

# KIC 006951231

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006951231-01	OBS	No	0.665527	132.108657	95.1	1.567	10.0	5.1	2.33	7222	2.64	39332.32
006951231-02	OBS	No	1.637286	132.302210	199.2	2.366	9.4	6.3	2.33	7222	3.82	11843.26

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006951231-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
006951231-02	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT

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

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

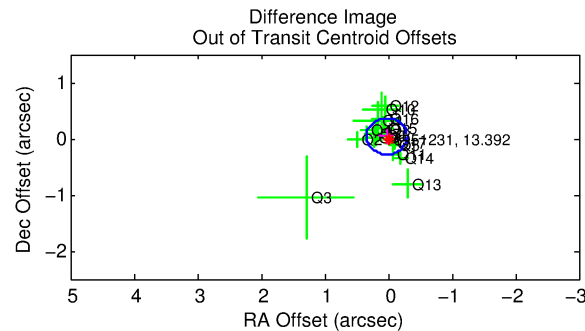
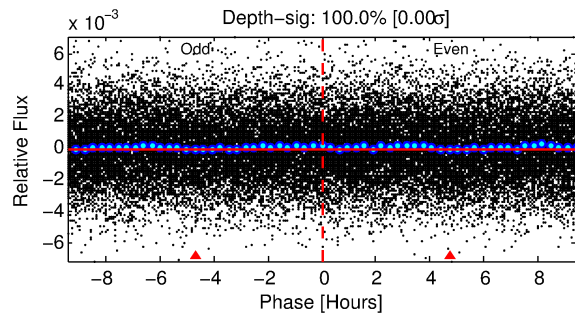
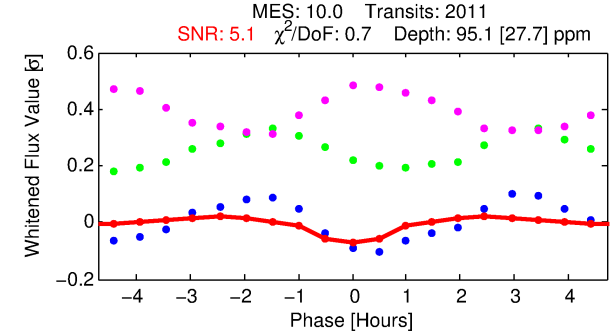
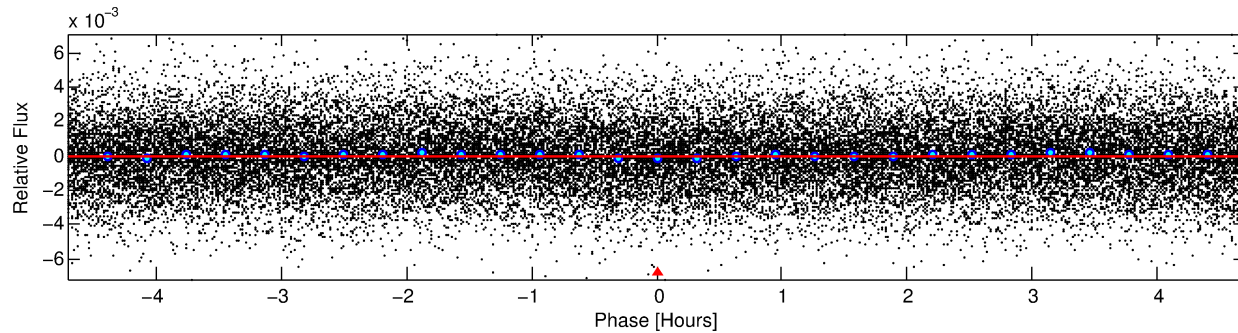
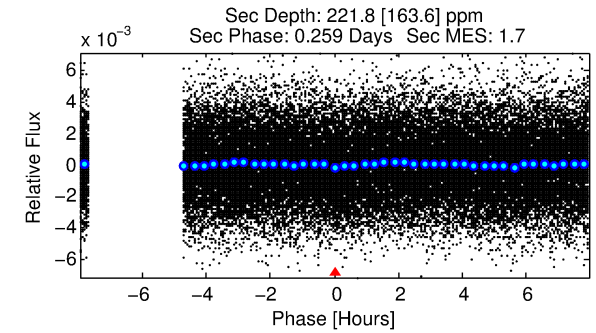
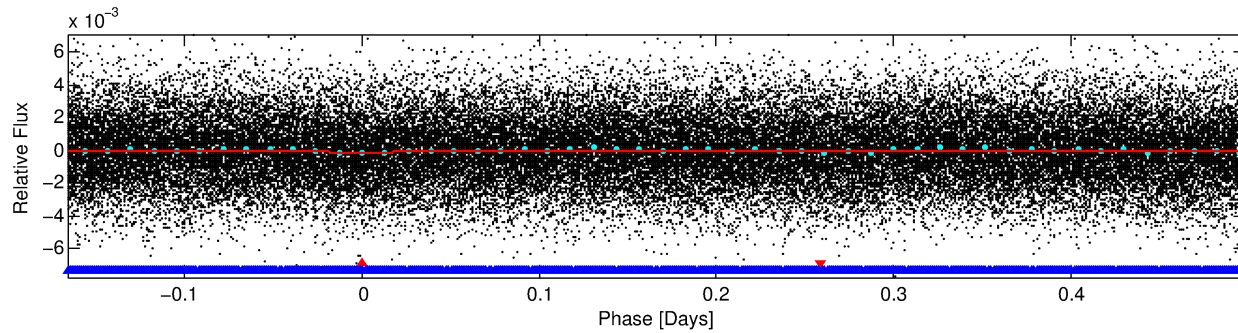
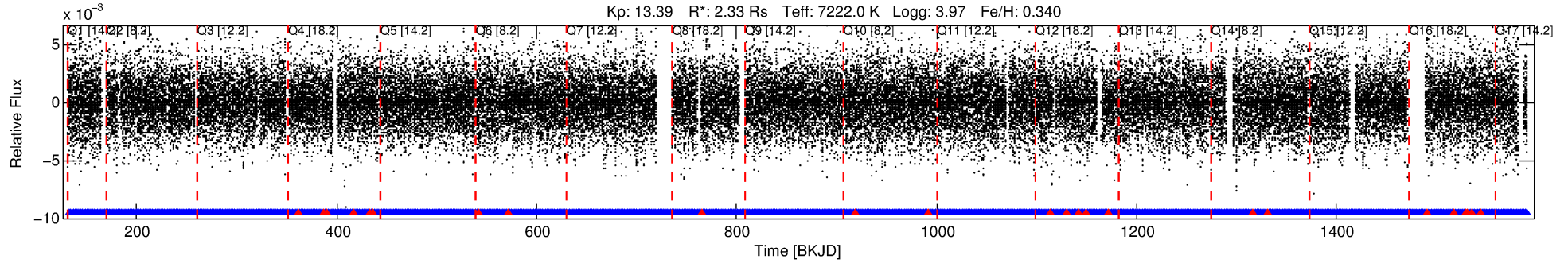
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 006951231-01

No Significant Match Found

# DV One-Page Summary

KIC: 6951231 Candidate: 1 of 2 Period: 0.666 d



## DV Fit Results:

Period = 0.66553 [0.00002] d  
Epoch = 132.1087 [0.0048] BKJD  
Rp/R\* = 0.0104 [0.0104]  
a/R\* = 1.76 [7.42]  
b = 0.90 [1.33]  
Seff = 39332.32 [8666.78]  
Teq = 3591 [198] K  
Rp = 2.64 [2.67] Re  
a = 0.0183 [0.0026] AU  
Ag = 5.88 [12.57] [0.39σ]  
Teffp = 8646 [4597] K [1.10σ]

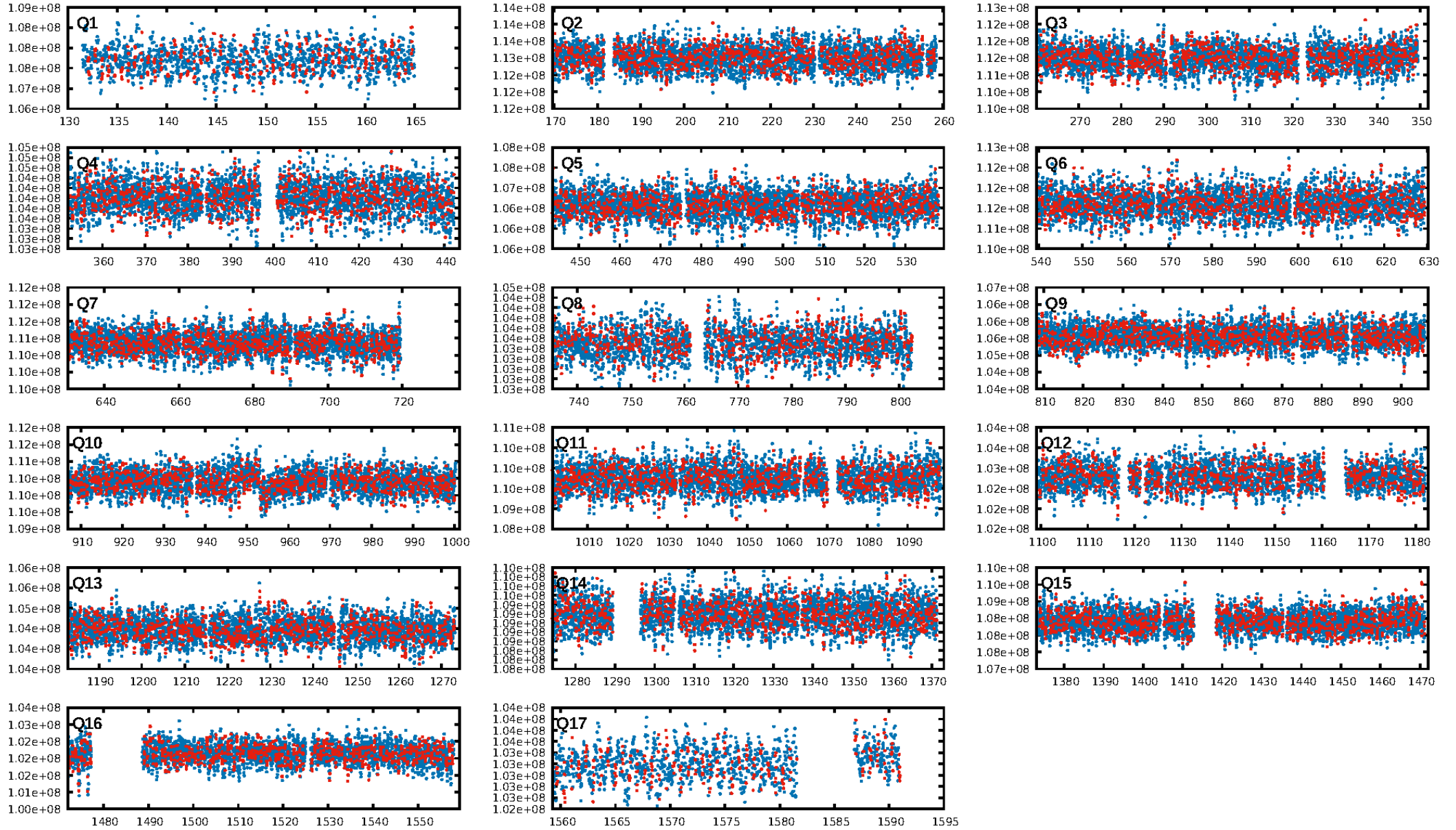
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [8.22σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 1.44e-29  
RollingBand-fgt: 0.99 [1896/1921]  
GhostDiagnostic-chr: 2.34  
Centroid-sig: N/A  
Centroid-so: 0.432 arcsec [1.59σ]  
OotOffset-rm: 0.046 arcsec [0.43σ]  
KicOffset-rm: 0.095 arcsec [0.91σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.82 [14/17]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 01:43:09 Z

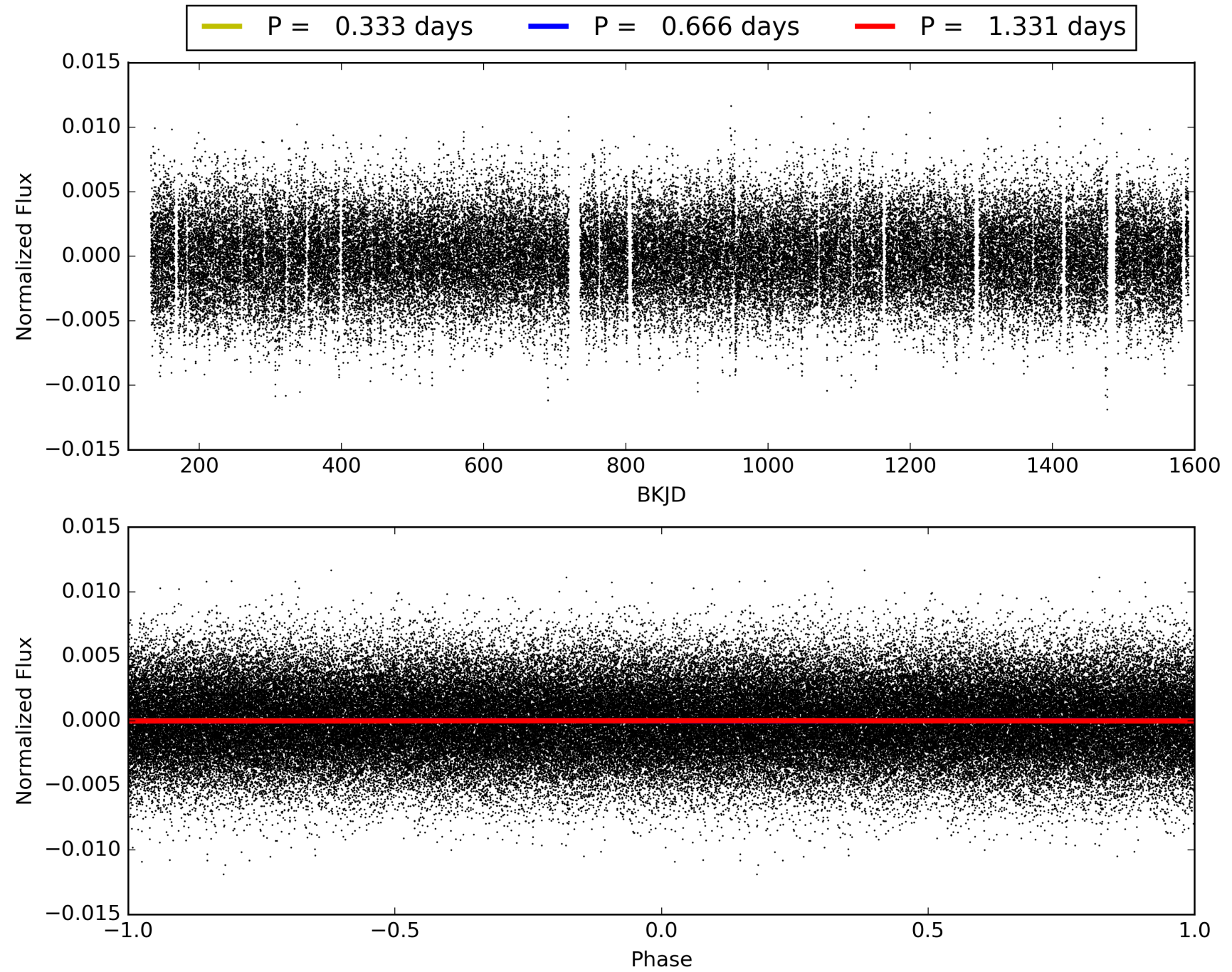
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 006951231-01, PDC Light Curves



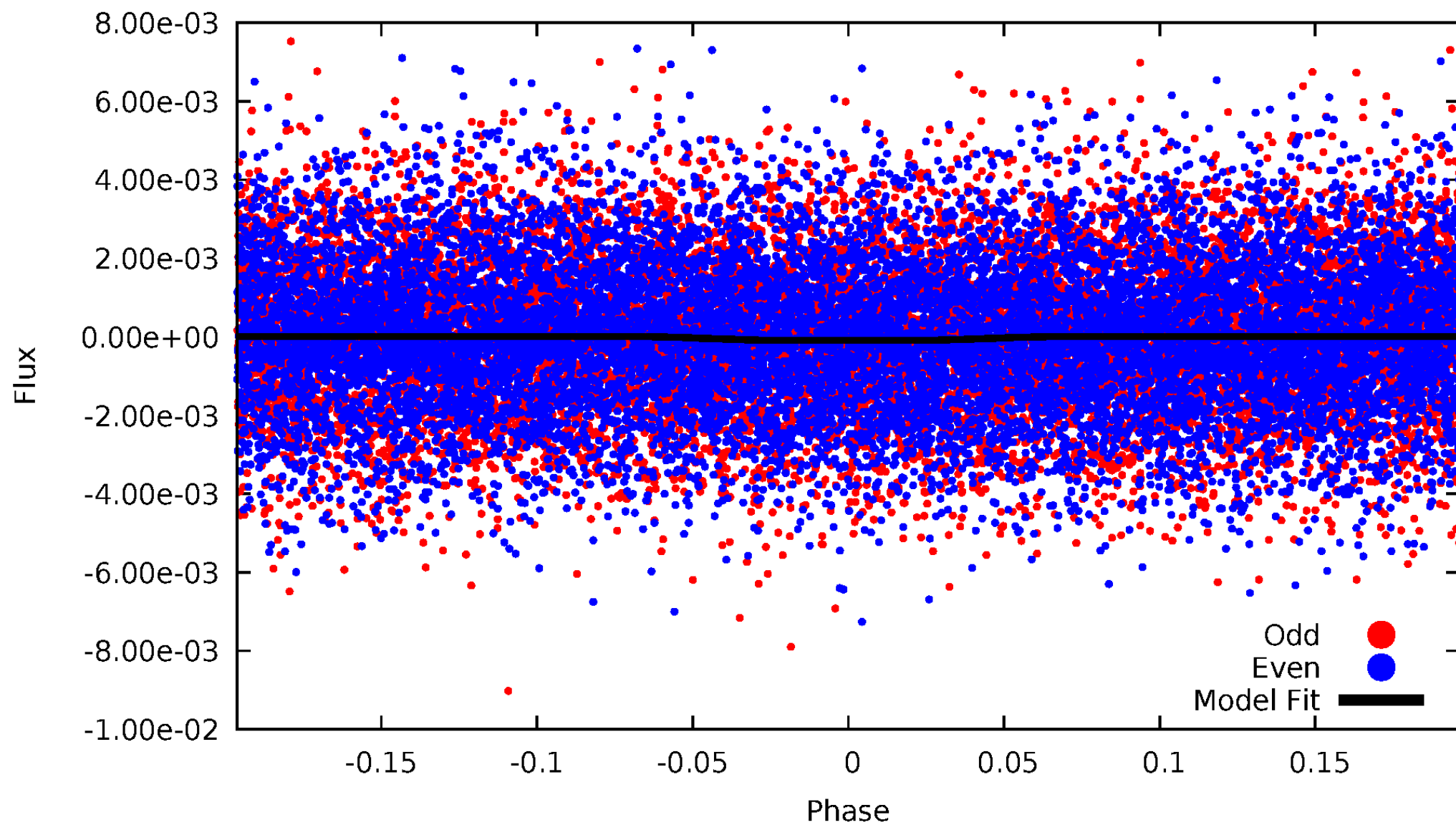


# TCE 006951231-01



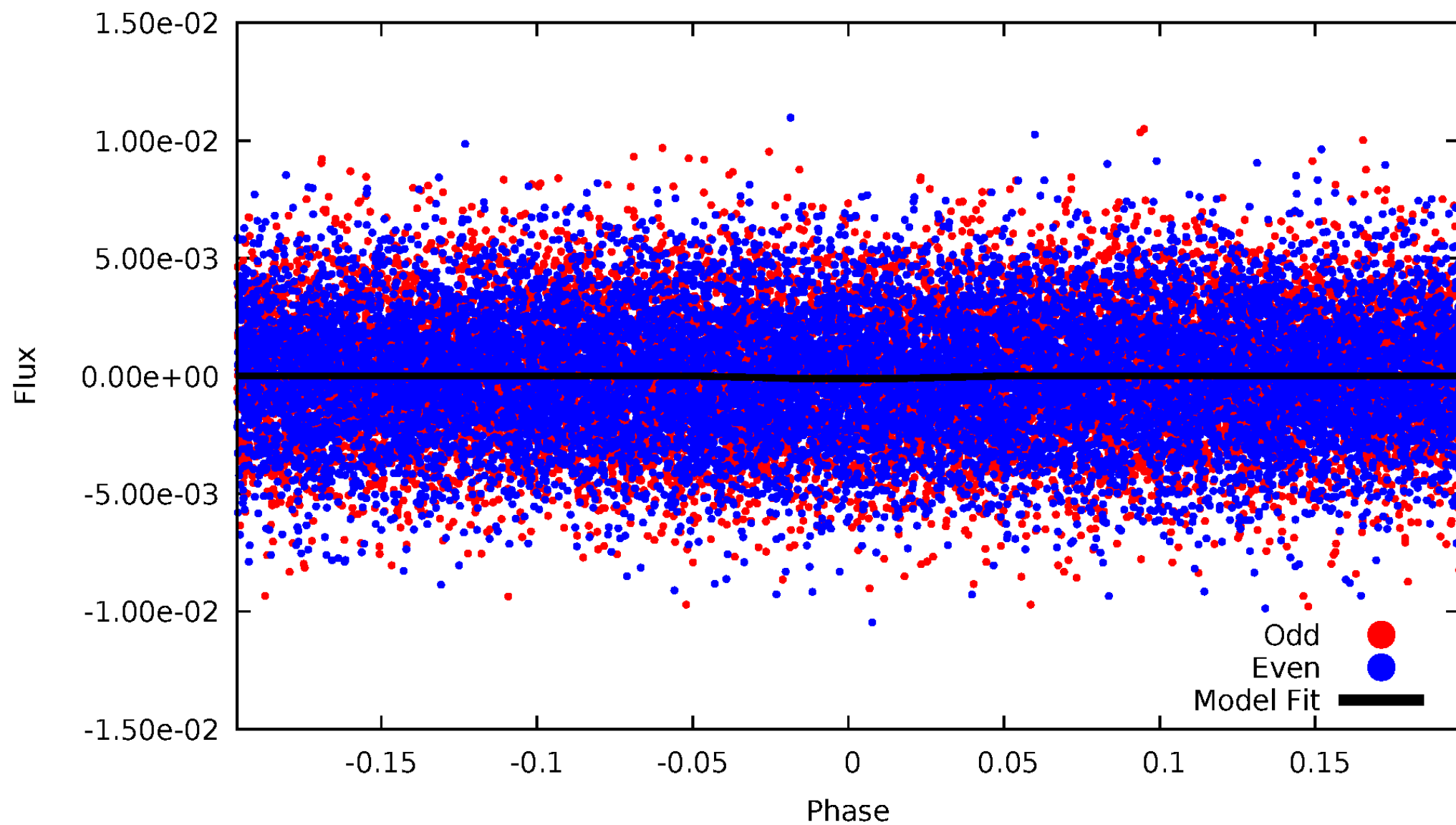
# DV Odd/Even

TCE 006951231-01

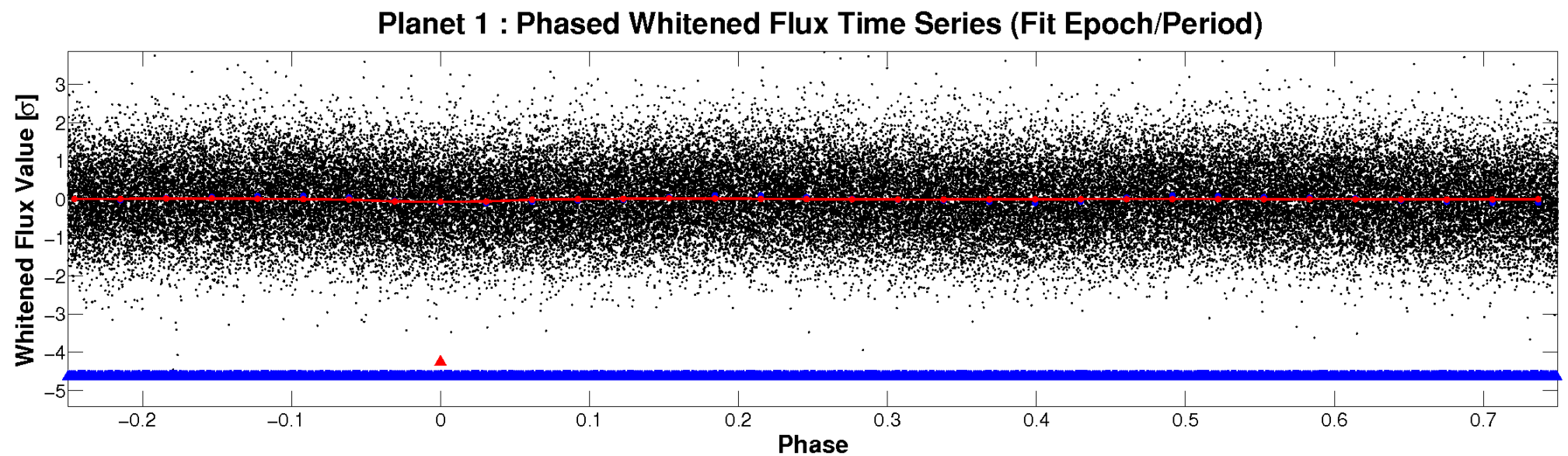
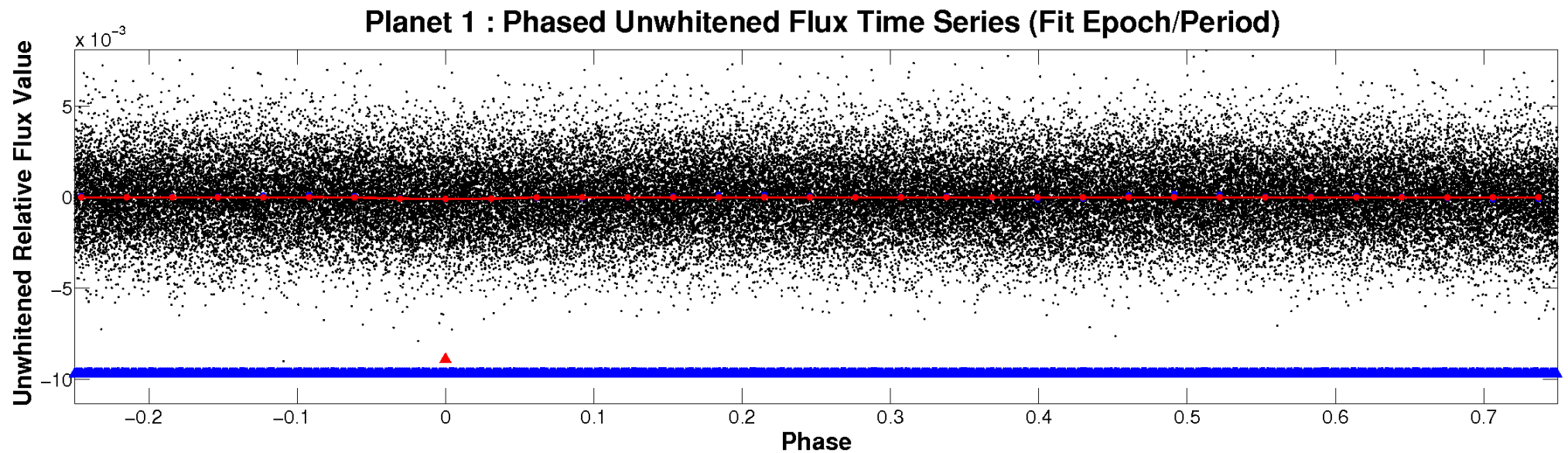


# ALT Odd/Even

TCE 006951231-01



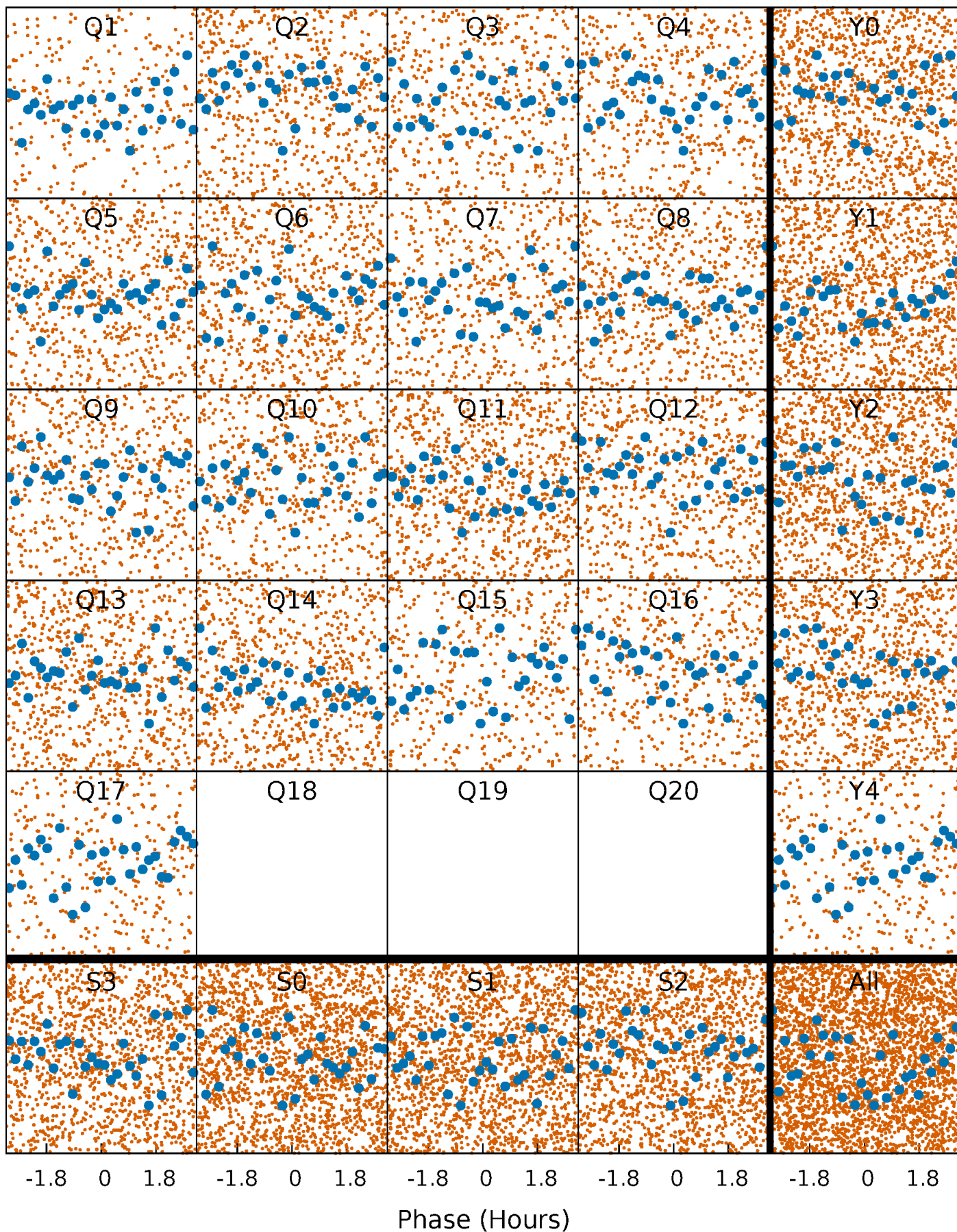
# Non-Whitened Vs. Whitened Light Curve





# PDC Quarter-Phased Transit Curves

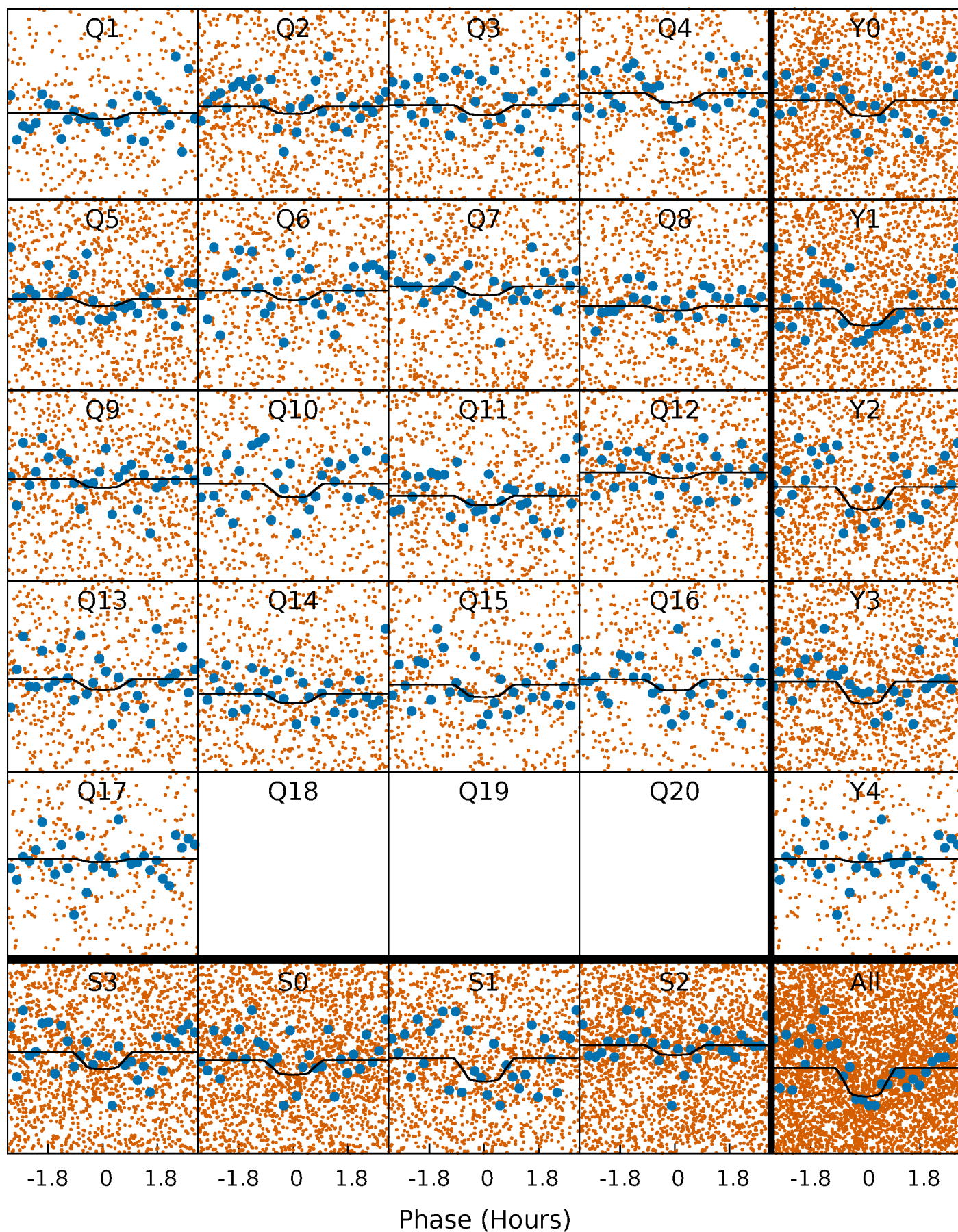
TCE 006951231-01 P= 0.665527 Days  $T_0=132.108657$  (BKJD)





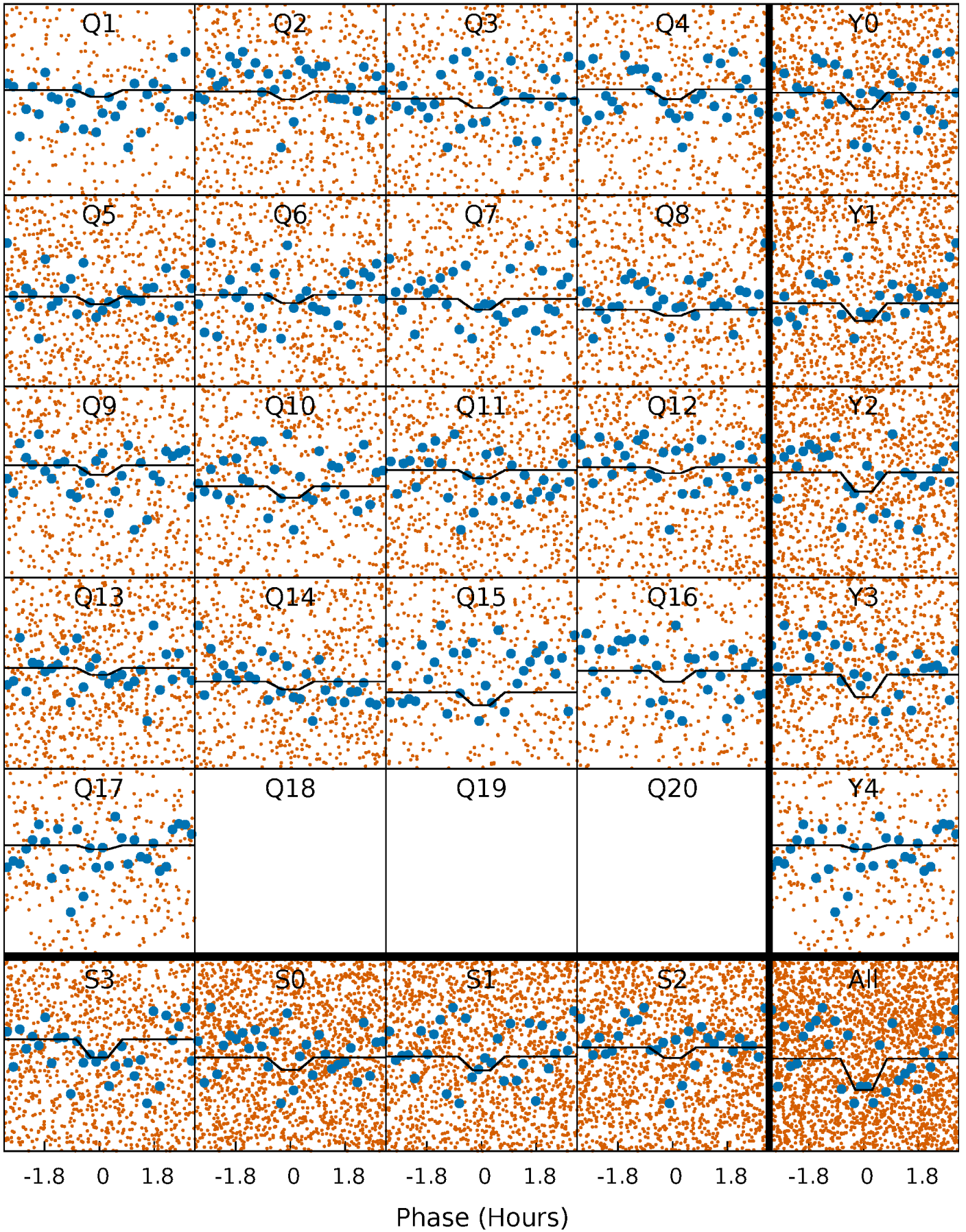
# DV Quarter-Phased Transit Curves

TCE 006951231-01 P= 0.665527 Days  $T_0=132.108657$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

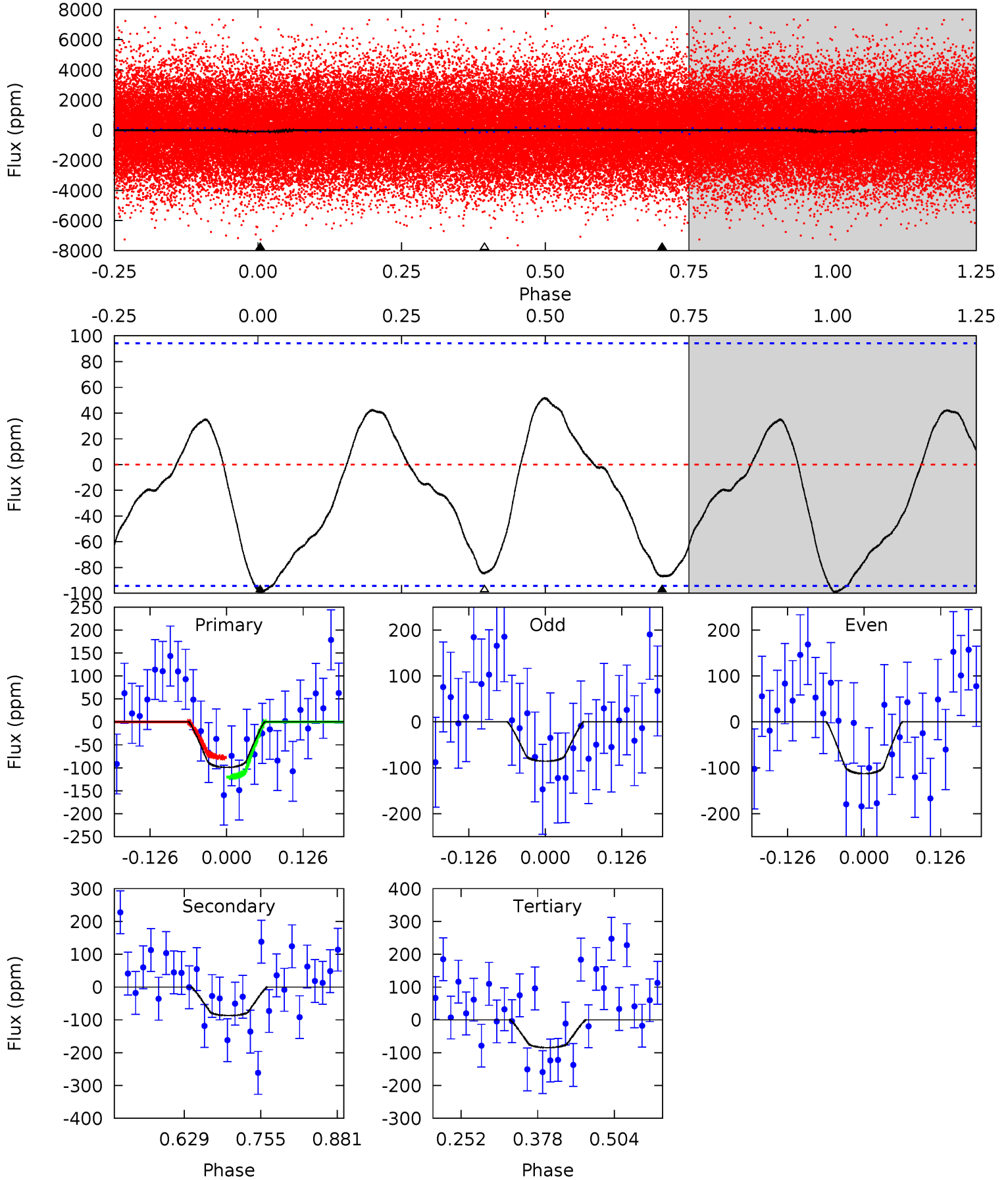
TCE 006951231-01 P= 0.665527 Days  $T_0=132.108657$  (BKJD)



# DV Model-Shift Uniqueness Test

006951231-01, P = 0.665527 Days, E = 131.443130 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
4.75	4.16	4.05	0	4.52	1.53	1.84	0.70	4.75	0.11	4.16	0.65	1.14	0.34	1.03

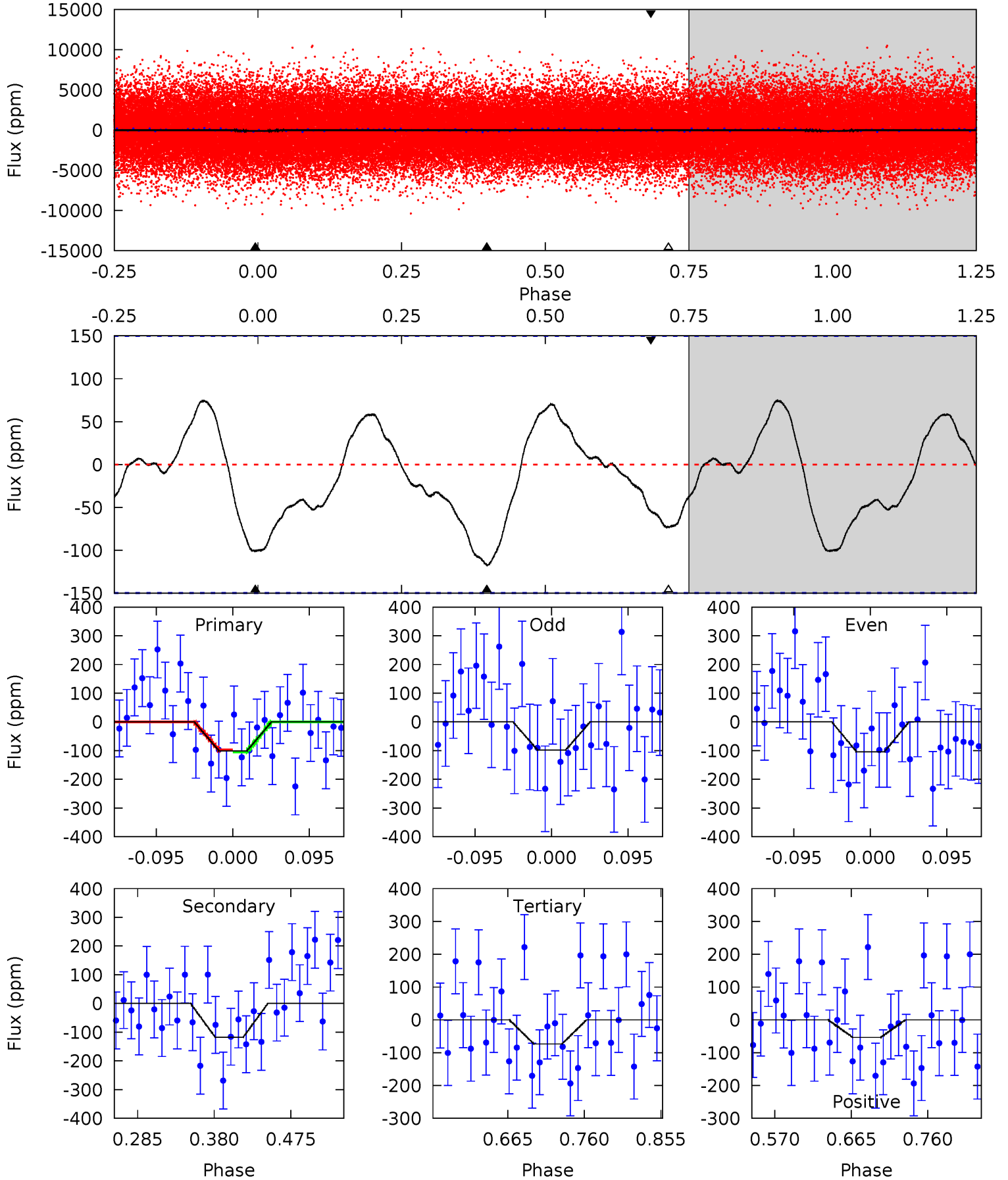




# Alt Model-Shift Uniqueness Test

006951231-01, P = 0.665527 Days, E = 131.443130 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
3.09	3.60	2.25	-1.63	4.58	1.67	1.16	0.84	4.73	1.36	5.24	0.09	0.62	0.39	0.10





### Stellar Parameters For KIC 006951231

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$7222^{+72}_{-93}$	$3.972^{+0.121}_{-0.099}$	$0.340^{+0.050}_{-0.150}$	$2.329^{+0.373}_{-0.373}$	$1.853^{+0.117}_{-0.169}$	$0.207^{+0.117}_{-0.063}$
	+1%/-1%	+3%/-2%	+15%/-44%	+16%/-16%	+6%/-9%	+57%/-31%
Source	SPE68	SPE68	SPE68	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 006951231-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-87 \pm 21$	$2.93^{+2.51}_{-1.95}$	$4990^{+208}_{-211}$	$6049^{+7471}_{-1989}$	$1.837^{+15.257}_{-1.311}$
Alt.	$-118 \pm 33$	$3.05^{+2.23}_{-1.75}$	$5003^{+204}_{-203}$	$6484^{+5413}_{-1885}$	$2.276^{+10.789}_{-1.567}$

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

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

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

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

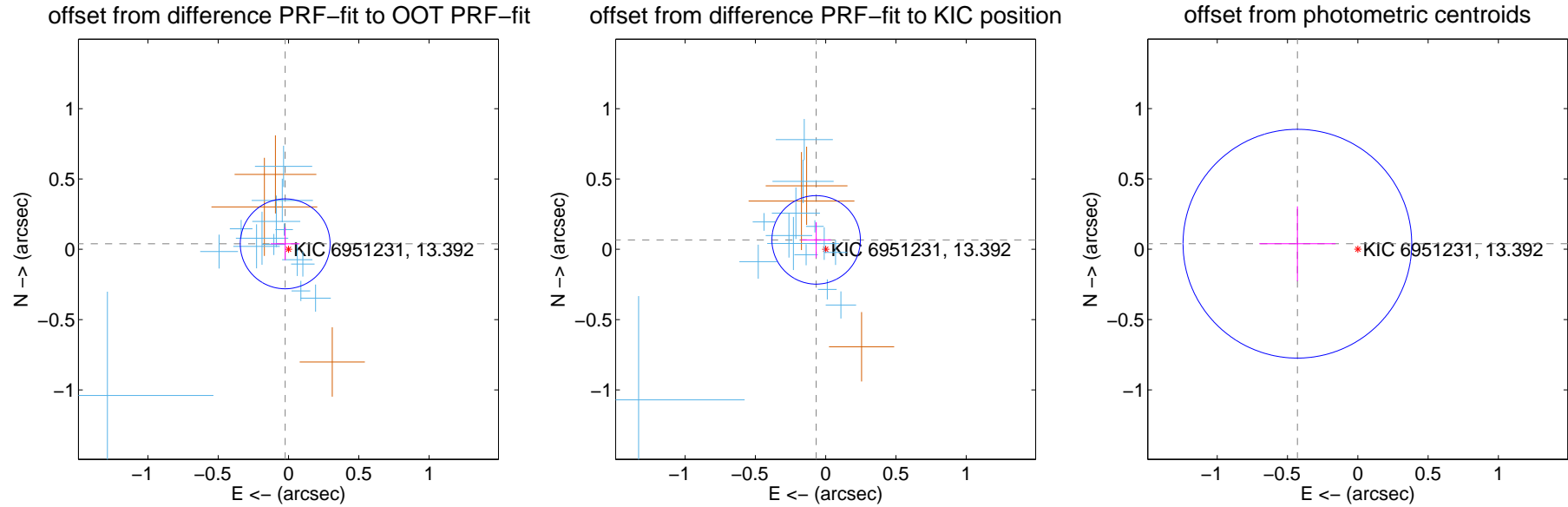
## DV Centroid Data

Supplemental centroid analysis for 006951231-01. Kepler magnitude: 13.39. Transit SNR 5.05

There are 14 quarters with good PRF difference image offsets

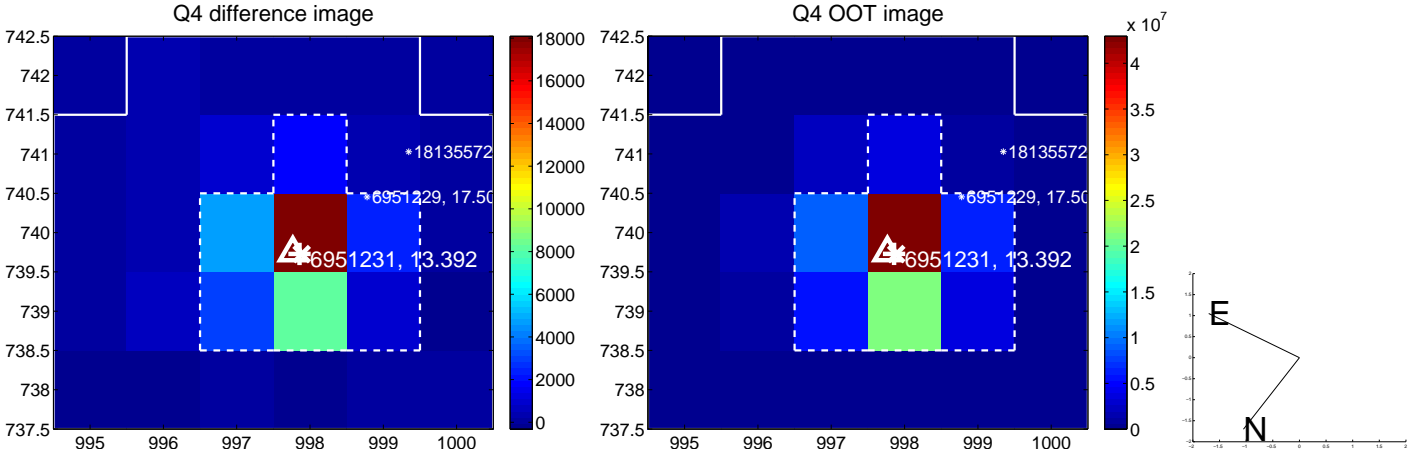
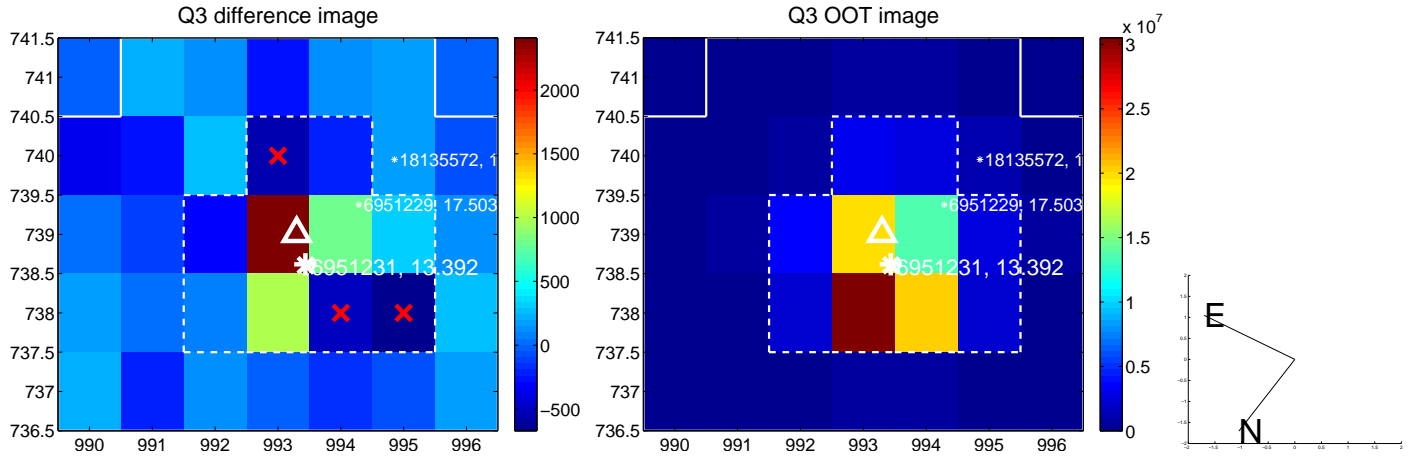
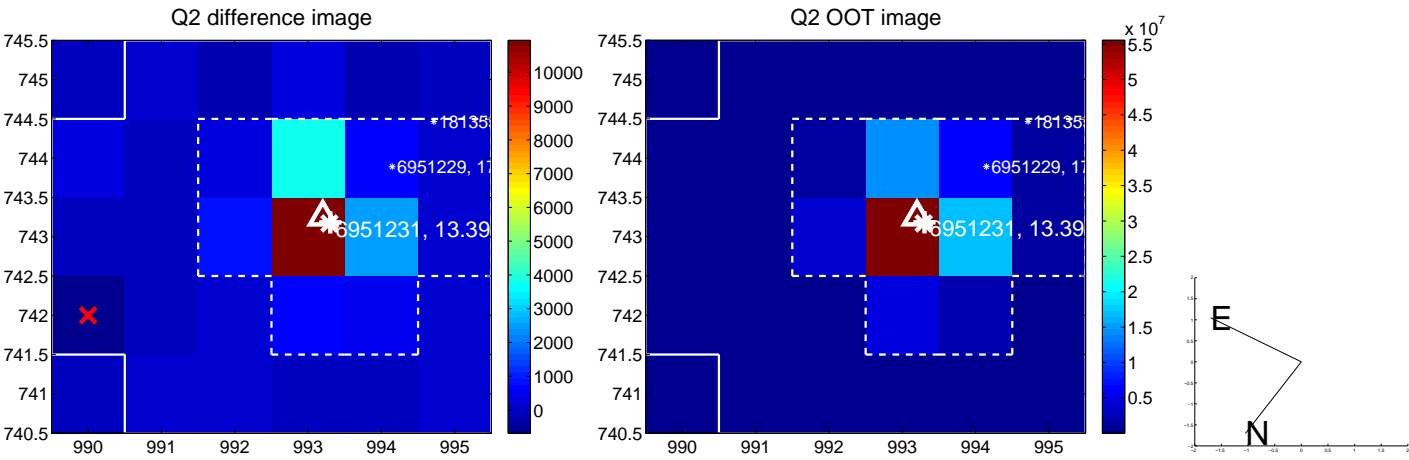
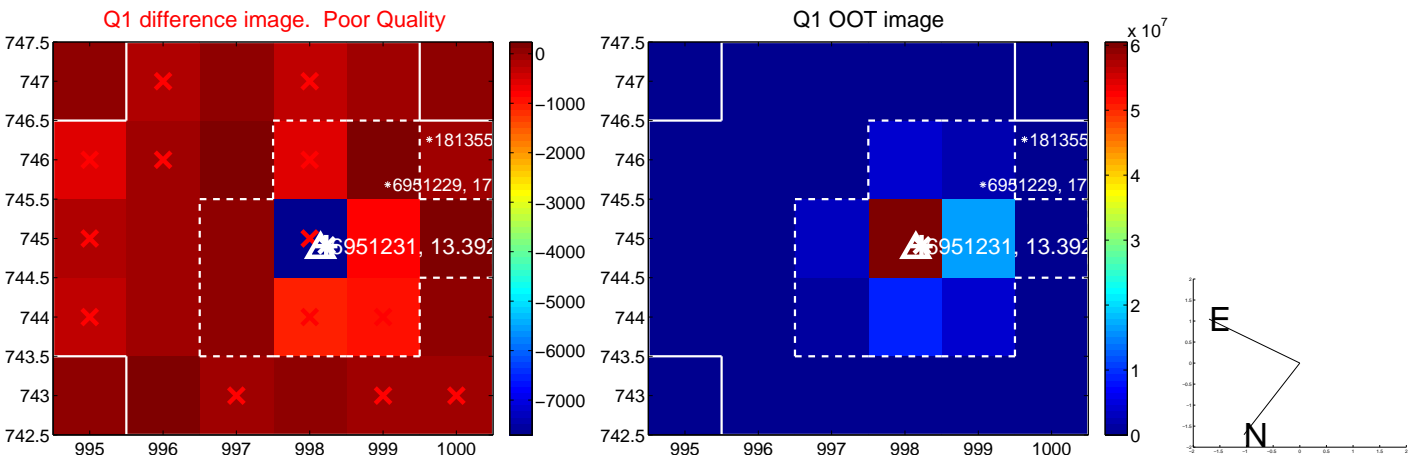
The direct PRF centroid is offset from the target star catalog position by about 0.14 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.046 \pm 0.107$	0.43	$0.024 \pm 0.103$	$0.039 \pm 0.116$
PRF-fit source offset from KIC position	$0.095 \pm 0.105$	0.91	$0.068 \pm 0.106$	$0.067 \pm 0.126$
photometric centroid source offset	$0.43 \pm 0.27$	1.59	$0.43 \pm 0.27$	$0.04 \pm 0.27$

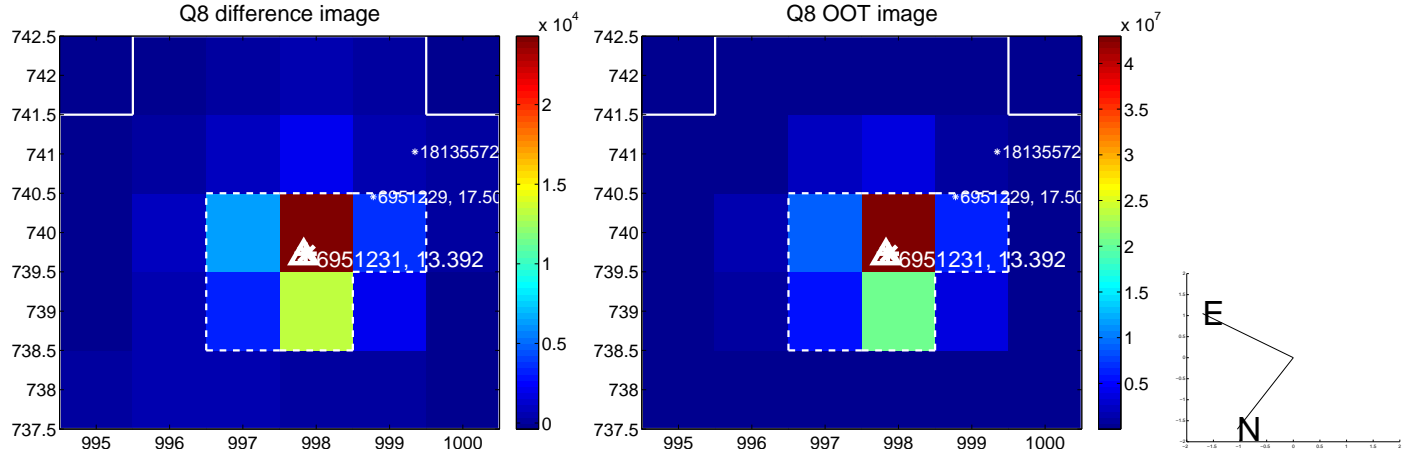
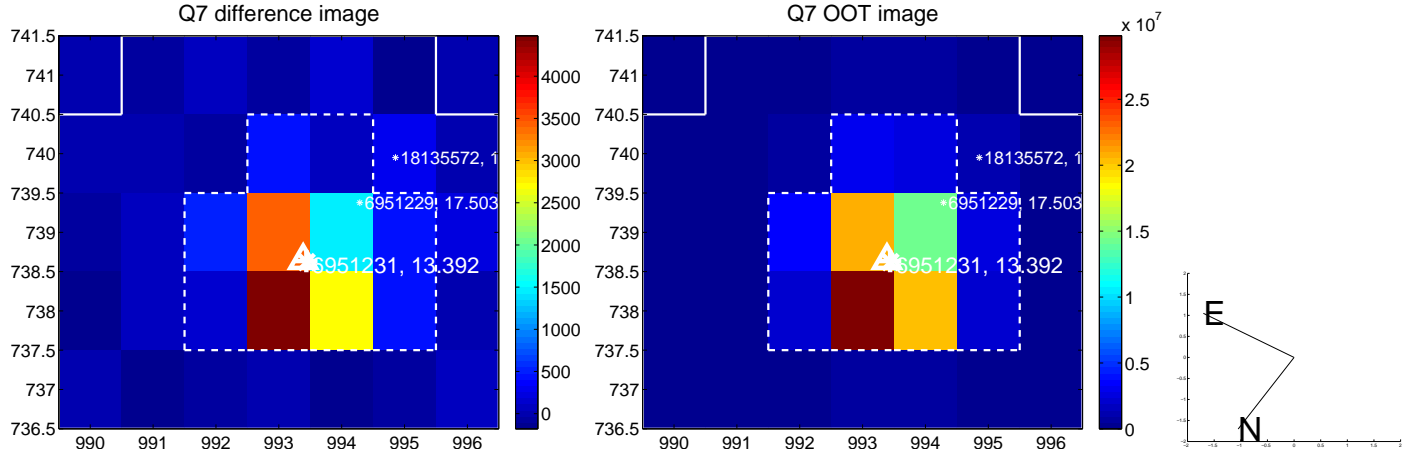
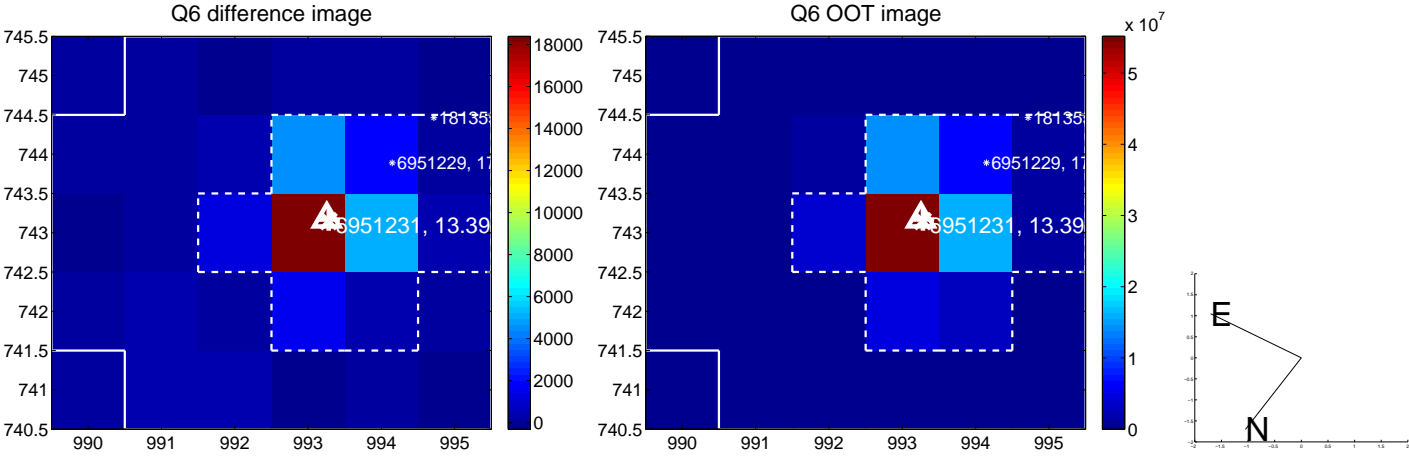
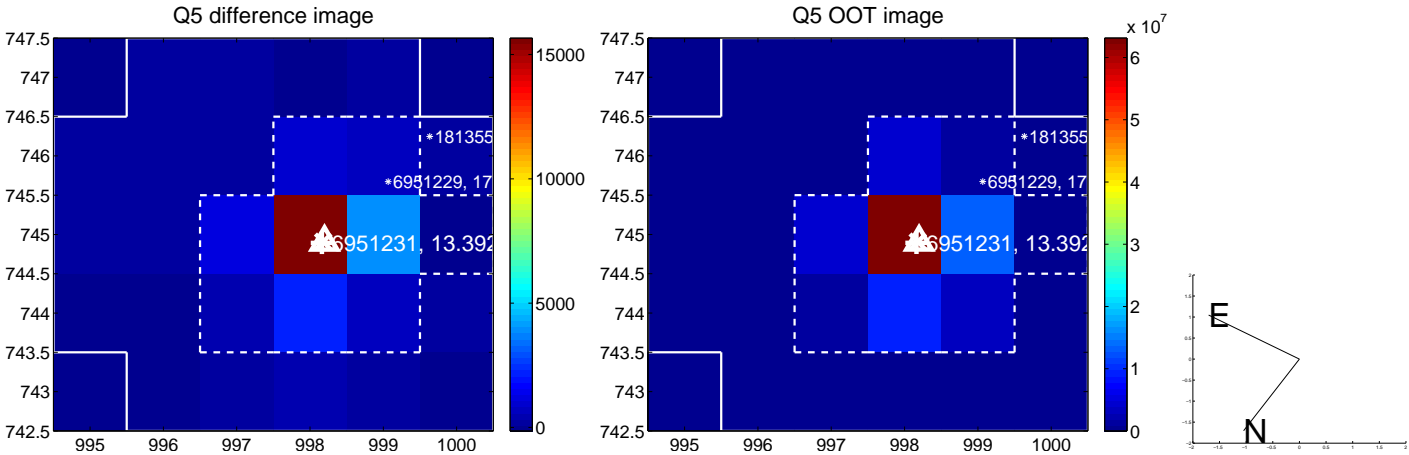


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

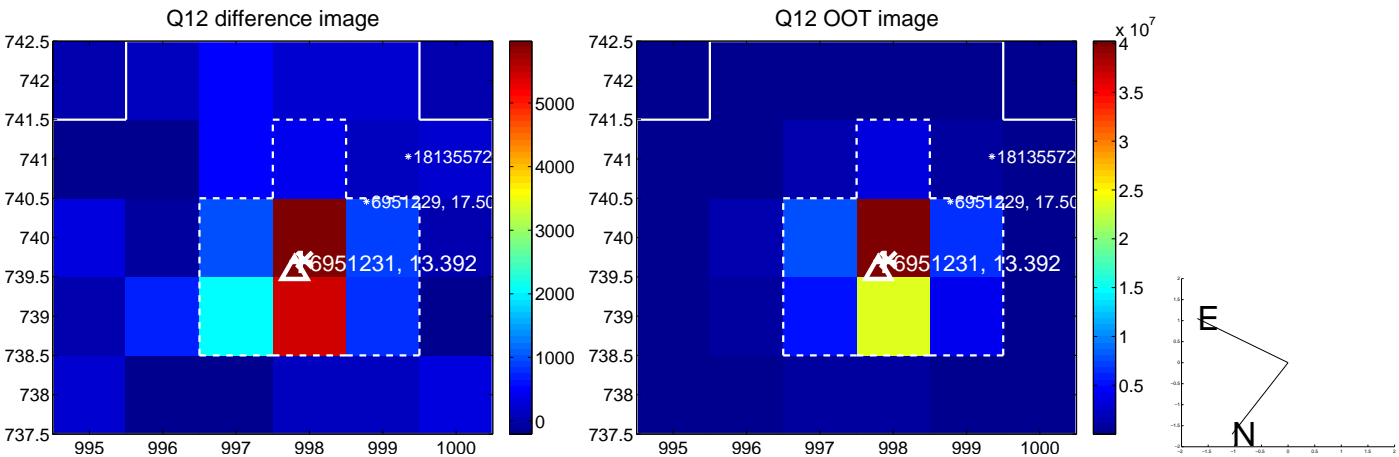
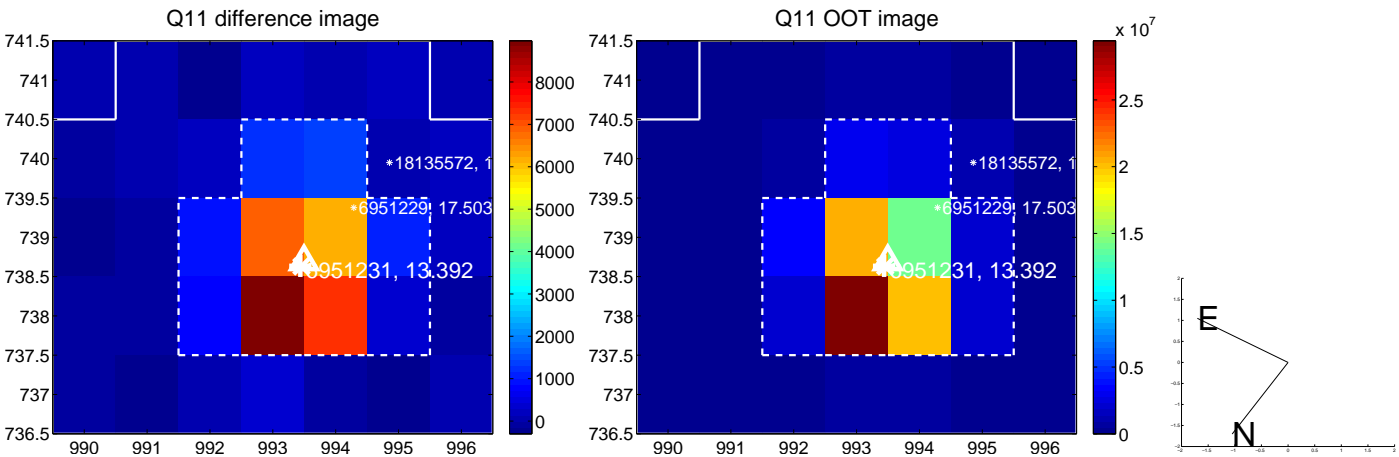
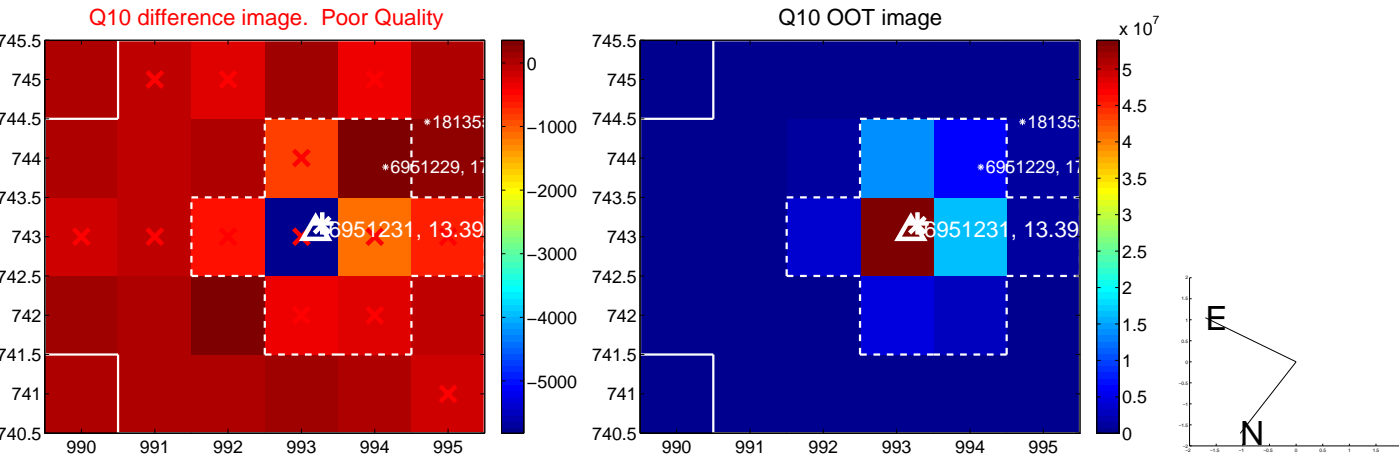
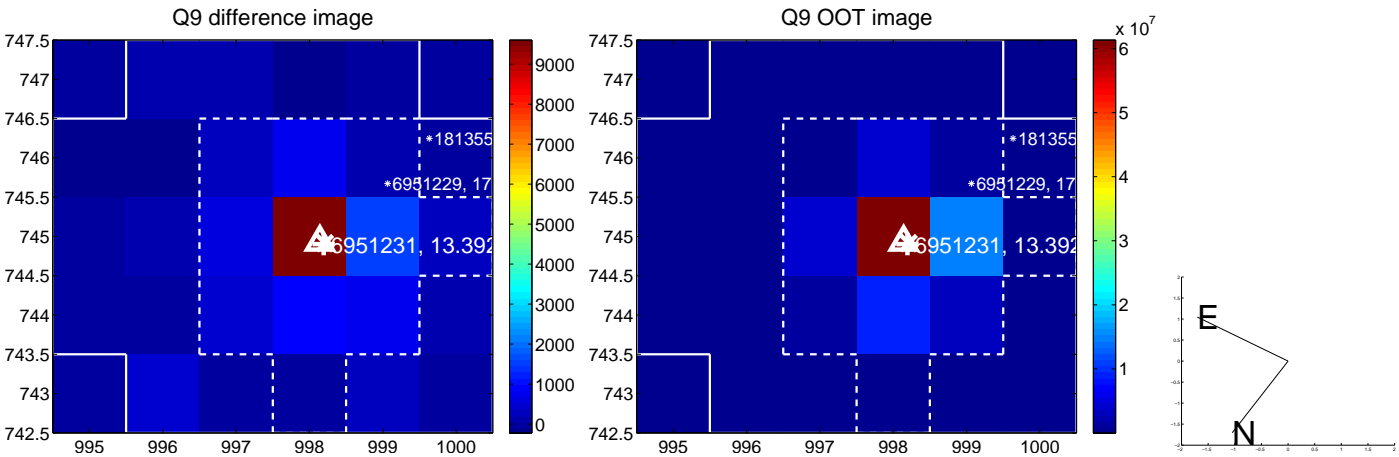


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

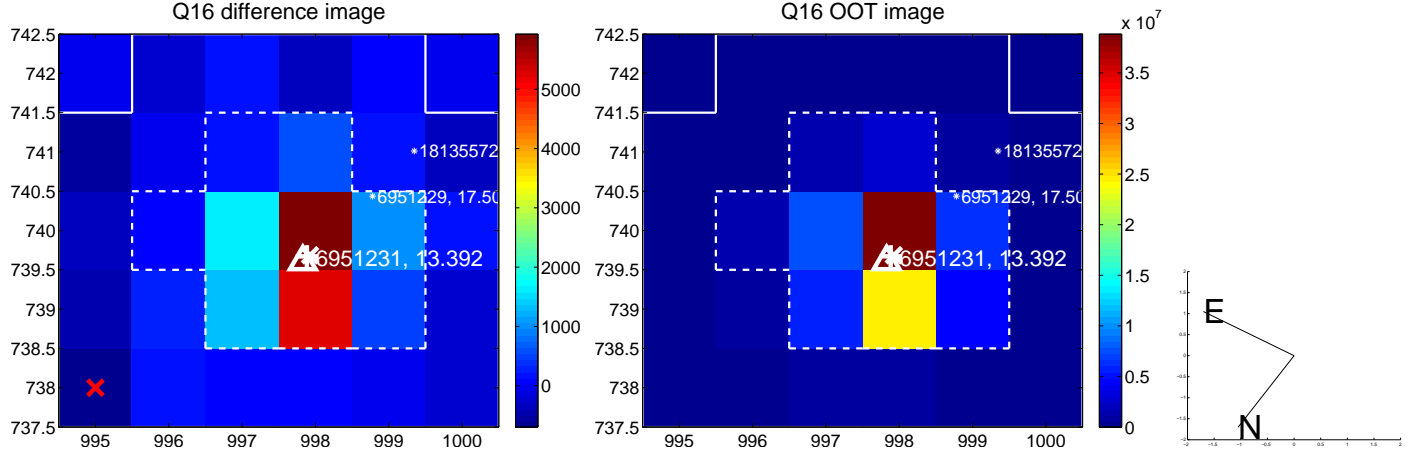
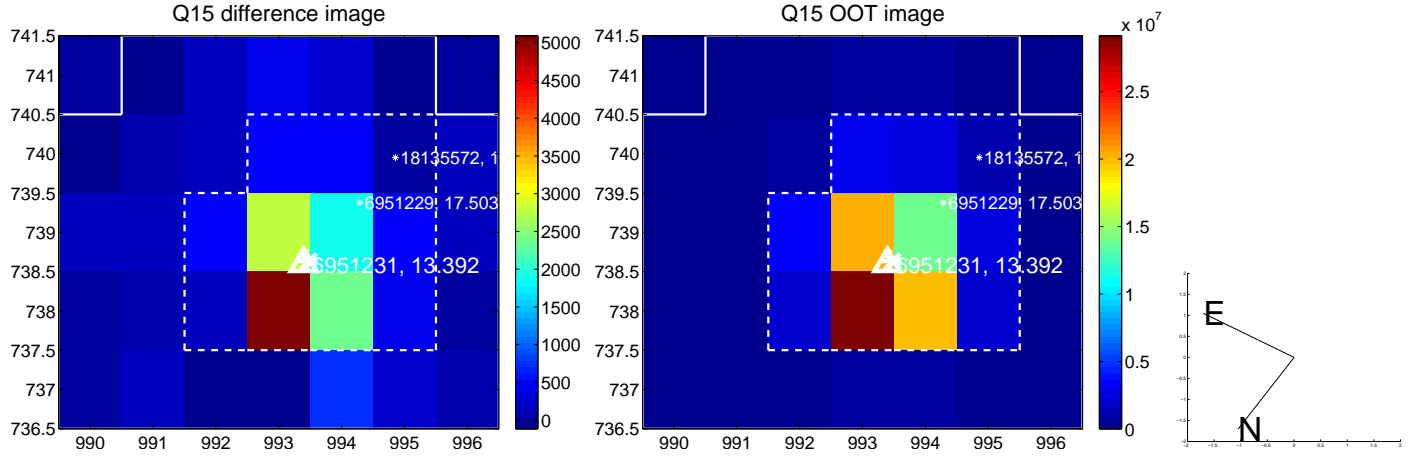
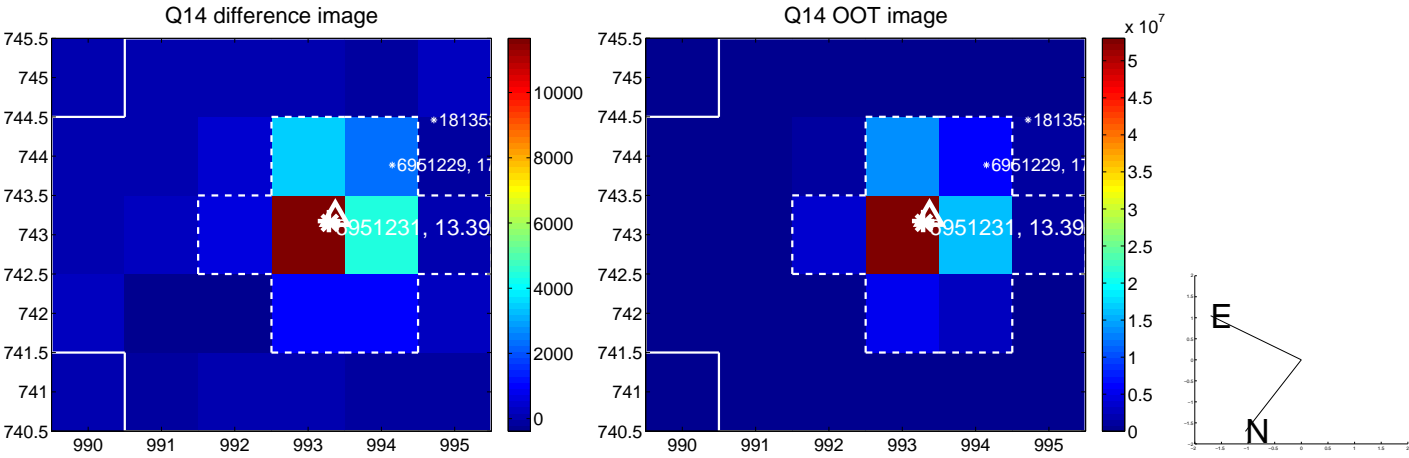
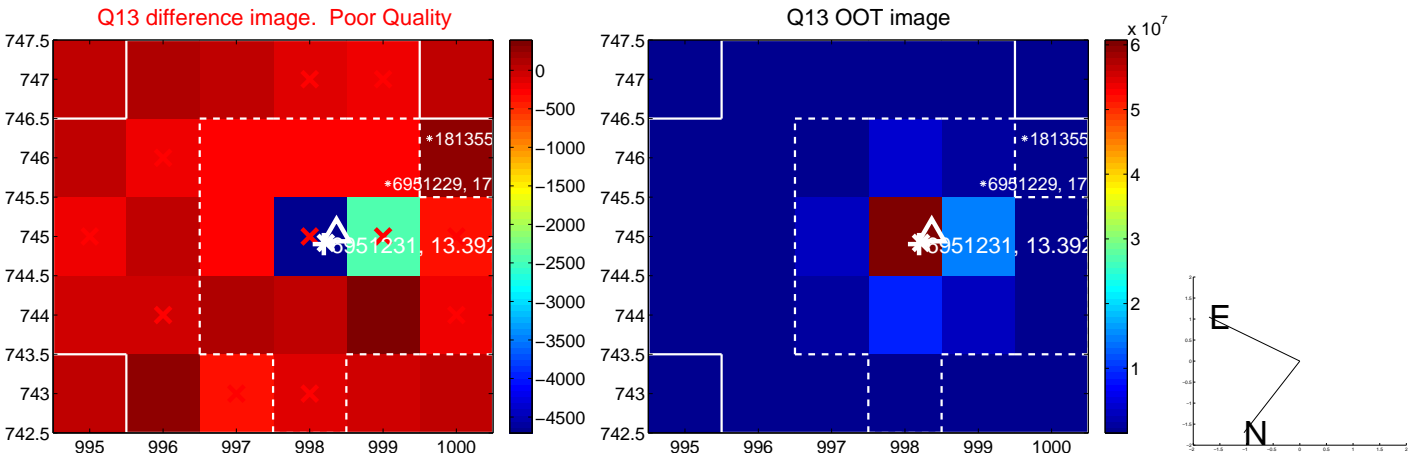




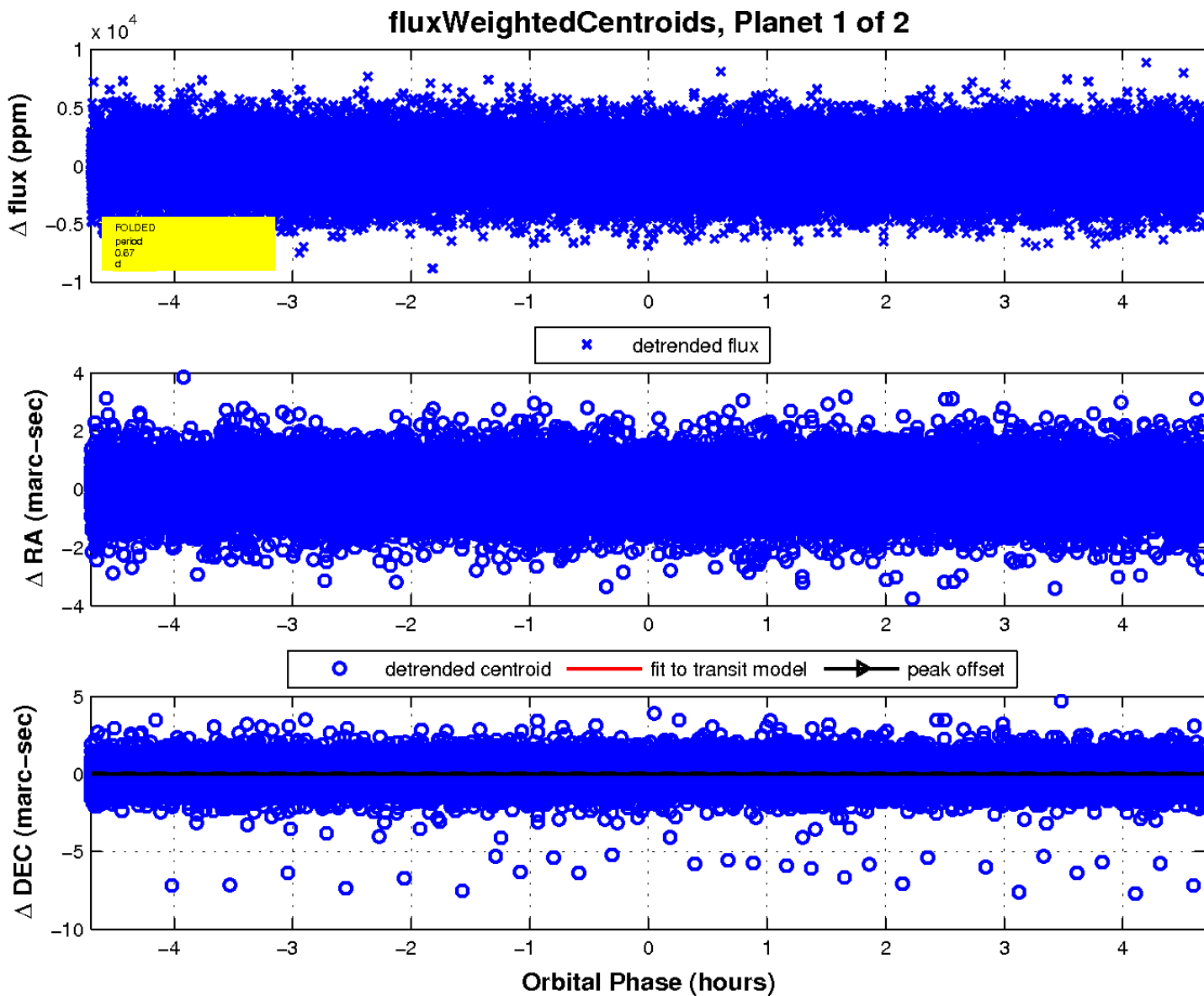
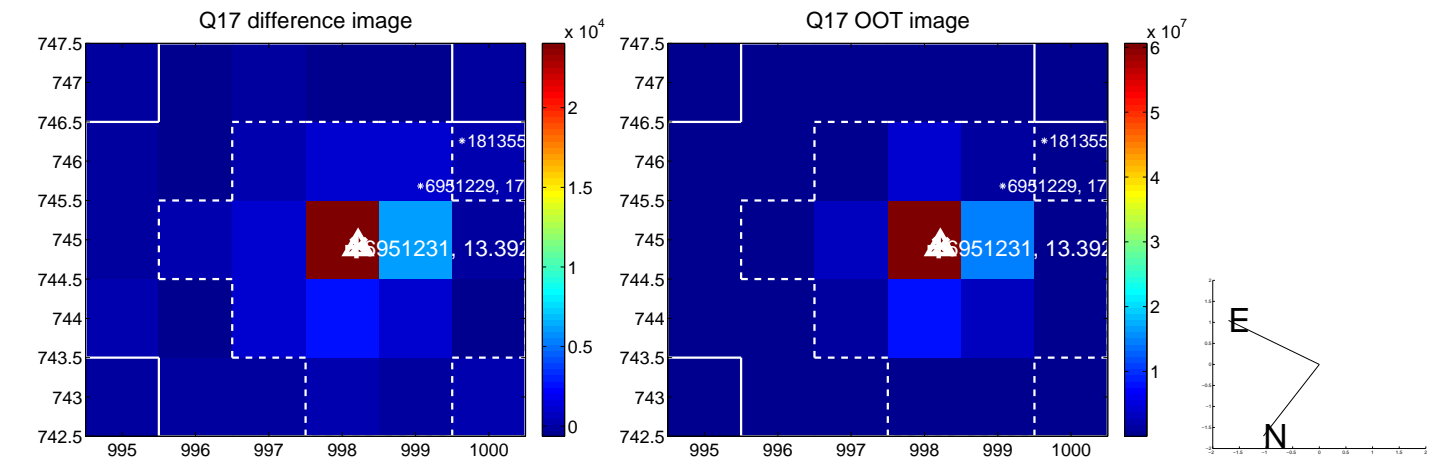
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

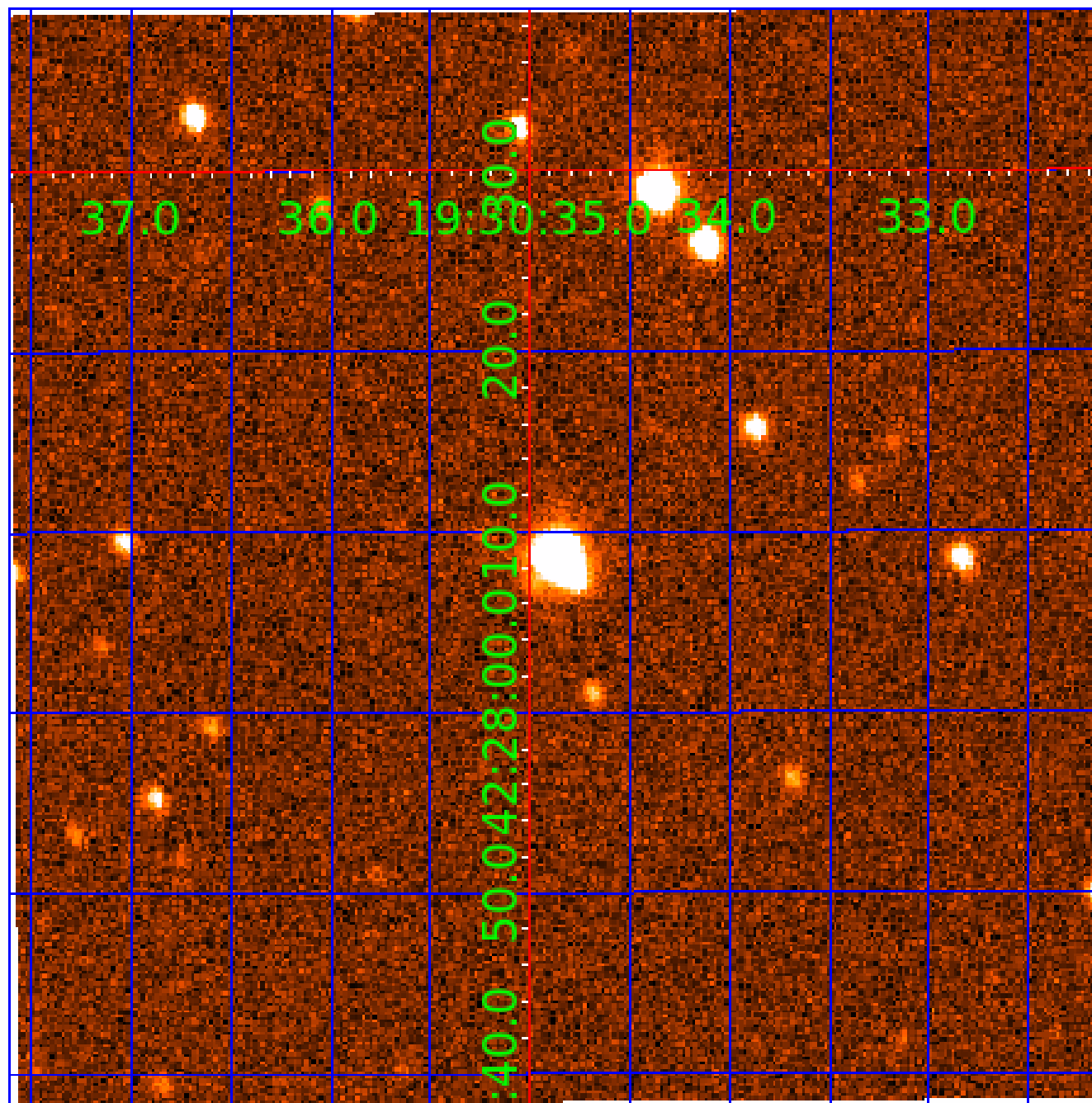


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 006951231

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006951231-01	OBS	No	0.665527	132.108657	95.1	1.567	10.0	5.1	2.33	7222	2.64	39332.32
006951231-02	OBS	No	1.637286	132.302210	199.2	2.366	9.4	6.3	2.33	7222	3.82	11843.26

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006951231-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
006951231-02	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT

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

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

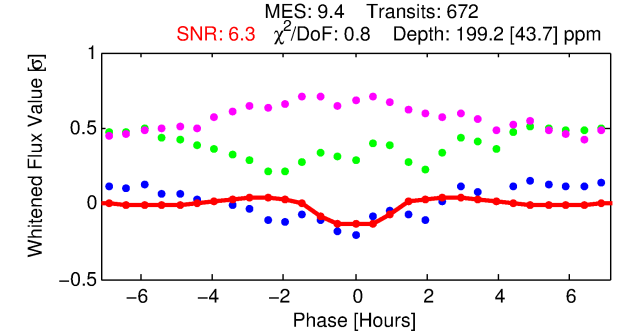
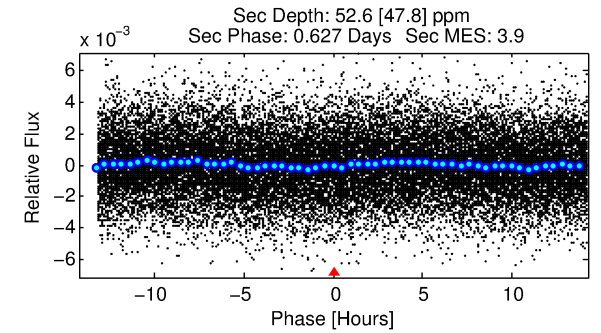
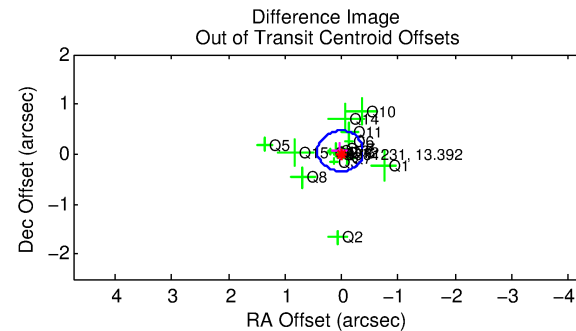
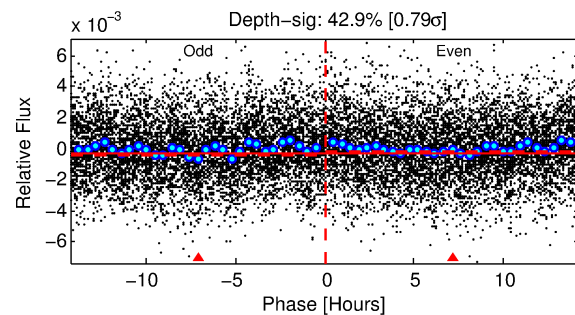
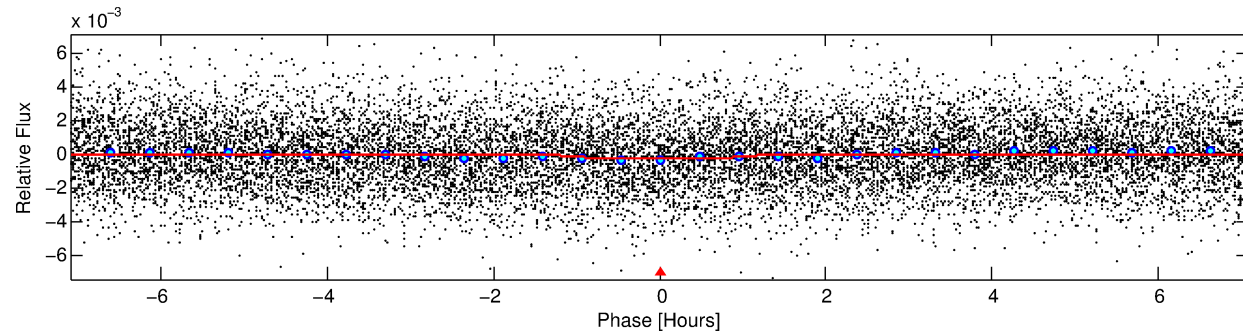
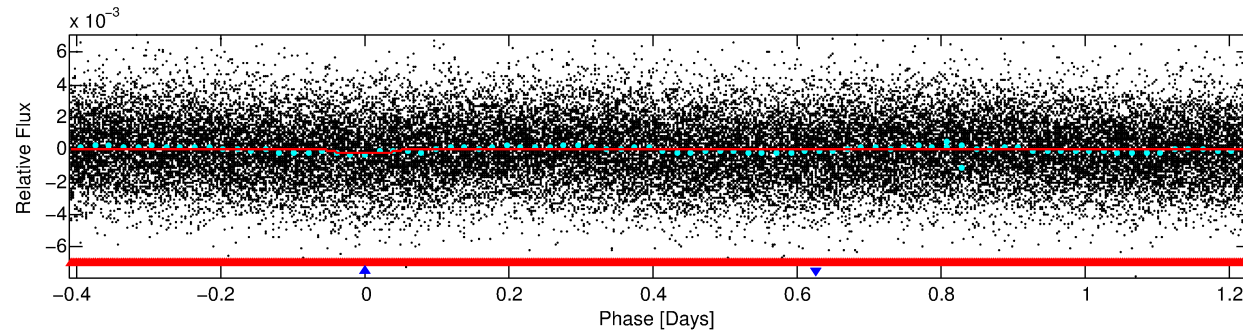
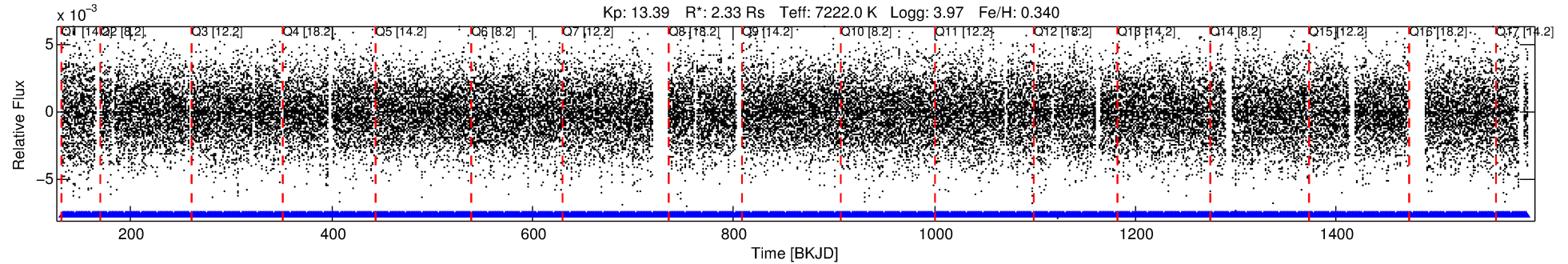
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 006951231-02

No Significant Match Found

# DV One-Page Summary

KIC: 6951231 Candidate: 2 of 2 Period: 1.637 d



## DV Fit Results:

Period = 1.63729 [0.00002] d  
Epoch = 132.3022 [0.0057] BKJD  
Rp/R\* = 0.0150 [0.0119]  
a/R\* = 2.65 [11.08]  
b = 0.90 [1.04]  
Seff = 11843.26 [2609.63]  
Teq = 2660 [147] K  
Rp = 3.82 [3.08] Re  
a = 0.0334 [0.0047] AU  
Ag = 2.22 [4.07] [0.30 $\sigma$ ]  
Teffp = 5019 [2289] K [1.03 $\sigma$ ]

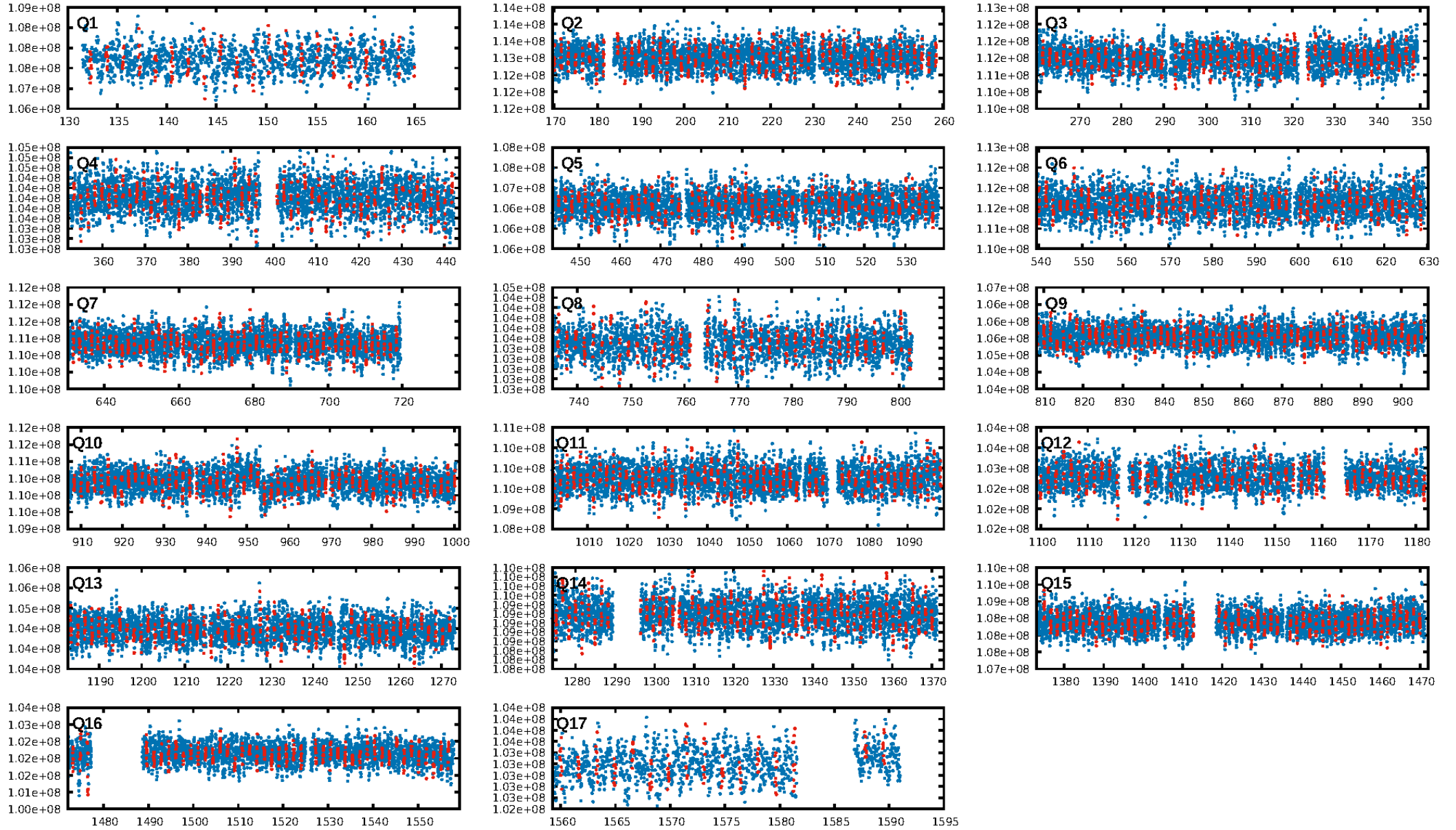
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [8.22 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 3.58e-17  
RollingBand-fgt: 1.00 [642/642]  
**GhostDiagnostic-chr: 0.3105**  
Centroid-sig: N/A  
Centroid-so: 0.234 arcsec [1.43 $\sigma$ ]  
OotOffset-rm: 0.069 arcsec [0.51 $\sigma$ ]  
KicOffset-rm: 0.170 arcsec [1.27 $\sigma$ ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.53 [9/17]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 01:43:19 Z

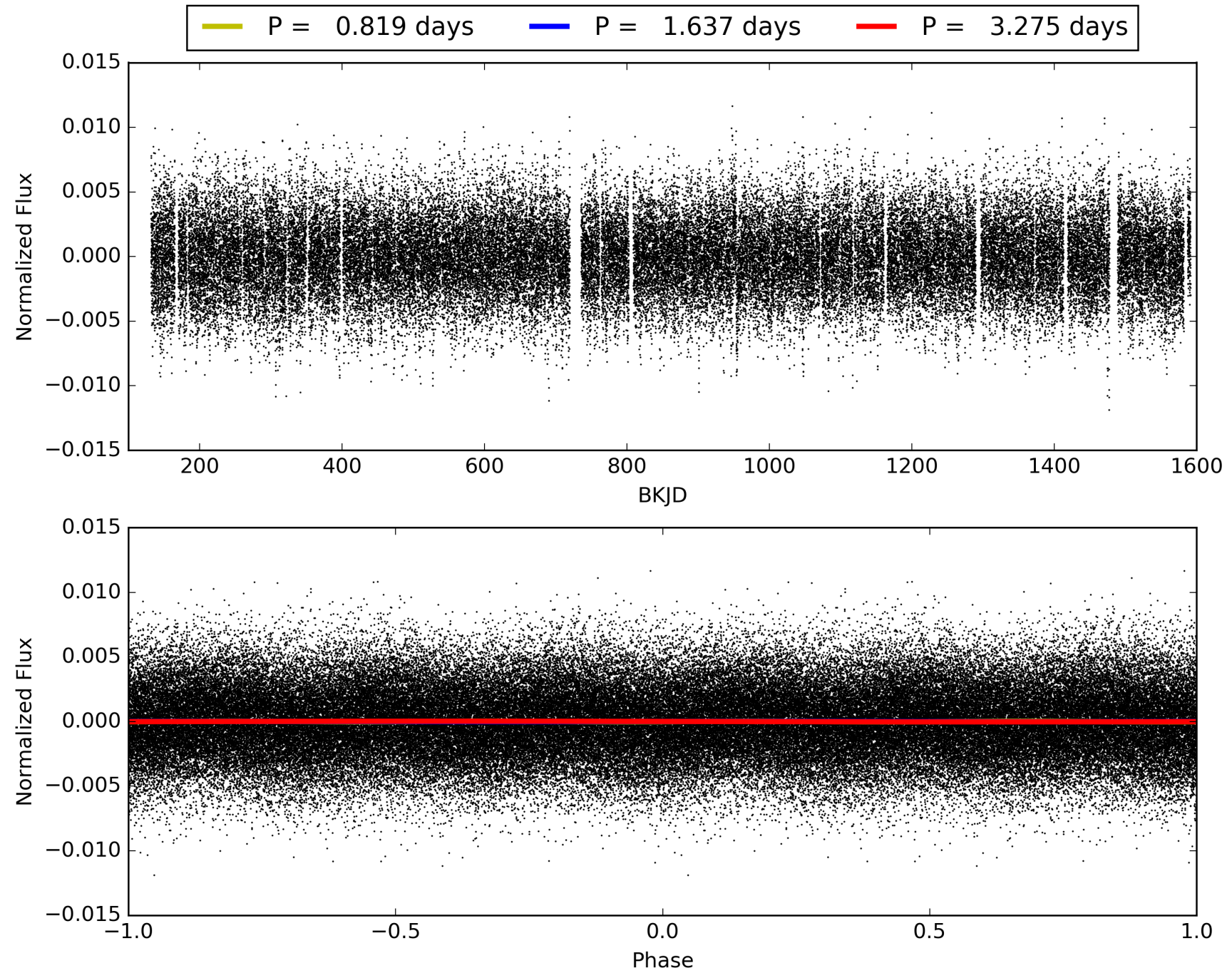
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 006951231-02, PDC Light Curves



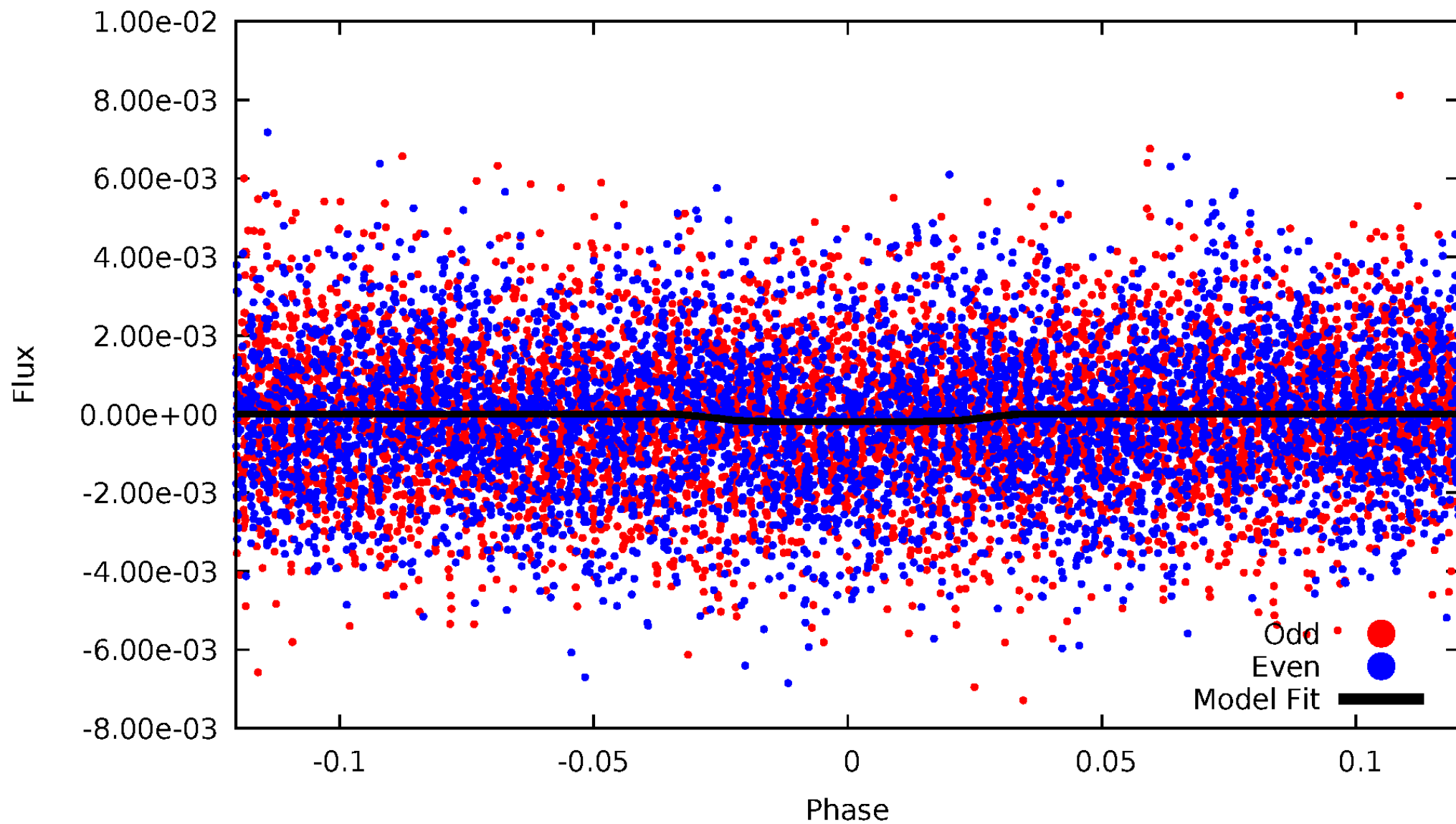


# TCE 006951231-02



# DV Odd/Even

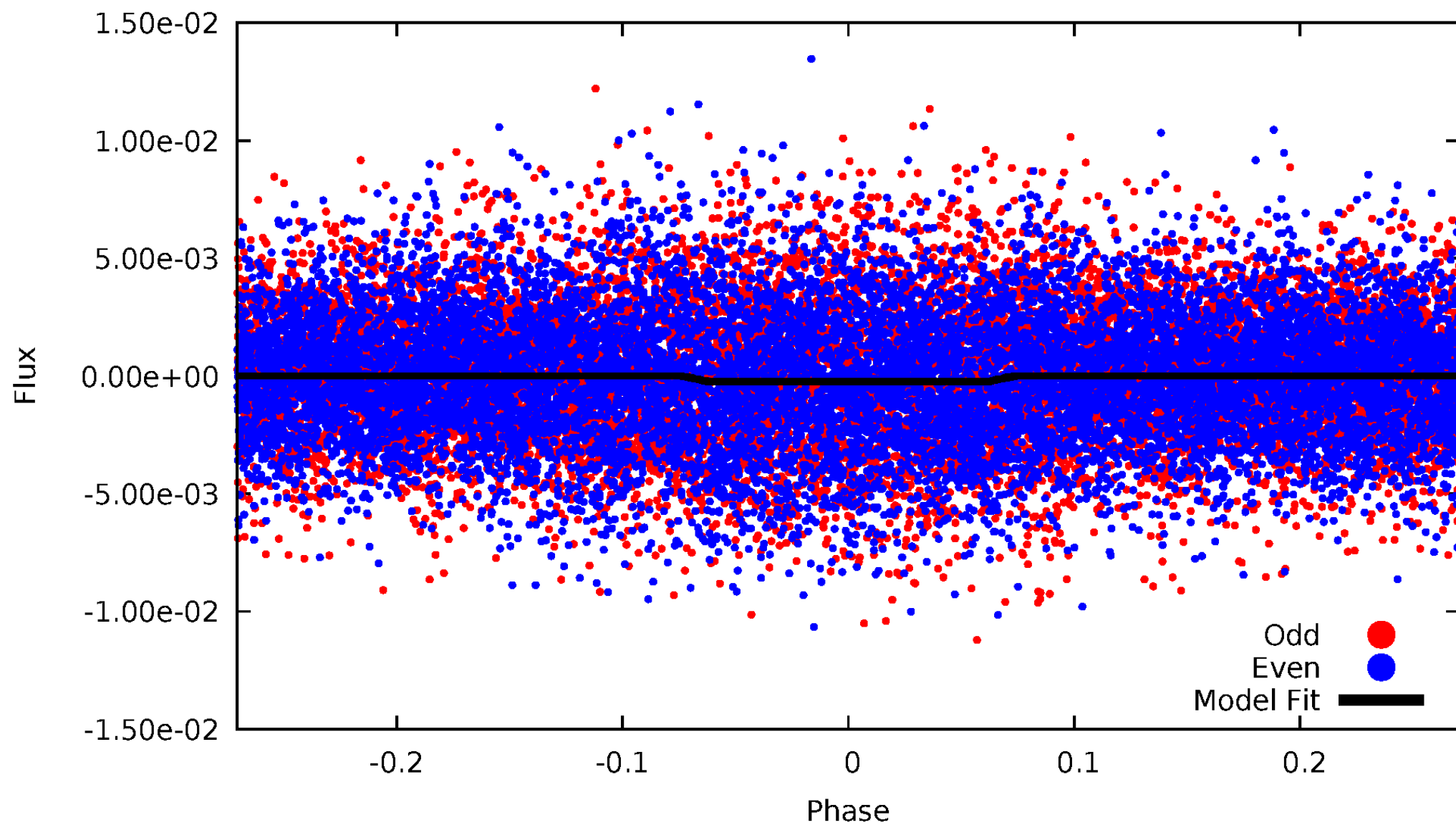
TCE 006951231-02





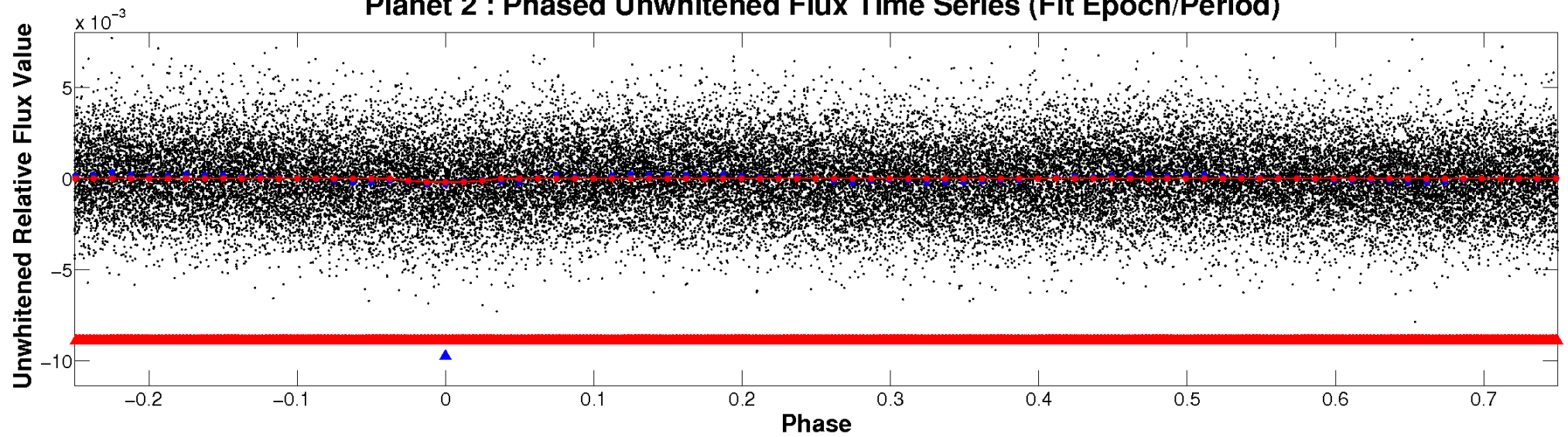
# ALT Odd/Even

TCE 006951231-02

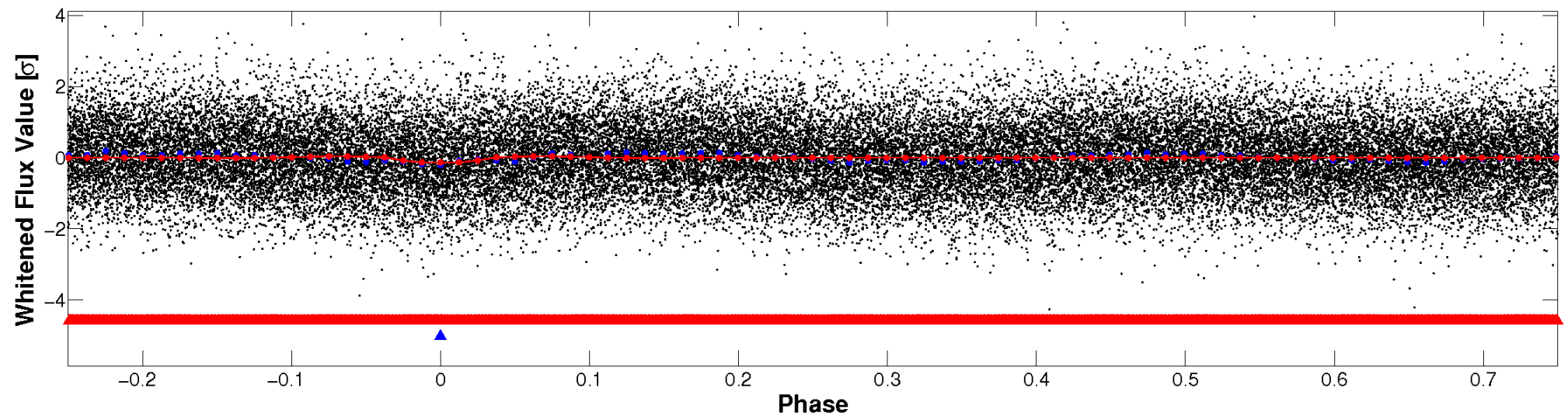


# Non-Whitened Vs. Whitened Light Curve

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

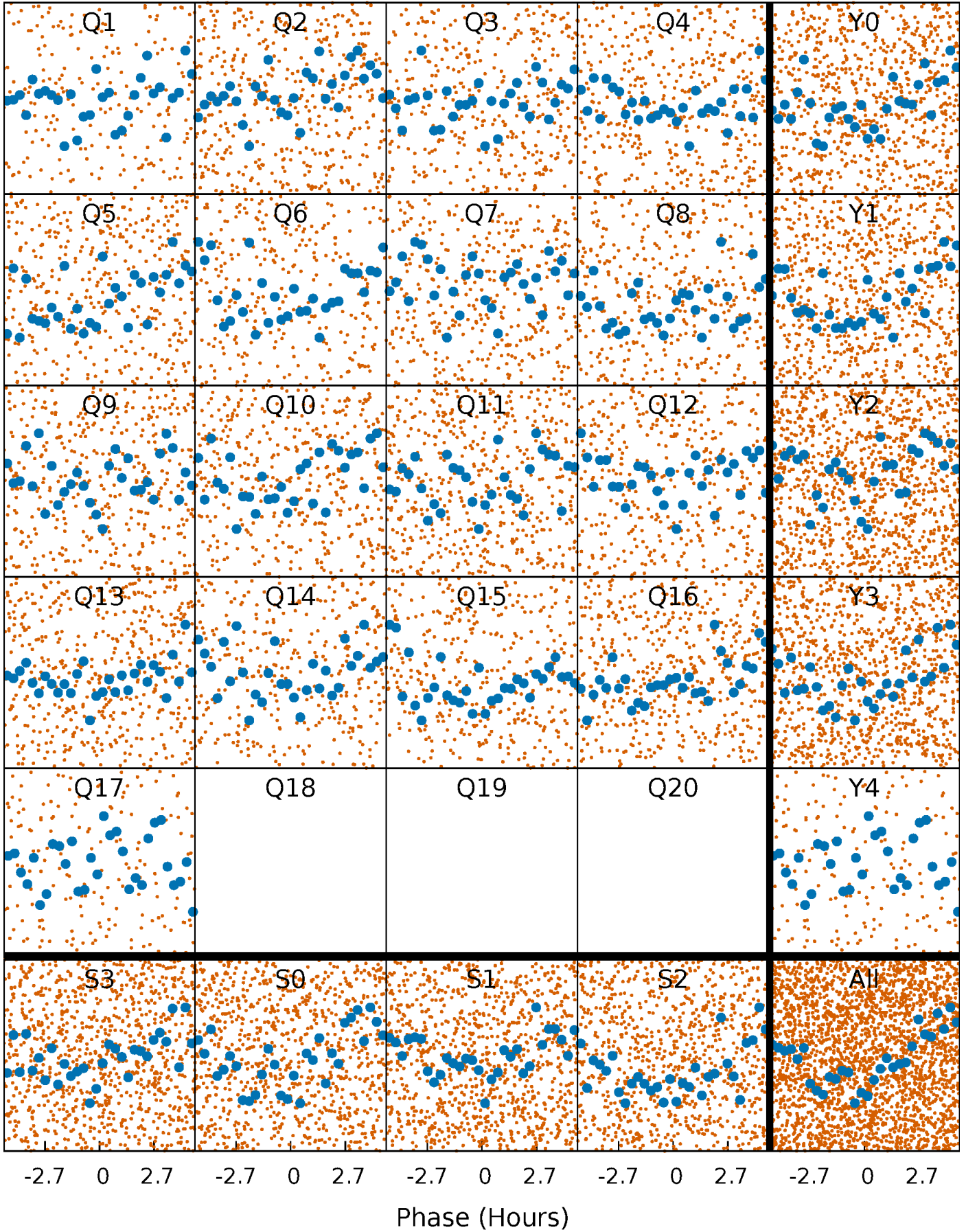


**Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



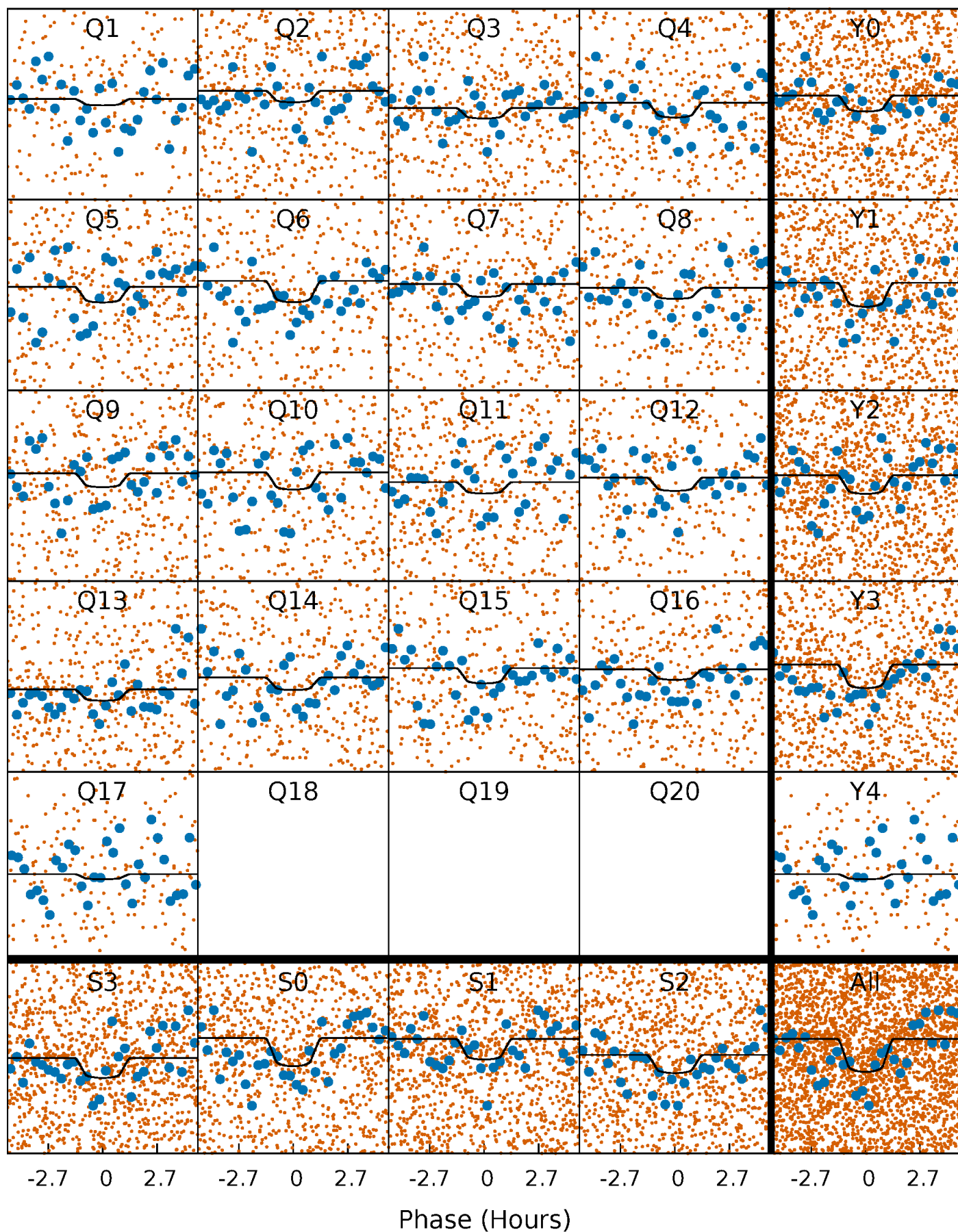
# PDC Quarter-Phased Transit Curves

TCE 006951231-02 P= 1.637286 Days  $T_0=132.302210$  (BKJD)



# DV Quarter-Phased Transit Curves

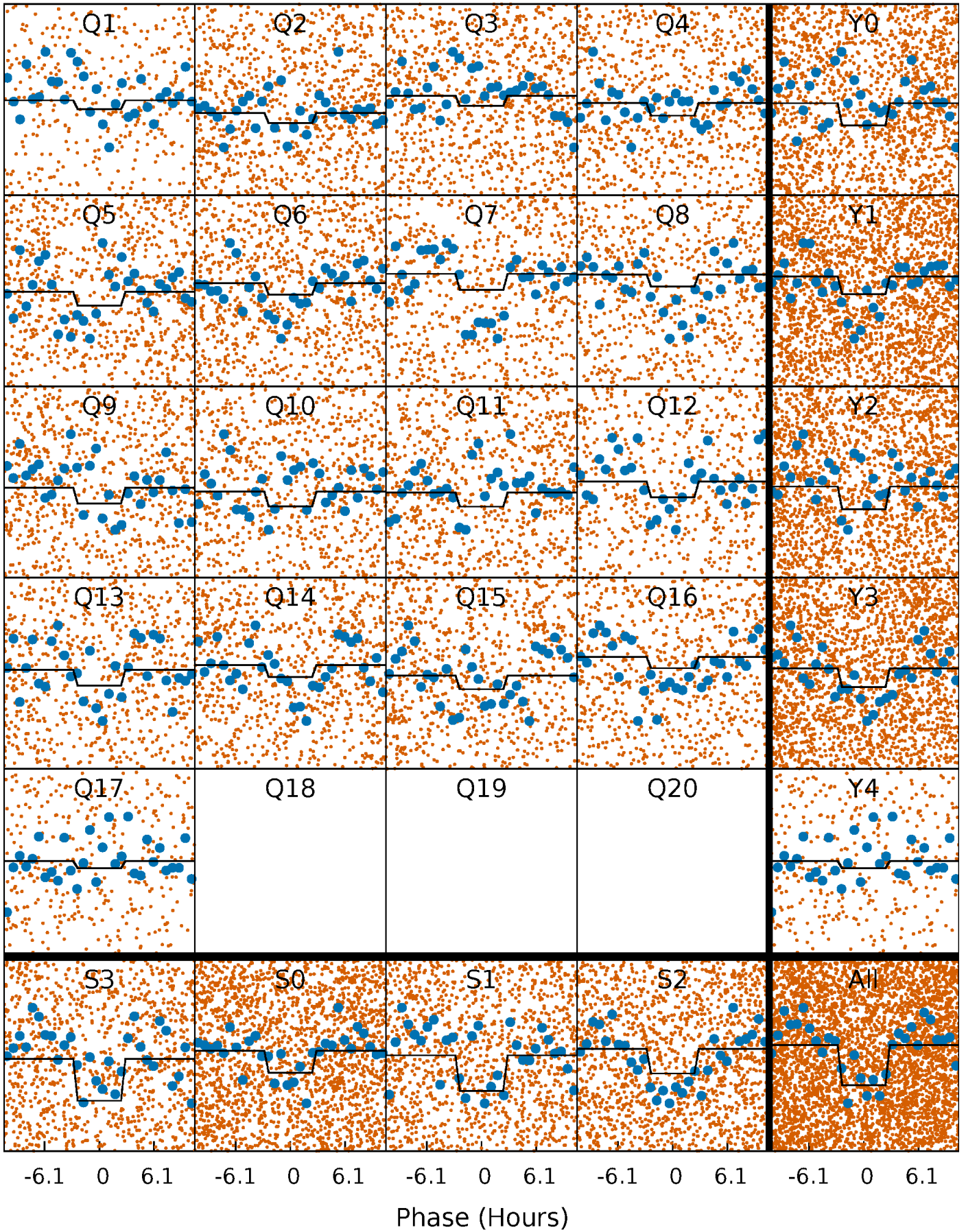
TCE 006951231-02   P= 1.637286 Days    $T_0=132.302210$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

TCE 006951231-02 P= 1.637258 Days  $T_0=132.304549$  (BKJD)

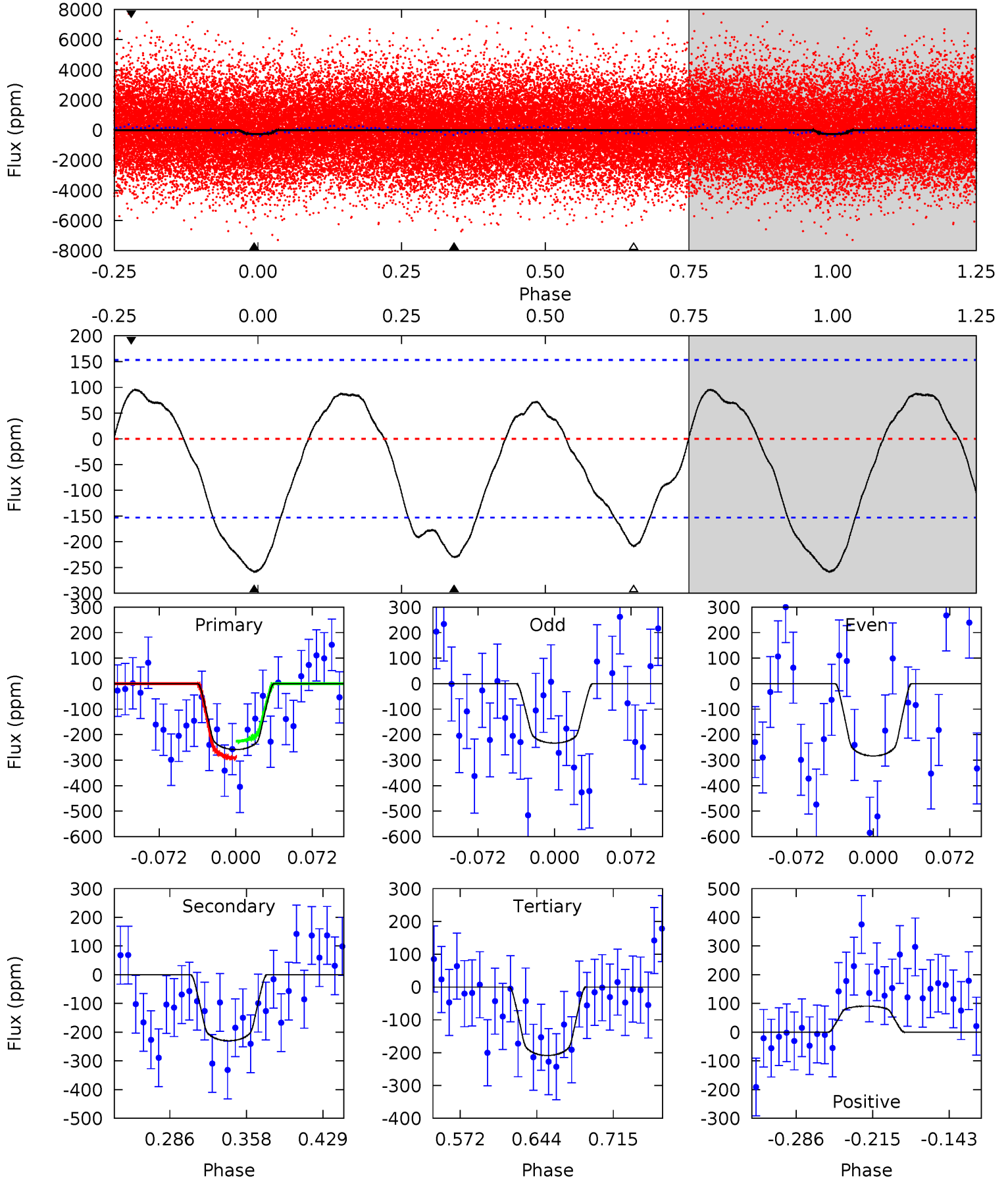




# DV Model-Shift Uniqueness Test

006951231-02, P = 1.637286 Days, E = 130.664924 Days

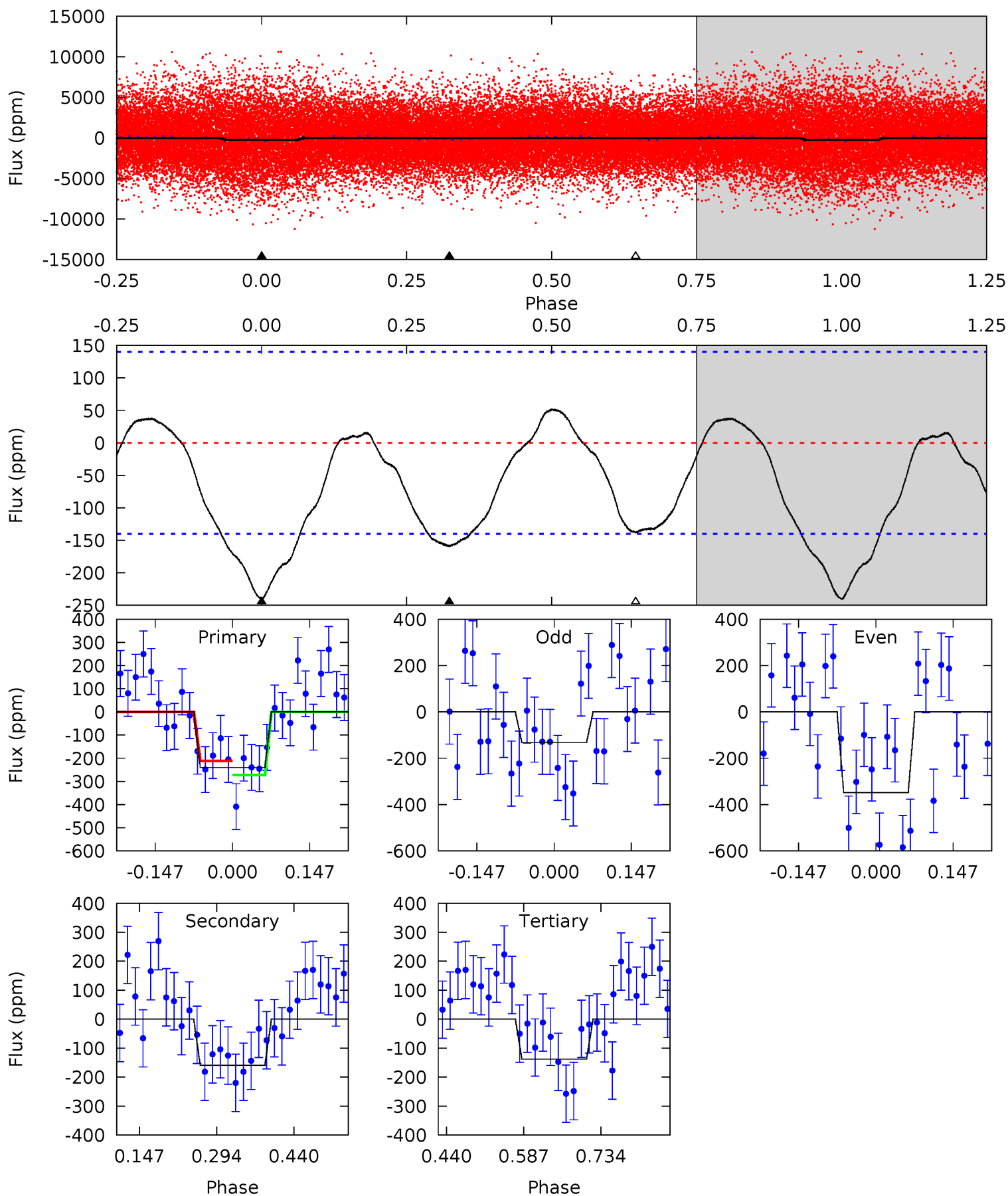
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.83	6.96	6.32	2.74	4.63	1.80	2.63	1.51	5.09	0.64	4.22	0.76	1.06	0.27	0.99



# Alt Model-Shift Uniqueness Test

006951231-02, P = 1.637258 Days, E = 130.667291 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
7.69	5.10	4.42	0	4.48	1.45	2.08	3.28	7.69	0.69	5.10	3.44	0.88	0.18	0.98



### Stellar Parameters For KIC 006951231

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$7222^{+72}_{-93}$	$3.972^{+0.121}_{-0.099}$	$0.340^{+0.050}_{-0.150}$	$2.329^{+0.373}_{-0.373}$	$1.853^{+0.117}_{-0.169}$	$0.207^{+0.117}_{-0.063}$
	+1%/-1%	+3%/-2%	+15%/-44%	+16%/-16%	+6%/-9%	+57%/-31%
Source	SPE68	SPE68	SPE68	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 006951231-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-230 \pm 33$	$4.03^{+2.95}_{-2.46}$	$3709^{+147}_{-161}$	$6875^{+6564}_{-1633}$	$8.424^{+48.094}_{-5.537}$
Alt.	$-160 \pm 31$	$4.49^{+2.79}_{-2.68}$	$3702^{+154}_{-140}$	$5929^{+4356}_{-1302}$	$4.890^{+24.706}_{-3.135}$

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

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

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

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

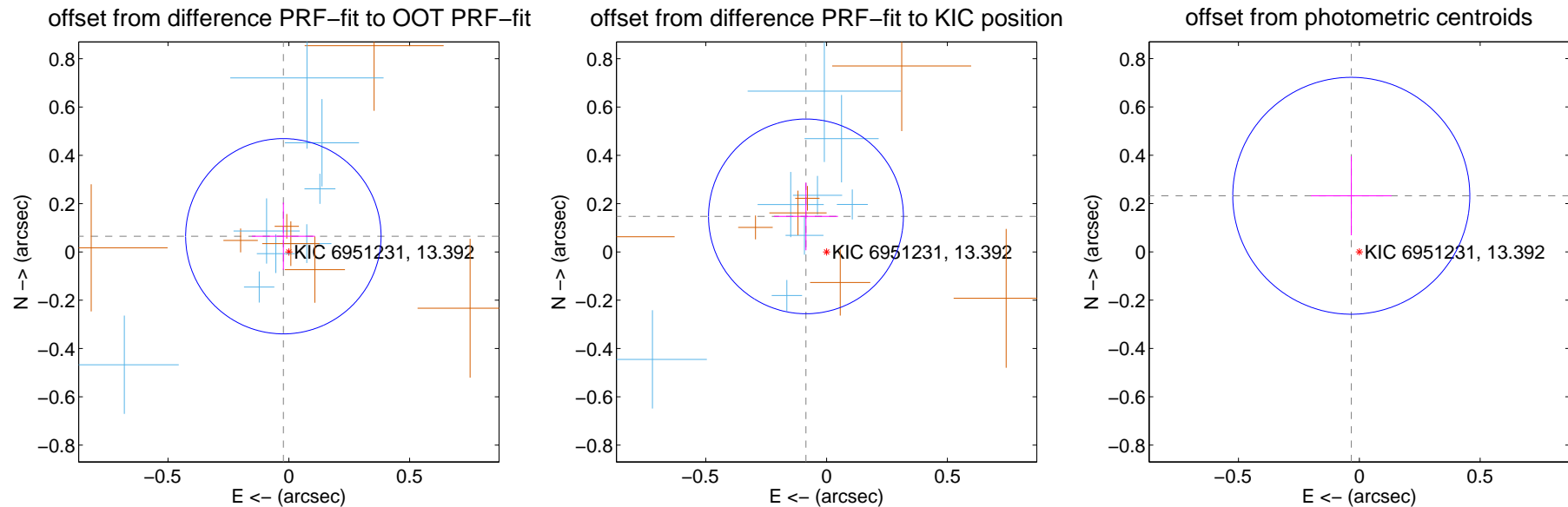
## DV Centroid Data

Supplemental centroid analysis for 006951231-02. Kepler magnitude: 13.39. Transit SNR 6.26

There are 9 quarters with good PRF difference image offsets

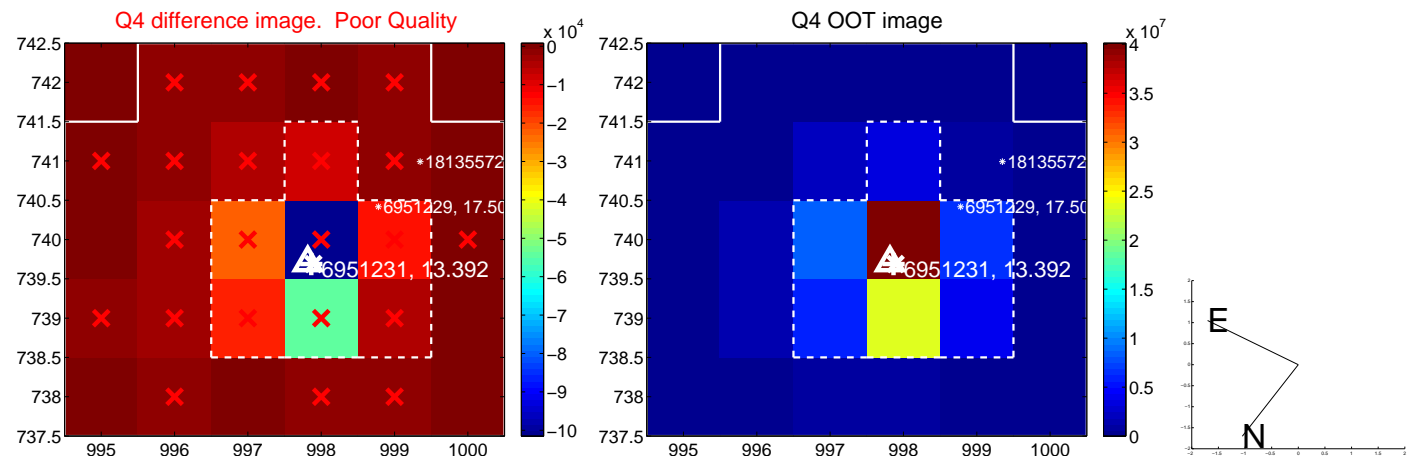
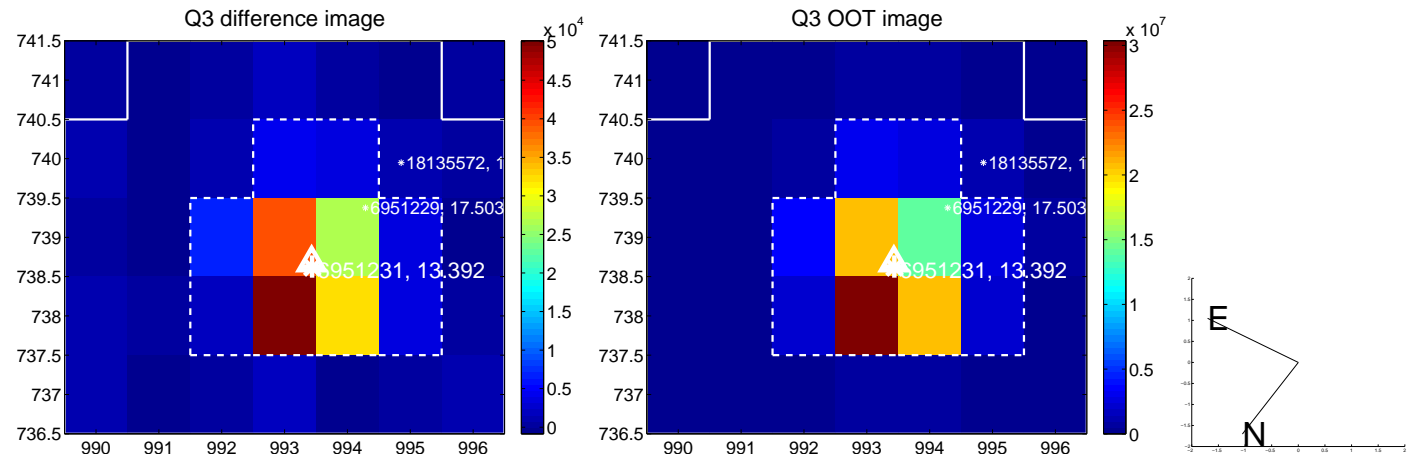
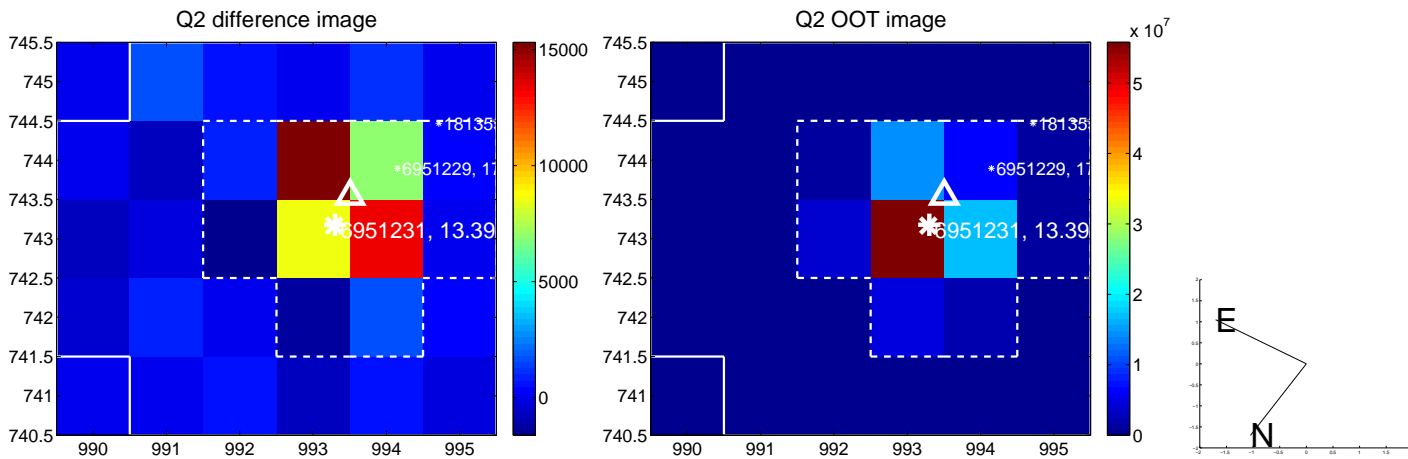
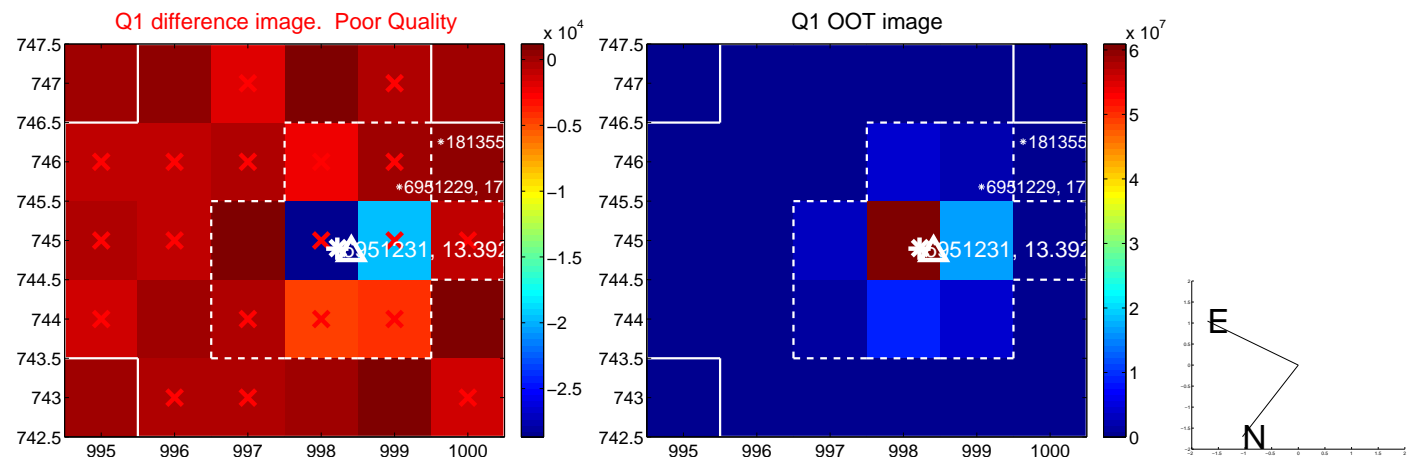
The direct PRF centroid is offset from the target star catalog position by about 0.14 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.069 \pm 0.135$	0.51	$0.023 \pm 0.130$	$0.065 \pm 0.139$
PRF-fit source offset from KIC position	$0.170 \pm 0.134$	1.27	$0.085 \pm 0.132$	$0.147 \pm 0.140$
photometric centroid source offset	$0.23 \pm 0.16$	1.43	$0.03 \pm 0.17$	$0.23 \pm 0.16$



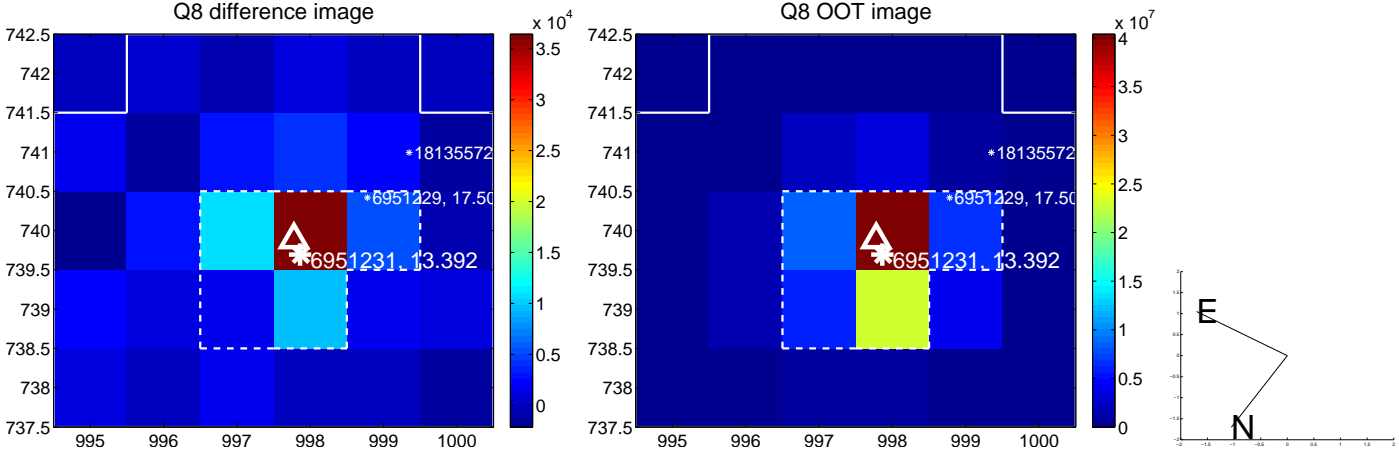
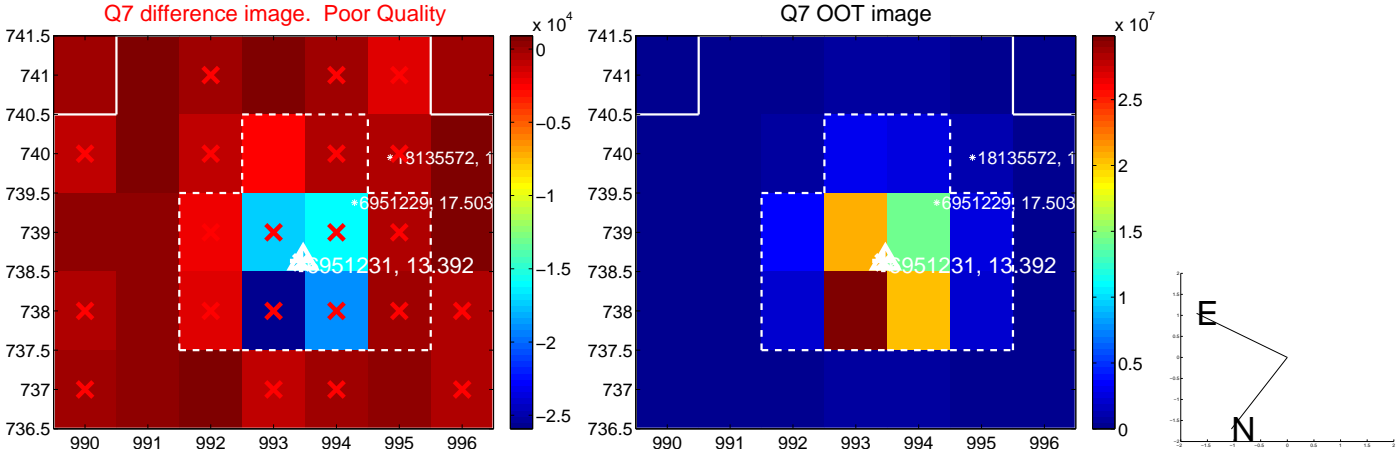
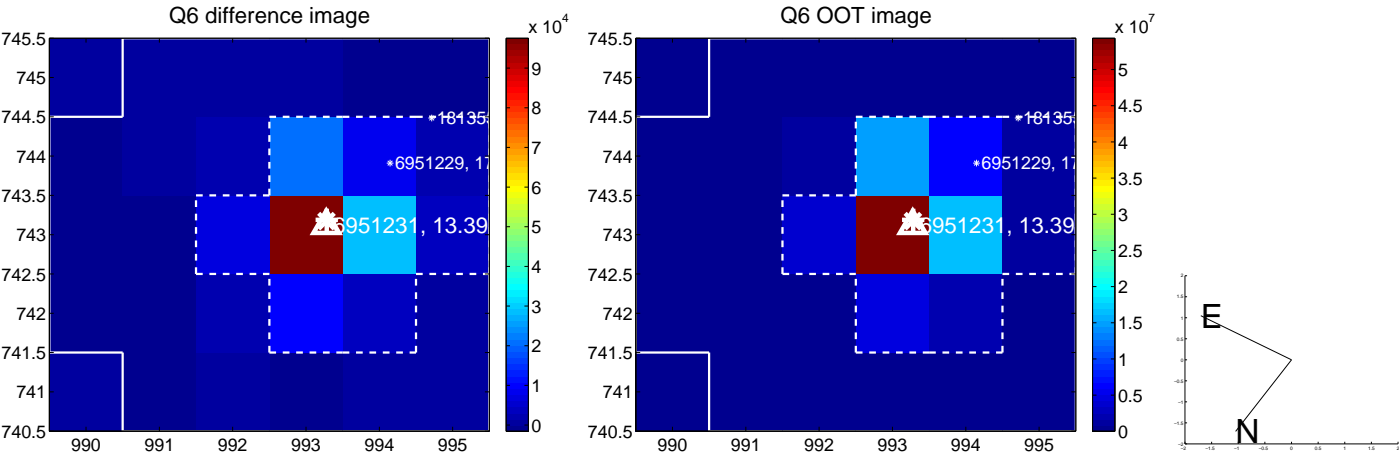
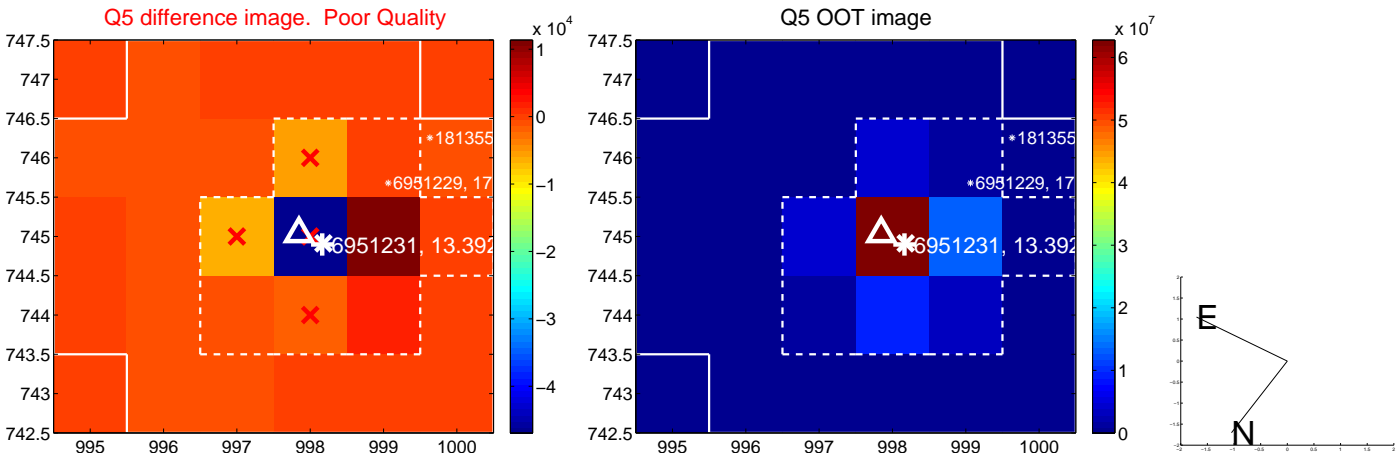
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

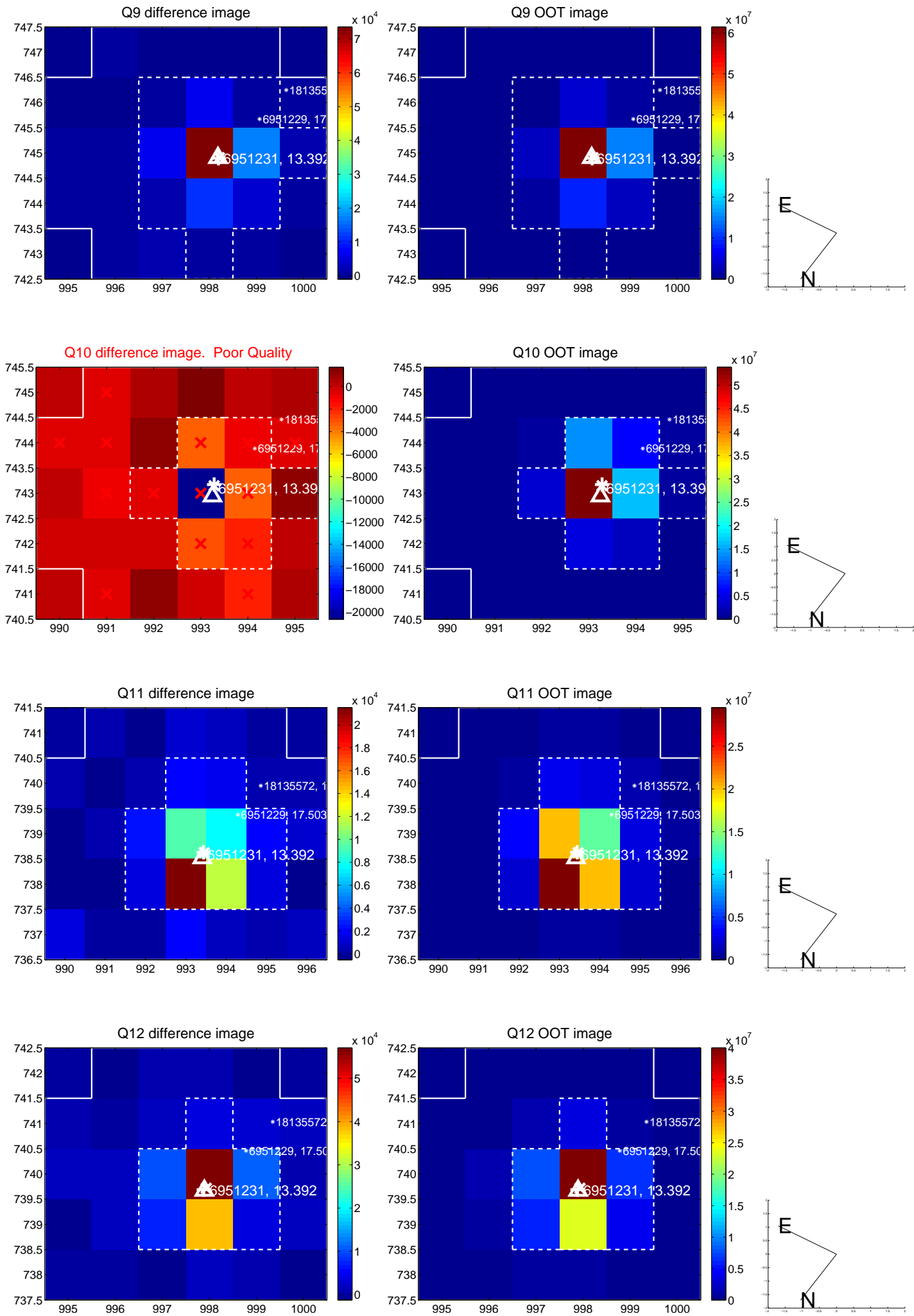




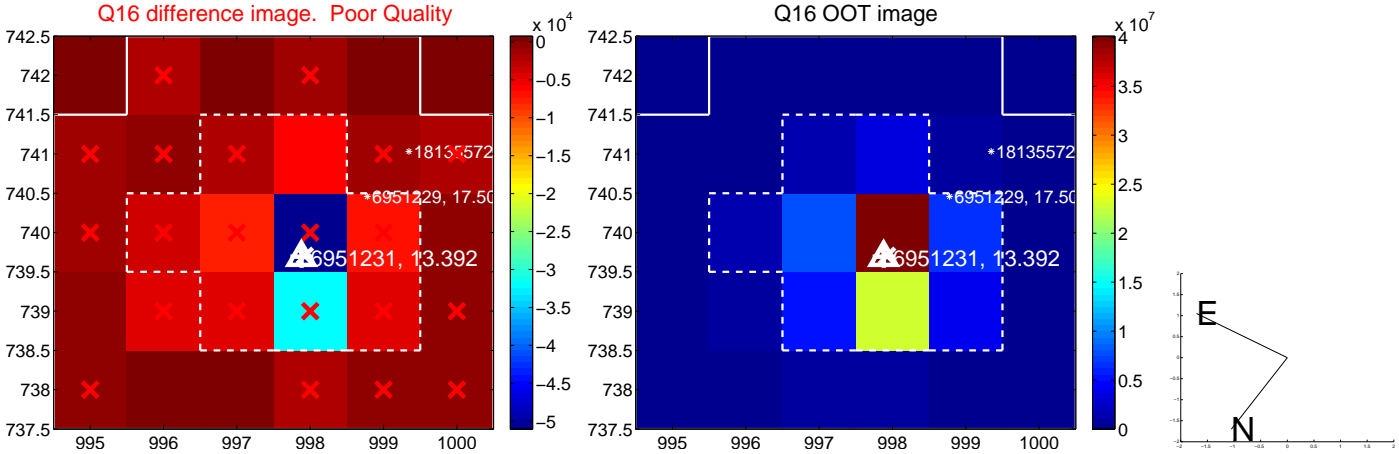
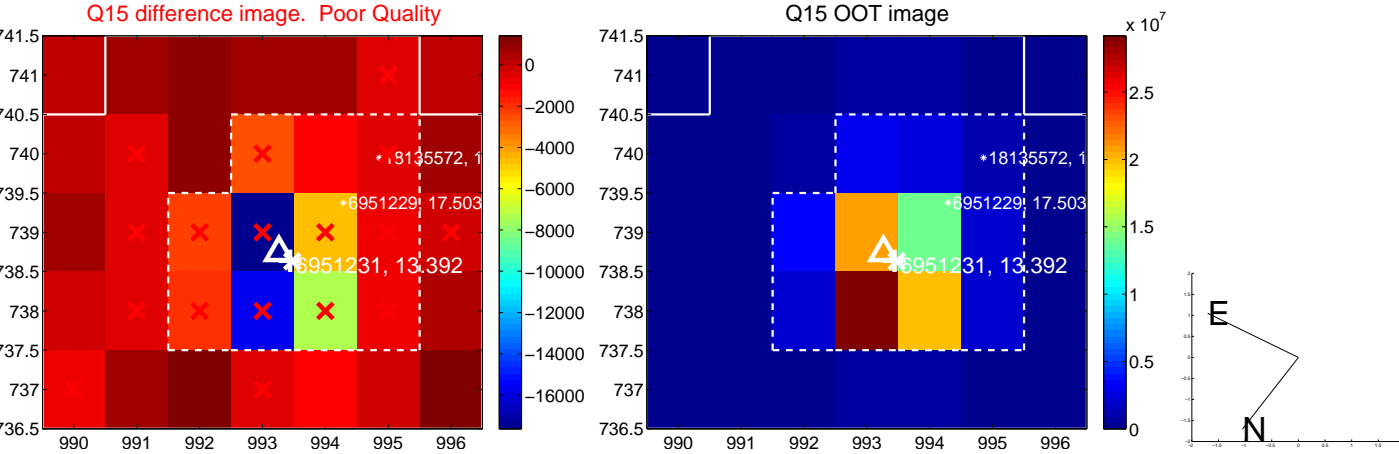
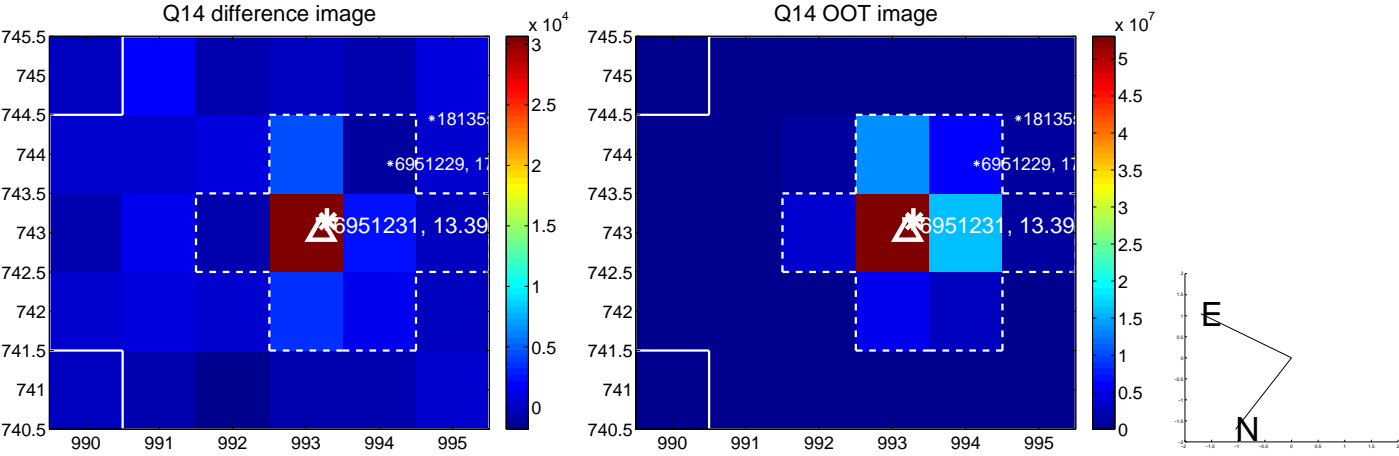
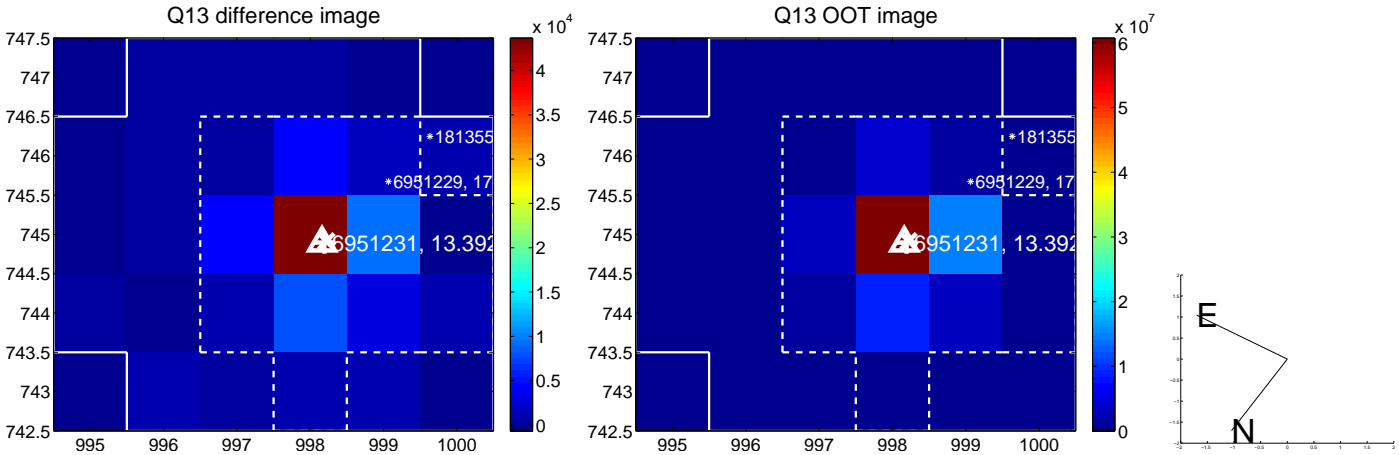
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



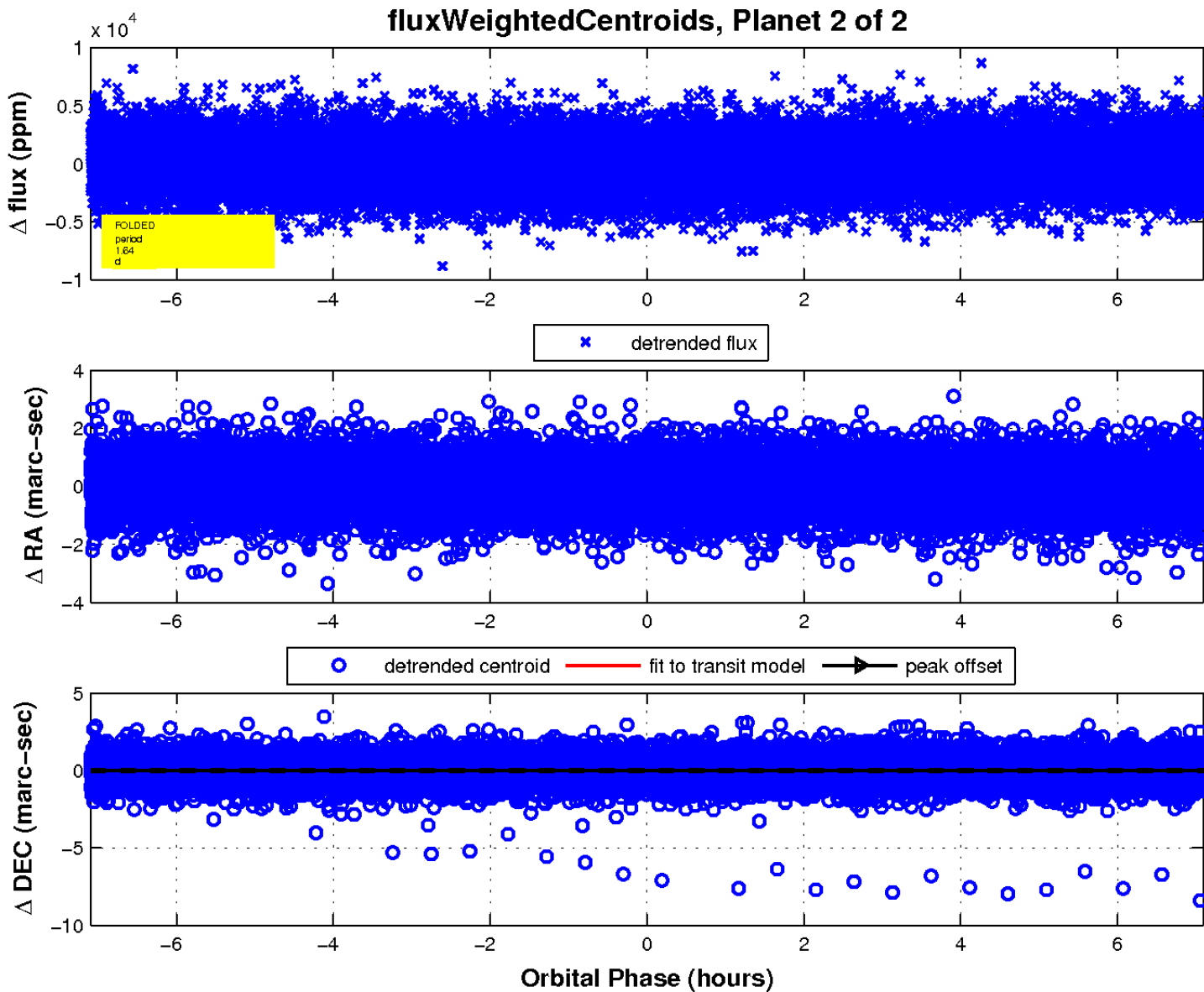
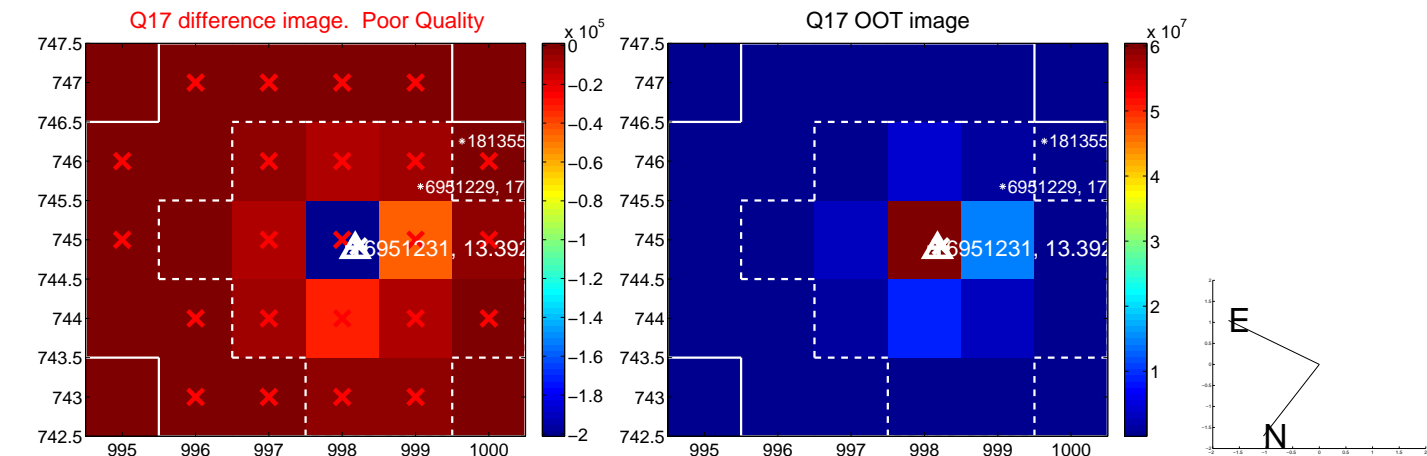
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

