

# KIC 005615202

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005615202-01	OBS	No	268.709185	373.356323	241.2	6.549	11.2	7.6	2.46	6579	4.80	12.25
005615202-02	OBS	No	532.153701	220.093528	339.8	3.869	13.5	8.9	2.46	6579	5.43	4.93

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005615202-01	OBS	FP	0.00	1	0	0	0	LPP_ALT—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_SATURATED
005615202-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—ALL_TRANS_CHASES—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED

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

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

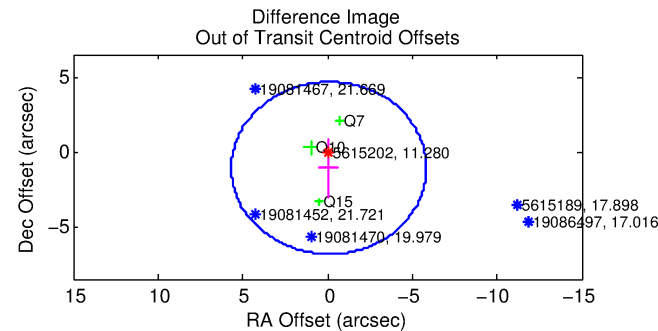
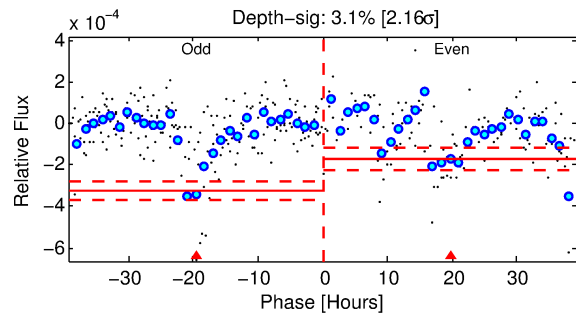
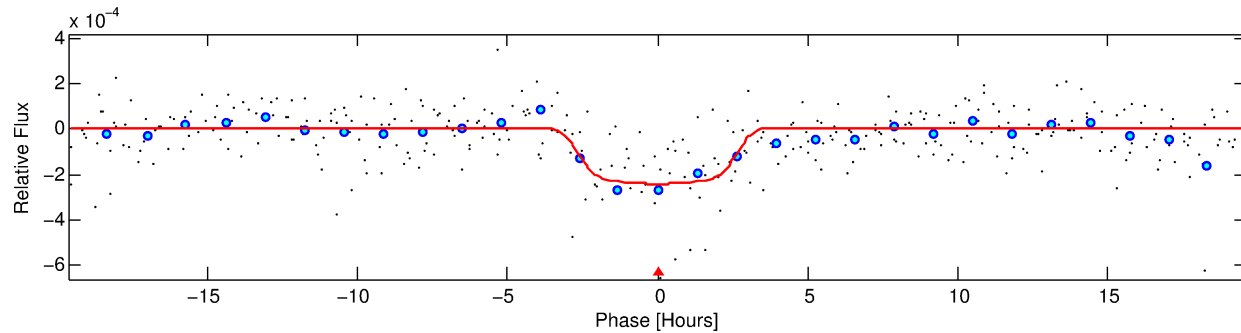
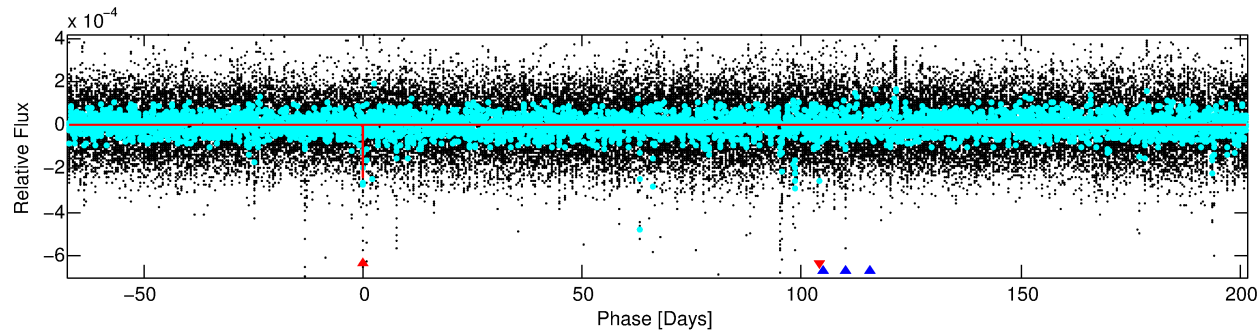
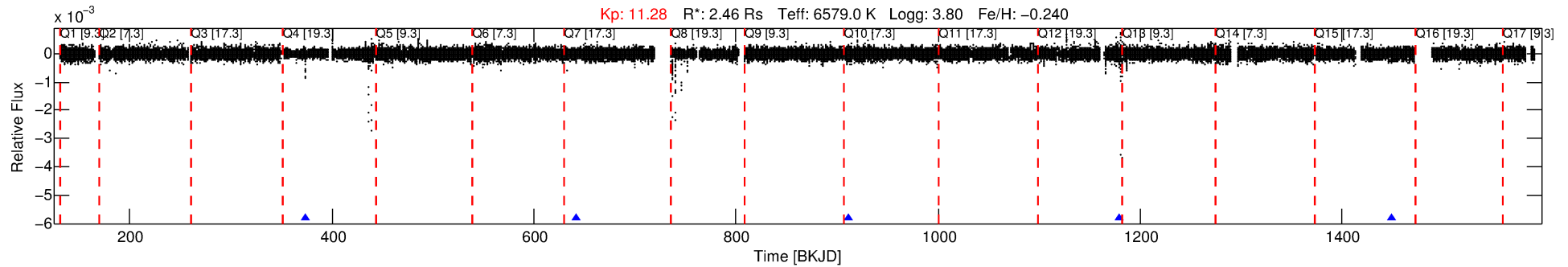
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 005615202-01

No Significant Match Found

# DV One-Page Summary

KIC: 5615202 Candidate: 1 of 2 Period: 268.709 d



## DV Fit Results:

Period = 268.70919 [0.00390] d  
Epoch = 373.3563 [0.0093] BKJD  
Rp/R\* = 0.0179 [0.0015]  
a/R\* = 105.87 [24.80]  
b = 0.96 [0.02]  
Seff = 12.25 [6.51]  
Teq = 477 [63] K  
Rp = 4.80 [1.70] Re  
a = 0.9120 [0.2983] AU  
Ag = N/A  
Teffp = N/A

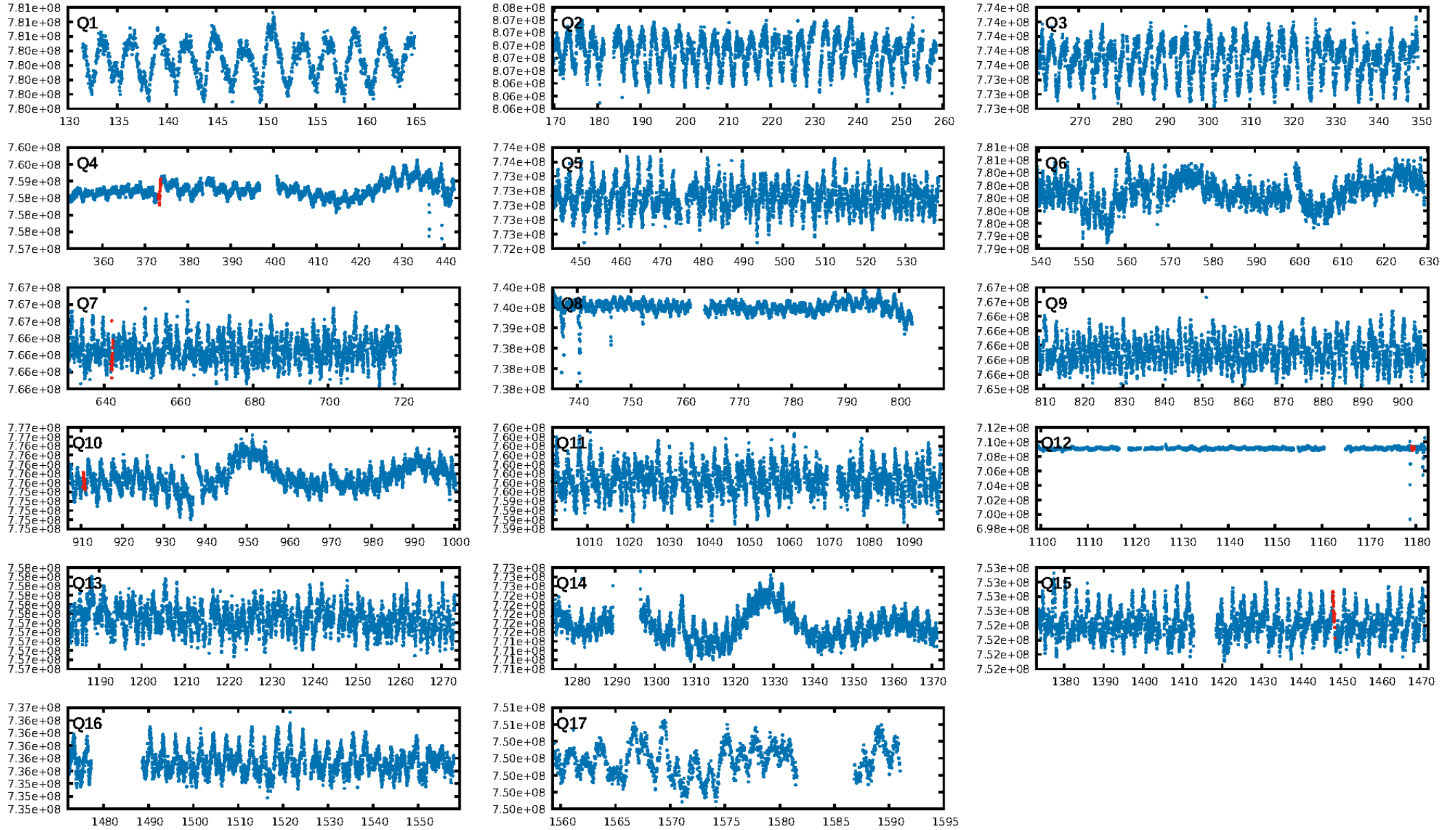
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [831.23 sigma]  
ModelChiSquare2-sig: 2.2%  
ModelChiSquareGof-sig: 94.1%  
Bootstrap-pfa: 3.56e-09  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: -6.65  
Centroid-sig: 65.1%  
Centroid-so: 0.302 arcsec [0.57 sigma]  
OotOffset-rm: 1.099 arcsec [0.57 sigma]  
KicOffset-rm: 1.025 arcsec [0.54 sigma]  
OotOffset-st: 1/2/0/0 [3]  
KicOffset-st: 1/2/0/0 [3]  
DiffImageQuality-fgm: 0.33 [1/3]  
DiffImageOverlap-fno: 1.00 [4/4]

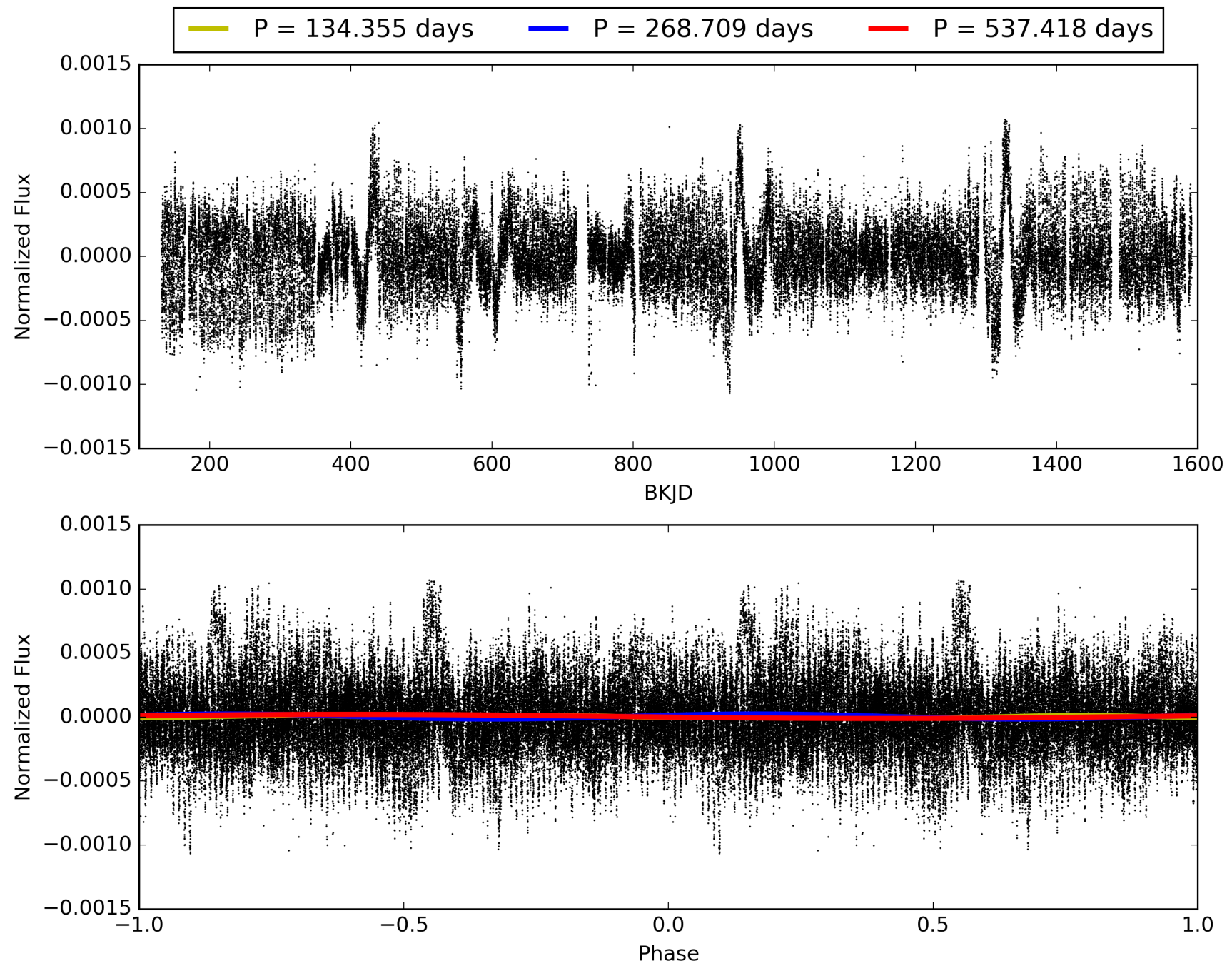
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 09:24:28 Z

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

# TCE 005615202-01, PDC Light Curves

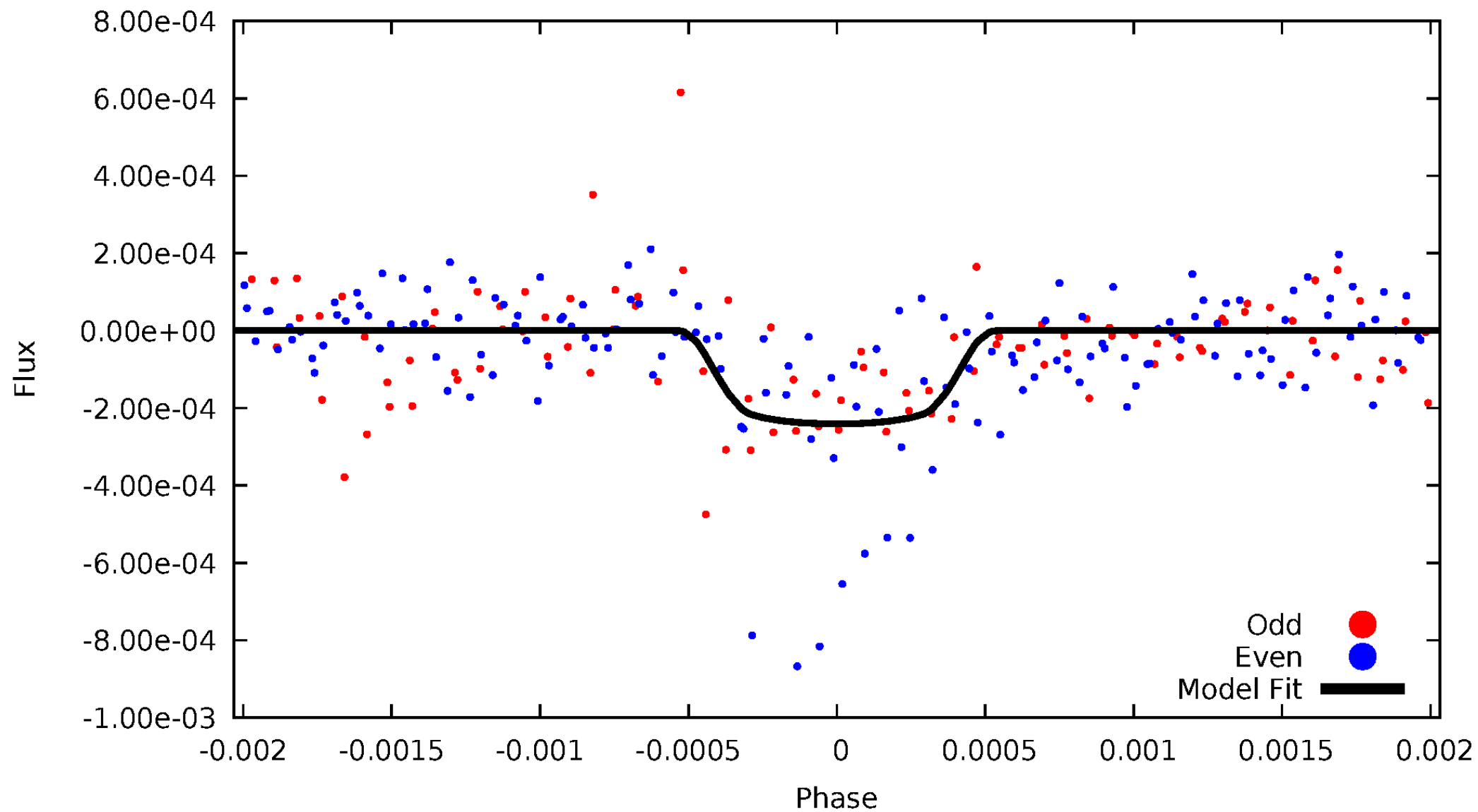


# TCE 005615202-01



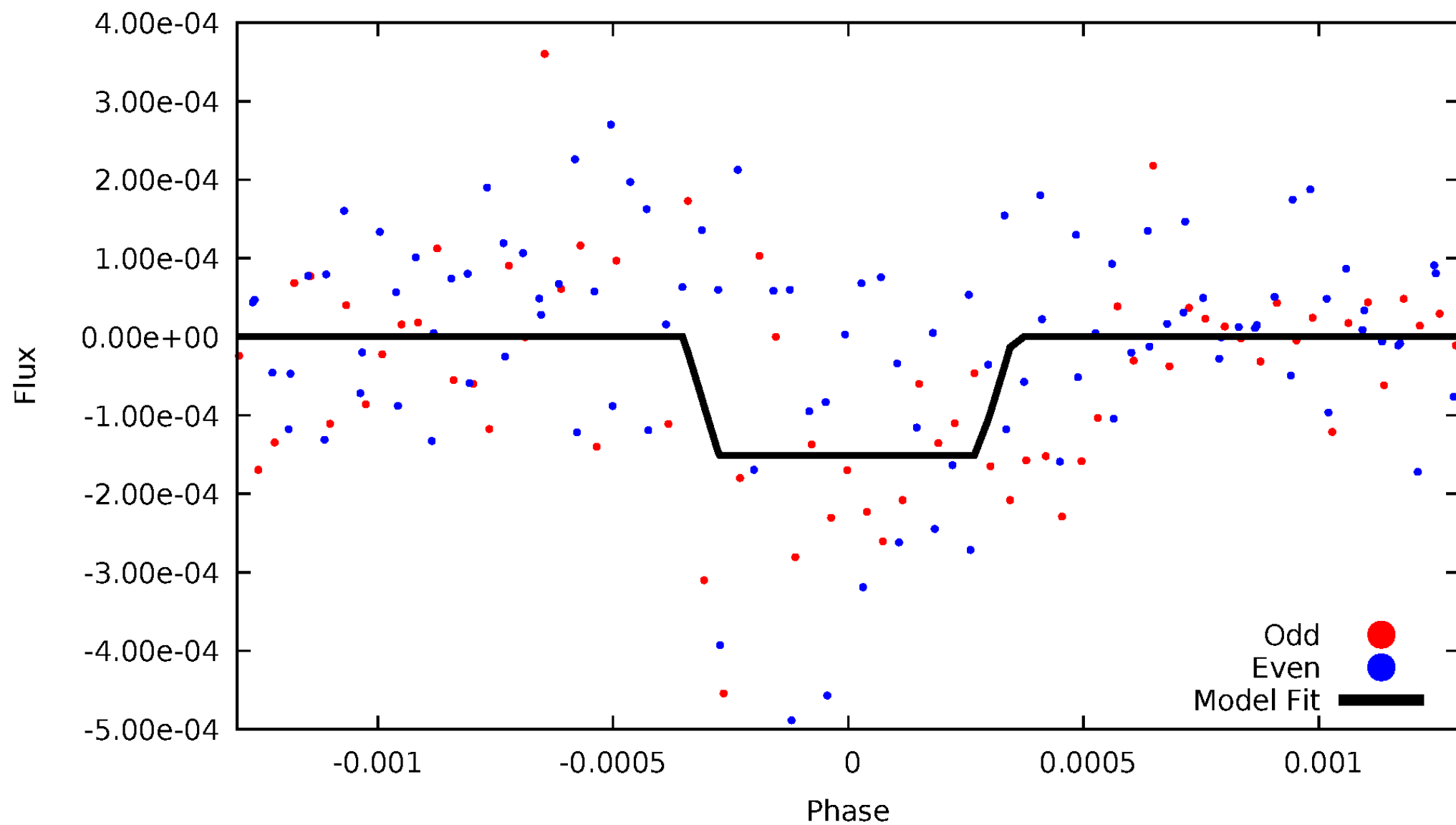
# DV Odd/Even

TCE 005615202-01



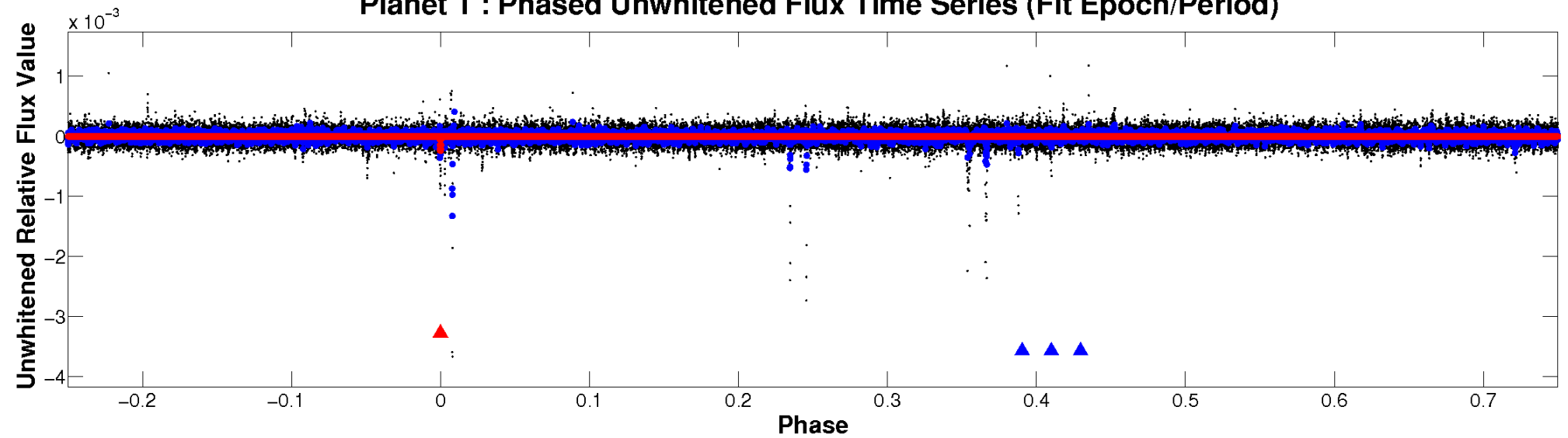
# ALT Odd/Even

TCE 005615202-01

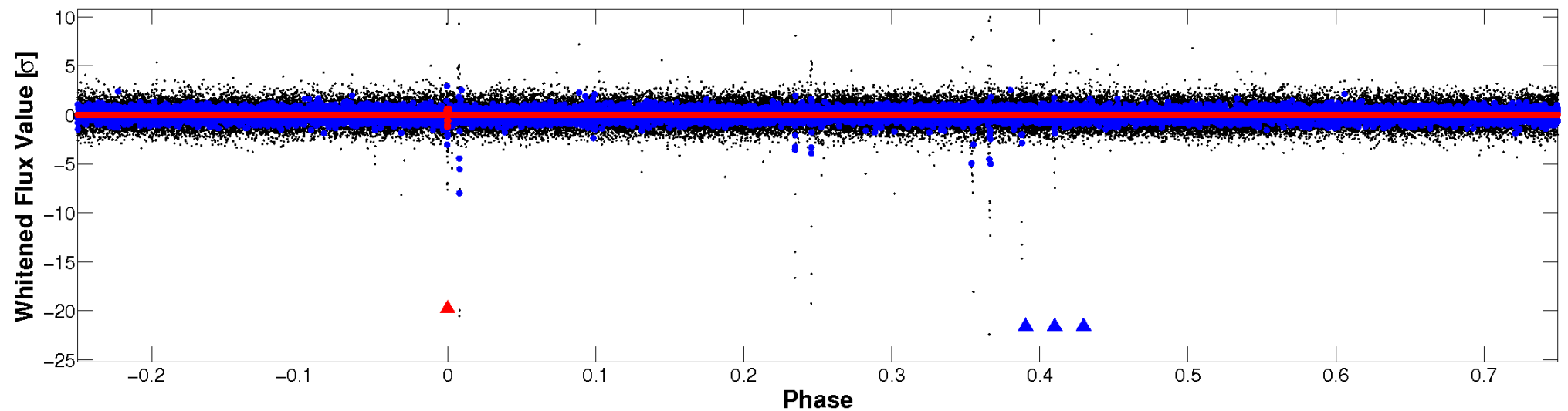


# Non-Whitened Vs. Whitened Light Curve

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

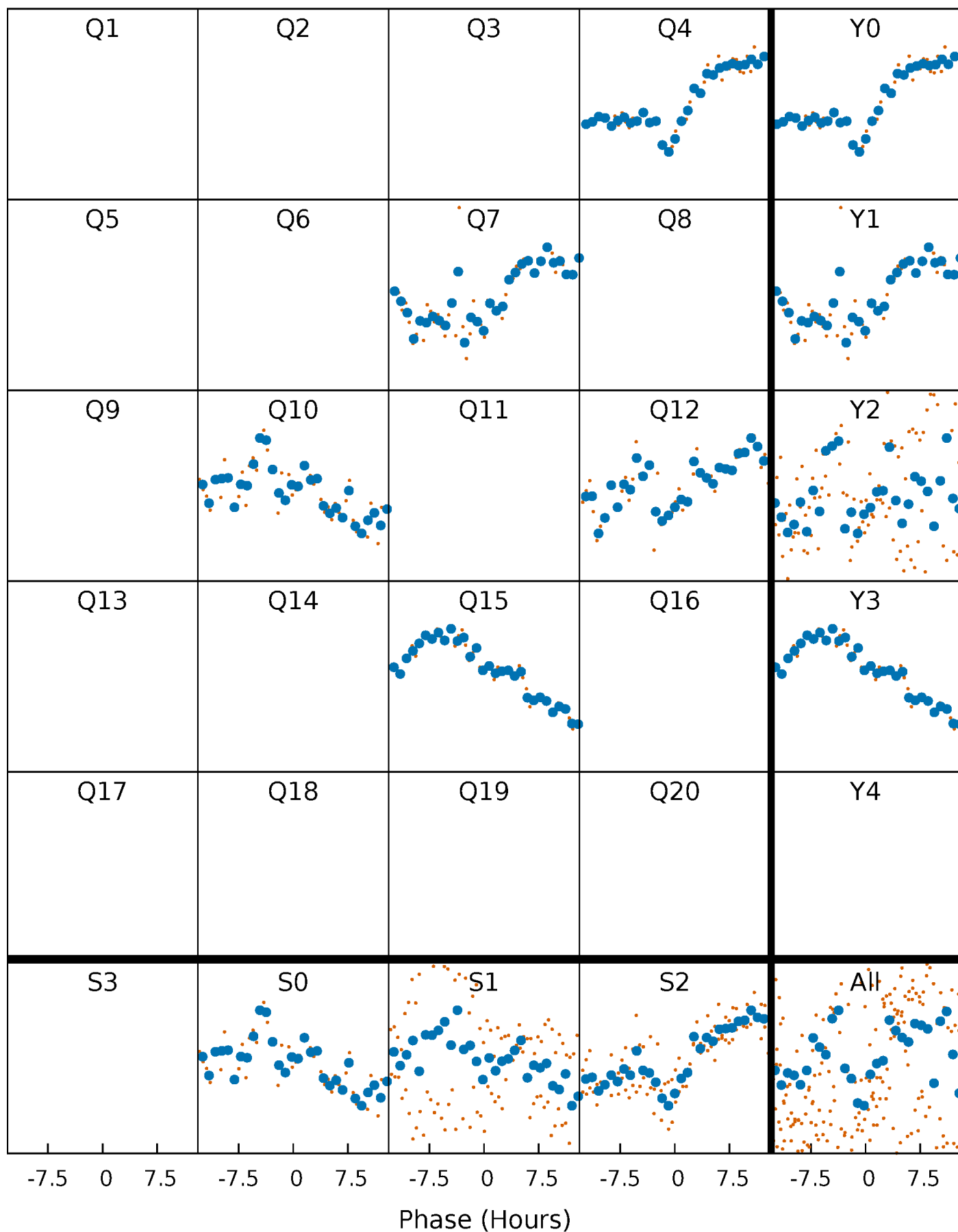


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

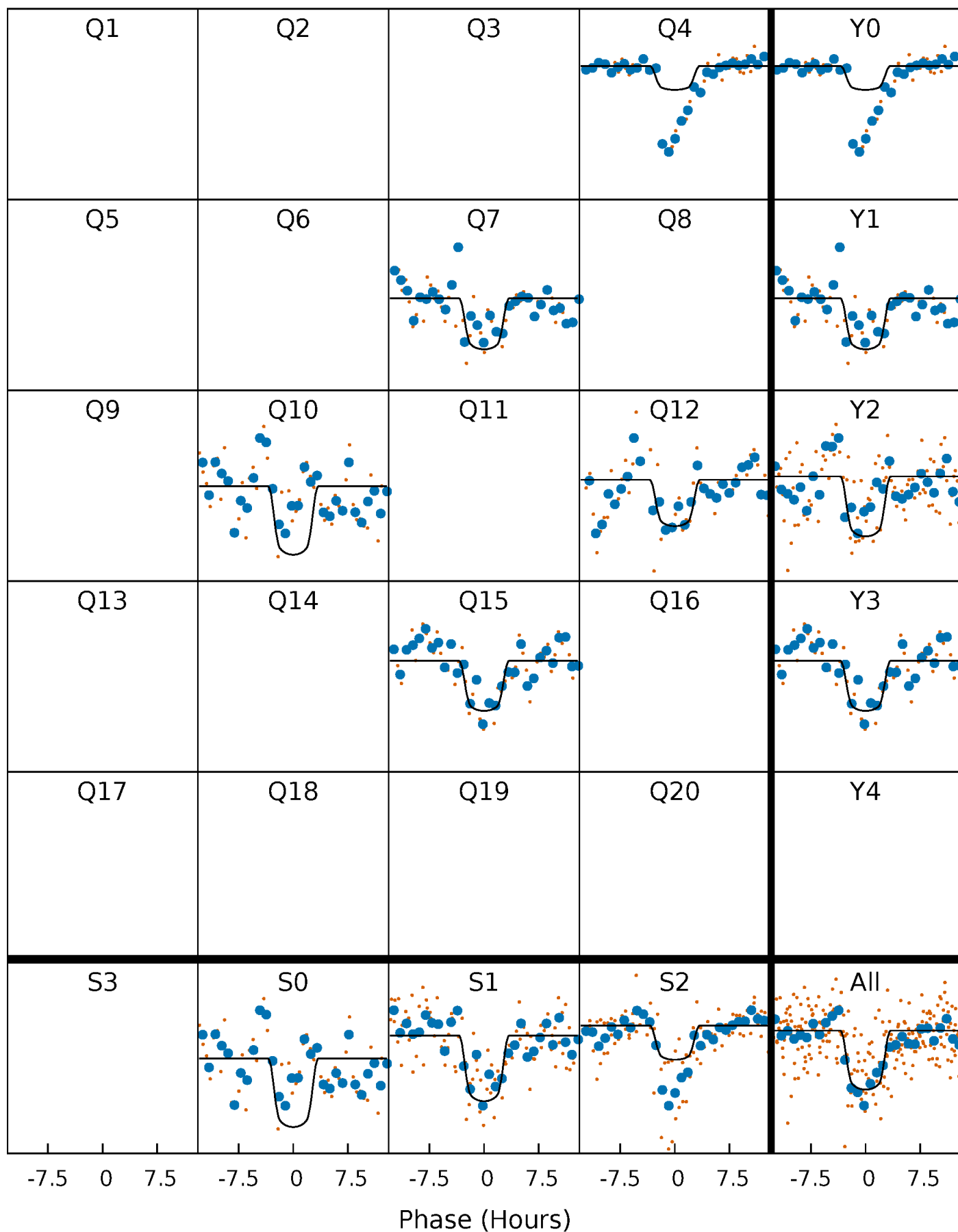
TCE 005615202-01 P=268.709185 Days  $T_0=373.356323$  (BKJD)





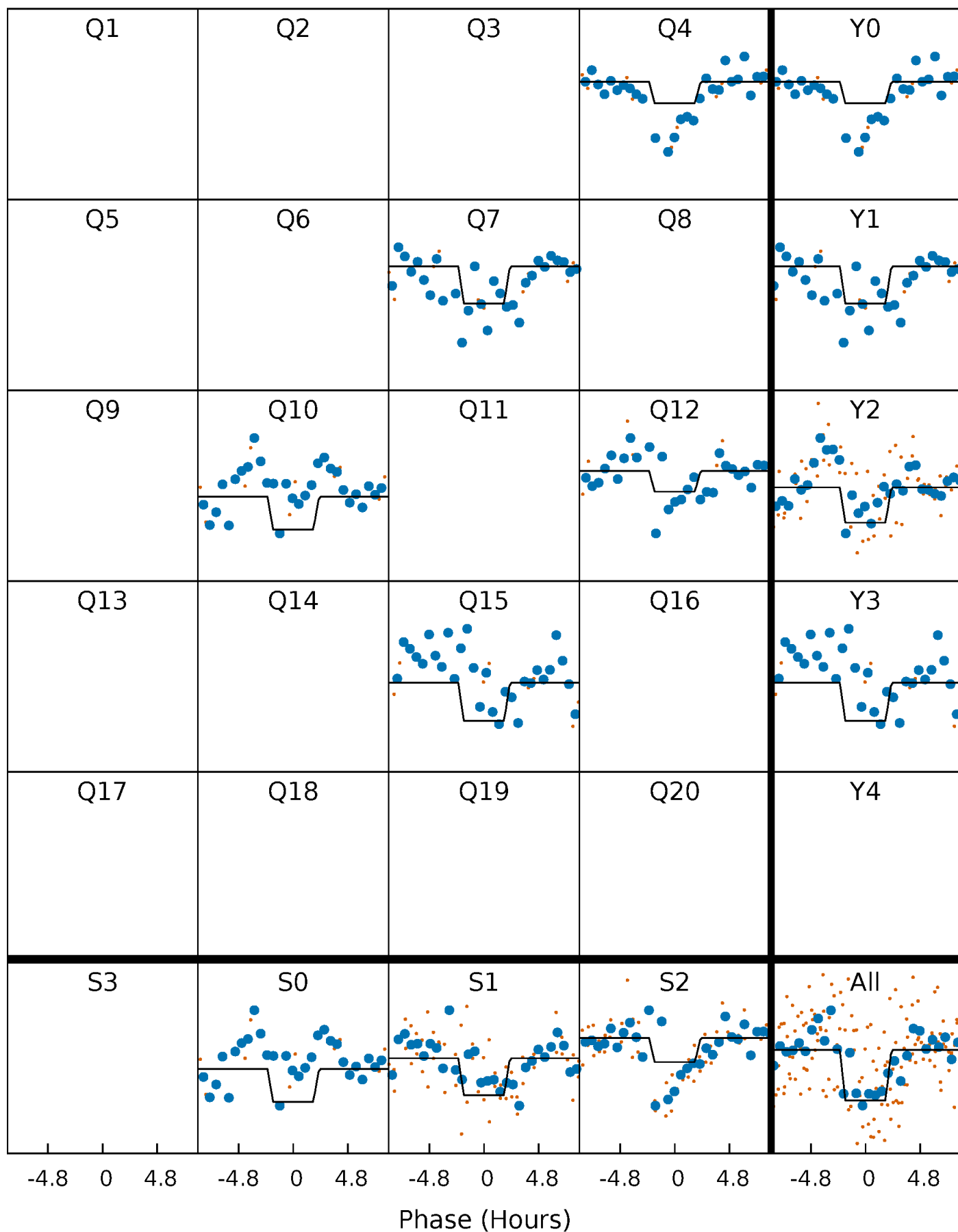
# DV Quarter-Phased Transit Curves

TCE 005615202-01 P=268.709185 Days  $T_0=373.356323$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

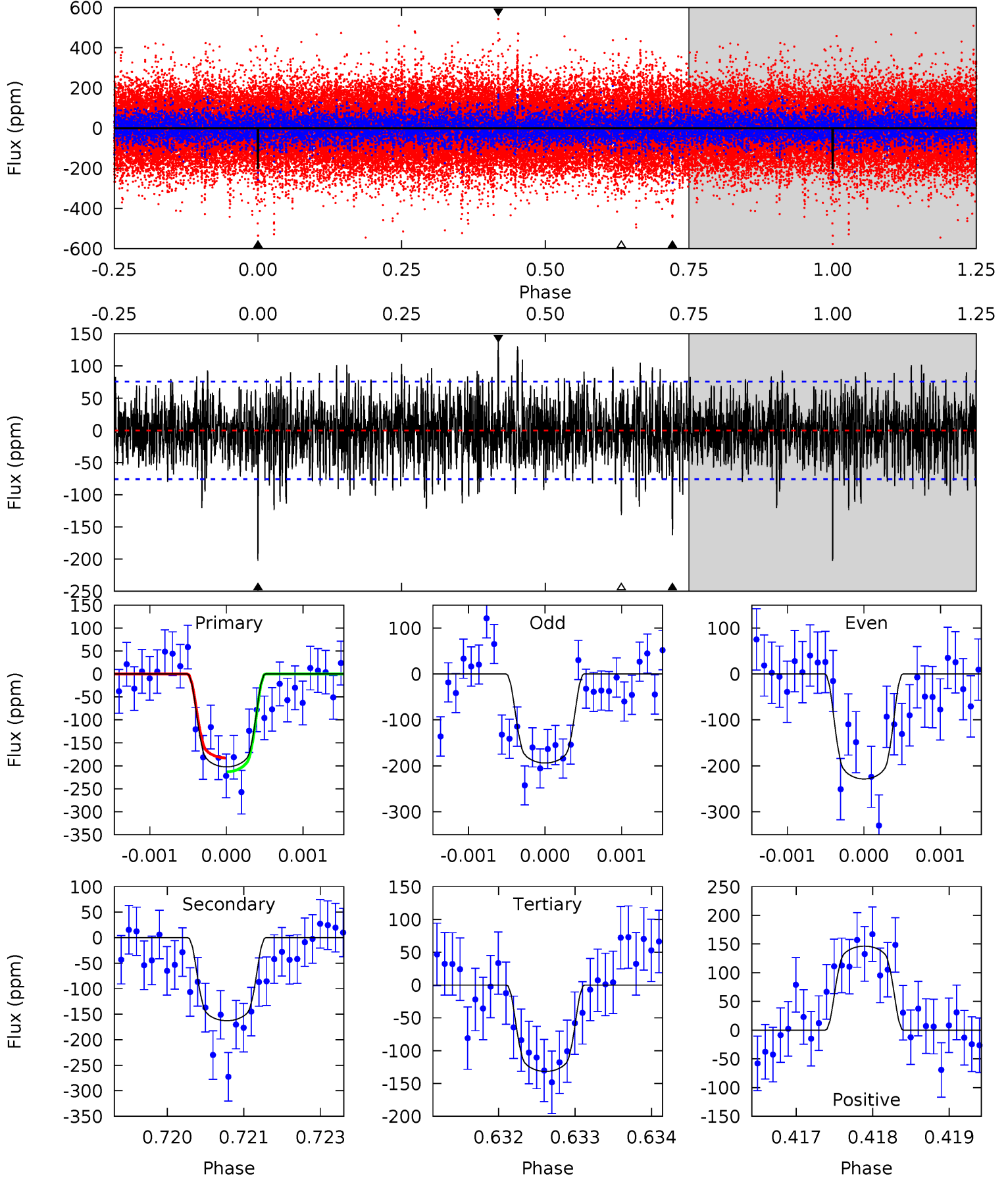
TCE 005615202-01 P=268.694503 Days  $T_0=373.352777$  (BKJD)



# DV Model-Shift Uniqueness Test

005615202-01, P = 268.709185 Days, E = 104.647138 Days

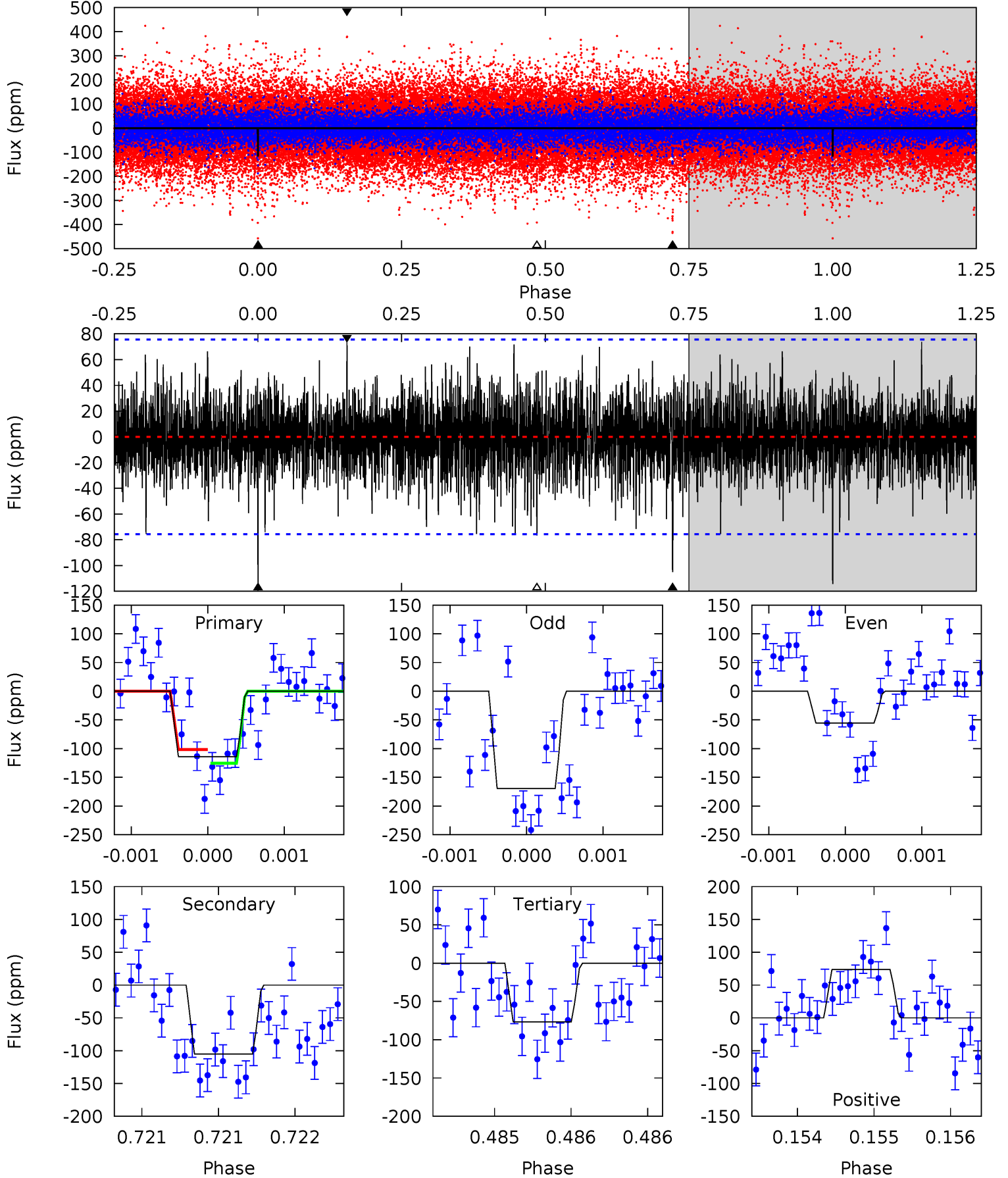
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
14.5	11.7	9.46	10.5	5.44	3.28	2.66	5.09	4.02	2.24	1.17	1.23	1.21	0.42	1.07



# Alt Model-Shift Uniqueness Test

005615202-01, P = 268.694503 Days, E = 104.658274 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
8.32	7.65	5.59	5.37	5.51	3.38	1.49	2.73	2.95	2.06	2.28	4.02	0.88	0.39	0.87



### Stellar Parameters For KIC 005615202

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6579^{+165}_{-181}$	$3.801^{+0.304}_{-0.095}$	$-0.240^{+0.300}_{-0.250}$	$2.464^{+0.456}_{-0.847}$	$1.400^{+0.239}_{-0.263}$	$0.132^{+0.275}_{-0.041}$
	+3%/-3%	+8%/-2%	+125%/-104%	+19%/-34%	+17%/-19%	+208%/-31%
Source	PHO1	FLK73	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 005615202-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-163 \pm 14$	$4.57^{+0.80}_{-0.86}$	$651^{+40}_{-55}$	$5573^{+301}_{-270}$	$3568^{+1699}_{-922}$
Alt.	$-105 \pm 14$	$3.15^{+0.64}_{-0.61}$	$654^{+40}_{-57}$	$6027^{+451}_{-426}$	$4839^{+2764}_{-1354}$

$T_{max}$  = 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

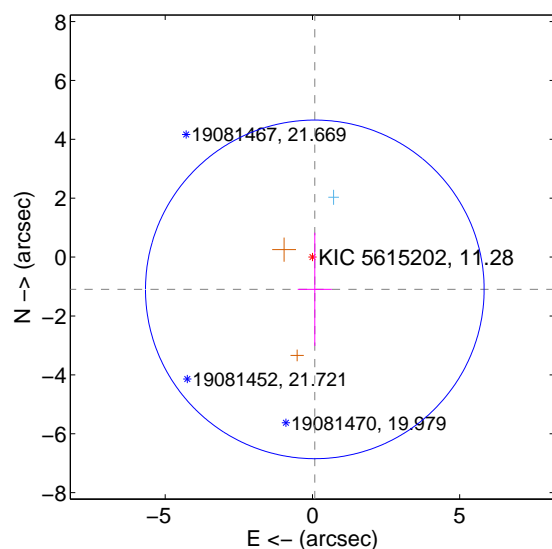
Supplemental centroid analysis for 005615202-01. **Kepler magnitude: 11.28.** Transit SNR 7.57

**There are 1 quarters with good PRF difference image offsets**

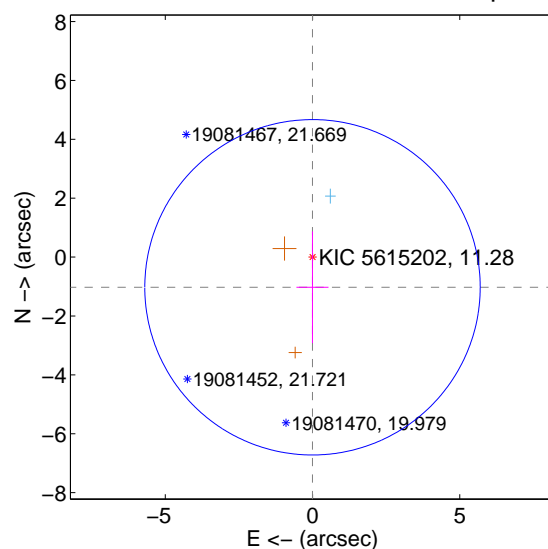
The direct PRF centroid is offset from the target star catalog position by about 0.12 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.099 \pm 1.916$	0.57	$-0.081 \pm 0.581$	$-1.096 \pm 1.921$
PRF-fit source offset from KIC position	$1.025 \pm 1.898$	0.54	$0.001 \pm 0.545$	$-1.025 \pm 1.898$
photometric centroid source offset	$0.30 \pm 0.53$	0.57	$-0.30 \pm 0.53$	$-0.04 \pm 0.66$

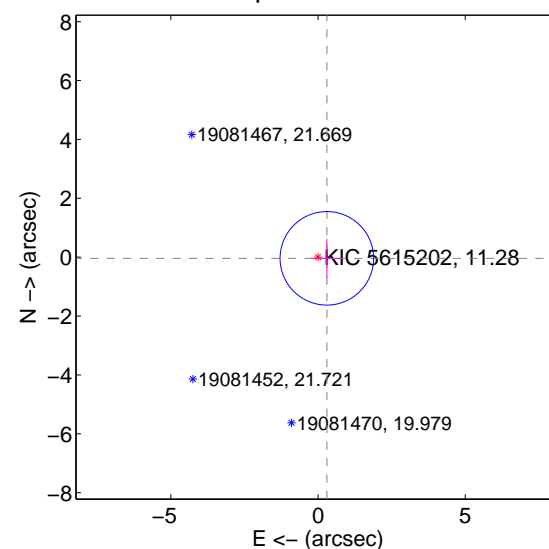
offset from difference PRF-fit to OOT PRF-fit



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.

Q5 no difference image



Q5 no OOT image



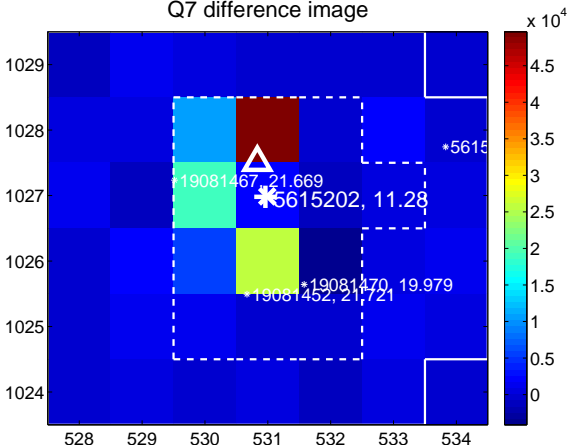
Q6 no difference image



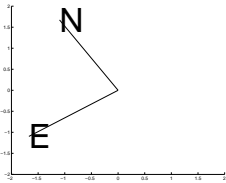
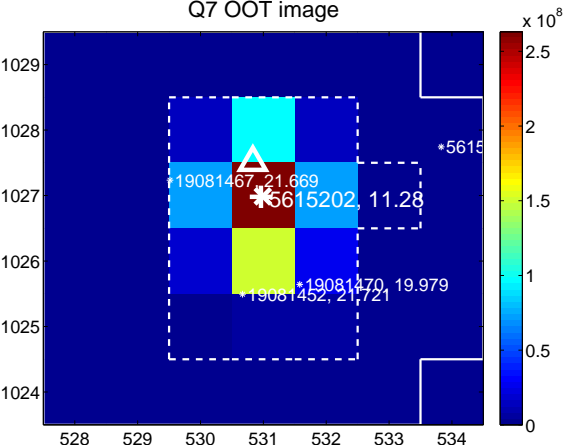
Q6 no OOT image



Q7 difference image



Q7 OOT image



Q8 no difference image

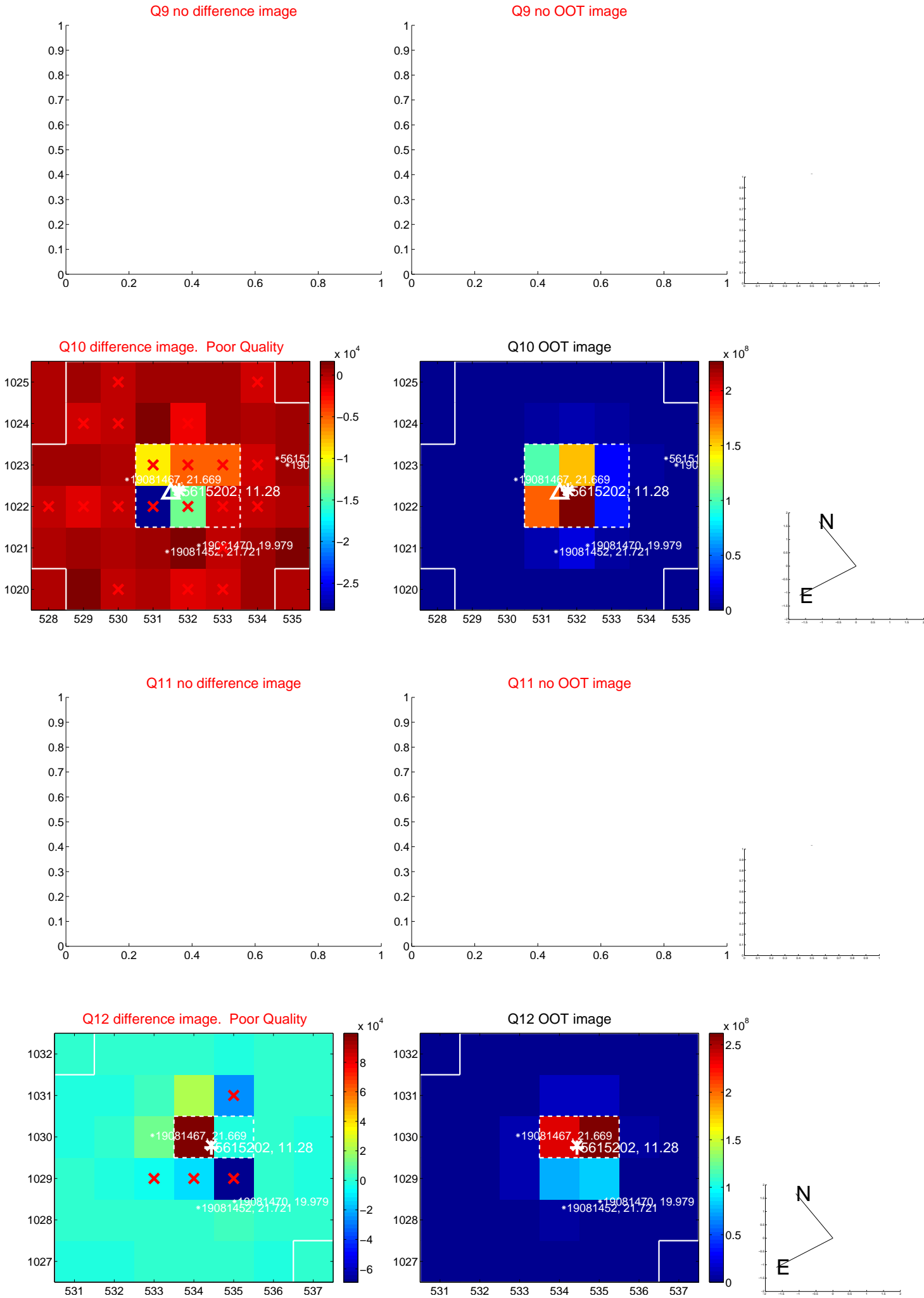


Q8 no OOT image





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.

Q13 no difference image



Q13 no OOT image



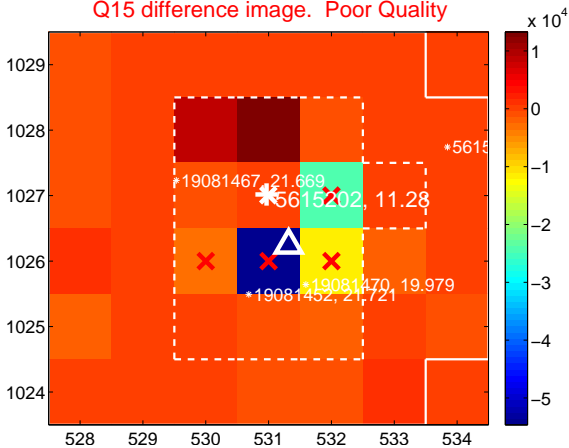
Q14 no difference image



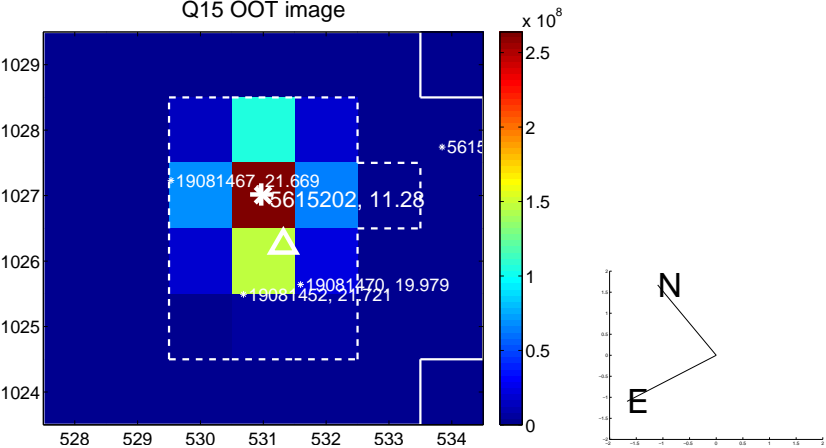
Q14 no OOT image



Q15 difference image. Poor Quality



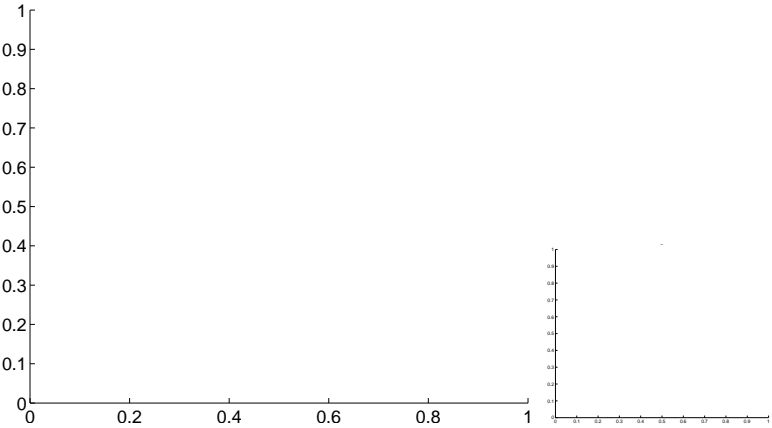
Q15 OOT image



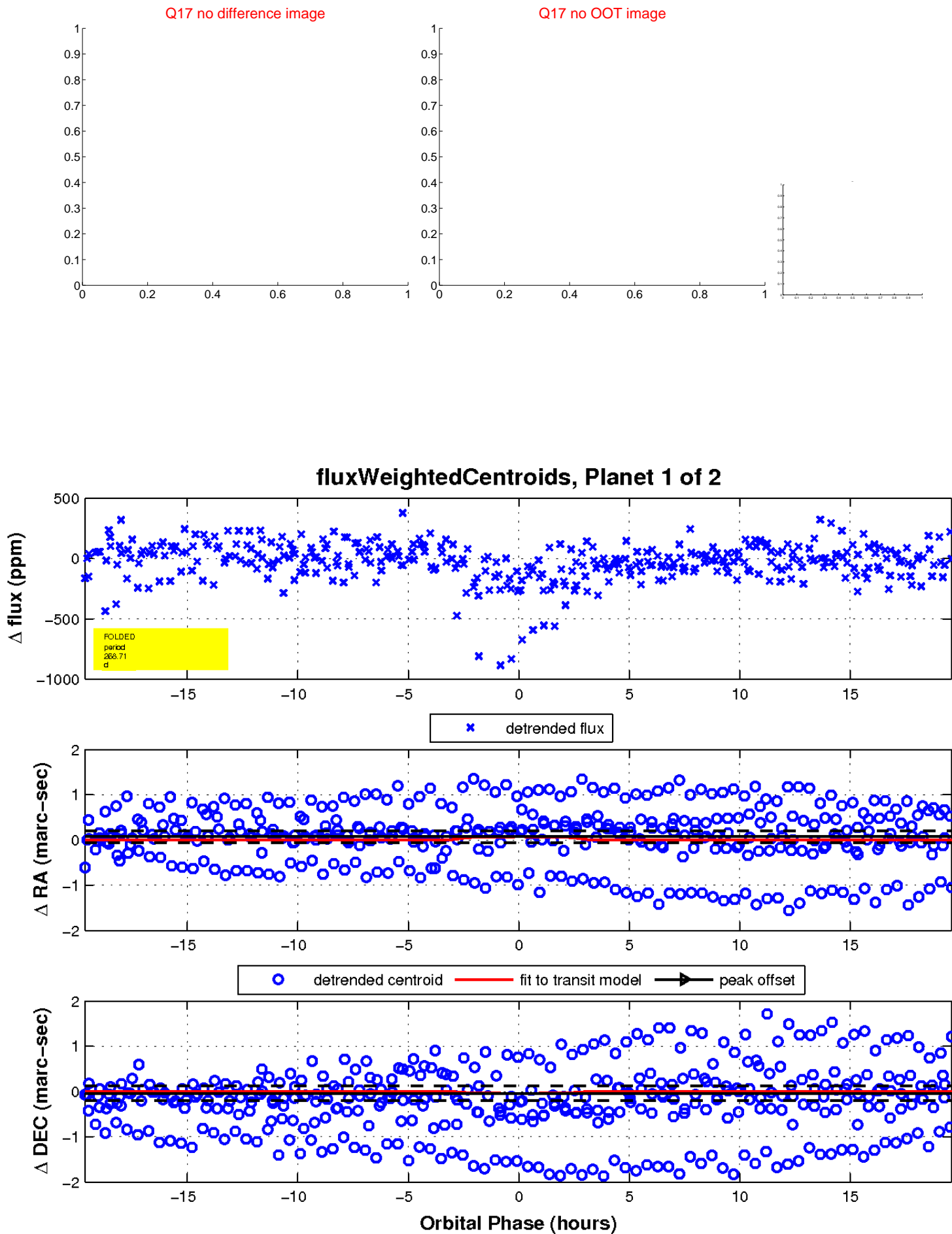
Q16 no difference image



Q16 no OOT image

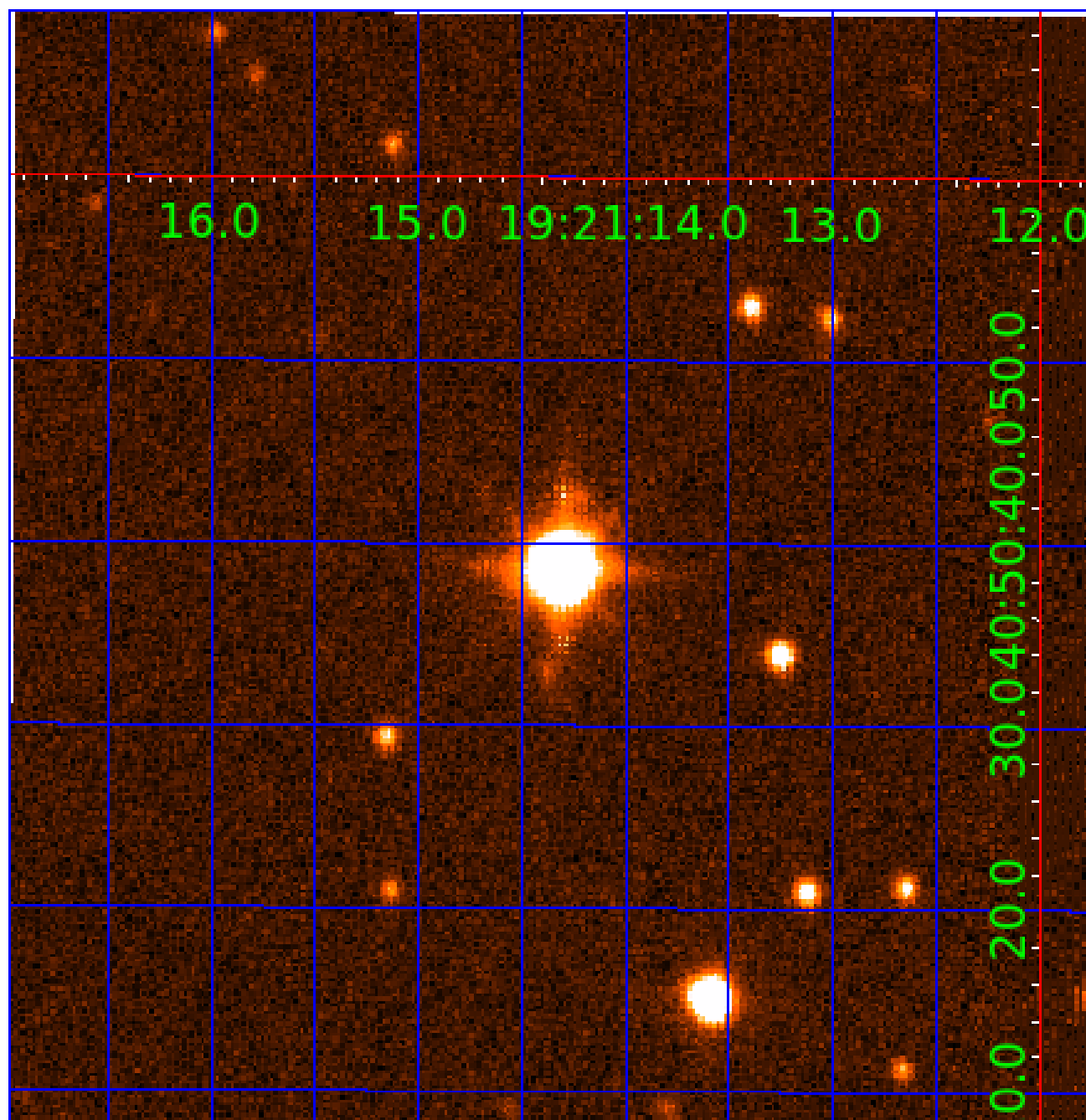


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 005615202

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005615202-01	OBS	No	268.709185	373.356323	241.2	6.549	11.2	7.6	2.46	6579	4.80	12.25
005615202-02	OBS	No	532.153701	220.093528	339.8	3.869	13.5	8.9	2.46	6579	5.43	4.93

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005615202-01	OBS	FP	0.00	1	0	0	0	LPP_ALT—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_SATURATED
005615202-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—ALL_TRANS_CHASES—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED

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

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

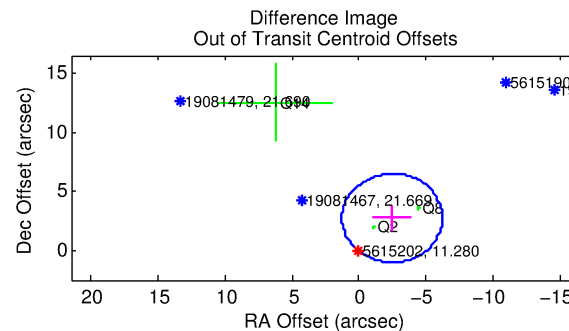
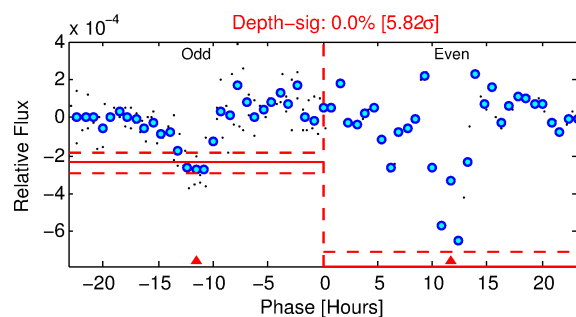
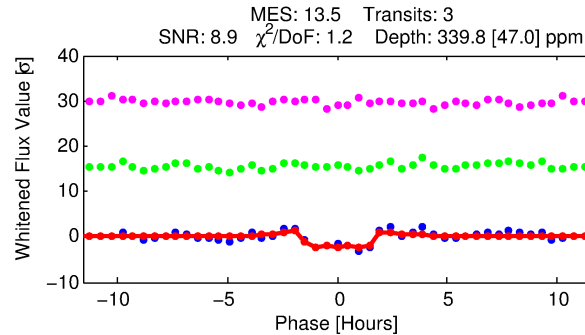
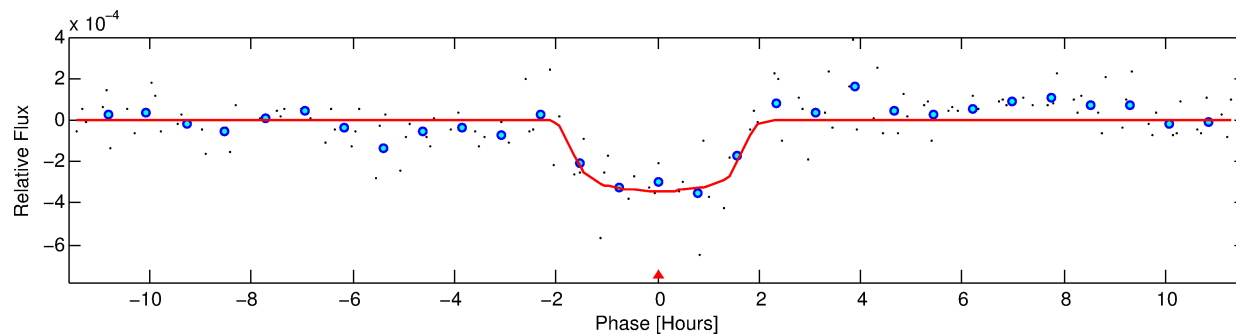
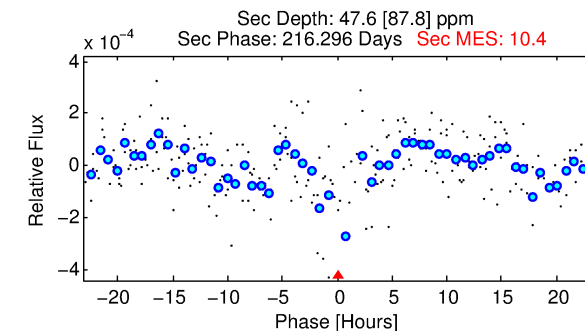
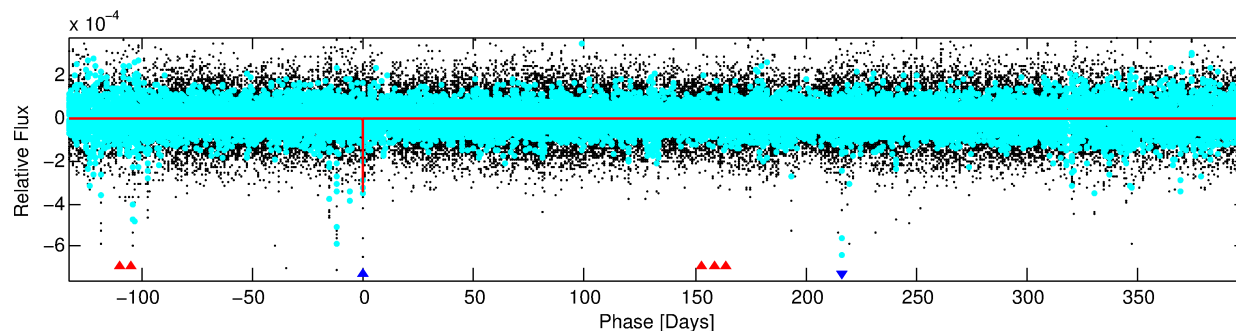
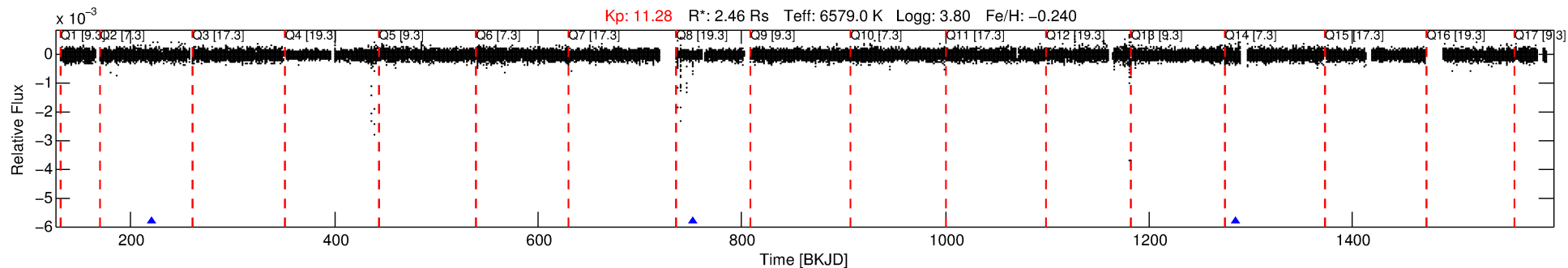
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 005615202-02

No Significant Match Found

# DV One-Page Summary

KIC: 5615202 Candidate: 2 of 2 Period: 532.154 d



## DV Fit Results:

Period = 532.15370 [0.00481] d  
Epoch = 220.0935 [0.0059] BKJD  
Rp/R\* = 0.0202 [0.0028]  
a/R\* = 450.93 [264.32]  
b = 0.93 [0.09]  
Seff = 4.93 [2.62]  
Teq = 380 [50] K  
Rp = 5.43 [2.01] Re  
a = 1.4382 [0.4704] AU  
Ag = 1836.93 [3559.35] [0.52σ]  
Teffp = 3845 [1798] K [1.93σ]

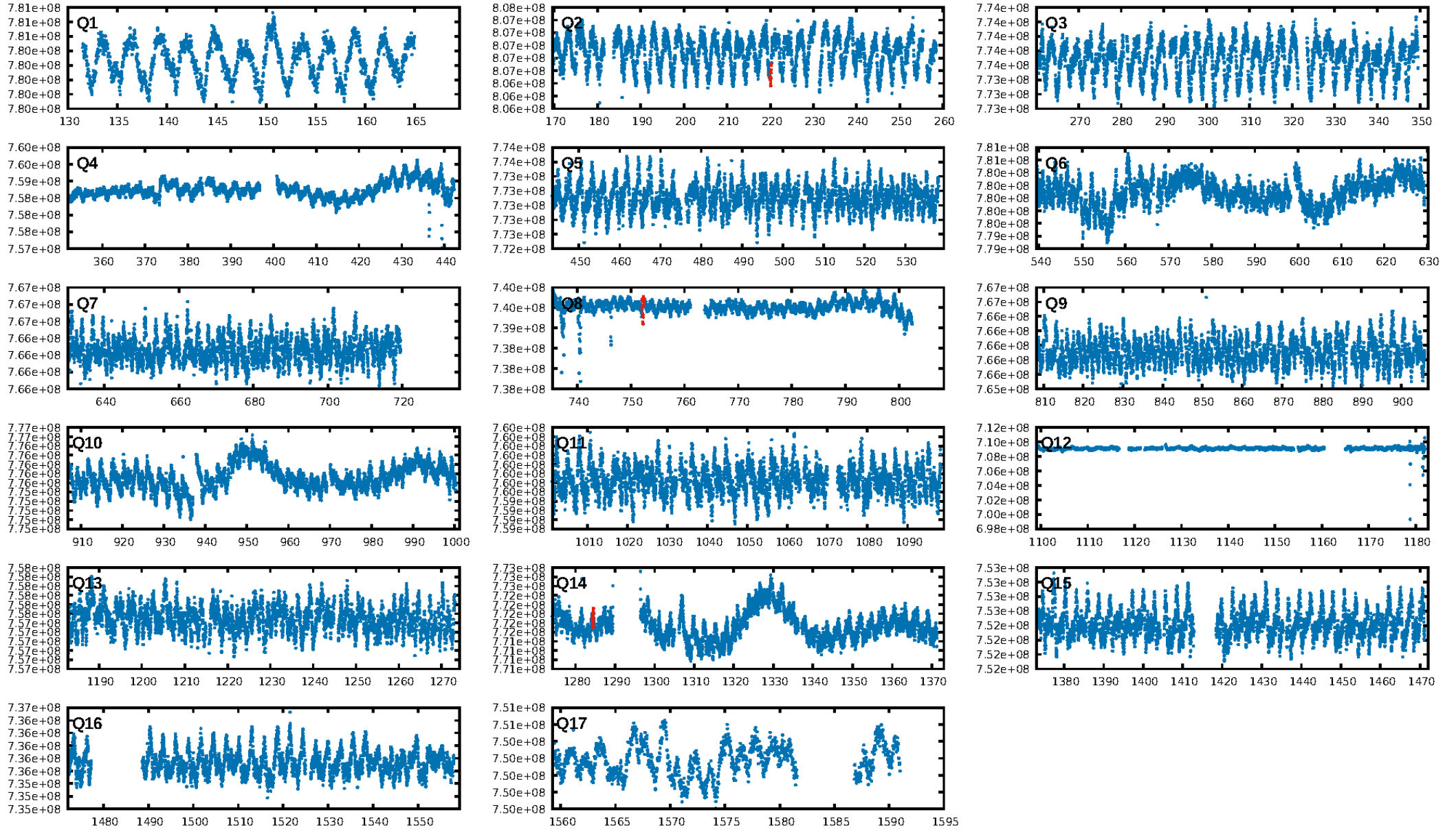
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [831.23σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 3.7%  
ModelChiSquareGof-sig: 88.3%  
**Bootstrap-pfa: 5.01e-09**  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -12.38  
Centroid-sig: 0.4%  
Centroid-so: 1.315 arcsec [2.52σ]  
OotOffset-rm: 3.689 arcsec [2.95σ]  
KicOffset-rm: 3.671 arcsec [2.95σ]  
OotOffset-st: 2/0/1/0 [3]  
KicOffset-st: 2/0/1/0 [3]  
DiffImageQuality-fgm: 0.33 [1/3]  
DiffImageOverlap-fno: 1.00 [3/3]

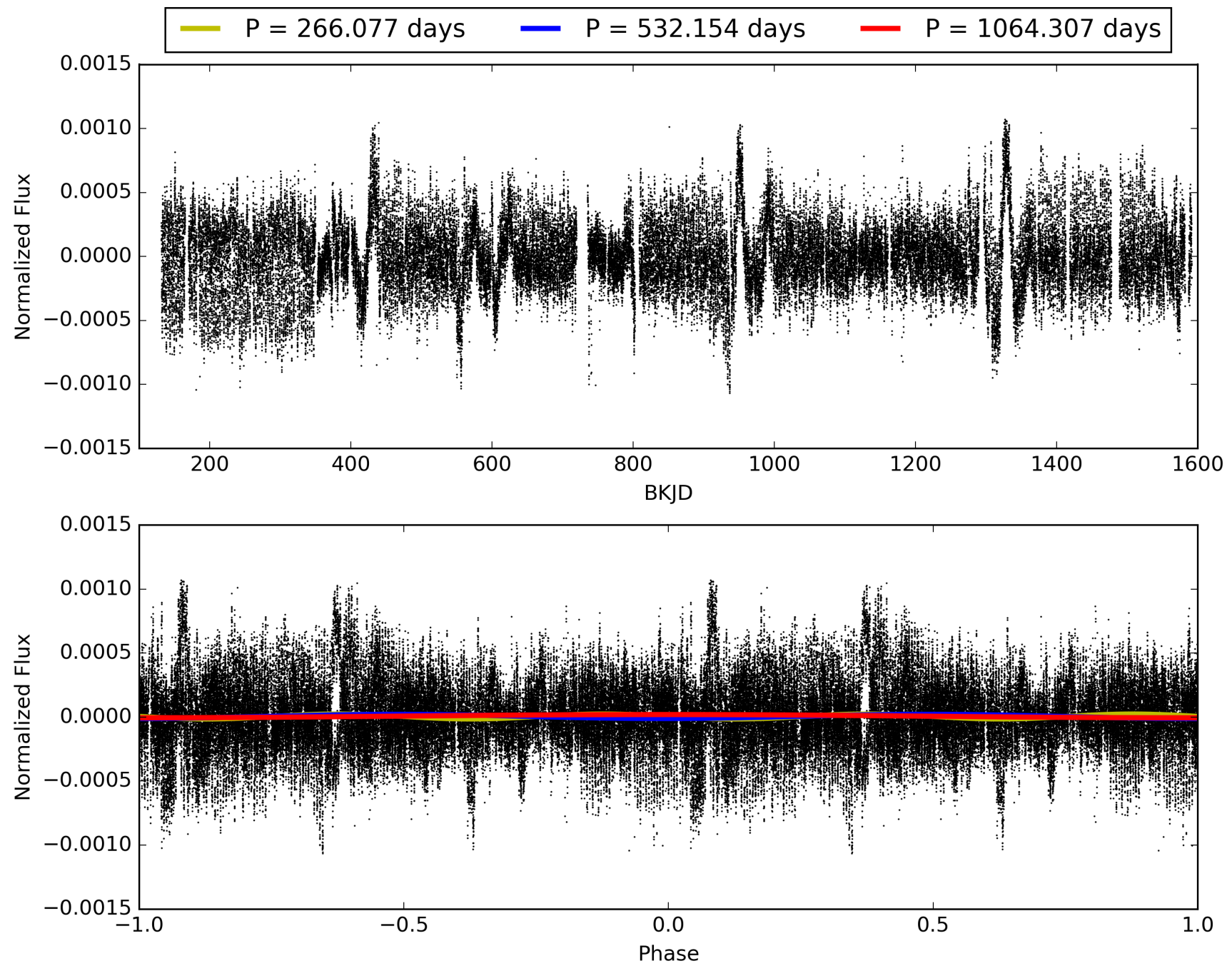
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 09:24:47 Z

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

# TCE 005615202-02, PDC Light Curves



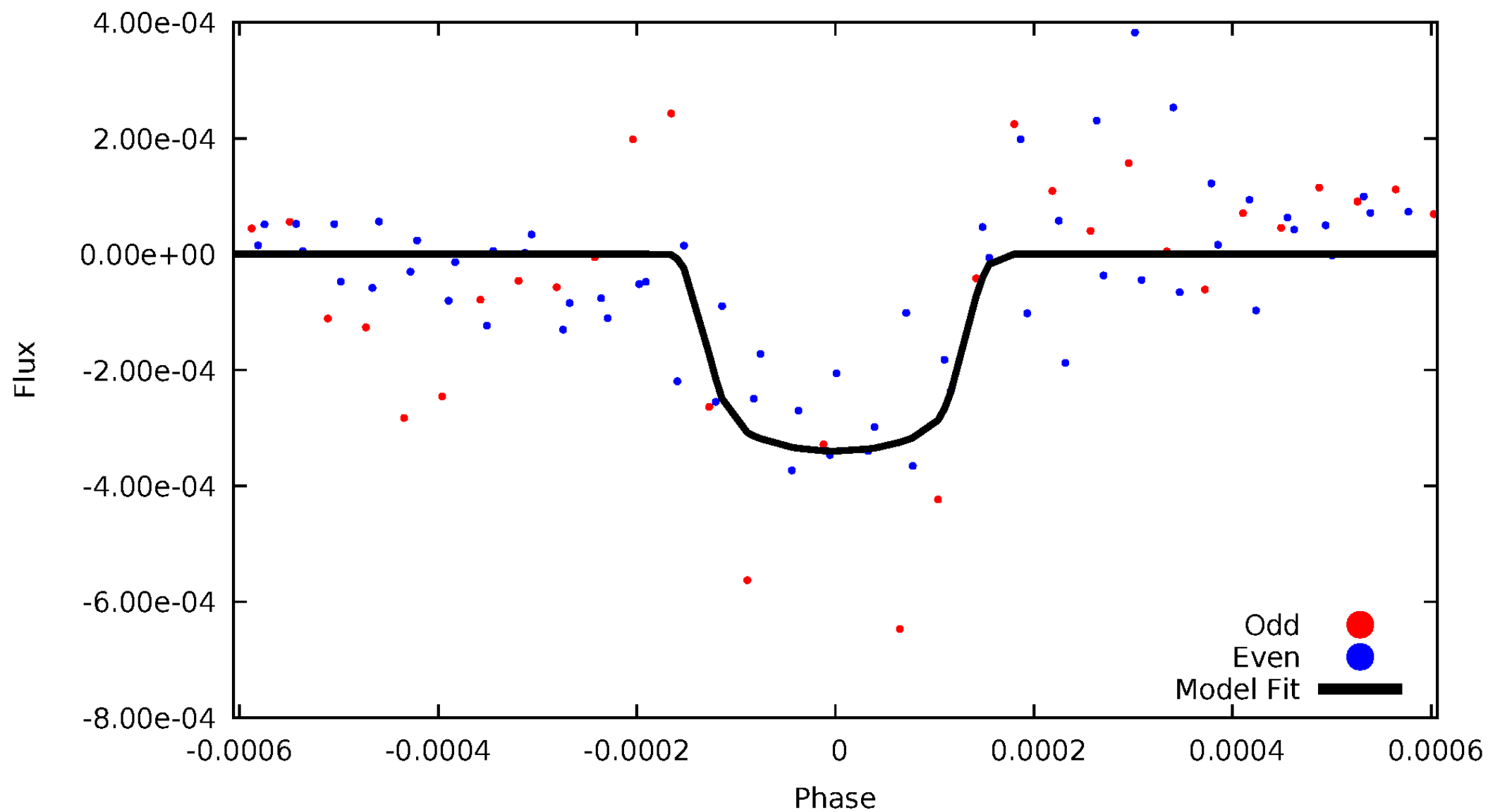
TCE 005615202-02





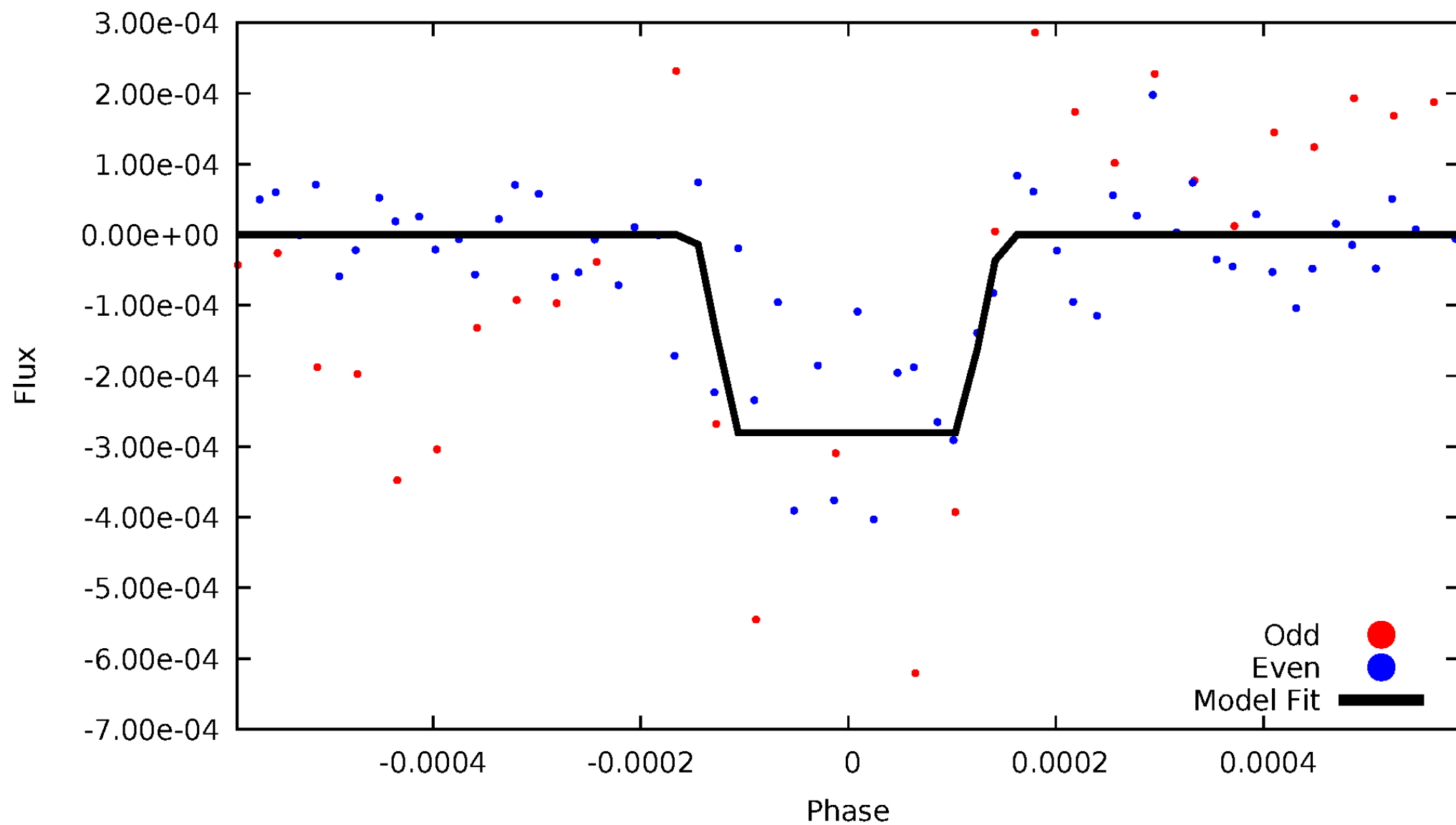
# DV Odd/Even

TCE 005615202-02



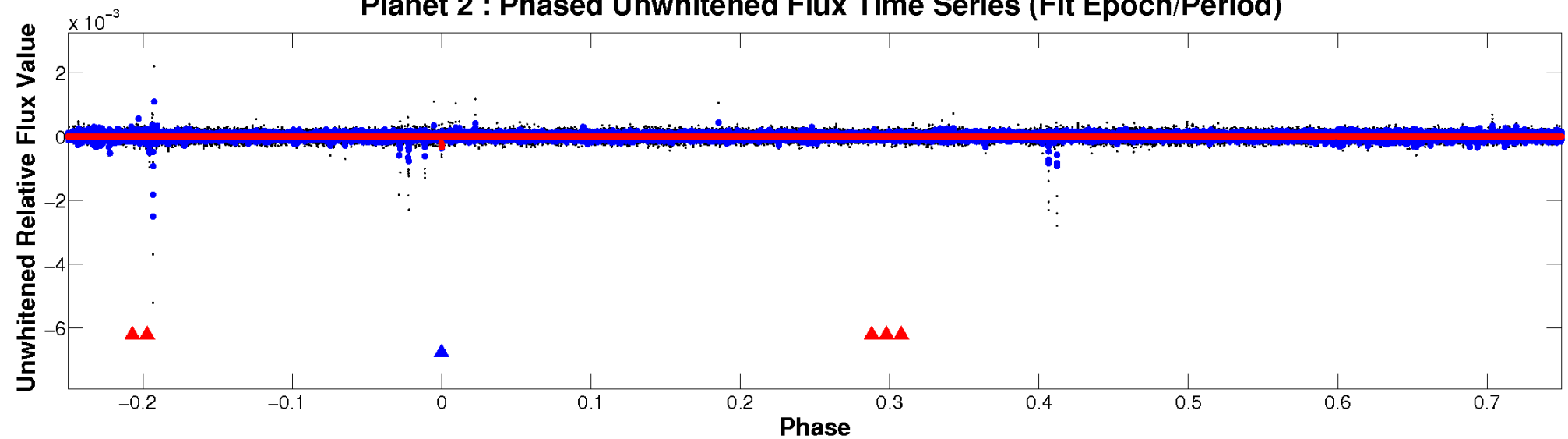
# ALT Odd/Even

TCE 005615202-02

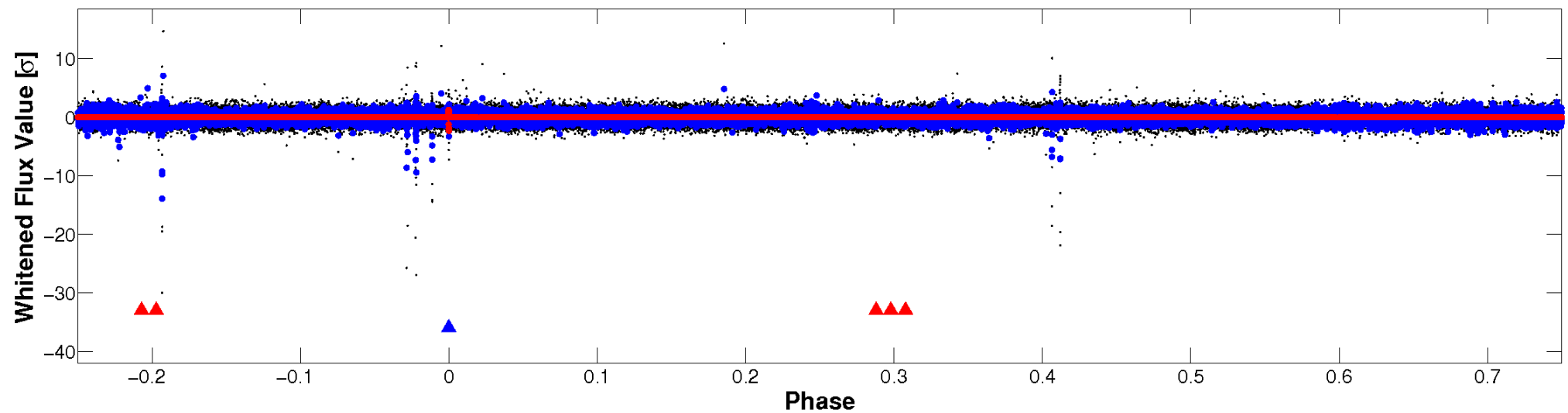


# Non-Whitened Vs. Whitened Light Curve

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

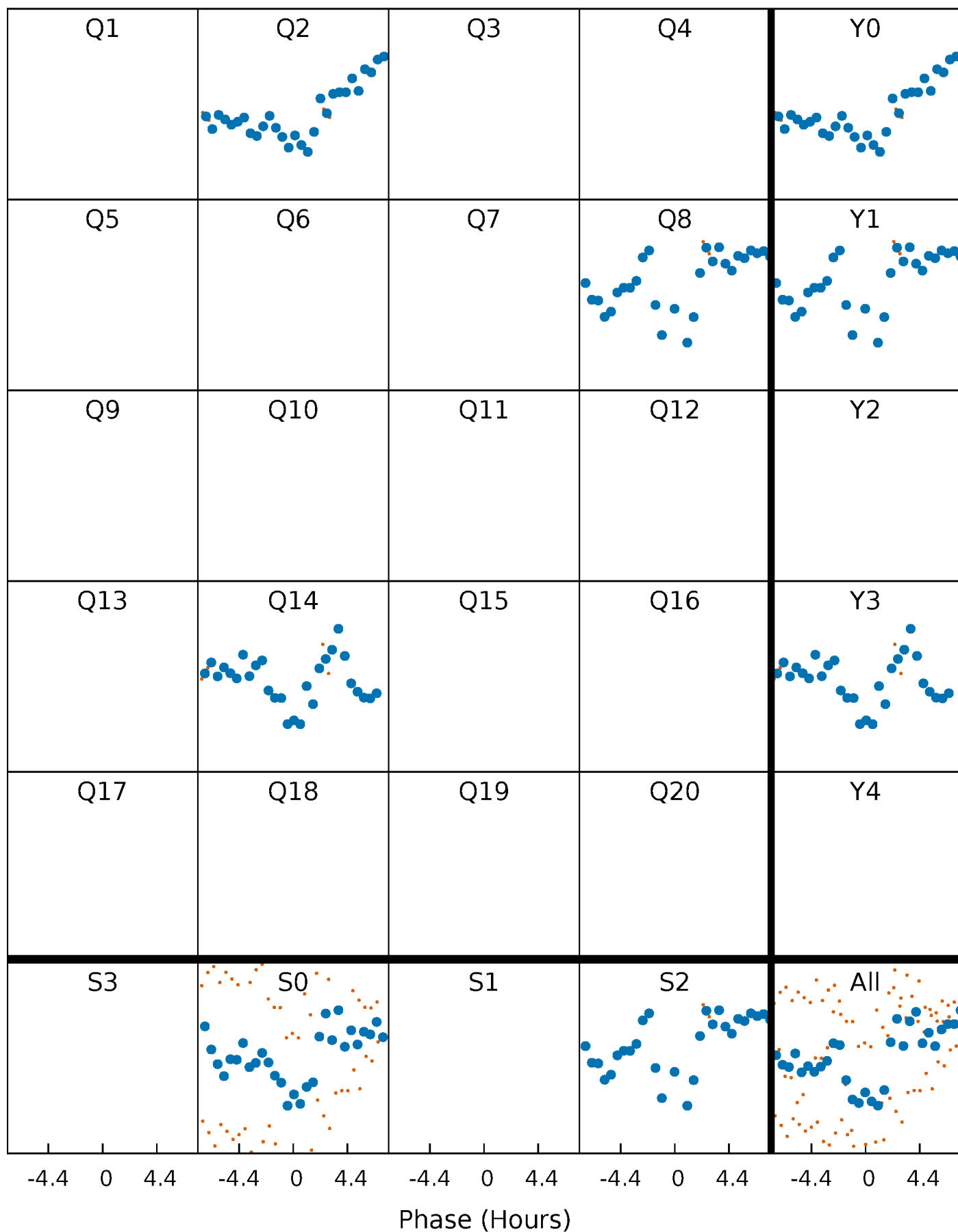


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



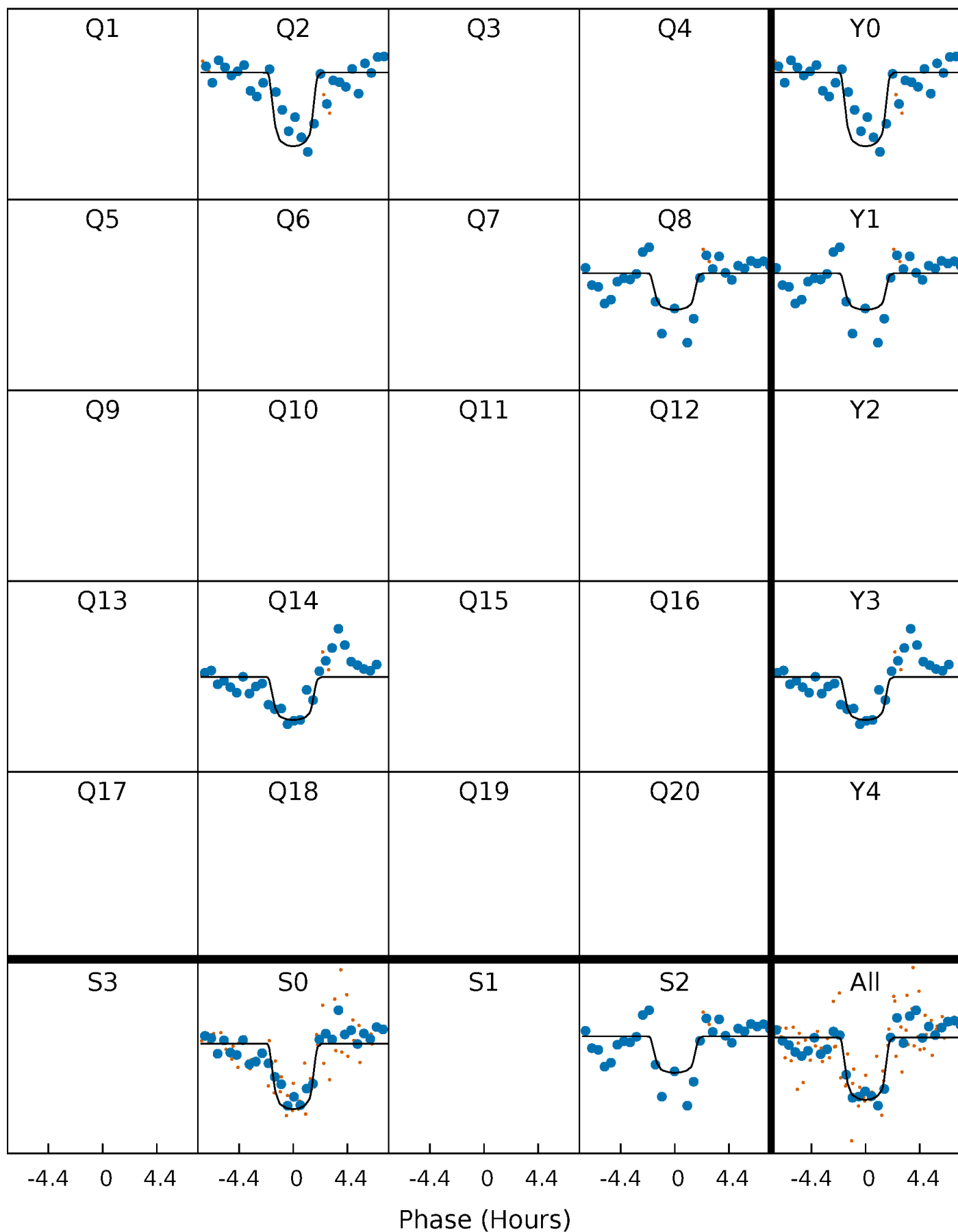
# PDC Quarter-Phased Transit Curves

TCE 005615202-02 P=532.153701 Days  $T_0=220.093528$  (BKJD)



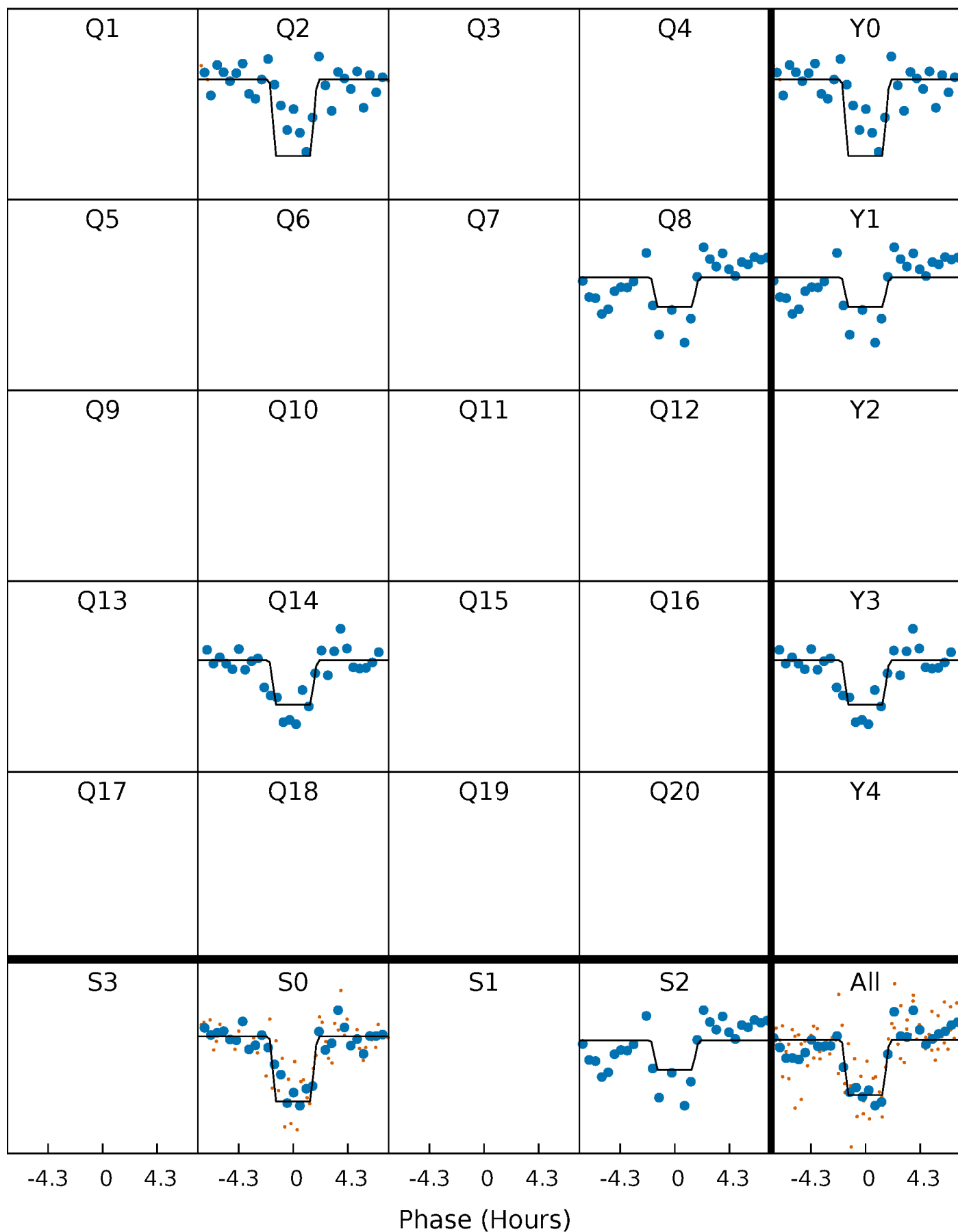
# DV Quarter-Phased Transit Curves

TCE 005615202-02 P=532.153701 Days  $T_0=220.093528$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

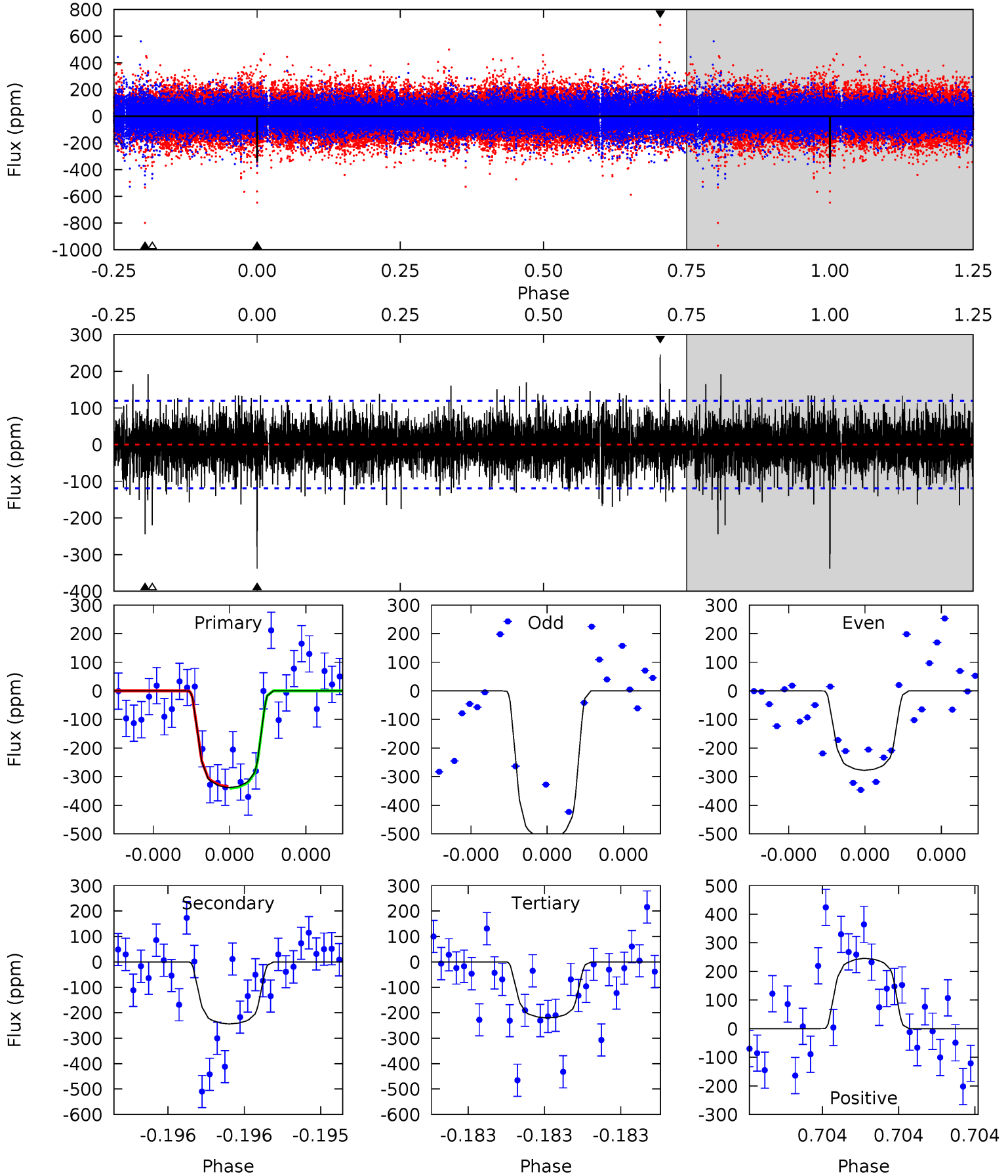
TCE 005615202-02 P=532.158014 Days  $T_0=220.089386$  (BKJD)



# DV Model-Shift Uniqueness Test

005615202-02, P = 532.153701 Days, E = 220.093528 Days

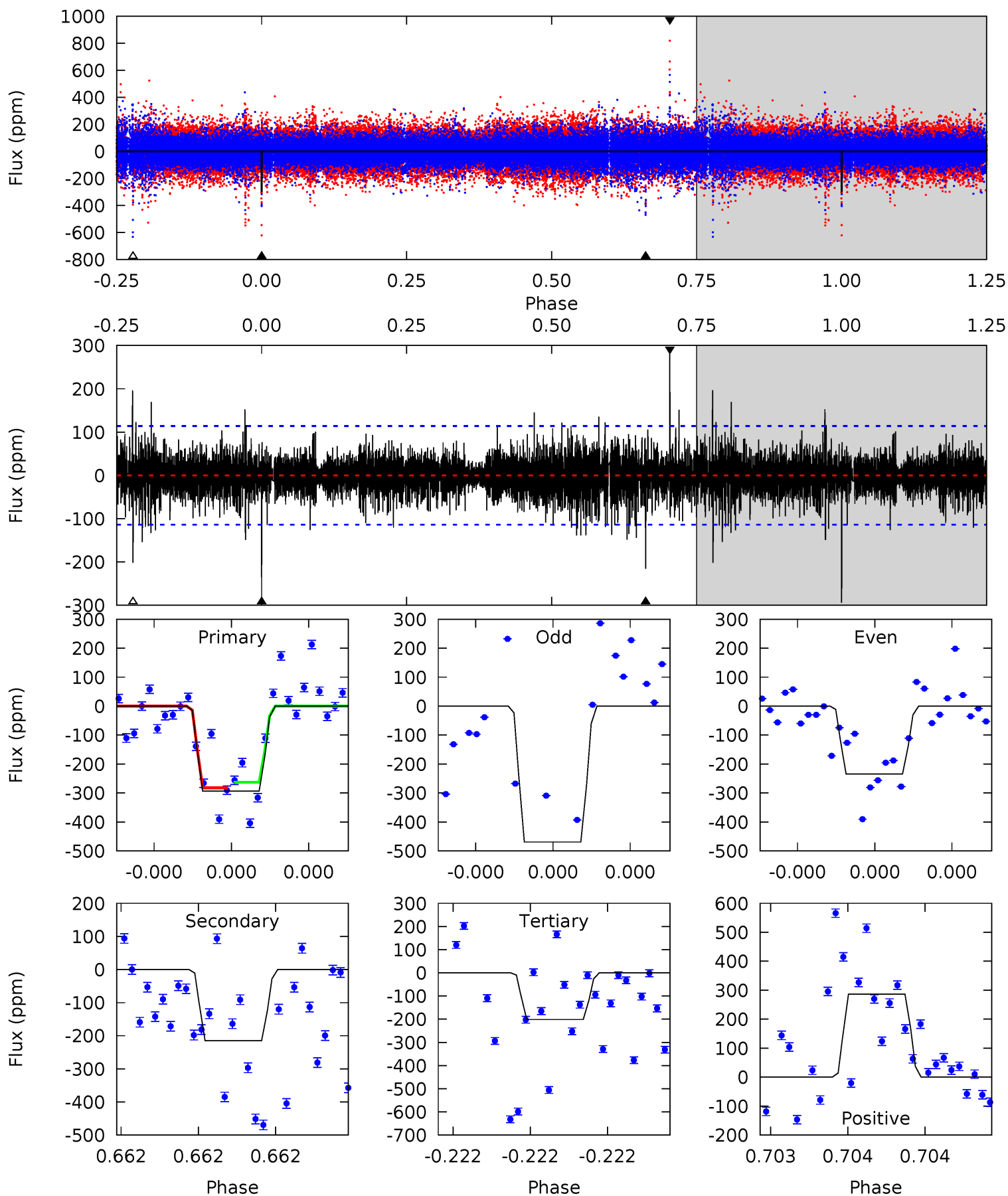
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
16.0	11.5	10.4	11.6	5.65	3.60	2.05	5.58	4.37	1.13	-0.08	5.16	1.22	0.42	0.15



# Alt Model-Shift Uniqueness Test

005615202-02, P = 532.158014 Days, E = 220.089386 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
14.6	10.7	10.0	14.3	5.67	3.63	1.68	4.59	0.34	0.69	-3.56	5.05	0.98	0.49	0.47





### Stellar Parameters For KIC 005615202

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6579^{+165}_{-181}$	$3.801^{+0.304}_{-0.095}$	$-0.240^{+0.300}_{-0.250}$	$2.464^{+0.456}_{-0.847}$	$1.400^{+0.239}_{-0.263}$	$0.132^{+0.275}_{-0.041}$
	+3%/-3%	+8%/-2%	+125%/-104%	+19%/-34%	+17%/-19%	+208%/-31%
Source	PHO1	FLK73	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 005615202-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-244 \pm 21$	$5.14^{+1.12}_{-1.03}$	$518^{+30}_{-44}$	$5777^{+440}_{-361}$	$10681^{+5587}_{-3308}$
Alt.	$-215 \pm 20$	$4.25^{+1.01}_{-1.02}$	$518^{+32}_{-46}$	$6143^{+670}_{-473}$	$14000^{+9701}_{-4792}$

$T_{\text{max}}$  = 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

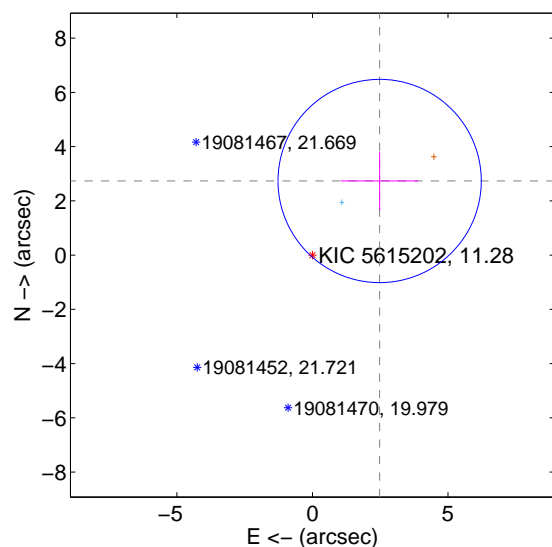
Supplemental centroid analysis for 005615202-02. **Kepler magnitude: 11.28.** Transit SNR 8.89

**There are 1 quarters with good PRF difference image offsets**

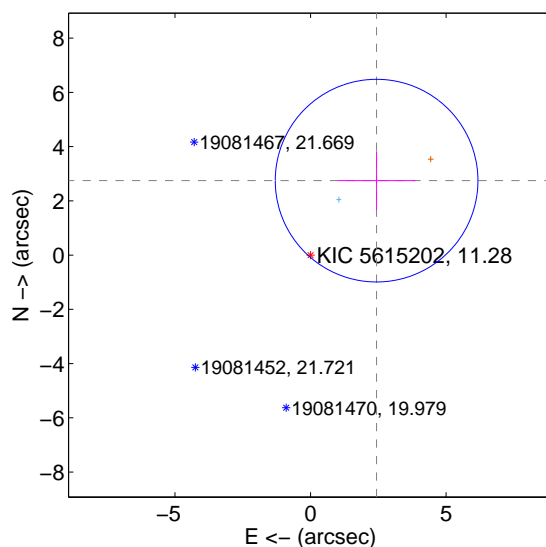
The direct PRF centroid is offset from the target star catalog position by about 0.06 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$3.689 \pm 1.249$	2.95	$-2.478 \pm 1.427$	$2.733 \pm 1.081$
PRF-fit source offset from KIC position	$3.671 \pm 1.245$	2.95	$-2.436 \pm 1.427$	$2.746 \pm 1.081$
photometric centroid source offset	$1.32 \pm 0.52$	2.52	$-1.18 \pm 0.49$	$0.59 \pm 0.63$

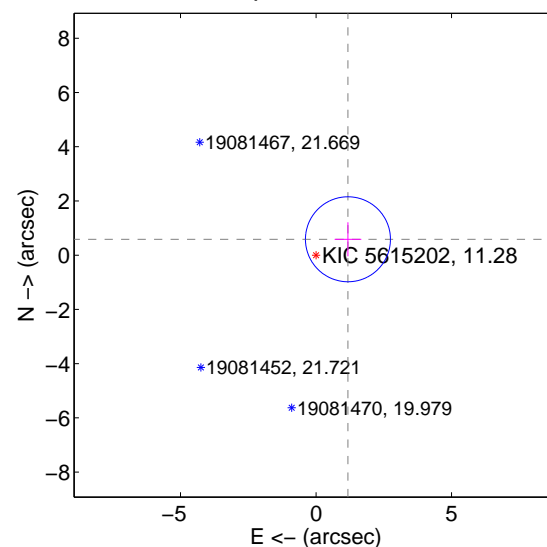
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

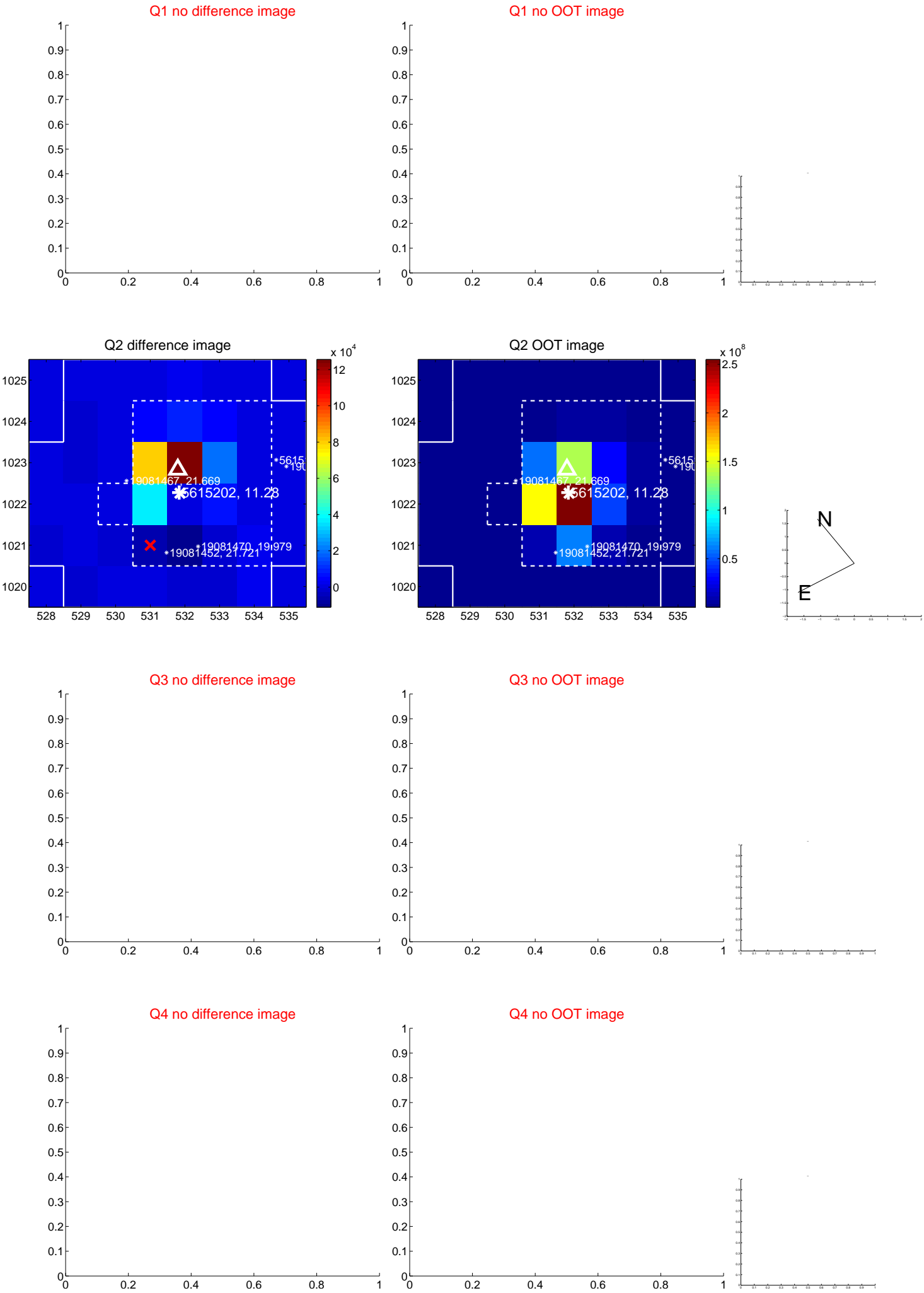


offset from photometric centroids

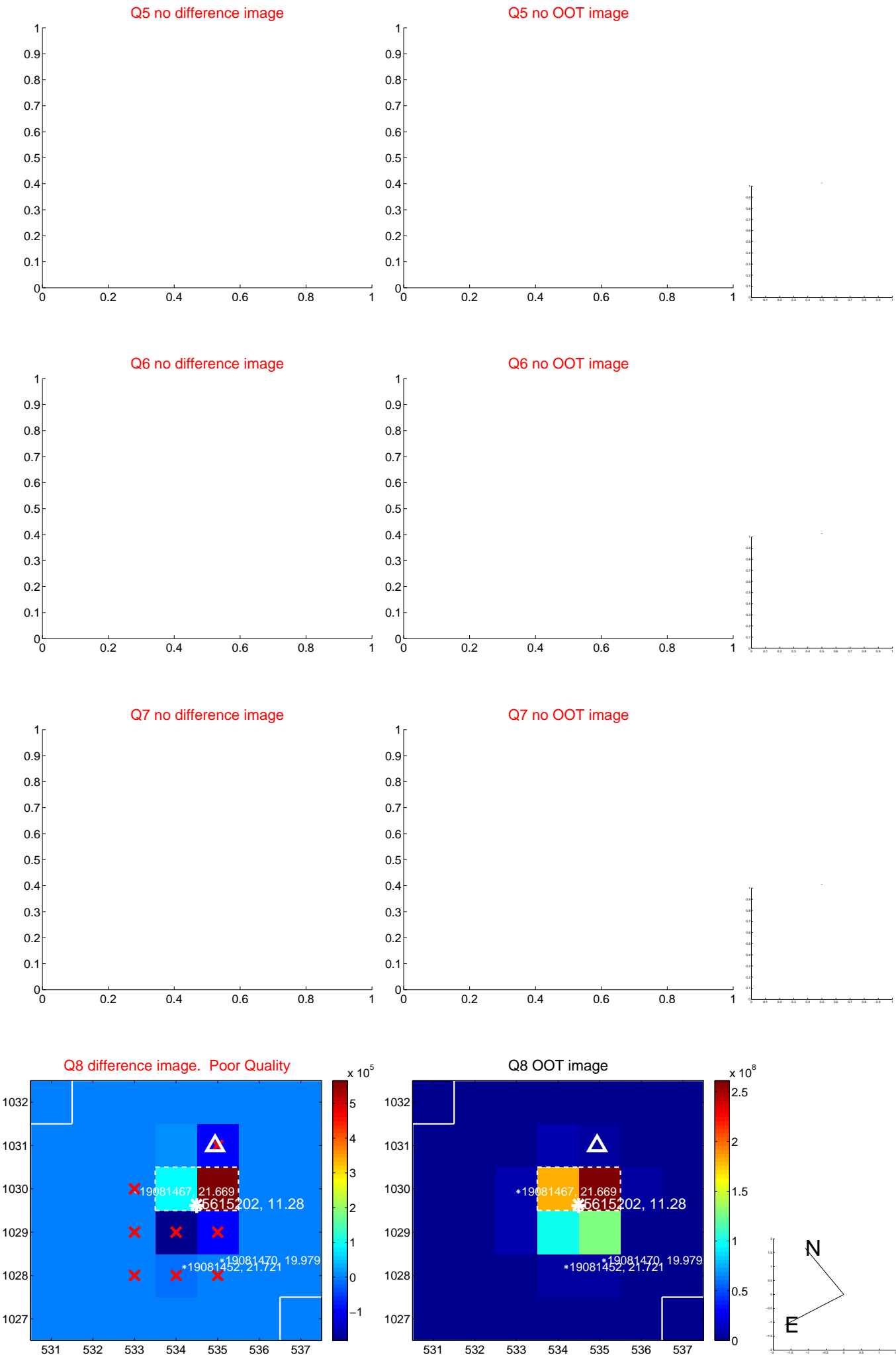


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



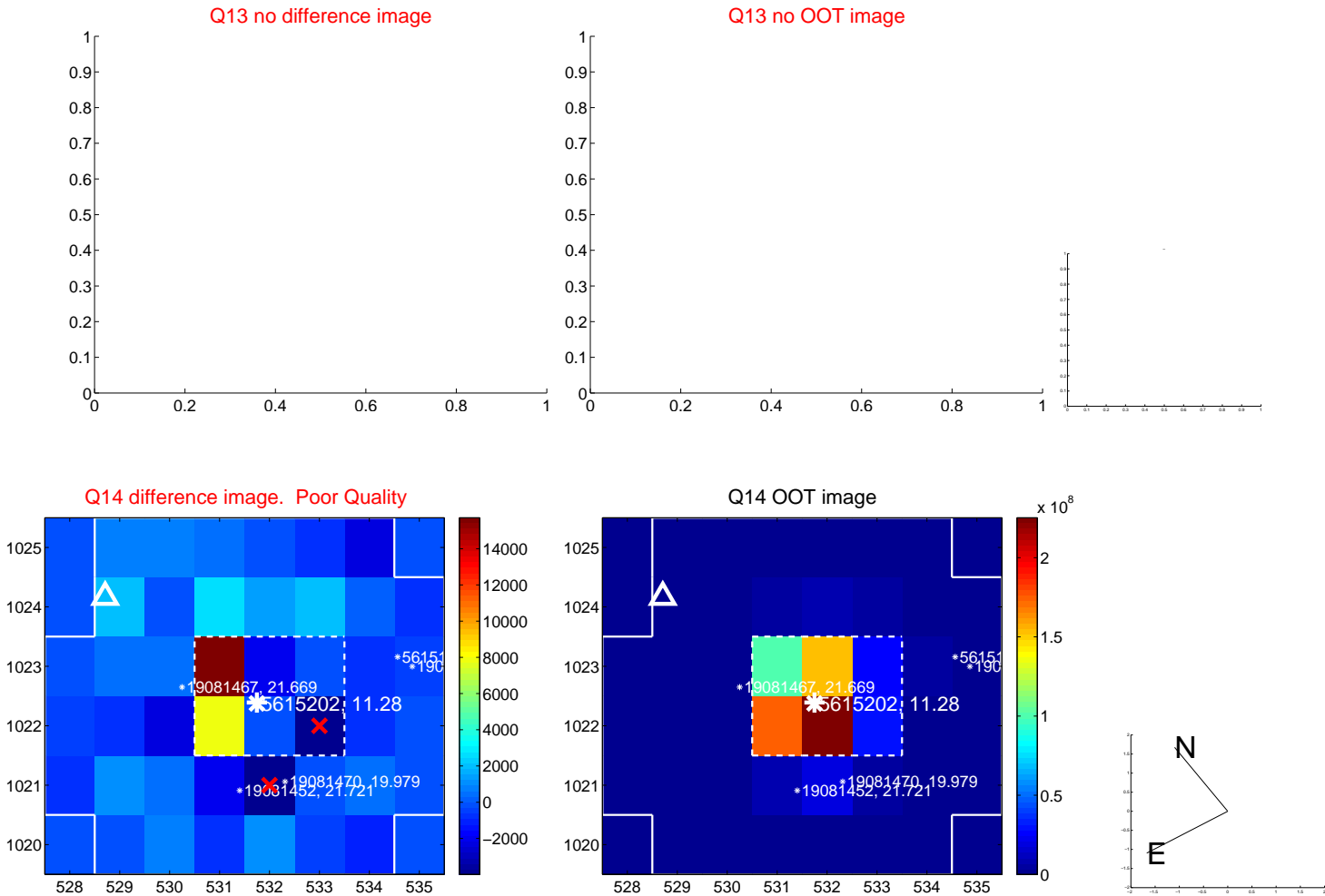
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



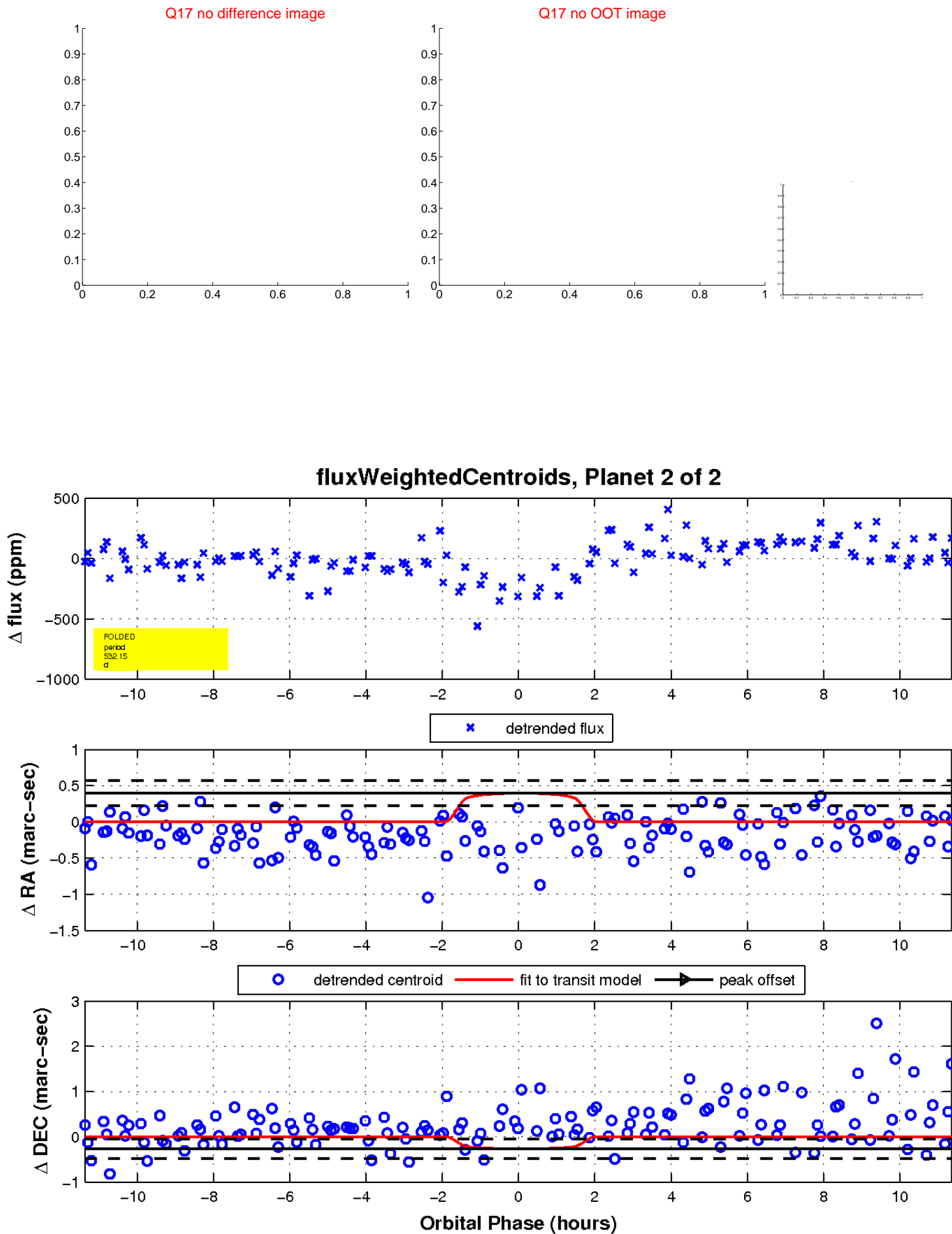
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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UKIRT Image

Declination

