

# KIC 012470530

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
012470530-01	OBS	7536.01	8.207198	135.828703	387955.9	2.500	10346.4	-1.0	0.62	4859	33.88	42.22
012470530-02	OBS	No	8.207260	133.626620	129960.2	3.557	3521.1	2134.1	0.62	4859	33.62	42.22
012470530-03	OBS	No	4.103508	131.558672	23678.9	12.500	1117.9	-1.0	0.62	4859	9.31	106.40
012470530-04	OBS	No	621.346864	159.420495	2430.3	4.072	11.9	8.1	0.62	4859	3.00	0.13
012470530-05	OBS	No	160.426848	166.881674	1419.0	3.397	8.4	7.1	0.62	4859	2.71	0.80

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
012470530-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_ALT—HAS_SEC_TCE—CENT_NOFITS
012470530-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE
012470530-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—RESIDUAL_TCE—CENT_NOFITS
012470530-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—ALL_TRANS_CHASES—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT— INCONSISTENT_TRANS—CENT_FEW_DIFFS
012470530-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—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 012470530-01

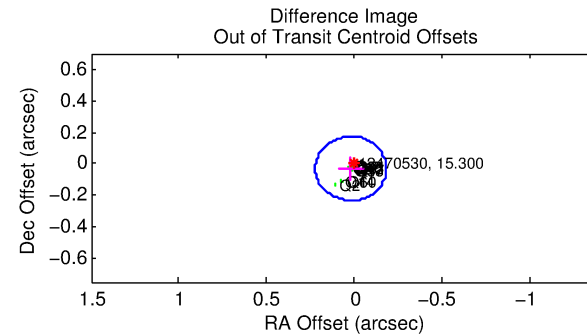
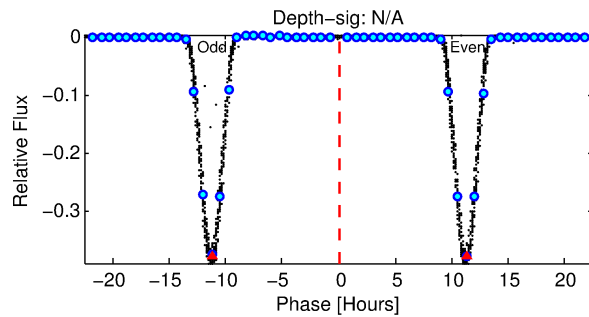
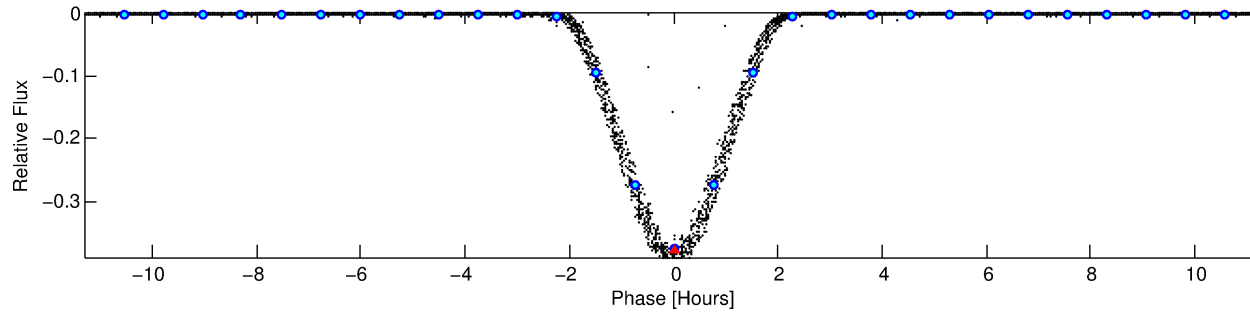
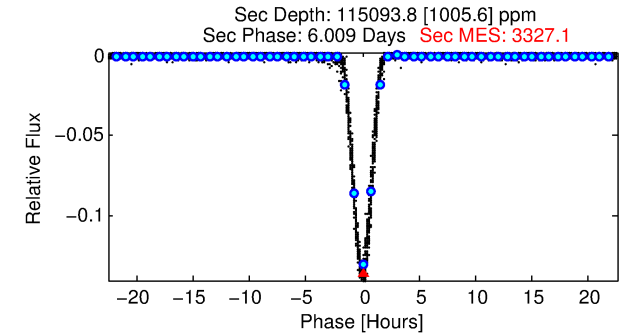
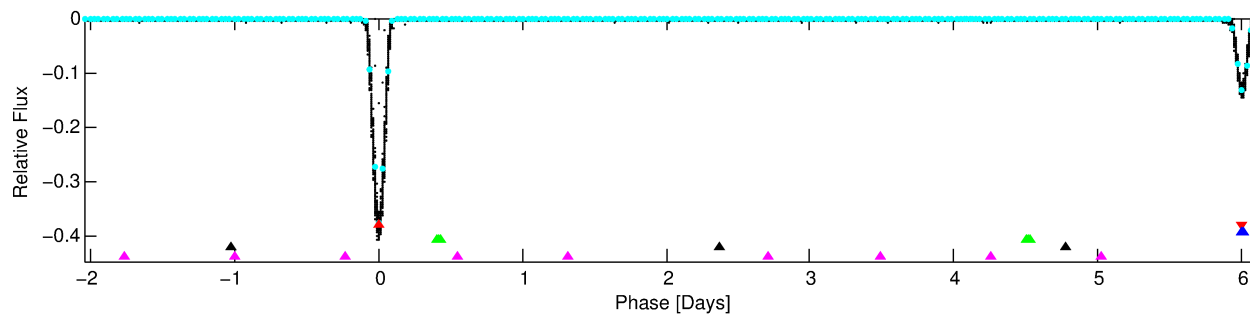
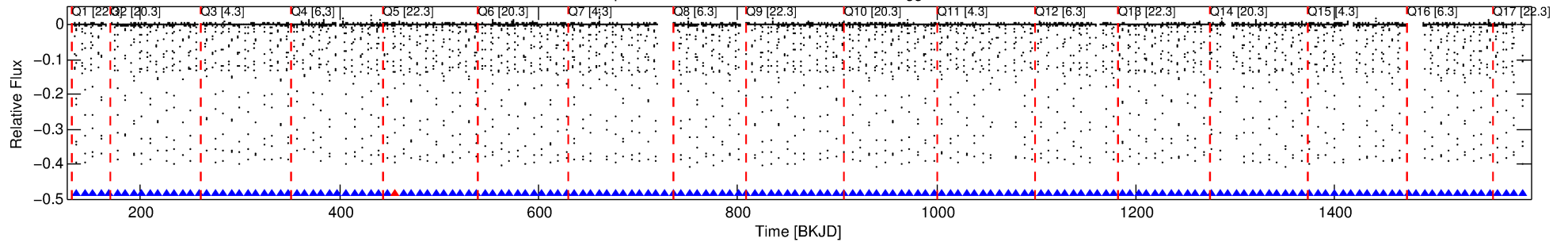
No Significant Match Found

# DV One-Page Summary

KIC: 12470530 Candidate: 1 of 5 Period: 8.207 d

KOI: K07536.01 Corr: 0.769

Kp: 15.30 R\*: 0.62 Rs Teff: 4859.0 K Logg: 4.64 Fe/H: -0.700



## TPS TCE Results:

Period = 8.20720 d  
Epoch = 135.8287 BKJD

DV fit results are unavailable

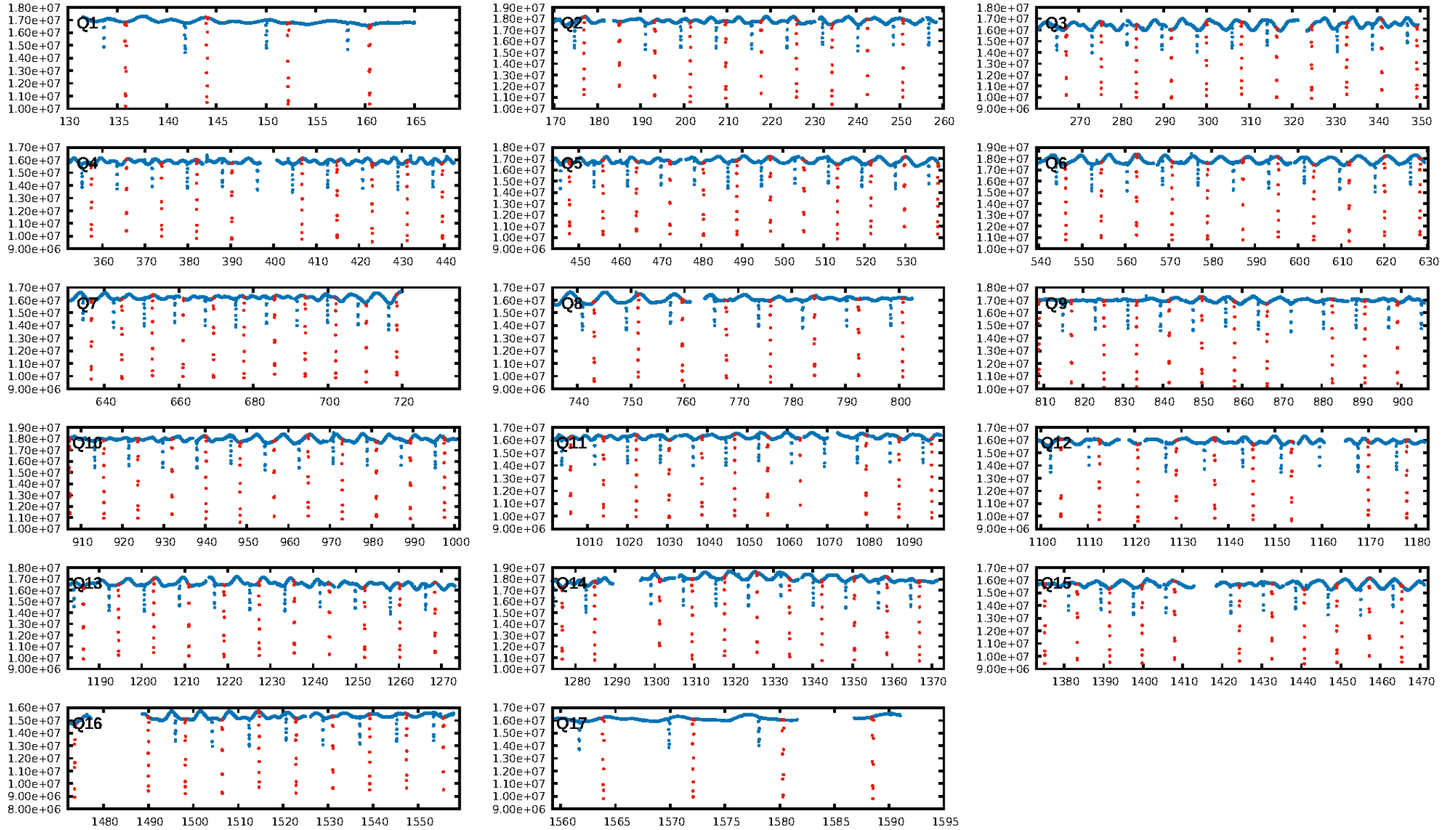
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [7.73 $\sigma$ ]  
LongPeriod-sig: 0.0% [0.00 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 0.99 [157/158]  
GhostDiagnostic-chr: 1.245  
Centroid-sig: 0.0%  
Centroid-so: 1.173 arcsec [1253.51 $\sigma$ ]  
OotOffset-rm: 0.036 arcsec [0.53 $\sigma$ ]  
KicOffset-rm: 0.016 arcsec [0.21 $\sigma$ ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 0.18 [3/17]

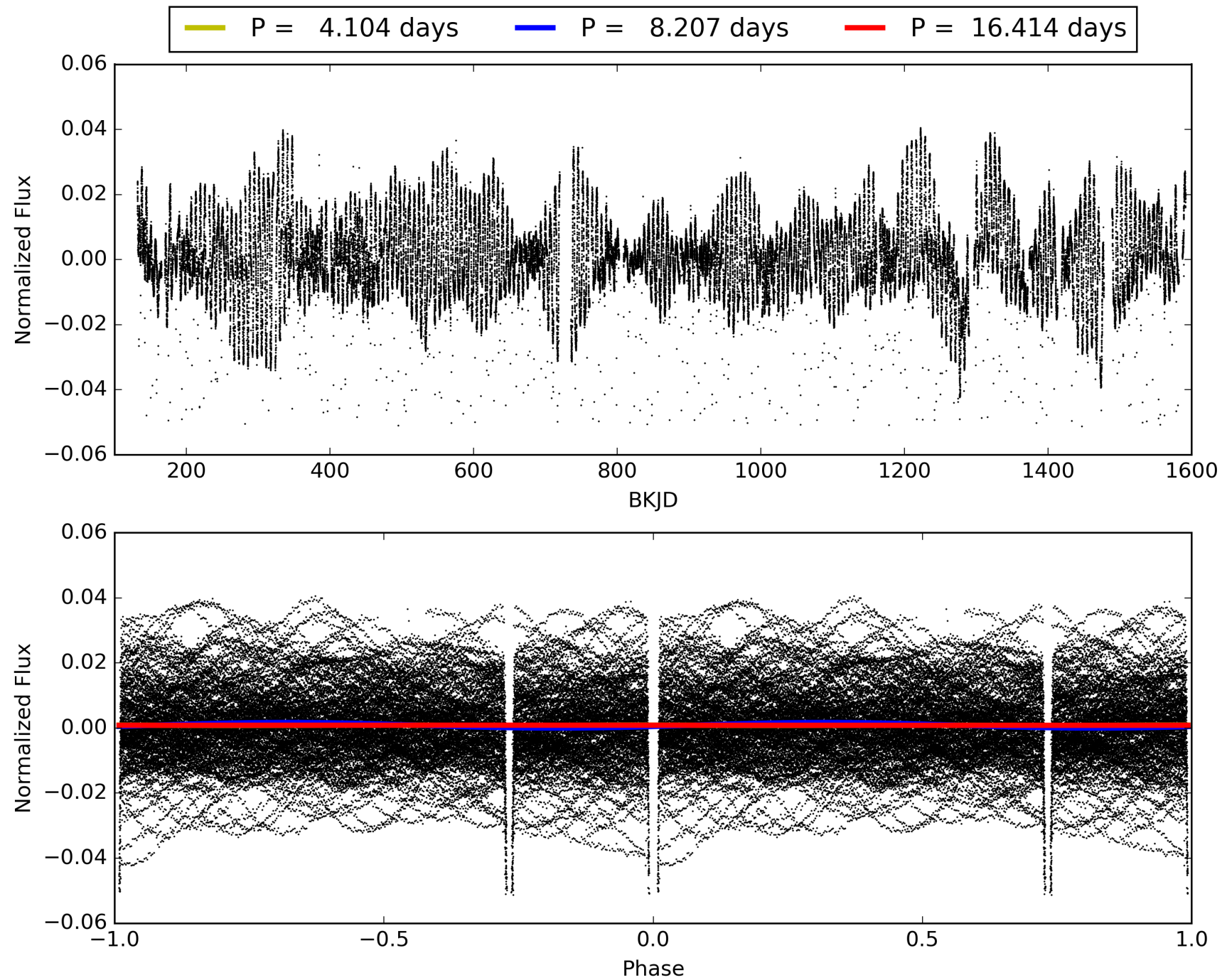
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 05:47:30 Z

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

# TCE 012470530-01, PDC Light Curves



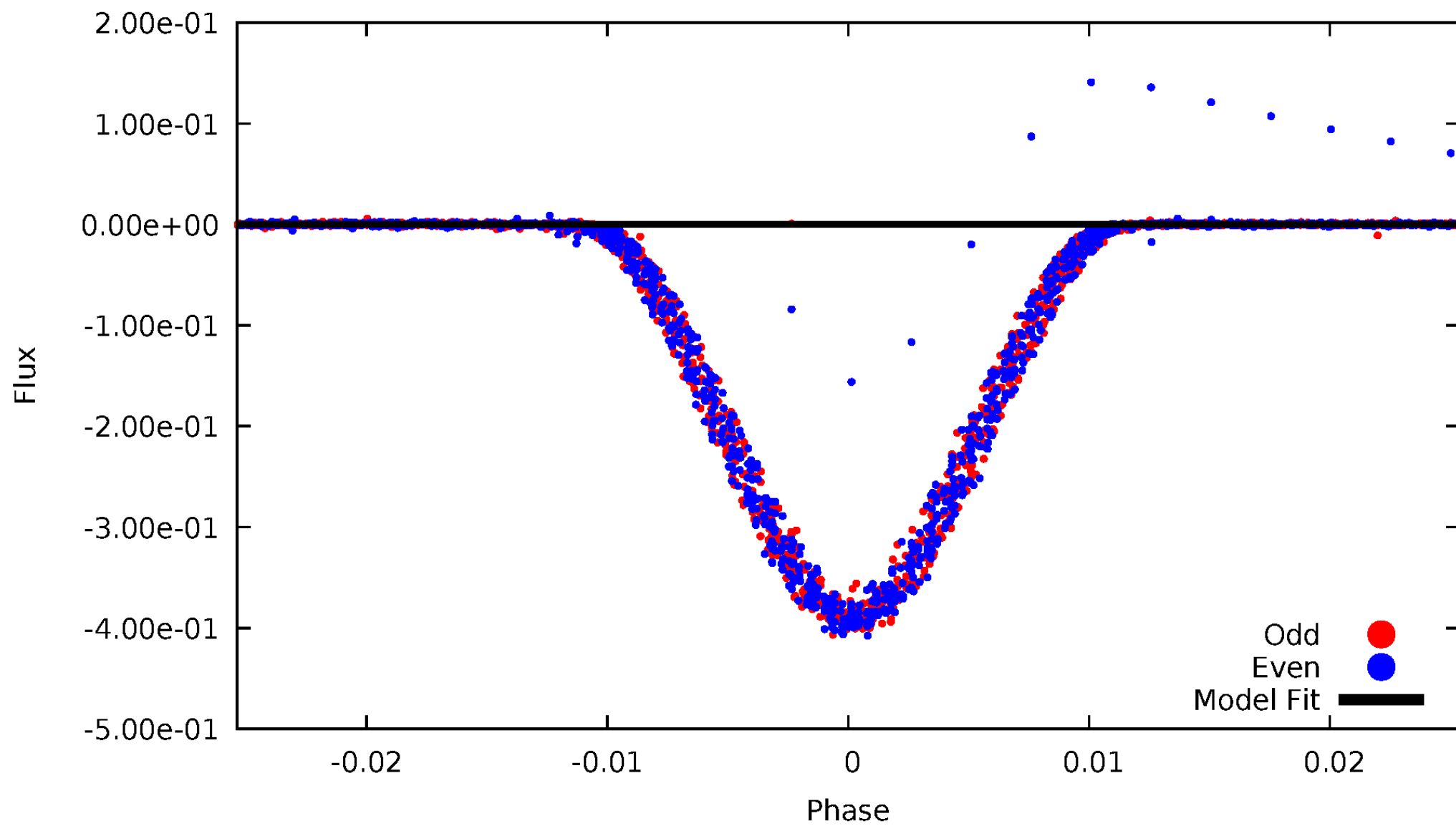
TCE 012470530-01





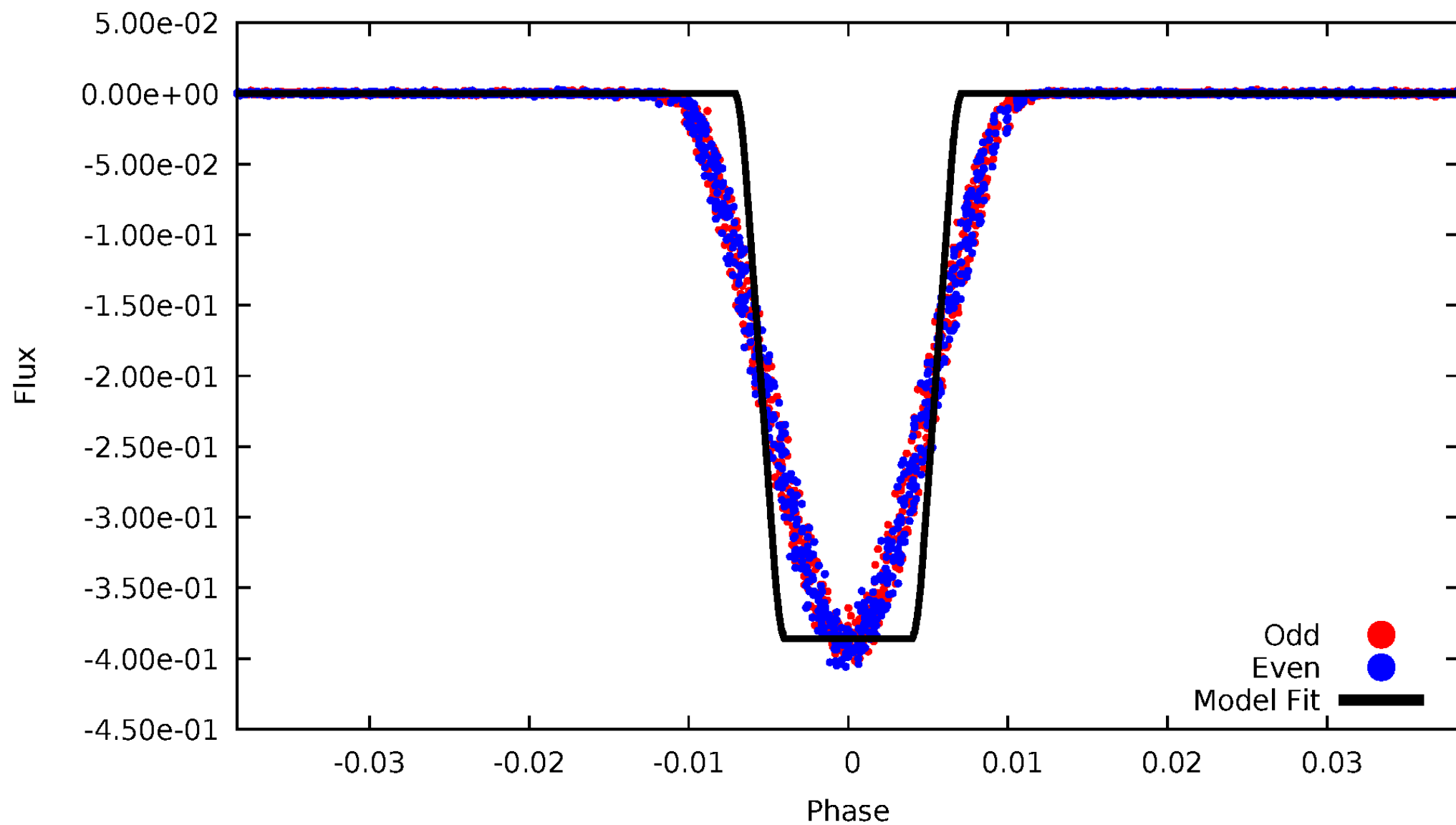
# DV Odd/Even

TCE 012470530-01



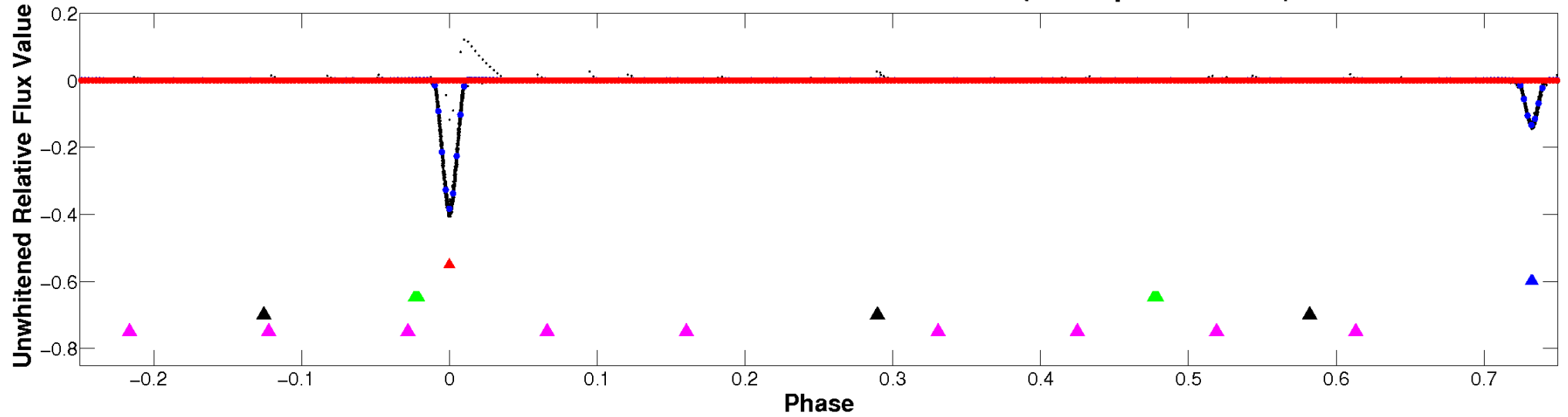
# ALT Odd/Even

TCE 012470530-01



# Non-Whitened Vs. Whitened Light Curve

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

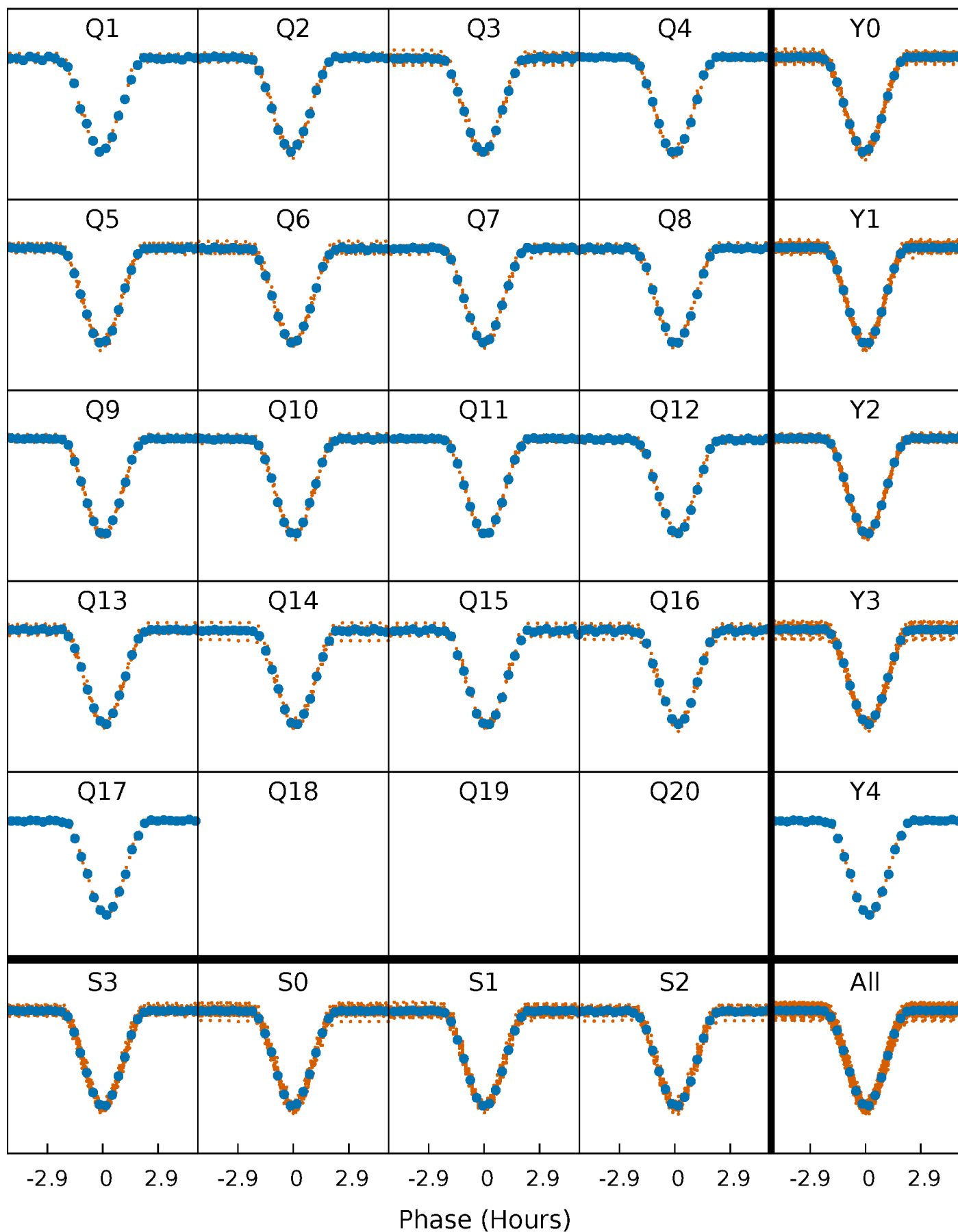


Planet 1 : Phased Whitened Flux Time Series (TPS Epoch/Period)



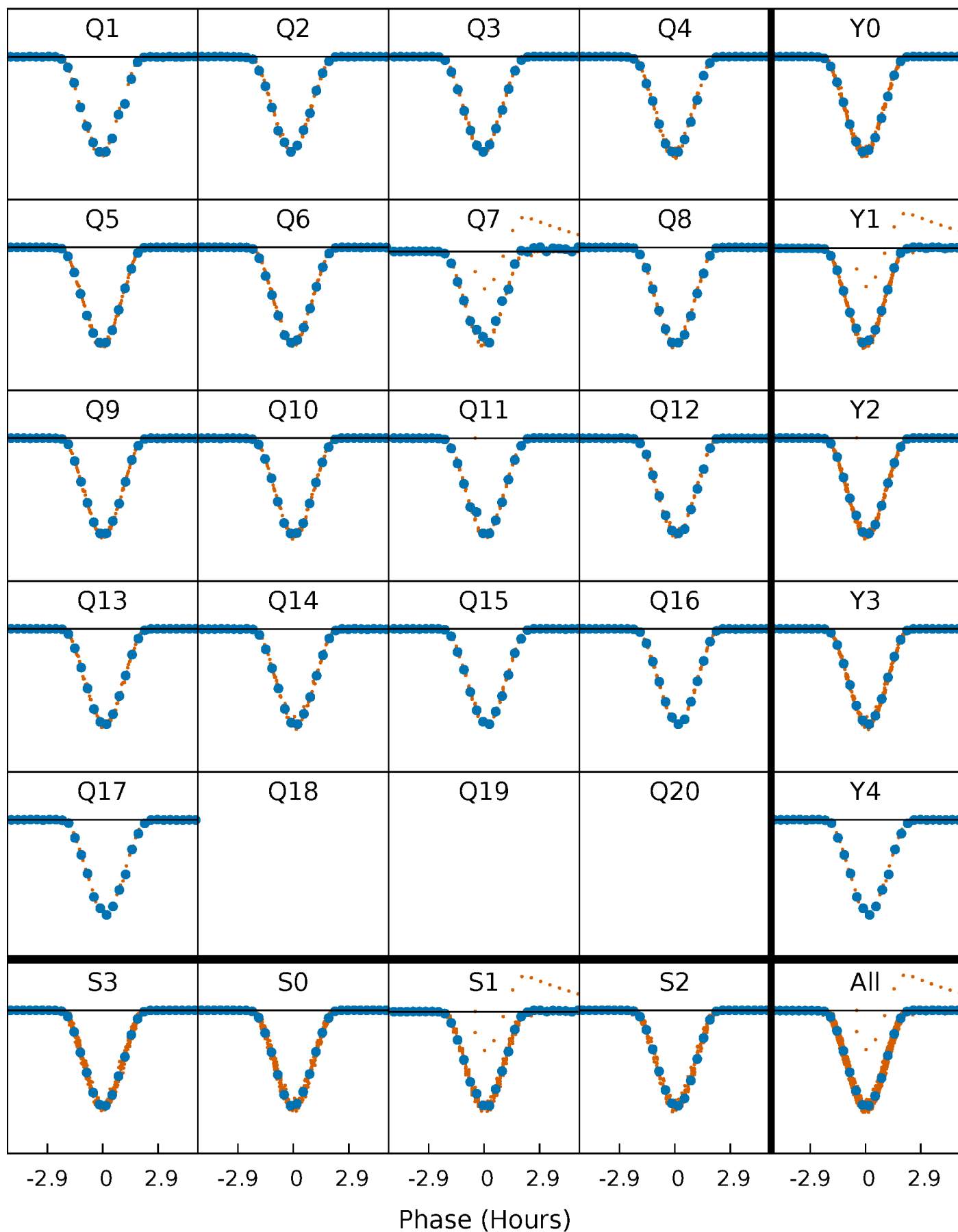
# PDC Quarter-Phased Transit Curves

TCE 012470530-01 P= 8.207198 Days  $T_0=135.828703$  (BKJD)



# DV Quarter-Phased Transit Curves

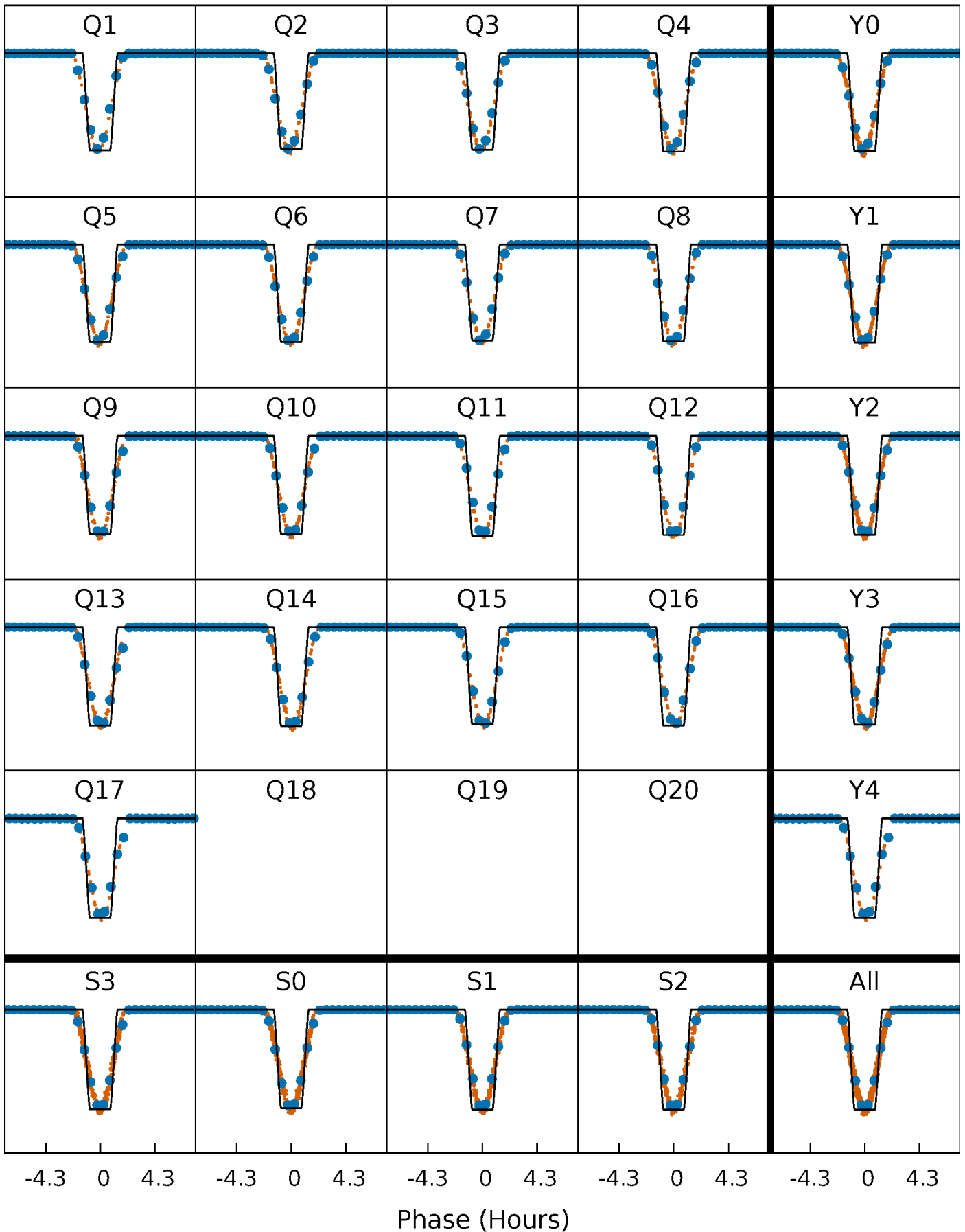
TCE 012470530-01 P= 8.207198 Days  $T_0=135.828703$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

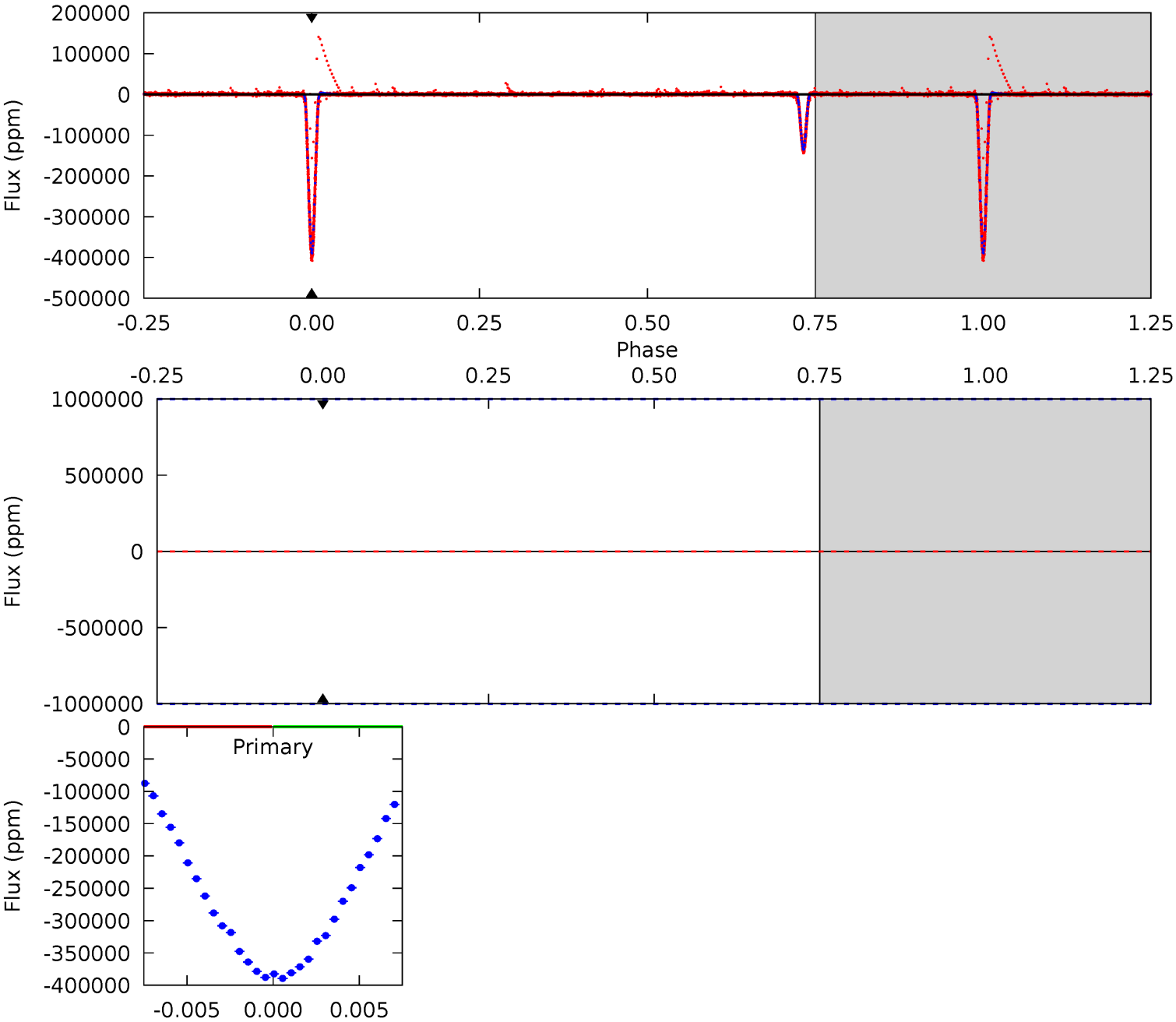
TCE 012470530-01 P= 8.207198 Days  $T_0=135.830122$  (BKJD)



# DV Model-Shift Uniqueness Test

012470530-01, P = 8.207198 Days, E = 127.621505 Days

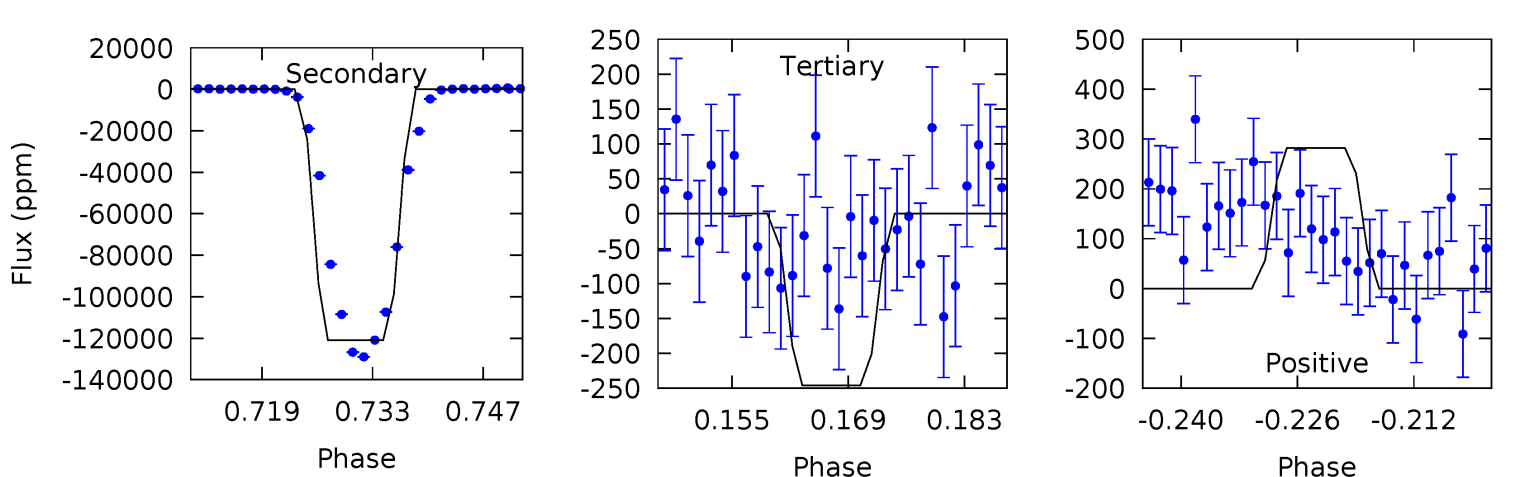
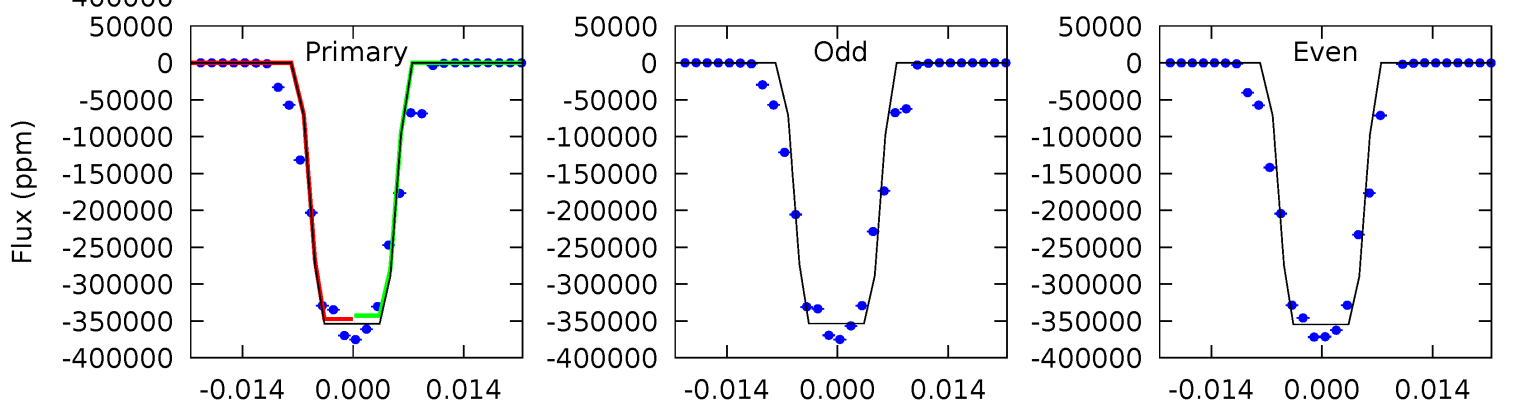
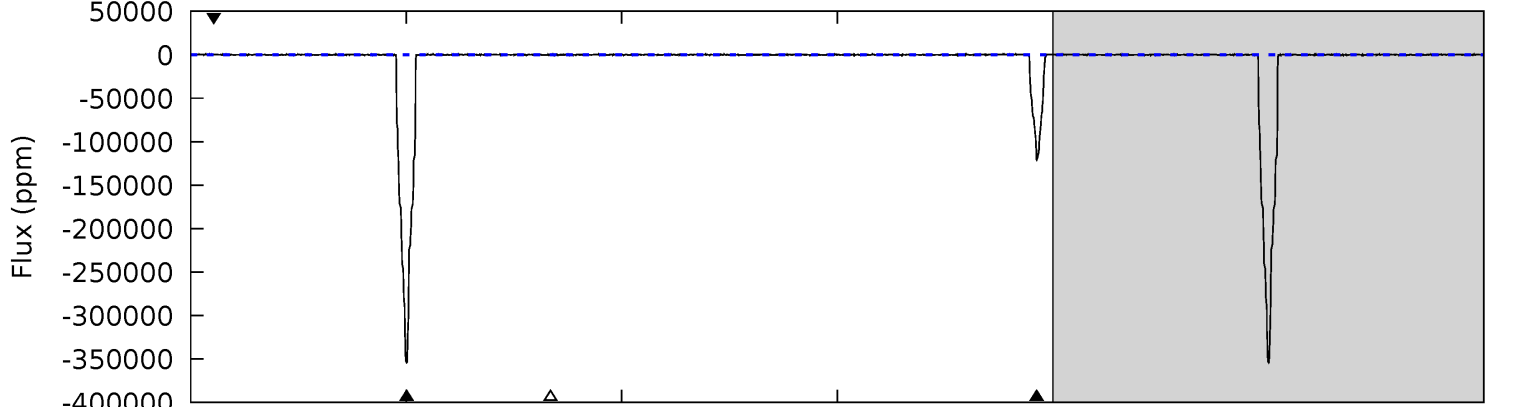
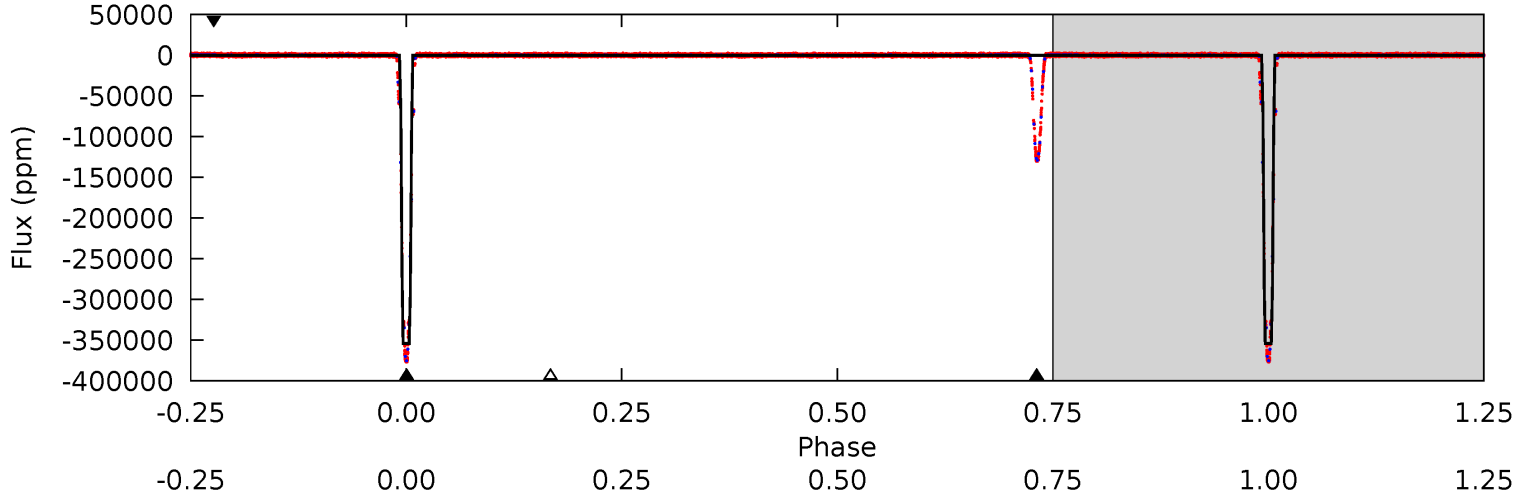
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



# Alt Model-Shift Uniqueness Test

012470530-01, P = 8.207198 Days, E = 127.622924 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
4991	1706	3.47	3.98	4.96	2.45	1.27	4987	4987	1703	1702	10.3	1.00	0.00	0



### Stellar Parameters For KIC 012470530

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4859^{+144}_{-144}$	$4.637^{+0.060}_{-0.035}$	$-0.700^{+0.300}_{-0.300}$	$0.621^{+0.054}_{-0.054}$	$0.610^{+0.060}_{-0.030}$	$3.588^{+0.869}_{-0.524}$
	+3%/-3%	+1%/-1%	+43%/-43%	+9%/-9%	+10%/-5%	+24%/-15%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 012470530-01 / KOI 7536.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$0 \pm 1000000$	$33.17^{+6.60}_{-6.67}$	$903^{+31}_{-32}$	$2041^{+2180}_{-6127}$	$1.568^{+257.454}_{-218.003}$
Alt.	$-121013 \pm 71$	$41.73^{+6.73}_{-6.96}$	$902^{+32}_{-32}$	$4007^{+280}_{-235}$	$202^{+87}_{-52}$

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

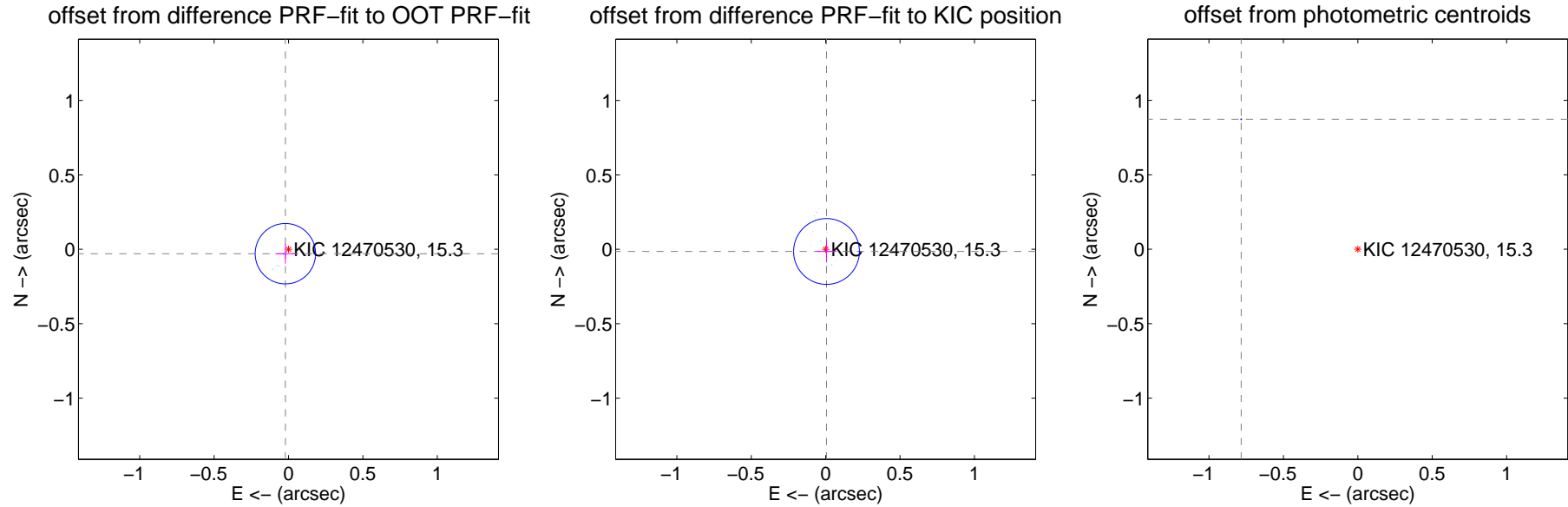
## DV Centroid Data

Supplemental centroid analysis for 012470530-01. Kepler magnitude: 15.30. Transit SNR -1.00

There are 17 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.05 arcsec

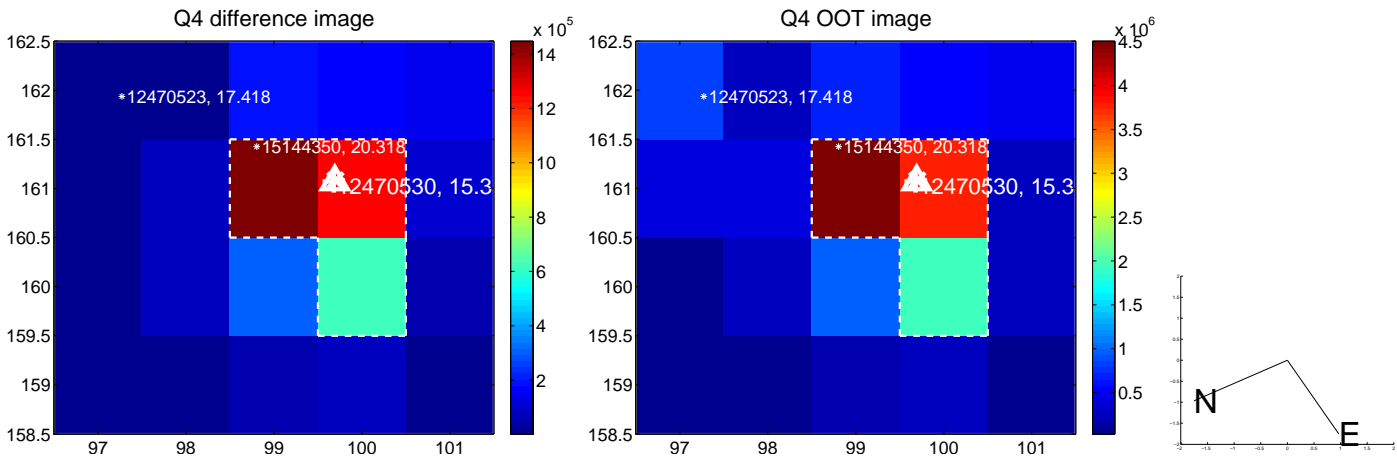
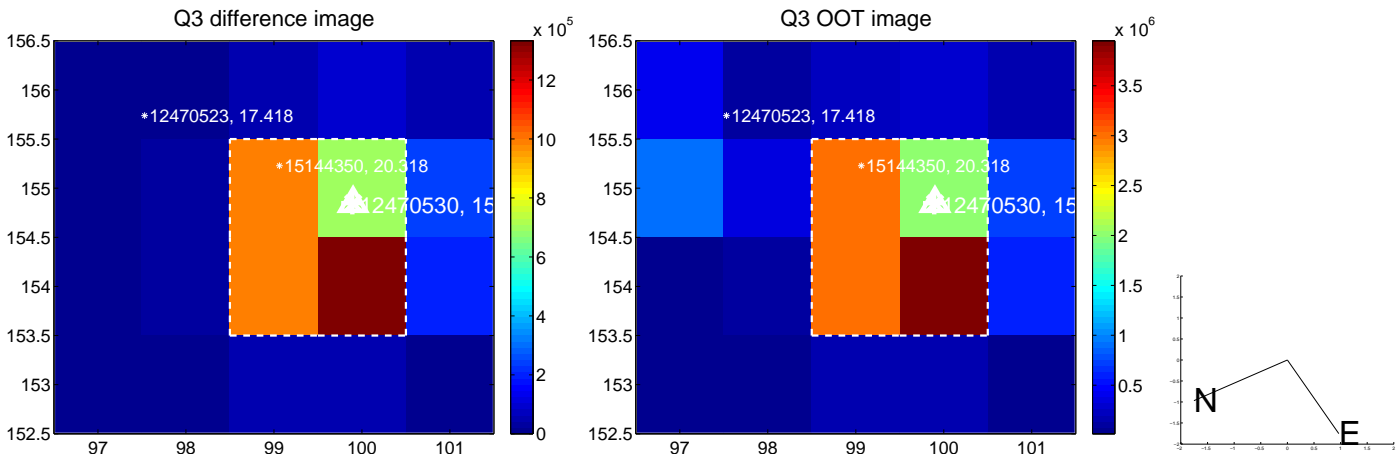
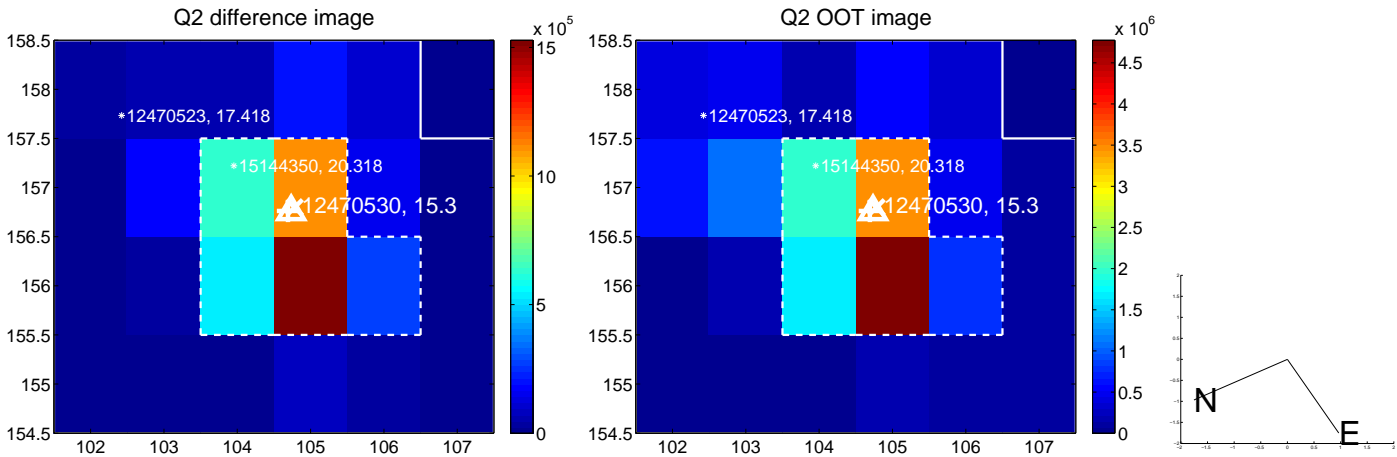
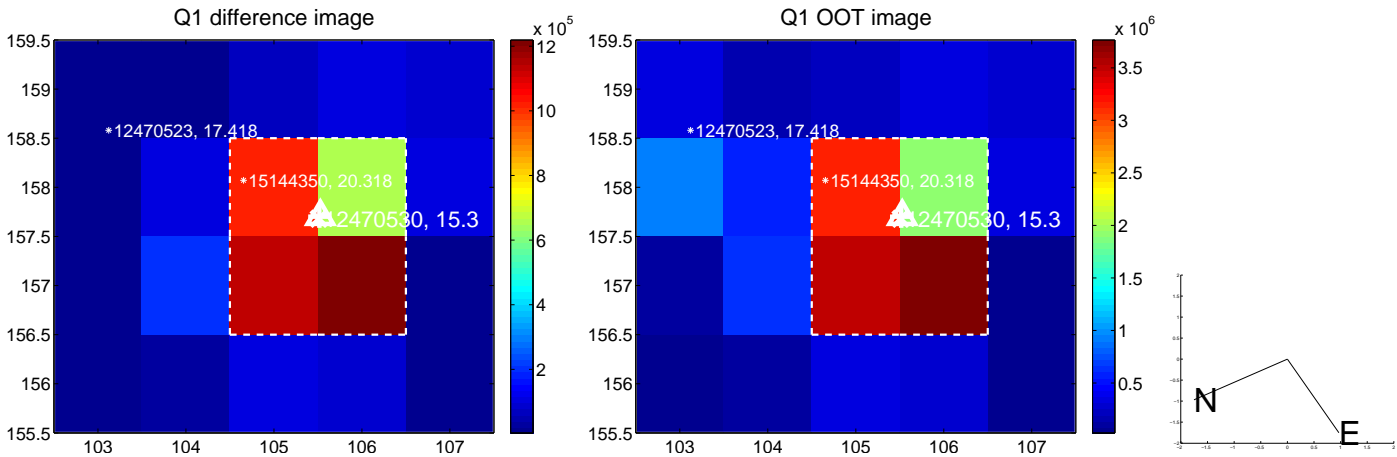
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.036 \pm 0.068$	0.53	$0.021 \pm 0.067$	$-0.029 \pm 0.067$
PRF-fit source offset from KIC position	$0.016 \pm 0.074$	0.21	$-0.006 \pm 0.068$	$-0.014 \pm 0.073$
photometric centroid source offset	$1.17 \pm 0.00$	$1253.51$	$0.78 \pm 0.00$	$0.87 \pm 0.00$



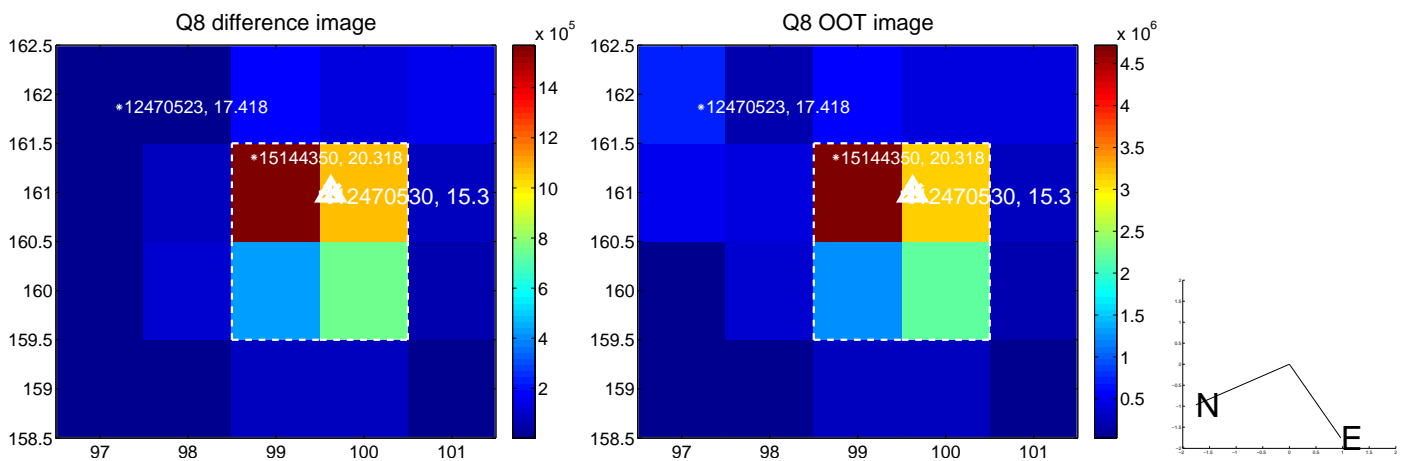
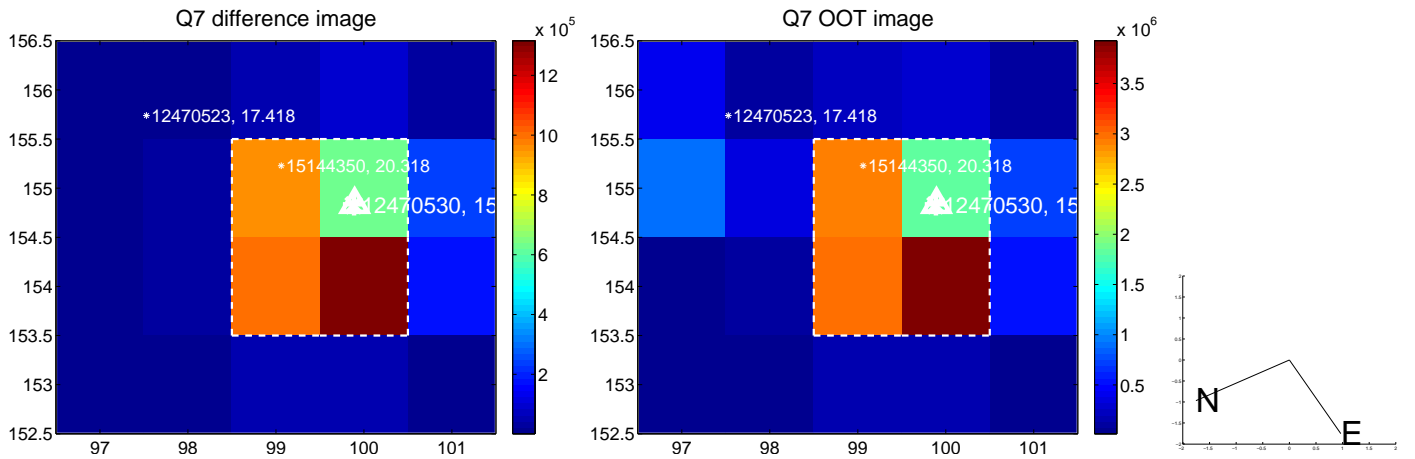
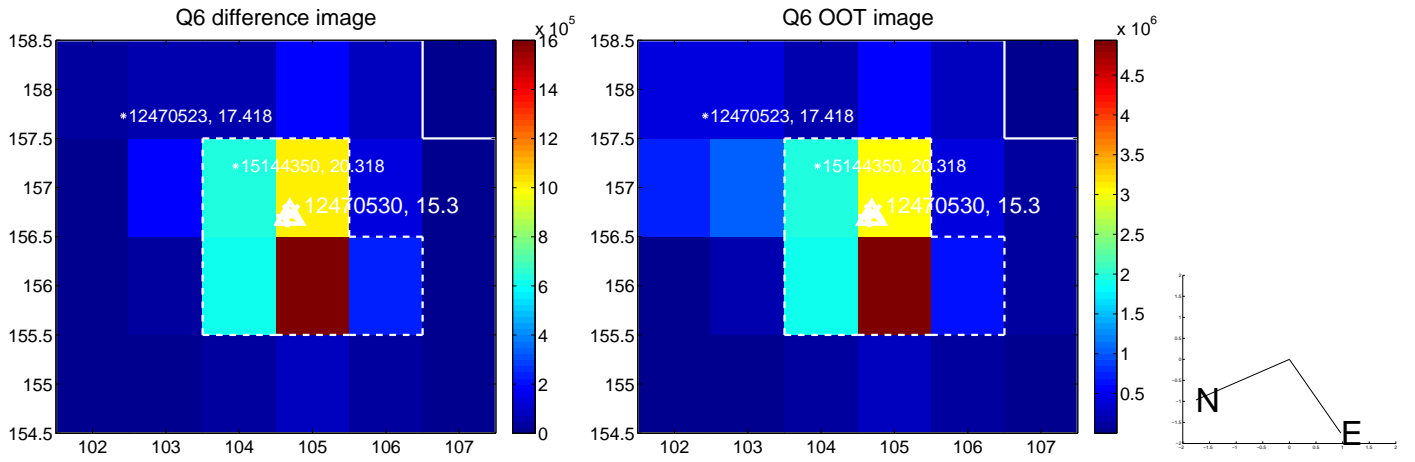
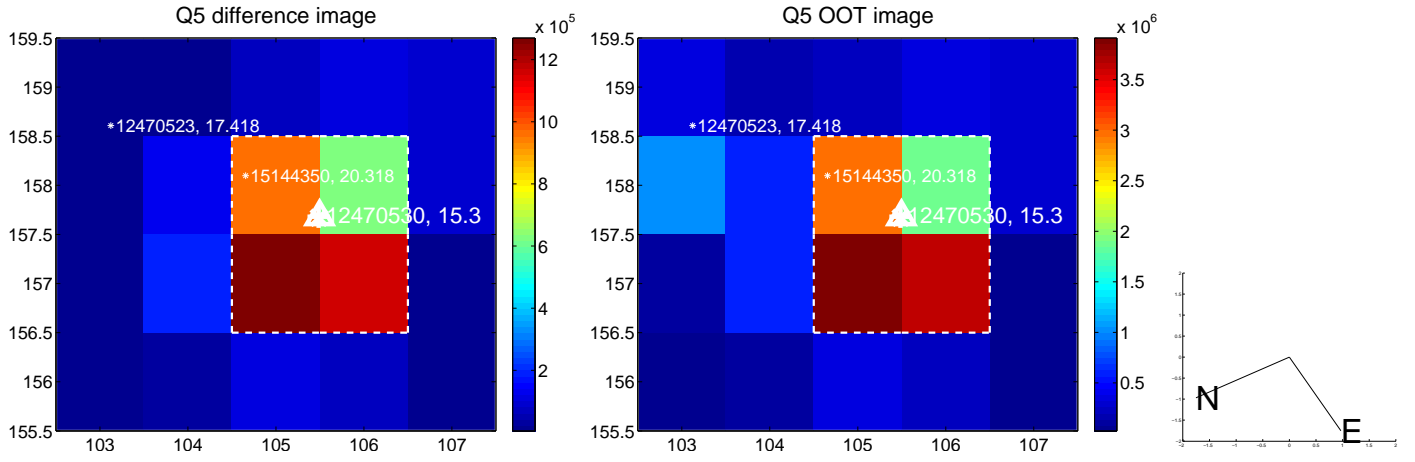
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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



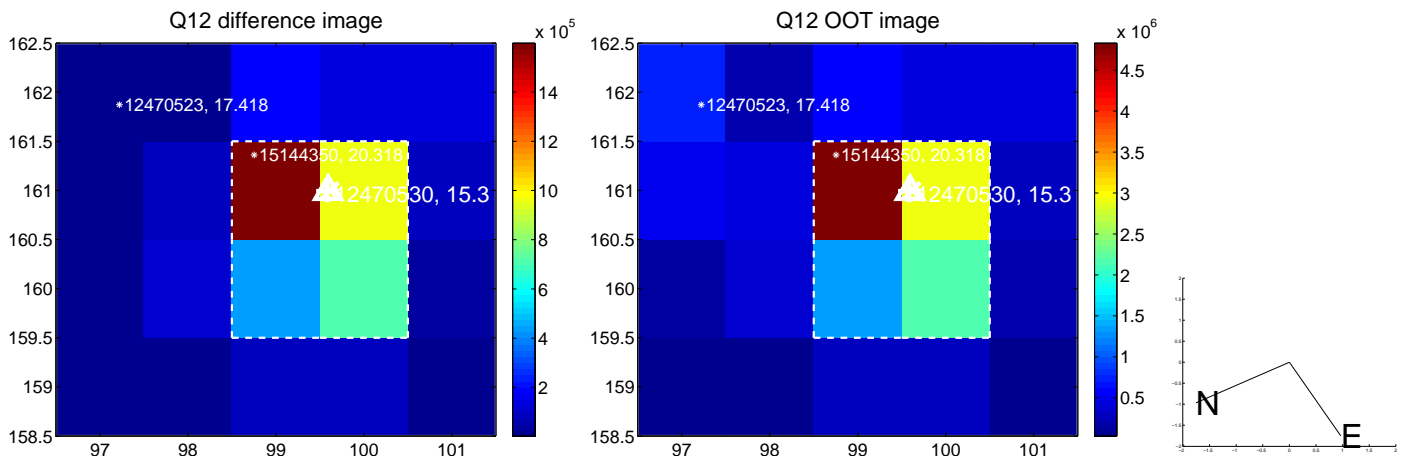
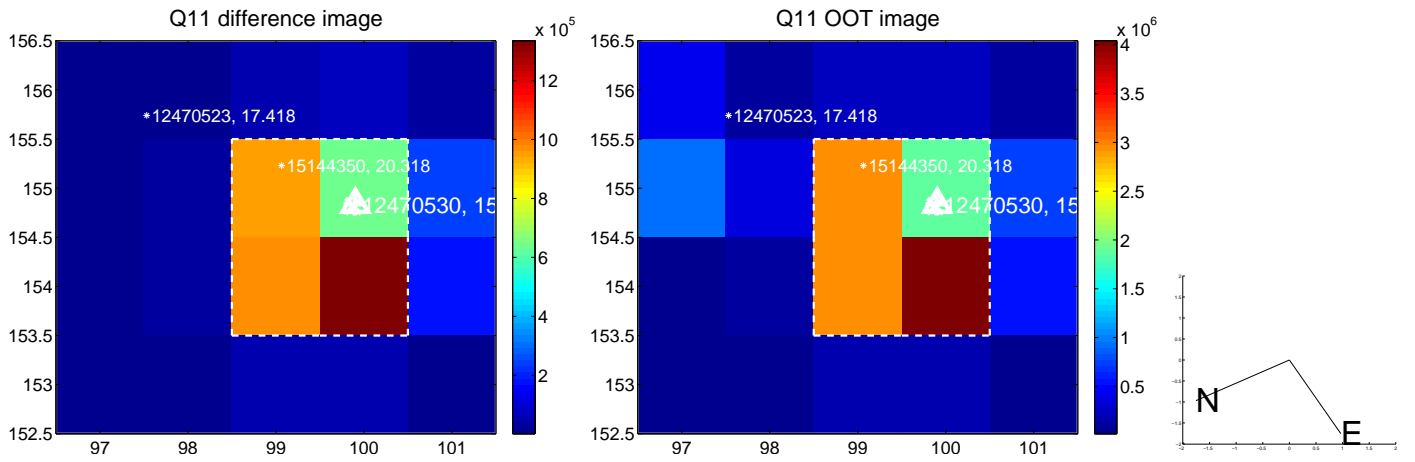
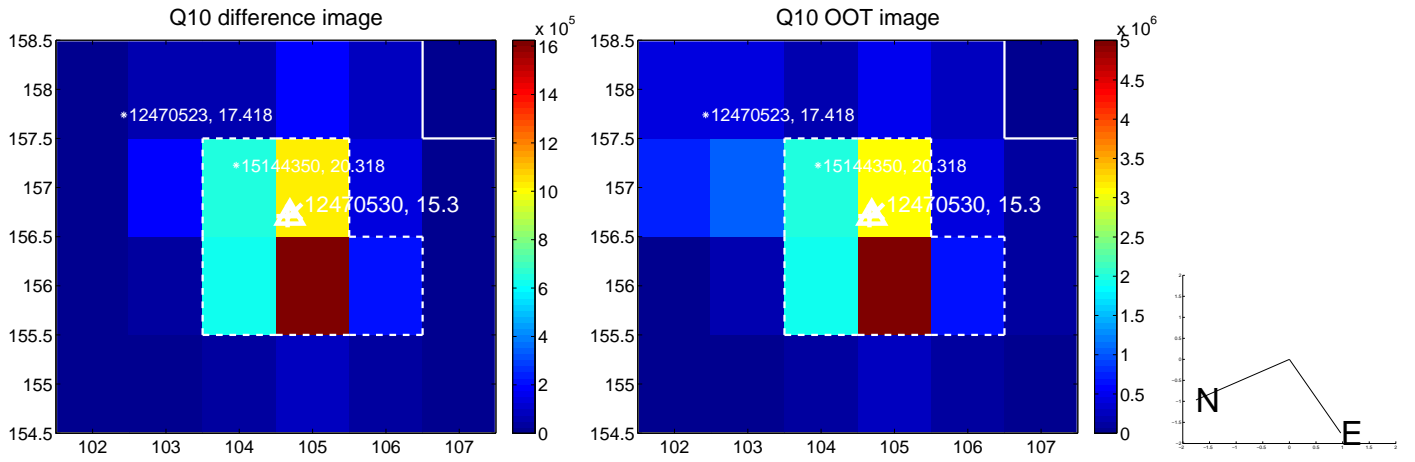
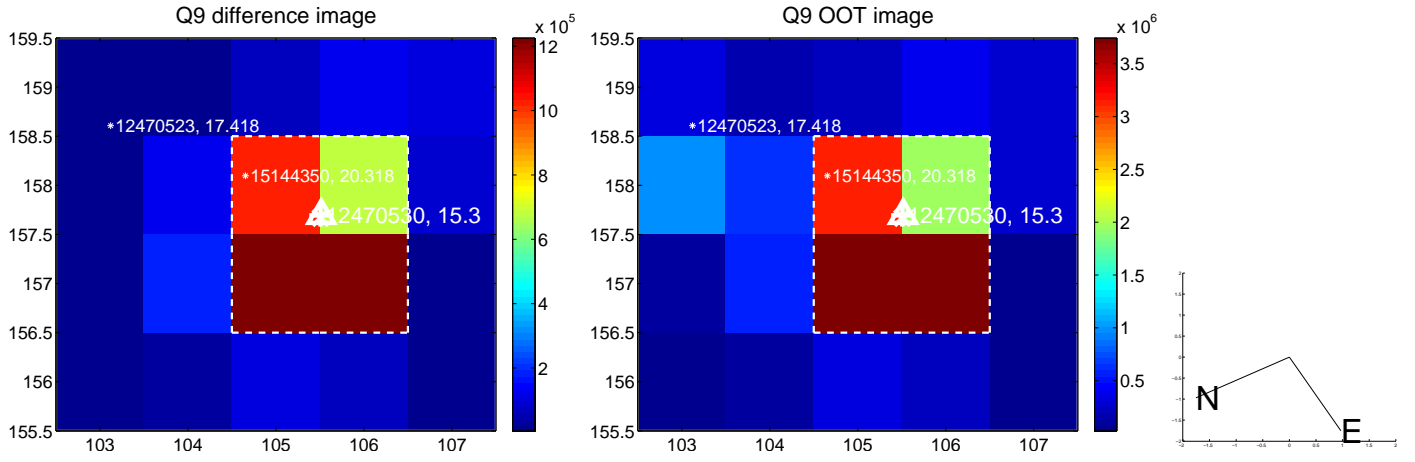
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



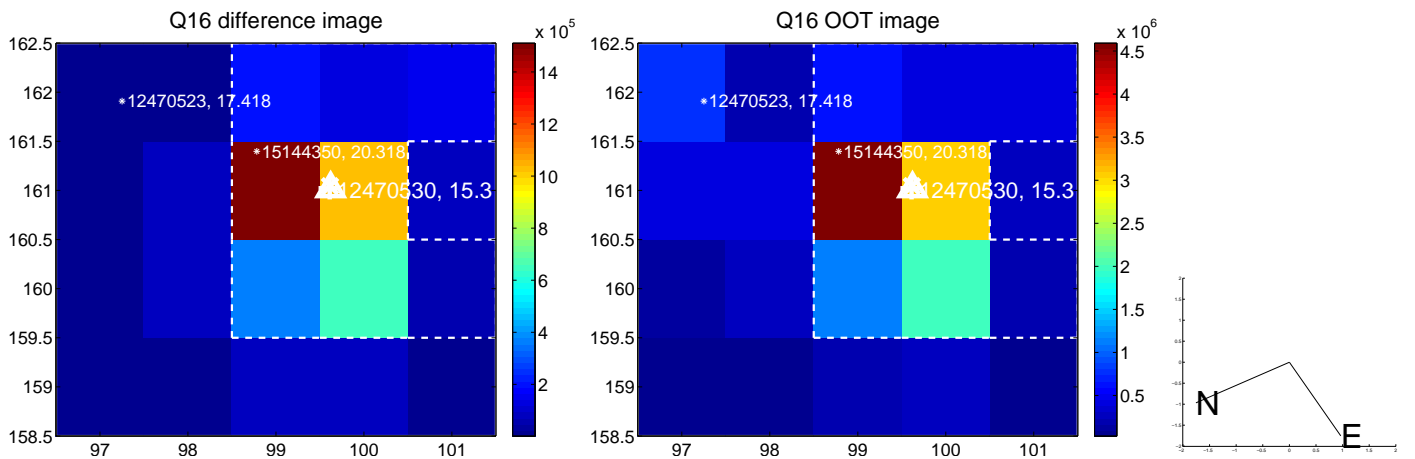
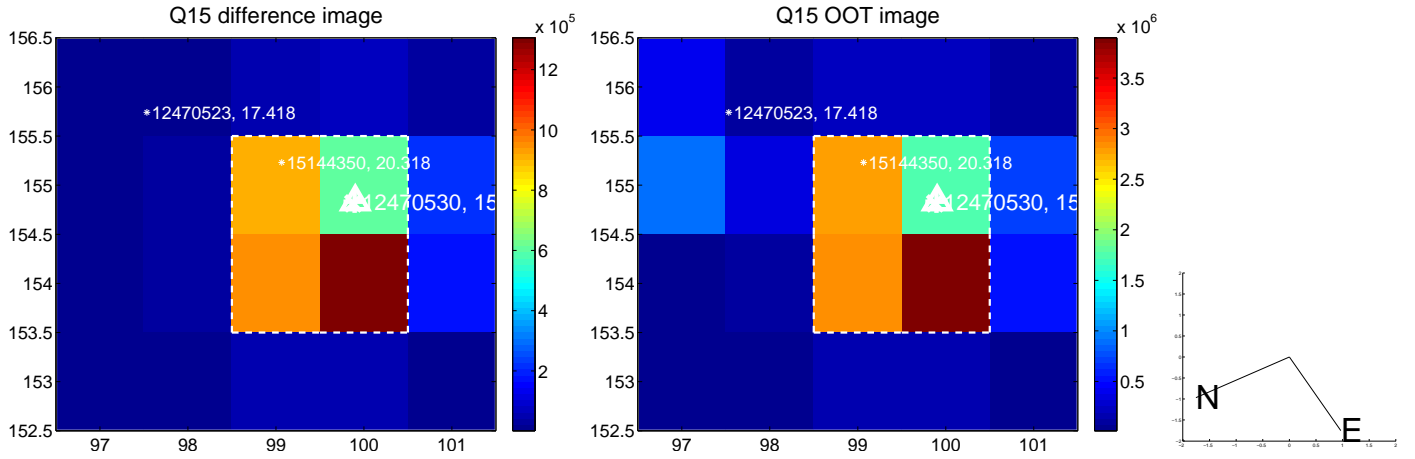
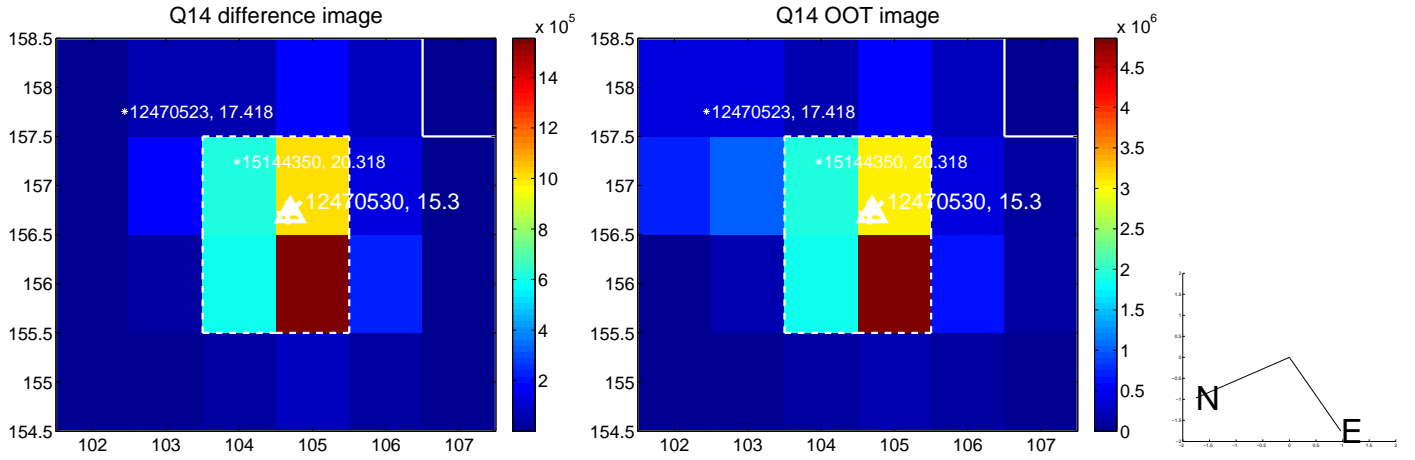
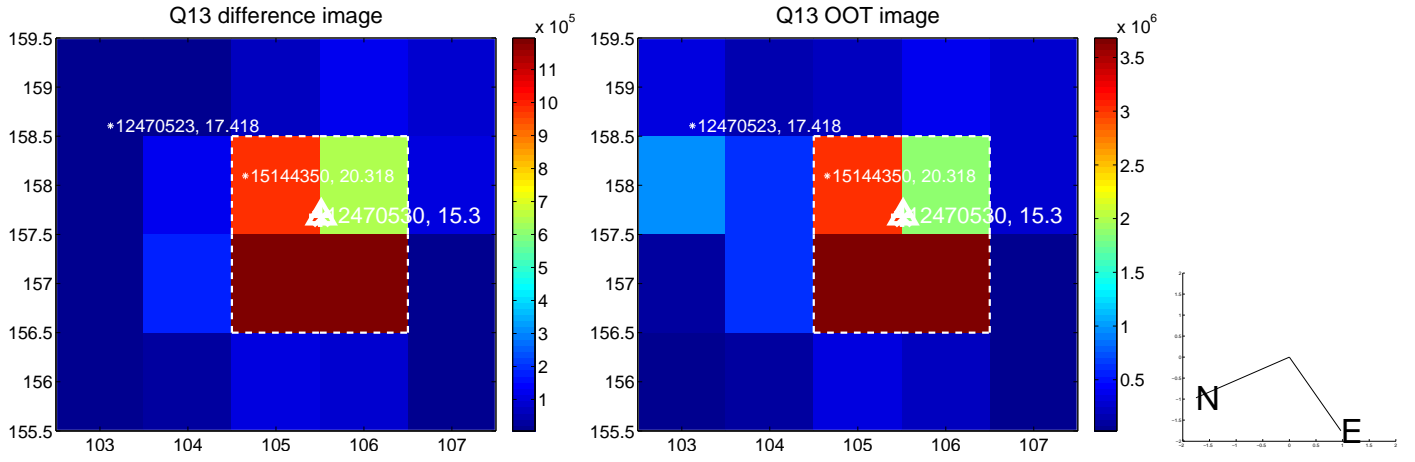
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



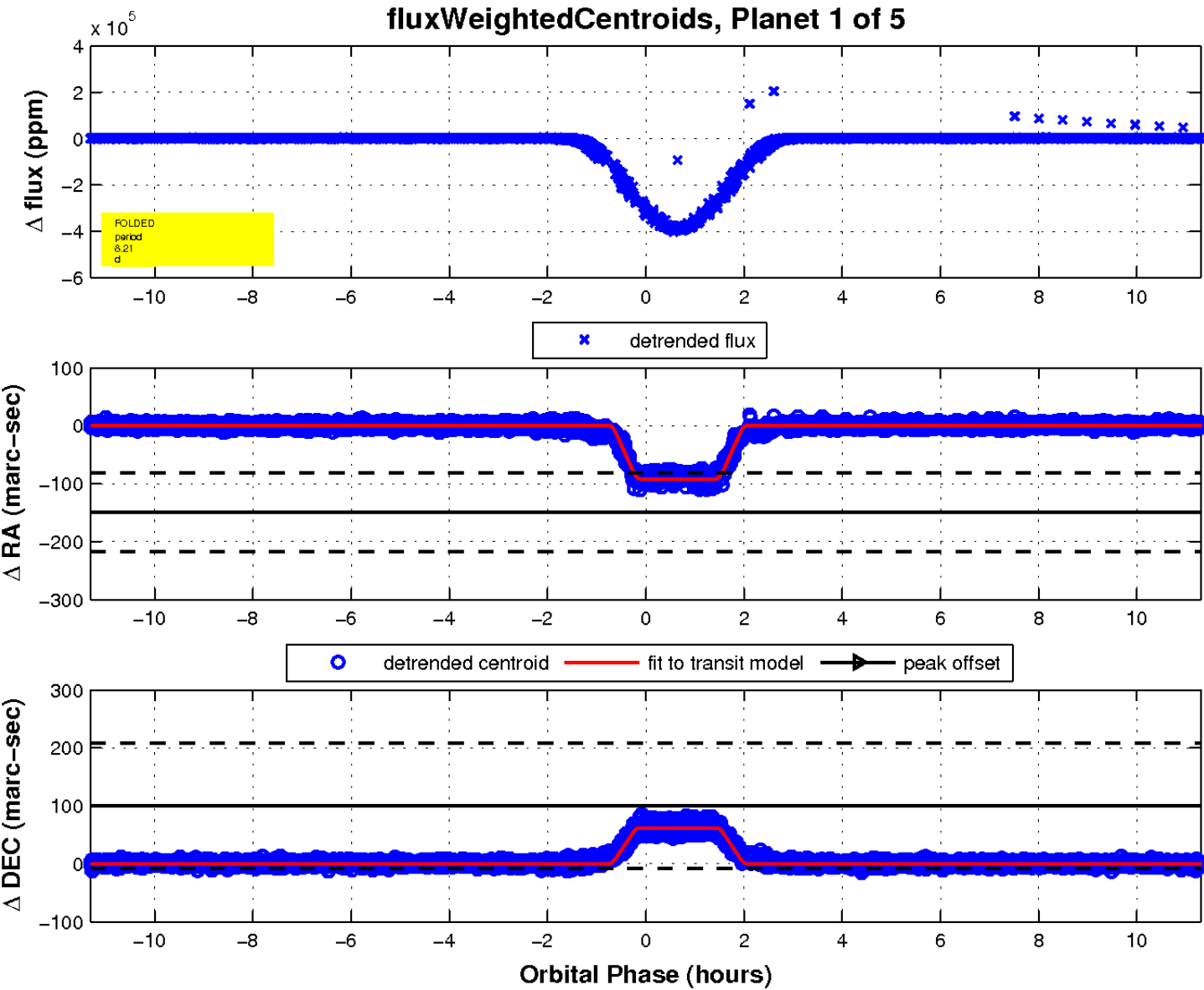
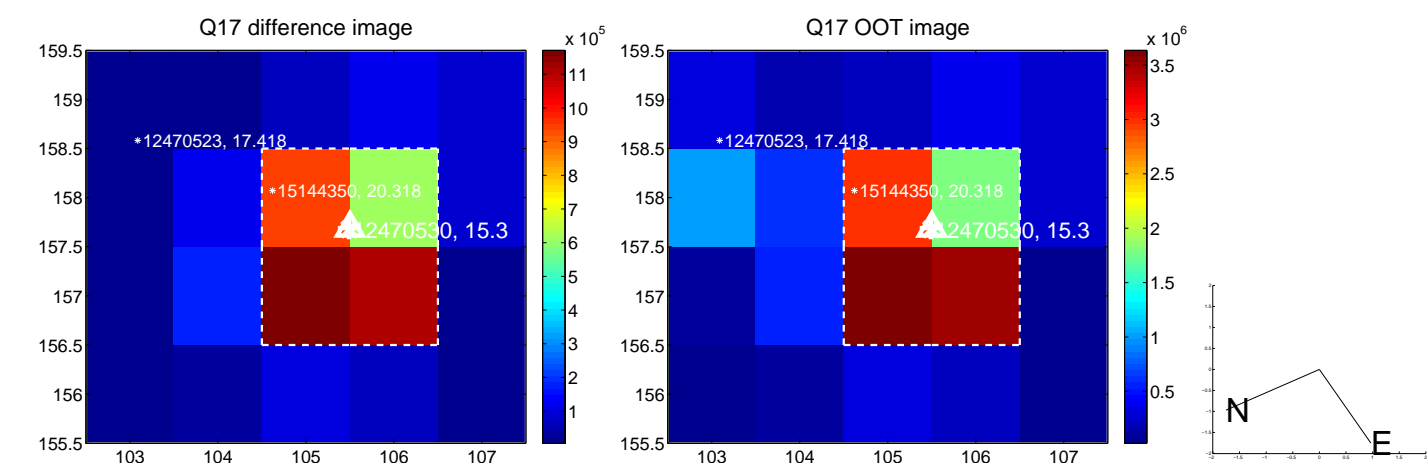
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



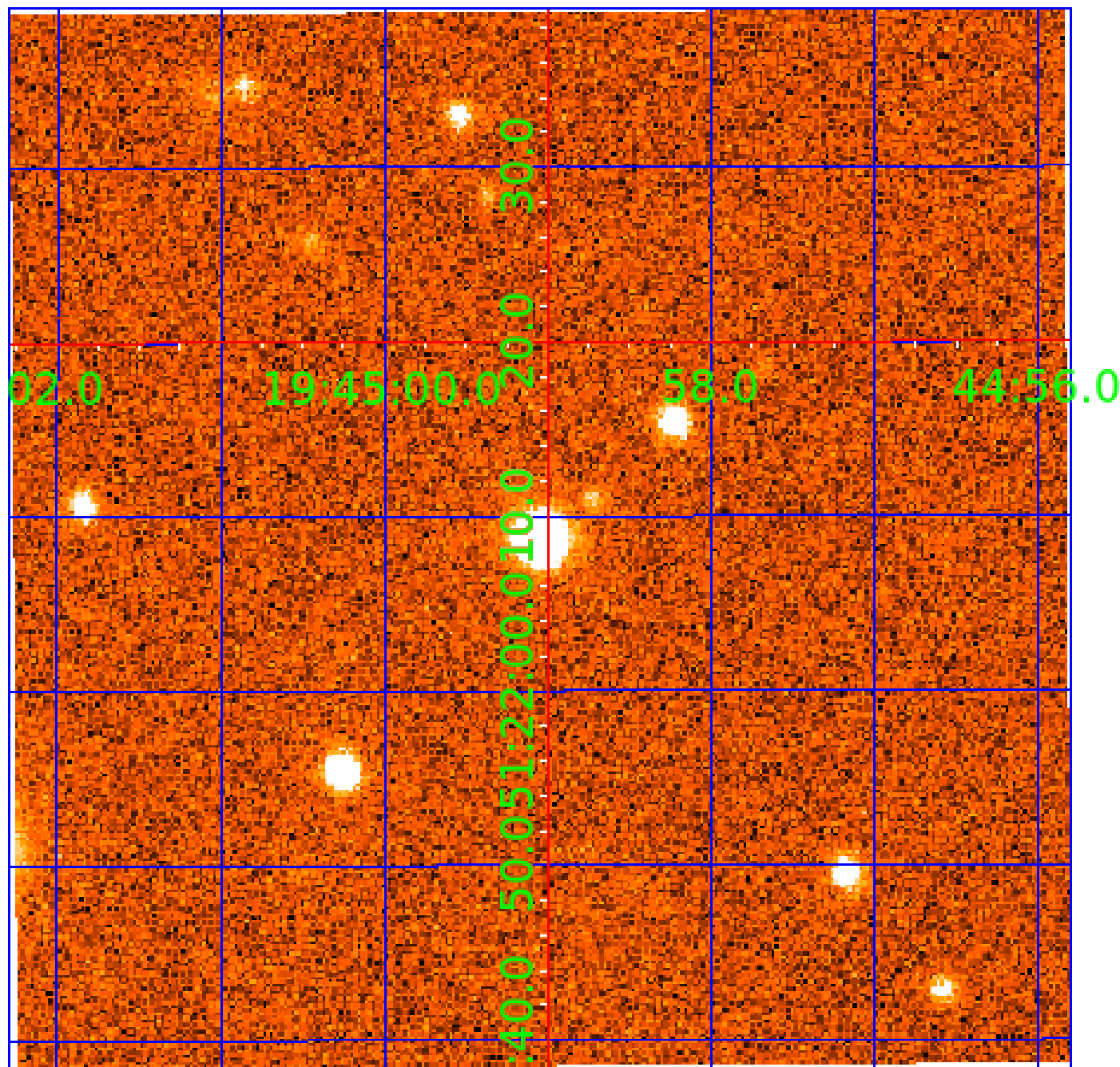
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image

Declination



# KIC 012470530

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
012470530-01	OBS	7536.01	8.207198	135.828703	387955.9	2.500	10346.4	-1.0	0.62	4859	33.88	42.22
012470530-02	OBS	No	8.207260	133.626620	129960.2	3.557	3521.1	2134.1	0.62	4859	33.62	42.22
012470530-03	OBS	No	4.103508	131.558672	23678.9	12.500	1117.9	-1.0	0.62	4859	9.31	106.40
012470530-04	OBS	No	621.346864	159.420495	2430.3	4.072	11.9	8.1	0.62	4859	3.00	0.13
012470530-05	OBS	No	160.426848	166.881674	1419.0	3.397	8.4	7.1	0.62	4859	2.71	0.80

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
012470530-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_ALT—HAS_SEC_TCE—CENT_NOFITS
012470530-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE
012470530-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—RESIDUAL_TCE—CENT_NOFITS
012470530-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—ALL_TRANS_CHASES—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT— INCONSISTENT_TRANS—CENT_FEW_DIFFS
012470530-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—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.

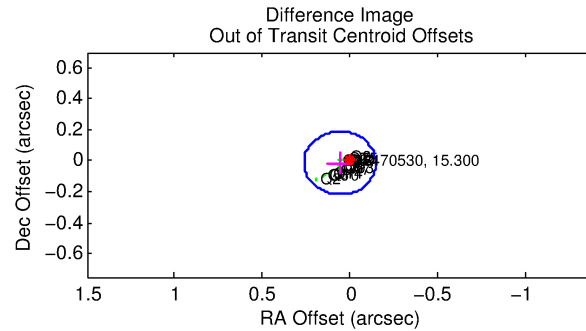
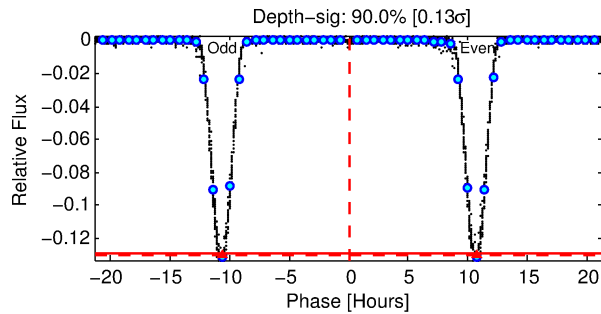
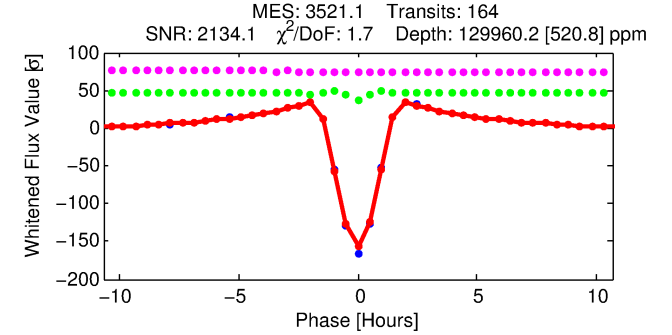
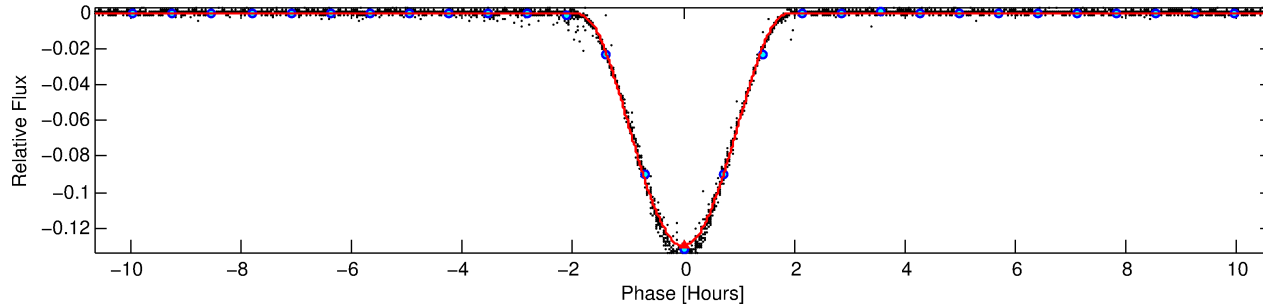
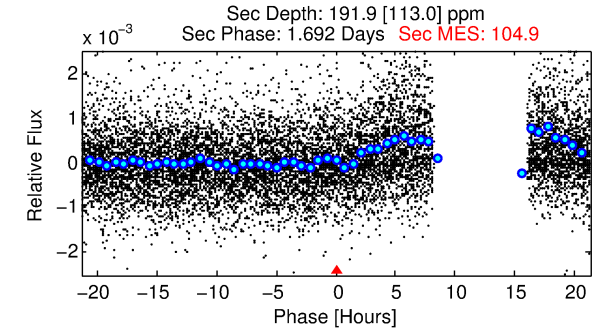
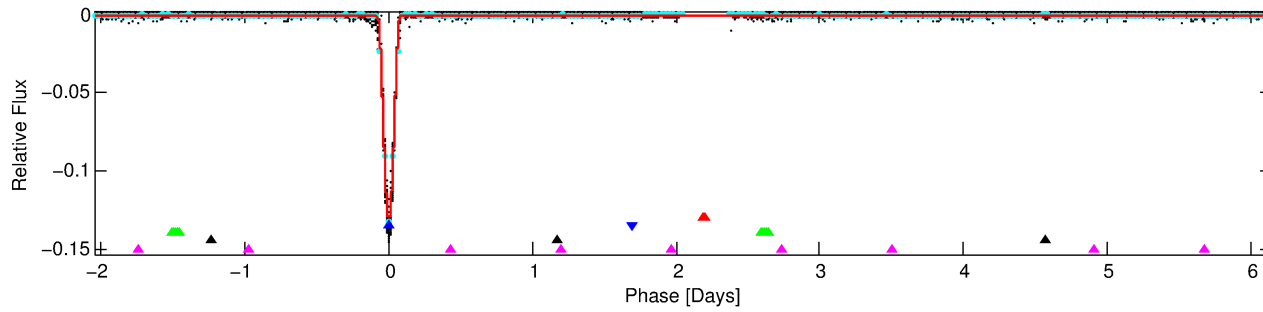
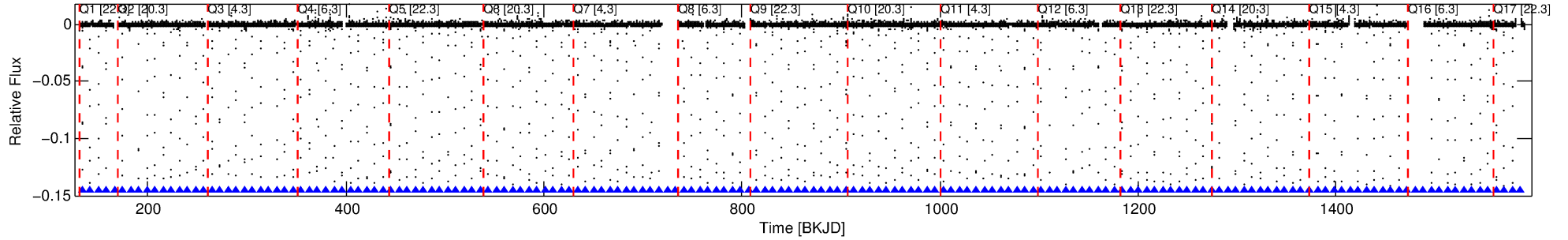
## Ephemeris Match Information For 012470530-02

No Significant Match Found

# DV One-Page Summary

KIC: 12470530 Candidate: 2 of 5 Period: 8.207 d  
KOI: K07536 Corr: No Ephemeris Match

Kp: 15.30 R\*: 0.62 Rs Teff: 4859.0 K Logg: 4.64 Fe/H: -0.700



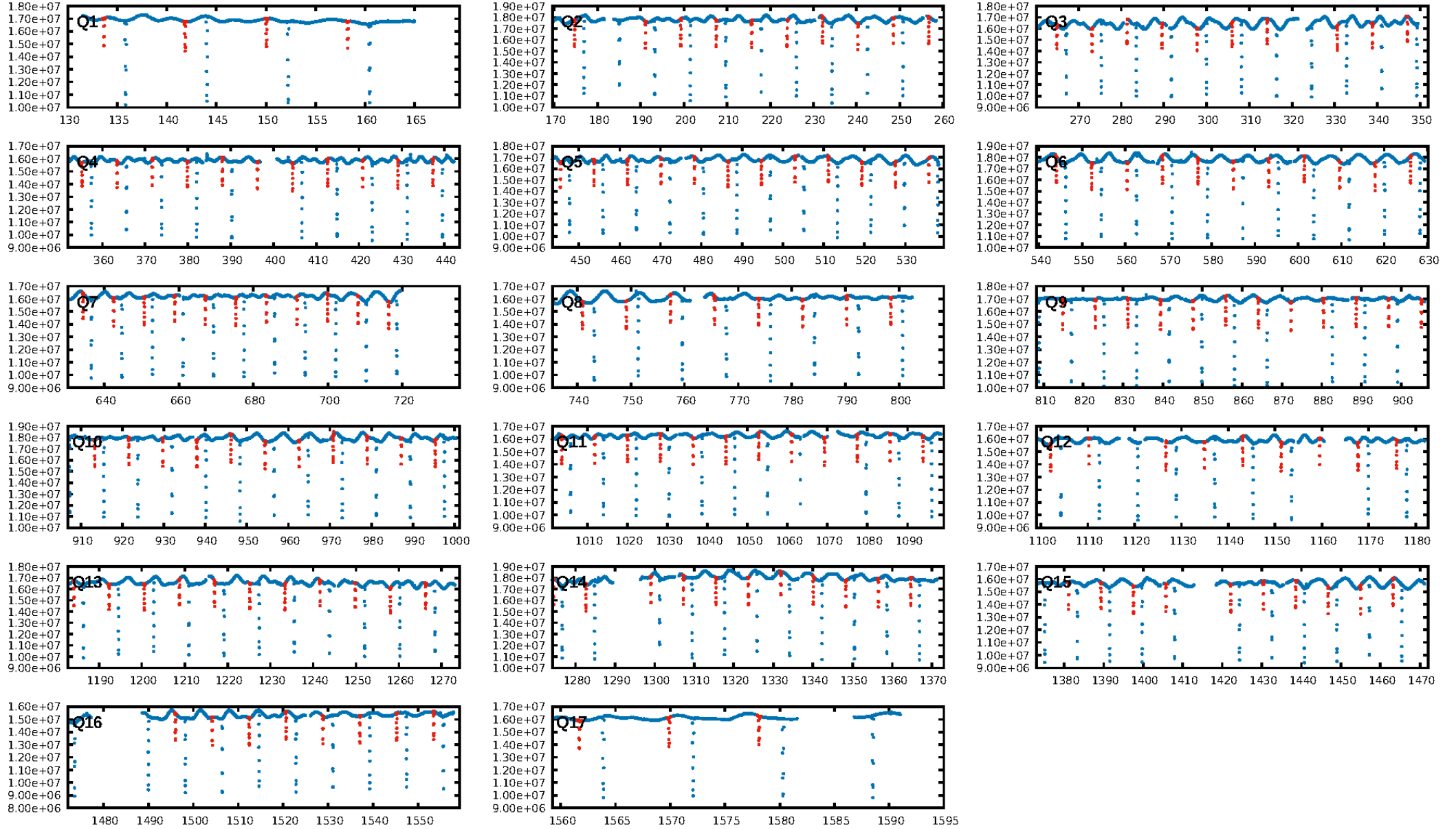
## DV Fit Results:

Period = 8.20726 [0.00000] d  
Epoch = 133.6266 [0.0000] BKJD  
Rp/R\* = 0.4961 [0.1437]  
a/R\* = 21.04 [0.52]  
b = 0.90 [0.20]  
Seff = 42.22 [6.79]  
Teq = 650 [26] K  
Rp = 33.62 [10.17] Re  
a = 0.0675 [0.0050] AU  
Ag = 0.43 [0.36] [-1.62σ]  
Teffp = 812 [169] K [0.94σ]

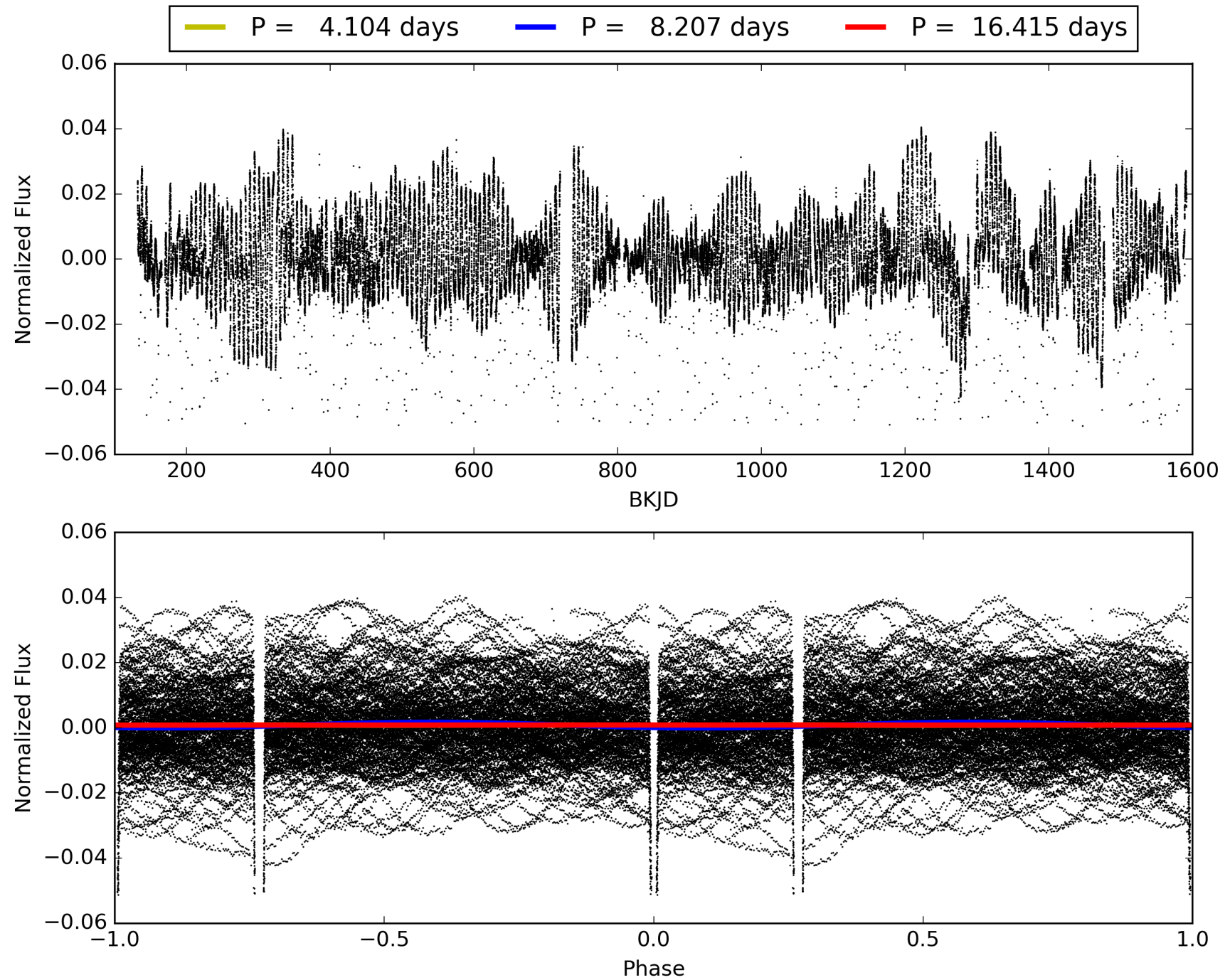
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: 100.0% [742.82σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 0.0%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [157/157]  
GhostDiagnostic-chr: 2.164  
Centroid-sig: 0.0%  
Centroid-so: 1.215 arcsec [410.93σ]  
OotOffset-rm: 0.060 arcsec [0.88σ]  
KicOffset-rm: 0.012 arcsec [0.16σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 1.00 [17/17]

# TCE 012470530-02, PDC Light Curves



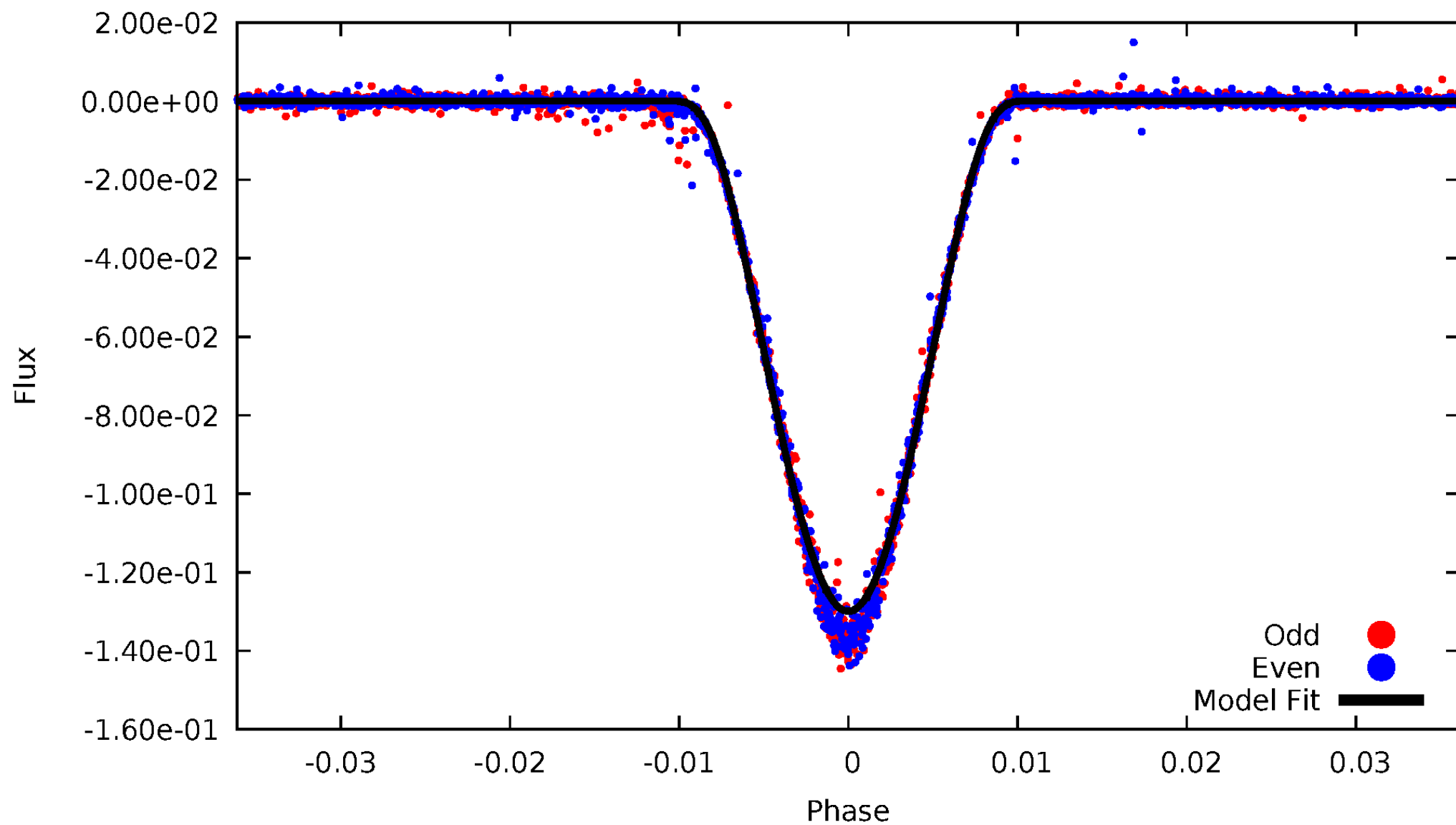
TCE 012470530-02





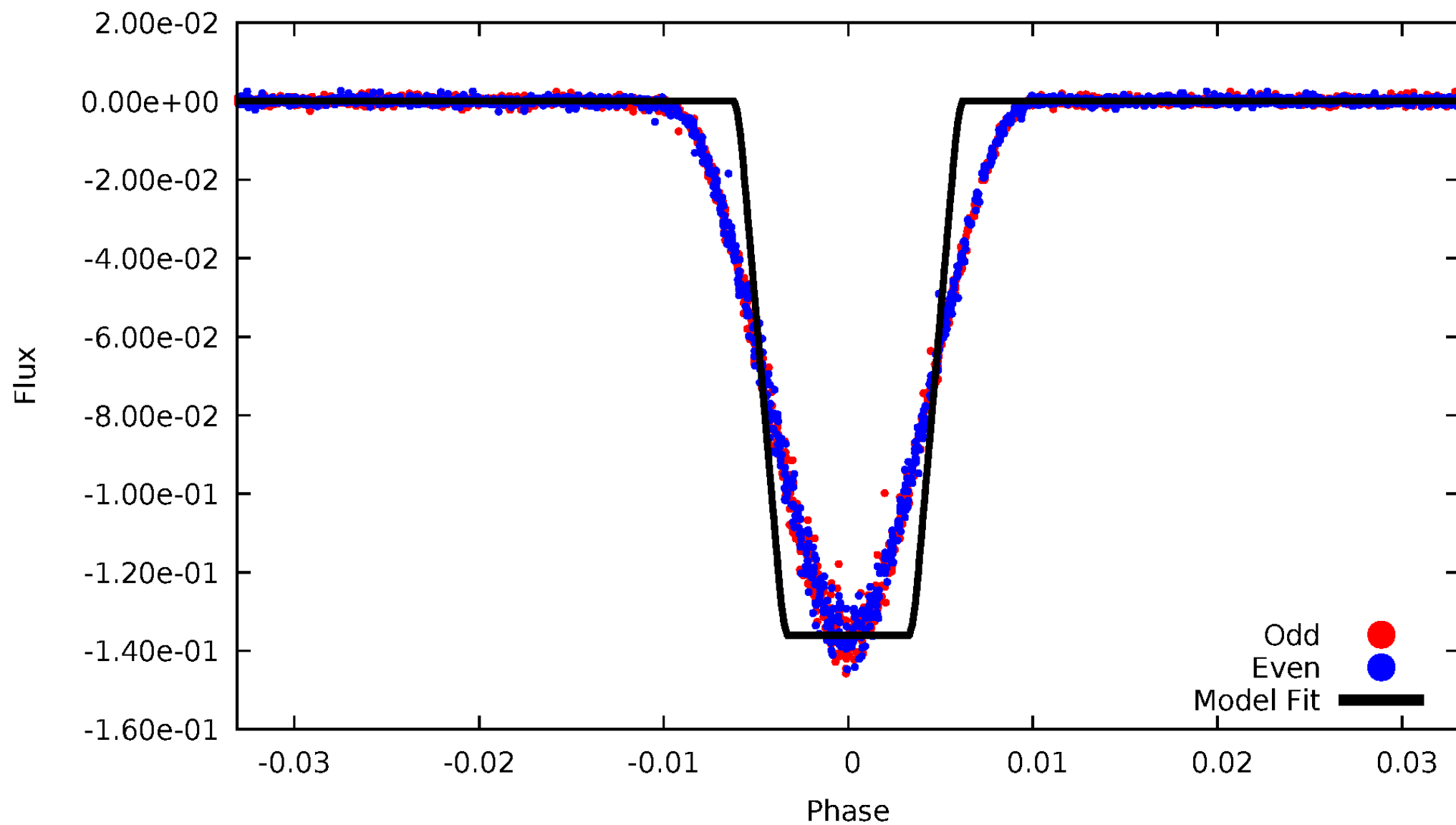
DV Odd/Even

TCE 012470530-02



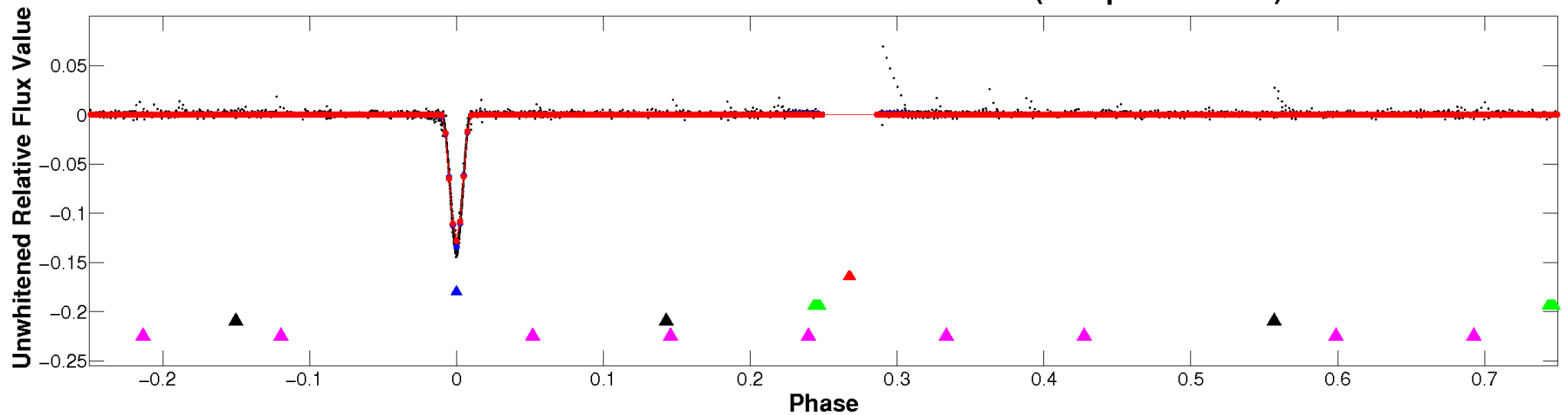
# ALT Odd/Even

TCE 012470530-02

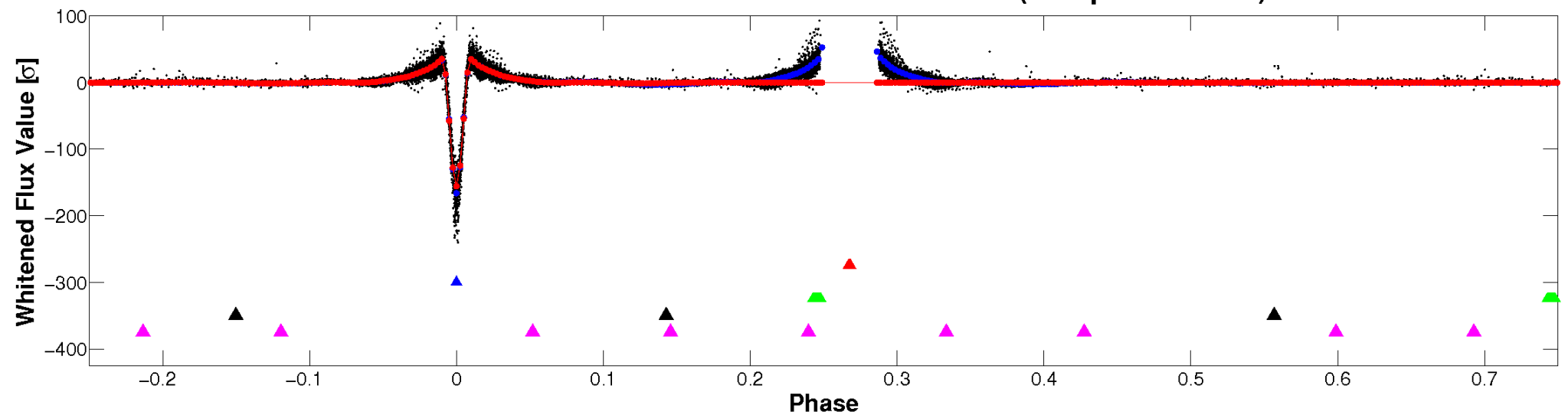


# Non-Whitened Vs. Whitened Light Curve

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

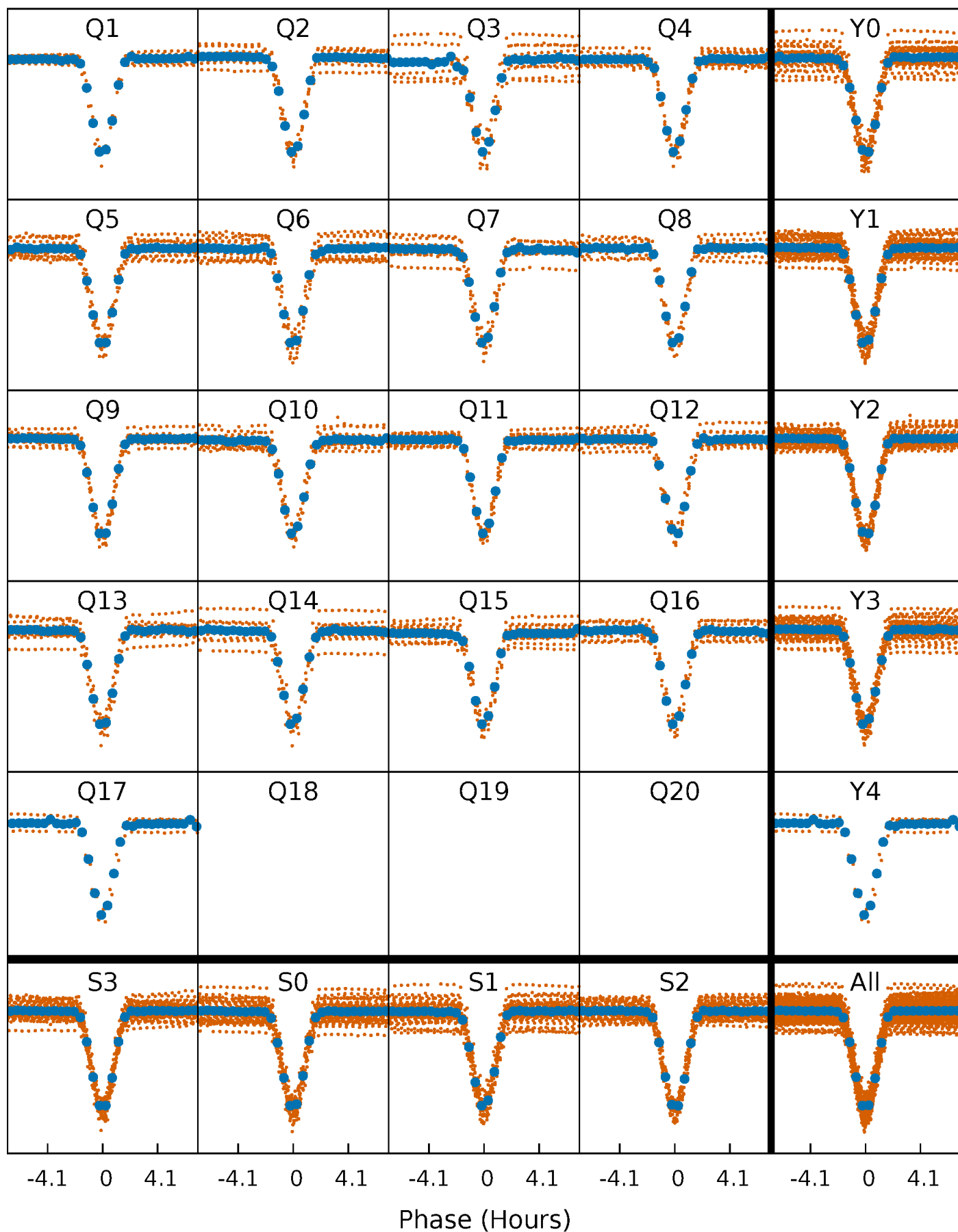


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



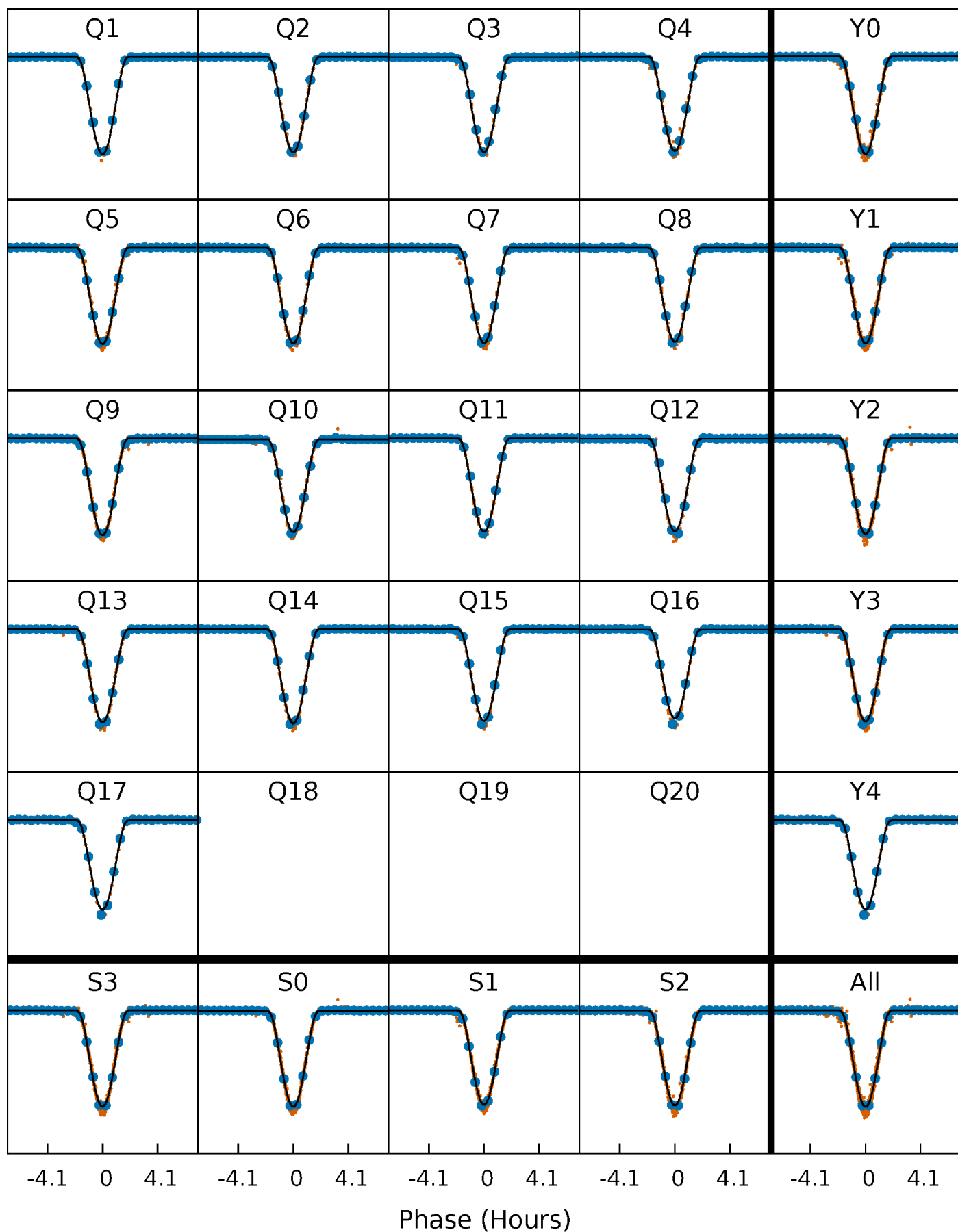
# PDC Quarter-Phased Transit Curves

TCE 012470530-02 P= 8.207260 Days  $T_0=133.626620$  (BKJD)



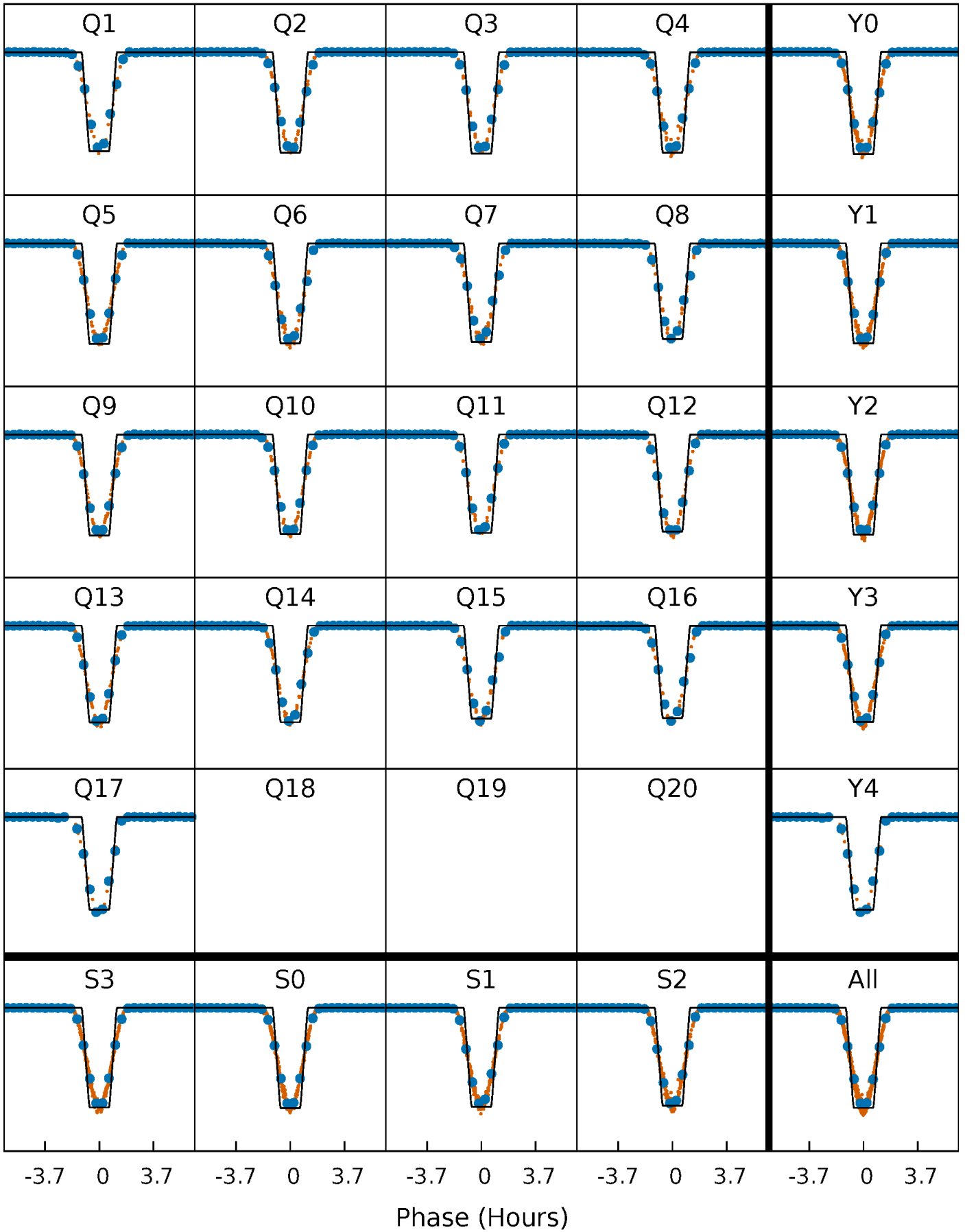
# DV Quarter-Phased Transit Curves

TCE 012470530-02   P= 8.207260 Days    $T_0=133.626620$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

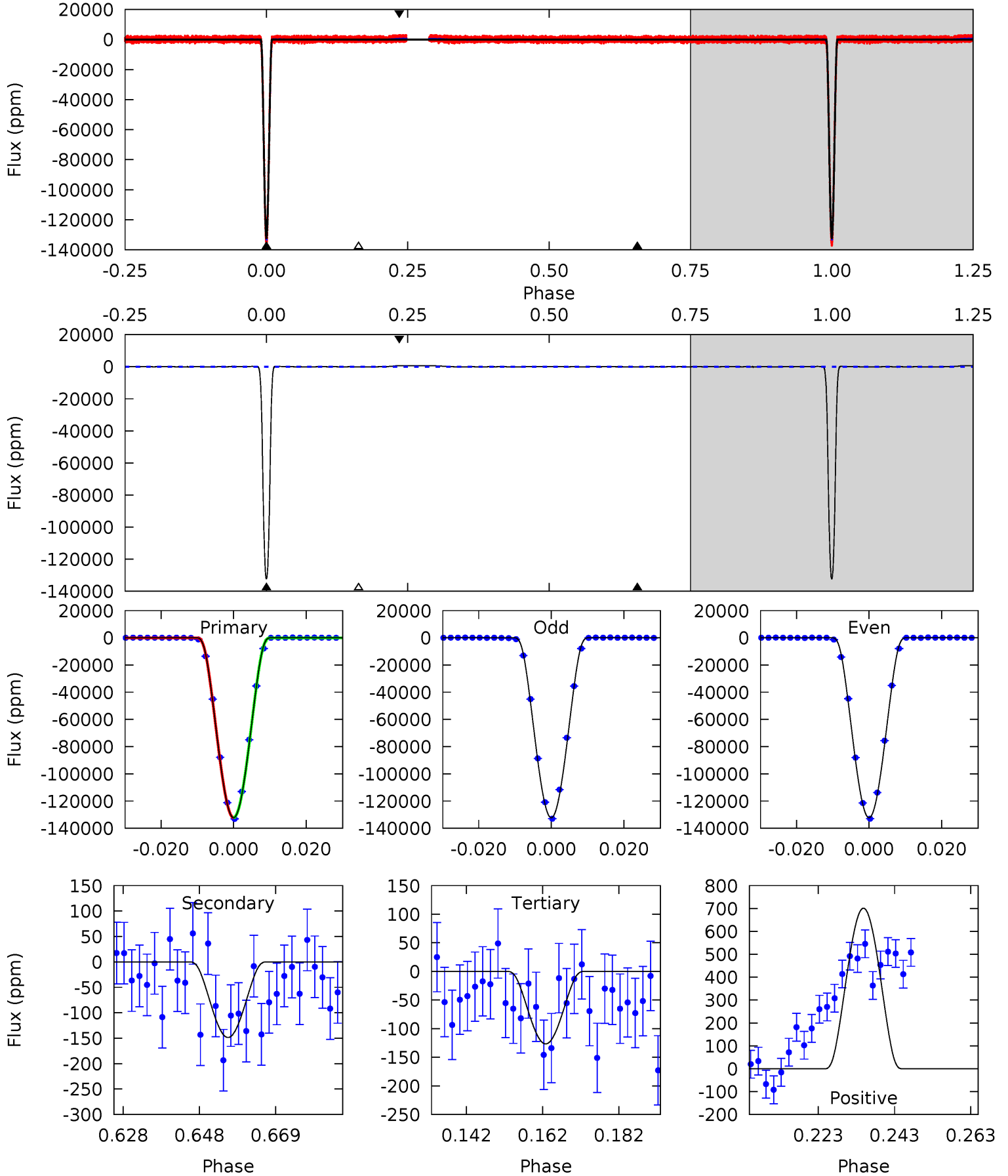
TCE 012470530-02     $P = 8.207272$  Days     $T_0 = 133.625640$  (BKJD)



# DV Model-Shift Uniqueness Test

012470530-02, P = 8.207260 Days, E = 125.419360 Days

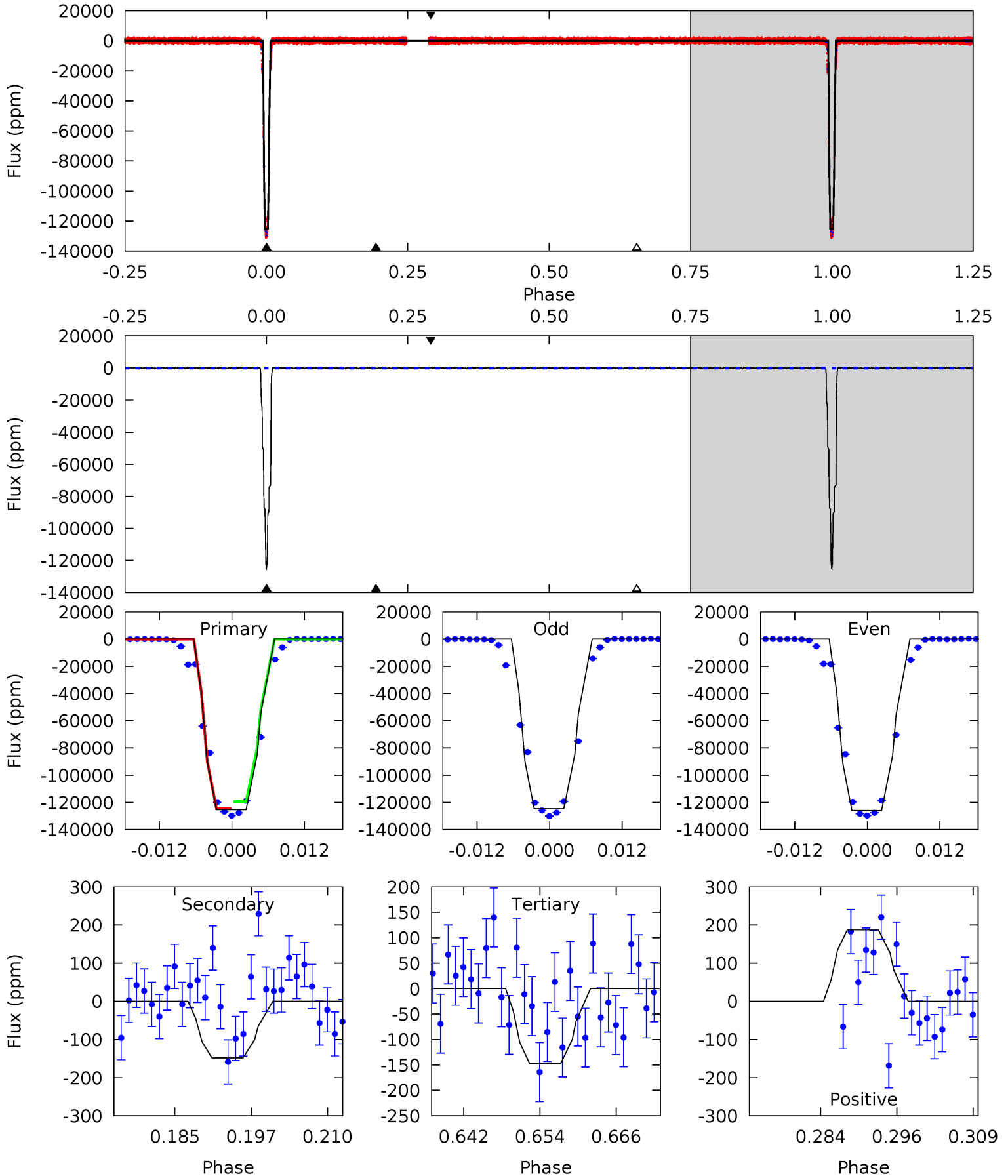
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6125	6.88	5.87	32.5	4.89	2.32	6.80	6120	6093	1.02	-25.6	0.14	1.00	0.01	0



# Alt Model-Shift Uniqueness Test

012470530-02, P = 8.207272 Days, E = 125.418368 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
2551	3.01	3.00	3.81	4.99	2.50	1.12	2548	2547	0.02	-0.80	14.0	1.00	0.00	0





### Stellar Parameters For KIC 012470530

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4859^{+144}_{-144}$	$4.637^{+0.060}_{-0.035}$	$-0.700^{+0.300}_{-0.300}$	$0.621^{+0.054}_{-0.054}$	$0.610^{+0.060}_{-0.030}$	$3.588^{+0.869}_{-0.524}$
	+3%/-3%	+1%/-1%	+43%/-43%	+9%/-9%	+10%/-5%	+24%/-15%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 012470530-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-149 \pm 22$	$33.58^{+9.42}_{-9.30}$	$906^{+30}_{-31}$	$1482^{+314}_{-3086}$	$0.341^{+0.333}_{-0.141}$
Alt.	$-148 \pm 49$	$24.95^{+10.31}_{-9.40}$	$905^{+31}_{-32}$	$1757^{+277}_{-3228}$	$0.585^{+0.943}_{-0.320}$

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

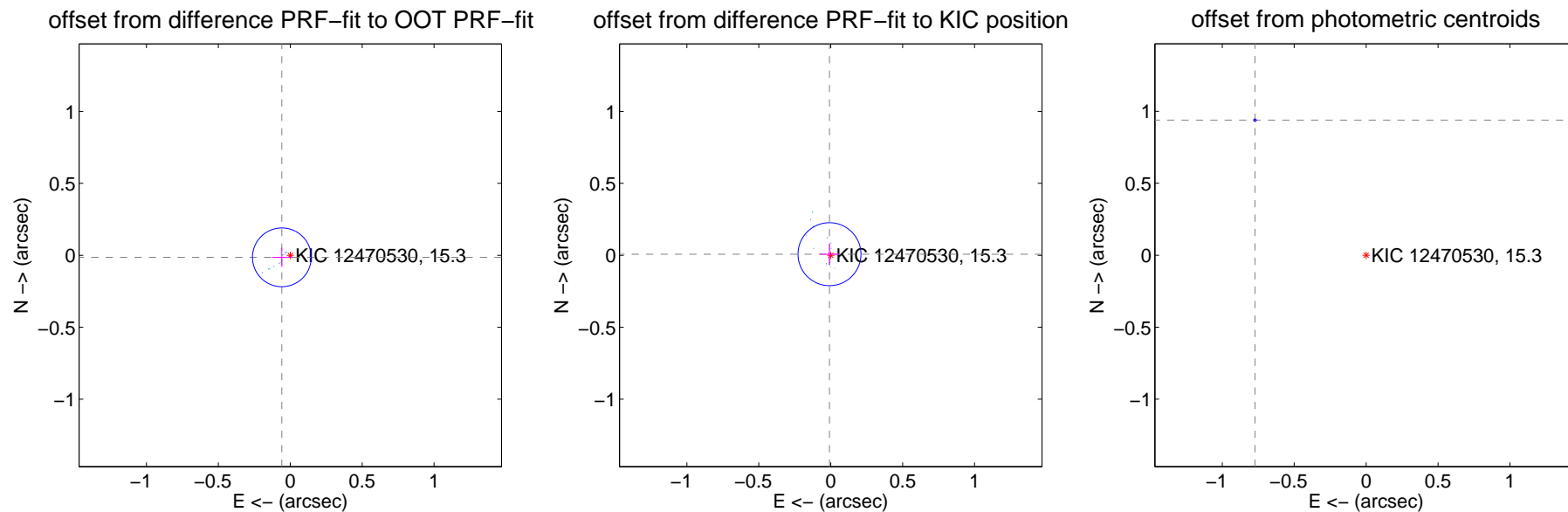
## DV Centroid Data

Supplemental centroid analysis for 012470530-02. Kepler magnitude: 15.30. Transit SNR 2134.10

There are 17 quarters with good PRF difference image offsets

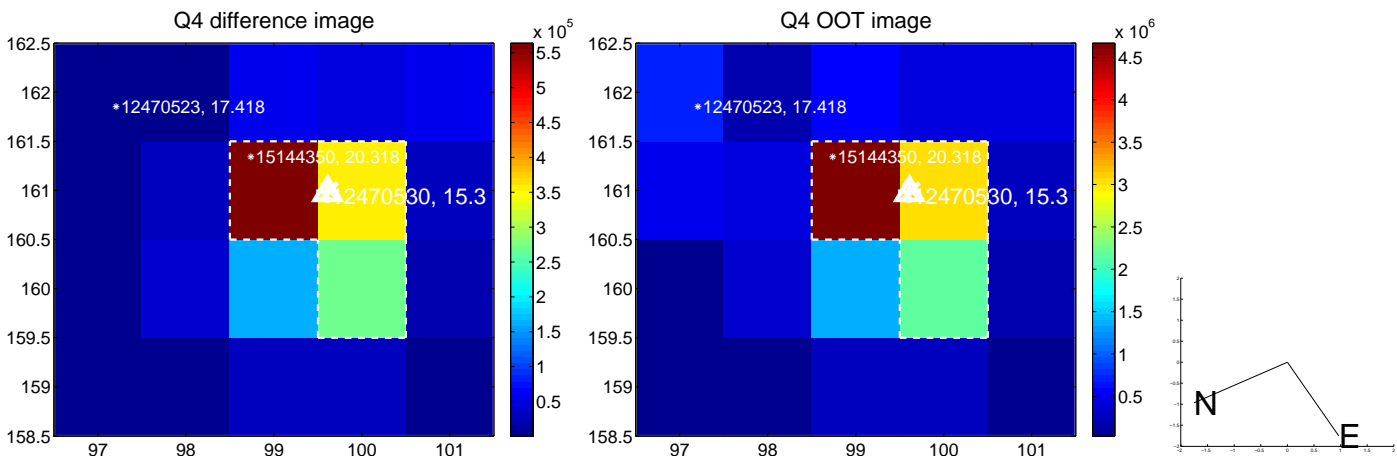
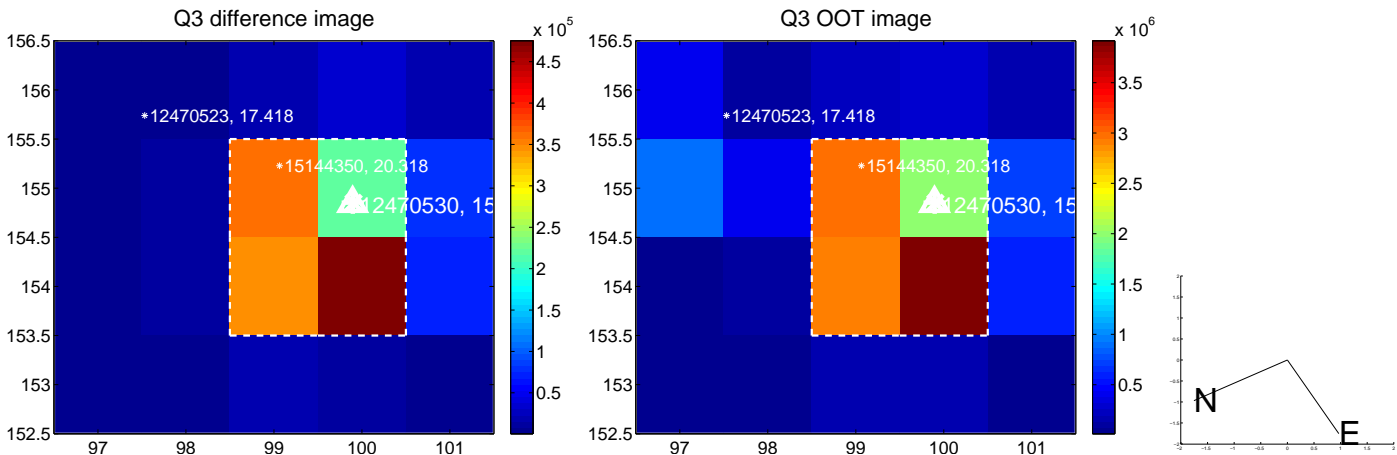
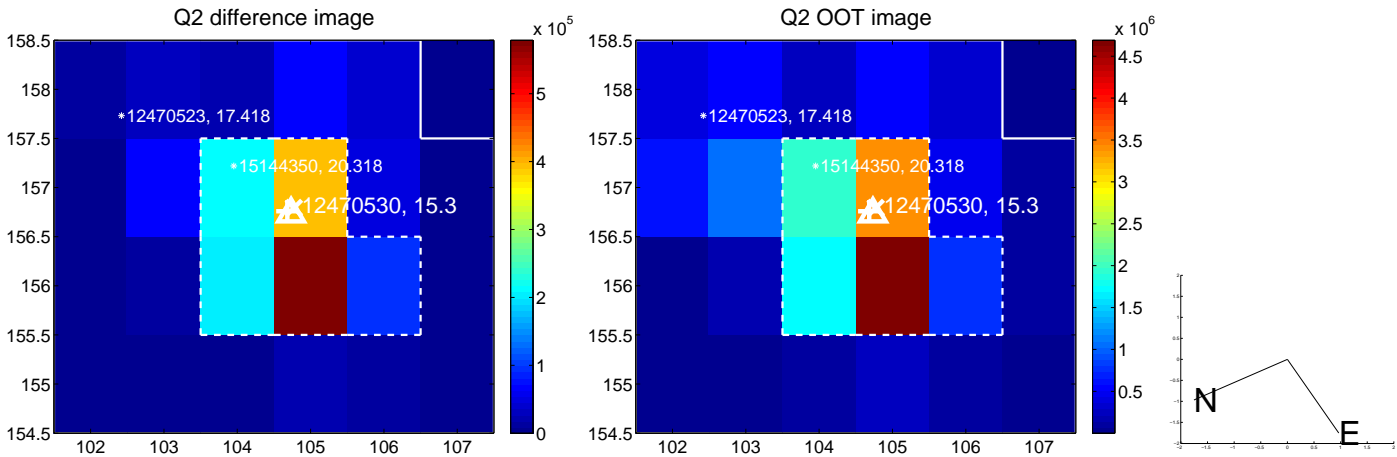
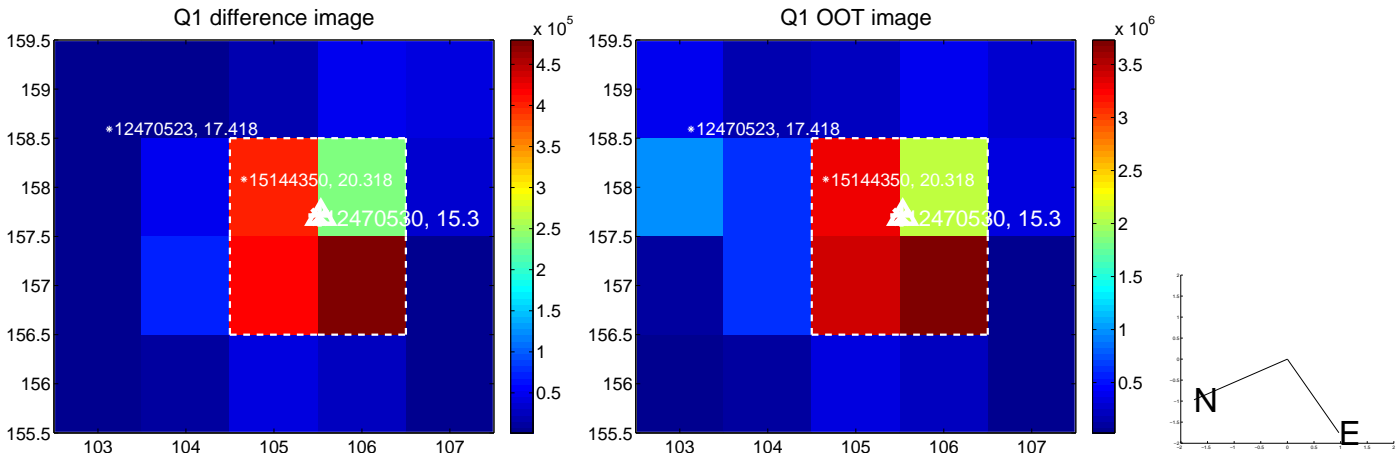
The direct PRF centroid is offset from the target star catalog position by about 0.05 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.060 \pm 0.068$	0.88	$0.059 \pm 0.068$	$-0.014 \pm 0.068$
PRF-fit source offset from KIC position	$0.012 \pm 0.073$	0.16	$0.009 \pm 0.068$	$0.008 \pm 0.073$
photometric centroid source offset	$1.21 \pm 0.00$	410.93	$0.77 \pm 0.00$	$0.94 \pm 0.00$

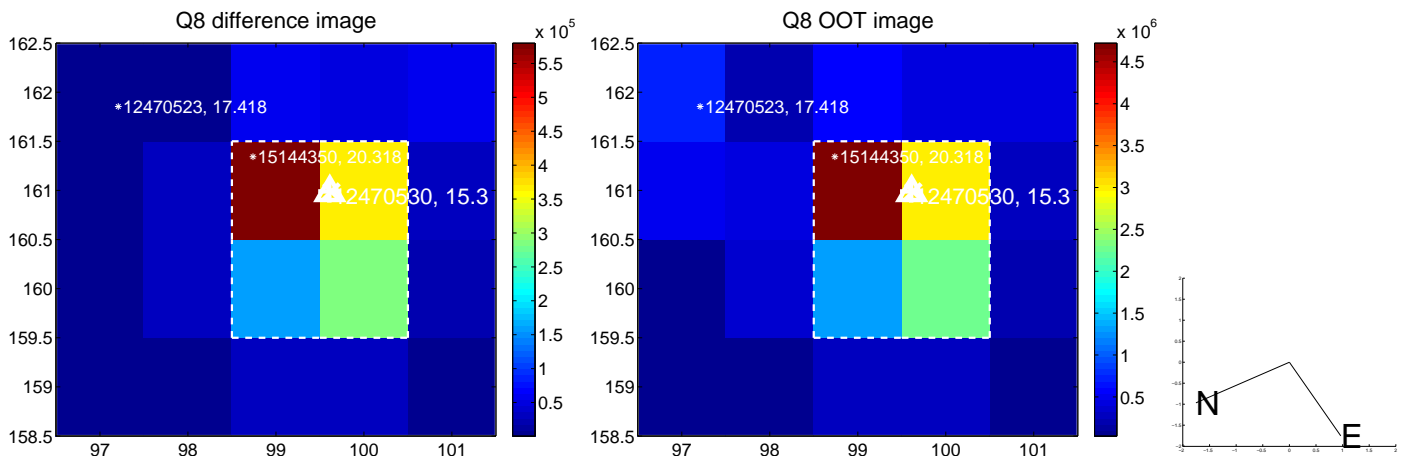
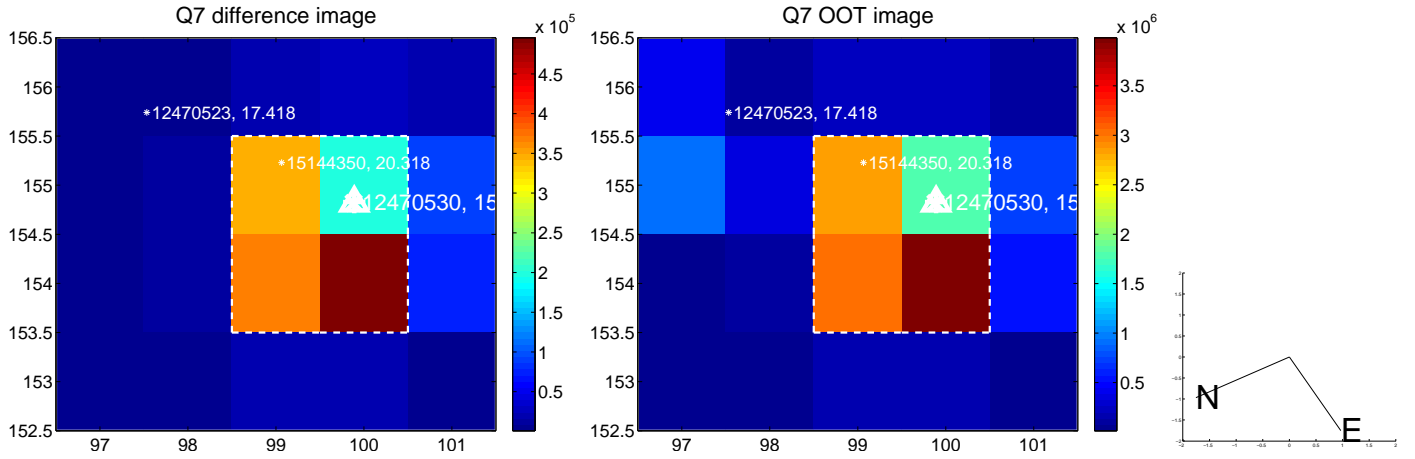
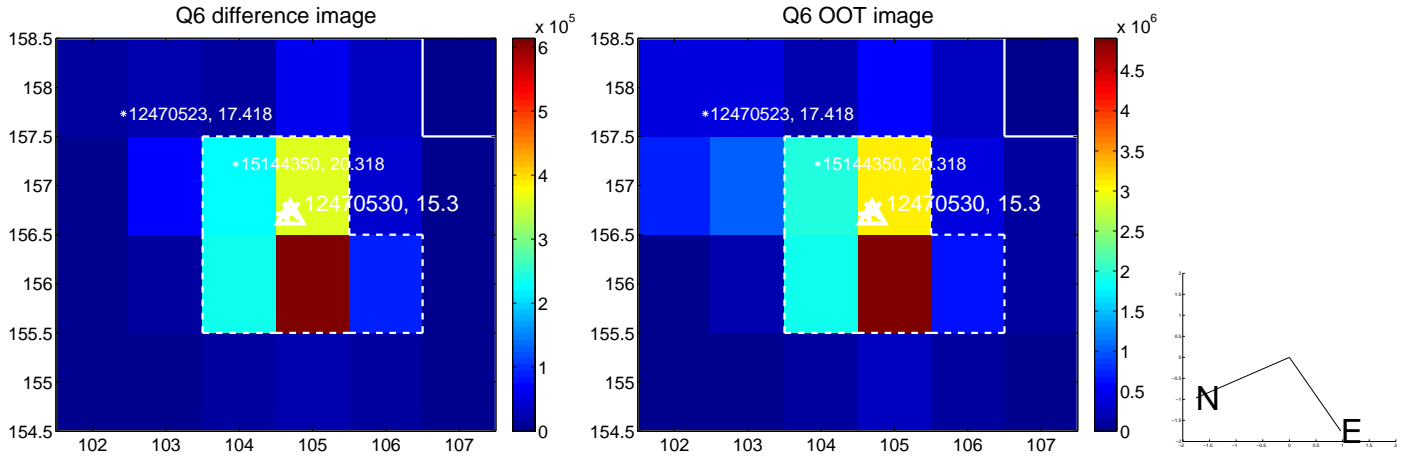
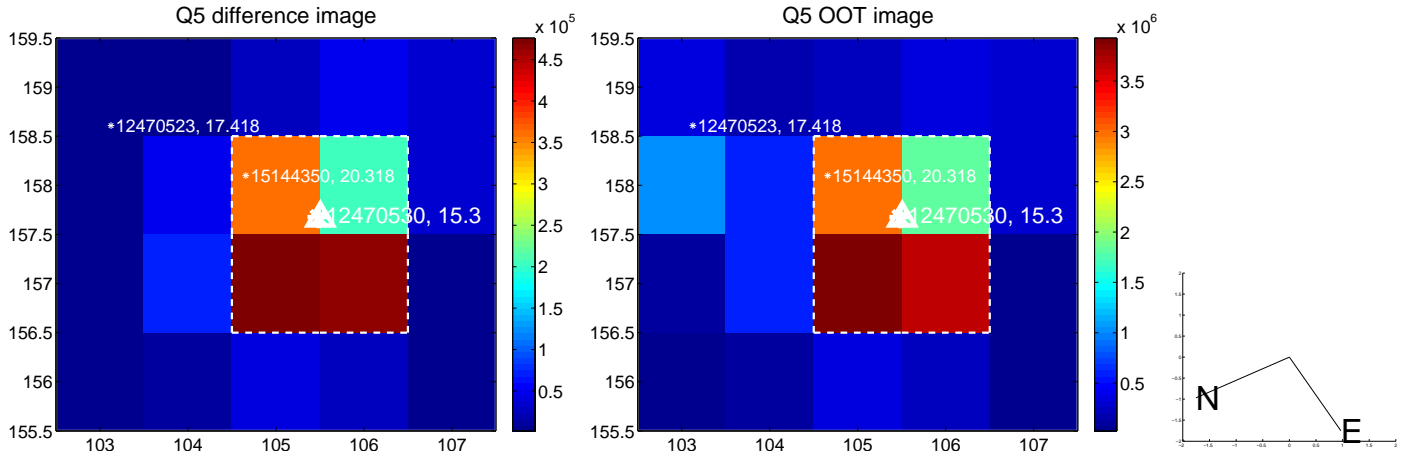


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

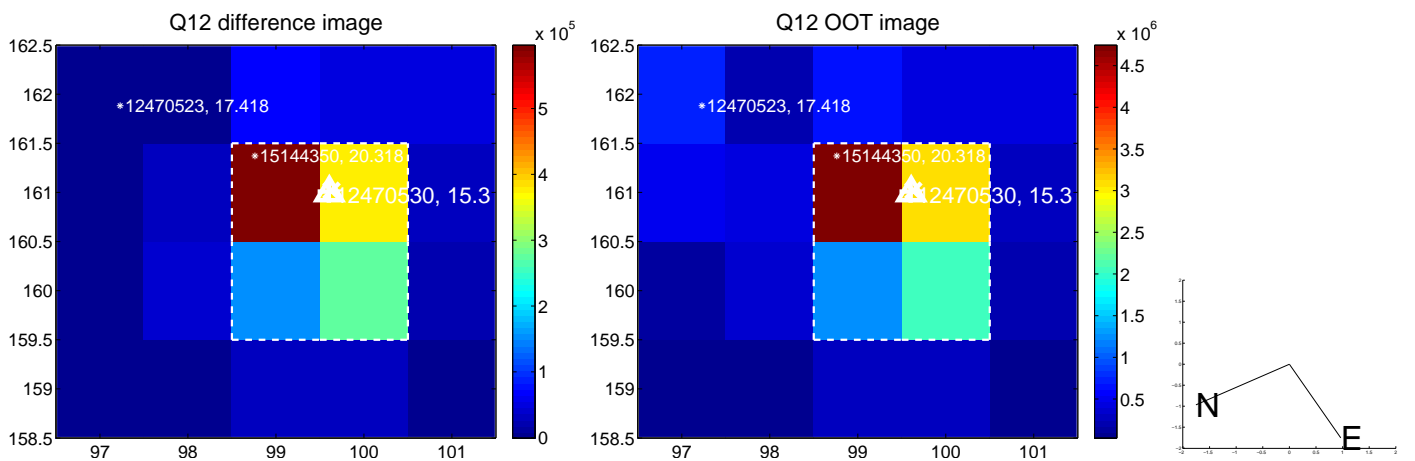
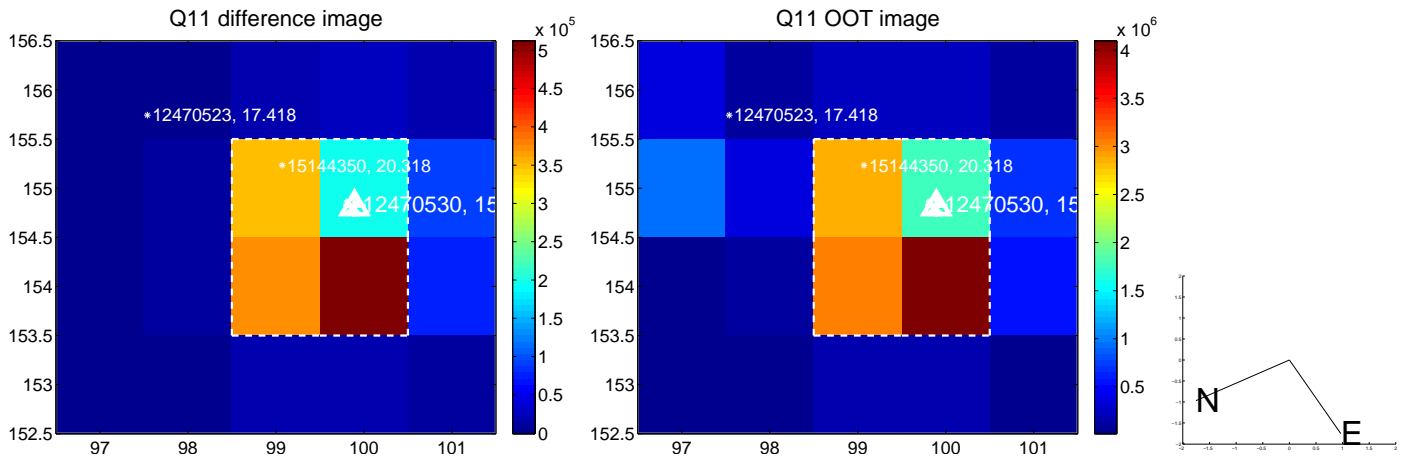
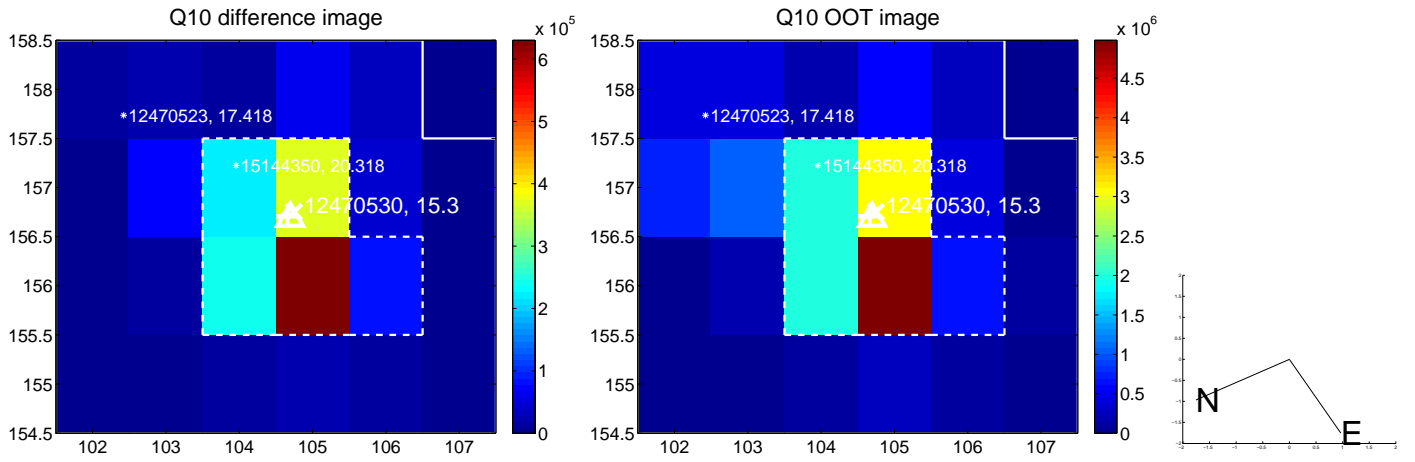
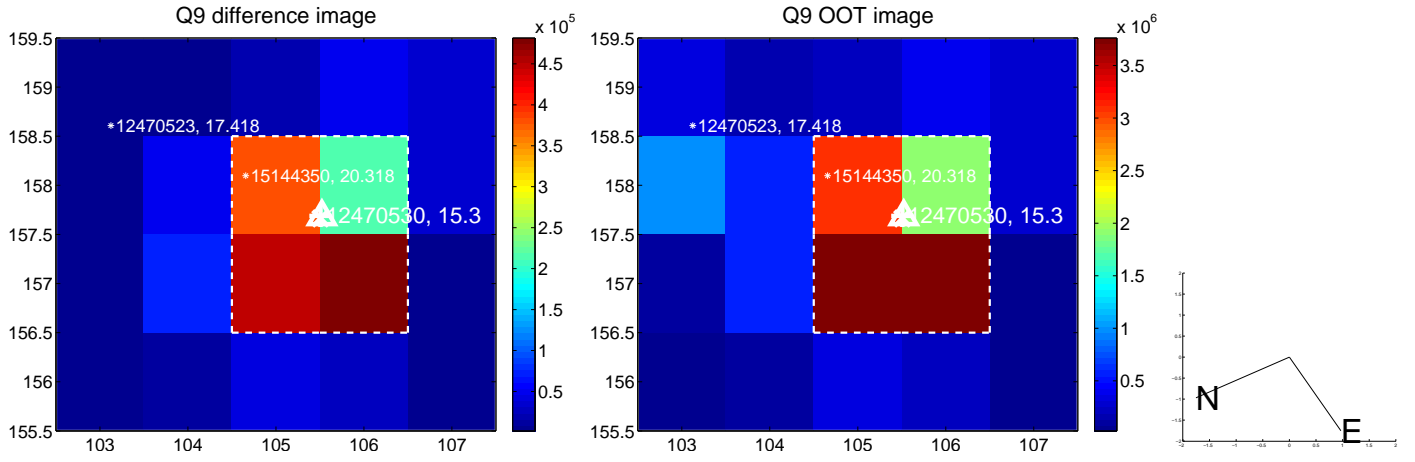
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



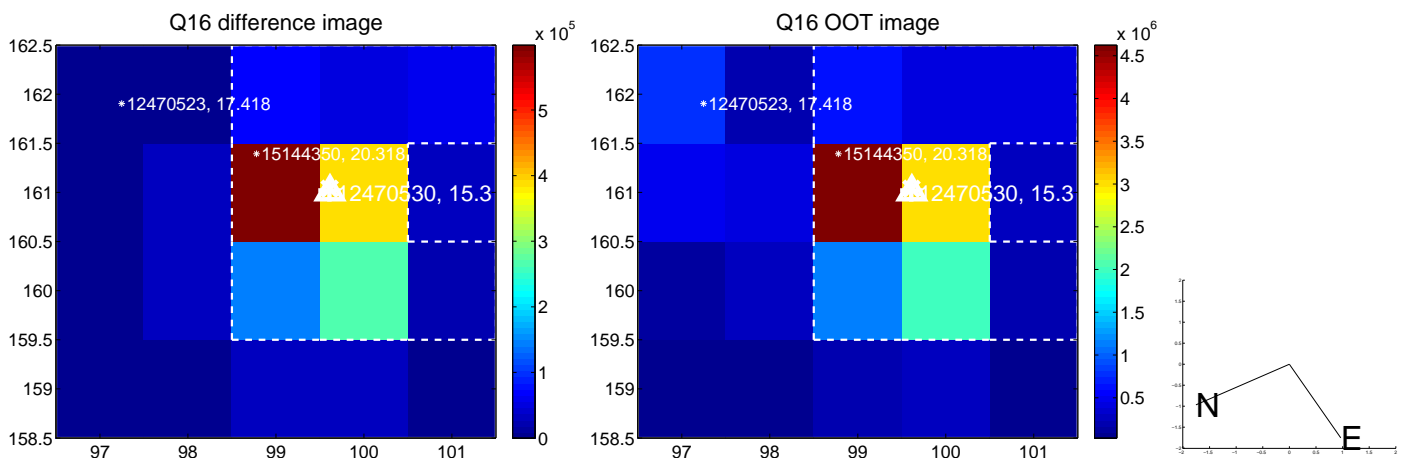
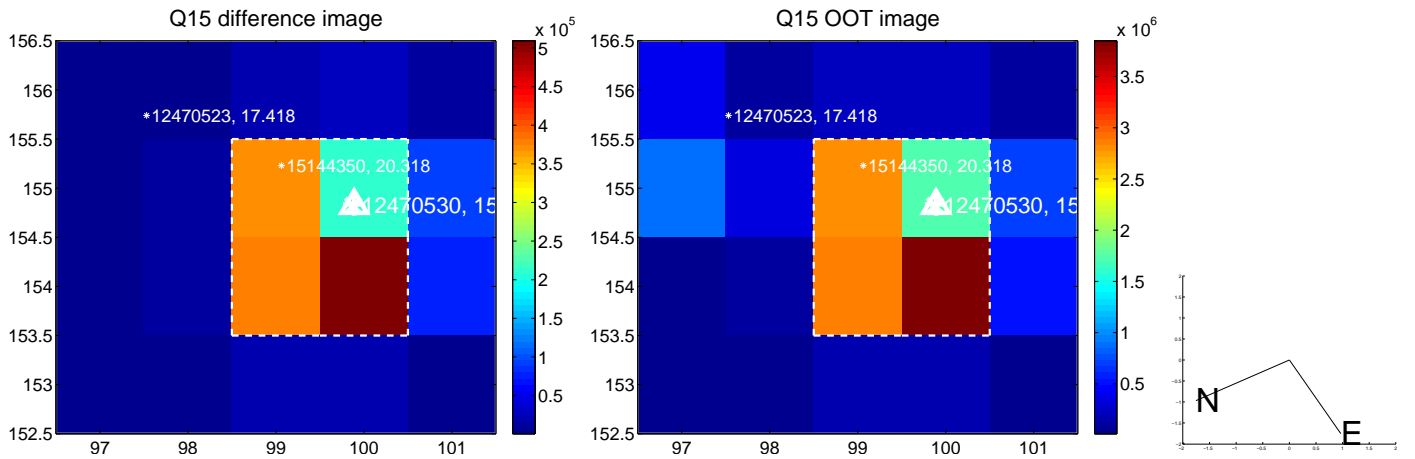
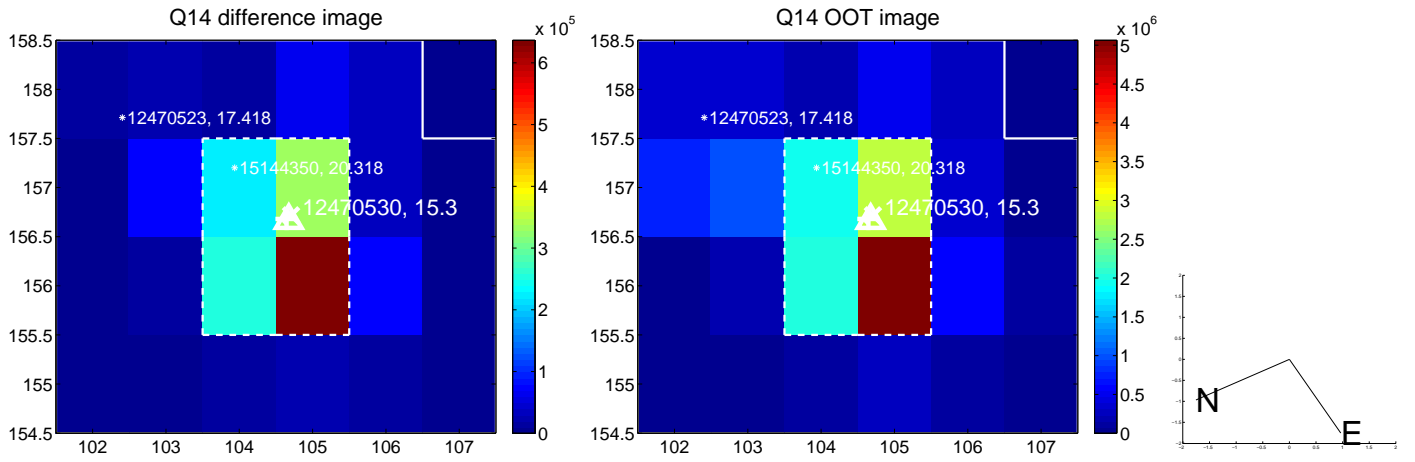
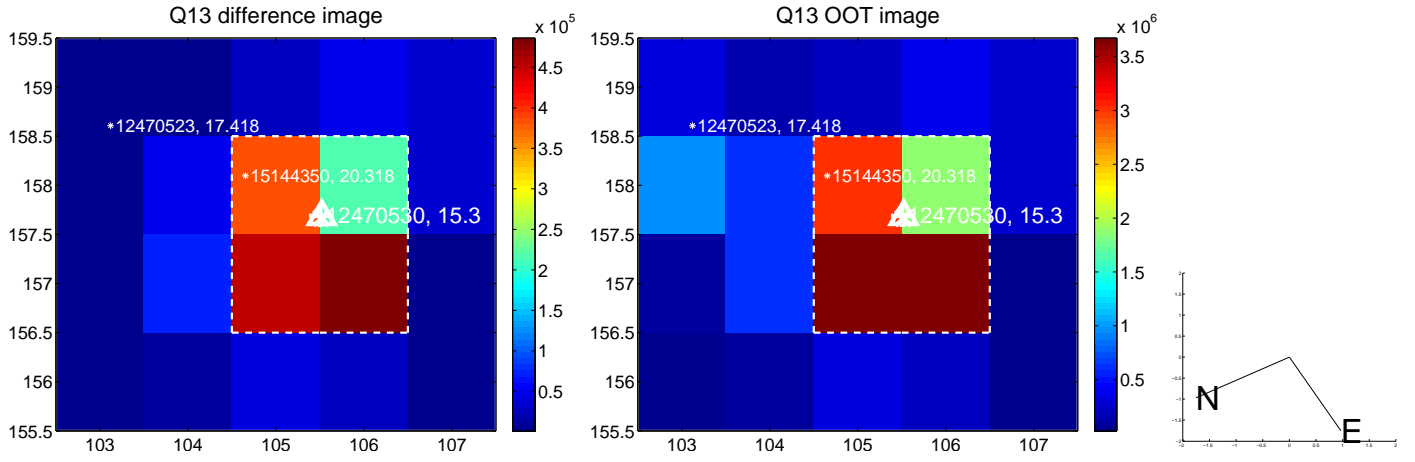
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



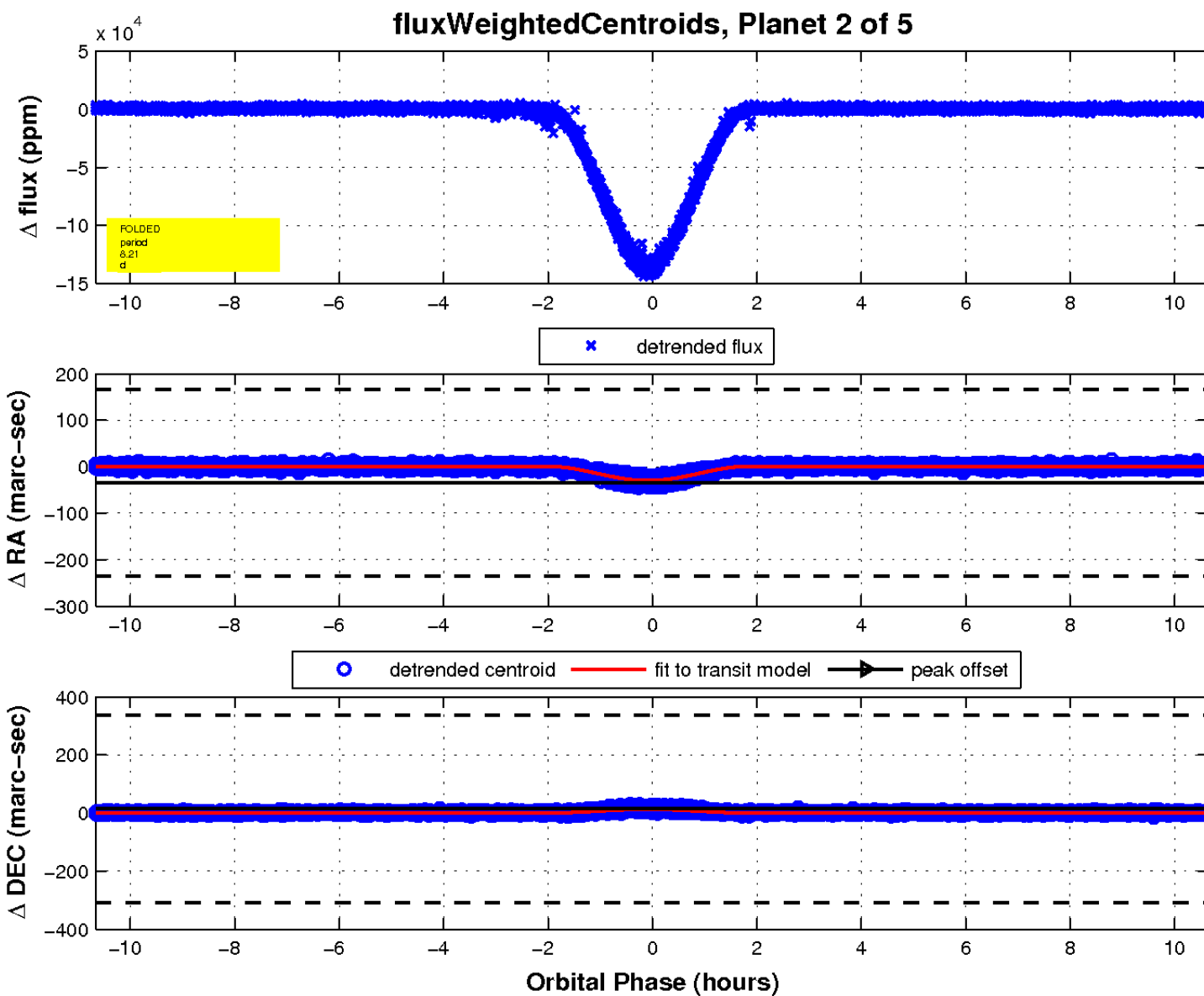
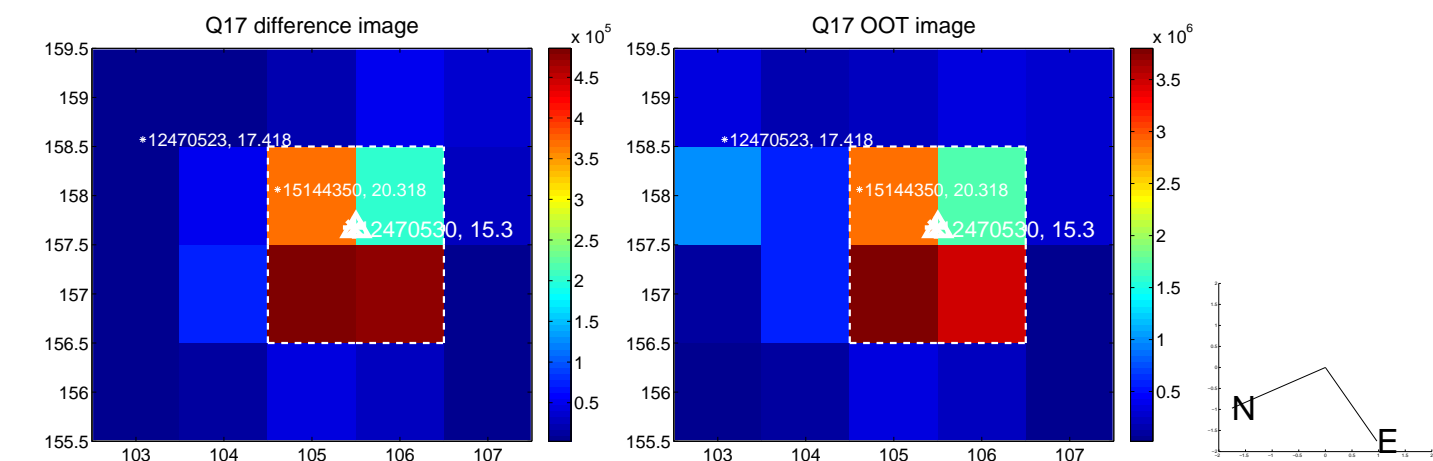
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

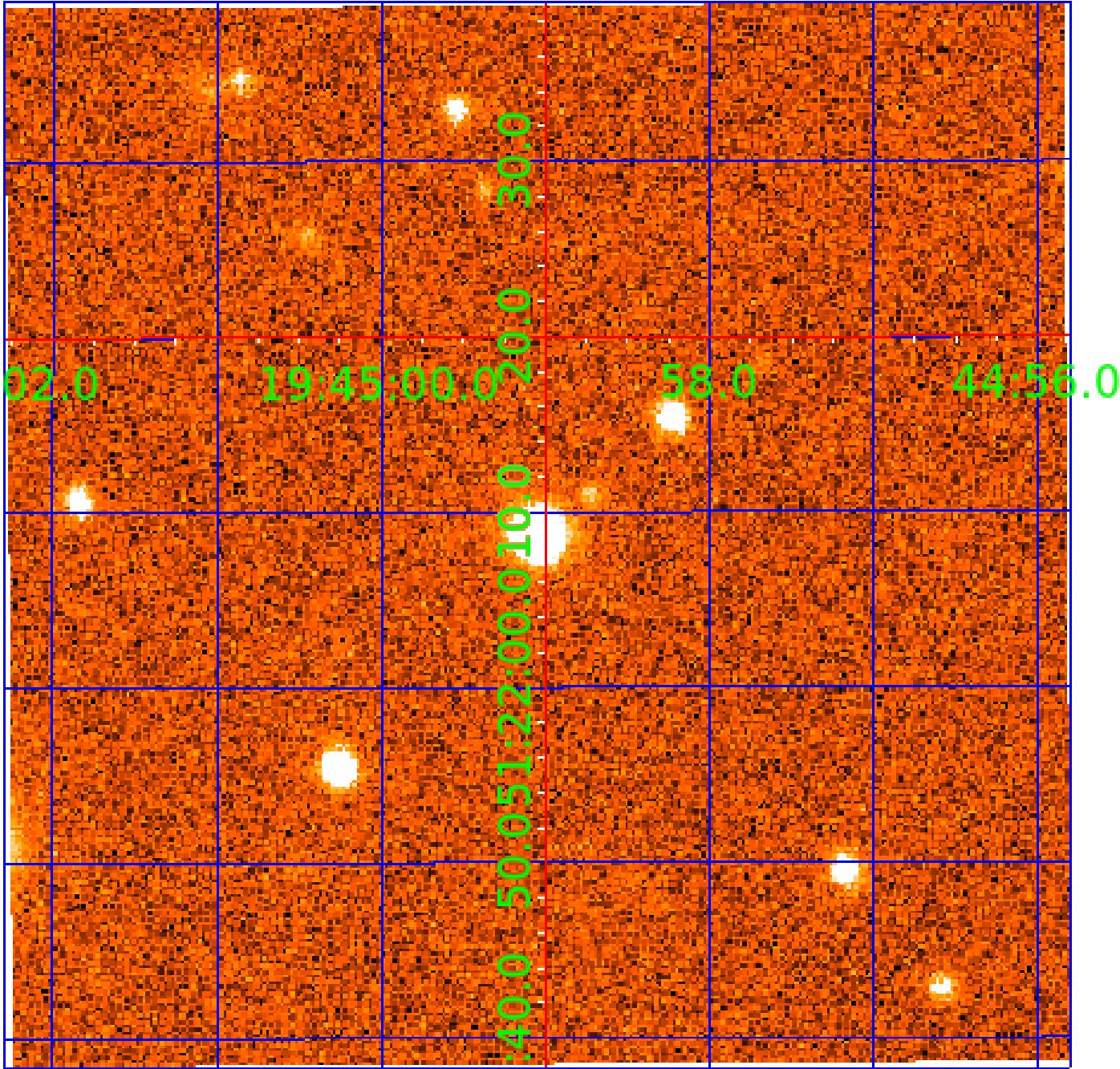


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 012470530

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
012470530-01	OBS	7536.01	8.207198	135.828703	387955.9	2.500	10346.4	-1.0	0.62	4859	33.88	42.22
012470530-02	OBS	No	8.207260	133.626620	129960.2	3.557	3521.1	2134.1	0.62	4859	33.62	42.22
012470530-03	OBS	No	4.103508	131.558672	23678.9	12.500	1117.9	-1.0	0.62	4859	9.31	106.40
012470530-04	OBS	No	621.346864	159.420495	2430.3	4.072	11.9	8.1	0.62	4859	3.00	0.13
012470530-05	OBS	No	160.426848	166.881674	1419.0	3.397	8.4	7.1	0.62	4859	2.71	0.80

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
012470530-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_ALT—HAS_SEC_TCE—CENT_NOFITS
012470530-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE
012470530-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—RESIDUAL_TCE—CENT_NOFITS
012470530-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—ALL_TRANS_CHASES—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
012470530-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—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 012470530-03

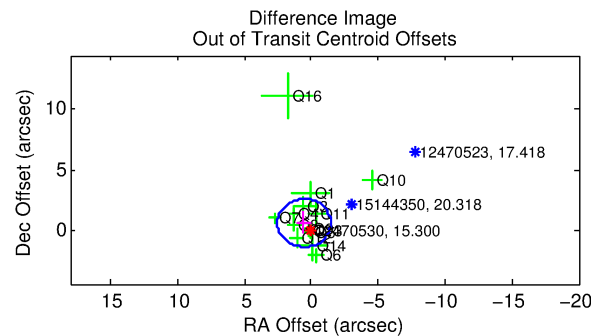
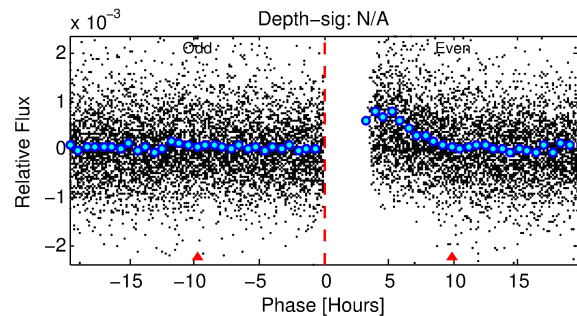
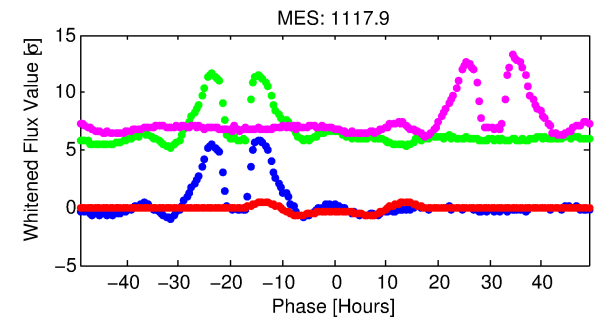
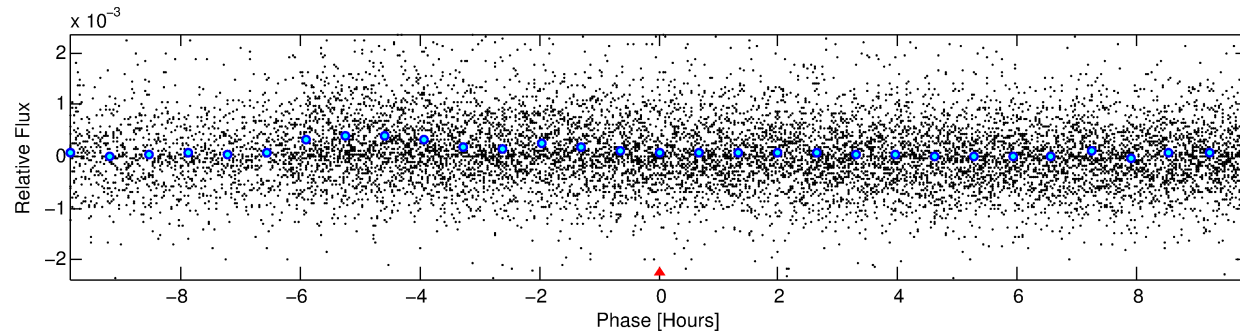
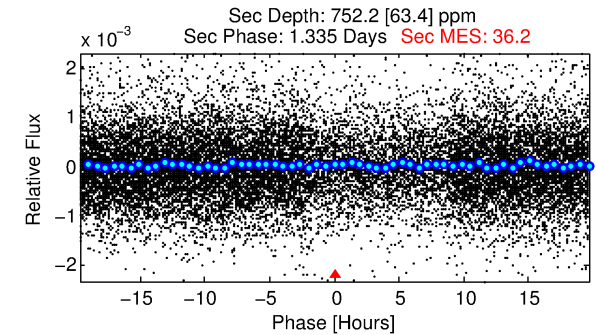
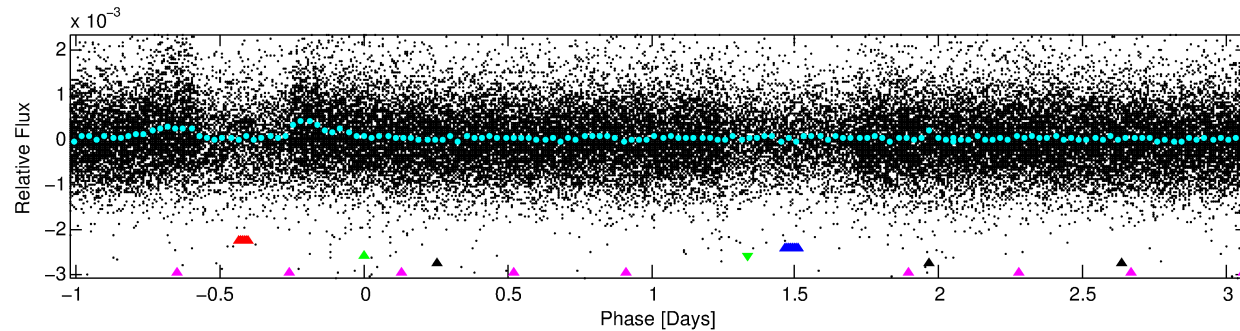
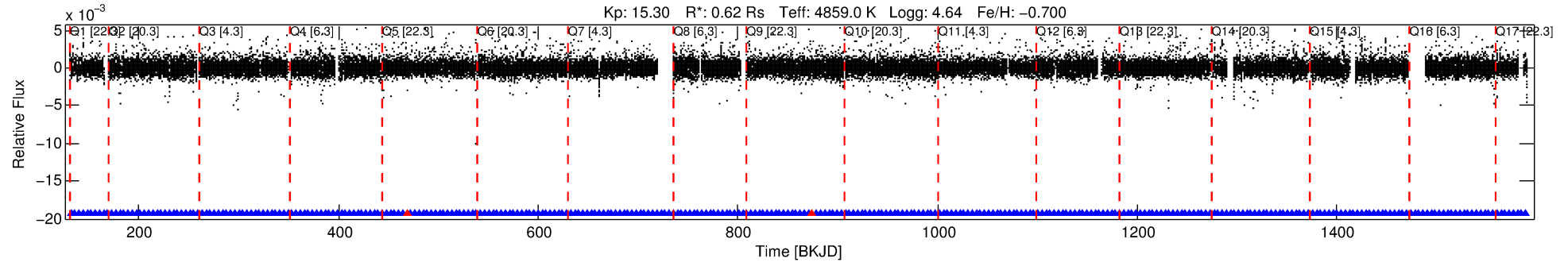
No Significant Match Found

# DV One-Page Summary

KIC: 12470530 Candidate: 3 of 5 Period: 4.104 d

KOI: K07536 Corr: No Ephemeris Match

Kp: 15.30 R\*: 0.62 Rs Teff: 4859.0 K Logg: 4.64 Fe/H: -0.700



TPS TCE Results:

Period = 4.10351 d  
Epoch = 131.5587 BKJD

DV fit results are unavailable

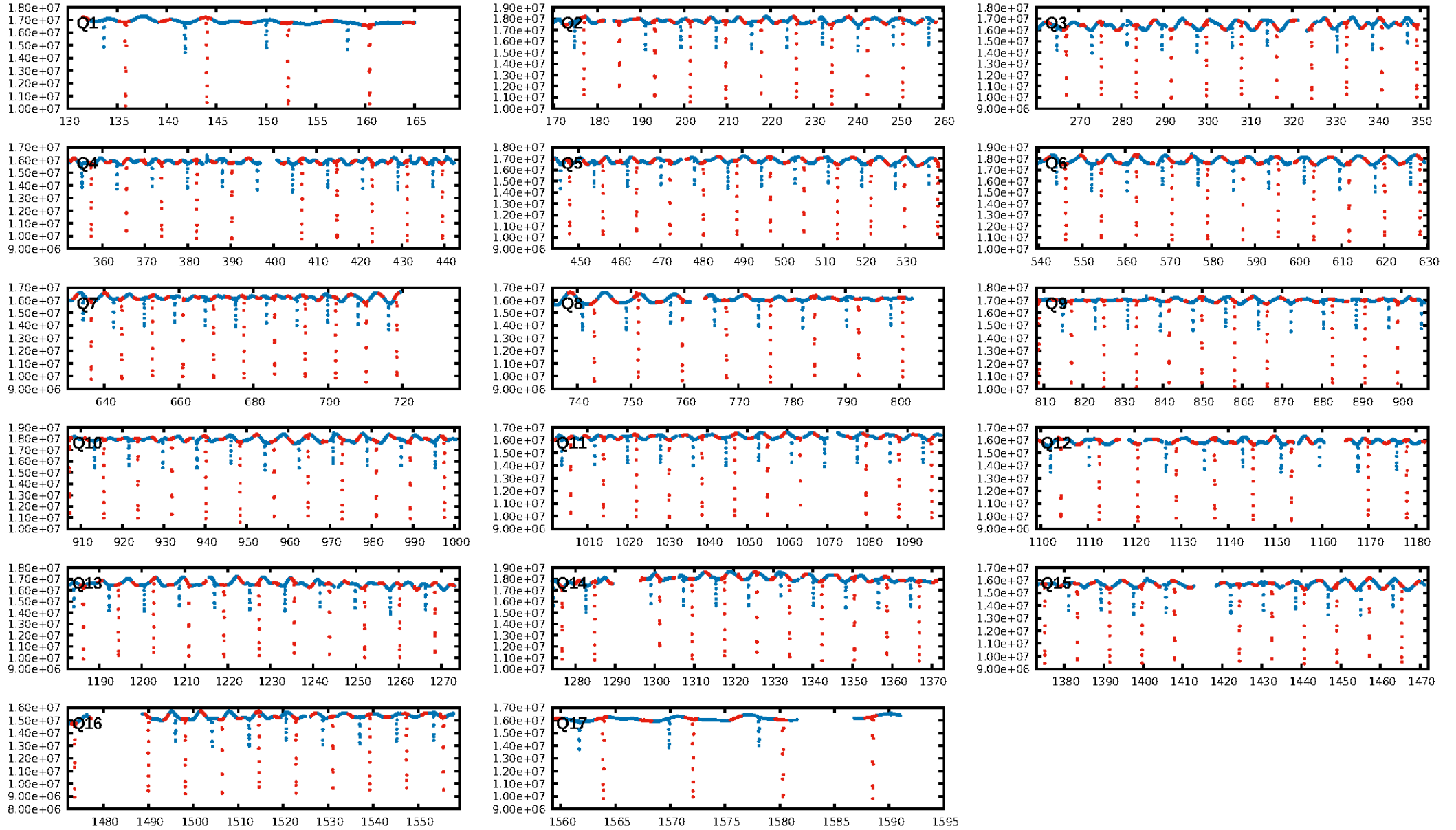
DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [7.73σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 0.99 [310/312]  
GhostDiagnostic-chr: 1.162  
Centroid-sig: 13.2%  
Centroid-so: 34.638 arcsec [1.36σ]  
OotOffset-rm: 0.792 arcsec [1.19σ]  
KicOffset-rm: 0.781 arcsec [1.11σ]  
OotOffset-st: 3/3/4/4 [14]  
KicOffset-st: 3/3/4/4 [14]  
DiffImageQuality-fgm: 0.29 [4/14]  
DiffImageOverlap-fno: 1.00 [17/17]

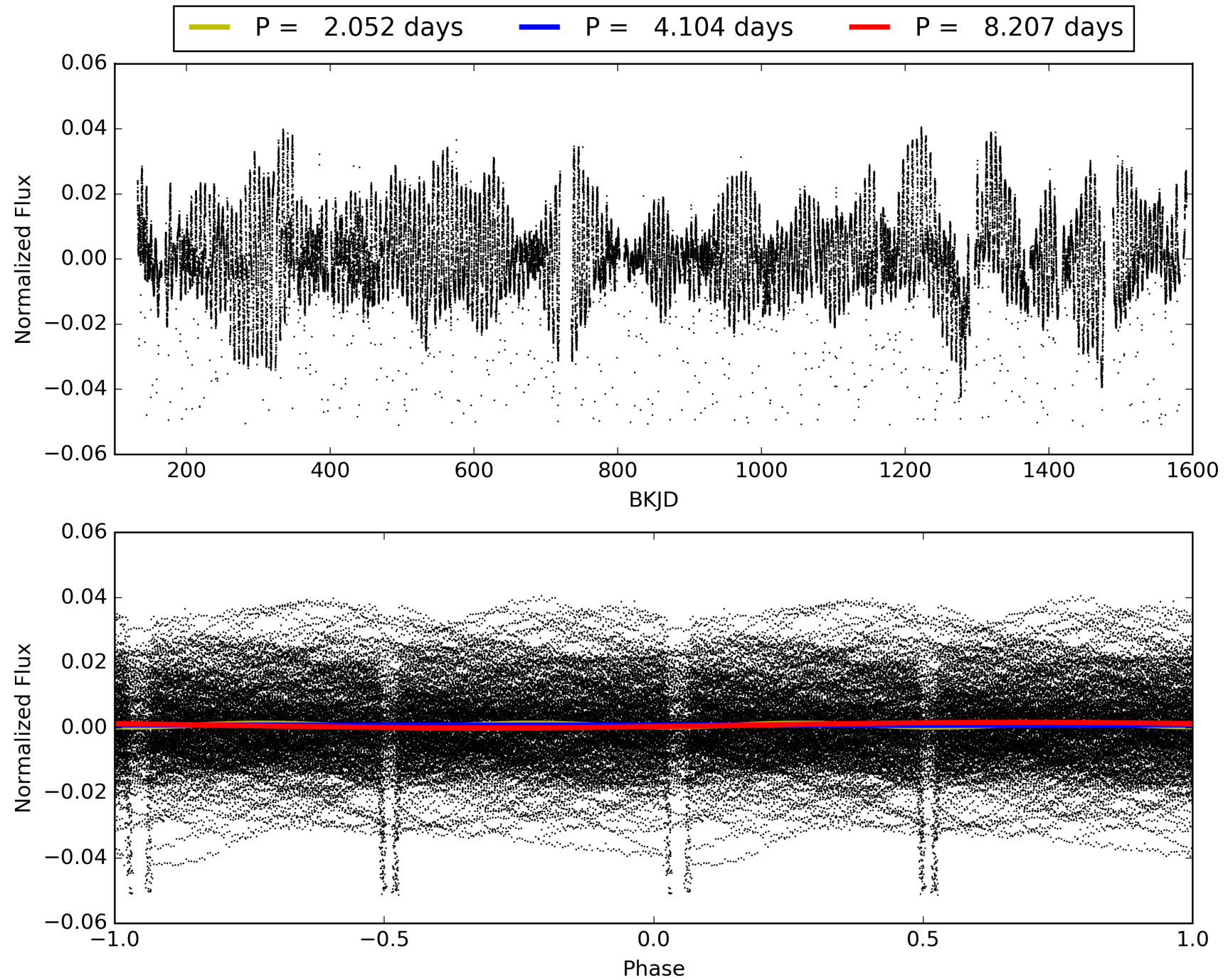
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 05:47:39 Z

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

# TCE 012470530-03, PDC Light Curves

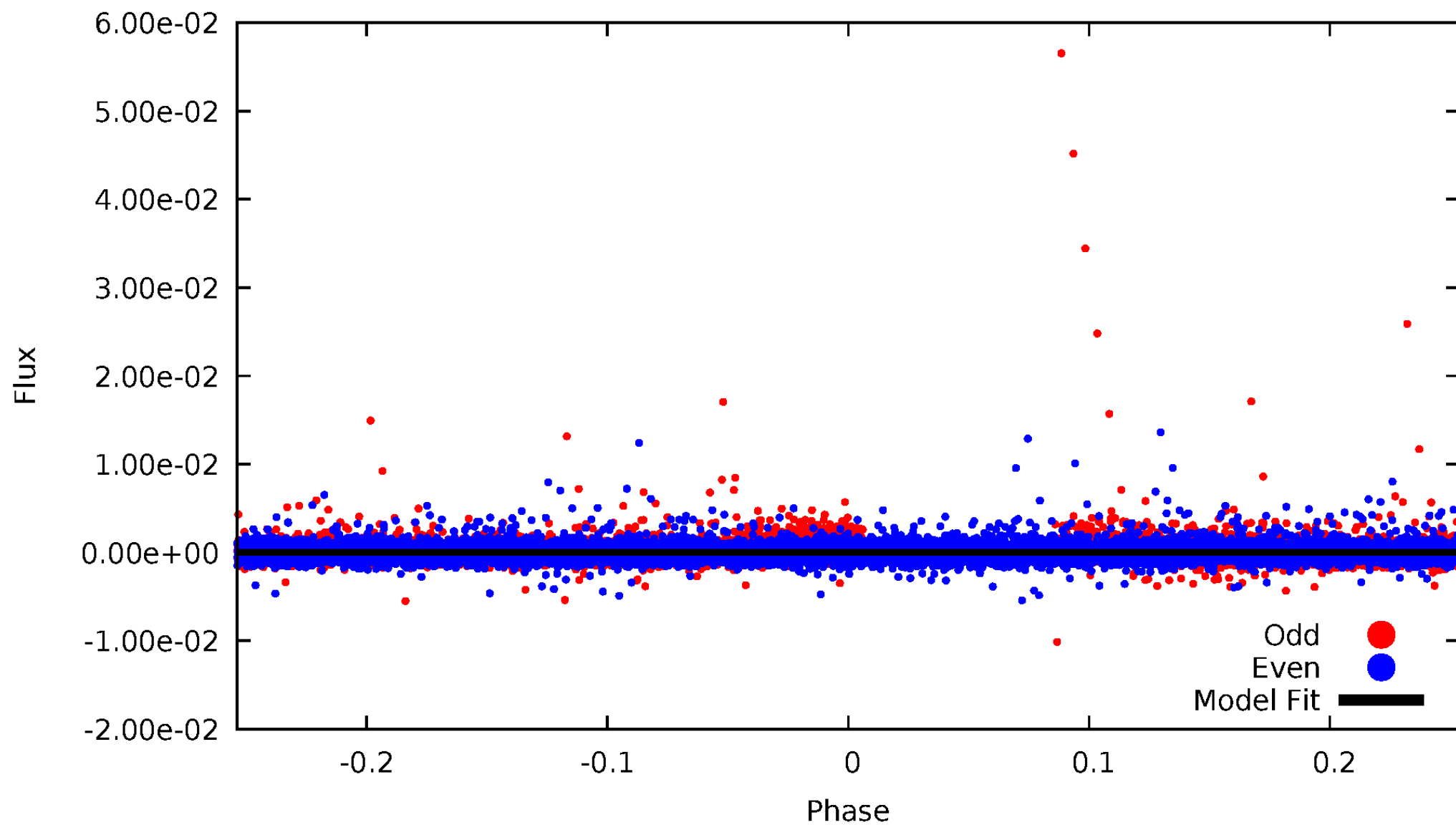


TCE 012470530-03



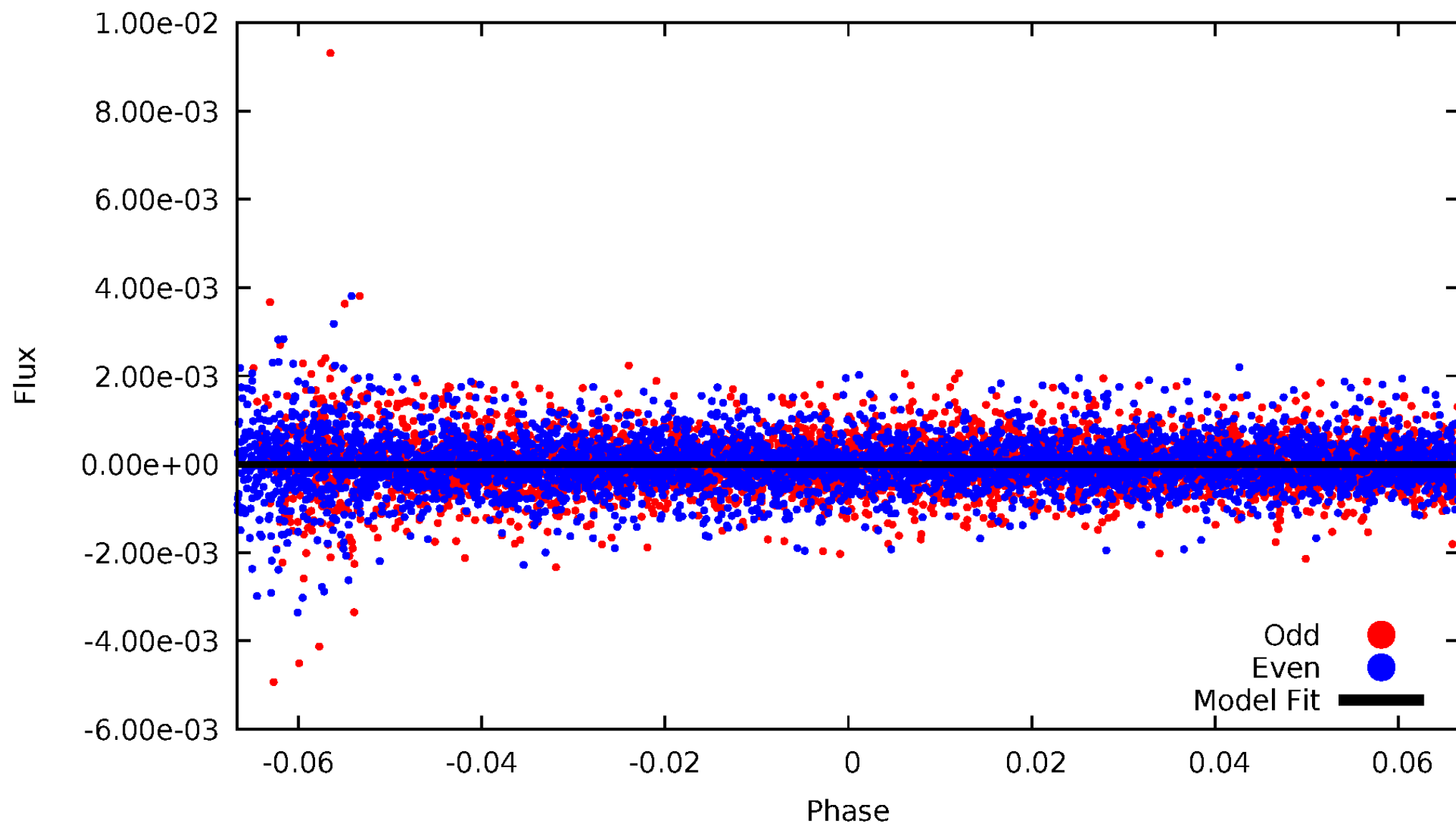
# DV Odd/Even

TCE 012470530-03



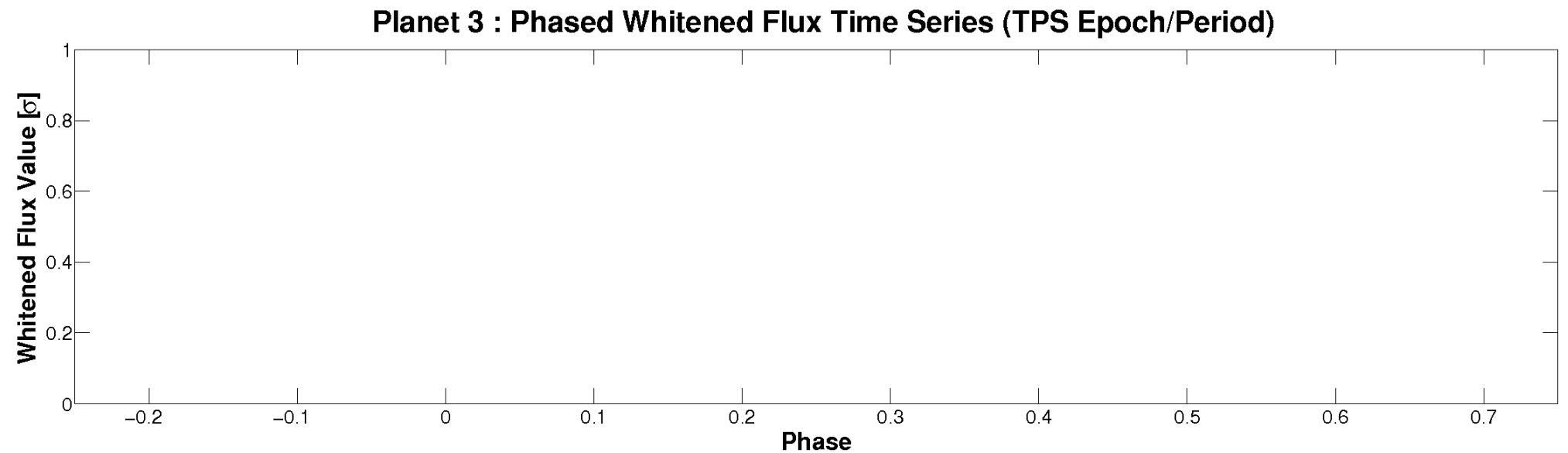
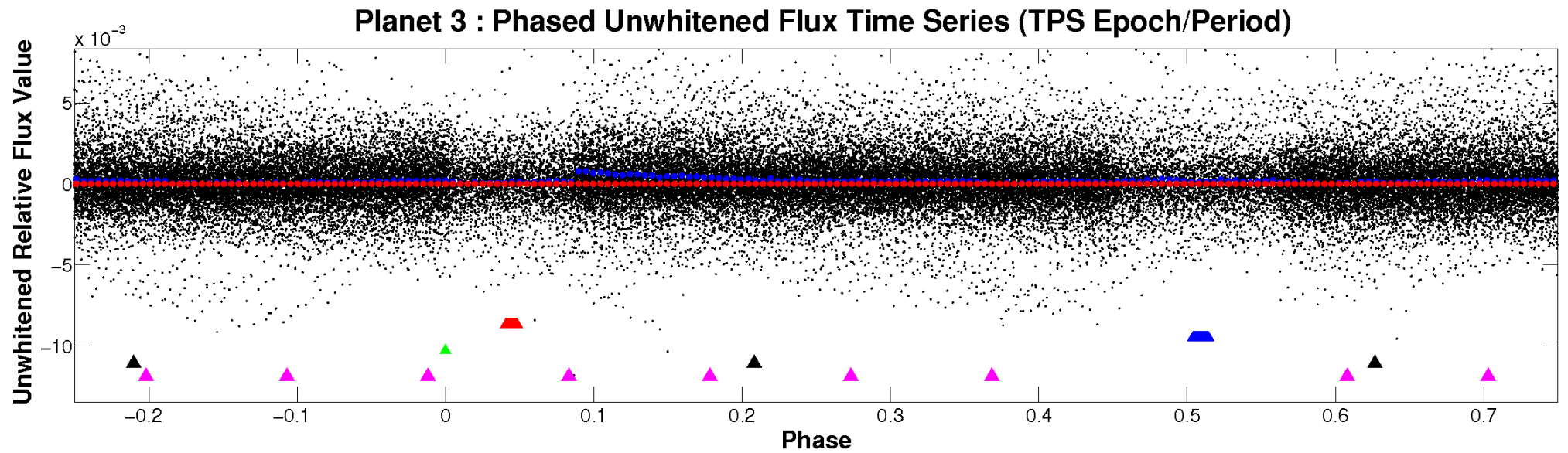
# ALT Odd/Even

TCE 012470530-03



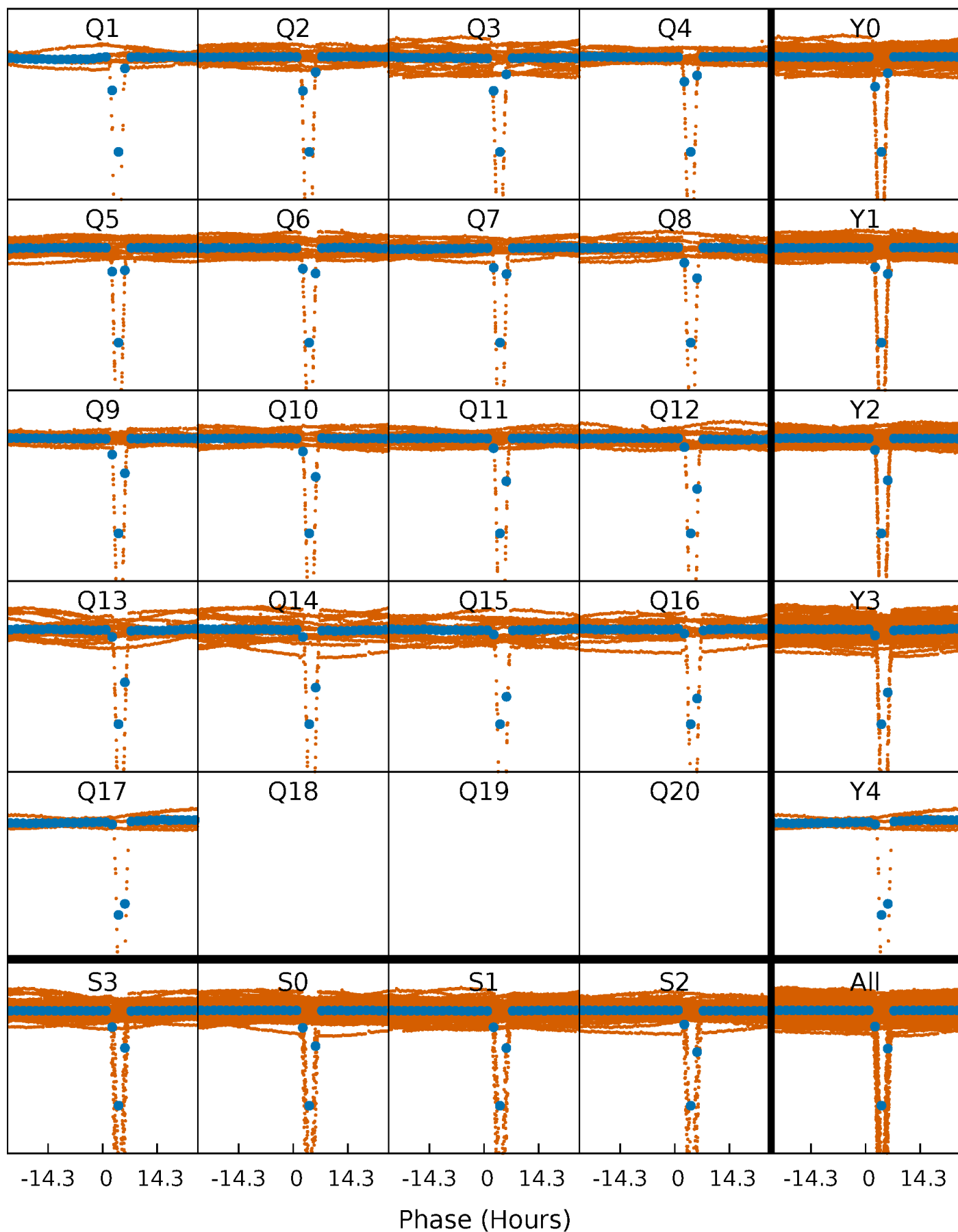


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

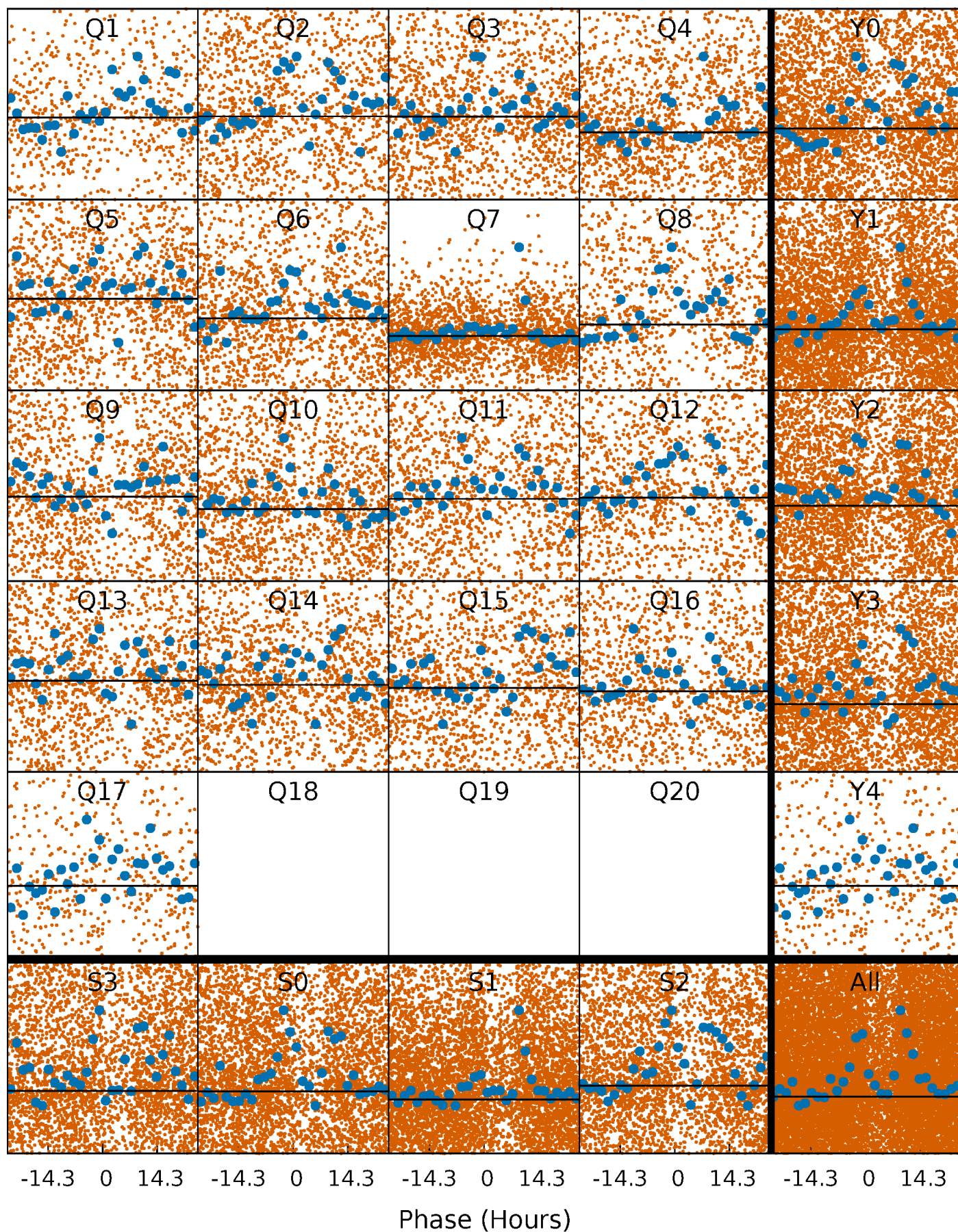
TCE 012470530-03 P= 4.103508 Days  $T_0=131.558672$  (BKJD)





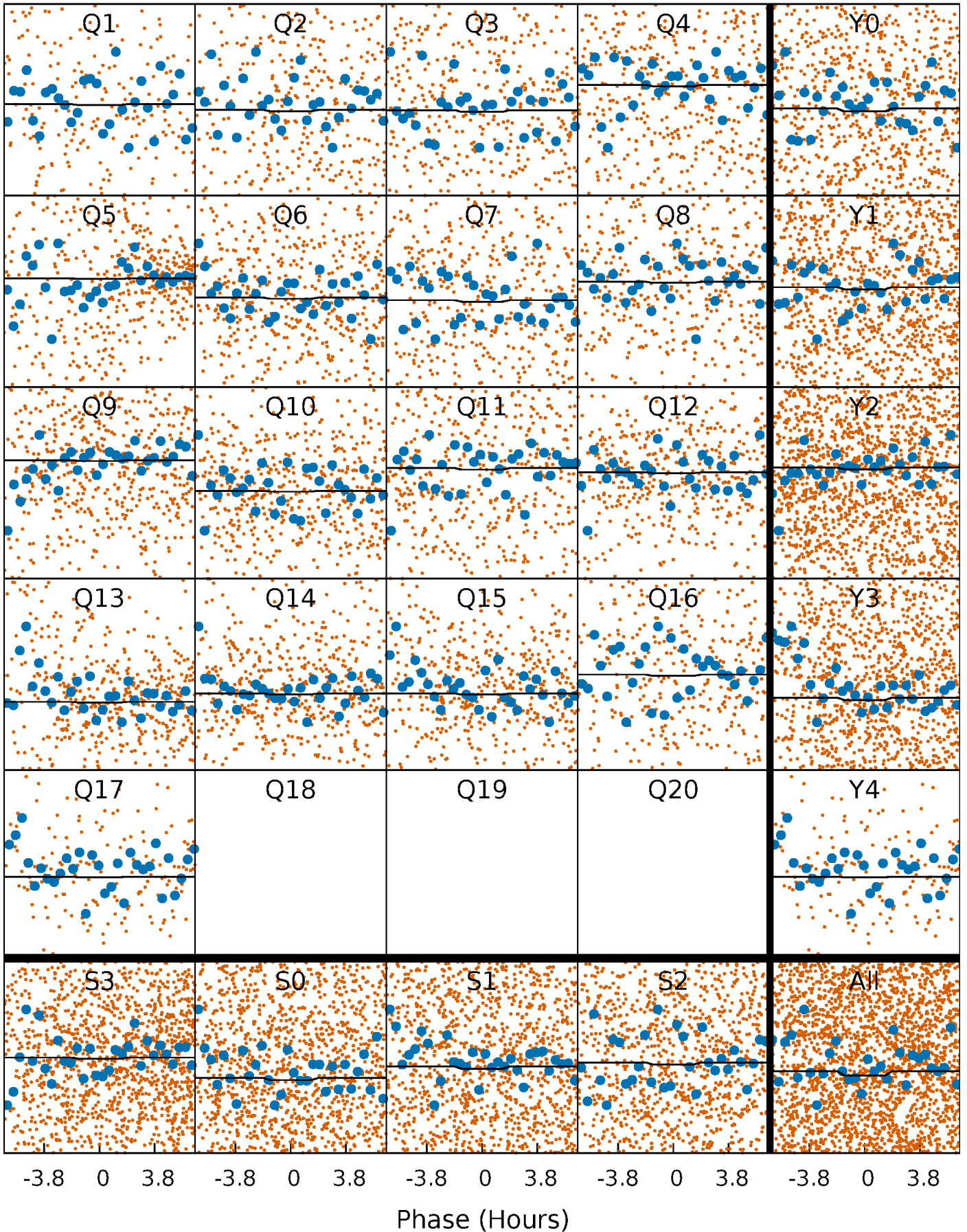
# DV Quarter-Phased Transit Curves

TCE 012470530-03 P= 4.103508 Days  $T_0=131.558672$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

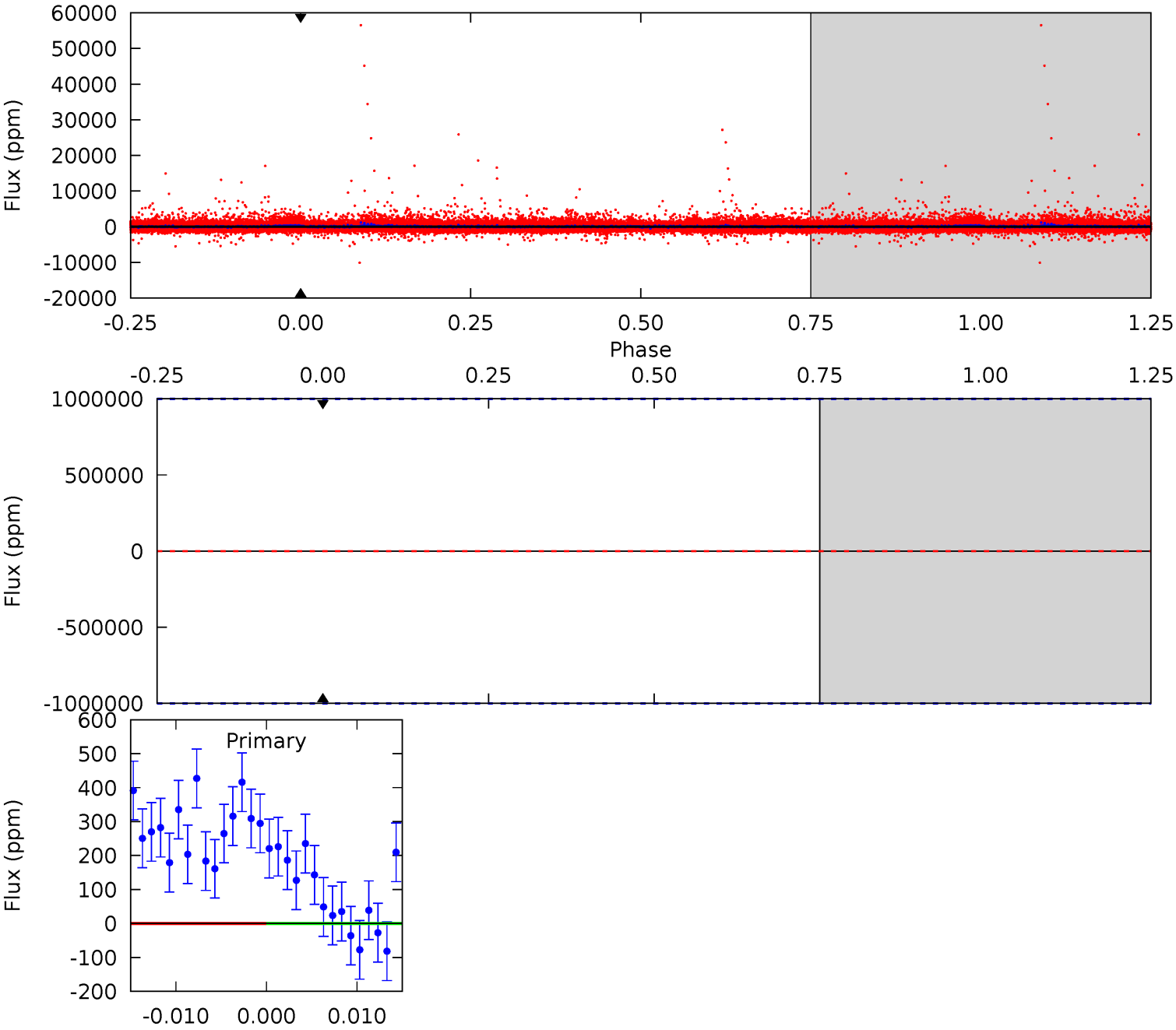
TCE 012470530-03 P= 4.103508 Days  $T_0=132.161362$  (BKJD)



# DV Model-Shift Uniqueness Test

012470530-03, P = 4.103508 Days, E = 127.455164 Days

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

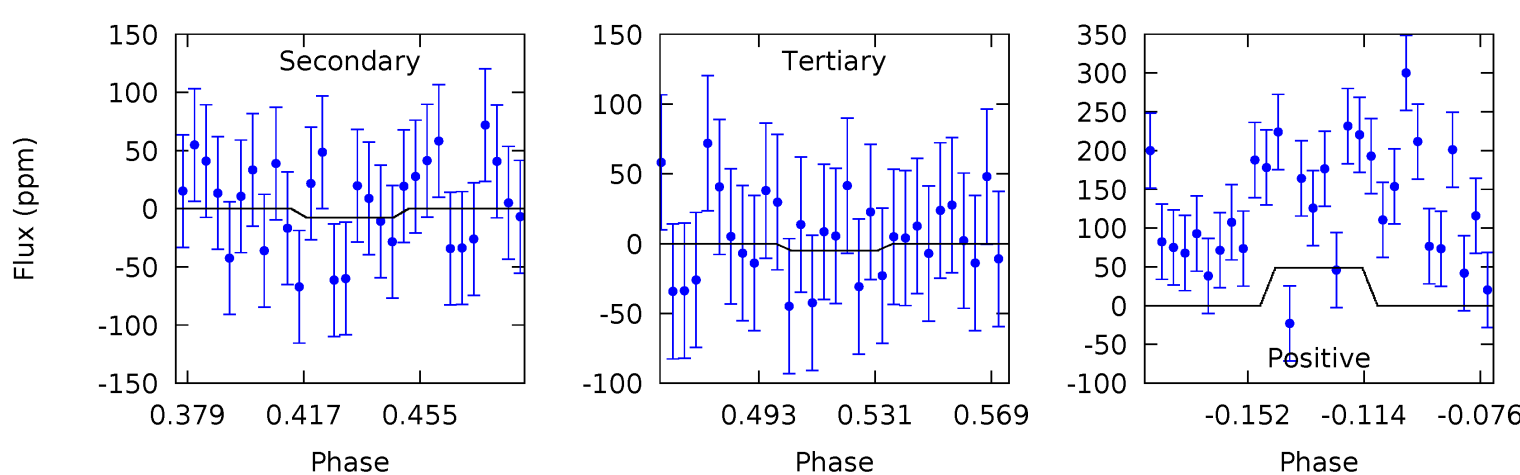
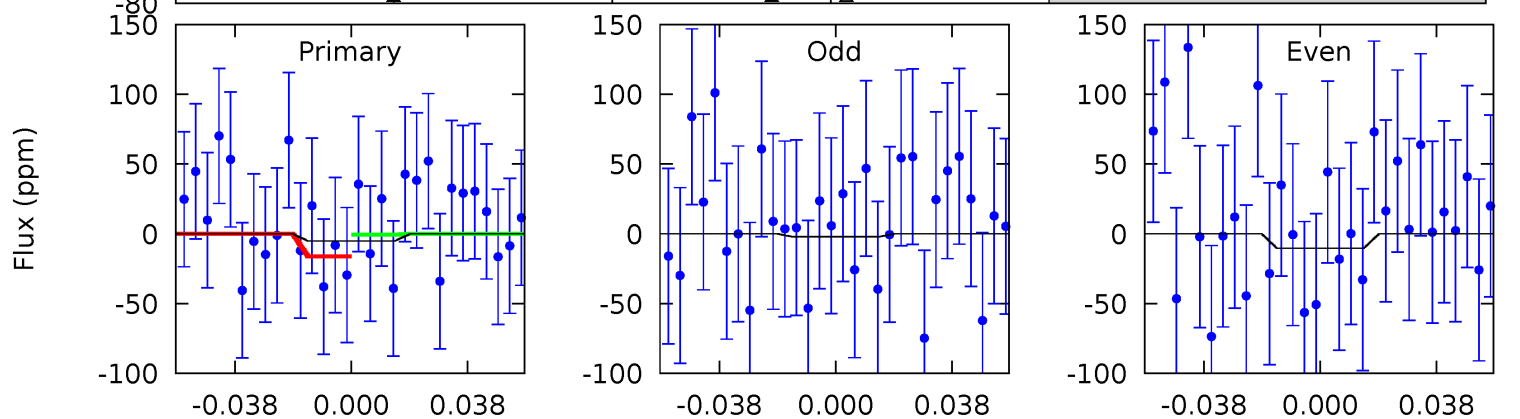
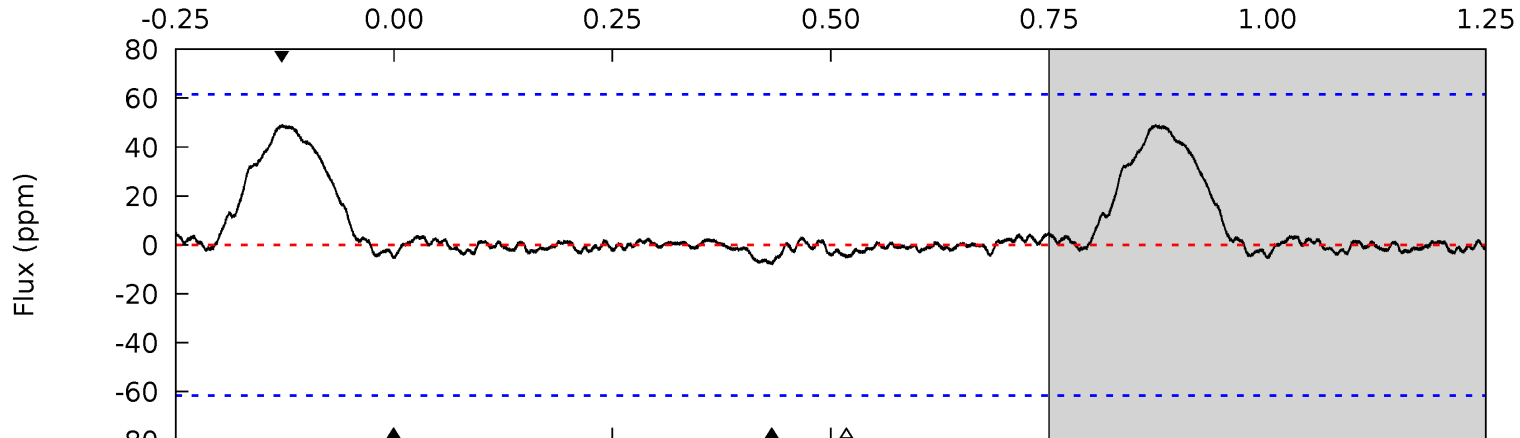
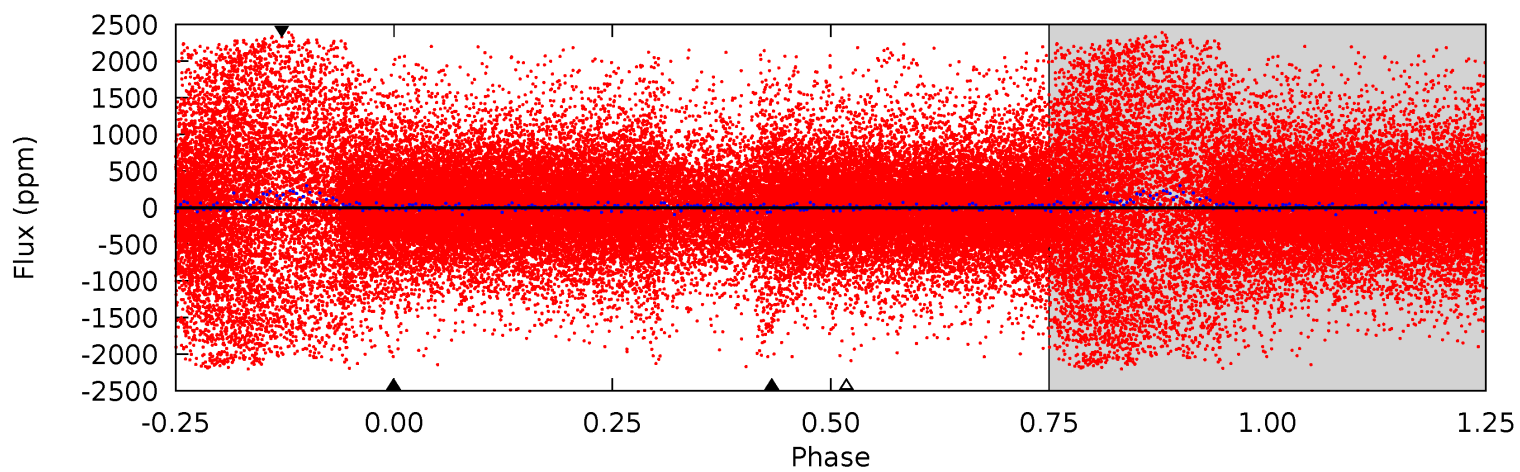




# Alt Model-Shift Uniqueness Test

012470530-03, P = 4.103508 Days, E = 128.057854 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0.40	0.59	0.37	3.78	4.76	2.08	0.81	0.02	-3.38	0.22	-3.18	0.33	-0.66	0.86	0.57



### Stellar Parameters For KIC 012470530

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4859^{+144}_{-144}$	$4.637^{+0.060}_{-0.035}$	$-0.700^{+0.300}_{-0.300}$	$0.621^{+0.054}_{-0.054}$	$0.610^{+0.060}_{-0.030}$	$3.588^{+0.869}_{-0.524}$
	+3%/-3%	+1%/-1%	+43%/-43%	+9%/-9%	+10%/-5%	+24%/-15%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 012470530-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$0 \pm 1000000$	$9.87^{+6.68}_{-5.69}$	$1138^{+42}_{-41}$	$3706^{+4582}_{-11543}$	$50^{+1680}_{-1572}$
Alt.	$-8 \pm 13$	$4.73^{+4.77}_{-3.30}$	$1138^{+41}_{-40}$	$-1687^{+4170}_{-334}$	$0.225^{+3.037}_{-0.411}$

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

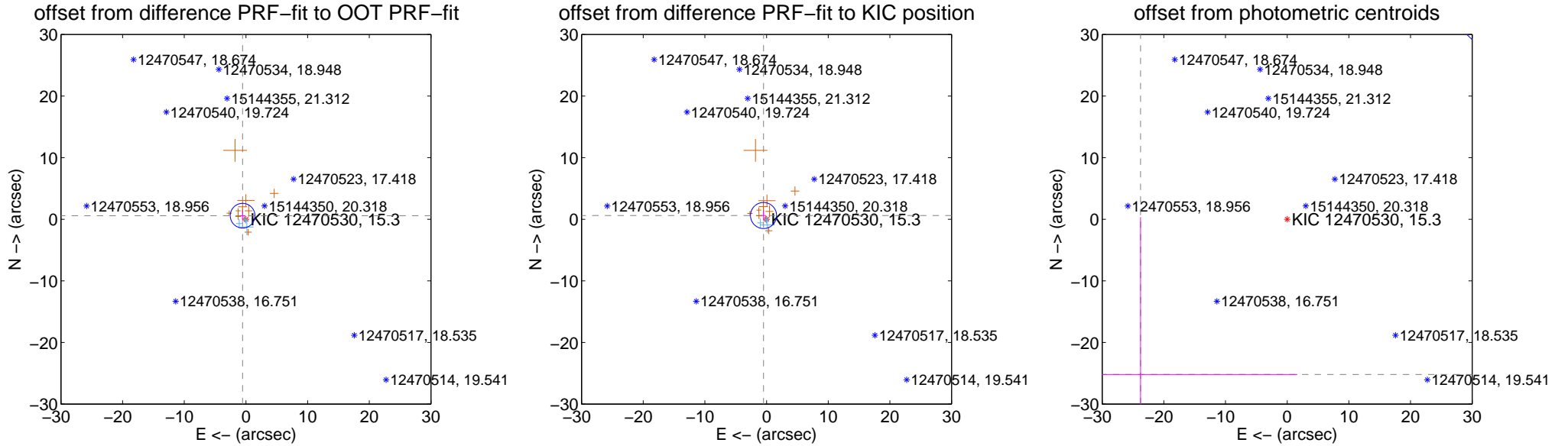
## DV Centroid Data

Supplemental centroid analysis for 012470530-03. Kepler magnitude: 15.30. Transit SNR -1.00

There are 4 quarters with good PRF difference image offsets

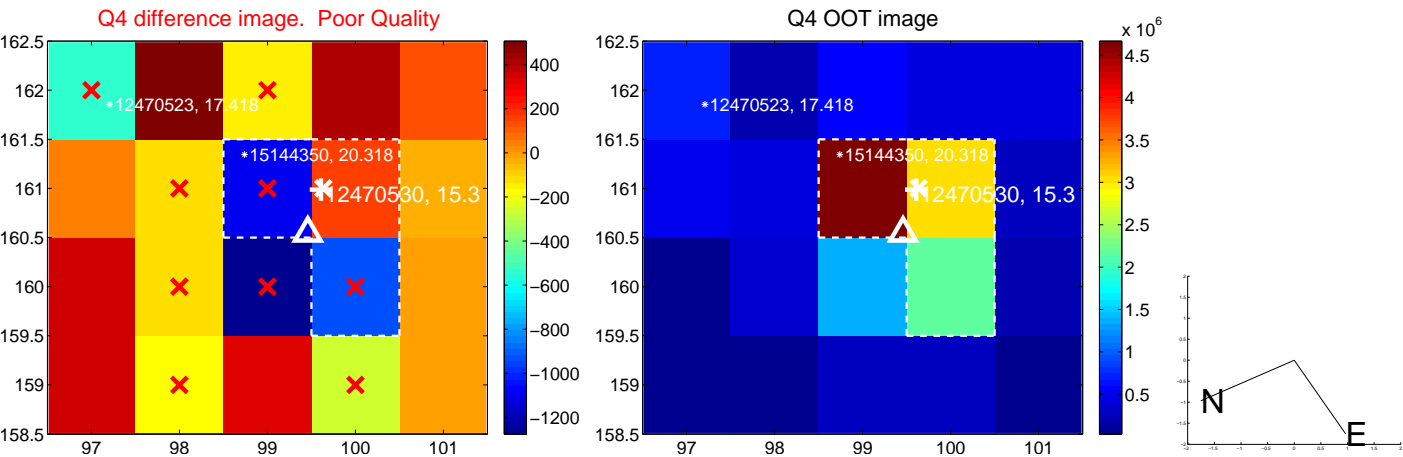
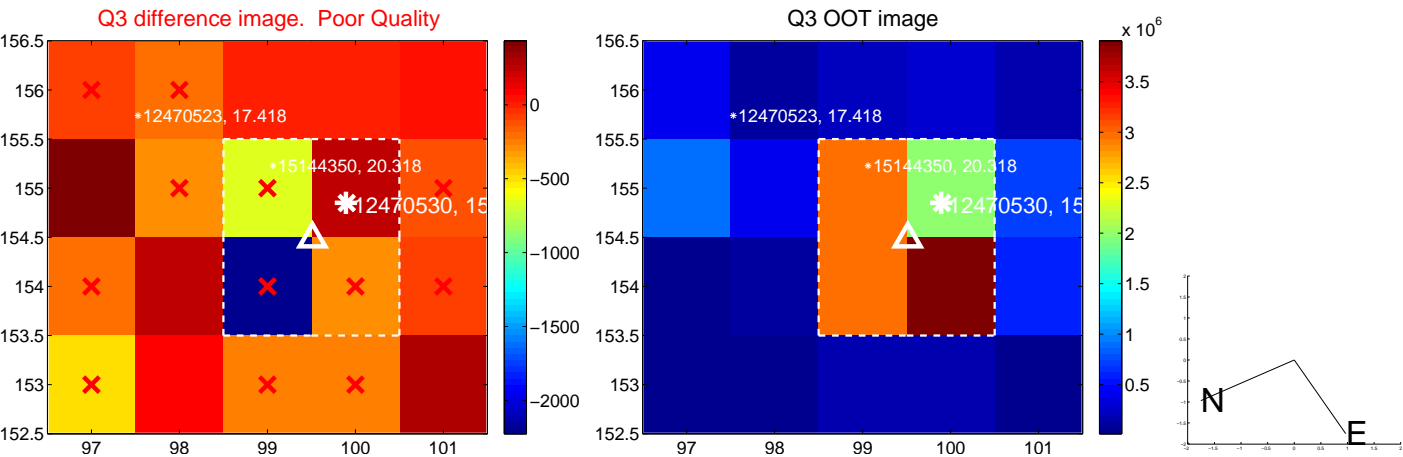
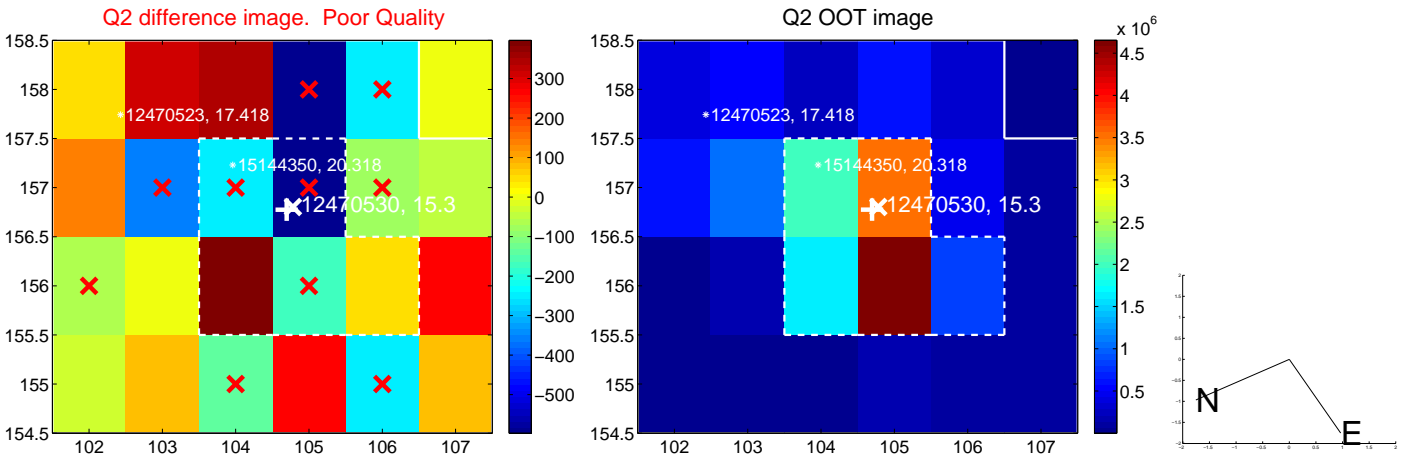
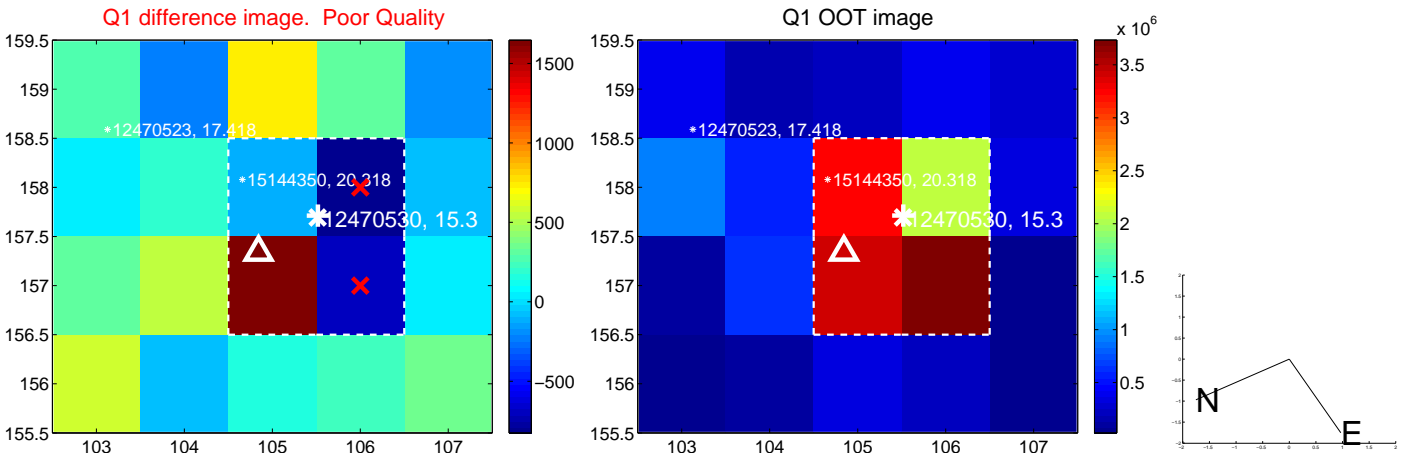
The direct PRF centroid is offset from the target star catalog position by about 0.02 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.792 \pm 0.667$	1.19	$0.541 \pm 0.442$	$0.579 \pm 0.846$
PRF-fit source offset from KIC position	$0.781 \pm 0.705$	1.11	$0.490 \pm 0.440$	$0.608 \pm 0.851$
photometric centroid source offset	$34.64 \pm 25.48$	1.36	$23.78 \pm 25.43$	$-25.19 \pm 25.53$

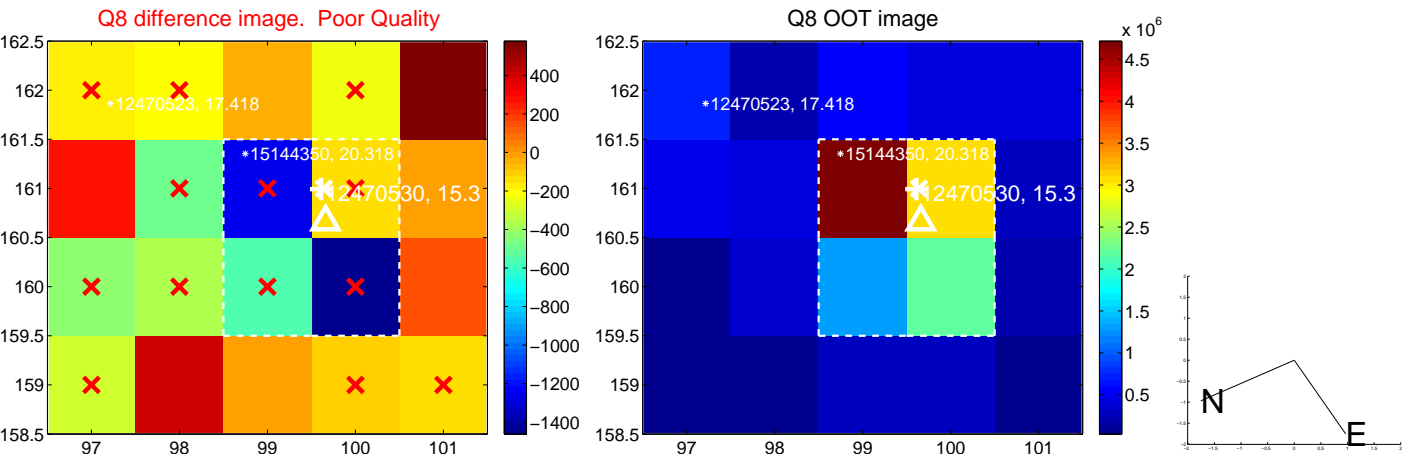
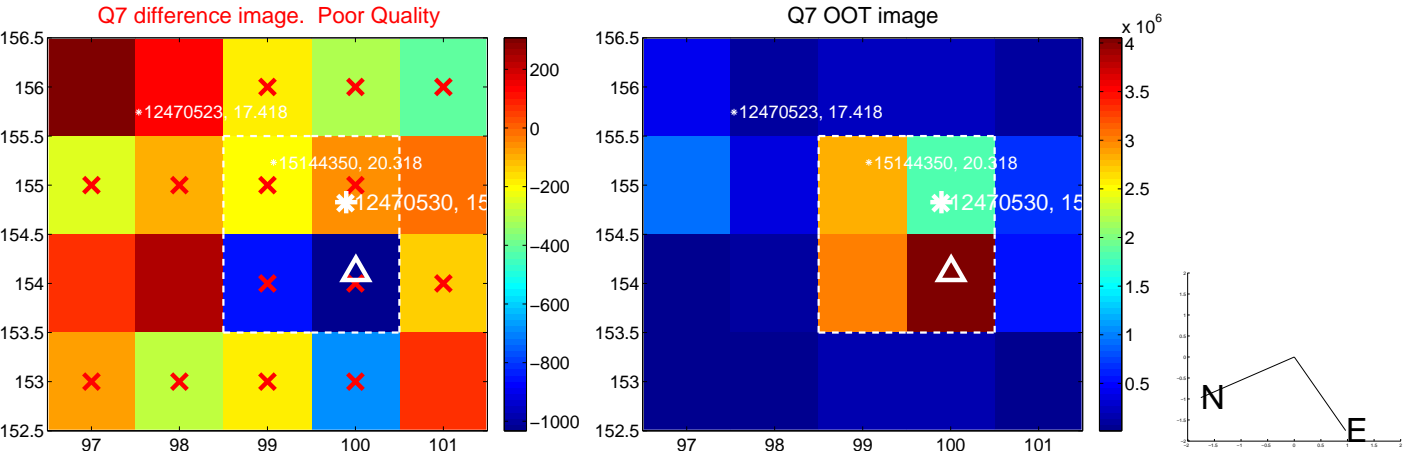
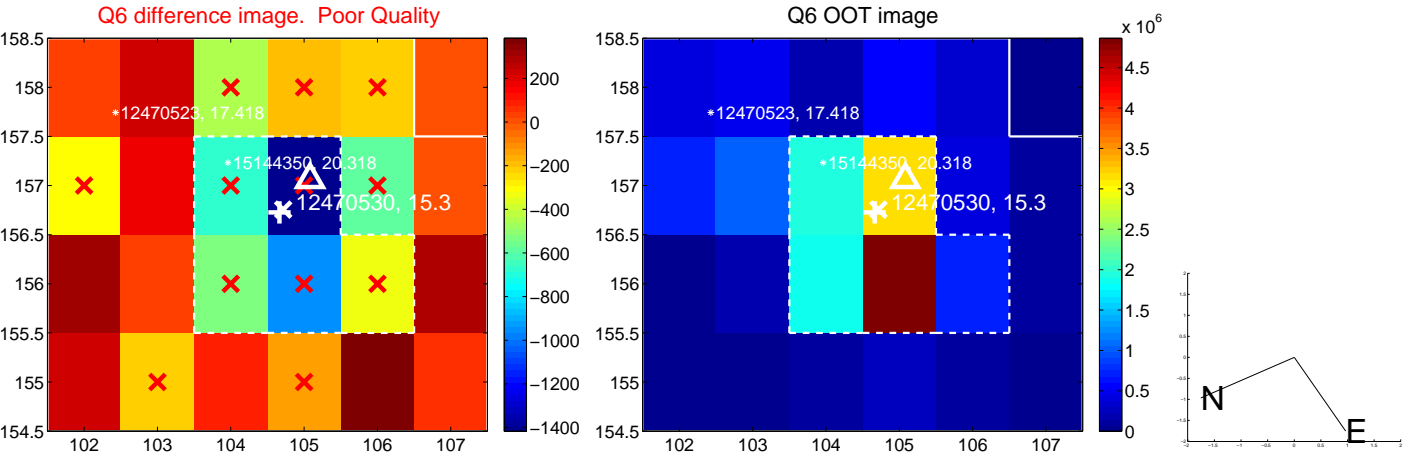
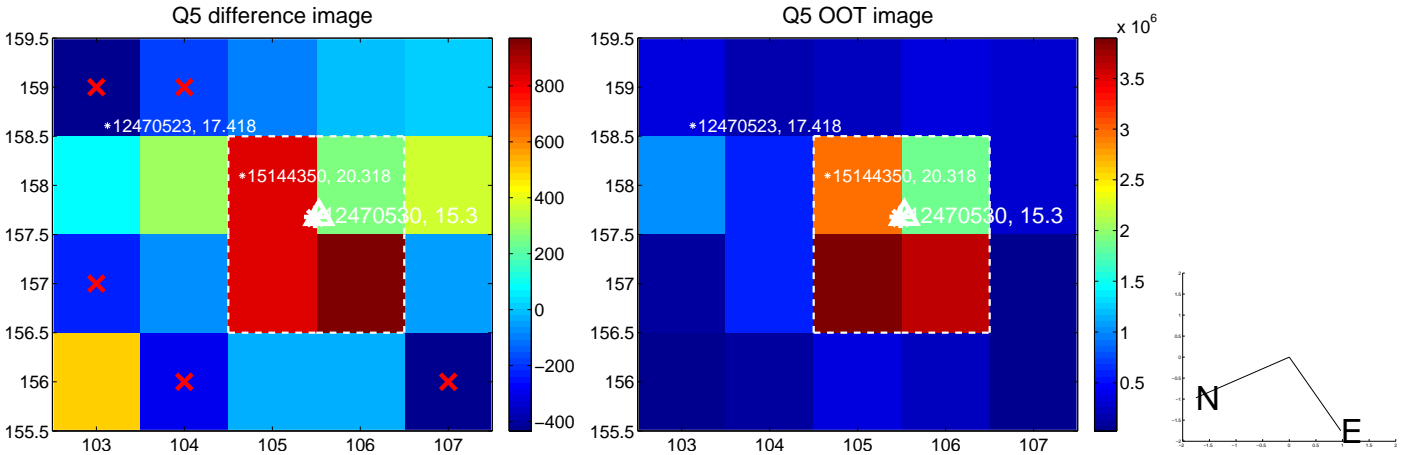


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

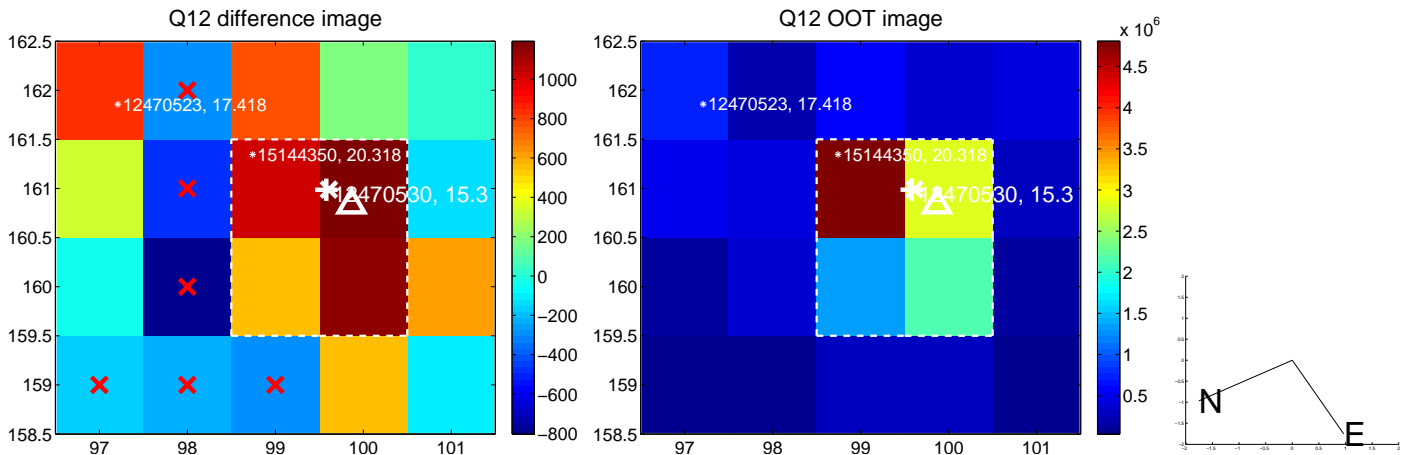
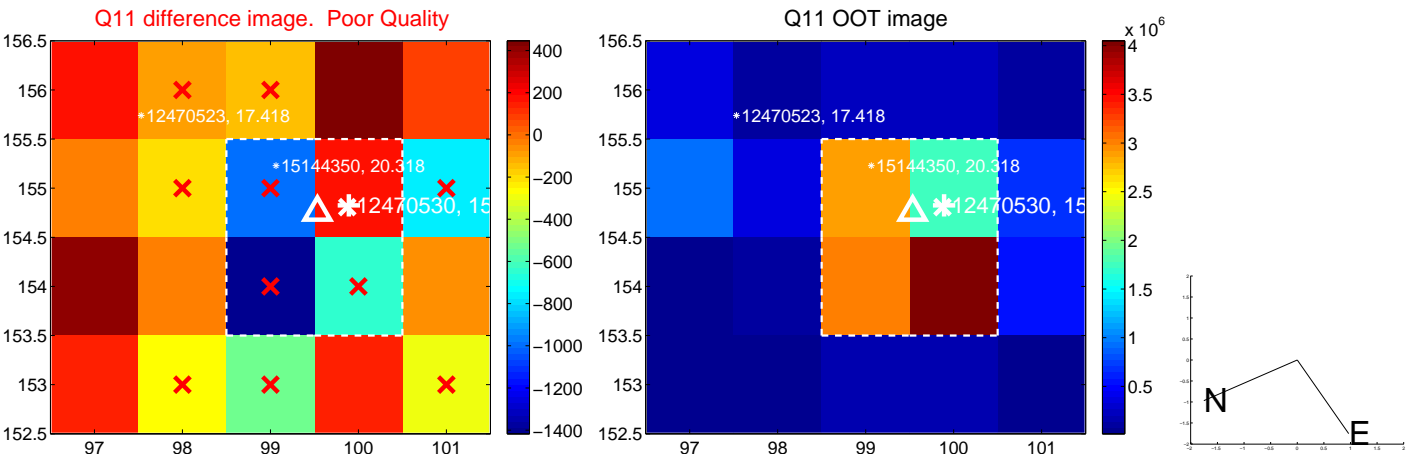
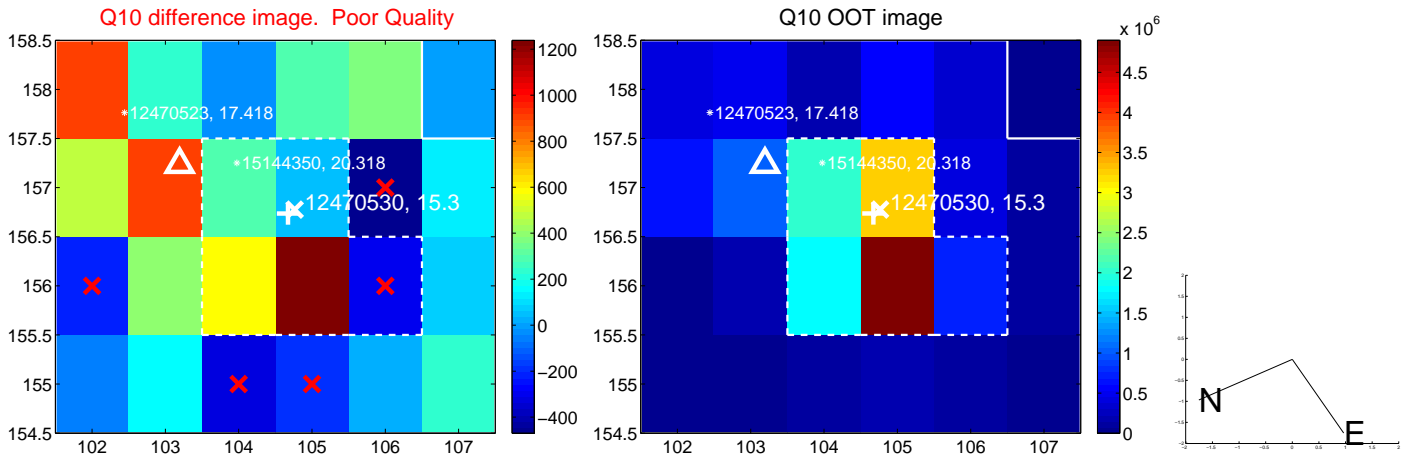
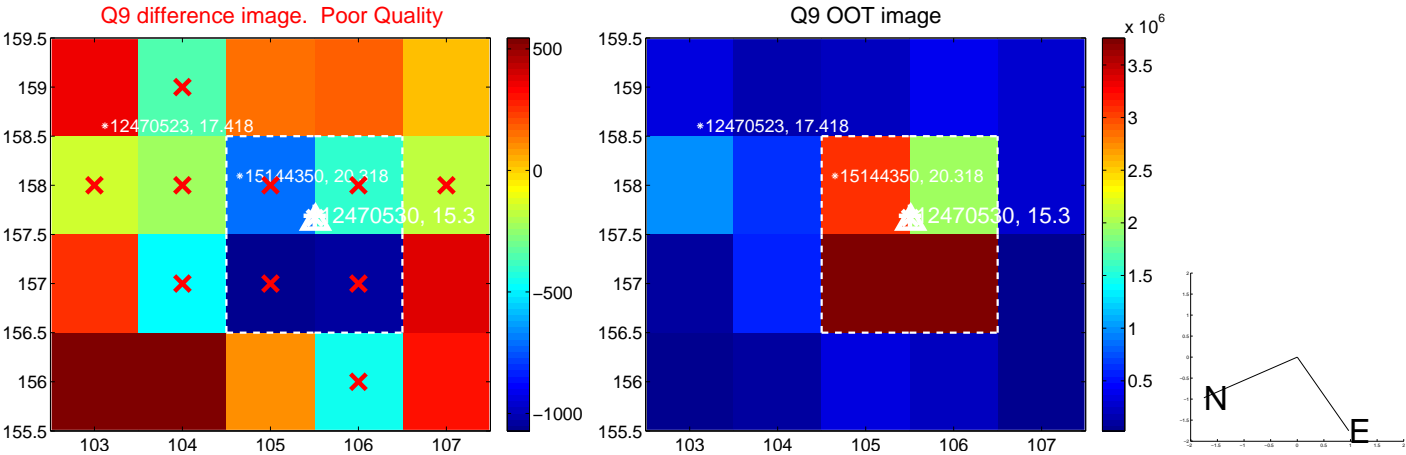


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

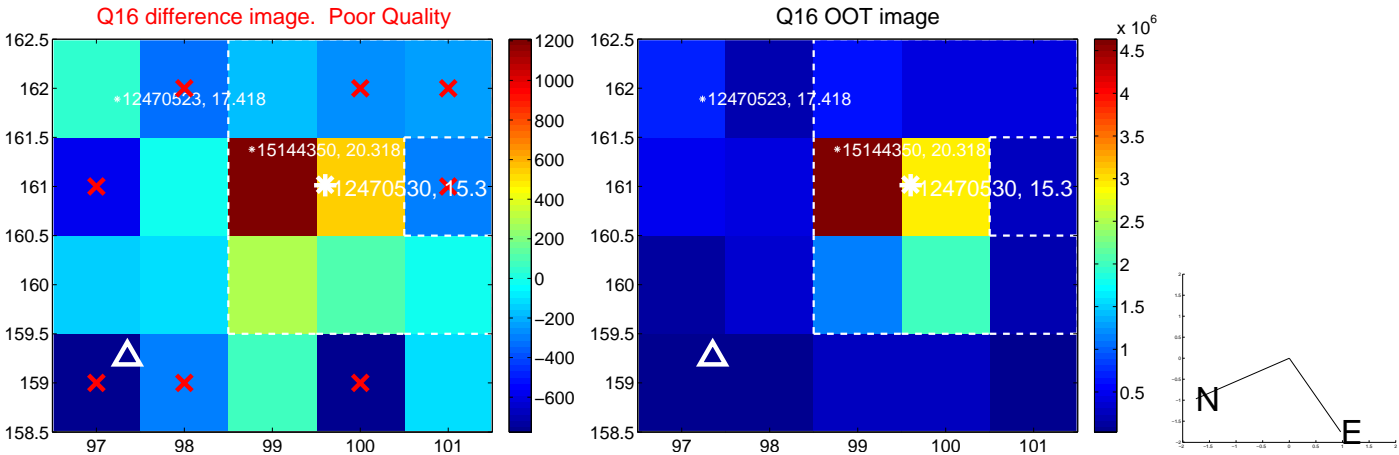
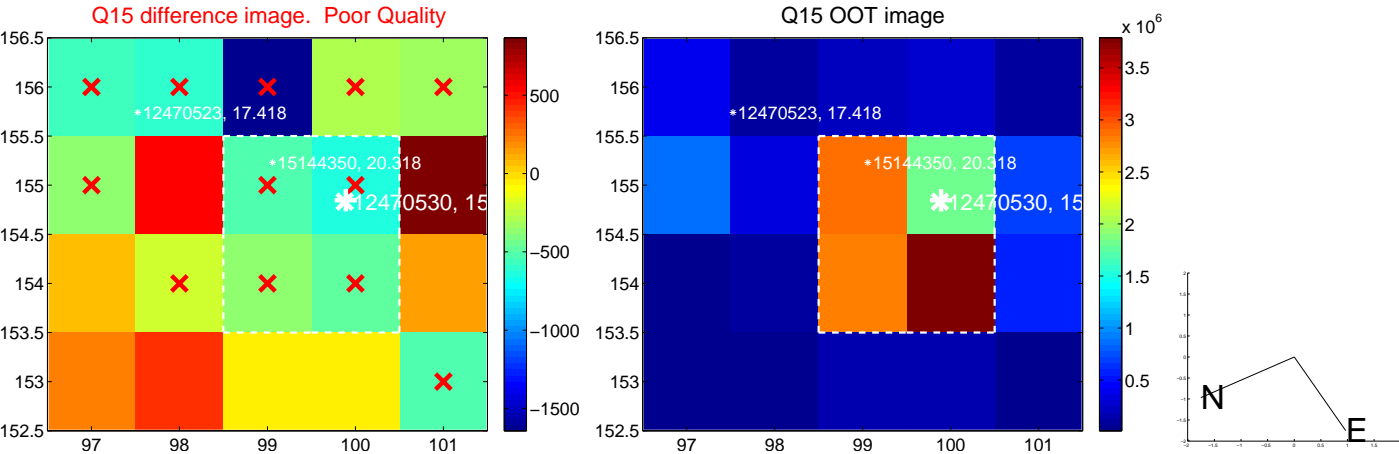
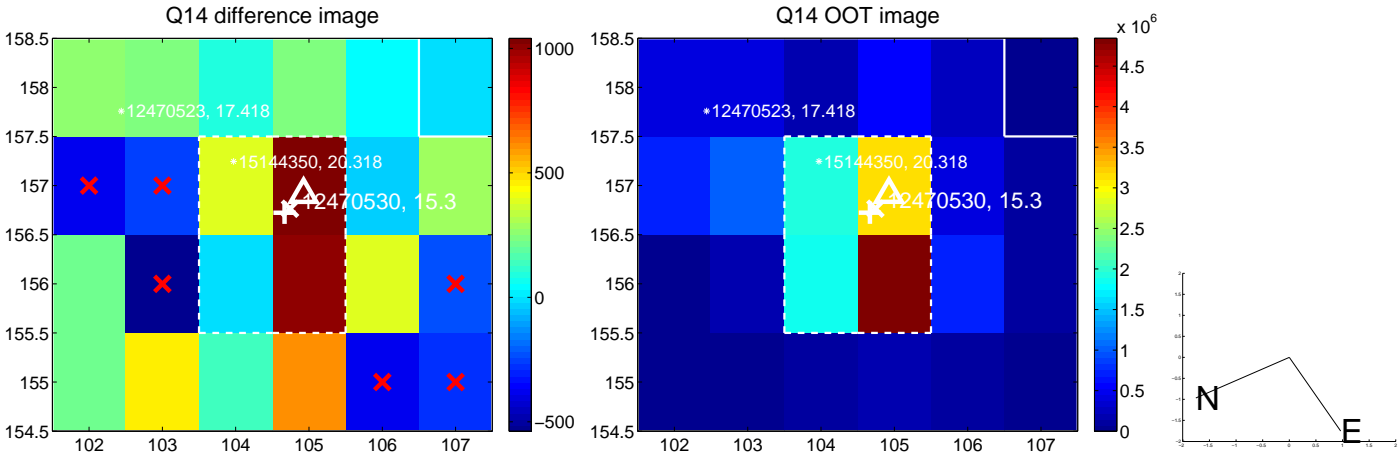
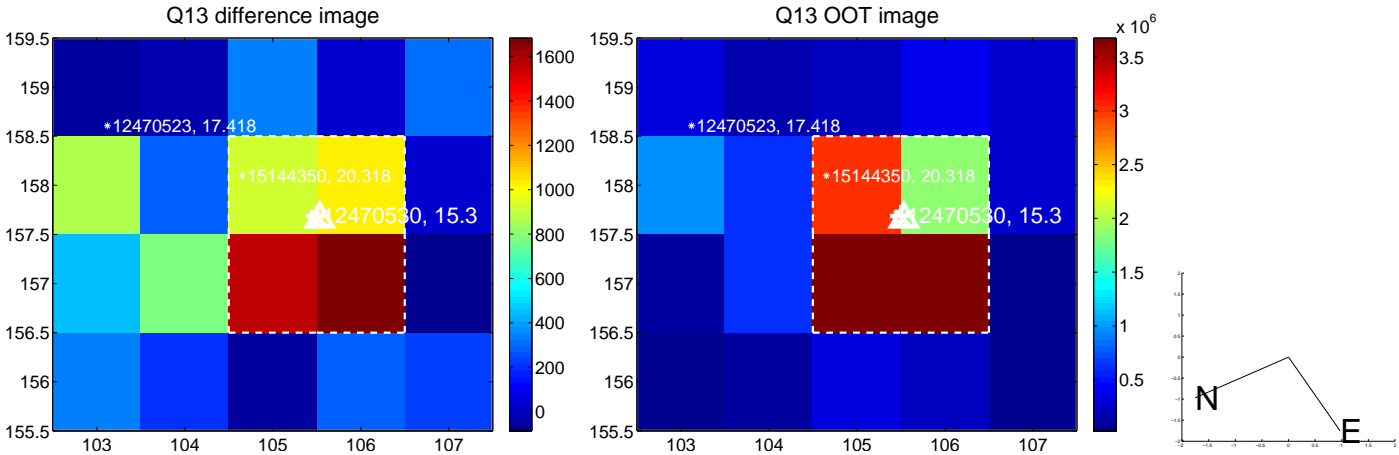




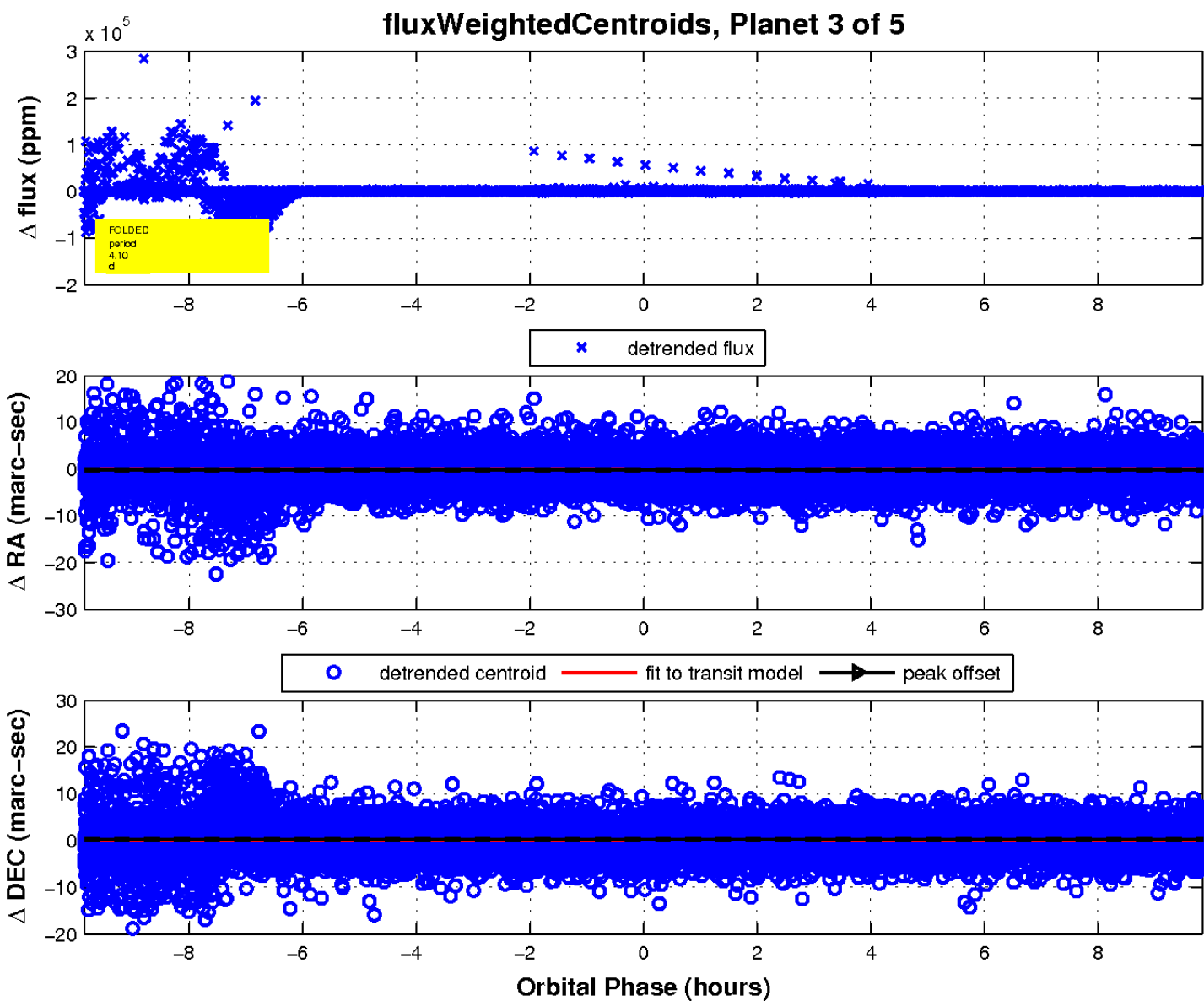
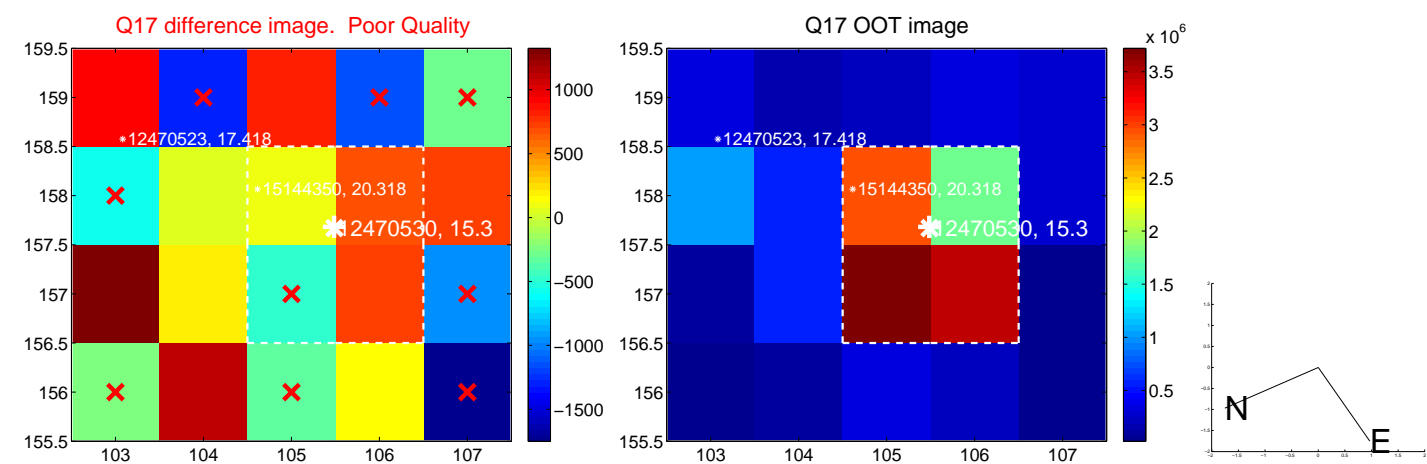
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

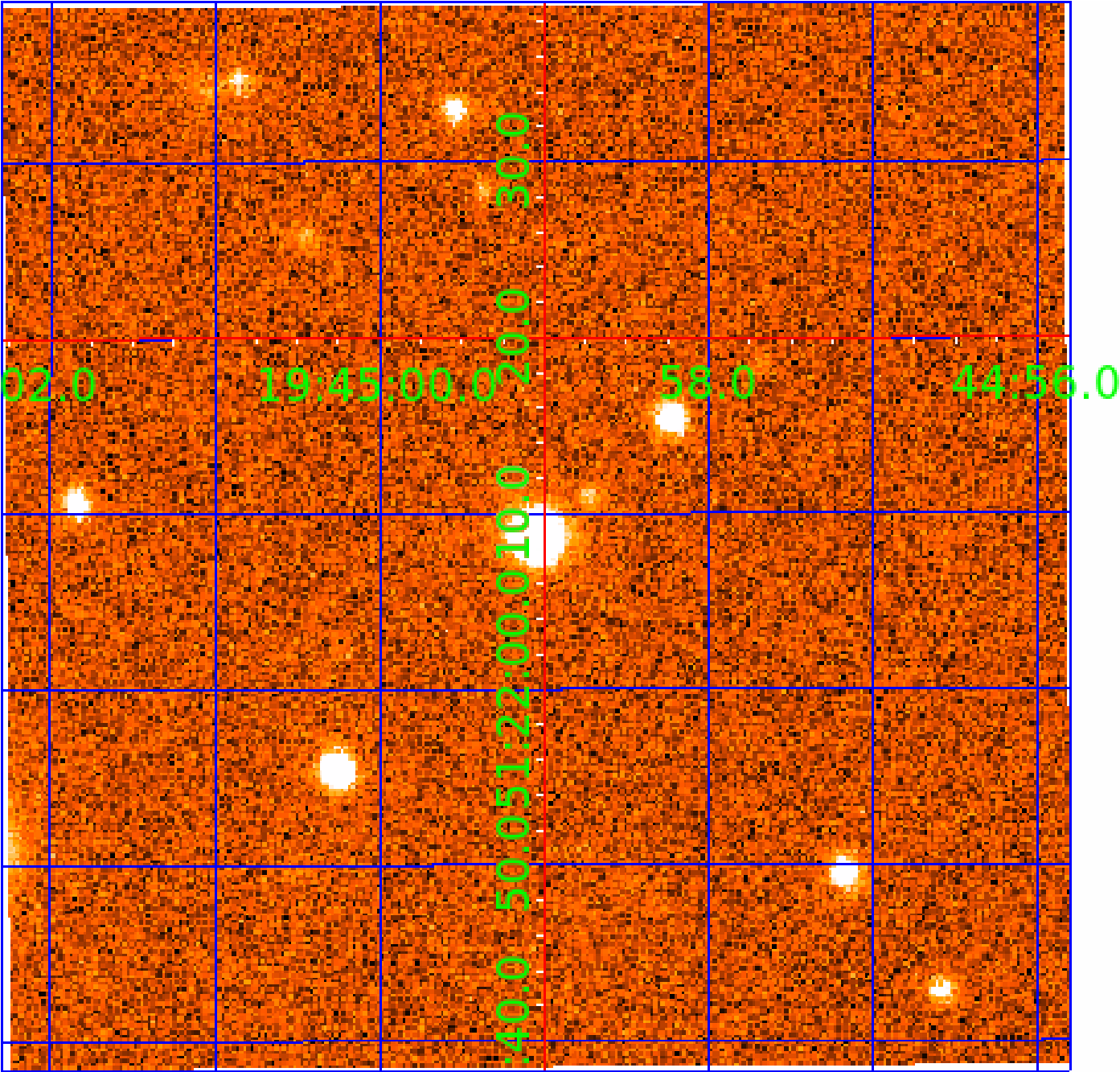


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 012470530

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
012470530-01	OBS	7536.01	8.207198	135.828703	387955.9	2.500	10346.4	-1.0	0.62	4859	33.88	42.22
012470530-02	OBS	No	8.207260	133.626620	129960.2	3.557	3521.1	2134.1	0.62	4859	33.62	42.22
012470530-03	OBS	No	4.103508	131.558672	23678.9	12.500	1117.9	-1.0	0.62	4859	9.31	106.40
012470530-04	OBS	No	621.346864	159.420495	2430.3	4.072	11.9	8.1	0.62	4859	3.00	0.13
012470530-05	OBS	No	160.426848	166.881674	1419.0	3.397	8.4	7.1	0.62	4859	2.71	0.80

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
012470530-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_ALT—HAS_SEC_TCE—CENT_NOFITS
012470530-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE
012470530-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—RESIDUAL_TCE—CENT_NOFITS
012470530-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—ALL_TRANS_CHASES—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT— INCONSISTENT_TRANS—CENT_FEW_DIFFS
012470530-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—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.

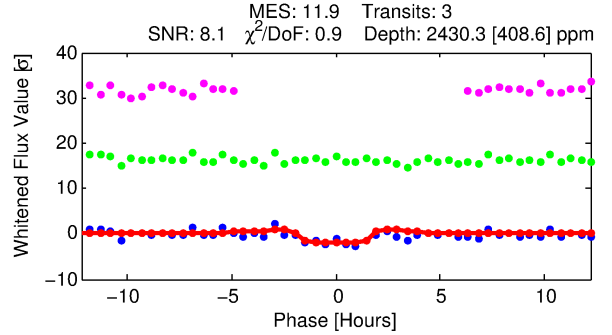
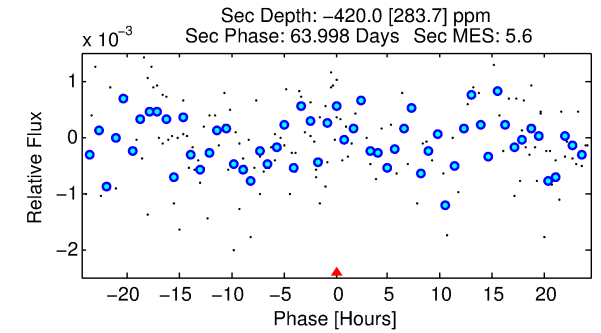
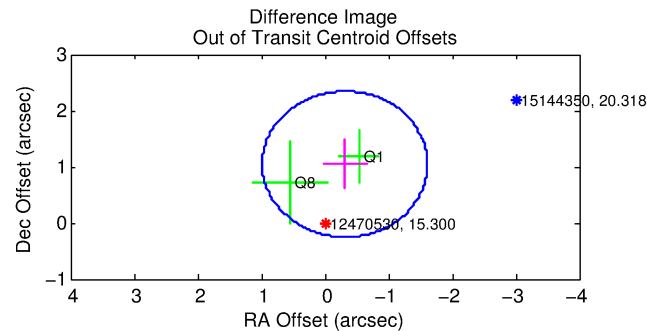
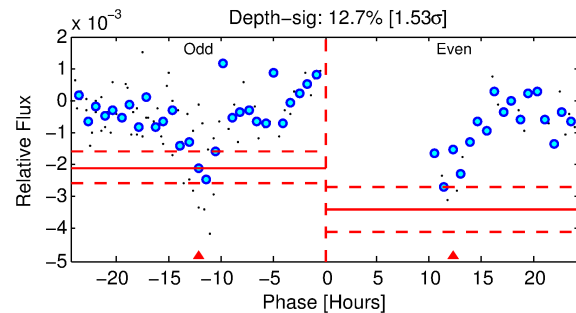
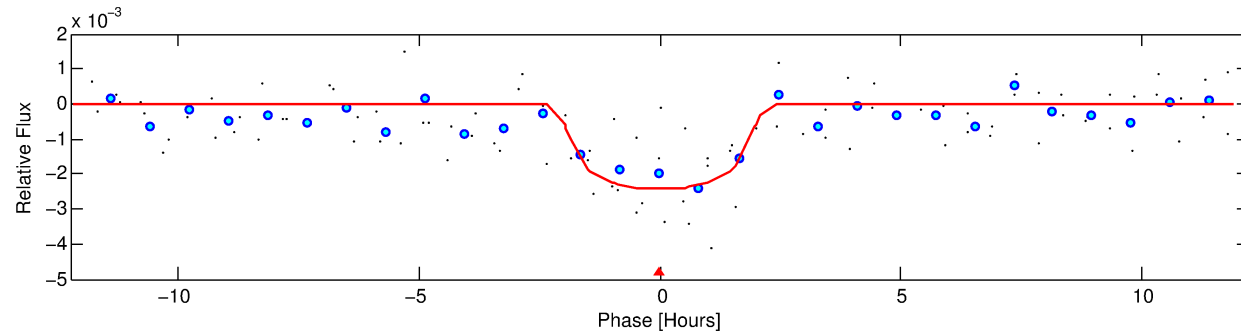
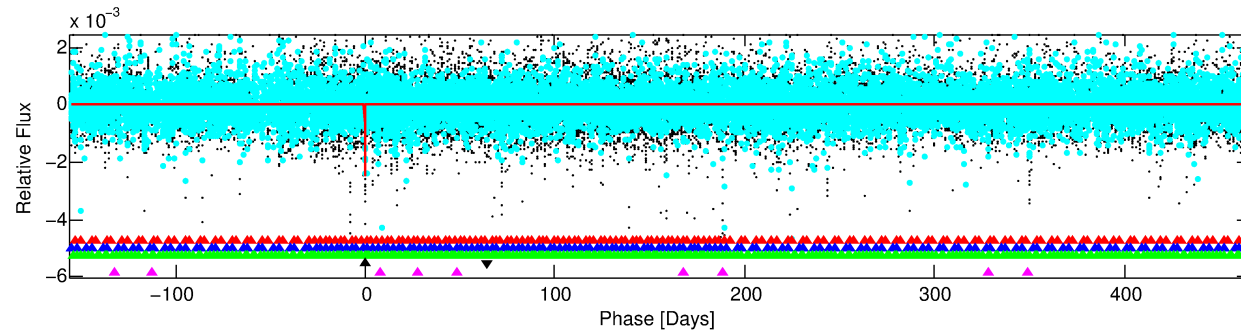
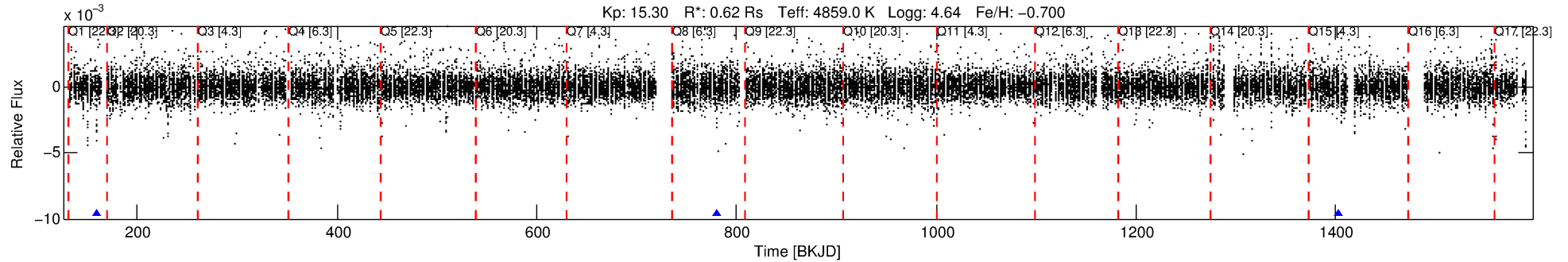
## Ephemeris Match Information For 012470530-04

No Significant Match Found

# DV One-Page Summary

KIC: 12470530 Candidate: 4 of 5 Period: 621.347 d

KOI: K07536 Corr: No Ephemeris Match



## DV Fit Results:

Period = 621.34686 [0.00602] d  
Epoch = 159.4205 [0.0100] BKJD  
Rp/R\* = 0.0442 [0.2063]  
a/R\* = 1188.59 [19835.47]  
b = 0.23 [71.14]  
Seff = 0.13 [0.02]  
Teq = 154 [6] K  
Rp = 3.00 [13.98] Re  
a = 1.2087 [0.0895] AU  
Ag = N/A  
Teffp = N/A

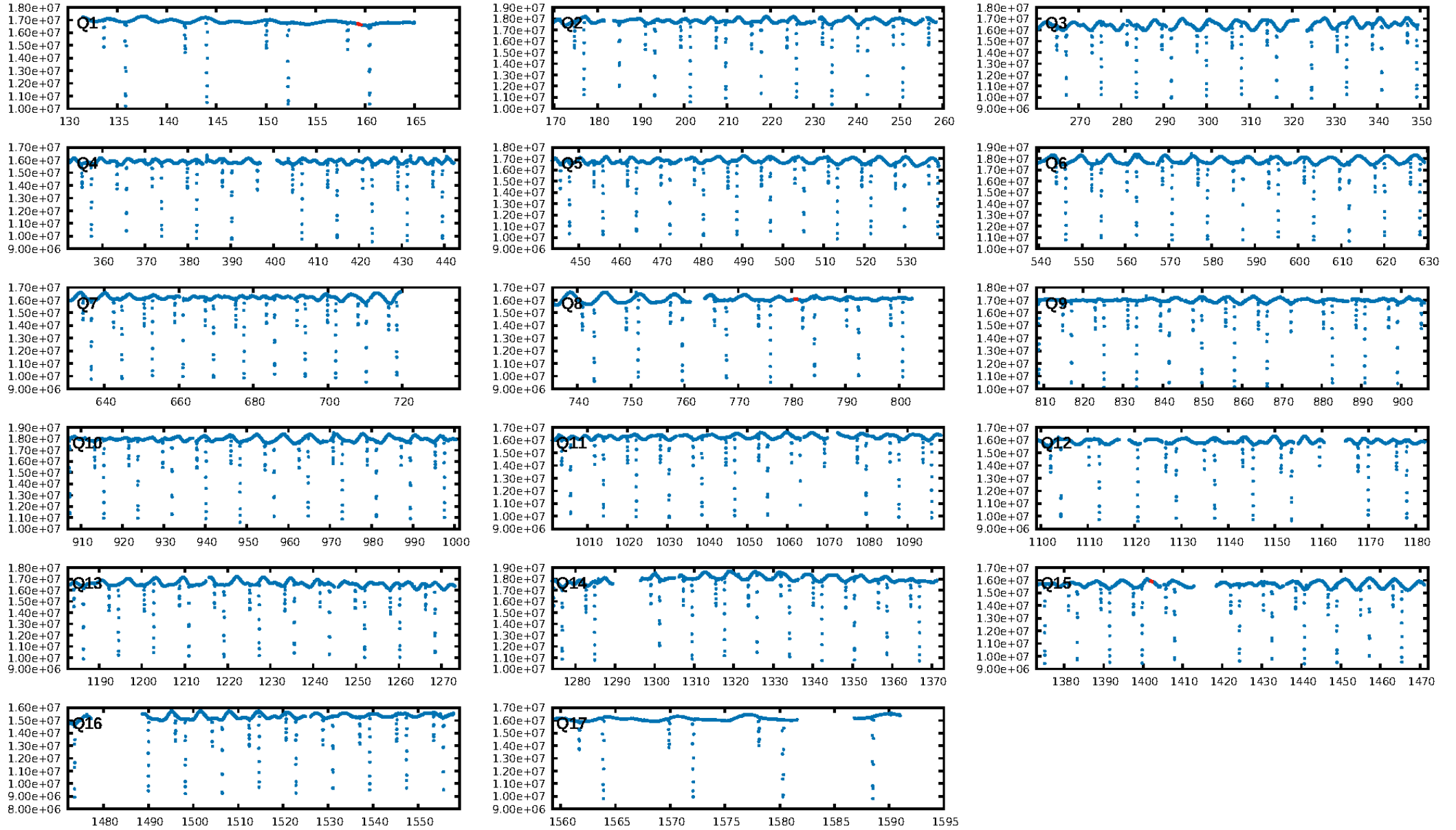
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [2086.26σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 3.2%  
ModelChiSquareGof-sig: 97.7%  
**Bootstrap-pfa: 4.02e-11**  
RollingBand-fgt: 1.00 [2/2]  
GhostDiagnostic-chr: -2.442  
Centroid-sig: 10.1%  
Centroid-so: 2.199 arcsec [2.81σ]  
OotOffset-rm: 1.090 arcsec [2.52σ]  
OotOffset-st: 0/0/1/1 [2]  
KicOffset-rm: 1.076 arcsec [2.50σ]  
KicOffset-st: 0/0/1/1 [2]  
DiffImageQuality-fgm: 0.50 [1/2]  
DiffImageOverlap-fno: 0.67 [2/3]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 05:47:54 Z

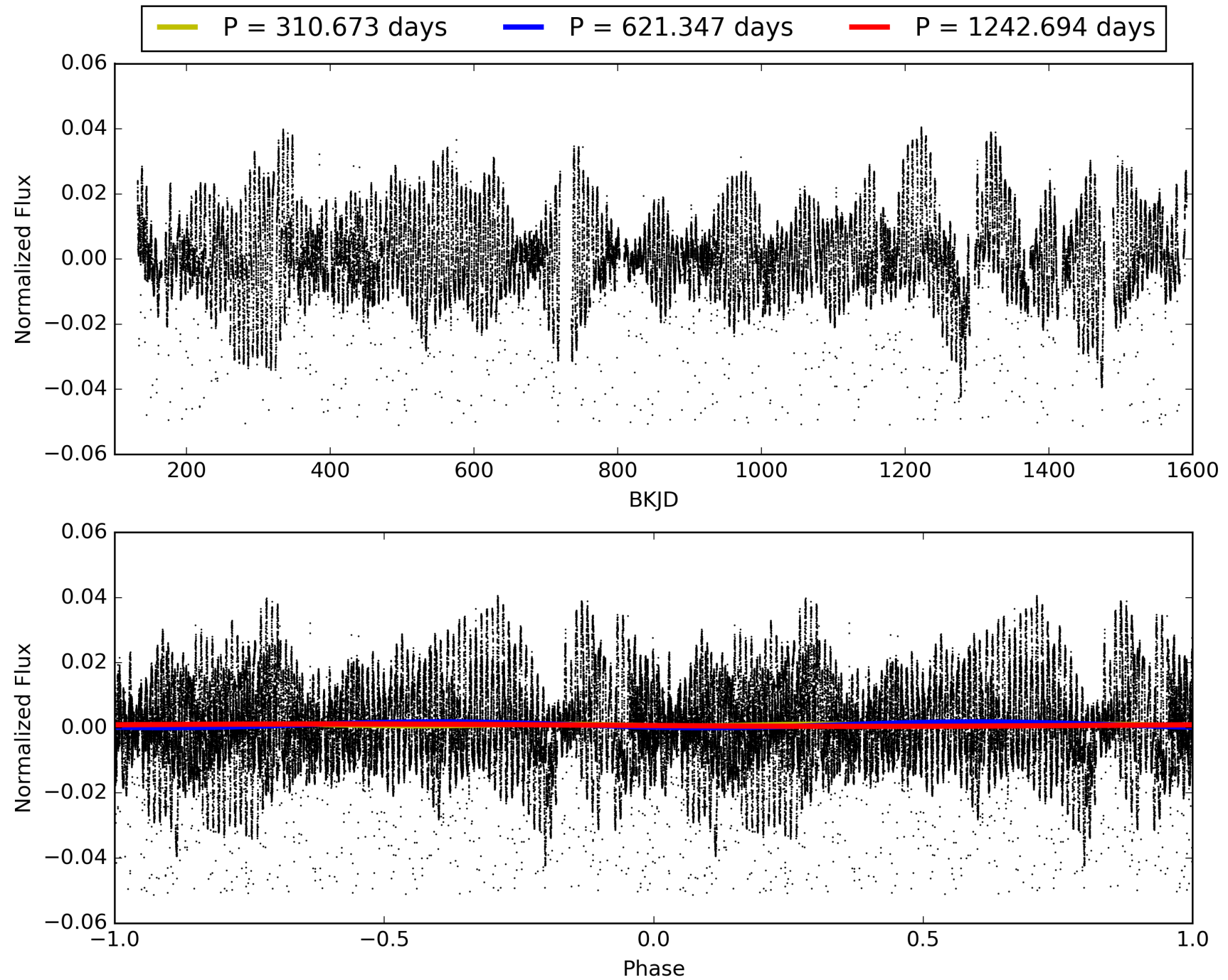
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 012470530-04, PDC Light Curves





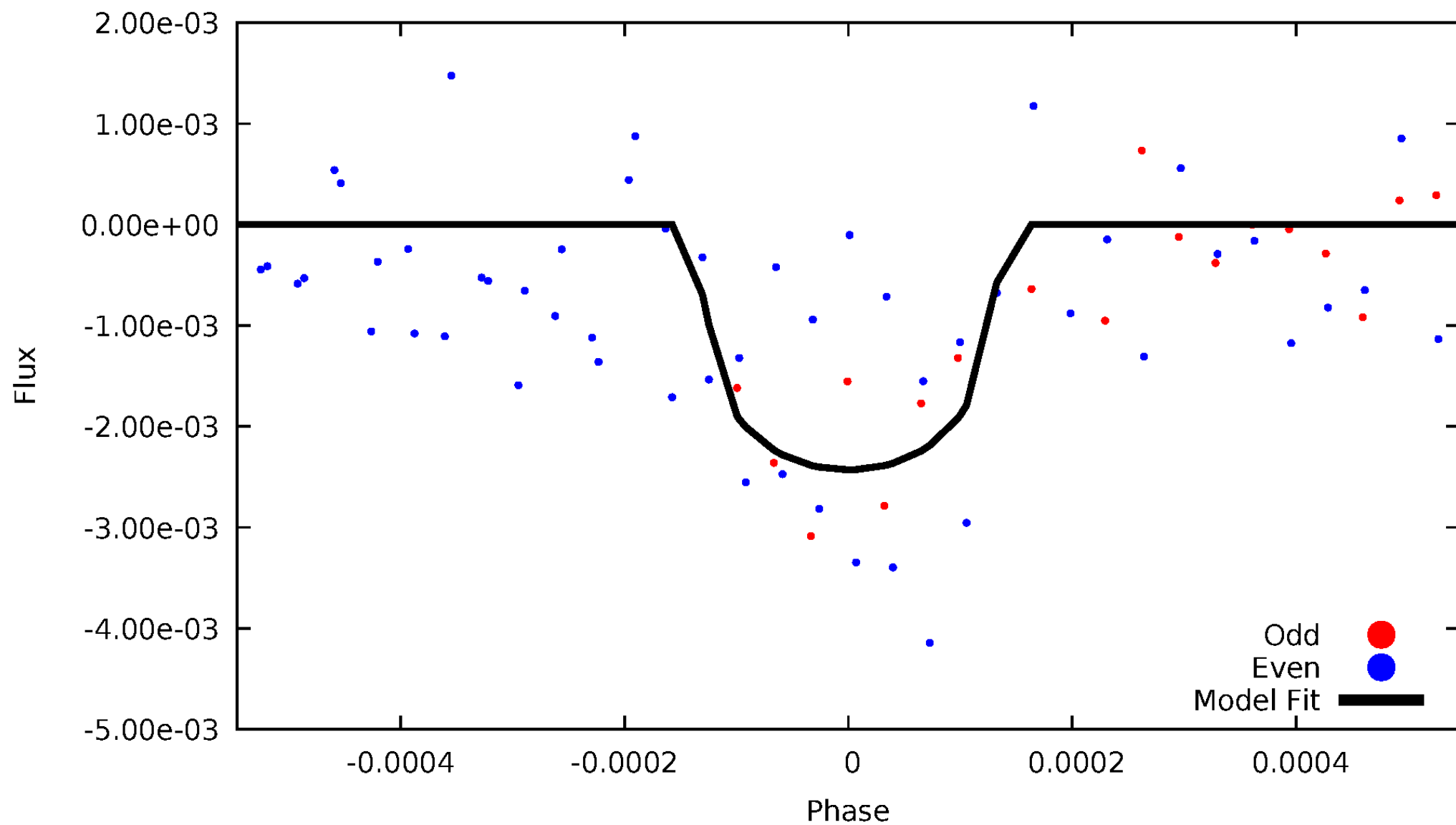
TCE 012470530-04





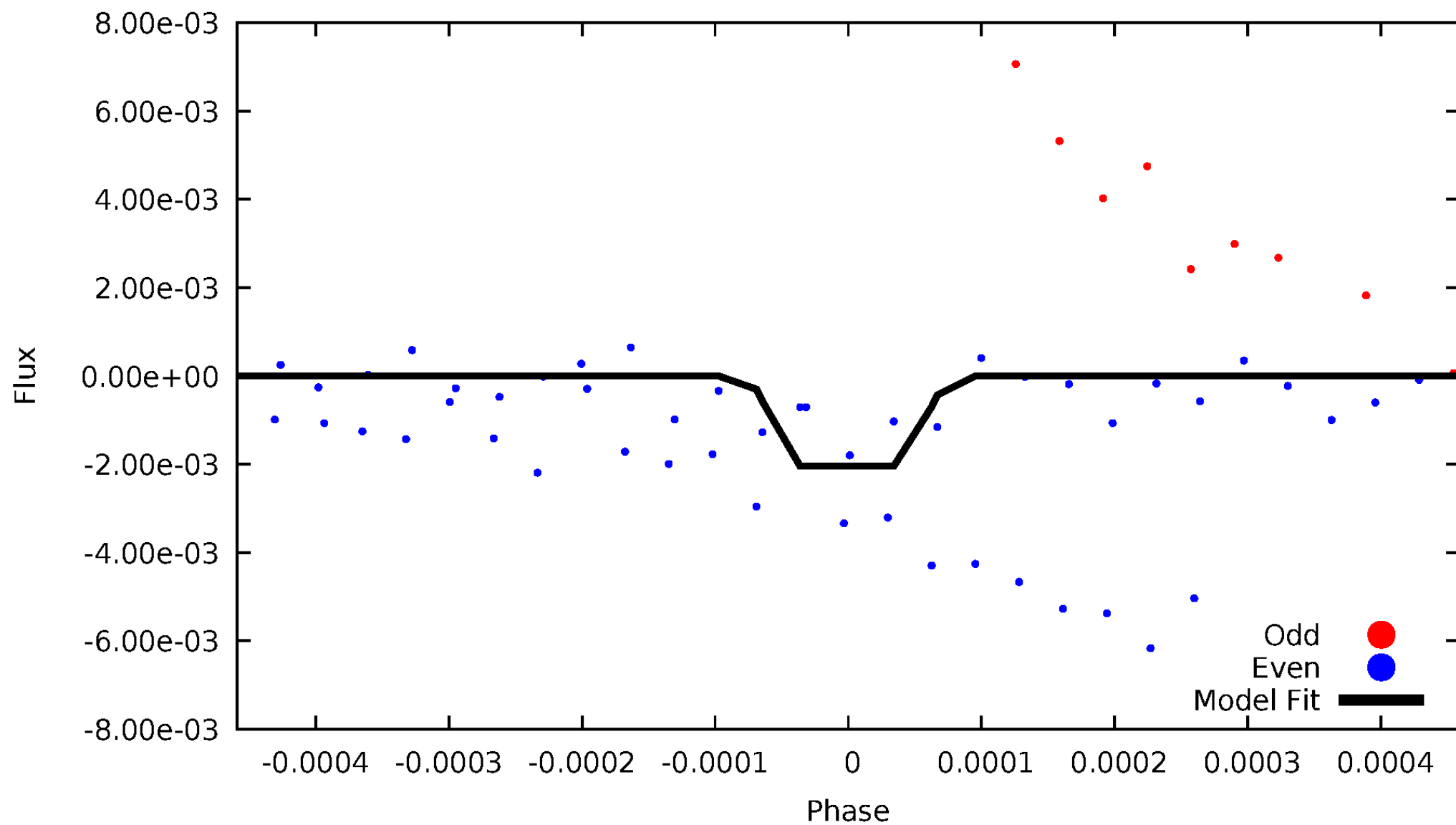
# DV Odd/Even

TCE 012470530-04



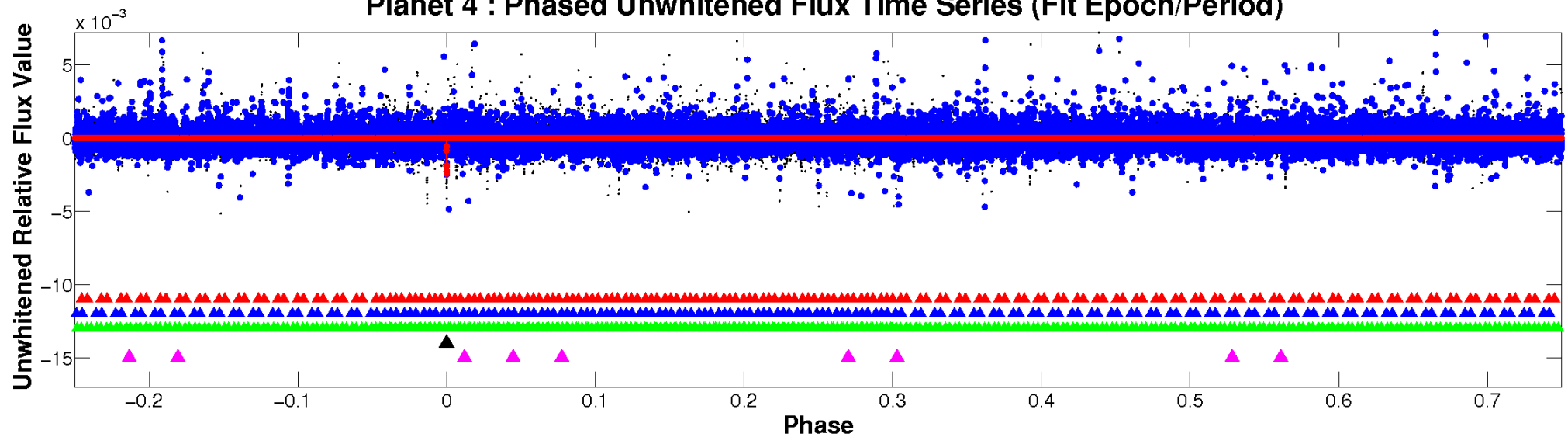
# ALT Odd/Even

TCE 012470530-04

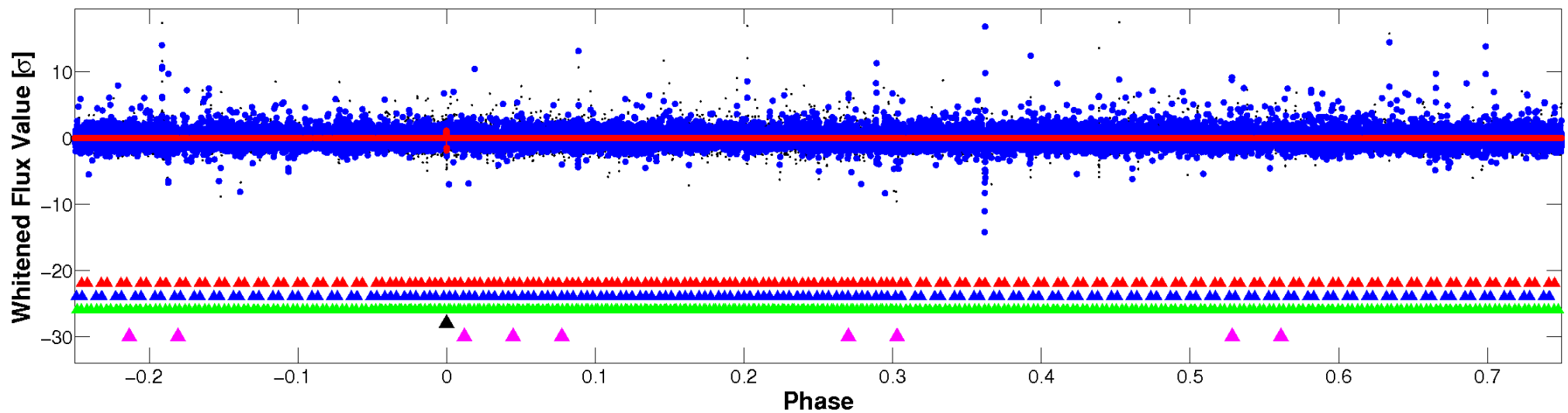


# Non-Whitened Vs. Whitened Light Curve

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

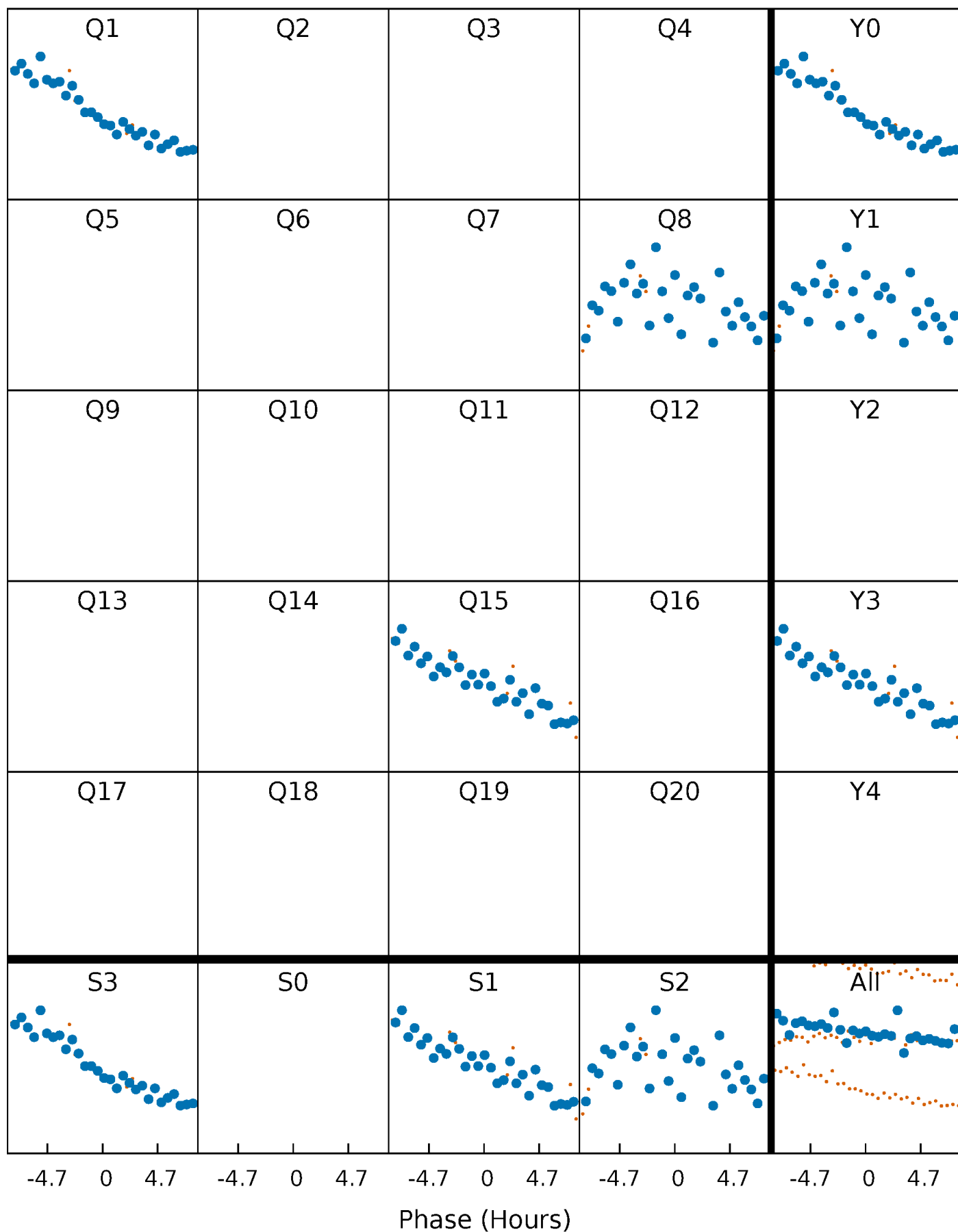


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



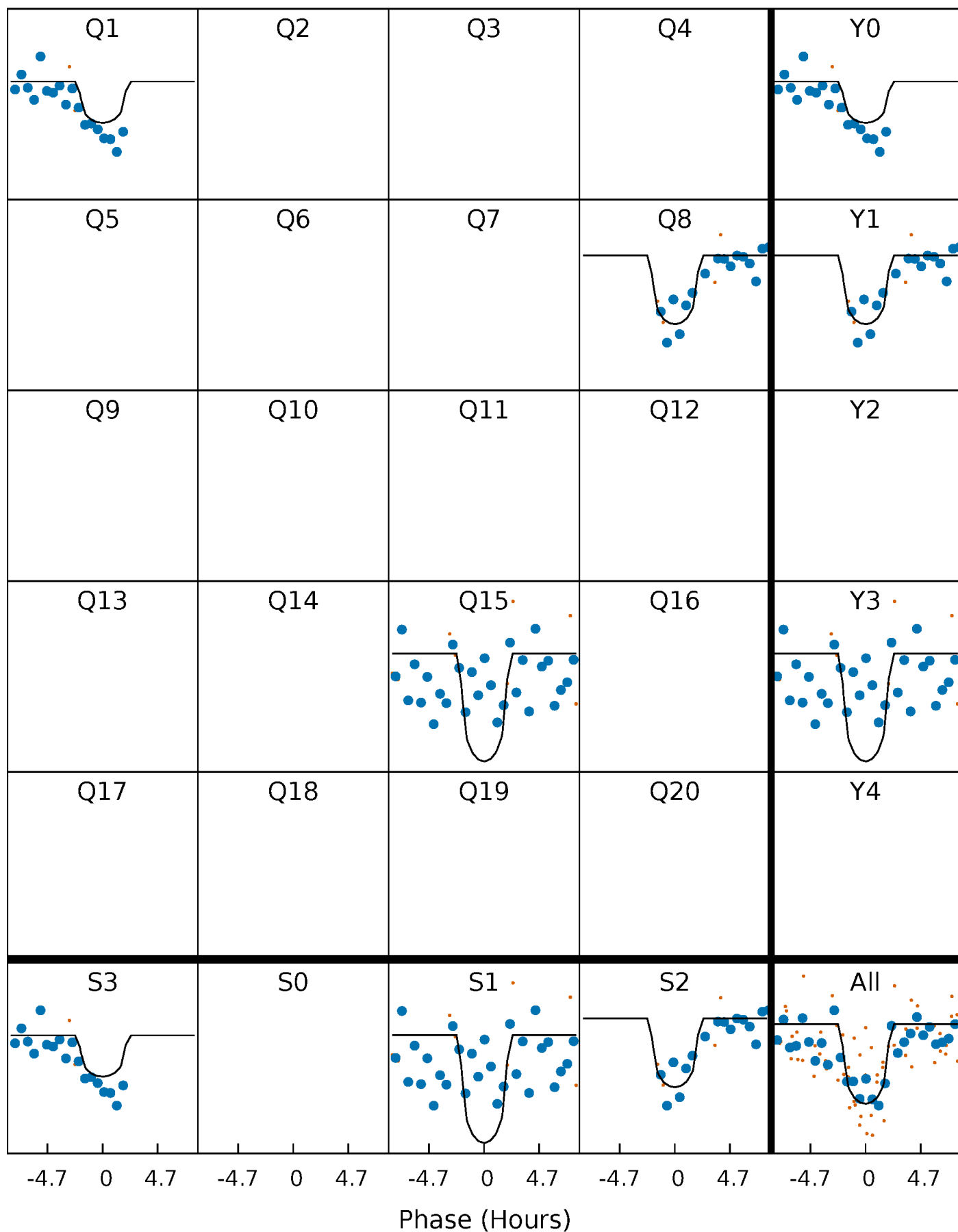
# PDC Quarter-Phased Transit Curves

TCE 012470530-04     $P=621.346864$  Days     $T_0=159.420495$  (BKJD)



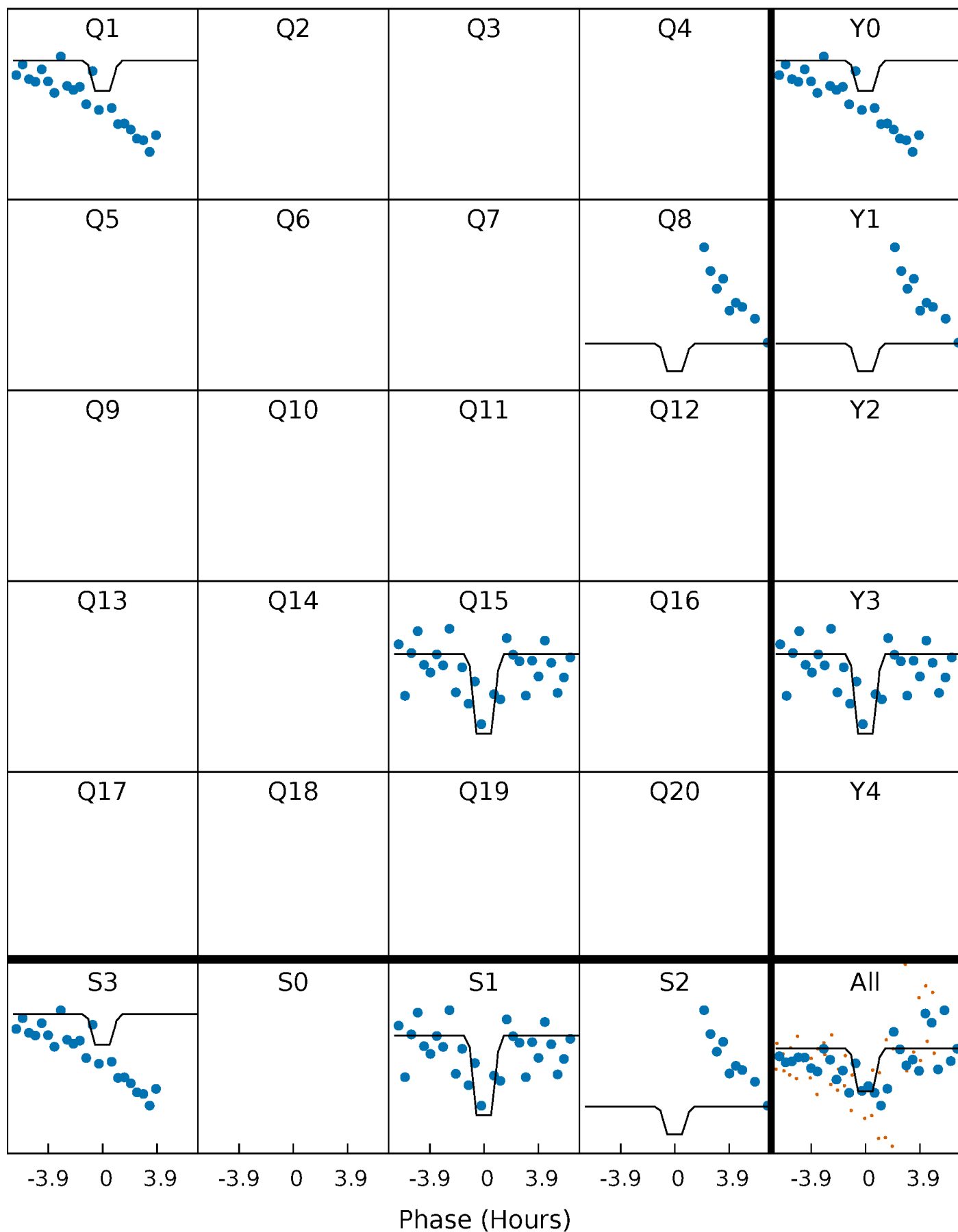
# DV Quarter-Phased Transit Curves

TCE 012470530-04     $P=621.346864$  Days     $T_0=159.420495$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

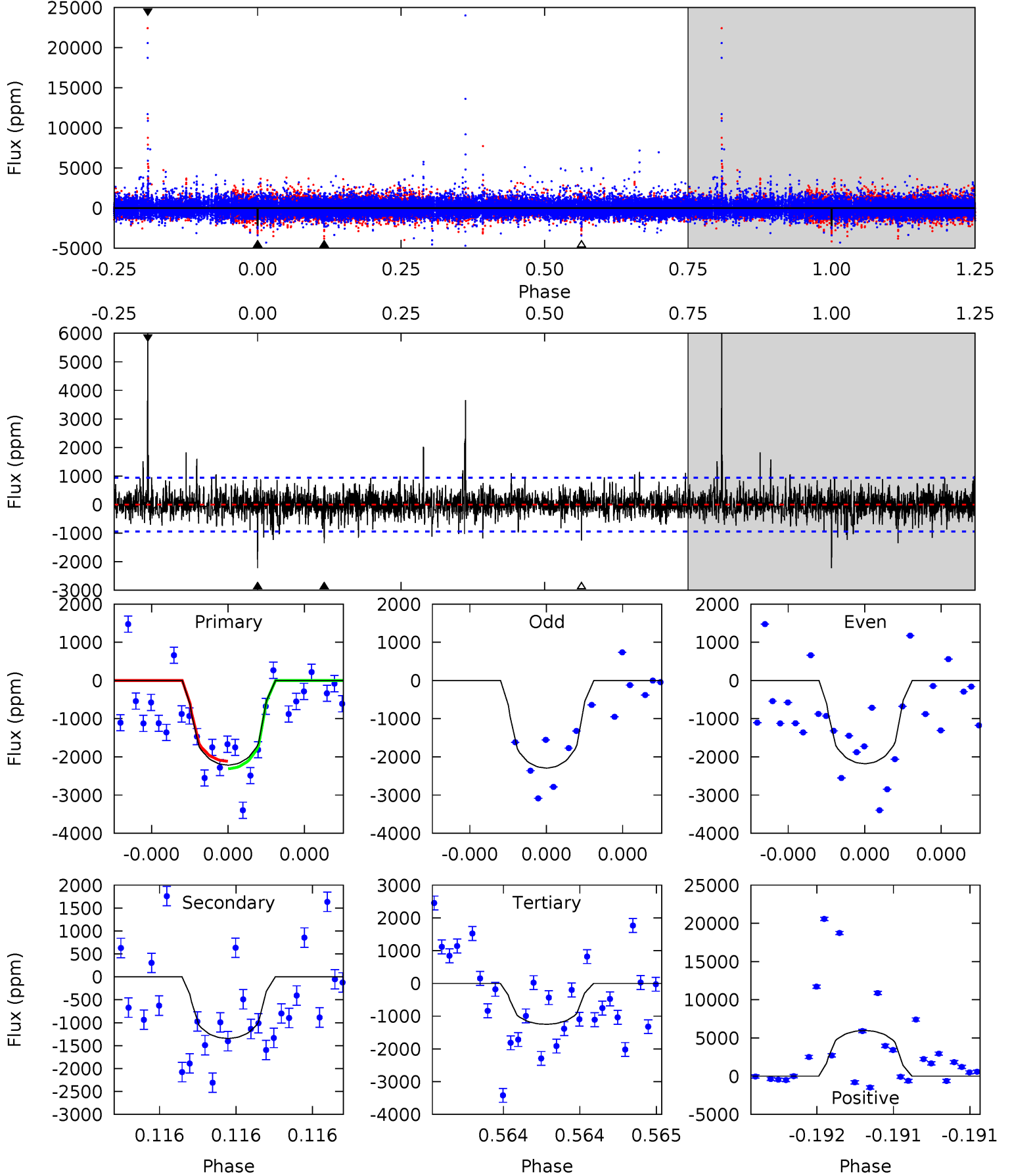
TCE 012470530-04 P=621.302825 Days  $T_0=159.324689$  (BKJD)



# DV Model-Shift Uniqueness Test

012470530-04, P = 621.346864 Days, E = 159.420495 Days

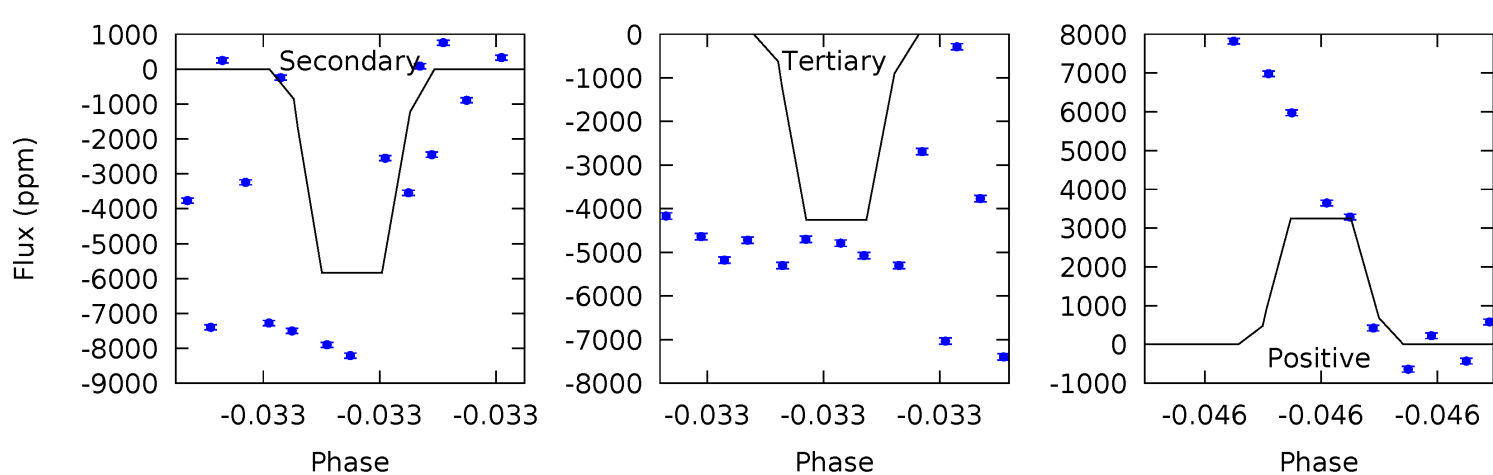
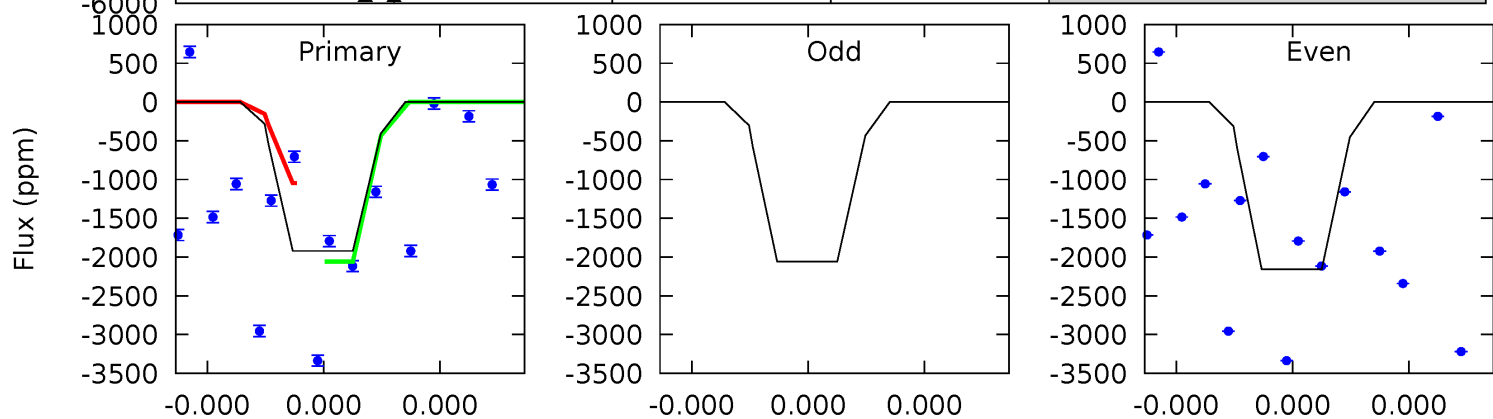
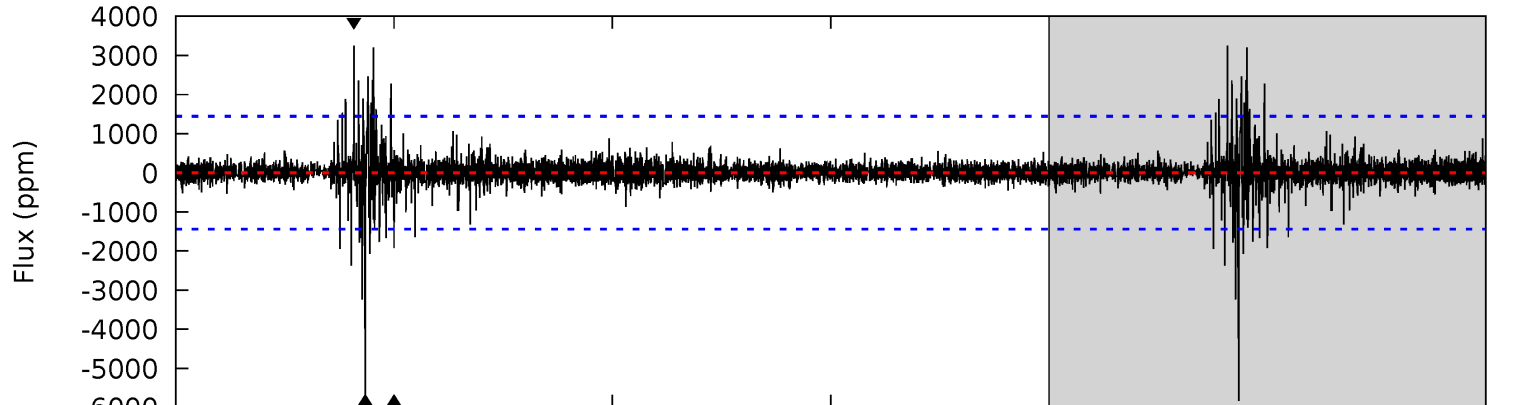
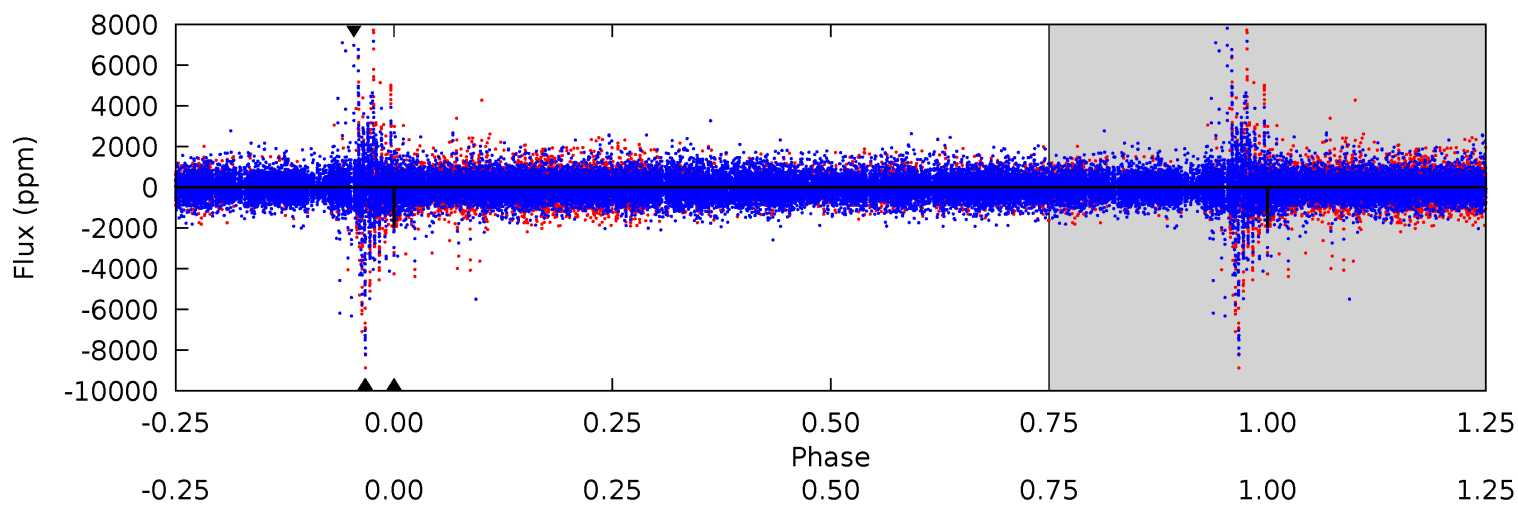
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
13.4	8.12	7.55	36.1	5.68	3.65	1.95	5.85	-22.7	0.57	-28.0	0.30	0.97	0.73	0.59



# Alt Model-Shift Uniqueness Test

012470530-04, P = 621.302825 Days, E = 159.324689 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
7.72	23.4	17.1	13.1	5.80	3.82	1.03	-9.40	-5.34	6.32	10.4	0.22	1.00	0.36	0





### Stellar Parameters For KIC 012470530

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$4859^{+144}_{-144}$	$4.637^{+0.060}_{-0.035}$	$-0.700^{+0.300}_{-0.300}$	$0.621^{+0.054}_{-0.054}$	$0.610^{+0.060}_{-0.030}$	$3.588^{+0.869}_{-0.524}$
	+3%/-3%	+1%/-1%	+43%/-43%	+9%/-9%	+10%/-5%	+24%/-15%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 012470530-04 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-1343 \pm 165$	$11.07^{+10.49}_{-7.95}$	$214^{+7}_{-8}$	$2930^{+1482}_{-441}$	$8963^{+100817}_{-6595}$
Alt.	$-5833 \pm 249$	$11.38^{+11.24}_{-7.98}$	$213^{+8}_{-8}$	$3653^{+2212}_{-687}$	$36898^{+385017}_{-27622}$

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

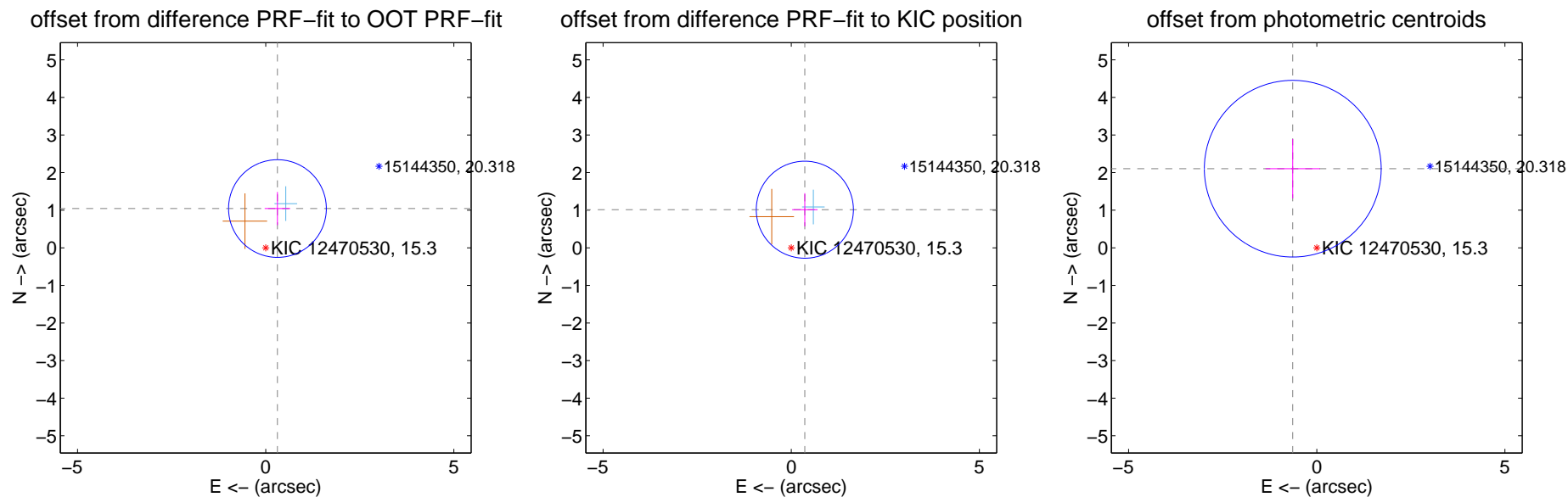
## DV Centroid Data

Supplemental centroid analysis for 012470530-04. Kepler magnitude: 15.30. Transit SNR 8.07

There are 1 quarters with good PRF difference image offsets

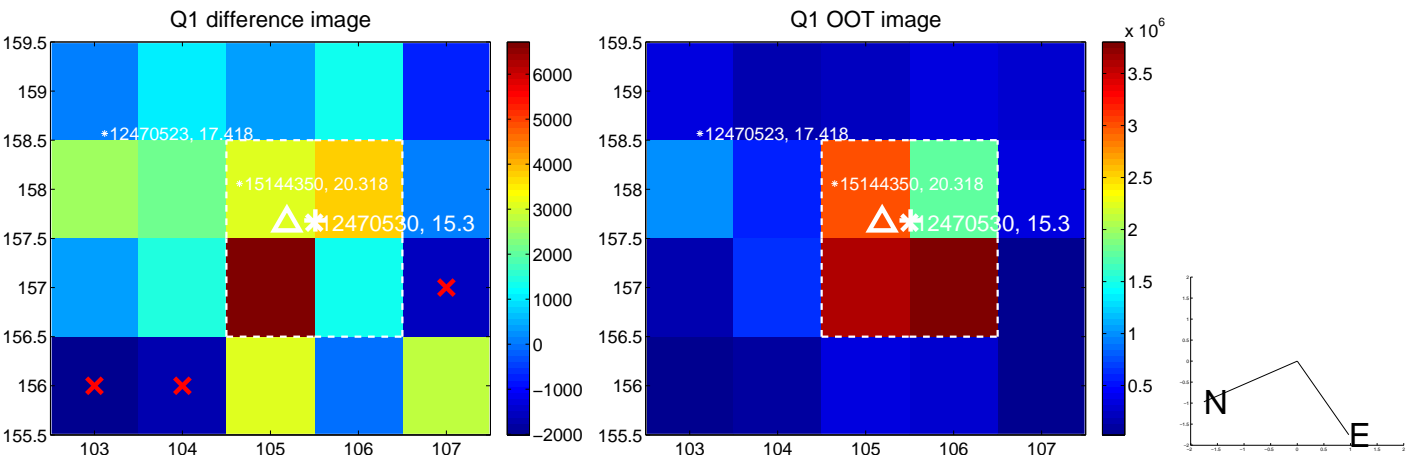
The direct PRF centroid is offset from the target star catalog position by about 0.12 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.090 \pm 0.433$	2.52	$-0.312 \pm 0.338$	$1.044 \pm 0.440$
PRF-fit source offset from KIC position	$1.076 \pm 0.430$	2.50	$-0.361 \pm 0.338$	$1.013 \pm 0.440$
photometric centroid source offset	$2.20 \pm 0.78$	2.81	$0.64 \pm 0.72$	$2.10 \pm 0.79$

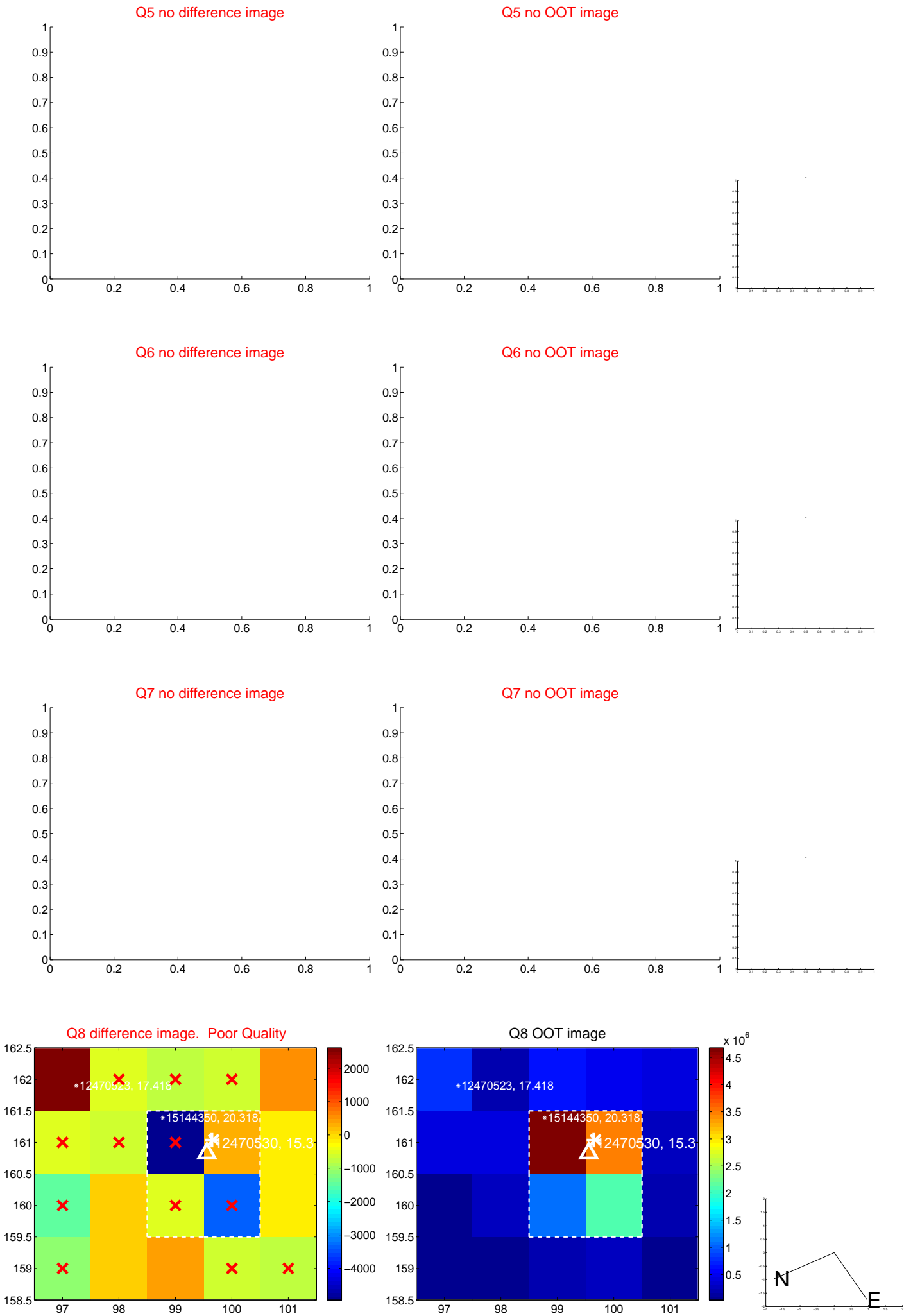


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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



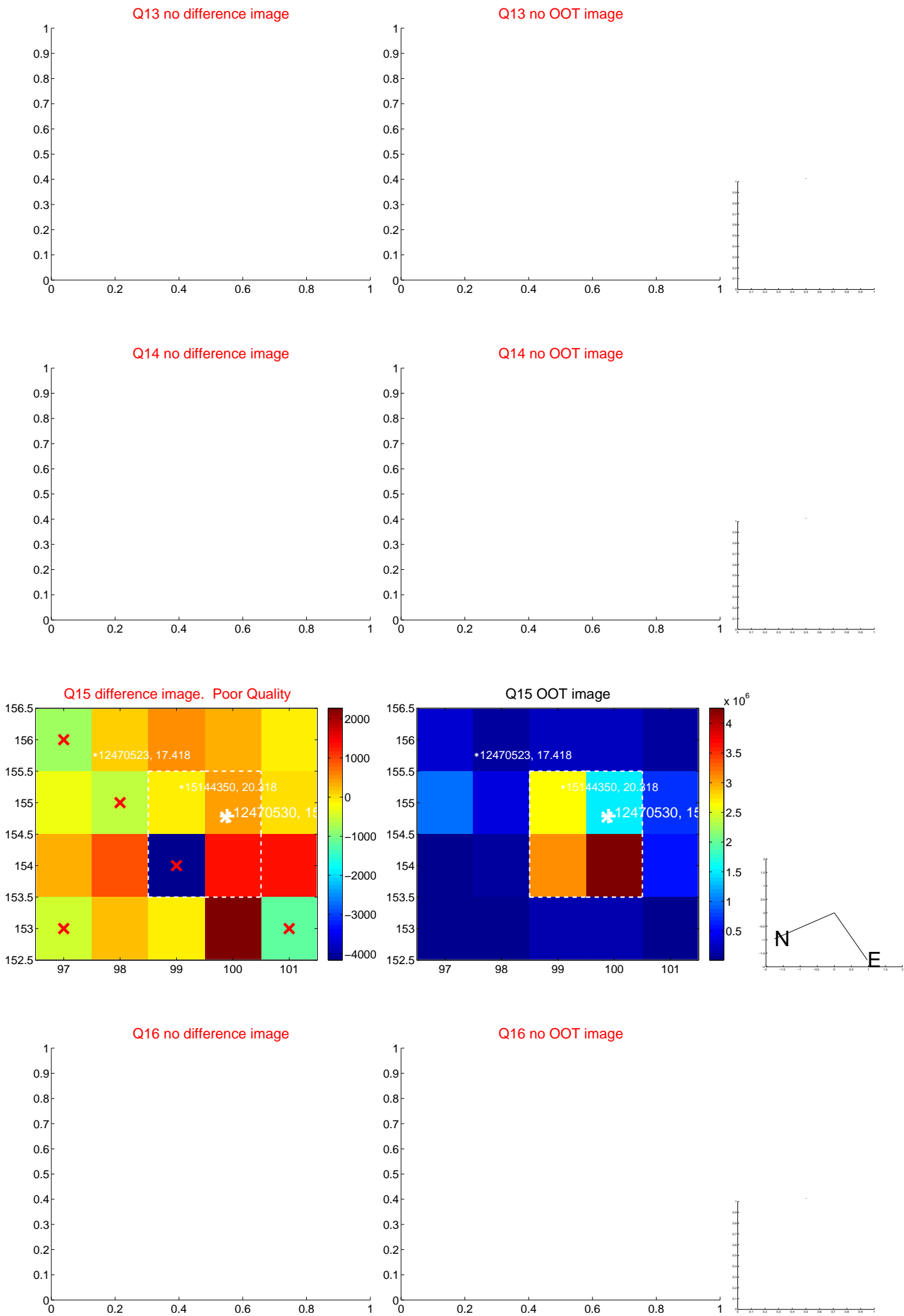
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



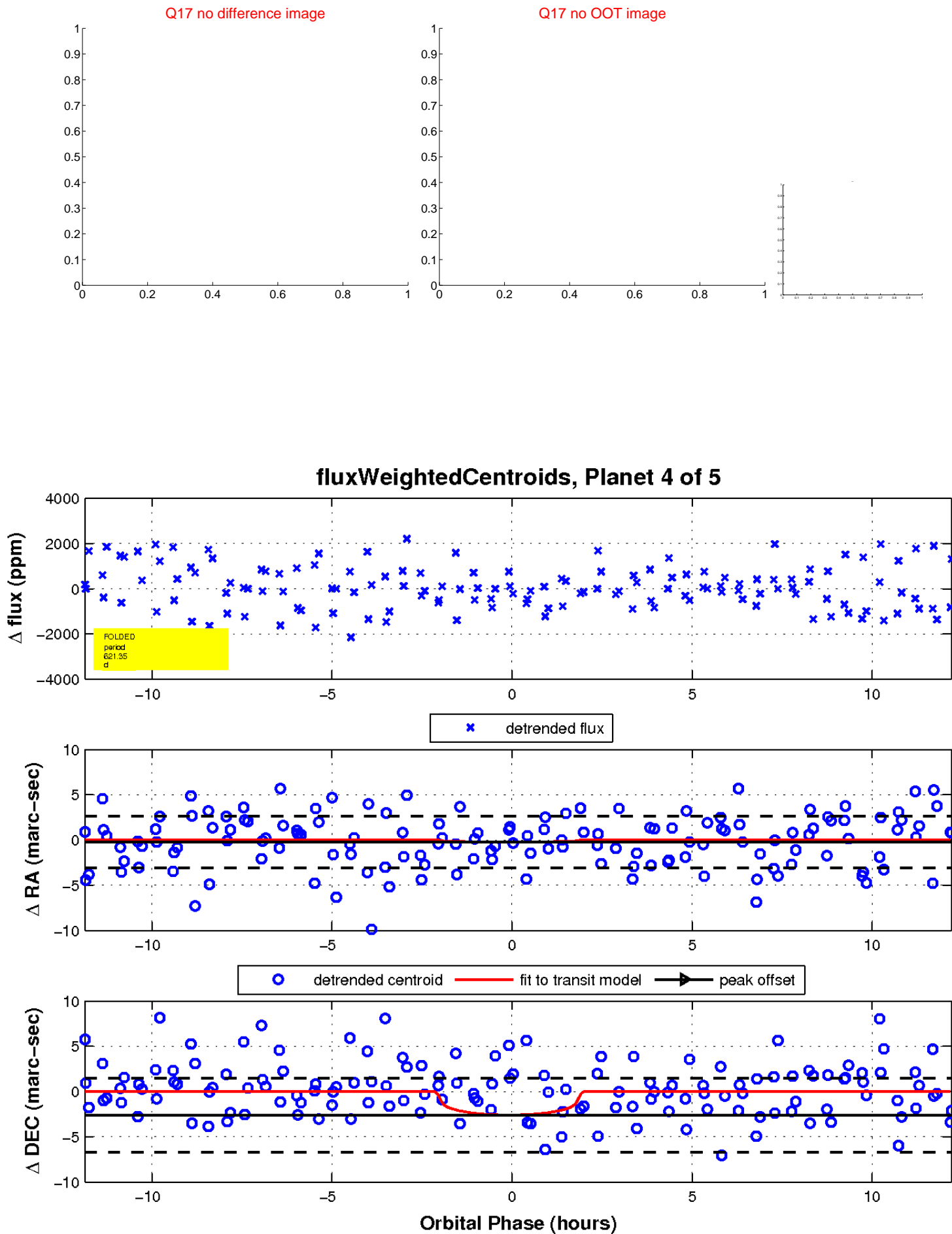
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

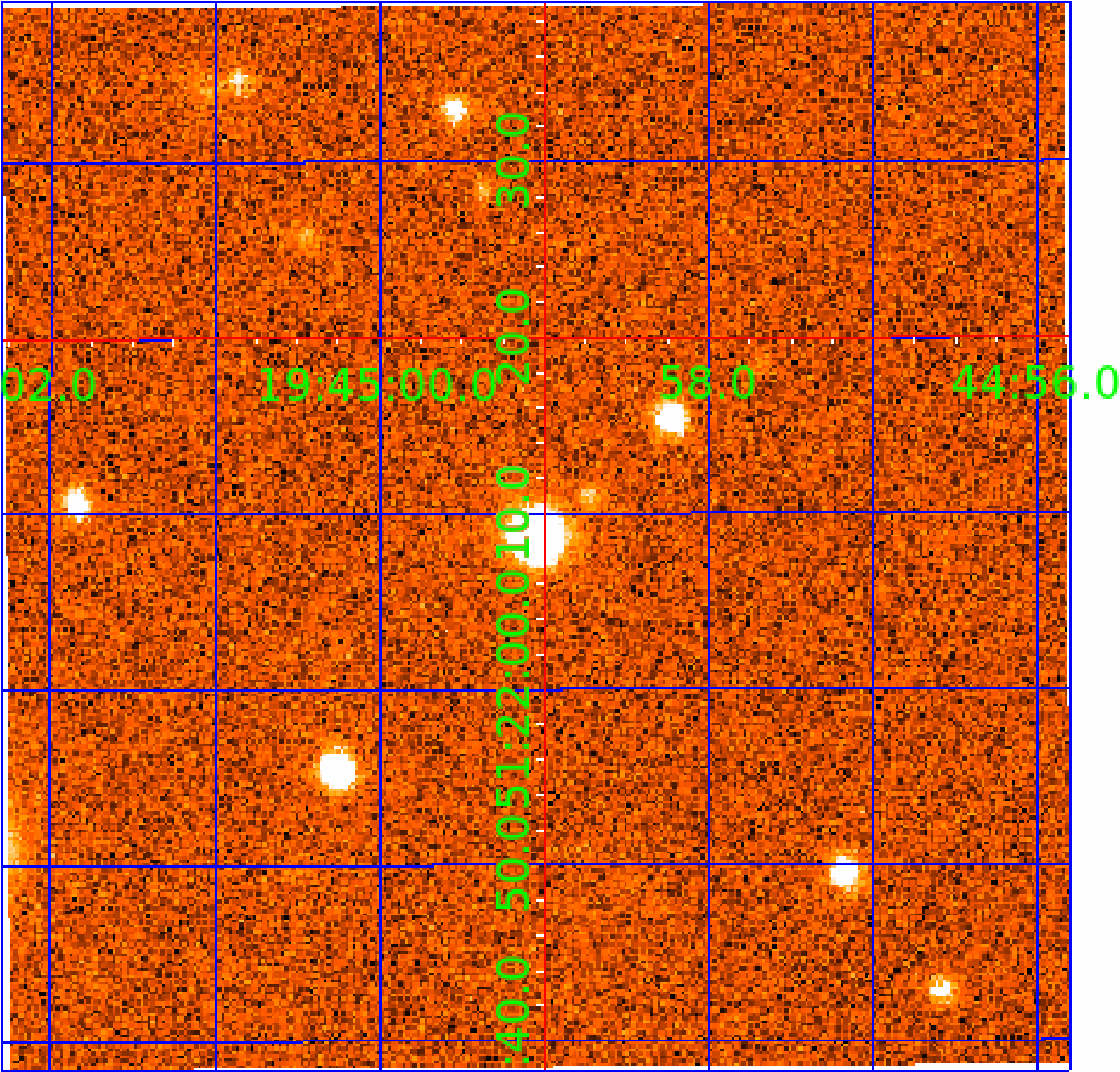


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 012470530

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
012470530-01	OBS	7536.01	8.207198	135.828703	387955.9	2.500	10346.4	-1.0	0.62	4859	33.88	42.22
012470530-02	OBS	No	8.207260	133.626620	129960.2	3.557	3521.1	2134.1	0.62	4859	33.62	42.22
012470530-03	OBS	No	4.103508	131.558672	23678.9	12.500	1117.9	-1.0	0.62	4859	9.31	106.40
012470530-04	OBS	No	621.346864	159.420495	2430.3	4.072	11.9	8.1	0.62	4859	3.00	0.13
012470530-05	OBS	No	160.426848	166.881674	1419.0	3.397	8.4	7.1	0.62	4859	2.71	0.80

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
012470530-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_ALT—HAS_SEC_TCE—CENT_NOFITS
012470530-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE
012470530-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—RESIDUAL_TCE—CENT_NOFITS
012470530-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—ALL_TRANS_CHASES—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
012470530-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—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.

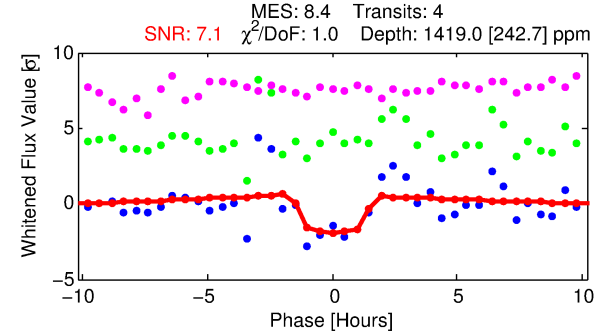
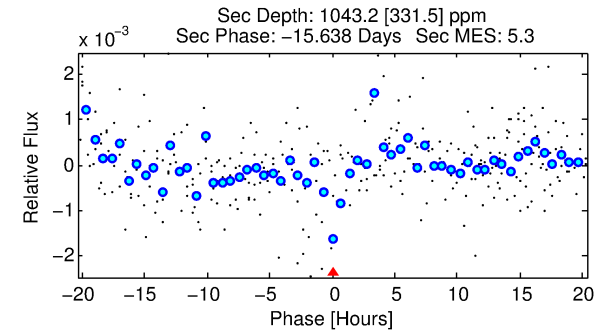
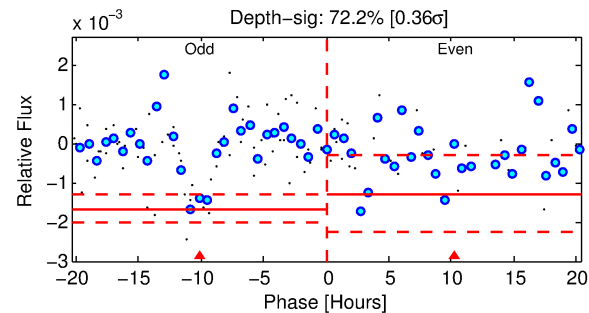
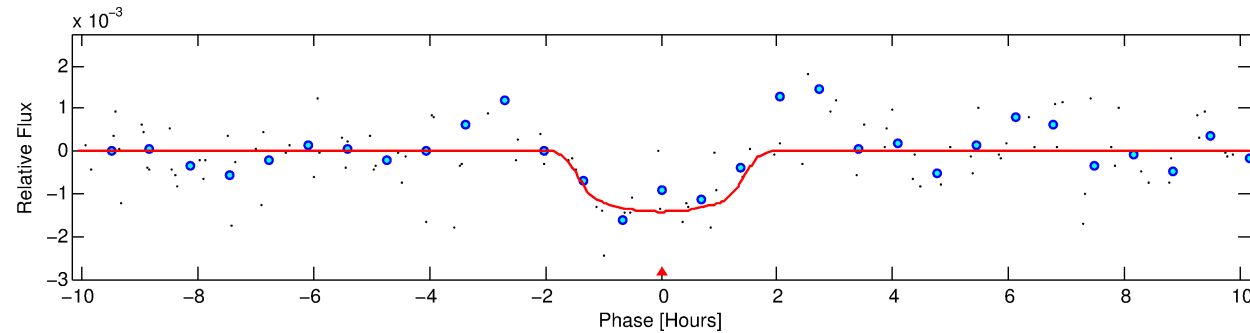
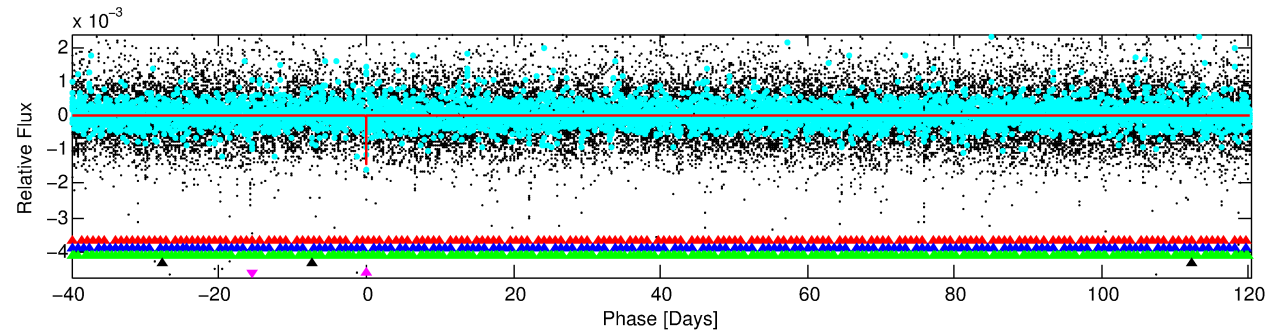
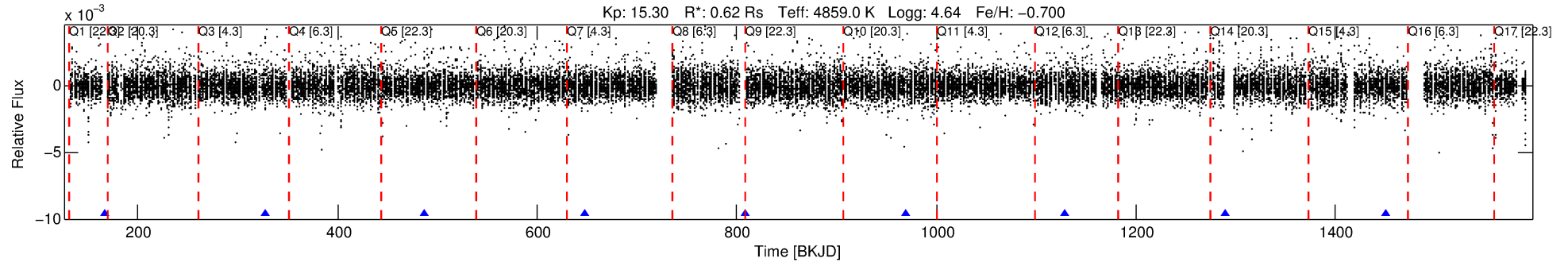
## Ephemeris Match Information For 012470530-05

No Significant Match Found

# DV One-Page Summary

KIC: 12470530 Candidate: 5 of 5 Period: 160.427 d

KOI: K07536 Corr: No Ephemeris Match



## DV Fit Results:

Period = 160.42685 [0.00183] d  
Epoch = 166.8817 [0.0106] BKJD  
Rp/R\* = 0.0399 [0.0367]  
a/R\* = 216.84 [724.05]  
b = 0.85 [1.15]  
Seff = 0.80 [0.13]  
Teq = 241 [10] K  
Rp = 2.71 [2.50] Re  
a = 0.4901 [0.0363] AU  
Ag = 18835.07 [35176.62] [0.54 $\sigma$ ]  
Teffp = 4371 [2041] K [2.02 $\sigma$ ]

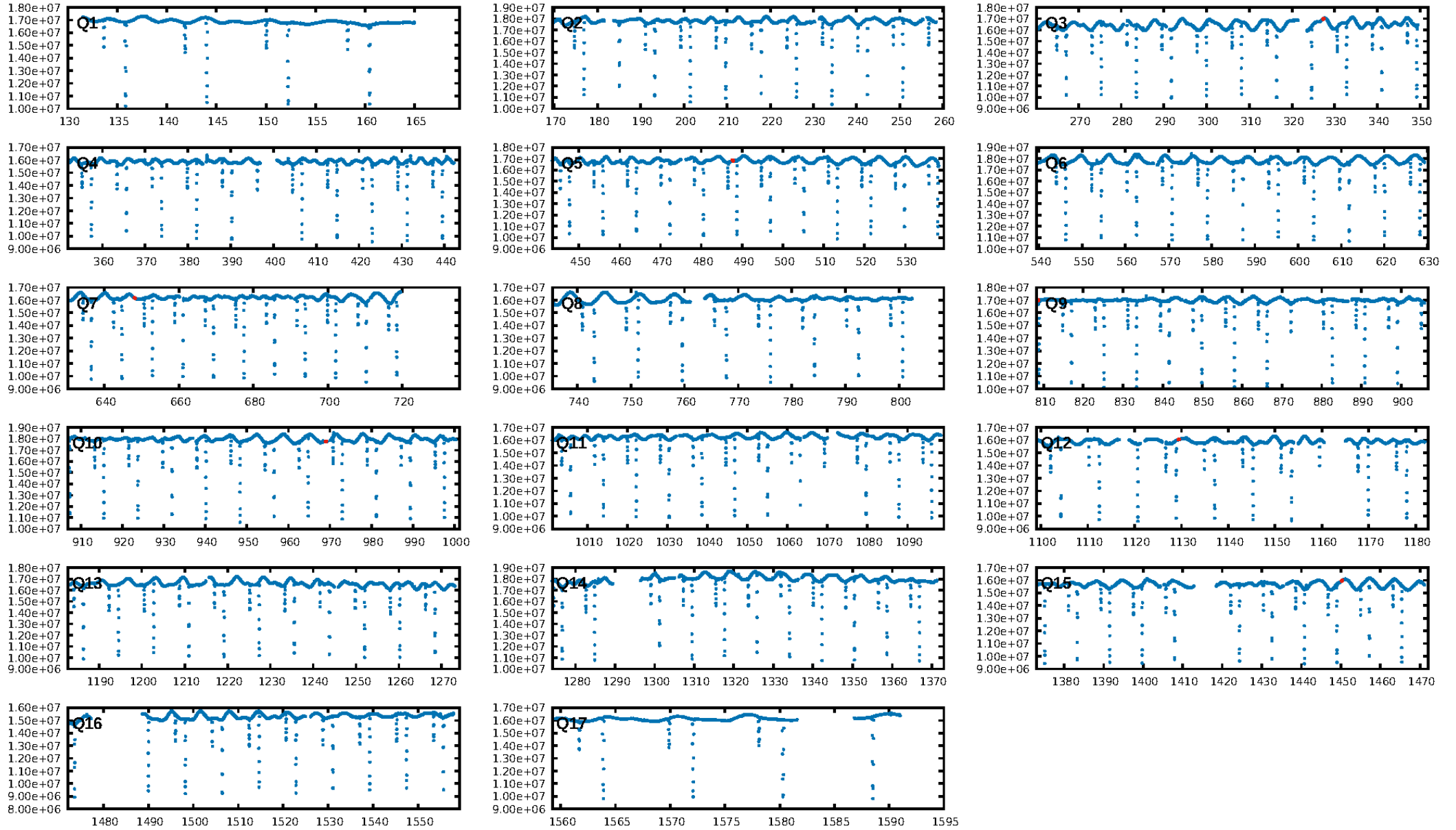
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [742.82 $\sigma$ ]  
LongPeriod-sig: 100.0% [2086.26 $\sigma$ ]  
ModelChiSquare2-sig: 66.7%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 1.21e-10**  
RollingBand-fgt: 1.00 [4/4]  
**GhostDiagnostic-chr: -1.641**  
Centroid-sig: 64.9%  
Centroid-so: 1.558 arcsec [1.48 $\sigma$ ]  
OotOffset-rm: N/A  
KicOffset-rm: N/A  
OotOffset-st: 0/0/0 [0]  
KicOffset-st: 0/0/0 [0]  
DiffImageQuality-fgm: N/A  
DiffImageOverlap-fno: 0.75 [3/4]

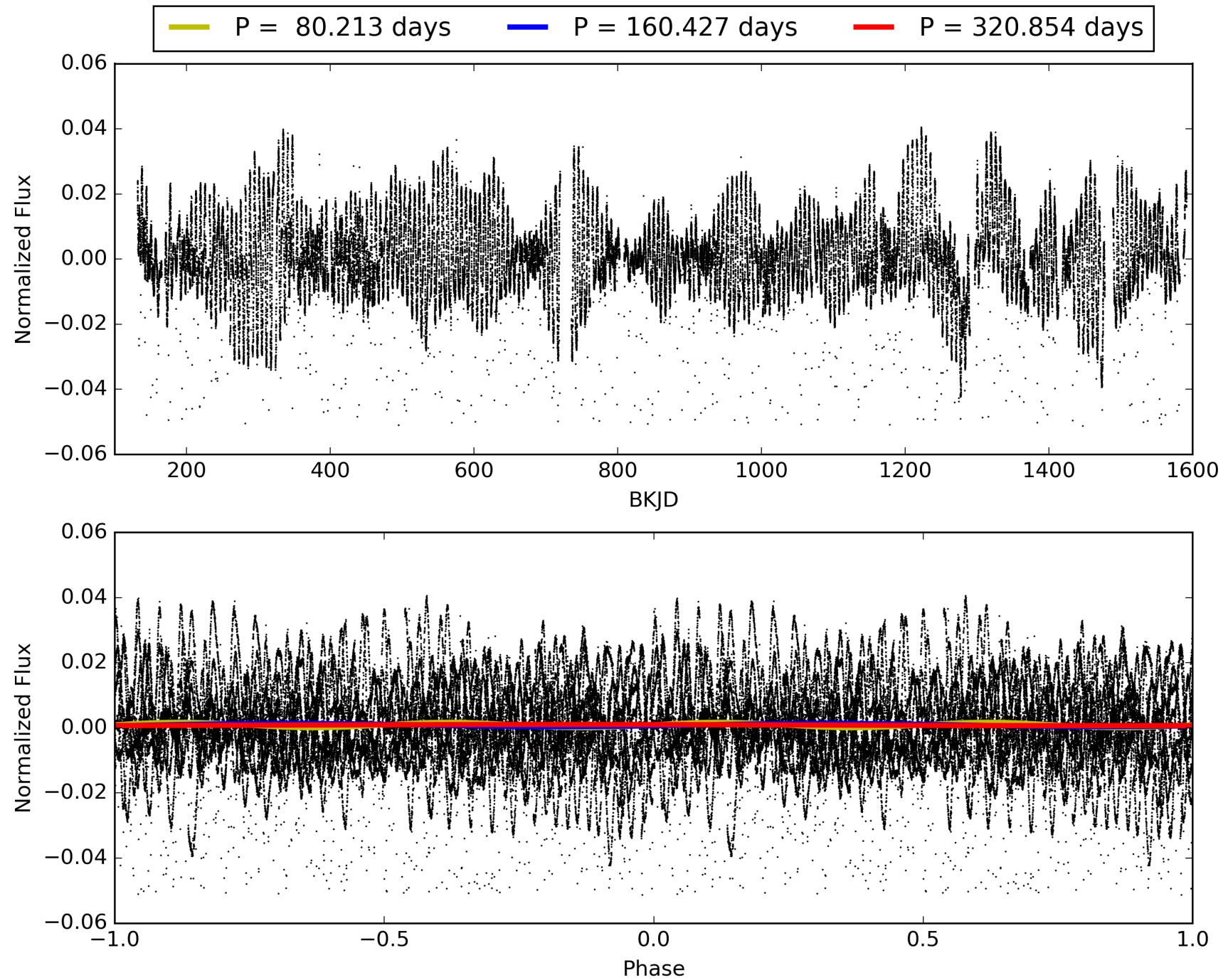
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 05:48:02 Z

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

# TCE 012470530-05, PDC Light Curves

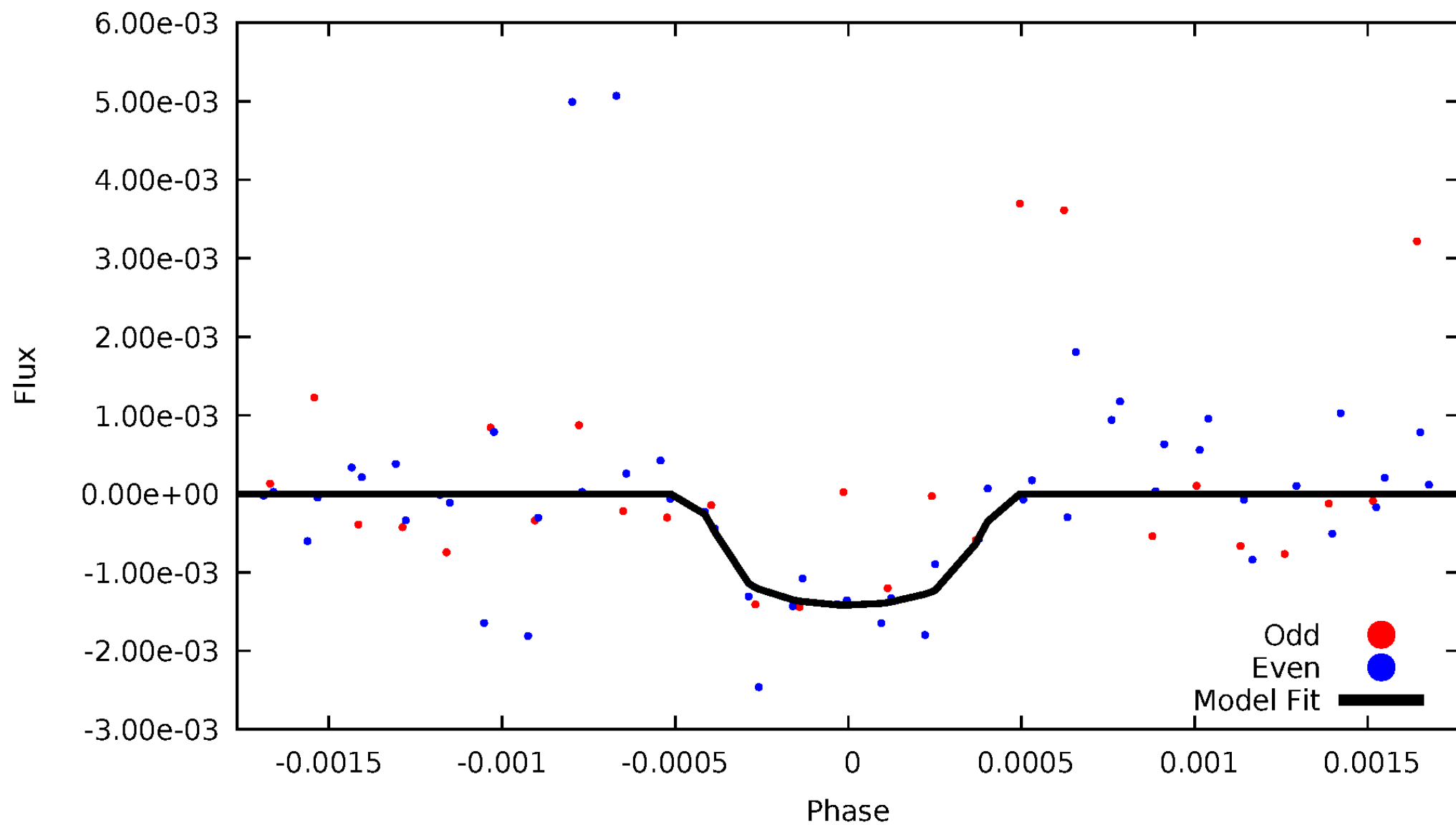


TCE 012470530-05



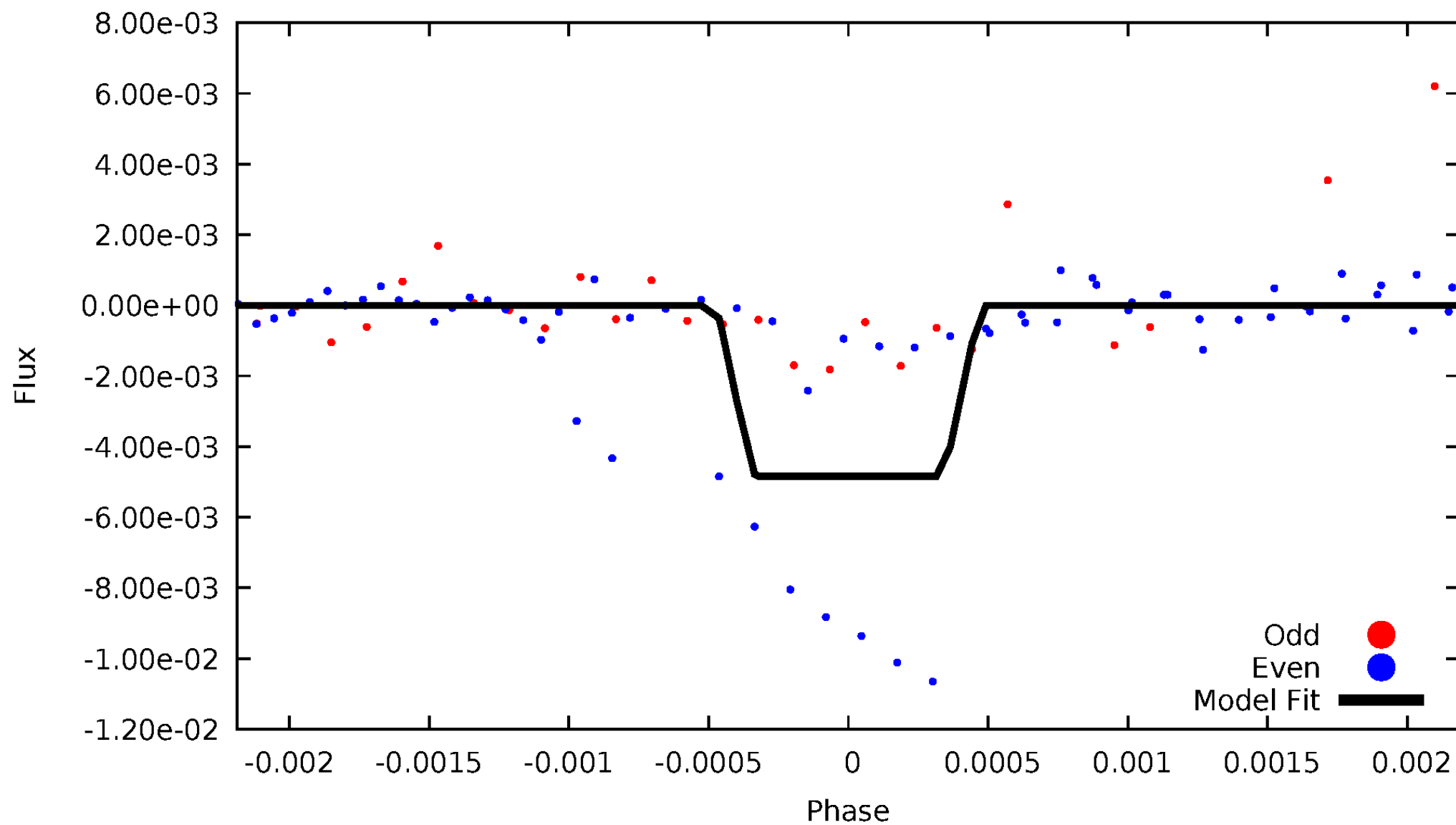
# DV Odd/Even

TCE 012470530-05



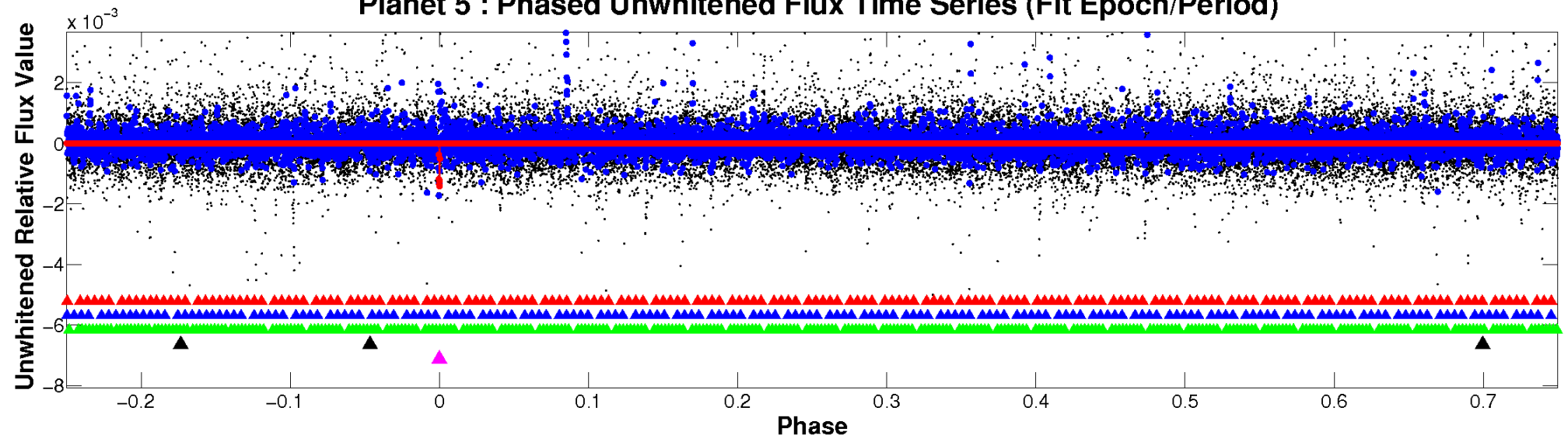
# ALT Odd/Even

TCE 012470530-05

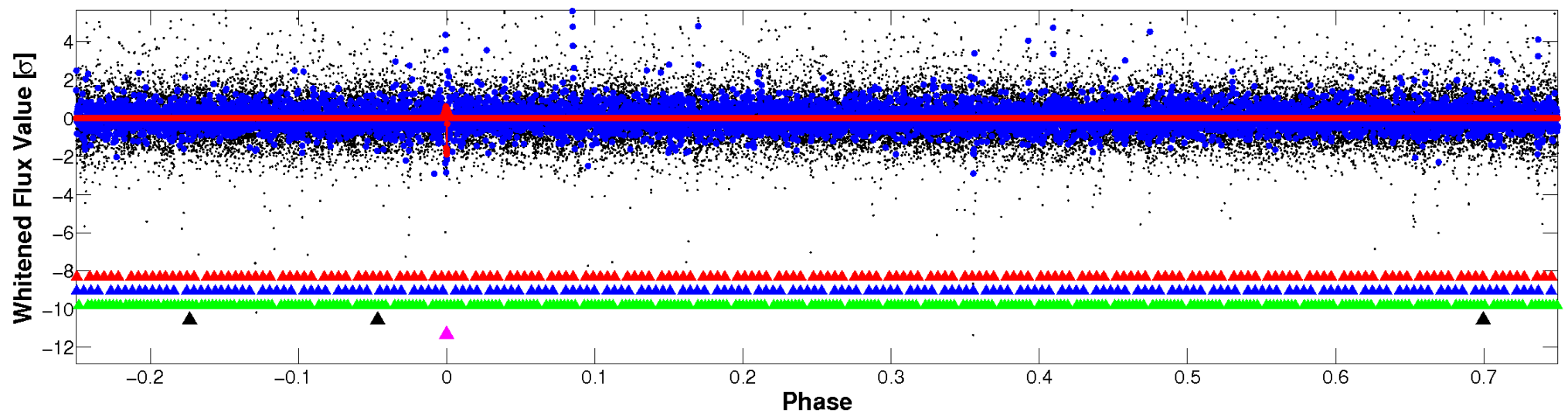


# Non-Whitened Vs. Whitened Light Curve

Planet 5 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

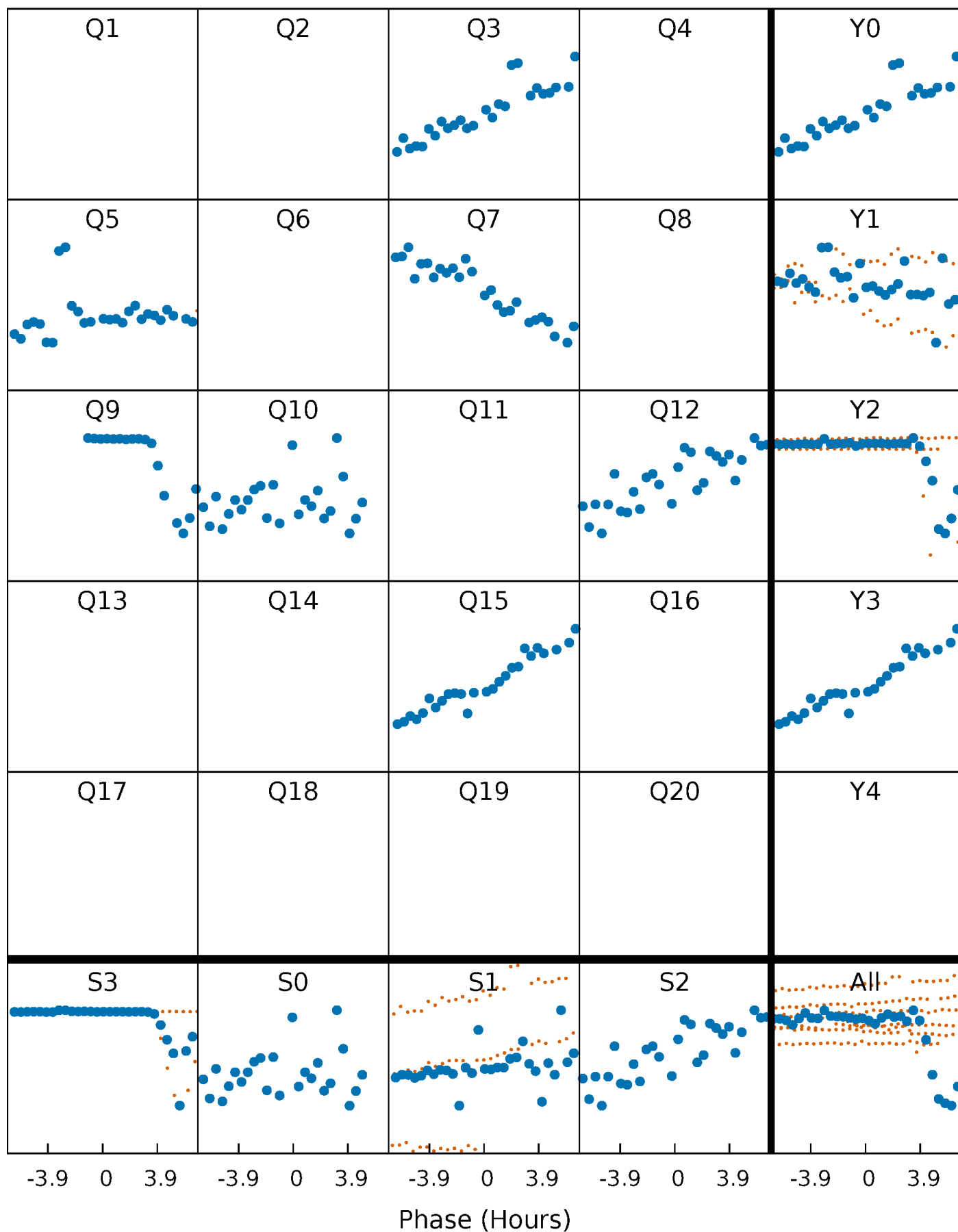


Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

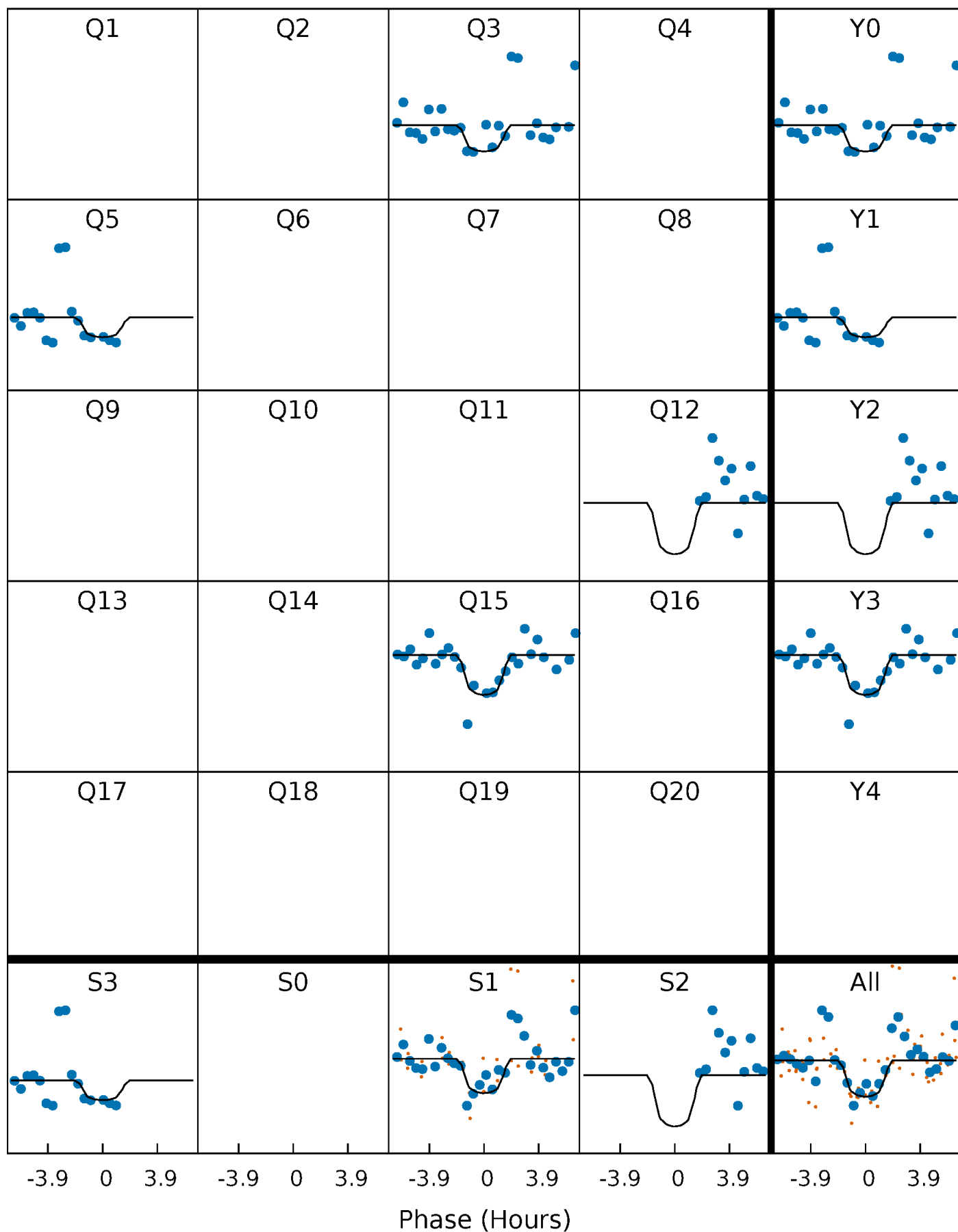
TCE 012470530-05     $P=160.426849$  Days     $T_0=166.881674$  (BKJD)





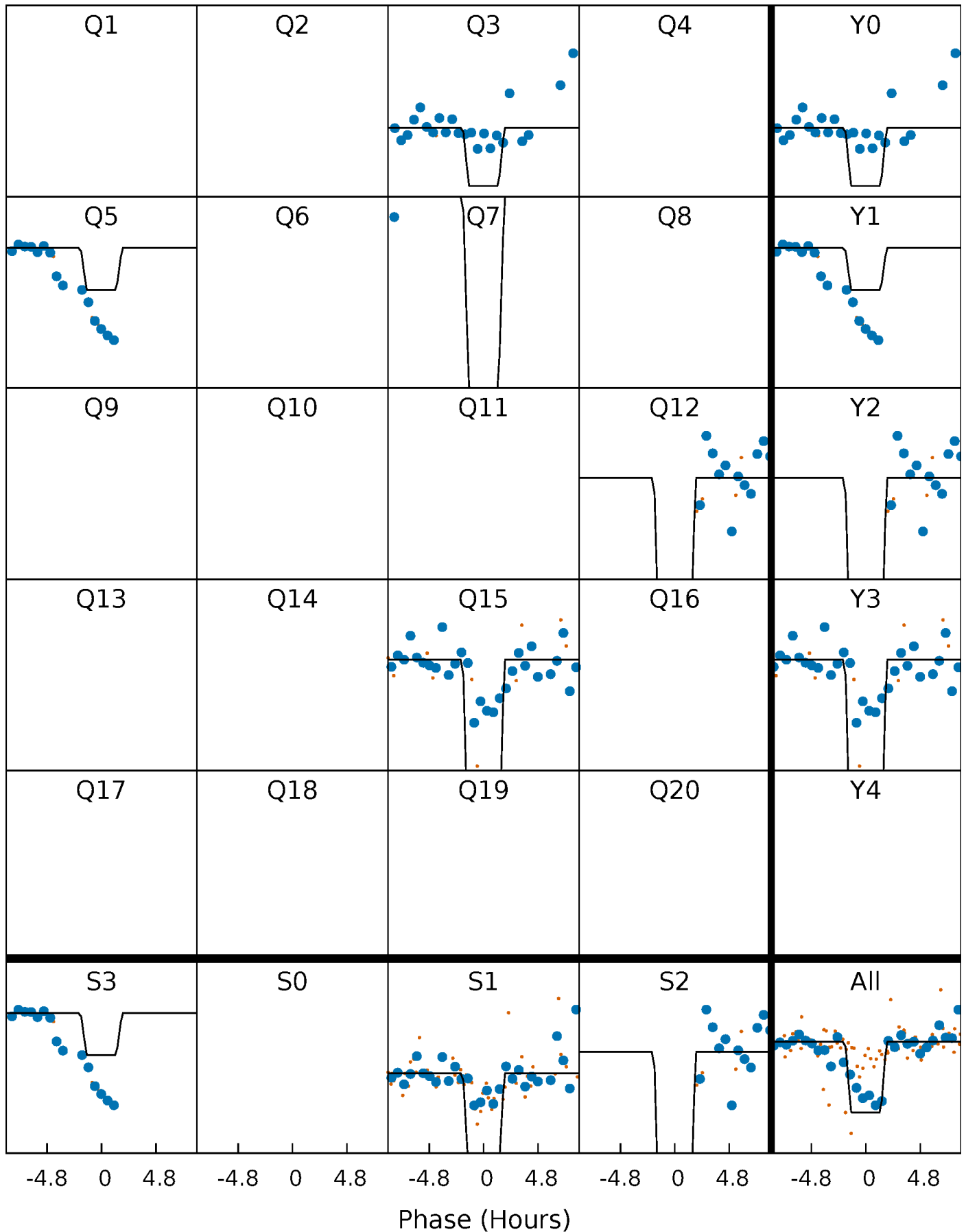
# DV Quarter-Phased Transit Curves

TCE 012470530-05     $P=160.426849$  Days     $T_0=166.881674$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

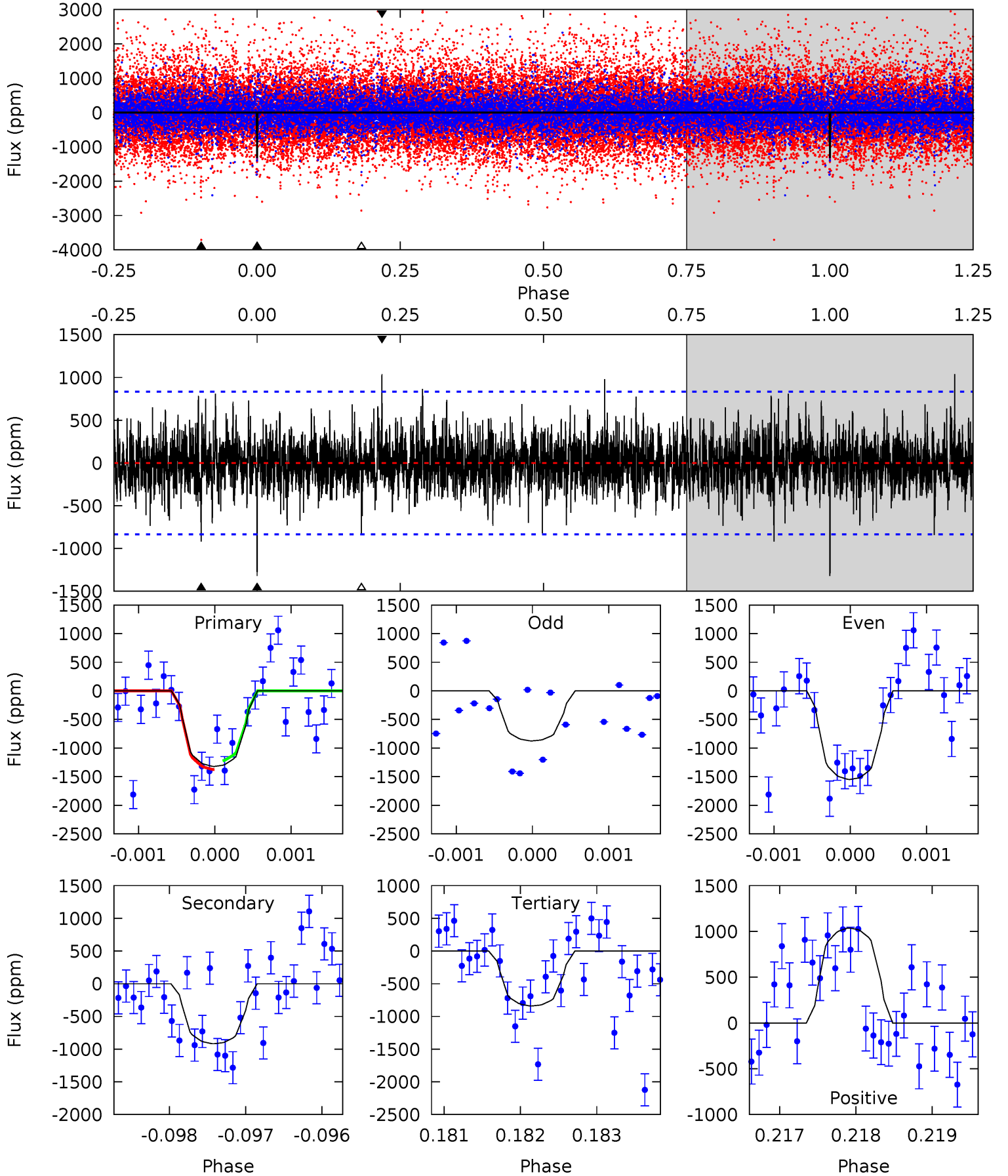
TCE 012470530-05     $P=160.425916$  Days     $T_0=166.870747$  (BKJD)



# DV Model-Shift Uniqueness Test

012470530-05, P = 160.426849 Days, E = 6.454825 Days

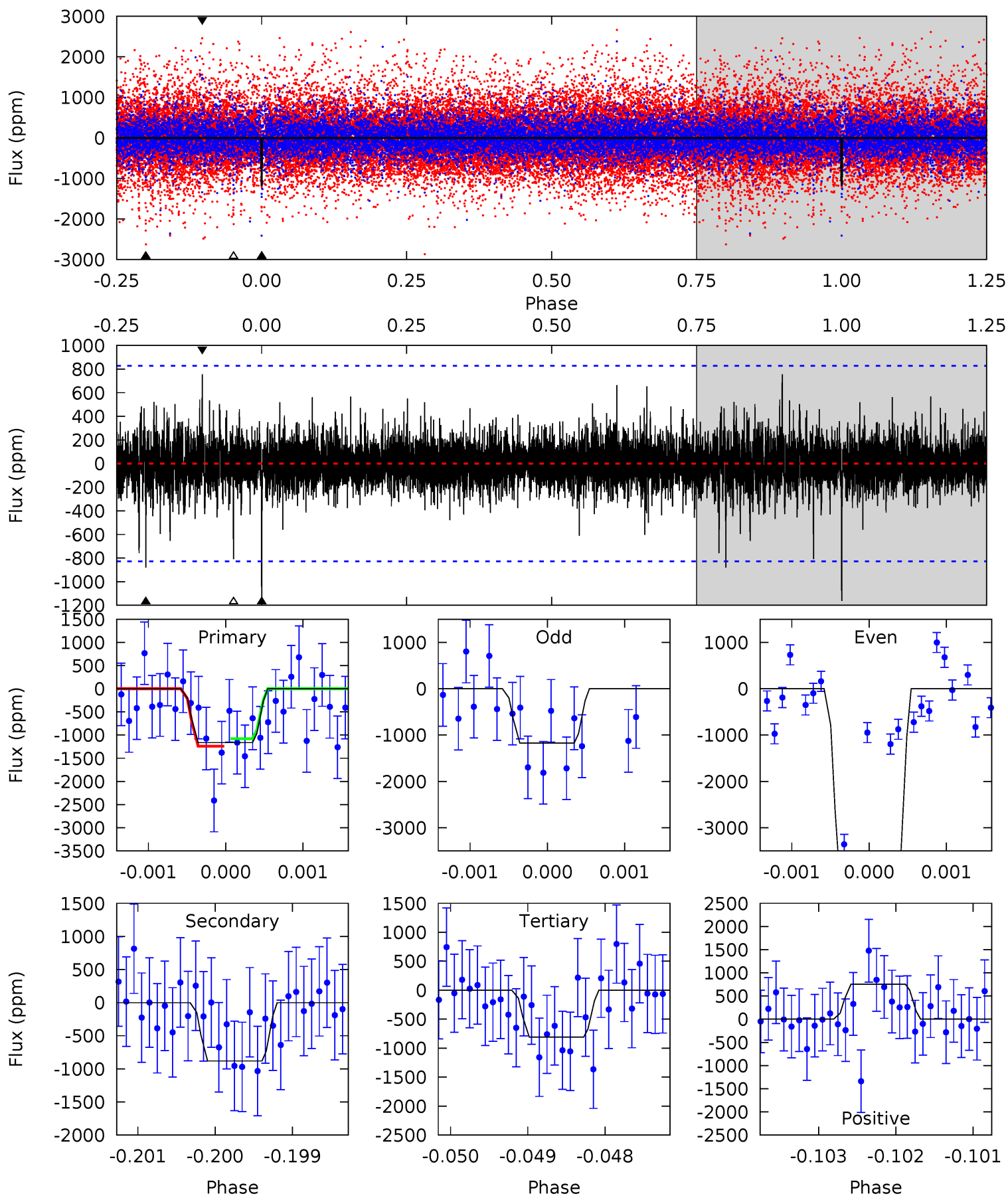
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.66	6.01	5.51	6.79	5.47	3.32	1.42	3.15	1.87	0.51	-0.78	2.13	0.89	0.44	0.50



# Alt Model-Shift Uniqueness Test

012470530-05, P = 160.425916 Days, E = 6.444831 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
7.69	5.82	5.35	5.00	5.47	3.32	0.93	2.34	2.69	0.47	0.82	12.2	3.21	0.39	0.53



### Stellar Parameters For KIC 012470530

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4859^{+144}_{-144}$	$4.637^{+0.060}_{-0.035}$	$-0.700^{+0.300}_{-0.300}$	$0.621^{+0.054}_{-0.054}$	$0.610^{+0.060}_{-0.030}$	$3.588^{+0.869}_{-0.524}$
	+3%/-3%	+1%/-1%	+43%/-43%	+9%/-9%	+10%/-5%	+24%/-15%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 012470530-05 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-918 \pm 153$	$3.04^{+2.54}_{-1.87}$	$336^{+11}_{-13}$	$4185^{+2096}_{-809}$	$13091^{+75843}_{-9154}$
Alt.	$-881 \pm 151$	$4.79^{+2.57}_{-2.32}$	$336^{+11}_{-12}$	$3547^{+968}_{-447}$	$5201^{+14916}_{-3057}$

$T_{\text{max}}$  = 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

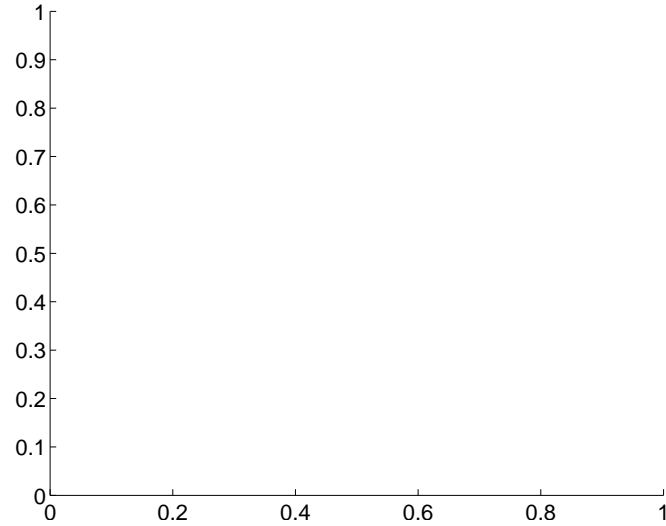
Supplemental centroid analysis for 012470530-05. Kepler magnitude: 15.30. Transit SNR 7.08

There are 0 quarters with good PRF difference image offsets

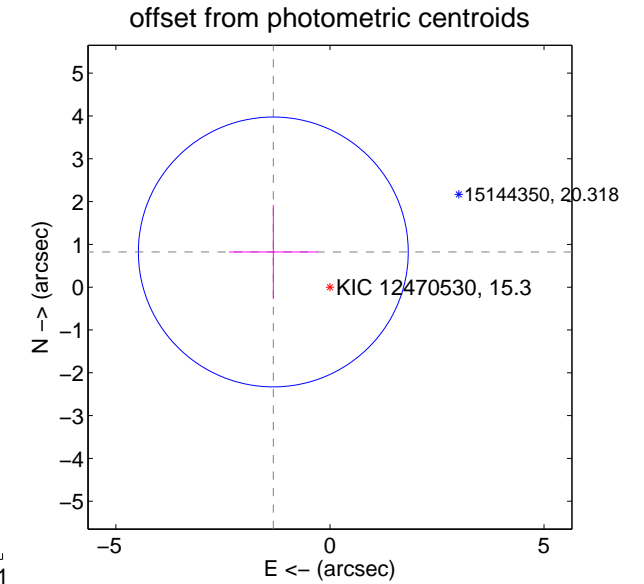
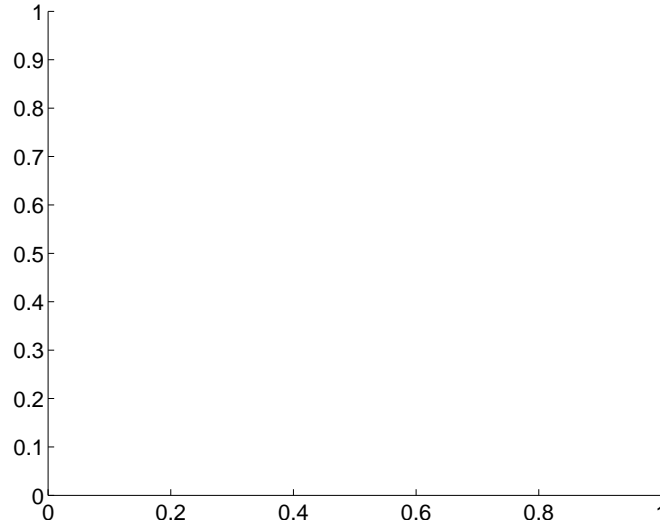
The direct PRF centroid is offset from the target star catalog position by about NaN arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	—	—	—	—
PRF-fit source offset from KIC position	—	—	—	—
photometric centroid source offset	$1.56 \pm 1.05$	1.48	$1.32 \pm 1.03$	$0.82 \pm 1.10$

There is no PRF-fit offset from OOT-fit

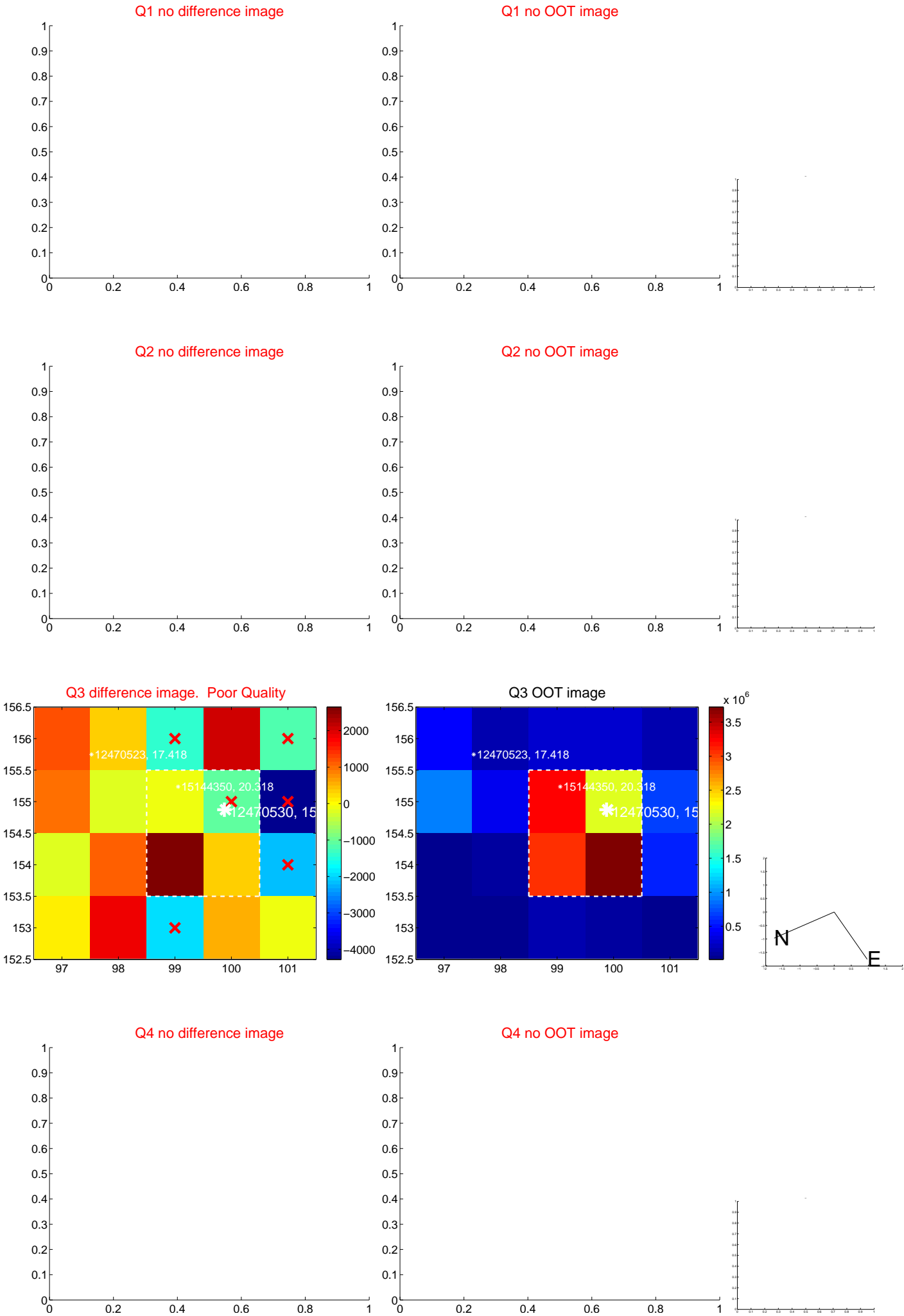


There is no PRF-fit offset from KIC

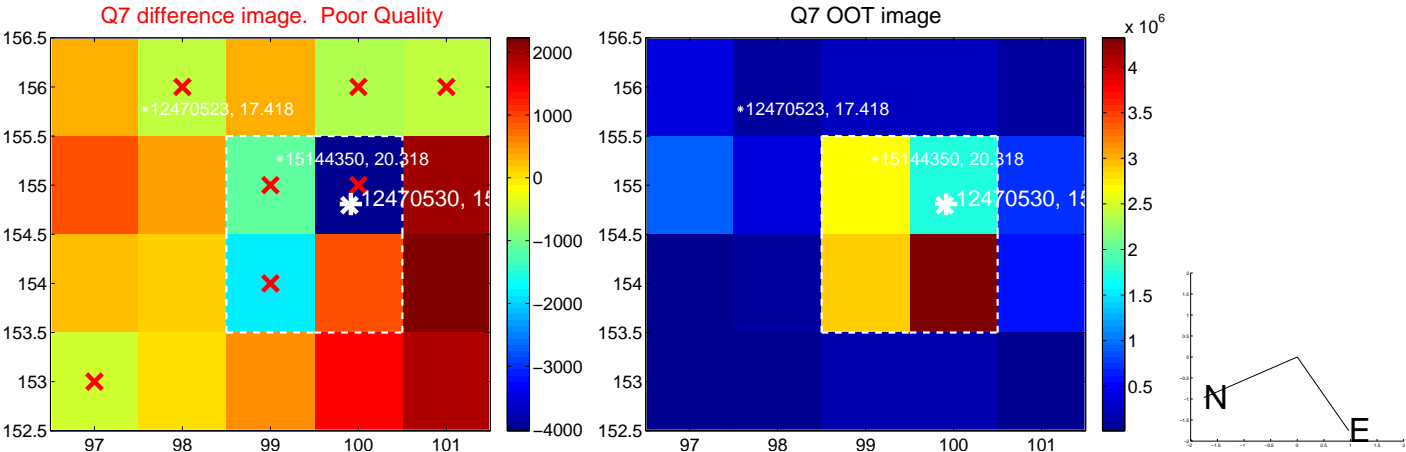
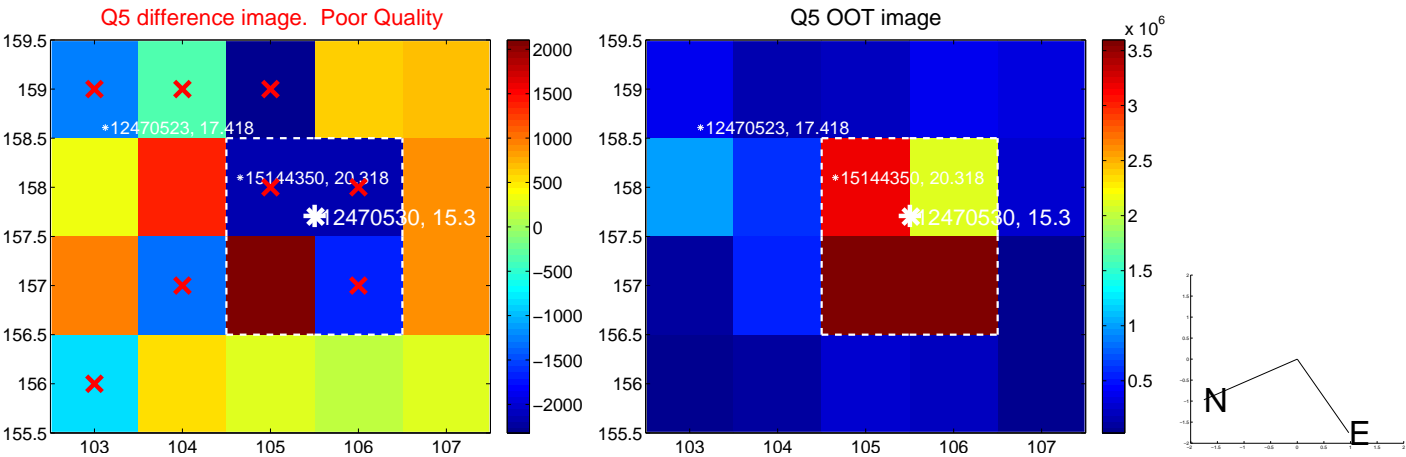


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.

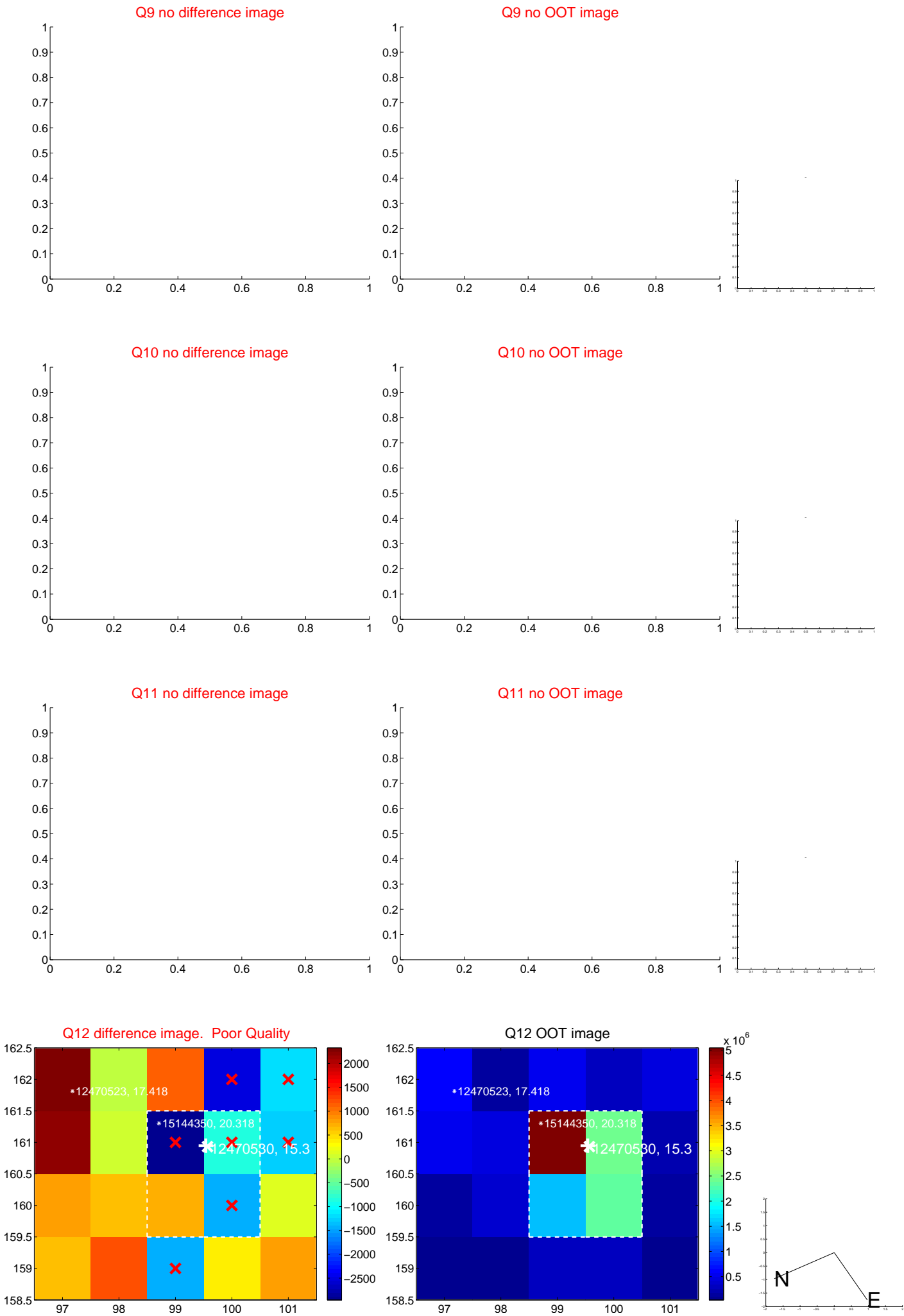


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





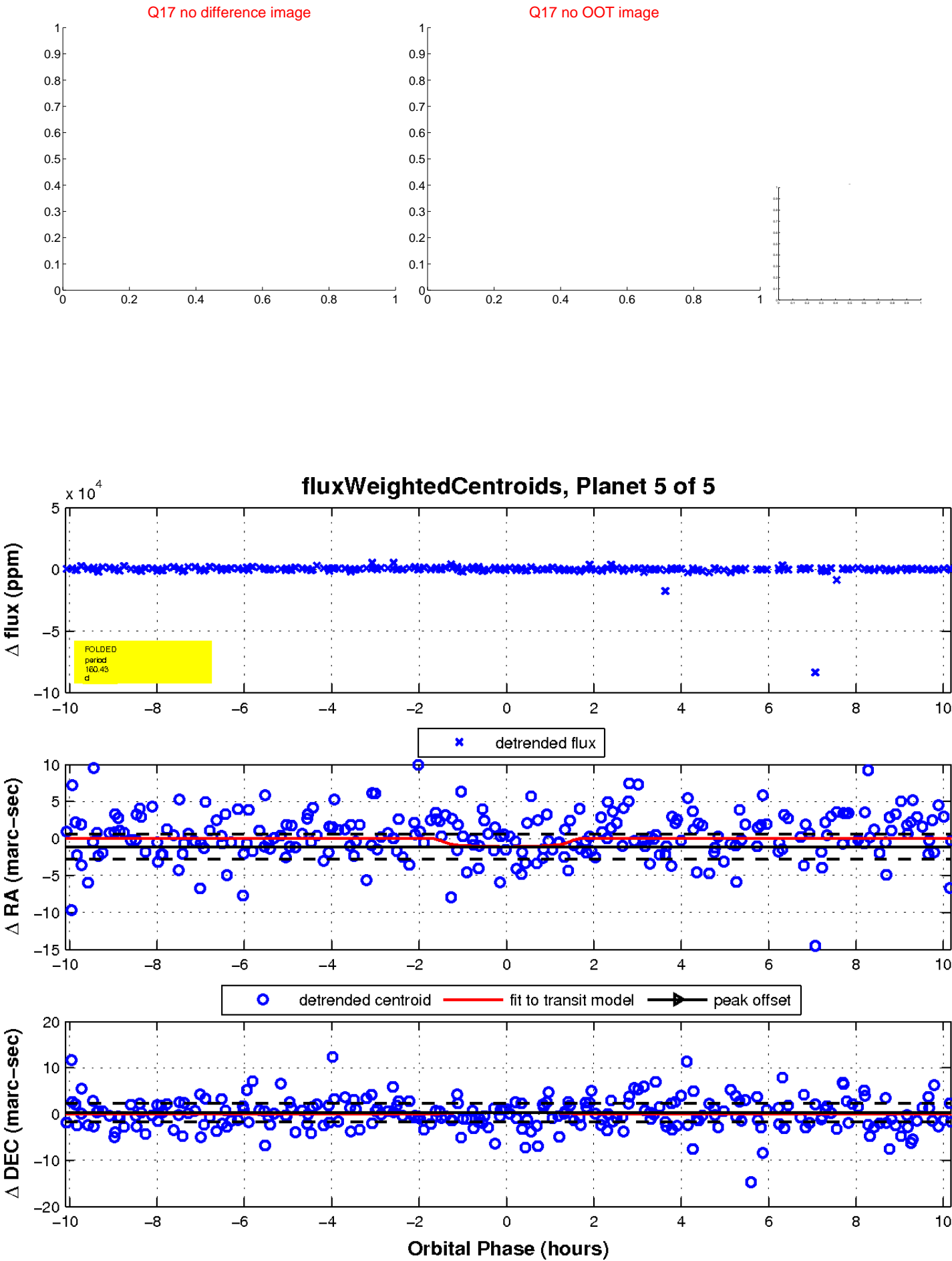
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



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



UKIRT Image

Declination

