

# KIC 009159131

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009159131-01	OBS	No	525.574876	342.391951	185.5	5.327	7.3	6.9	1.26	6647	1.87	1.54

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009159131-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—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.

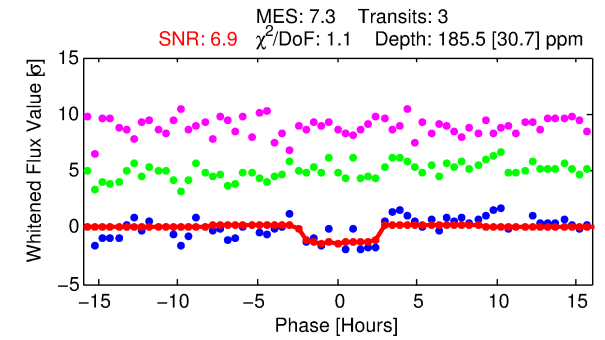
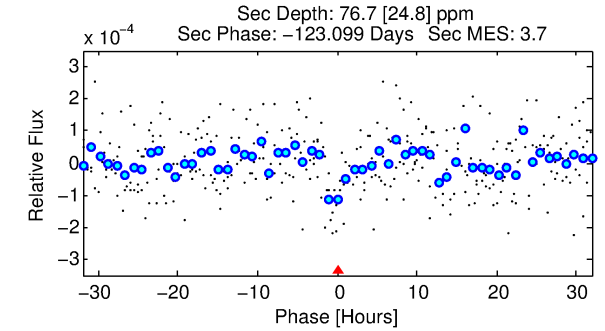
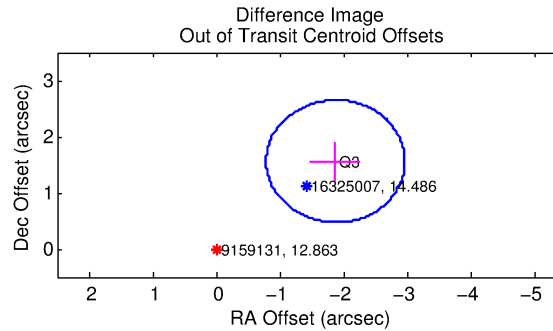
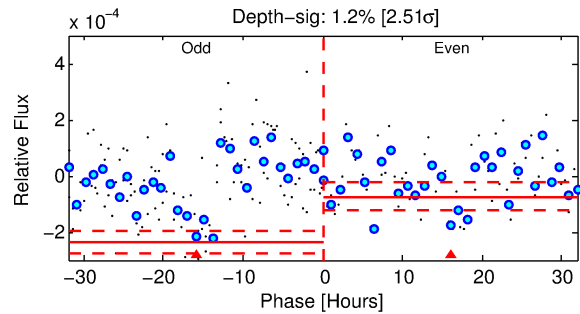
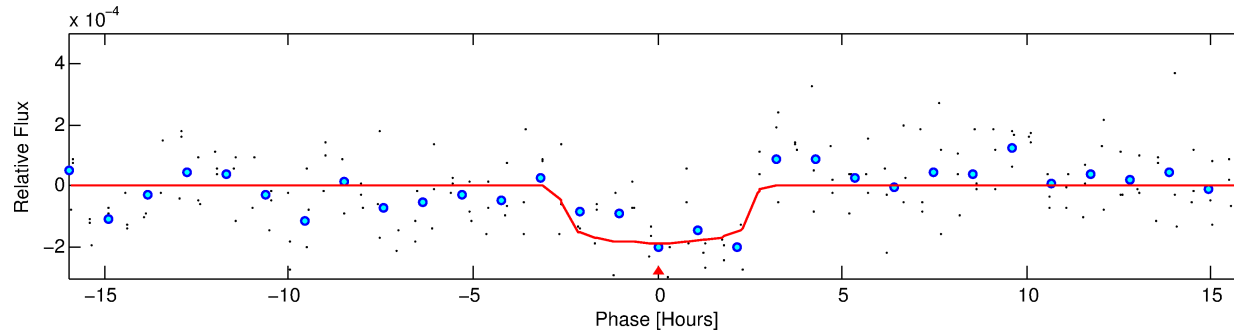
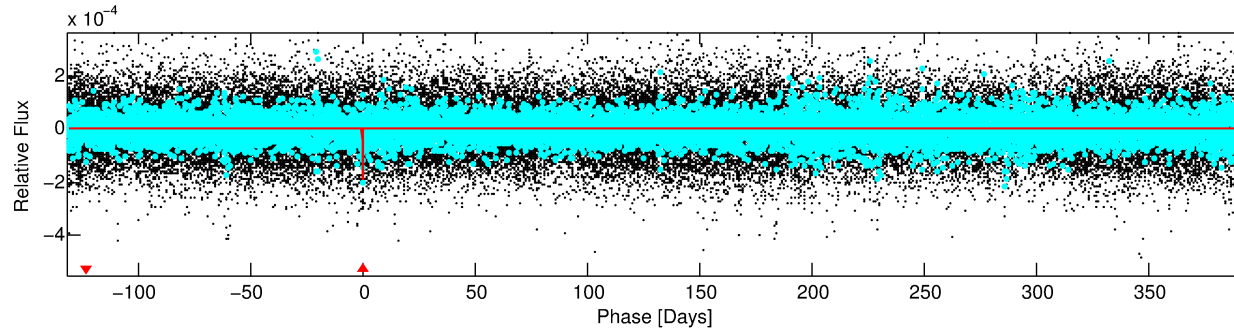
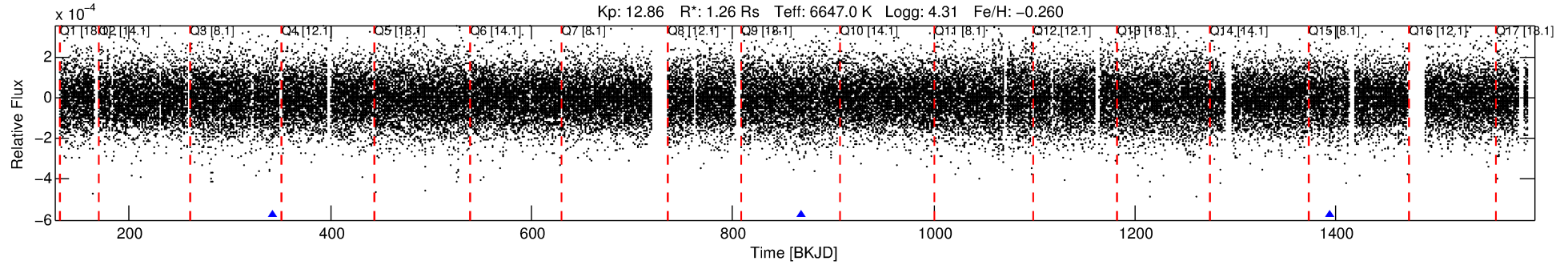
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009159131-01

No Significant Match Found

# DV One-Page Summary

KIC: 9159131 Candidate: 1 of 1 Period: 525.575 d



## DV Fit Results:

Period = 525.57488 [0.00976] d  
Epoch = 342.3920 [0.0131] BKJD  
Rp/R\* = 0.0136 [0.0141]  
a/R\* = 512.00 [3031.52]  
b = 0.75 [3.45]  
Seff = 1.54 [0.46]  
Teq = 284 [21] K  
Rp = 1.87 [1.99] Re  
a = 1.3485 [0.2375] AU  
Ag = 21897.46 [46447.83] [0.47 $\sigma$ ]  
Teffp = 5342 [2820] K [1.79 $\sigma$ ]

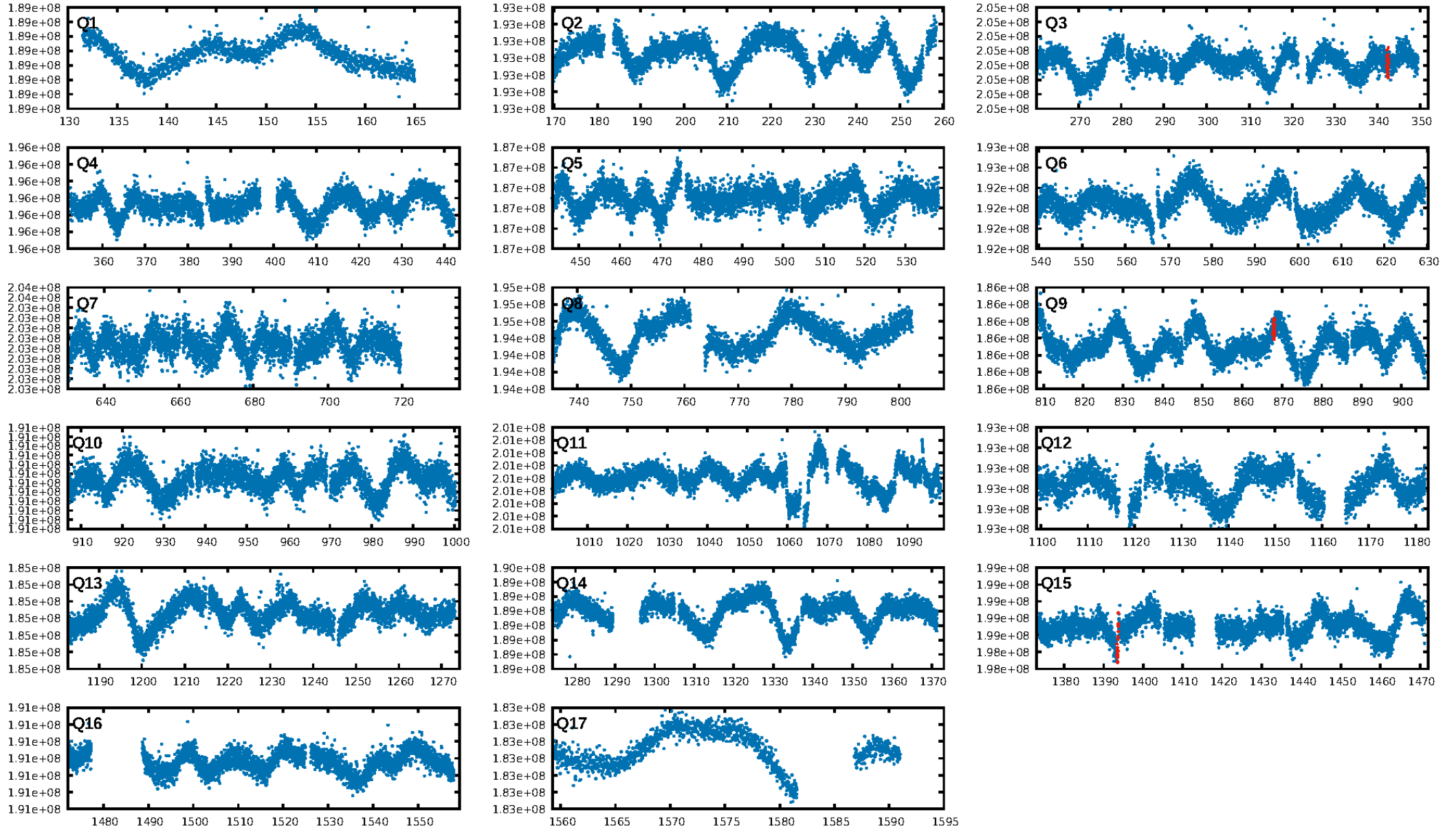
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 7.8%  
ModelChiSquareGof-sig: 90.7%  
Bootstrap-pfa: 1.36e-13  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -1.286  
Centroid-sig: 12.1%  
Centroid-so: 1.648 arcsec [1.17 $\sigma$ ]  
OotOffset-rm: 2.441 arcsec [6.72 $\sigma$ ]  
KicOffset-rm: 2.333 arcsec [6.37 $\sigma$ ]  
OotOffset-st: 0/1/0/0 [1]  
KicOffset-st: 0/1/0/0 [1]  
DiffImageQuality-fgm: 1.00 [1/1]  
DiffImageOverlap-fno: 1.00 [2/2]

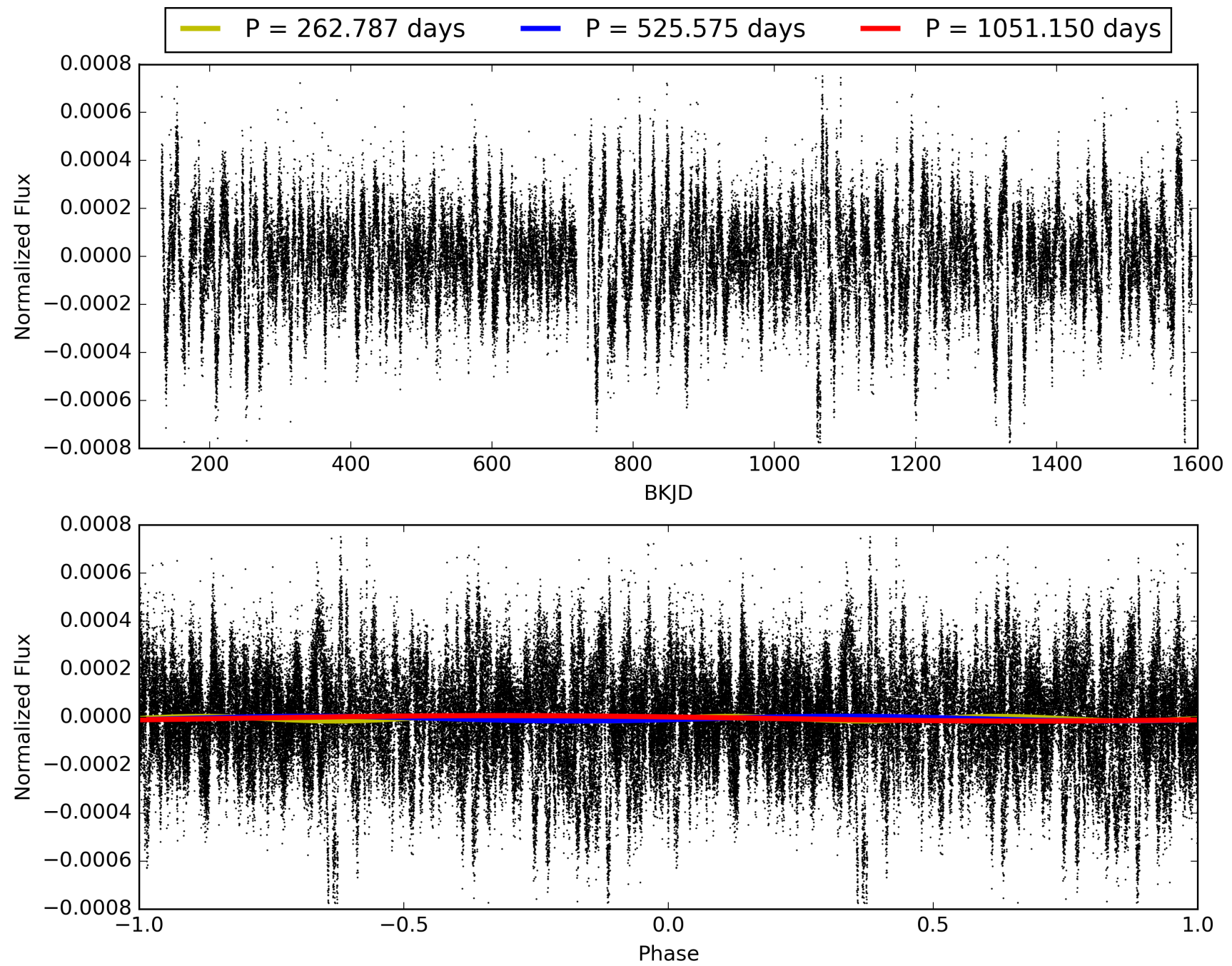
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 14:50:38 Z

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

# TCE 009159131-01, PDC Light Curves

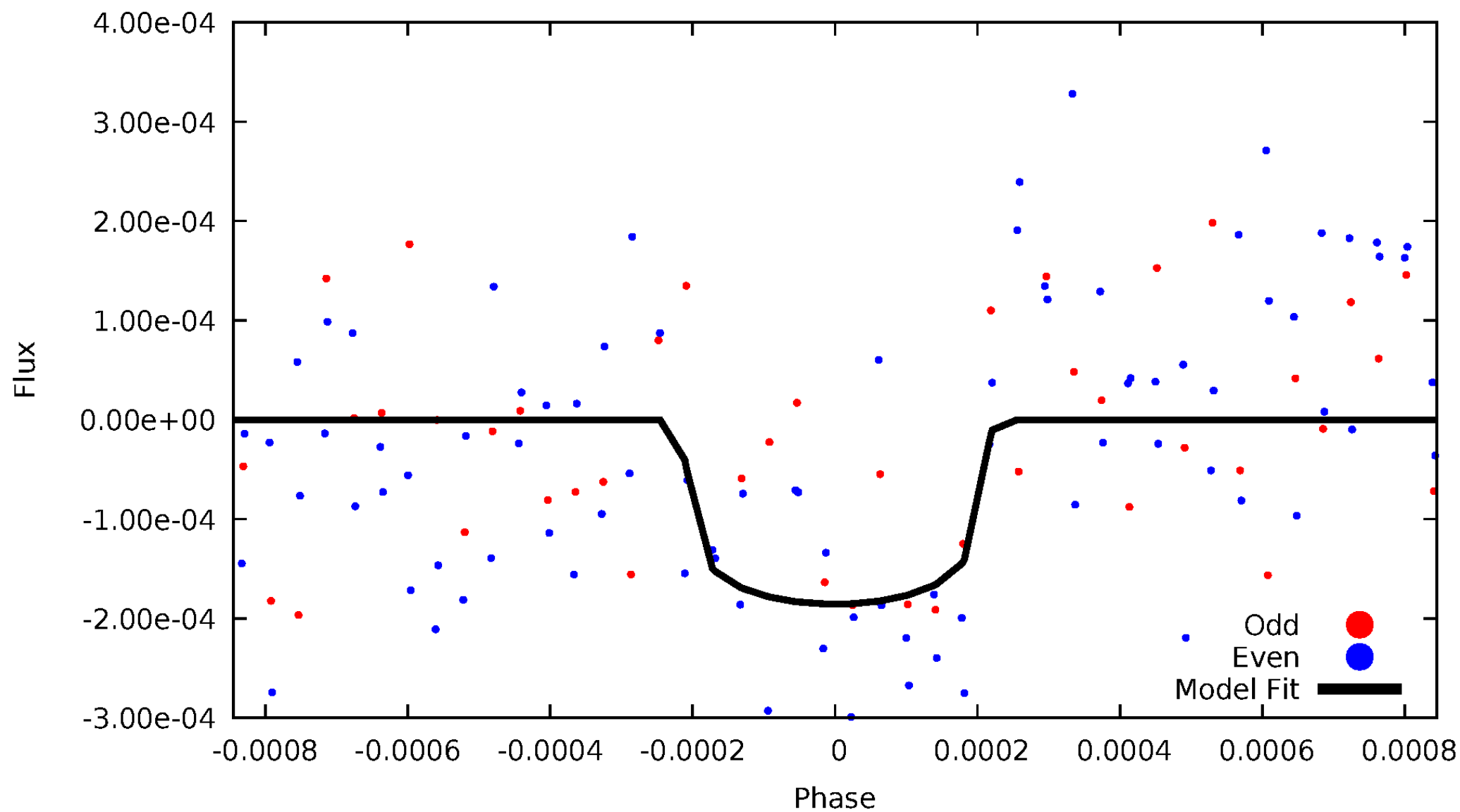


TCE 009159131-01



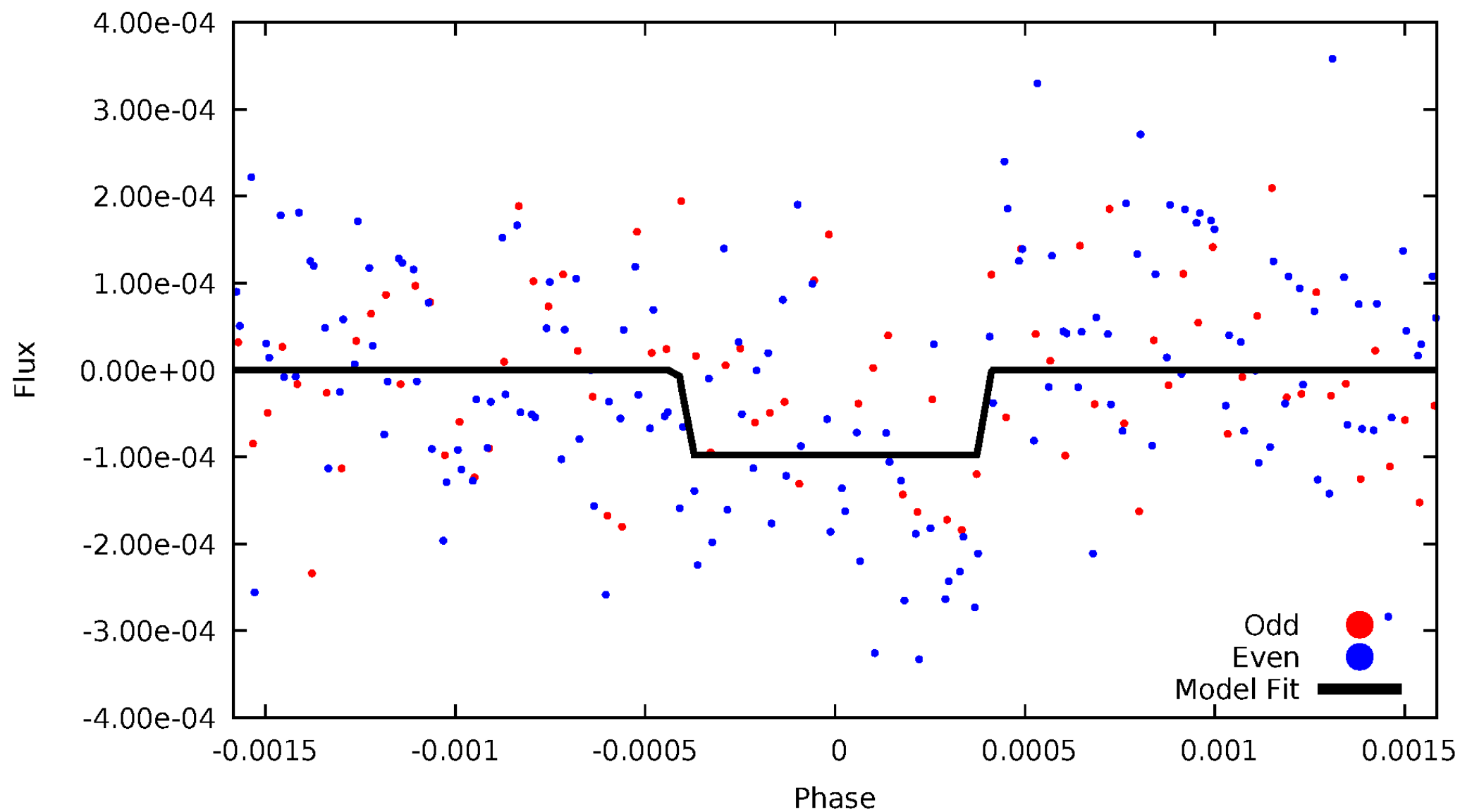
# DV Odd/Even

TCE 009159131-01



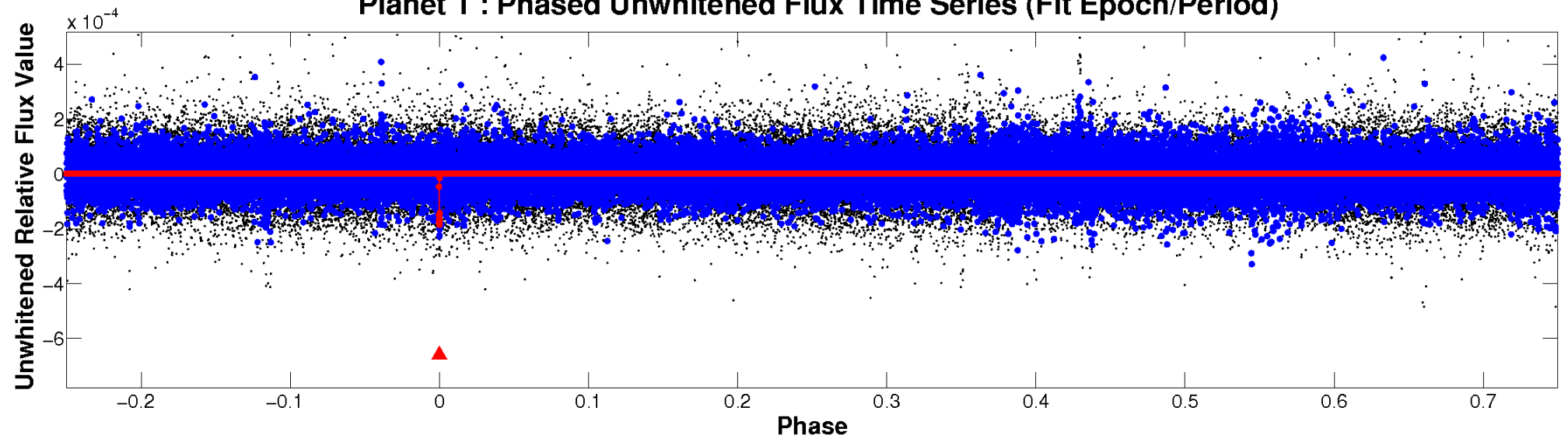
# ALT Odd/Even

TCE 009159131-01

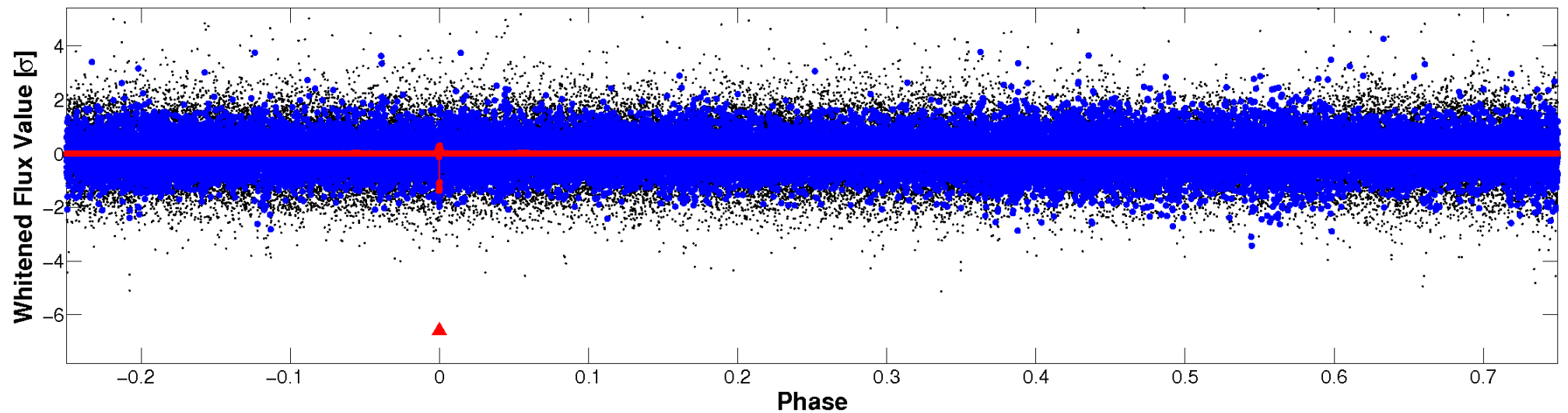


# Non-Whitened Vs. Whitened Light Curve

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



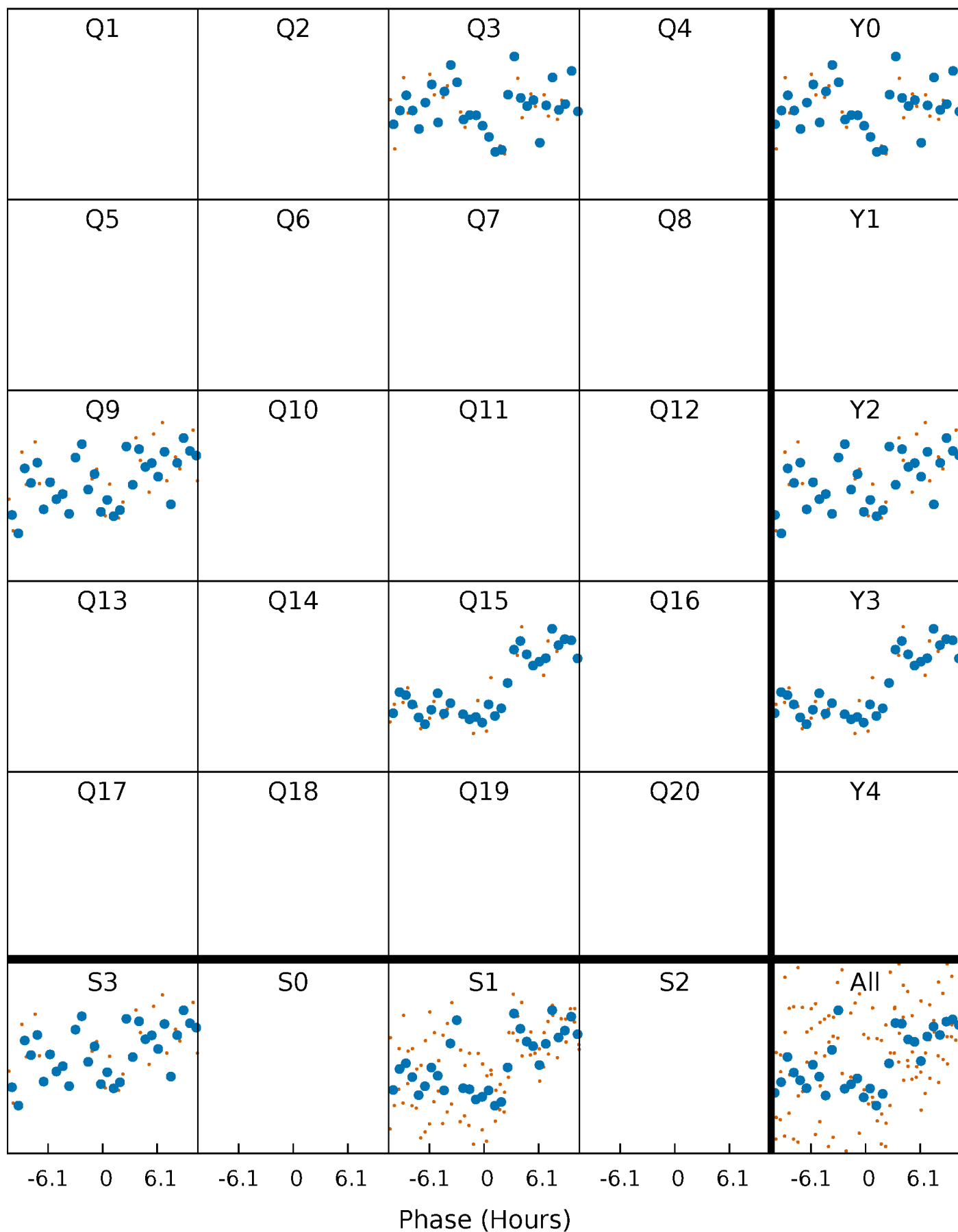
**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**





# PDC Quarter-Phased Transit Curves

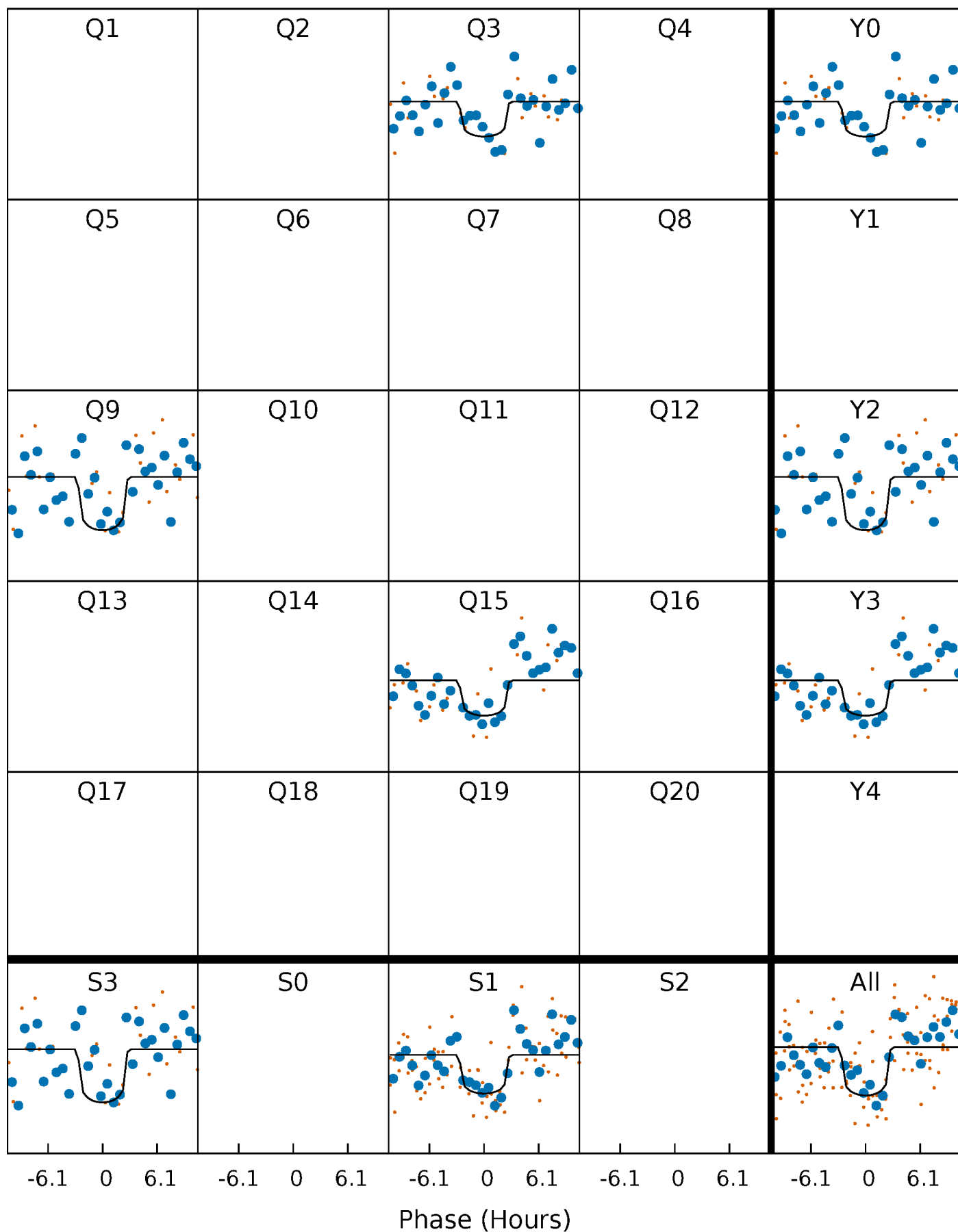
TCE 009159131-01 P=525.574876 Days  $T_0=342.391951$  (BKJD)





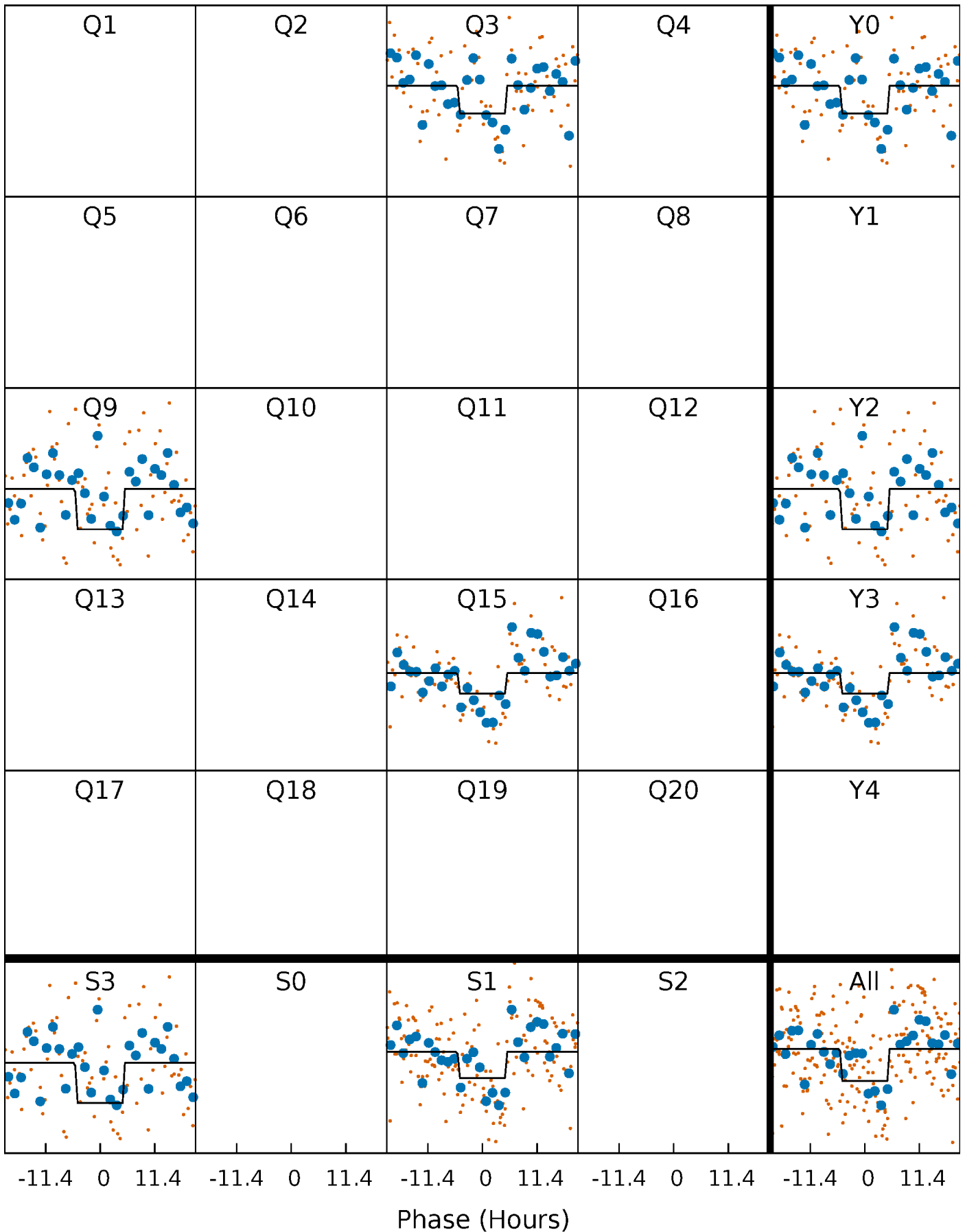
# DV Quarter-Phased Transit Curves

TCE 009159131-01   P=525.574876 Days    $T_0=342.391951$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

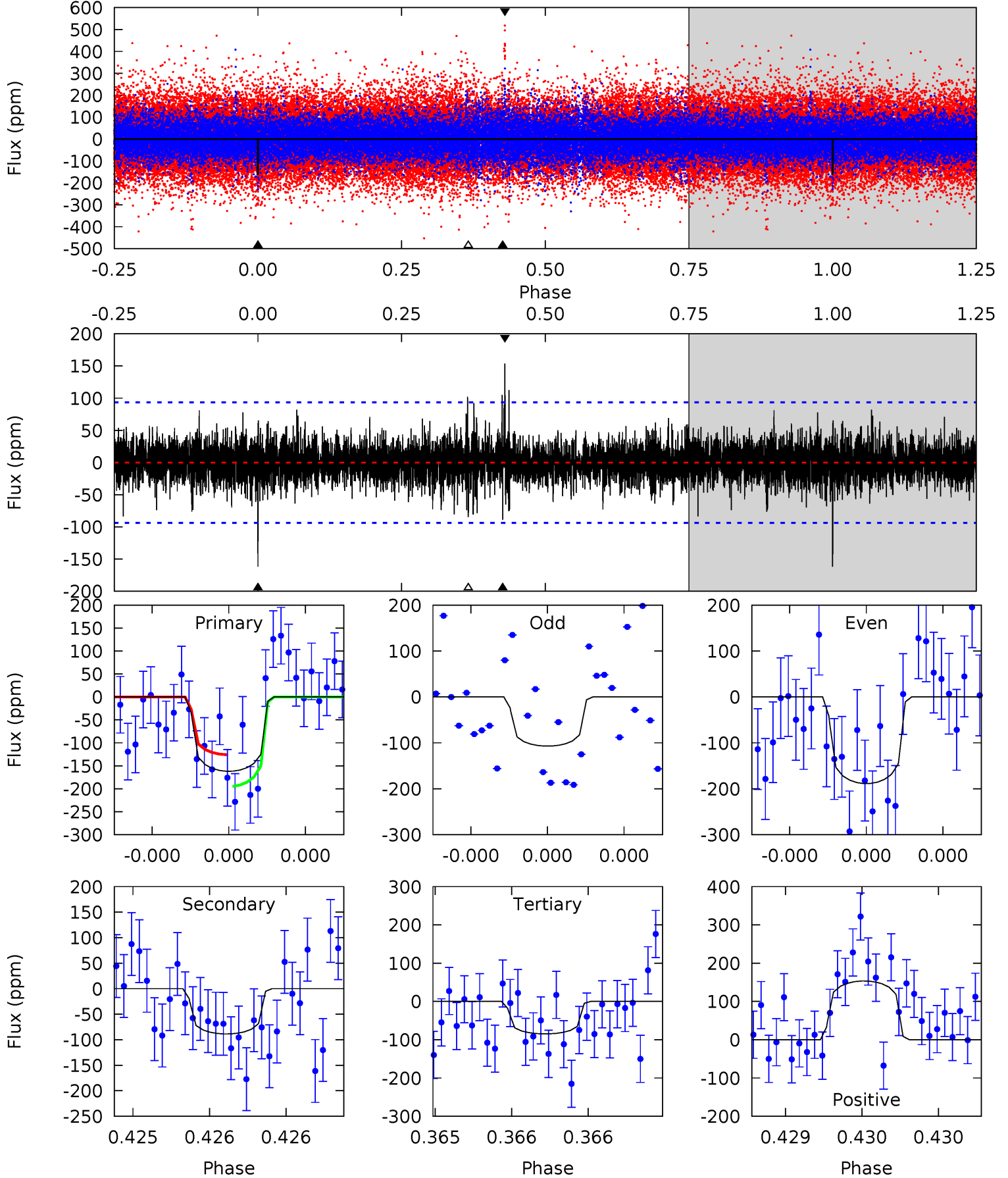
TCE 009159131-01 P=525.571597 Days  $T_0=342.293979$  (BKJD)



# DV Model-Shift Uniqueness Test

009159131-01, P = 525.574876 Days, E = 342.391951 Days

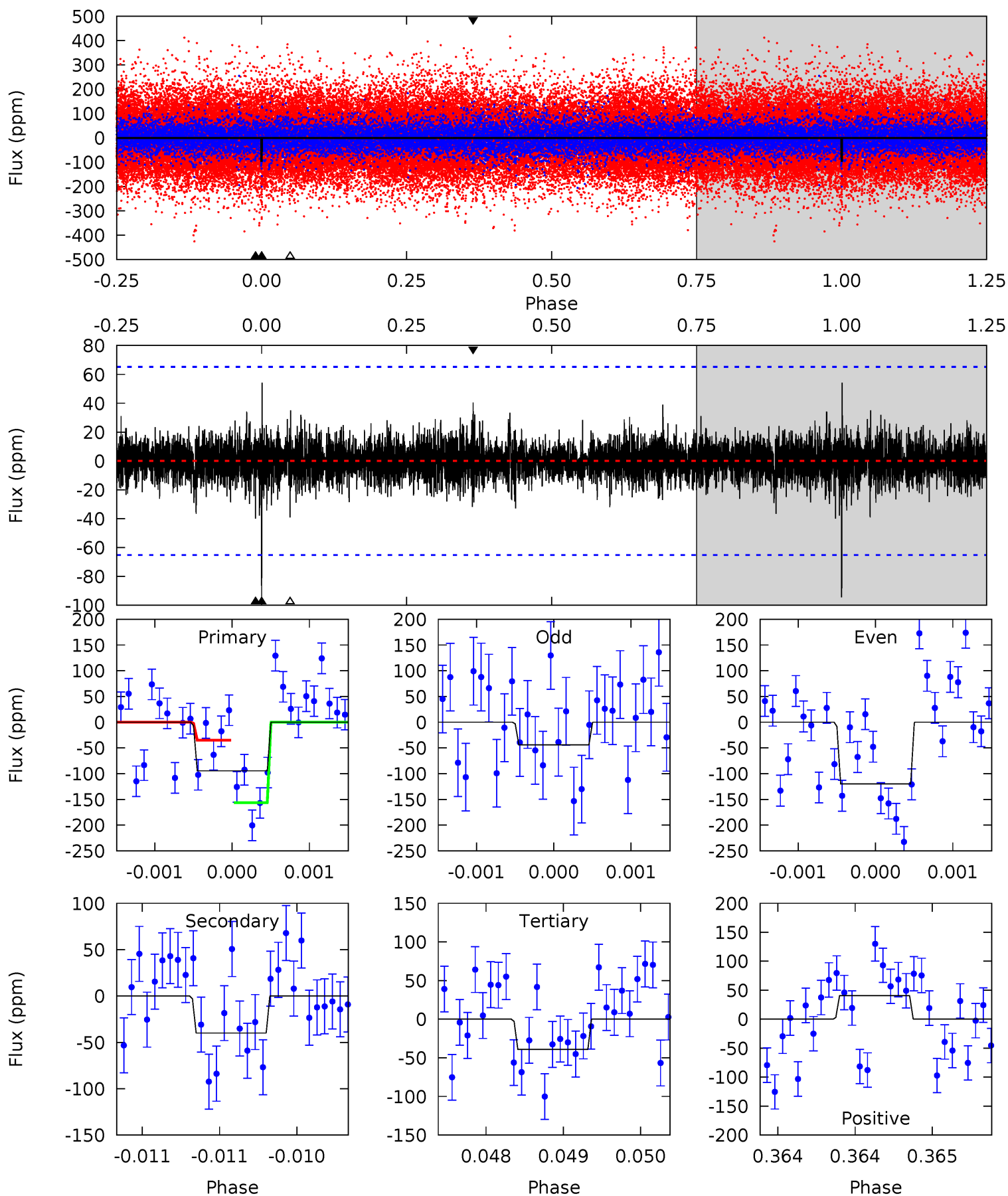
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.68	5.30	5.06	9.18	5.60	3.52	1.27	4.61	0.50	0.24	-3.88	2.34	0.86	0.49	2.06



# Alt Model-Shift Uniqueness Test

009159131-01, P = 525.571597 Days, E = 342.293979 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
7.96	3.36	3.29	3.40	5.49	3.35	0.75	4.66	4.55	0.07	-0.04	3.01	1.38	0.36	5.12



### Stellar Parameters For KIC 009159131

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6647^{+186}_{-255}$	$4.307^{+0.092}_{-0.138}$	$-0.260^{+0.250}_{-0.300}$	$1.265^{+0.267}_{-0.178}$	$1.189^{+0.142}_{-0.174}$	$0.827^{+0.398}_{-0.337}$
	+3%/-4%	+2%/-3%	+96%/-115%	+21%/-14%	+12%/-15%	+48%/-41%
Source	PHO1	FLK73	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 009159131-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-89 \pm 17$	$2.27^{+1.95}_{-1.42}$	$398^{+22}_{-21}$	$5113^{+3713}_{-1094}$	$17052^{+116091}_{-12167}$
Alt.	$-40 \pm 12$	$1.99^{+1.72}_{-1.36}$	$400^{+23}_{-22}$	$4569^{+3408}_{-954}$	$9891^{+86583}_{-7180}$

$T_{max}$  = 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

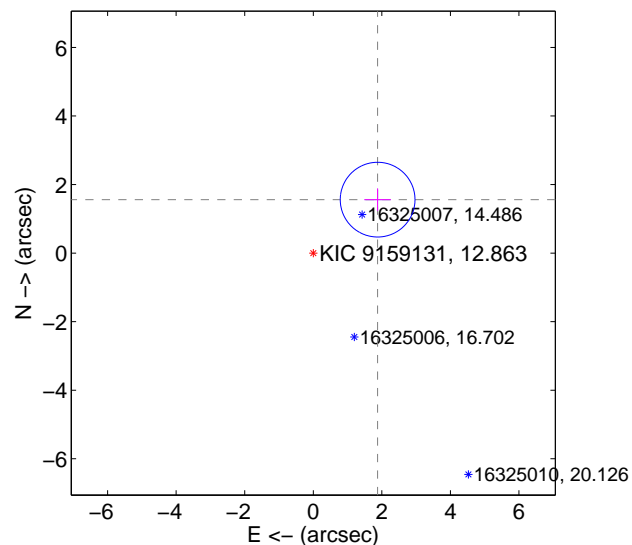
Supplemental centroid analysis for 009159131-01. Kepler magnitude: 12.86. Transit SNR 6.86

There are 1 quarters with good PRF difference image offsets

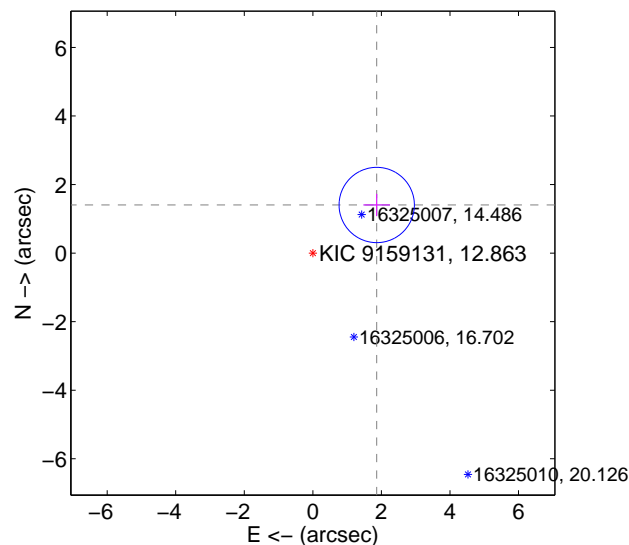
The direct PRF centroid is offset from the target star catalog position by about 0.16 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.441 \pm 0.363$	6.72	$-1.877 \pm 0.387$	$1.559 \pm 0.326$
PRF-fit source offset from KIC position	$2.333 \pm 0.366$	6.37	$-1.864 \pm 0.387$	$1.404 \pm 0.326$
photometric centroid source offset	$1.65 \pm 1.41$	1.17	$1.55 \pm 1.40$	$0.56 \pm 1.47$

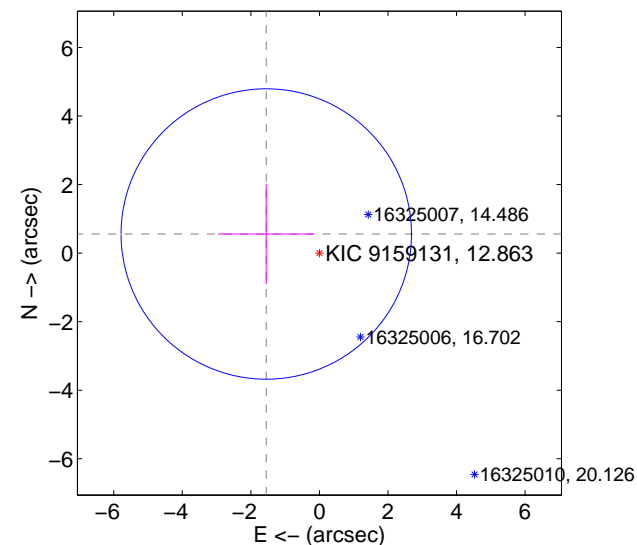
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



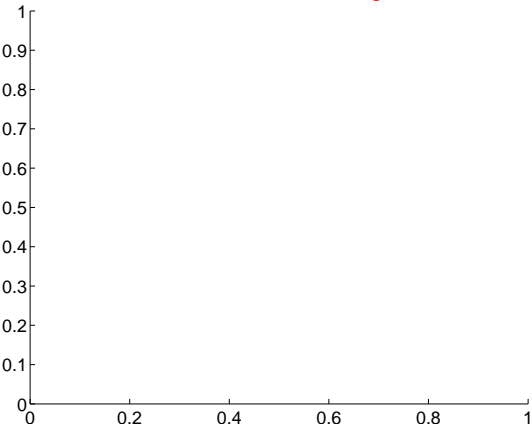
offset from photometric centroids



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.

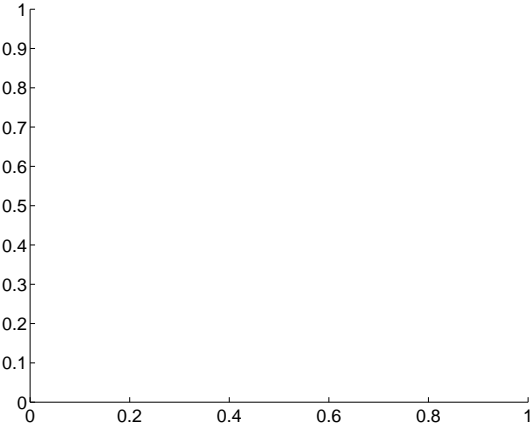
Q1 no difference image



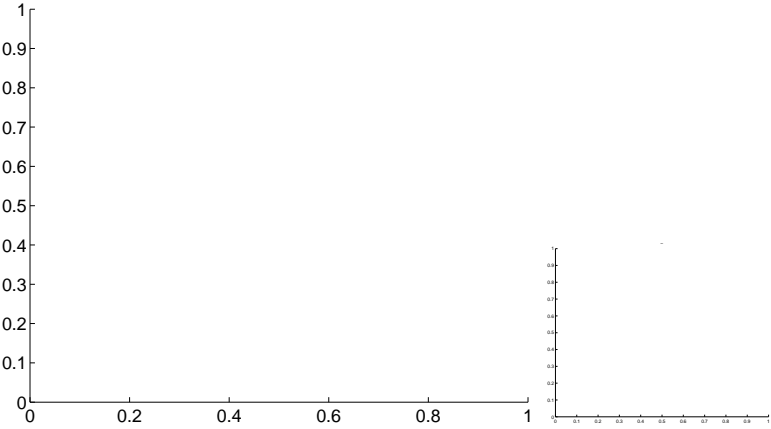
Q1 no OOT image



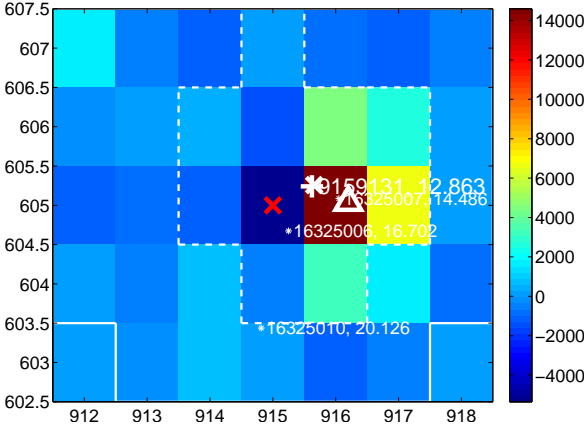
Q2 no difference image



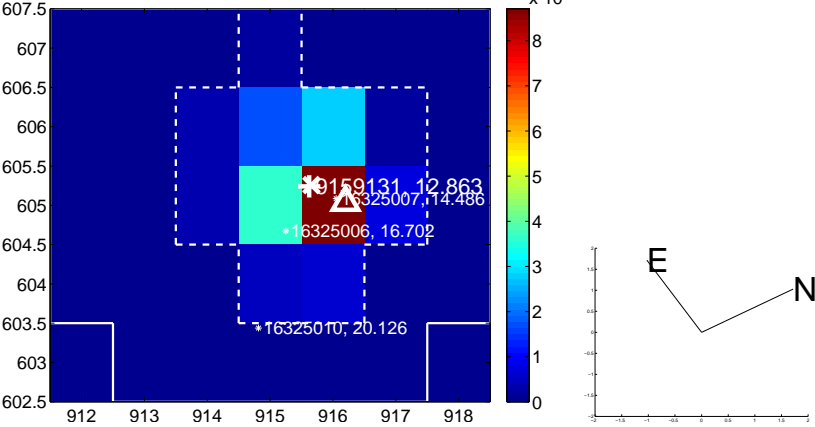
Q2 no OOT image



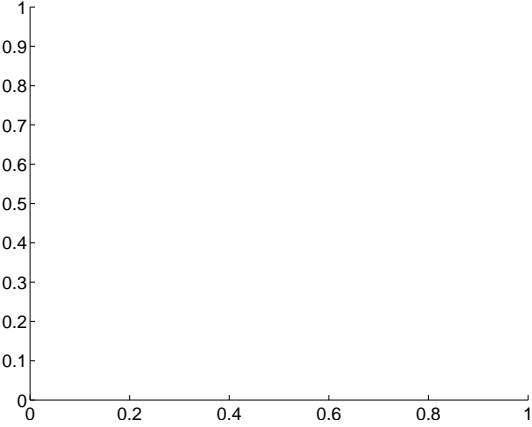
Q3 difference image



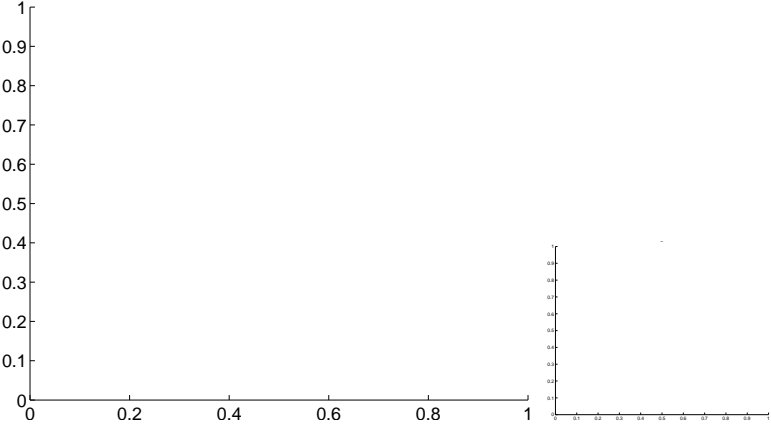
Q3 OOT image



Q4 no difference image

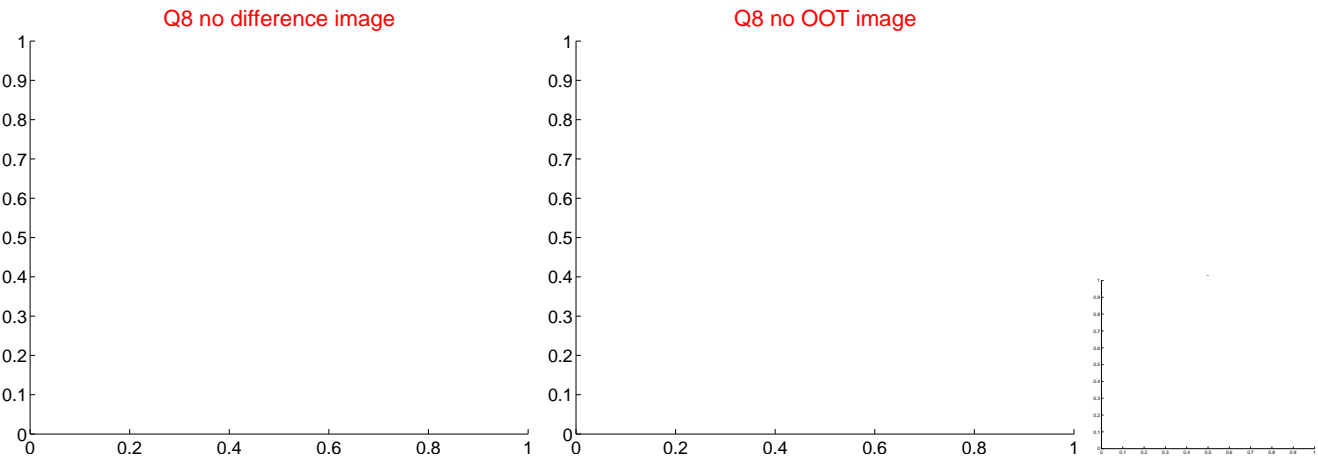
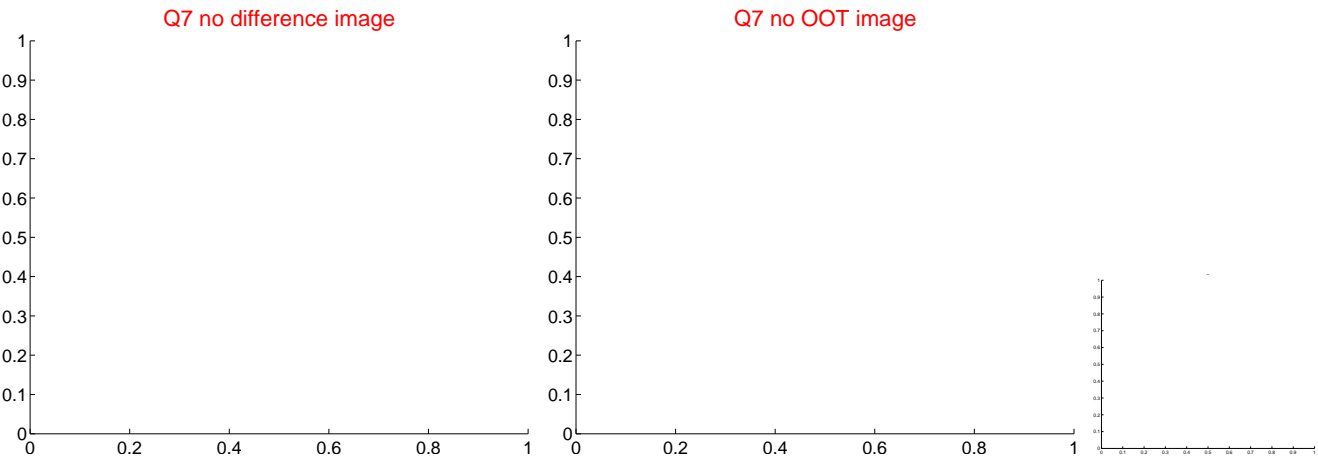
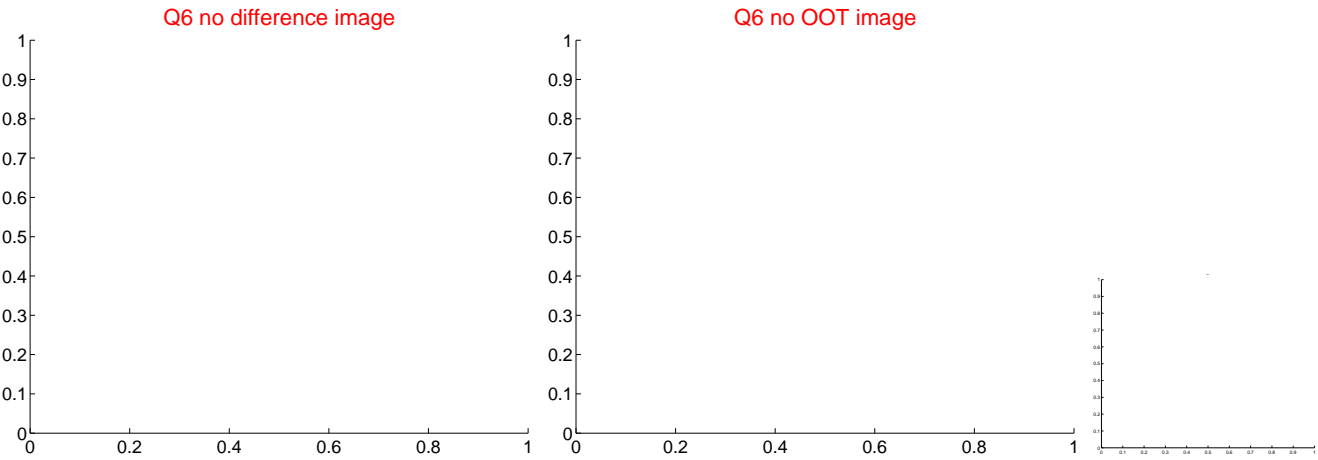
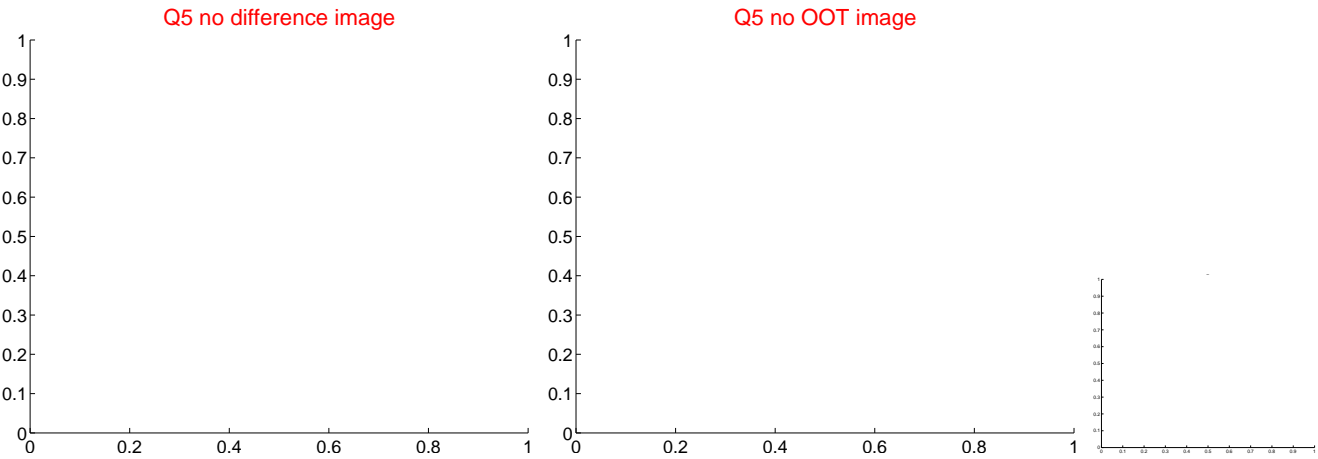


Q4 no OOT image

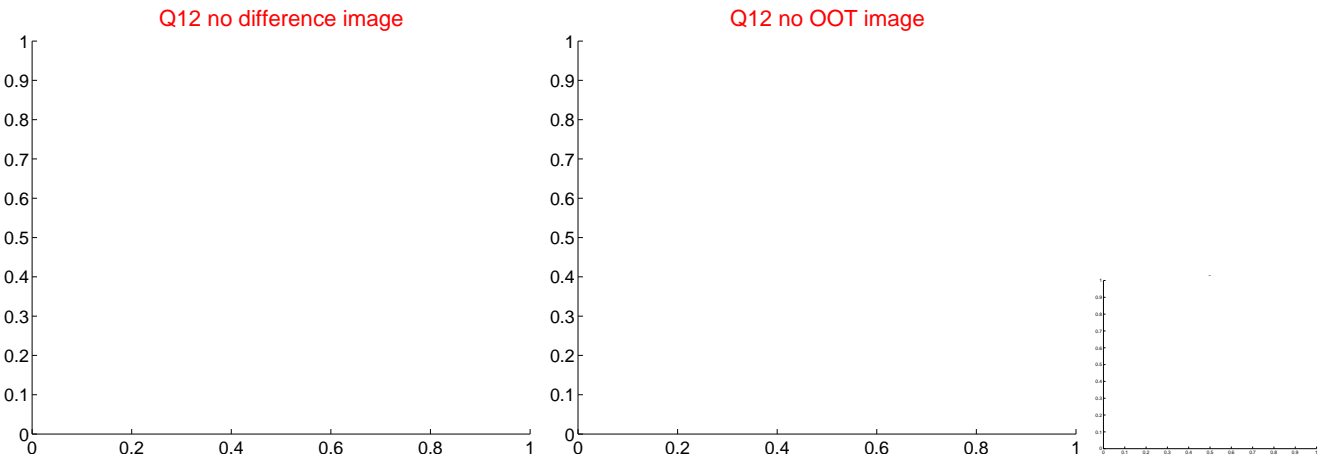
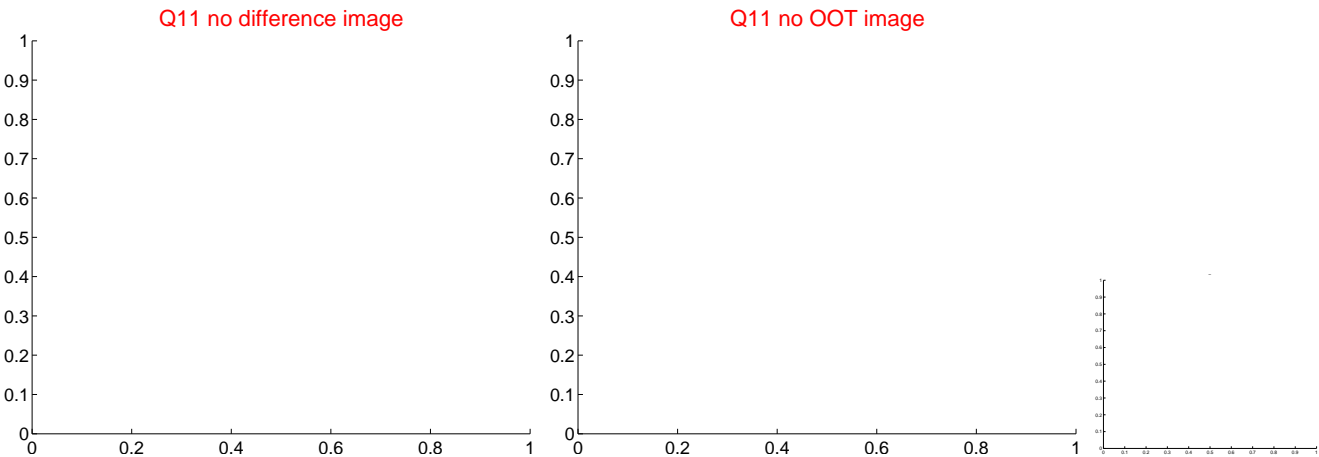
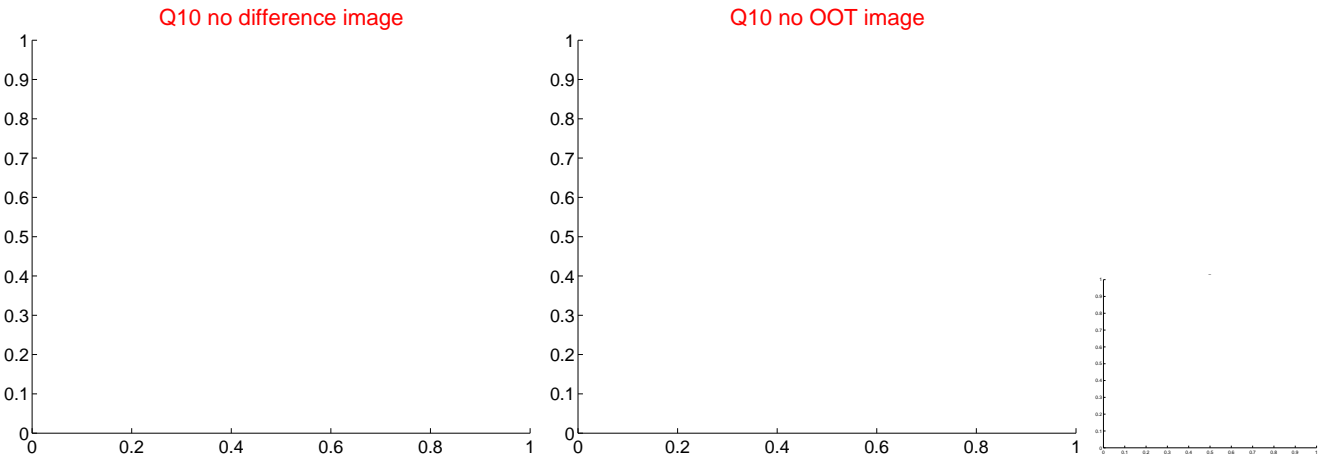
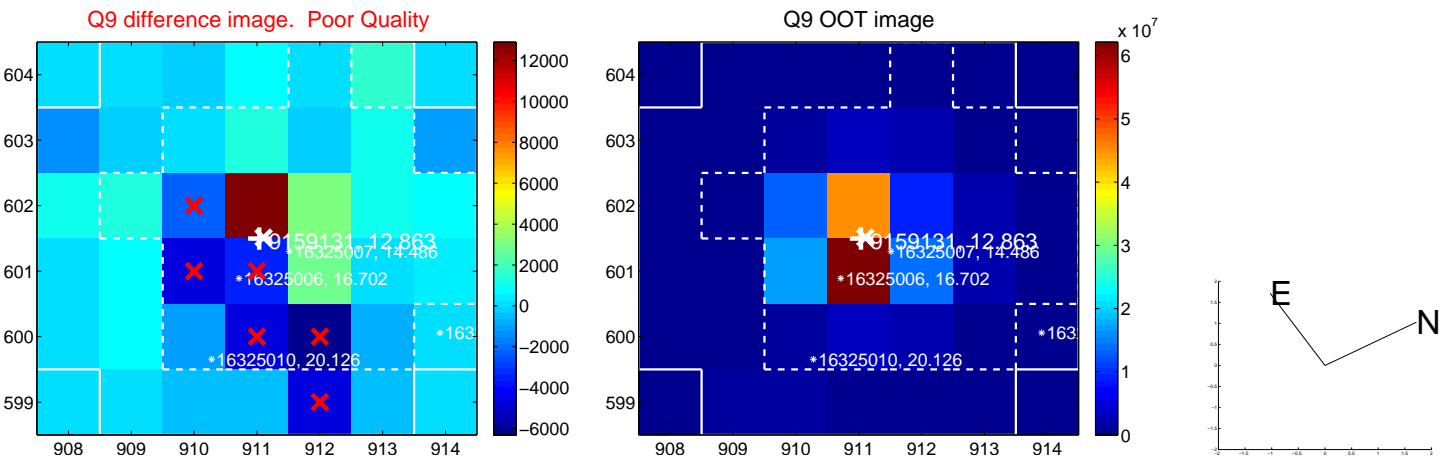




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



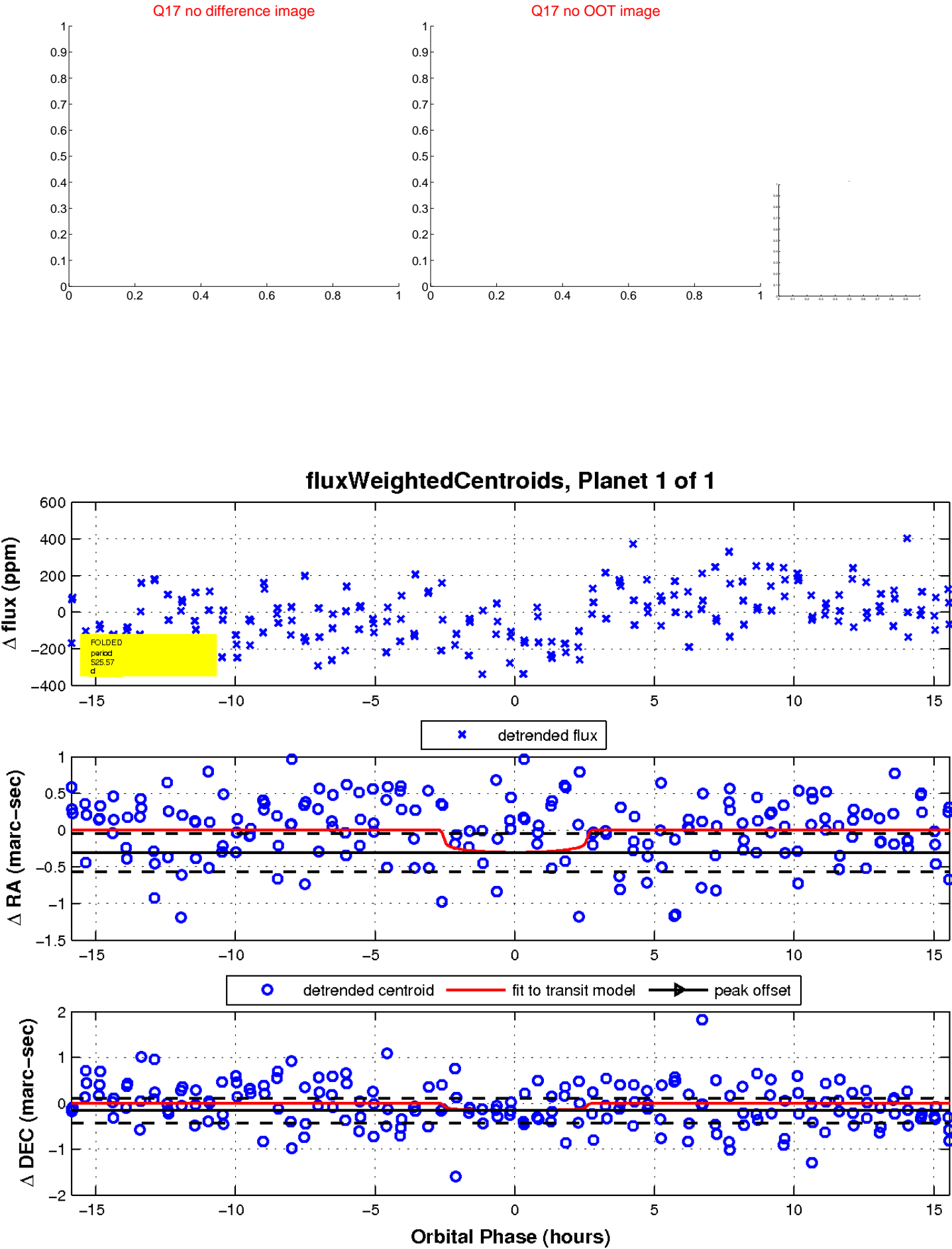
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



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



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



UKIRT Image

