

# KIC 004382311

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004382311-01	OBS	No	1.412416	132.777143	6.8	8.062	7.4	4.7	2.08	8462	0.55	20859.11
004382311-02	OBS	No	91.585354	180.147473	73.9	21.858	10.3	5.7	2.08	8462	2.06	80.07

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004382311-01	OBS	FP	0.00	1	0	0	0	LPP_DV
004382311-02	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST

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

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

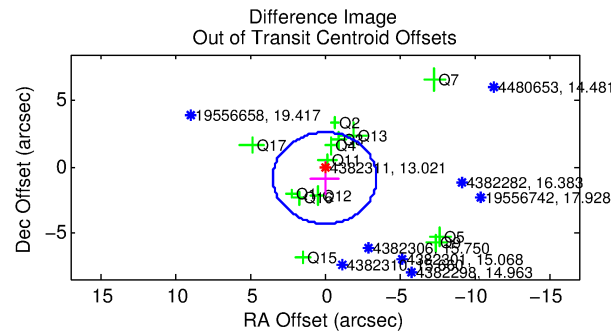
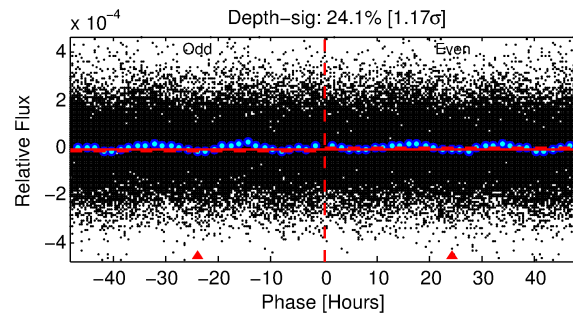
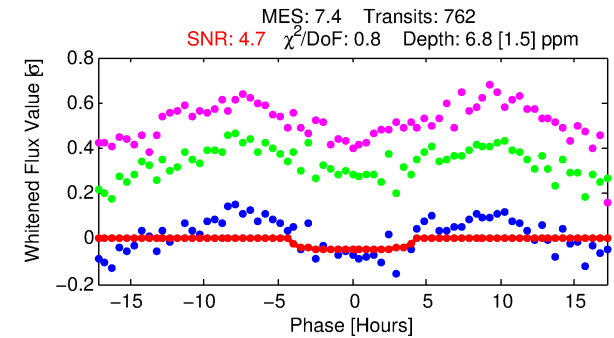
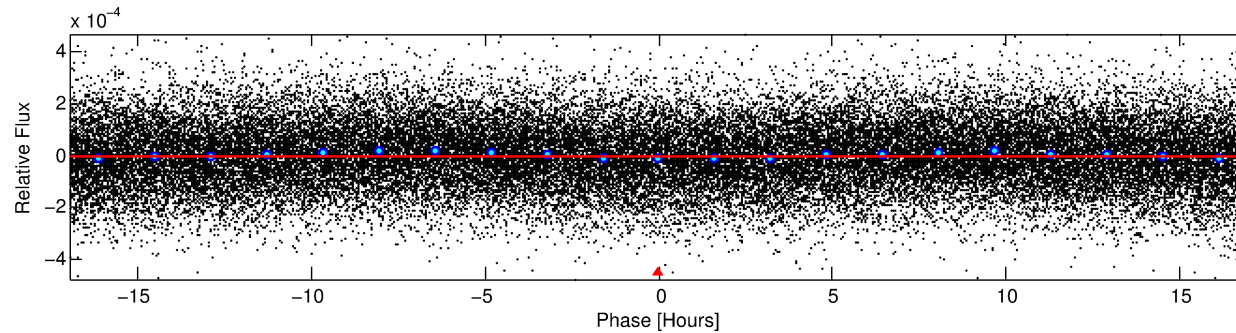
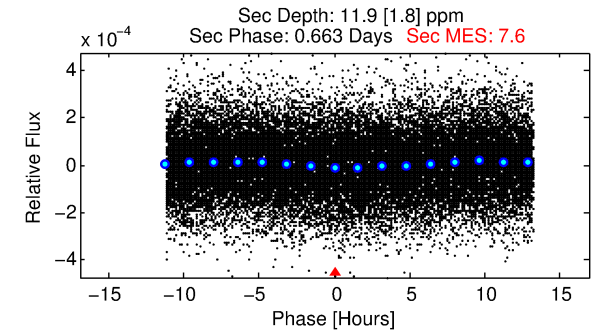
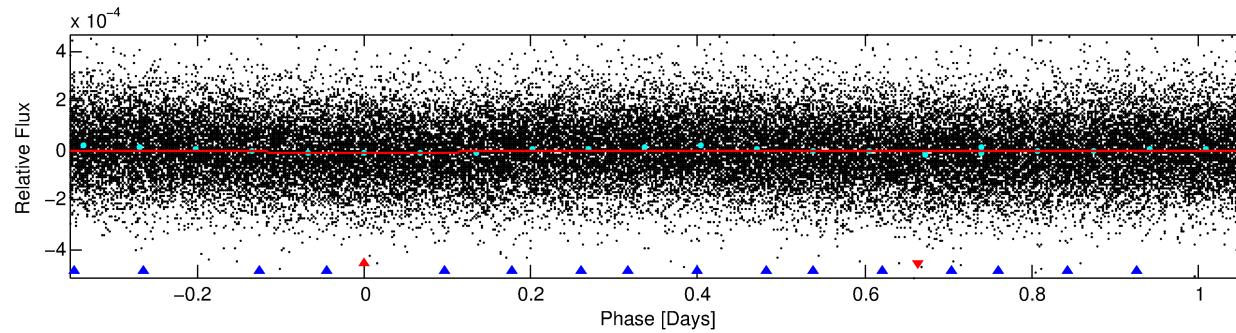
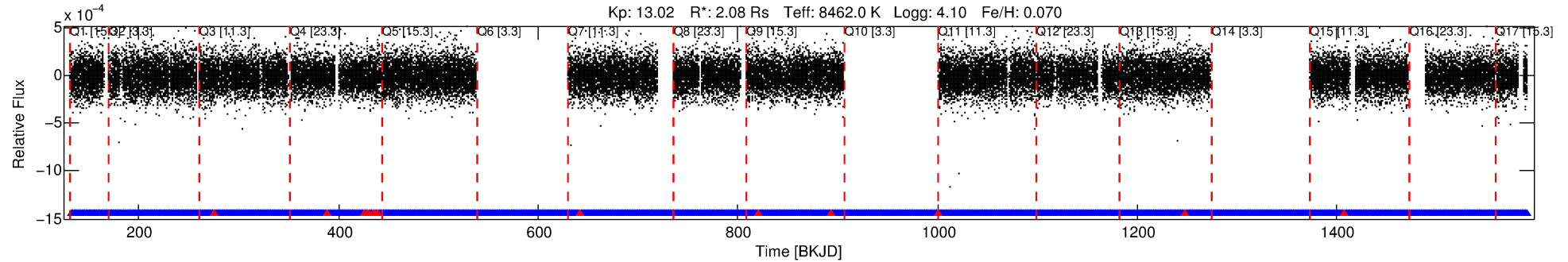
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 004382311-01

No Significant Match Found

# DV One-Page Summary

KIC: 4382311 Candidate: 1 of 2 Period: 1.412 d



## DV Fit Results:

Period = 1.41242 [0.00005] d  
Epoch = 132.7771 [0.0152] BKJD  
Rp/R\* = 0.0024 [0.0031]  
a/R\* = 1.45 [5.75]  
b = 0.26 [26.98]  
Seff = 20859.11 [6646.46]  
Teq = 3064 [244] K  
Rp = 0.55 [0.72] Re  
a = 0.0309 [0.0057] AU  
Ag = 20.40 [52.34] [0.37σ]  
Teffp = 10069 [6439] K [1.09σ]

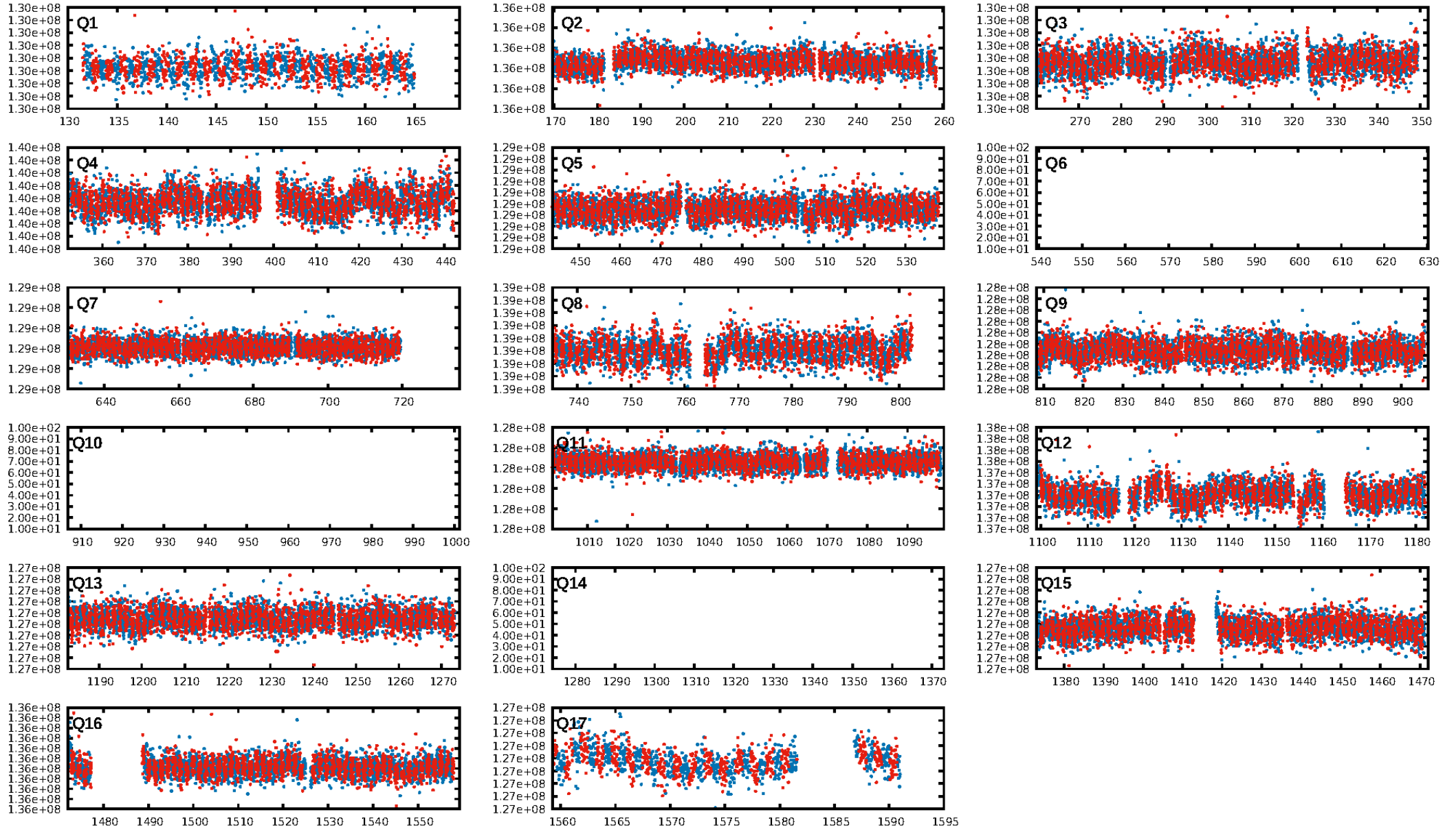
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [92.89σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
**Bootstrap-pfa: 1.47e-08**  
RollingBand-fgt: 0.98 [705/719]  
GhostDiagnostic-chr: 103.4  
**Centroid-sig: 0.0%**  
Centroid-so: 8.038 arcsec [2.09σ]  
OotOffset-rm: 0.861 arcsec [0.75σ]  
KicOffset-rm: 0.914 arcsec [0.80σ]  
OotOffset-st: 1/4/3/5 [13]  
KicOffset-st: 1/4/3/5 [13]  
DiffImageQuality-fgm: 0.54 [7/13]  
DiffImageOverlap-fno: 1.00 [14/14]

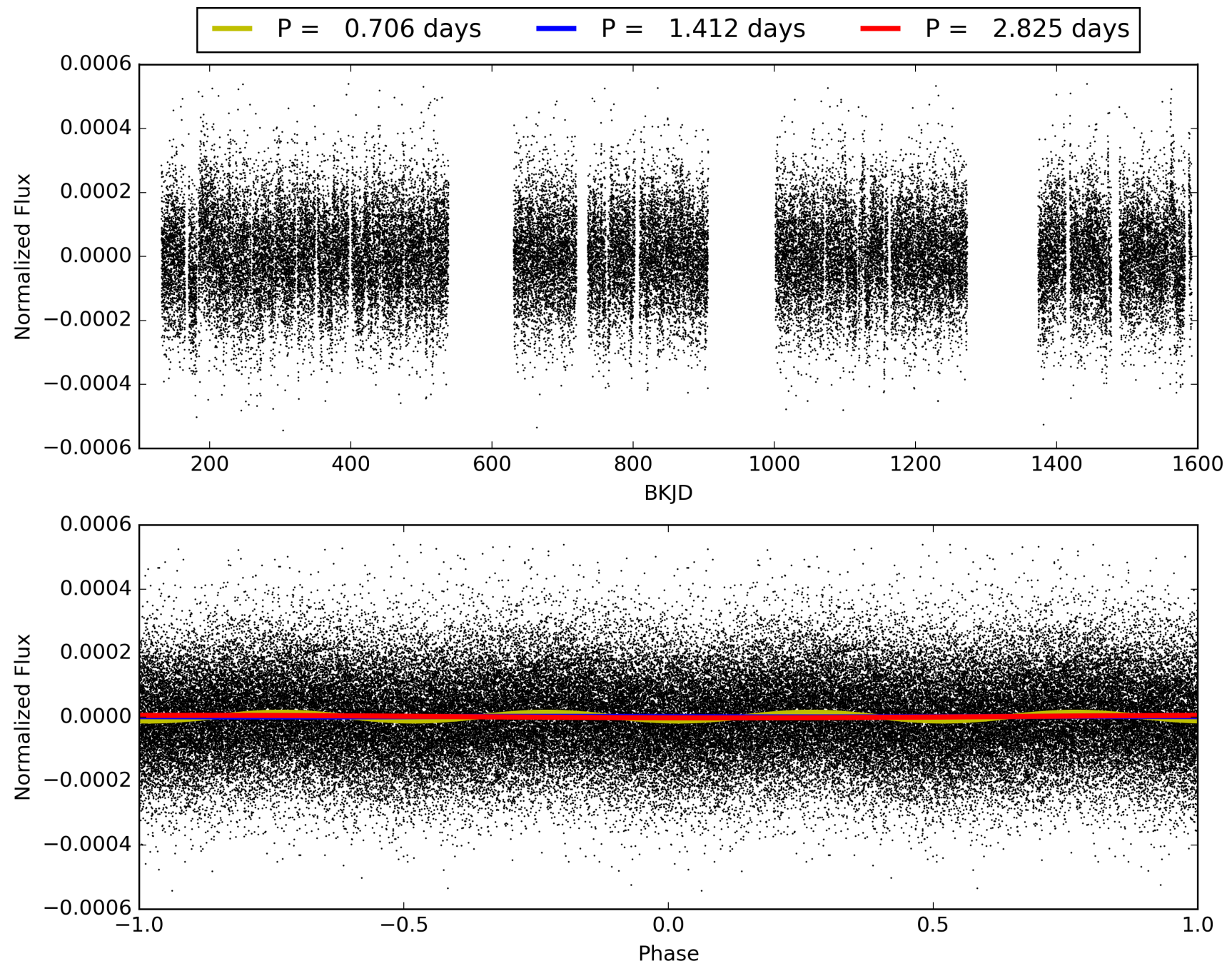
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 23:56:31 Z

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

# TCE 004382311-01, PDC Light Curves



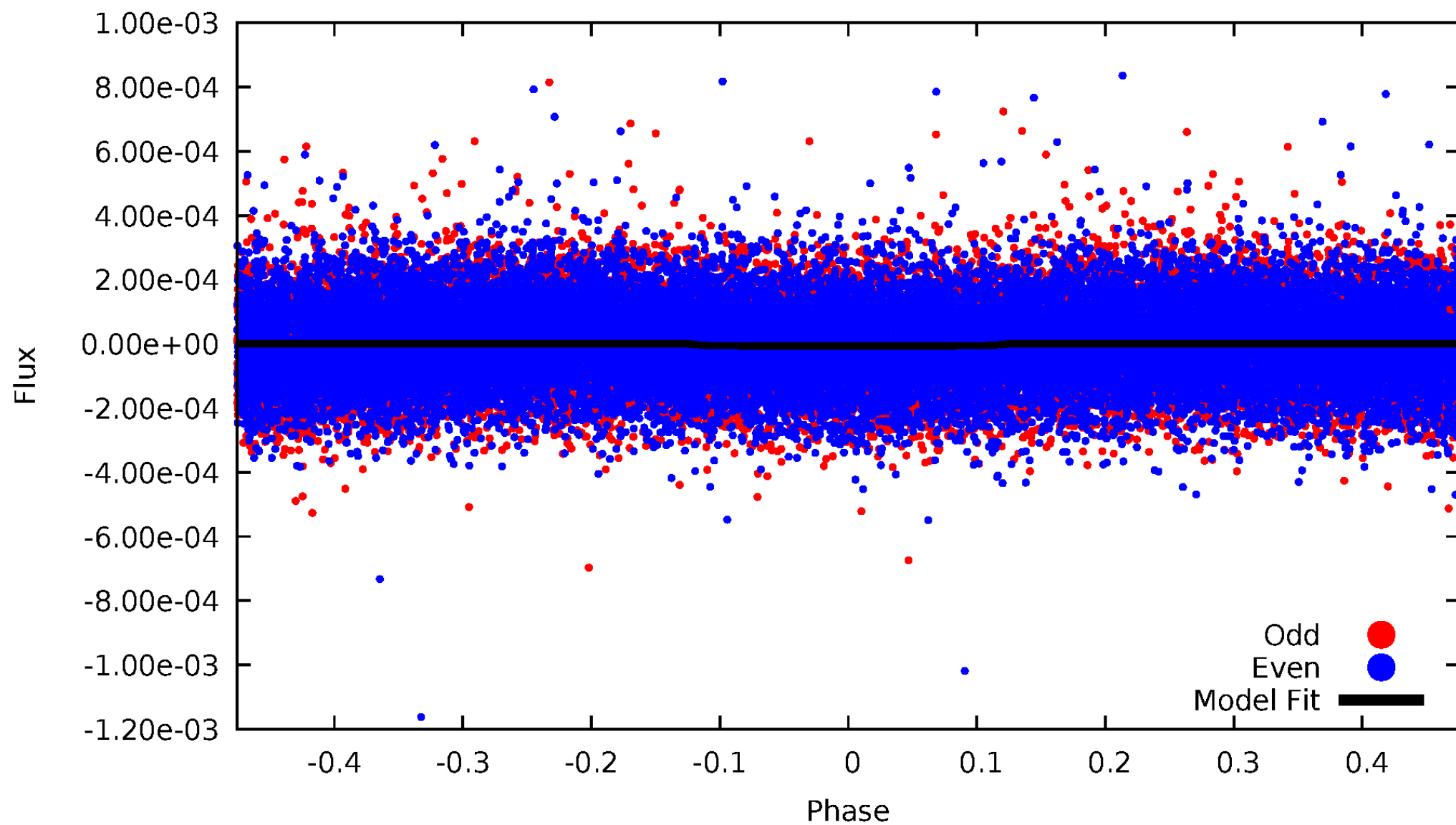
TCE 004382311-01





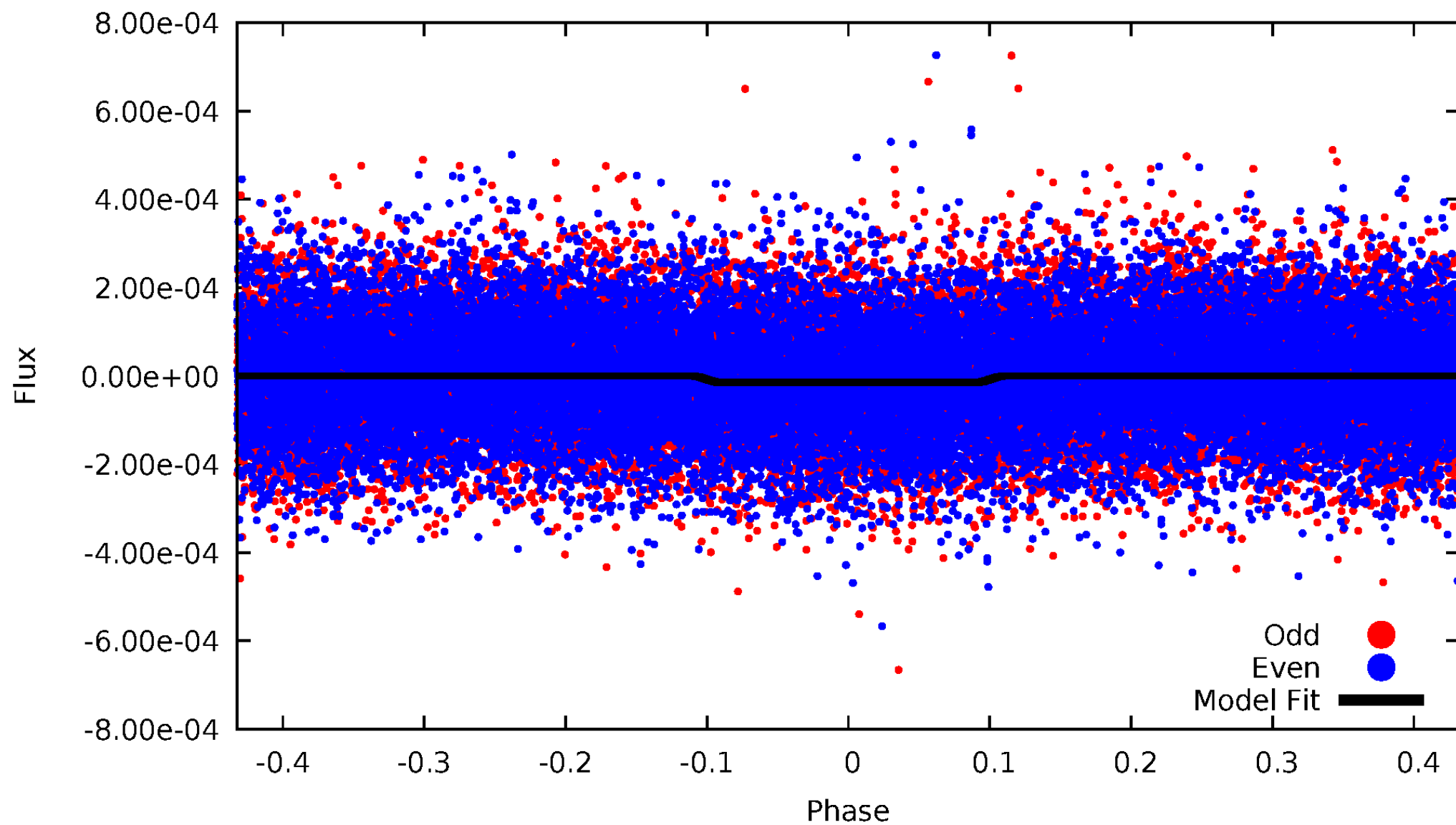
# DV Odd/Even

TCE 004382311-01



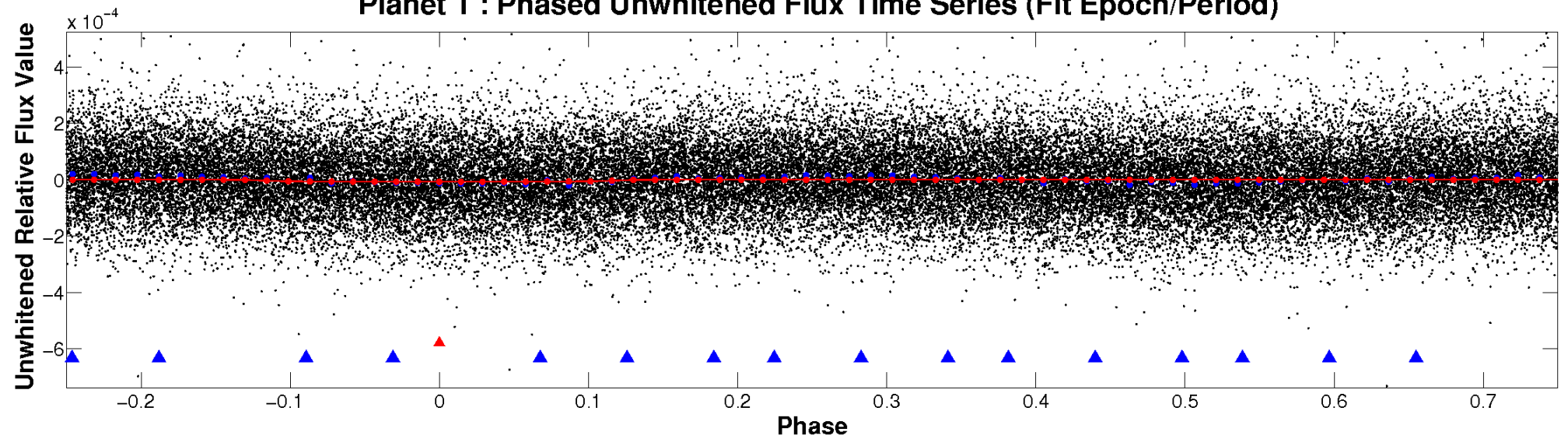
# ALT Odd/Even

TCE 004382311-01

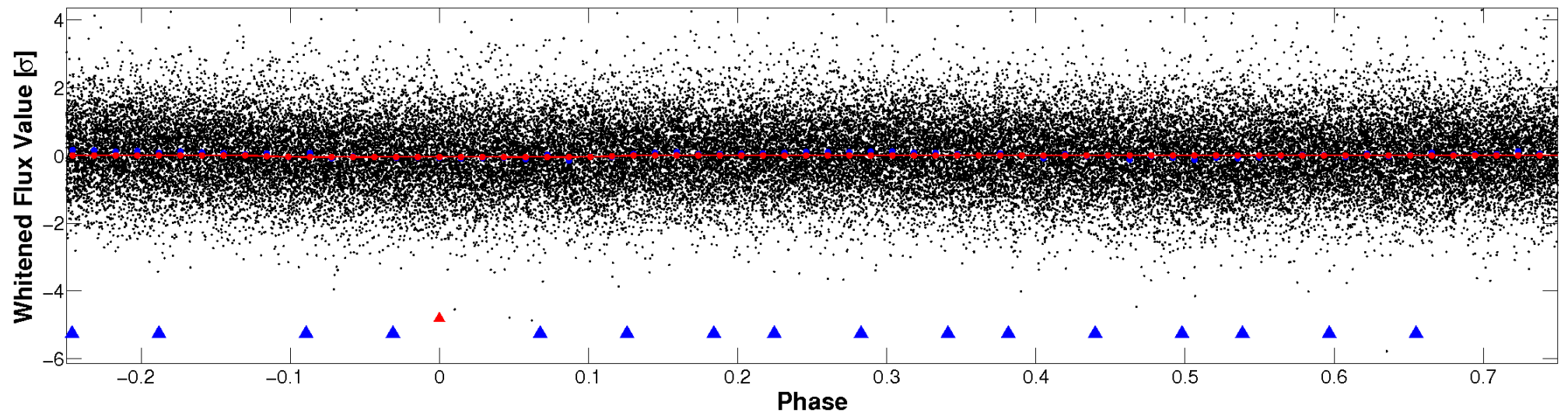


# Non-Whitened Vs. Whitened Light Curve

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

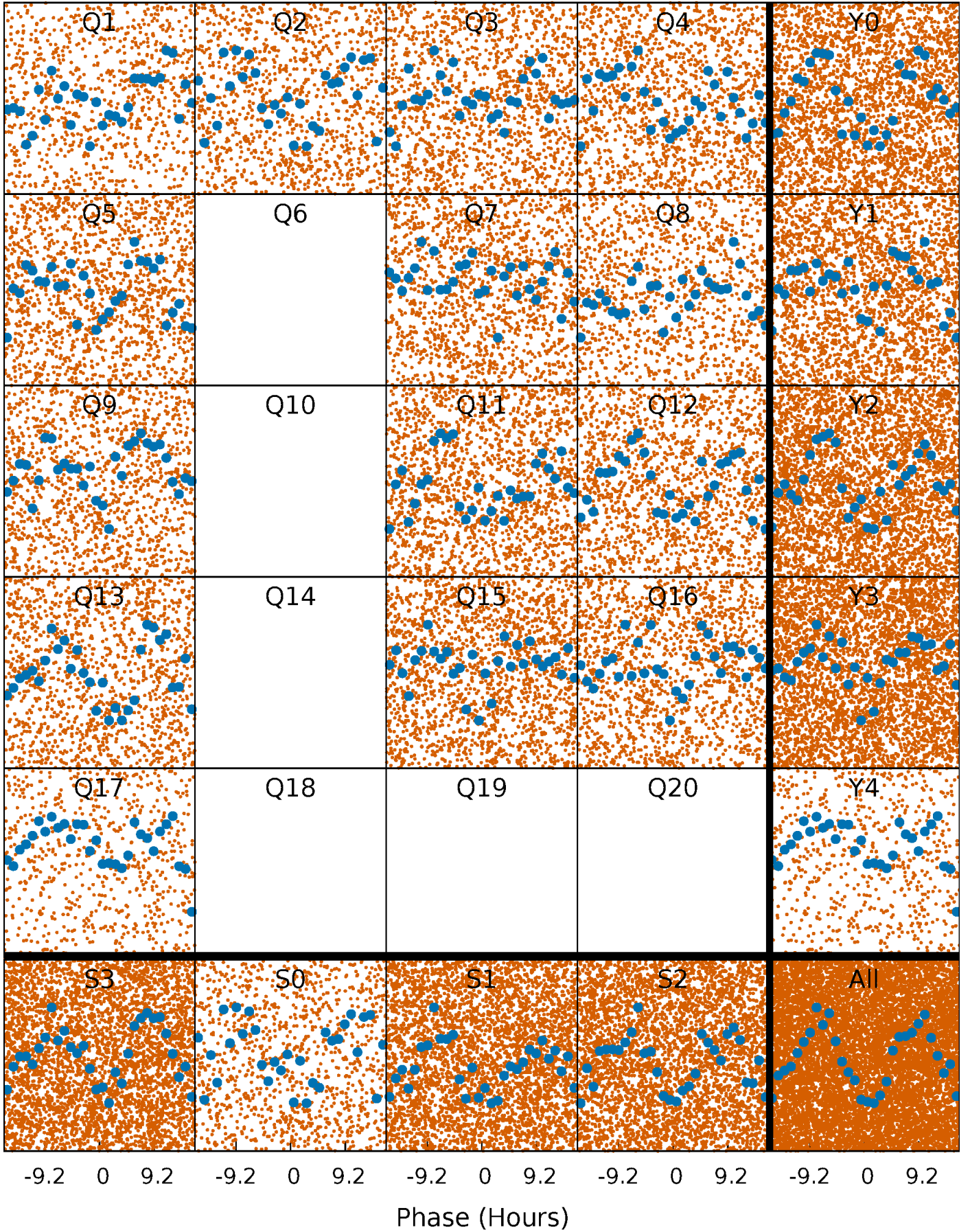


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

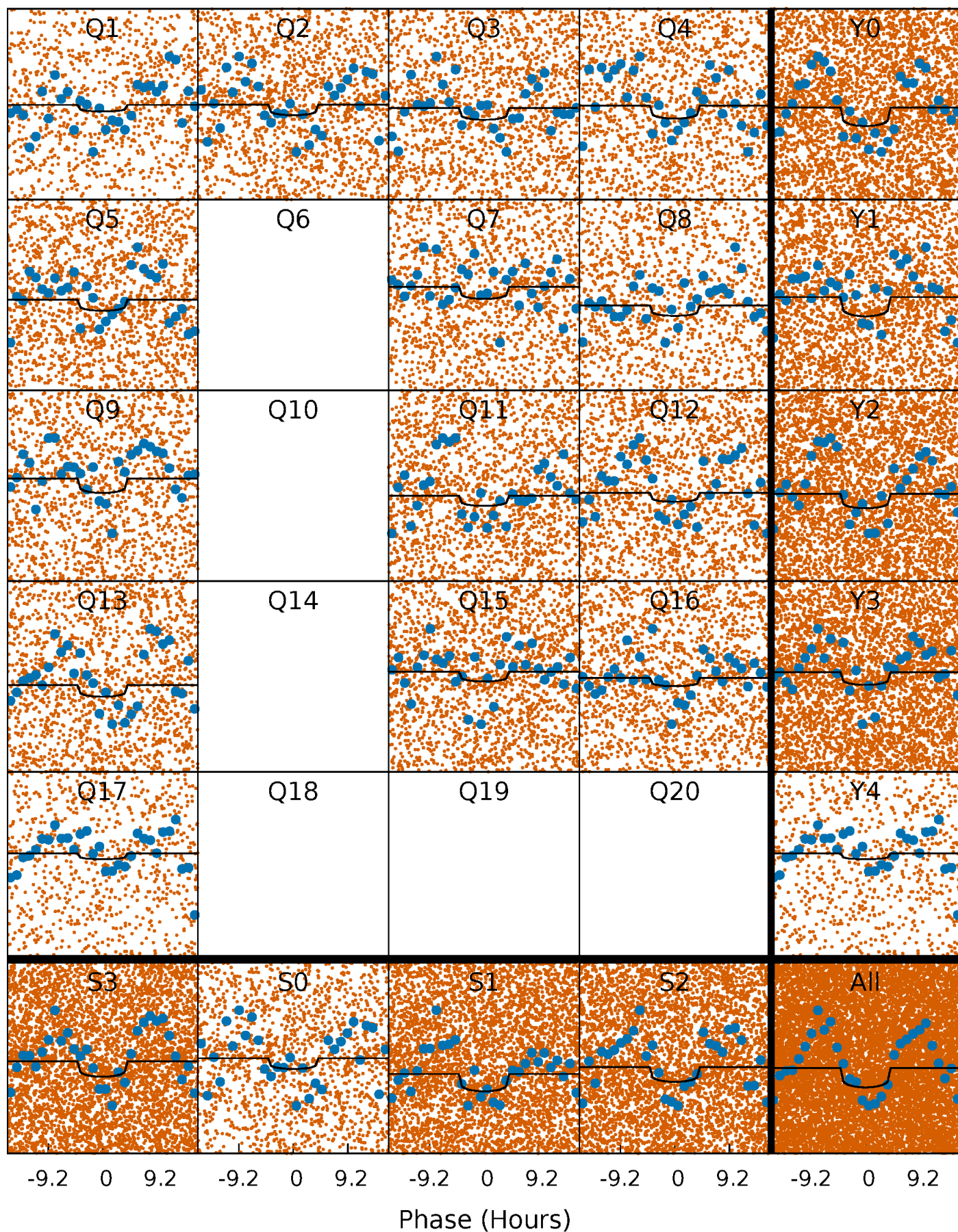
TCE 004382311-01   P= 1.412416 Days    $T_0=132.777143$  (BKJD)





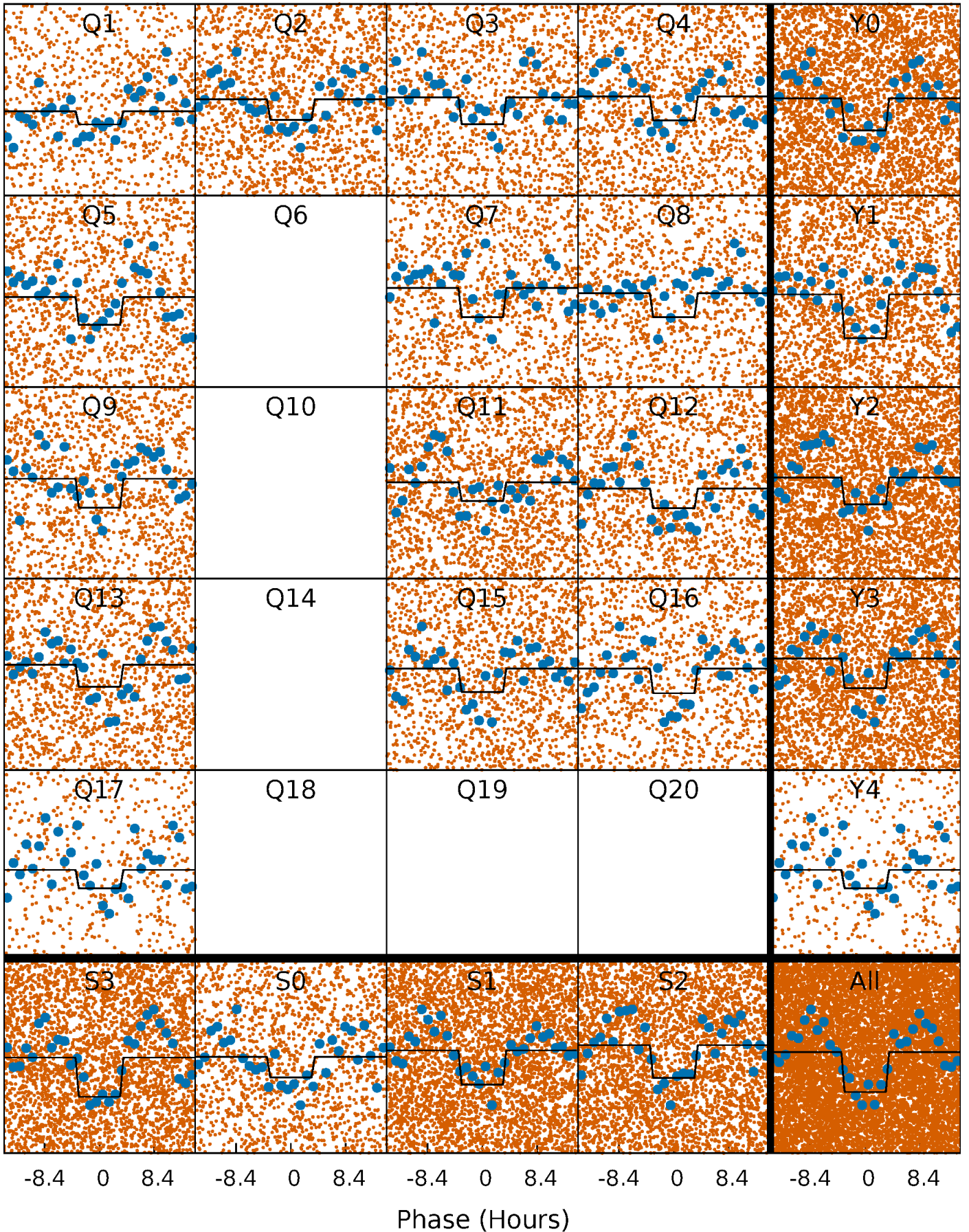
# DV Quarter-Phased Transit Curves

TCE 004382311-01 P= 1.412416 Days  $T_0=132.777143$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 004382311-01 P= 1.412359 Days  $T_0=132.838165$  (BKJD)

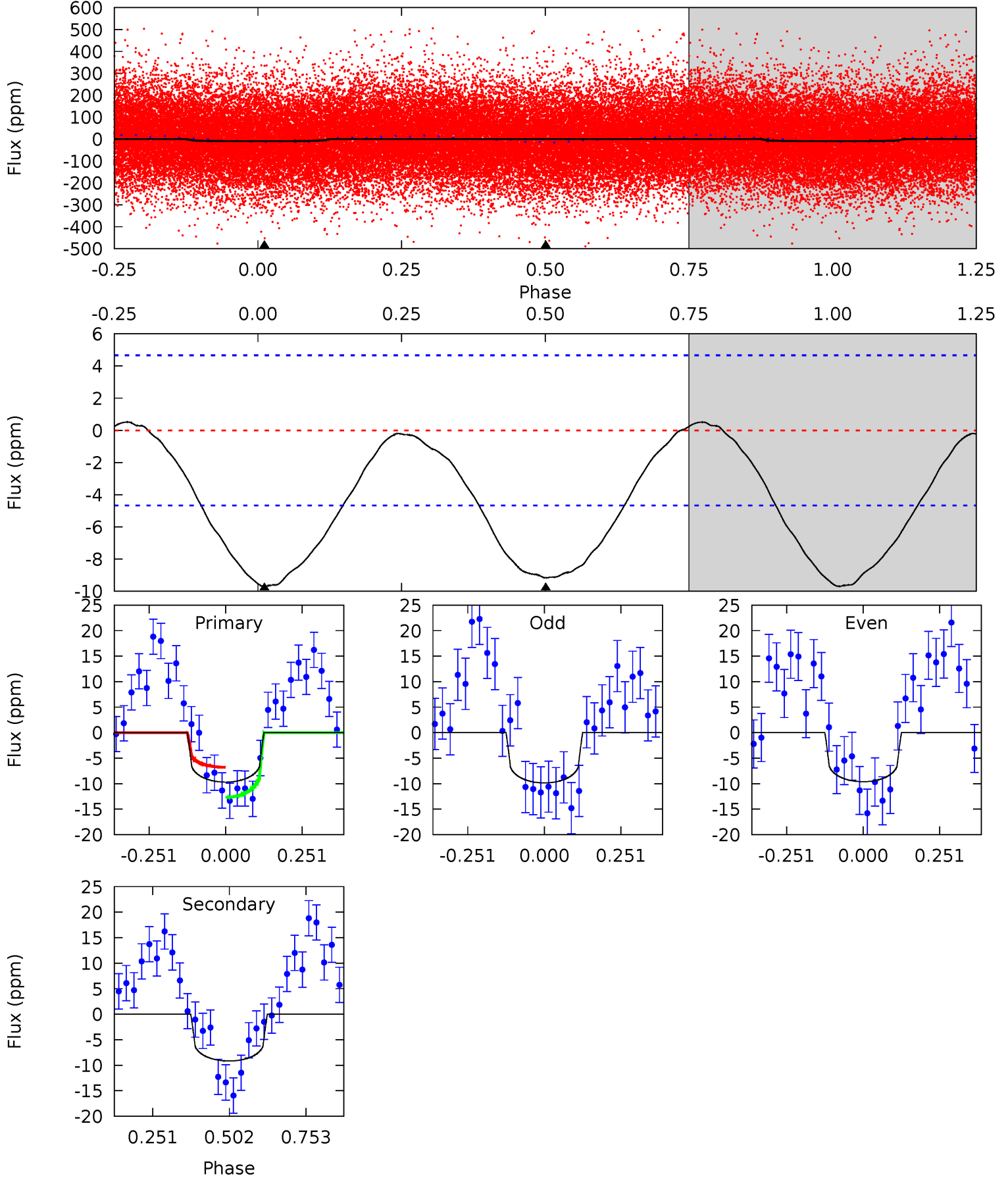




# DV Model-Shift Uniqueness Test

004382311-01, P = 1.412416 Days, E = 131.364727 Days

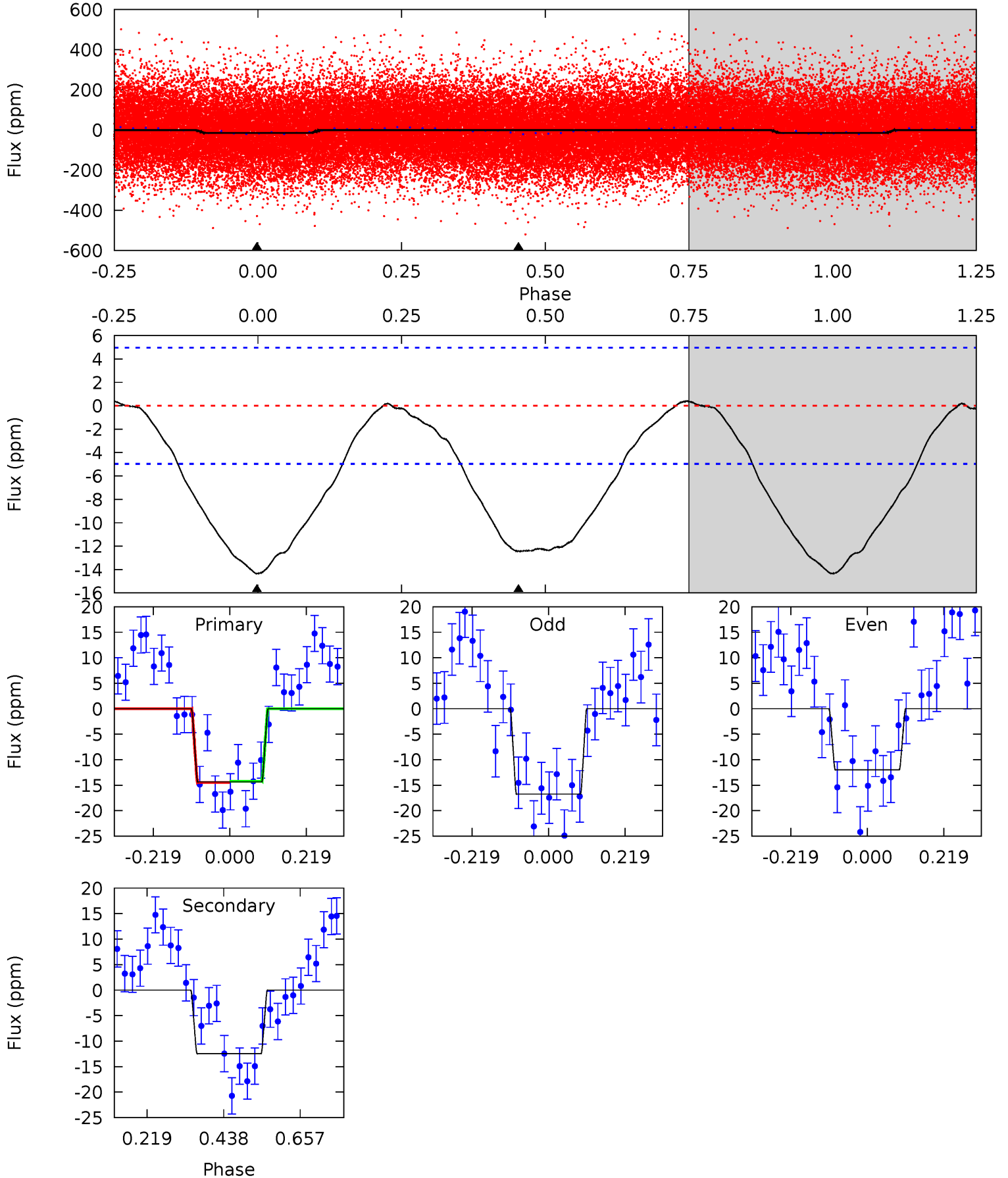
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.07	8.58	0	0	4.37	1.15	0.30	9.07	9.07	8.58	8.58	0.11	1.12	0.05	2.78



# Alt Model-Shift Uniqueness Test

004382311-01, P = 1.412359 Days, E = 131.425806 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
12.7	11.0	0	0	4.40	1.23	0.69	12.7	12.7	11.0	11.0	2.09	1.01	0.03	0.12





### Stellar Parameters For KIC 004382311

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$8462^{+233}_{-366}$	$4.096^{+0.145}_{-0.145}$	$0.070^{+0.200}_{-0.500}$	$2.083^{+0.464}_{-0.464}$	$1.974^{+0.344}_{-0.420}$	$0.308^{+0.226}_{-0.130}$
	+3%/-4%	+4%/-4%	+286%/-714%	+22%/-22%	+17%/-21%	+73%/-42%
Source	KIC0	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 004382311-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-9 \pm 1$	$0.74^{+0.63}_{-0.48}$	$4260^{+263}_{-263}$	$7899^{+10410}_{-2270}$	$8.804^{+56.875}_{-6.298}$
Alt.	$-12 \pm 1$	$0.93^{+0.74}_{-0.57}$	$4266^{+299}_{-284}$	$7487^{+7748}_{-2022}$	$7.572^{+39.919}_{-5.257}$

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

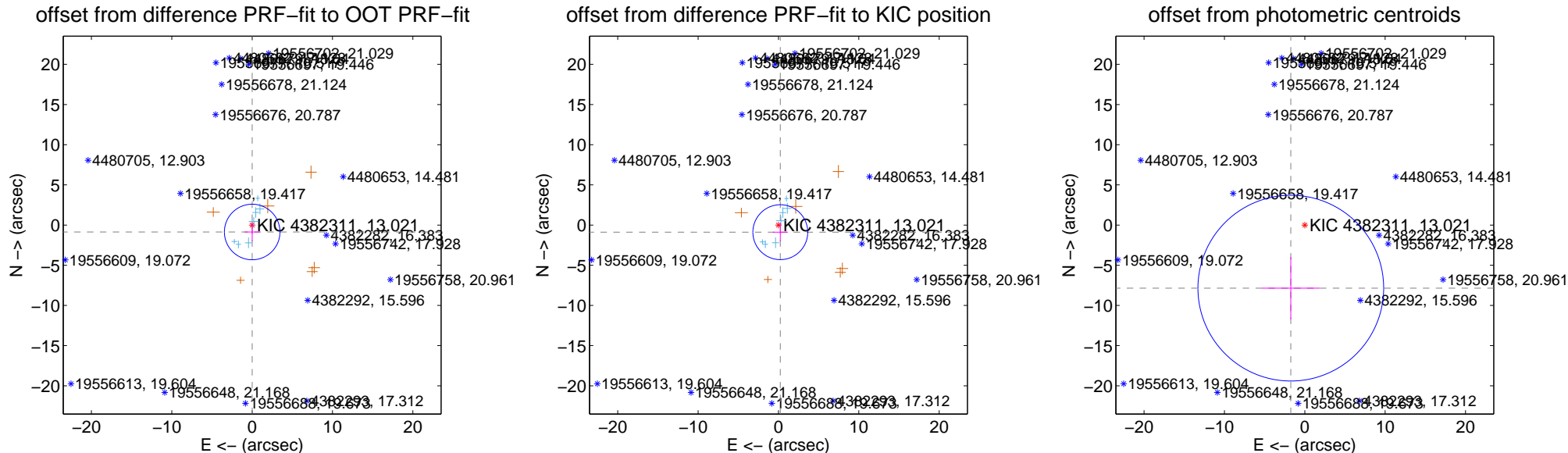
## DV Centroid Data

Supplemental centroid analysis for 004382311-01. Kepler magnitude: 13.02. Transit SNR 4.66

There are 7 quarters with good PRF difference image offsets

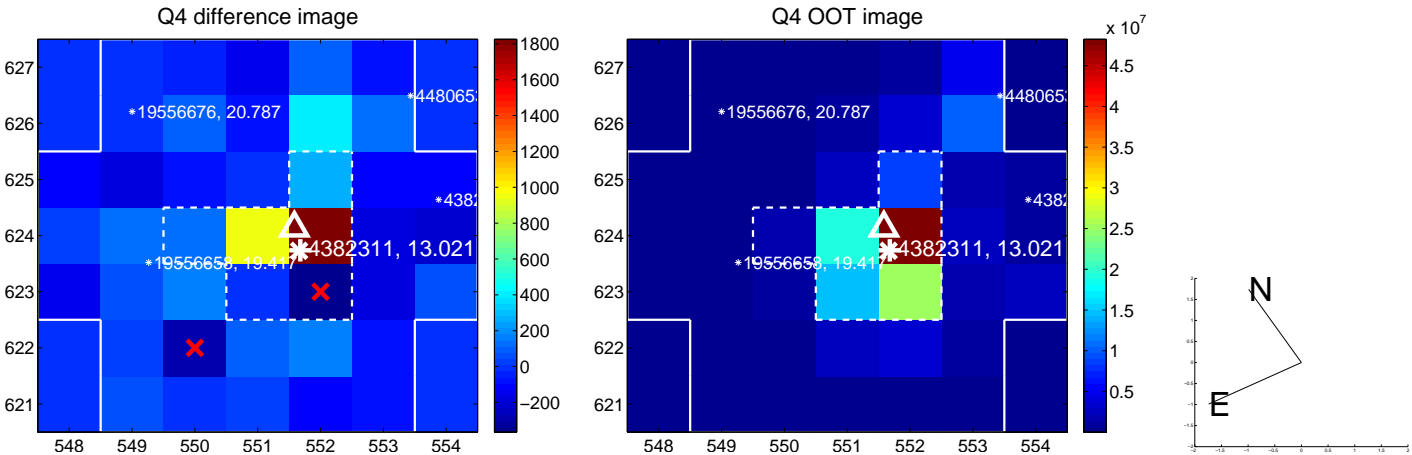
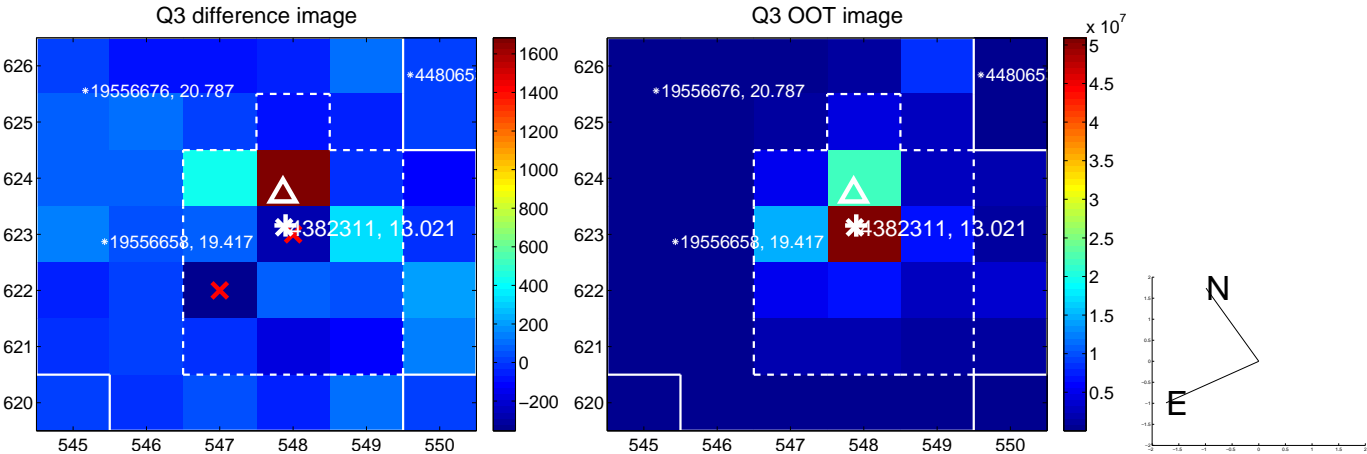
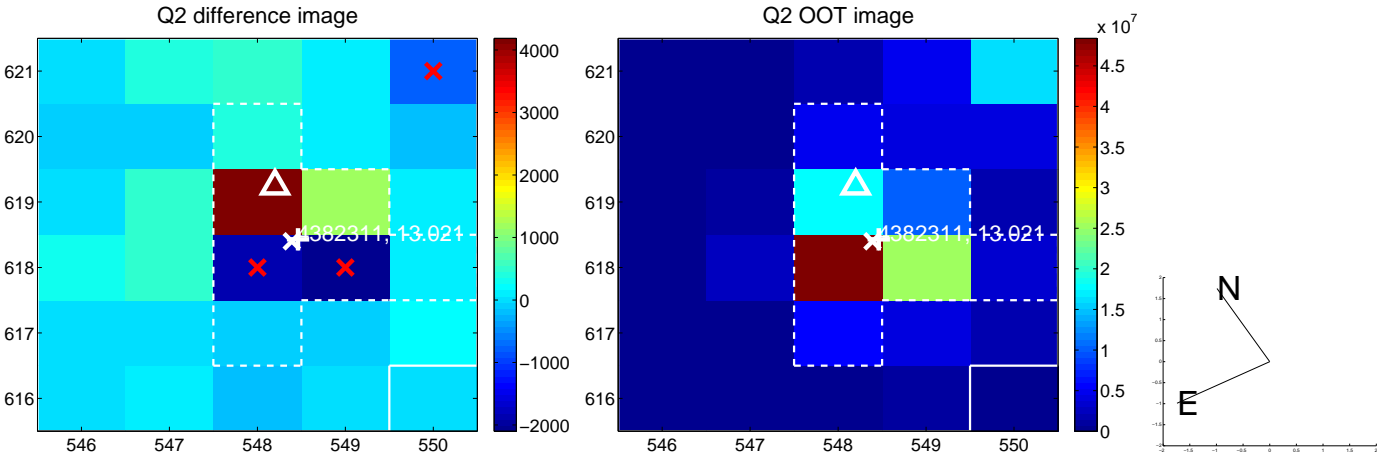
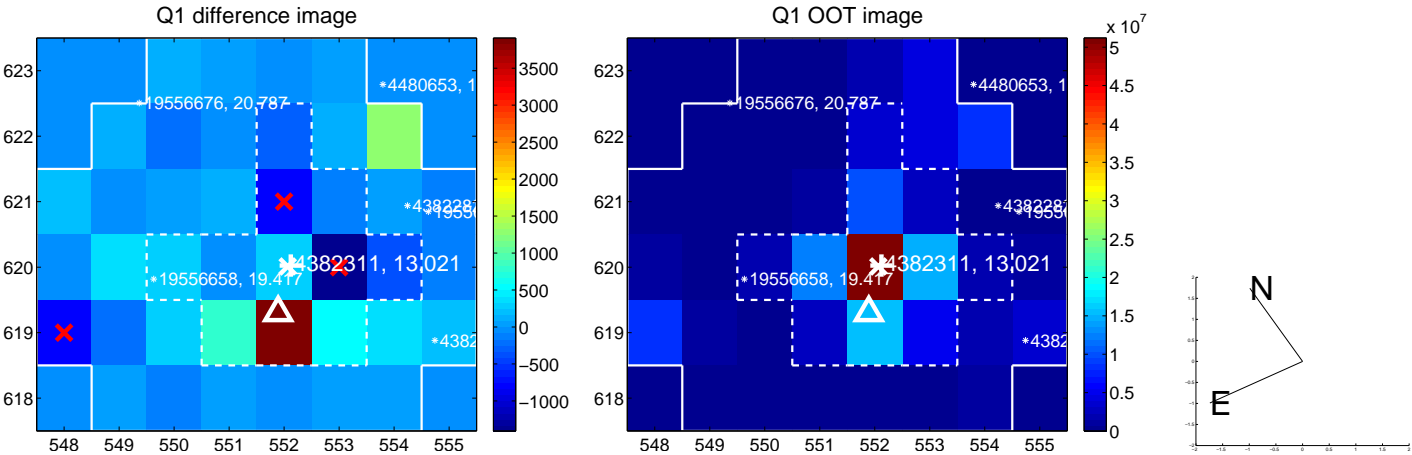
The direct PRF centroid is offset from the target star catalog position by about 0.23 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.861 \pm 1.152$	0.75	$-0.005 \pm 0.959$	$-0.861 \pm 1.152$
PRF-fit source offset from KIC position	$0.914 \pm 1.138$	0.80	$-0.231 \pm 0.936$	$-0.884 \pm 1.151$
photometric centroid source offset	$8.04 \pm 3.85$	2.09	$1.74 \pm 3.62$	$-7.85 \pm 3.86$

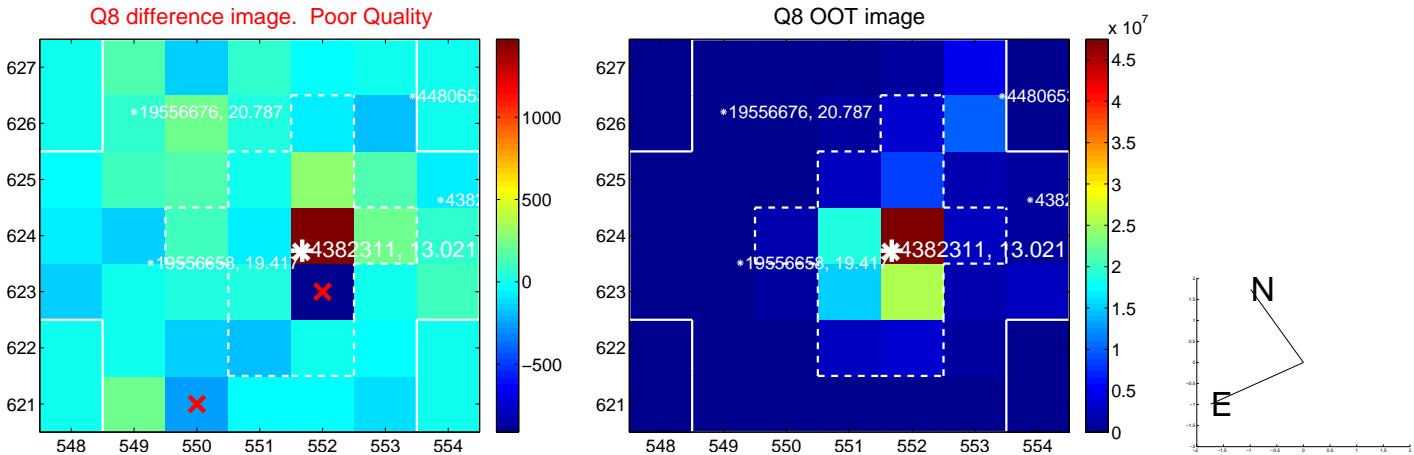
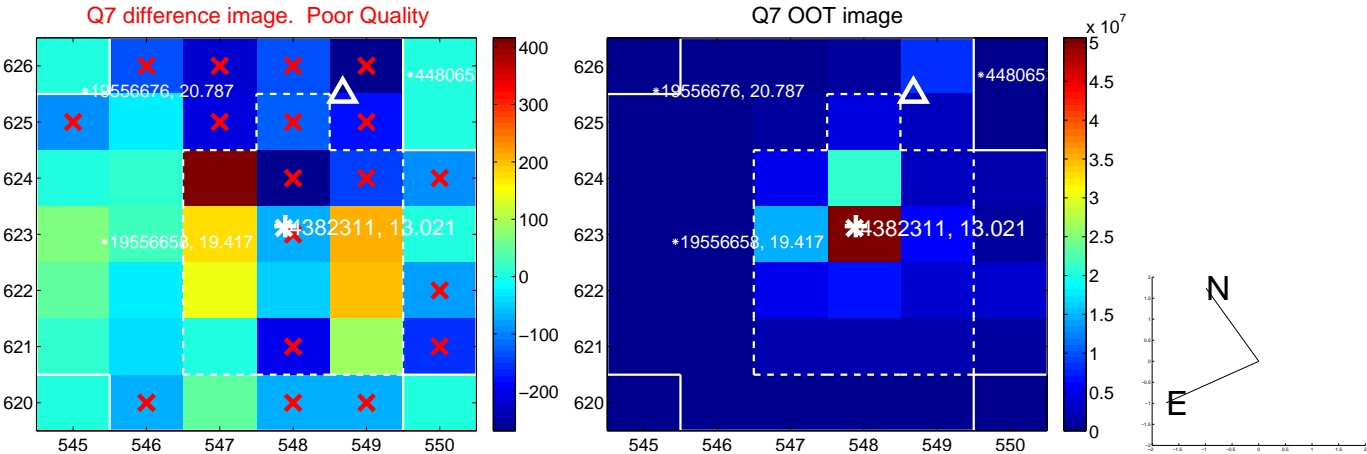
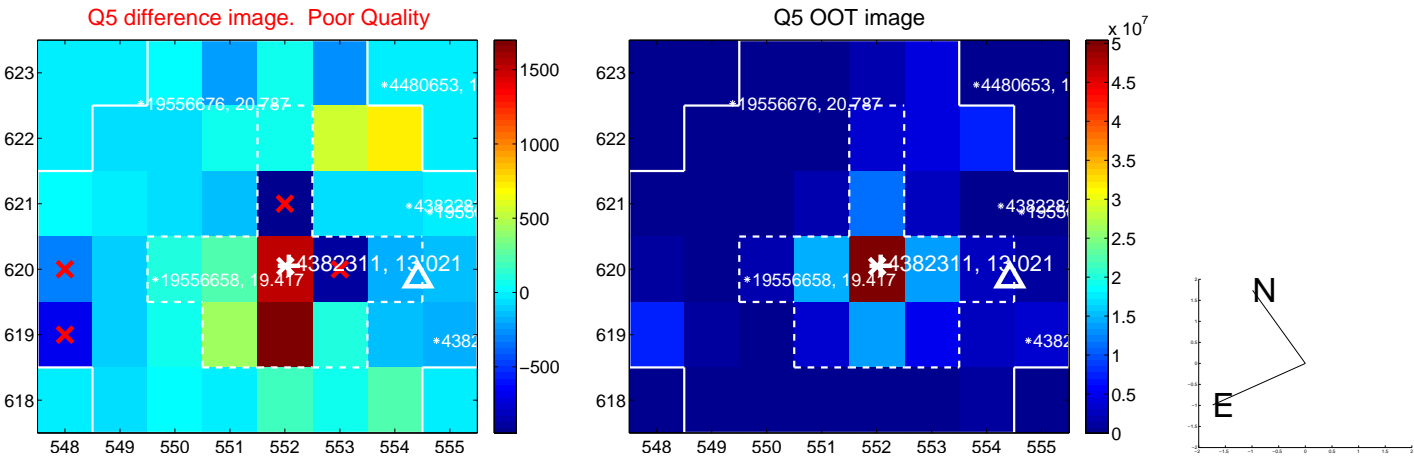


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

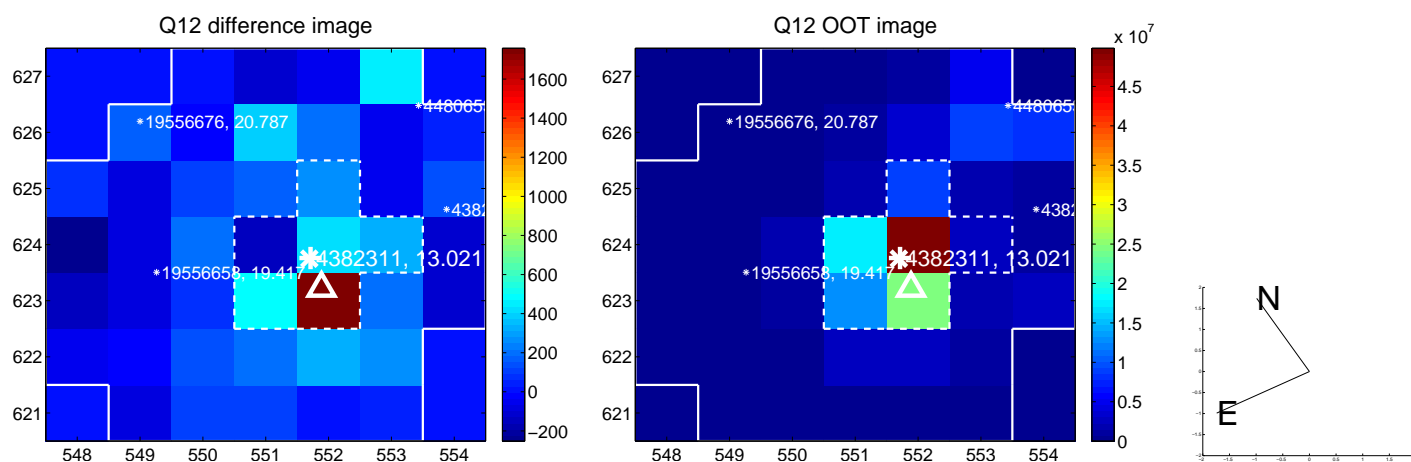
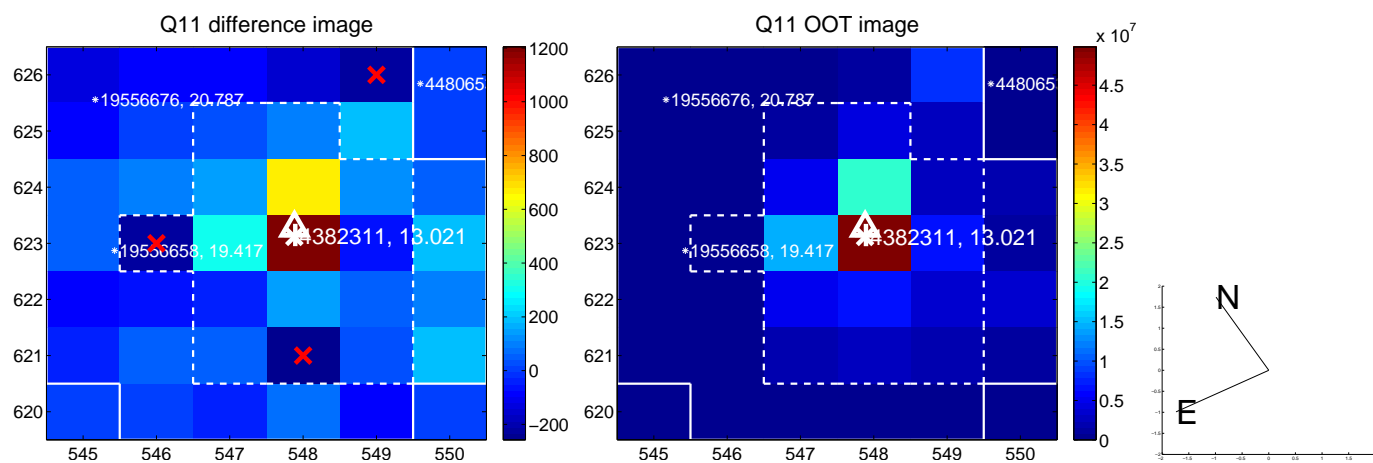
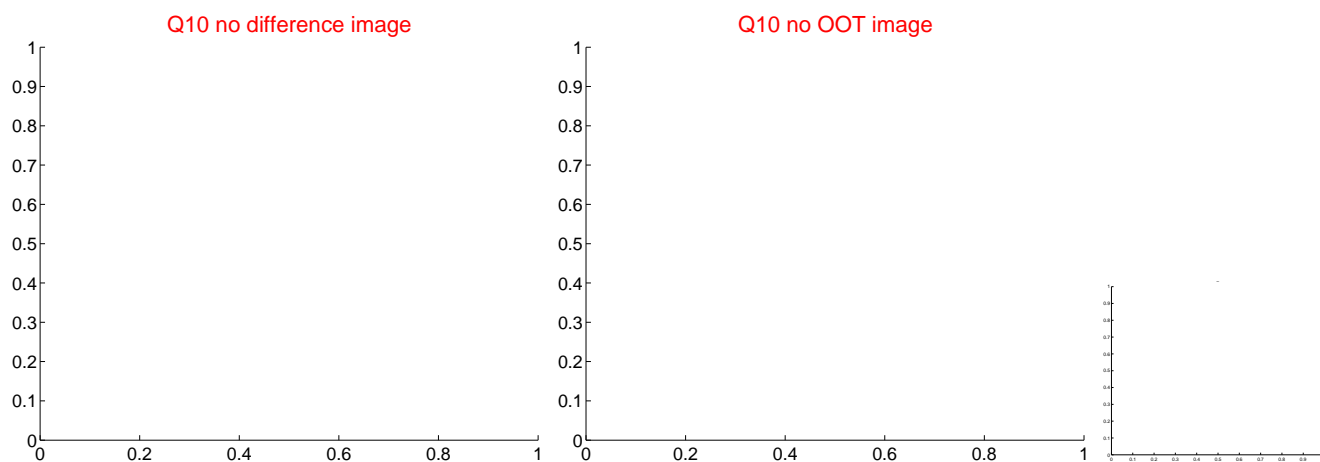
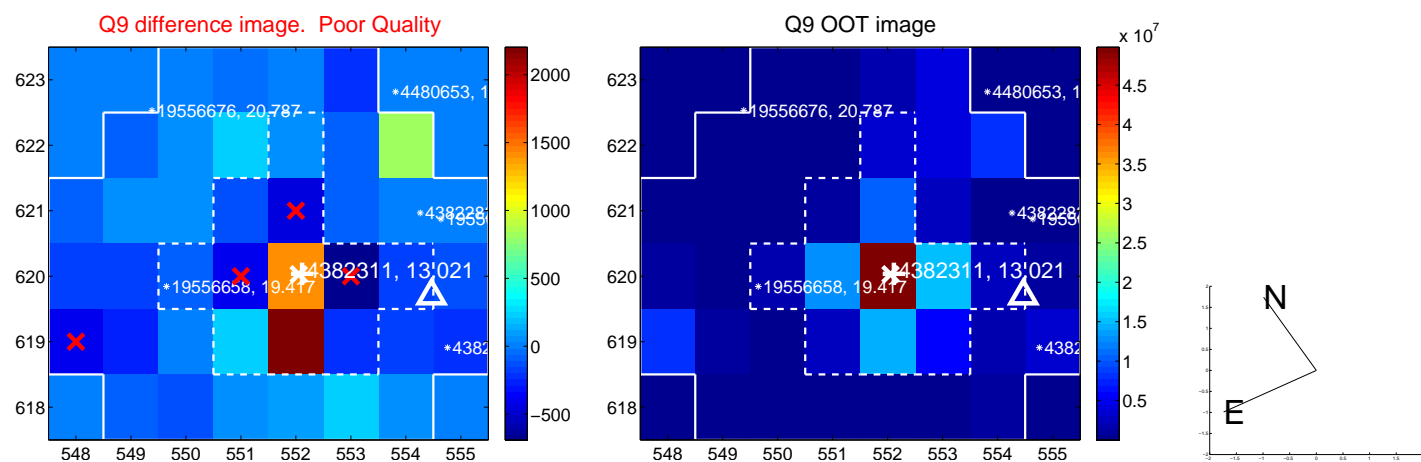


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

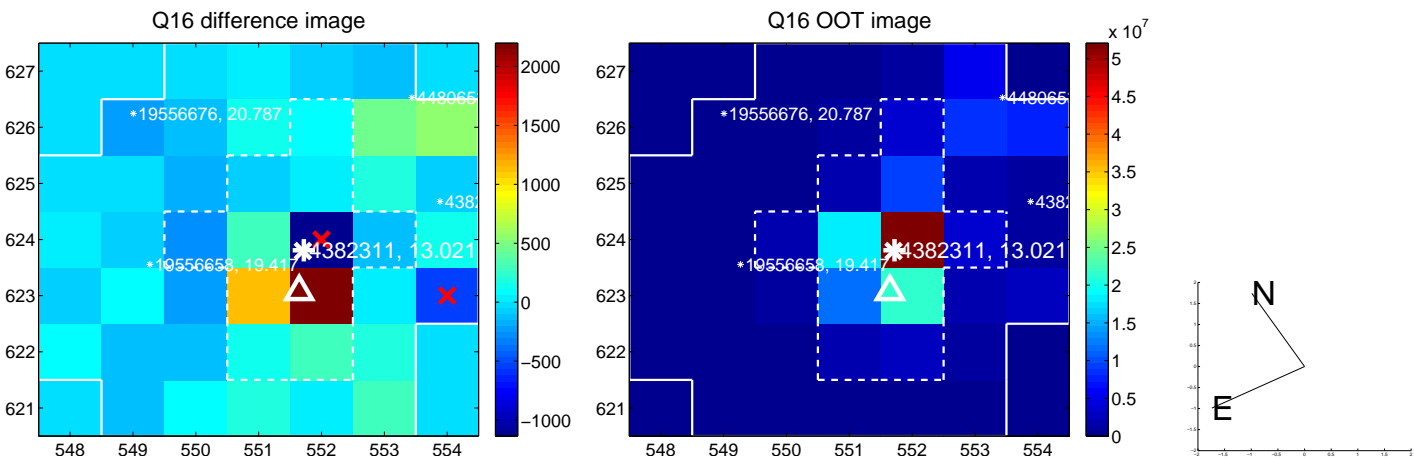
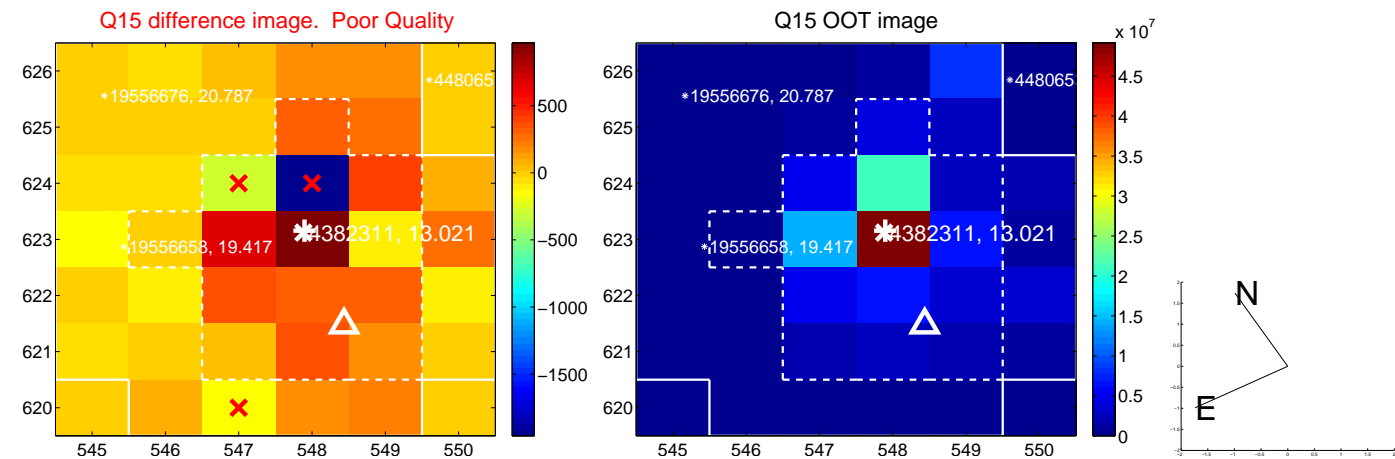
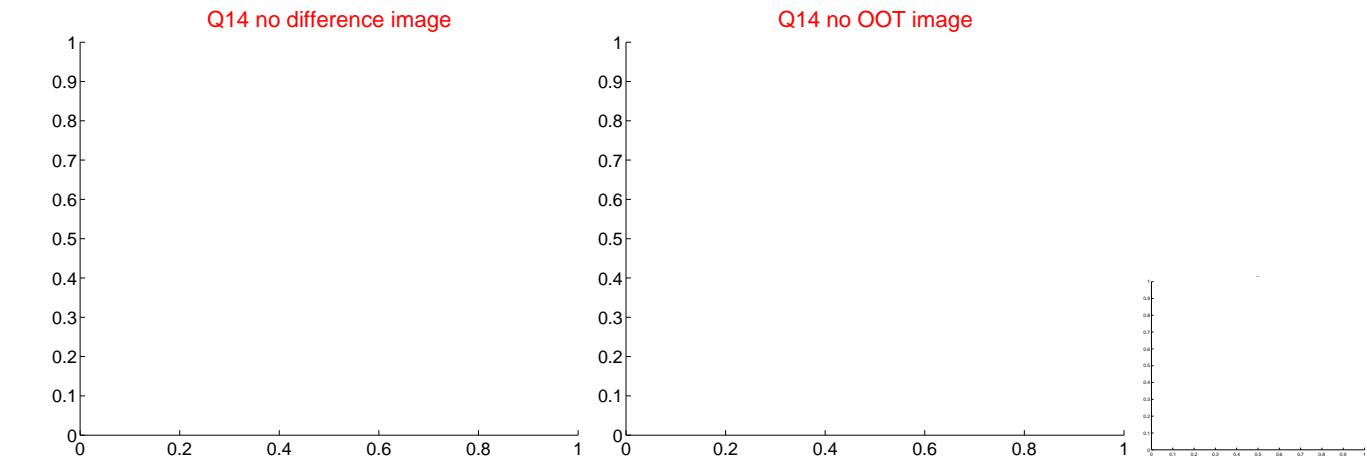
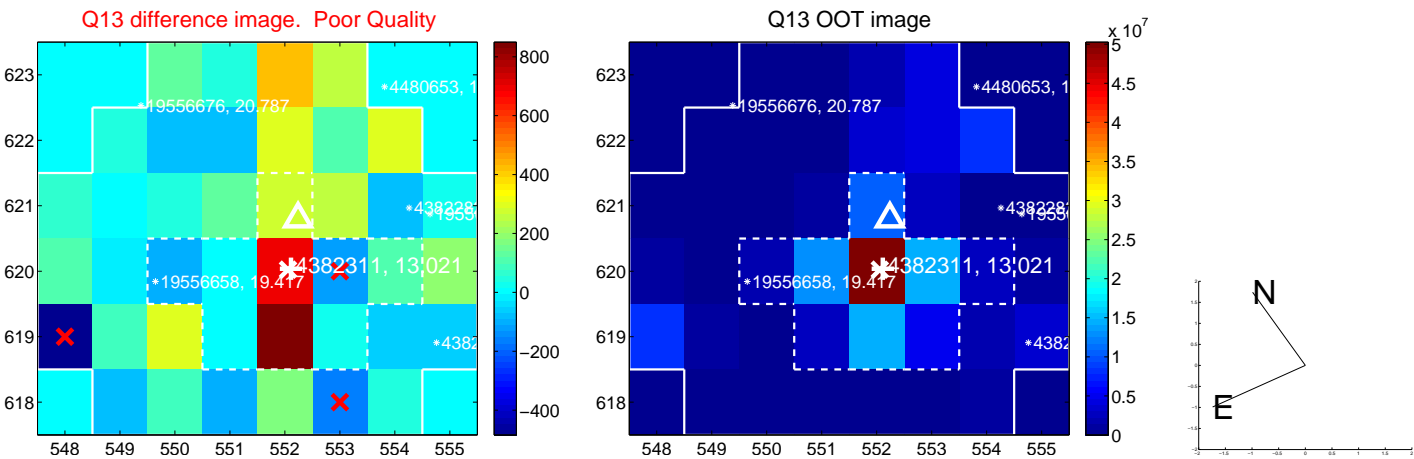




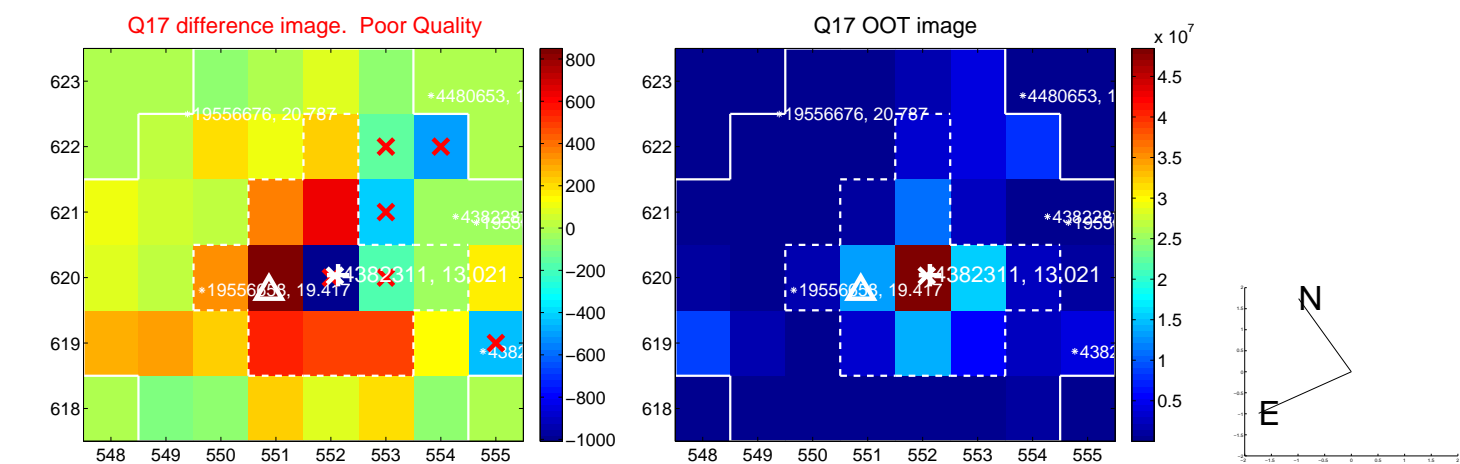
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



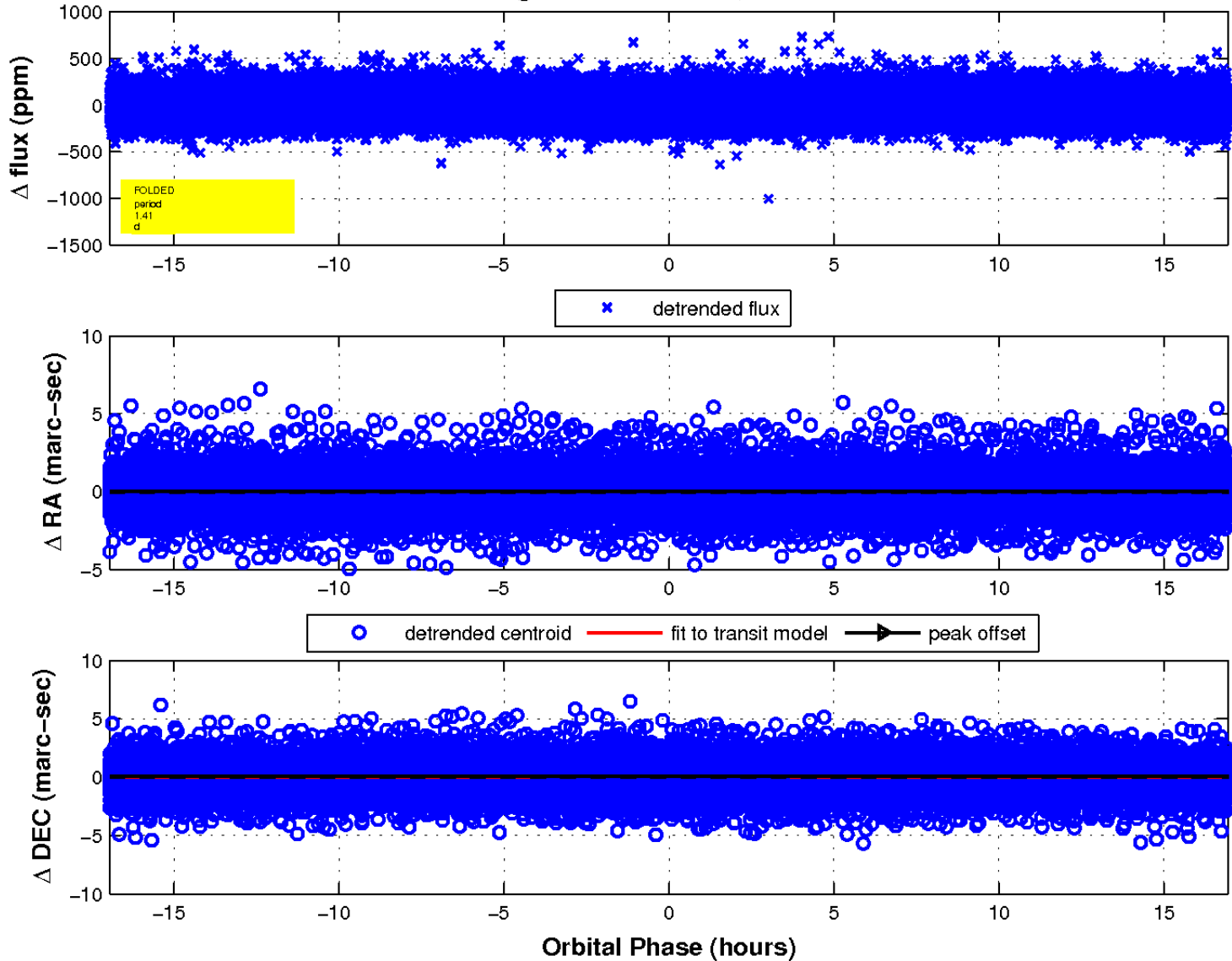
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

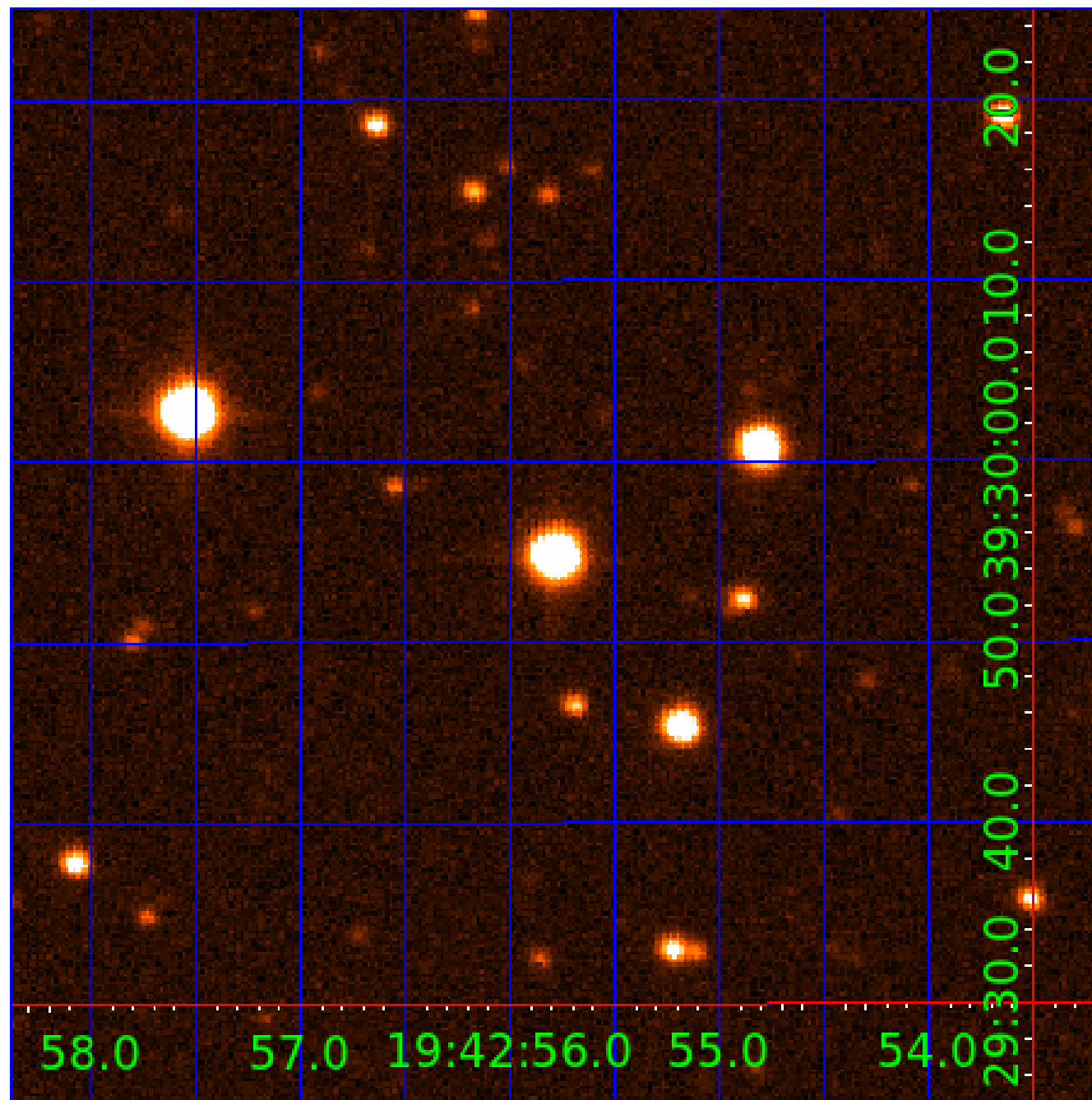


fluxWeightedCentroids, Planet 1 of 2



UKIRT Image

Declination





# KIC 004382311

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004382311-01	OBS	No	1.412416	132.777143	6.8	8.062	7.4	4.7	2.08	8462	0.55	20859.11
004382311-02	OBS	No	91.585354	180.147473	73.9	21.858	10.3	5.7	2.08	8462	2.06	80.07

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004382311-01	OBS	FP	0.00	1	0	0	0	LPP_DV
004382311-02	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST

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

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

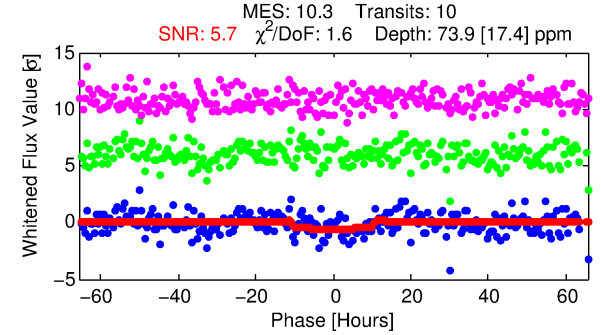
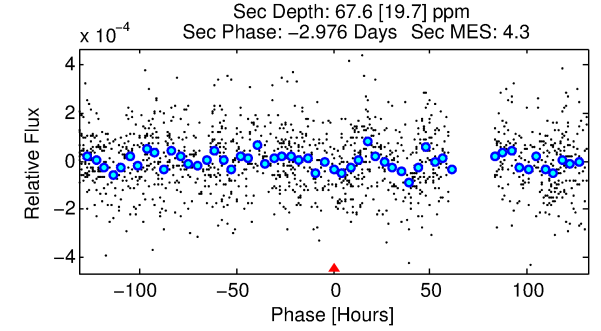
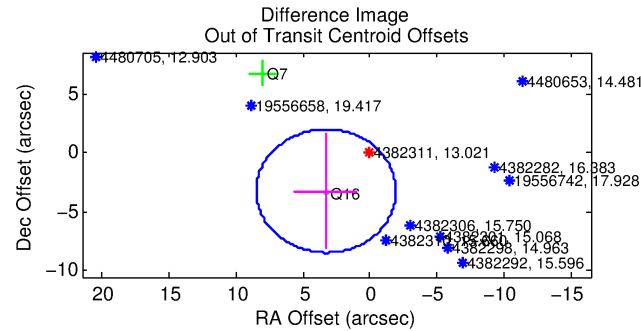
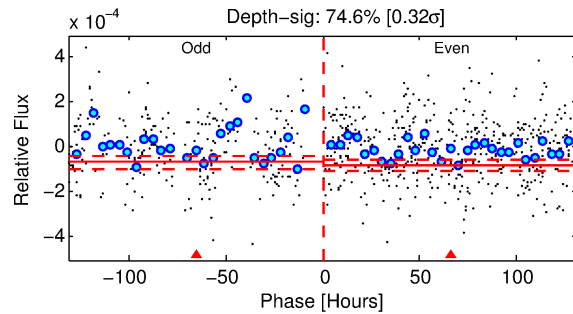
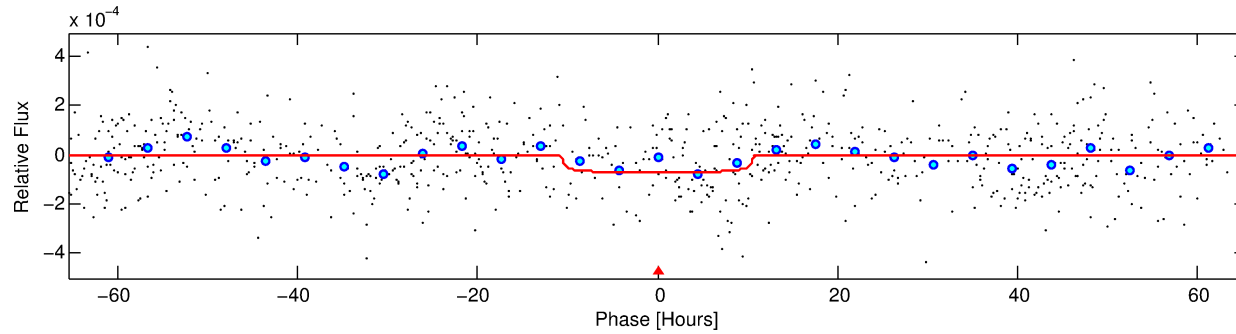
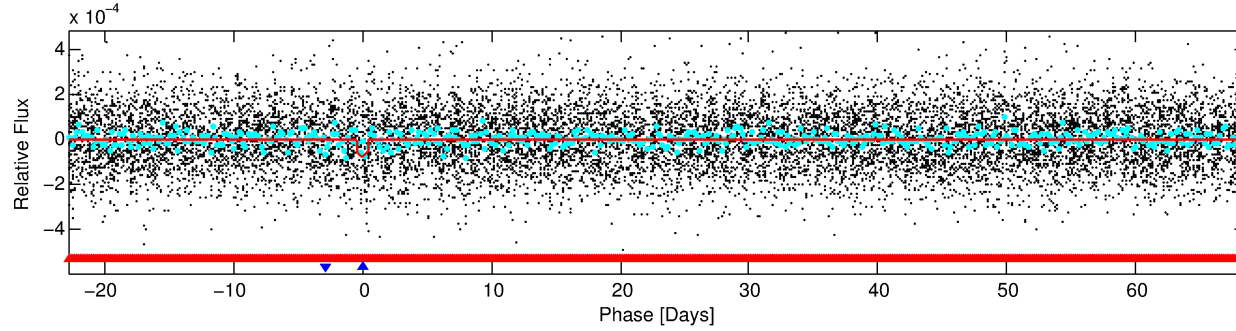
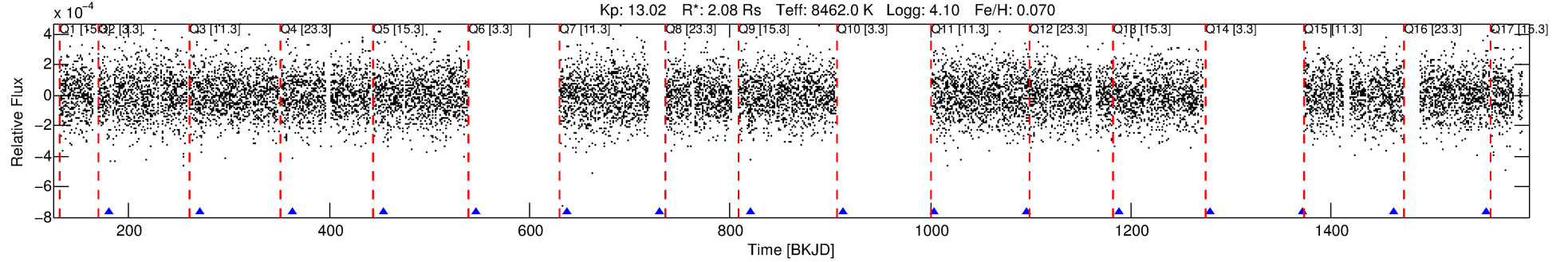
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 004382311-02

No Significant Match Found

# DV One-Page Summary

KIC: 4382311 Candidate: 2 of 2 Period: 91.585 d



## DV Fit Results:

Period = 91.58535 [0.00591] d  
Epoch = 180.1475 [0.0561] BKJD  
Rp/R\* = 0.0091 [0.0023]  
a/R\* = 15.46 [22.09]  
b = 0.89 [0.35]  
Seff = 80.07 [25.51]  
Teq = 763 [61] K  
Rp = 2.06 [0.70] Re  
a = 0.4989 [0.0926] AU  
Ag = 2187.41 [1416.45] [1.54 $\sigma$ ]  
Teffp = 8065 [1239] K [5.89 $\sigma$ ]

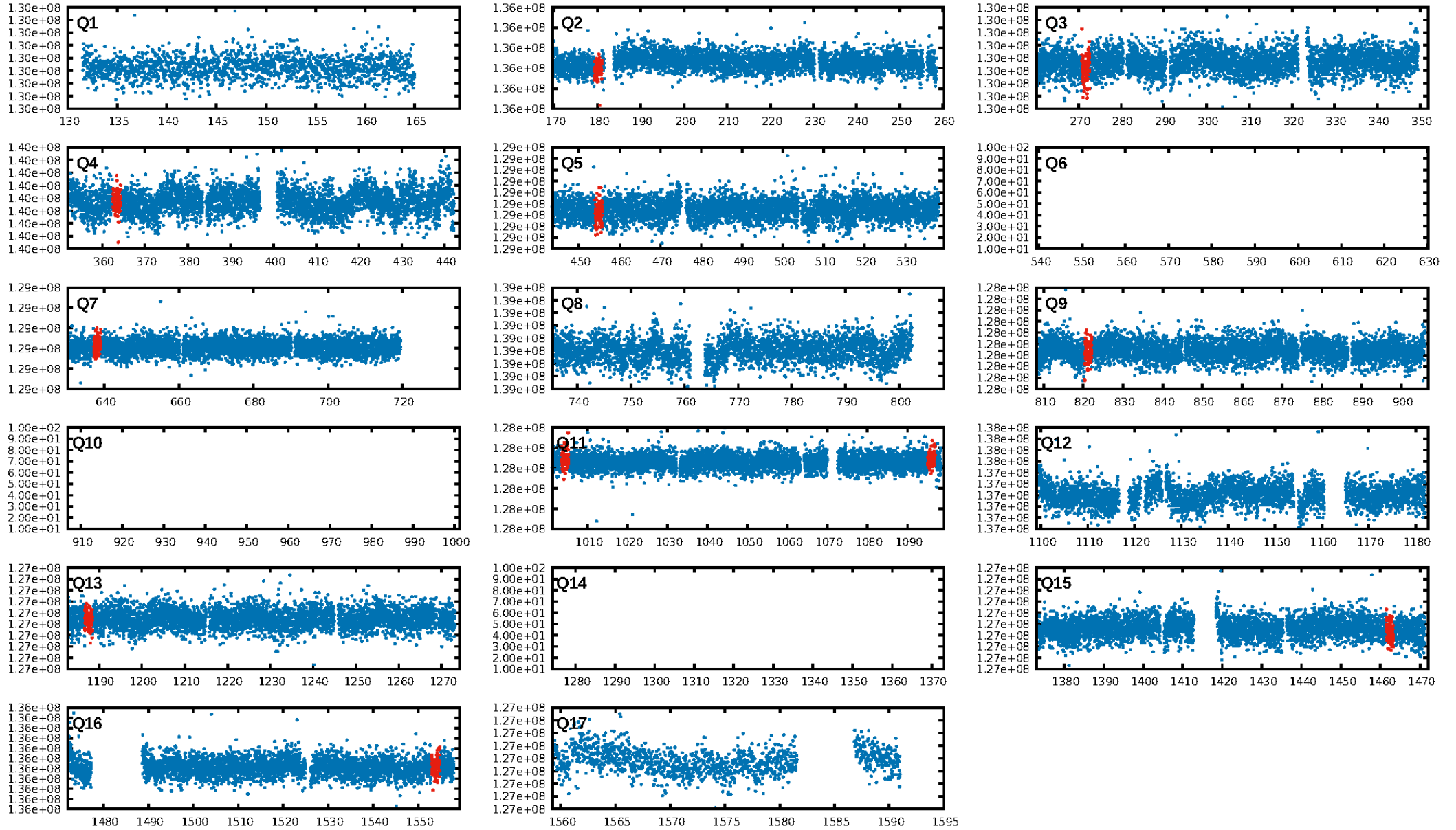
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [92.89 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 2.7%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 1.96e-17  
RollingBand-fgt: 1.00 [10/10]  
GhostDiagnostic-chr: 0.1068  
Centroid-sig: 2.0%  
Centroid-so: 3.696 arcsec [1.36 $\sigma$ ]  
OotOffset-rm: 4.610 arcsec [2.65 $\sigma$ ]  
OotOffset-st: 0/1/1/0 [2]  
KicOffset-rm: 4.500 arcsec [3.92 $\sigma$ ]  
KicOffset-st: 0/1/1/0 [2]  
DiffImageQuality-fgm: 0.00 [0/2]  
DiffImageOverlap-fno: 0.00 [0/6]

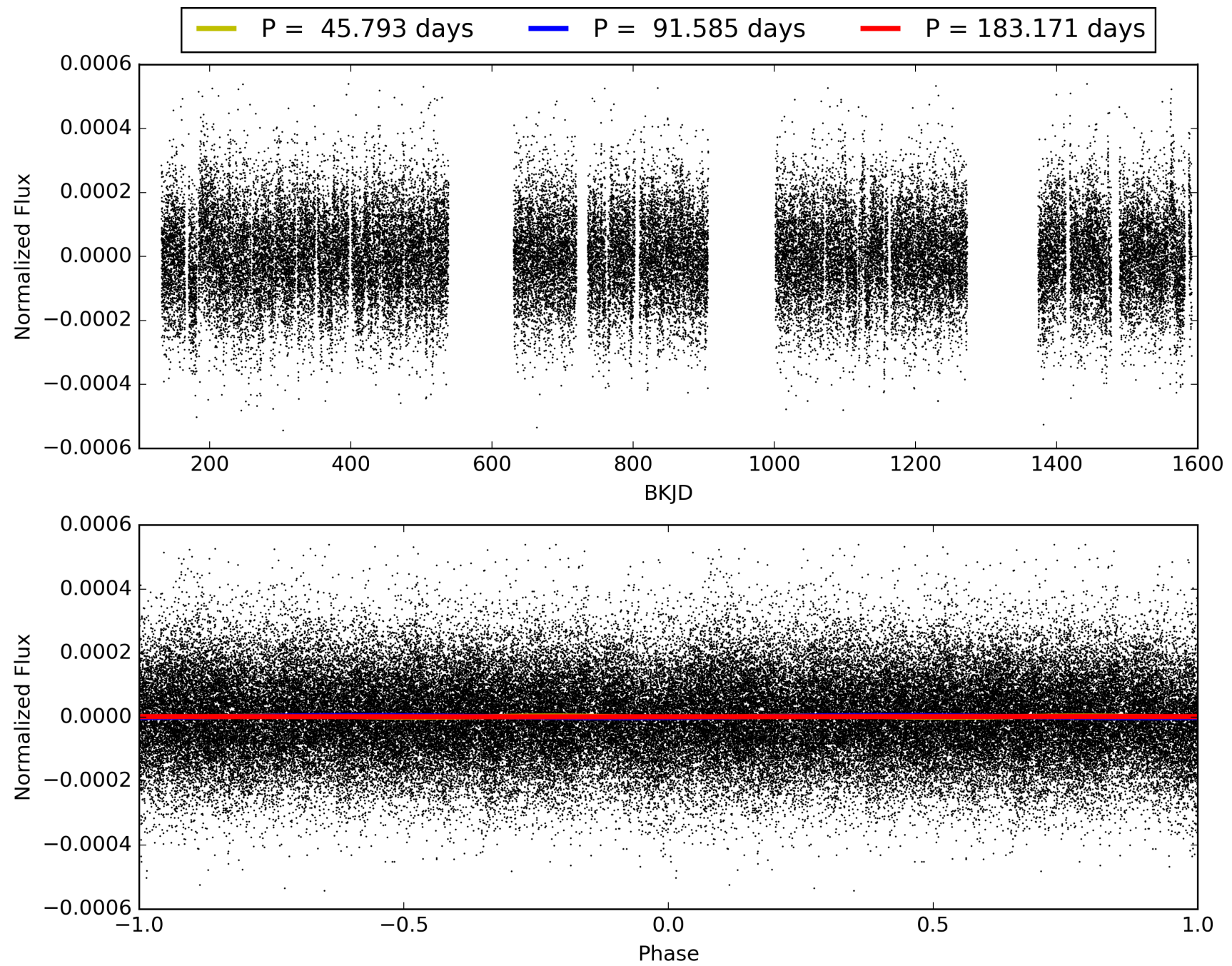
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 23:56:41 Z

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

# TCE 004382311-02, PDC Light Curves



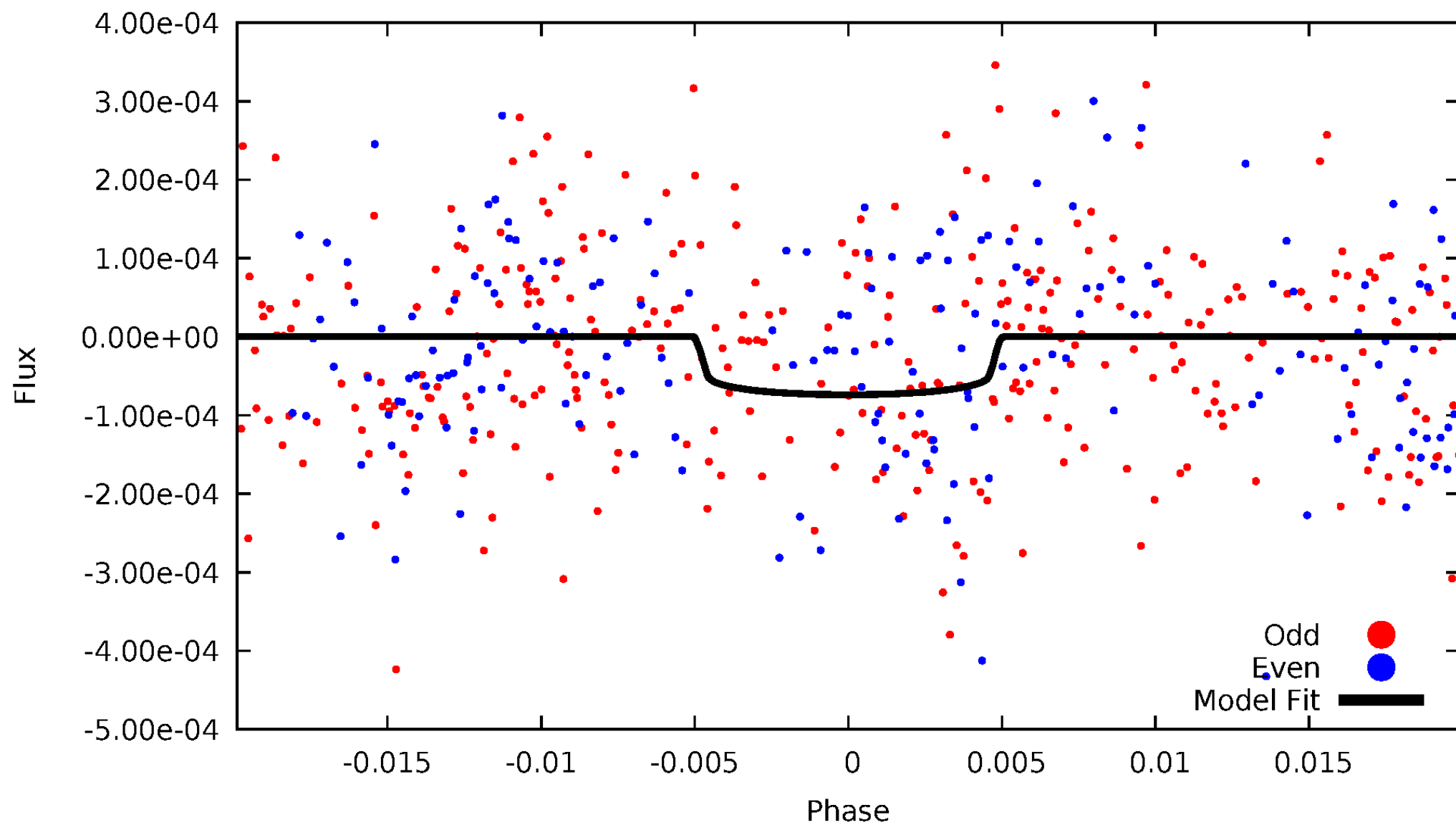
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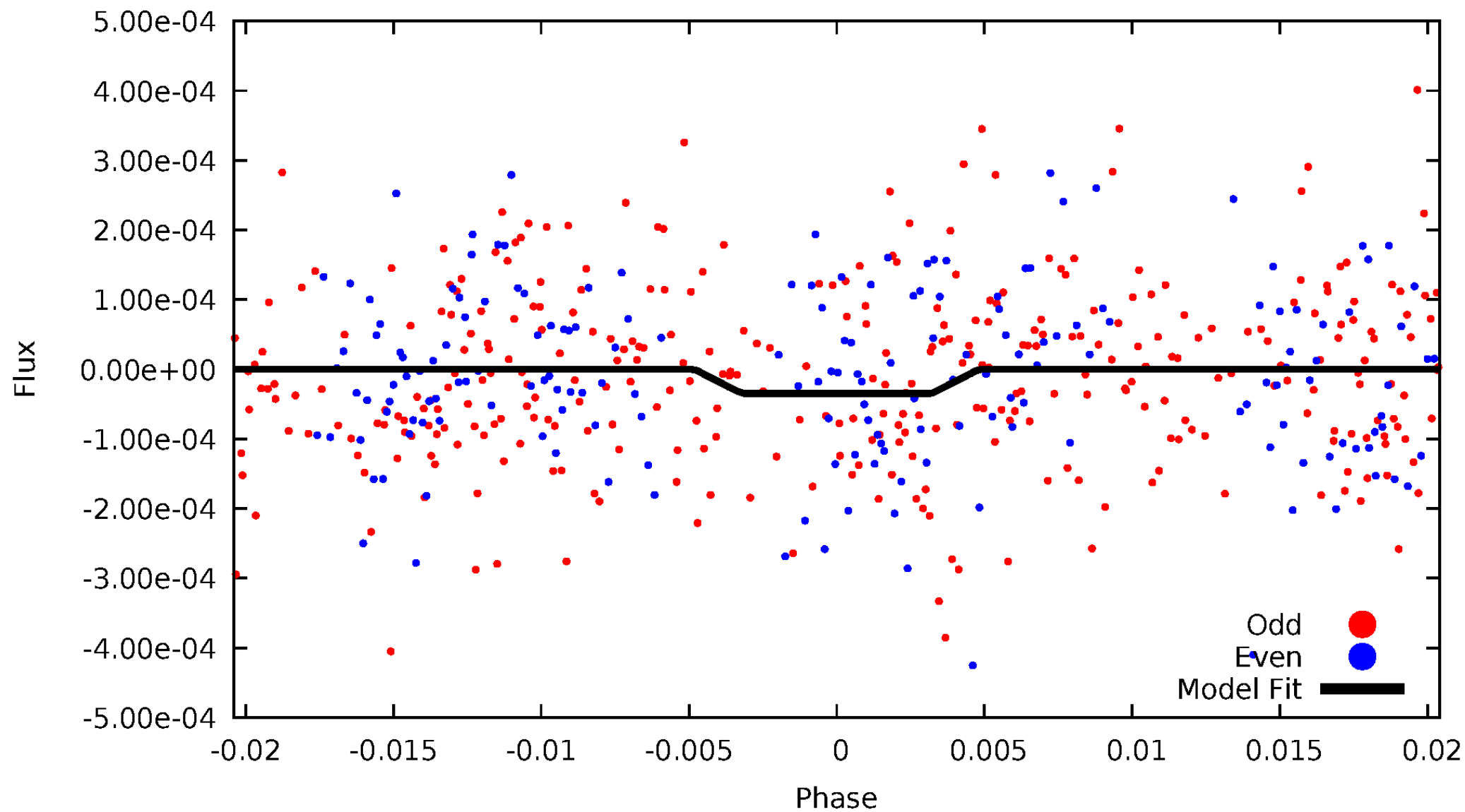
# DV Odd/Even

TCE 004382311-02



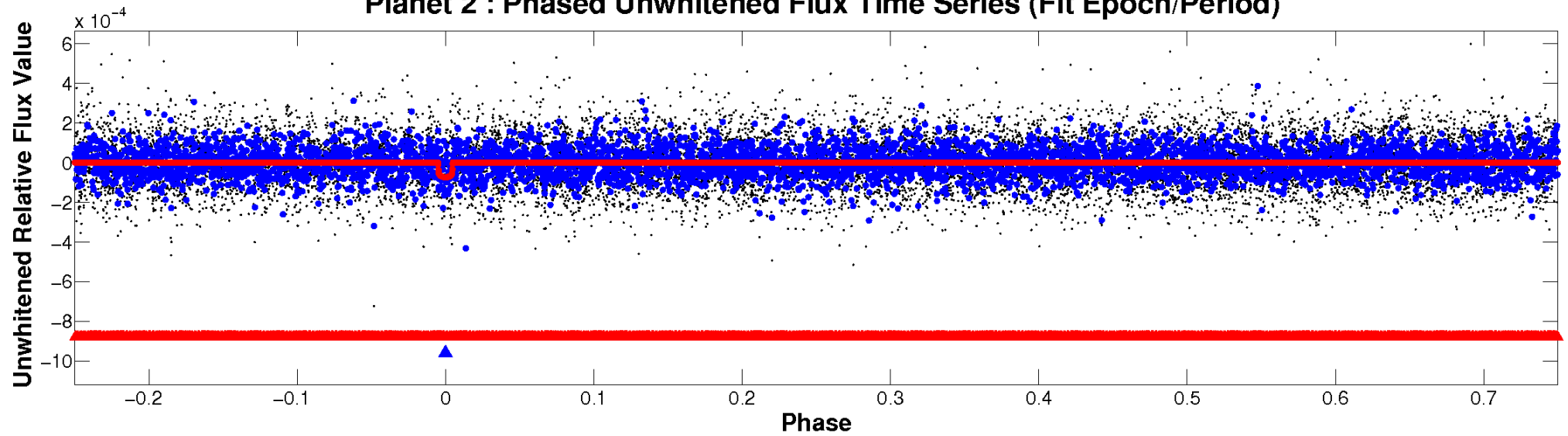
# ALT Odd/Even

TCE 004382311-02

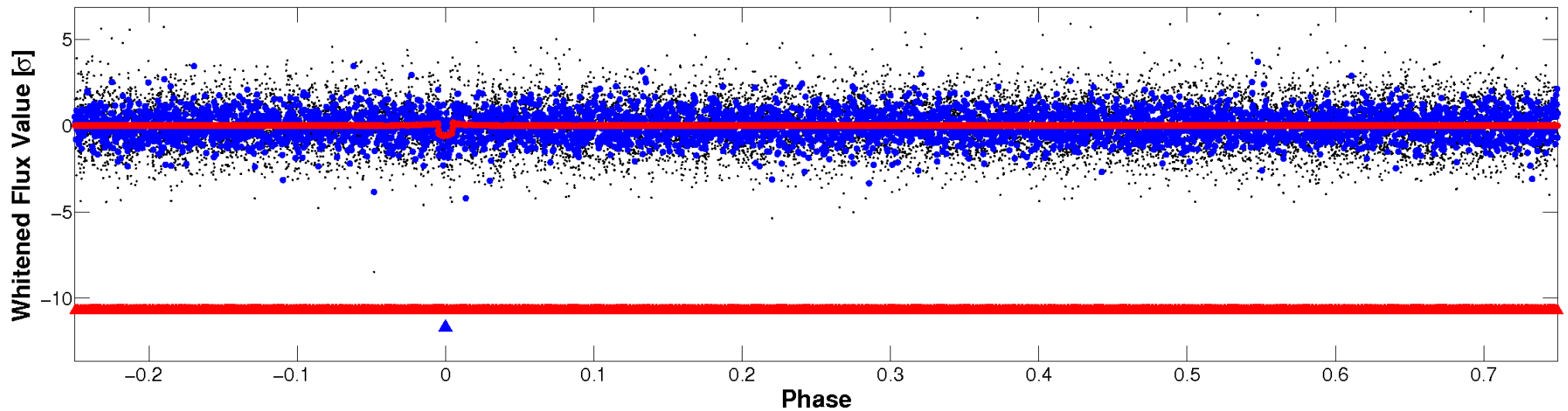


# Non-Whitened Vs. Whitened Light Curve

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

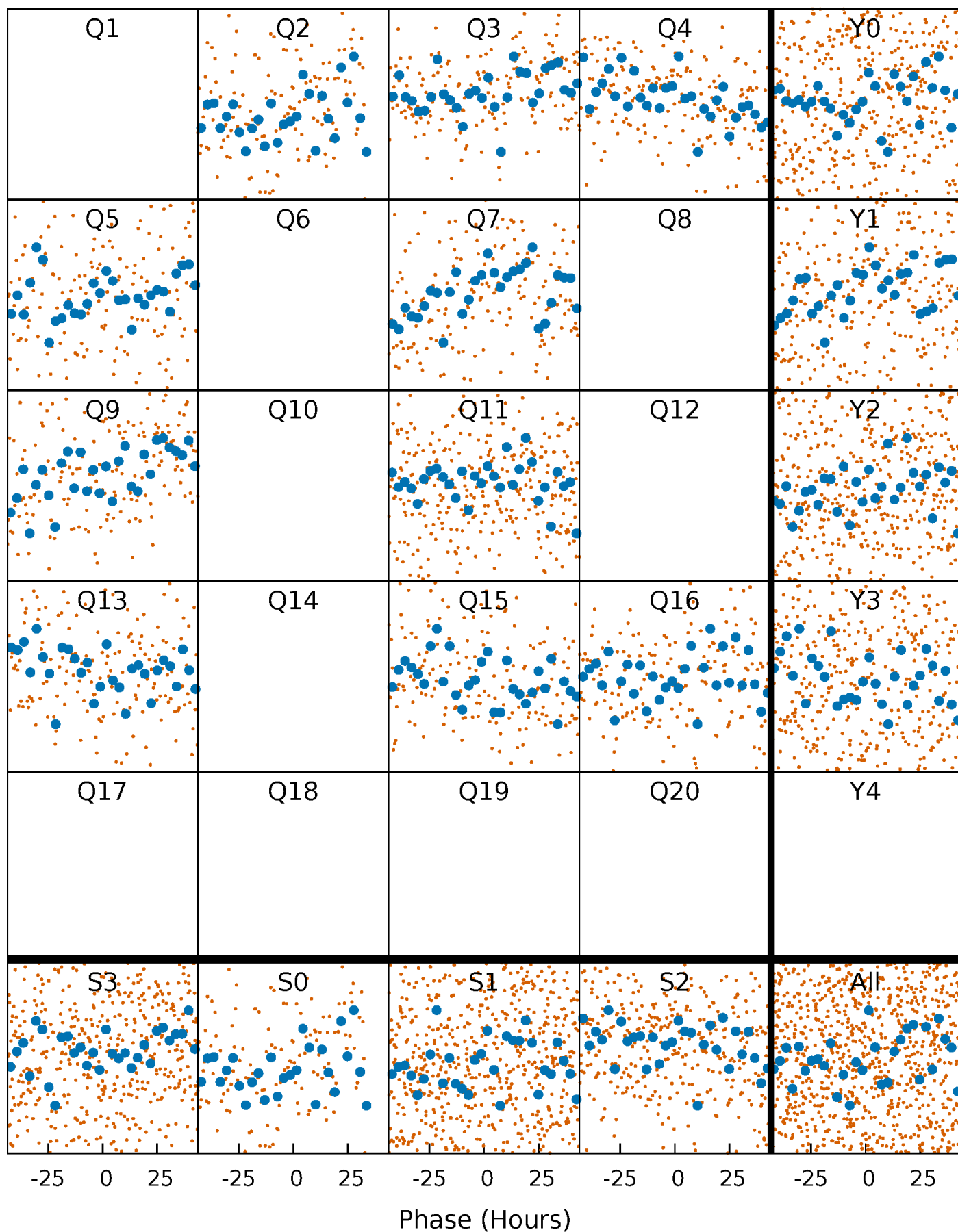


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



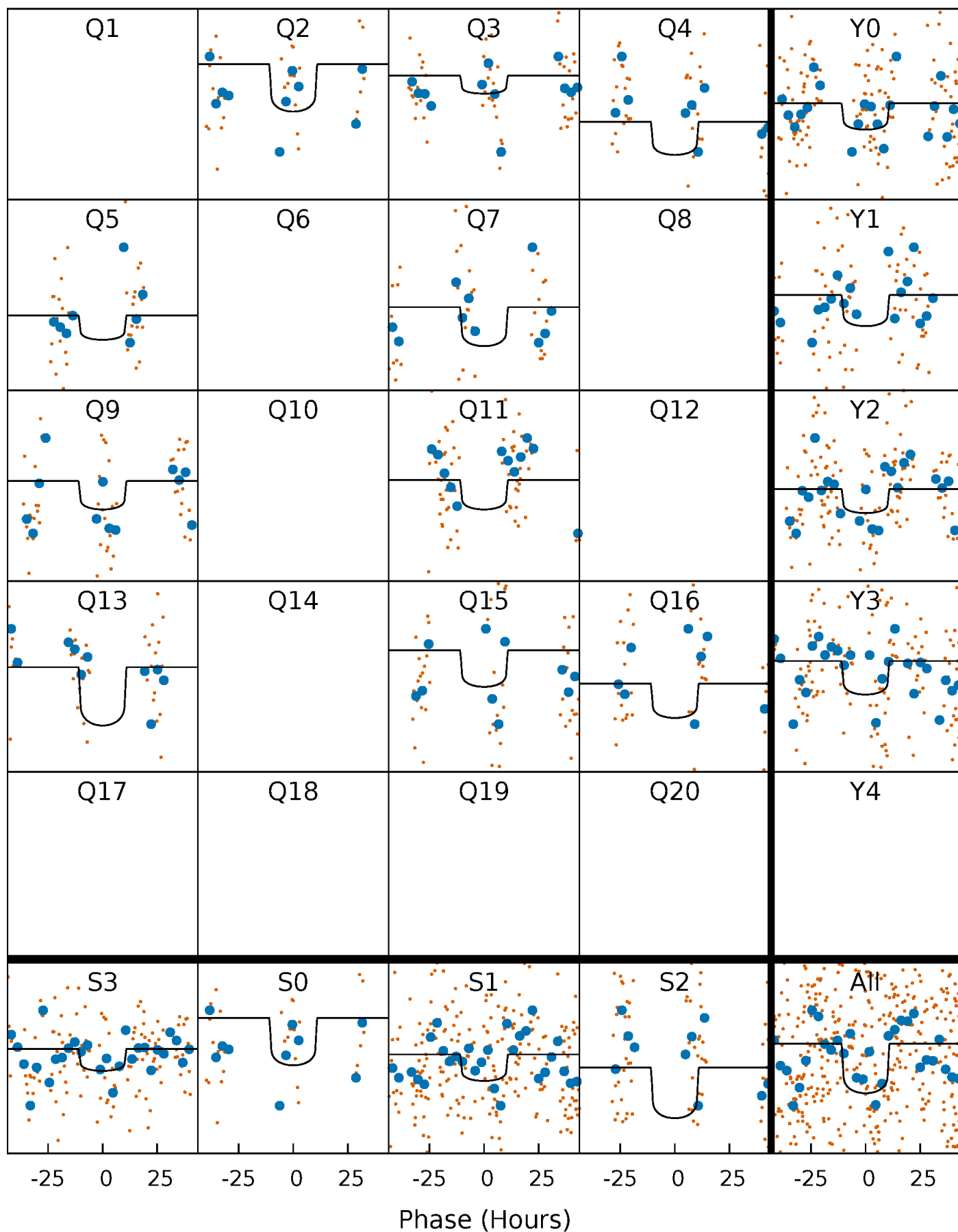
# PDC Quarter-Phased Transit Curves

TCE 004382311-02 P= 91.585354 Days  $T_0=180.147472$  (BKJD)



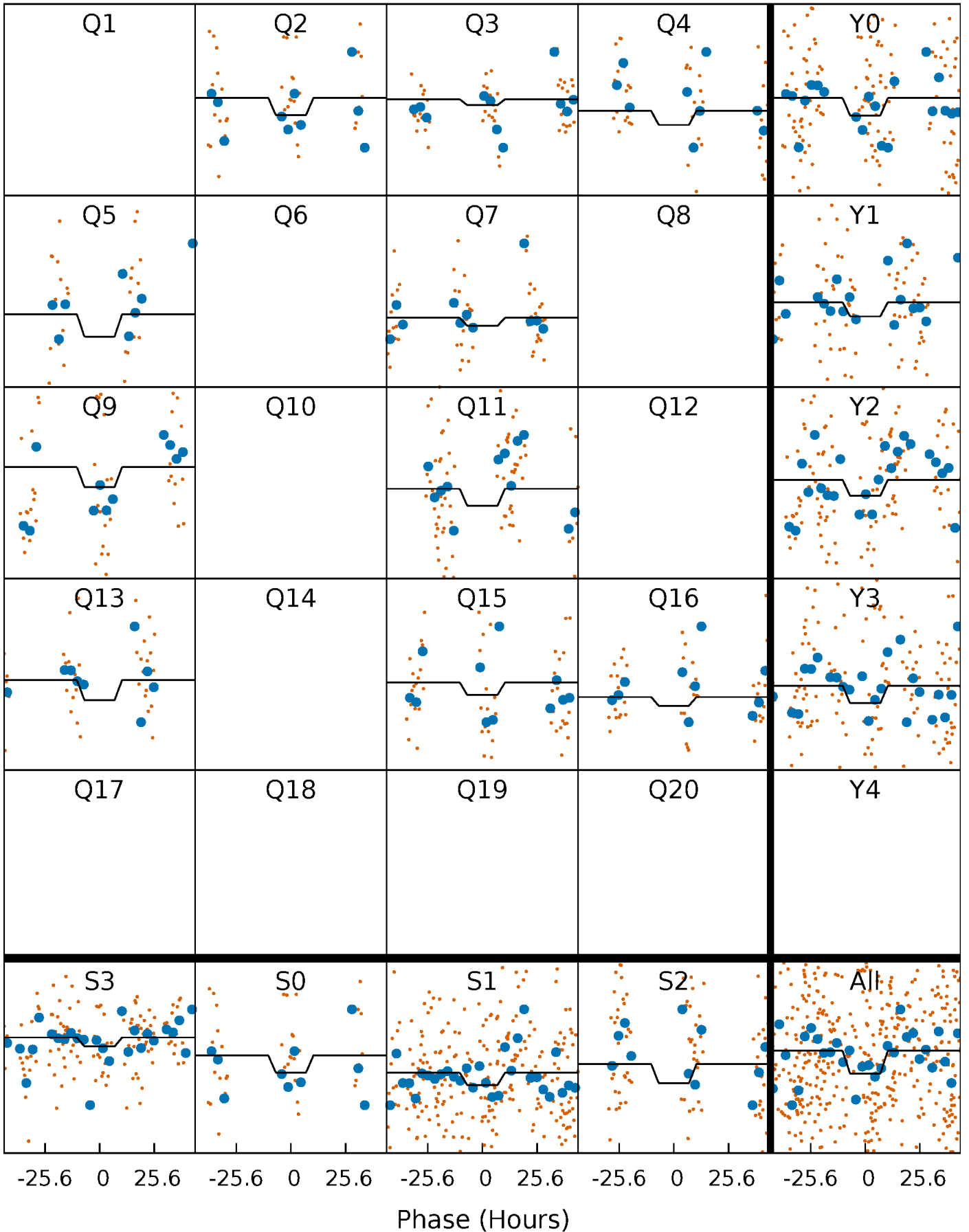
# DV Quarter-Phased Transit Curves

TCE 004382311-02   P= 91.585354 Days    $T_0=180.147472$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 004382311-02     $P = 91.596838$  Days     $T_0 = 180.101465$  (BKJD)

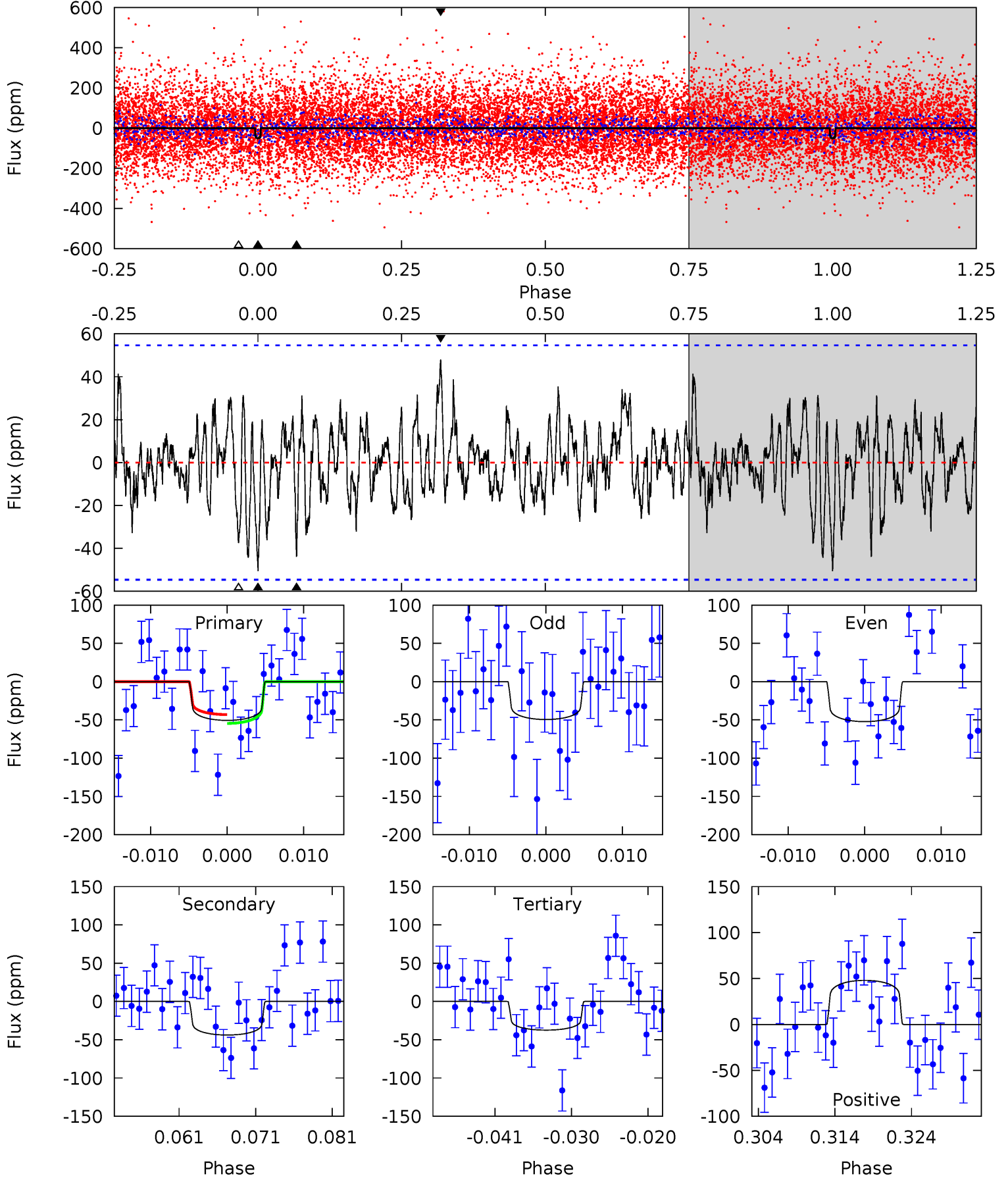




# DV Model-Shift Uniqueness Test

004382311-02, P = 91.585354 Days, E = 88.562118 Days

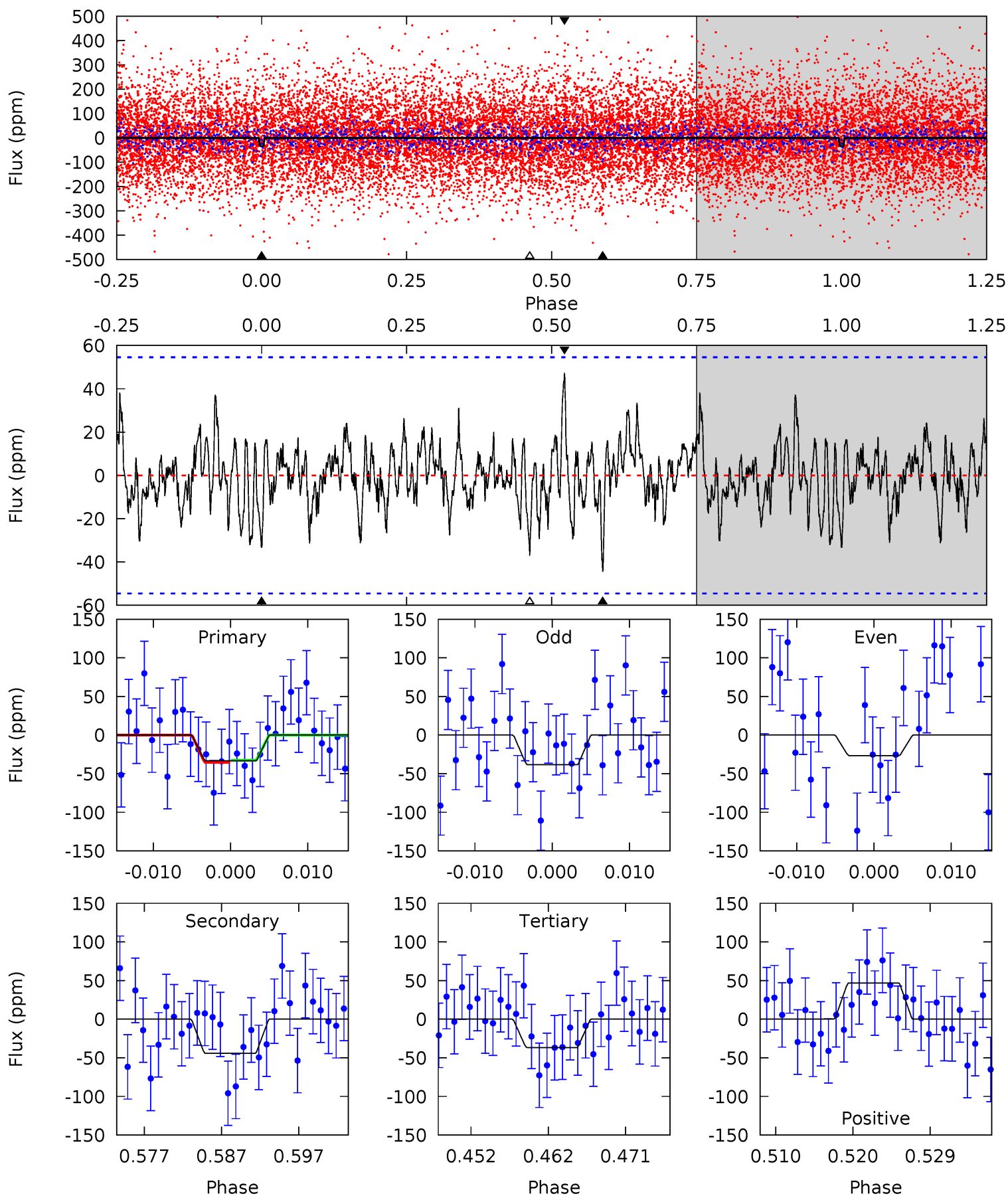
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
4.65	4.03	3.44	4.41	5.02	2.57	1.30	1.21	0.24	0.59	-0.38	0.12	-2.67	0.49	0.50



# Alt Model-Shift Uniqueness Test

004382311-02, P = 91.596838 Days, E = 88.504627 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
3.08	4.08	3.39	4.33	5.03	2.59	1.17	-0.31	-1.25	0.70	-0.24	0.52	0.40	0.51	0.12



### Stellar Parameters For KIC 004382311

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$\rho_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$8462^{+233}_{-366}$	$4.096^{+0.145}_{-0.145}$	$0.070^{+0.200}_{-0.500}$	$2.083^{+0.464}_{-0.464}$	$1.974^{+0.344}_{-0.420}$	$0.308^{+0.226}_{-0.130}$
	+3%/-4%	+4%/-4%	+286%/-714%	+22%/-22%	+17%/-21%	+73%/-42%
Source	KIC0	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 004382311-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-44 \pm 11$	$2.09^{+0.59}_{-0.59}$	$1067^{+66}_{-75}$	$6912^{+1559}_{-956}$	$1378^{+1382}_{-626}$
Alt.	$-44 \pm 11$	$1.32^{+0.56}_{-0.47}$	$1064^{+73}_{-68}$	$9174^{+3630}_{-1915}$	$3356^{+4919}_{-1785}$

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

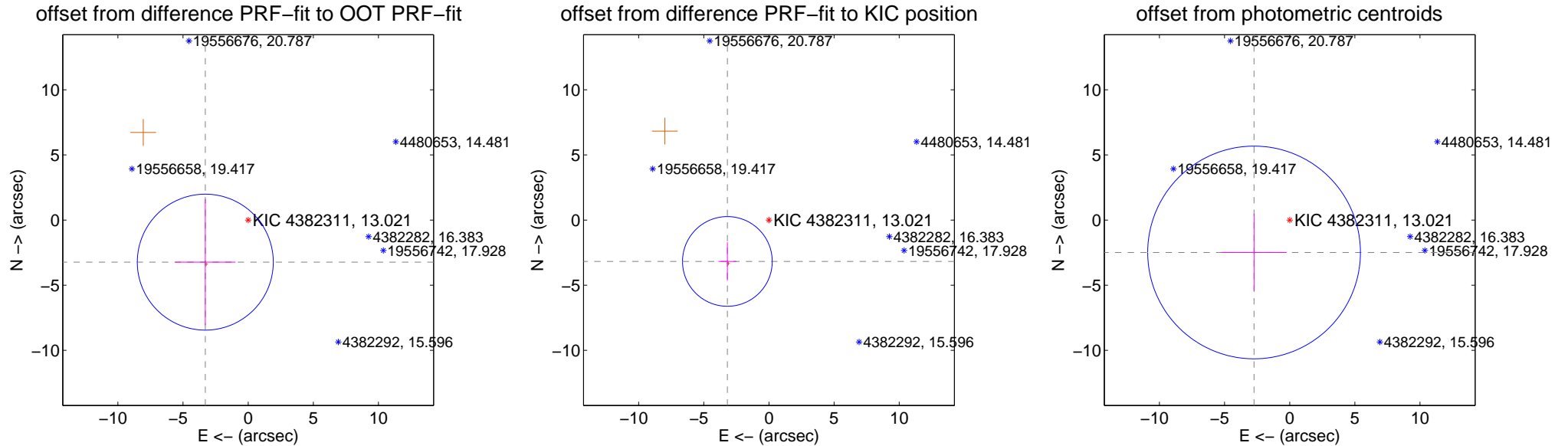
## DV Centroid Data

Supplemental centroid analysis for 004382311-02. Kepler magnitude: 13.02. Transit SNR 5.74

There are 0 quarters with good PRF difference image offsets

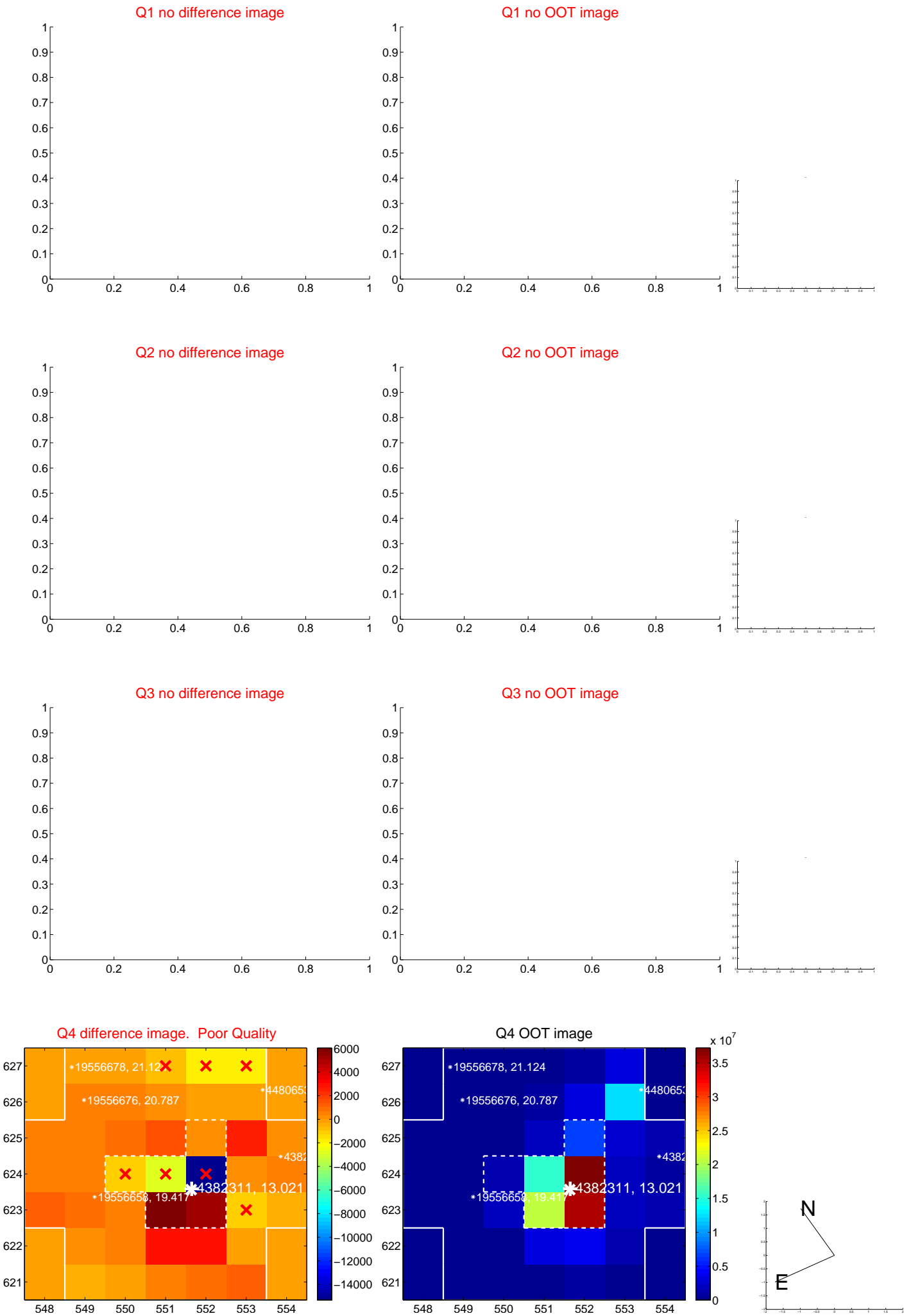
The direct PRF centroid is offset from the target star catalog position by about 0.11 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$4.610 \pm 1.739$	2.65	$3.290 \pm 2.316$	$-3.229 \pm 4.840$
PRF-fit source offset from KIC position	$4.500 \pm 1.147$	3.92	$3.189 \pm 0.691$	$-3.175 \pm 1.471$
photometric centroid source offset	$3.70 \pm 2.72$	1.36	$2.73 \pm 2.50$	$-2.49 \pm 2.96$

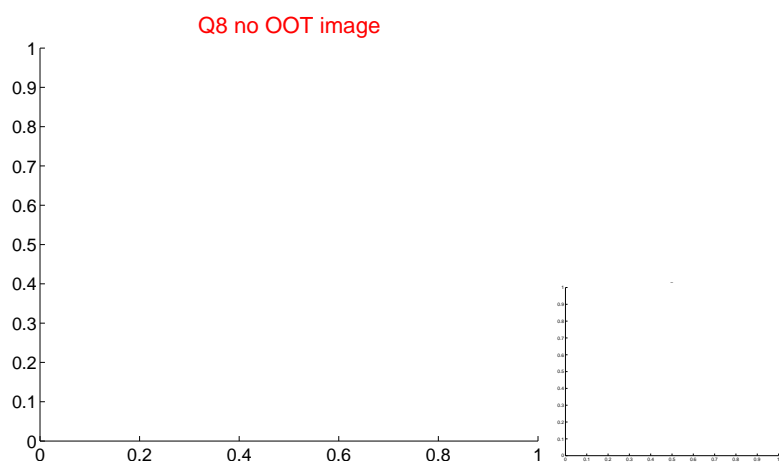
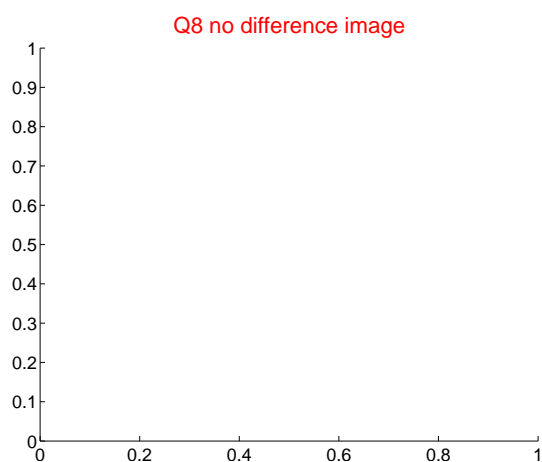
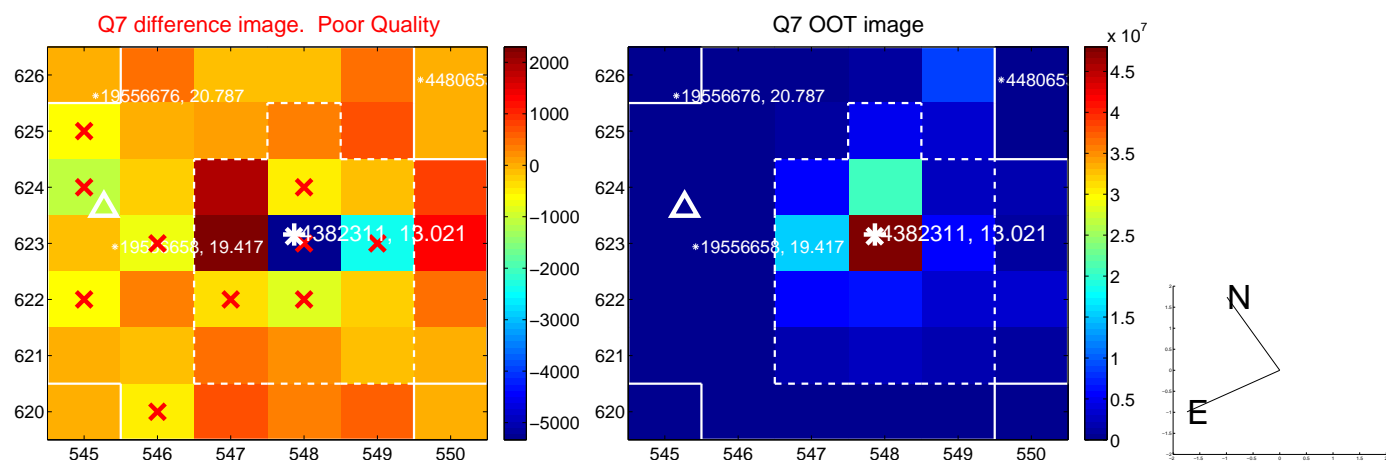
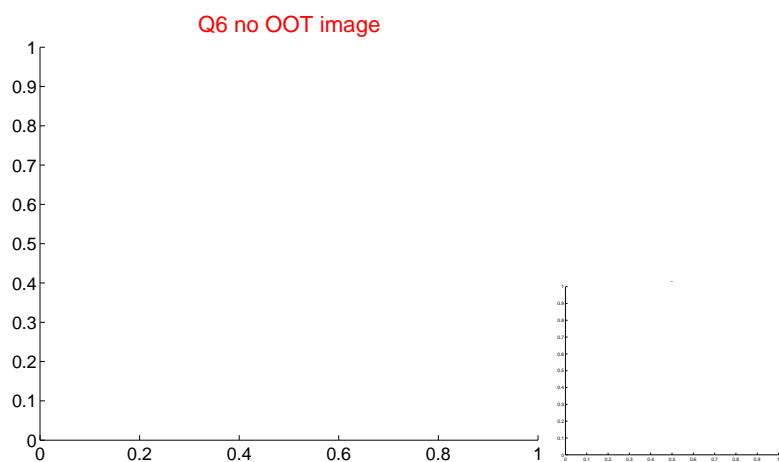
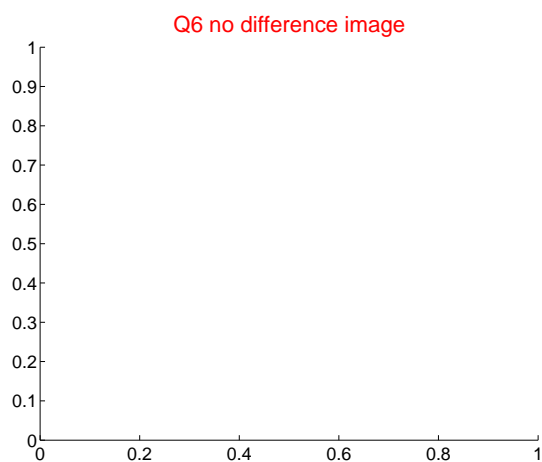
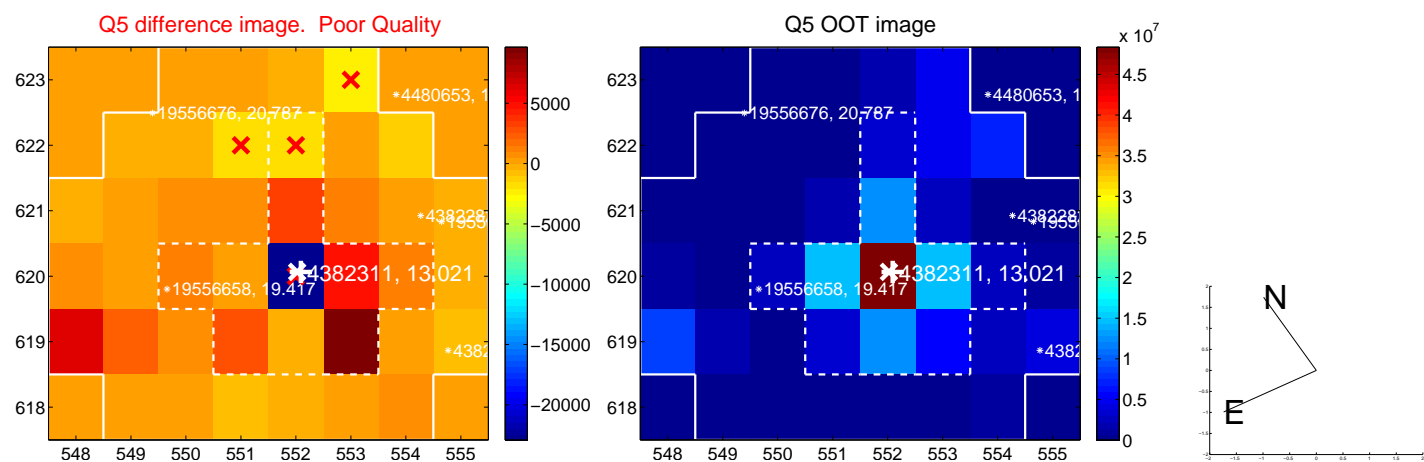


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

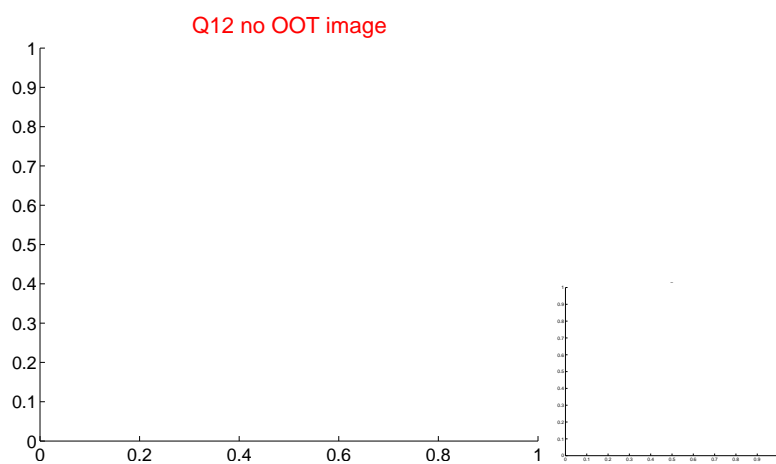
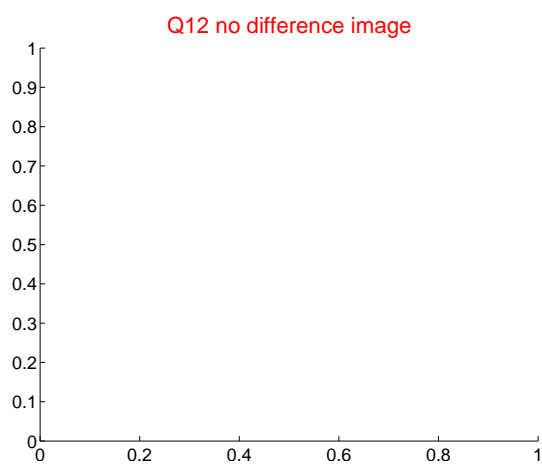
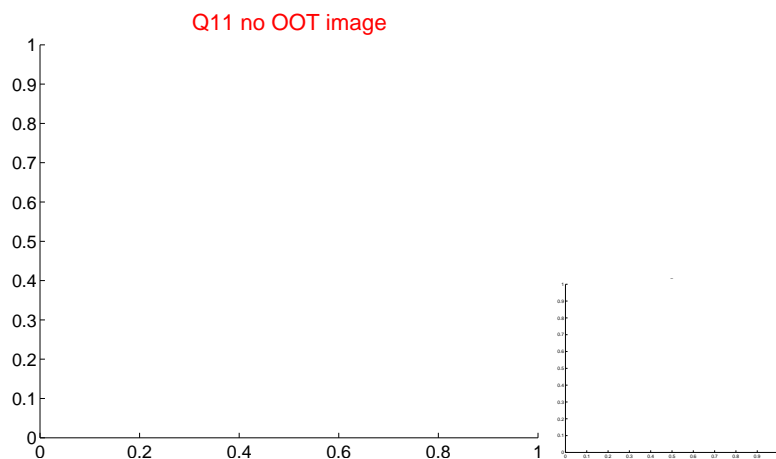
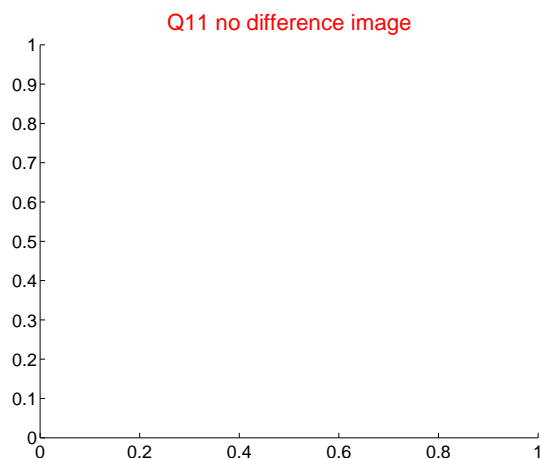
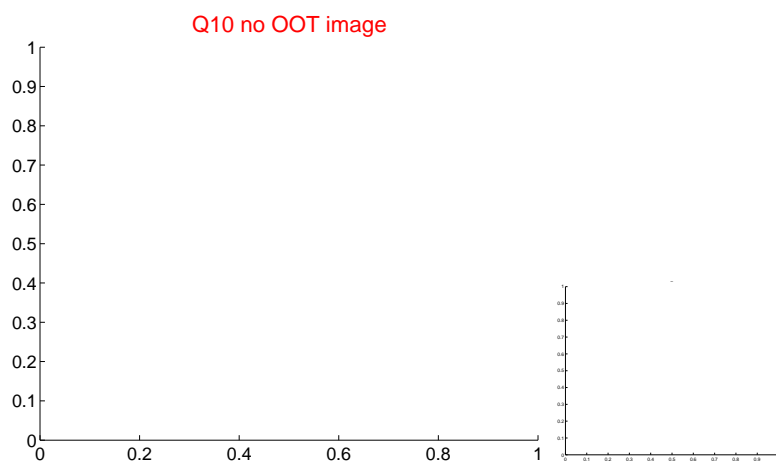
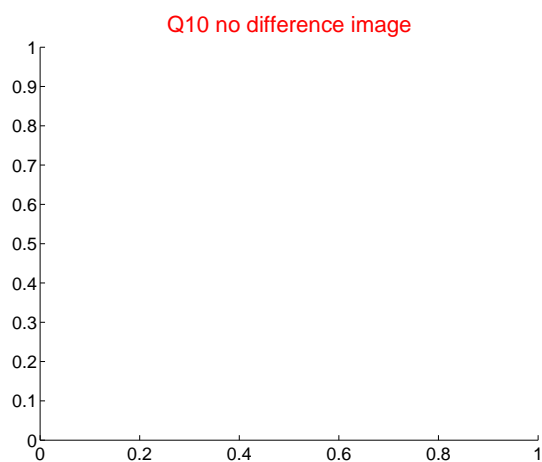
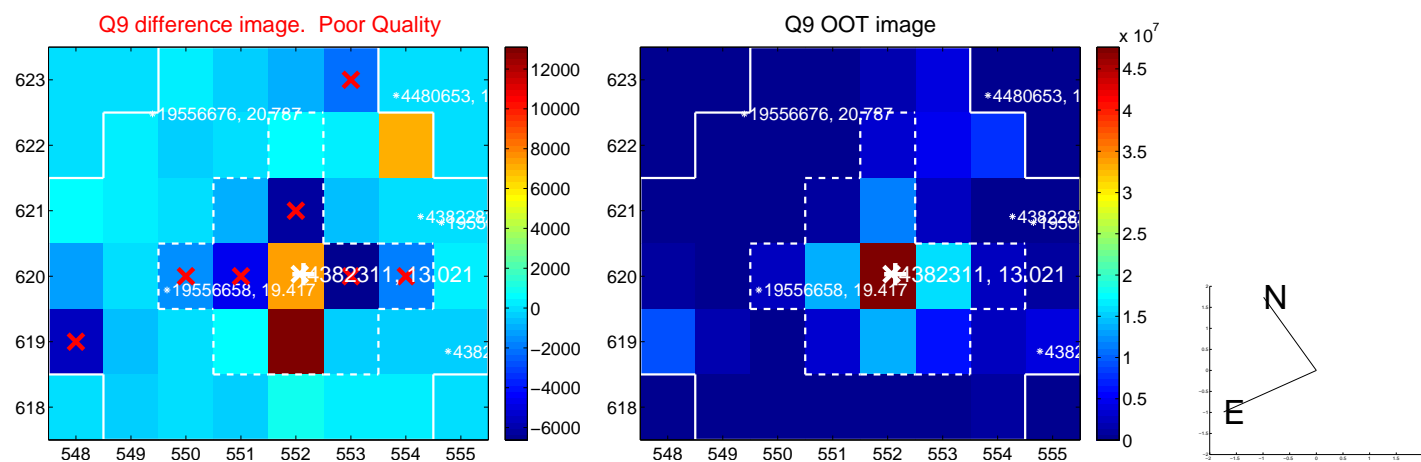


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

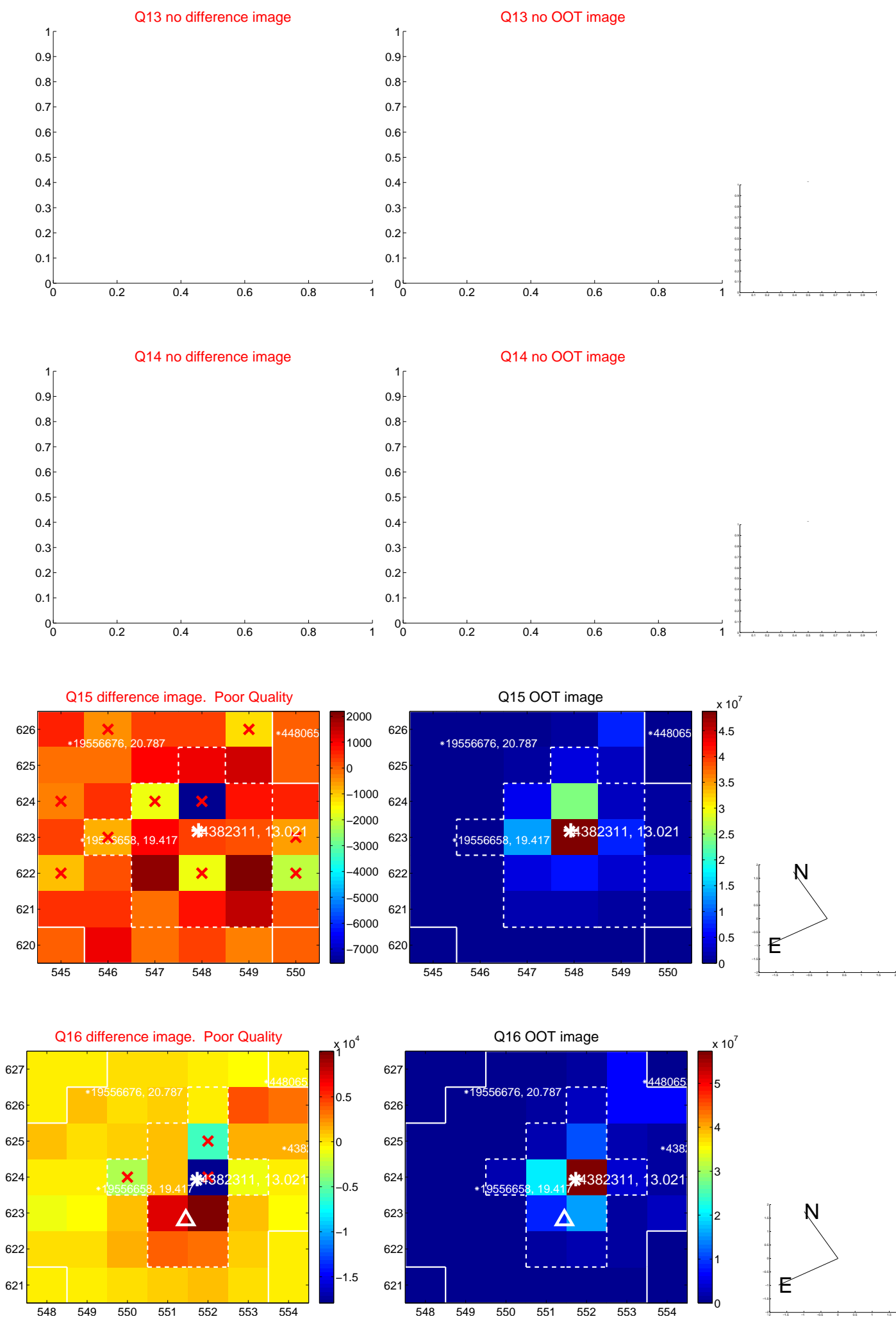




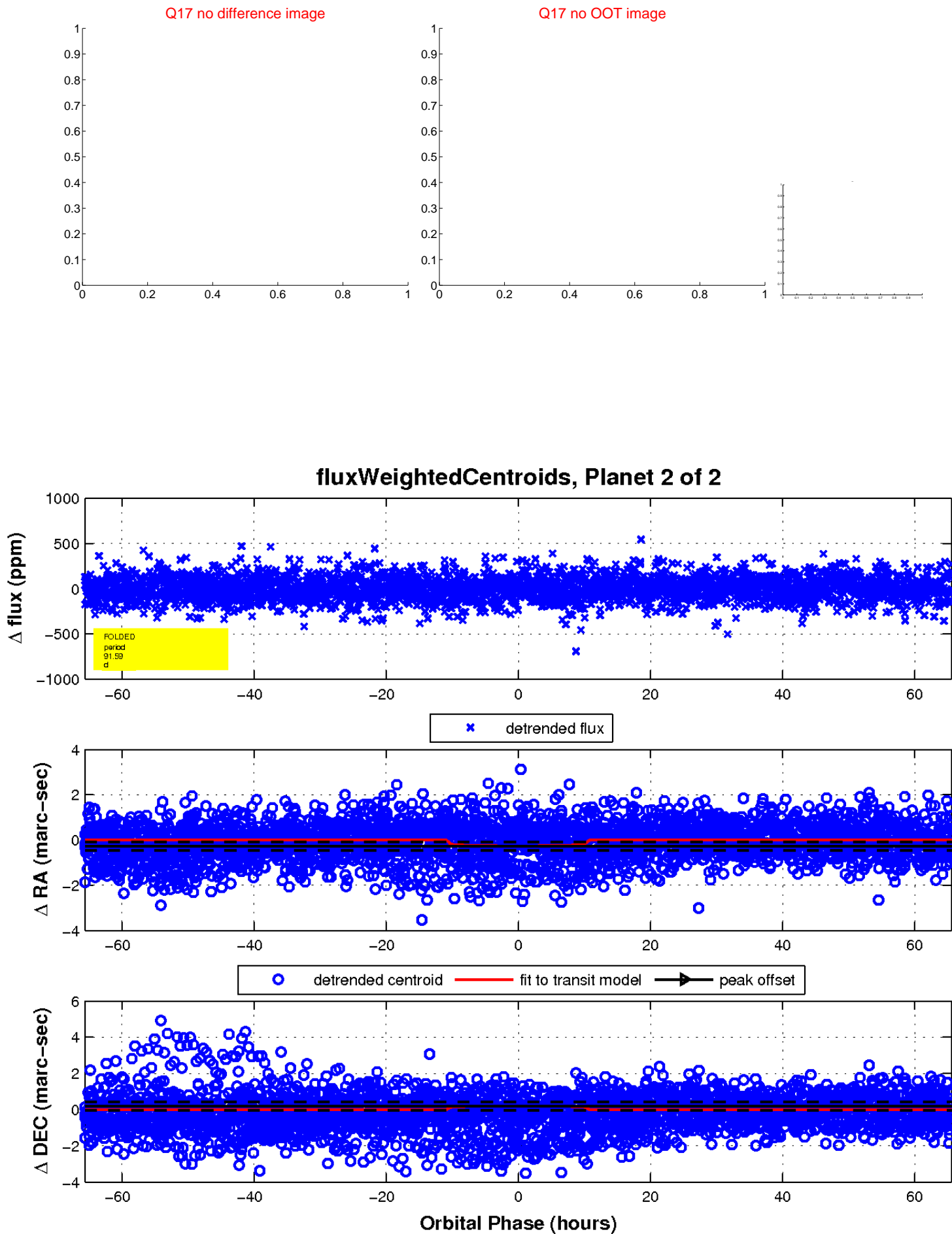
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



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

