

# KIC 005427641

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005427641-01	OBS	No	391.965114	295.438714	687.9	3.245	13.4	3.9	0.85	5351	2.38	0.57
005427641-02	OBS	No	310.331144	172.789966	1710.3	4.059	11.6	7.4	0.85	5351	6.87	0.78

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005427641-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
005427641-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—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.

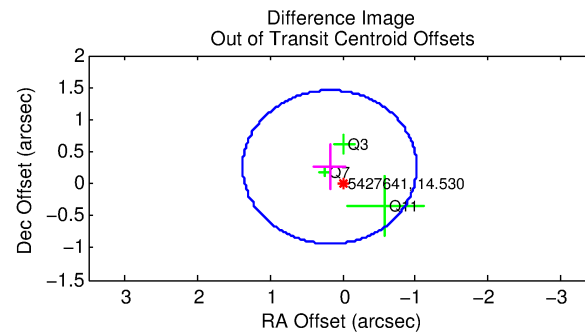
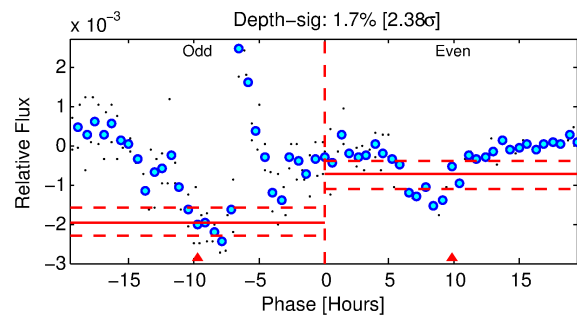
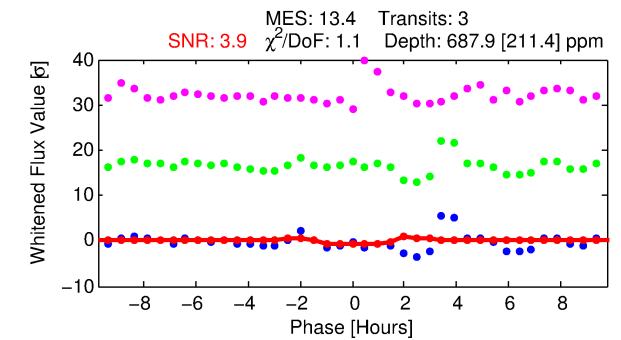
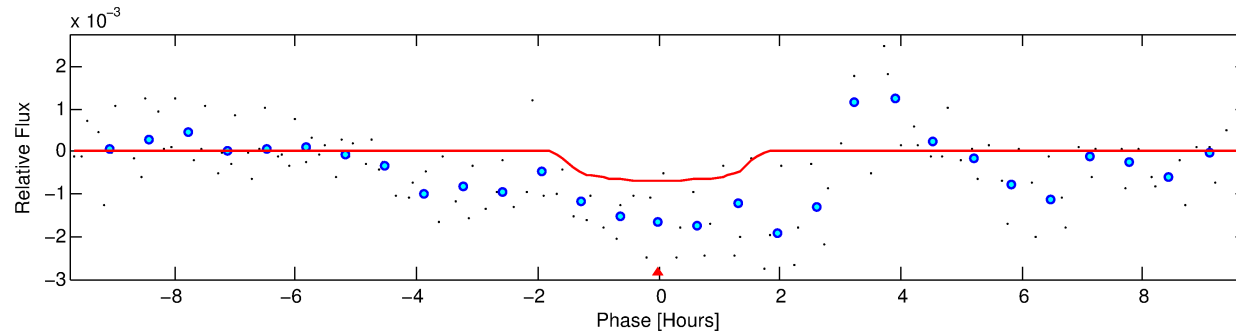
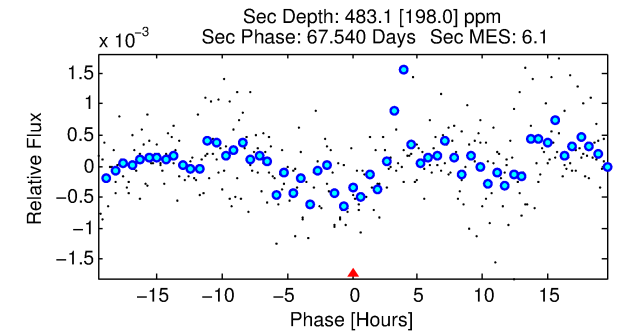
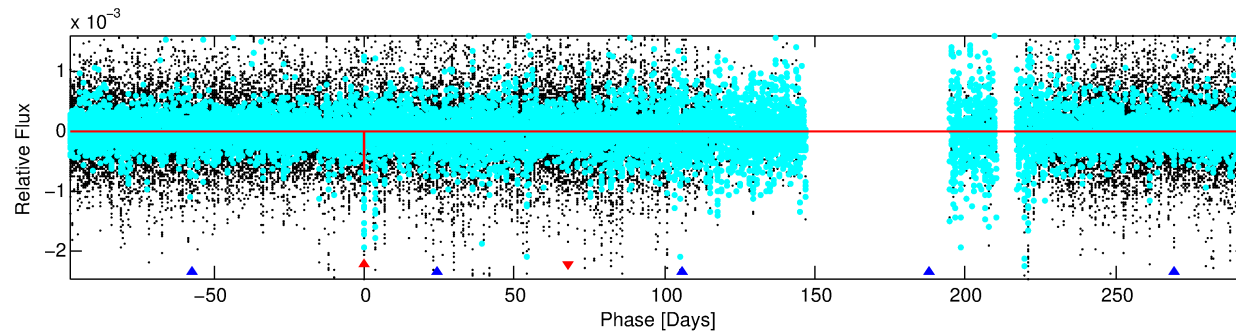
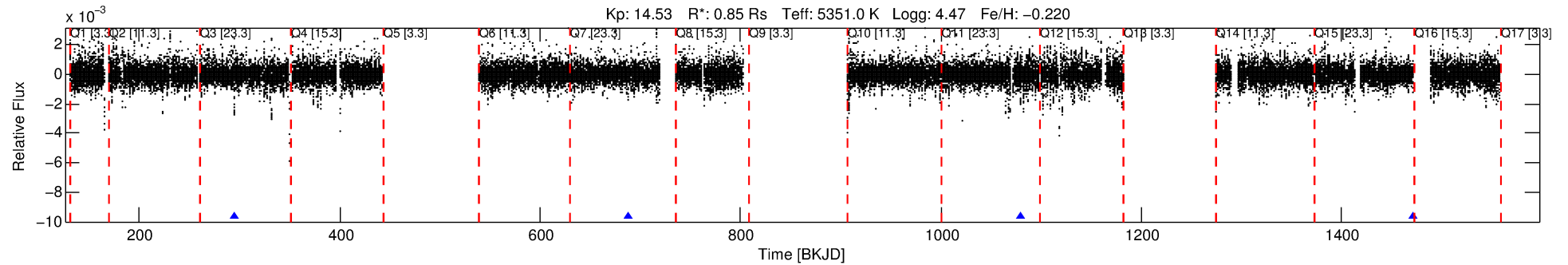
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 005427641-01

No Significant Match Found

# DV One-Page Summary

KIC: 5427641 Candidate: 1 of 2 Period: 391.965 d



## DV Fit Results:

Period = 391.96511 [0.00929] d  
Epoch = 295.4387 [0.0125] BKJD  
Rp/R\* = 0.0257 [0.0602]  
a/R\* = 692.28 [6372.86]  
b = 0.70 [6.84]  
Seff = 0.57 [0.17]  
Teq = 222 [17] K  
Rp = 2.38 [5.60] Re  
a = 0.9612 [0.1671] AU  
Ag = 43343.74 [204608.63] [0.21 $\sigma$ ]  
Teffp = 4952 [5836] K [0.81 $\sigma$ ]

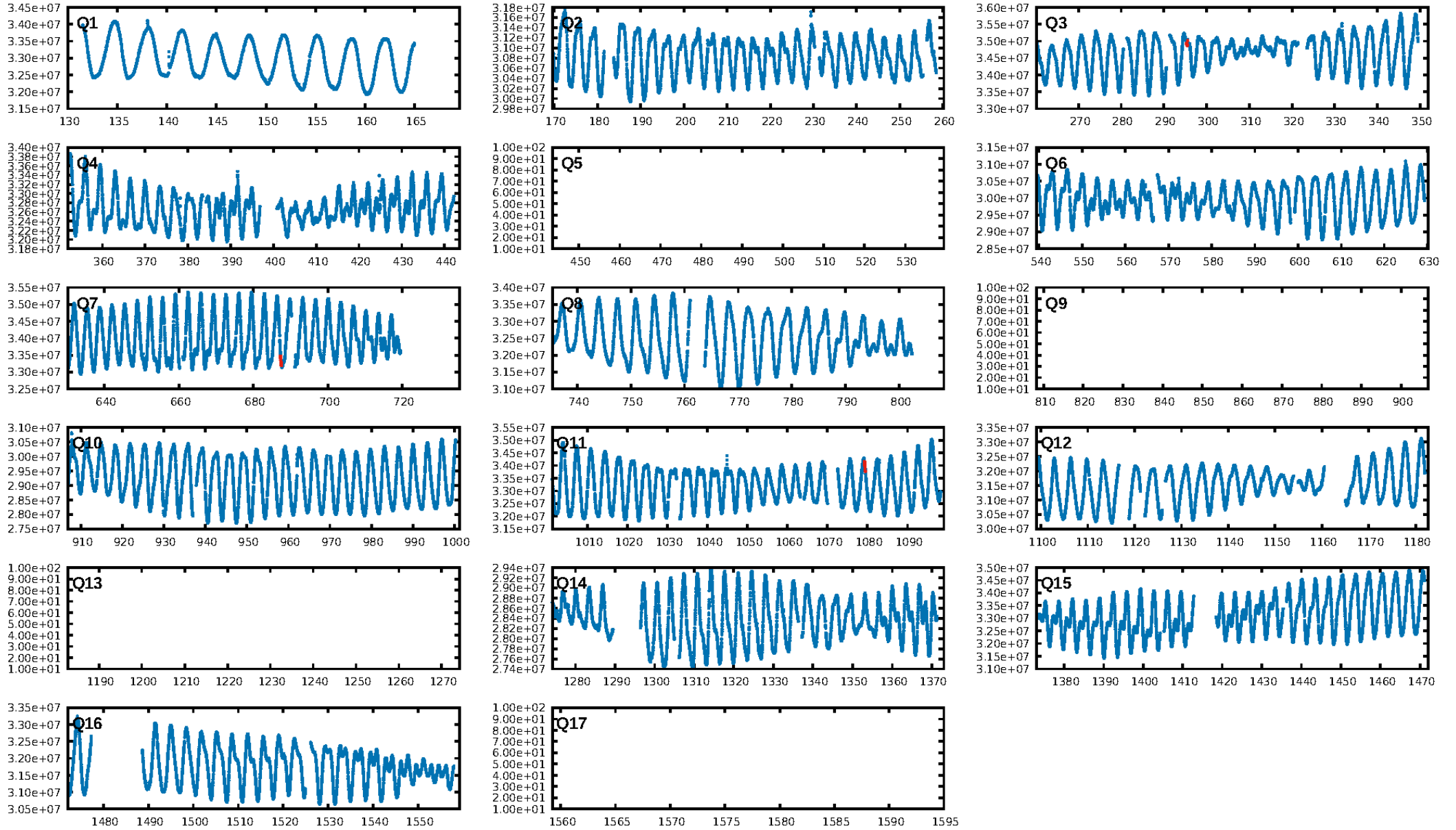
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [377.00 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 21.1%  
ModelChiSquareGof-sig: 84.0%  
**Bootstrap-pfa: 1.83e-12**  
RollingBand-fgt: 1.00 [3/3]  
**GhostDiagnostic-chr: 3.412**  
Centroid-sig: 24.5%  
Centroid-so: 1.104 arcsec [0.60 $\sigma$ ]  
OotOffset-rm: 0.313 arcsec [0.78 $\sigma$ ]  
OotOffset-st: 0/3/0/0 [3]  
KicOffset-rm: 0.392 arcsec [1.71 $\sigma$ ]  
KicOffset-st: 0/3/0/0 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 1.00 [3/3]

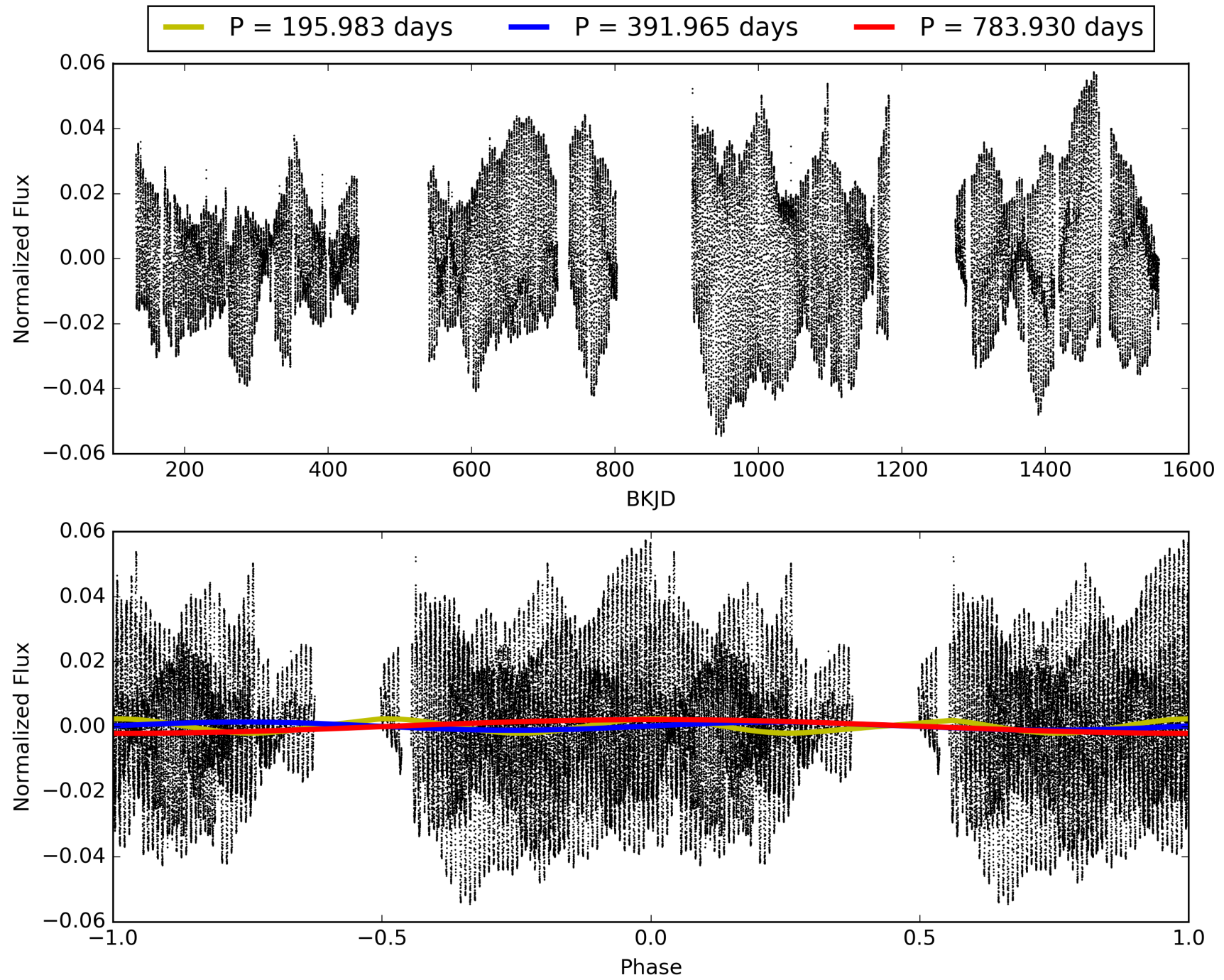
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 08:36:44 Z

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

# TCE 005427641-01, PDC Light Curves

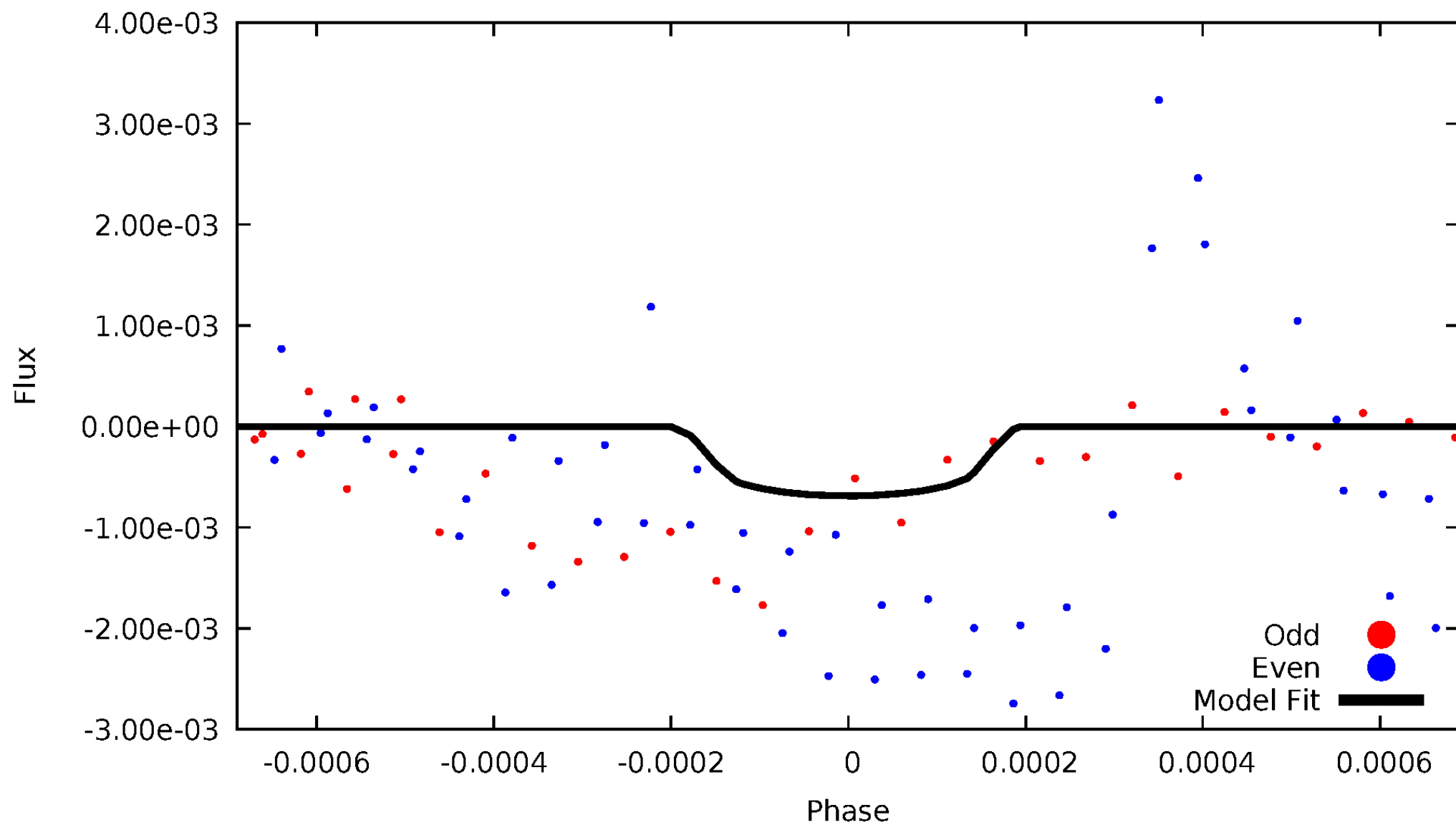


TCE 005427641-01



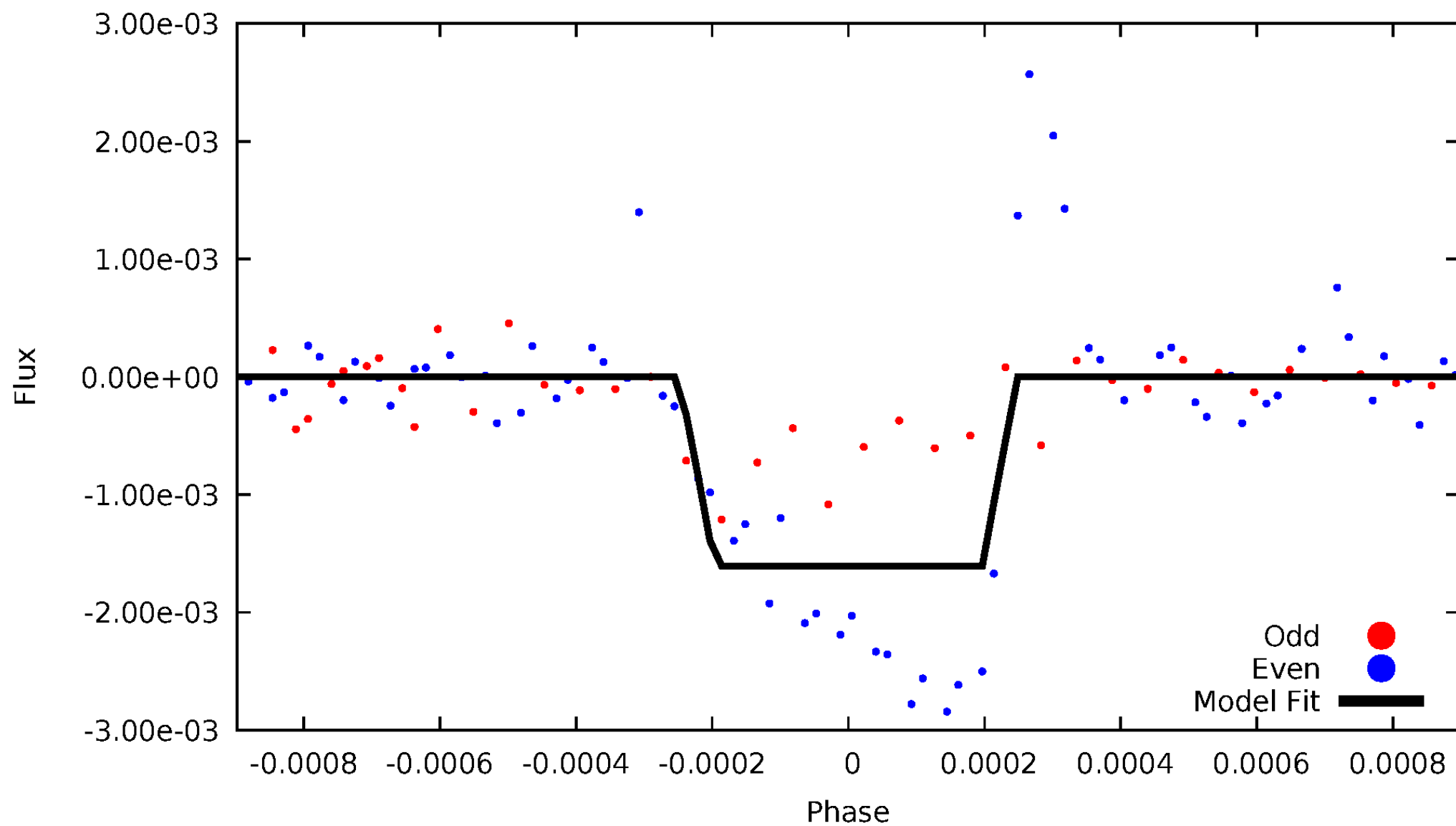
# DV Odd/Even

TCE 005427641-01



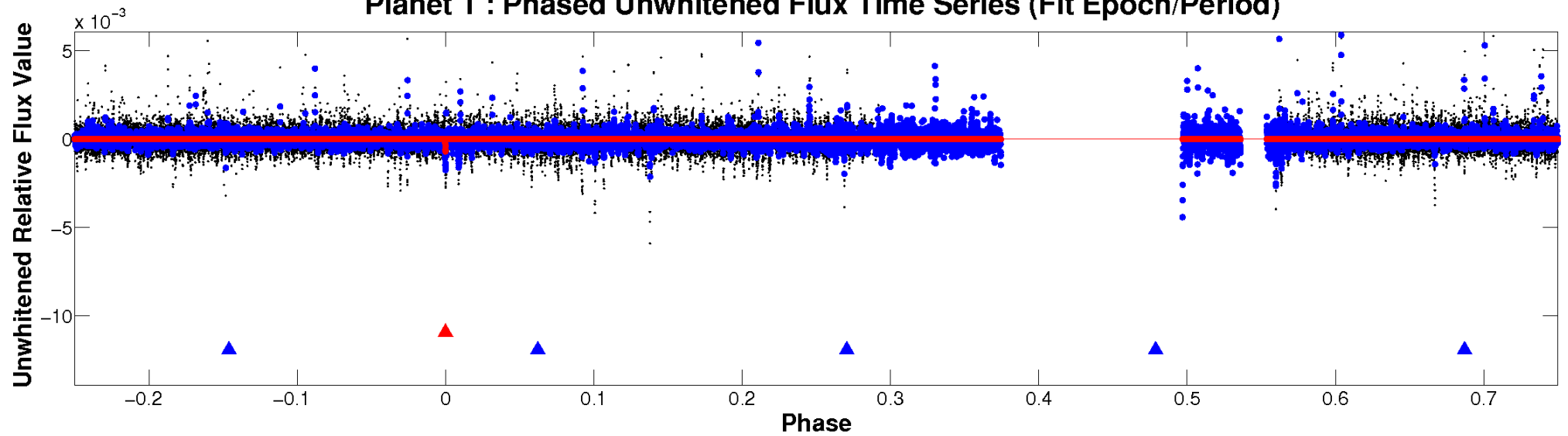
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TCE 005427641-01

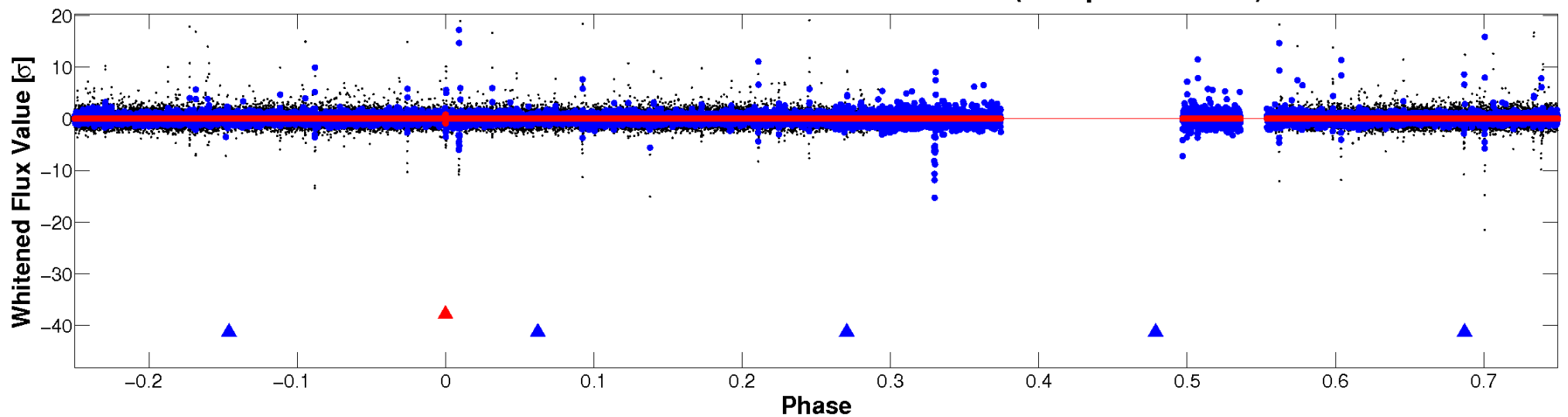


# Non-Whitened Vs. Whitened Light Curve

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

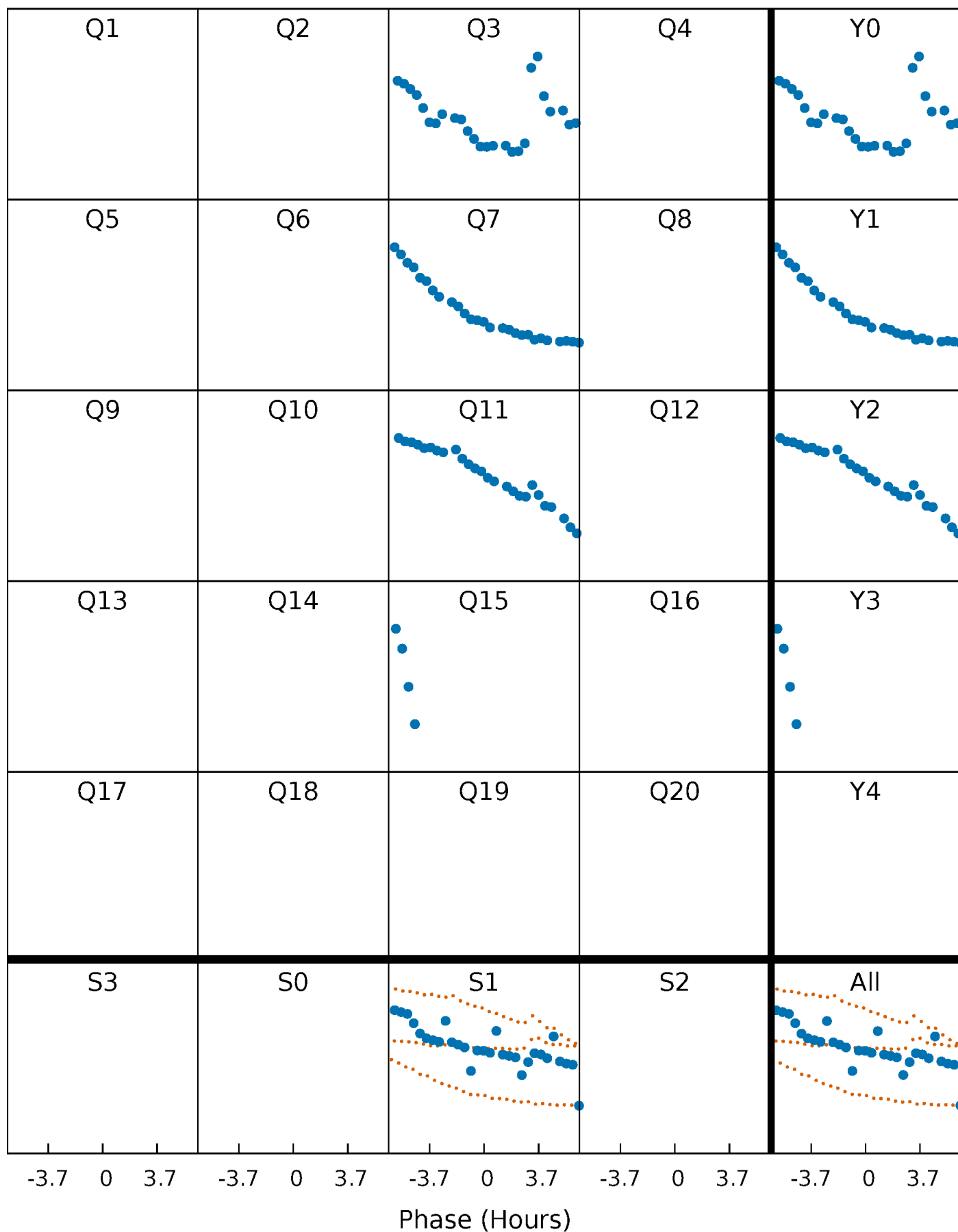


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

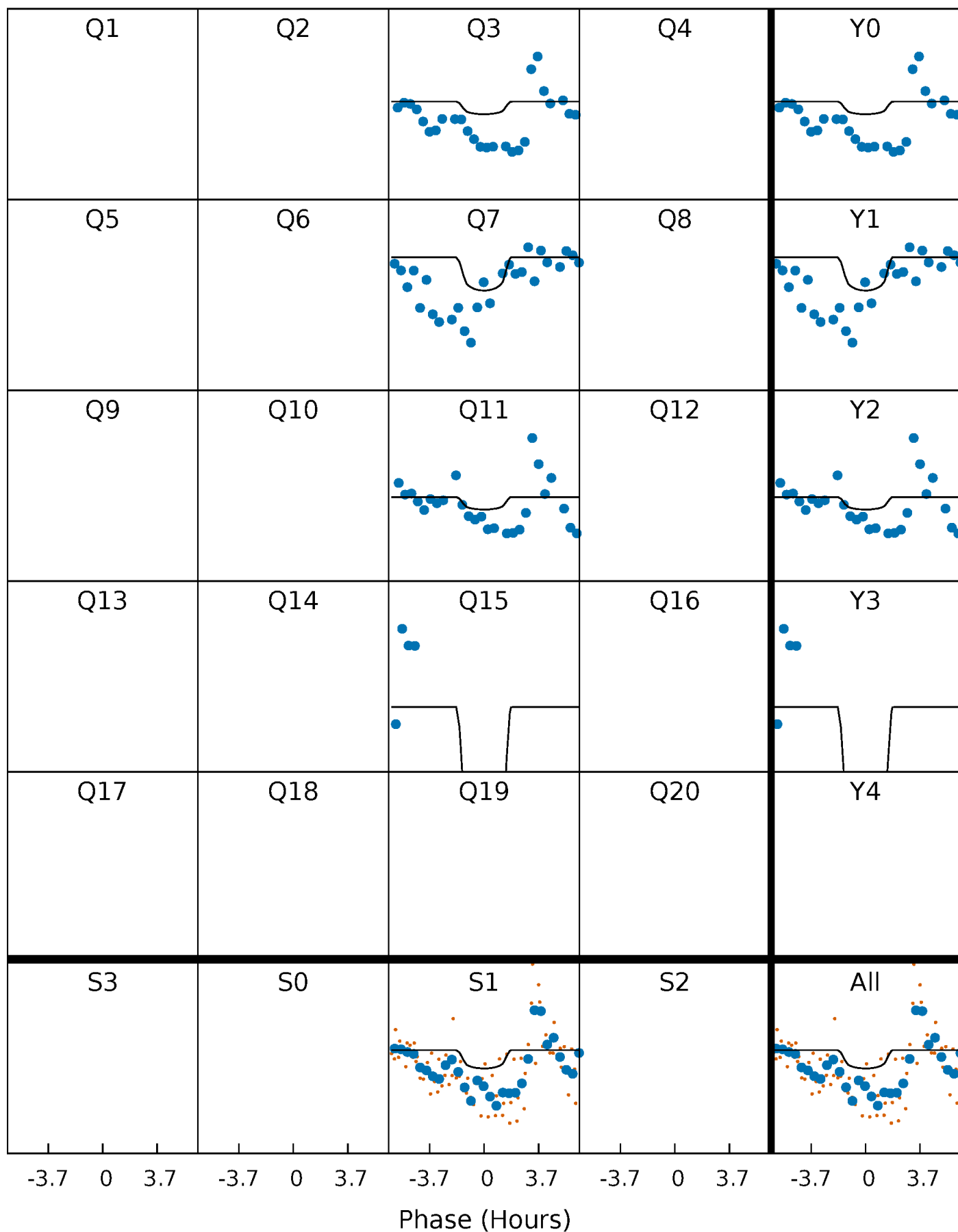
TCE 005427641-01     $P=391.965115$  Days     $T_0=295.438714$  (BKJD)





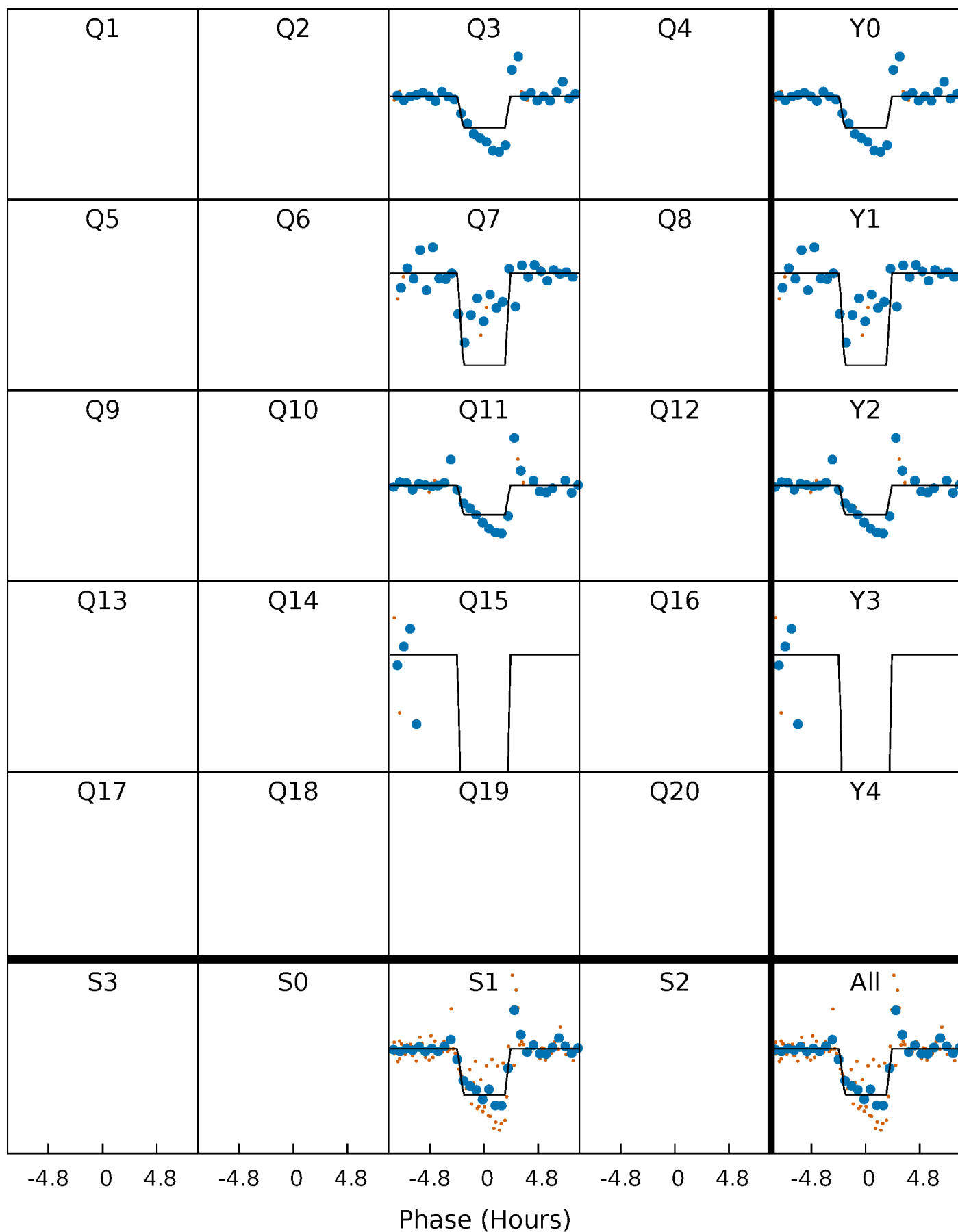
# DV Quarter-Phased Transit Curves

TCE 005427641-01 P=391.965115 Days  $T_0=295.438714$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

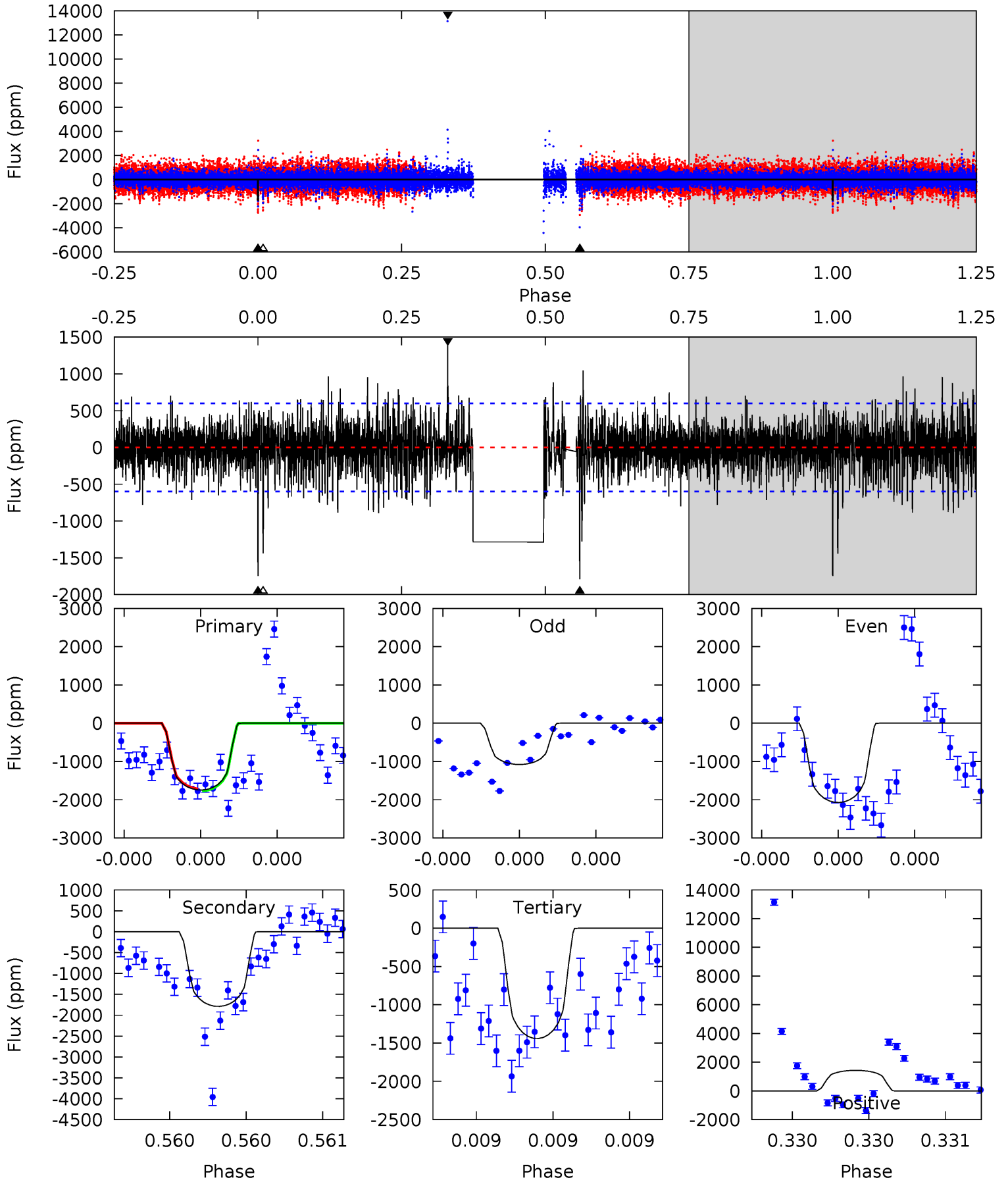
TCE 005427641-01 P=391.963359 Days  $T_0=295.475447$  (BKJD)



# DV Model-Shift Uniqueness Test

005427641-01, P = 391.965115 Days, E = 295.438714 Days

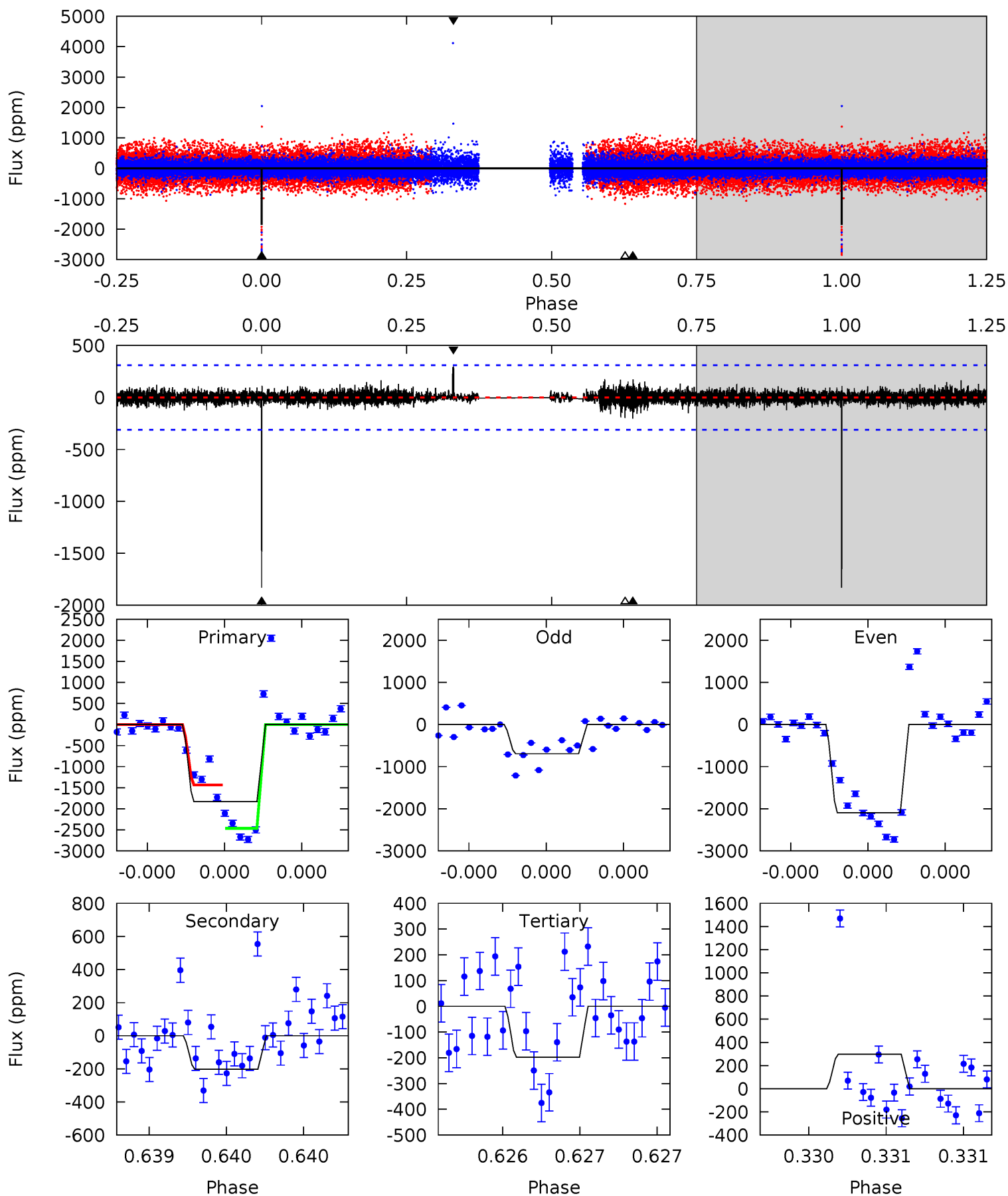
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
16.4	16.8	13.5	13.4	5.61	3.54	2.18	2.86	2.95	3.26	3.35	4.18	1.08	0.44	0.24



# Alt Model-Shift Uniqueness Test

005427641-01, P = 391.963359 Days, E = 295.475447 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
32.9	3.64	3.56	5.34	5.58	3.50	0.62	29.4	27.6	0.09	-1.70	13.3	0.83	0.14	9.06



### Stellar Parameters For KIC 005427641

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5351^{+159}_{-159}$	$4.466^{+0.121}_{-0.162}$	$-0.220^{+0.350}_{-0.300}$	$0.850^{+0.155}_{-0.113}$	$0.770^{+0.113}_{-0.061}$	$1.769^{+0.900}_{-0.697}$
	+3%/-3%	+3%/-4%	+159%/-136%	+18%/-13%	+15%/-8%	+51%/-39%
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 005427641-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-1788 \pm 107$	$4.92^{+4.73}_{-3.31}$	$312^{+19}_{-16}$	$4891^{+3937}_{-1067}$	$37791^{+316600}_{-27792}$
Alt.	$-203 \pm 56$	$5.32^{+4.83}_{-3.53}$	$312^{+20}_{-17}$	$3219^{+1490}_{-538}$	$3481^{+29038}_{-2568}$

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

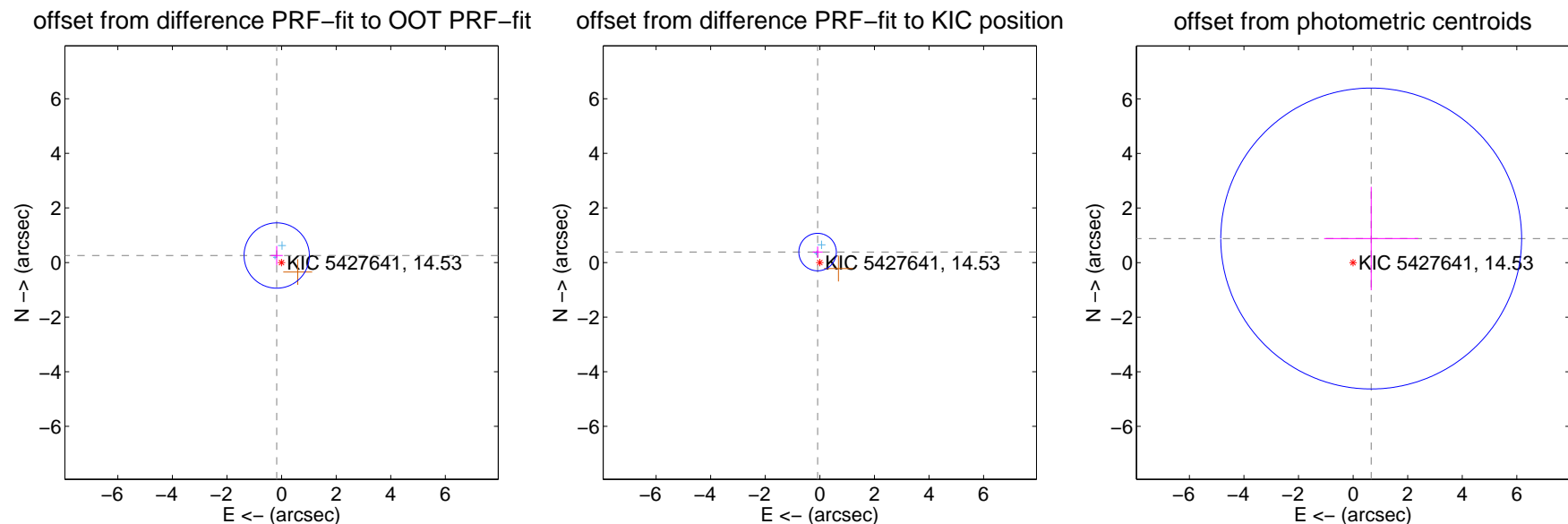
## DV Centroid Data

Supplemental centroid analysis for 005427641-01. Kepler magnitude: 14.53. Transit SNR 3.87

There are 2 quarters with good PRF difference image offsets

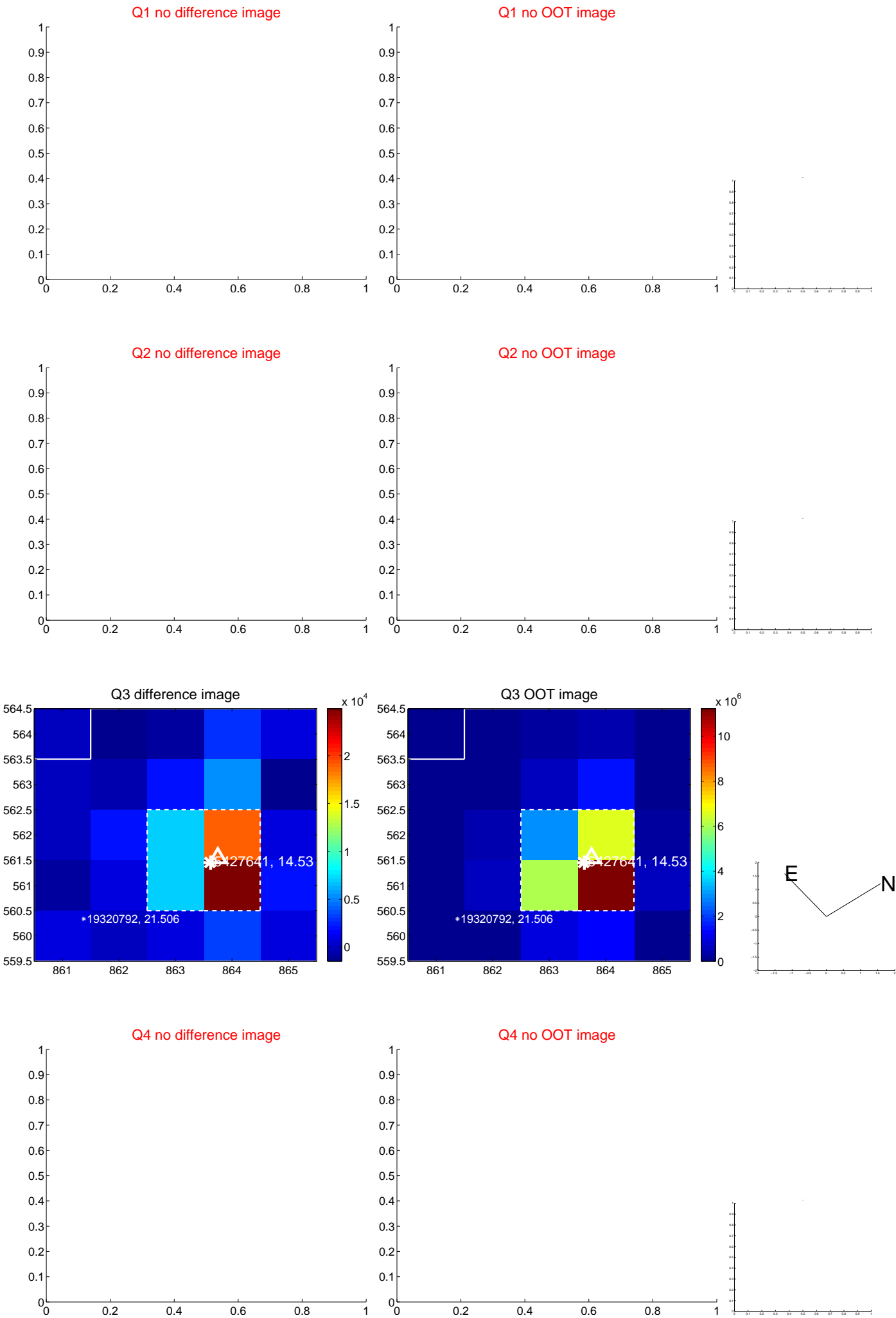
The direct PRF centroid is offset from the target star catalog position by about 0.16 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.313 \pm 0.399$	0.78	$0.178 \pm 0.220$	$0.257 \pm 0.348$
PRF-fit source offset from KIC position	$0.392 \pm 0.229$	1.71	$0.083 \pm 0.180$	$0.383 \pm 0.205$
photometric centroid source offset	$1.10 \pm 1.84$	0.60	$-0.66 \pm 1.73$	$0.88 \pm 1.90$



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

white ×: 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.

Q5 no difference image



Q5 no OOT image



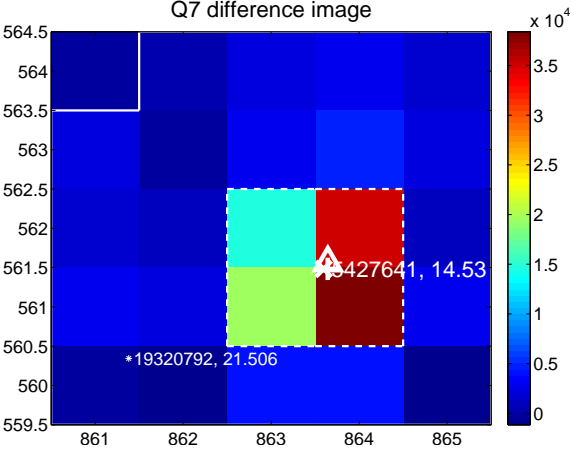
Q6 no difference image



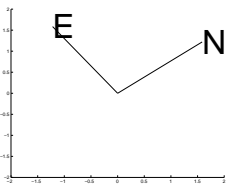
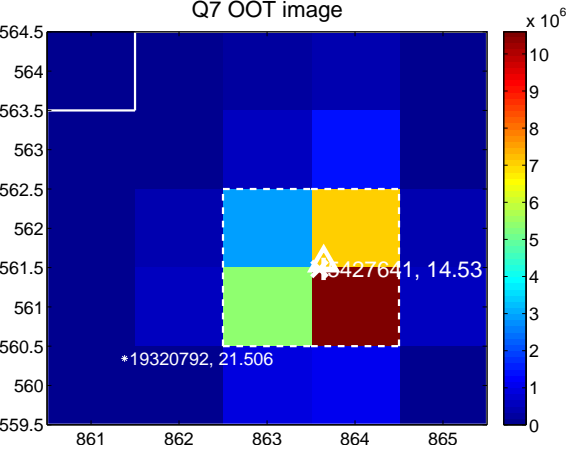
Q6 no OOT image



Q7 difference image



Q7 OOT image



Q8 no difference image

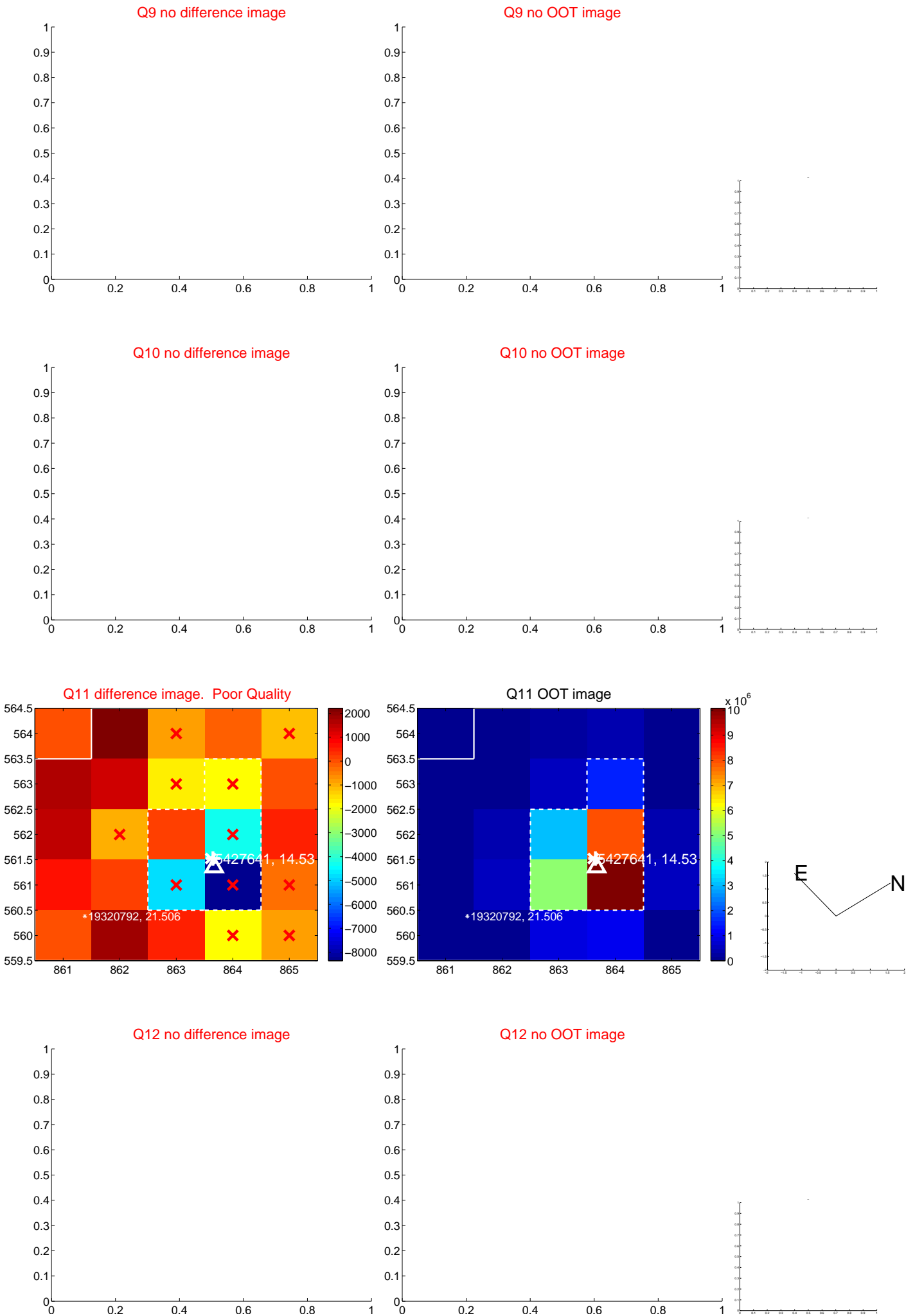


Q8 no OOT image





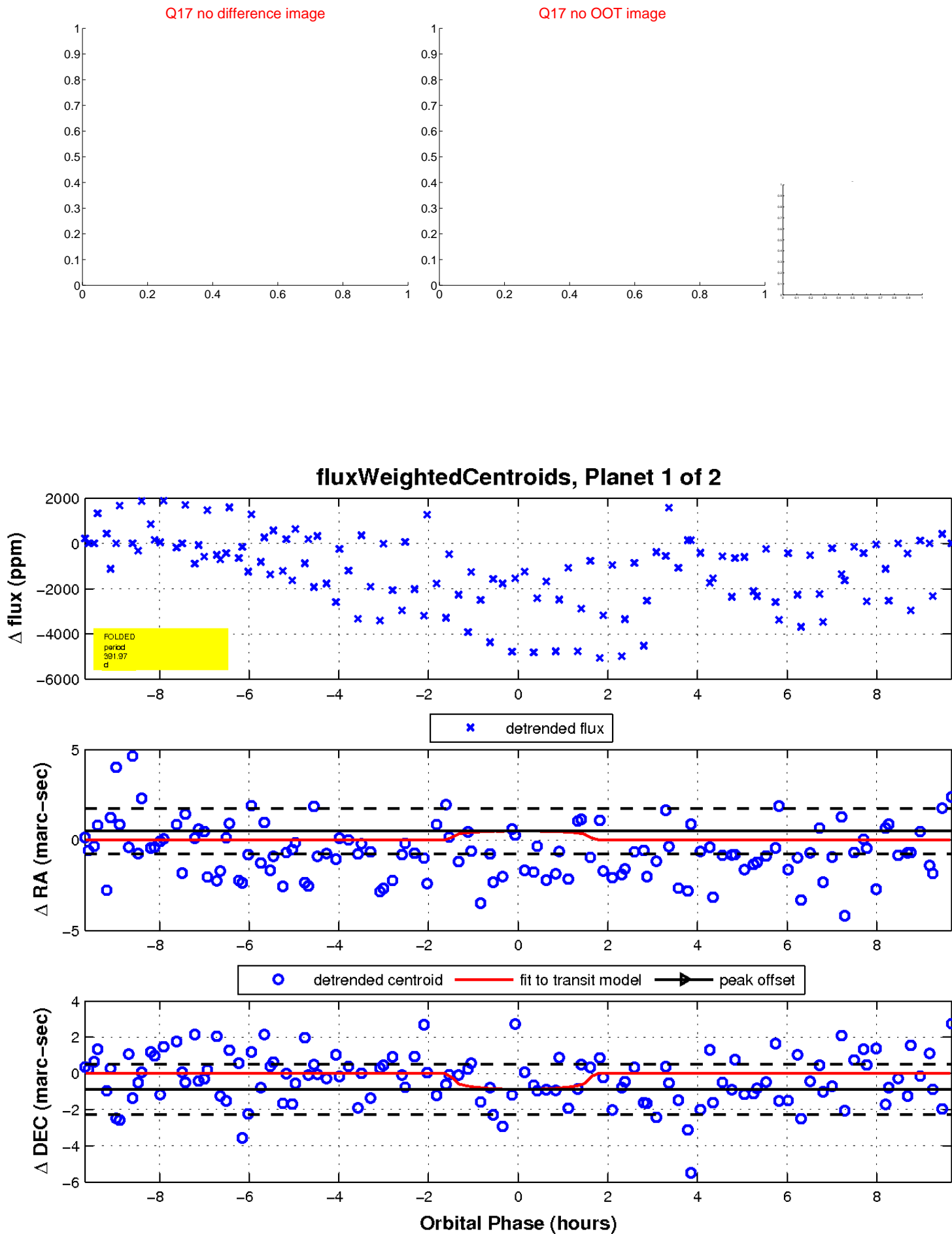
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

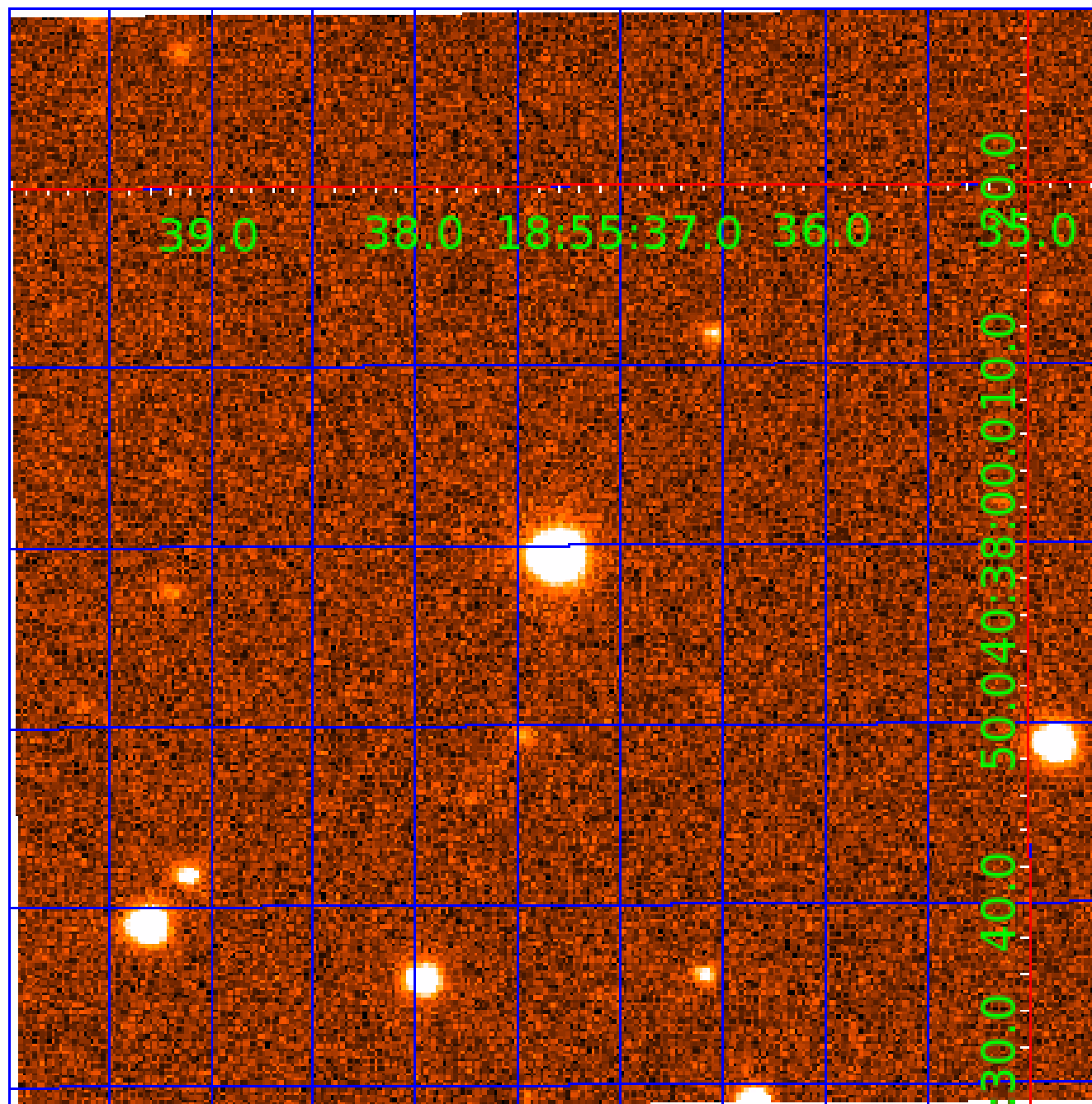


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 005427641

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005427641-01	OBS	No	391.965114	295.438714	687.9	3.245	13.4	3.9	0.85	5351	2.38	0.57
005427641-02	OBS	No	310.331144	172.789966	1710.3	4.059	11.6	7.4	0.85	5351	6.87	0.78

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005427641-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
005427641-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—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.

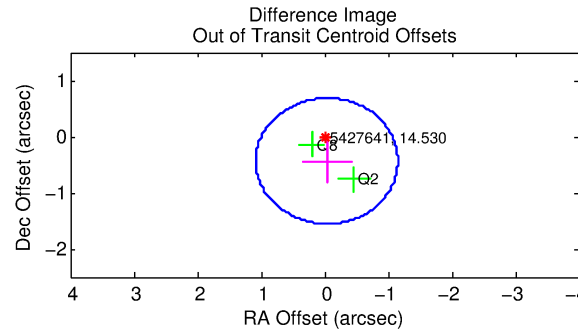
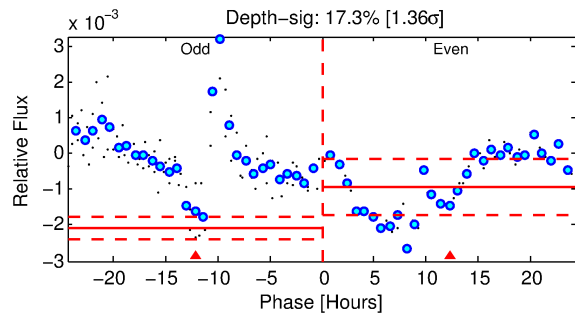
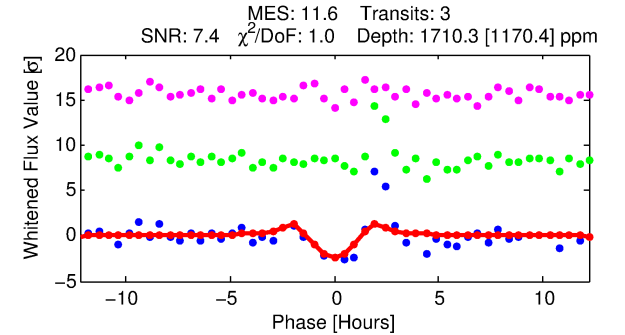
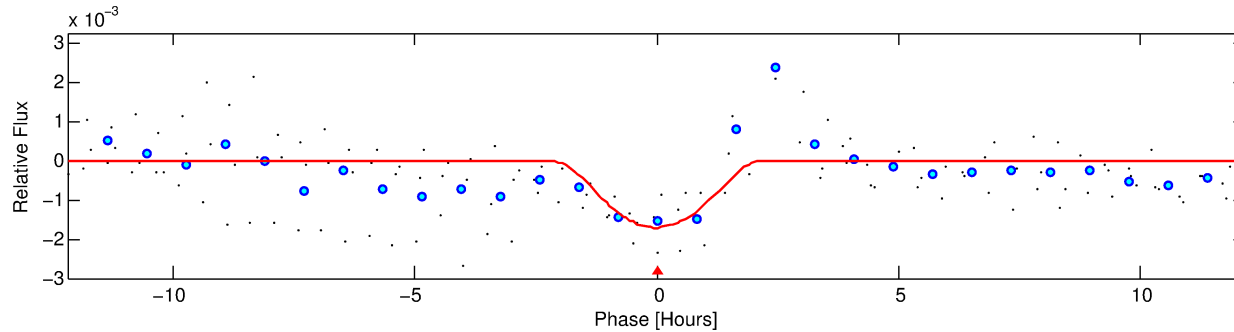
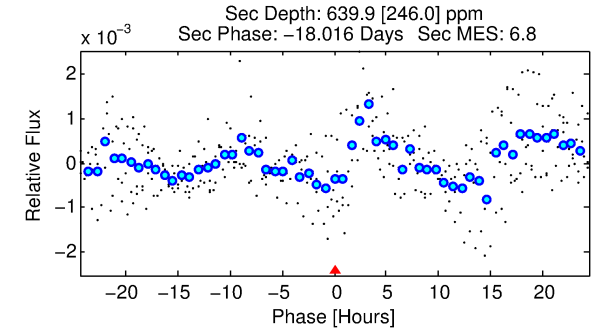
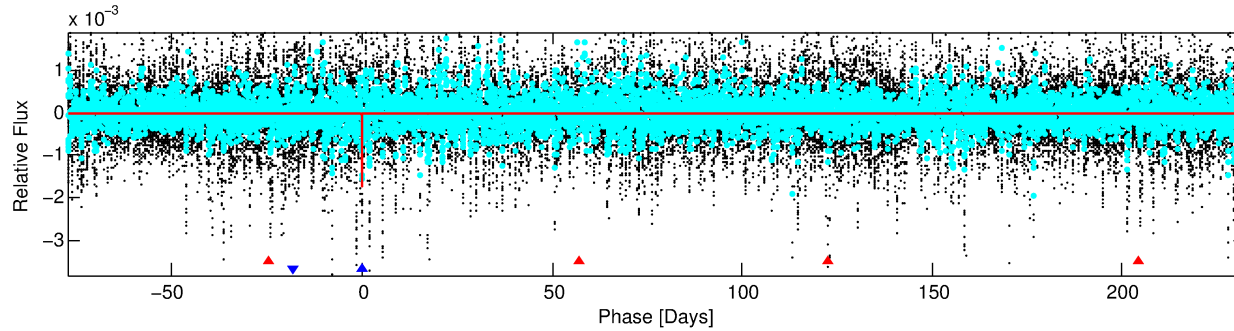
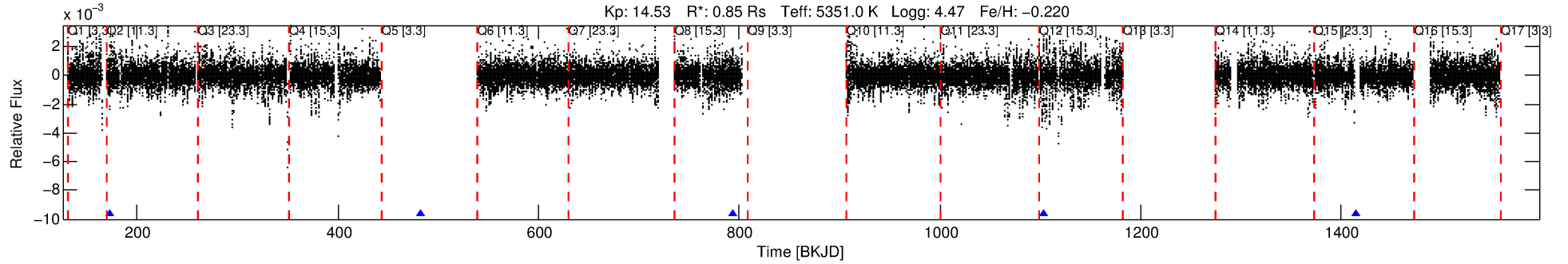
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 005427641-02

No Significant Match Found

# DV One-Page Summary

KIC: 5427641 Candidate: 2 of 2 Period: 310.331 d



## DV Fit Results:

Period = 310.33114 [0.00441] d  
Epoch = 172.7900 [0.0088] BKJD  
Rp/R\* = 0.0741 [0.3116]  
a/R\* = 228.93 [213.01]  
b = 1.00 [0.41]  
Seff = 0.78 [0.24]  
Teq = 240 [18] K  
Rp = 6.87 [28.93] Re  
a = 0.8226 [0.1430] AU  
Ag = 5049.22 [42557.61] [0.12σ]  
Teffp = 3127 [6587] K [0.44σ]

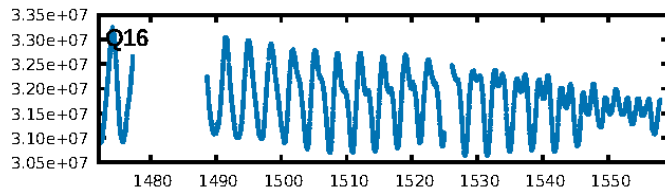
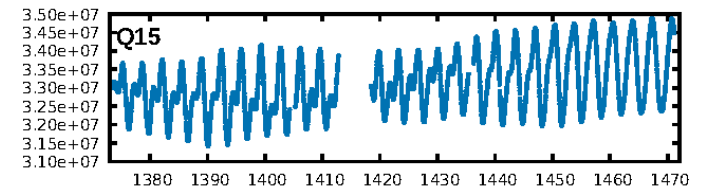
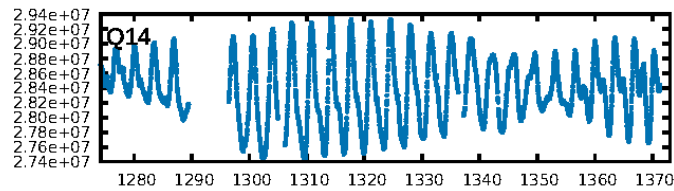
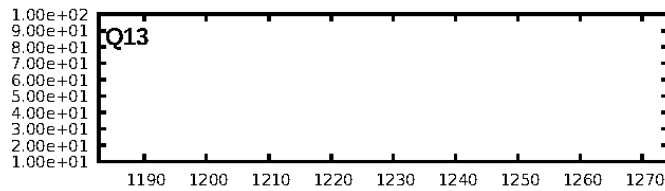
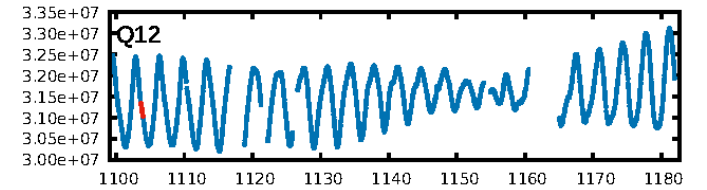
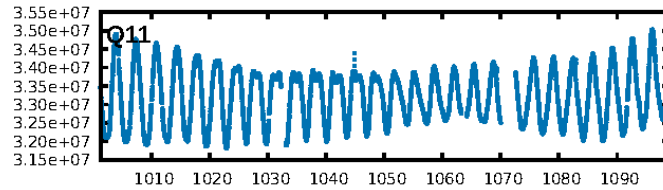
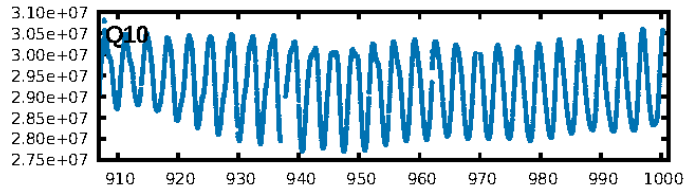
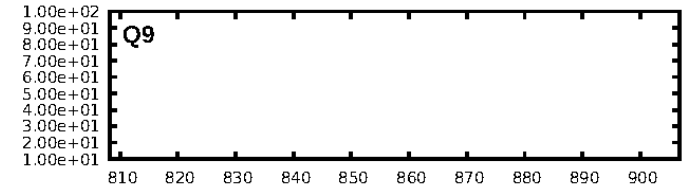
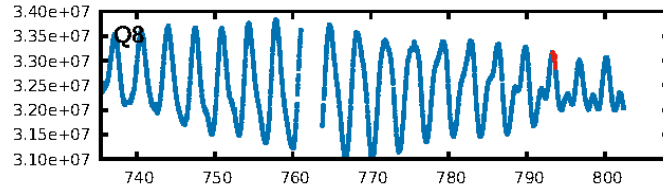
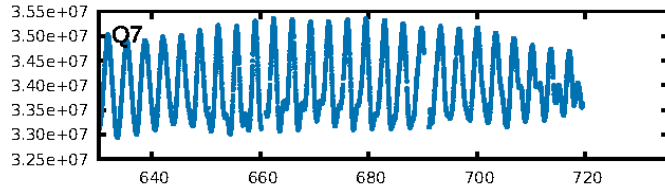
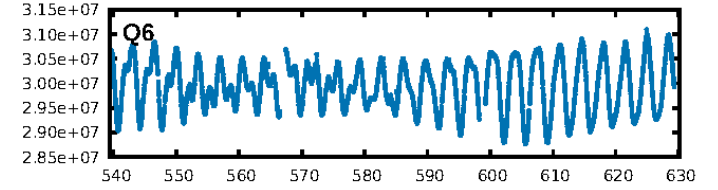
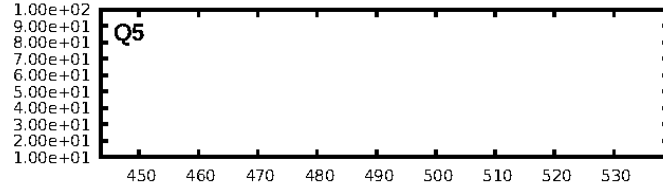
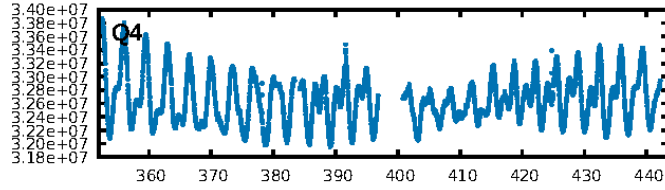
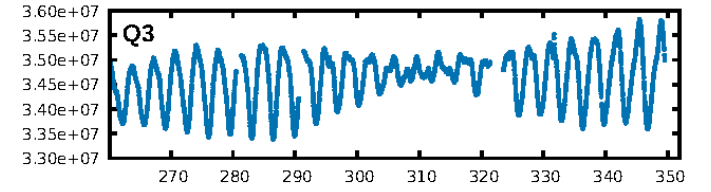
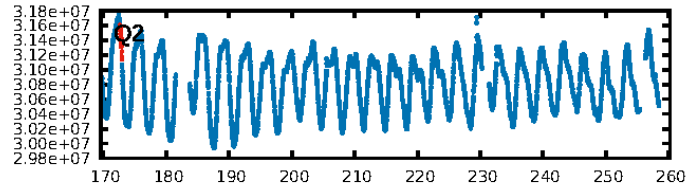
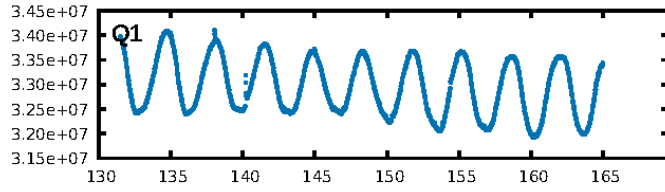
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [377.00σ]  
ModelChiSquare2-sig: 1.6%  
ModelChiSquareGof-sig: 98.4%  
**Bootstrap-pfa: 4.38e-11**  
RollingBand-fgt: 1.00 [3/3]  
**GhostDiagnostic-chr: 0.7008**  
Centroid-sig: 2.7%  
Centroid-so: 2.070 arcsec [1.59σ]  
OotOffset-rm: 0.437 arcsec [1.17σ]  
OotOffset-st: 1/0/1/0 [2]  
KicOffset-rm: 0.485 arcsec [1.11σ]  
KicOffset-st: 1/0/1/0 [2]  
DiffImageQuality-fgm: 0.00 [0/2]  
DiffImageOverlap-fno: 1.00 [3/3]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 08:36:56 Z

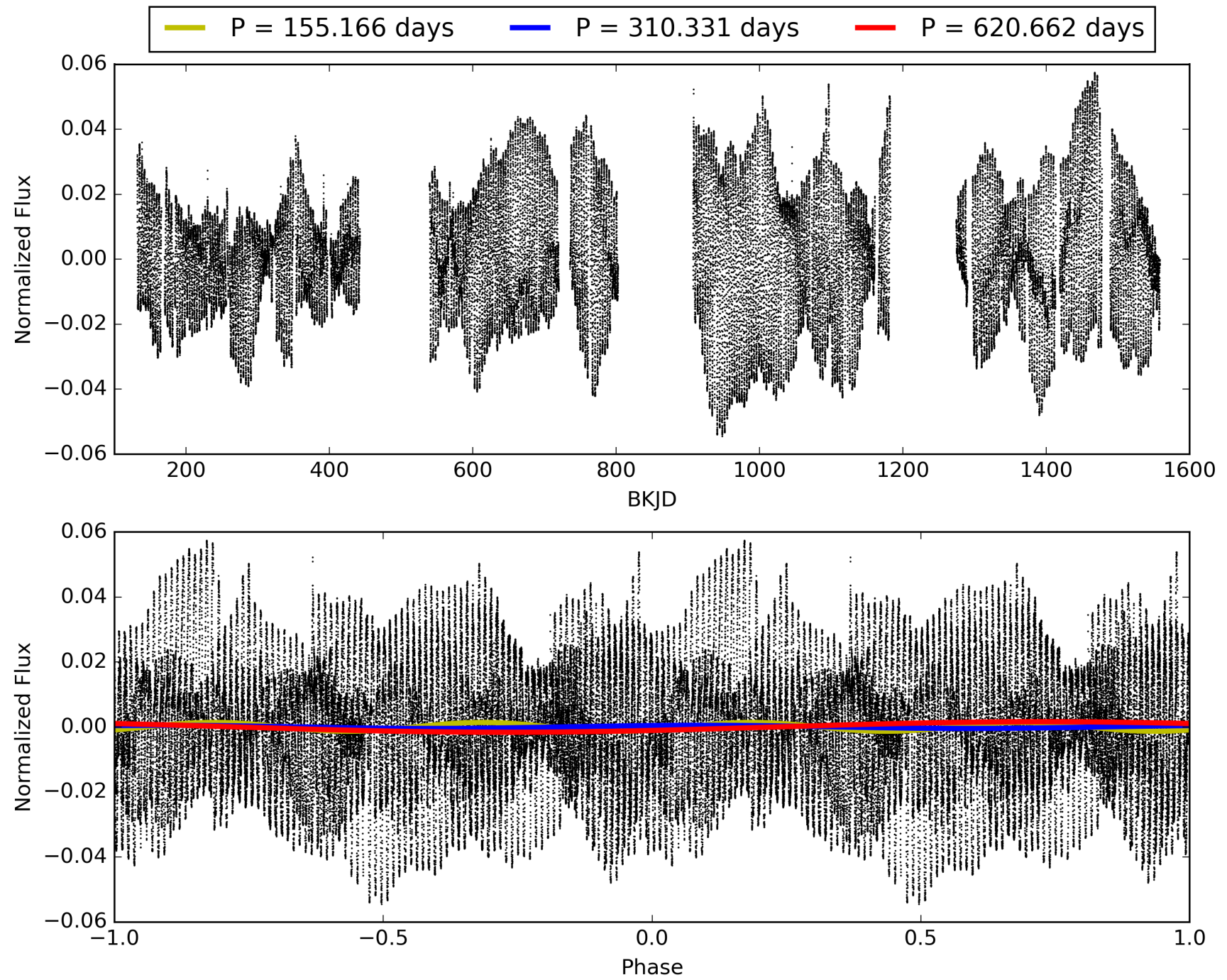
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 005427641-02, PDC Light Curves





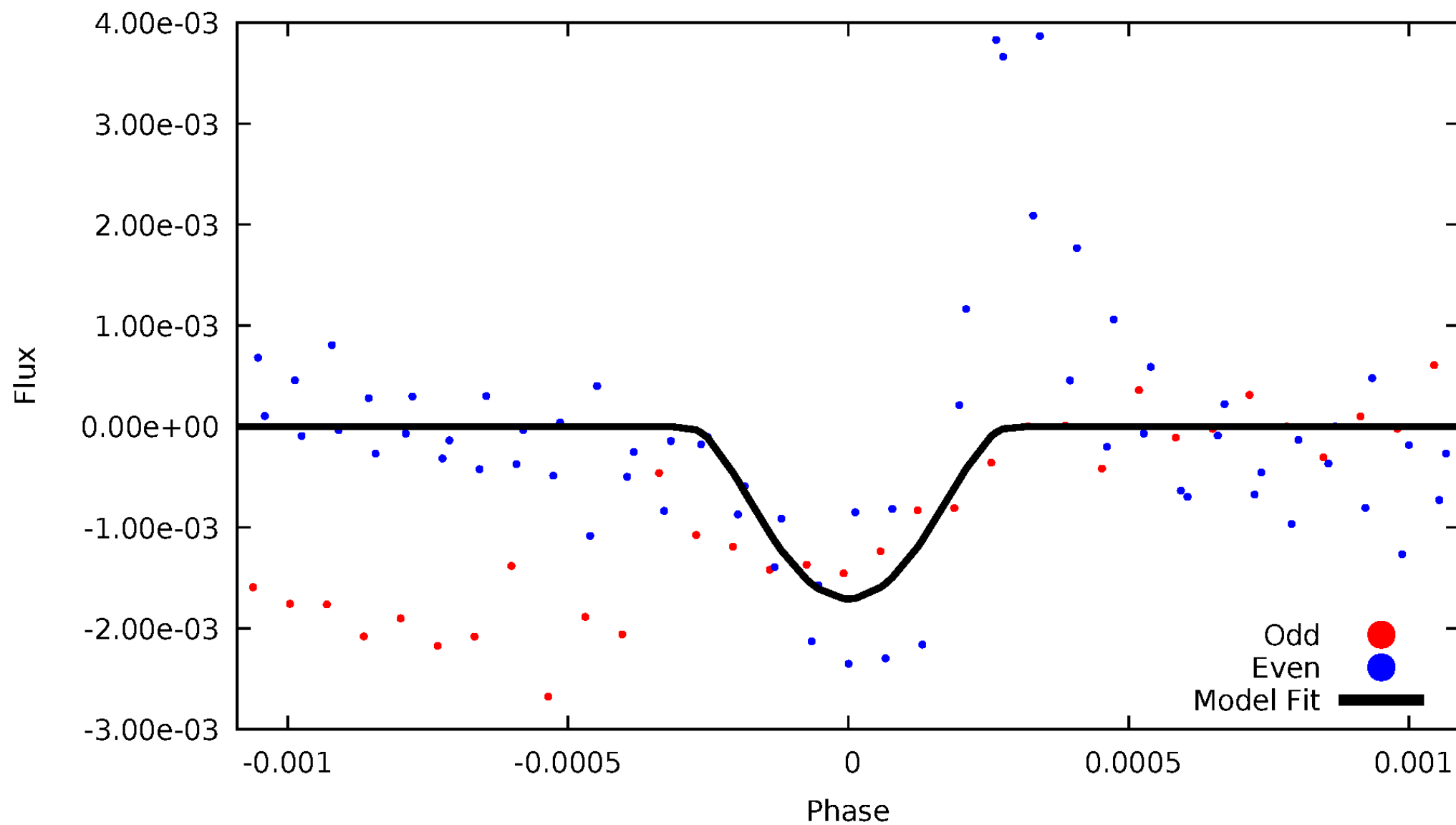
# TCE 005427641-02





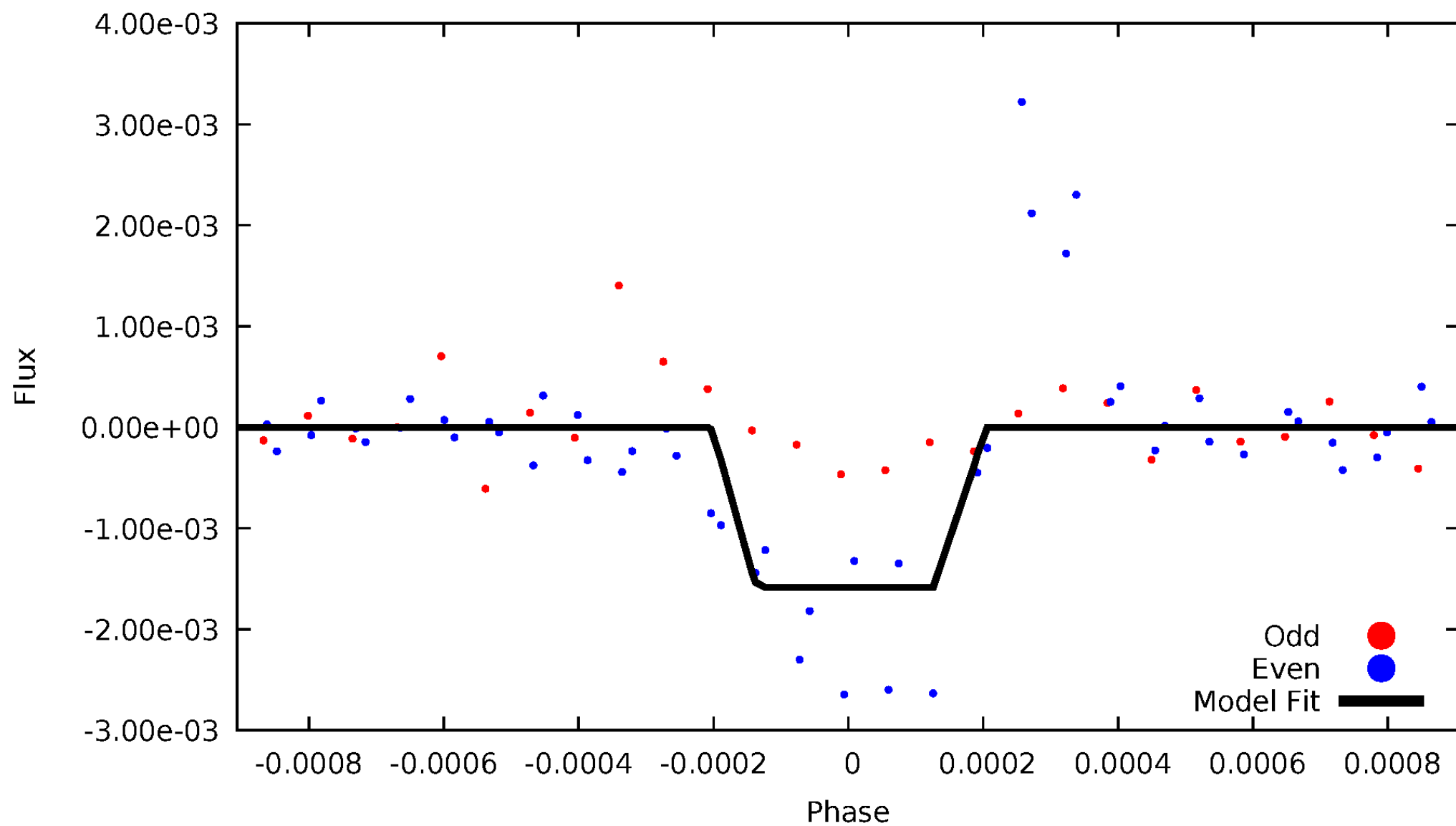
# DV Odd/Even

TCE 005427641-02



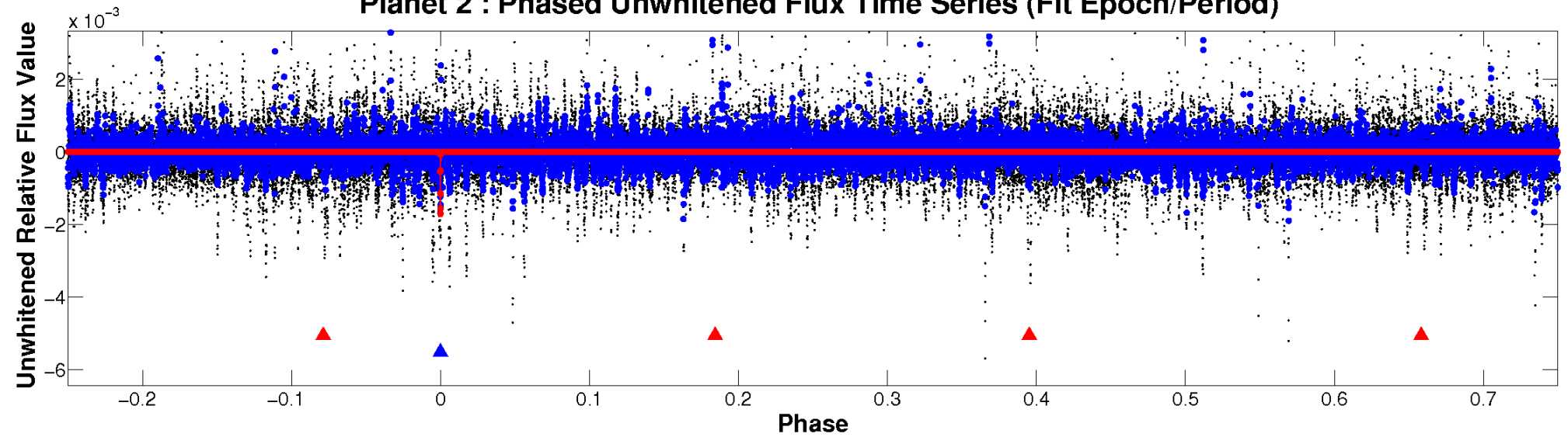
# ALT Odd/Even

TCE 005427641-02

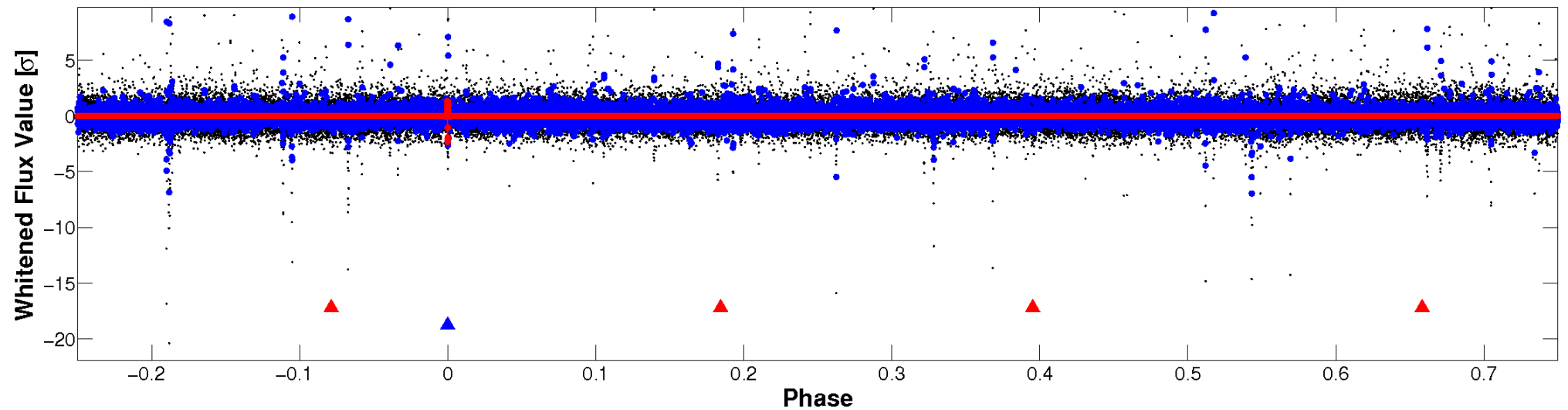


# Non-Whitened Vs. Whitened Light Curve

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

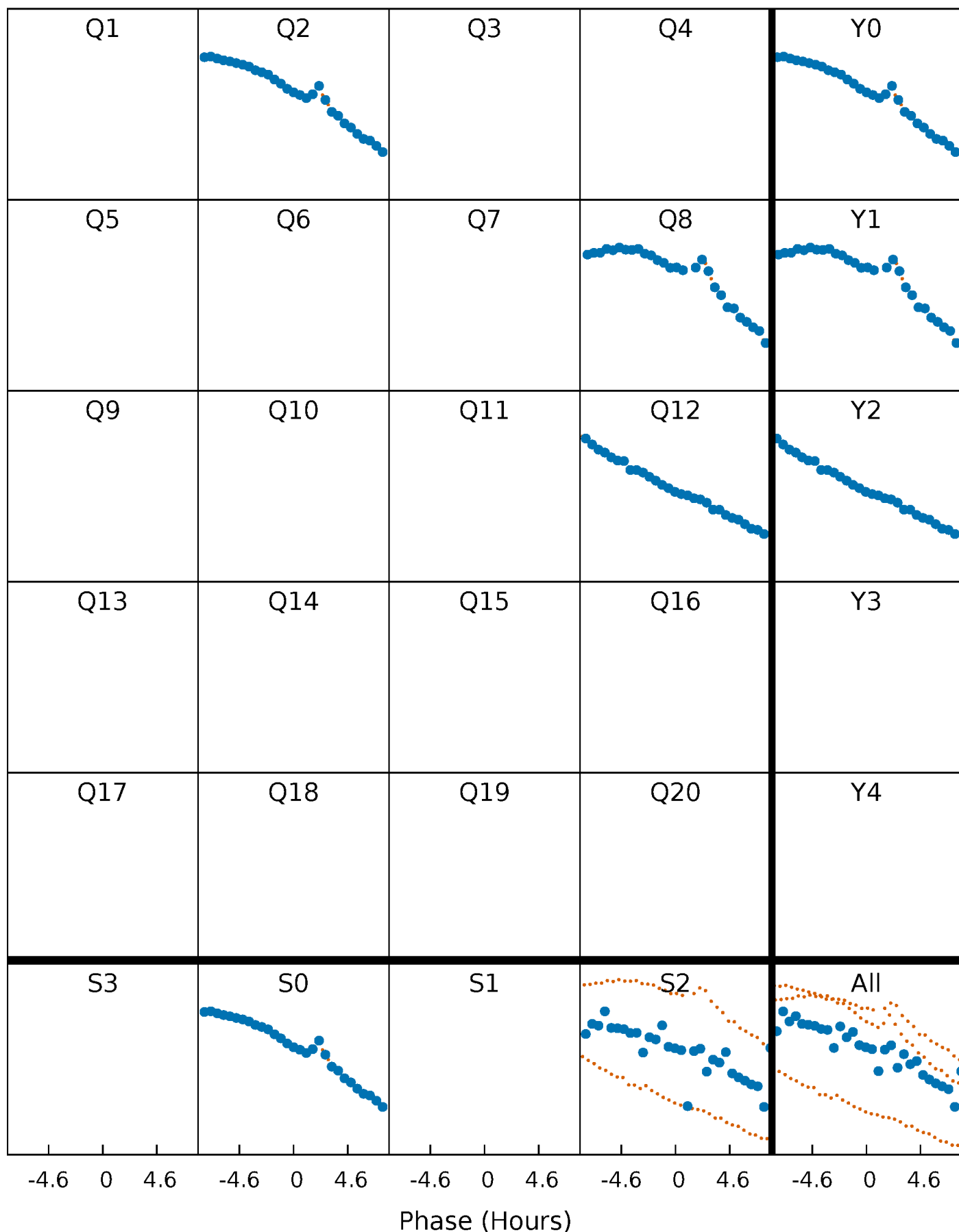


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



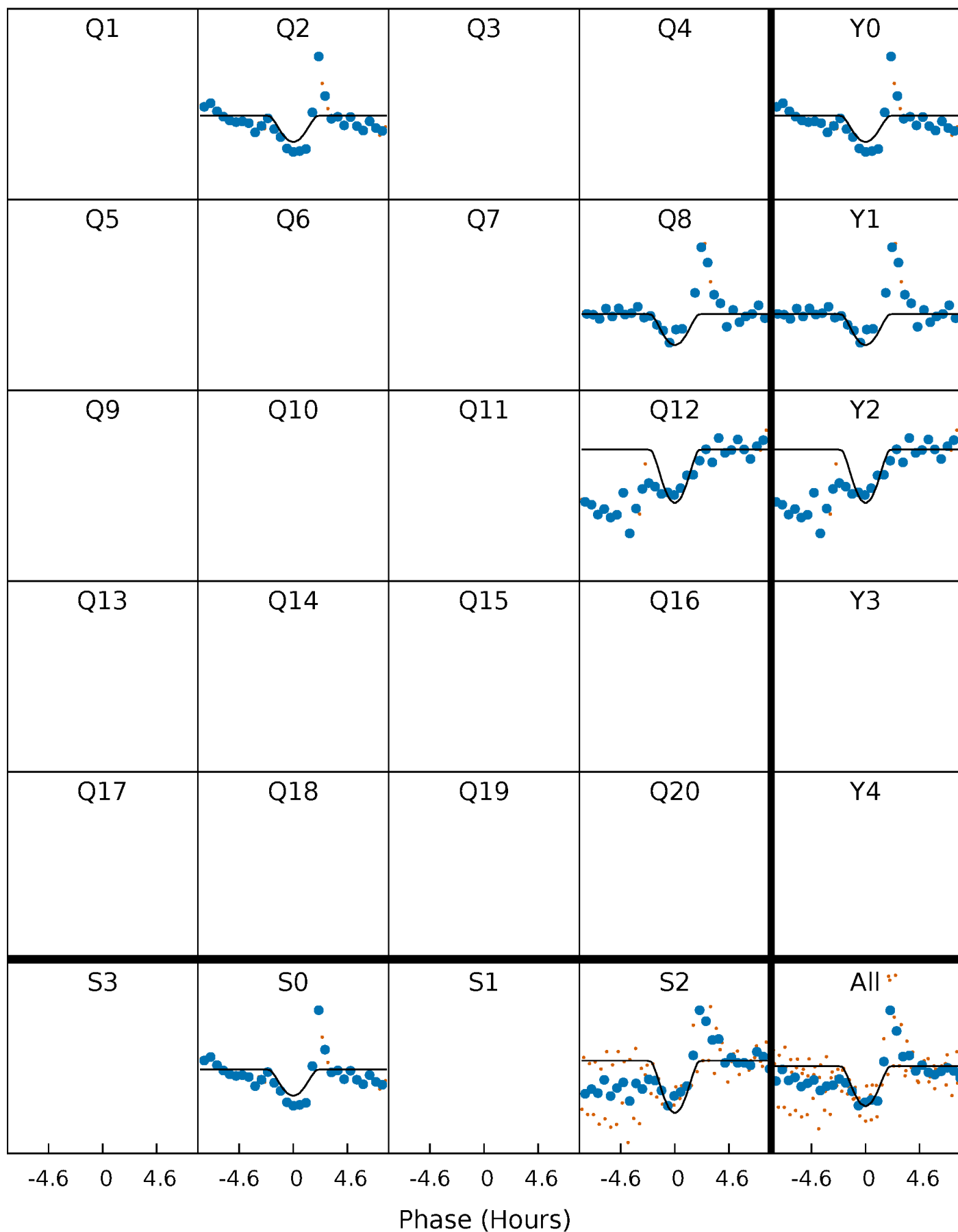
# PDC Quarter-Phased Transit Curves

TCE 005427641-02 P=310.331144 Days  $T_0=172.789966$  (BKJD)



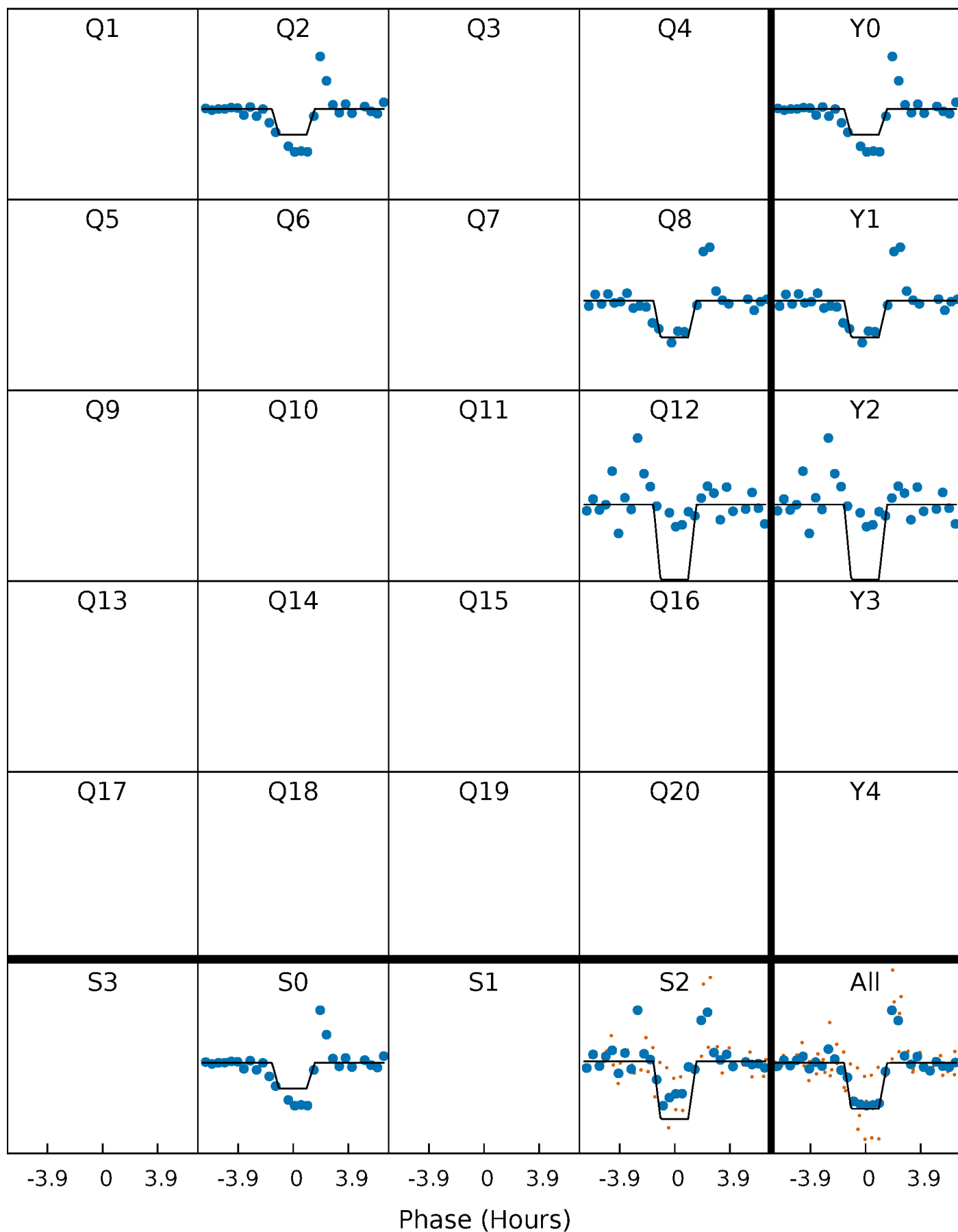
# DV Quarter-Phased Transit Curves

TCE 005427641-02 P=310.331144 Days  $T_0=172.789966$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

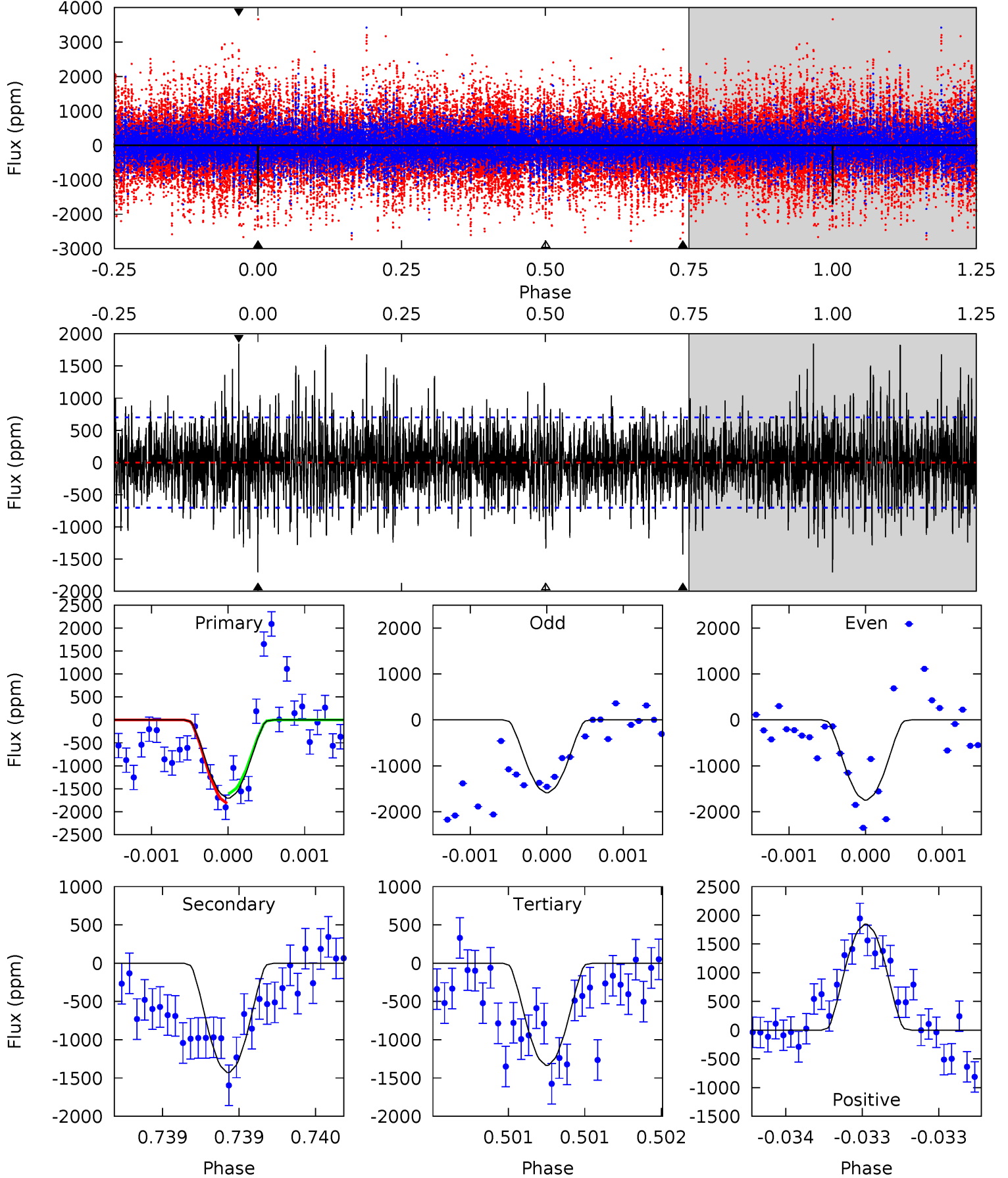
TCE 005427641-02 P=310.330734 Days  $T_0=172.792013$  (BKJD)



# DV Model-Shift Uniqueness Test

005427641-02, P = 310.331144 Days, E = 172.789966 Days

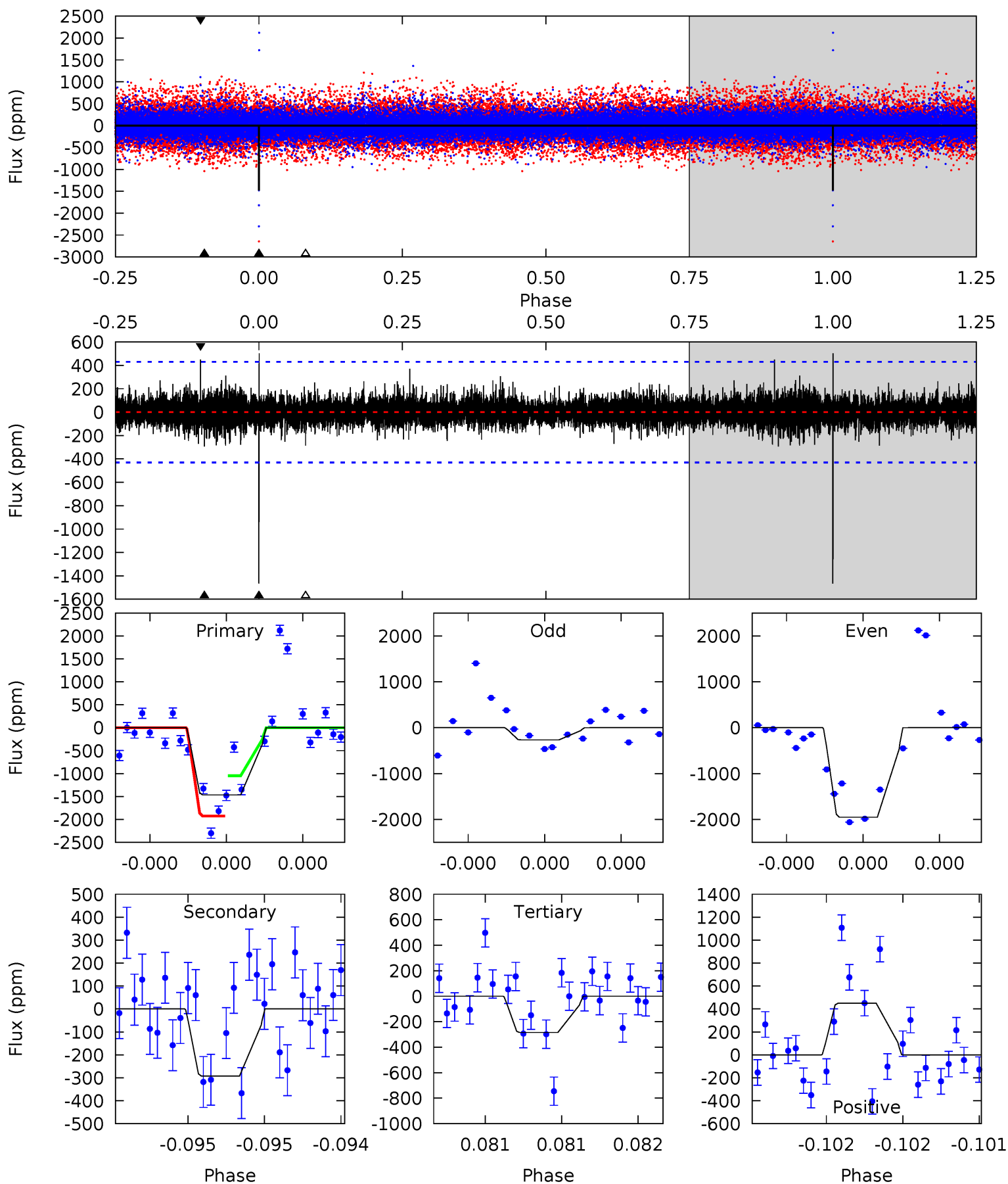
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
13.5	11.3	10.6	14.6	5.56	3.46	2.93	2.93	-1.12	0.74	-3.31	0.54	1.05	0.52	0.86



# Alt Model-Shift Uniqueness Test

005427641-02, P = 310.330734 Days, E = 172.792013 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
19.1	3.81	3.71	5.86	5.61	3.54	0.87	15.4	13.2	0.10	-2.05	13.0	0.93	0.26	5.49





### Stellar Parameters For KIC 005427641

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5351^{+159}_{-159}$	$4.466^{+0.121}_{-0.162}$	$-0.220^{+0.350}_{-0.300}$	$0.850^{+0.155}_{-0.113}$	$0.770^{+0.113}_{-0.061}$	$1.769^{+0.900}_{-0.697}$
	+3%/-3%	+3%/-4%	+159%/-136%	+18%/-13%	+15%/-8%	+51%/-39%
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 005427641-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-1429 \pm 126$	$21.07^{+22.57}_{-14.71}$	$337^{+20}_{-18}$	$2910^{+1348}_{-507}$	$1217^{+12036}_{-931}$
Alt.	$-292 \pm 77$	$21.11^{+21.81}_{-14.11}$	$336^{+21}_{-19}$	$2371^{+810}_{-368}$	$260^{+2001}_{-203}$

$T_{max}$  = 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

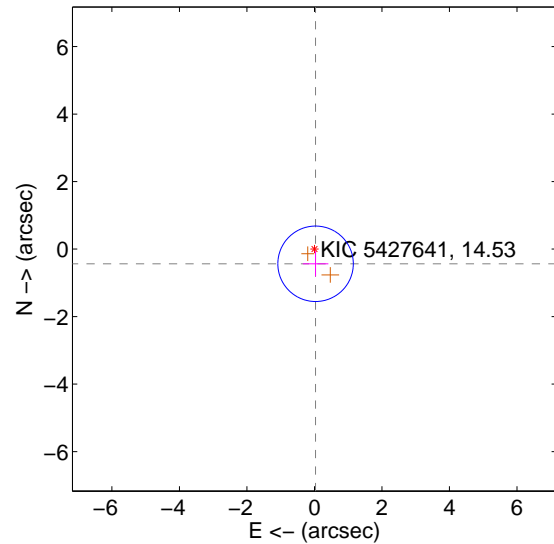
Supplemental centroid analysis for 005427641-02. Kepler magnitude: 14.53. Transit SNR 7.37

There are 0 quarters with good PRF difference image offsets

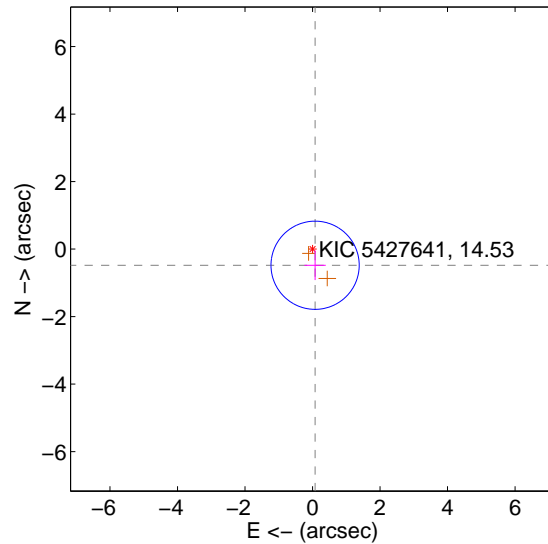
The direct PRF centroid is offset from the target star catalog position by about 0.08 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.437 \pm 0.373$	1.17	$-0.034 \pm 0.379$	$-0.435 \pm 0.373$
PRF-fit source offset from KIC position	$0.485 \pm 0.436$	1.11	$-0.076 \pm 0.316$	$-0.479 \pm 0.438$
photometric centroid source offset	$2.07 \pm 1.30$	1.59	$0.64 \pm 1.10$	$1.97 \pm 1.32$

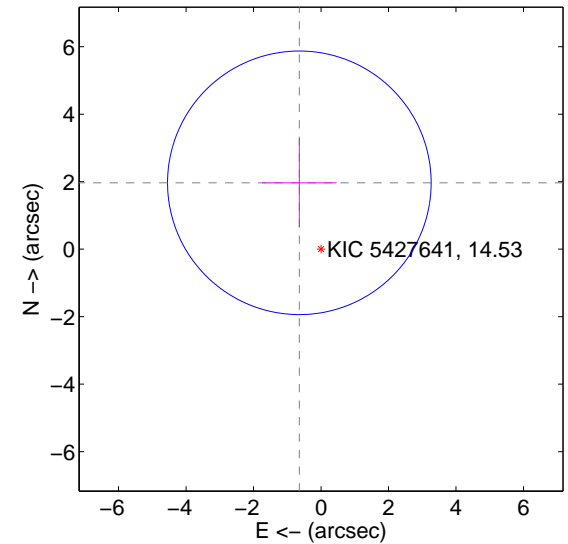
offset from difference PRF-fit to OOT PRF-fit



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.

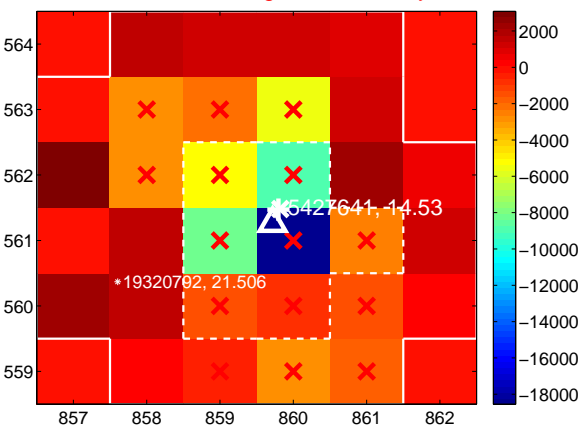
Q1 no difference image



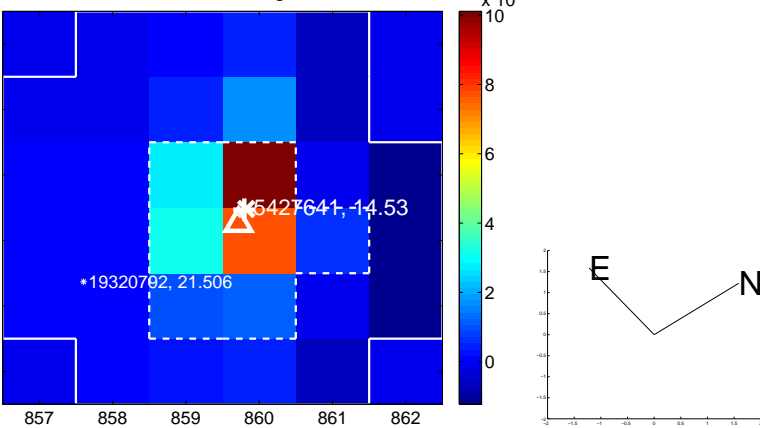
Q1 no OOT image



Q2 difference image. Poor Quality



Q2 OOT image



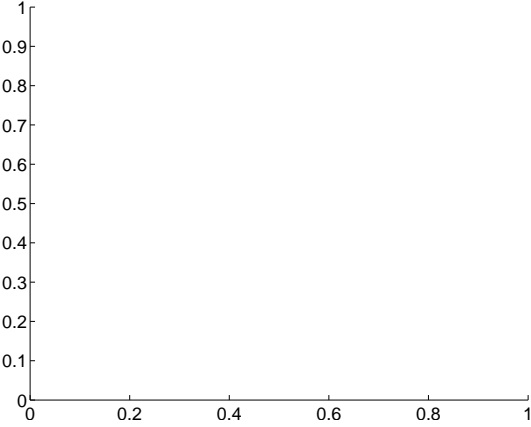
Q3 no difference image



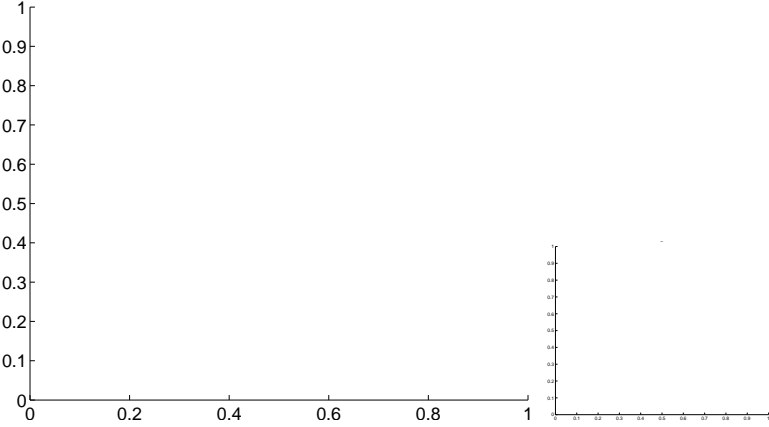
Q3 no OOT image



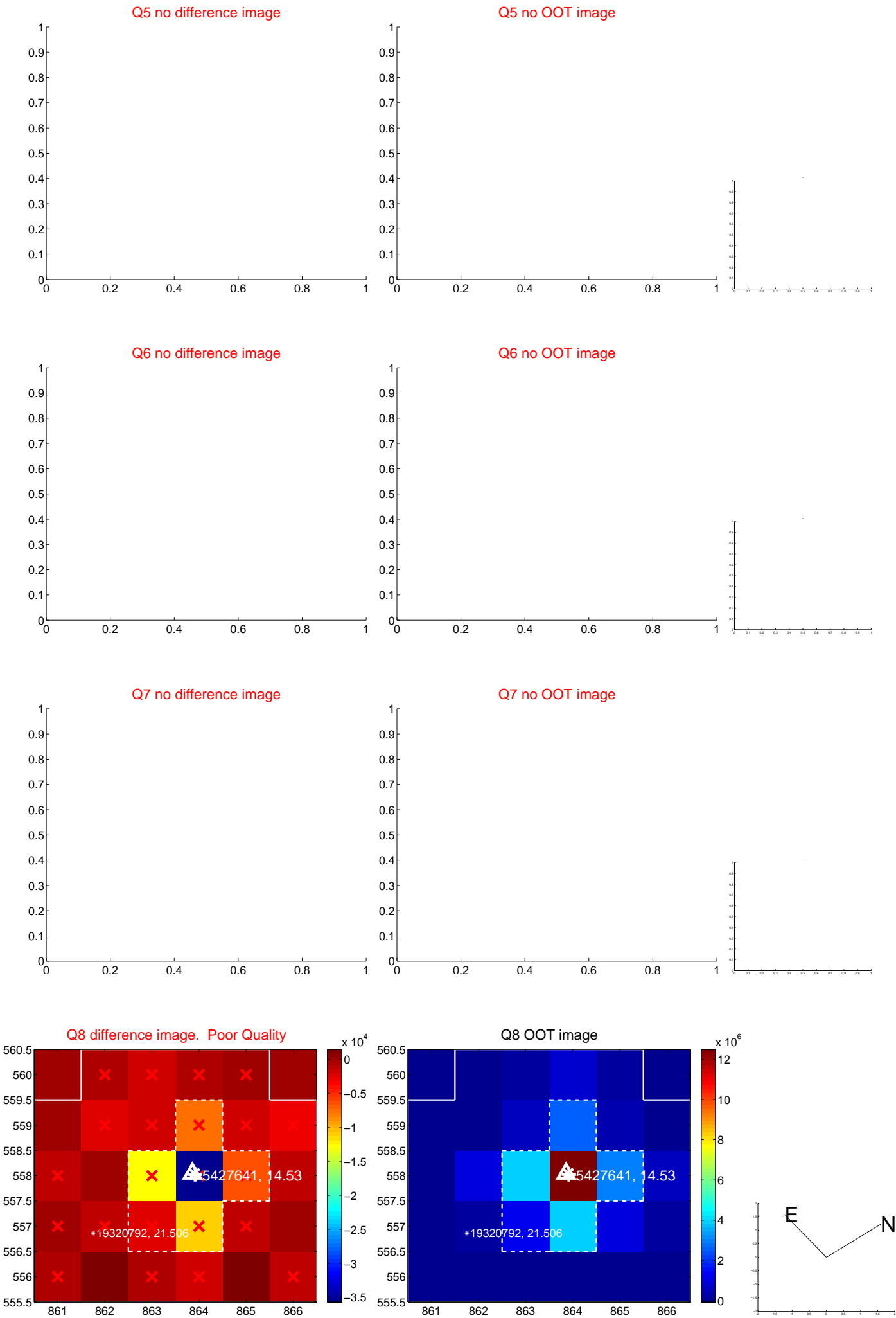
Q4 no difference image



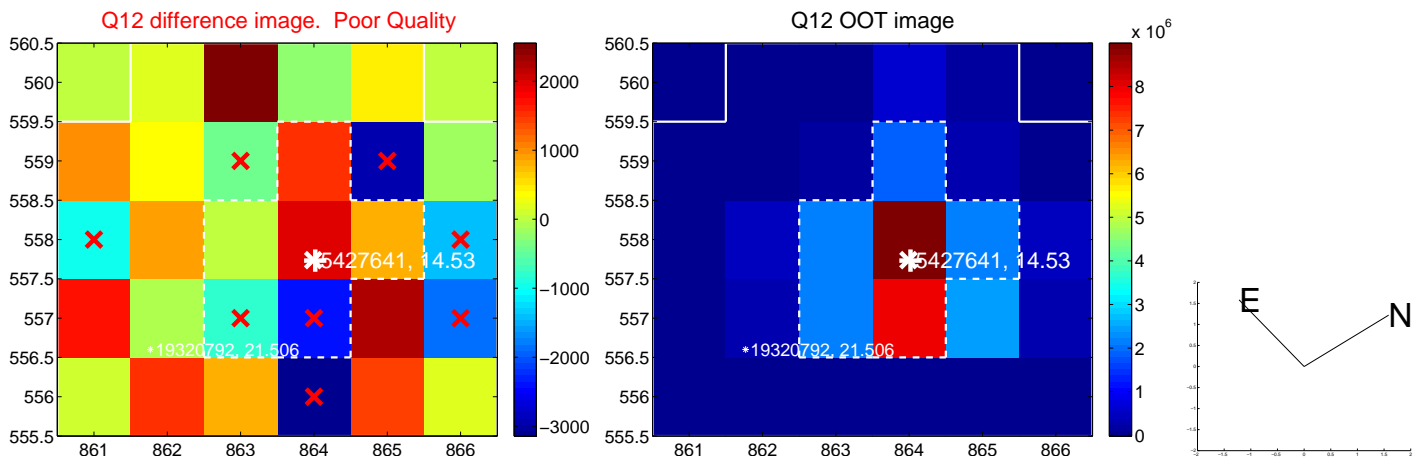
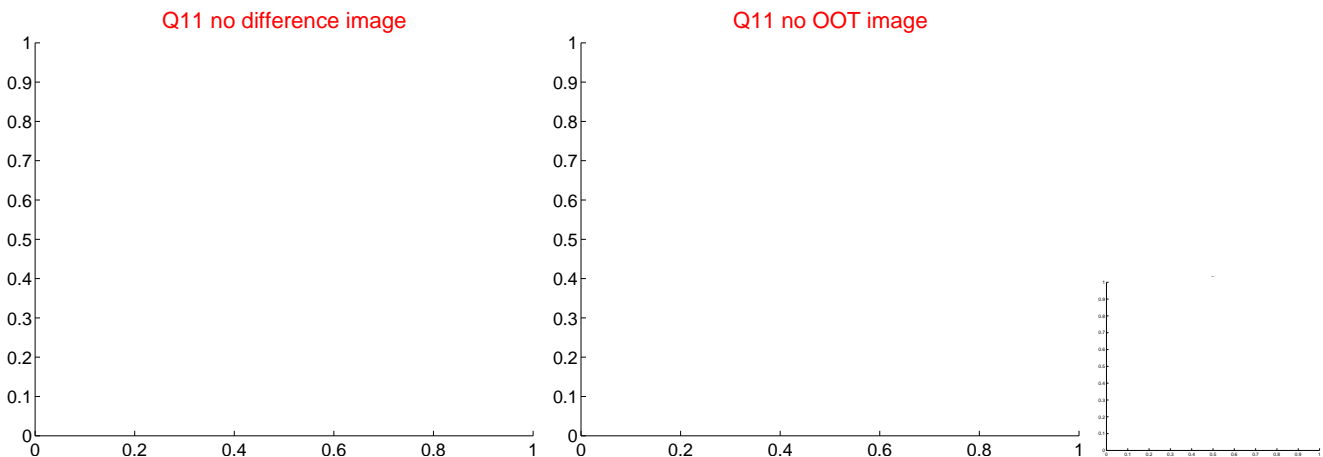
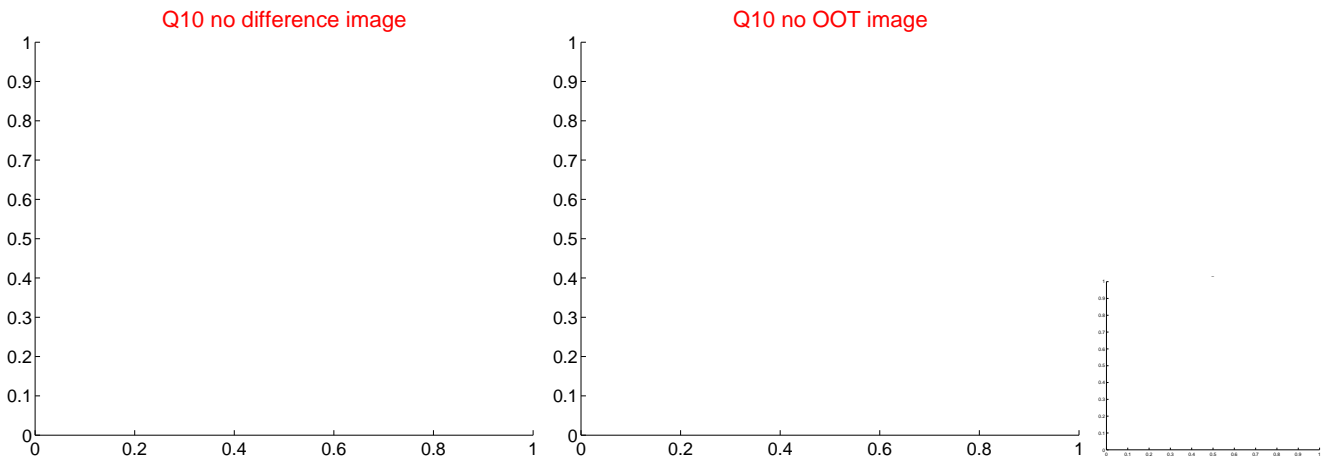
Q4 no OOT image



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



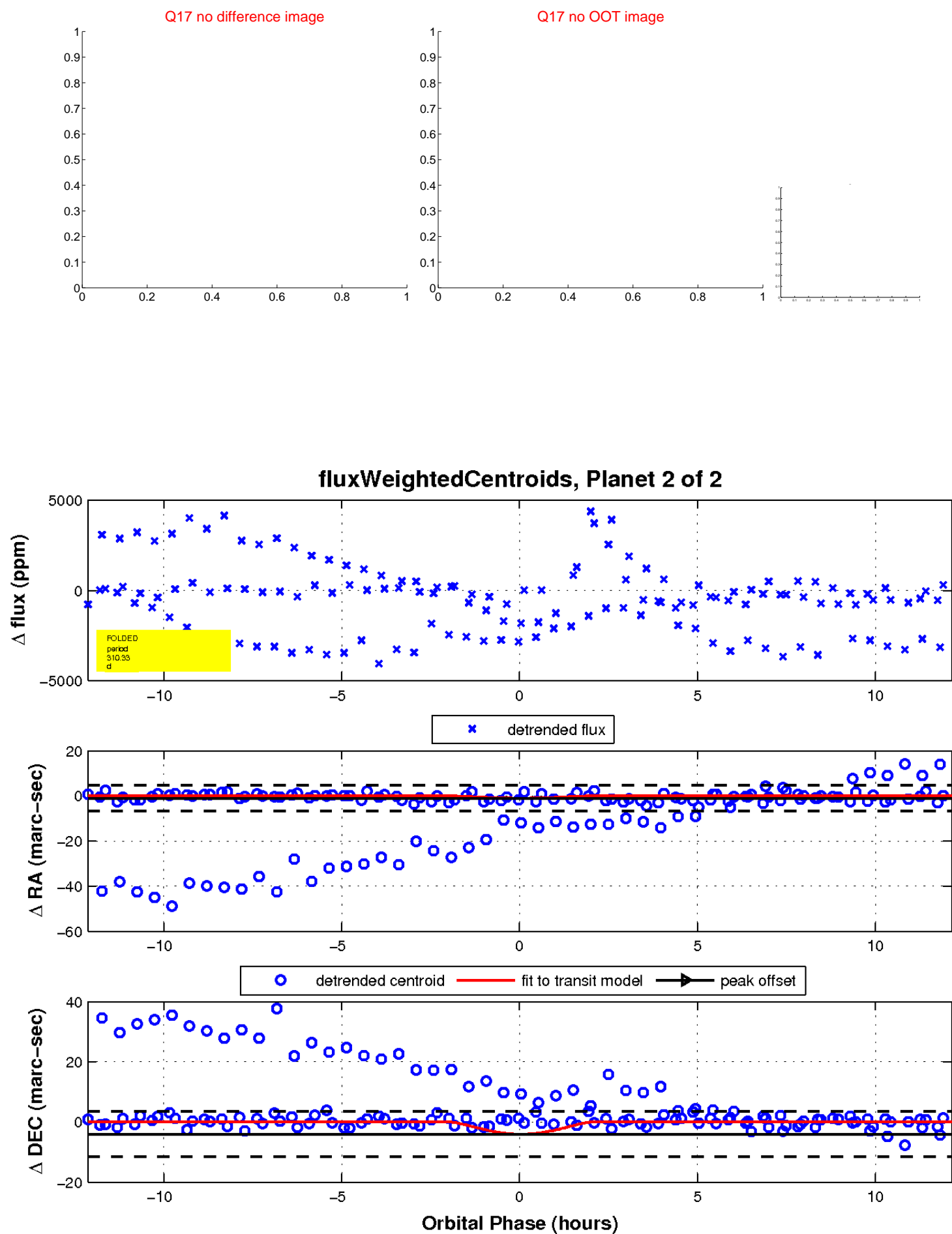
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



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

