

# KIC 002693450

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
002693450-01	OBS	No	0.847675	131.773359	3.2	5.078	8.5	2.1	1.86	7262	0.35	22162.65
002693450-02	OBS	No	36.587899	136.578337	159.6	2.371	8.7	9.0	1.86	7262	2.64	146.38
002693450-03	OBS	No	37.529820	155.612259	59.4	0.819	8.3	2.0	1.86	7262	1.48	141.50
002693450-04	OBS	No	138.808551	188.521521	315.3	2.744	8.4	10.0	1.86	7262	3.79	24.74

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
002693450-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT
002693450-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002693450-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002693450-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_UNCERTAIN

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

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

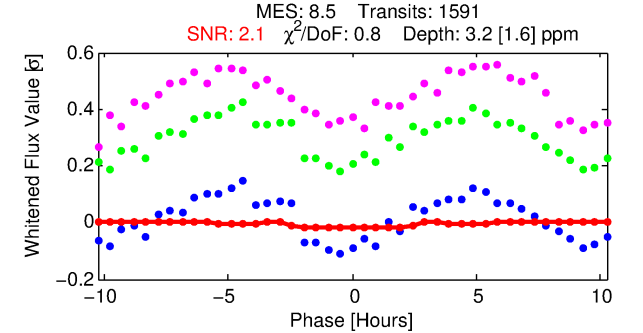
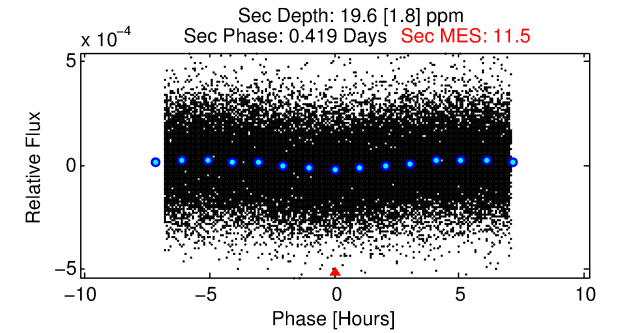
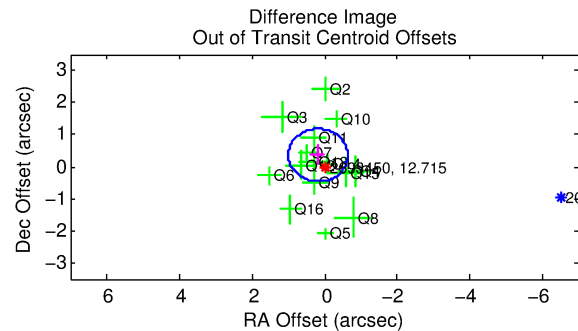
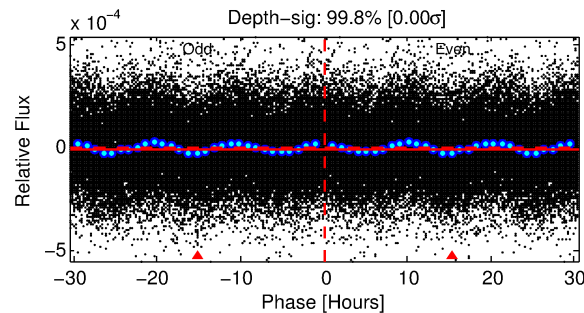
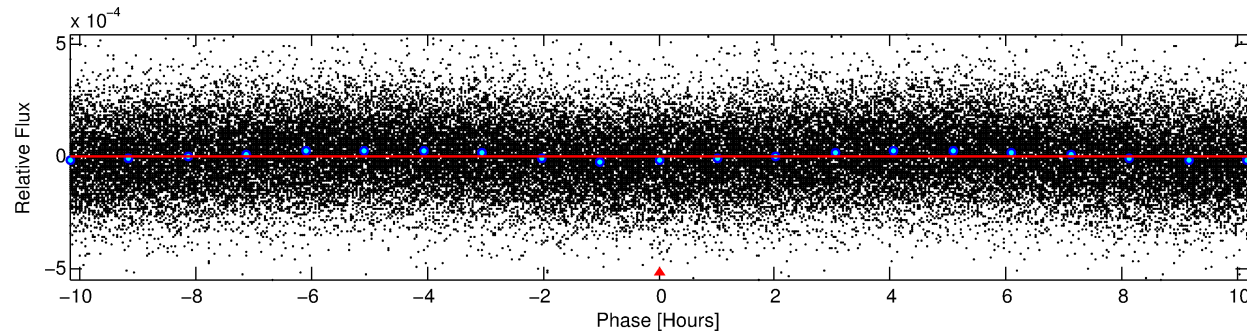
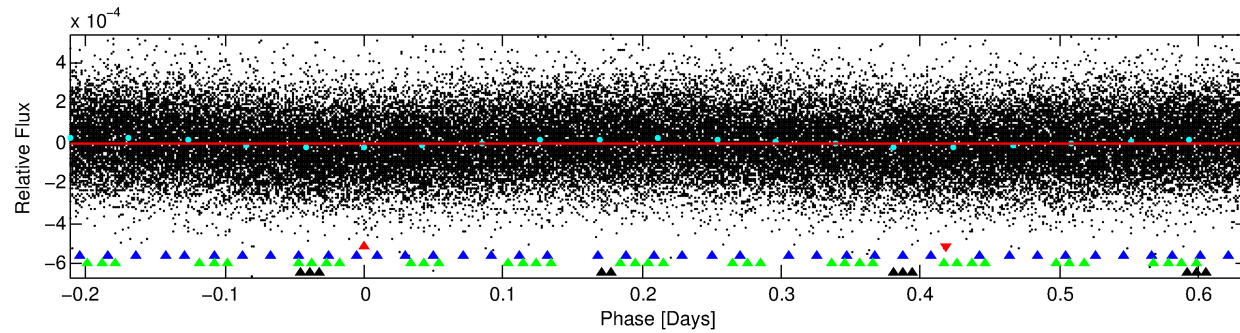
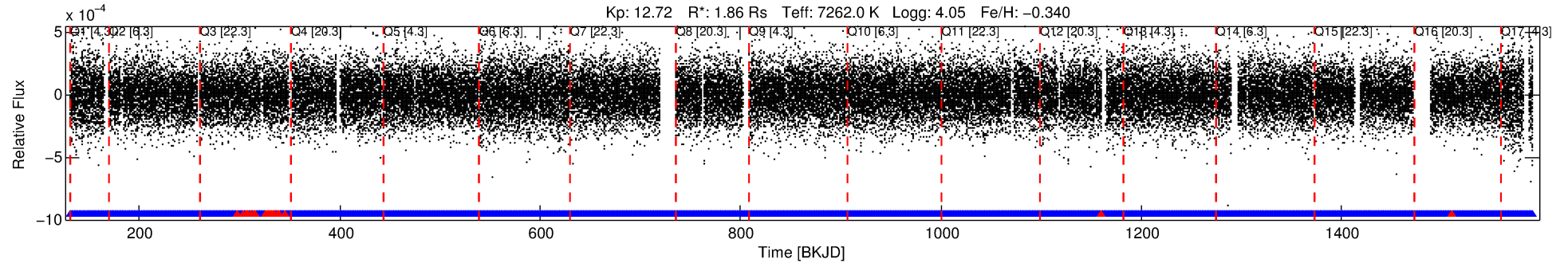
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 002693450-01

No Significant Match Found

# DV One-Page Summary

KIC: 2693450 Candidate: 1 of 4 Period: 0.848 d



## DV Fit Results:

Period = 0.84768 [0.00006] d  
Epoch = 131.7734 [0.0213] BKJD  
Rp/R\* = 0.0017 [0.0014]  
a/R\* = 1.32 [2.62]  
b = 0.51 [6.79]  
Seff = 22162.65 [9171.35]  
Teff = 3111 [322] K  
Rp = 0.35 [0.29] Re  
a = 0.0198 [0.0049] AU  
Ag = 34.63 [56.34] [0.60σ]  
Teffp = 11669 [4641] K [1.84σ]

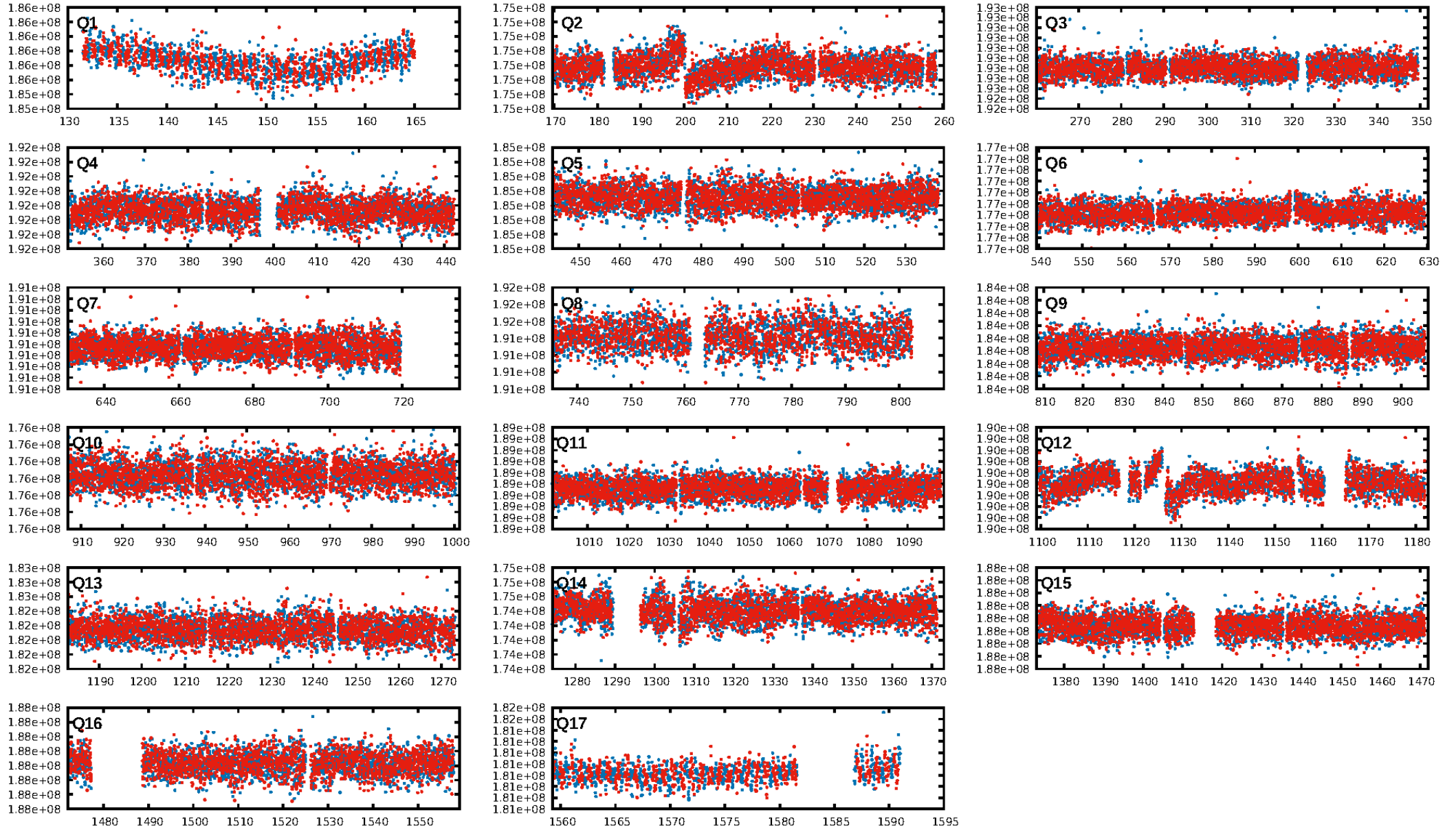
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [153.05σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
**Bootstrap-pfa: 5.56e-08**  
RollingBand-fgt: 0.99 [1497/1519]  
GhostDiagnostic-chr: N/A  
Centroid-sig: N/A  
Centroid-so: N/A  
OotOffset-rm: 0.402 arcsec [1.47σ]  
KicOffset-rm: 0.444 arcsec [1.62σ]  
OotOffset-st: 4/4/4/3 [15]  
KicOffset-st: 4/4/4/3 [15]  
DiffImageQuality-fgm: 0.93 [14/15]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 02:25:16 Z

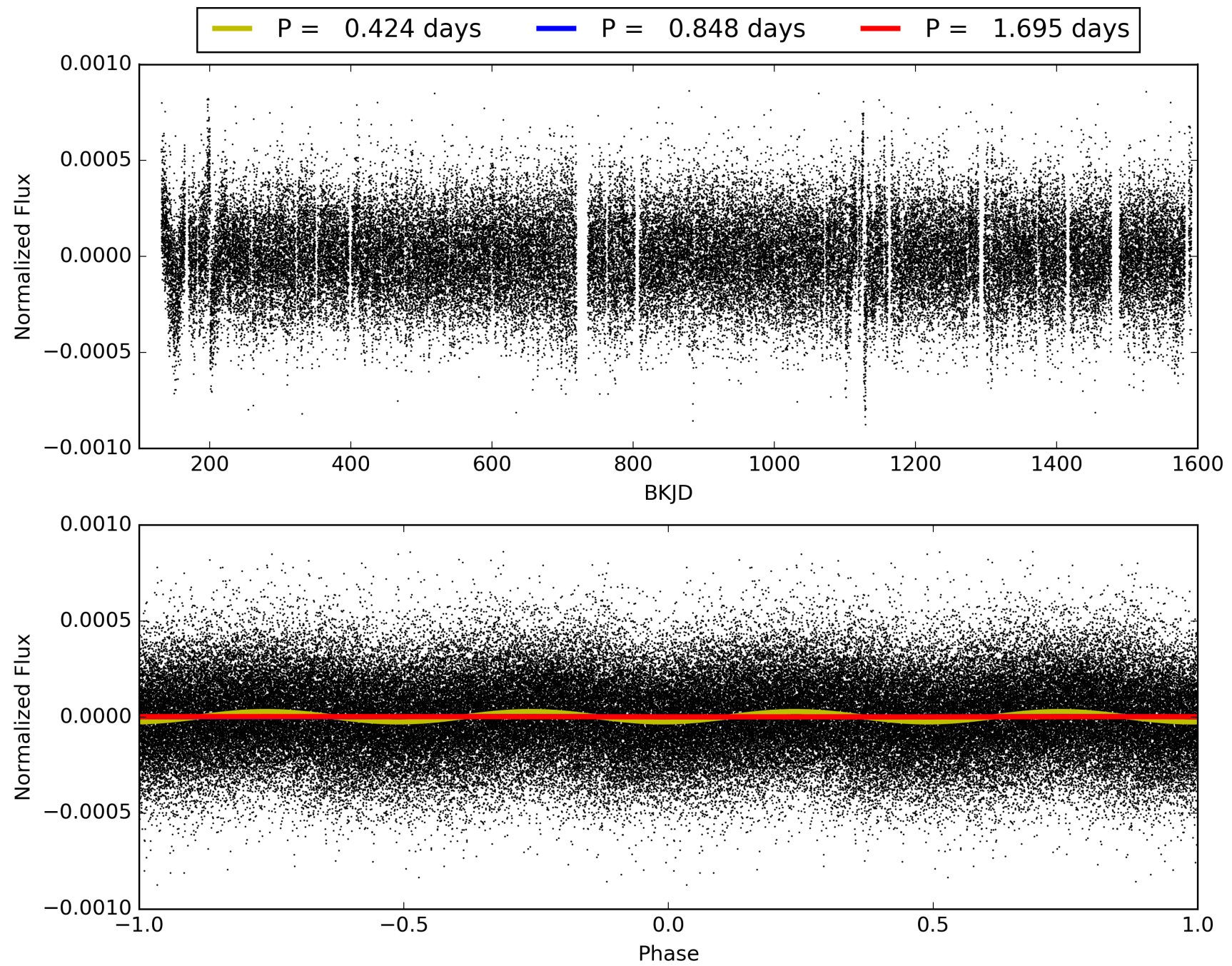
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 002693450-01, PDC Light Curves





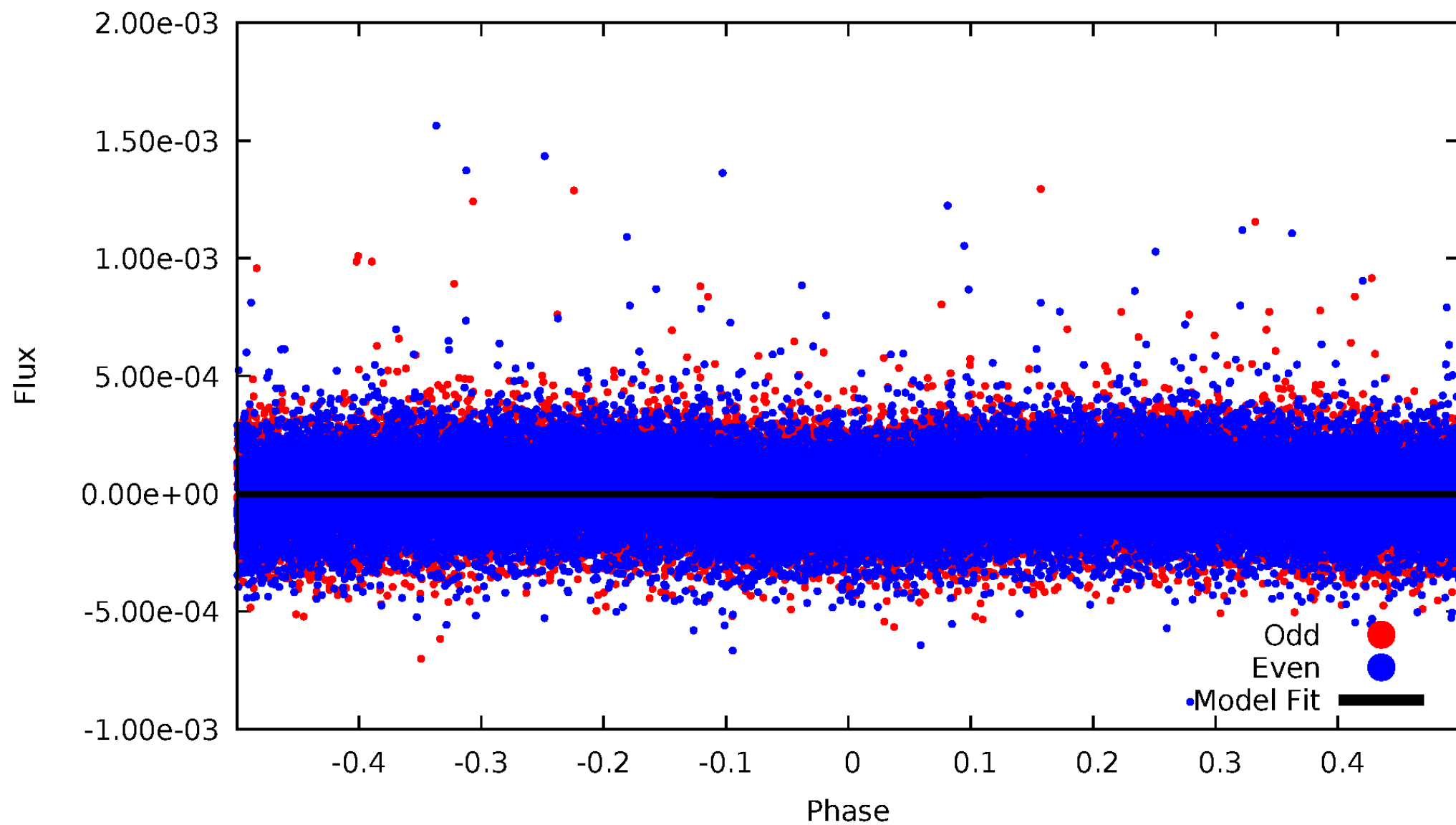
TCE 002693450-01





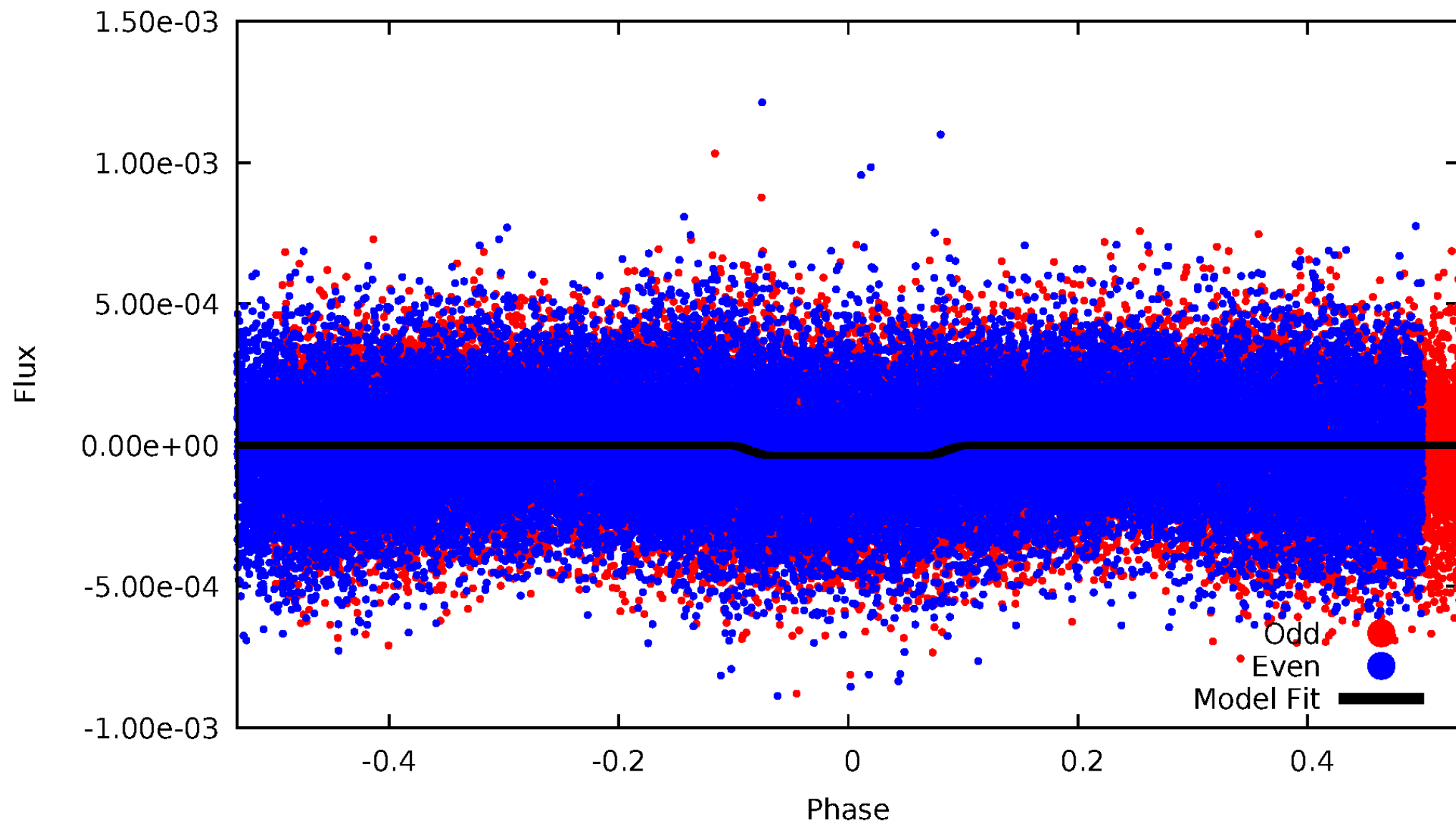
# DV Odd/Even

TCE 002693450-01

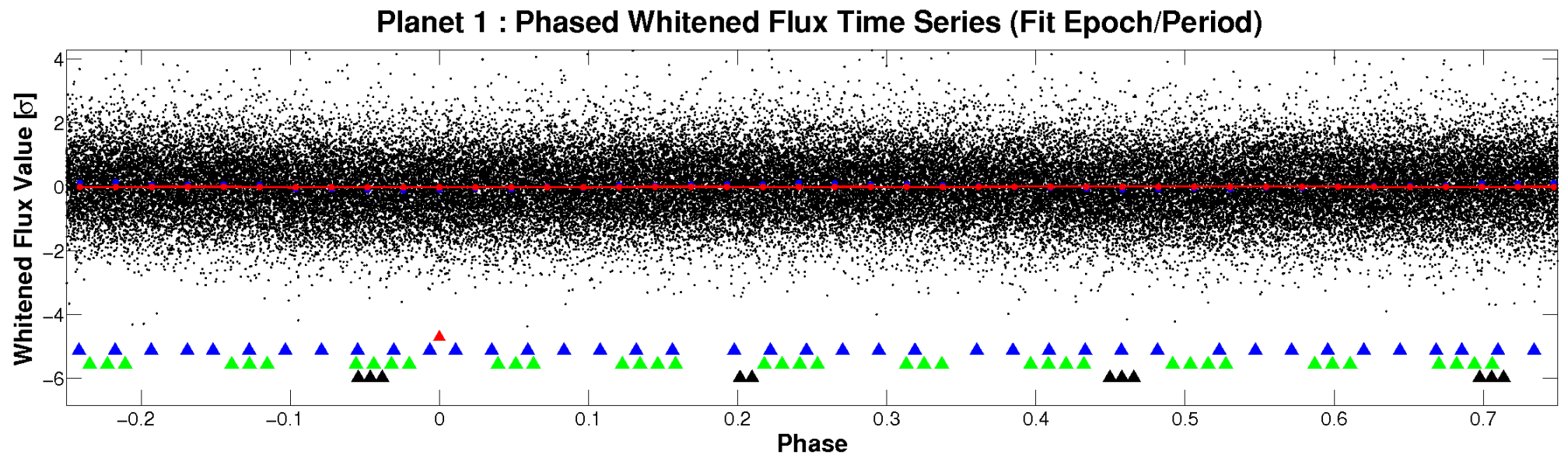
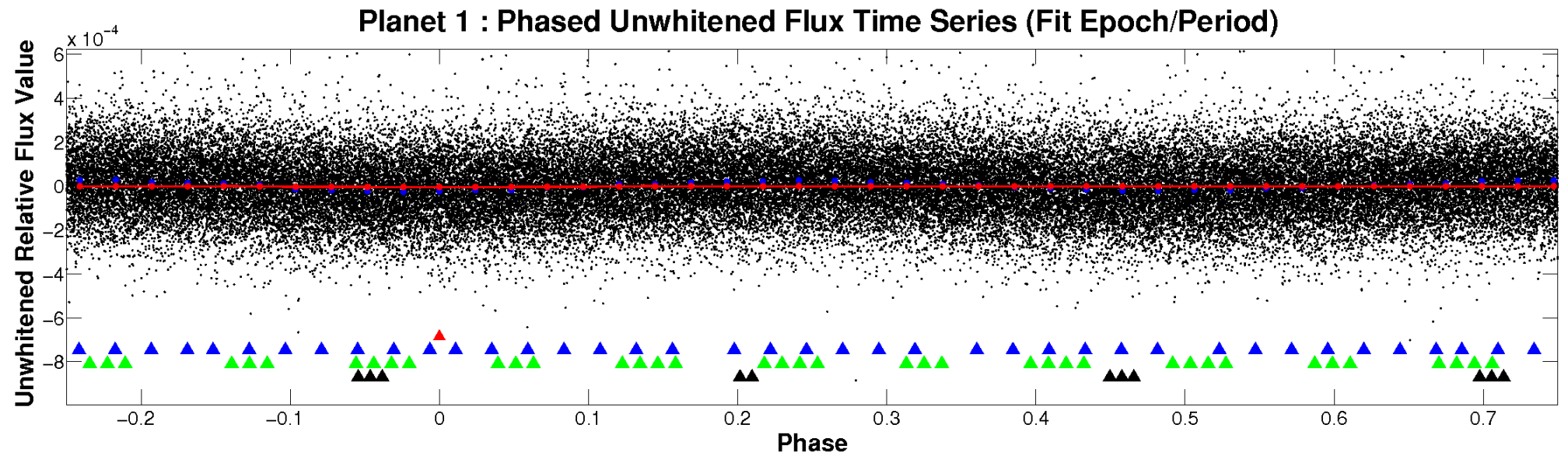


# ALT Odd/Even

TCE 002693450-01



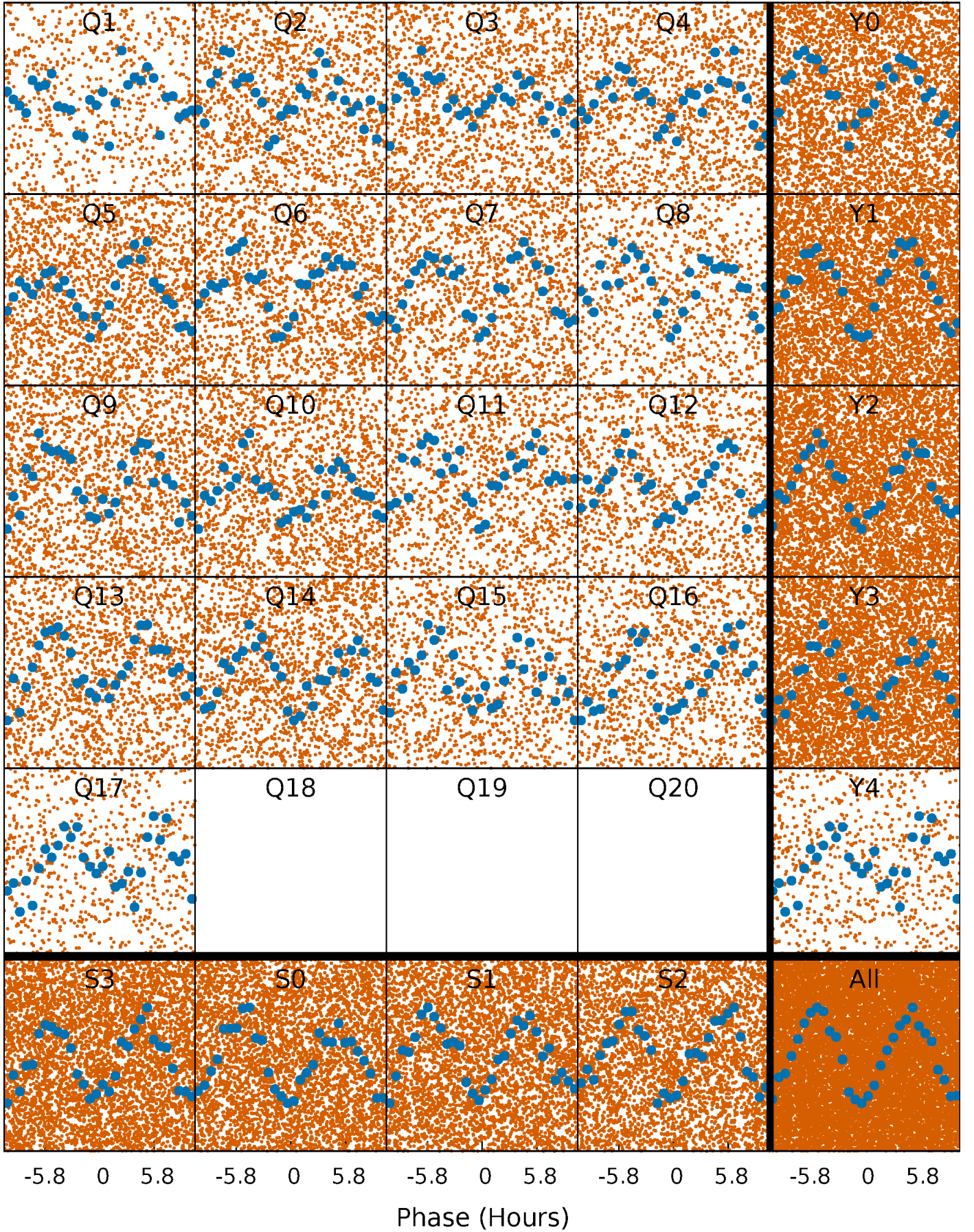
# Non-Whitened Vs. Whitened Light Curve





# PDC Quarter-Phased Transit Curves

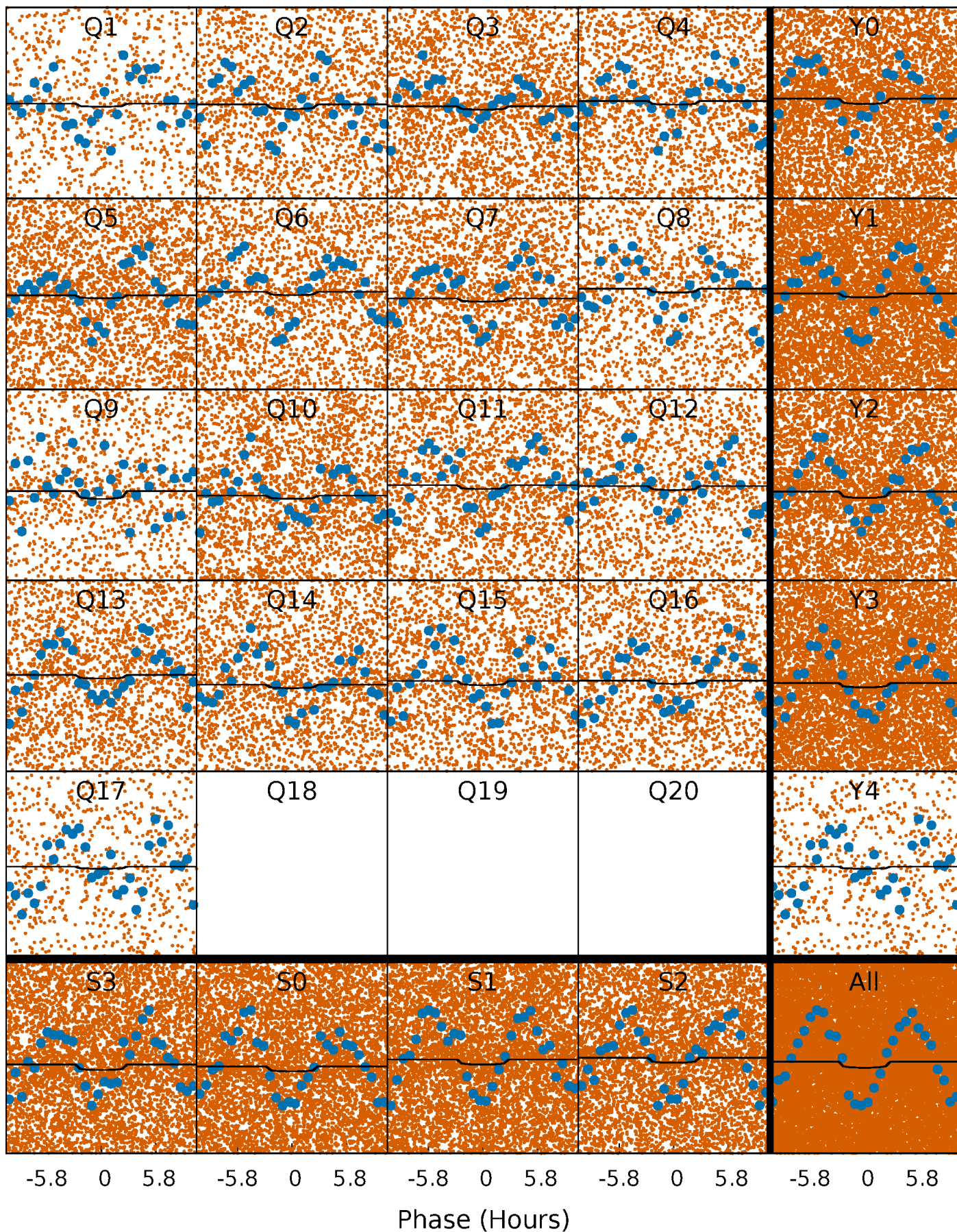
TCE 002693450-01   P= 0.847675 Days    $T_0=131.773359$  (BKJD)





# DV Quarter-Phased Transit Curves

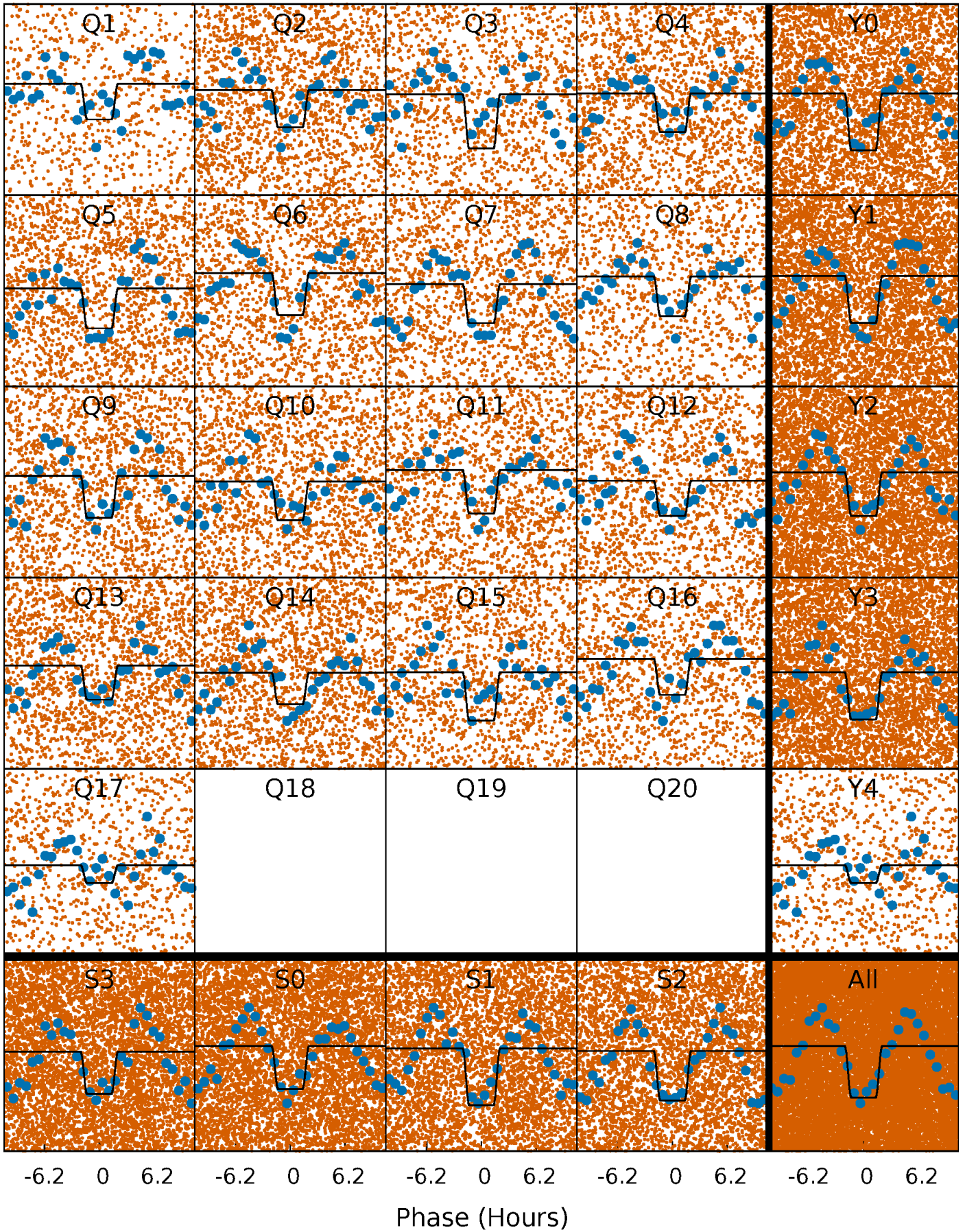
TCE 002693450-01 P= 0.847675 Days  $T_0=131.773359$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

TCE 002693450-01 P= 0.847714 Days  $T_0=131.726487$  (BKJD)

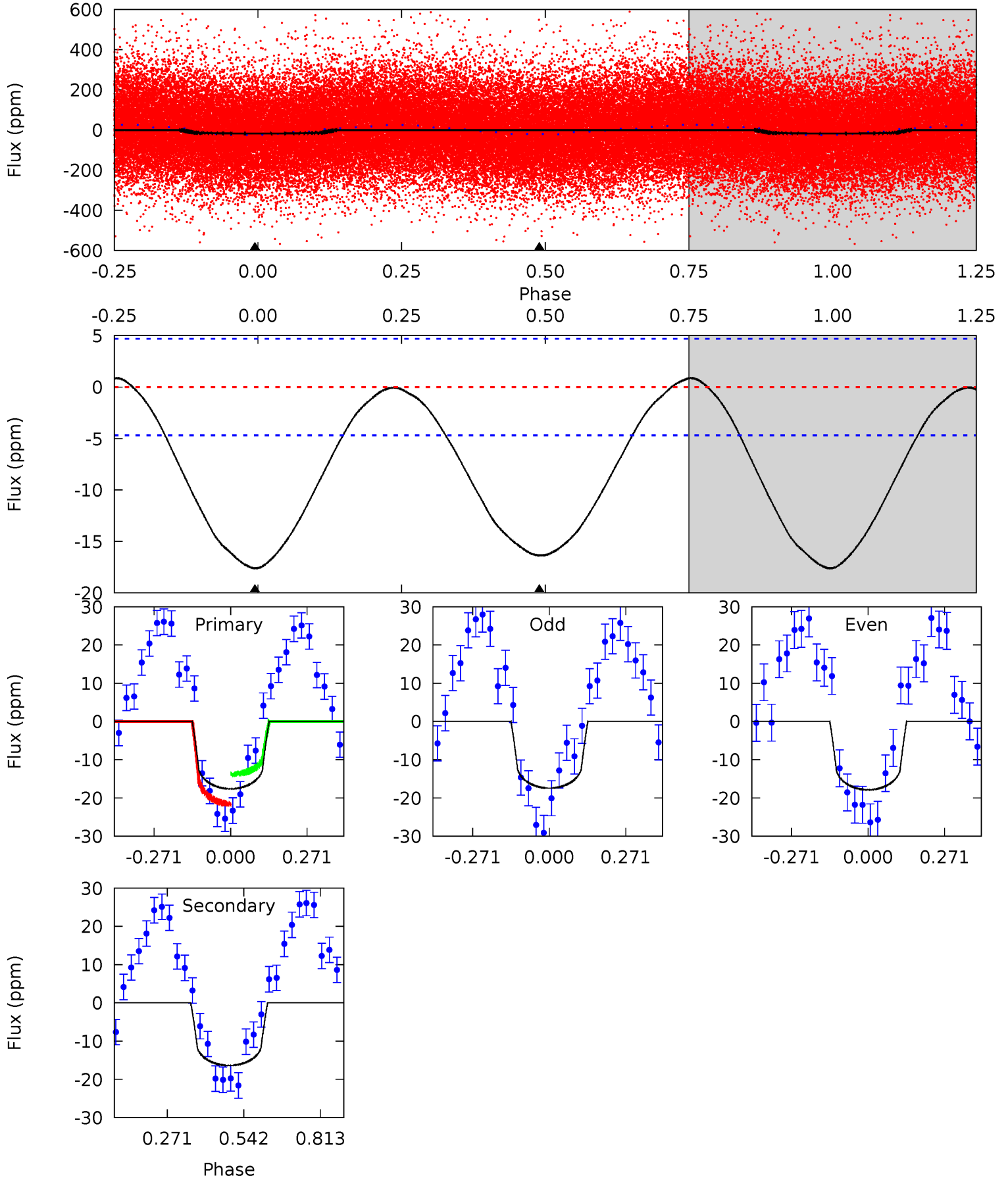




# DV Model-Shift Uniqueness Test

002693450-01, P = 0.847675 Days, E = 130.925684 Days

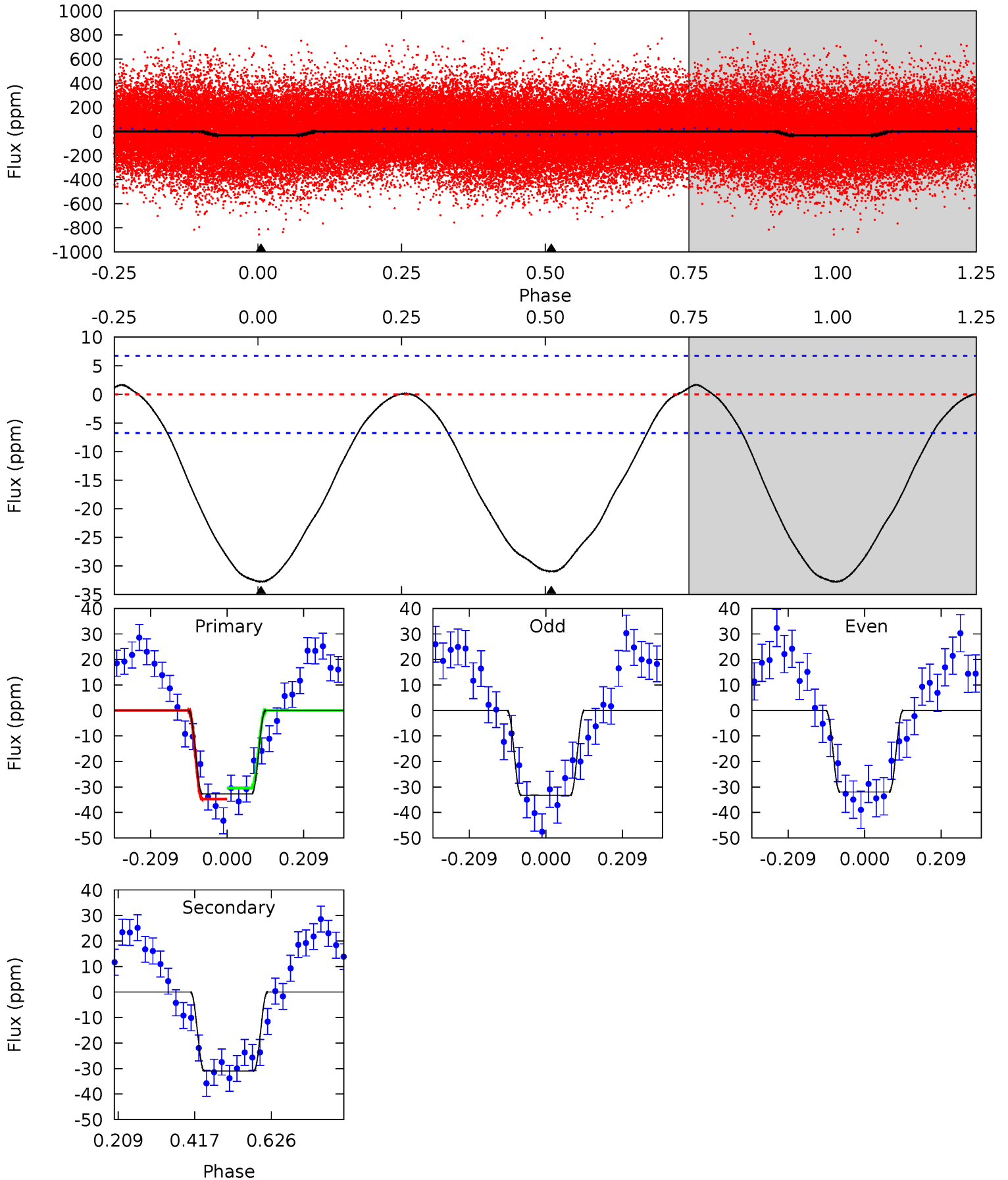
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
16.3	15.2	0	0	4.35	1.10	0.43	16.3	16.3	15.2	15.2	0.20	1.02	0.05	3.65



# Alt Model-Shift Uniqueness Test

002693450-01, P = 0.847714 Days, E = 130.878773 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
21.4	20.2	0	0	4.41	1.26	0.65	21.4	21.4	20.2	20.2	0.41	1.20	0.05	1.38



### Stellar Parameters For KIC 002693450

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7262^{+228}_{-304}$	$4.053^{+0.214}_{-0.156}$	$-0.340^{+0.250}_{-0.350}$	$1.863^{+0.525}_{-0.525}$	$1.428^{+0.204}_{-0.249}$	$0.311^{+0.409}_{-0.144}$
	+3%/-4%	+5%/-4%	+74%/-103%	+28%/-28%	+14%/-17%	+131%/-46%
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 002693450-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-16 \pm 1$	$0.39^{+0.28}_{-0.23}$	$4300^{+355}_{-307}$	$11931^{+20597}_{-3733}$	$23^{+109}_{-15}$
Alt.	$-31 \pm 2$	$1.18^{+0.33}_{-0.29}$	$4314^{+325}_{-363}$	$6893^{+1095}_{-806}$	$4.812^{+3.565}_{-1.870}$

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



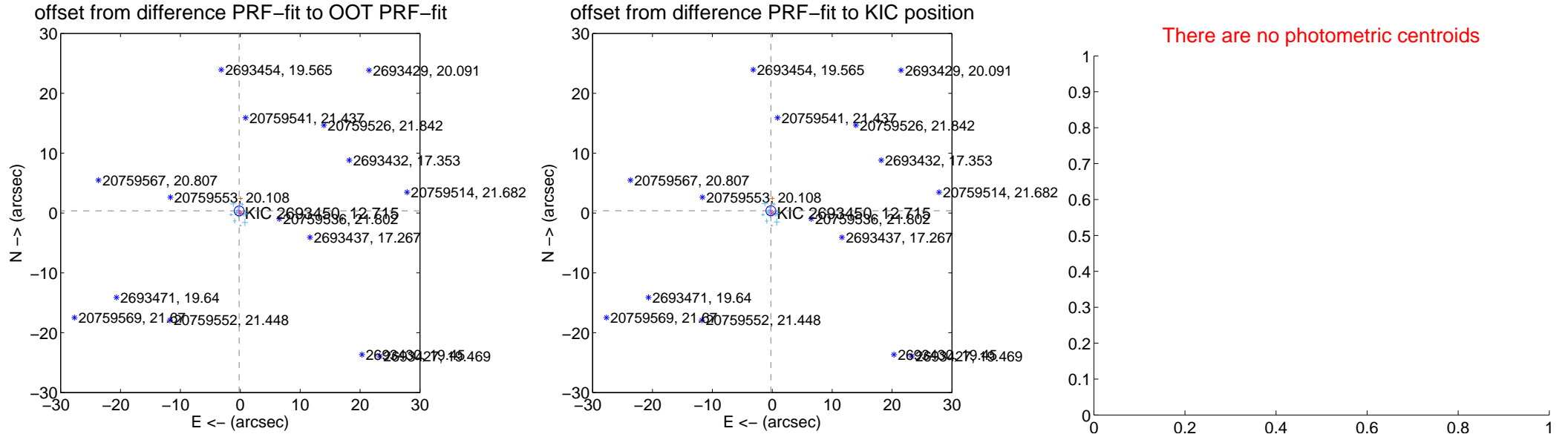
## DV Centroid Data

Supplemental centroid analysis for 002693450-01. Kepler magnitude: 12.71. Transit SNR 2.15

There are 14 quarters with good PRF difference image offsets

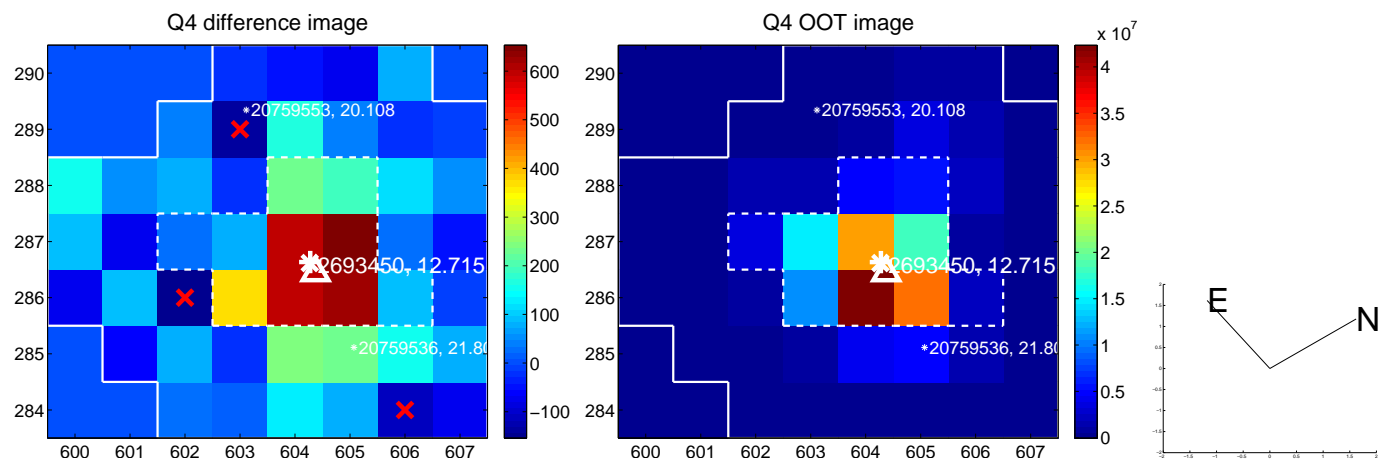
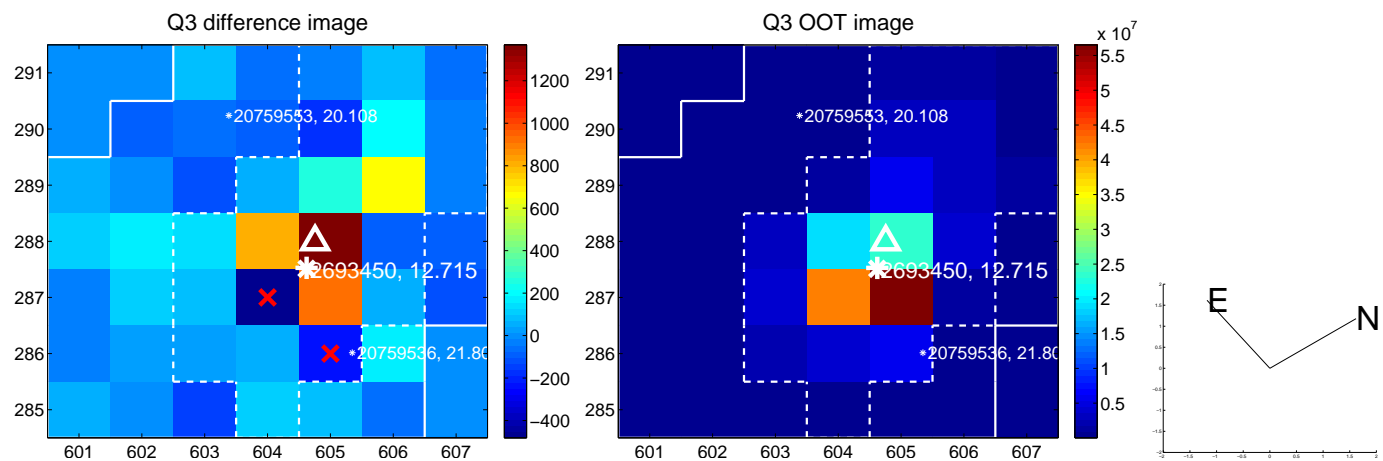
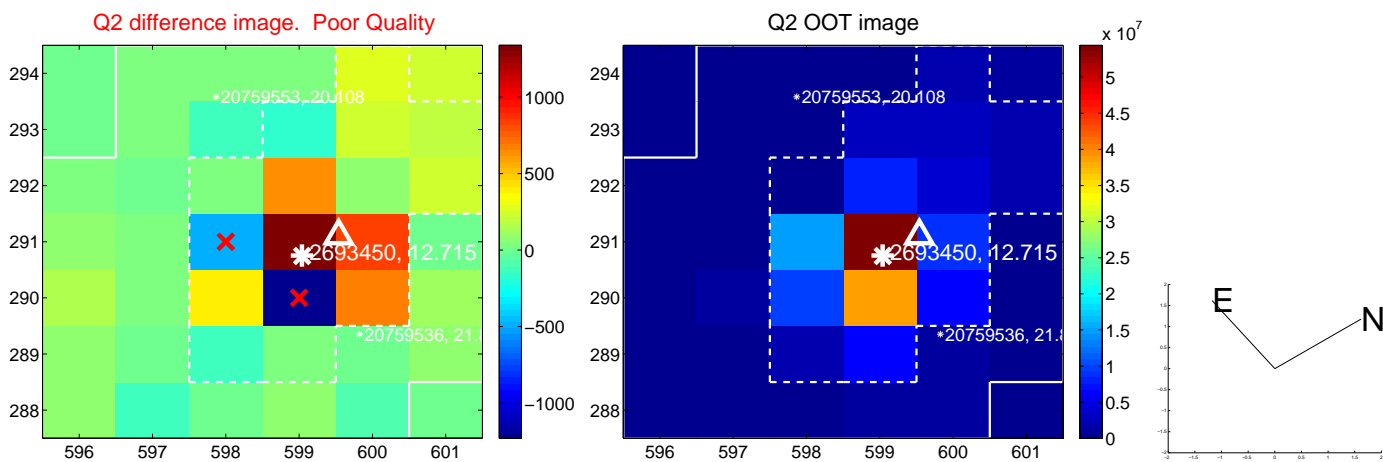
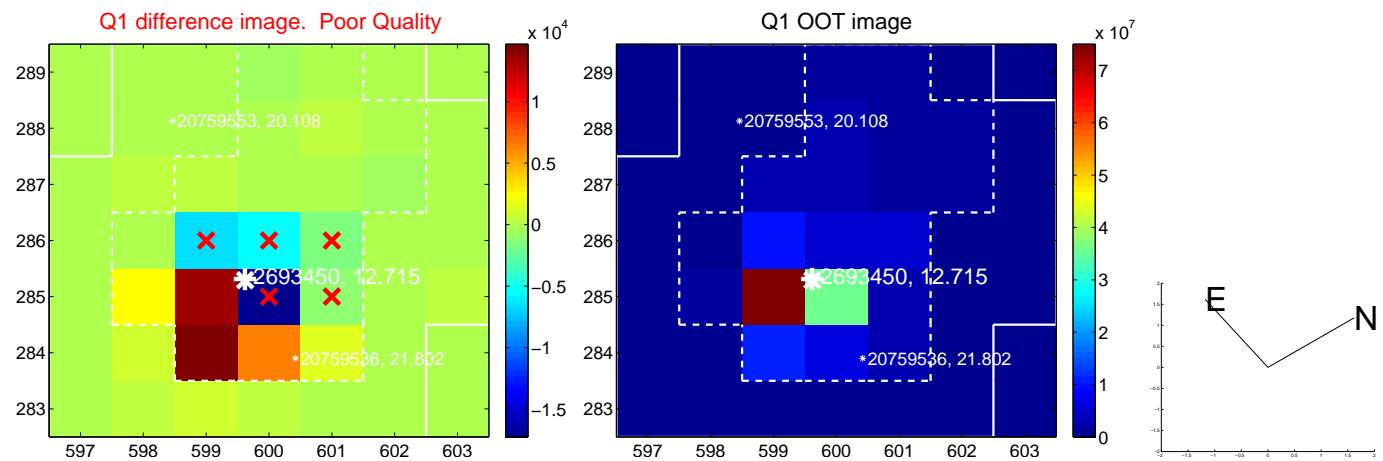
The direct PRF centroid is offset from the target star catalog position by about 0.01 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.402 \pm 0.274$	1.47	$0.187 \pm 0.183$	$0.356 \pm 0.293$
PRF-fit source offset from KIC position	$0.444 \pm 0.275$	1.62	$0.233 \pm 0.184$	$0.378 \pm 0.300$
photometric centroid source offset	—	—	—	—

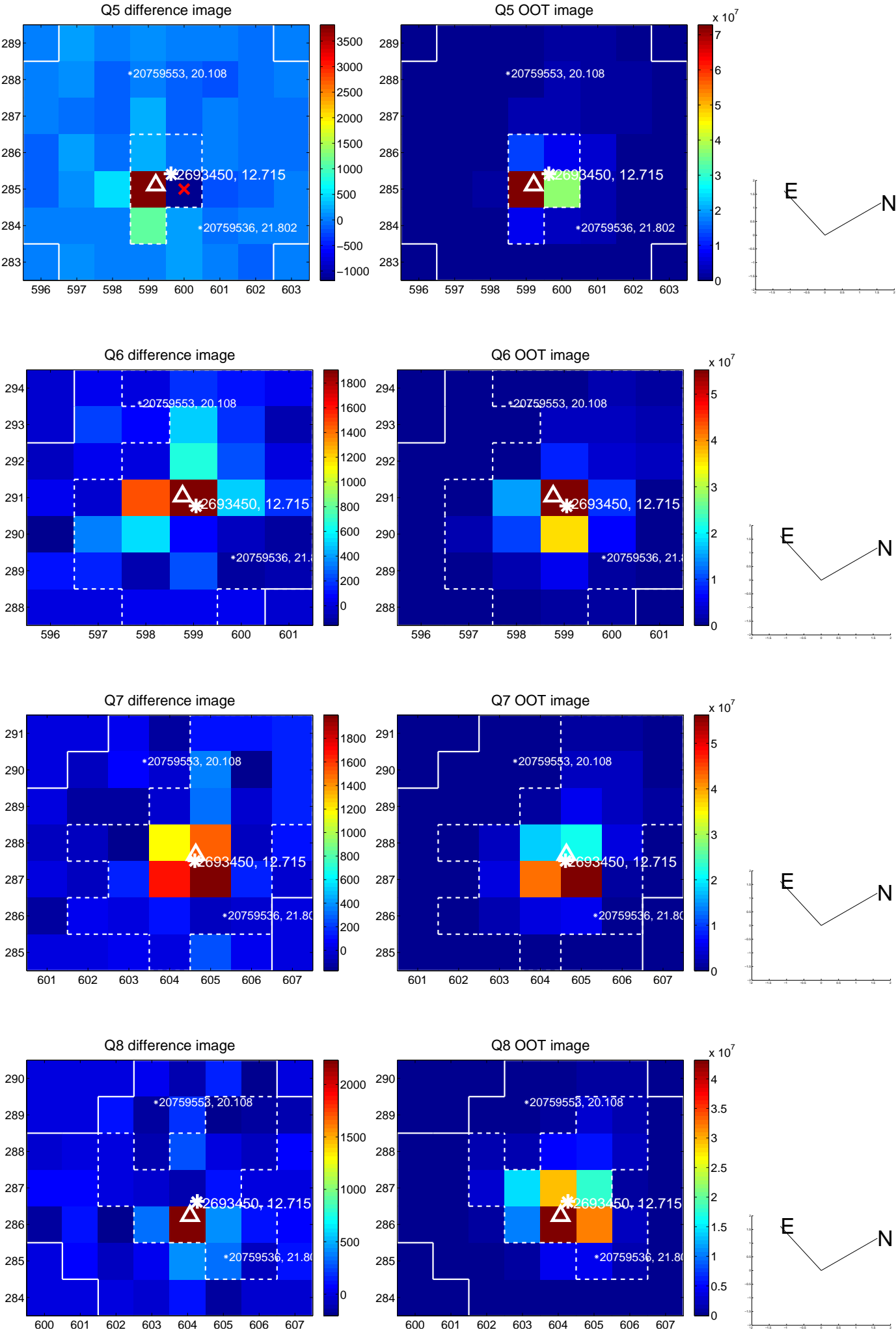


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

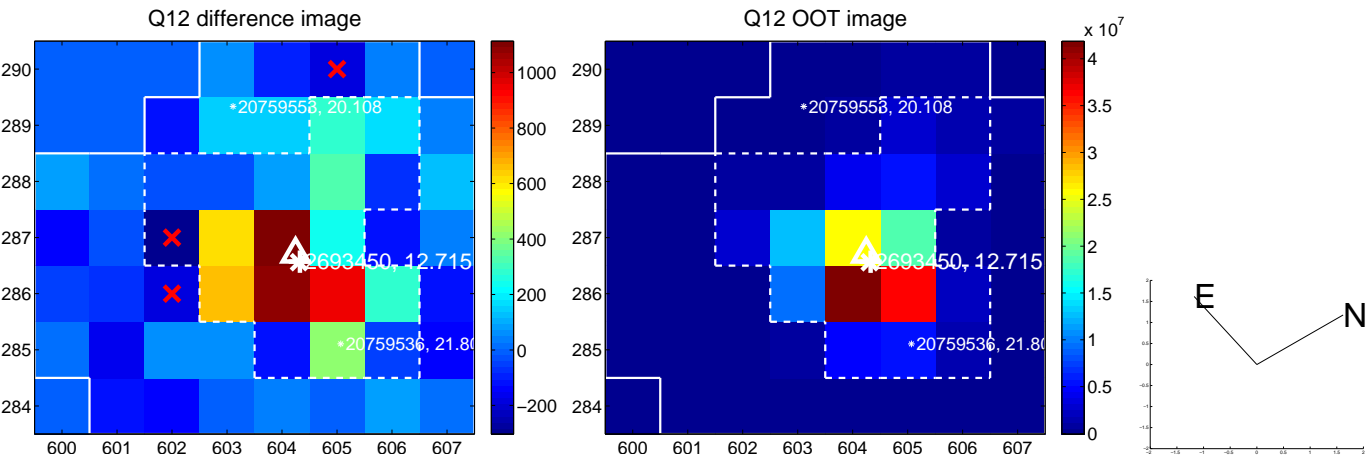
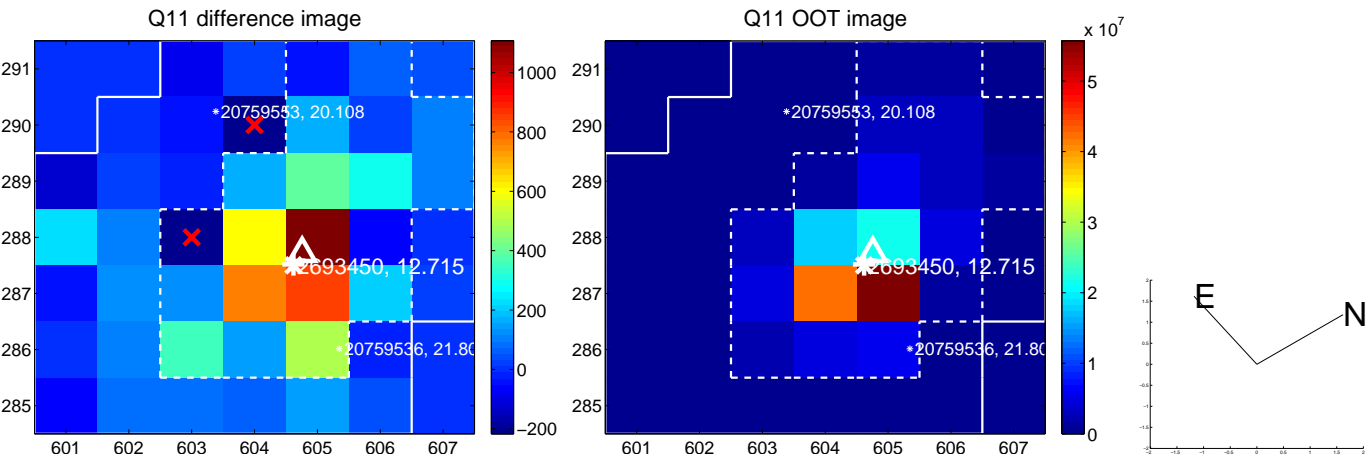
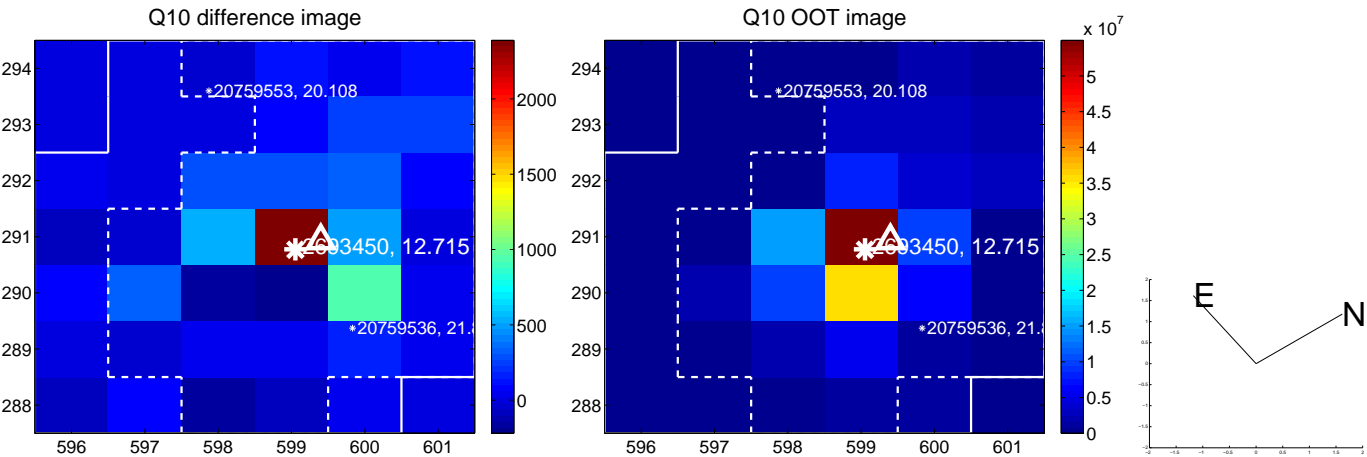
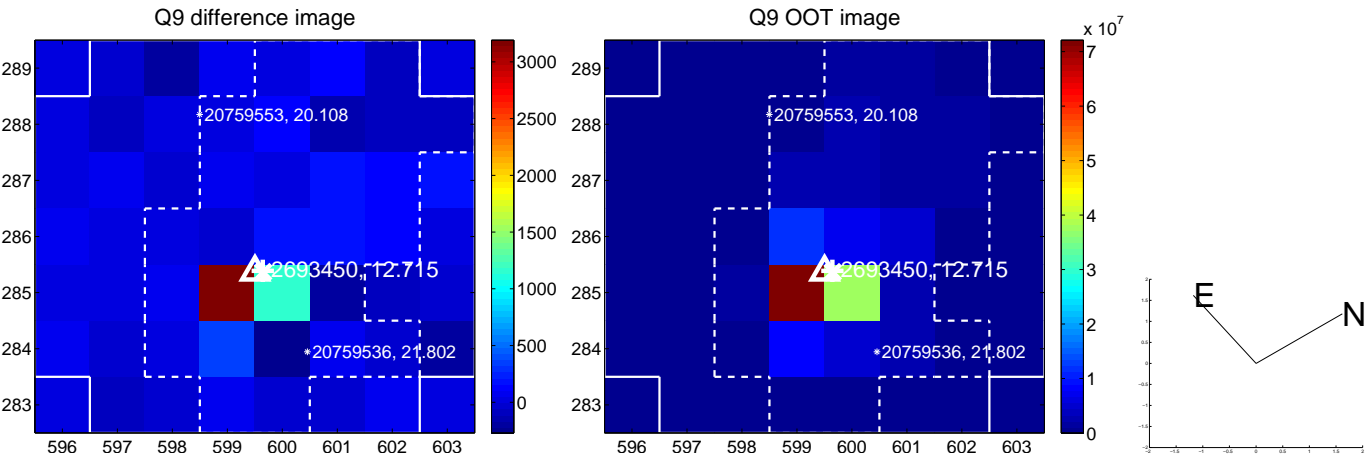


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

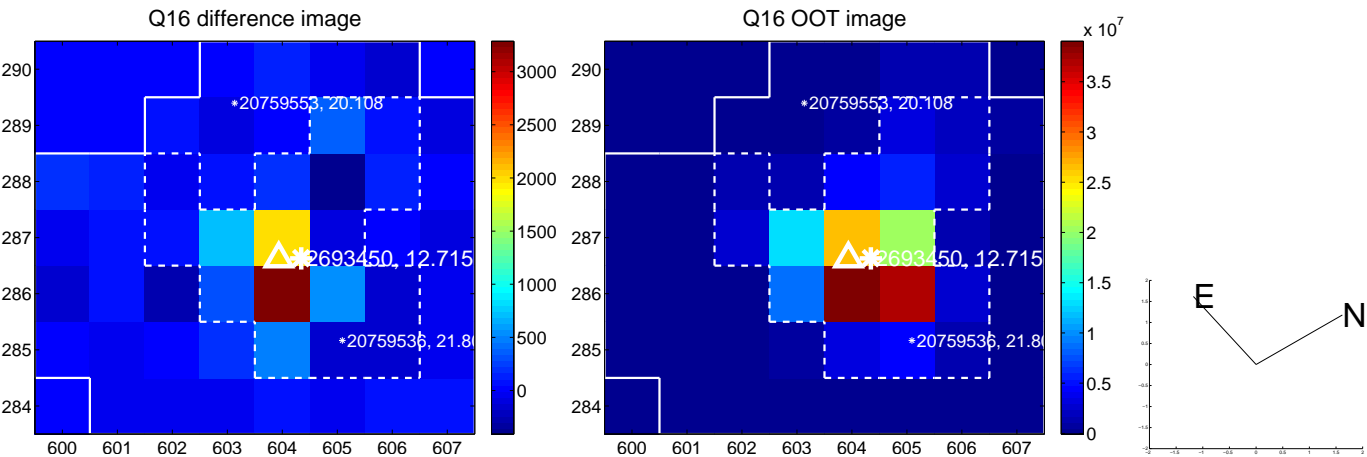
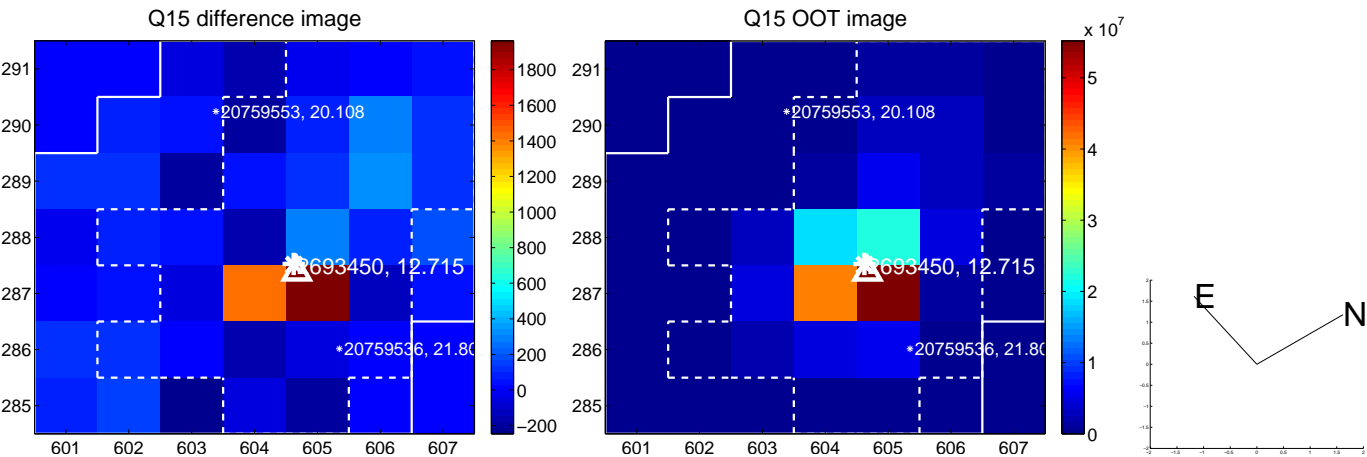
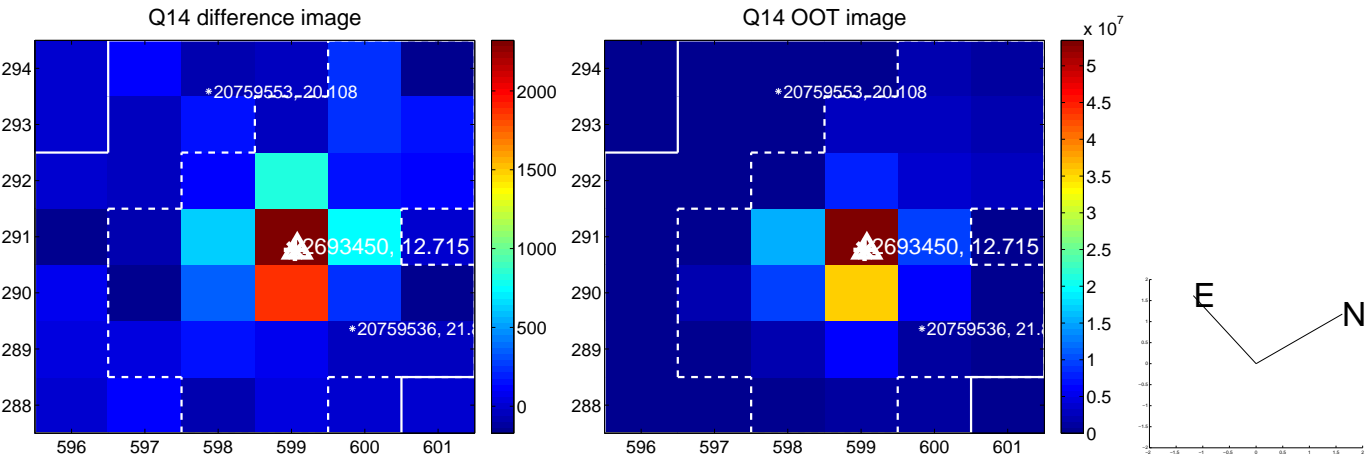
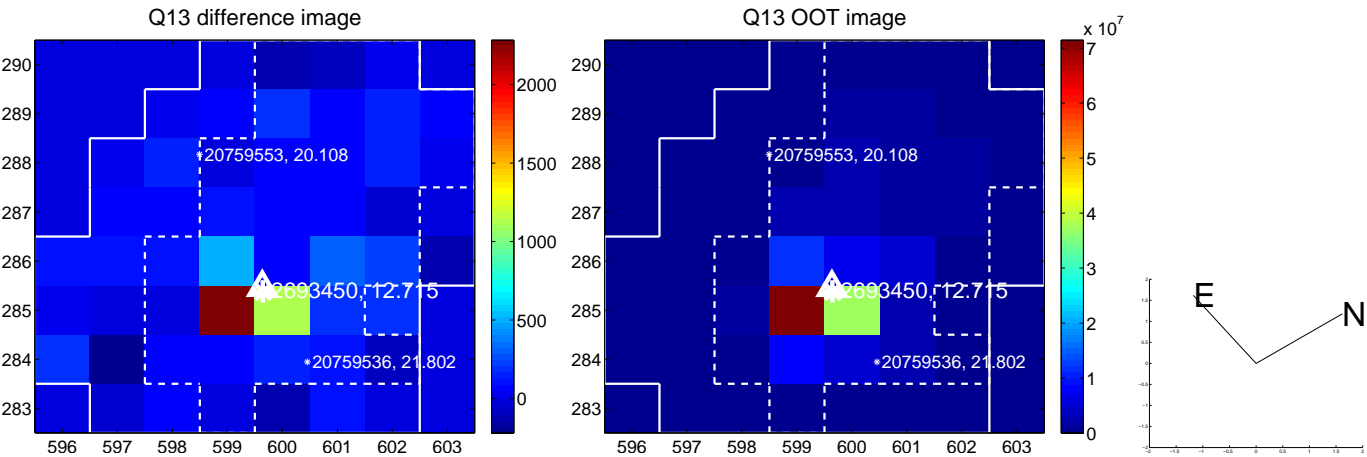




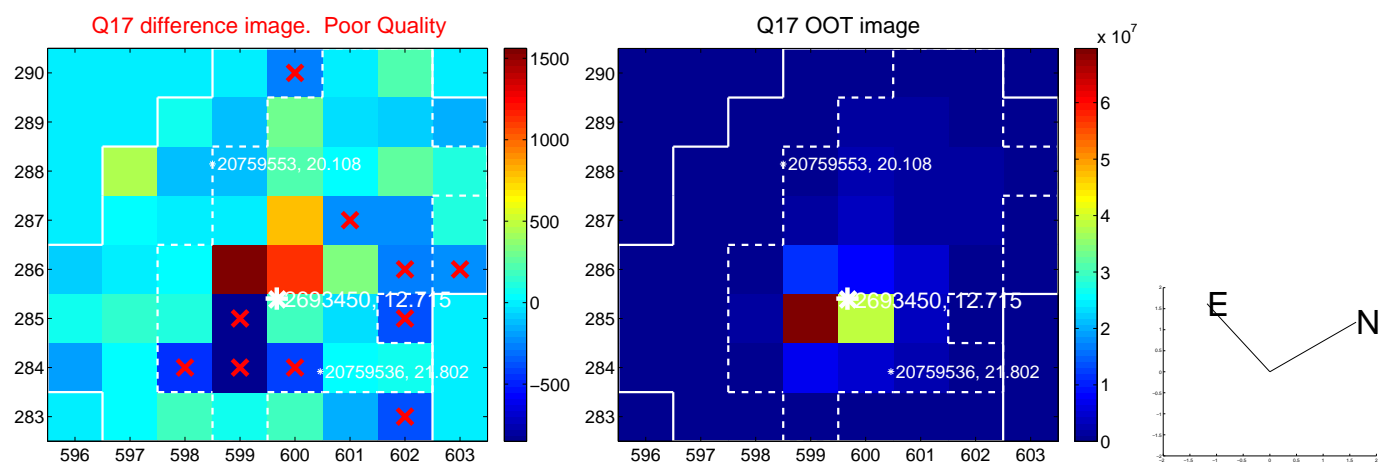
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

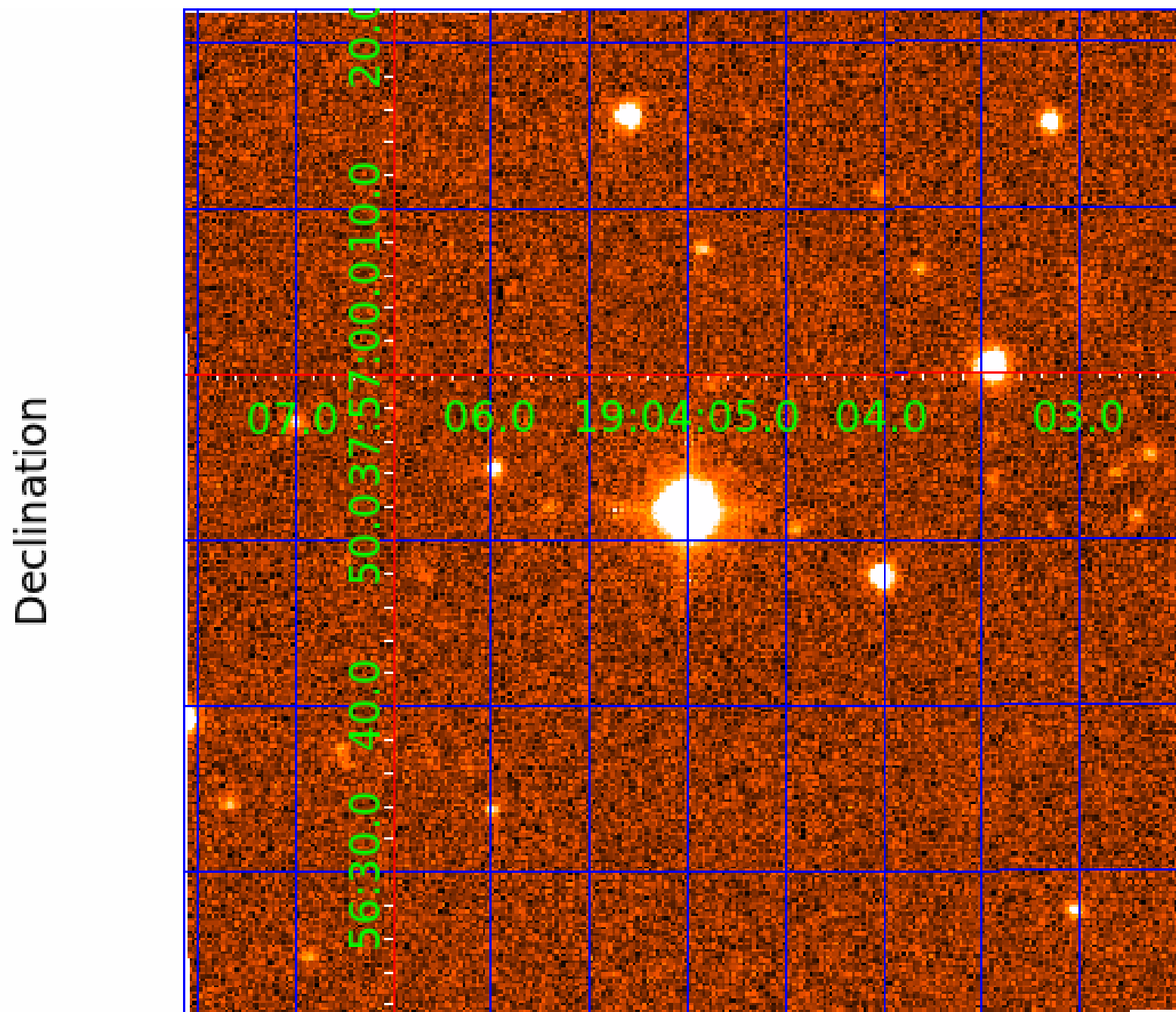


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



folded centroid time series figure for this object.

UKIRT Image



# KIC 002693450

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
002693450-01	OBS	No	0.847675	131.773359	3.2	5.078	8.5	2.1	1.86	7262	0.35	22162.65
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002693450-03	OBS	No	37.529820	155.612259	59.4	0.819	8.3	2.0	1.86	7262	1.48	141.50
002693450-04	OBS	No	138.808551	188.521521	315.3	2.744	8.4	10.0	1.86	7262	3.79	24.74

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
002693450-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT
002693450-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002693450-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002693450-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_UNCERTAIN

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

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

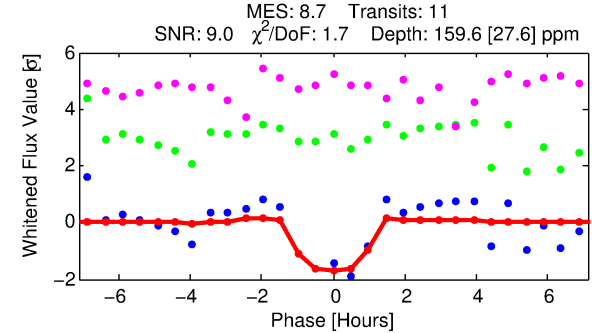
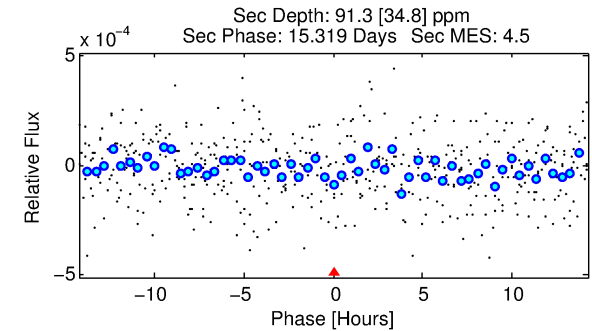
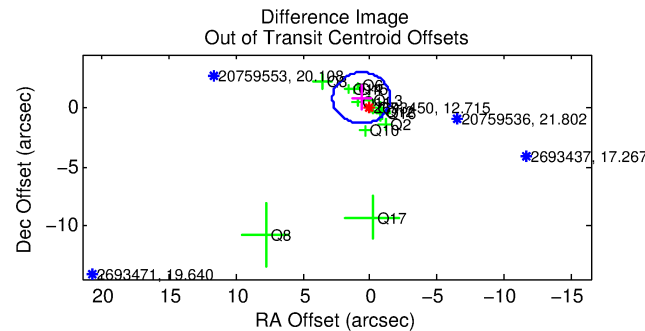
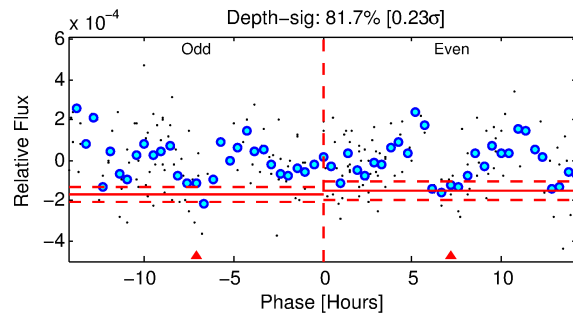
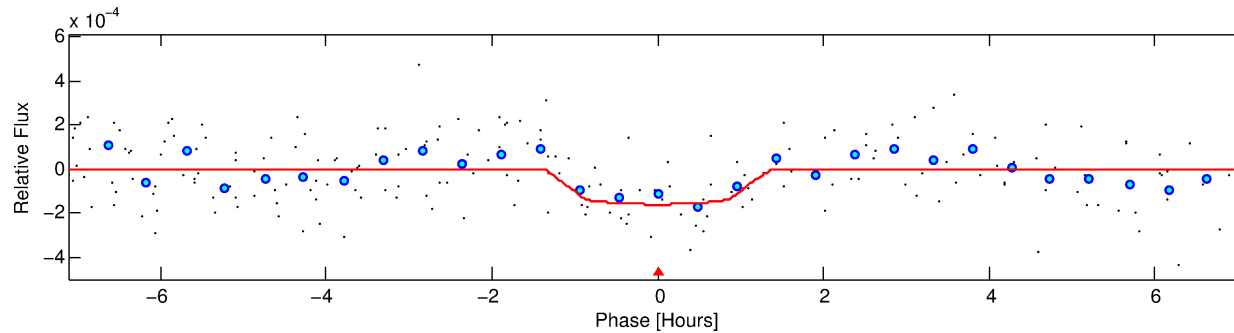
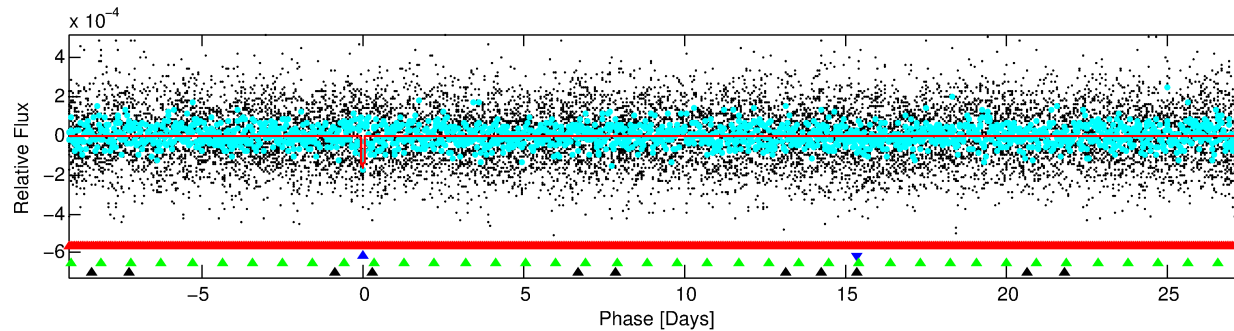
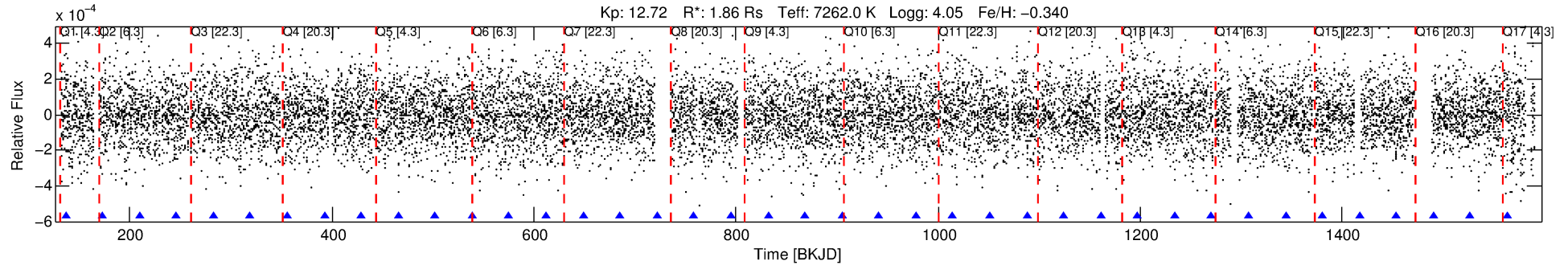
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 002693450-02

No Significant Match Found

# DV One-Page Summary

KIC: 2693450 Candidate: 2 of 4 Period: 36.588 d



## DV Fit Results:

Period = 36.58790 [0.00053] d  
Epoch = 136.5783 [0.0122] BKJD  
Rp/R\* = 0.0130 [0.0180]  
a/R\* = 66.91 [591.87]  
b = 0.84 [3.12]  
Seff = 146.38 [60.57]  
Teq = 887 [92] K  
Rp = 2.64 [3.74] Re  
a = 0.2431 [0.0607] AU  
Ag = 427.23 [1209.82] [0.35 $\sigma$ ]  
Teffp = 6234 [4382] K [1.22 $\sigma$ ]

## DV Diagnostic Results:

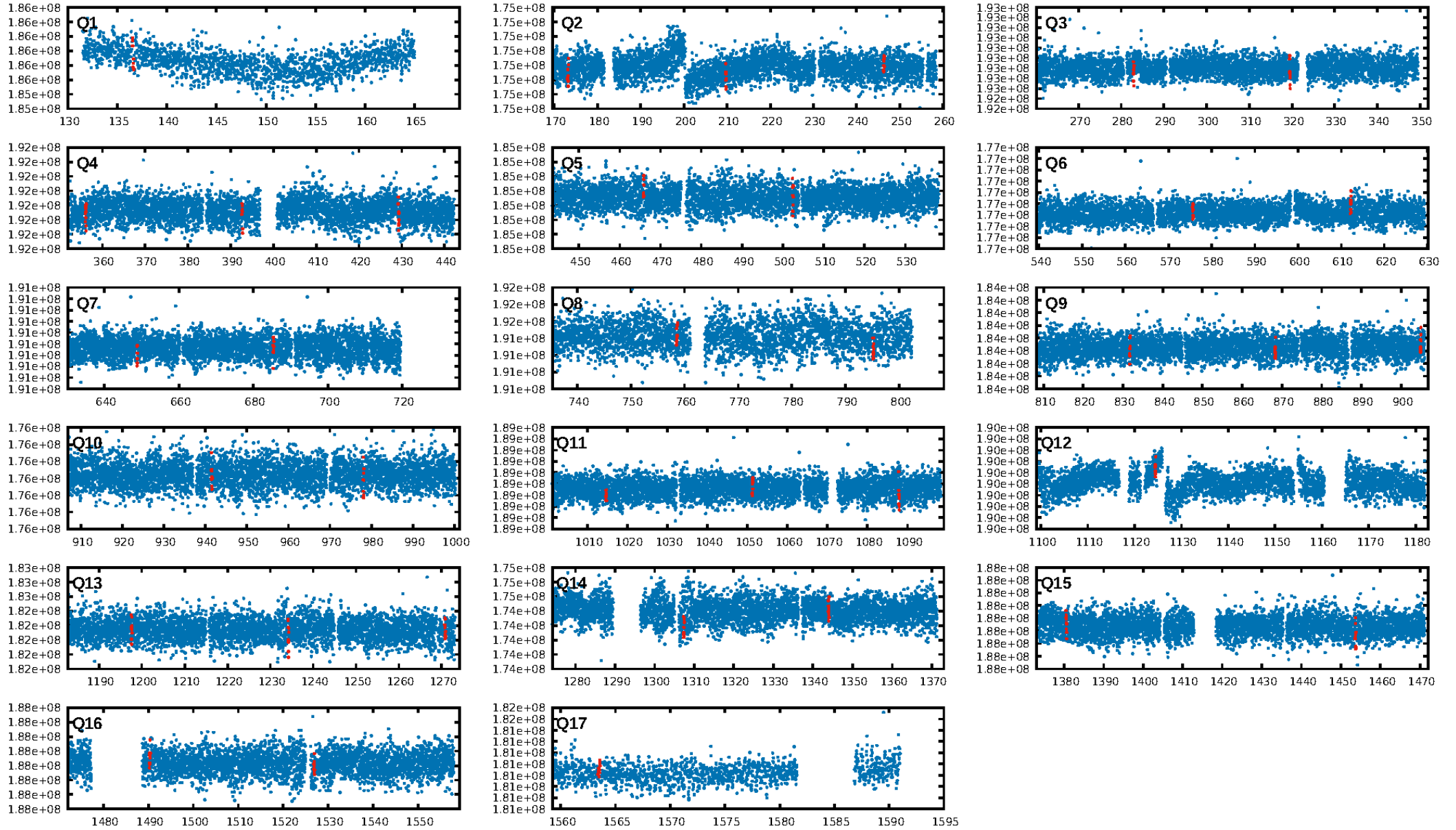
ShortPeriod-sig: 100.0% [153.05 $\sigma$ ]  
LongPeriod-sig: 100.0% [9.01 $\sigma$ ]  
ModelChiSquare2-sig: 38.2%  
ModelChiSquareGof-sig: 97.7%  
**Bootstrap-pfa: 4.08e-09**  
RollingBand-fgt: 1.00 [10/10]  
GhostDiagnostic-chr: -7.128  
**Centroid-sig: 0.0%**  
Centroid-so: 2.851 arcsec [2.73 $\sigma$ ]  
OotOffset-rm: 1.037 arcsec [1.44 $\sigma$ ]  
KicOffset-rm: 1.076 arcsec [1.30 $\sigma$ ]  
OotOffset-st: 4/4/3/2 [13]  
KicOffset-st: 4/4/3/2 [13]  
DiffImageQuality-fgm: 0.54 [7/13]  
DiffImageOverlap-fno: 0.18 [3/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 02:25:27 Z

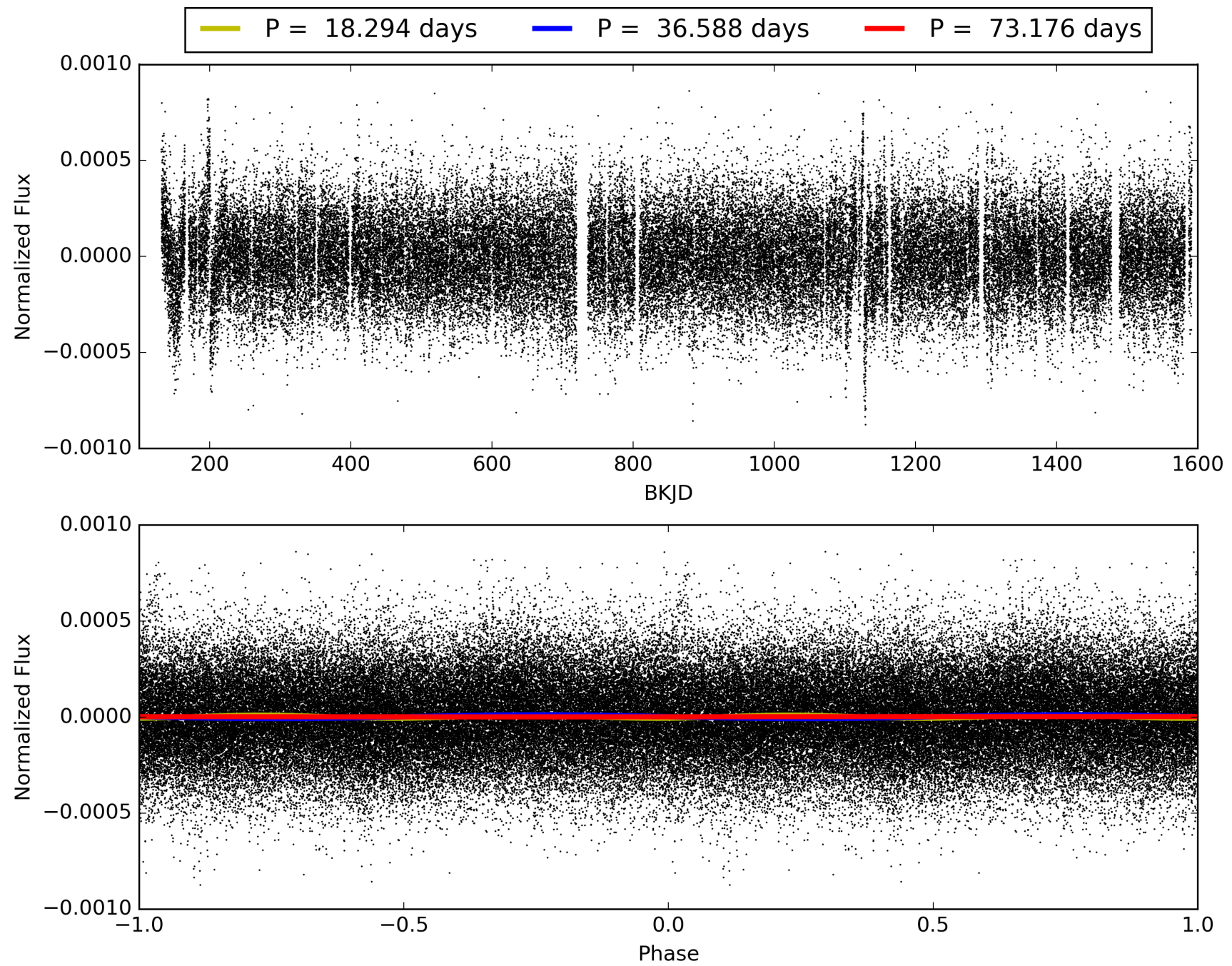
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 002693450-02, PDC Light Curves

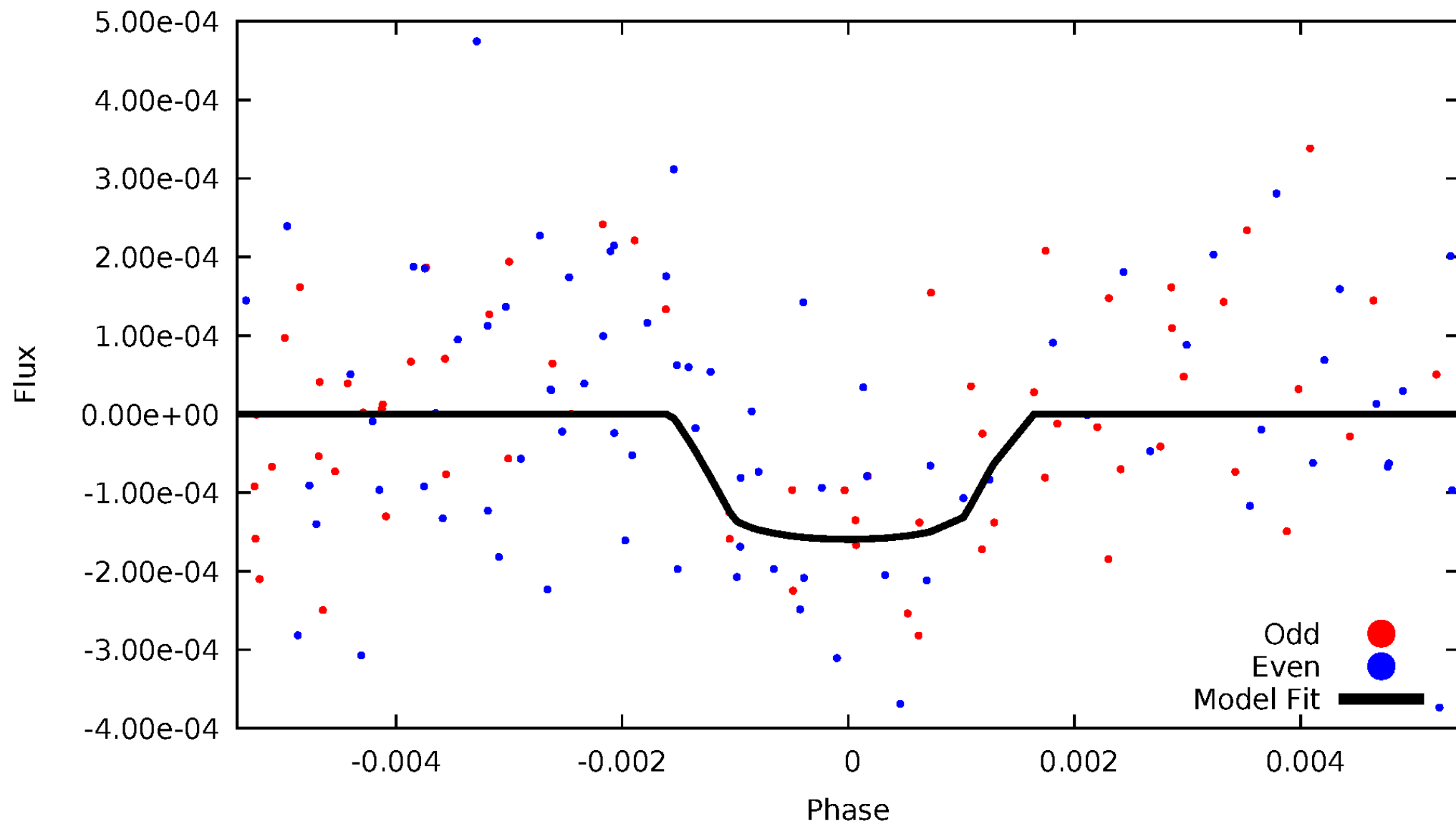


TCE 002693450-02



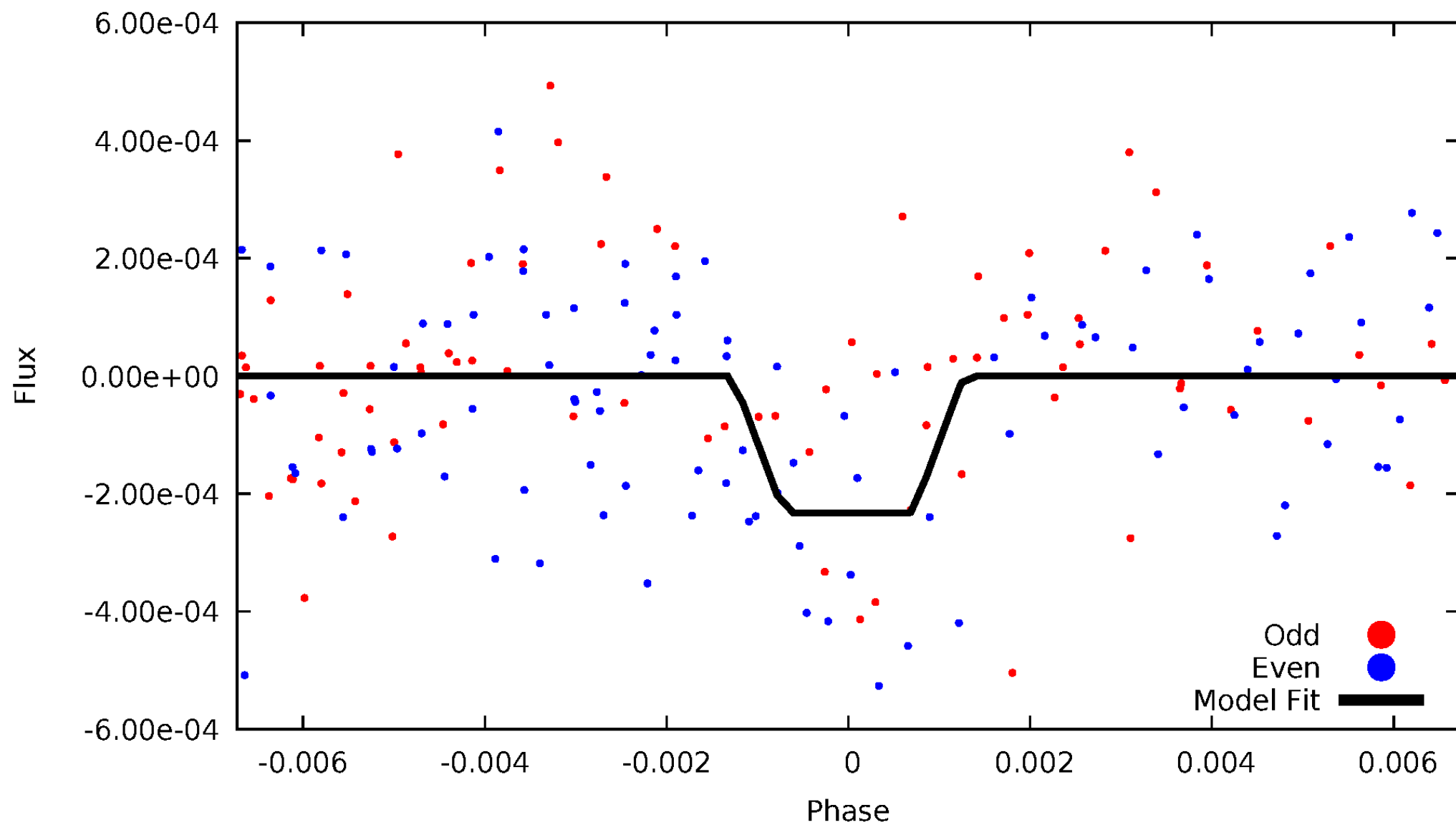
# DV Odd/Even

TCE 002693450-02



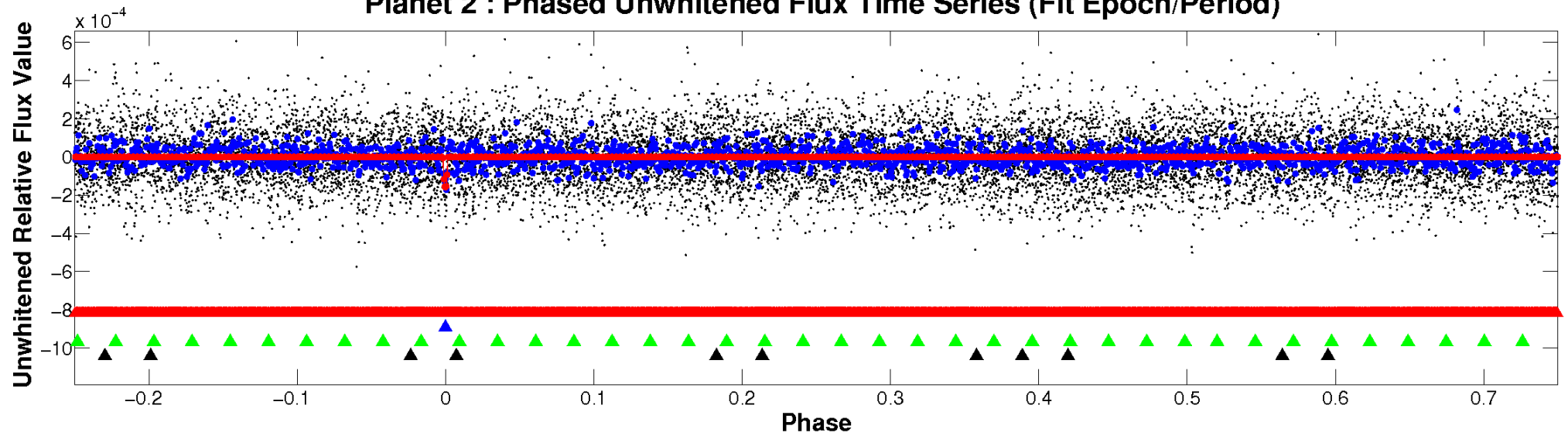
# ALT Odd/Even

TCE 002693450-02

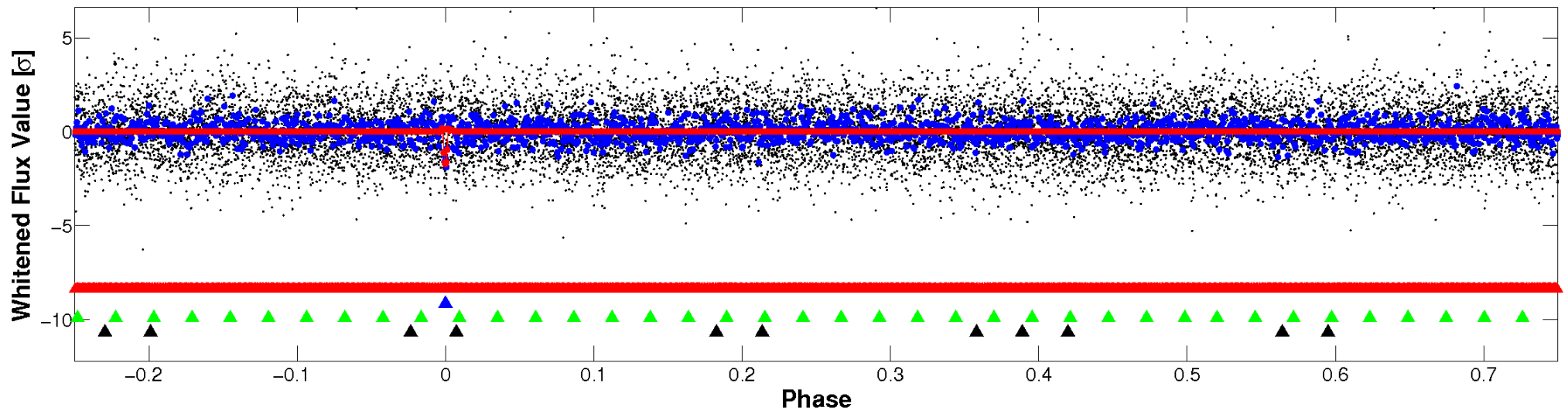


# Non-Whitened Vs. Whitened Light Curve

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

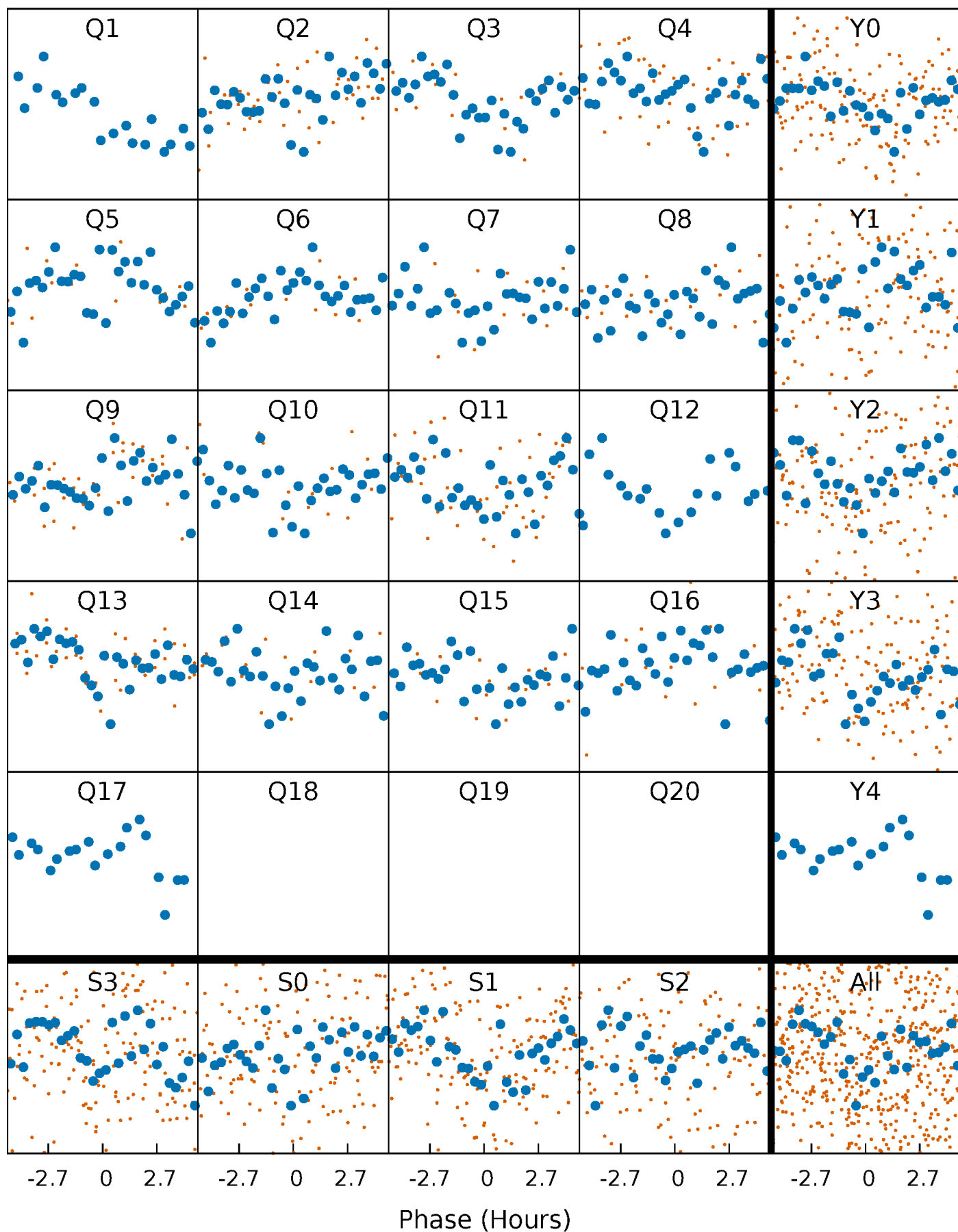


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

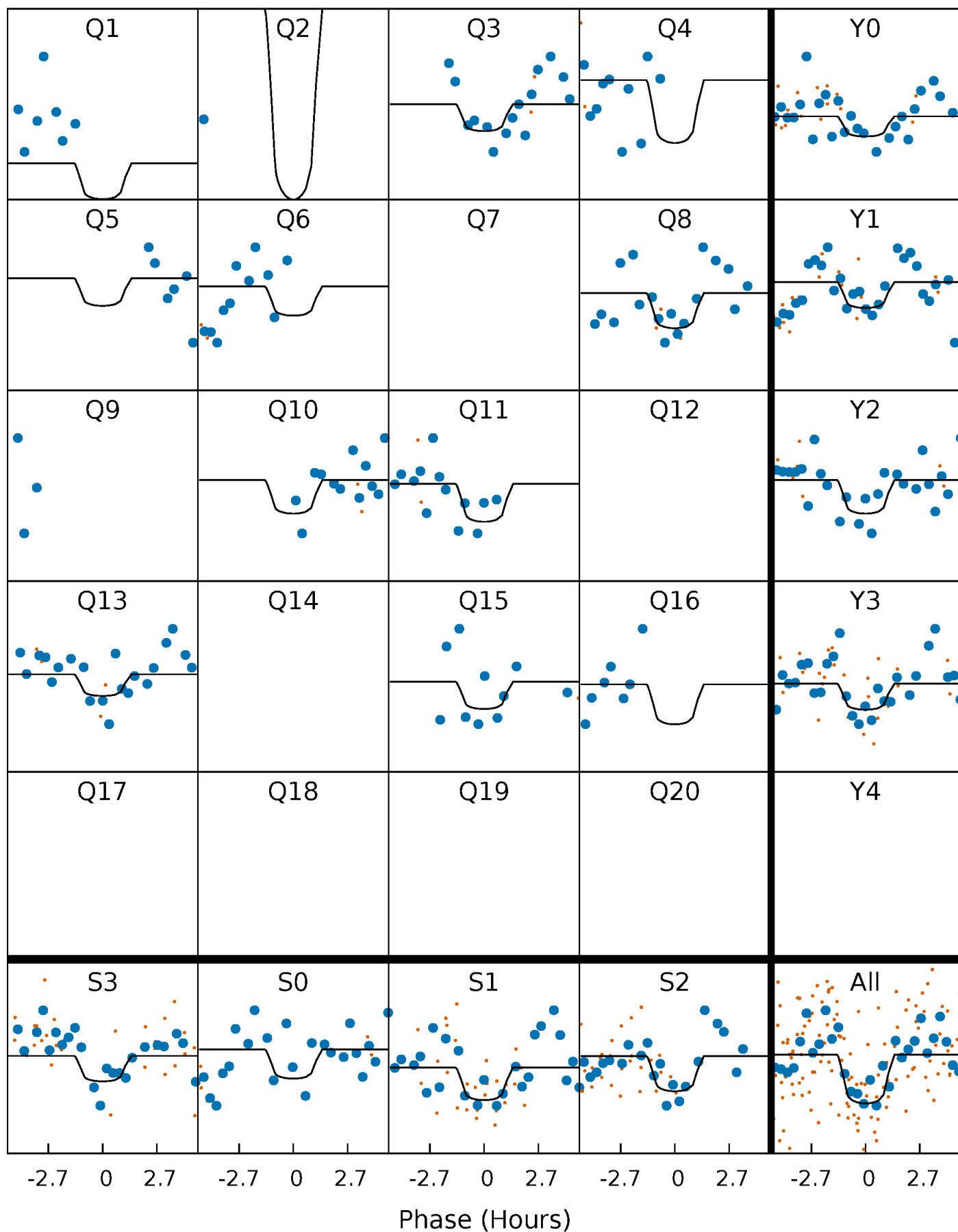
TCE 002693450-02   P= 36.587899 Days    $T_0=136.578337$  (BKJD)





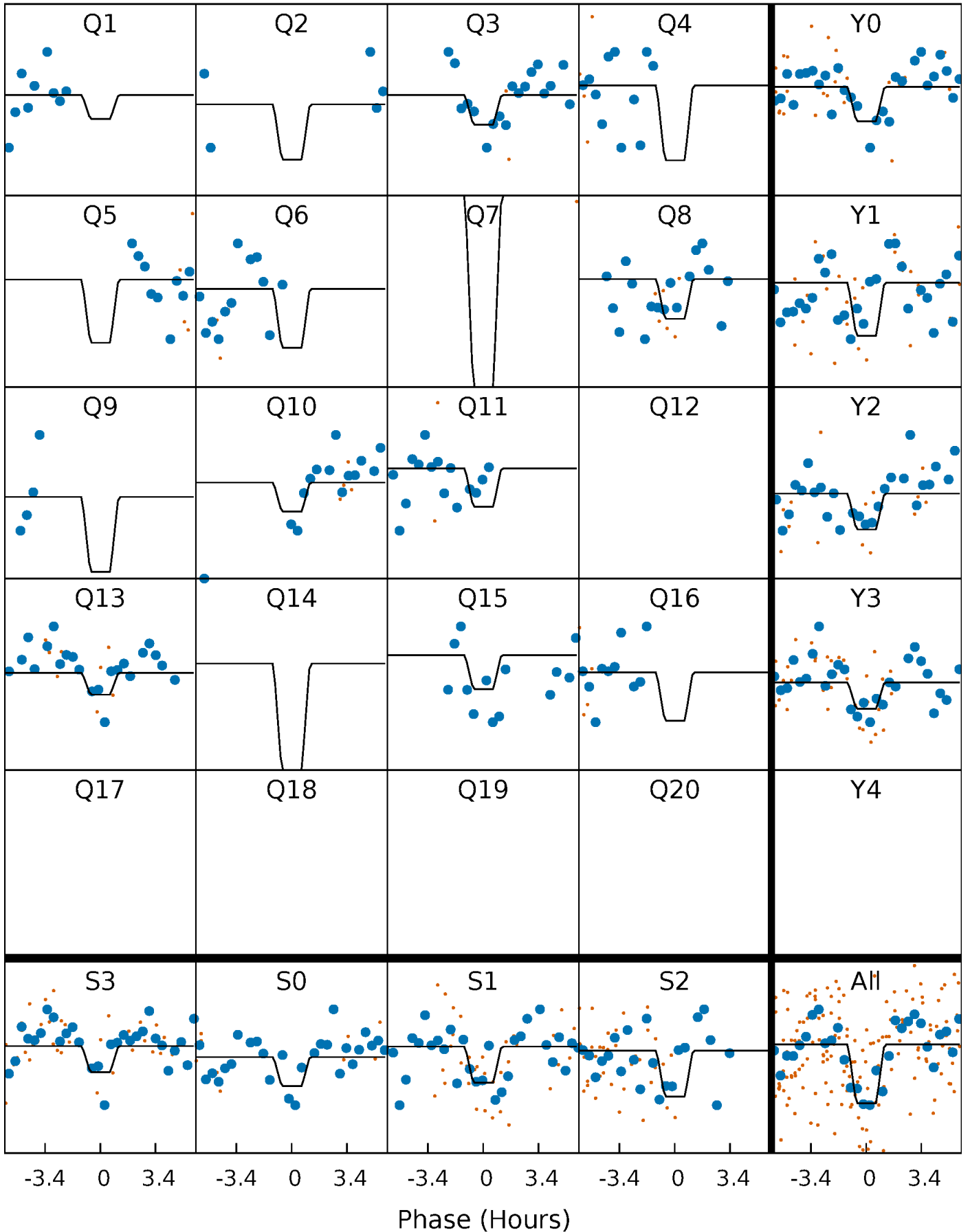
# DV Quarter-Phased Transit Curves

TCE 002693450-02   P= 36.587899 Days    $T_0=136.578337$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

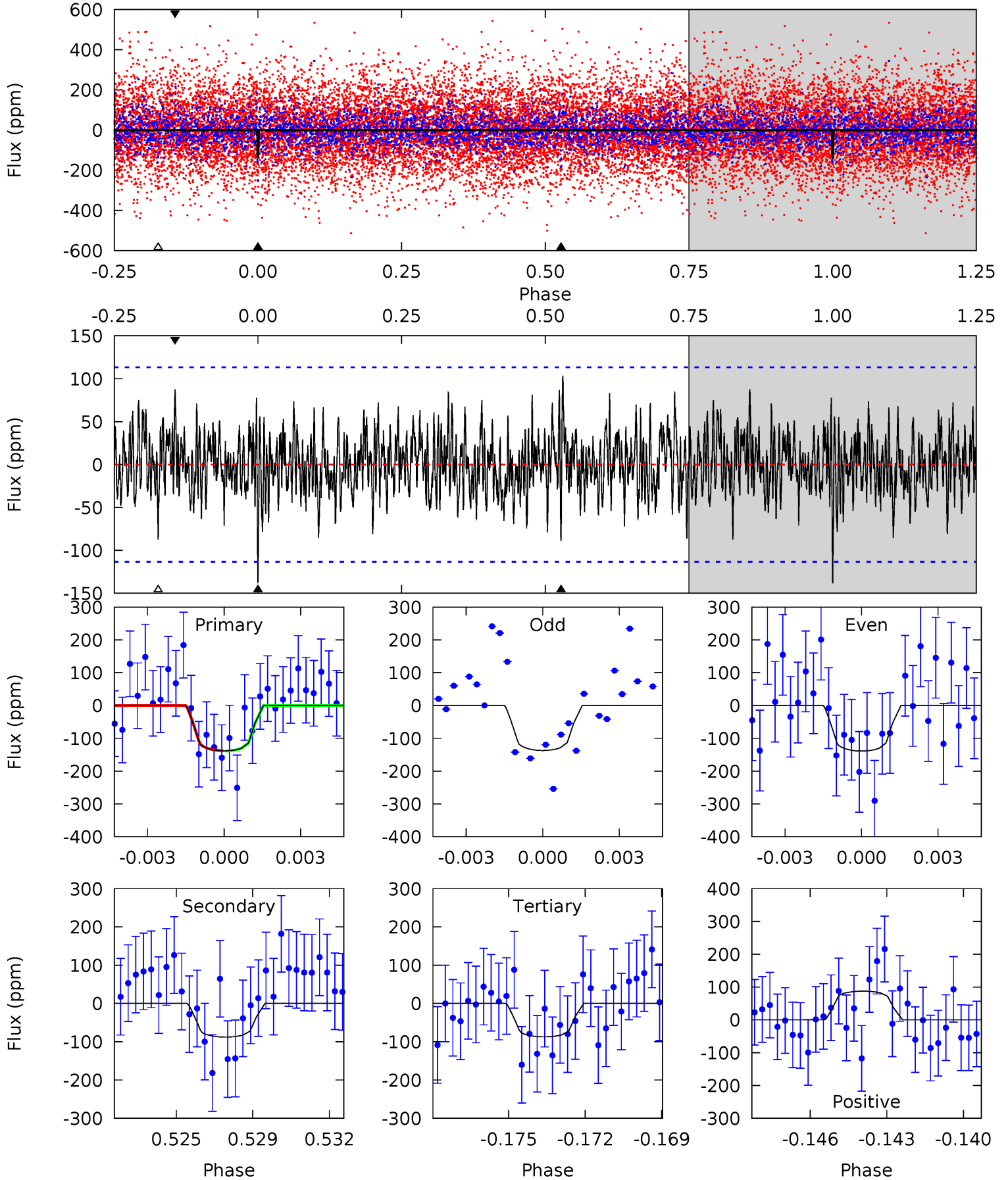
TCE 002693450-02   P= 36.587357 Days    $T_0=136.599034$  (BKJD)



# DV Model-Shift Uniqueness Test

002693450-02, P = 36.587899 Days, E = 99.990438 Days

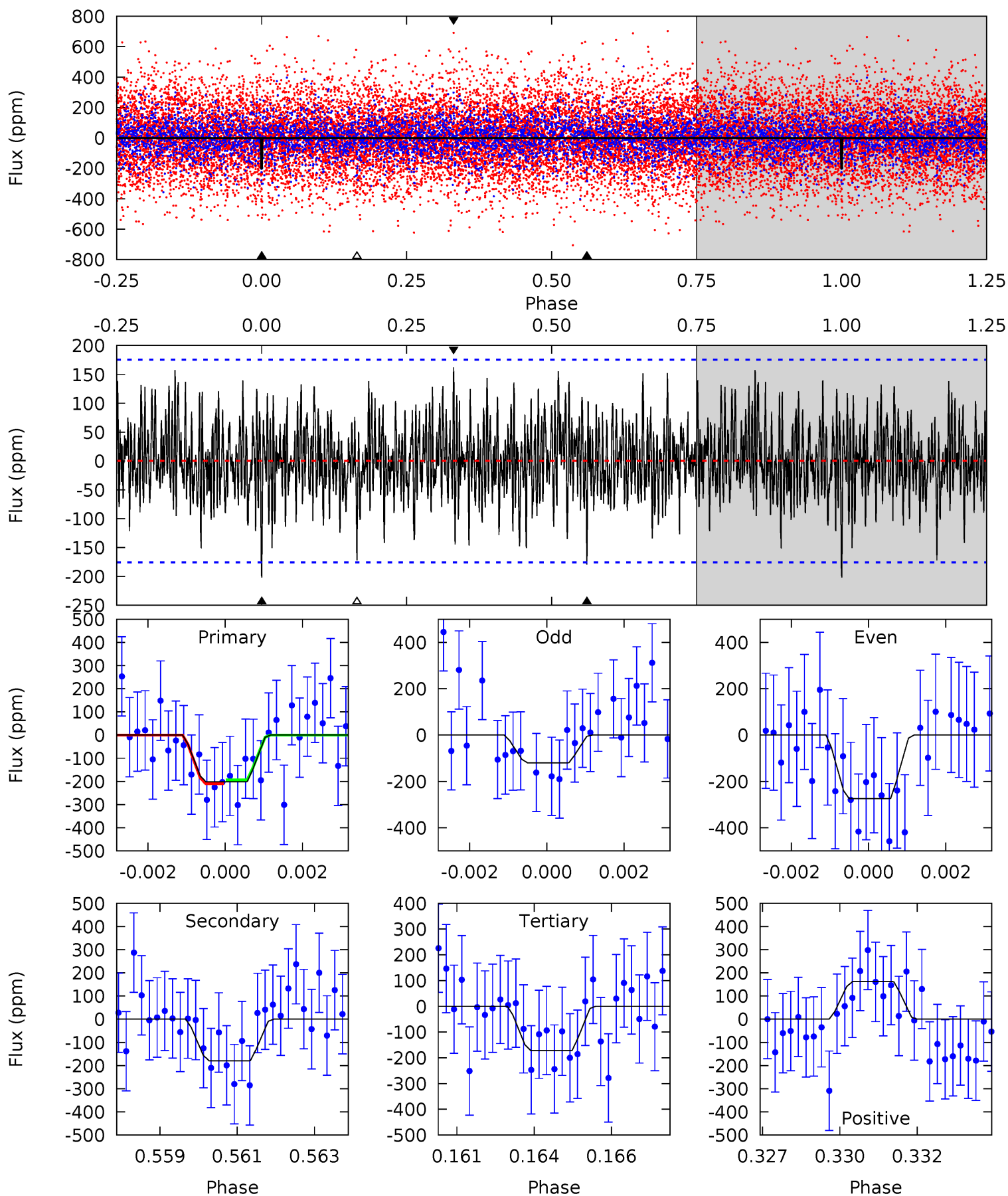
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.39	4.06	4.03	4.05	5.24	2.95	1.36	2.36	2.35	0.03	0.02	0.04	0.87	0.43	0.03



# Alt Model-Shift Uniqueness Test

002693450-02, P = 36.587357 Days, E = 100.011677 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
6.07	5.40	5.18	4.88	5.29	3.03	1.60	0.89	1.19	0.22	0.52	2.33	0.71	0.45	0.24



### Stellar Parameters For KIC 002693450

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7262^{+228}_{-304}$	$4.053^{+0.214}_{-0.156}$	$-0.340^{+0.250}_{-0.350}$	$1.863^{+0.525}_{-0.525}$	$1.428^{+0.204}_{-0.249}$	$0.311^{+0.409}_{-0.144}$
	+3%/-4%	+5%/-4%	+74%/-103%	+28%/-28%	+14%/-17%	+131%/-46%
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 002693450-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-88 \pm 22$	$3.77^{+3.40}_{-2.54}$	$1231^{+93}_{-97}$	$5067^{+4276}_{-1115}$	$200^{+1549}_{-147}$
Alt.	$-179 \pm 33$	$3.64^{+3.53}_{-2.43}$	$1230^{+93}_{-98}$	$6094^{+5745}_{-1559}$	$417^{+3408}_{-311}$

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

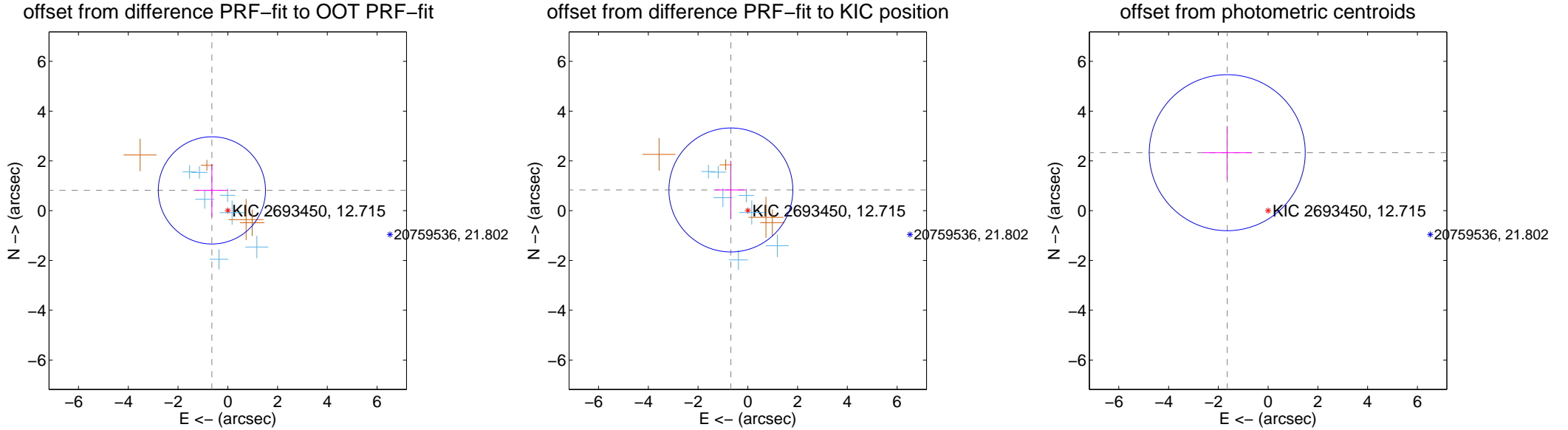
## DV Centroid Data

Supplemental centroid analysis for 002693450-02. Kepler magnitude: 12.71. Transit SNR 8.95

There are 7 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.08 arcsec

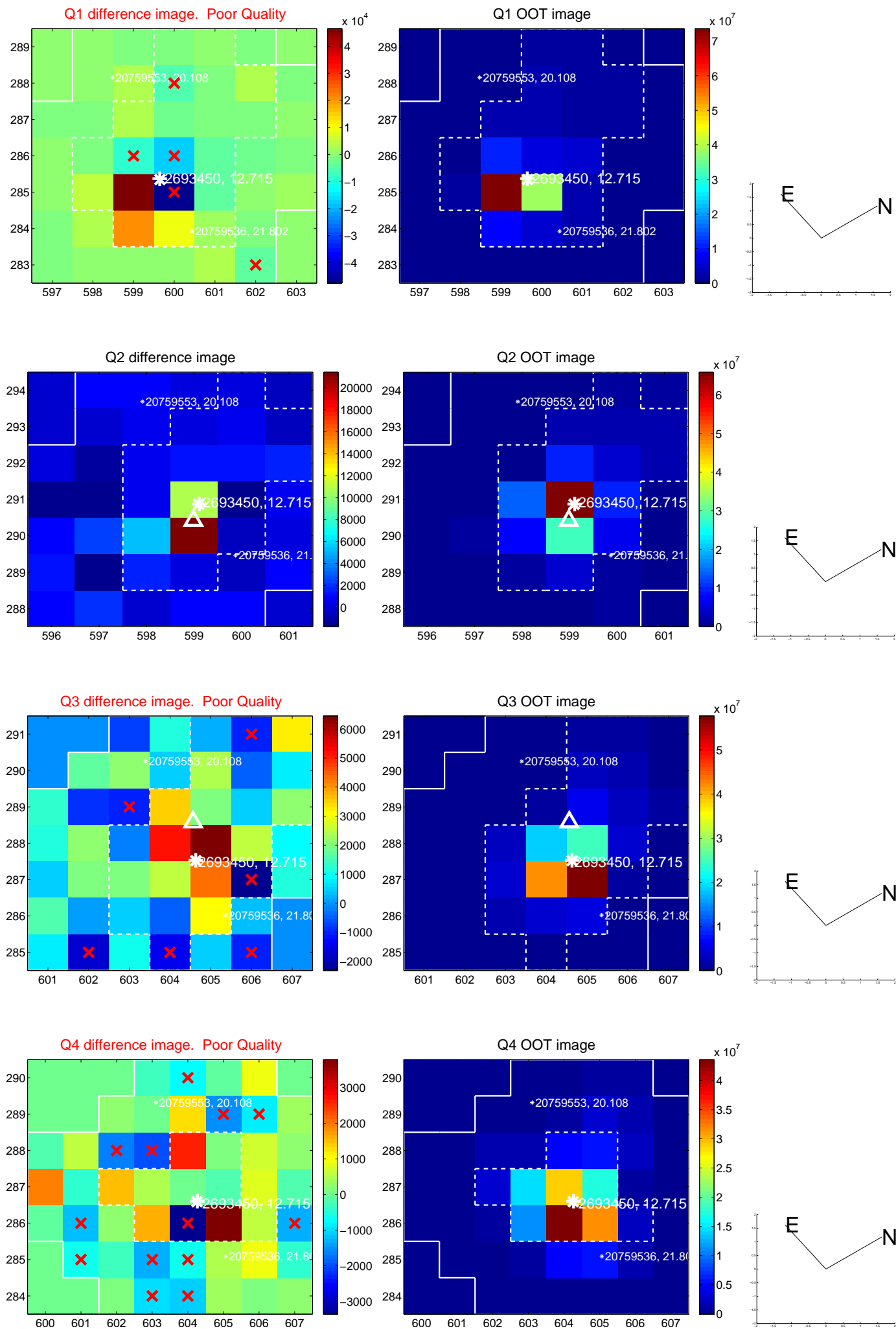
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.037 \pm 0.718$	1.44	$0.639 \pm 0.656$	$0.816 \pm 1.066$
PRF-fit source offset from KIC position	$1.076 \pm 0.830$	1.30	$0.681 \pm 0.625$	$0.833 \pm 1.170$
photometric centroid source offset	$2.85 \pm 1.04$	2.73	$1.64 \pm 0.98$	$2.33 \pm 1.07$



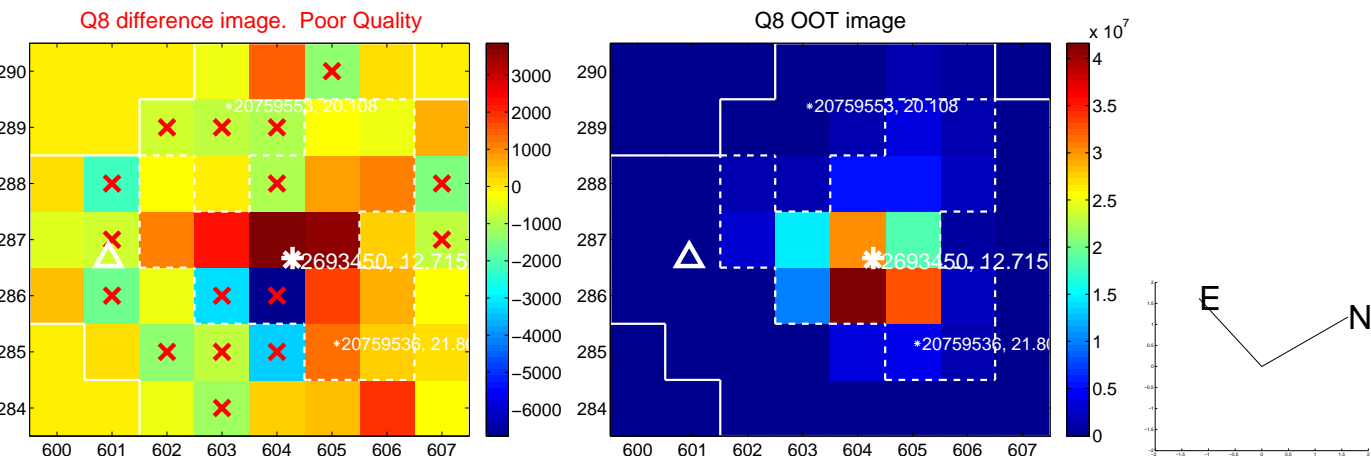
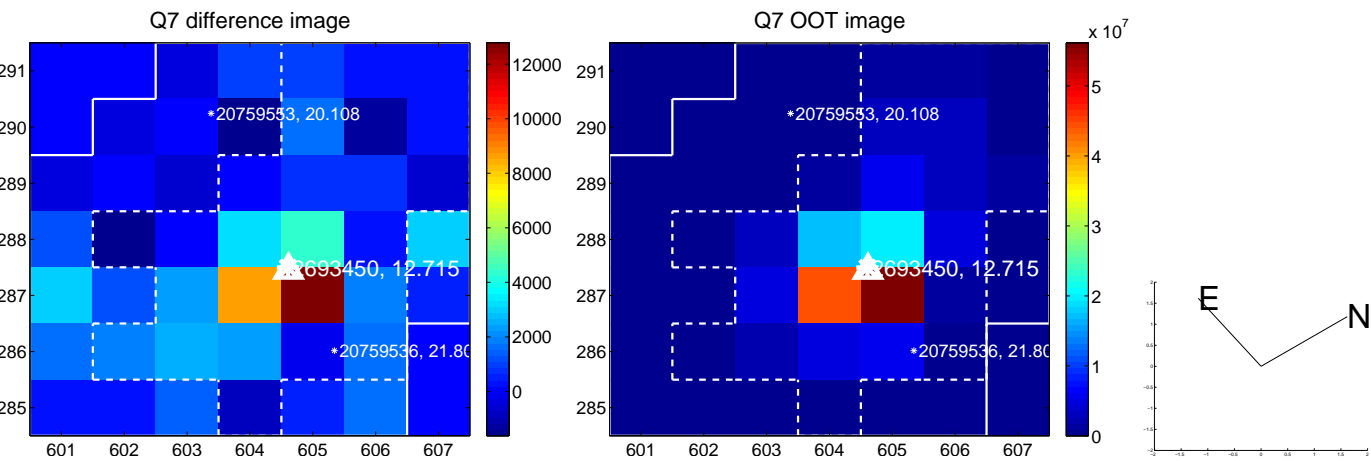
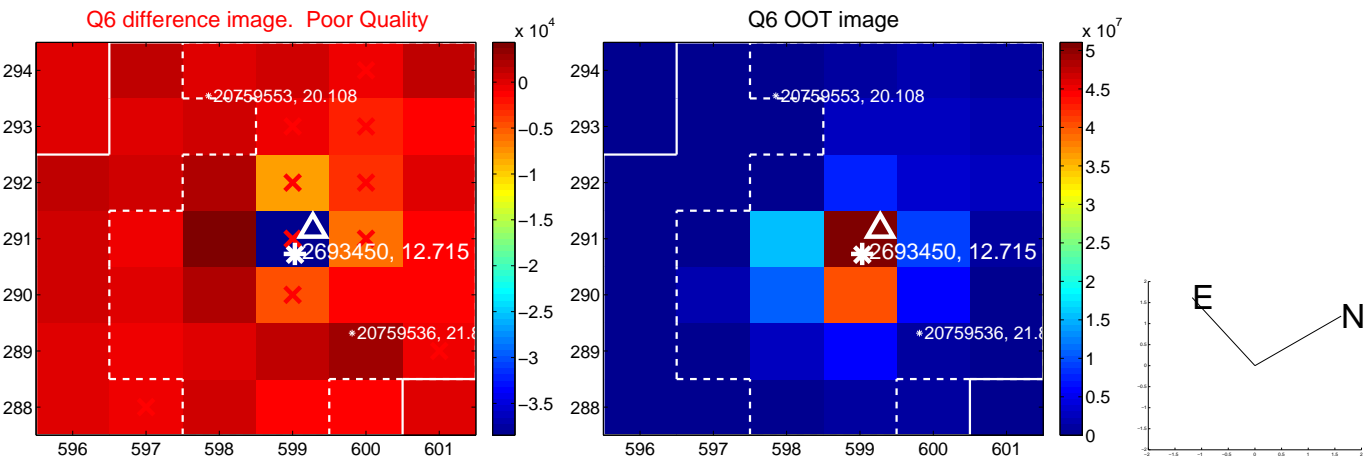
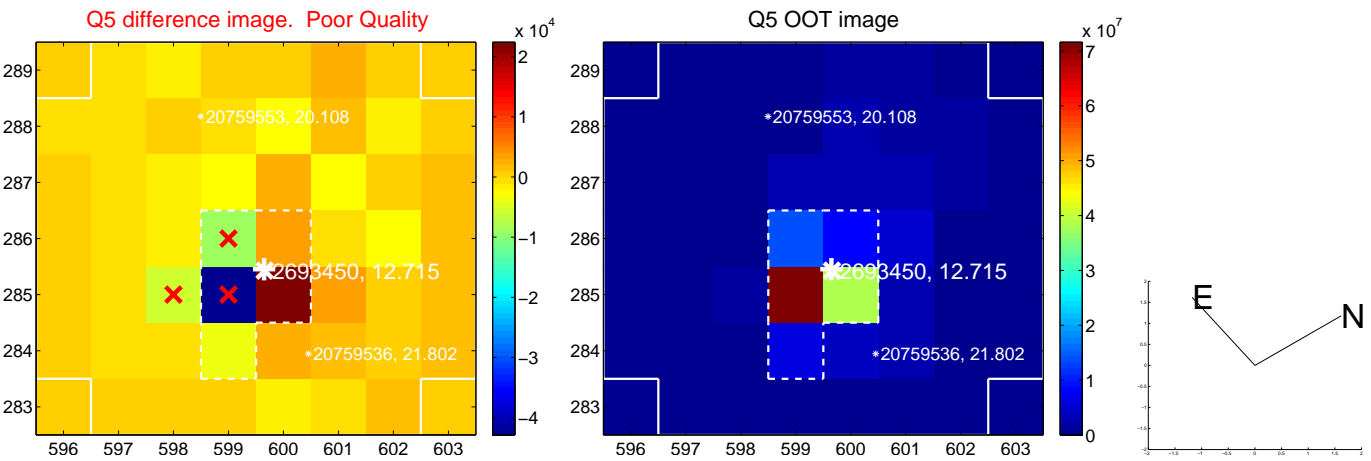
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



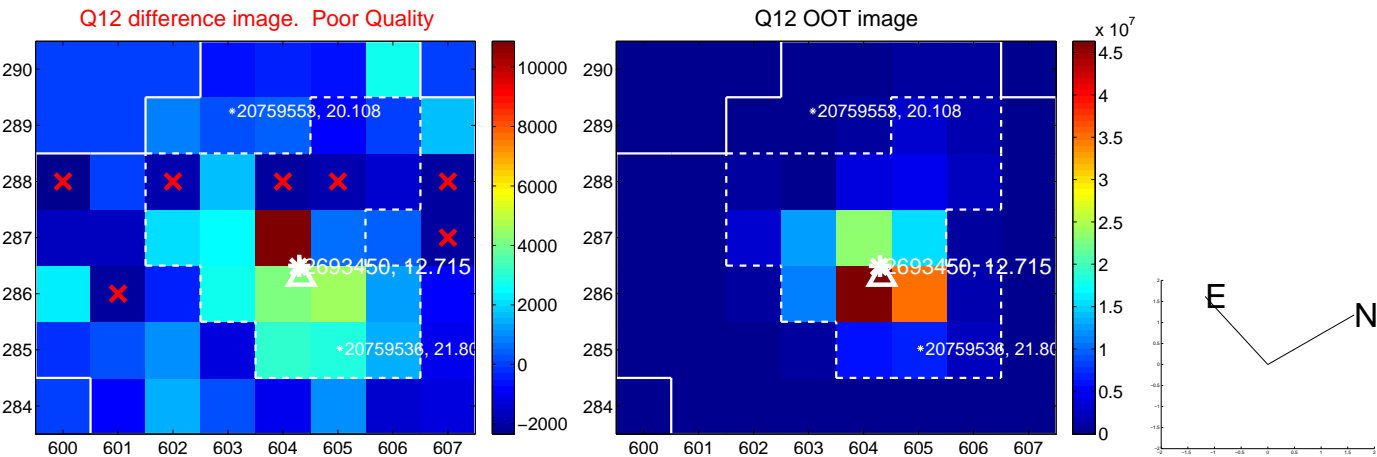
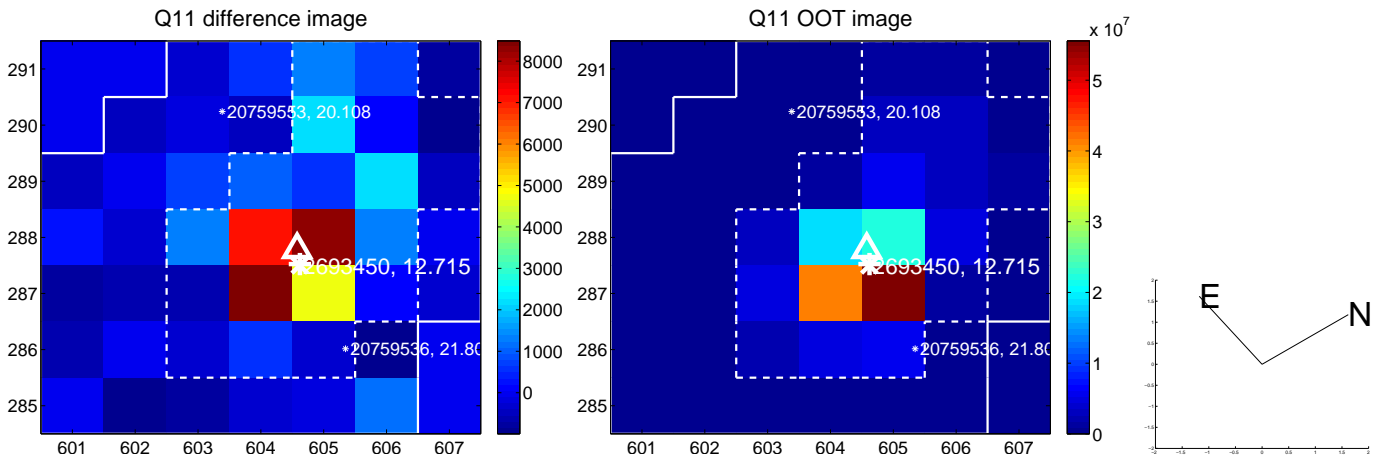
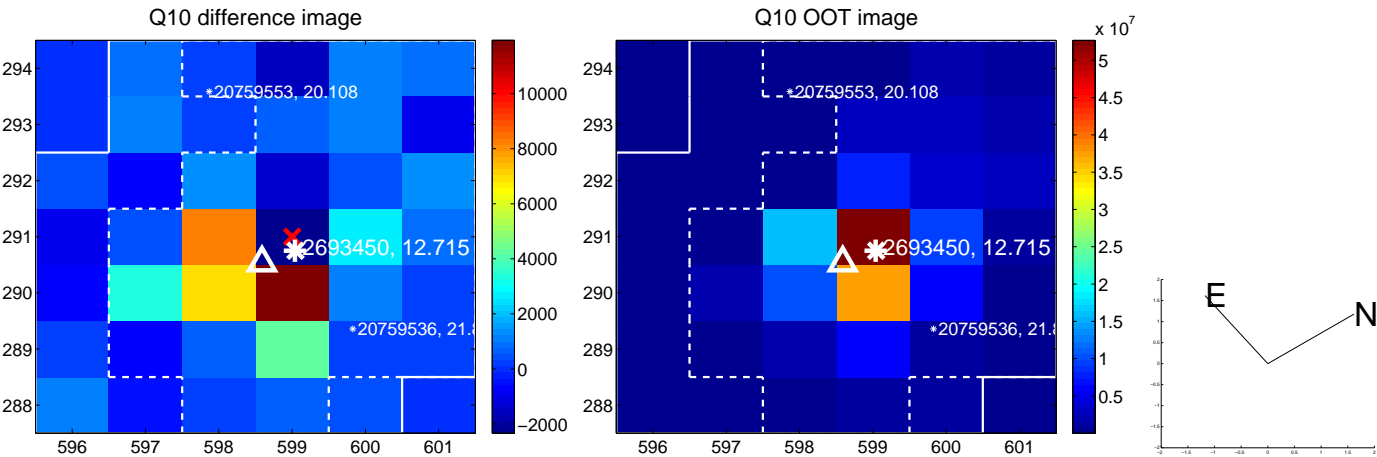
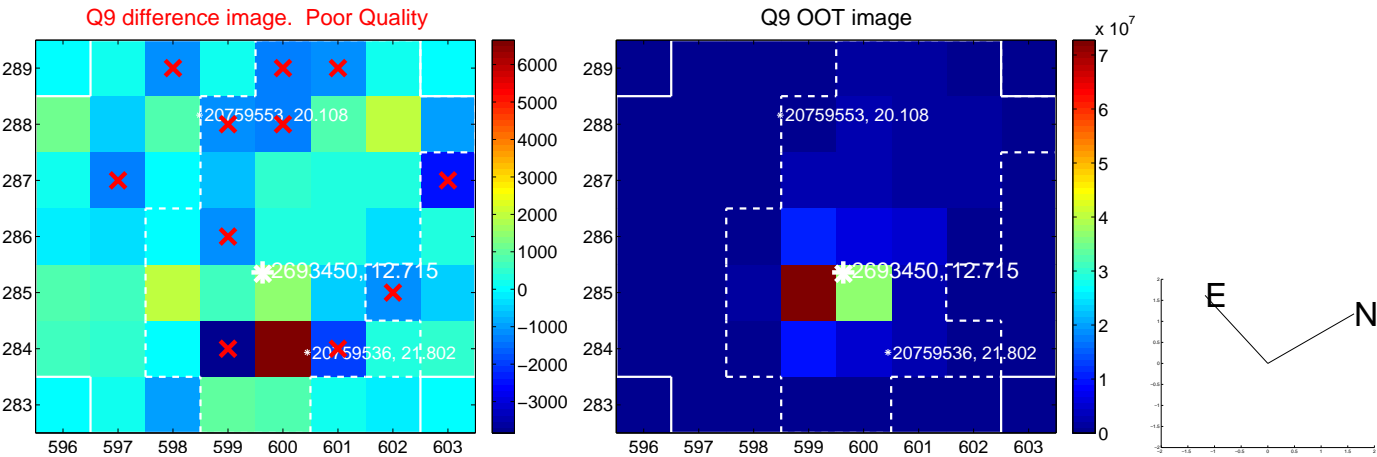
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



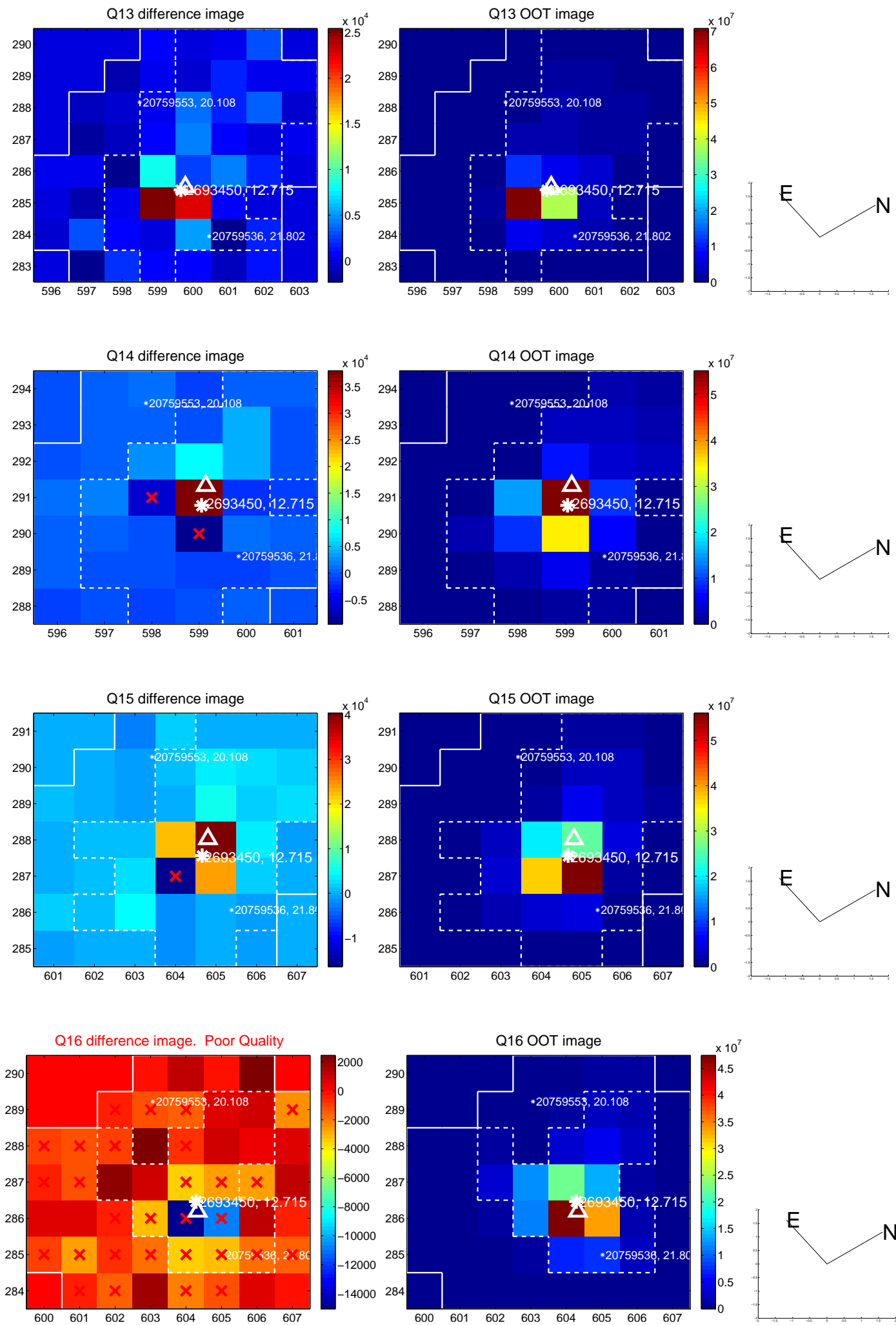
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

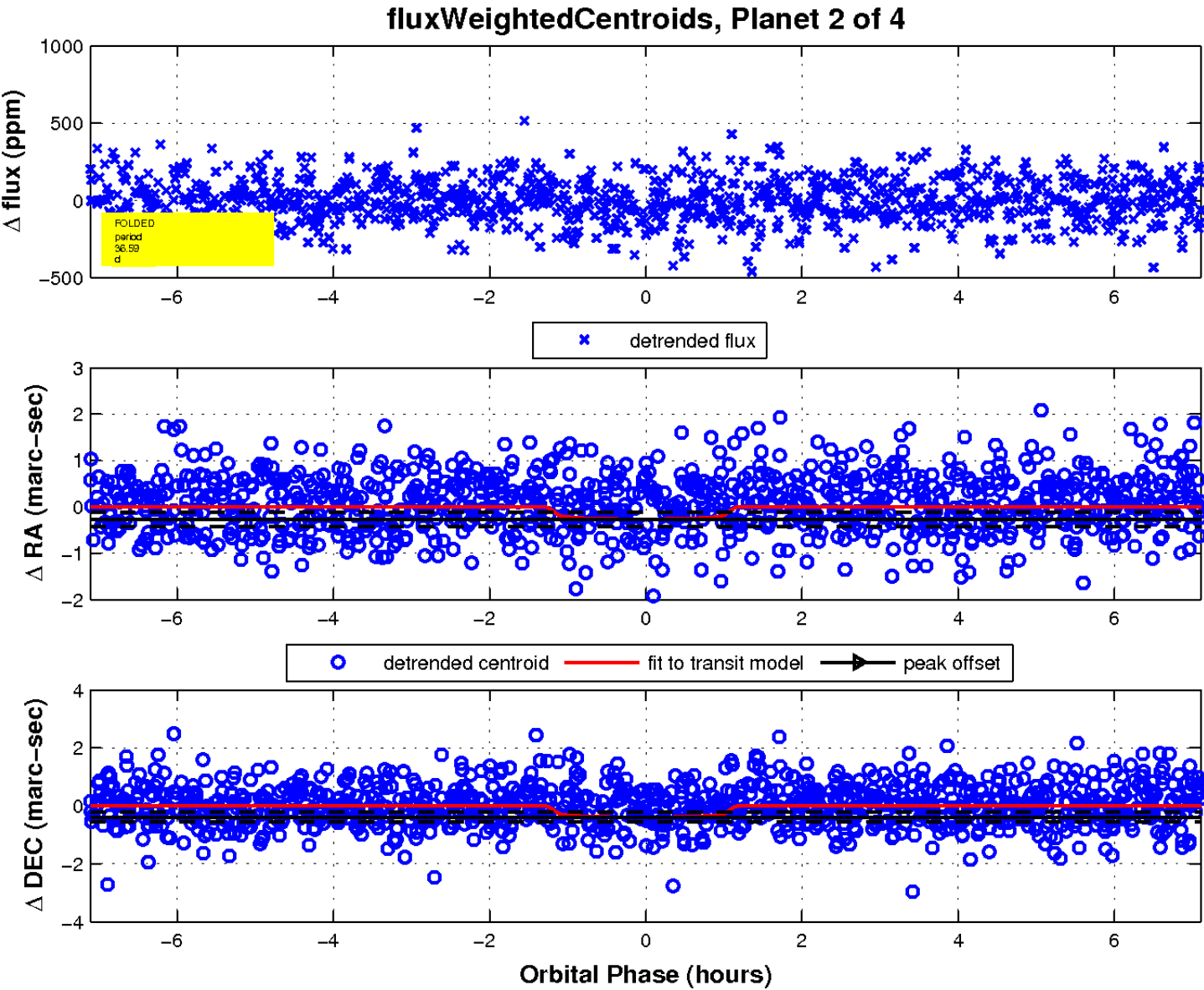
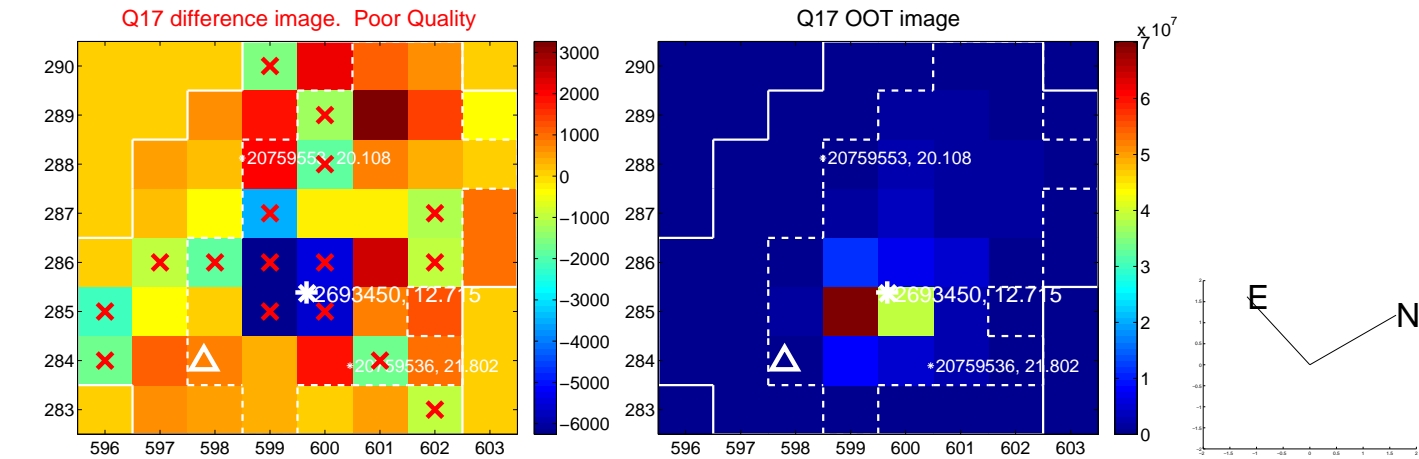


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



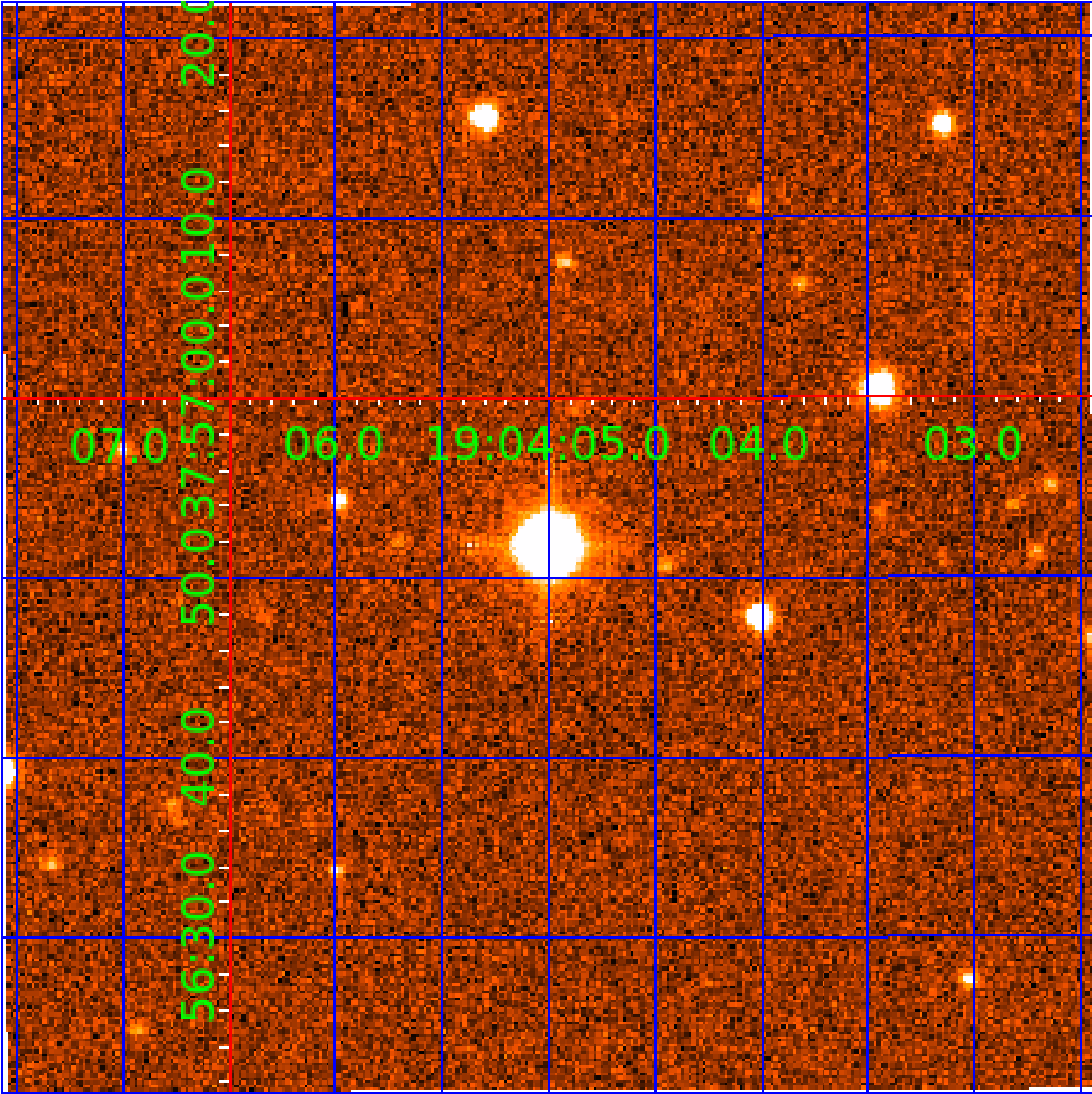


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 002693450

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
002693450-01	OBS	No	0.847675	131.773359	3.2	5.078	8.5	2.1	1.86	7262	0.35	22162.65
002693450-02	OBS	No	36.587899	136.578337	159.6	2.371	8.7	9.0	1.86	7262	2.64	146.38
002693450-03	OBS	No	37.529820	155.612259	59.4	0.819	8.3	2.0	1.86	7262	1.48	141.50
002693450-04	OBS	No	138.808551	188.521521	315.3	2.744	8.4	10.0	1.86	7262	3.79	24.74

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
002693450-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT
002693450-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002693450-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002693450-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_UNCERTAIN

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

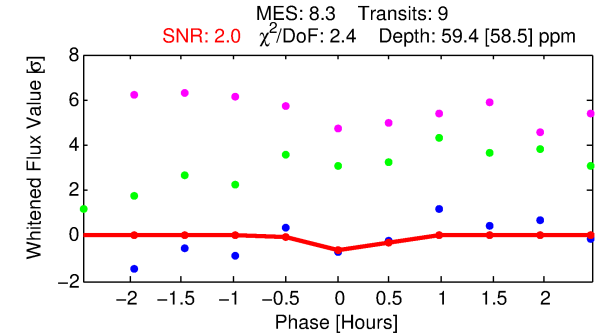
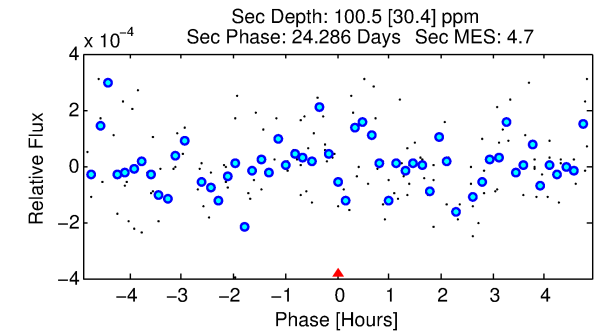
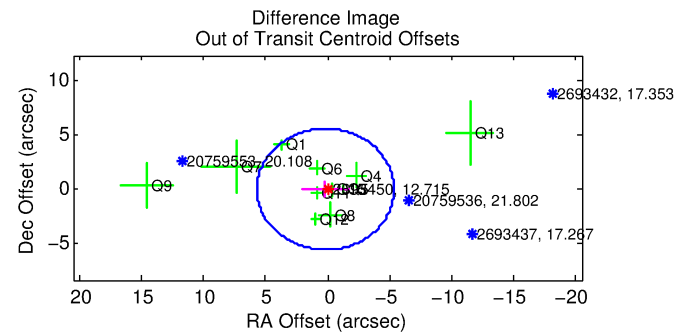
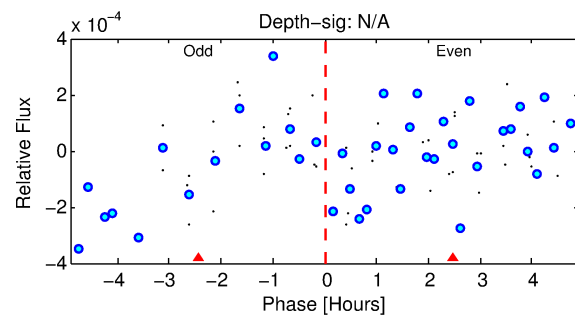
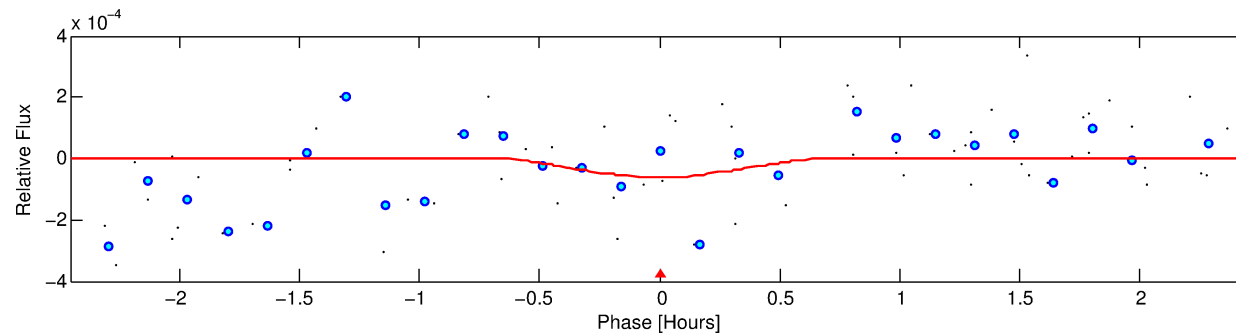
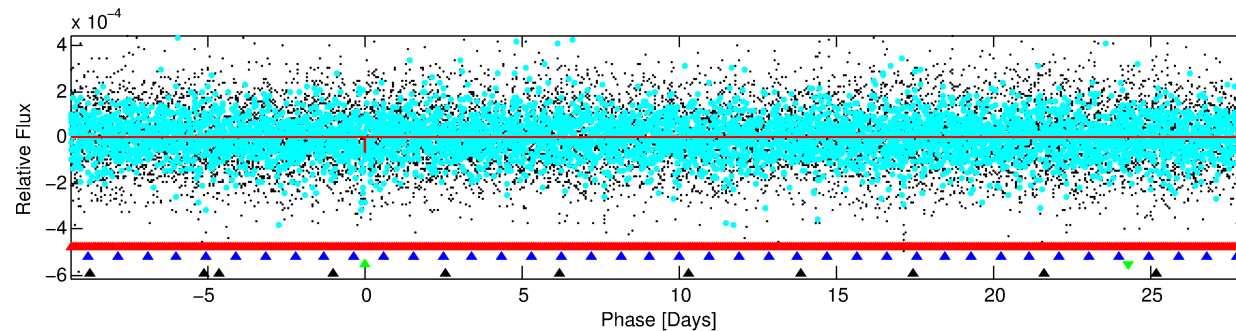
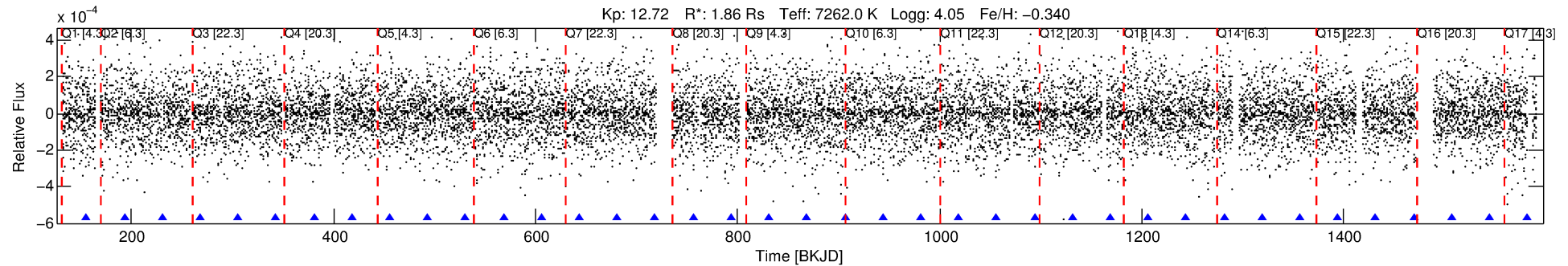
N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

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 002693450-03

No Significant Match Found

KIC: 2693450    Candidate: 3 of 4    Period: 37.530 d



DV Fit Results:

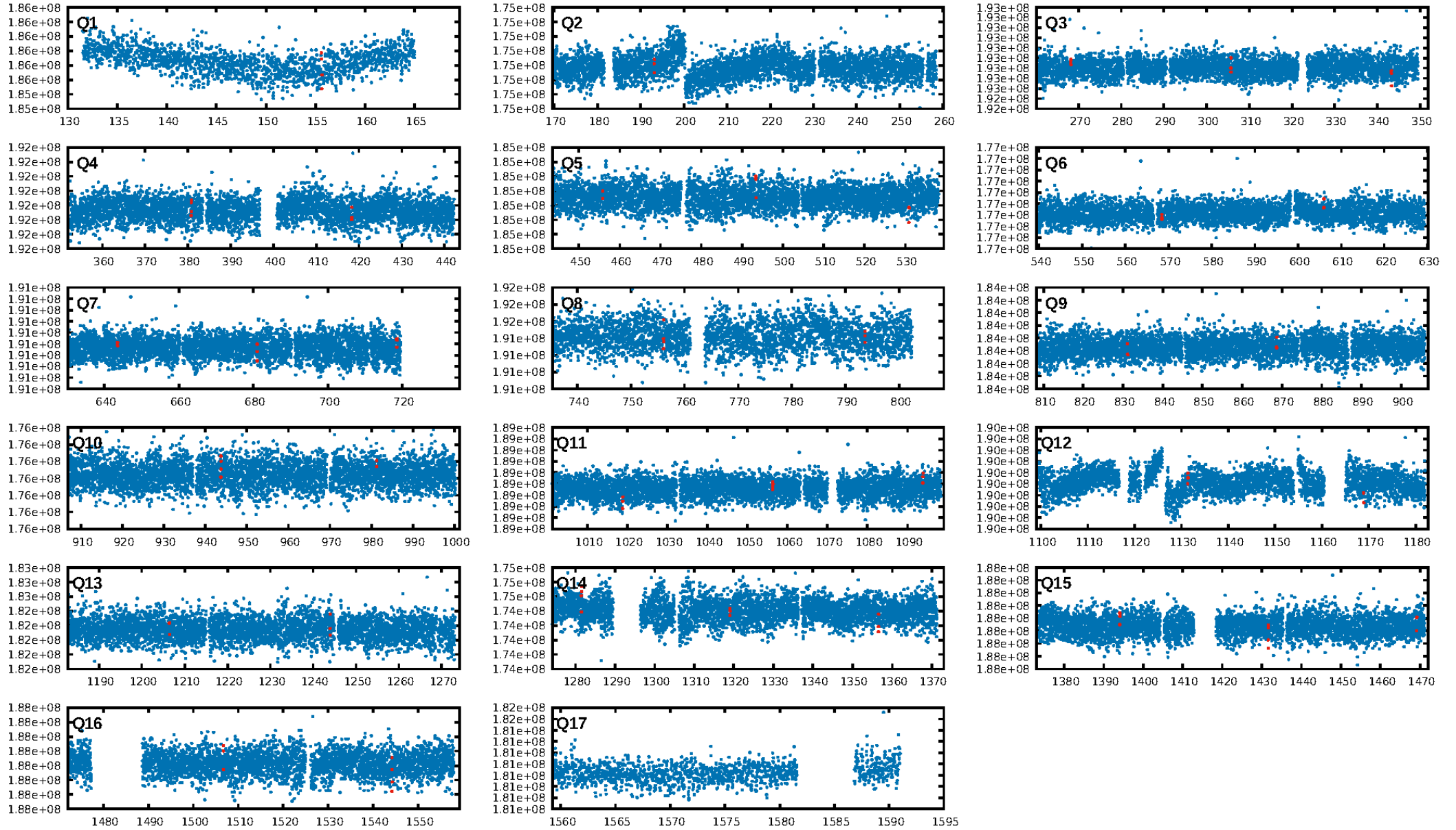
Period = 37.52982 [0.00124] d  
 Epoch = 155.6123 [0.0241] BKJD  
 Rp/R\* = 0.0073 [0.0648]  
 a/R\* = 343.65 [18166.92]  
 b = 0.23 [220.99]  
 Seff = 141.50 [58.56]  
 Teq = 879 [91] K  
 Rp = 1.48 [13.19] Re  
 a = 0.2472 [0.0617] AU  
 Ag = 1547.99 [27630.00] [0.06σ]  
 Teffp = 8529 [38052] K [0.20σ]

DV Diagnostic Results:

ShortPeriod-sig: 100.0% [9.01σ]  
LongPeriod-sig: 100.0% [848.69σ]  
ModelChiSquare2-sig: 0.2%  
ModelChiSquareGof-sig: 14.0%  
Bootstrap-pfa: 1.65e-08  
RollingBand-fgt: 1.00 [9/9]  
GhostDiagnostic-chr: -3.64

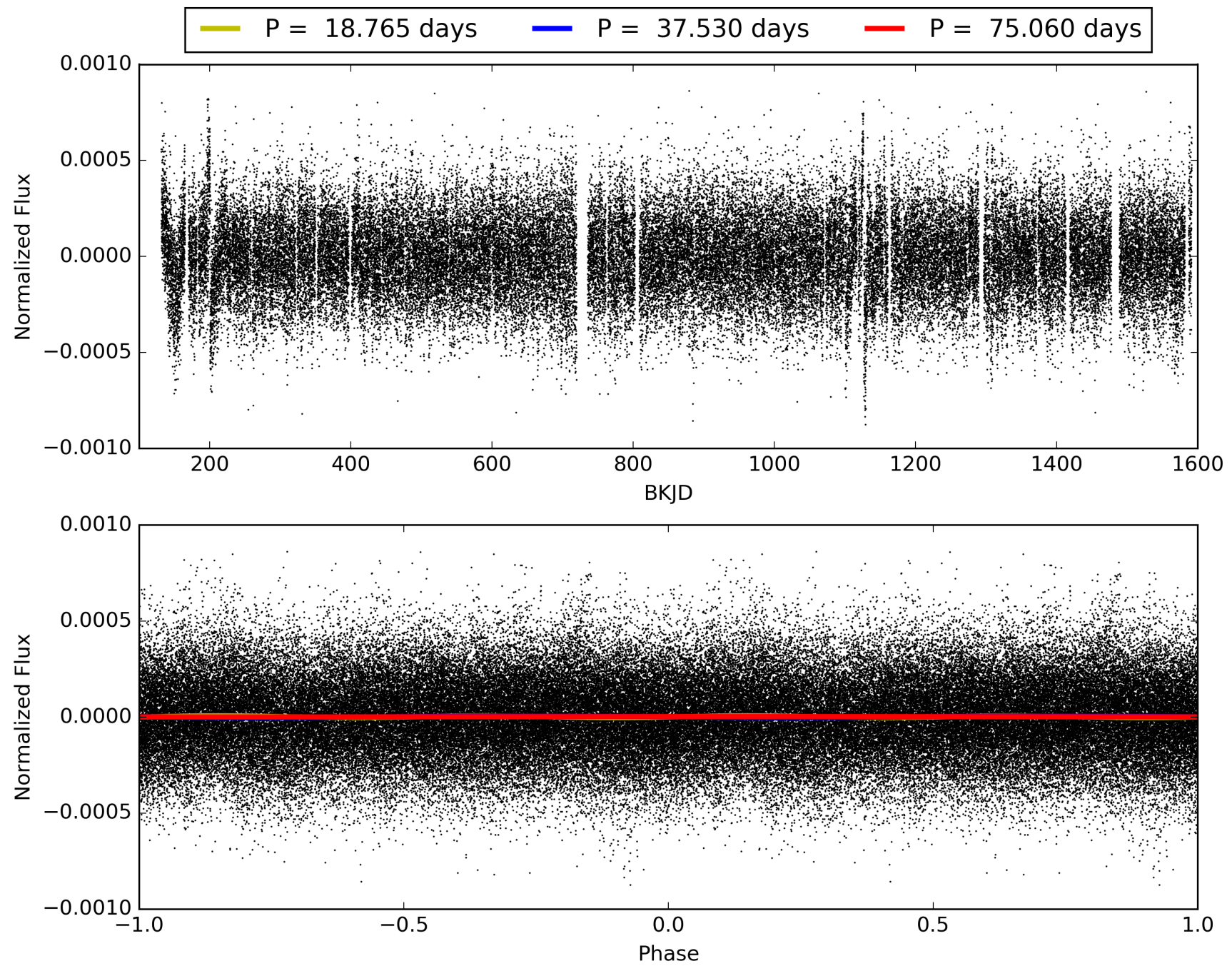
Centroid-sig: 37.8%  
Centroid-so: 3.849 arcsec [0.86σ]  
OotOffset-rm: 0.174 arcsec [0.09σ]  
KicOffset-rm: 0.231 arcsec [0.12σ]  
OotOffset-st: 1/3/3/4 [11]  
KicOffset-st: 1/3/3/4 [11]  
DiffImageQuality-fgm: 0.36 [4/11]  
DiffImageOverlap-fno: 0.44 [7/16]

# TCE 002693450-03, PDC Light Curves





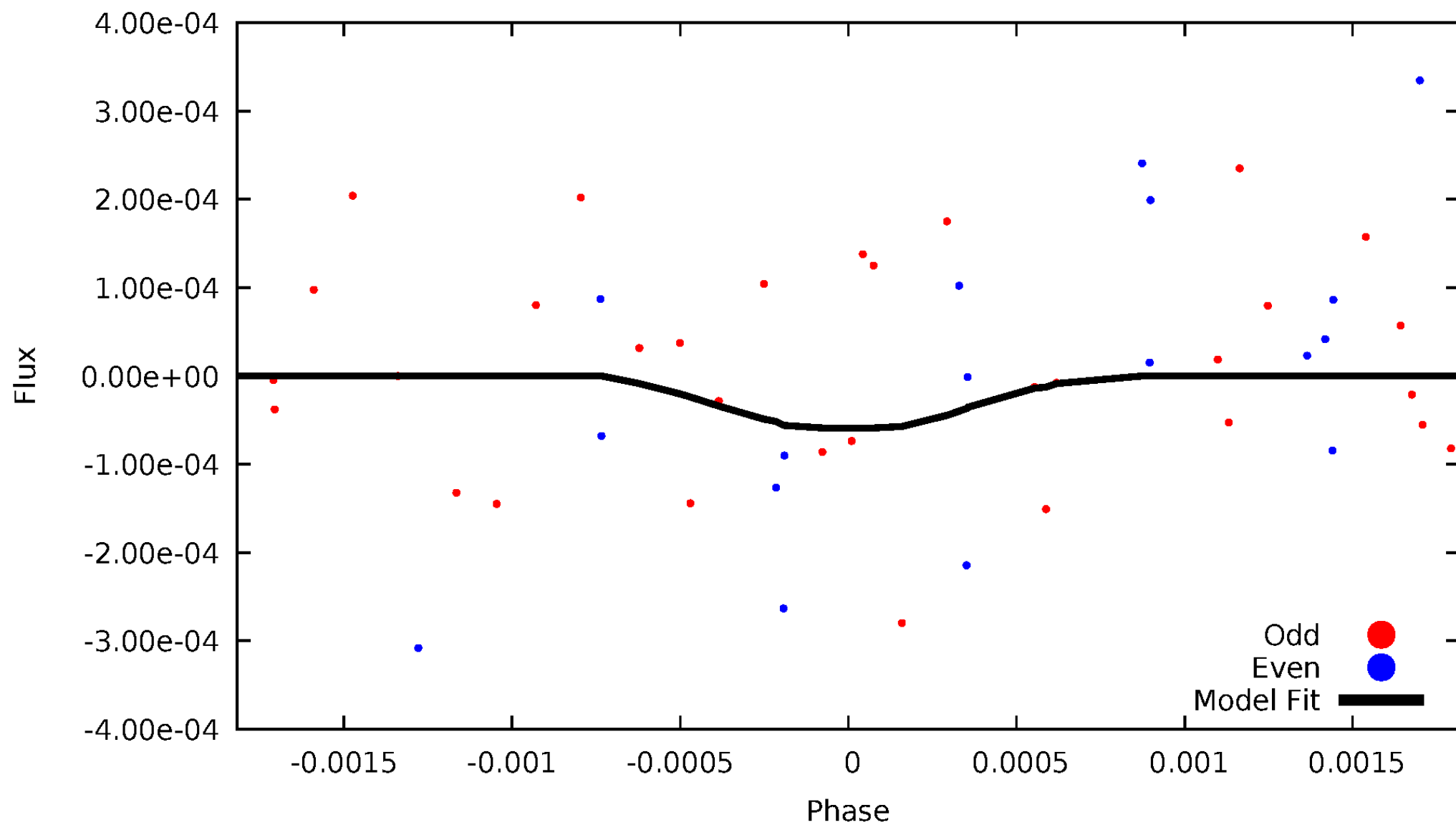
TCE 002693450-03





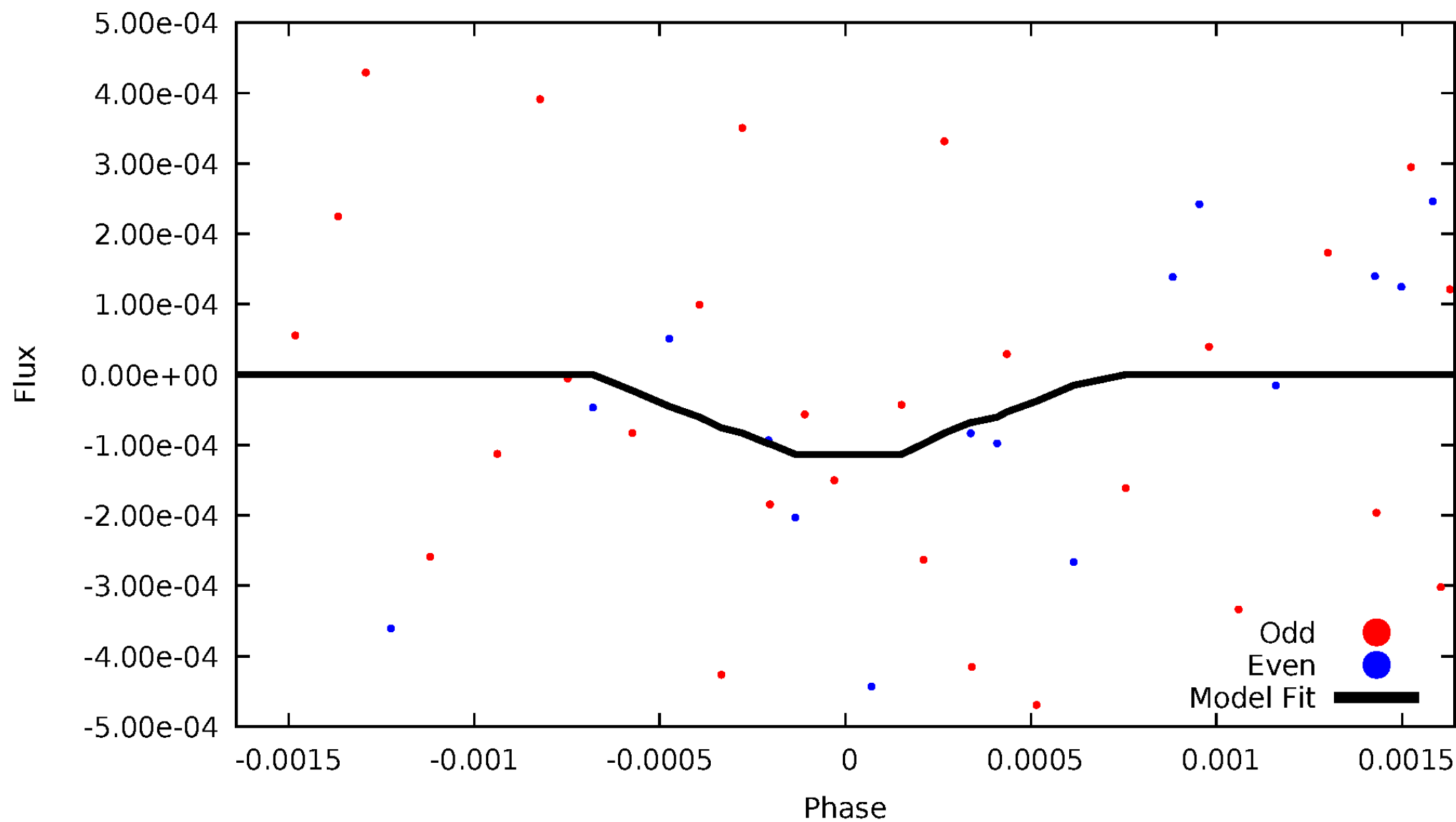
# DV Odd/Even

TCE 002693450-03



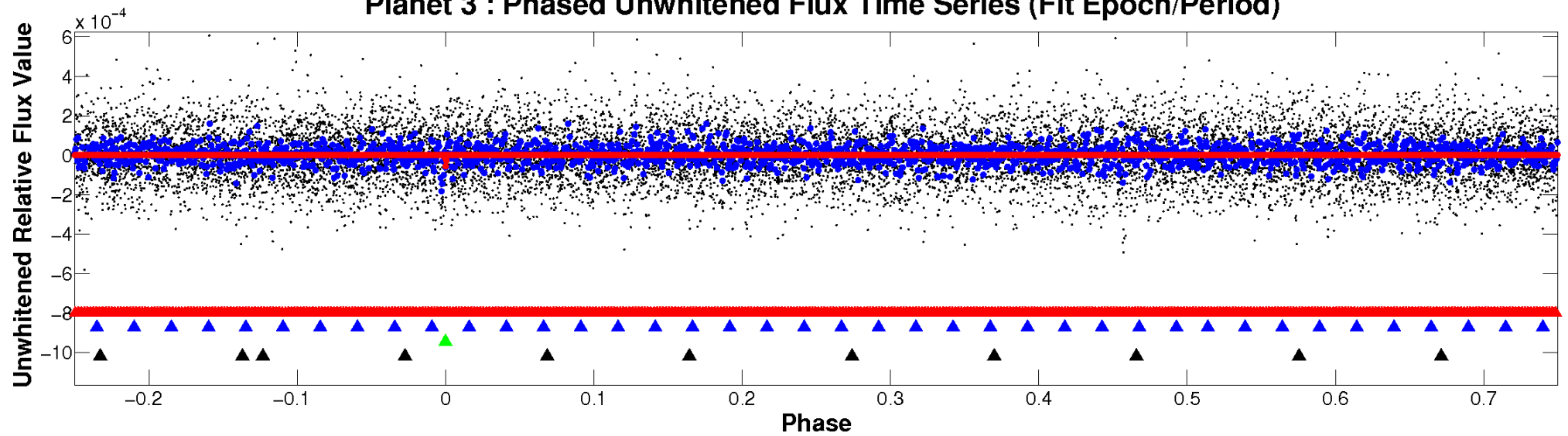
# ALT Odd/Even

TCE 002693450-03

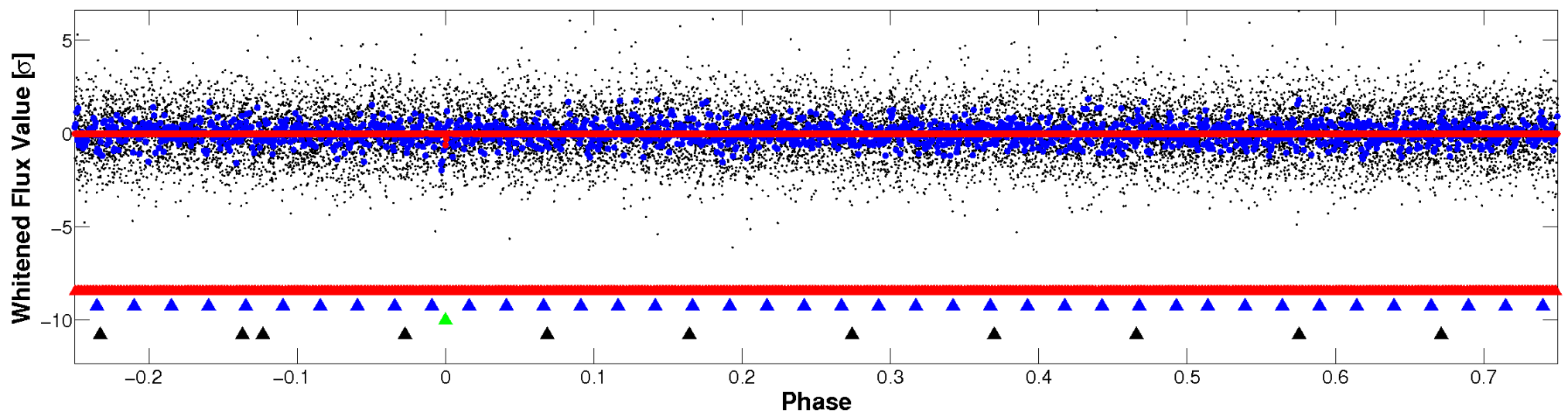


# Non-Whitened Vs. Whitened Light Curve

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

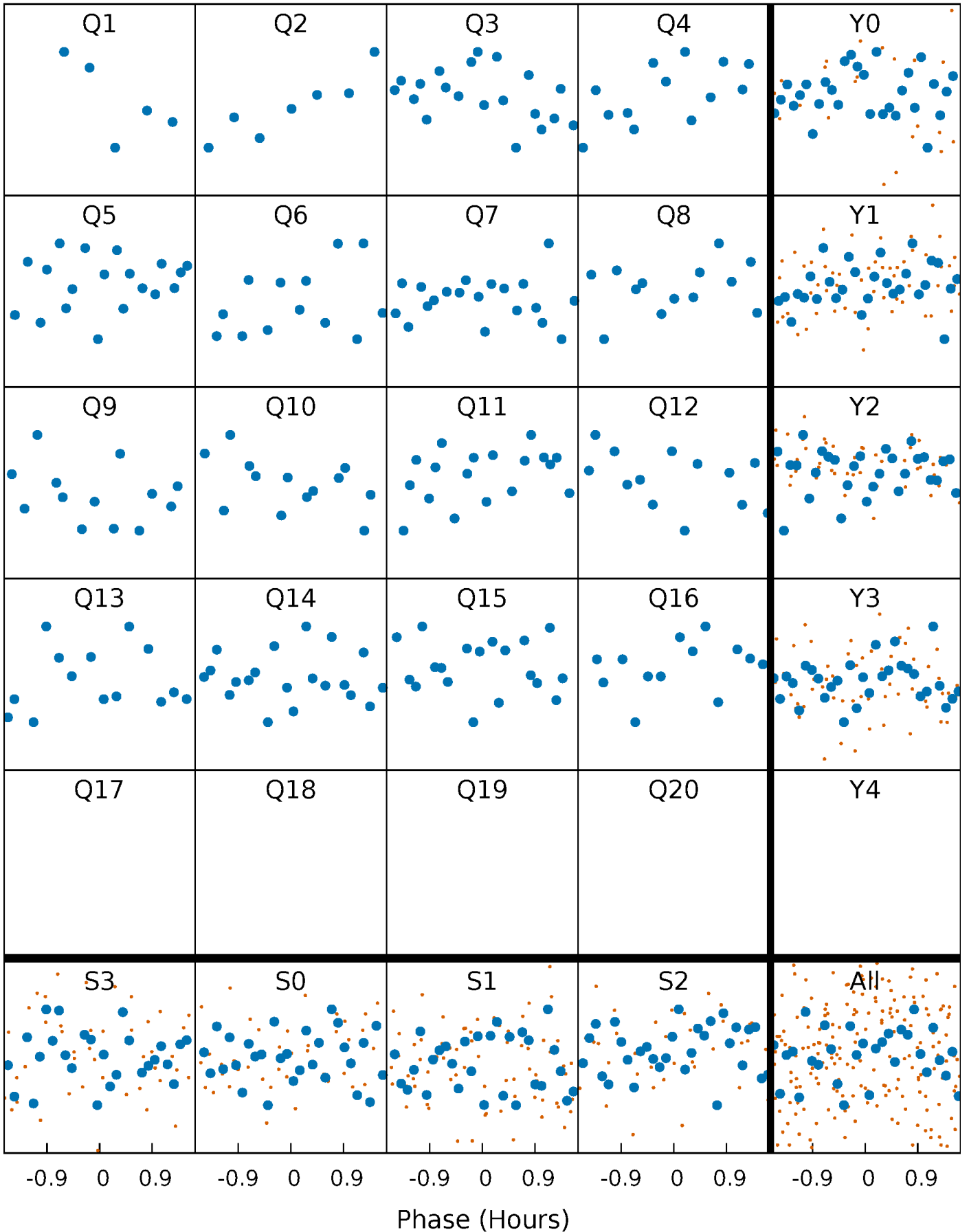


Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



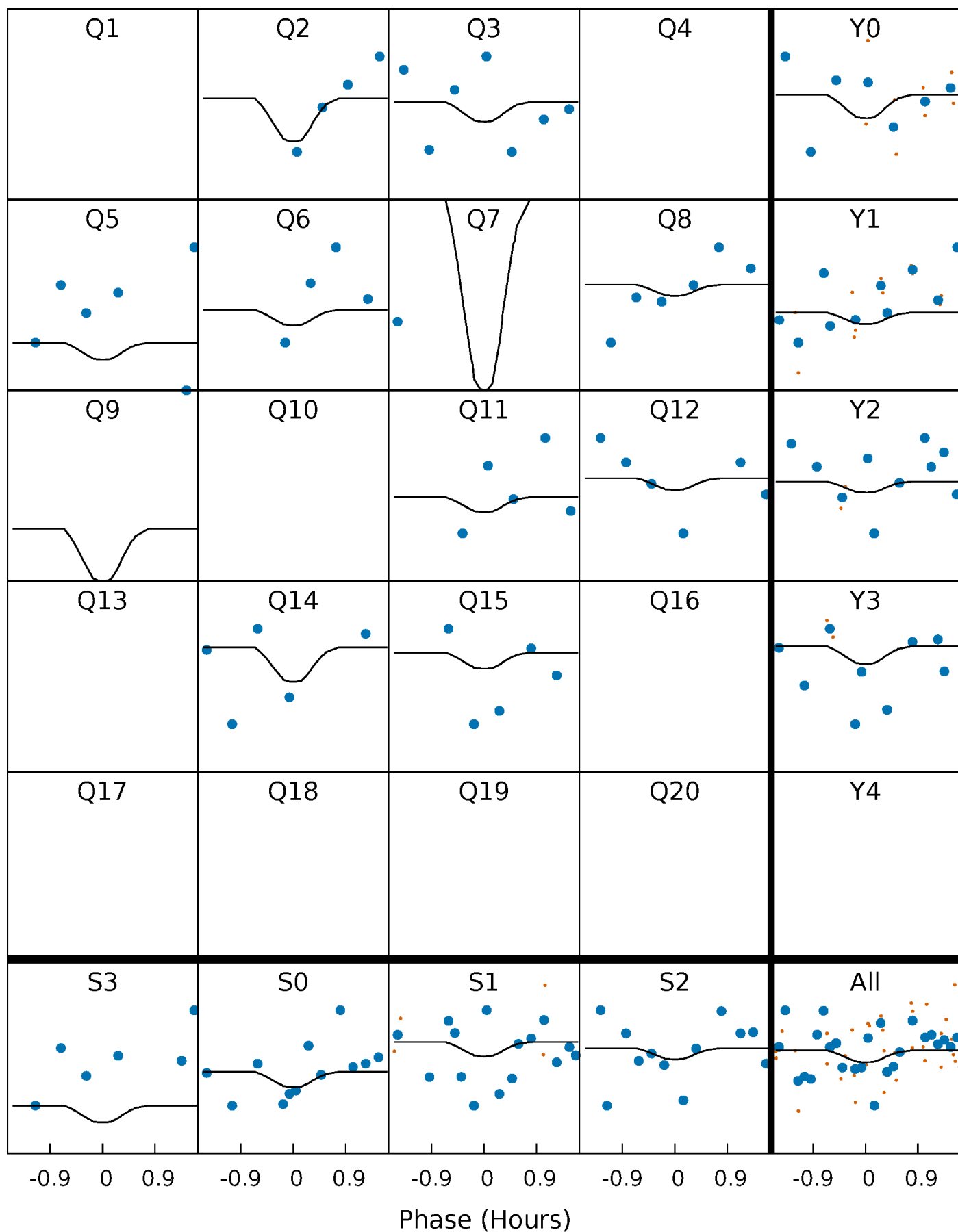
# PDC Quarter-Phased Transit Curves

TCE 002693450-03   P= 37.529820 Days    $T_0=155.612259$  (BKJD)



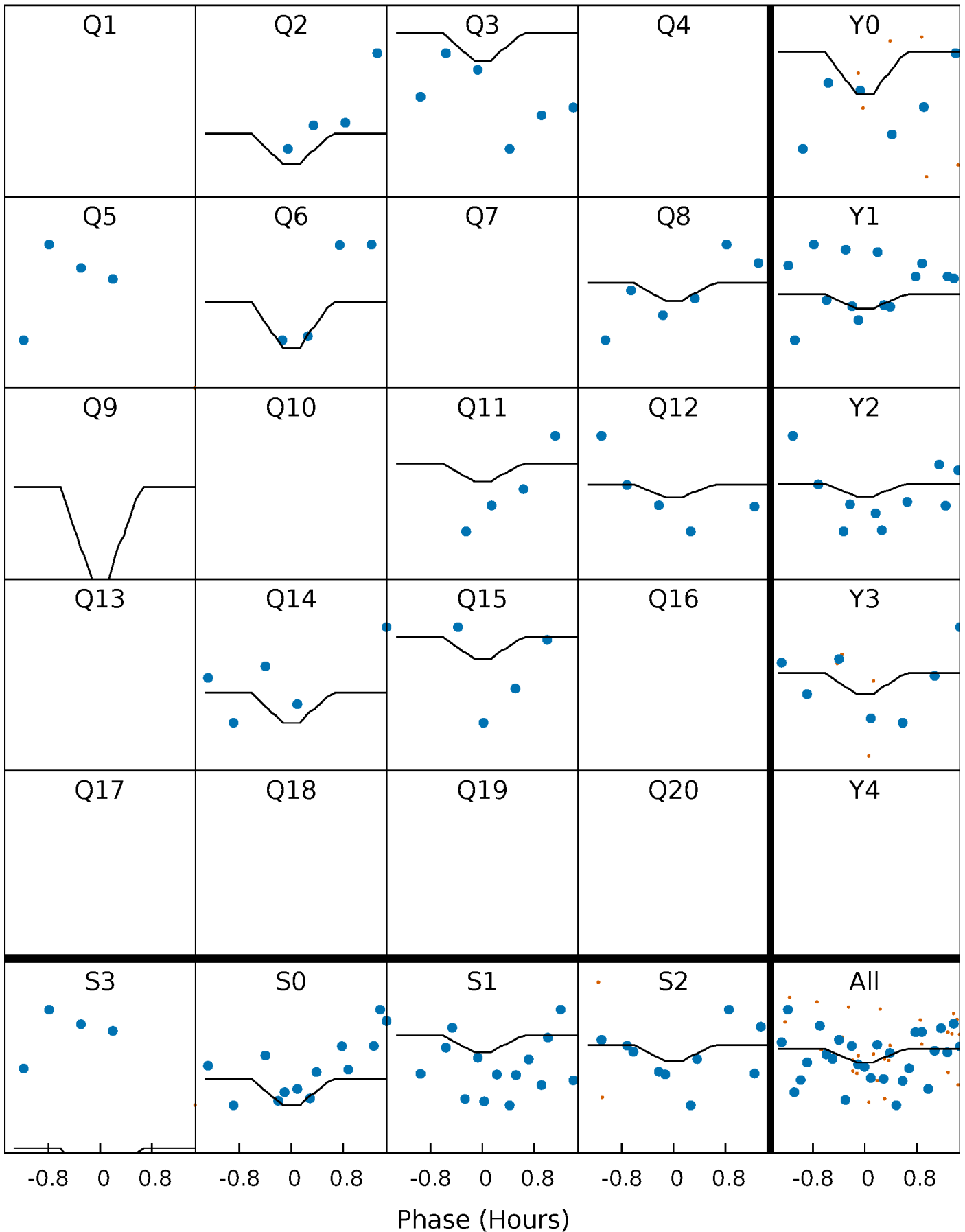
# DV Quarter-Phased Transit Curves

TCE 002693450-03     $P = 37.529820$  Days     $T_0 = 155.612259$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 002693450-03 P= 37.529385 Days  $T_0=155.617180$  (BKJD)

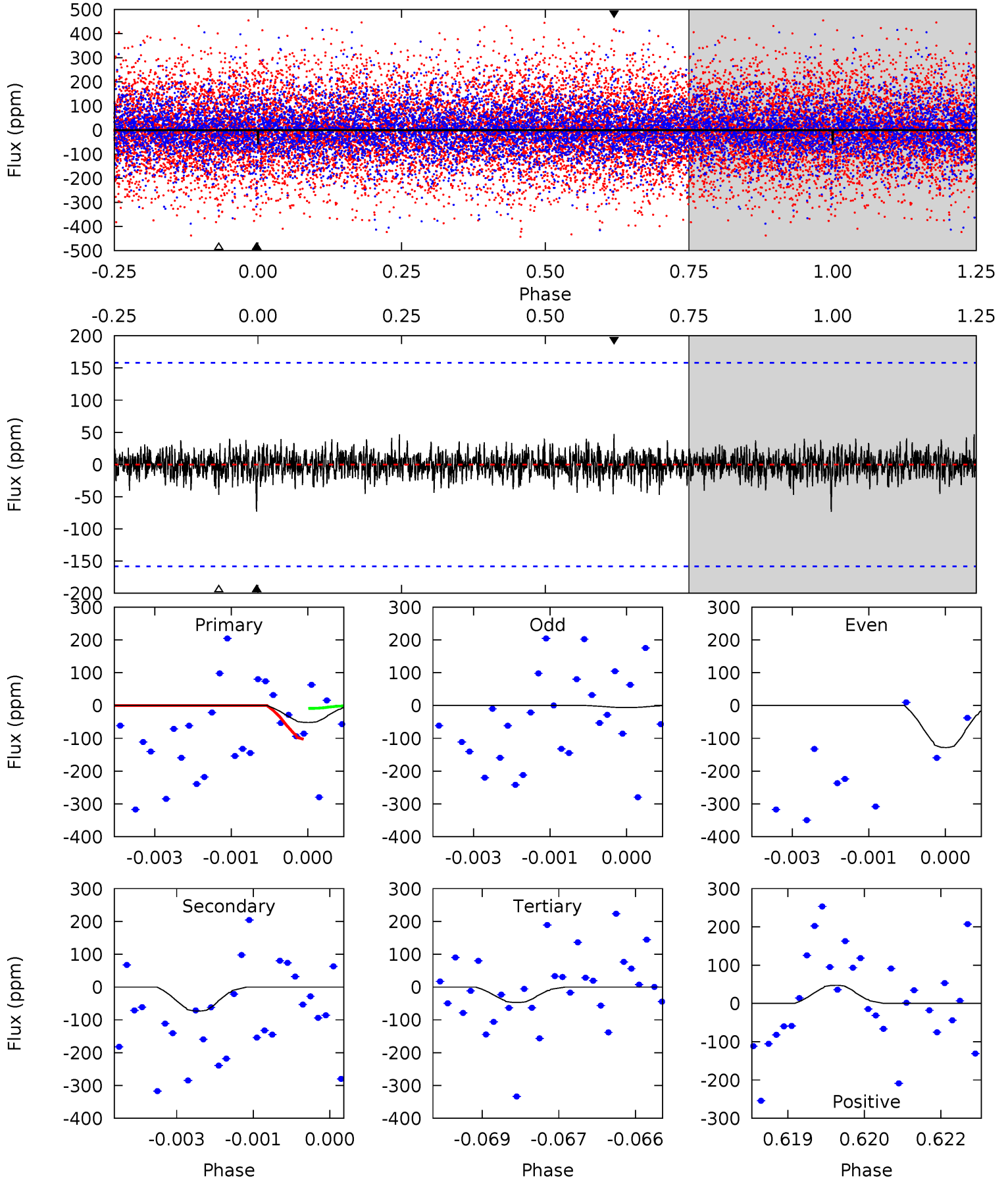




# DV Model-Shift Uniqueness Test

002693450-03, P = 37.529820 Days, E = 118.082439 Days

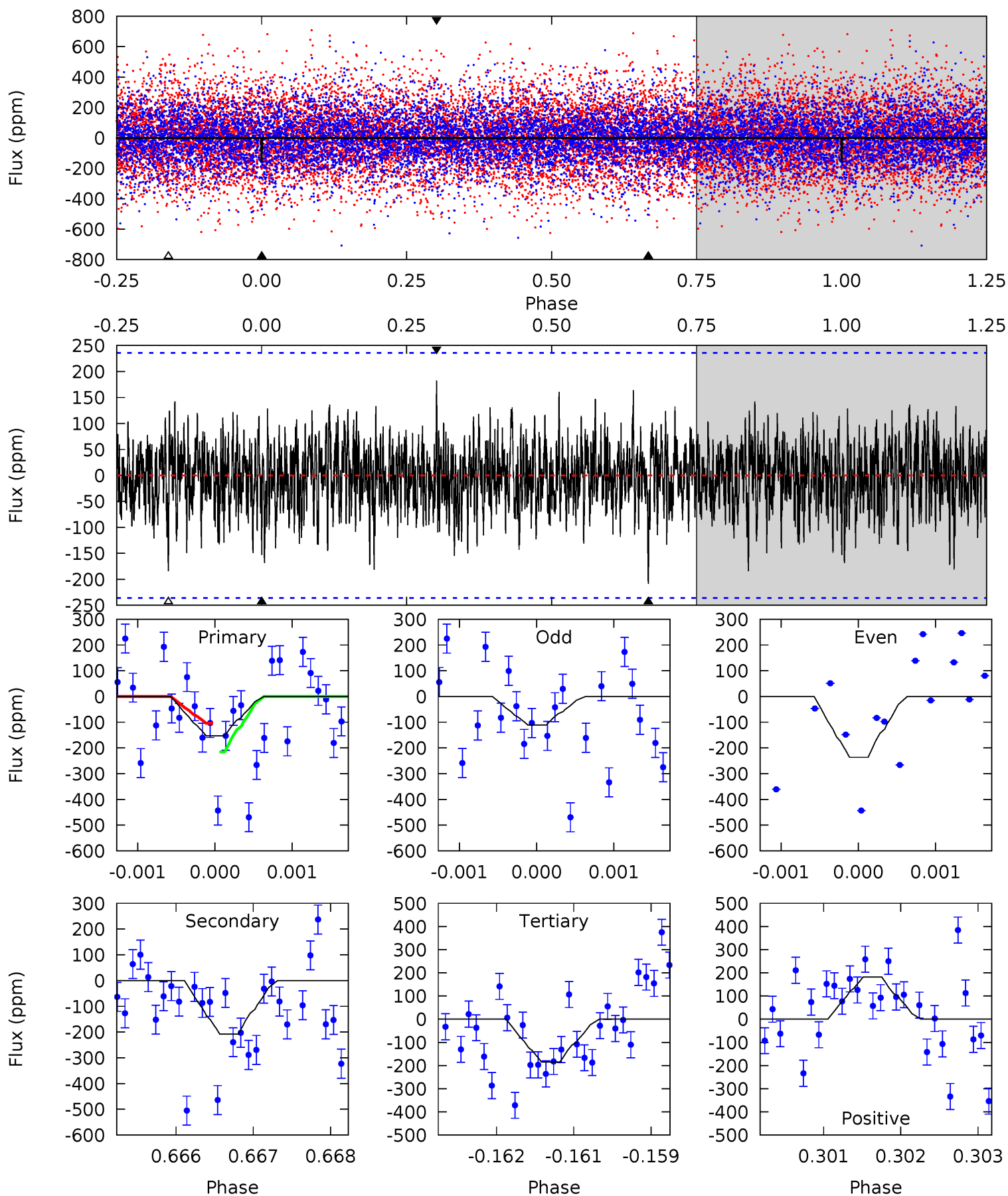
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
1.77	2.49	1.60	1.62	5.39	3.20	0.48	0.17	0.15	0.89	0.88	1.96	0.73	0.39	1.56



# Alt Model-Shift Uniqueness Test

002693450-03, P = 37.529385 Days, E = 118.087795 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
3.51	4.79	4.24	4.19	5.42	3.24	1.20	-0.72	-0.68	0.55	0.60	1.44	0.75	0.47	1.29



### Stellar Parameters For KIC 002693450

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7262^{+228}_{-304}$	$4.053^{+0.214}_{-0.156}$	$-0.340^{+0.250}_{-0.350}$	$1.863^{+0.525}_{-0.525}$	$1.428^{+0.204}_{-0.249}$	$0.311^{+0.409}_{-0.144}$
	+3%/-4%	+5%/-4%	+74%/-103%	+28%/-28%	+14%/-17%	+131%/-46%
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 002693450-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-73 \pm 29$	$10.13^{+10.65}_{-7.02}$	$1214^{+97}_{-99}$	$3415^{+1786}_{-699}$	$24^{+209}_{-19}$
Alt.	$-208 \pm 44$	$9.79^{+10.79}_{-6.97}$	$1214^{+96}_{-91}$	$4046^{+3193}_{-804}$	$68^{+801}_{-52}$

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

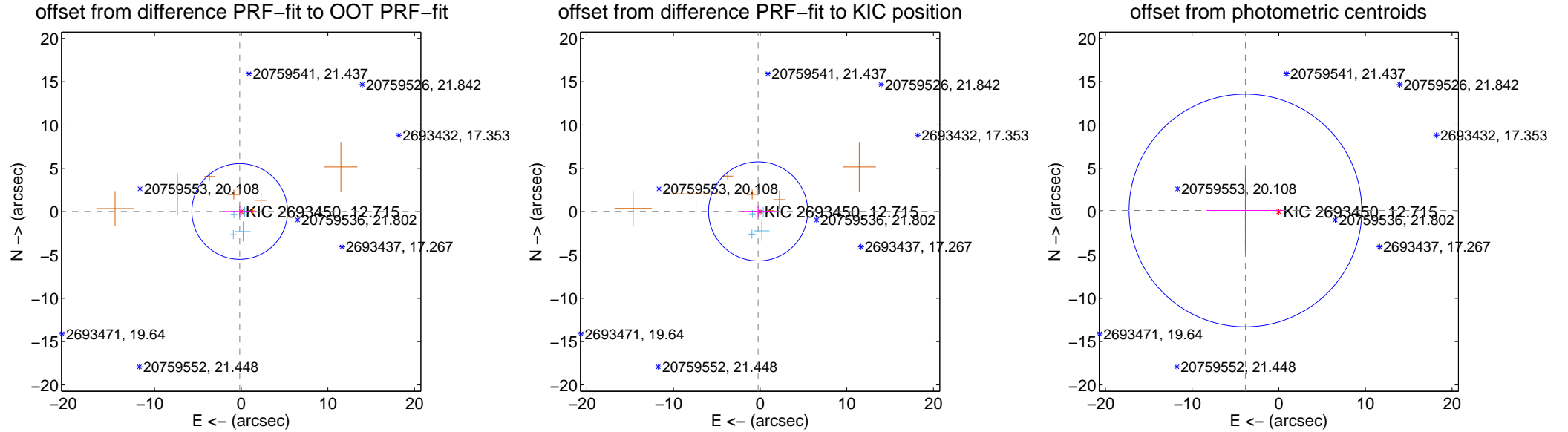
## DV Centroid Data

Supplemental centroid analysis for 002693450-03. Kepler magnitude: 12.71. Transit SNR 1.95

There are 4 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.04 arcsec

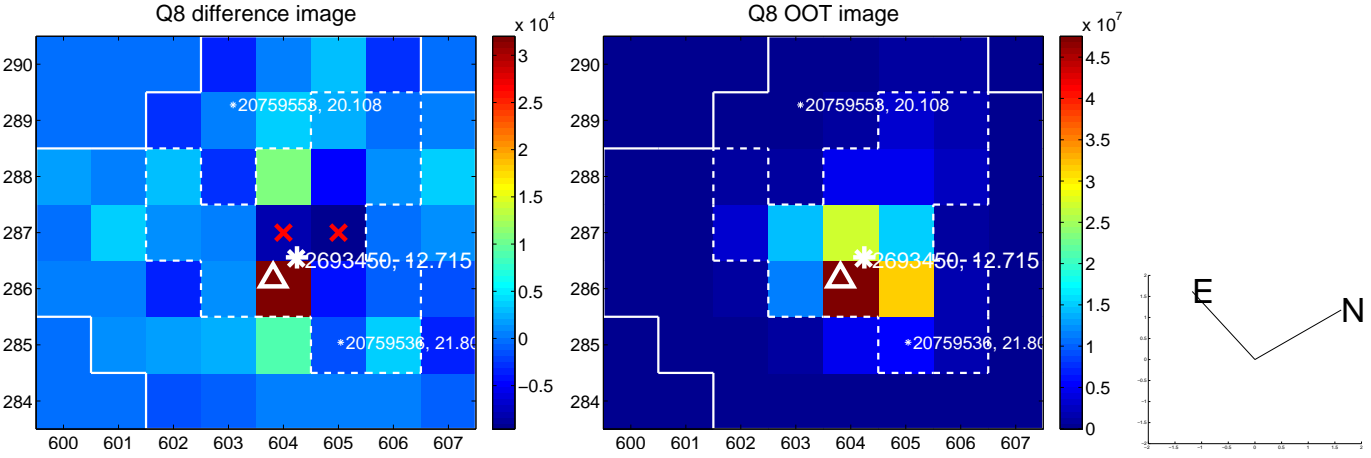
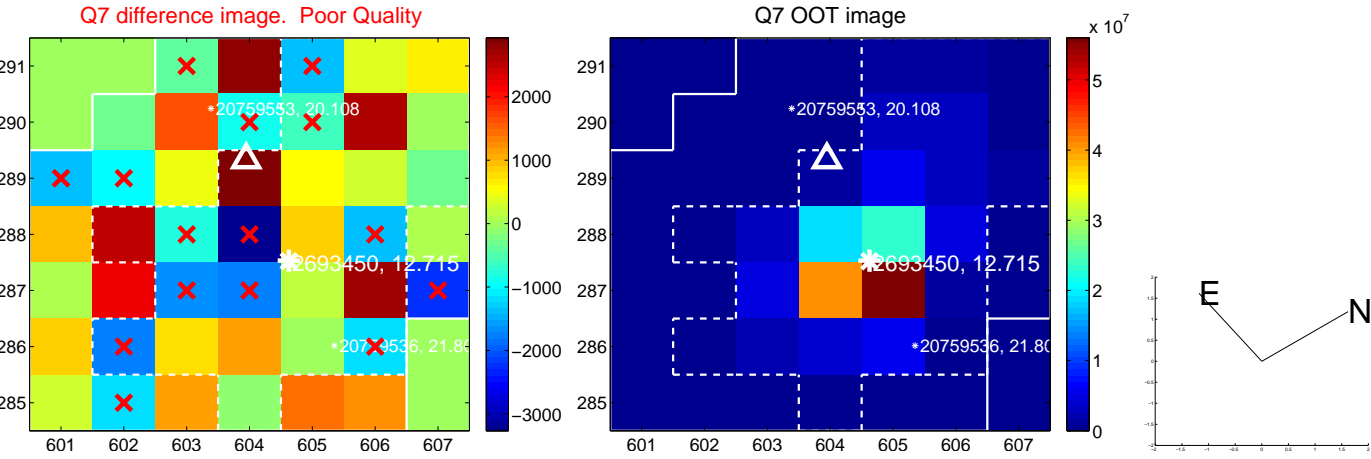
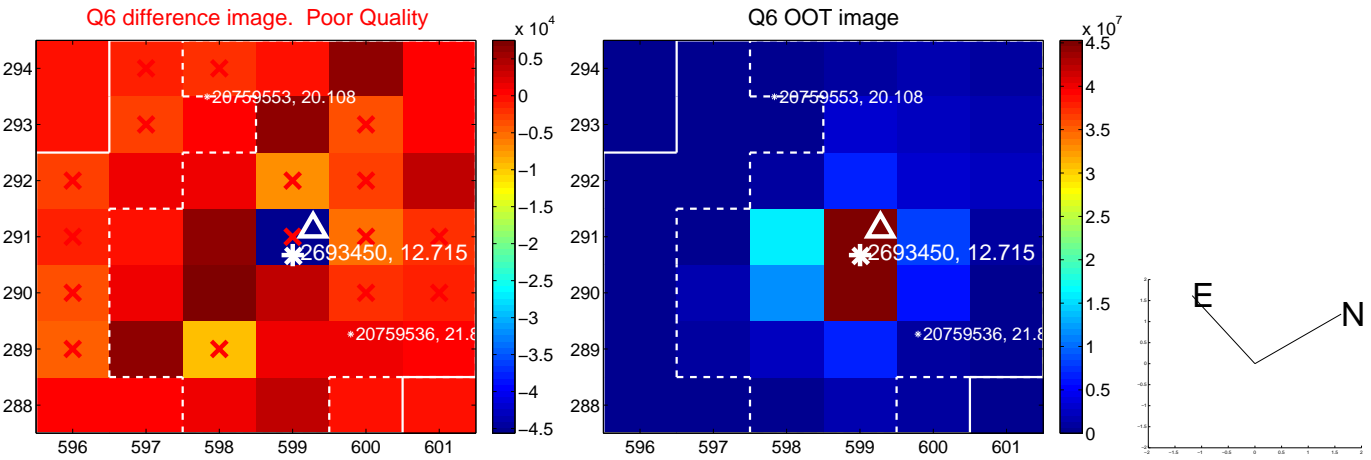
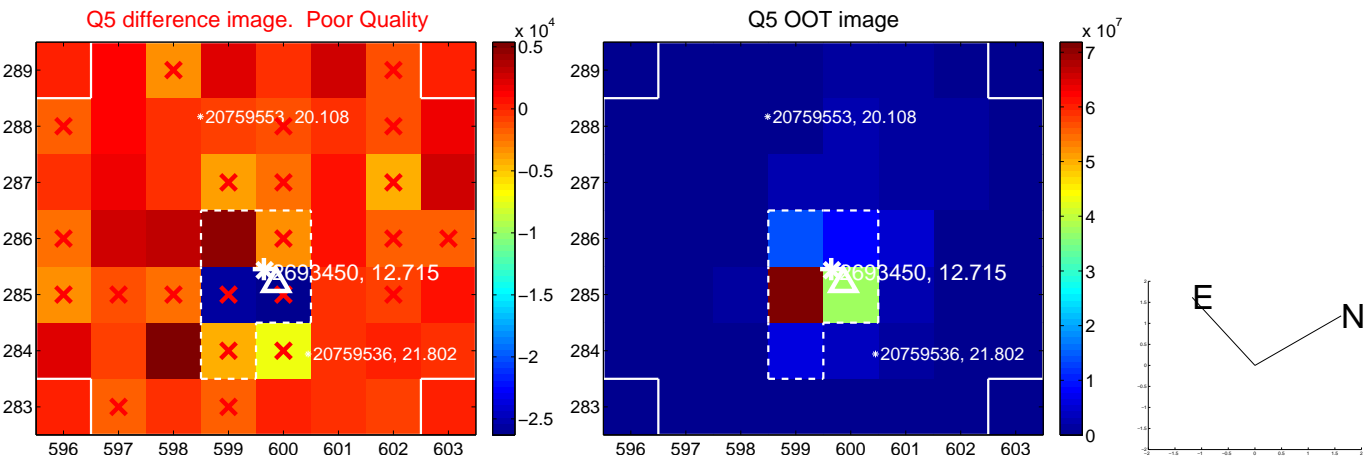
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.174 \pm 1.841$	0.09	$0.173 \pm 1.890$	$0.026 \pm 0.700$
PRF-fit source offset from KIC position	$0.231 \pm 1.907$	0.12	$0.229 \pm 1.959$	$0.032 \pm 0.680$
photometric centroid source offset	$3.85 \pm 4.48$	0.86	$3.85 \pm 4.48$	$0.14 \pm 4.71$



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.

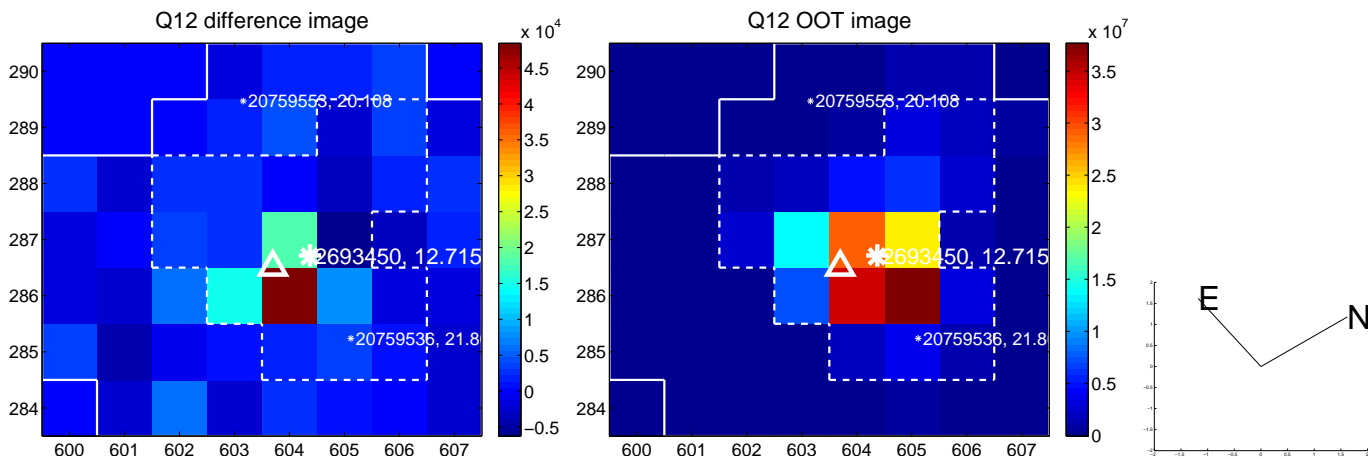
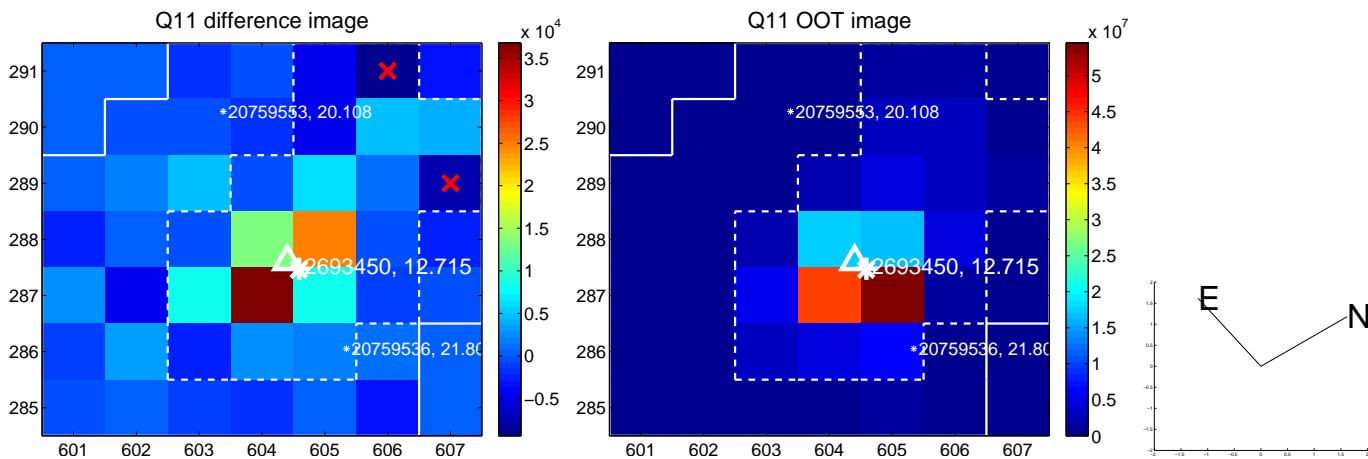
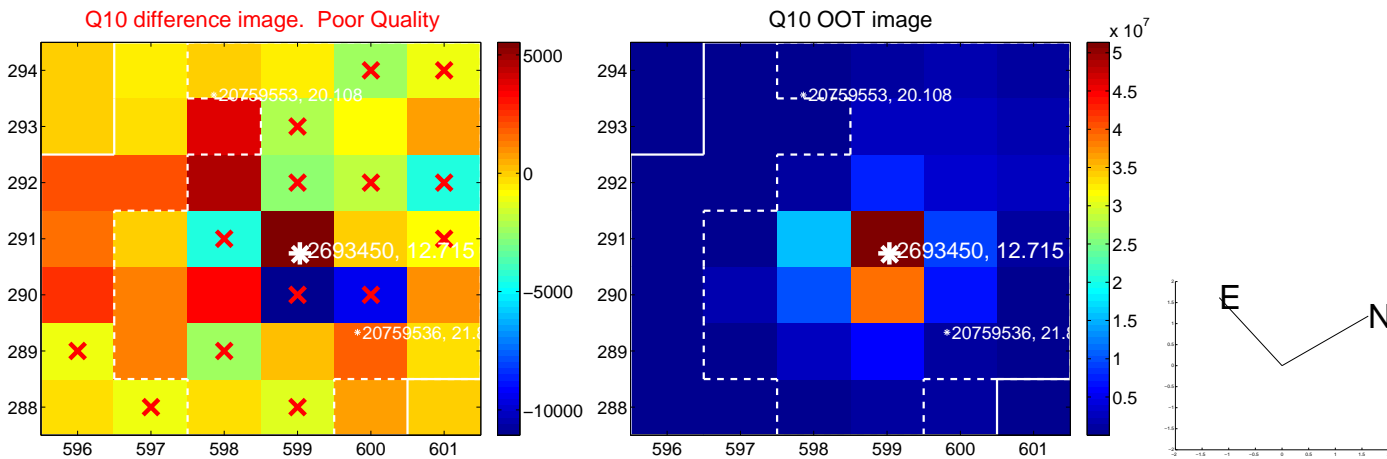
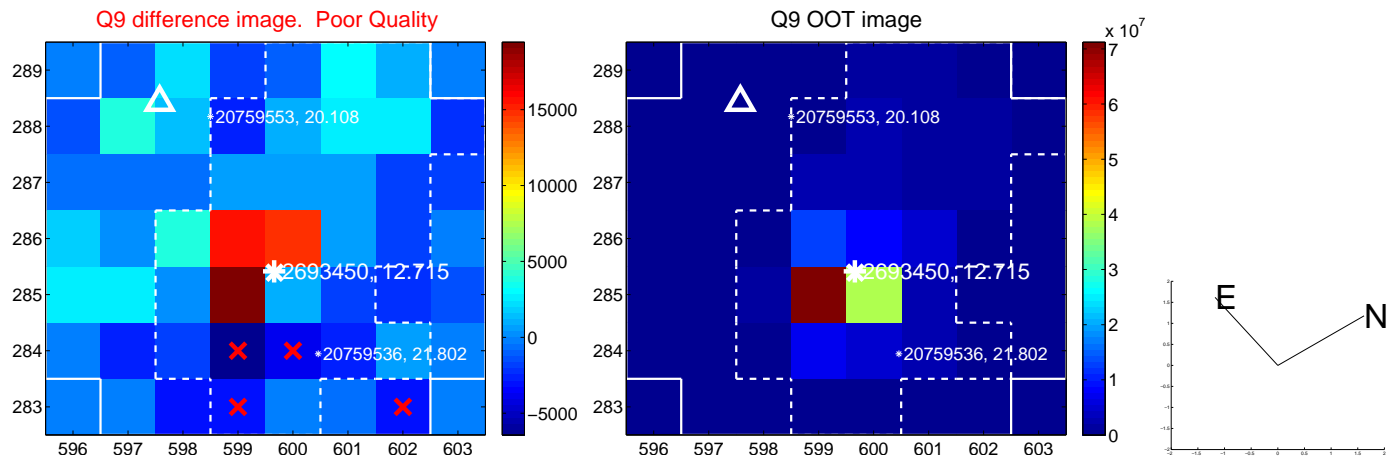


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

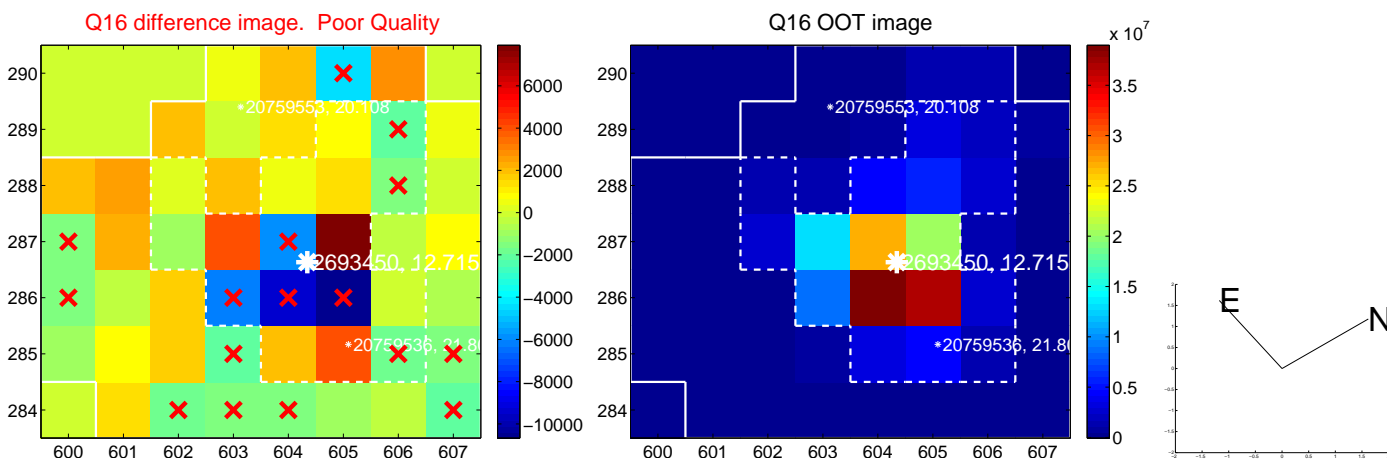
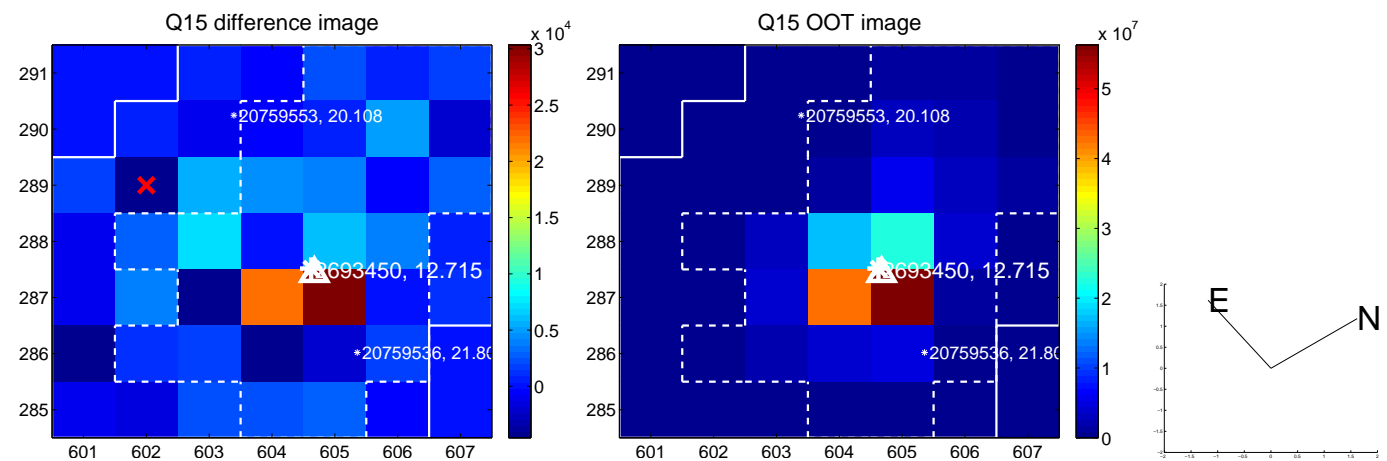
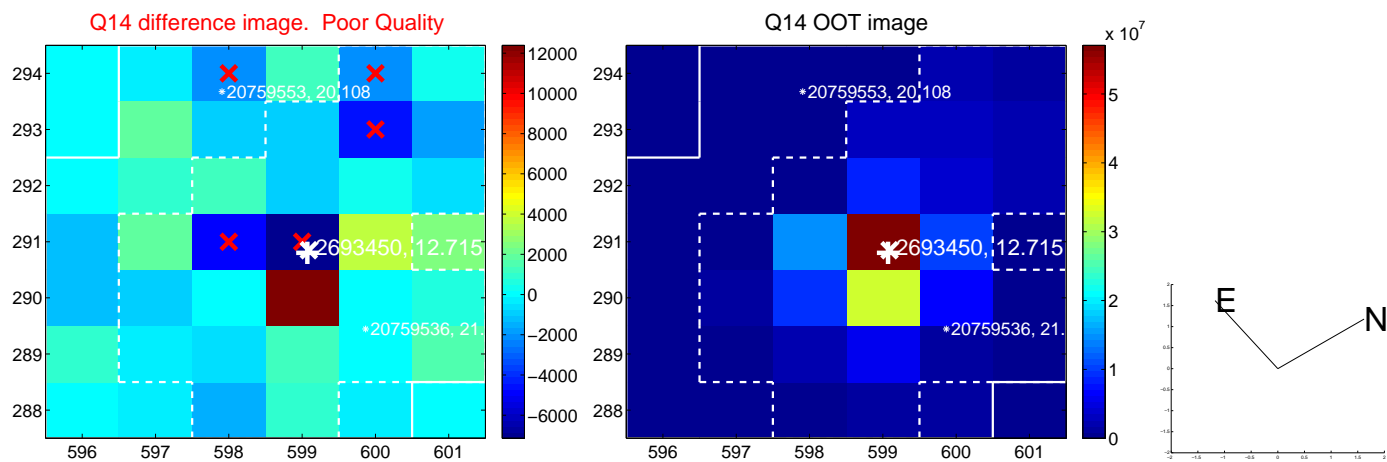
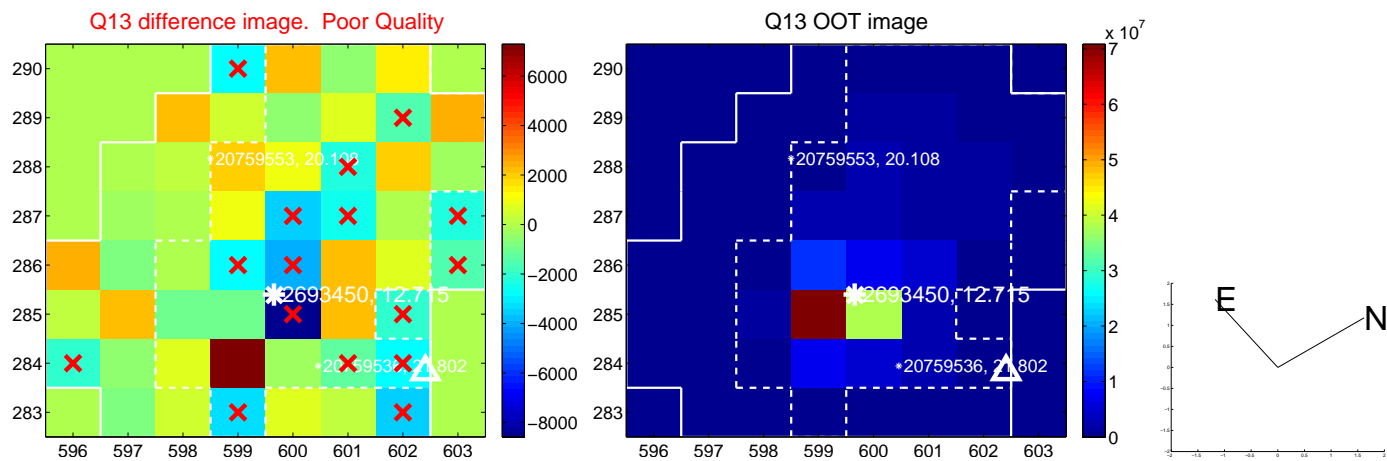




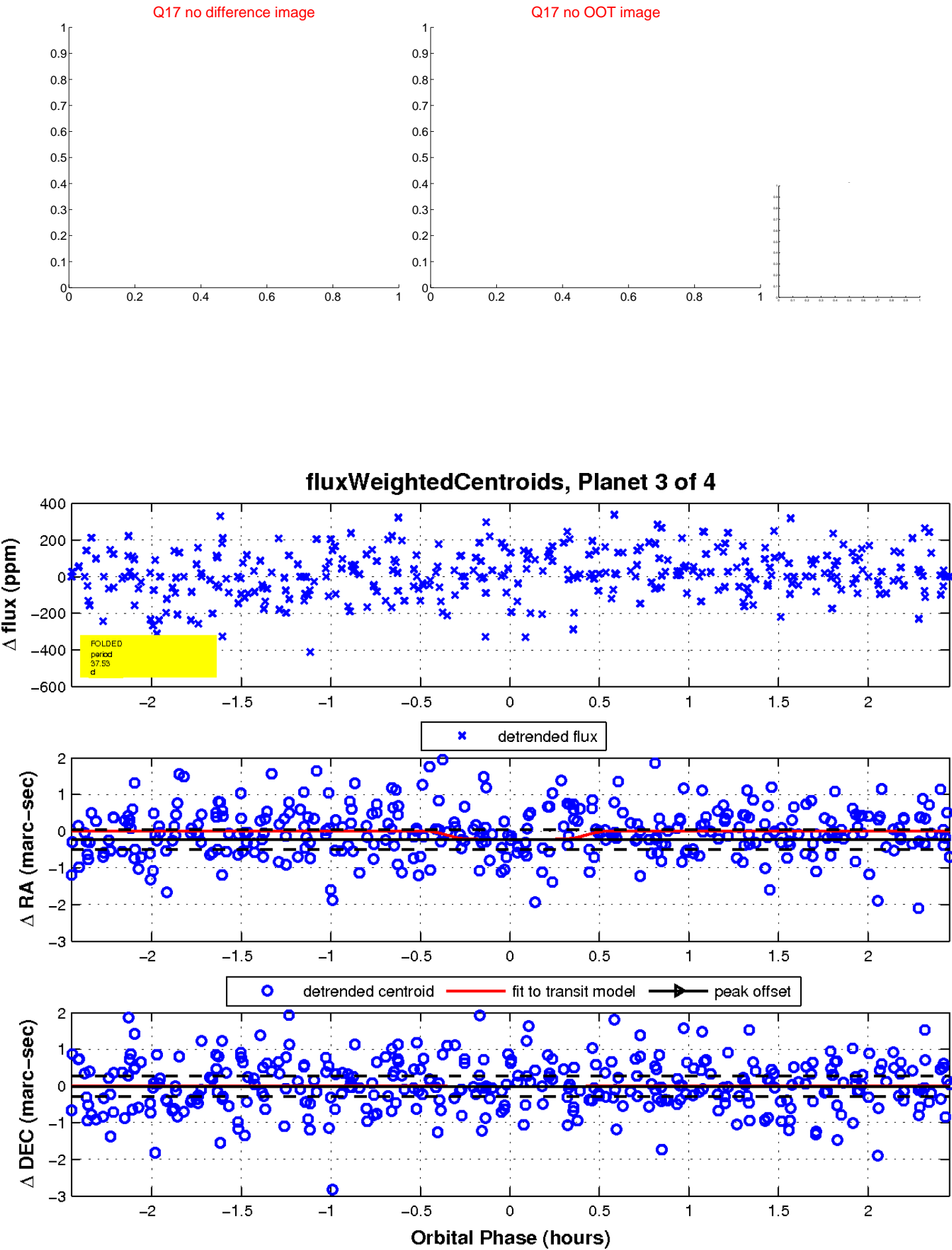
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



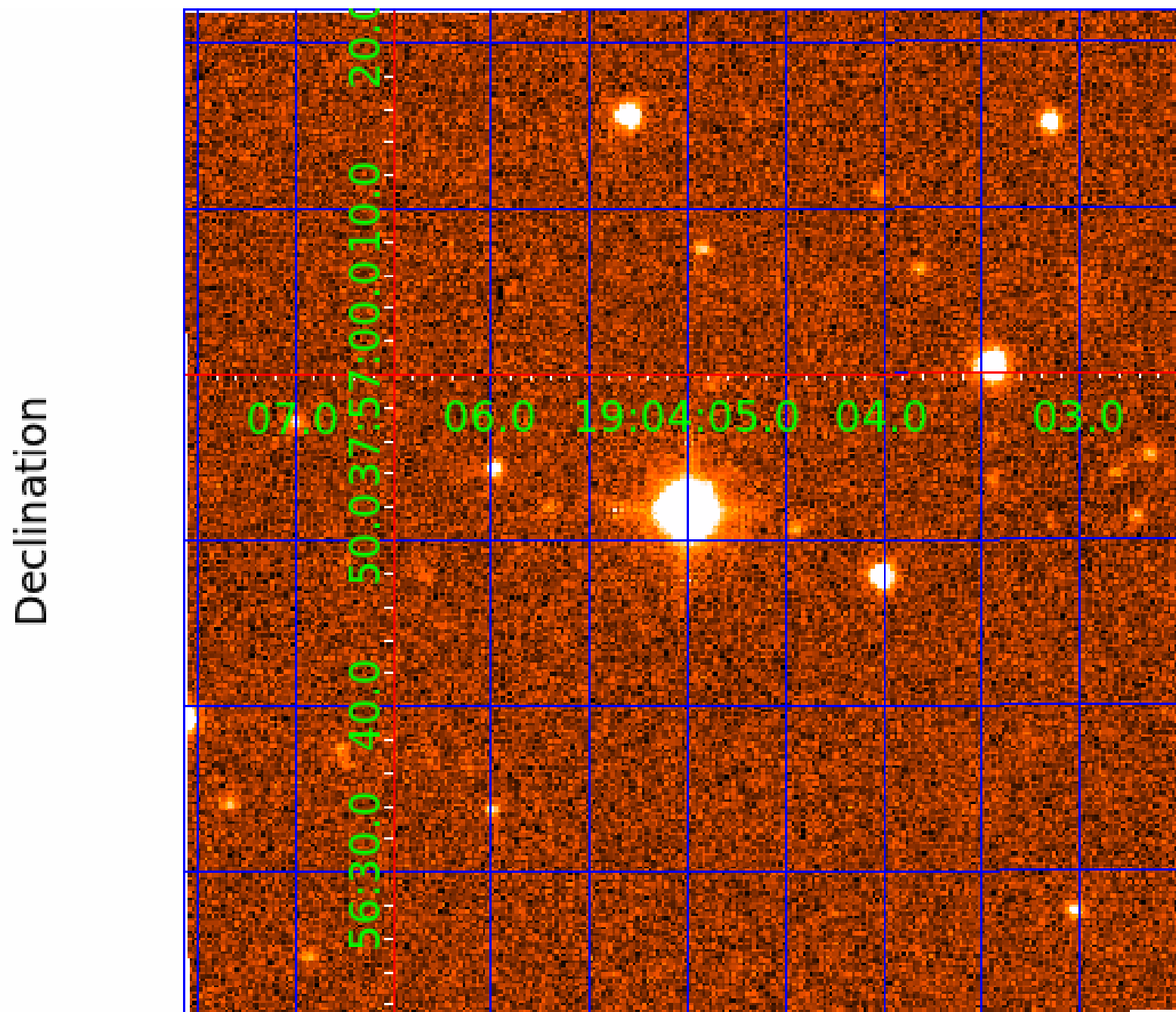
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image



# KIC 002693450

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
002693450-01	OBS	No	0.847675	131.773359	3.2	5.078	8.5	2.1	1.86	7262	0.35	22162.65
002693450-02	OBS	No	36.587899	136.578337	159.6	2.371	8.7	9.0	1.86	7262	2.64	146.38
002693450-03	OBS	No	37.529820	155.612259	59.4	0.819	8.3	2.0	1.86	7262	1.48	141.50
002693450-04	OBS	No	138.808551	188.521521	315.3	2.744	8.4	10.0	1.86	7262	3.79	24.74

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
002693450-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT
002693450-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002693450-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002693450-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_UNCERTAIN

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

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

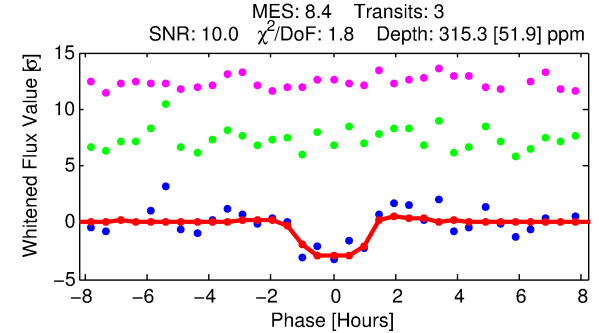
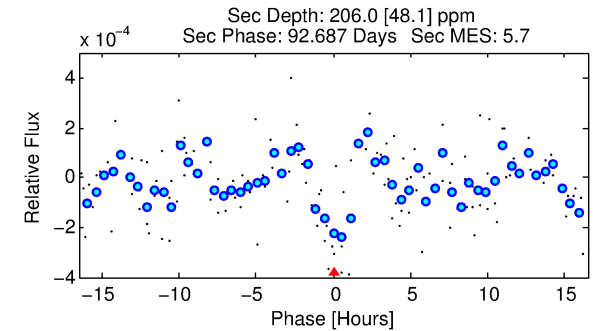
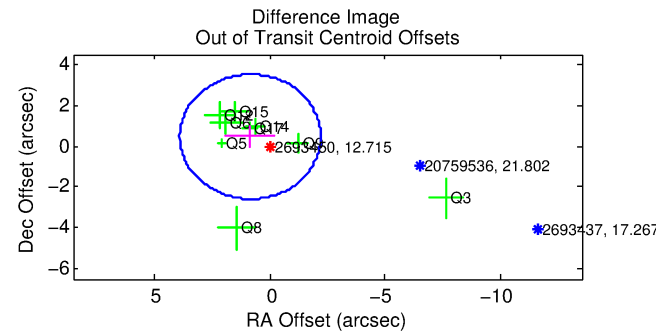
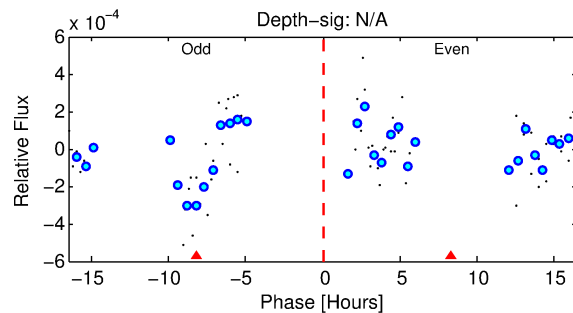
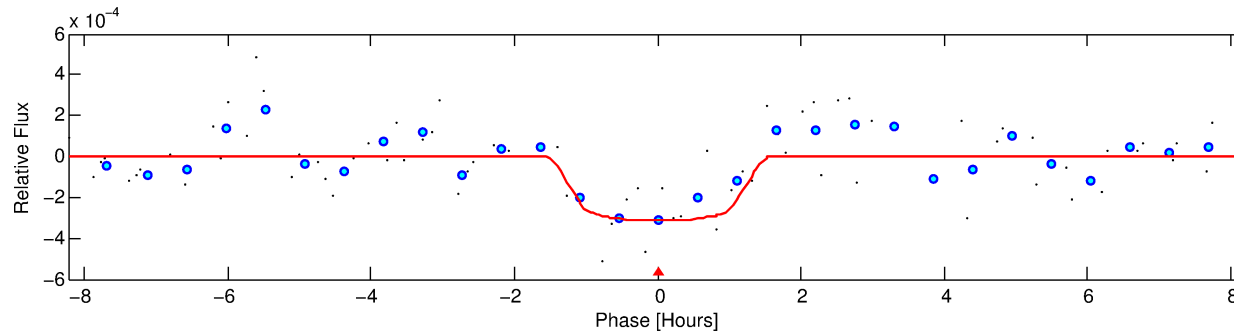
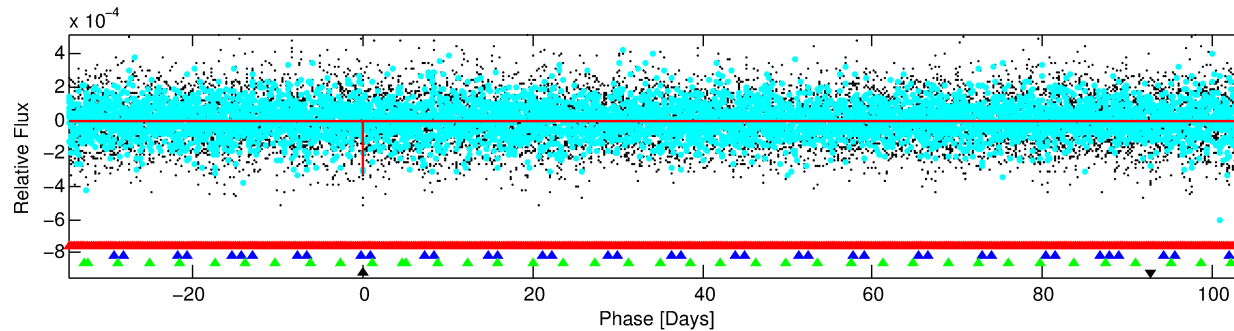
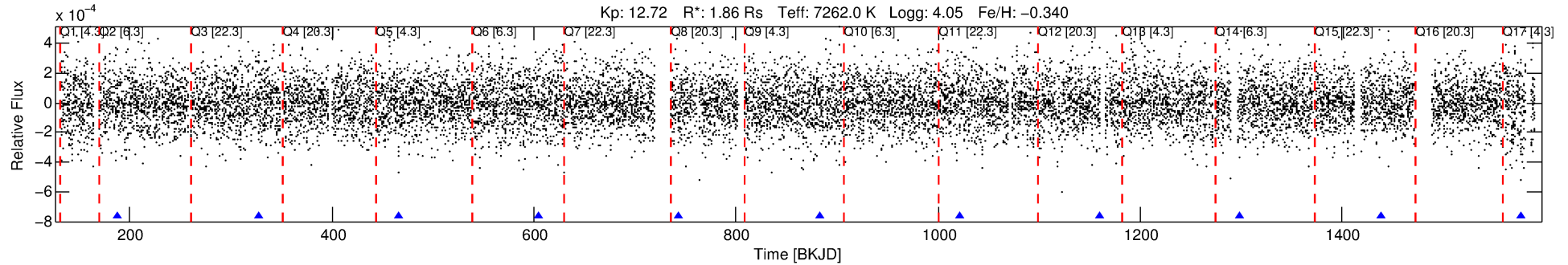
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 002693450-04

No Significant Match Found

# DV One-Page Summary

KIC: 2693450 Candidate: 4 of 4 Period: 138.809 d



## DV Fit Results:

Period = 138.80855 [0.00129] d  
Epoch = 188.5215 [0.0083] BKJD  
Rp/R\* = 0.0187 [0.0118]  
a/R\* = 196.21 [766.30]  
b = 0.88 [0.98]  
Seff = 24.74 [10.24]  
Teq = 569 [59] K  
Rp = 3.79 [2.62] Re  
a = 0.5913 [0.1475] AU  
Ag = 2755.61 [3688.79] [0.75σ]  
Teffp = 6370 [2062] K [2.81σ]

## DV Diagnostic Results:

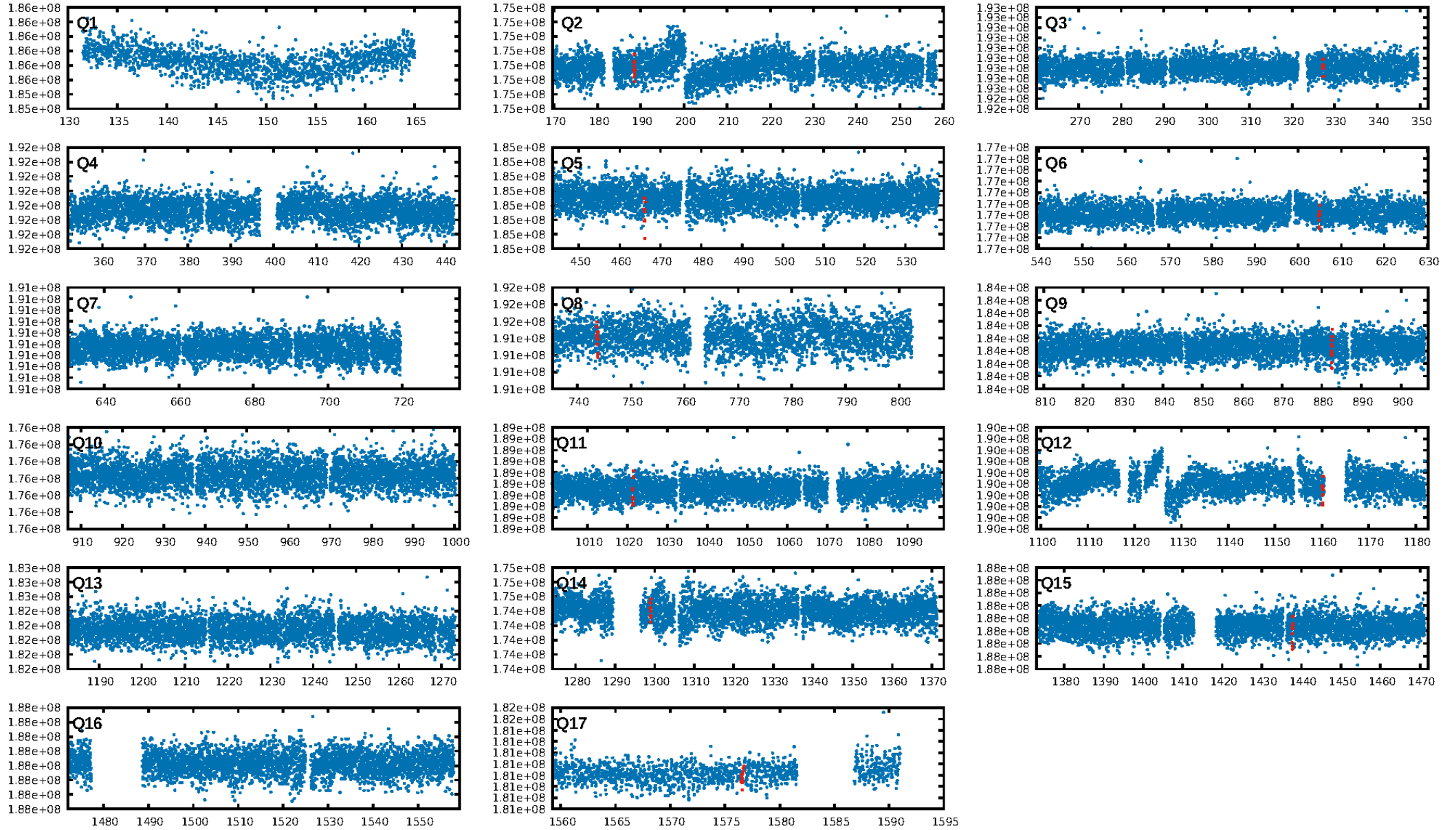
ShortPeriod-sig: 100.0% [848.69σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 20.0%  
ModelChiSquareGof-sig: 47.0%  
**Bootstrap-pfa: 1.30e-08**  
RollingBand-fgt: 1.00 [2/2]  
**GhostDiagnostic-chr: -0.2923**  
Centroid-sig: 85.3%  
Centroid-so: 0.299 arcsec [0.35σ]  
OotOffset-rm: 0.962 arcsec [0.95σ]  
KicOffset-rm: 1.009 arcsec [0.87σ]  
OotOffset-st: 2/2/2/3 [9]  
KicOffset-st: 2/2/2/3 [9]  
DiffImageQuality-fgm: 0.67 [6/9]  
DiffImageOverlap-fno: 0.00 [0/10]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 02:25:36 Z

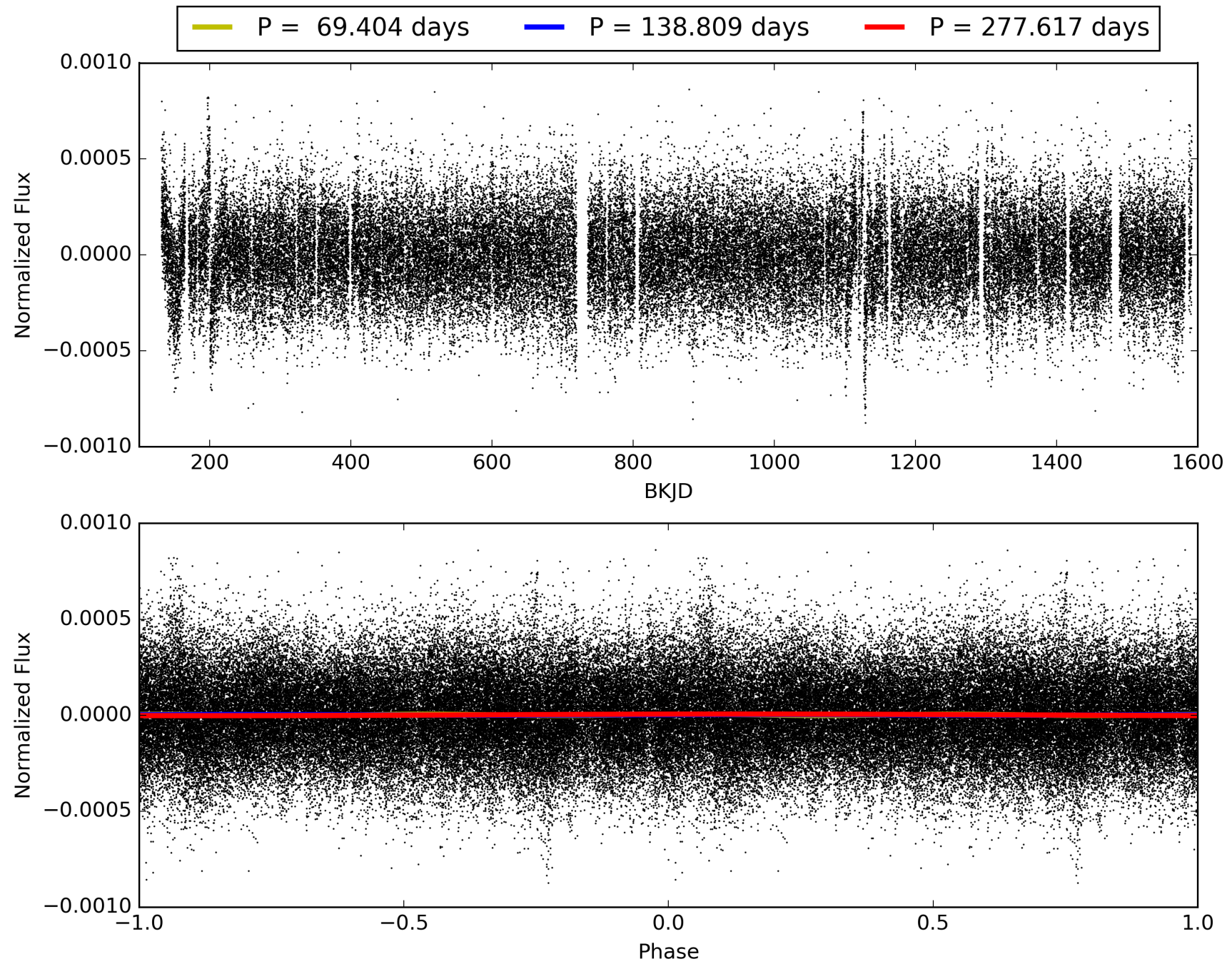
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 002693450-04, PDC Light Curves

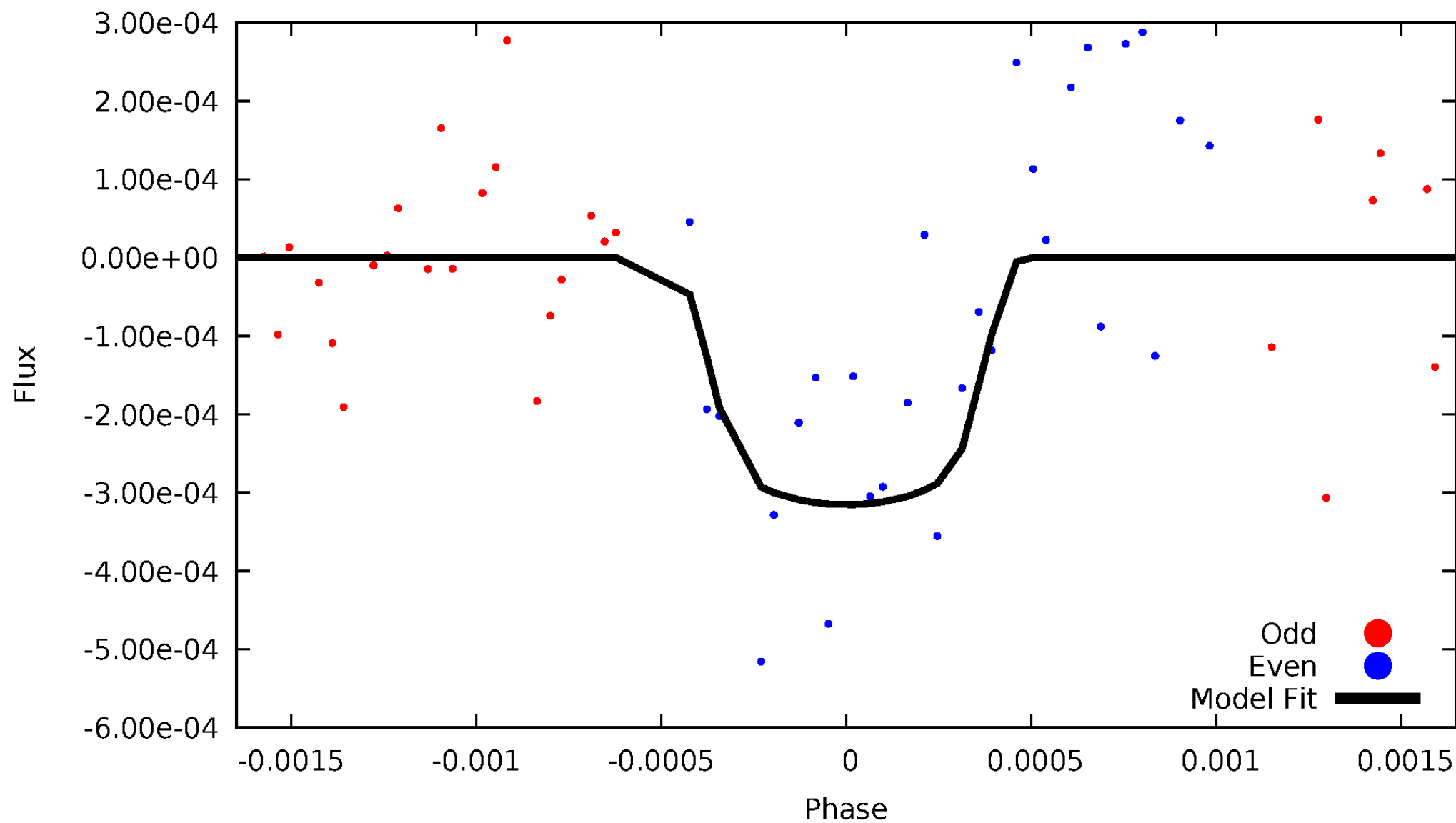


TCE 002693450-04



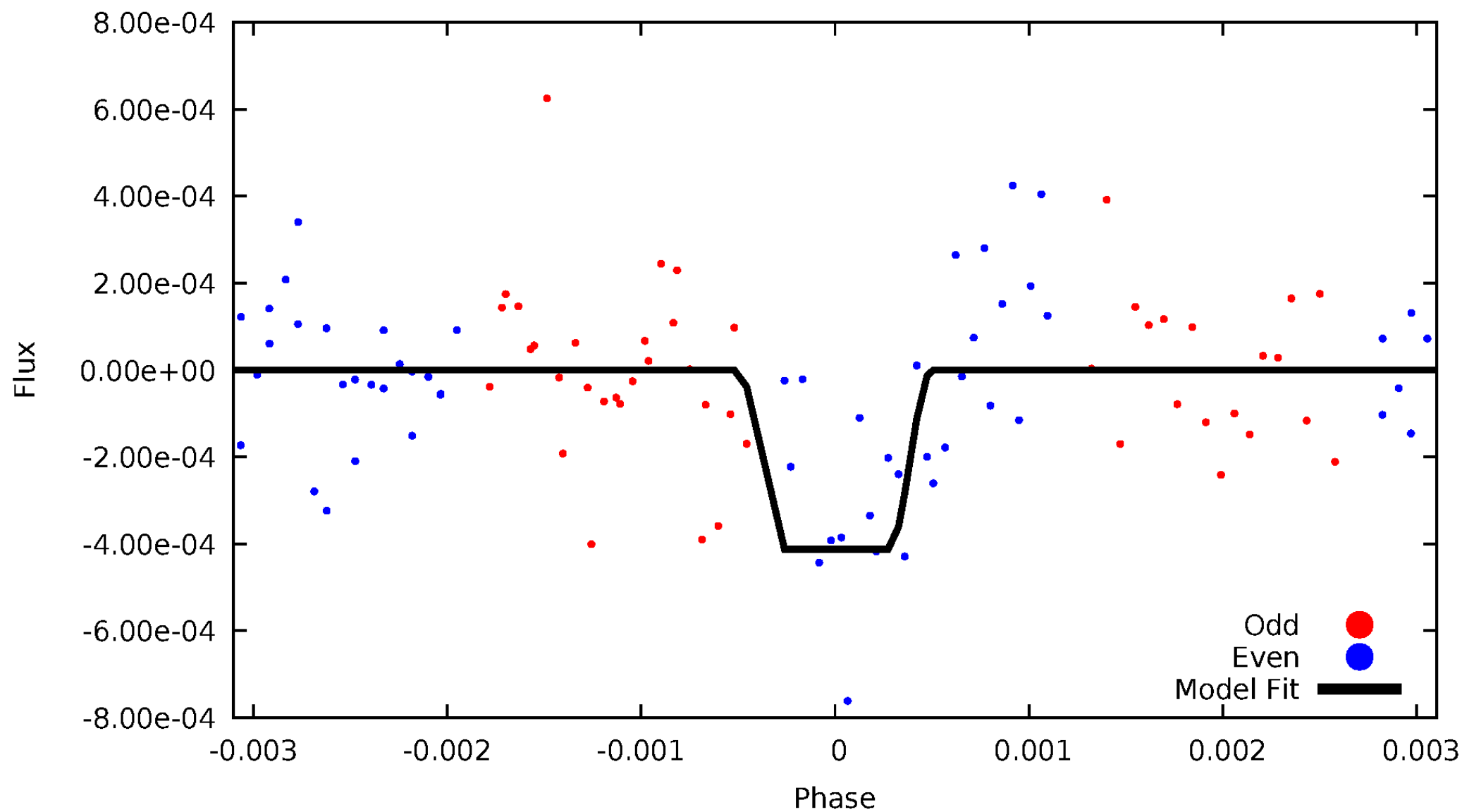
# DV Odd/Even

TCE 002693450-04



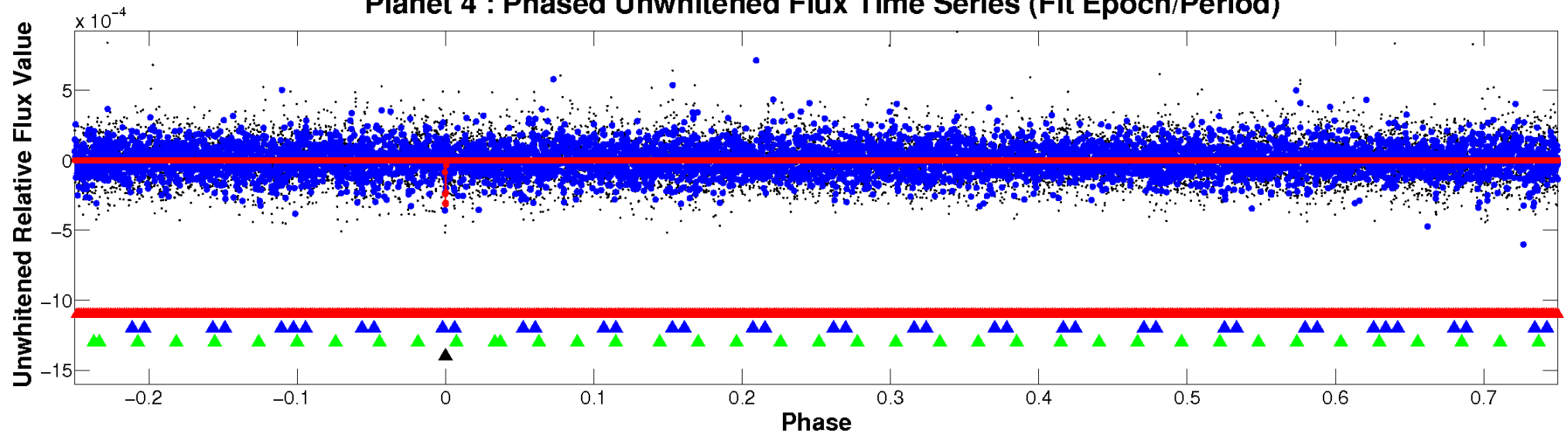
# ALT Odd/Even

TCE 002693450-04

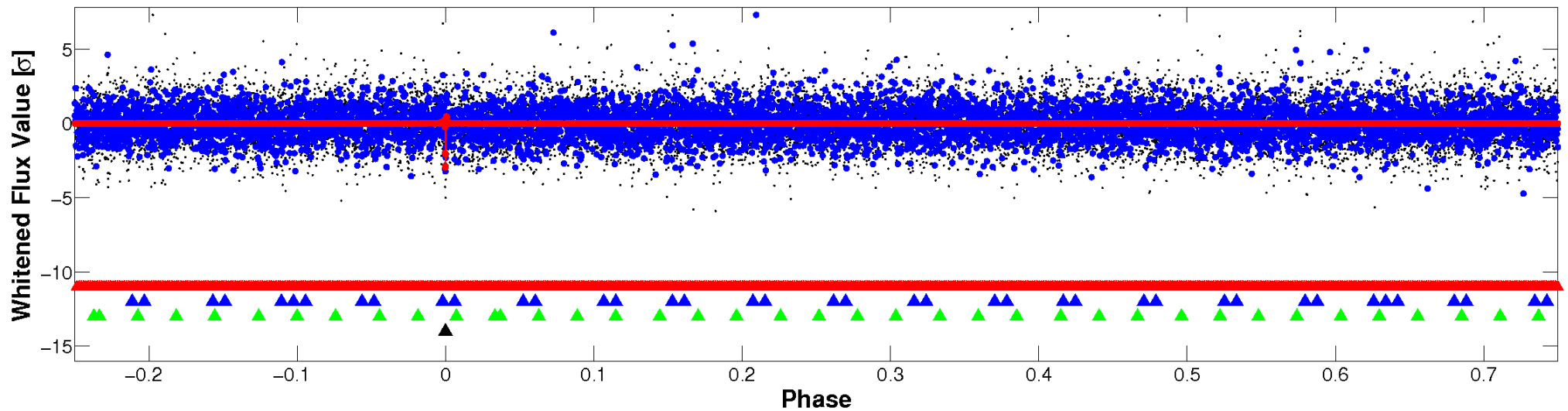


# Non-Whitened Vs. Whitened Light Curve

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

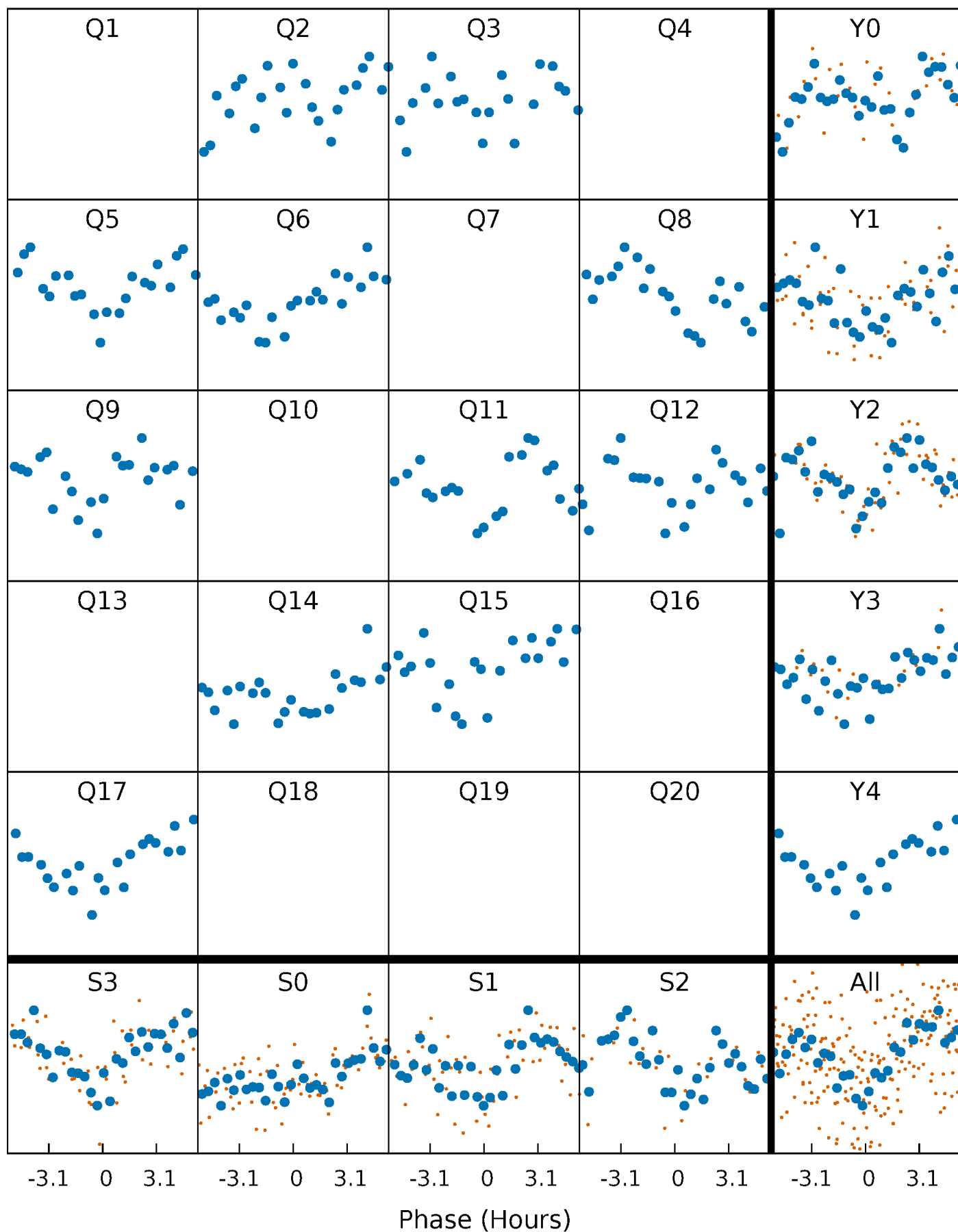


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



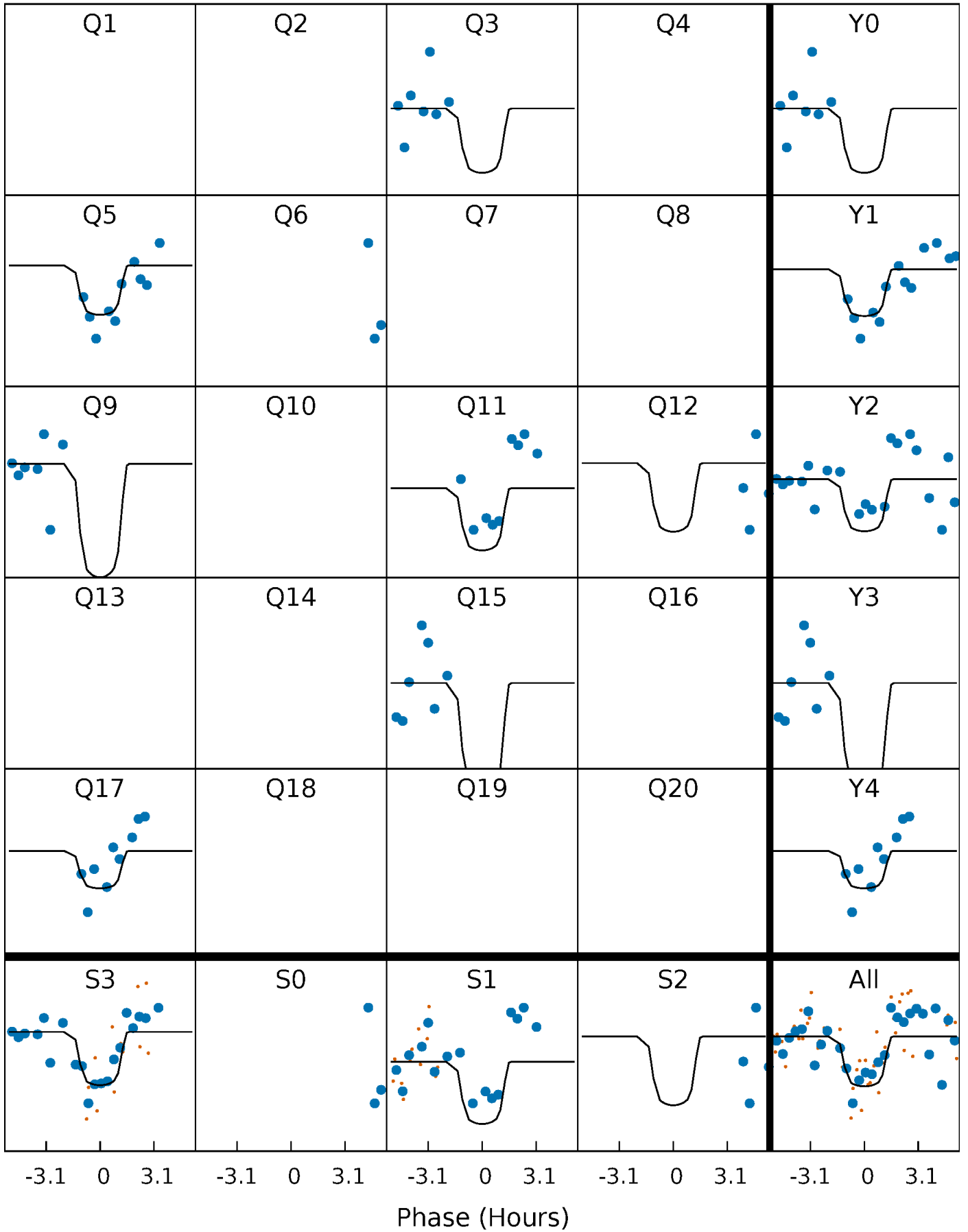
# PDC Quarter-Phased Transit Curves

TCE 002693450-04 P=138.808551 Days  $T_0=188.521521$  (BKJD)



# DV Quarter-Phased Transit Curves

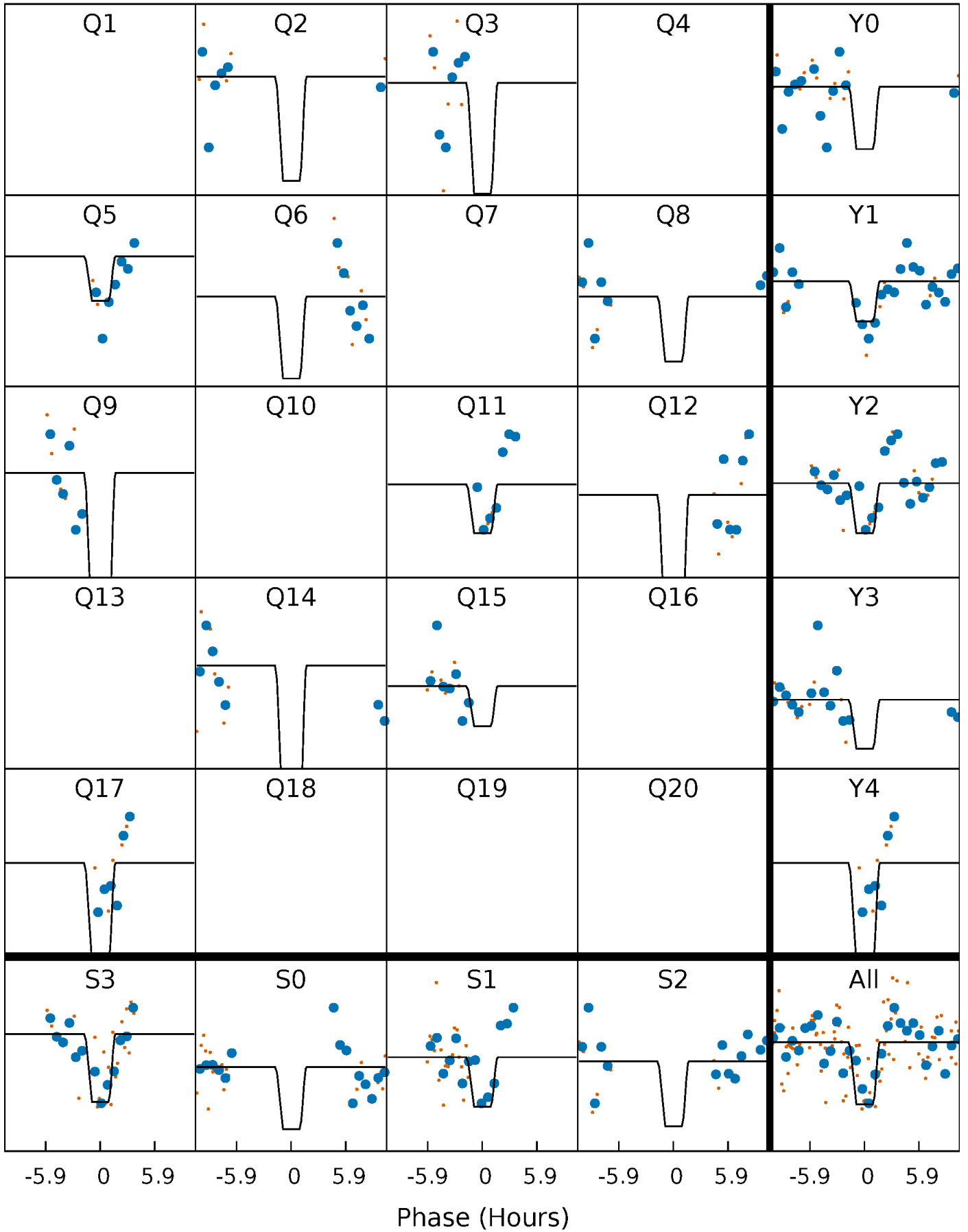
TCE 002693450-04     $P=138.808551$  Days     $T_0=188.521521$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

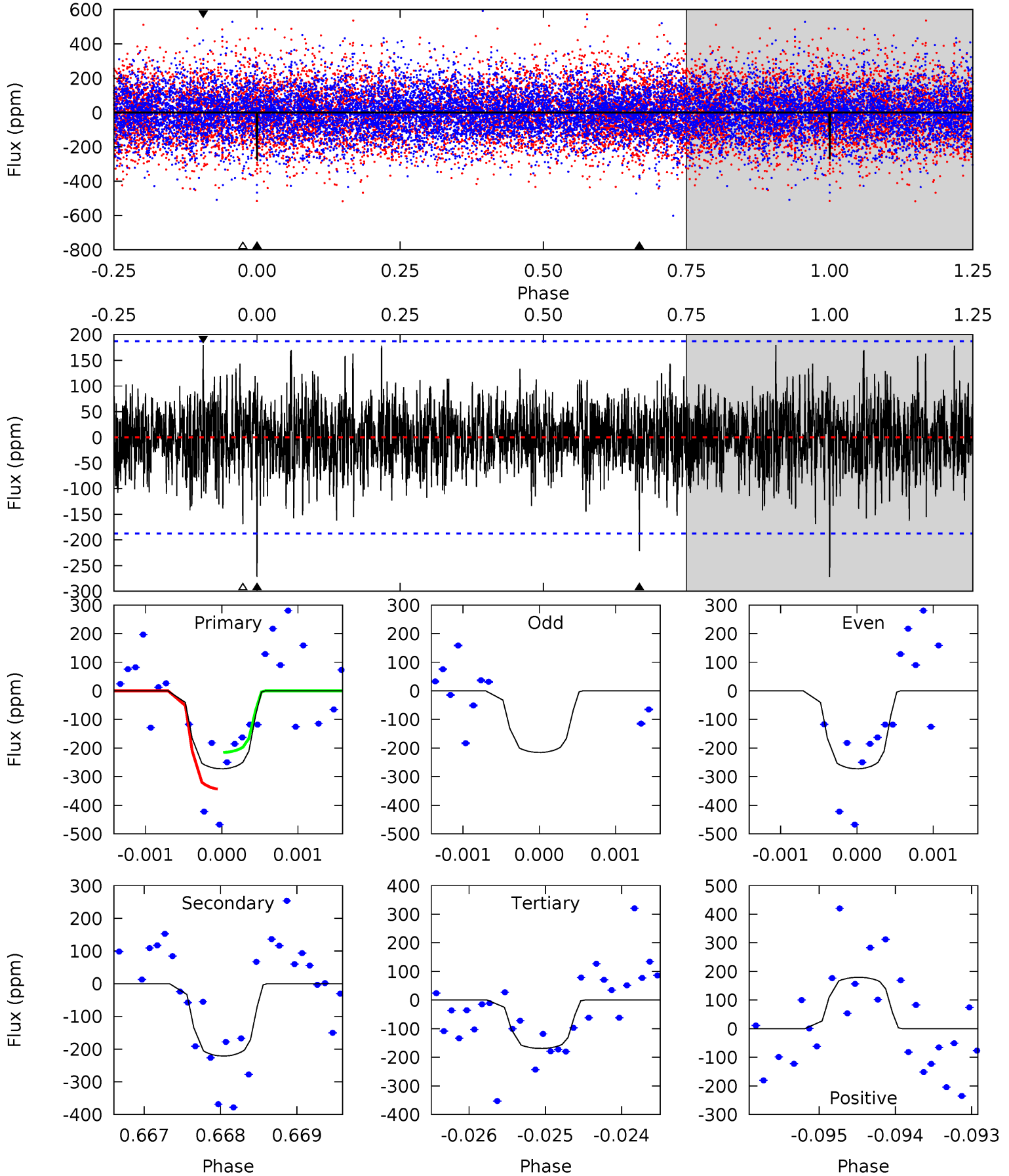
TCE 002693450-04     $P=138.806892$  Days     $T_0=188.509014$  (BKJD)



# DV Model-Shift Uniqueness Test

002693450-04, P = 138.808551 Days, E = 49.712970 Days

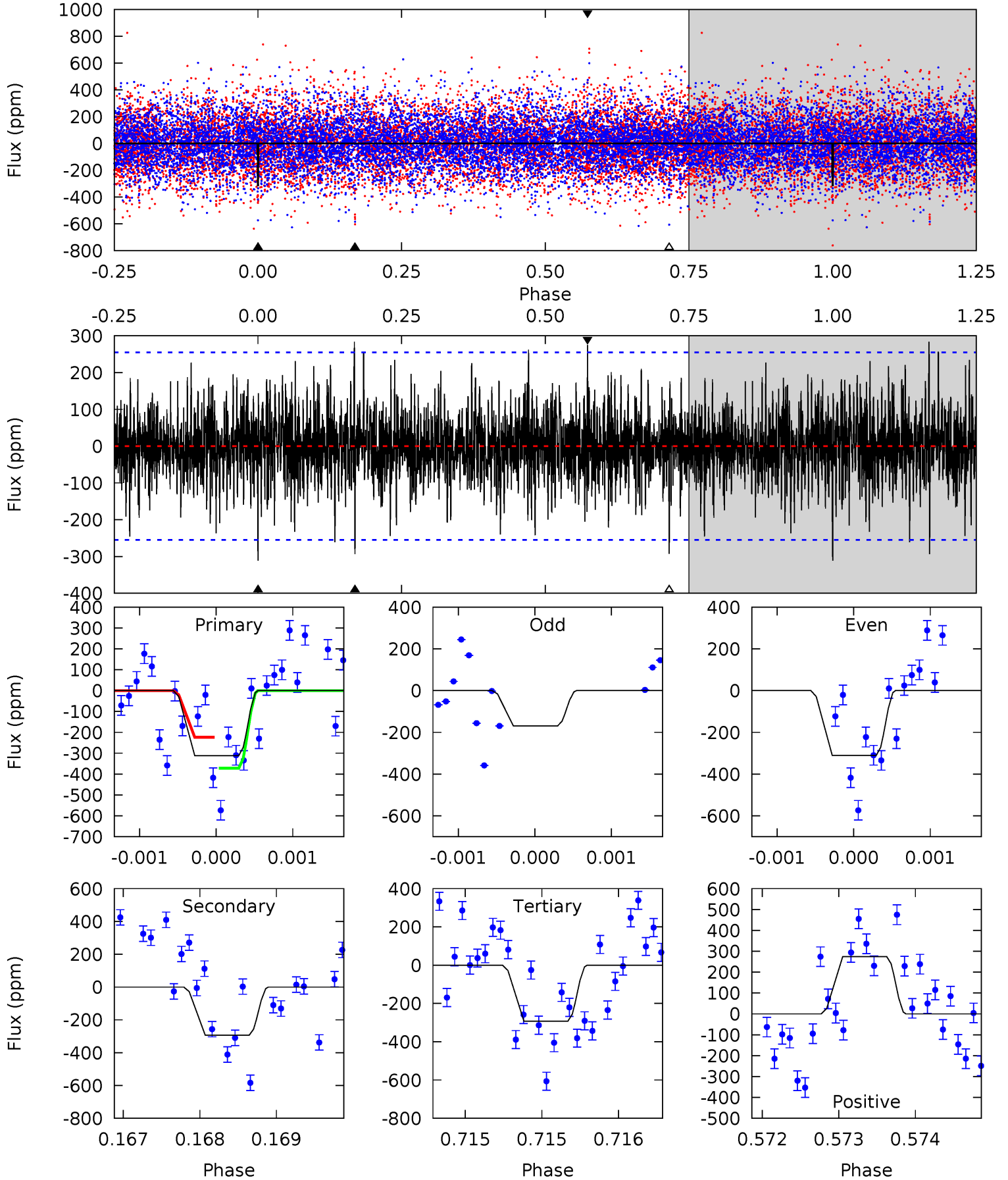
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.97	6.47	4.95	5.25	5.47	3.33	1.42	3.02	2.72	1.52	1.22	1.01	1.09	0.40	1.85



# Alt Model-Shift Uniqueness Test

002693450-04, P = 138.806892 Days, E = 49.702122 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	6.28	6.26	5.88	5.46	3.31	1.58	0.41	0.79	0.02	0.40	1.87	1.19	0.48	1.53



### Stellar Parameters For KIC 002693450

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7262^{+228}_{-304}$	$4.053^{+0.214}_{-0.156}$	$-0.340^{+0.250}_{-0.350}$	$1.863^{+0.525}_{-0.525}$	$1.428^{+0.204}_{-0.249}$	$0.311^{+0.409}_{-0.144}$
	+3%/-4%	+5%/-4%	+74%/-103%	+28%/-28%	+14%/-17%	+131%/-46%
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 002693450-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-221 \pm 34$	$3.78^{+2.40}_{-2.06}$	$789^{+61}_{-59}$	$6296^{+3877}_{-1216}$	$3010^{+11867}_{-1916}$
Alt.	$-293 \pm 47$	$4.20^{+2.14}_{-2.15}$	$788^{+58}_{-63}$	$6416^{+3671}_{-1113}$	$3093^{+10092}_{-1722}$

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

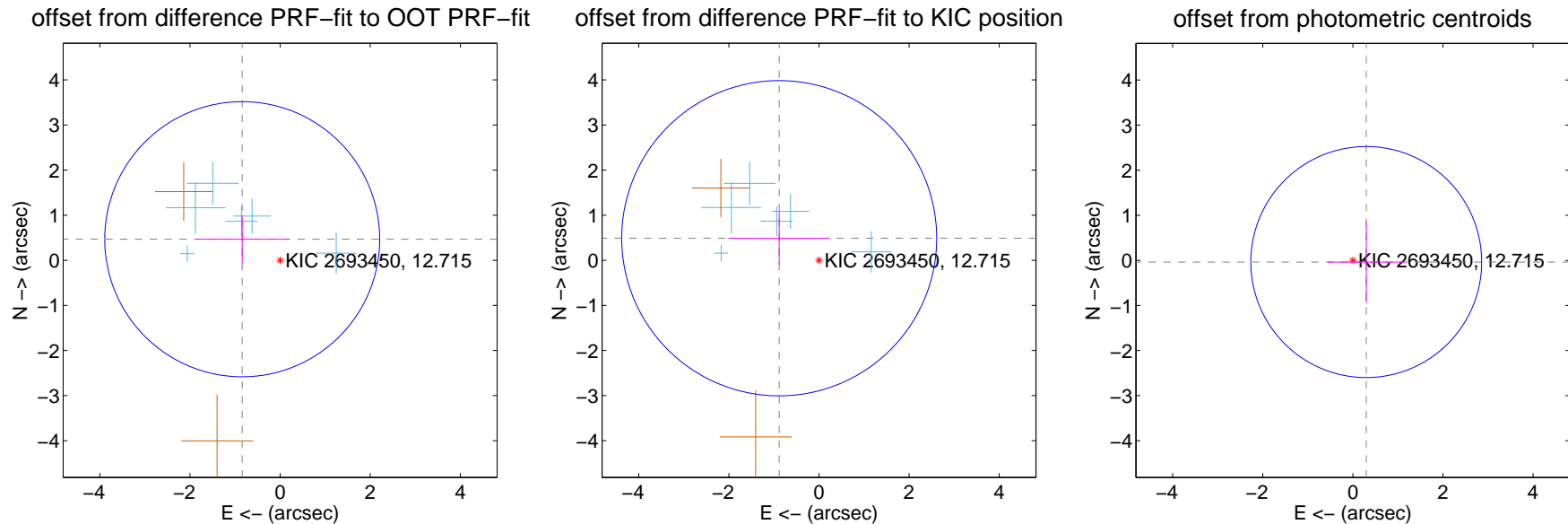
## DV Centroid Data

Supplemental centroid analysis for 002693450-04. Kepler magnitude: 12.71. Transit SNR 10.00

There are 6 quarters with good PRF difference image offsets

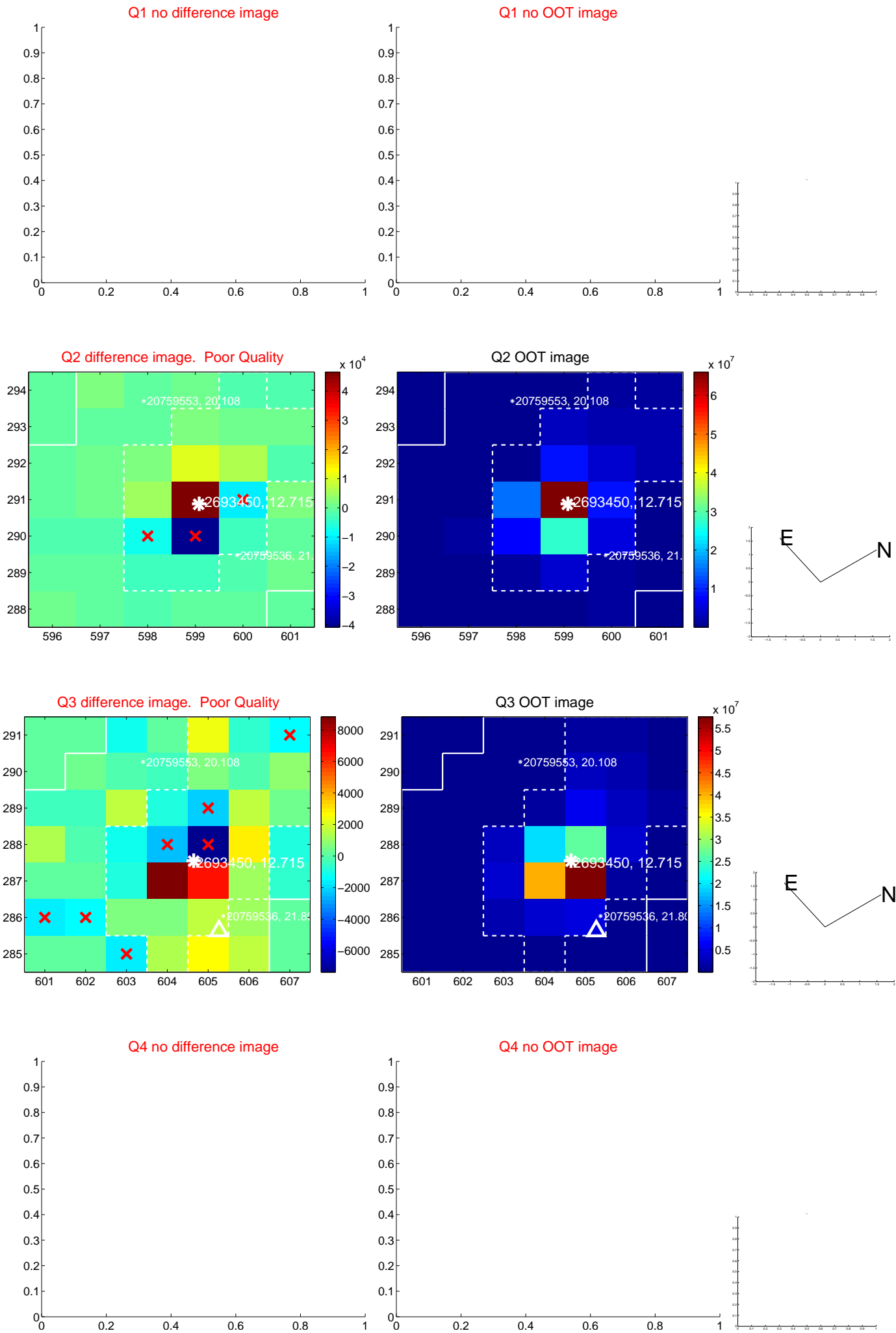
The direct PRF centroid is offset from the target star catalog position by about 0.08 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.962 \pm 1.016$	0.95	$0.841 \pm 1.030$	$0.467 \pm 0.531$
PRF-fit source offset from KIC position	$1.009 \pm 1.165$	0.87	$0.883 \pm 1.126$	$0.489 \pm 0.586$
photometric centroid source offset	$0.30 \pm 0.85$	0.35	$-0.30 \pm 0.85$	$-0.04 \pm 0.90$

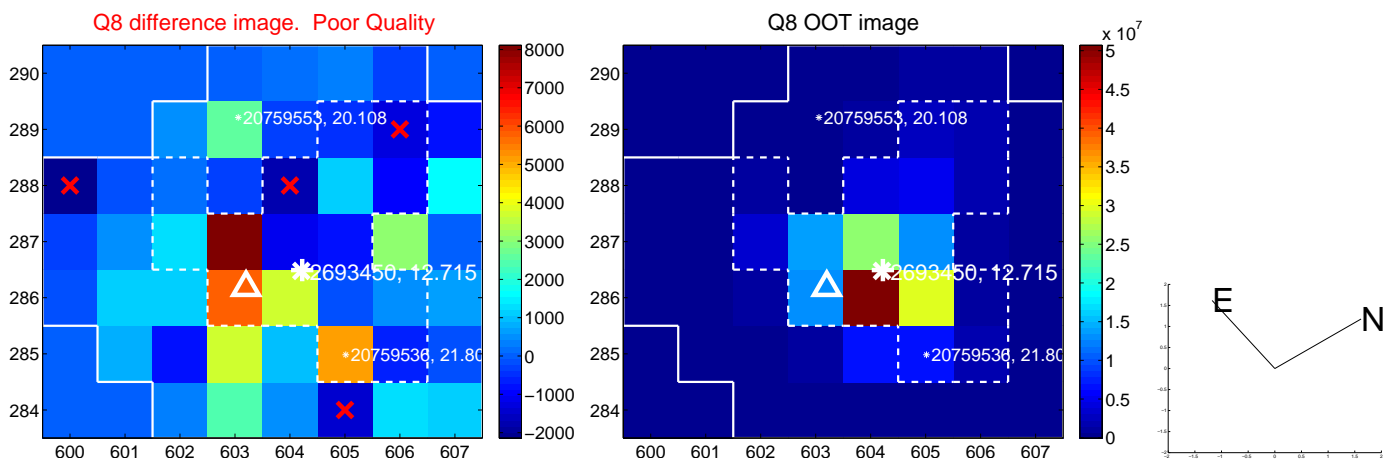
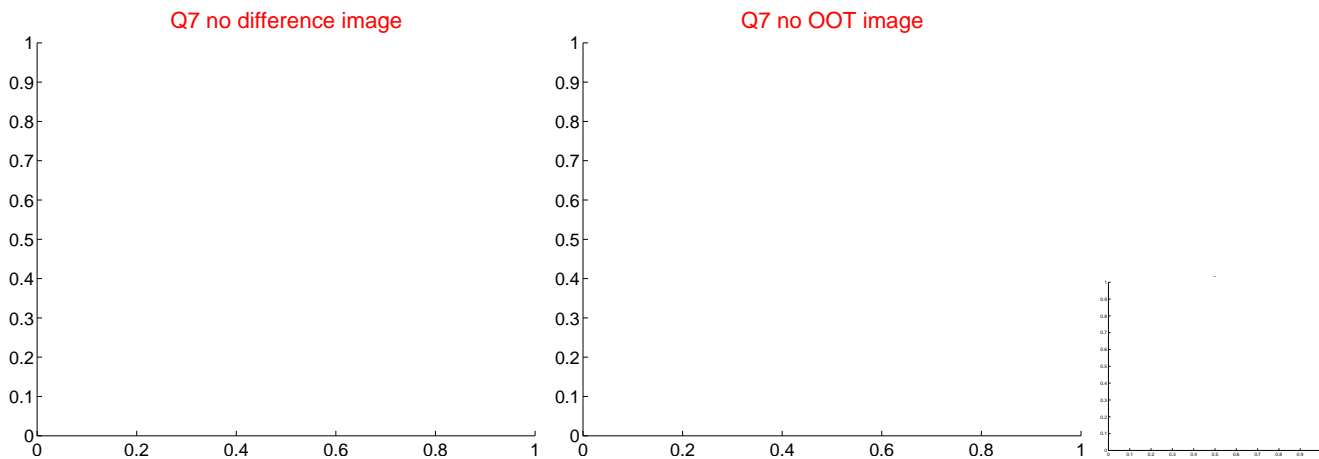
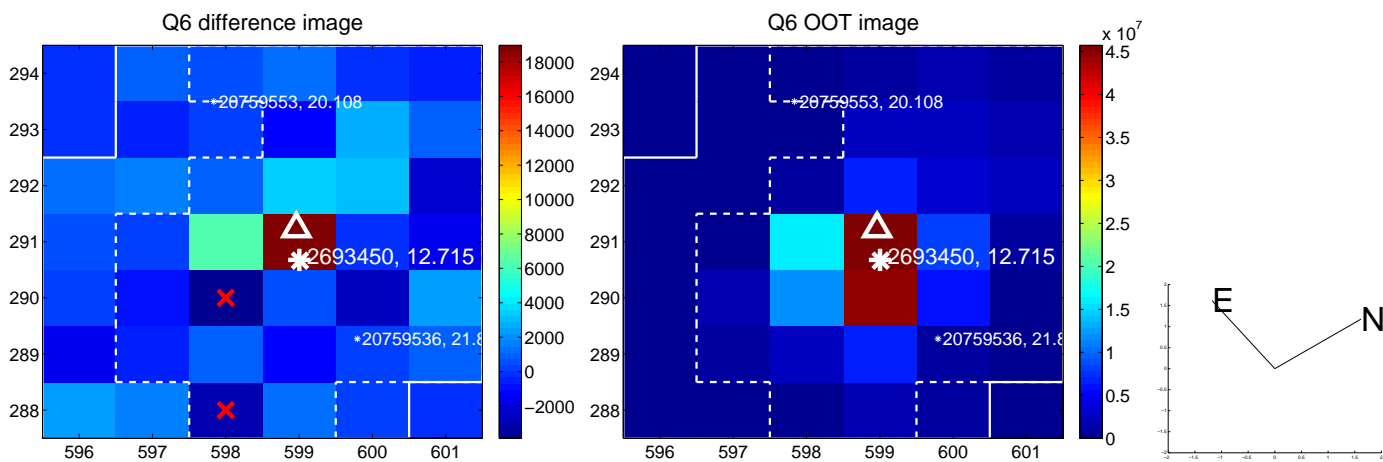
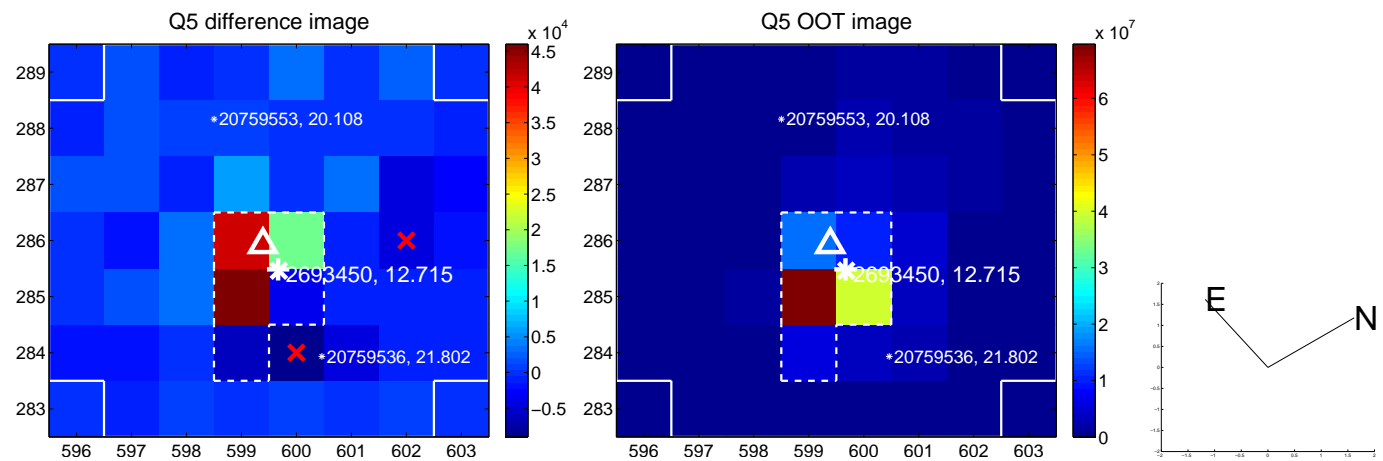


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

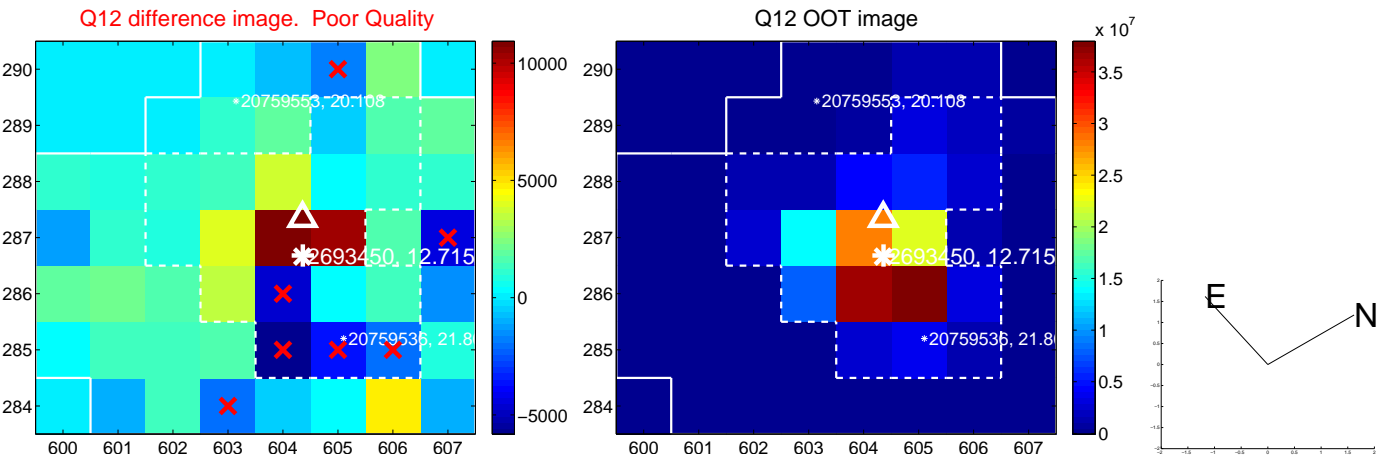
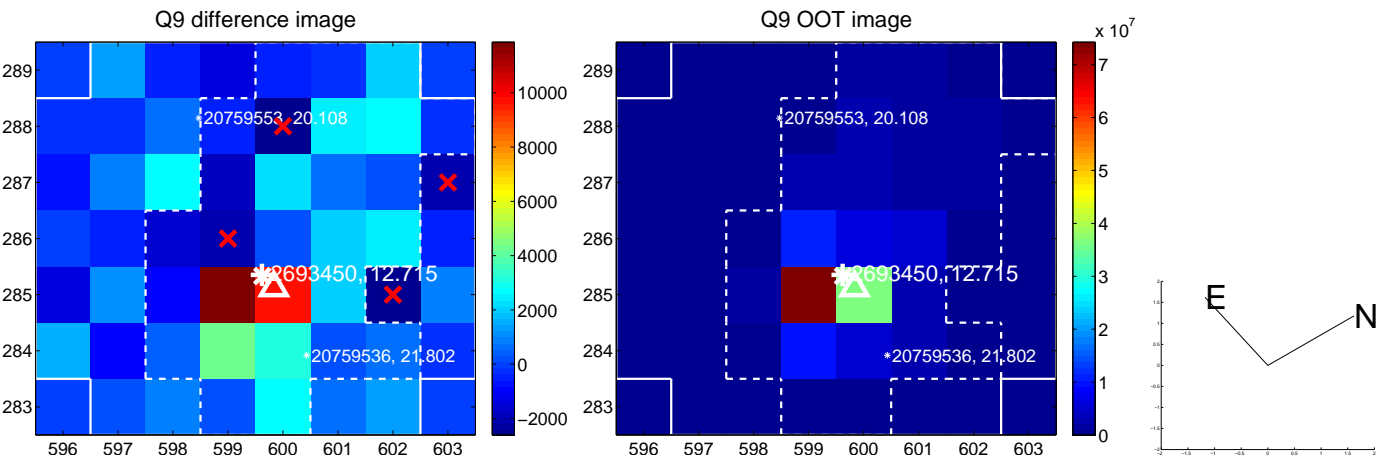


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

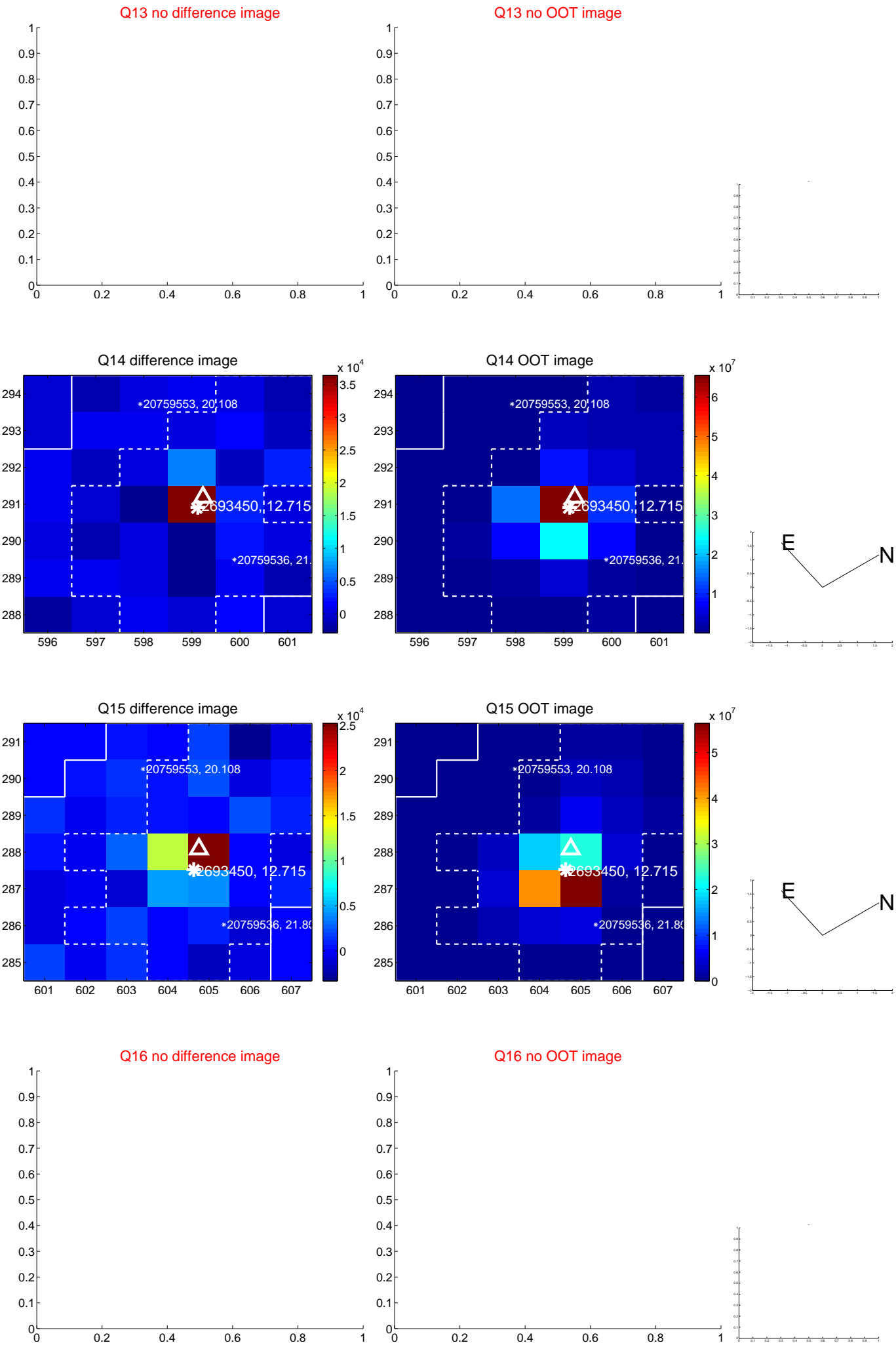




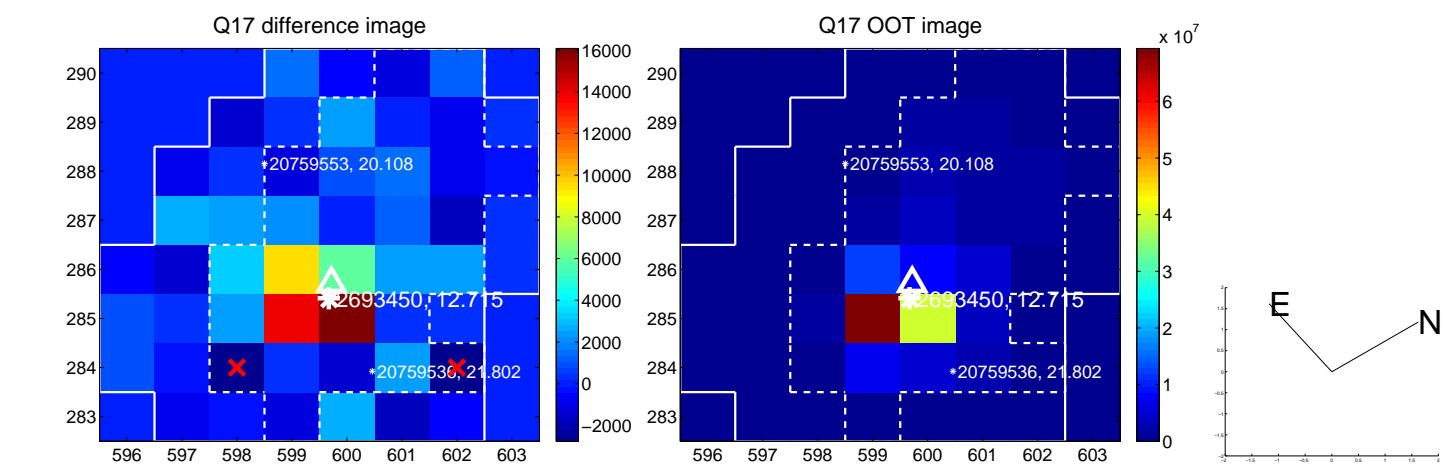
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



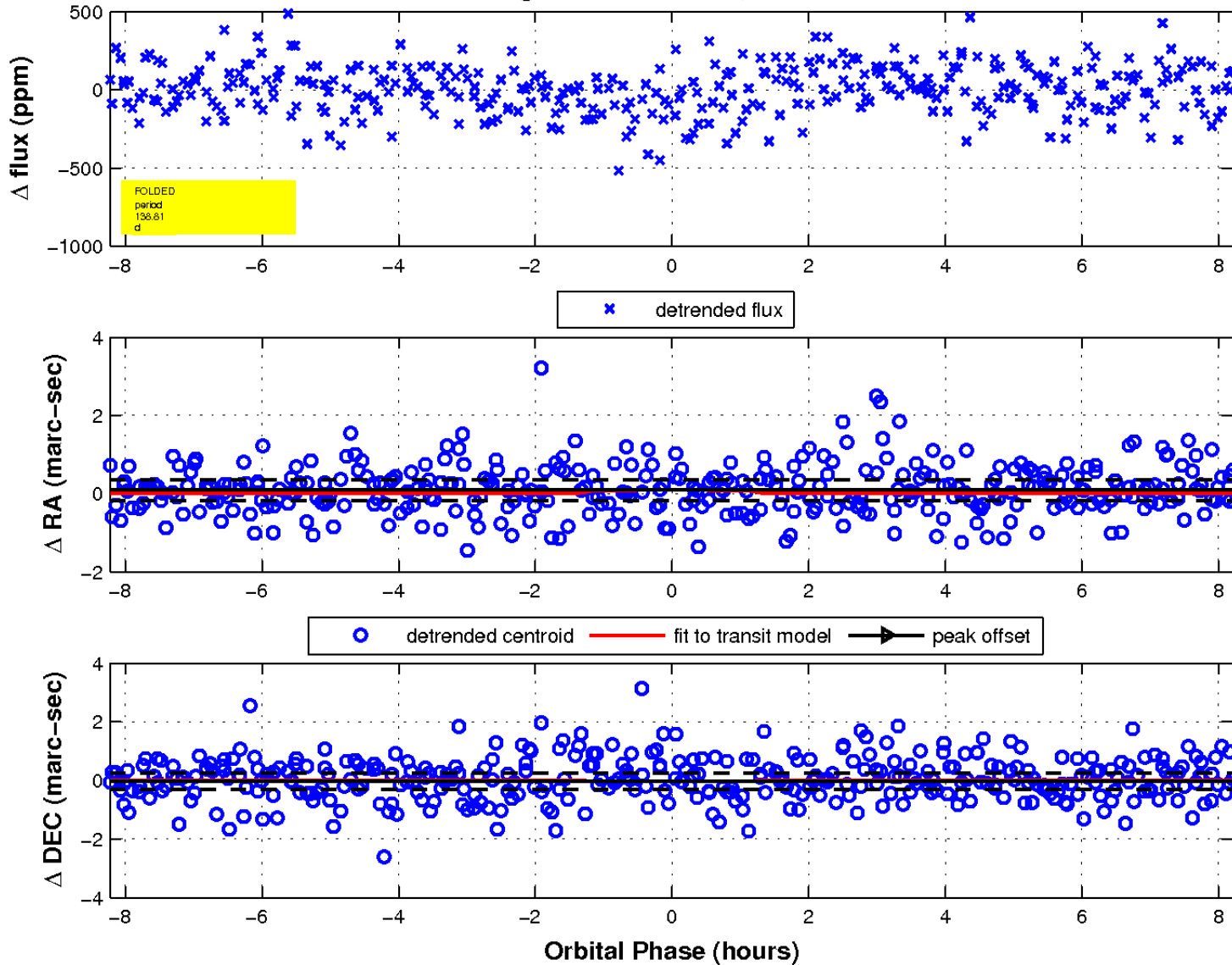
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 4 of 4



UKIRT Image

