

# KIC 010728219

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010728219-01	OBS	6229.01	3.371796	134.872573	358840.8	2.000	10819.7	-1.0	0.91	5615	49.76	421.19
010728219-02	OBS	No	3.371799	133.190004	43403.1	3.471	1466.3	1361.8	0.91	5615	20.95	421.19
010728219-03	OBS	No	5.057671	134.630517	22823.9	15.000	963.5	-1.0	0.91	5615	13.62	245.29
010728219-04	OBS	No	1.123925	132.083134	5676.0	3.500	151.8	-1.0	0.91	5615	6.79	1822.38

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010728219-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_ALT—HAS_SEC_TCE—CENT_NOFITS
010728219-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE
010728219-03	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—CENT_NOFITS
010728219-04	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—SAME_NTL_PERIOD—CENT_NOFITS

**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 010728219-01

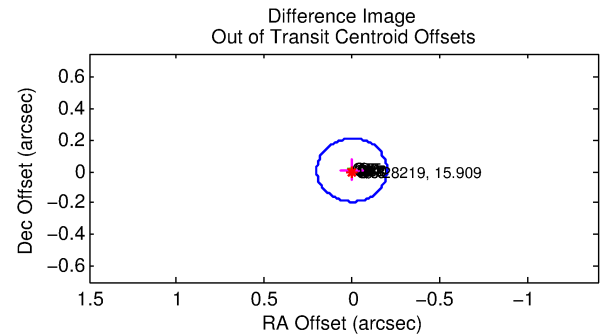
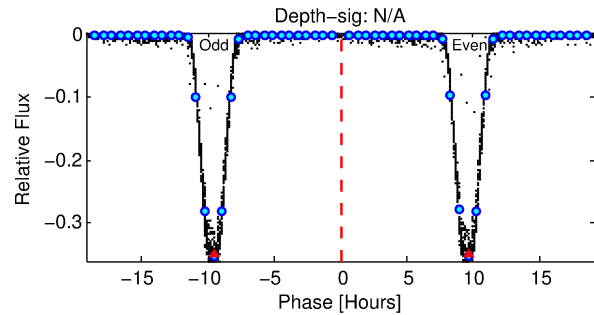
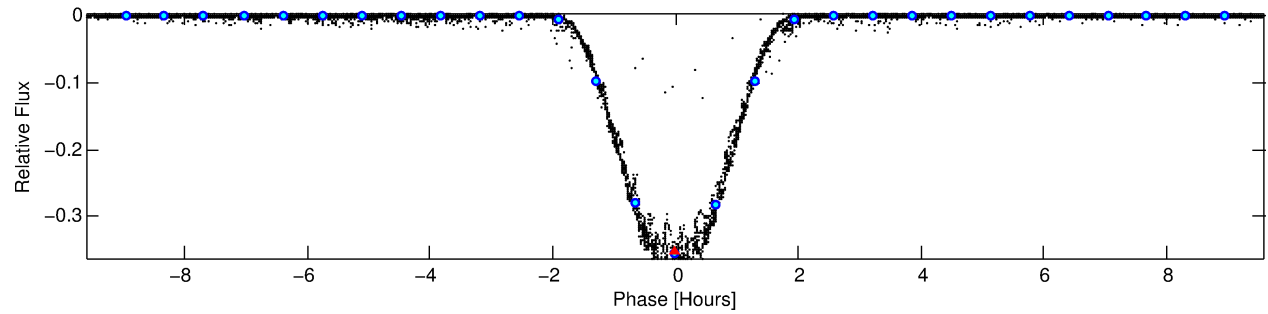
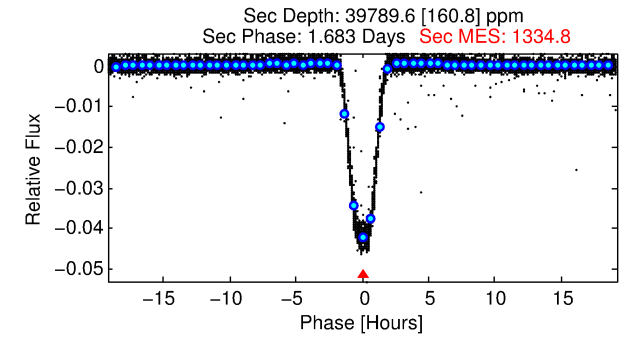
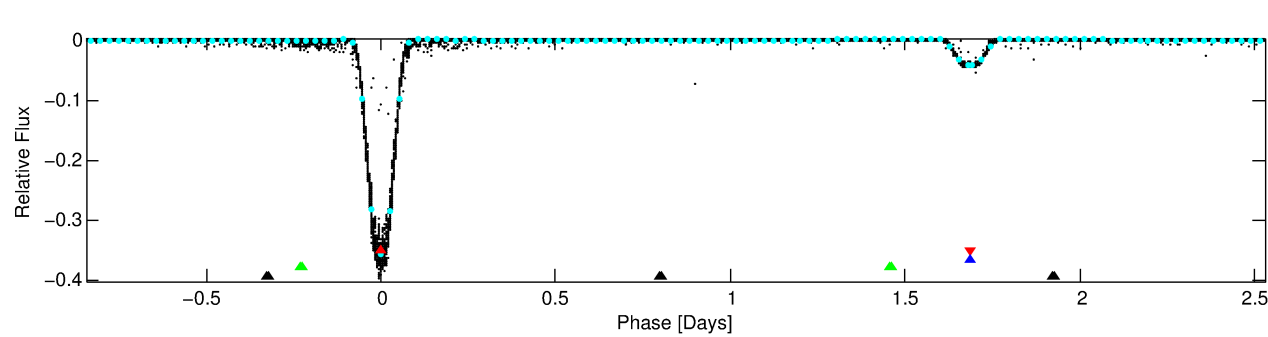
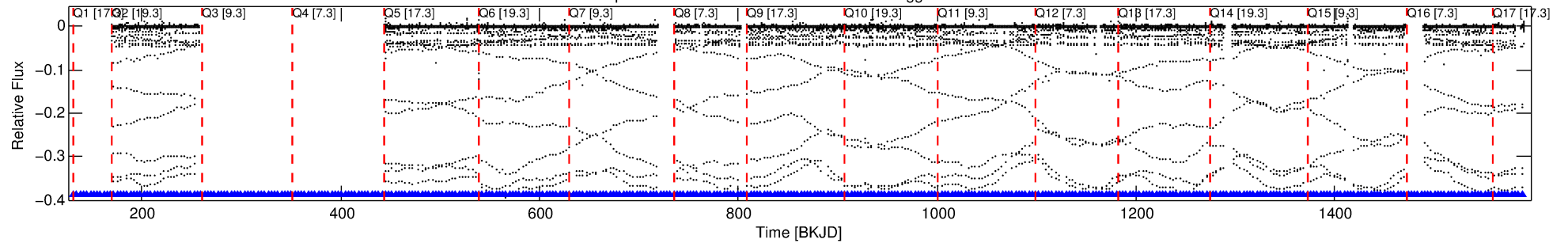
No Significant Match Found

# DV One-Page Summary

KIC: 10728219 Candidate: 1 of 4 Period: 3.372 d

KOI: K06229.01 Corr: 0.762

Kp: 15.91 R\*: 0.91 Rs Teff: 5615.0 K Logg: 4.46 Fe/H: -0.160



## TPS TCE Results:

Period = 3.37180 d  
Epoch = 134.8726 BKJD

DV fit results are unavailable

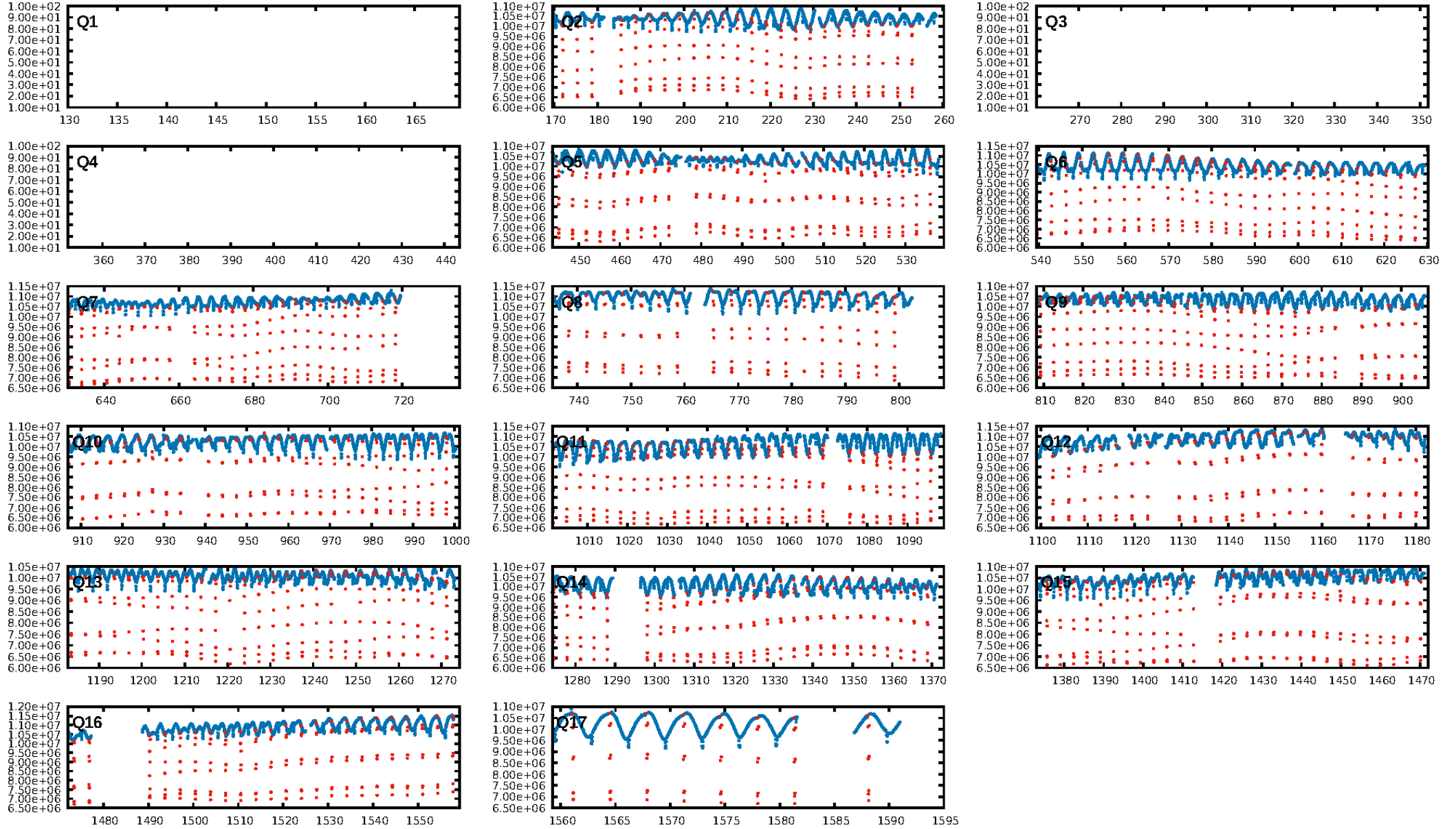
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [13.38σ]  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [329/329]  
GhostDiagnostic-chr: N/A  
Centroid-sig: N/A  
Centroid-so: N/A  
OotOffset-rm: 0.010 arcsec [0.15σ]  
KicOffset-rm: 0.242 arcsec [3.44σ]  
OotOffset-st: 4/3/3/4 [14]  
KicOffset-st: 4/3/3/4 [14]  
DiffImageQuality-fgm: 1.00 [14/14]  
DiffImageOverlap-fno: 0.00 [0/14]

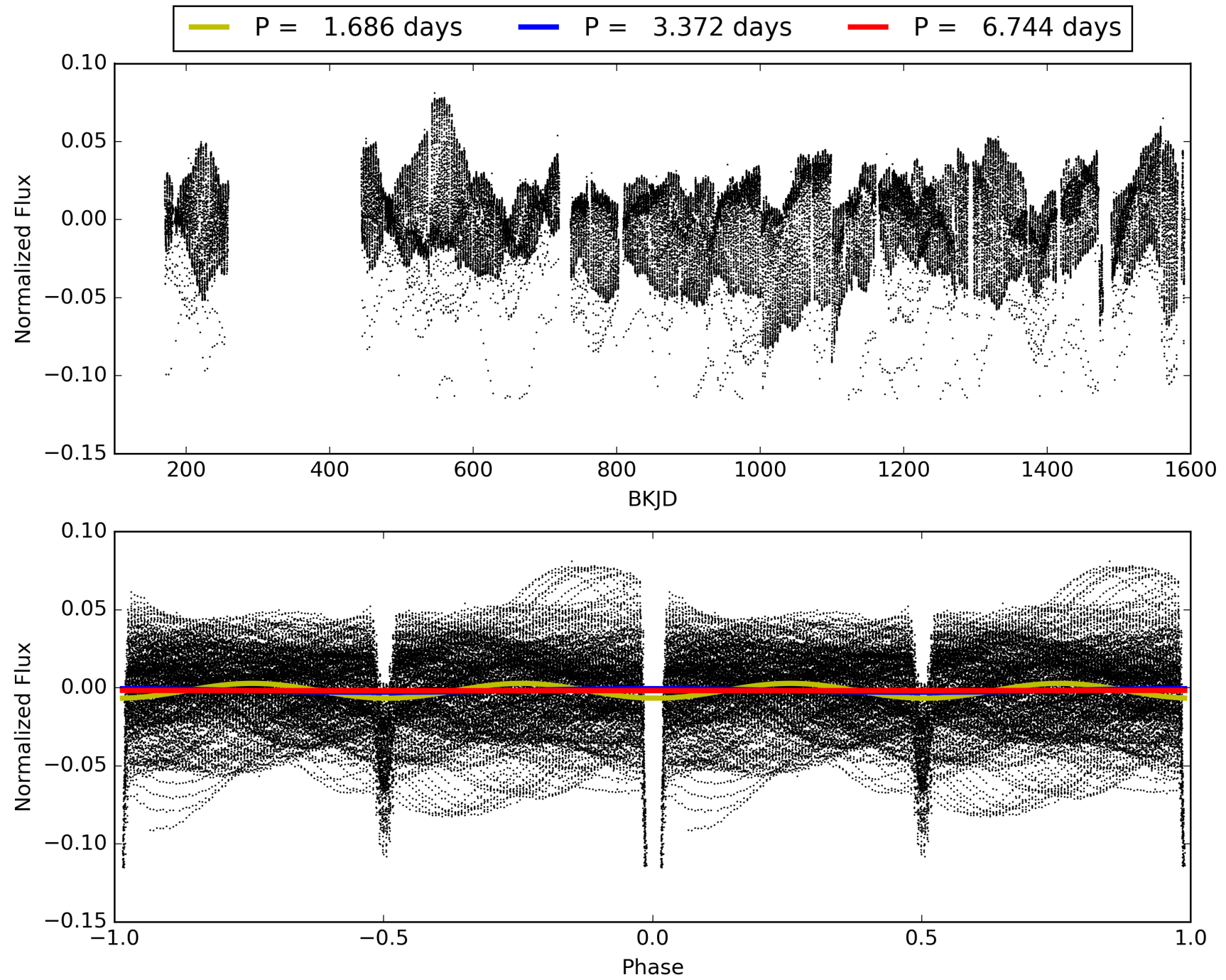
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 07:49:40 Z

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

# TCE 010728219-01, PDC Light Curves



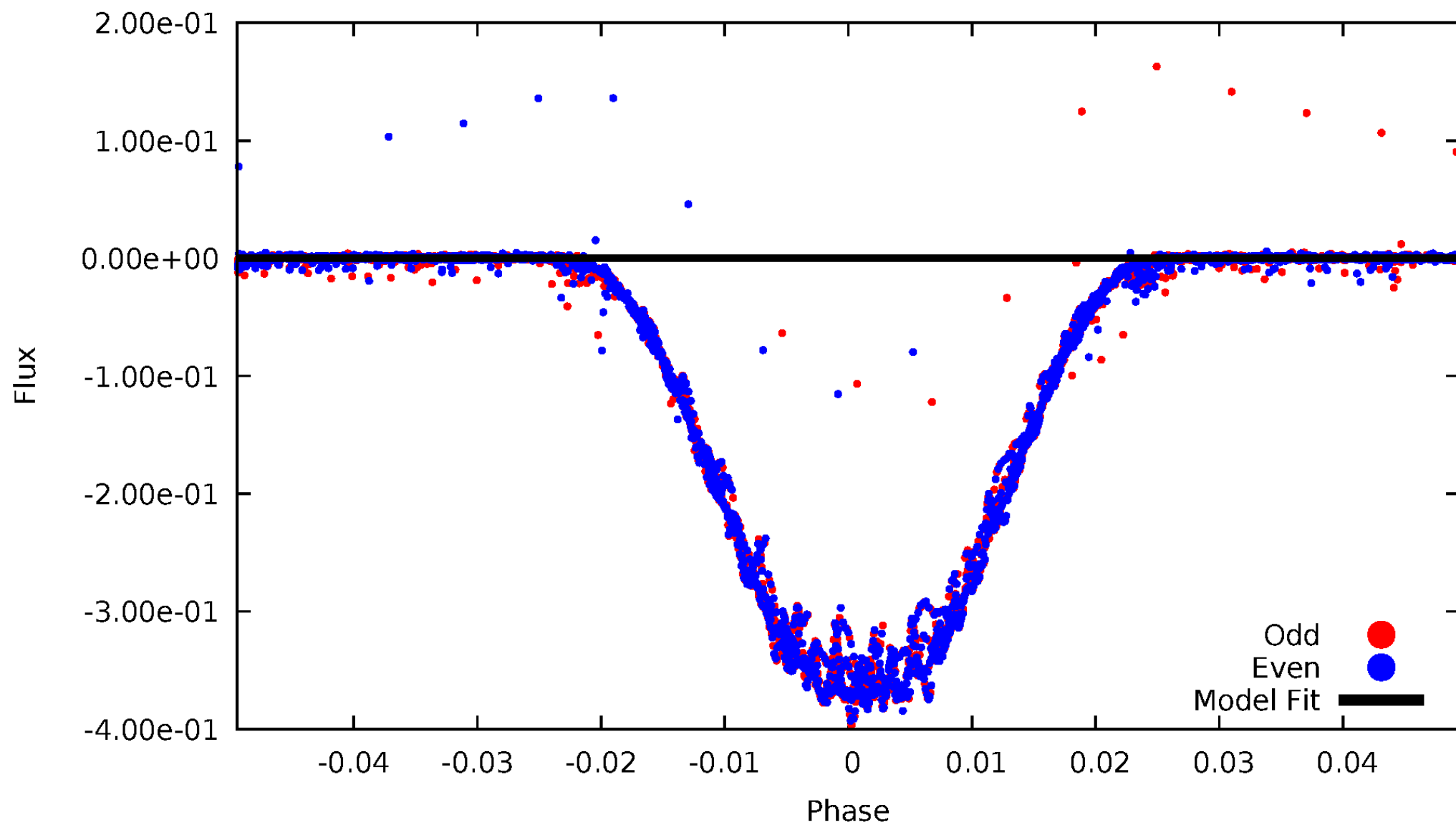
TCE 010728219-01





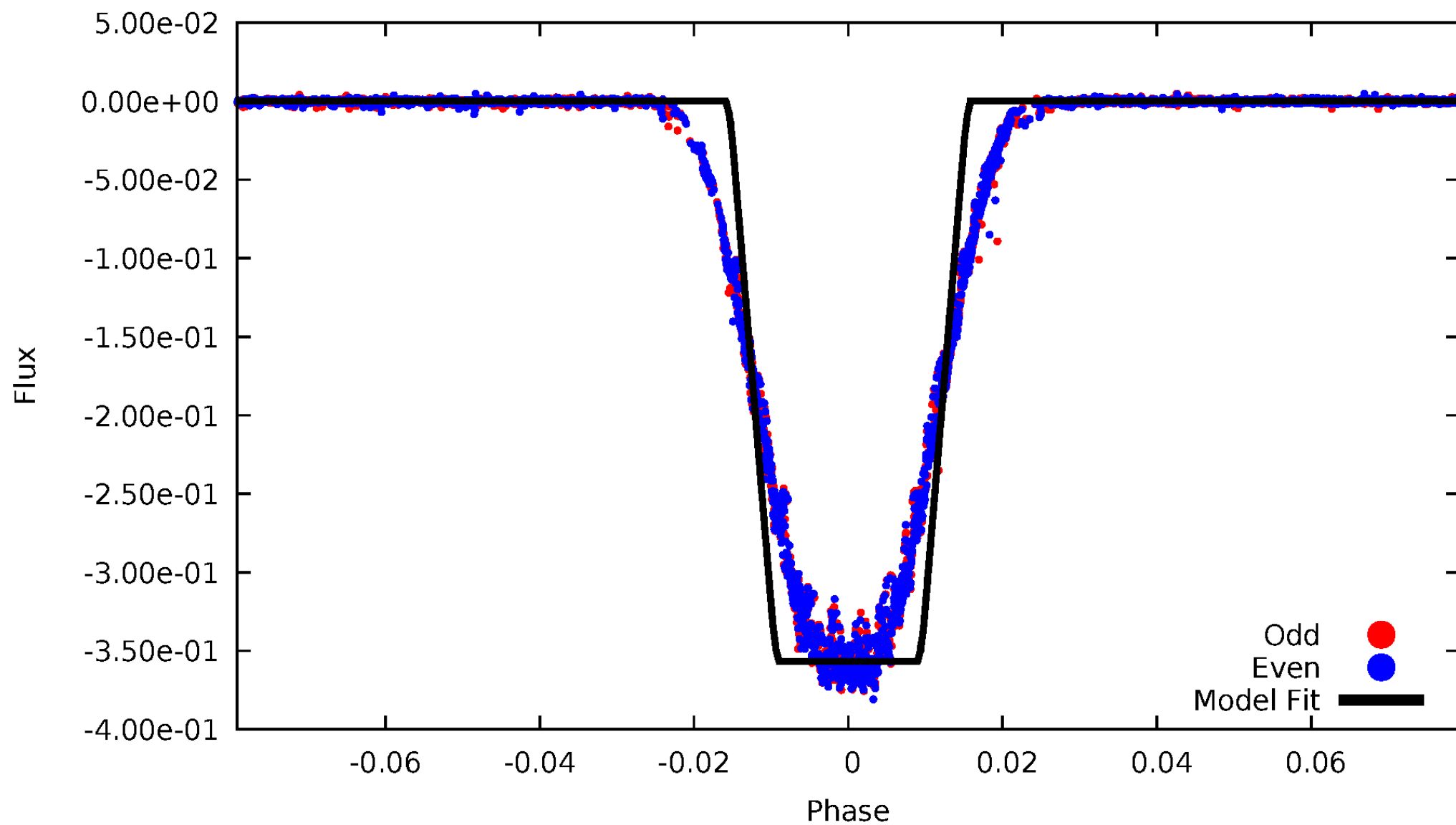
# DV Odd/Even

TCE 010728219-01



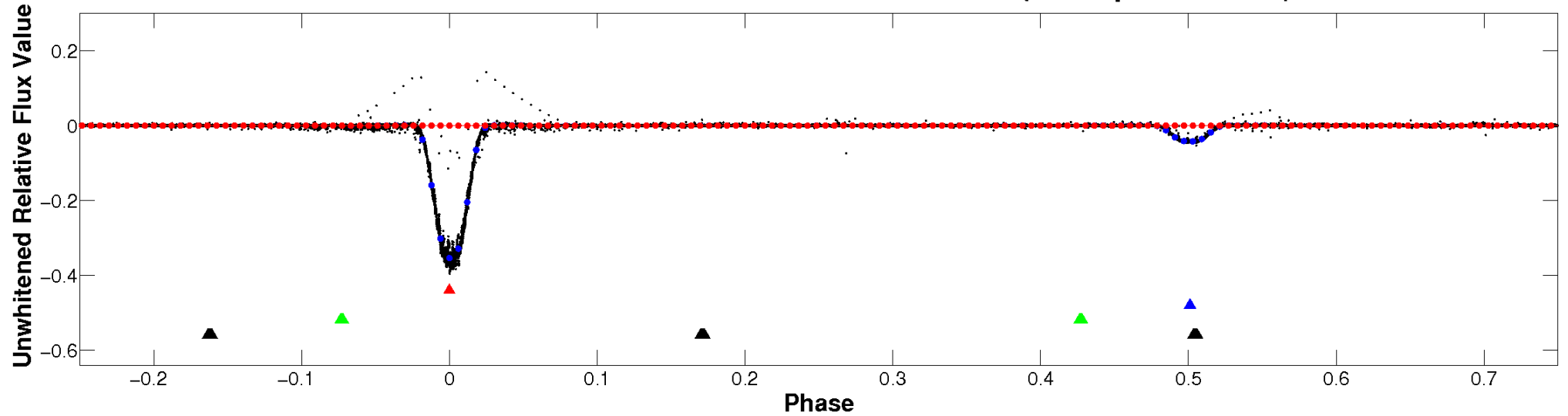
# ALT Odd/Even

TCE 010728219-01

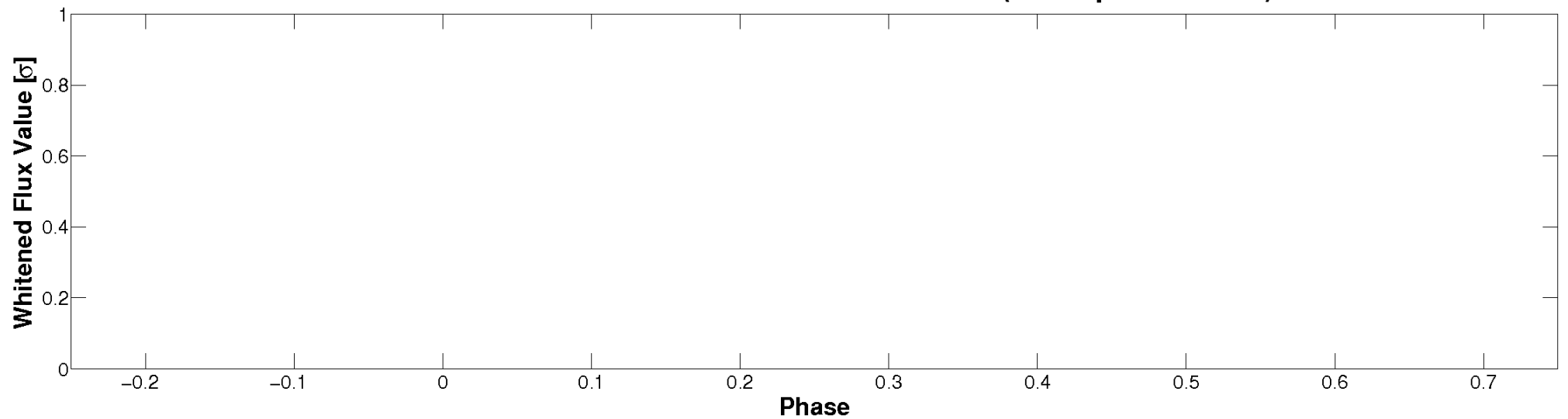


# Non-Whitened Vs. Whitened Light Curve

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

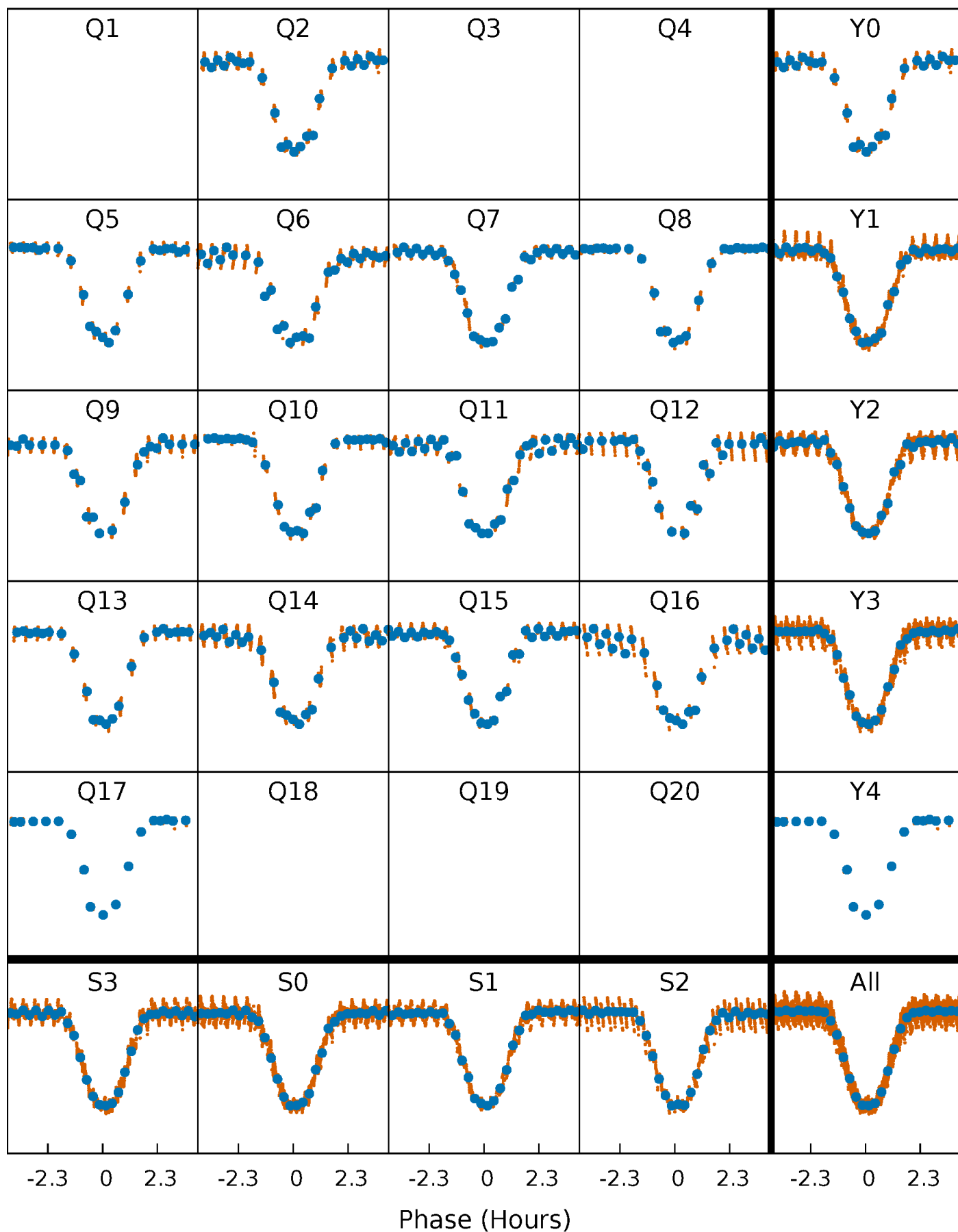


**Planet 1 : Phased Whitened Flux Time Series (TPS Epoch/Period)**



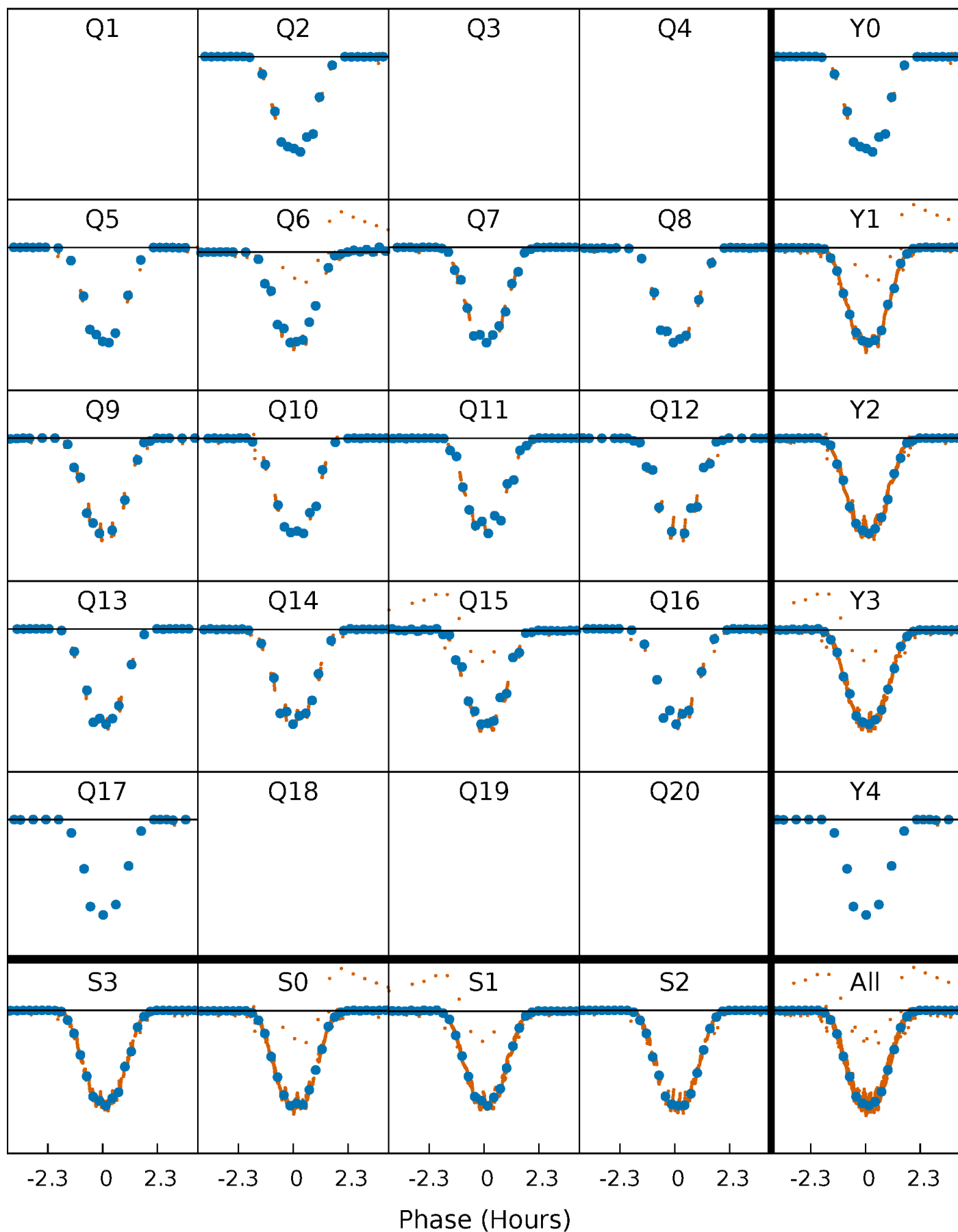
# PDC Quarter-Phased Transit Curves

TCE 010728219-01 P= 3.371796 Days  $T_0=134.872573$  (BKJD)



# DV Quarter-Phased Transit Curves

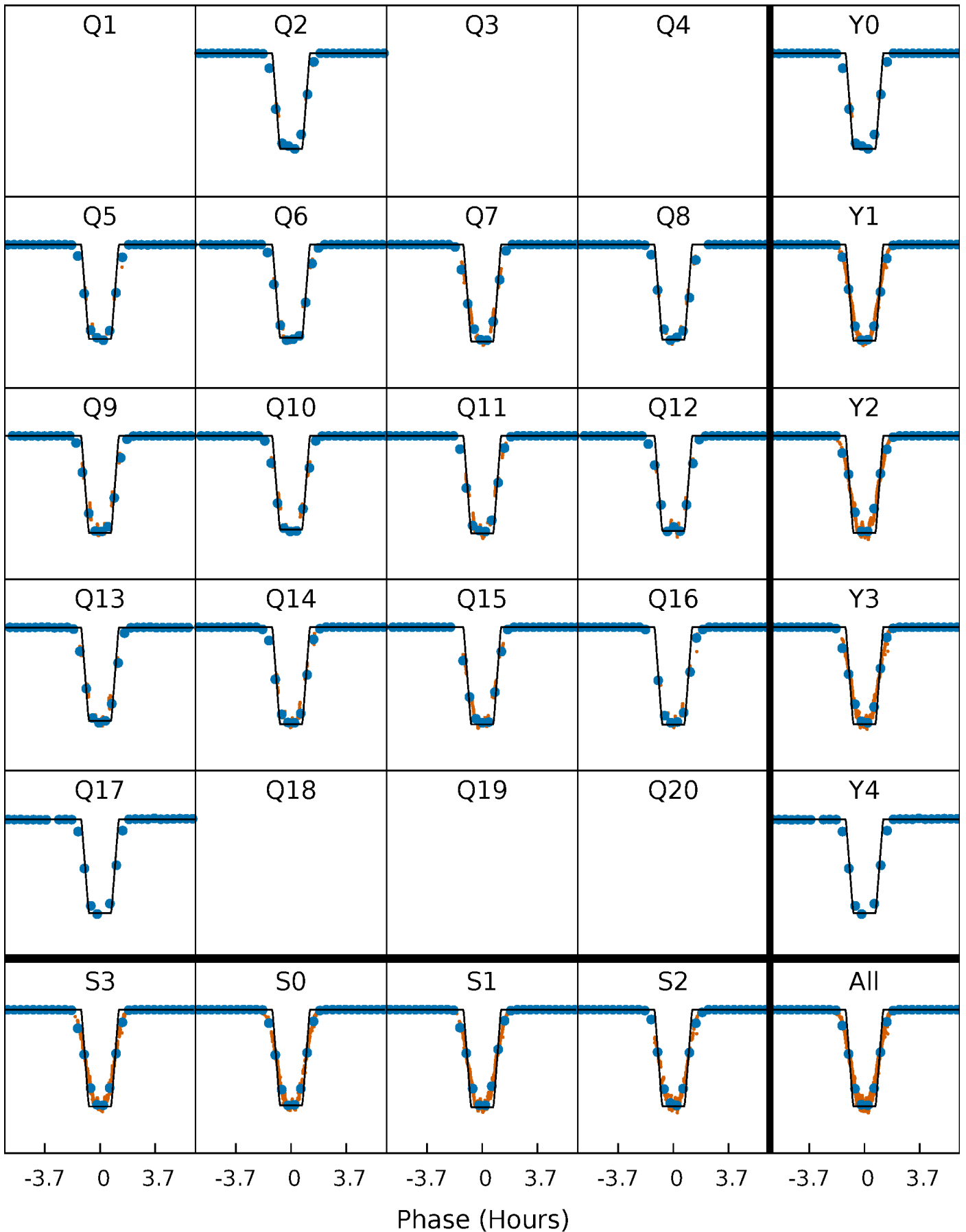
TCE 010728219-01 P= 3.371796 Days  $T_0=134.872573$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

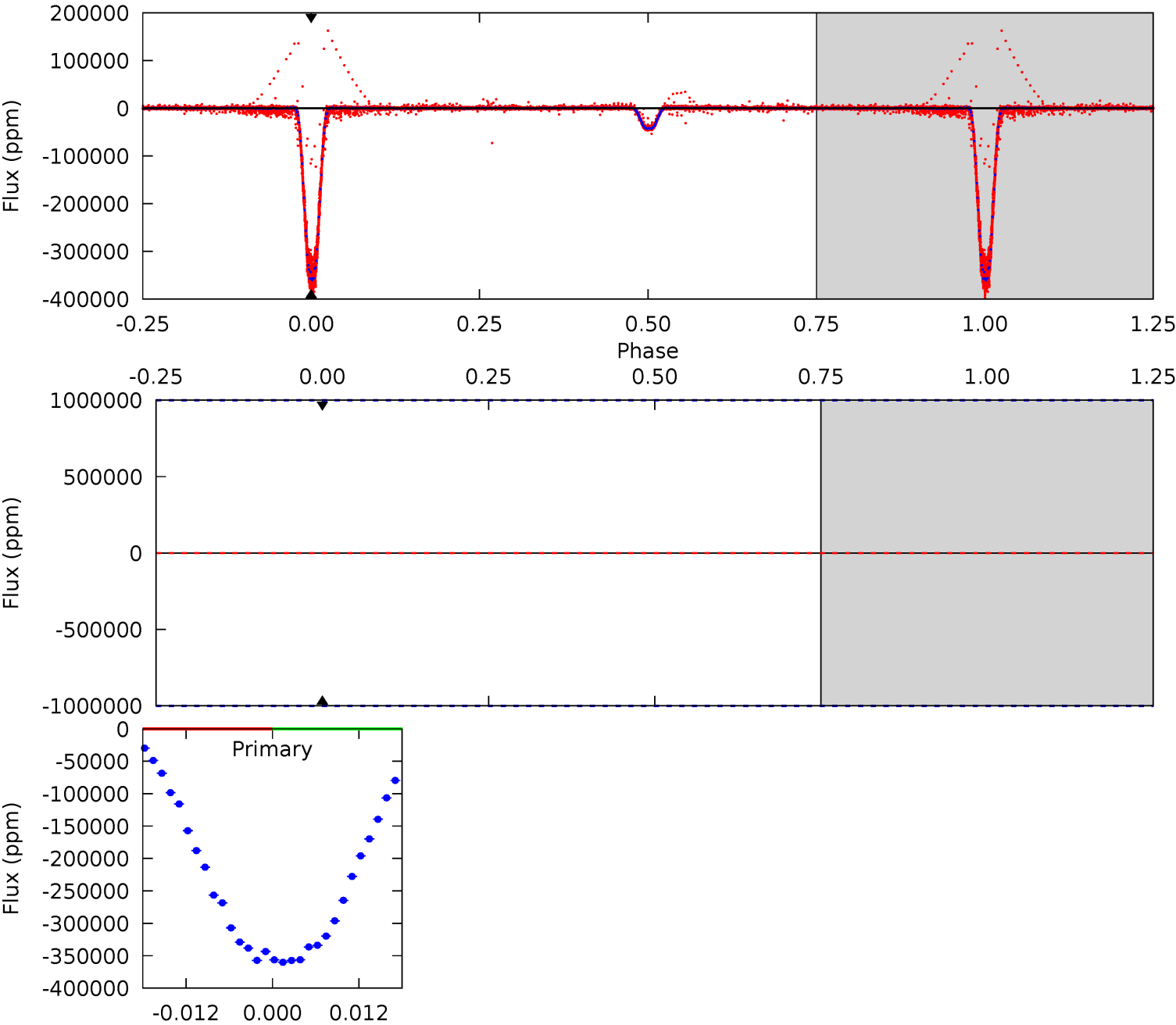
TCE 010728219-01 P= 3.371796 Days  $T_0=131.504636$  (BKJD)



# DV Model-Shift Uniqueness Test

010728219-01, P = 3.371796 Days, E = 134.872573 Days

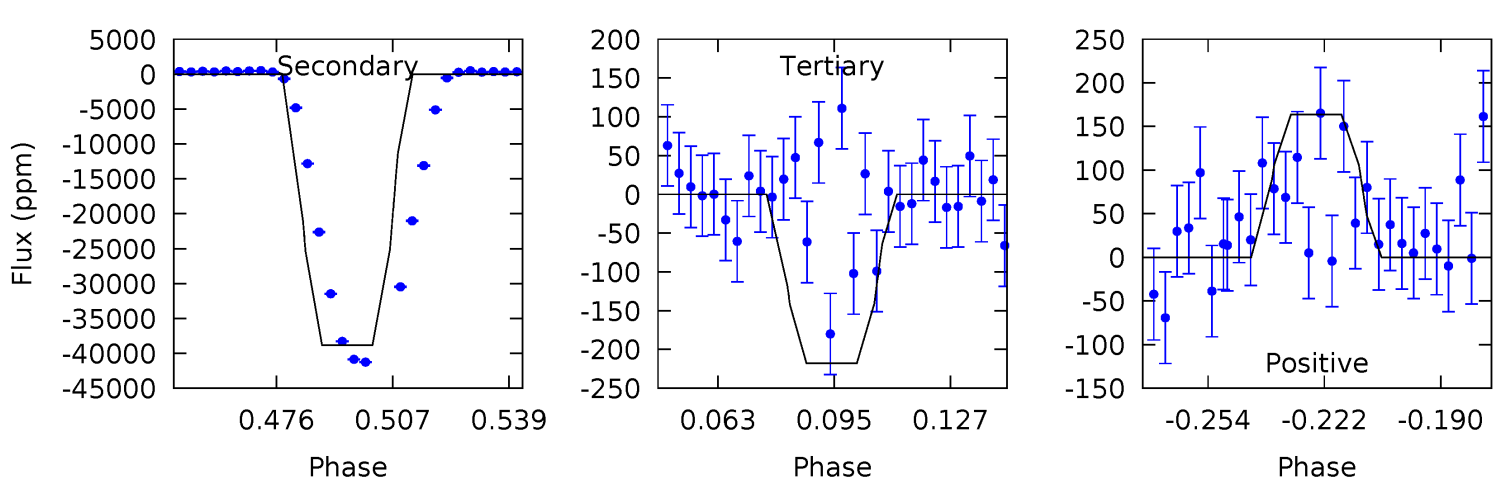
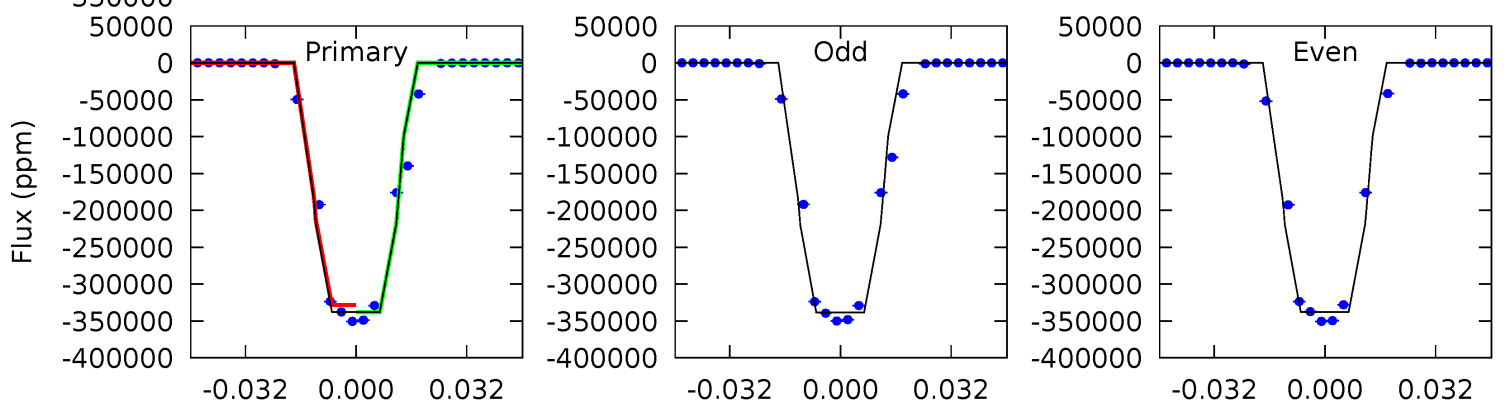
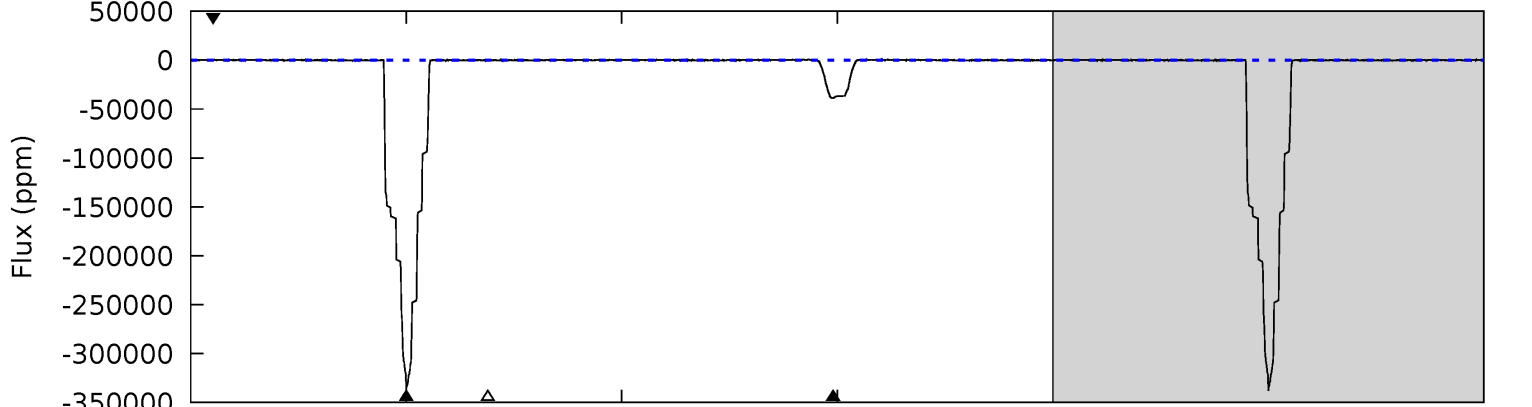
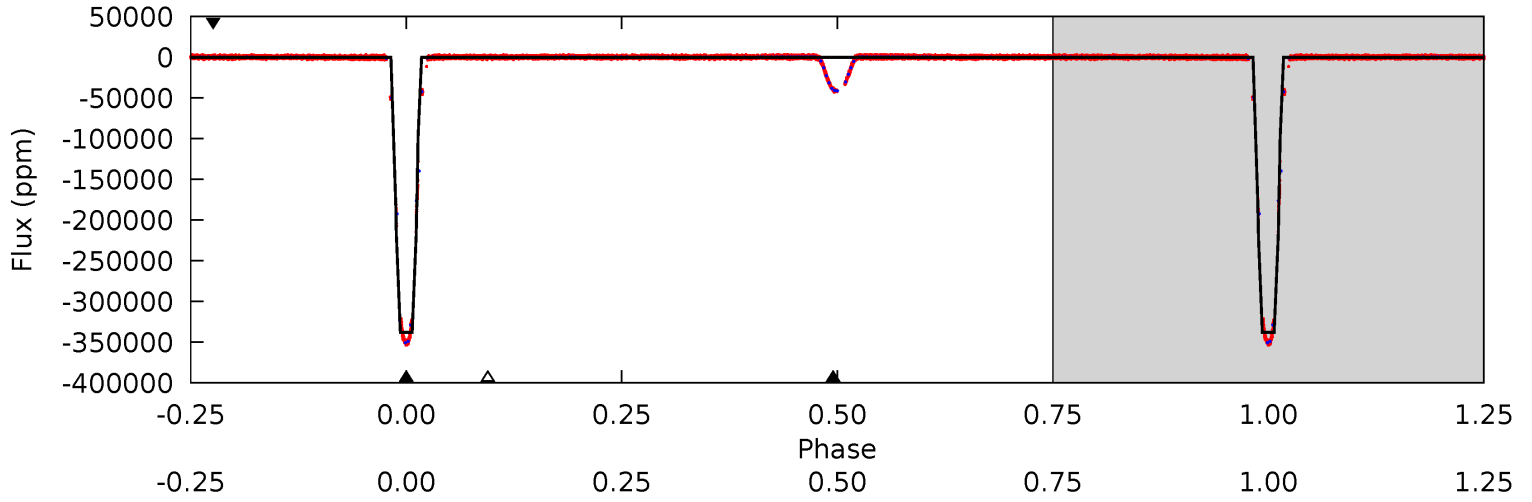
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



# Alt Model-Shift Uniqueness Test

010728219-01, P = 3.371796 Days, E = 131.504636 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
6421	738.3	4.14	3.12	4.80	2.15	2.23	6417	6418	734.1	735.2	7.37	1.00	0.00	0



### Stellar Parameters For KIC 010728219

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5615^{+169}_{-152}$	$4.455^{+0.094}_{-0.175}$	$-0.160^{+0.300}_{-0.300}$	$0.912^{+0.224}_{-0.121}$	$0.865^{+0.114}_{-0.076}$	$1.608^{+0.765}_{-0.747}$
	+3%/-3%	+2%/-4%	+188%/-188%	+25%/-13%	+13%/-9%	+48%/-46%
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 010728219-01 / KOI 6229.01

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$0 \pm 1000000$	$51.46^{+12.13}_{-11.31}$	$1632^{+104}_{-88}$	$1945^{+2768}_{-6541}$	$0.351^{+40.994}_{-35.113}$
Alt.	$-38849 \pm 53$	$61.11^{+14.05}_{-11.94}$	$1635^{+104}_{-94}$	$3652^{+263}_{-199}$	$11^{+5}_{-4}$

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

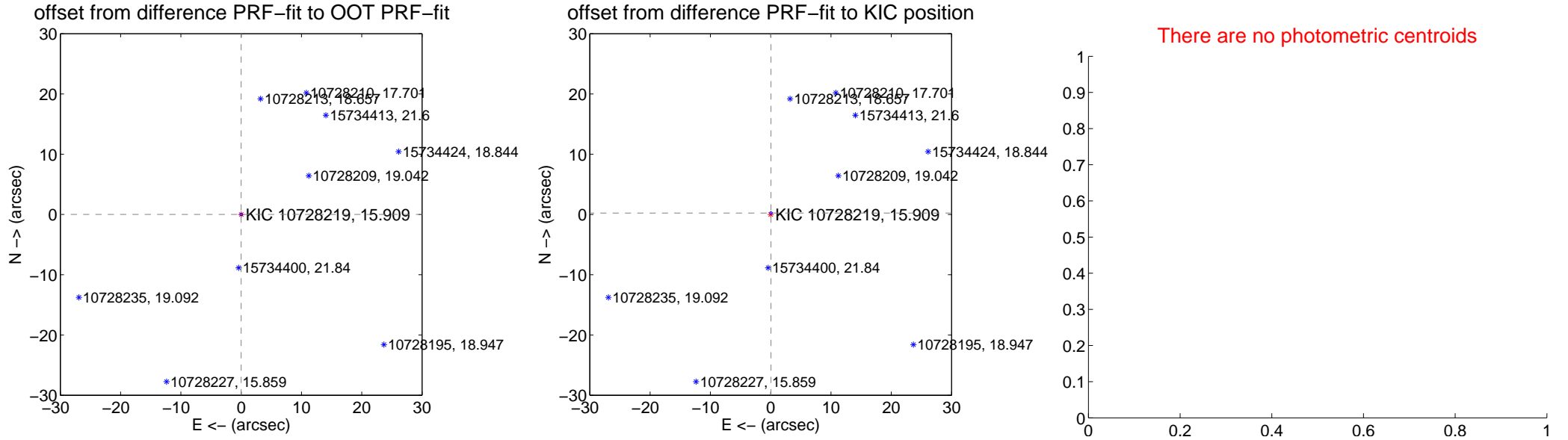
## DV Centroid Data

Supplemental centroid analysis for 010728219-01. Kepler magnitude: 15.91. Transit SNR -1.00

There are 14 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.18 arcsec

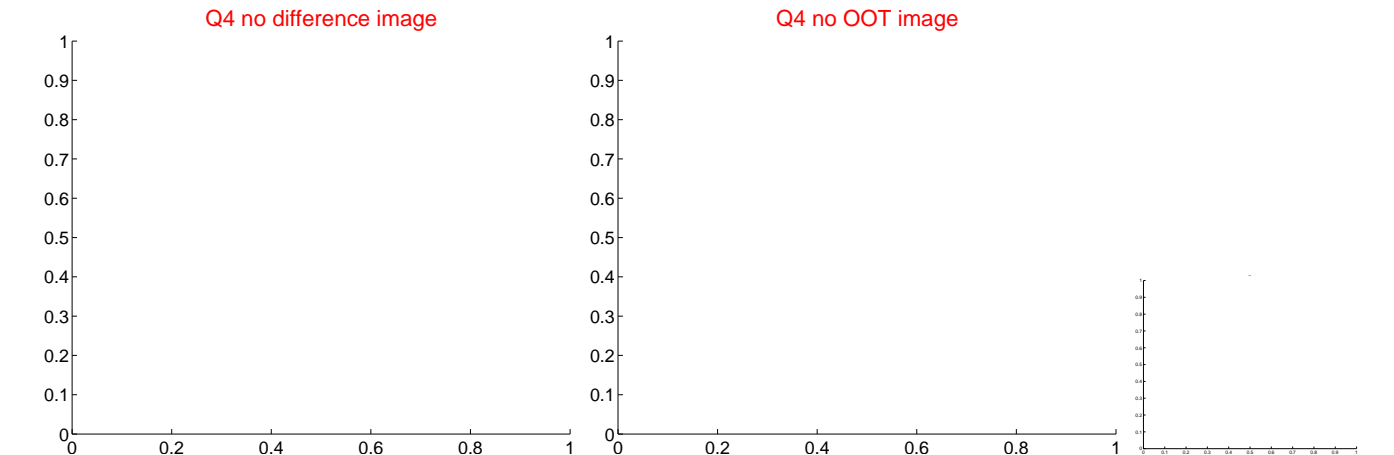
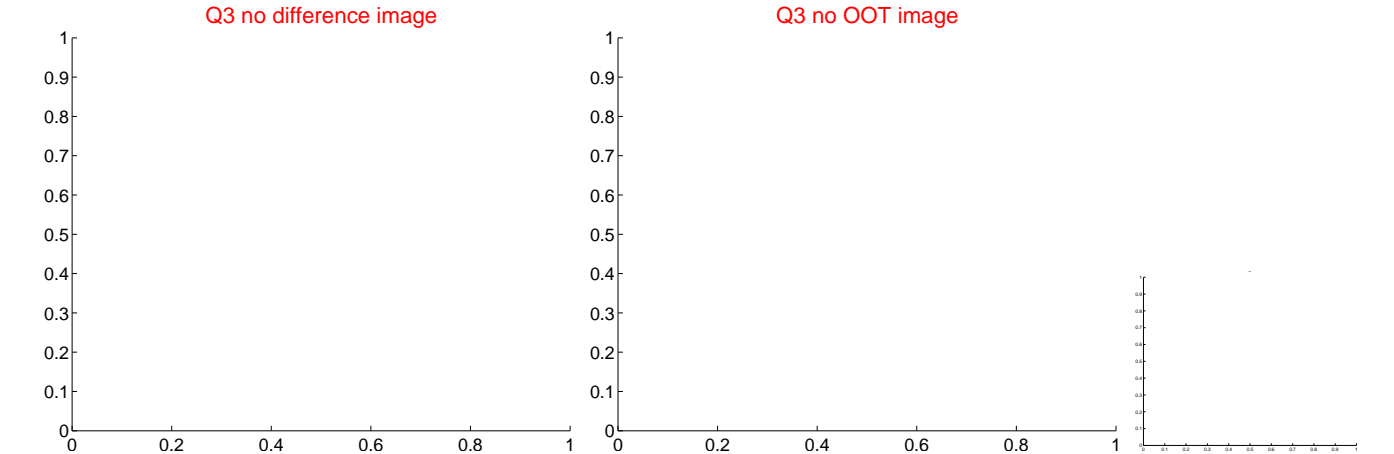
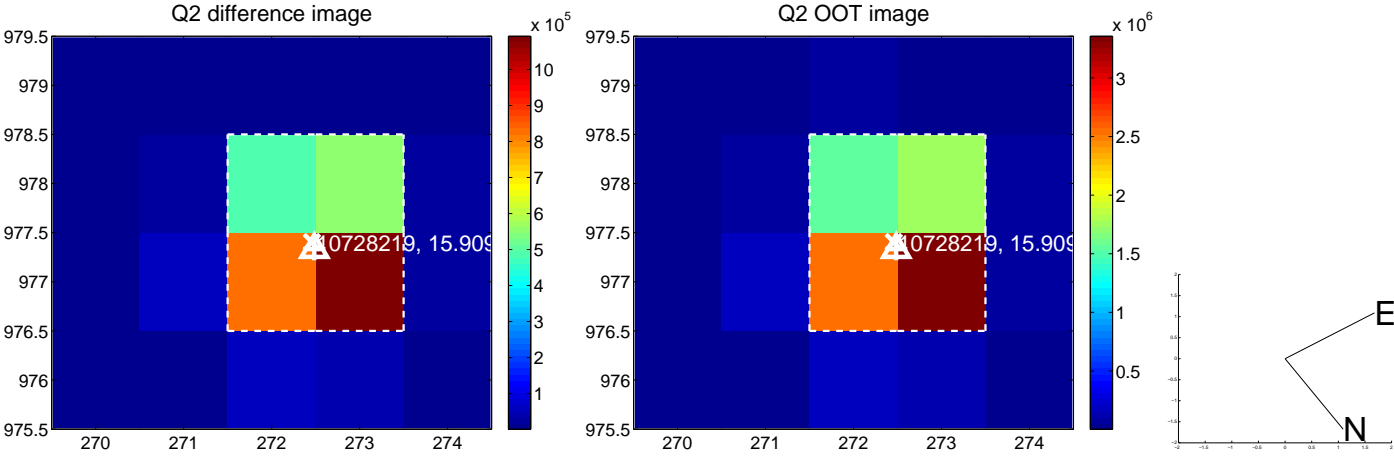
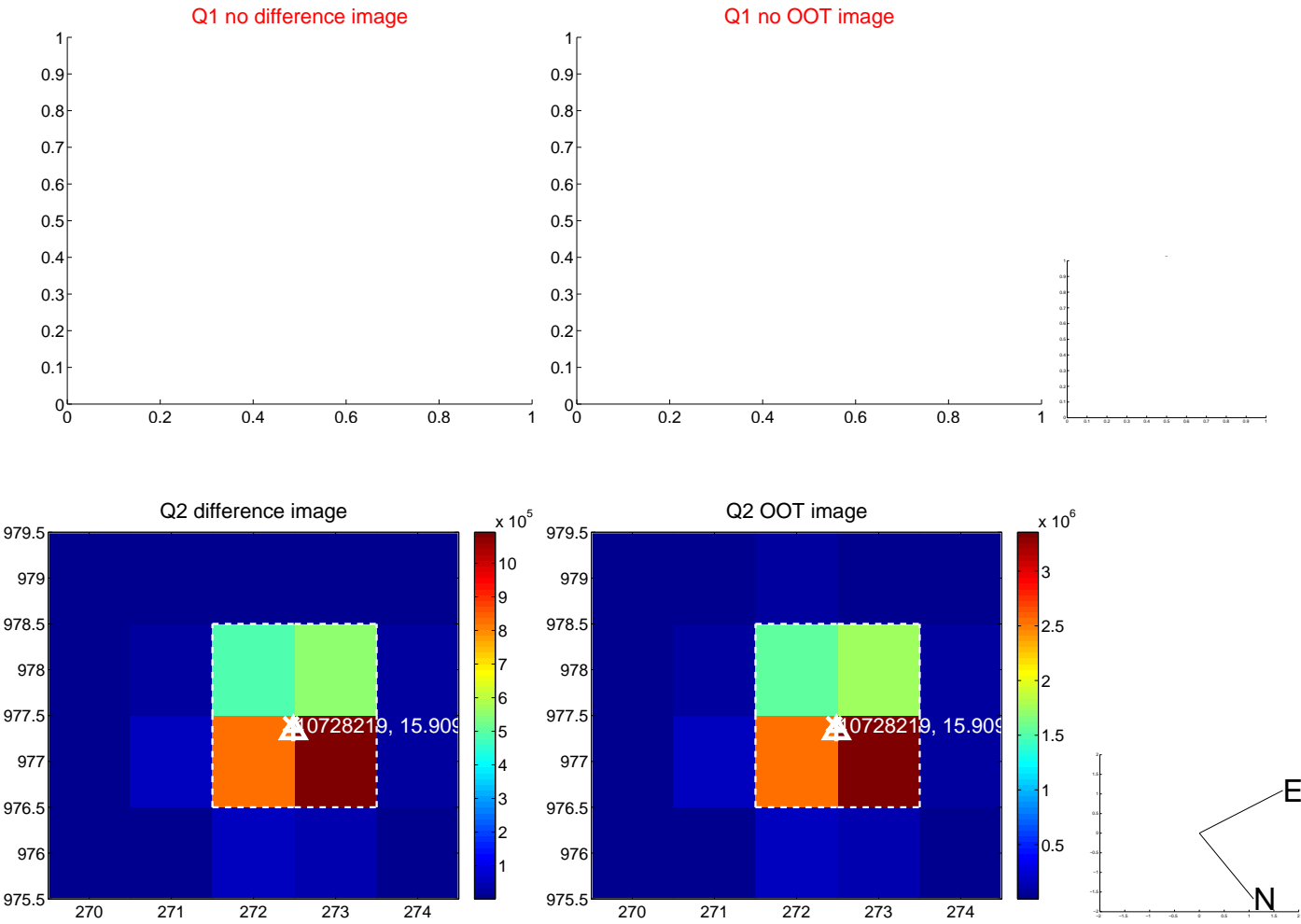
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.010 \pm 0.067$	0.15	$0.002 \pm 0.067$	$0.010 \pm 0.067$
PRF-fit source offset from KIC position	<b><math>0.242 \pm 0.070</math></b>	<b>3.44</b>	$-0.044 \pm 0.067$	$0.238 \pm 0.071$
photometric centroid source offset	—	—	—	—



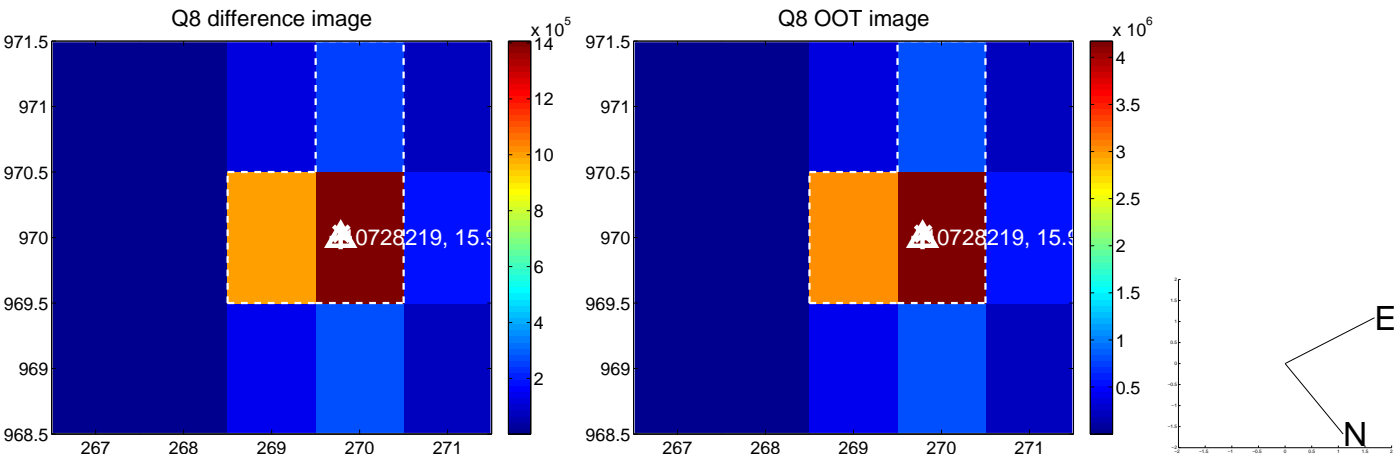
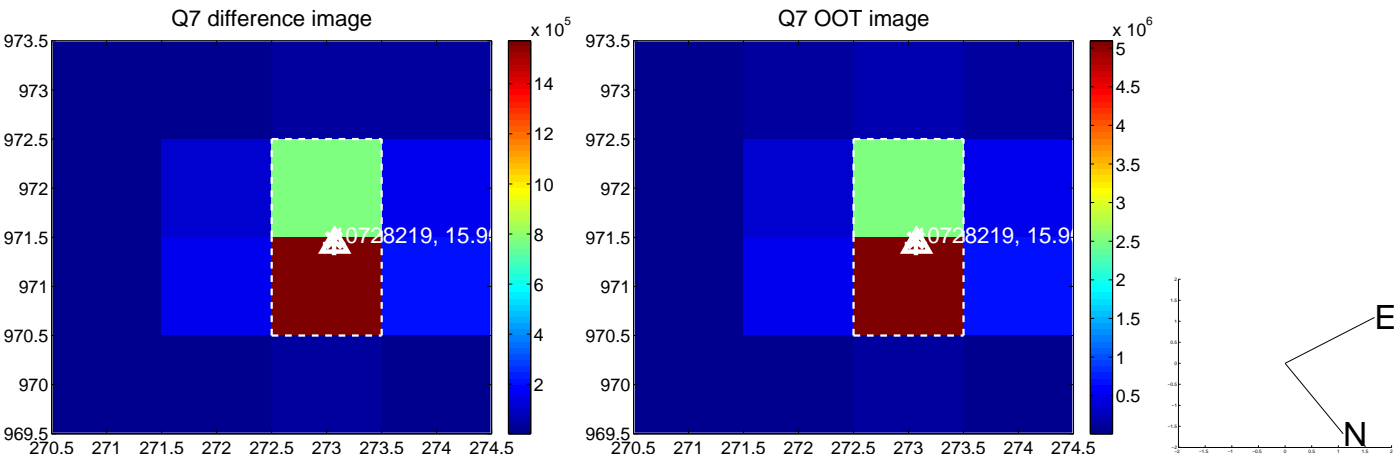
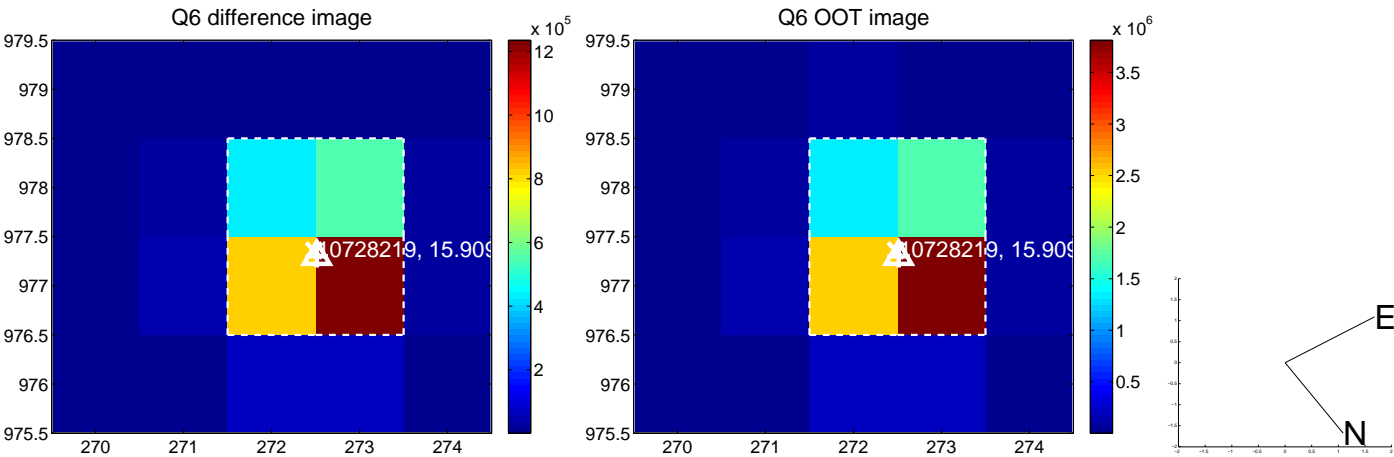
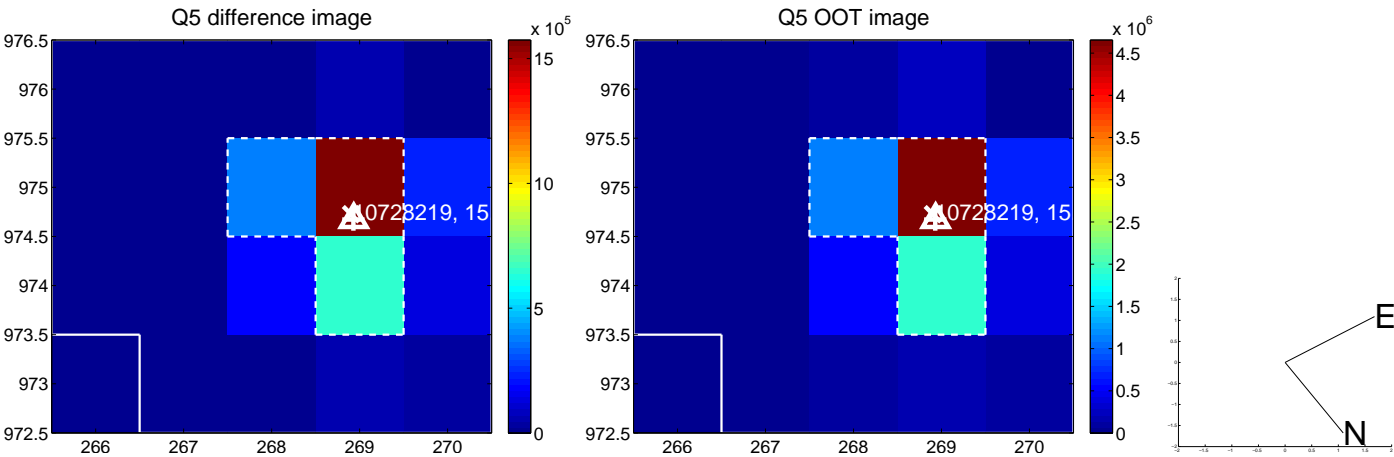
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



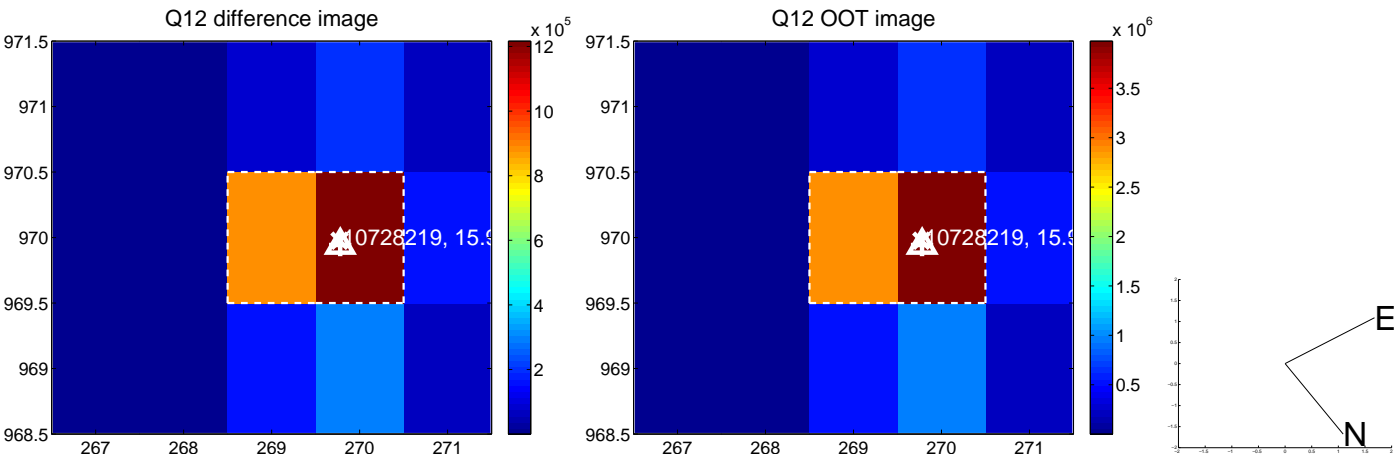
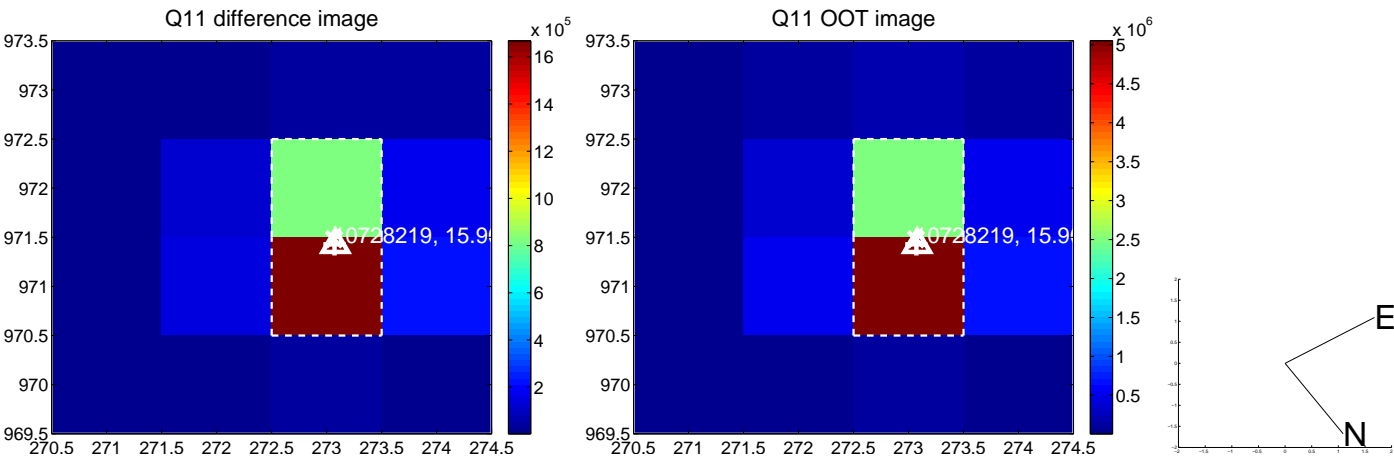
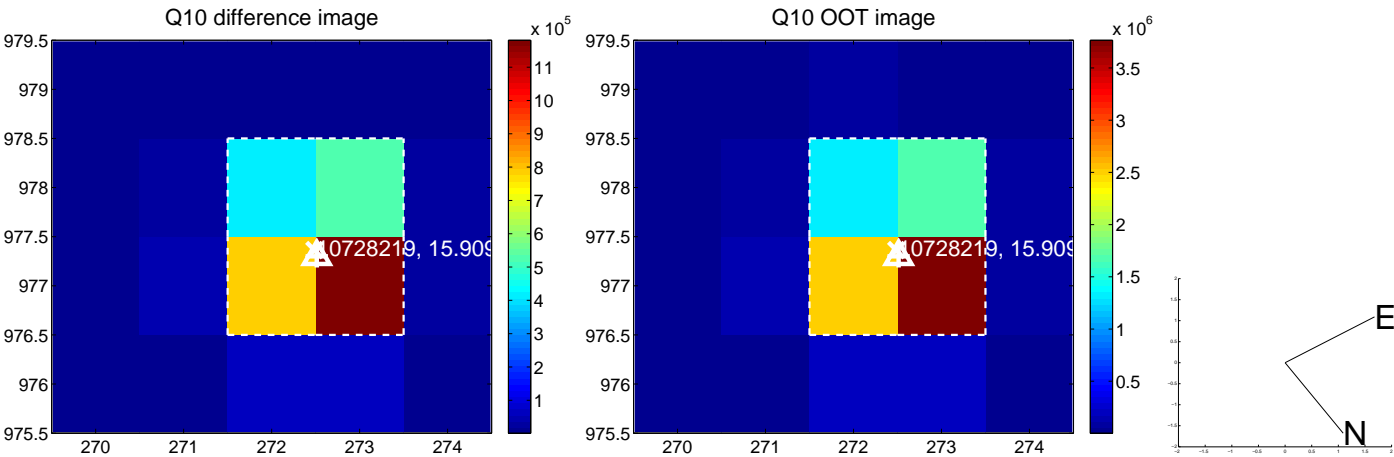
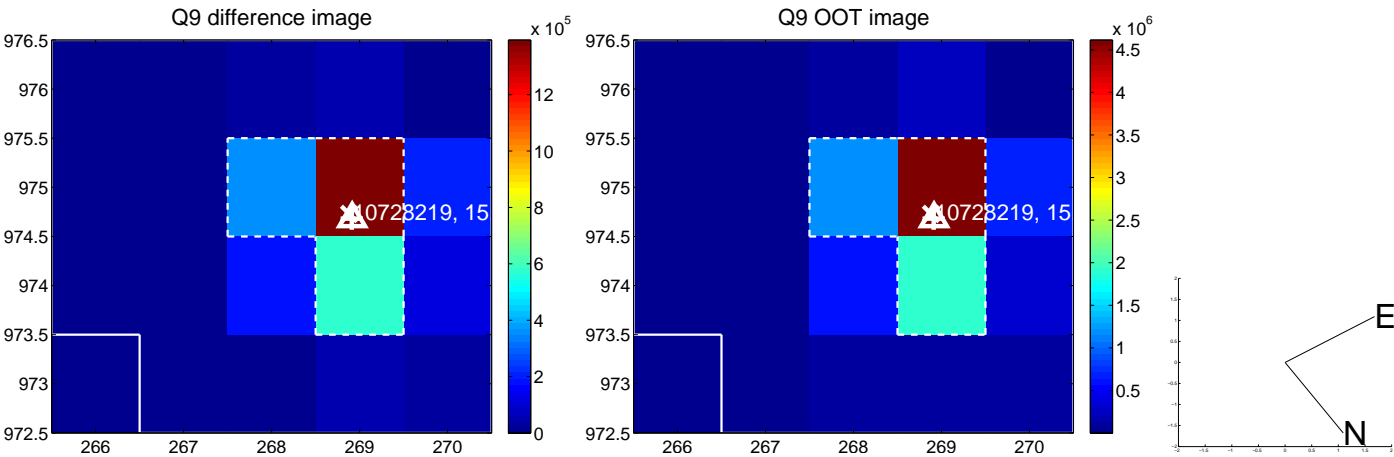
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



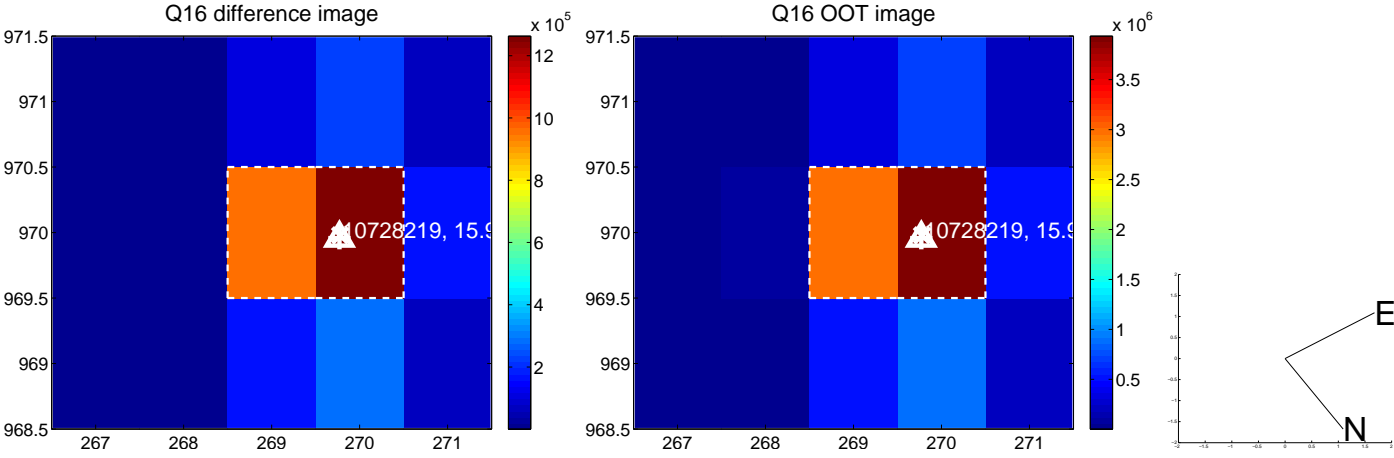
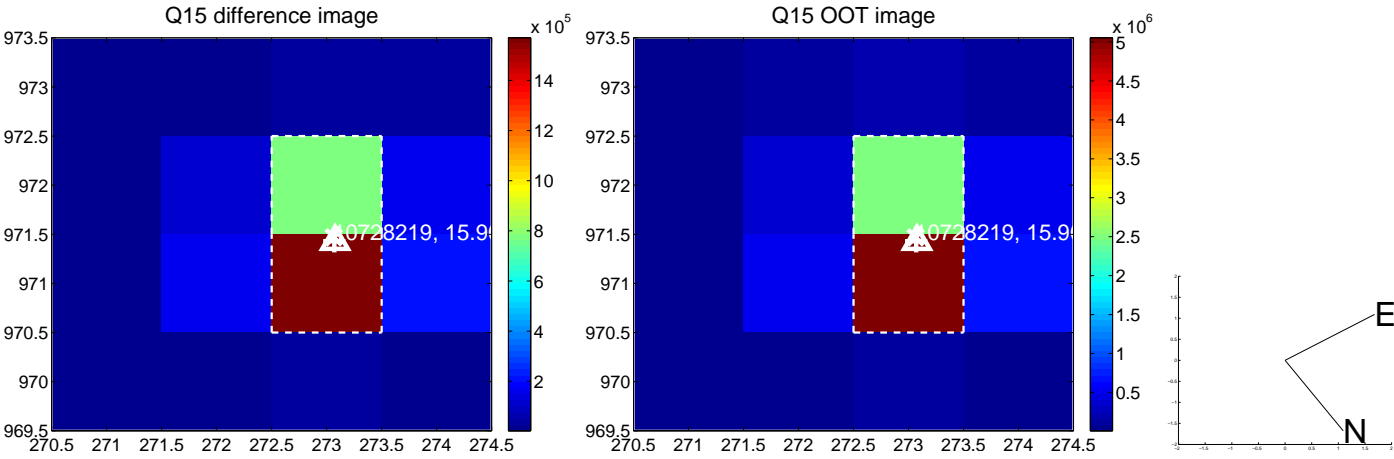
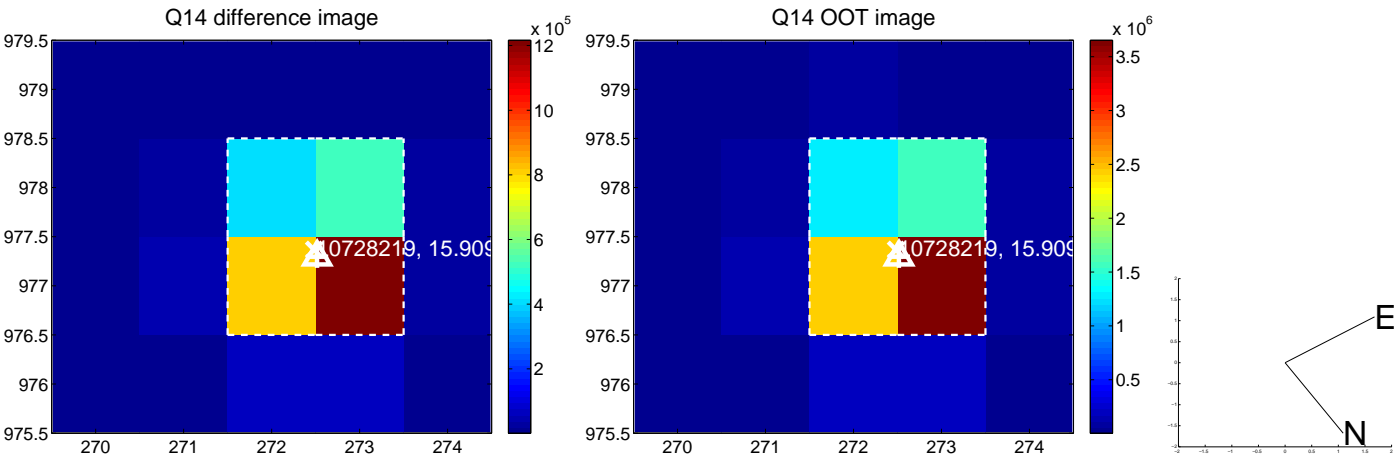
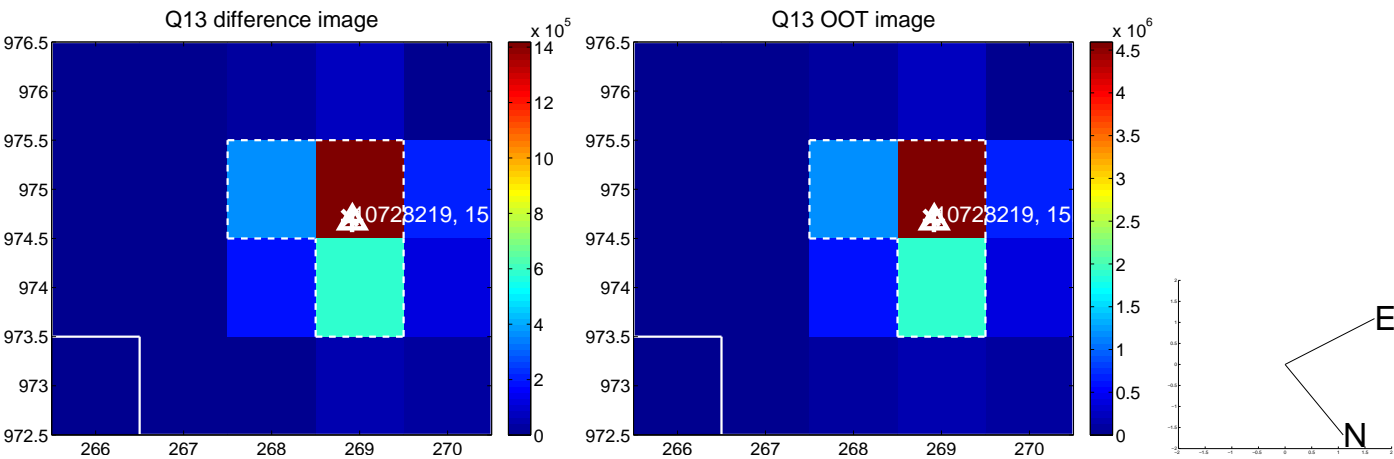
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



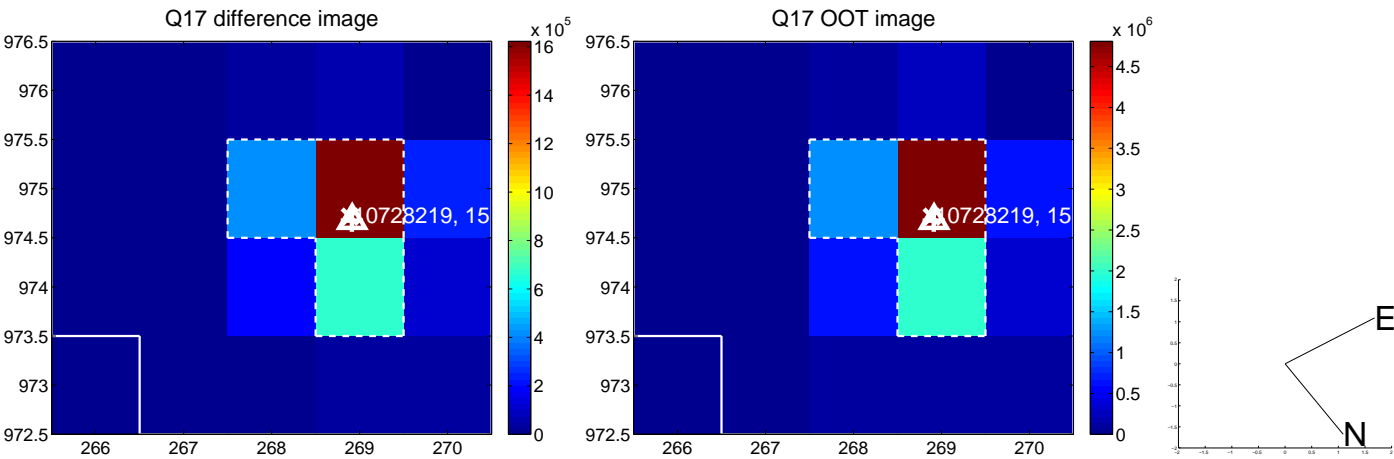
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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.

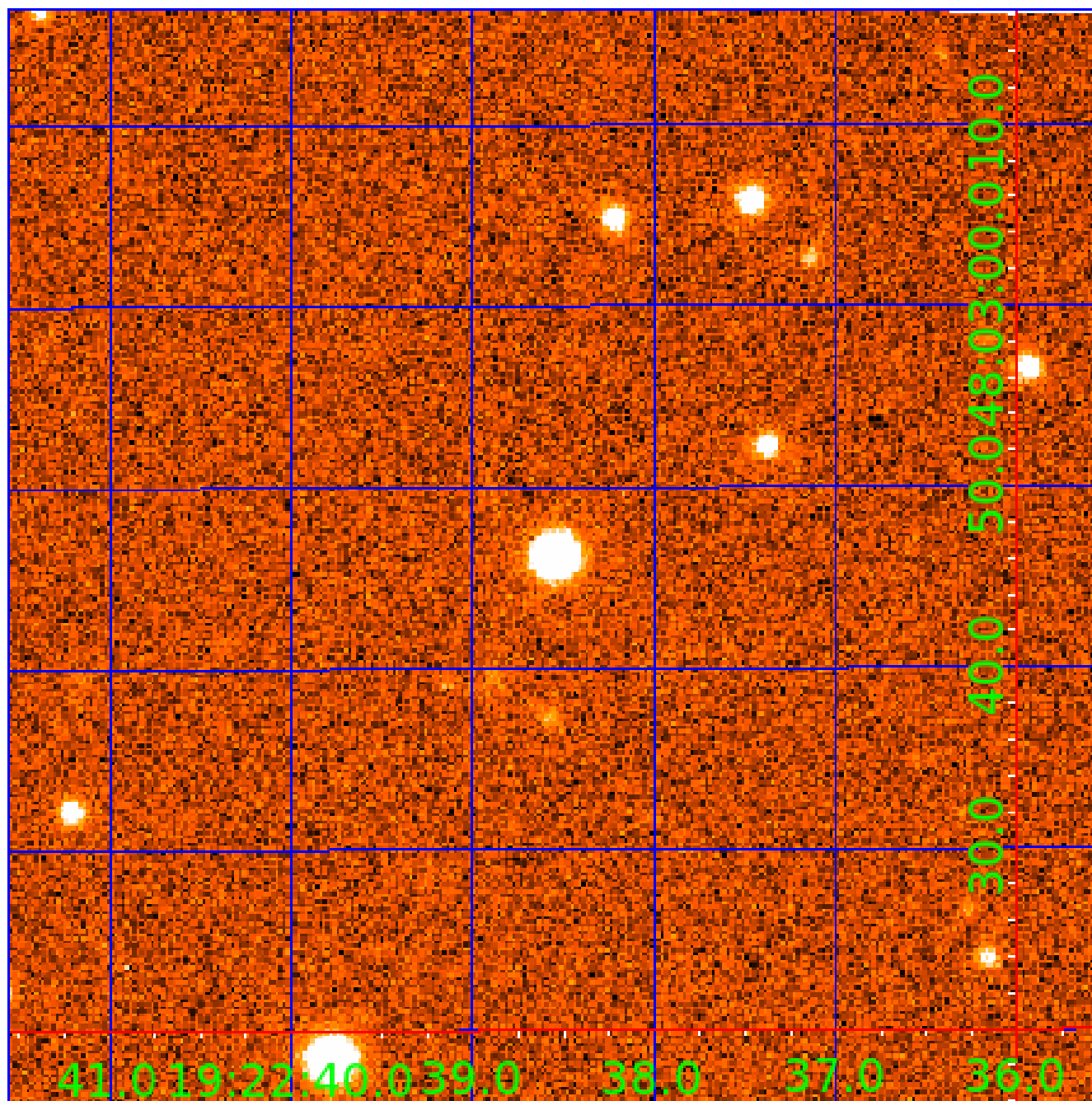


folded centroid time series figure for this object.



UKIRT Image

Declination



# KIC 010728219

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
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010728219-03	OBS	No	5.057671	134.630517	22823.9	15.000	963.5	-1.0	0.91	5615	13.62	245.29
010728219-04	OBS	No	1.123925	132.083134	5676.0	3.500	151.8	-1.0	0.91	5615	6.79	1822.38

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010728219-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_ALT—HAS_SEC_TCE—CENT_NOFITS
010728219-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE
010728219-03	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—CENT_NOFITS
010728219-04	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQU_ALT—MOD_TER_ALT—MOD_POS_ALT—SAME_NTL_PERIOD—CENT_NOFITS

**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.

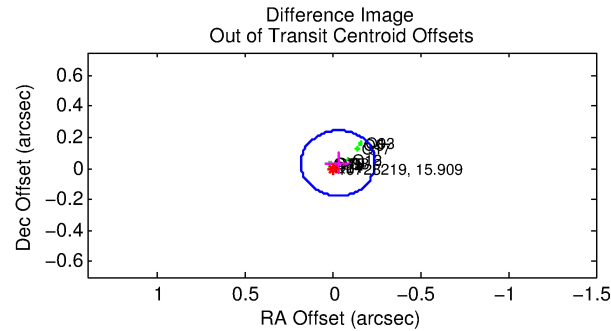
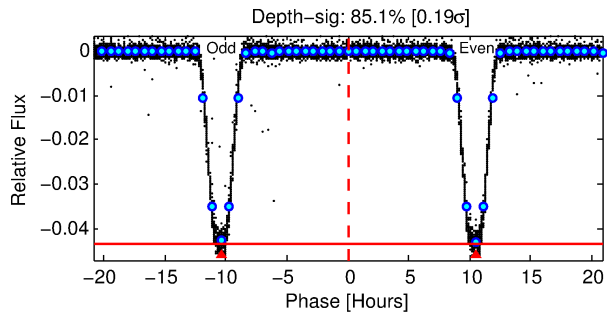
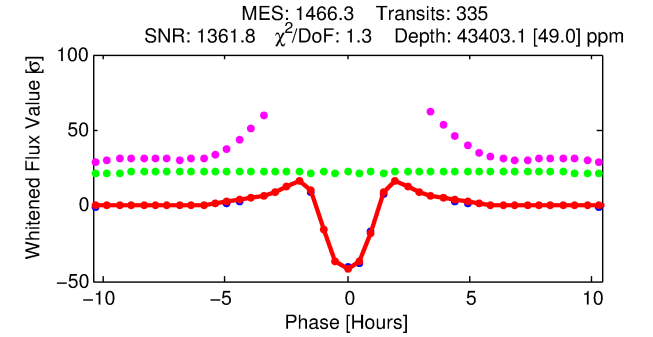
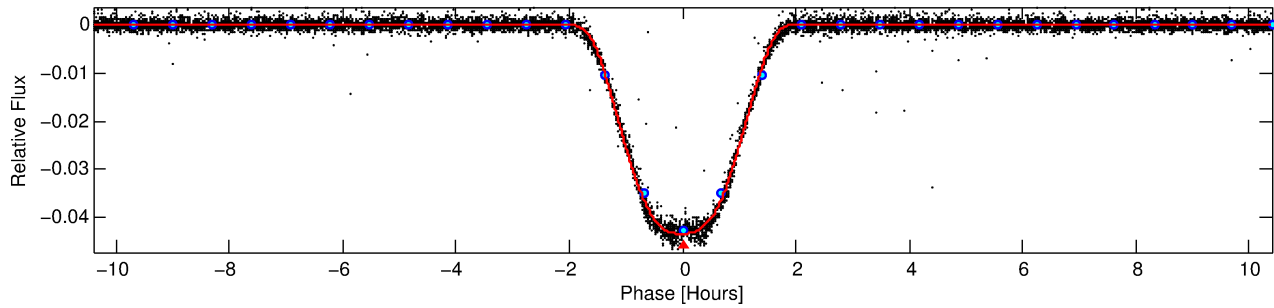
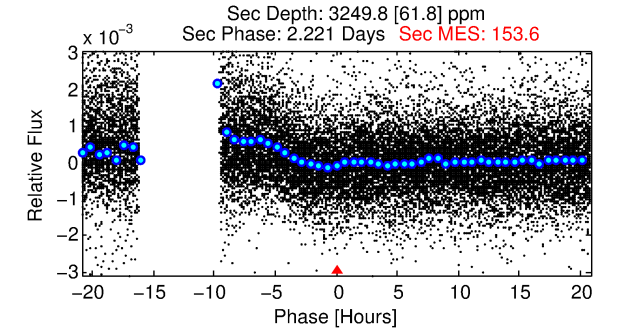
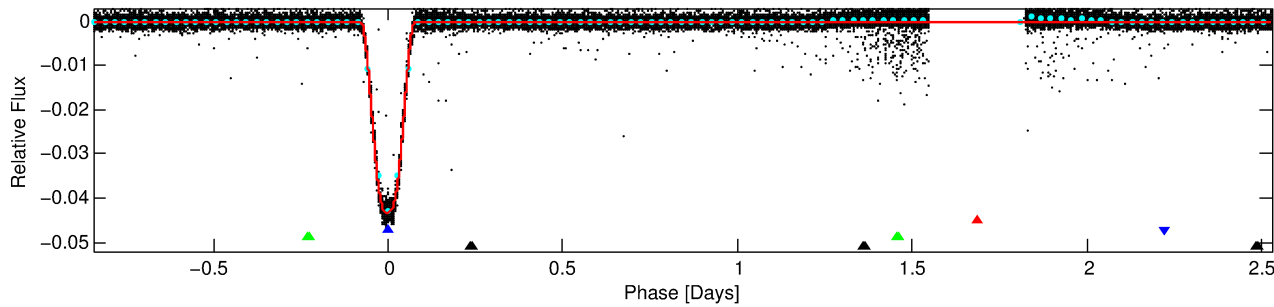
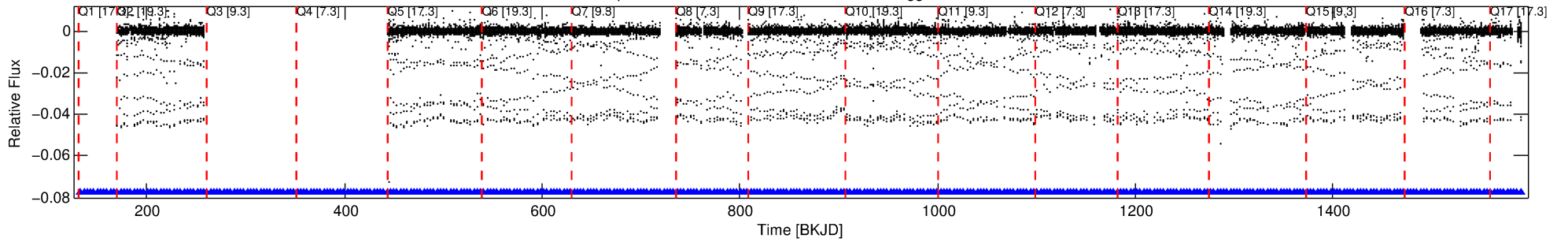
## Ephemeris Match Information For 010728219-02

No Significant Match Found

# DV One-Page Summary

KIC: 10728219 Candidate: 2 of 4 Period: 3.372 d  
KOI: K06229 Corr: No Ephemeris Match

Kp: 15.91 R\*: 0.91 Rs Teff: 5615.0 K Logg: 4.46 Fe/H: -0.160



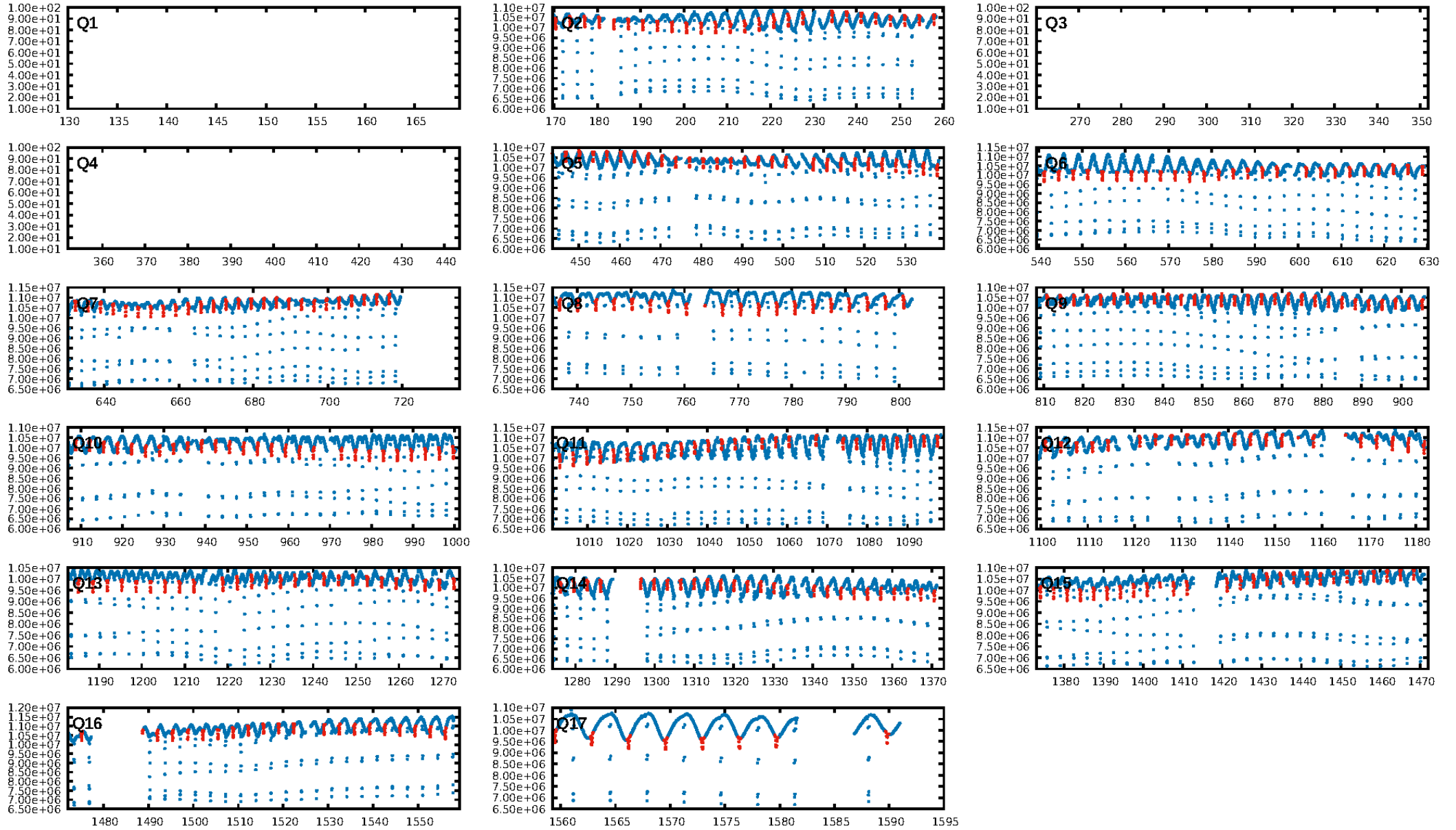
## DV Fit Results:

Period = 3.37180 [0.00000] d  
Epoch = 133.1900 [0.0000] BKJD  
Rp/R\* = 0.2105 [0.0002]  
a/R\* = 7.11 [0.01]  
b = 0.75 [0.00]  
Seff = 421.19 [141.88]  
Teq = 1155 [97] K  
Rp = 20.95 [5.14] Re  
a = 0.0419 [0.0089] AU  
Ag = 7.17 [2.26] [2.73σ]  
Teffp = 2922 [89] K [13.40σ]

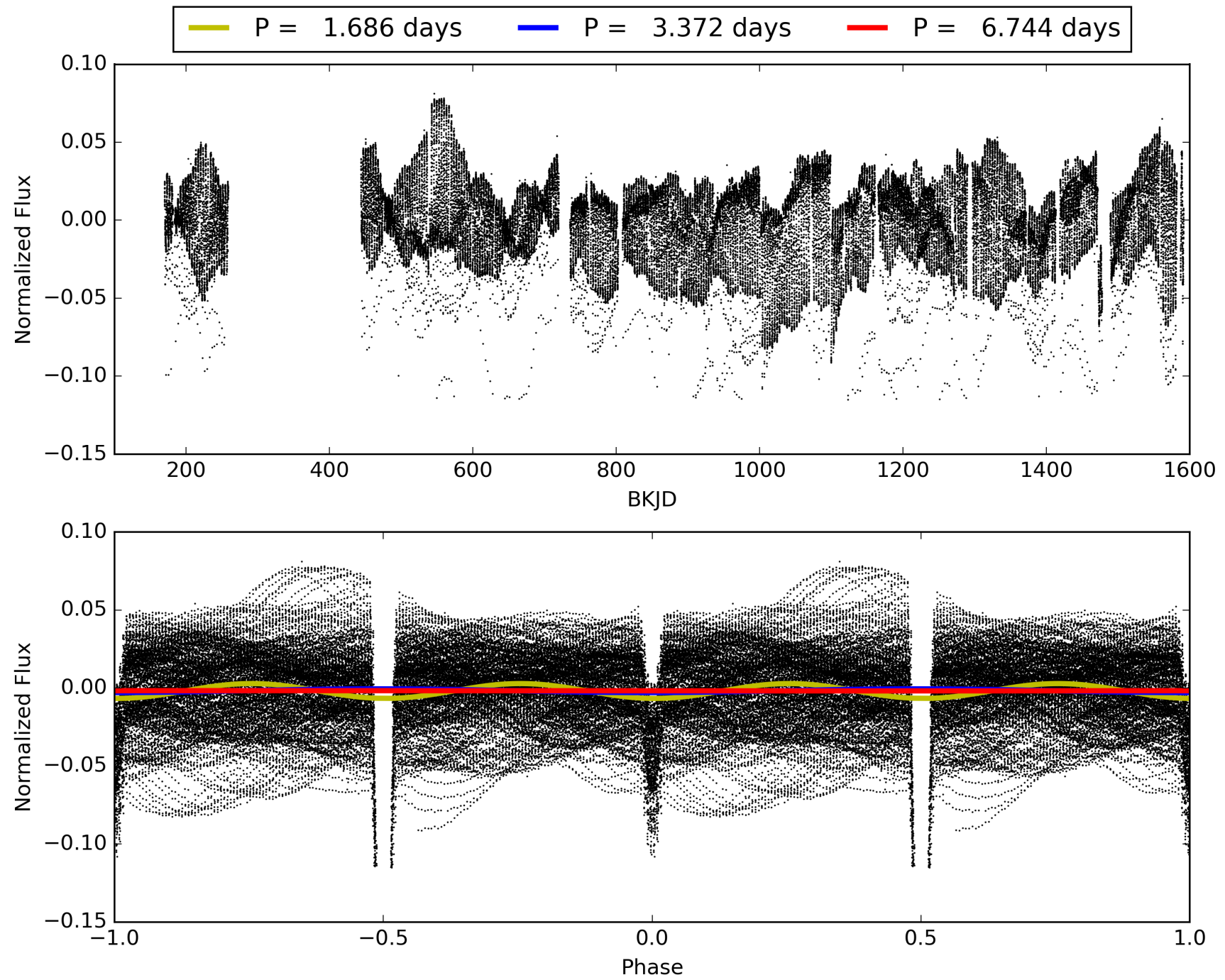
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: 99.1% [2.63σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [327/327]  
GhostDiagnostic-chr: 1.613  
Centroid-sig: N/A  
Centroid-so: 0.299 arcsec [49.72σ]  
OotOffset-rm: 0.046 arcsec [0.65σ]  
KicOffset-rm: 0.281 arcsec [3.97σ]  
OotOffset-st: 4/3/3/4 [14]  
KicOffset-st: 4/3/3/4 [14]  
DiffImageQuality-fgm: 1.00 [14/14]  
DiffImageOverlap-fno: 0.00 [0/14]

# TCE 010728219-02, PDC Light Curves



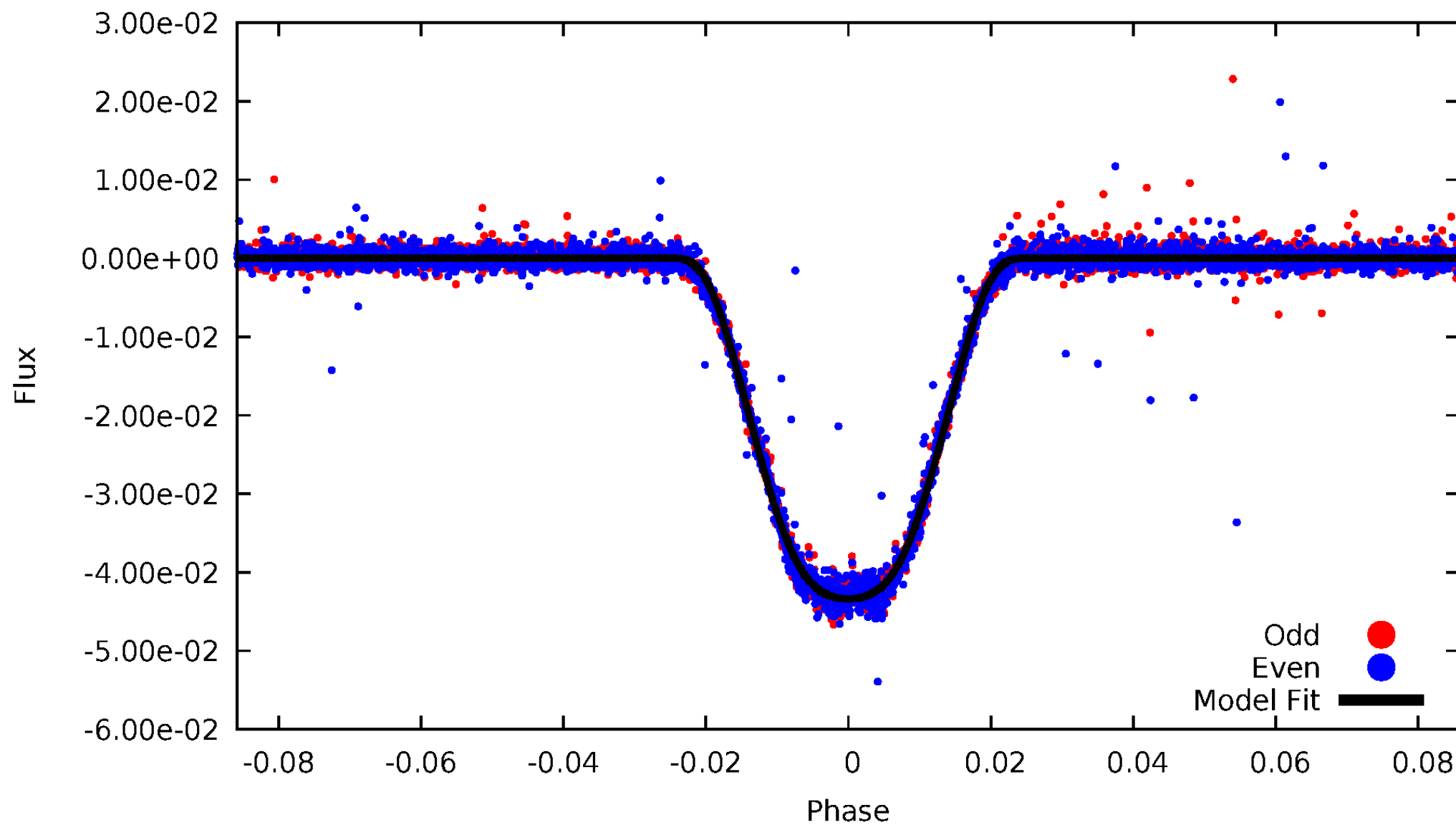
TCE 010728219-02





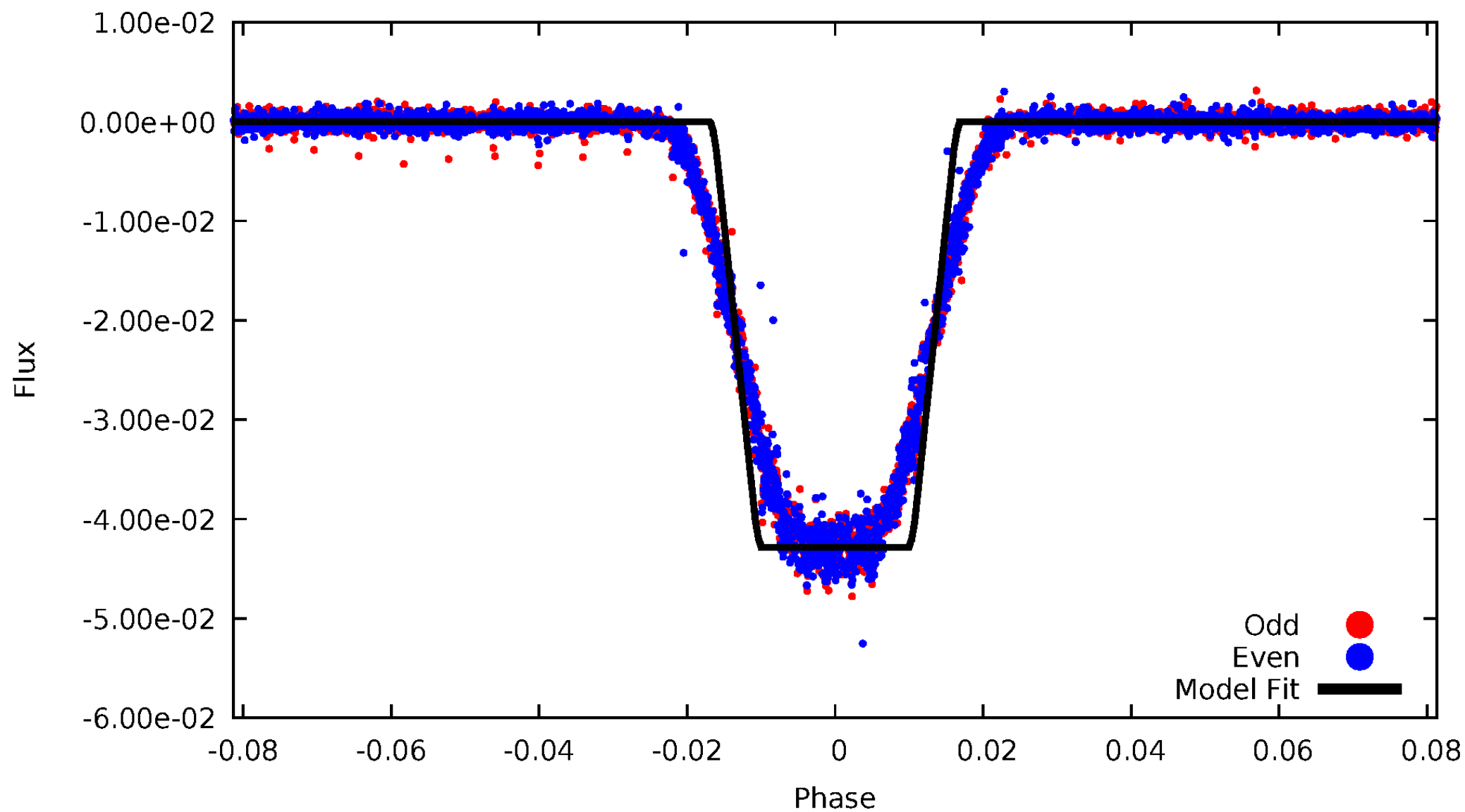
# DV Odd/Even

TCE 010728219-02



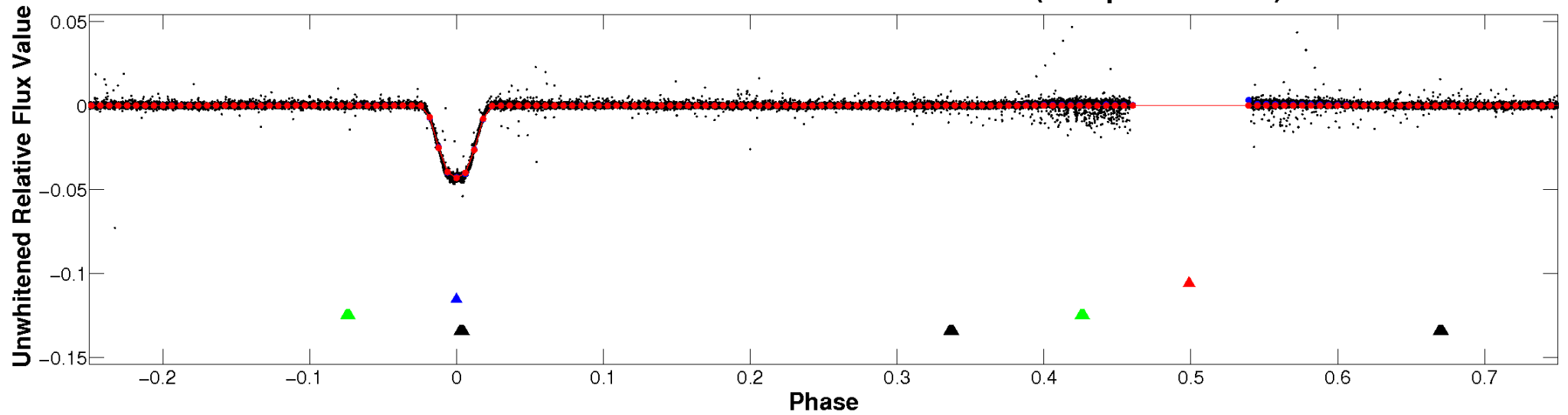
# ALT Odd/Even

TCE 010728219-02

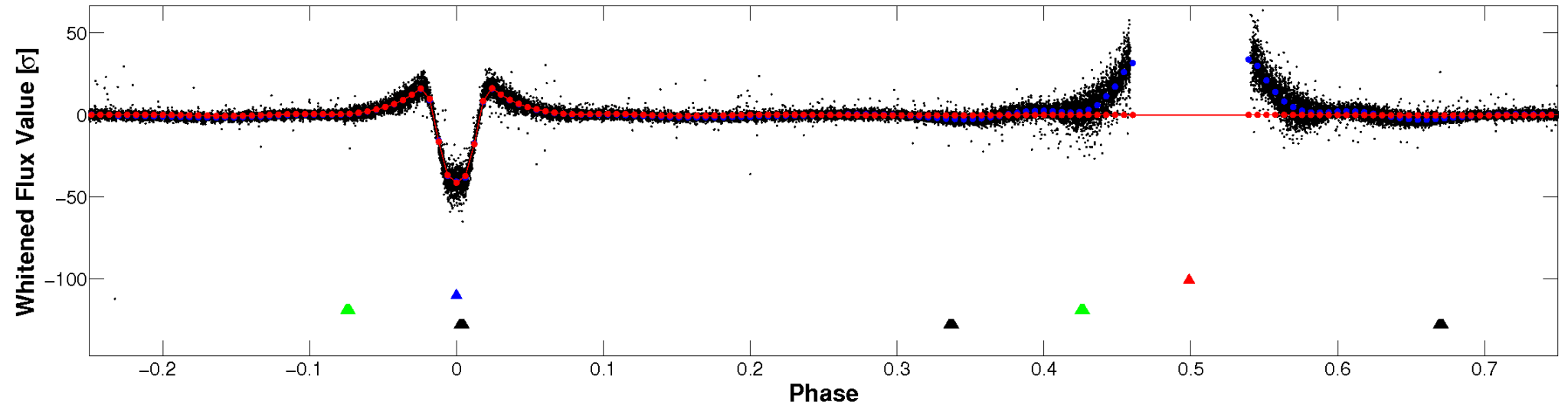


# Non-Whitened Vs. Whitened Light Curve

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

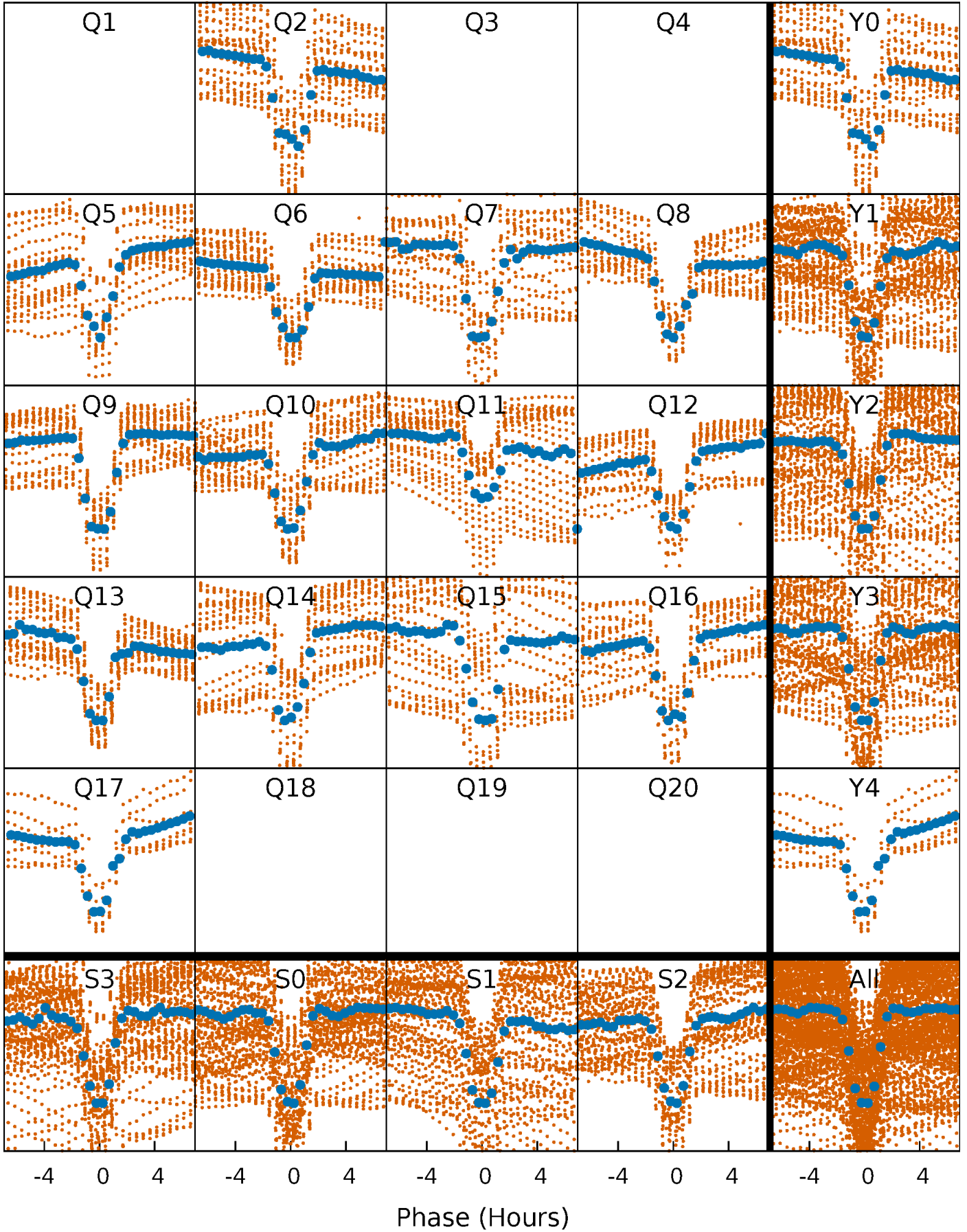


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



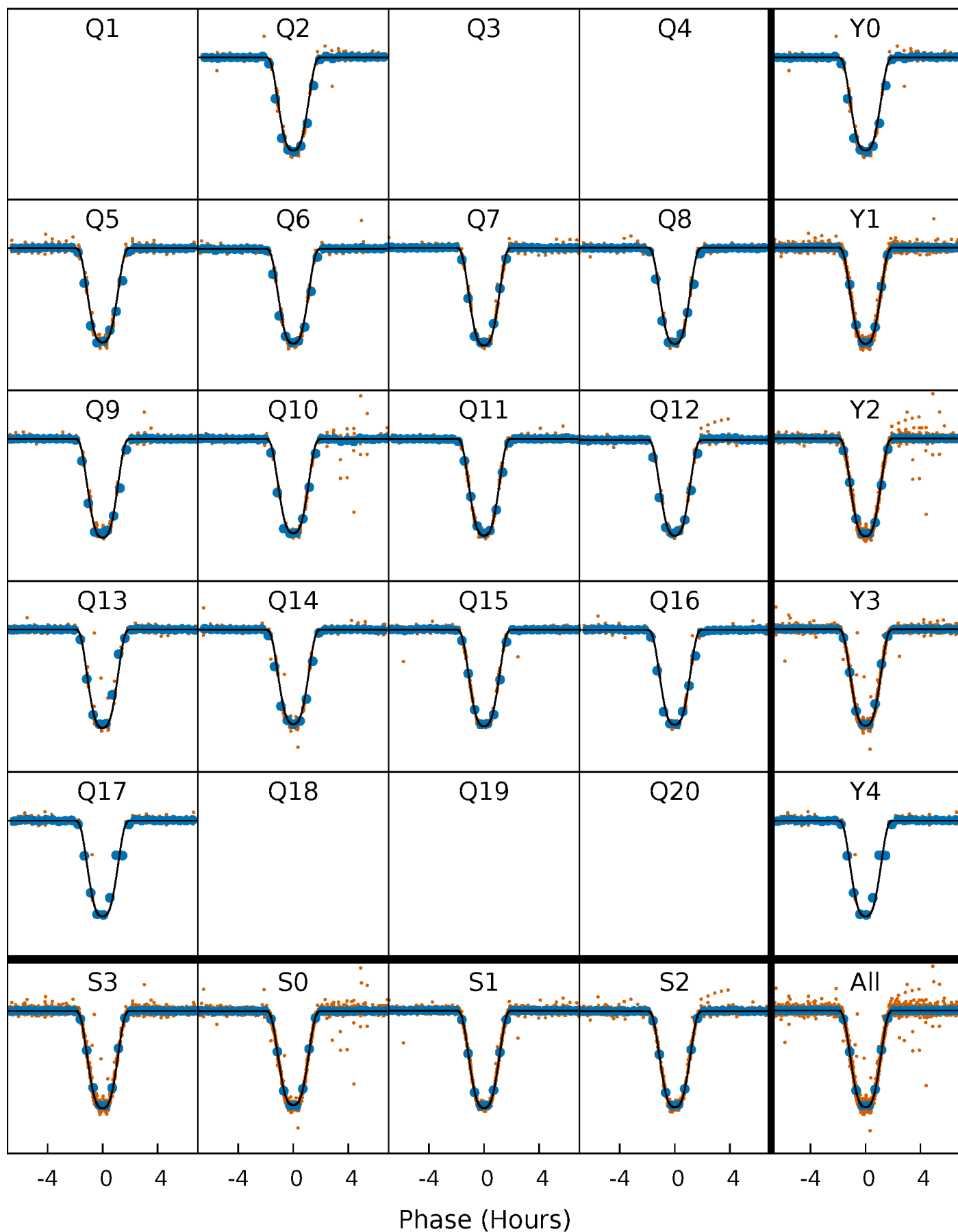
# PDC Quarter-Phased Transit Curves

TCE 010728219-02 P= 3.371799 Days  $T_0=133.190004$  (BKJD)



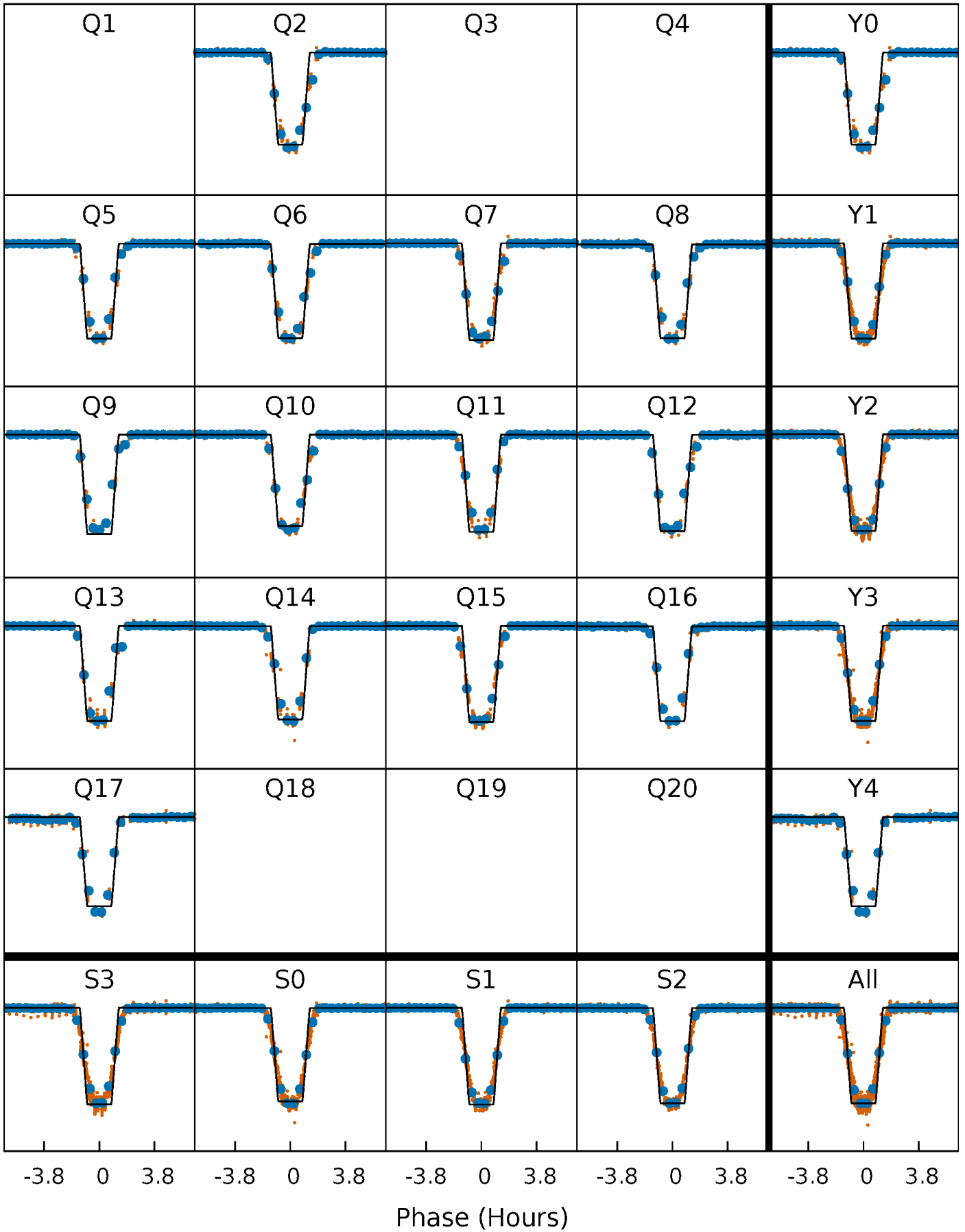
# DV Quarter-Phased Transit Curves

TCE 010728219-02   P= 3.371799 Days    $T_0=133.190004$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

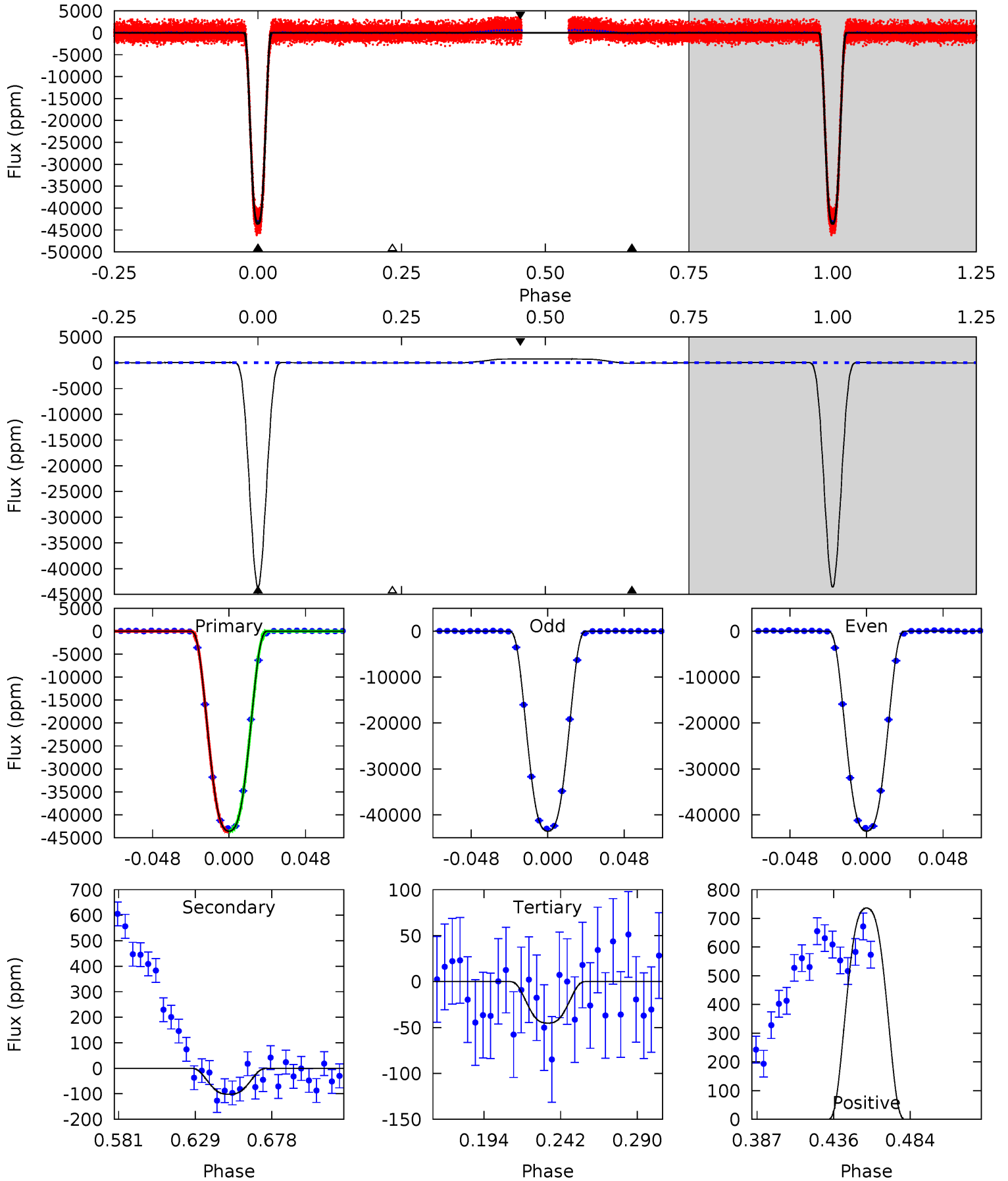
TCE 010728219-02     $P = 3.371810$  Days     $T_0 = 133.187477$  (BKJD)



# DV Model-Shift Uniqueness Test

010728219-02, P = 3.371799 Days, E = 133.190004 Days

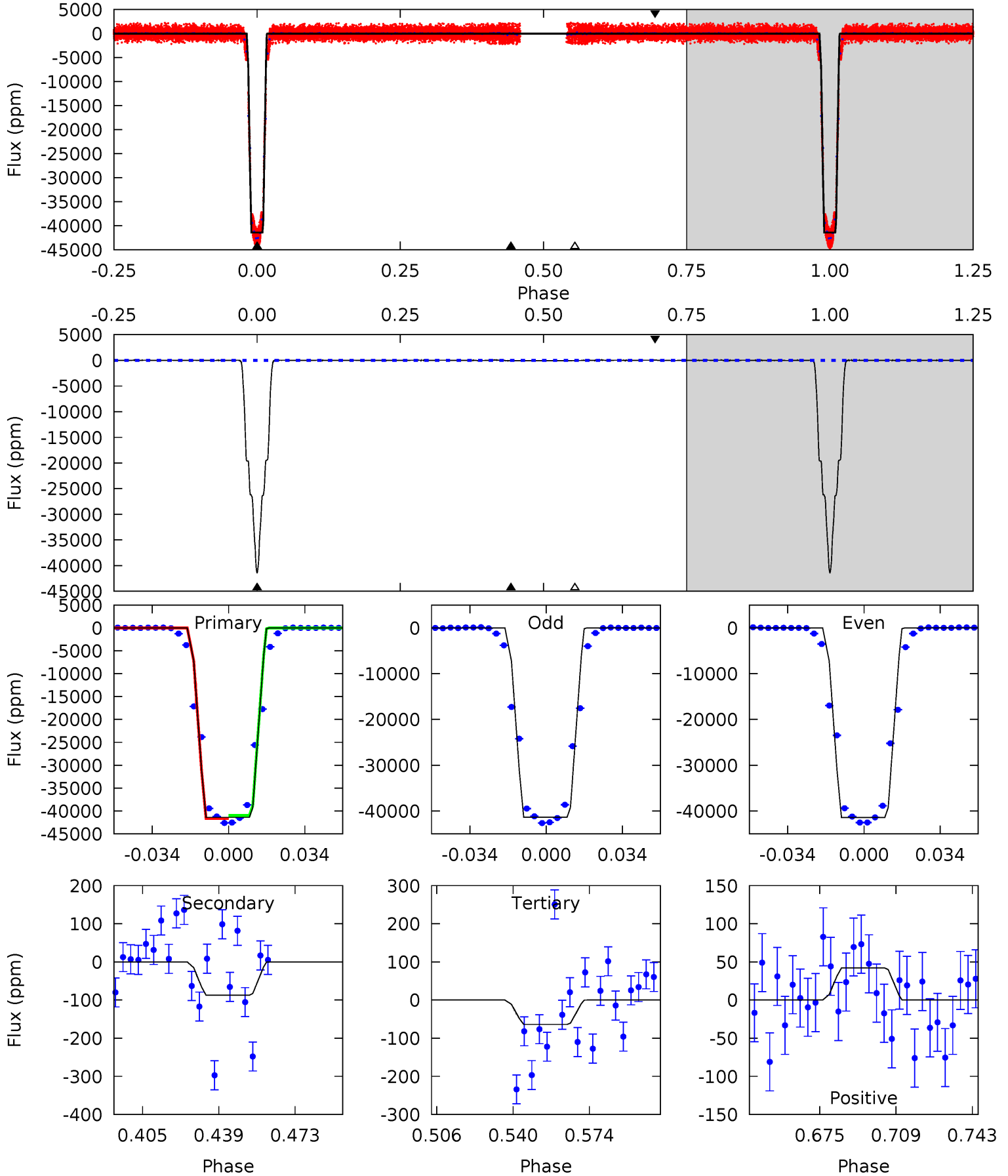
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
2639	6.18	2.75	44.6	4.71	1.97	14.9	2637	2595	3.43	-38.4	1.33	1.00	0.02	3.36



# Alt Model-Shift Uniqueness Test

010728219-02, P = 3.371810 Days, E = 133.187477 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
2349	4.96	3.63	2.39	4.79	2.12	1.11	2345	2347	1.33	2.57	0.94	1.00	0.00	18.9





### Stellar Parameters For KIC 010728219

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5615^{+169}_{-152}$	$4.455^{+0.094}_{-0.175}$	$-0.160^{+0.300}_{-0.300}$	$0.912^{+0.224}_{-0.121}$	$0.865^{+0.114}_{-0.076}$	$1.608^{+0.765}_{-0.747}$
	+3%/-3%	+2%/-4%	+188%/-188%	+25%/-13%	+13%/-9%	+48%/-46%
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 010728219-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-102 \pm 17$	$21.27^{+2.96}_{-1.70}$	$1635^{+108}_{-87}$	$-1987^{+231}_{-144}$	$0.212^{+0.060}_{-0.054}$
Alt.	$-87 \pm 18$	$20.82^{+3.03}_{-1.54}$	$1633^{+104}_{-82}$	$-2033^{+156}_{-132}$	$0.191^{+0.051}_{-0.054}$

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

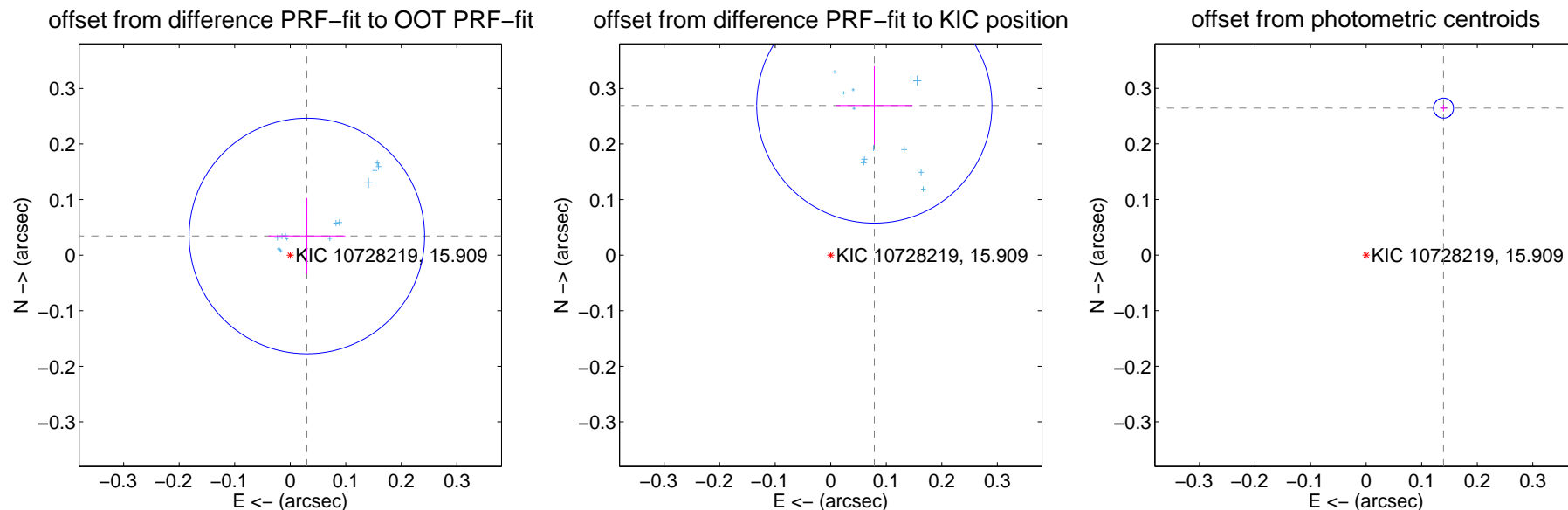
## DV Centroid Data

Supplemental centroid analysis for 010728219-02. Kepler magnitude: 15.91. Transit SNR 1361.78

There are 14 quarters with good PRF difference image offsets

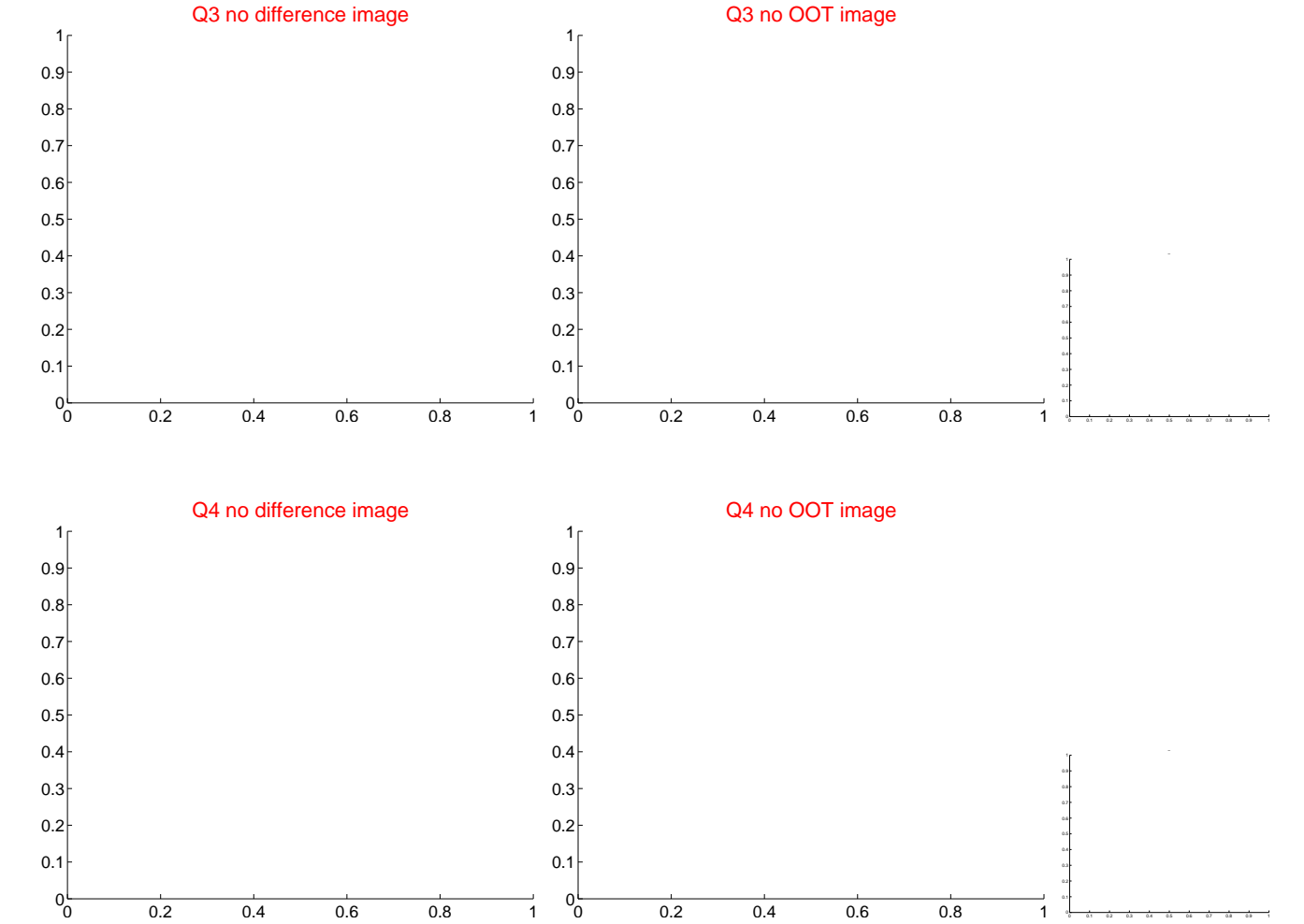
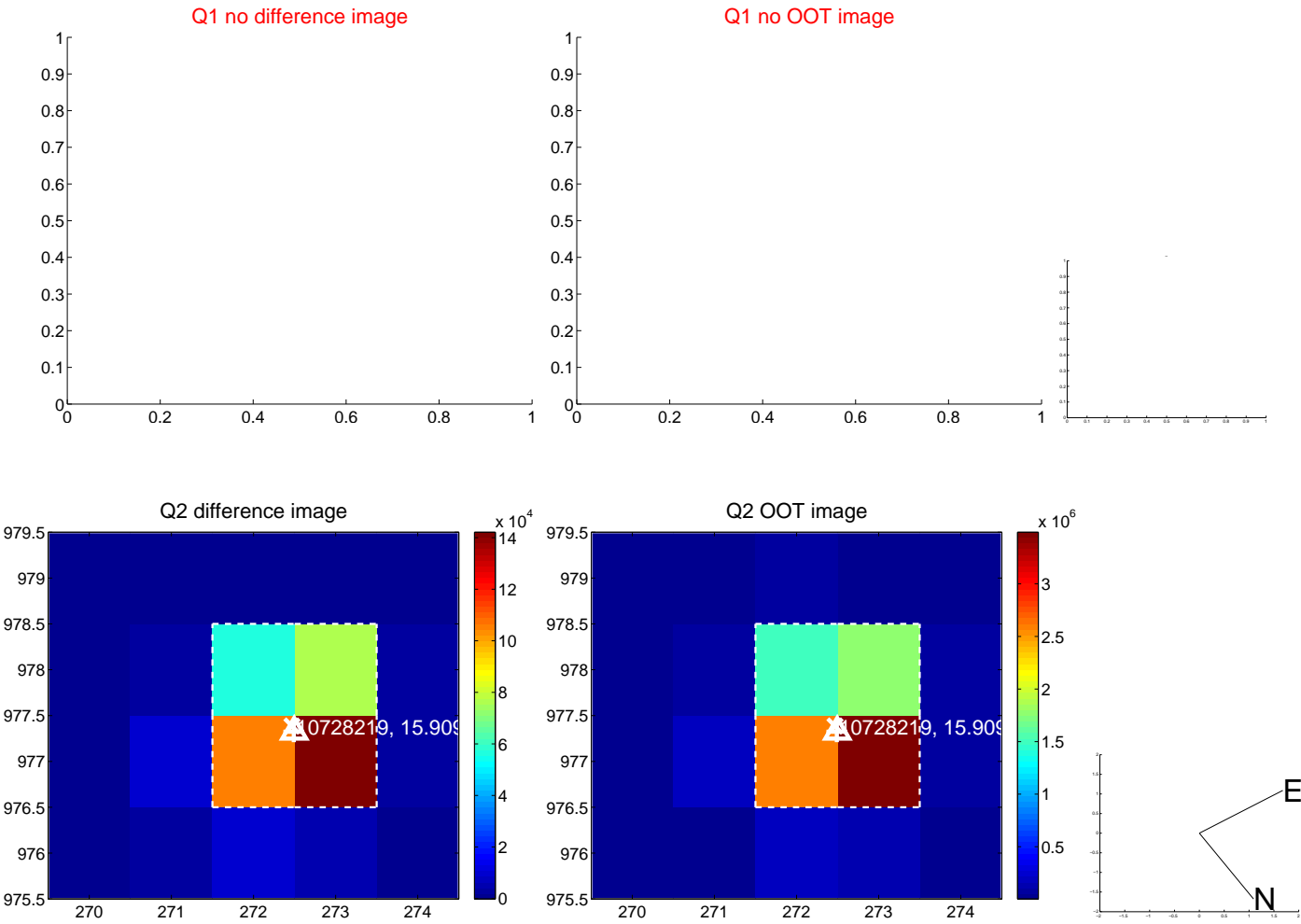
The direct PRF centroid is offset from the target star catalog position by about 0.18 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.046 \pm 0.071$	0.65	$-0.030 \pm 0.069$	$0.034 \pm 0.068$
PRF-fit source offset from KIC position	$0.281 \pm 0.071$	3.97	$-0.078 \pm 0.069$	$0.269 \pm 0.071$
photometric centroid source offset	$0.30 \pm 0.01$	49.72	$-0.14 \pm 0.01$	$0.26 \pm 0.01$

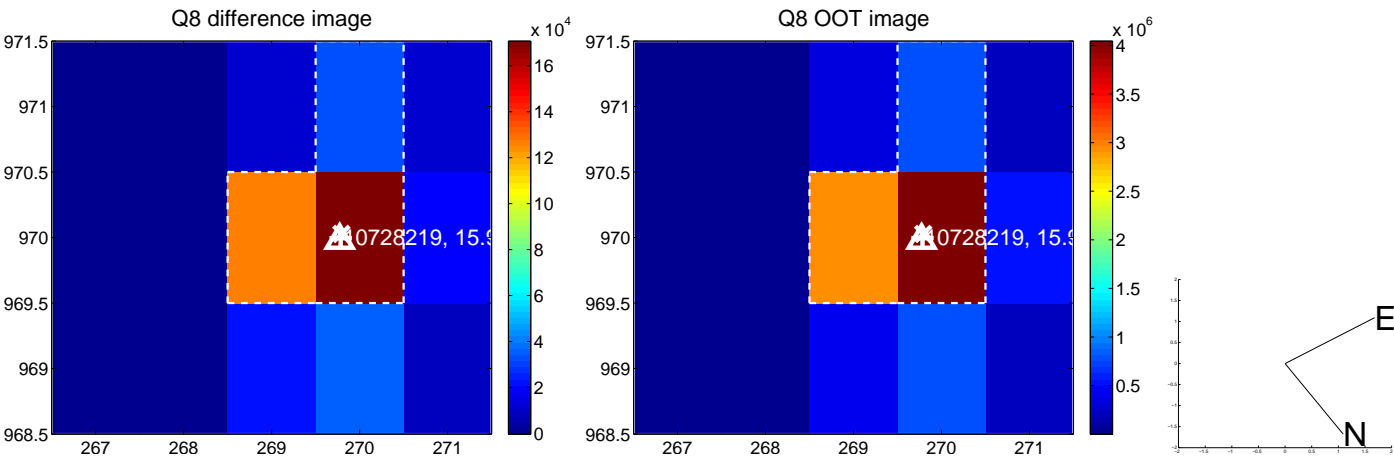
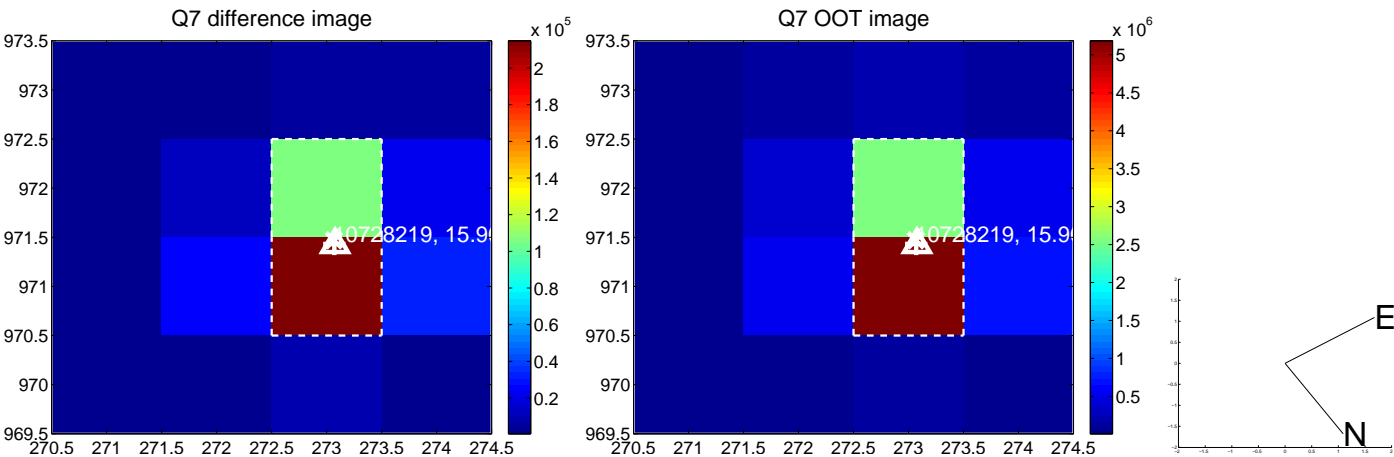
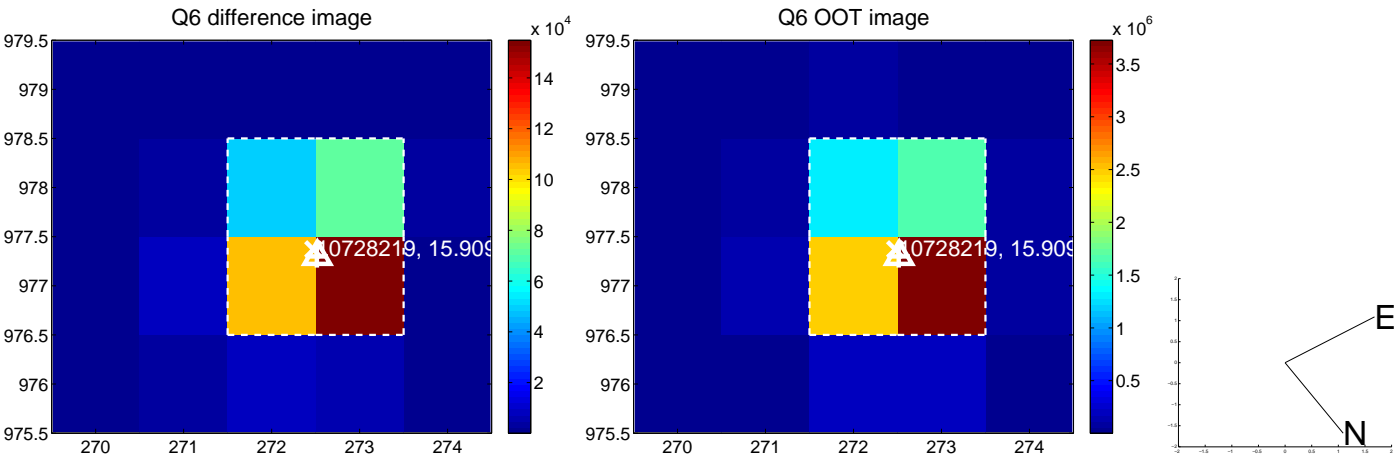
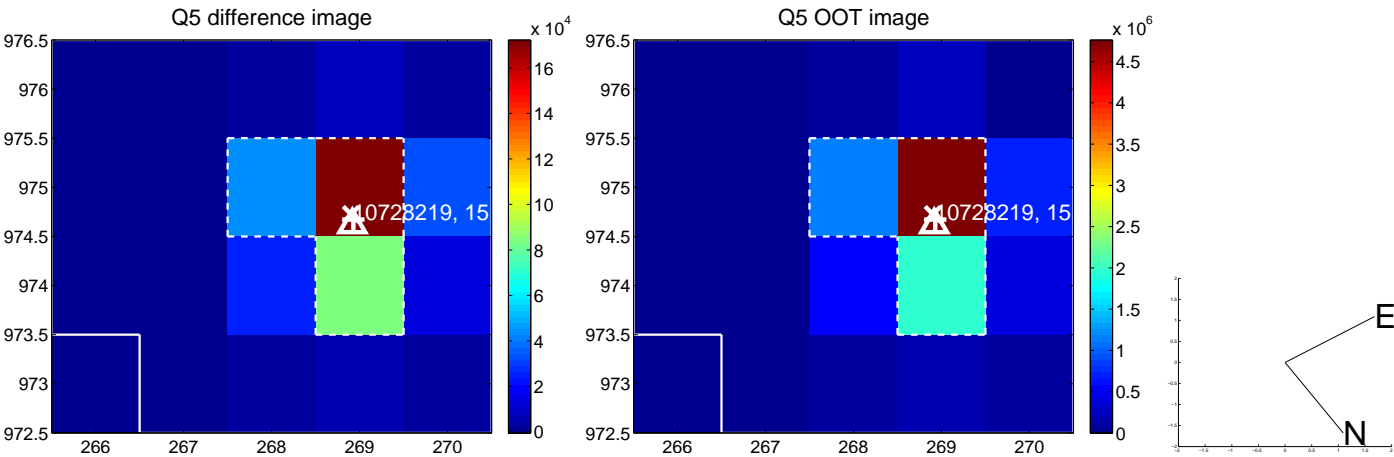


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

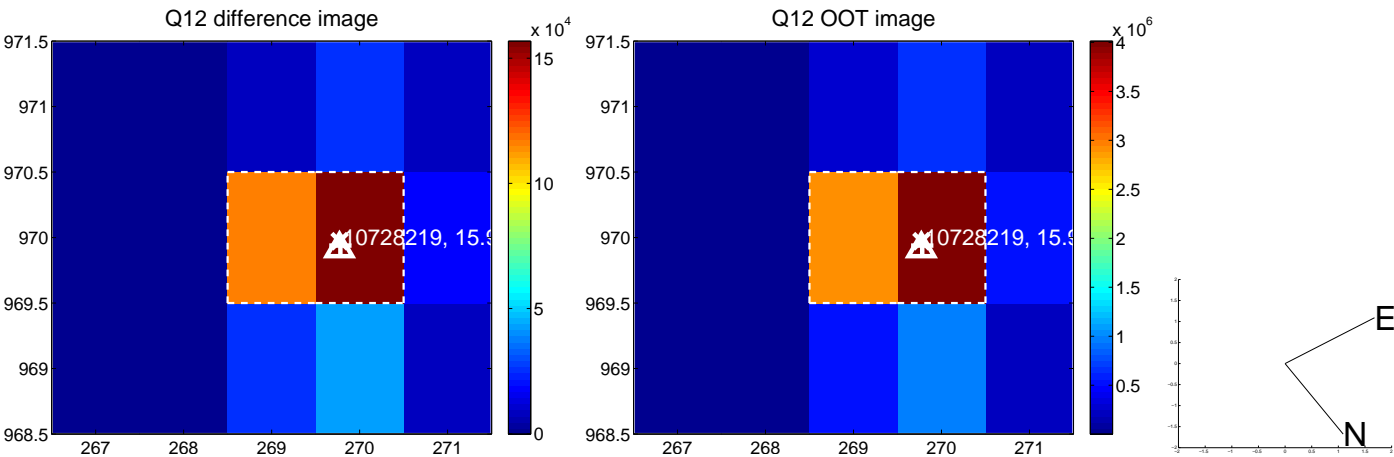
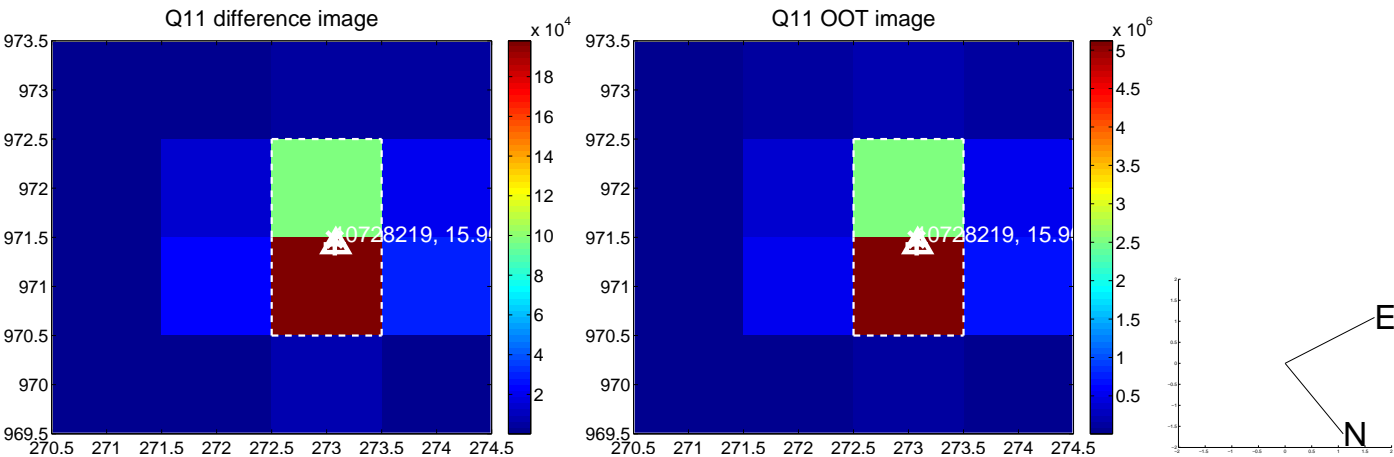
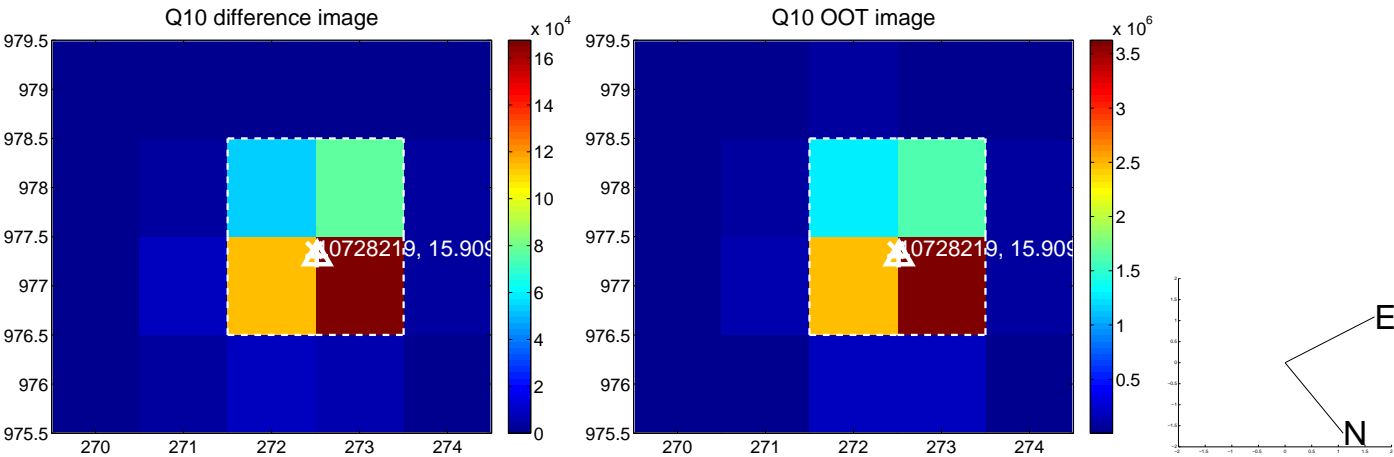
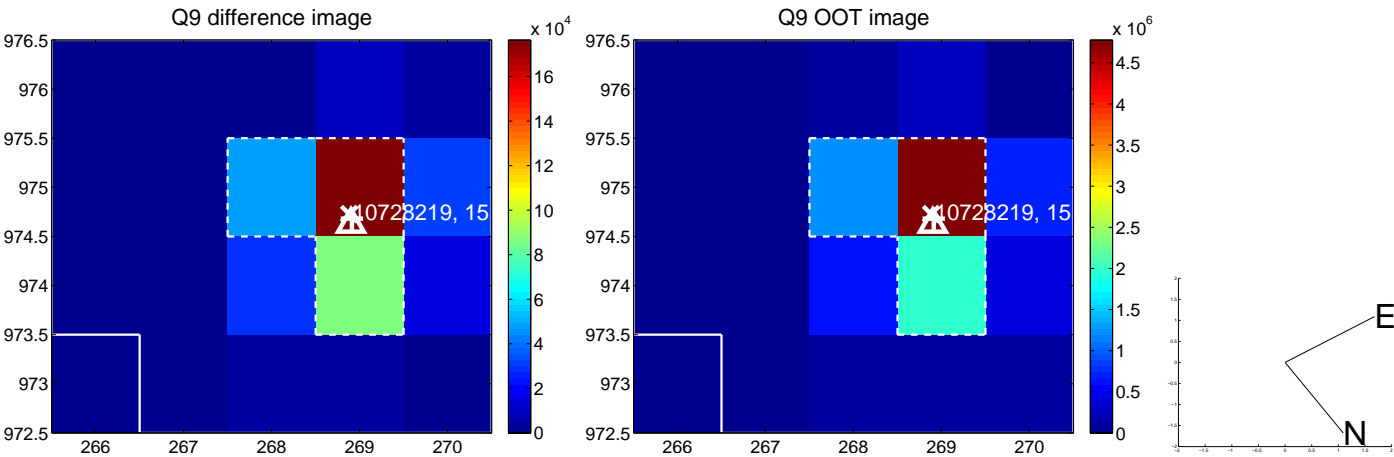
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



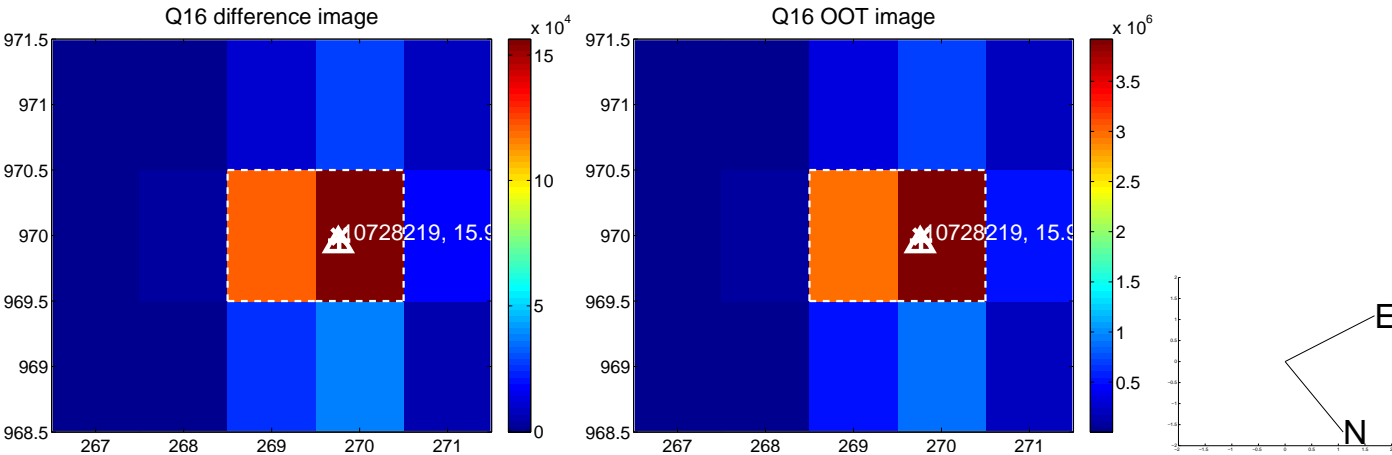
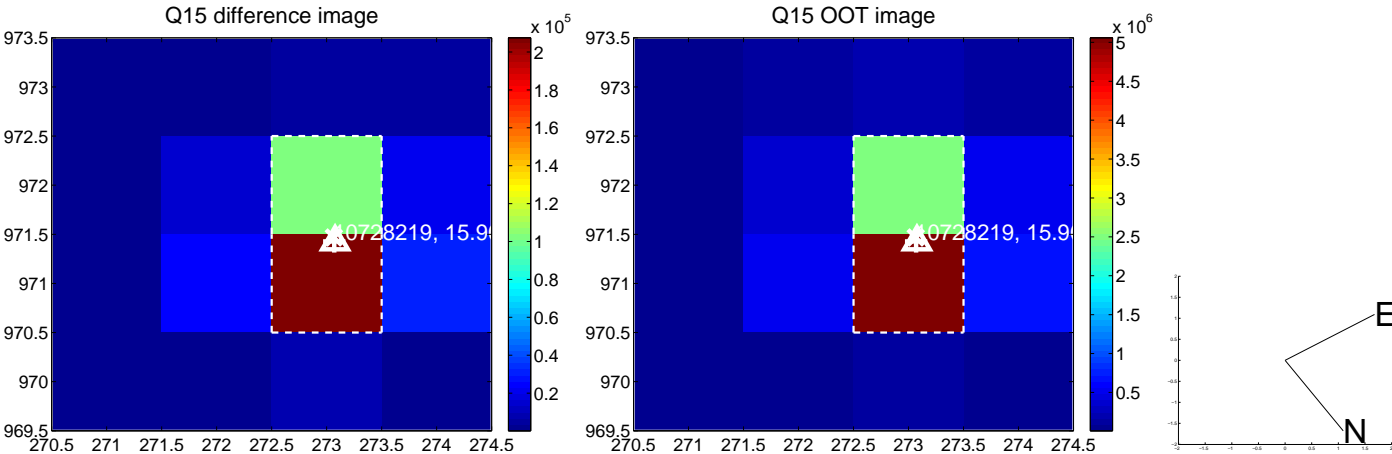
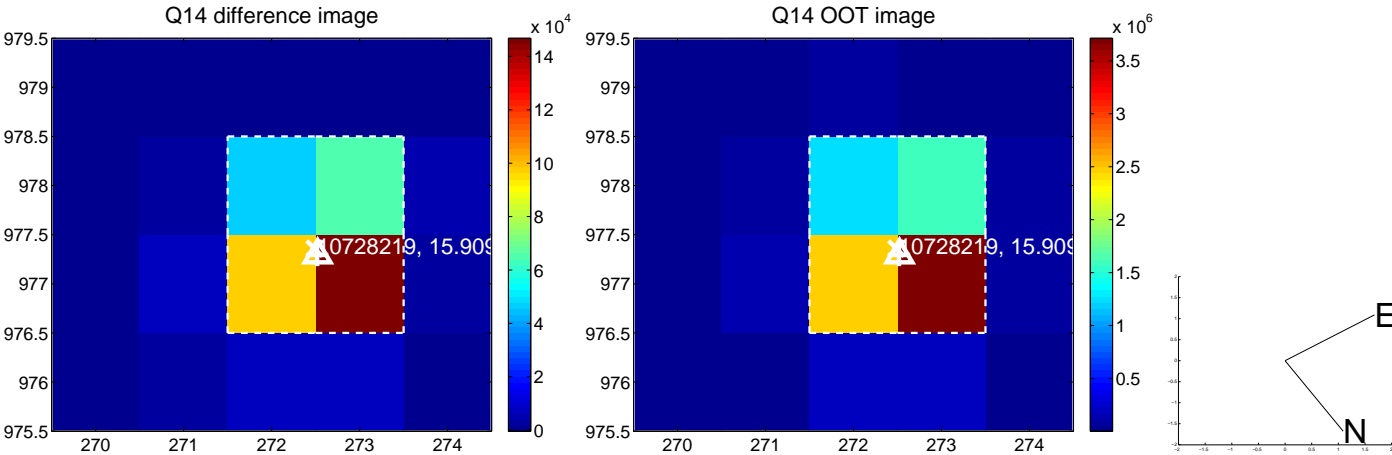
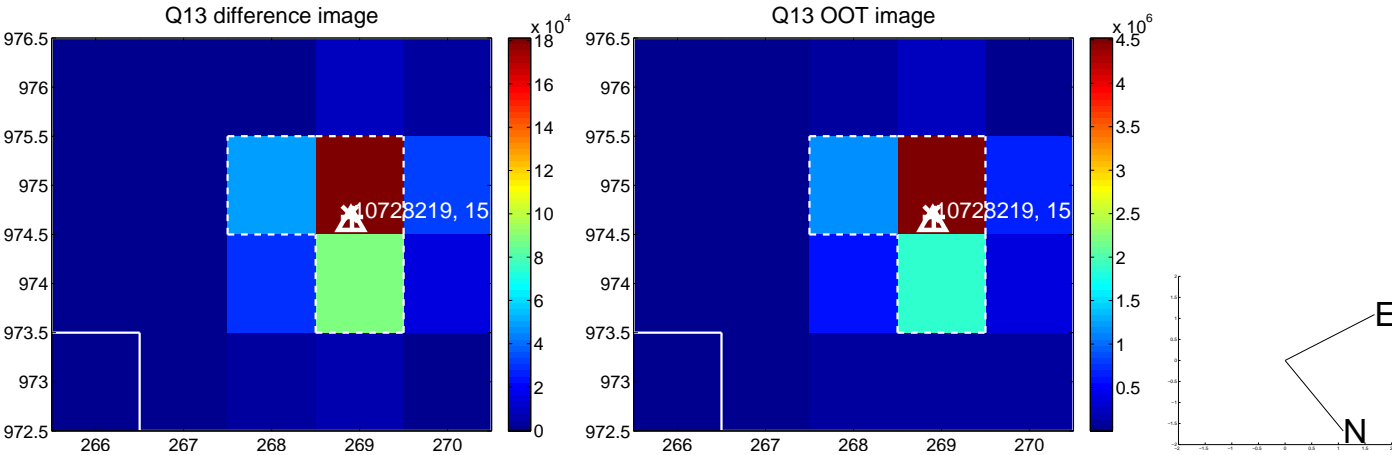
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



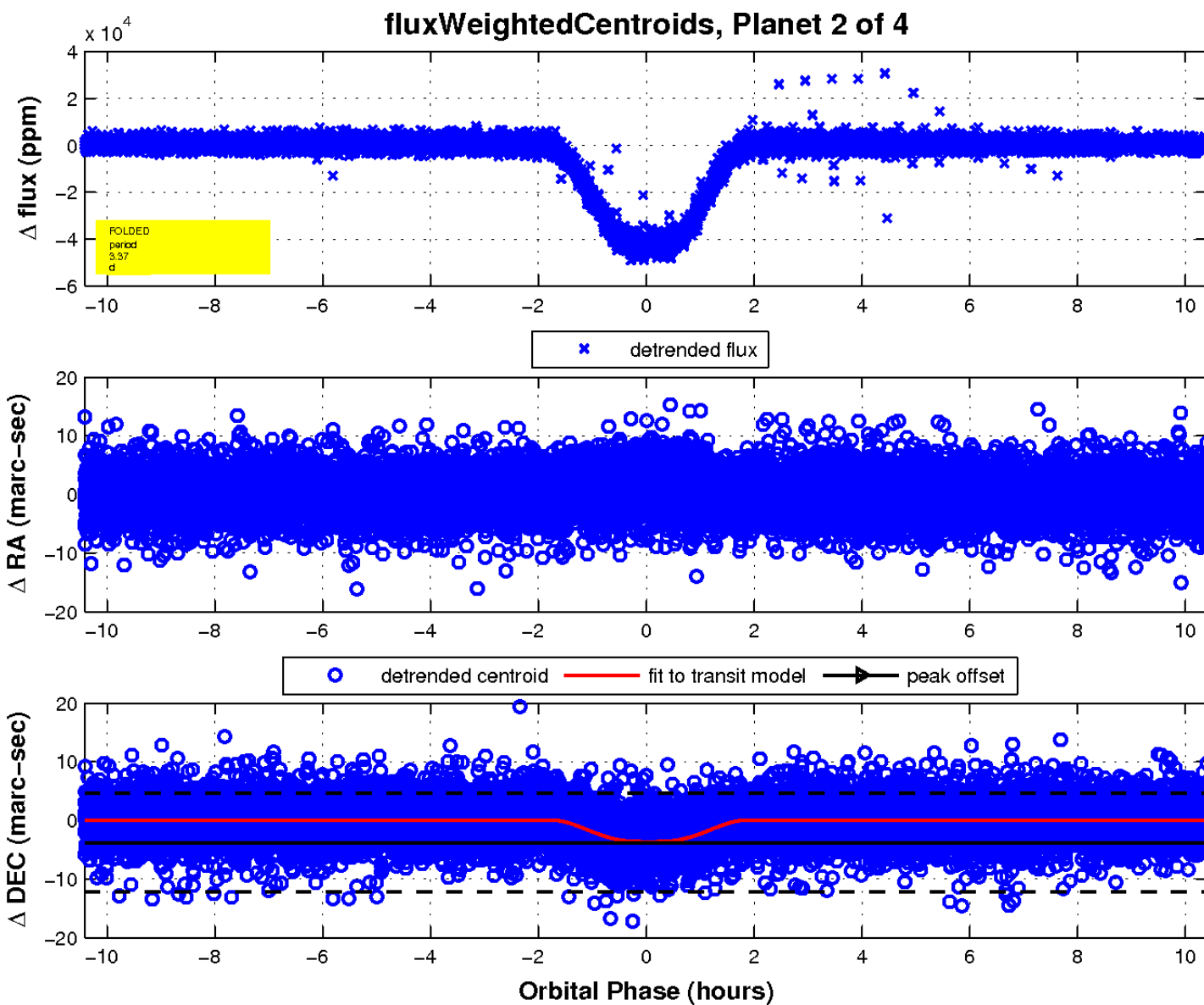
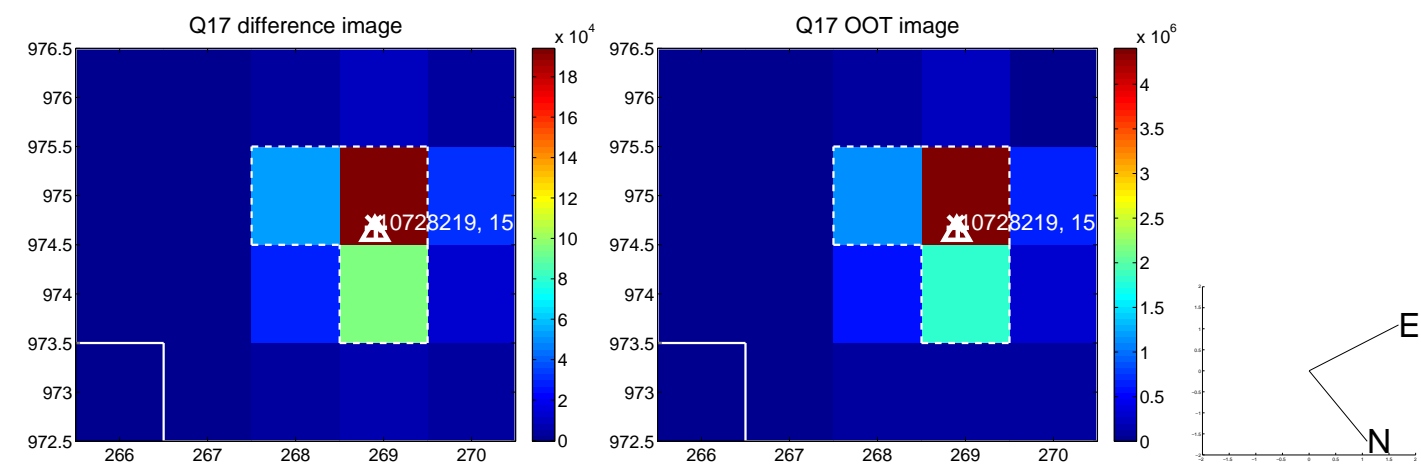
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

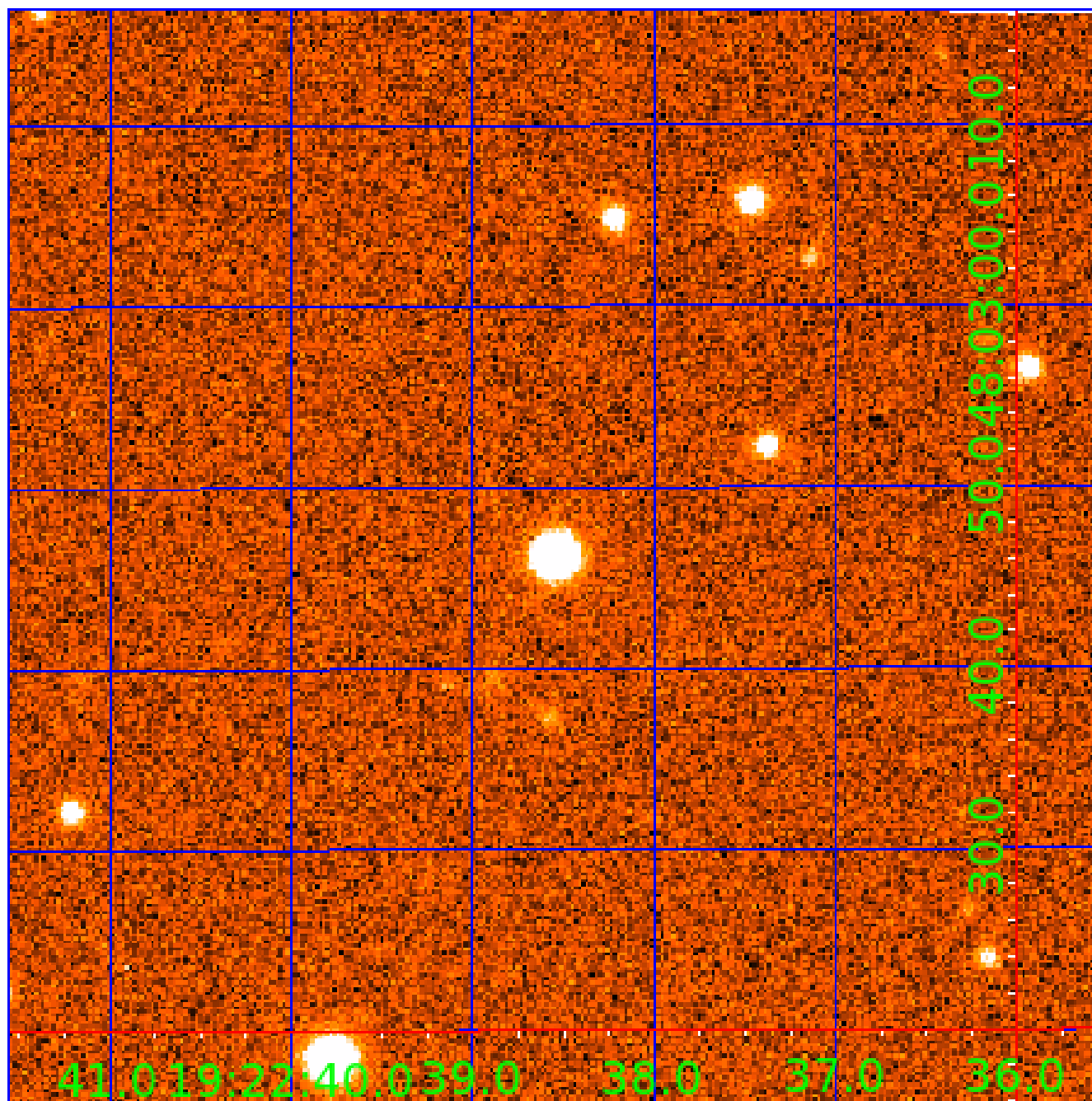


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 010728219

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010728219-01	OBS	6229.01	3.371796	134.872573	358840.8	2.000	10819.7	-1.0	0.91	5615	49.76	421.19
010728219-02	OBS	No	3.371799	133.190004	43403.1	3.471	1466.3	1361.8	0.91	5615	20.95	421.19
010728219-03	OBS	No	5.057671	134.630517	22823.9	15.000	963.5	-1.0	0.91	5615	13.62	245.29
010728219-04	OBS	No	1.123925	132.083134	5676.0	3.500	151.8	-1.0	0.91	5615	6.79	1822.38

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010728219-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_ALT—HAS_SEC_TCE—CENT_NOFITS
010728219-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE
010728219-03	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—CENT_NOFITS
010728219-04	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—SAME_NTL_PERIOD—CENT_NOFITS

**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.

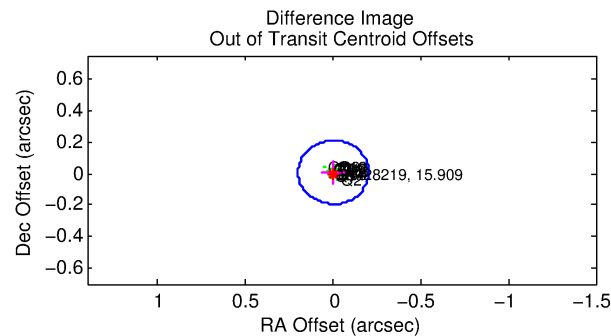
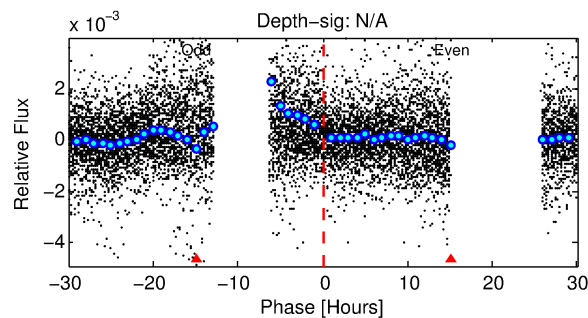
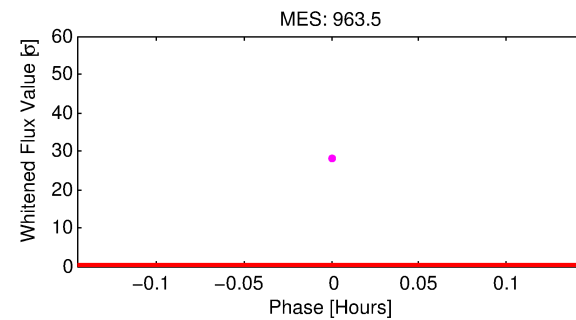
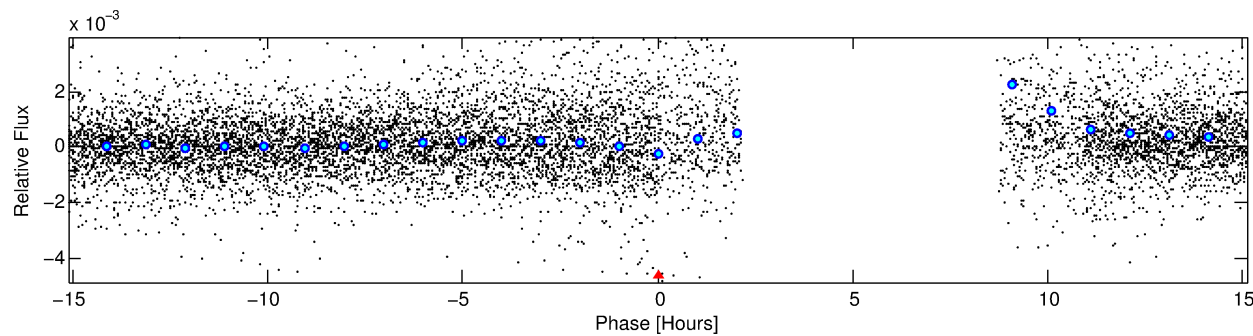
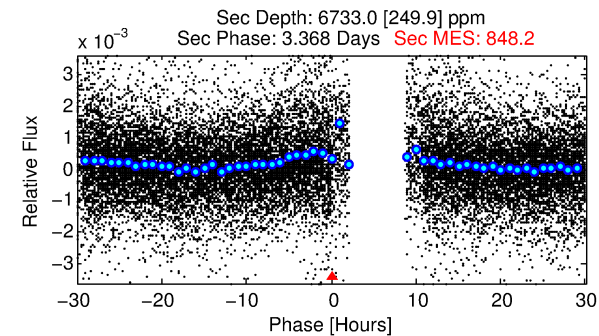
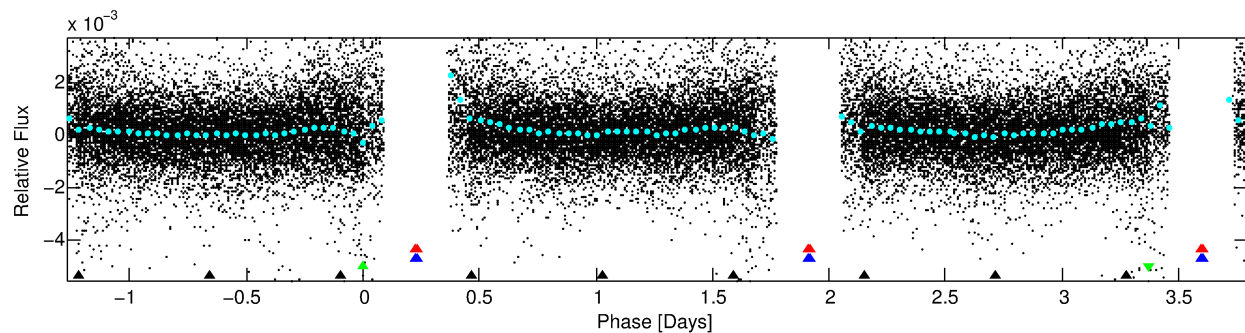
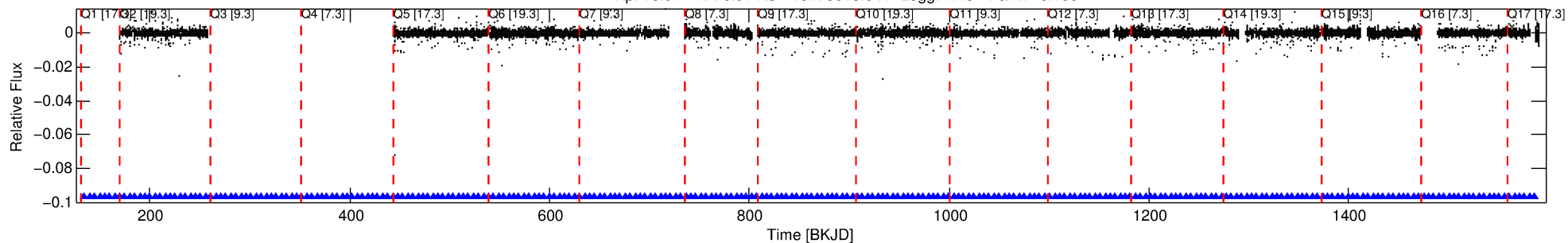
## Ephemeris Match Information For 010728219-03

No Significant Match Found

# DV One-Page Summary

KIC: 10728219 Candidate: 3 of 4 Period: 5.058 d  
KOI: K06229 Corr: No Ephemeris Match

Kp: 15.91 R\*: 0.91 Rs Teff: 5615.0 K Logg: 4.46 Fe/H: -0.160



TPS TCE Results:

Period = 5.05767 d  
Epoch = 134.6305 BKJD

DV fit results are unavailable

DV Diagnostic Results:

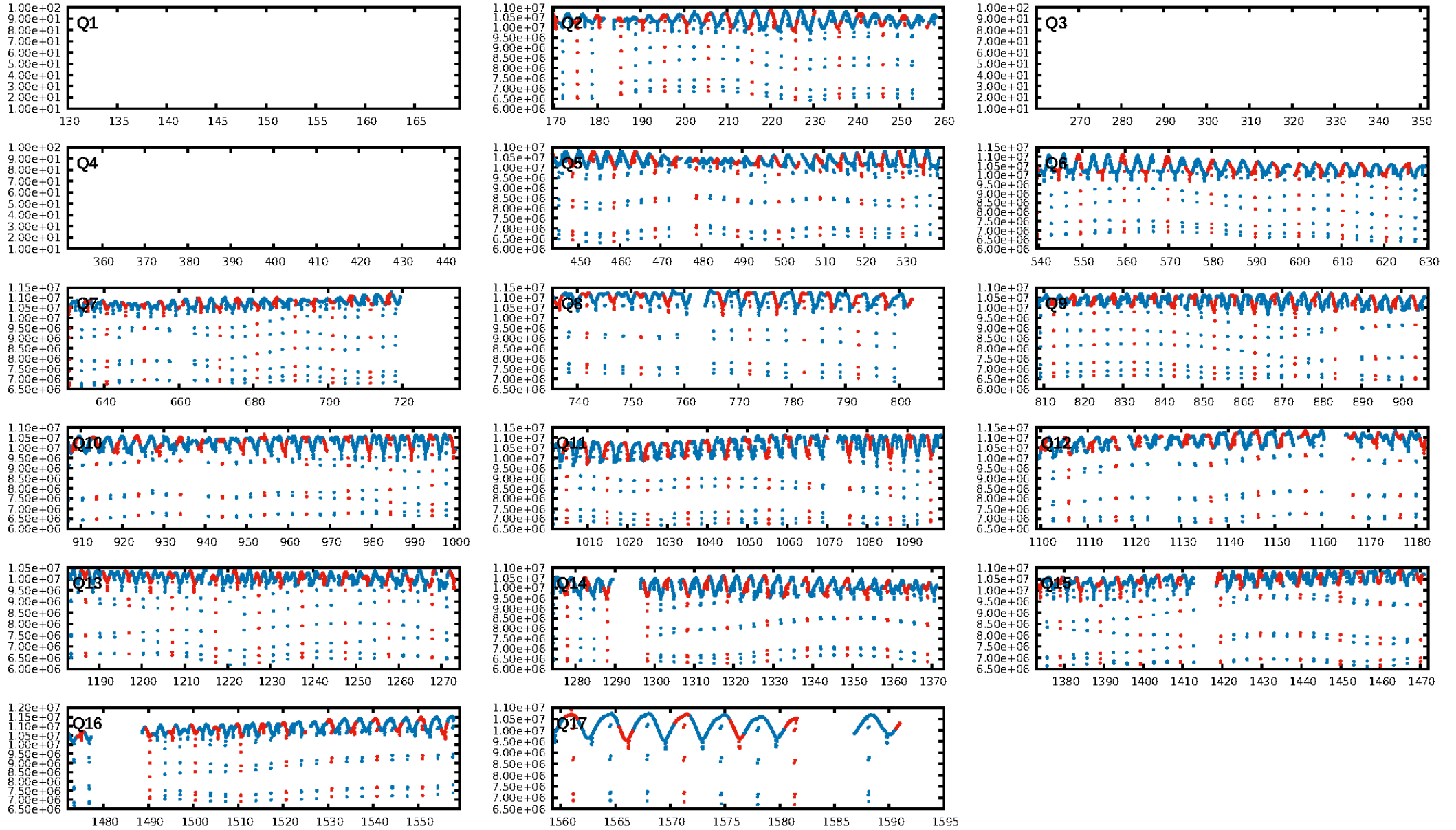
ShortPeriod-sig: 99.1% [2.63σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [218/218]  
GhostDiagnostic-chr: 0.3992

Centroid-sig: N/A  
Centroid-so: 0.118 arcsec [0.48σ]  
OotOffset-rm: 0.009 arcsec [0.13σ]  
KicOffset-rm: 0.242 arcsec [3.51σ]  
OotOffset-st: 4/3/3/4 [14]  
KicOffset-st: 4/3/3/4 [14]  
DiffImageQuality-fgm: 0.00 [0/14]  
DiffImageOverlap-fno: 0.00 [0/14]

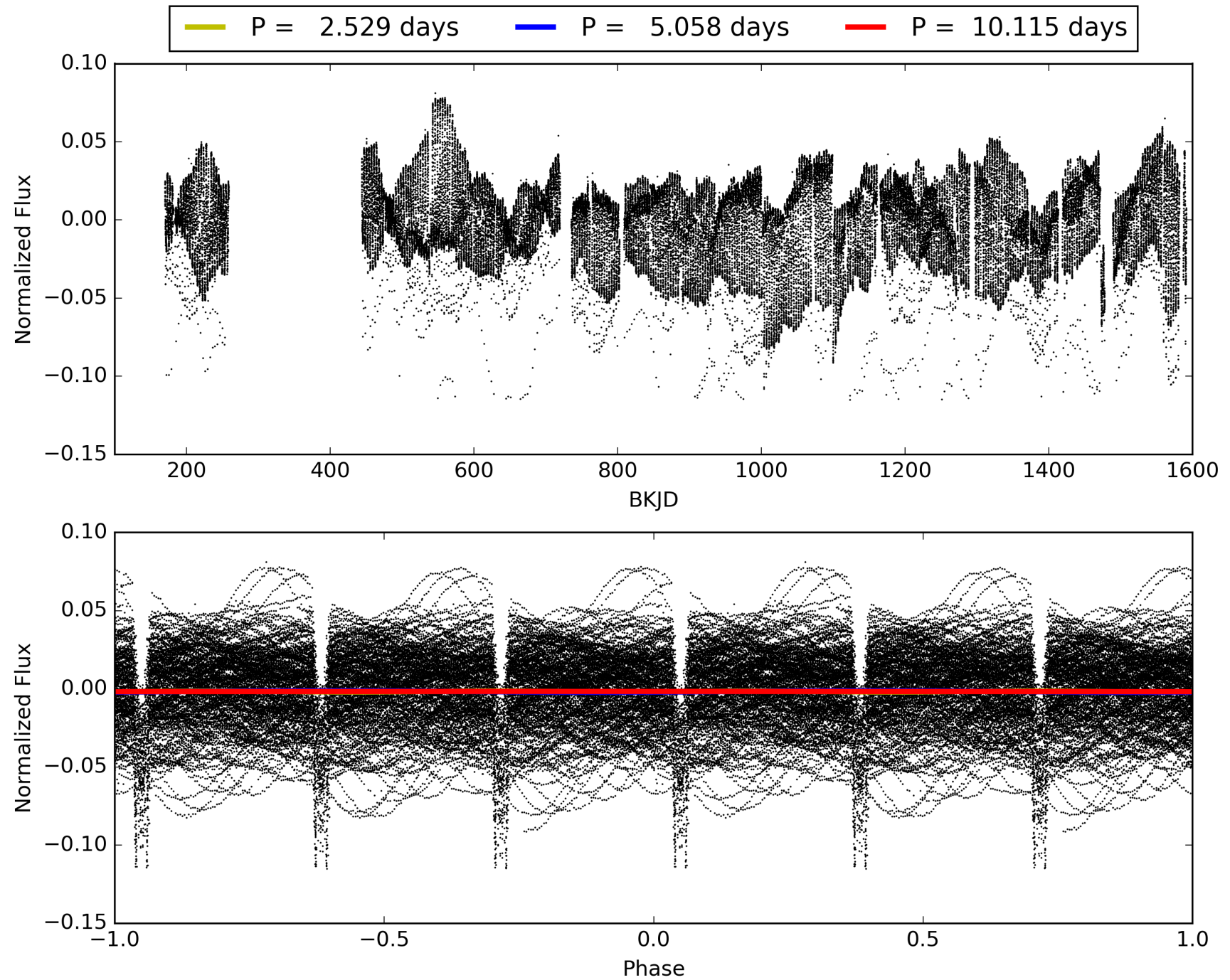
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 07:49:52 Z

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

# TCE 010728219-03, PDC Light Curves

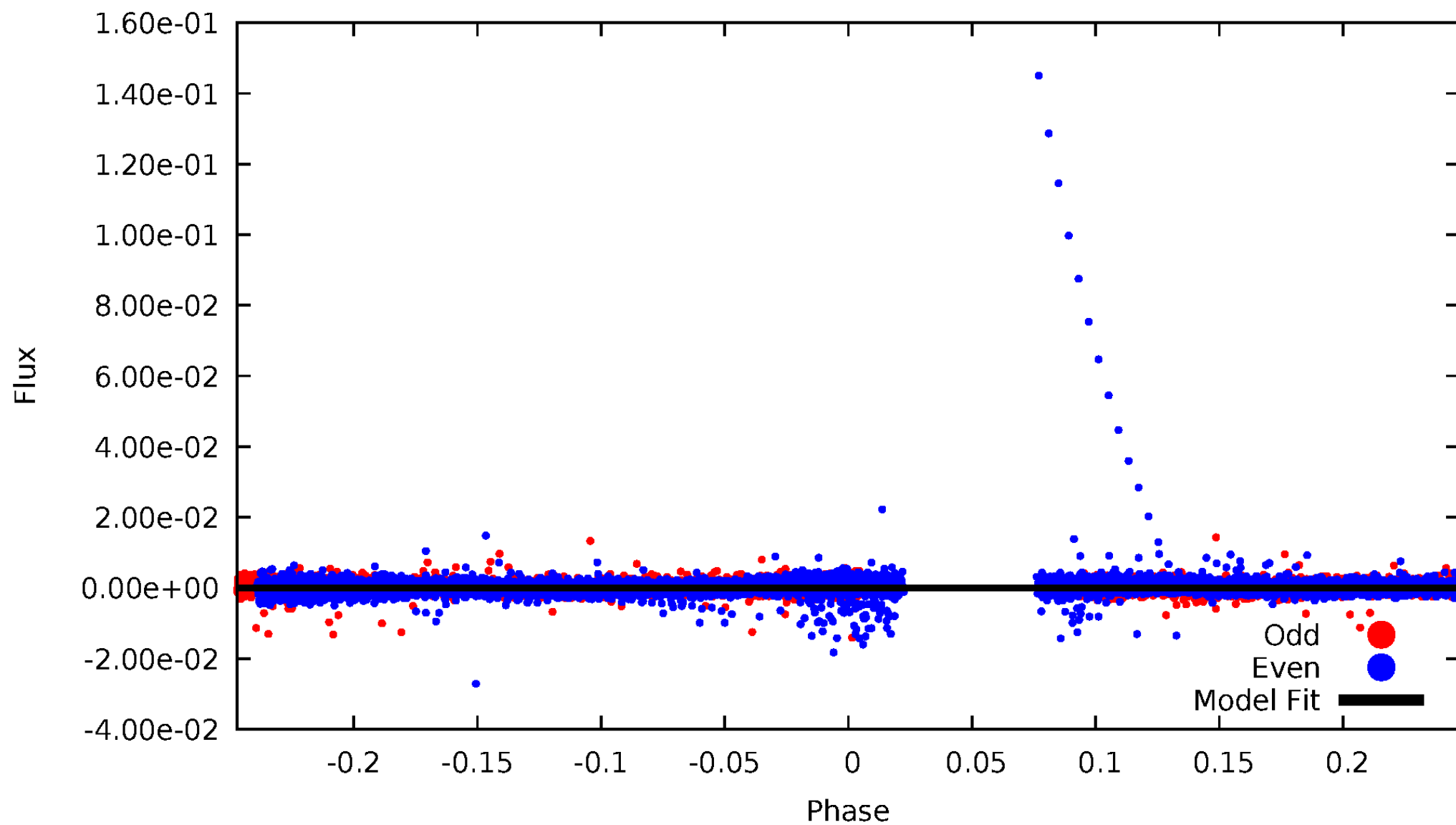


# TCE 010728219-03



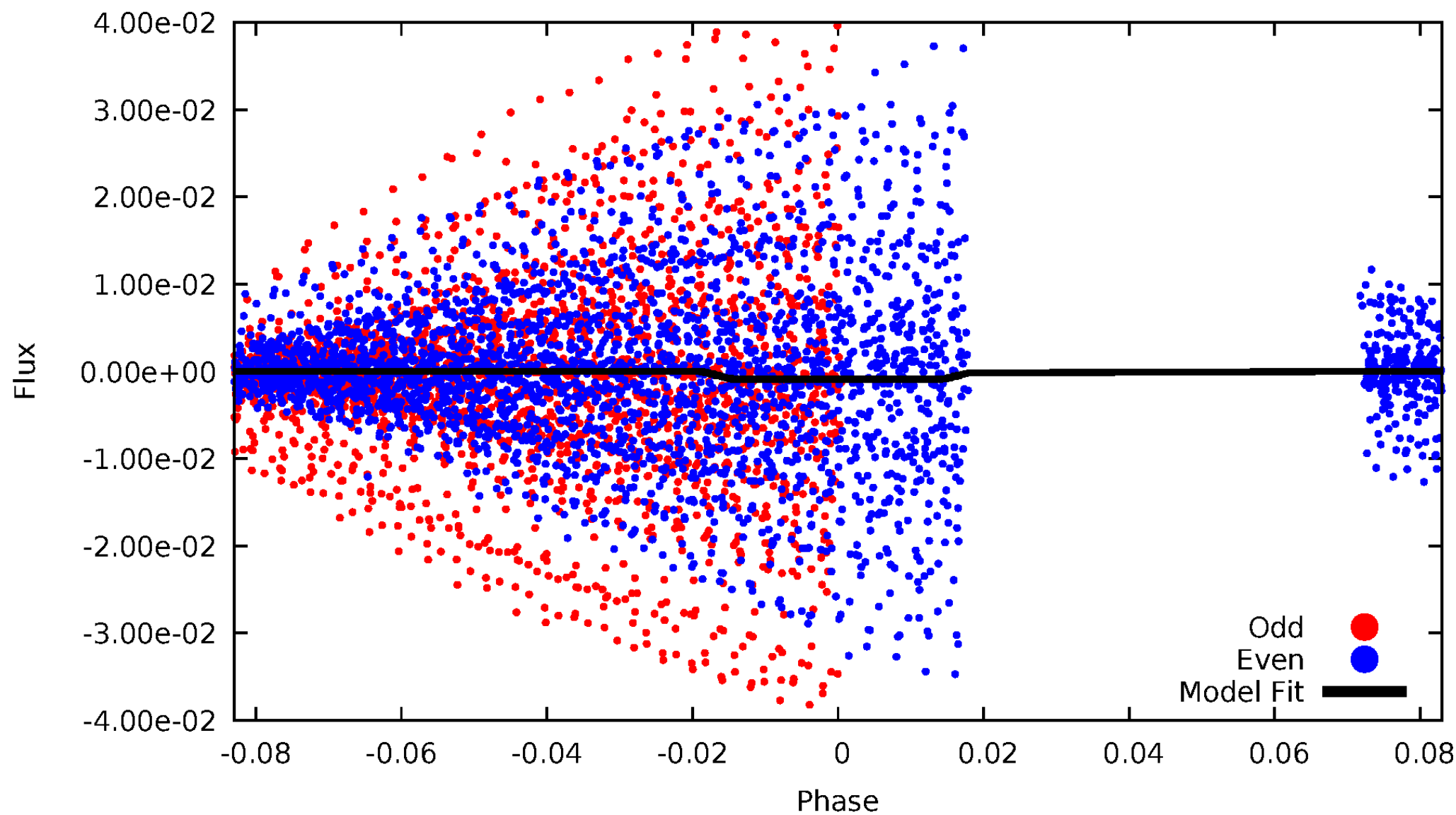
# DV Odd/Even

TCE 010728219-03



# ALT Odd/Even

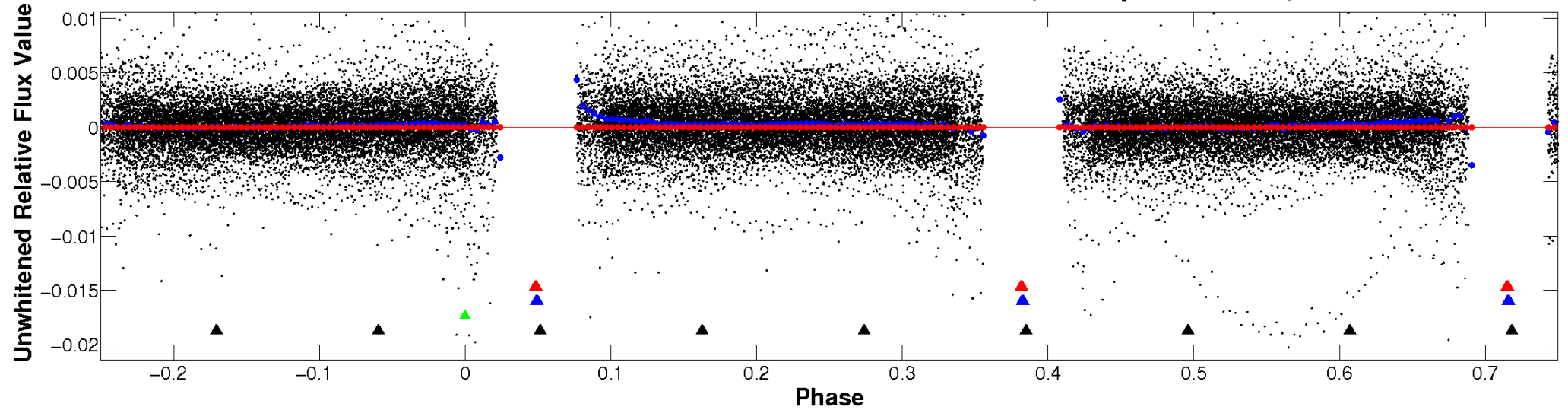
TCE 010728219-03



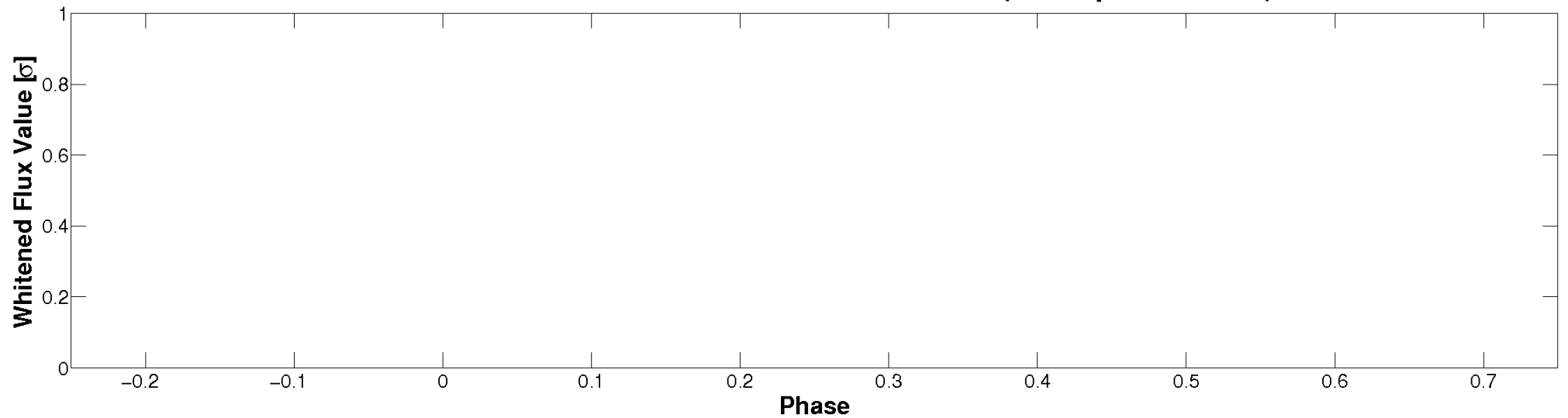


# Non-Whitened Vs. Whitened Light Curve

**Planet 3 : Phased Unwhitened Flux Time Series (TPS Epoch/Period)**

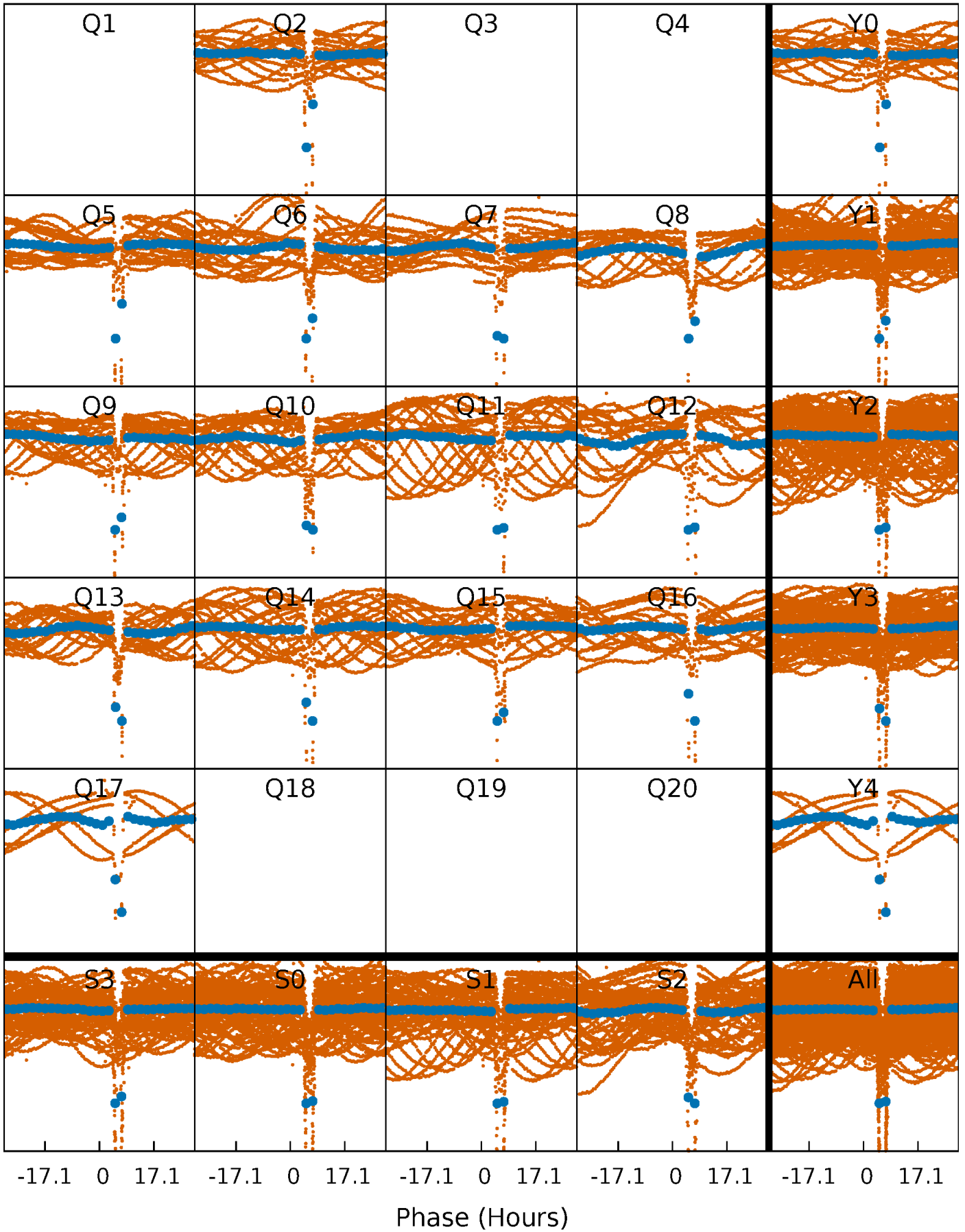


**Planet 3 : Phased Whitened Flux Time Series (TPS Epoch/Period)**



# PDC Quarter-Phased Transit Curves

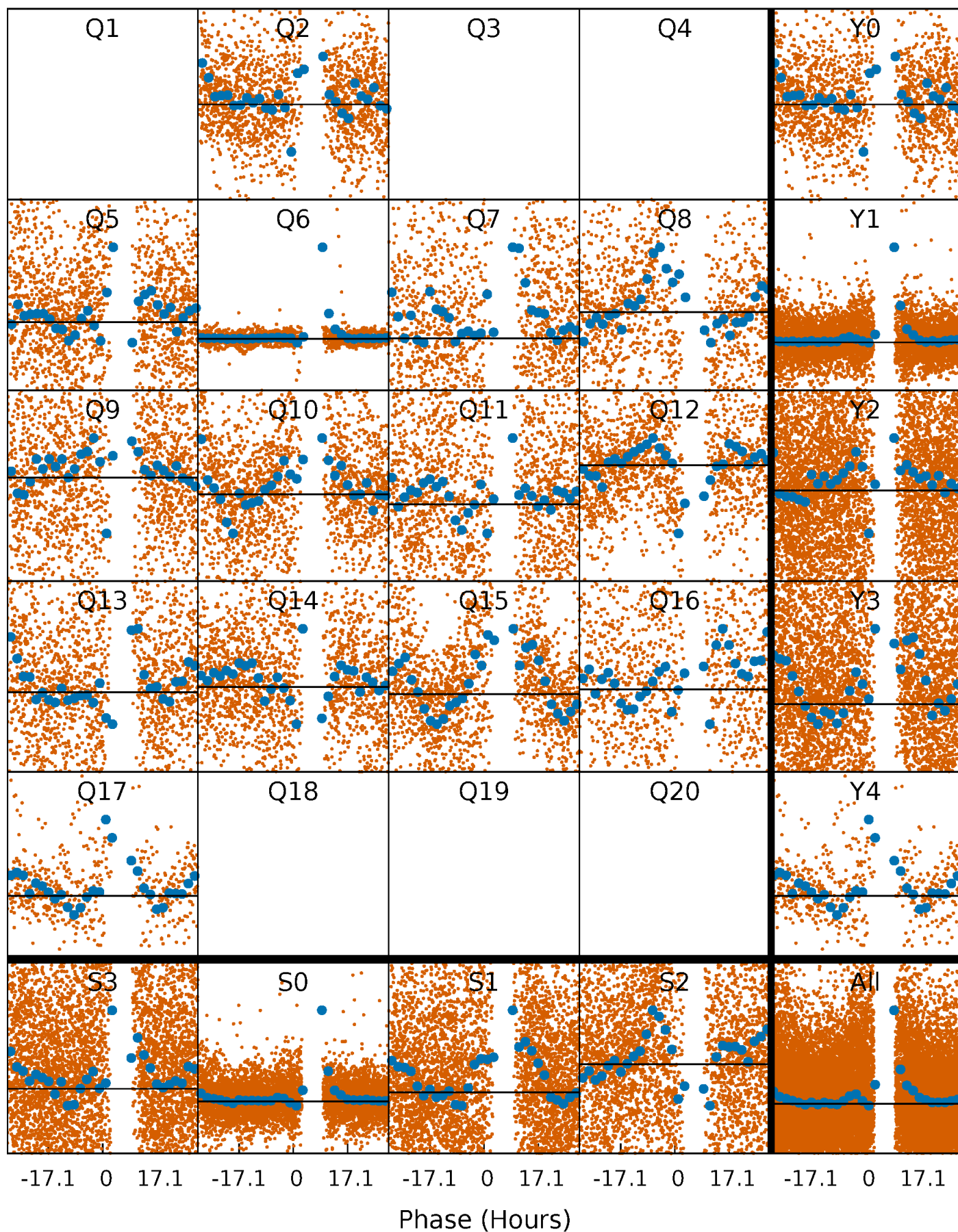
TCE 010728219-03 P= 5.057671 Days  $T_0=134.630517$  (BKJD)





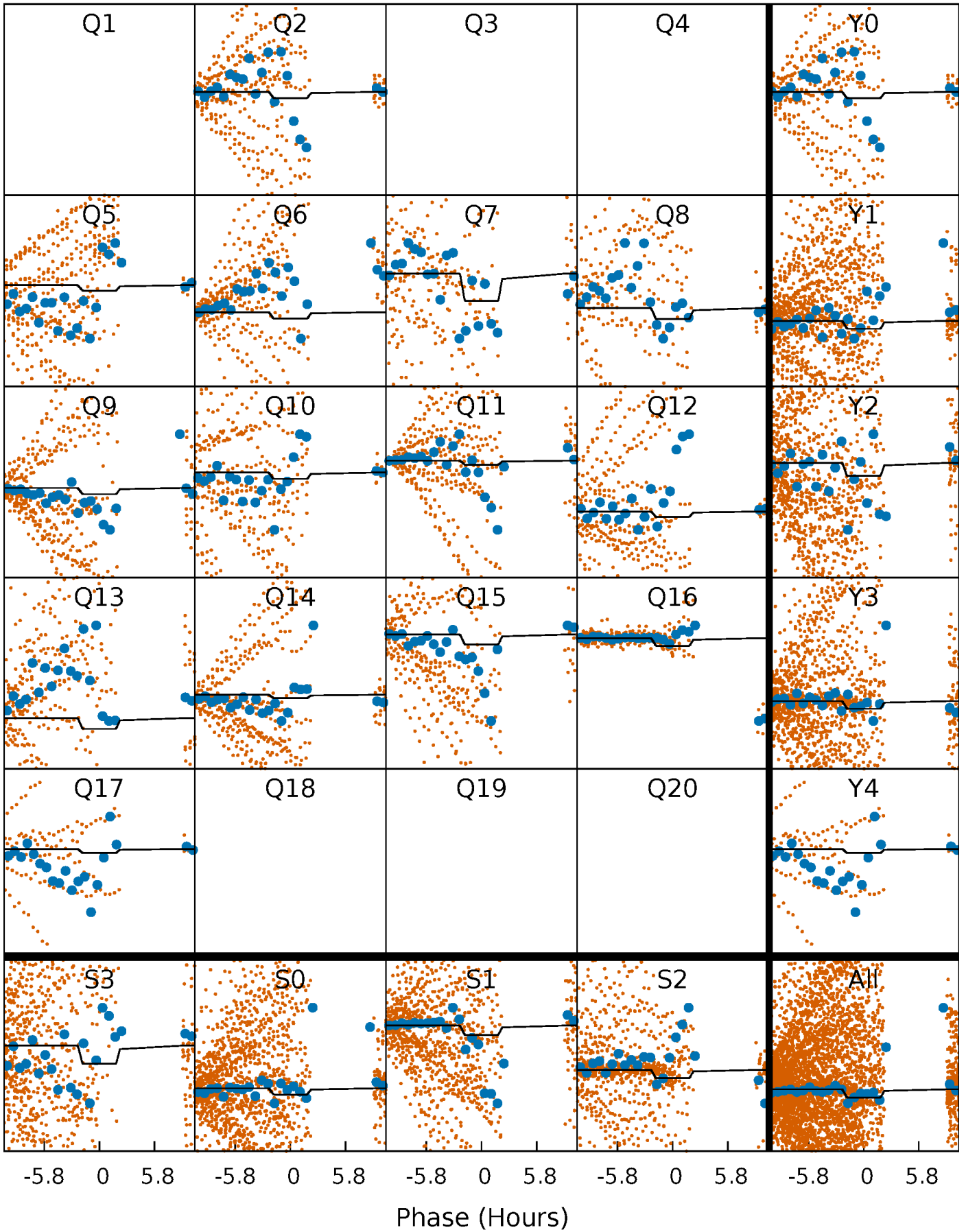
# DV Quarter-Phased Transit Curves

TCE 010728219-03   P= 5.057671 Days    $T_0=134.630517$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

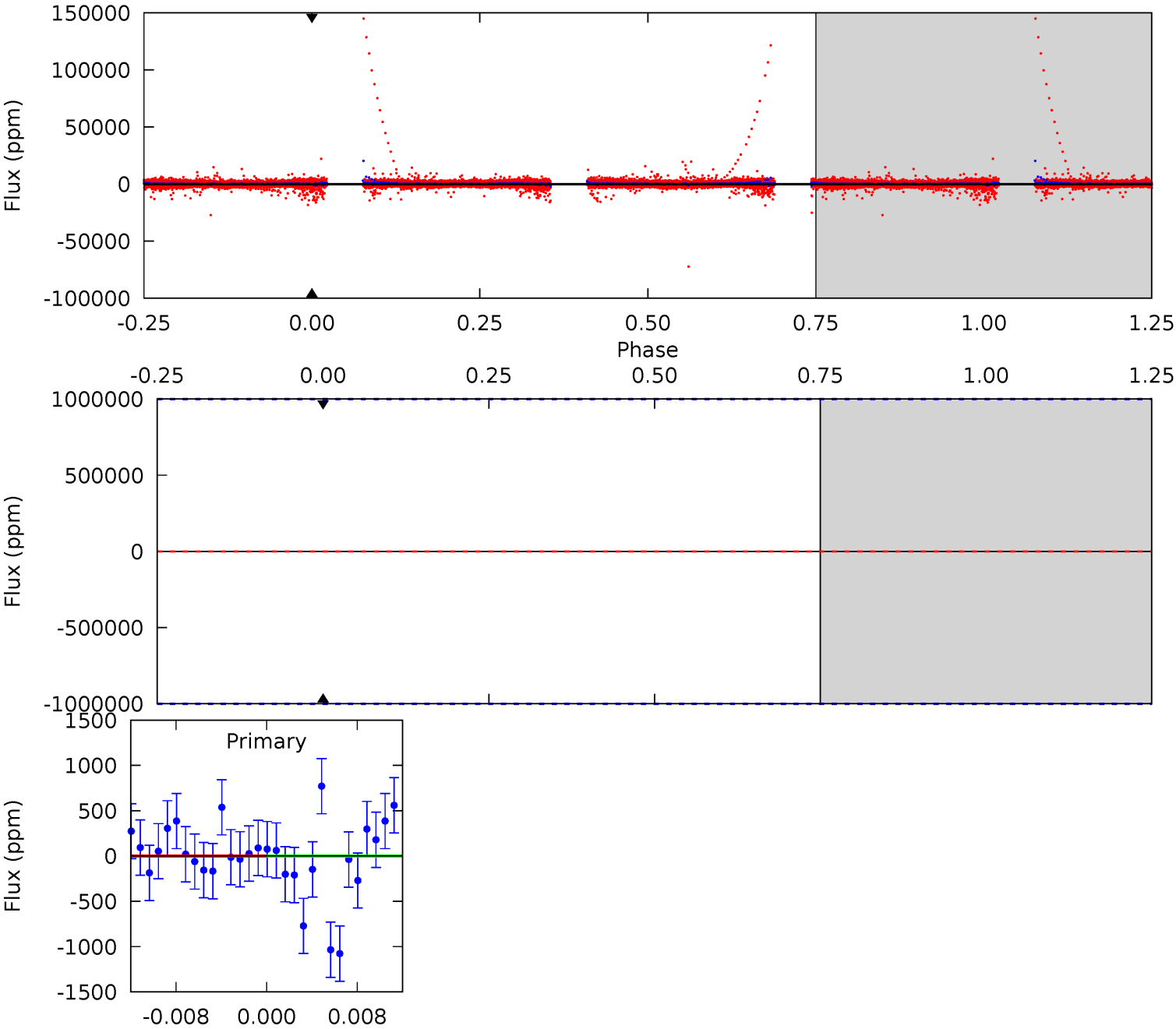
TCE 010728219-03 P= 5.057671 Days  $T_0=134.653211$  (BKJD)



# DV Model-Shift Uniqueness Test

010728219-03, P = 5.057671 Days, E = 134.630517 Days

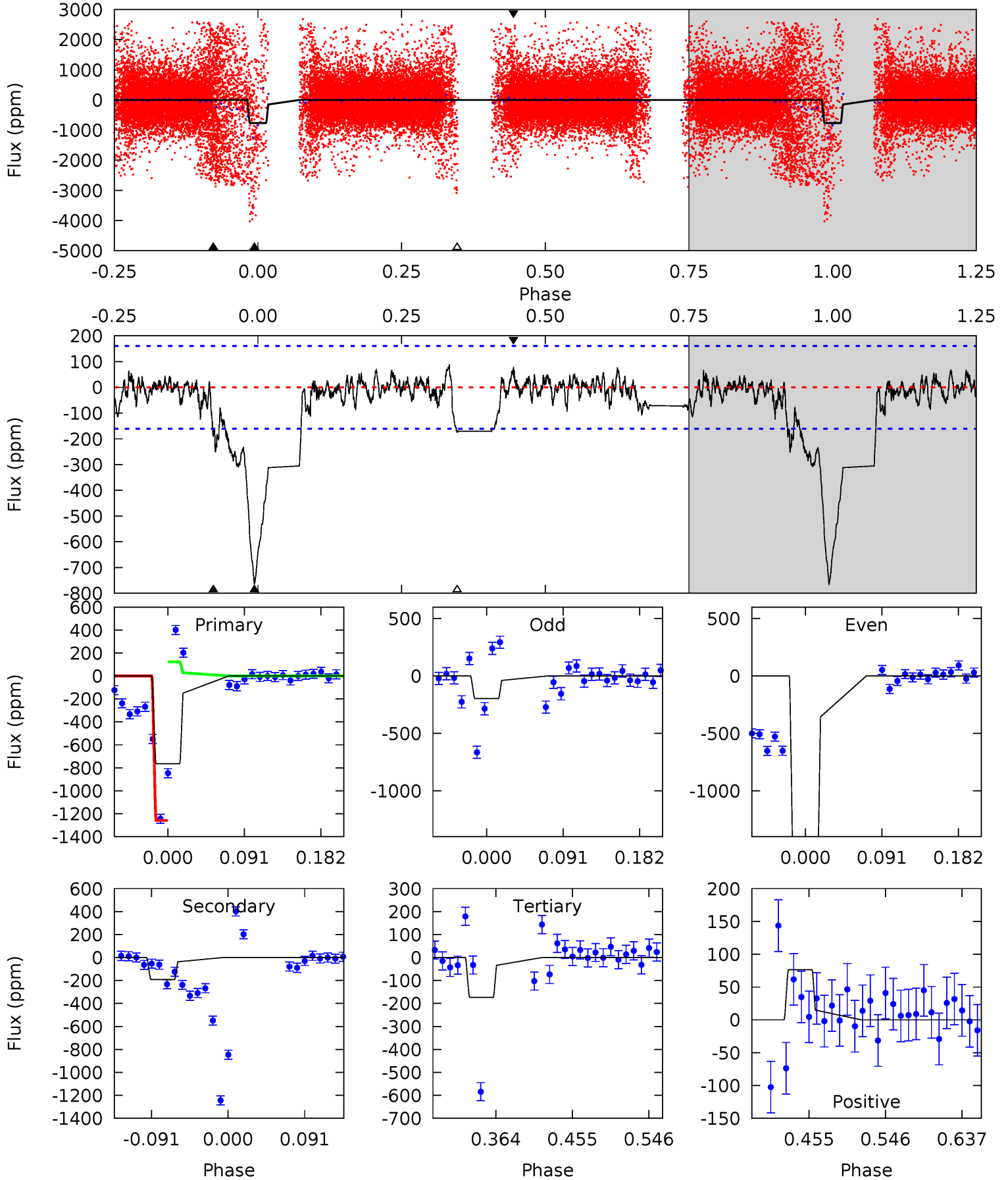
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



# Alt Model-Shift Uniqueness Test

010728219-03, P = 5.057671 Days, E = 134.653211 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
21.8	5.46	4.95	2.18	4.58	1.69	0.95	16.9	19.6	0.52	3.29	20.8	0.86	0.10	0



### Stellar Parameters For KIC 010728219

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5615^{+169}_{-152}$	$4.455^{+0.094}_{-0.175}$	$-0.160^{+0.300}_{-0.300}$	$0.912^{+0.224}_{-0.121}$	$0.865^{+0.114}_{-0.076}$	$1.608^{+0.765}_{-0.747}$
	+3%/-3%	+2%/-4%	+188%/-188%	+25%/-13%	+13%/-9%	+48%/-46%
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 010728219-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$0 \pm 1000000$	$15.25^{+10.69}_{-9.31}$	$1420^{+95}_{-67}$	$3699^{+6511}_{-12909}$	$21^{+1182}_{-1008}$
Alt.	$-192 \pm 35$	$8.76^{+8.71}_{-6.28}$	$1425^{+90}_{-67}$	$2918^{+1461}_{-556}$	$4.074^{+48.414}_{-3.032}$

$T_{max}$  = 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

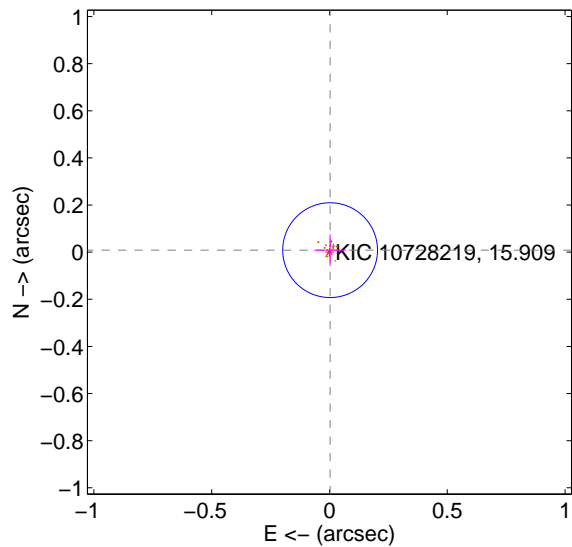
Supplemental centroid analysis for 010728219-03. Kepler magnitude: 15.91. Transit SNR -1.00

There are 0 quarters with good PRF difference image offsets

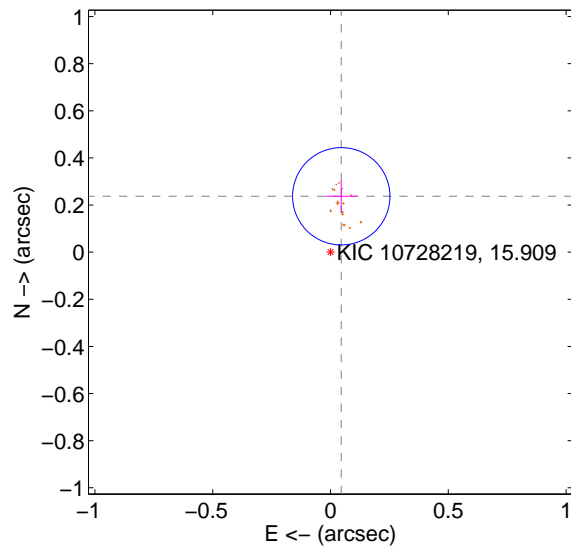
The direct PRF centroid is offset from the target star catalog position by about 0.18 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.009 \pm 0.067$	0.13	$-0.003 \pm 0.067$	$0.009 \pm 0.067$
PRF-fit source offset from KIC position	<b><math>0.242 \pm 0.069</math></b>	<b>3.51</b>	$-0.046 \pm 0.067$	$0.237 \pm 0.069$
photometric centroid source offset	$0.12 \pm 0.25$	0.48	$0.06 \pm 0.25$	$-0.10 \pm 0.24$

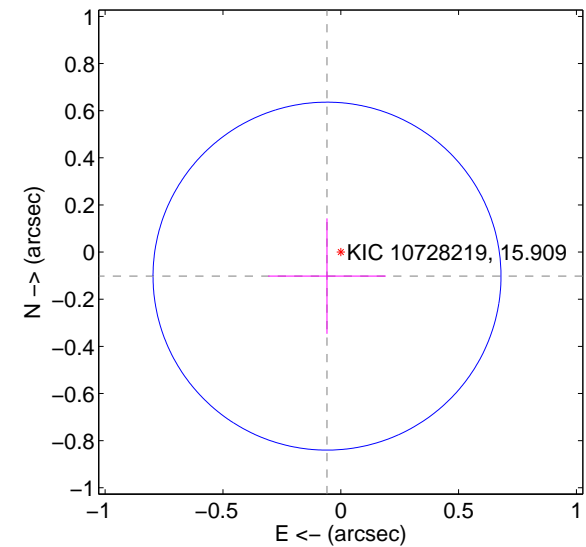
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

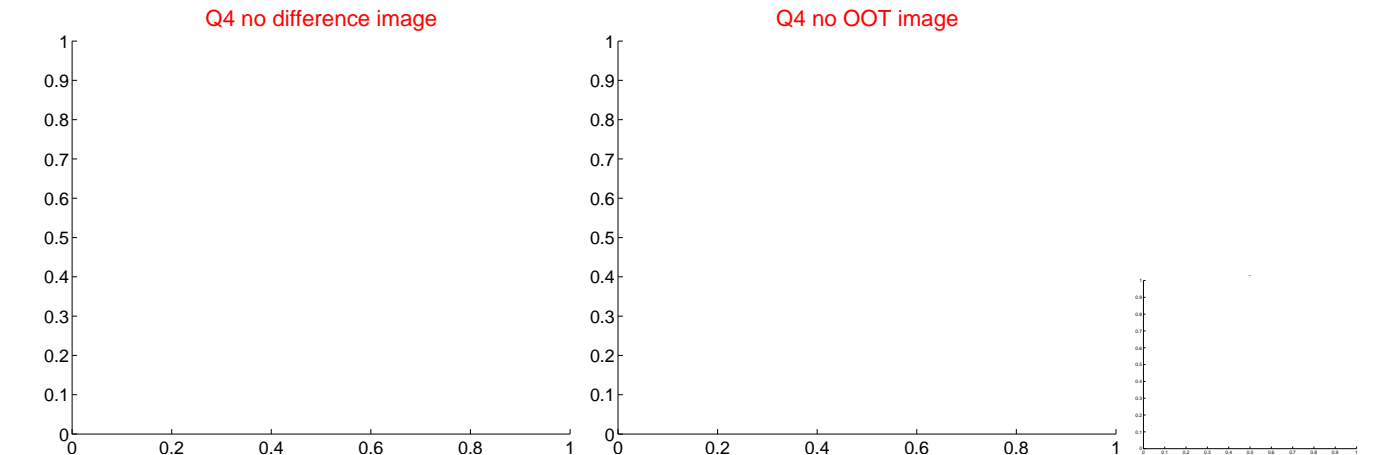
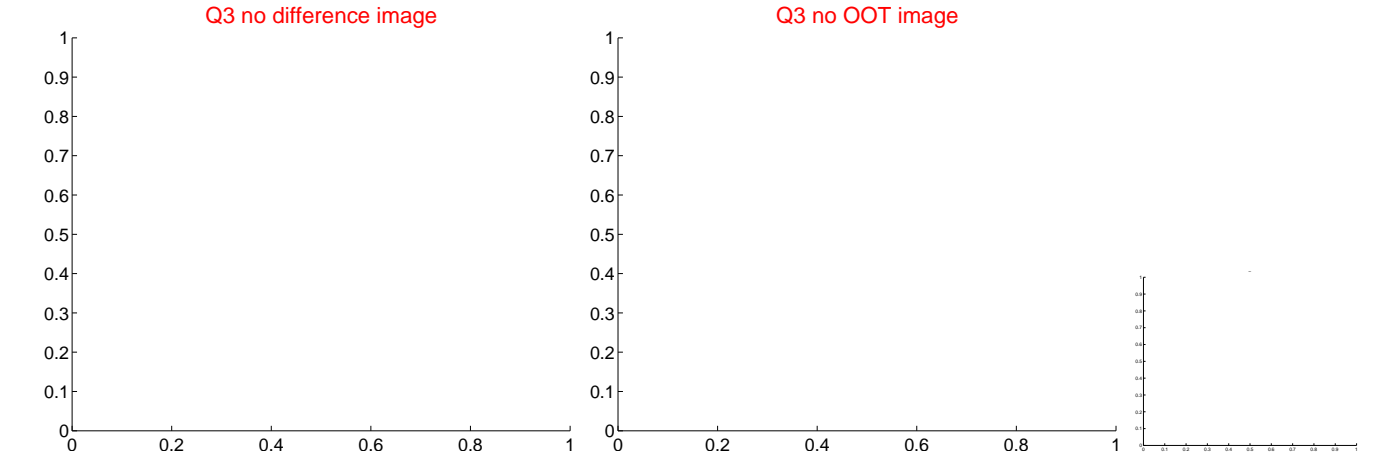
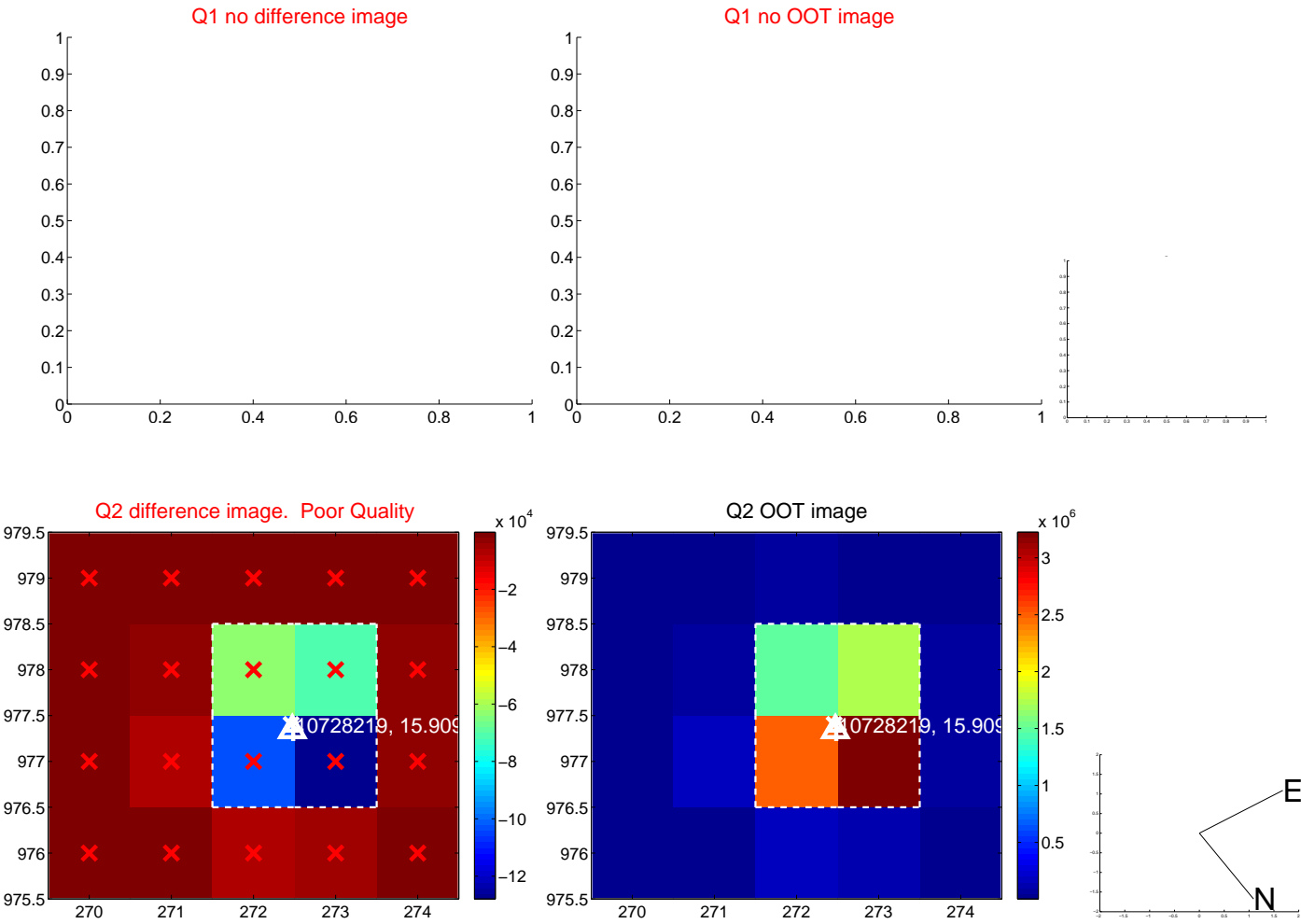


offset from photometric centroids

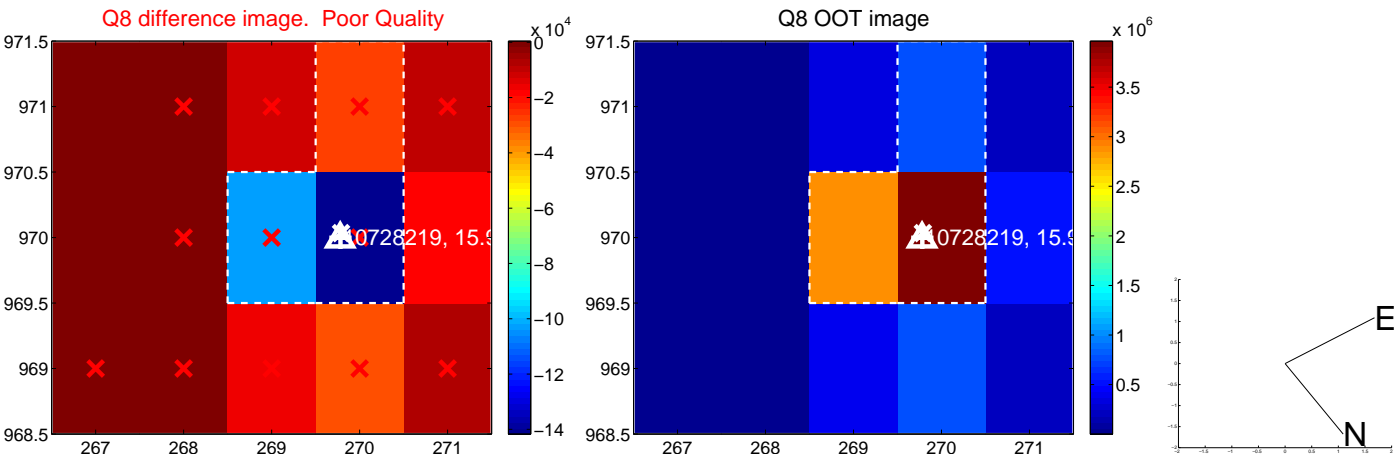
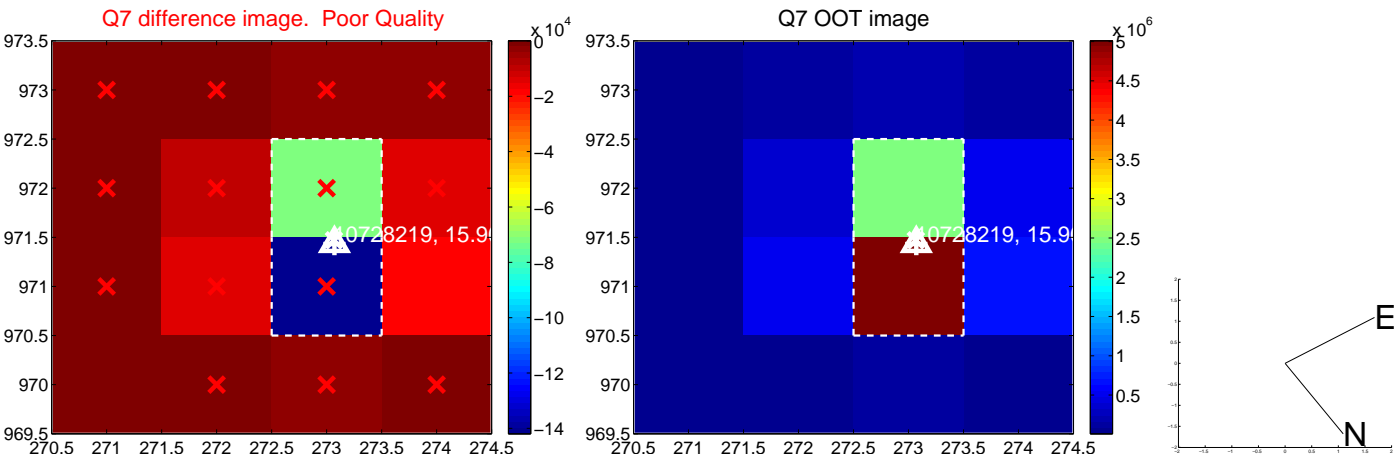
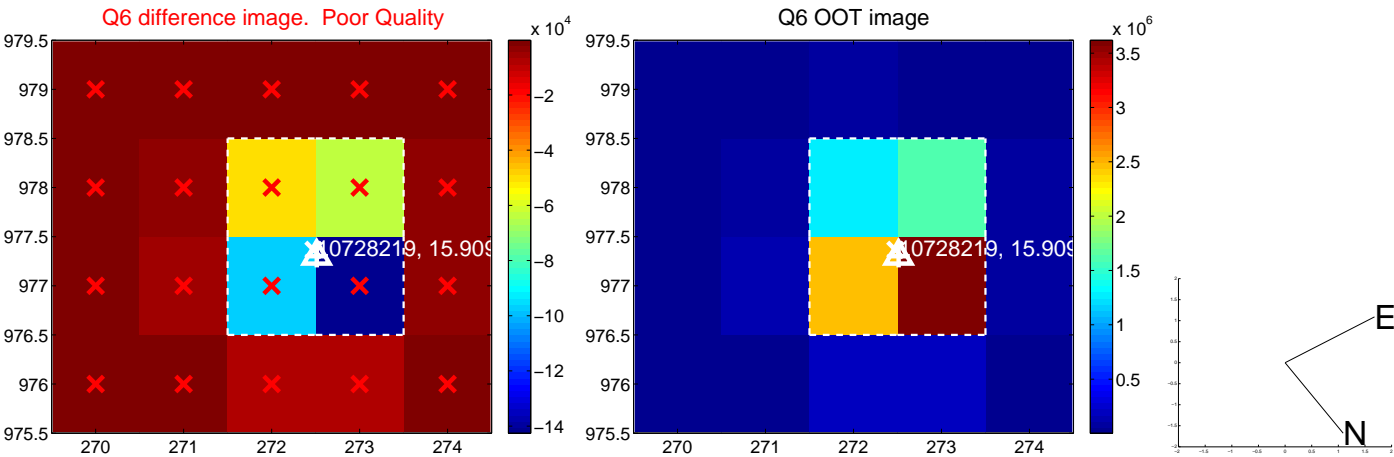
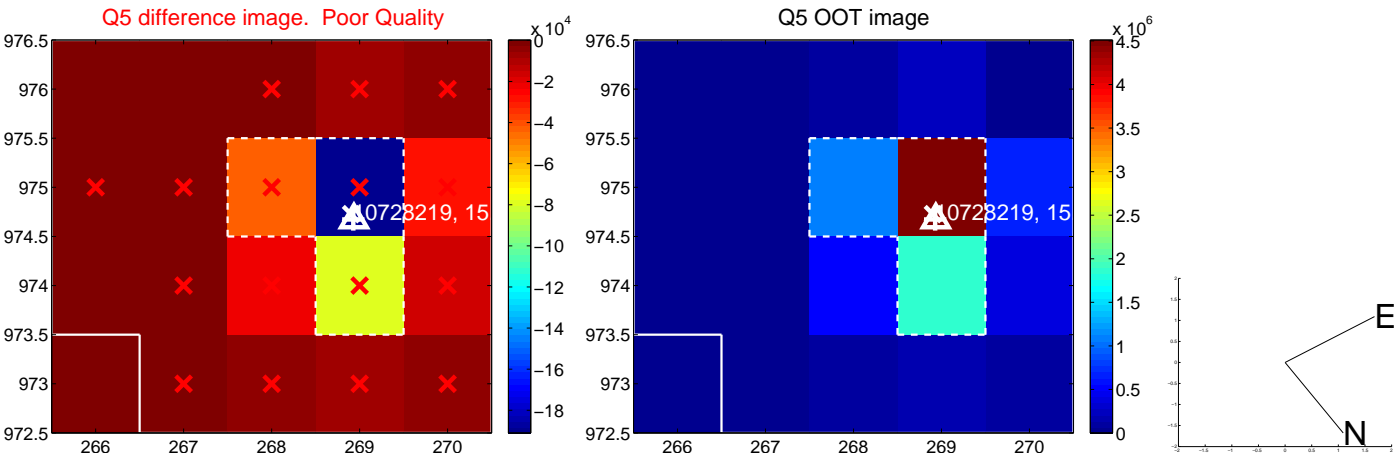


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . 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 ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.

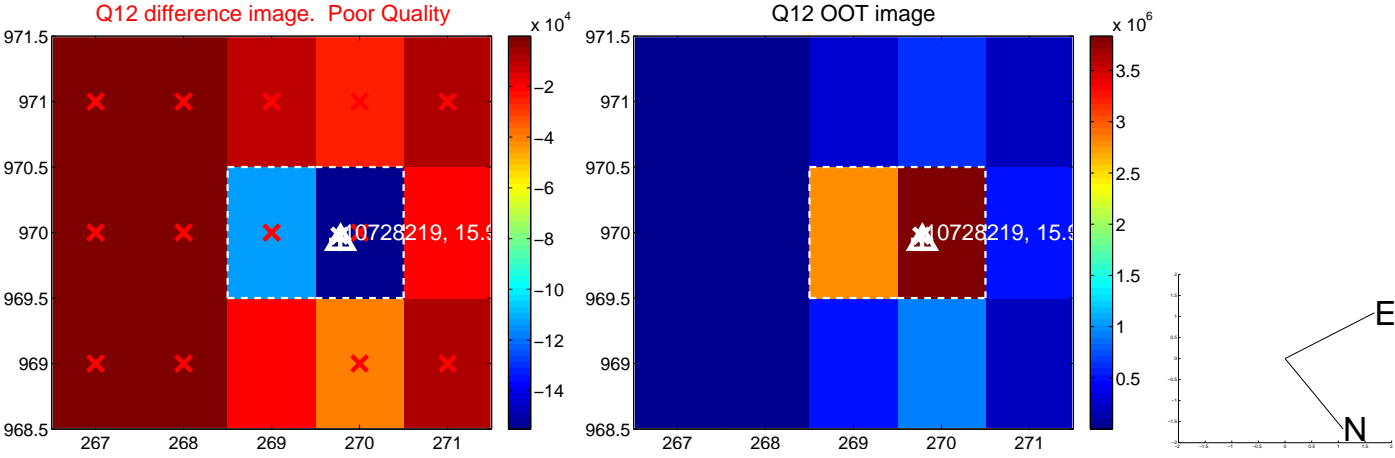
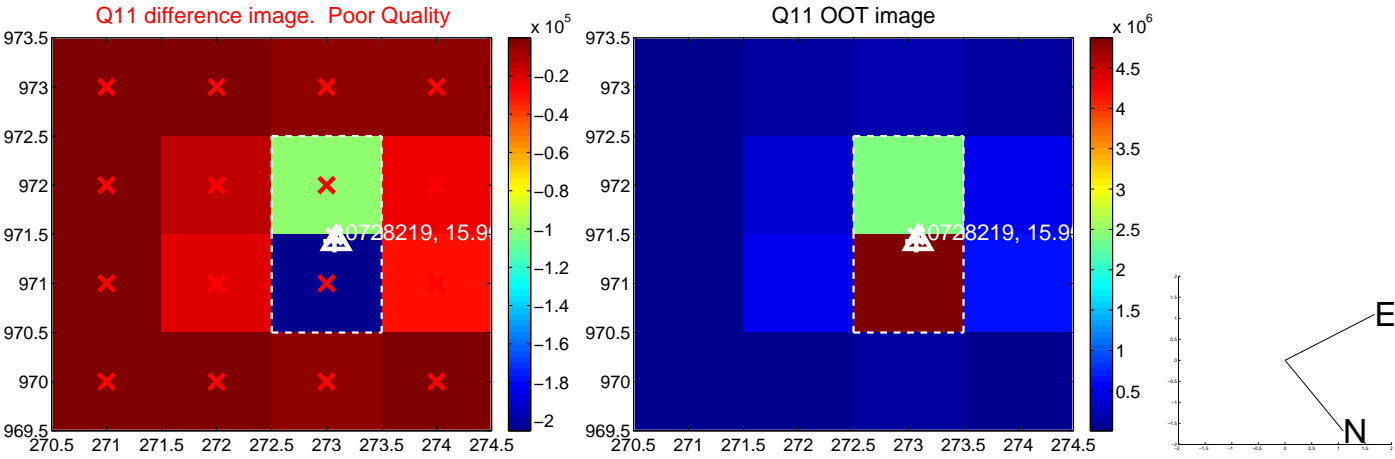
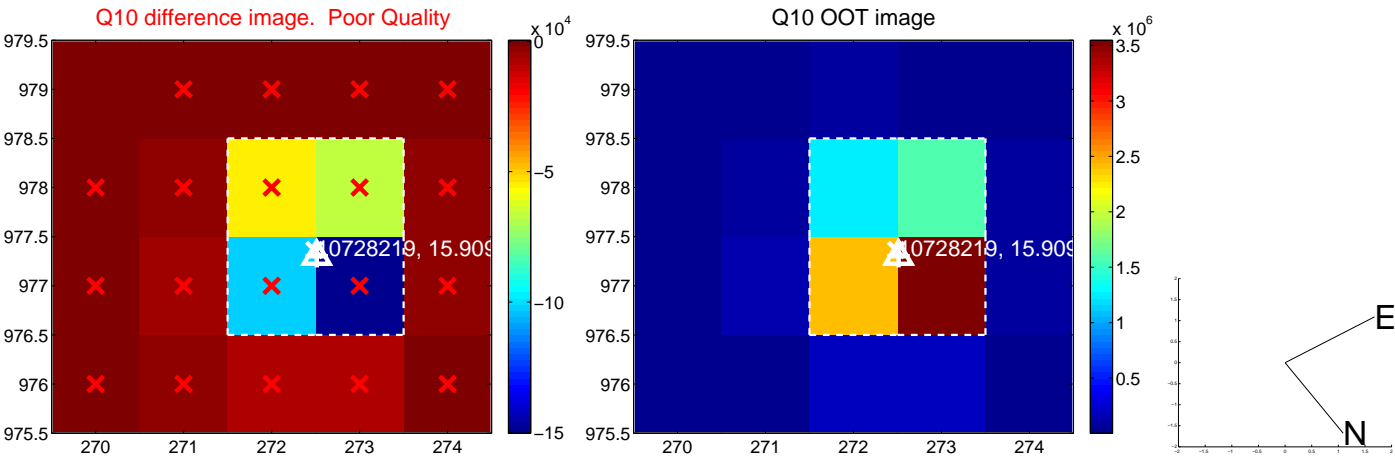
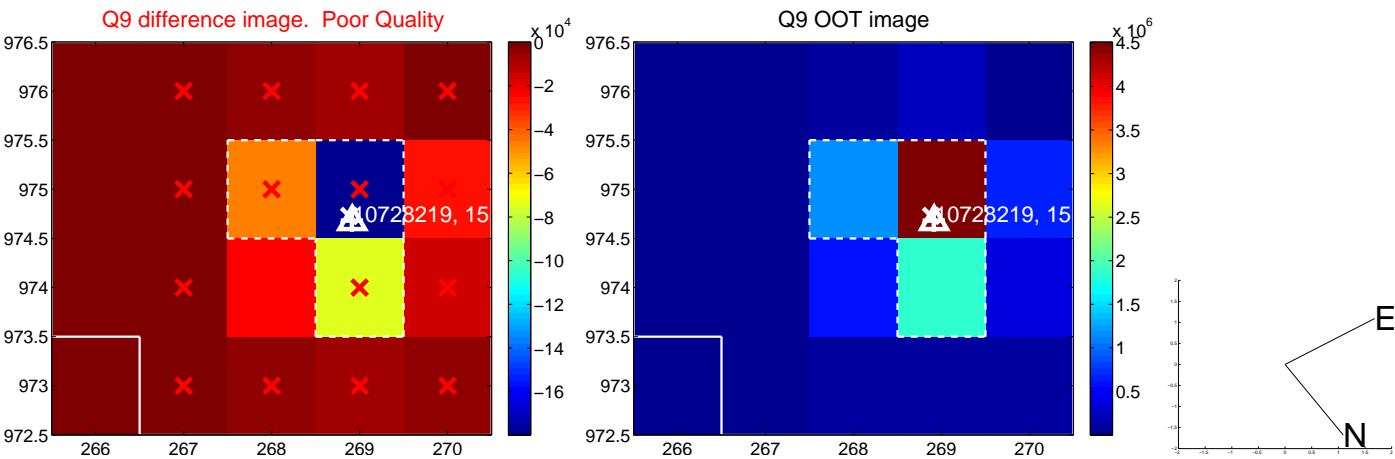


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



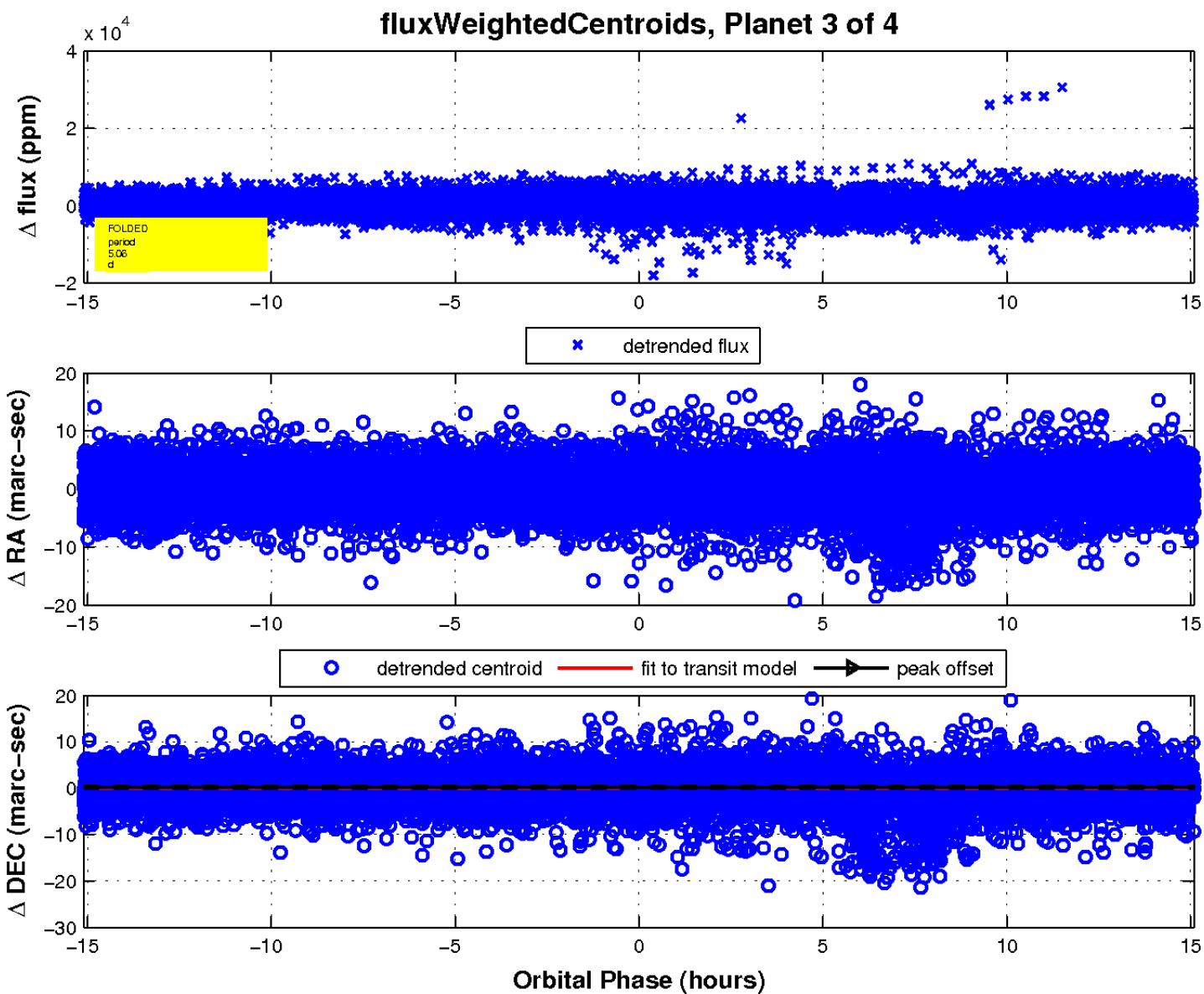
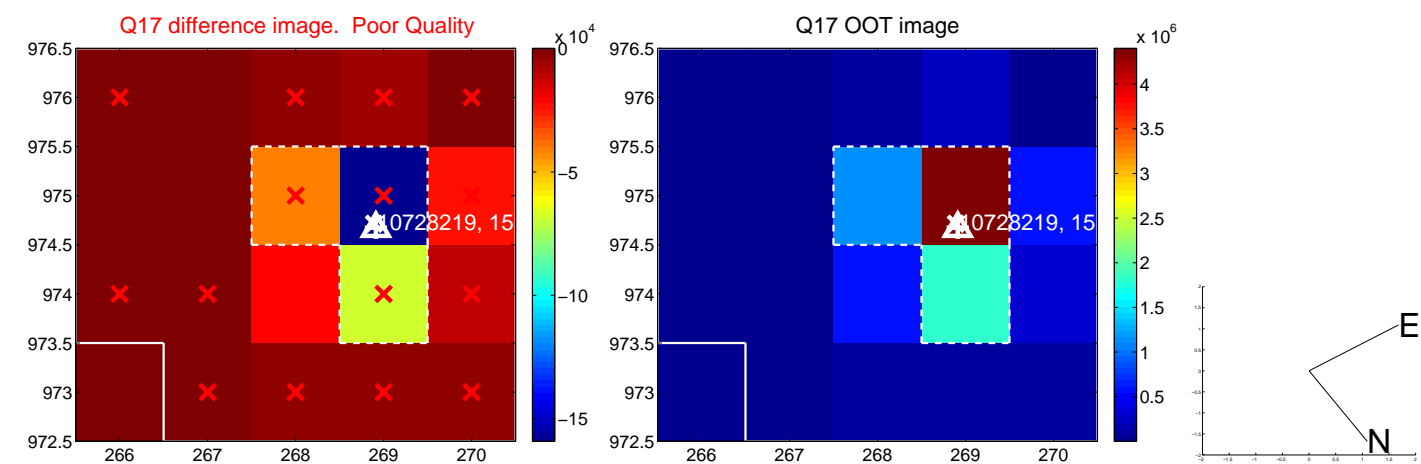


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



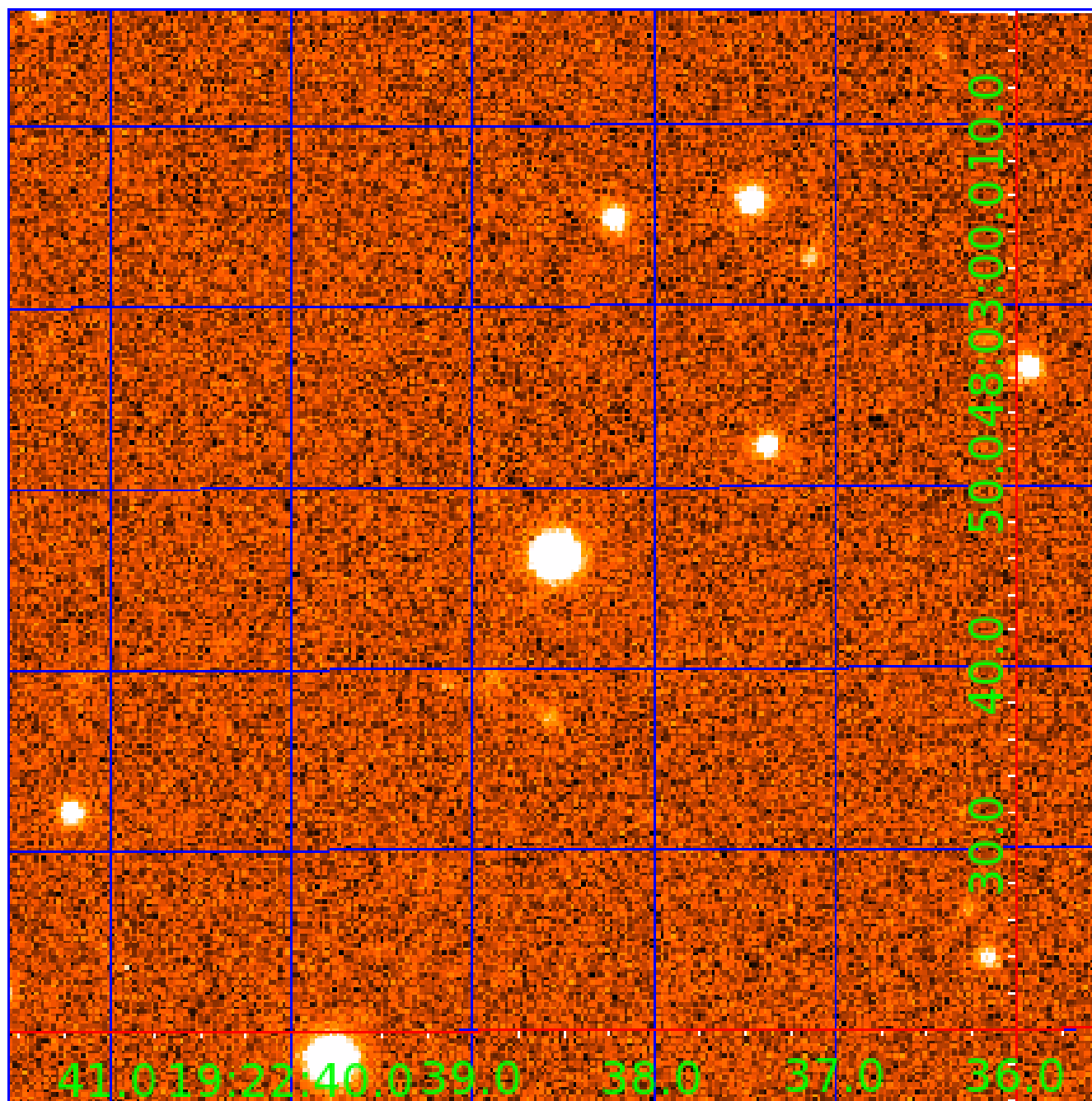


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 010728219

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010728219-01	OBS	6229.01	3.371796	134.872573	358840.8	2.000	10819.7	-1.0	0.91	5615	49.76	421.19
010728219-02	OBS	No	3.371799	133.190004	43403.1	3.471	1466.3	1361.8	0.91	5615	20.95	421.19
010728219-03	OBS	No	5.057671	134.630517	22823.9	15.000	963.5	-1.0	0.91	5615	13.62	245.29
010728219-04	OBS	No	1.123925	132.083134	5676.0	3.500	151.8	-1.0	0.91	5615	6.79	1822.38

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010728219-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_ALT—HAS_SEC_TCE—CENT_NOFITS
010728219-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE
010728219-03	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—CENT_NOFITS
010728219-04	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—SAME_NTL_PERIOD—CENT_NOFITS

**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 010728219-04

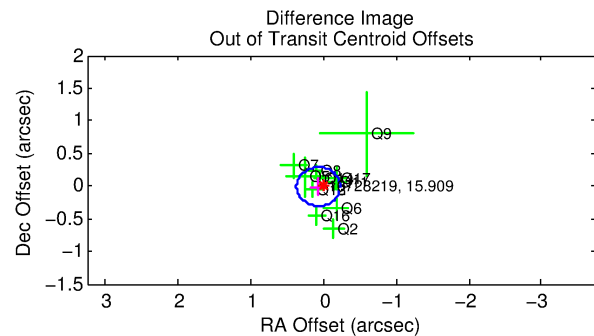
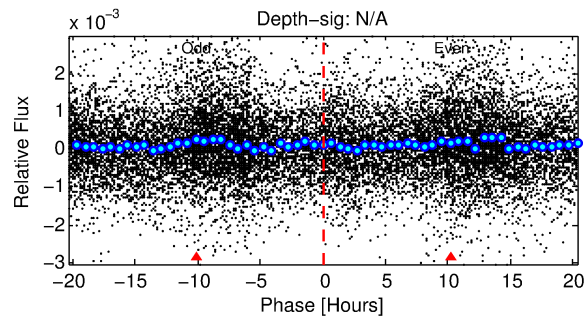
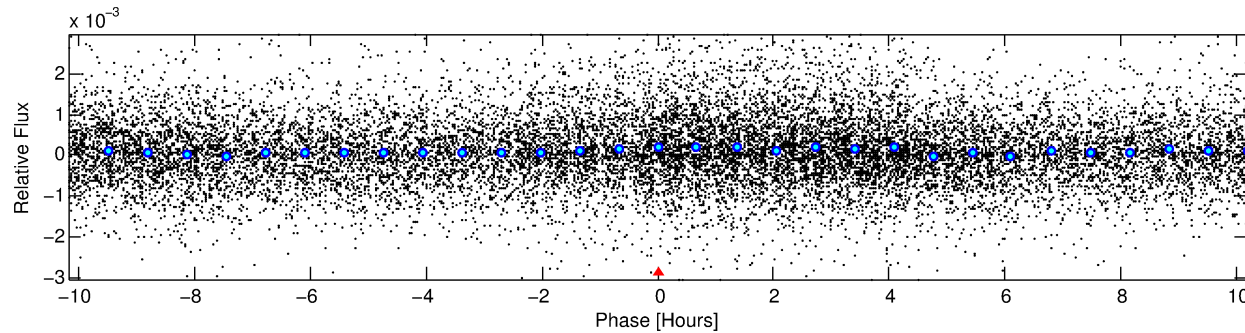
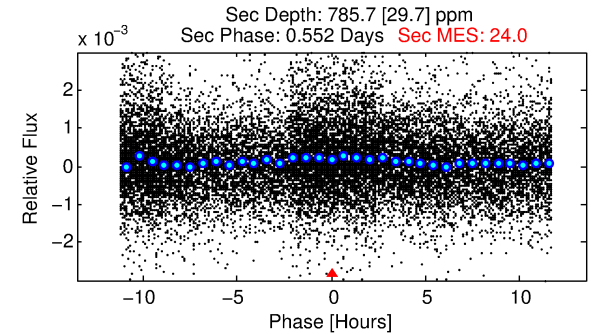
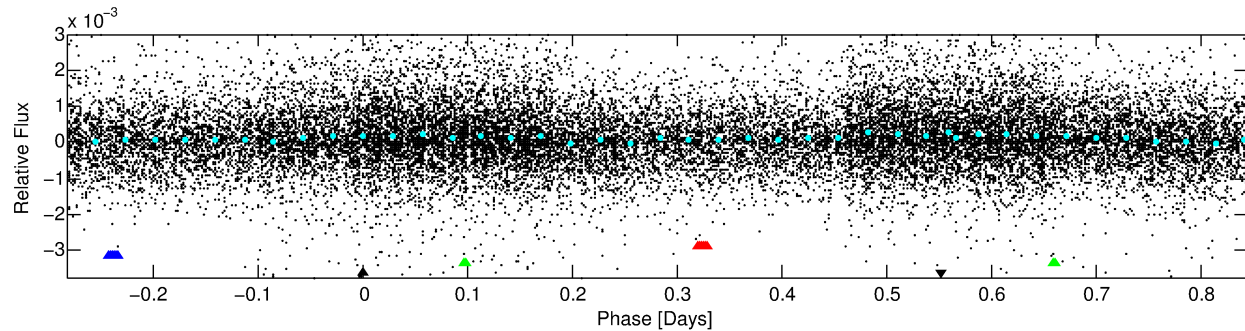
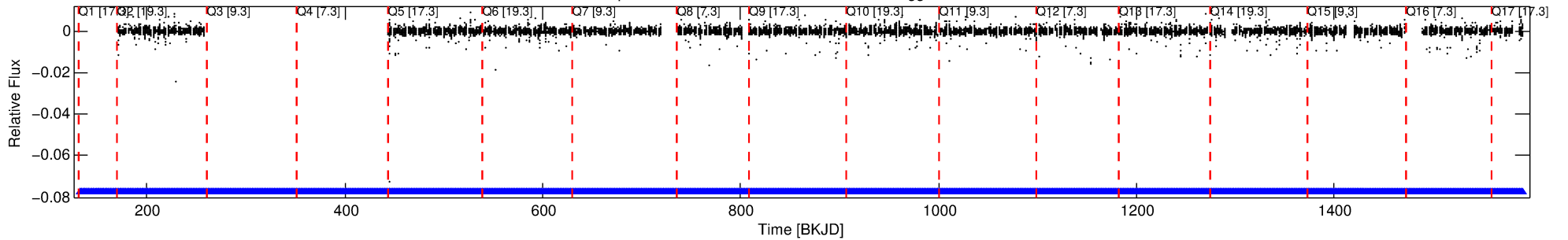
No Significant Match Found

# DV One-Page Summary

KIC: 10728219 Candidate: 4 of 4 Period: 1.124 d

KOI: K06229 Corr: No Ephemeris Match

Kp: 15.91 R\*: 0.91 Rs Teff: 5615.0 K Logg: 4.46 Fe/H: -0.160



## TPS TCE Results:

Period = 1.12392 d  
Epoch = 132.0831 BKJD

DV fit results are unavailable

## DV Diagnostic Results:

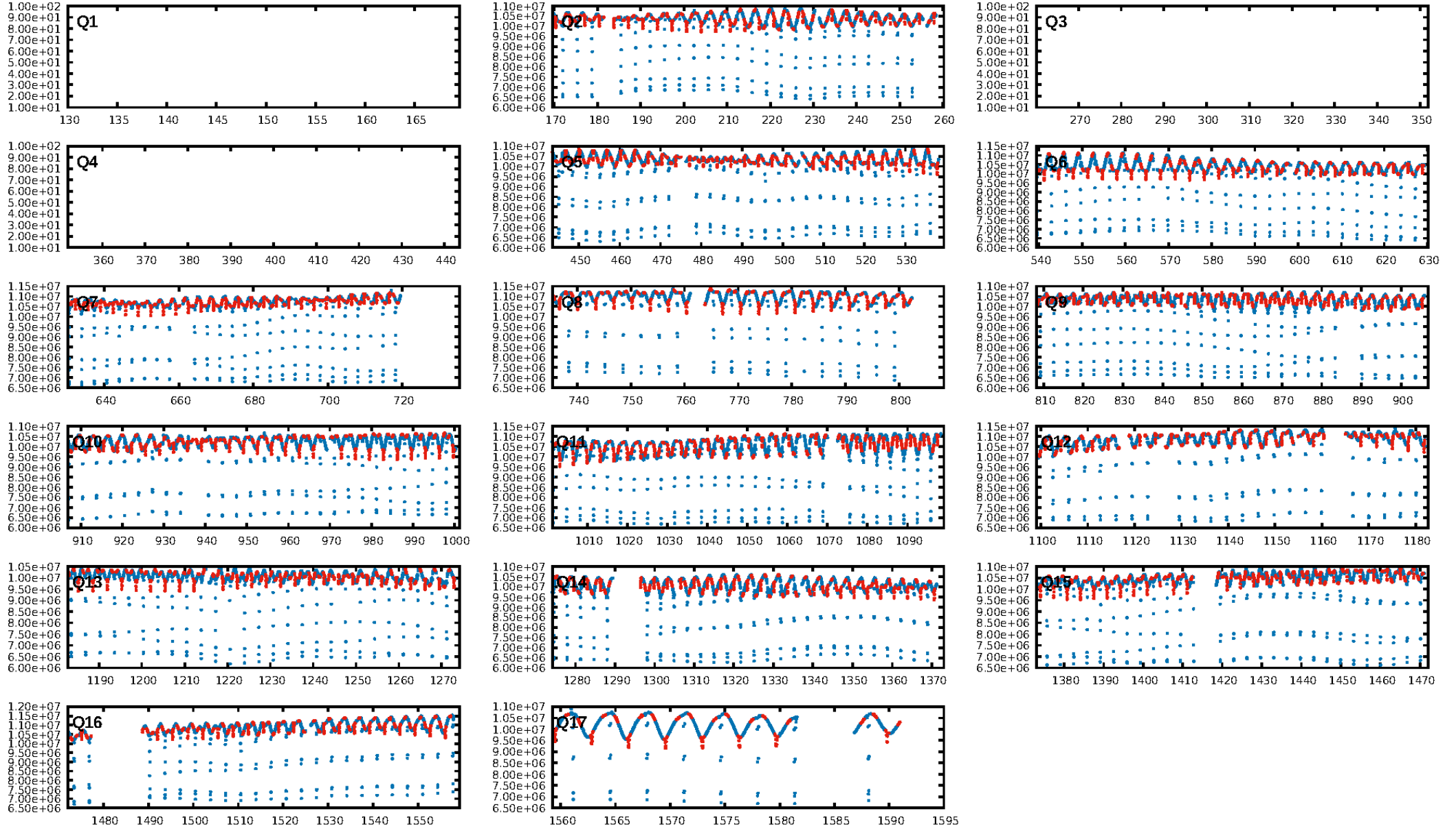
ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [13.38σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [663/663]  
GhostDiagnostic-chr: 1.949

Centroid-sig: N/A  
Centroid-so: 0.220 arcsec [0.09σ]  
OotOffset-rm: 0.071 arcsec [0.71σ]  
KicOffset-rm: 0.161 arcsec [1.36σ]  
OotOffset-st: 3/2/3/4 [12]  
KicOffset-st: 3/2/3/4 [12]  
DiffImageQuality-fgm: 0.42 [5/12]  
DiffImageOverlap-fno: 1.00 [14/14]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 07:49:59 Z

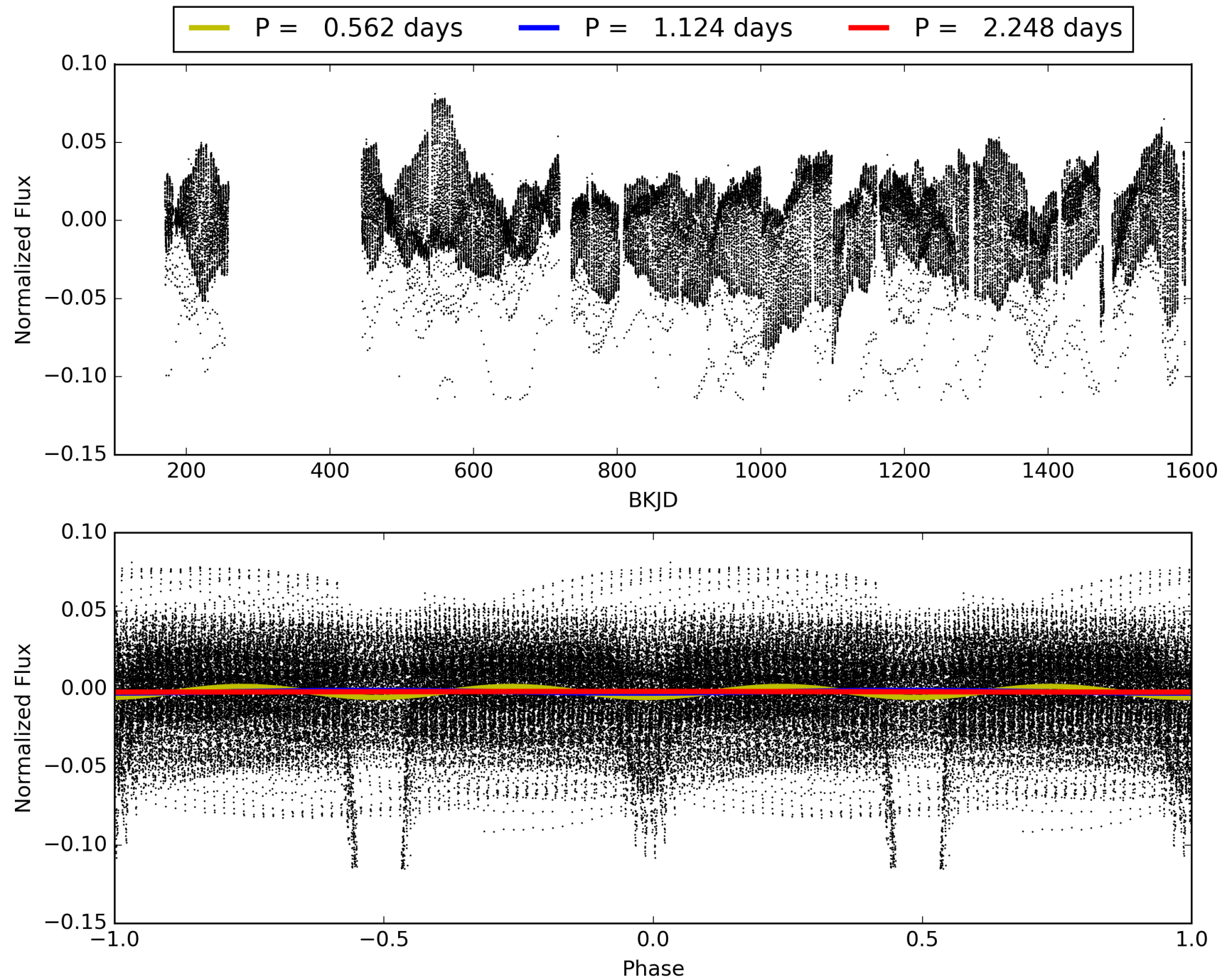
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 010728219-04, PDC Light Curves





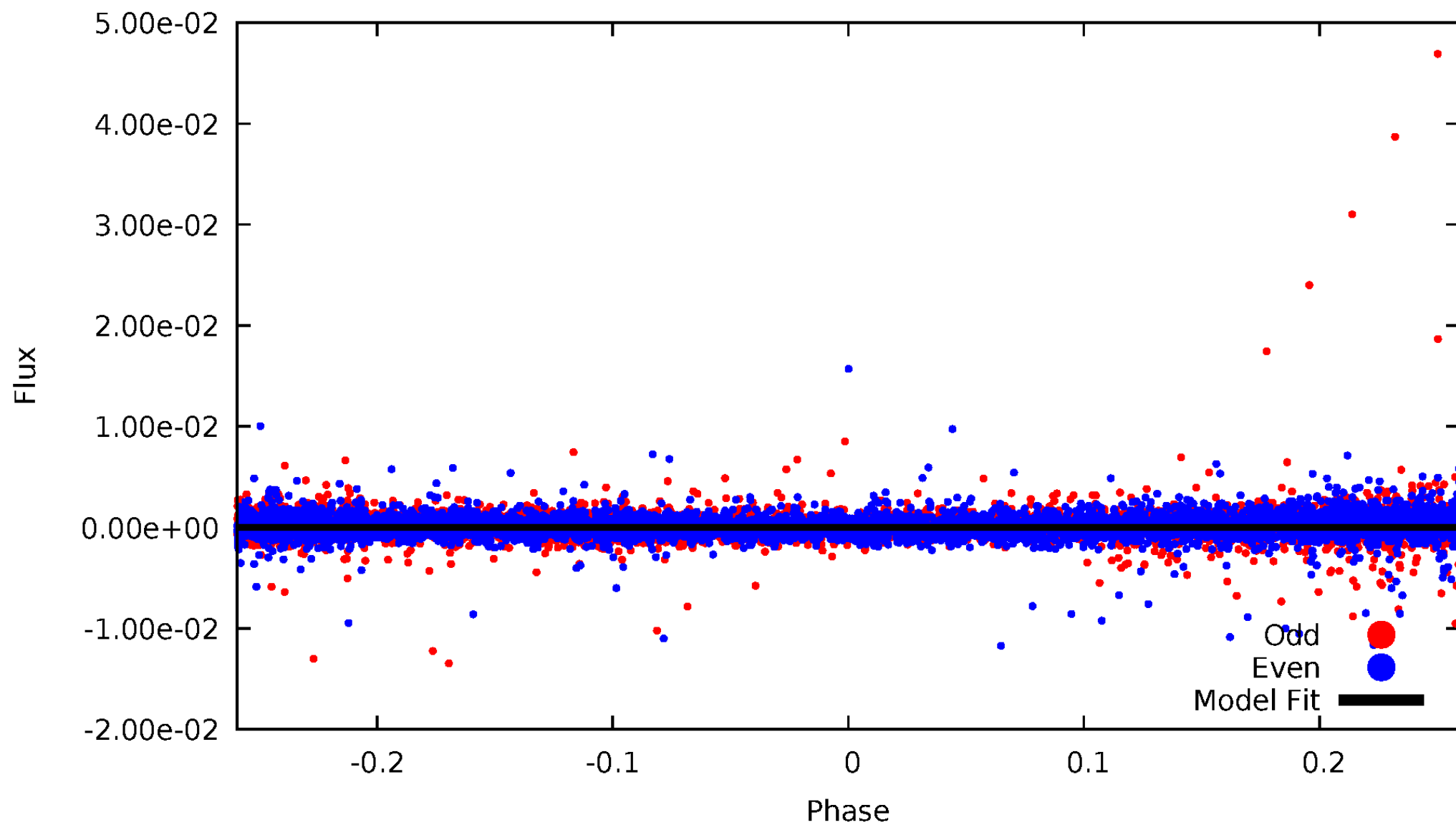
TCE 010728219-04





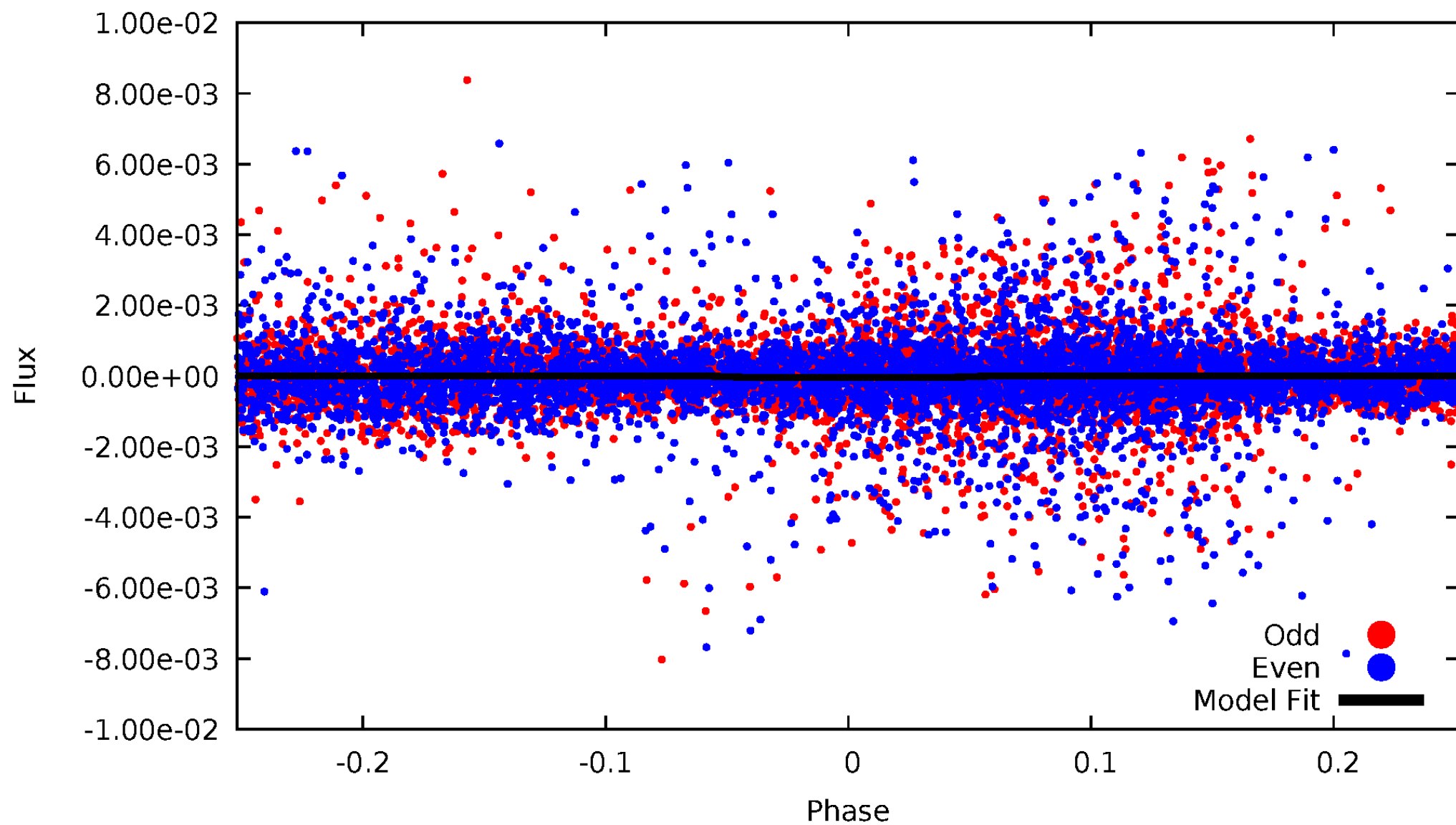
# DV Odd/Even

TCE 010728219-04



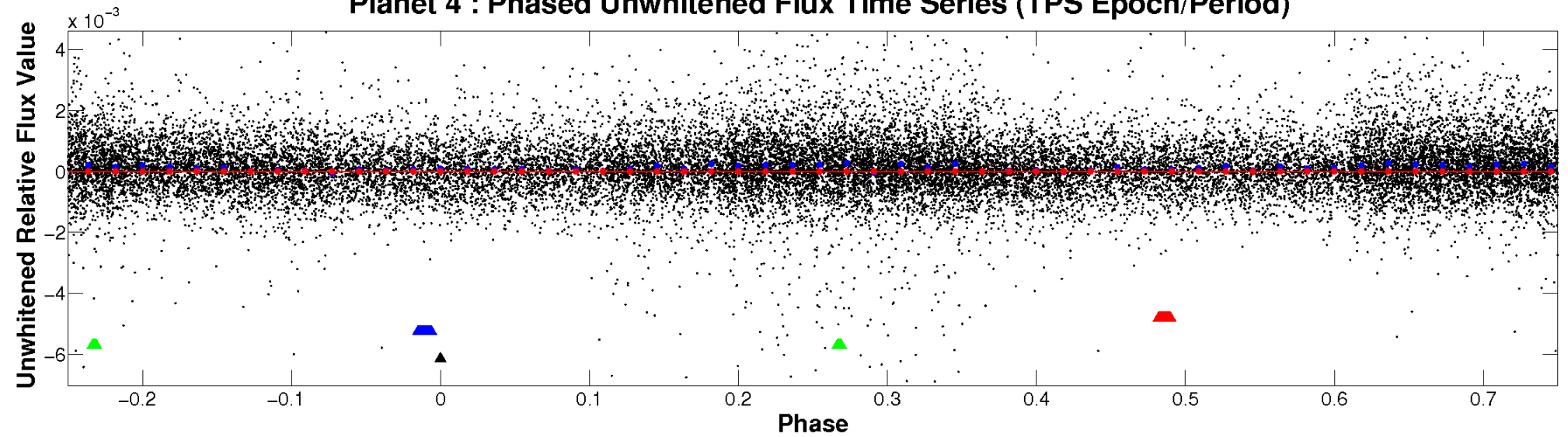
# ALT Odd/Even

TCE 010728219-04

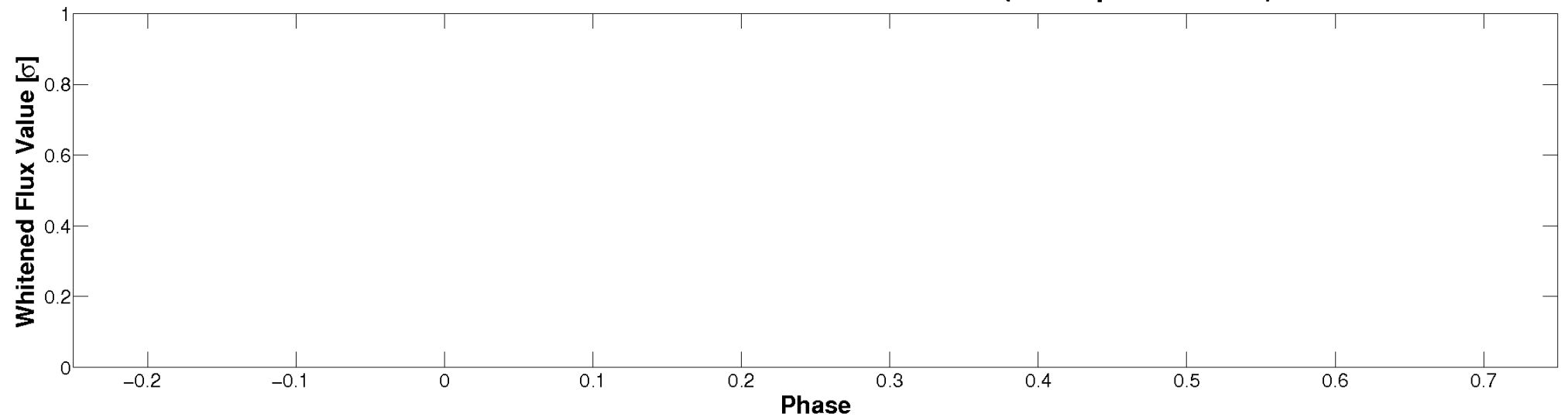


# Non-Whitened Vs. Whitened Light Curve

**Planet 4 : Phased Unwhitened Flux Time Series (TPS Epoch/Period)**

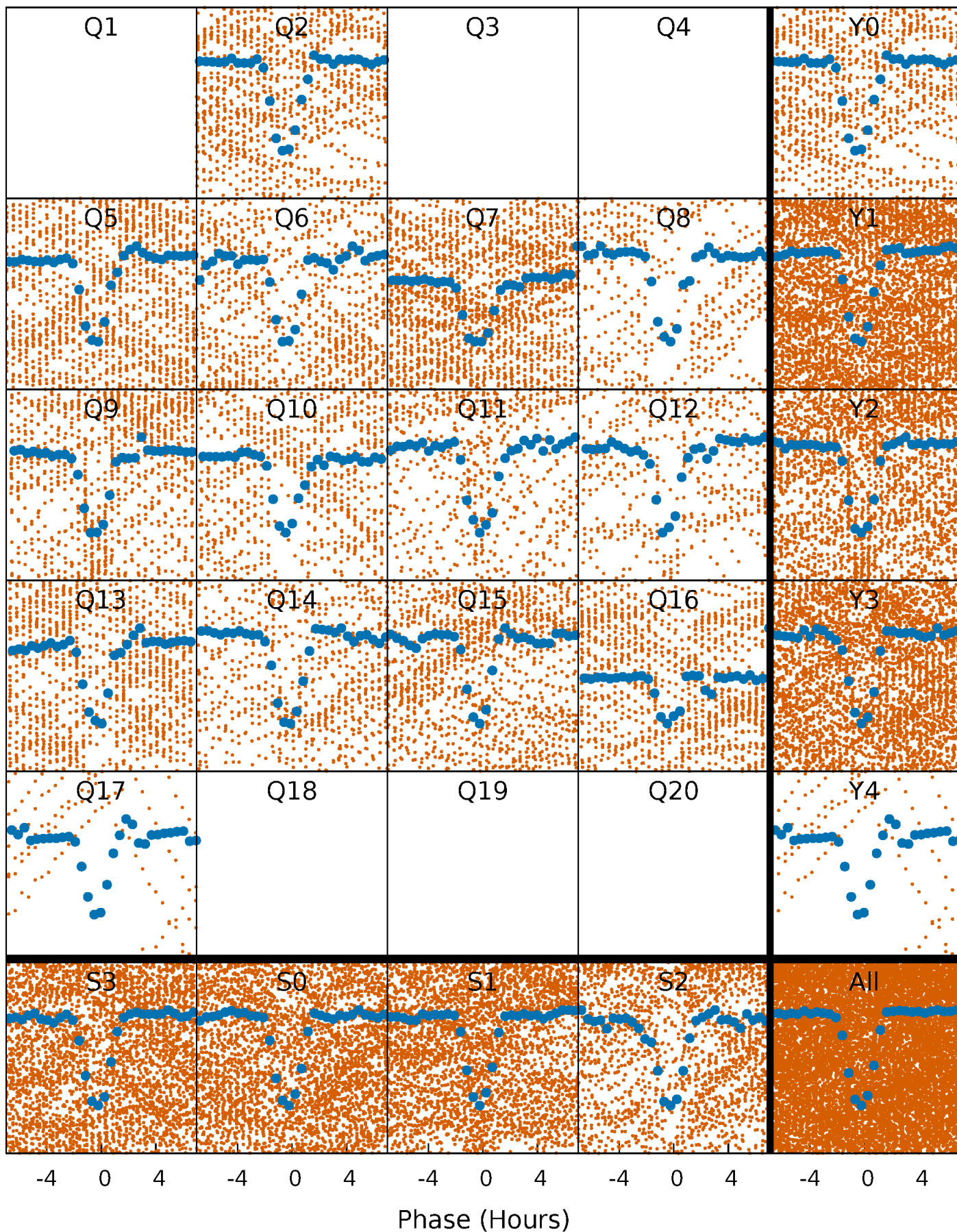


**Planet 4 : Phased Whitened Flux Time Series (TPS Epoch/Period)**



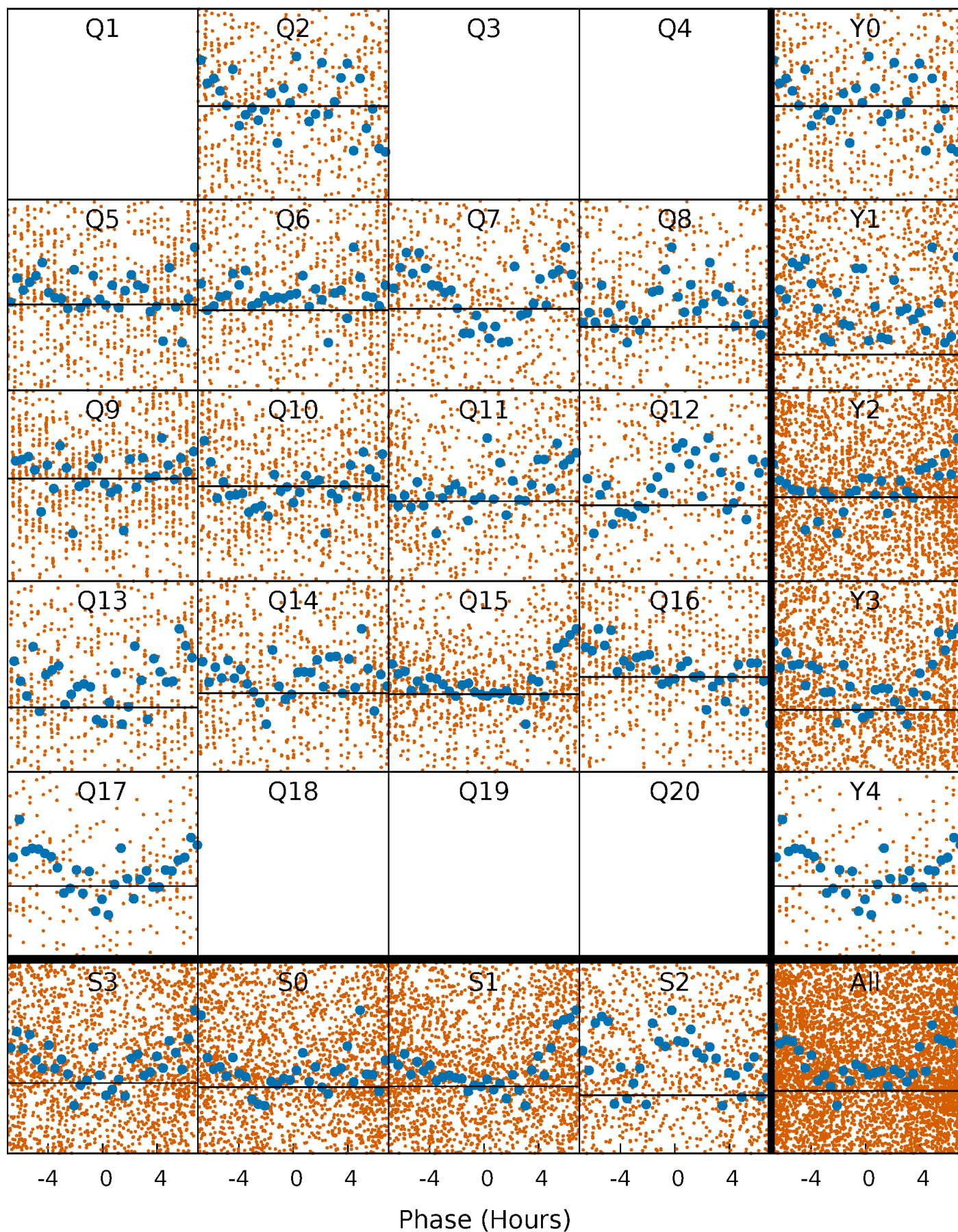
# PDC Quarter-Phased Transit Curves

TCE 010728219-04 P= 1.123925 Days  $T_0=132.083134$  (BKJD)



# DV Quarter-Phased Transit Curves

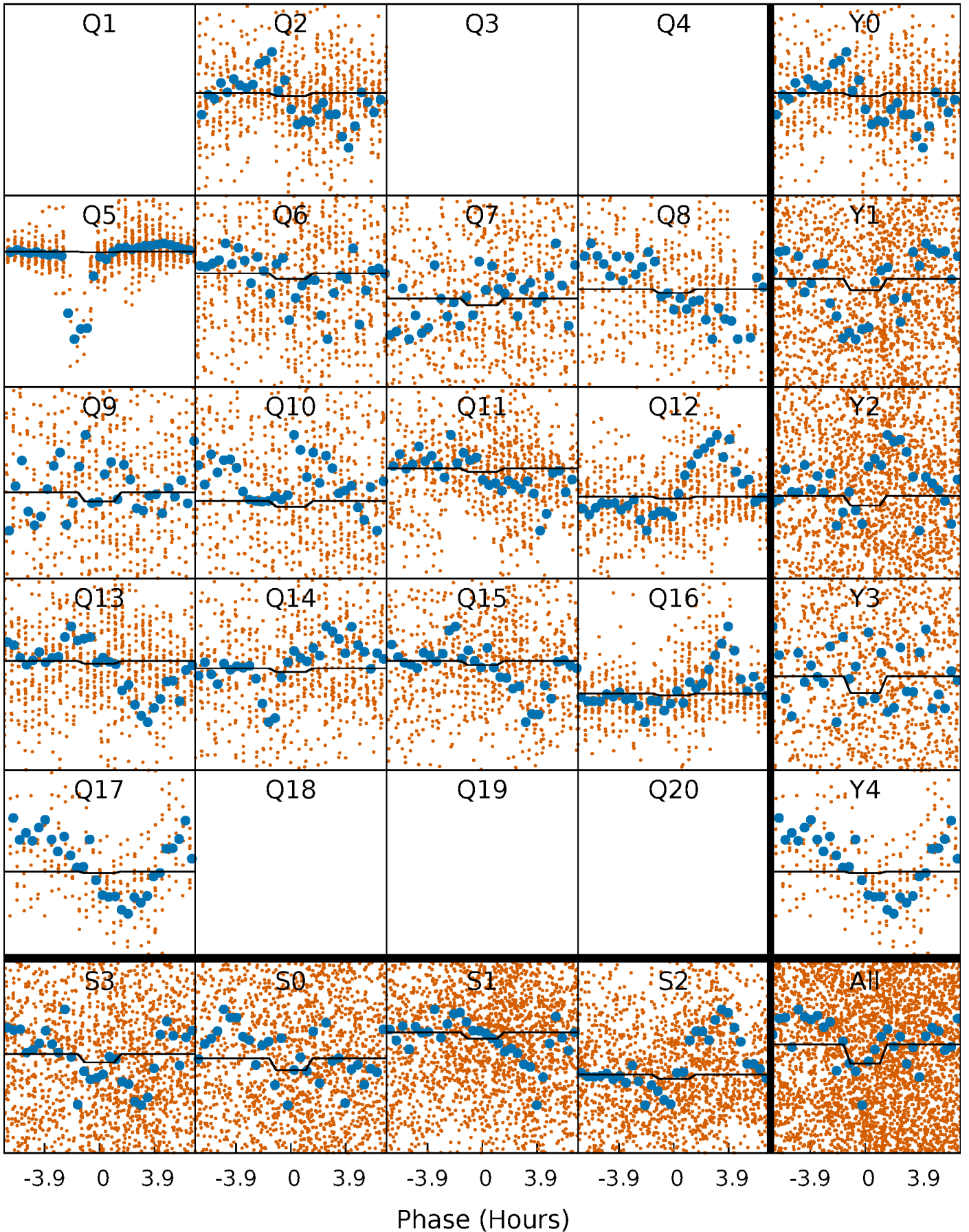
TCE 010728219-04     $P = 1.123925$  Days     $T_0 = 132.083134$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

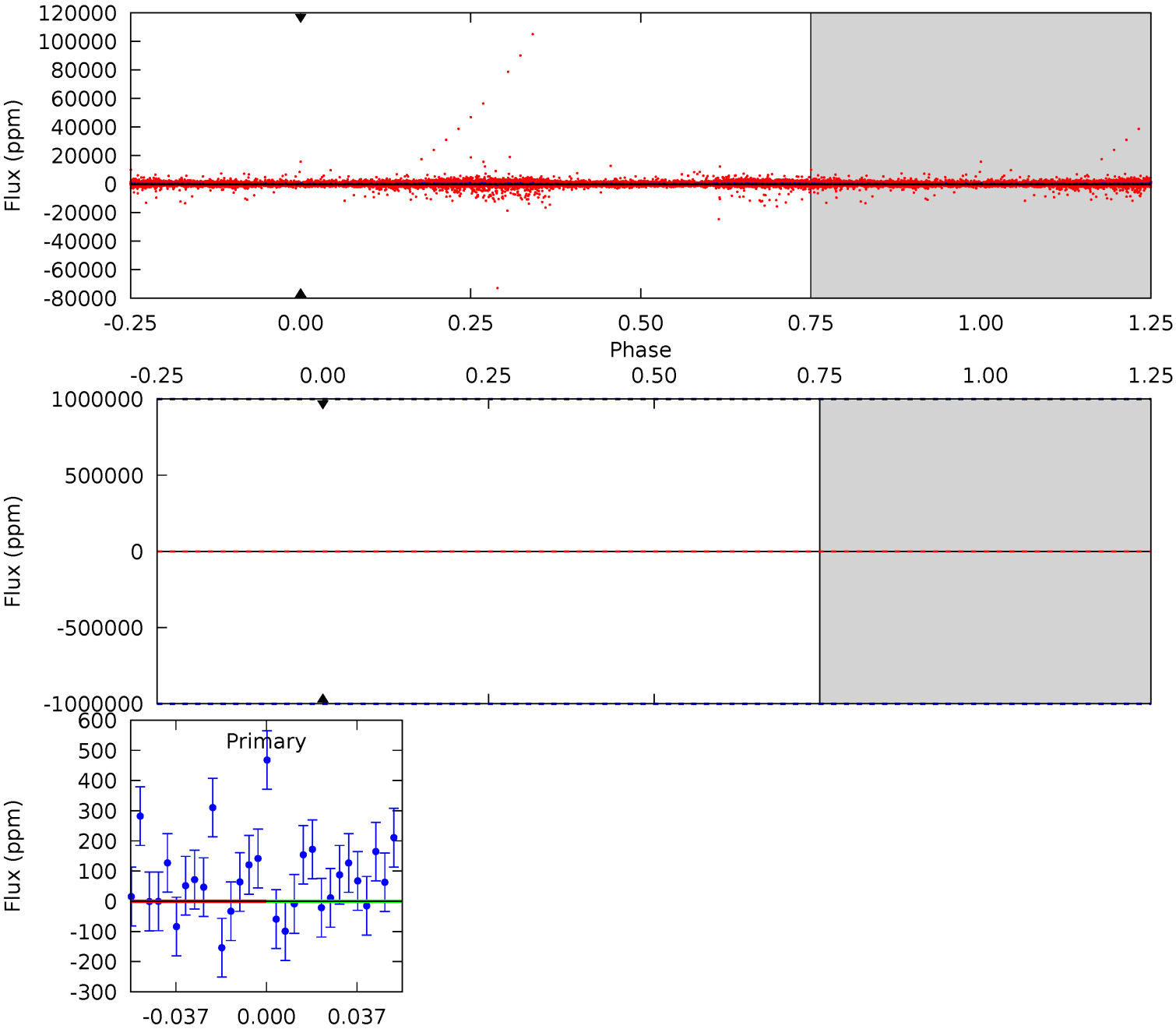
TCE 010728219-04     $P = 1.123925$  Days     $T_0 = 132.309305$  (BKJD)



# DV Model-Shift Uniqueness Test

010728219-04, P = 1.123925 Days, E = 132.083134 Days

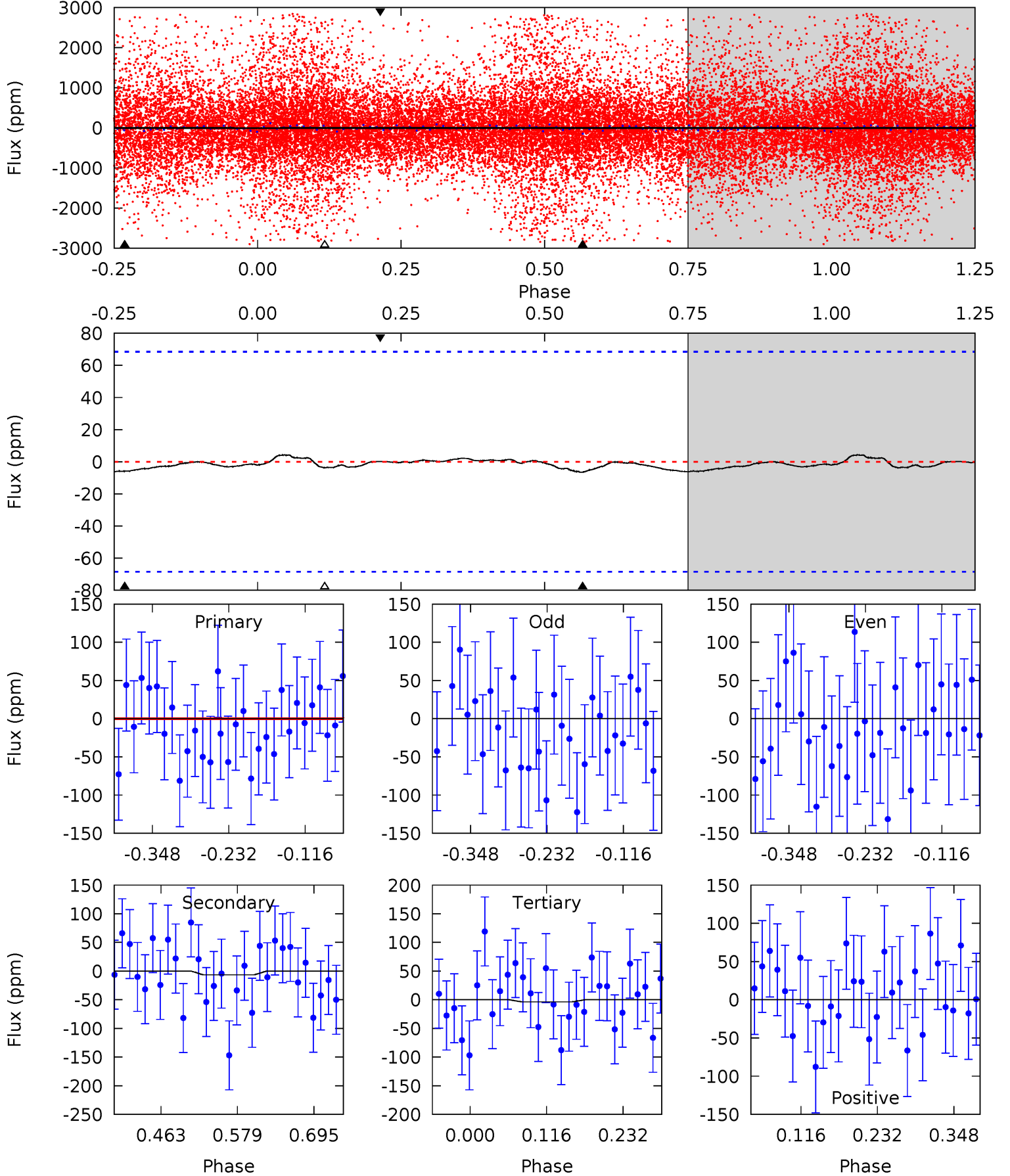
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



# Alt Model-Shift Uniqueness Test

010728219-04, P = 1.123925 Days, E = 132.309305 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
0.39	0.43	0.25	0.01	4.53	1.57	0.14	0.14	0.38	0.19	0.42	0.46	8.49	0.39	0.78





### Stellar Parameters For KIC 010728219

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5615^{+169}_{-152}$	$4.455^{+0.094}_{-0.175}$	$-0.160^{+0.300}_{-0.300}$	$0.912^{+0.224}_{-0.121}$	$0.865^{+0.114}_{-0.076}$	$1.608^{+0.765}_{-0.747}$
	+3%/-3%	+2%/-4%	+188%/-188%	+25%/-13%	+13%/-9%	+48%/-46%
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 010728219-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$0 \pm 1000000$	$10.02^{+8.84}_{-6.54}$	$2346^{+153}_{-116}$	$-3727^{+18026}_{-11689}$	$-2.324^{+371.942}_{-426.549}$
Alt.	$-7 \pm 15$	$7.56^{+7.56}_{-5.51}$	$2361^{+137}_{-132}$	$-2674^{+4396}_{-146}$	$0.014^{+0.292}_{-0.050}$

$T_{max}$  = 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

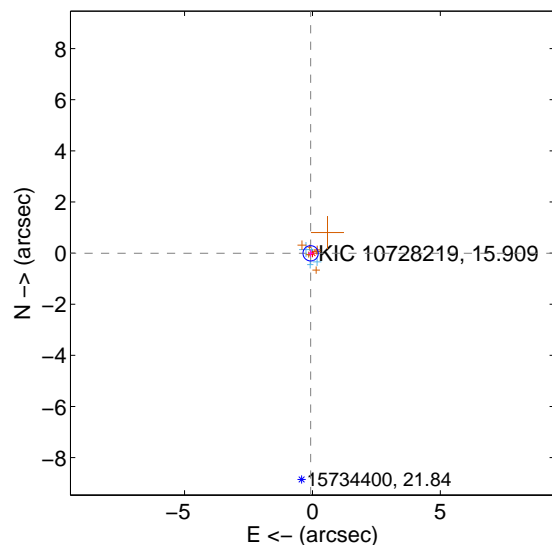
Supplemental centroid analysis for 010728219-04. Kepler magnitude: 15.91. Transit SNR -1.00

There are 5 quarters with good PRF difference image offsets

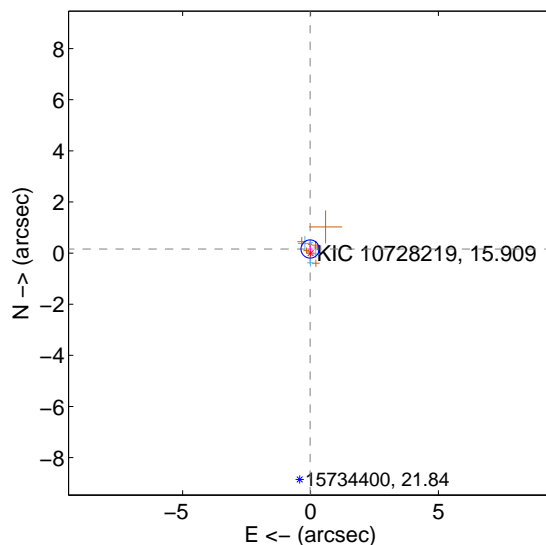
The direct PRF centroid is offset from the target star catalog position by about 0.18 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.071 \pm 0.100$	0.71	$0.071 \pm 0.097$	$-0.009 \pm 0.128$
PRF-fit source offset from KIC position	$0.161 \pm 0.119$	1.36	$0.017 \pm 0.096$	$0.160 \pm 0.120$
photometric centroid source offset	$0.22 \pm 2.56$	0.09	$0.02 \pm 2.62$	$-0.22 \pm 2.56$

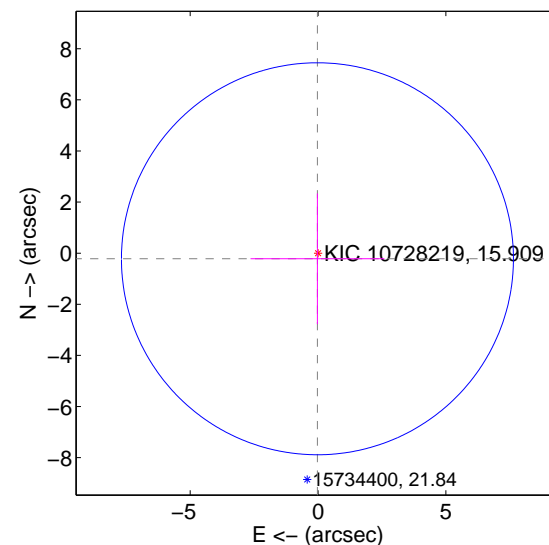
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

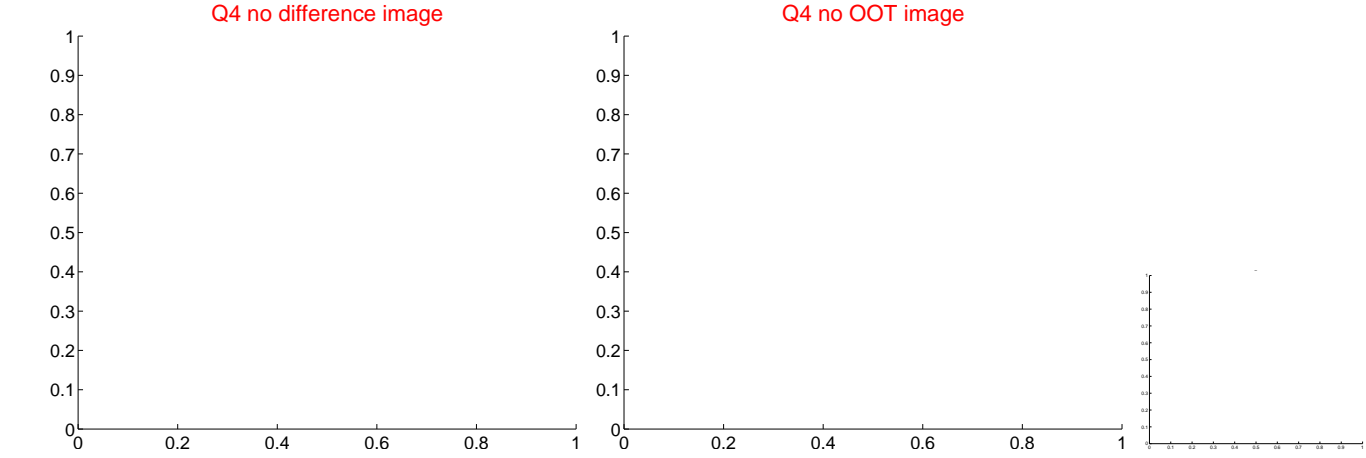
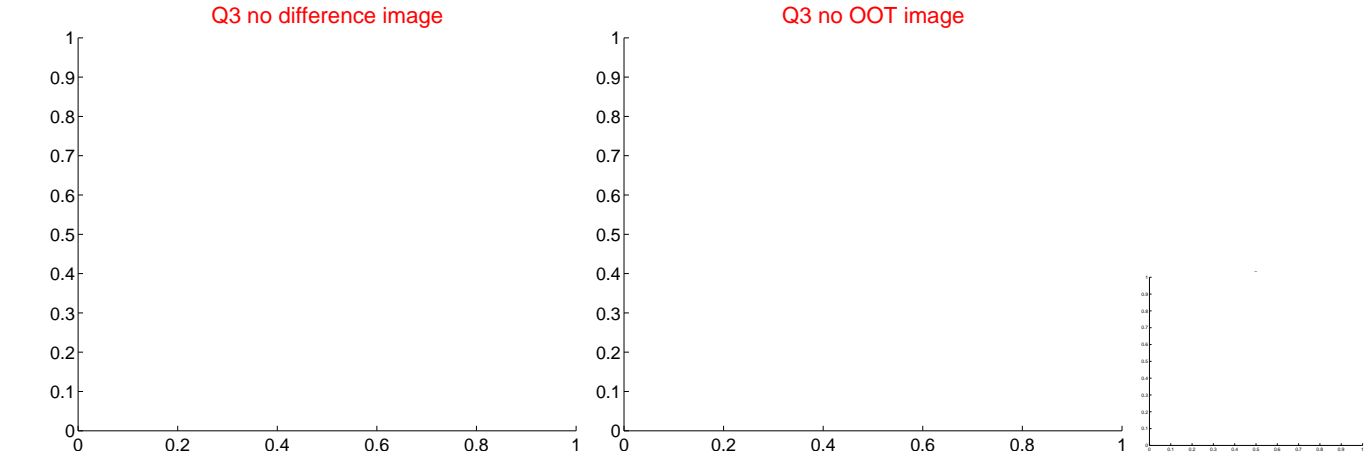
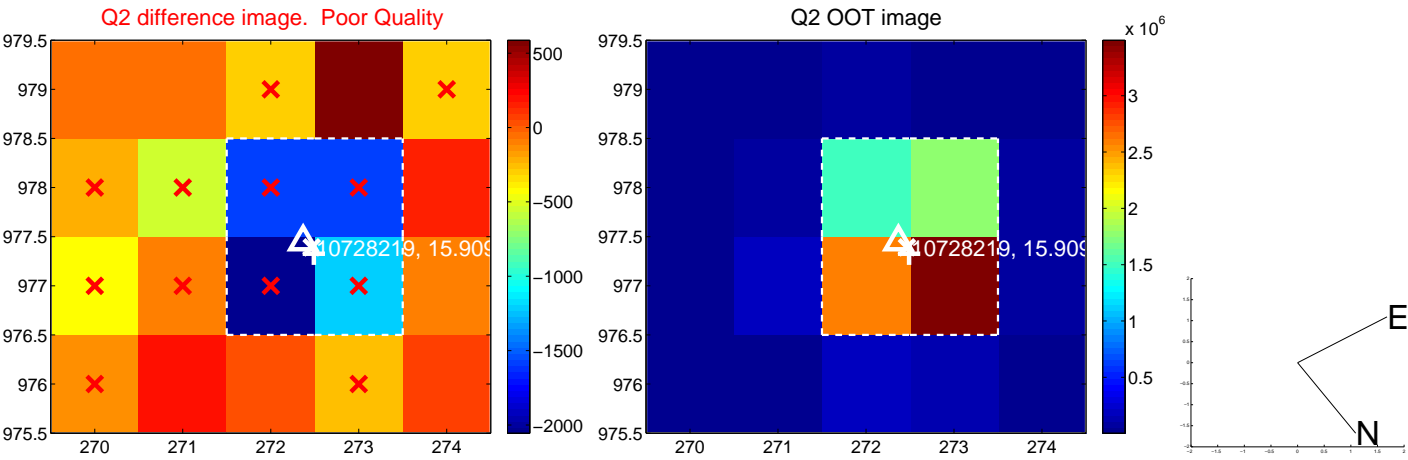
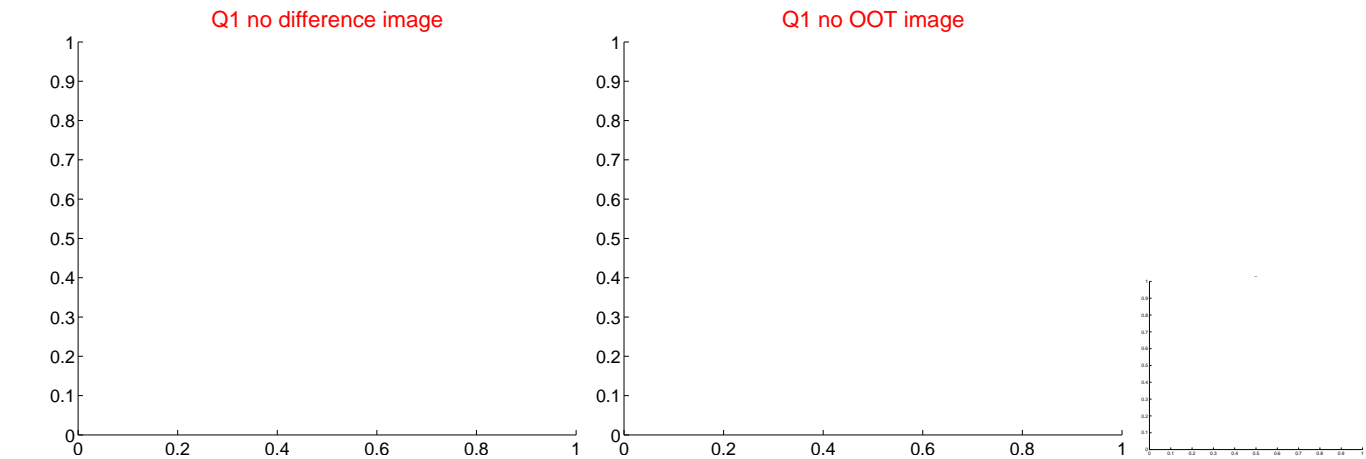


offset from photometric centroids

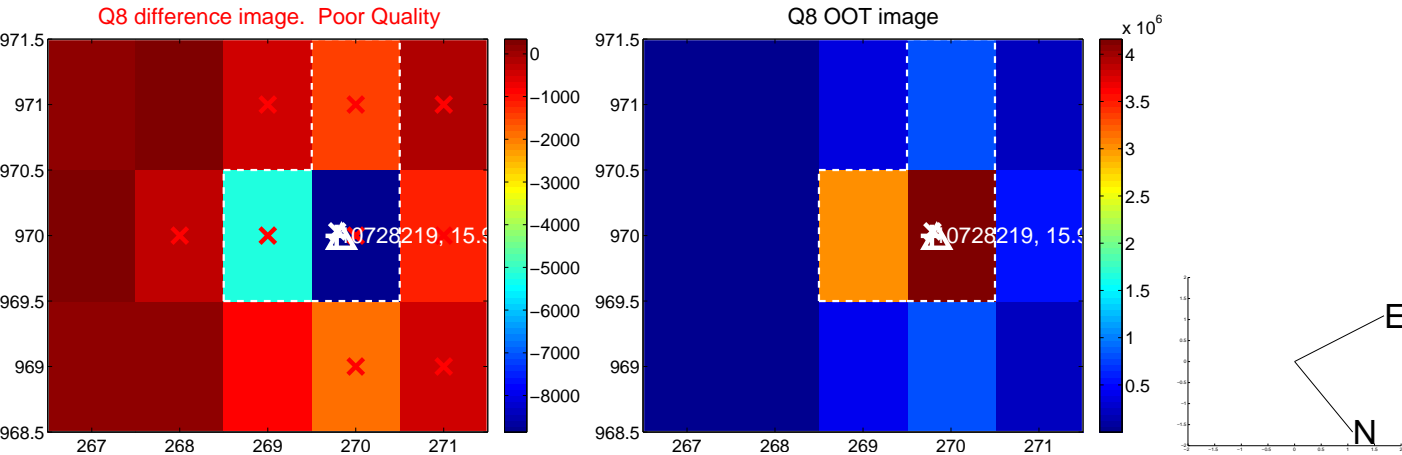
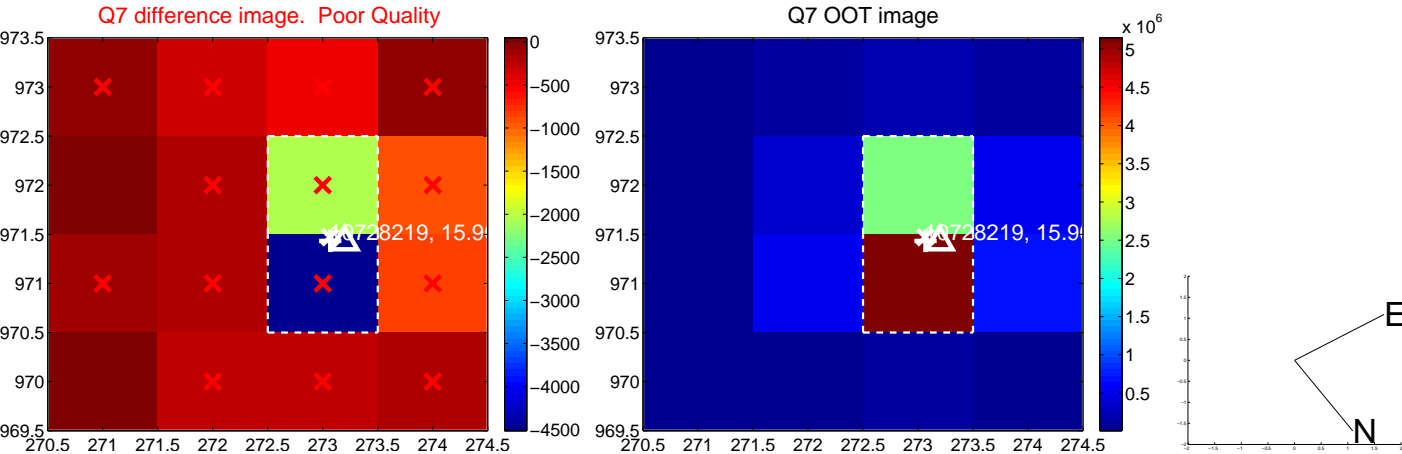
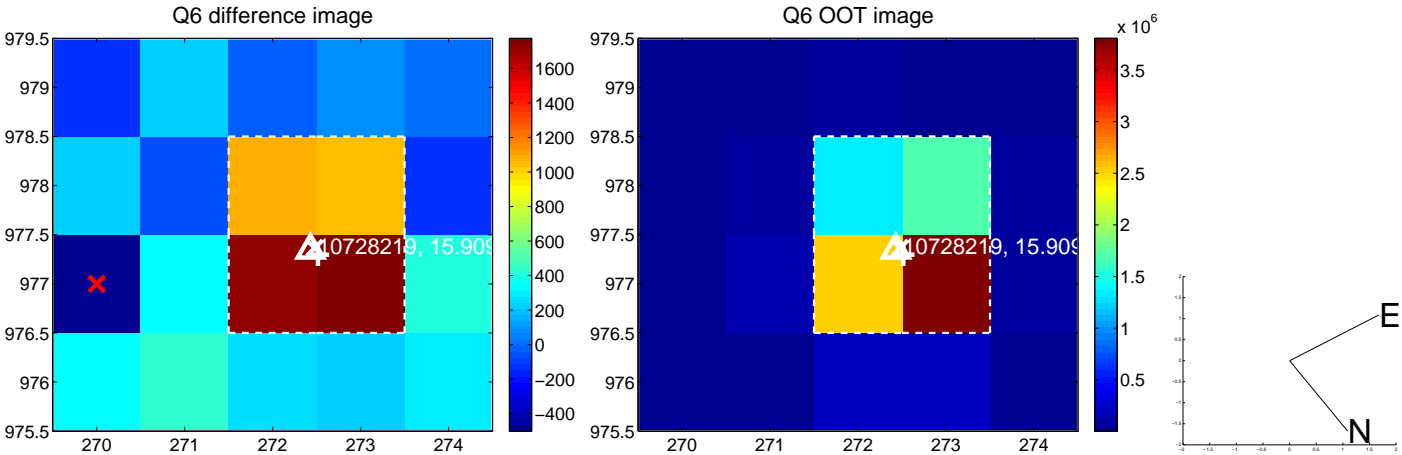
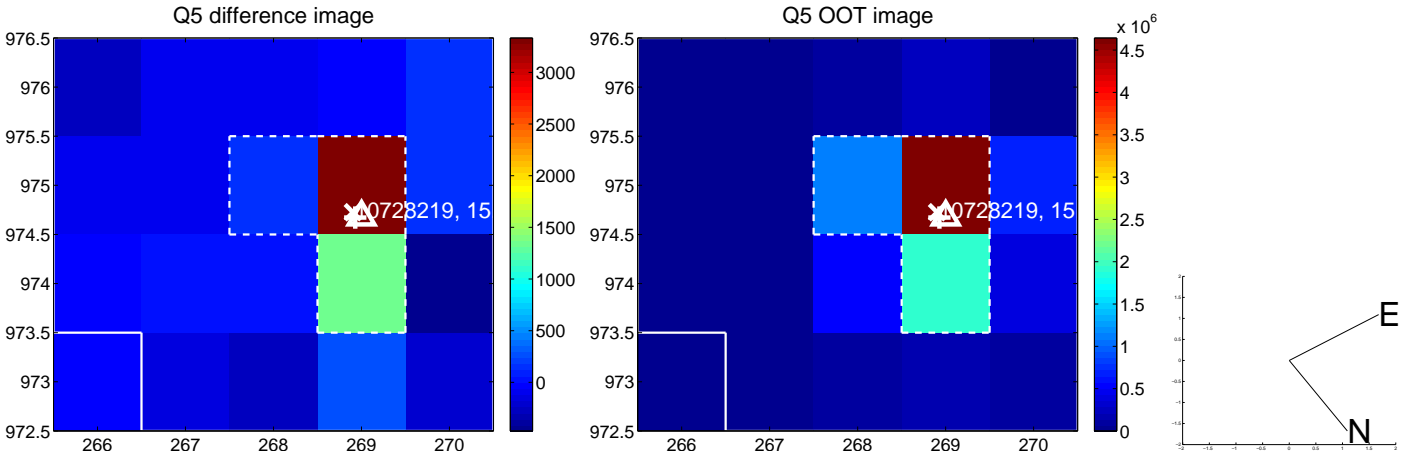


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

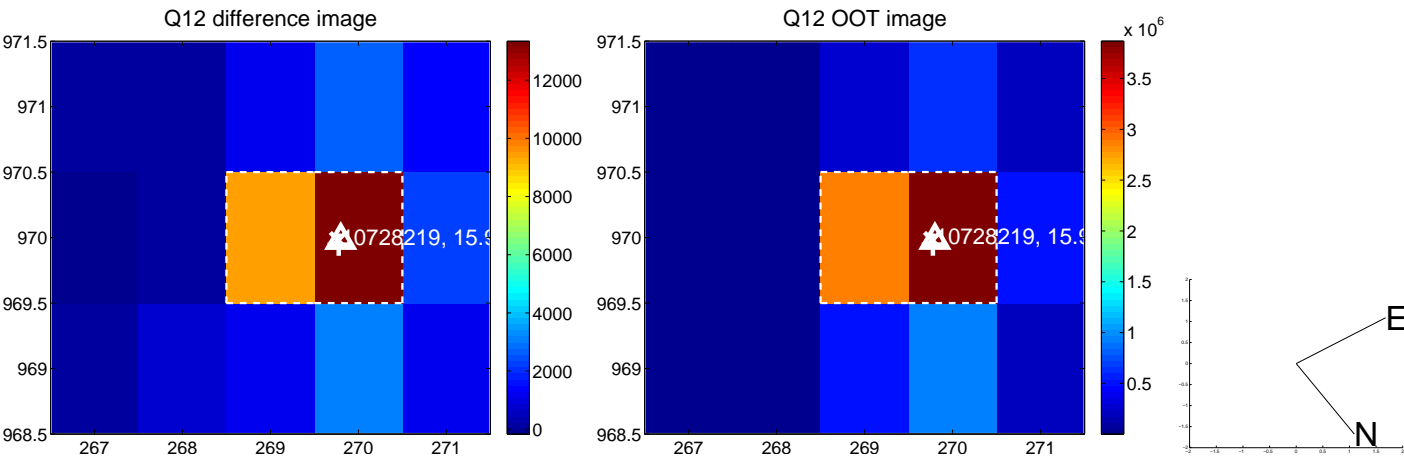
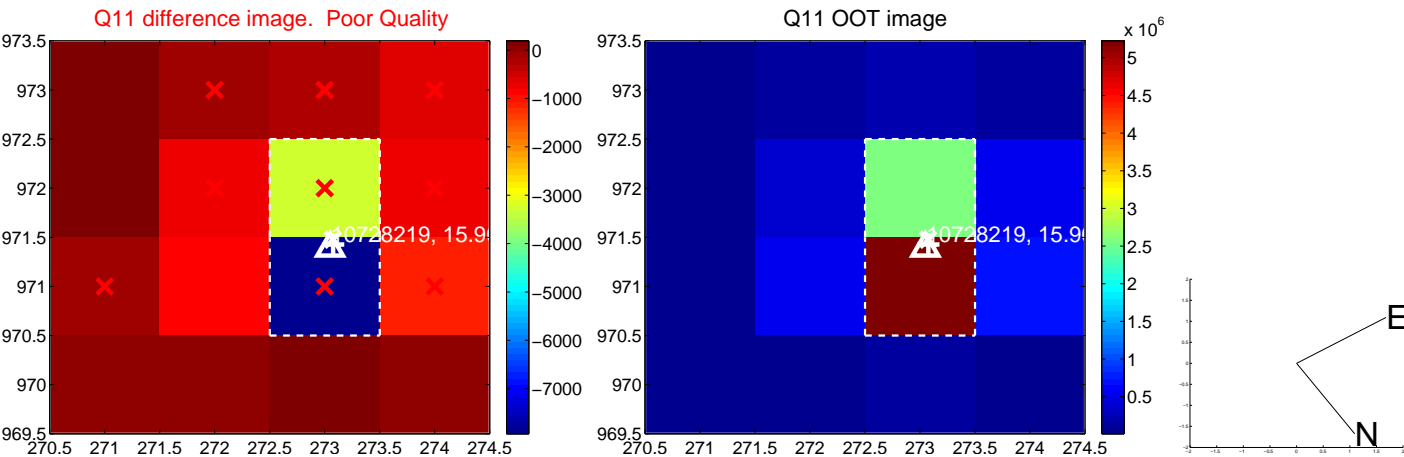
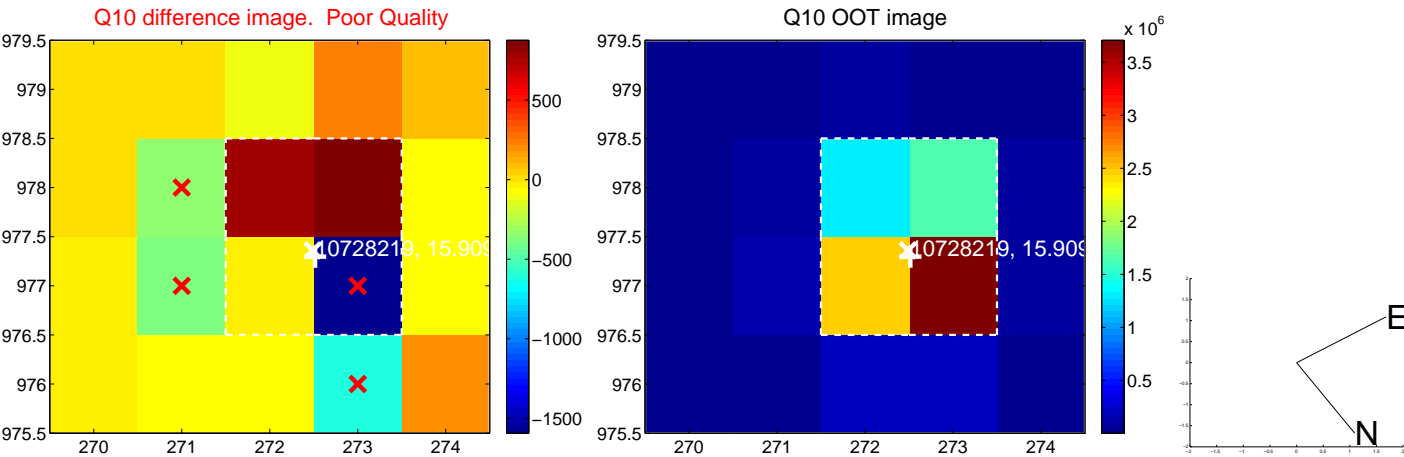
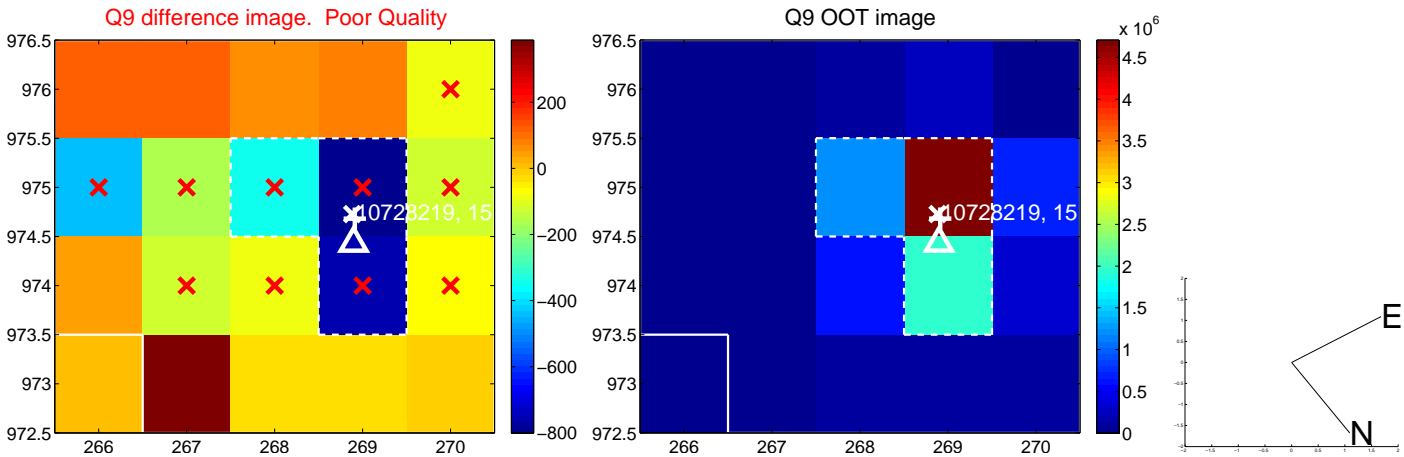
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



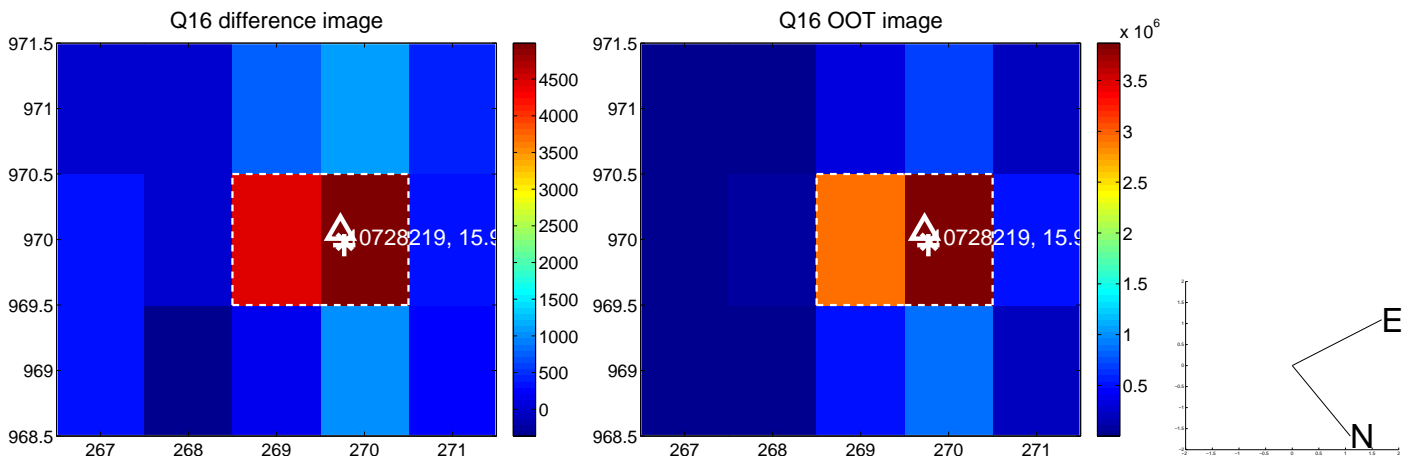
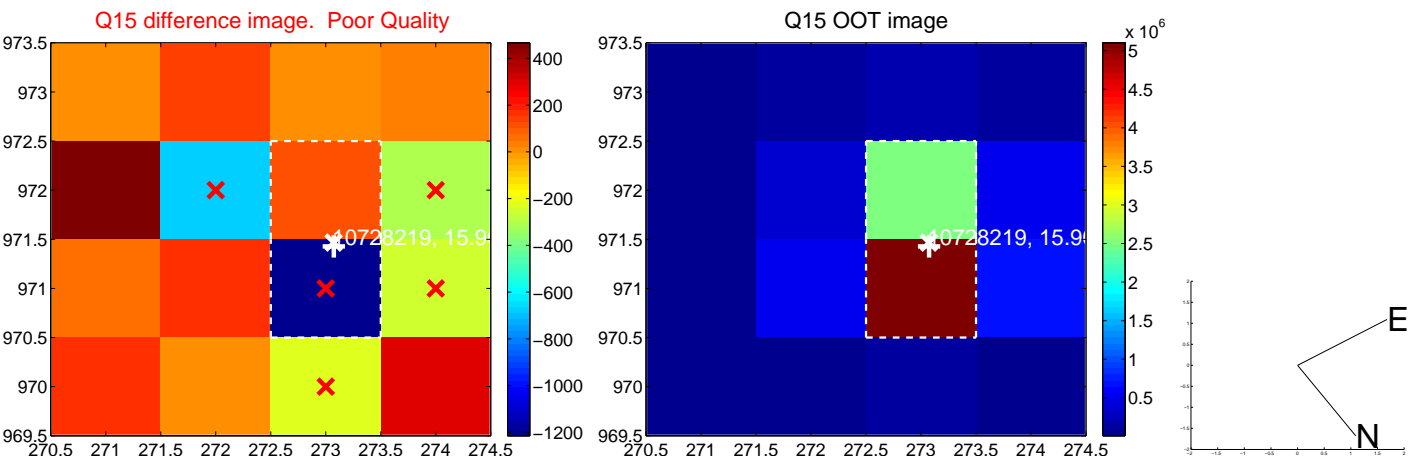
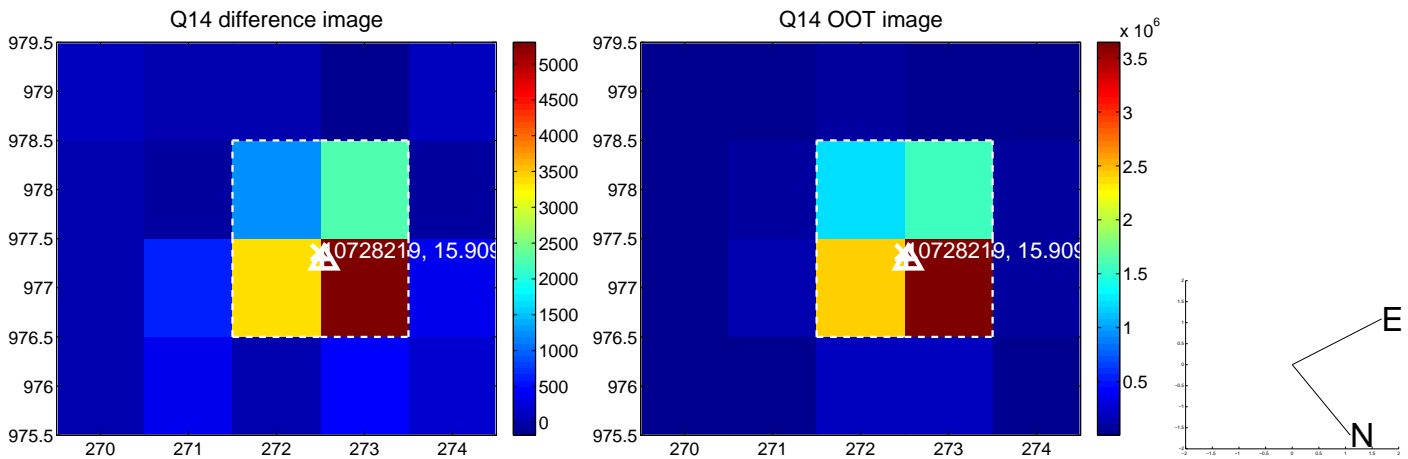
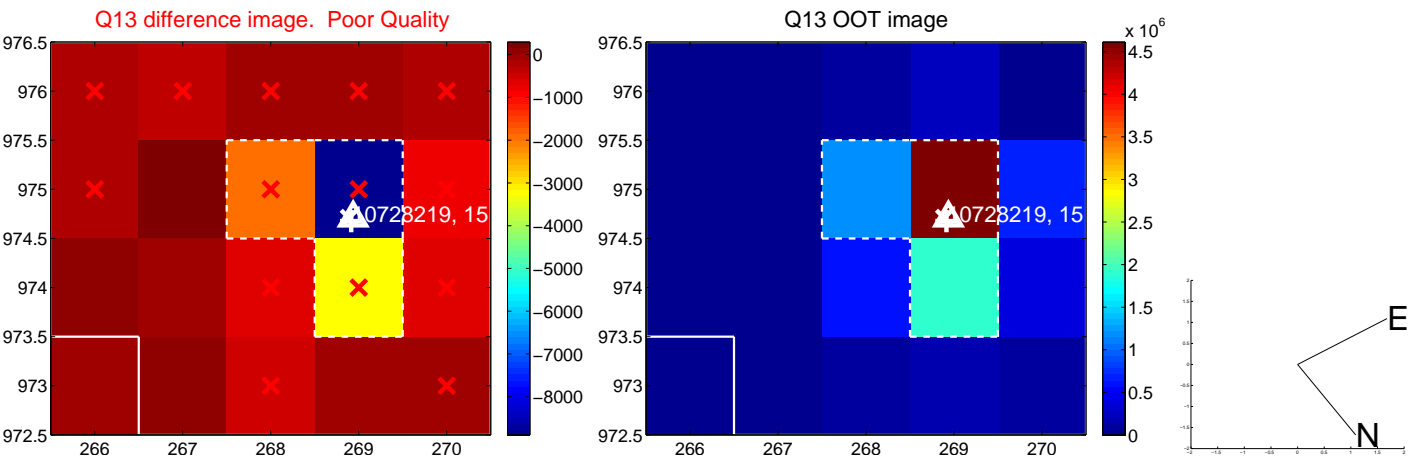
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



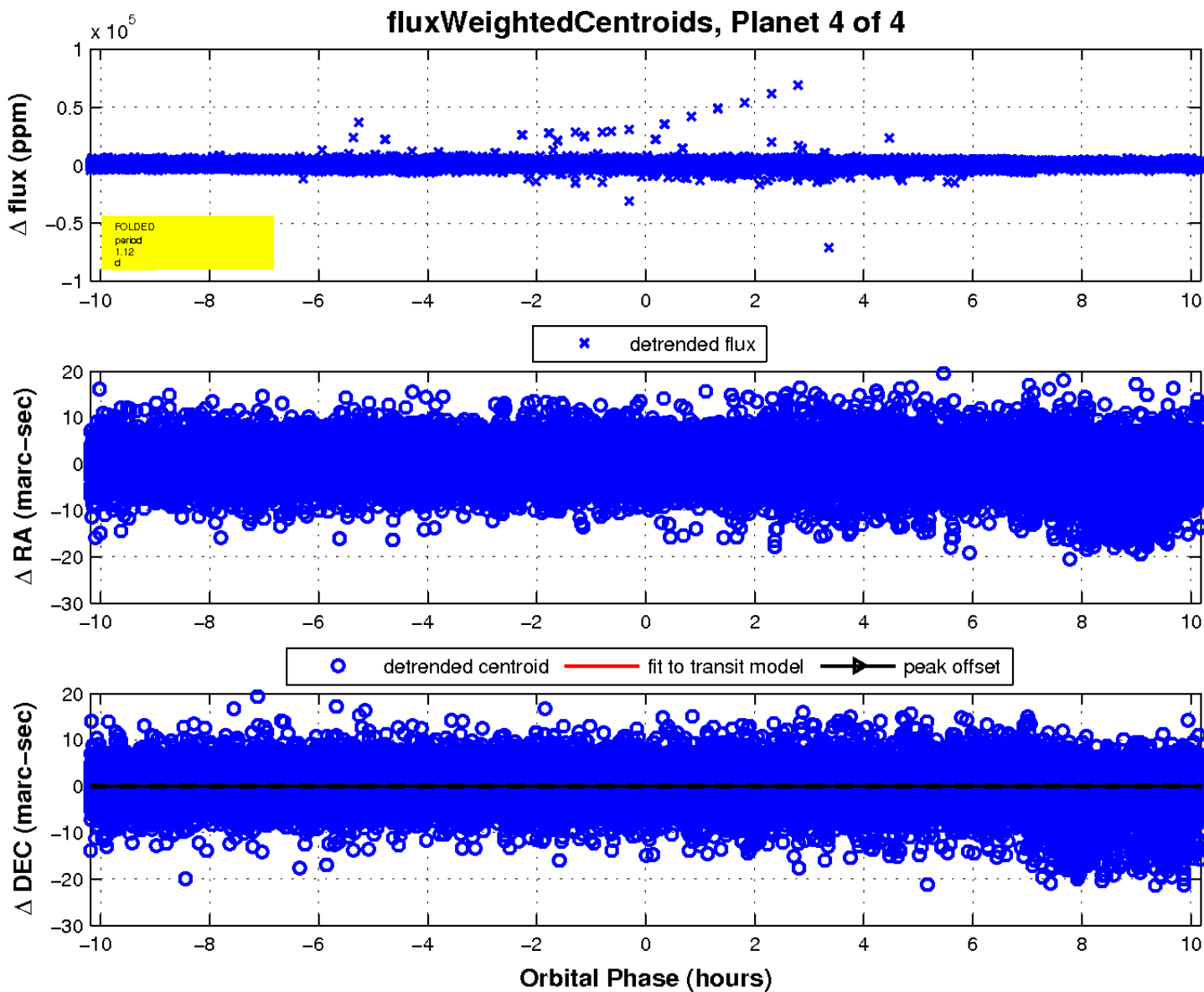
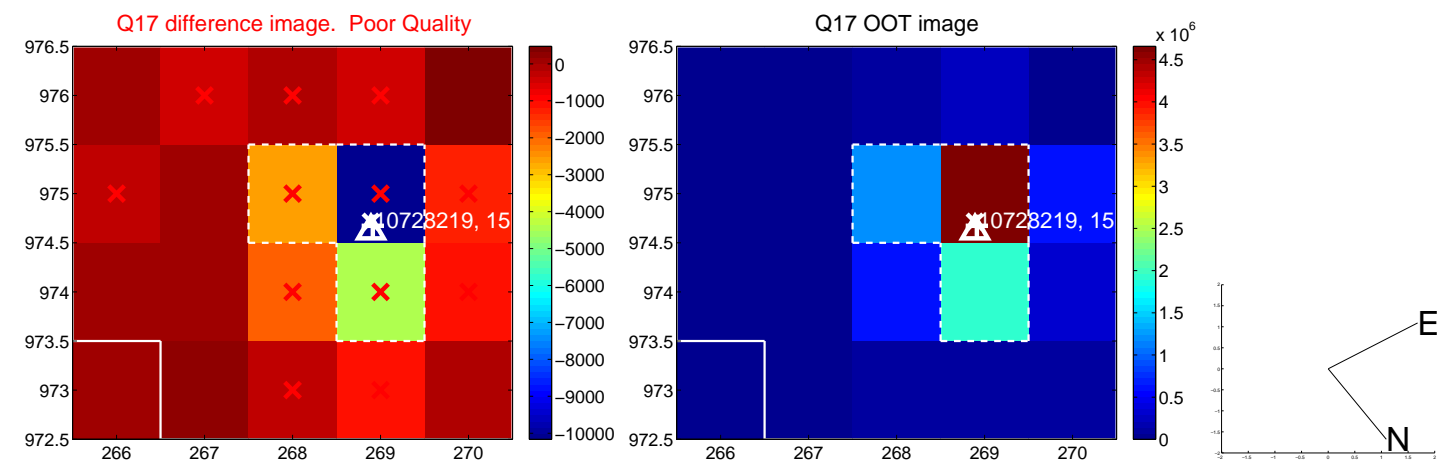
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

