

# KIC 007422811

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007422811-01	OBS	No	497.385969	426.962025	1780.4	7.416	10.3	6.2	0.41	3584	1.72	0.03
007422811-02	OBS	No	456.251889	551.400281	2216.4	5.801	16.8	8.1	0.41	3584	1.93	0.03

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007422811-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_POS_ALT— INCONSISTENT_TRANS—CENT_FEW_DIFFS
007422811-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS

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

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

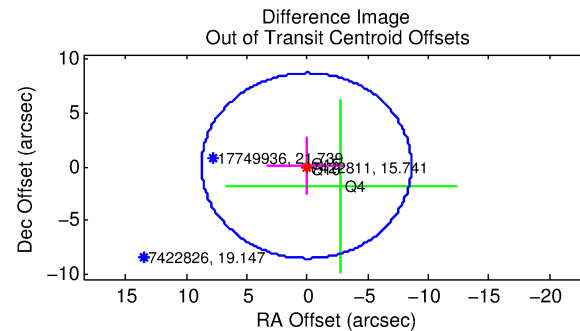
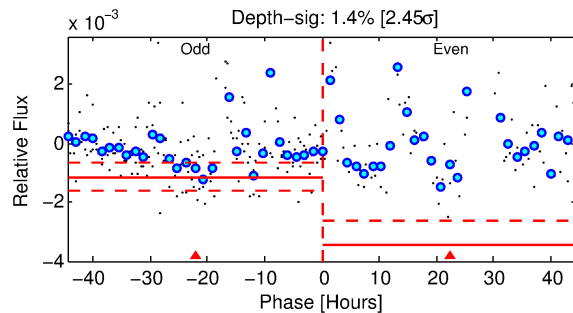
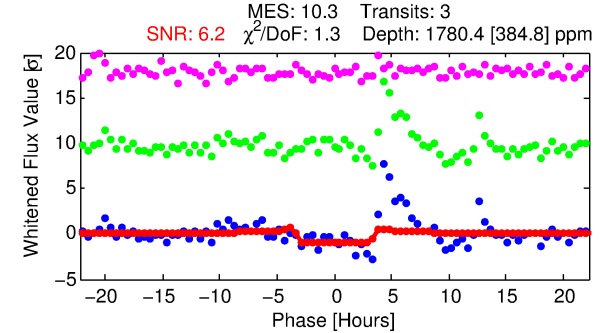
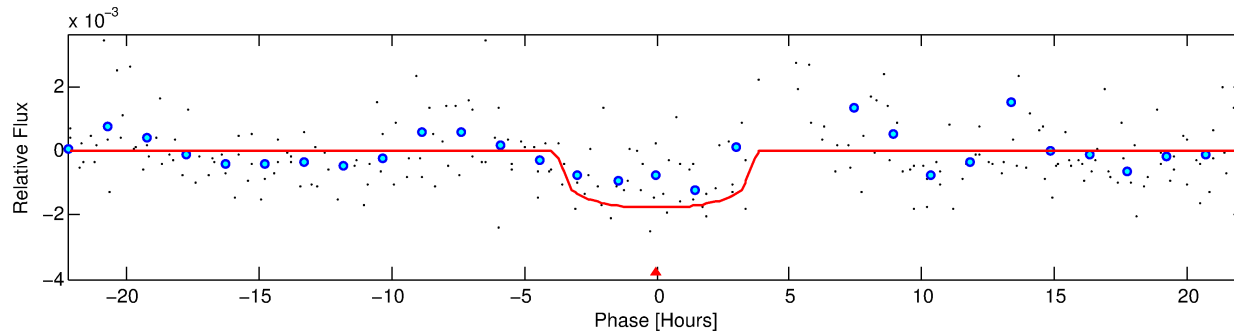
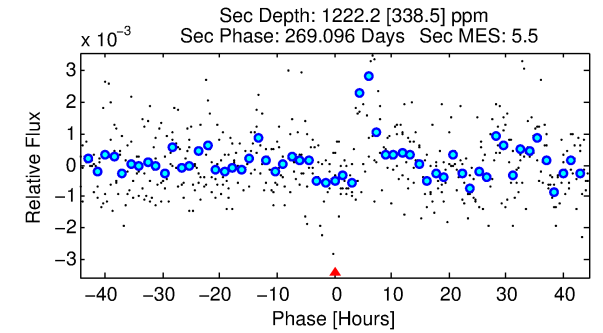
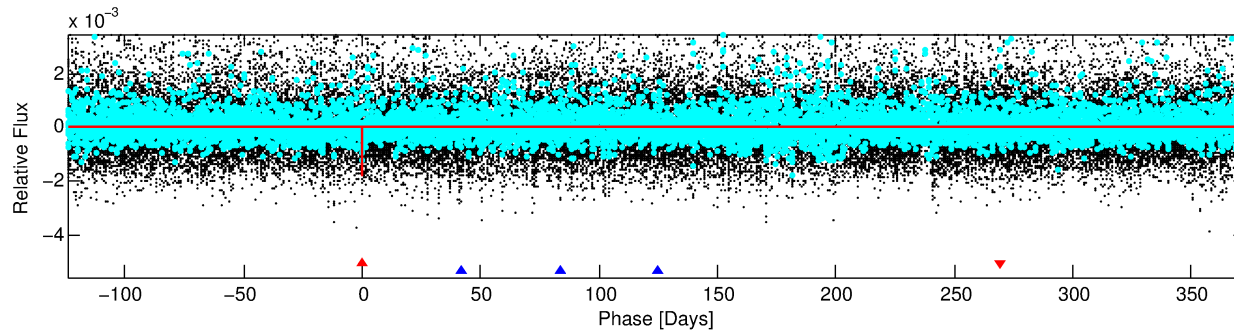
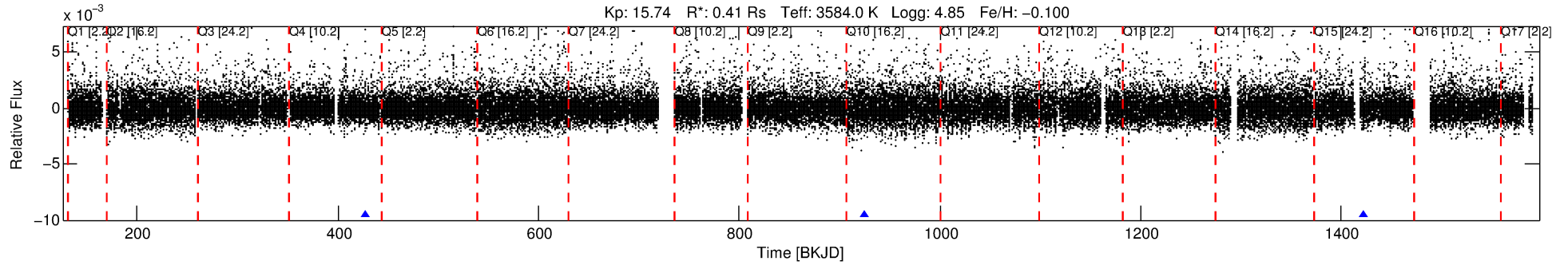
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 007422811-01

No Significant Match Found

# DV One-Page Summary

KIC: 7422811 Candidate: 1 of 2 Period: 497.386 d



## DV Fit Results:

Period = 497.38597 [0.00985] d  
Epoch = 426.9620 [0.0134] BKJD  
Rp/R\* = 0.0385 [0.0413]  
a/R\* = 514.29 [2374.37]  
b = 0.27 [16.13]  
Seff = 0.03 [0.00]  
Teq = 105 [2] K  
Rp = 1.72 [1.85] Re  
a = 0.9268 [0.0537] AU  
Ag = 195633.22 [423877.01] [0.46σ]  
Teffp = 3415 [1850] K [1.79σ]

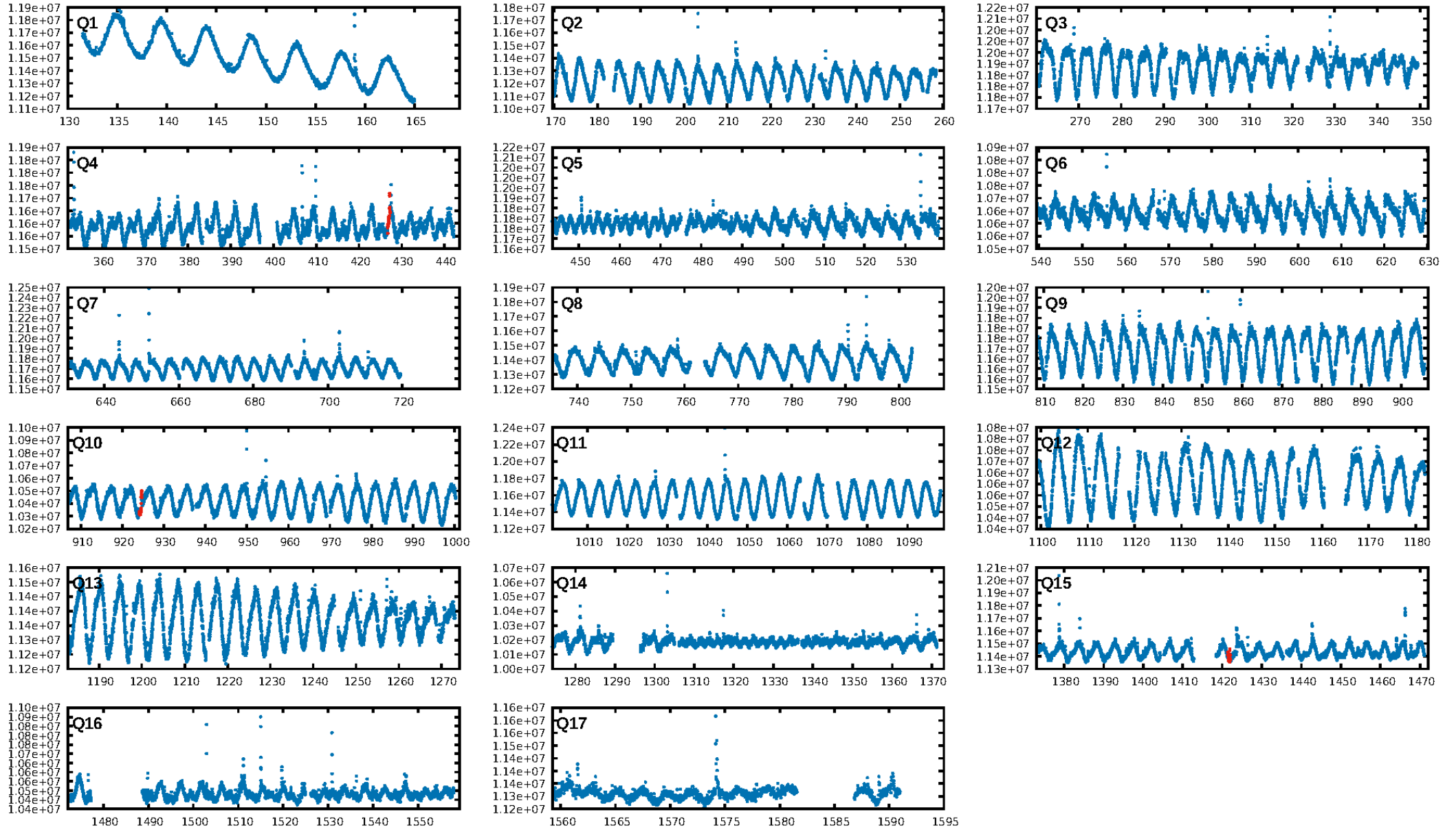
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [104.86σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.7%  
ModelChiSquareGof-sig: 51.8%  
**Bootstrap-pfa: 1.05e-11**  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 2.428  
Centroid-sig: 94.9%  
Centroid-so: 0.614 arcsec [0.56σ]  
OotOffset-rm: 0.107 arcsec [0.04σ]  
OotOffset-st: 1/1/1/0 [3]  
KicOffset-rm: 0.721 arcsec [0.26σ]  
KicOffset-st: 1/1/1/0 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 1.00 [3/3]

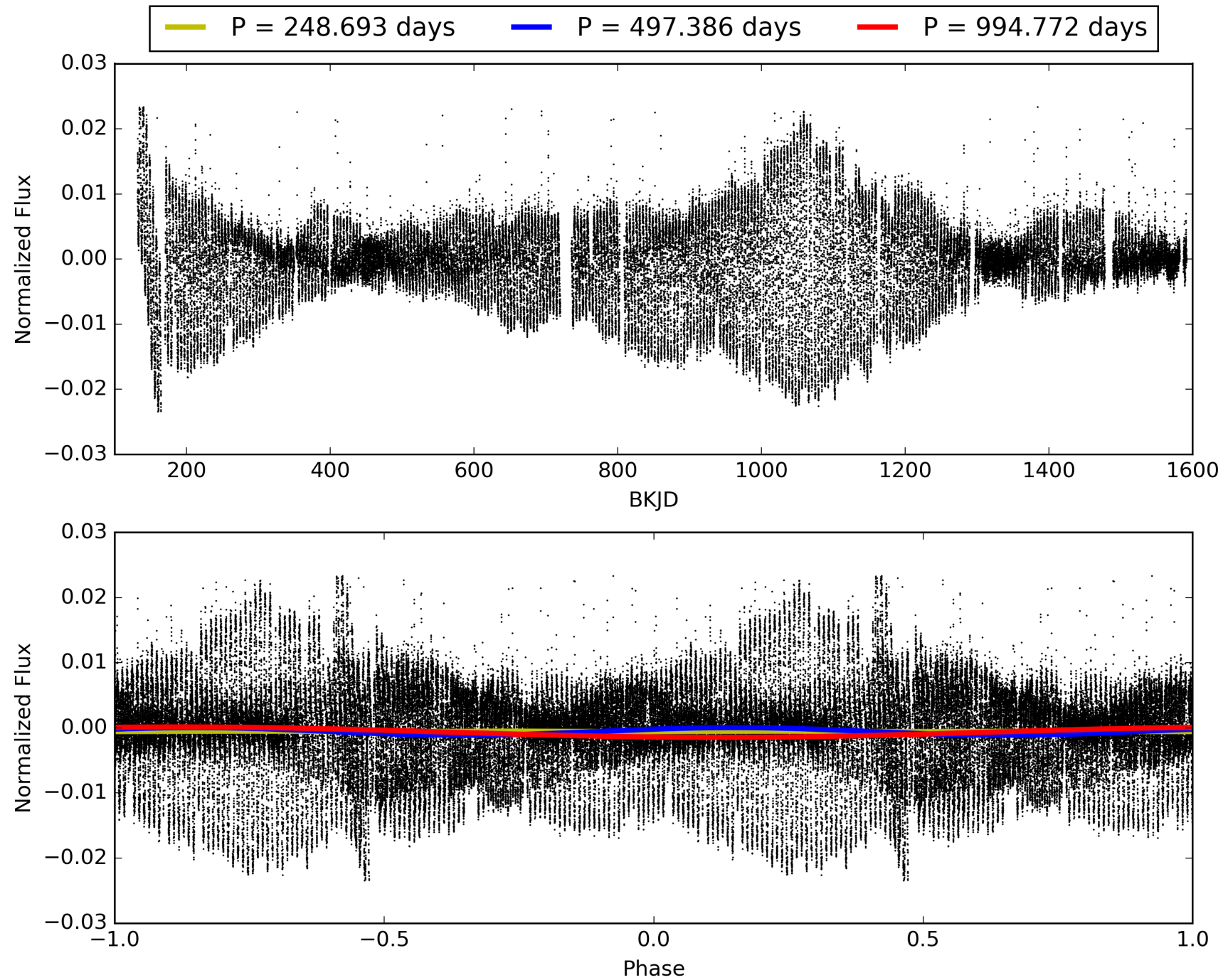
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 07:34:10 Z

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

# TCE 007422811-01, PDC Light Curves

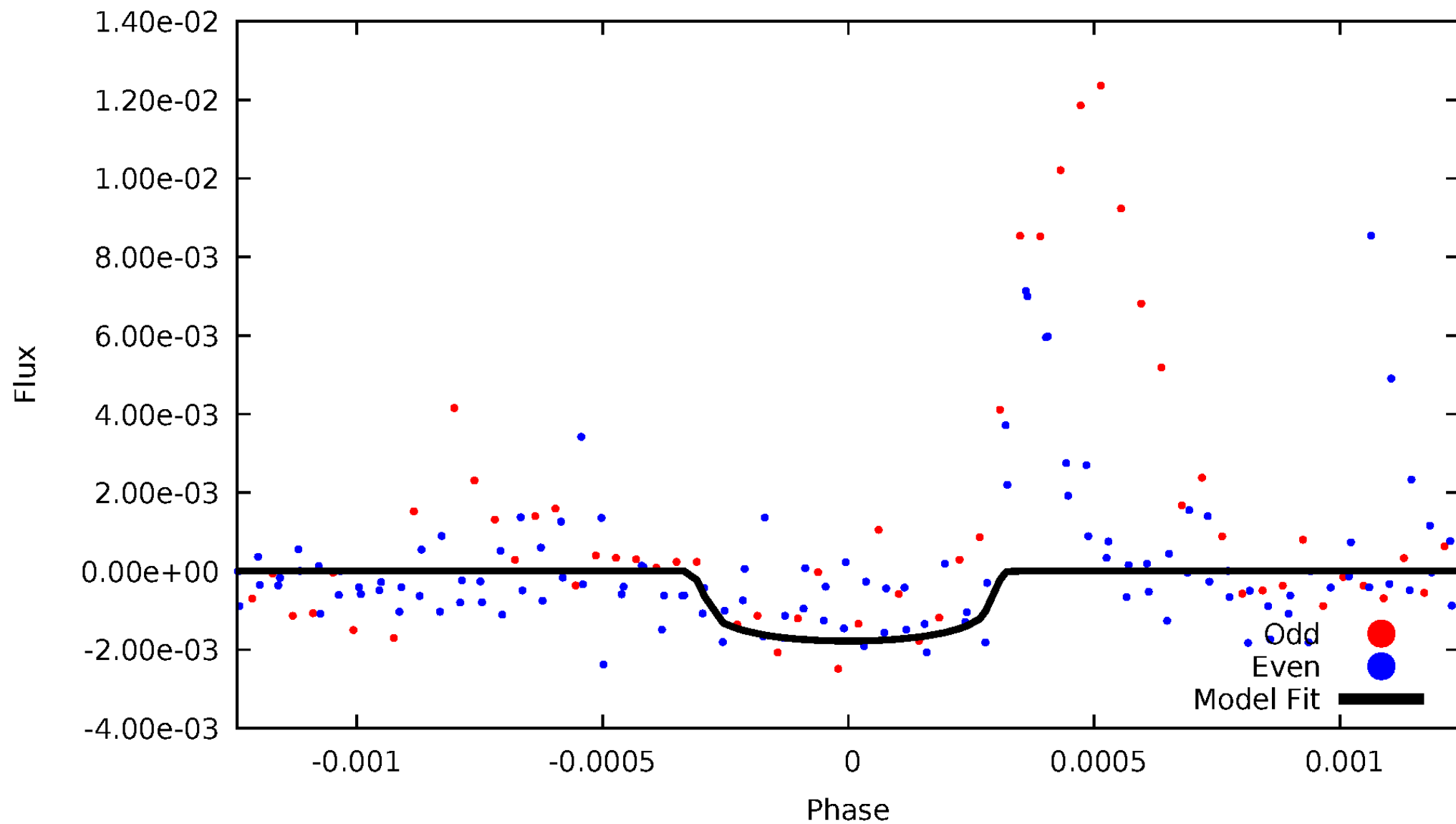


TCE 007422811-01



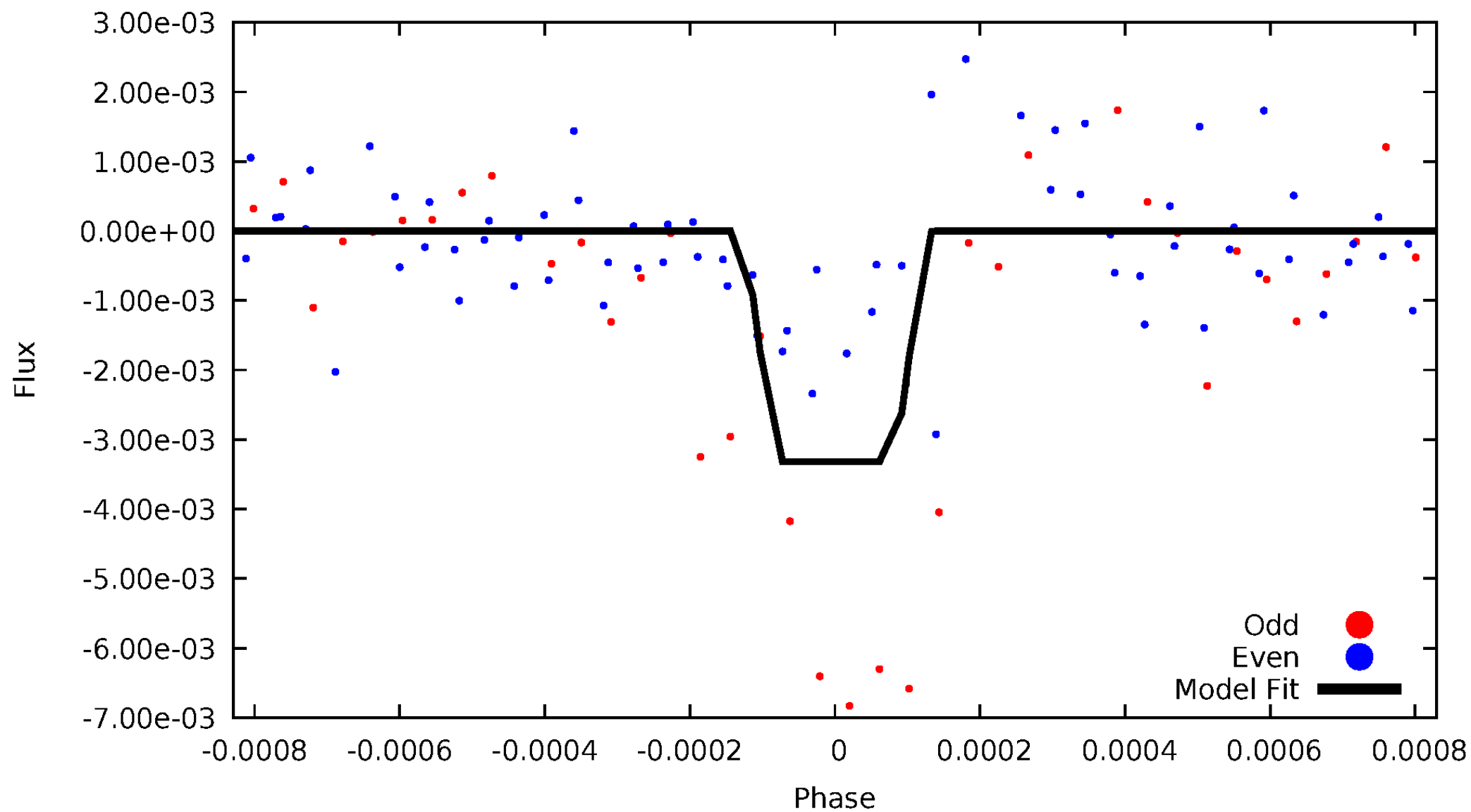
# DV Odd/Even

TCE 007422811-01

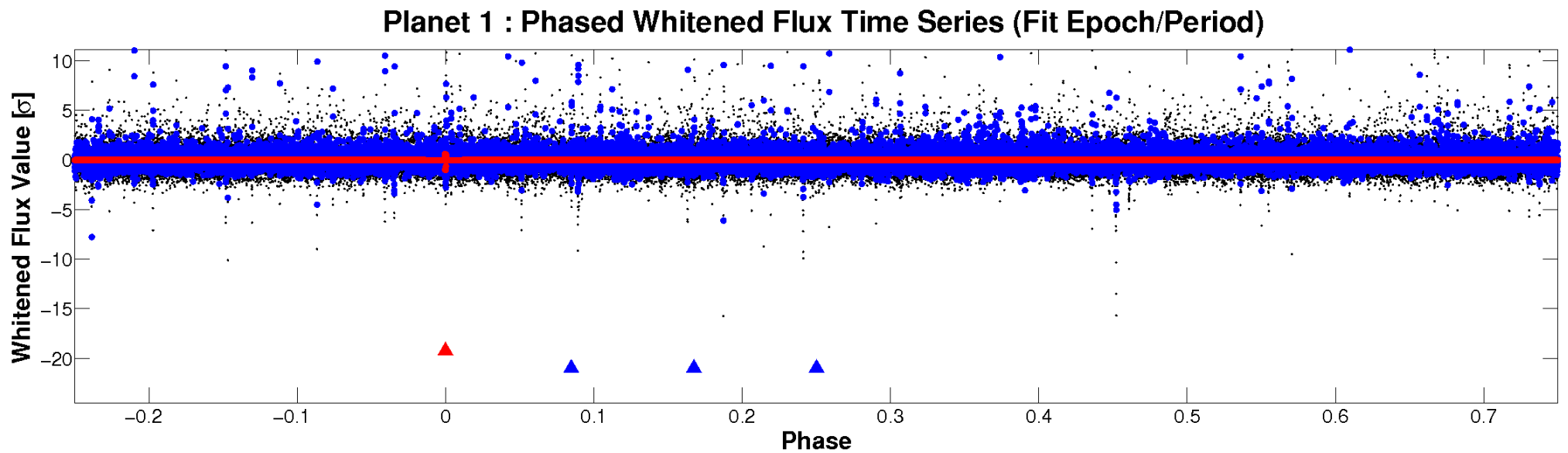
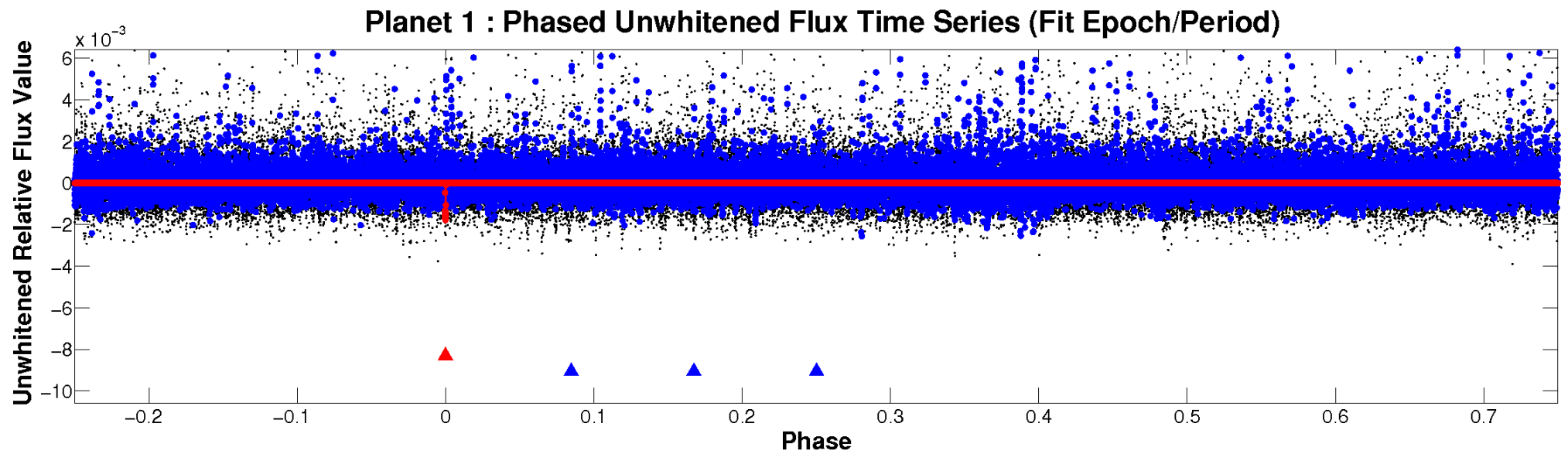


# ALT Odd/Even

TCE 007422811-01

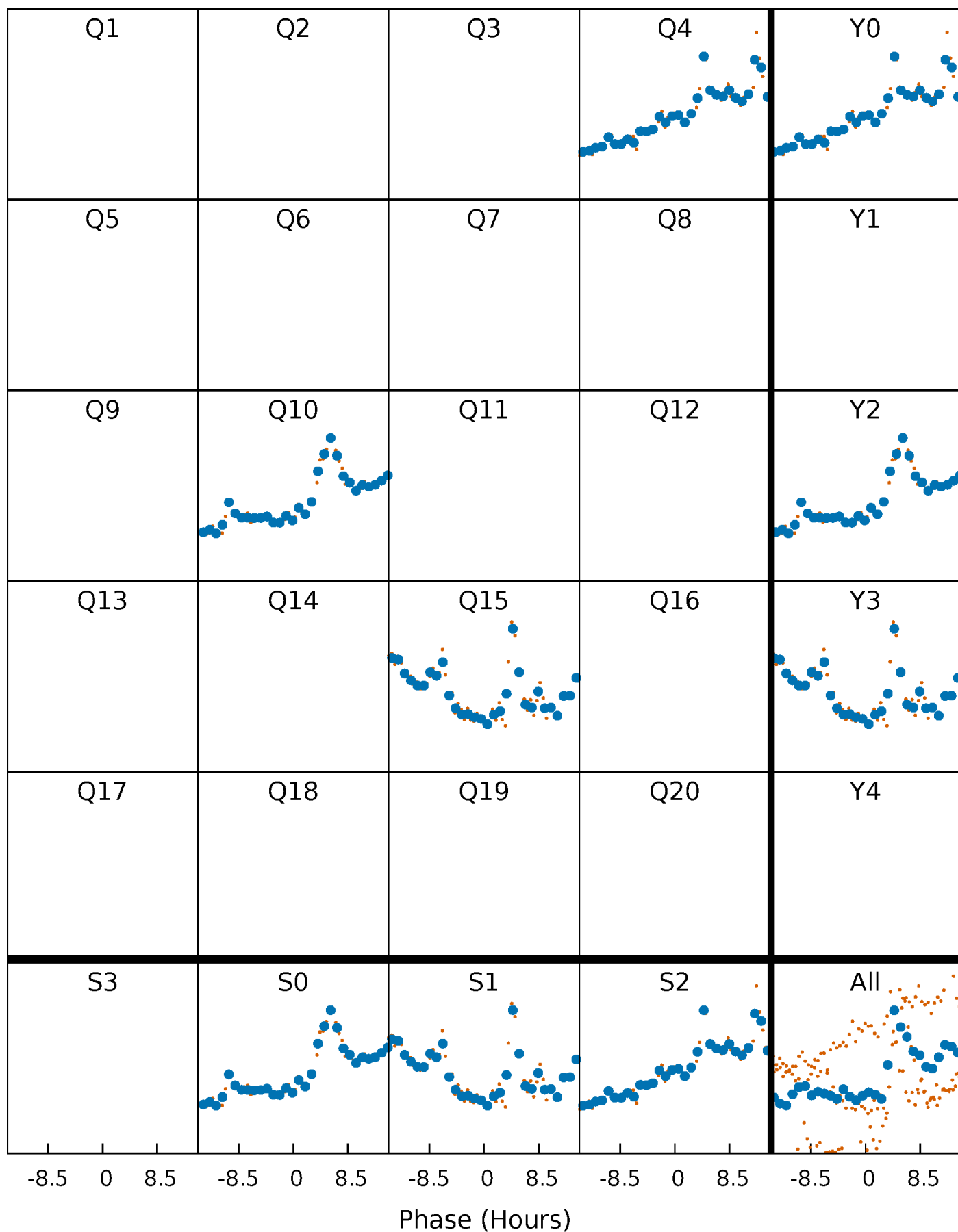


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

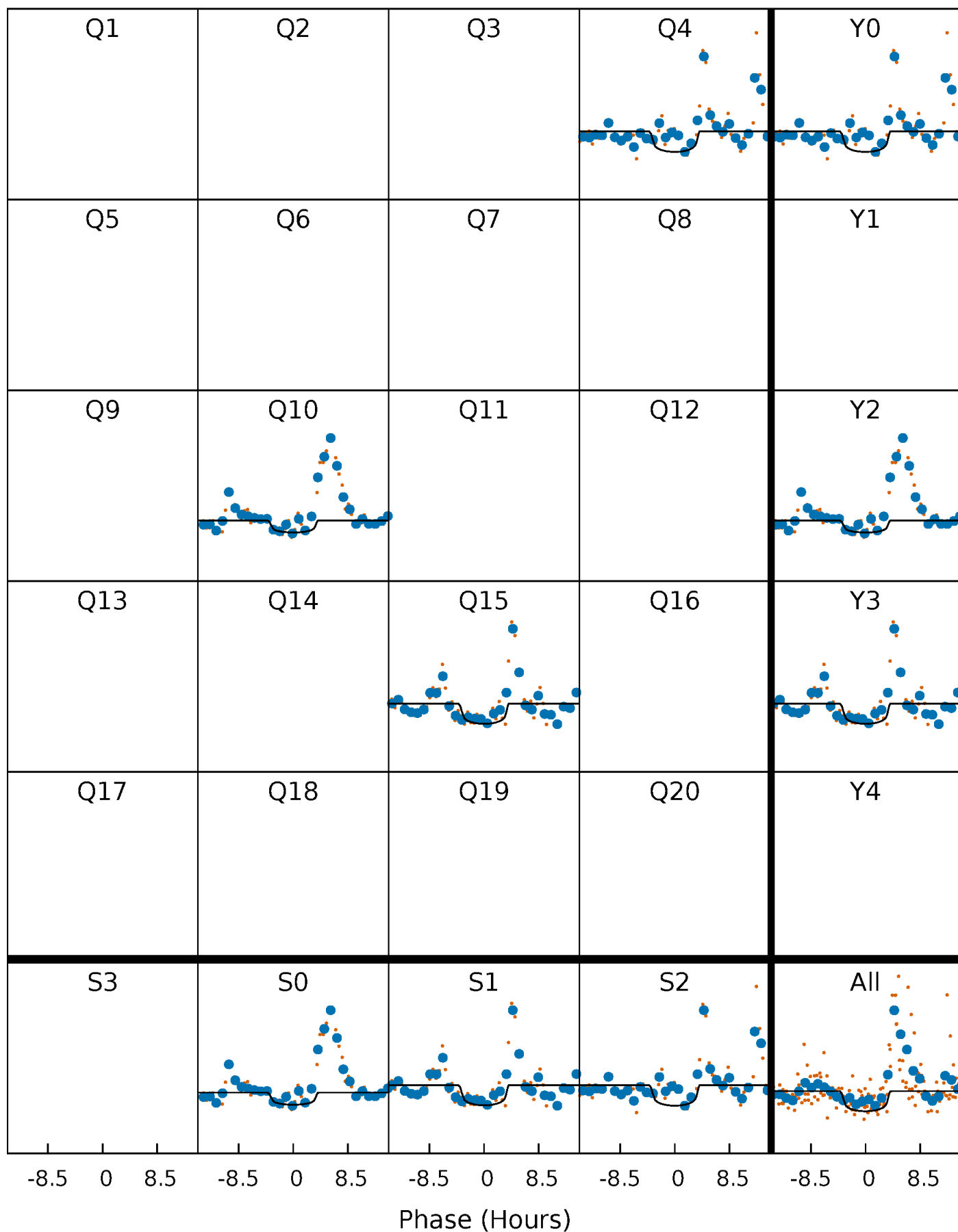
TCE 007422811-01 P=497.385969 Days  $T_0=426.962025$  (BKJD)





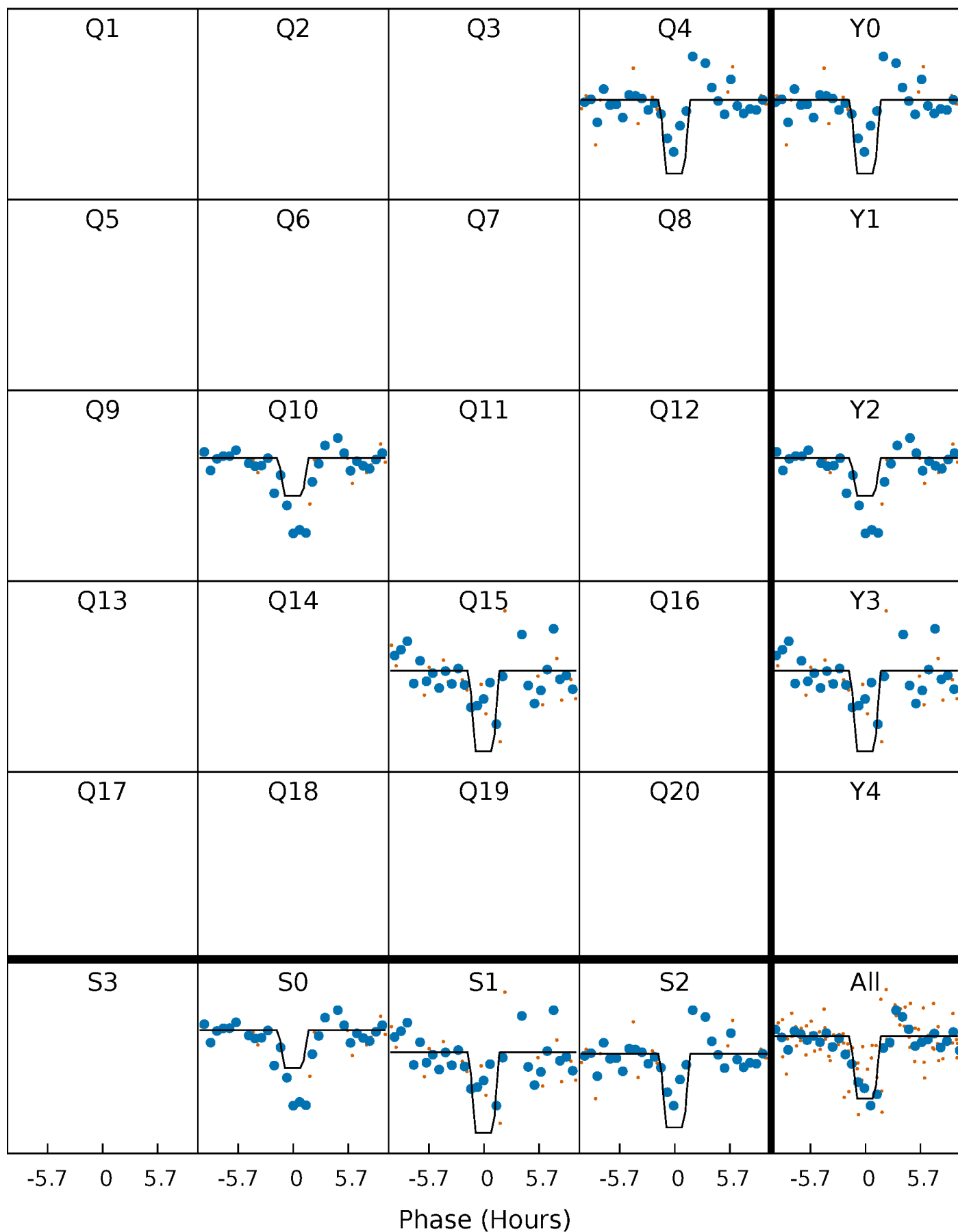
# DV Quarter-Phased Transit Curves

TCE 007422811-01 P=497.385969 Days  $T_0=426.962025$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

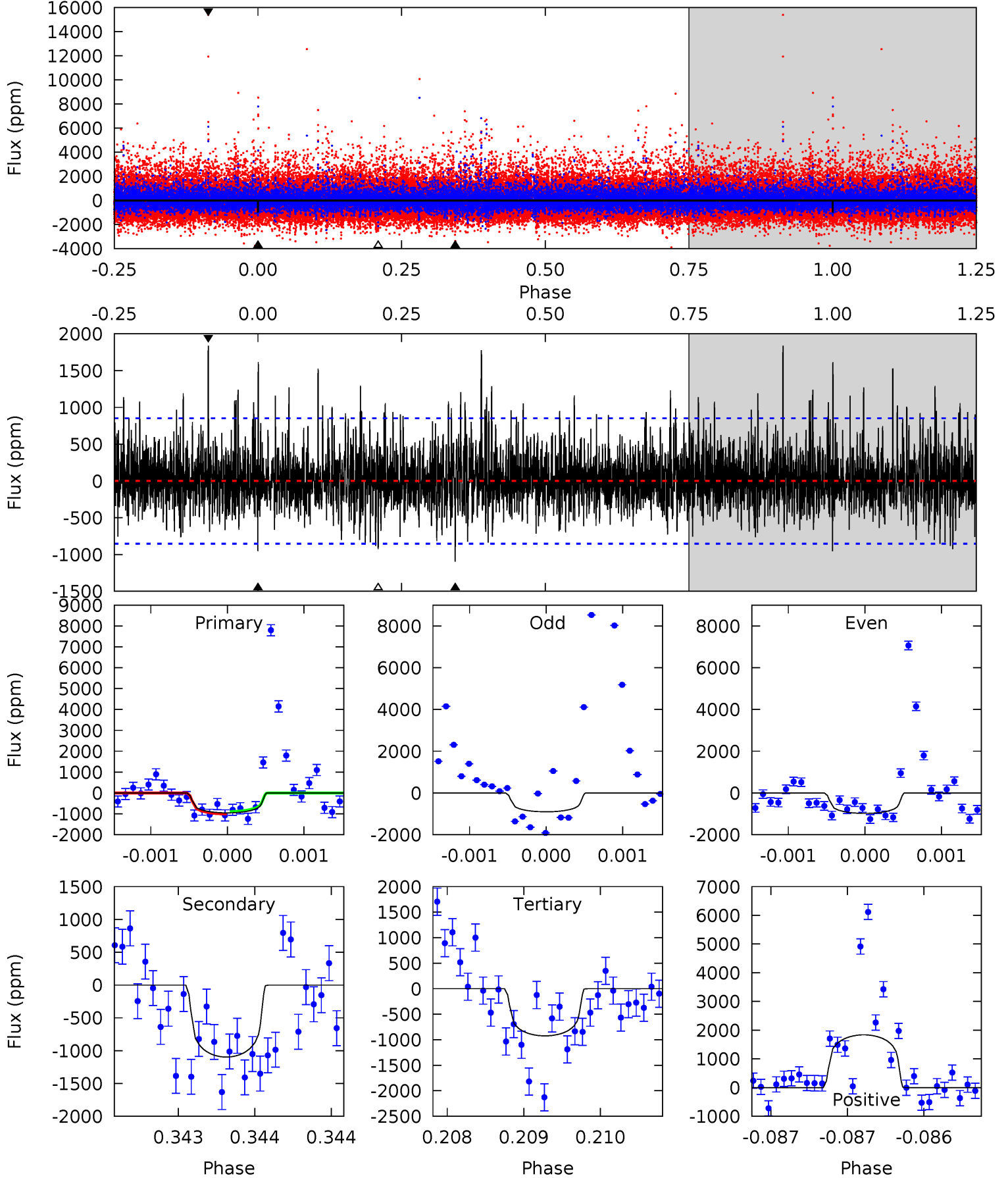
TCE 007422811-01 P=497.373284 Days  $T_0=427.056627$  (BKJD)



# DV Model-Shift Uniqueness Test

007422811-01, P = 497.385969 Days, E = 426.962025 Days

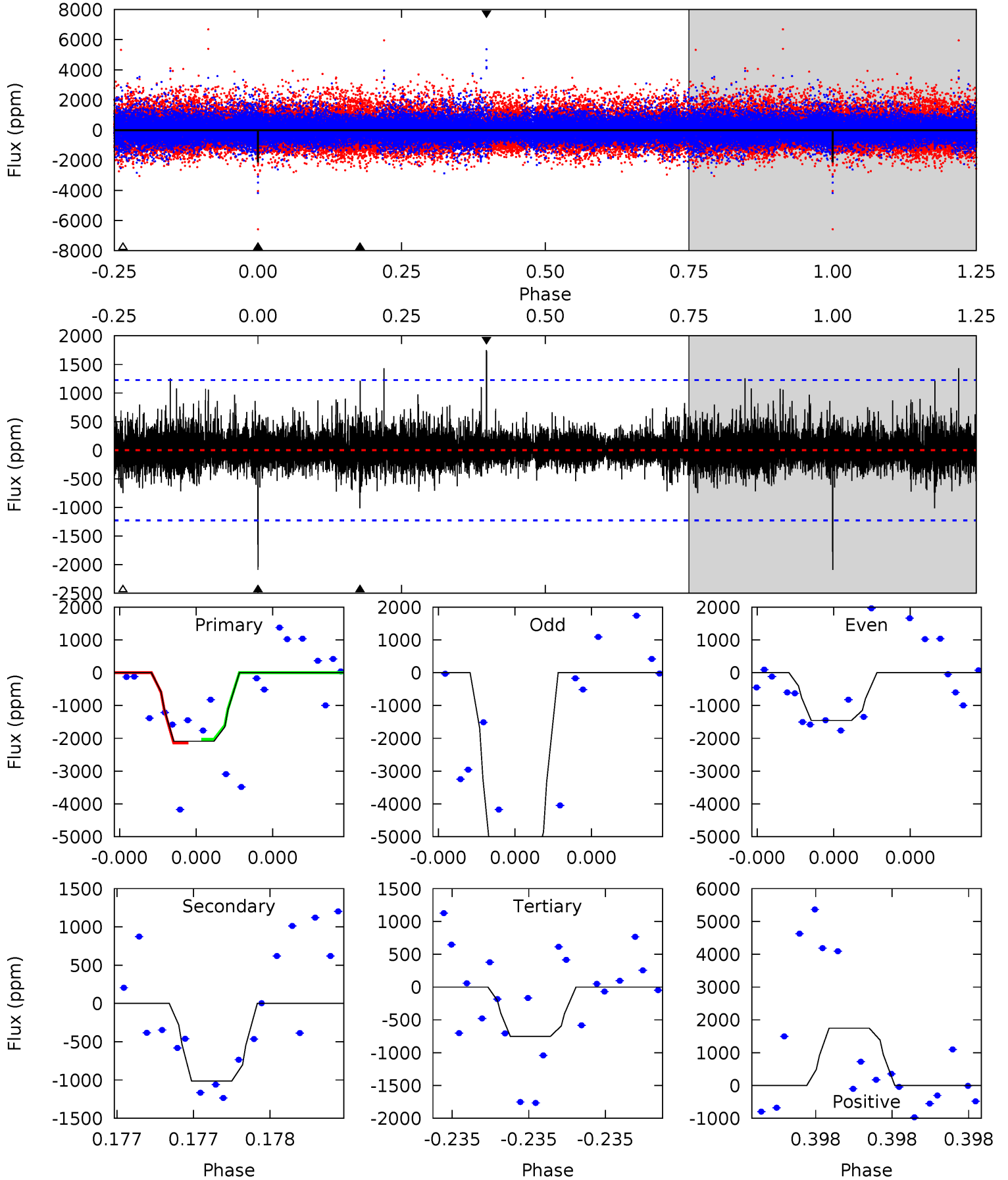
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.19	7.12	6.00	11.9	5.53	3.42	1.99	0.19	-5.73	1.12	-4.80	0.19	1.05	0.63	0.38



# Alt Model-Shift Uniqueness Test

007422811-01, P = 497.373284 Days, E = 427.056627 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
9.70	4.70	3.48	8.11	5.70	3.67	0.91	6.22	1.60	1.22	-3.40	12.5	1.93	0.46	0



### Stellar Parameters For KIC 007422811

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3584^{+43}_{-48}$	$4.847^{+0.033}_{-0.030}$	$-0.100^{+0.100}_{-0.100}$	$0.409^{+0.029}_{-0.032}$	$0.430^{+0.027}_{-0.039}$	$8.855^{+1.584}_{-1.115}$
	+1%/-1%	+1%/-1%	+100%/-100%	+7%/-8%	+6%/-9%	+18%/-13%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 007422811-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-1097 \pm 154$	$2.12^{+1.56}_{-1.28}$	$147^{+3}_{-3}$	$3200^{+1133}_{-456}$	$116634^{+582478}_{-79279}$
Alt.	$-1014 \pm 215$	$2.72^{+1.99}_{-1.60}$	$147^{+3}_{-3}$	$2941^{+926}_{-388}$	$64552^{+304581}_{-43218}$

$T_{\text{max}}$  = 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

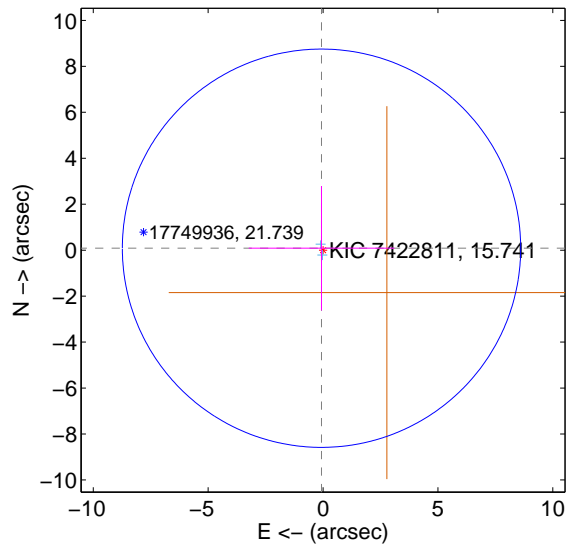
Supplemental centroid analysis for 007422811-01. Kepler magnitude: 15.74. Transit SNR 6.24

There are 2 quarters with good PRF difference image offsets

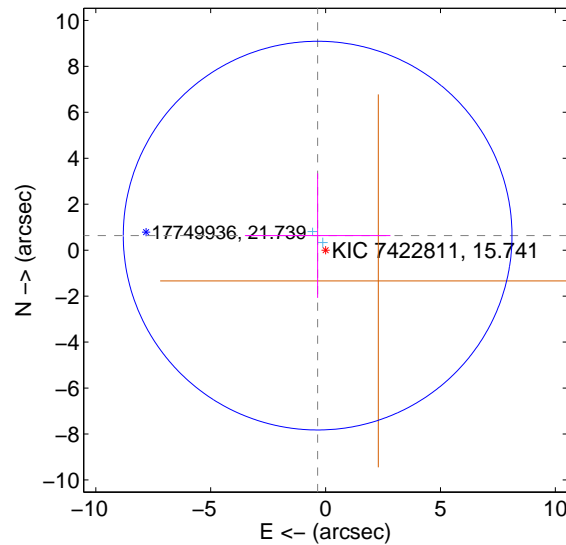
The direct PRF centroid is offset from the target star catalog position by about 0.72 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.107 \pm 2.889$	0.04	$0.066 \pm 3.167$	$0.085 \pm 2.707$
PRF-fit source offset from KIC position	$0.721 \pm 2.819$	0.26	$0.345 \pm 3.167$	$0.633 \pm 2.707$
photometric centroid source offset	$0.61 \pm 1.09$	0.56	$0.39 \pm 1.04$	$0.47 \pm 1.13$

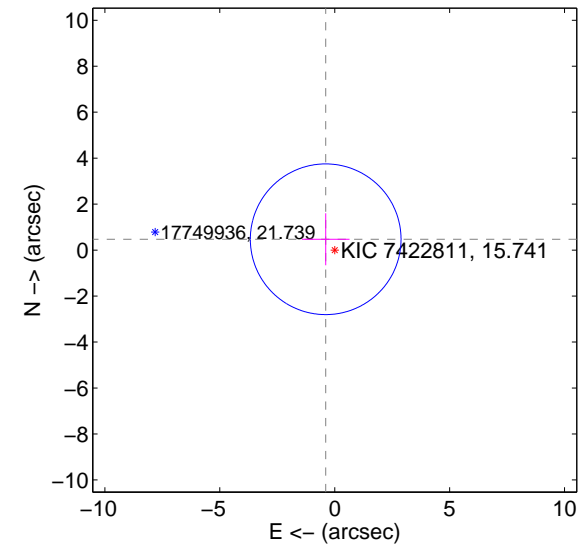
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

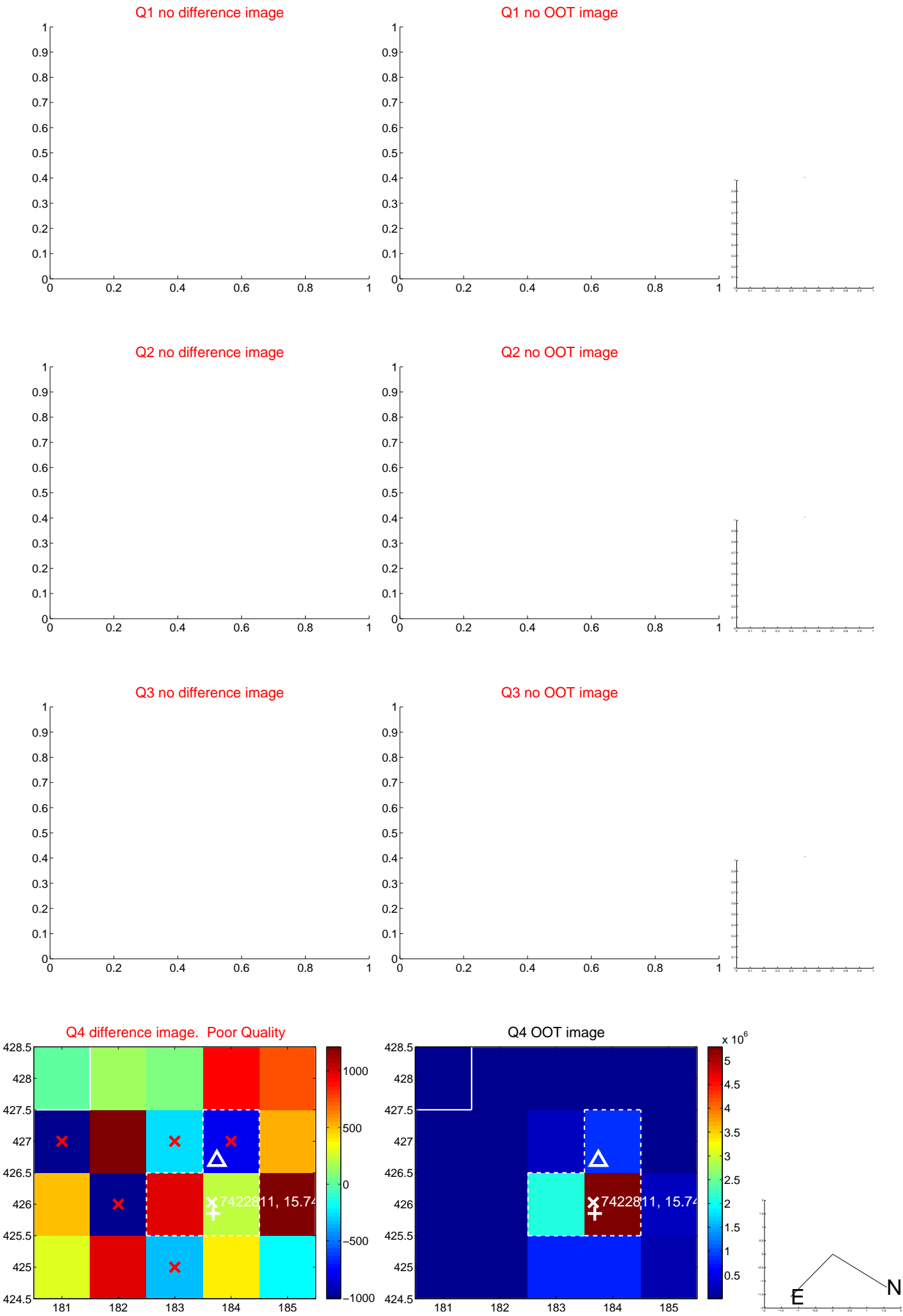


offset from photometric centroids



Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

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

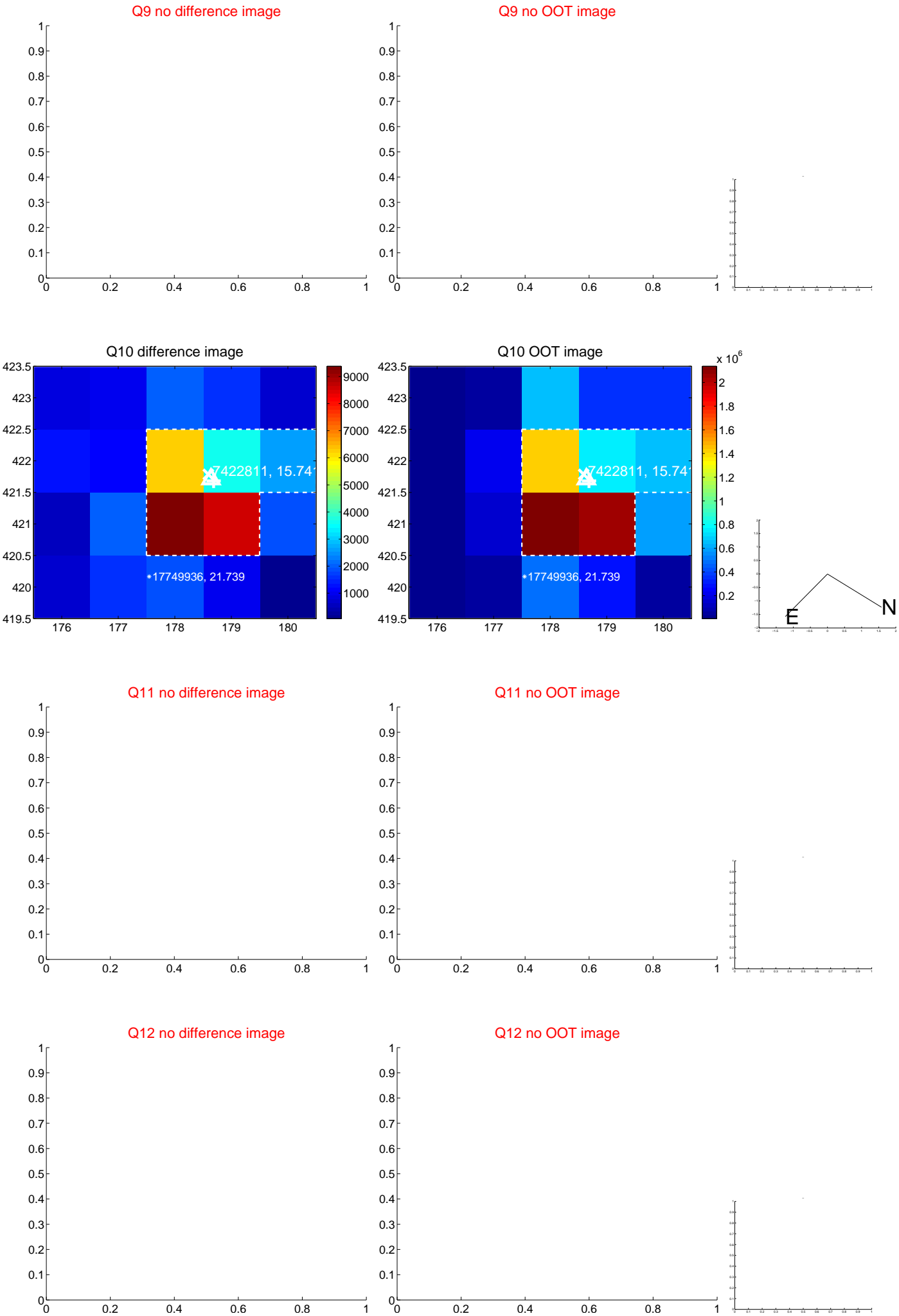


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

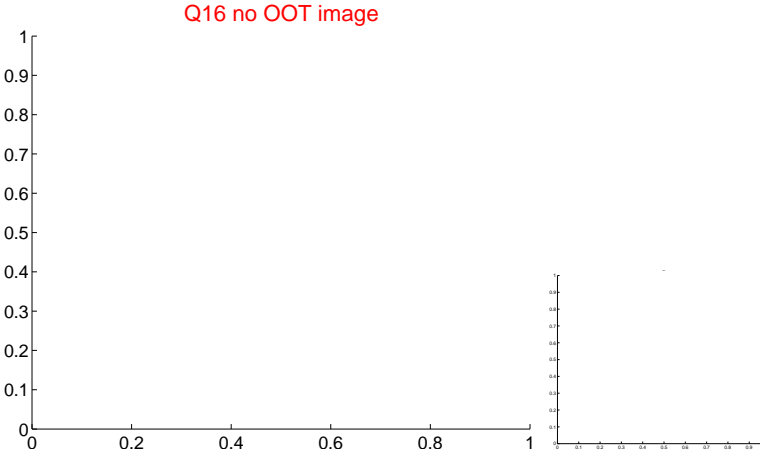
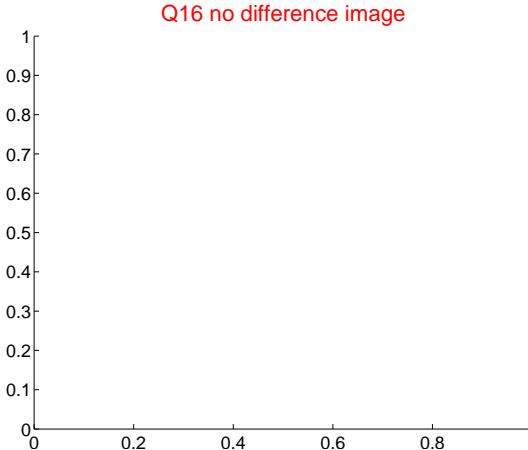
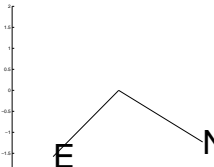
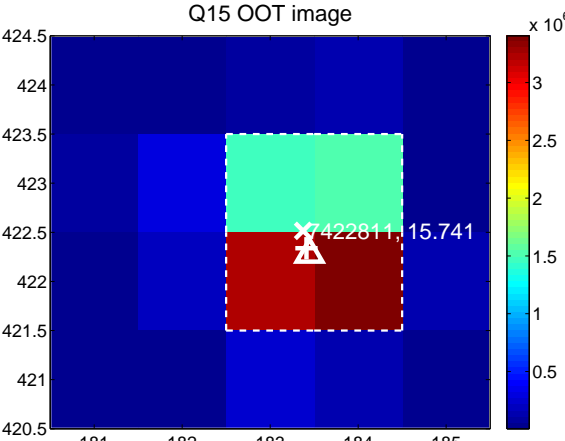
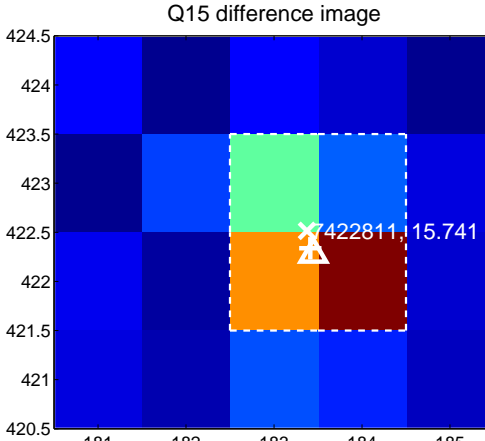
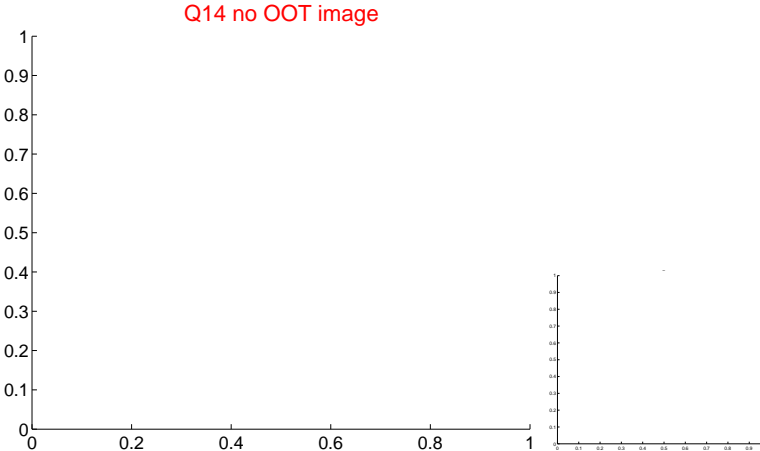
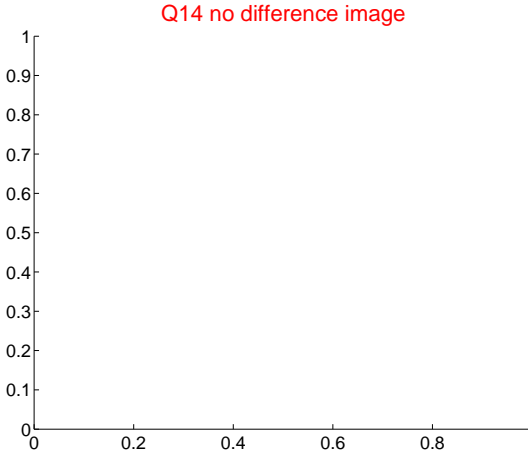
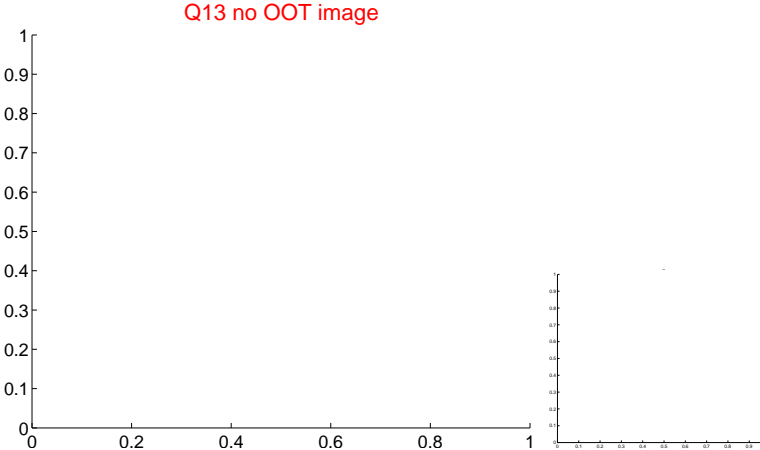
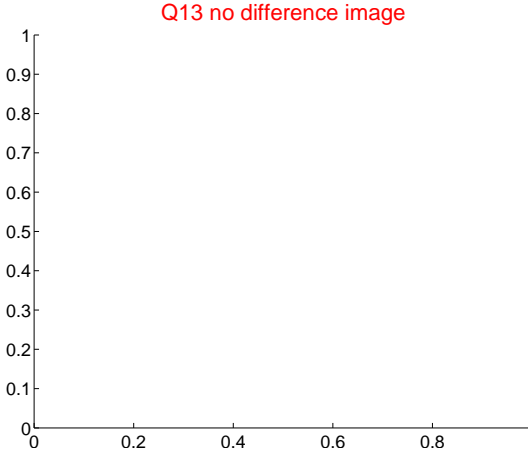




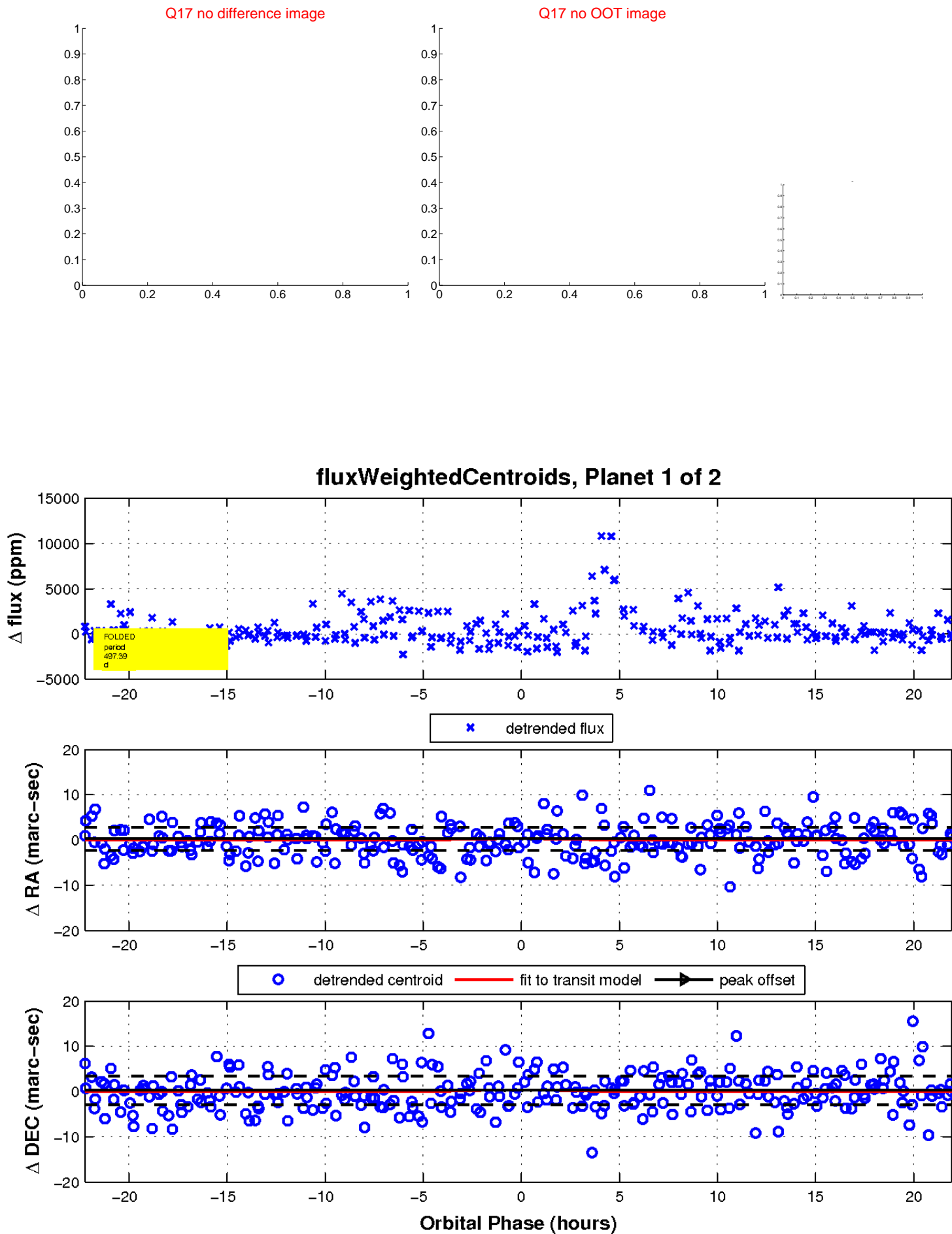
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

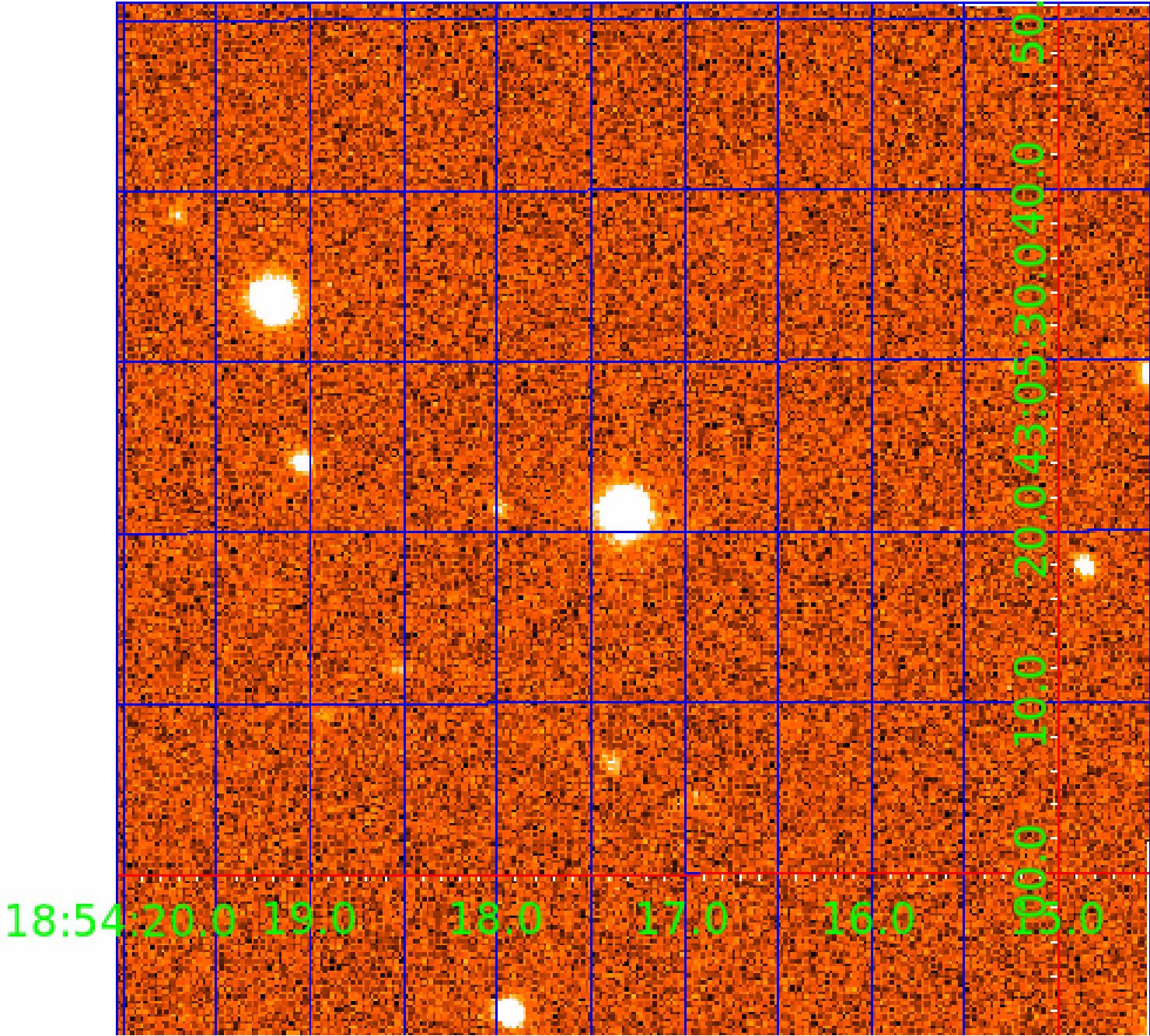


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 007422811

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007422811-01	OBS	No	497.385969	426.962025	1780.4	7.416	10.3	6.2	0.41	3584	1.72	0.03
007422811-02	OBS	No	456.251889	551.400281	2216.4	5.801	16.8	8.1	0.41	3584	1.93	0.03

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007422811-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_POS_ALT— INCONSISTENT_TRANS—CENT_FEW_DIFFS
007422811-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS

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

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

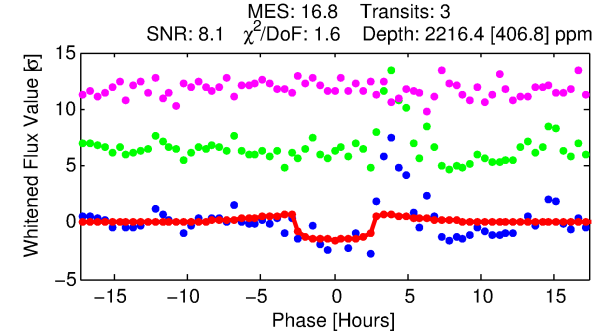
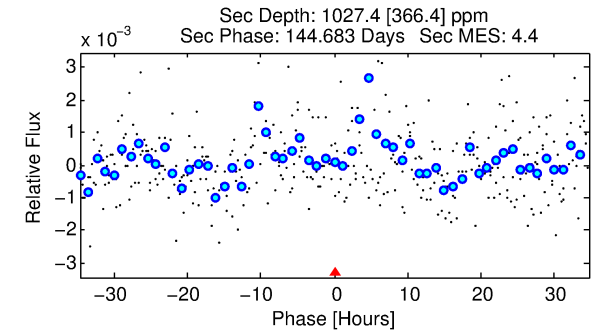
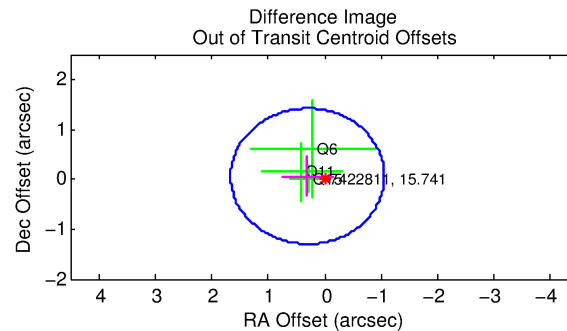
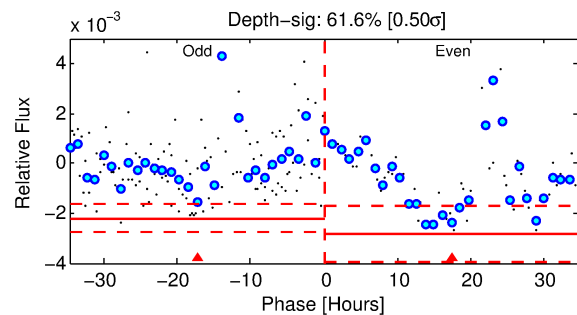
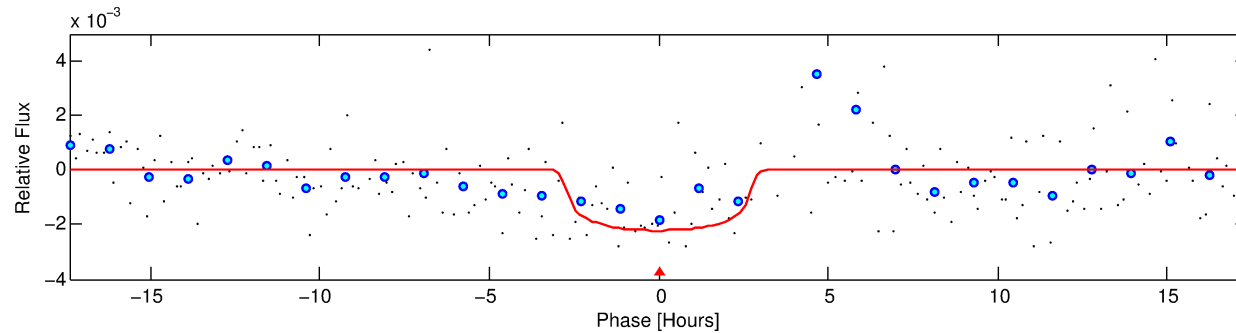
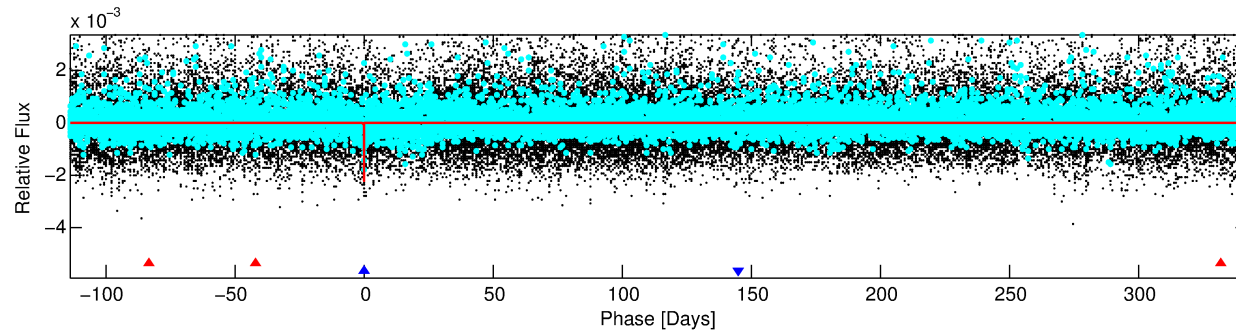
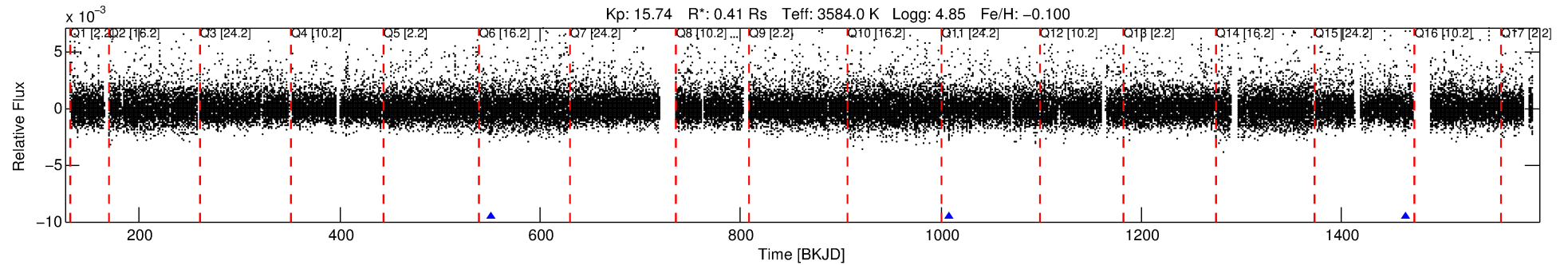
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 007422811-02

No Significant Match Found

# DV One-Page Summary

KIC: 7422811 Candidate: 2 of 2 Period: 456.252 d



## DV Fit Results:

Period = 456.25189 [0.01118] d  
Epoch = 551.4003 [0.0147] BKJD  
Rp/R\* = 0.0433 [0.0411]  
a/R\* = 589.49 [2398.52]  
b = 0.35 [10.06]  
Seff = 0.03 [0.00]  
Teq = 108 [2] K  
Rp = 1.93 [1.84] Re  
a = 0.8749 [0.0507] AU  
Ag = 116109.76 [224598.88] [0.52 $\sigma$ ]  
Teffp = 3085 [1492] K [2.00 $\sigma$ ]

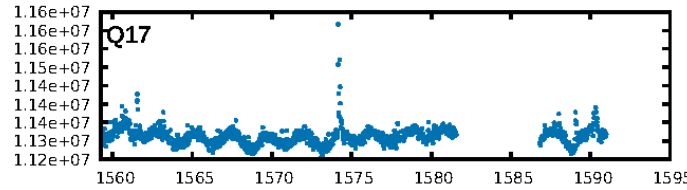
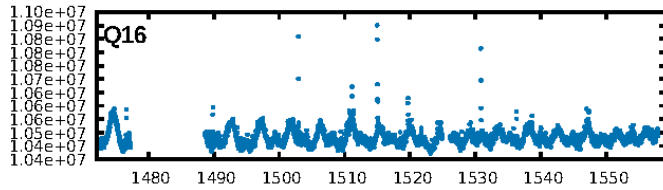
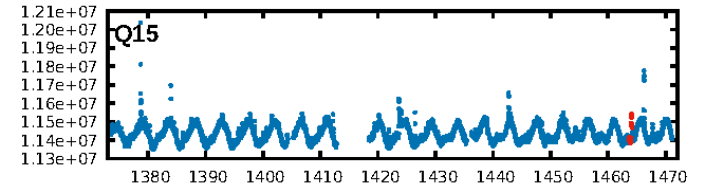
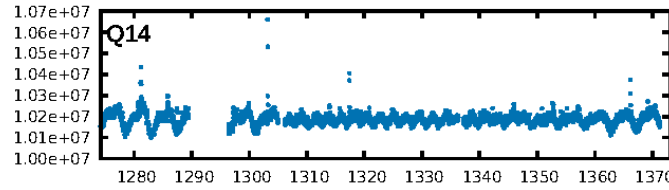
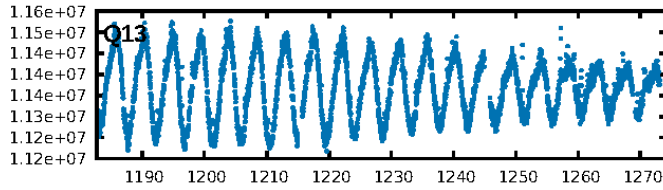
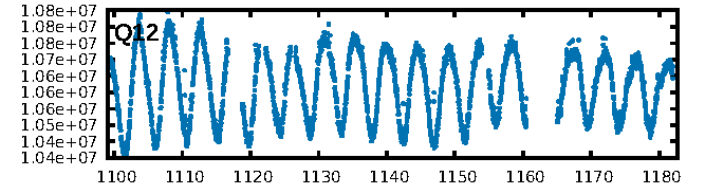
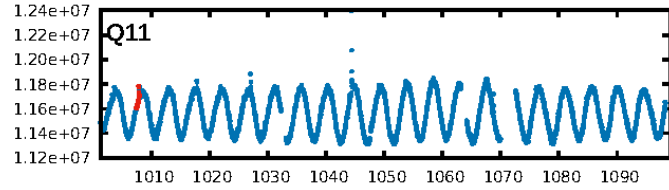
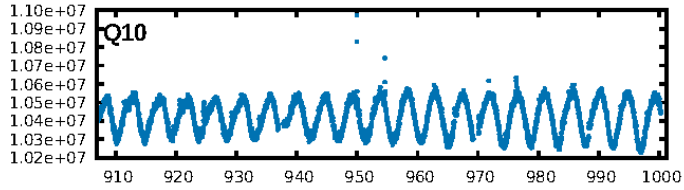
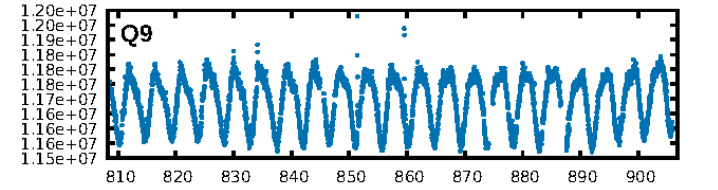
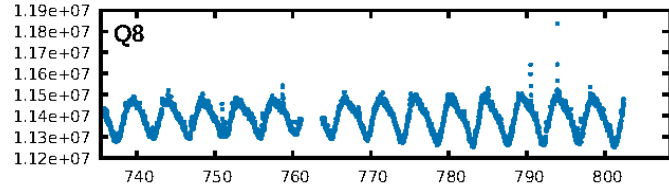
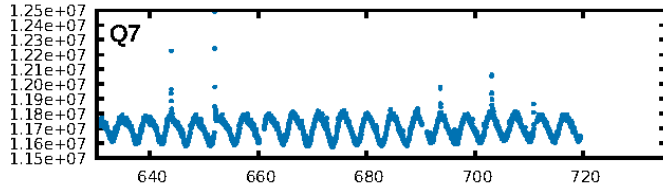
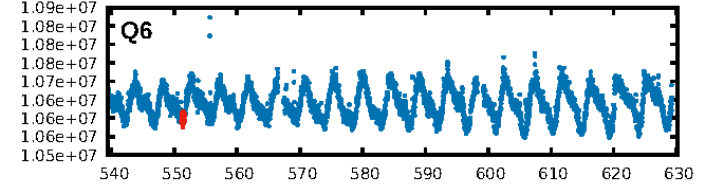
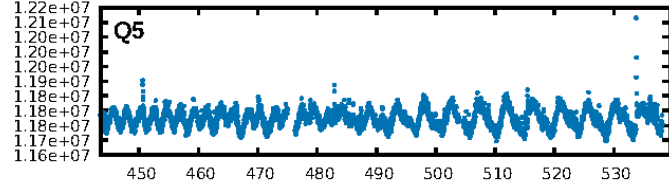
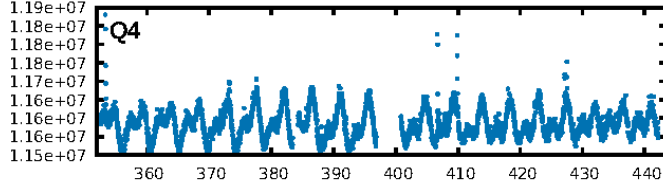
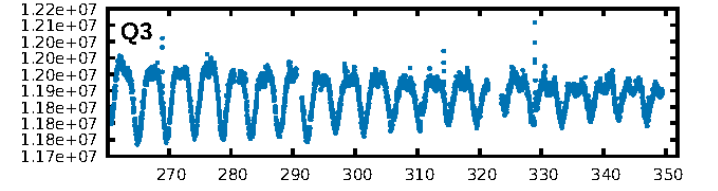
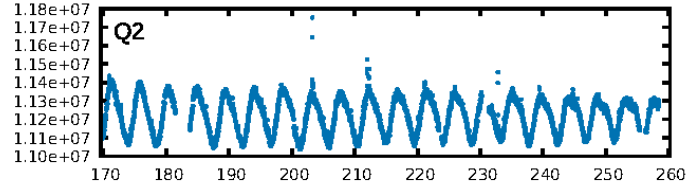
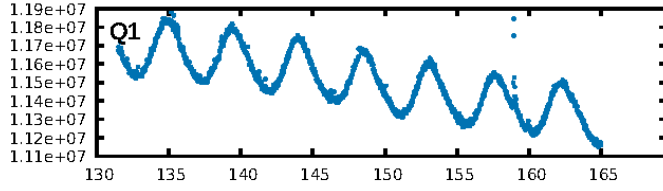
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [104.86 $\sigma$ ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 13.8%  
Bootstrap-pfa: 2.93e-24  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -5.943  
Centroid-sig: 67.9%  
Centroid-so: 1.237 arcsec [1.29 $\sigma$ ]  
OotOffset-rm: 0.309 arcsec [0.68 $\sigma$ ]  
OotOffset-st: 1/2/0/0 [3]  
KicOffset-rm: 0.957 arcsec [2.21 $\sigma$ ]  
KicOffset-st: 1/2/0/0 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 1.00 [3/3]

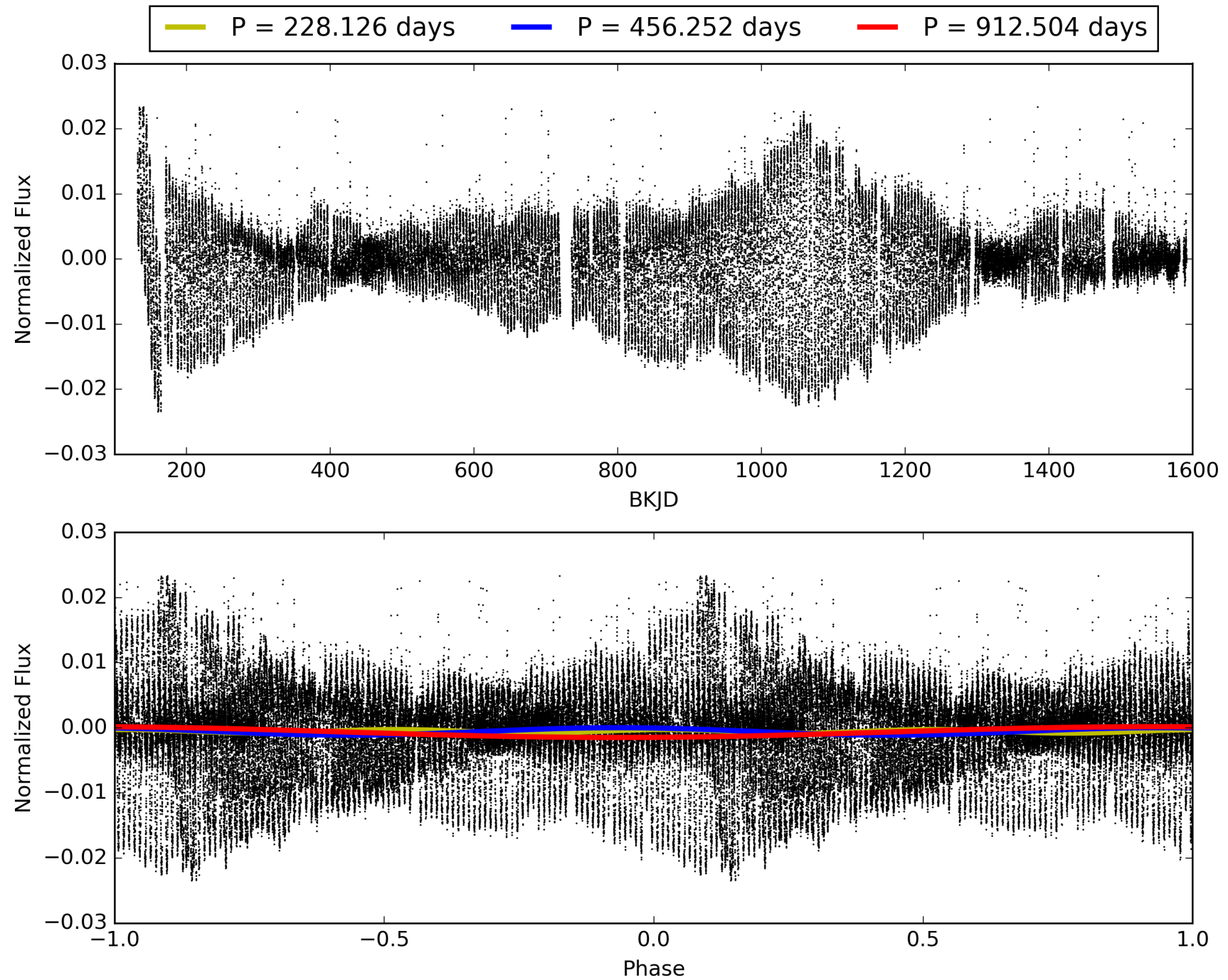
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 07:34:23 Z

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

# TCE 007422811-02, PDC Light Curves



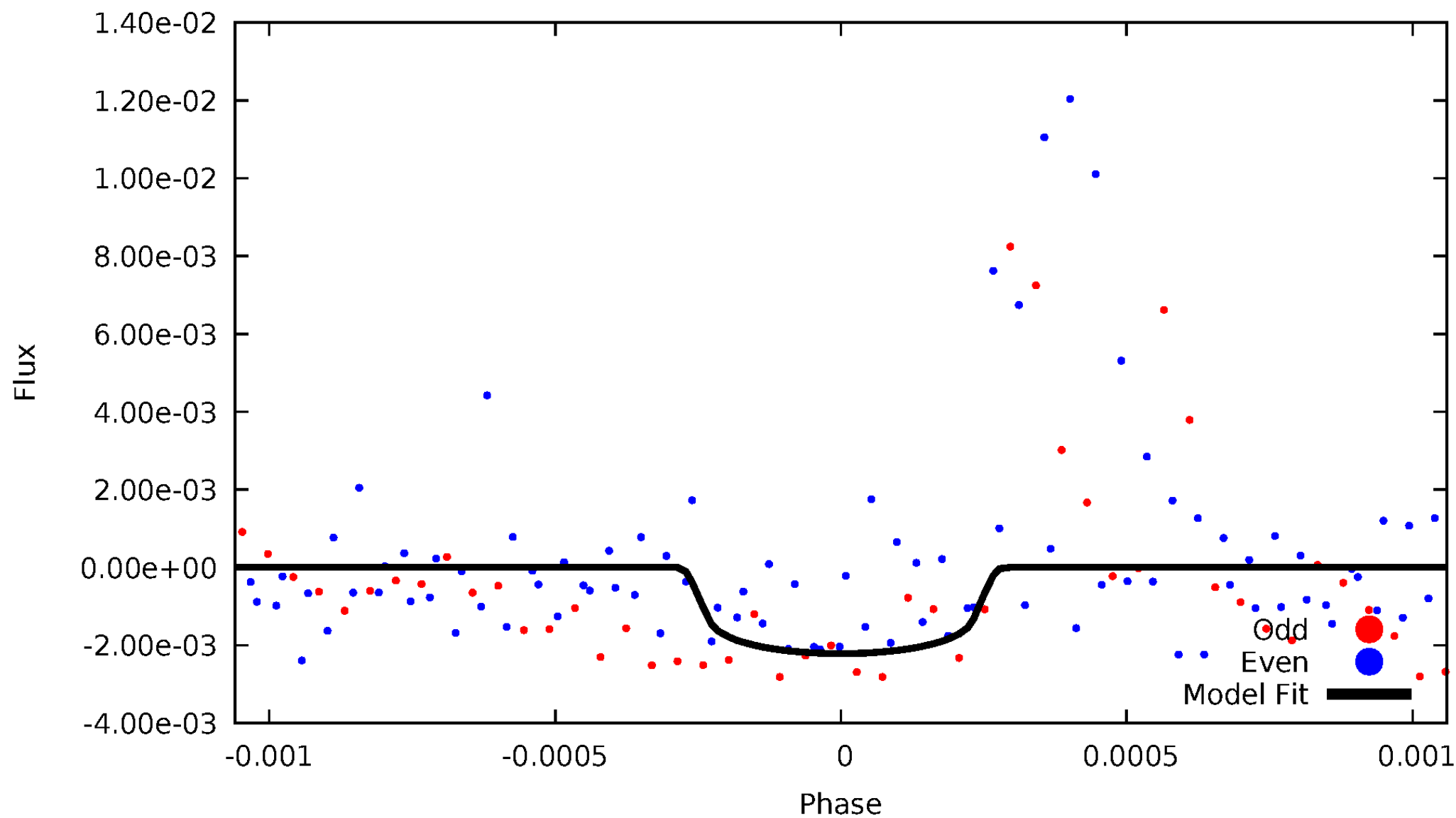
TCE 007422811-02





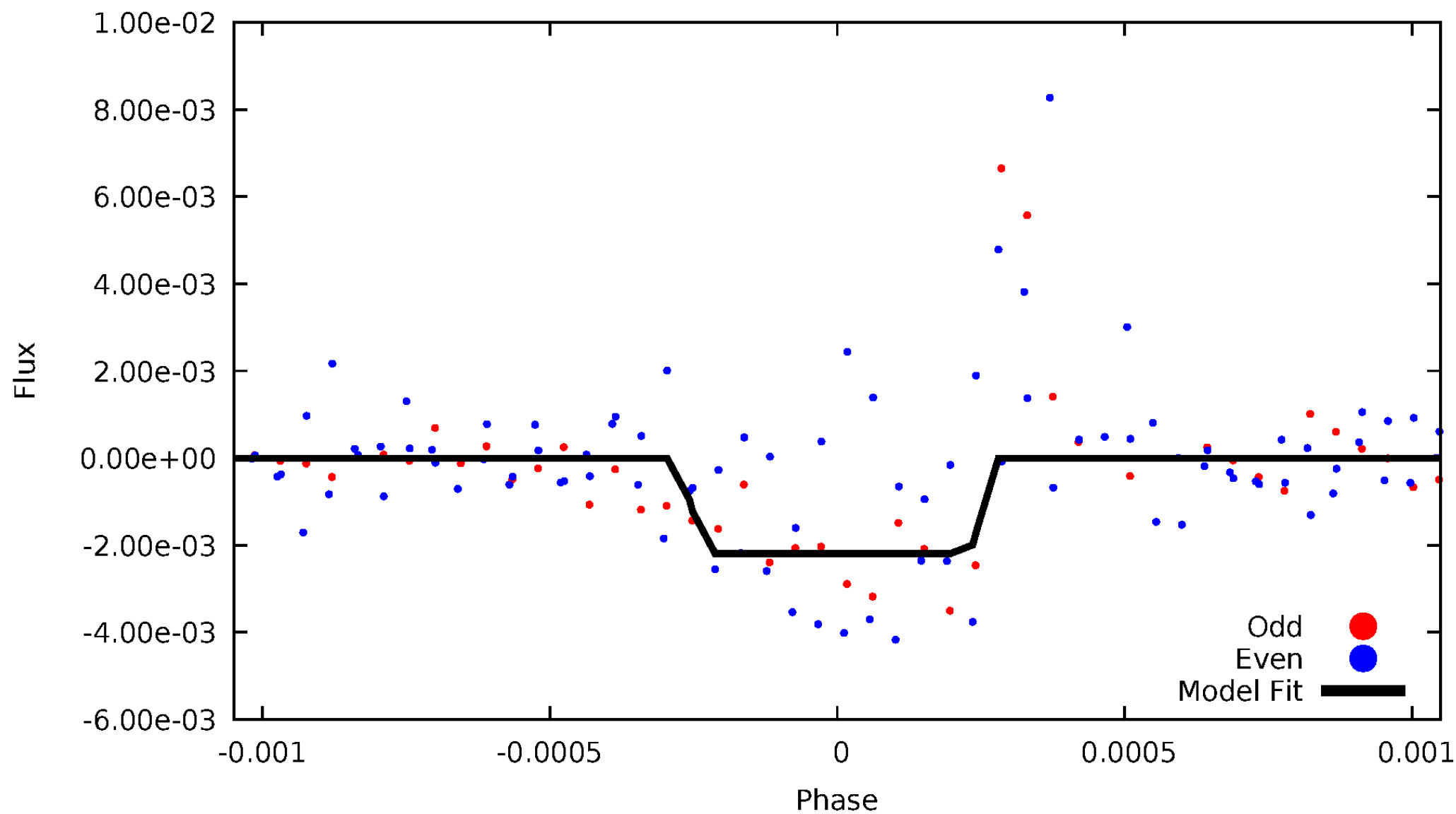
# DV Odd/Even

TCE 007422811-02



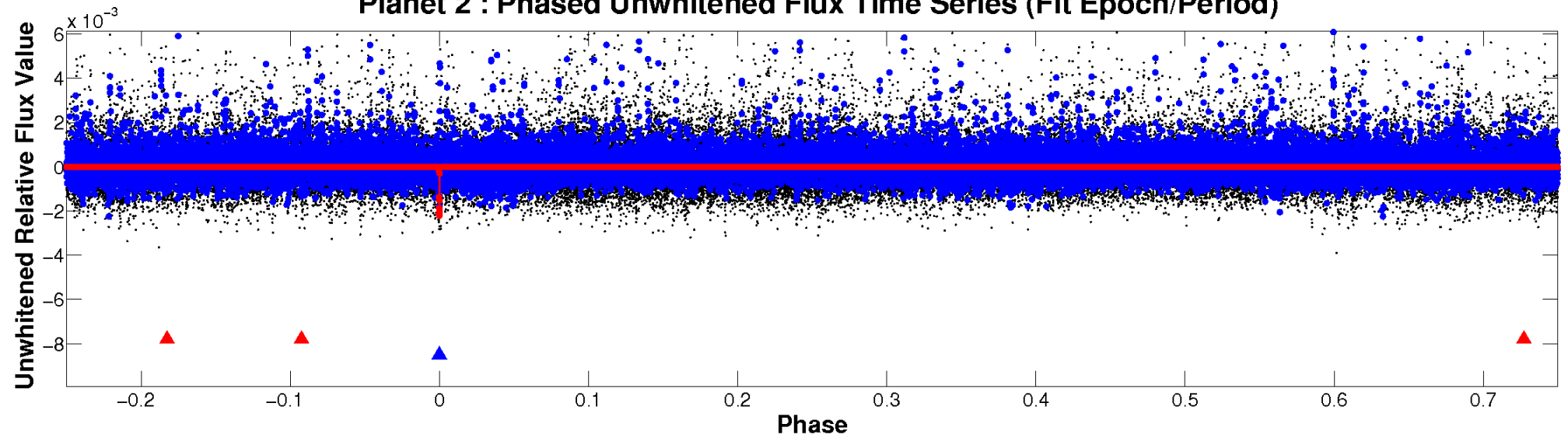
# ALT Odd/Even

TCE 007422811-02

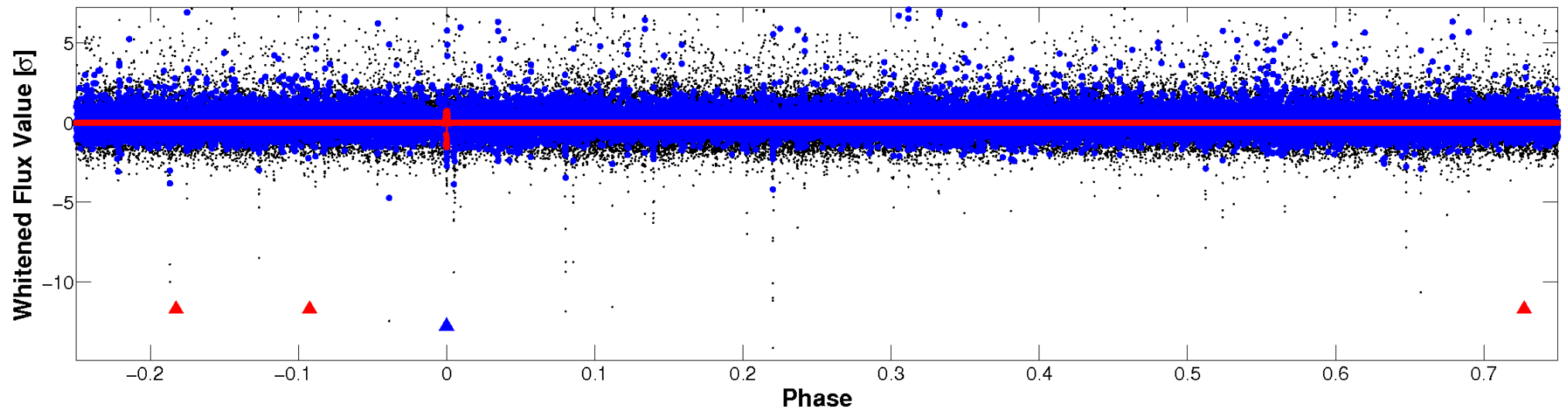


# Non-Whitened Vs. Whitened Light Curve

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

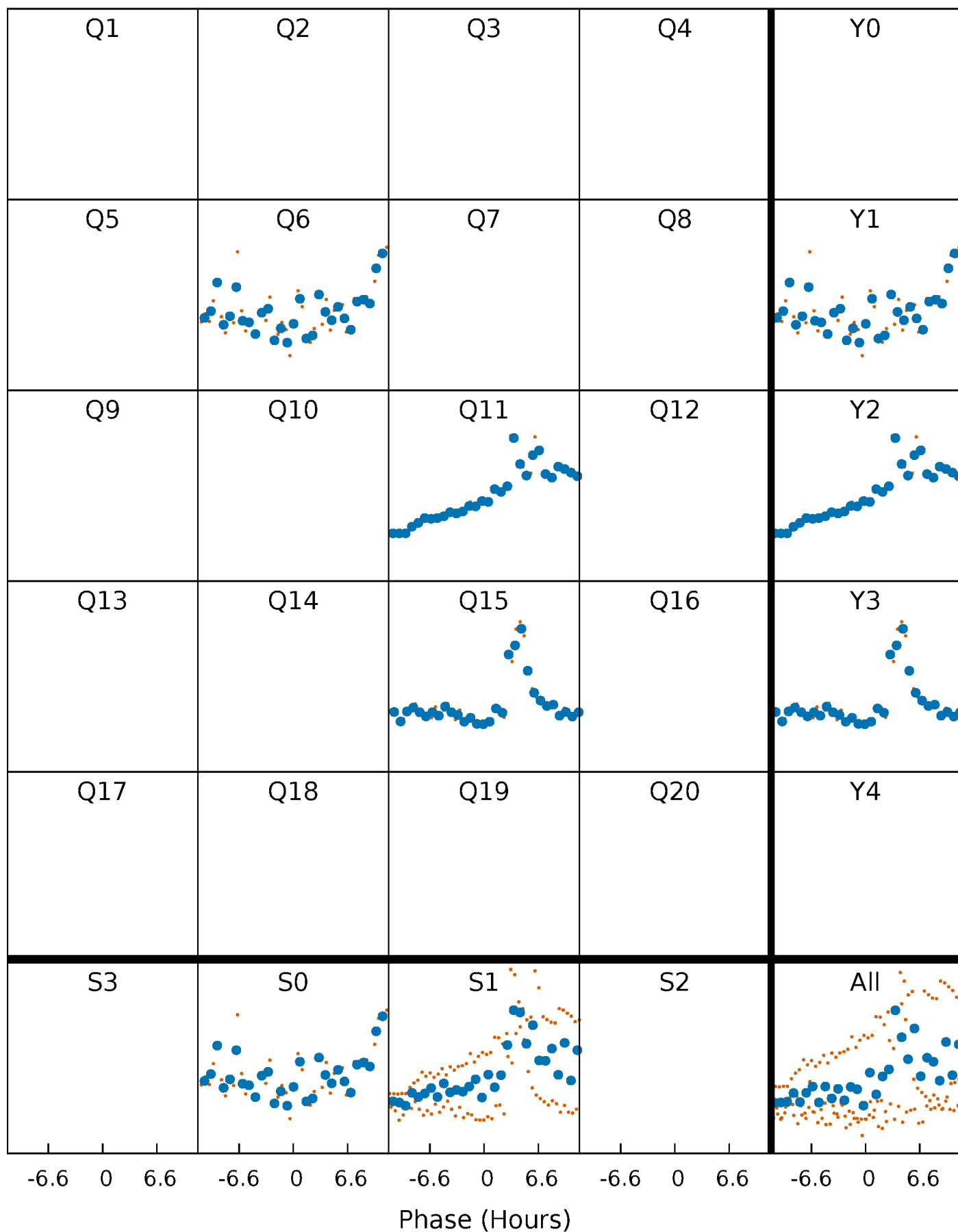


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



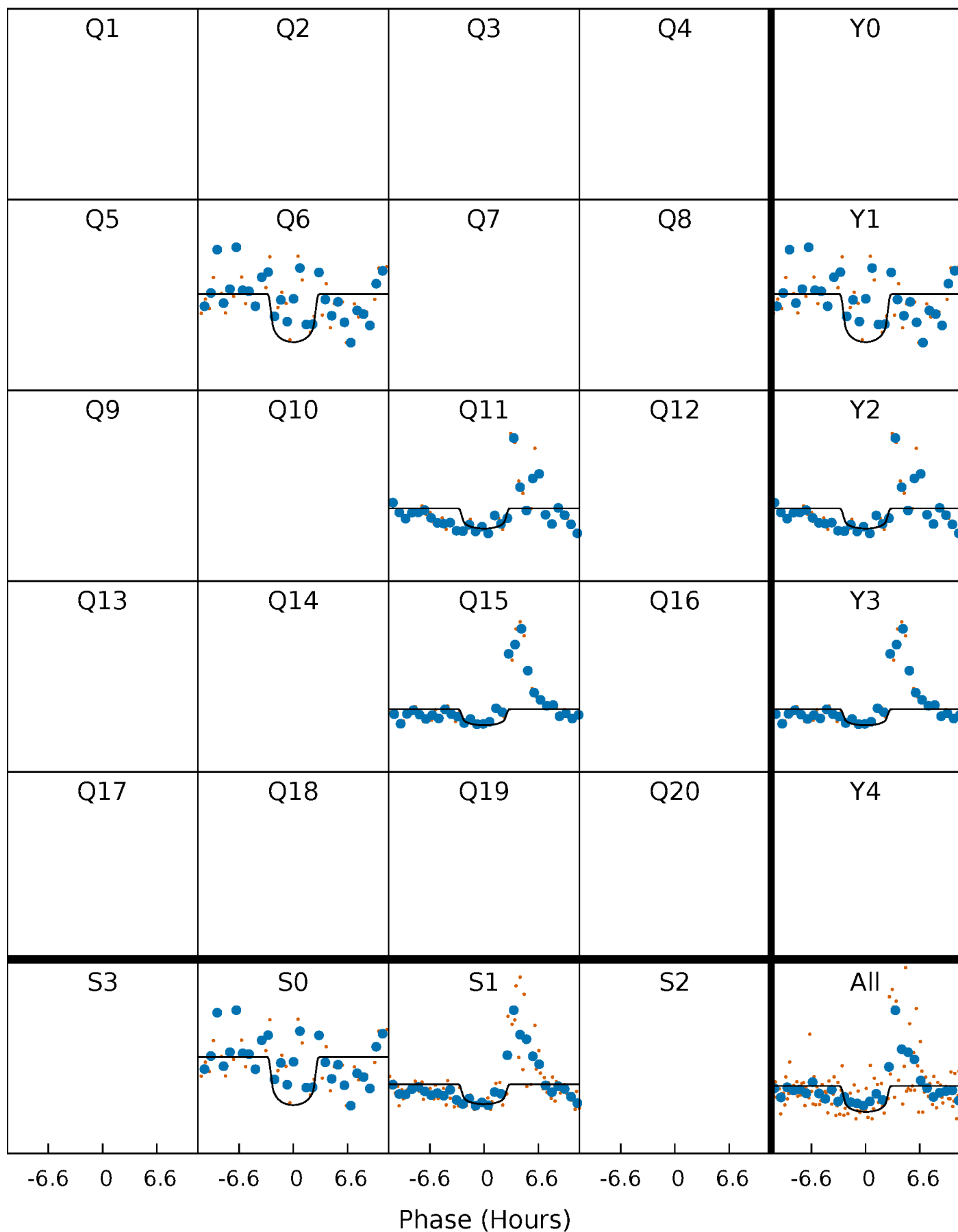
# PDC Quarter-Phased Transit Curves

TCE 007422811-02 P=456.251889 Days  $T_0=551.400281$  (BKJD)



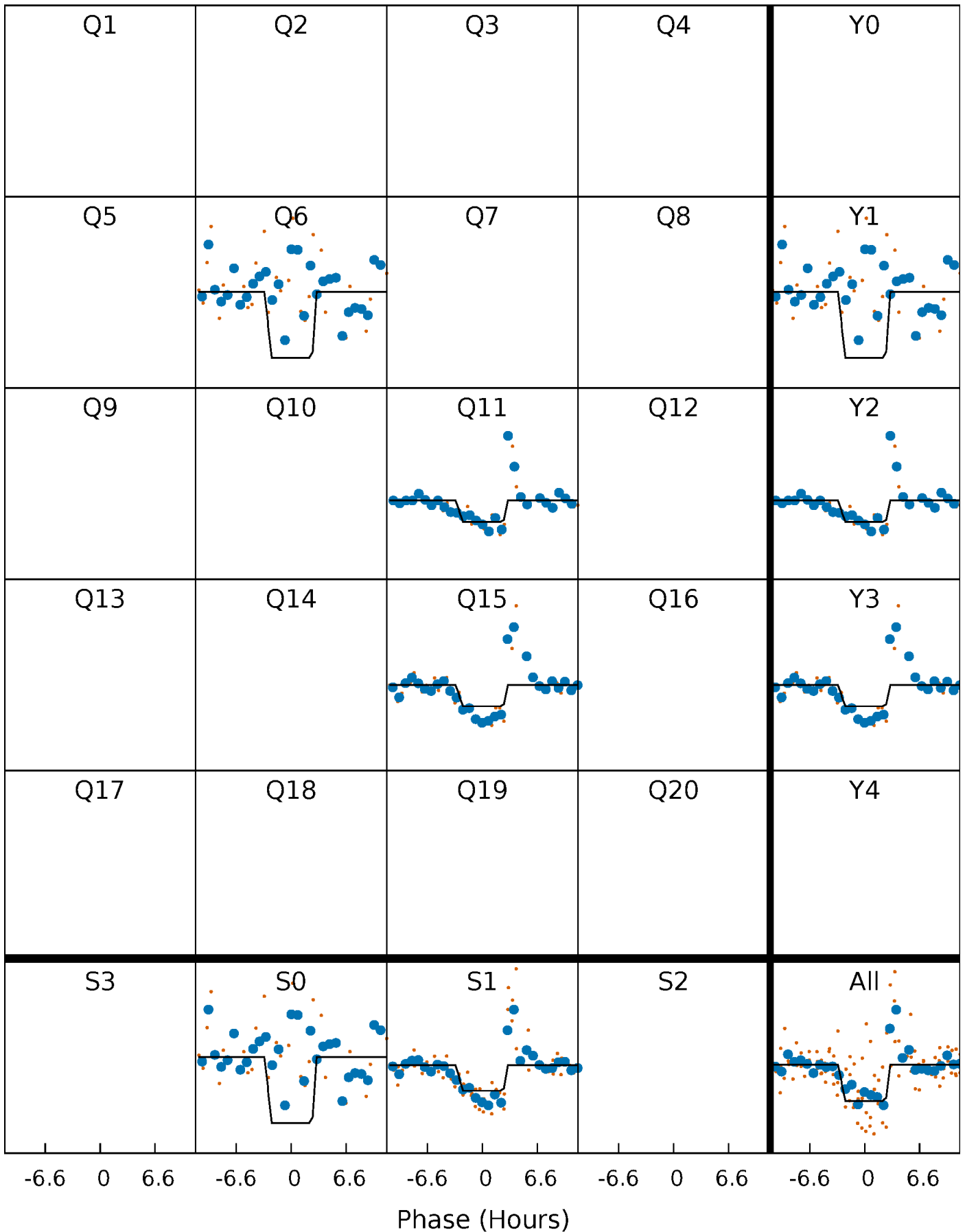
# DV Quarter-Phased Transit Curves

TCE 007422811-02 P=456.251889 Days  $T_0=551.400281$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

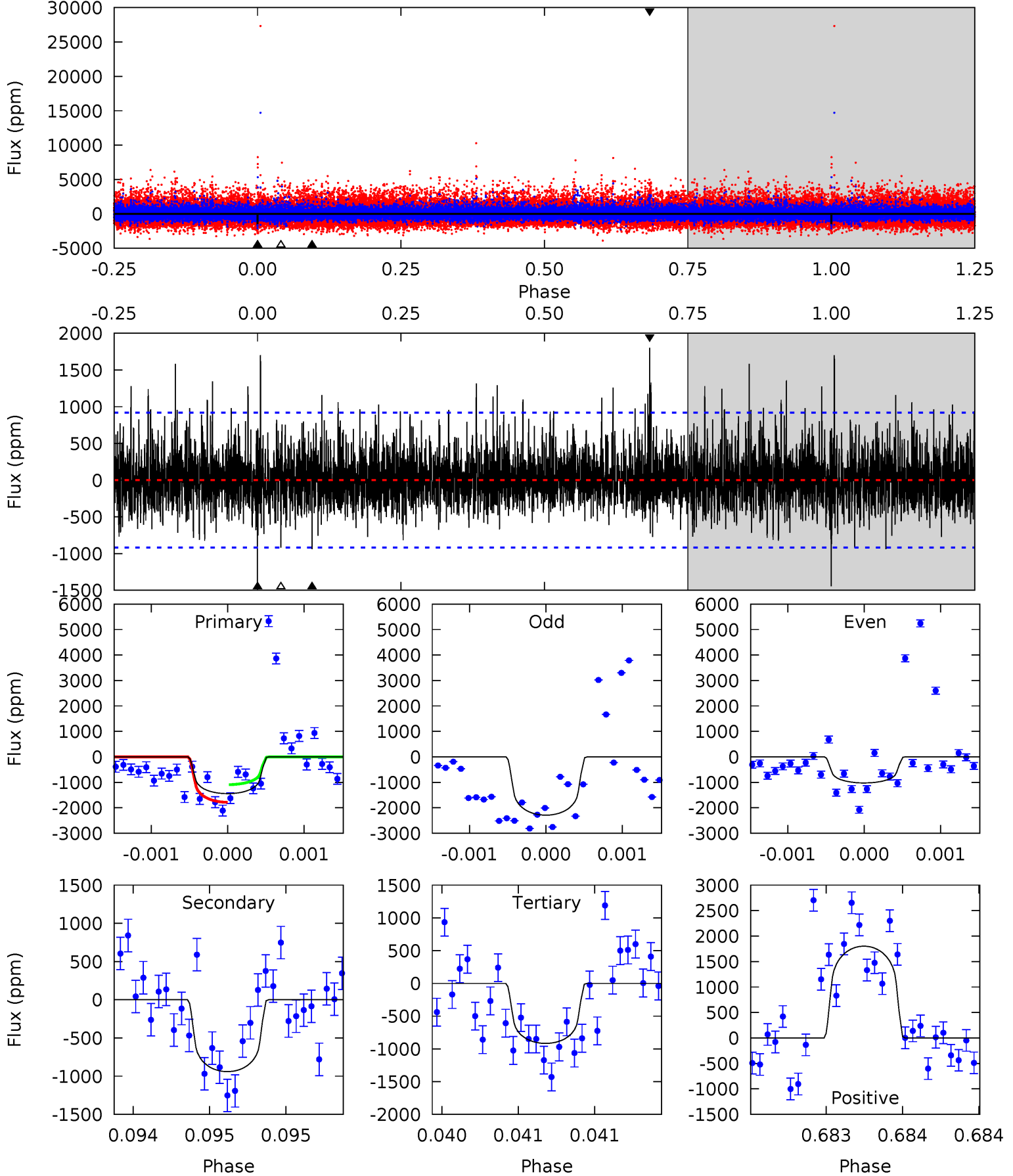
TCE 007422811-02 P=456.240528 Days  $T_0=551.416602$  (BKJD)



# DV Model-Shift Uniqueness Test

007422811-02, P = 456.251889 Days, E = 95.148392 Days

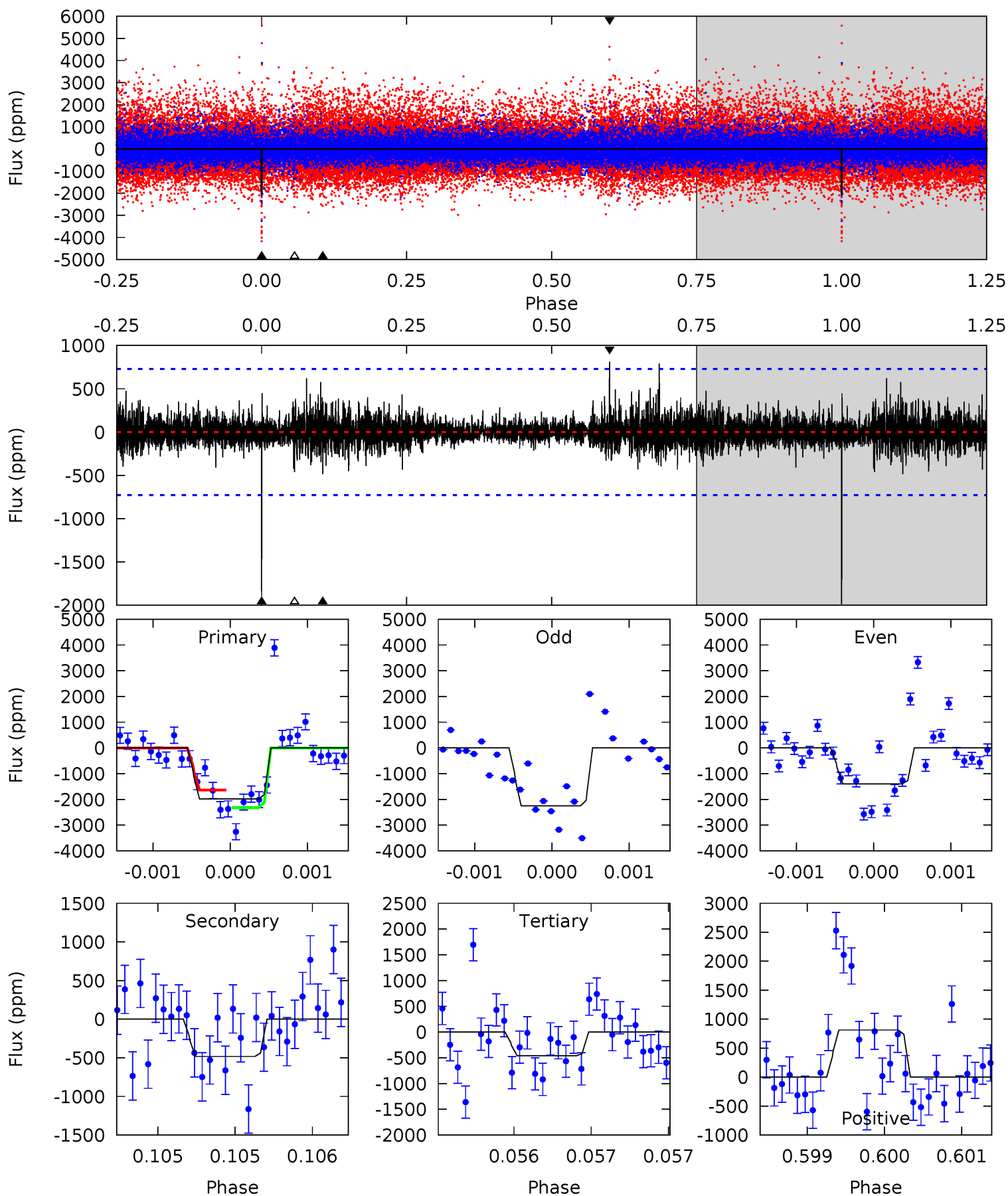
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.74	5.69	5.55	10.9	5.56	3.46	1.75	3.19	-2.16	0.14	-5.21	3.18	0.98	0.56	2.11



# Alt Model-Shift Uniqueness Test

007422811-02, P = 456.240528 Days, E = 95.176074 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
15.2	3.69	3.52	6.21	5.56	3.46	0.83	11.7	8.96	0.18	-2.52	3.20	0.77	0.29	2.57





### Stellar Parameters For KIC 007422811

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3584^{+43}_{-48}$	$4.847^{+0.033}_{-0.030}$	$-0.100^{+0.100}_{-0.100}$	$0.409^{+0.029}_{-0.032}$	$0.430^{+0.027}_{-0.039}$	$8.855^{+1.584}_{-1.115}$
	+1%/-1%	+1%/-1%	+100%/-100%	+7%/-8%	+6%/-9%	+18%/-13%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 007422811-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-940 \pm 165$	$2.28^{+1.66}_{-1.34}$	$151^{+3}_{-3}$	$3063^{+990}_{-439}$	$75898^{+358517}_{-51437}$
Alt.	$-483 \pm 131$	$2.41^{+1.62}_{-1.34}$	$151^{+3}_{-3}$	$2744^{+765}_{-358}$	$33138^{+145448}_{-22028}$

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

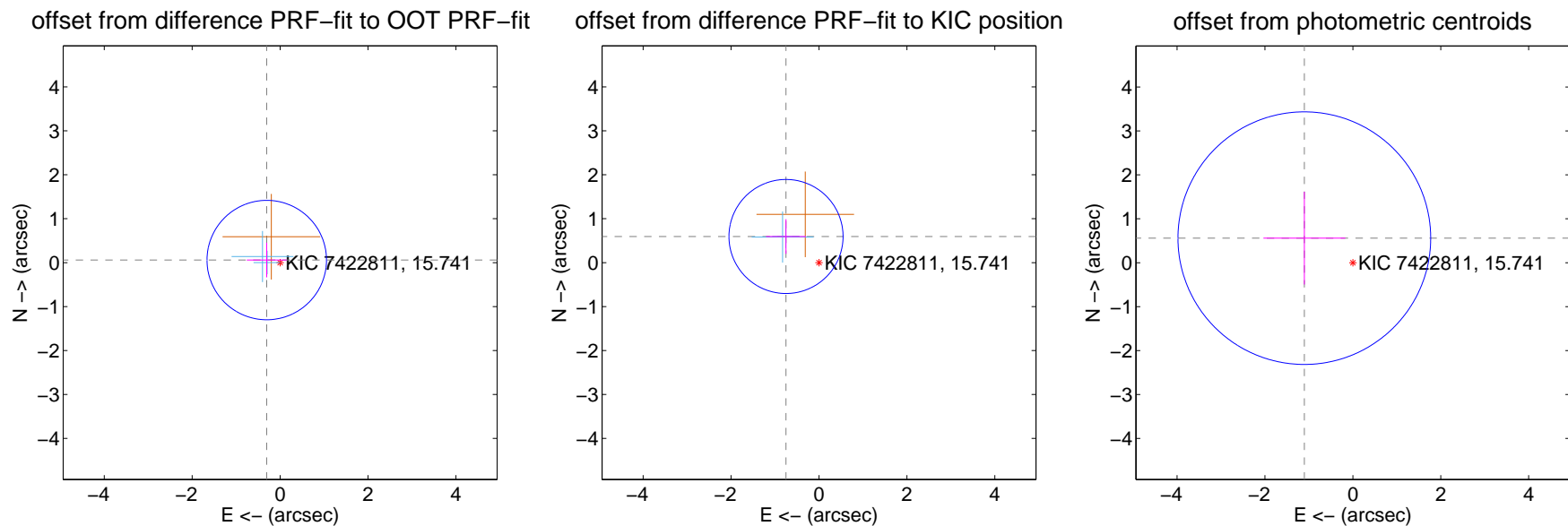
## DV Centroid Data

Supplemental centroid analysis for 007422811-02. Kepler magnitude: 15.74. Transit SNR 8.13

There are 2 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.75 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.309 \pm 0.453$	0.68	$0.304 \pm 0.455$	$0.059 \pm 0.394$
PRF-fit source offset from KIC position	$0.957 \pm 0.432$	2.21	$0.750 \pm 0.455$	$0.595 \pm 0.394$
photometric centroid source offset	$1.24 \pm 0.96$	1.29	$1.10 \pm 0.93$	$0.56 \pm 1.06$

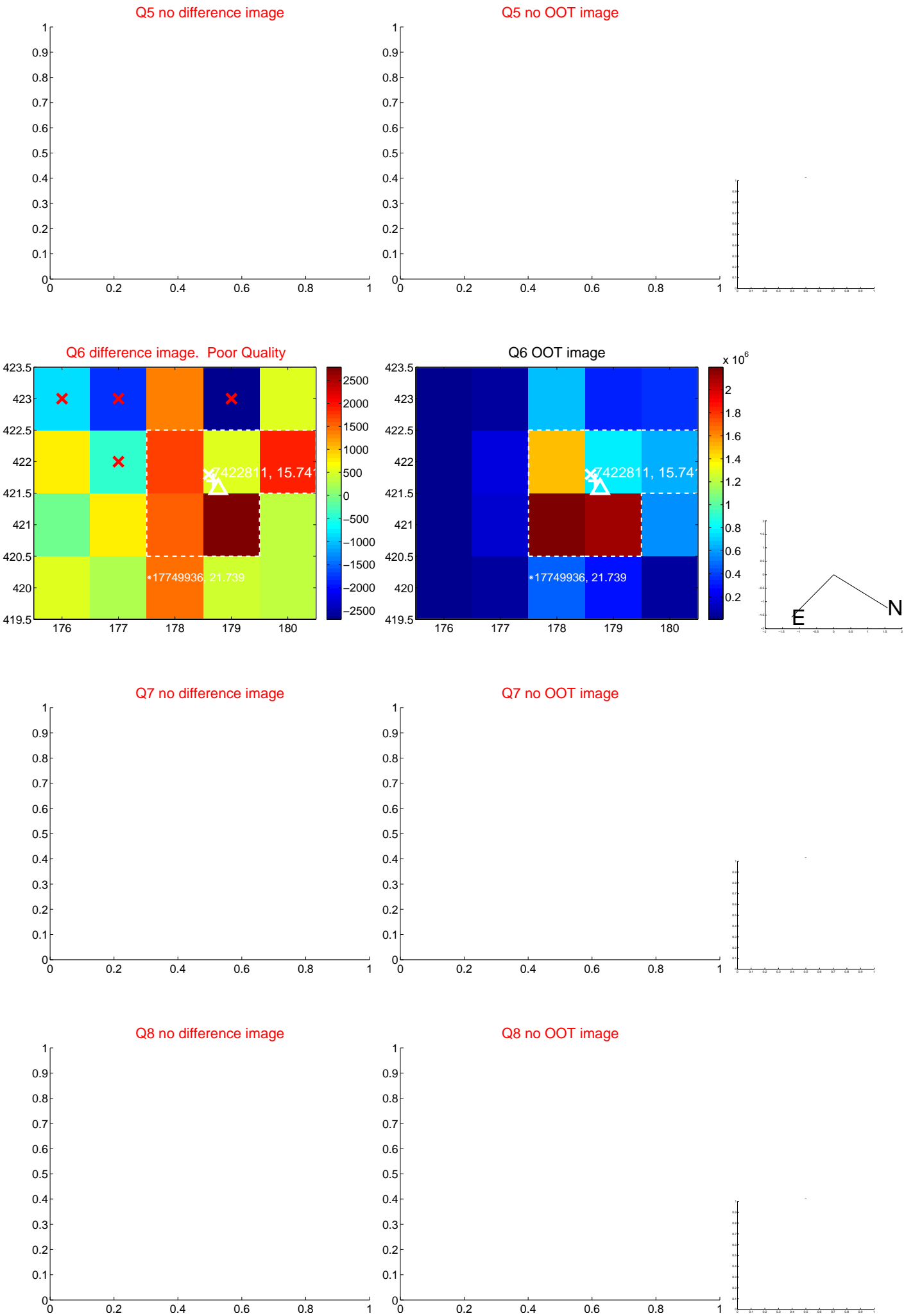


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

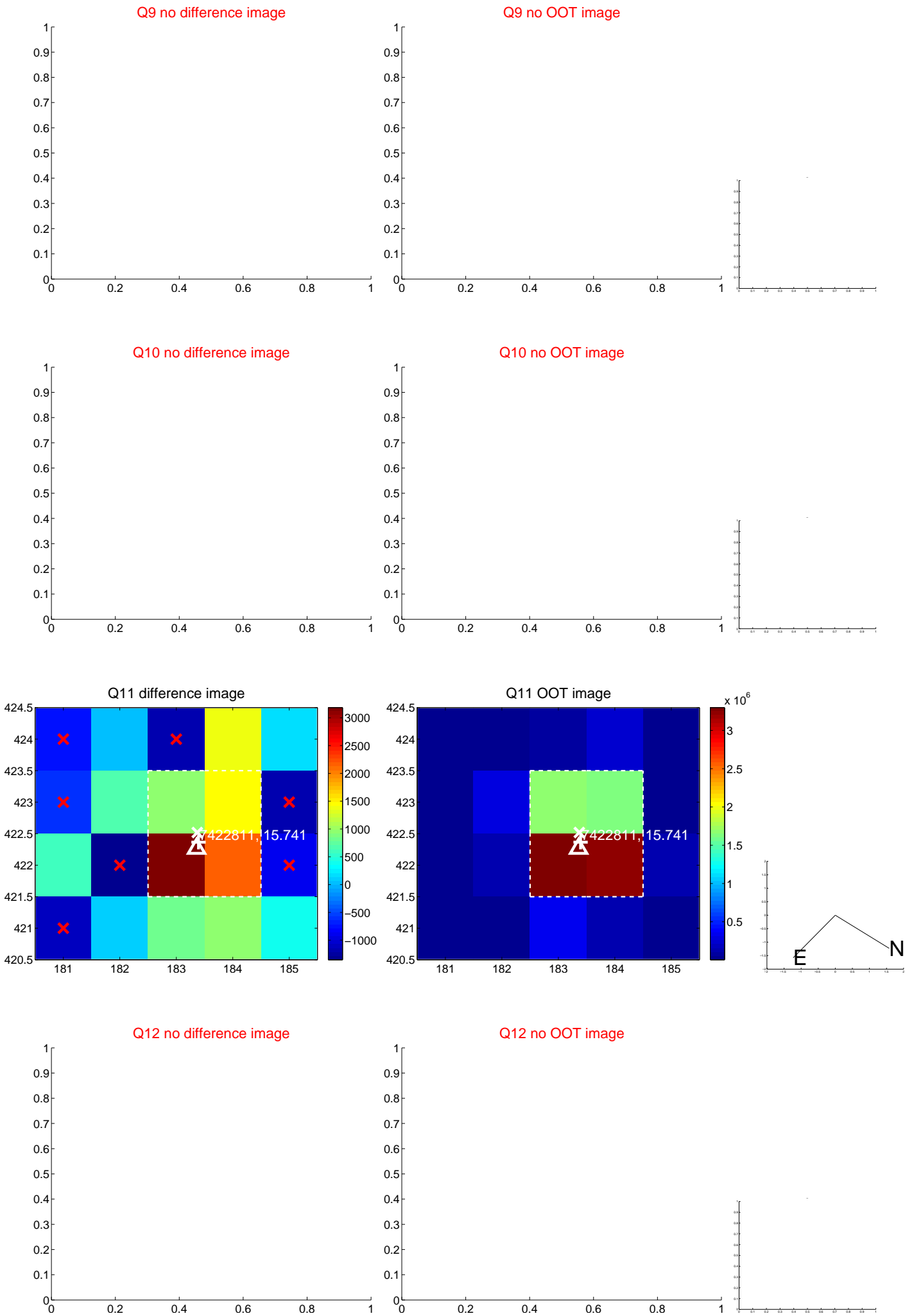
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



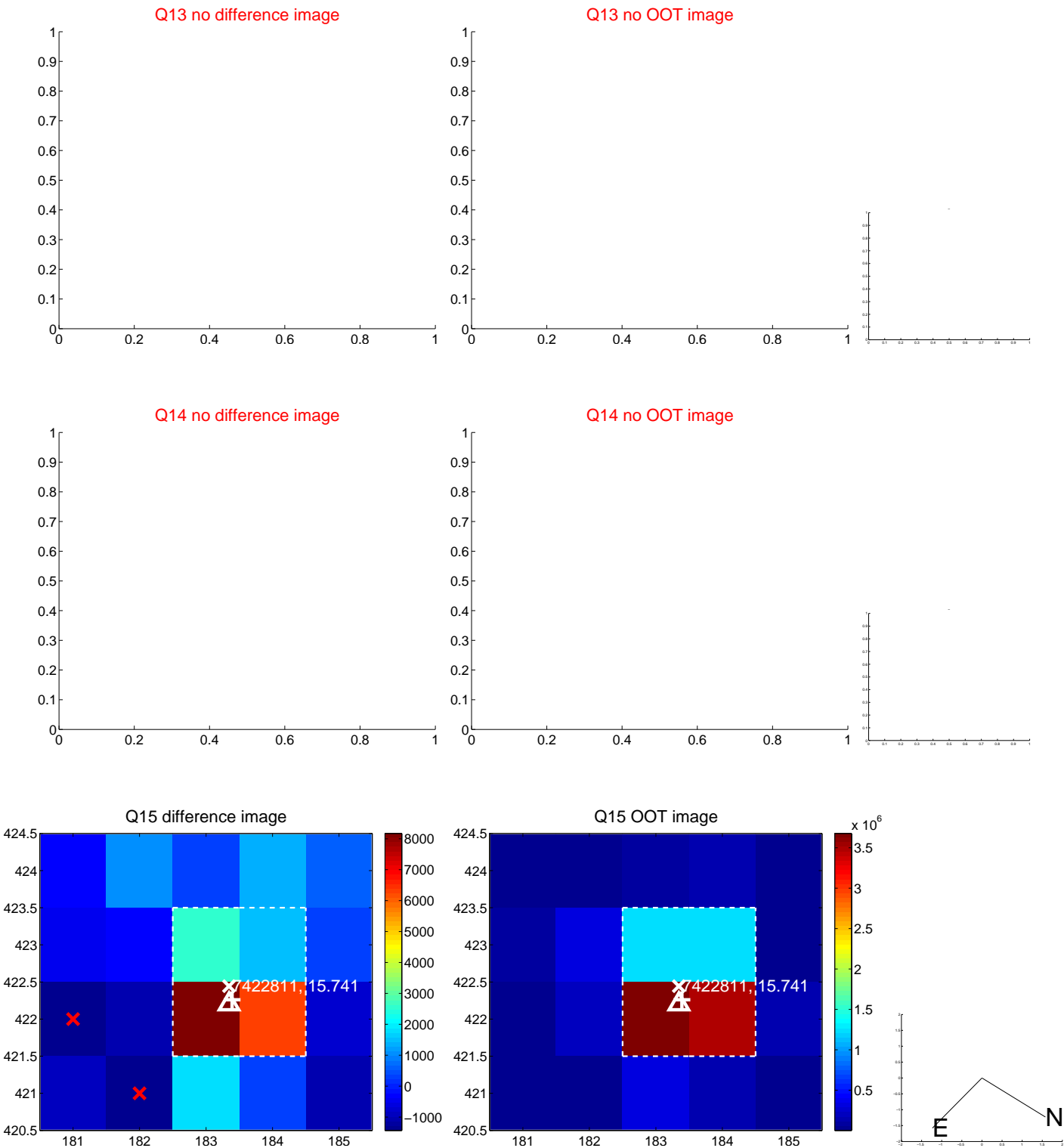
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



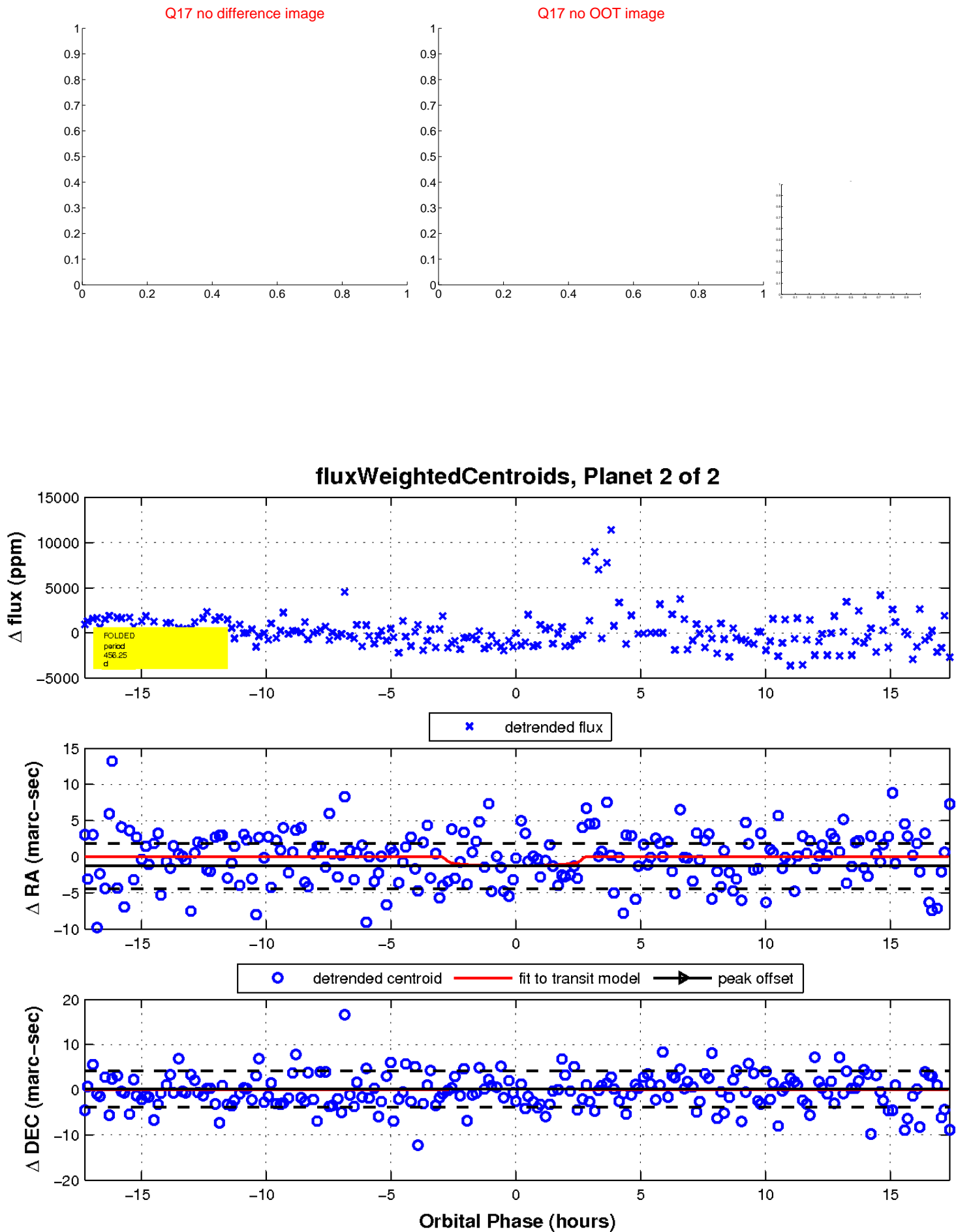
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

