

# KIC 010907307

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010907307-01	OBS	8217.01	277.290942	399.964828	1524.3	10.488	14.3	13.6	1.05	6046	7.51	2.02
010907307-02	OBS	No	353.776362	347.154749	1483.9	11.301	9.7	7.8	1.05	6046	5.11	1.46

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010907307-01	OBS	FP	0.00	1	0	0	0	INCONSISTENT_TRANS—CENT_FEW_DIFFS
010907307-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—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.

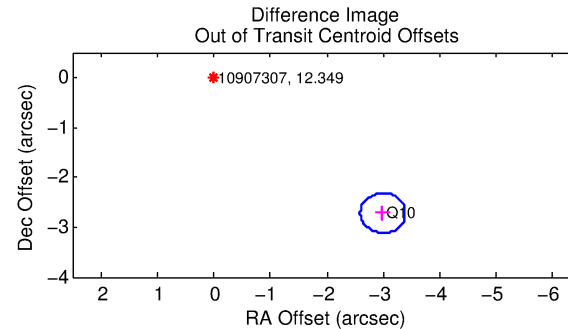
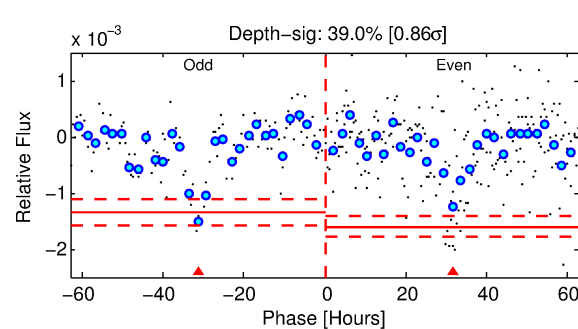
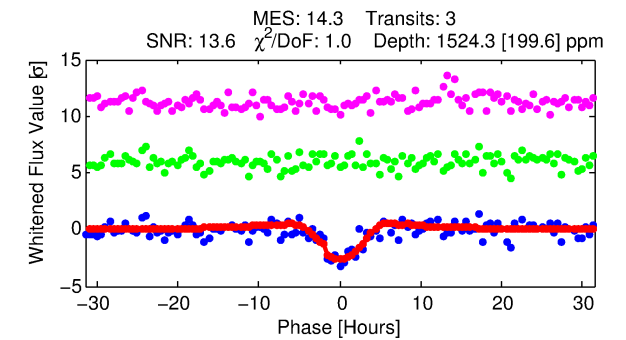
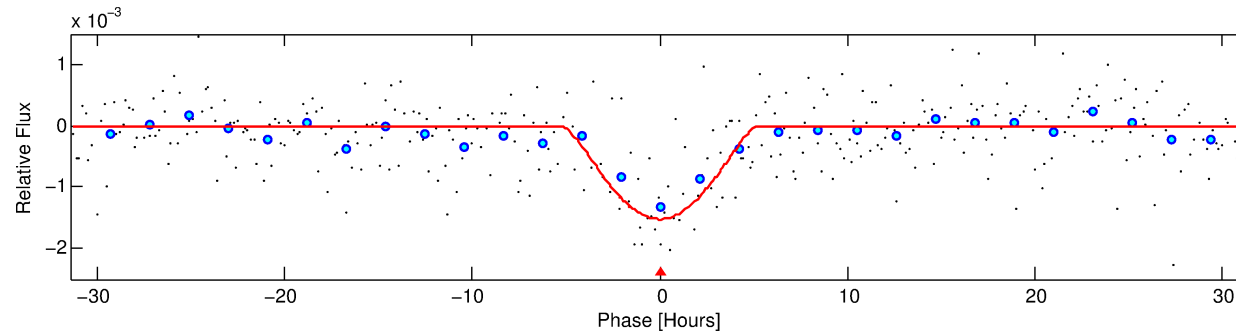
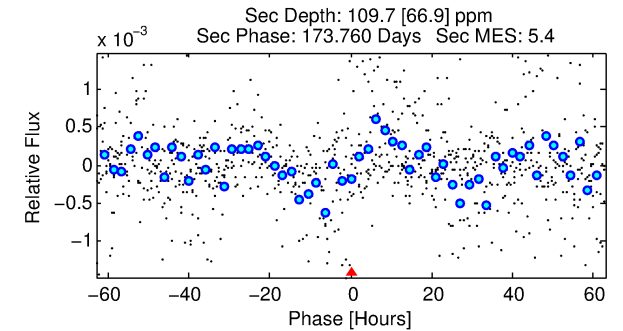
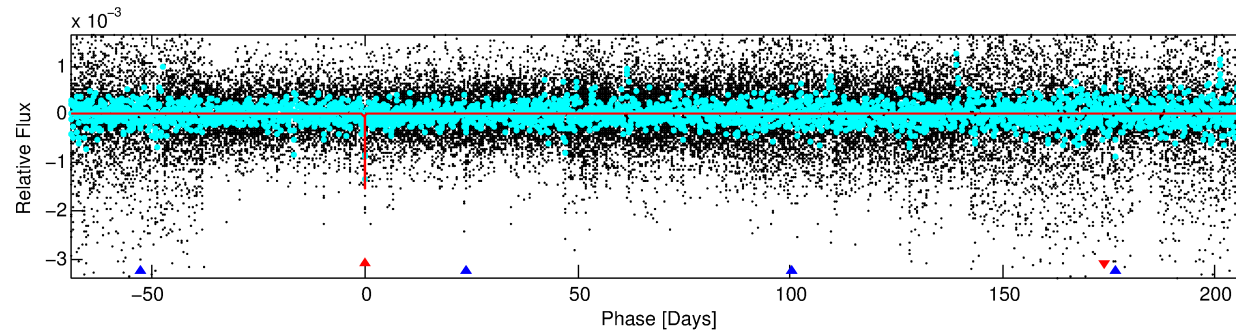
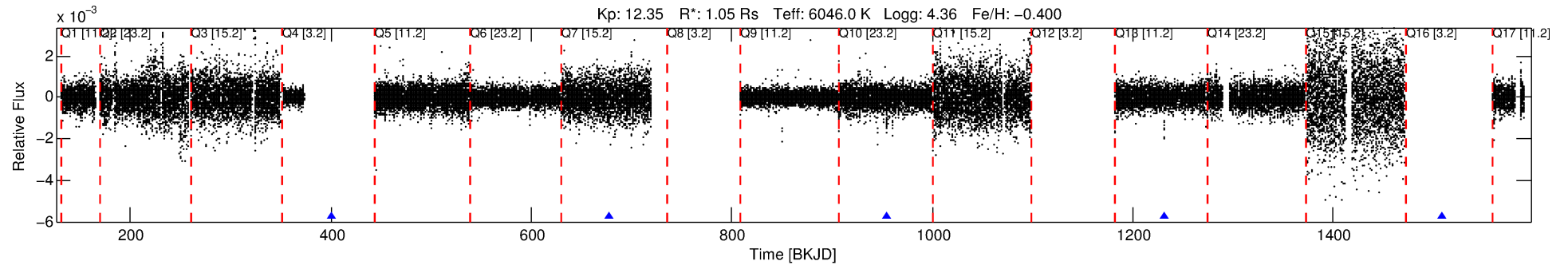
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010907307-01

No Significant Match Found

# DV One-Page Summary

KIC: 10907307 Candidate: 1 of 2 Period: 277.291 d



## DV Fit Results:

Period = 277.29094 [0.01550] d  
Epoch = 399.9648 [0.0377] BKJD  
Rp/R\* = 0.0657 [0.1577]  
a/R\* = 75.79 [43.27]  
b = 1.00 [0.24]  
Seff = 2.02 [0.72]  
Teq = 304 [27] K  
Rp = 7.51 [18.15] Re  
a = 0.8070 [0.1866] AU  
Ag = 696.76 [3381.56] [0.21σ]  
Teff = 2414 [2923] K [0.72σ]

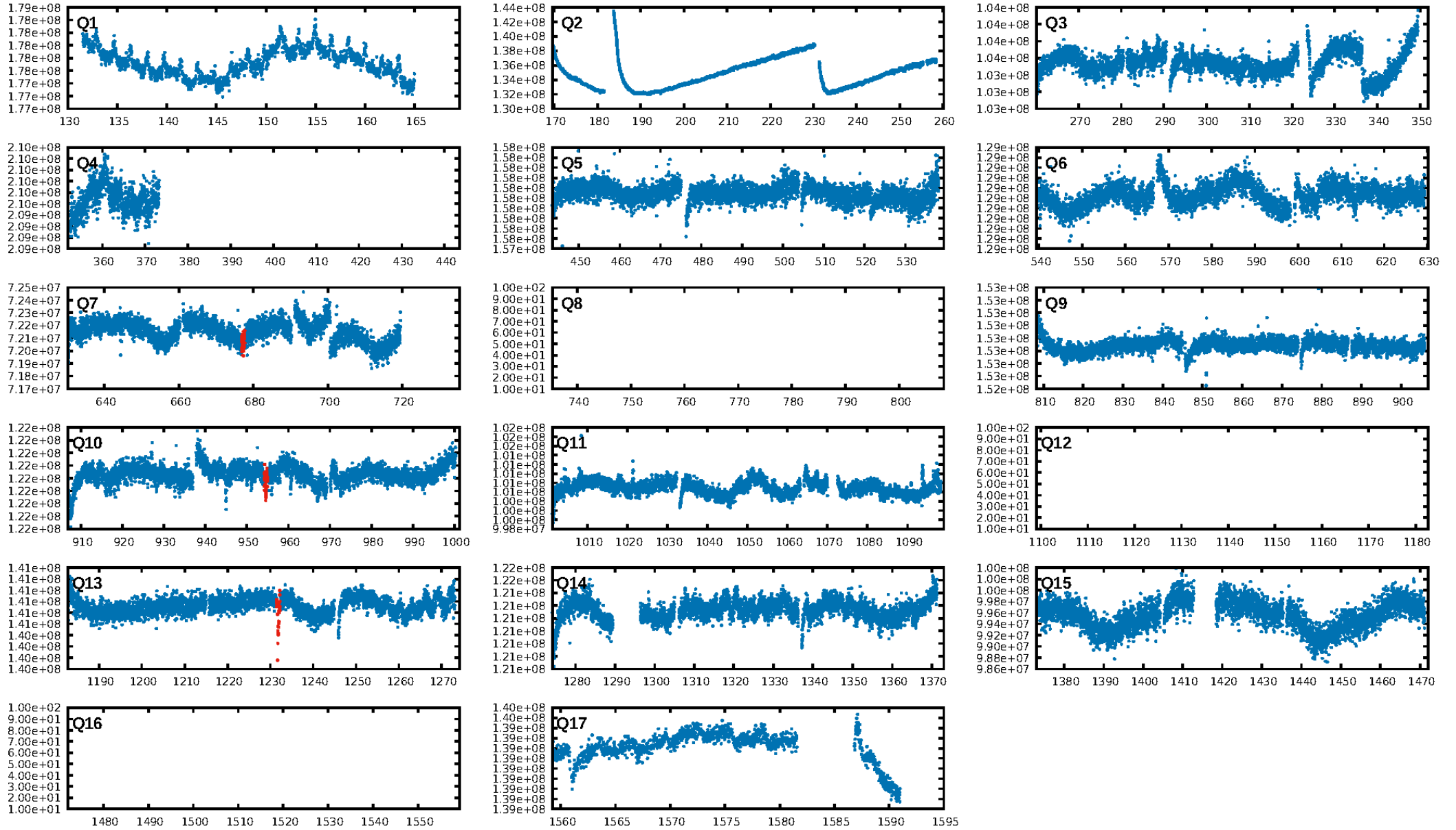
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [119.06σ]  
ModelChiSquare2-sig: 16.8%  
ModelChiSquareGoF-sig: 96.8%  
Bootstrap-pfa: 3.11e-20  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -0.8802  
Centroid-sig: 84.0%  
Centroid-so: 2.259 arcsec [16.80σ]  
OotOffset-rm: 4.045 arcsec [30.52σ]  
KicOffset-rm: 2.151 arcsec [17.58σ]  
OotOffset-st: 1/0/0/0 [1]  
KicOffset-st: 1/0/0/0 [1]  
DiffImageQuality-fgm: 1.00 [1/1]  
DiffImageOverlap-fno: 1.00 [2/2]

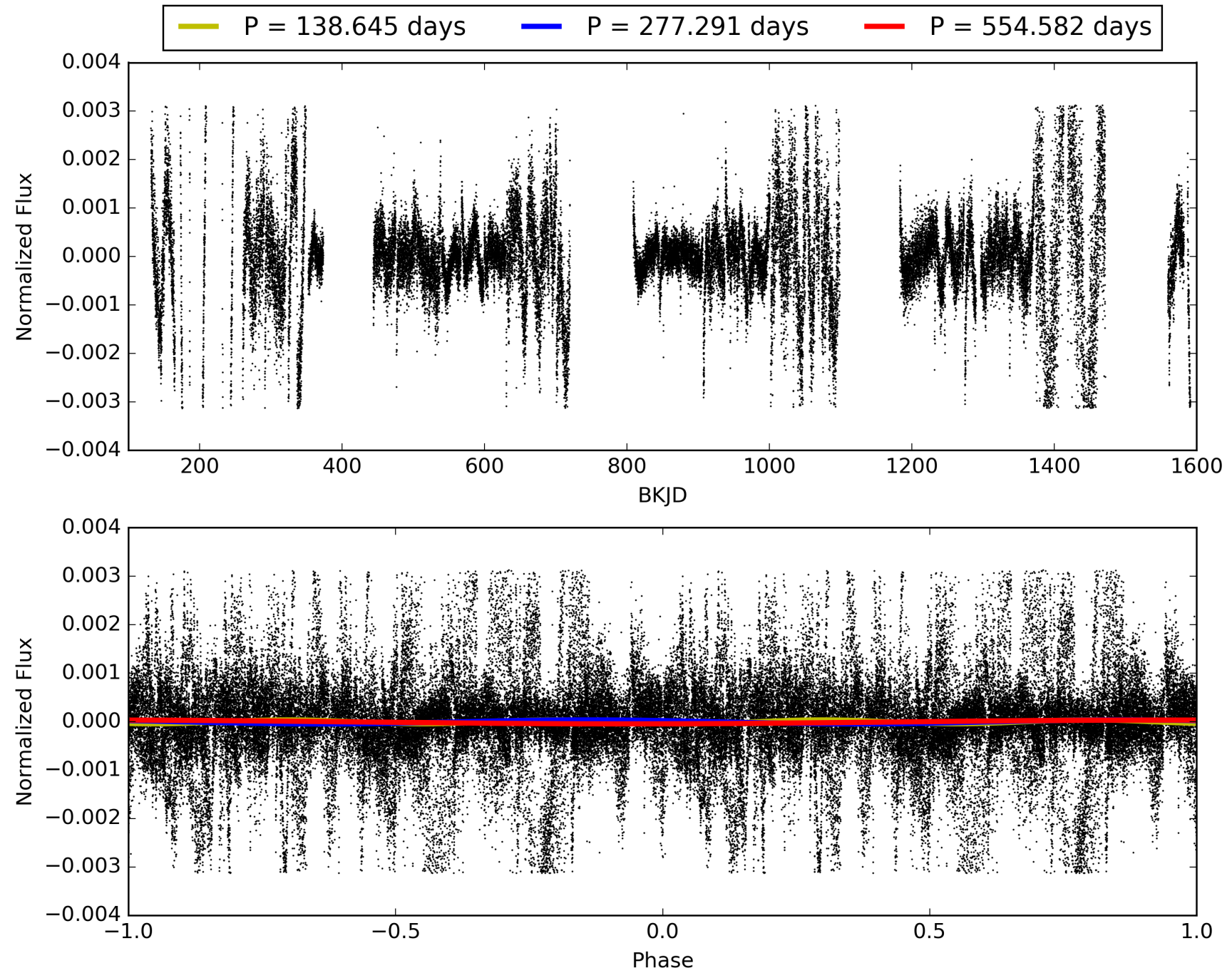
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 05:34:01 Z

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

# TCE 010907307-01, PDC Light Curves

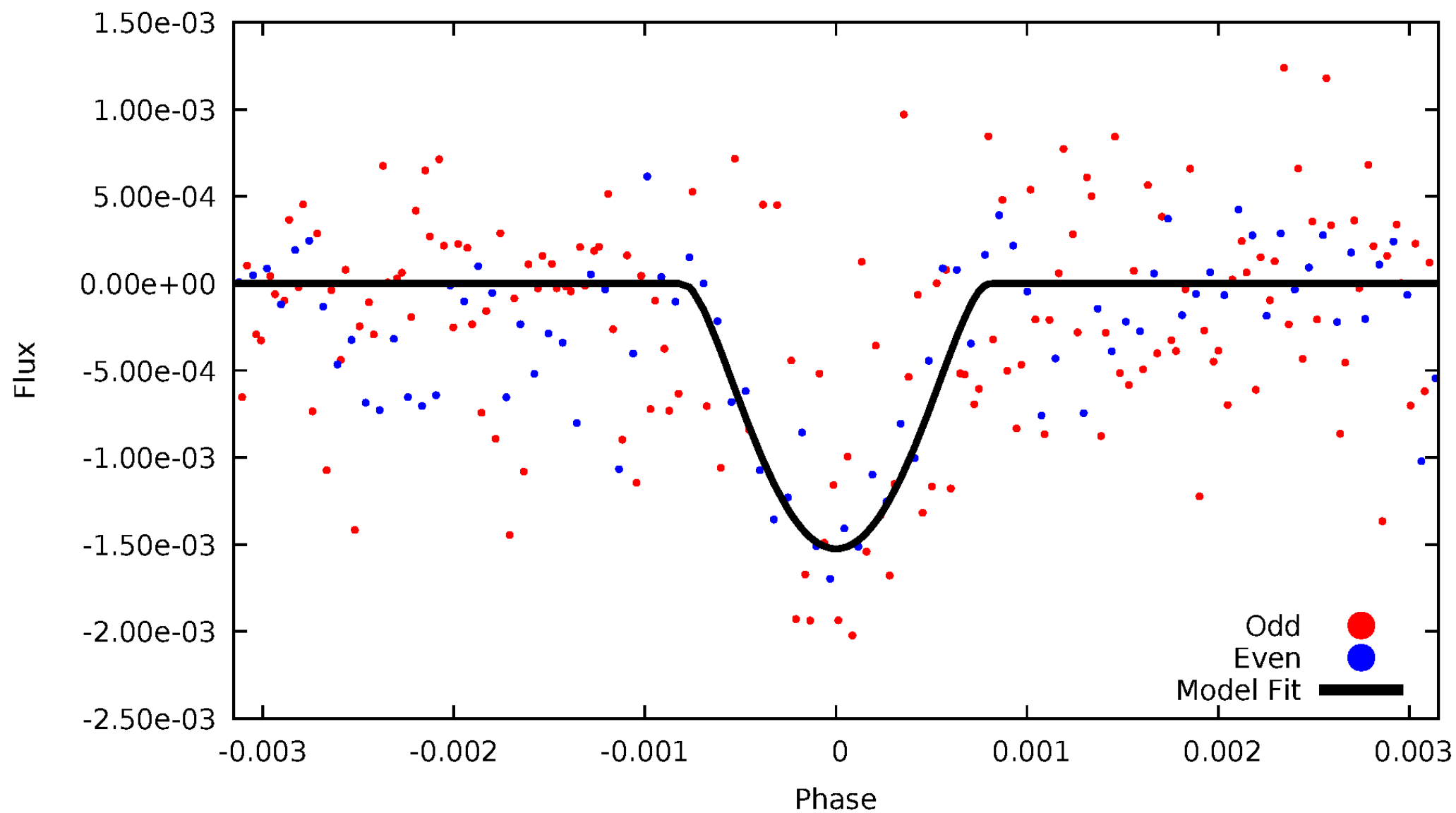


# TCE 010907307-01



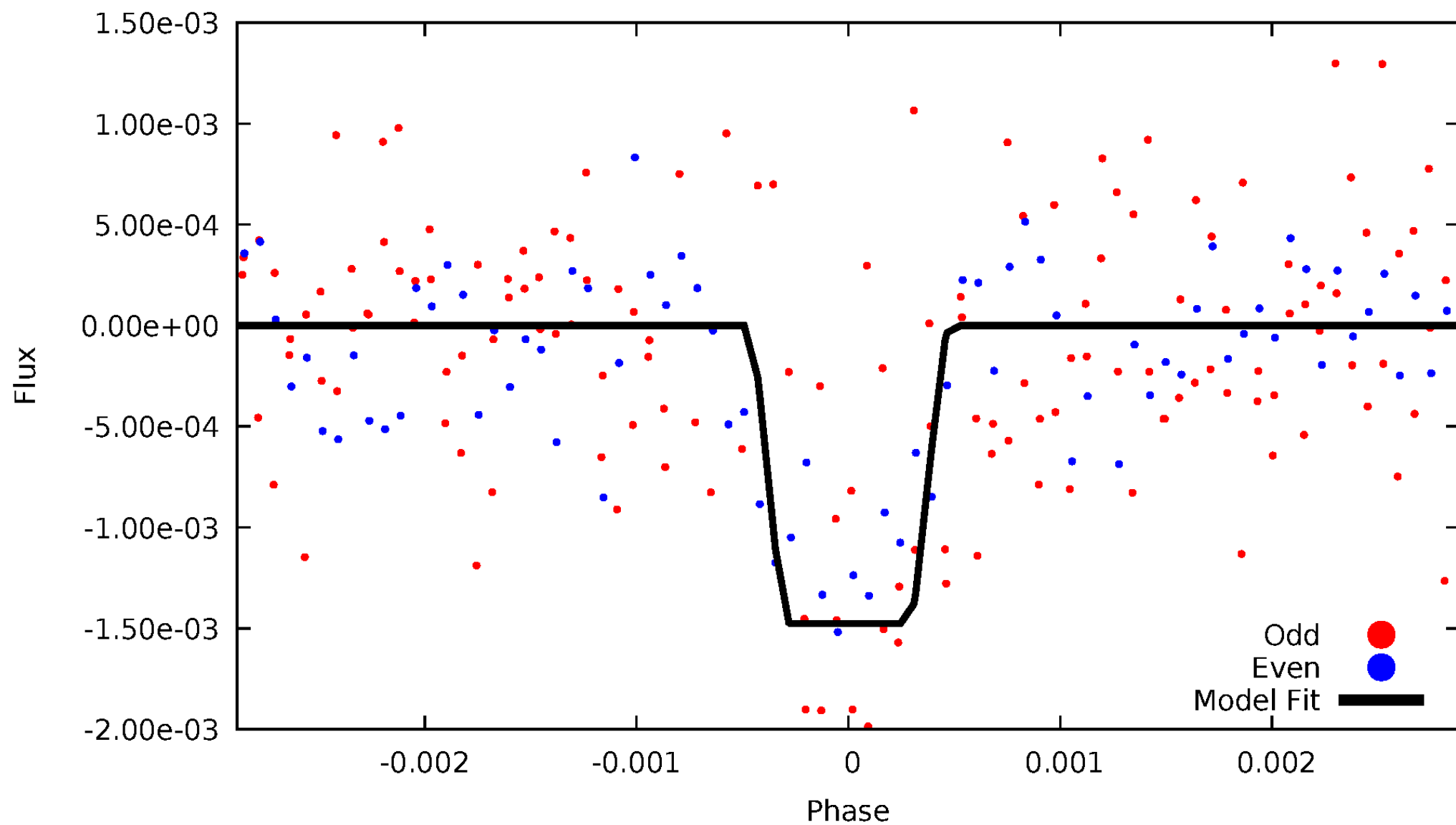
# DV Odd/Even

TCE 010907307-01



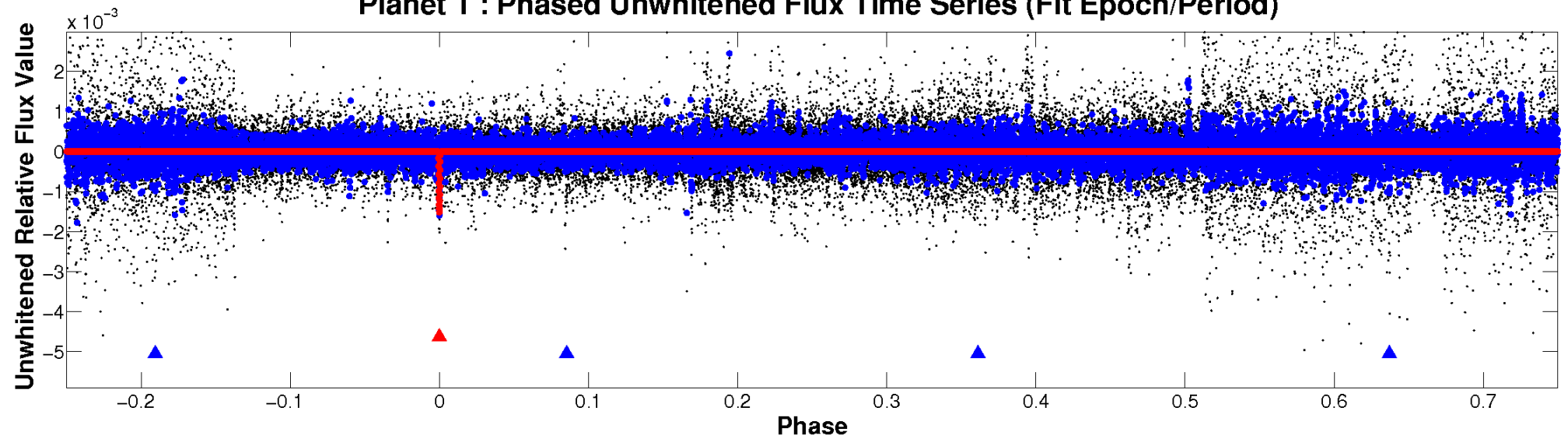
# ALT Odd/Even

TCE 010907307-01

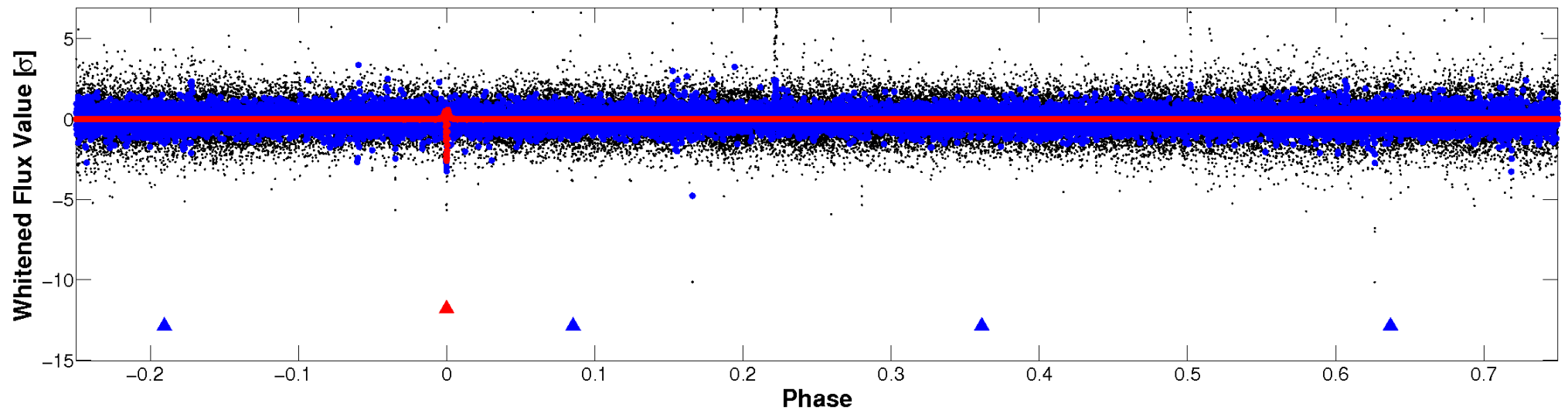


# Non-Whitened Vs. Whitened Light Curve

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

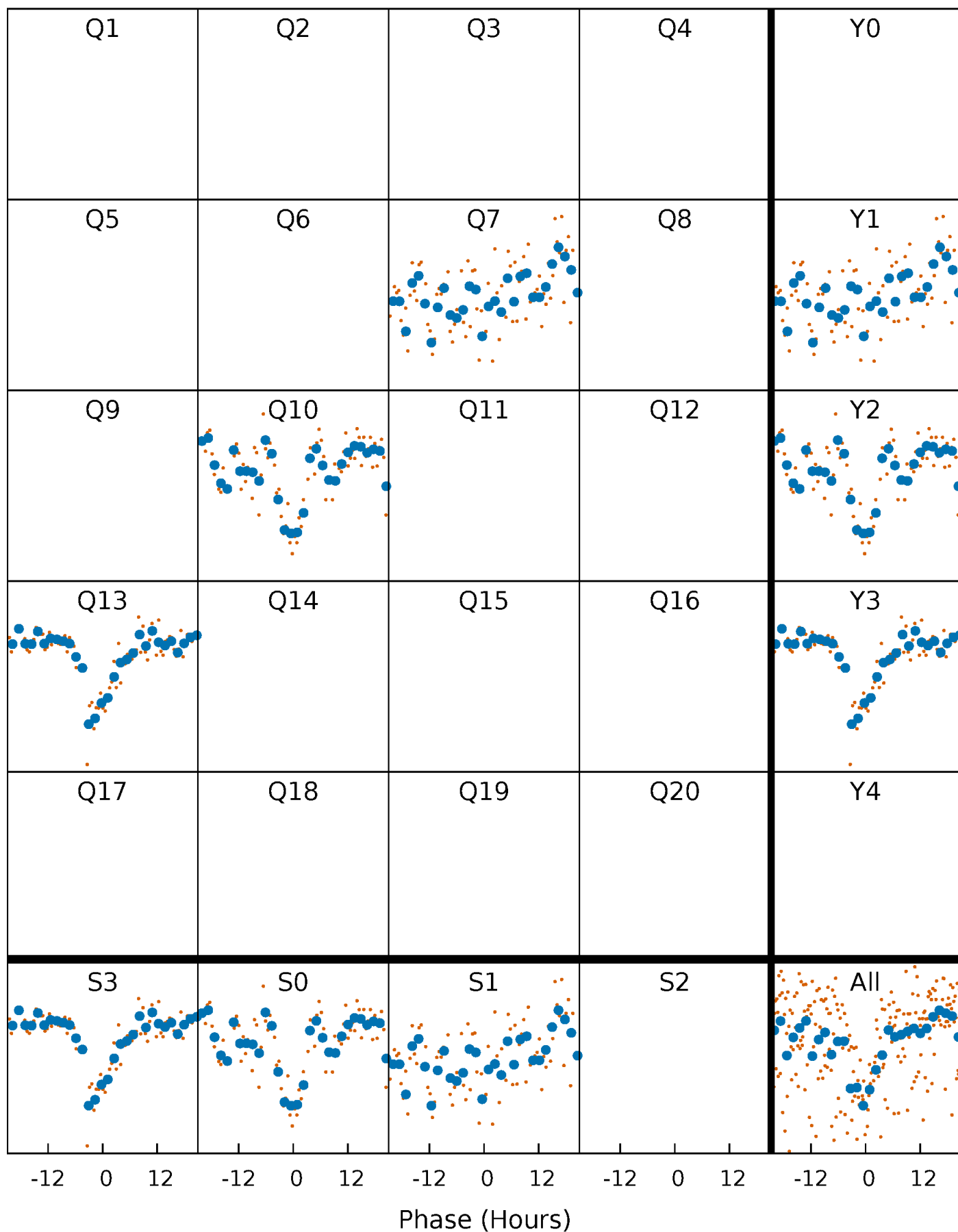


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

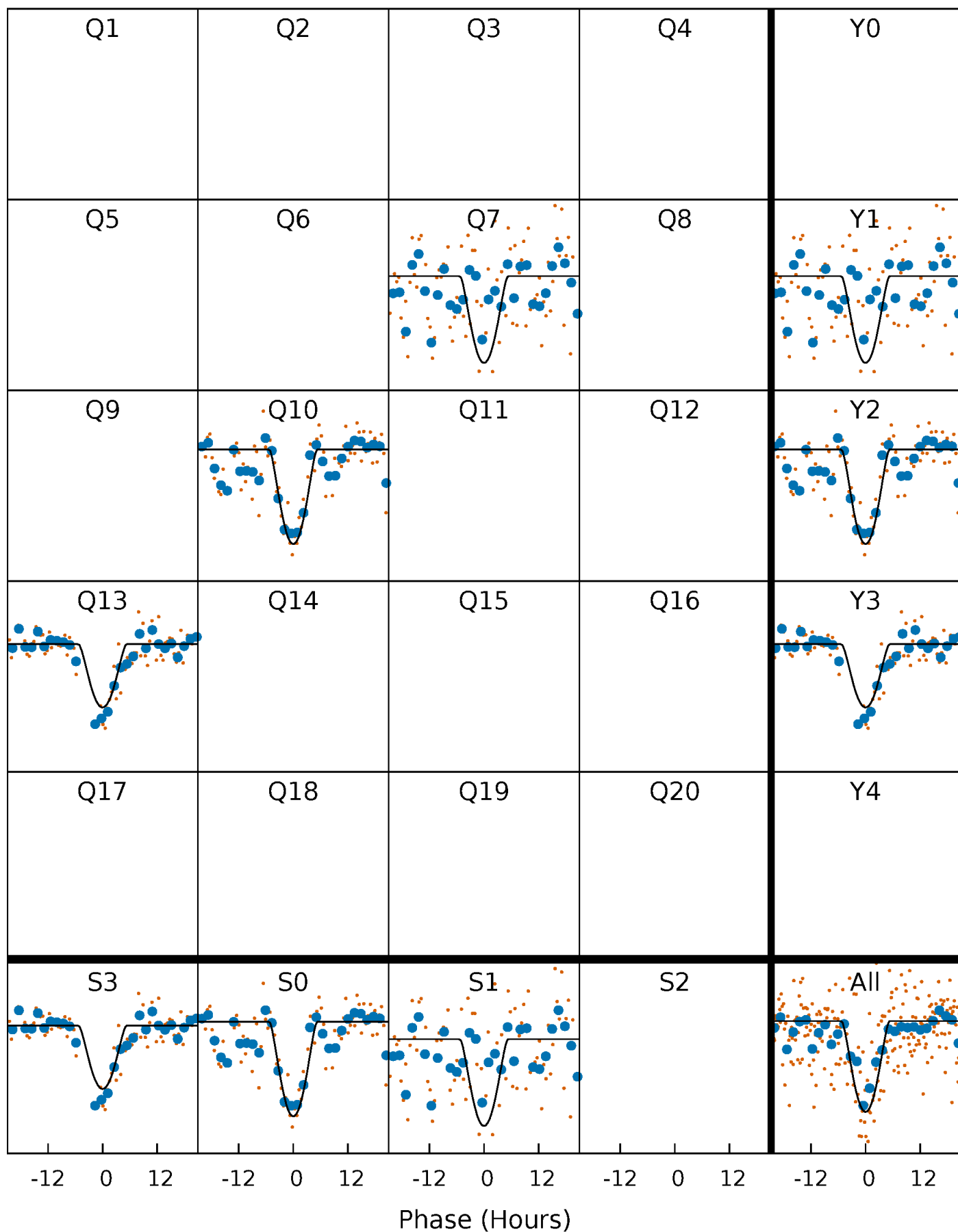
TCE 010907307-01 P=277.290943 Days  $T_0=399.964828$  (BKJD)





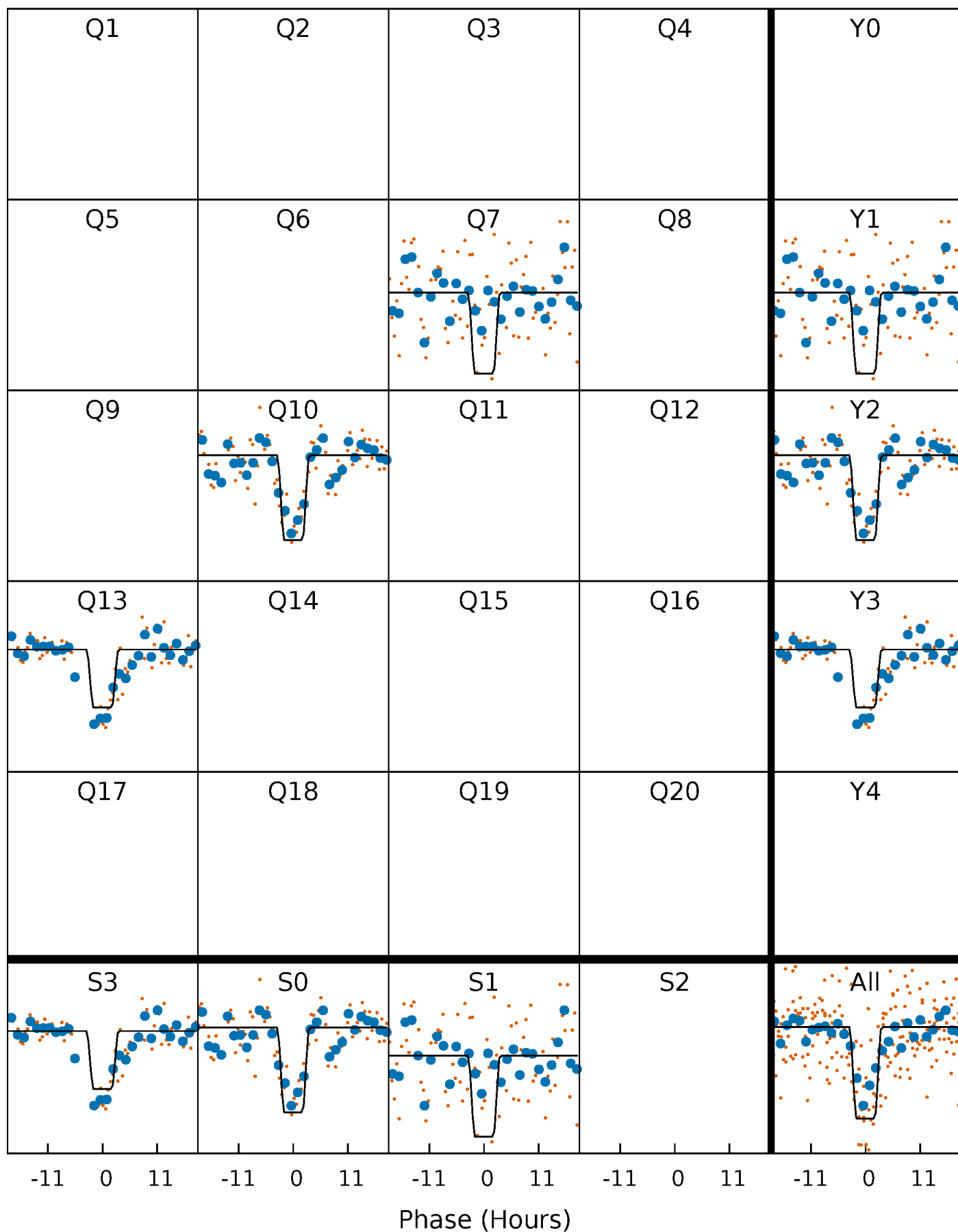
# DV Quarter-Phased Transit Curves

TCE 010907307-01     $P=277.290943$  Days     $T_0=399.964828$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

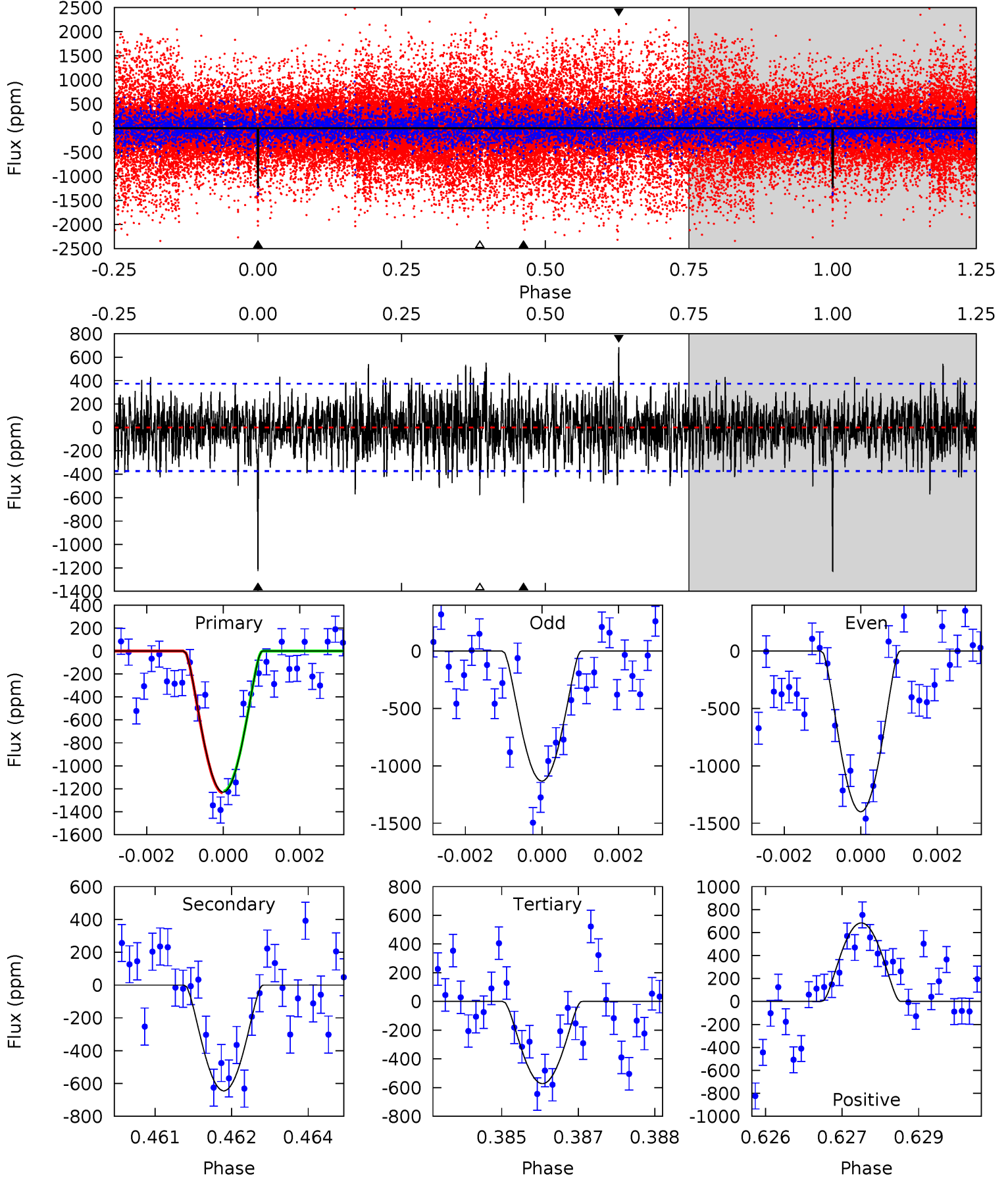
TCE 010907307-01     $P=277.283409$  Days     $T_0=399.985224$  (BKJD)



# DV Model-Shift Uniqueness Test

010907307-01, P = 277.290943 Days, E = 122.673885 Days

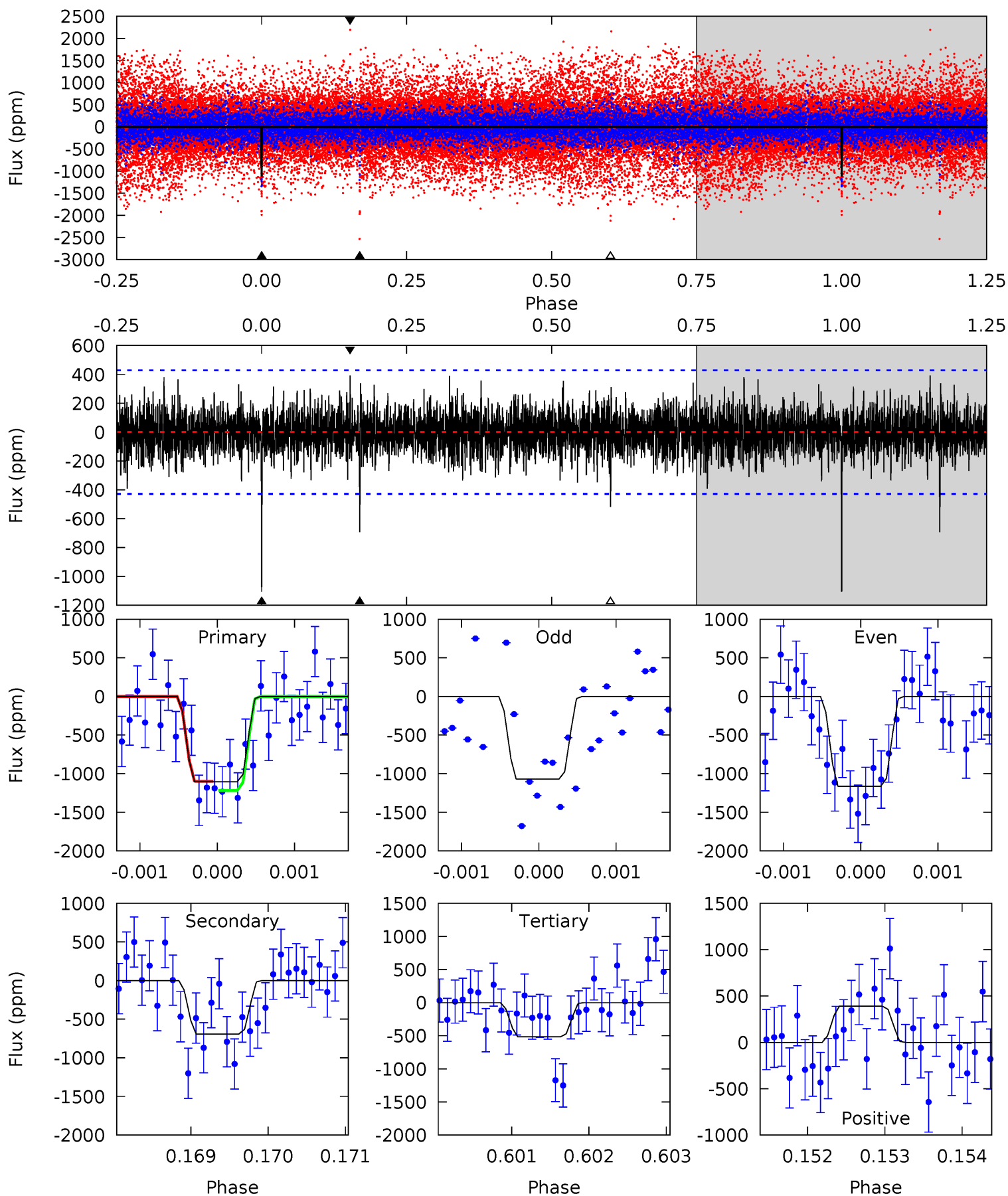
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
17.7	9.28	8.25	9.85	5.37	3.16	2.30	9.44	7.84	1.04	-0.56	1.77	0.90	0.36	0.10



# Alt Model-Shift Uniqueness Test

010907307-01, P = 277.283409 Days, E = 122.701815 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
14.1	8.83	6.60	5.00	5.46	3.31	1.34	7.51	9.11	2.24	3.83	0.54	0.92	0.26	0.74



### Stellar Parameters For KIC 010907307

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6046^{+164}_{-164}$	$4.357^{+0.136}_{-0.187}$	$-0.400^{+0.300}_{-0.300}$	$1.048^{+0.285}_{-0.190}$	$0.910^{+0.119}_{-0.089}$	$1.114^{+0.794}_{-0.536}$
	+3%/-3%	+3%/-4%	+75%/-75%	+27%/-18%	+13%/-10%	+71%/-48%
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 010907307-01 / KOI 8217.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-645 \pm 69$	$15.86^{+16.73}_{-10.68}$	$427^{+31}_{-24}$	$3230^{+1404}_{-589}$	$922^{+7760}_{-708}$
Alt.	$-692 \pm 78$	$13.95^{+14.67}_{-9.43}$	$427^{+30}_{-26}$	$3371^{+1735}_{-627}$	$1281^{+10877}_{-965}$

$T_{\text{max}}$  = Theoretical Maximum Planetary Temperature

$T_{\text{obs}}$  = Observed Planetary Temperature (Assuming  $A=0.3$ )

$A_{\text{obs}}$  = Observed Albedo (Assuming  $T=0$ )

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

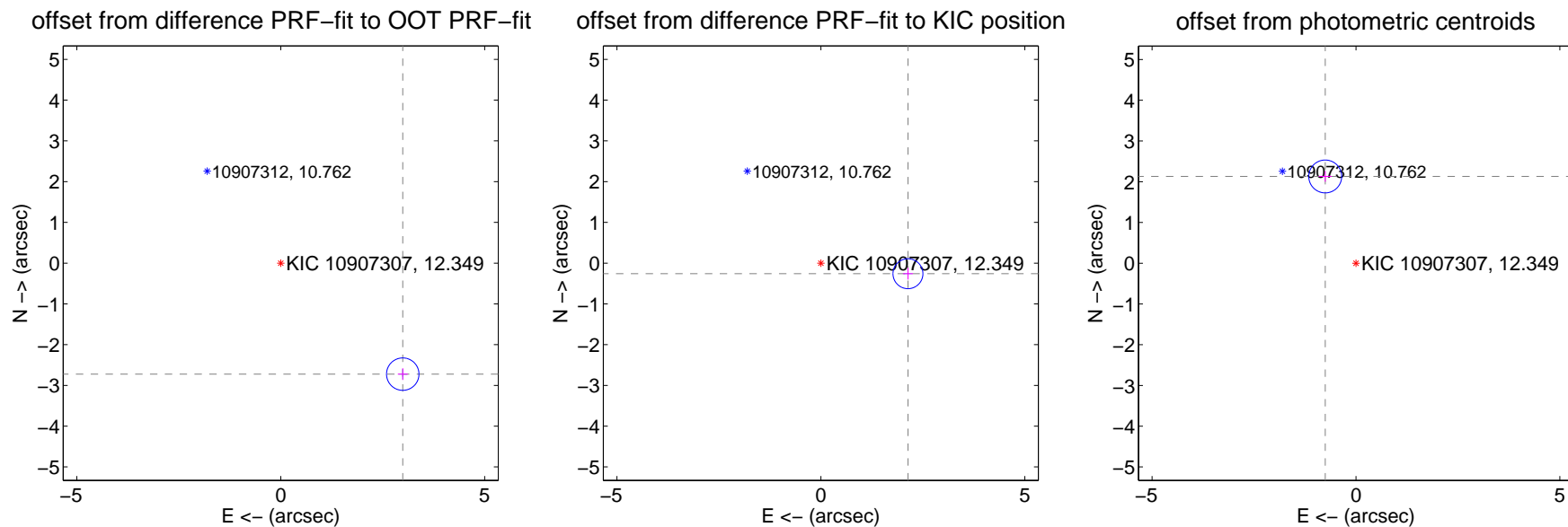
## DV Centroid Data

Supplemental centroid analysis for 010907307-01. Kepler magnitude: 12.35. Transit SNR 13.64

There are 1 quarters with good PRF difference image offsets

The OOT PRF centroid is offset from the target star catalog position by about 2.61 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$4.045 \pm 0.133$	30.52	$-2.991 \pm 0.122$	$-2.723 \pm 0.144$
PRF-fit source offset from KIC position	$2.151 \pm 0.122$	17.58	$-2.135 \pm 0.122$	$-0.259 \pm 0.144$
photometric centroid source offset	$2.26 \pm 0.13$	16.80	$0.75 \pm 0.16$	$2.13 \pm 0.13$

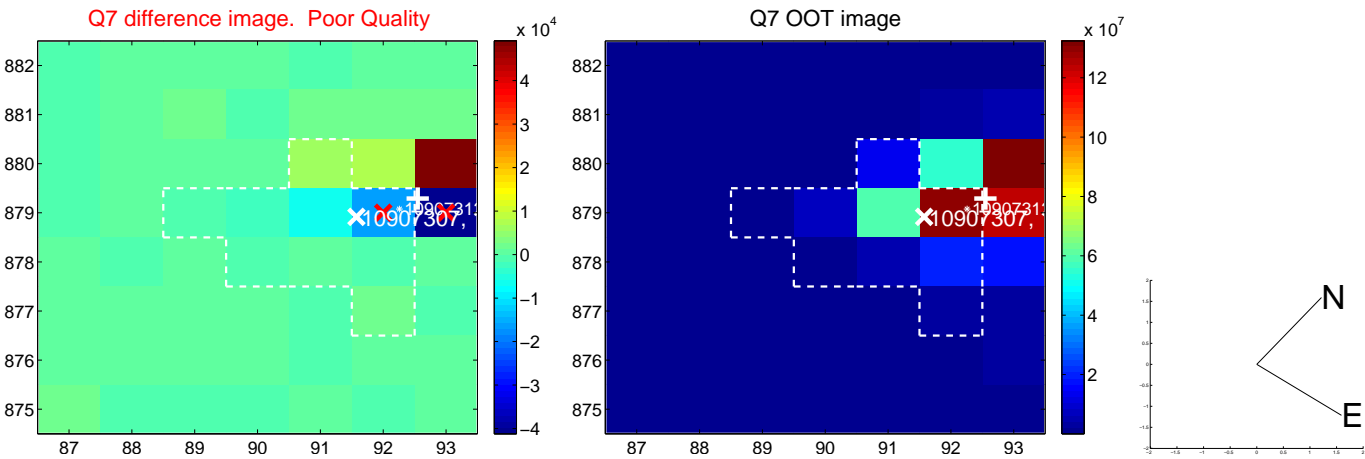


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

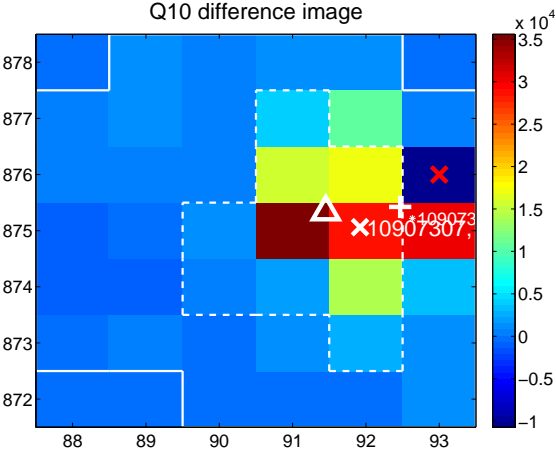
Q9 no difference image



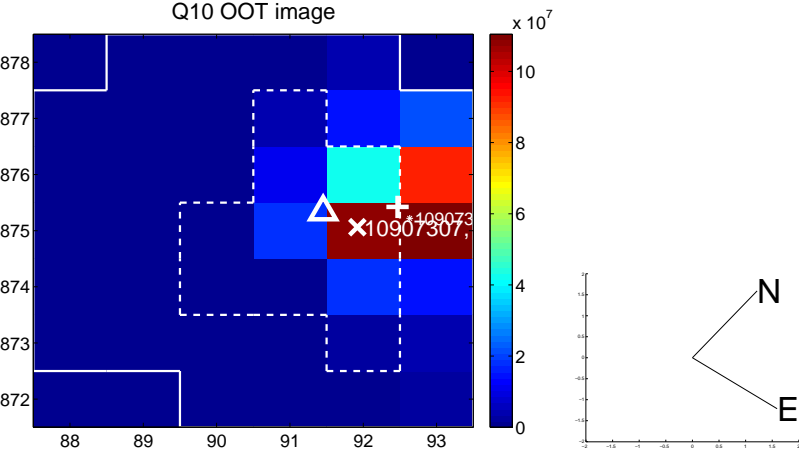
Q9 no OOT image



Q10 difference image



Q10 OOT image



Q11 no difference image



Q11 no OOT image



Q12 no difference image



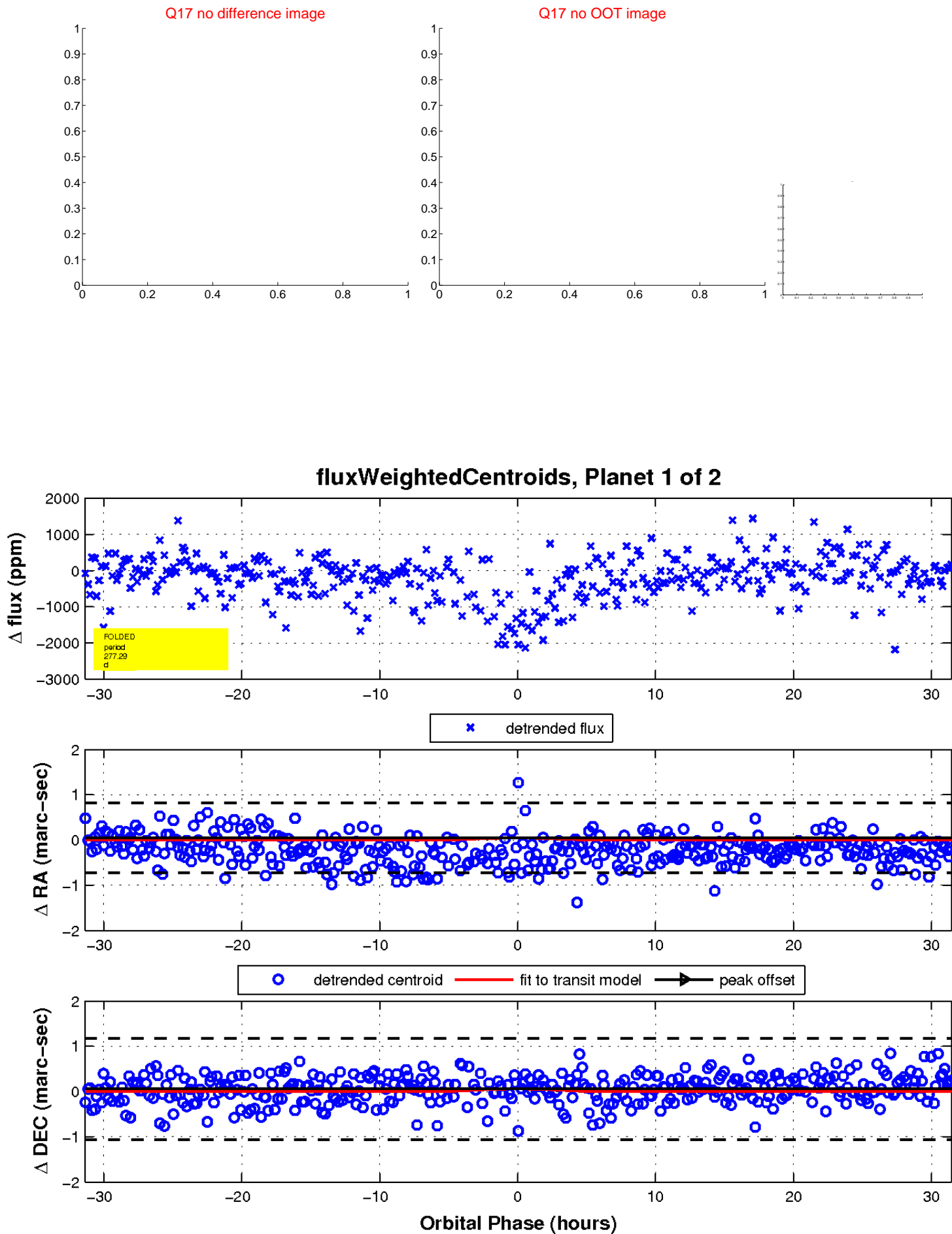
Q12 no OOT image



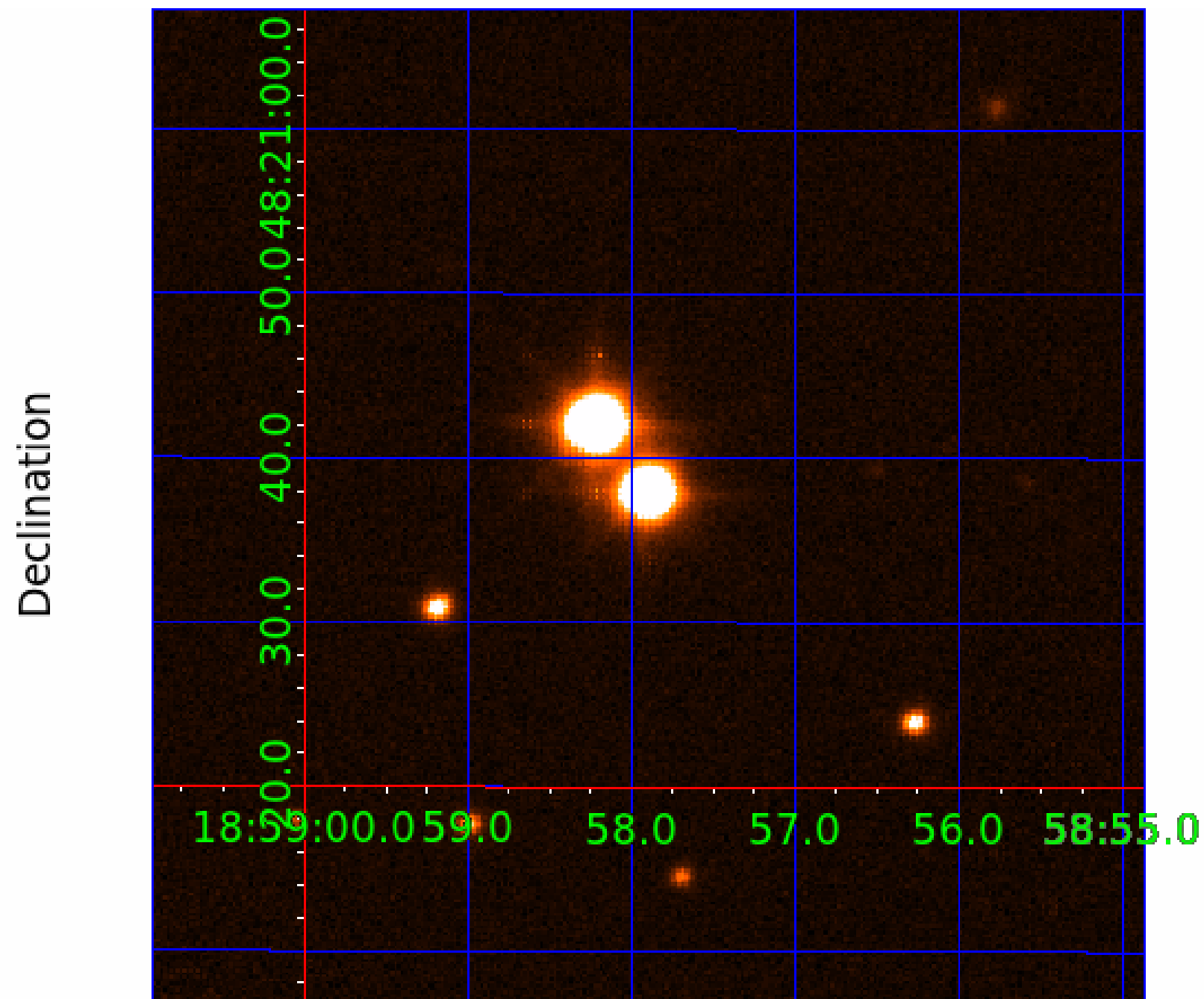
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image



# KIC 010907307

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010907307-01	OBS	8217.01	277.290942	399.964828	1524.3	10.488	14.3	13.6	1.05	6046	7.51	2.02
010907307-02	OBS	No	353.776362	347.154749	1483.9	11.301	9.7	7.8	1.05	6046	5.11	1.46

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010907307-01	OBS	FP	0.00	1	0	0	0	INCONSISTENT_TRANS—CENT_FEW_DIFFS
010907307-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—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.

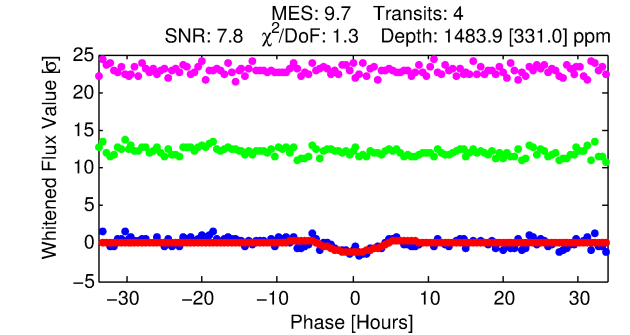
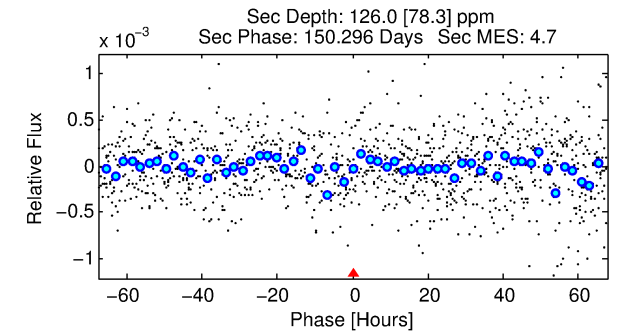
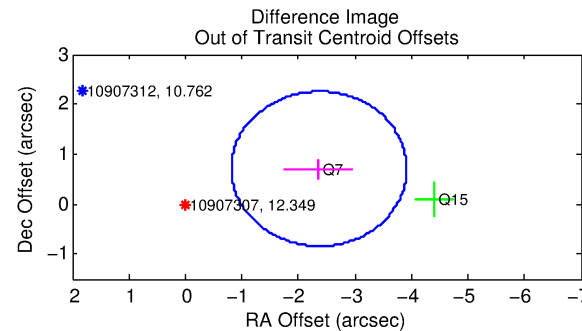
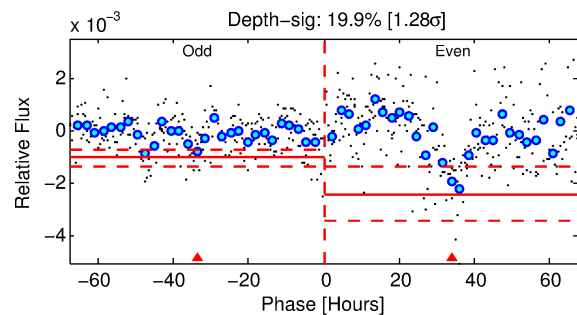
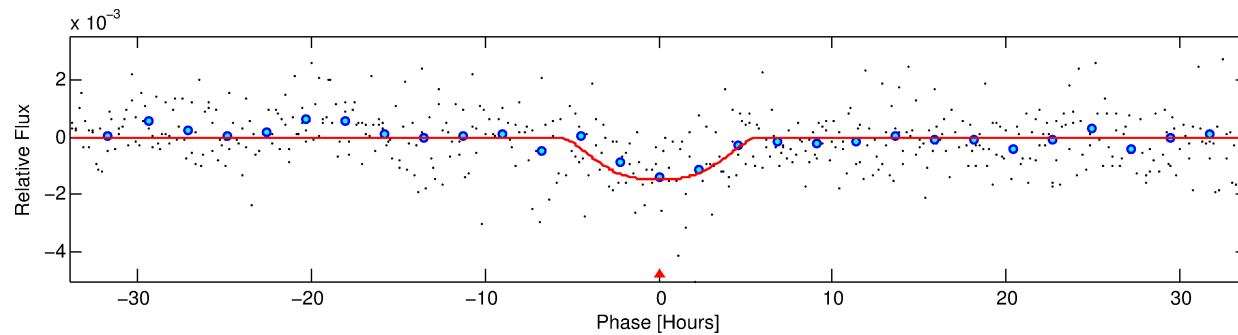
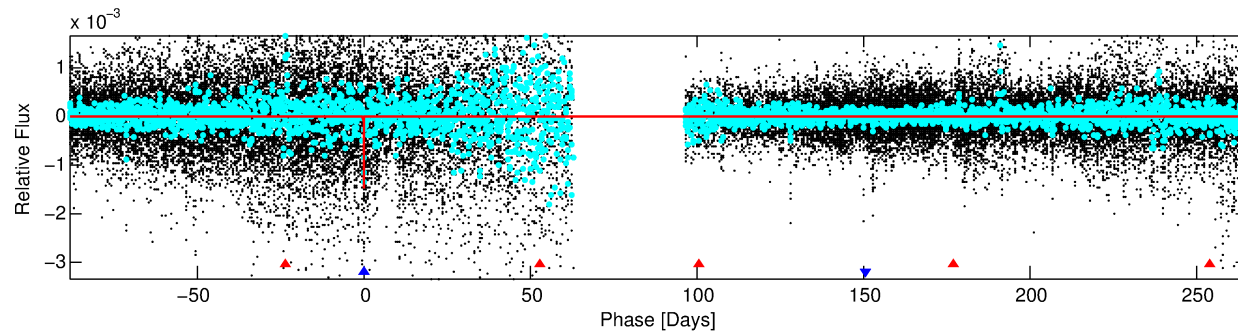
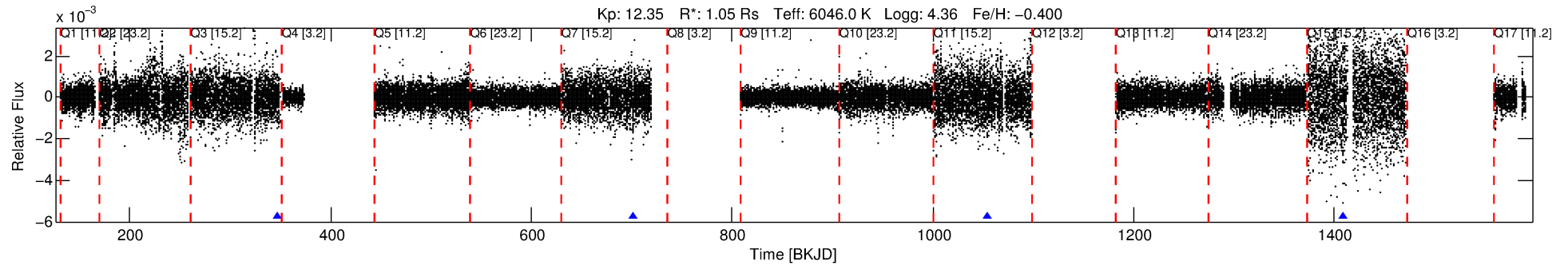
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010907307-02

No Significant Match Found

# DV One-Page Summary

KIC: 10907307 Candidate: 2 of 2 Period: 353.776 d



## DV Fit Results:

Period = 353.77636 [0.01507] d  
Epoch = 347.1547 [0.0275] BKJD  
Rp/R\* = 0.0447 [0.0071]  
a/R\* = 101.90 [22.28]  
b = 0.95 [0.03]  
Seff = 1.46 [0.52]  
Teq = 280 [25] K  
Rp = 5.11 [1.61] Re  
a = 0.9493 [0.2195] AU  
Ag = 2395.84 [1861.32] [1.29 $\sigma$ ]  
Teffp = 3031 [536] K [5.13 $\sigma$ ]

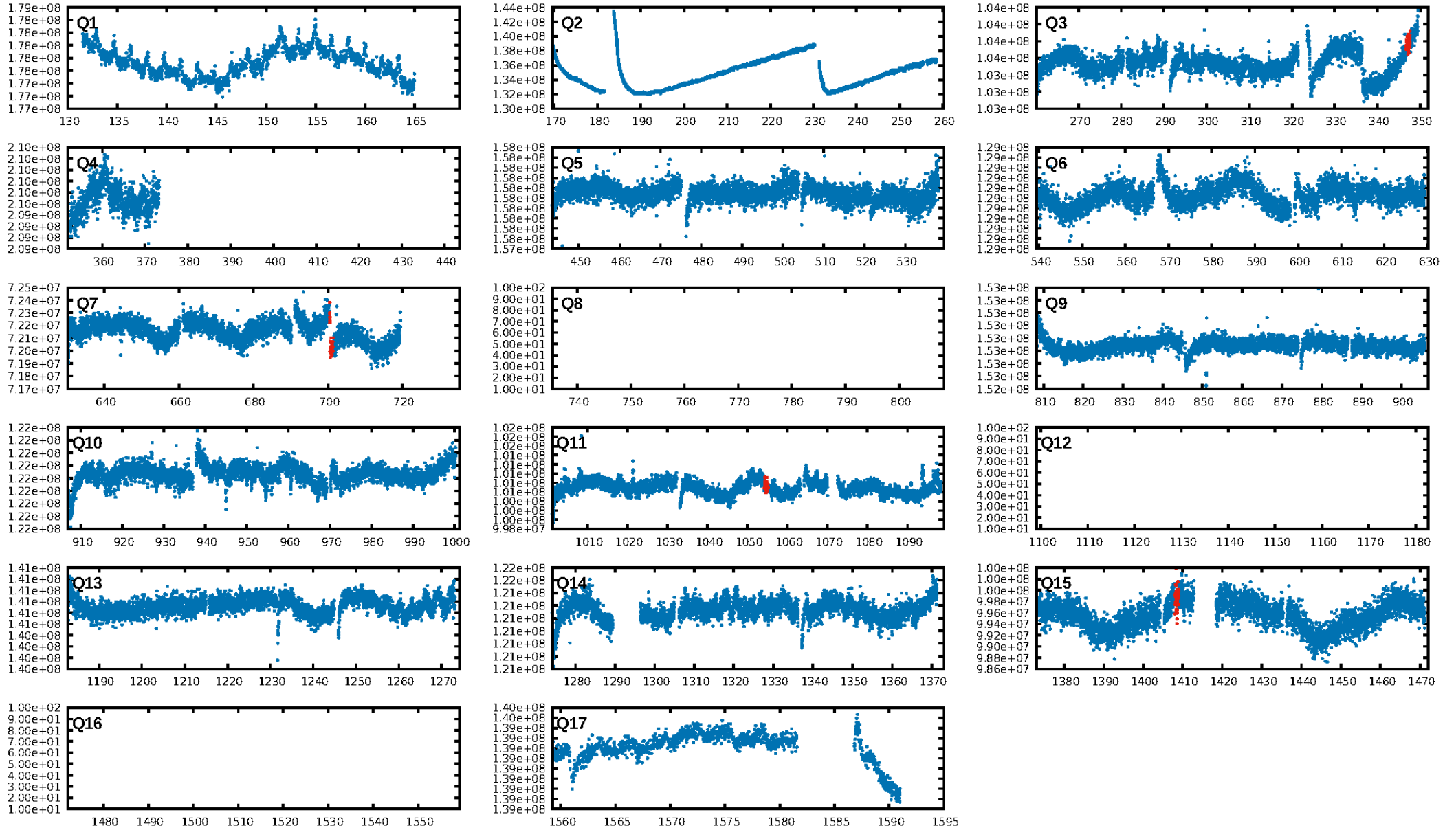
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [119.06 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 1.1%  
ModelChiSquareGof-sig: 81.8%  
**Bootstrap-pfa: 7.88e-11**  
RollingBand-fgt: 1.00 [4/4]  
**GhostDiagnostic-chr: -2.788**  
Centroid-sig: 91.9%  
Centroid-so: 2.281 arcsec [22.63 $\sigma$ ]  
OotOffset-rm: 2.467 arcsec [4.77 $\sigma$ ]  
KicOffset-rm: 4.287 arcsec [23.31 $\sigma$ ]  
OotOffset-st: 0/2/0/0 [2]  
KicOffset-st: 0/2/0/0 [2]  
DiffImageQuality-fgm: 0.50 [1/2]  
DiffImageOverlap-fno: 1.00 [4/4]

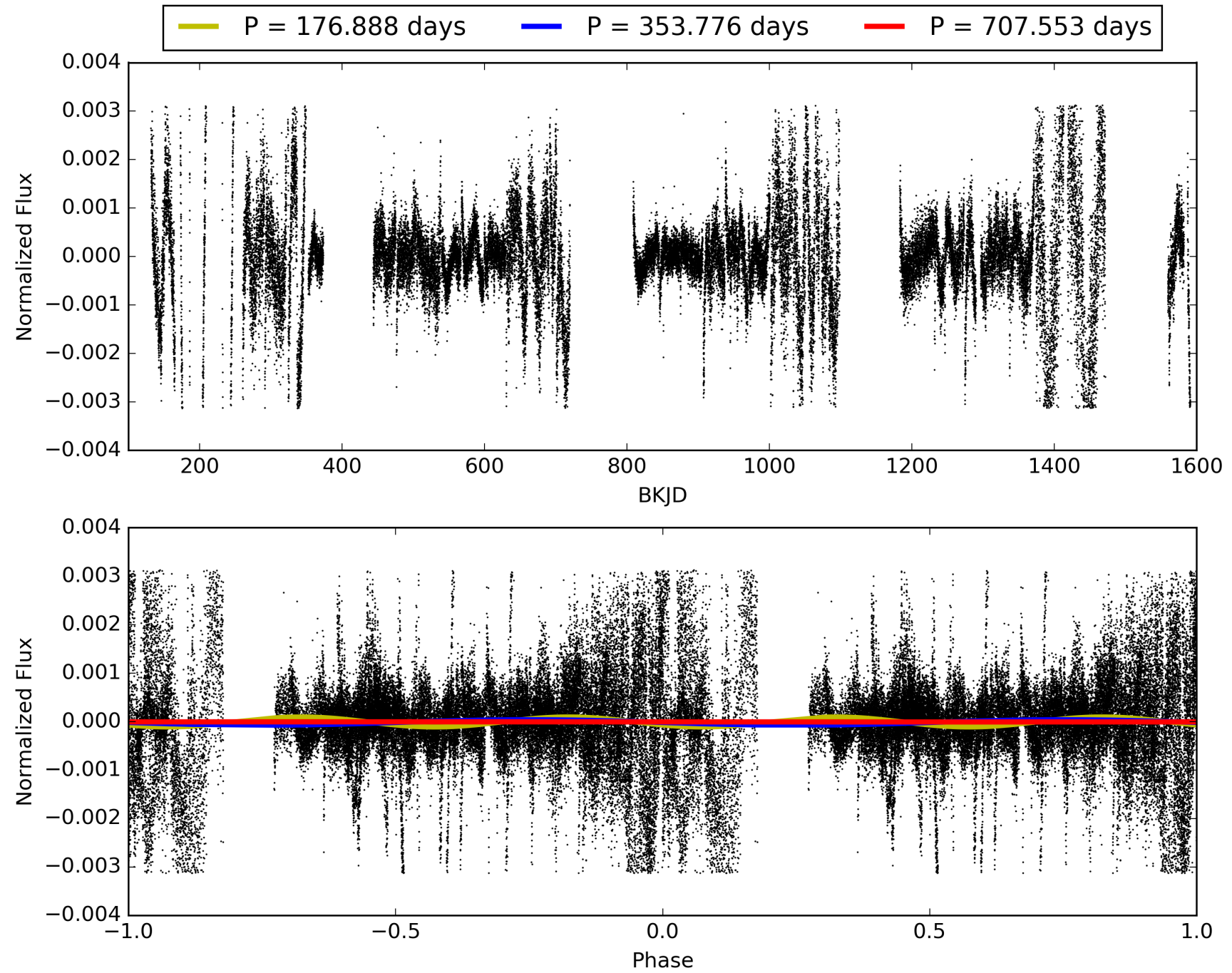
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 05:34:09 Z

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

# TCE 010907307-02, PDC Light Curves



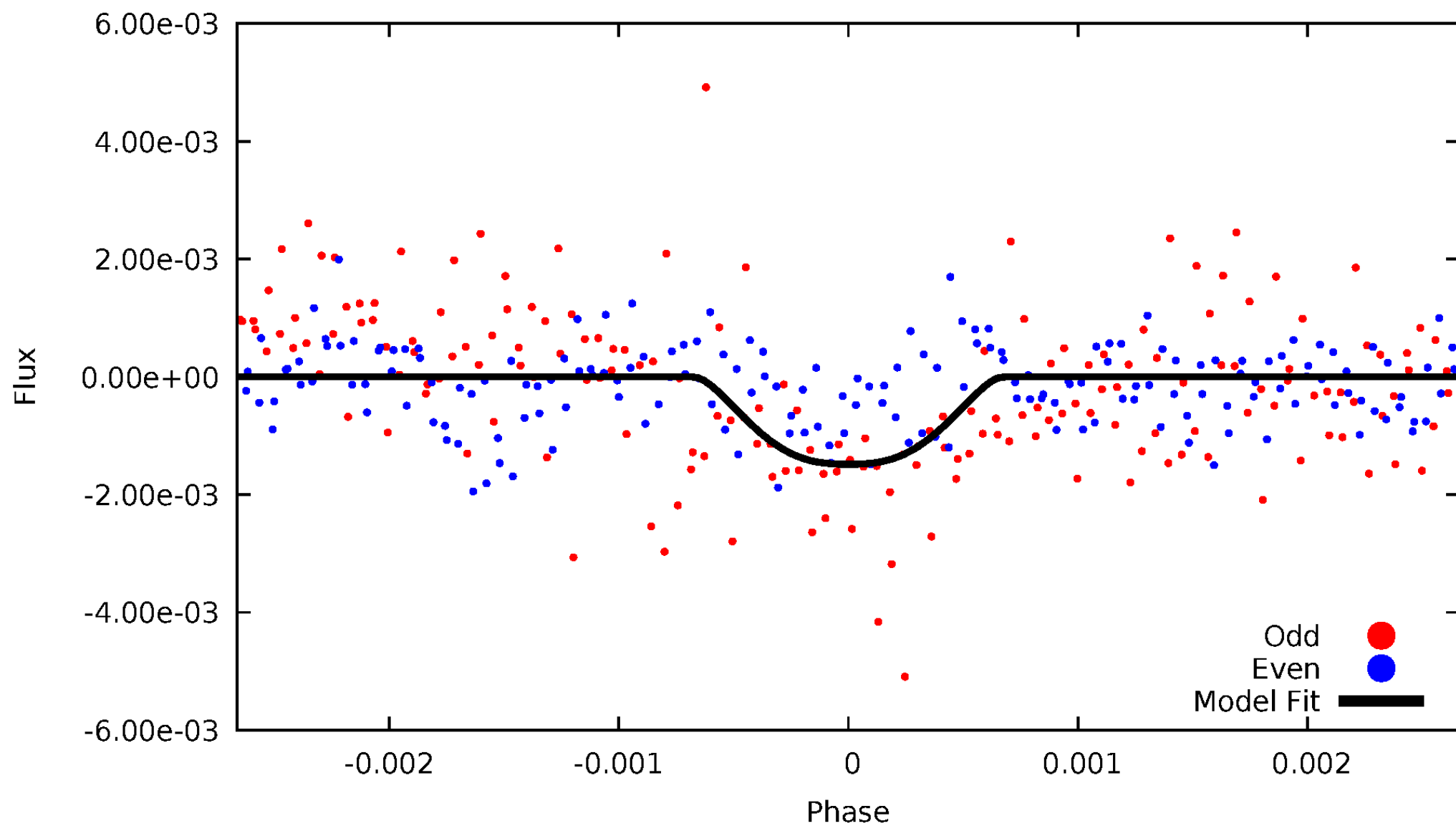
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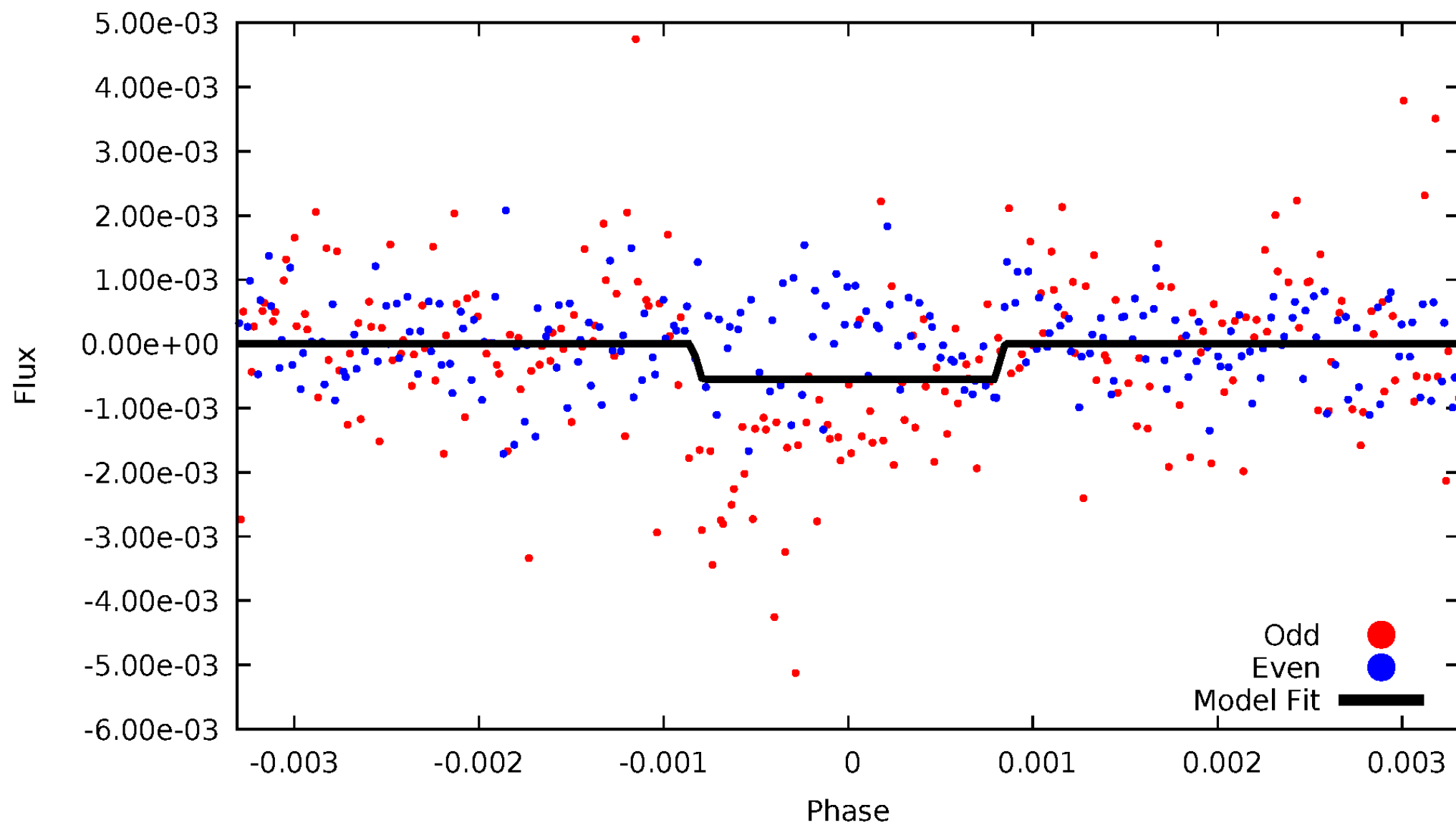
# DV Odd/Even

TCE 010907307-02



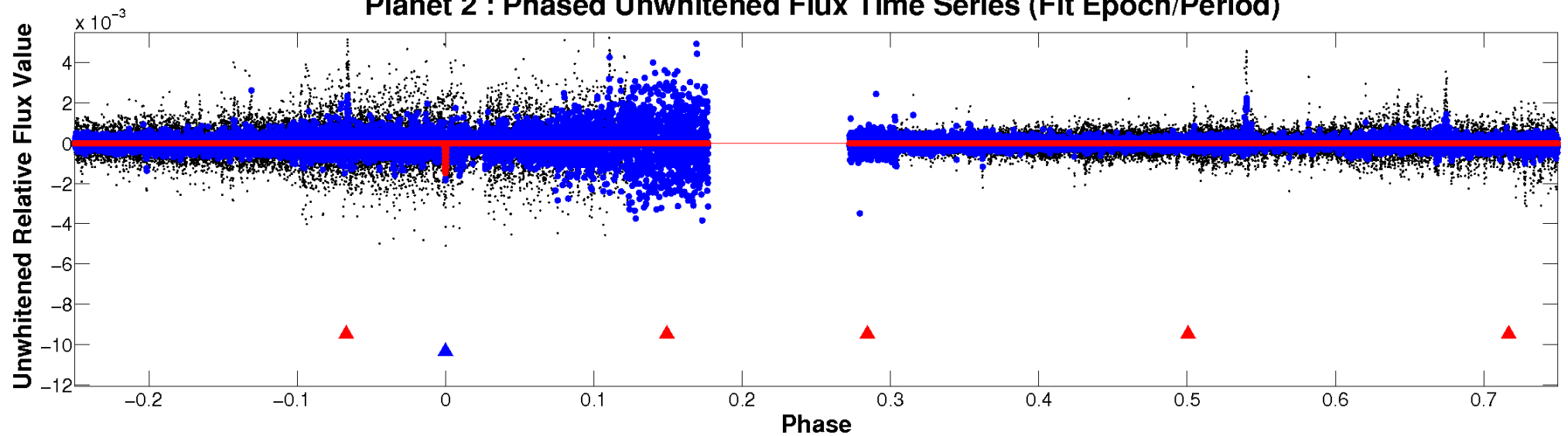
# ALT Odd/Even

TCE 010907307-02

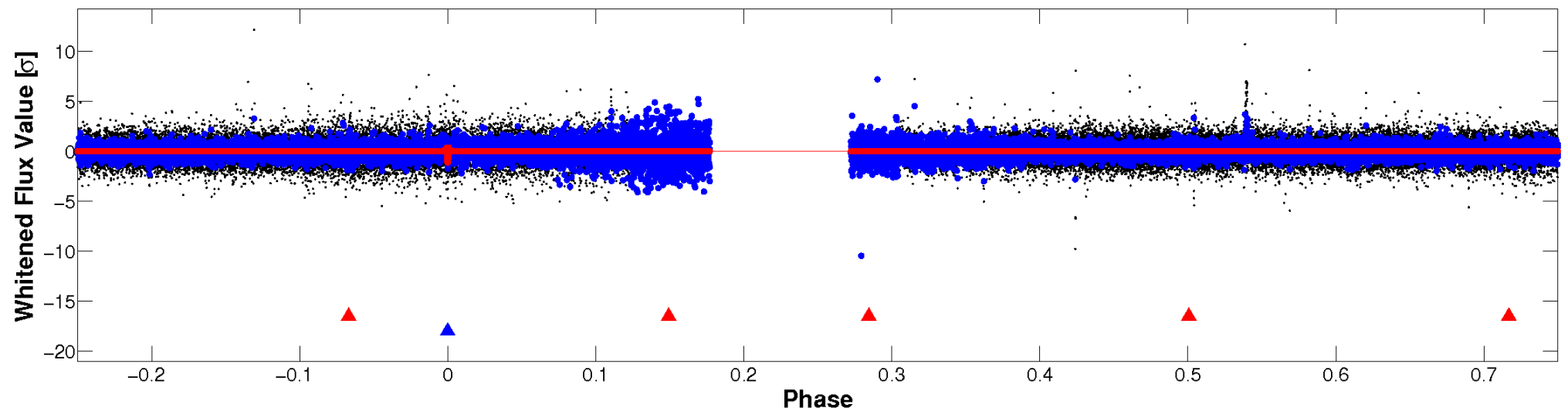


# Non-Whitened Vs. Whitened Light Curve

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

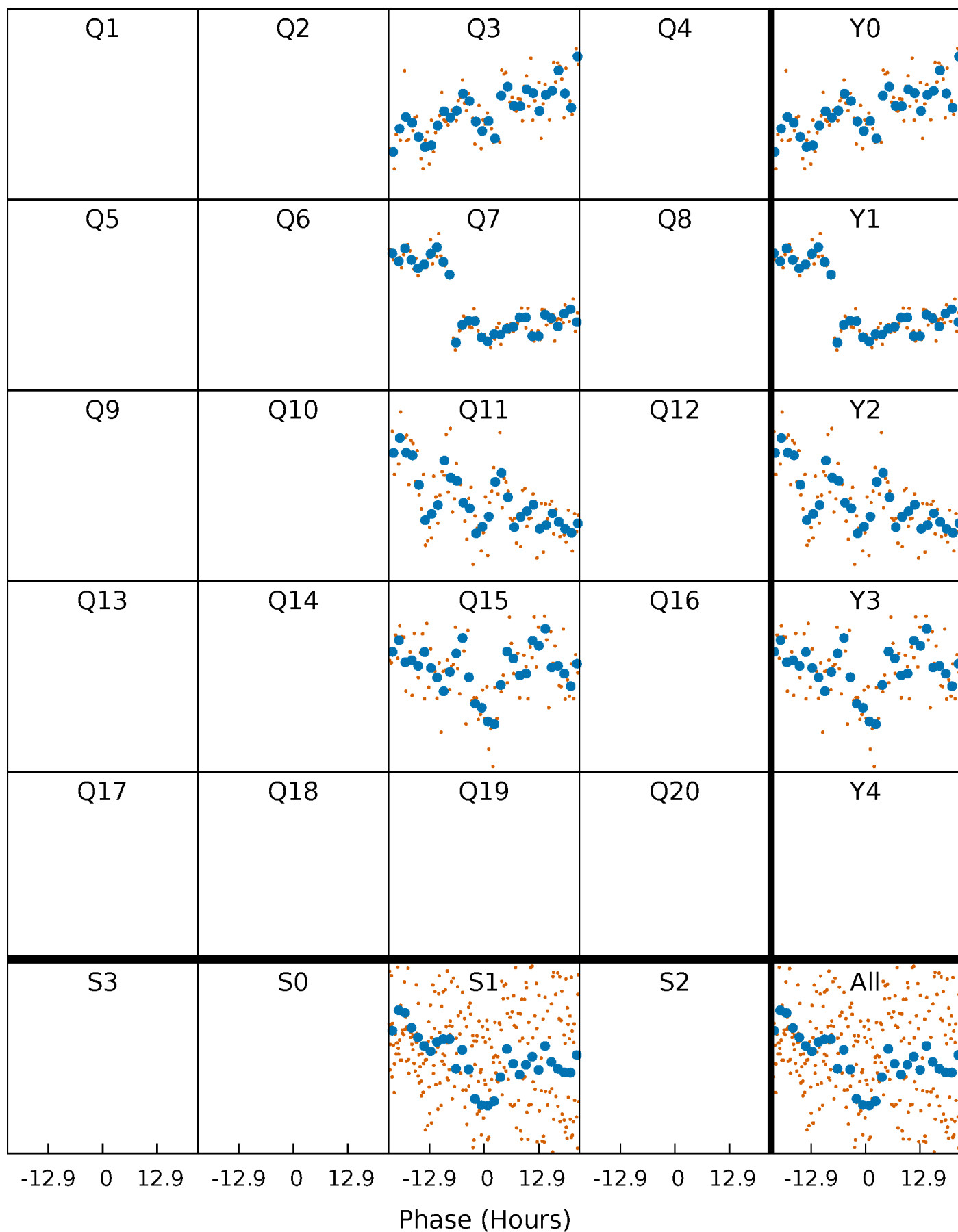


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



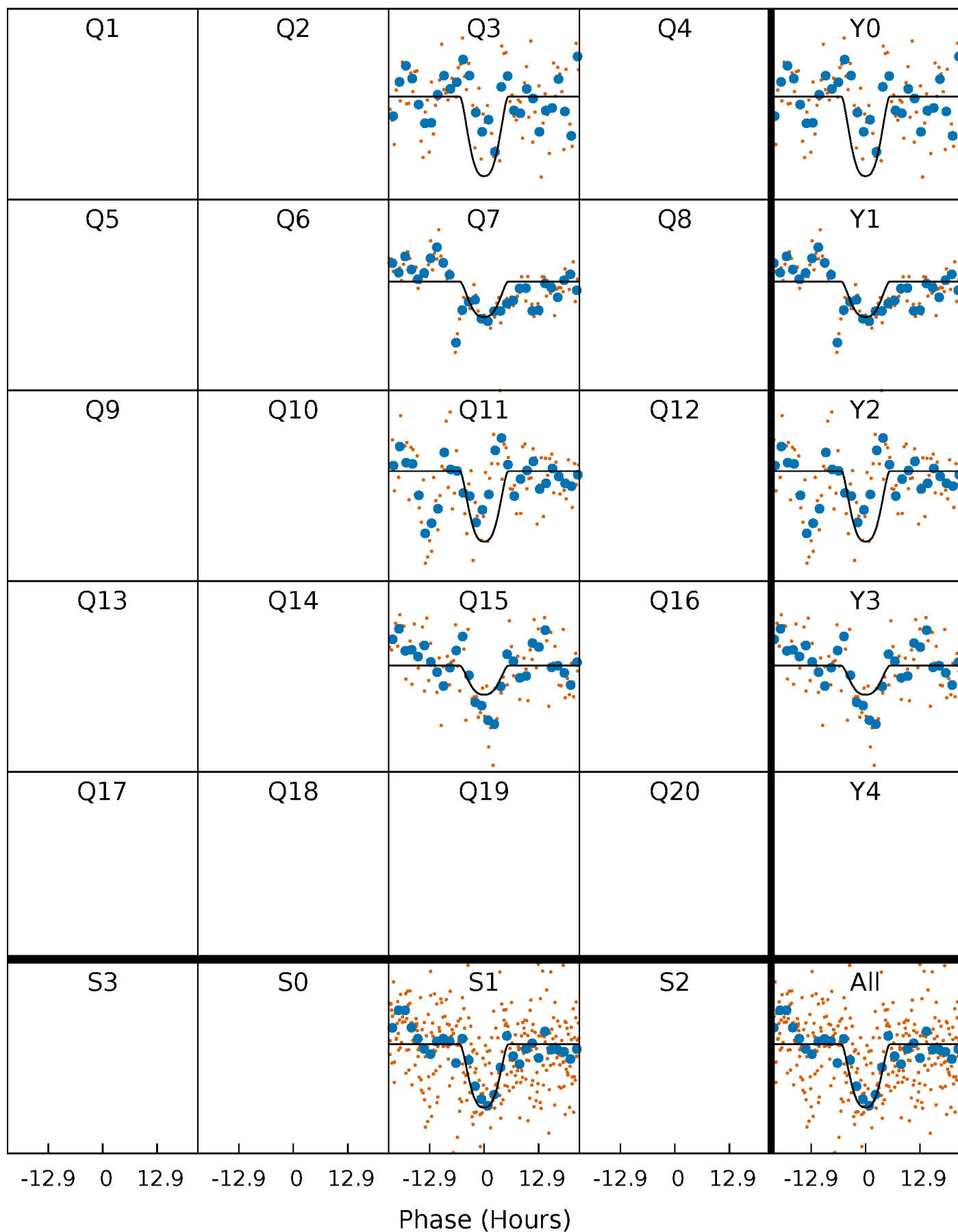
# PDC Quarter-Phased Transit Curves

TCE 010907307-02     $P=353.776362$  Days     $T_0=347.154749$  (BKJD)



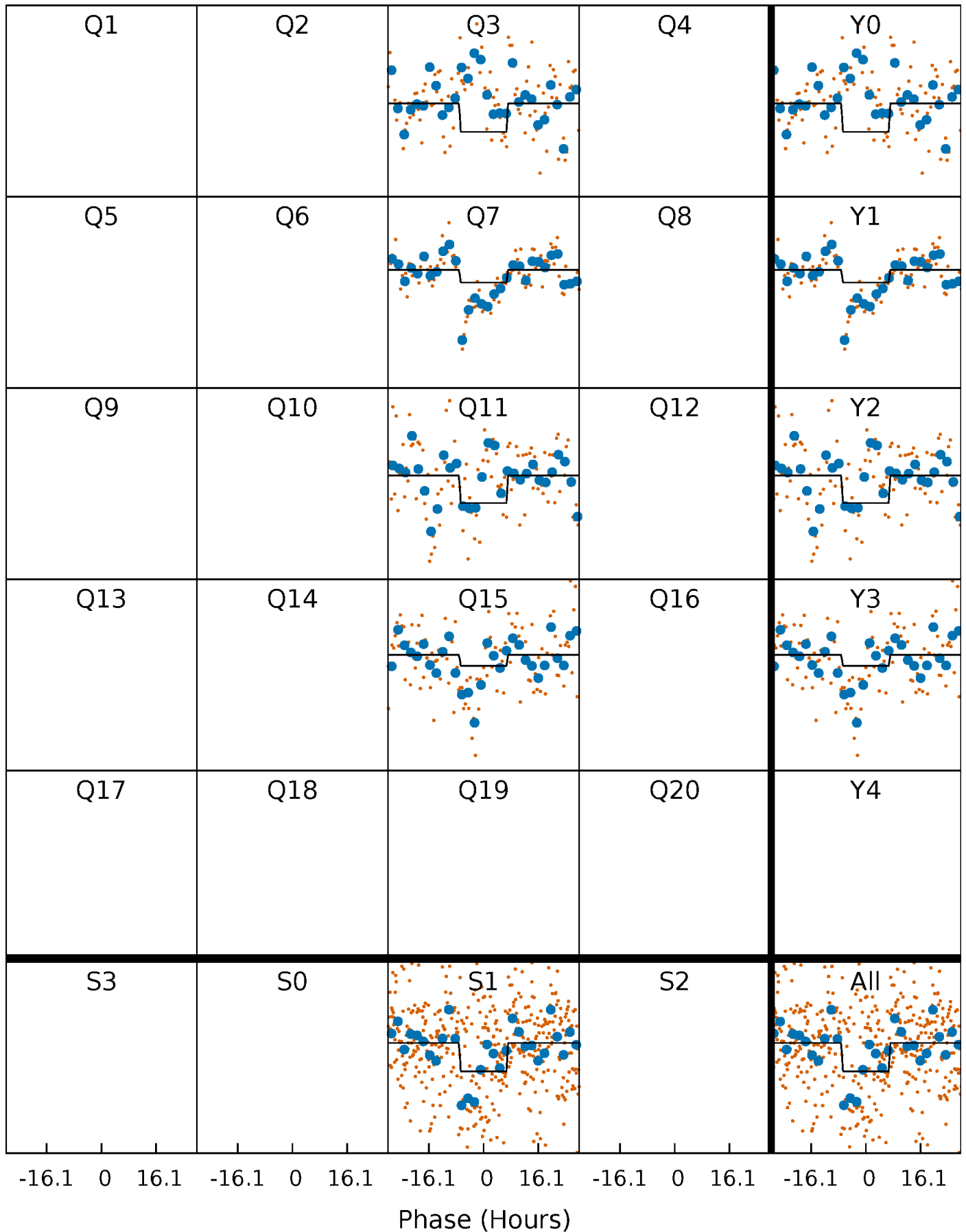
# DV Quarter-Phased Transit Curves

TCE 010907307-02     $P=353.776362$  Days     $T_0=347.154749$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

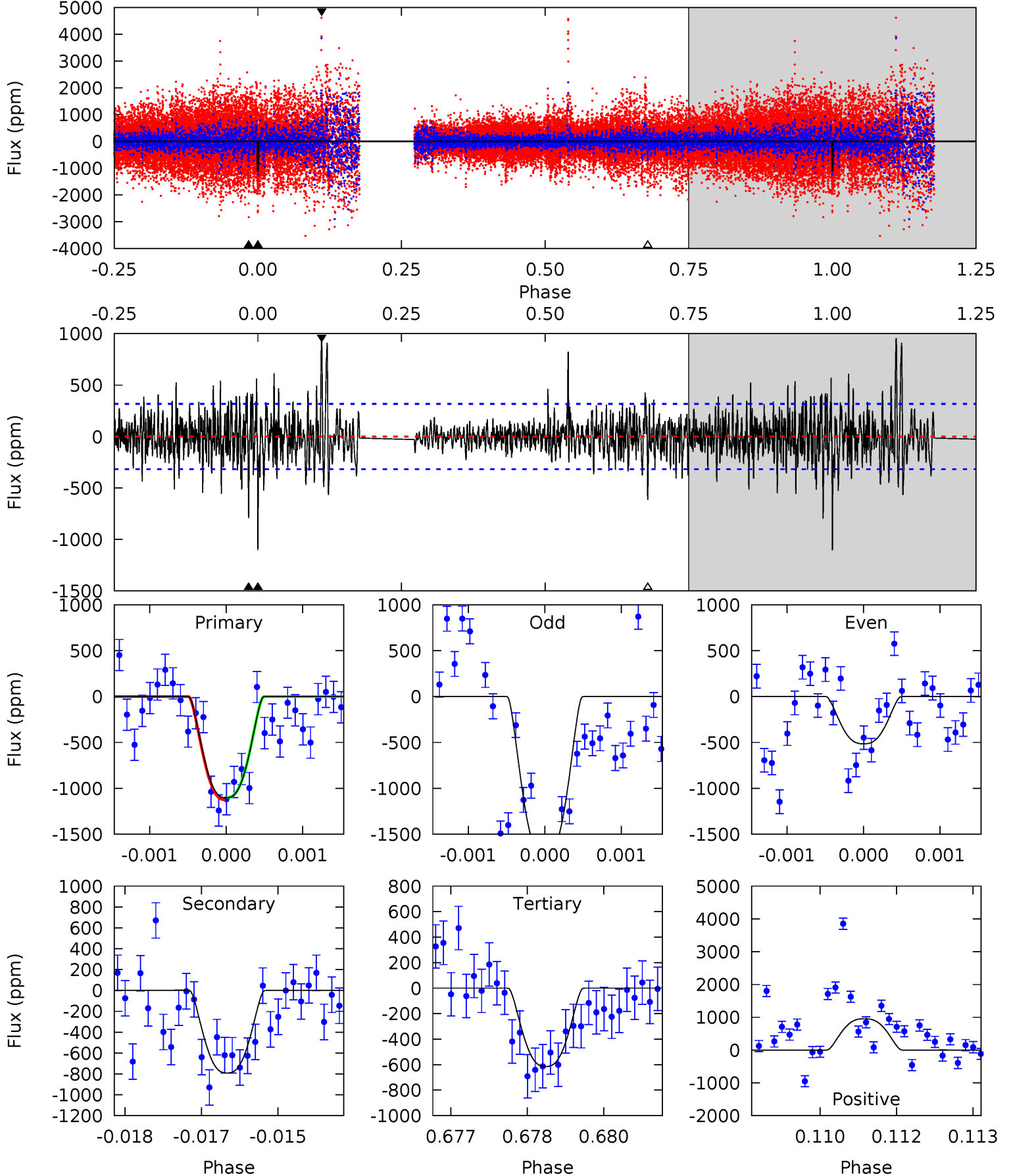
TCE 010907307-02     $P=353.882014$  Days     $T_0=347.025993$  (BKJD)



# DV Model-Shift Uniqueness Test

010907307-02, P = 353.776362 Days, E = 347.154749 Days

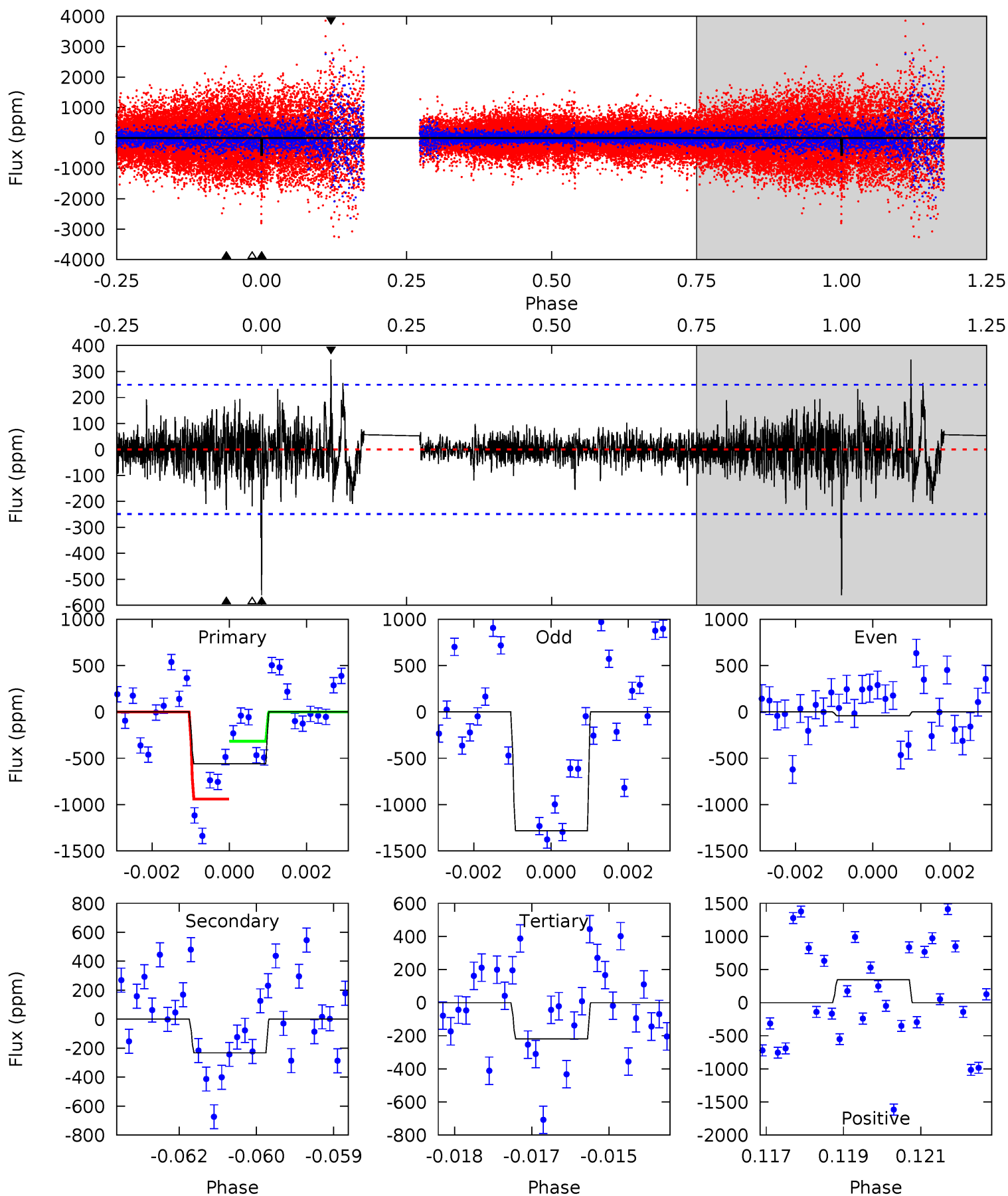
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
18.7	13.4	10.4	16.2	5.39	3.20	2.60	8.31	2.53	3.00	-2.77	10.2	1.21	0.46	0.22



# Alt Model-Shift Uniqueness Test

010907307-02, P = 353.882014 Days, E = 347.025993 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
12.1	5.01	4.70	7.43	5.36	3.14	1.03	7.37	4.63	0.31	-2.42	13.5	0.90	0.38	6.54





### Stellar Parameters For KIC 010907307

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6046^{+164}_{-164}$	$4.357^{+0.136}_{-0.187}$	$-0.400^{+0.300}_{-0.300}$	$1.048^{+0.285}_{-0.190}$	$0.910^{+0.119}_{-0.089}$	$1.114^{+0.794}_{-0.536}$
	+3%/-3%	+3%/-4%	+75%/-75%	+27%/-18%	+13%/-10%	+71%/-48%
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 010907307-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-791 \pm 59$	$5.20^{+1.14}_{-1.01}$	$395^{+28}_{-24}$	$4910^{+404}_{-307}$	$14609^{+7564}_{-4821}$
Alt.	$-233 \pm 46$	$2.73^{+0.95}_{-0.82}$	$394^{+26}_{-22}$	$4975^{+874}_{-581}$	$15583^{+18528}_{-7502}$

$T_{\text{max}}$  = Theoretical Maximum Planetary Temperature

$T_{\text{obs}}$  = Observed Planetary Temperature (Assuming A=0.3)

$A_{\text{obs}}$  = Observed Albedo (Assuming T=0)

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

## DV Centroid Data

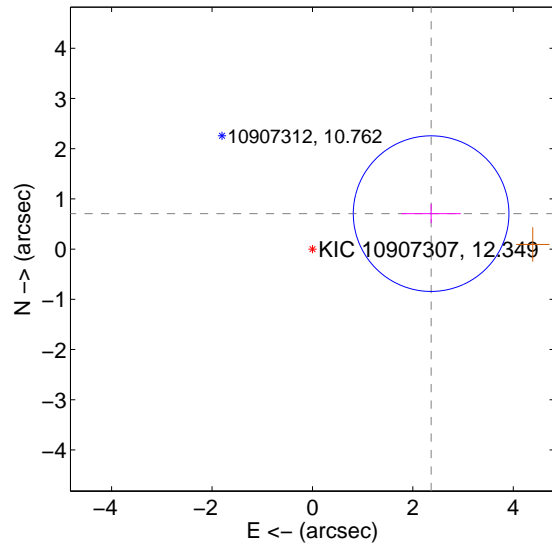
Supplemental centroid analysis for 010907307-02. Kepler magnitude: 12.35. Transit SNR 7.79

There are 1 quarters with good PRF difference image offsets

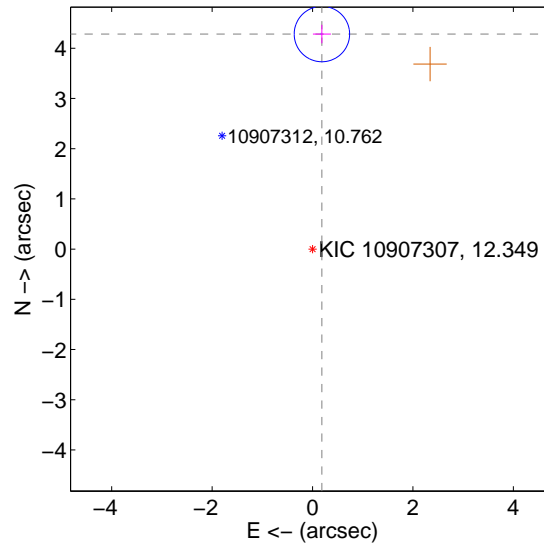
The OOT PRF centroid is offset from the target star catalog position by about 4.14 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.467 \pm 0.517$	4.77	$-2.363 \pm 0.592$	$0.706 \pm 0.190$
PRF-fit source offset from KIC position	$4.287 \pm 0.184$	23.31	$-0.187 \pm 0.179$	$4.283 \pm 0.184$
photometric centroid source offset	$2.28 \pm 0.10$	22.63	$0.76 \pm 0.11$	$2.15 \pm 0.10$

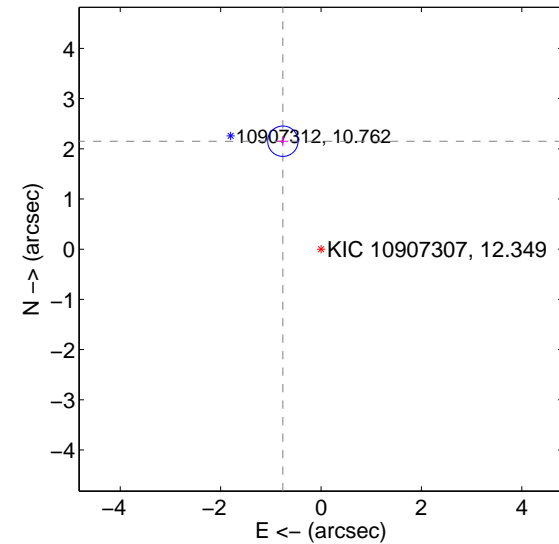
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

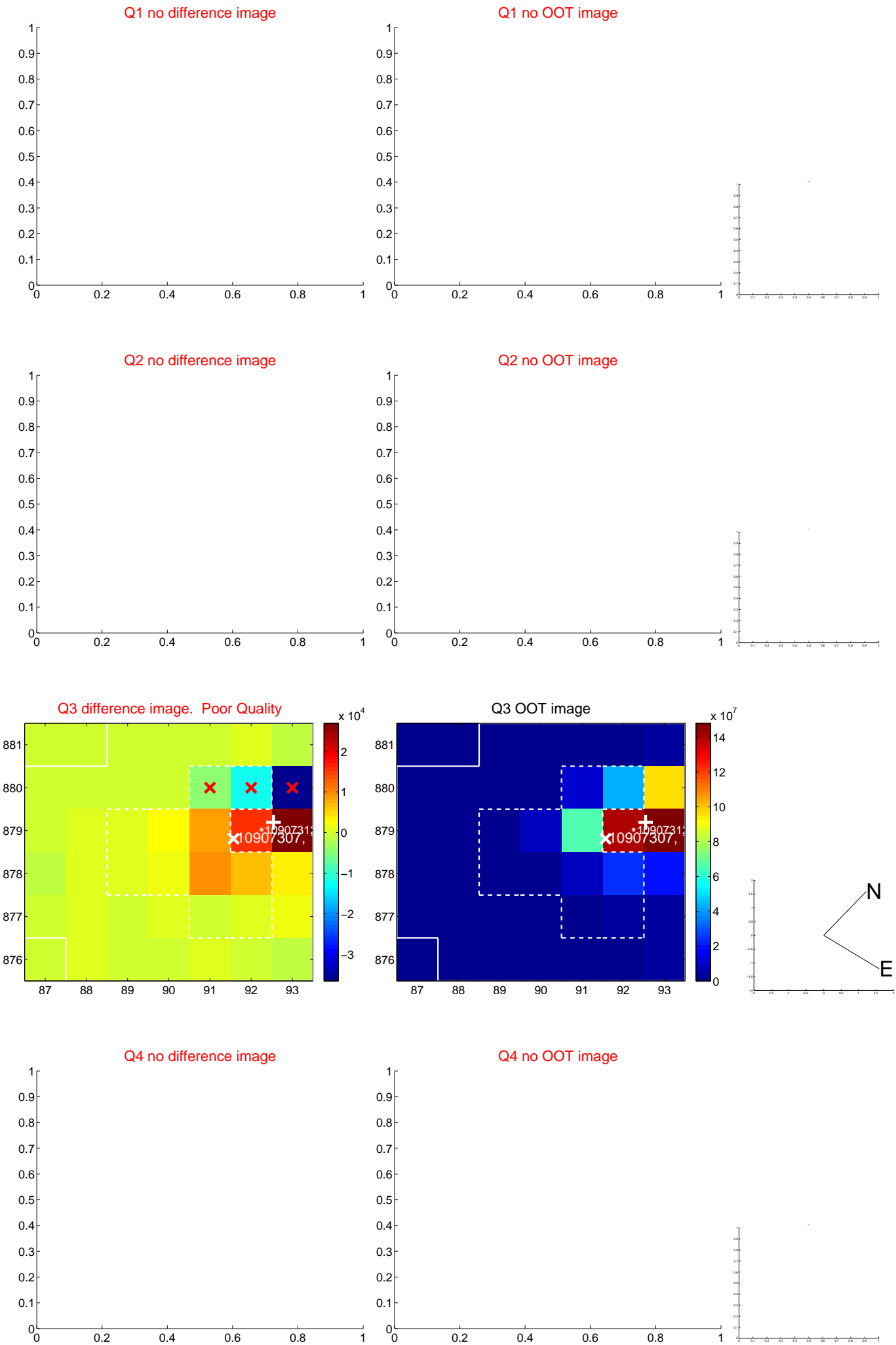


offset from photometric centroids

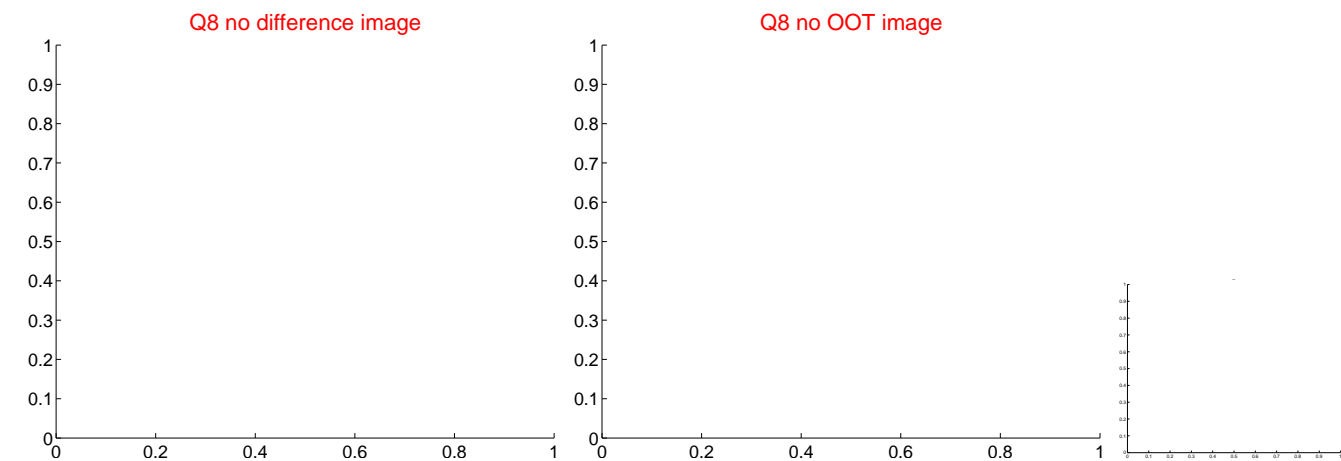
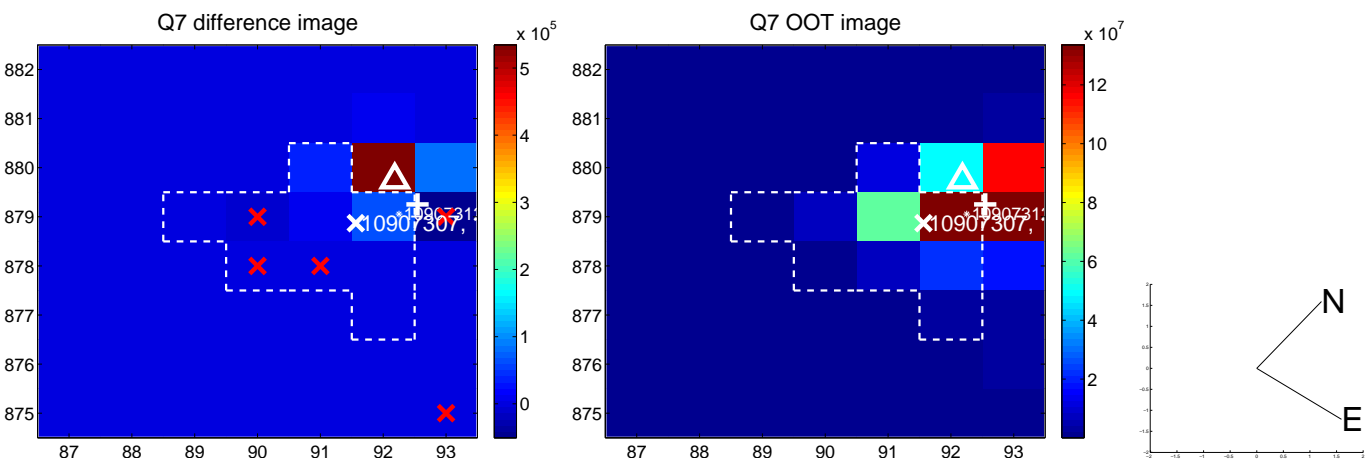
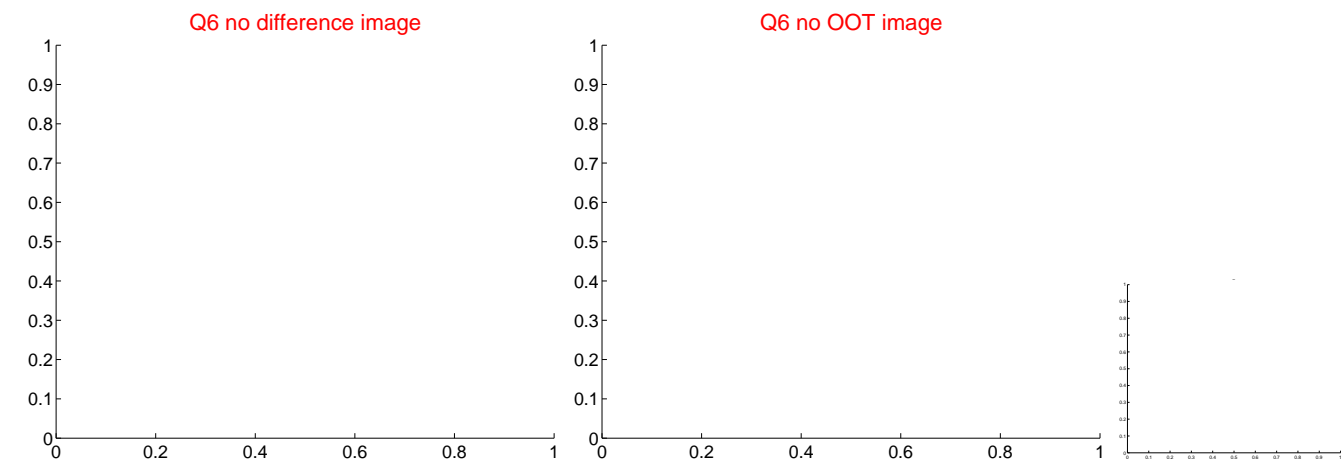
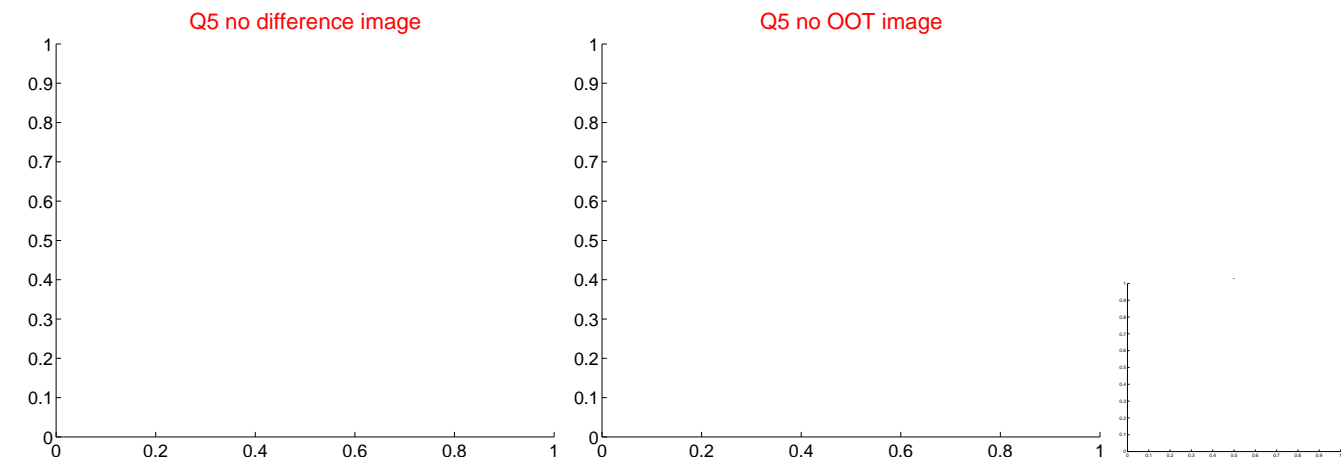


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

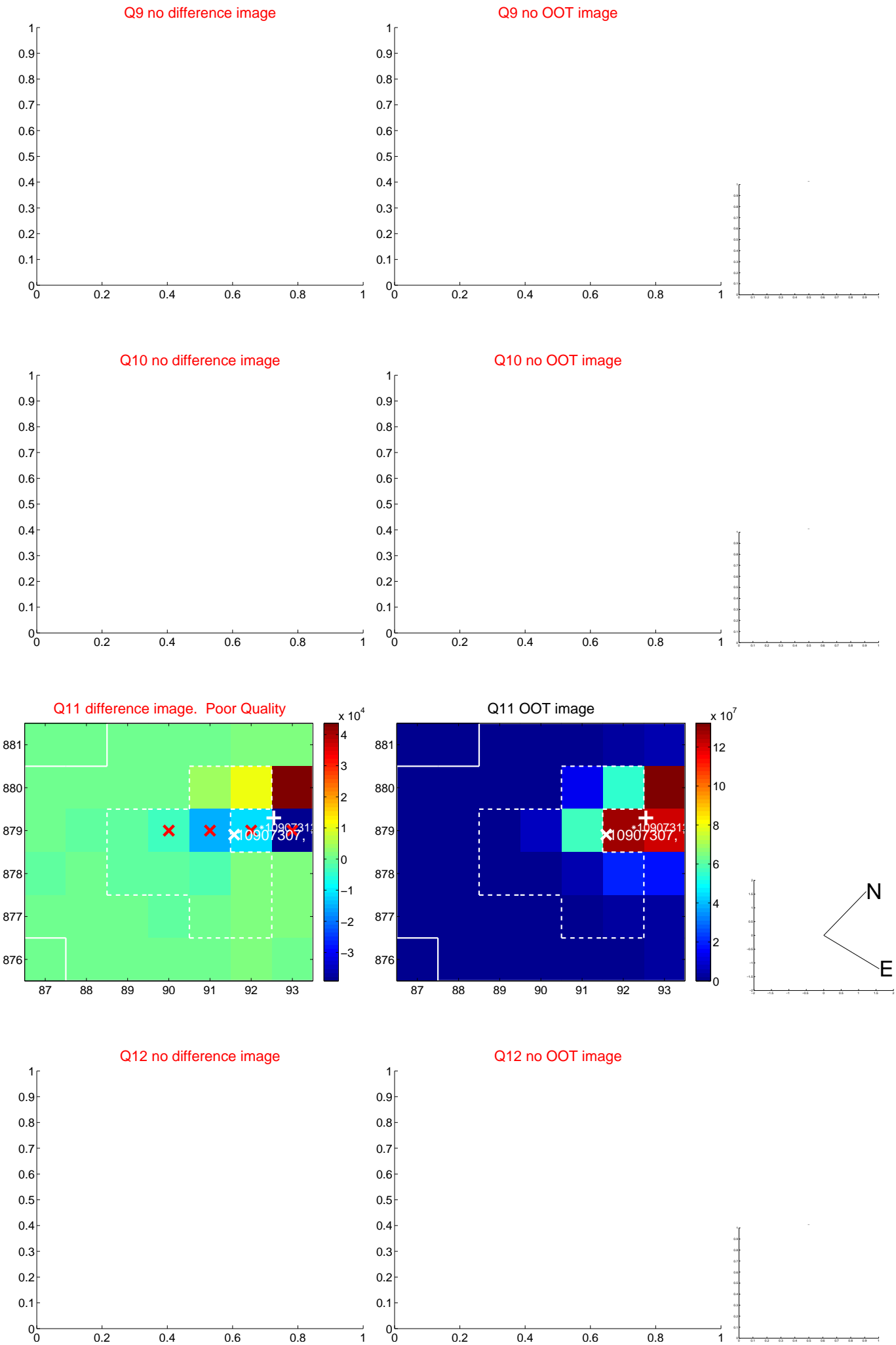
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



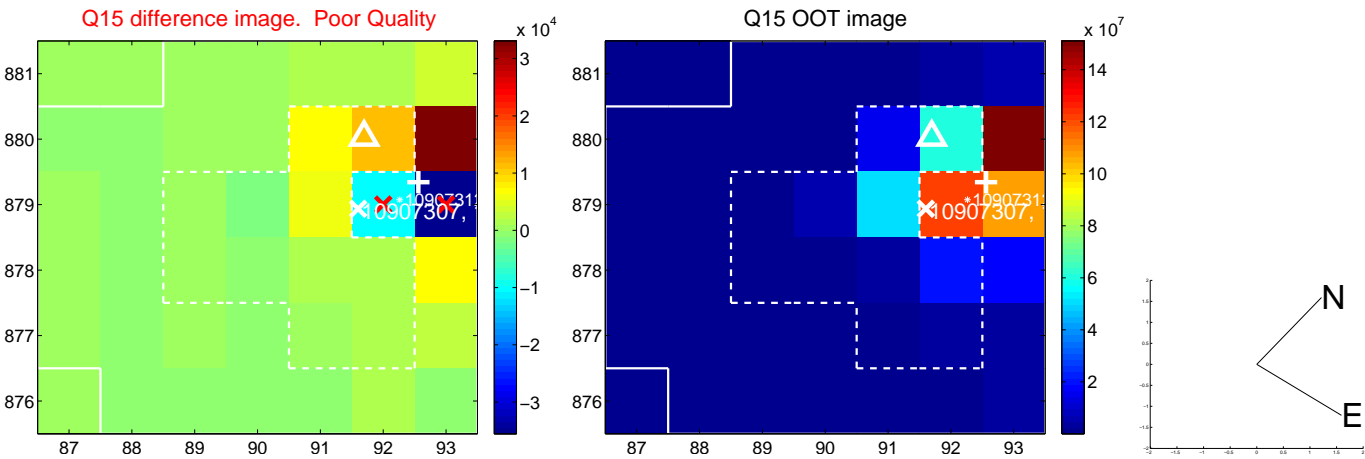
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



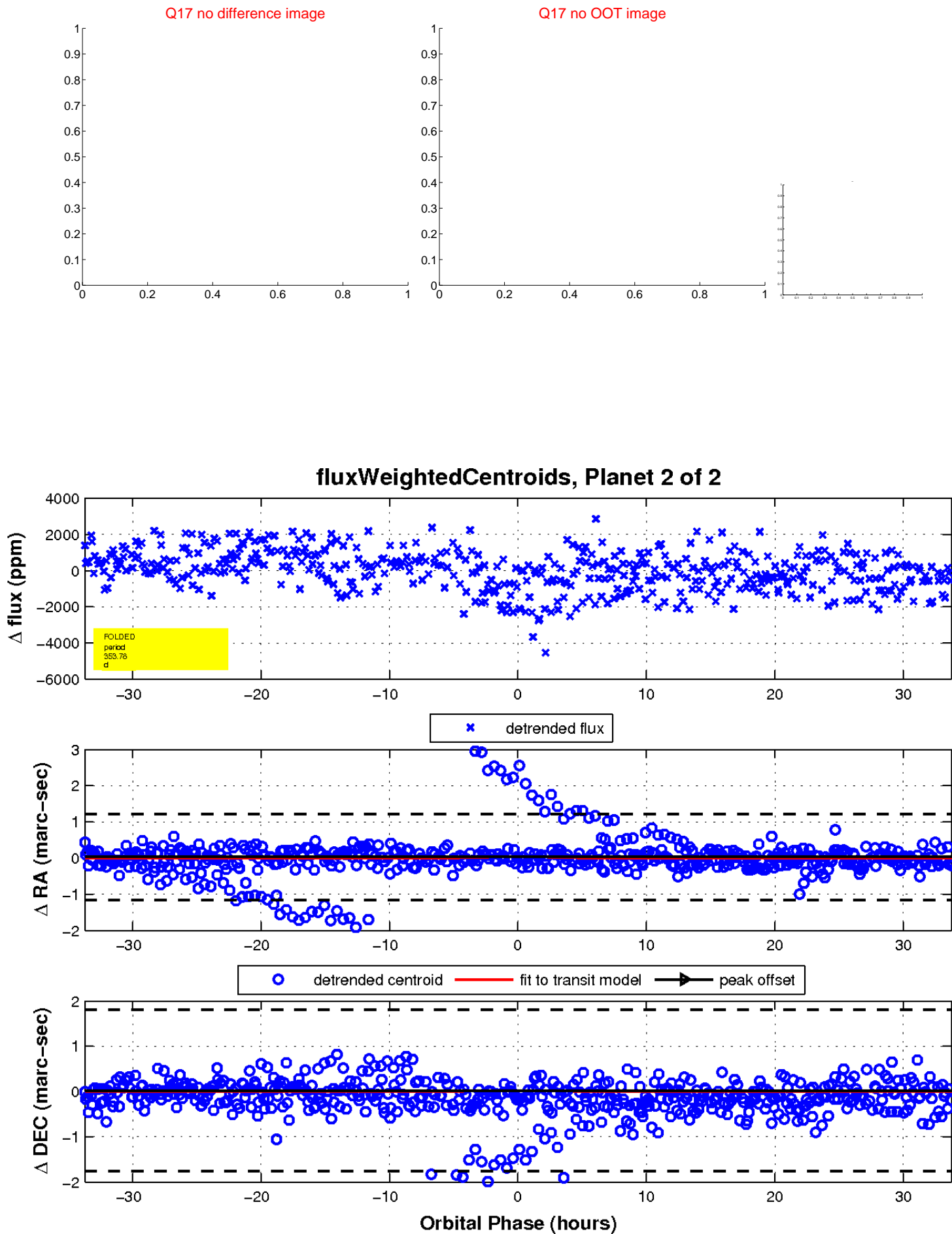
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



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



UKIRT Image

