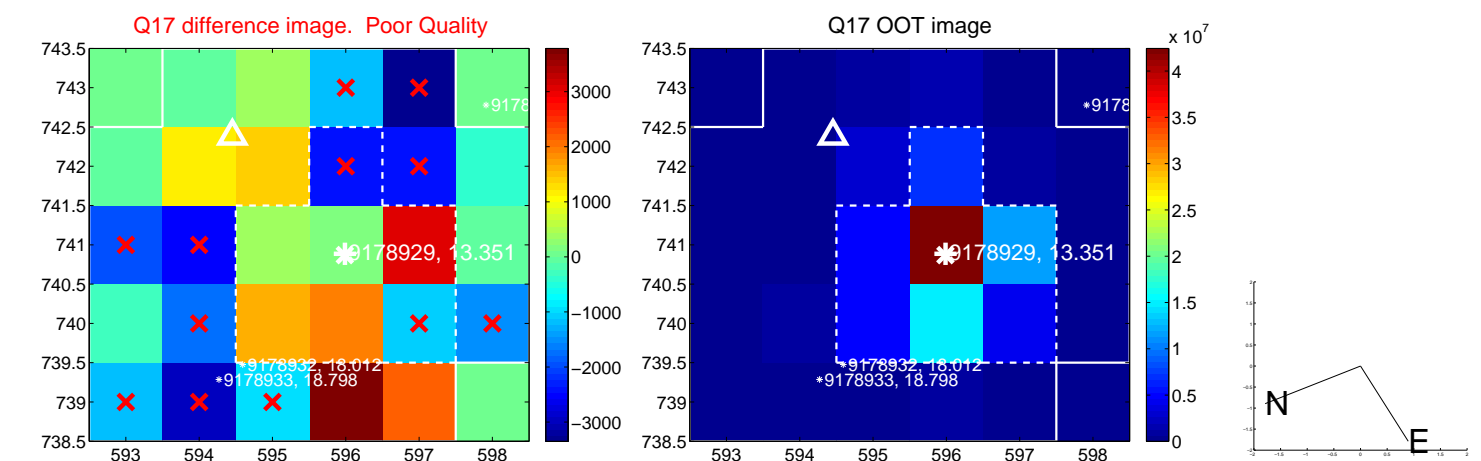


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



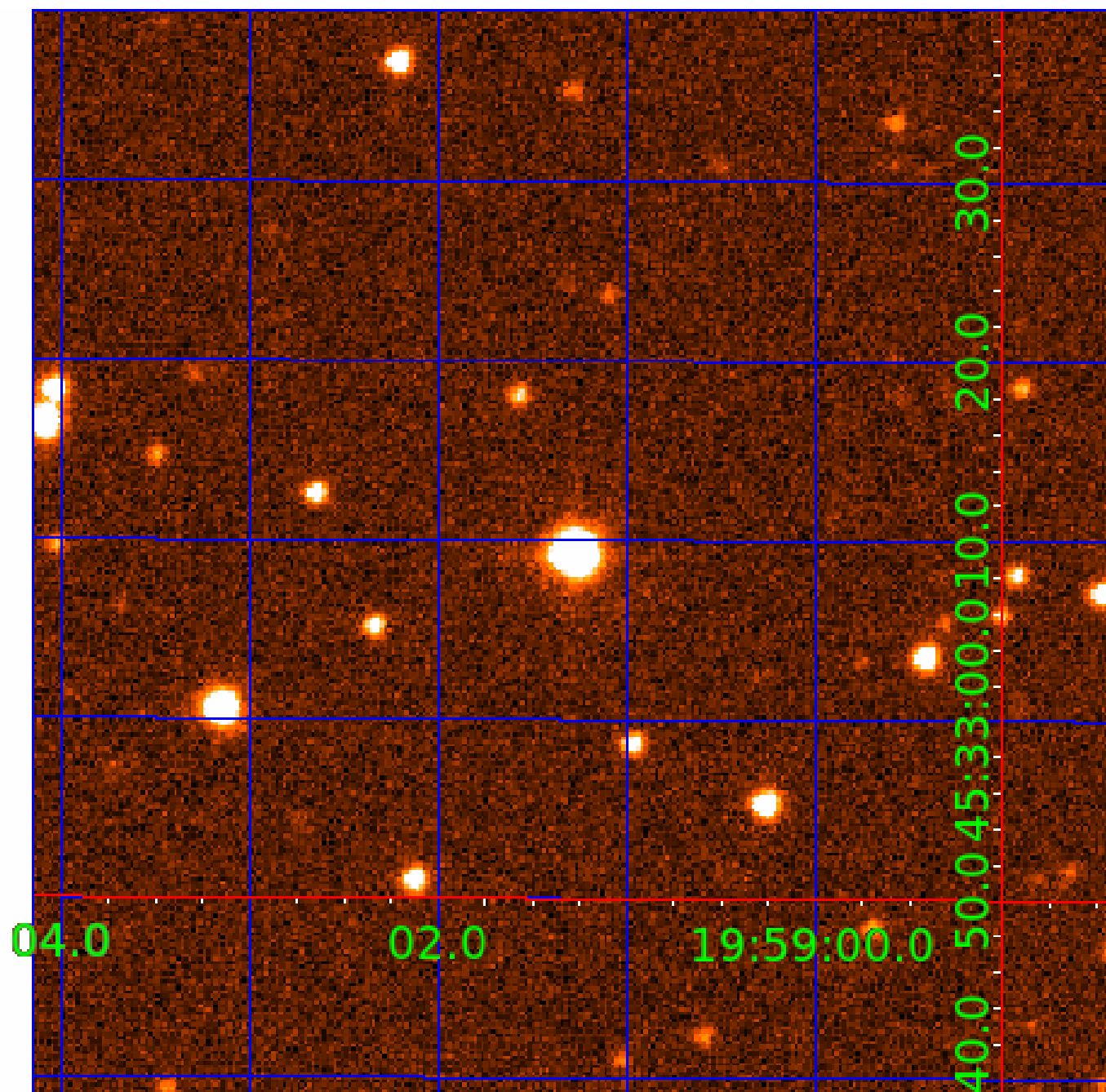


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



# UKIRT Image

Declination



# KIC 009178929

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009178929-01	OBS	No	0.972242	131.947460	14.6	5.740	9.0	10.0	2.03	7547	0.79	23098.03
009178929-02	OBS	No	32.775948	163.551851	204.1	1.468	7.8	9.4	2.03	7547	3.25	212.10
009178929-03	OBS	No	91.127024	221.944621	189.9	2.868	7.8	8.3	2.03	7547	3.16	54.25

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009178929-01	OBS	FP	0.00	1	0	0	0	LPP_DV
009178929-02	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—MOD_NONUNIQ_ALT
009178929-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—CENT_FEW_DIFFS—HALO_GHOST

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

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

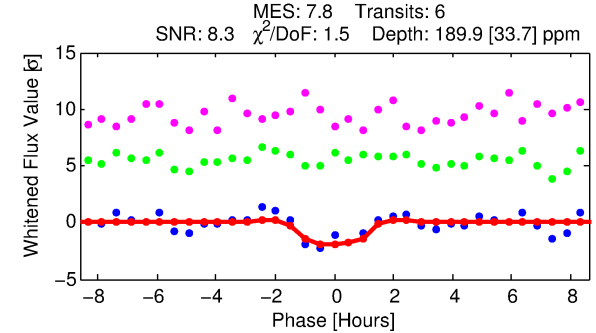
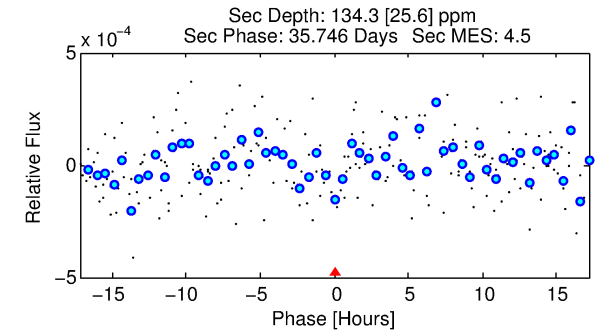
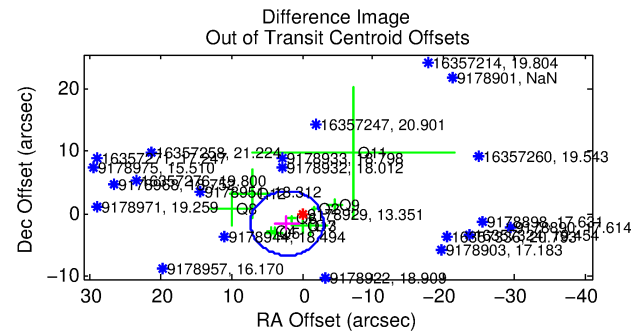
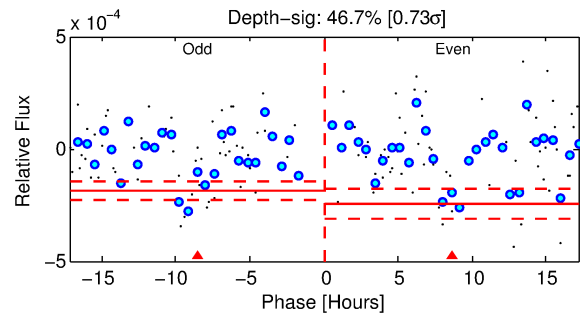
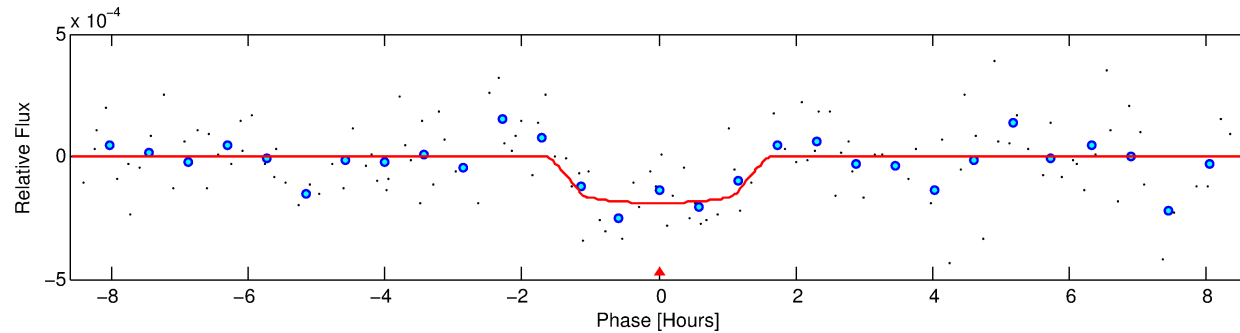
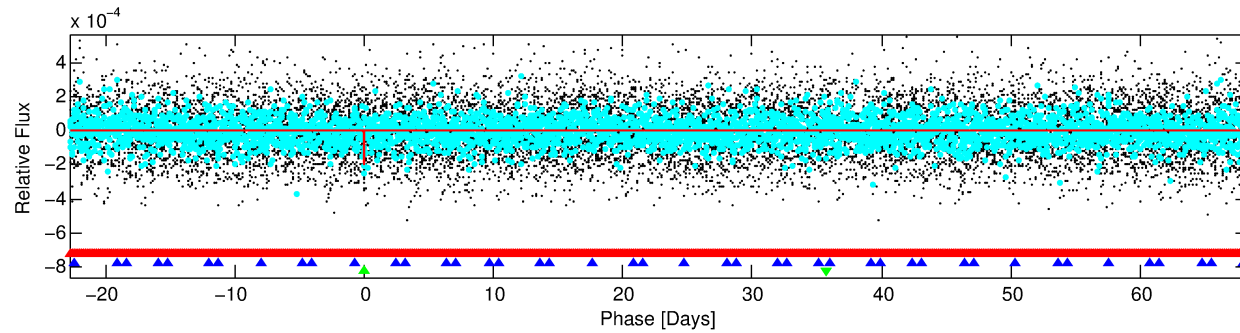
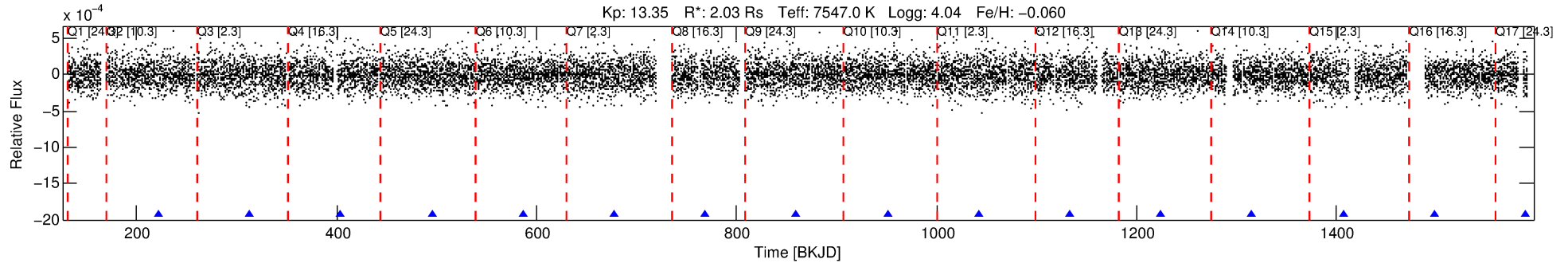
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009178929-03

No Significant Match Found

# DV One-Page Summary

KIC: 9178929 Candidate: 3 of 3 Period: 91.127 d



## DV Fit Results:

Period = 91.12702 [0.00114] d  
Epoch = 221.9446 [0.0094] BKJD  
Rp/R\* = 0.0143 [0.0163]  
a/R\* = 130.55 [968.16]  
b = 0.86 [2.27]  
Seff = 54.25 [19.15]  
Teq = 692 [61] K  
Rp = 3.16 [3.71] Re  
a = 0.4703 [0.1007] AU  
Ag = 1633.78 [3788.96] [0.43 $\sigma$ ]  
Teffp = 6802 [3919] K [1.56 $\sigma$ ]

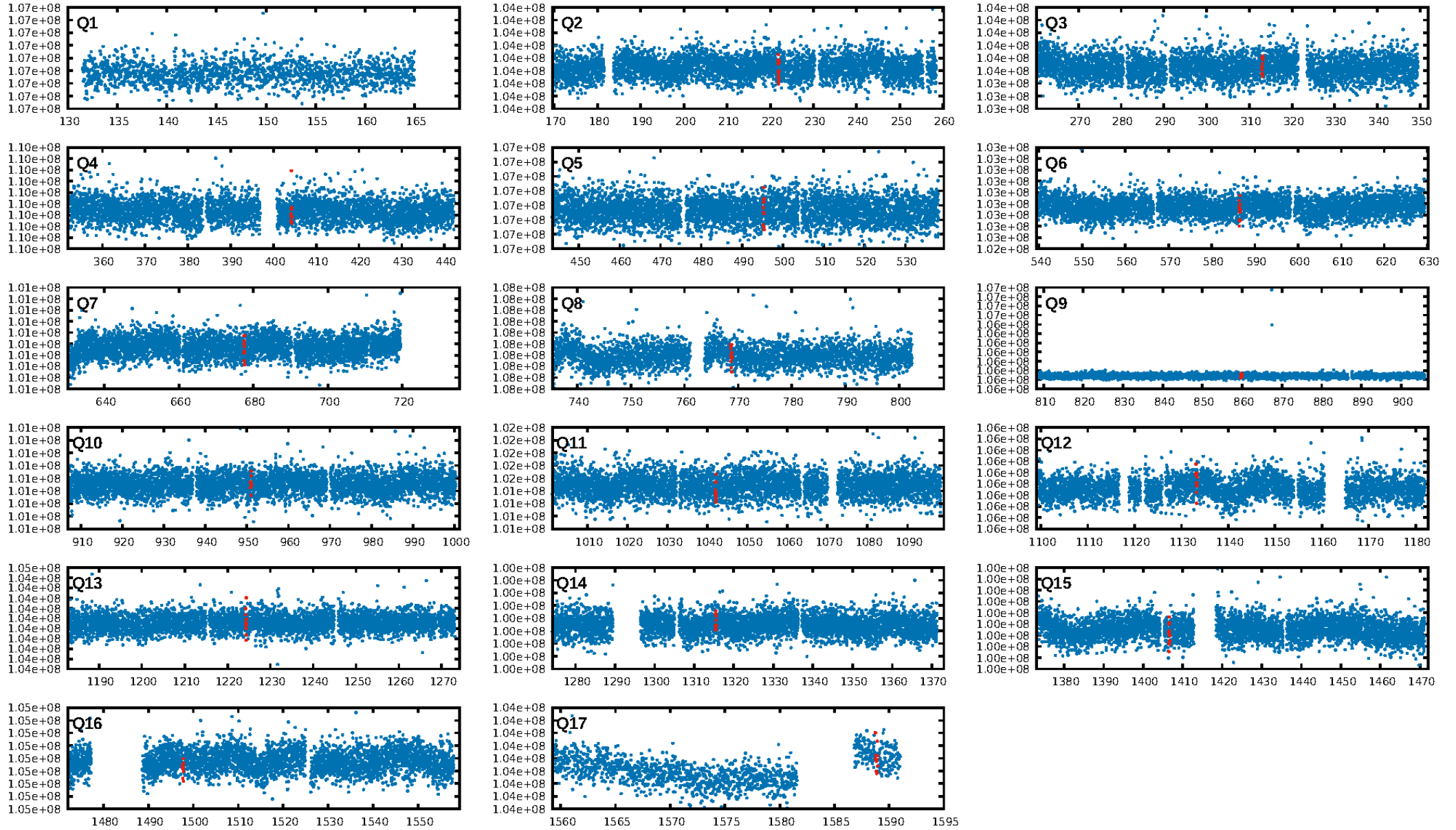
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [434.71 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 43.9%  
ModelChiSquareGof-sig: 99.4%  
**Bootstrap-pfa: 8.48e-10**  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: -0.2368  
Centroid-sig: 21.4%  
Centroid-so: 1.386 arcsec [0.89 $\sigma$ ]  
OotOffset-rm: 2.702 arcsec [1.57 $\sigma$ ]  
KicOffset-rm: 2.795 arcsec [1.54 $\sigma$ ]  
OotOffset-st: 2/2/3/3 [10]  
KicOffset-st: 2/2/3/3 [10]  
DiffImageQuality-fgm: 0.10 [1/10]  
DiffImageOverlap-fno: 0.12 [2/16]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 15:27:16 Z

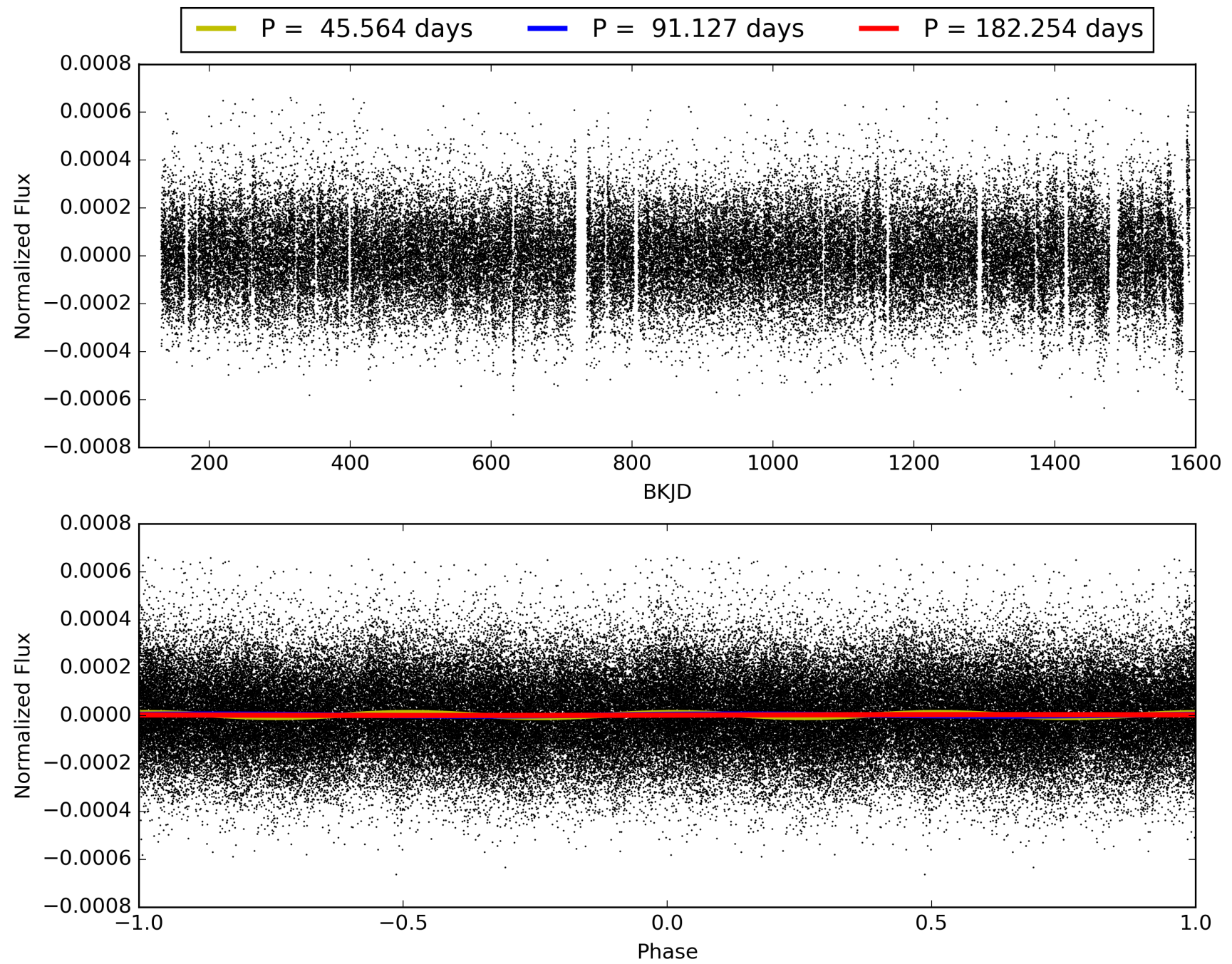
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 009178929-03, PDC Light Curves



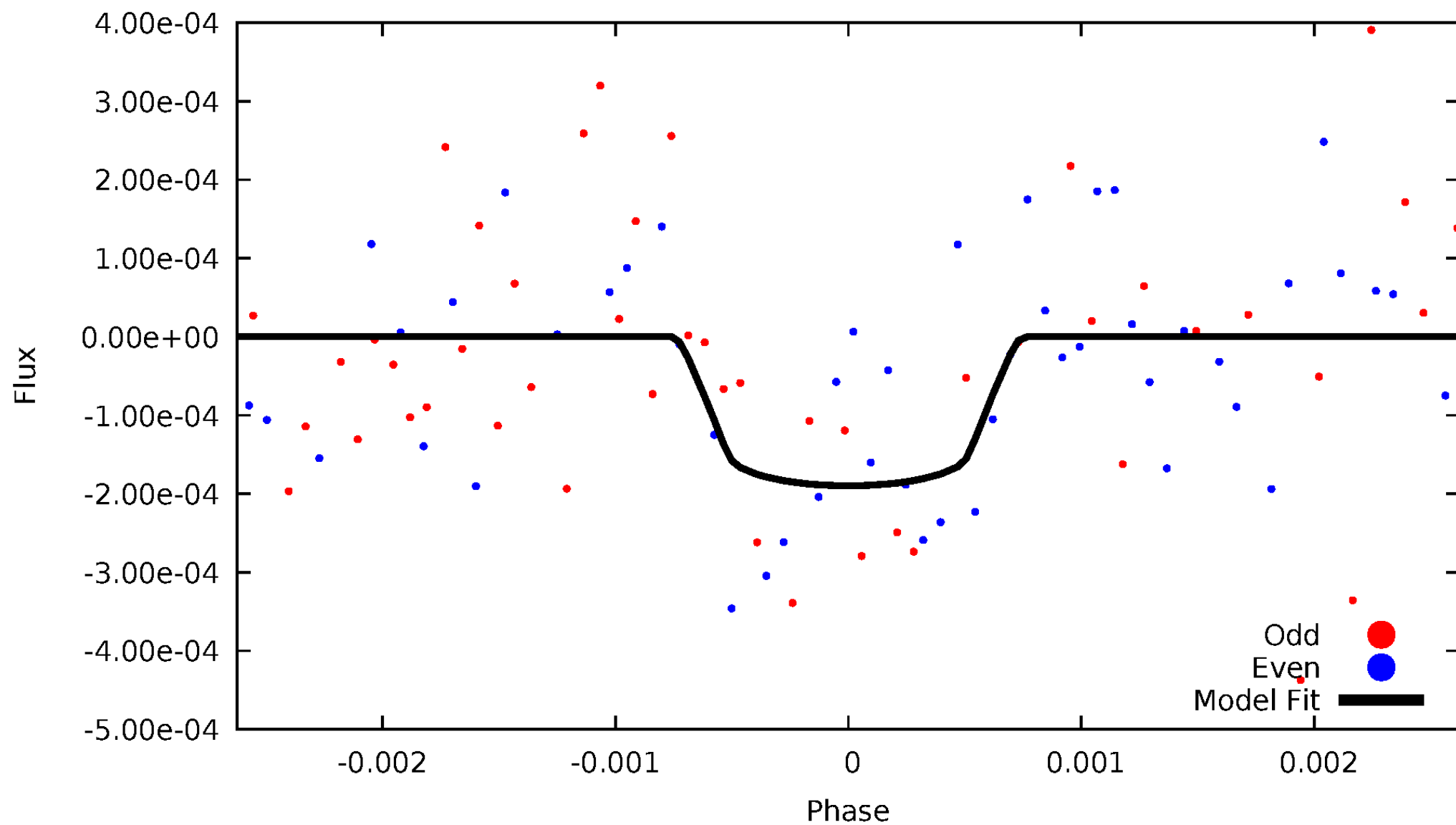


# TCE 009178929-03



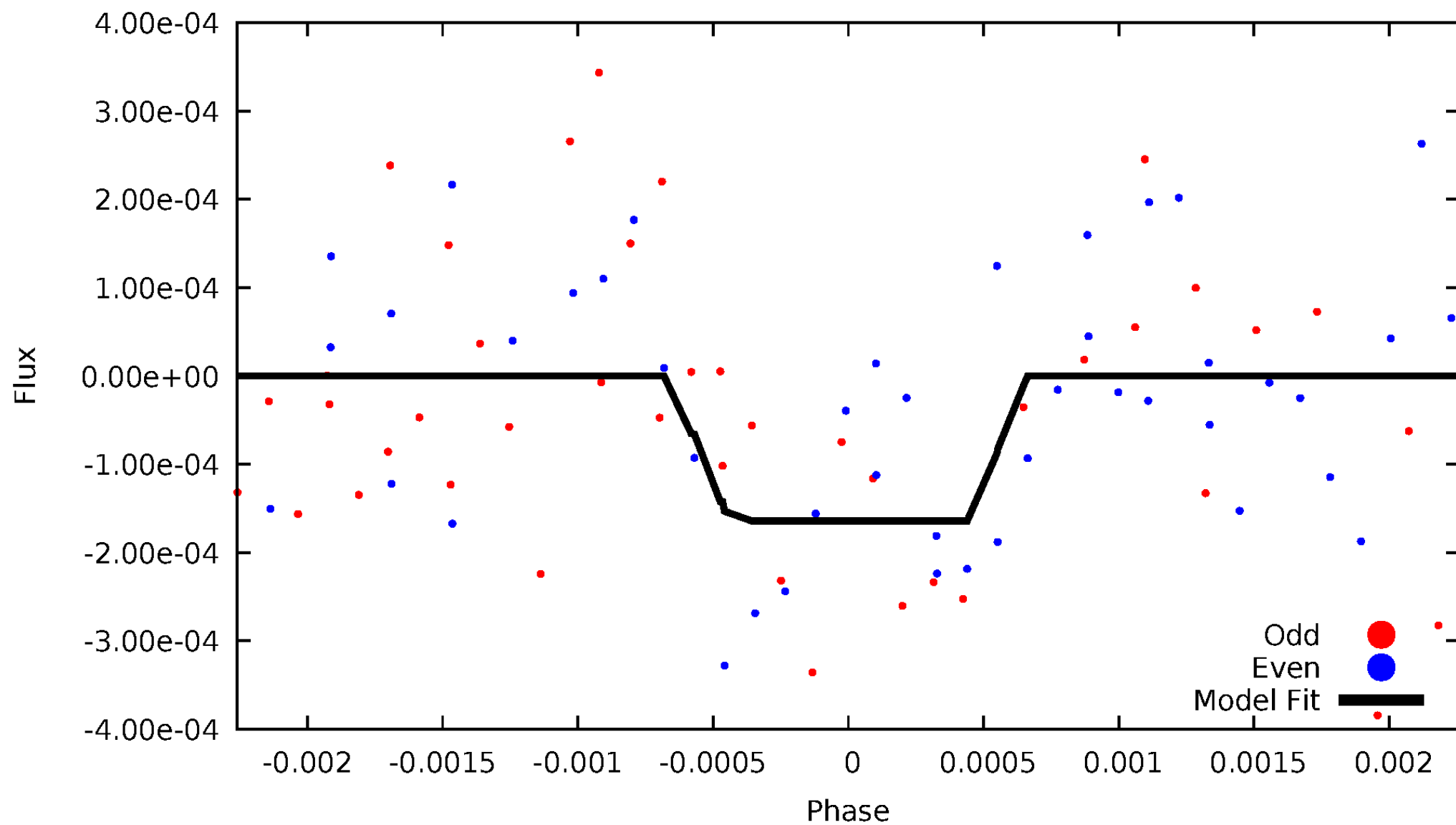
# DV Odd/Even

TCE 009178929-03



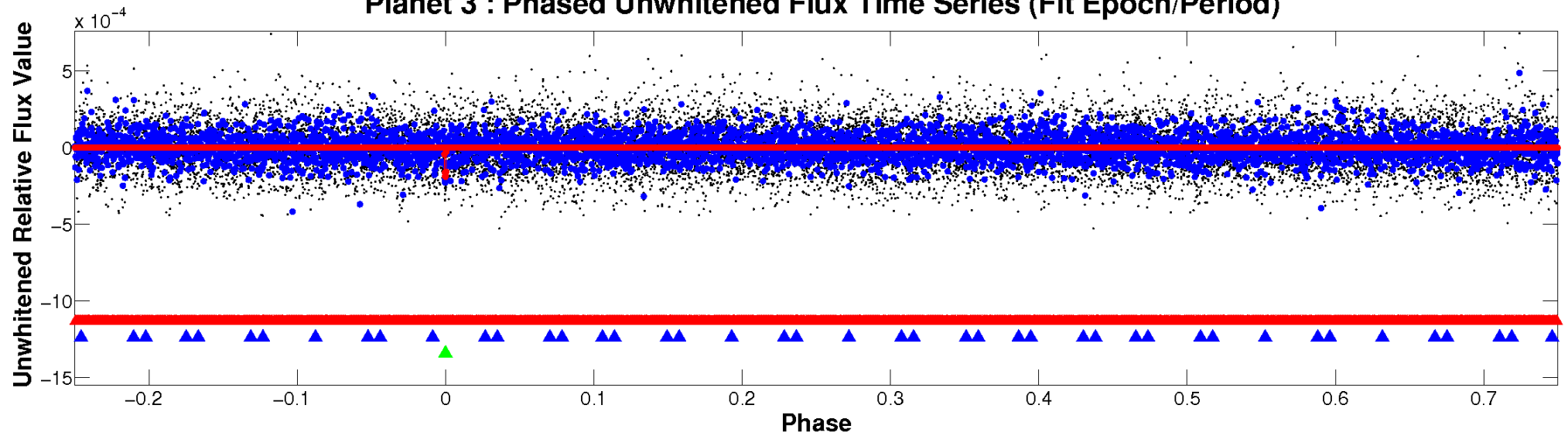
# ALT Odd/Even

TCE 009178929-03

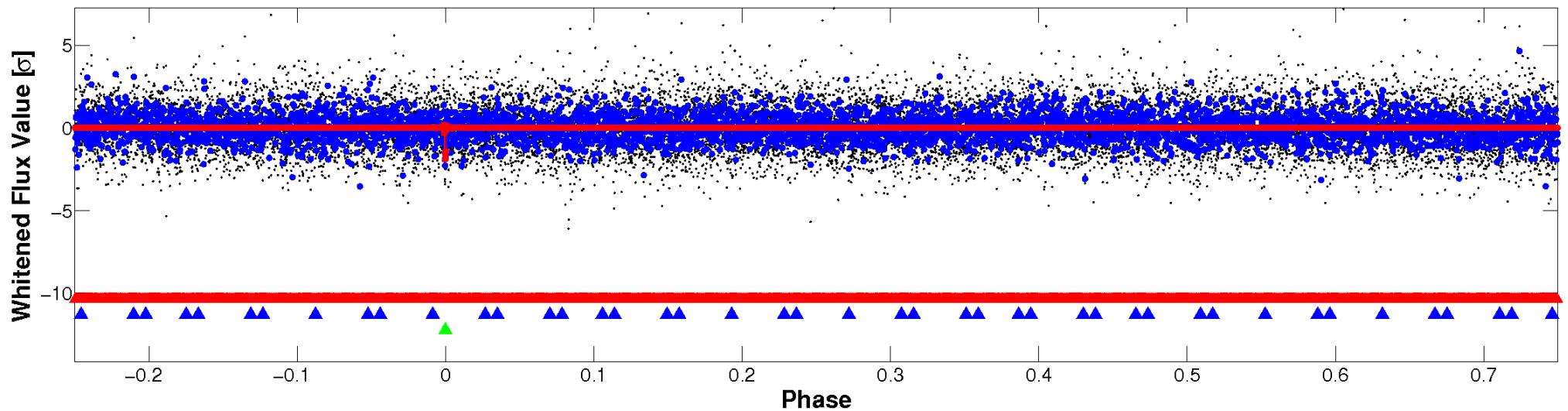


# Non-Whitened Vs. Whitened Light Curve

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

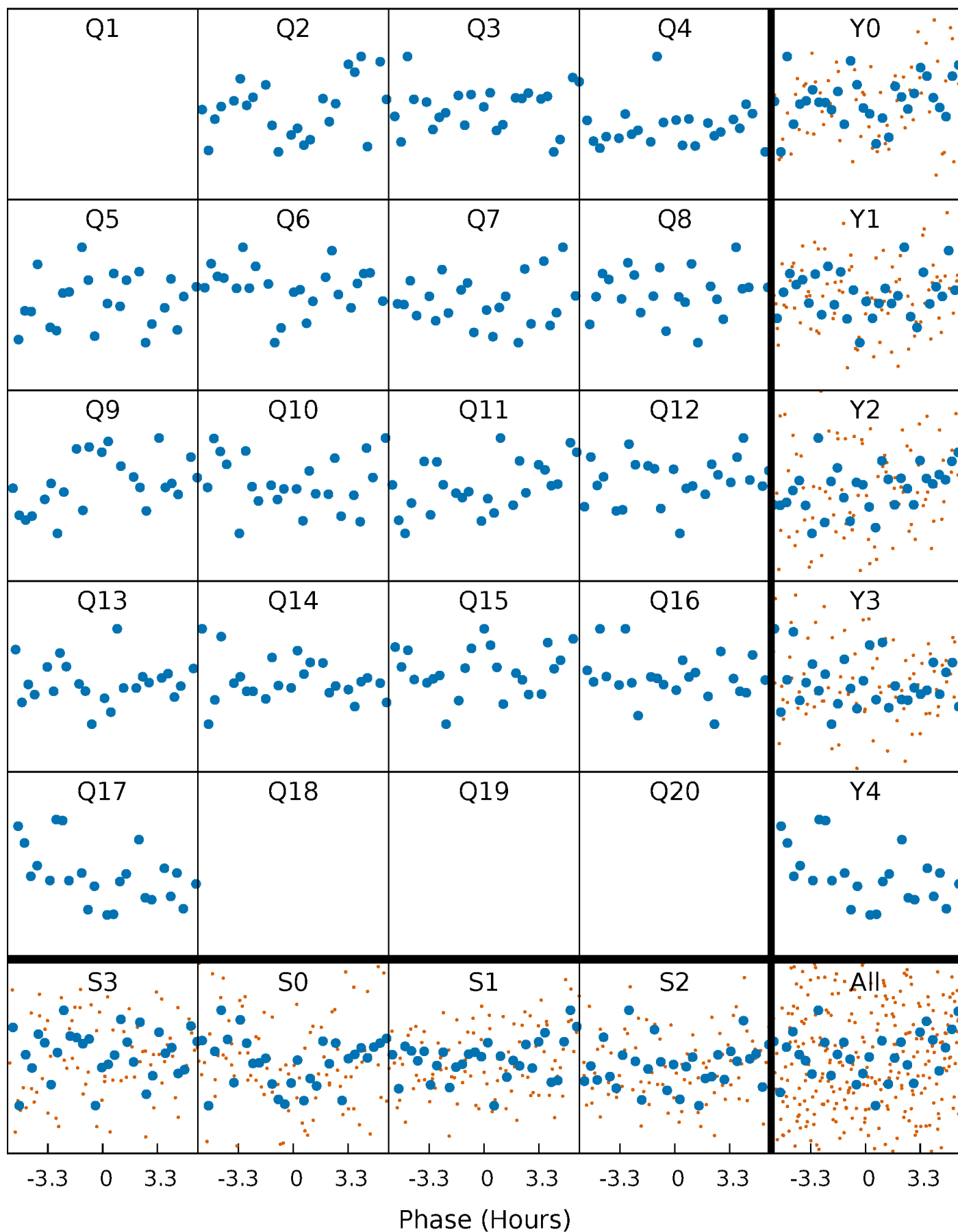


**Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



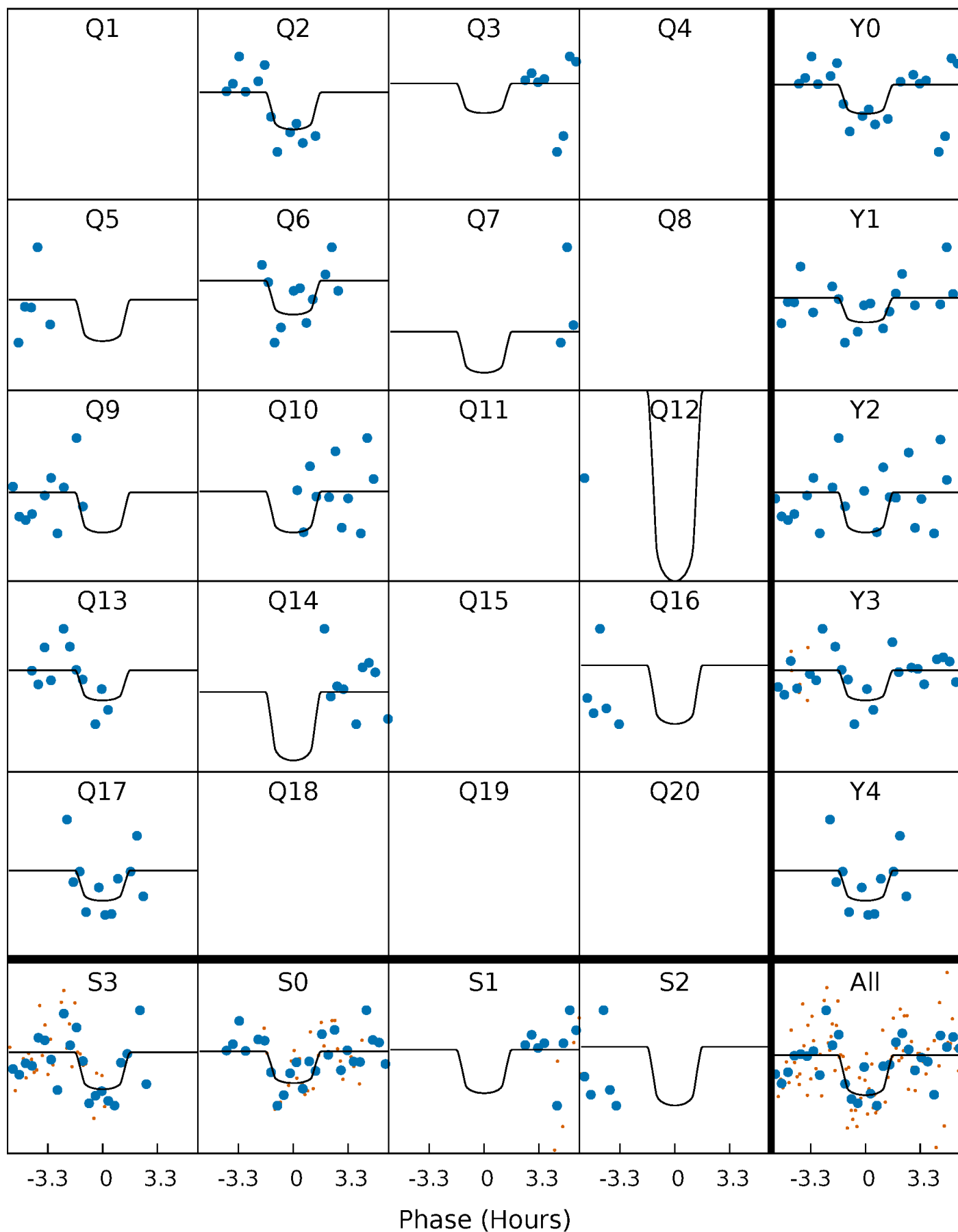
# PDC Quarter-Phased Transit Curves

TCE 009178929-03   P= 91.127024 Days    $T_0=221.944621$  (BKJD)



# DV Quarter-Phased Transit Curves

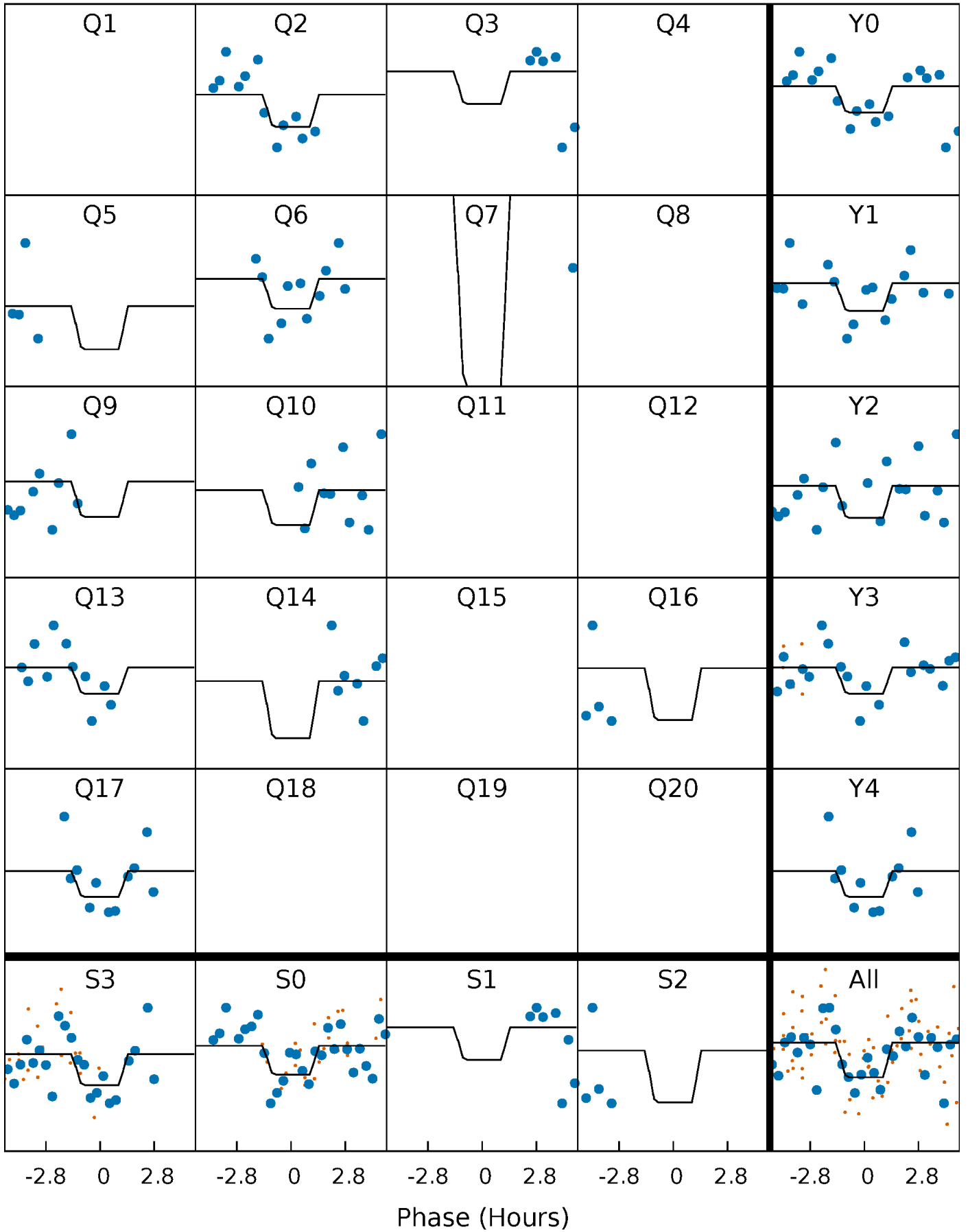
TCE 009178929-03     $P = 91.127024$  Days     $T_0 = 221.944621$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

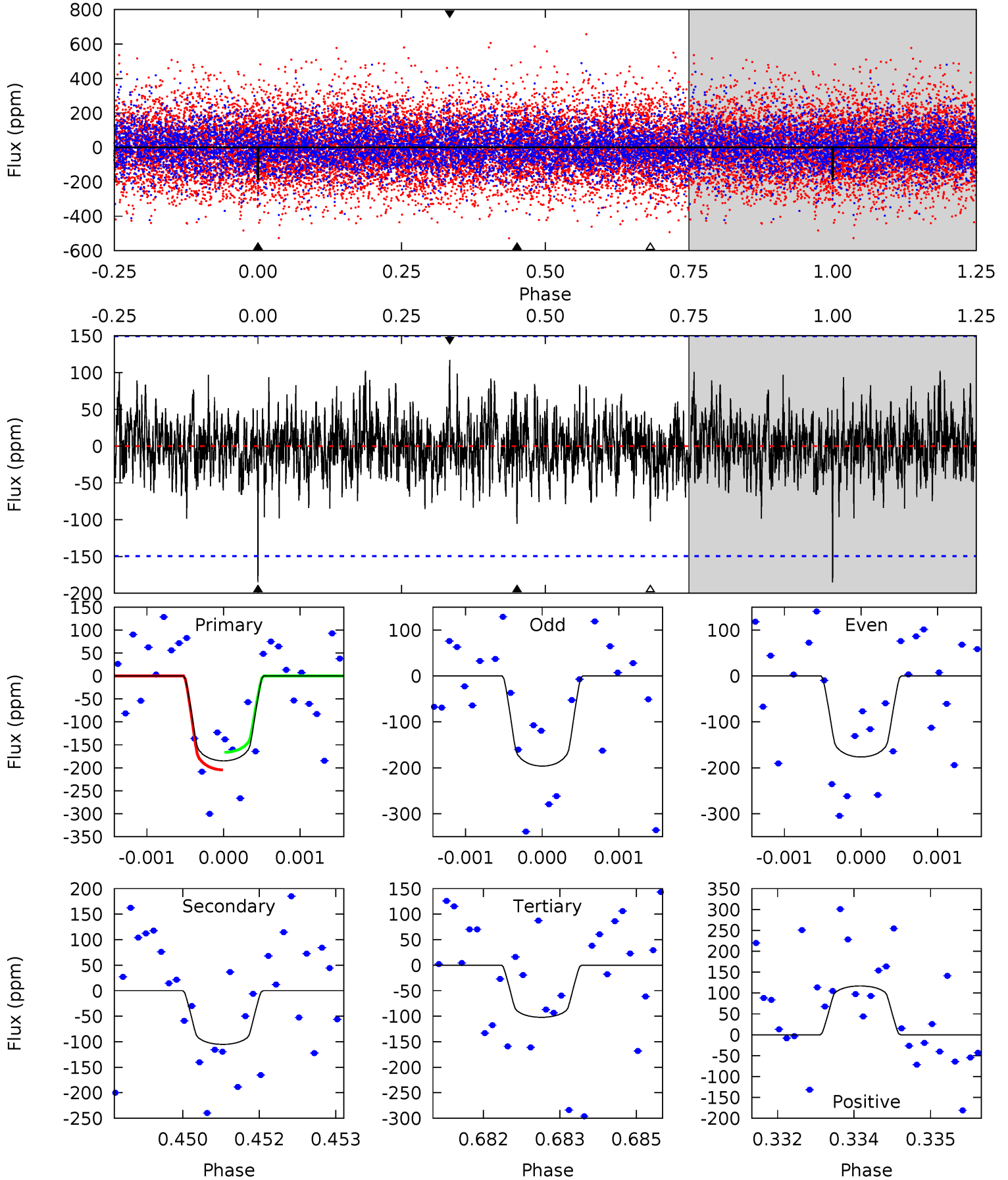
TCE 009178929-03 P= 91.126200 Days  $T_0=221.943970$  (BKJD)



# DV Model-Shift Uniqueness Test

009178929-03, P = 91.127024 Days, E = 130.817597 Days

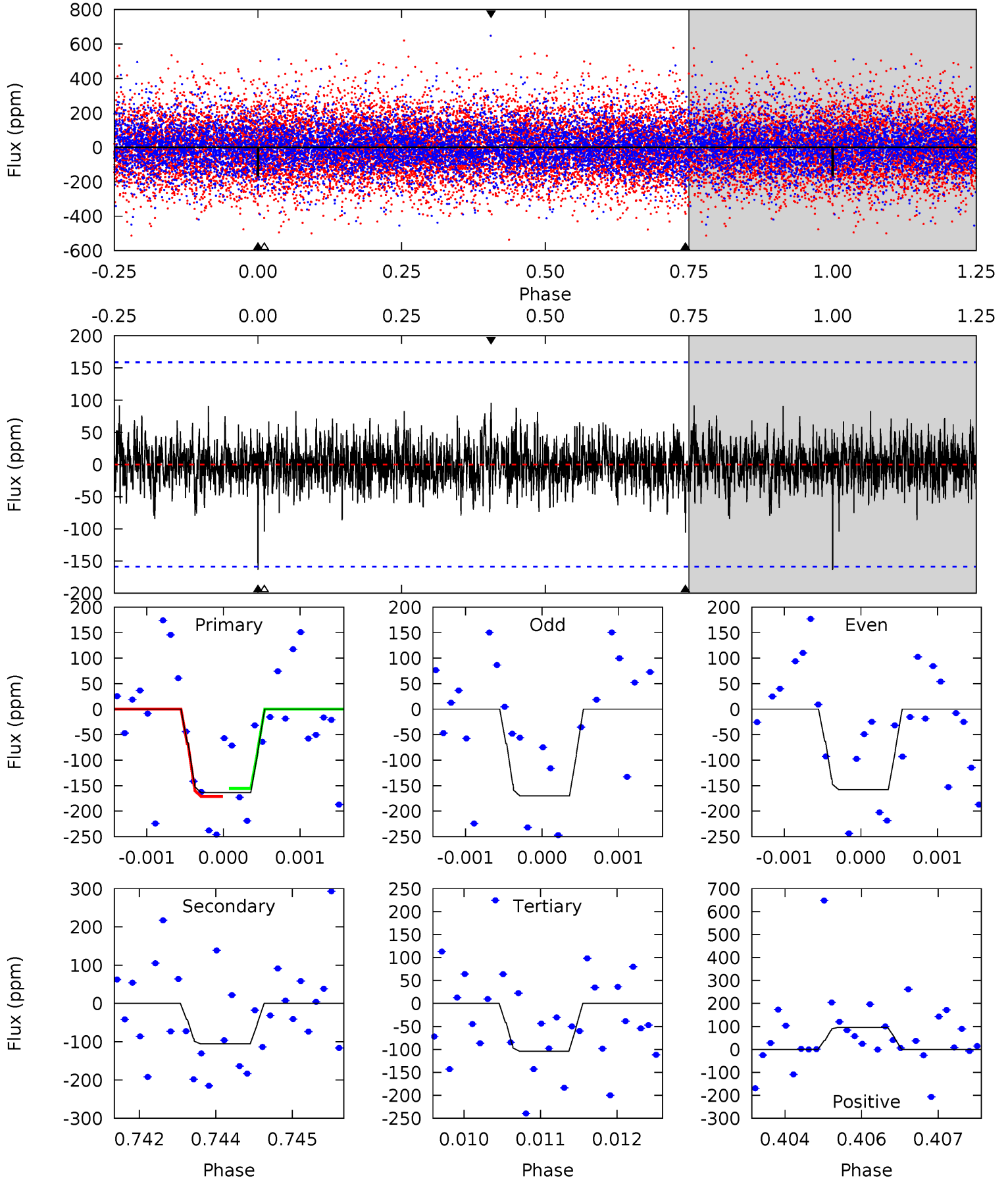
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.67	3.79	3.68	4.21	5.38	3.18	1.10	2.99	2.45	0.11	-0.42	0.36	0.87	0.39	0.69



# Alt Model-Shift Uniqueness Test

009178929-03, P = 91.126200 Days, E = 130.817770 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
5.57	3.60	3.54	3.27	5.41	3.23	0.89	2.03	2.30	0.06	0.33	0.21	0.89	0.37	0.27



### Stellar Parameters For KIC 009178929

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7547^{+209}_{-314}$	$4.045^{+0.170}_{-0.153}$	$-0.060^{+0.200}_{-0.350}$	$2.032^{+0.517}_{-0.517}$	$1.669^{+0.212}_{-0.282}$	$0.280^{+0.283}_{-0.121}$
	+3%/-4%	+4%/-4%	+333%/-583%	+25%/-25%	+13%/-17%	+101%/-43%
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 009178929-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-105 \pm 28$	$4.08^{+3.36}_{-2.68}$	$959^{+72}_{-64}$	$5537^{+4806}_{-1275}$	$763^{+6017}_{-554}$
Alt.	$-106 \pm 29$	$3.89^{+2.96}_{-2.63}$	$961^{+74}_{-73}$	$5611^{+5229}_{-1227}$	$805^{+6569}_{-563}$

$T_{\text{max}}$  = Theoretical Maximum Planetary Temperature  
 $T_{\text{obs}}$  = Observed Planetary Temperature (Assuming  $A=0.3$ )  
 $A_{\text{obs}}$  = Observed Albedo (Assuming  $T=0$ )

If a secondary eclipse is present, the system is likely an EB if  $T_{\text{obs}} \gg T_{\text{max}}$  AND  $A_{\text{obs}} \gg 1.0$

## DV Centroid Data

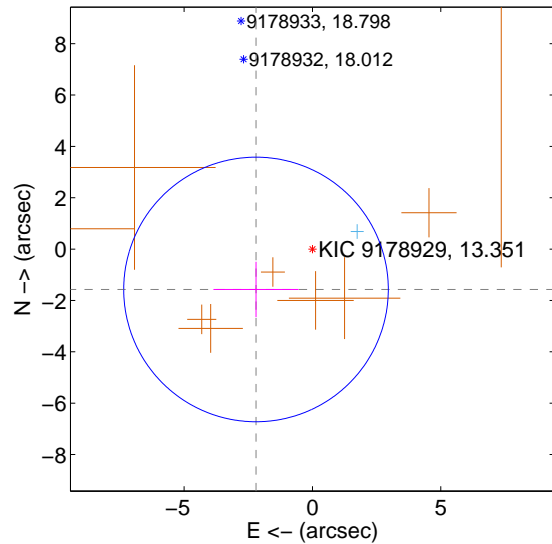
Supplemental centroid analysis for 009178929-03. Kepler magnitude: 13.35. Transit SNR 8.28

There are 1 quarters with good PRF difference image offsets

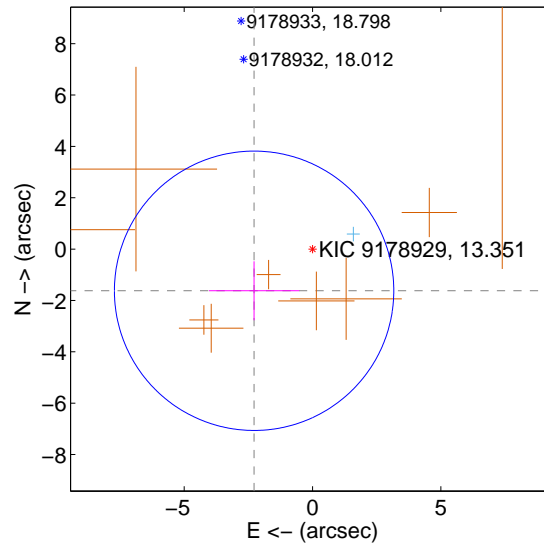
The direct PRF centroid is offset from the target star catalog position by about 0.03 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.702 \pm 1.717$	1.57	$2.198 \pm 1.659$	$-1.572 \pm 1.079$
PRF-fit source offset from KIC position	$2.795 \pm 1.813$	1.54	$2.276 \pm 1.759$	$-1.623 \pm 1.149$
photometric centroid source offset	$1.39 \pm 1.55$	0.89	$0.71 \pm 1.76$	$1.19 \pm 1.47$

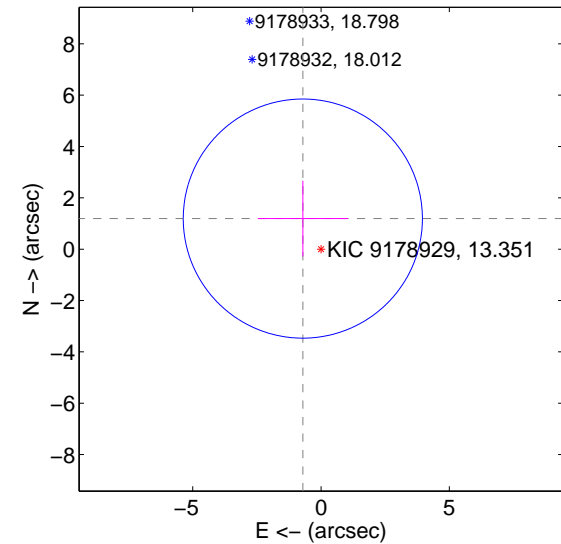
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



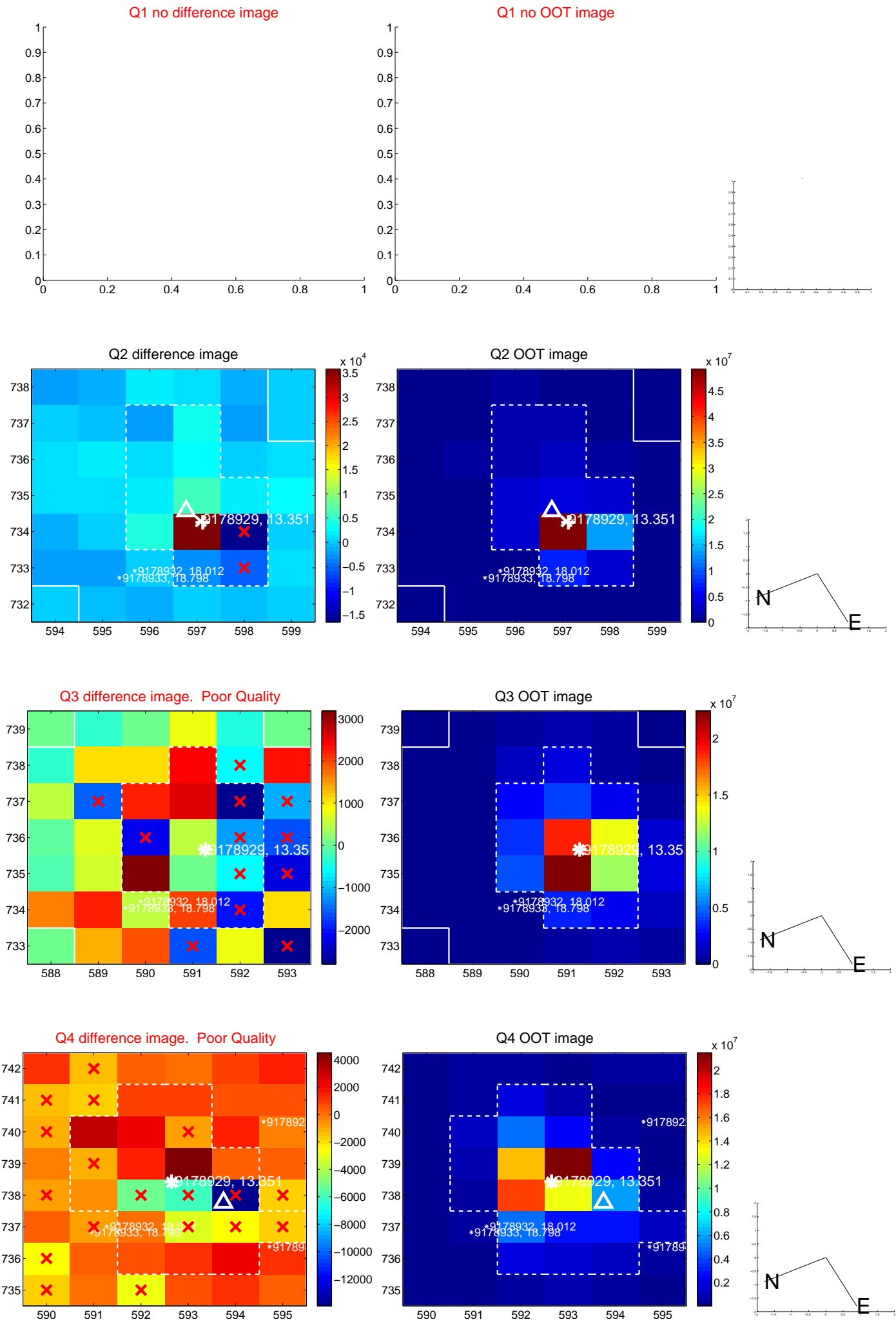
offset from photometric centroids



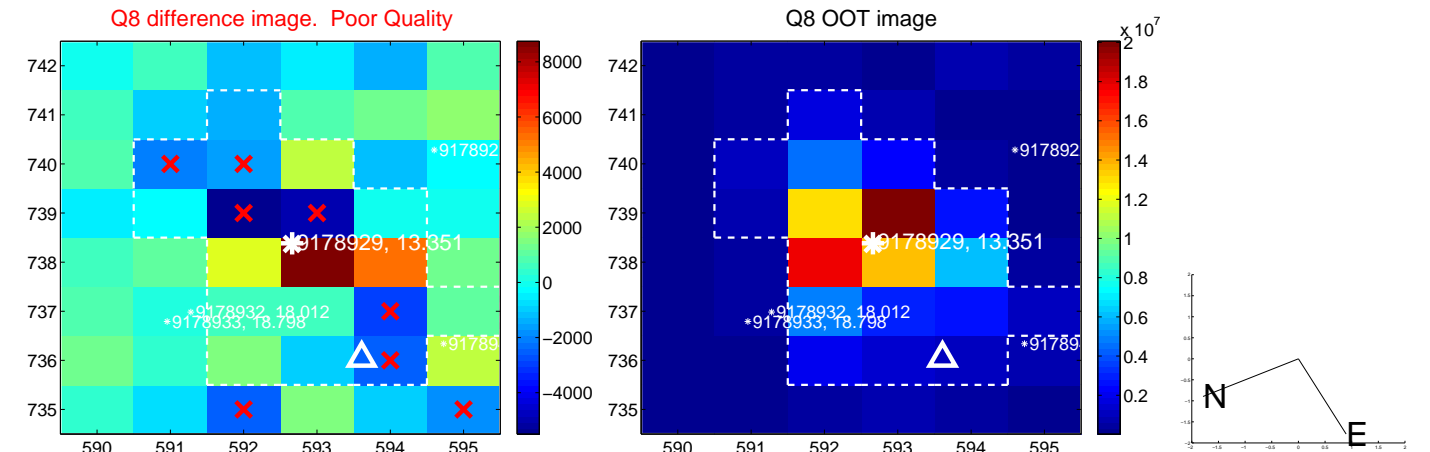
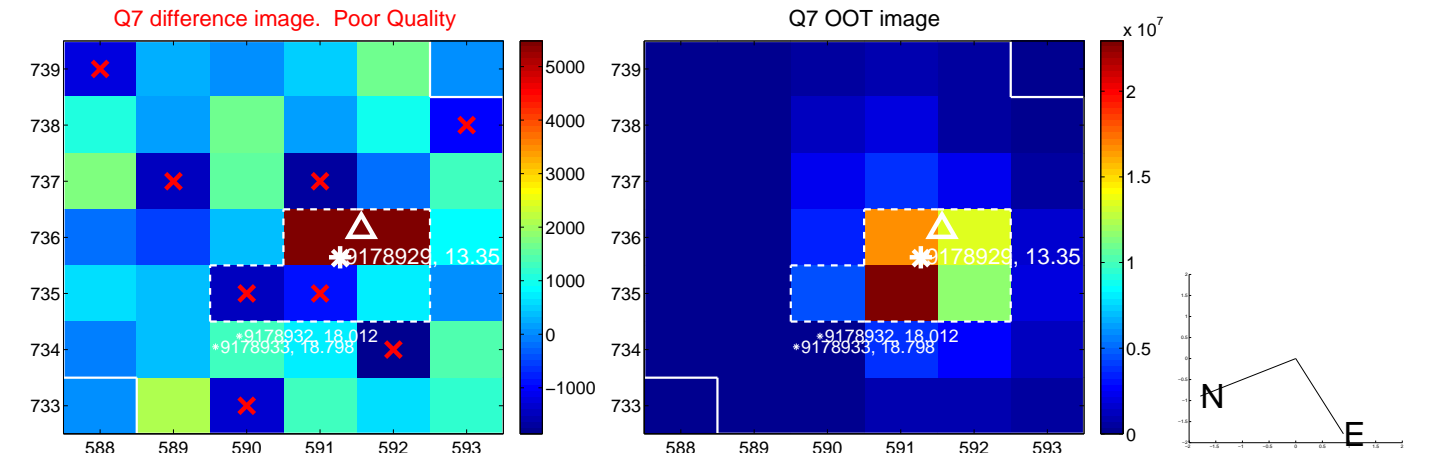
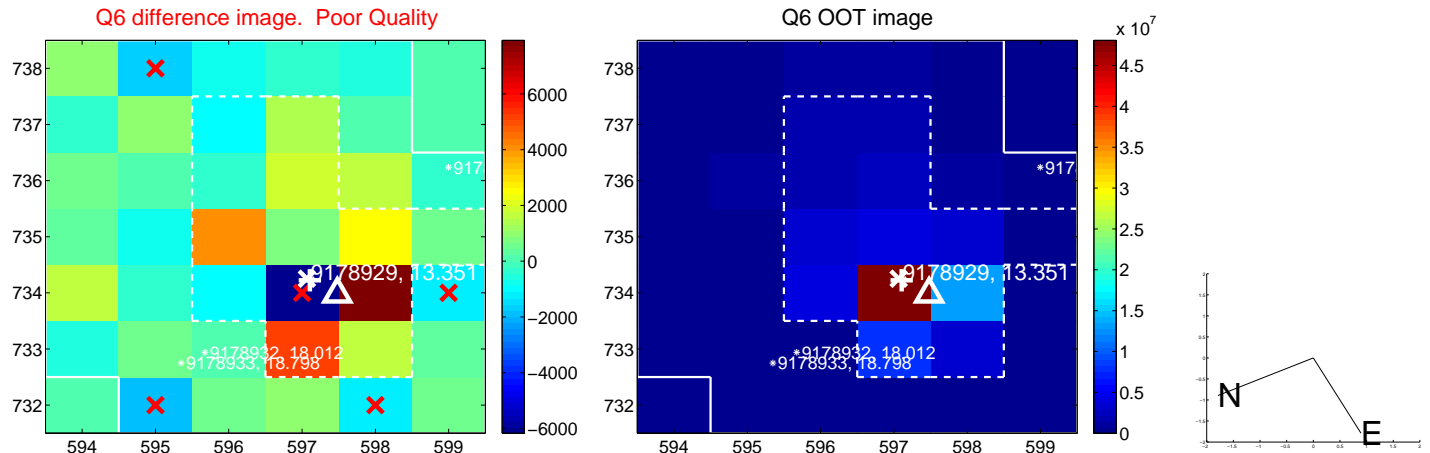
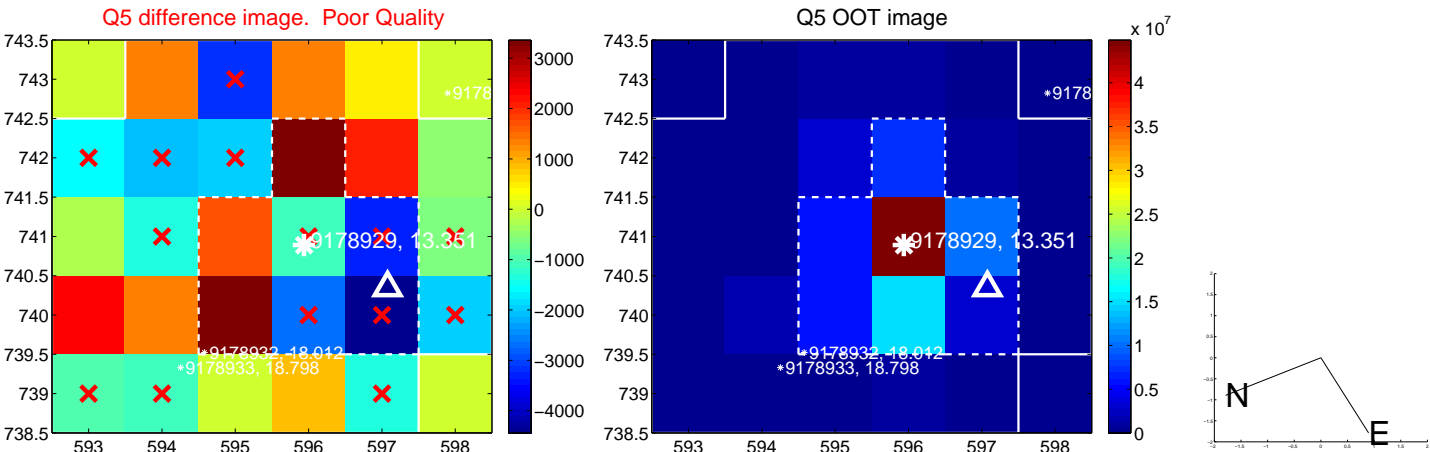
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

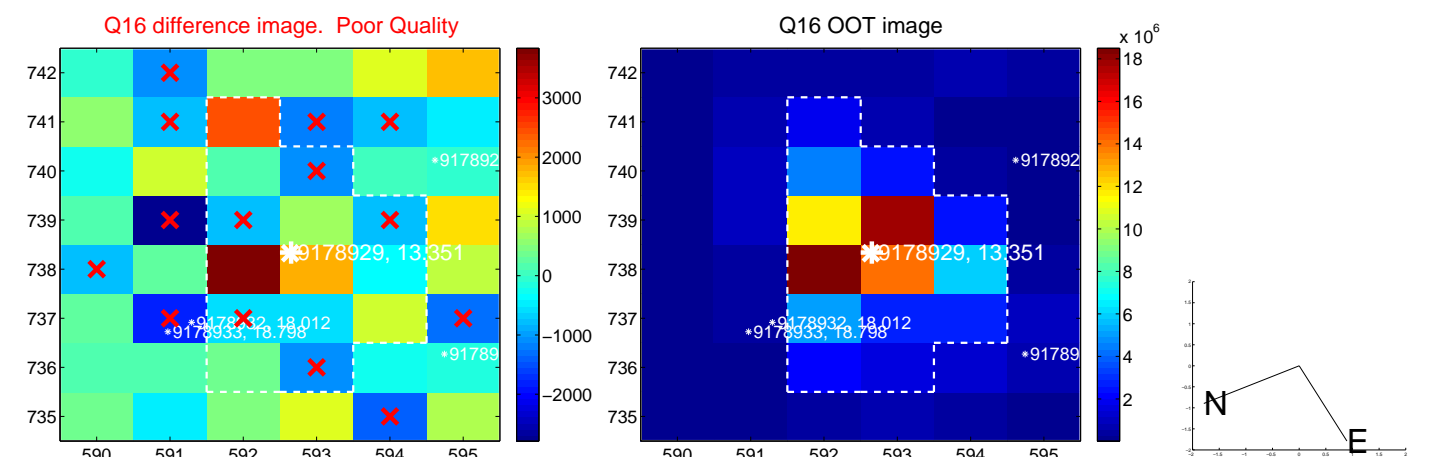
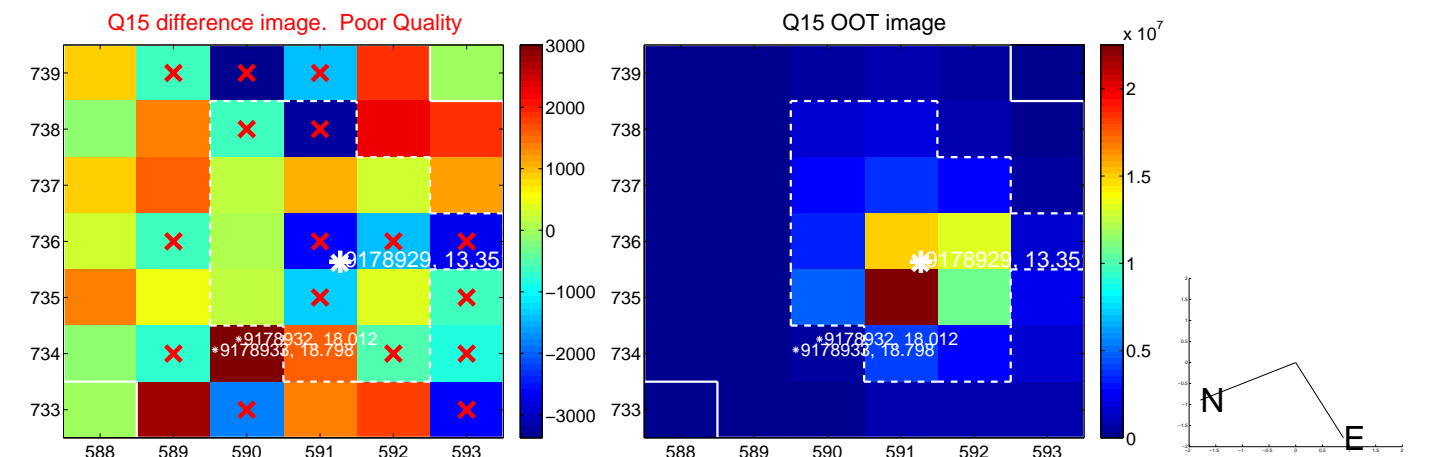
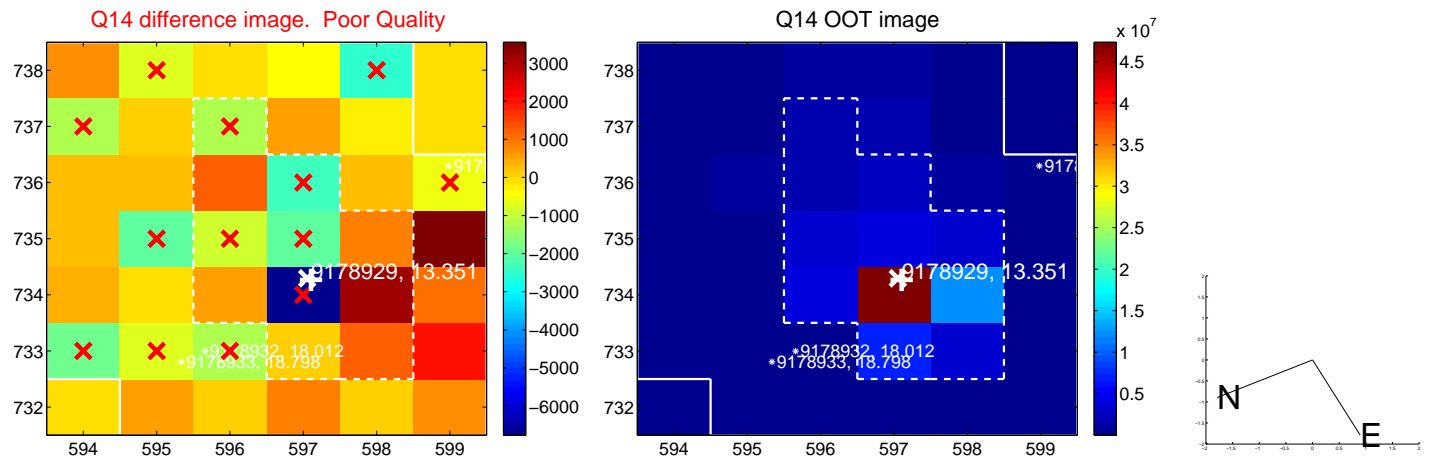
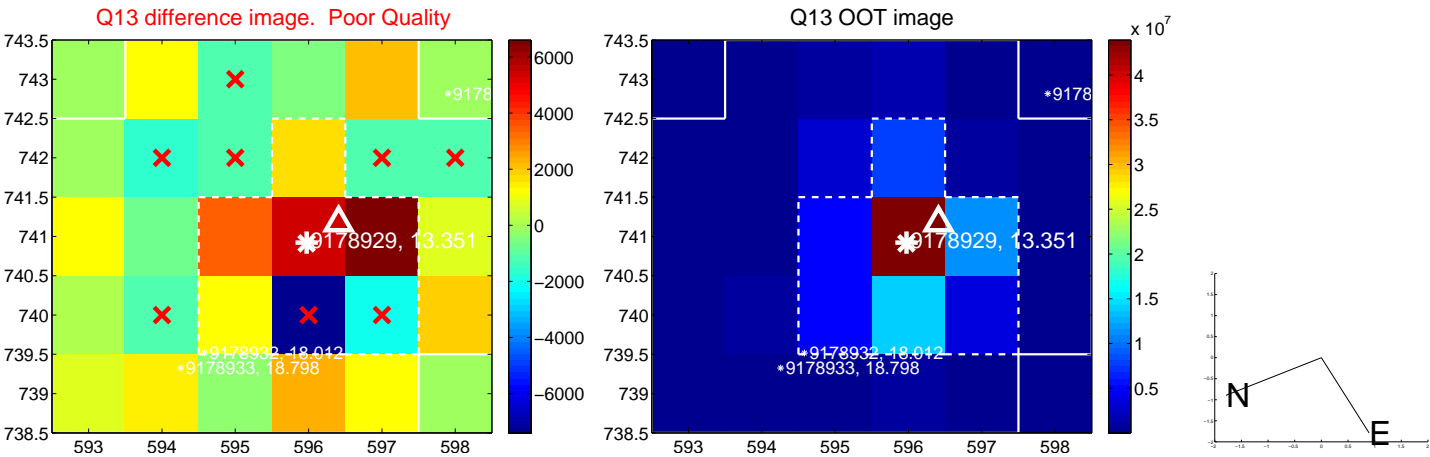


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

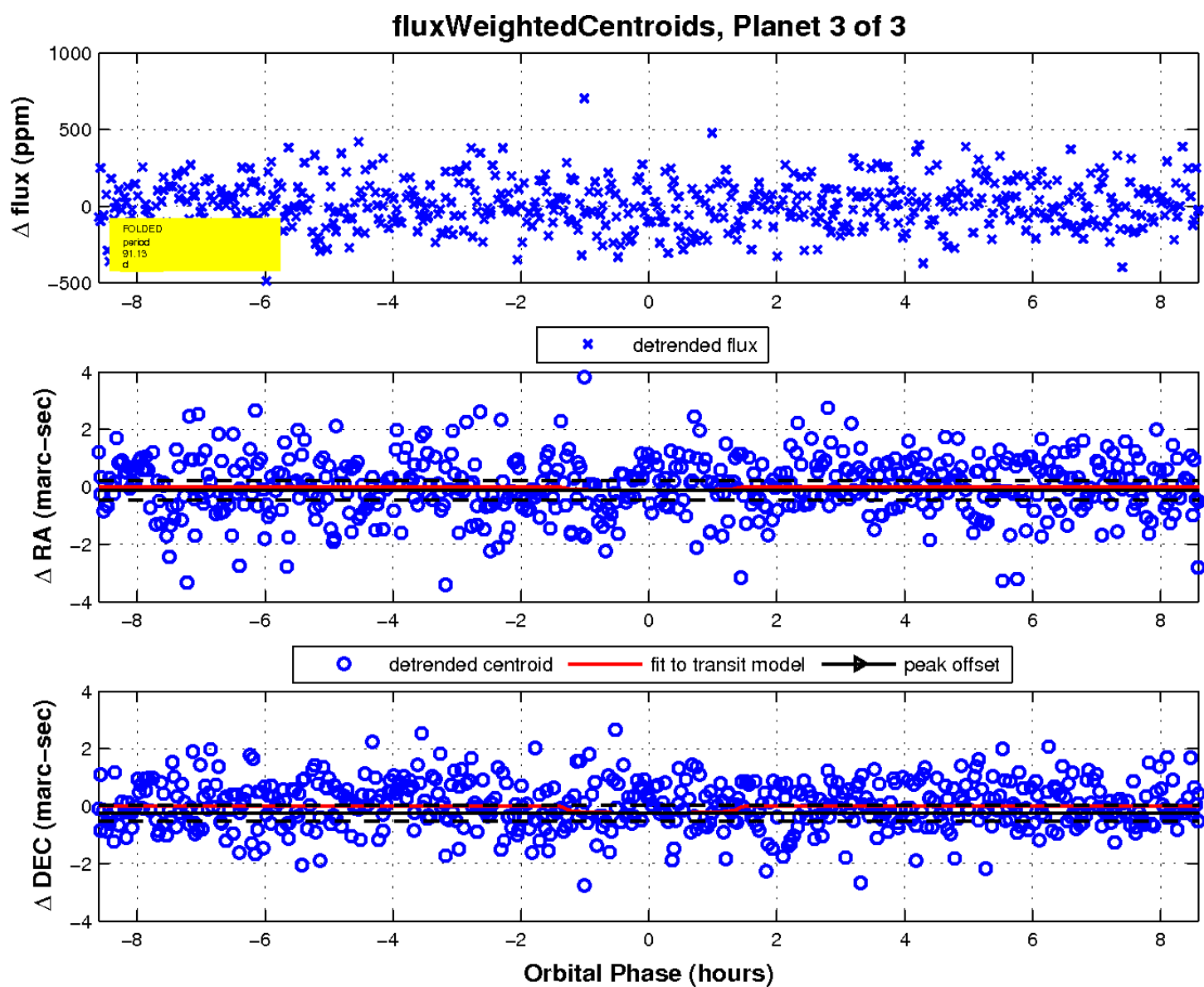
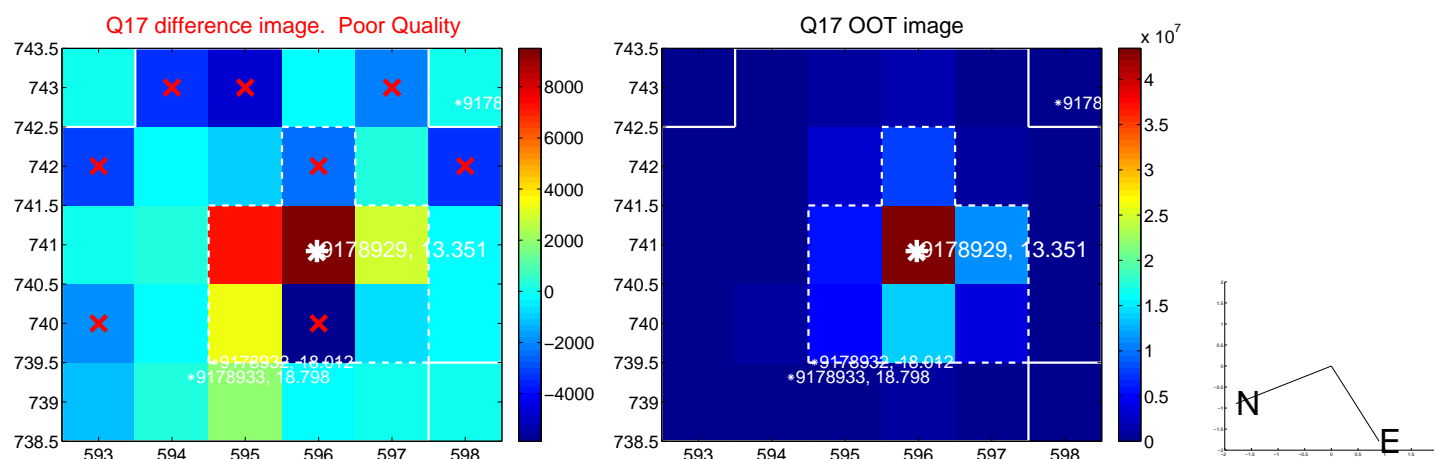




white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image

Declination

