

# KIC 009902856

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009902856-01	OBS	1556.01	135.912355	141.415682	9845.1	5.532	142.1	108.4	0.96	6141	14.53	4.42

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009902856-01	OBS	FP	0.00	0	1	0	0	DEEP_V_SHAPED—CENT_KIC_POS

**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 009902856-01

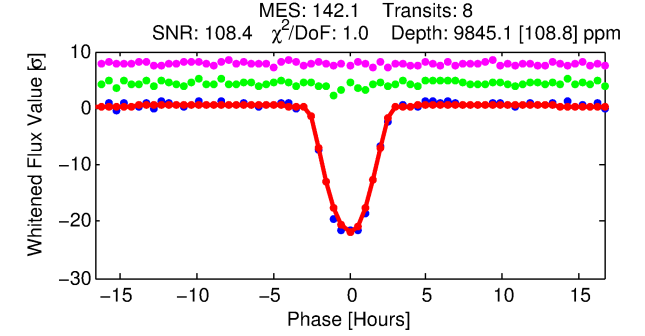
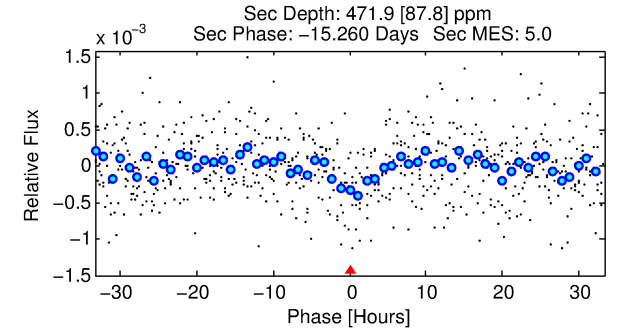
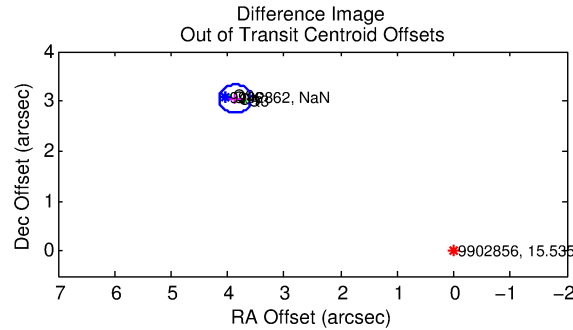
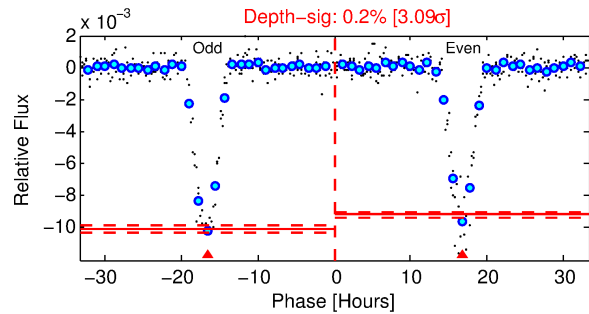
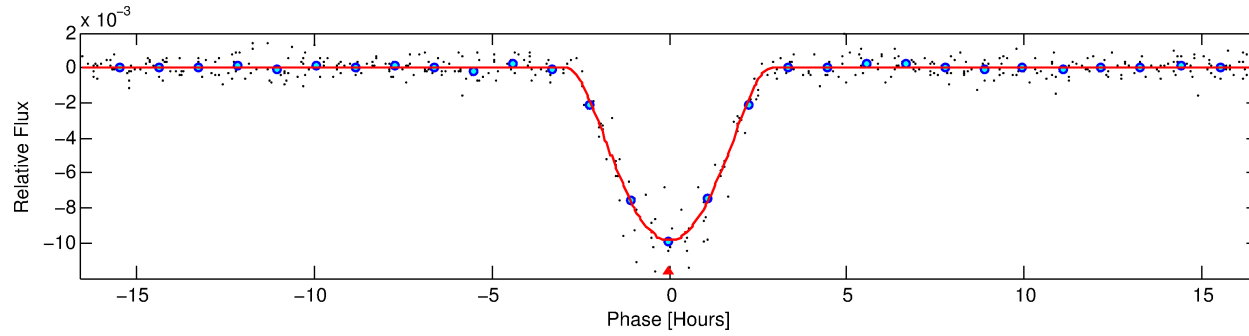
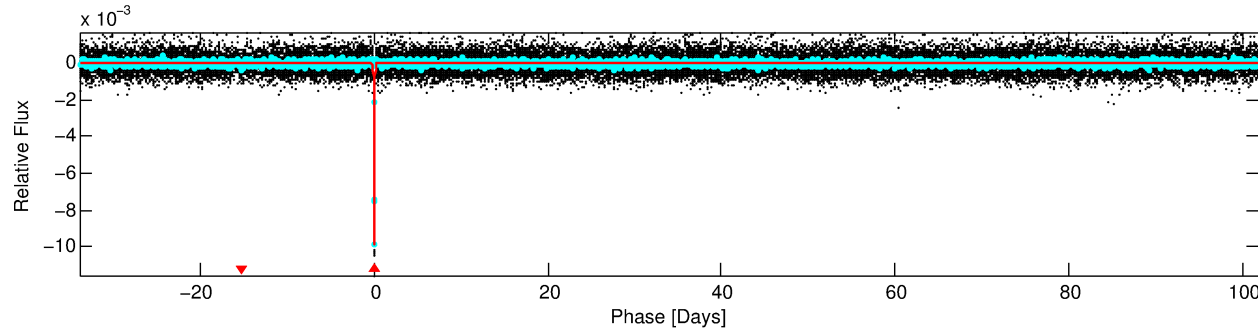
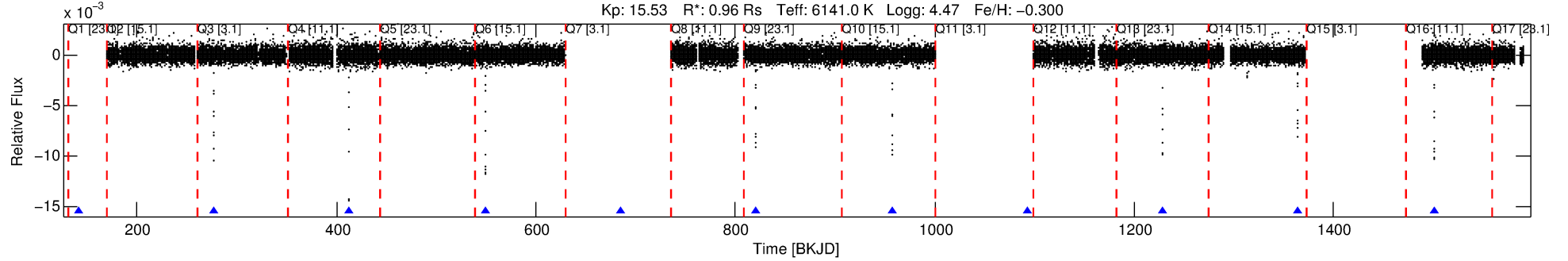
No Significant Match Found

# DV One-Page Summary

KIC: 9902856 Candidate: 1 of 1 Period: 135.912 d

KOI: K01556.01 Corr: 0.988

Kp: 15.53 R\*: 0.96 Rs Teff: 6141.0 K Logg: 4.47 Fe/H: -0.300



## DV Fit Results:

Period = 135.91235 [0.00020] d  
Epoch = 141.4157 [0.0012] BKJD  
Rp/R\* = 0.1388 [0.0373]  
a/R\* = 113.54 [6.82]  
b = 0.96 [0.06]  
Seff = 4.42 [1.79]  
Teq = 370 [38] K  
Rp = 14.53 [5.91] Re  
a = 0.5149 [0.1337] AU  
Ag = 326.14 [223.43] [1.46σ]  
Teffp = 2429 [356] K [5.76σ]

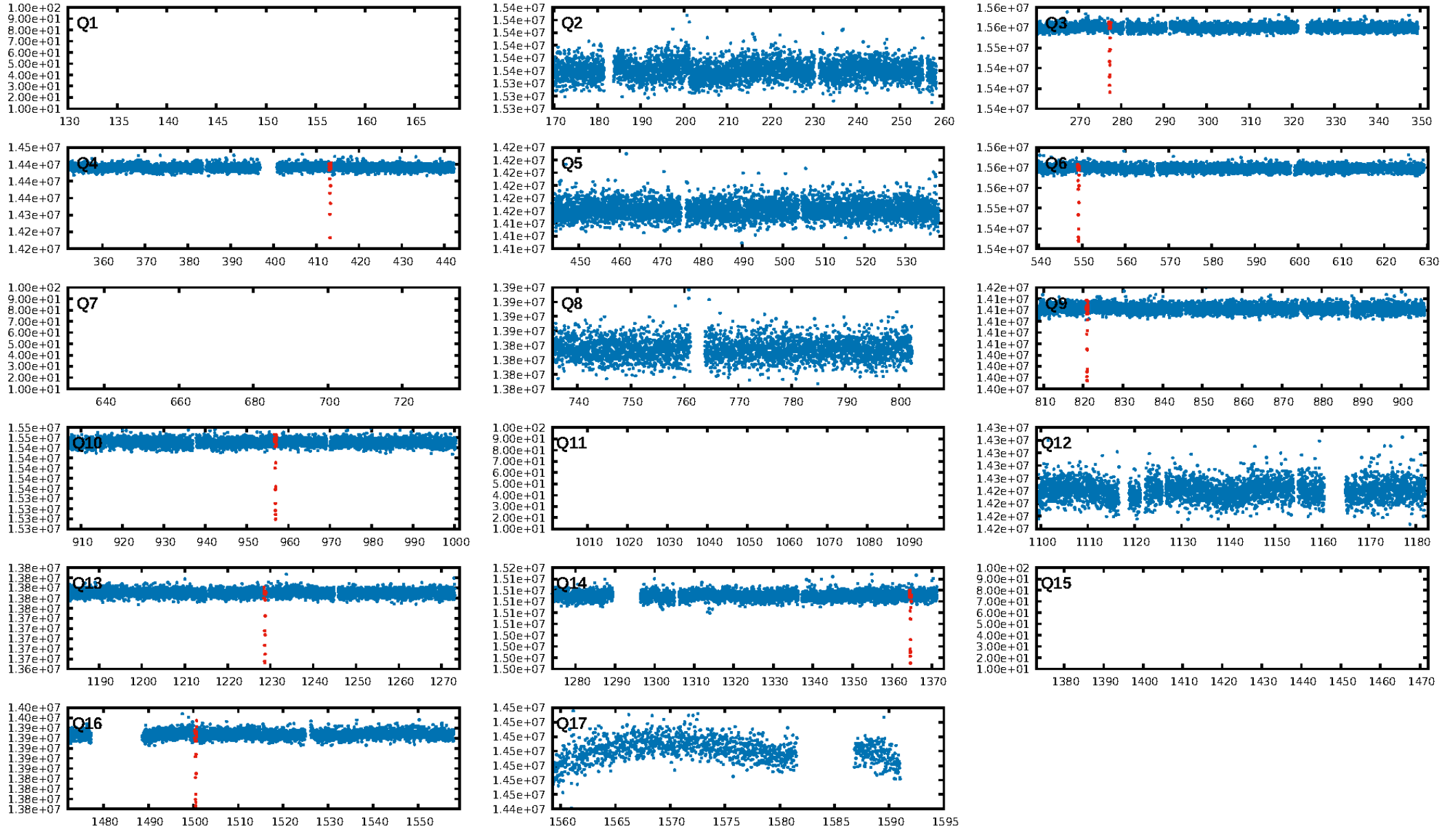
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 99.8%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [8/8]  
GhostDiagnostic-chr: 2.12  
Centroid-sig: 0.0%  
Centroid-so: 5.746 arcsec [58.15σ]  
OotOffset-rm: 4.929 arcsec [52.28σ]  
KicOffset-rm: 5.309 arcsec [57.32σ]  
OotOffset-st: 0/1/2/1 [4]  
KicOffset-st: 0/1/2/1 [4]  
DiffImageQuality-fgm: 1.00 [4/4]  
DiffImageOverlap-fno: 1.00 [7/7]

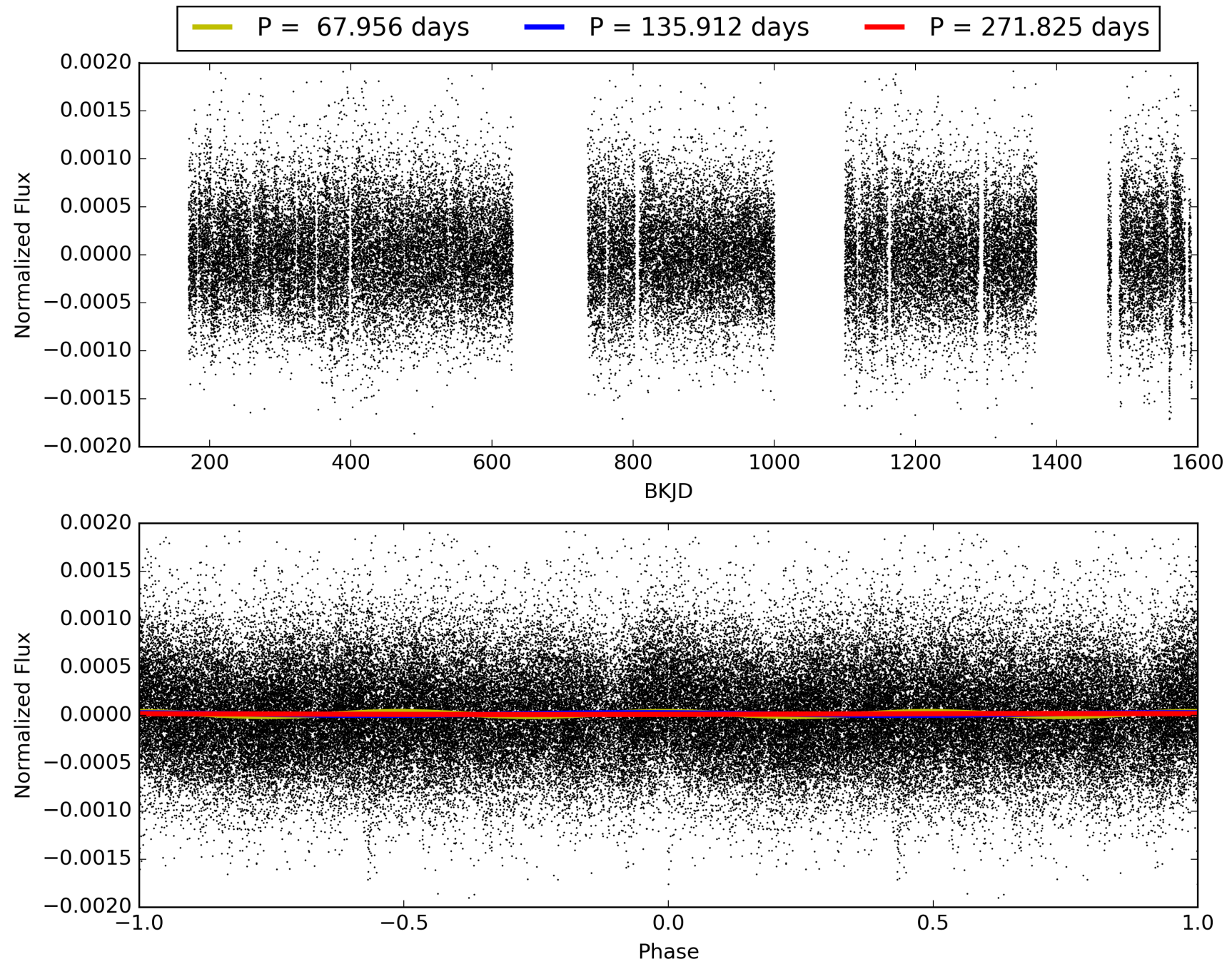
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 10:22:05 Z

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

# TCE 009902856-01, PDC Light Curves

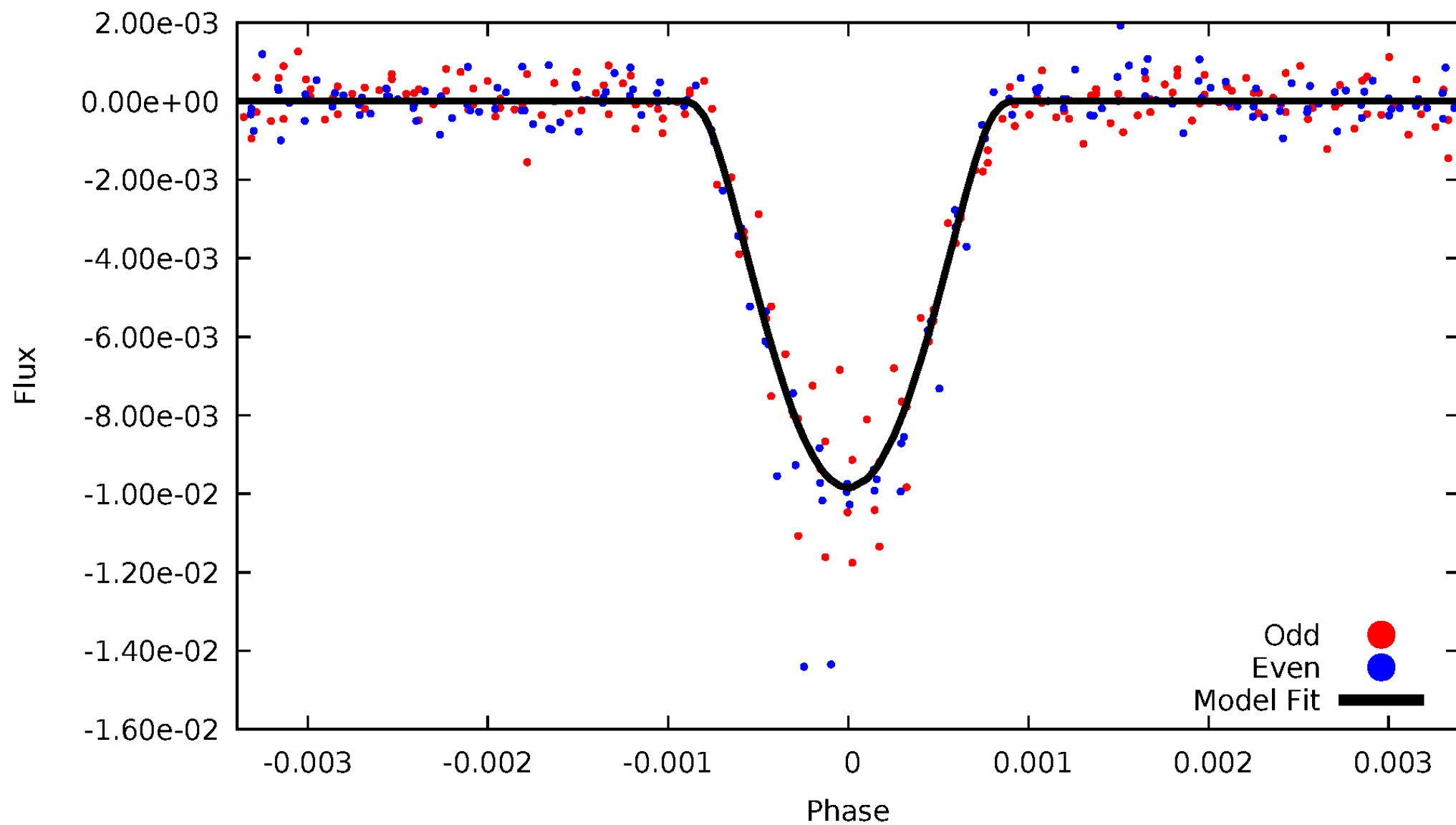


TCE 009902856-01



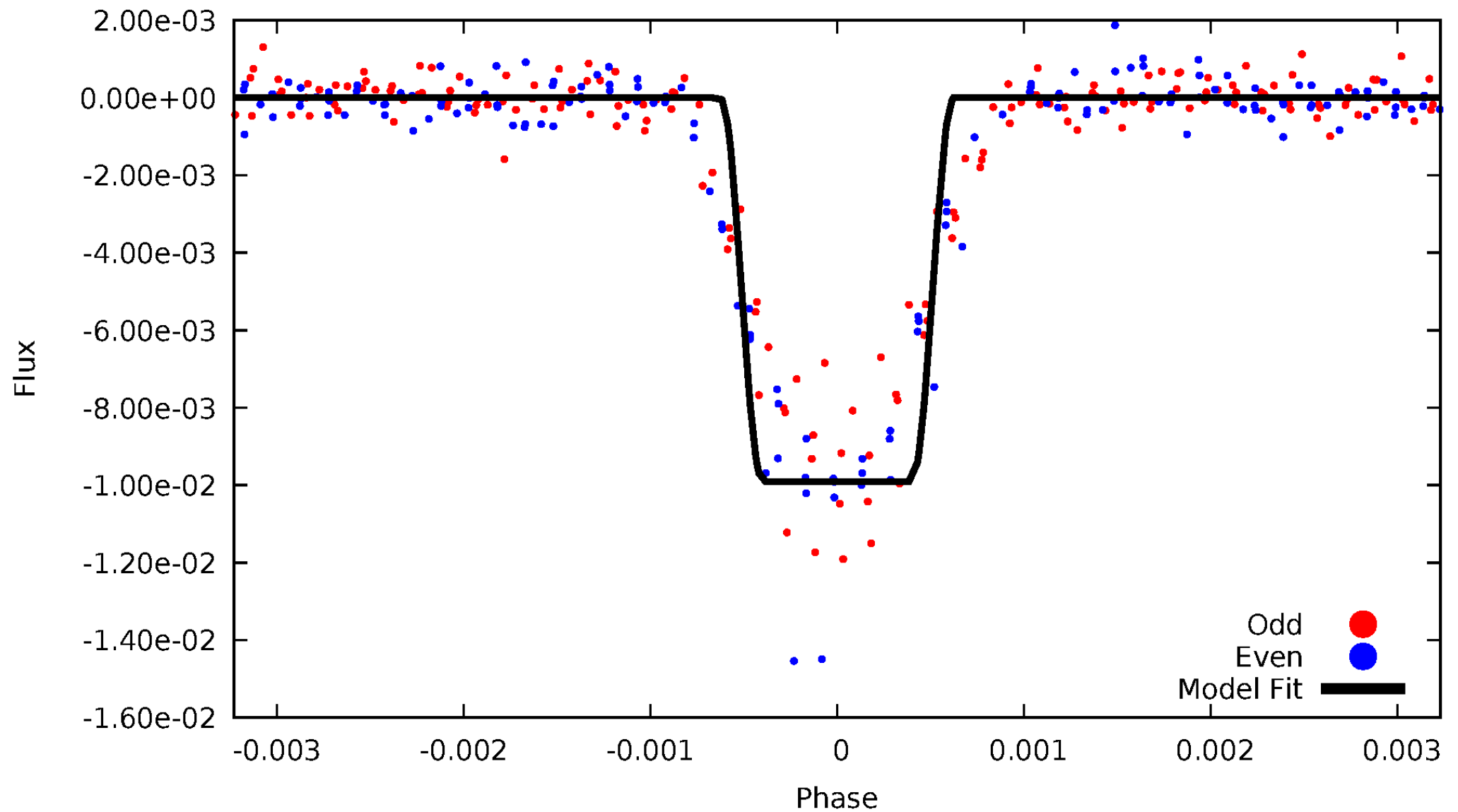
# DV Odd/Even

TCE 009902856-01



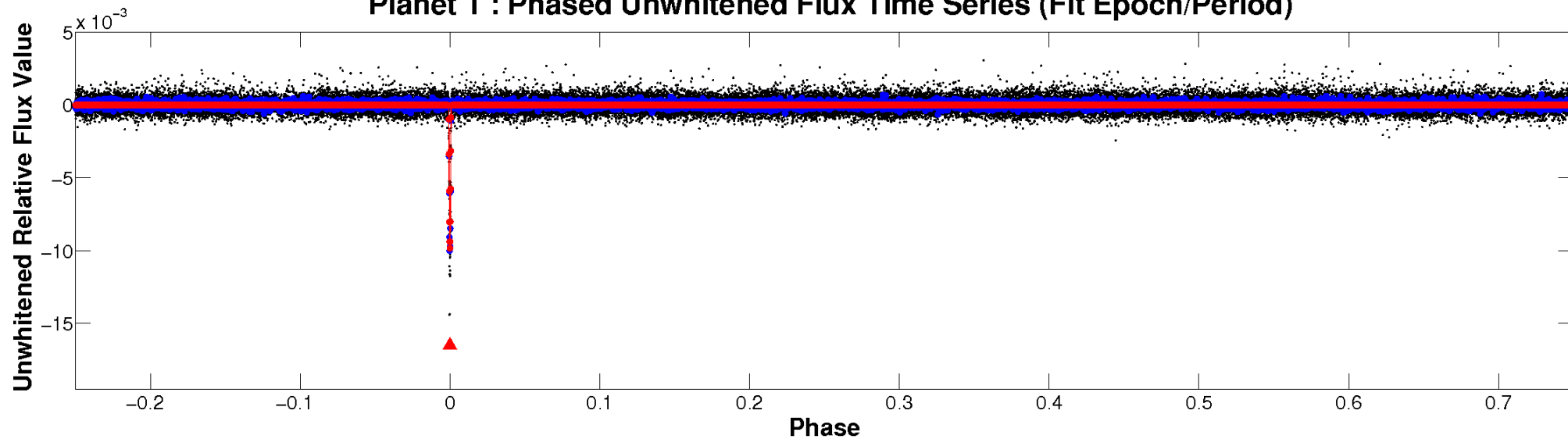
# ALT Odd/Even

TCE 009902856-01

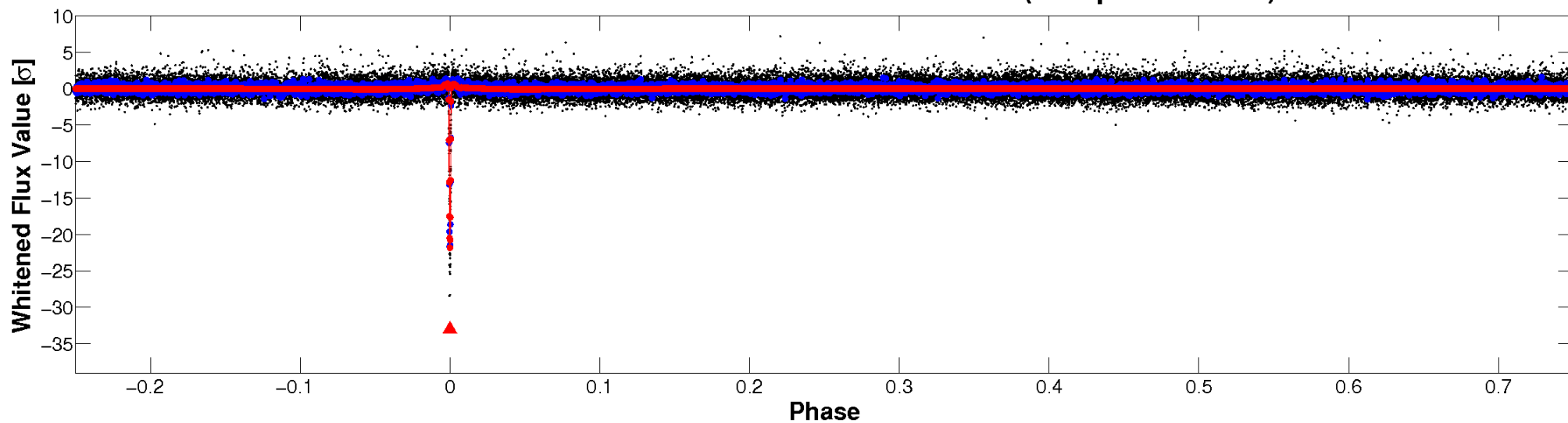


# Non-Whitened Vs. Whitened Light Curve

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

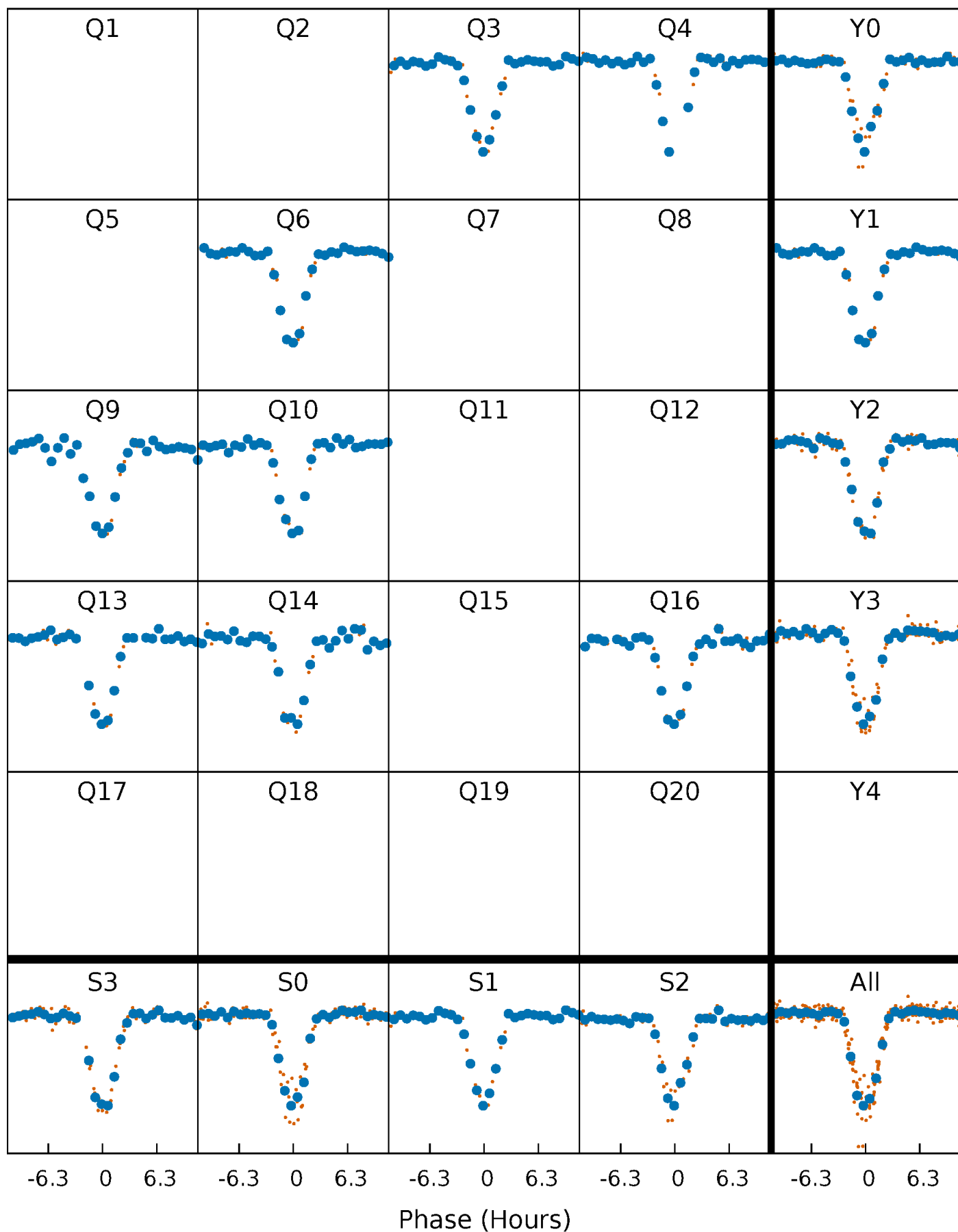


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

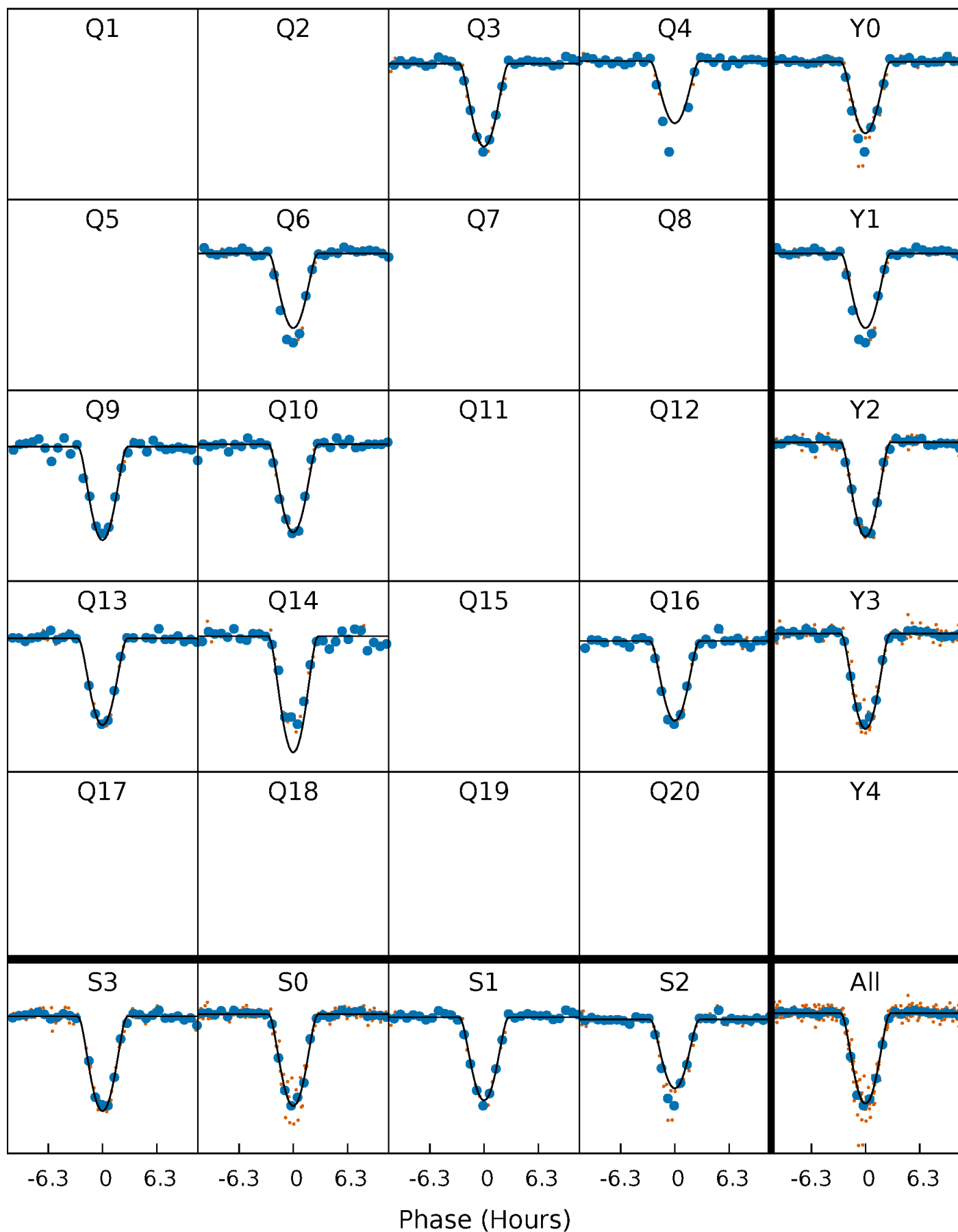
TCE 009902856-01 P=135.912355 Days  $T_0=141.415682$  (BKJD)





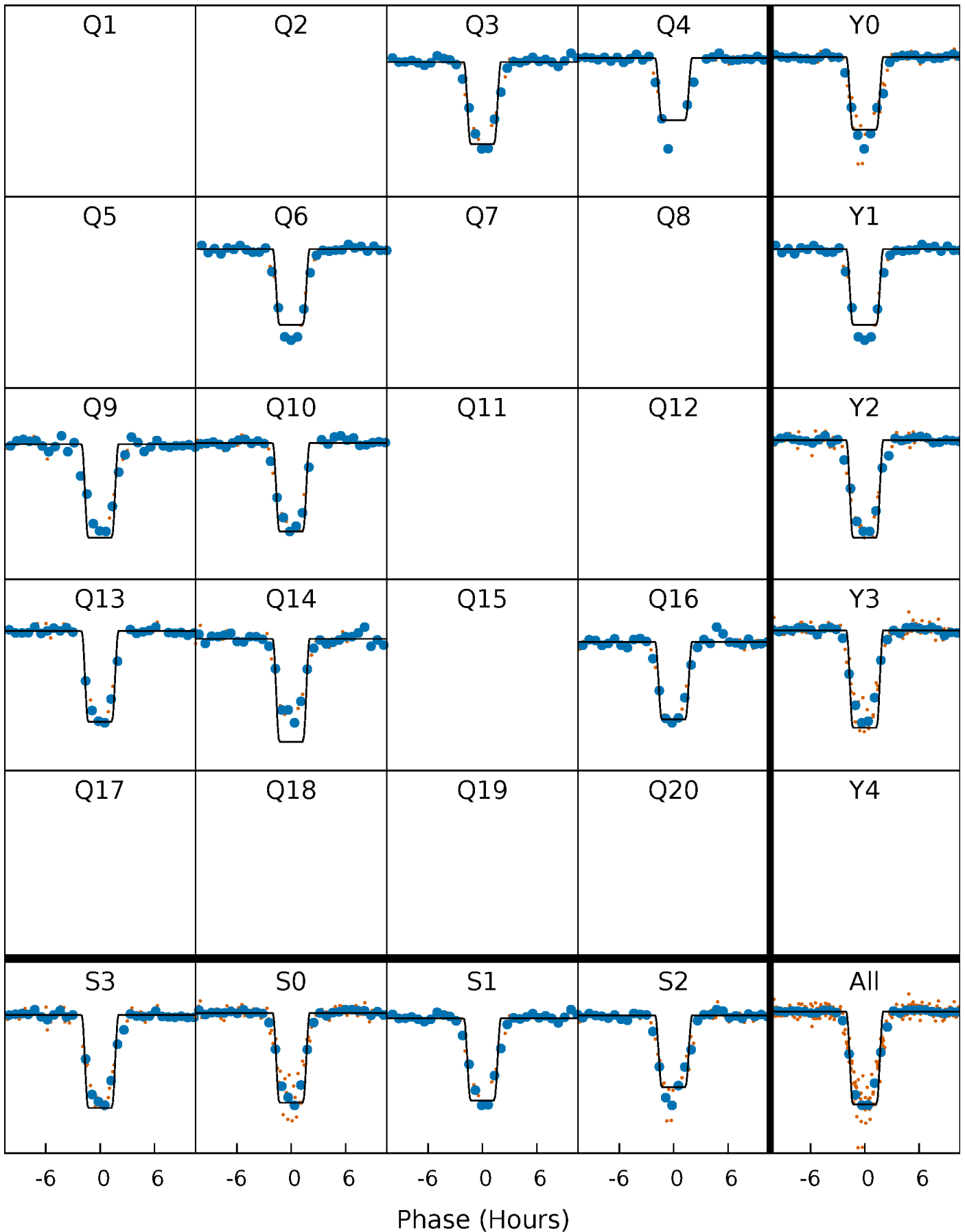
# DV Quarter-Phased Transit Curves

TCE 009902856-01 P=135.912355 Days  $T_0=141.415682$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

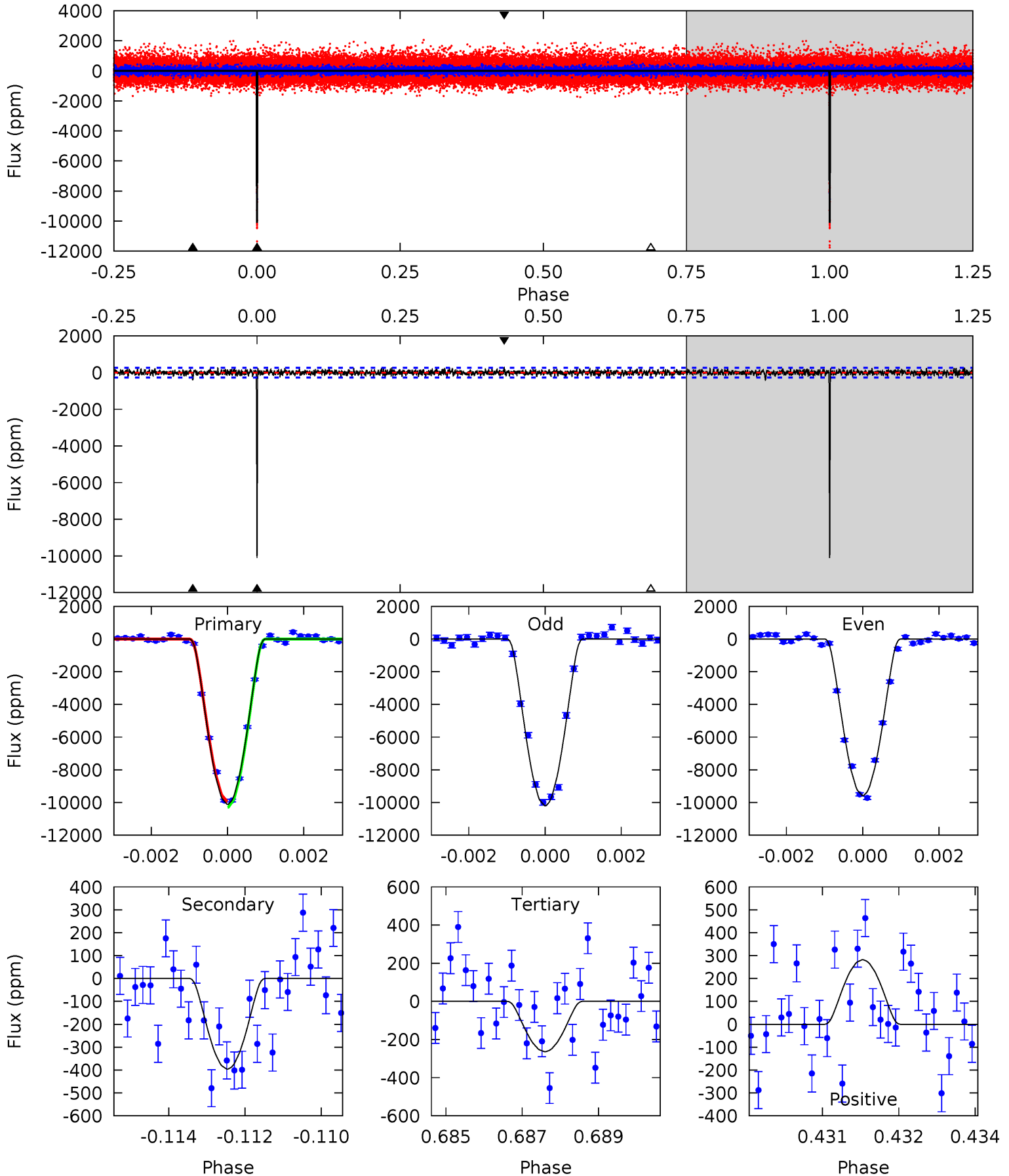
TCE 009902856-01 P=135.912993 Days  $T_0=141.412469$  (BKJD)



# DV Model-Shift Uniqueness Test

009902856-01, P = 135.912355 Days, E = 141.415682 Days

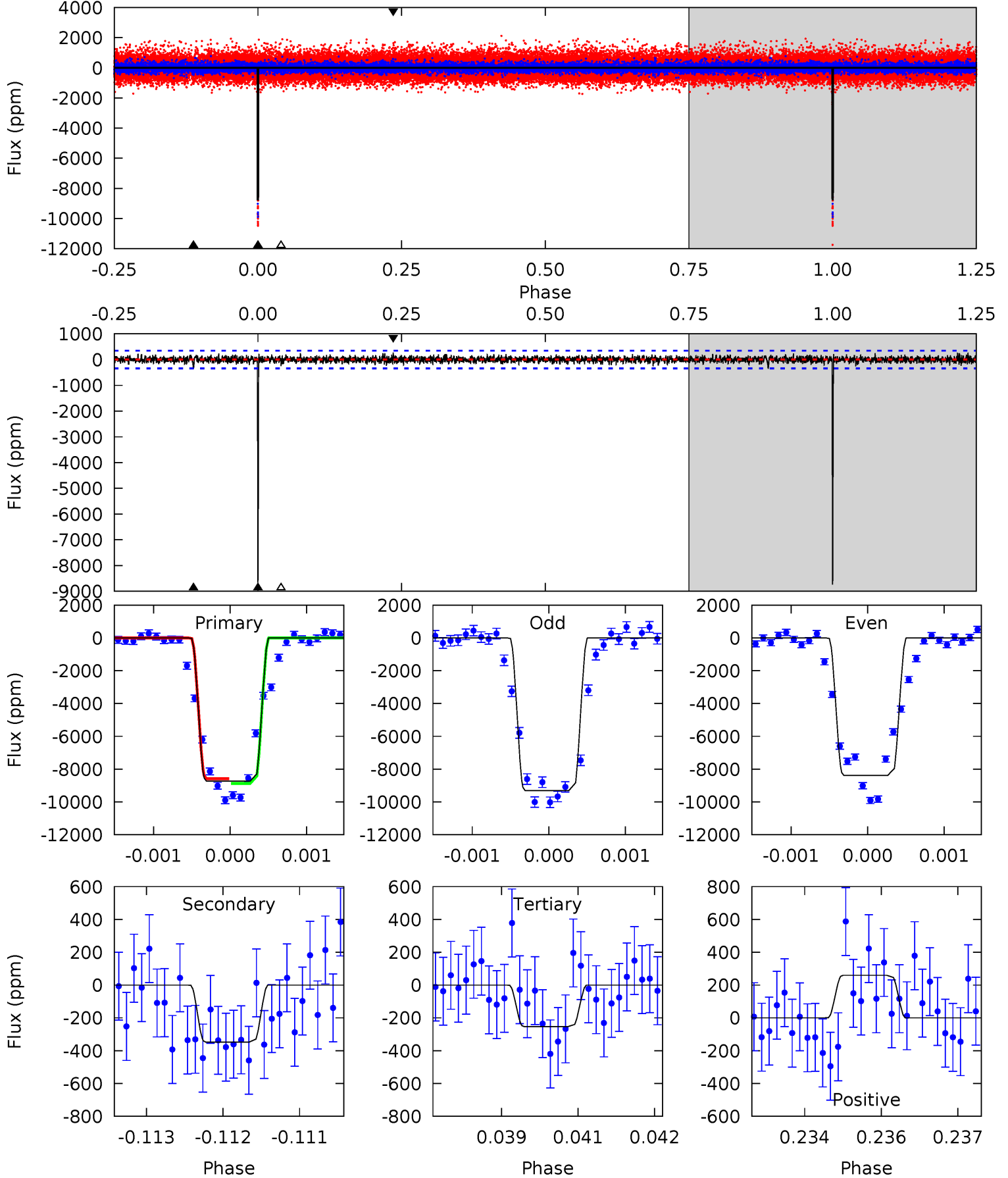
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
202.8	7.94	5.29	5.65	5.34	3.12	1.57	197.5	197.2	2.65	2.29	6.31	1.05	0.03	3.64



# Alt Model-Shift Uniqueness Test

009902856-01, P = 135.912993 Days, E = 141.412469 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
137.4	5.46	3.99	4.08	5.41	3.23	1.11	133.4	133.3	1.48	1.38	7.20	1.06	0.03	2.20



### Stellar Parameters For KIC 009902856

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6141^{+192}_{-213}$	$4.468^{+0.070}_{-0.210}$	$-0.300^{+0.300}_{-0.300}$	$0.959^{+0.293}_{-0.104}$	$0.982^{+0.140}_{-0.115}$	$1.568^{+0.449}_{-0.829}$
	+3%/-3%	+2%/-5%	+100%/-100%	+31%/-11%	+14%/-12%	+29%/-53%
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 009902856-01 / KOI 1556.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-396 \pm 50$	$14.98^{+4.87}_{-4.40}$	$525^{+40}_{-29}$	$3004^{+335}_{-215}$	$260^{+246}_{-113}$
Alt.	$-347 \pm 64$	$10.94^{+4.59}_{-4.26}$	$526^{+37}_{-28}$	$3226^{+526}_{-310}$	$417^{+647}_{-219}$

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

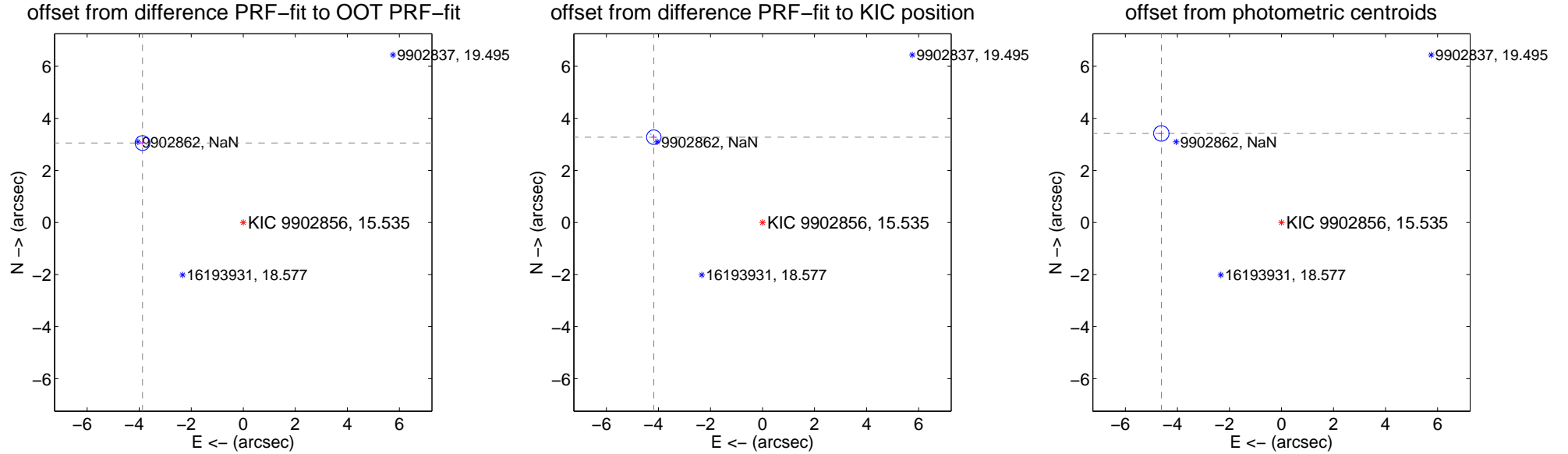
## DV Centroid Data

Supplemental centroid analysis for 009902856-01. Kepler magnitude: 15.54. Transit SNR 108.36

There are 4 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.45 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$4.929 \pm 0.094$	<b>52.28</b>	$3.871 \pm 0.106$	$3.051 \pm 0.072$
PRF-fit source offset from KIC position	$5.309 \pm 0.093$	<b>57.32</b>	$4.178 \pm 0.087$	$3.276 \pm 0.101$
photometric centroid source offset	$5.75 \pm 0.10$	<b>58.15</b>	$4.62 \pm 0.09$	$3.42 \pm 0.11$



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



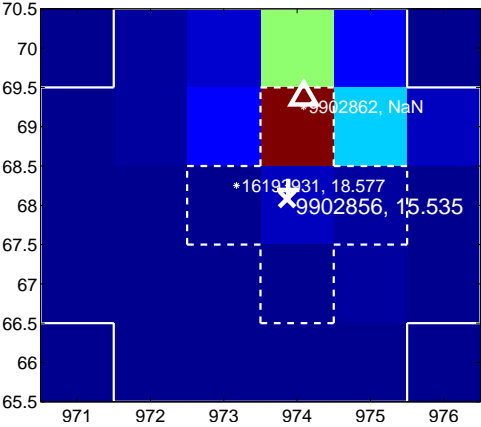
Q2 no difference image



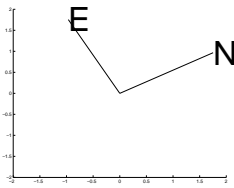
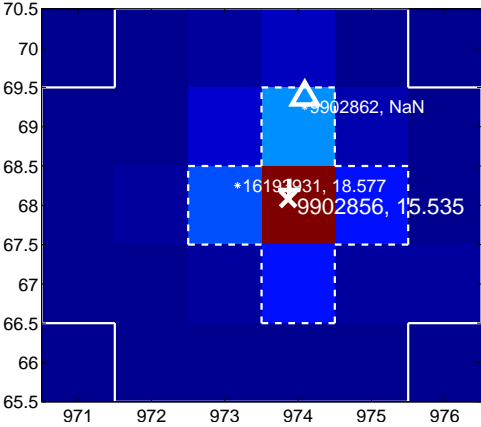
Q2 no OOT image



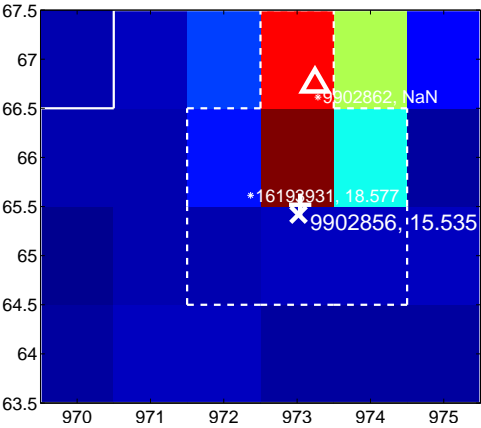
Q3 difference image



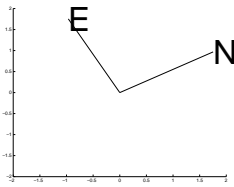
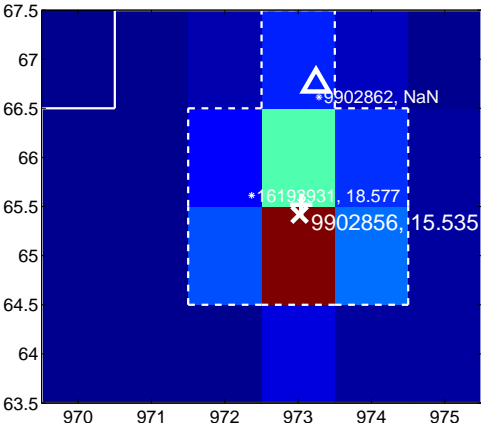
Q3 OOT image



Q4 difference image



Q4 OOT image

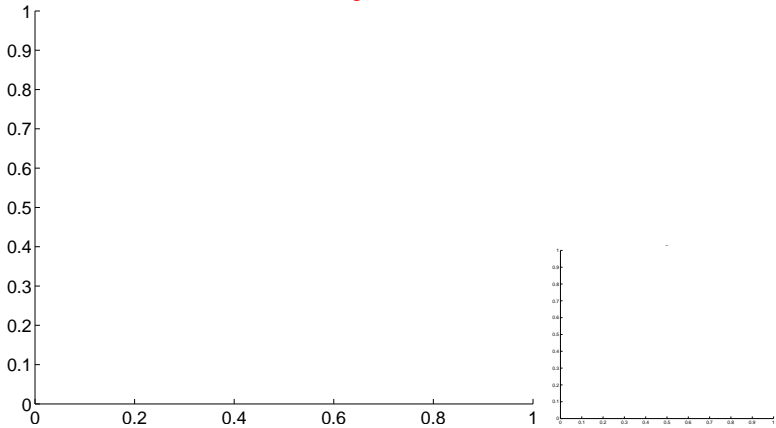


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

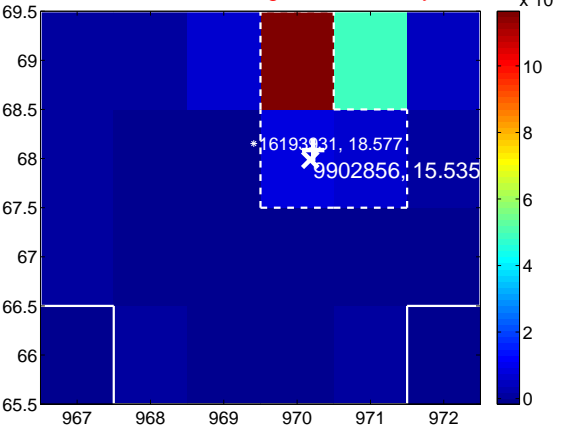
Q5 no difference image



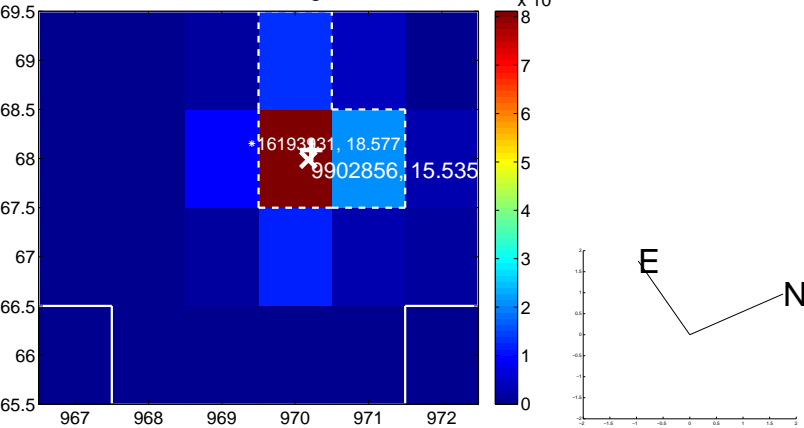
Q5 no OOT image



Q6 difference image. Poor Quality



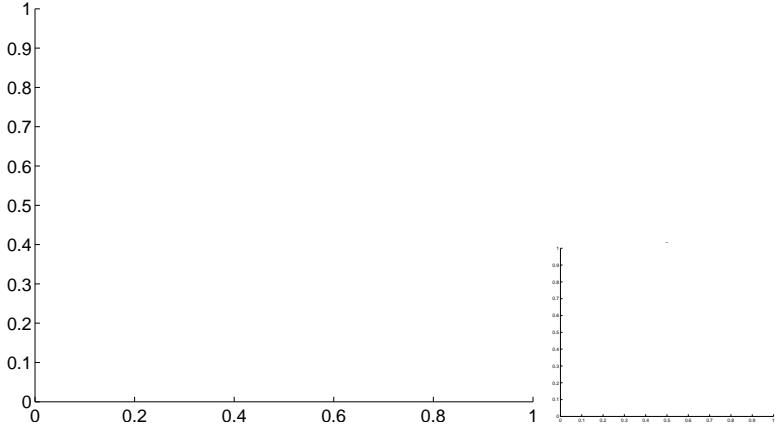
Q6 OOT image



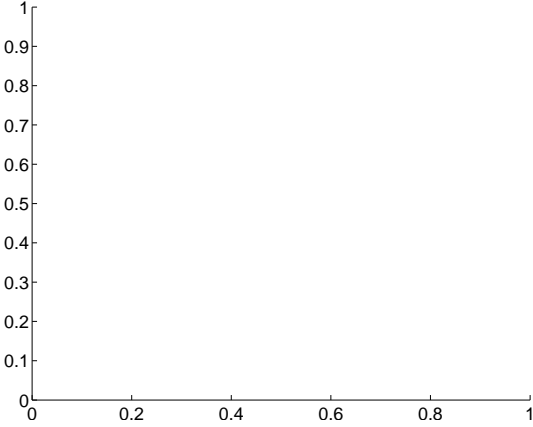
Q7 no difference image



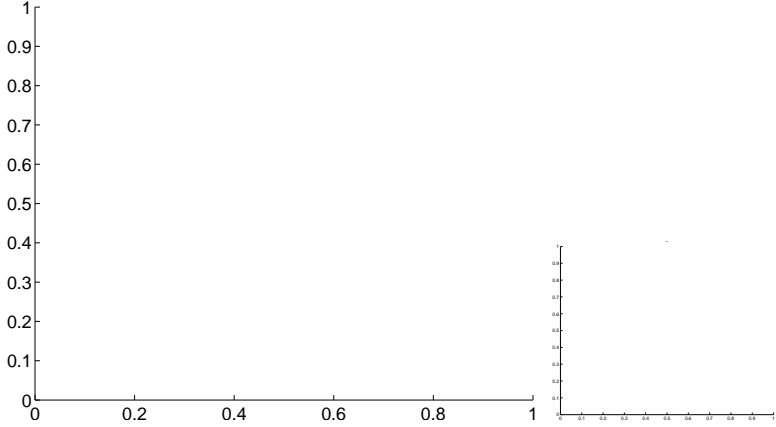
Q7 no OOT image



Q8 no difference image

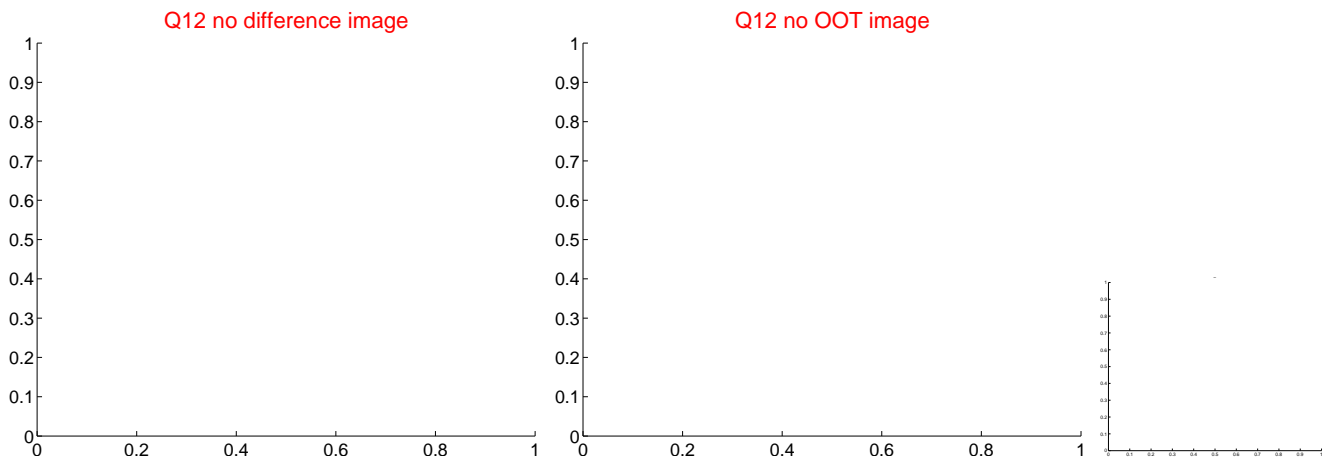
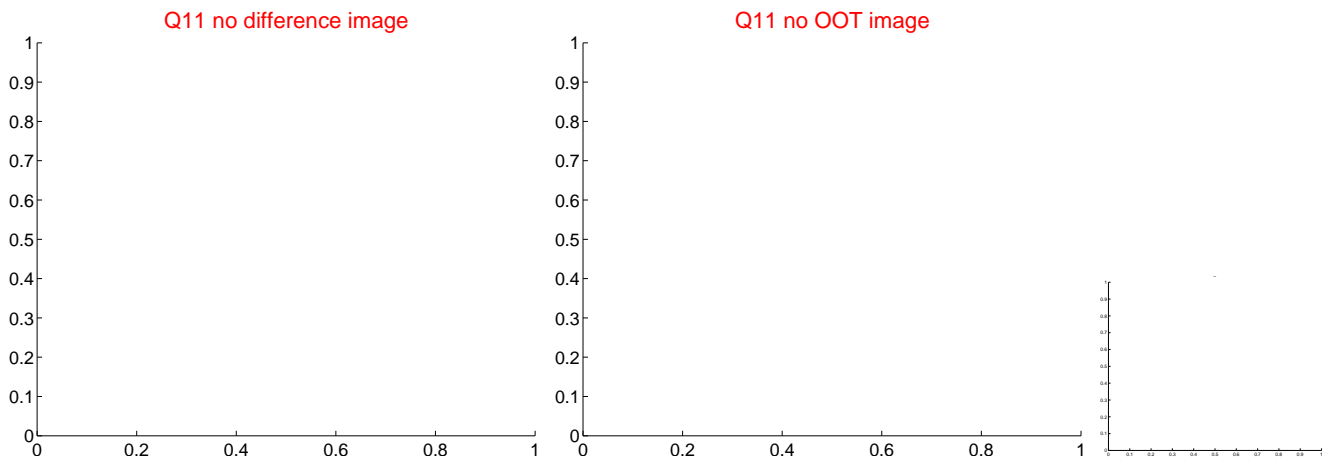
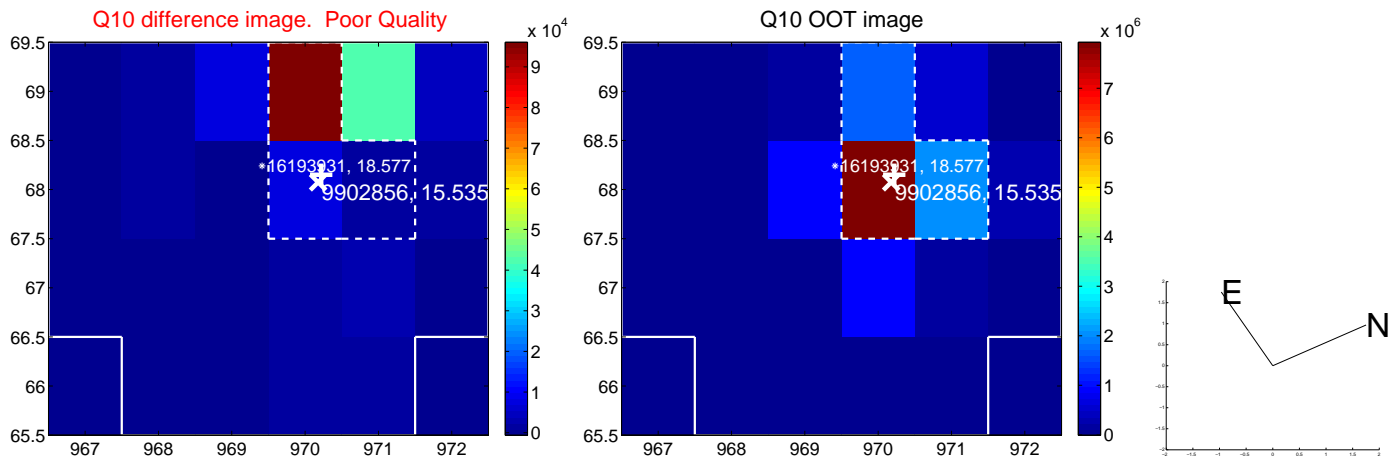
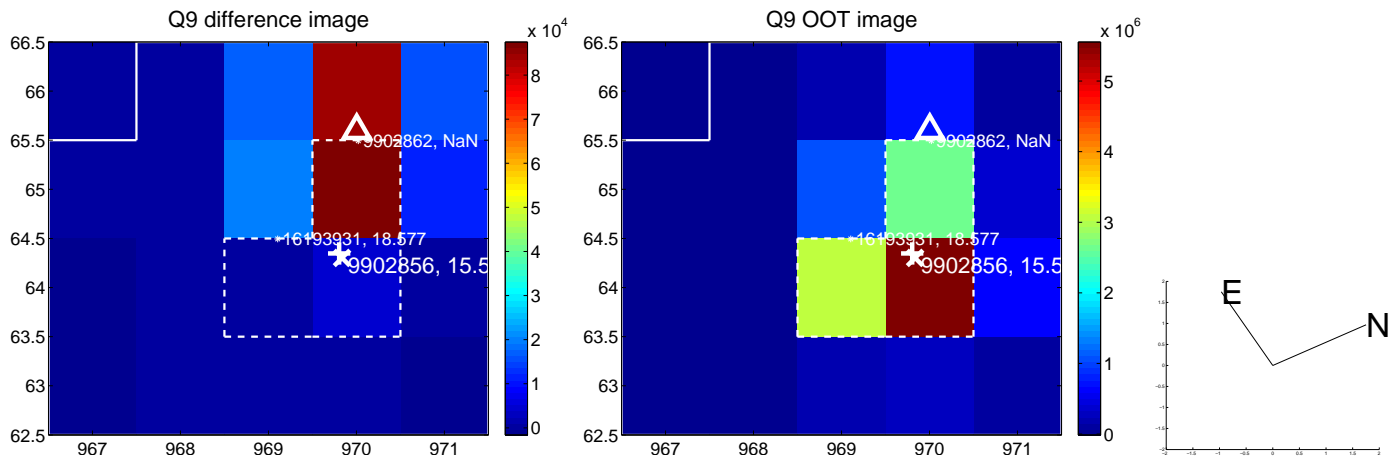


Q8 no OOT image





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



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

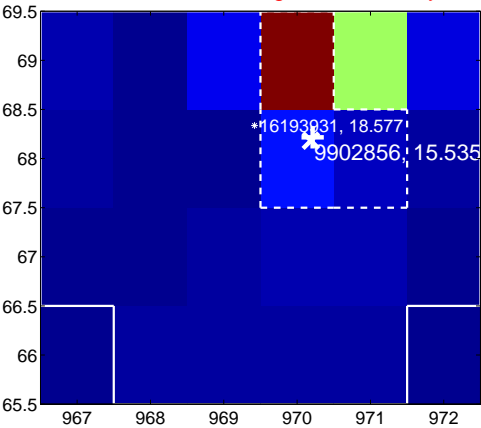
Q13 no difference image



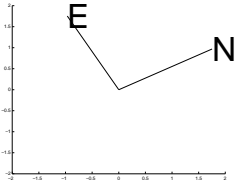
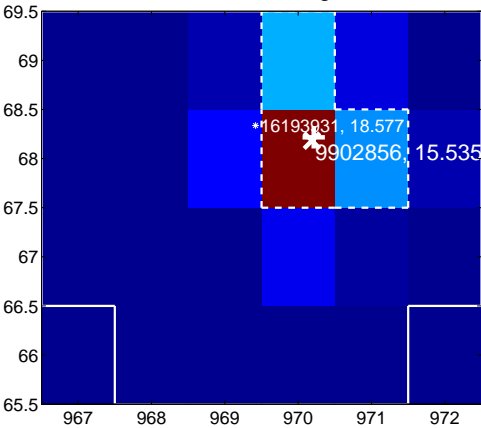
Q13 no OOT image



Q14 difference image. Poor Quality



Q14 OOT image



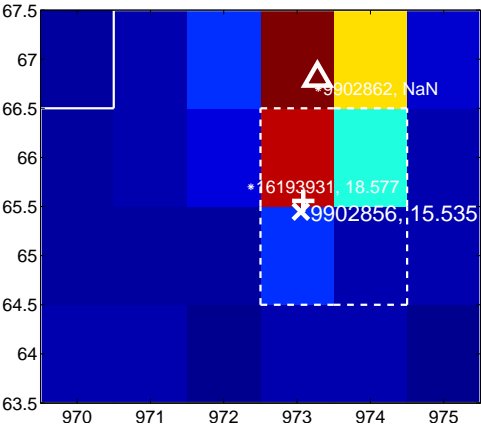
Q15 no difference image



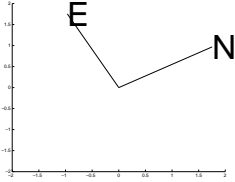
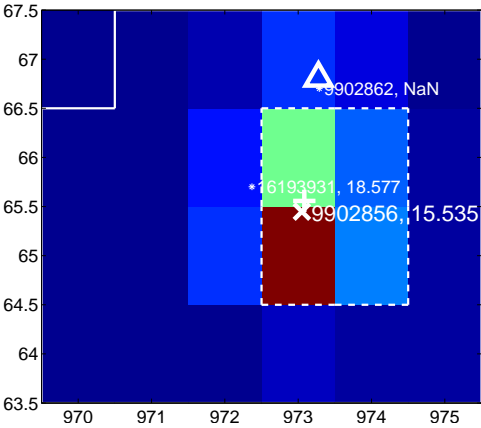
Q15 no OOT image



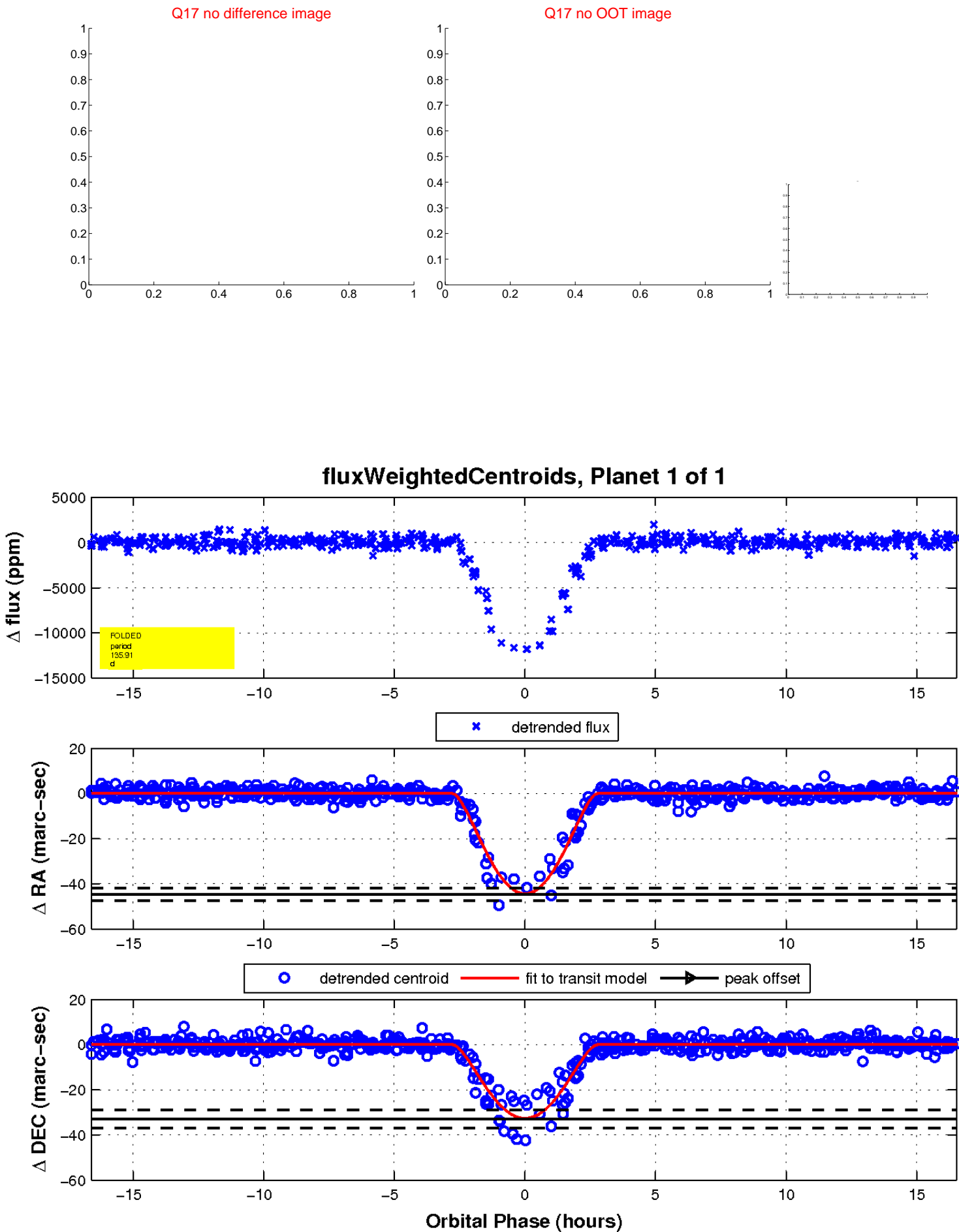
Q16 difference image



Q16 OOT image



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



UKIRT Image

Declination

