

# KIC 004171302

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004171302-01	OBS	No	8.735223	139.834669	79.7	14.861	14.4	16.1	3.90	8918	6.70	6260.43
004171302-02	OBS	No	1.455886	132.216589	22.5	5.150	15.5	14.6	3.90	8918	2.15	68254.70
004171302-03	OBS	No	1.747031	132.312513	1.5	4.185	14.7	0.8	3.90	8918	0.55	53526.46
004171302-04	OBS	No	4.367933	134.421149	43.6	9.524	15.4	18.2	3.90	8918	2.98	15773.74

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004171302-01	OBS	FP	0.00	1	0	1	0	LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—HALO_GHOST
004171302-02	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD
004171302-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT— SAME_NTL_PERIOD—CENT_FEW_DIFFS
004171302-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—SWEET_NTL—LPP_DV—MOD_NONUNIQ_DV—SAME_NTL_PERIOD

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

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

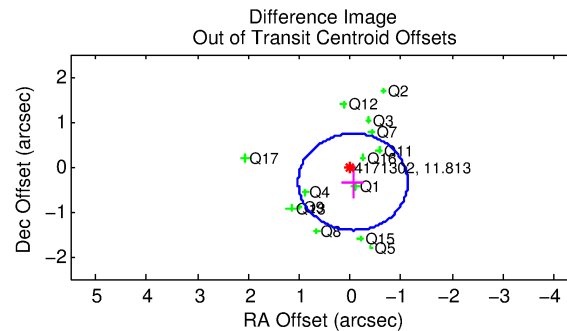
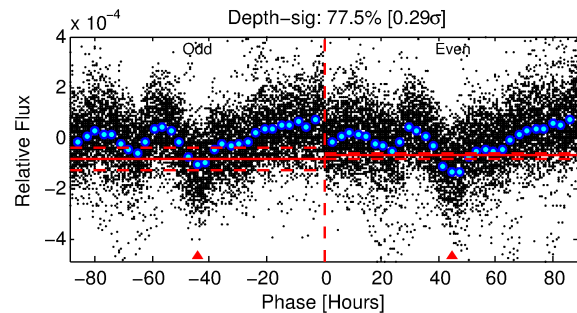
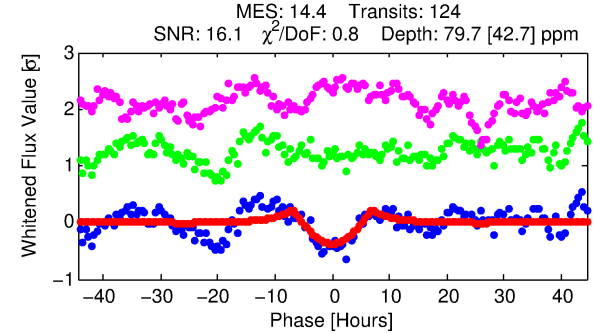
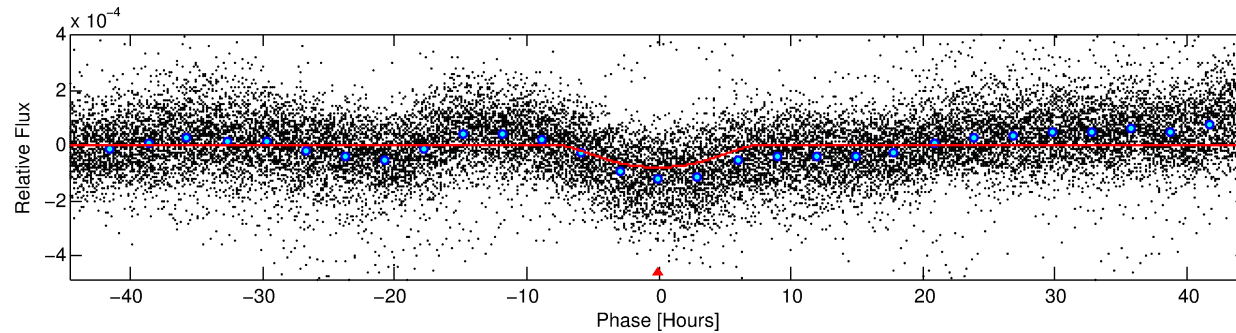
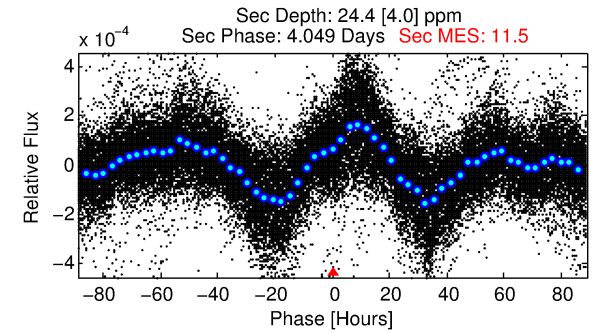
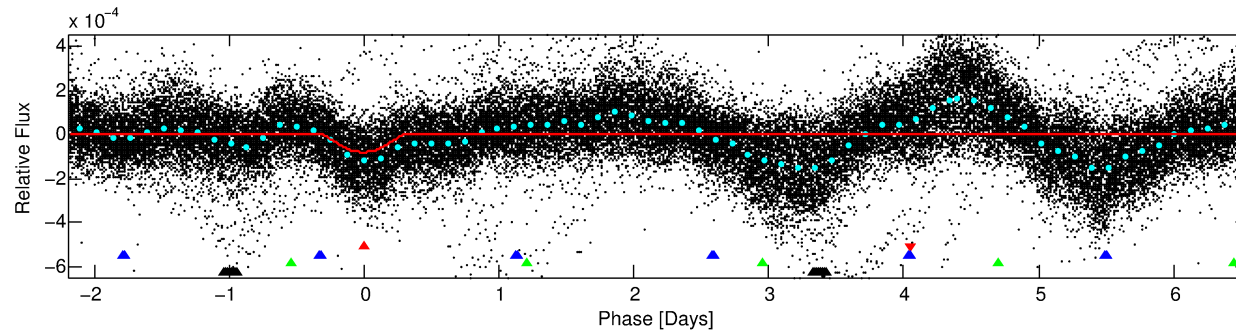
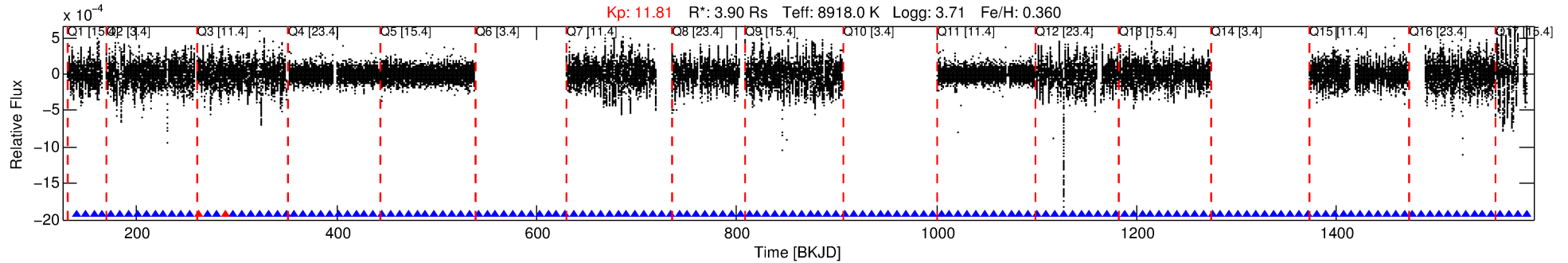
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 004171302-01

No Significant Match Found

# DV One-Page Summary

KIC: 4171302 Candidate: 1 of 4 Period: 8.735 d



## DV Fit Results:

Period = 8.73522 [0.00016] d  
Epoch = 139.8347 [0.0143] BKJD  
Rp/R\* = 0.0158 [0.0140]  
a/R\* = 1.29 [0.11]  
b = 1.00 [0.02]  
Seff = 6260.43 [4060.55]  
Teq = 2268 [368] K  
Rp = 6.70 [6.52] Re  
a = 0.1172 [0.0438] AU  
Ag = 4.11 [7.69] [0.40σ]  
Teffp = 4994 [2247] K [1.20σ]

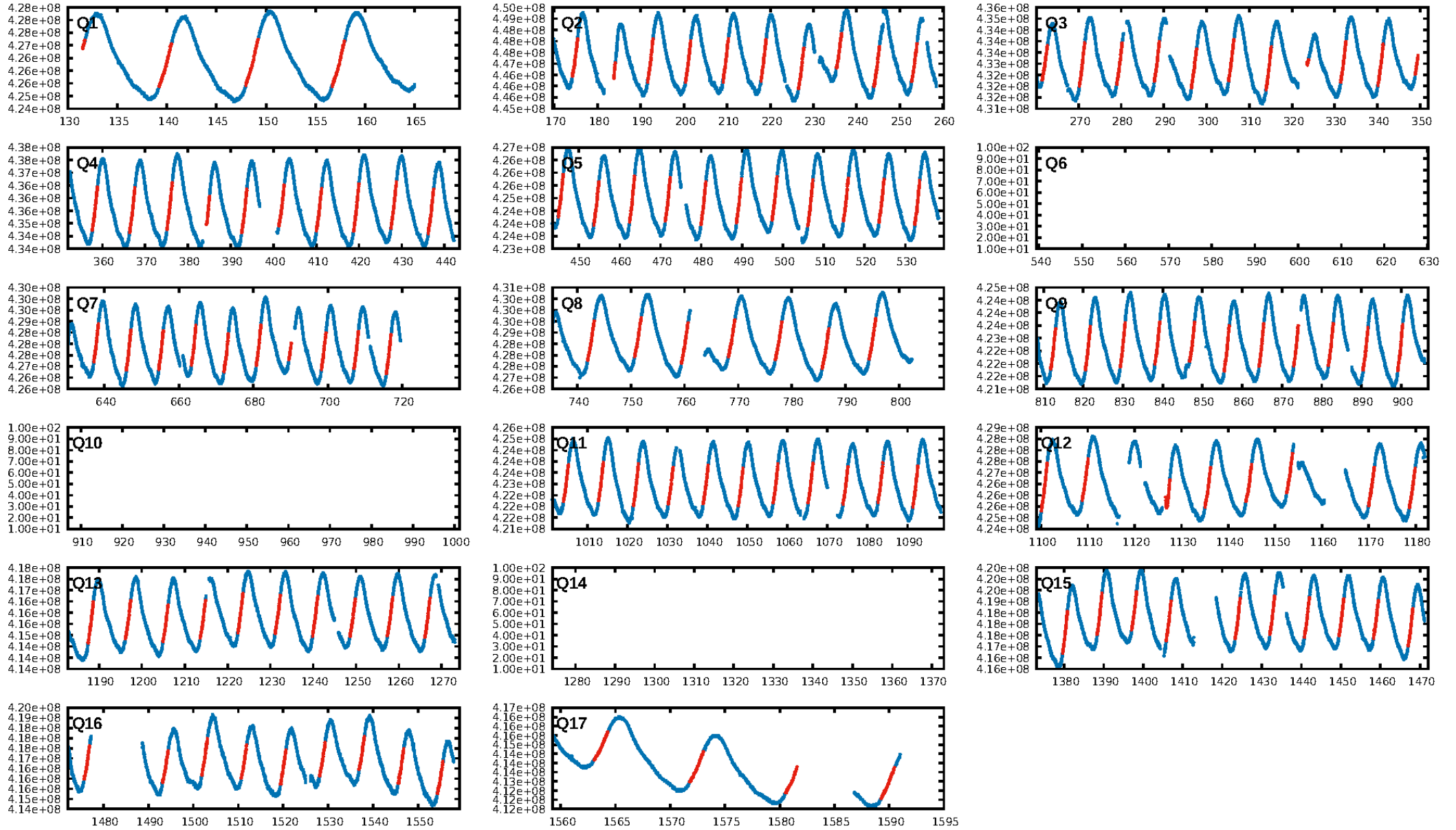
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [5.94σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 96.9%  
ModelChiSquareGoF-sig: 100.0%  
Bootstrap-pfa: 3.16e-27  
RollingBand-fgt: 0.98 [115/117]  
GhostDiagnostic-chr: 0.1173  
Centroid-sig: N/A  
Centroid-so: 0.491 arcsec [1.11σ]  
OotOffset-rm: 0.346 arcsec [0.97σ]  
KicOffset-rm: 0.221 arcsec [0.62σ]  
OotOffset-st: 1/4/4/5 [14]  
KicOffset-st: 1/4/4/5 [14]  
DiffImageQuality-fgm: 1.00 [14/14]  
DiffImageOverlap-fno: 0.00 [0/14]

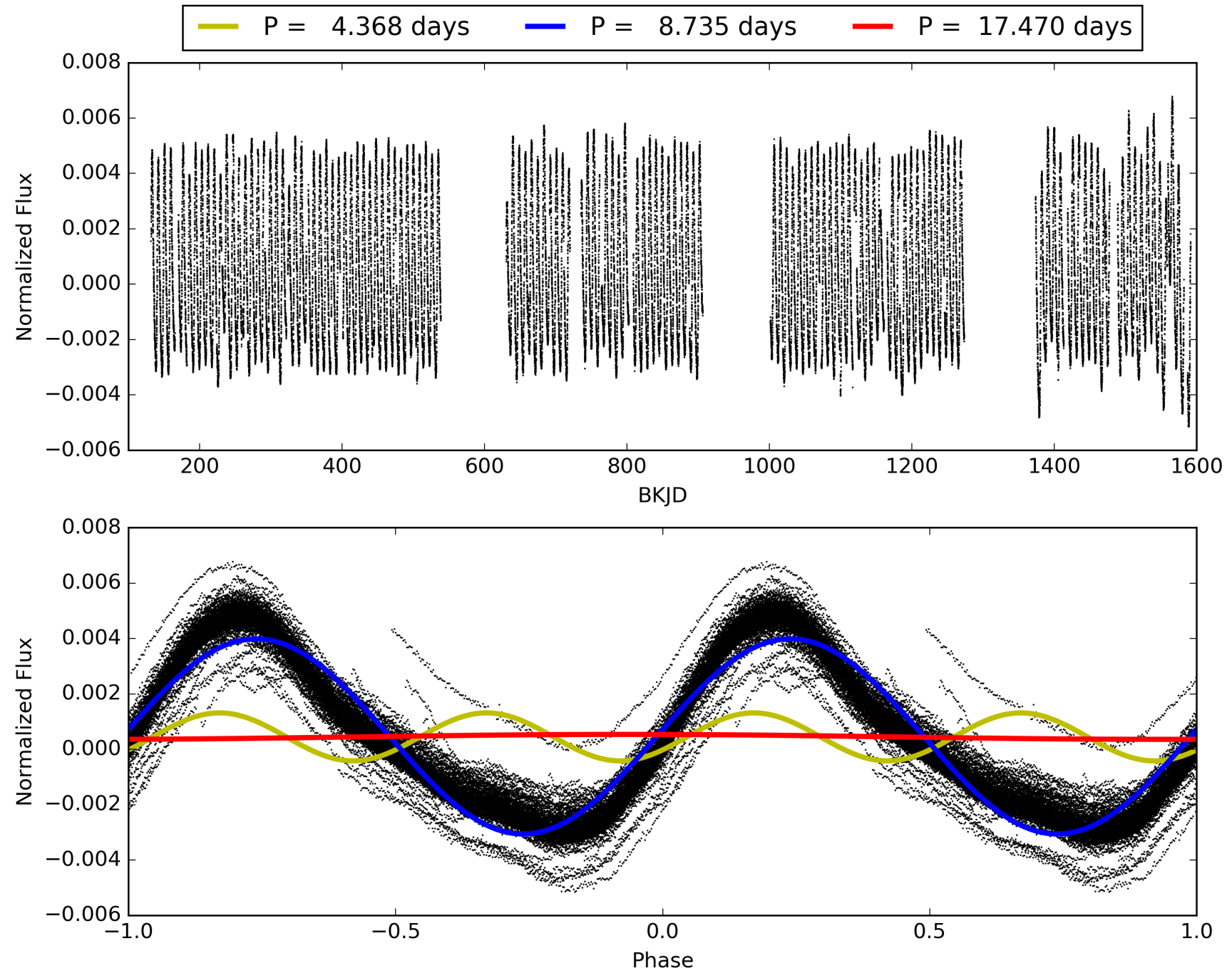
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 14:03:40 Z

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

# TCE 004171302-01, PDC Light Curves



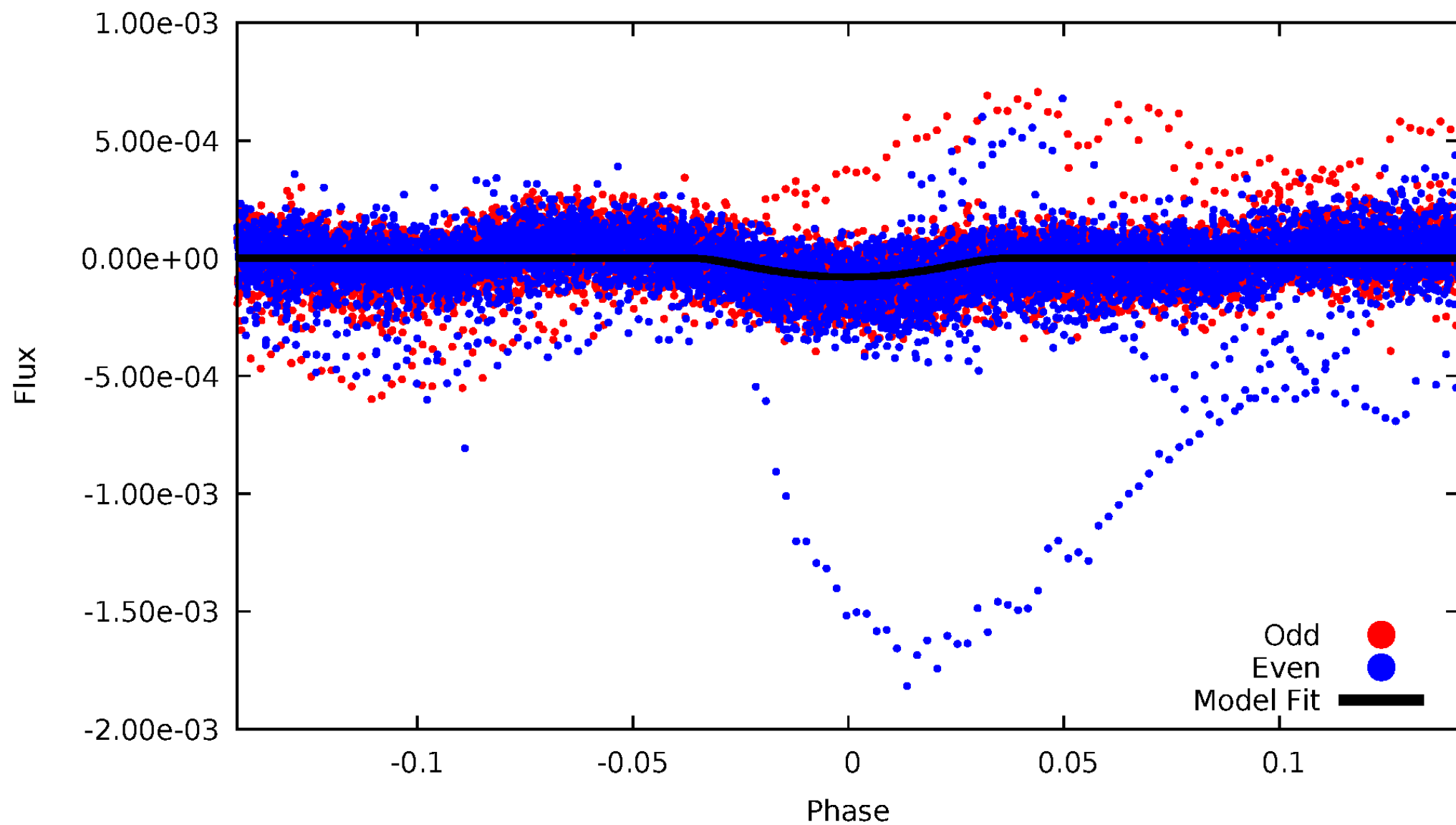
TCE 004171302-01





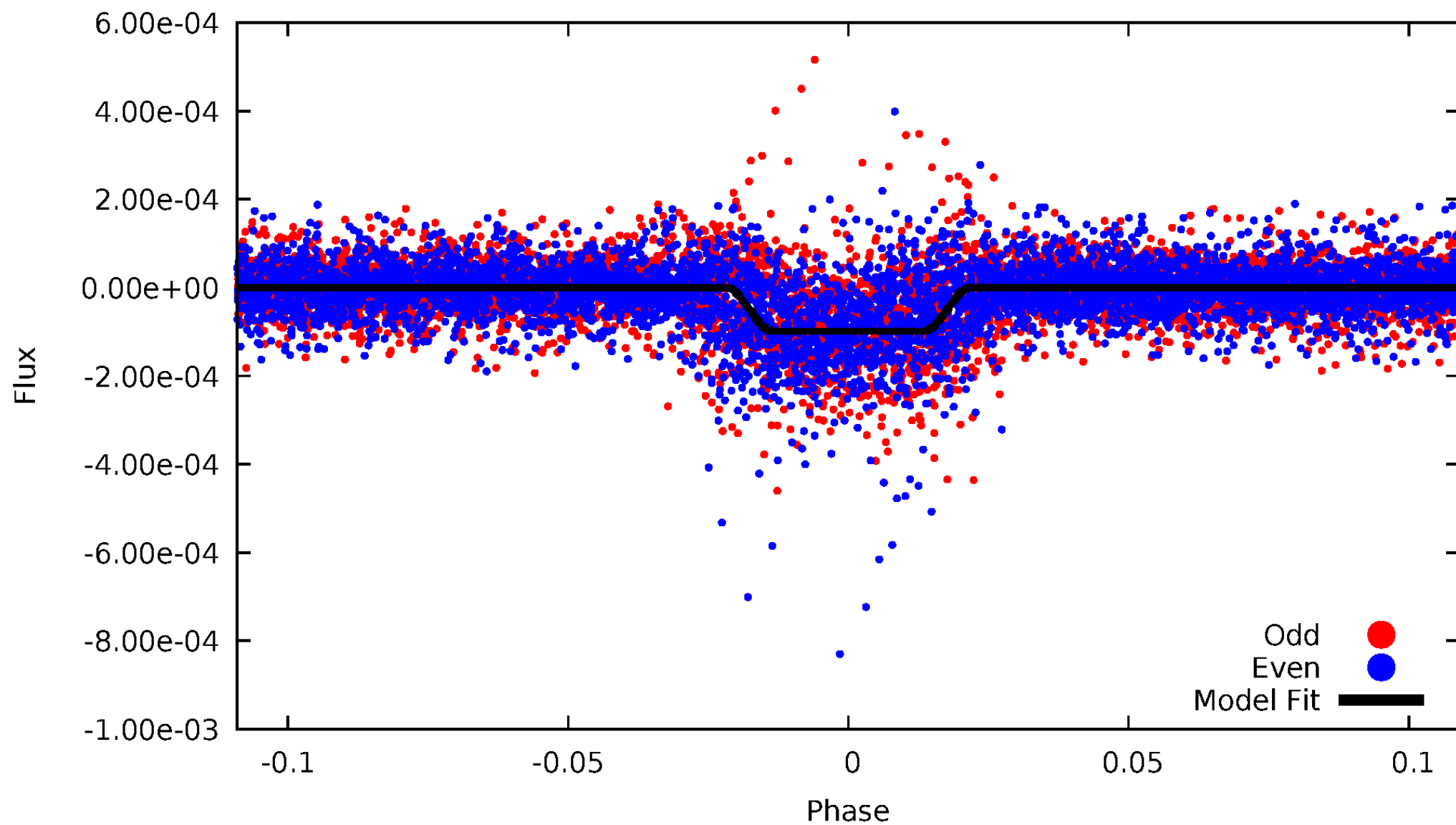
# DV Odd/Even

TCE 004171302-01

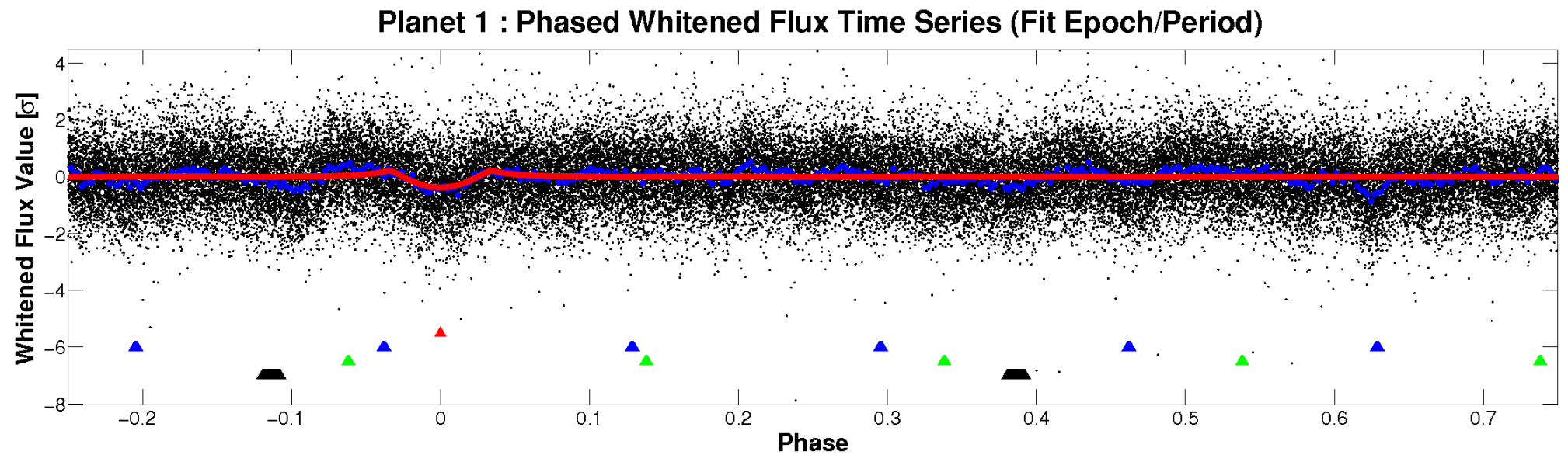
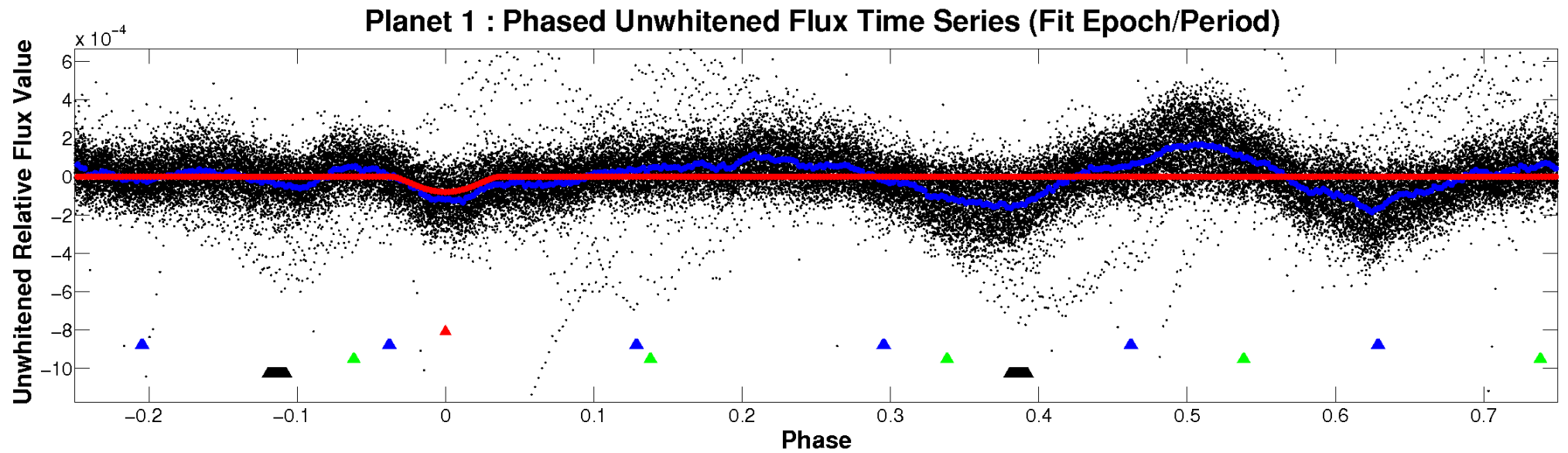


# ALT Odd/Even

TCE 004171302-01

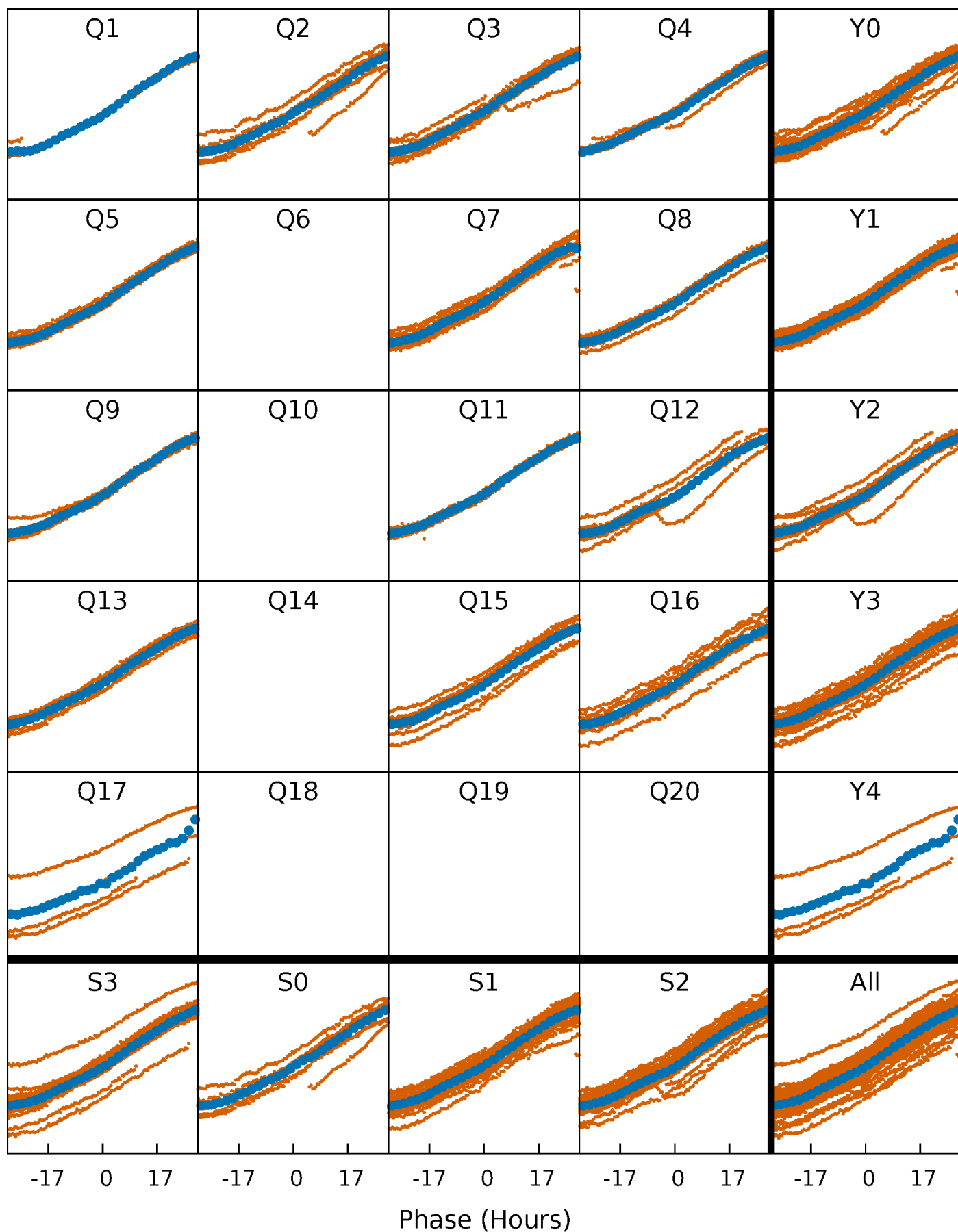


# Non-Whitened Vs. Whitened Light Curve



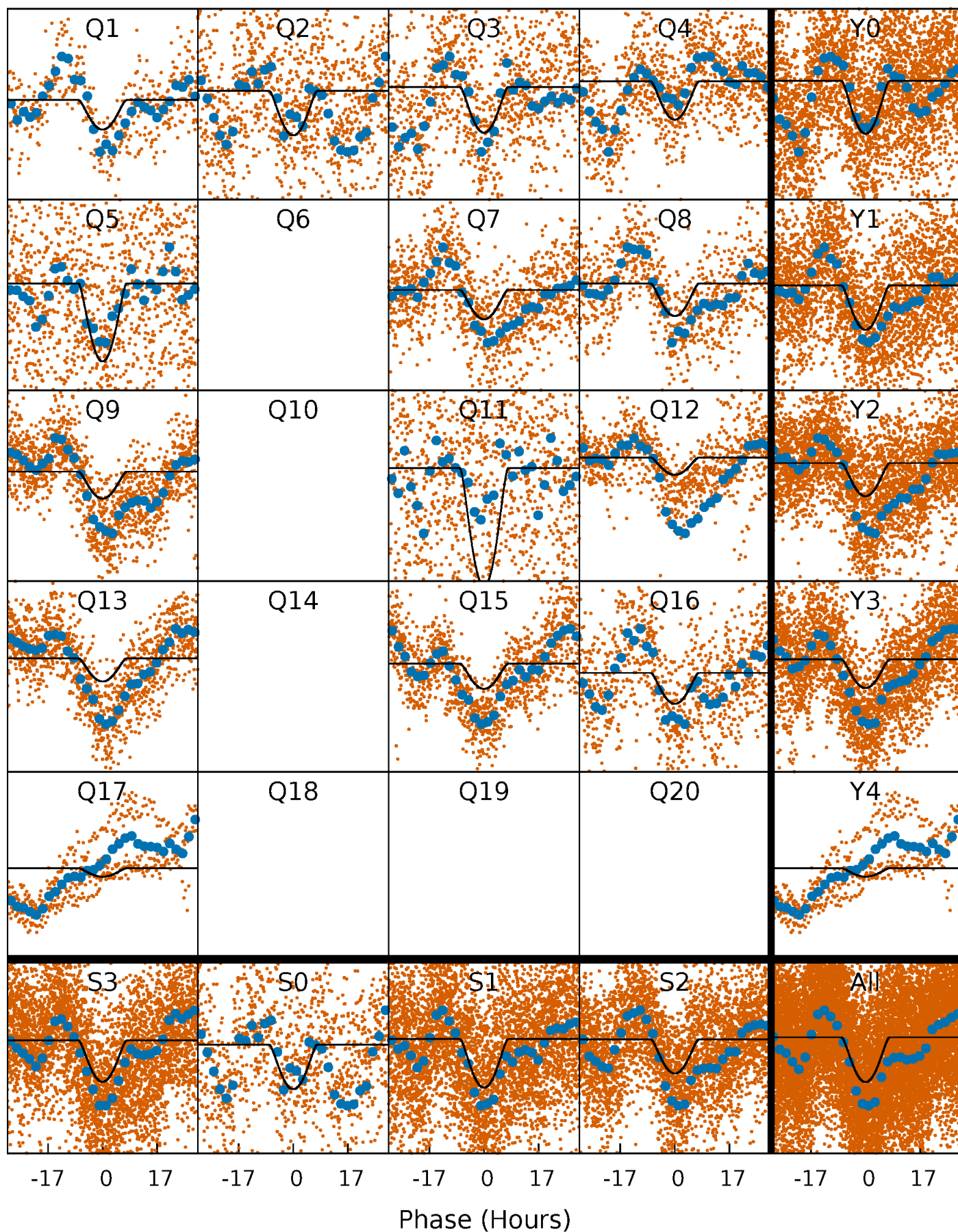
# PDC Quarter-Phased Transit Curves

TCE 004171302-01 P= 8.735223 Days  $T_0=139.834669$  (BKJD)



# DV Quarter-Phased Transit Curves

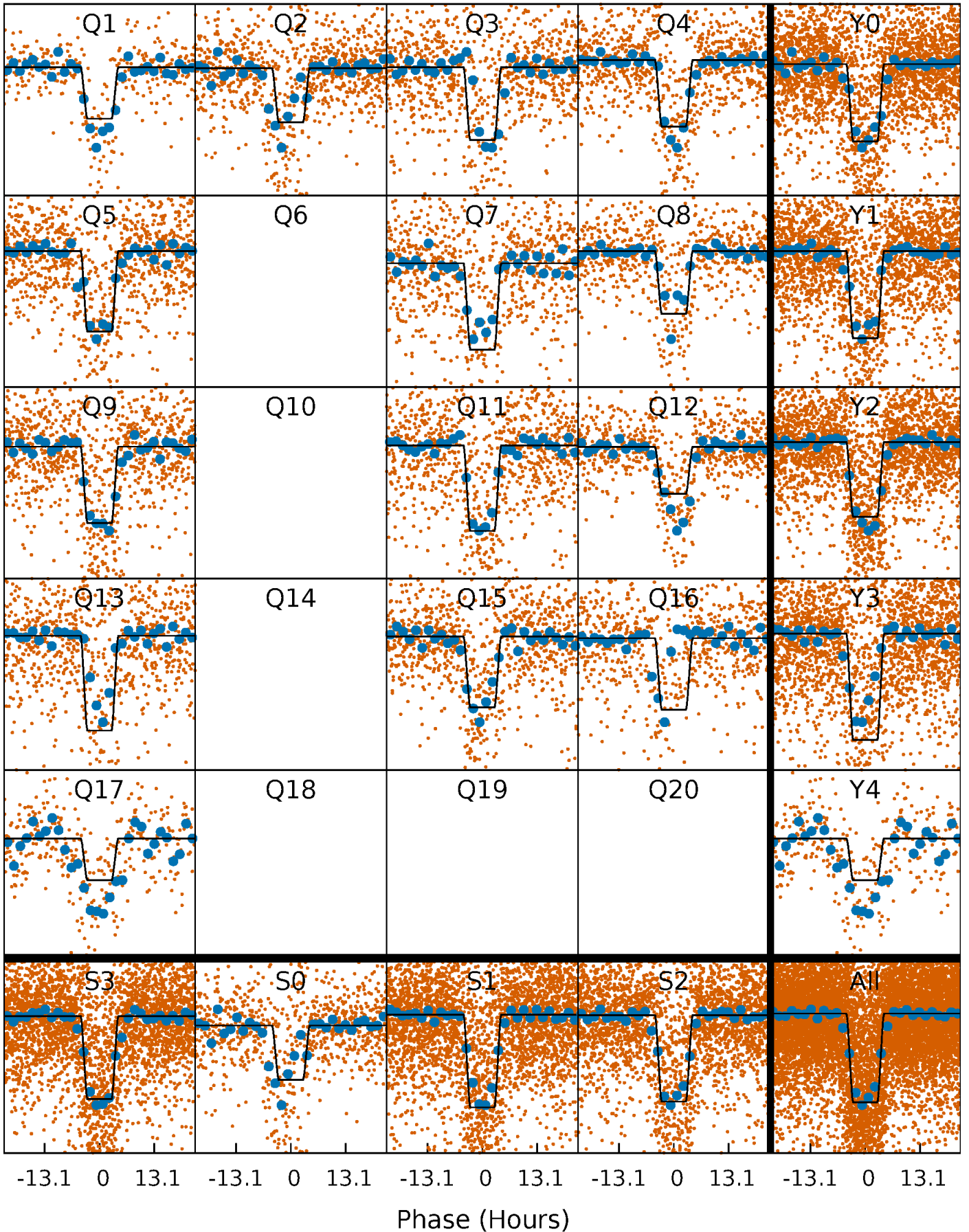
TCE 004171302-01   P= 8.735223 Days    $T_0=139.834669$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

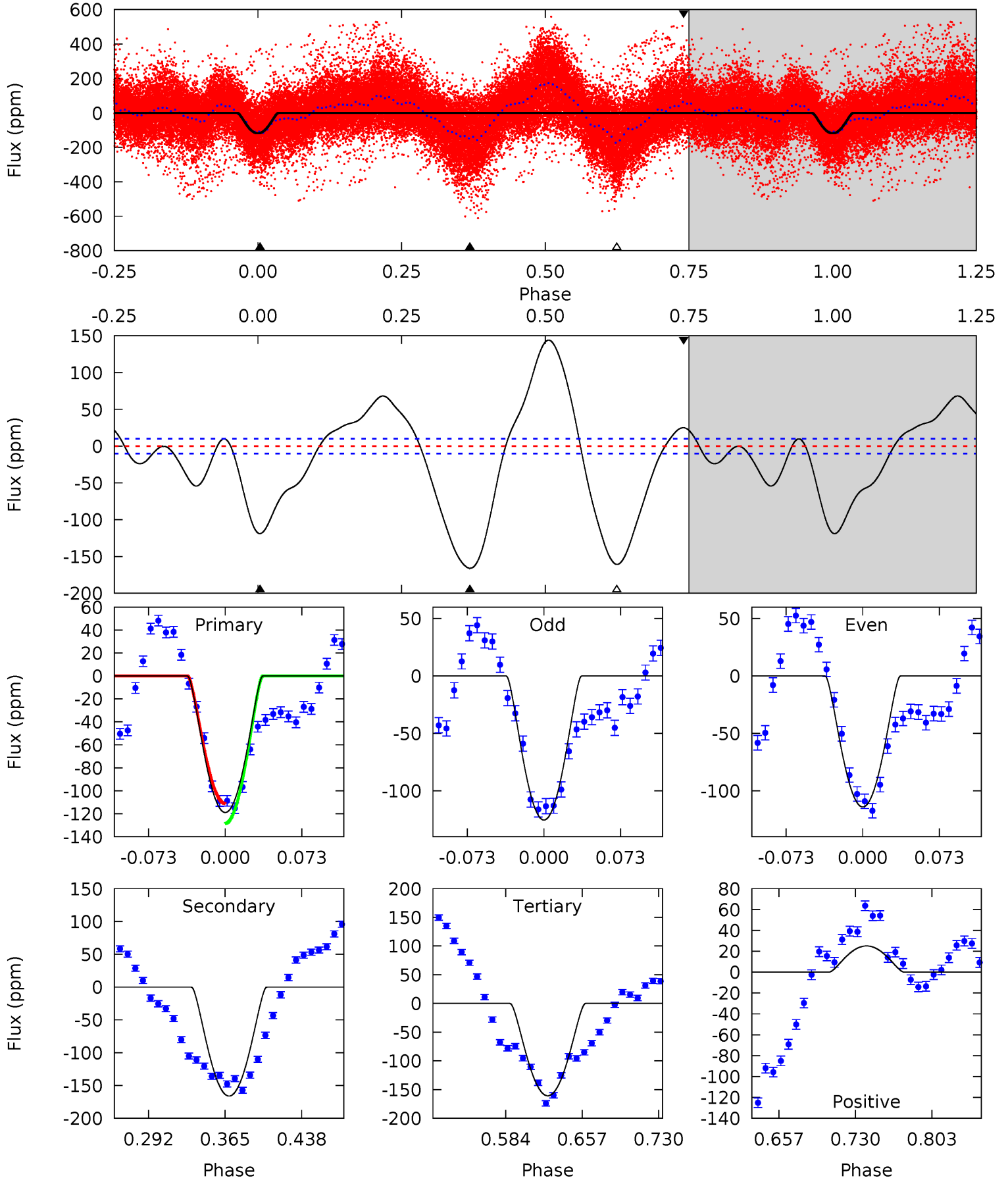
TCE 004171302-01 P= 8.735256 Days  $T_0=139.820167$  (BKJD)



# DV Model-Shift Uniqueness Test

004171302-01, P = 8.735223 Days, E = 131.099446 Days

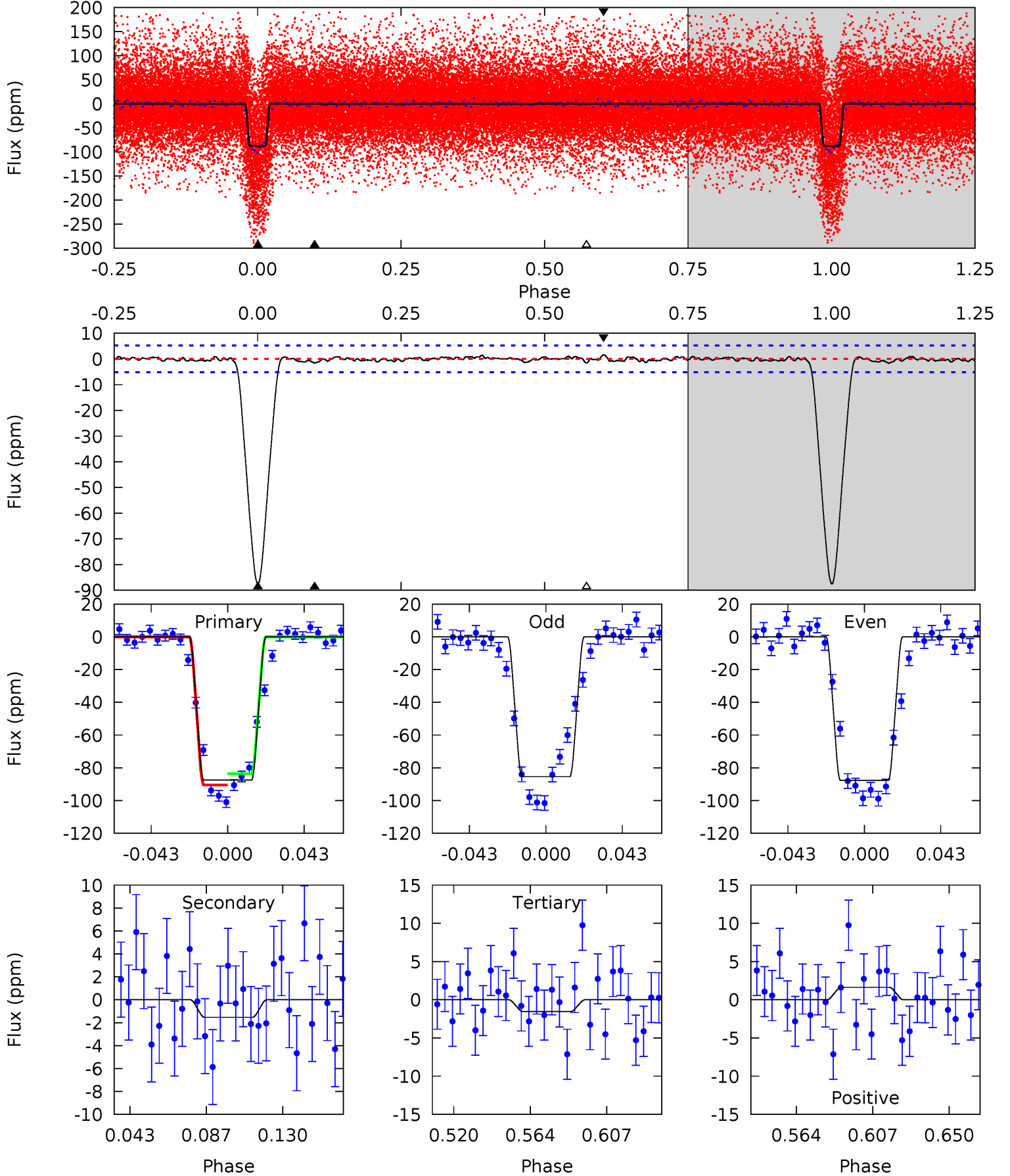
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
54.7	76.5	74.0	11.5	4.63	1.79	31.3	-19.3	43.2	2.45	64.9	2.63	0.67	0.46	4.16



# Alt Model-Shift Uniqueness Test

004171302-01, P = 8.735256 Days, E = 131.084911 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
79.7	1.40	1.40	1.49	4.74	2.02	0.51	78.3	78.2	0.00	-0.09	1.05	1.03	0.02	3.13



### Stellar Parameters For KIC 004171302

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$8918^{+418}_{-627}$	$3.706^{+0.338}_{-0.156}$	$0.360^{+0.050}_{-0.150}$	$3.895^{+1.048}_{-1.572}$	$2.813^{+0.271}_{-0.587}$	$0.067^{+0.174}_{-0.030}$
	+5%/-7%	+9%/-4%	+14%/-42%	+27%/-40%	+10%/-21%	+259%/-45%
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 004171302-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-166 \pm 2$	$6.92^{+6.04}_{-4.16}$	$3109^{+312}_{-352}$	$7284^{+7005}_{-1929}$	$26^{+129}_{-19}$
Alt.	$-2 \pm 1$	$5.52^{+4.57}_{-3.65}$	$3080^{+304}_{-333}$	$-1995^{+6237}_{-1023}$	$0.289^{+2.547}_{-0.242}$

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

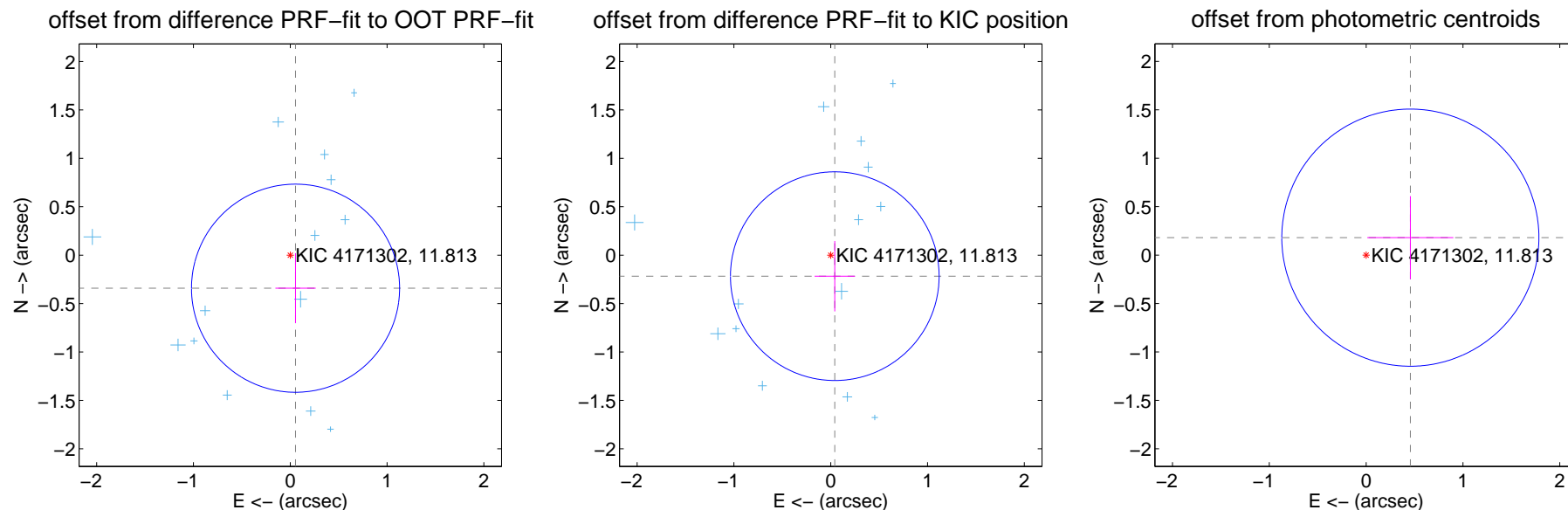
## DV Centroid Data

Supplemental centroid analysis for 004171302-01. **Kepler magnitude: 11.81.** Transit SNR 16.07

There are 14 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.15 arcsec

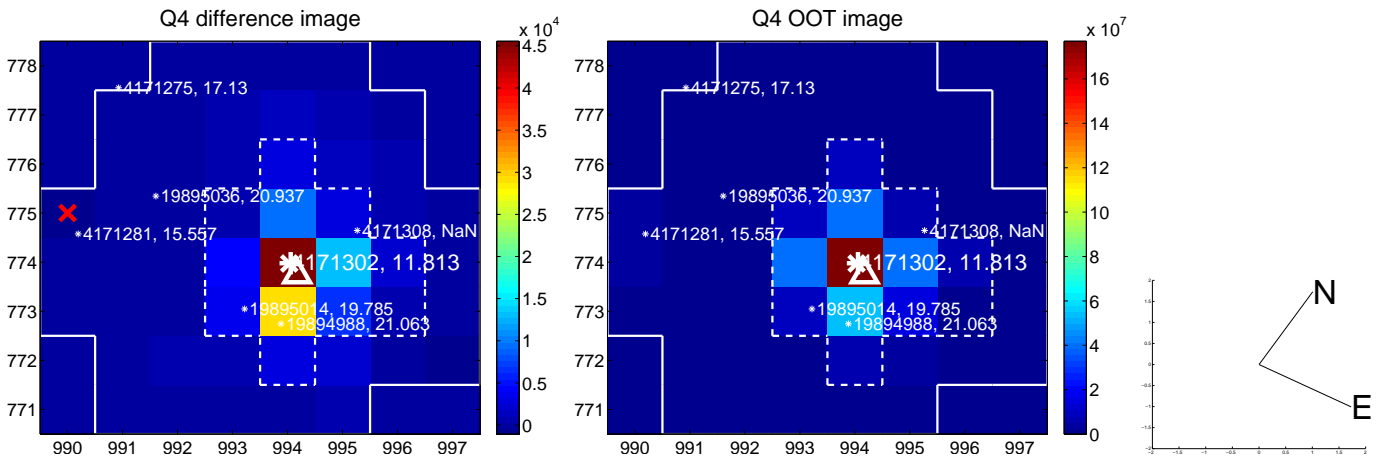
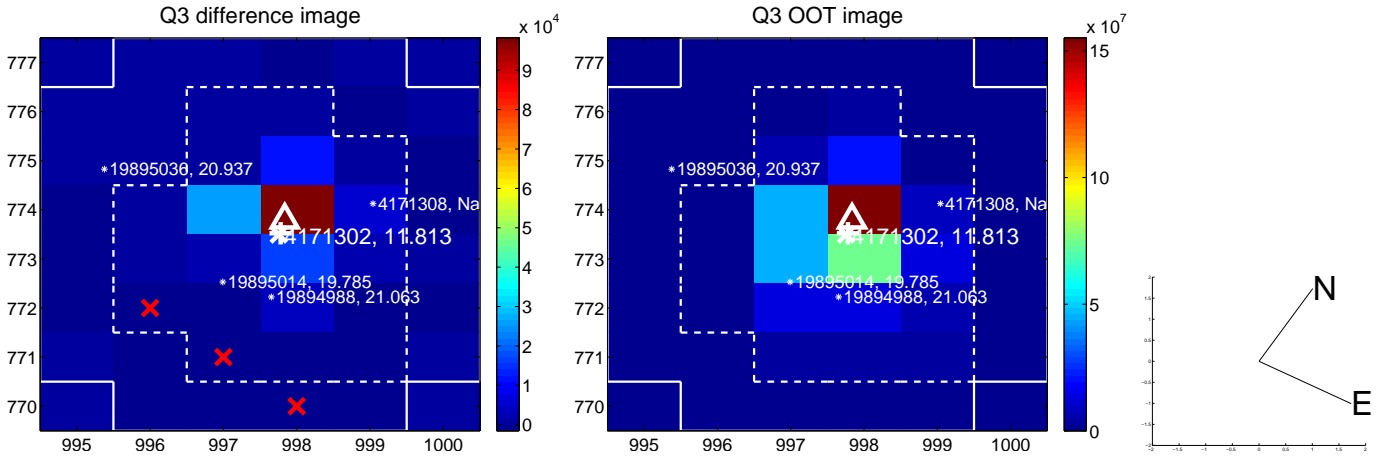
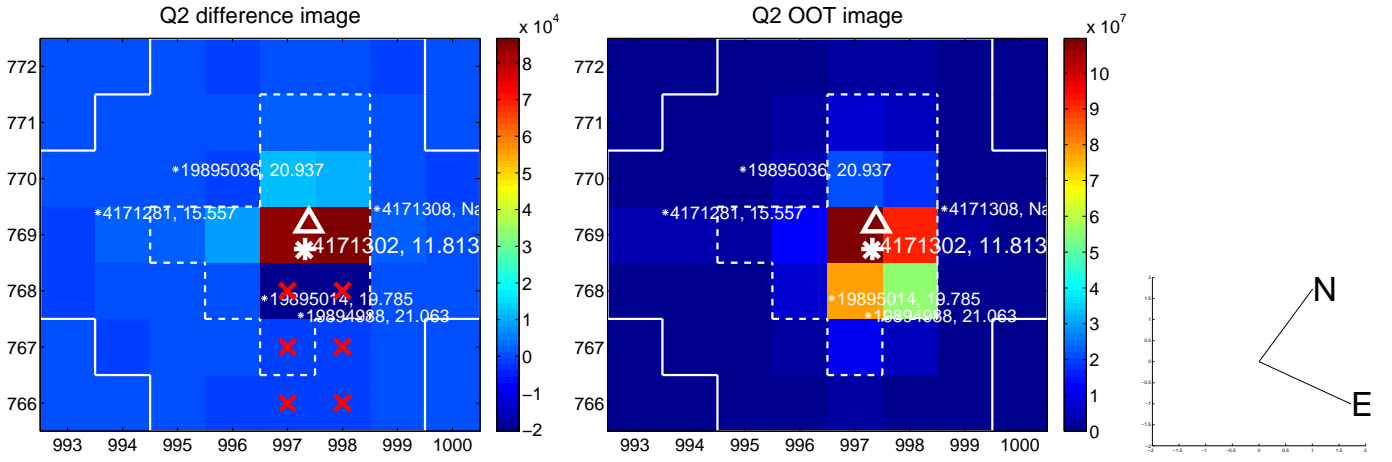
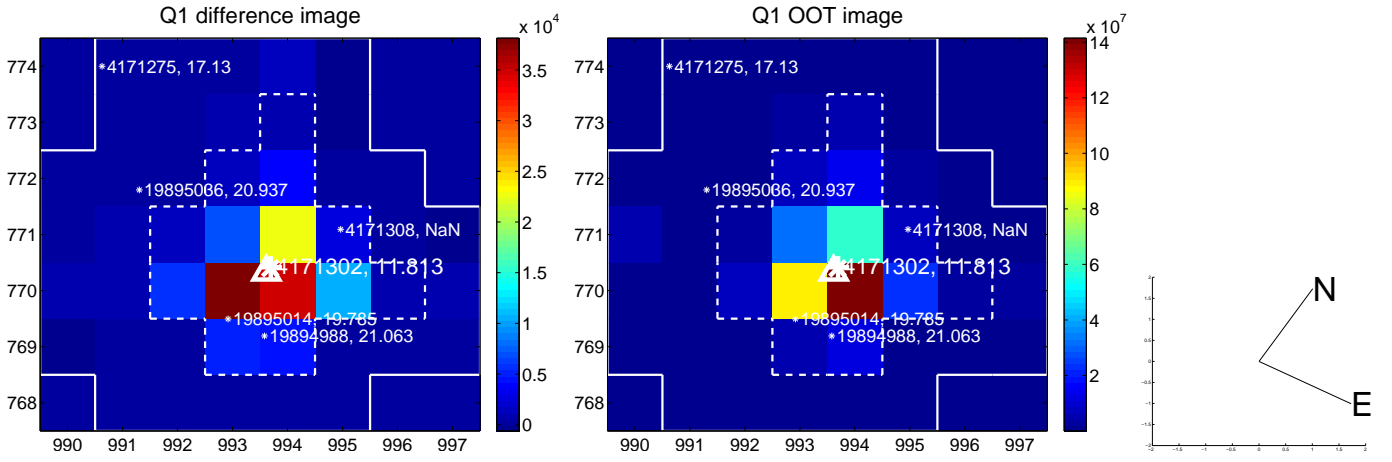
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.346 \pm 0.358$	0.97	$-0.055 \pm 0.208$	$-0.342 \pm 0.361$
PRF-fit source offset from KIC position	$0.221 \pm 0.359$	0.62	$-0.042 \pm 0.208$	$-0.217 \pm 0.364$
photometric centroid source offset	$0.49 \pm 0.44$	1.11	$-0.46 \pm 0.44$	$0.18 \pm 0.43$



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.

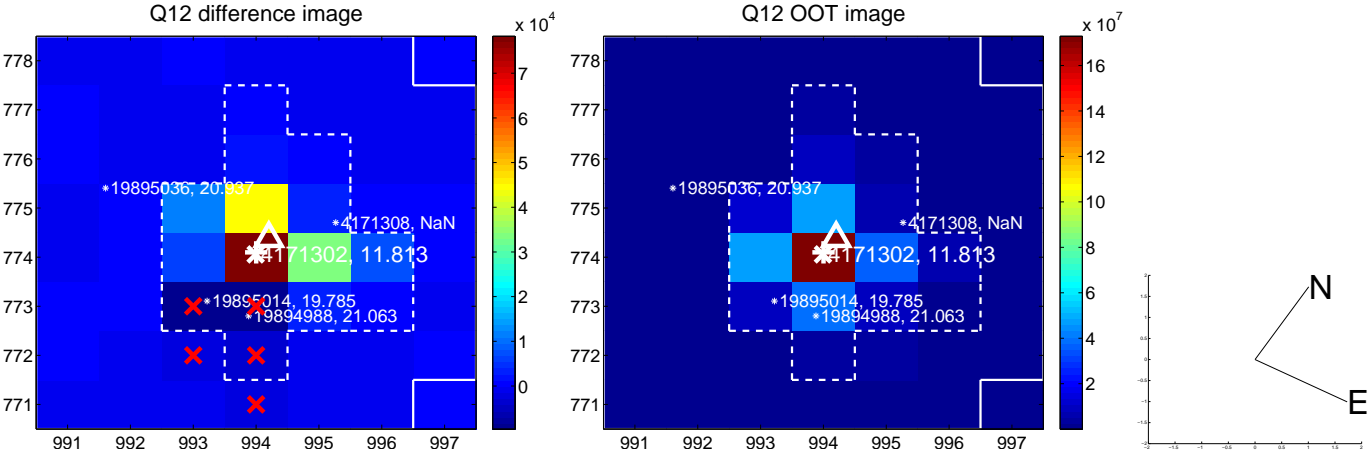
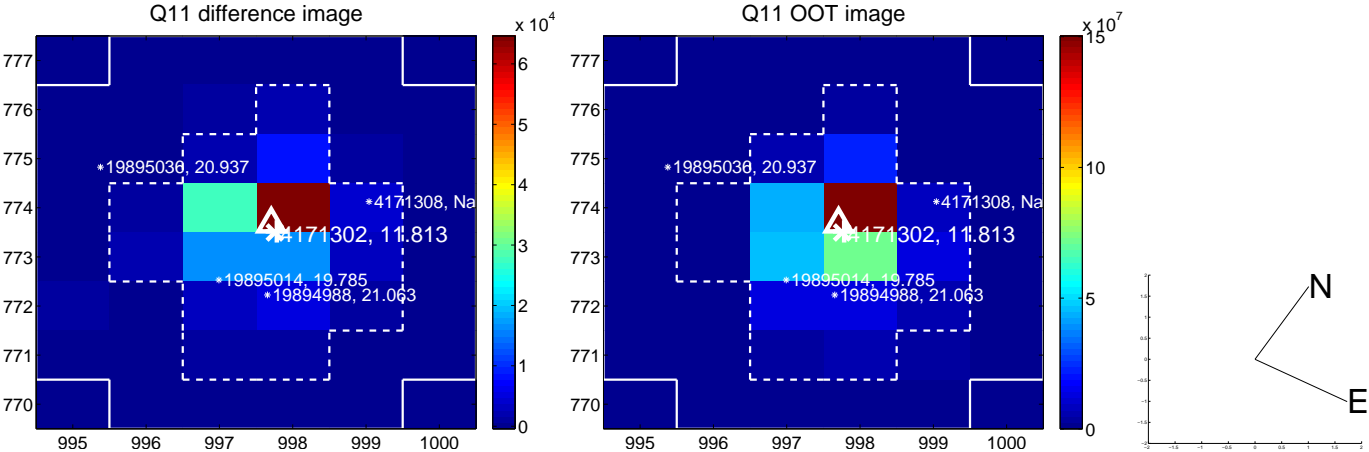
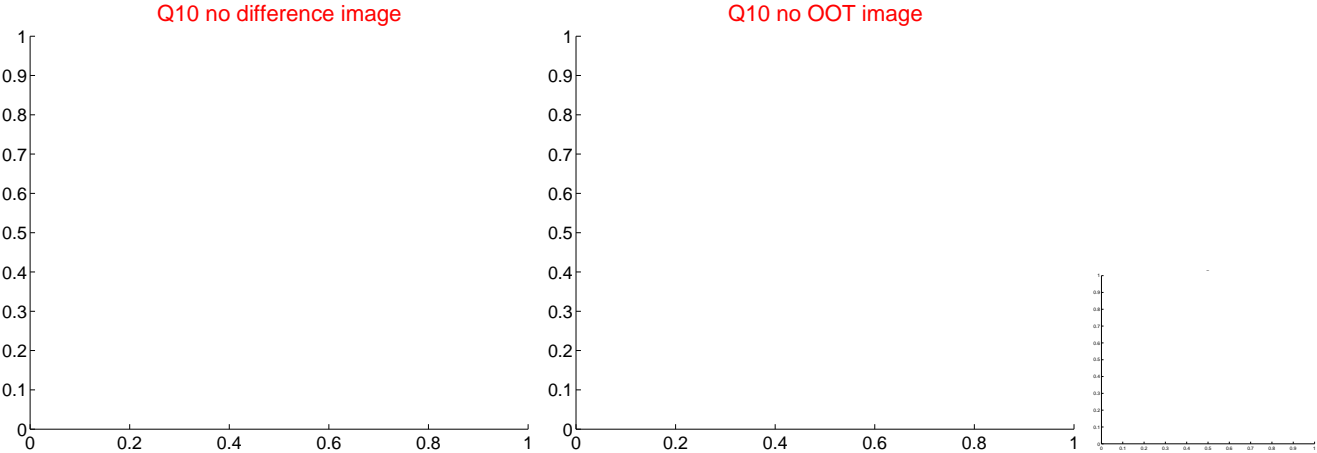
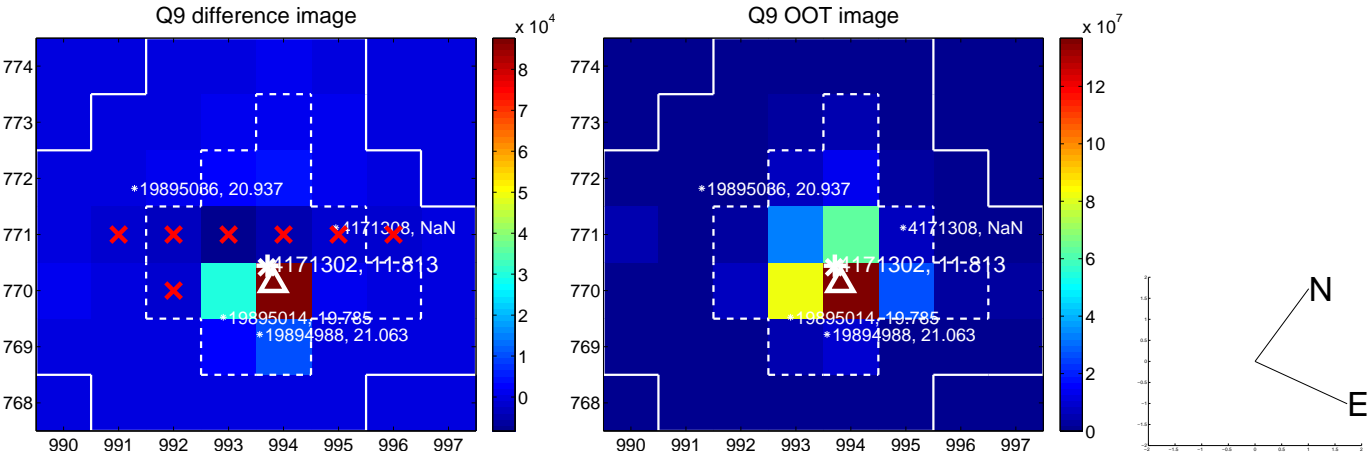


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

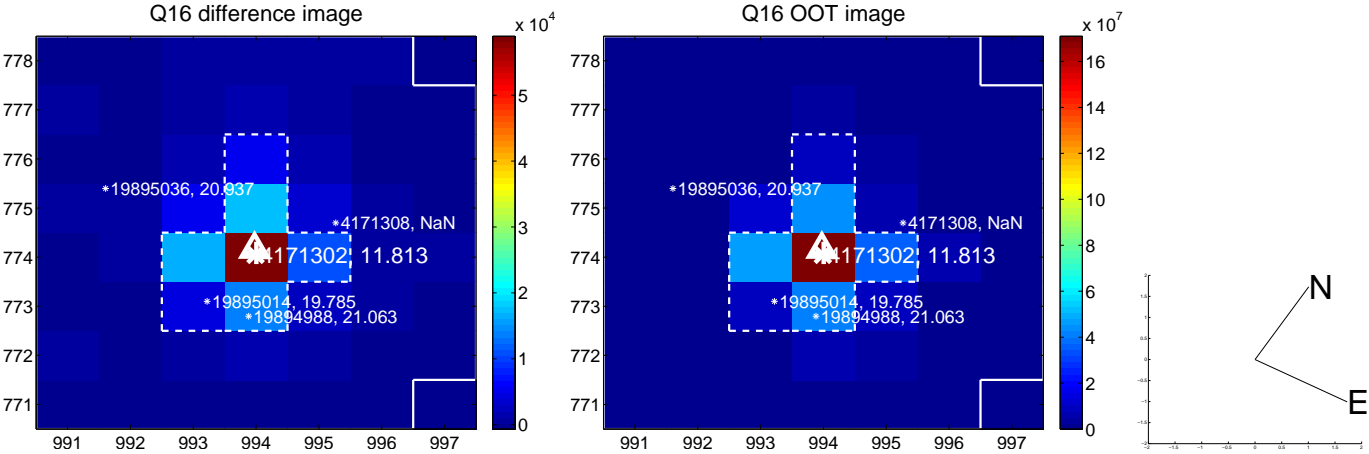
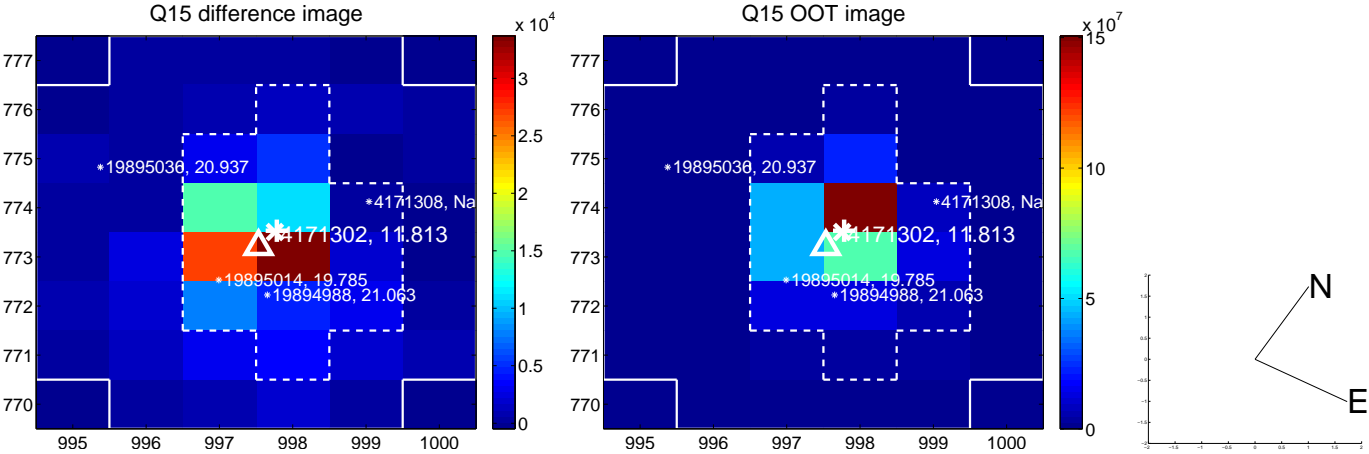
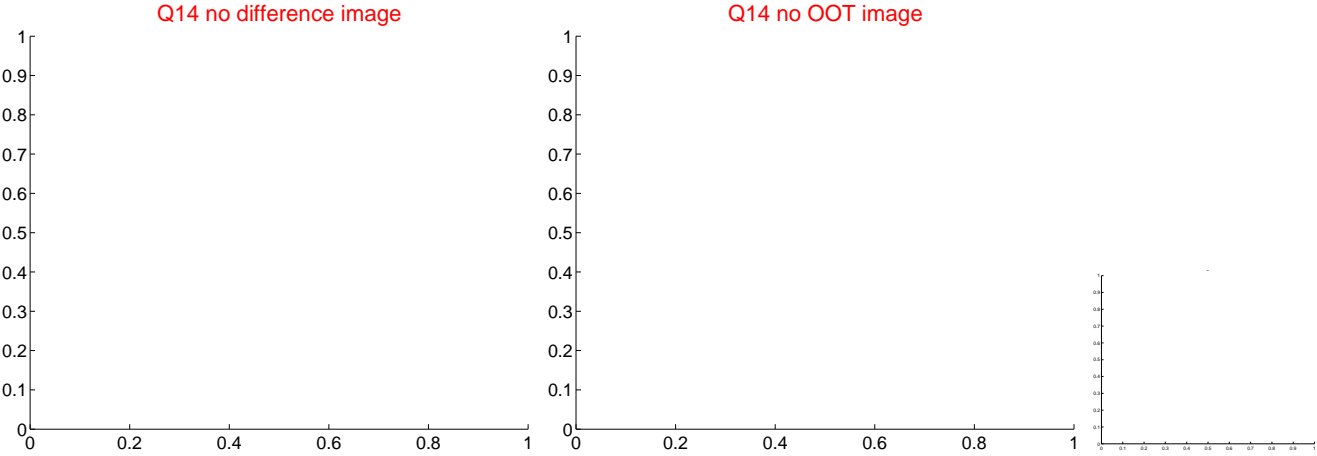
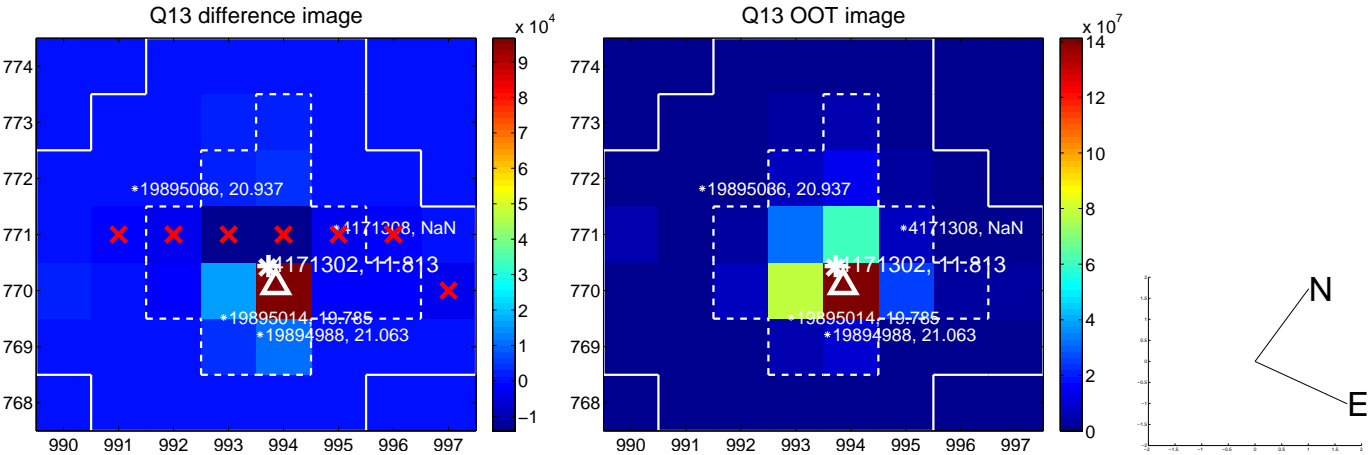




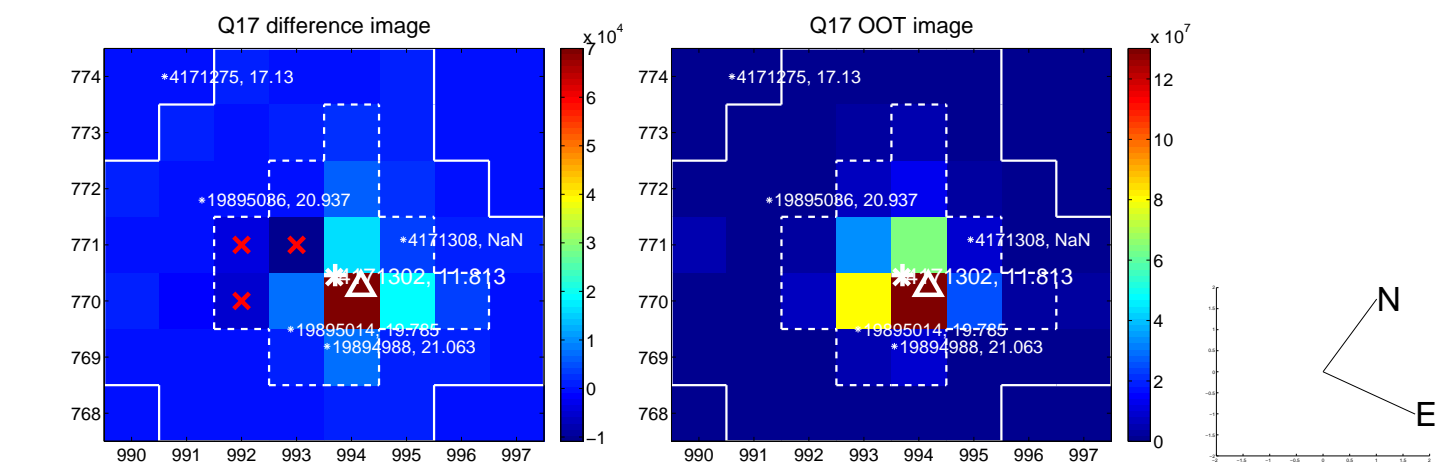
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



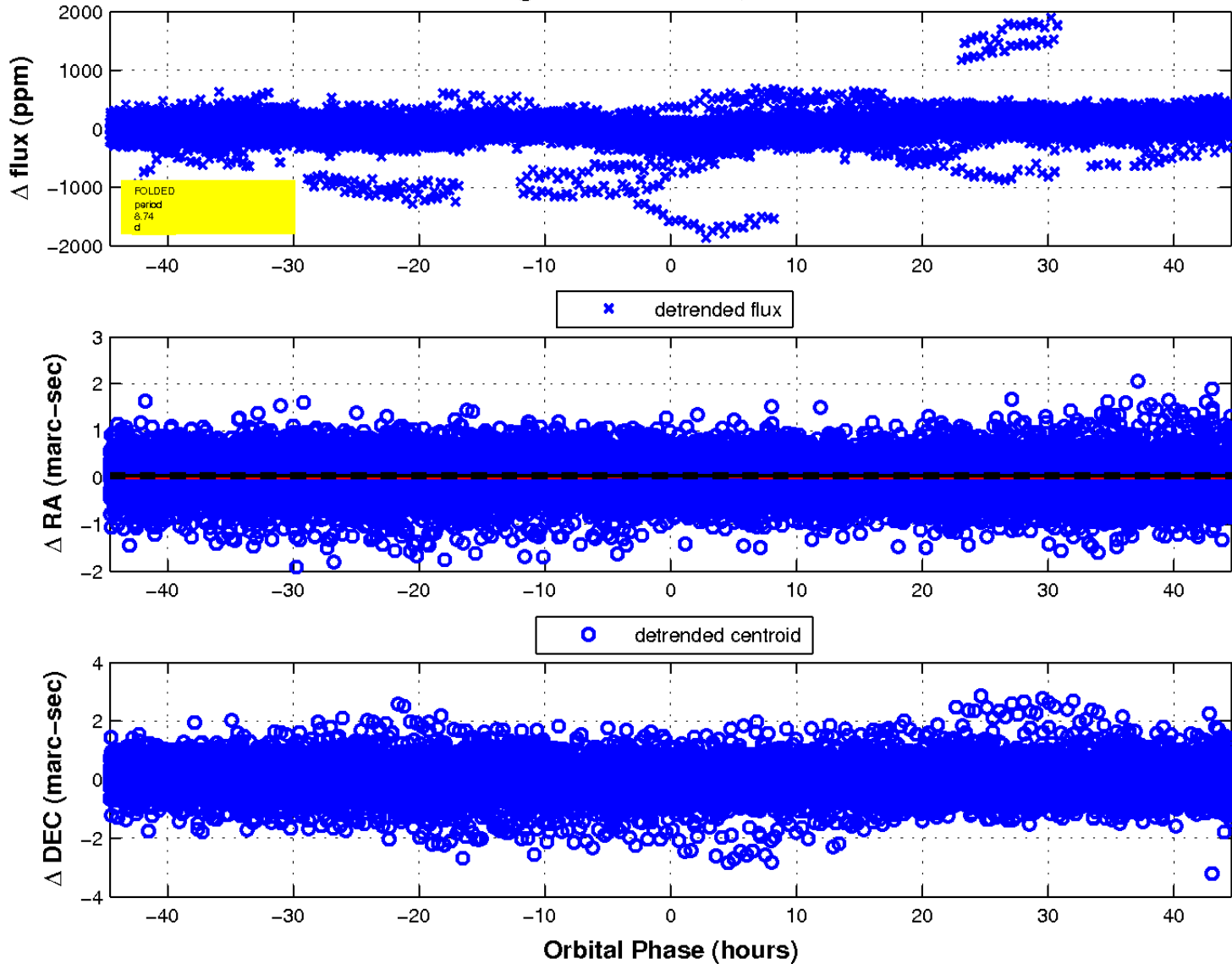
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



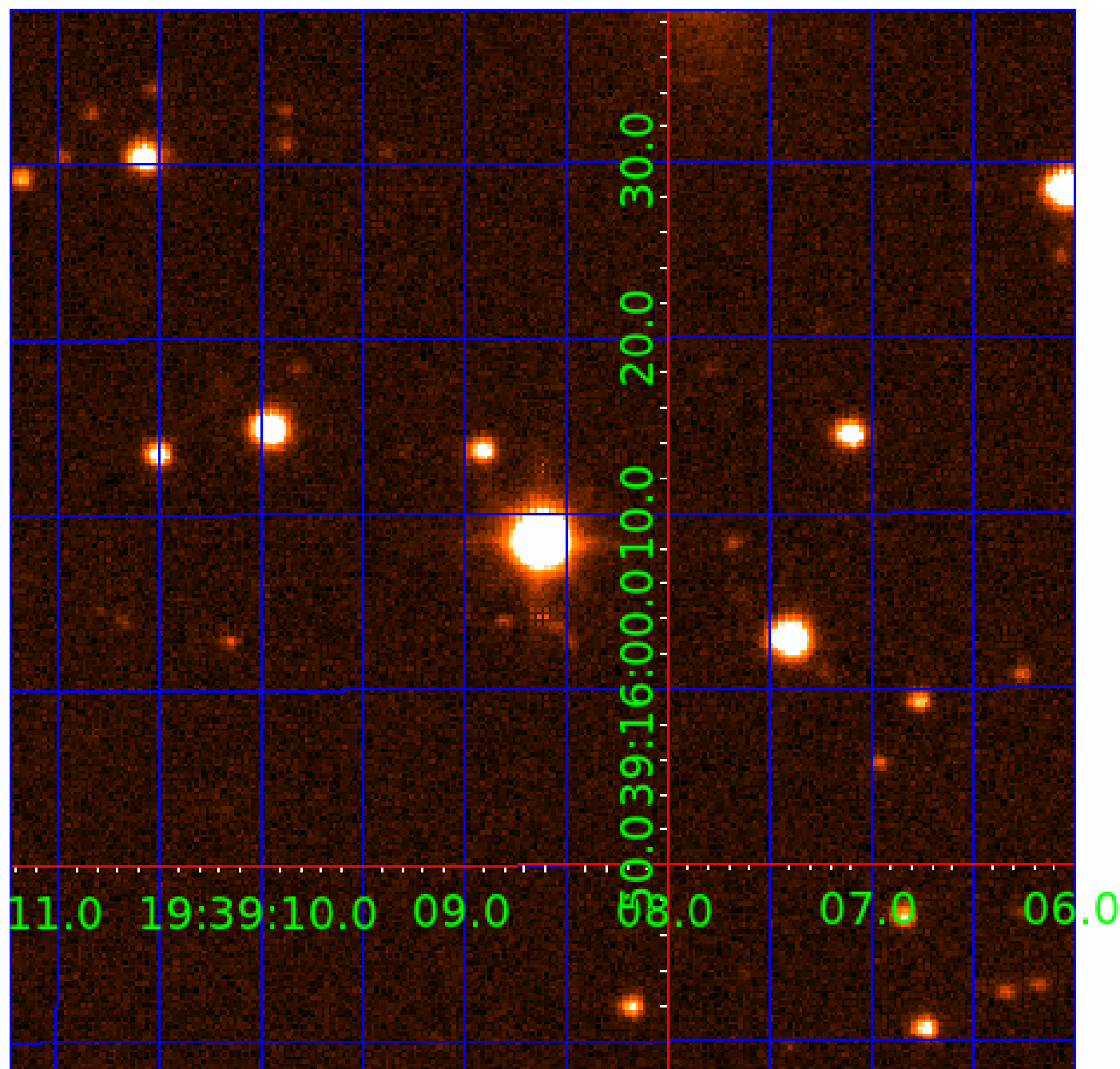
fluxWeightedCentroids, Planet 1 of 4





UKIRT Image

Declination



# KIC 004171302

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004171302-01	OBS	No	8.735223	139.834669	79.7	14.861	14.4	16.1	3.90	8918	6.70	6260.43
004171302-02	OBS	No	1.455886	132.216589	22.5	5.150	15.5	14.6	3.90	8918	2.15	68254.70
004171302-03	OBS	No	1.747031	132.312513	1.5	4.185	14.7	0.8	3.90	8918	0.55	53526.46
004171302-04	OBS	No	4.367933	134.421149	43.6	9.524	15.4	18.2	3.90	8918	2.98	15773.74

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004171302-01	OBS	FP	0.00	1	0	1	0	LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—HALO_GHOST
004171302-02	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD
004171302-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT— SAME_NTL_PERIOD—CENT_FEW_DIFFS
004171302-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—SWEET_NTL—LPP_DV—MOD_NONUNIQ_DV—SAME_NTL_PERIOD

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

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

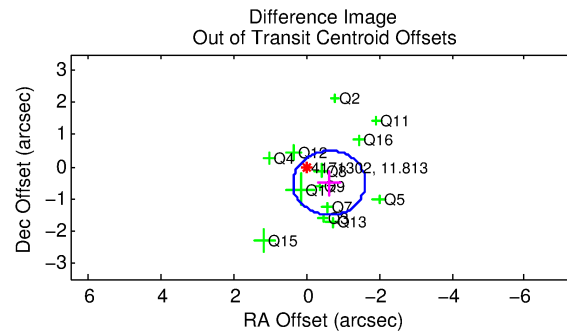
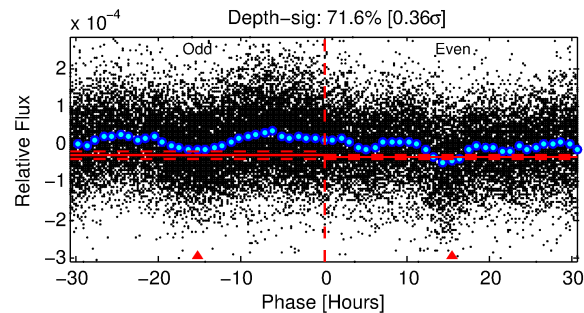
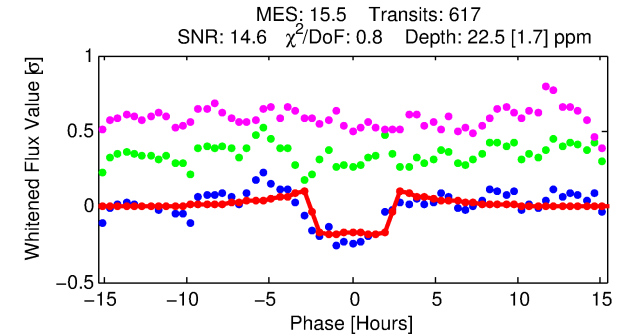
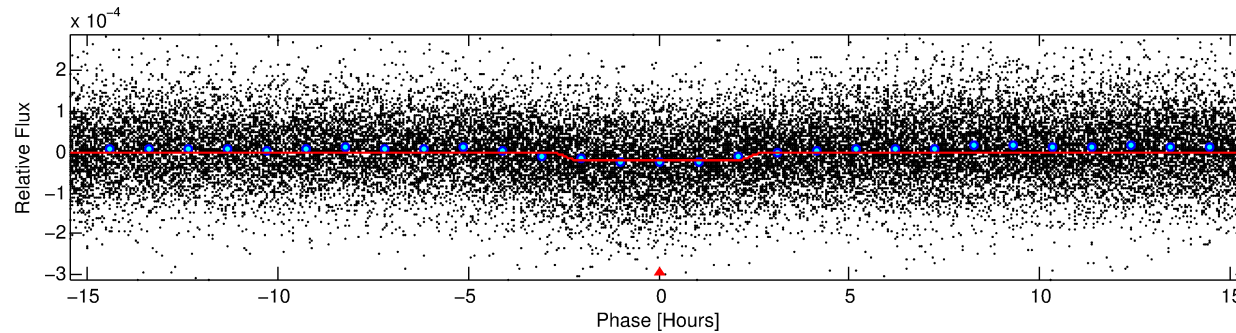
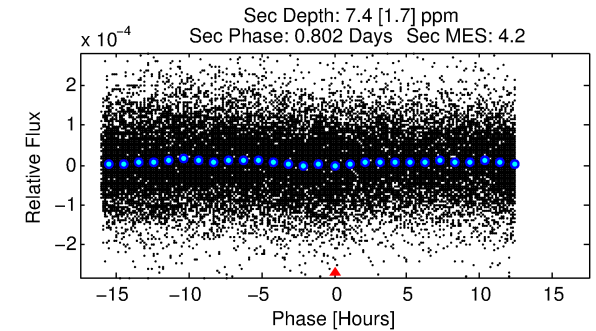
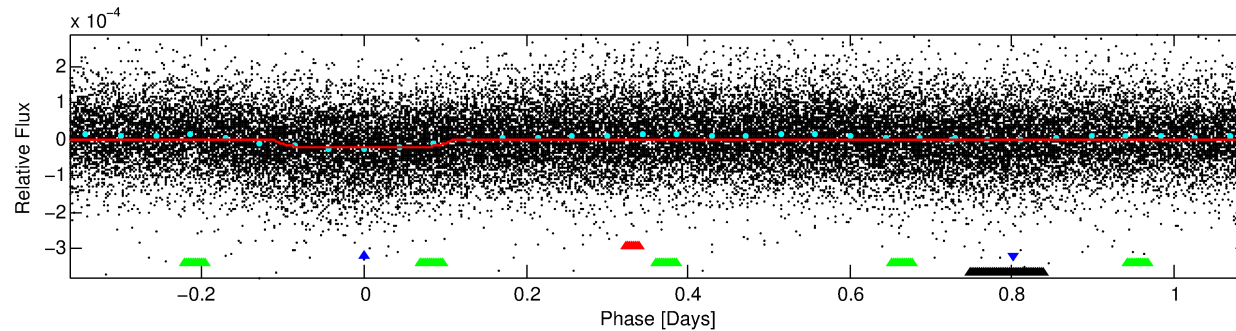
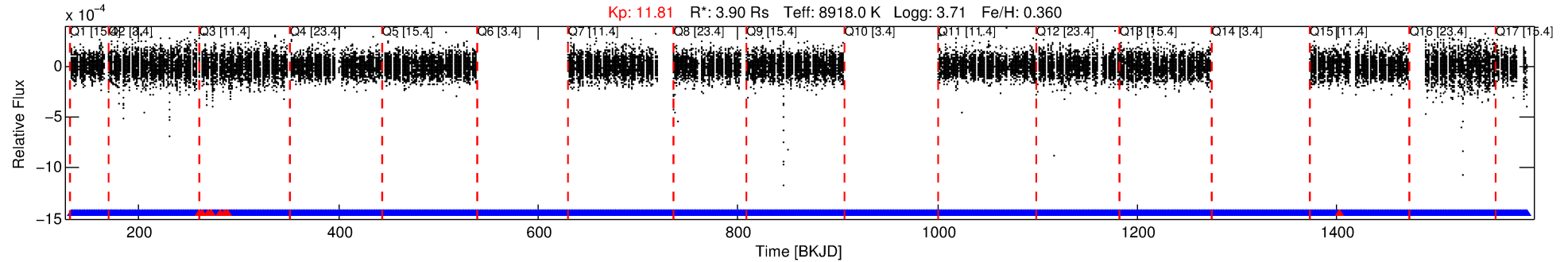
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 004171302-02

No Significant Match Found

# DV One-Page Summary

KIC: 4171302 Candidate: 2 of 4 Period: 1.456 d



## DV Fit Results:

Period = 1.45589 [0.00001] d  
Epoch = 132.2166 [0.0025] BKJD  
 $R_p/R^* = 0.0051$  [0.0007]  
 $a/R^* = 1.32$  [0.55]  
 $b = 0.91$  [0.18]  
 $\text{Seff} = 68254.70$  [44270.37]  
 $T_{\text{eq}} = 4122$  [668] K  
 $R_p = 2.15$  [0.92]  $R_e$   
 $a = 0.0355$  [0.0133] AU  
 $A_g = 1.12$  [0.77] [0.15] $\sigma$   
 $T_{\text{eff}} = 6550$  [752] K [2.41] $\sigma$

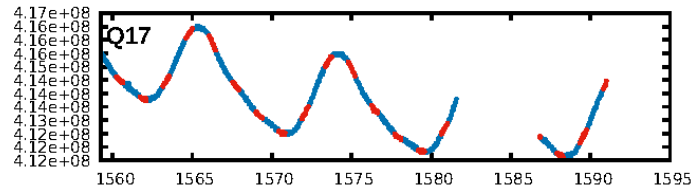
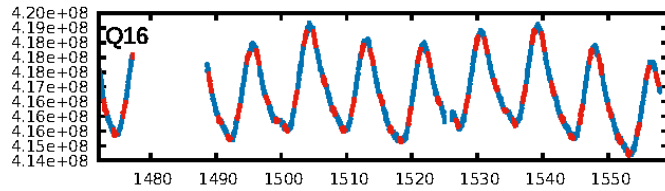
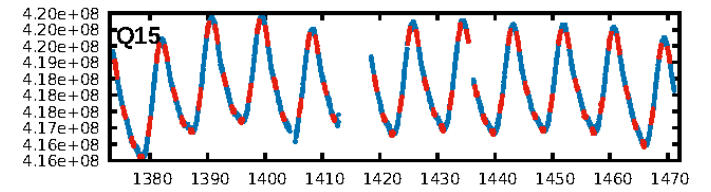
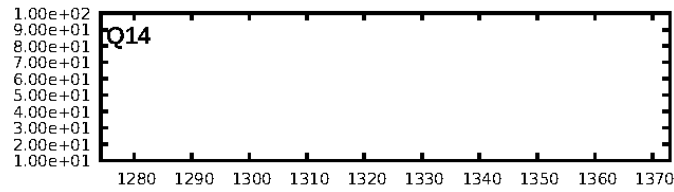
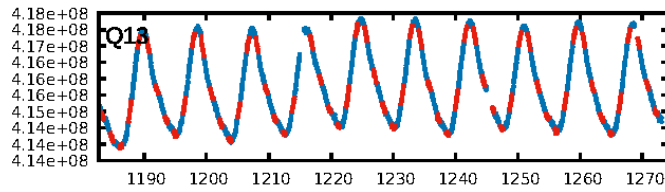
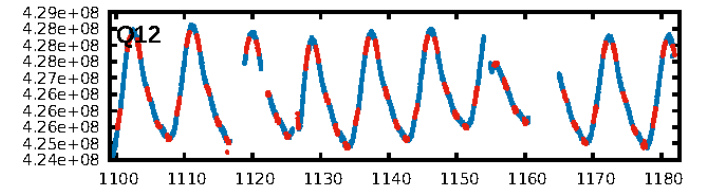
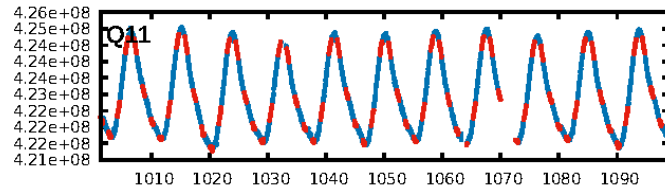
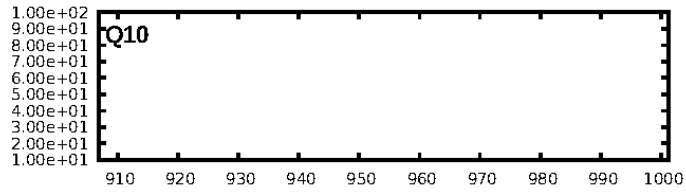
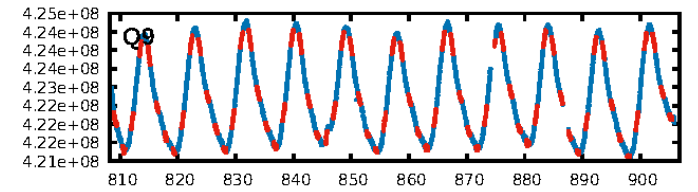
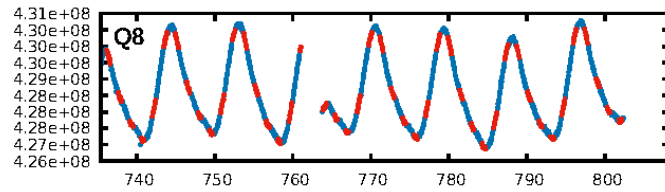
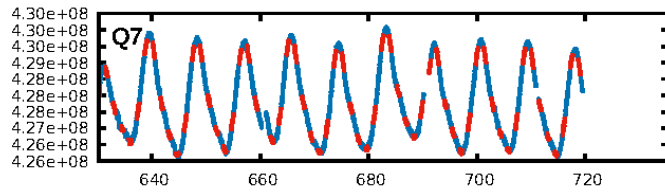
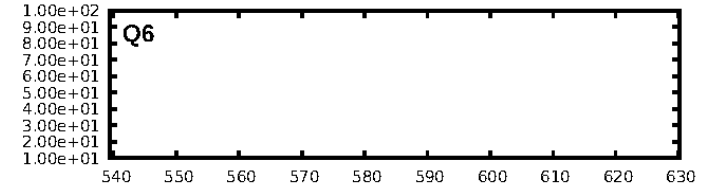
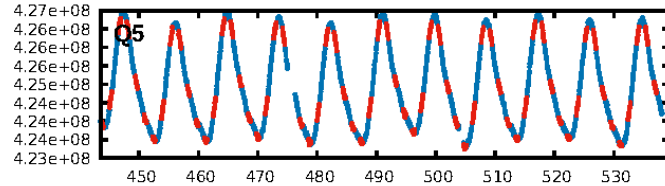
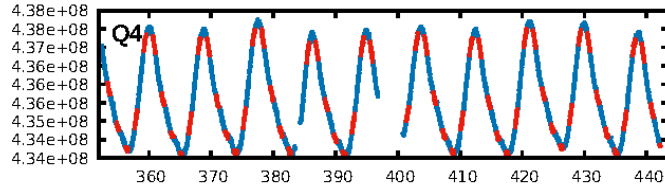
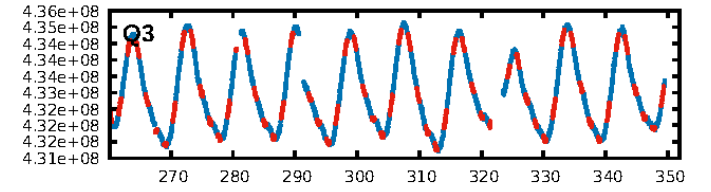
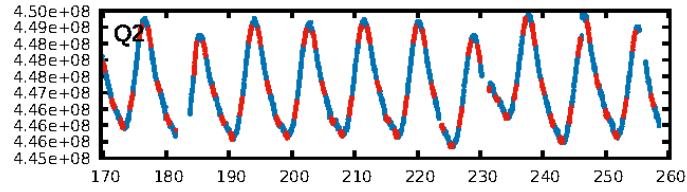
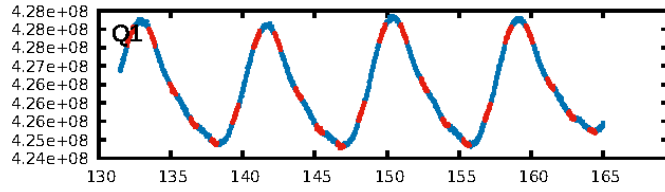
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 70.8% [1.05] $\sigma$   
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 1.47e-33  
RollingBand-fgt: 0.99 [575/583]  
GhostDiagnostic-chr: -0.6714  
Centroid-sig: N/A  
Centroid-so: 1.243 arcsec [2.01] $\sigma$   
OotOffset-rm: 0.805 arcsec [2.42] $\sigma$   
KicOffset-rm: 0.701 arcsec [2.10] $\sigma$   
OotOffset-st: 1/4/4/4 [13]  
KicOffset-st: 1/4/4/4 [13]  
DiffImageQuality-fgm: 1.00 [13/13]  
DiffImageOverlap-fno: 1.00 [14/14]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 14:03:50 Z

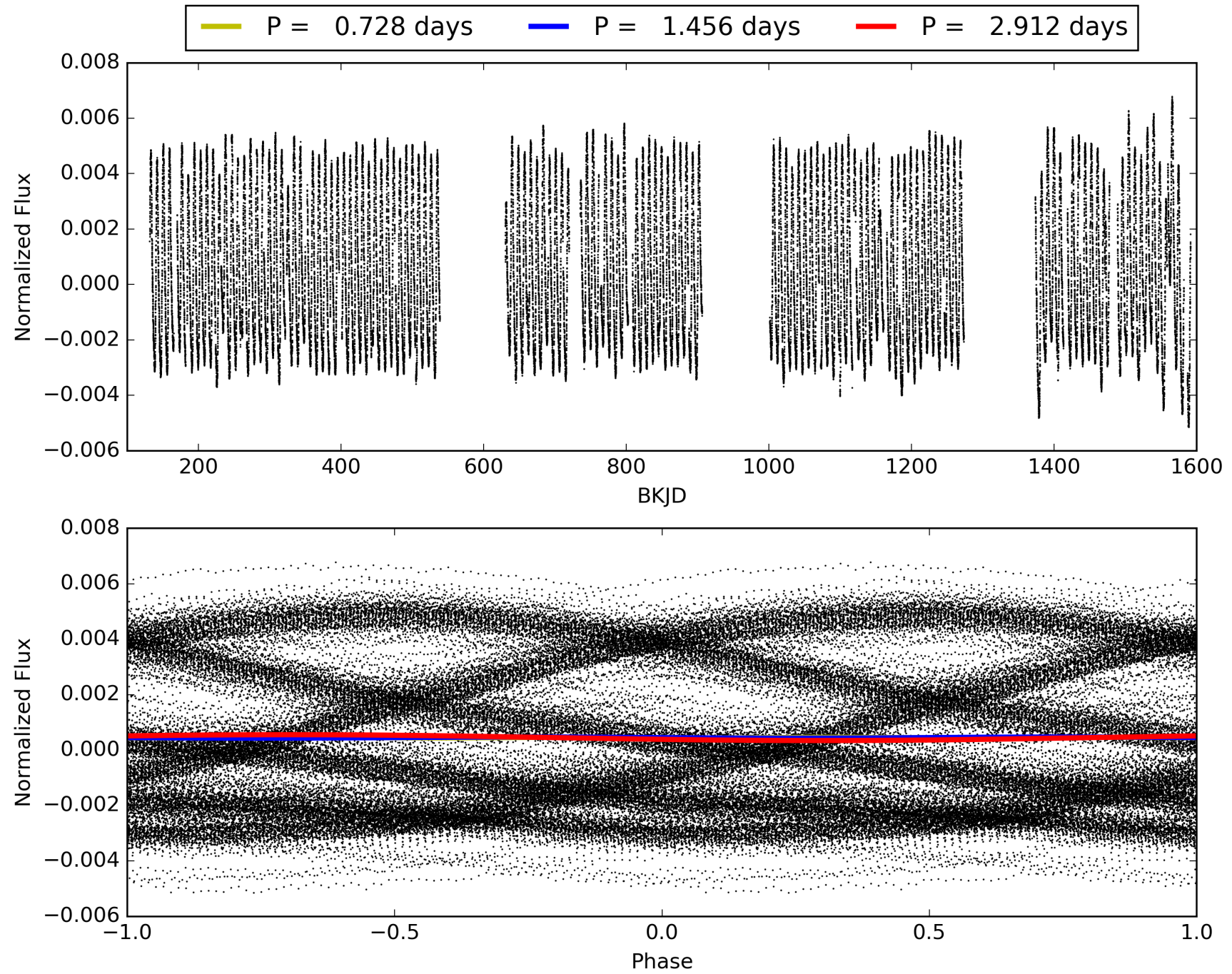
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 004171302-02, PDC Light Curves





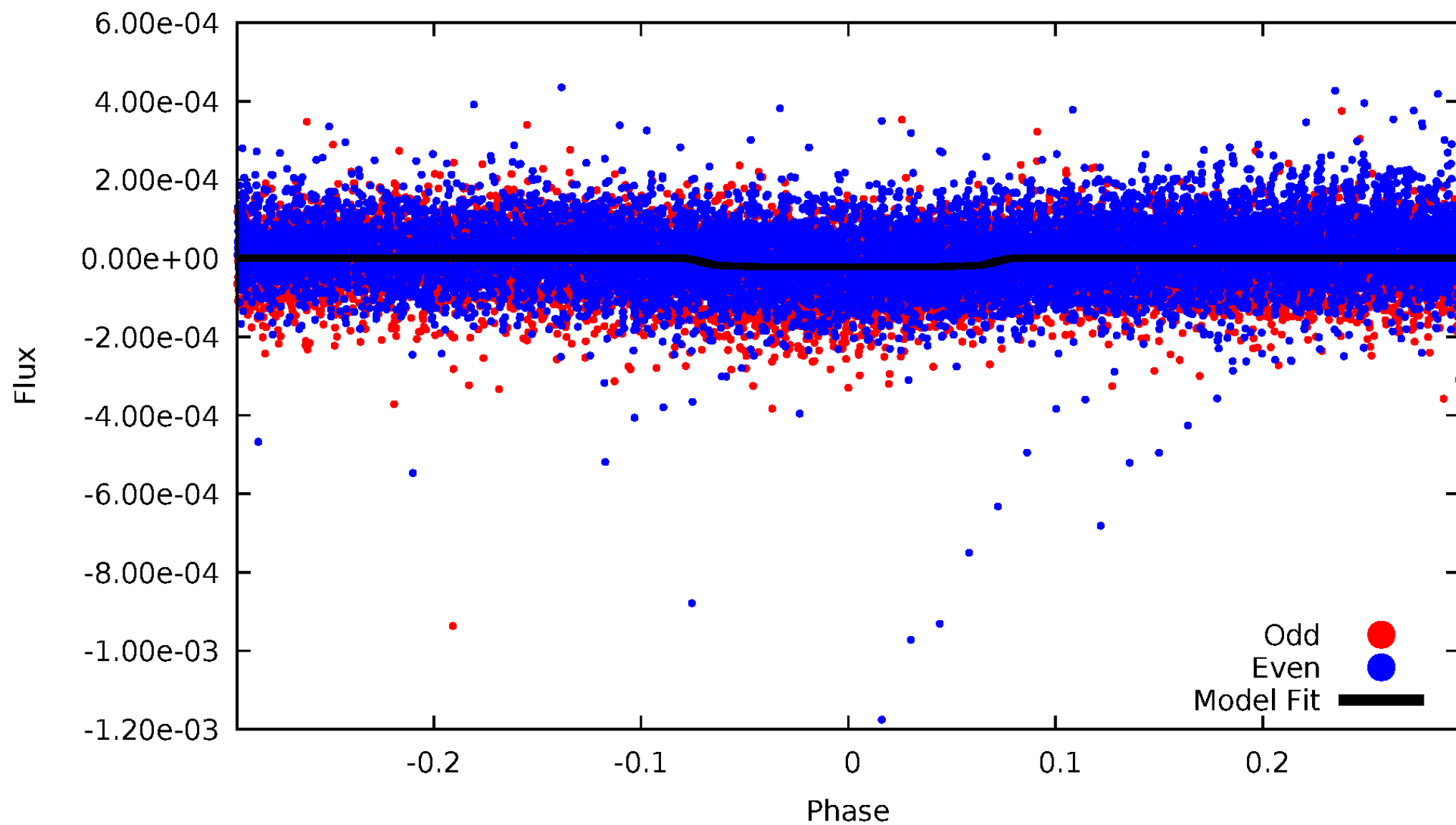
TCE 004171302-02





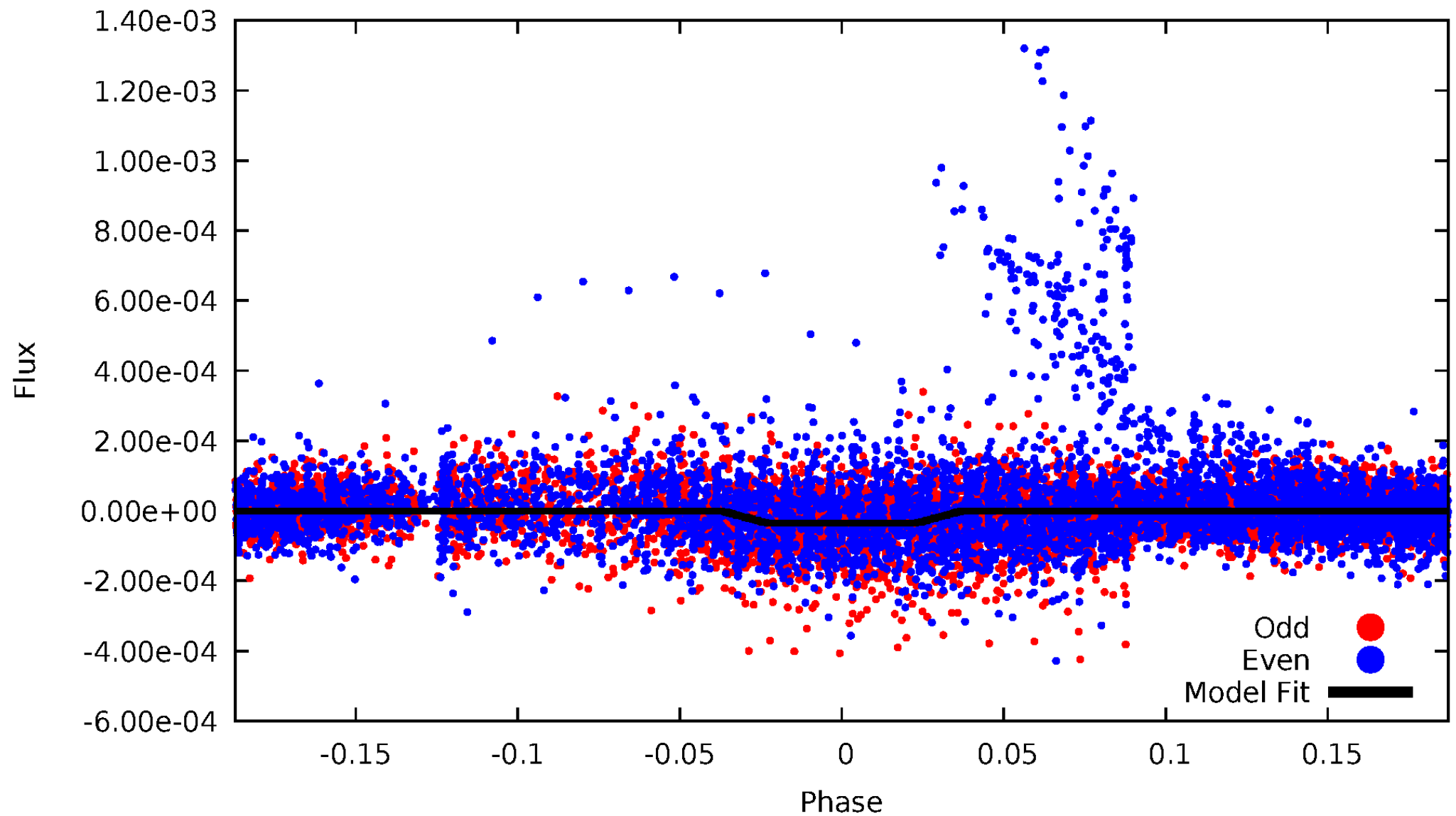
# DV Odd/Even

TCE 004171302-02



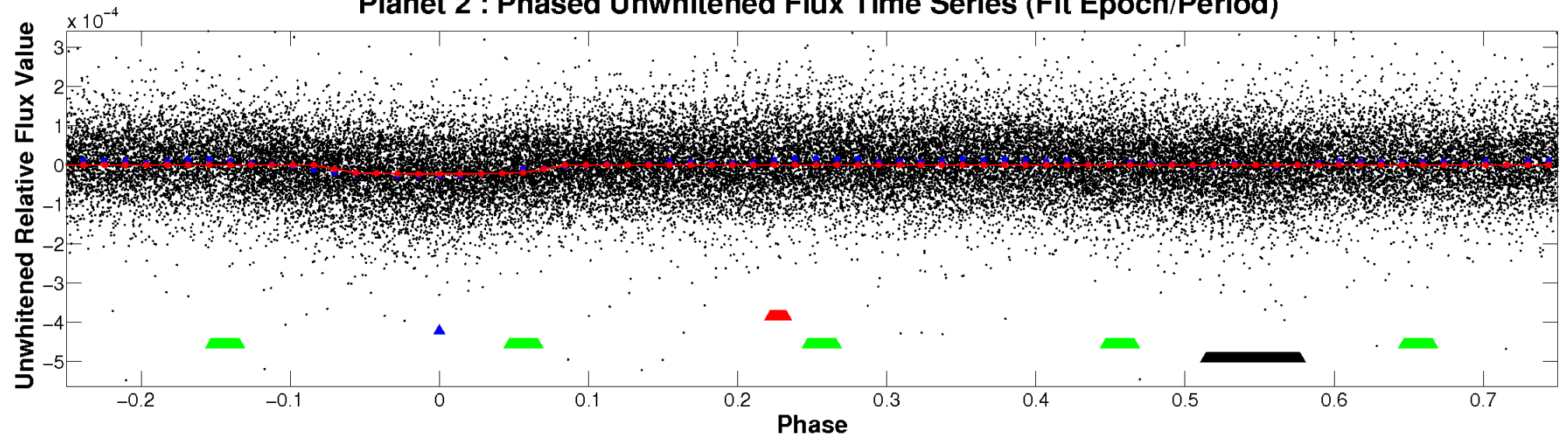
# ALT Odd/Even

TCE 004171302-02

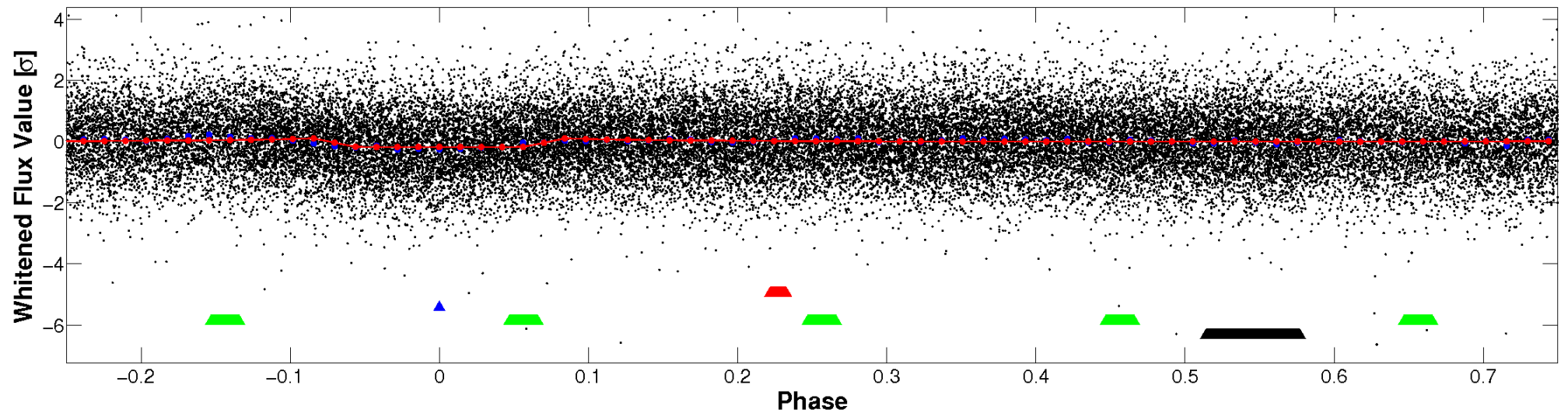


# Non-Whitened Vs. Whitened Light Curve

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

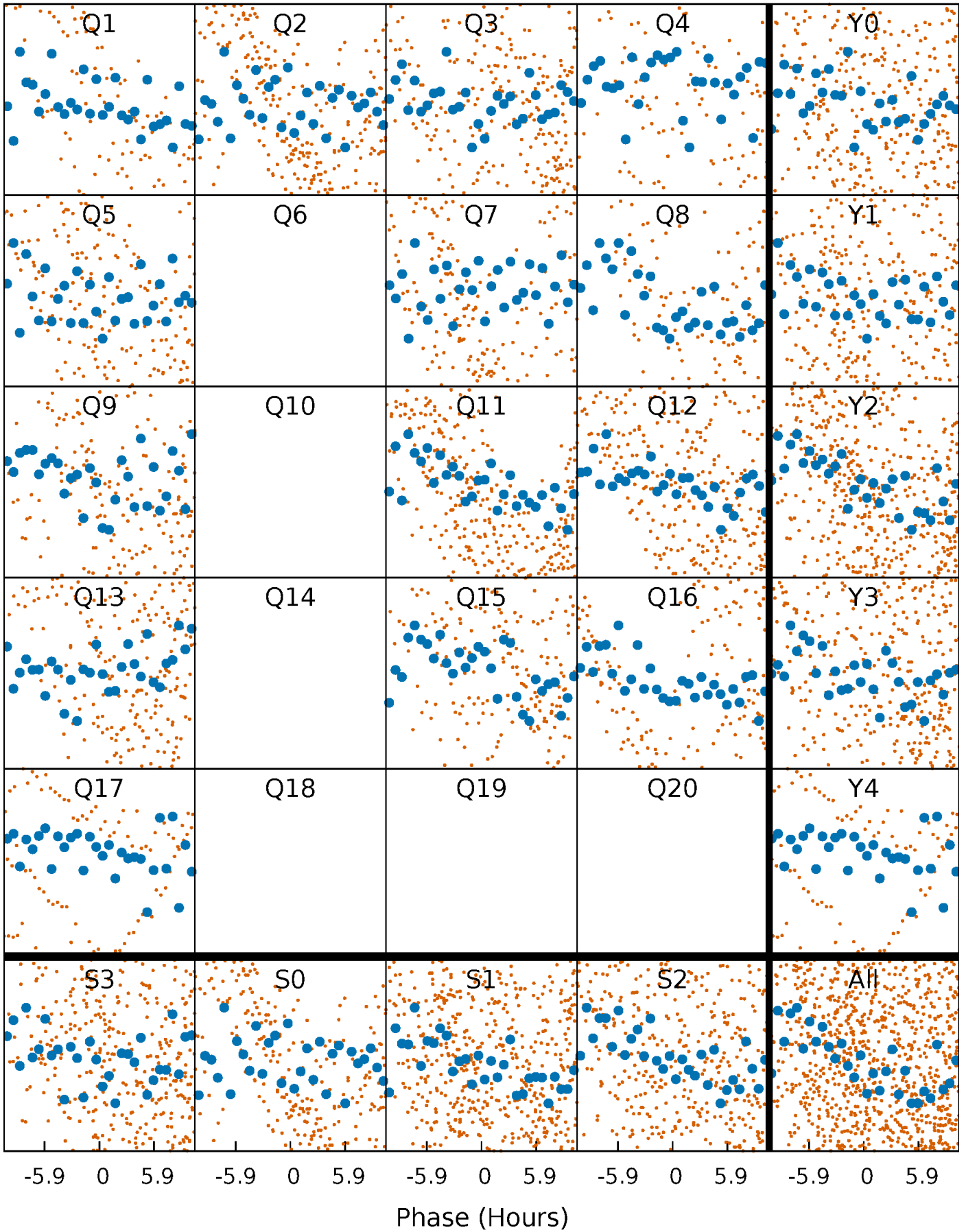


**Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



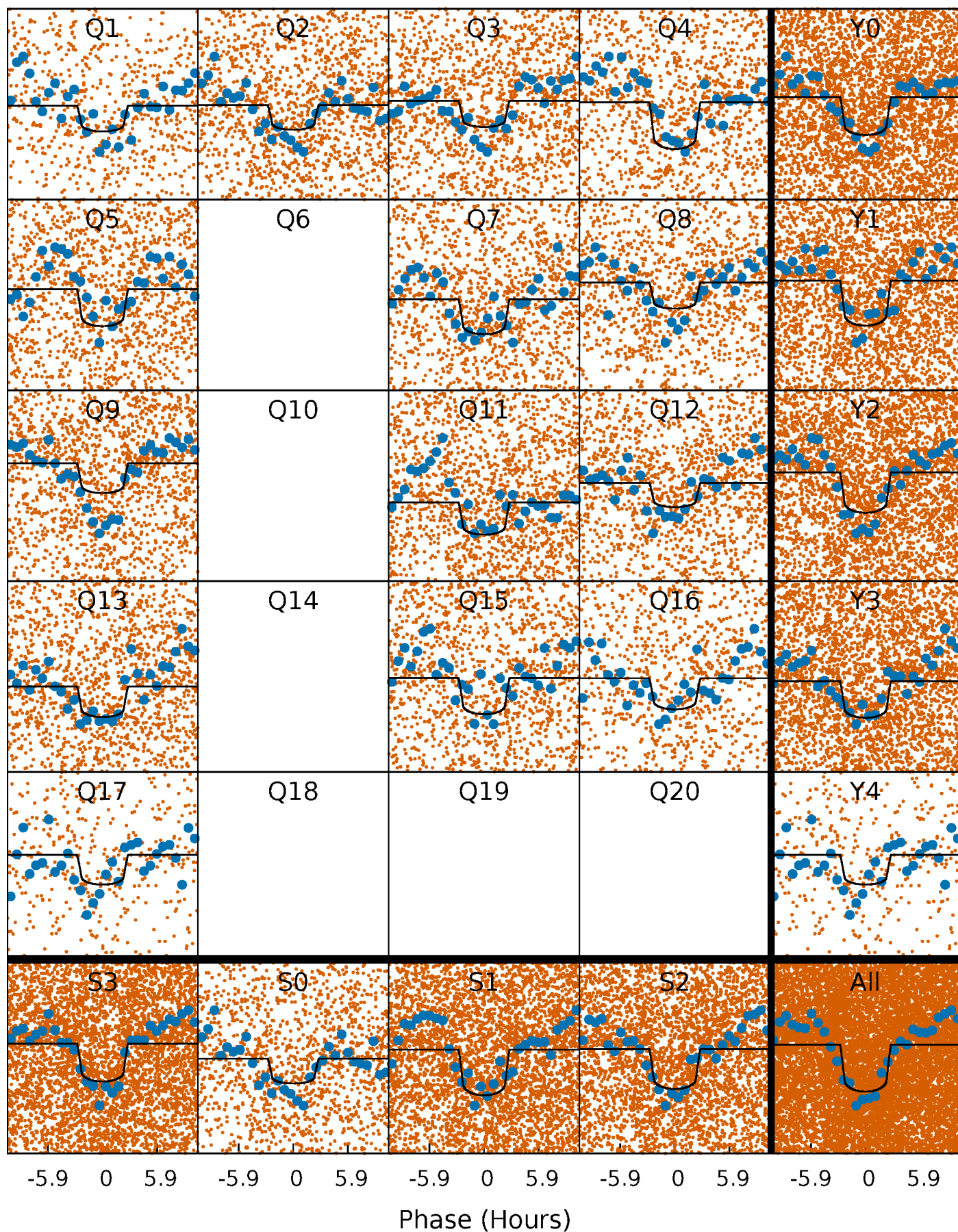
# PDC Quarter-Phased Transit Curves

TCE 004171302-02   P= 1.455886 Days    $T_0=132.216589$  (BKJD)



# DV Quarter-Phased Transit Curves

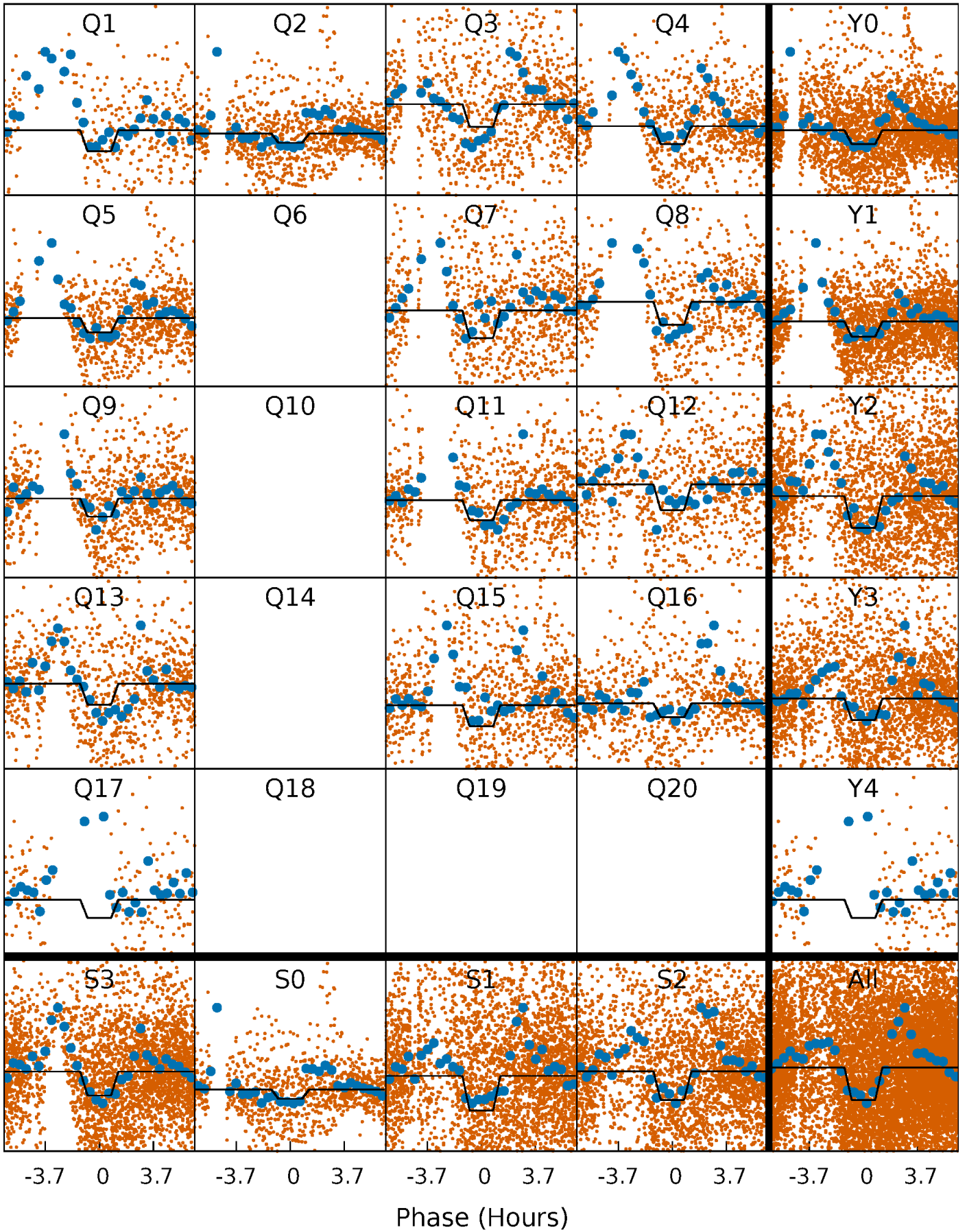
TCE 004171302-02 P= 1.455886 Days  $T_0=132.216589$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

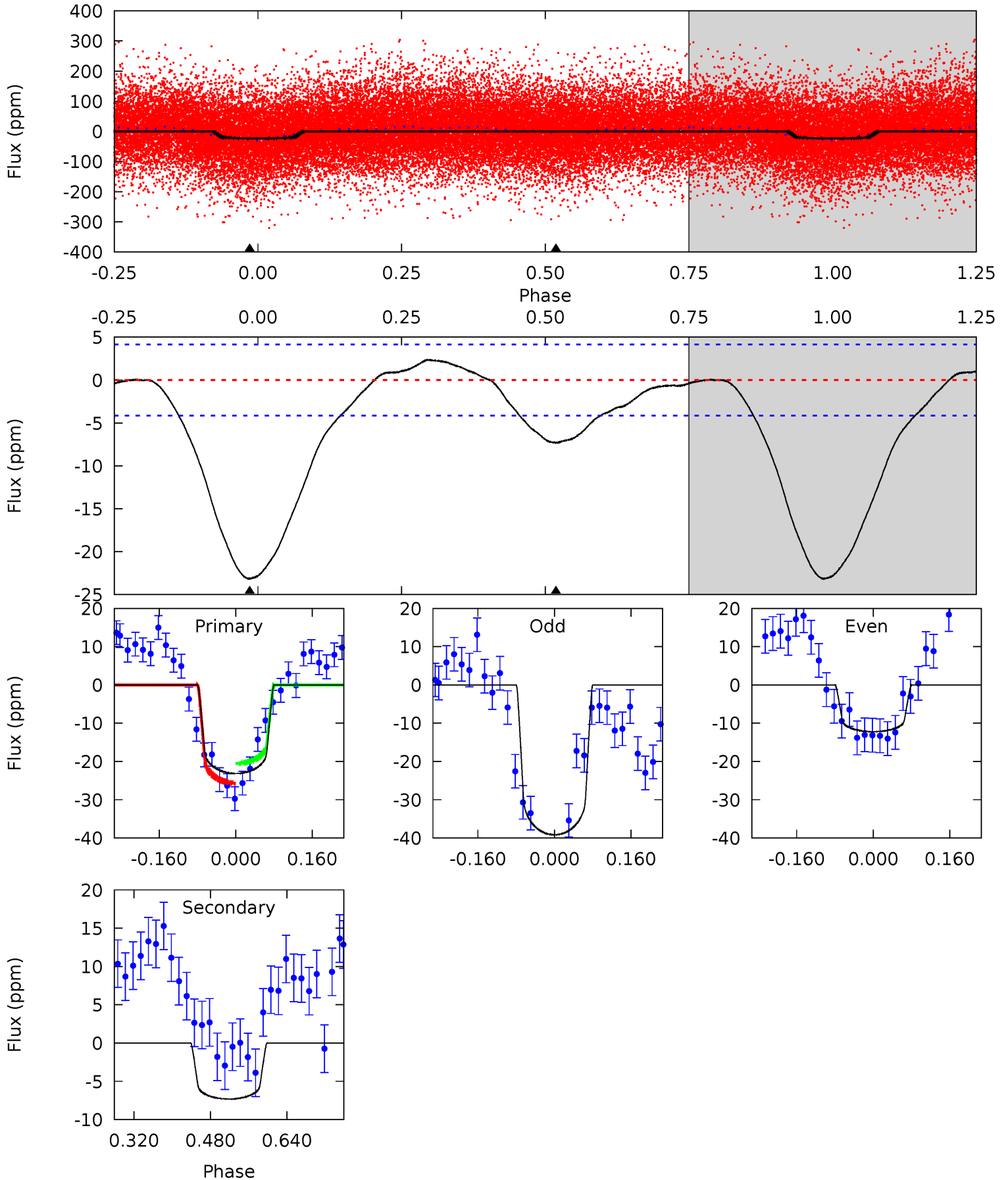
TCE 004171302-02   P= 1.455813 Days    $T_0=132.252629$  (BKJD)



# DV Model-Shift Uniqueness Test

004171302-02, P = 1.455886 Days, E = 130.760703 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
24.9	7.87	0	0	4.47	1.40	1.60	24.9	24.9	7.87	7.87	14.5	1.45	0.09	2.82

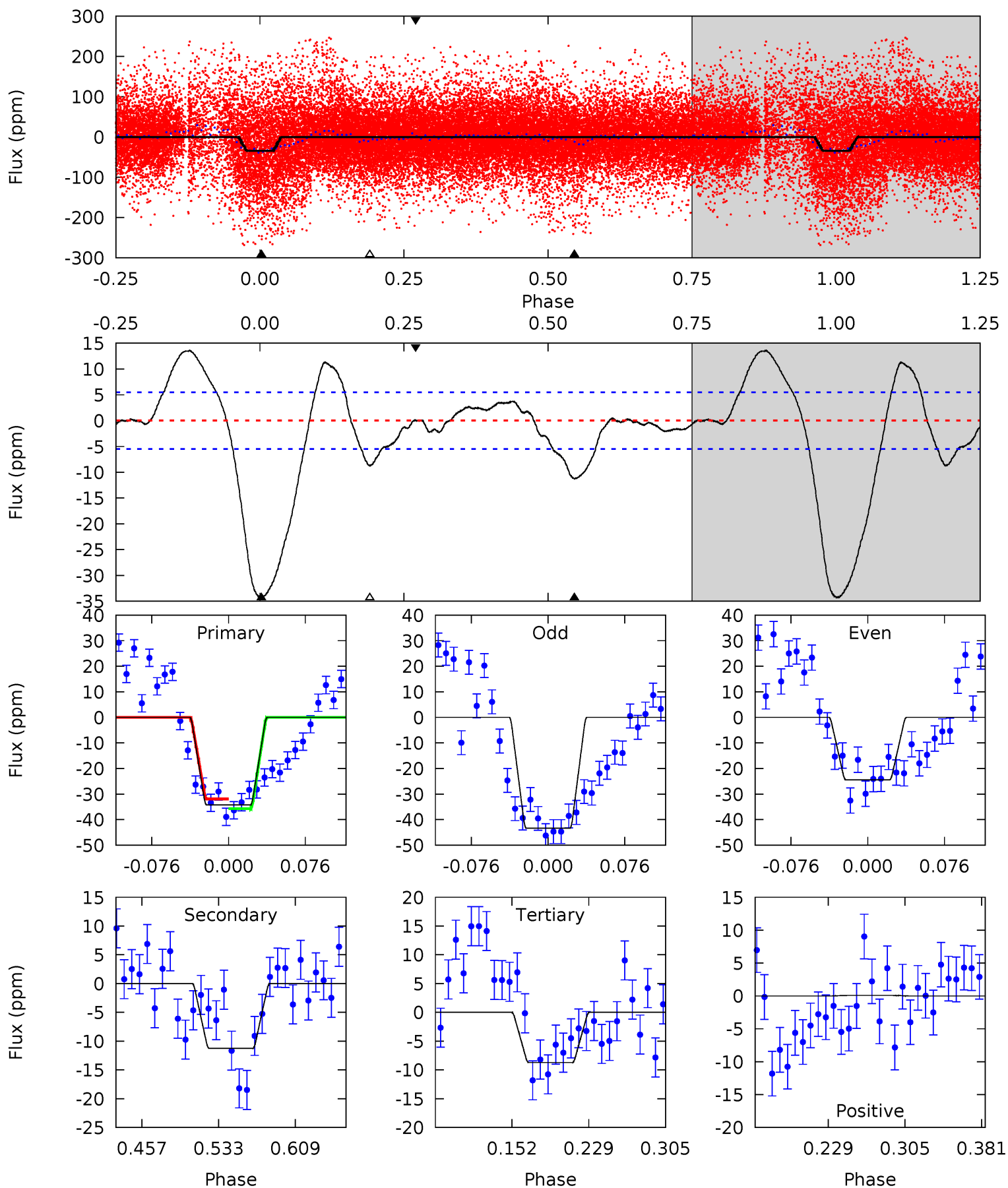




# Alt Model-Shift Uniqueness Test

004171302-02, P = 1.455813 Days, E = 130.796816 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
28.8	9.45	7.33	0.07	4.62	1.77	3.81	21.5	28.7	2.12	9.38	8.02	1.03	0.28	1.59



### Stellar Parameters For KIC 004171302

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$8918^{+418}_{-627}$	$3.706^{+0.338}_{-0.156}$	$0.360^{+0.050}_{-0.150}$	$3.895^{+1.048}_{-1.572}$	$2.813^{+0.271}_{-0.587}$	$0.067^{+0.174}_{-0.030}$
	+5%/-7%	+9%/-4%	+14%/-42%	+27%/-40%	+10%/-21%	+259%/-45%
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 004171302-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-7 \pm 1$	$2.02^{+0.50}_{-0.44}$	$5623^{+534}_{-639}$	$5728^{+639}_{-581}$	$1.212^{+0.741}_{-0.441}$
Alt.	$-11 \pm 1$	$2.43^{+0.52}_{-0.54}$	$5599^{+587}_{-623}$	$5938^{+610}_{-580}$	$1.304^{+0.889}_{-0.414}$

$T_{\text{max}}$  = 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

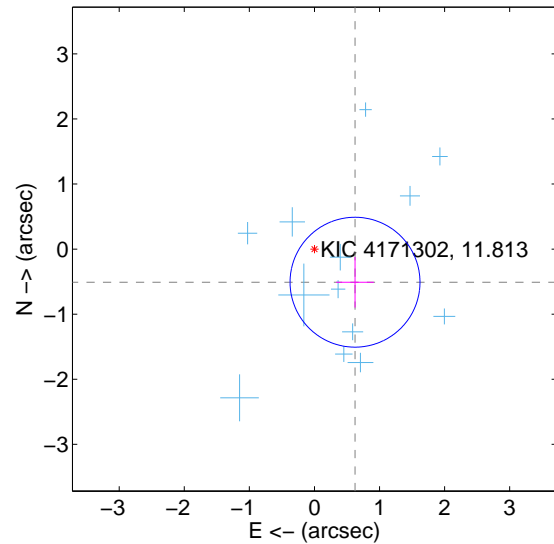
Supplemental centroid analysis for 004171302-02. **Kepler magnitude: 11.81.** Transit SNR 14.59

There are 13 quarters with good PRF difference image offsets

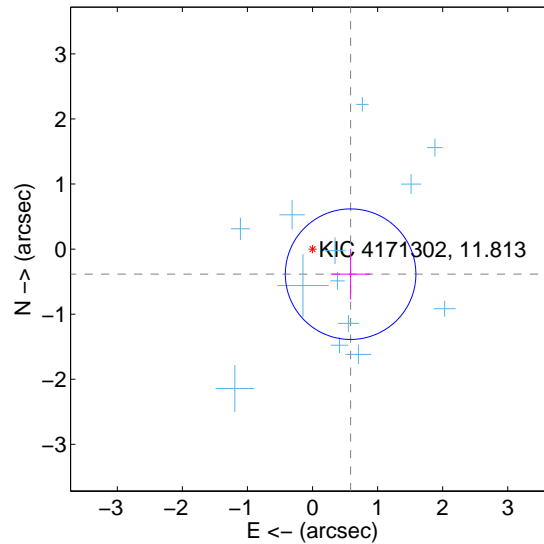
The direct PRF centroid is offset from the target star catalog position by about 0.15 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.805 \pm 0.333$	2.42	$-0.624 \pm 0.289$	$-0.509 \pm 0.389$
PRF-fit source offset from KIC position	$0.701 \pm 0.334$	2.10	$-0.585 \pm 0.307$	$-0.385 \pm 0.390$
photometric centroid source offset	$1.24 \pm 0.62$	2.01	$0.91 \pm 0.63$	$0.85 \pm 0.61$

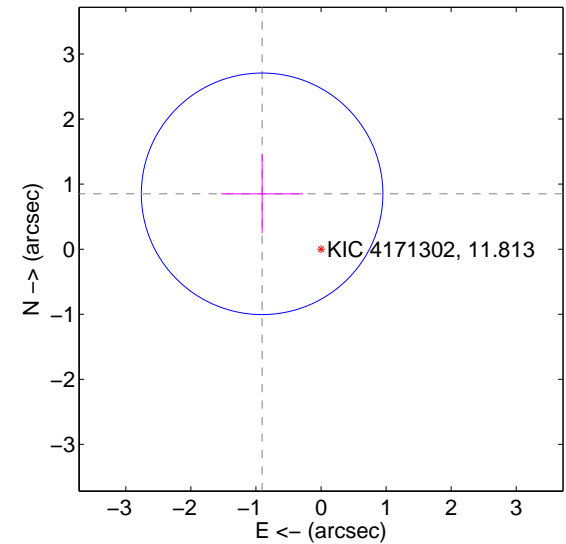
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

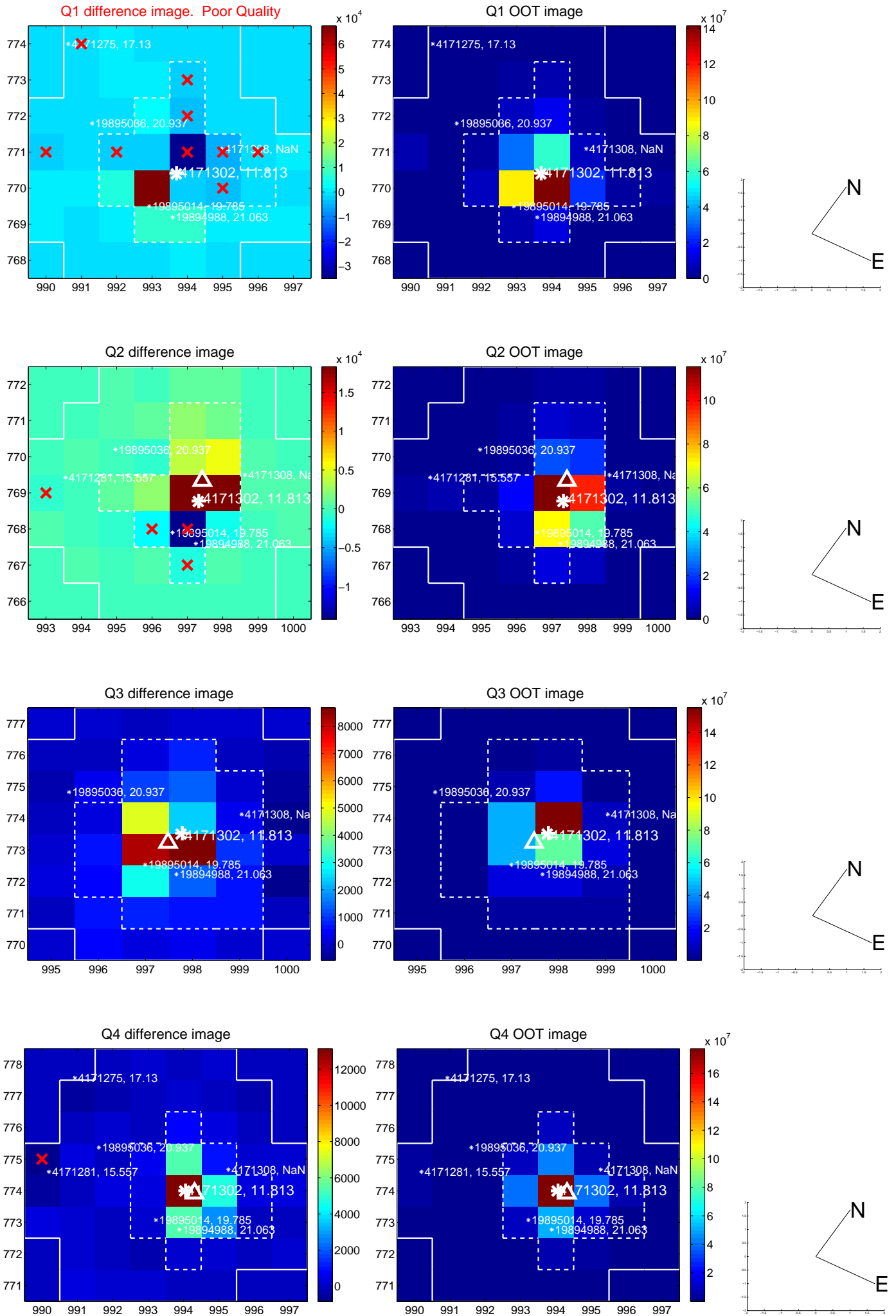


offset from photometric centroids

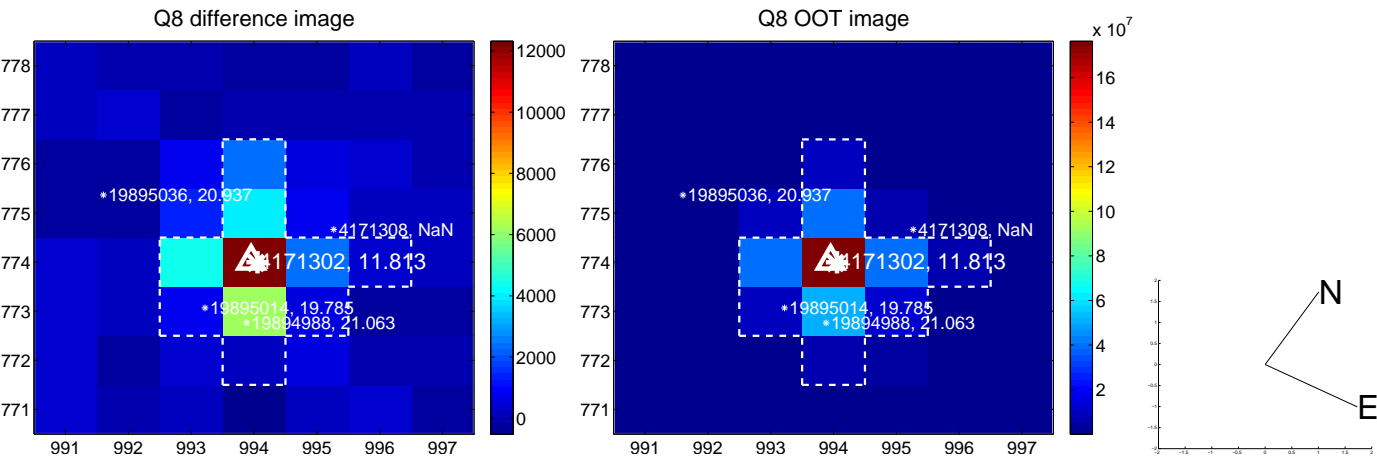
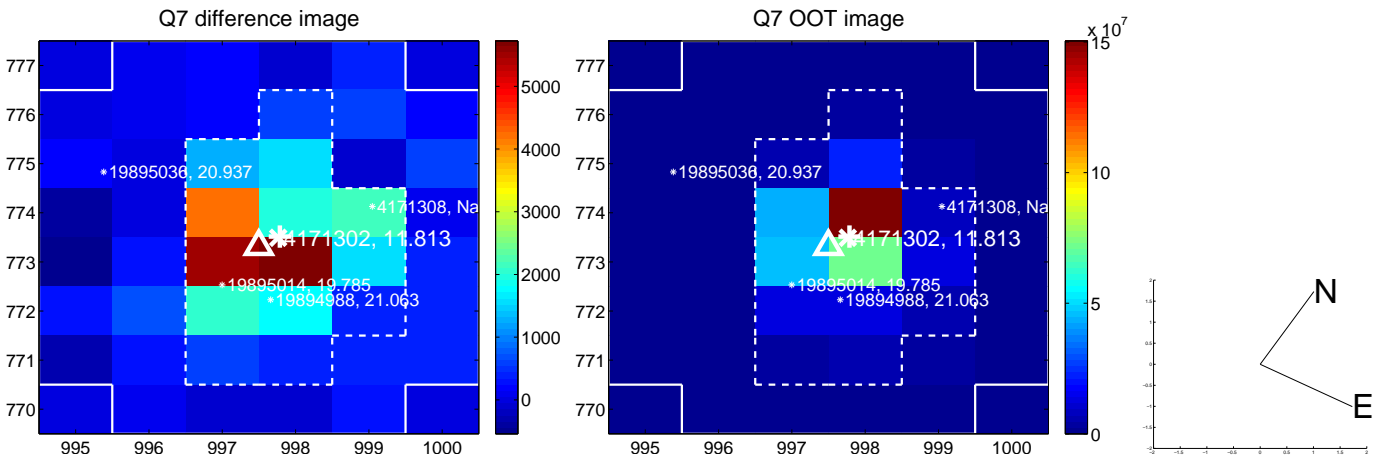
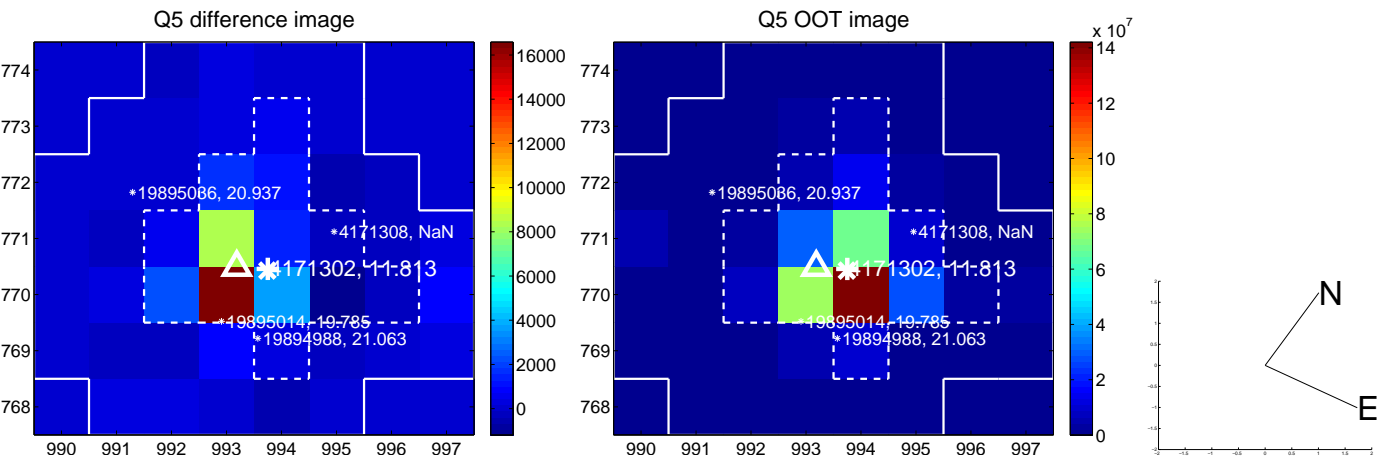


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

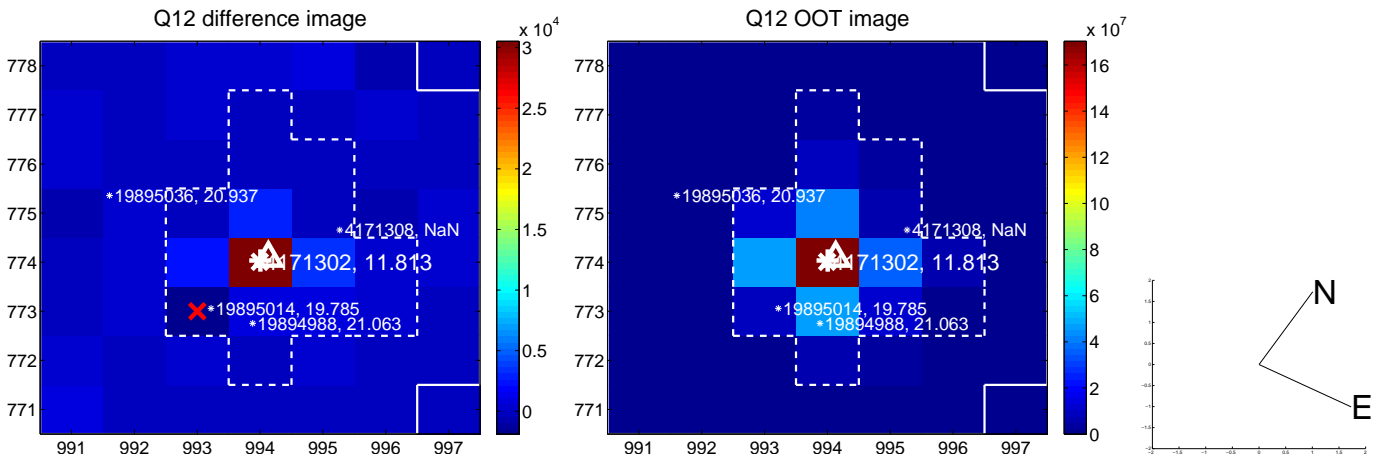
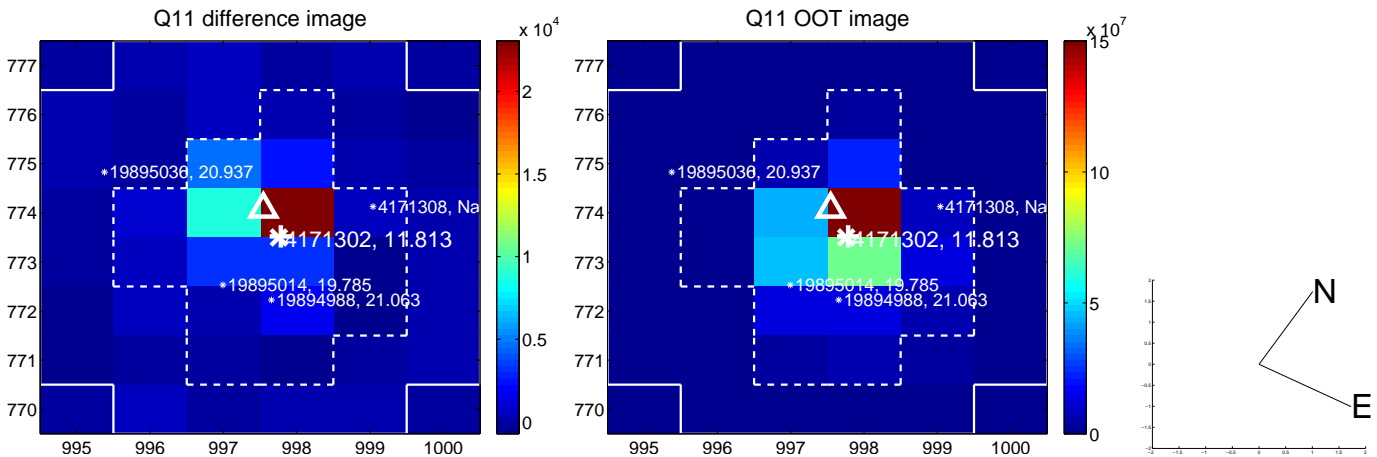
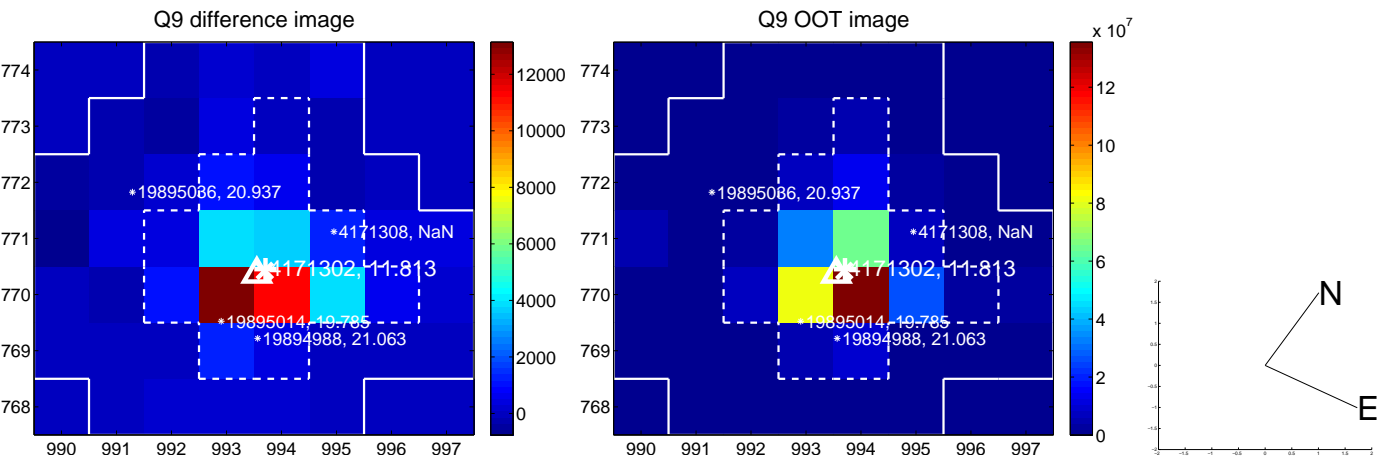
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



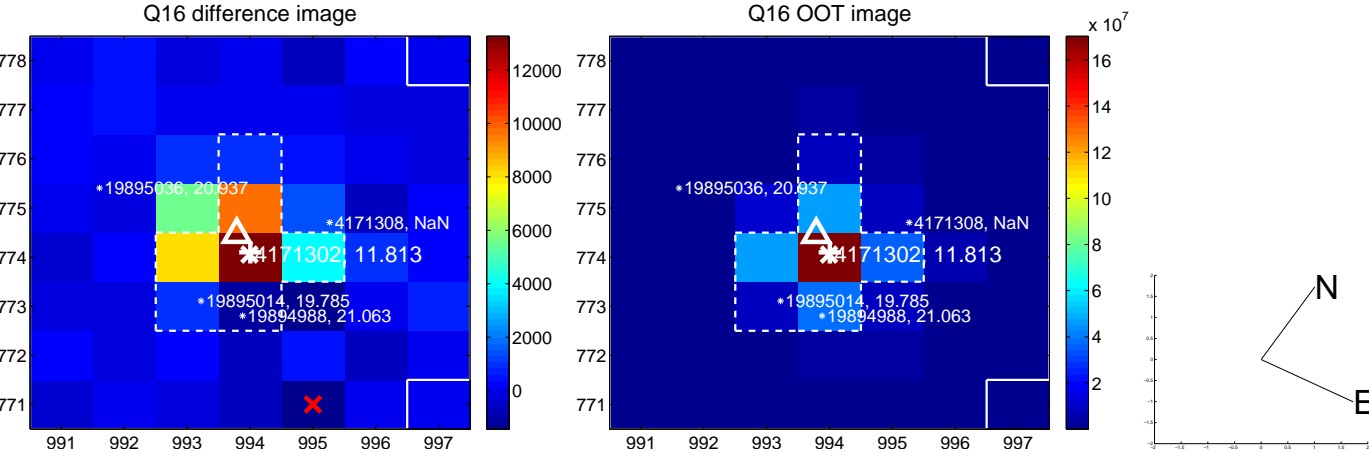
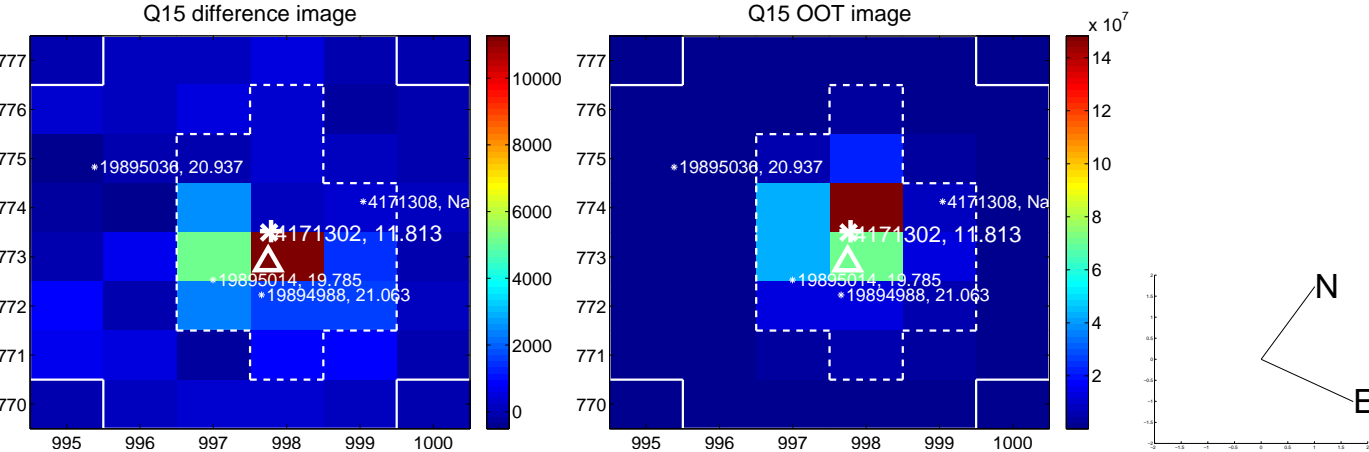
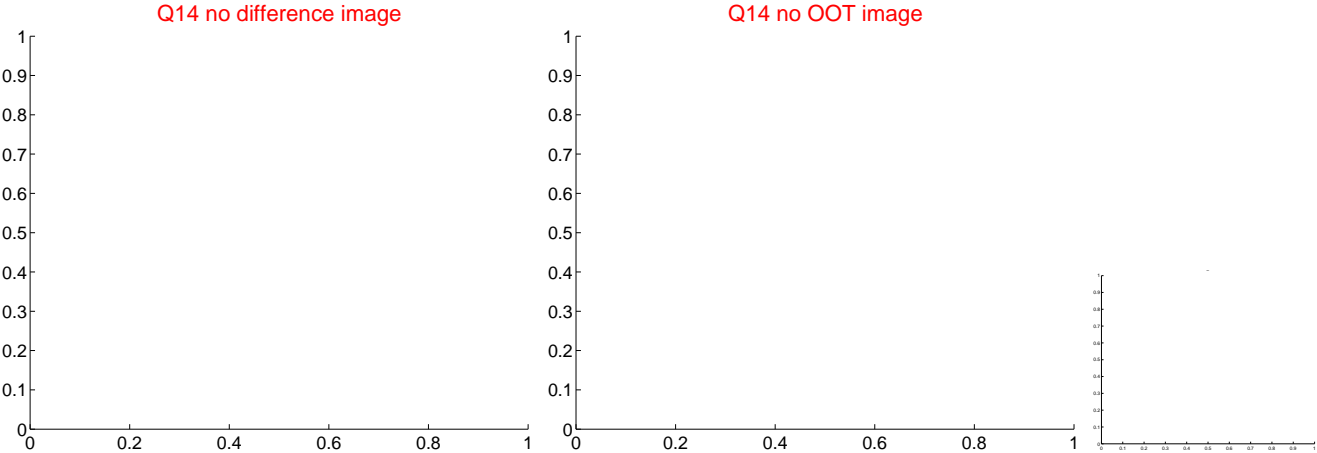
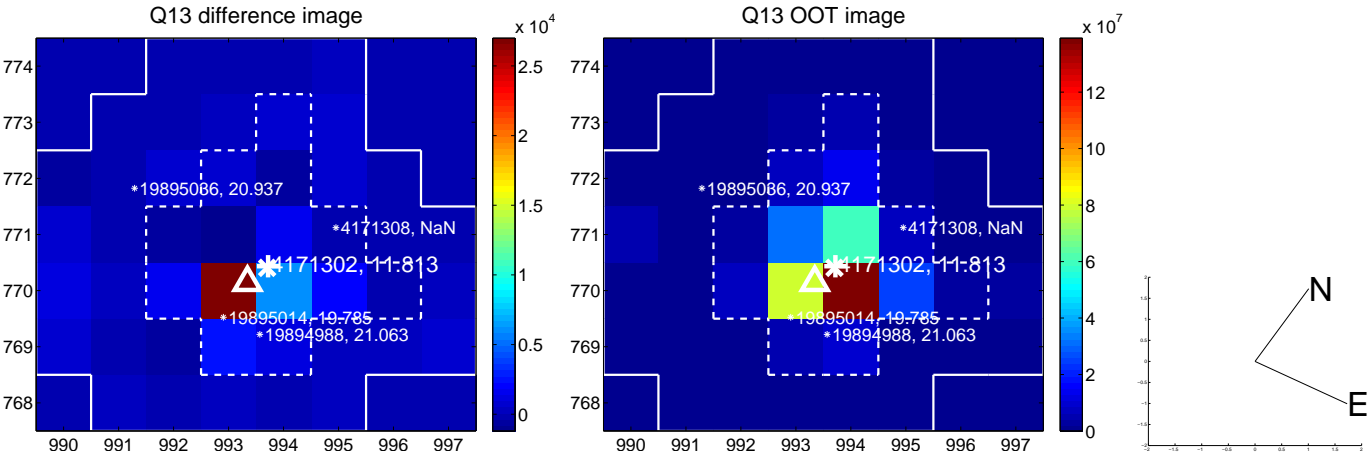
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

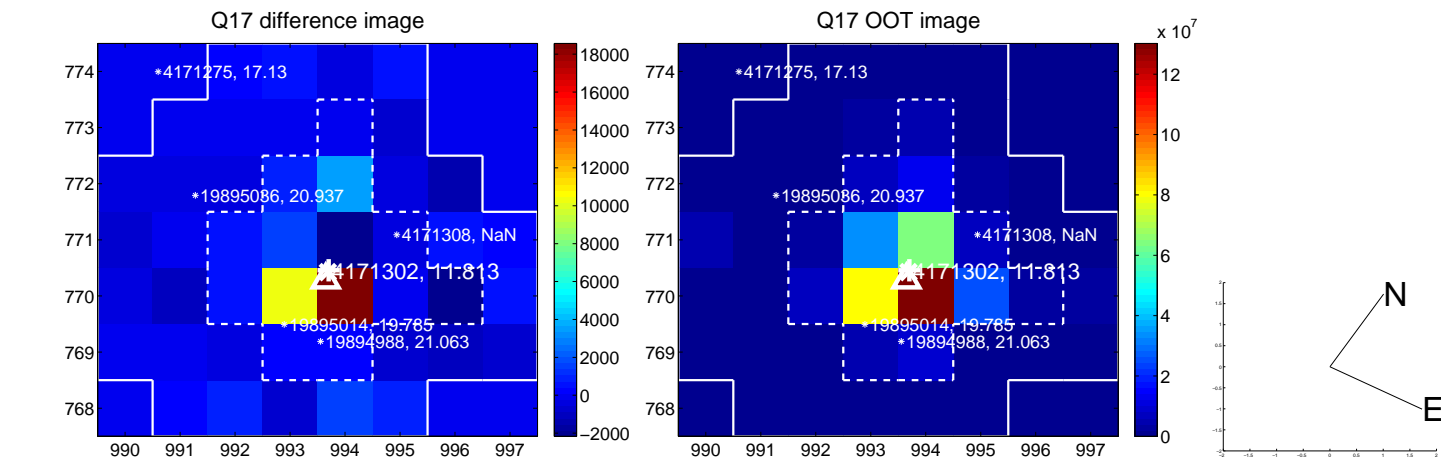


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

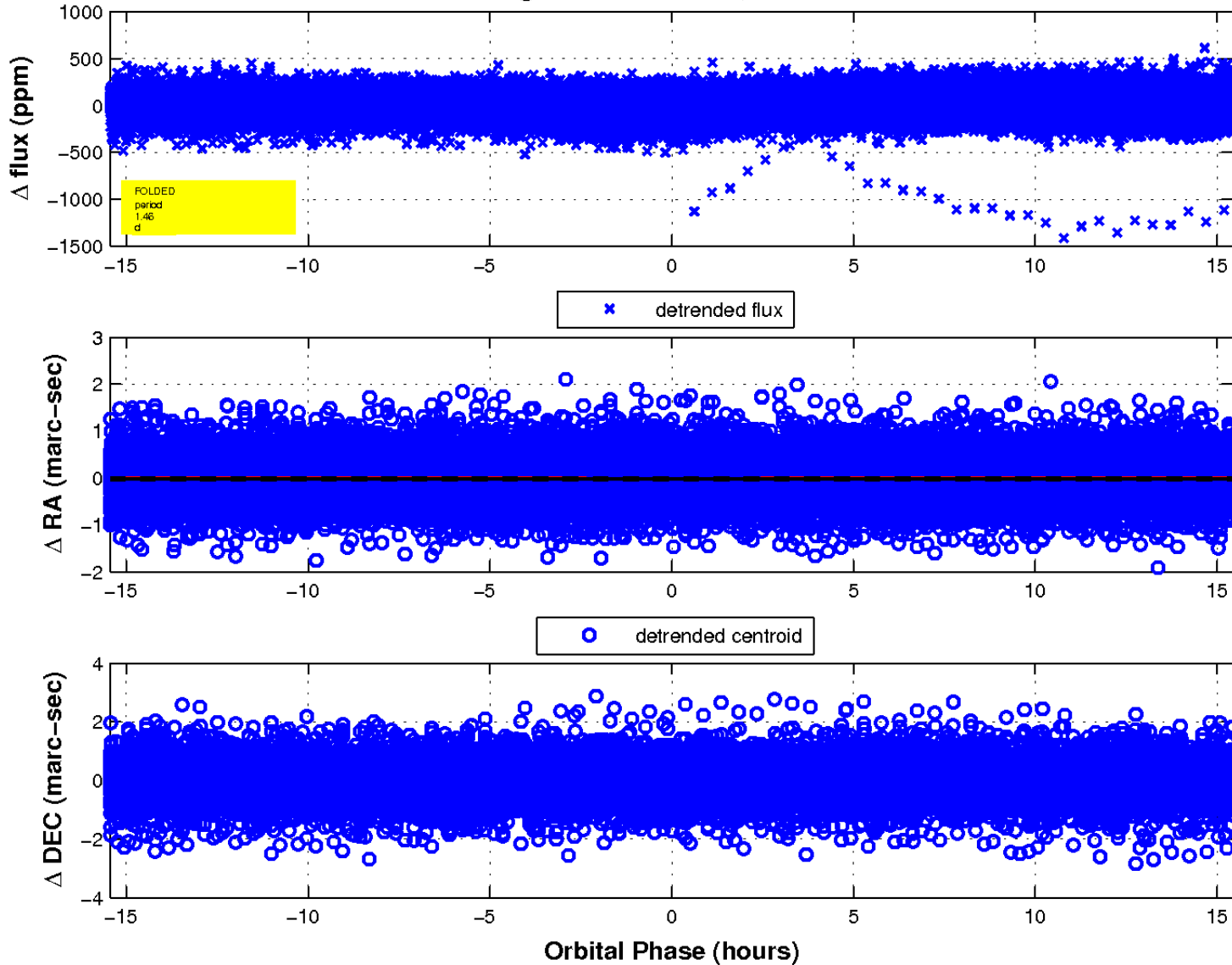




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

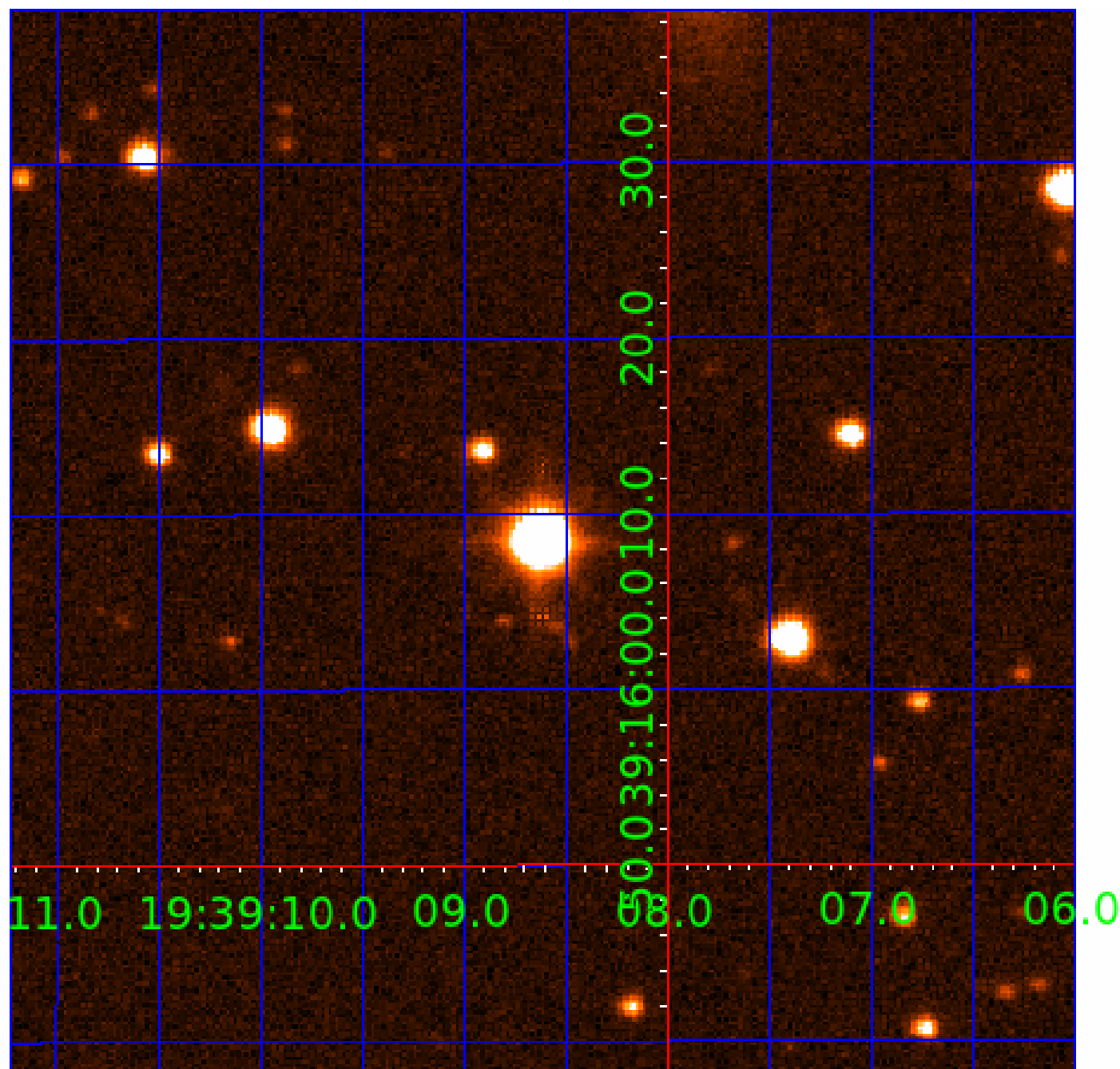


fluxWeightedCentroids, Planet 2 of 4



UKIRT Image

Declination



# KIC 004171302

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004171302-01	OBS	No	8.735223	139.834669	79.7	14.861	14.4	16.1	3.90	8918	6.70	6260.43
004171302-02	OBS	No	1.455886	132.216589	22.5	5.150	15.5	14.6	3.90	8918	2.15	68254.70
004171302-03	OBS	No	1.747031	132.312513	1.5	4.185	14.7	0.8	3.90	8918	0.55	53526.46
004171302-04	OBS	No	4.367933	134.421149	43.6	9.524	15.4	18.2	3.90	8918	2.98	15773.74

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004171302-01	OBS	FP	0.00	1	0	1	0	LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—HALO_GHOST
004171302-02	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD
004171302-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—SAME_NTL_PERIOD—CENT_FEW_DIFFS
004171302-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—SWEET_NTL—LPP_DV—MOD_NONUNIQ_DV—SAME_NTL_PERIOD

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

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

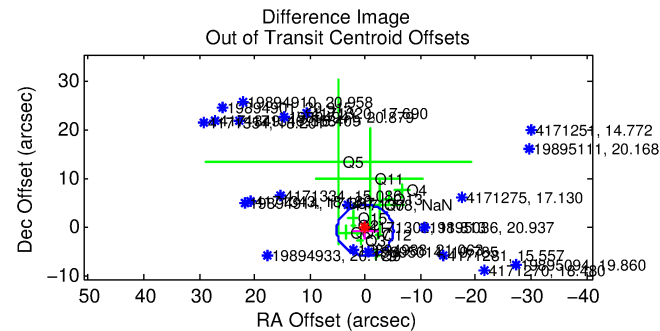
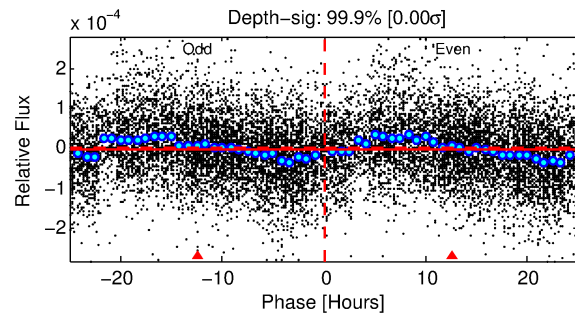
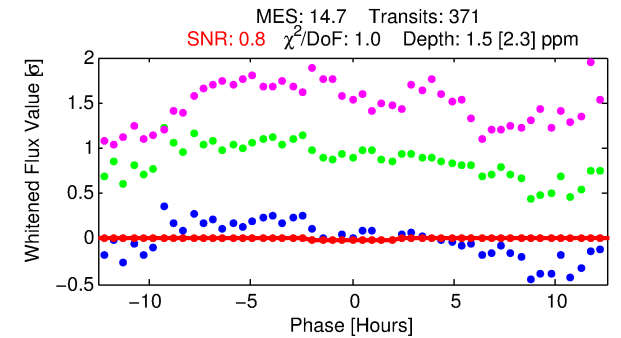
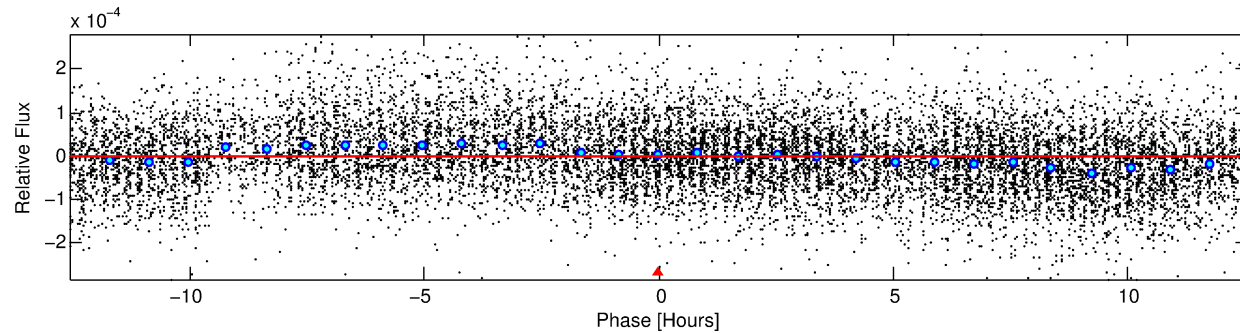
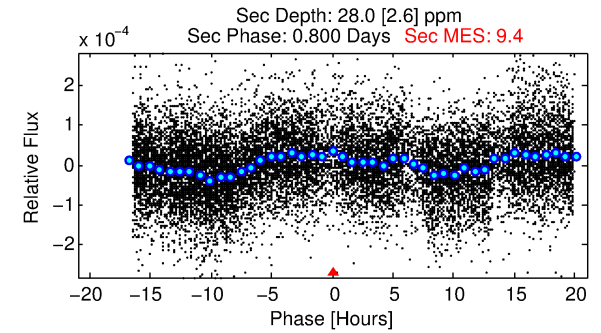
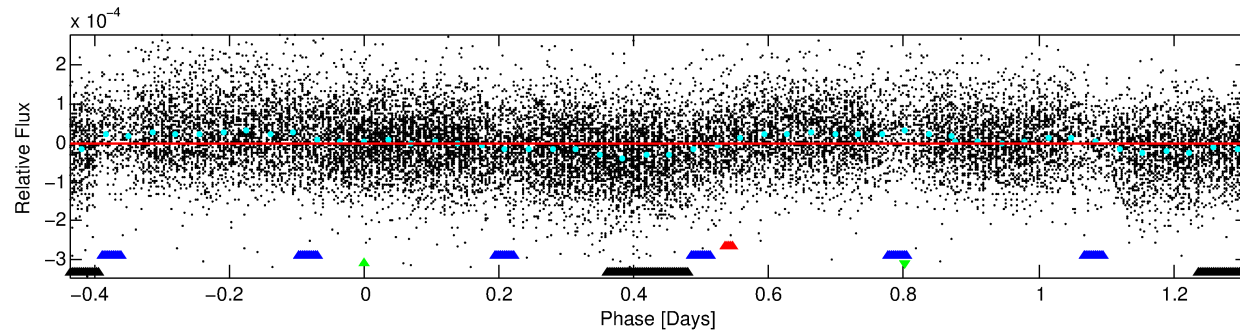
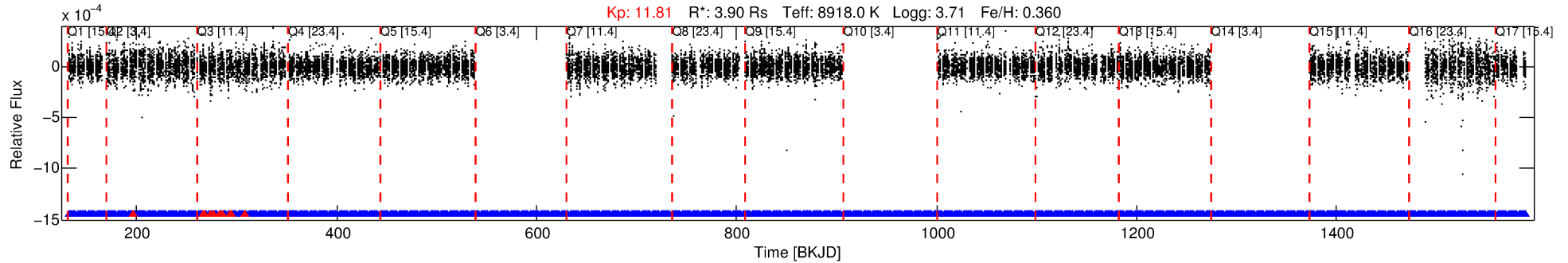
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 004171302-03

No Significant Match Found

# DV One-Page Summary

KIC: 4171302 Candidate: 3 of 4 Period: 1.747 d



## DV Fit Results:

Period = 1.74703 [0.00021] d  
Epoch = 132.3125 [0.0540] BKJD  
Rp/R\* = 0.0013 [0.0011]  
a/R\* = 1.68 [2.89]  
b = 0.90 [0.57]  
Seff = 53526.46 [34717.56]  
Teq = 3879 [629] K  
Rp = 0.55 [0.52] Re  
a = 0.0401 [0.0150] AU  
Ag = 80.81 [143.83] [0.55σ]  
Teff = 17980 [7662] K [1.83σ]

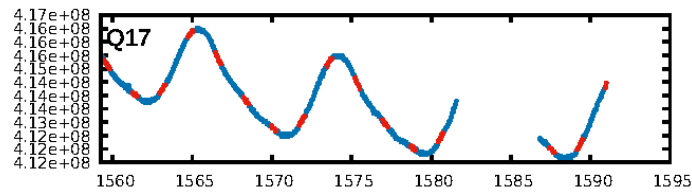
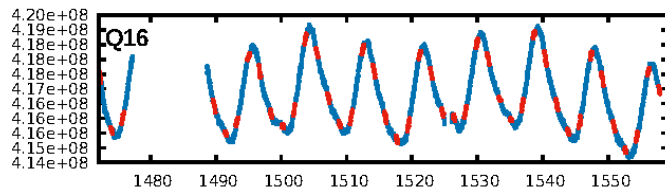
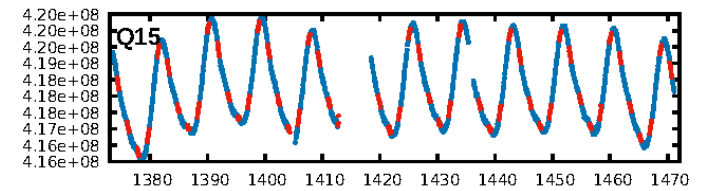
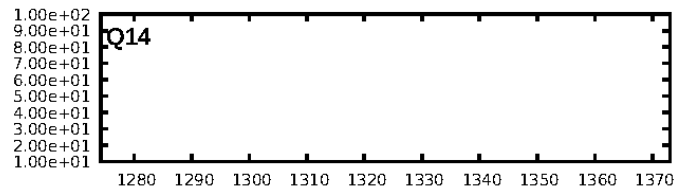
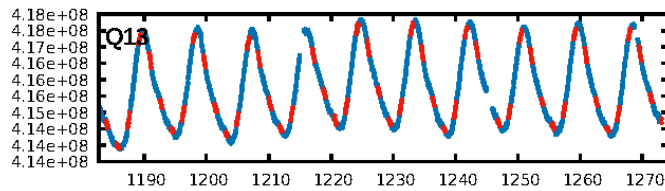
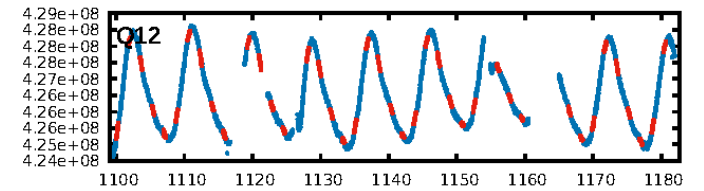
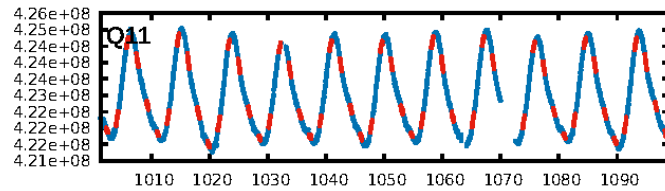
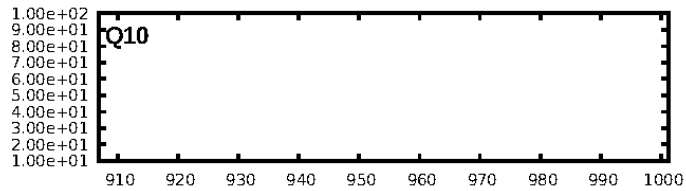
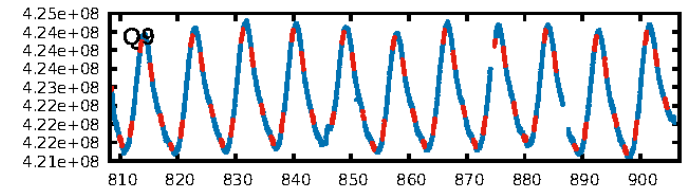
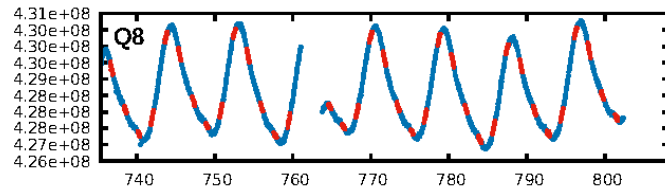
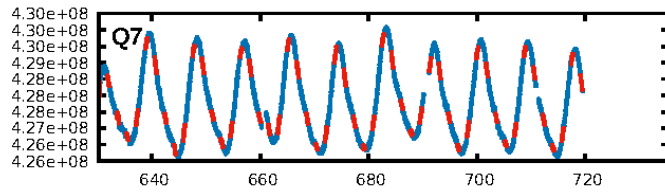
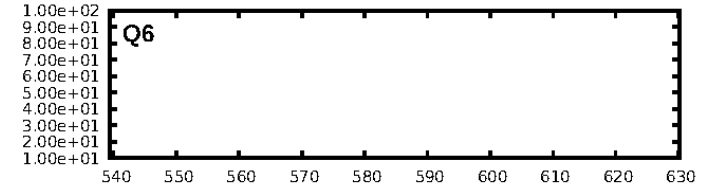
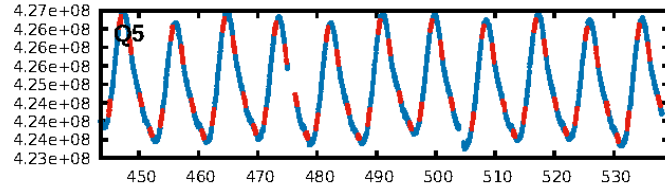
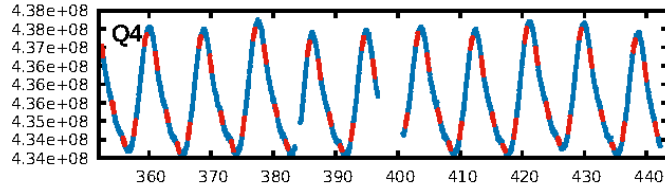
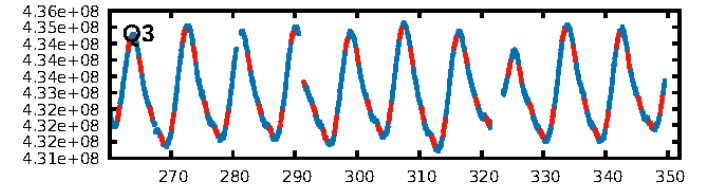
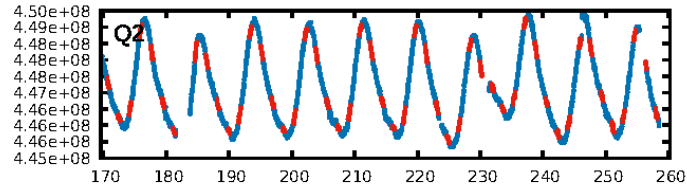
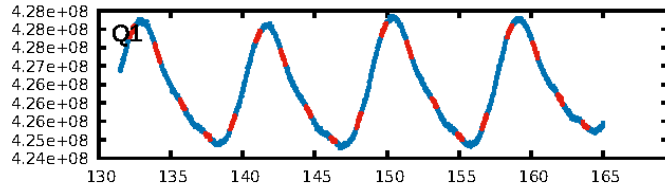
## DV Diagnostic Results:

ShortPeriod-sig: 70.8% [1.05σ]  
LongPeriod-sig: 100.0% [6.05σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 1.93e-29  
RollingBand-fgt: 0.97 [340/350]  
GhostDiagnostic-chr: N/A  
Centroid-sig: N/A  
Centroid-so: N/A  
OotOffset-rm: 0.564 arcsec [0.33σ]  
KicOffset-rm: 0.445 arcsec [0.26σ]  
OotOffset-st: 1/4/3/4 [12]  
KicOffset-st: 1/4/3/4 [12]  
DiffImageQuality-fgm: 0.00 [0/12]  
DiffImageOverlap-fno: 1.00 [14/14]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 14:03:59 Z

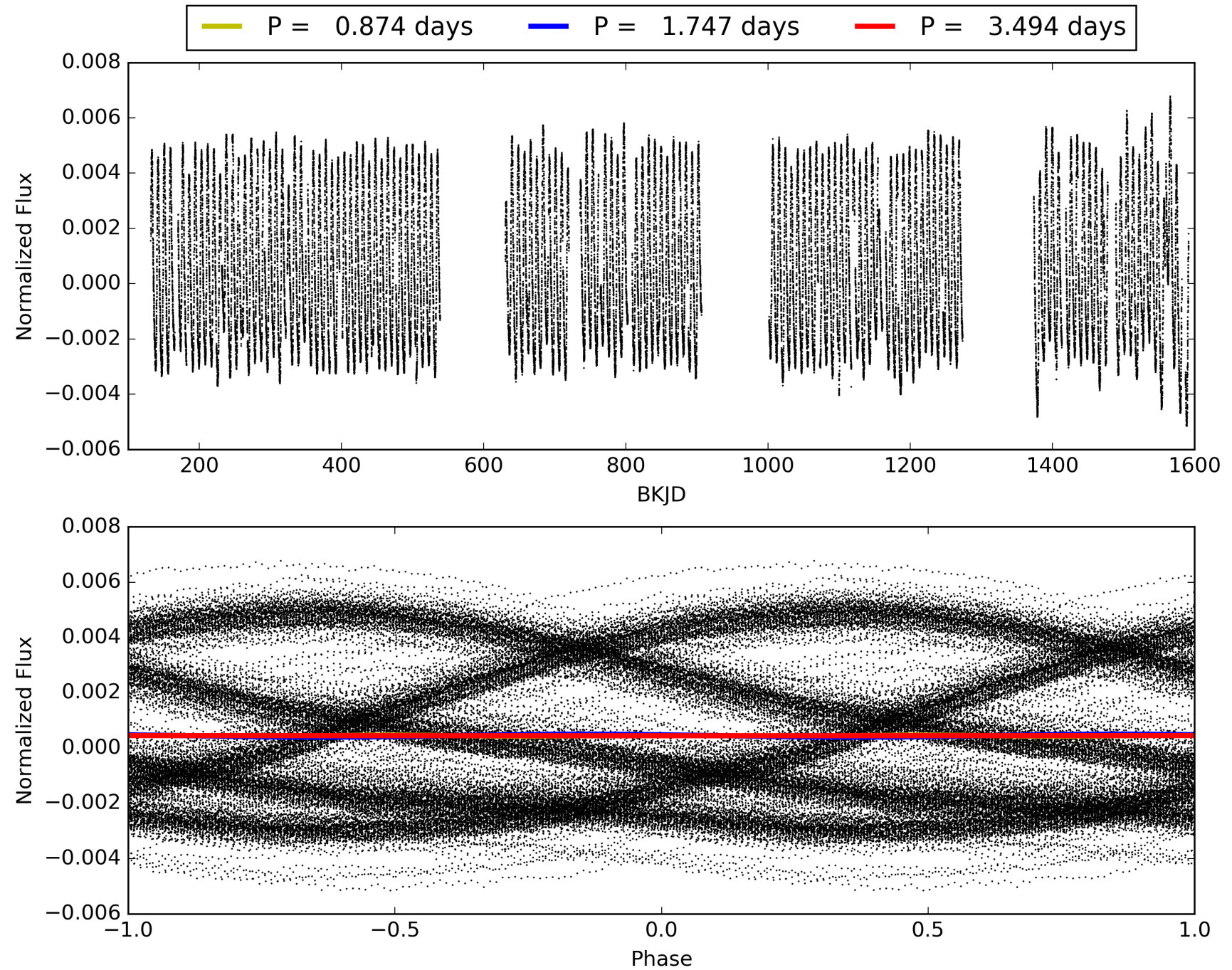
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 004171302-03, PDC Light Curves





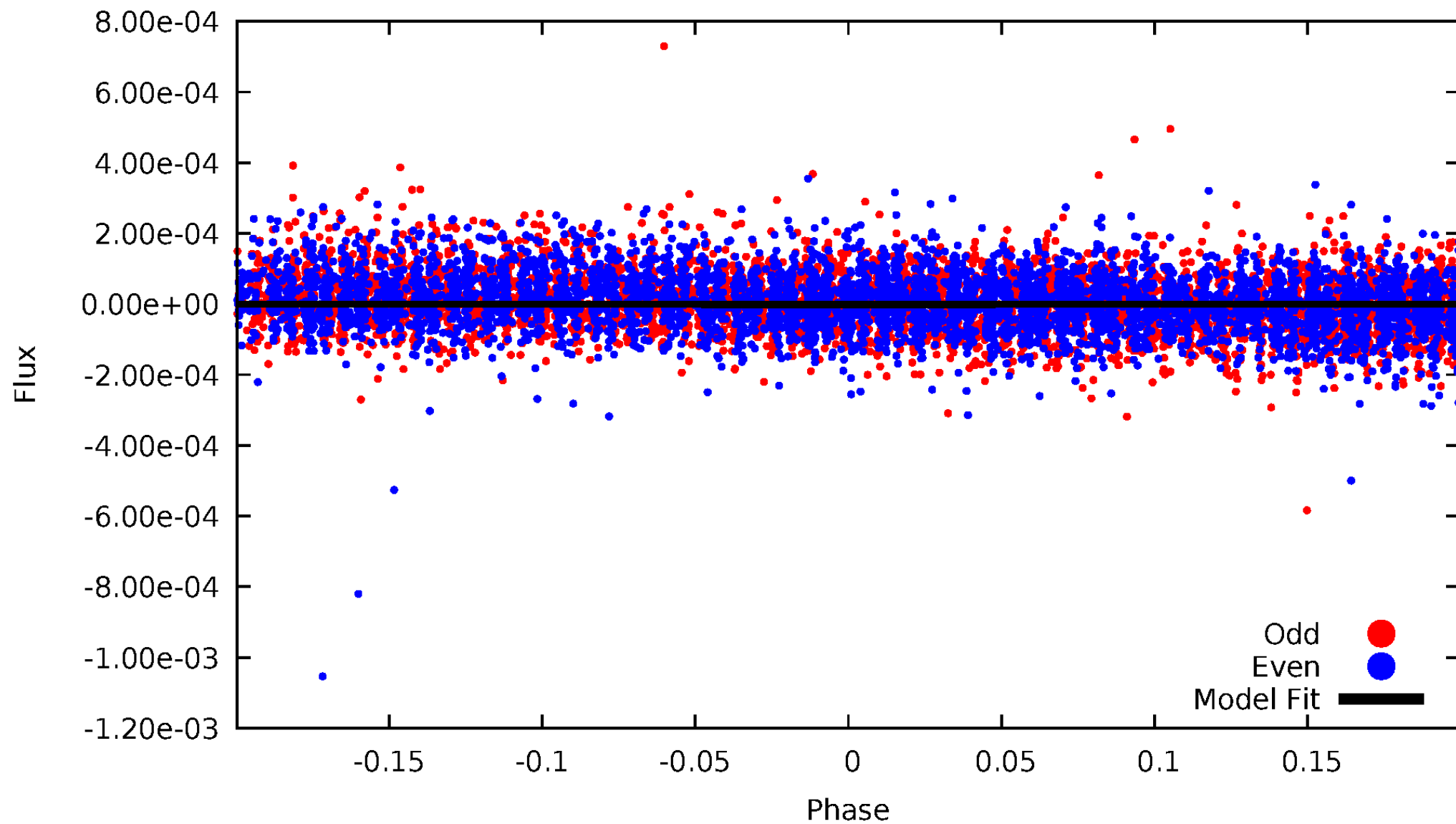
TCE 004171302-03





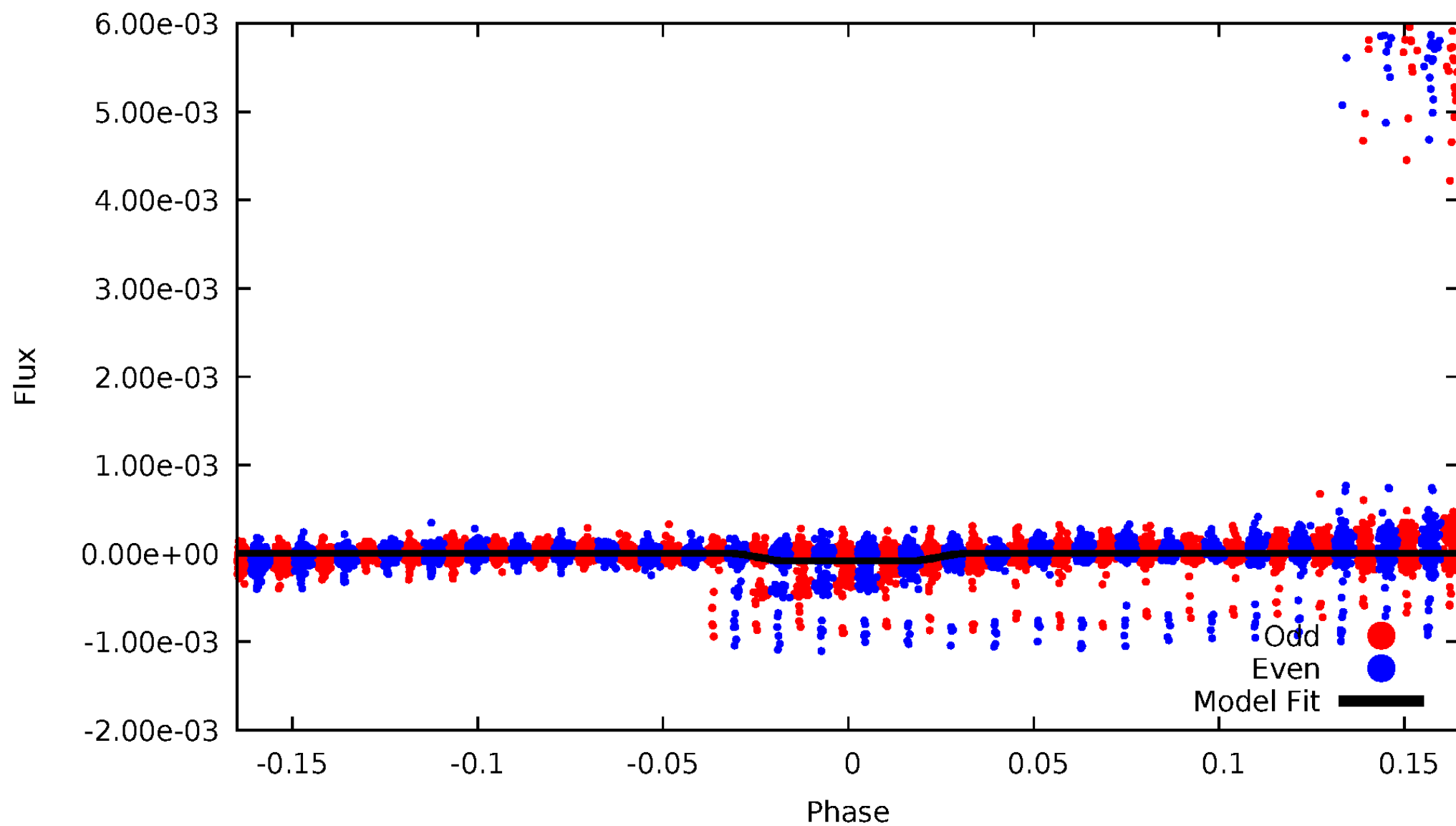
# DV Odd/Even

TCE 004171302-03



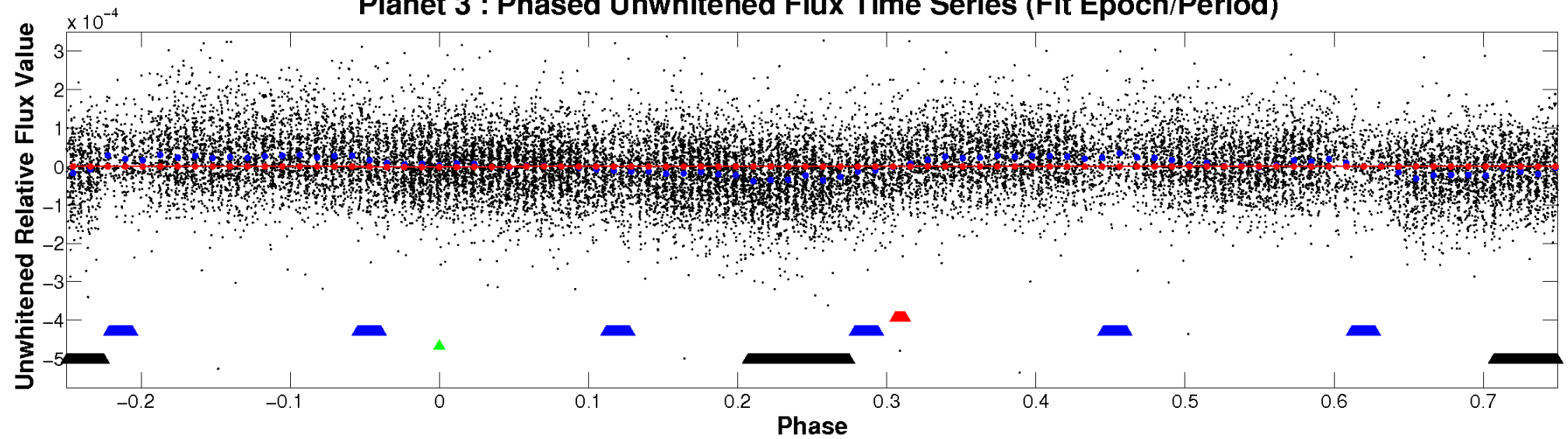
# ALT Odd/Even

TCE 004171302-03

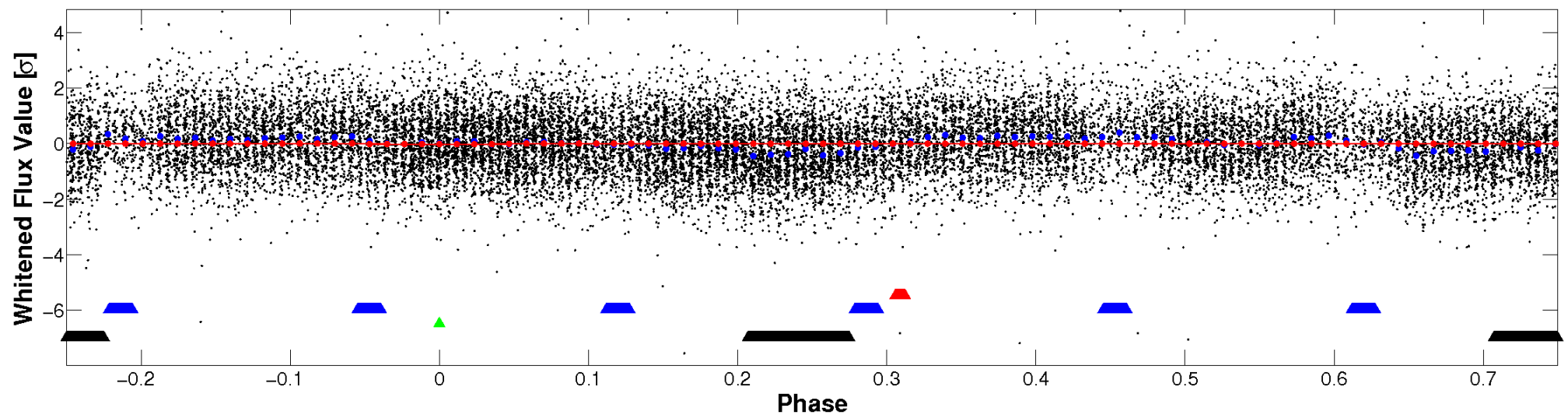


# Non-Whitened Vs. Whitened Light Curve

## Planet 3 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

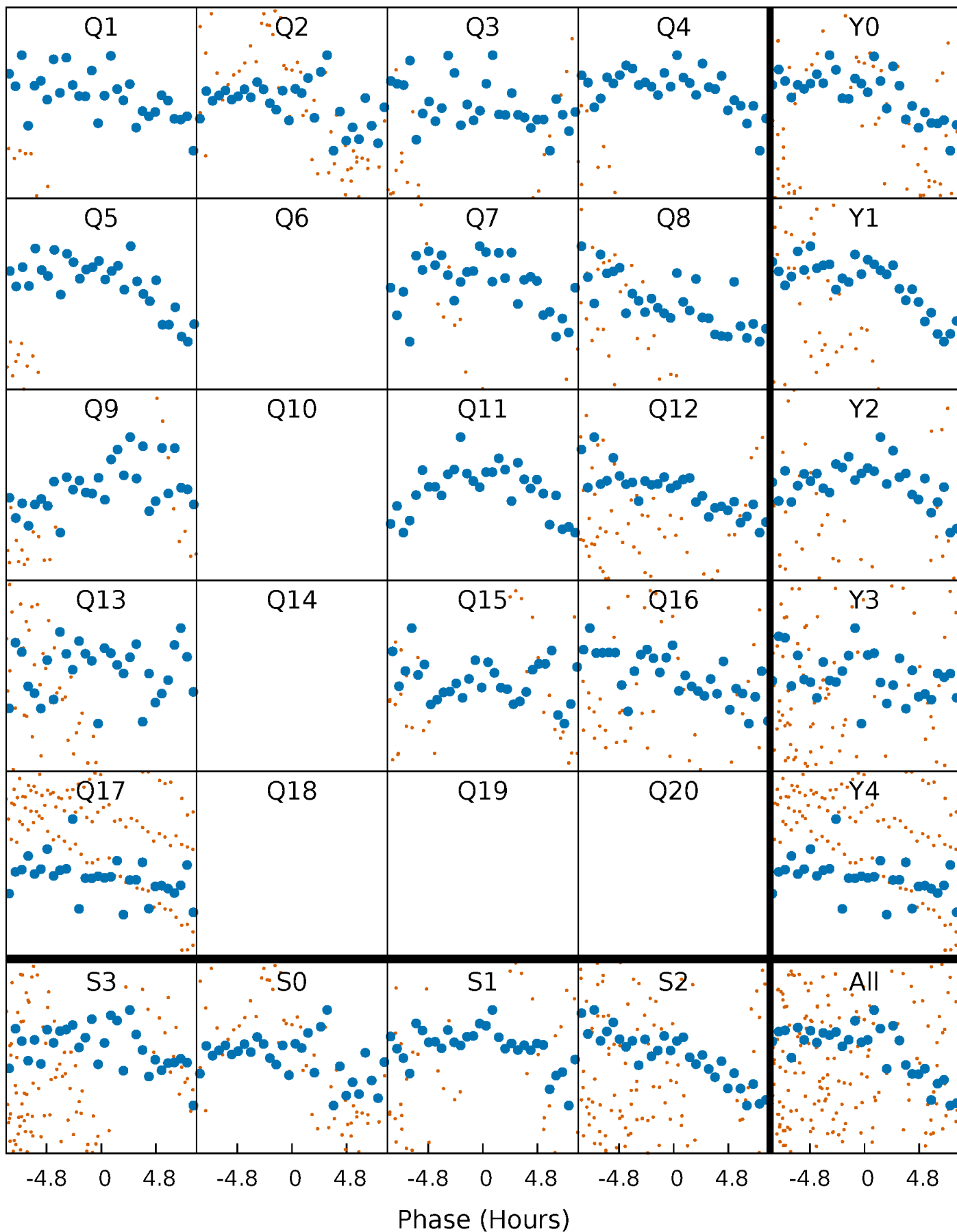


## Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



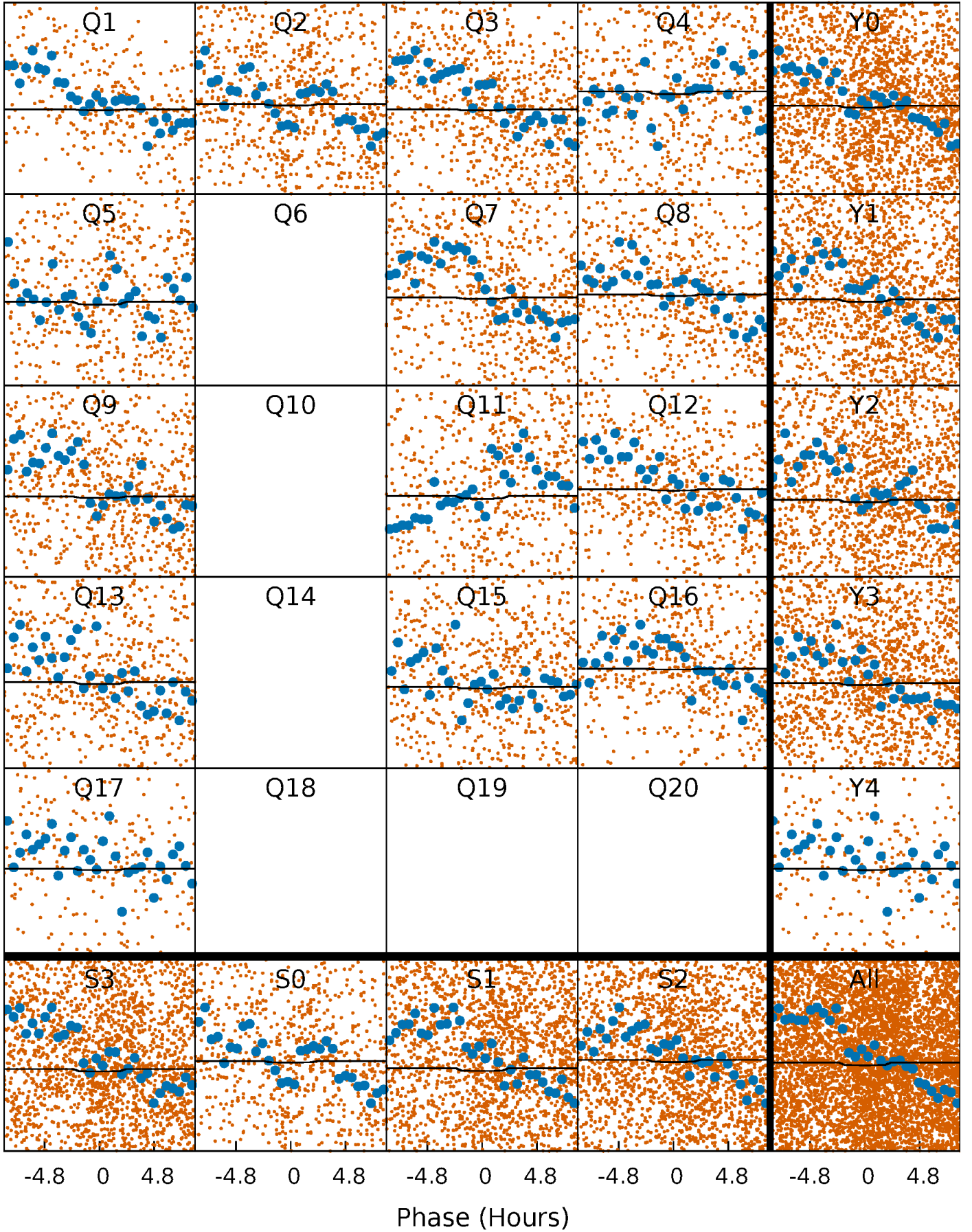
# PDC Quarter-Phased Transit Curves

TCE 004171302-03 P= 1.747031 Days  $T_0=132.312513$  (BKJD)



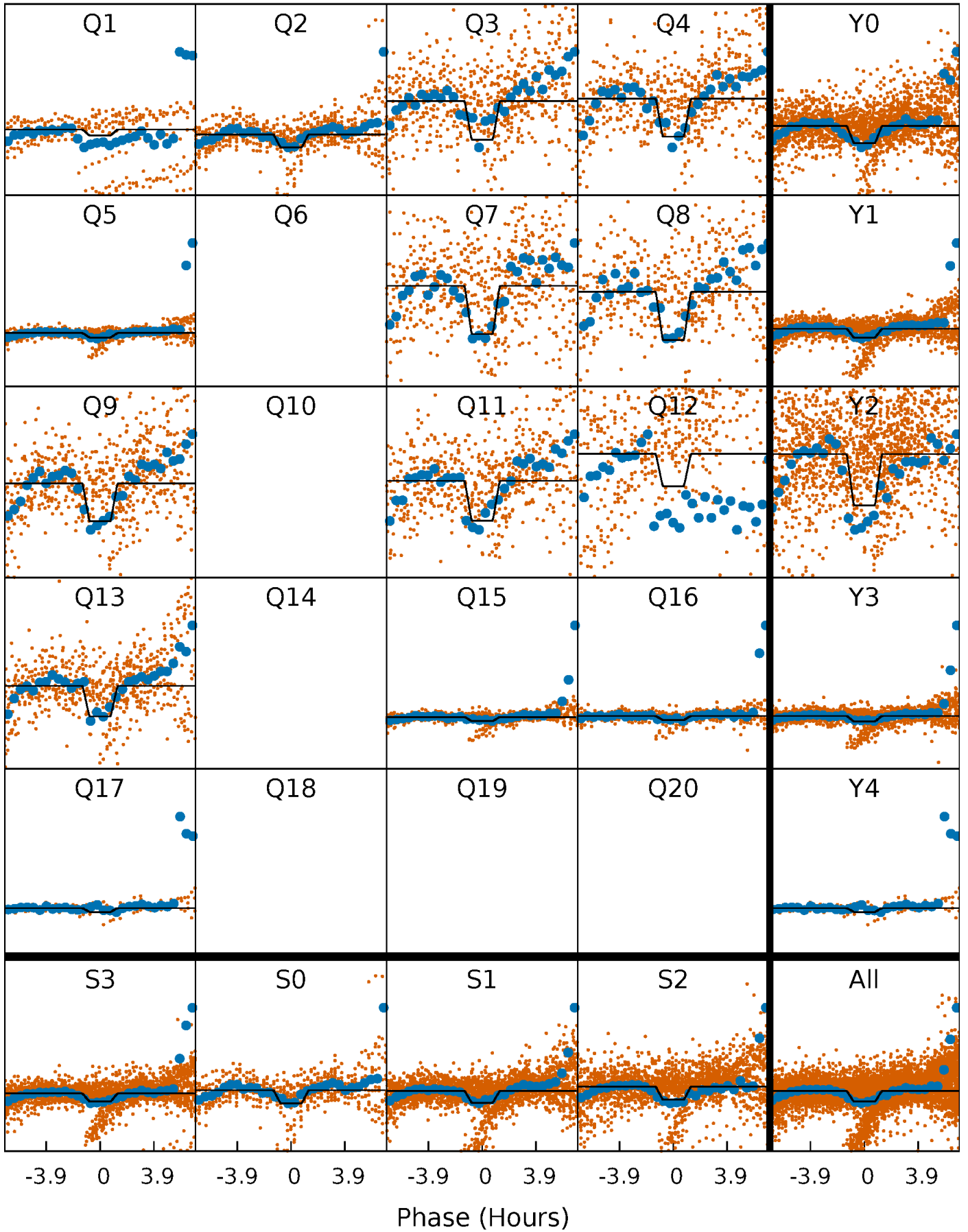
# DV Quarter-Phased Transit Curves

TCE 004171302-03   P= 1.747031 Days    $T_0=132.312513$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 004171302-03 P= 1.747066 Days  $T_0=132.322533$  (BKJD)

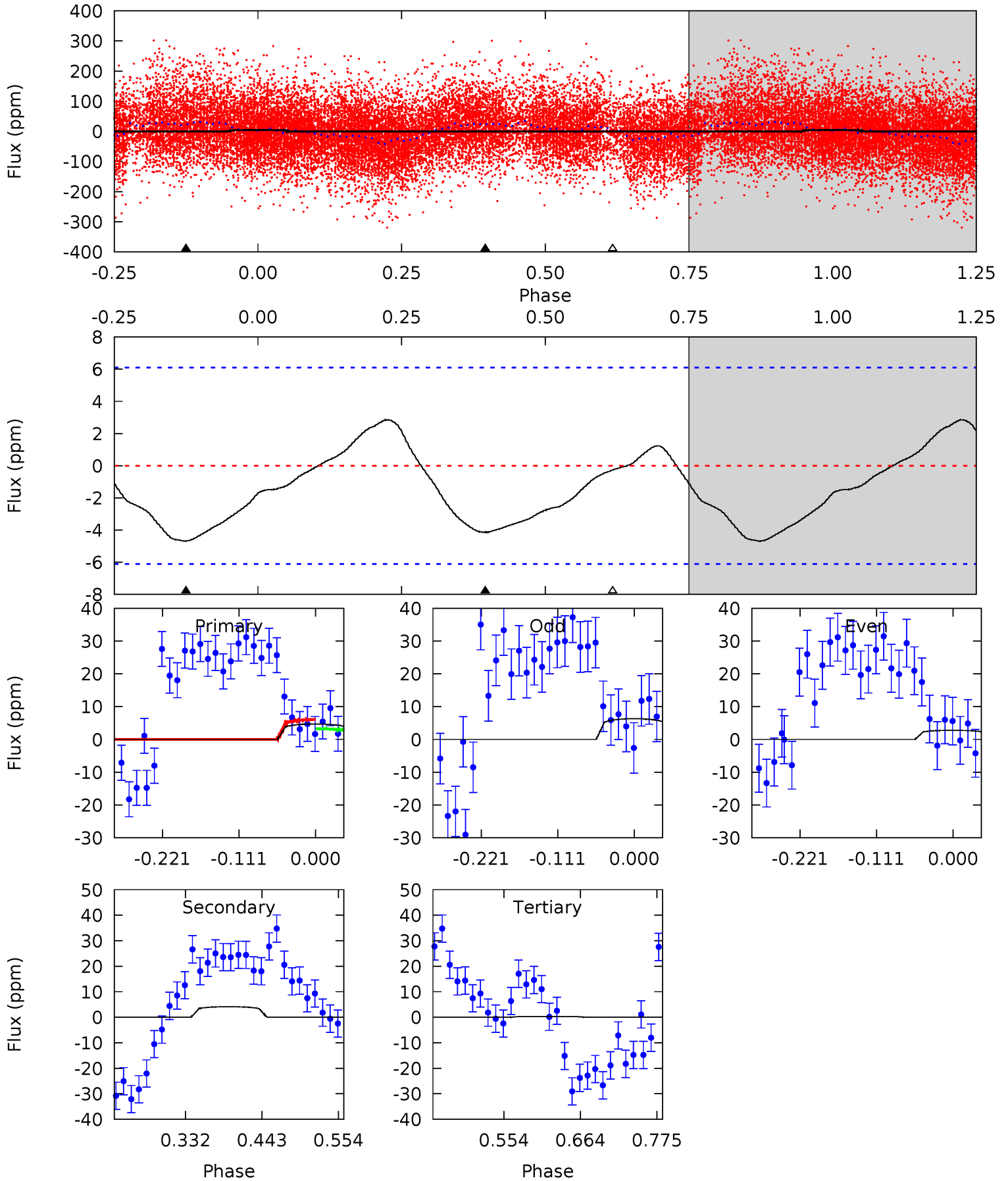




# DV Model-Shift Uniqueness Test

004171302-03, P = 1.747031 Days, E = 132.312513 Days

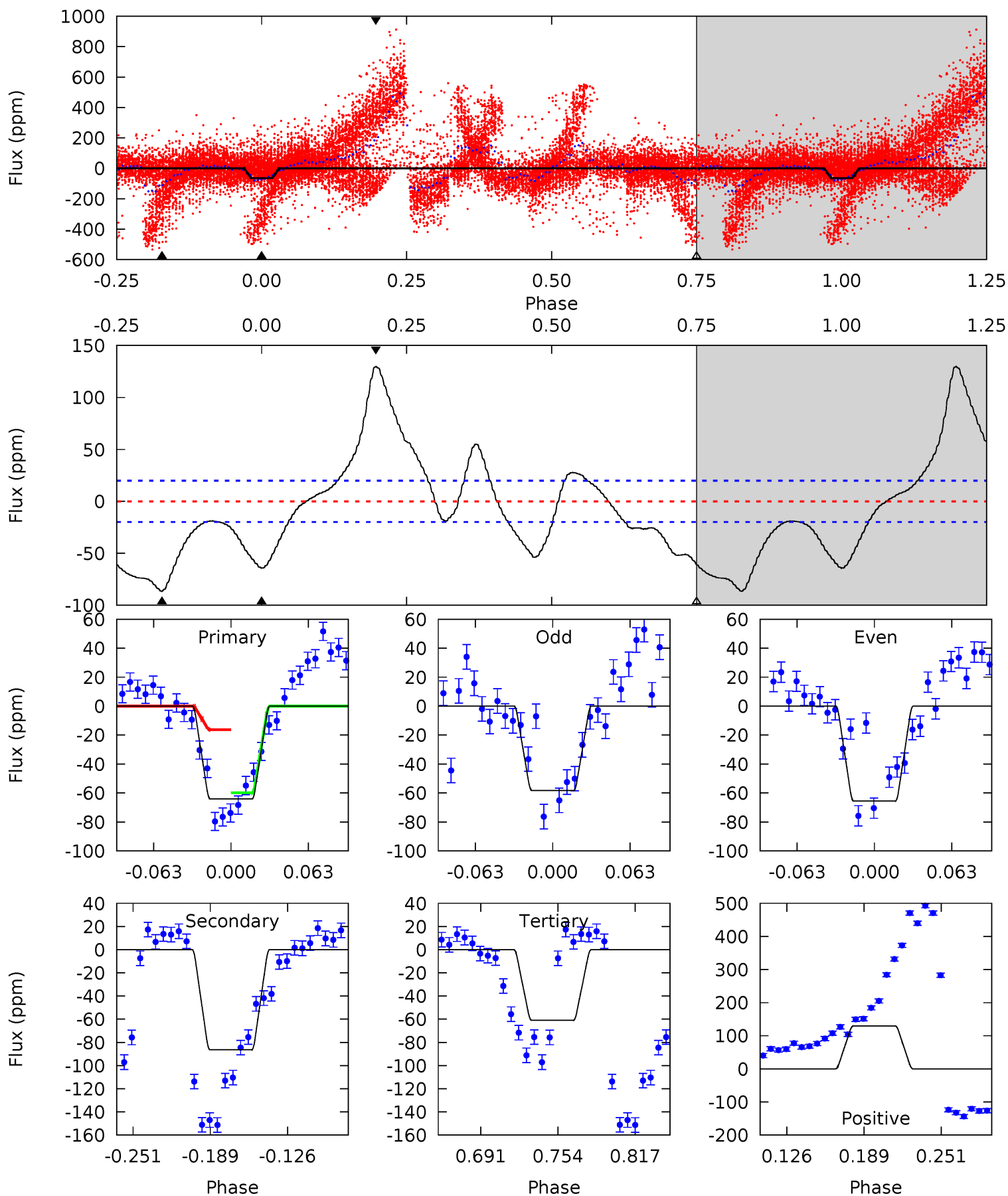
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
3.48	3.08	0.20	0	4.54	1.59	1.15	3.28	3.48	2.87	3.08	1.33	6.05	0.38	1.01



# Alt Model-Shift Uniqueness Test

004171302-03, P = 1.747066 Days, E = 132.322533 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
15.0	20.2	14.3	30.3	4.66	1.86	10.1	0.75	-15.3	5.96	-10.1	0.84	7.37	0.60	6.22



### Stellar Parameters For KIC 004171302

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$8918^{+418}_{-627}$	$3.706^{+0.338}_{-0.156}$	$0.360^{+0.050}_{-0.150}$	$3.895^{+1.048}_{-1.572}$	$2.813^{+0.271}_{-0.587}$	$0.067^{+0.174}_{-0.030}$
	+5%/-7%	+9%/-4%	+14%/-42%	+27%/-40%	+10%/-21%	+259%/-45%
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 004171302-03 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-4 \pm 1$	$0.58^{+0.46}_{-0.35}$	$5281^{+533}_{-579}$	$10910^{+18575}_{-3413}$	$10^{+63}_{-7}$
Alt.	$-86 \pm 4$	$3.75^{+0.81}_{-0.81}$	$5275^{+541}_{-600}$	$8729^{+946}_{-889}$	$5.433^{+2.936}_{-1.808}$

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

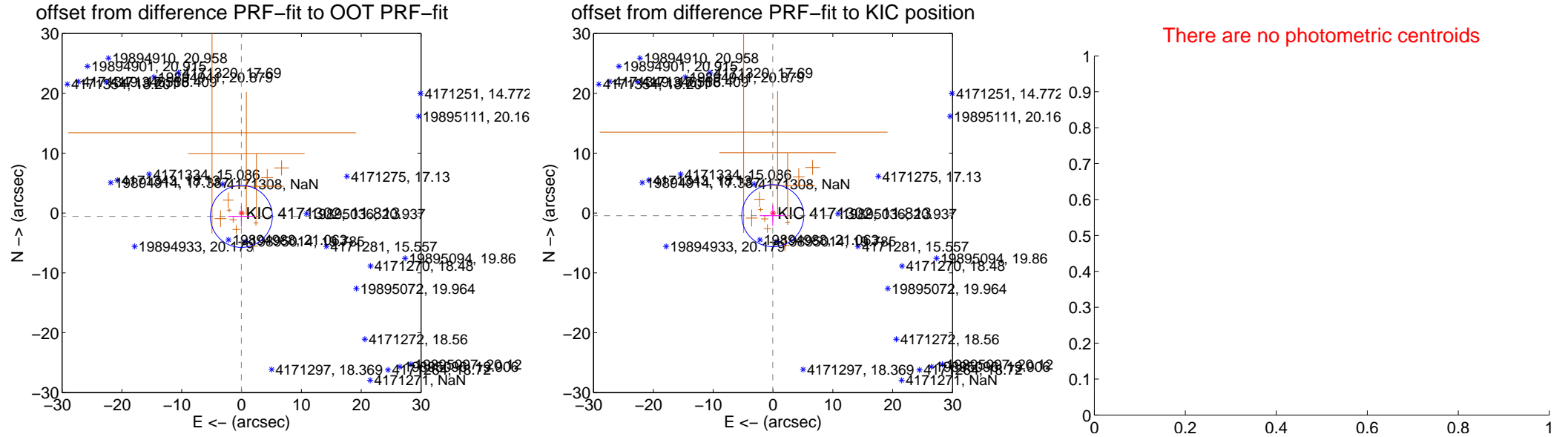
## DV Centroid Data

Supplemental centroid analysis for 004171302-03. **Kepler magnitude: 11.81.** Transit SNR 0.77

**There are 0 quarters with good PRF difference image offsets**

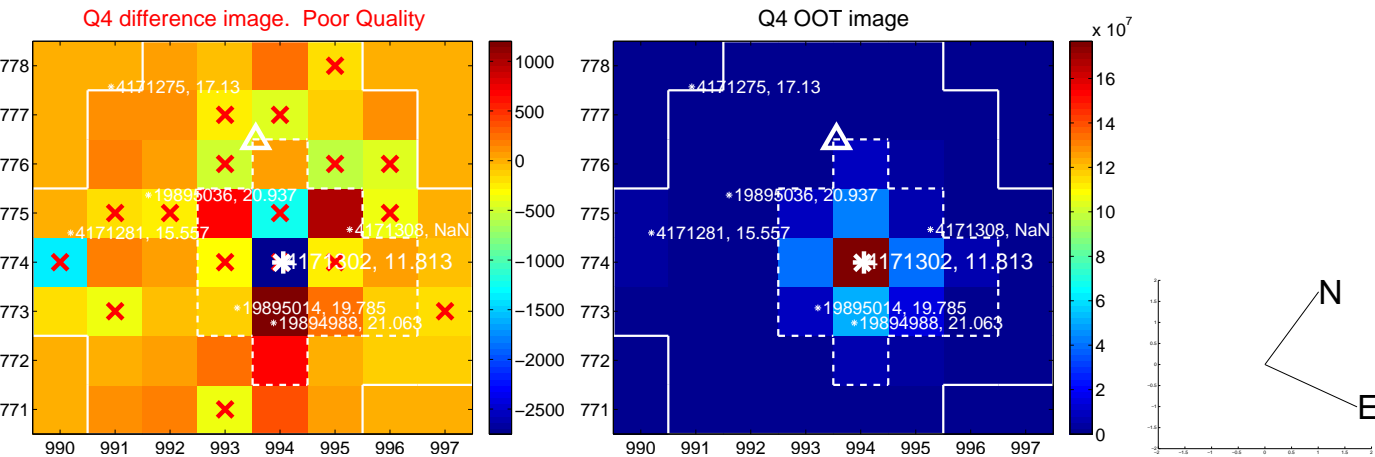
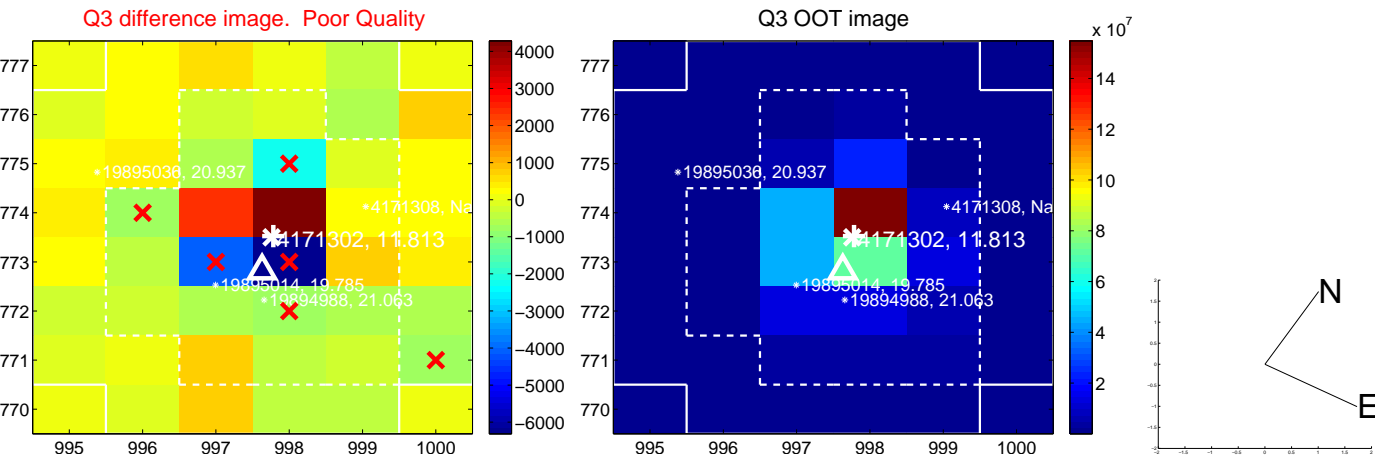
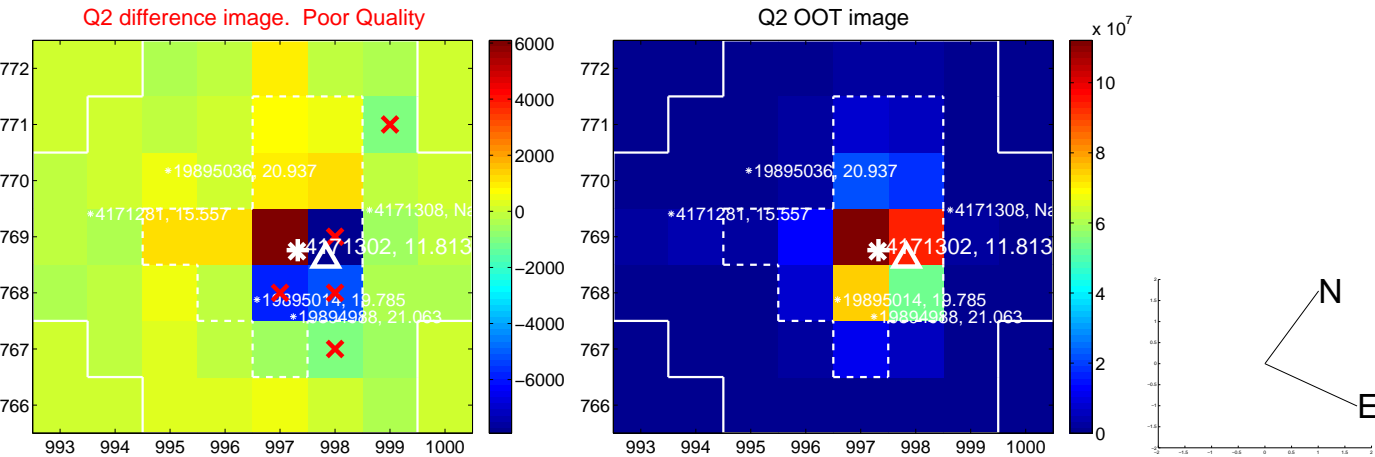
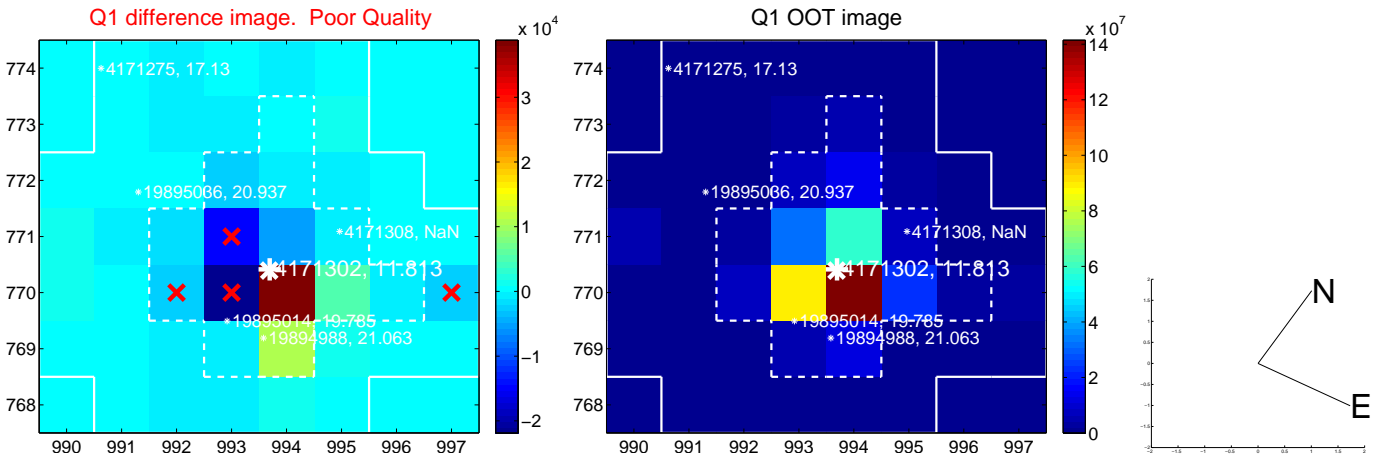
The direct PRF centroid is offset from the target star catalog position by about 0.15 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.564 \pm 1.726$	0.33	$0.030 \pm 2.206$	$-0.564 \pm 1.725$
PRF-fit source offset from KIC position	$0.445 \pm 1.728$	0.26	$0.034 \pm 2.206$	$-0.443 \pm 1.725$
photometric centroid source offset	—	—	—	—

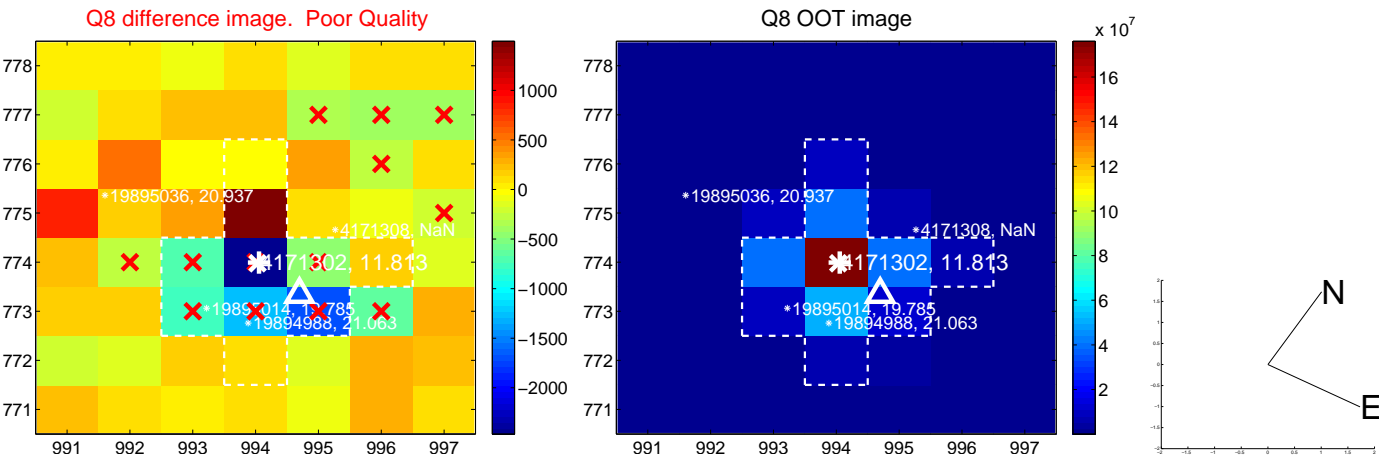
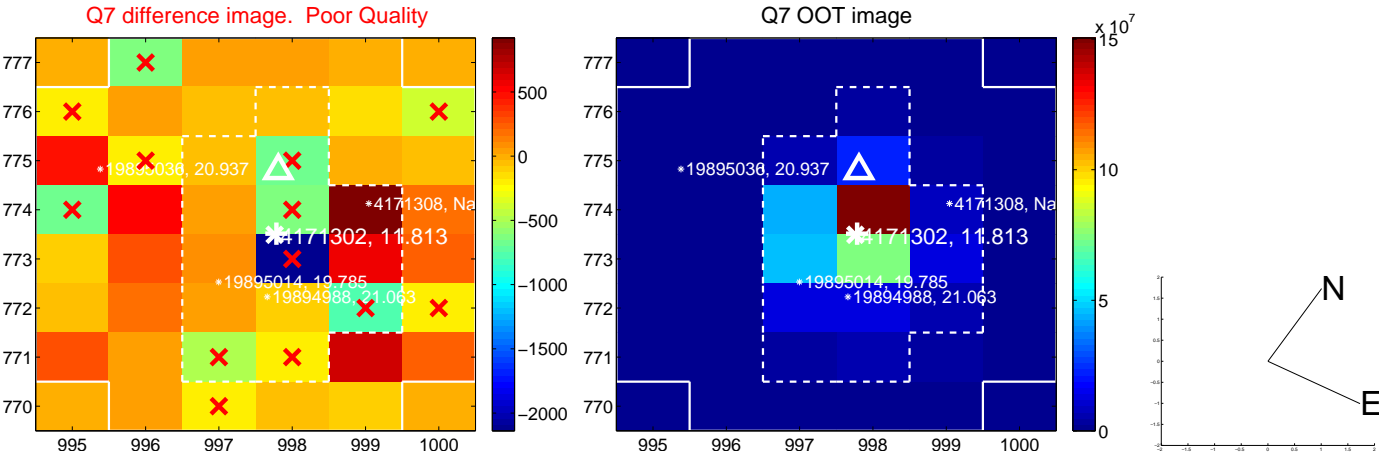
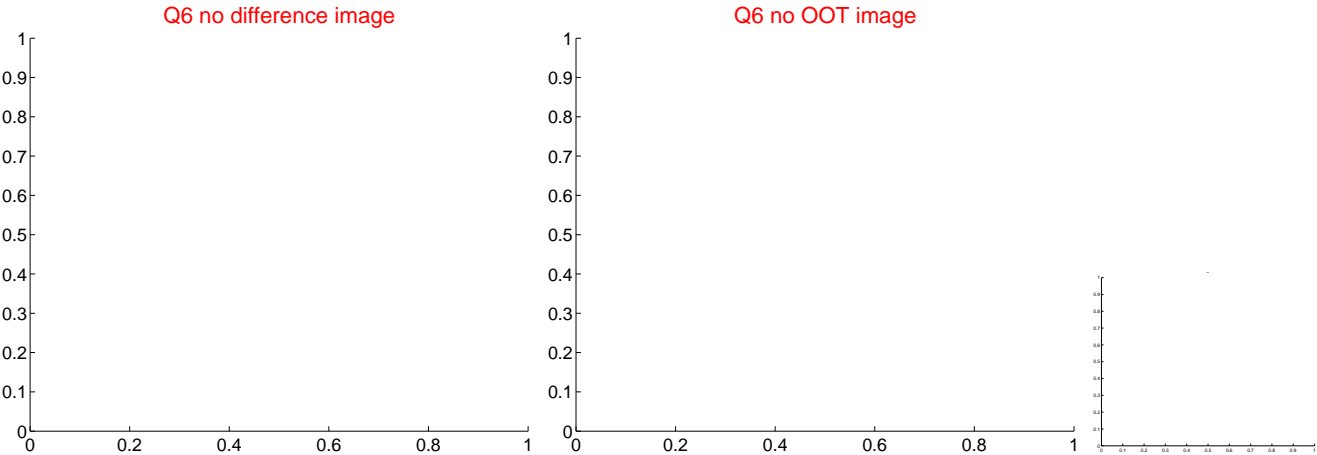
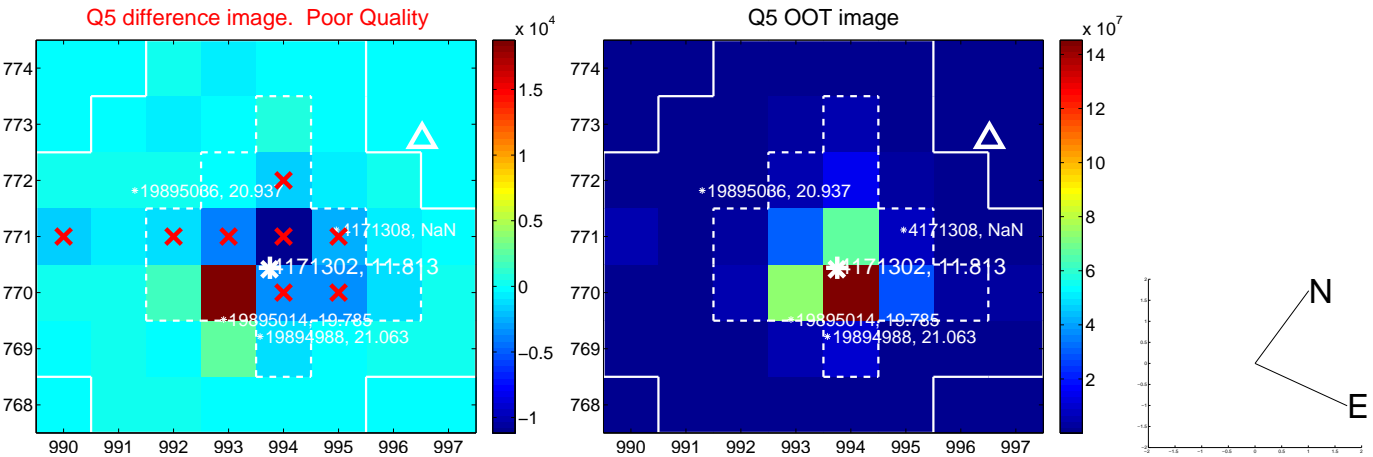


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

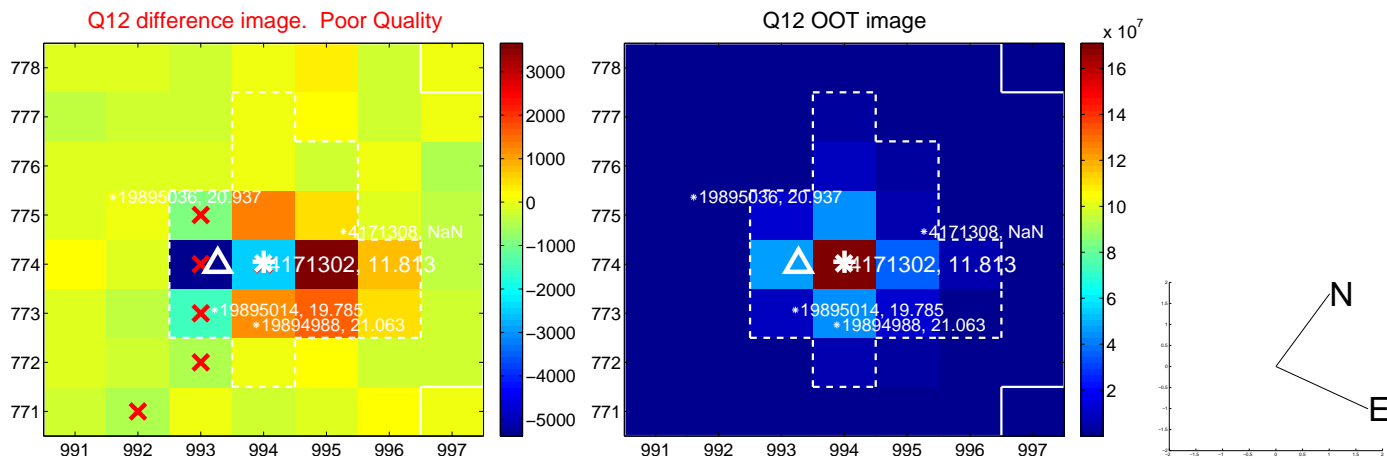
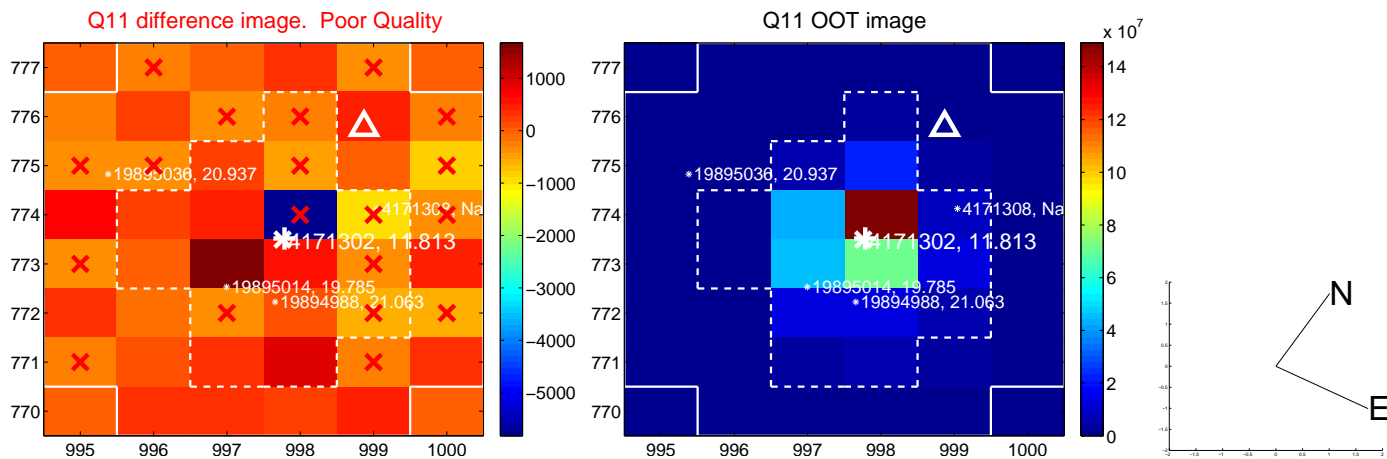
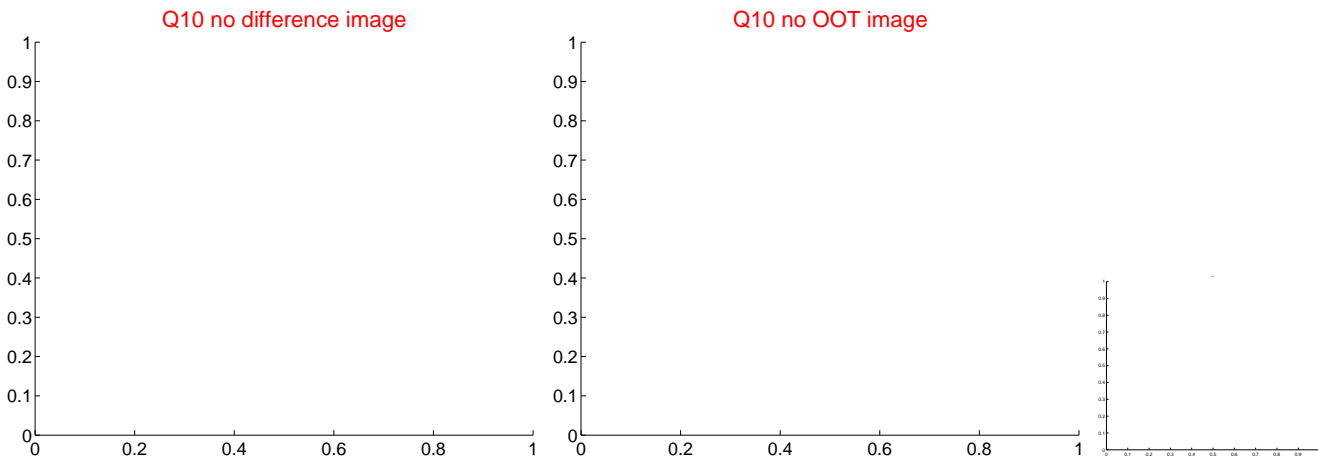
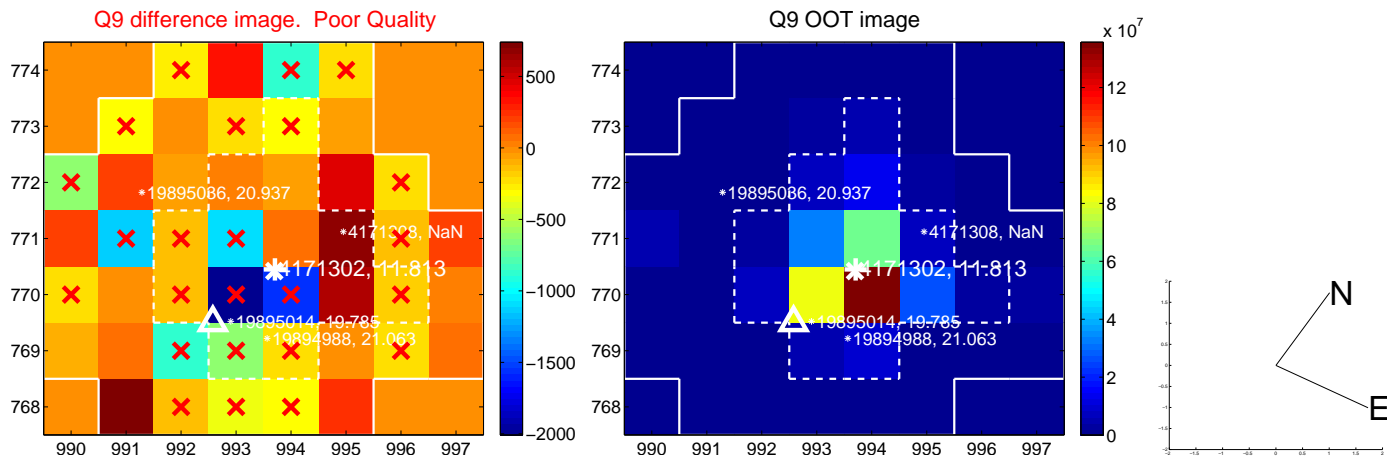


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

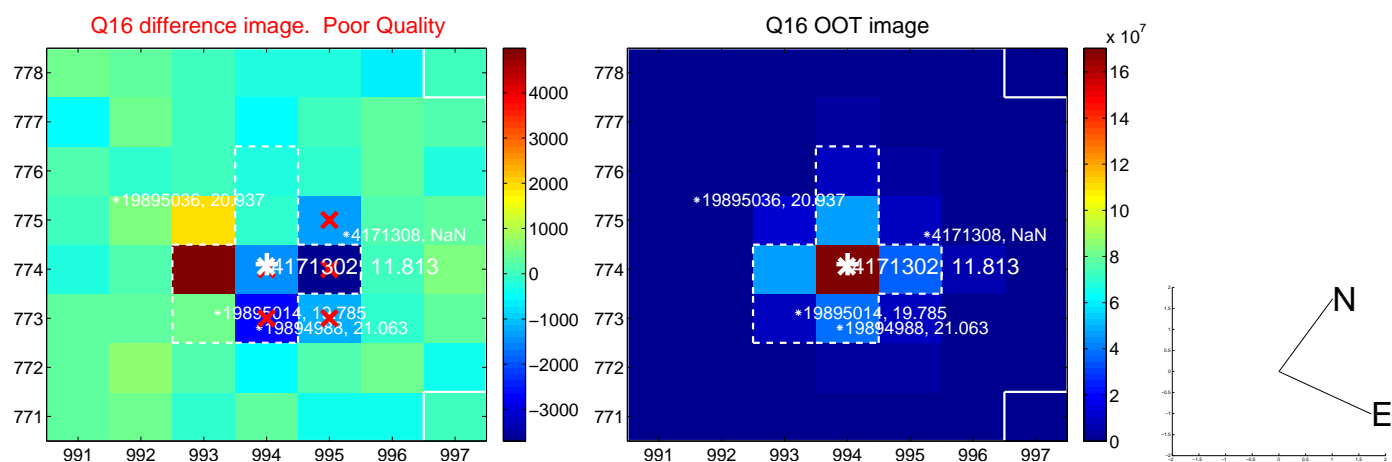
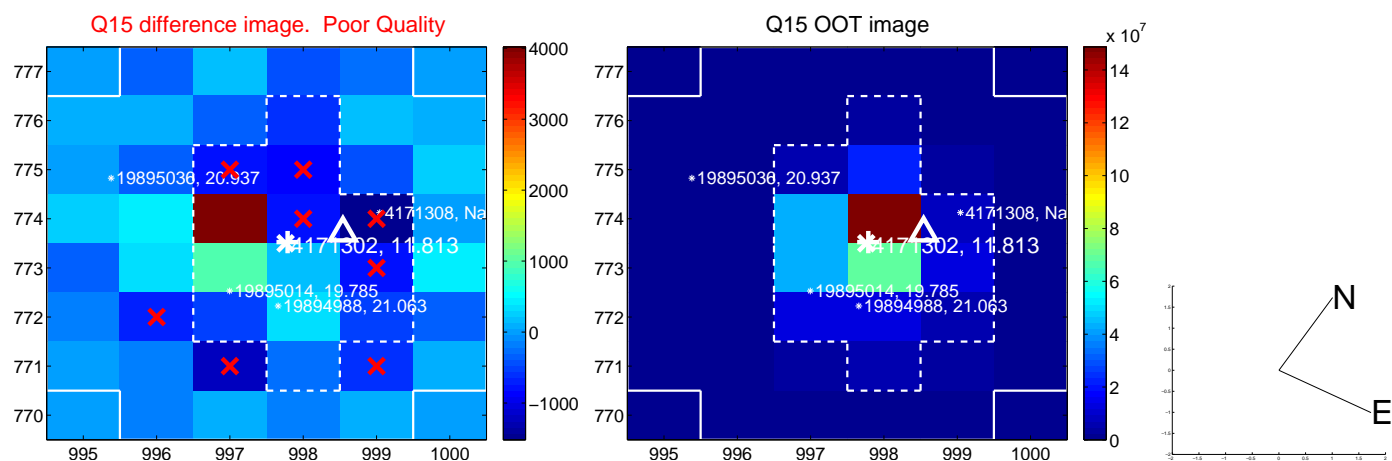
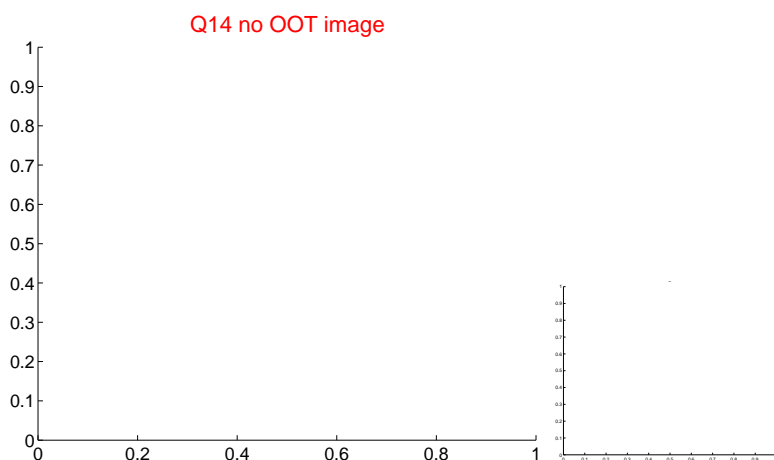
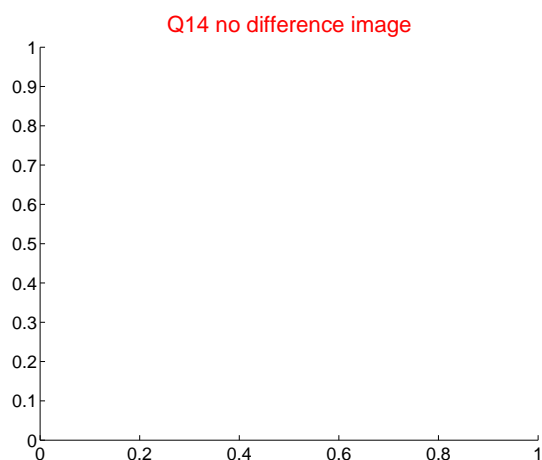
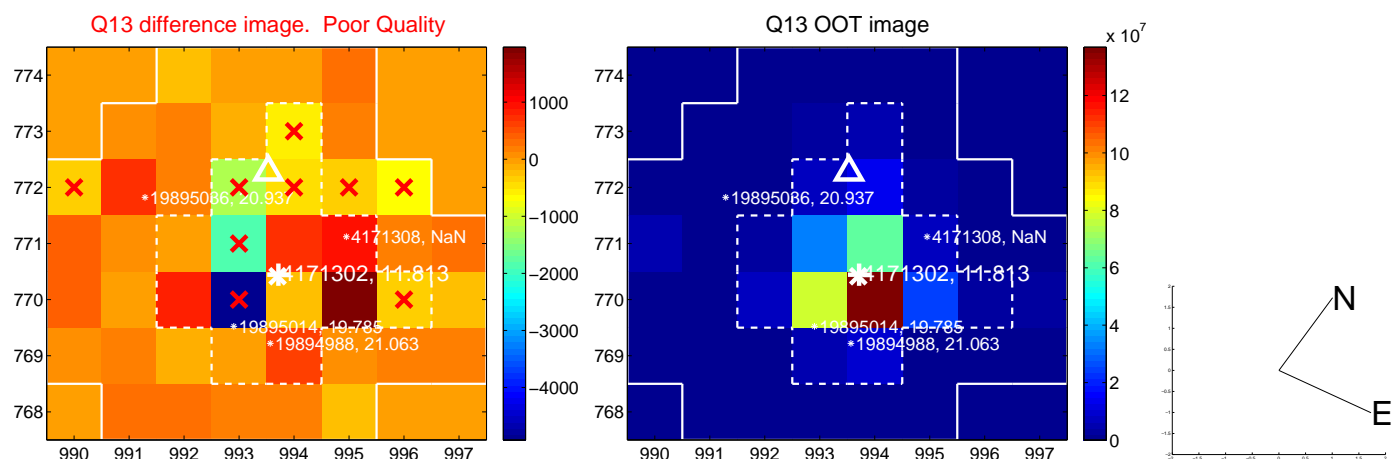




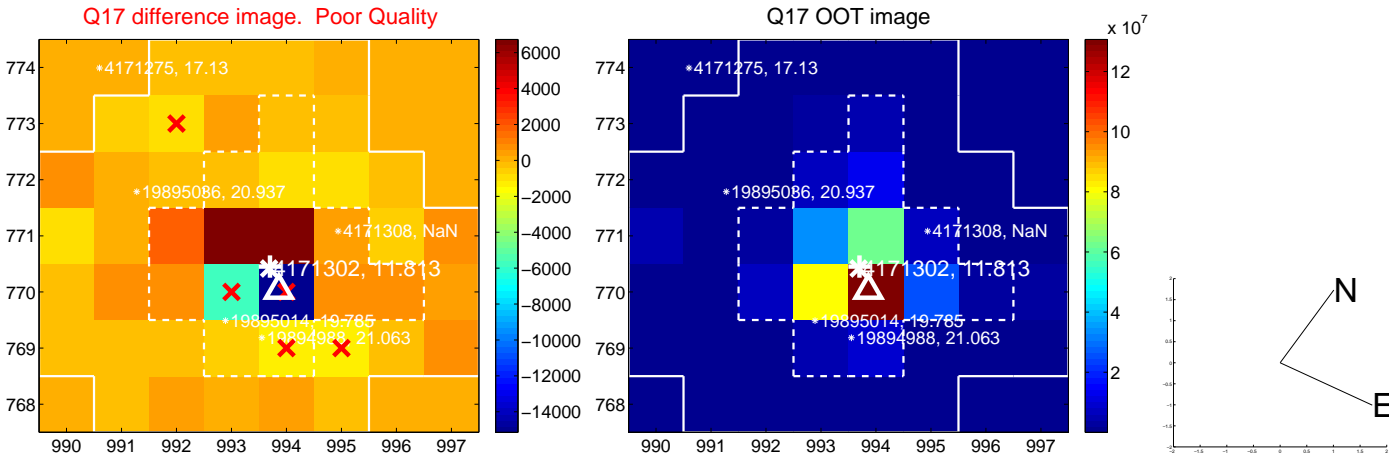
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



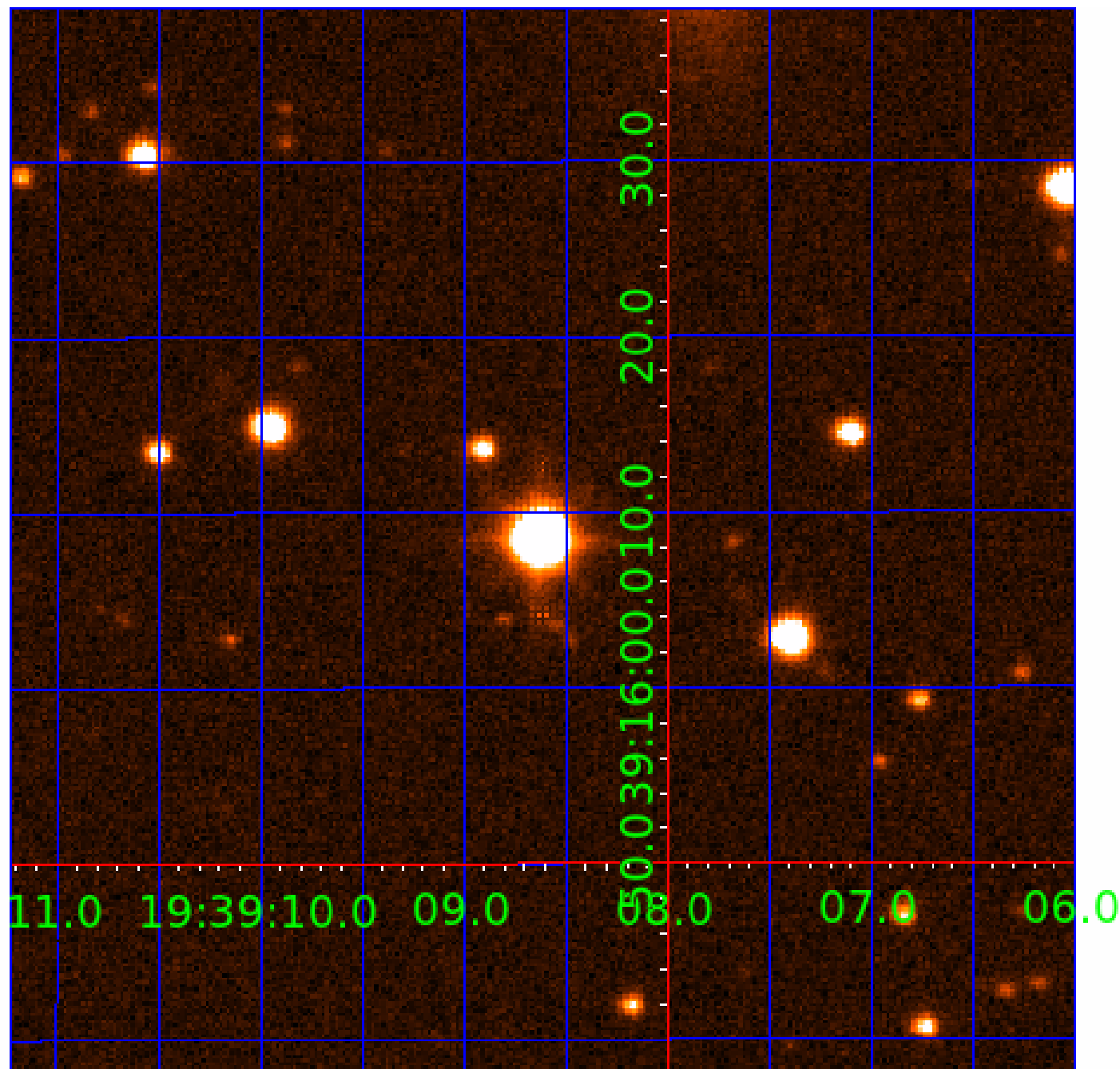
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



folded centroid time series figure for this object.

UKIRT Image

Declination



# KIC 004171302

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004171302-01	OBS	No	8.735223	139.834669	79.7	14.861	14.4	16.1	3.90	8918	6.70	6260.43
004171302-02	OBS	No	1.455886	132.216589	22.5	5.150	15.5	14.6	3.90	8918	2.15	68254.70
004171302-03	OBS	No	1.747031	132.312513	1.5	4.185	14.7	0.8	3.90	8918	0.55	53526.46
004171302-04	OBS	No	4.367933	134.421149	43.6	9.524	15.4	18.2	3.90	8918	2.98	15773.74

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004171302-01	OBS	FP	0.00	1	0	1	0	LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—HALO_GHOST
004171302-02	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD
004171302-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT— SAME_NTL_PERIOD—CENT_FEW_DIFFS
004171302-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—SWEET_NTL—LPP_DV—MOD_NONUNIQ_DV—SAME_NTL_PERIOD

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

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

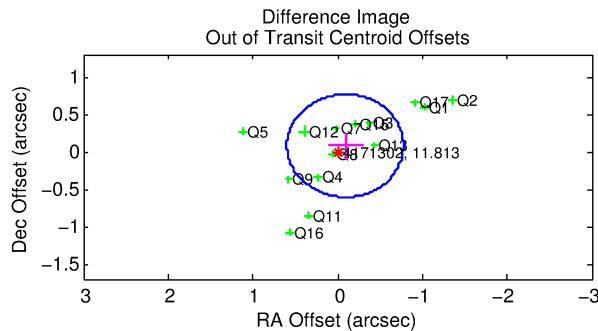
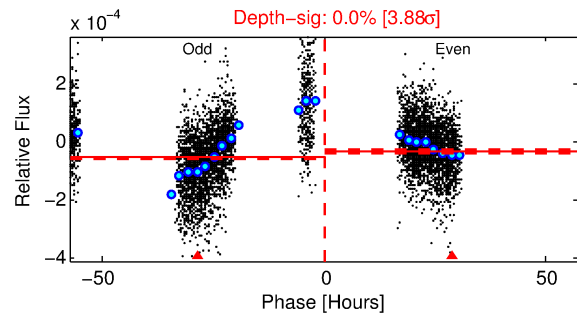
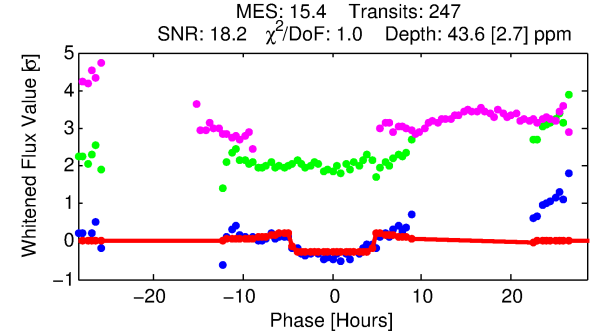
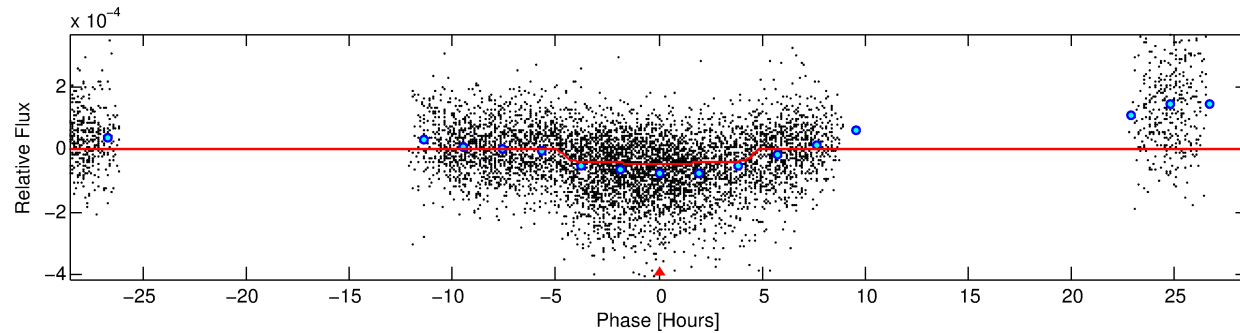
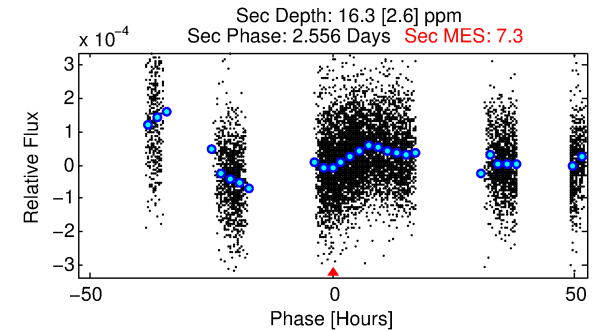
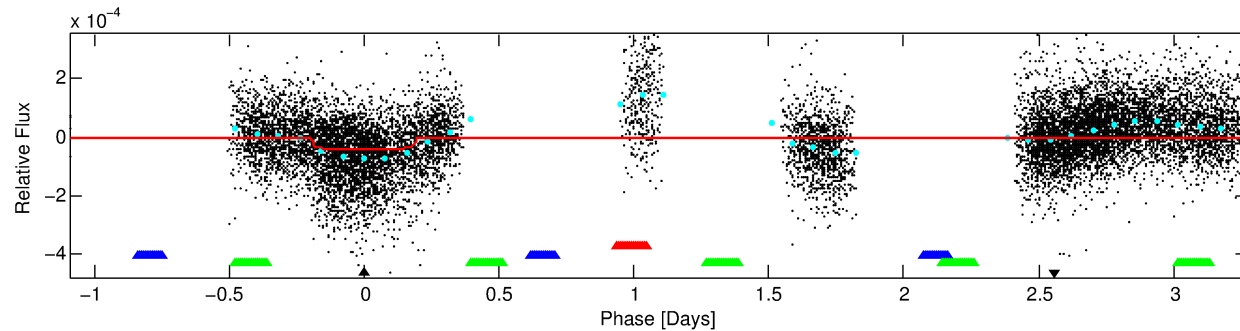
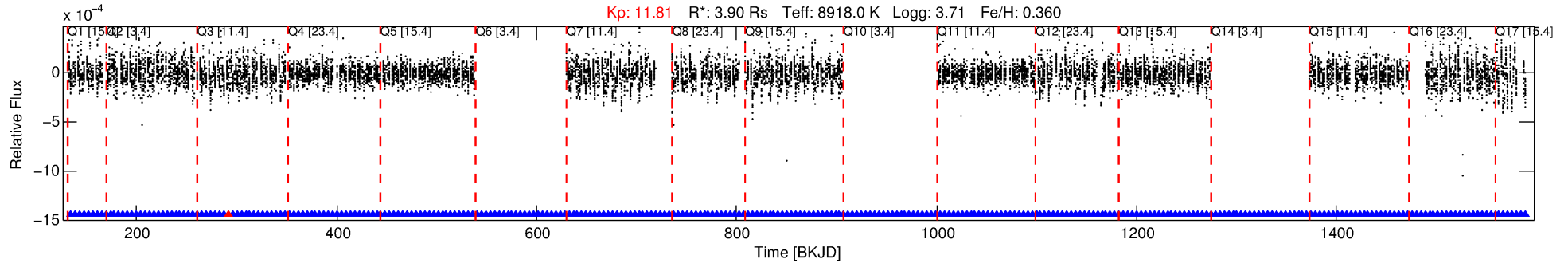
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 004171302-04

No Significant Match Found

# DV One-Page Summary

KIC: 4171302 Candidate: 4 of 4 Period: 4.368 d



## DV Fit Results:

Period = 4.36793 [0.00003] d  
Epoch = 134.4211 [0.0040] BKJD  
Rp/R\* = 0.0070 [0.0006]  
a/R\* = 1.82 [0.68]  
b = 0.90 [0.11]  
Seff = 15773.74 [10230.93]  
Teq = 2858 [463] K  
Rp = 2.98 [1.23] Re  
a = 0.0738 [0.0276] AU  
Ag = 5.52 [3.47] [1.30σ]  
Teffp = 6772 [617] K [5.07σ]

## DV Diagnostic Results:

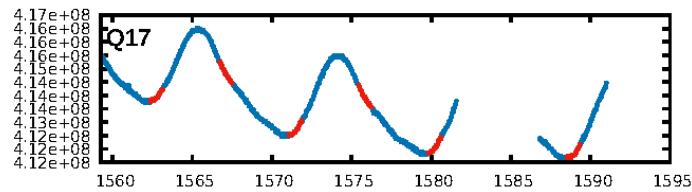
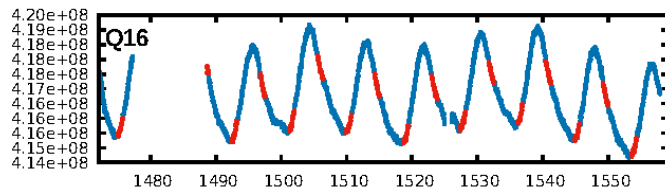
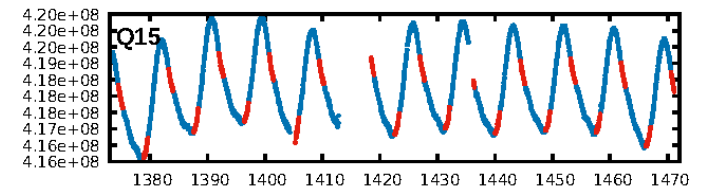
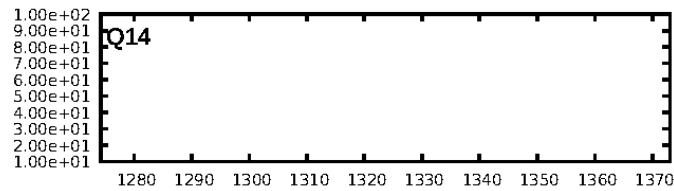
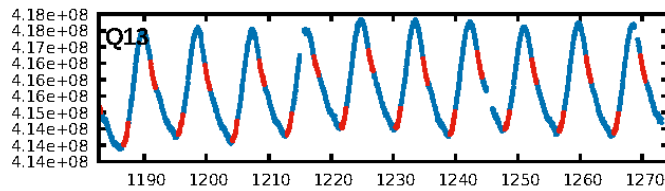
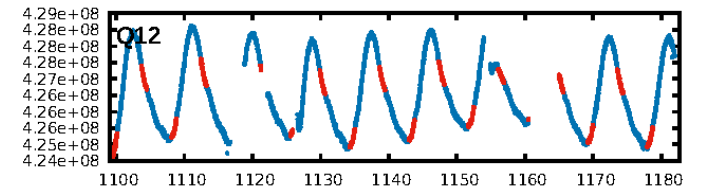
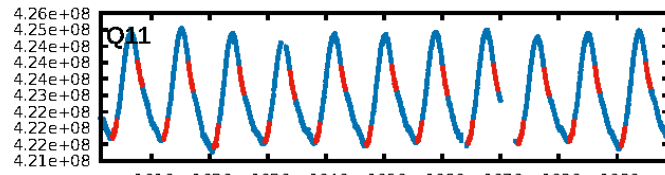
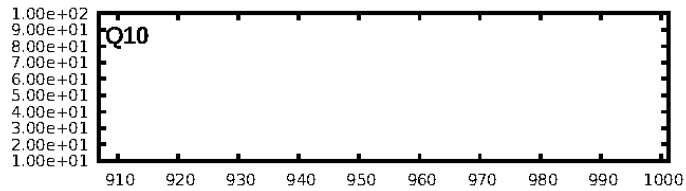
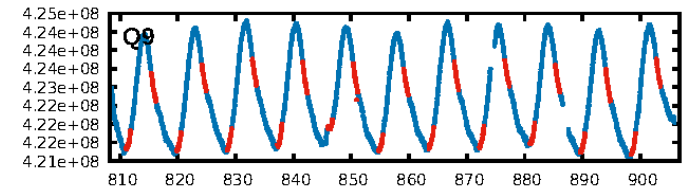
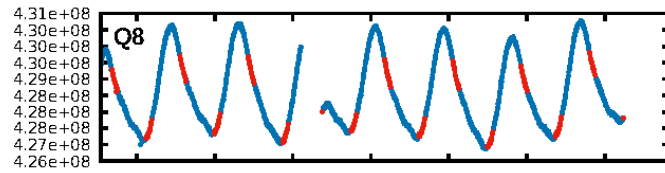
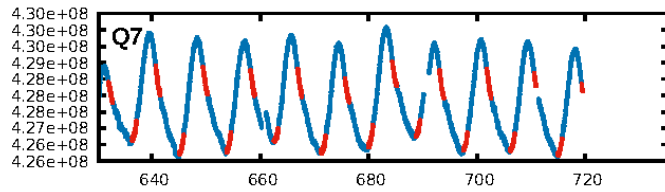
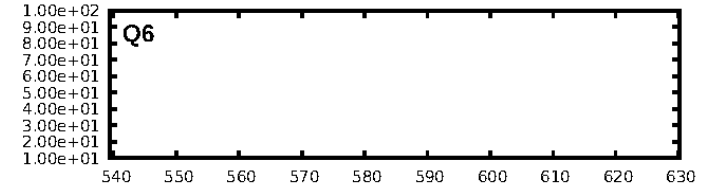
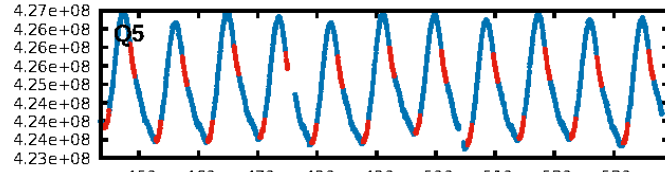
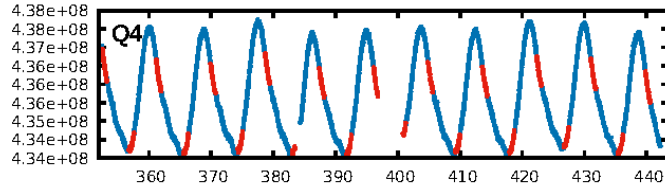
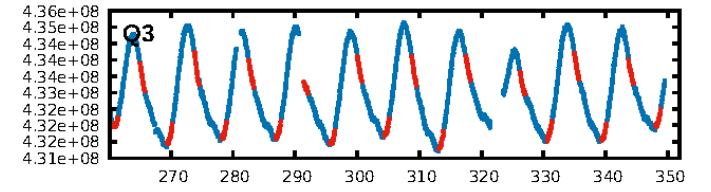
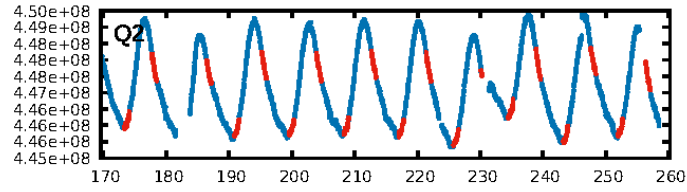
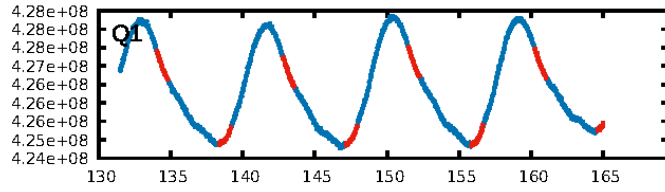
ShortPeriod-sig: 100.0% [6.05σ]  
LongPeriod-sig: 100.0% [5.94σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 1.37e-32  
RollingBand-fgt: 1.00 [232/233]  
GhostDiagnostic-chr: 1.366  
Centroid-sig: N/A  
Centroid-so: 0.947 arcsec [1.96σ]  
OotOffset-rm: 0.118 arcsec [0.52σ]  
KicOffset-rm: 0.204 arcsec [1.05σ]  
OotOffset-st: 1/4/4/5 [14]  
KicOffset-st: 1/4/4/5 [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: 31-Jan-2016 14:04:06 Z

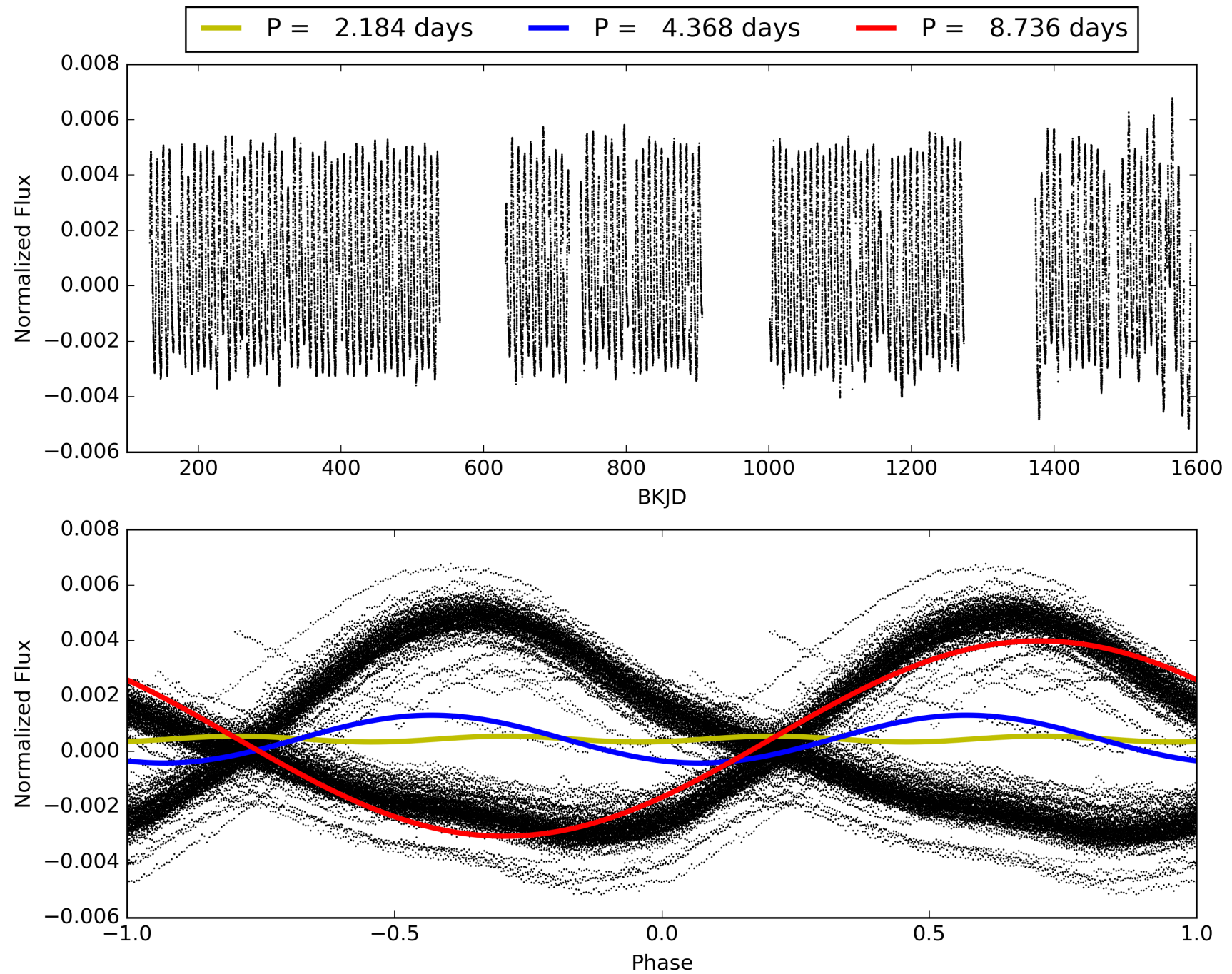
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 004171302-04, PDC Light Curves

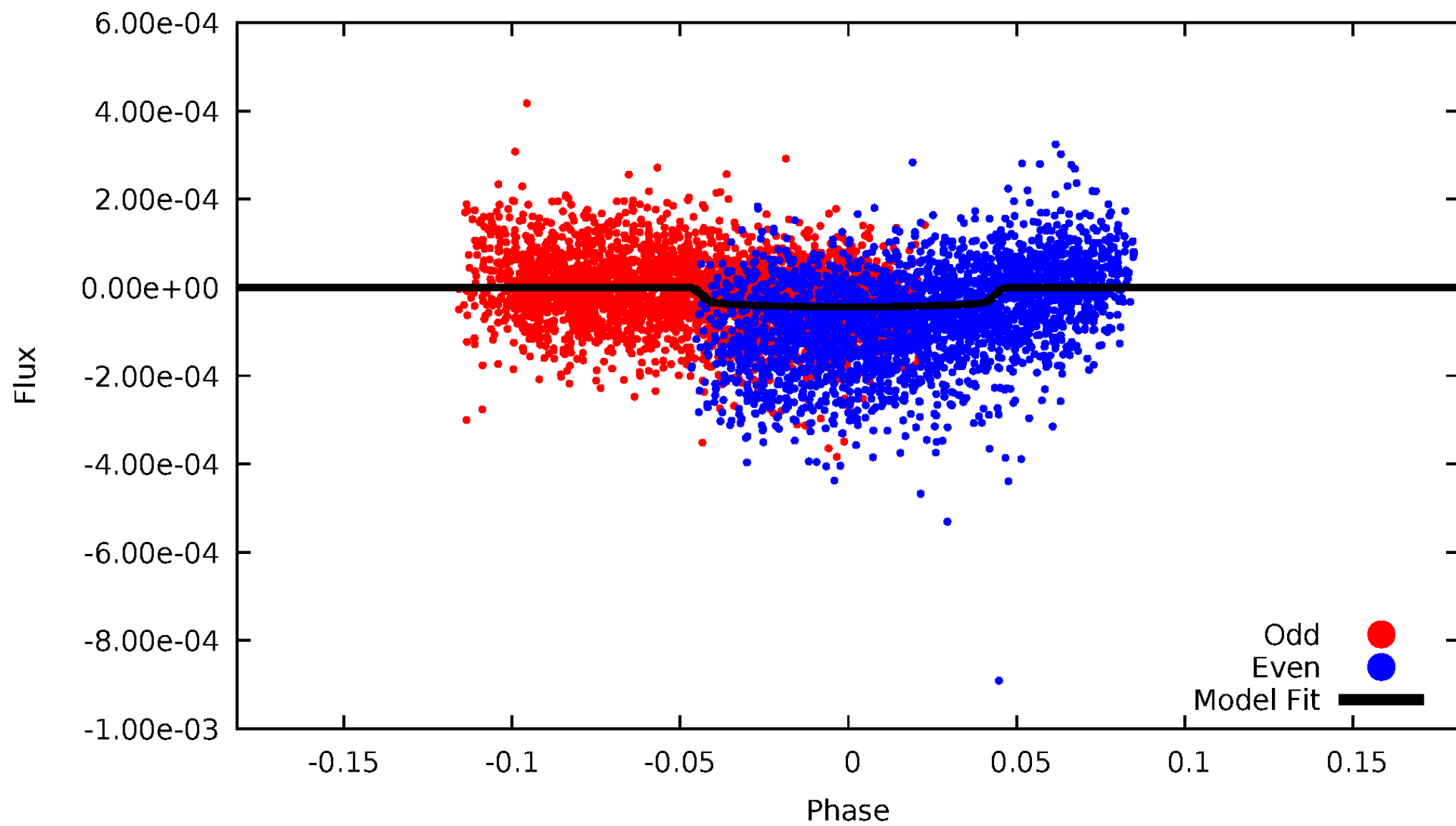


TCE 004171302-04



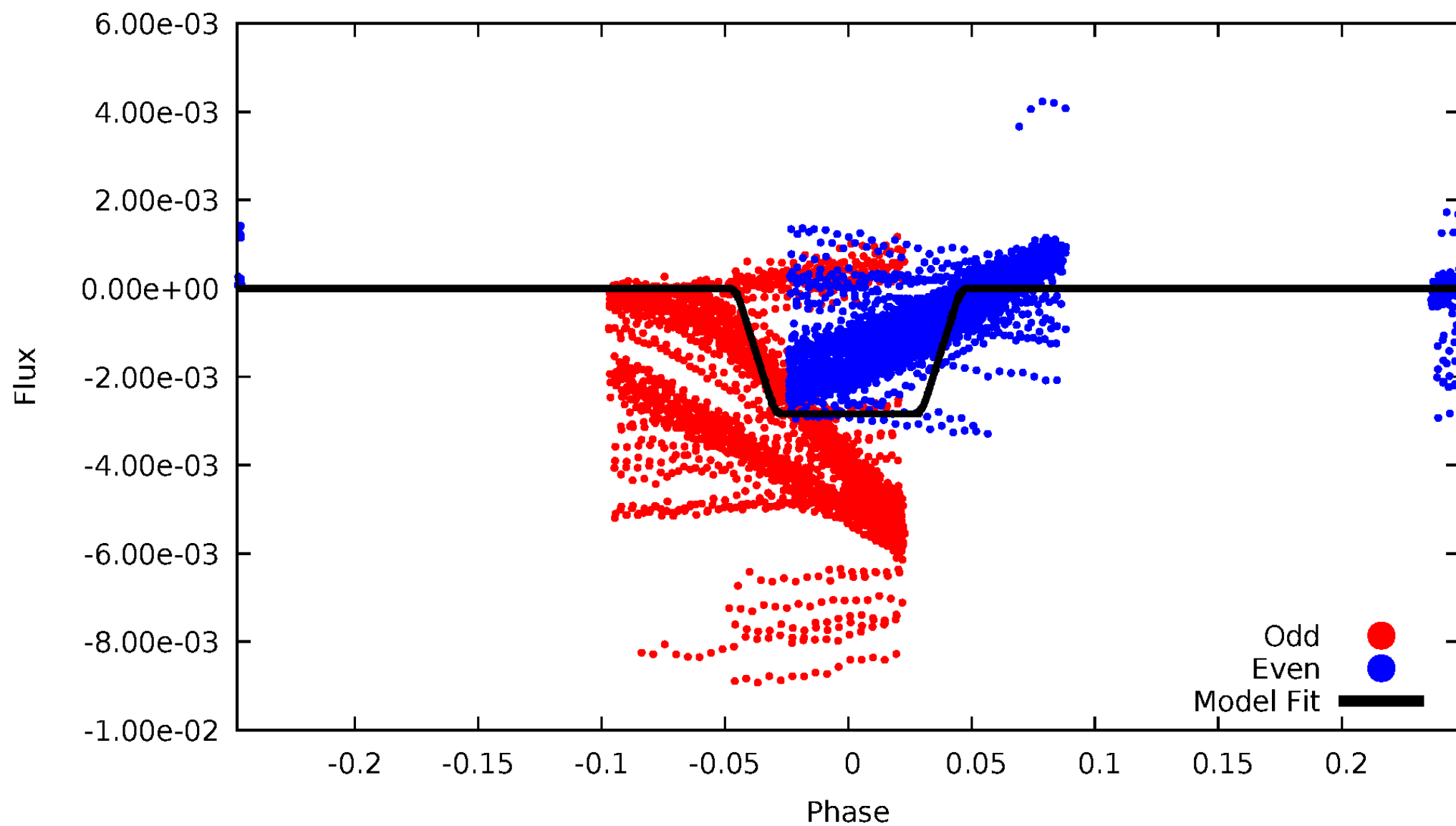
# DV Odd/Even

TCE 004171302-04



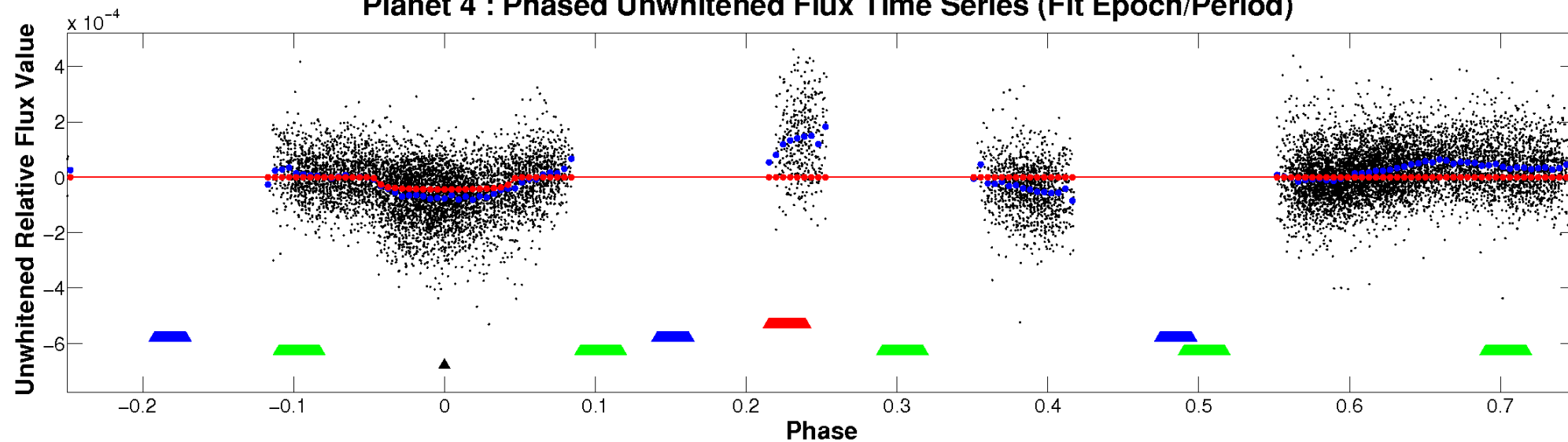
# ALT Odd/Even

TCE 004171302-04

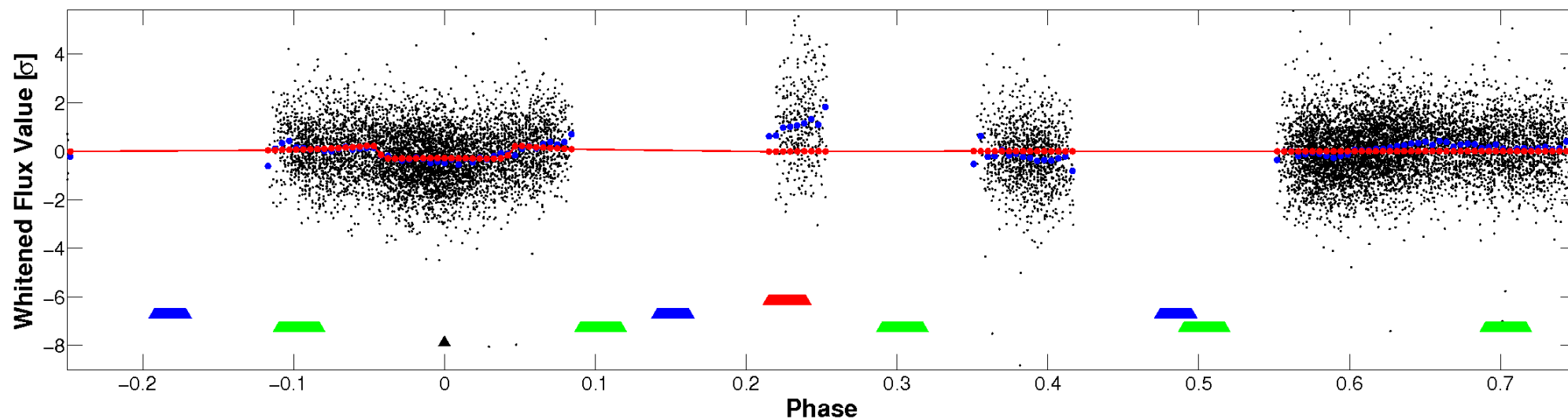


# Non-Whitened Vs. Whitened Light Curve

## Planet 4 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

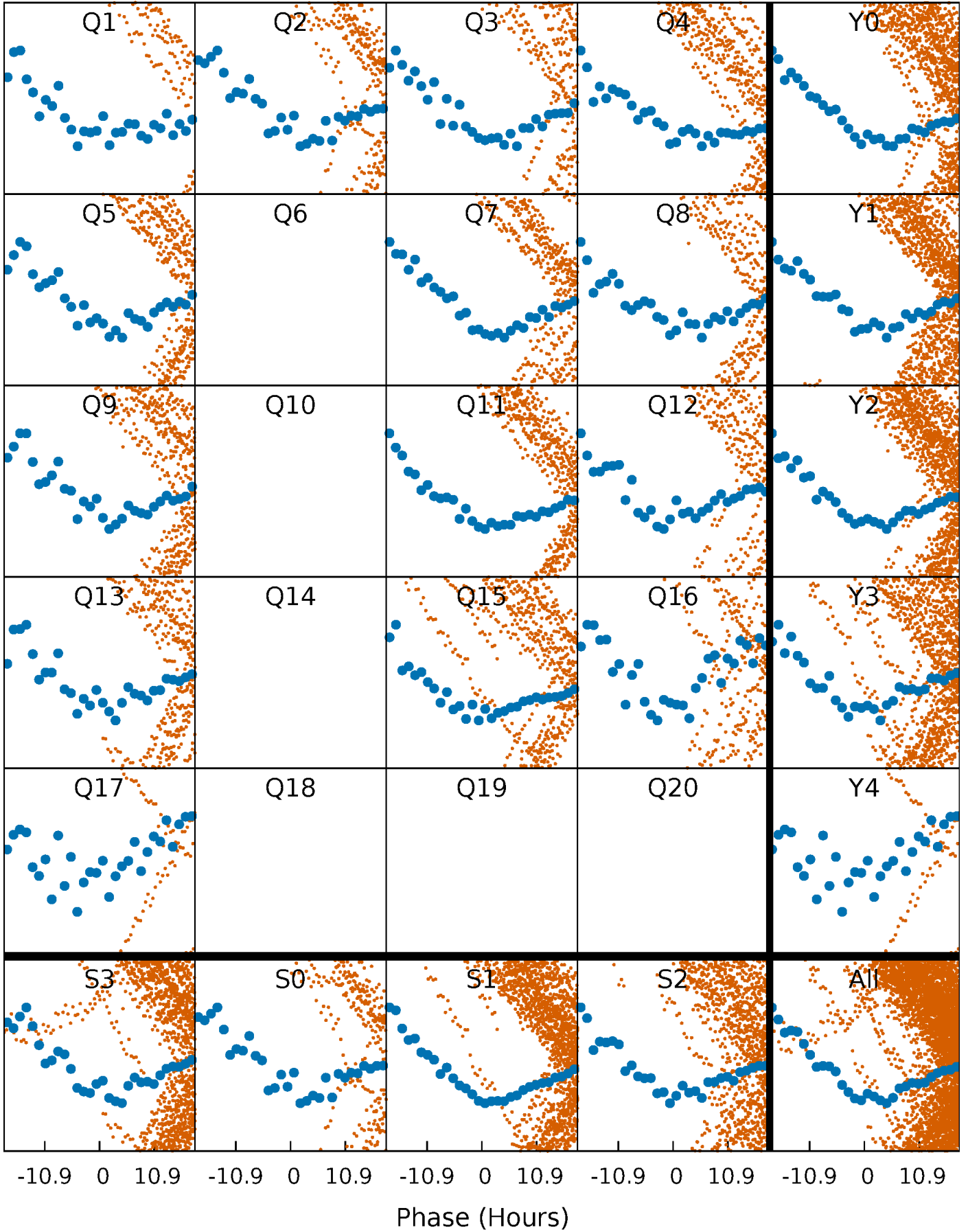


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

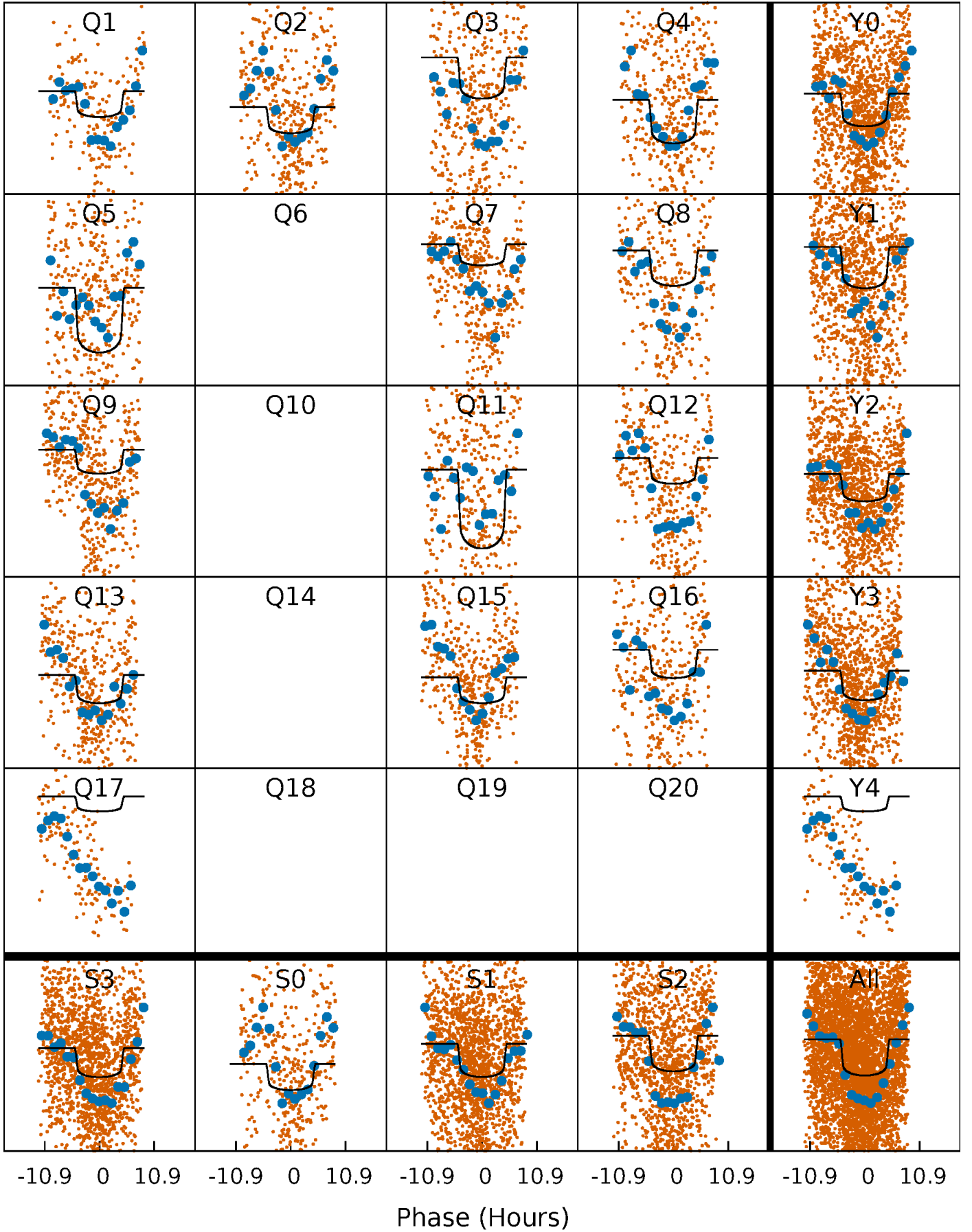
TCE 004171302-04     $P = 4.367933$  Days     $T_0 = 134.421149$  (BKJD)





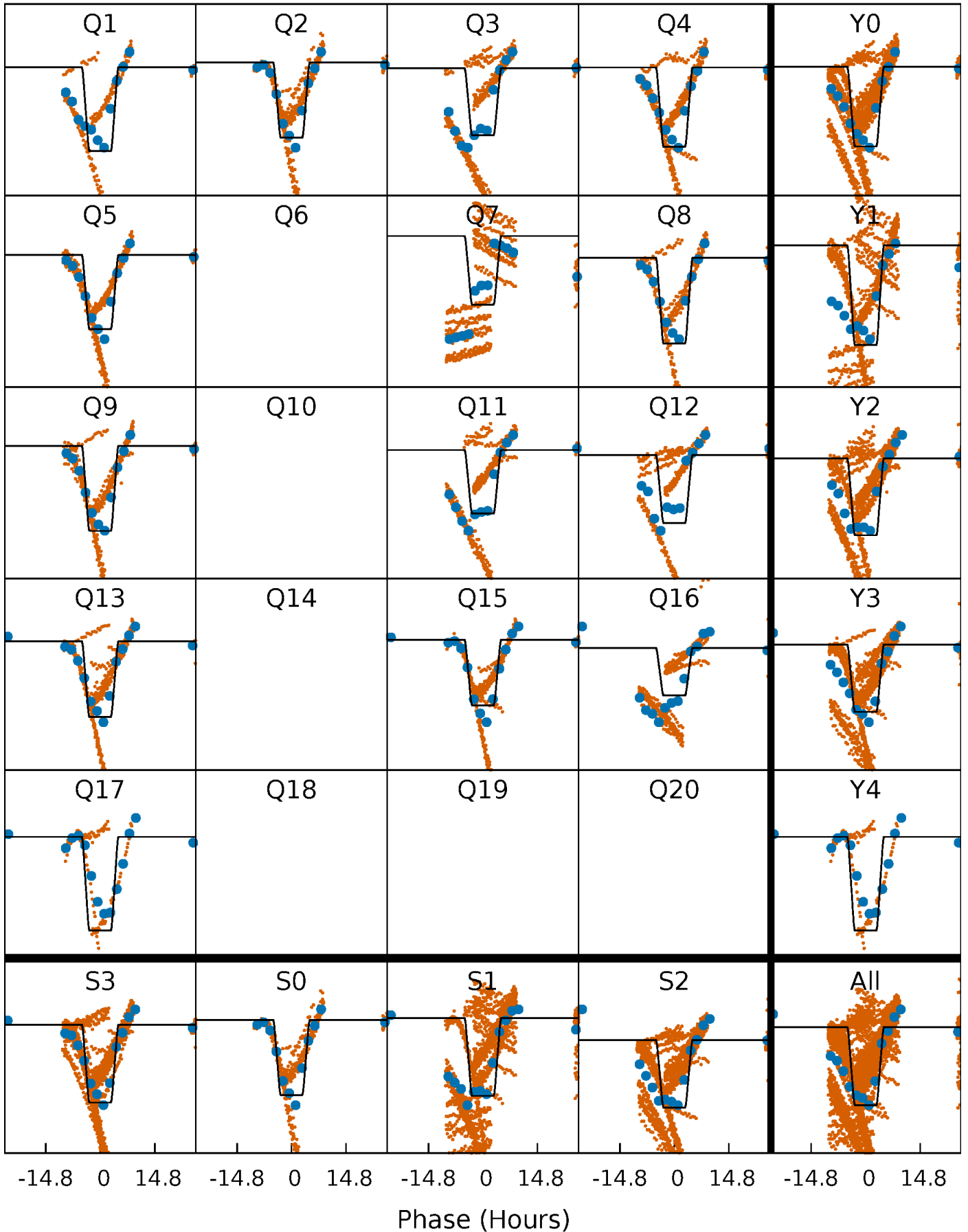
# DV Quarter-Phased Transit Curves

TCE 004171302-04     $P = 4.367933$  Days     $T_0 = 134.421149$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

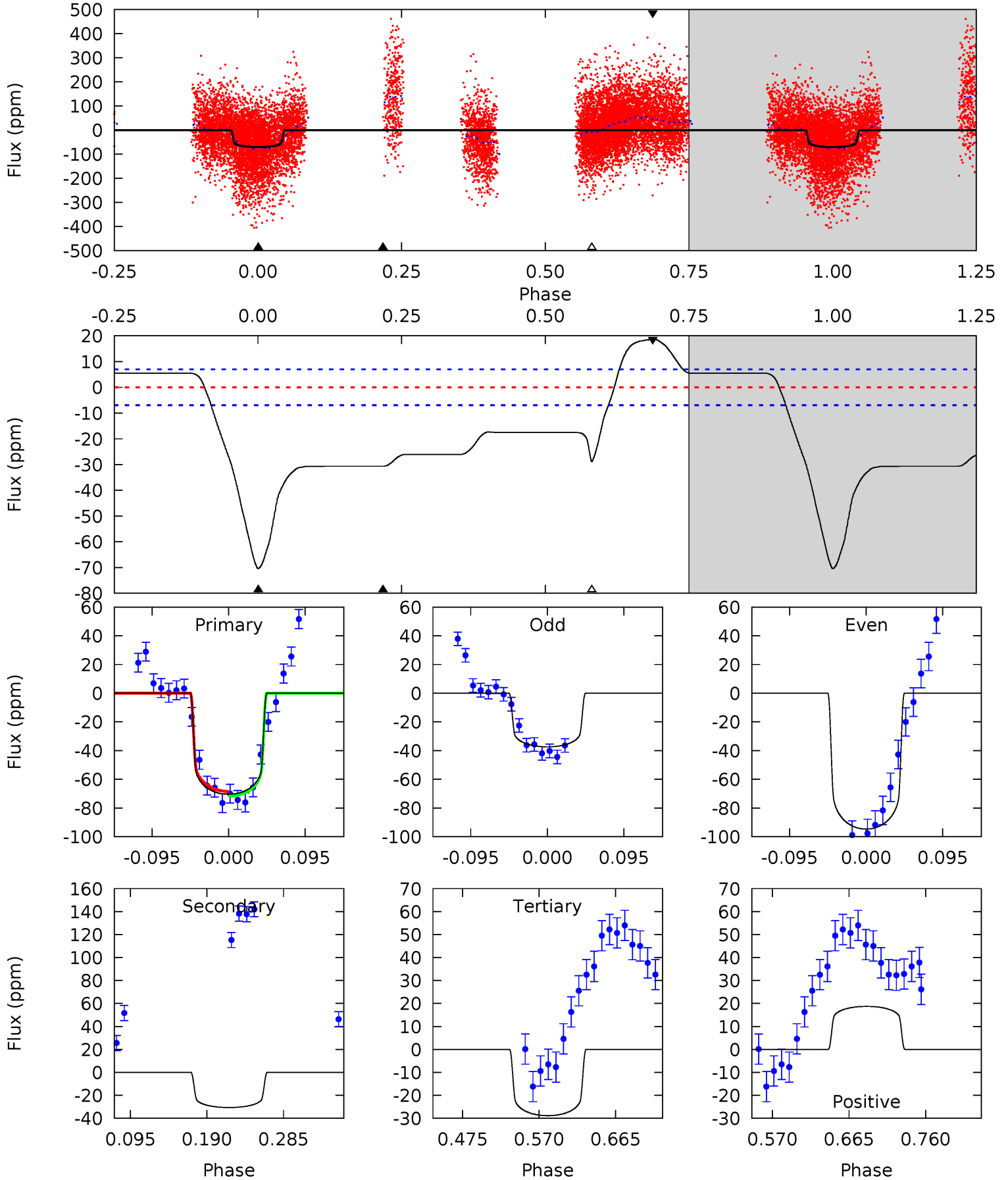
TCE 004171302-04     $P = 4.367582$  Days     $T_0 = 134.435195$  (BKJD)



# DV Model-Shift Uniqueness Test

004171302-04, P = 4.367933 Days, E = 130.053216 Days

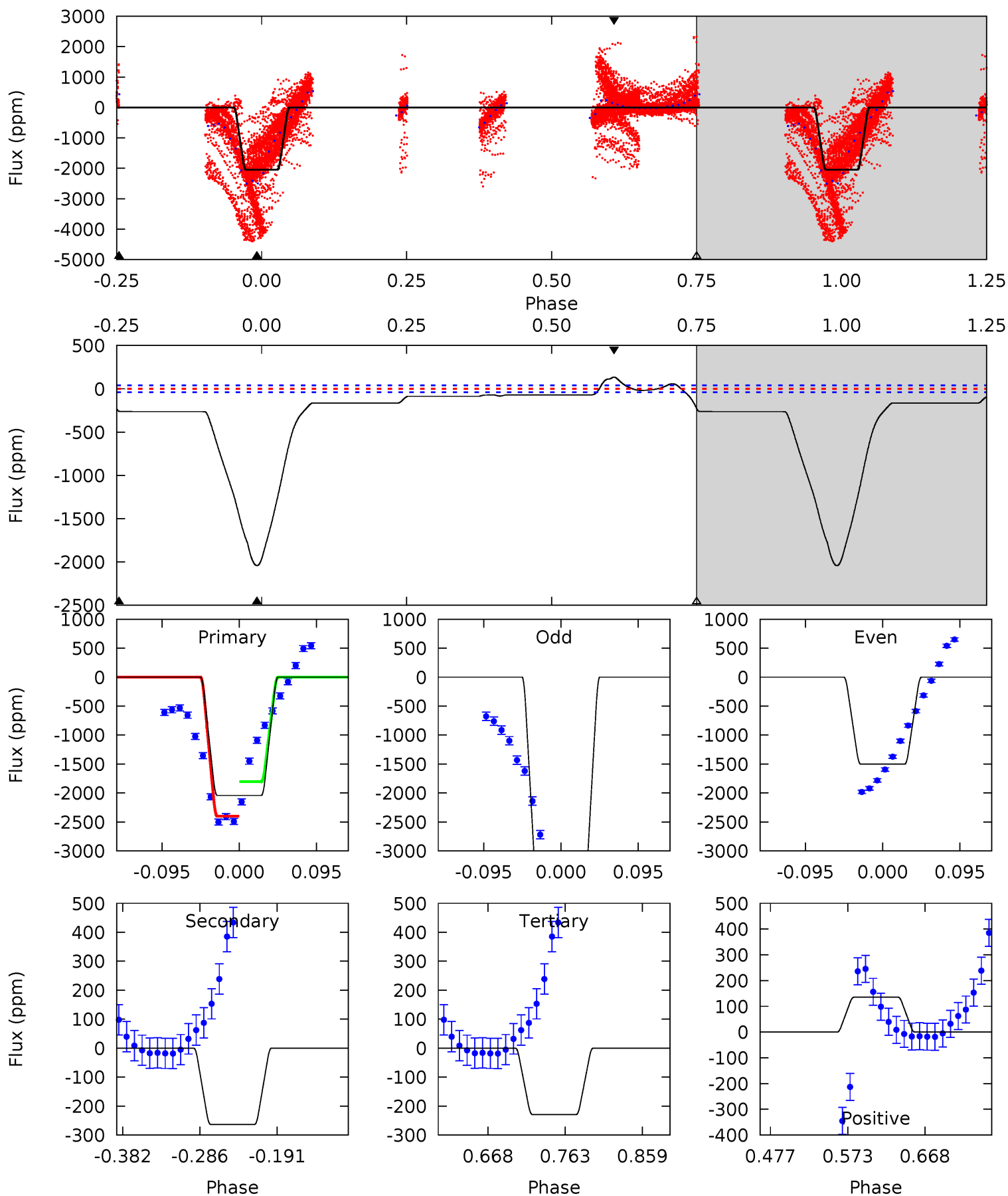
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
46.2	20.1	19.0	12.3	4.58	1.67	10.8	27.3	33.9	1.17	7.83	18.9	1.33	0.21	0.64



# Alt Model-Shift Uniqueness Test

004171302-04, P = 4.367582 Days, E = 130.067613 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
233.9	30.1	26.2	15.5	4.57	1.67	8.68	207.7	218.4	3.92	14.6	87.7	1.30	0.06	33.1



### Stellar Parameters For KIC 004171302

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$8918^{+418}_{-627}$	$3.706^{+0.338}_{-0.156}$	$0.360^{+0.050}_{-0.150}$	$3.895^{+1.048}_{-1.572}$	$2.813^{+0.271}_{-0.587}$	$0.067^{+0.174}_{-0.030}$
	+5%/-7%	+9%/-4%	+14%/-42%	+27%/-40%	+10%/-21%	+259%/-45%
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 004171302-04 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-31 \pm 2$	$2.86^{+0.54}_{-0.59}$	$3914^{+396}_{-464}$	$7581^{+630}_{-532}$	$11^{+6}_{-3}$
Alt.	$-263 \pm 9$	$22.19^{+3.31}_{-4.59}$	$3911^{+363}_{-416}$	$4599^{+167}_{-228}$	$1.570^{+0.833}_{-0.371}$

$T_{\text{max}}$  = 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

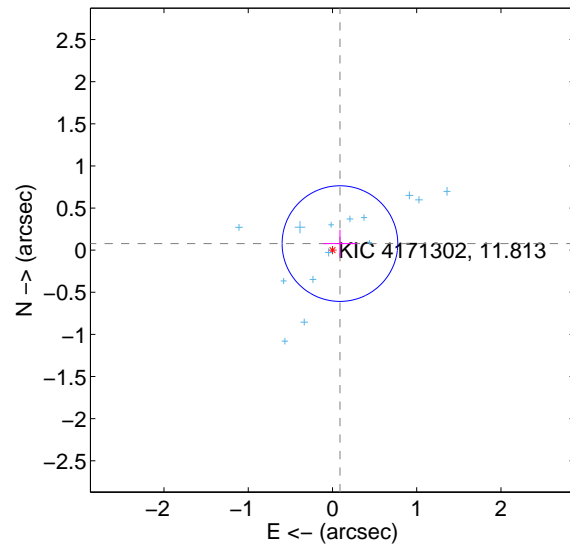
Supplemental centroid analysis for 004171302-04. **Kepler magnitude: 11.81.** Transit SNR 18.15

There are 14 quarters with good PRF difference image offsets

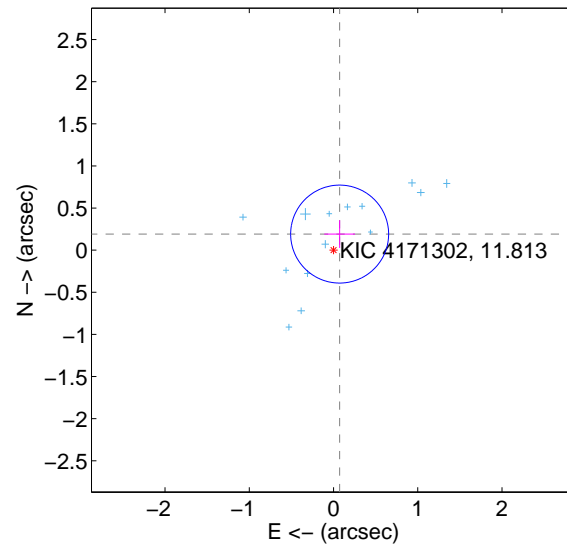
The direct PRF centroid is offset from the target star catalog position by about 0.15 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.118 \pm 0.229$	0.52	$-0.089 \pm 0.199$	$0.078 \pm 0.164$
PRF-fit source offset from KIC position	$0.204 \pm 0.194$	1.05	$-0.073 \pm 0.182$	$0.191 \pm 0.165$
photometric centroid source offset	$0.95 \pm 0.48$	1.96	$-0.80 \pm 0.49$	$0.50 \pm 0.47$

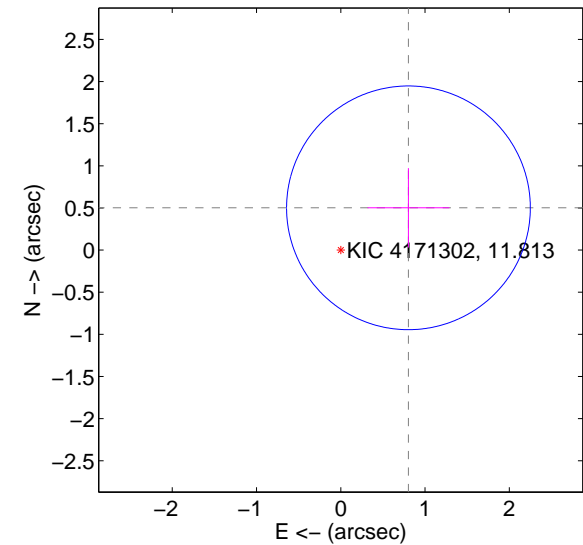
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



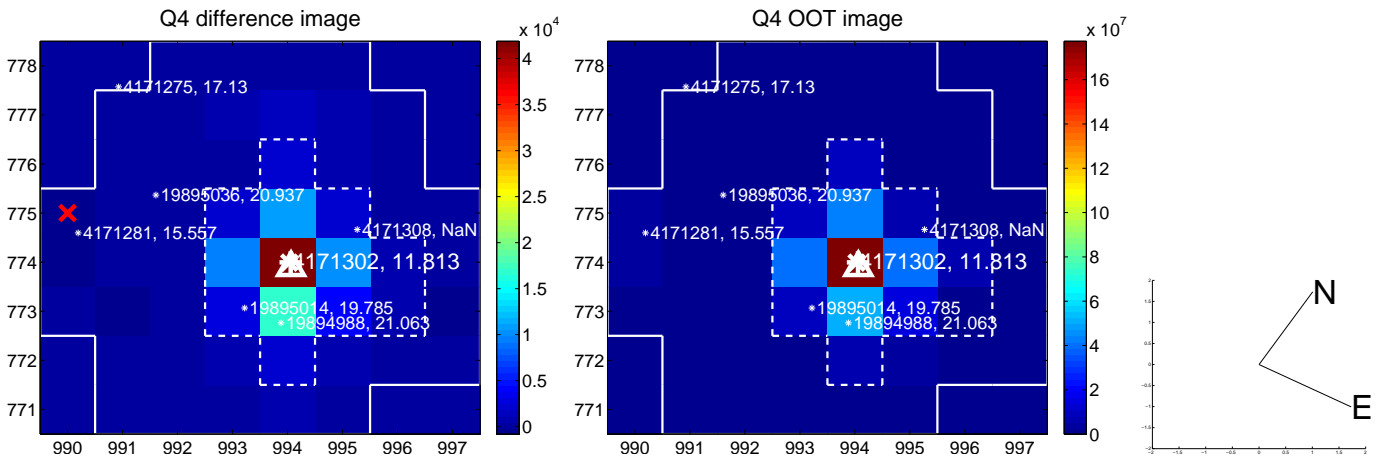
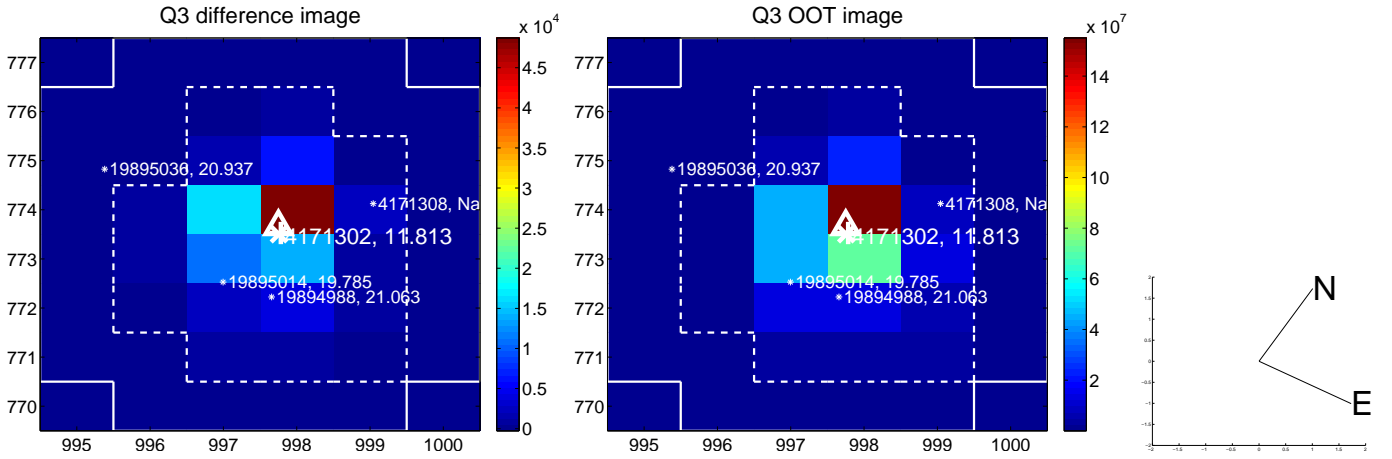
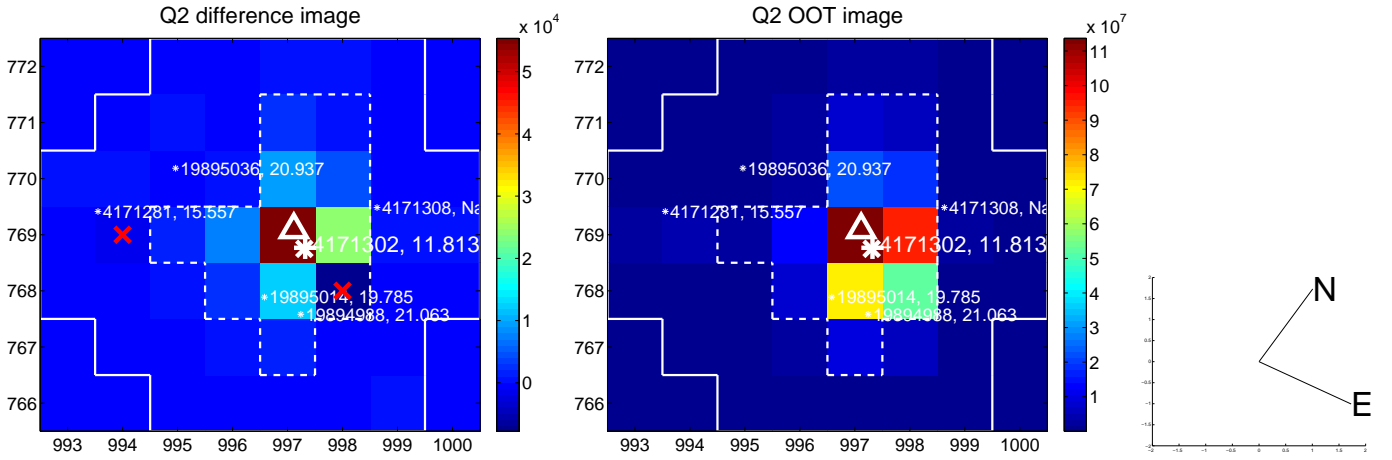
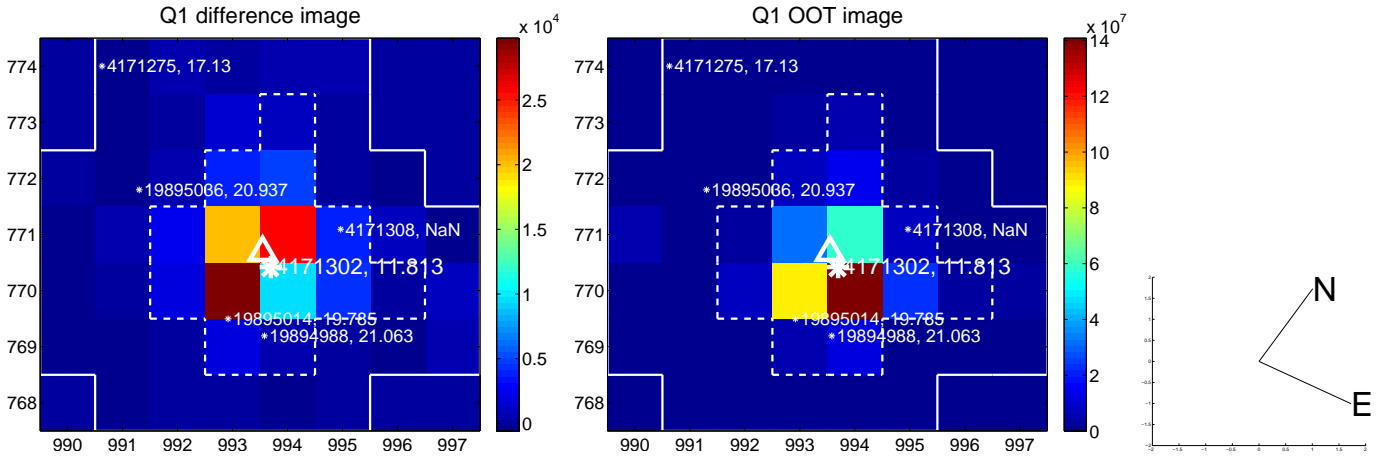
offset from photometric centroids



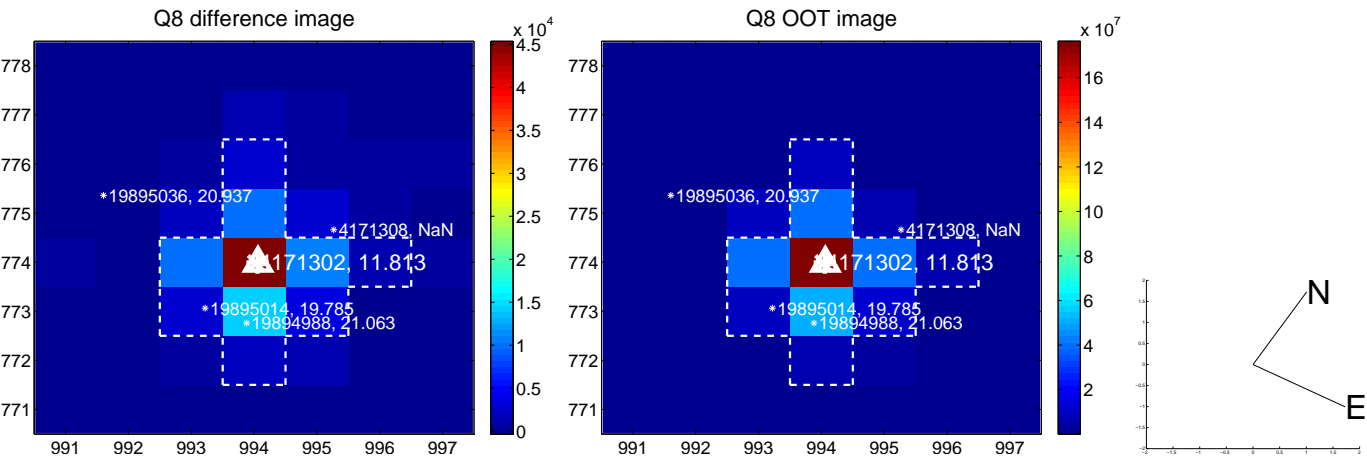
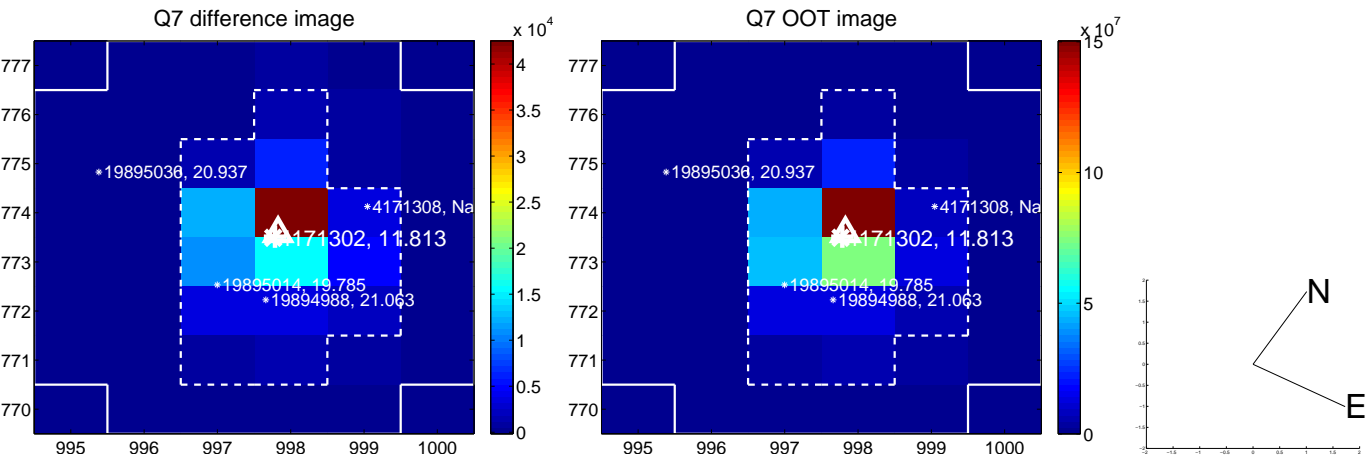
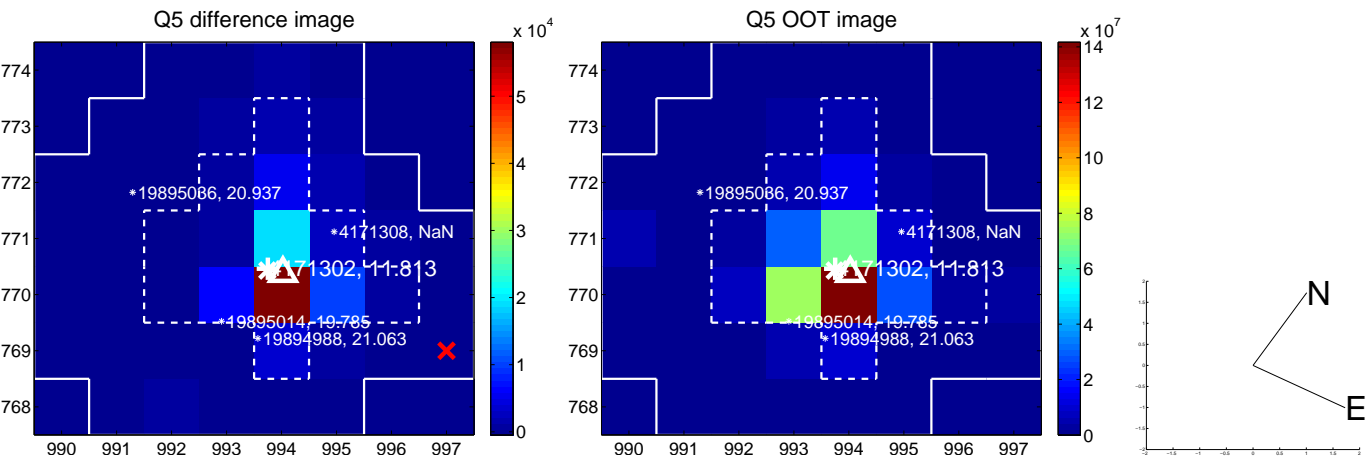
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



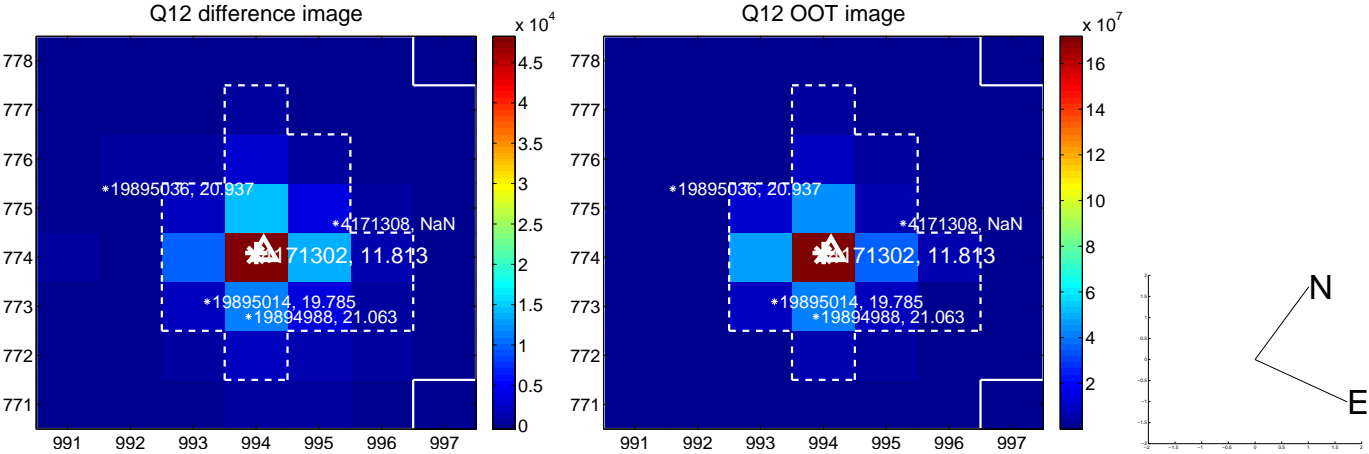
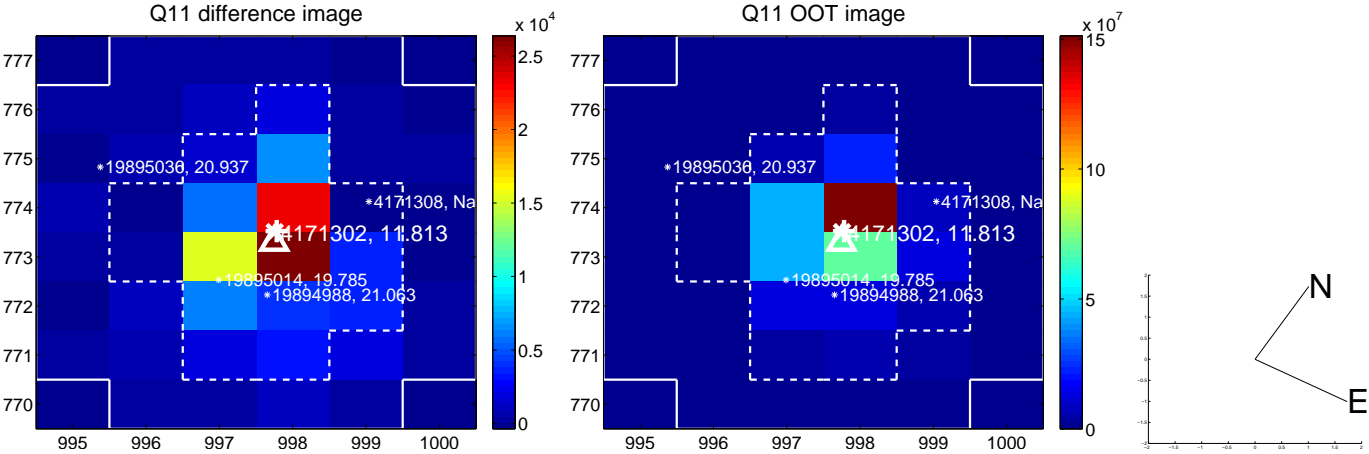
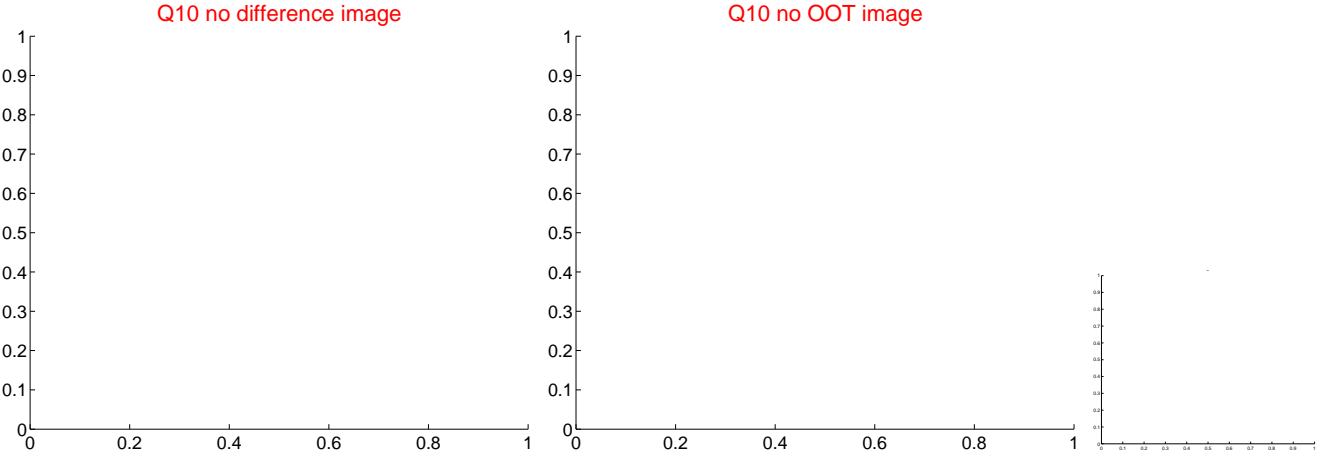
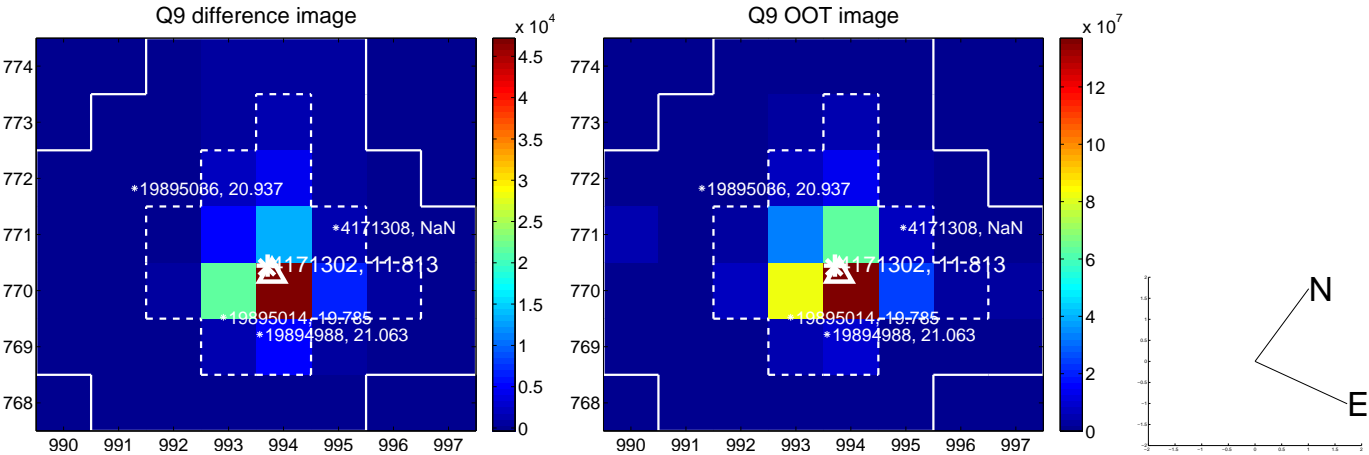
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



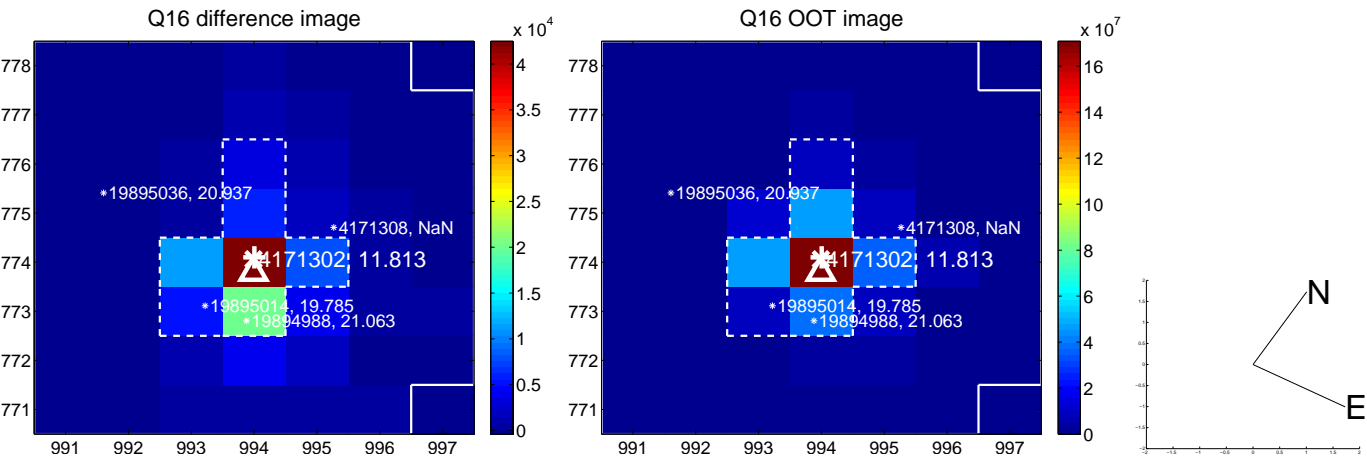
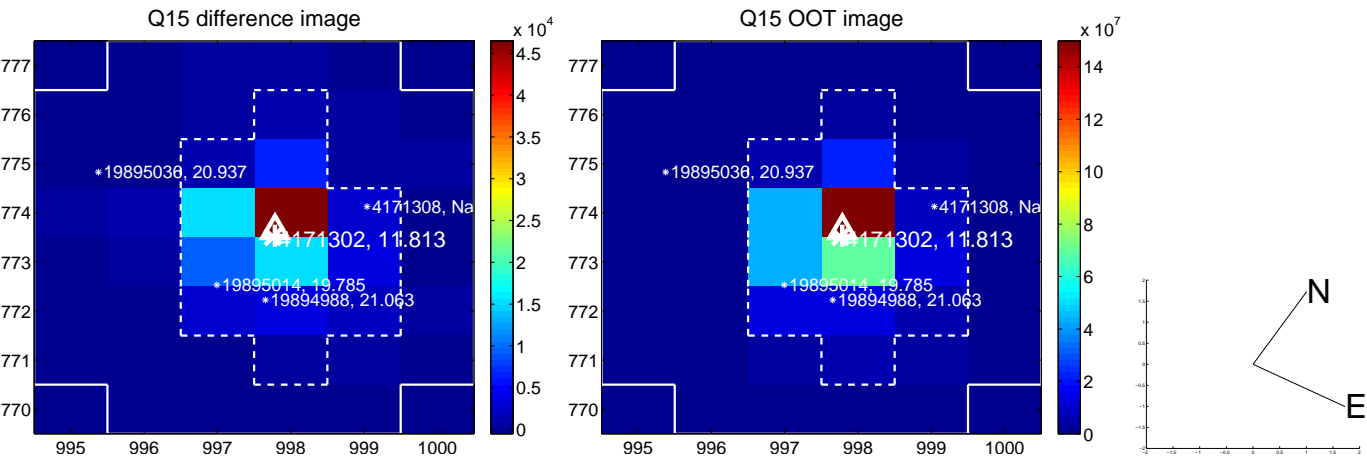
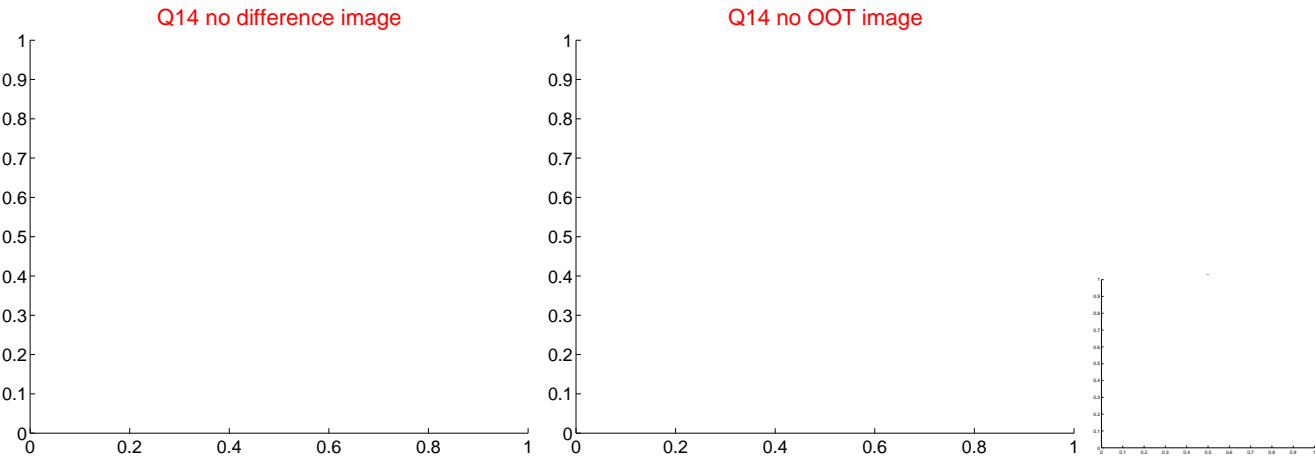
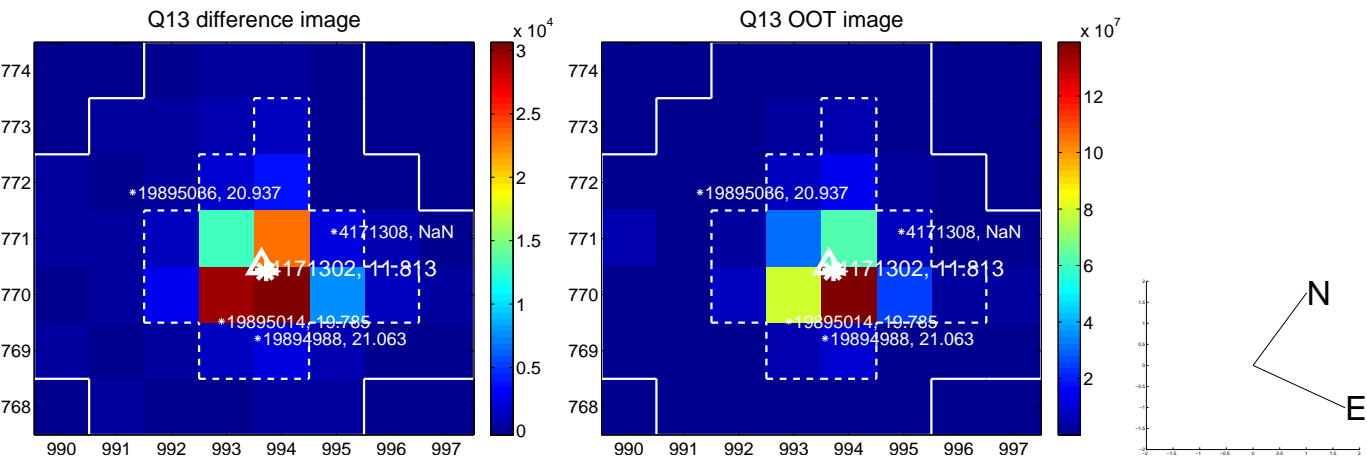
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



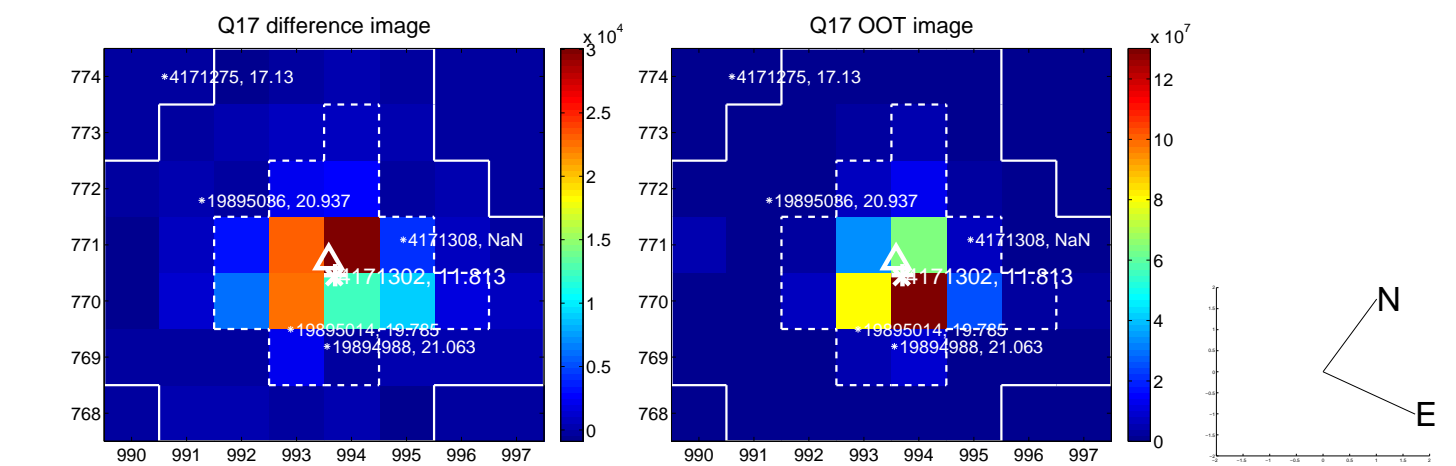
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



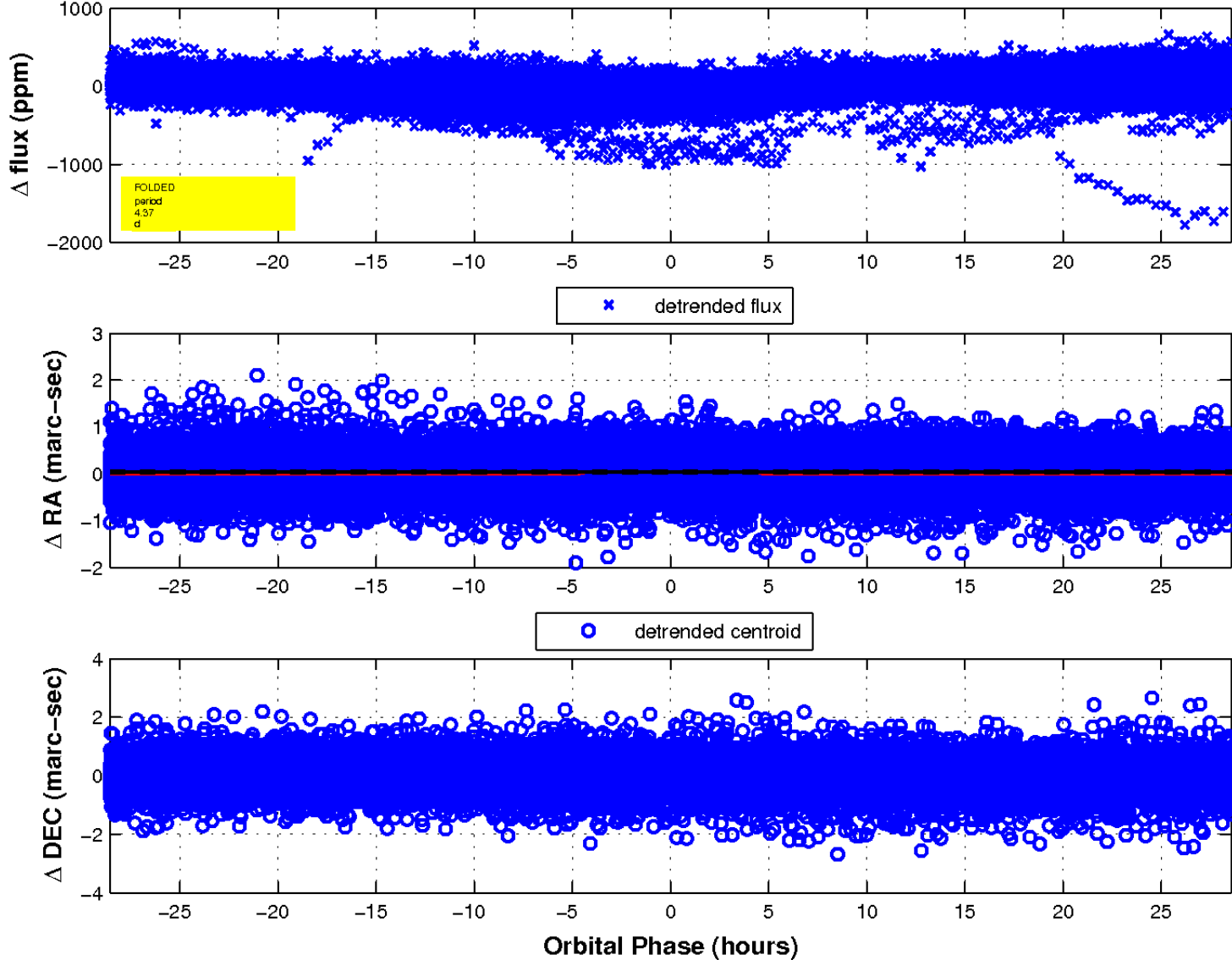
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 4 of 4



UKIRT Image

Declination

