

# KIC 009530170

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009530170-01	OBS	No	493.748563	588.015249	1226.7	8.751	13.1	5.6	0.99	6079	4.17	0.83
009530170-02	OBS	No	176.832521	250.373252	543.3	3.123	11.3	5.8	0.99	6079	2.67	3.26
009530170-03	OBS	No	383.007279	277.651680	1005.1	3.236	10.7	5.9	0.99	6079	3.47	1.16

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009530170-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009530170-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—INCONSISTENT_TRANS
009530170-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS

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

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

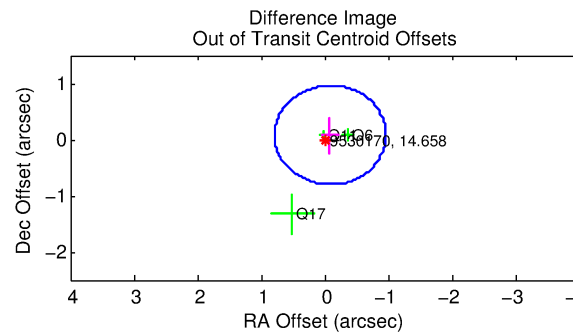
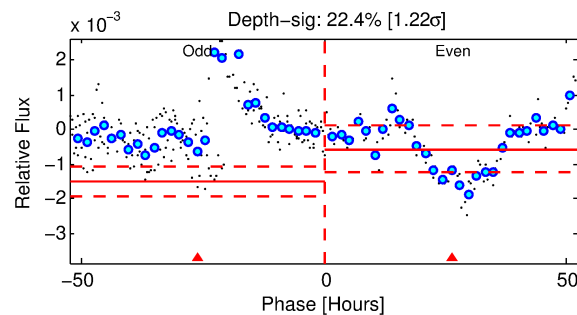
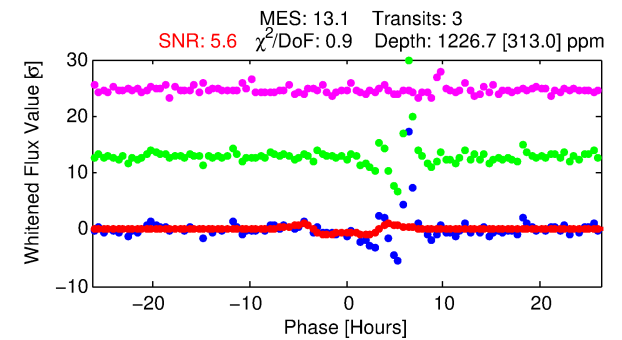
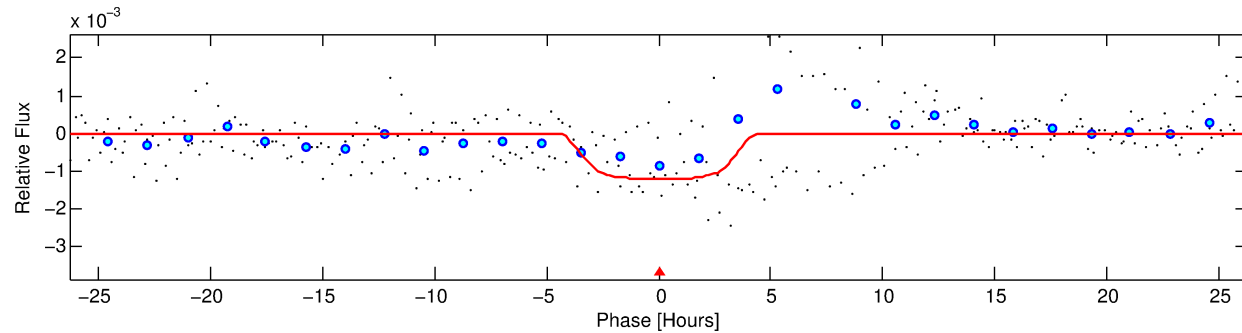
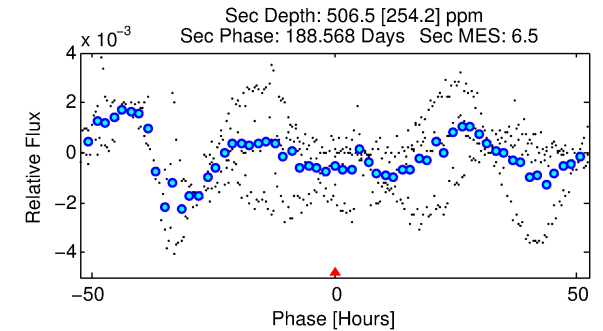
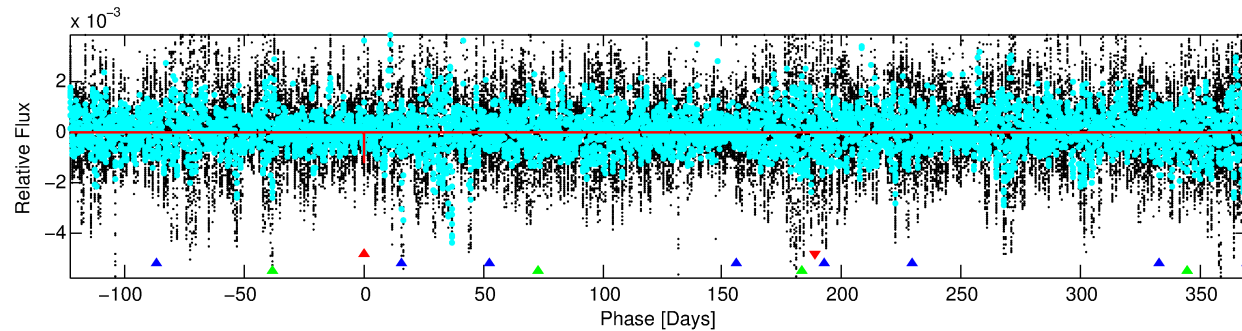
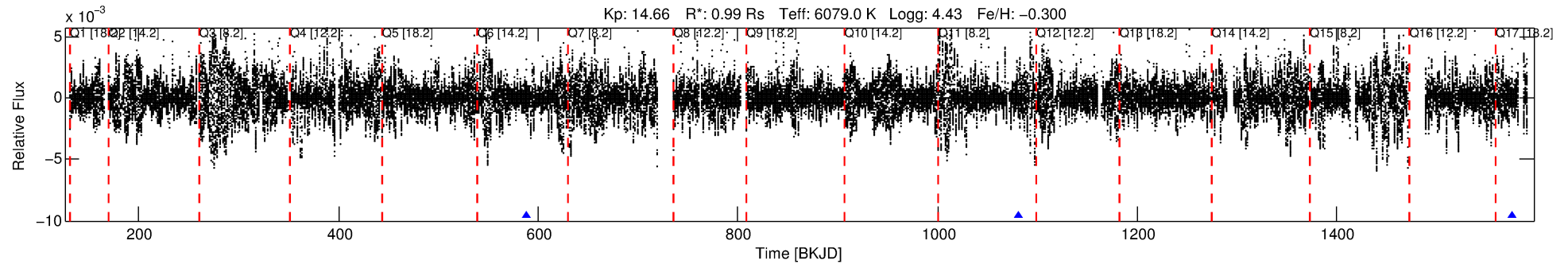
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 009530170-01

No Significant Match Found

# DV One-Page Summary

KIC: 9530170 Candidate: 1 of 3 Period: 493.749 d



## DV Fit Results:

Period = 493.74856 [0.01241] d  
Epoch = 588.0152 [0.0154] BKJD  
Rp/R\* = 0.0385 [0.0057]  
a/R\* = 208.65 [55.42]  
b = 0.92 [0.05]  
Seff = 0.83 [0.32]  
Teq = 243 [24] K  
Rp = 4.17 [1.38] Re  
a = 1.2077 [0.3041] AU  
Ag = 23349.79 [16117.75] [1.45 $\sigma$ ]  
Teffp = 4650 [695] K [6.34 $\sigma$ ]

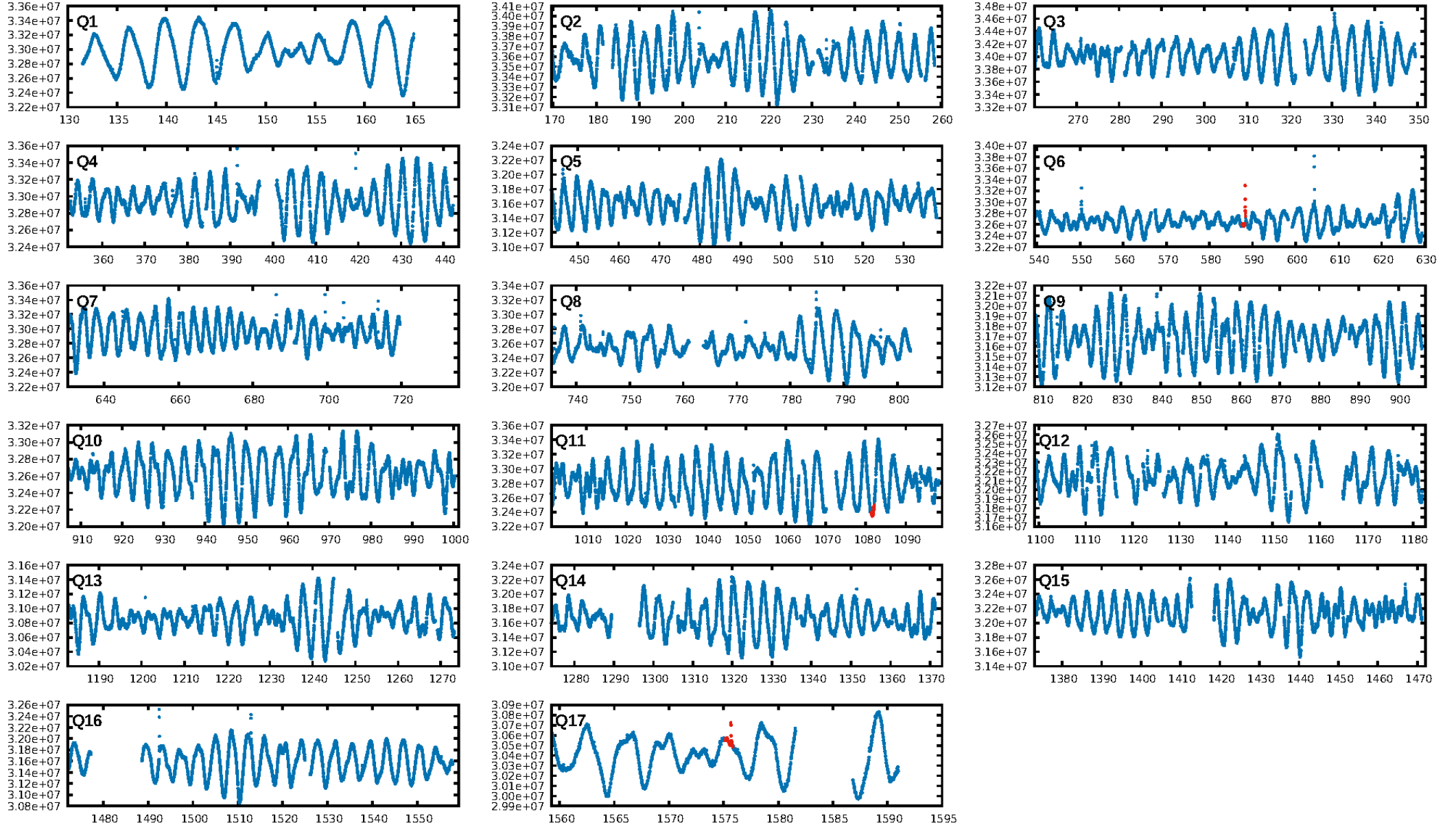
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [284.87 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 9.2%  
ModelChiSquareGof-sig: 99.3%  
**Bootstrap-pfa: 6.07e-11**  
RollingBand-fgt: 1.00 [2/2]  
GhostDiagnostic-chr: 3.945  
Centroid-sig: 7.4%  
Centroid-so: 0.869 arcsec [1.23 $\sigma$ ]  
OotOffset-rm: 0.119 arcsec [0.40 $\sigma$ ]  
KicOffset-rm: 0.144 arcsec [0.79 $\sigma$ ]  
OotOffset-st: 1/1/0/1 [3]  
KicOffset-st: 1/1/0/1 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 1.00 [3/3]

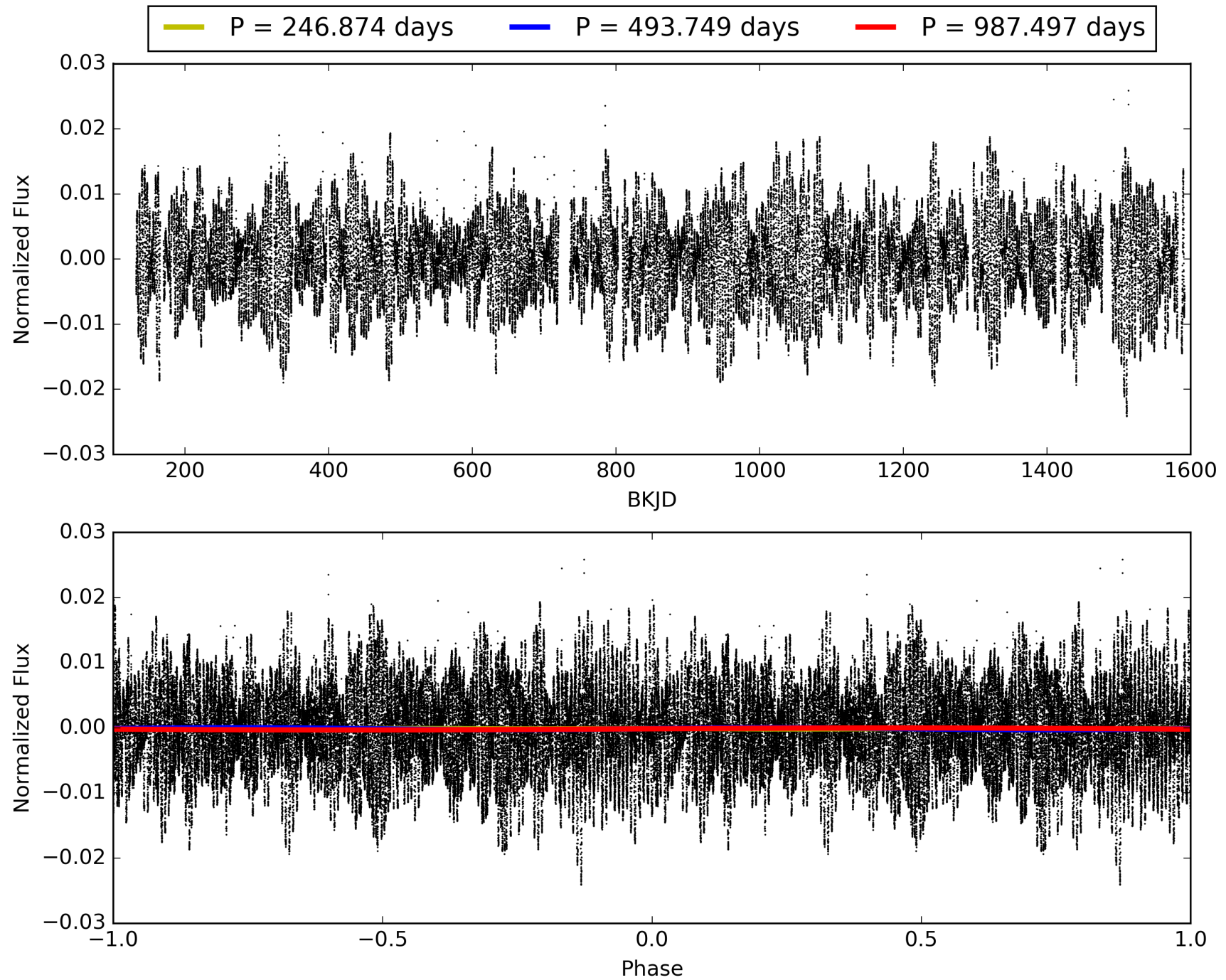
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 13:24:47 Z

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

# TCE 009530170-01, PDC Light Curves

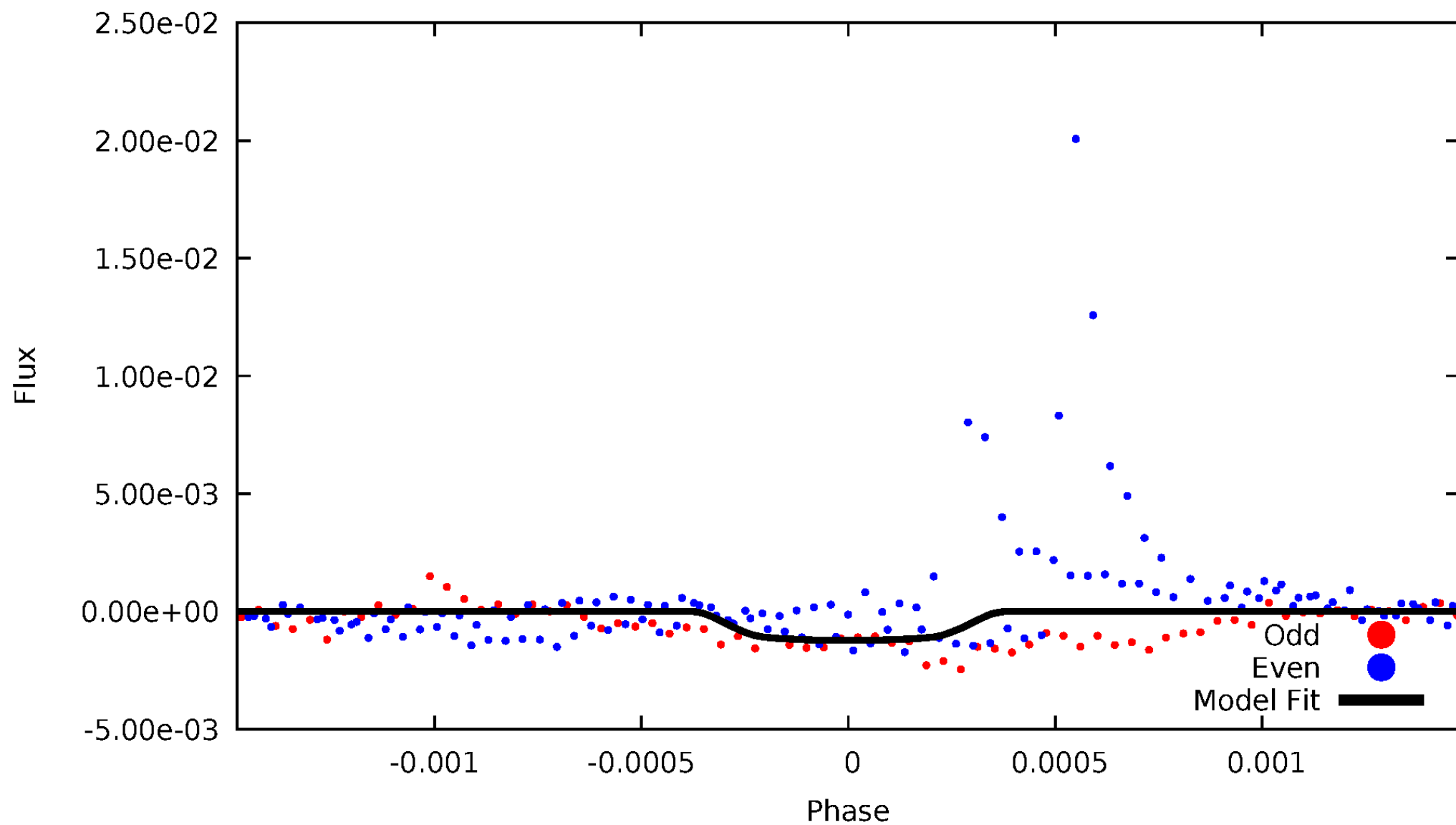


TCE 009530170-01



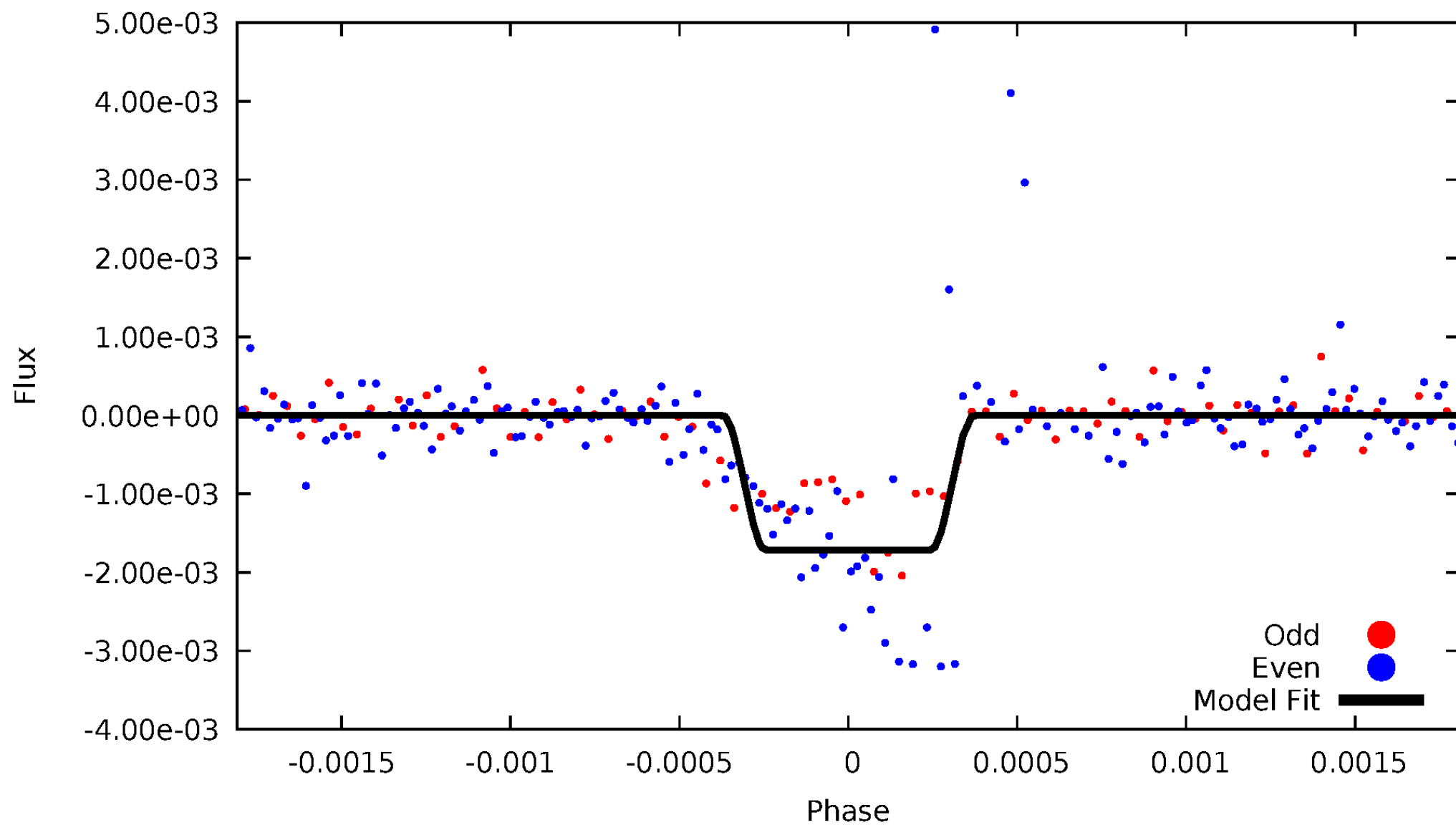
# DV Odd/Even

TCE 009530170-01

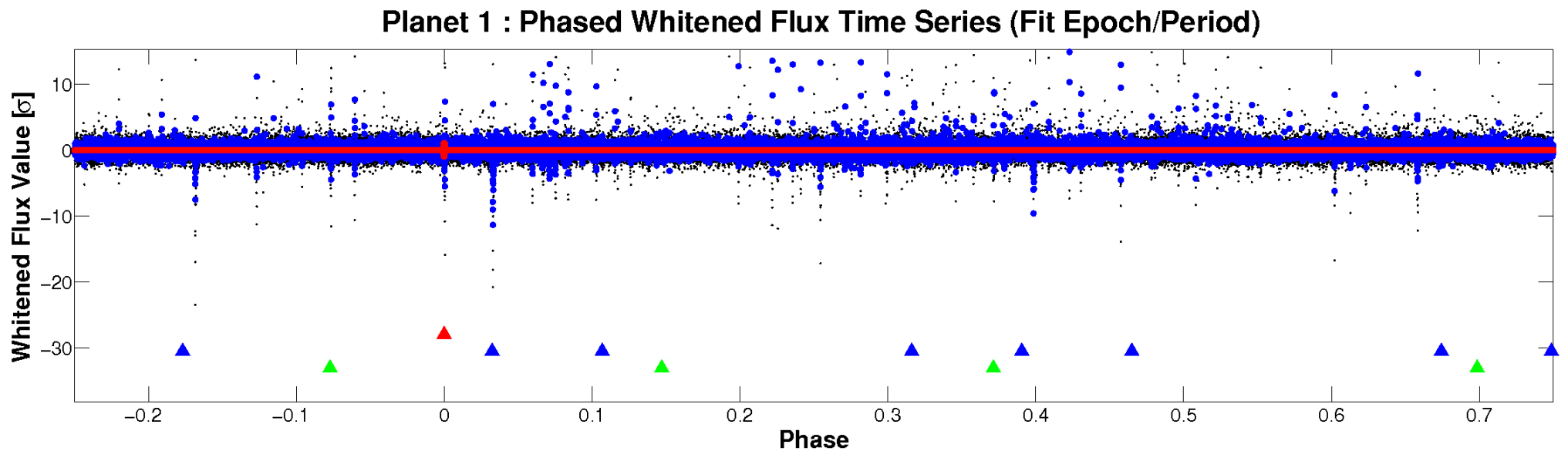
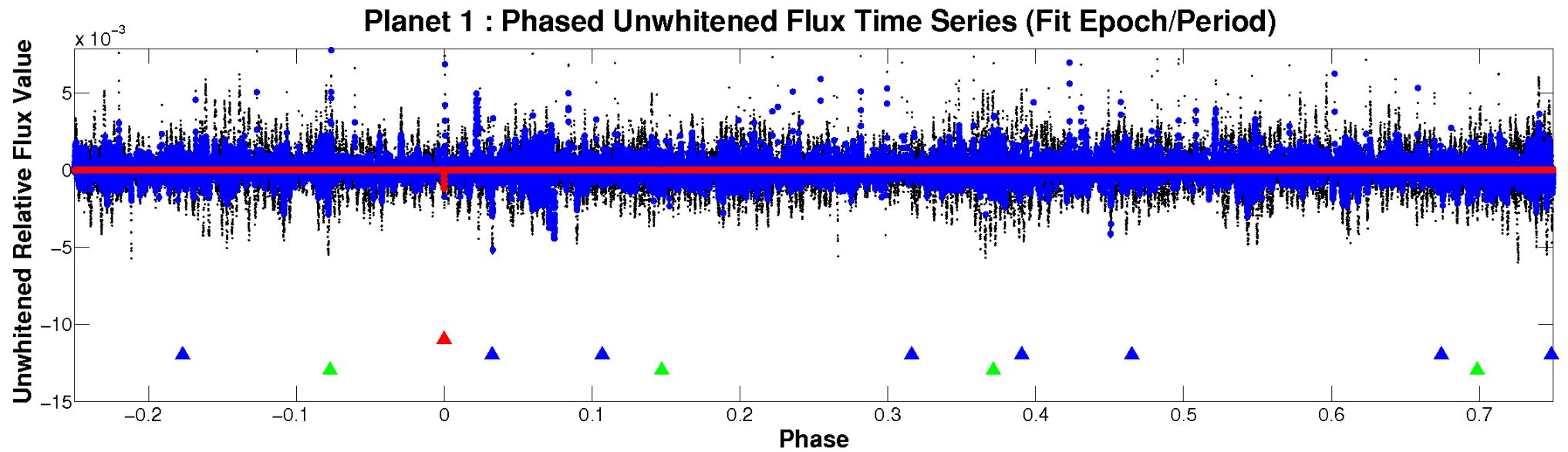


# ALT Odd/Even

TCE 009530170-01

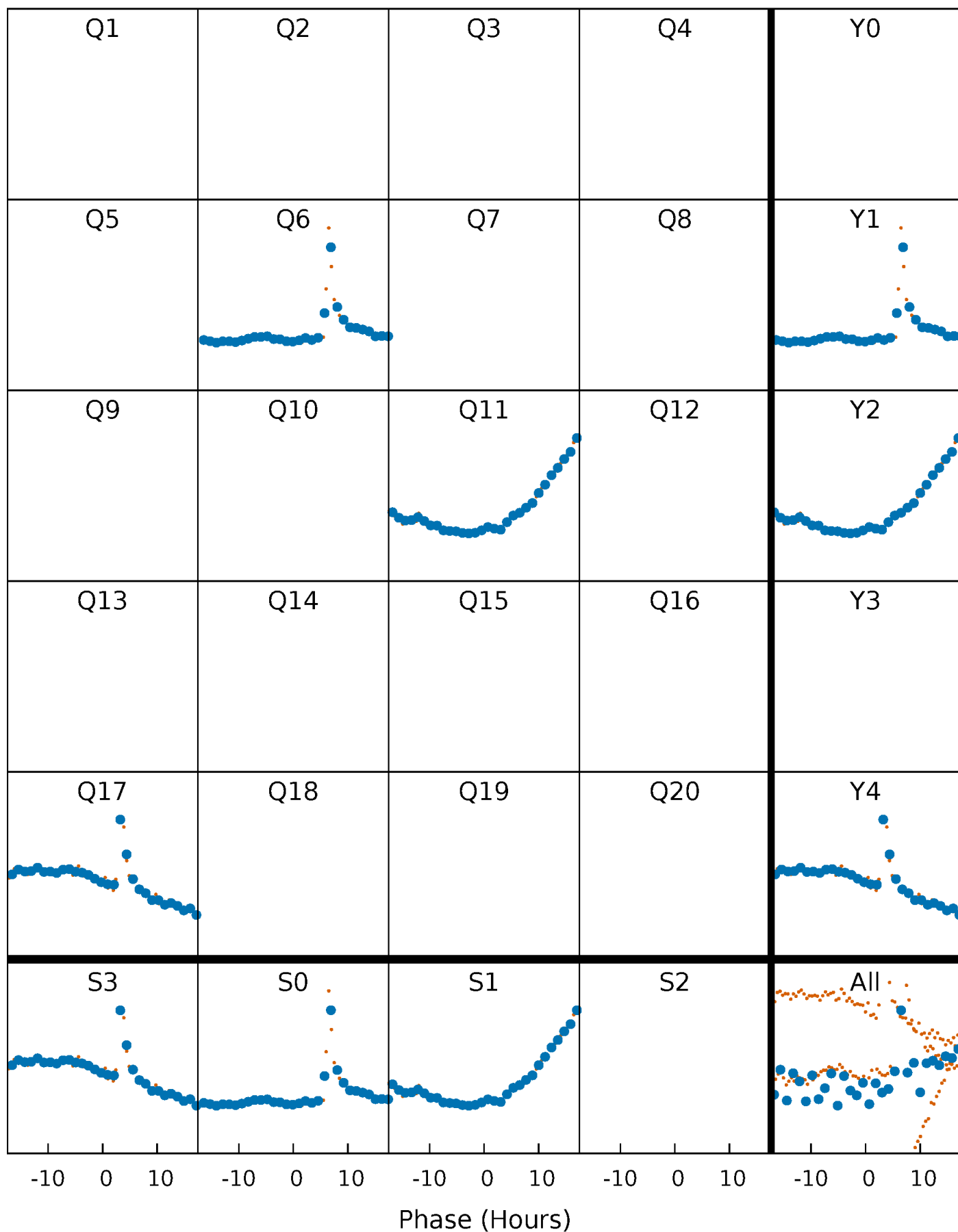


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

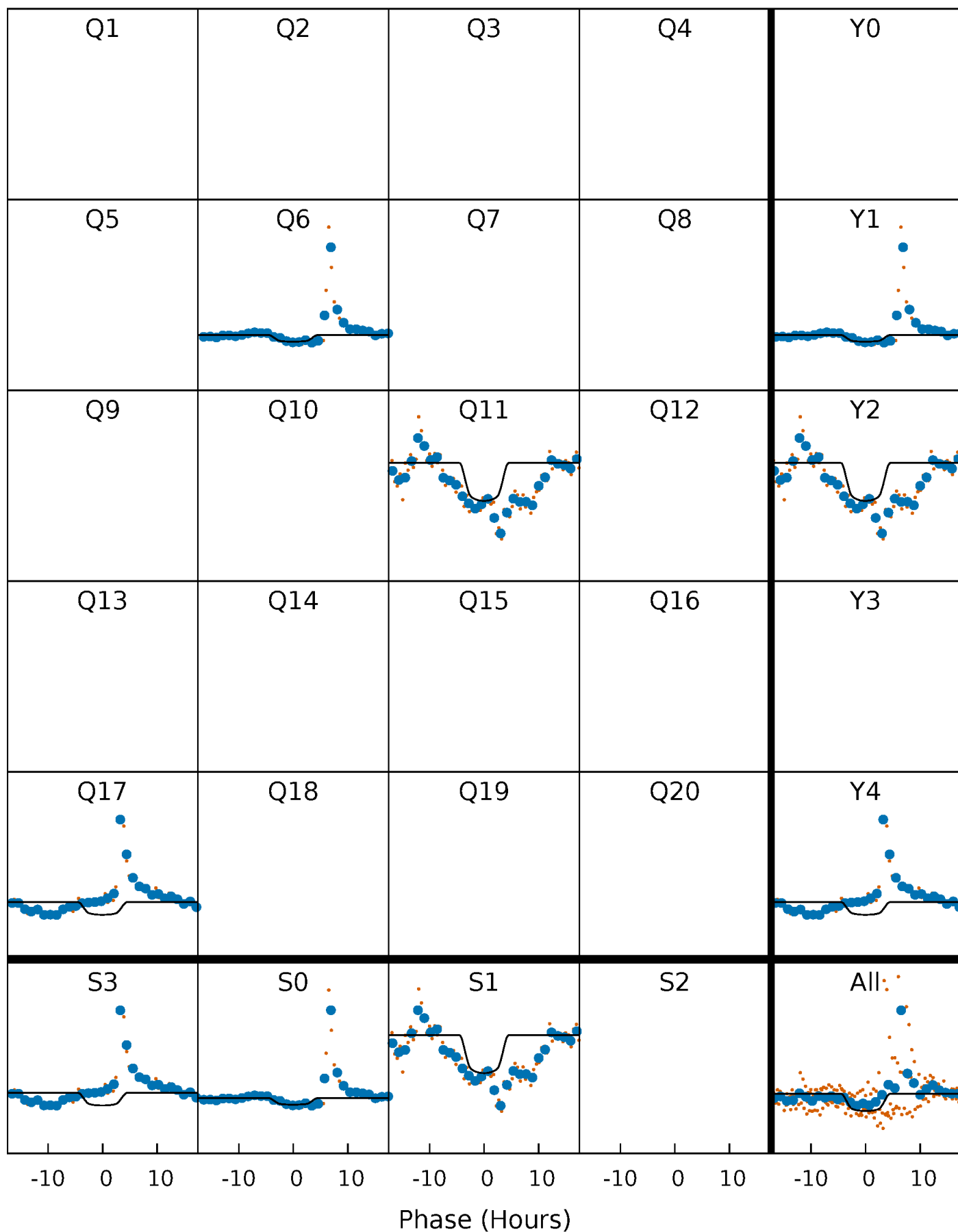
TCE 009530170-01 P=493.748563 Days  $T_0=588.015248$  (BKJD)





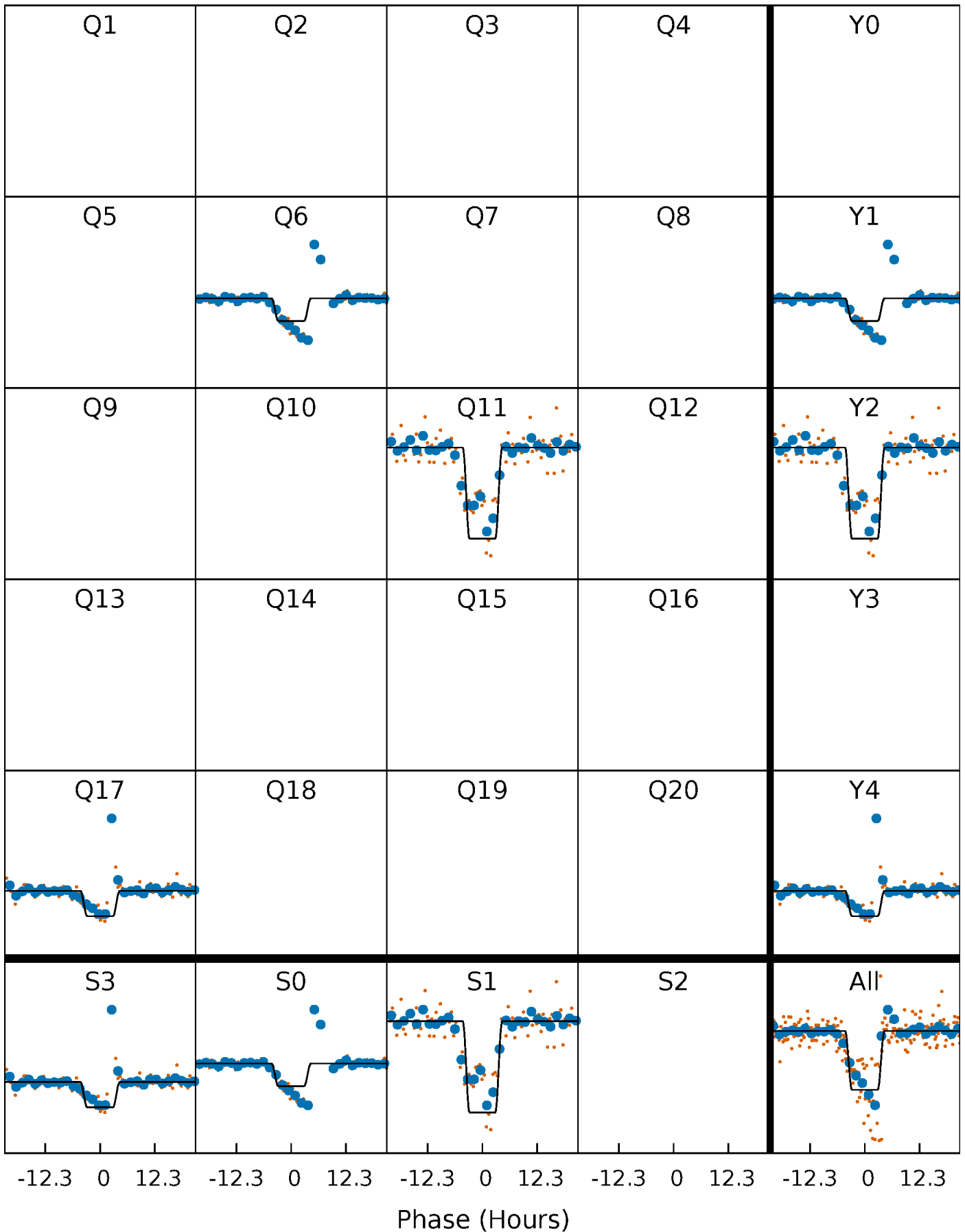
# DV Quarter-Phased Transit Curves

TCE 009530170-01 P=493.748563 Days  $T_0=588.015248$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

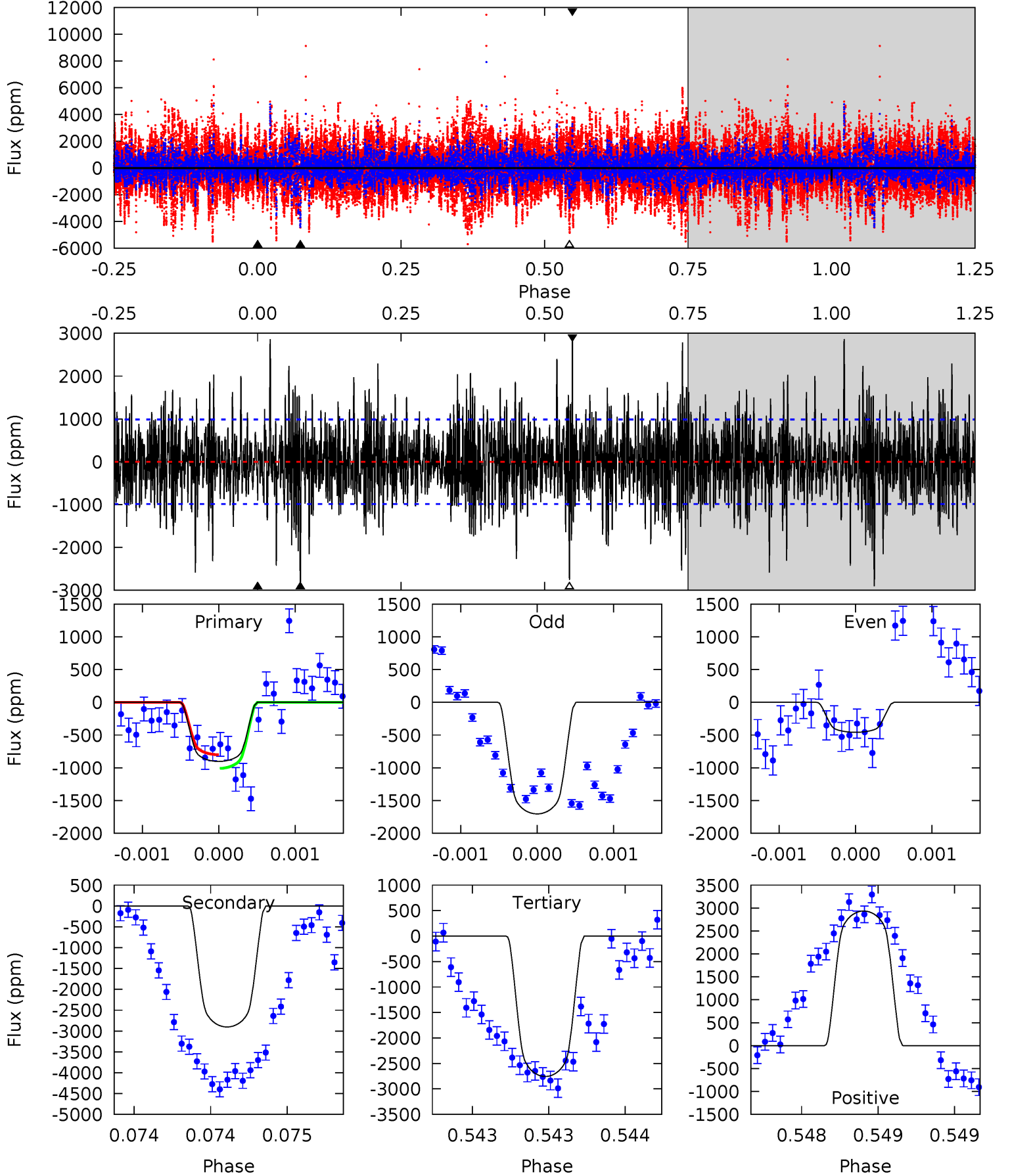
TCE 009530170-01     $P=493.729299$  Days     $T_0=588.090143$  (BKJD)



# DV Model-Shift Uniqueness Test

009530170-01, P = 493.748563 Days, E = 94.266685 Days

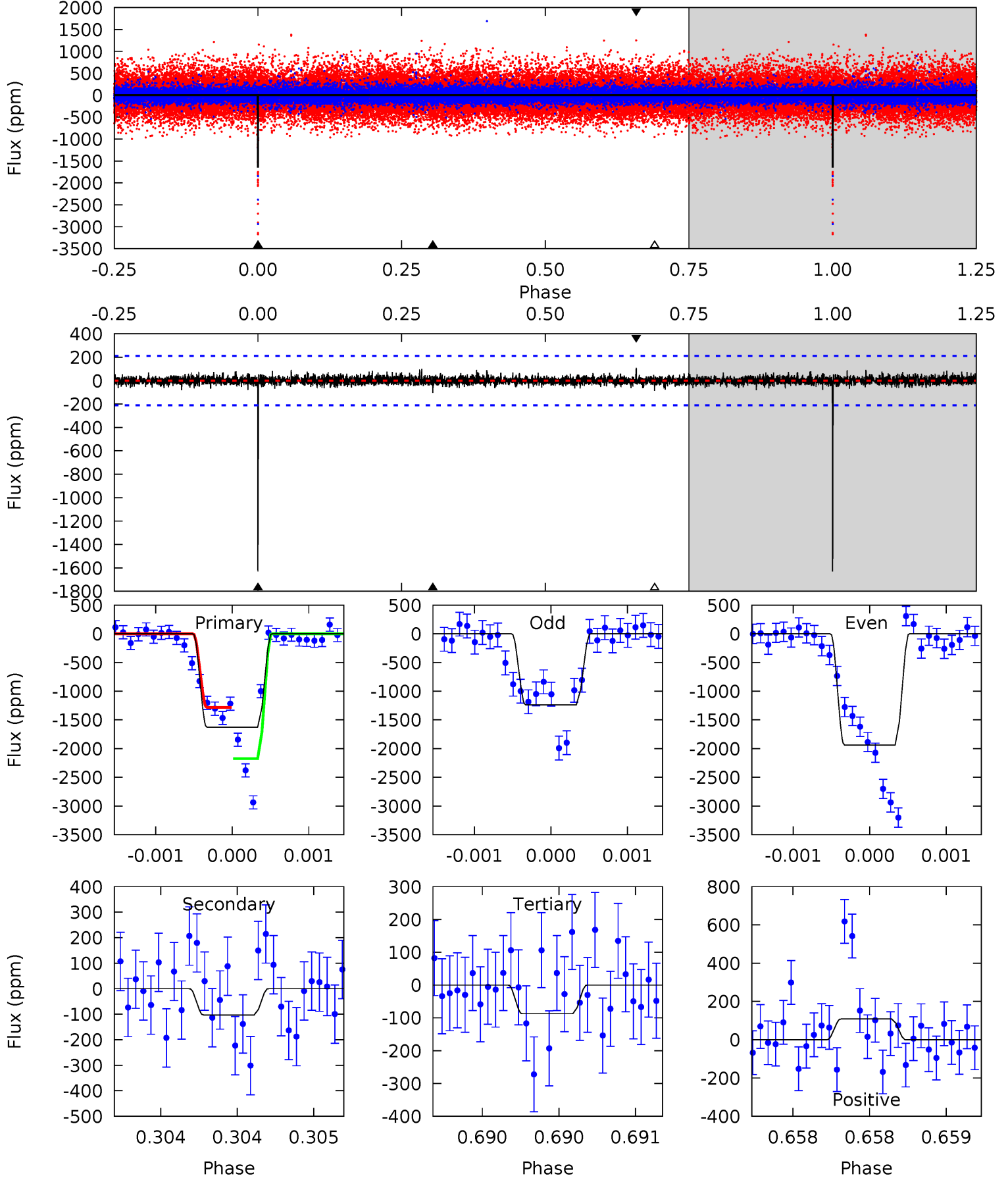
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.04	16.2	15.4	16.4	5.50	3.37	3.97	-10.3	-11.3	0.82	-0.18	3.25	0.61	0.50	0.59



# Alt Model-Shift Uniqueness Test

009530170-01, P = 493.729299 Days, E = 94.360844 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
42.5	2.68	2.27	2.83	5.51	3.38	0.50	40.2	39.6	0.40	-0.15	9.11	1.17	0.06	11.2



### Stellar Parameters For KIC 009530170

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6079^{+164}_{-200}$	$4.427^{+0.087}_{-0.203}$	$-0.300^{+0.300}_{-0.300}$	$0.994^{+0.295}_{-0.126}$	$0.962^{+0.129}_{-0.116}$	$1.381^{+0.606}_{-0.672}$
	+3%/-3%	+2%/-5%	+100%/-100%	+30%/-13%	+13%/-12%	+44%/-49%
Source	PHO1	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 009530170-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-2902 \pm 179$	$4.29^{+0.83}_{-0.76}$	$345^{+24}_{-19}$	$7275^{+783}_{-605}$	$126991^{+57803}_{-41837}$
Alt.	$-103 \pm 38$	$4.65^{+1.03}_{-0.76}$	$344^{+29}_{-19}$	$3495^{+269}_{-313}$	$3674^{+2328}_{-1584}$

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

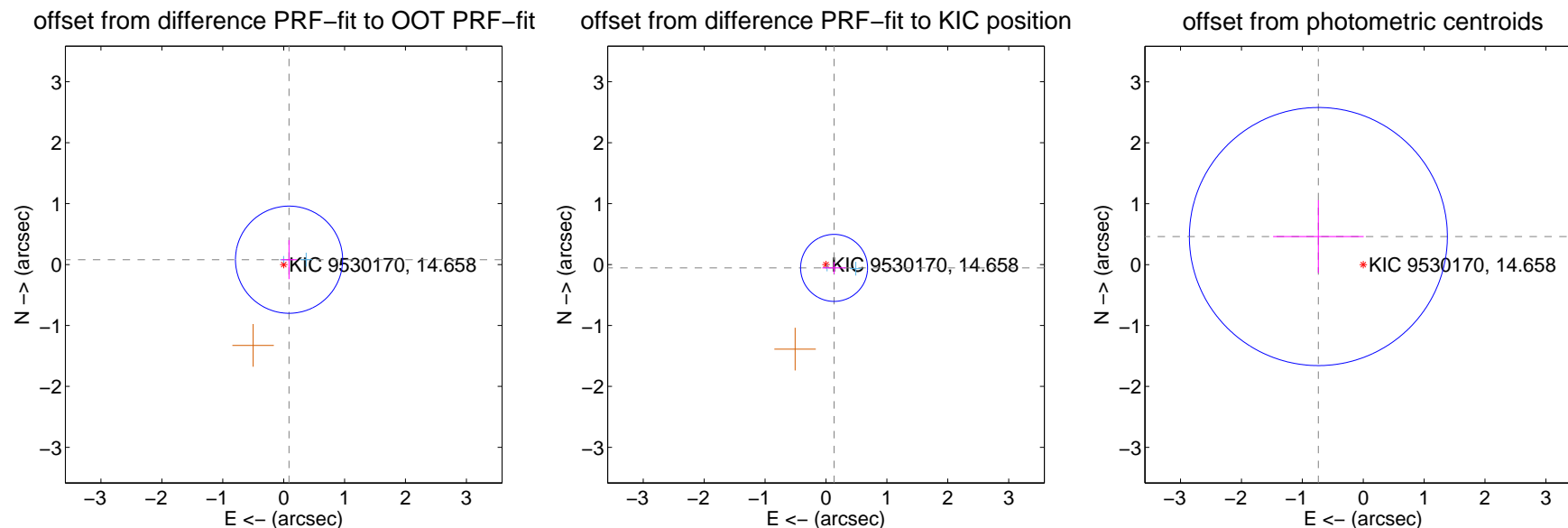
## DV Centroid Data

Supplemental centroid analysis for 009530170-01. Kepler magnitude: 14.66. Transit SNR 5.59

There are 2 quarters with good PRF difference image offsets

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

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.119 \pm 0.293$	0.40	$-0.088 \pm 0.130$	$0.080 \pm 0.319$
PRF-fit source offset from KIC position	$0.144 \pm 0.183$	0.79	$-0.133 \pm 0.194$	$-0.055 \pm 0.097$
photometric centroid source offset	$0.87 \pm 0.71$	1.23	$0.74 \pm 0.74$	$0.46 \pm 0.60$



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.

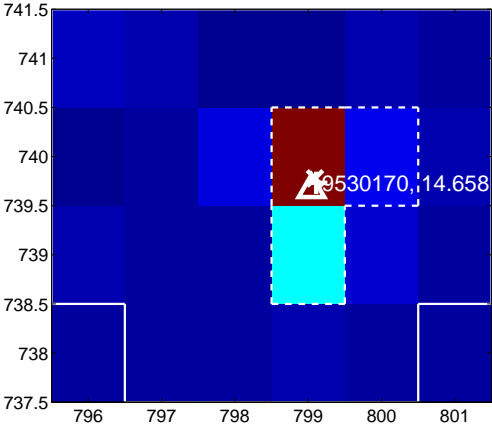
Q5 no difference image



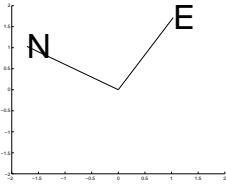
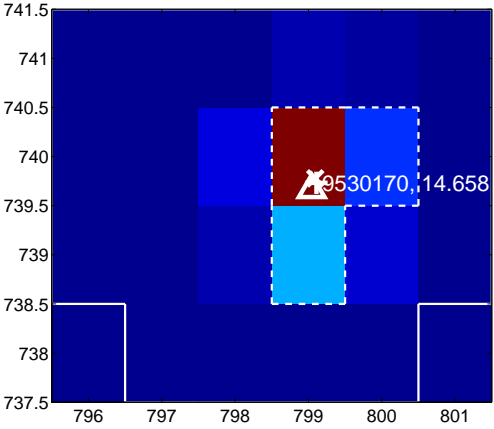
Q5 no OOT image



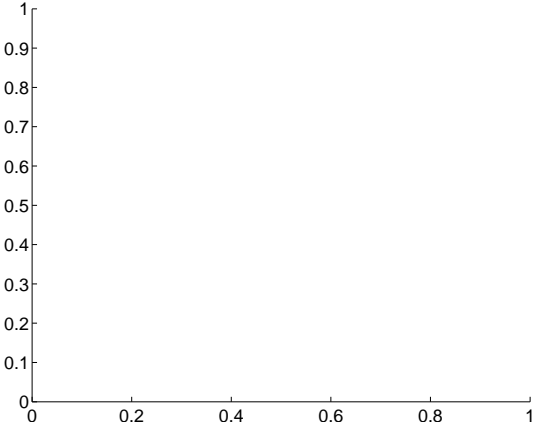
Q6 difference image



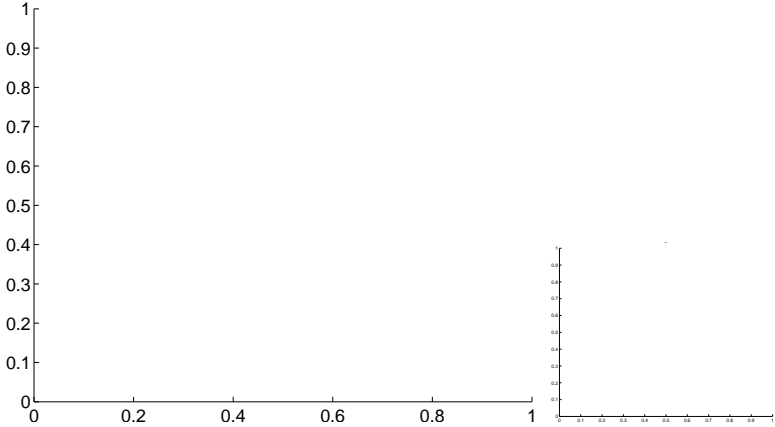
Q6 OOT image



Q7 no difference image



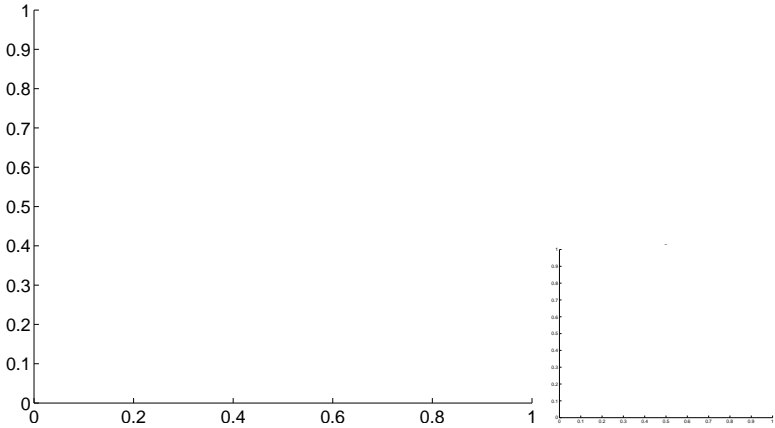
Q7 no OOT image



Q8 no difference image



Q8 no OOT image





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

Q9 no difference image



Q9 no OOT image



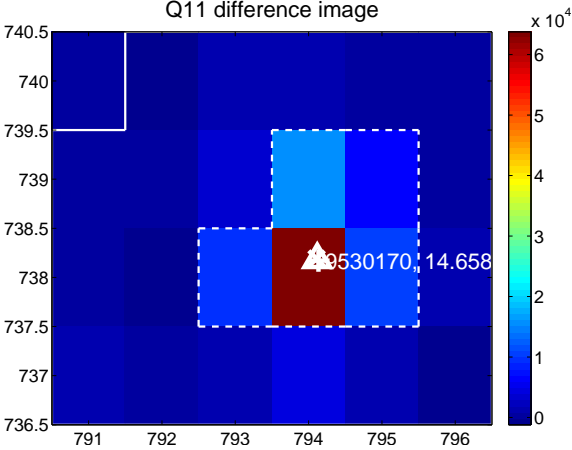
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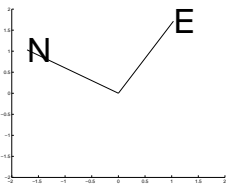
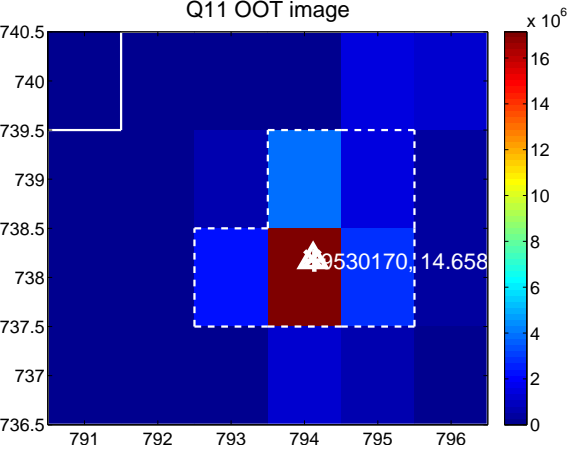
Q10 no OOT image



Q11 difference image



Q11 OOT image



Q12 no difference image



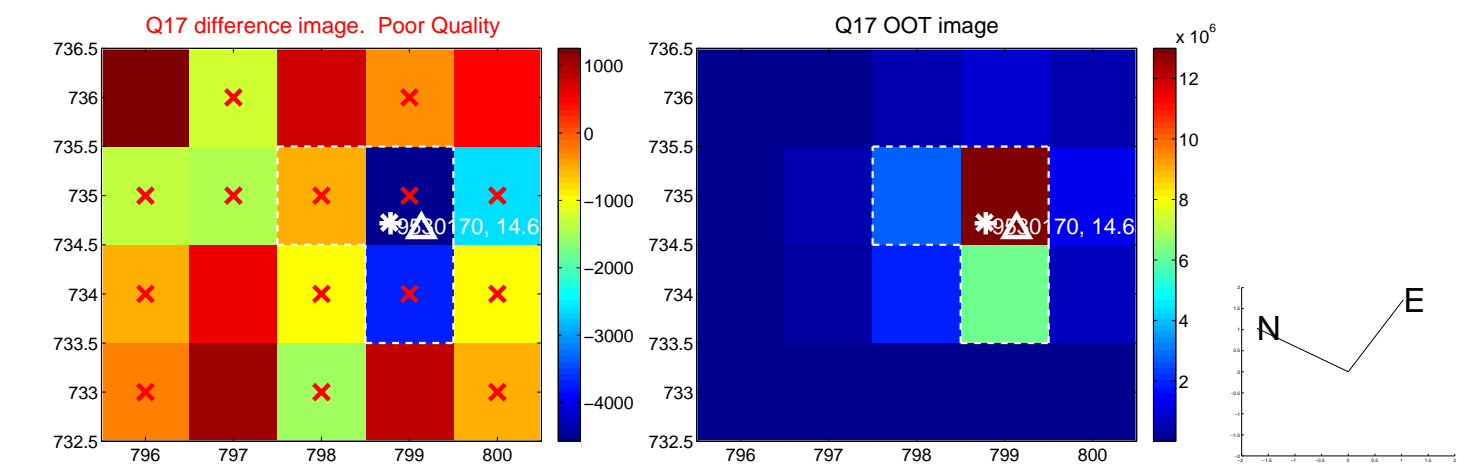
Q12 no OOT image



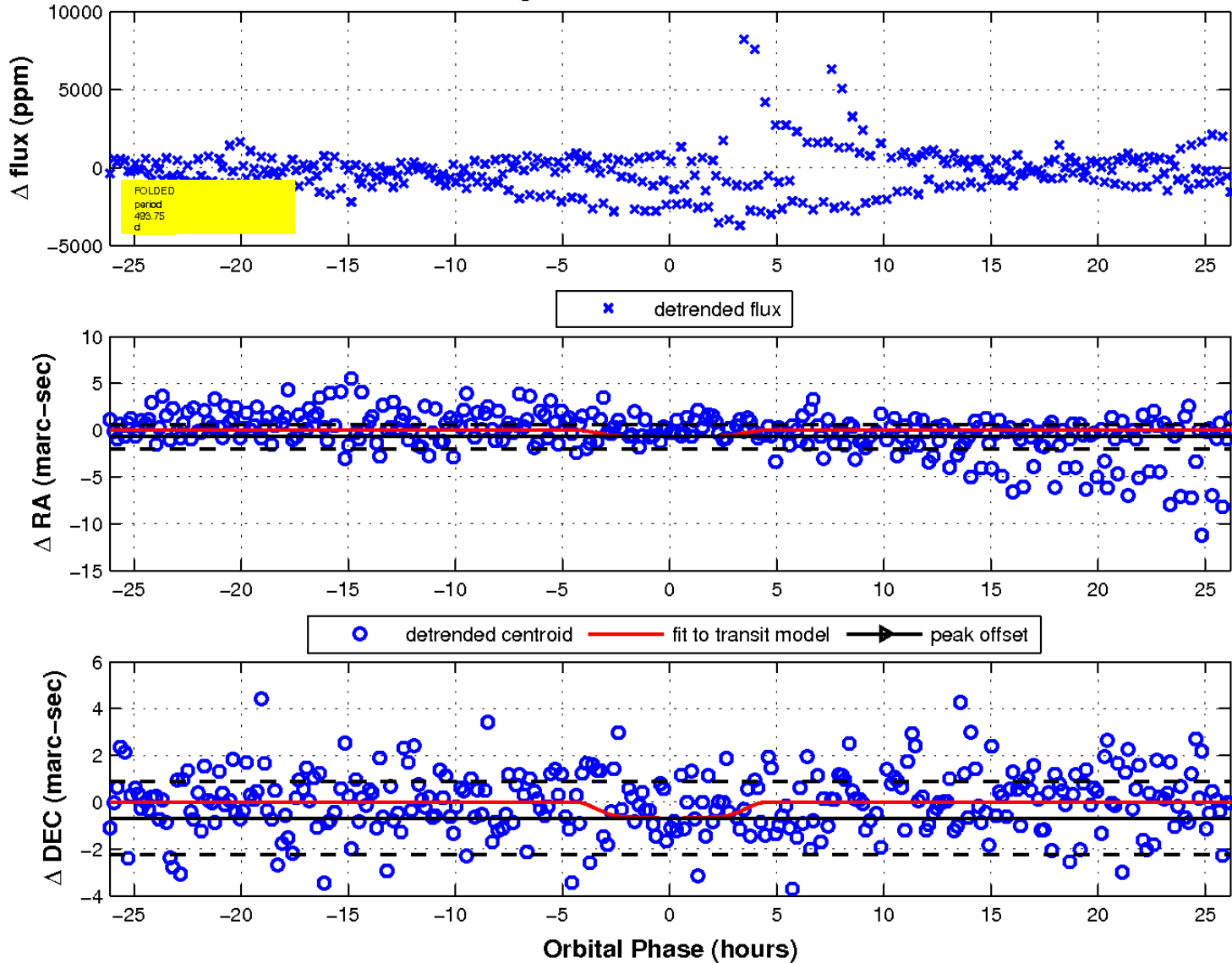
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

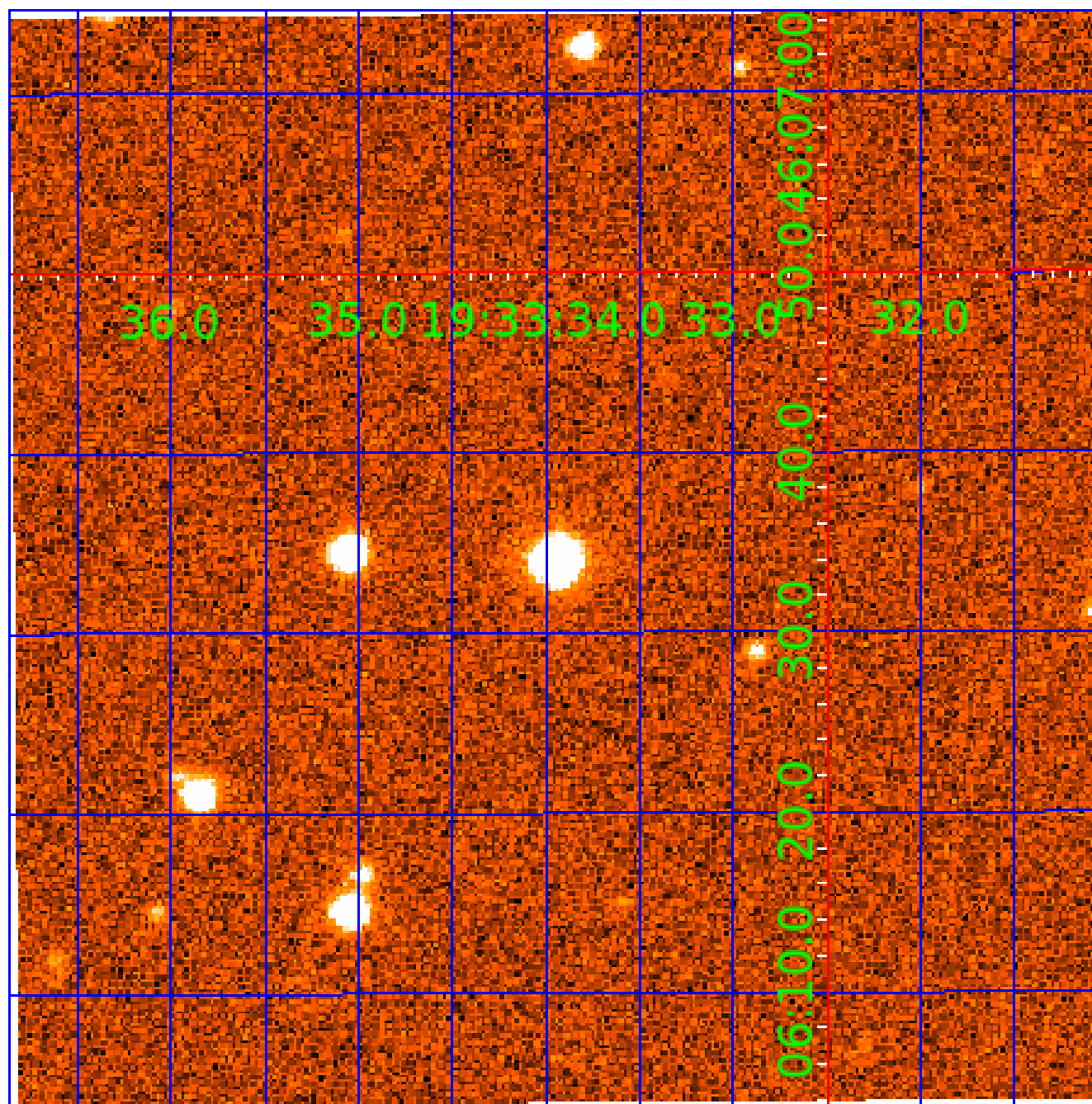


fluxWeightedCentroids, Planet 1 of 3



# UKIRT Image

Declination



# KIC 009530170

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
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## Robovetter Results

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009530170-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—INCONSISTENT_TRANS
009530170-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS

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

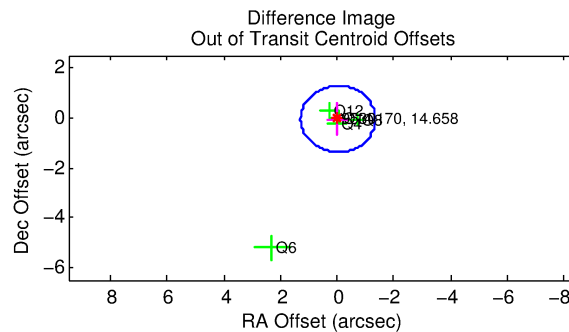
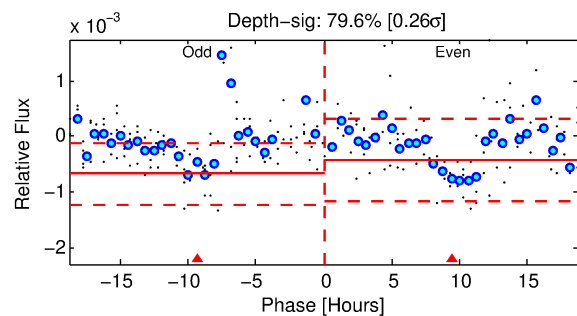
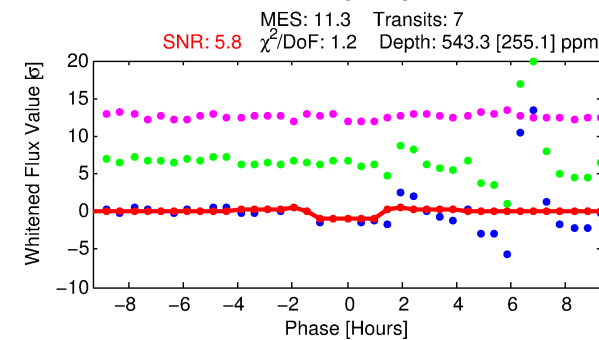
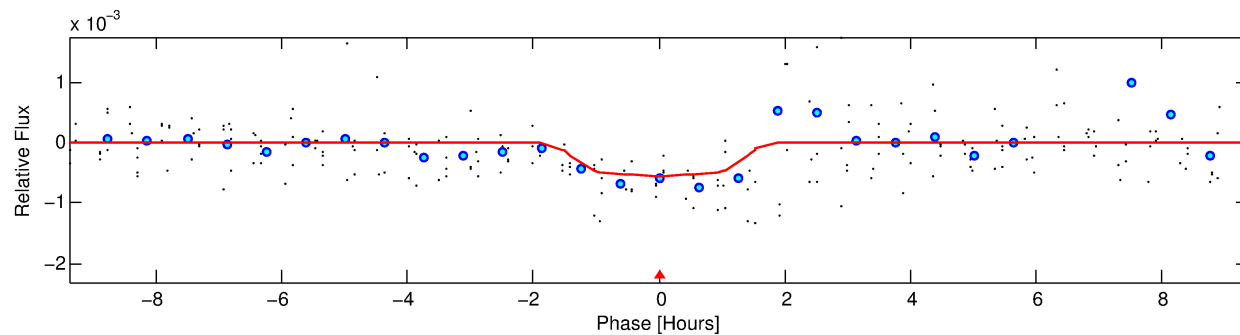
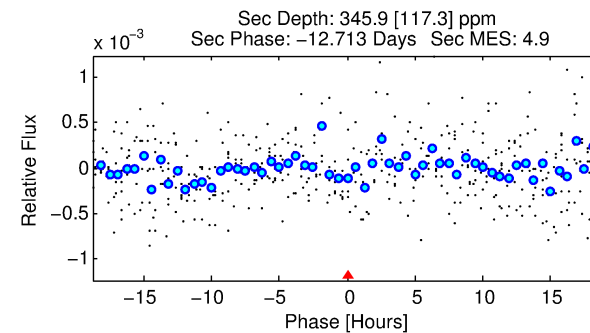
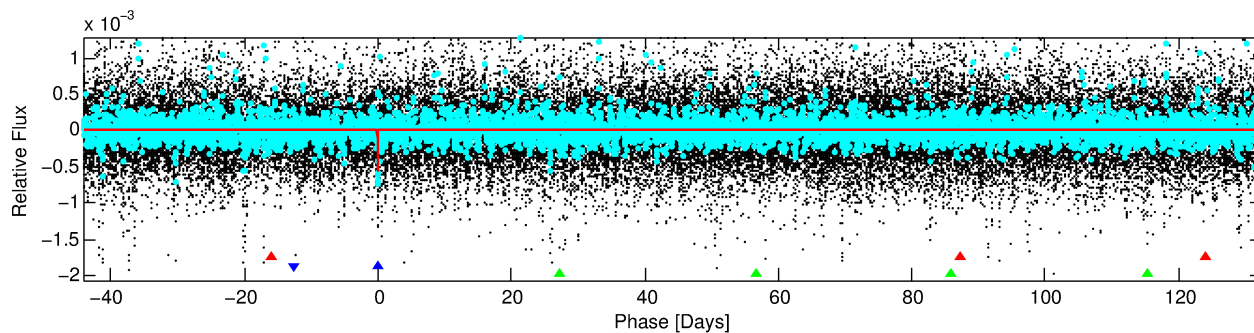
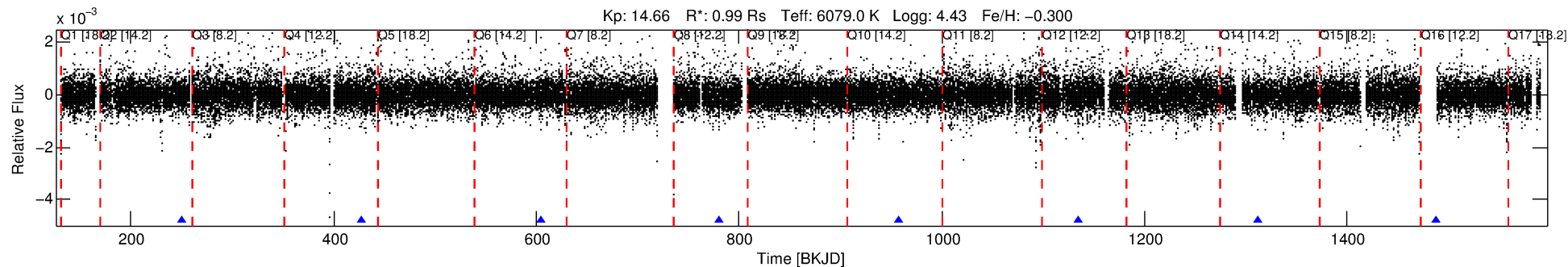
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## Ephemeris Match Information For 009530170-02

No Significant Match Found

# DV One-Page Summary

KIC: 9530170 Candidate: 2 of 3 Period: 176.833 d



## DV Fit Results:

Period = 176.83252 [0.00484] d  
Epoch = 250.3733 [0.0179] BKJD  
Rp/R\* = 0.0246 [0.1003]  
a/R\* = 232.41 [4921.36]  
b = 0.87 [5.90]  
Seff = 3.26 [1.28]  
Teq = 343 [34] K  
Rp = 2.67 [10.90] Re  
a = 0.6091 [0.1534] AU  
Ag = 9920.59 [81041.52] [0.12σ]  
Teffp = 5286 [10787] K [0.46σ]

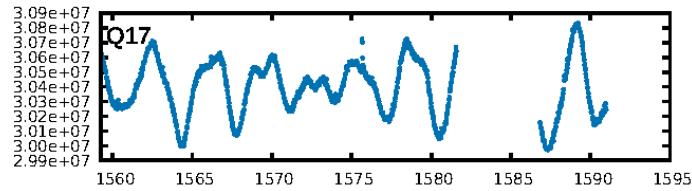
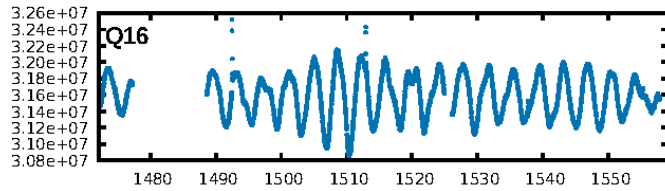
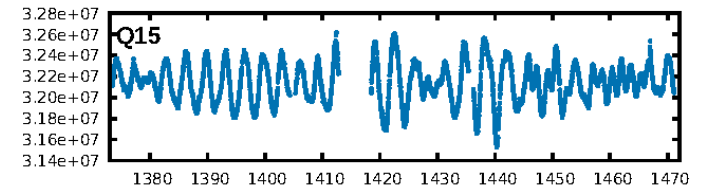
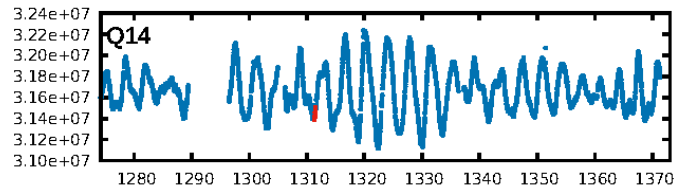
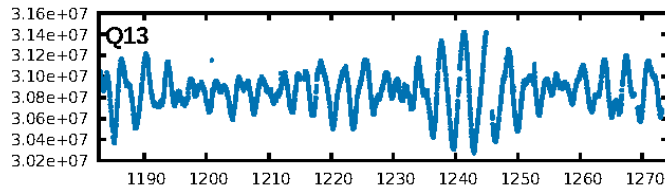
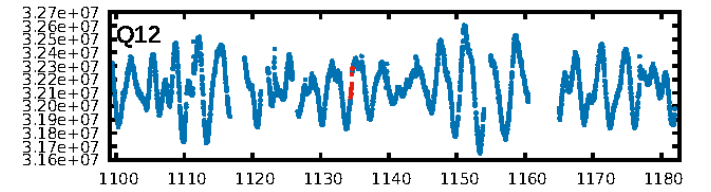
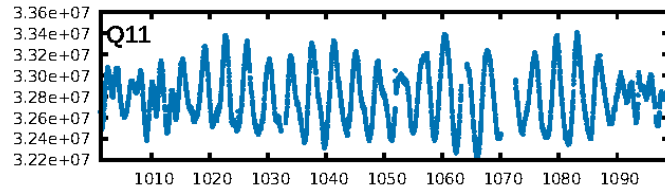
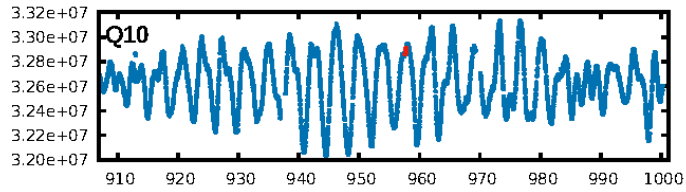
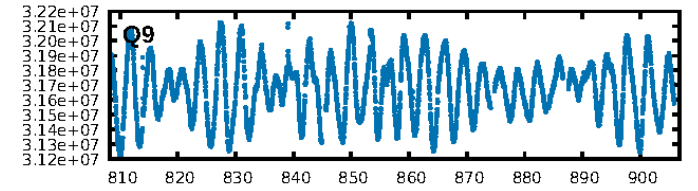
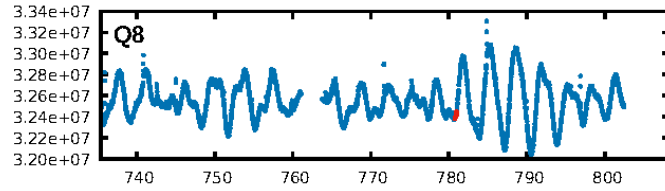
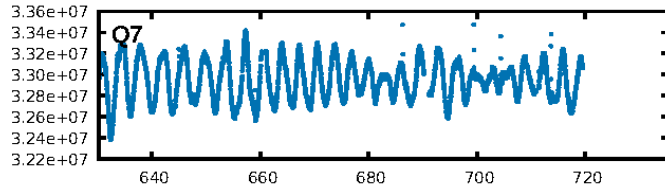
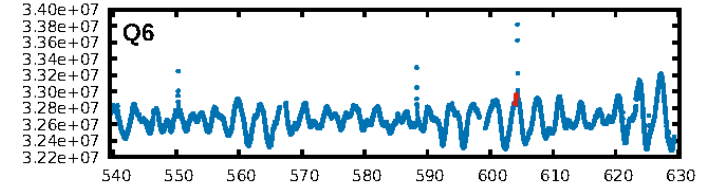
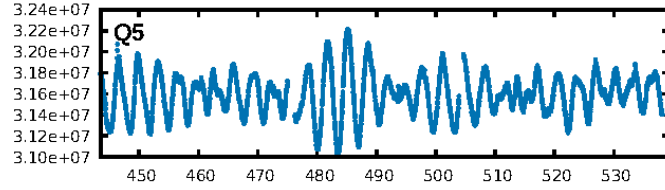
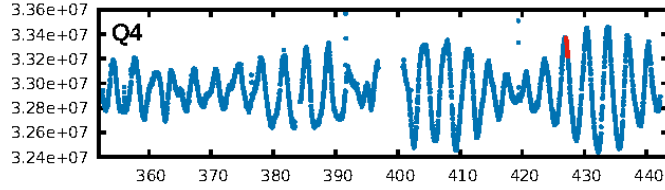
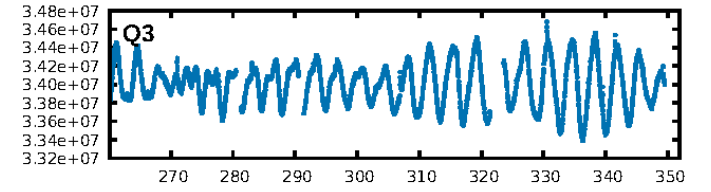
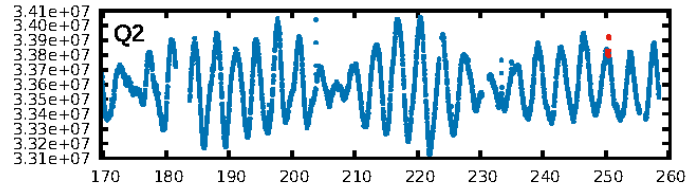
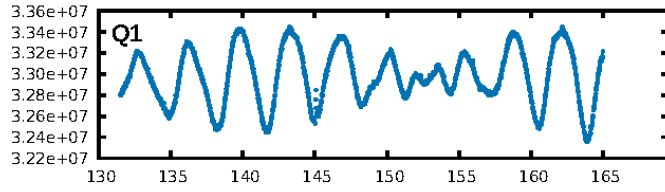
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [1100.33σ]  
ModelChiSquare2-sig: 17.3%  
ModelChiSquareGof-sig: 94.8%  
**Bootstrap-pfa: 1.72e-12**  
RollingBand-fgt: 1.00 [7/7]  
GhostDiagnostic-chr: 1.198  
Centroid-sig: 87.8%  
Centroid-so: 0.242 arcsec [0.18σ]  
OotOffset-rm: 0.057 arcsec [0.13σ]  
OotOffset-st: 2/0/3/0 [5]  
KicOffset-rm: 0.151 arcsec [0.22σ]  
KicOffset-st: 2/0/3/0 [5]  
DiffImageQuality-fgm: 0.60 [3/5]  
DiffImageOverlap-fno: 1.00 [7/7]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 13:24:59 Z

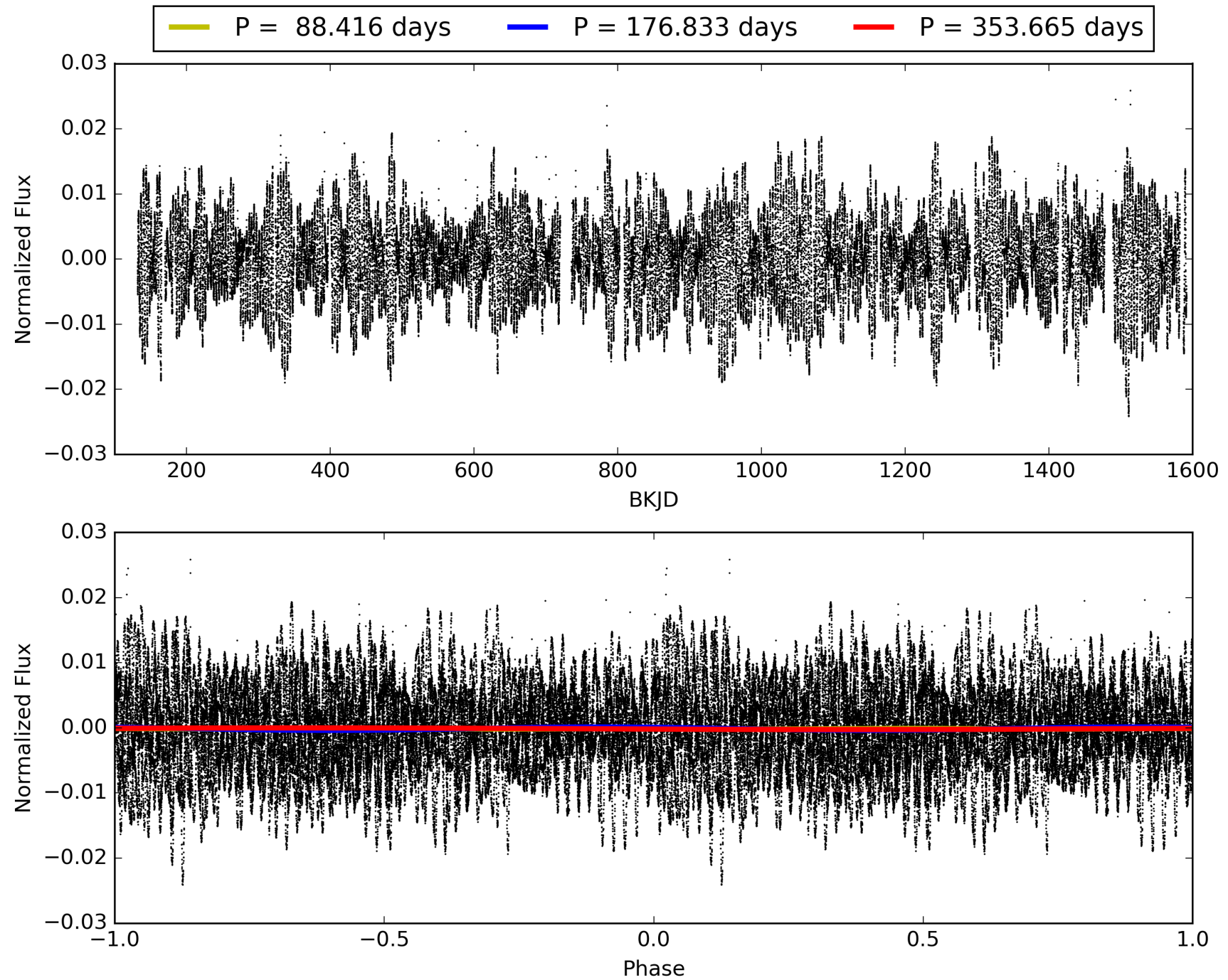
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 009530170-02, PDC Light Curves





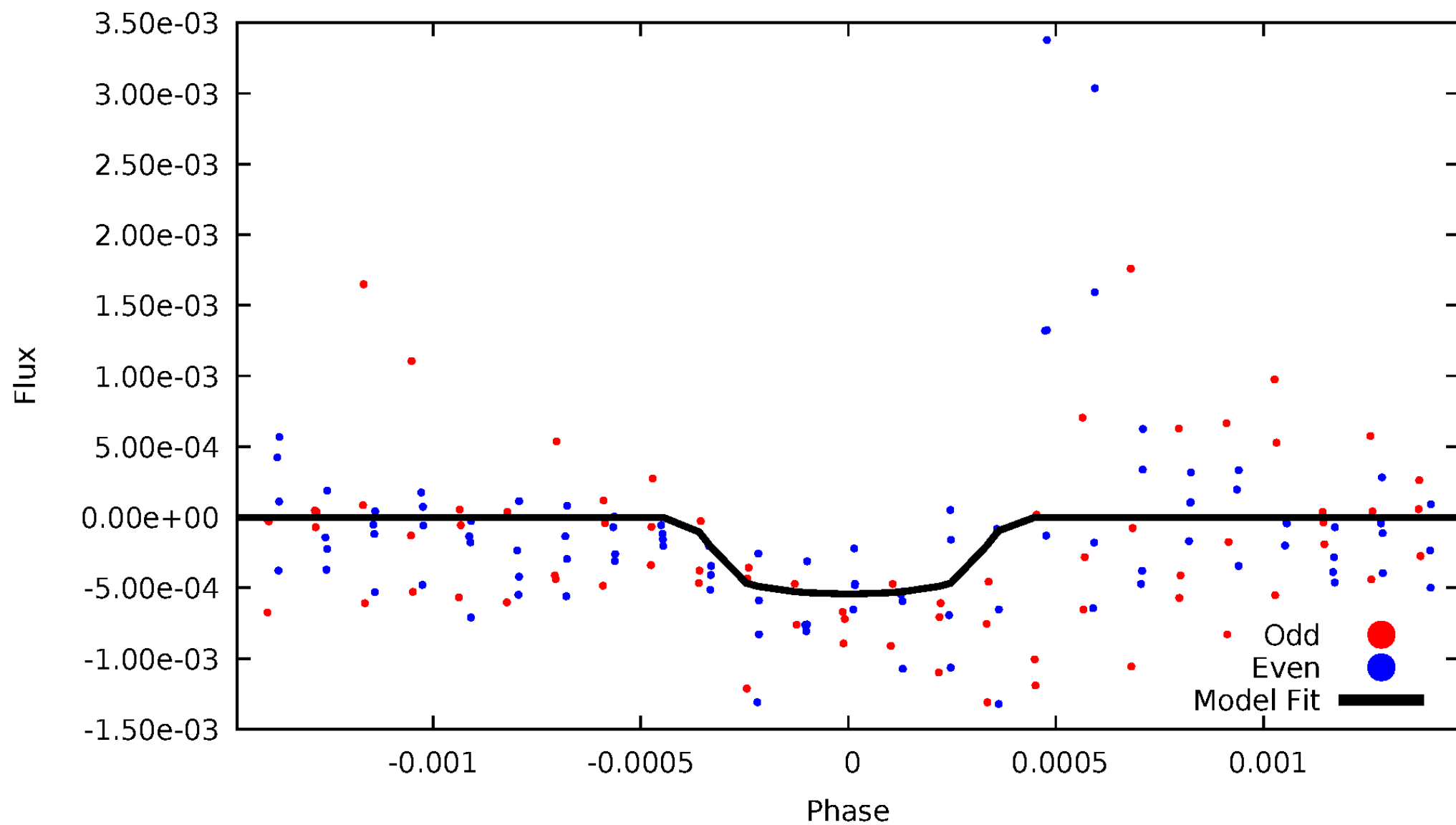
TCE 009530170-02





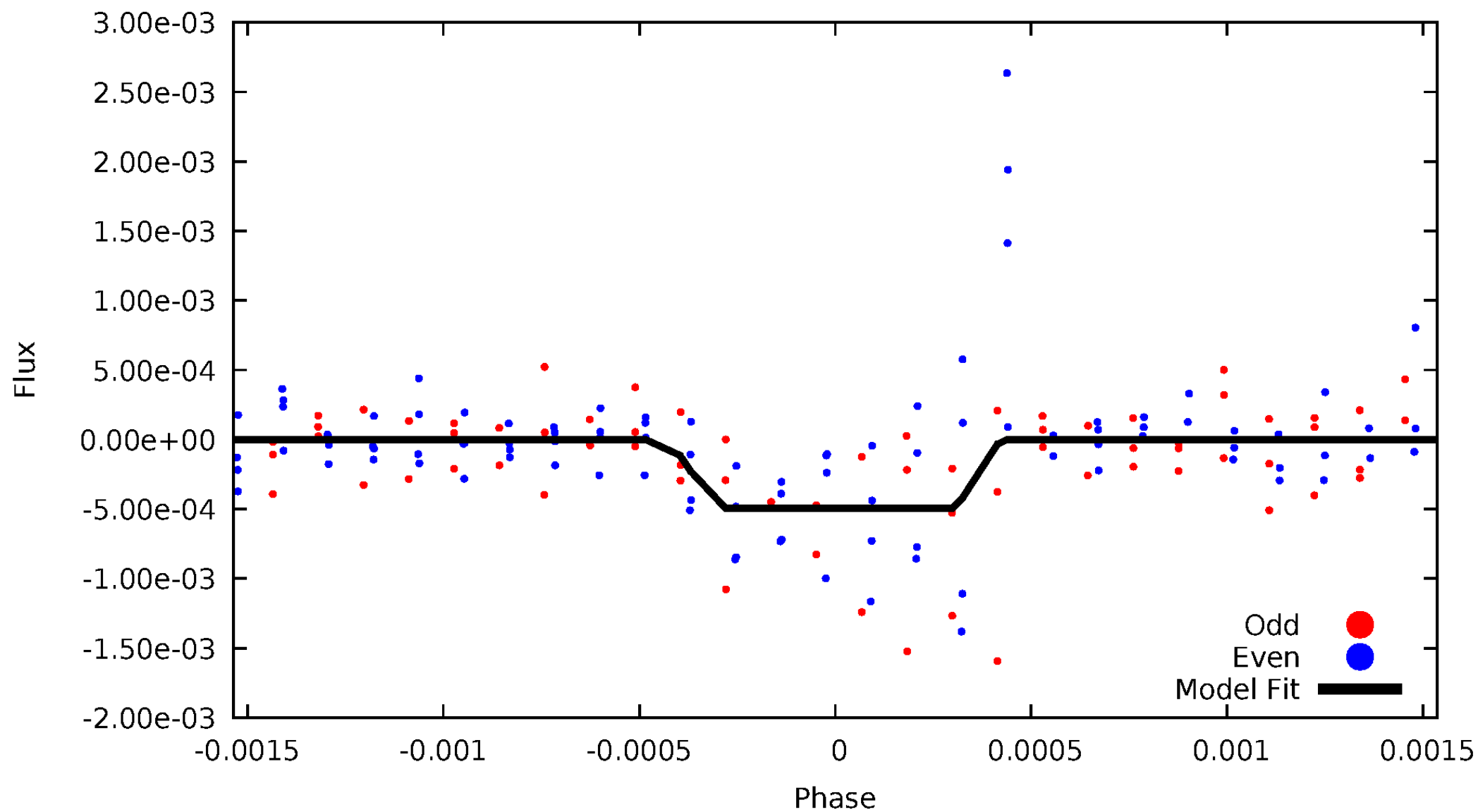
# DV Odd/Even

TCE 009530170-02



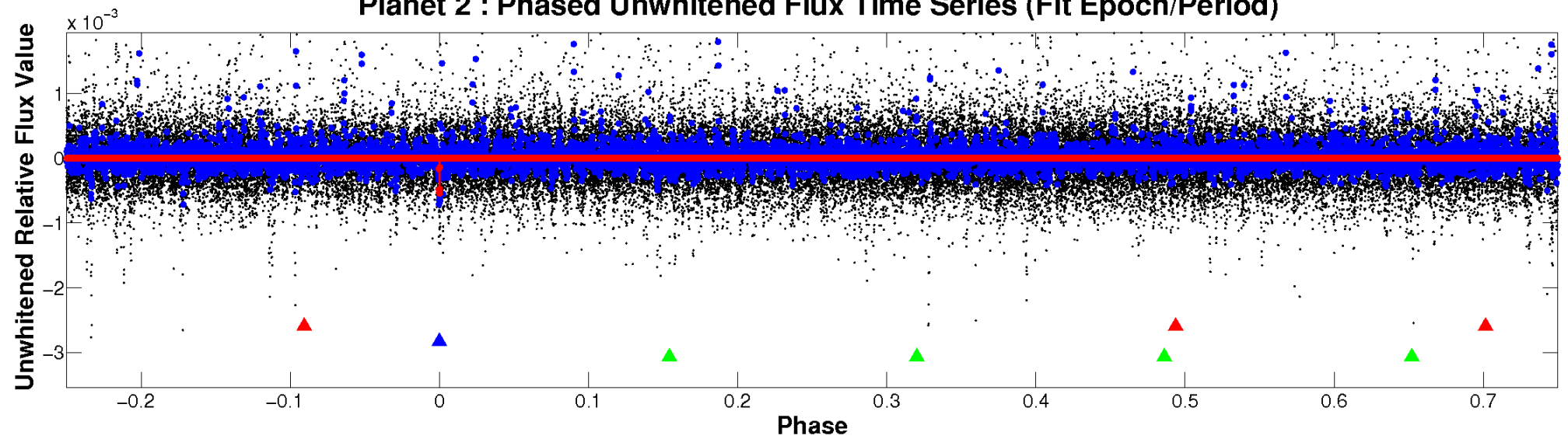
# ALT Odd/Even

TCE 009530170-02

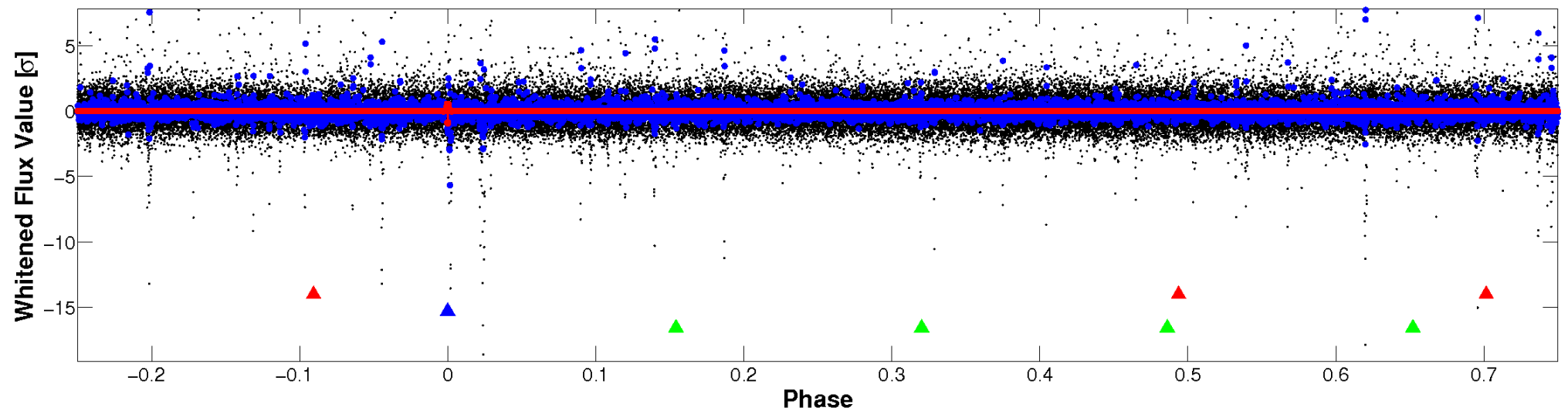


# Non-Whitened Vs. Whitened Light Curve

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

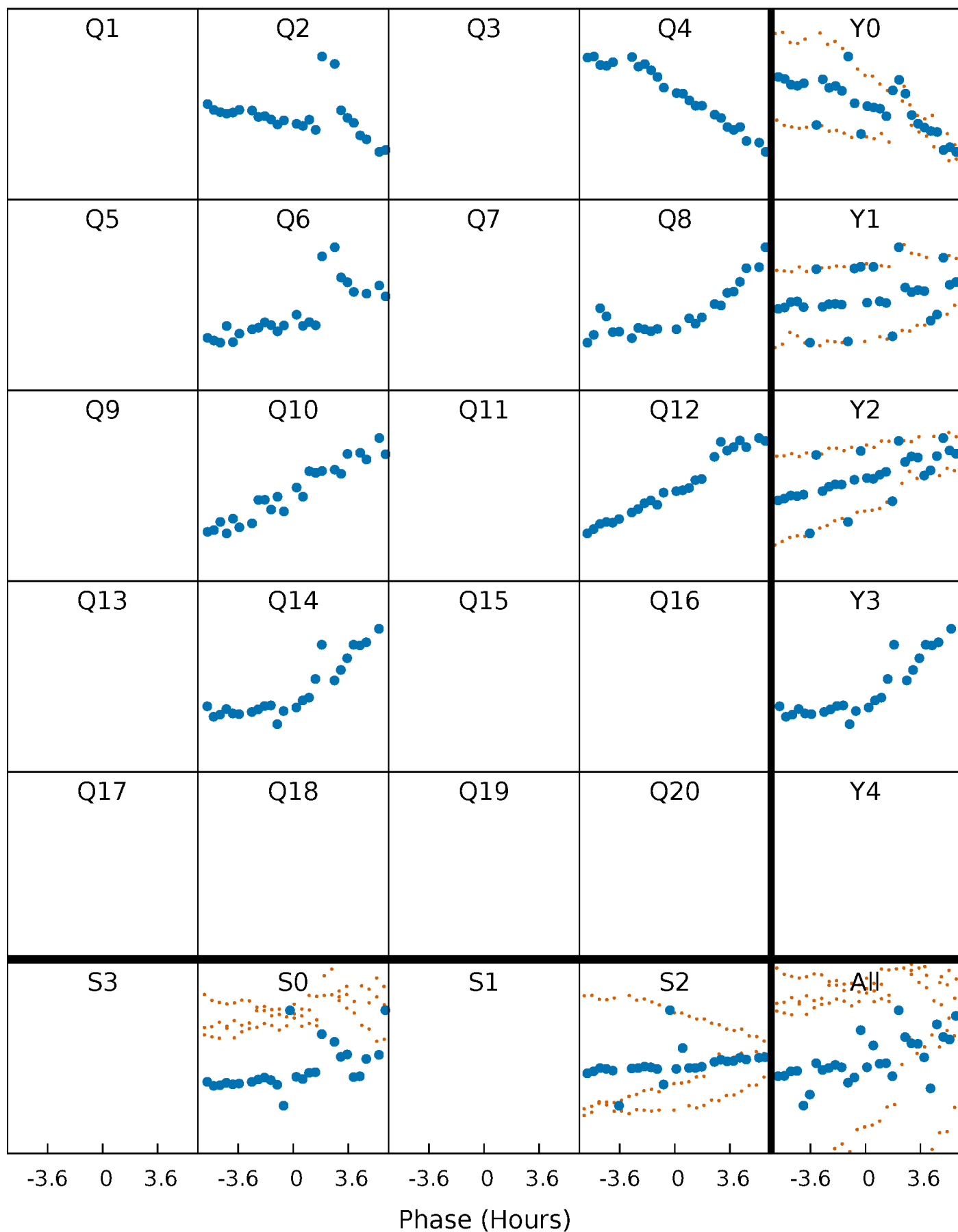


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



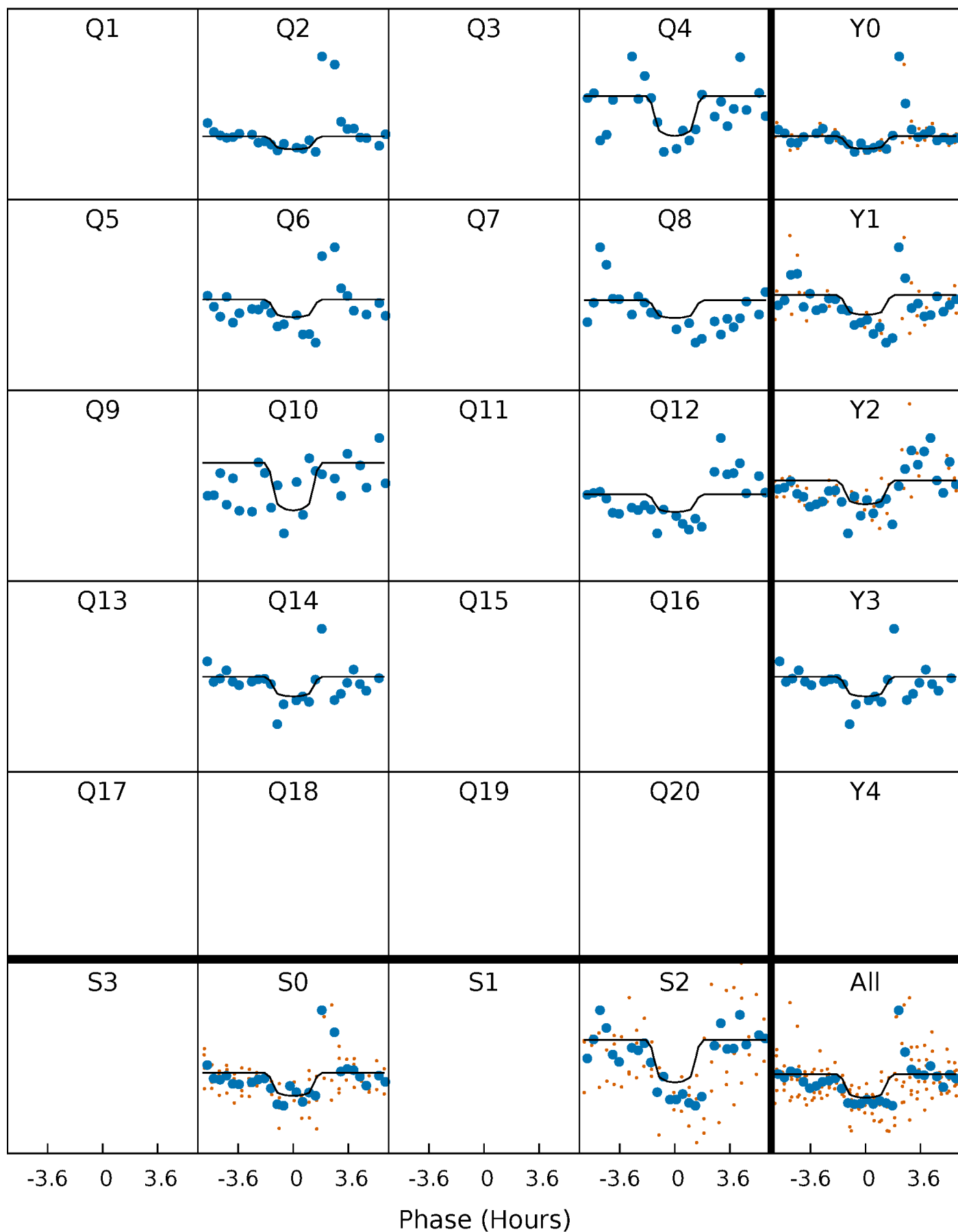
# PDC Quarter-Phased Transit Curves

TCE 009530170-02 P=176.832521 Days  $T_0=250.373252$  (BKJD)



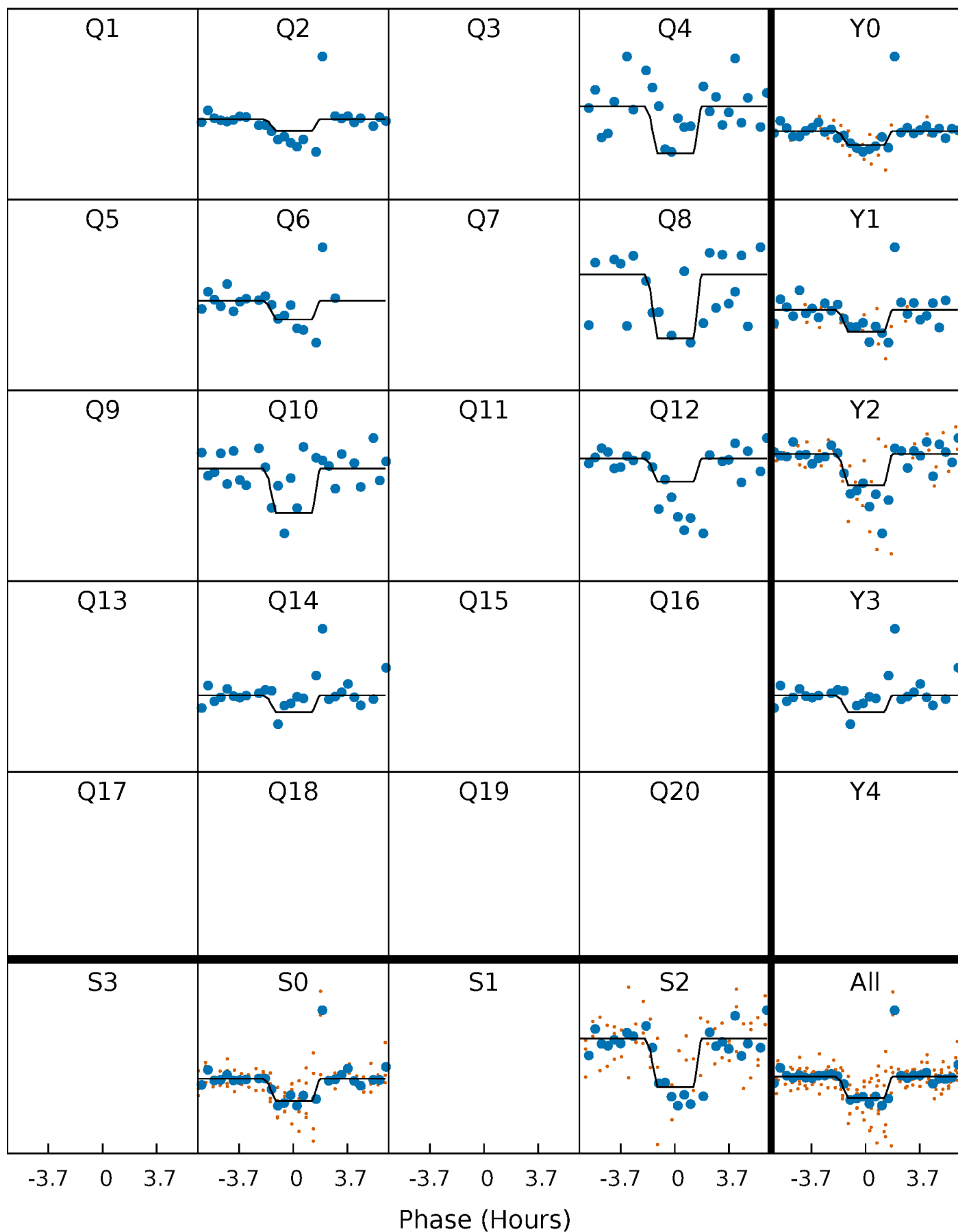
# DV Quarter-Phased Transit Curves

TCE 009530170-02     $P=176.832521$  Days     $T_0=250.373252$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

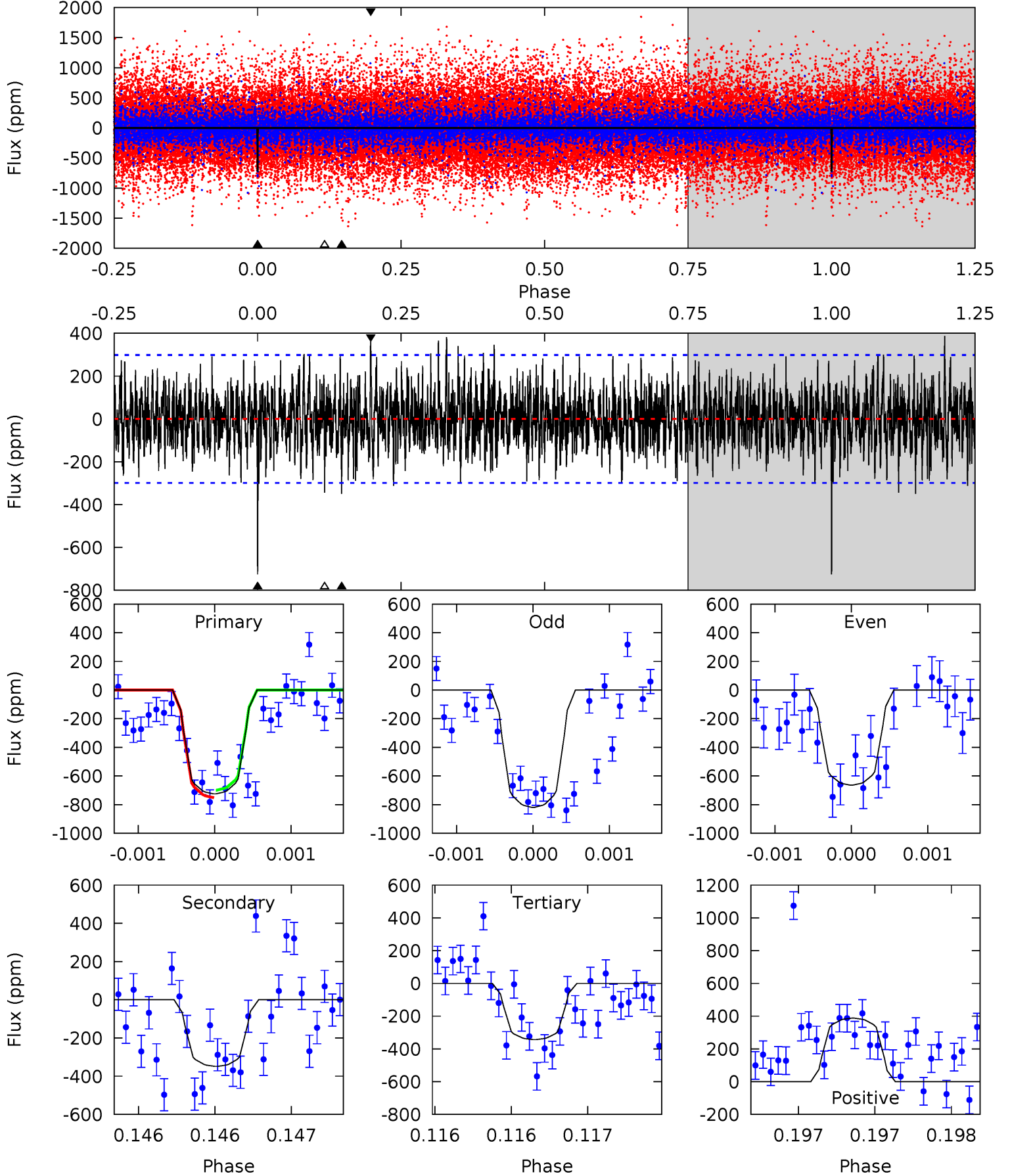
TCE 009530170-02 P=176.832309 Days  $T_0=250.380417$  (BKJD)



# DV Model-Shift Uniqueness Test

009530170-02, P = 176.832521 Days, E = 73.540731 Days

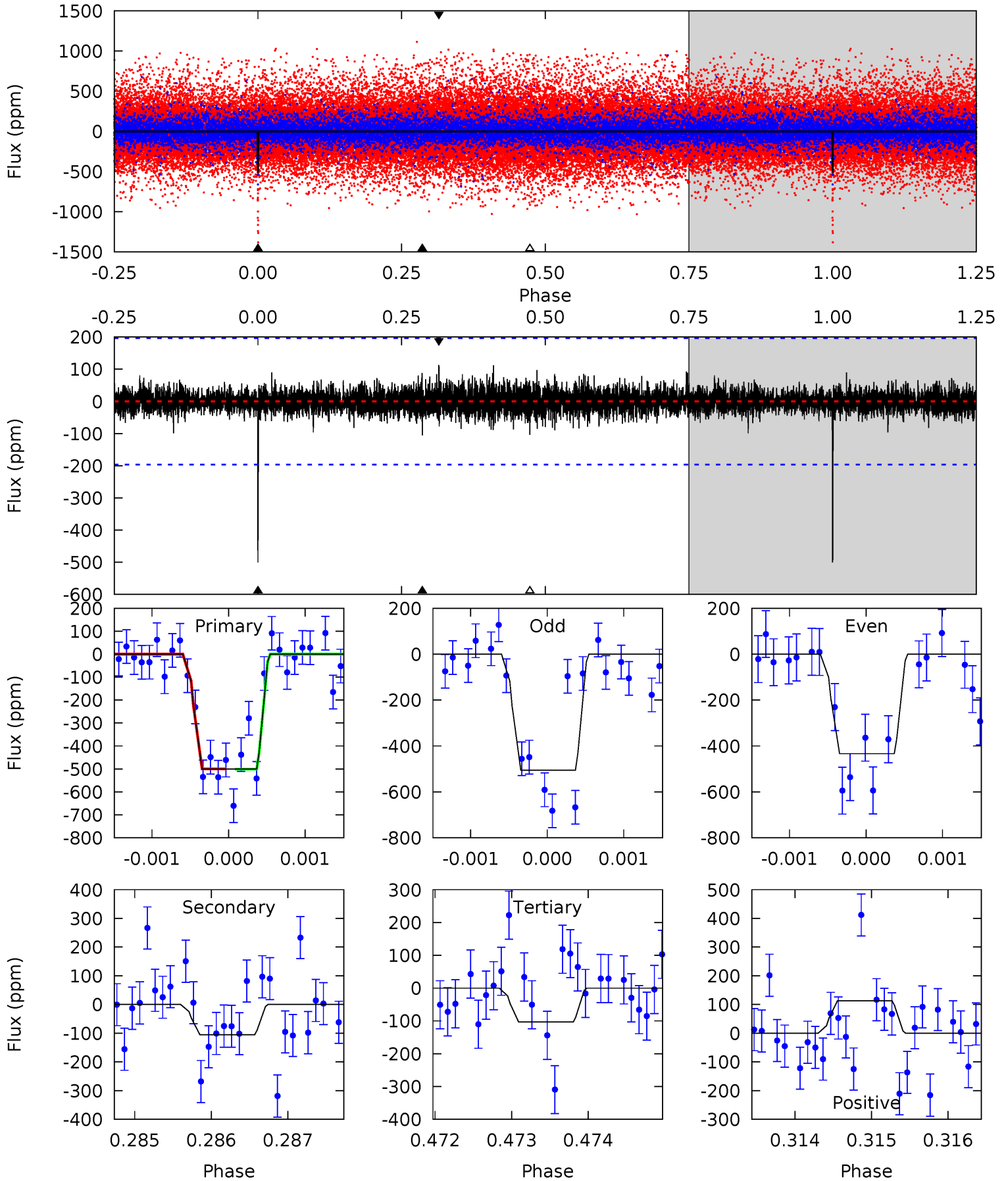
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
13.3	6.41	6.31	7.12	5.49	3.35	1.88	7.01	6.19	0.10	-0.72	1.38	0.90	0.35	0.48



# Alt Model-Shift Uniqueness Test

009530170-02,  $P = 176.832309$  Days,  $E = 73.548108$  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
14.0	2.95	2.89	3.16	5.49	3.35	0.68	11.1	10.8	0.05	-0.21	0.96	1.55	0.18	0.02





### Stellar Parameters For KIC 009530170

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6079^{+164}_{-200}$	$4.427^{+0.087}_{-0.203}$	$-0.300^{+0.300}_{-0.300}$	$0.994^{+0.295}_{-0.126}$	$0.962^{+0.129}_{-0.116}$	$1.381^{+0.606}_{-0.672}$
	+3%/-3%	+2%/-5%	+100%/-100%	+30%/-13%	+13%/-12%	+44%/-49%
Source	PHO1	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 009530170-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-349 \pm 54$	$9.30^{+8.80}_{-6.22}$	$483^{+37}_{-26}$	$3430^{+1660}_{-632}$	$804^{+6908}_{-594}$
Alt.	$-105 \pm 36$	$8.44^{+8.76}_{-5.95}$	$486^{+36}_{-28}$	$2931^{+1358}_{-518}$	$279^{+2700}_{-212}$

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

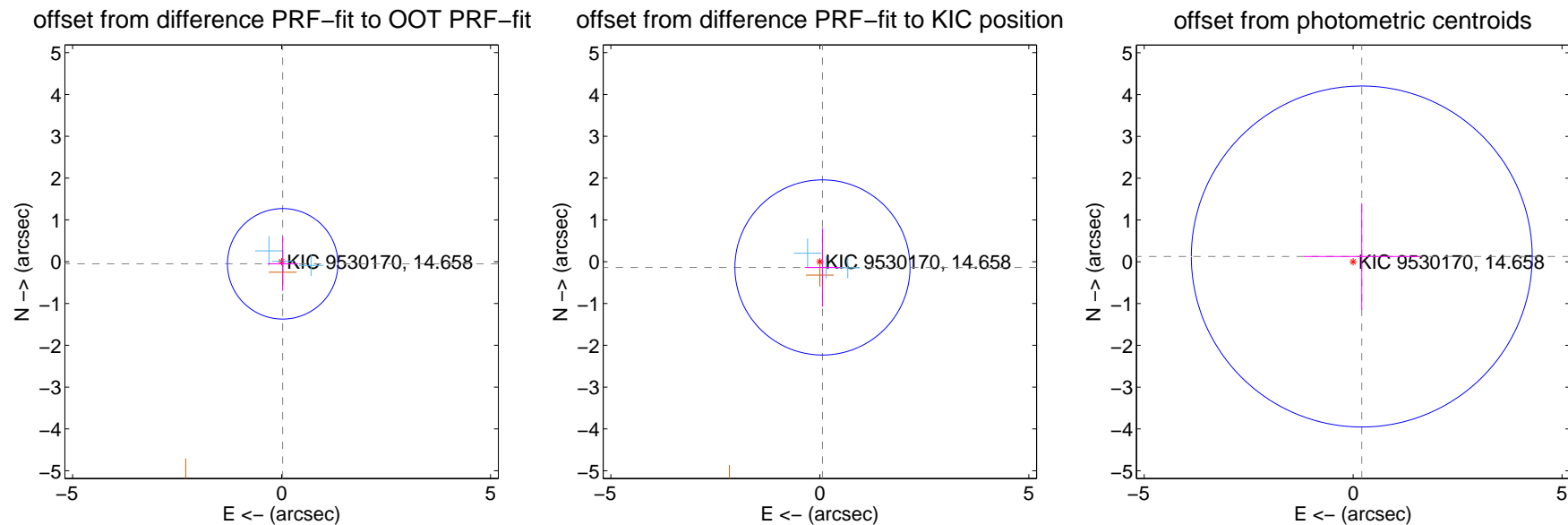
## DV Centroid Data

Supplemental centroid analysis for 009530170-02. Kepler magnitude: 14.66. Transit SNR 5.84

There are 3 quarters with good PRF difference image offsets

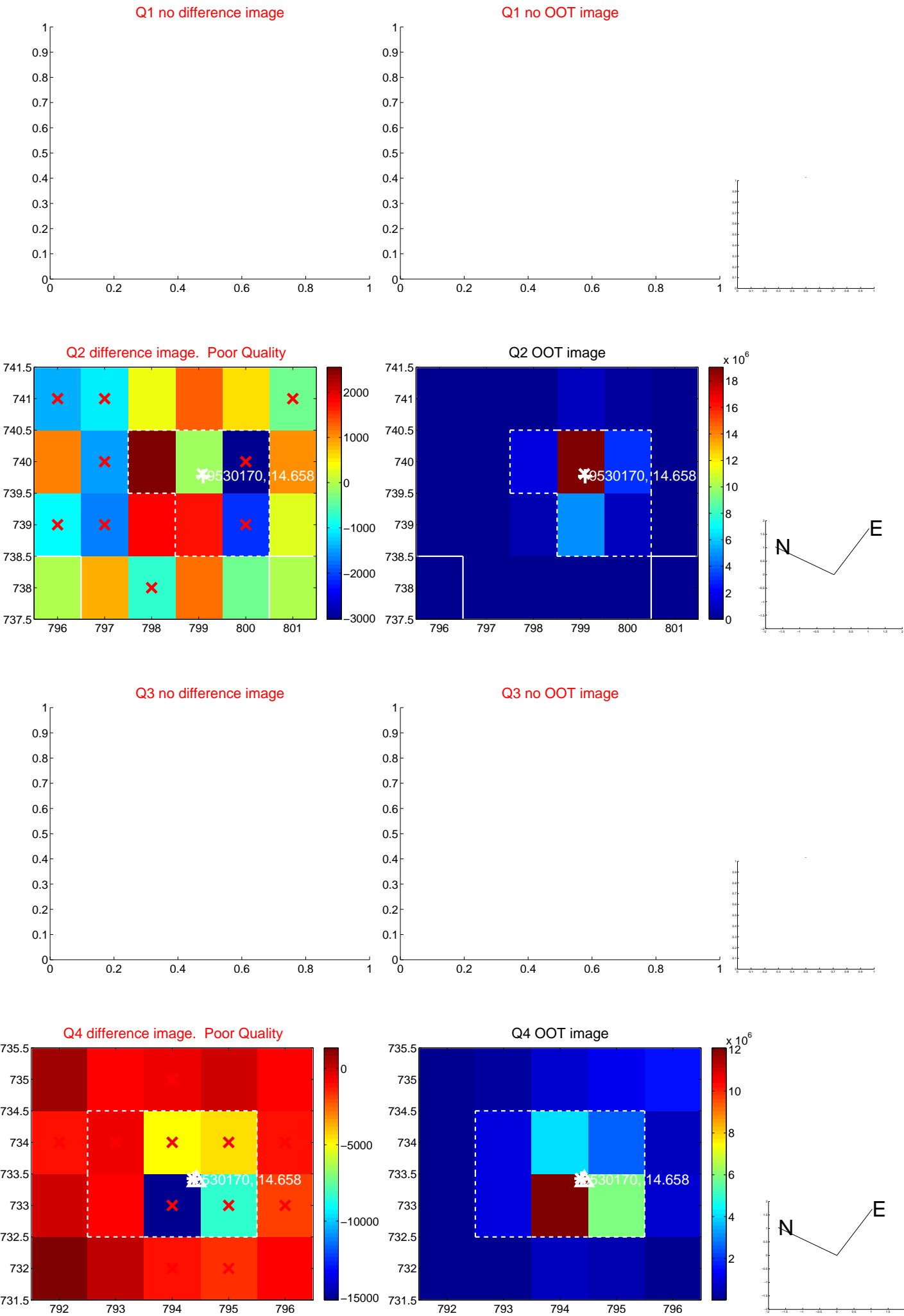
The direct PRF centroid is offset from the target star catalog position by about 0.19 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.057 \pm 0.440$	0.13	$-0.026 \pm 0.361$	$-0.051 \pm 0.644$
PRF-fit source offset from KIC position	$0.151 \pm 0.698$	0.22	$-0.063 \pm 0.422$	$-0.138 \pm 0.939$
photometric centroid source offset	$0.24 \pm 1.36$	0.18	$-0.21 \pm 1.39$	$0.13 \pm 1.28$

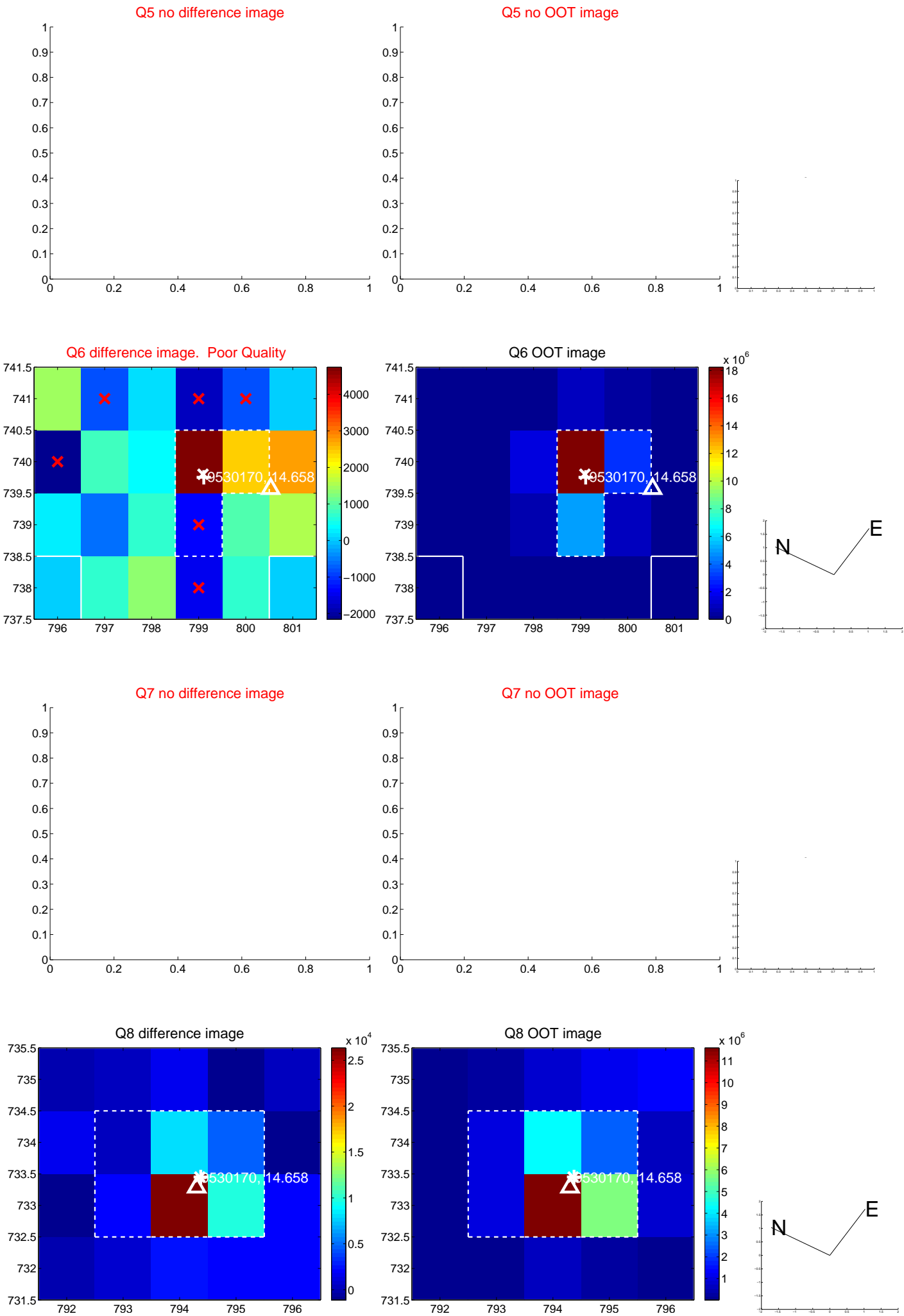


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

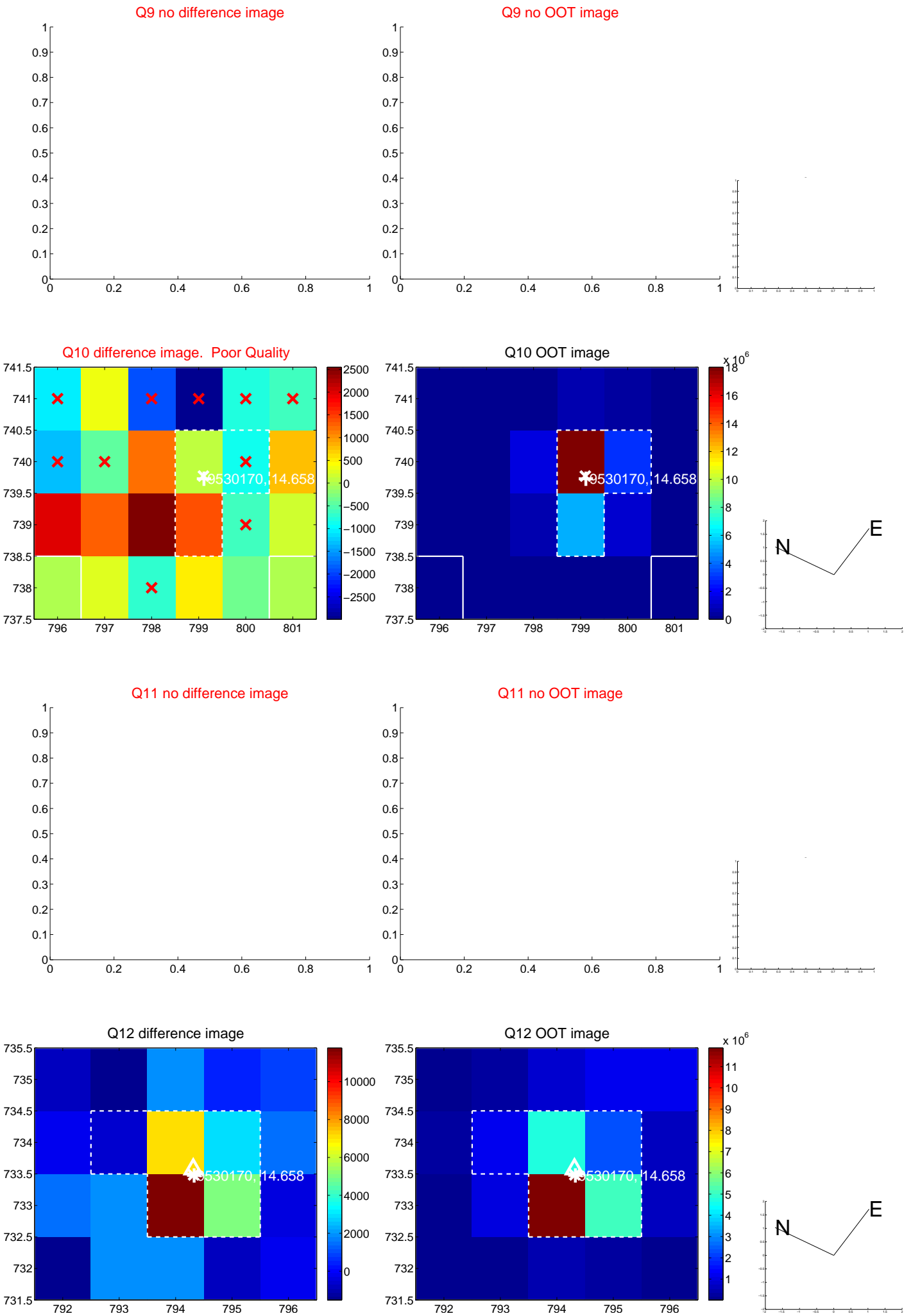
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



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



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



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

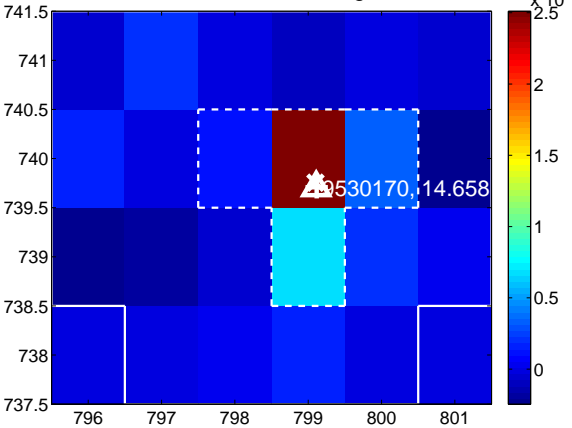
Q13 no difference image



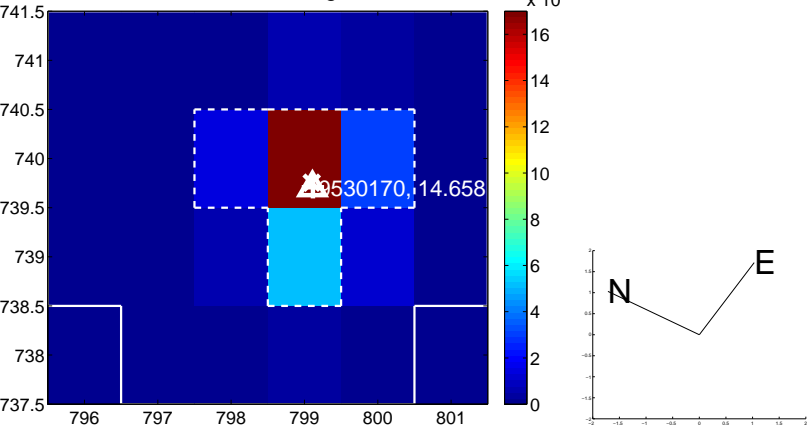
Q13 no OOT image



Q14 difference image



Q14 OOT image



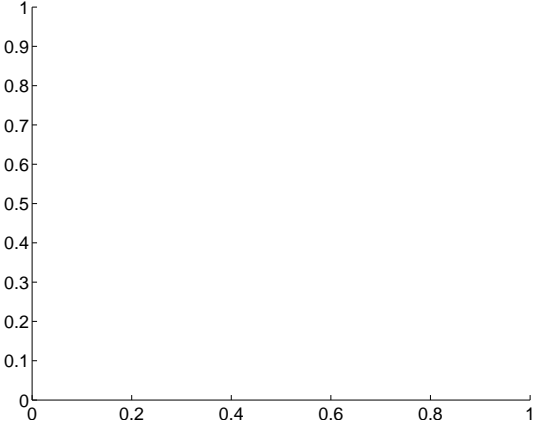
Q15 no difference image



Q15 no OOT image



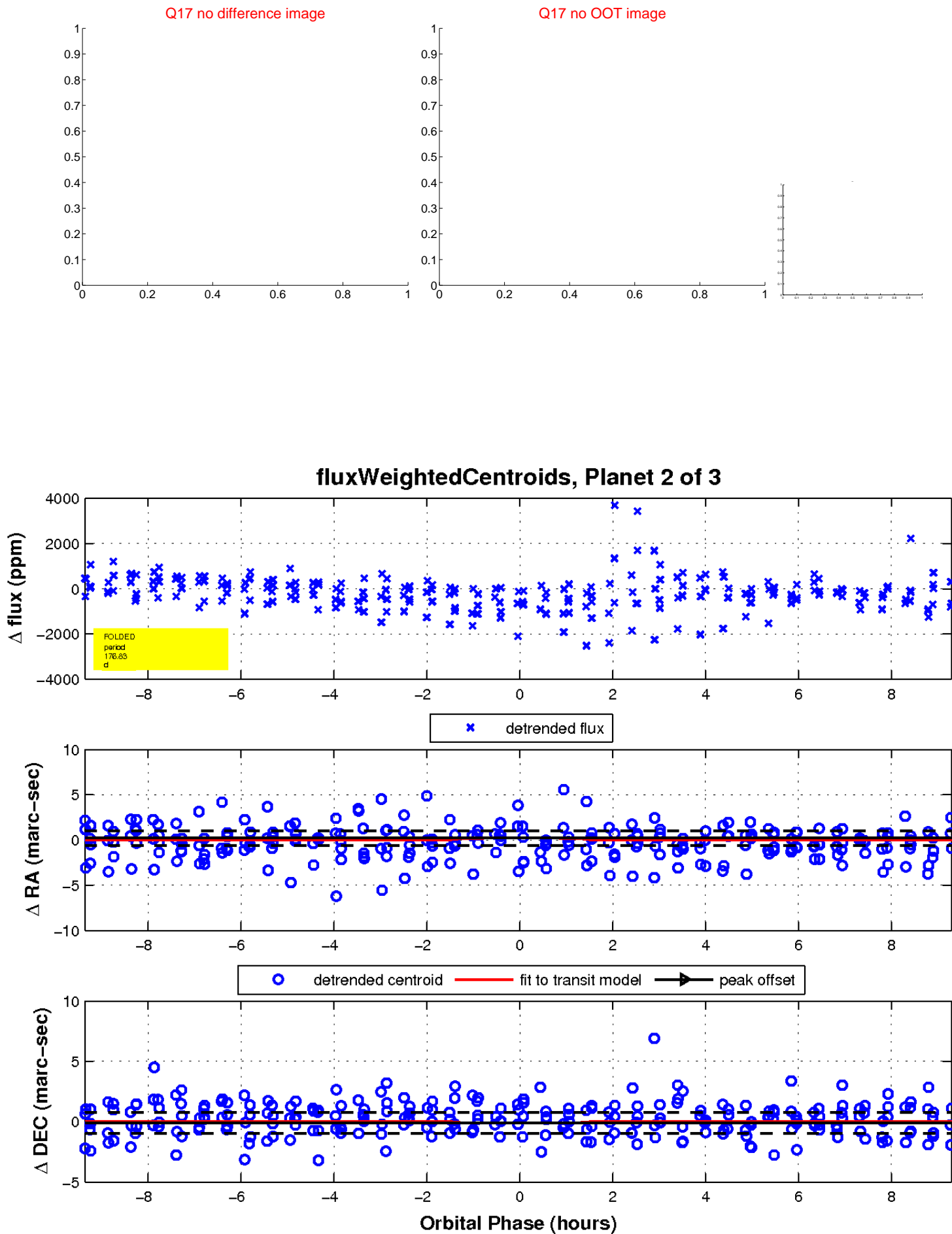
Q16 no difference image



Q16 no OOT image

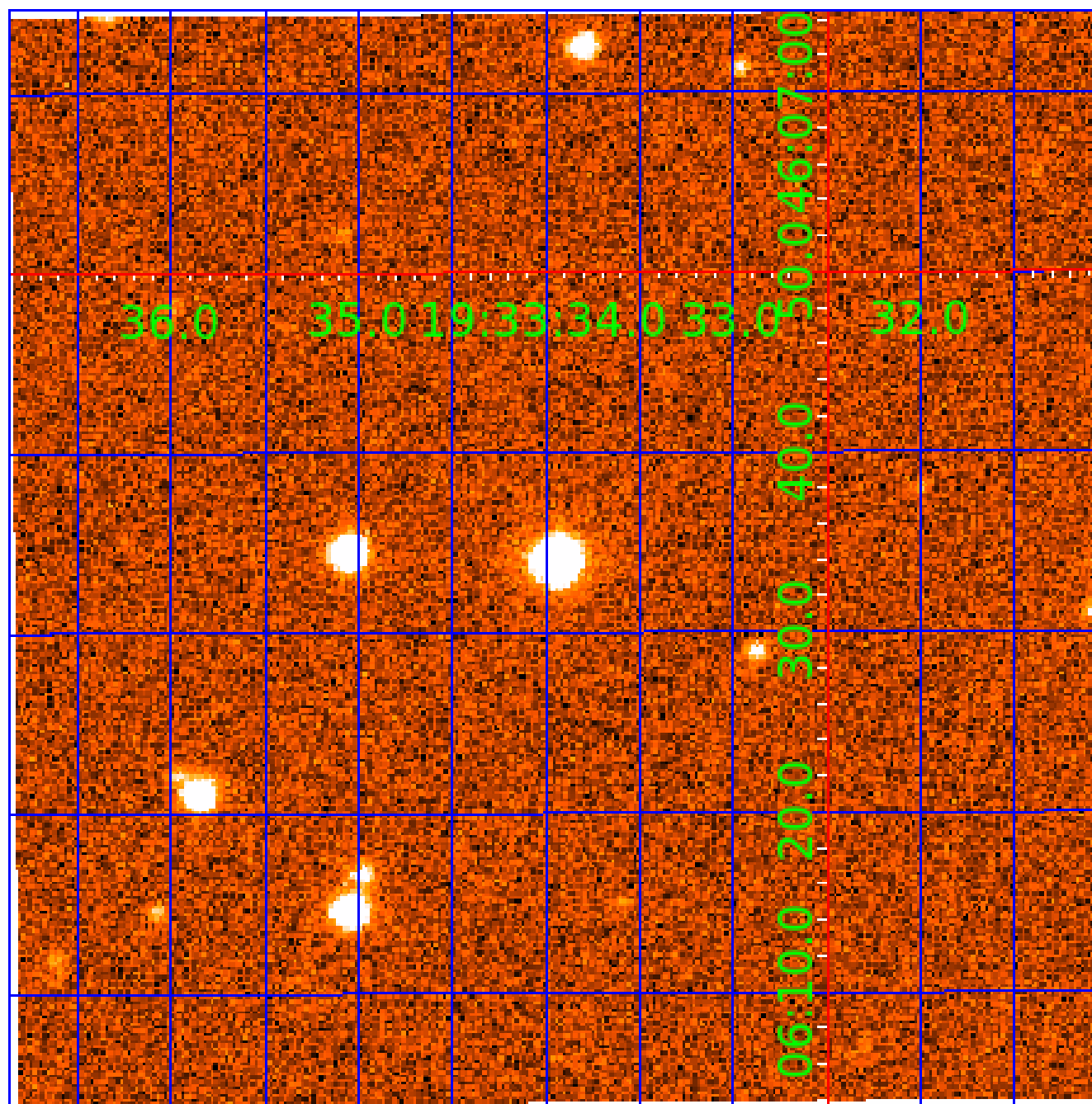


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



# UKIRT Image

Declination





# KIC 009530170

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009530170-01	OBS	No	493.748563	588.015249	1226.7	8.751	13.1	5.6	0.99	6079	4.17	0.83
009530170-02	OBS	No	176.832521	250.373252	543.3	3.123	11.3	5.8	0.99	6079	2.67	3.26
009530170-03	OBS	No	383.007279	277.651680	1005.1	3.236	10.7	5.9	0.99	6079	3.47	1.16

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009530170-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009530170-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—INCONSISTENT_TRANS
009530170-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS

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

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

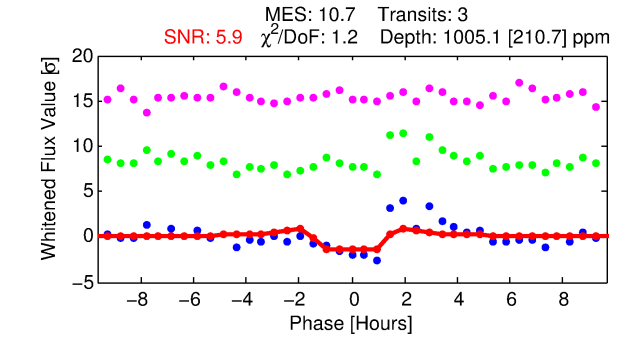
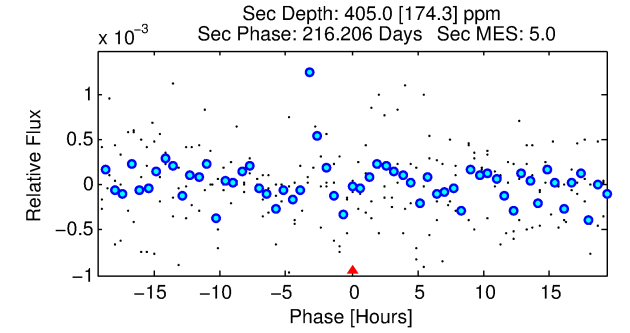
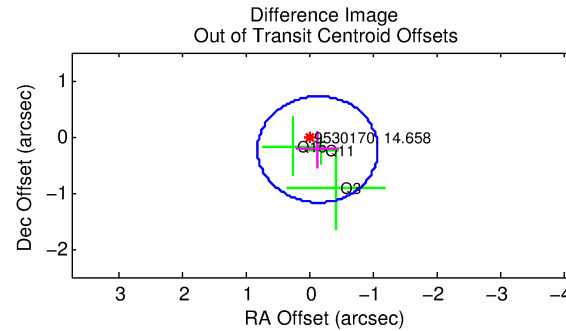
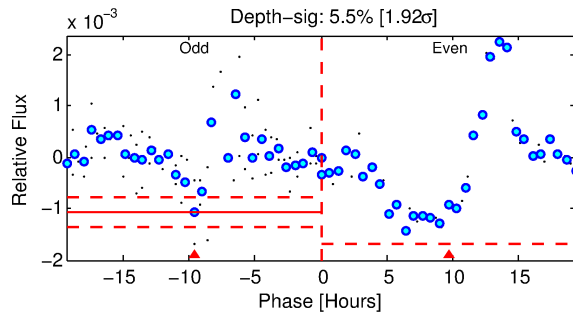
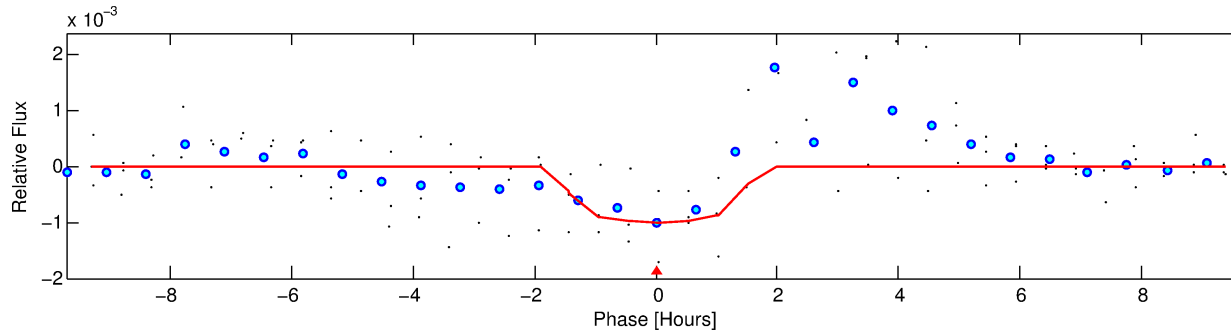
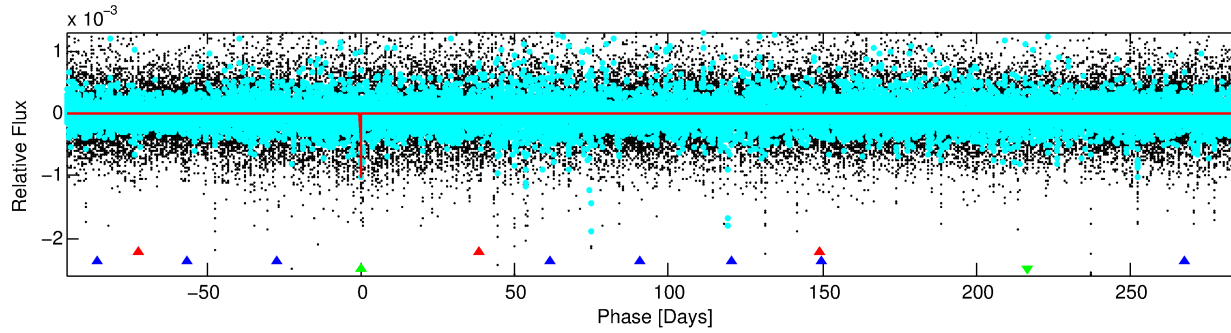
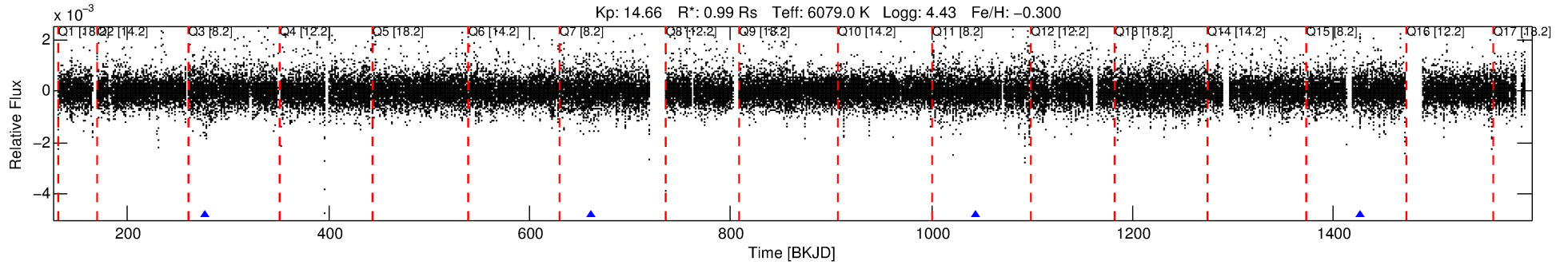
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009530170-03

No Significant Match Found

# DV One-Page Summary

KIC: 9530170 Candidate: 3 of 3 Period: 383.007 d



## DV Fit Results:

Period = 383.00728 [0.00393] d  
Epoch = 277.6517 [0.0095] BKJD  
Rp/R\* = 0.0320 [0.1963]  
a/R\* = 605.45 [18981.18]  
b = 0.79 [15.51]  
Seff = 1.16 [0.46]  
Teq = 265 [26] K  
Rp = 3.47 [21.31] Re  
a = 1.0196 [0.2568] AU  
Ag = 19262.94 [236781.72] [0.08σ]  
Teff = 4823 [14816] K [0.3σ]

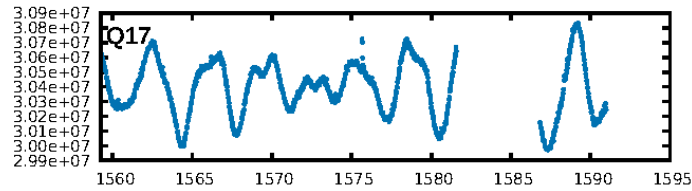
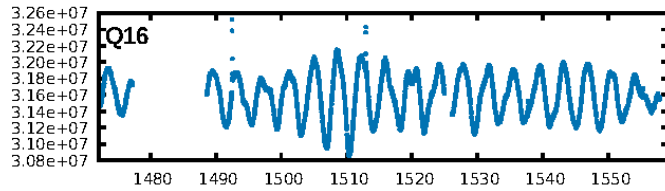
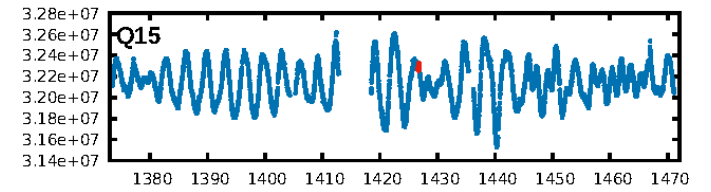
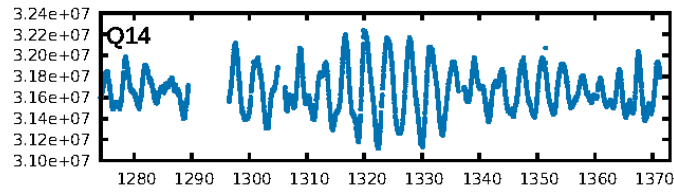
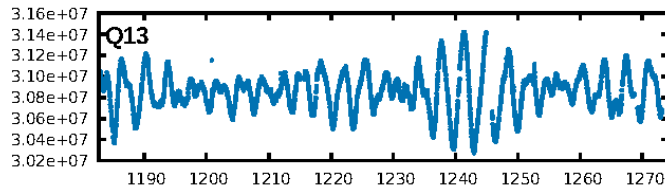
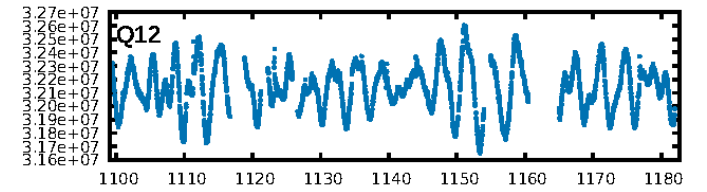
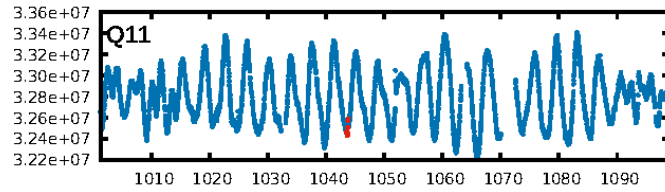
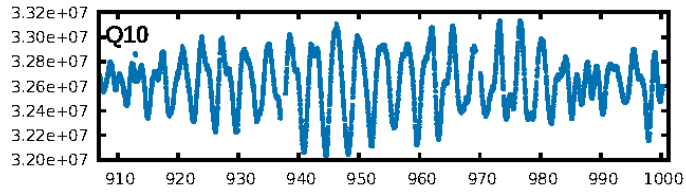
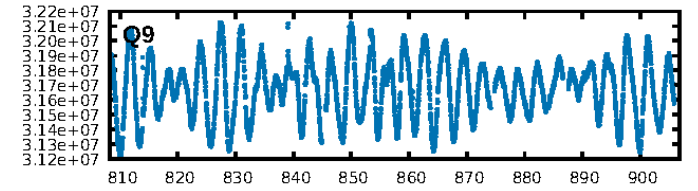
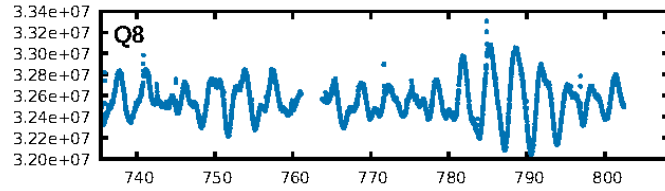
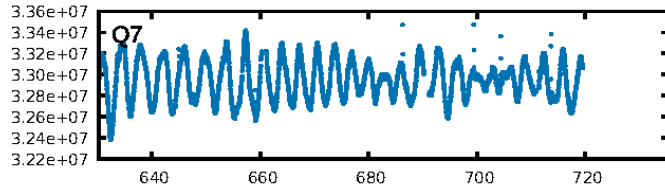
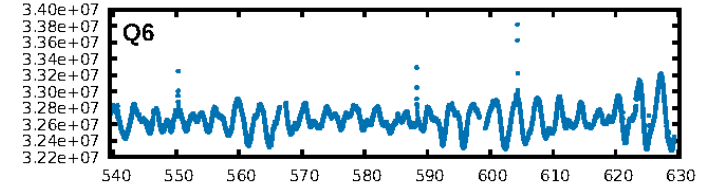
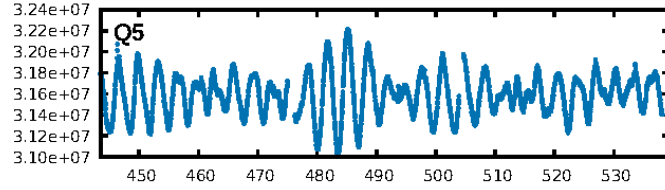
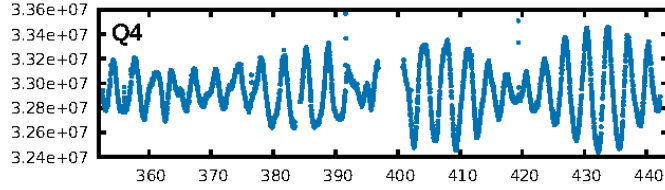
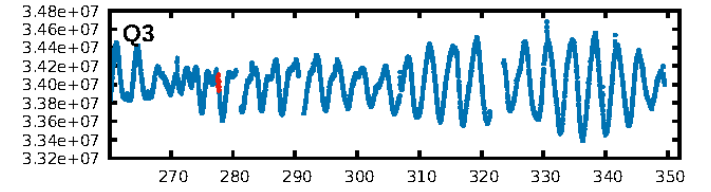
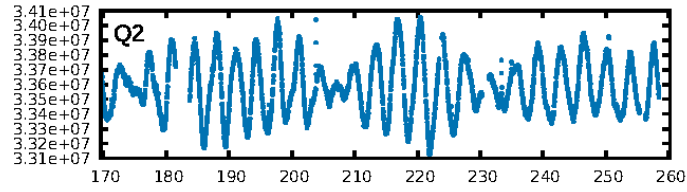
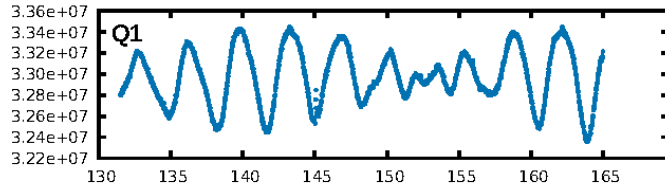
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [1100.33σ]  
LongPeriod-sig: 100.0% [284.87σ]  
ModelChiSquare2-sig: 45.8%  
ModelChiSquareGof-sig: 87.5%  
**Bootstrap-pfa: 5.23e-10**  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 1.599  
Centroid-sig: 98.6%  
Centroid-so: 0.073 arcsec [0.05σ]  
OotOffset-rm: 0.260 arcsec [0.82σ]  
KicOffset-rm: 0.345 arcsec [1.10σ]  
OotOffset-st: 0/3/0/0 [3]  
KicOffset-st: 0/3/0/0 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 1.00 [3/3]

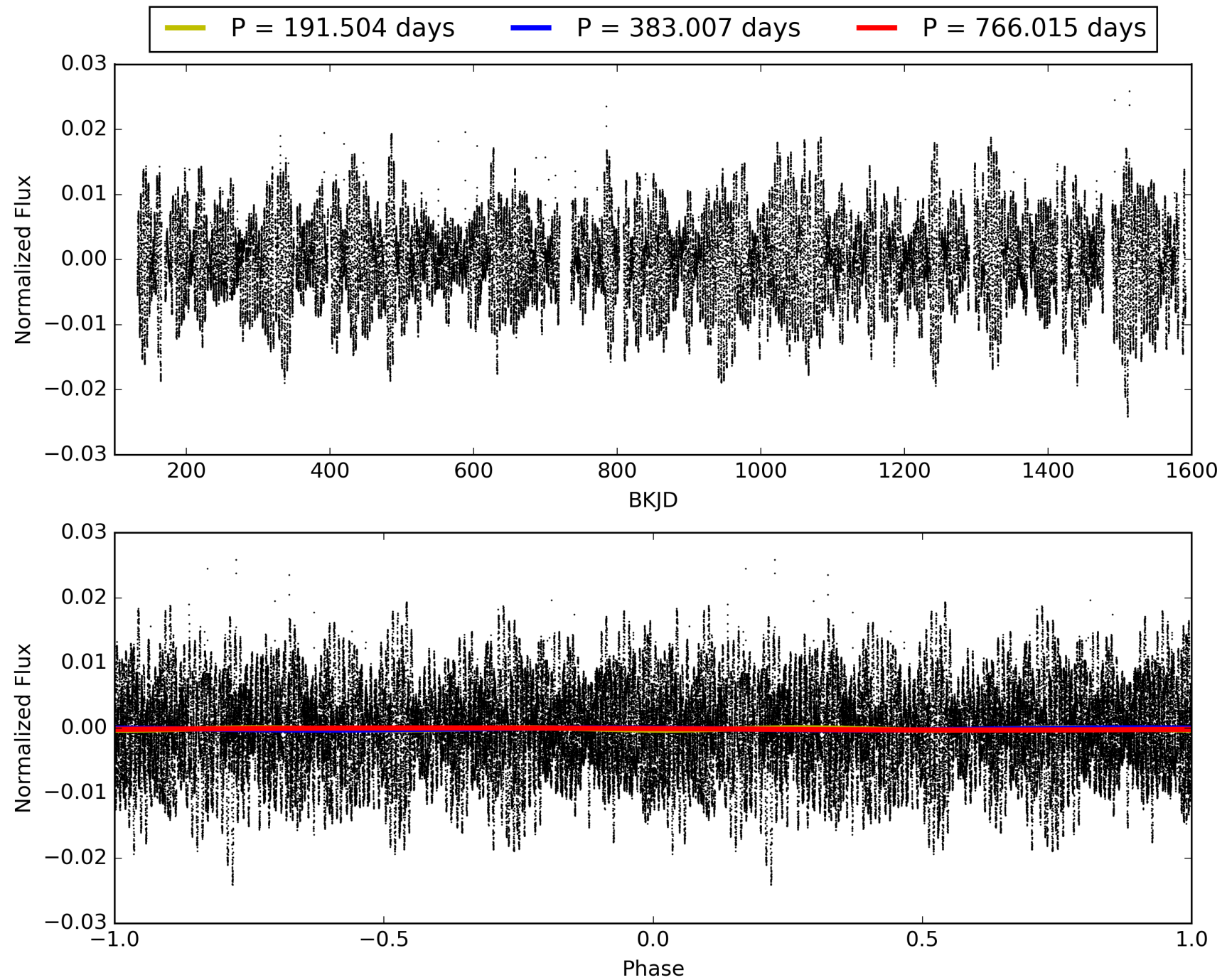
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 13:25:17 Z

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

# TCE 009530170-03, PDC Light Curves

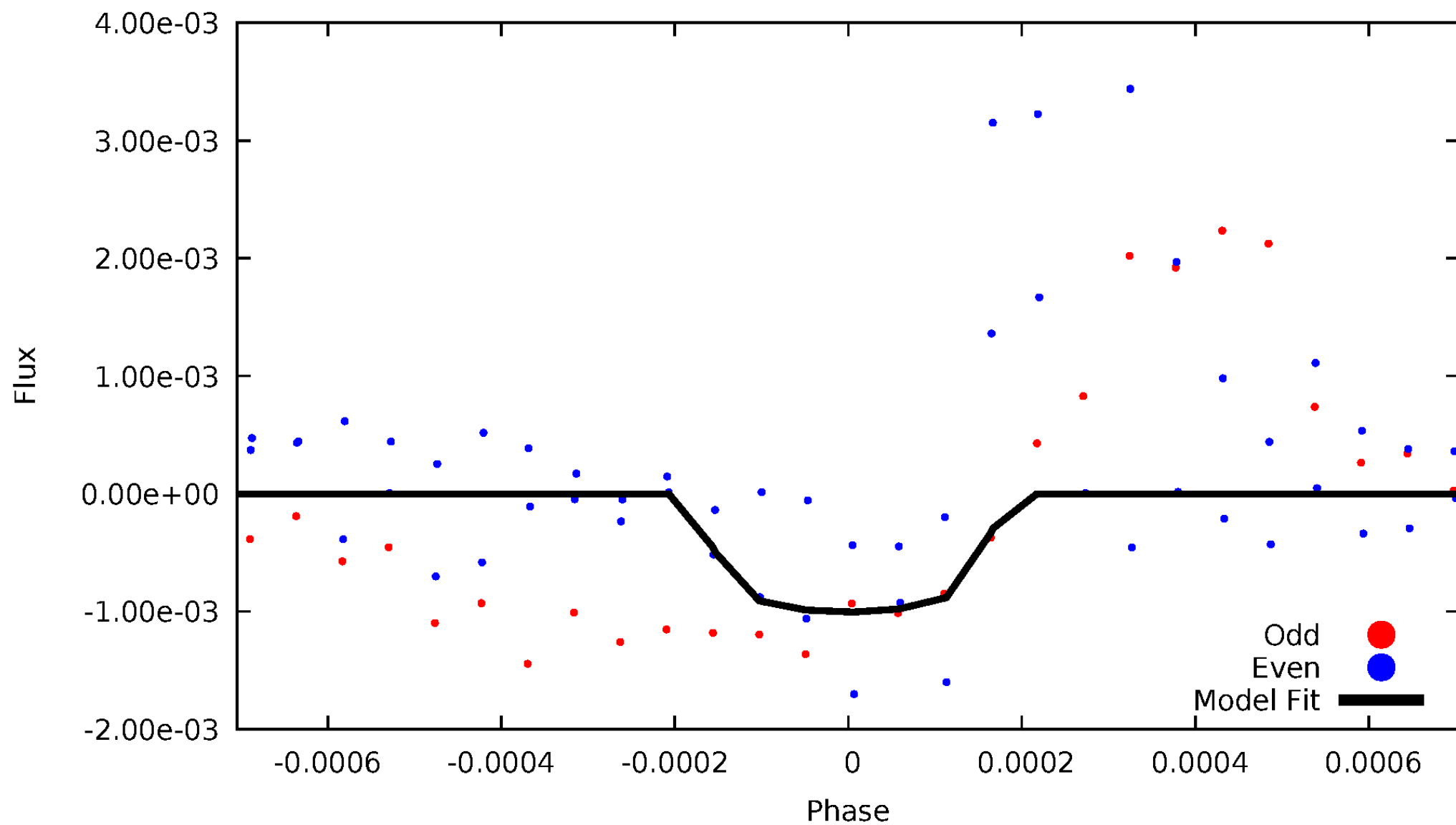


TCE 009530170-03



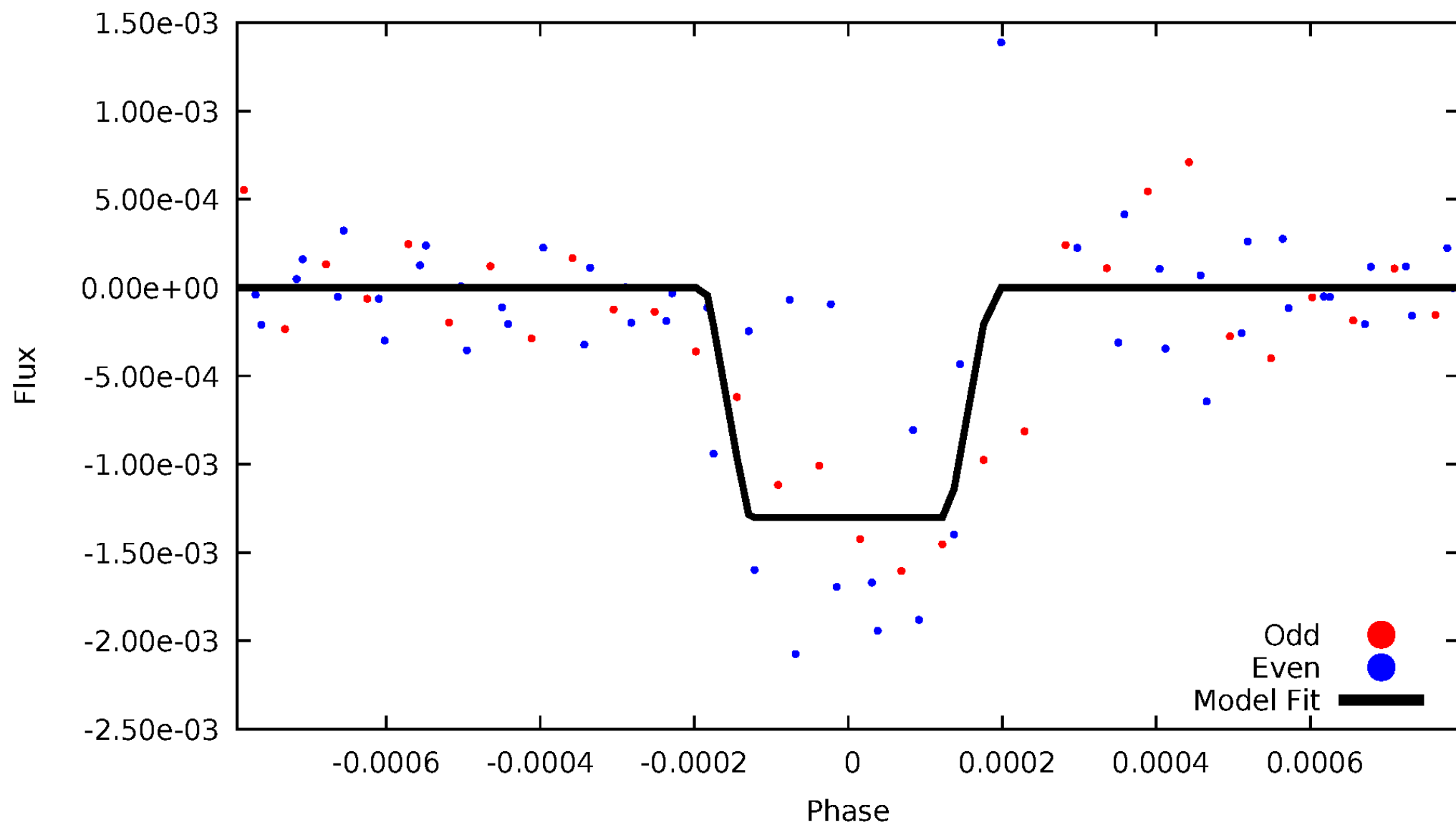
# DV Odd/Even

TCE 009530170-03



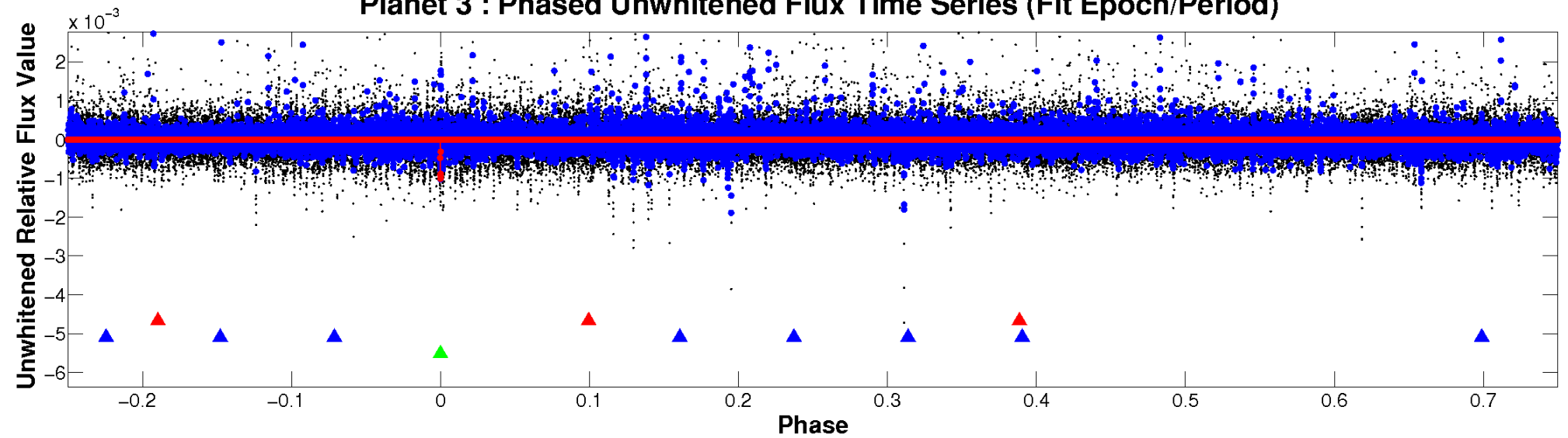
# ALT Odd/Even

TCE 009530170-03

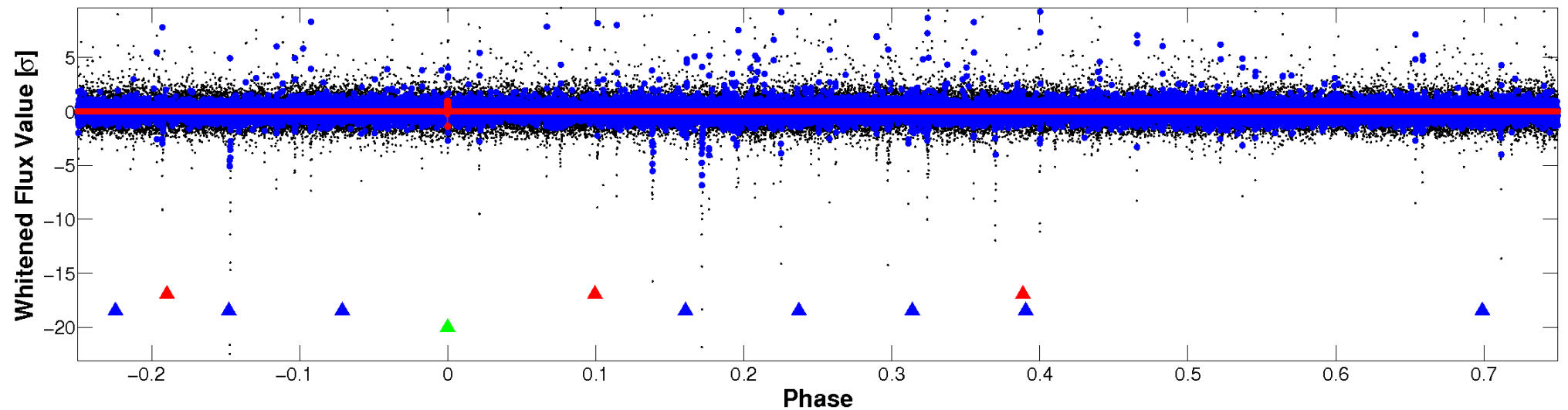


# Non-Whitened Vs. Whitened Light Curve

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

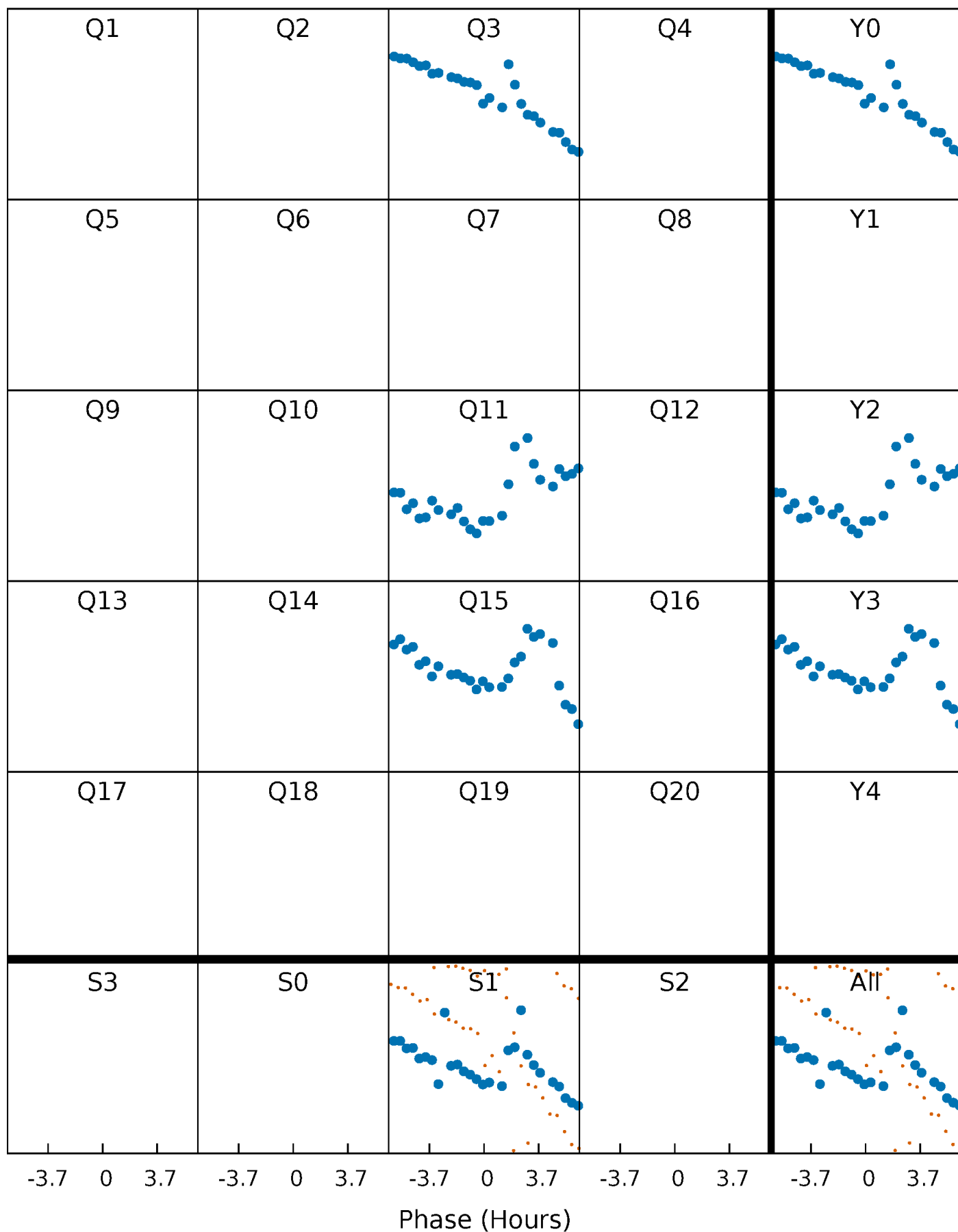


**Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

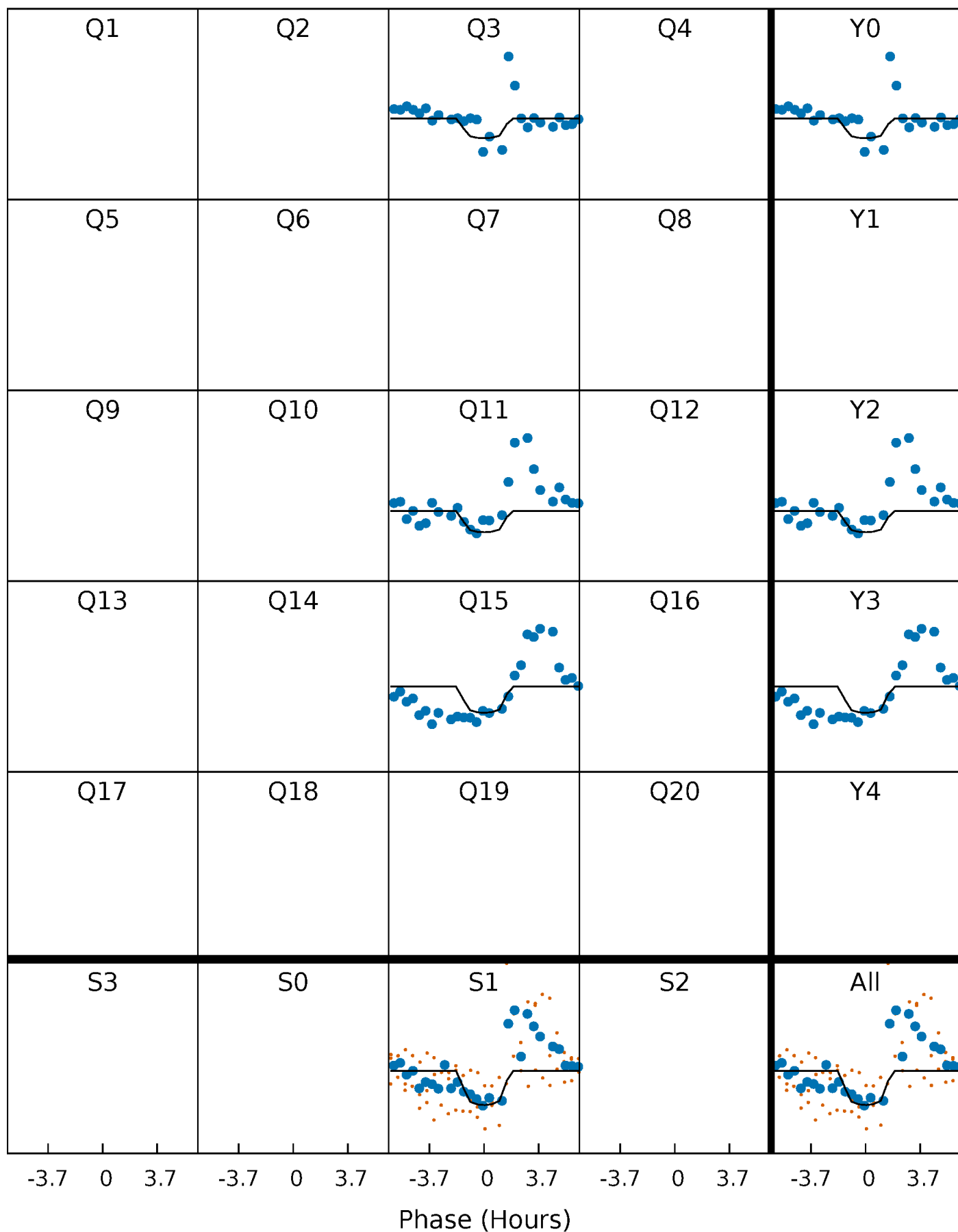
TCE 009530170-03     $P=383.007279$  Days     $T_0=277.651680$  (BKJD)





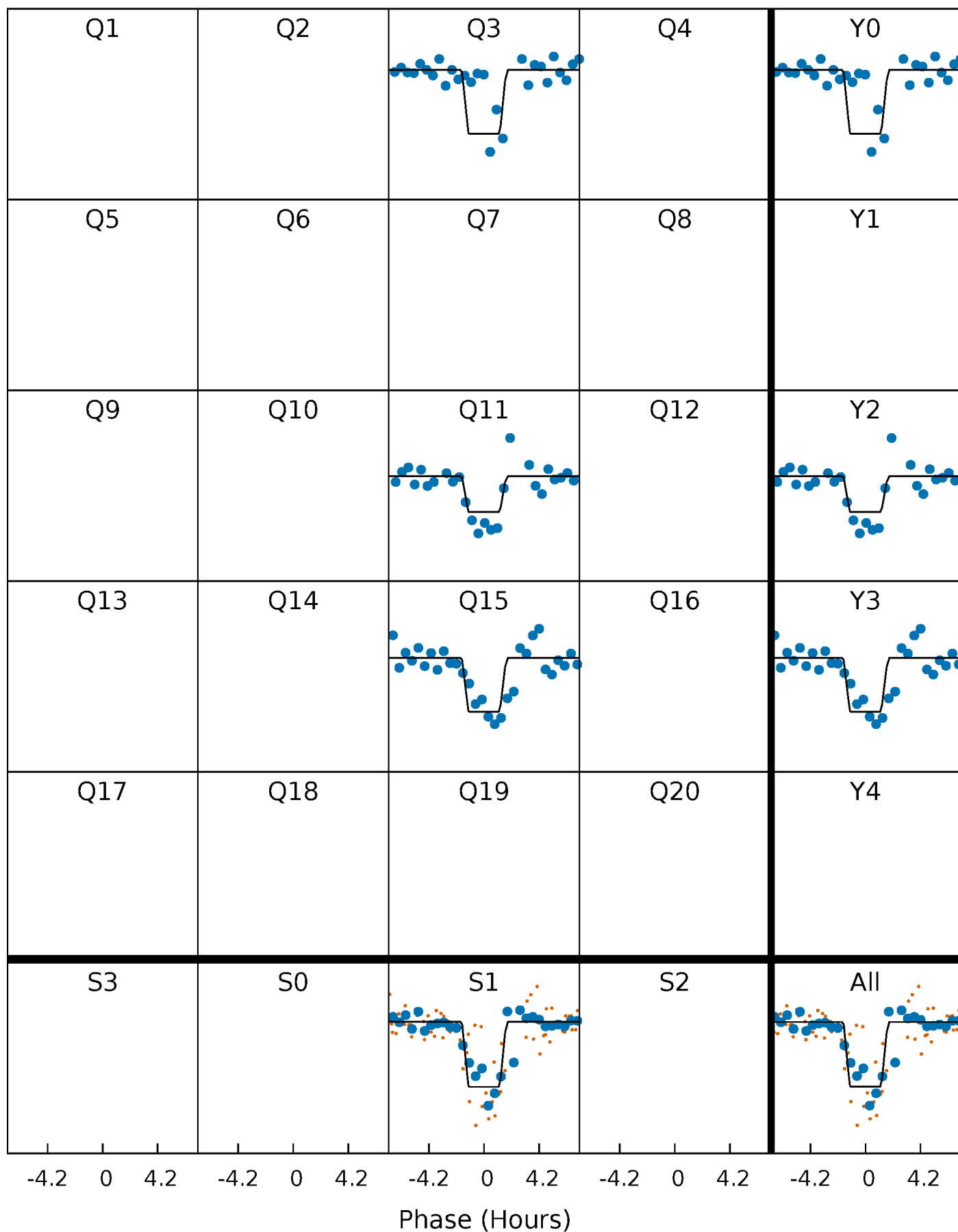
# DV Quarter-Phased Transit Curves

TCE 009530170-03     $P=383.007279$  Days     $T_0=277.651680$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

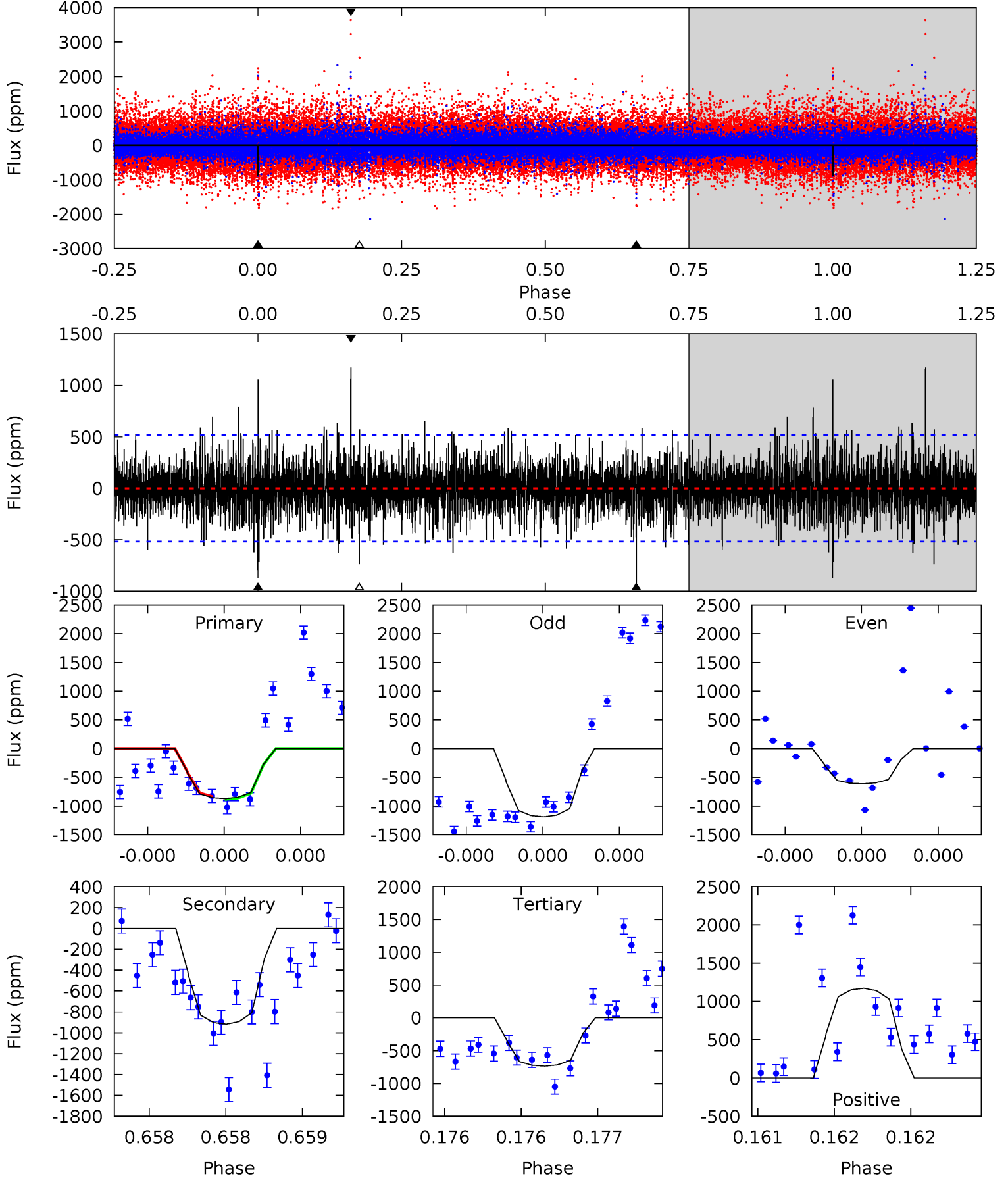
TCE 009530170-03 P=383.015691 Days  $T_0=277.642470$  (BKJD)



# DV Model-Shift Uniqueness Test

009530170-03, P = 383.007279 Days, E = 277.651680 Days

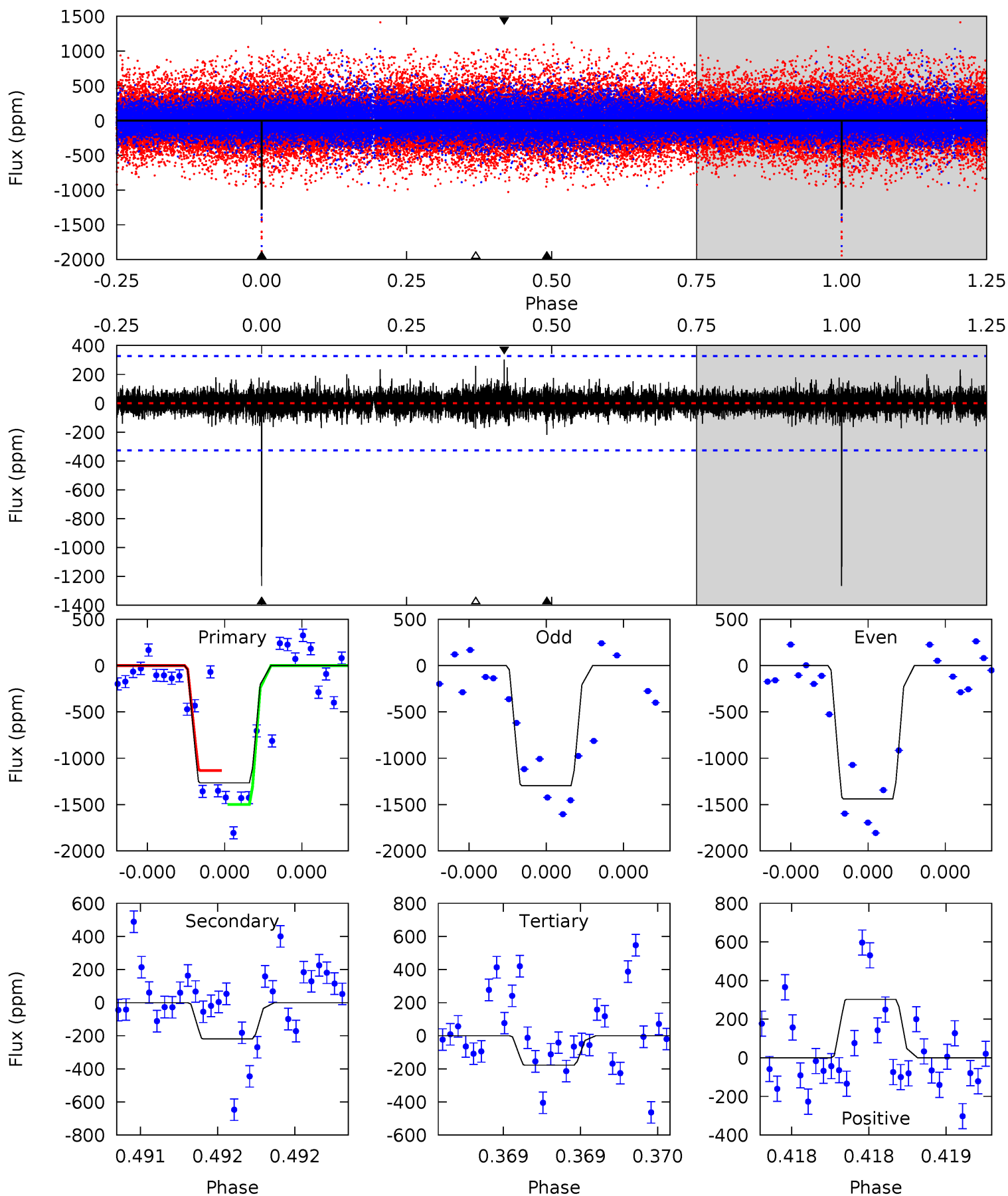
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.52	10.0	8.03	12.8	5.65	3.60	1.77	1.49	-3.28	2.00	-2.77	2.63	1.22	0.56	0.24



# Alt Model-Shift Uniqueness Test

009530170-03, P = 383.015691 Days, E = 277.642470 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
21.8	3.77	3.06	5.20	5.62	3.55	0.75	18.7	16.6	0.71	-1.43	1.20	0.96	0.19	3.05



### Stellar Parameters For KIC 009530170

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6079^{+164}_{-200}$	$4.427^{+0.087}_{-0.203}$	$-0.300^{+0.300}_{-0.300}$	$0.994^{+0.295}_{-0.126}$	$0.962^{+0.129}_{-0.116}$	$1.381^{+0.606}_{-0.672}$
	+3%/-3%	+2%/-5%	+100%/-100%	+30%/-13%	+13%/-12%	+44%/-49%
Source	PHO1	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 009530170-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-918 \pm 92$	$16.30^{+16.30}_{-11.19}$	$375^{+26}_{-19}$	$3356^{+1649}_{-605}$	$1969^{+18314}_{-1499}$
Alt.	$-219 \pm 58$	$16.83^{+19.15}_{-12.05}$	$373^{+26}_{-19}$	$2679^{+1311}_{-433}$	$413^{+5379}_{-323}$

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

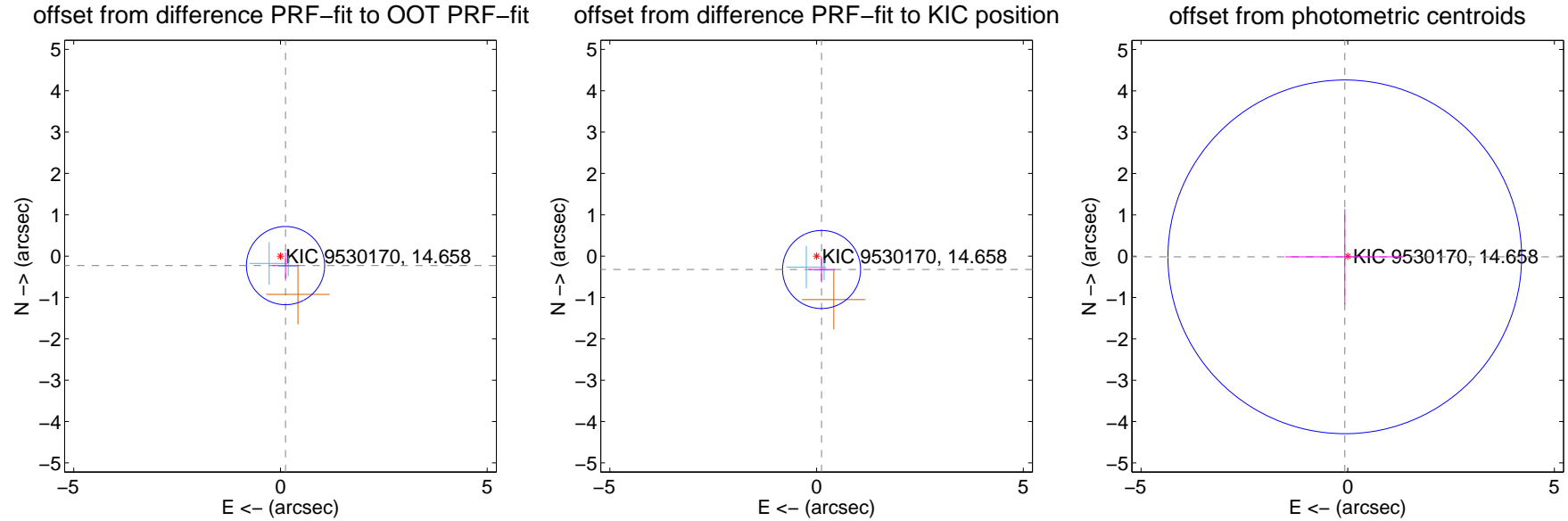
## DV Centroid Data

Supplemental centroid analysis for 009530170-03. Kepler magnitude: 14.66. Transit SNR 5.90

There are 2 quarters with good PRF difference image offsets

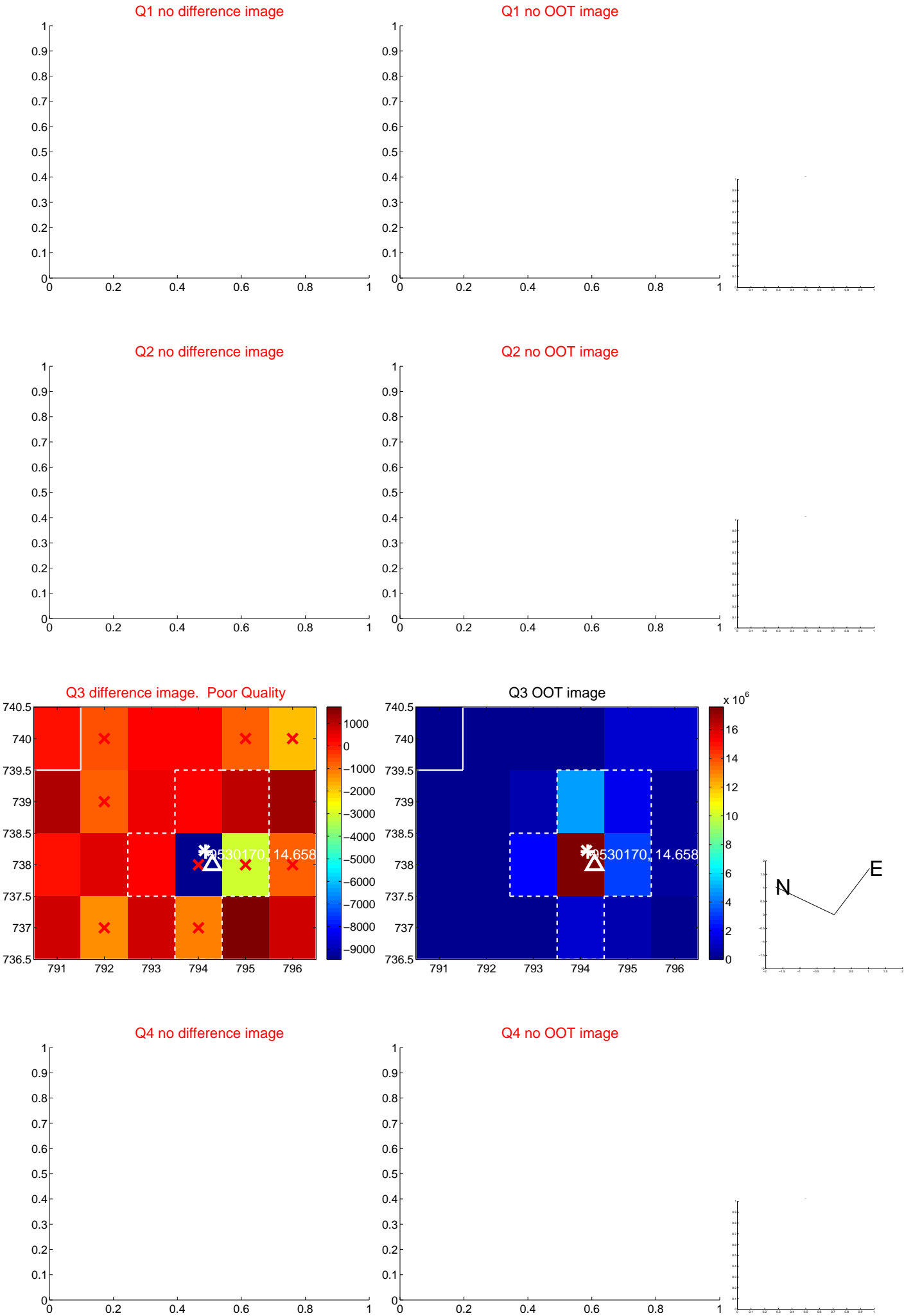
The direct PRF centroid is offset from the target star catalog position by about 0.09 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.260 \pm 0.315$	0.82	$-0.123 \pm 0.319$	$-0.229 \pm 0.314$
PRF-fit source offset from KIC position	$0.345 \pm 0.315$	1.10	$-0.121 \pm 0.319$	$-0.323 \pm 0.314$
photometric centroid source offset	$0.07 \pm 1.43$	0.05	$0.07 \pm 1.44$	$-0.02 \pm 1.15$



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

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



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





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

Q9 no difference image



Q9 no OOT image



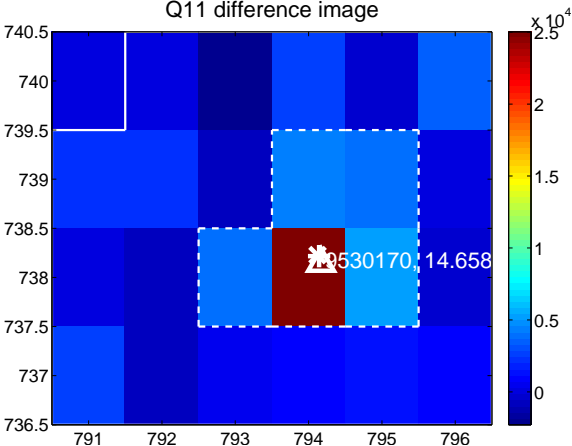
Q10 no difference image



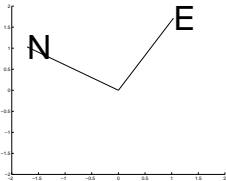
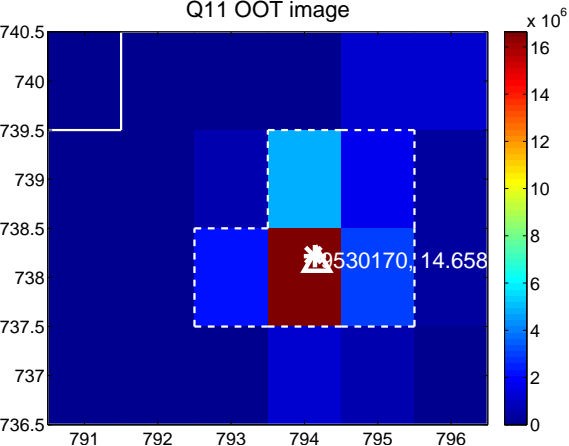
Q10 no OOT image



Q11 difference image



Q11 OOT image



Q12 no difference image



Q12 no OOT image



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

Q13 no difference image



Q13 no OOT image



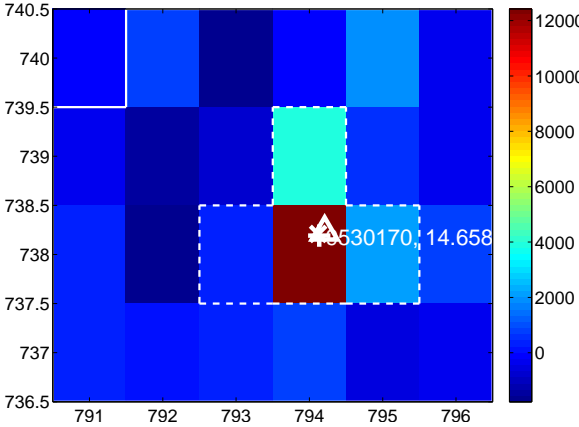
Q14 no difference image



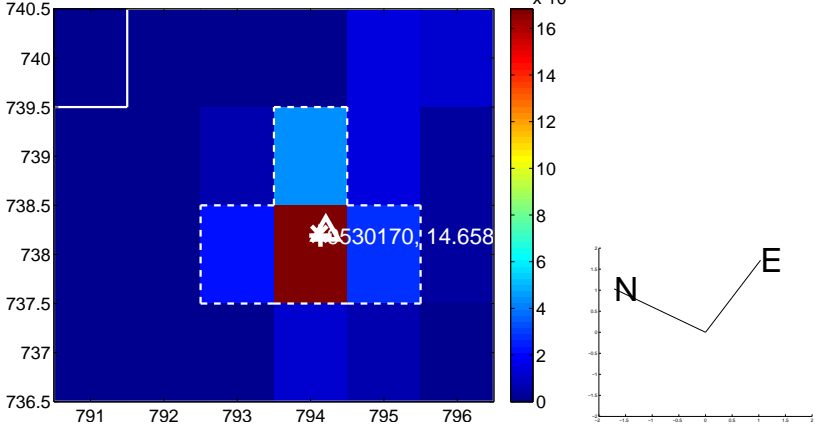
Q14 no OOT image



Q15 difference image



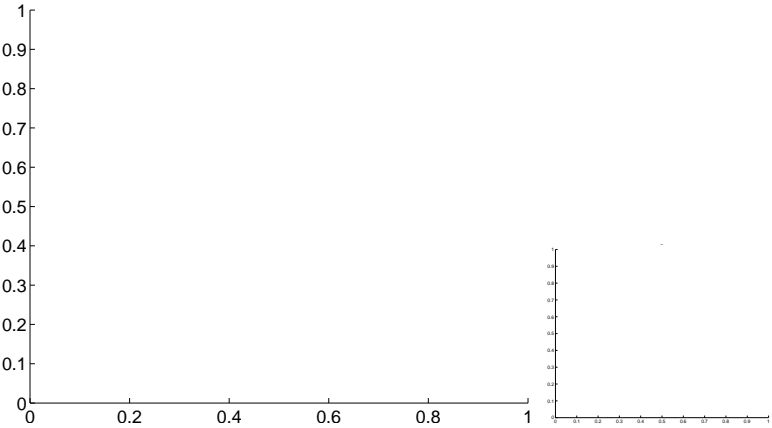
Q15 OOT image



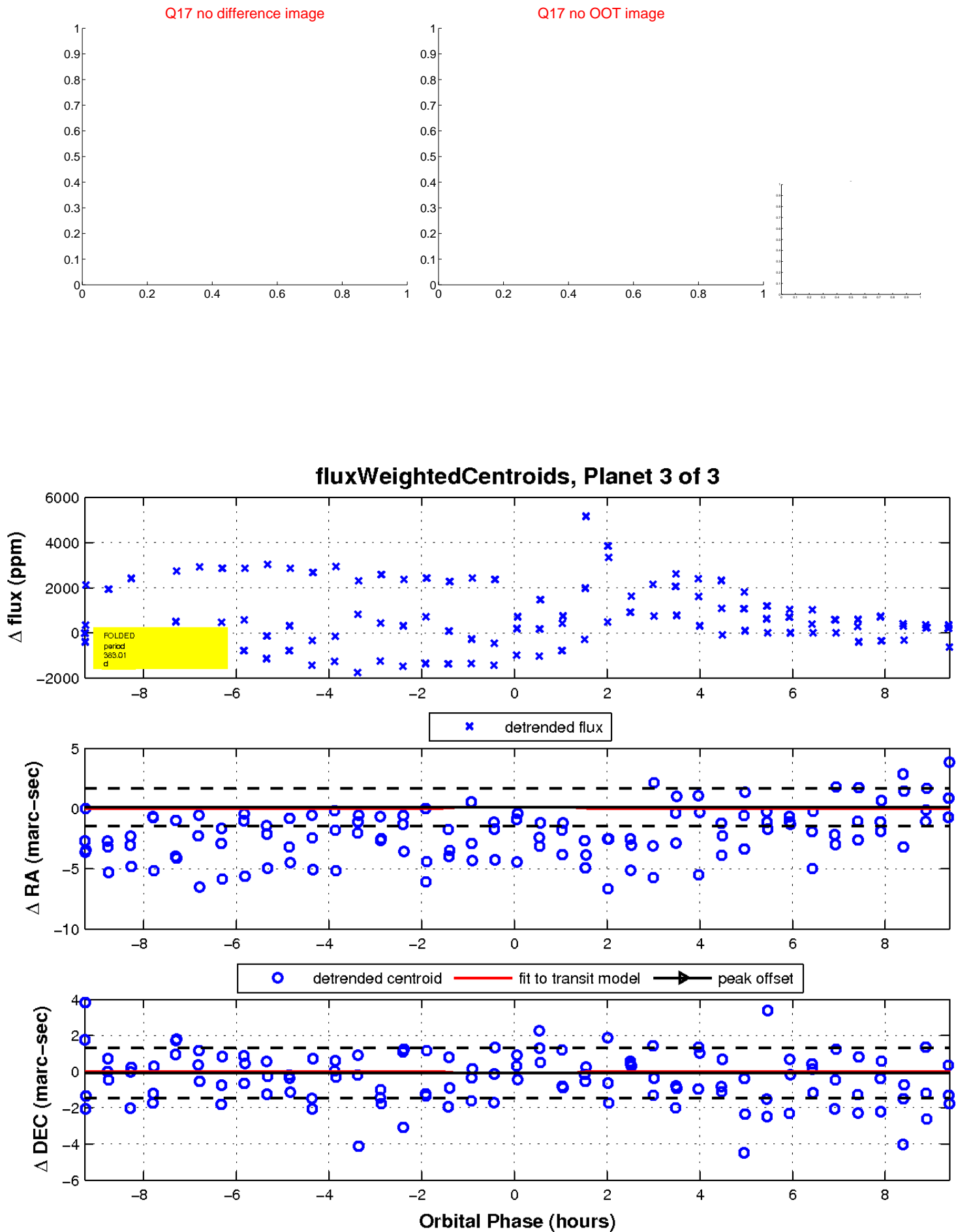
Q16 no difference image



Q16 no OOT image



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



# UKIRT Image

Declination

