

# KIC 007220332

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007220332-01	OBS	No	267.554220	221.521493	130.2	55.239	23.6	4.6	151.74	3298	159.48	3404.75
007220332-02	OBS	No	298.139729	144.284714	388.1	4.952	31.3	10.5	151.74	3298	273.81	2947.19
007220332-03	OBS	No	311.099441	151.763878	11.3	15.486	73.7	1.3	151.74	3298	59.07	2784.64

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007220332-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_SATURATED
007220332-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_SATURATED
007220332-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_SATURATED

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

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

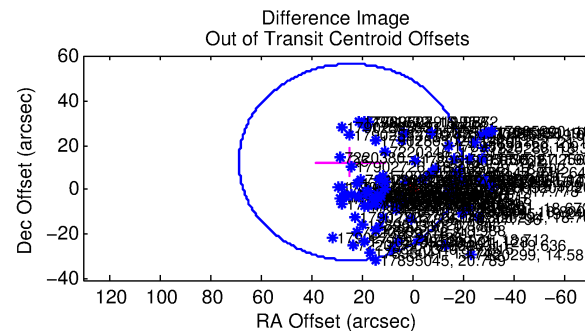
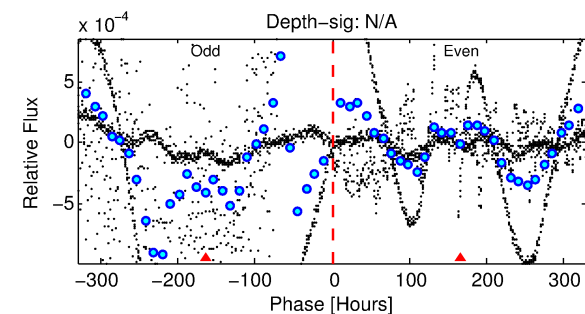
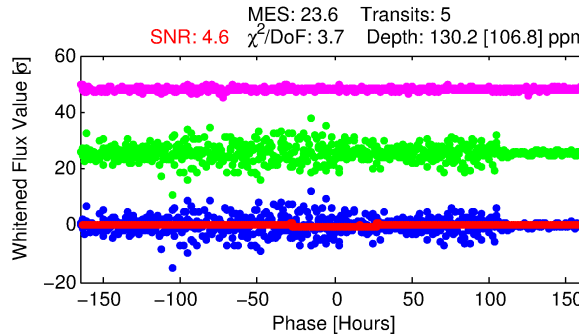
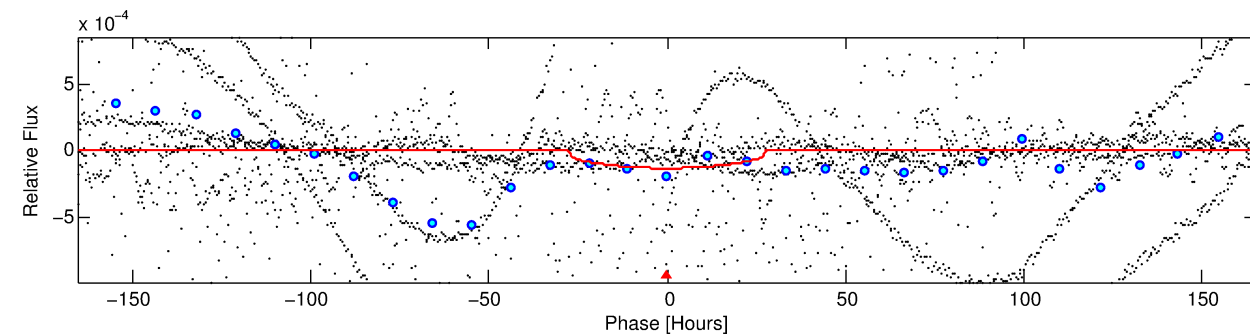
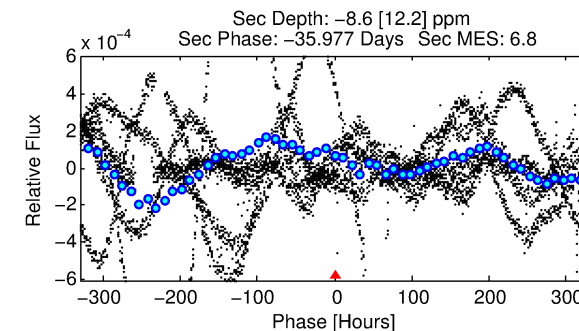
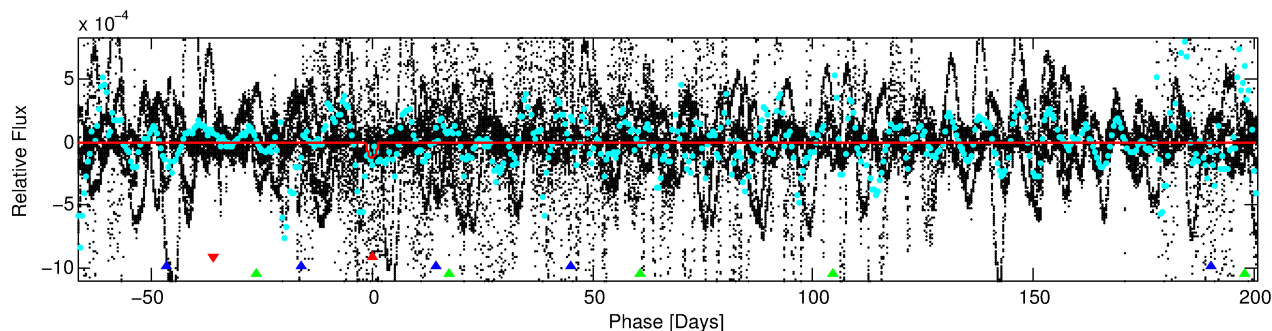
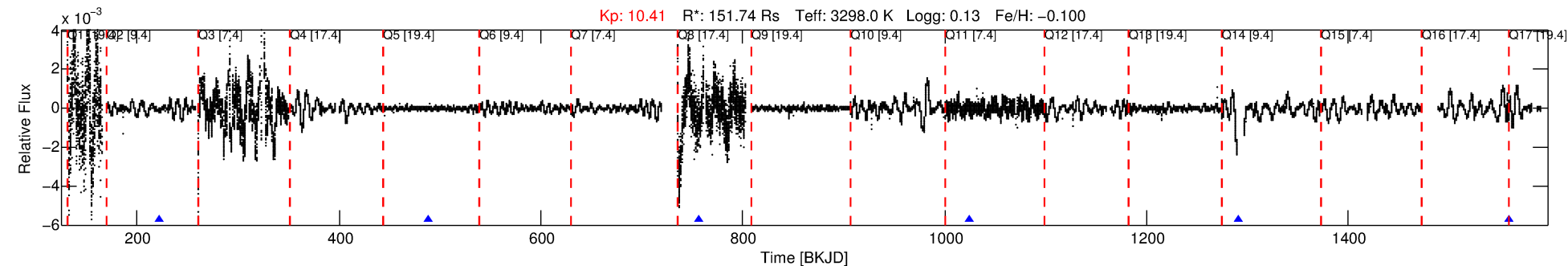
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 007220332-01

No Significant Match Found

# DV One-Page Summary

KIC: 7220332 Candidate: 1 of 3 Period: 267.554 d



## DV Fit Results:

Period = 267.55422 [1.88766] d  
Epoch = 221.5215 [8.4544] BKJD  
Rp/R\* = 0.0096 [0.0812]  
a/R\* = 36.89 [564.42]  
b = 0.16 [100.22]  
Seff = 3404.75 [1268.80]  
Teq = 1948 [181] K  
**Rp = 159.48 [1345.31] Re**  
a = 0.8467 [0.1739] AU  
Ag = N/A  
Teffp = N/A

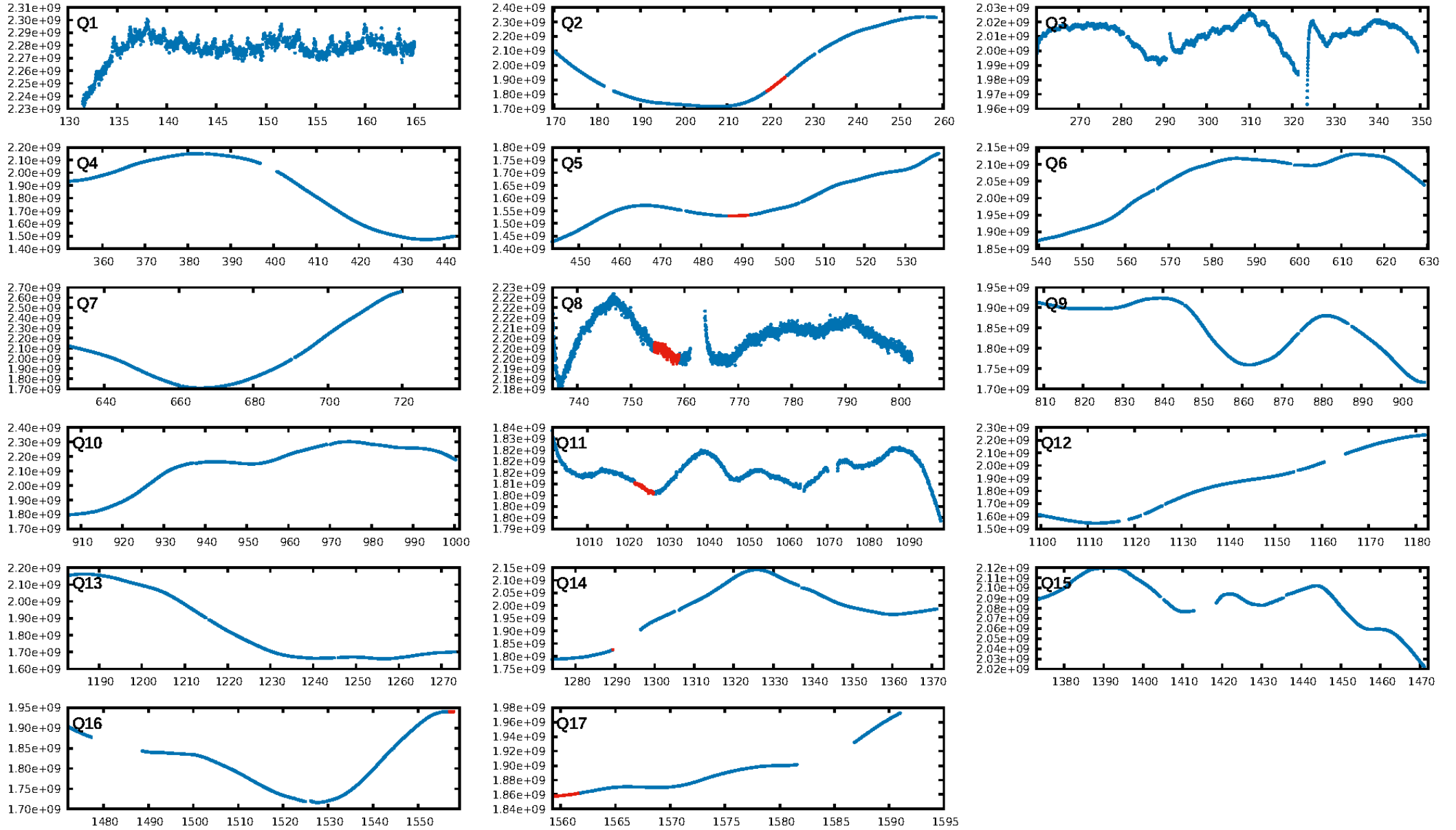
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [13.24σ]  
ModelChiSquare2-sig: 6.4%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 3.73e-09**  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: N/A  
Centroid-sig: 86.7%  
Centroid-so: 0.635 arcsec [0.48σ]  
OotOffset-rm: 27.863 arcsec [1.89σ]  
KicOffset-rm: 30.341 arcsec [1.70σ]  
OotOffset-st: 0/0/1/1 [2]  
KicOffset-st: 0/0/1/1 [2]  
DiffImageQuality-fgm: 0.50 [1/2]  
DiffImageOverlap-fno: 1.00 [2/2]

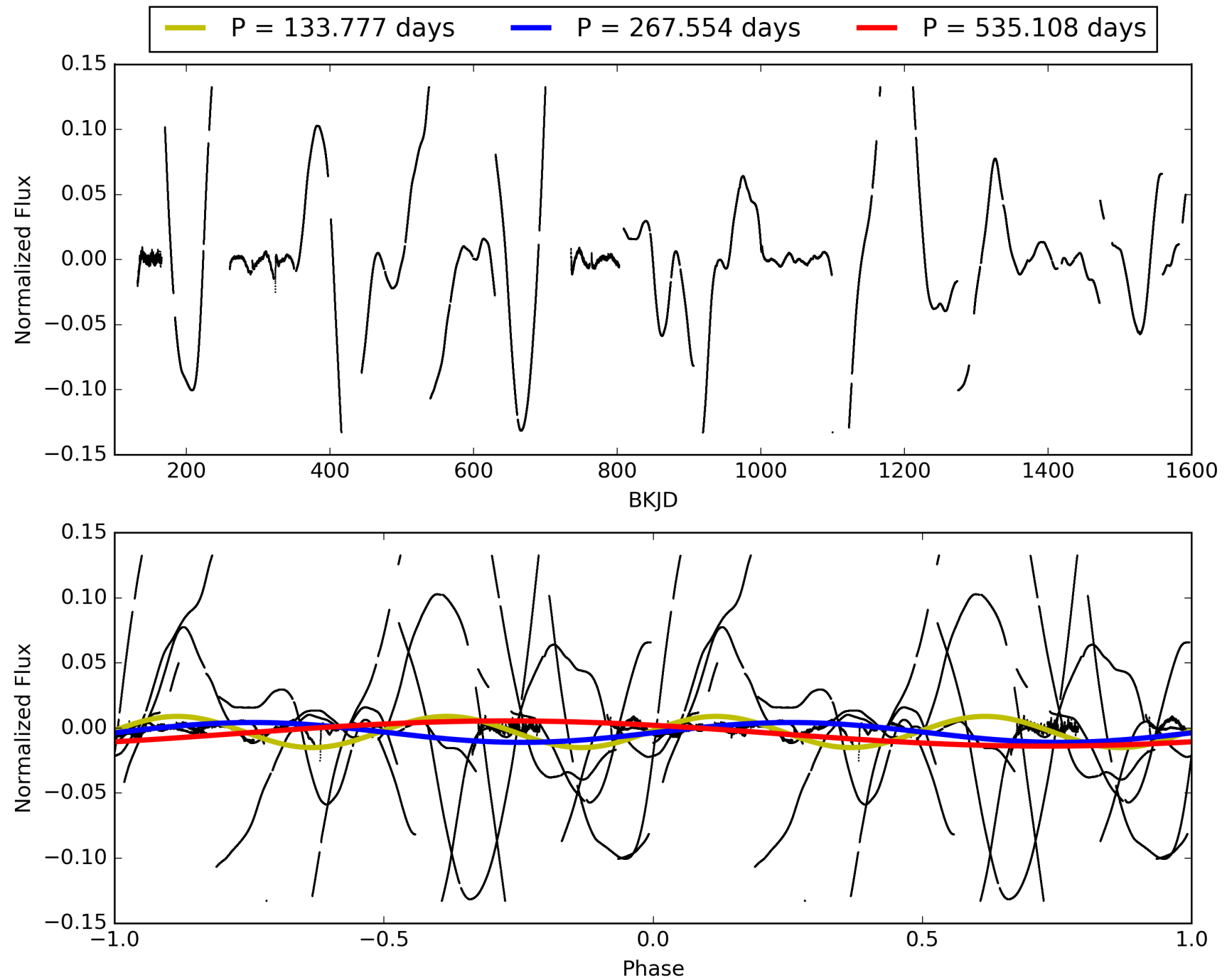
Software Revision: svn-ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 05:14:48 Z

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

# TCE 007220332-01, PDC Light Curves

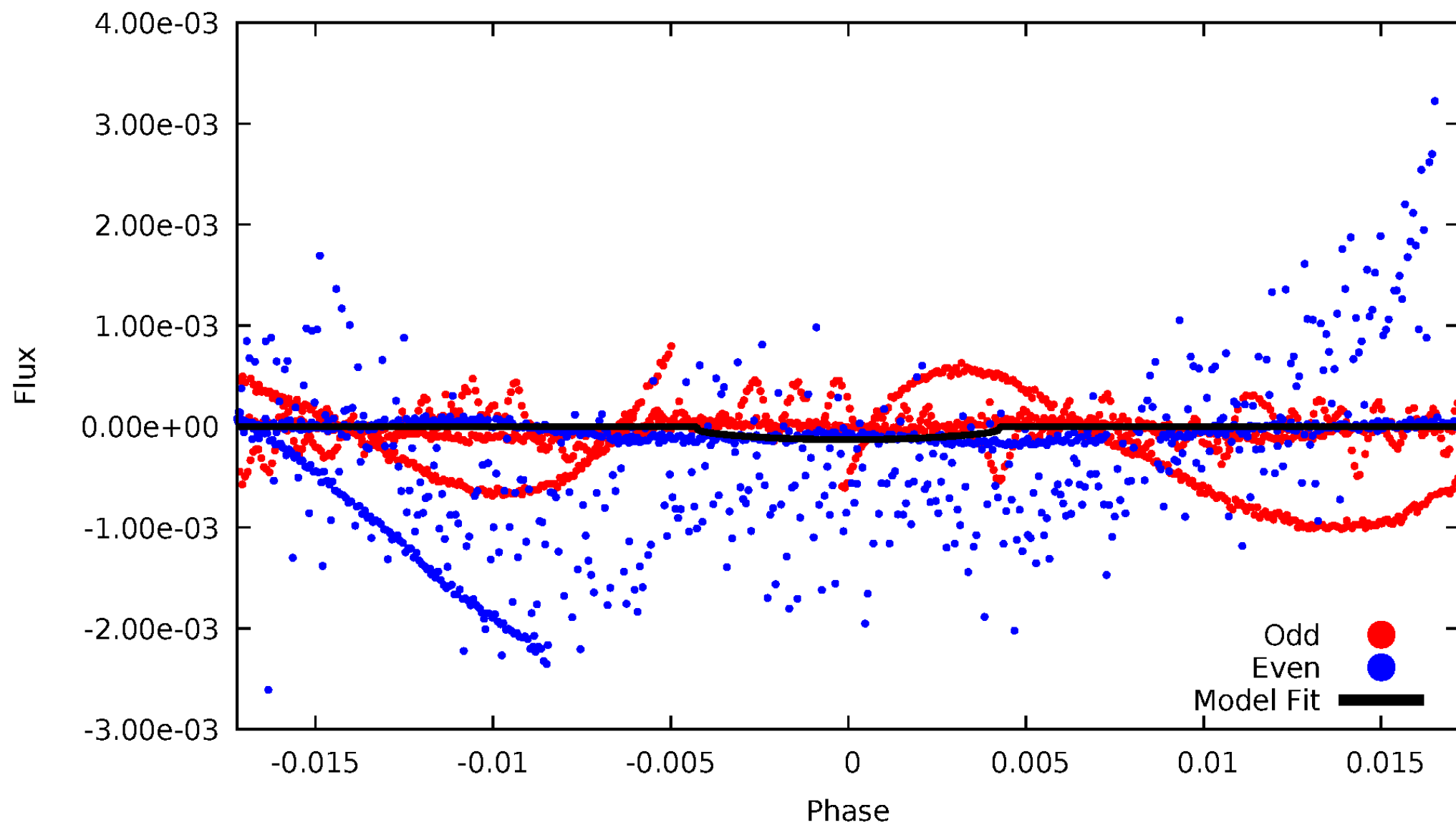


TCE 007220332-01



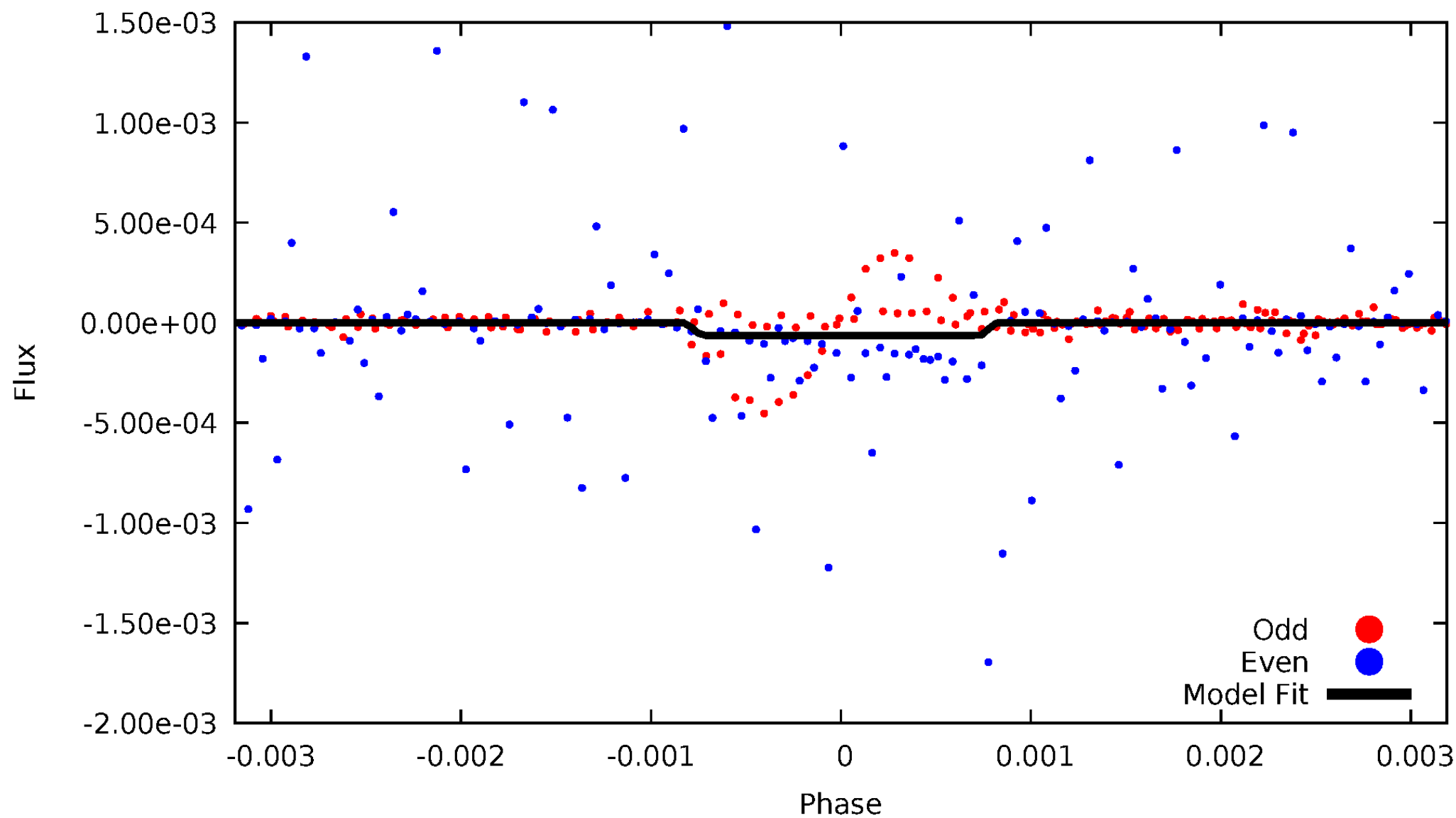
# DV Odd/Even

TCE 007220332-01



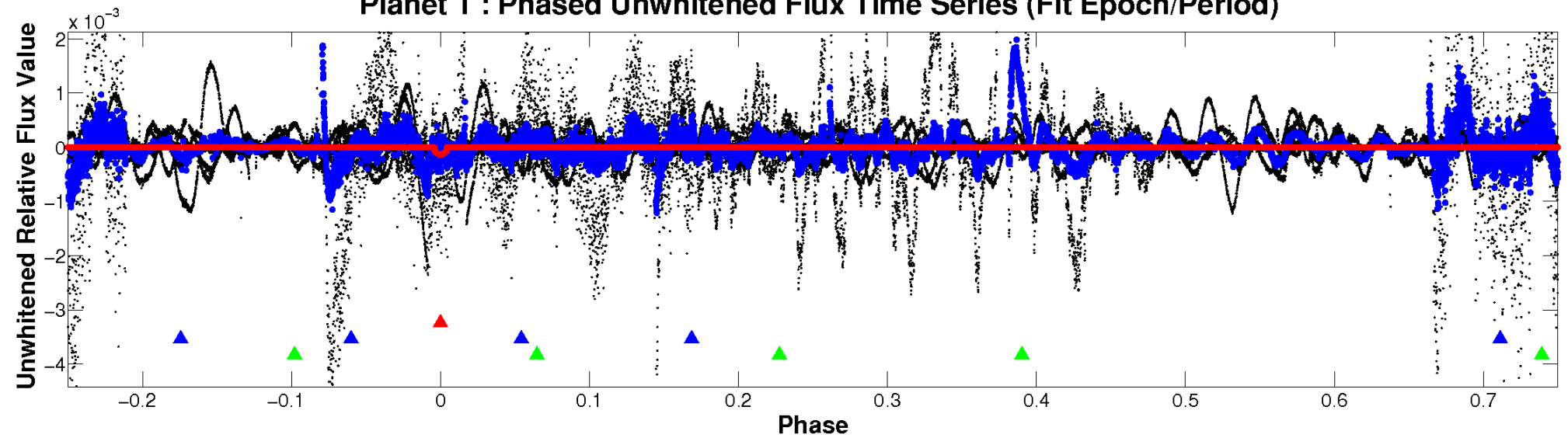
# ALT Odd/Even

TCE 007220332-01

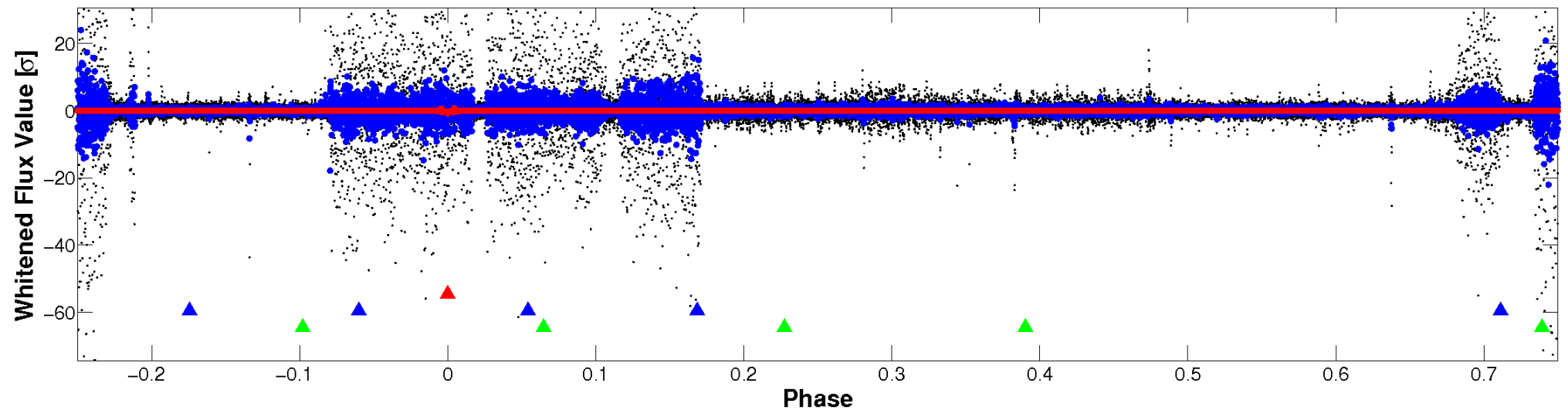


# Non-Whitened Vs. Whitened Light Curve

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

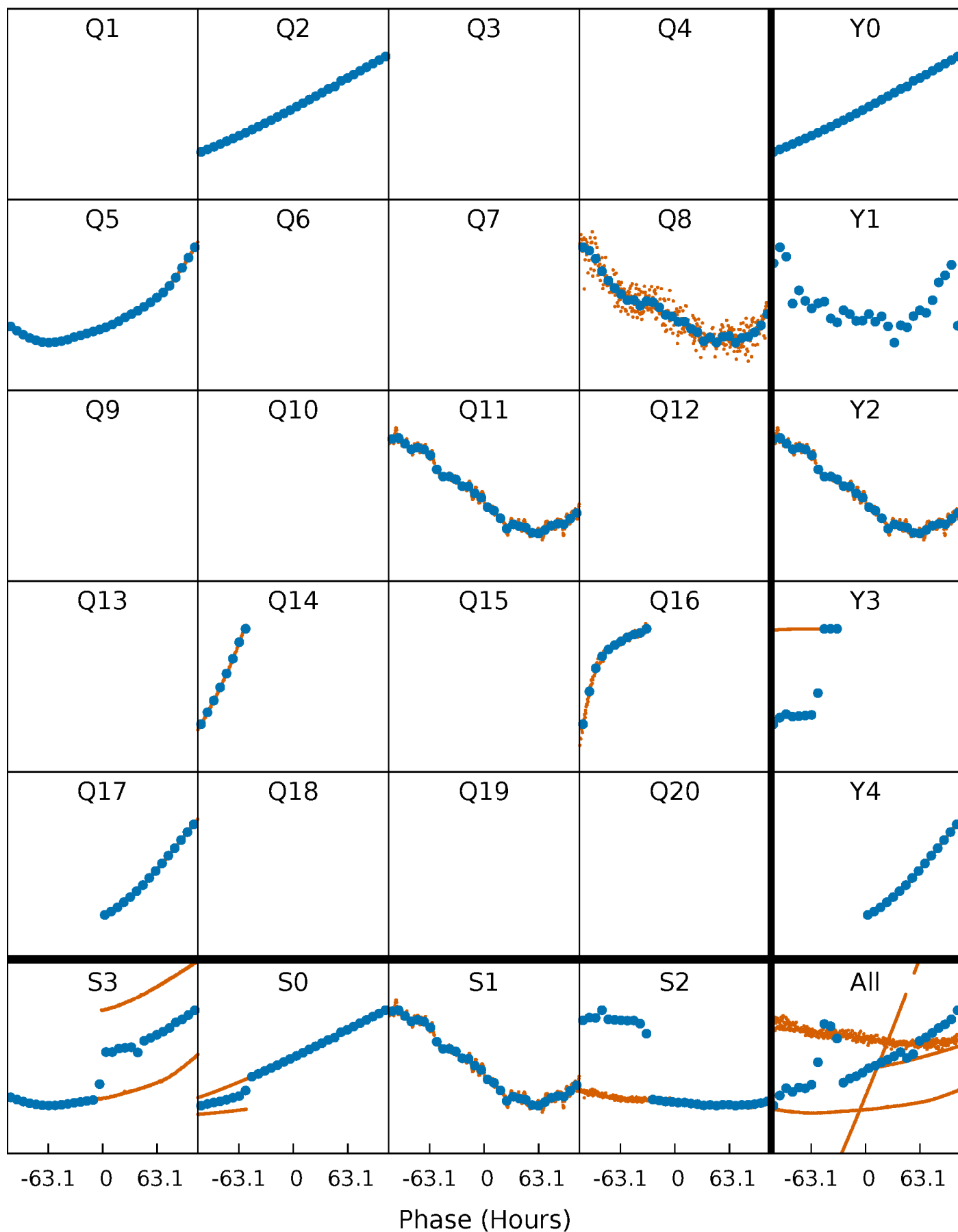


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

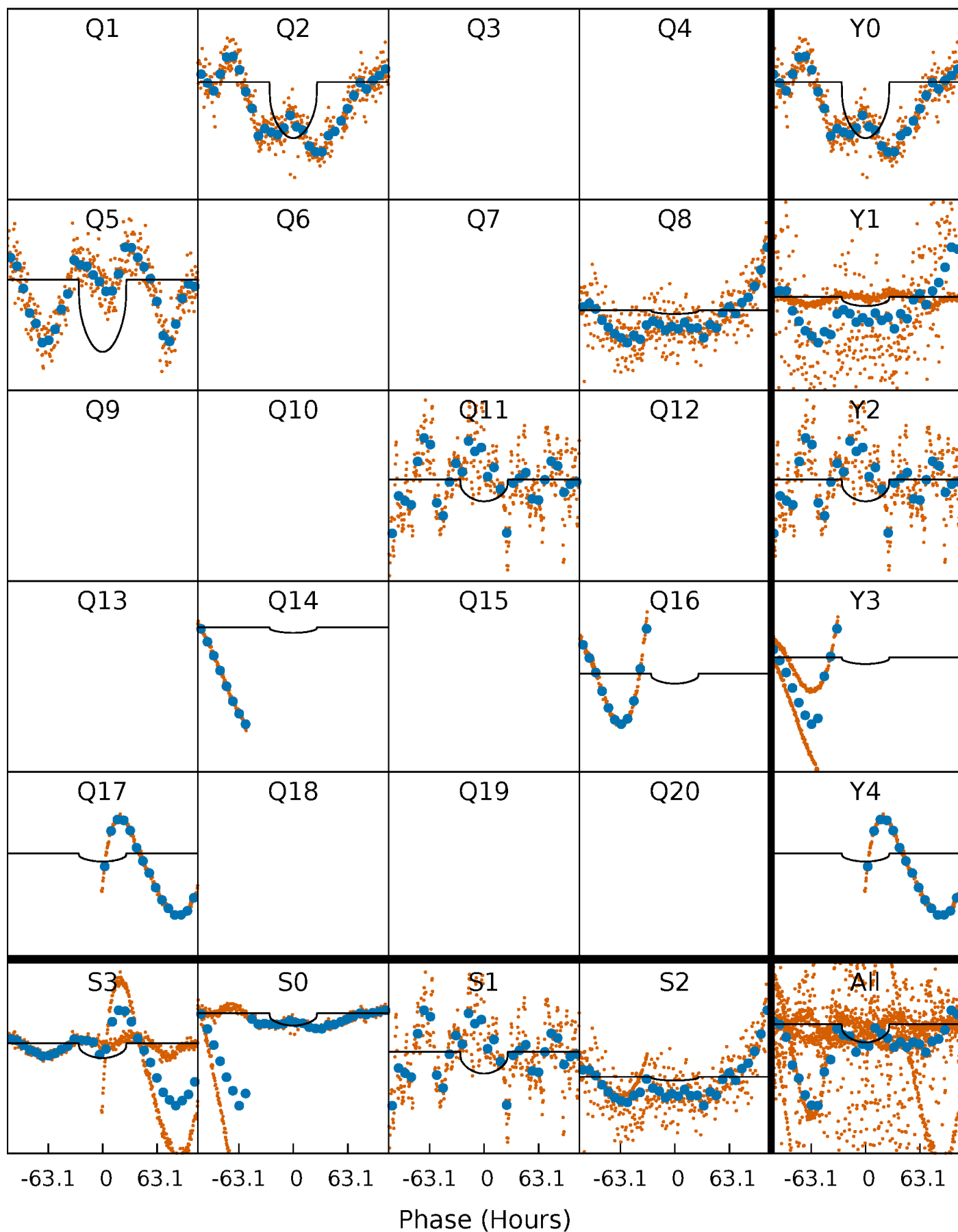
TCE 007220332-01 P=267.554220 Days  $T_0=221.521493$  (BKJD)





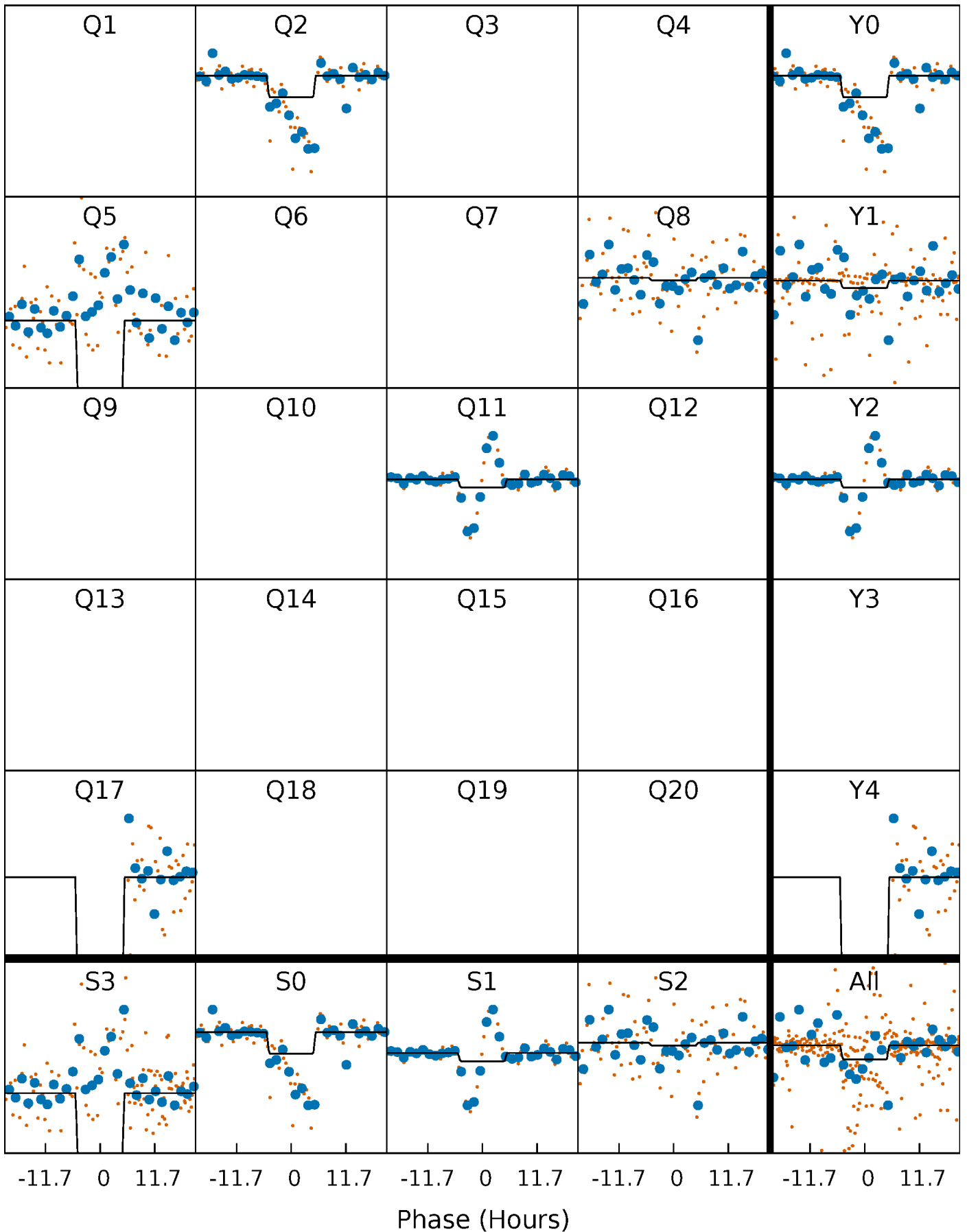
# DV Quarter-Phased Transit Curves

TCE 007220332-01 P=267.554220 Days  $T_0=221.521493$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

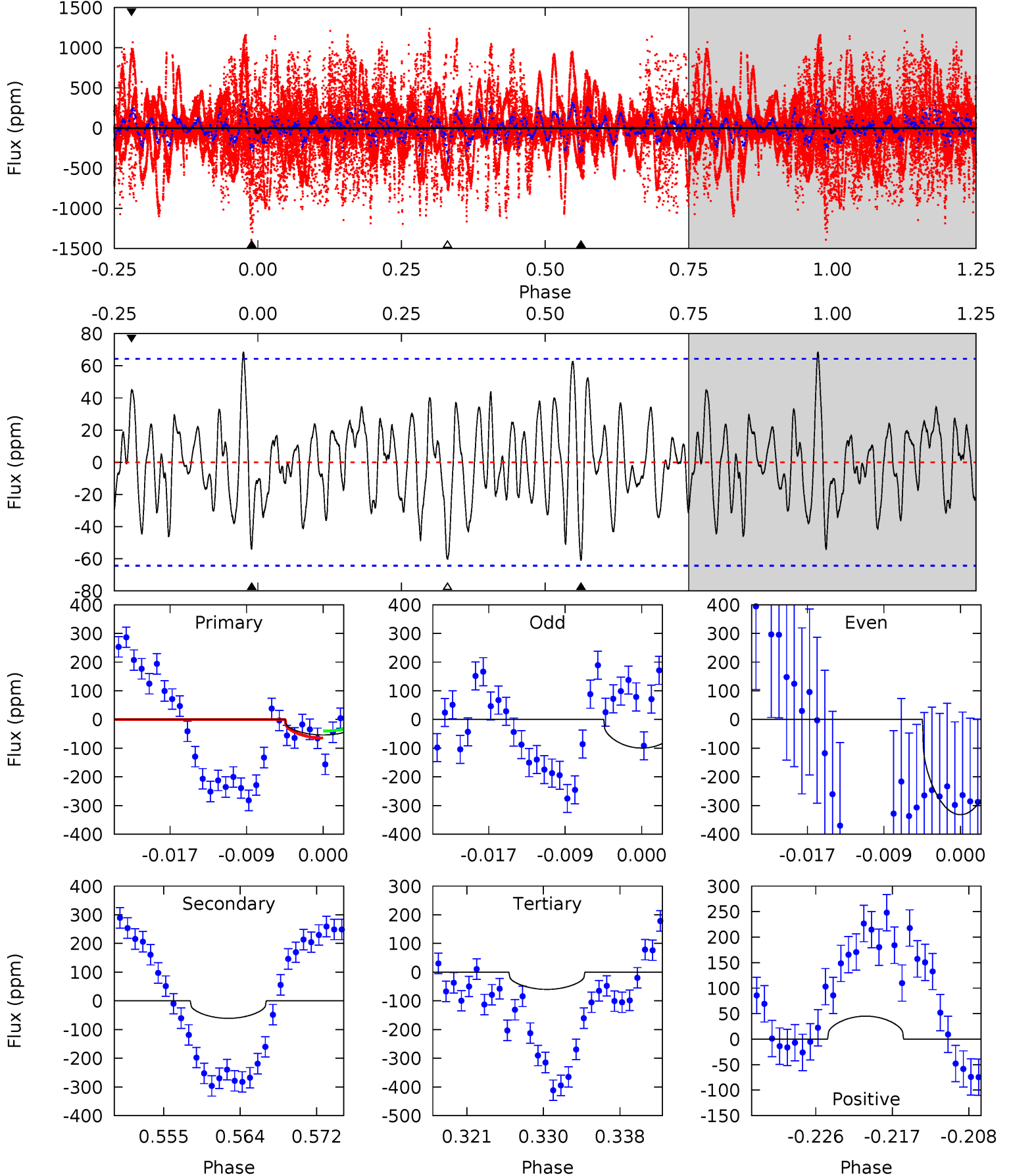
TCE 007220332-01 P=267.488923 Days  $T_0=221.571568$  (BKJD)



# DV Model-Shift Uniqueness Test

007220332-01, P = 267.554220 Days, E = 221.521493 Days

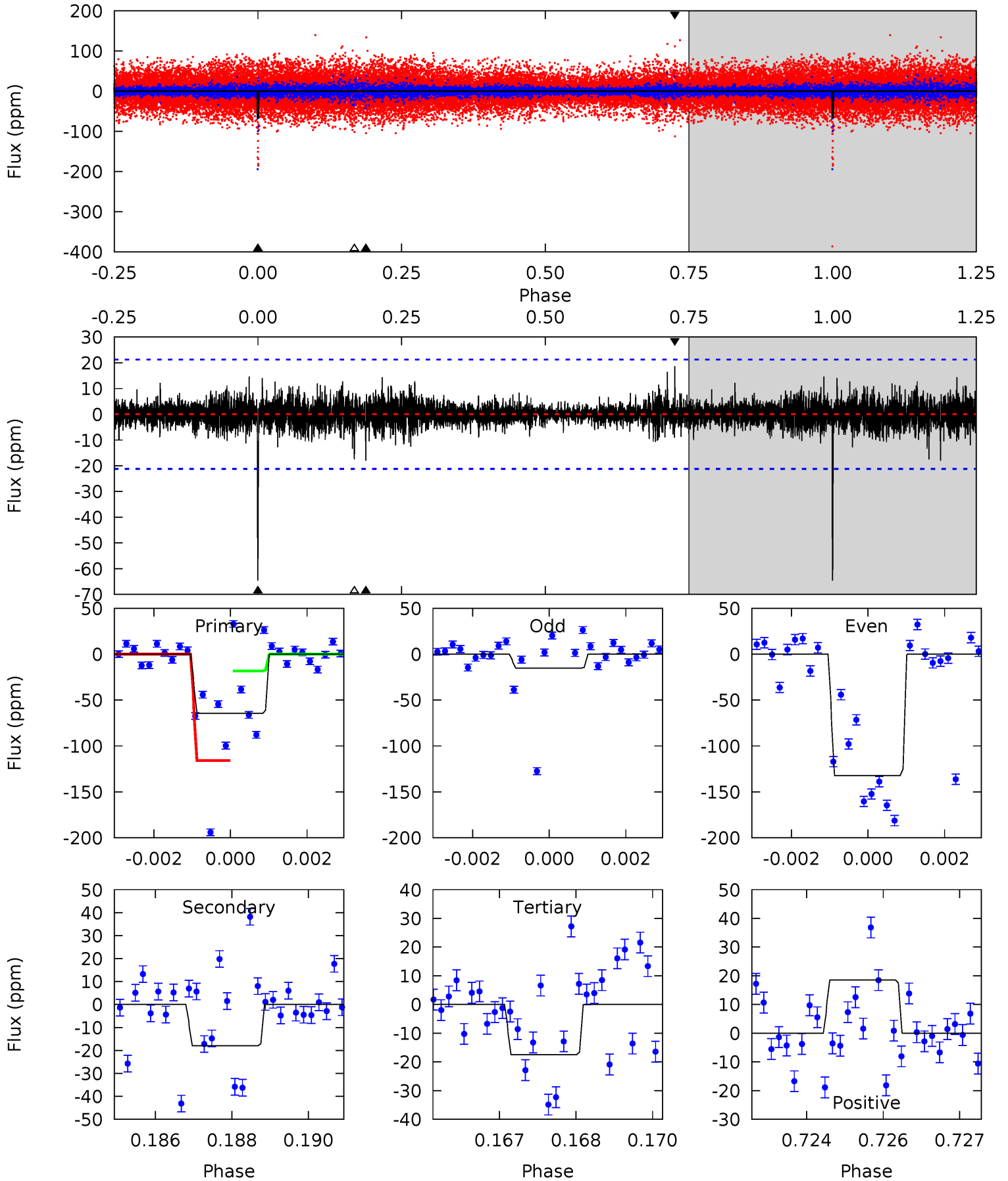
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
4.24	4.78	4.71	3.54	5.05	2.62	1.77	-0.47	0.70	0.07	1.24	8.00	-20.0	0.53	0.98



# Alt Model-Shift Uniqueness Test

007220332-01, P = 267.488923 Days, E = 221.571568 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	4.54	4.42	4.70	5.36	3.15	0.75	11.9	11.6	0.12	-0.15	15.8	0.83	0.22	12.2



### Stellar Parameters For KIC 007220332

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3298^{+117}_{-88}$	$0.129^{+0.208}_{-0.039}$	$-0.100^{+0.250}_{-0.150}$	$151.742^{+9.192}_{-29.414}$	$1.130^{+0.206}_{-0.137}$	$0.000^{+0.000}_{-0.000}$
	+4%/-3%	+161%/-30%	+250%/-150%	+6%/-19%	+18%/-12%	+91%/-11%
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 007220332-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-61 \pm 13$	$913.35^{+1016.17}_{-608.08}$	$2669^{+117}_{-163}$	$-2557^{+495}_{-112}$	$0.027^{+0.235}_{-0.020}$
Alt.	$-18 \pm 4$	$873.48^{+1081.59}_{-649.37}$	$2666^{+117}_{-151}$	$-2580^{+214}_{-102}$	$0.010^{+0.135}_{-0.008}$

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

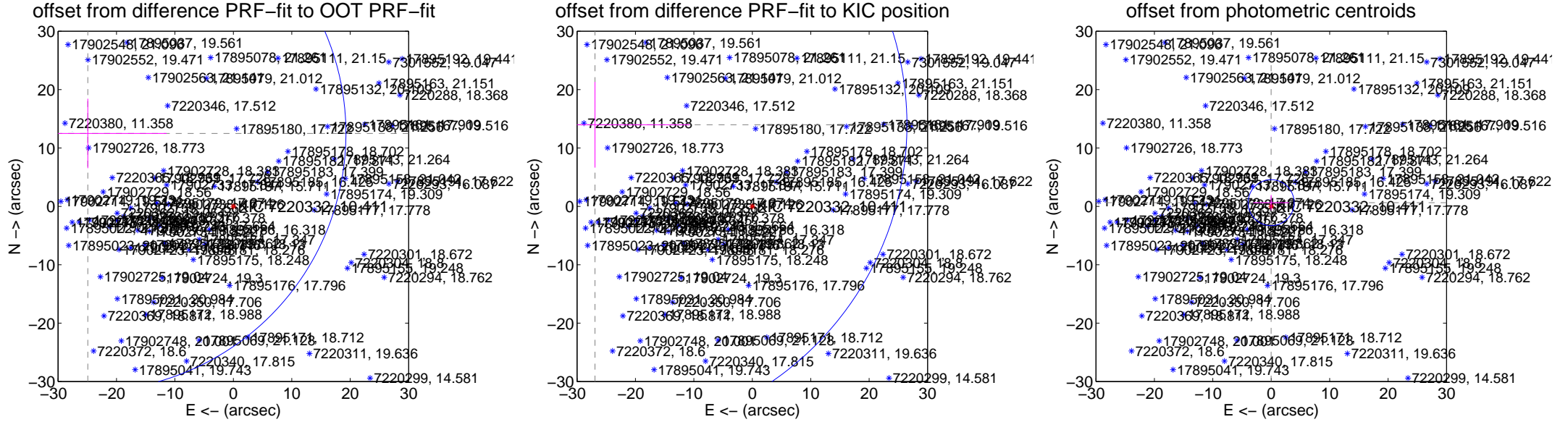
## DV Centroid Data

Supplemental centroid analysis for 007220332-01. **Kepler magnitude: 10.41.** Transit SNR 4.59

There are 1 quarters with good PRF difference image offsets

The OOT PRF centroid is offset from the target star catalog position by about 2.69 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	$27.863 \pm 14.726$	1.89	$24.910 \pm 13.489$	$12.484 \pm 5.953$
PRF-fit source offset from KIC position	$30.341 \pm 17.800$	1.70	$26.933 \pm 16.246$	$13.972 \pm 7.338$
photometric centroid source offset	$0.64 \pm 1.31$	0.48	$0.02 \pm 3.06$	$0.63 \pm 1.31$

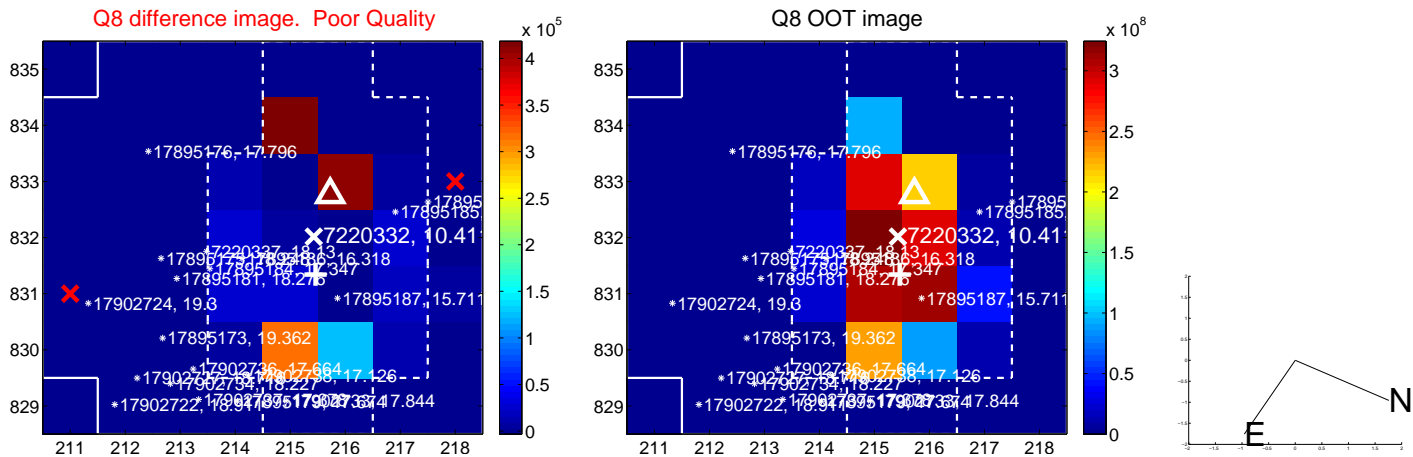
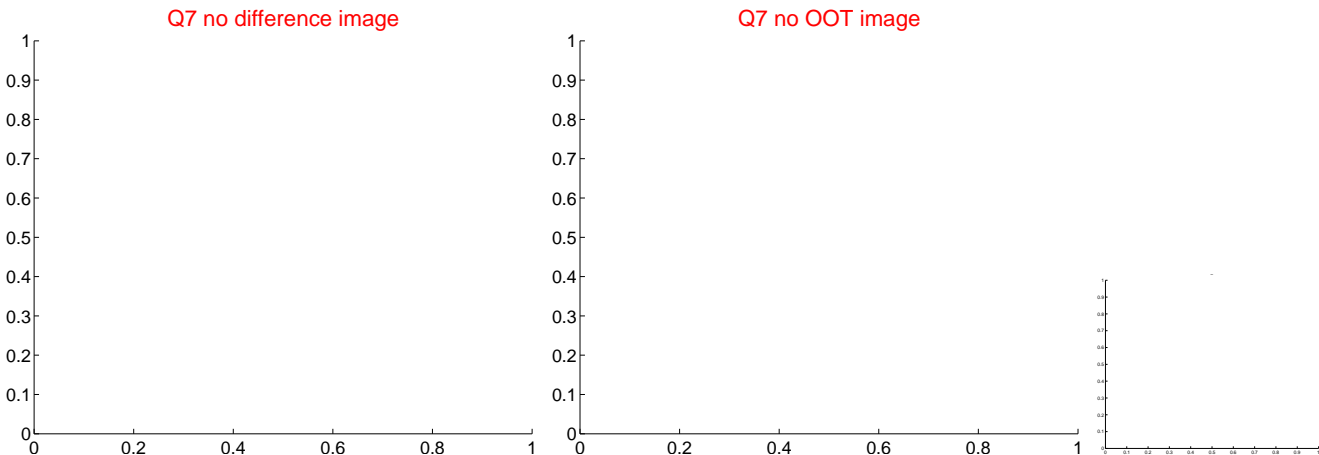
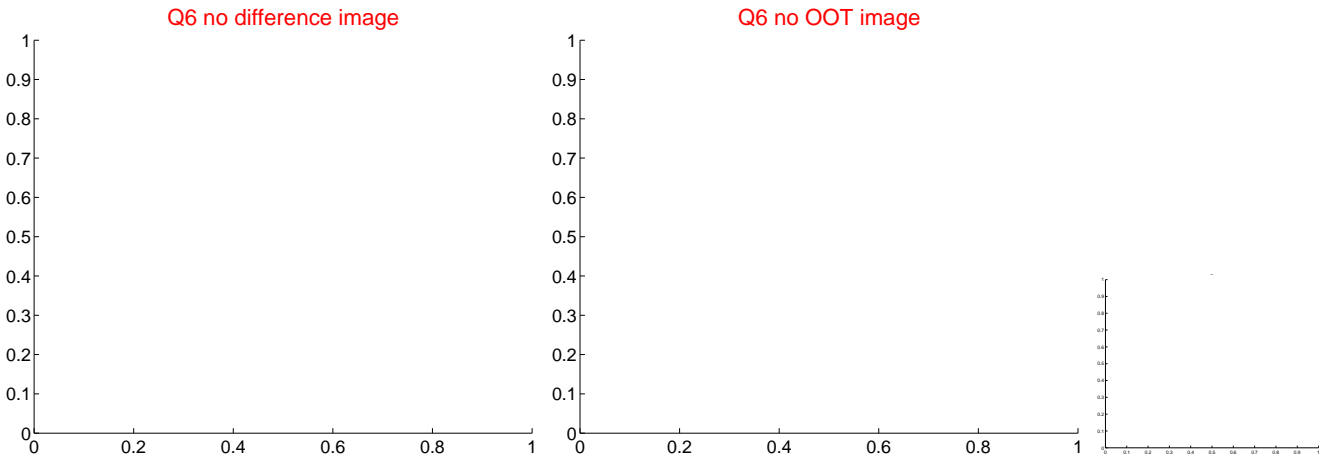
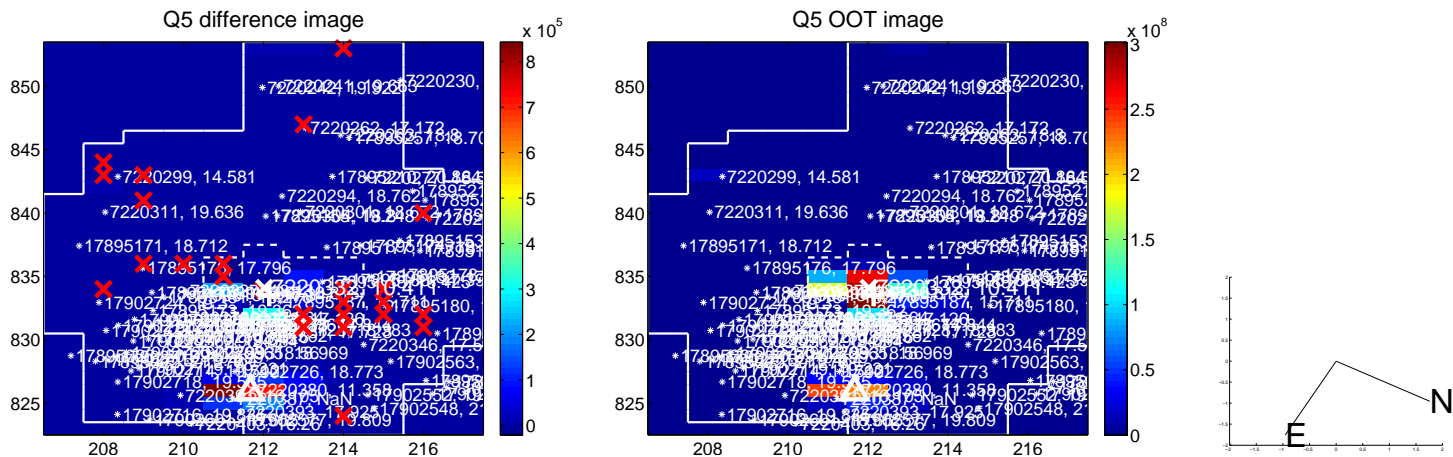


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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





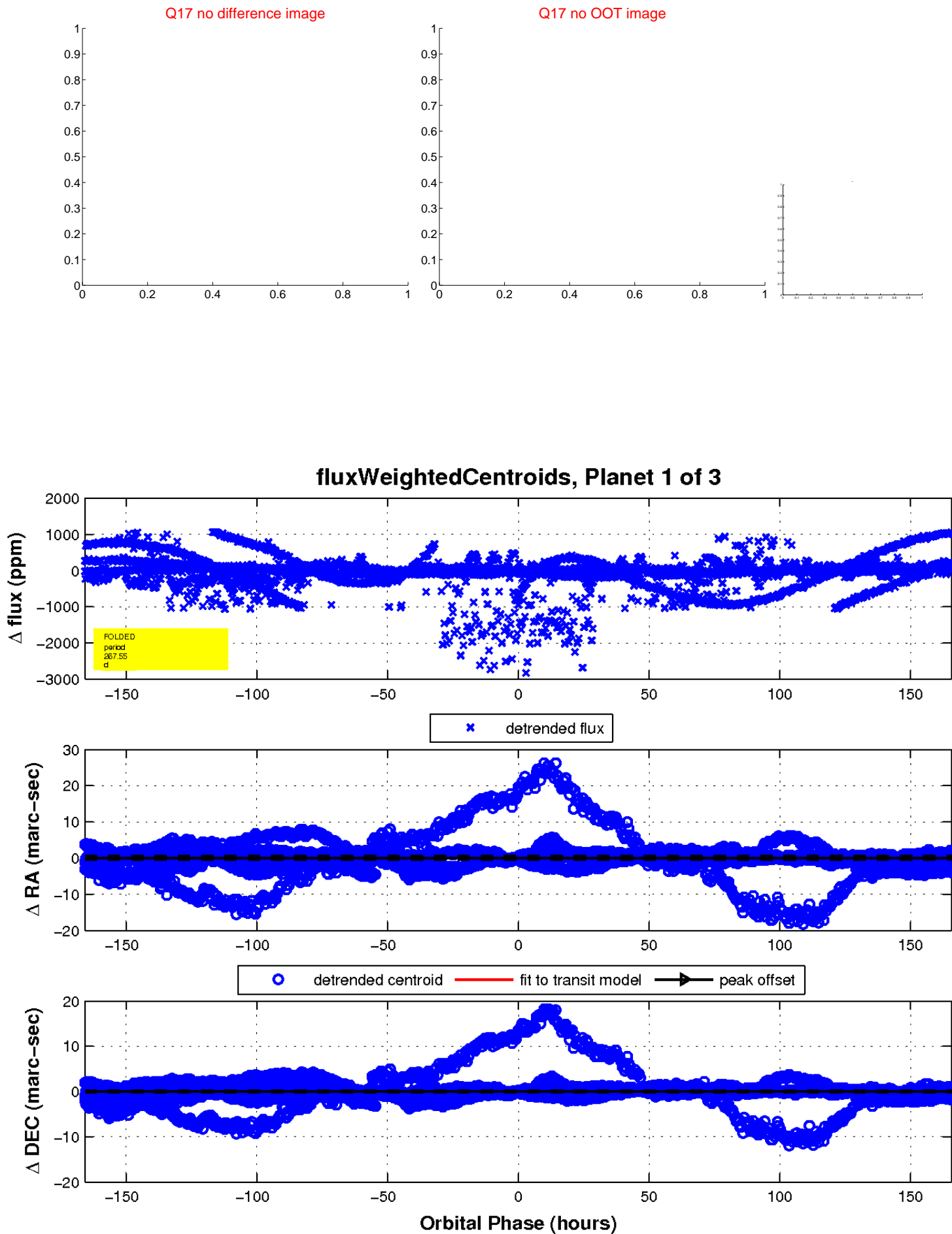
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

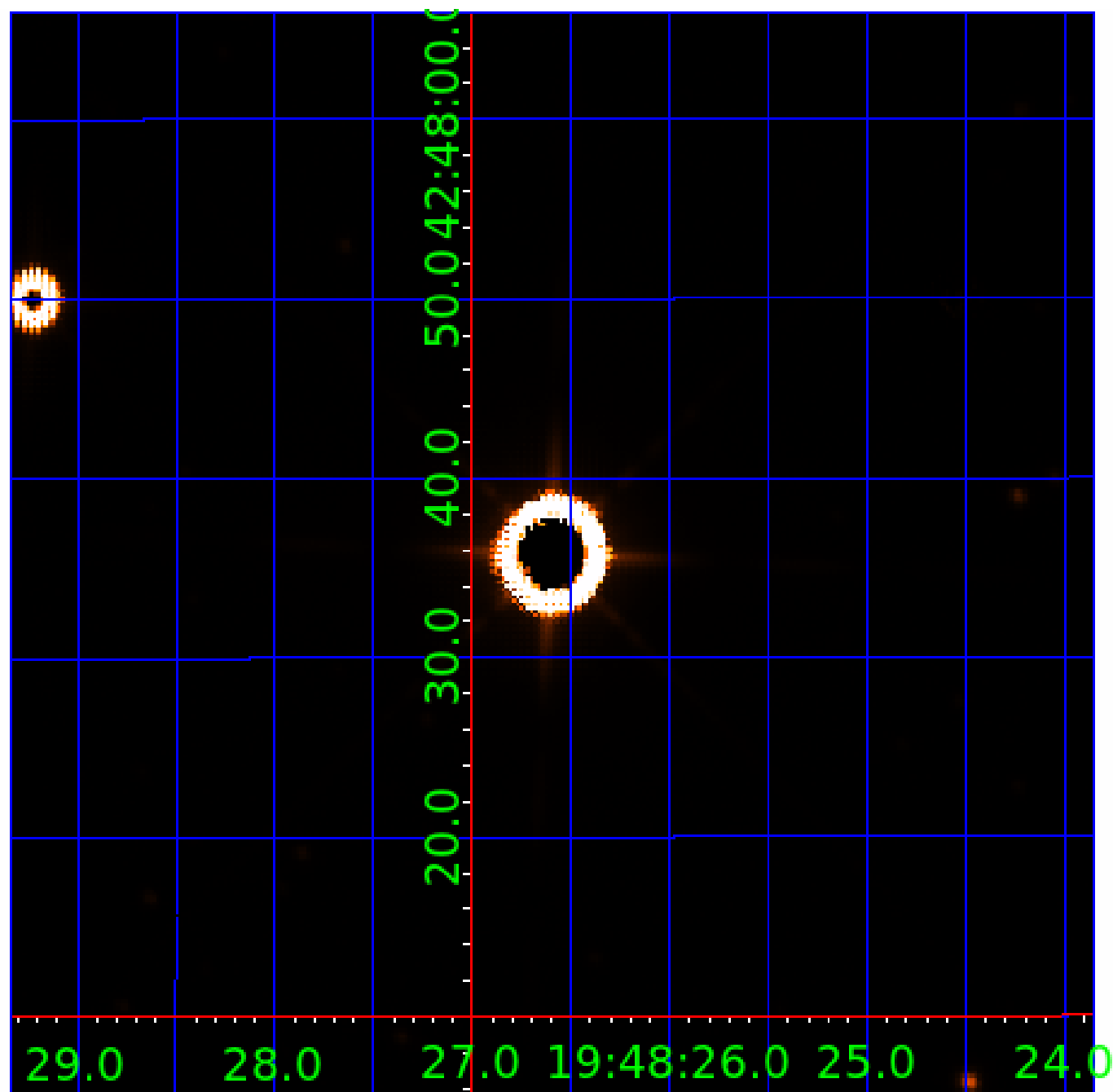


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 007220332

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007220332-01	OBS	No	267.554220	221.521493	130.2	55.239	23.6	4.6	151.74	3298	159.48	3404.75
007220332-02	OBS	No	298.139729	144.284714	388.1	4.952	31.3	10.5	151.74	3298	273.81	2947.19
007220332-03	OBS	No	311.099441	151.763878	11.3	15.486	73.7	1.3	151.74	3298	59.07	2784.64

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007220332-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_SATURATED
007220332-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_SATURATED
007220332-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_SATURATED

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

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

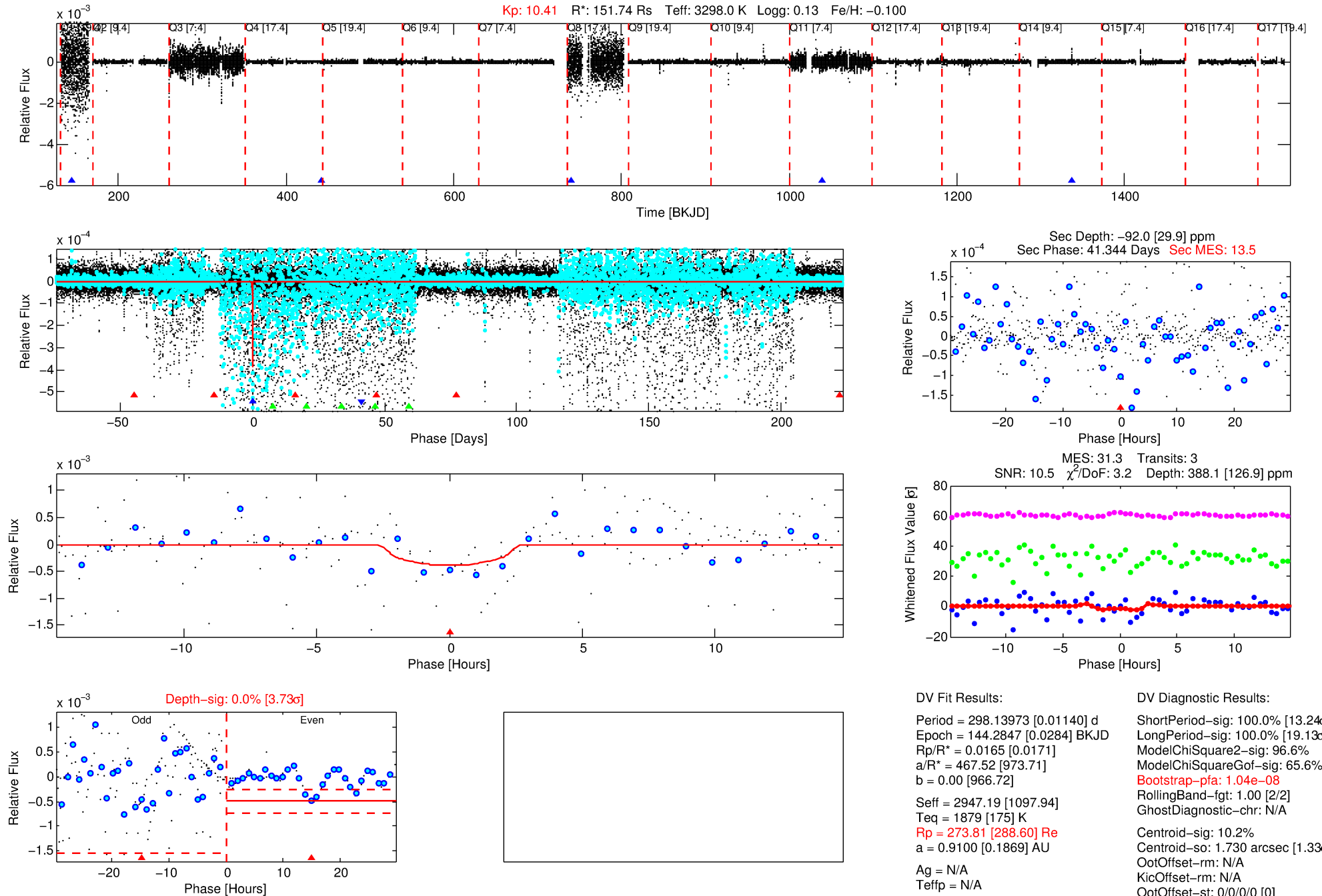
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 007220332-02

No Significant Match Found

# DV One-Page Summary

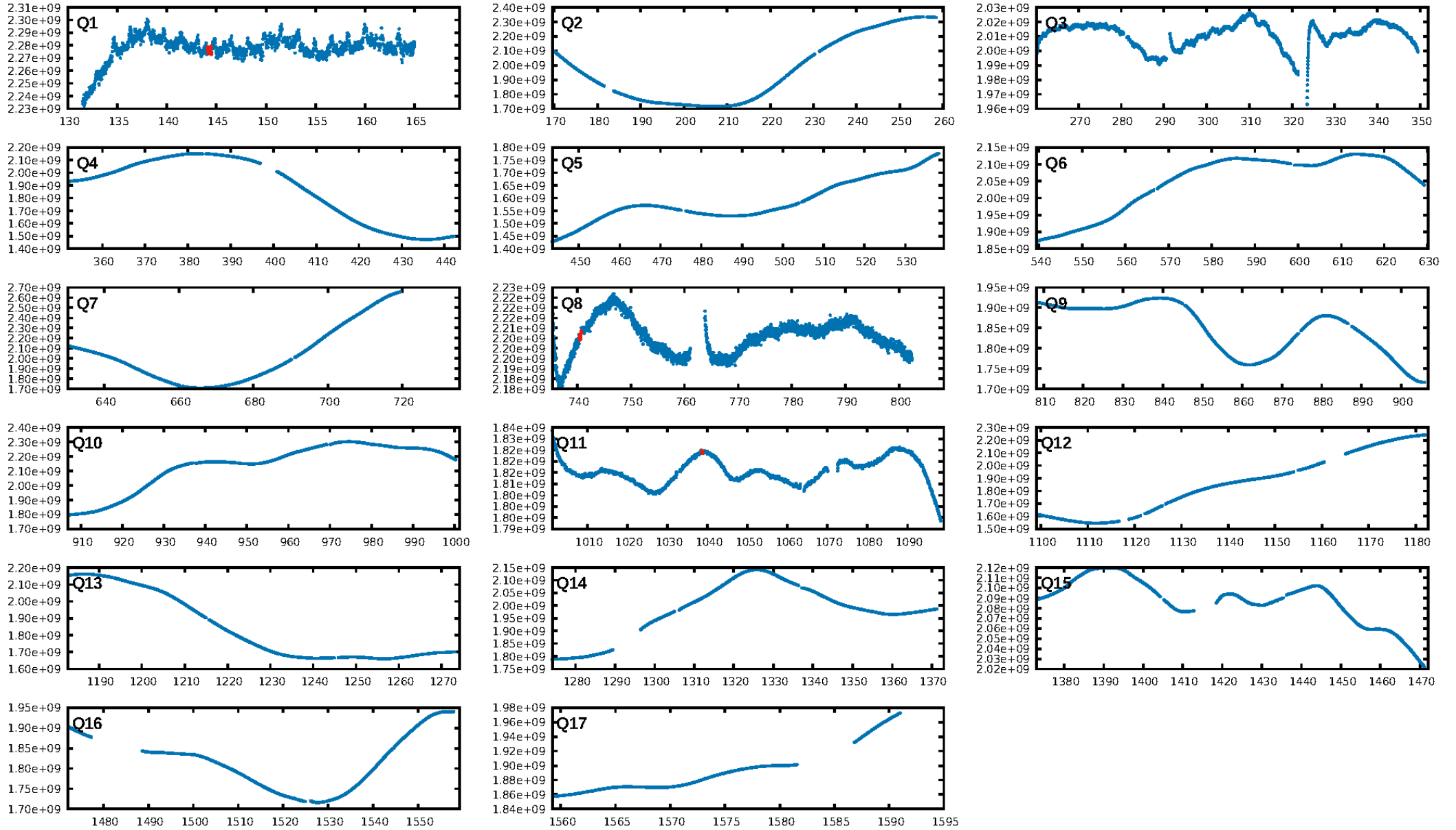
KIC: 7220332 Candidate: 2 of 3 Period: 298.140 d



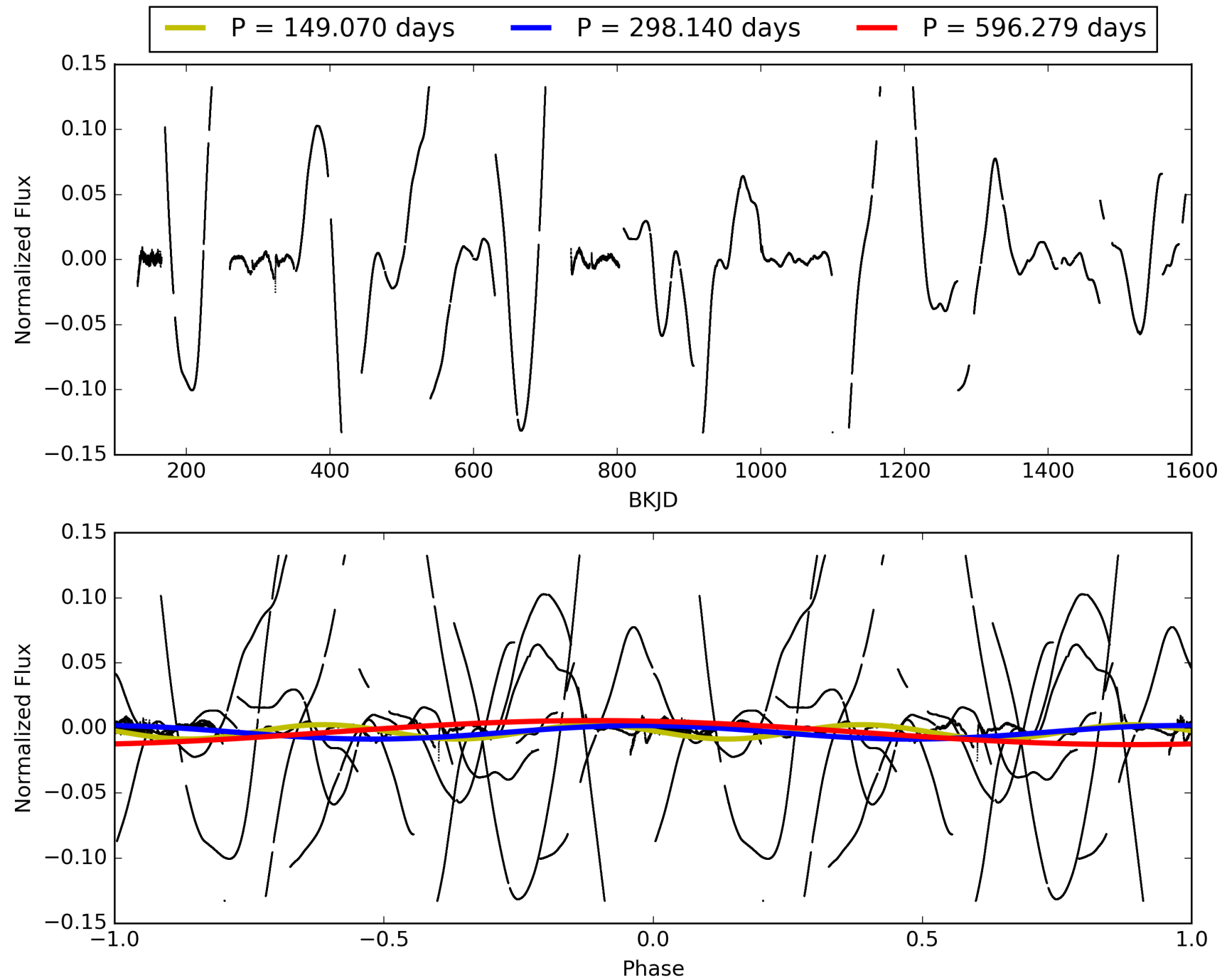
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 05:14:59 Z

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

# TCE 007220332-02, PDC Light Curves



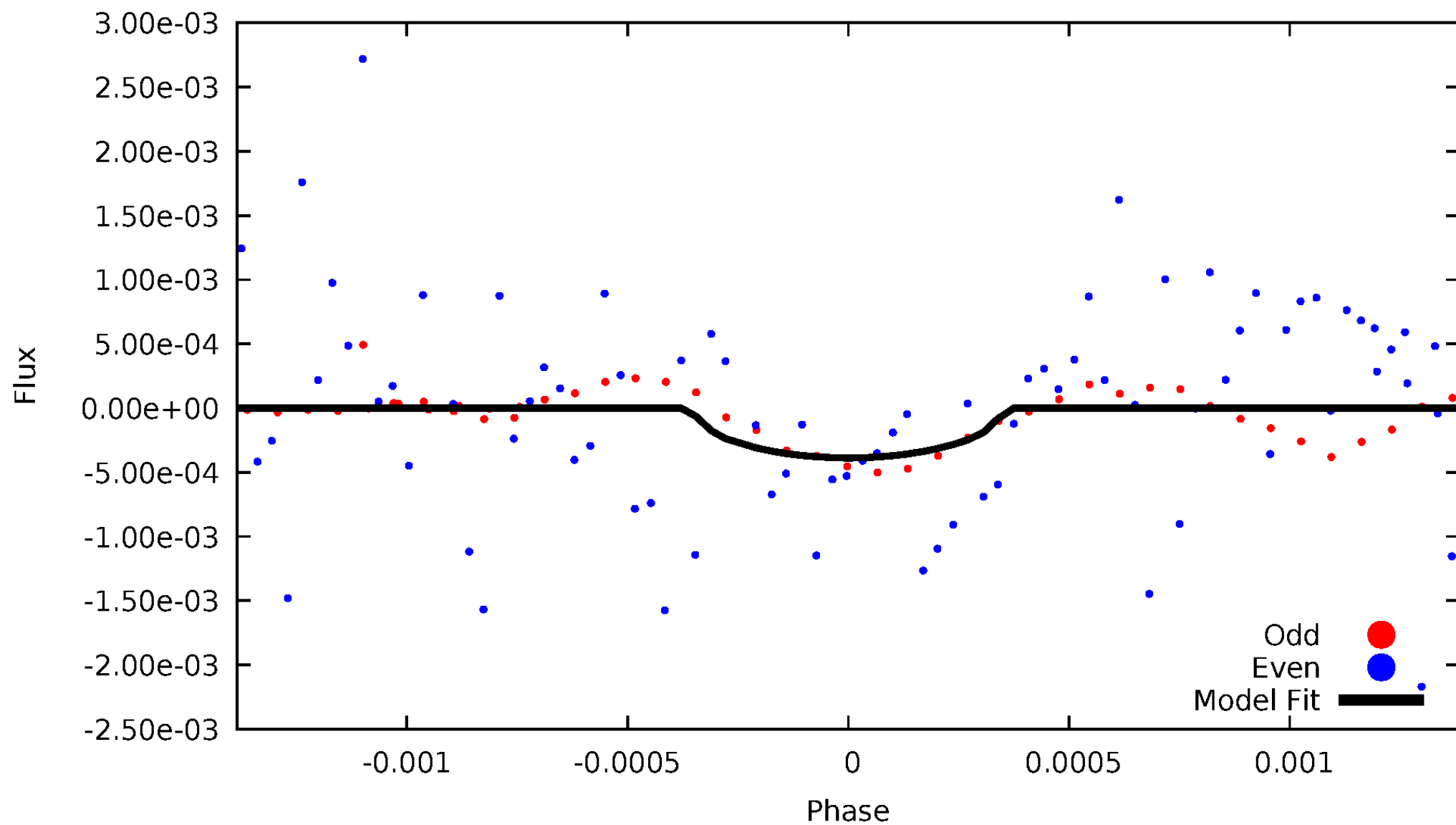
# TCE 007220332-02





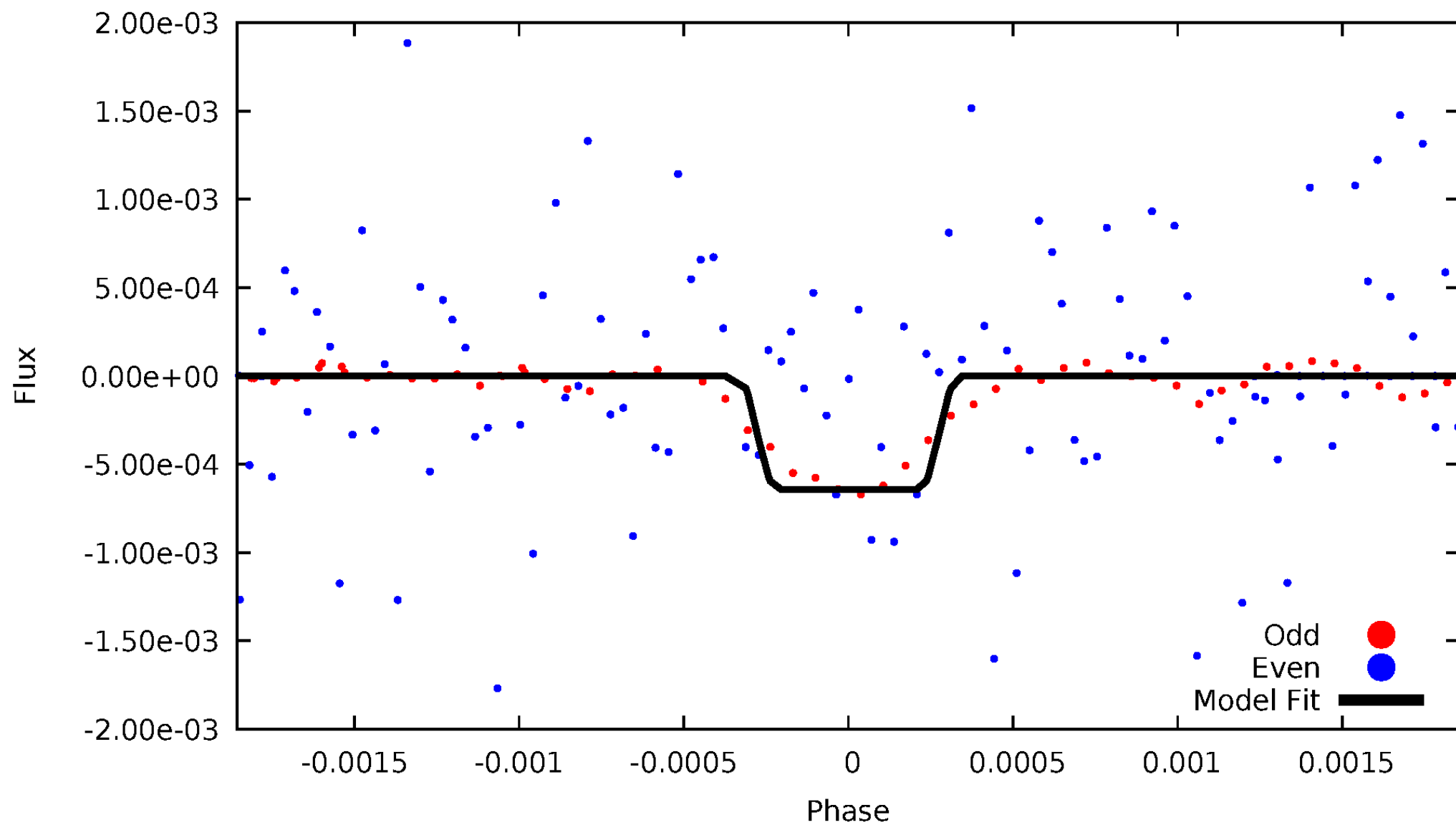
# DV Odd/Even

TCE 007220332-02



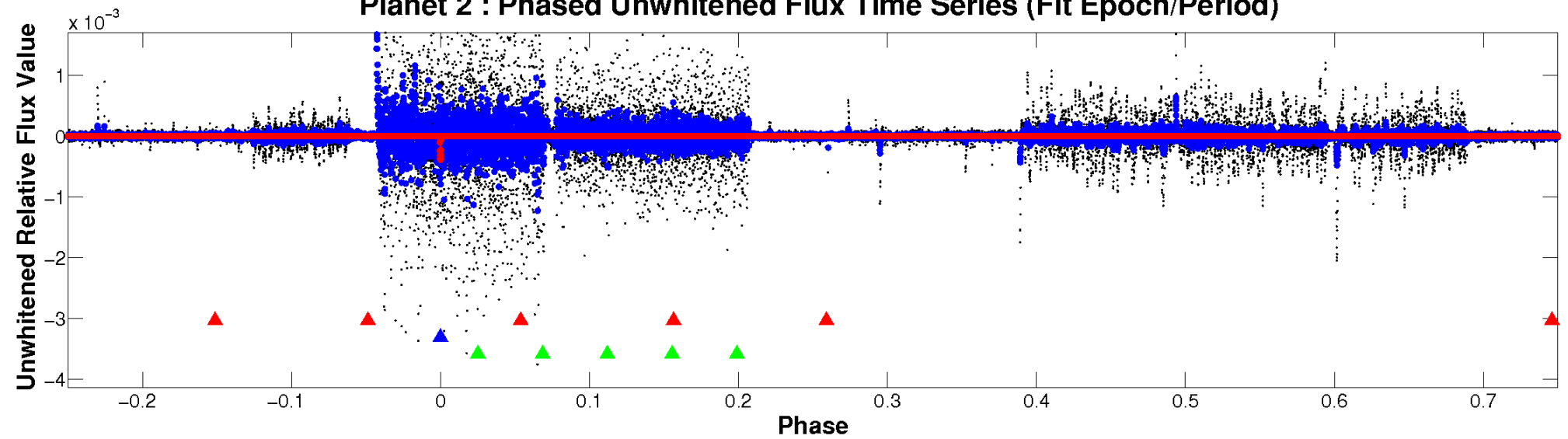
# ALT Odd/Even

TCE 007220332-02

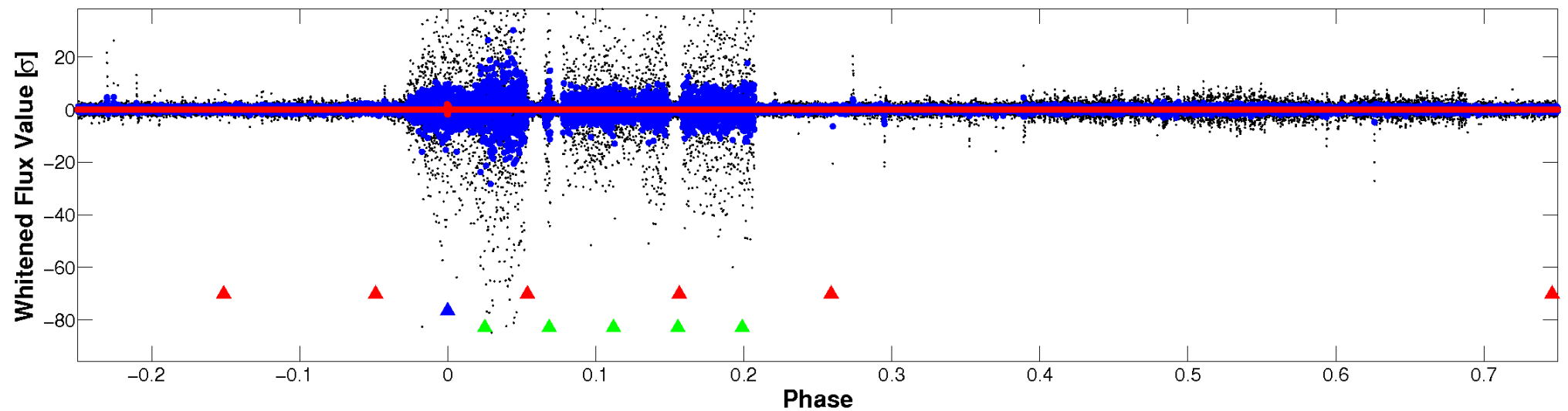


# Non-Whitened Vs. Whitened Light Curve

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

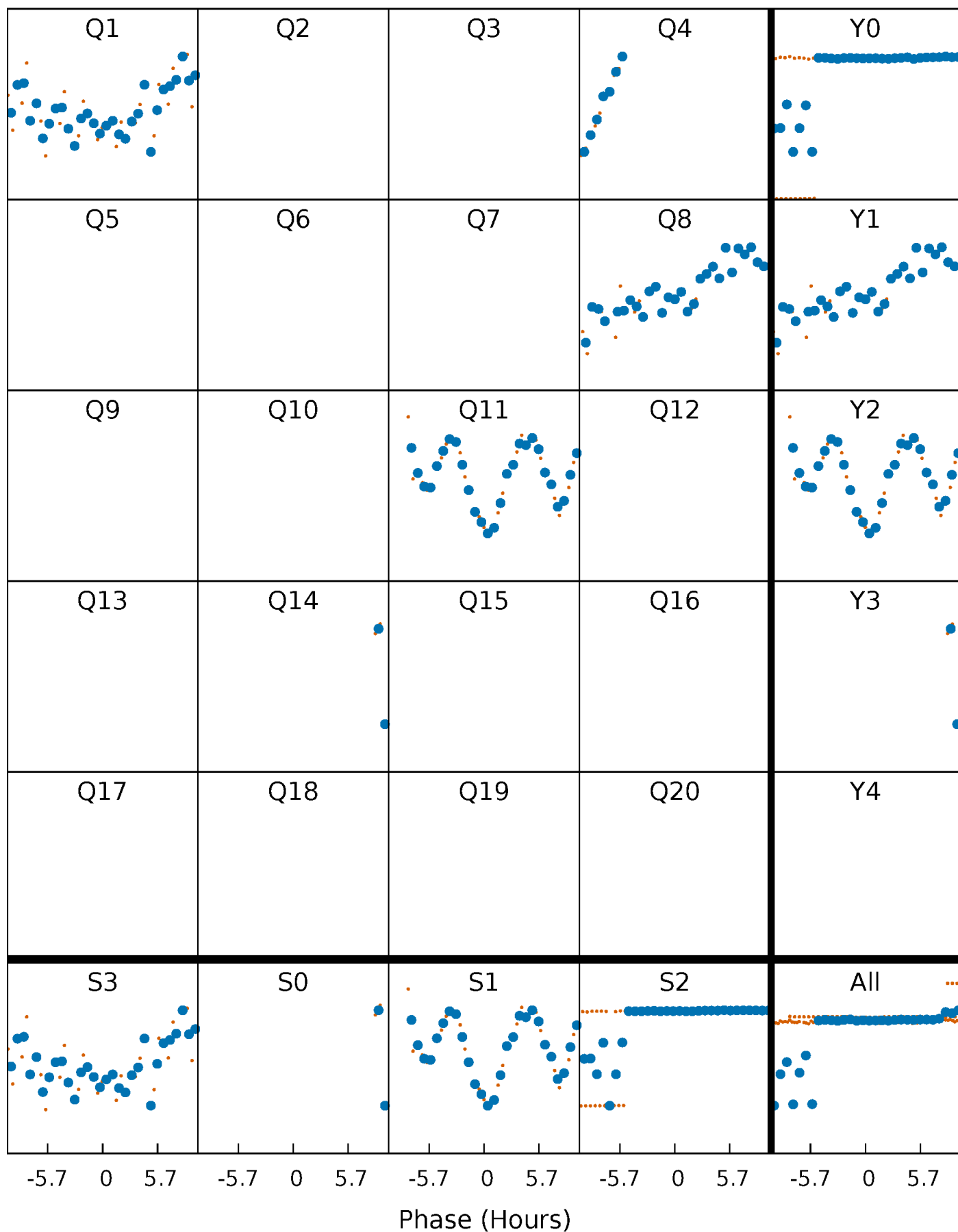


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

TCE 007220332-02     $P=298.139729$  Days     $T_0=144.284714$  (BKJD)



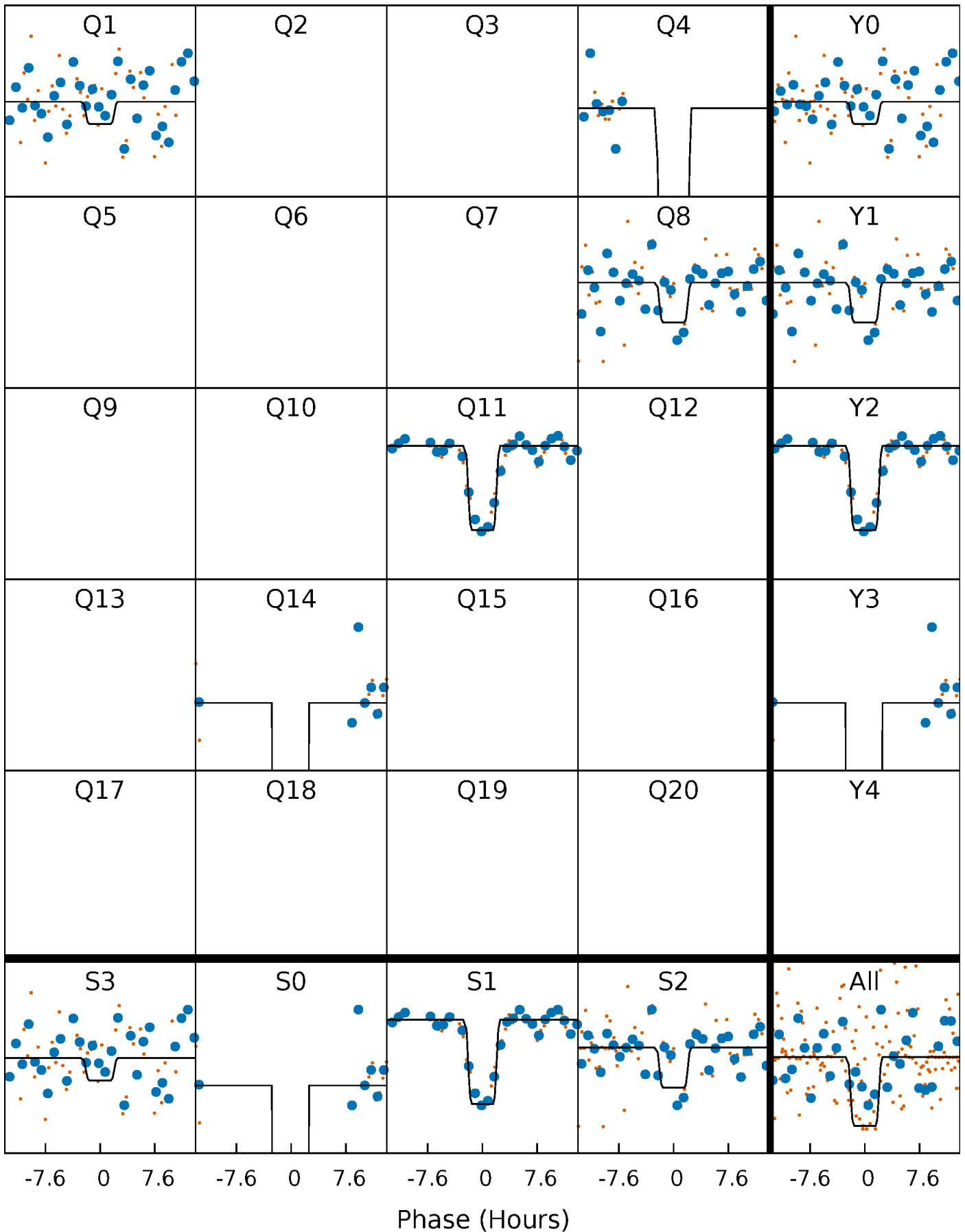
# DV Quarter-Phased Transit Curves

TCE 007220332-02     $P=298.139729$  Days     $T_0=144.284714$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

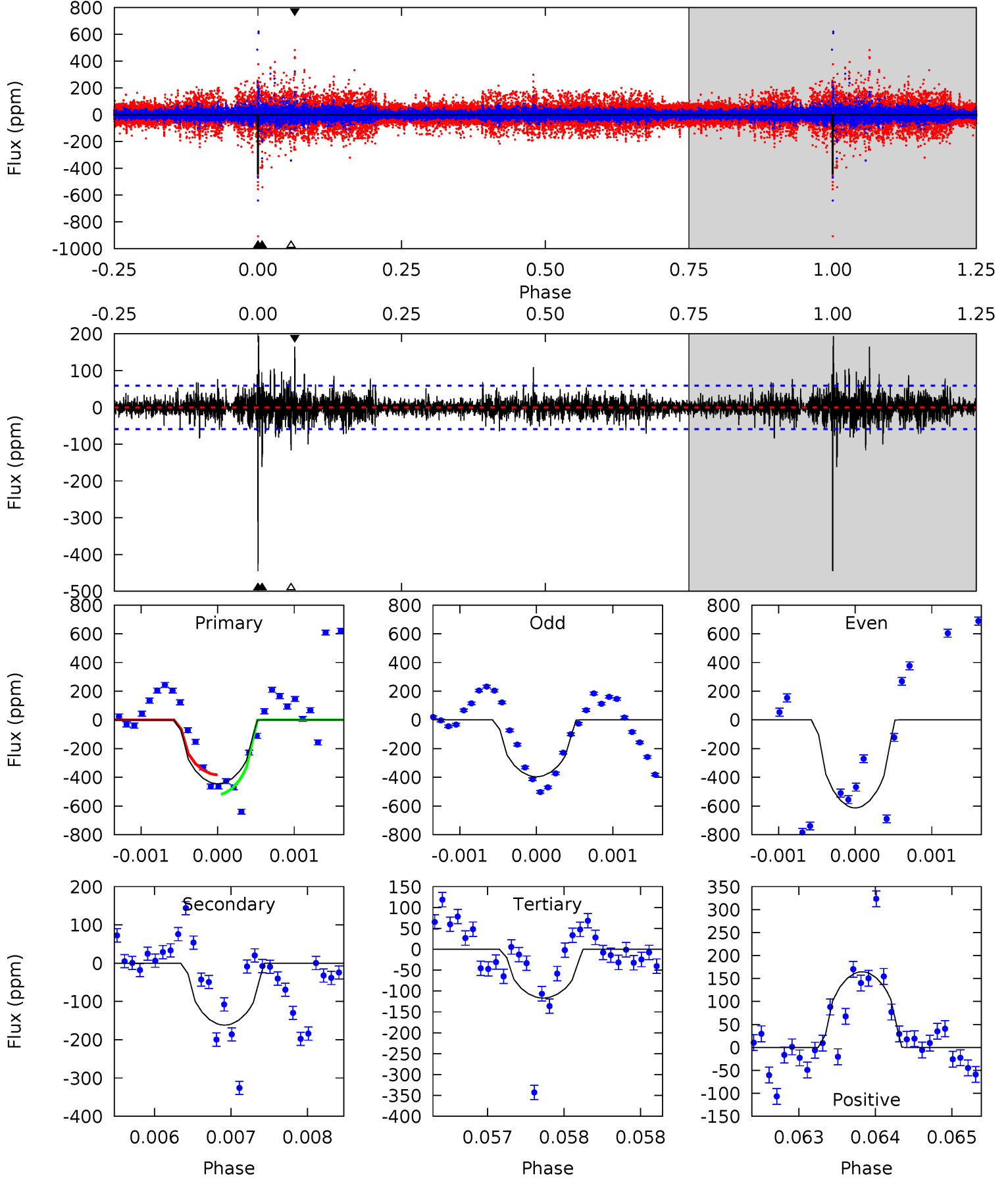
TCE 007220332-02 P=298.118829 Days  $T_0=144.355977$  (BKJD)



# DV Model-Shift Uniqueness Test

007220332-02, P = 298.139729 Days, E = 144.284714 Days

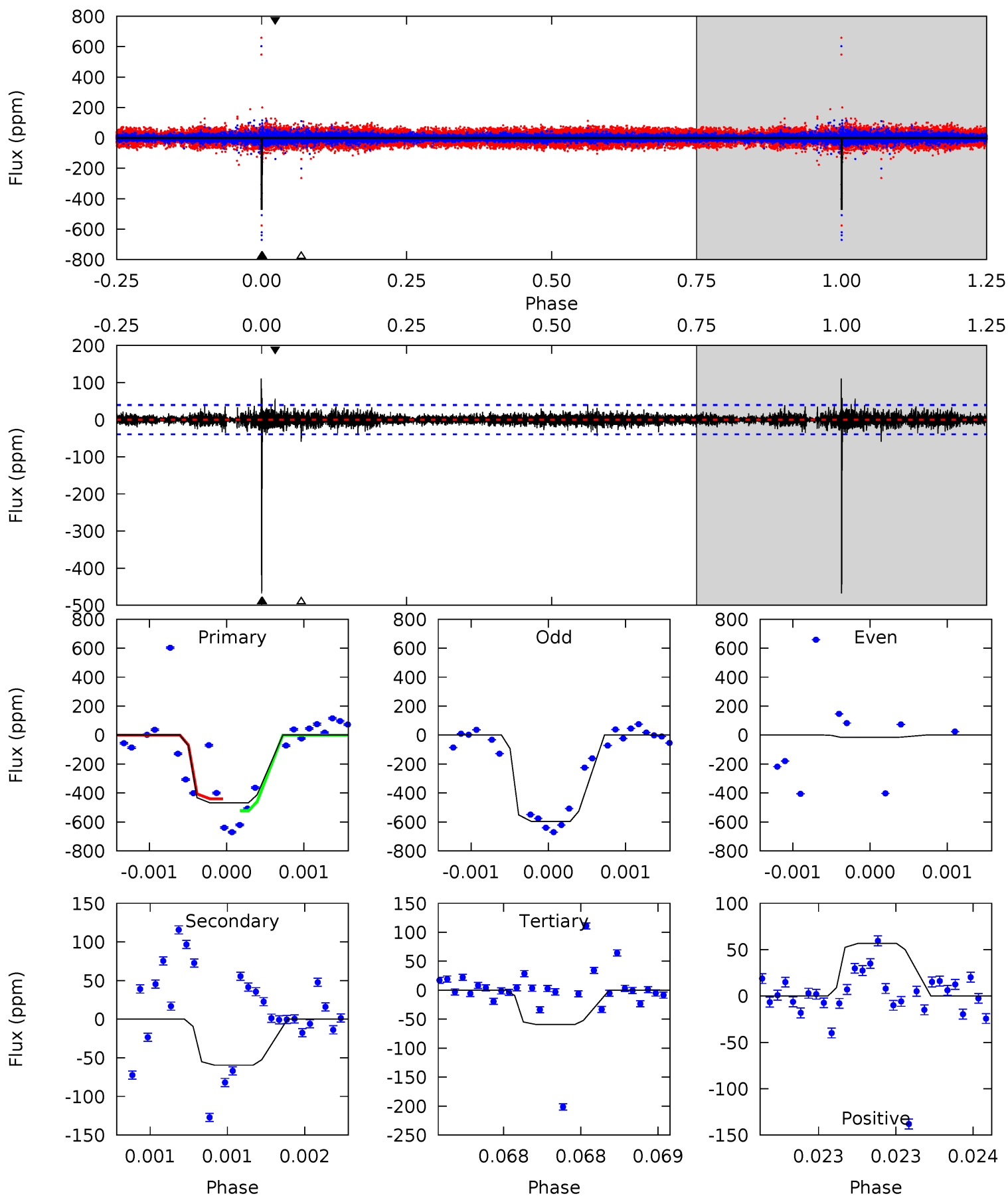
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
41.6	15.1	10.9	15.4	5.51	3.38	1.62	30.7	26.2	4.20	-0.27	6.19	0.95	0.30	6.31



# Alt Model-Shift Uniqueness Test

007220332-02, P = 298.118829 Days, E = 144.355977 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
65.6	8.36	8.30	7.96	5.54	3.42	1.03	57.3	57.7	0.05	0.39	25.8	0.74	0.19	5.03





### Stellar Parameters For KIC 007220332

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (g \cdot \text{cm}^{-3})$
	$3298^{+117}_{-88}$	$0.129^{+0.208}_{-0.039}$	$-0.100^{+0.250}_{-0.150}$	$151.742^{+9.192}_{-29.414}$	$1.130^{+0.206}_{-0.137}$	$0.000^{+0.000}_{-0.000}$
	+4%/-3%	+161%/-30%	+250%/-150%	+6%/-19%	+18%/-12%	+91%/-11%
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 007220332-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	-162±11	$338.78^{+229.42}_{-211.08}$	$2566^{+112}_{-136}$	$2641^{+1109}_{-4772}$	$0.682^{+3.869}_{-0.446}$
Alt.	-60±7	$417.17^{+280.18}_{-232.11}$	$2580^{+118}_{-157}$	$-2335^{+5095}_{-201}$	$0.153^{+0.649}_{-0.096}$

$T_{max}$  = 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

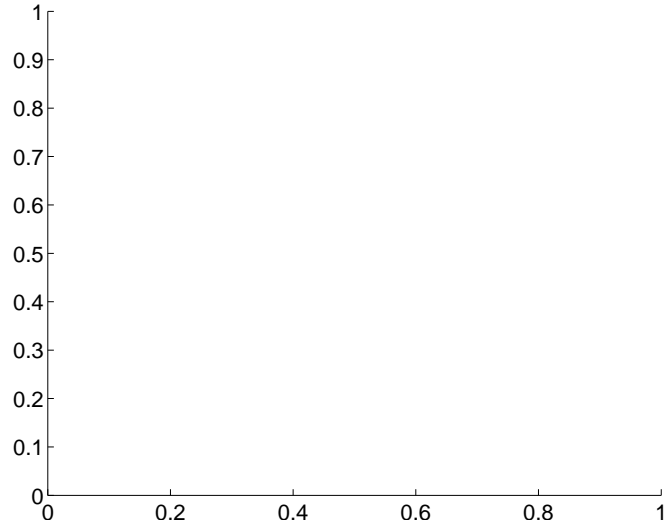
Supplemental centroid analysis for 007220332-02. **Kepler magnitude: 10.41.** Transit SNR 10.50

**There are 0 quarters with good PRF difference image offsets**

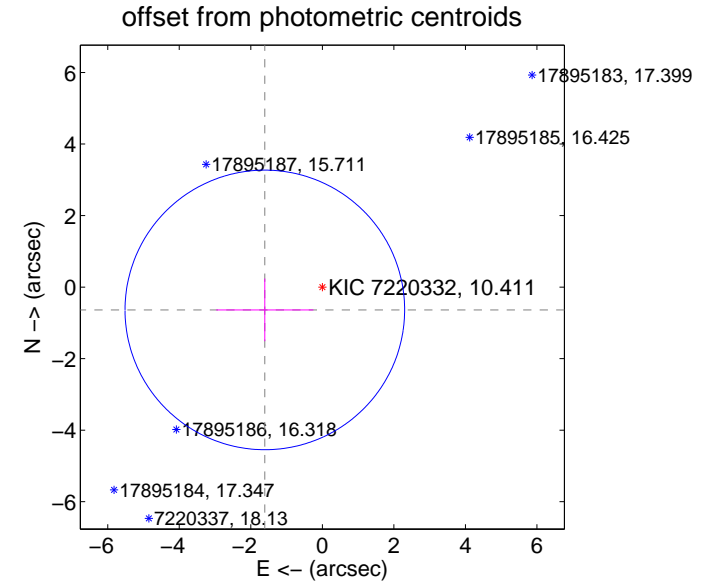
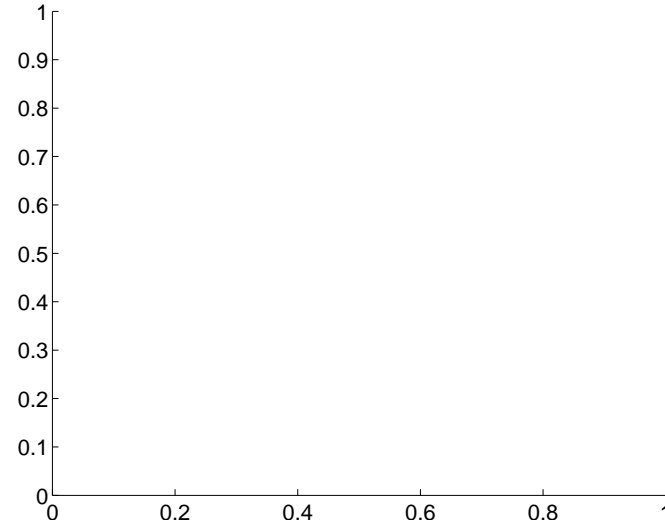
The direct PRF centroid is offset from the target star catalog position by about NaN arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	—	—	—	—
PRF-fit source offset from KIC position	—	—	—	—
photometric centroid source offset	$1.73 \pm 1.30$	1.33	$1.61 \pm 1.36$	$-0.64 \pm 0.88$

There is no PRF-fit offset from OOT-fit

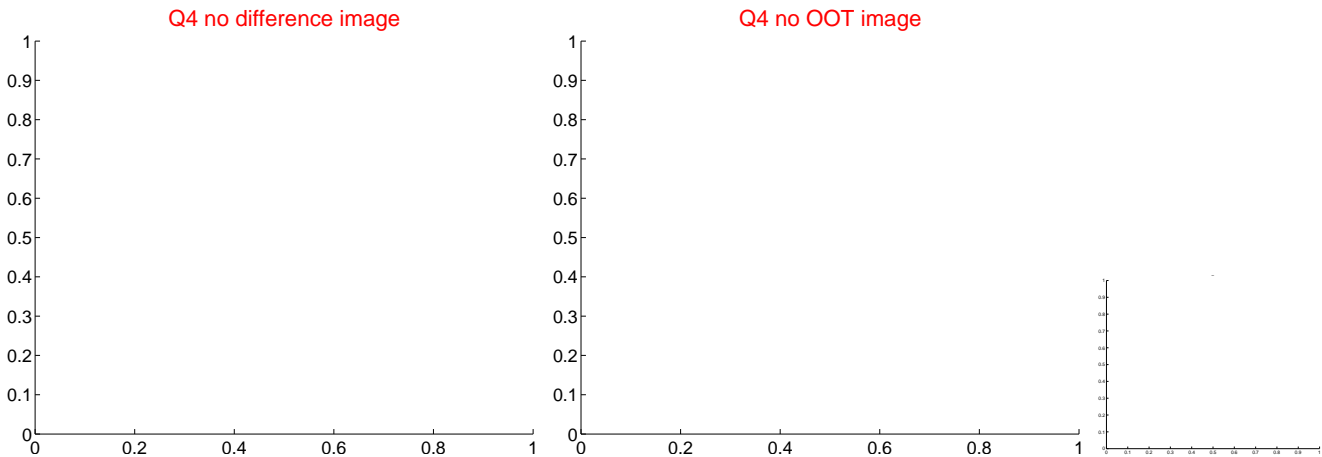
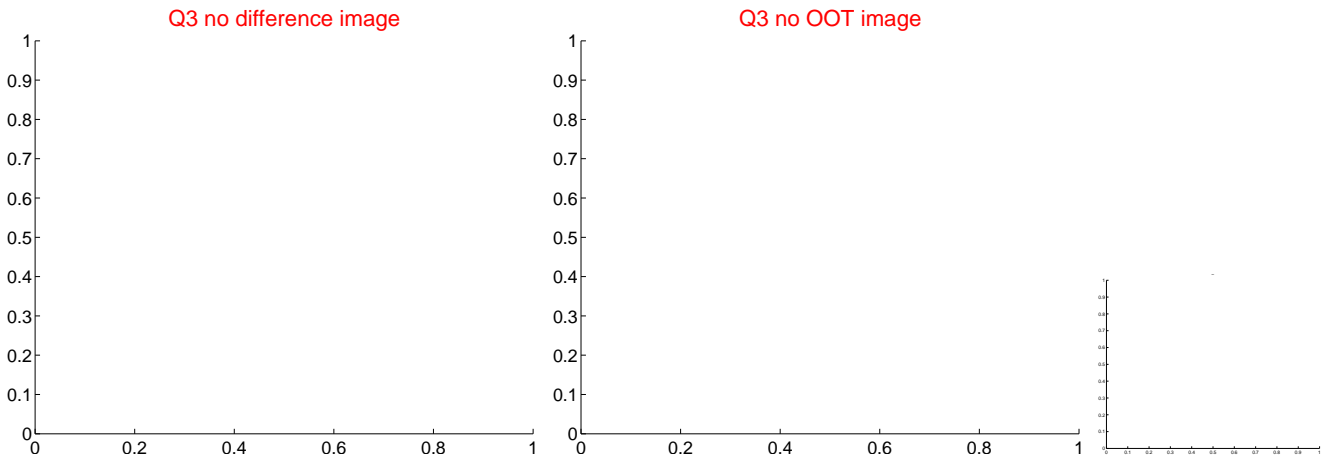
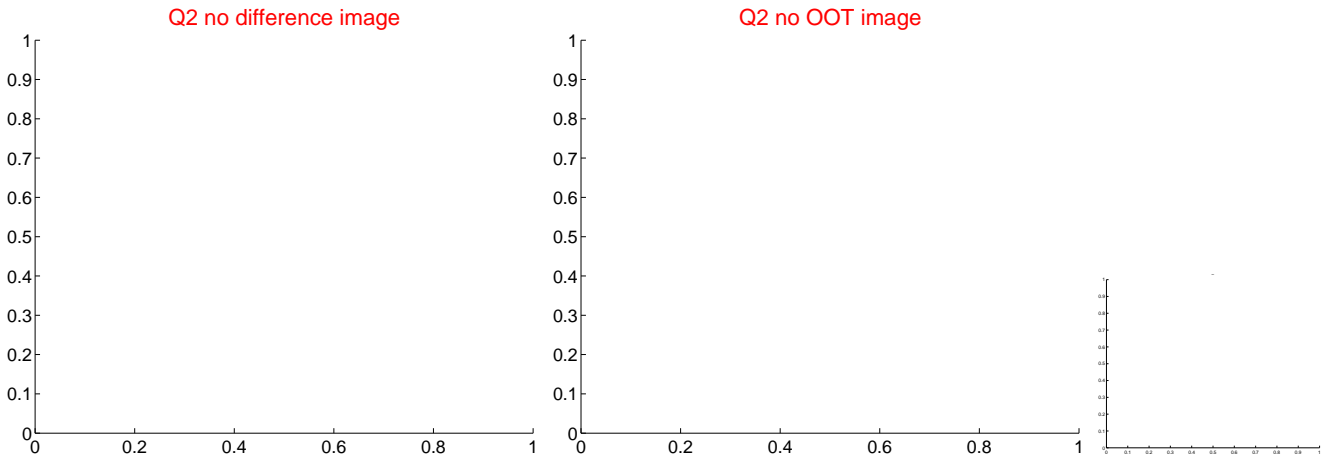
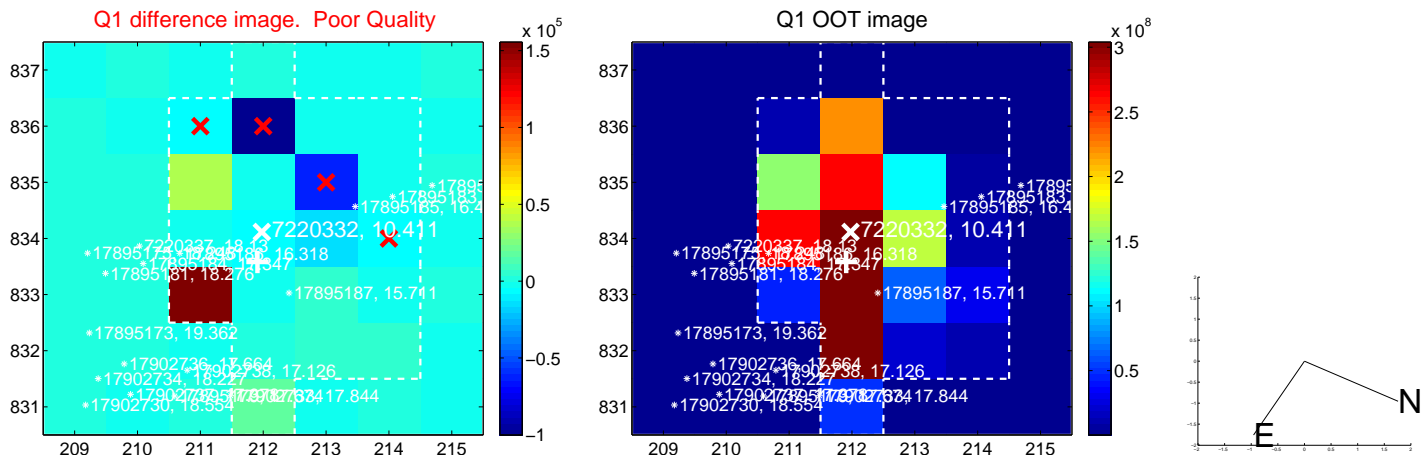


There is no PRF-fit offset from KIC

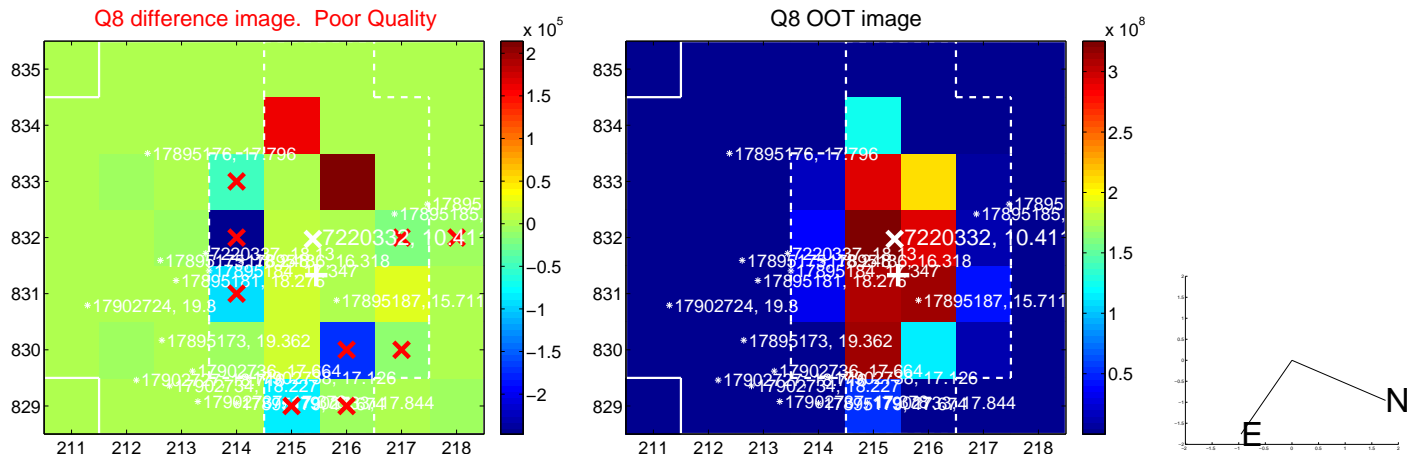
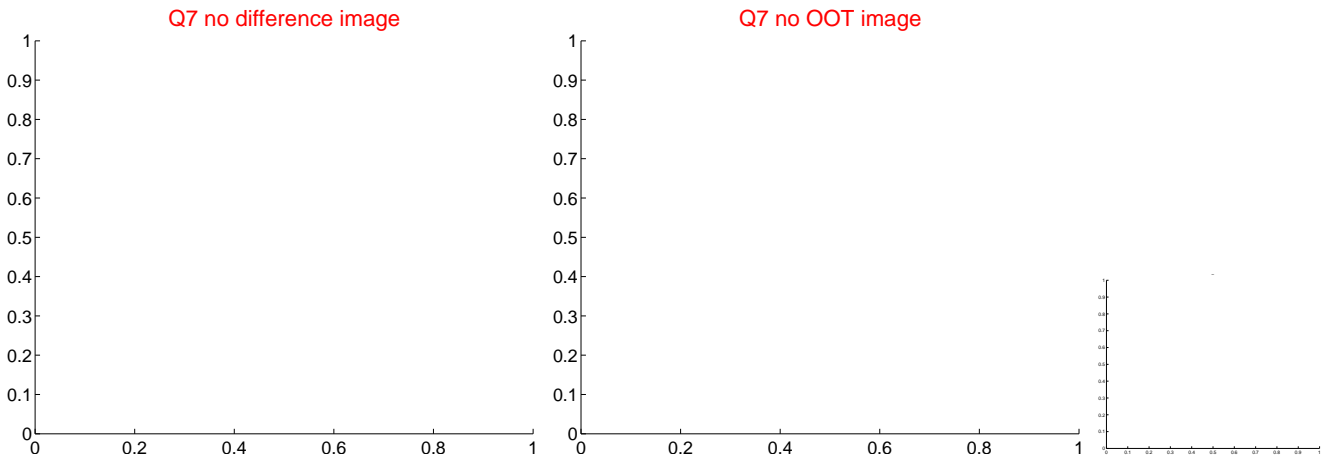
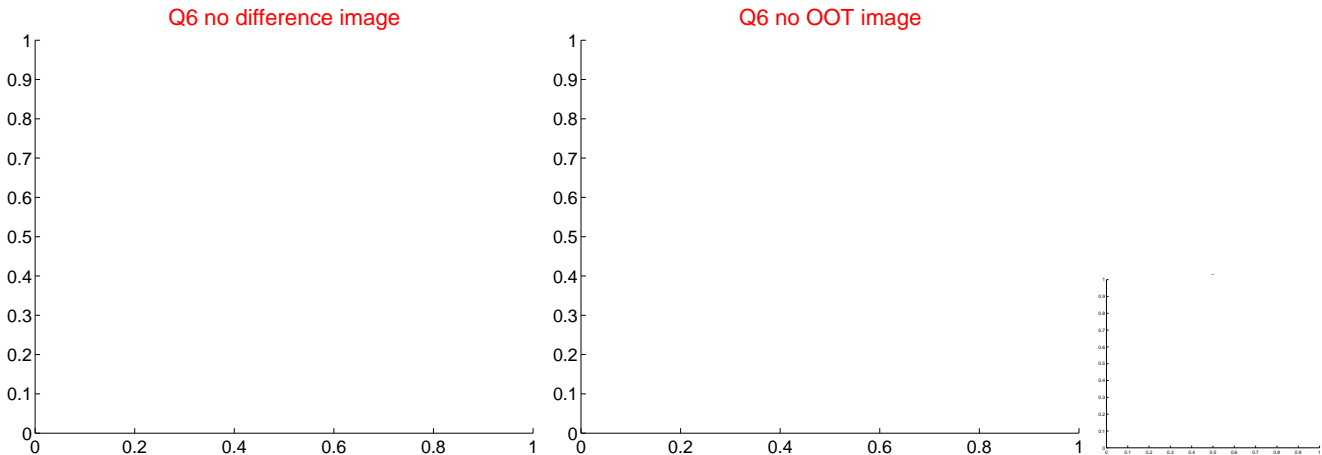
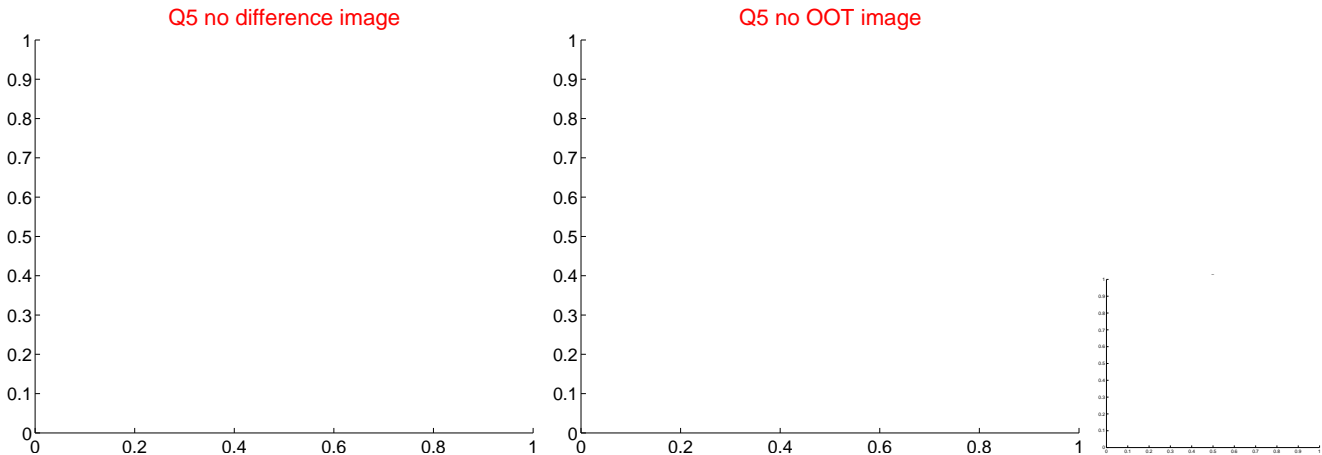


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



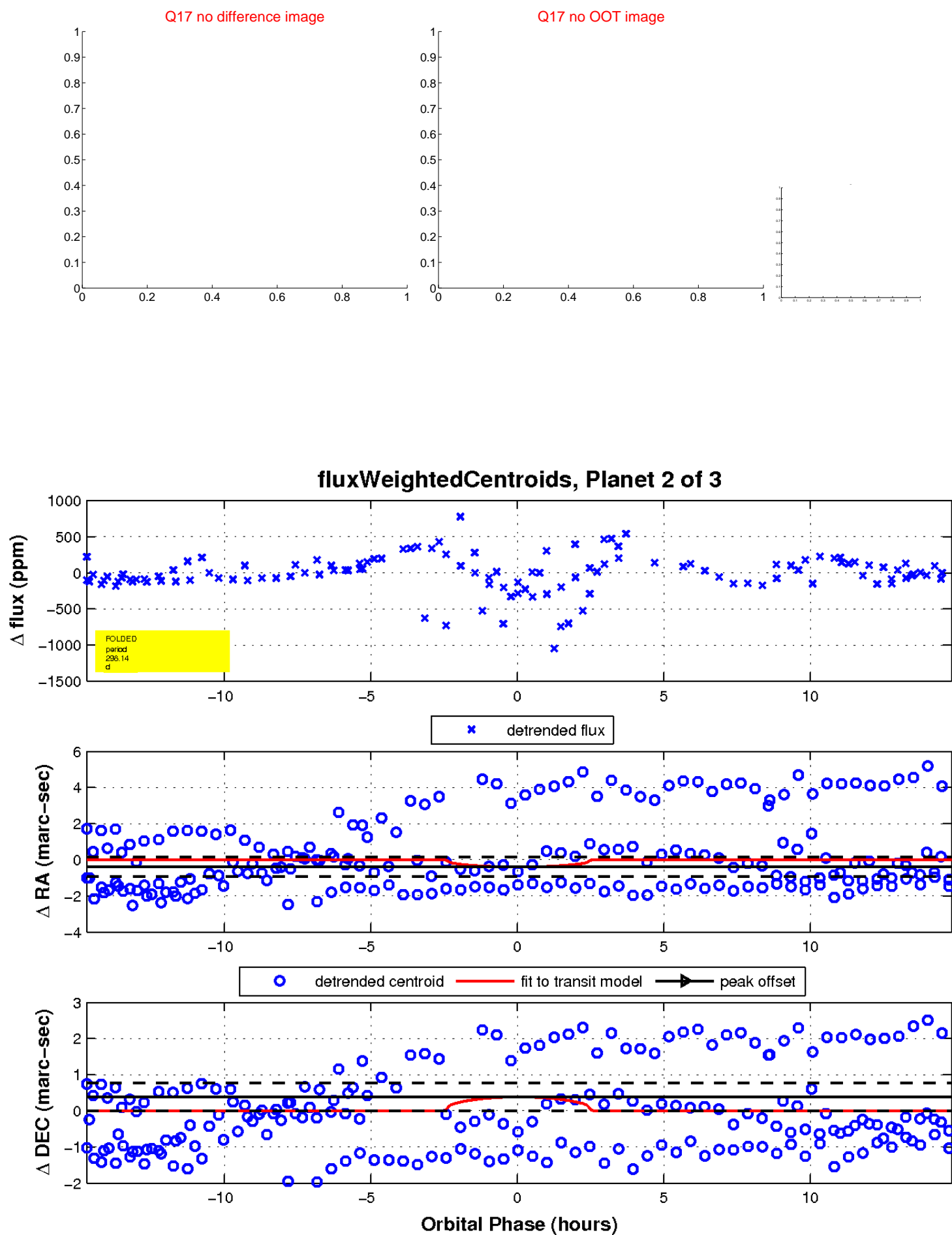
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

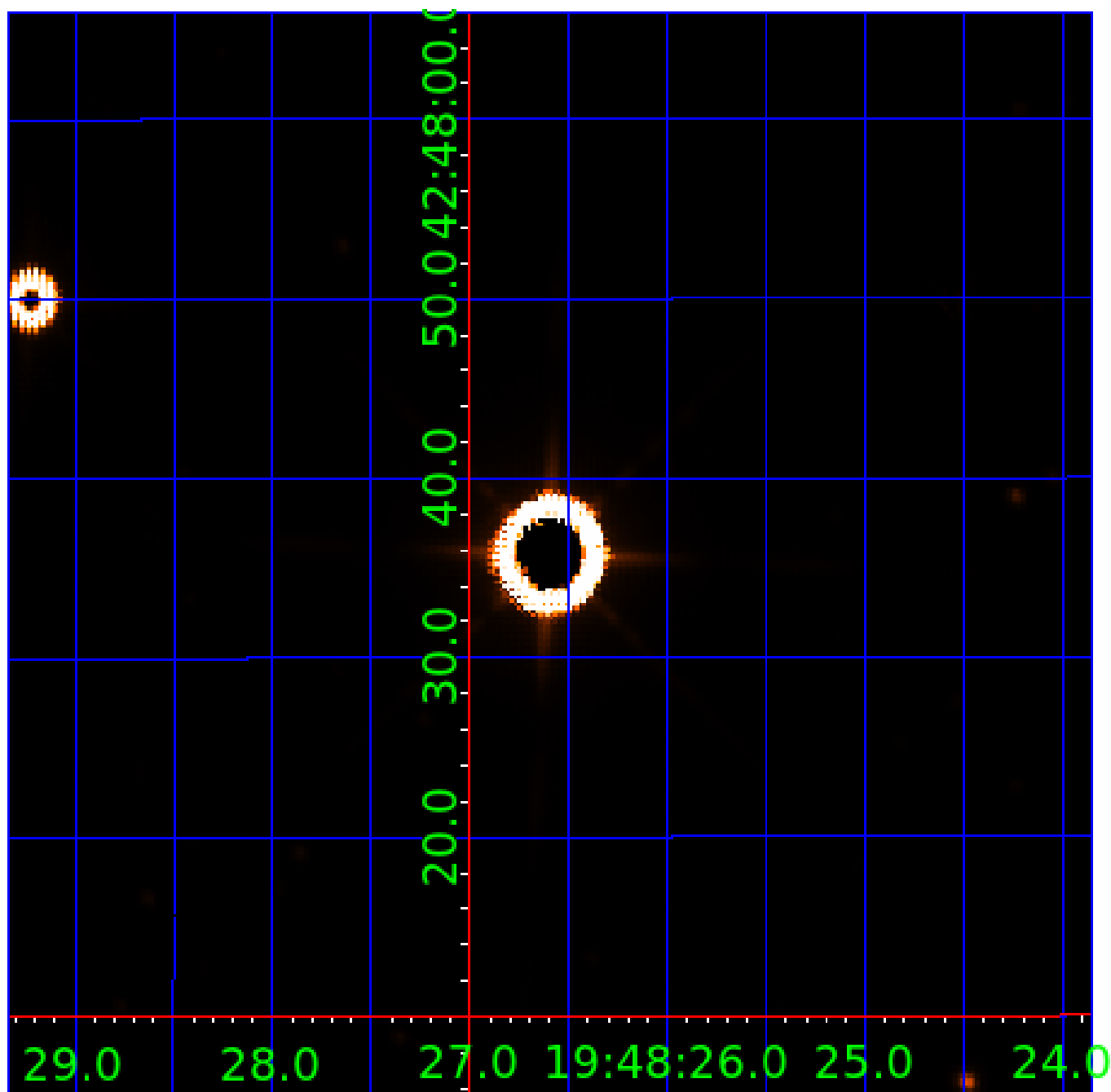


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 007220332

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007220332-01	OBS	No	267.554220	221.521493	130.2	55.239	23.6	4.6	151.74	3298	159.48	3404.75
007220332-02	OBS	No	298.139729	144.284714	388.1	4.952	31.3	10.5	151.74	3298	273.81	2947.19
007220332-03	OBS	No	311.099441	151.763878	11.3	15.486	73.7	1.3	151.74	3298	59.07	2784.64

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007220332-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_SATURATED
007220332-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_SATURATED
007220332-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_SATURATED

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

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

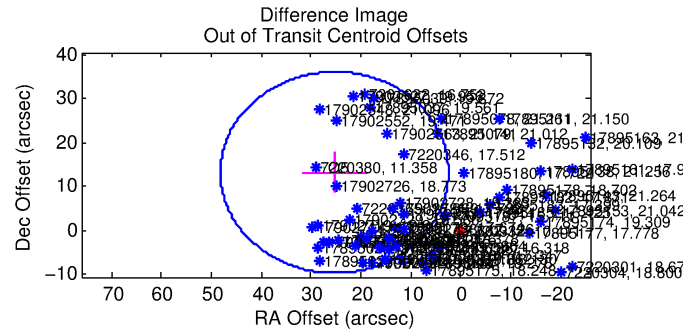
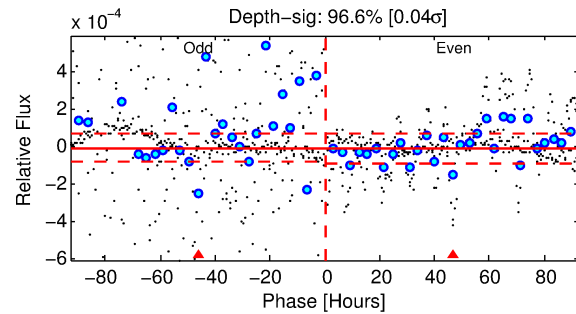
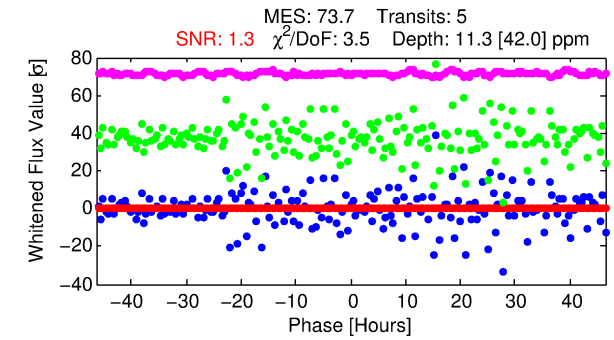
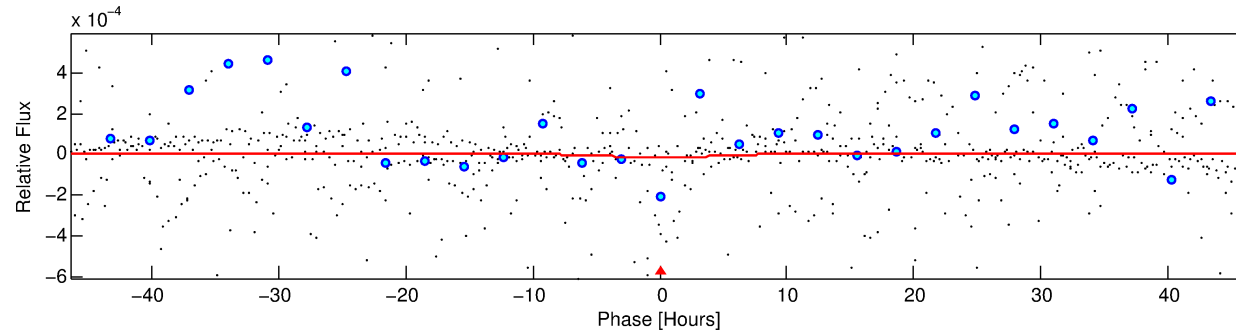
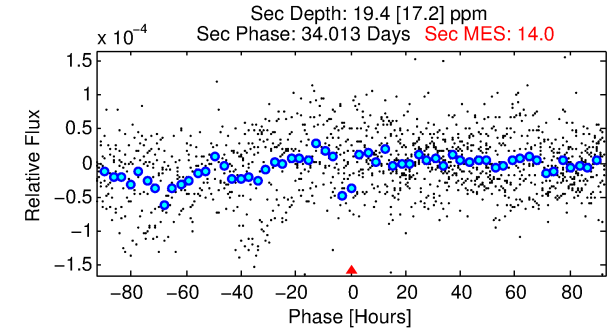
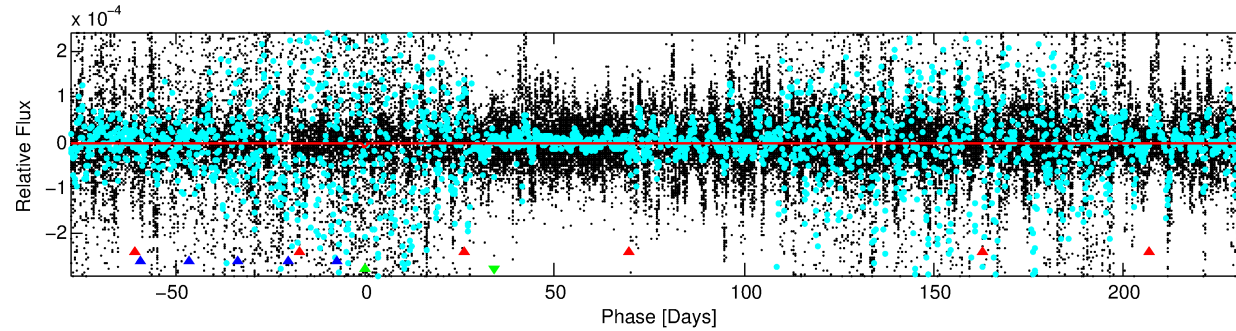
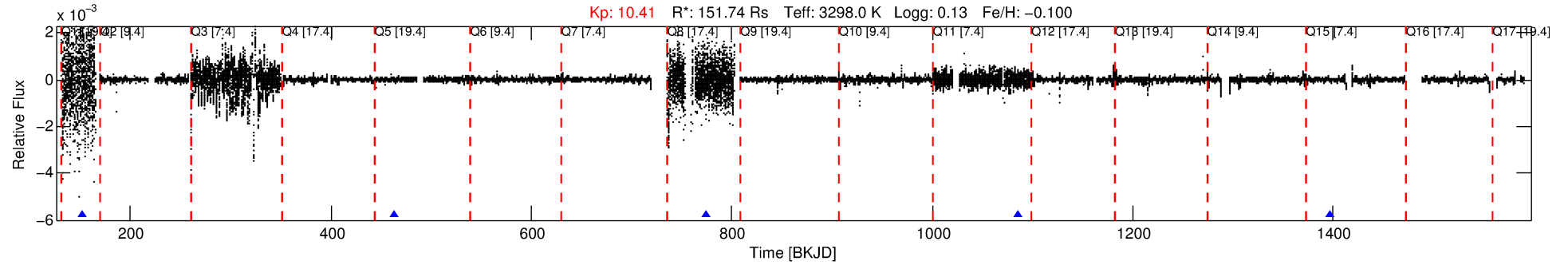
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 007220332-03

No Significant Match Found

# DV One-Page Summary

KIC: 7220332 Candidate: 3 of 3 Period: 311.099 d



## DV Fit Results:

Period = 311.09944 [0.11369] d  
Epoch = 151.7639 [0.3094] BKJD  
Rp/R\* = 0.0036 [0.0221]  
b/R\* = 90.46 [1480.83]  
b = 0.81 [7.04]  
Seff = 2784.64 [1037.38]  
Teq = 1852 [173] K  
Rp = 59.07 [366.20] Re  
a = 0.9362 [0.1923] AU  
Ag = 2.68 [33.31] [0.05σ]  
Teff = 3664 [11382] K [0.16σ]

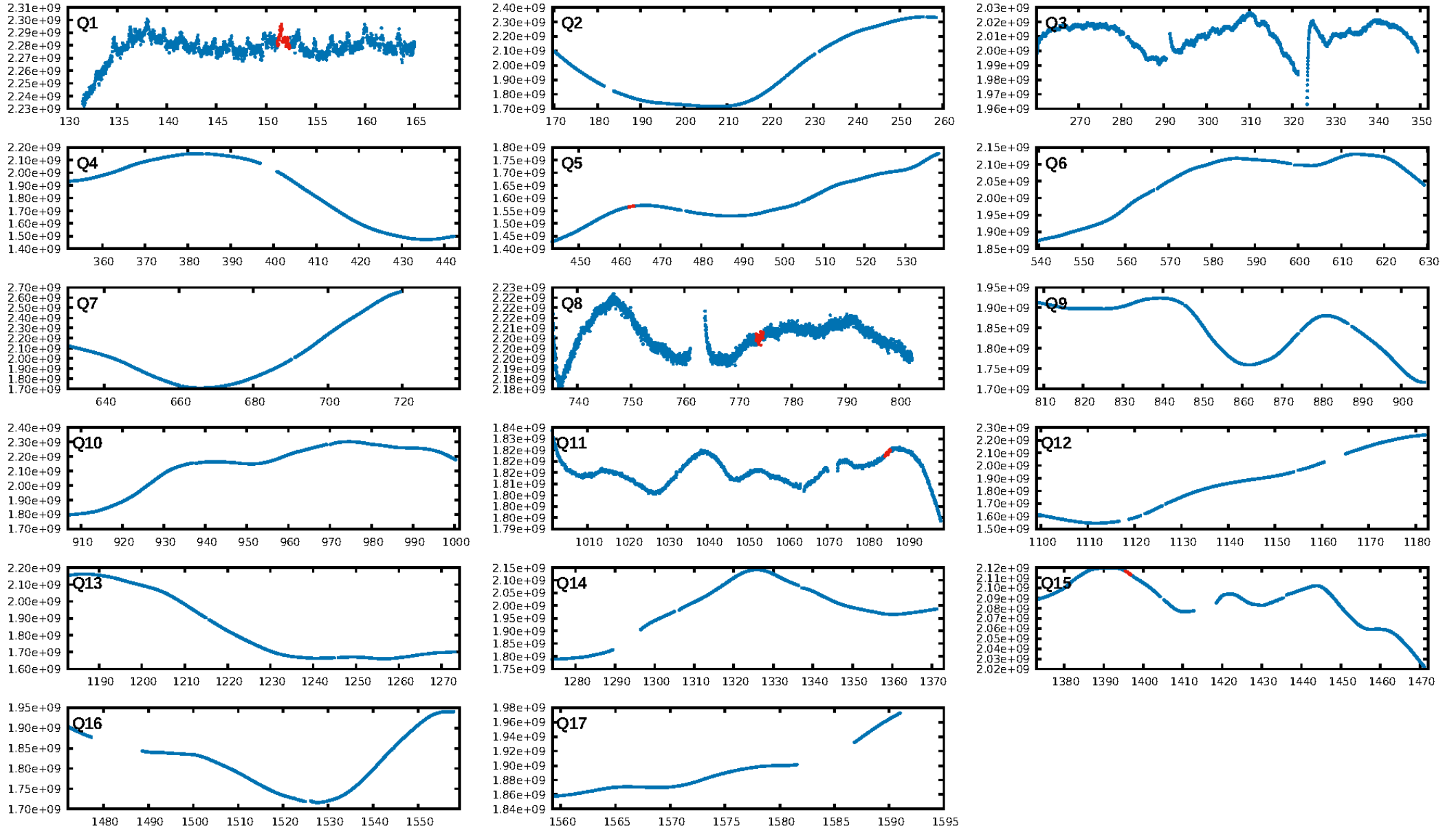
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [19.13σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 2.6%  
ModelChiSquareGoF-sig: 0.0%  
Bootstrap-pfa: 3.92e-19  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: N/A  
Centroid-sig: 40.6%  
Centroid-so: 30.697 arcsec [0.95σ]  
OotOffset-rm: 28.507 arcsec [3.74σ]  
KicOffset-rm: 30.528 arcsec [3.60σ]  
OotOffset-st: 0/1/1/1 [3]  
KicOffset-st: 0/1/1/1 [3]  
DiffImageQuality-fgm: 0.00 [0/3]  
DiffImageOverlap-fno: 1.00 [4/4]

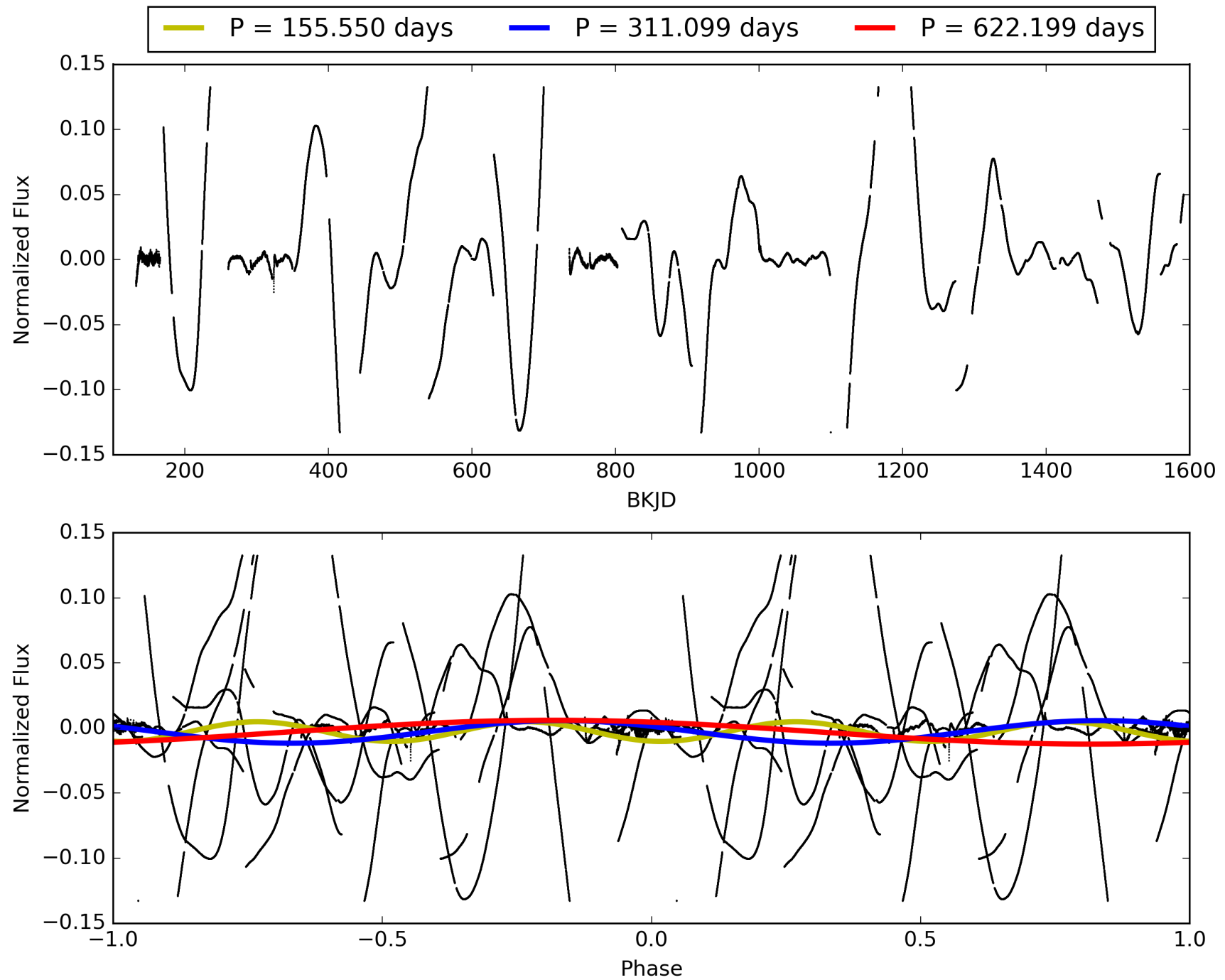
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 05:15:06 Z

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

# TCE 007220332-03, PDC Light Curves

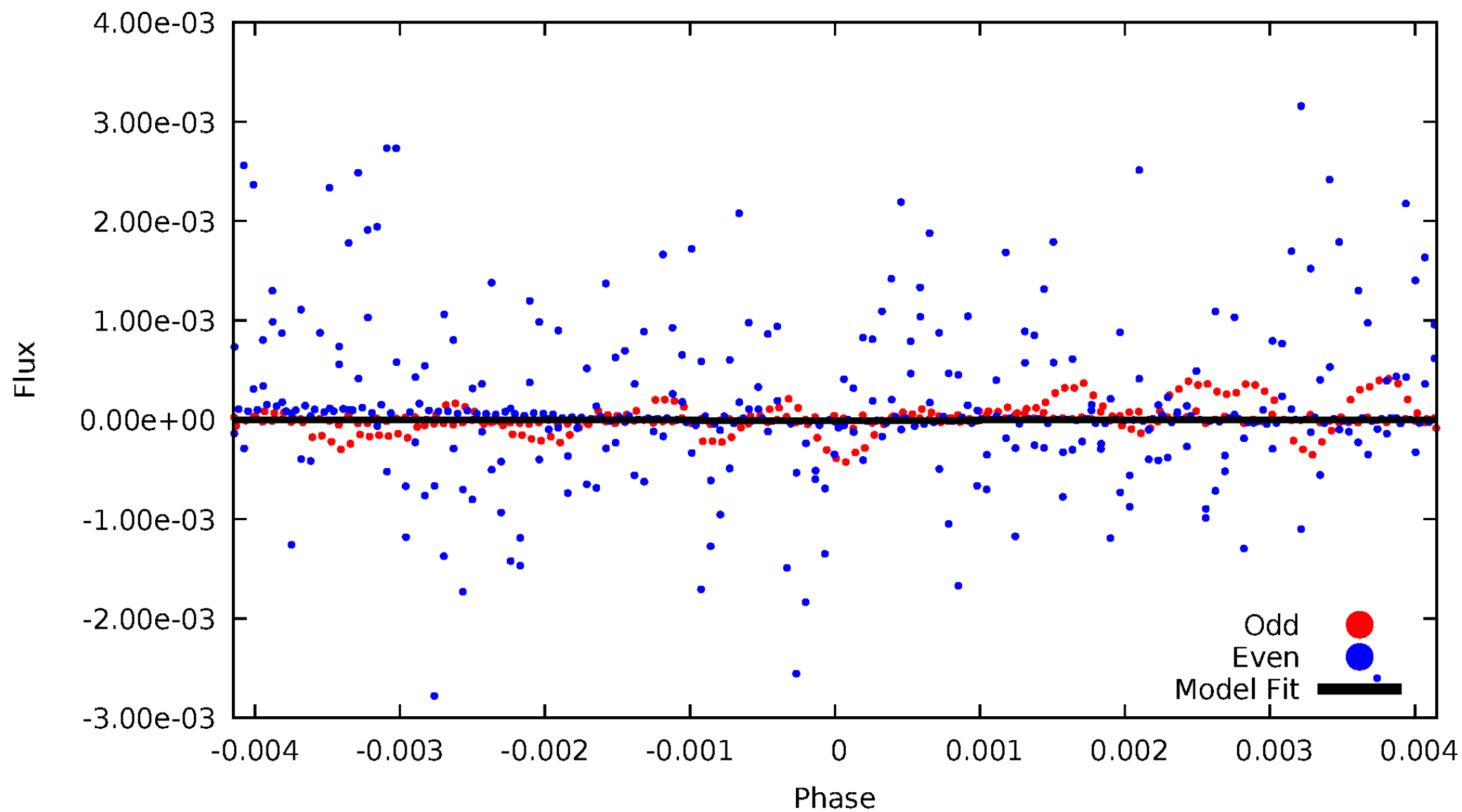


TCE 007220332-03



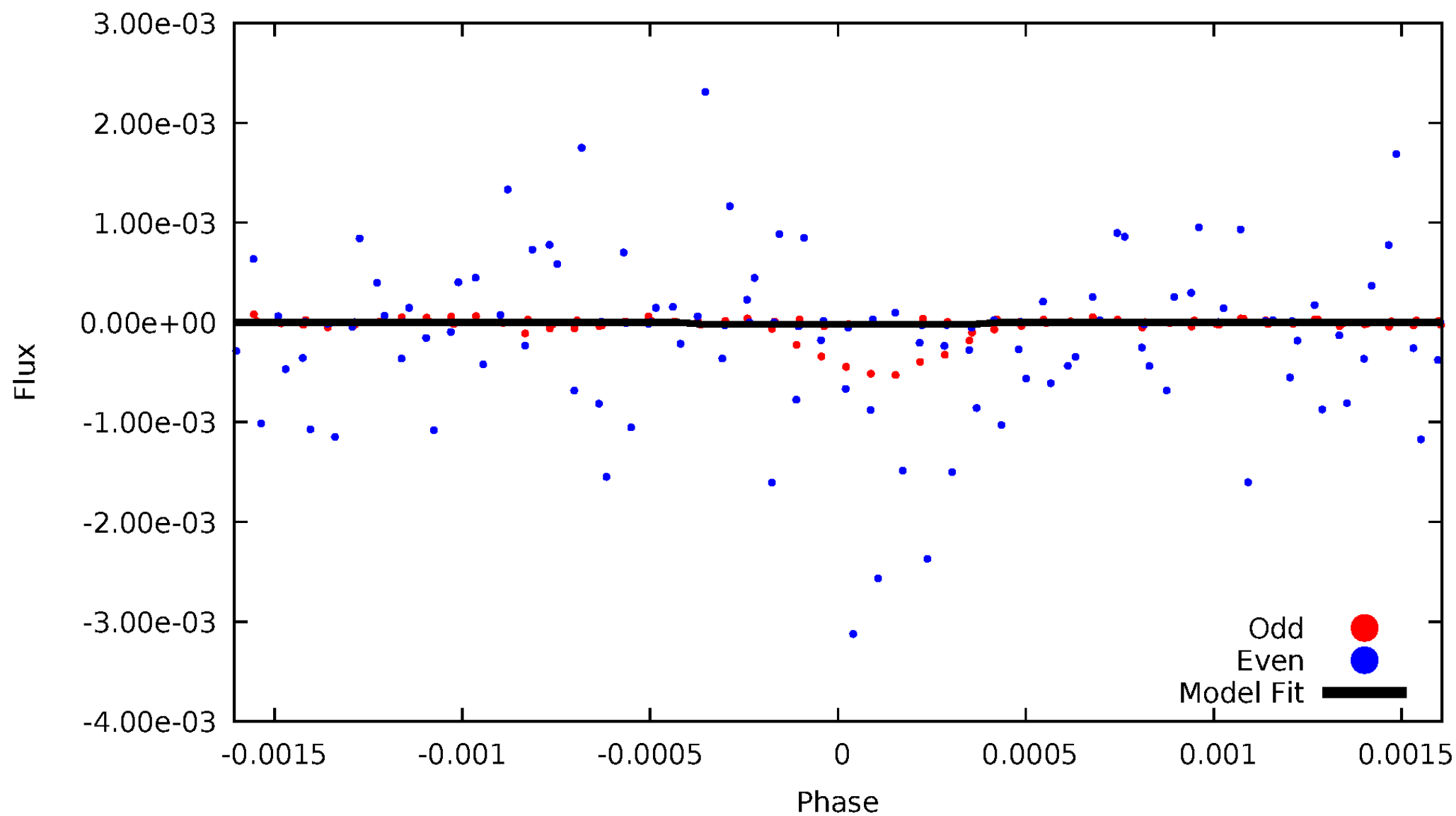
DV Odd/Even

TCE 007220332-03



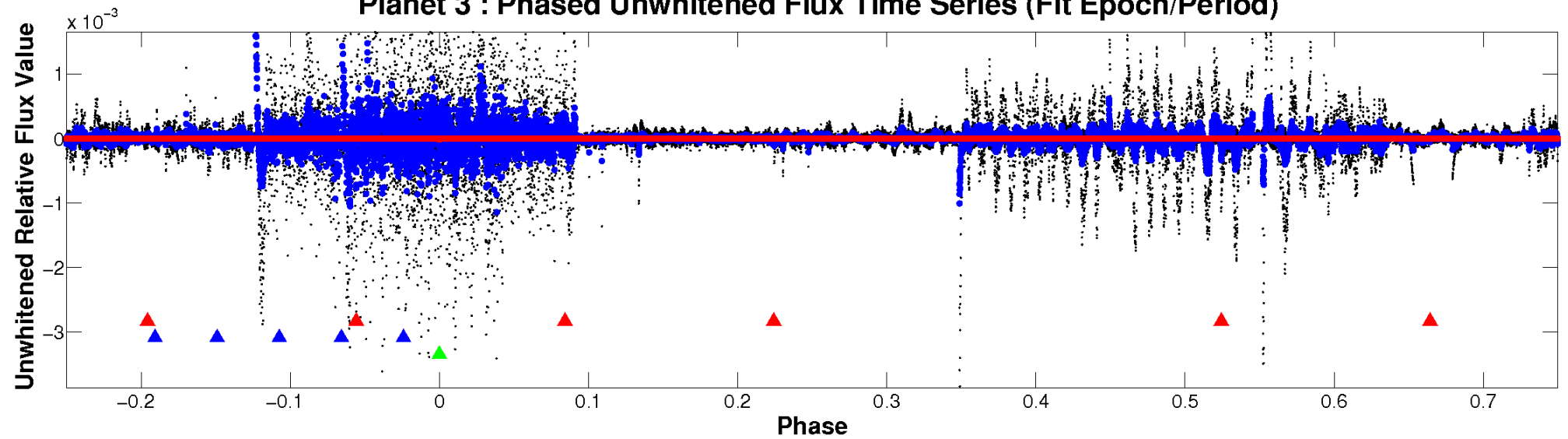
# ALT Odd/Even

TCE 007220332-03

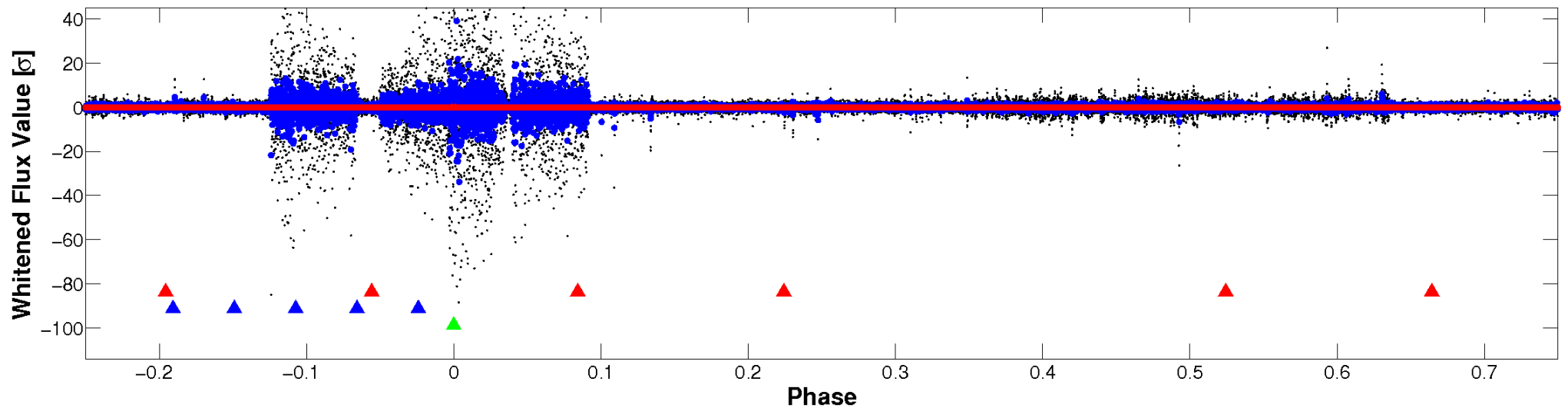


# Non-Whitened Vs. Whitened Light Curve

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

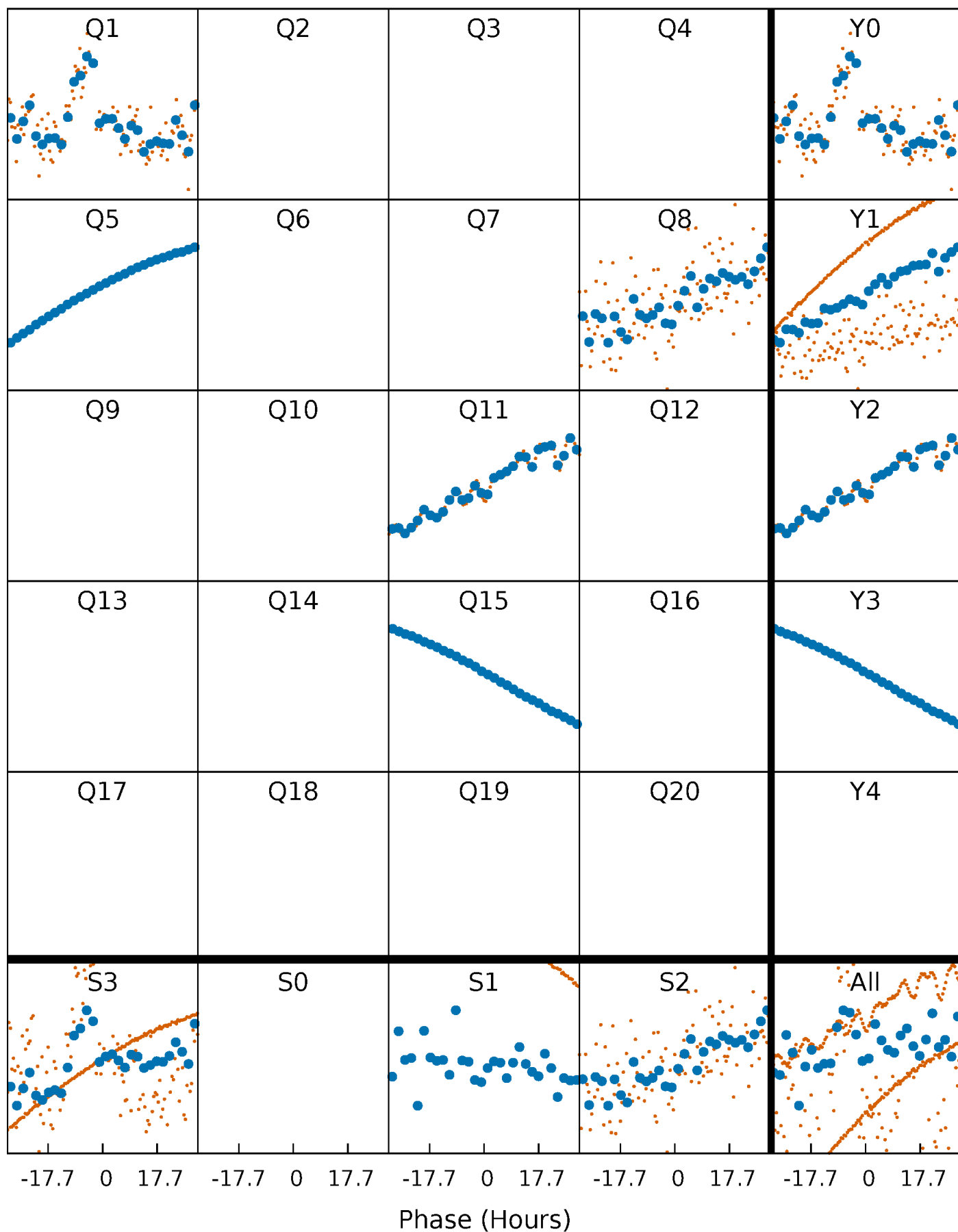


## Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

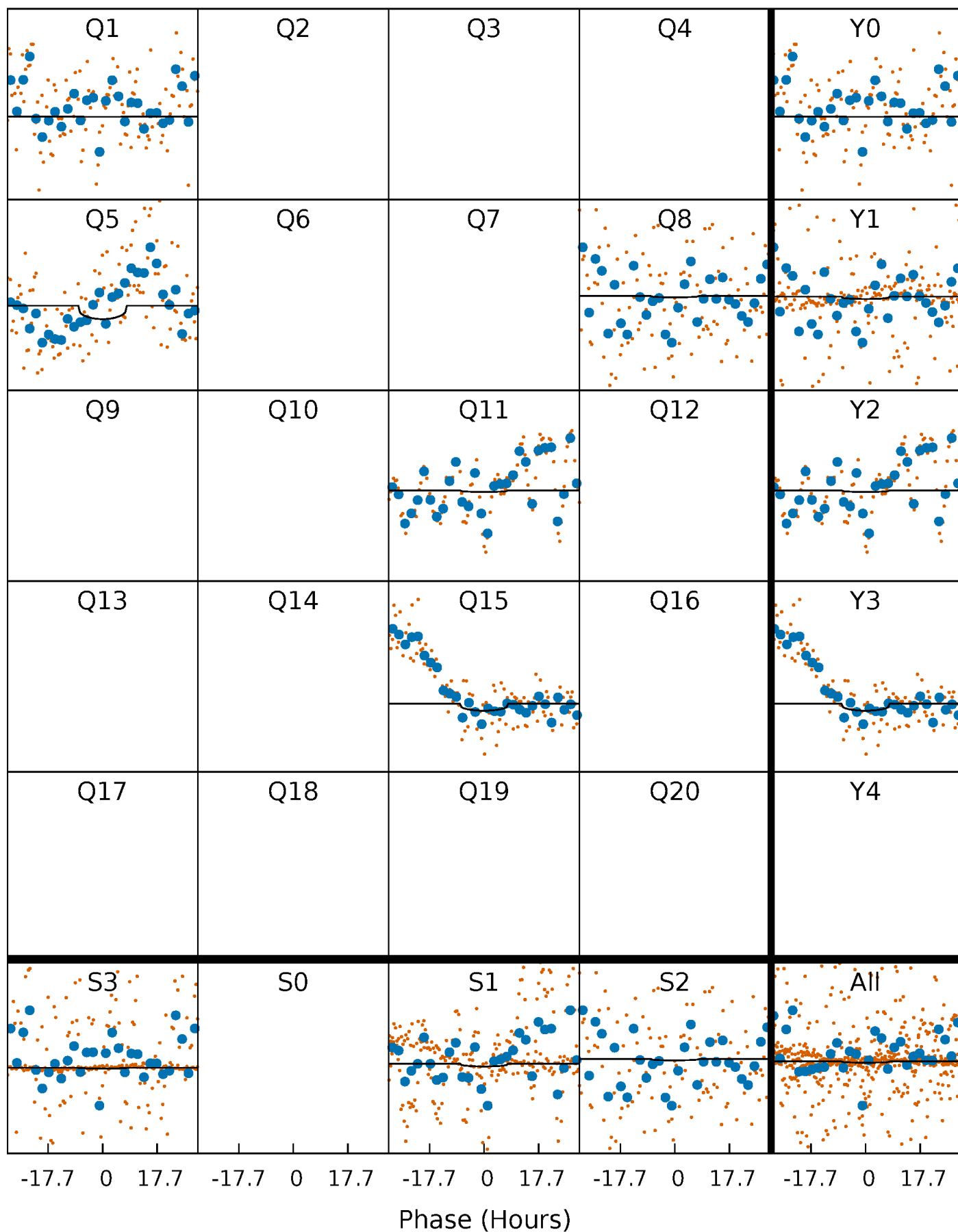
TCE 007220332-03     $P=311.099441$  Days     $T_0=151.763878$  (BKJD)





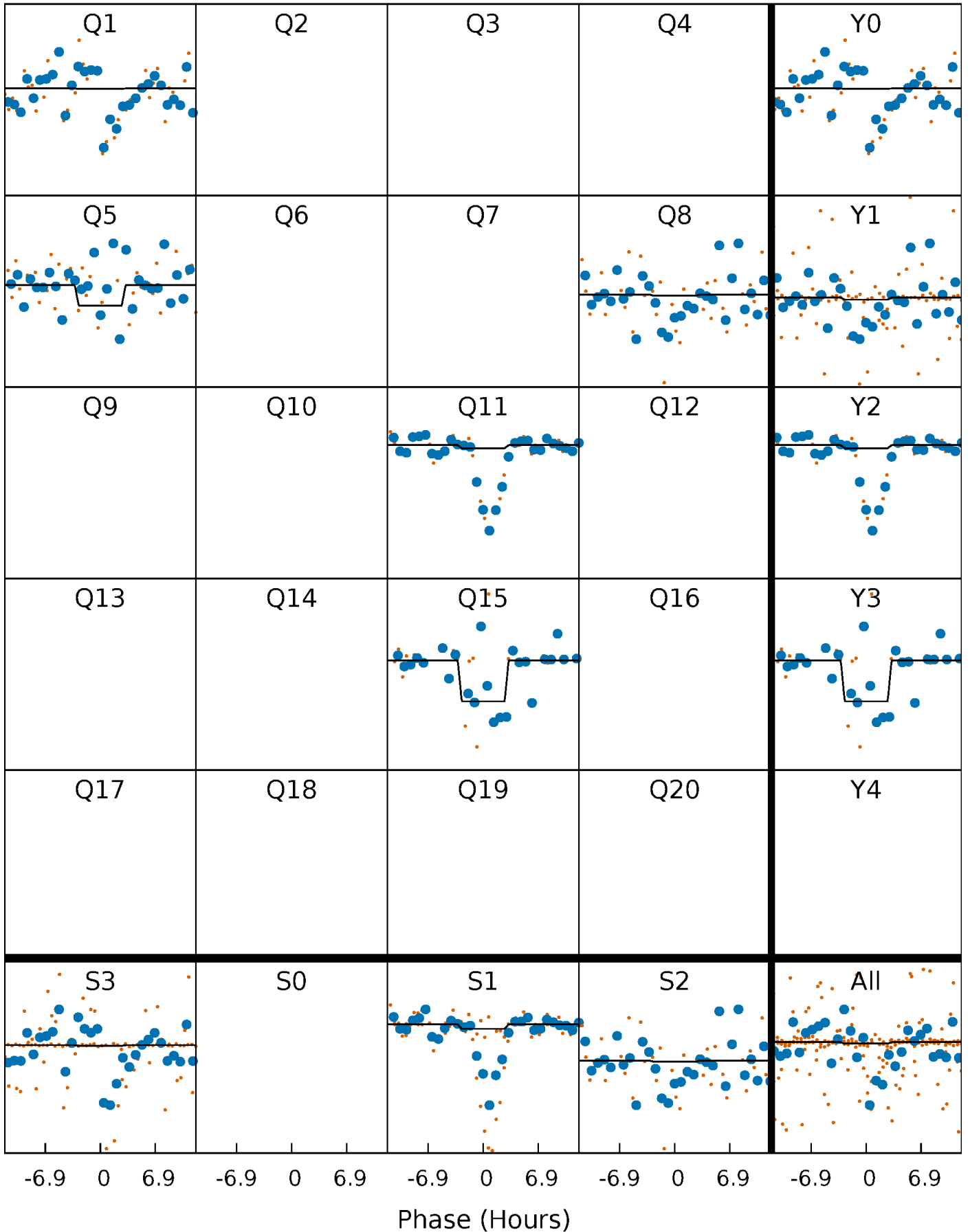
# DV Quarter-Phased Transit Curves

TCE 007220332-03 P=311.099441 Days  $T_0=151.763878$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

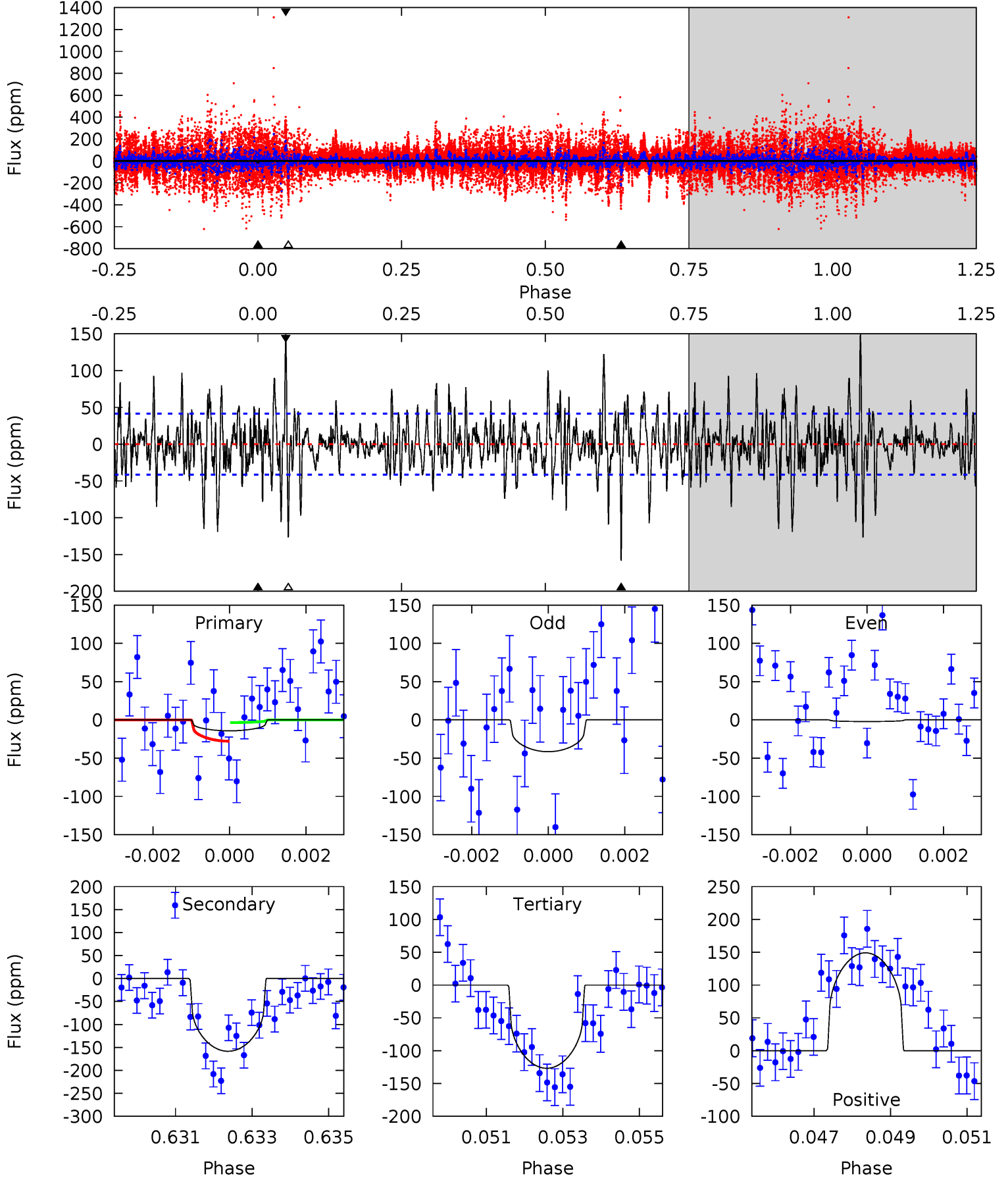
TCE 007220332-03 P=311.123174 Days  $T_0=151.668209$  (BKJD)



# DV Model-Shift Uniqueness Test

007220332-03, P = 311.099441 Days, E = 151.763878 Days

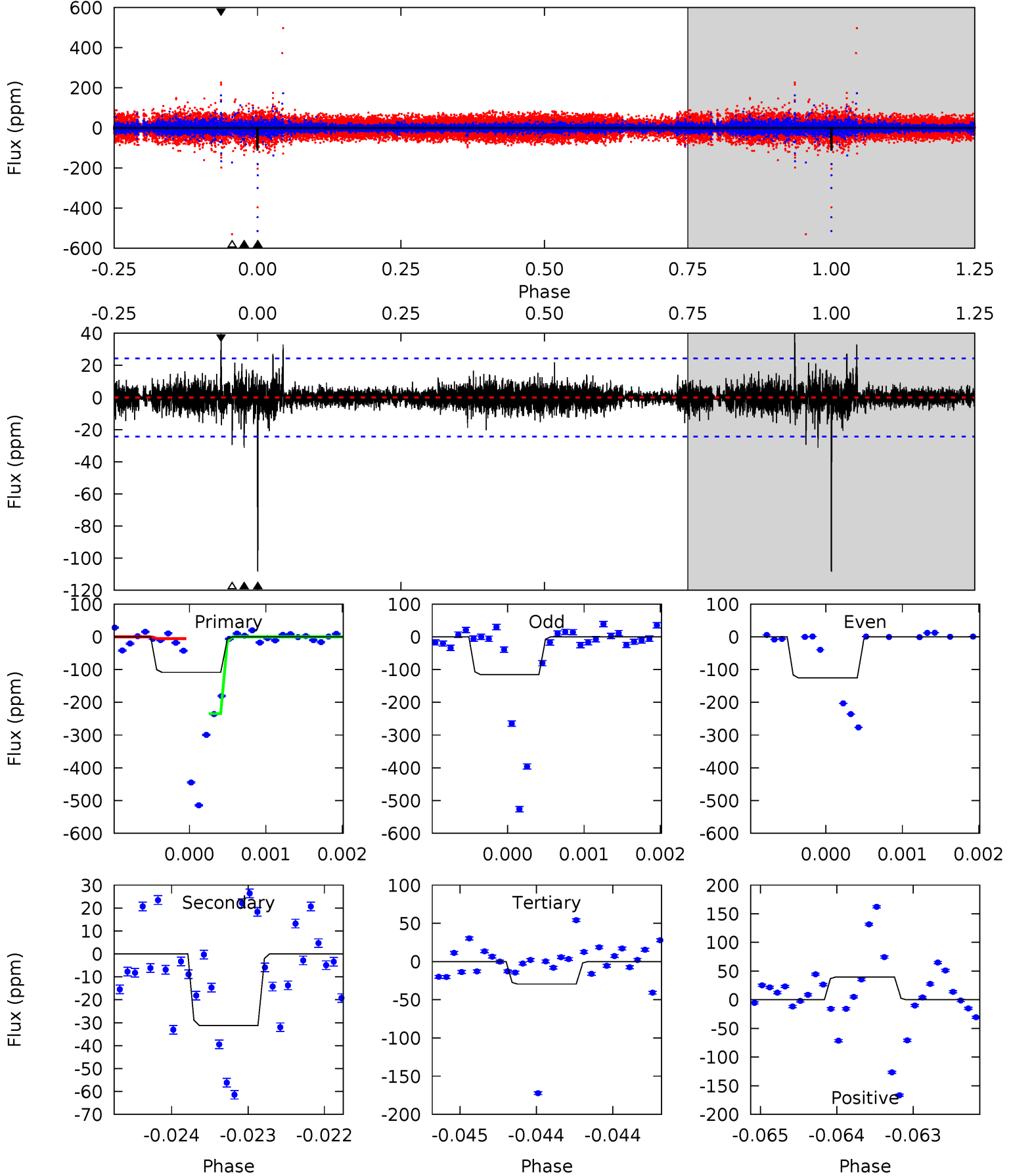
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
1.83	20.3	16.3	19.1	5.32	3.07	3.95	-14.4	-17.3	4.06	1.19	1.59	-0.82	0.48	1.55



# Alt Model-Shift Uniqueness Test

007220332-03, P = 311.123174 Days, E = 151.668209 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
24.4	7.03	6.64	8.96	5.48	3.33	0.89	17.8	15.5	0.39	-1.93	0.65	0.99	0.27	23.2



### Stellar Parameters For KIC 007220332

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$3298^{+117}_{-88}$	$0.129^{+0.208}_{-0.039}$	$-0.100^{+0.250}_{-0.150}$	$151.742^{+9.192}_{-29.414}$	$1.130^{+0.206}_{-0.137}$	$0.000^{+0.000}_{-0.000}$
	+4%/-3%	+161%/-30%	+250%/-150%	+6%/-19%	+18%/-12%	+91%/-11%
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 007220332-03 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-158 \pm 8$	$249.45^{+281.01}_{-171.29}$	$2534^{+117}_{-133}$	$2986^{+1585}_{-4894}$	$1.271^{+11.967}_{-0.999}$
Alt.	$-31 \pm 4$	$253.00^{+277.38}_{-172.33}$	$2538^{+116}_{-139}$	$-2146^{+5431}_{-358}$	$0.233^{+2.182}_{-0.178}$

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

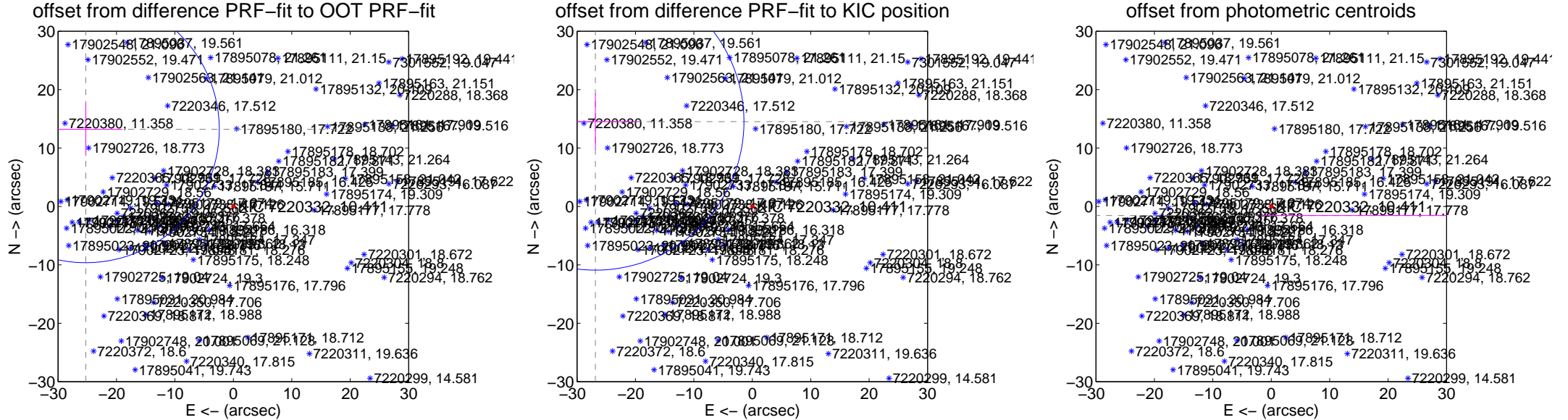
## DV Centroid Data

Supplemental centroid analysis for 007220332-03. **Kepler magnitude: 10.41**. Transit SNR 1.30

**There are 0 quarters with good PRF difference image offsets**

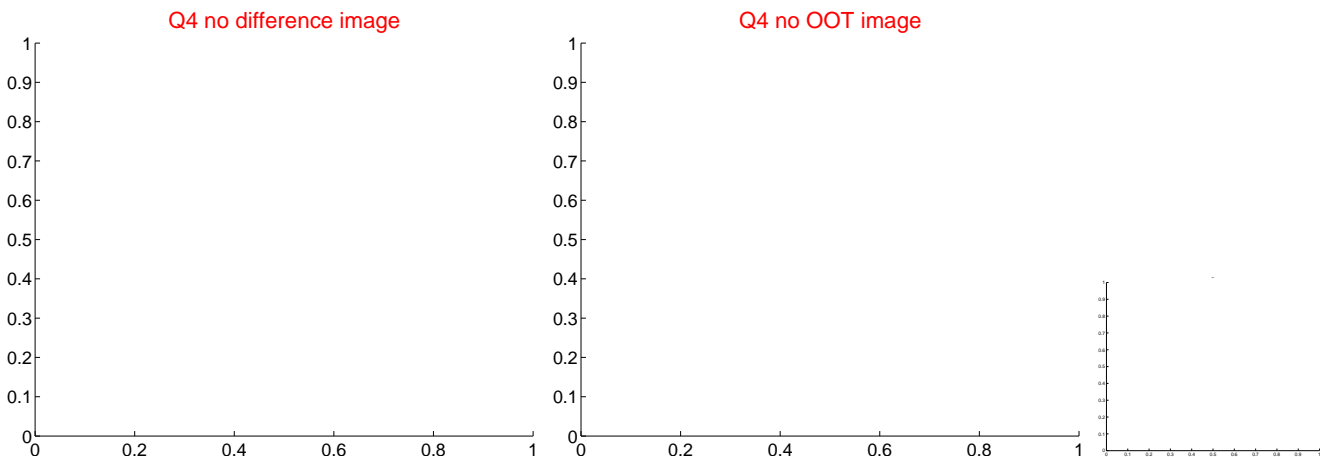
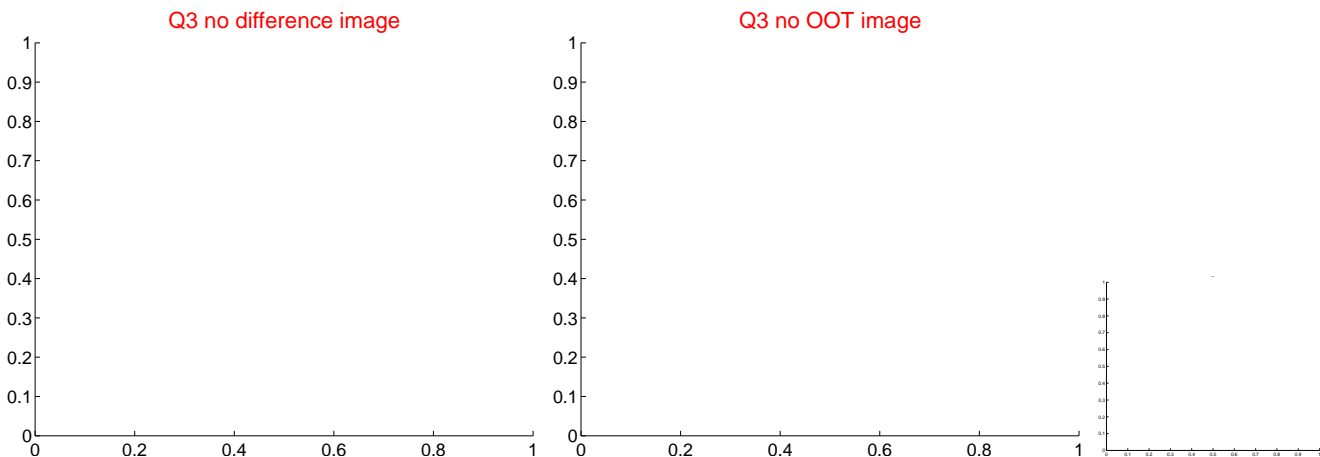
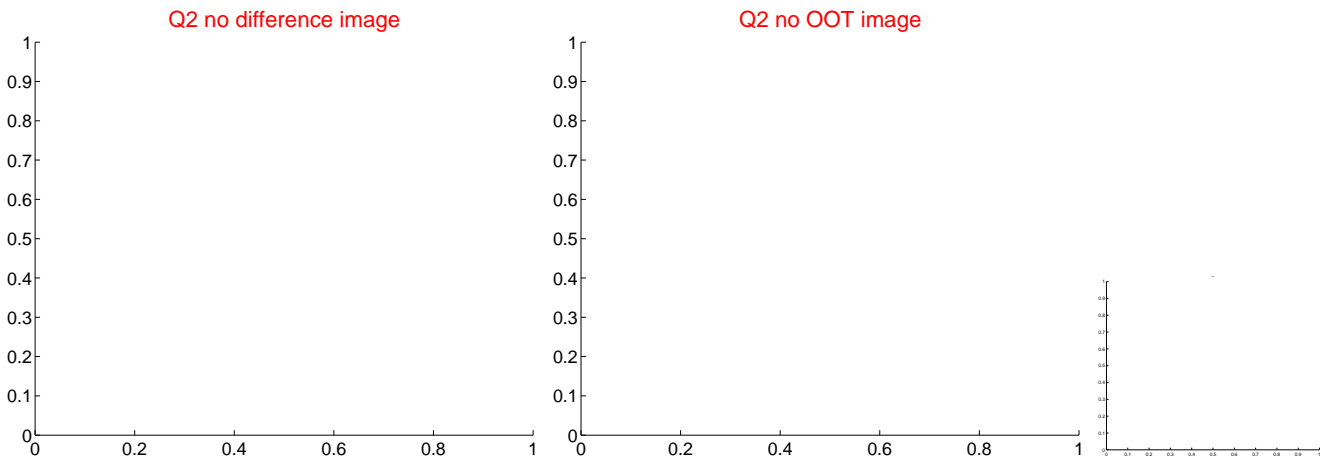
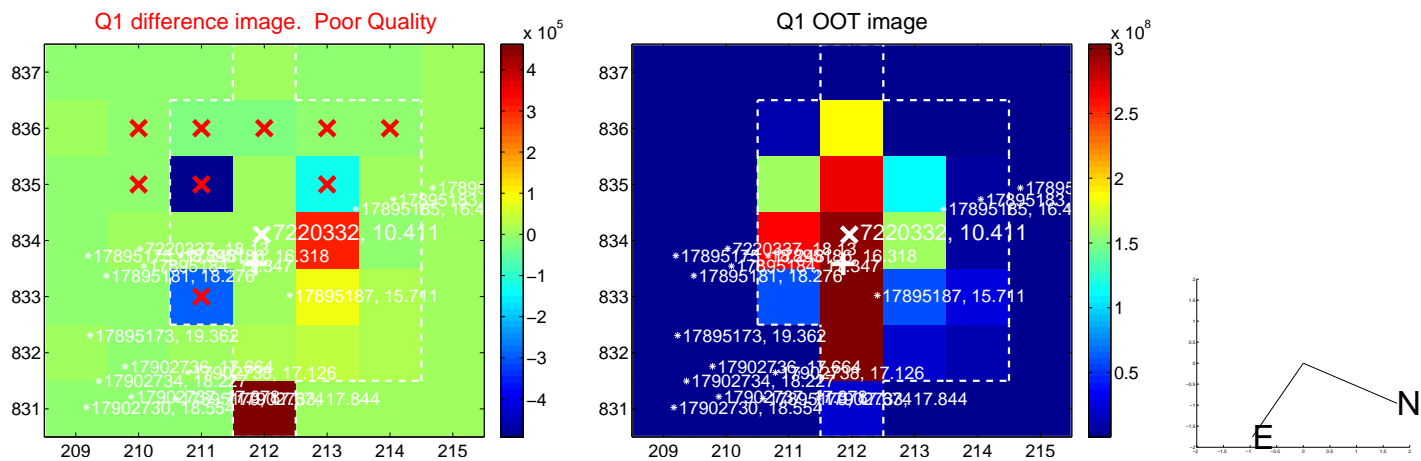
The direct PRF centroid is offset from the target star catalog position by about 0.55 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b><math>28.507 \pm 7.616</math></b>	<b>3.74</b>	$25.258 \pm 6.285$	$13.218 \pm 4.553$
PRF-fit source offset from KIC position	<b><math>30.528 \pm 8.475</math></b>	<b>3.60</b>	$26.853 \pm 7.273$	$14.521 \pm 4.802$
photometric centroid source offset	$30.70 \pm 32.45$	0.95	$-30.66 \pm 32.47$	$-1.55 \pm 21.69$

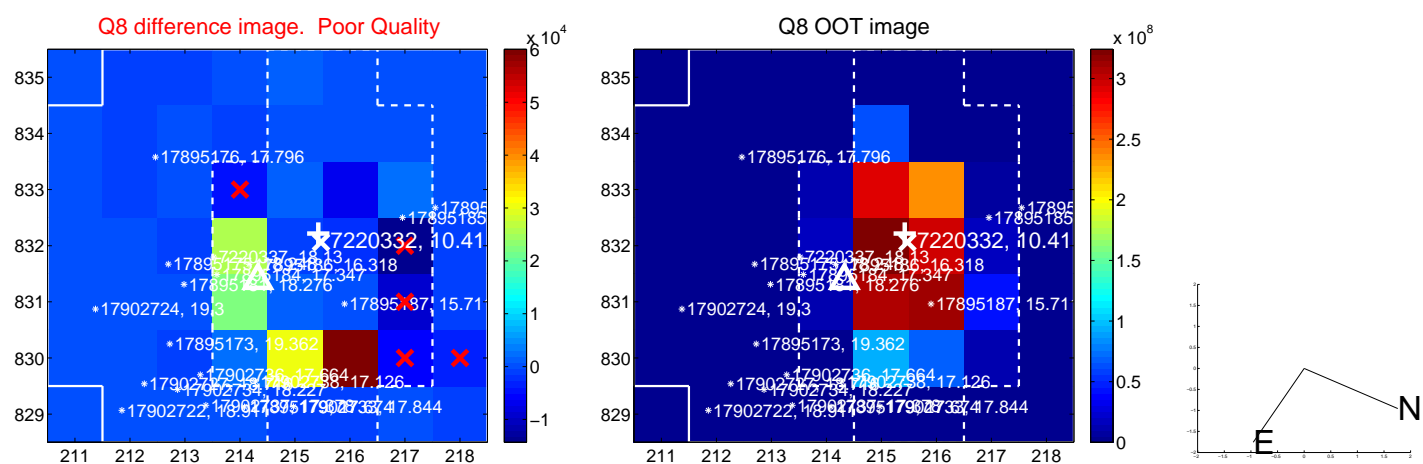
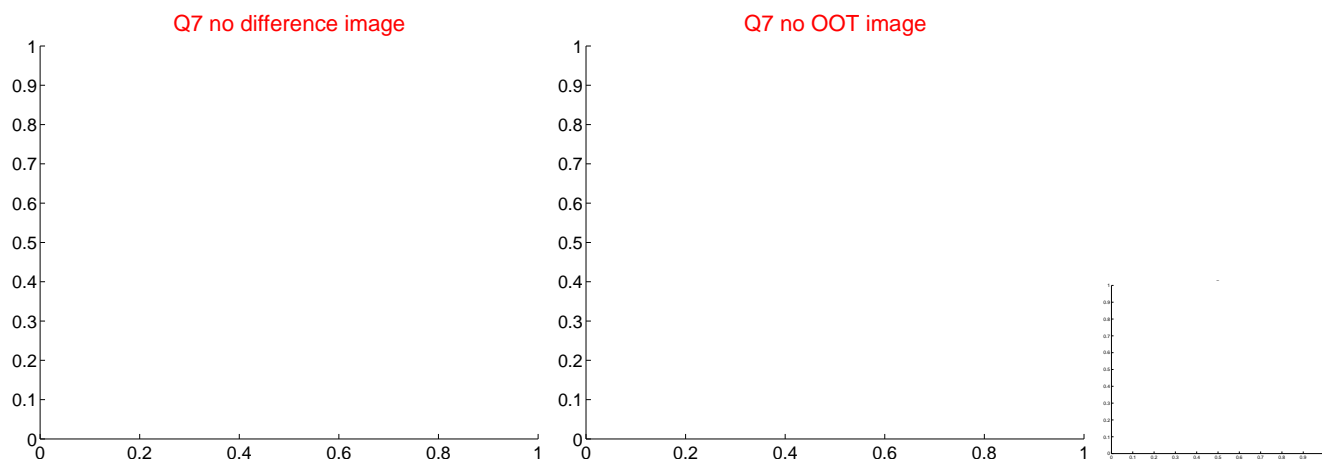
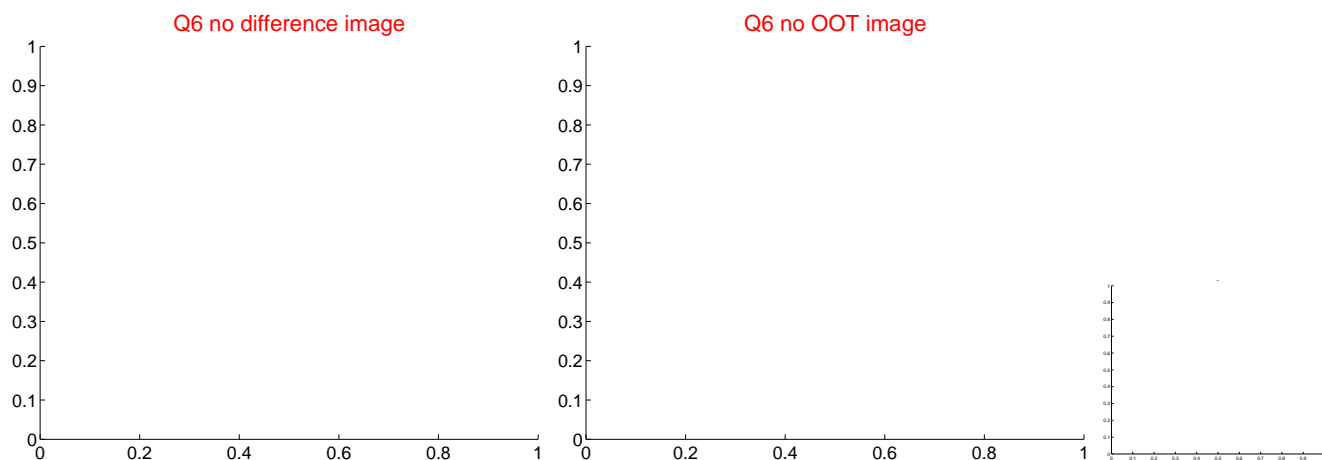
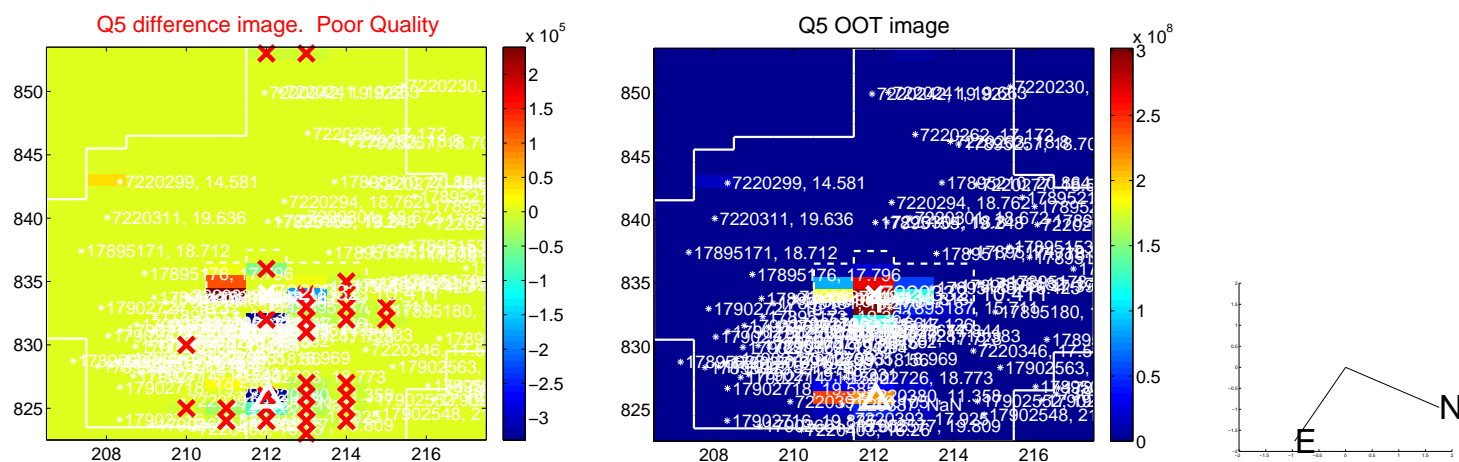


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



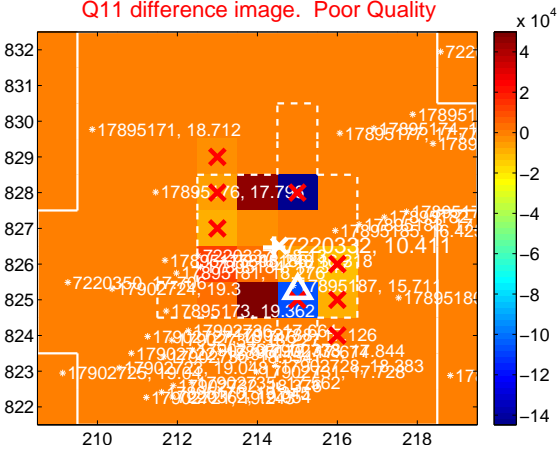
Q10 no difference image



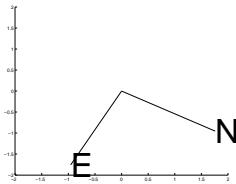
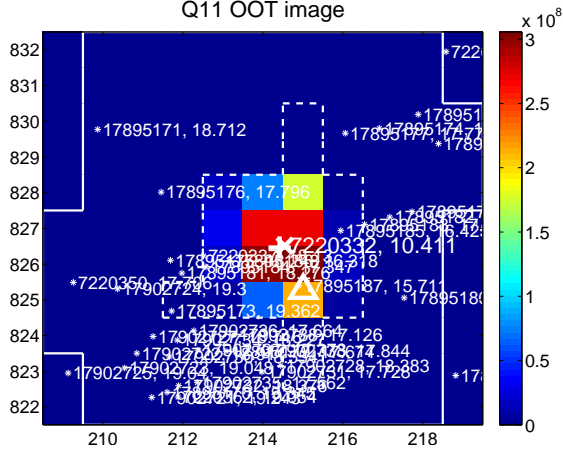
Q10 no OOT image



Q11 difference image. Poor Quality



Q11 OOT image



Q12 no difference image



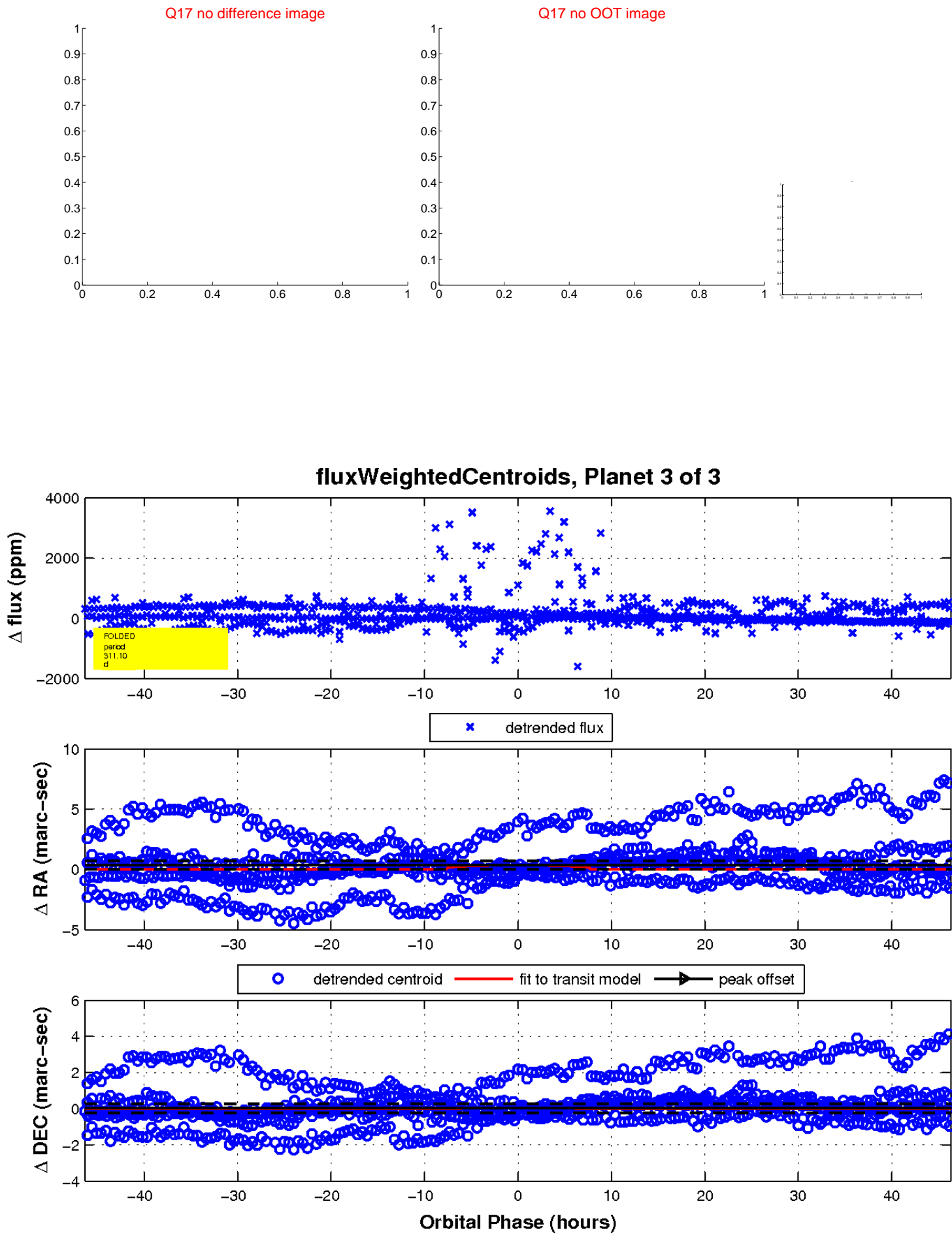
Q12 no OOT image



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.



UKIRT Image

Declination

