

# KIC 004551202

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004551202-01	OBS	No	439.482056	482.939144	1370.1	4.513	12.9	7.2	0.75	5249	2.98	0.38
004551202-02	OBS	No	562.993241	427.673344	953.2	2.938	10.4	5.9	0.75	5249	2.33	0.27
004551202-03	OBS	No	0.739386	131.989600	65.5	3.699	7.3	8.2	0.75	5249	0.60	1900.87
004551202-04	OBS	No	176.551716	145.921457	1355.1	3.753	14.0	5.3	0.75	5249	3.22	1.28
004551202-05	OBS	No	116.355427	224.286918	1724.3	8.038	10.6	6.2	0.75	5249	3.43	2.24
004551202-06	OBS	No	102.598270	199.185496	1551.4	3.420	11.7	6.7	0.75	5249	3.19	2.65

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004551202-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
004551202-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004551202-03	OBS	FP	0.00	1	0	0	0	LPP_DV—CENT_FEW_MEAS
004551202-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_POS_DV—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004551202-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004551202-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_MEAS

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

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

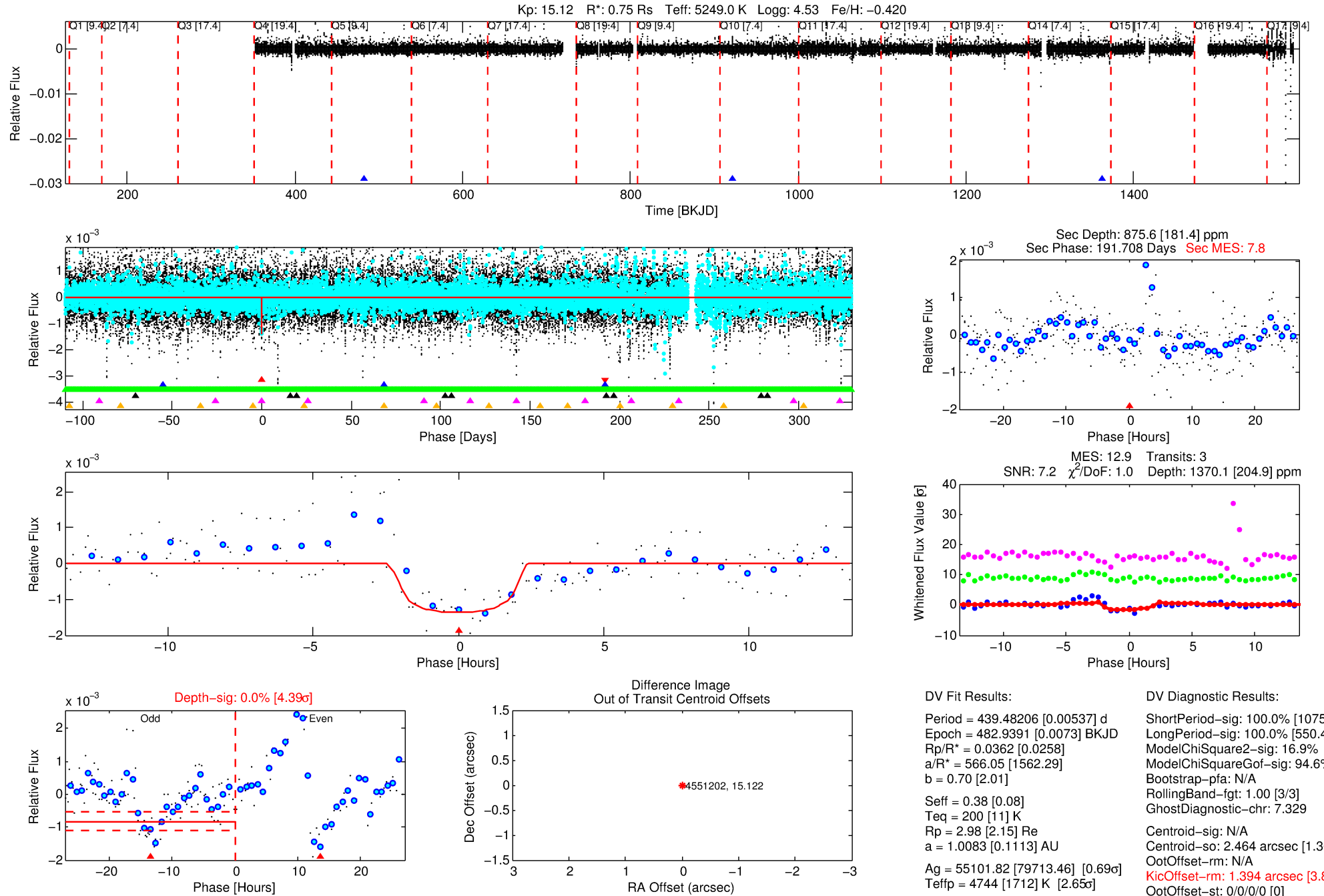
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004551202-01

No Significant Match Found

# DV One-Page Summary

KIC: 4551202 Candidate: 1 of 6 Period: 439.482 d



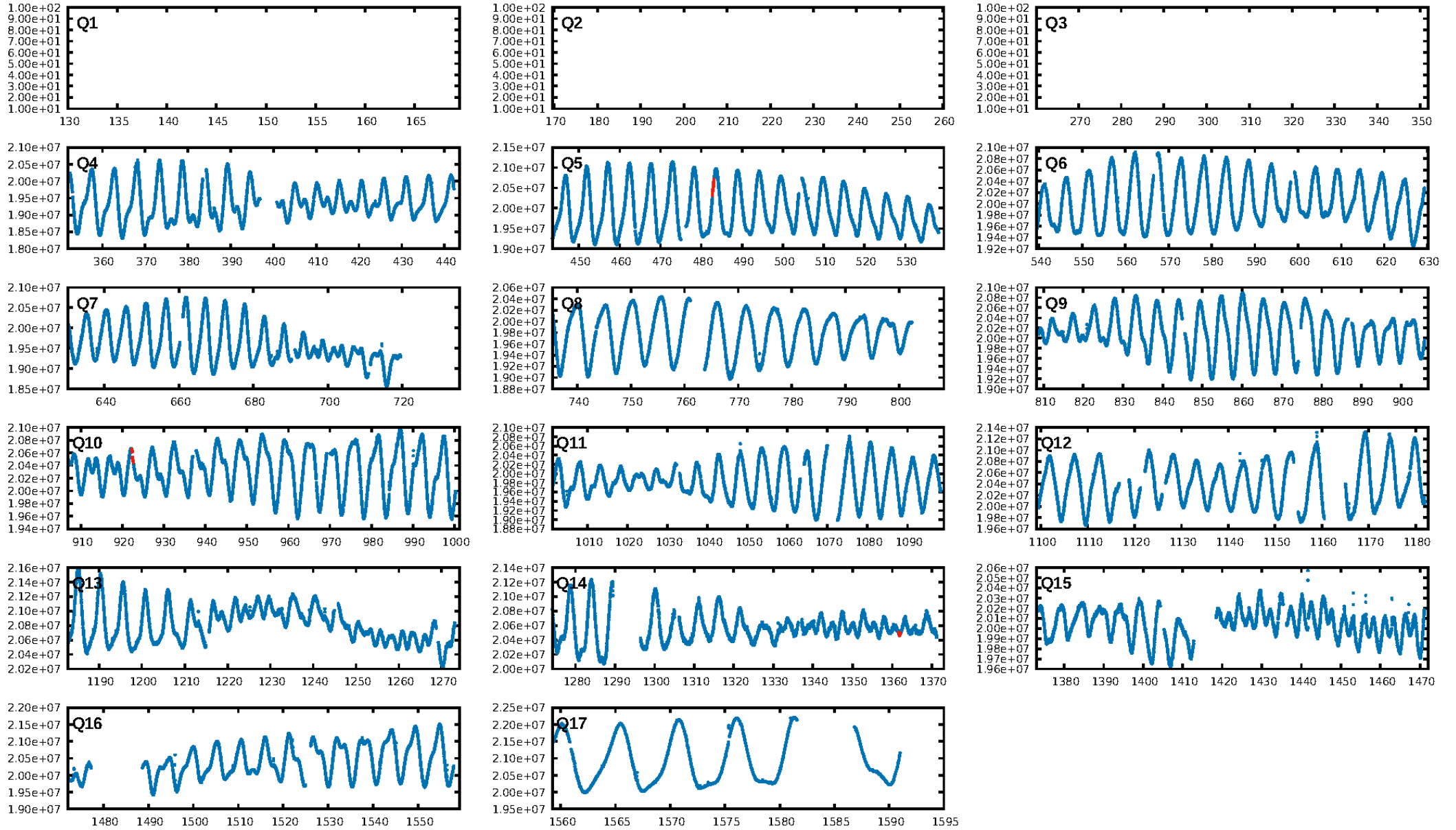
## DV Fit Results:

Period = 439.48206 [0.00537] d  
Epoch = 482.9391 [0.0073] BKJD  
Rp/R\* = 0.0362 [0.0258]  
a/R\* = 566.05 [1562.29]  
b = 0.70 [2.01]  
Seff = 0.38 [0.08]  
Teq = 200 [11] K  
Rp = 2.98 [2.15] Re  
a = 1.0083 [0.1113] AU  
Ag = 55101.82 [79713.46] [0.69σ]  
Teffp = 4744 [1712] K [2.65σ]

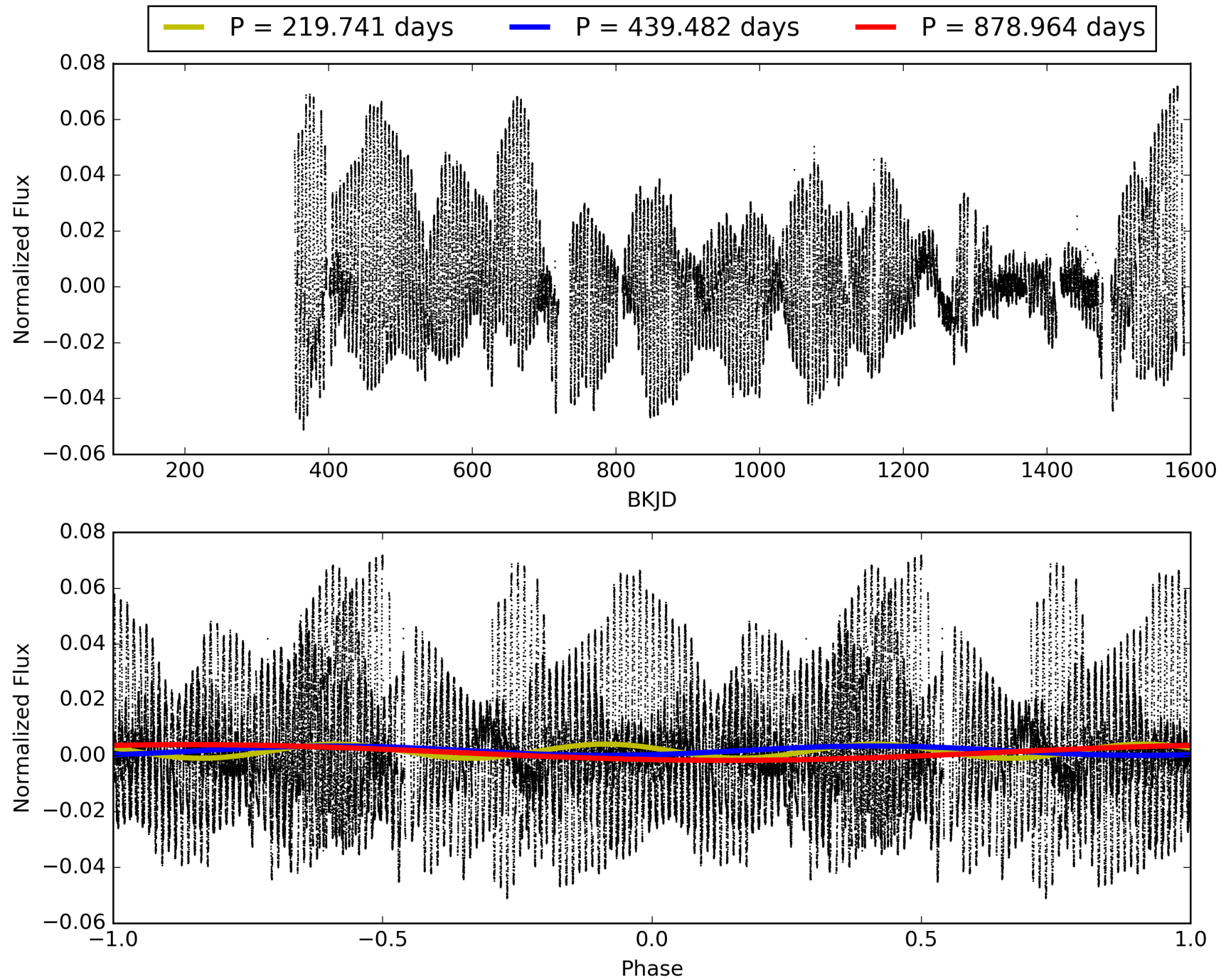
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [1075.08σ]  
LongPeriod-sig: 100.0% [550.41σ]  
ModelChiSquare2-sig: 16.9%  
ModelChiSquareGoF-sig: 94.6%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 7.329  
Centroid-sig: N/A  
Centroid-so: 2.464 arcsec [1.36σ]  
OotOffset-rm: N/A  
KicOffset-rm: 1.394 arcsec [3.85σ]  
OotOffset-st: 0/0/0 [0]  
KicOffset-st: 1/0/0 [1]  
DiffImageQuality-fgm: 1.00 [1/1]  
DiffImageOverlap-fno: 0.00 [0/3]

# TCE 004551202-01, PDC Light Curves



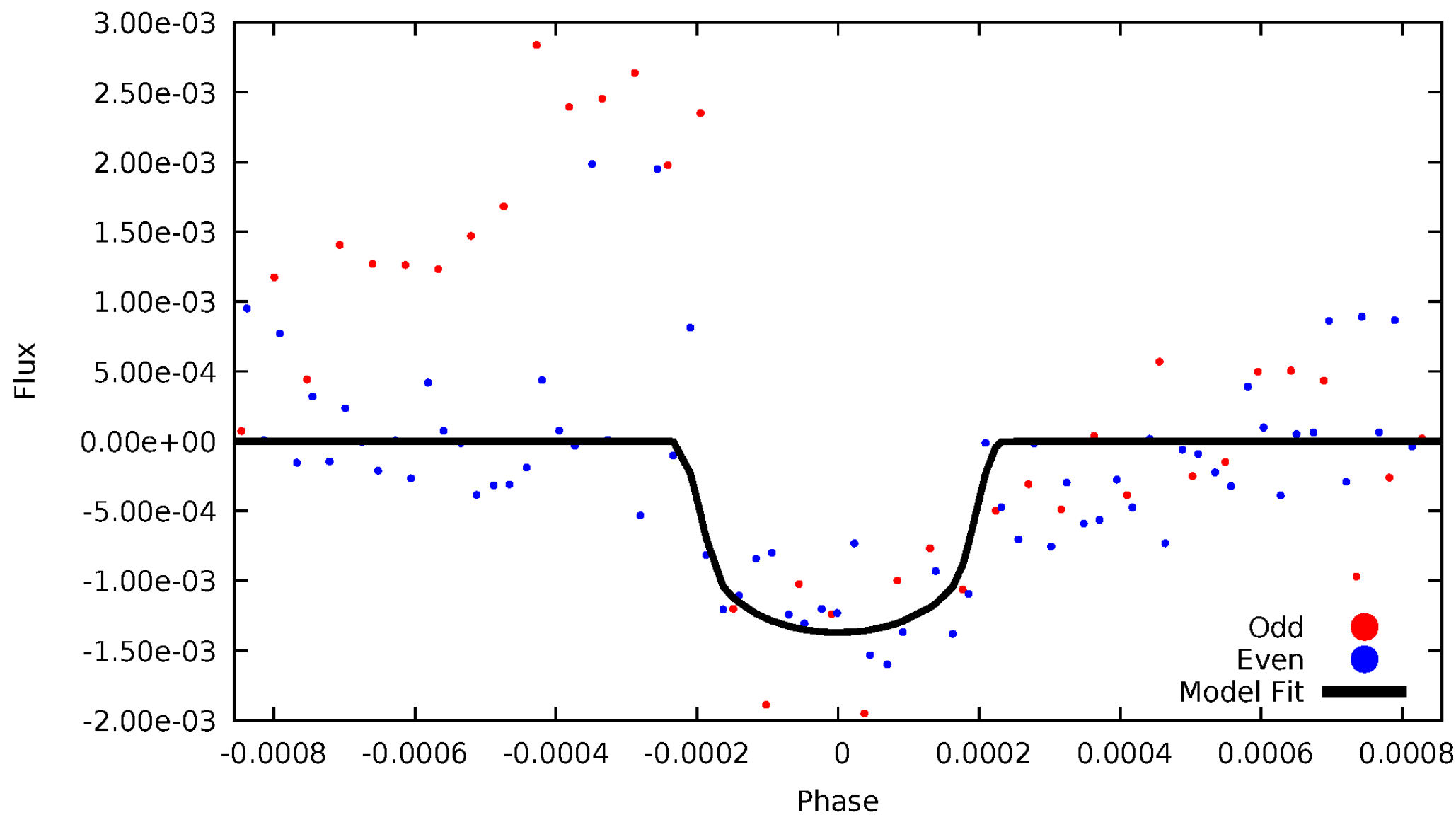
TCE 004551202-01





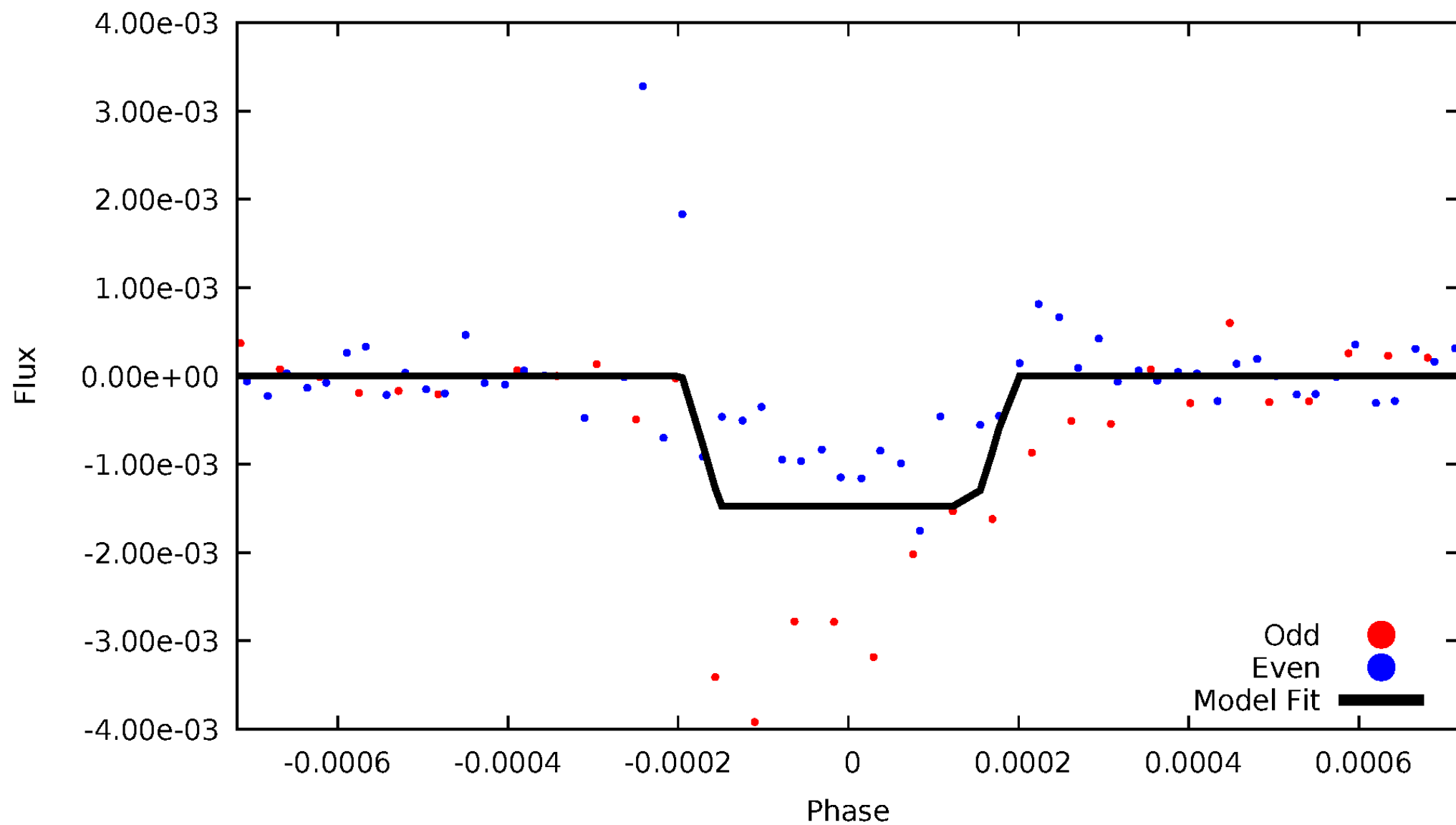
# DV Odd/Even

TCE 004551202-01



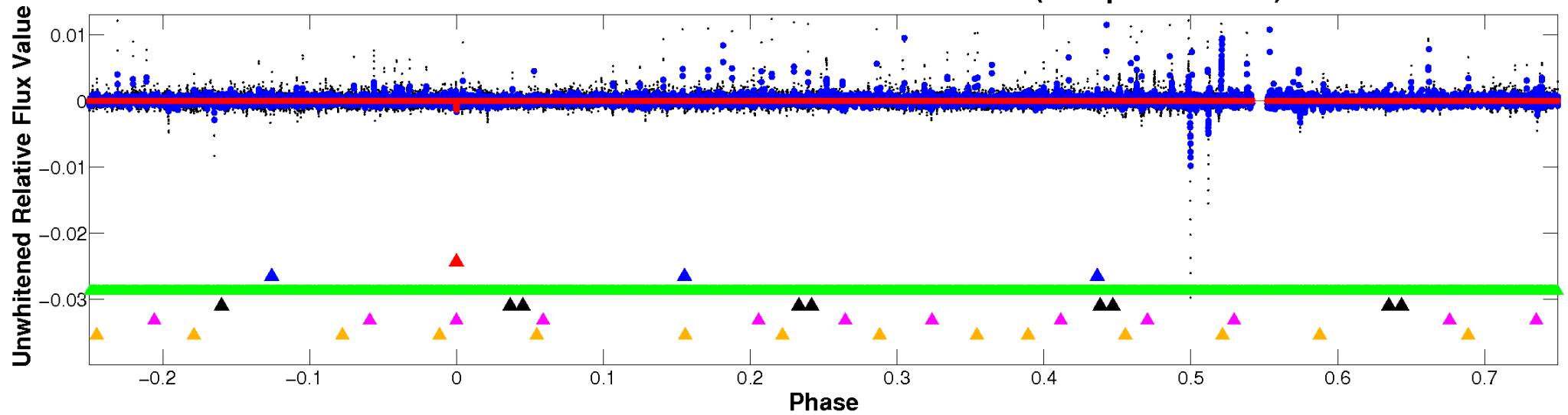
# ALT Odd/Even

TCE 004551202-01

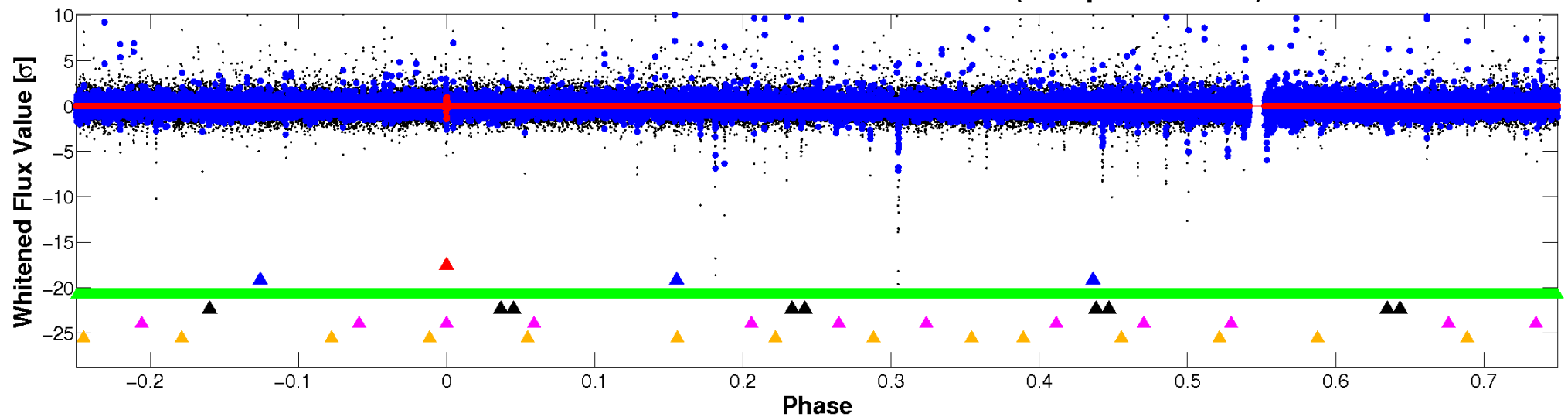


# Non-Whitened Vs. Whitened Light Curve

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

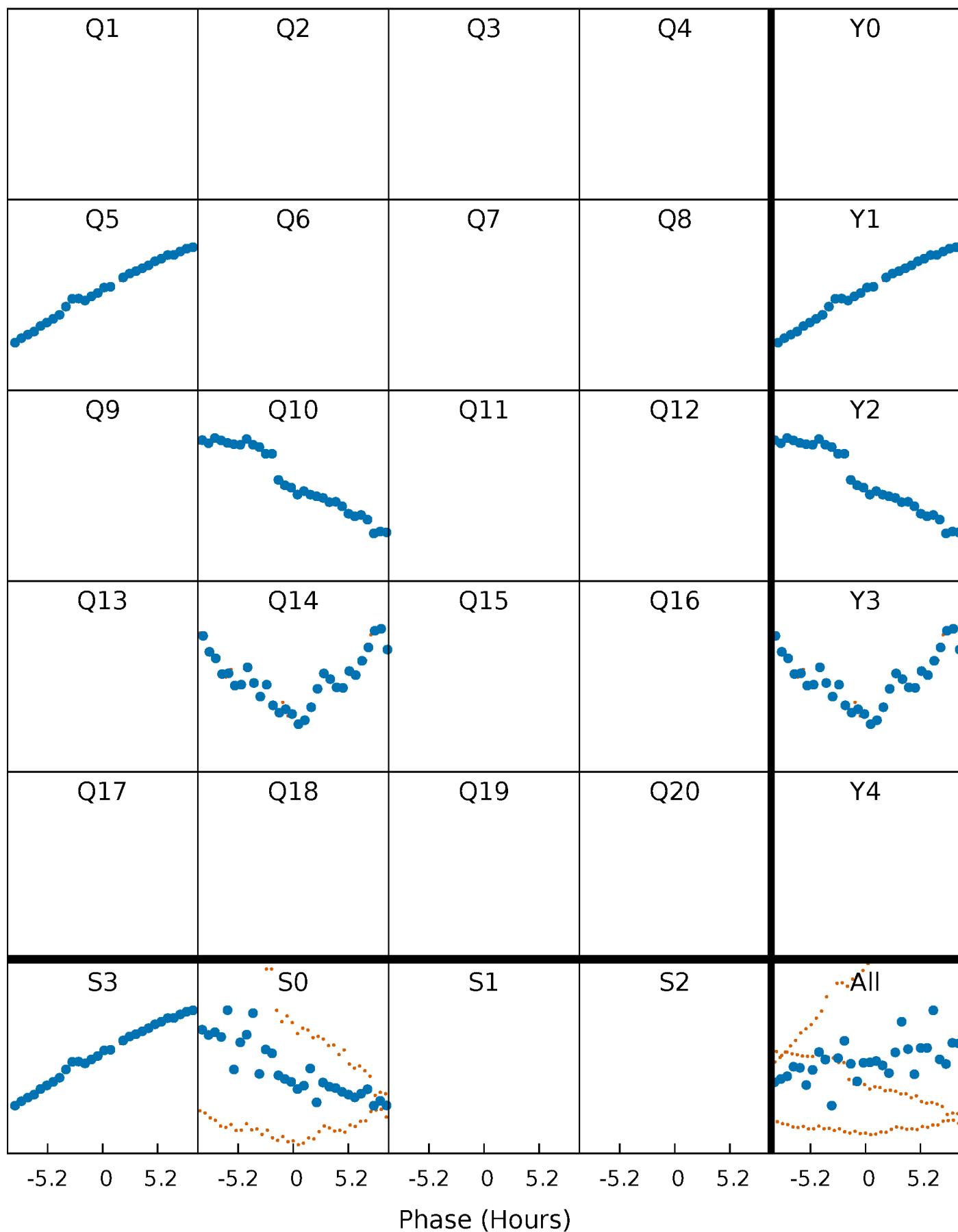


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



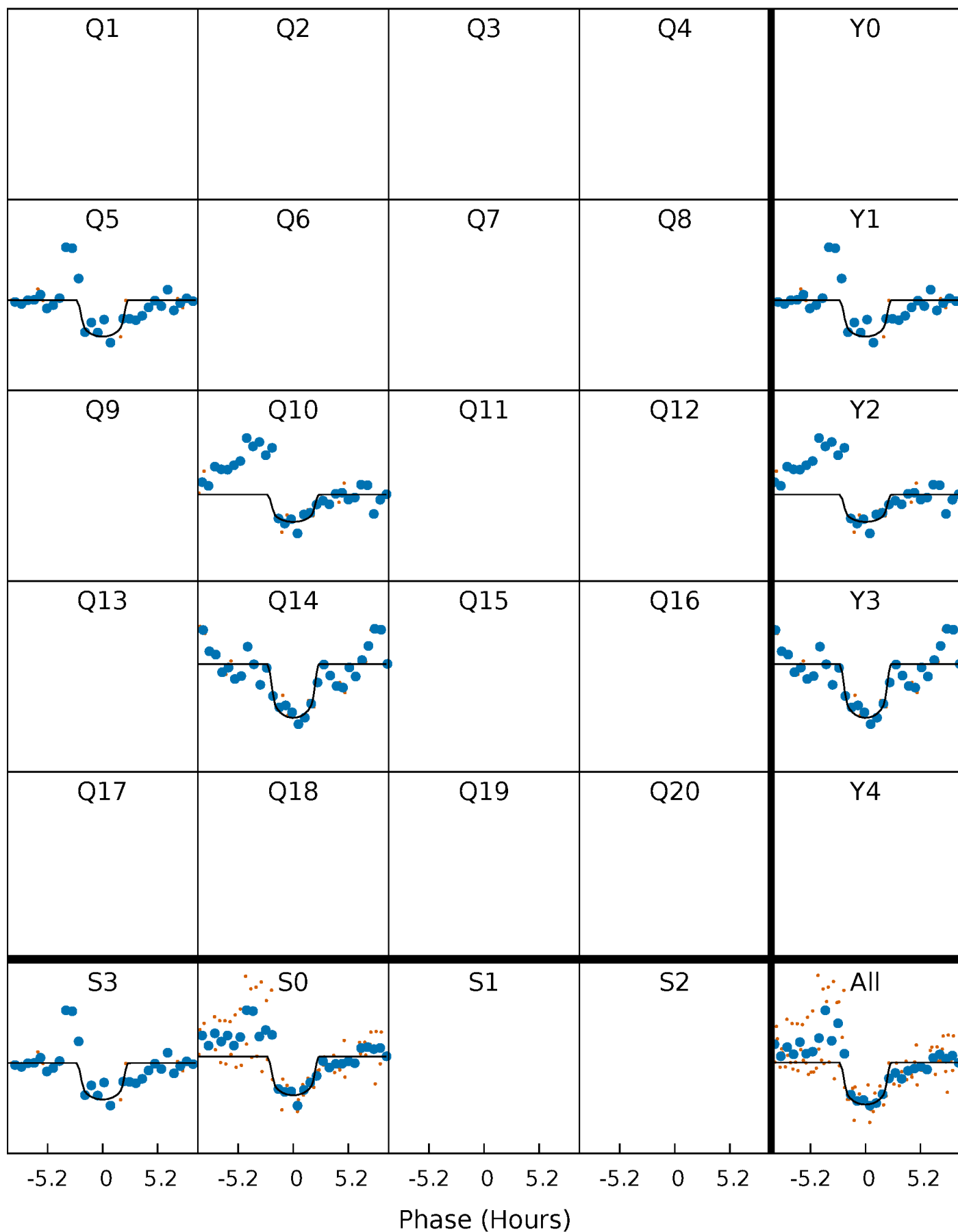
# PDC Quarter-Phased Transit Curves

TCE 004551202-01 P=439.482056 Days  $T_0=482.939144$  (BKJD)



# DV Quarter-Phased Transit Curves

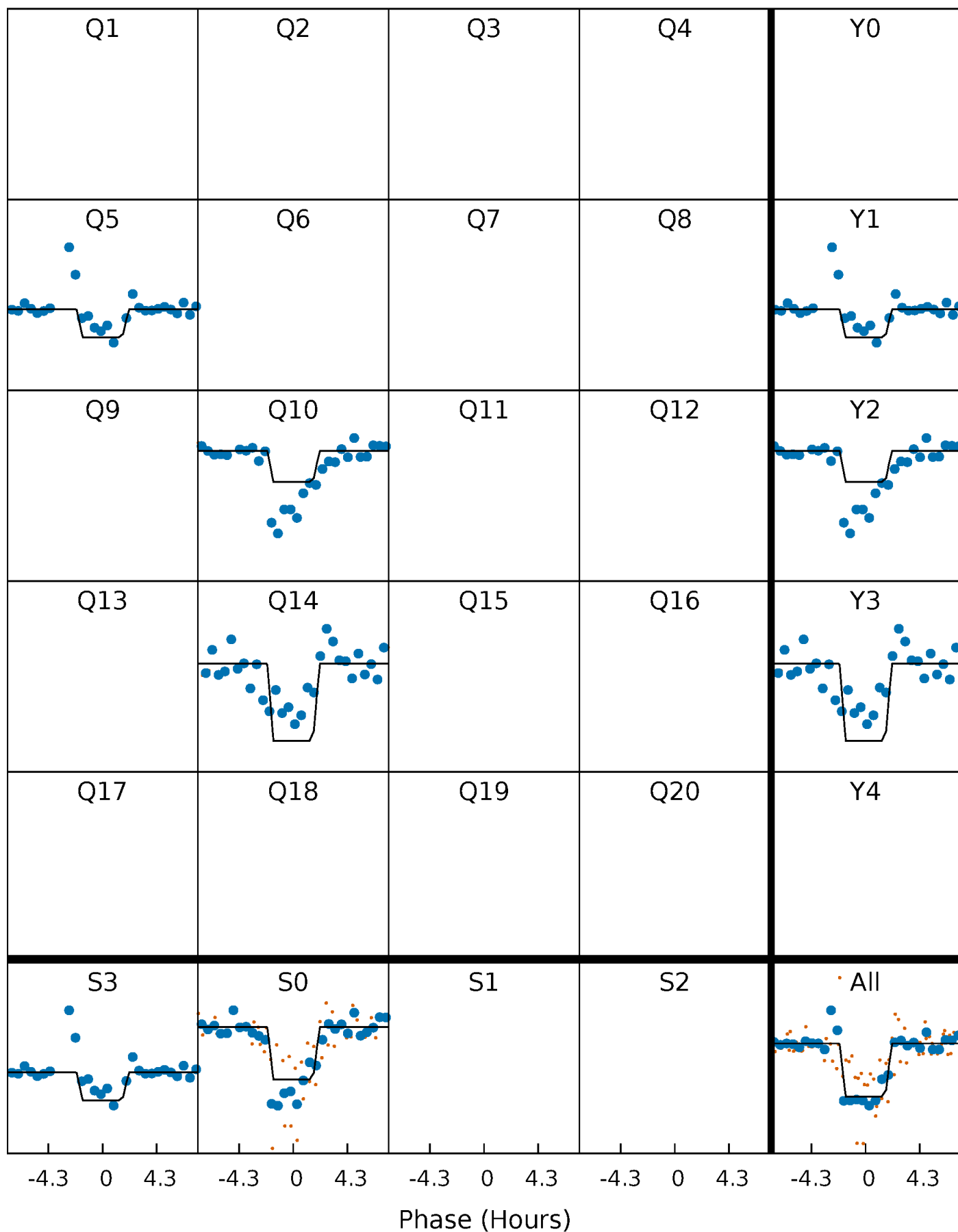
TCE 004551202-01 P=439.482056 Days  $T_0=482.939144$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

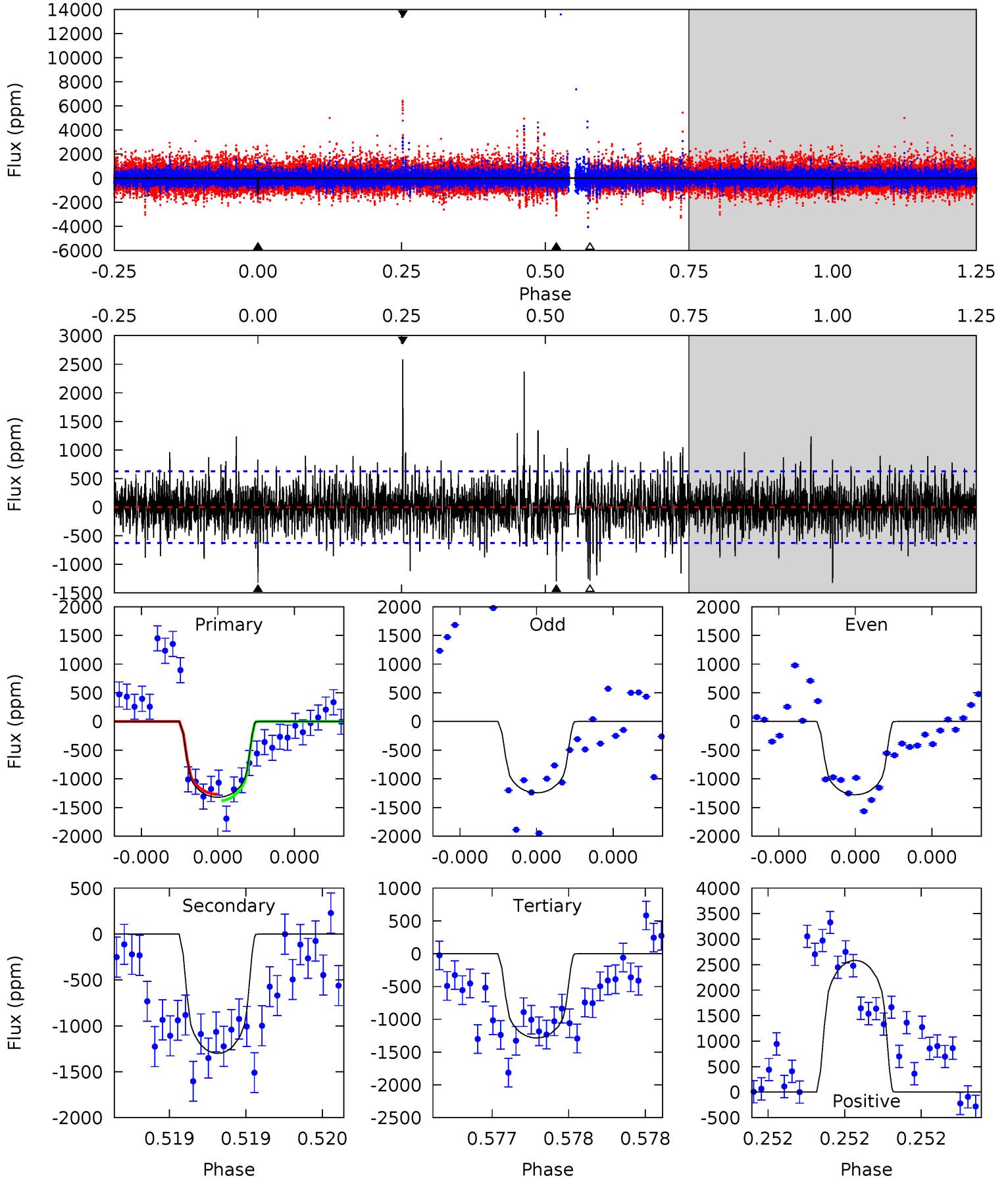
TCE 004551202-01 P=439.491820 Days  $T_0=482.932840$  (BKJD)



# DV Model-Shift Uniqueness Test

004551202-01, P = 439.482056 Days, E = 43.457088 Days

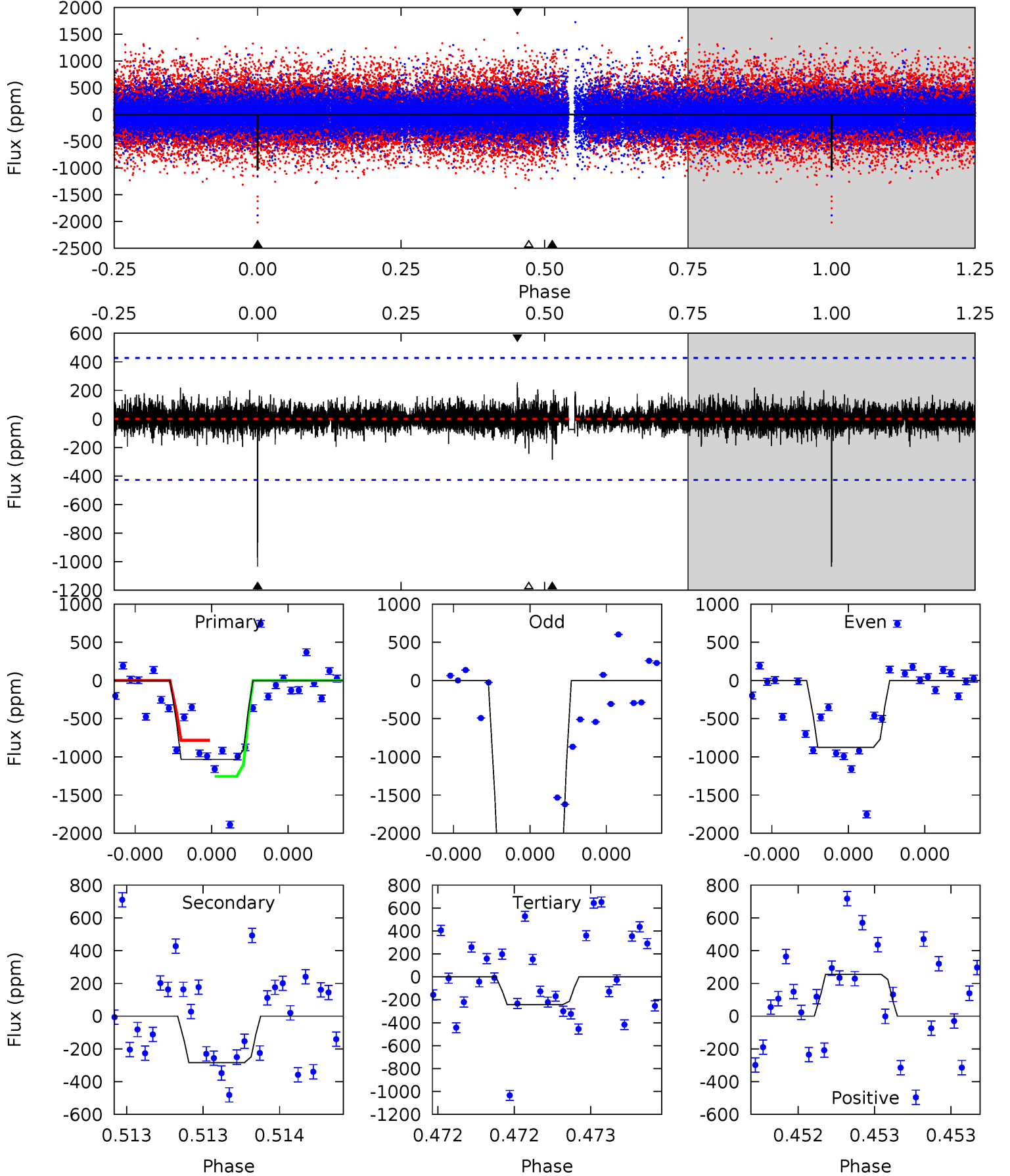
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.8	11.6	11.5	23.1	5.59	3.50	2.45	0.33	-11.3	0.14	-11.5	0.11	1.02	0.66	0.51



# Alt Model-Shift Uniqueness Test

004551202-01,  $P = 439.491820$  Days,  $E = 43.441020$  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
13.6	3.73	3.19	3.36	5.62	3.56	0.60	10.4	10.2	0.54	0.37	14.6	1.66	0.20	3.07



### Stellar Parameters For KIC 004551202

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5249^{+183}_{-183}$	$4.533^{+0.096}_{-0.072}$	$-0.420^{+0.350}_{-0.300}$	$0.754^{+0.093}_{-0.093}$	$0.708^{+0.105}_{-0.045}$	$2.326^{+0.902}_{-0.546}$
	+3%/-3%	+2%/-2%	+83%/-71%	+12%/-12%	+15%/-6%	+39%/-23%
Source	KIC0	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 004551202-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-1300 \pm 112$	$3.17^{+2.15}_{-1.81}$	$278^{+12}_{-13}$	$5123^{+2573}_{-959}$	$75106^{+323296}_{-49576}$
Alt.	$-284 \pm 76$	$3.41^{+2.02}_{-1.84}$	$279^{+13}_{-13}$	$3712^{+1292}_{-529}$	$14085^{+52414}_{-8923}$

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

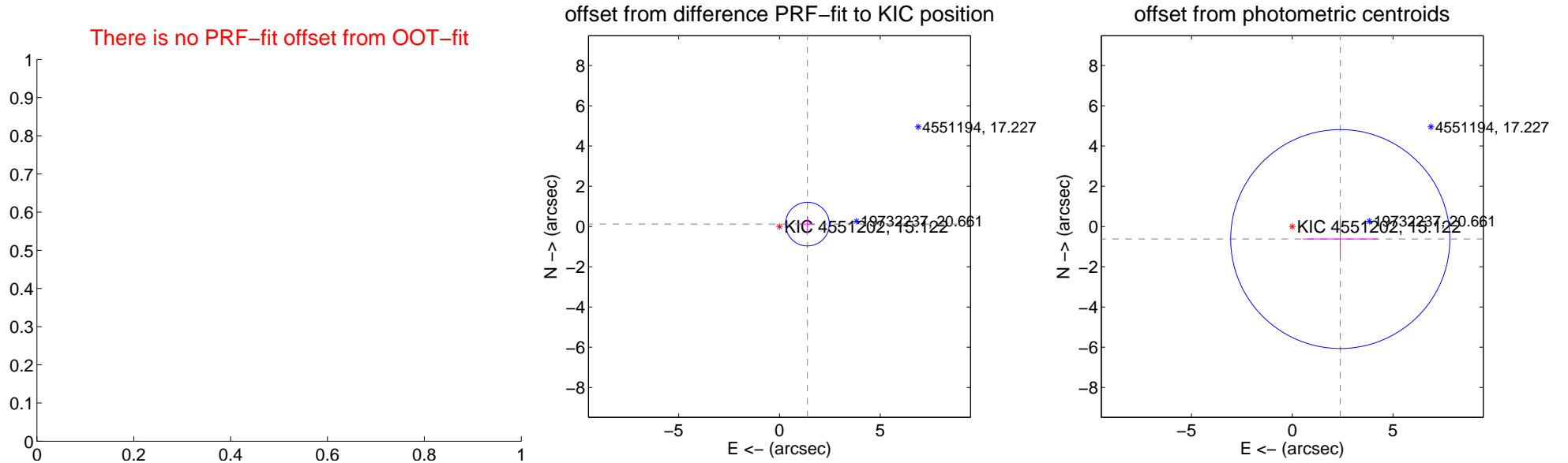
## DV Centroid Data

Supplemental centroid analysis for 004551202-01. Kepler magnitude: 15.12. Transit SNR 7.23

There are 1 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	$1.394 \pm 0.362$	3.85	$-1.389 \pm 0.362$	$0.120 \pm 0.358$
photometric centroid source offset	$2.46 \pm 1.81$	1.36	$-2.38 \pm 1.86$	$-0.62 \pm 0.95$



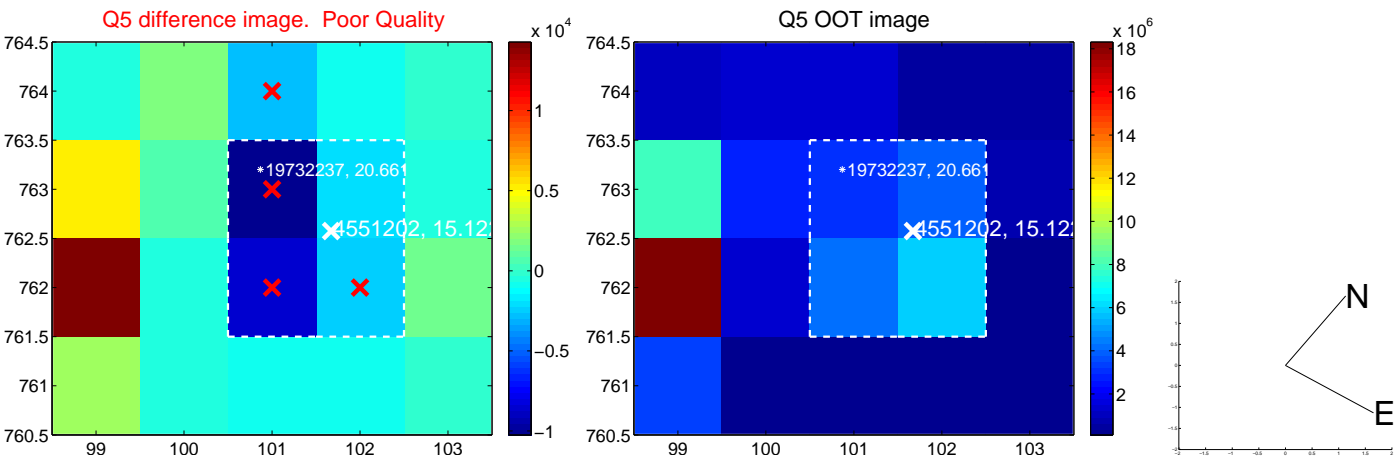
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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



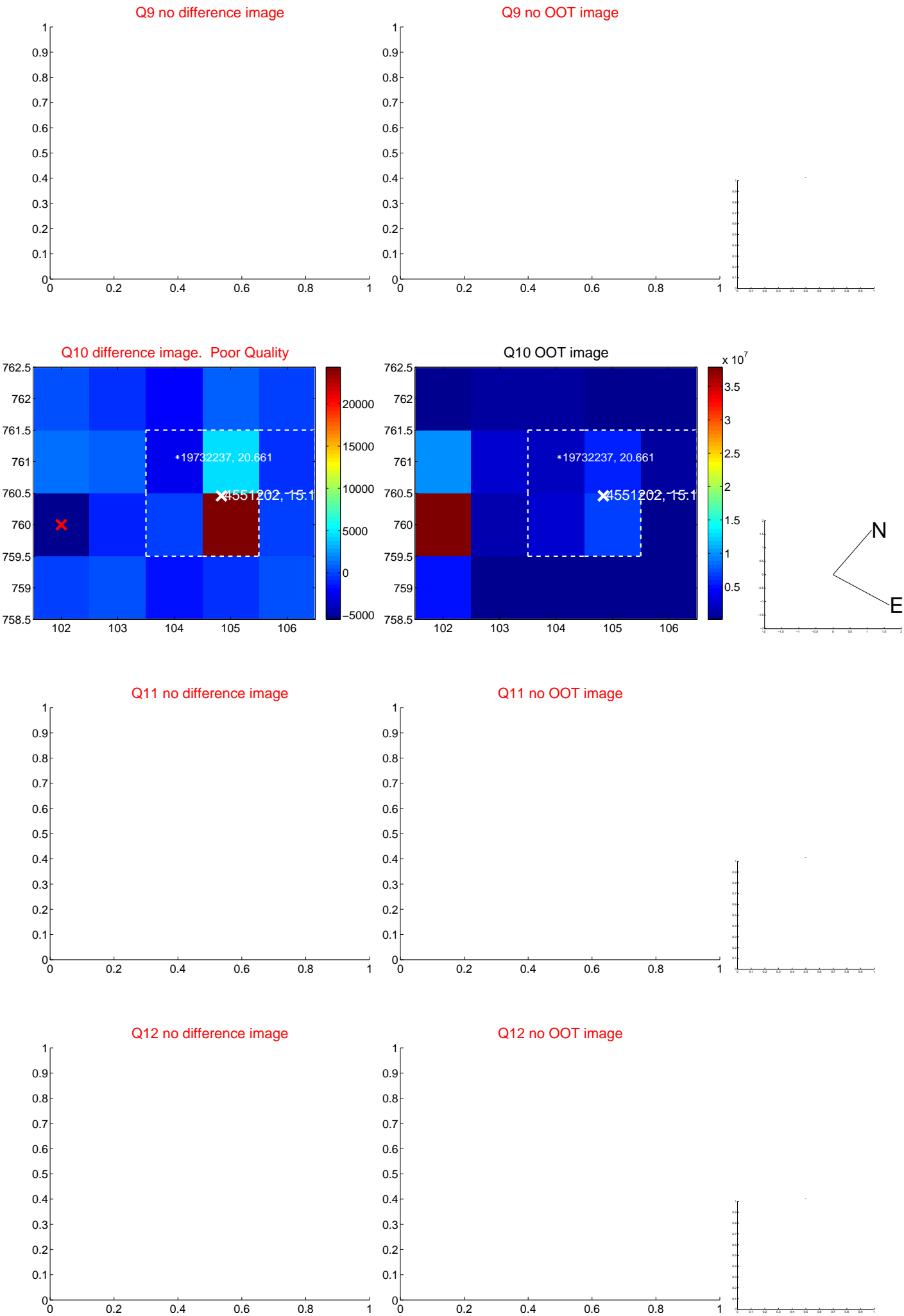
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



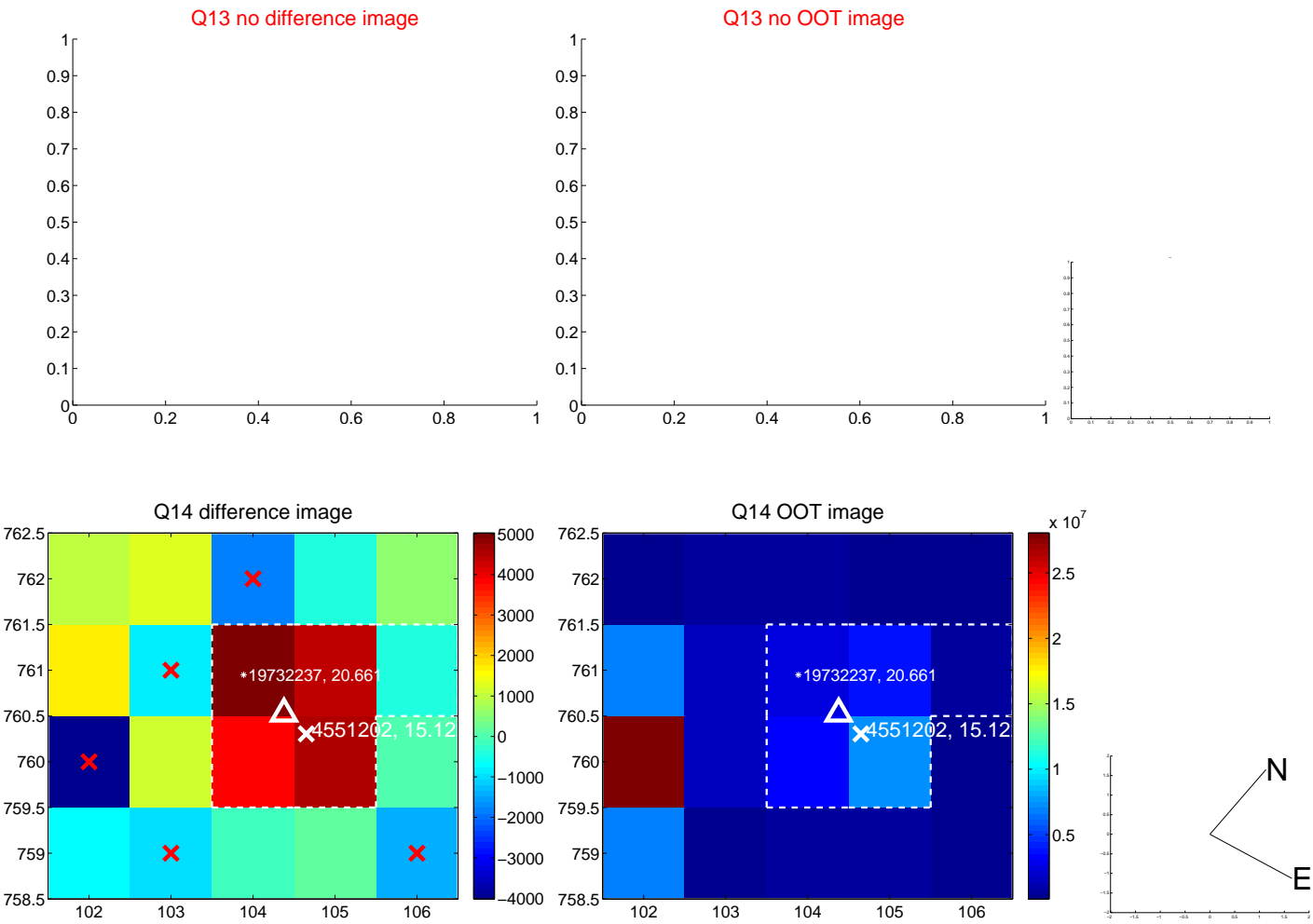
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.



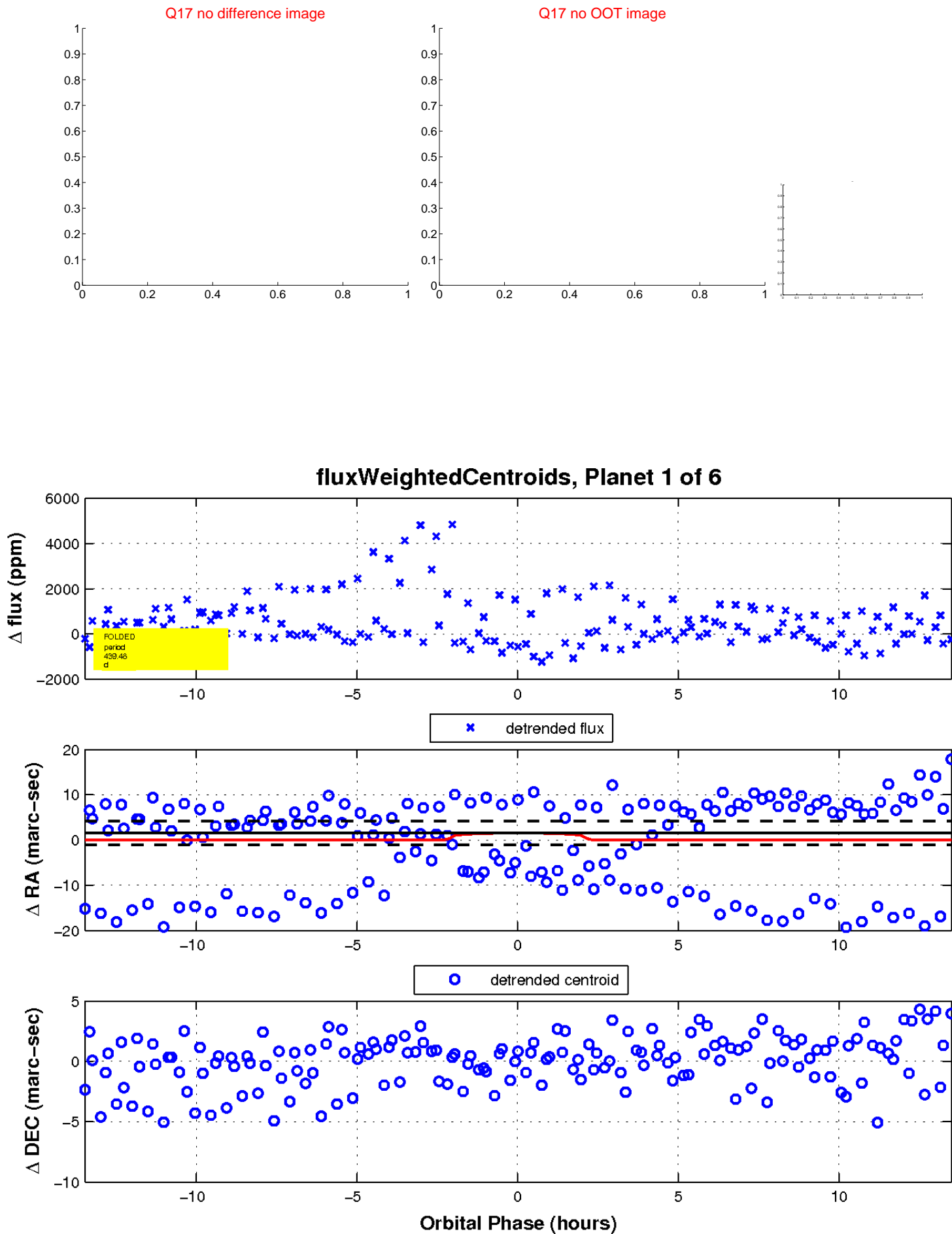
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white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



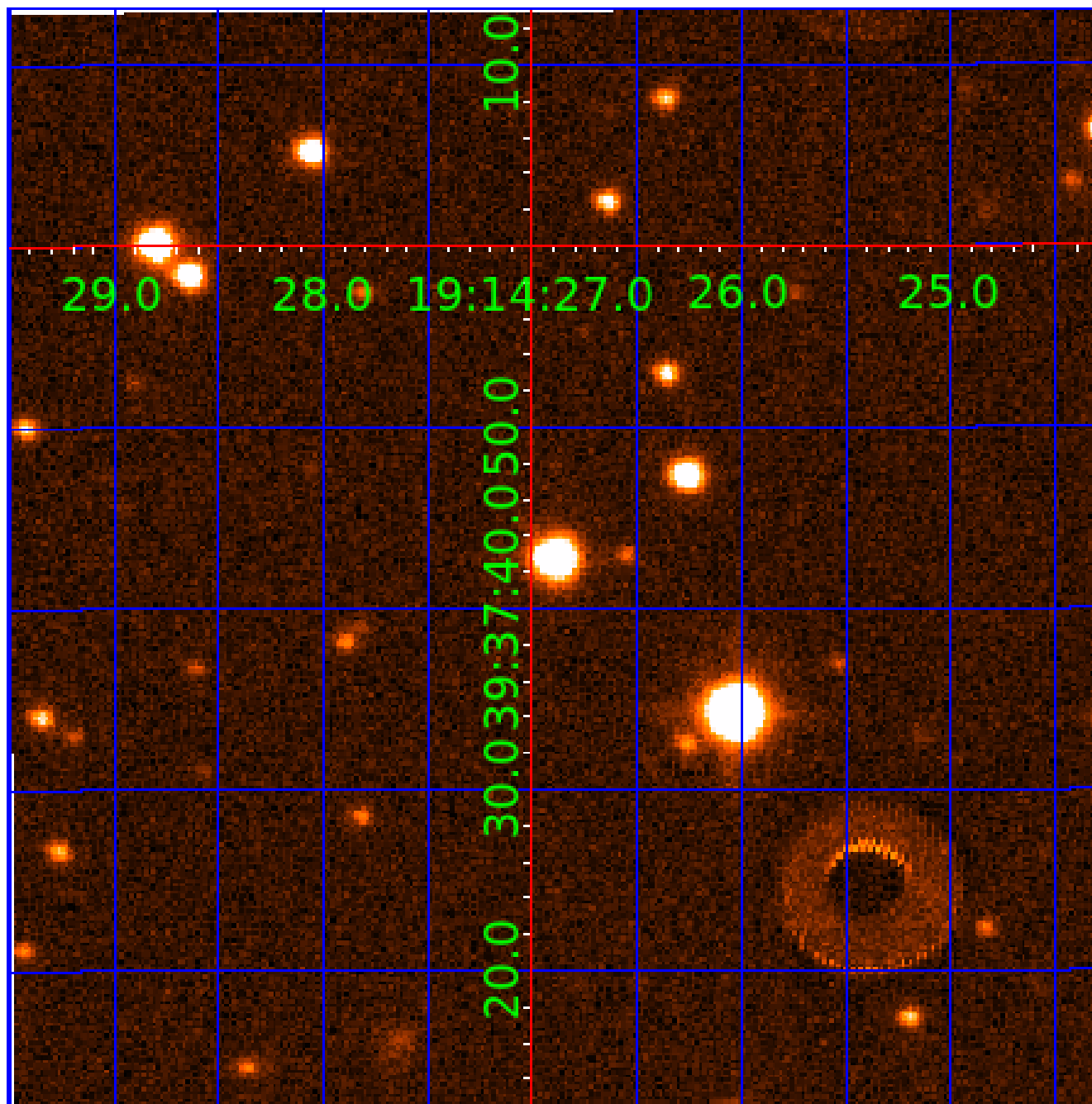
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image

Declination



# KIC 004551202

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
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## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
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004551202-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004551202-03	OBS	FP	0.00	1	0	0	0	LPP_DV—CENT_FEW_MEAS
004551202-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_POS_DV—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004551202-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004551202-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_MEAS

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

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

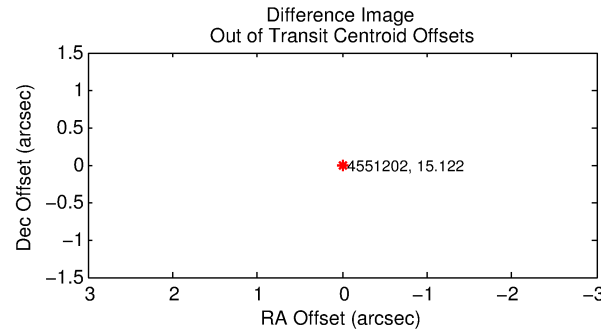
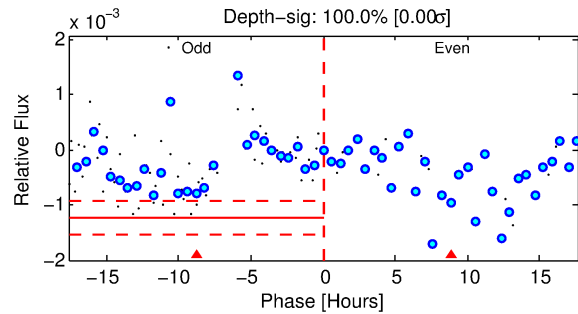
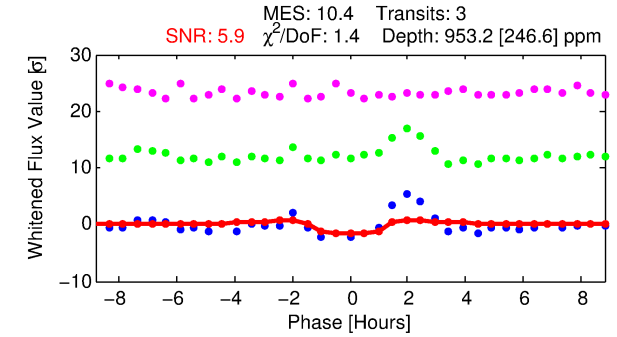
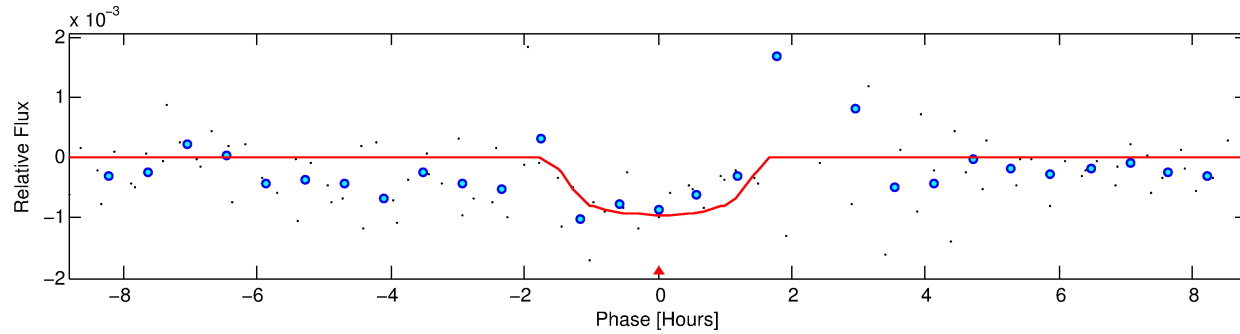
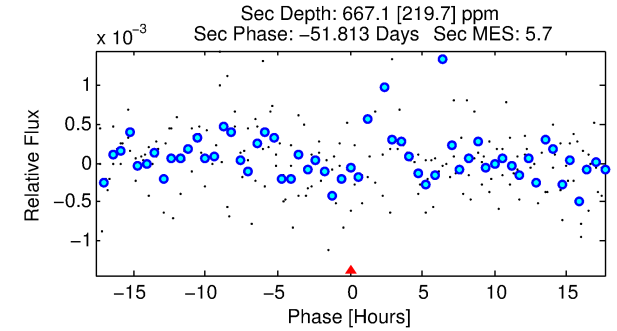
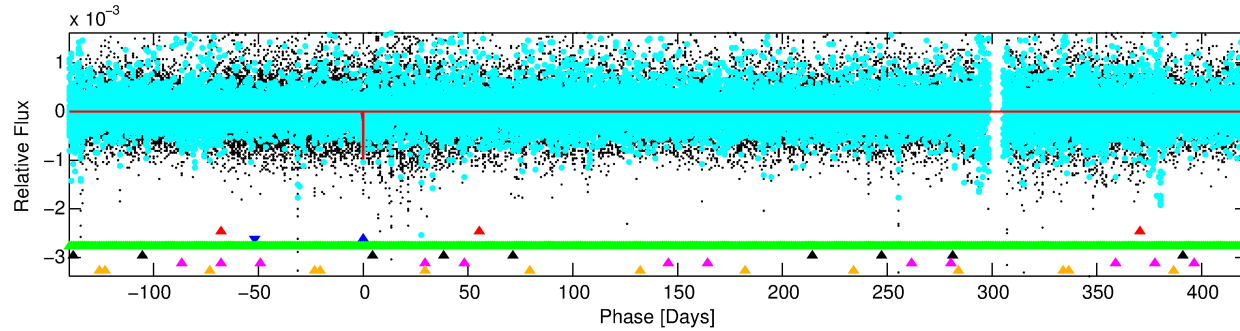
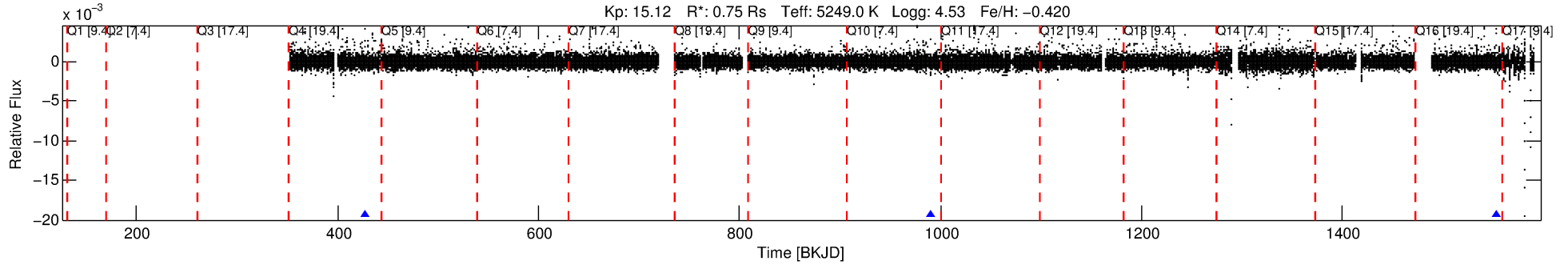
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 004551202-02

No Significant Match Found

# DV One-Page Summary

KIC: 4551202 Candidate: 2 of 6 Period: 562.993 d



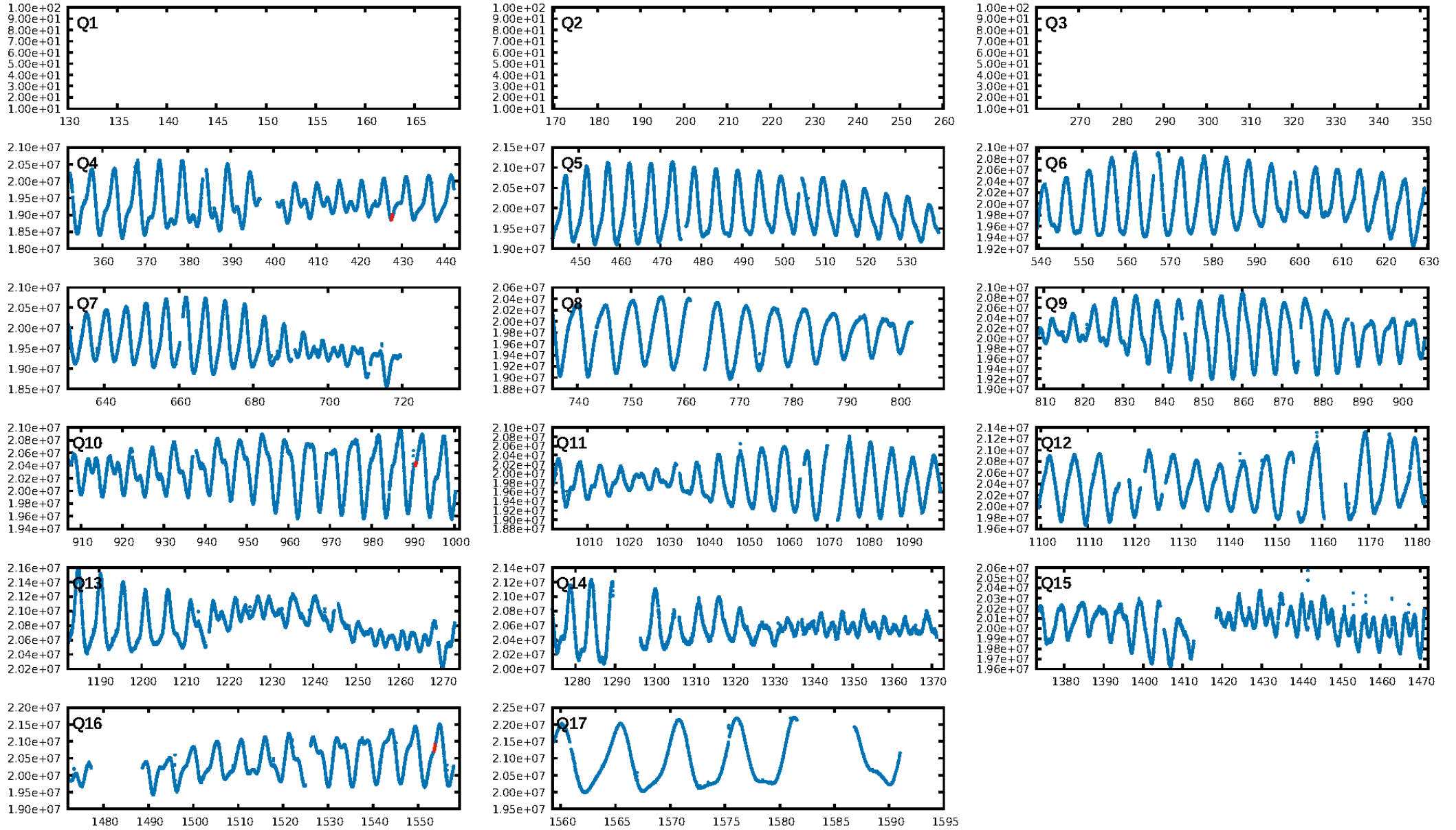
## DV Fit Results:

Period = 562.99324 [0.00877] d  
Epoch = 427.6733 [0.0103] BKJD  
Rp/R\* = 0.0283 [0.1484]  
a/R\* = 1405.48 [28853.53]  
b = 0.37 [48.92]  
Seff = 0.27 [0.06]  
Teq = 184 [10] K  
Rp = 2.33 [12.21] Re  
a = 1.1893 [0.1313] AU  
Ag = 95970.87 [1008178.44] [0.10σ]  
Teffp = 5018 [13177] K [0.37σ]

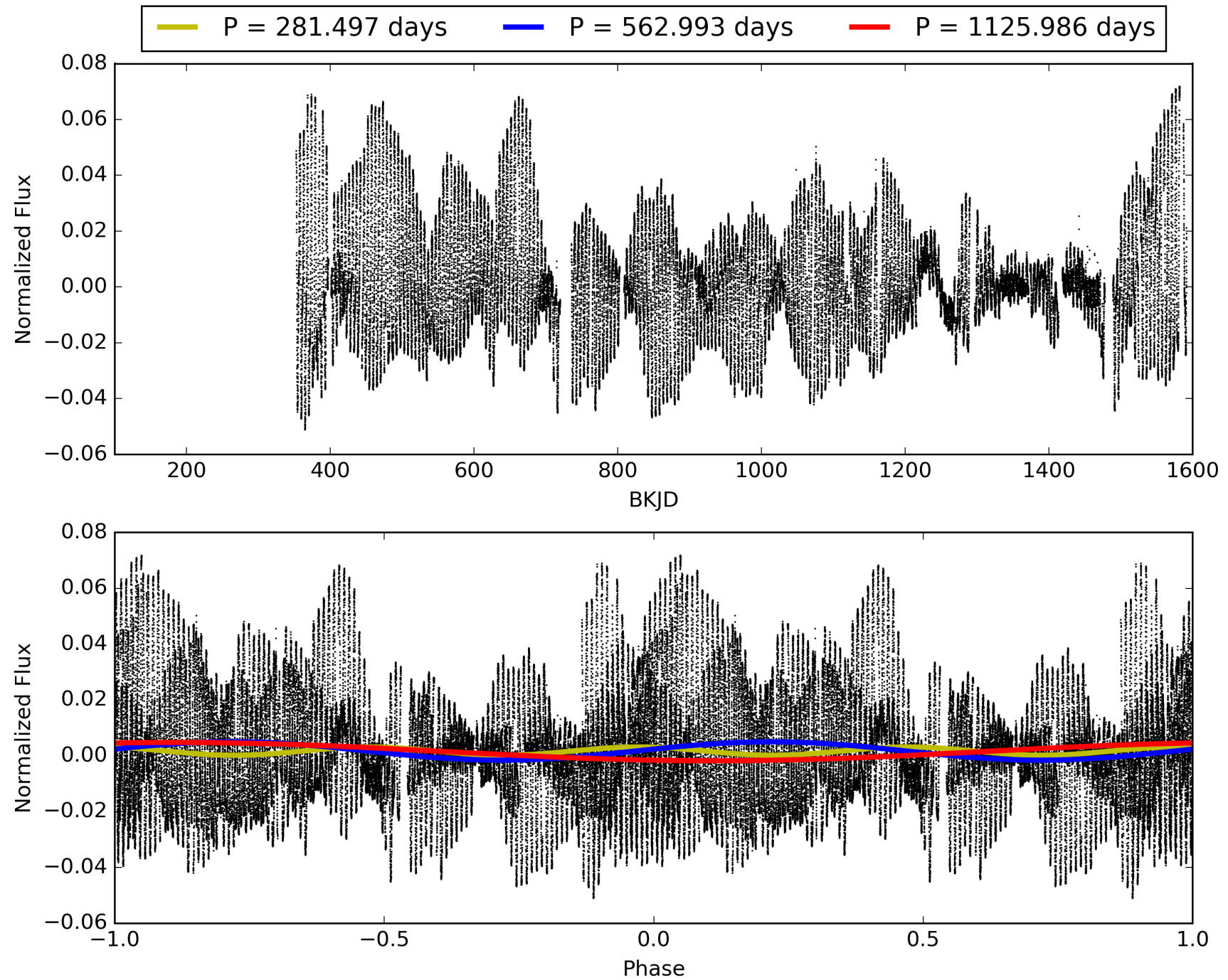
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [550.41σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 3.9%  
ModelChiSquareGof-sig: 56.8%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -0.5961  
Centroid-sig: N/A  
Centroid-so: 3.999 arcsec [1.07σ]  
OotOffset-rm: N/A  
KicOffset-rm: 0.368 arcsec [1.40σ]  
OotOffset-st: 0/0/0 [0]  
KicOffset-st: 1/0/2/0 [3]  
DiffImageQuality-fgm: 1.00 [3/3]  
DiffImageOverlap-fno: 0.00 [0/3]

# TCE 004551202-02, PDC Light Curves



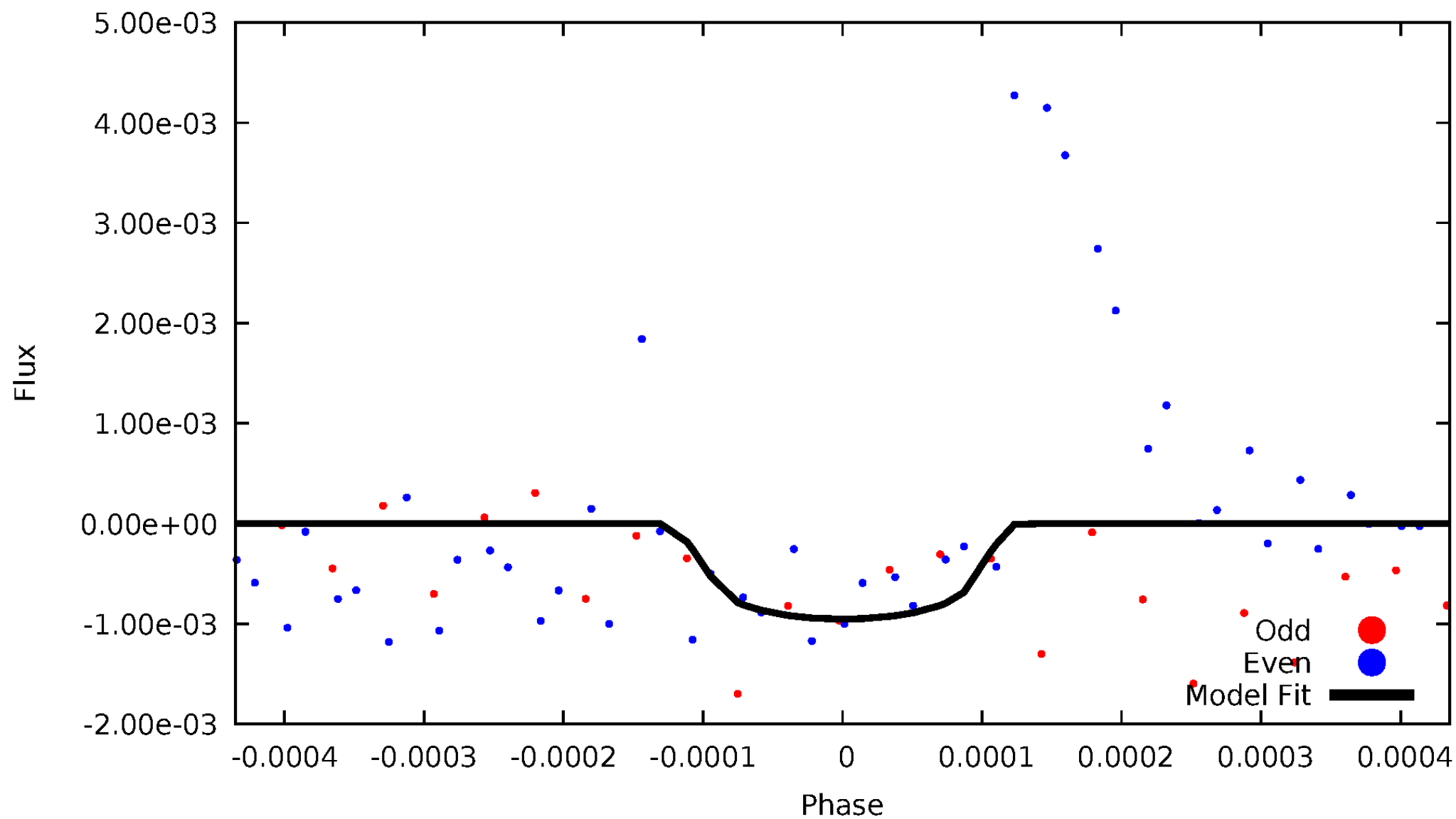
TCE 004551202-02





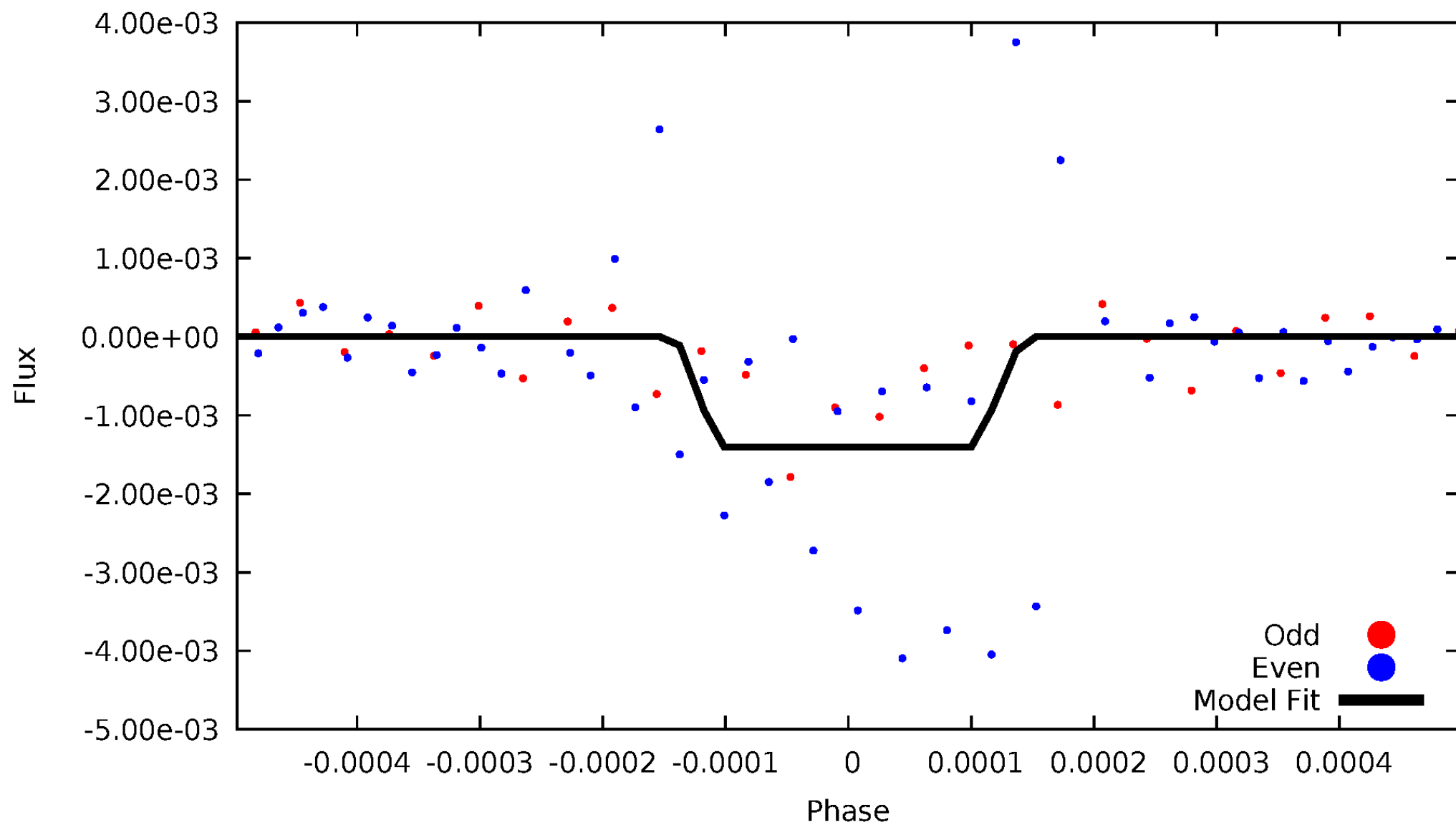
# DV Odd/Even

TCE 004551202-02



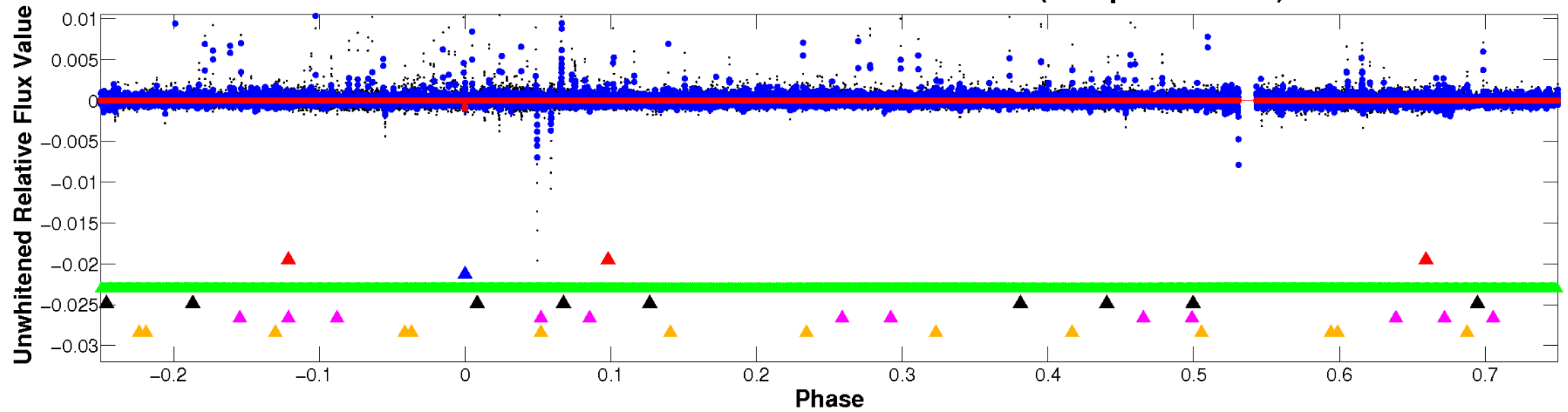
# ALT Odd/Even

TCE 004551202-02

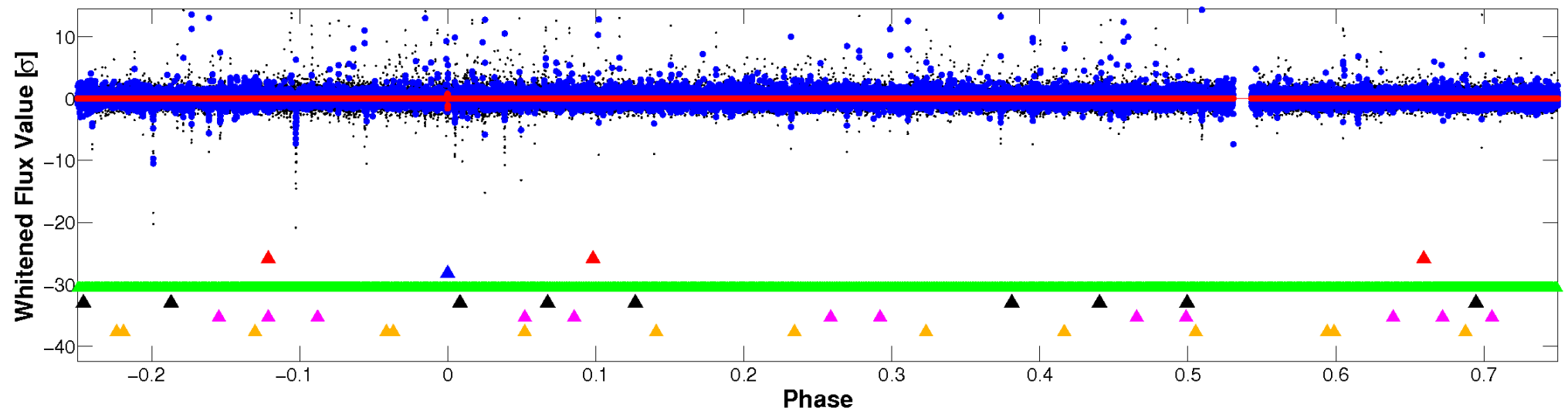


# Non-Whitened Vs. Whitened Light Curve

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

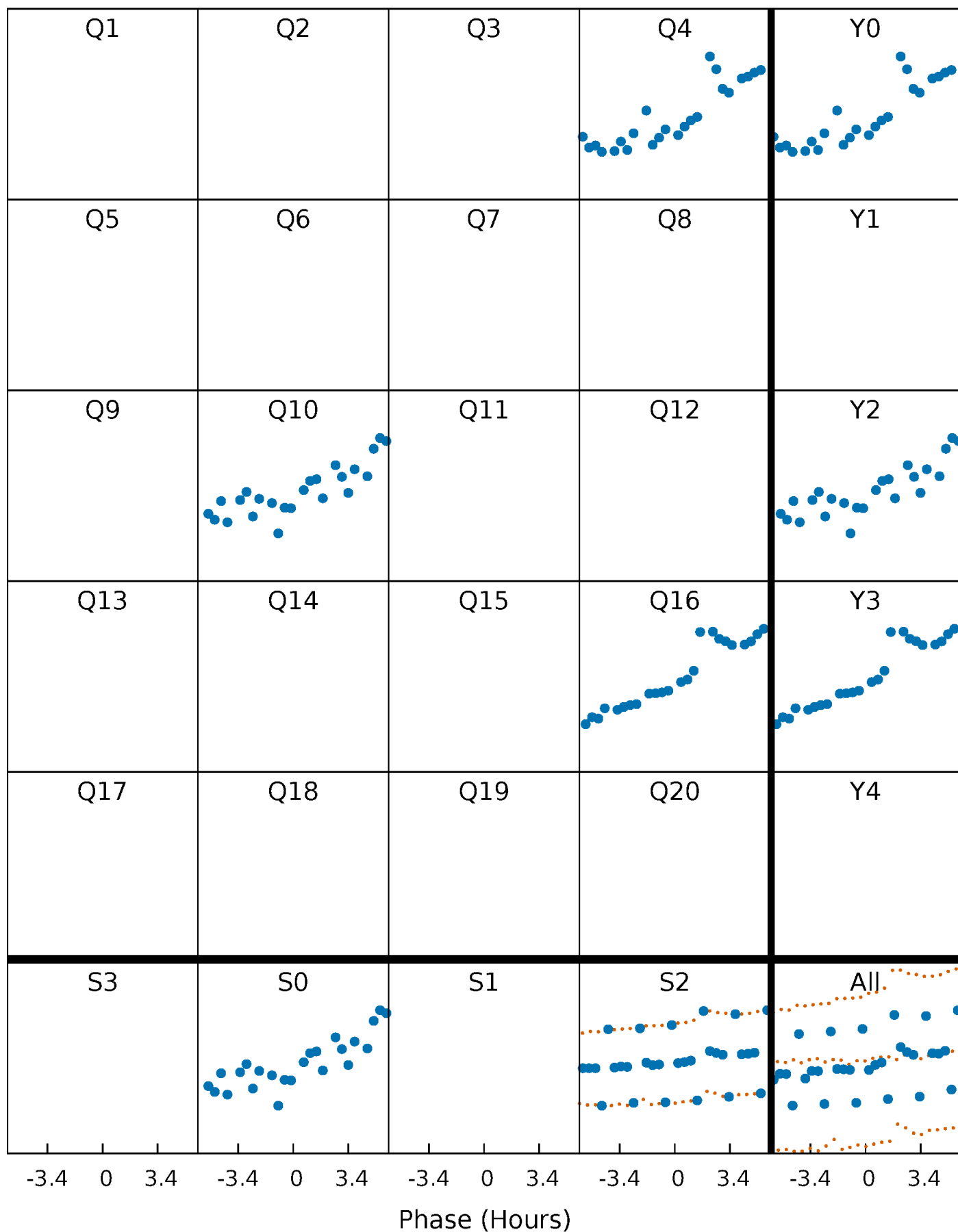


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



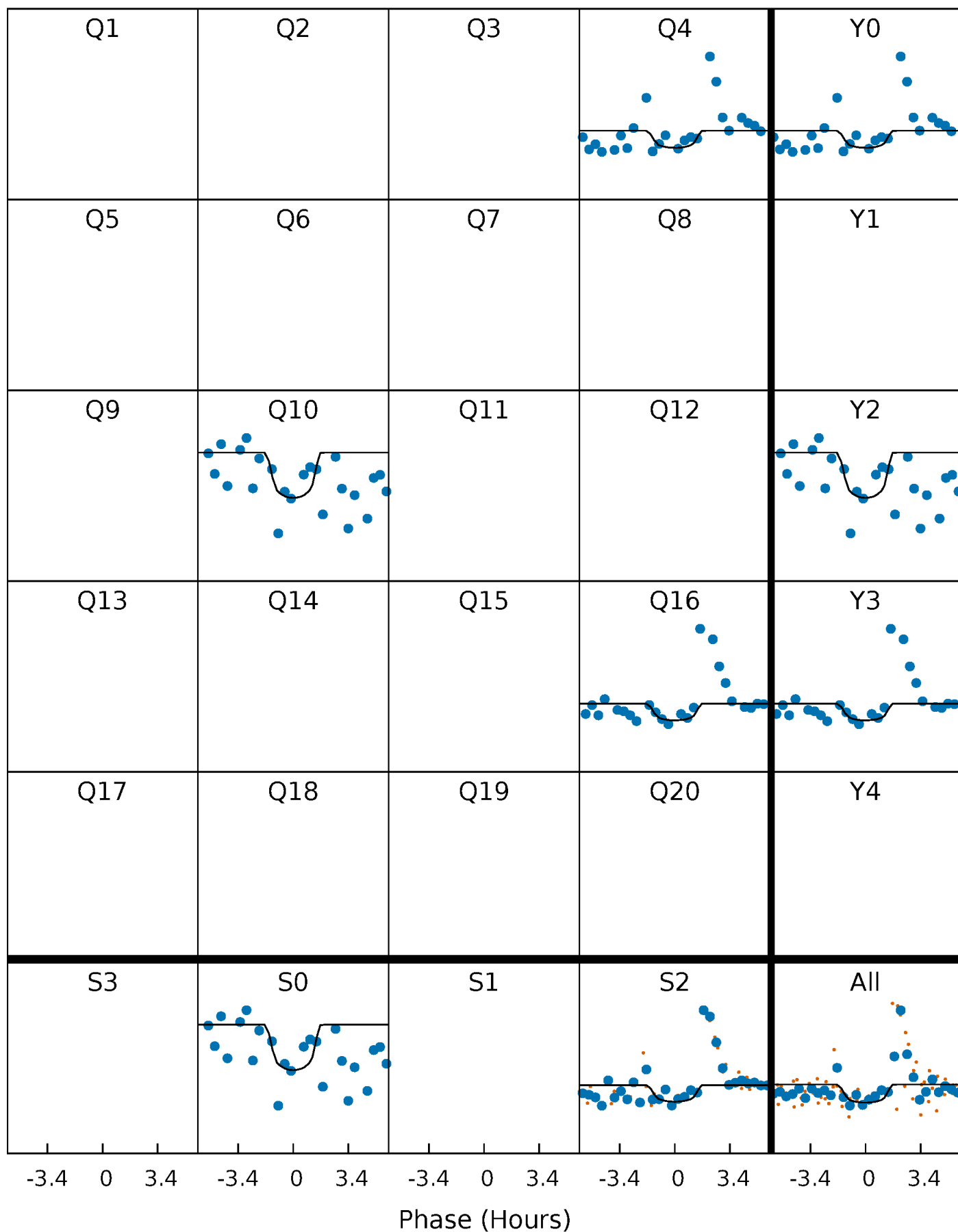
# PDC Quarter-Phased Transit Curves

TCE 004551202-02     $P=562.993241$  Days     $T_0=427.673344$  (BKJD)



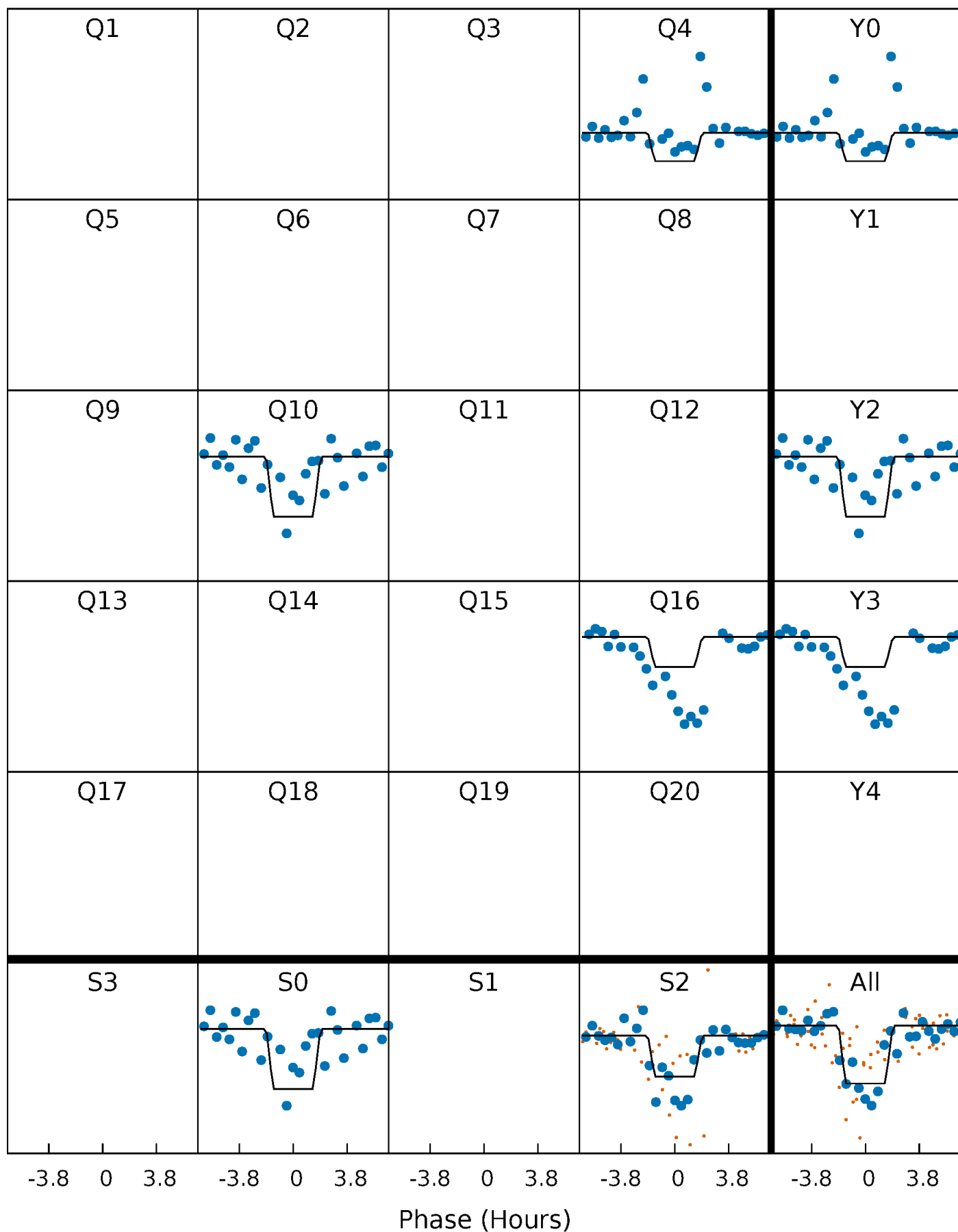
# DV Quarter-Phased Transit Curves

TCE 004551202-02 P=562.993241 Days  $T_0=427.673344$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

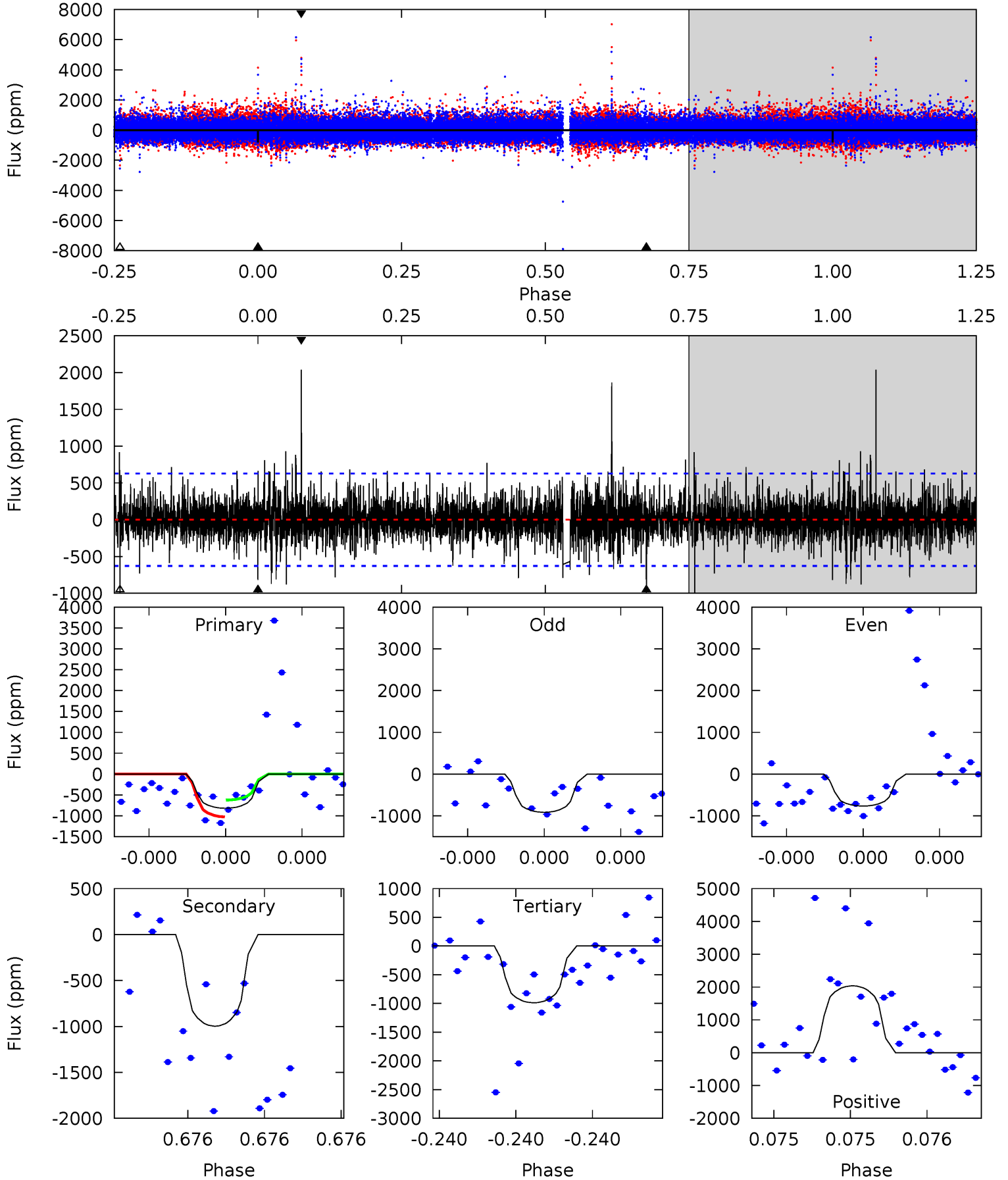
TCE 004551202-02 P=562.971823 Days  $T_0=427.679000$  (BKJD)



# DV Model-Shift Uniqueness Test

004551202-02, P = 562.993241 Days, E = 427.673344 Days

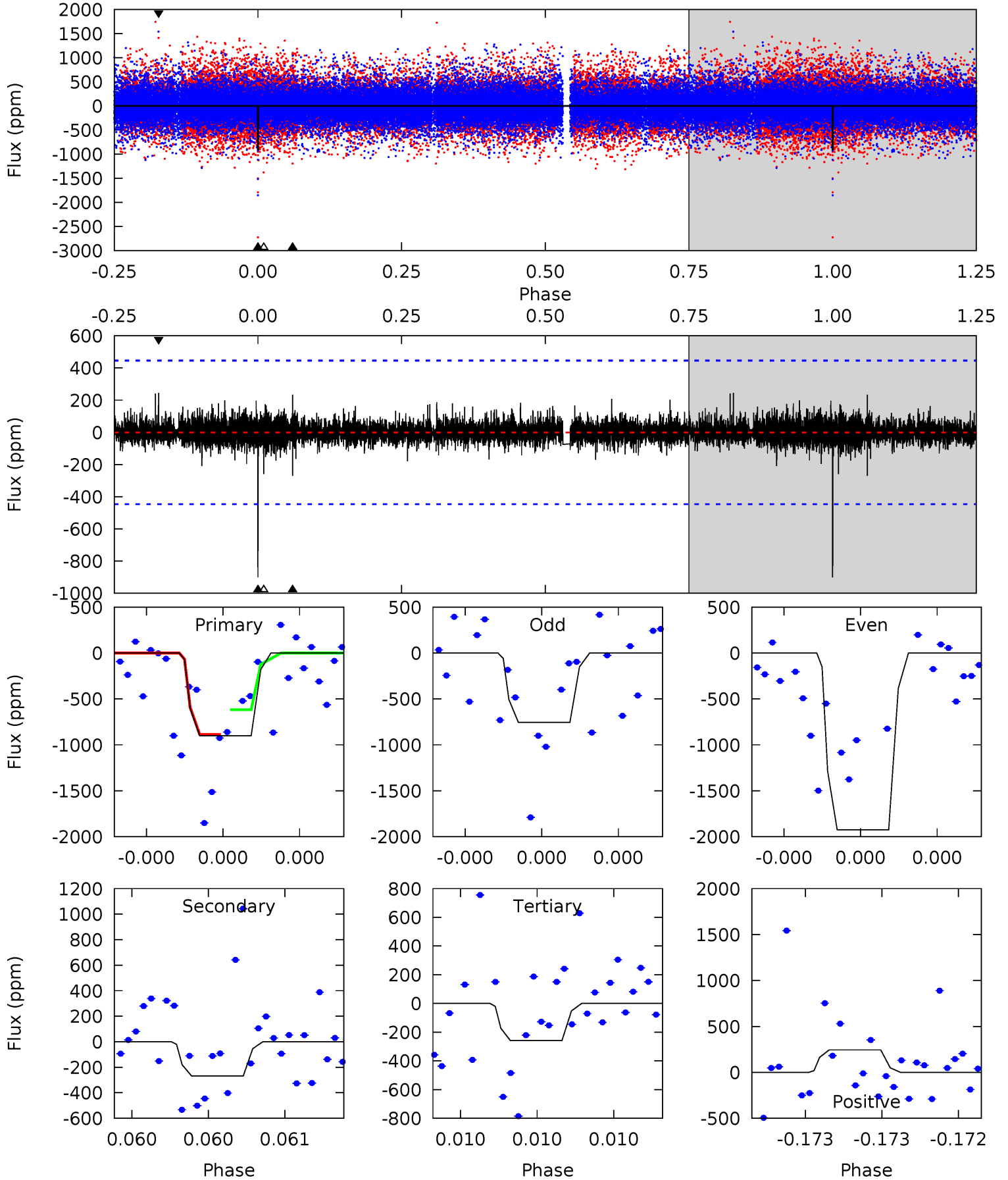
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.43	9.04	8.96	18.5	5.69	3.66	1.67	-1.53	-11.0	0.09	-9.43	0.56	0.98	0.67	1.84



# Alt Model-Shift Uniqueness Test

004551202-02, P = 562.971823 Days, E = 427.679000 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
11.4	3.42	3.29	3.11	5.68	3.64	0.51	8.16	8.34	0.13	0.31	8.15	2.00	0.21	1.67





### Stellar Parameters For KIC 004551202

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5249^{+183}_{-183}$	$4.533^{+0.096}_{-0.072}$	$-0.420^{+0.350}_{-0.300}$	$0.754^{+0.093}_{-0.093}$	$0.708^{+0.105}_{-0.045}$	$2.326^{+0.902}_{-0.546}$
	+3%/-3%	+2%/-2%	+83%/-71%	+12%/-12%	+15%/-6%	+39%/-23%
Source	KIC0	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 004551202-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-998 \pm 110$	$9.19^{+9.58}_{-6.63}$	$256^{+12}_{-12}$	$3328^{+1883}_{-604}$	$9439^{+116612}_{-7134}$
Alt.	$-269 \pm 79$	$9.34^{+9.35}_{-6.55}$	$256^{+12}_{-13}$	$2731^{+1215}_{-437}$	$2396^{+24512}_{-1860}$

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

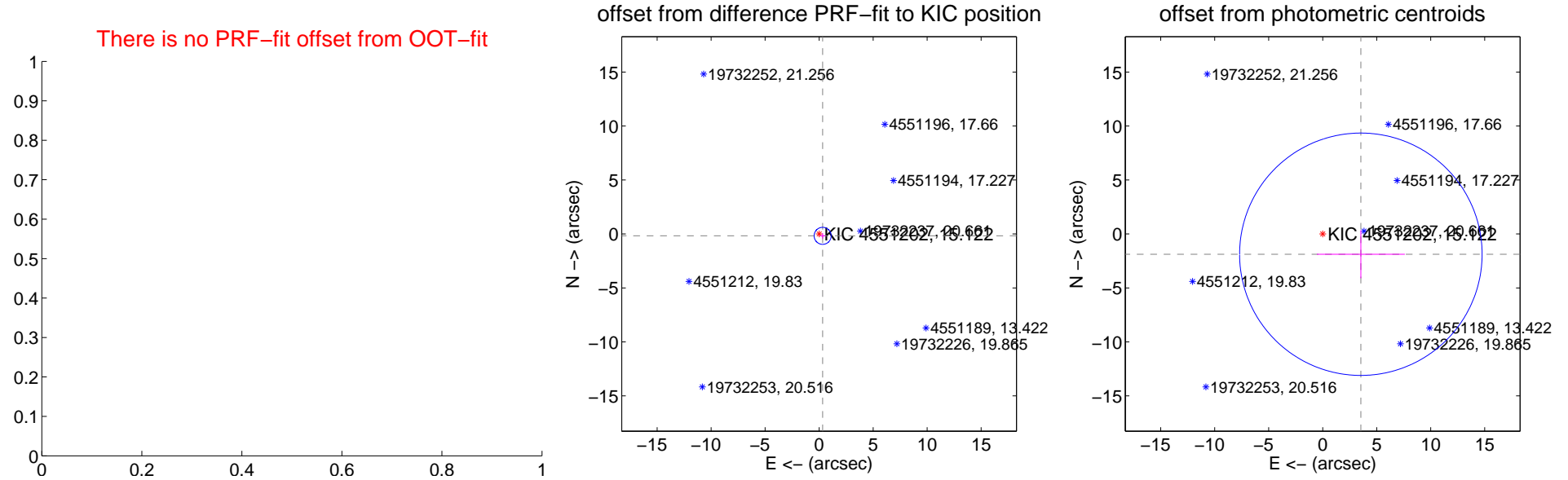
## DV Centroid Data

Supplemental centroid analysis for 004551202-02. Kepler magnitude: 15.12. Transit SNR 5.87

There are 3 quarters with good PRF difference image offsets

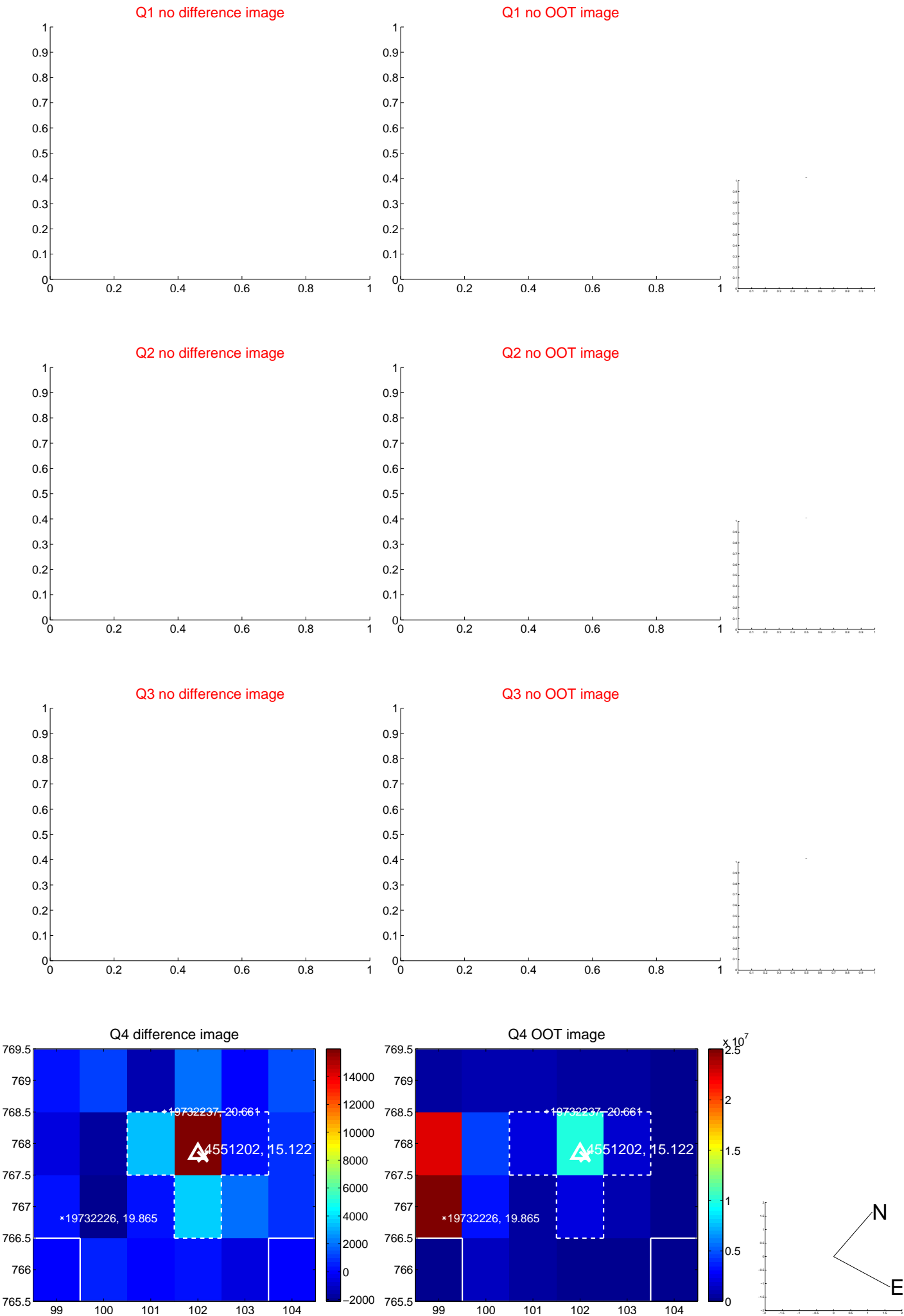
The direct PRF centroid is offset from the target star catalog position by about NaN arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	—	—	—	—
PRF-fit source offset from KIC position	$0.368 \pm 0.263$	1.40	$-0.325 \pm 0.265$	$-0.173 \pm 0.256$
photometric centroid source offset	$4.00 \pm 3.74$	1.07	$-3.53 \pm 4.07$	$-1.88 \pm 2.22$



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.

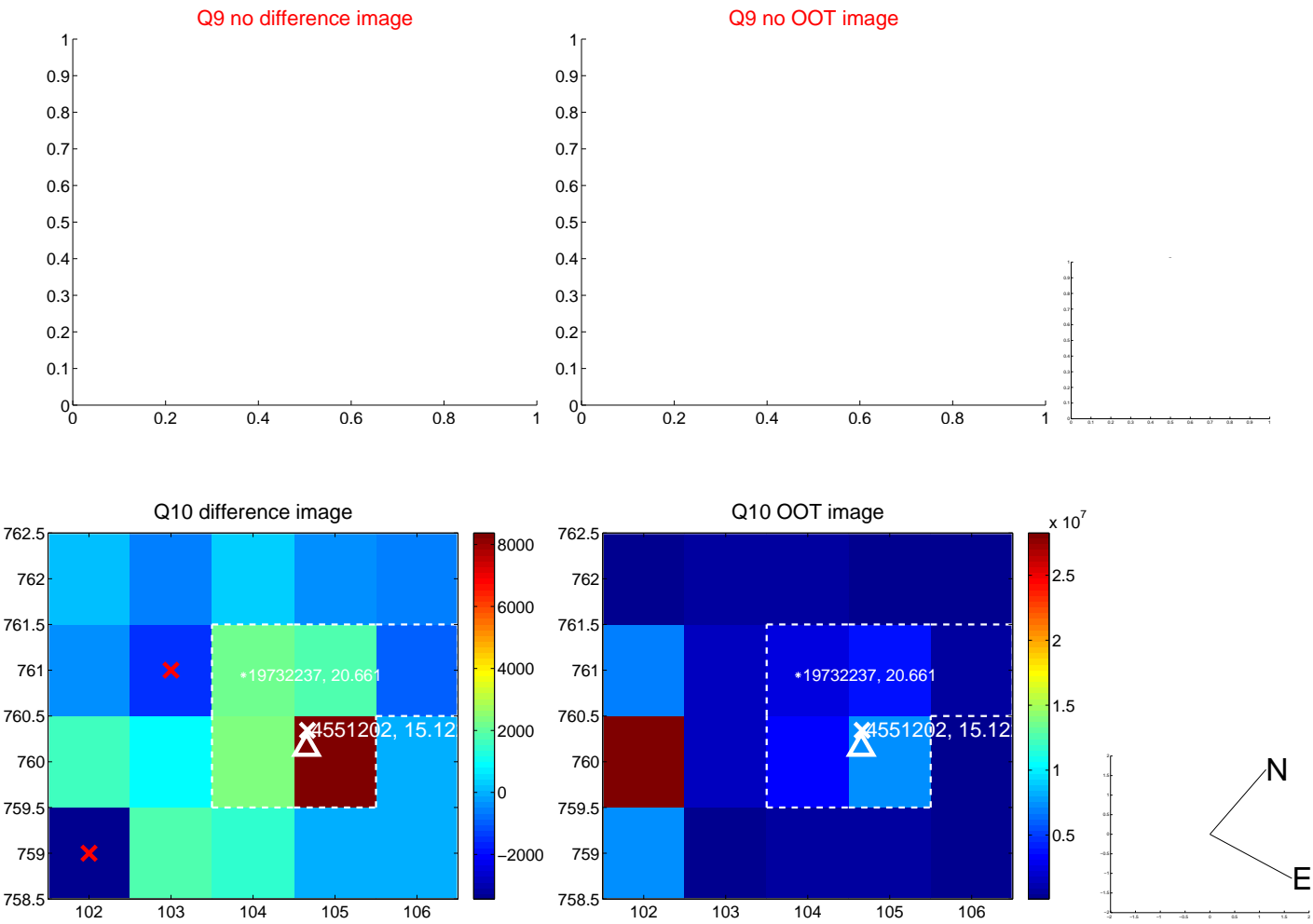
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



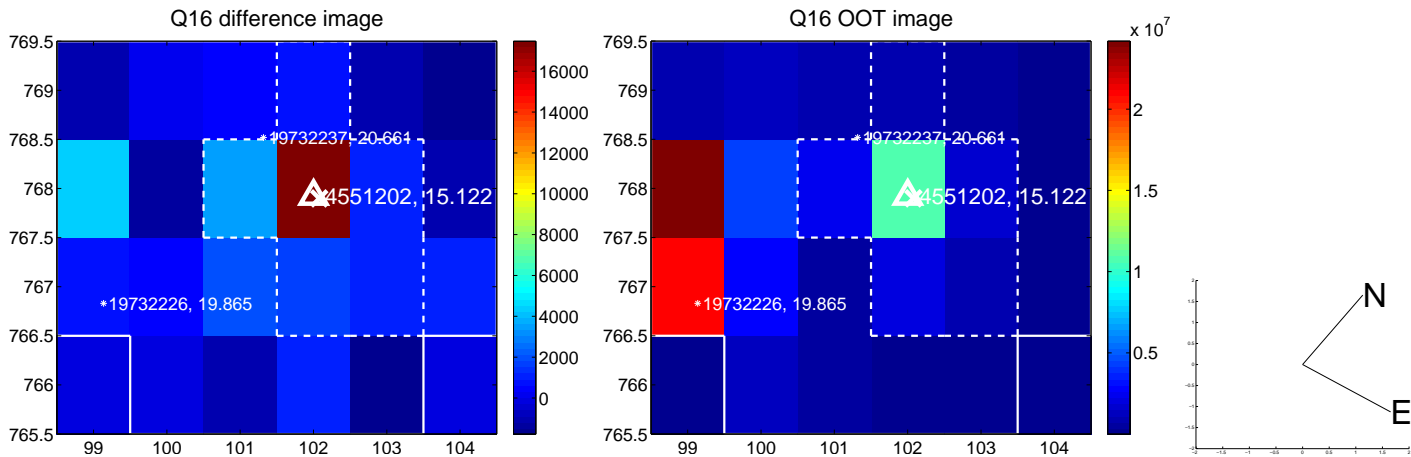
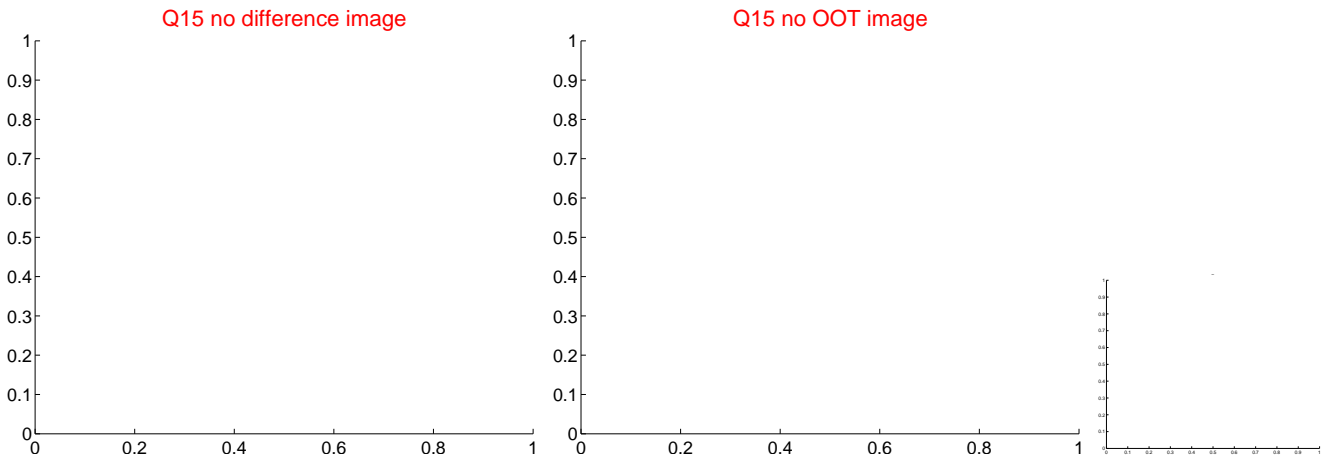
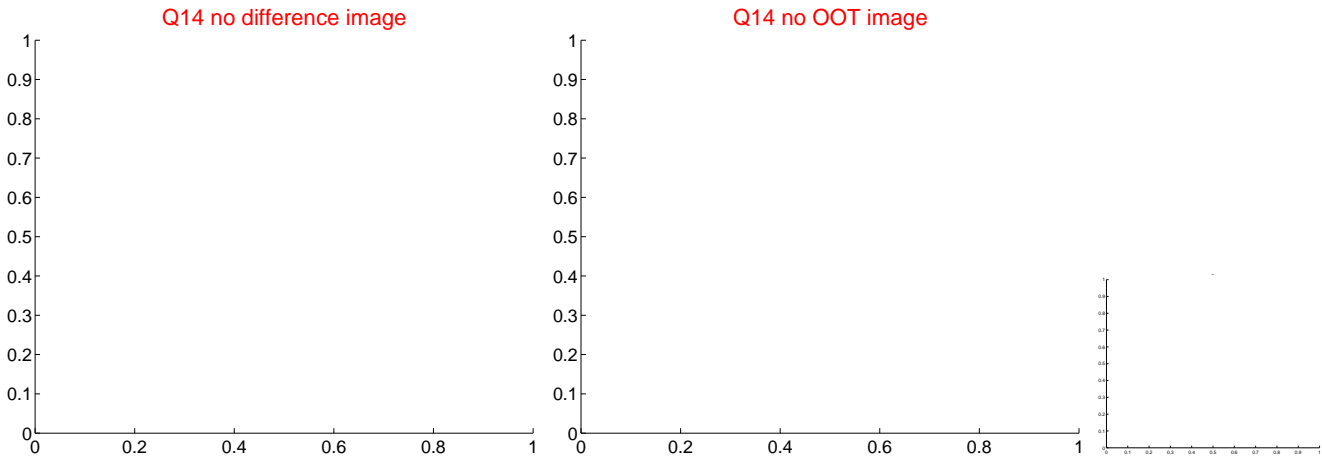
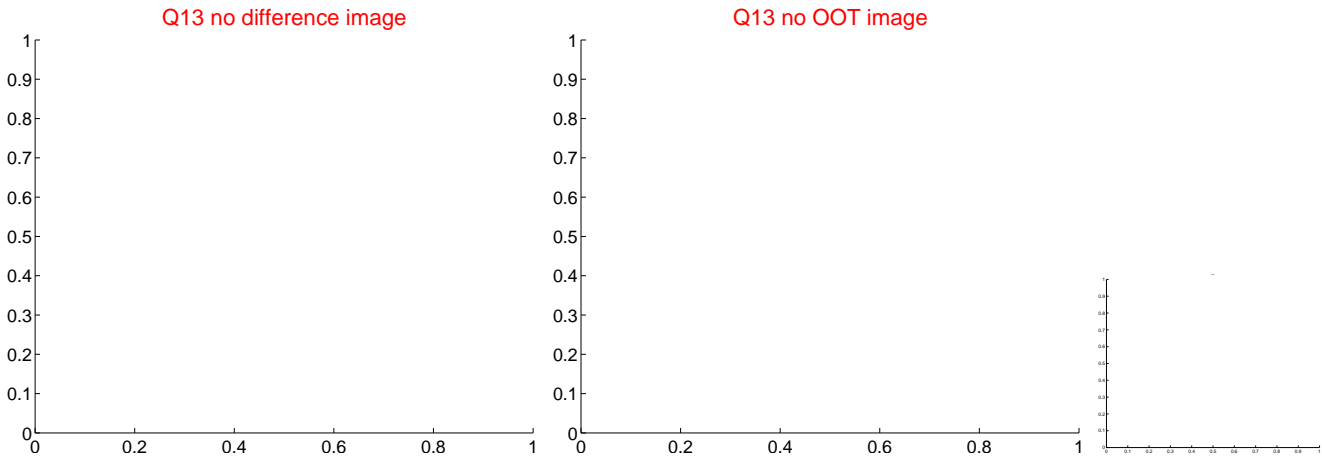
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



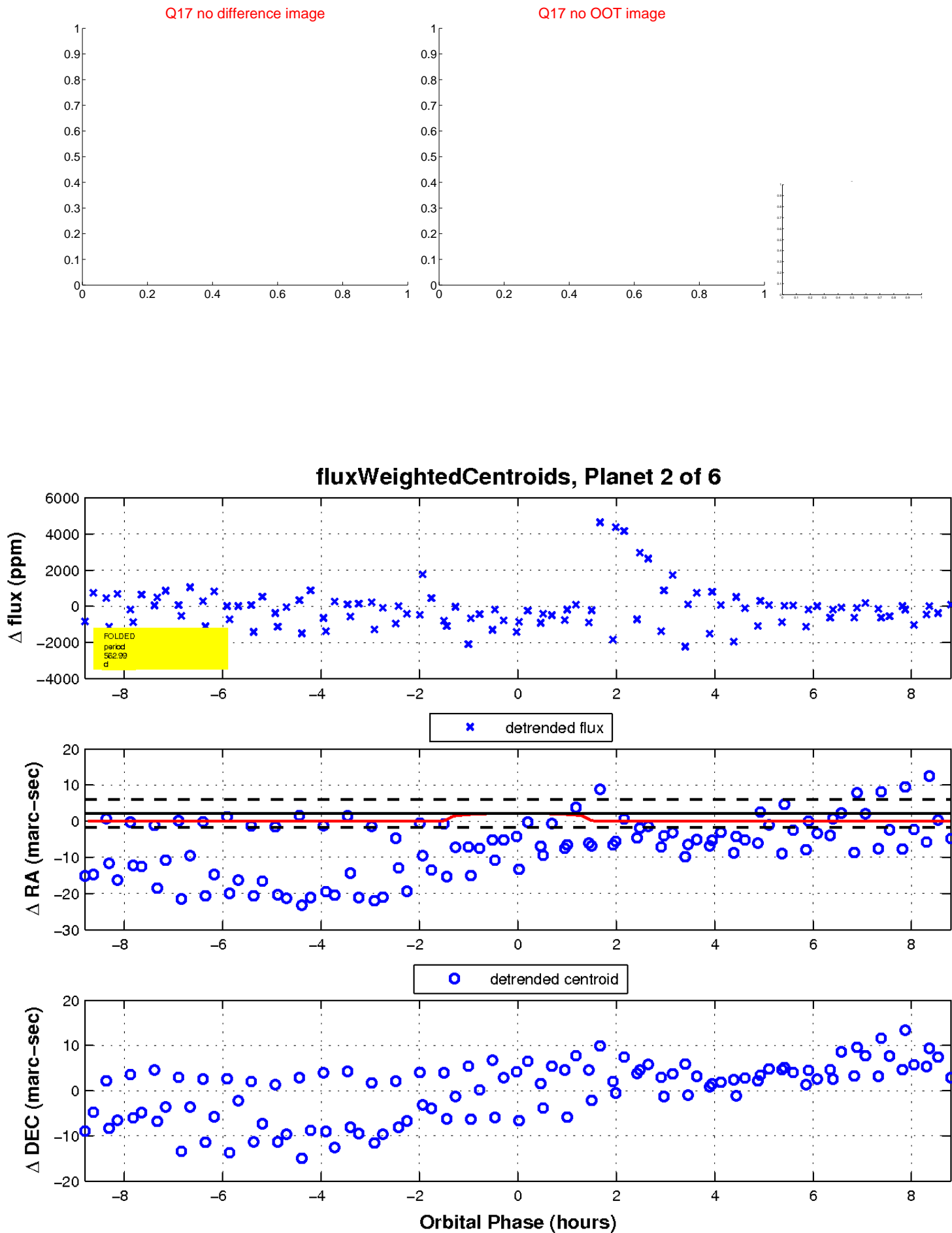
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

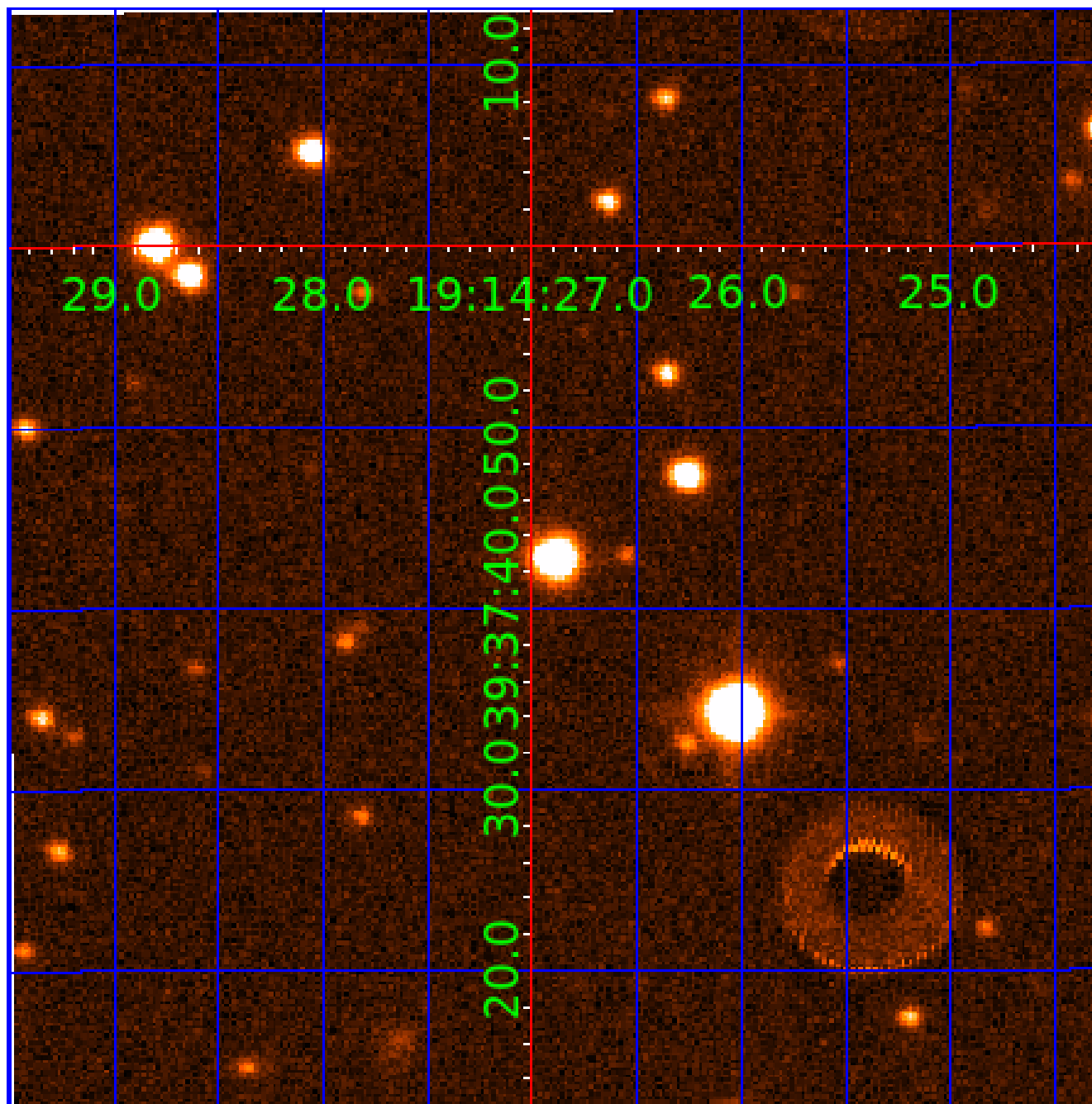


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 004551202

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004551202-01	OBS	No	439.482056	482.939144	1370.1	4.513	12.9	7.2	0.75	5249	2.98	0.38
004551202-02	OBS	No	562.993241	427.673344	953.2	2.938	10.4	5.9	0.75	5249	2.33	0.27
004551202-03	OBS	No	0.739386	131.989600	65.5	3.699	7.3	8.2	0.75	5249	0.60	1900.87
004551202-04	OBS	No	176.551716	145.921457	1355.1	3.753	14.0	5.3	0.75	5249	3.22	1.28
004551202-05	OBS	No	116.355427	224.286918	1724.3	8.038	10.6	6.2	0.75	5249	3.43	2.24
004551202-06	OBS	No	102.598270	199.185496	1551.4	3.420	11.7	6.7	0.75	5249	3.19	2.65

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004551202-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
004551202-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004551202-03	OBS	FP	0.00	1	0	0	0	LPP_DV—CENT_FEW_MEAS
004551202-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_POS_DV—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004551202-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004551202-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_MEAS

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

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

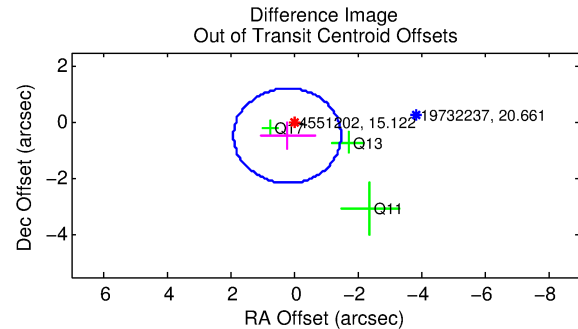
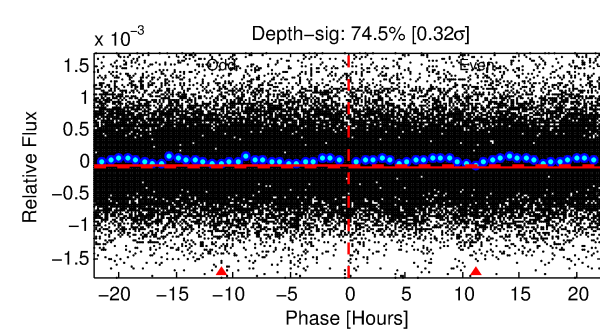
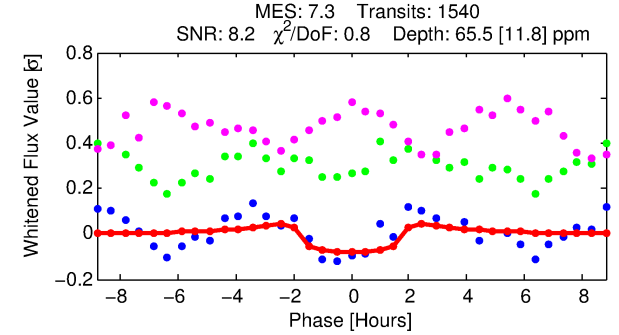
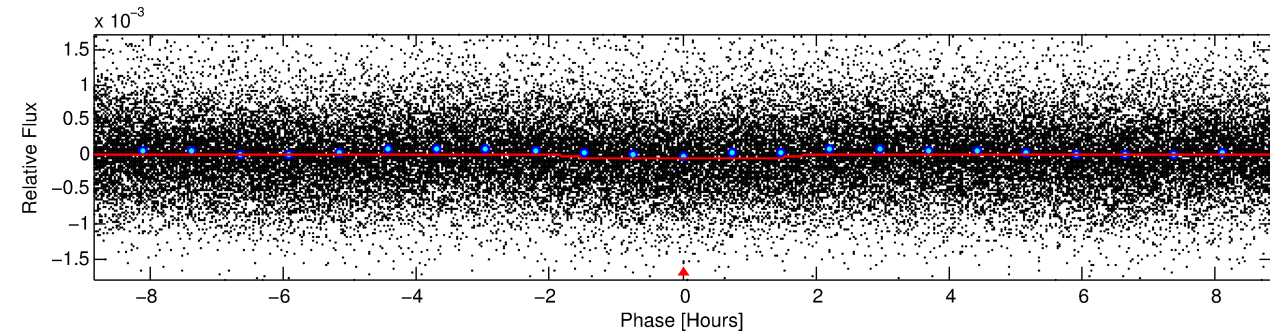
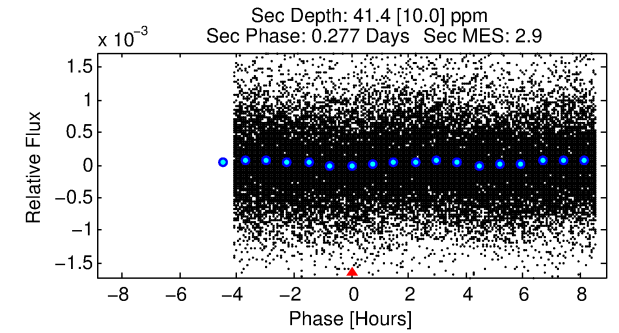
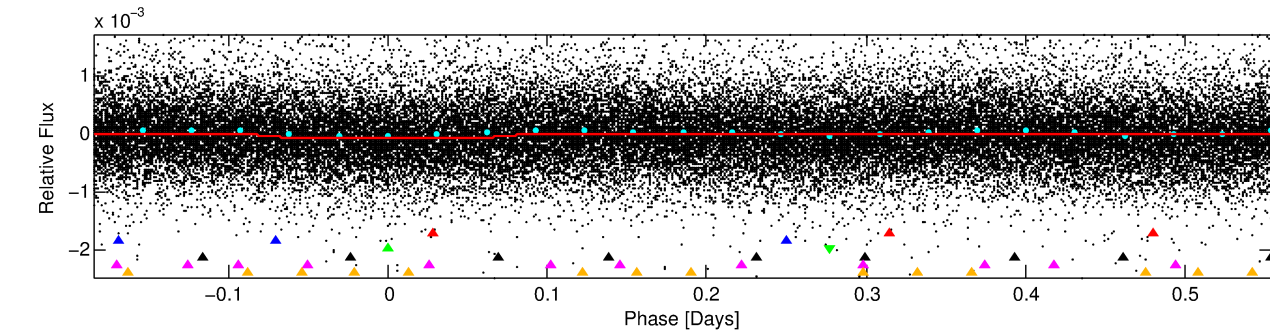
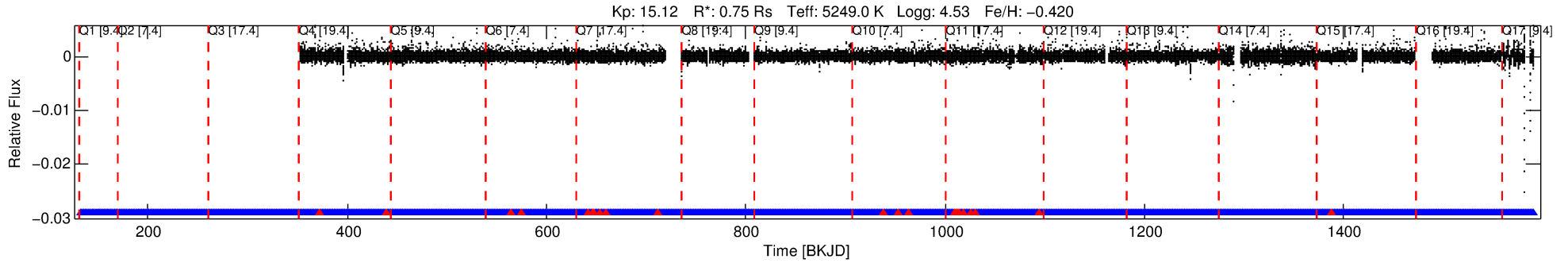
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 004551202-03

No Significant Match Found

# DV One-Page Summary

KIC: 4551202 Candidate: 3 of 6 Period: 0.739 d



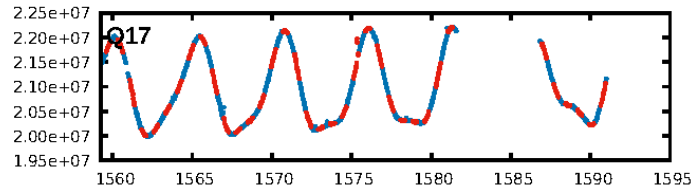
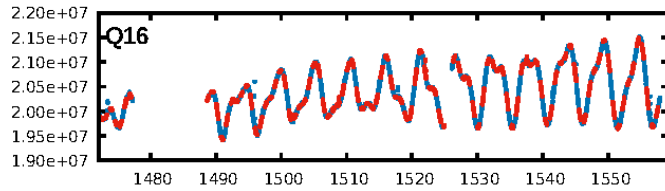
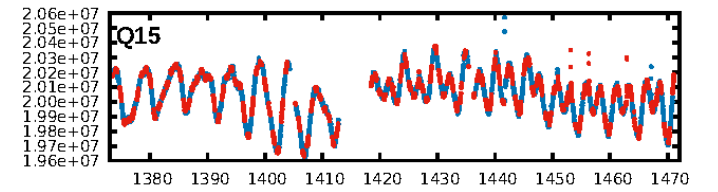
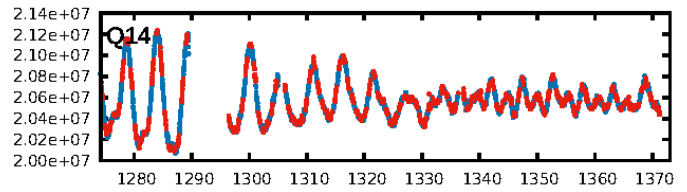
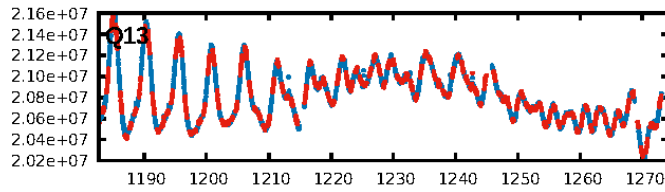
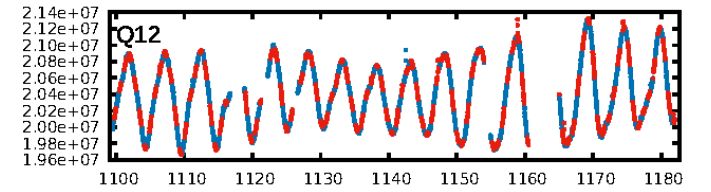
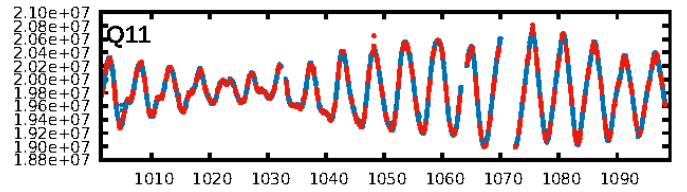
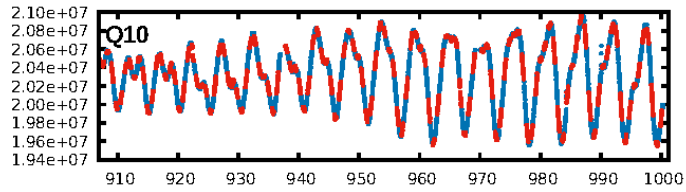
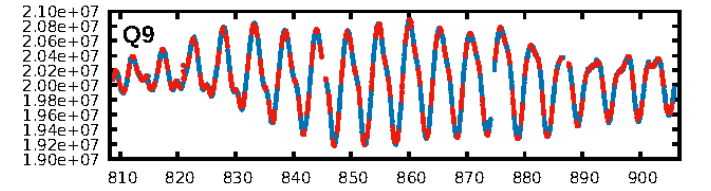
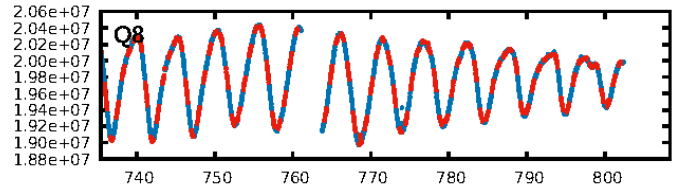
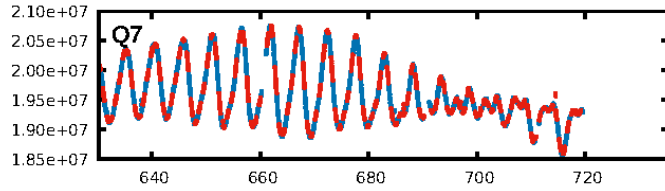
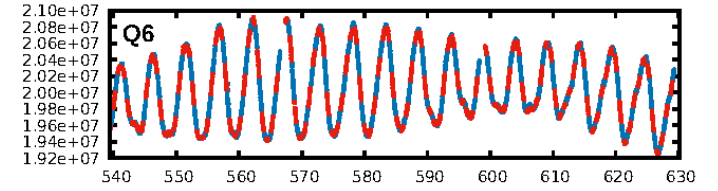
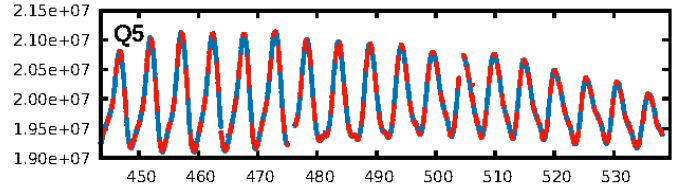
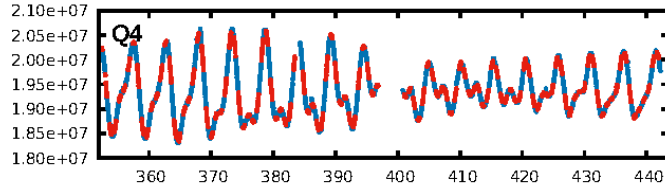
## DV Fit Results:

Period = 0.73939 [0.00001] d  
Epoch = 131.9896 [0.0035] BKJD  
Rp/R\* = 0.0073 [0.0087]  
a/R\* = 1.63 [4.72]  
b = 0.24 [18.99]  
Seff = 1900.87 [416.14]  
Teff = 1684 [92] K  
Rp = 0.60 [0.72] Re  
a = 0.0143 [0.0016] AU  
Ag = 12.77 [30.39] [0.39σ]  
Teffp = 4921 [2926] K [1.11σ]

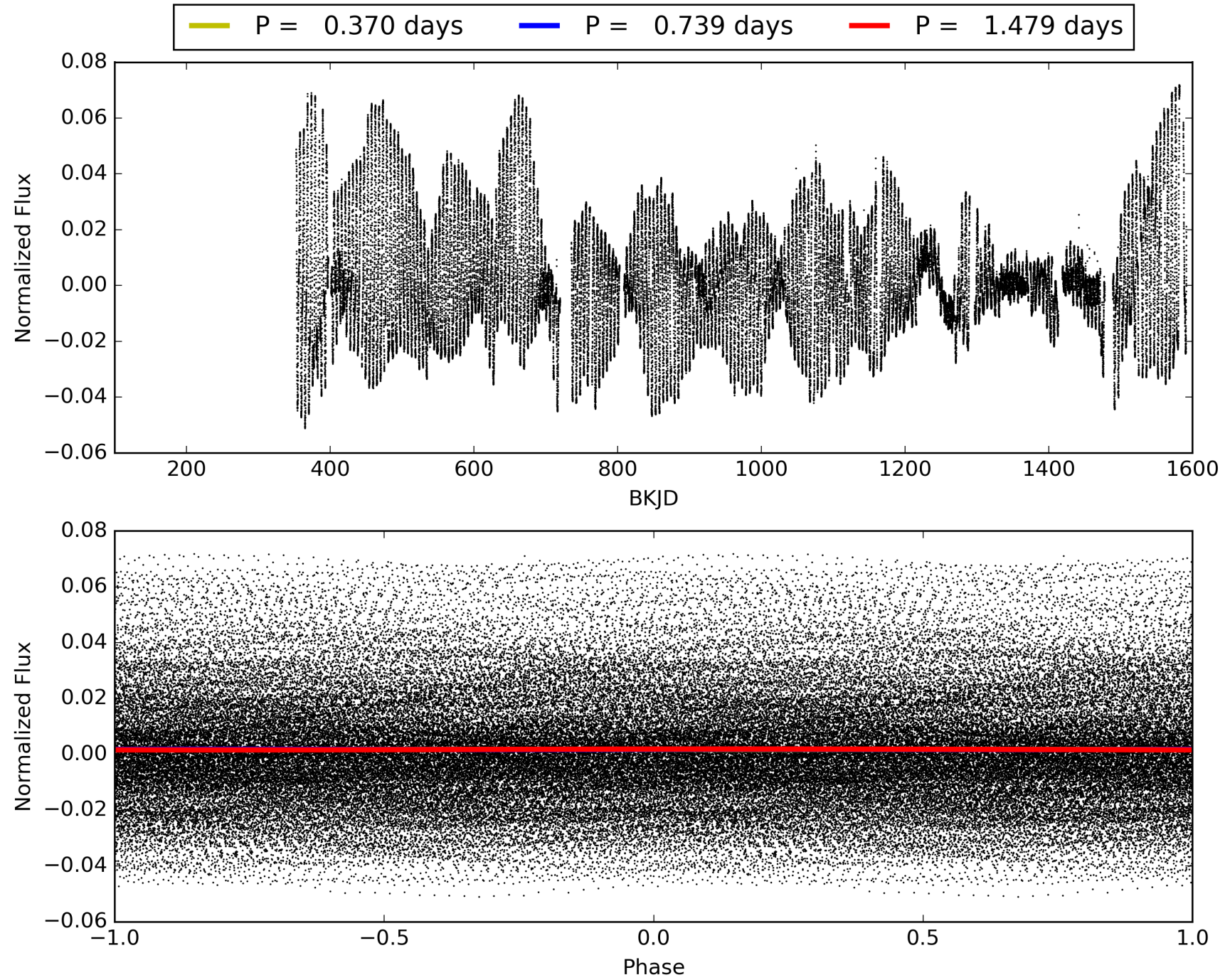
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [485.29σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 0.99 [1482/1504]  
GhostDiagnostic-chr: 3.781  
Centroid-sig: N/A  
Centroid-so: 3.806 arcsec [2.27σ]  
OotOffset-rm: 0.514 arcsec [0.91σ]  
KicOffset-rm: 0.281 arcsec [1.19σ]  
OotOffset-st: 0/1/0/2 [3]  
KicOffset-st: 2/1/3/3 [9]  
DiffImageQuality-fgm: 0.67 [6/9]  
DiffImageOverlap-fno: 1.00 [14/14]

# TCE 004551202-03, PDC Light Curves



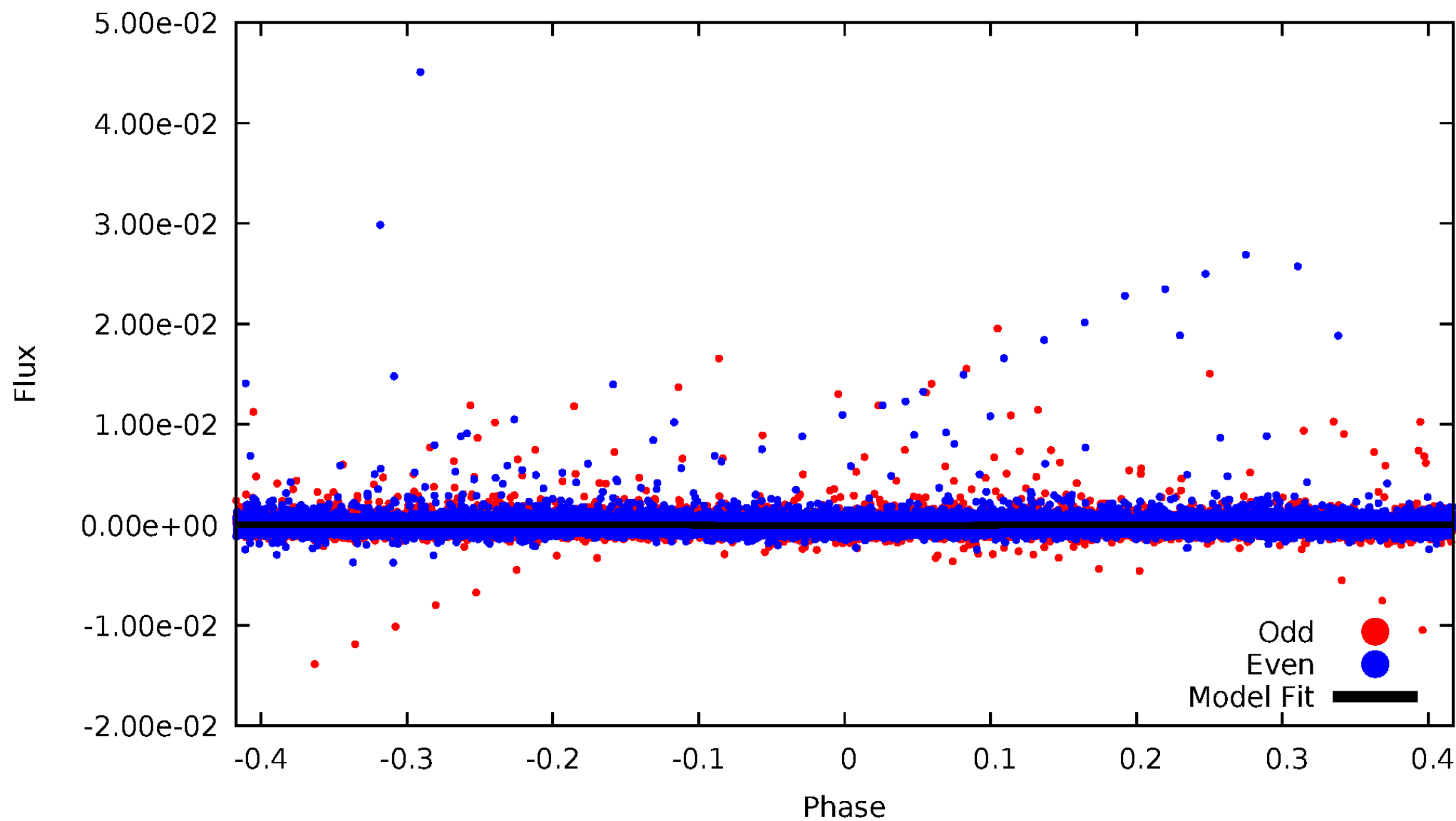
# TCE 004551202-03





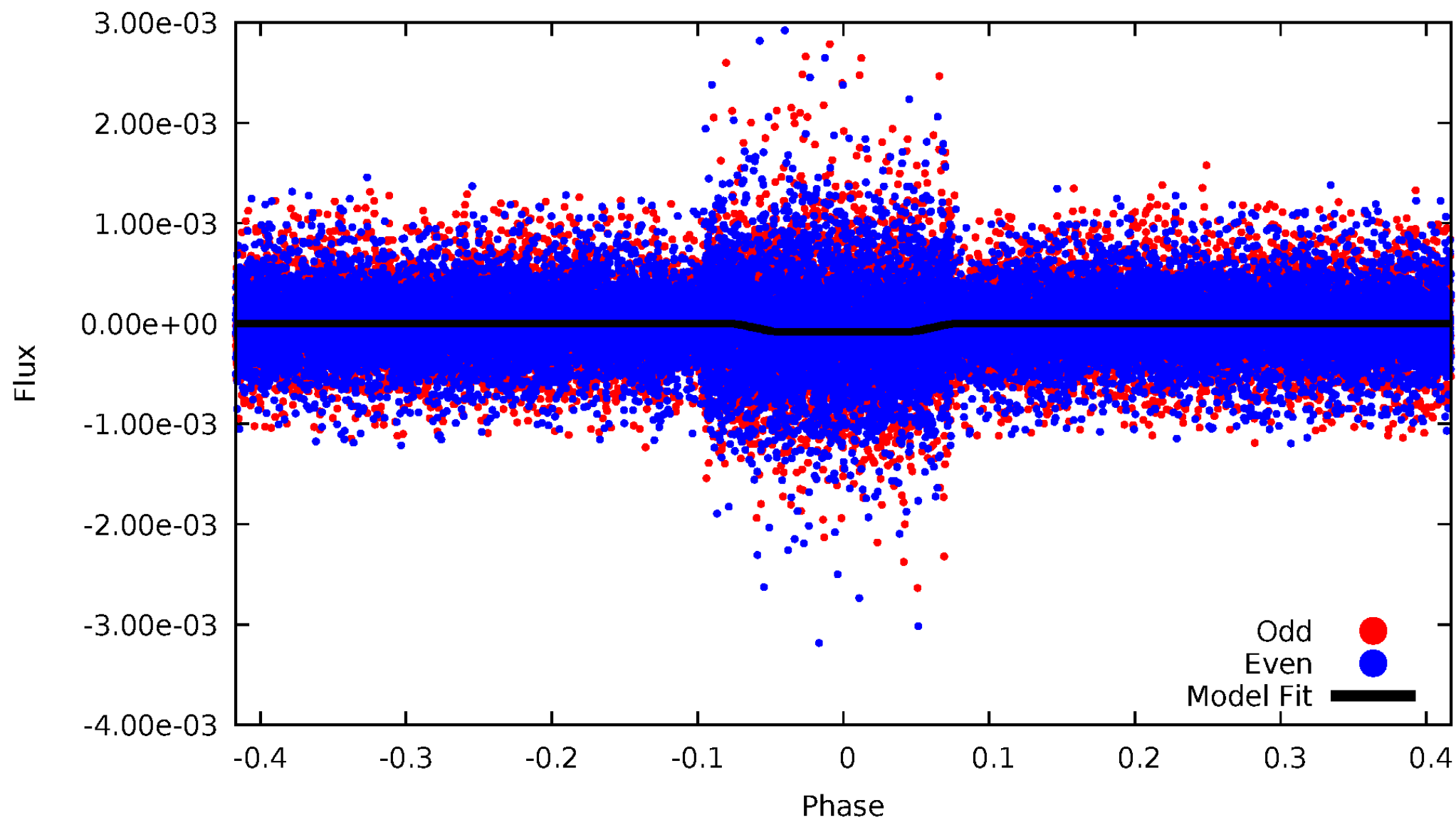
# DV Odd/Even

TCE 004551202-03



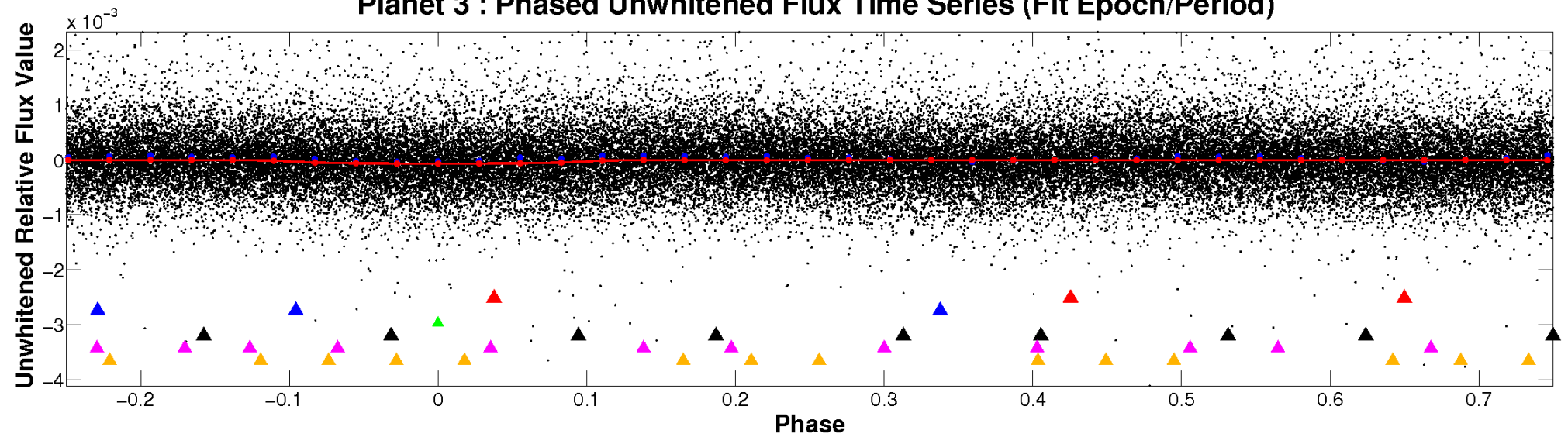
# ALT Odd/Even

TCE 004551202-03

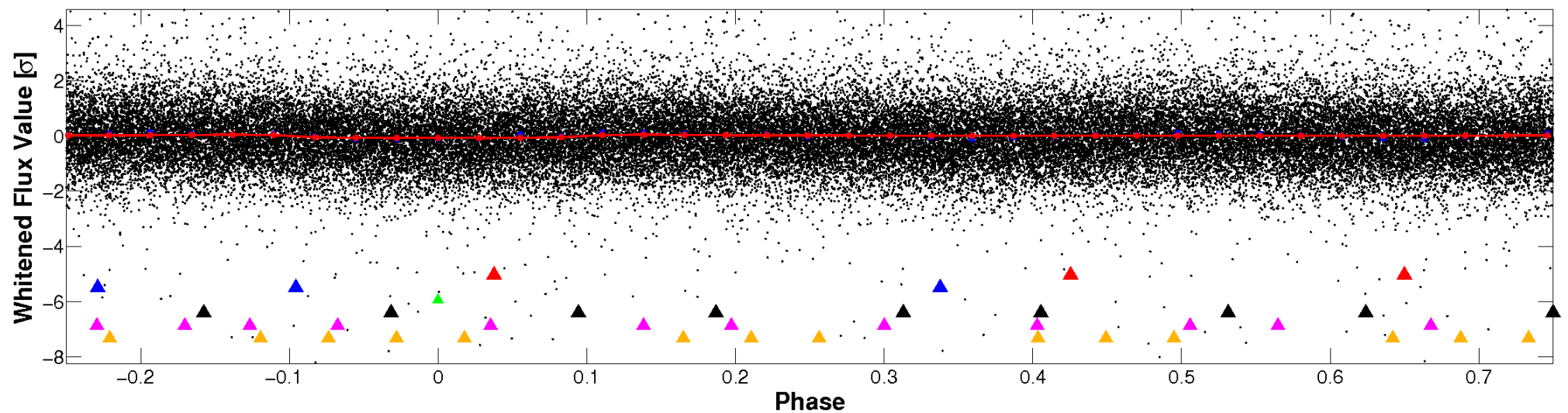


# Non-Whitened Vs. Whitened Light Curve

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

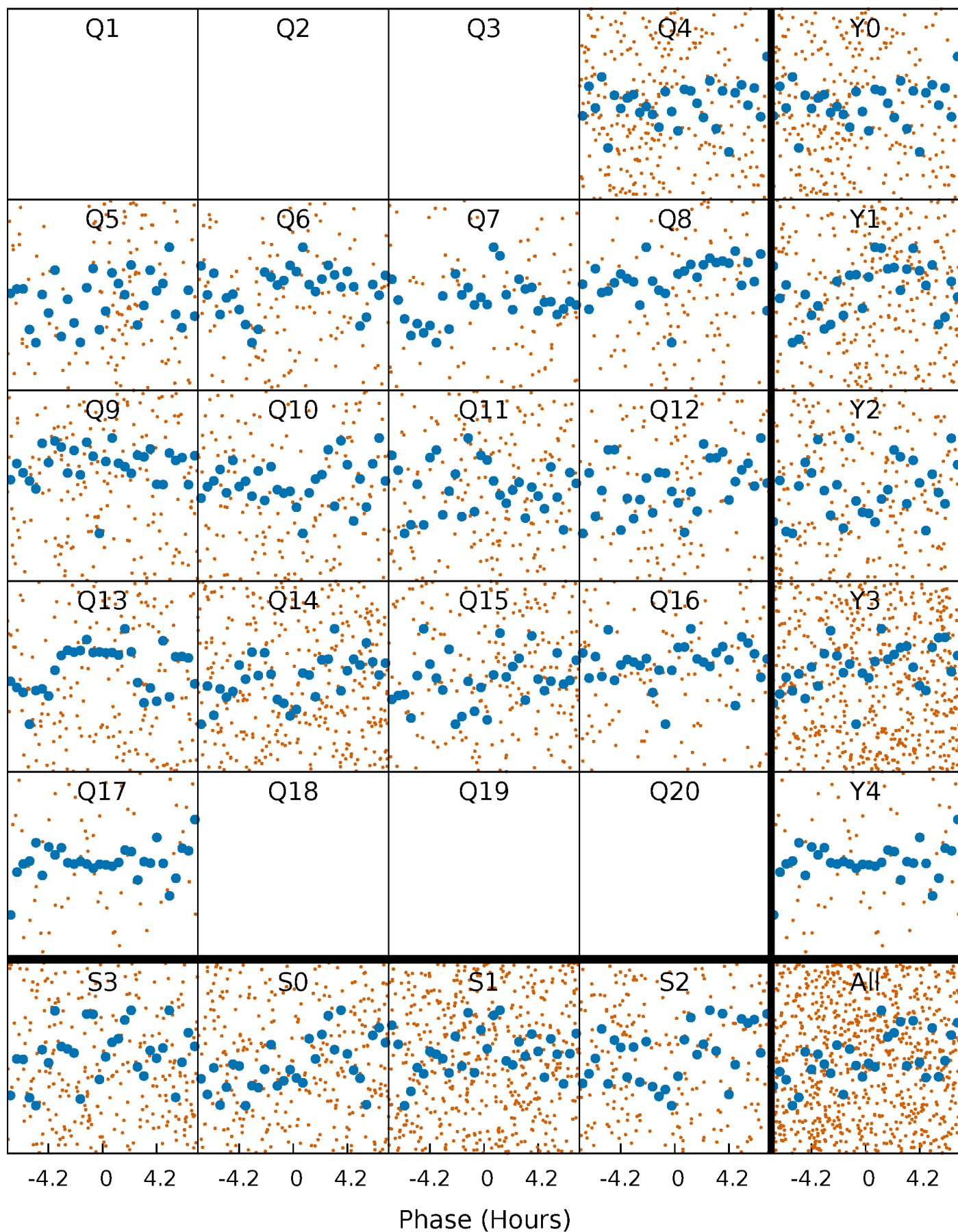


## Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

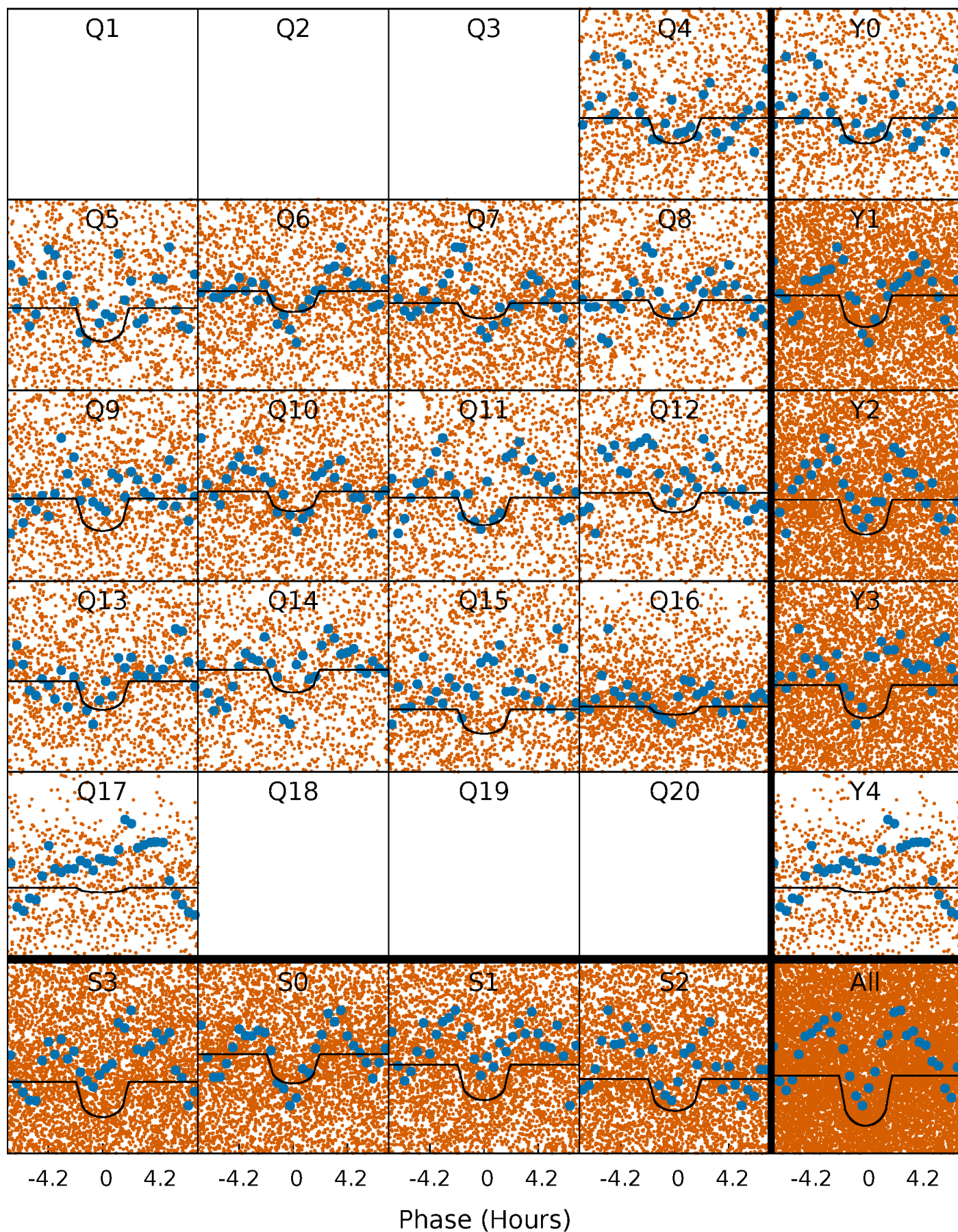
TCE 004551202-03 P= 0.739386 Days  $T_0=131.989600$  (BKJD)





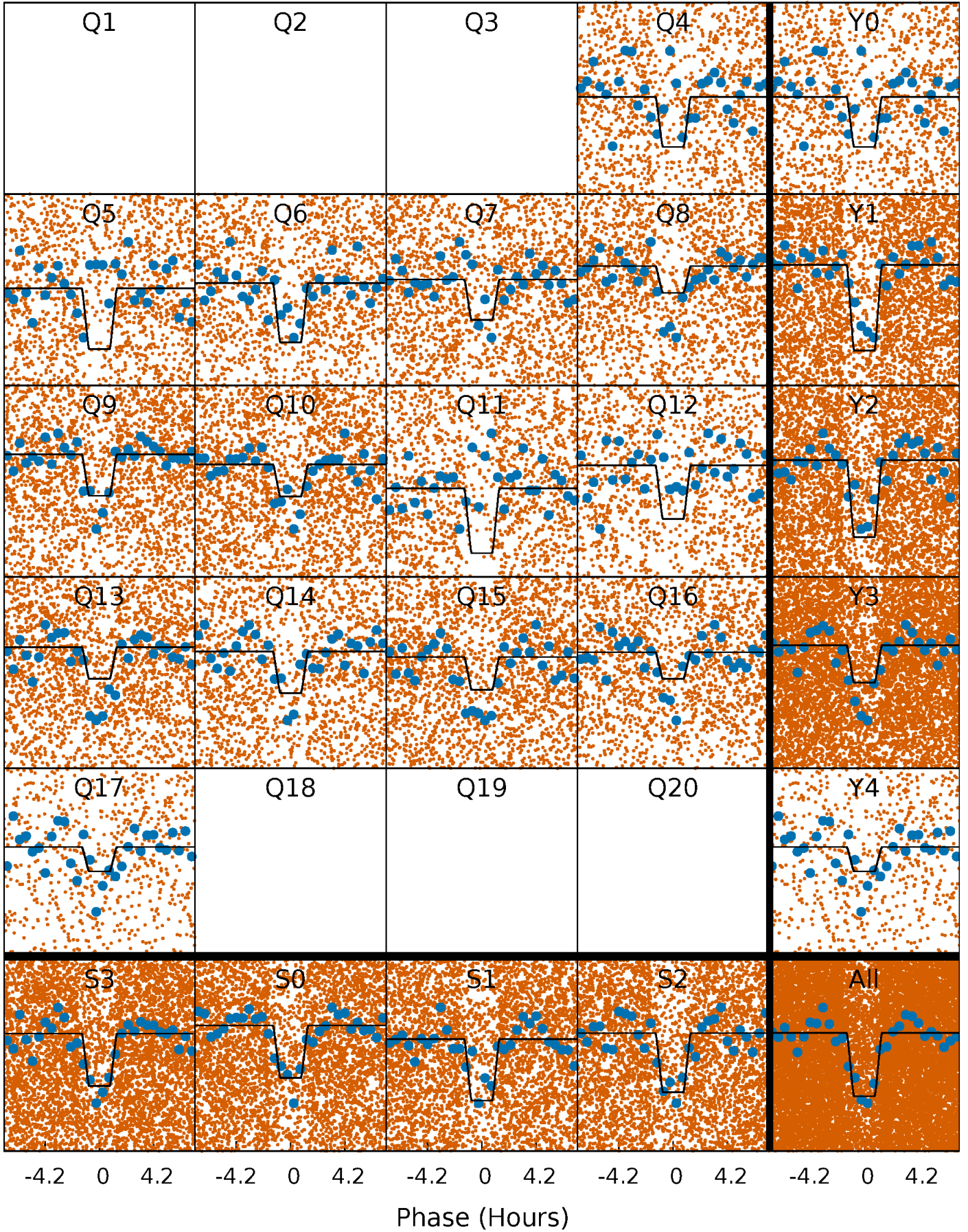
# DV Quarter-Phased Transit Curves

TCE 004551202-03     $P = 0.739386$  Days     $T_0 = 131.989600$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 004551202-03 P= 0.739373 Days  $T_0=131.990389$  (BKJD)

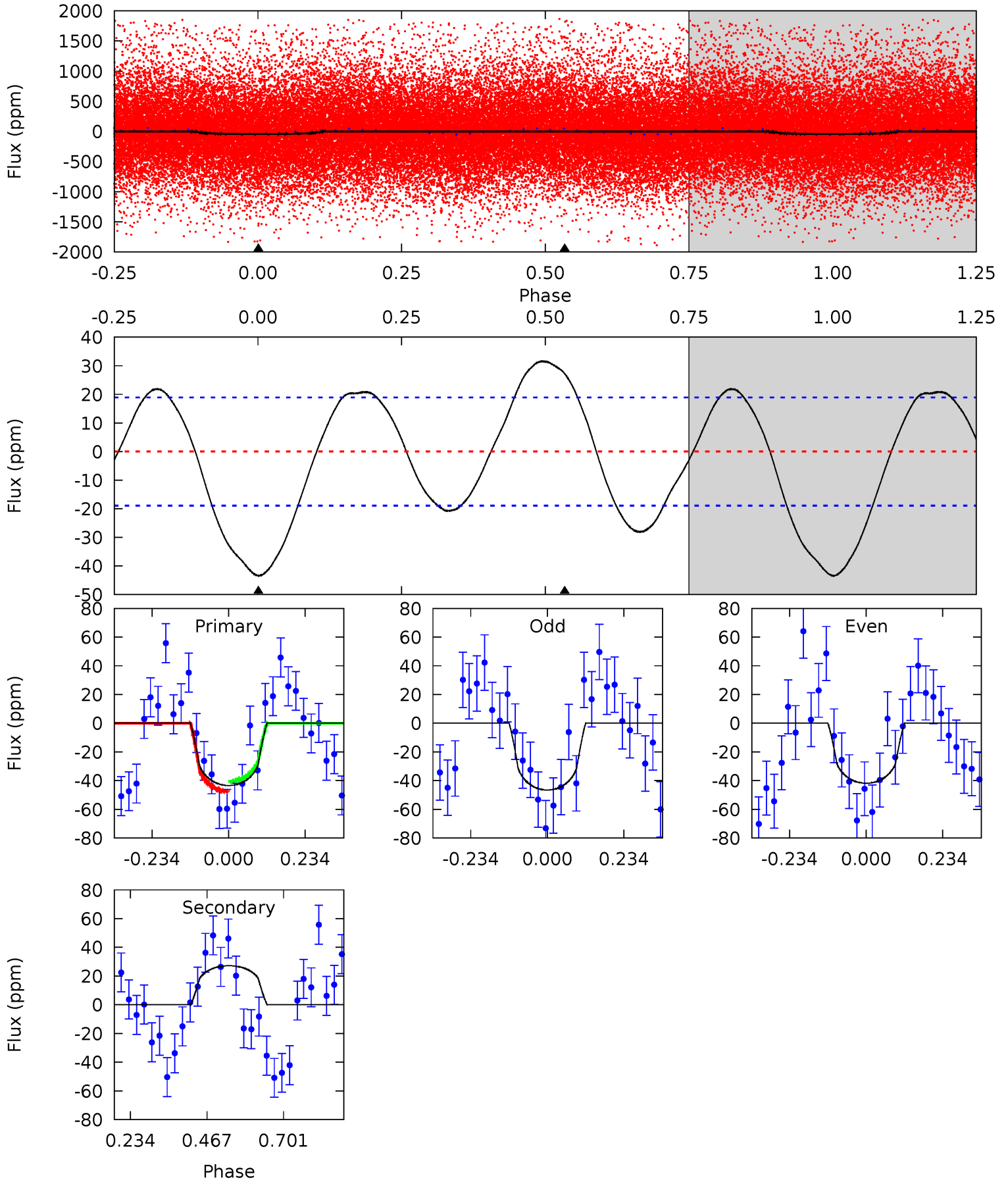




# DV Model-Shift Uniqueness Test

004551202-03, P = 0.739386 Days, E = 131.989600 Days

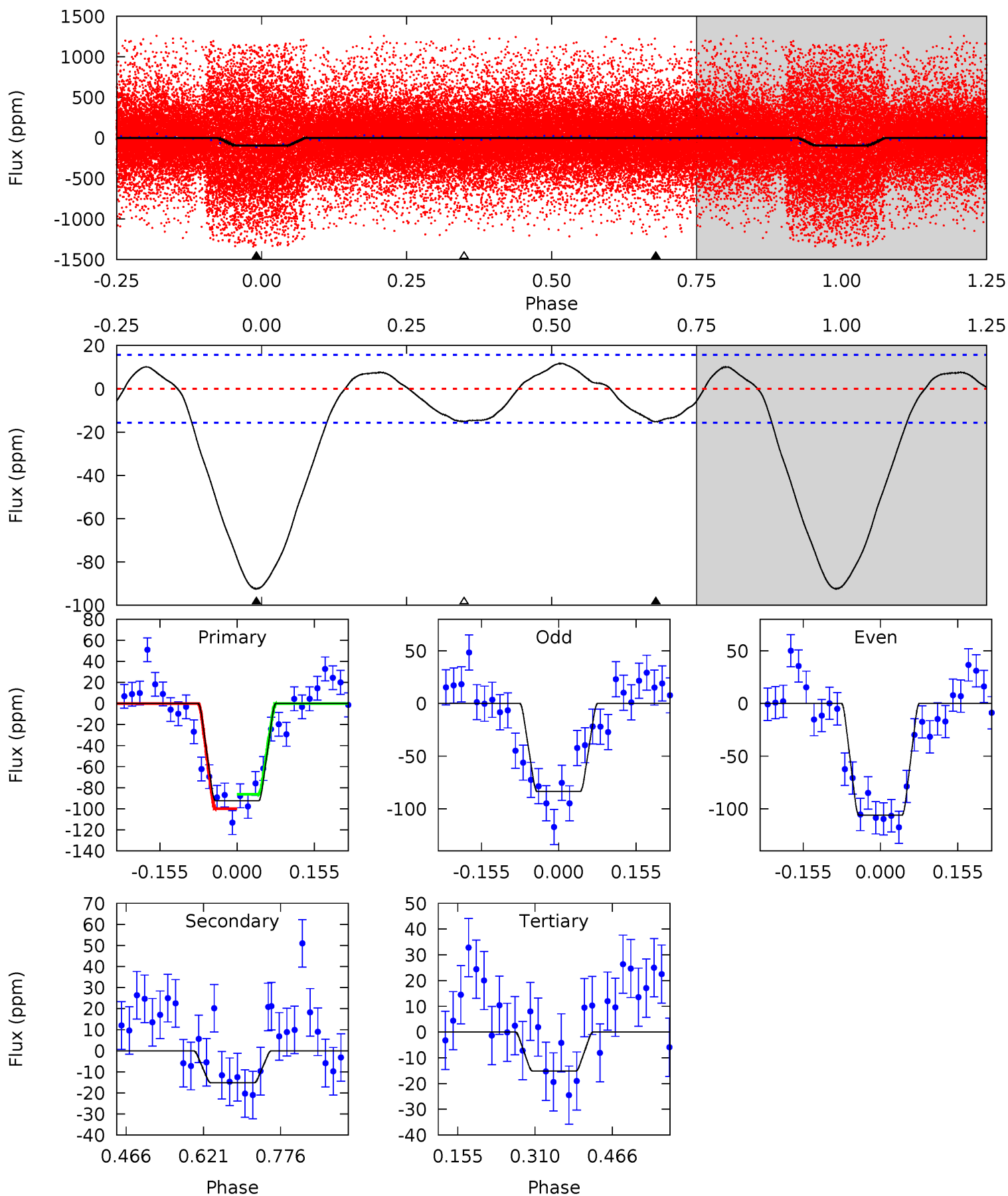
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.1	-6.31	0	0	4.38	1.19	2.29	10.1	10.1	-6.31	-6.31	0.55	-0.00	0.42	0.82



# Alt Model-Shift Uniqueness Test

004551202-03, P = 0.739373 Days, E = 131.990389 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
26.4	4.34	4.32	0	4.47	1.42	2.56	22.0	26.4	0.02	4.34	3.21	0.83	0.11	1.95



### Stellar Parameters For KIC 004551202

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5249^{+183}_{-183}$	$4.533^{+0.096}_{-0.072}$	$-0.420^{+0.350}_{-0.300}$	$0.754^{+0.093}_{-0.093}$	$0.708^{+0.105}_{-0.045}$	$2.326^{+0.902}_{-0.546}$
	+3%/-3%	+2%/-2%	+83%/-71%	+12%/-12%	+15%/-6%	+39%/-23%
Source	KIC0	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 004551202-03 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$27 \pm 4$	$0.78^{+0.61}_{-0.52}$	$2357^{+109}_{-123}$	$-4193^{+711}_{-2449}$	$-4.949^{+3.401}_{-40.791}$
Alt.	$-15 \pm 4$	$0.92^{+0.65}_{-0.58}$	$2345^{+113}_{-106}$	$3450^{+1658}_{-661}$	$1.983^{+12.753}_{-1.295}$

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

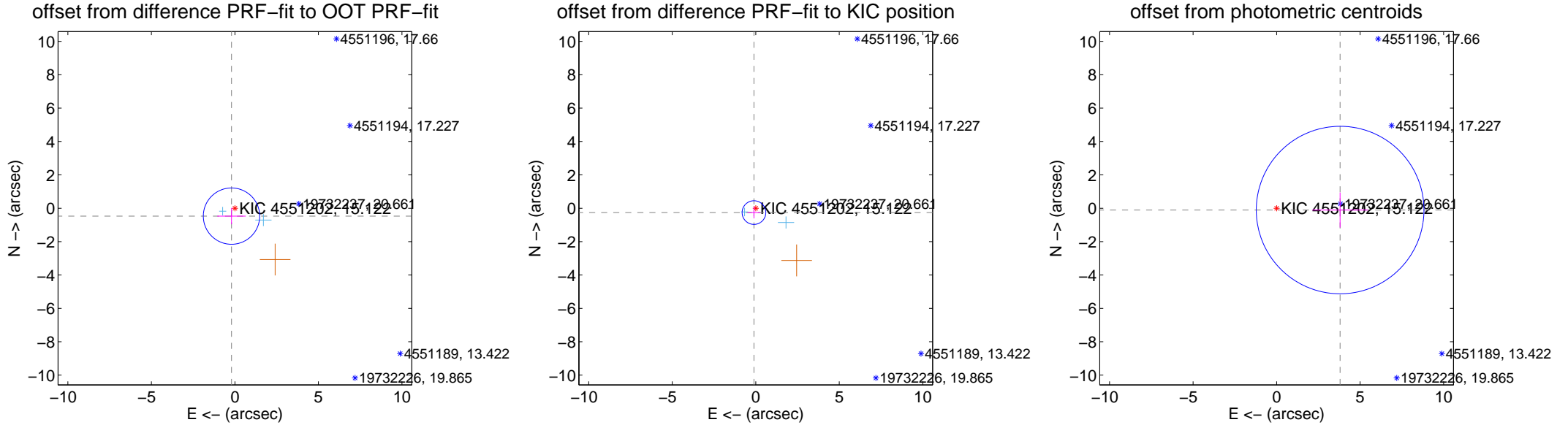
## DV Centroid Data

Supplemental centroid analysis for 004551202-03. Kepler magnitude: 15.12. Transit SNR 8.16

There are 6 quarters with good PRF difference image offsets

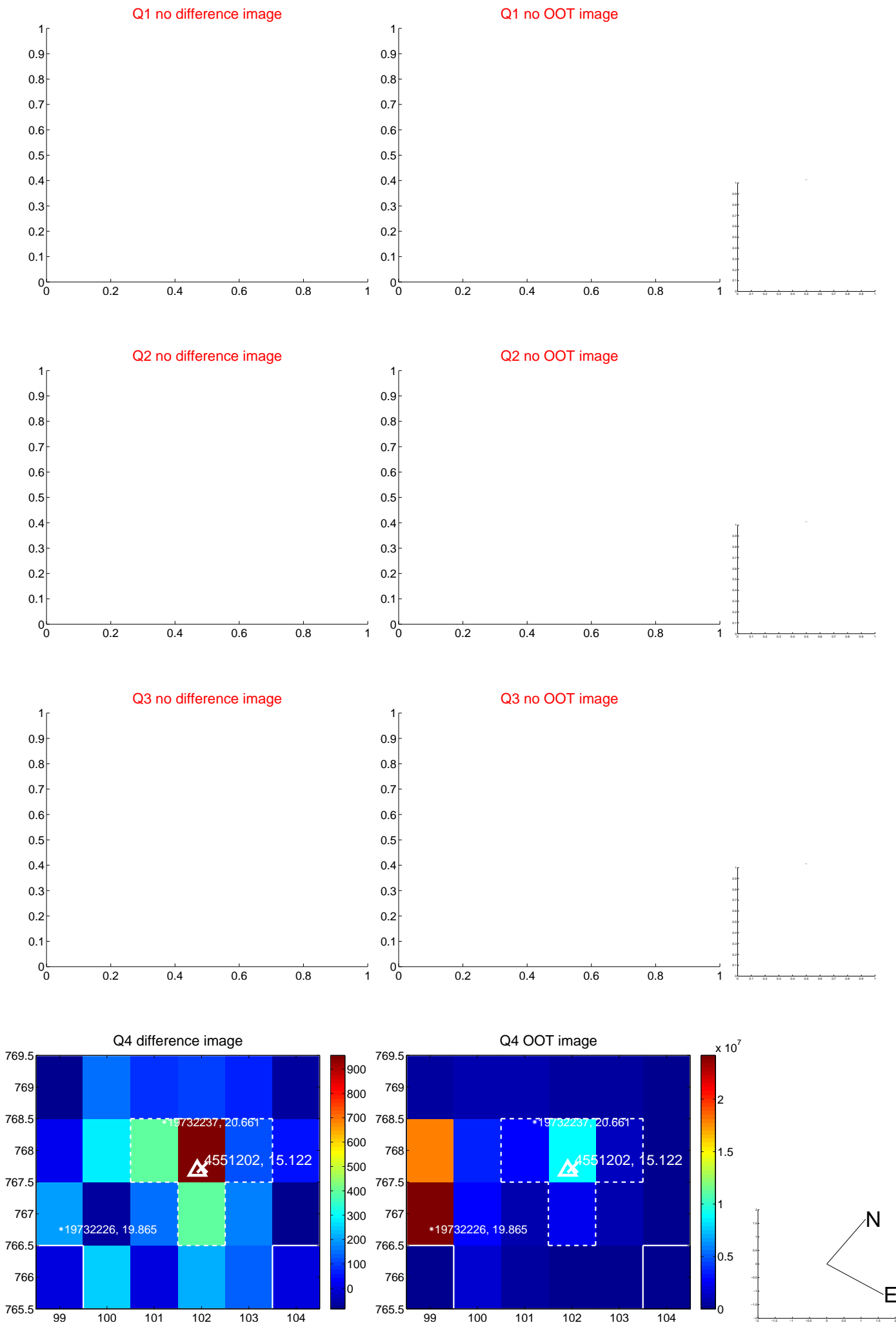
The direct PRF centroid is offset from the target star catalog position by about 0.08 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.514 \pm 0.563$	0.91	$0.204 \pm 0.852$	$-0.472 \pm 0.490$
PRF-fit source offset from KIC position	$0.281 \pm 0.236$	1.19	$0.107 \pm 0.392$	$-0.260 \pm 0.352$
photometric centroid source offset	$3.81 \pm 1.67$	2.27	$-3.80 \pm 1.67$	$-0.11 \pm 1.05$

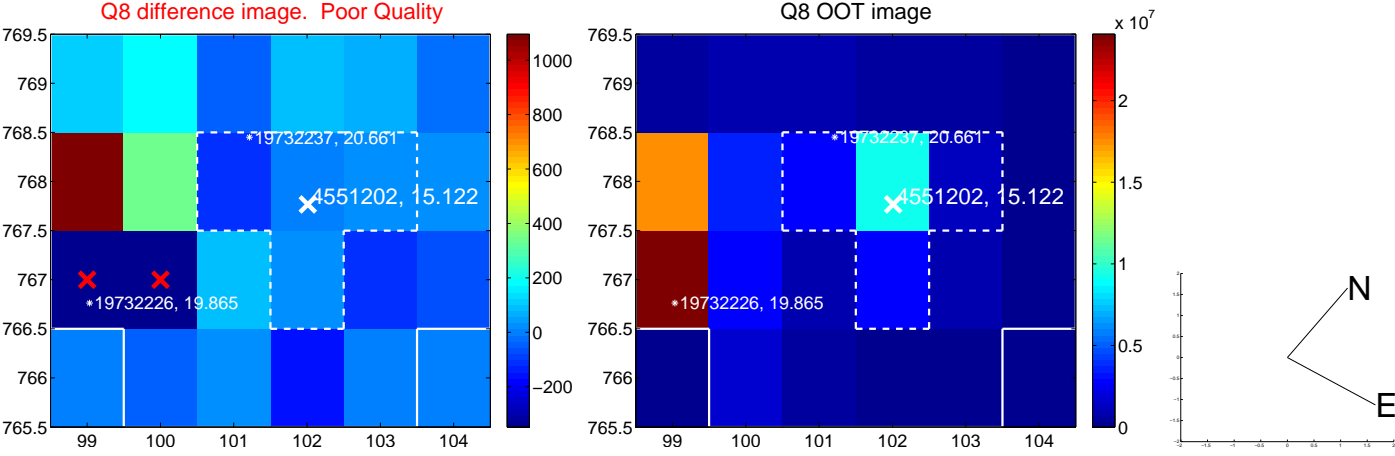
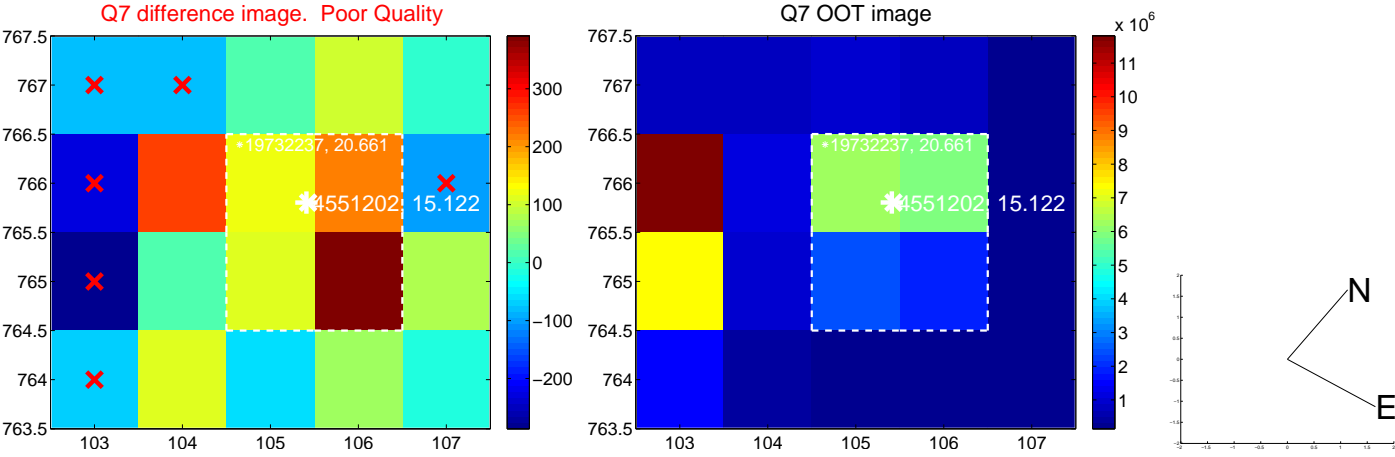
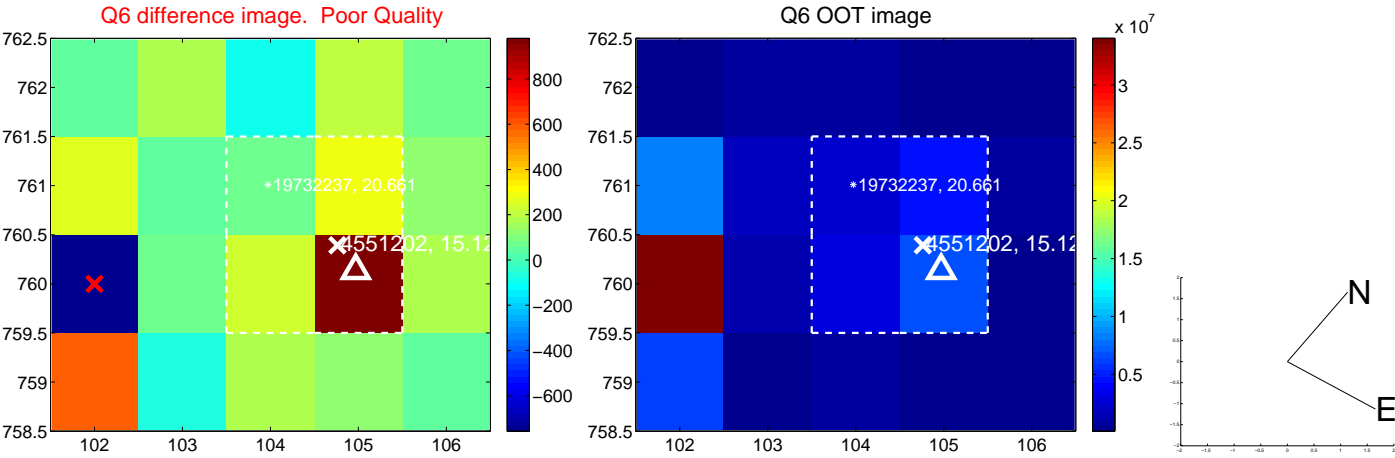
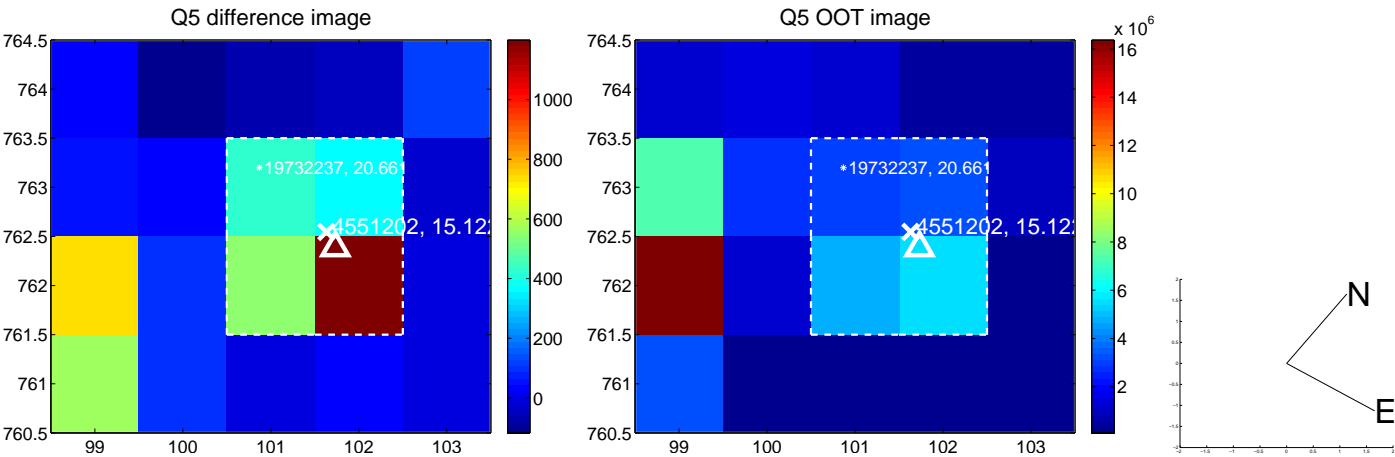


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

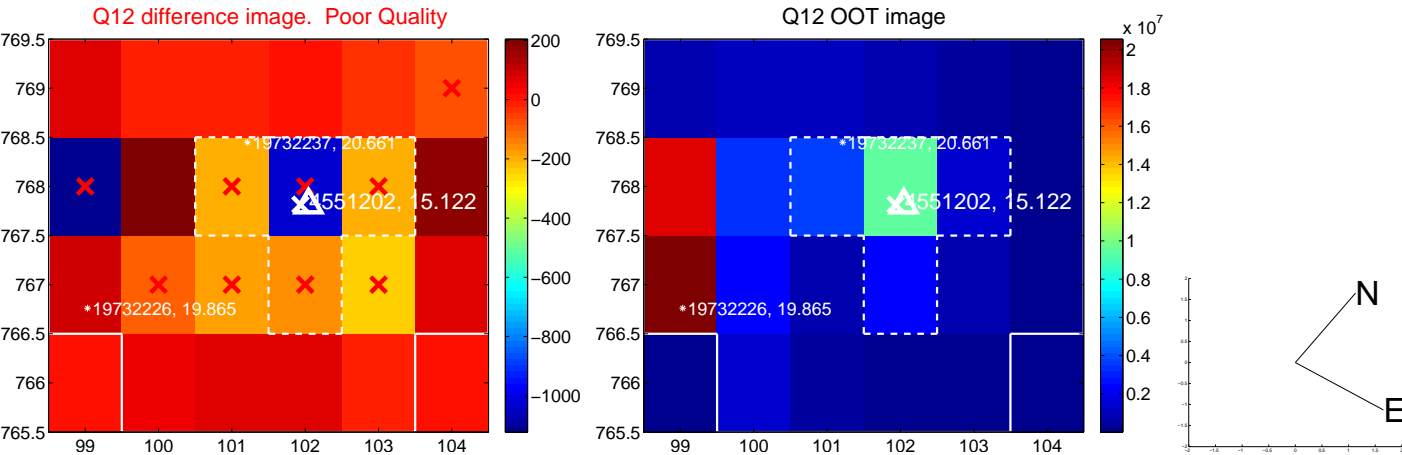
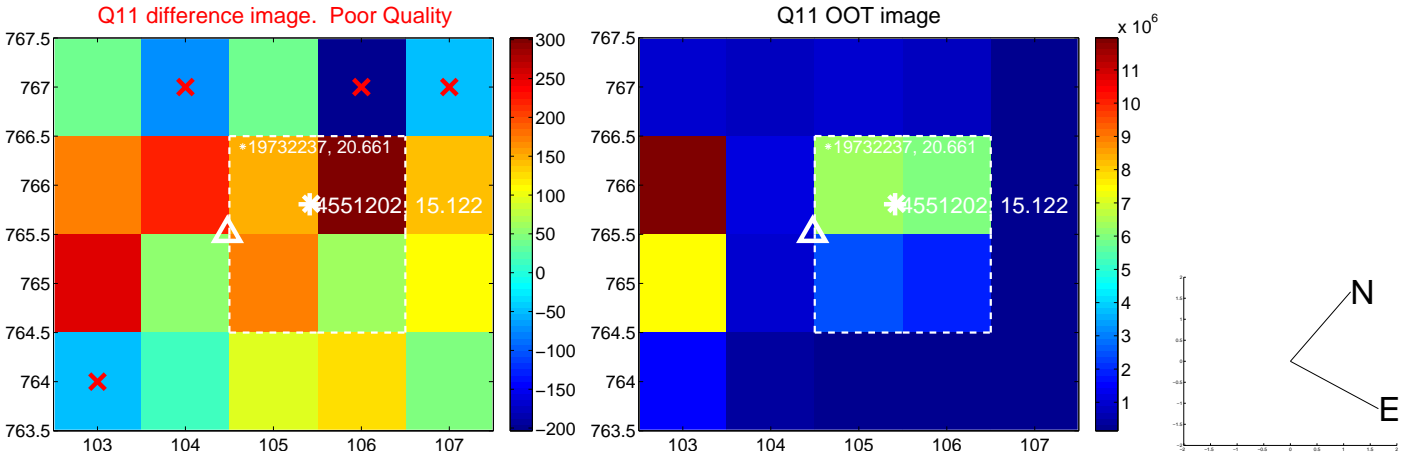
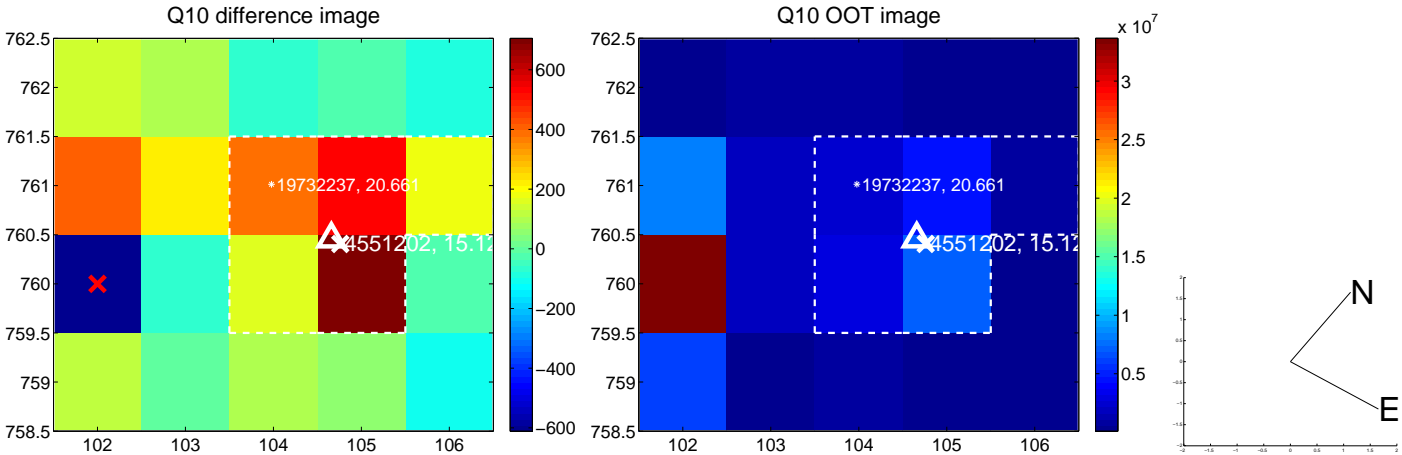
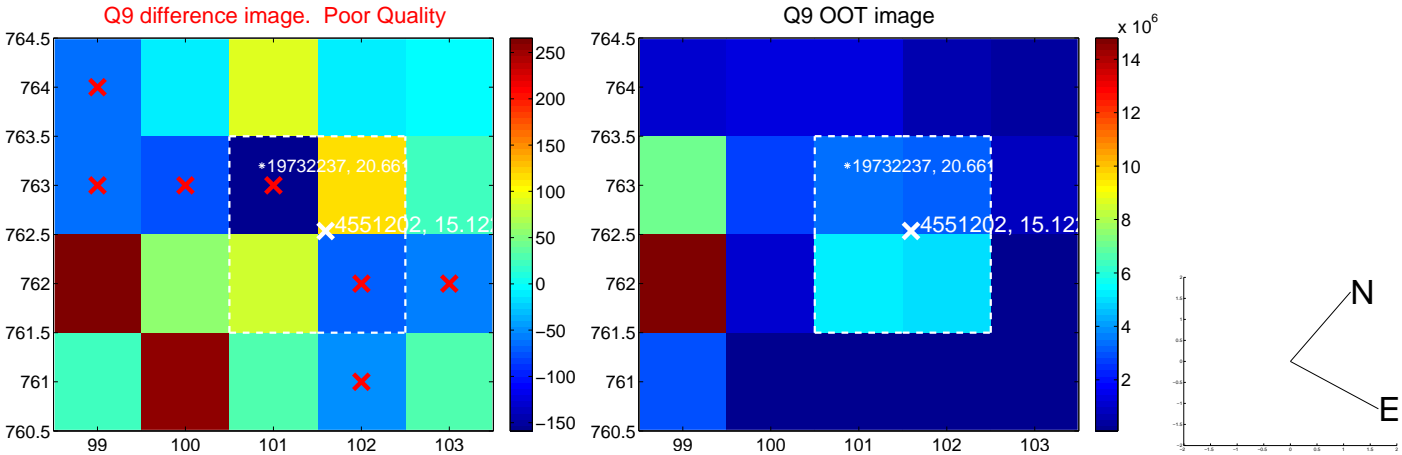


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

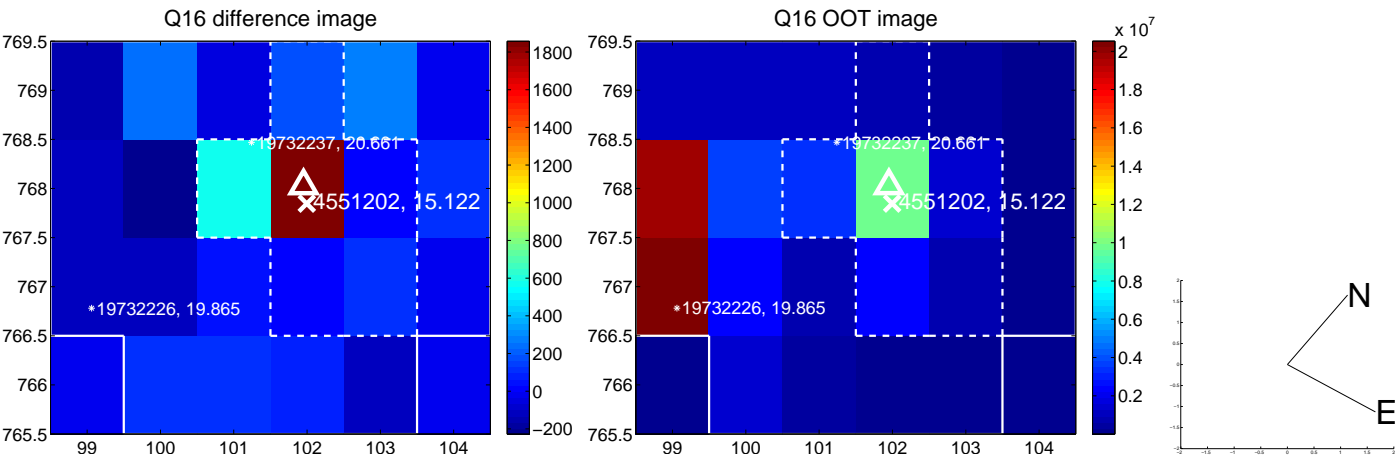
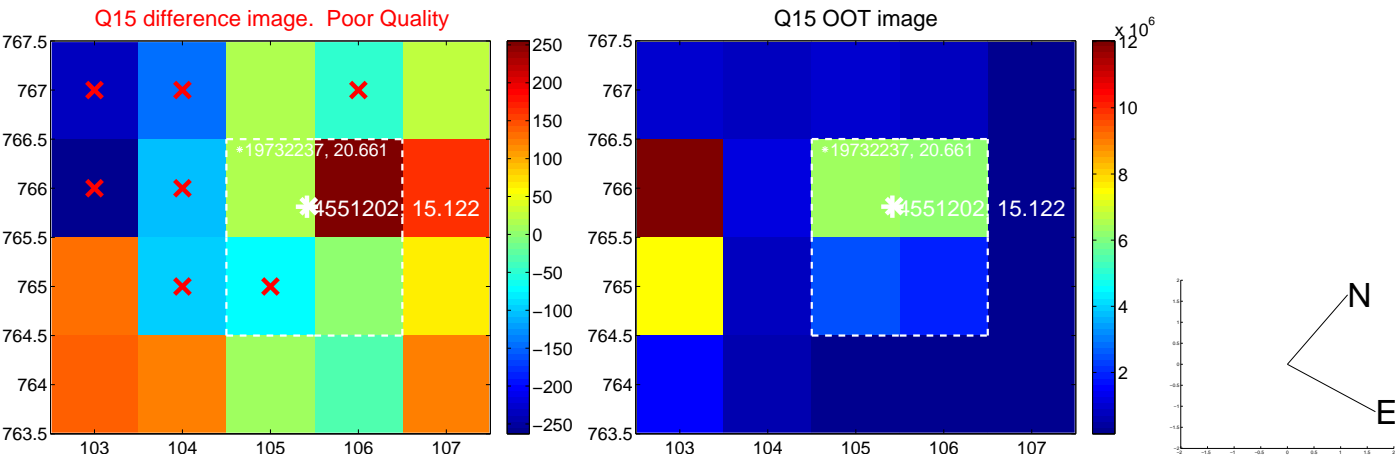
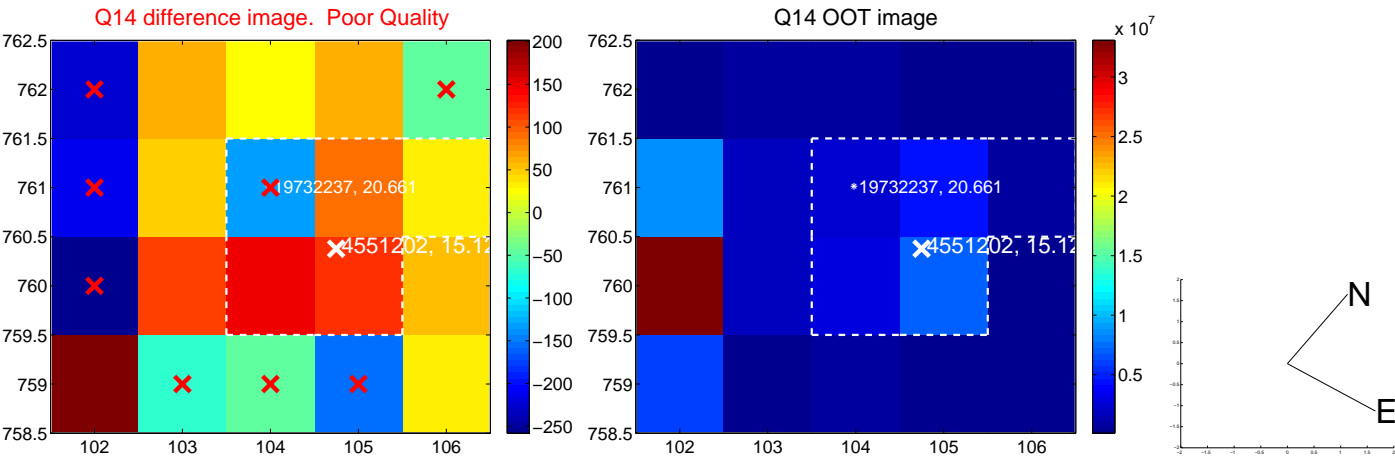
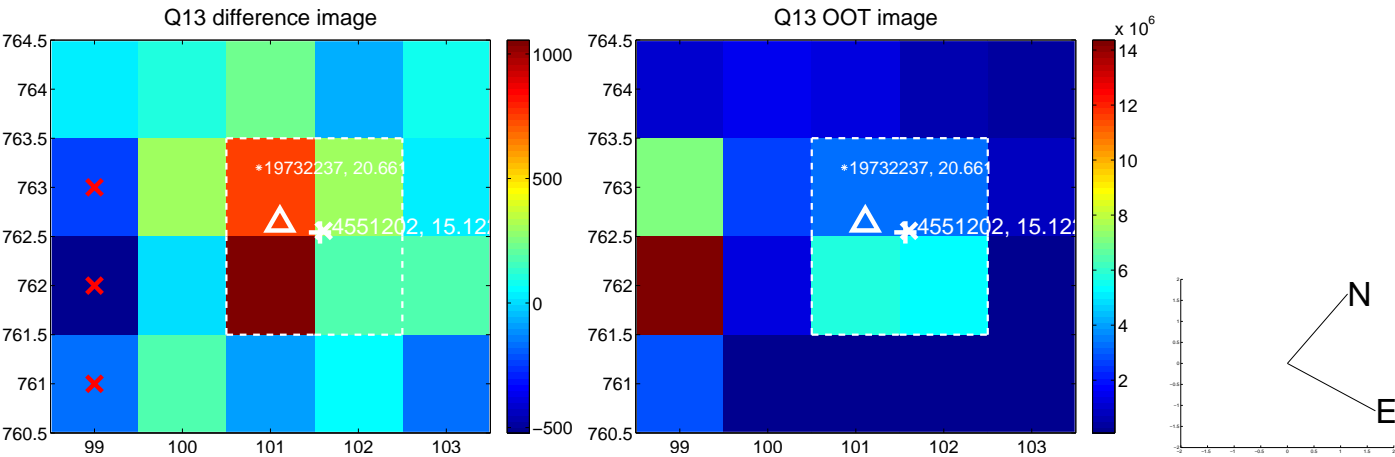




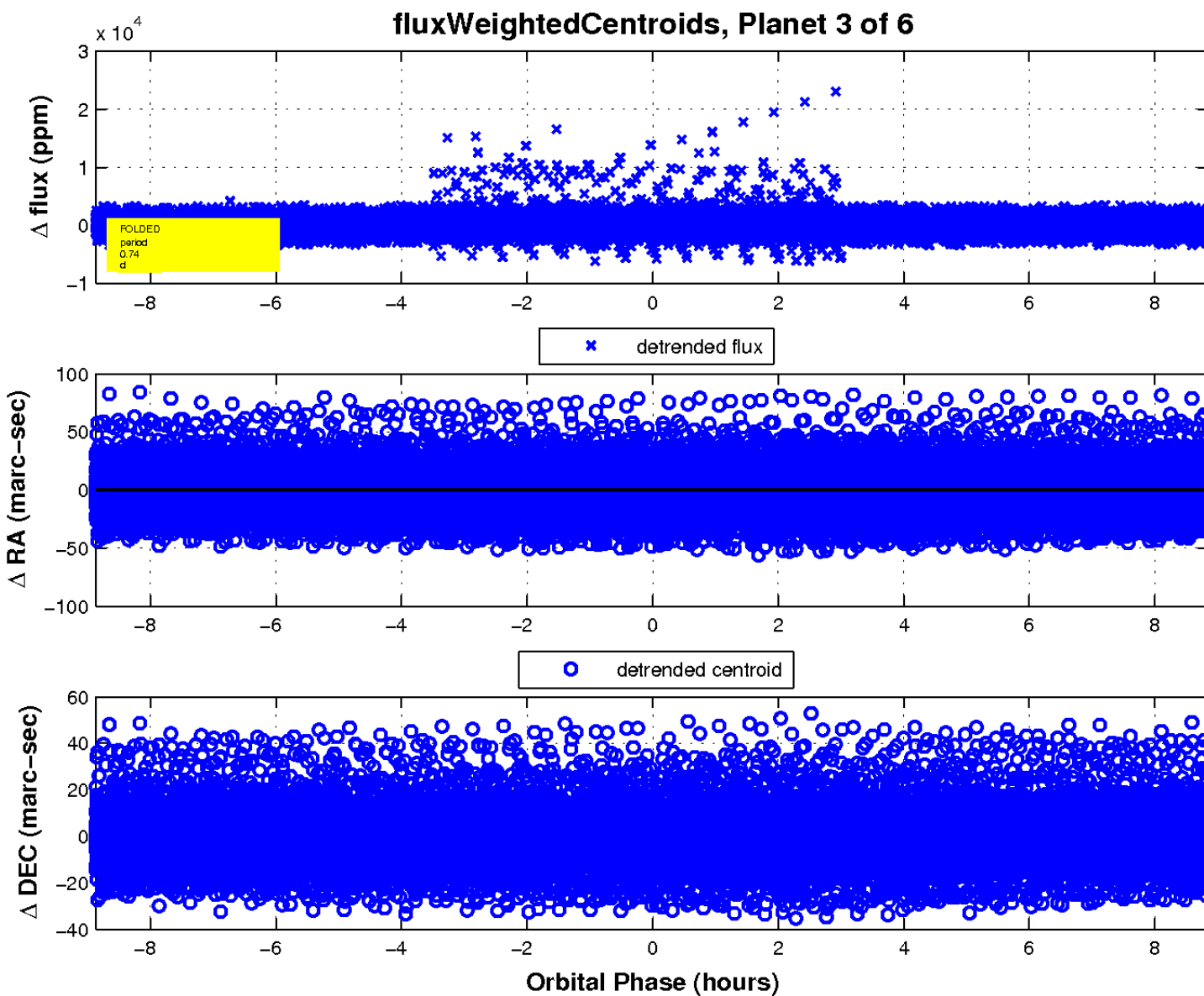
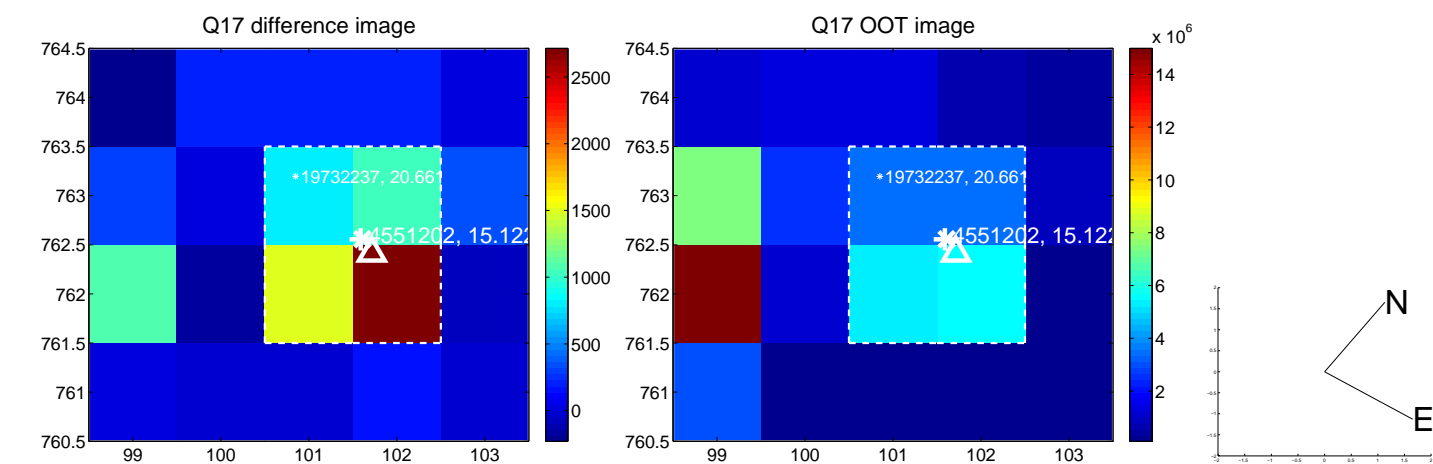
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

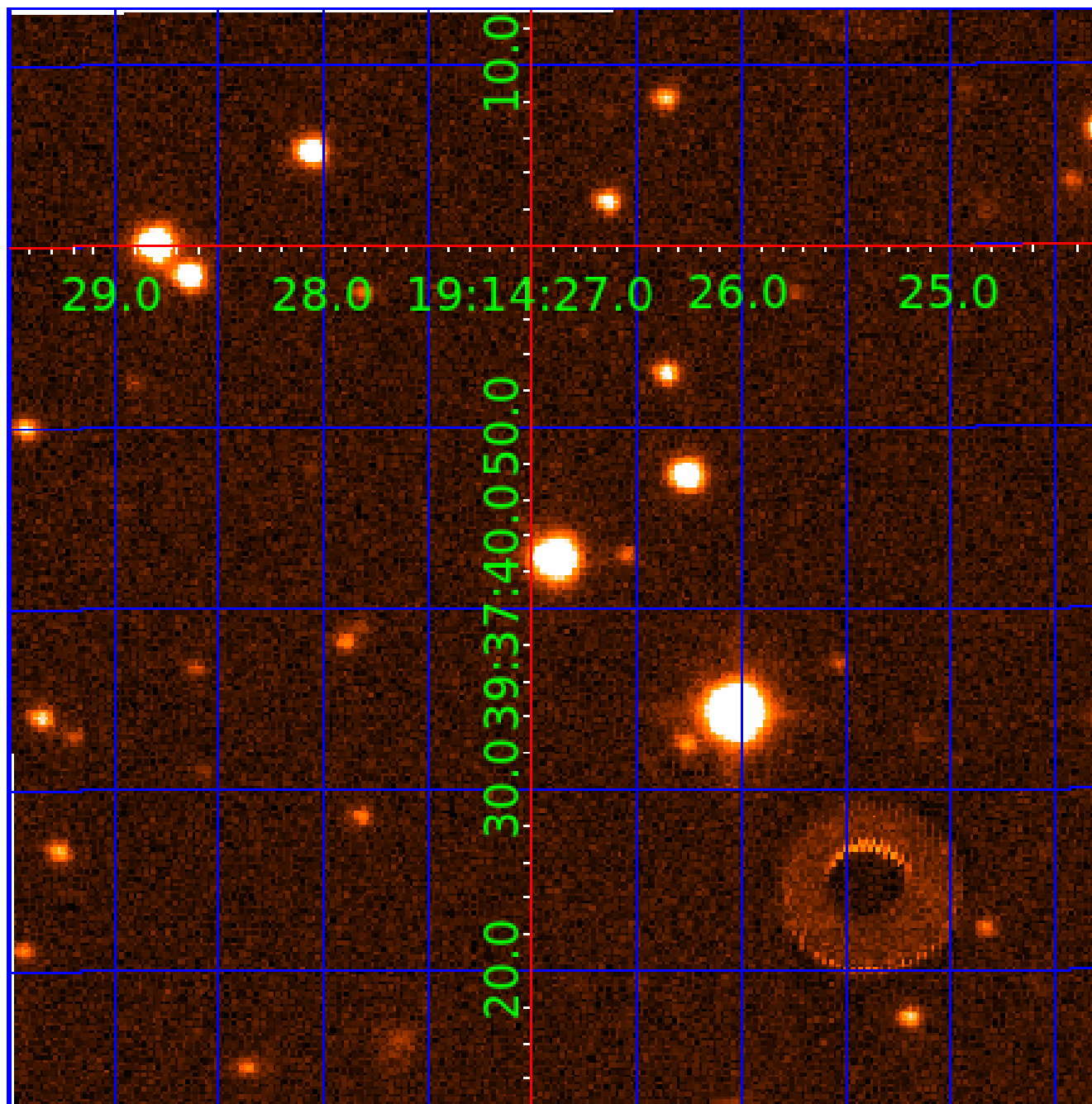


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 004551202

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004551202-01	OBS	No	439.482056	482.939144	1370.1	4.513	12.9	7.2	0.75	5249	2.98	0.38
004551202-02	OBS	No	562.993241	427.673344	953.2	2.938	10.4	5.9	0.75	5249	2.33	0.27
004551202-03	OBS	No	0.739386	131.989600	65.5	3.699	7.3	8.2	0.75	5249	0.60	1900.87
004551202-04	OBS	No	176.551716	145.921457	1355.1	3.753	14.0	5.3	0.75	5249	3.22	1.28
004551202-05	OBS	No	116.355427	224.286918	1724.3	8.038	10.6	6.2	0.75	5249	3.43	2.24
004551202-06	OBS	No	102.598270	199.185496	1551.4	3.420	11.7	6.7	0.75	5249	3.19	2.65

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004551202-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
004551202-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004551202-03	OBS	FP	0.00	1	0	0	0	LPP_DV—CENT_FEW_MEAS
004551202-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_POS_DV—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004551202-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004551202-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_MEAS

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

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

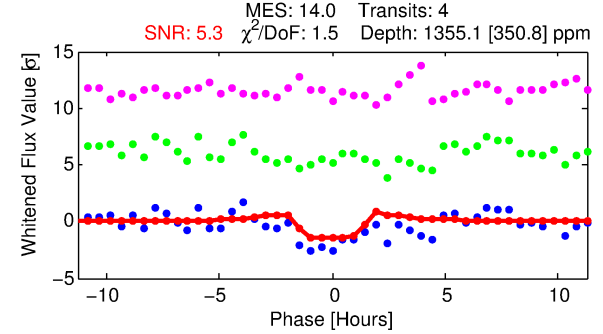
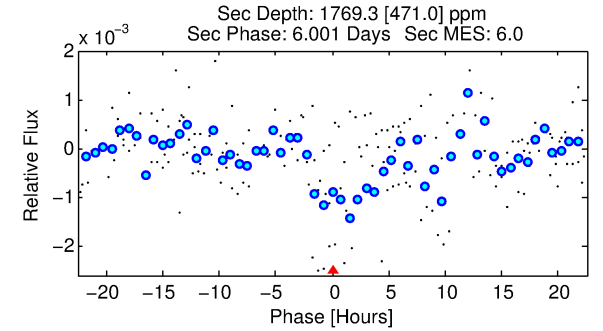
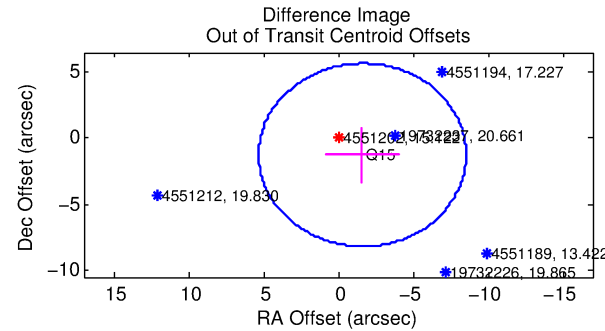
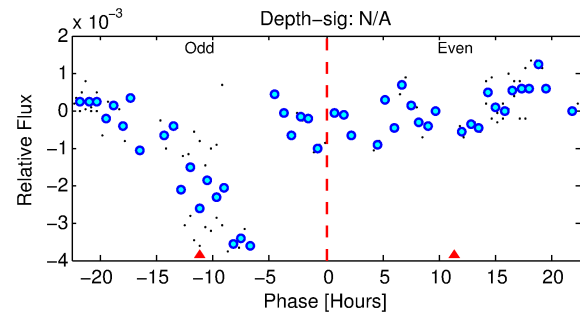
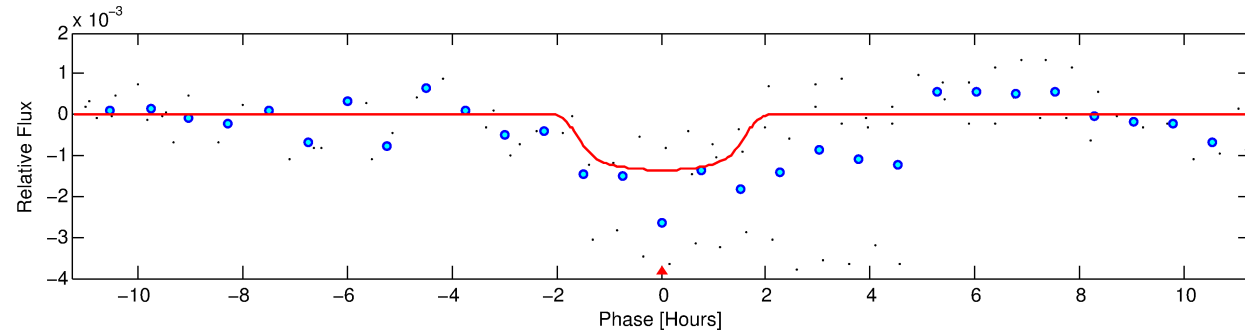
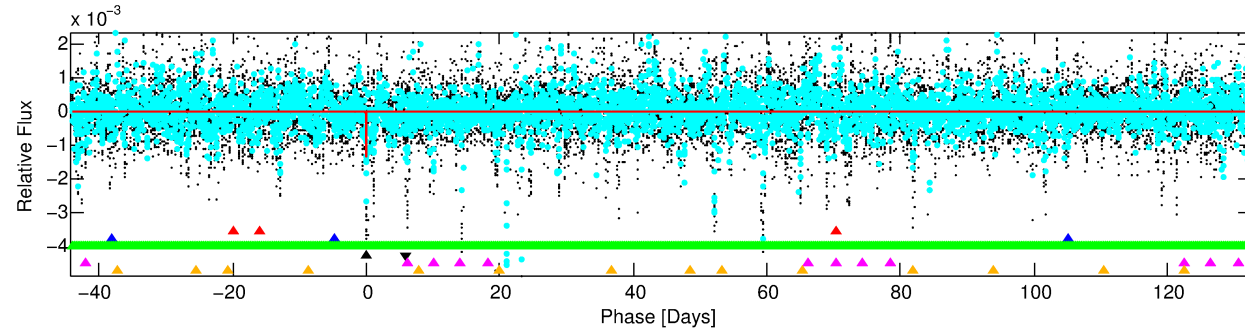
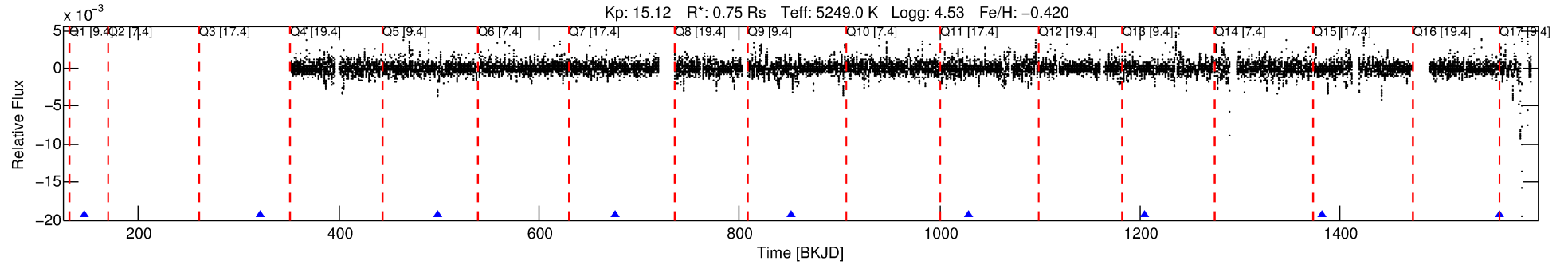
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 004551202-04

No Significant Match Found

# DV One-Page Summary

KIC: 4551202 Candidate: 4 of 6 Period: 176.552 d



## DV Fit Results:

Period = 176.55172 [0.00395] d  
Epoch = 145.9215 [0.0215] BKJD  
Rp/R\* = 0.0392 [0.0214]  
a/R\* = 208.15 [439.60]  
b = 0.86 [0.63]  
Seff = 1.28 [0.28]  
Teq = 271 [15] K  
Rp = 3.22 [1.80] Re  
a = 0.5489 [0.0606] AU  
Ag = 28211.53 [32004.19] [0.88σ]  
Teffp = 5438 [1537] K [3.36σ]

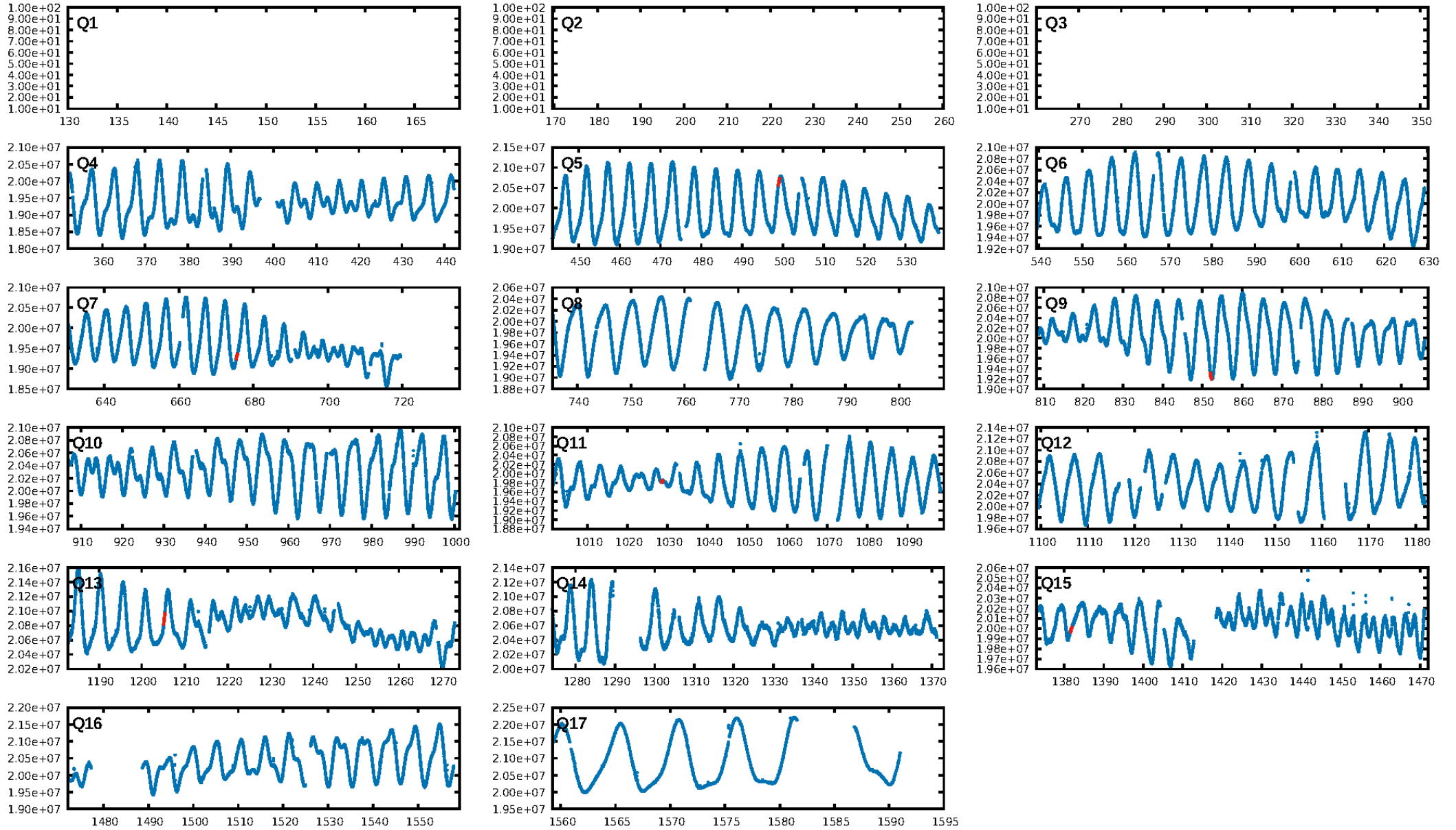
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [162.87σ]  
LongPeriod-sig: 100.0% [1075.08σ]  
ModelChiSquare2-sig: 0.1%  
ModelChiSquareGof-sig: 91.8%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: -12.54  
Centroid-sig: N/A  
Centroid-so: 1.593 arcsec [1.81σ]  
OotOffset-rm: 2.056 arcsec [0.89σ]  
KicOffset-rm: 0.298 arcsec [0.36σ]  
OotOffset-st: 0/1/0/0 [1]  
KicOffset-st: 0/1/0/2 [3]  
DiffImageQuality-fgm: 0.33 [1/3]  
DiffImageOverlap-fno: 0.00 [0/6]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 02:01:11 Z

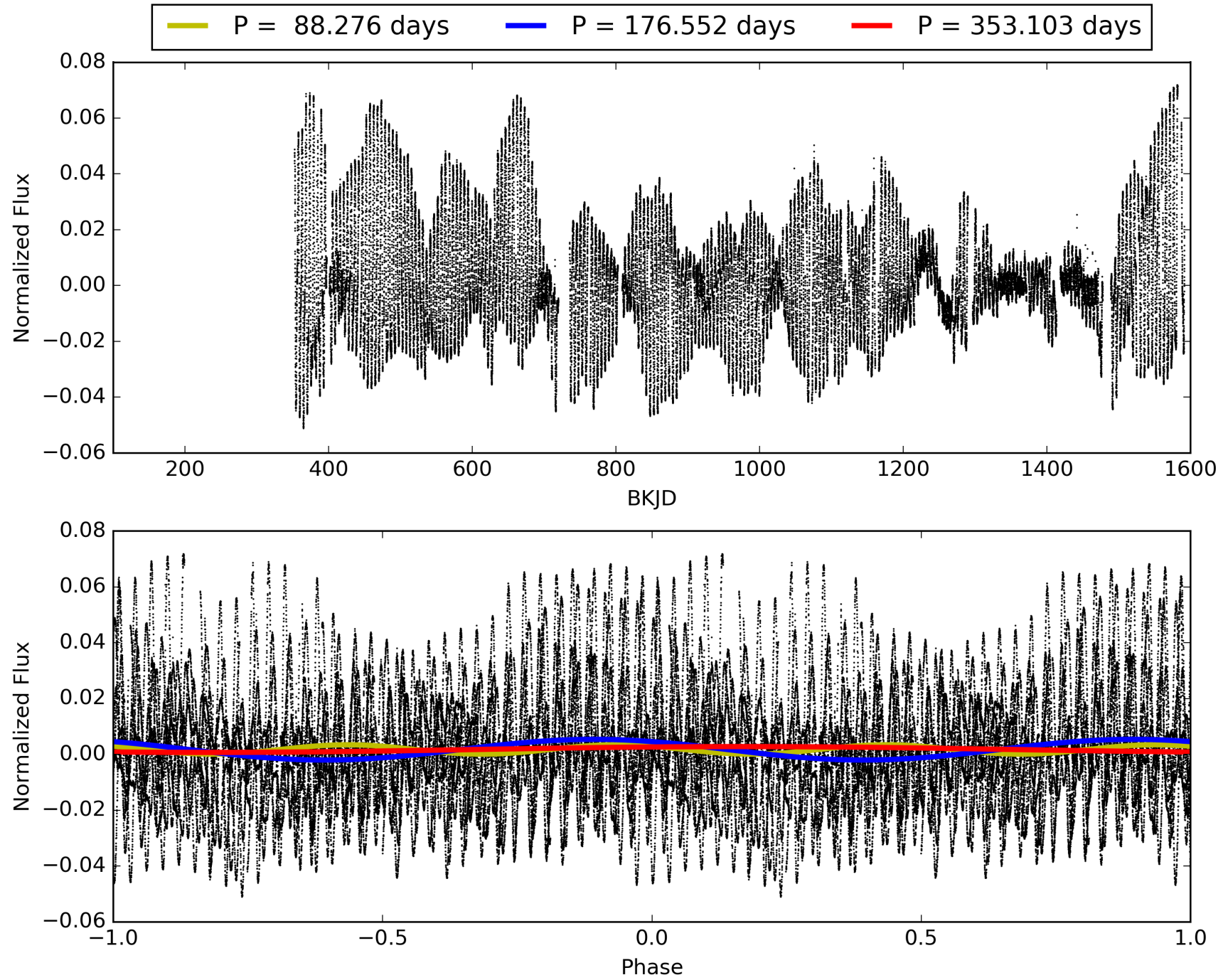
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 004551202-04, PDC Light Curves





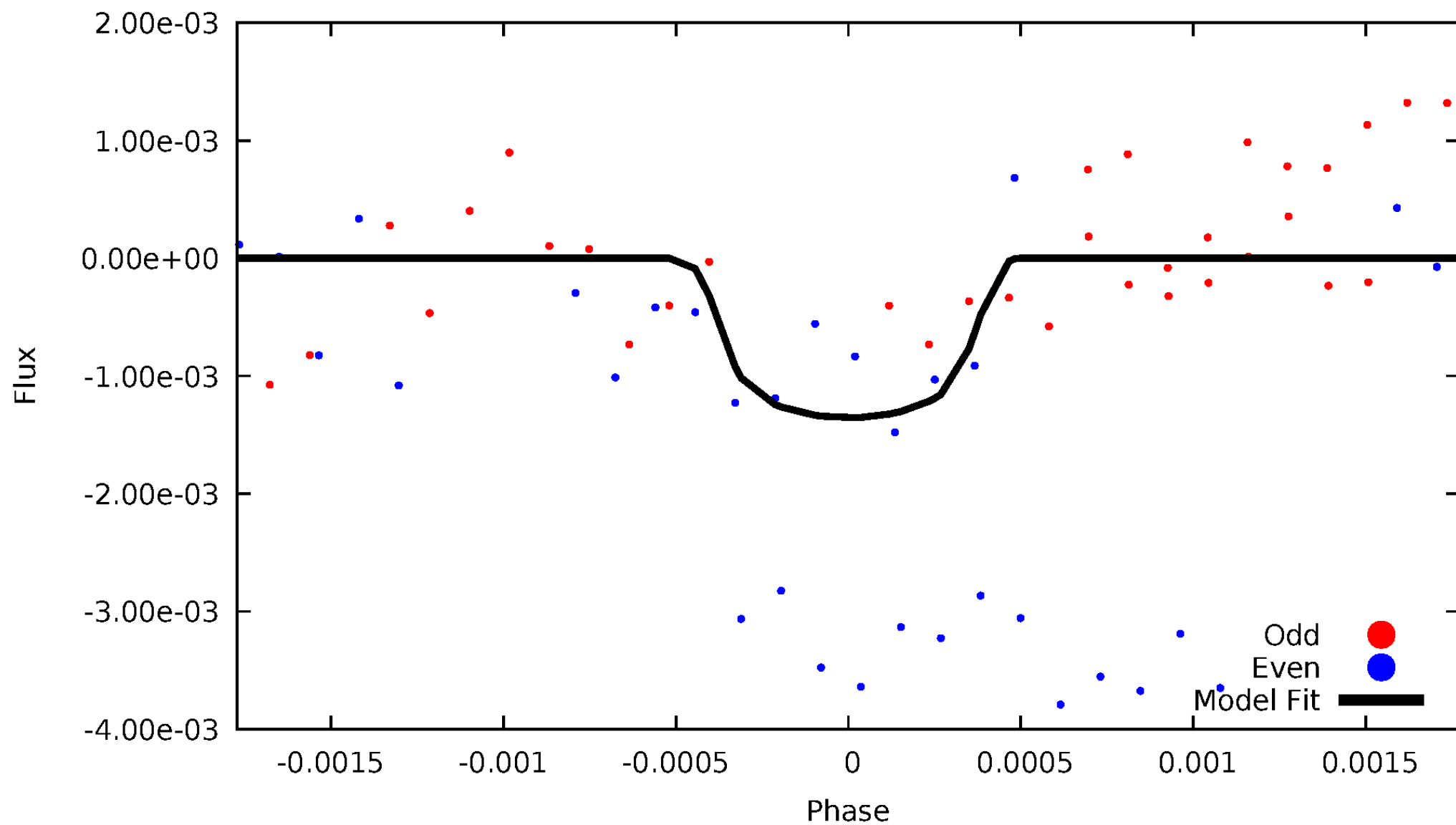
TCE 004551202-04





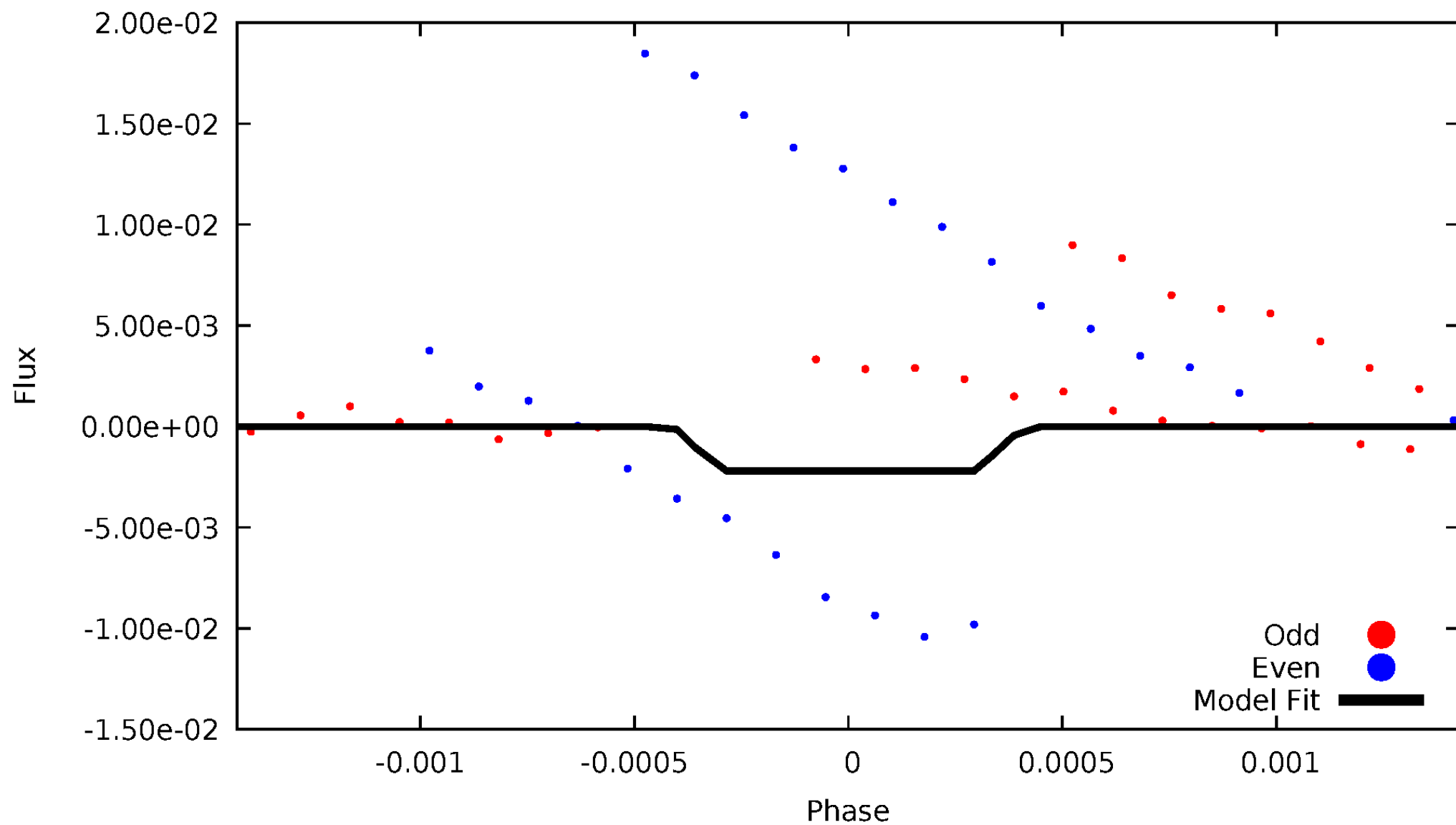
# DV Odd/Even

TCE 004551202-04



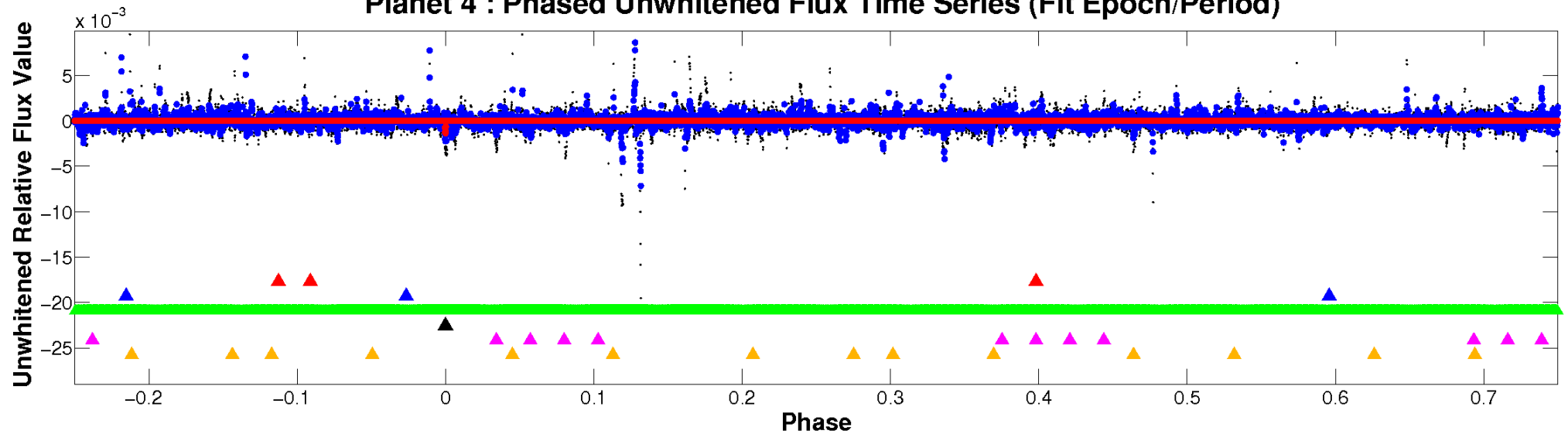
# ALT Odd/Even

TCE 004551202-04

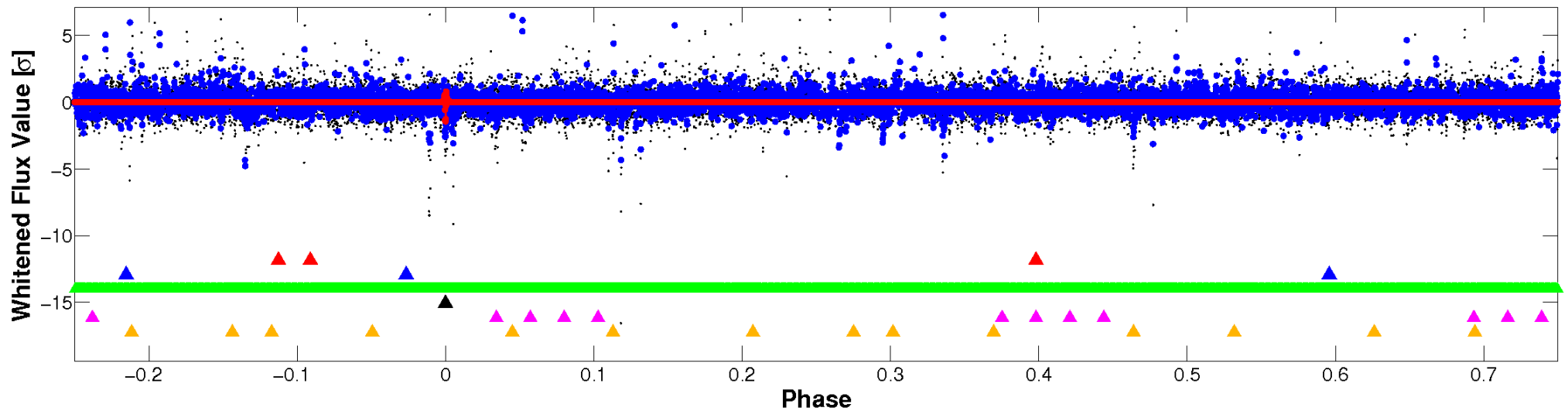


# Non-Whitened Vs. Whitened Light Curve

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

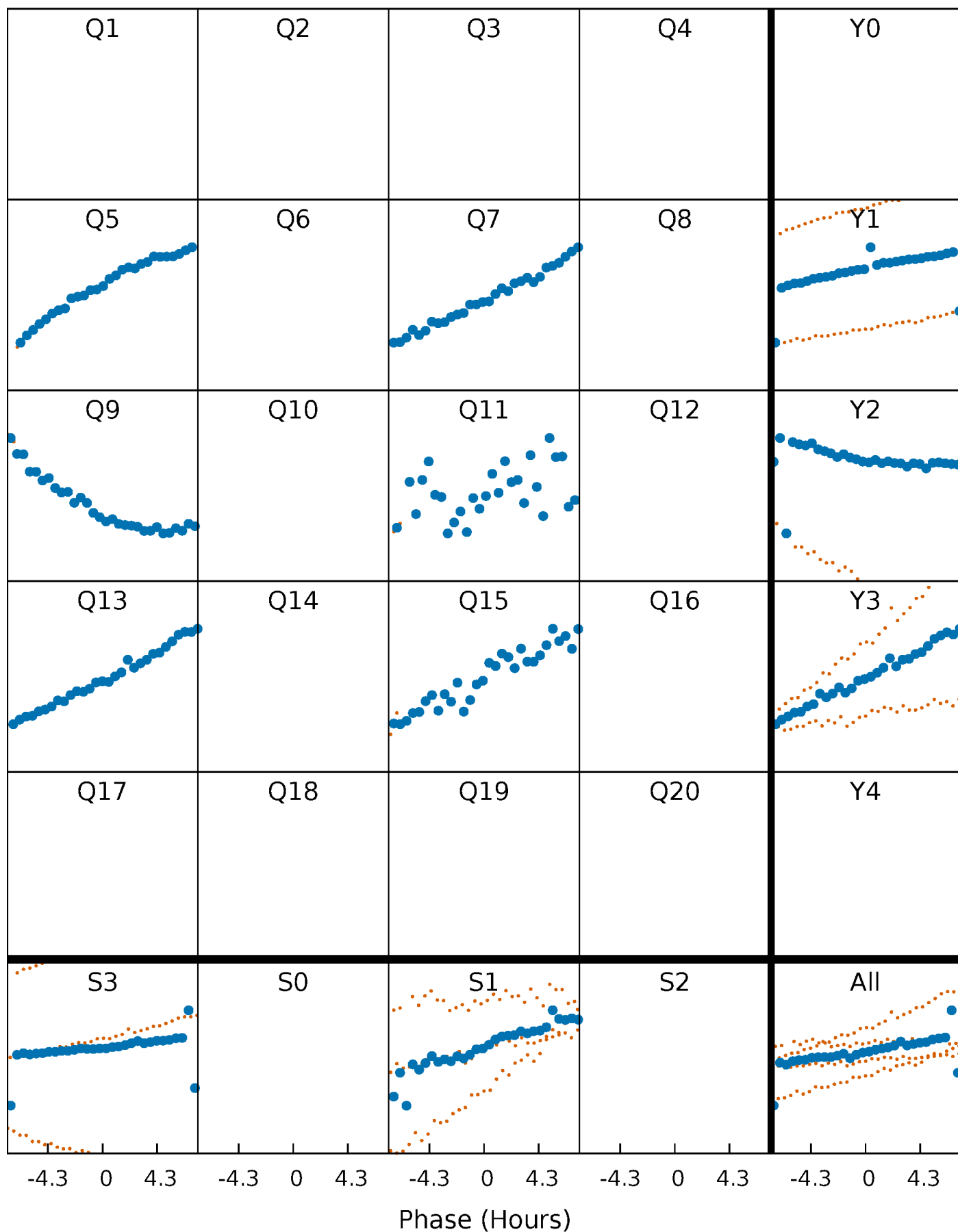


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



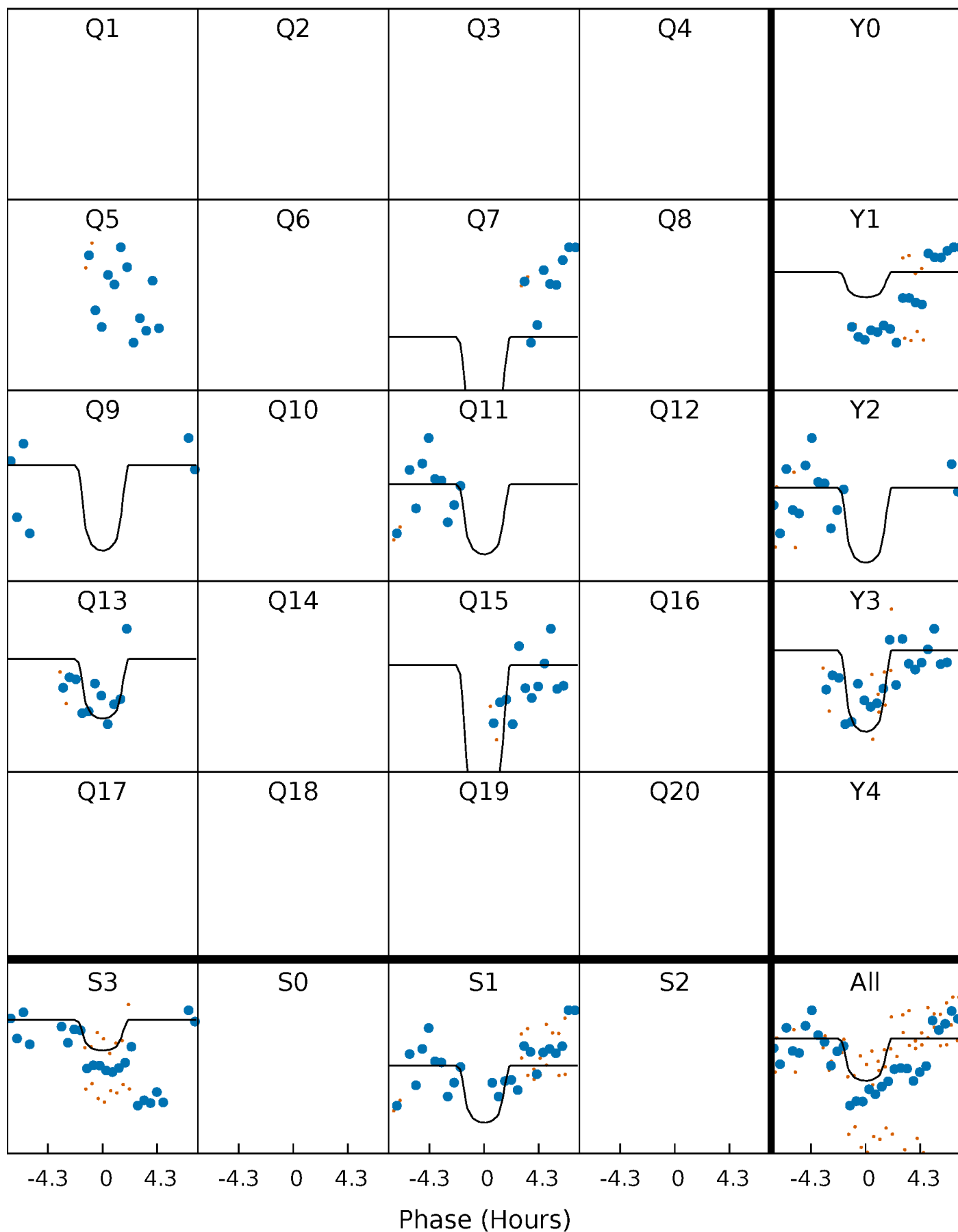
# PDC Quarter-Phased Transit Curves

TCE 004551202-04 P=176.551716 Days  $T_0=145.921457$  (BKJD)



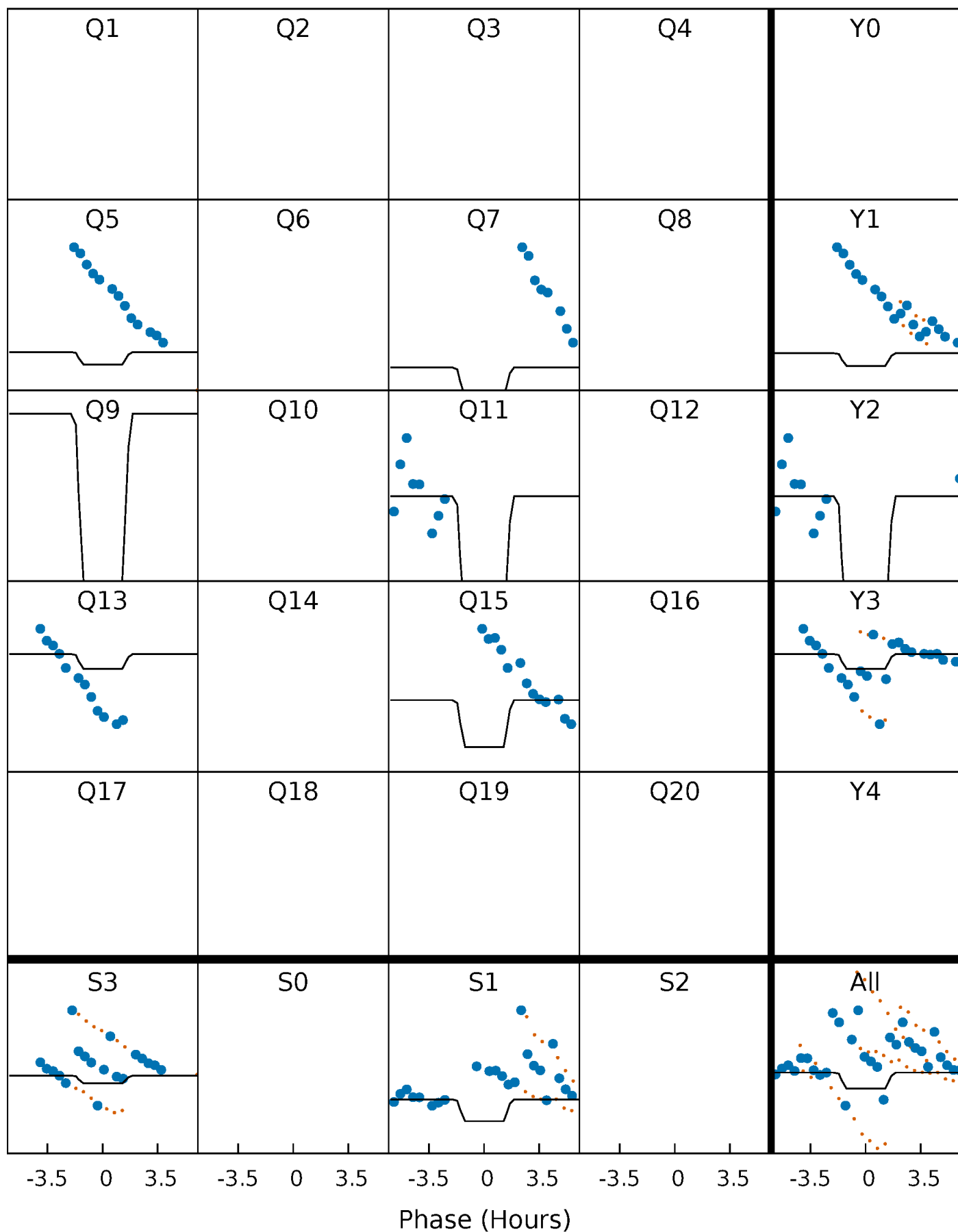
# DV Quarter-Phased Transit Curves

TCE 004551202-04     $P=176.551716$  Days     $T_0=145.921457$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

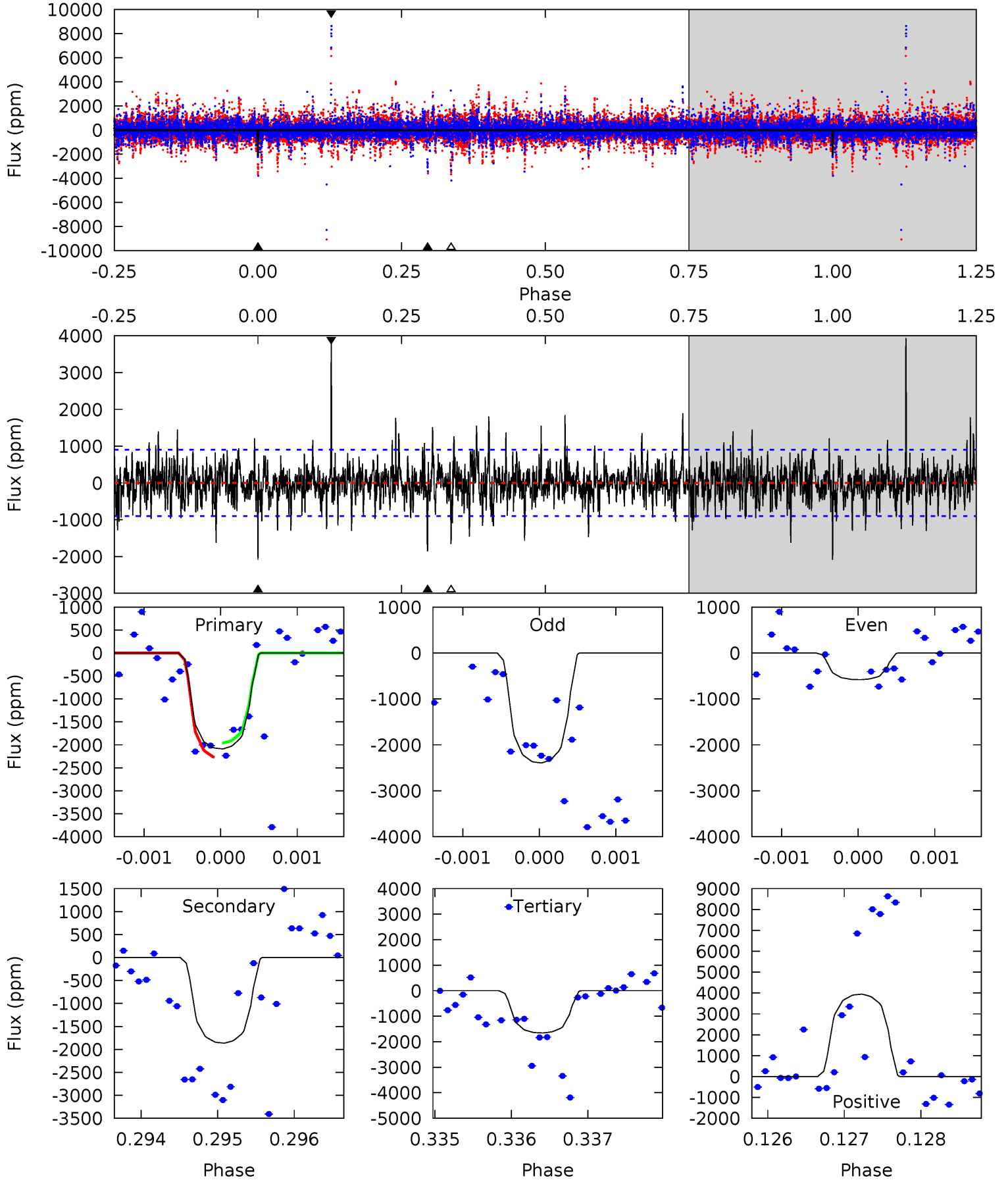
TCE 004551202-04     $P=176.552770$  Days     $T_0=145.948363$  (BKJD)



# DV Model-Shift Uniqueness Test

004551202-04, P = 176.551716 Days, E = 145.921457 Days

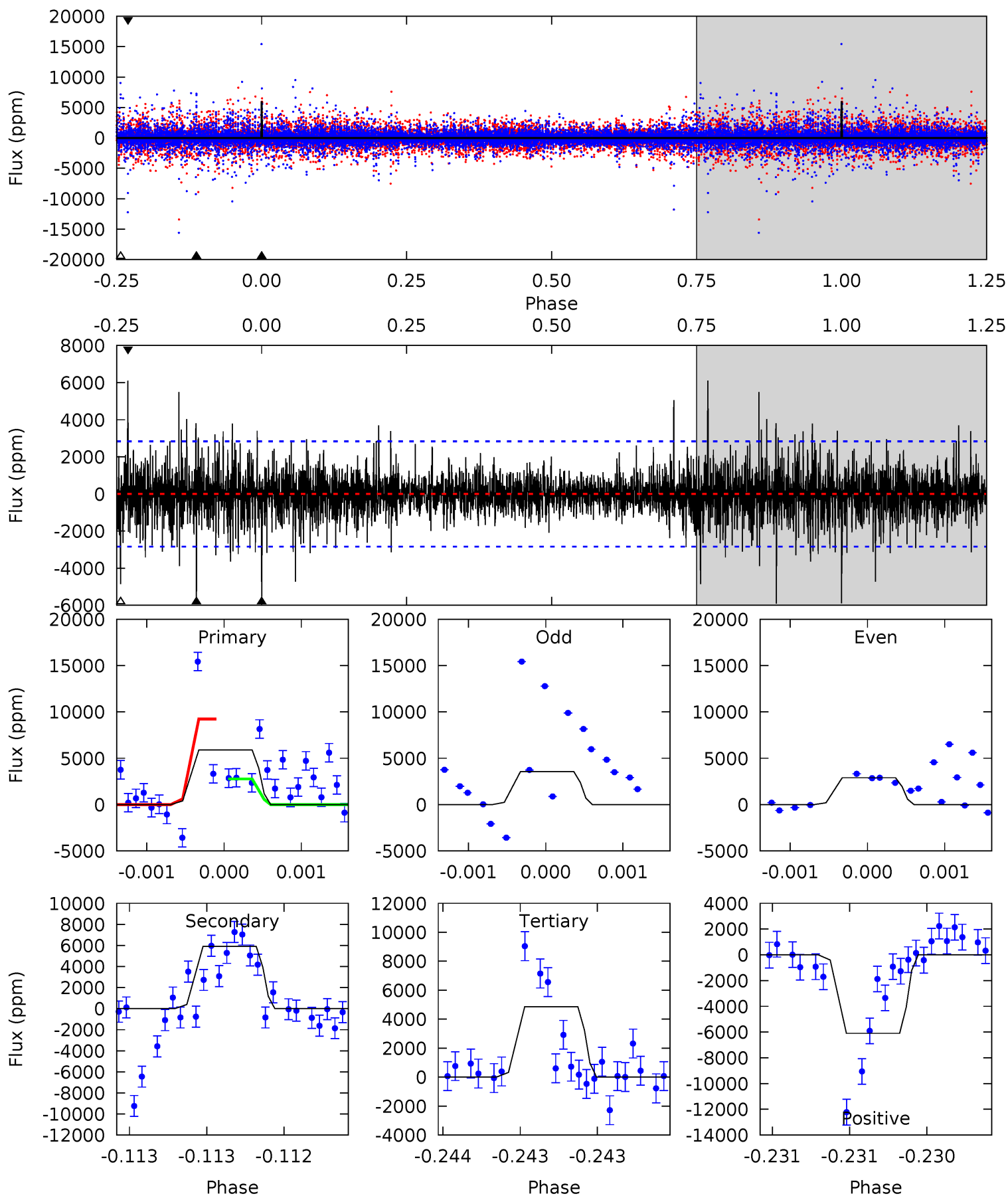
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.6	11.3	10.0	23.9	5.46	3.31	2.47	2.61	-11.2	1.25	-12.6	4.48	1.54	0.65	0.91



# Alt Model-Shift Uniqueness Test

004551202-04, P = 176.552770 Days, E = 145.948363 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
11.4	11.4	9.40	11.8	5.50	3.37	1.50	2.01	-0.40	2.04	-0.38	0.71	0.95	0.51	0





### Stellar Parameters For KIC 004551202

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5249^{+183}_{-183}$	$4.533^{+0.096}_{-0.072}$	$-0.420^{+0.350}_{-0.300}$	$0.754^{+0.093}_{-0.093}$	$0.708^{+0.105}_{-0.045}$	$2.326^{+0.902}_{-0.546}$
	+3%/-3%	+2%/-2%	+83%/-71%	+12%/-12%	+15%/-6%	+39%/-23%
Source	KIC0	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 004551202-04 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-1863 \pm 165$	$3.35^{+1.72}_{-1.73}$	$378^{+17}_{-18}$	$5405^{+2420}_{-903}$	$28269^{+87454}_{-16465}$
Alt.	$-5905 \pm 516$	$3.96^{+1.73}_{-1.71}$	$378^{+17}_{-18}$	$6531^{+2759}_{-1007}$	$62831^{+132087}_{-32326}$

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

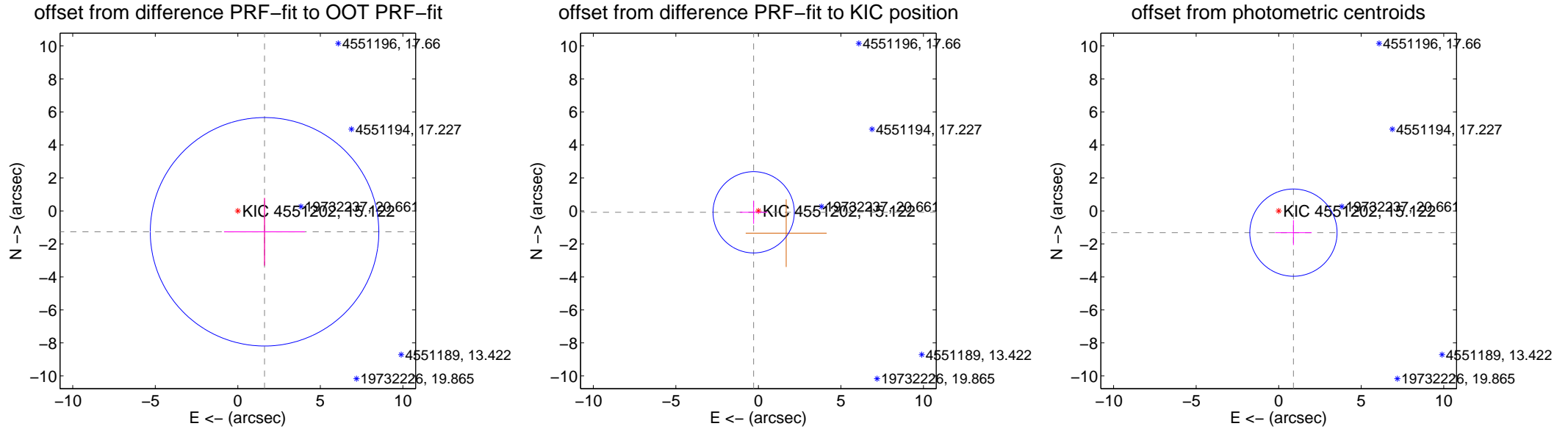
## DV Centroid Data

Supplemental centroid analysis for 004551202-04. Kepler magnitude: 15.12. Transit SNR 5.30

There are 1 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.10 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.056 \pm 2.308$	0.89	$-1.620 \pm 2.452$	$-1.266 \pm 2.050$
PRF-fit source offset from KIC position	$0.298 \pm 0.821$	0.36	$0.286 \pm 0.831$	$-0.084 \pm 0.698$
photometric centroid source offset	$1.59 \pm 0.88$	1.81	$-0.89 \pm 1.10$	$-1.32 \pm 0.76$

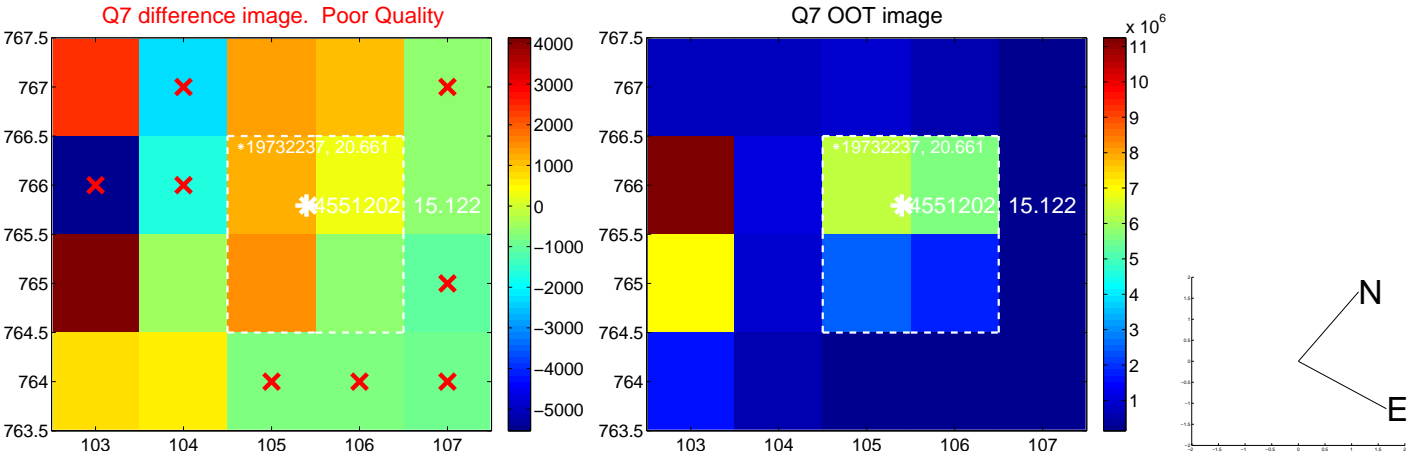
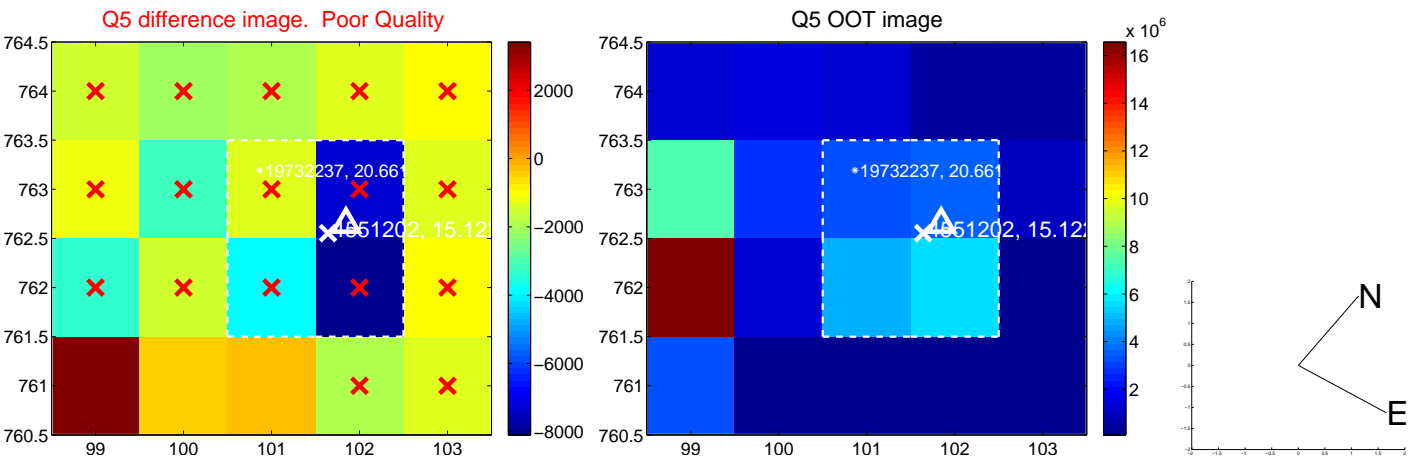


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

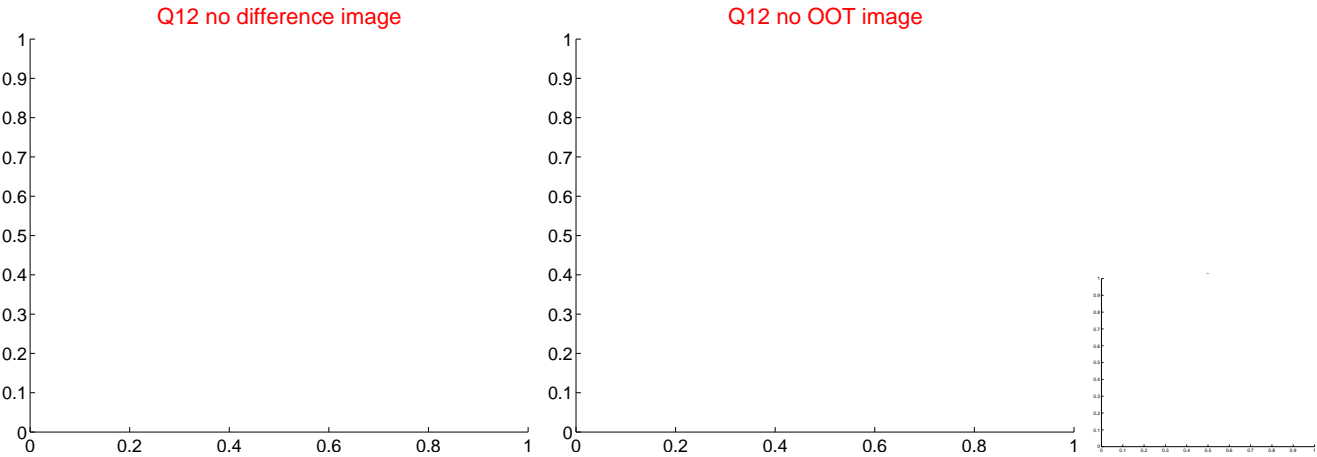
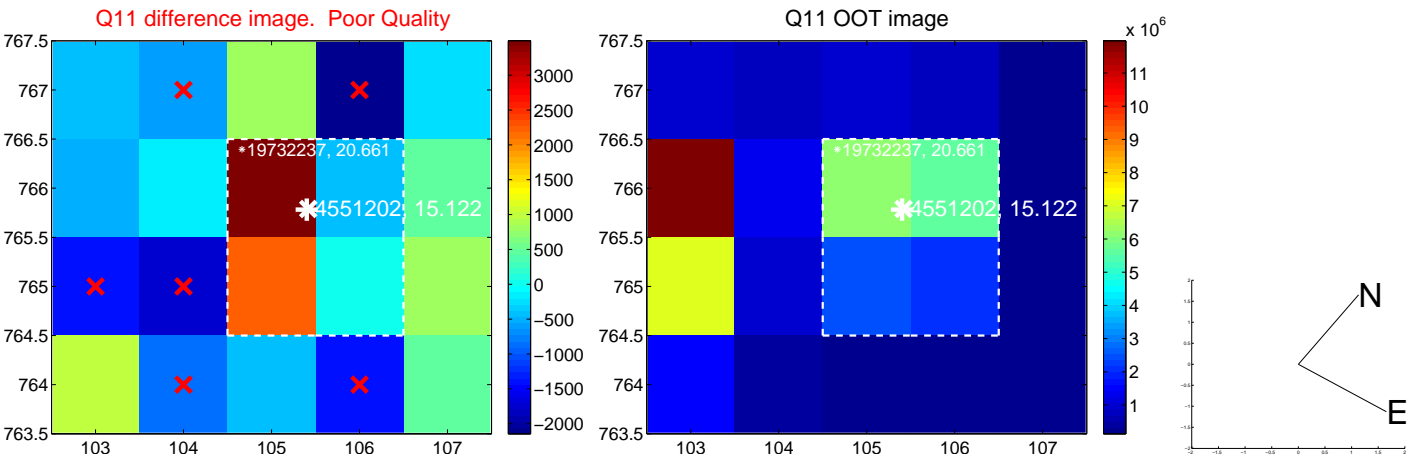
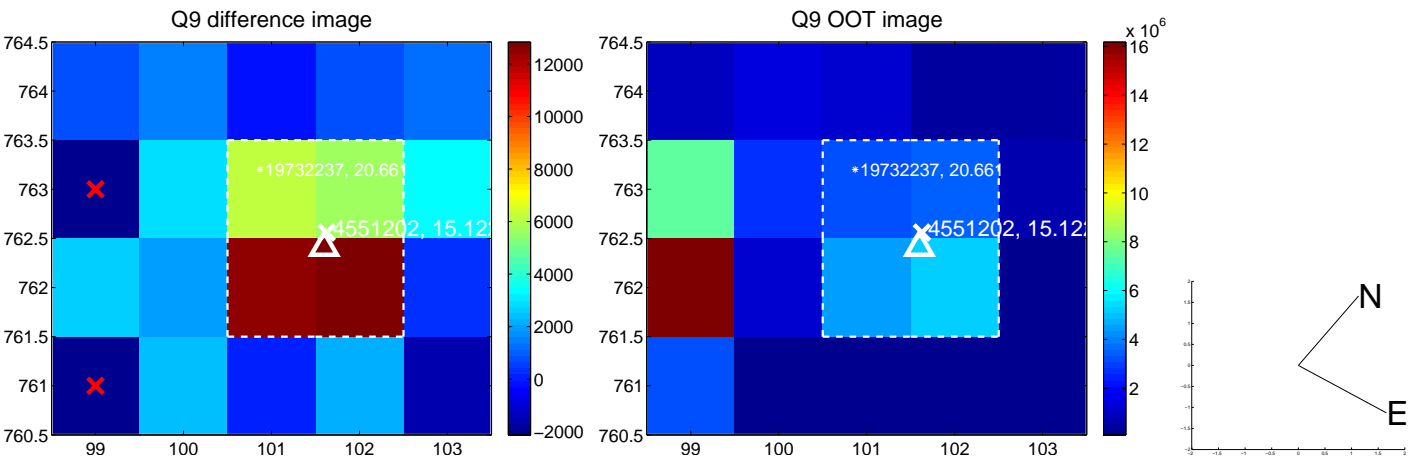
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



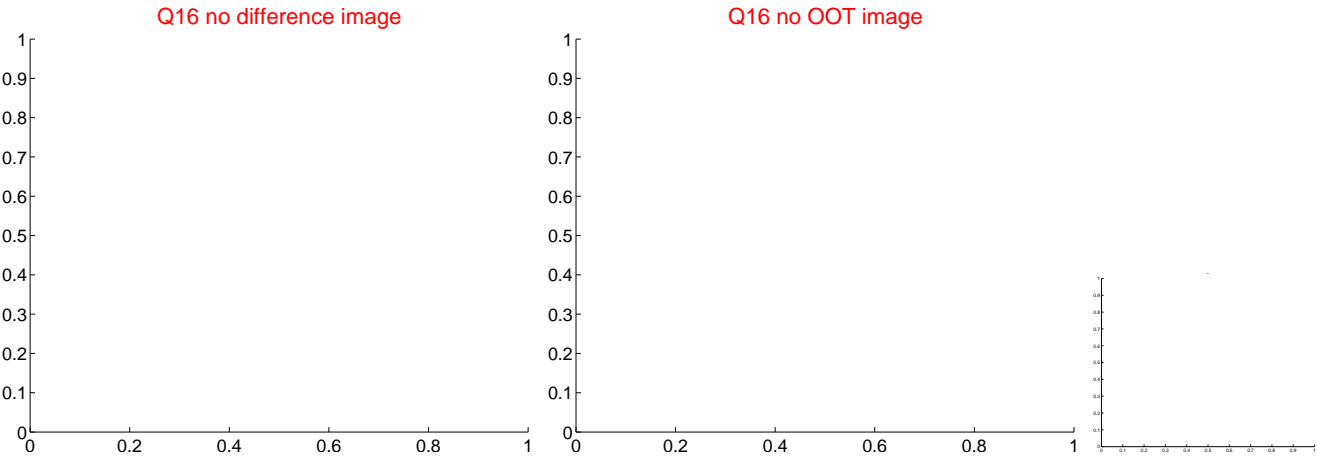
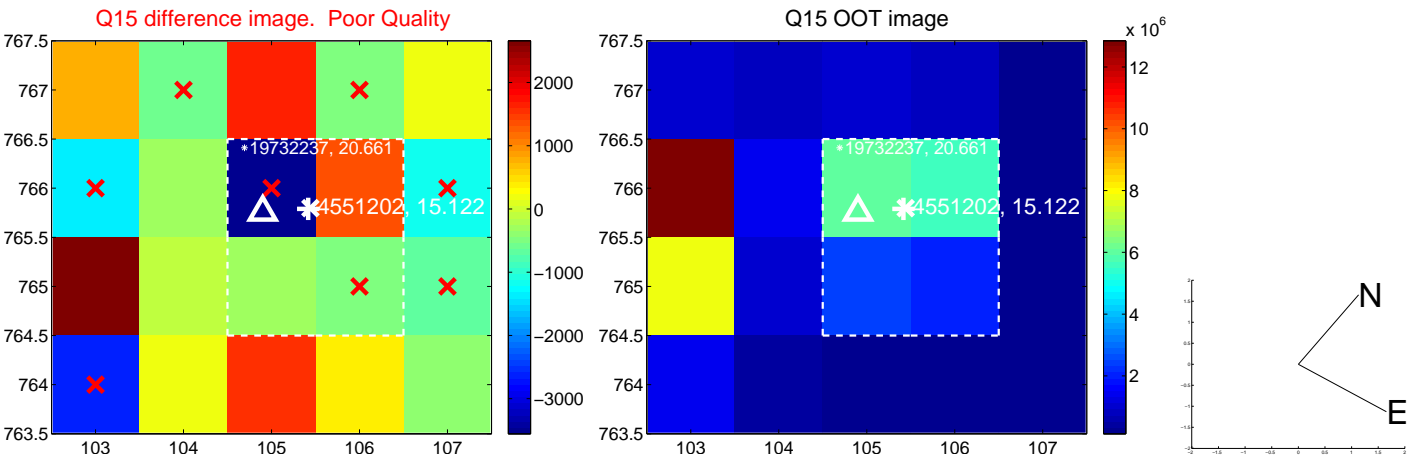
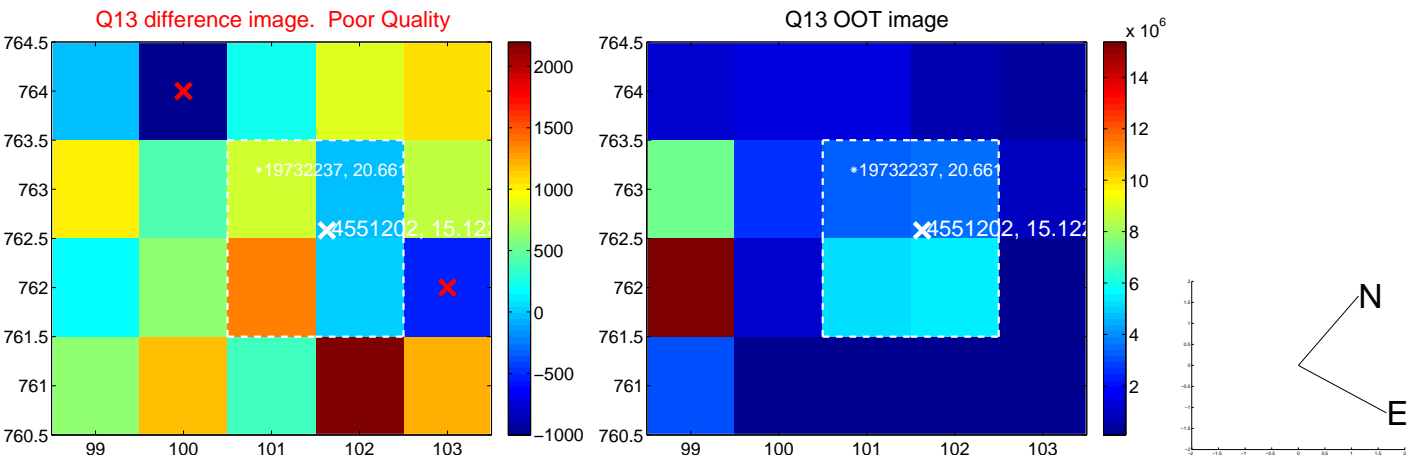
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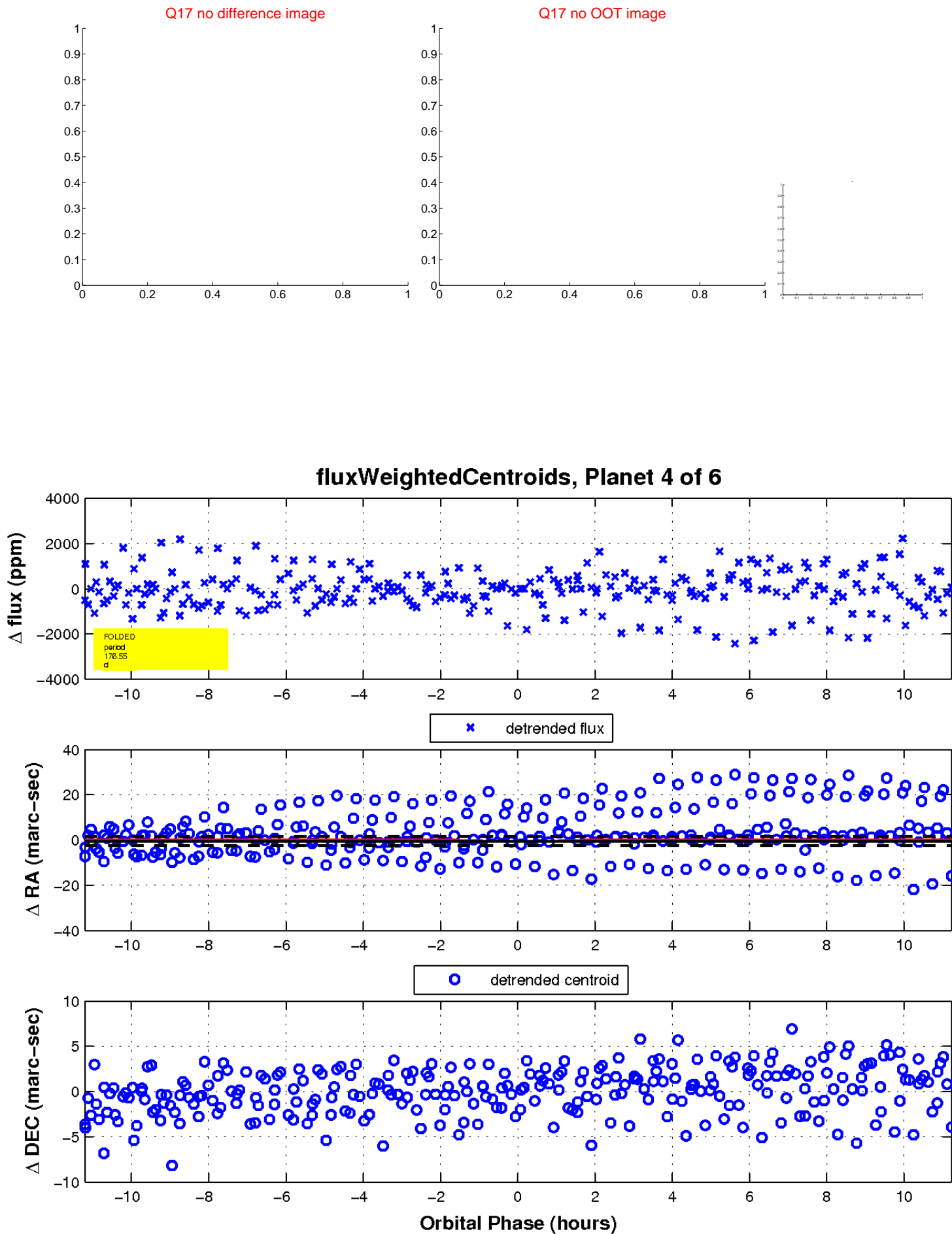
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white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

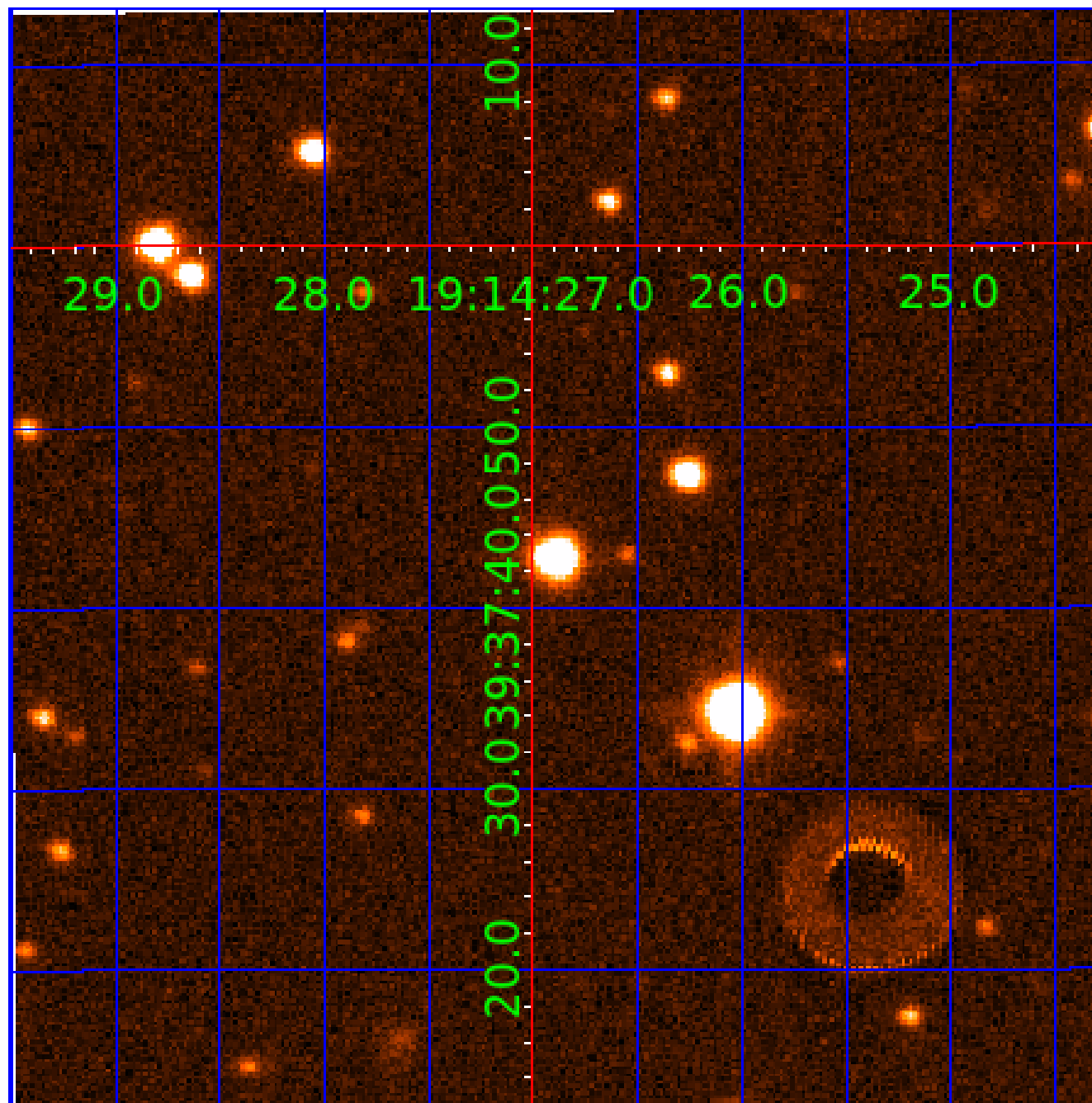


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 004551202

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
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004551202-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004551202-03	OBS	FP	0.00	1	0	0	0	LPP_DV—CENT_FEW_MEAS
004551202-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_POS_DV—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004551202-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004551202-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_MEAS

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

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

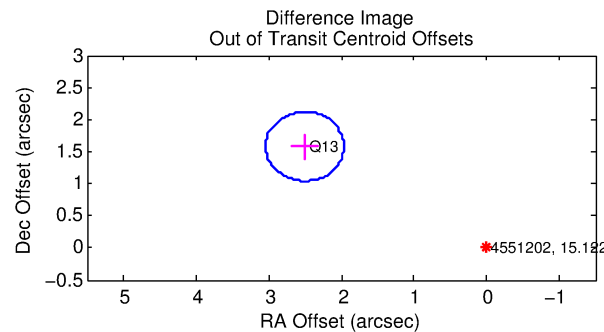
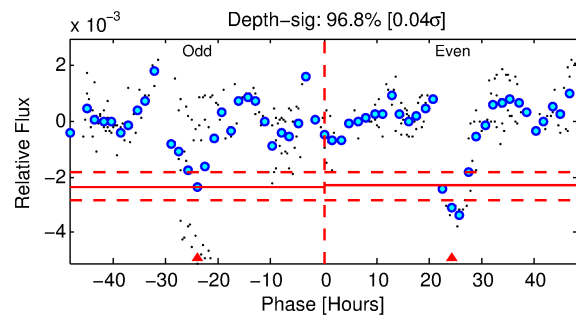
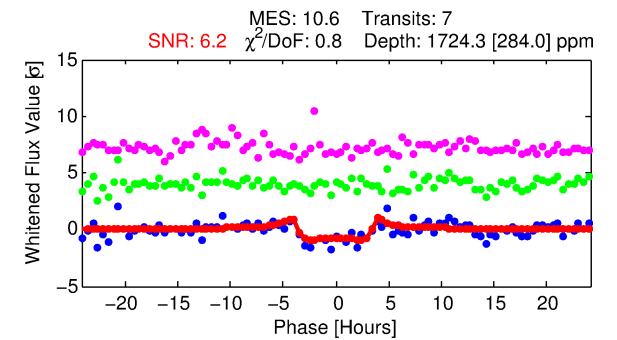
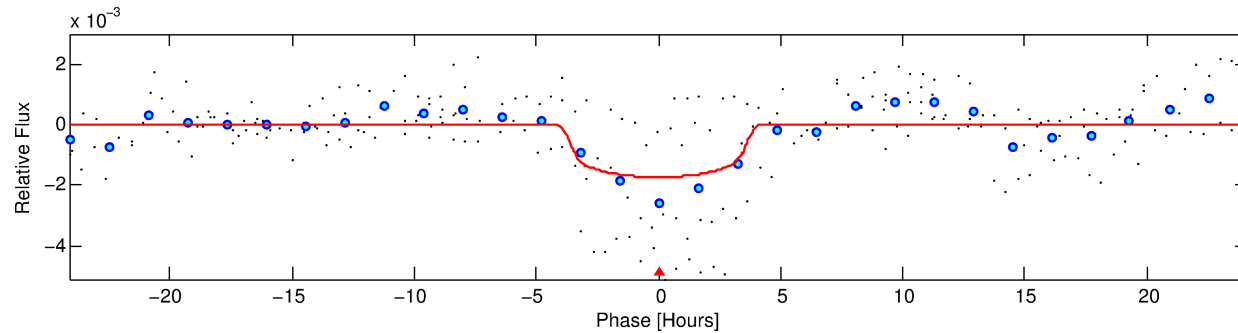
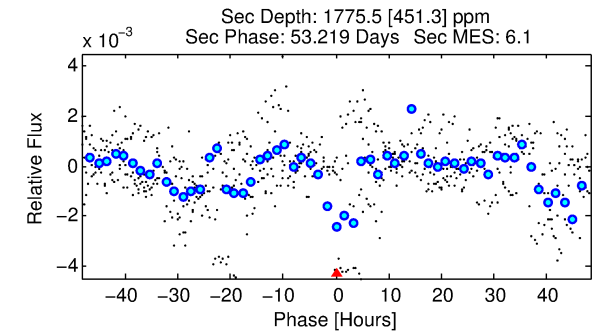
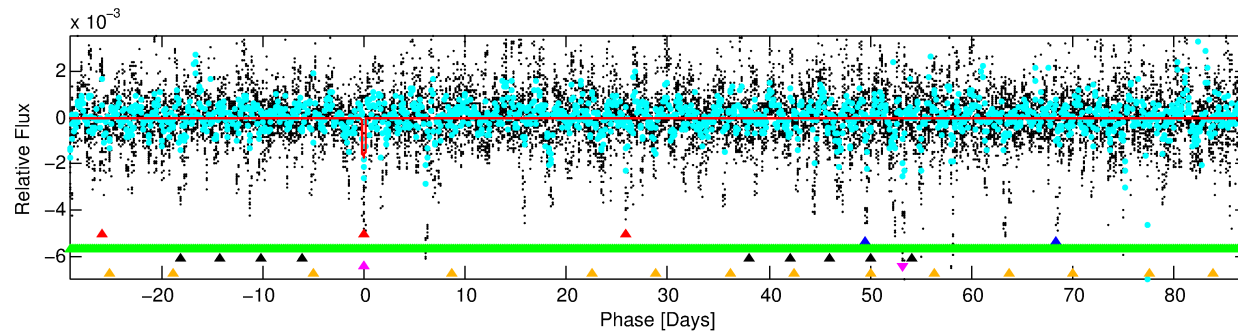
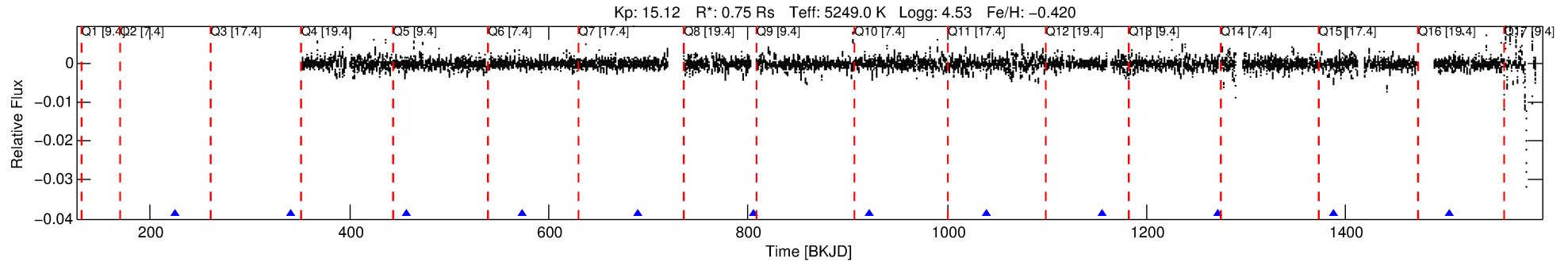
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004551202-05

No Significant Match Found

# DV One-Page Summary

KIC: 4551202 Candidate: 5 of 6 Period: 116.355 d



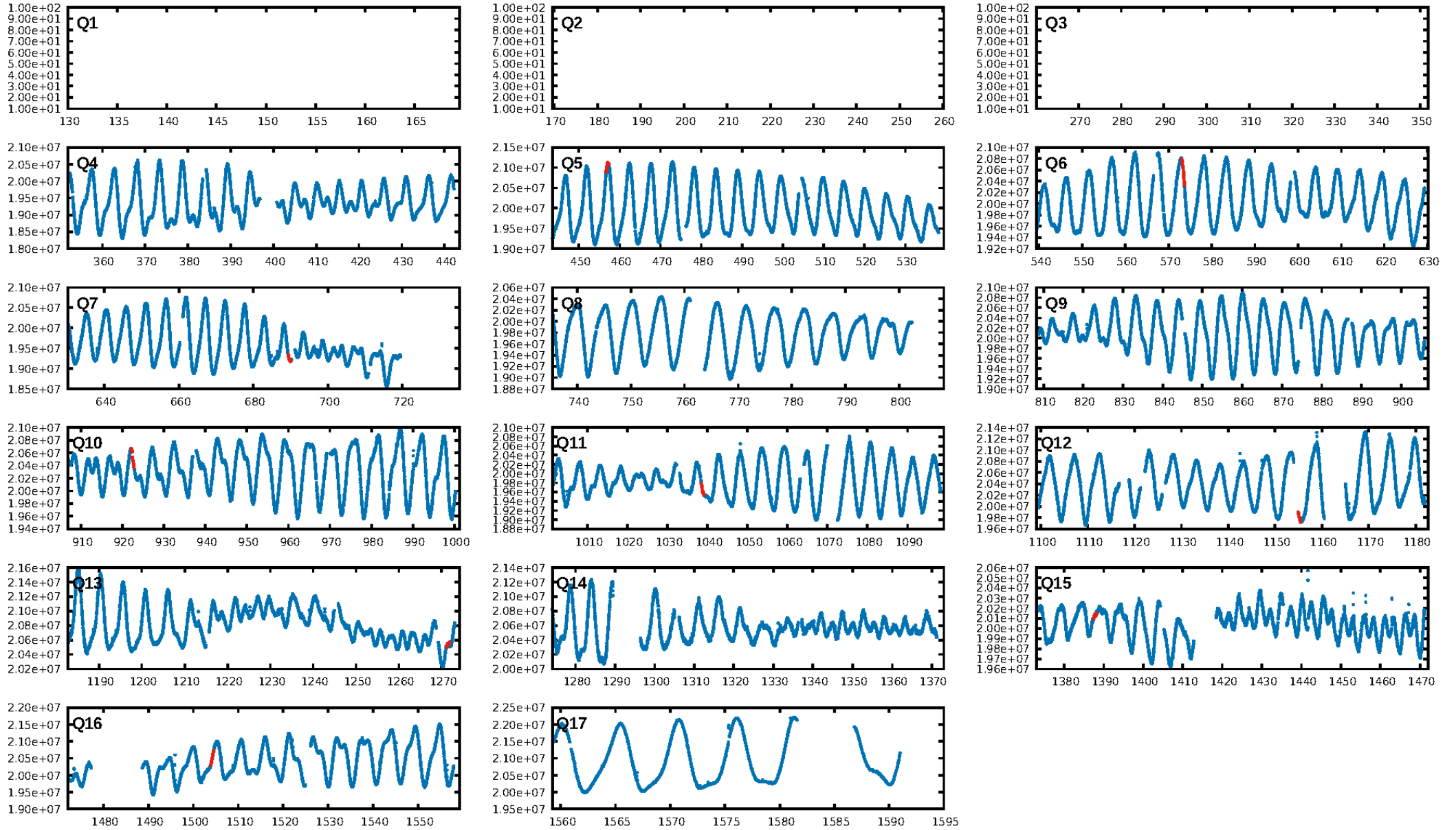
## DV Fit Results:

Period = 116.35543 [0.00236] d  
Epoch = 224.2869 [0.0159] BKJD  
Rp/R\* = 0.0417 [0.0078]  
a/R\* = 78.15 [46.87]  
b = 0.77 [0.33]  
Seff = 2.24 [0.49]  
Teq = 312 [17] K  
Rp = 3.43 [0.77] Re  
a = 0.4157 [0.0459] AU  
Ag = 14370.31 [6951.15] [2.07σ]  
Teffp = 5279 [626] K [7.93σ]

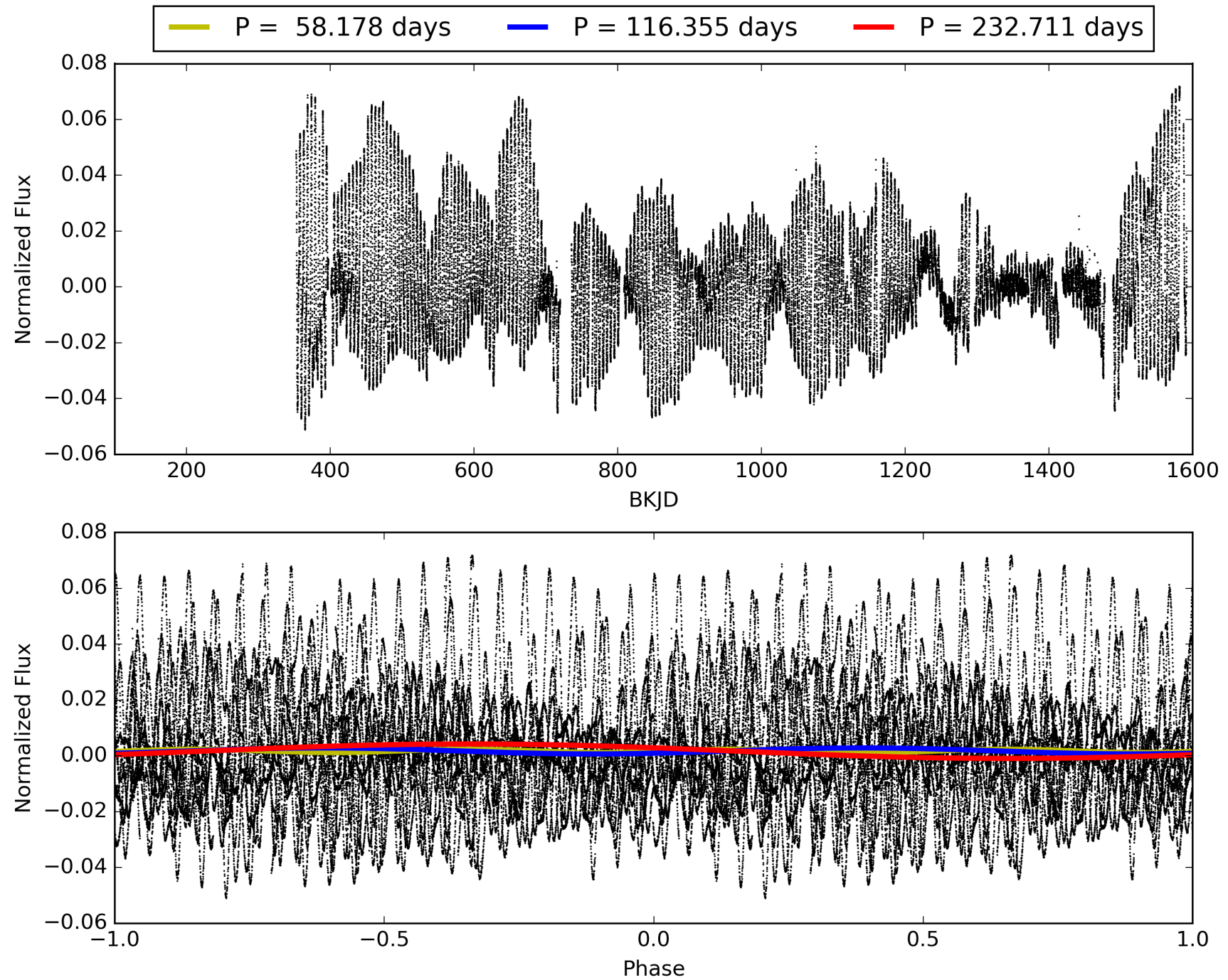
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [37.80σ]  
LongPeriod-sig: 100.0% [162.87σ]  
ModelChiSquare2-sig: 0.8%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [7/7]  
GhostDiagnostic-chr: 2.386  
Centroid-sig: N/A  
Centroid-so: 1.138 arcsec [2.11σ]  
**OutOffset-rm: 2.961 arcsec [16.51σ]**  
KicOffset-rm: 0.188 arcsec [1.34σ]  
OotOffset-st: 0/0/0/1 [1]  
KicOffset-st: 2/0/0/2 [4]  
DiffImageQuality-fgm: 0.00 [0/4]  
DiffImageOverlap-fno: 0.00 [0/6]

# TCE 004551202-05, PDC Light Curves

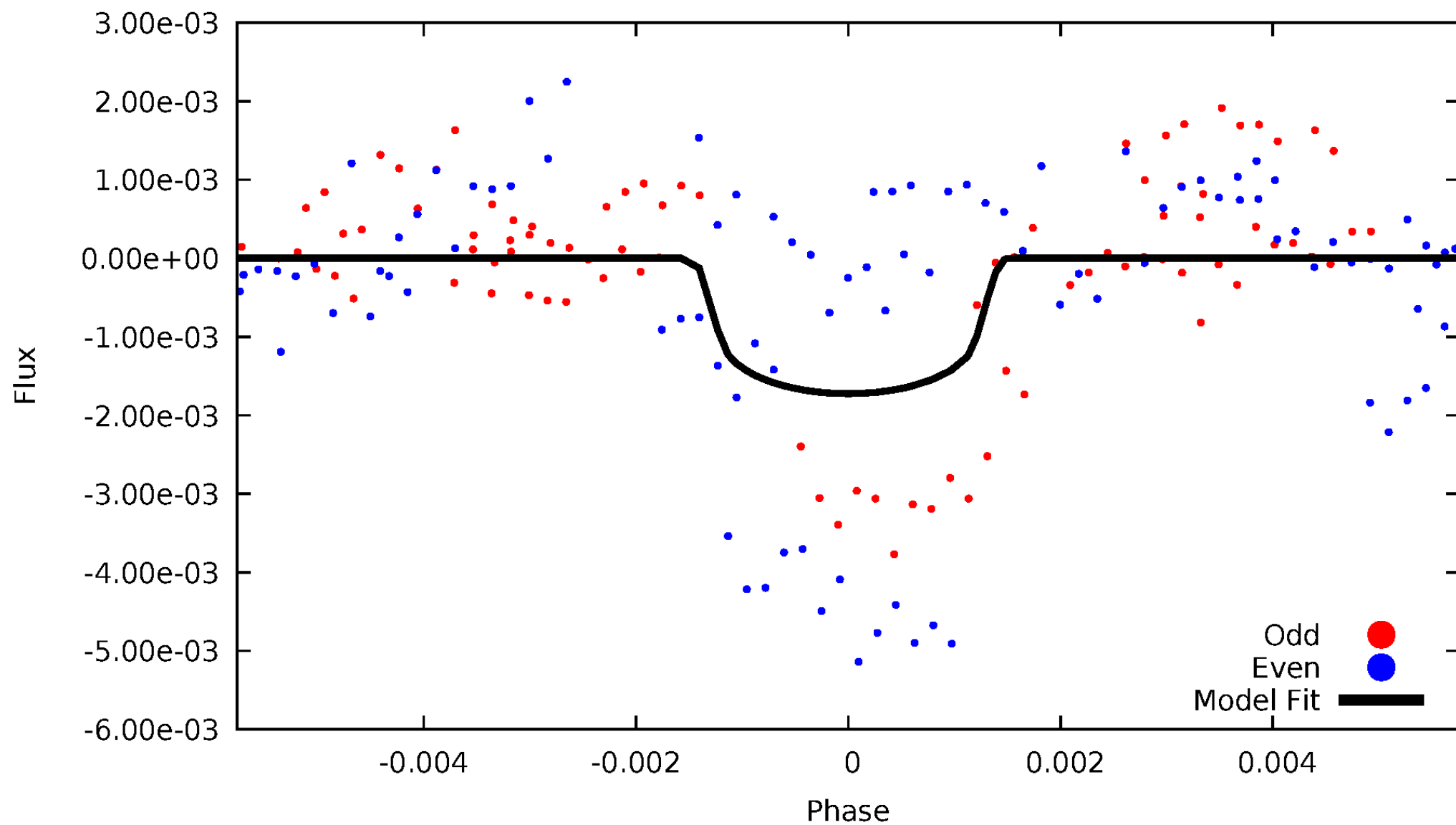


TCE 004551202-05



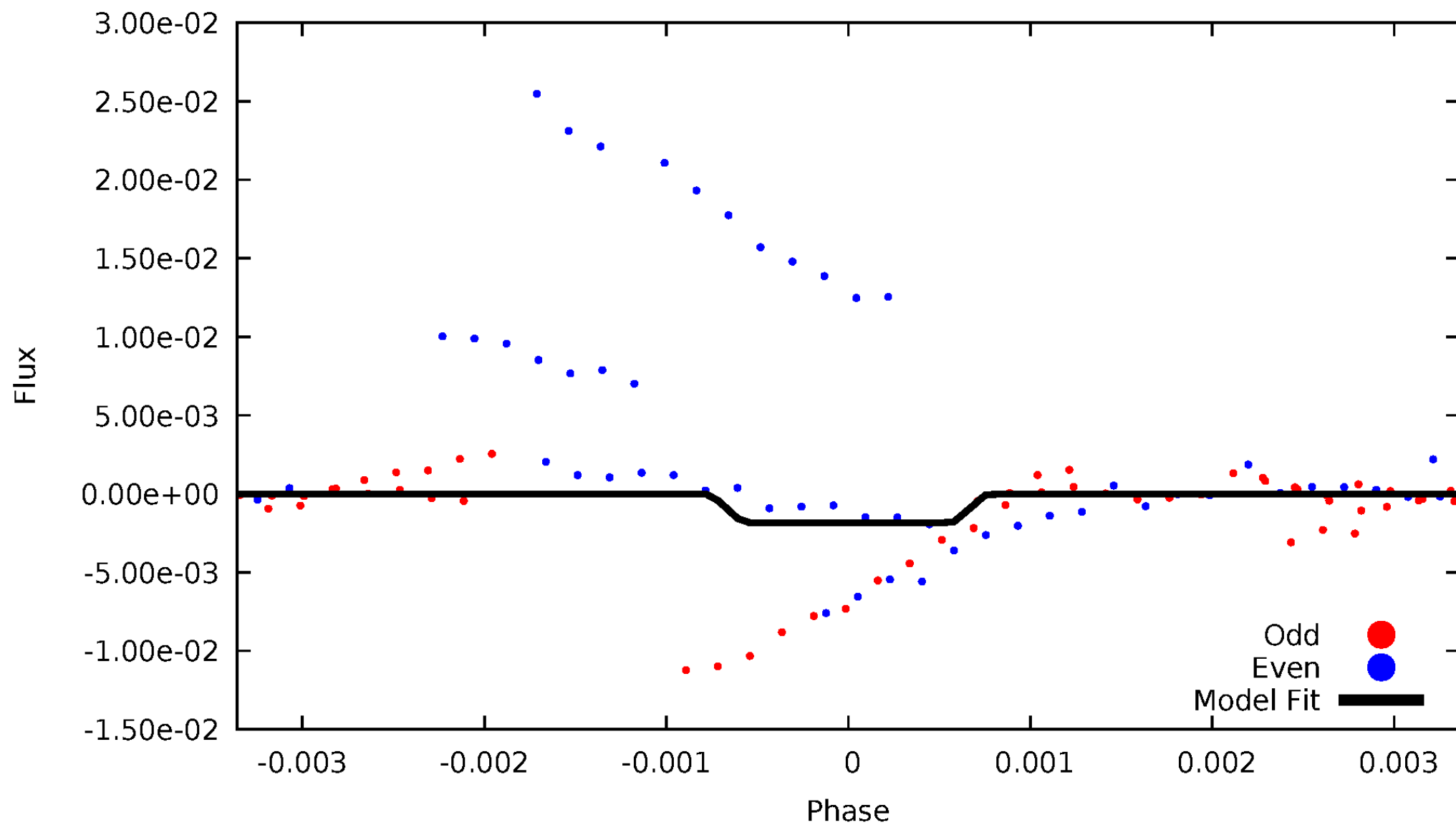
# DV Odd/Even

TCE 004551202-05



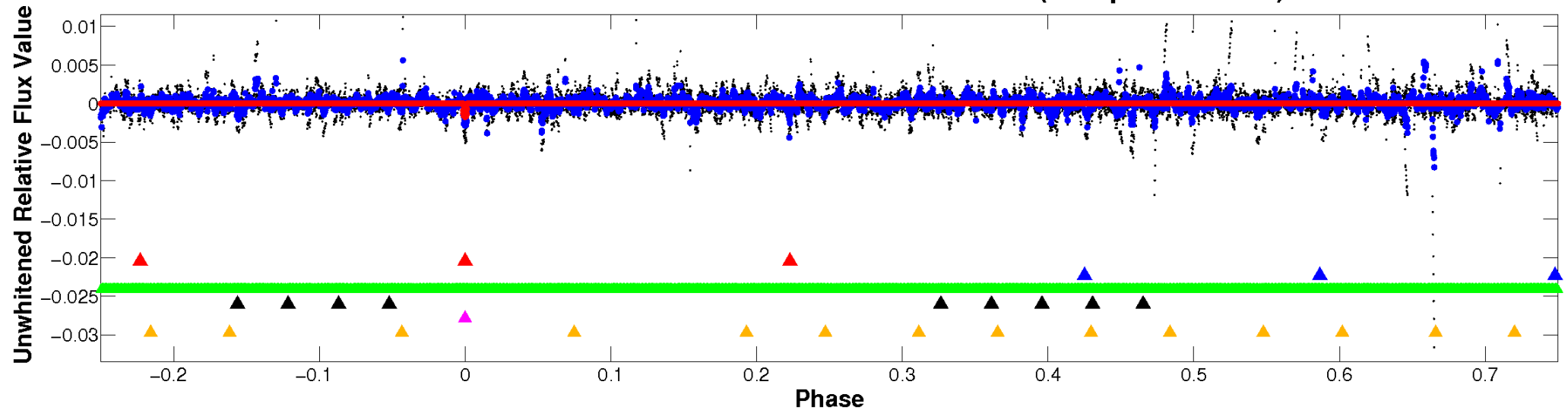
# ALT Odd/Even

TCE 004551202-05

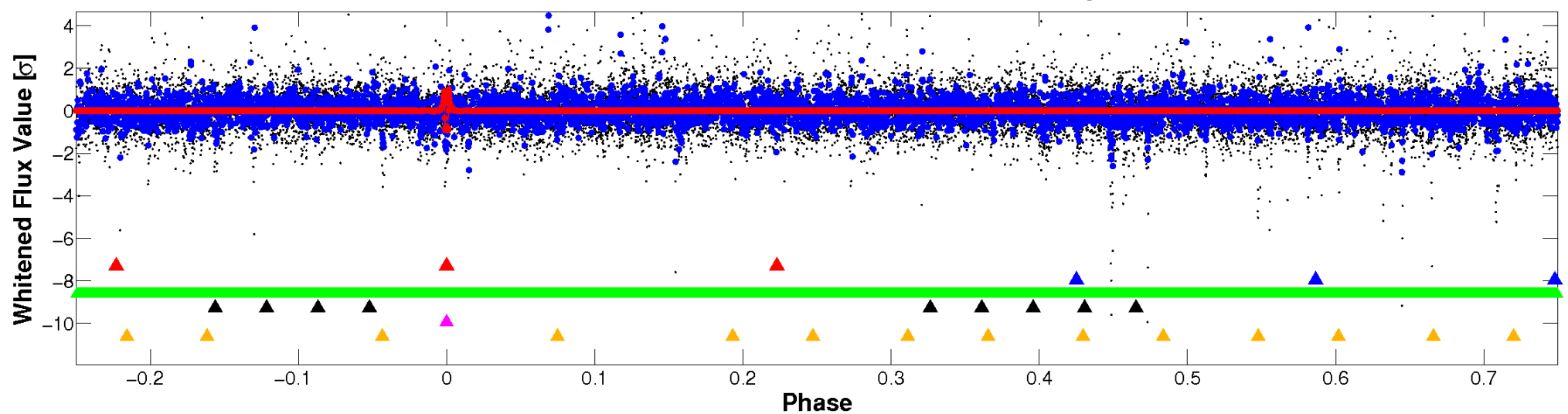


# Non-Whitened Vs. Whitened Light Curve

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



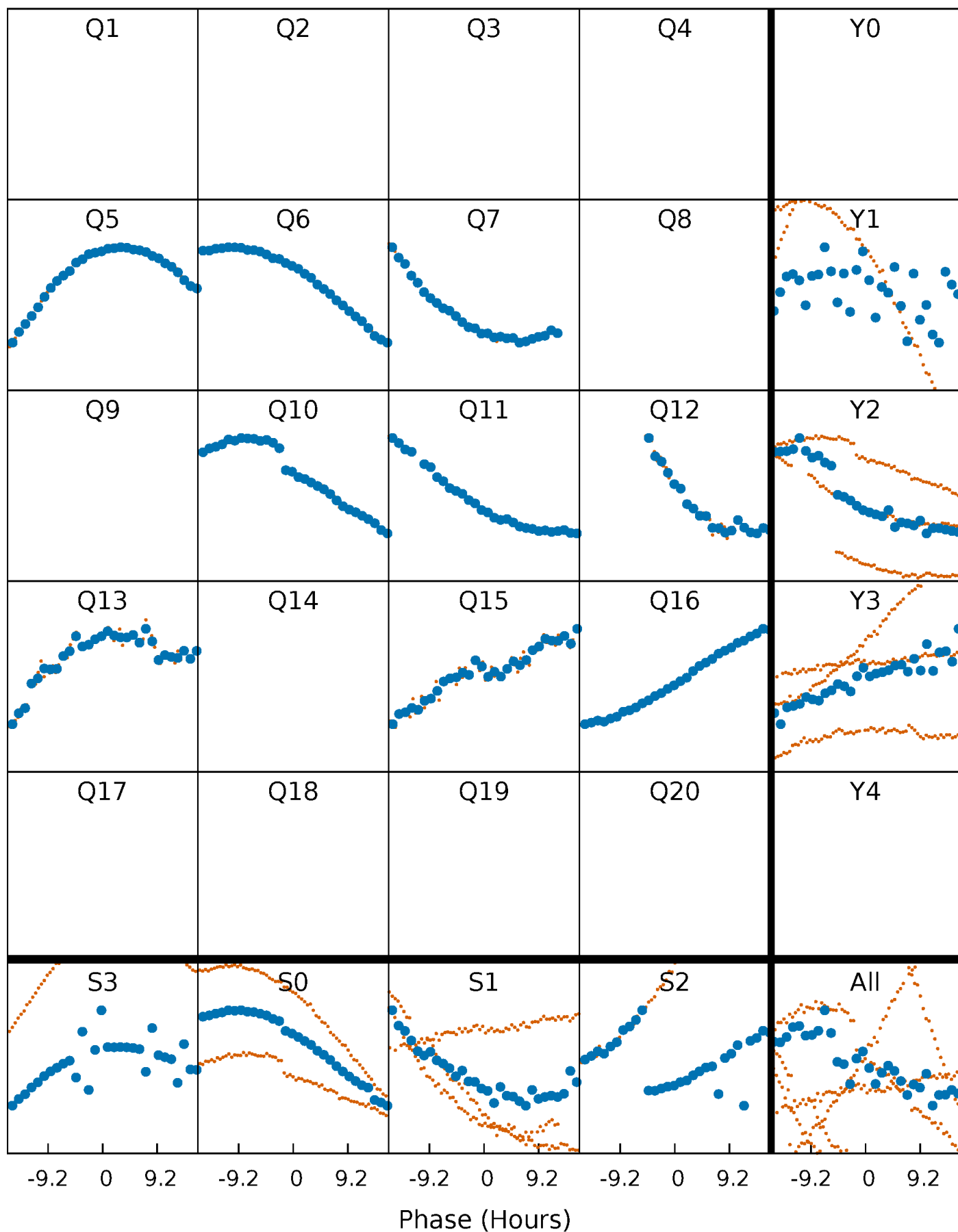
## Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)





# PDC Quarter-Phased Transit Curves

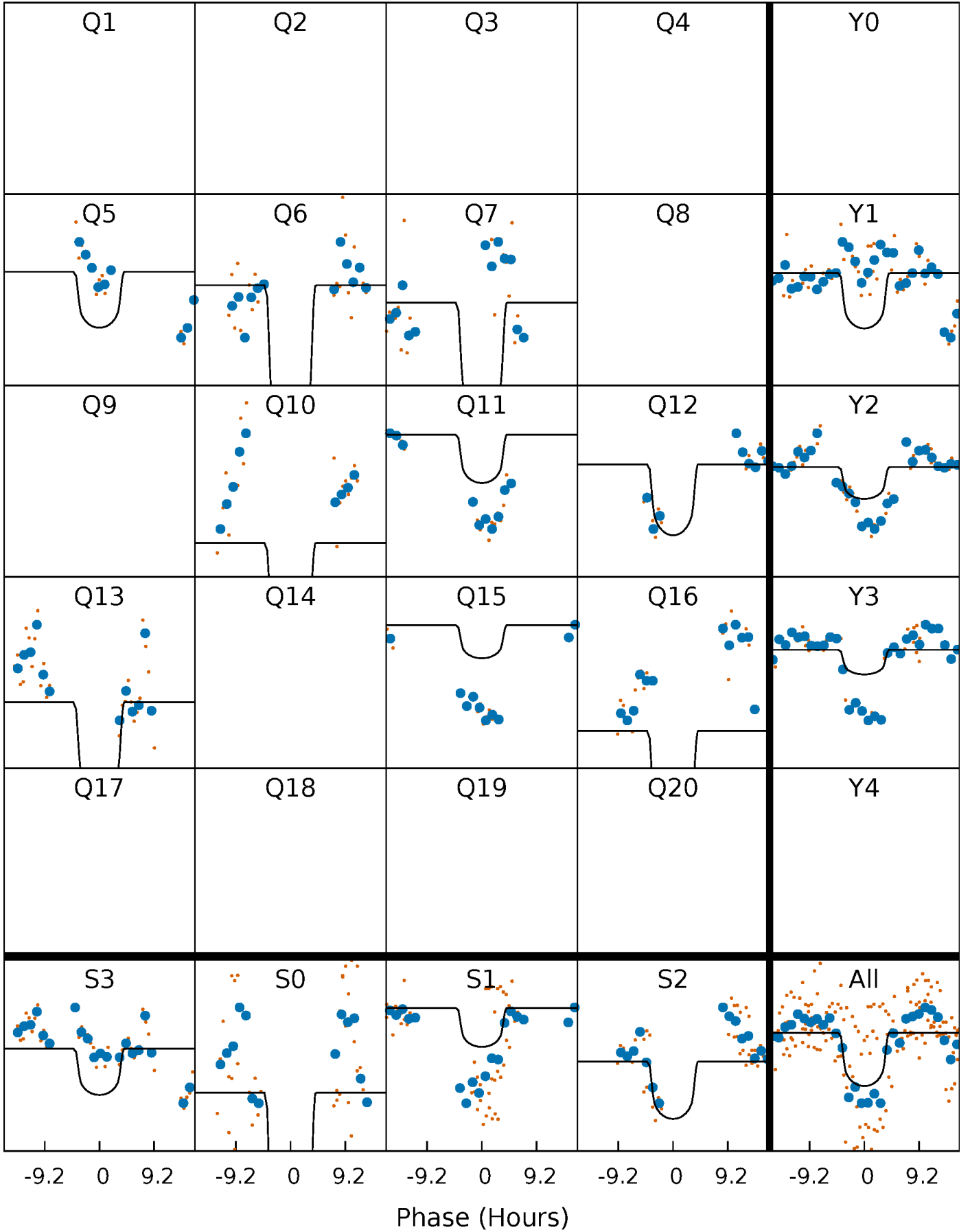
TCE 004551202-05     $P=116.355427$  Days     $T_0=224.286918$  (BKJD)





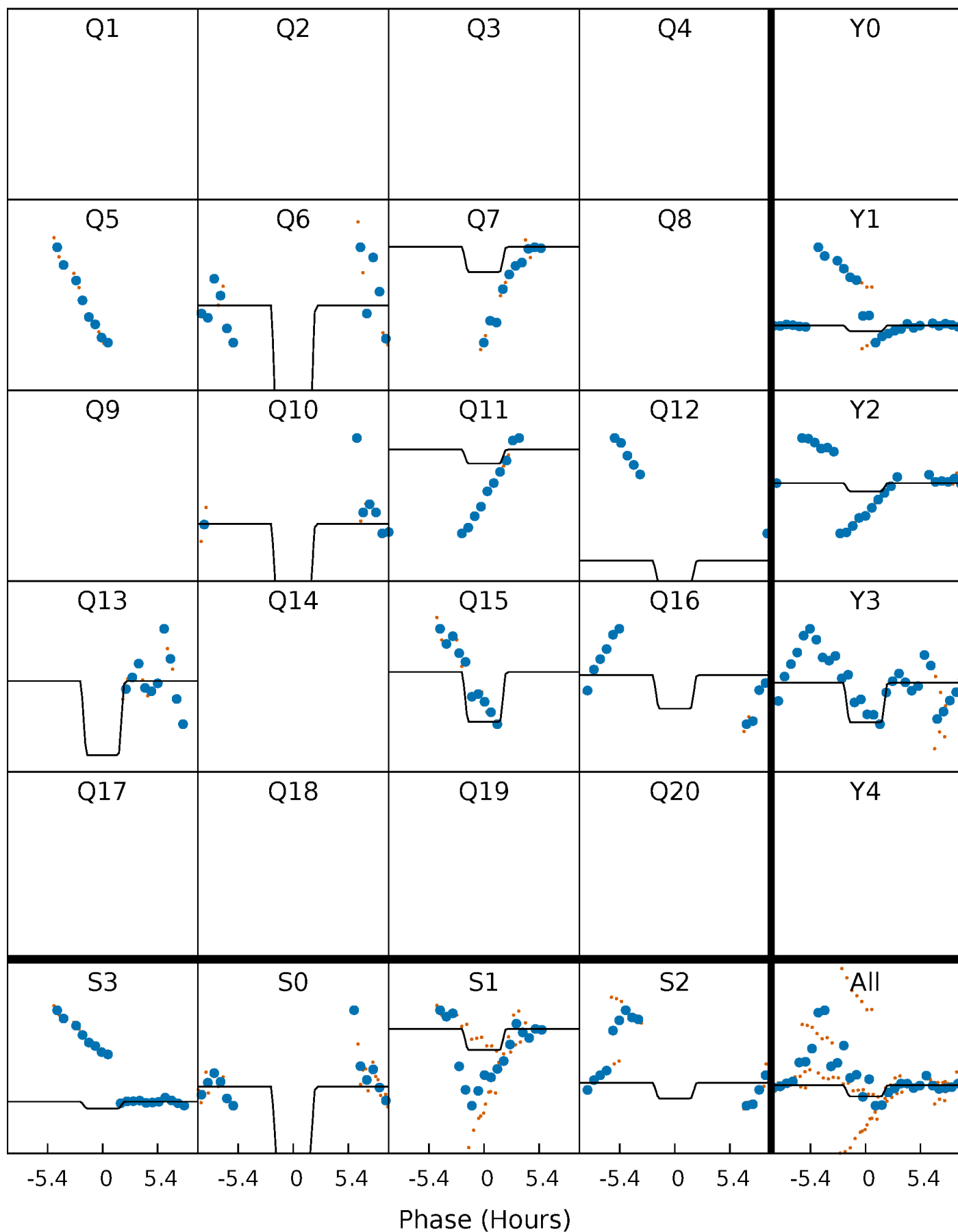
# DV Quarter-Phased Transit Curves

TCE 004551202-05     $P=116.355427$  Days     $T_0=224.286918$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

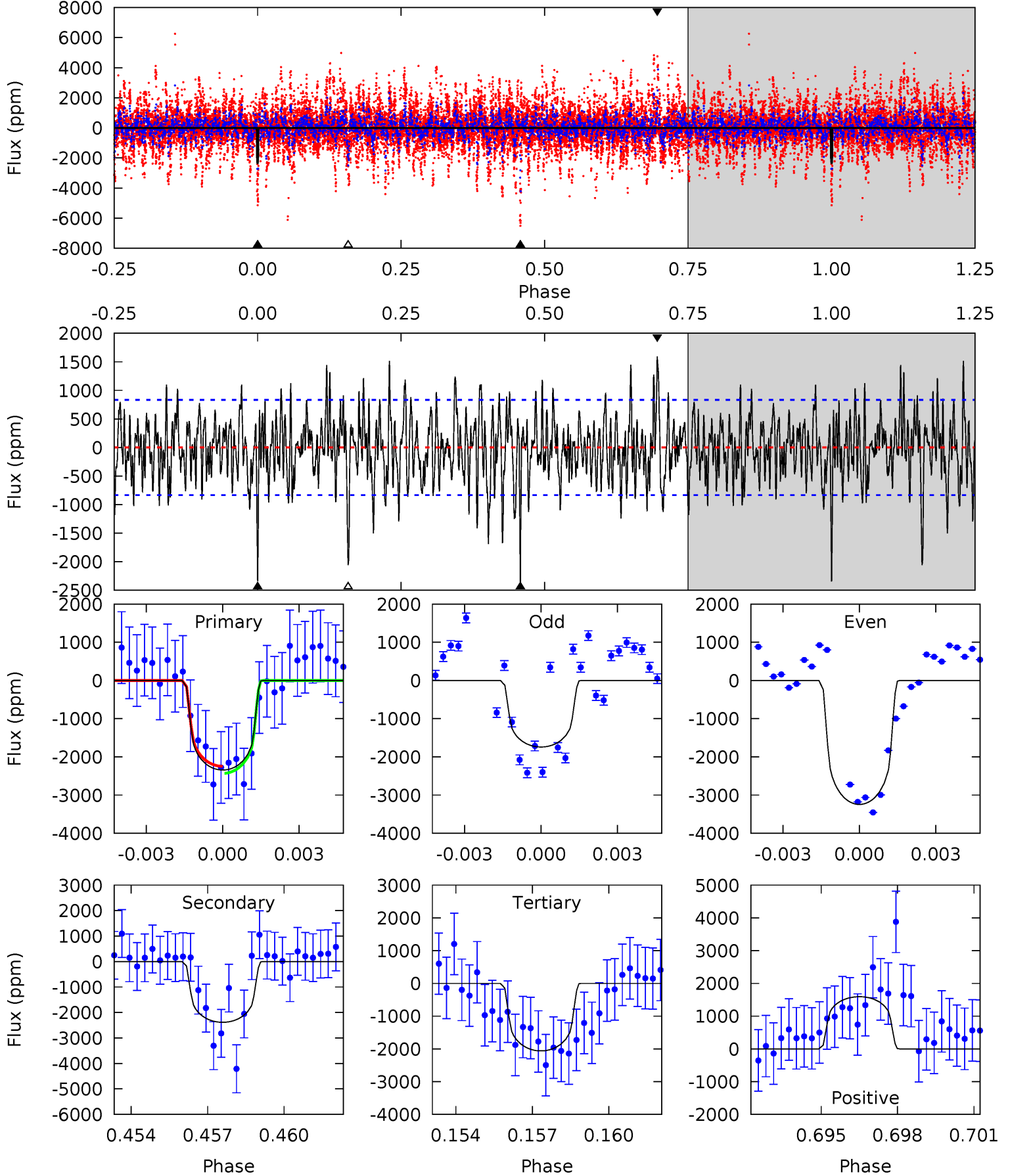
TCE 004551202-05     $P=116.358704$  Days     $T_0=224.315823$  (BKJD)



# DV Model-Shift Uniqueness Test

004551202-05, P = 116.355427 Days, E = 224.286918 Days

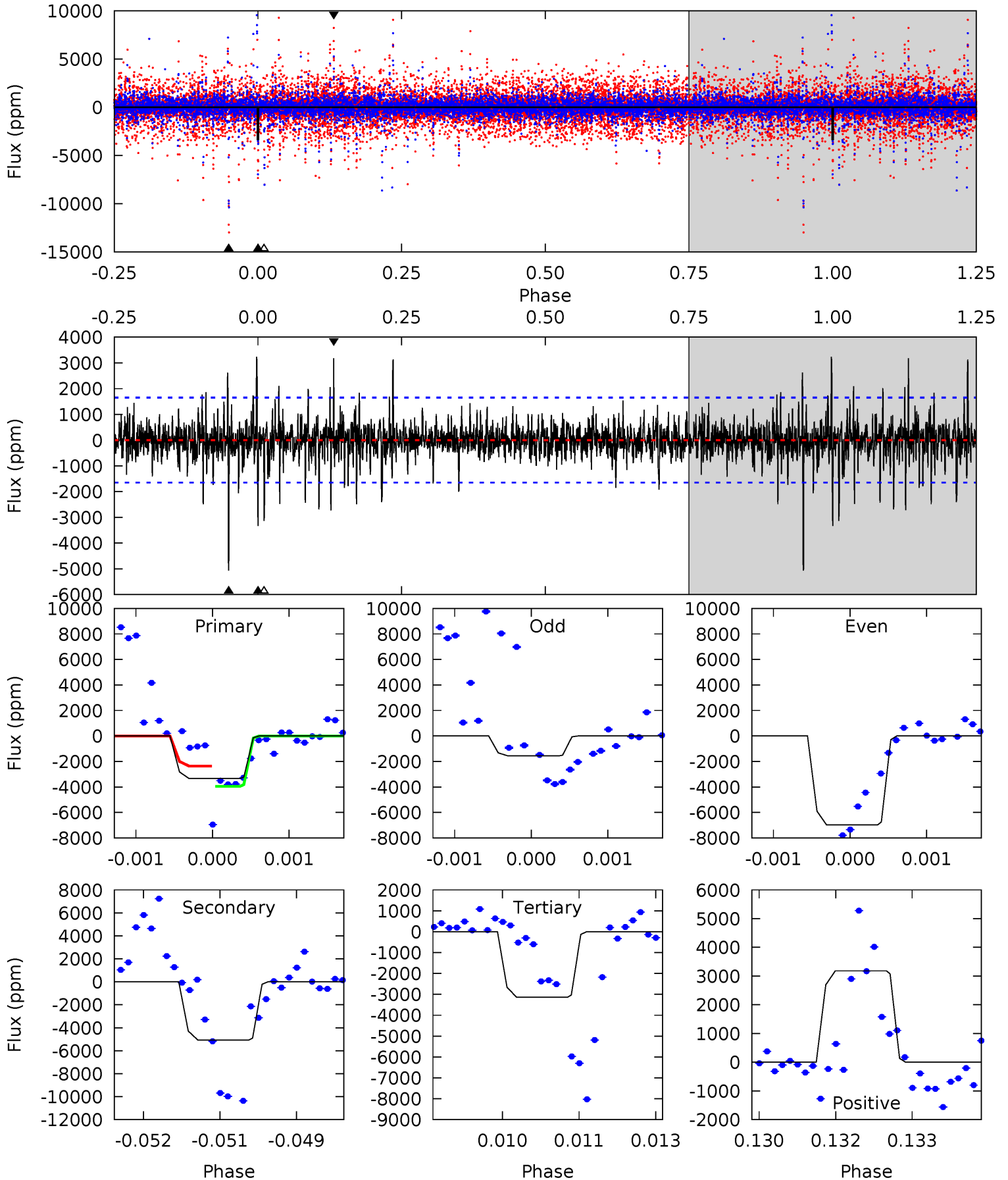
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
14.8	15.0	13.0	10.0	5.25	2.97	3.14	1.79	4.73	2.05	4.99	3.87	1.20	0.40	0.58



# Alt Model-Shift Uniqueness Test

004551202-05, P = 116.358704 Days, E = 224.315823 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
10.9	16.5	10.2	10.4	5.39	3.19	1.70	0.64	0.49	6.30	6.16	7.79	-0.07	0.39	2.22



### Stellar Parameters For KIC 004551202

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5249^{+183}_{-183}$	$4.533^{+0.096}_{-0.072}$	$-0.420^{+0.350}_{-0.300}$	$0.754^{+0.093}_{-0.093}$	$0.708^{+0.105}_{-0.045}$	$2.326^{+0.902}_{-0.546}$
	+3%/-3%	+2%/-2%	+83%/-71%	+12%/-12%	+15%/-6%	+39%/-23%
Source	KIC0	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 004551202-05 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-2386 \pm 159$	$3.41^{+0.72}_{-0.64}$	$434^{+19}_{-21}$	$5651^{+590}_{-513}$	$19773^{+9758}_{-6444}$
Alt.	$-5065 \pm 306$	$3.52^{+0.71}_{-0.67}$	$434^{+21}_{-21}$	$6691^{+867}_{-600}$	$39412^{+20602}_{-12161}$

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

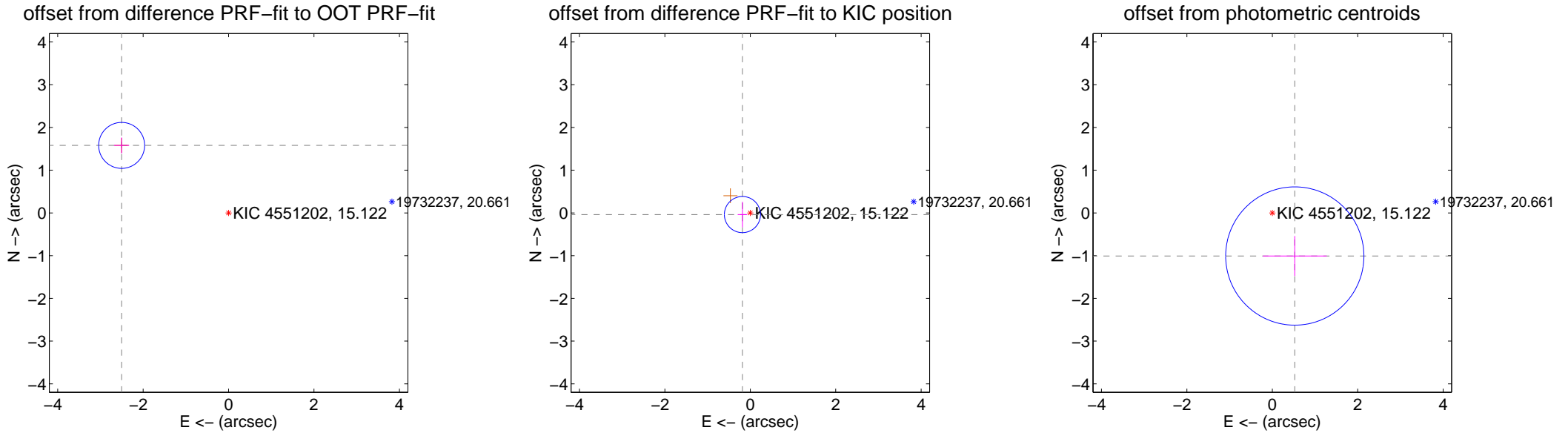
## DV Centroid Data

Supplemental centroid analysis for 004551202-05. Kepler magnitude: 15.12. Transit SNR 6.23

There are 0 quarters with good PRF difference image offsets

The OOT PRF centroid is offset from the target star catalog position by about 2.35 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b>2.961 <math>\pm</math> 0.179</b>	<b>16.51</b>	2.504 $\pm$ 0.177	1.580 $\pm$ 0.185
PRF-fit source offset from KIC position	0.188 $\pm$ 0.141	1.34	0.184 $\pm$ 0.111	-0.039 $\pm$ 0.298
photometric centroid source offset	1.14 $\pm$ 0.54	2.11	-0.53 $\pm$ 0.75	-1.01 $\pm$ 0.47

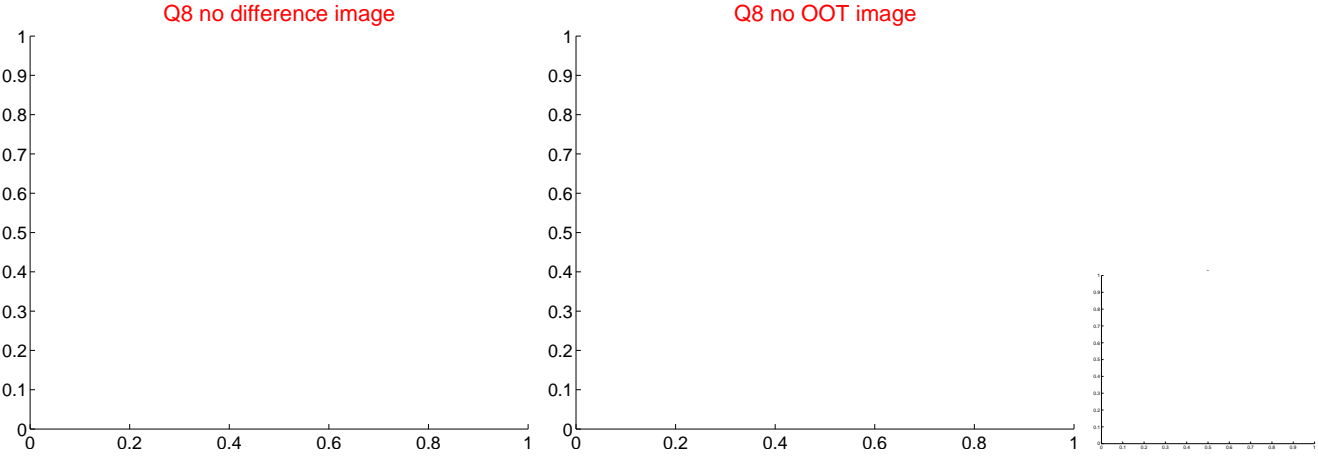
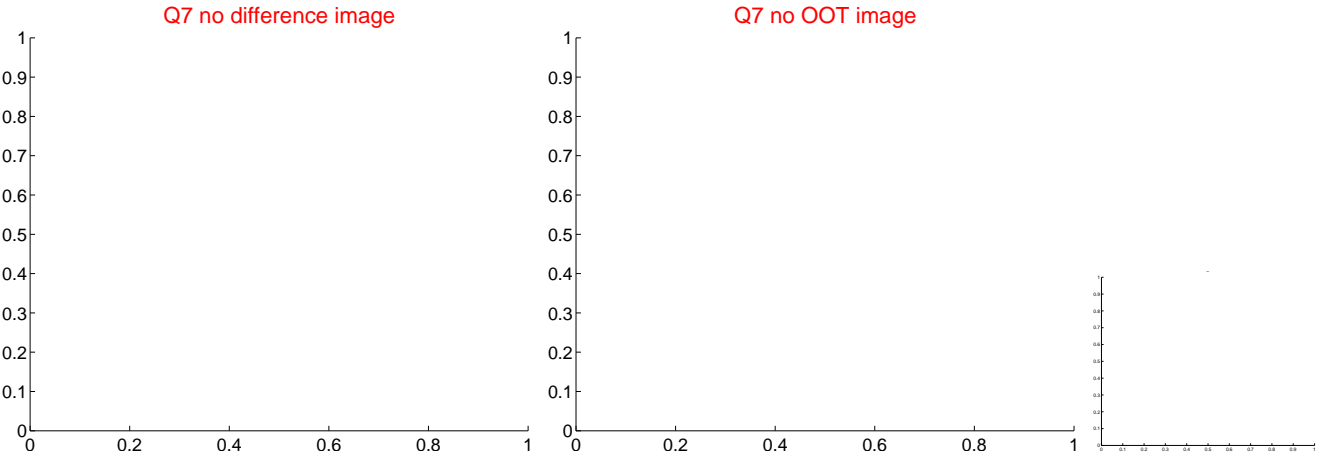
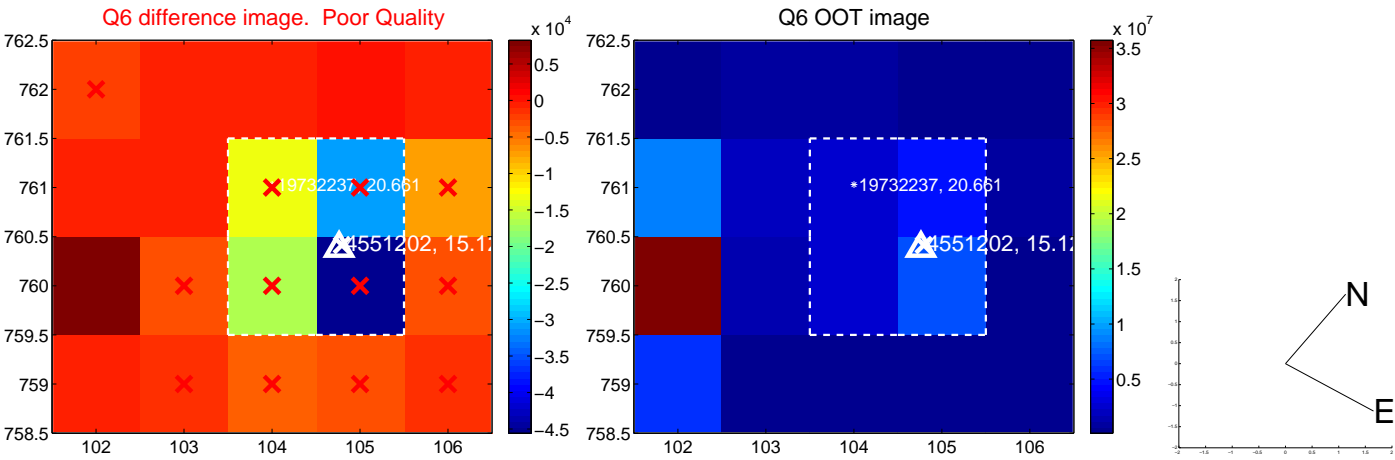
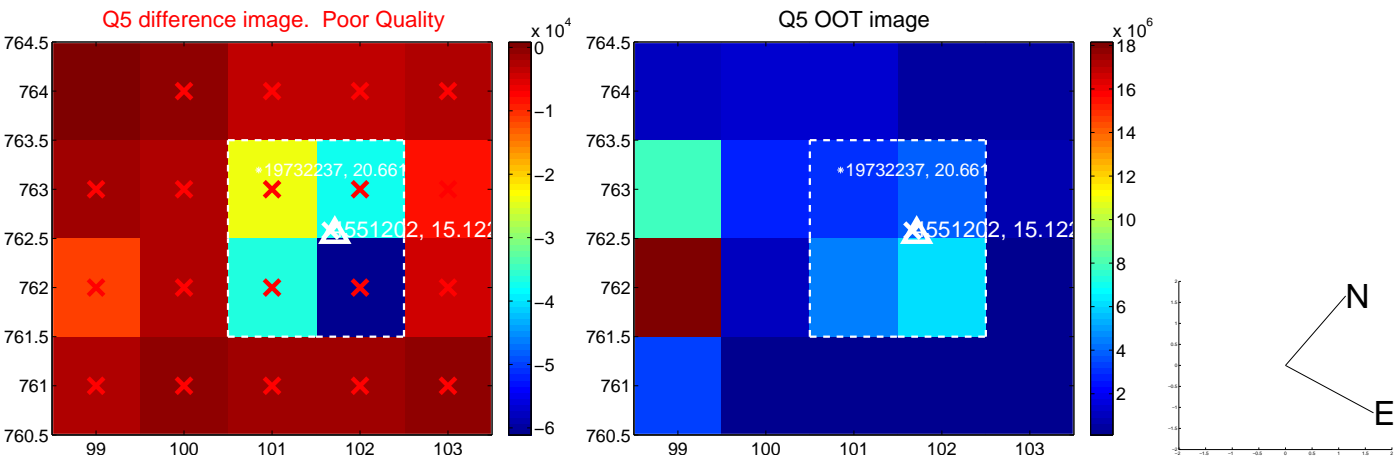


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

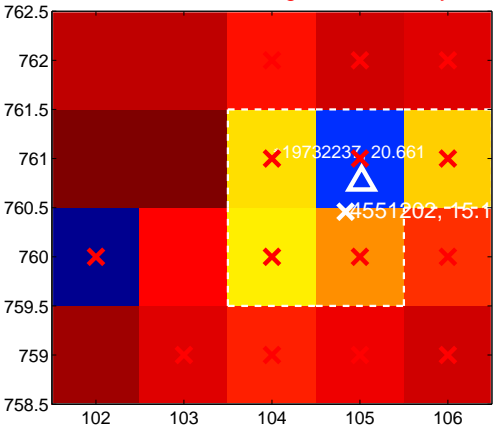
Q9 no difference image



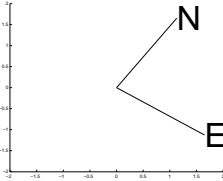
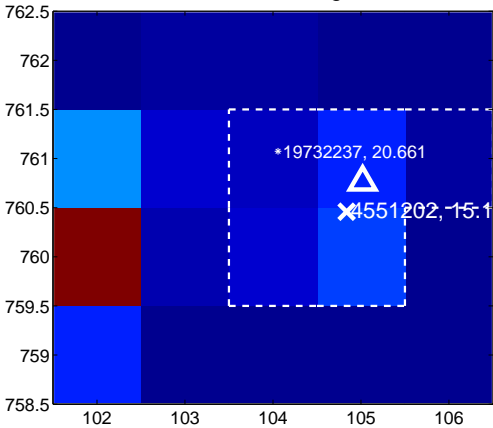
Q9 no OOT image



Q10 difference image. Poor Quality



Q10 OOT image



Q11 no difference image



Q11 no OOT image



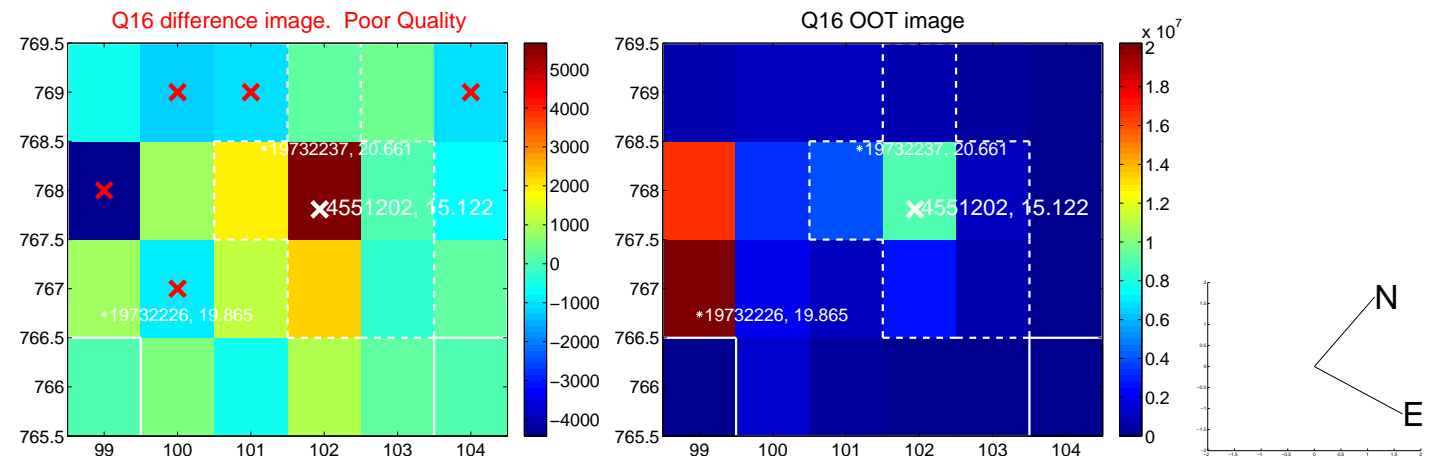
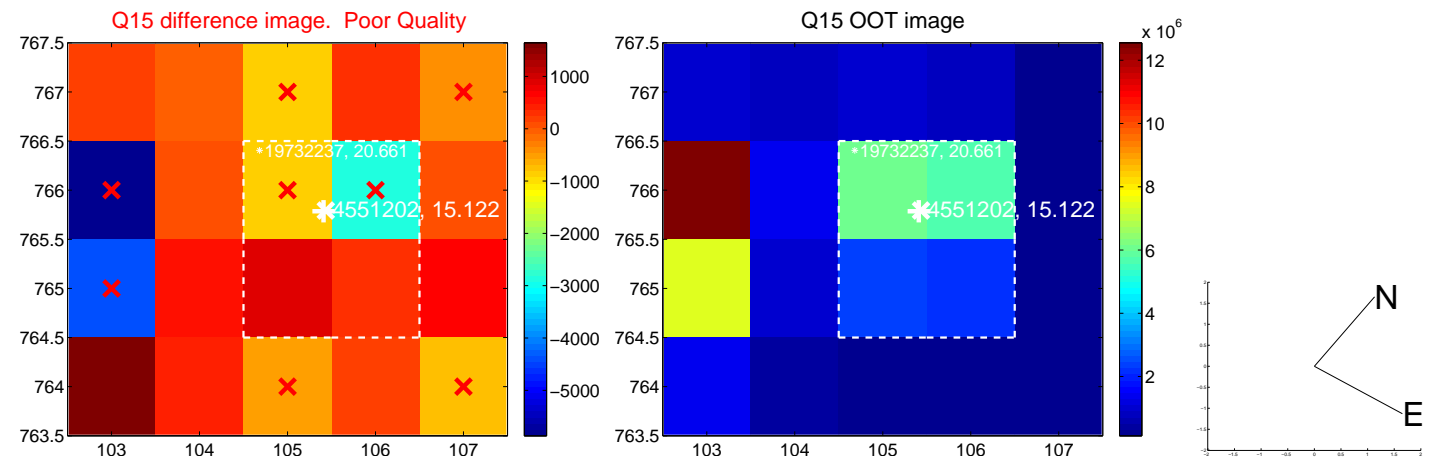
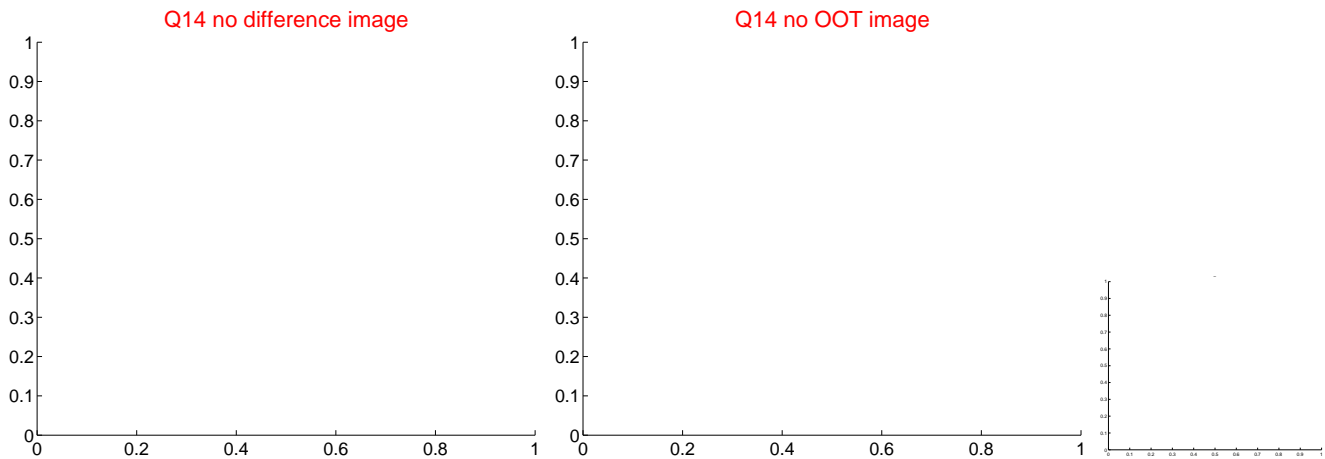
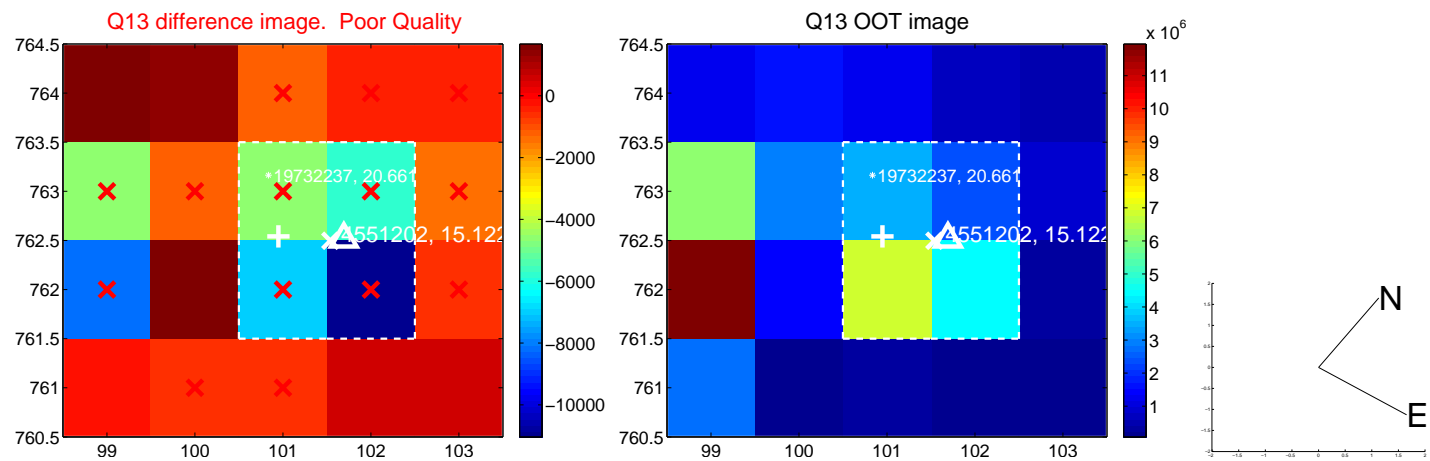
Q12 no difference image



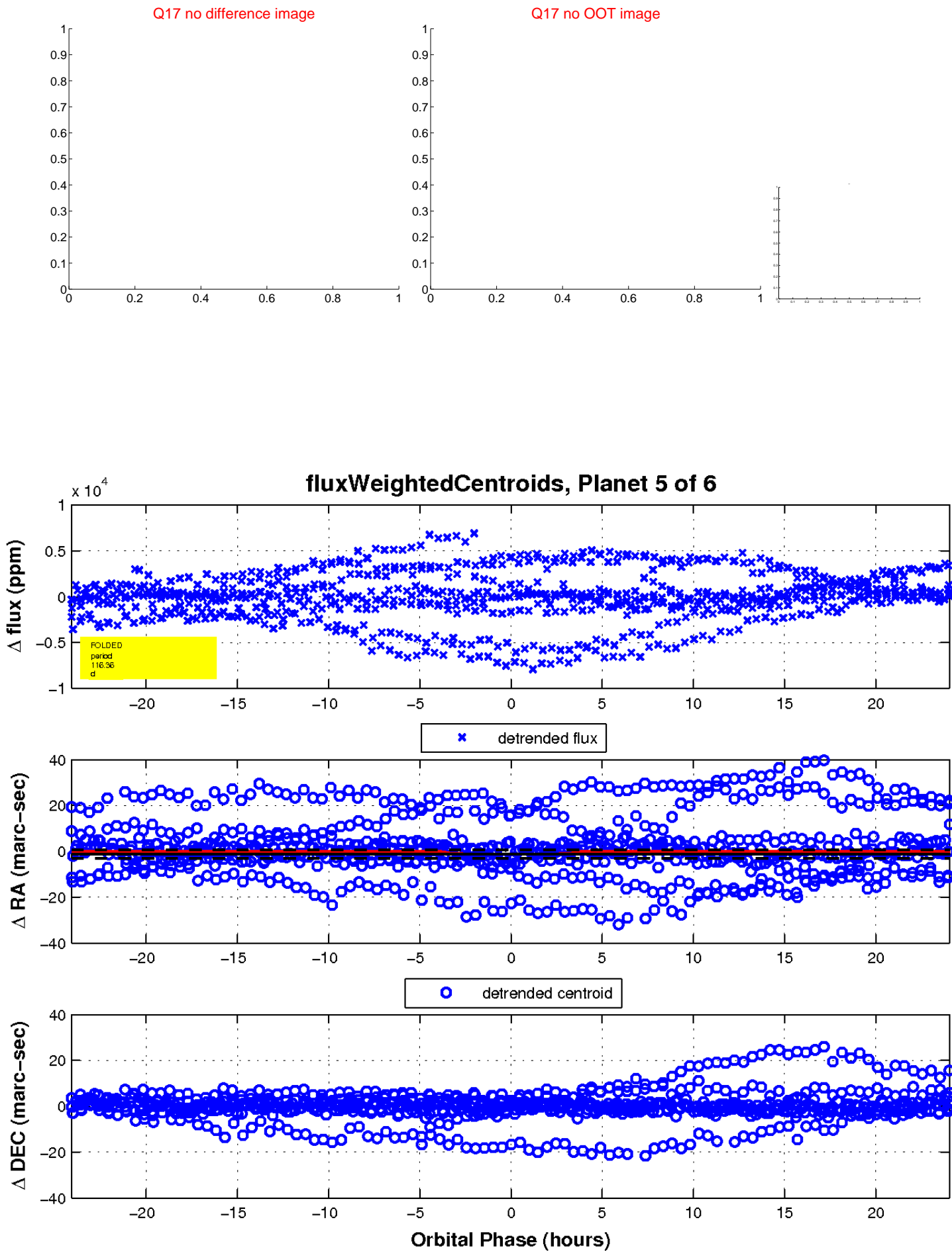
Q12 no OOT image



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

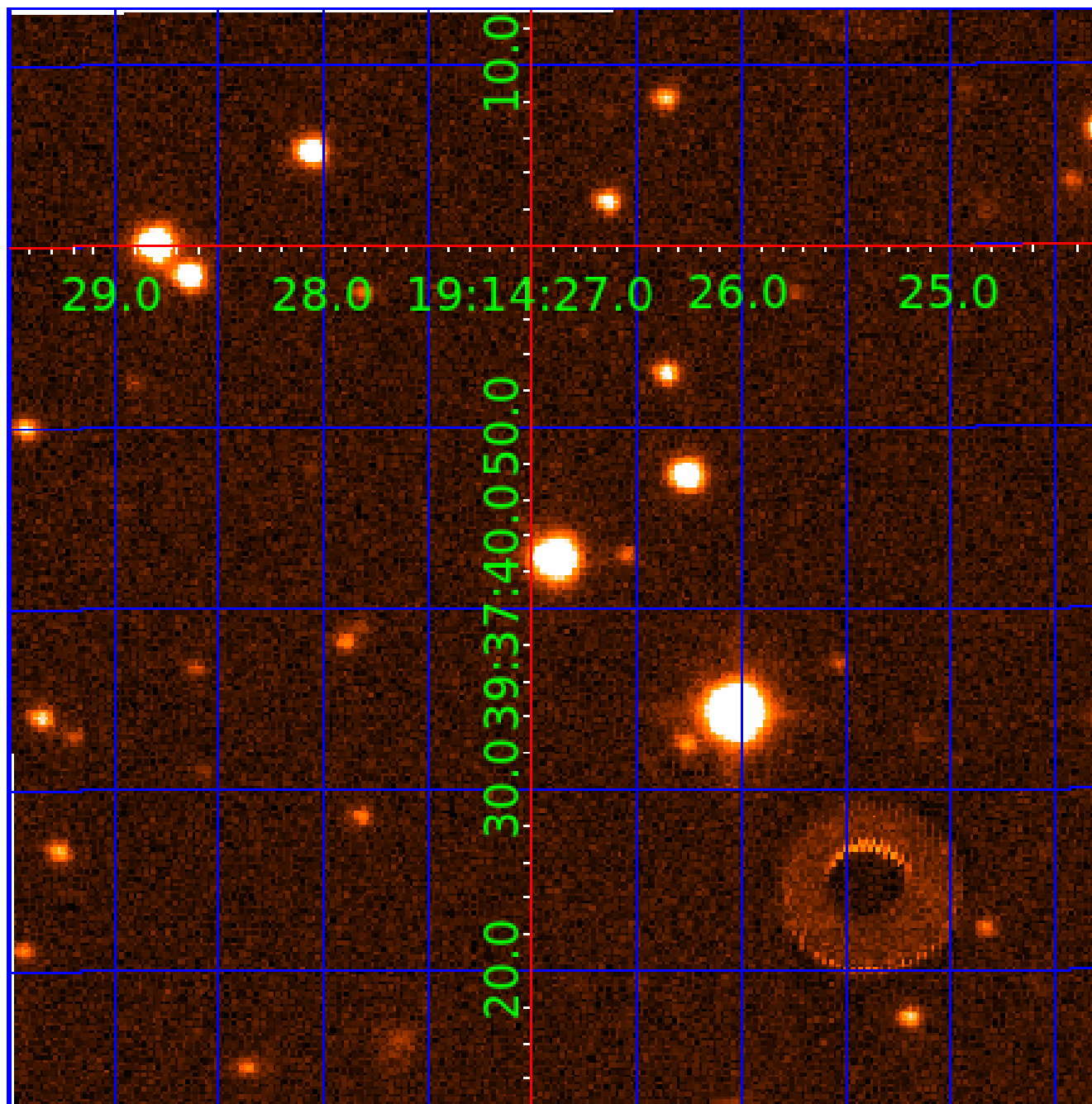


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 004551202

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004551202-01	OBS	No	439.482056	482.939144	1370.1	4.513	12.9	7.2	0.75	5249	2.98	0.38
004551202-02	OBS	No	562.993241	427.673344	953.2	2.938	10.4	5.9	0.75	5249	2.33	0.27
004551202-03	OBS	No	0.739386	131.989600	65.5	3.699	7.3	8.2	0.75	5249	0.60	1900.87
004551202-04	OBS	No	176.551716	145.921457	1355.1	3.753	14.0	5.3	0.75	5249	3.22	1.28
004551202-05	OBS	No	116.355427	224.286918	1724.3	8.038	10.6	6.2	0.75	5249	3.43	2.24
004551202-06	OBS	No	102.598270	199.185496	1551.4	3.420	11.7	6.7	0.75	5249	3.19	2.65

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004551202-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
004551202-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004551202-03	OBS	FP	0.00	1	0	0	0	LPP_DV—CENT_FEW_MEAS
004551202-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_POS_DV—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004551202-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004551202-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_MEAS

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

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

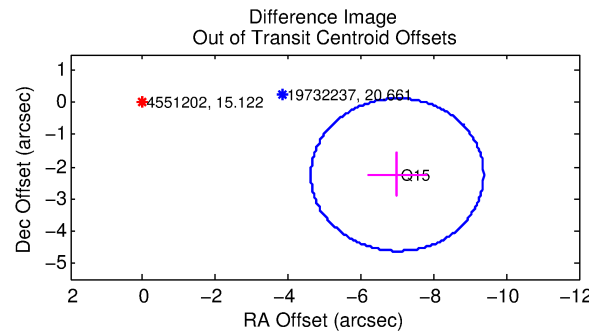
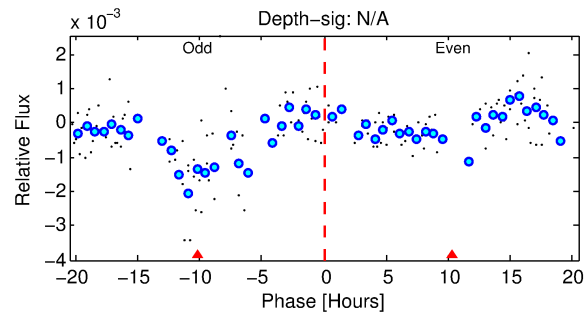
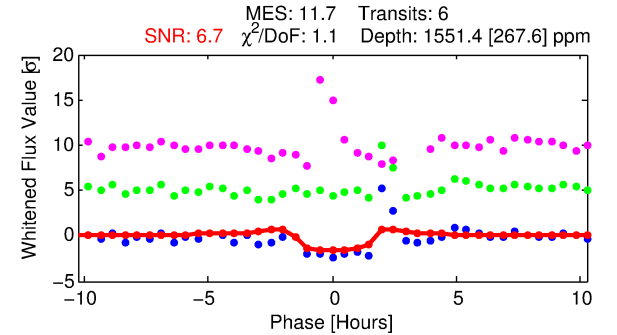
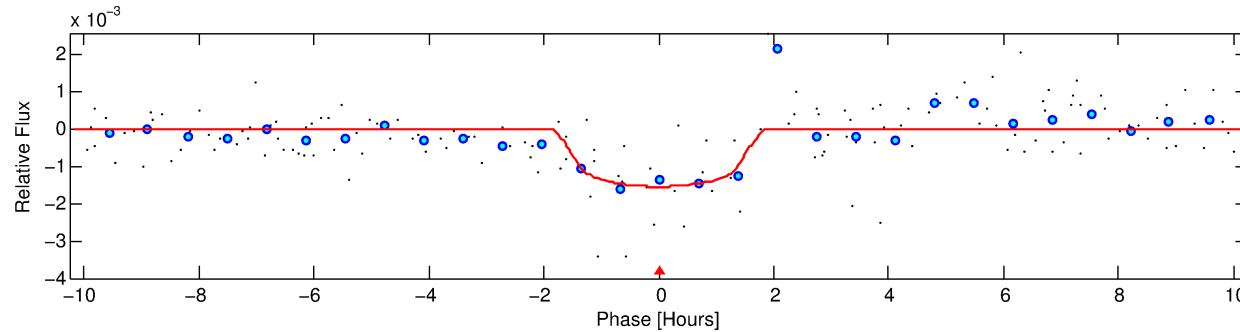
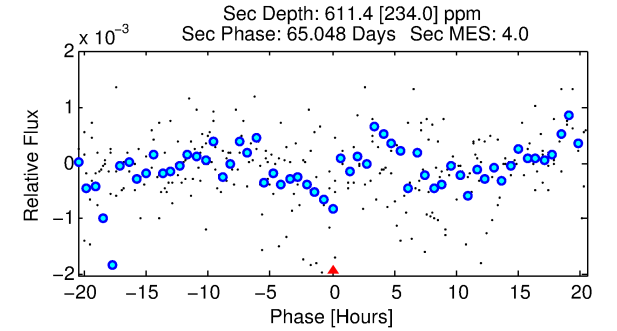
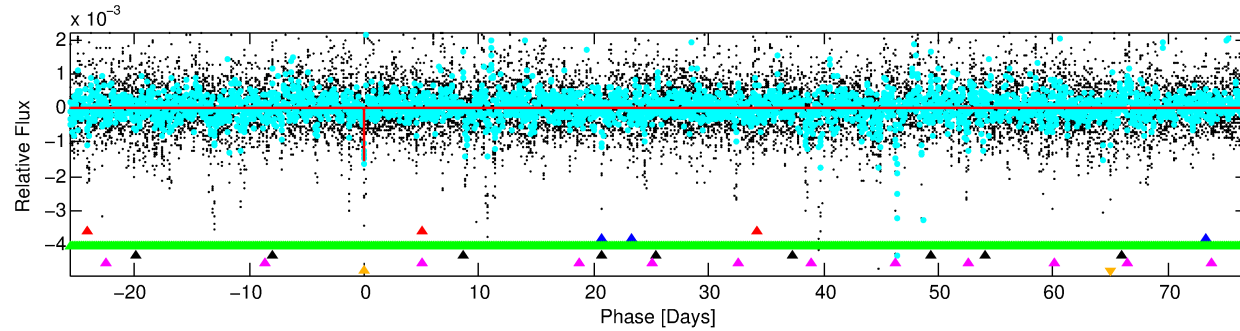
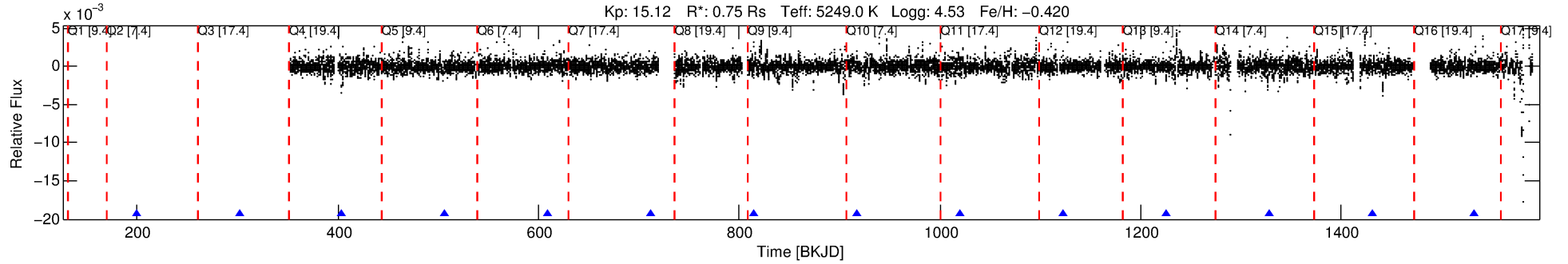
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 004551202-06

No Significant Match Found

# DV One-Page Summary

KIC: 4551202 Candidate: 6 of 6 Period: 102.598 d



## DV Fit Results:

Period = 102.59827 [0.00164] d  
Epoch = 199.1855 [0.0133] BKJD  
Rp/R\* = 0.0388 [0.0345]  
a/R\* = 172.00 [586.54]  
b = 0.72 [2.35]  
Seff = 2.65 [0.58]  
Teq = 325 [18] K  
Rp = 3.19 [2.87] Re  
a = 0.3823 [0.0422] AU  
Ag = 4827.63 [8825.24] [0.55σ]  
Teffp = 4191 [1913] K [2.02σ]

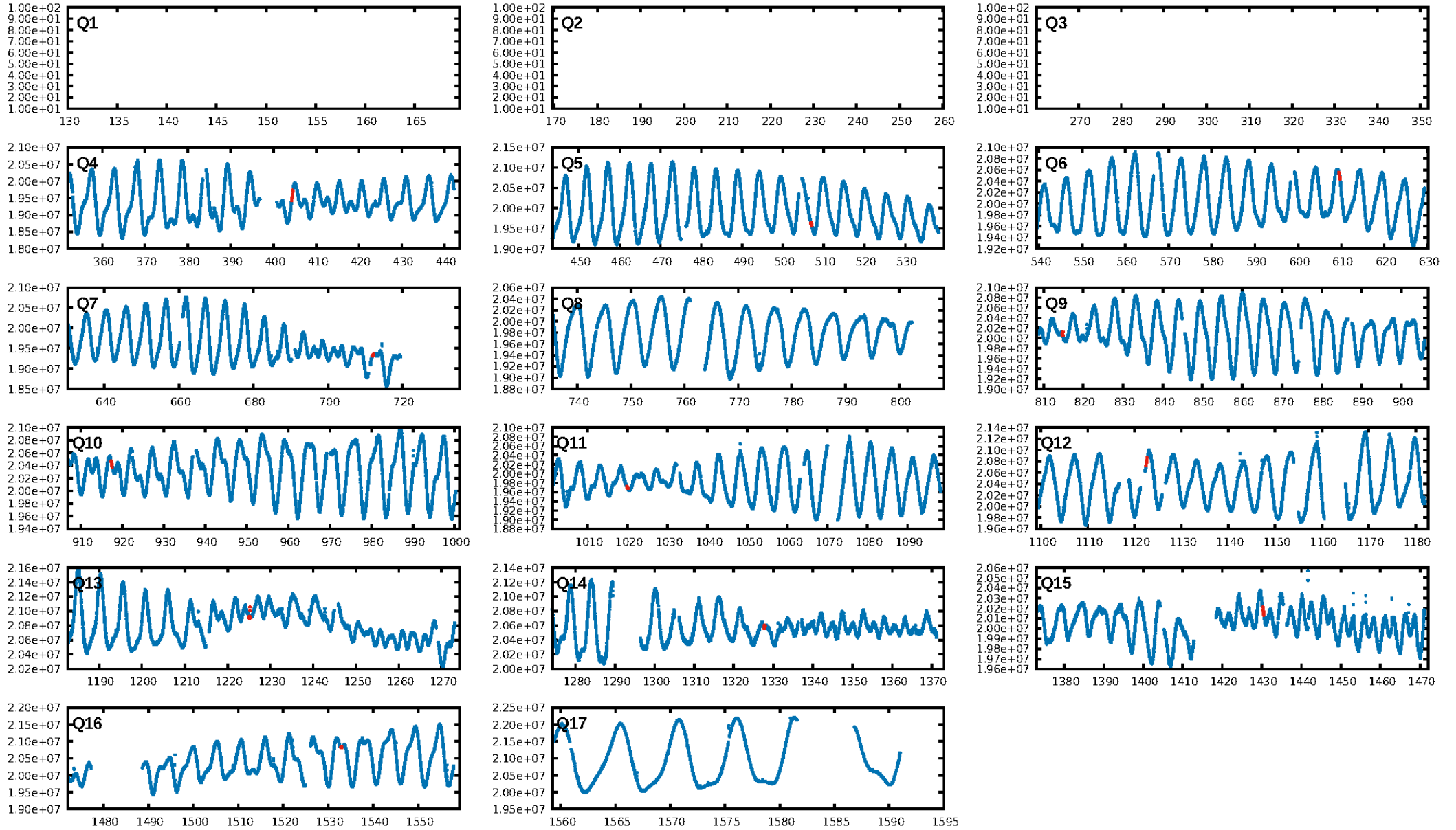
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [485.29σ]  
LongPeriod-sig: 100.0% [37.80σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 99.6%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [6/6]  
GhostDiagnostic-chr: -0.4027  
Centroid-sig: N/A  
Centroid-so: 1.346 arcsec [1.78σ]  
OotOffset-rm: 7.354 arcsec [9.28σ]  
KicOffset-rm: 0.833 arcsec [0.90σ]  
OotOffset-st: 0/1/0/0 [1]  
KicOffset-st: 2/1/3/3 [9]  
DiffImageQuality-fgm: 0.22 [2/9]  
DiffImageOverlap-fno: 0.00 [0/12]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 02:01:20 Z

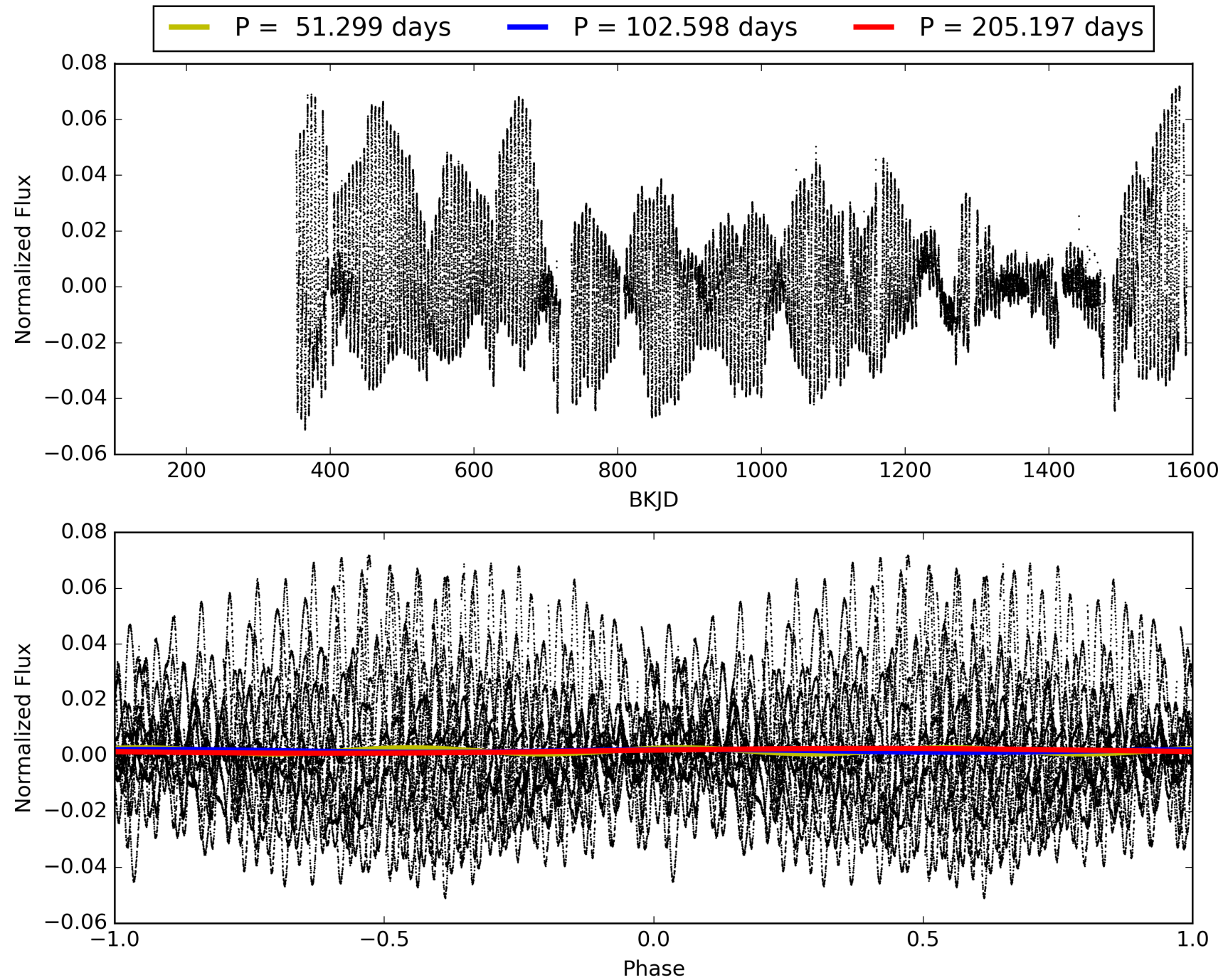
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 004551202-06, PDC Light Curves





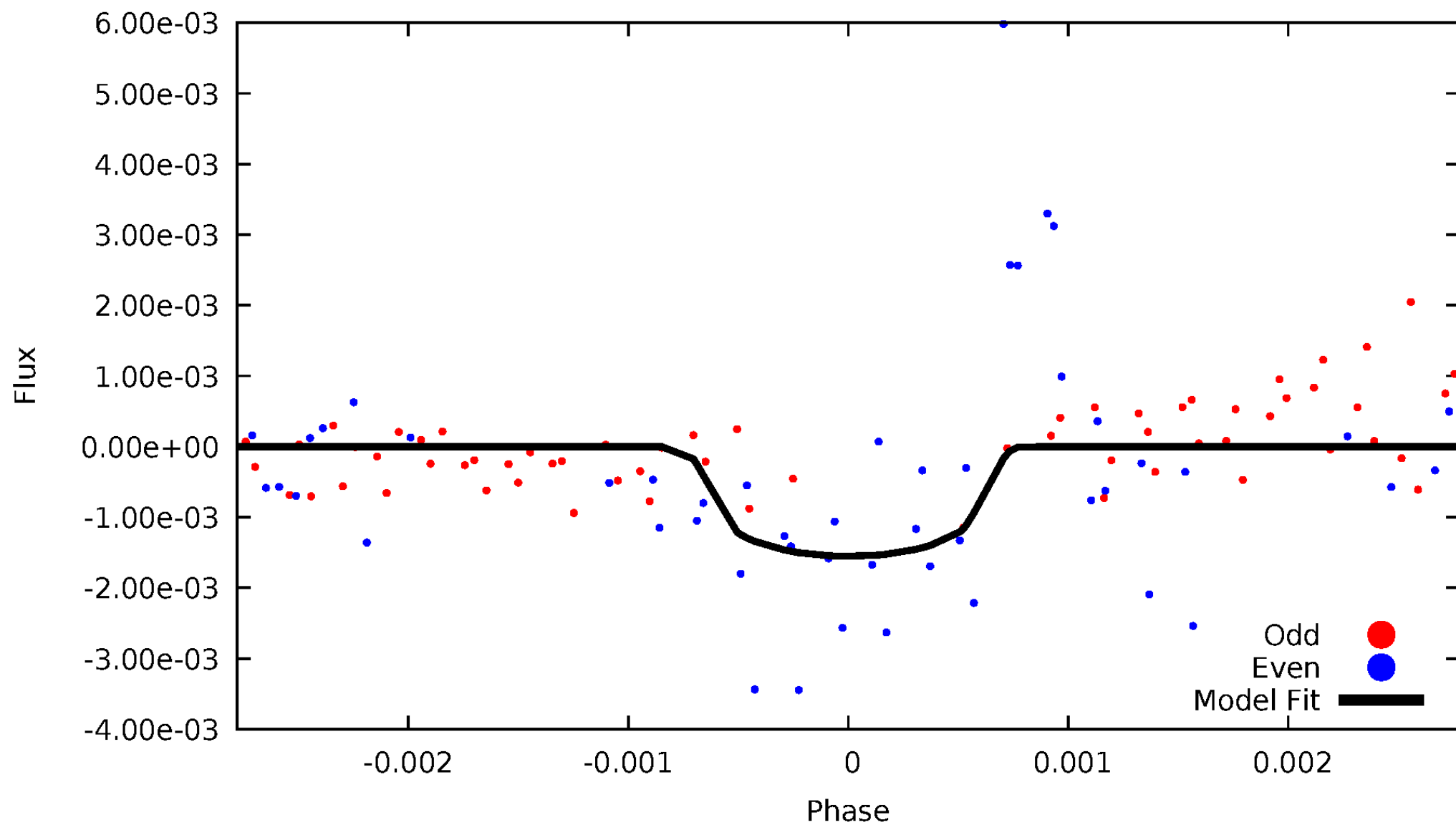
TCE 004551202-06





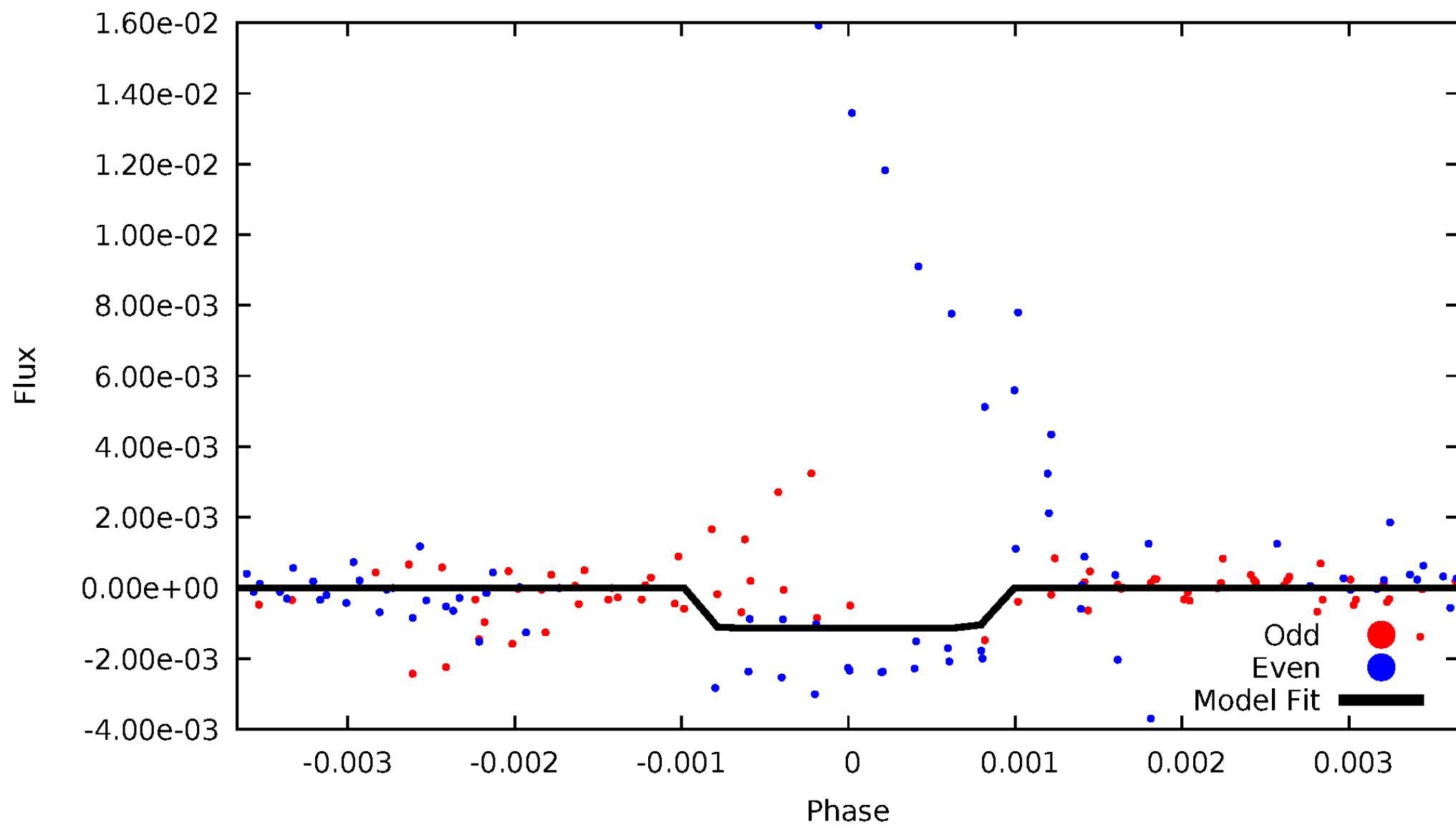
# DV Odd/Even

TCE 004551202-06



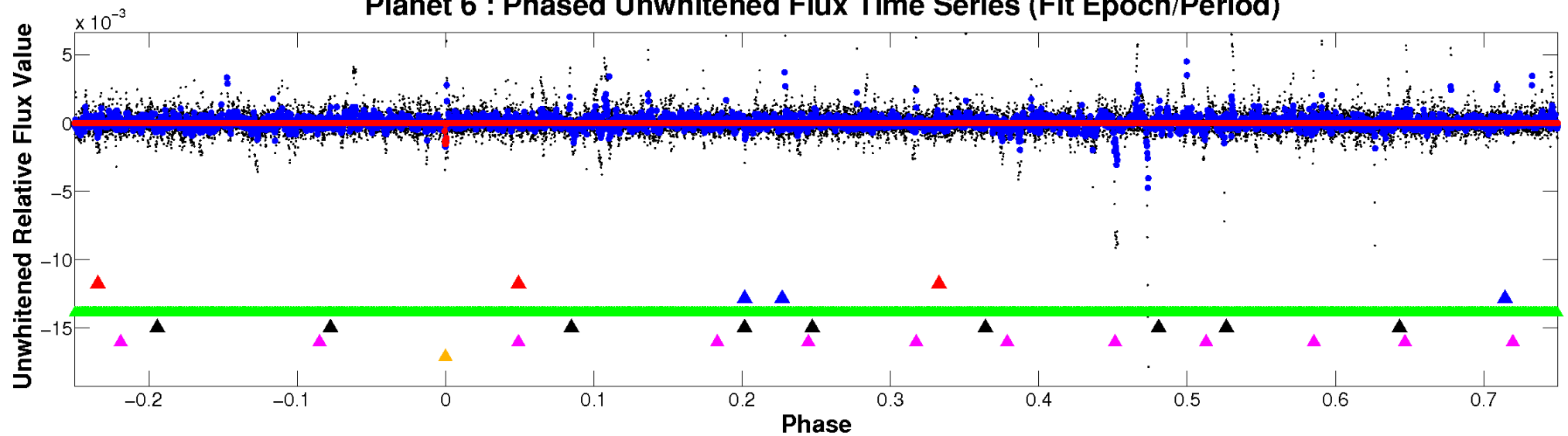
# ALT Odd/Even

TCE 004551202-06

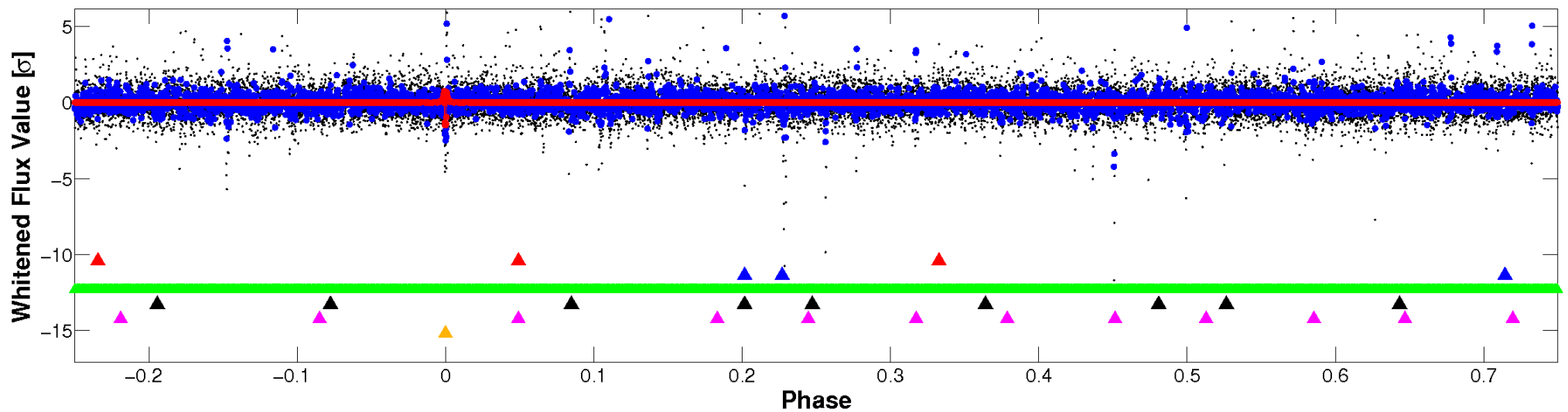


# Non-Whitened Vs. Whitened Light Curve

## Planet 6 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

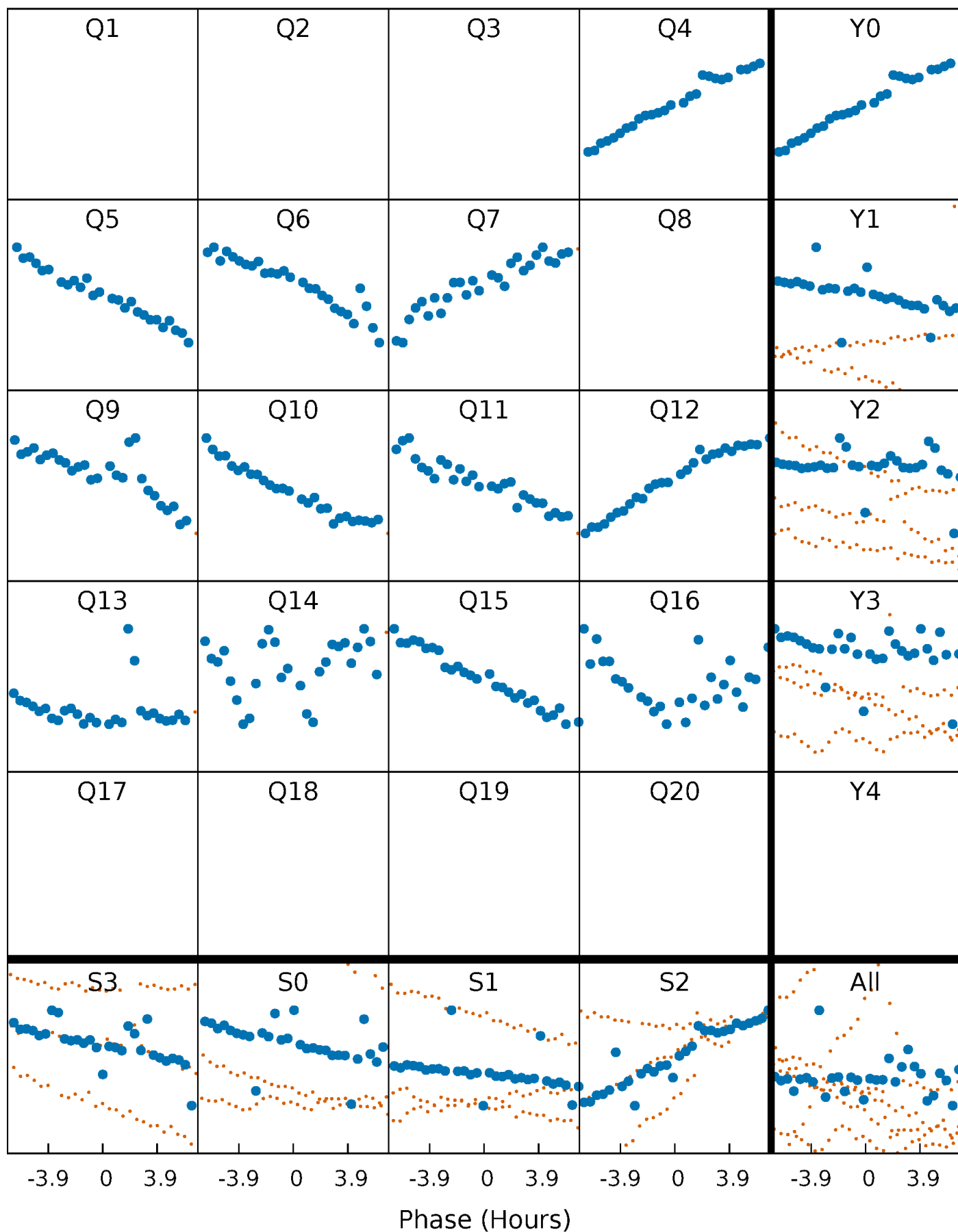


## Planet 6 : Phased Whitened Flux Time Series (Fit Epoch/Period)



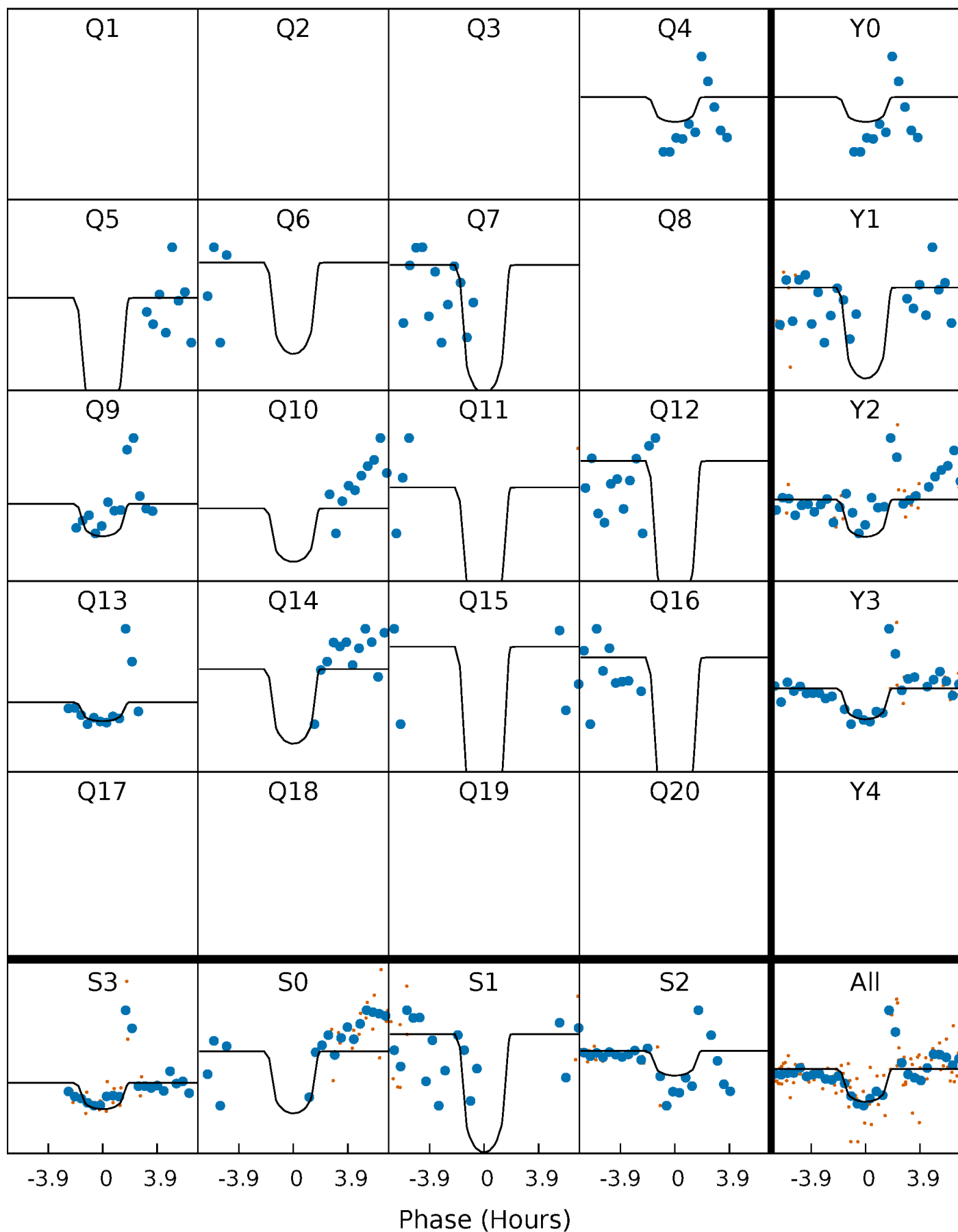
# PDC Quarter-Phased Transit Curves

TCE 004551202-06 P=102.598270 Days  $T_0=199.185496$  (BKJD)



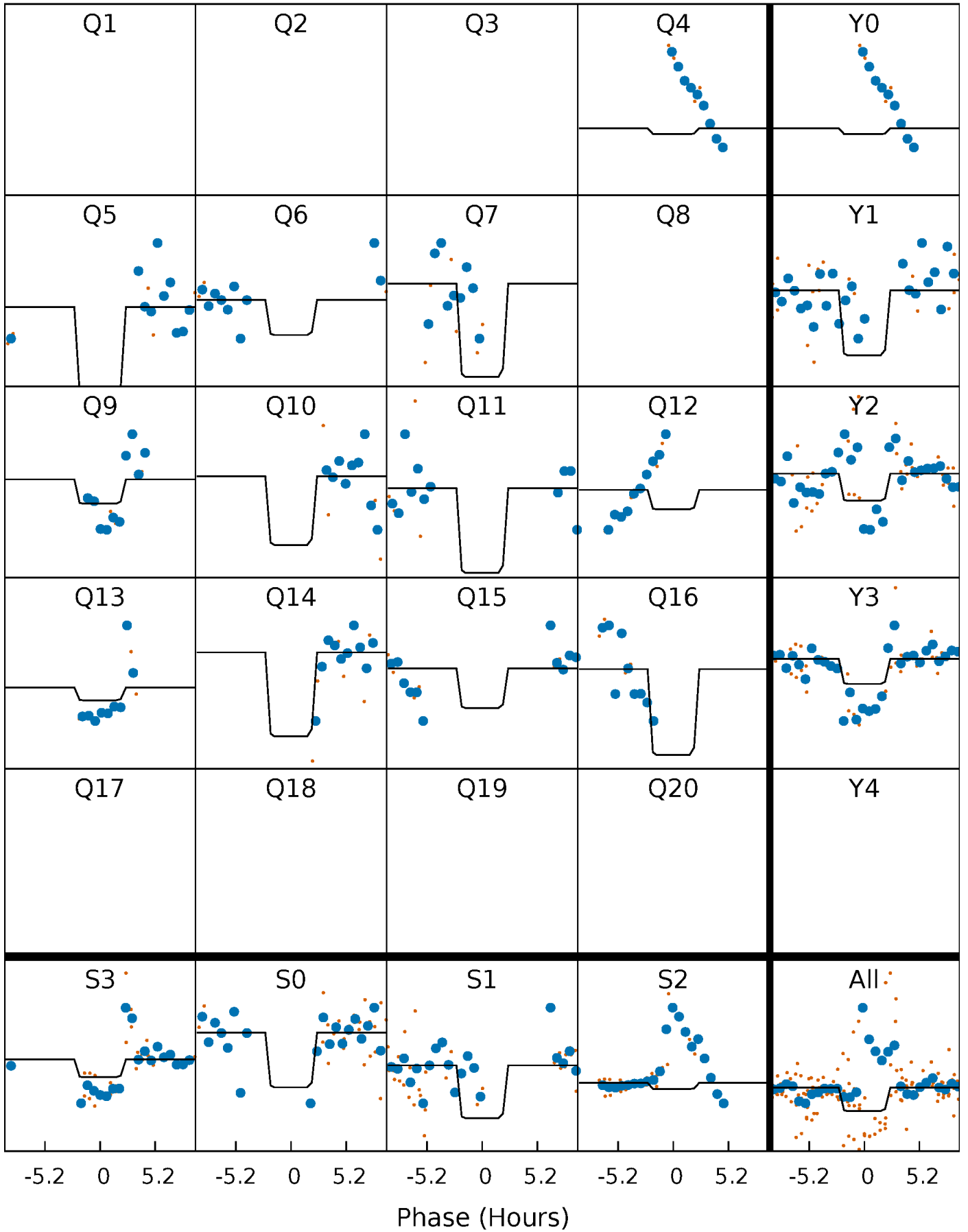
# DV Quarter-Phased Transit Curves

TCE 004551202-06 P=102.598270 Days  $T_0=199.185496$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

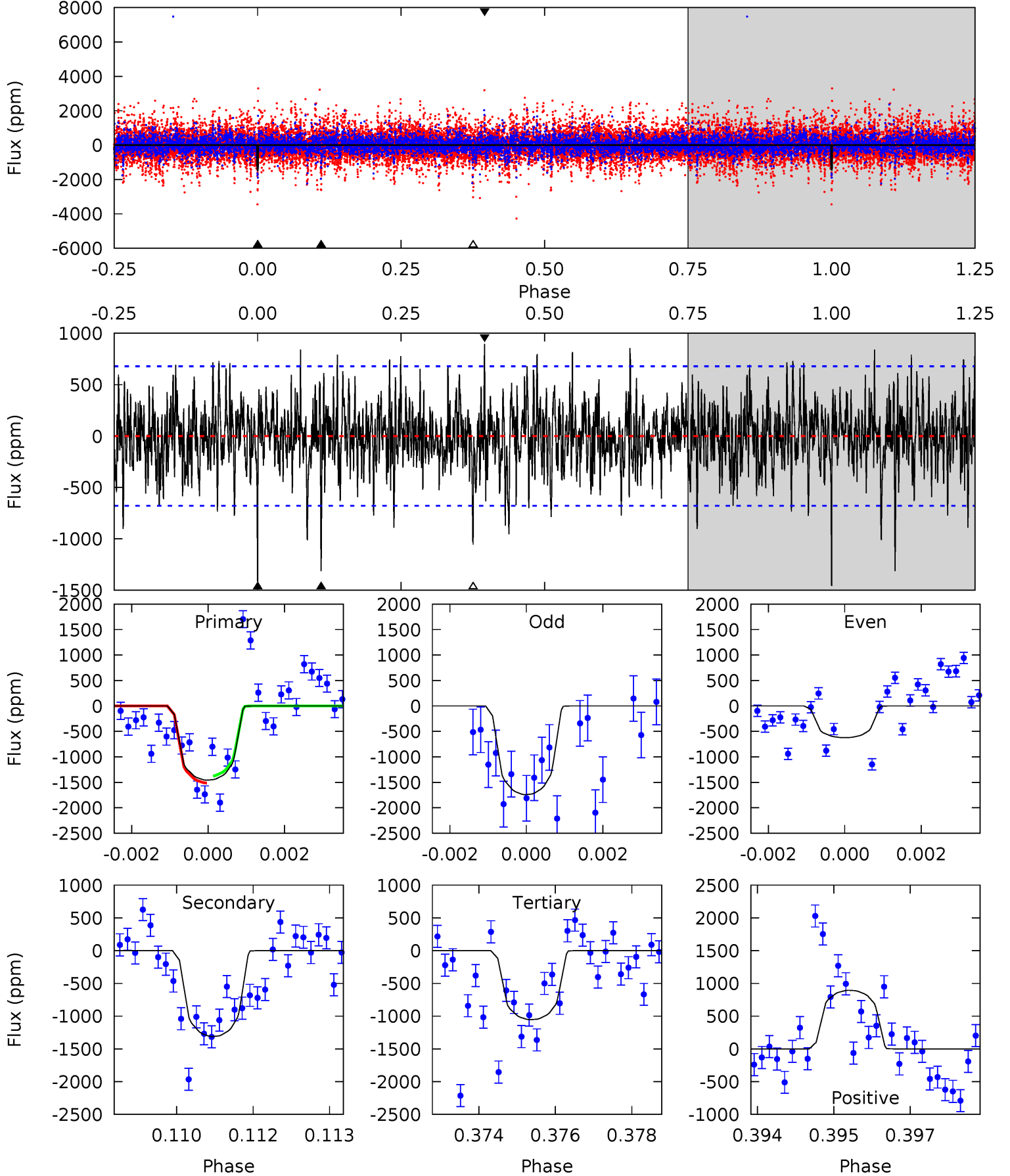
TCE 004551202-06 P=102.597725 Days  $T_0=199.161262$  (BKJD)



# DV Model-Shift Uniqueness Test

004551202-06, P = 102.598270 Days, E = 199.185496 Days

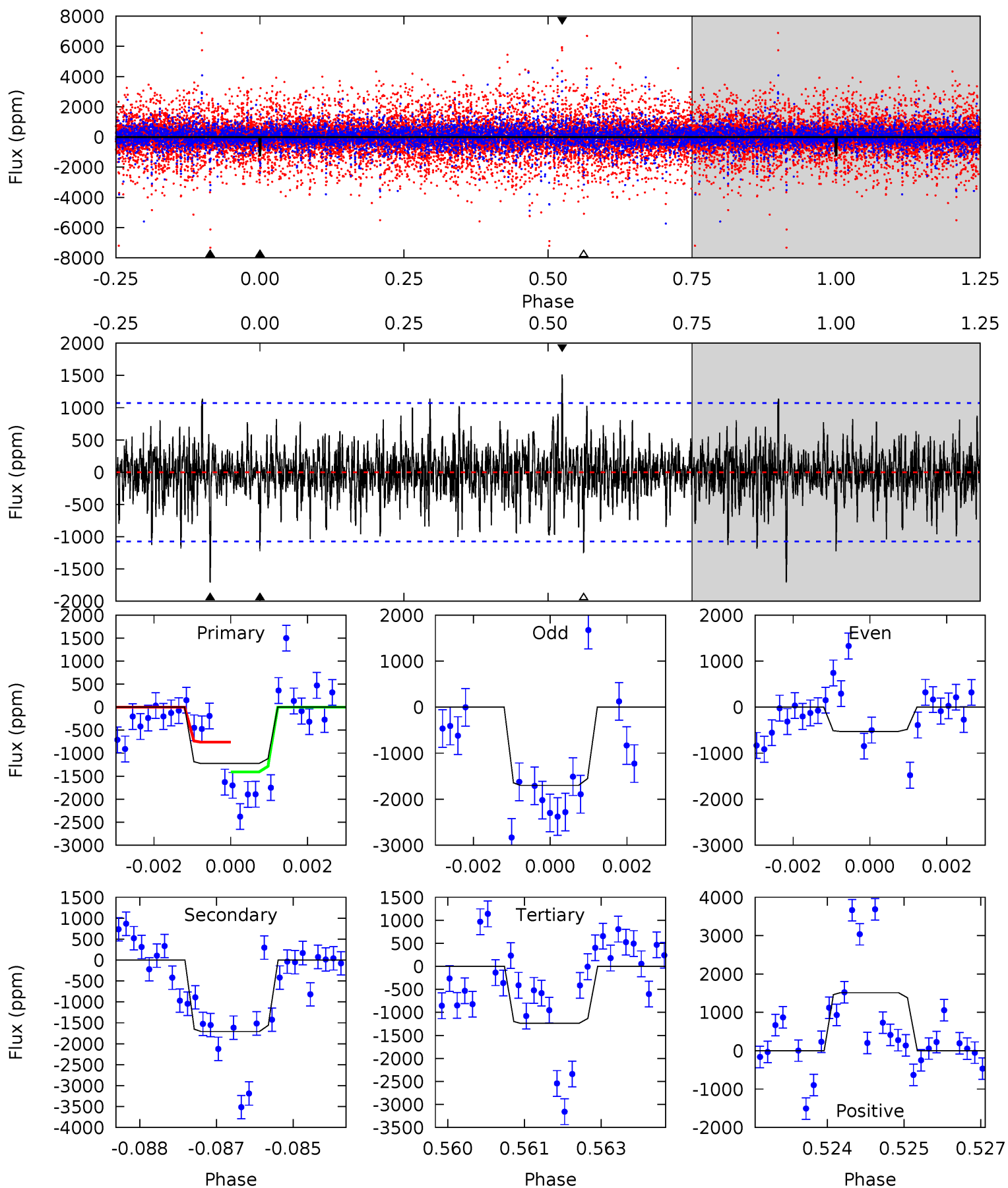
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.5	10.4	8.34	7.08	5.37	3.16	2.04	3.19	4.45	2.04	3.30	3.59	1.06	0.38	0.55



# Alt Model-Shift Uniqueness Test

004551202-06, P = 102.597725 Days, E = 199.161262 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.13	8.54	6.20	7.56	5.36	3.15	1.51	-0.07	-1.43	2.34	0.98	1.91	-6.52	0.47	1.60





### Stellar Parameters For KIC 004551202

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5249^{+183}_{-183}$	$4.533^{+0.096}_{-0.072}$	$-0.420^{+0.350}_{-0.300}$	$0.754^{+0.093}_{-0.093}$	$0.708^{+0.105}_{-0.045}$	$2.326^{+0.902}_{-0.546}$
	+3%/-3%	+2%/-2%	+83%/-71%	+12%/-12%	+15%/-6%	+39%/-23%
Source	KIC0	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 004551202-06 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-1312 \pm 126$	$3.62^{+2.70}_{-2.16}$	$455^{+21}_{-23}$	$4867^{+2587}_{-959}$	$8247^{+42039}_{-5502}$
Alt.	$-1708 \pm 200$	$3.35^{+2.81}_{-2.11}$	$454^{+22}_{-22}$	$5286^{+3716}_{-1152}$	$12483^{+82492}_{-8758}$

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

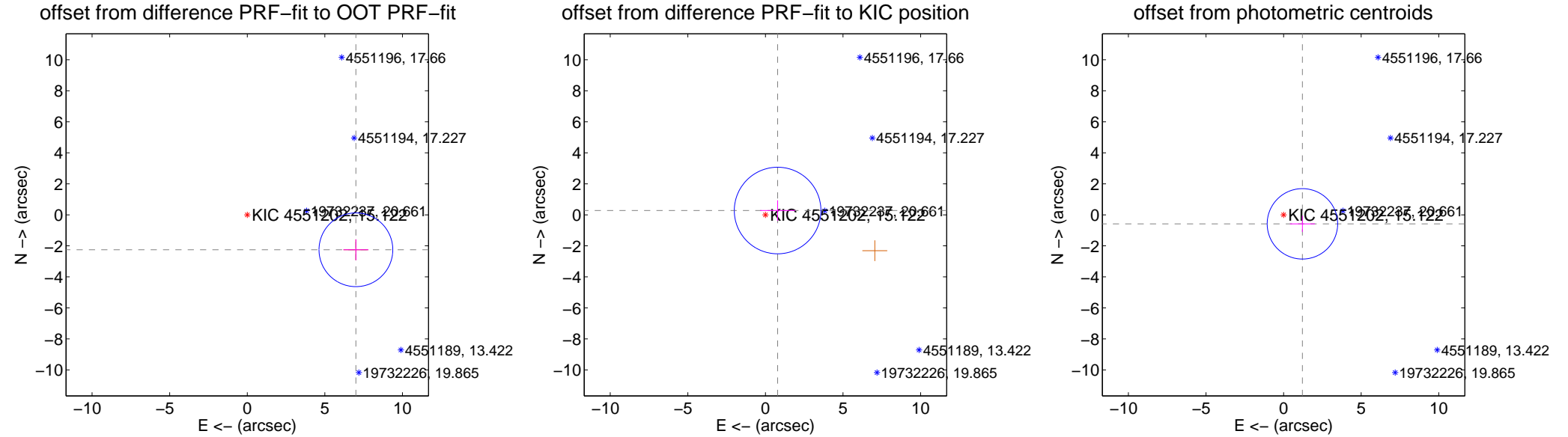
## DV Centroid Data

Supplemental centroid analysis for 004551202-06. Kepler magnitude: 15.12. Transit SNR 6.74

There are 2 quarters with good PRF difference image offsets

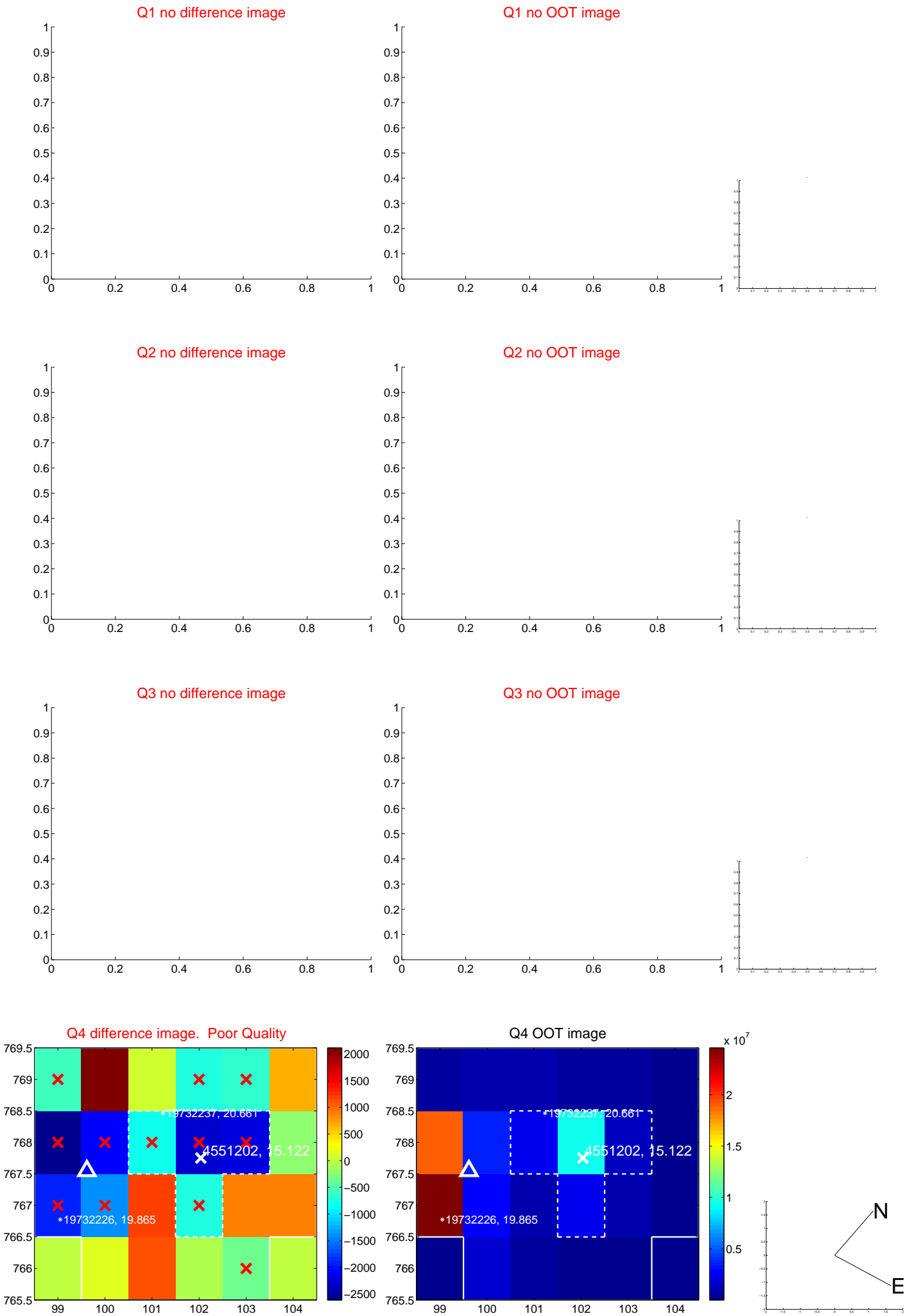
The direct PRF centroid is offset from the target star catalog position by about 0.08 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$7.354 \pm 0.792$	9.28	$-7.000 \pm 0.804$	$-2.253 \pm 0.673$
PRF-fit source offset from KIC position	$0.833 \pm 0.930$	0.90	$-0.786 \pm 1.127$	$0.278 \pm 0.656$
photometric centroid source offset	$1.35 \pm 0.76$	1.78	$-1.21 \pm 0.80$	$-0.58 \pm 0.52$

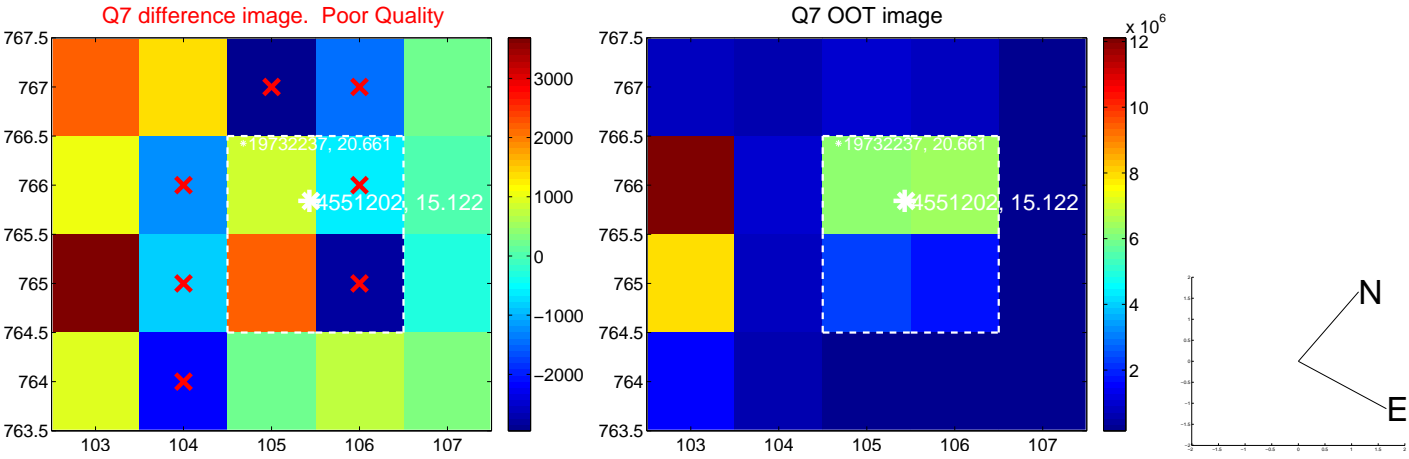
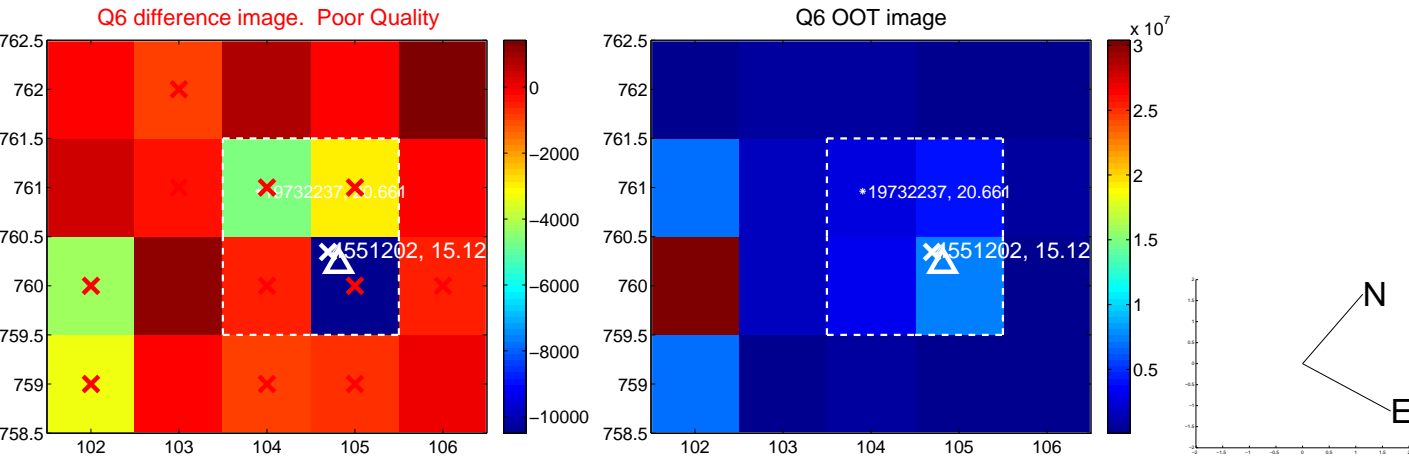
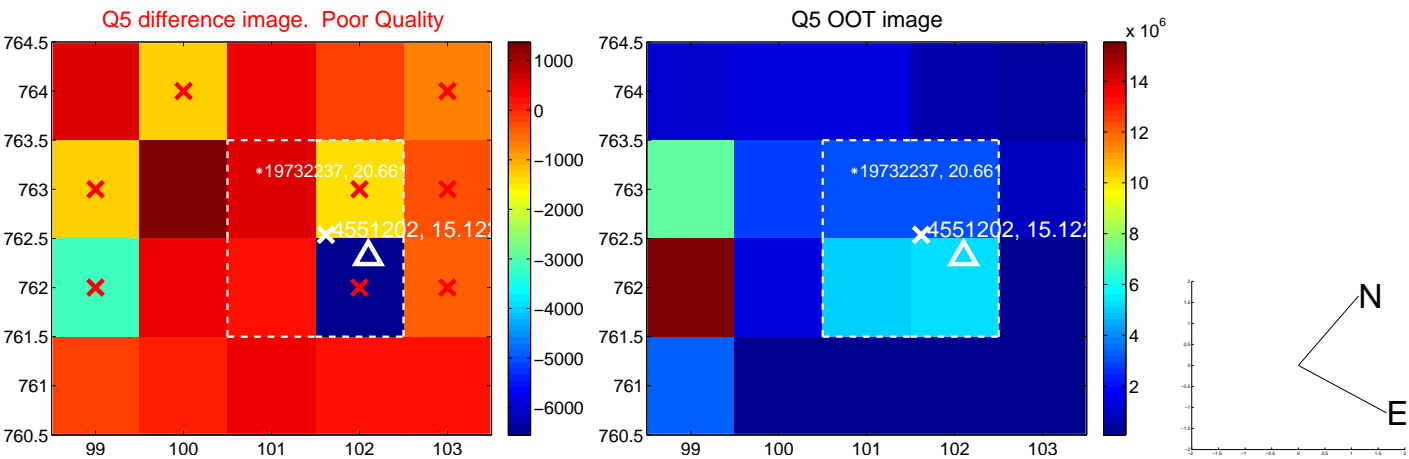


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

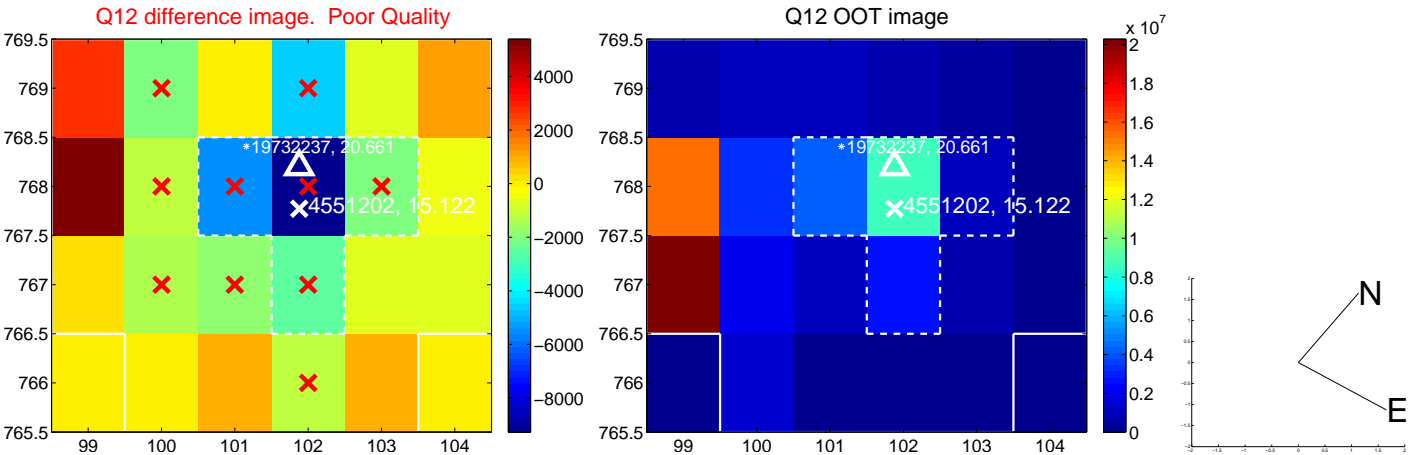
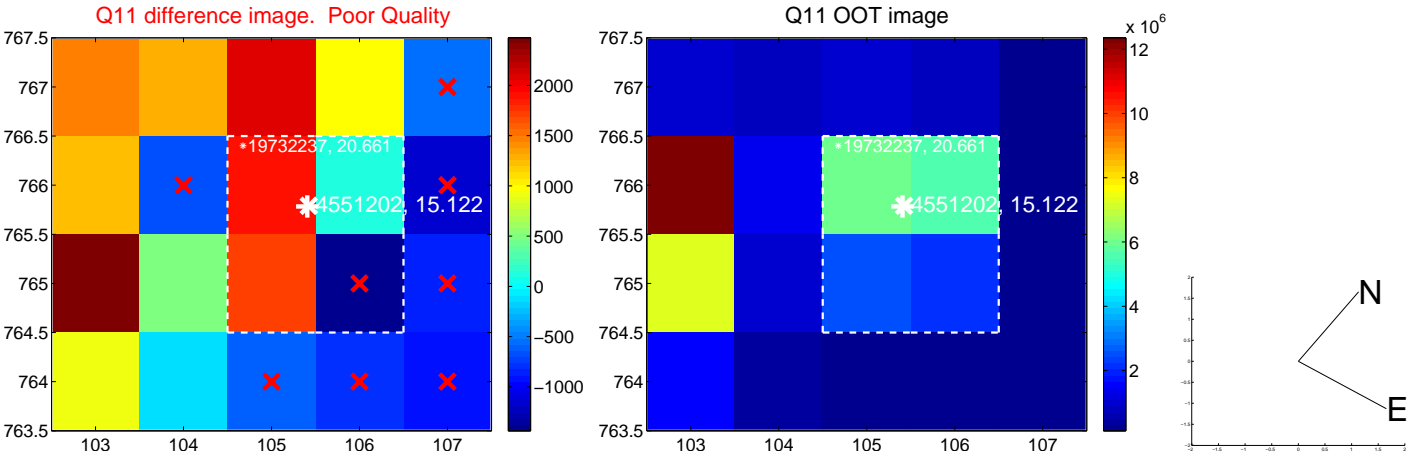
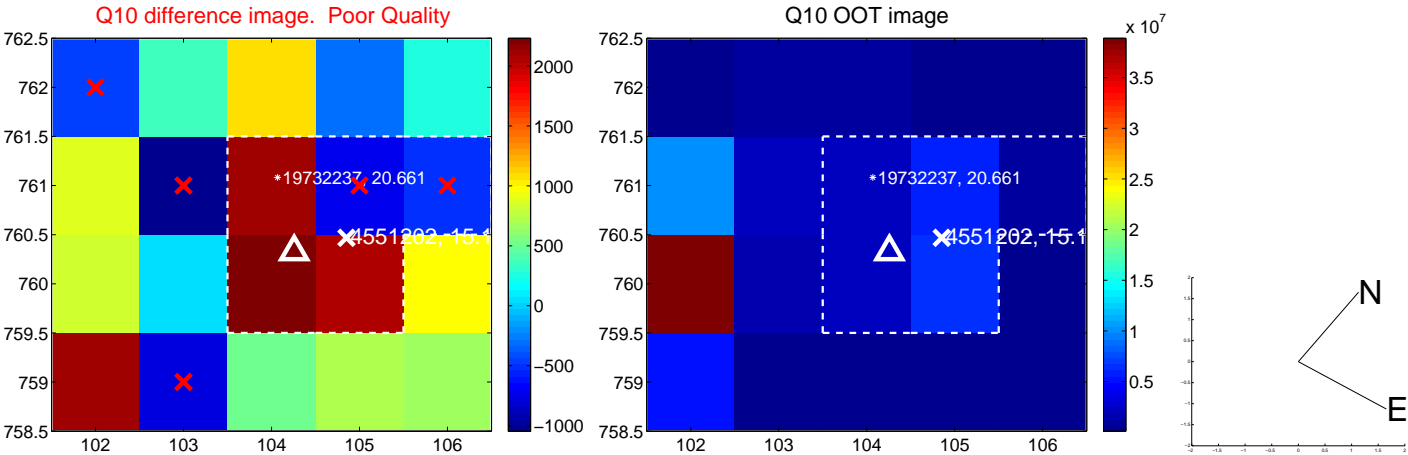
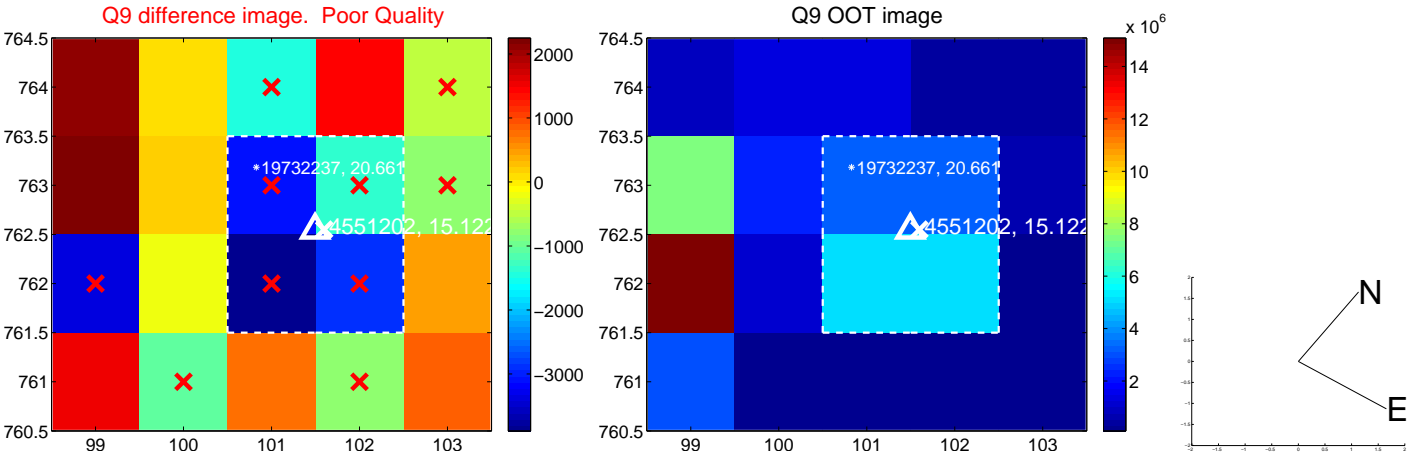
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



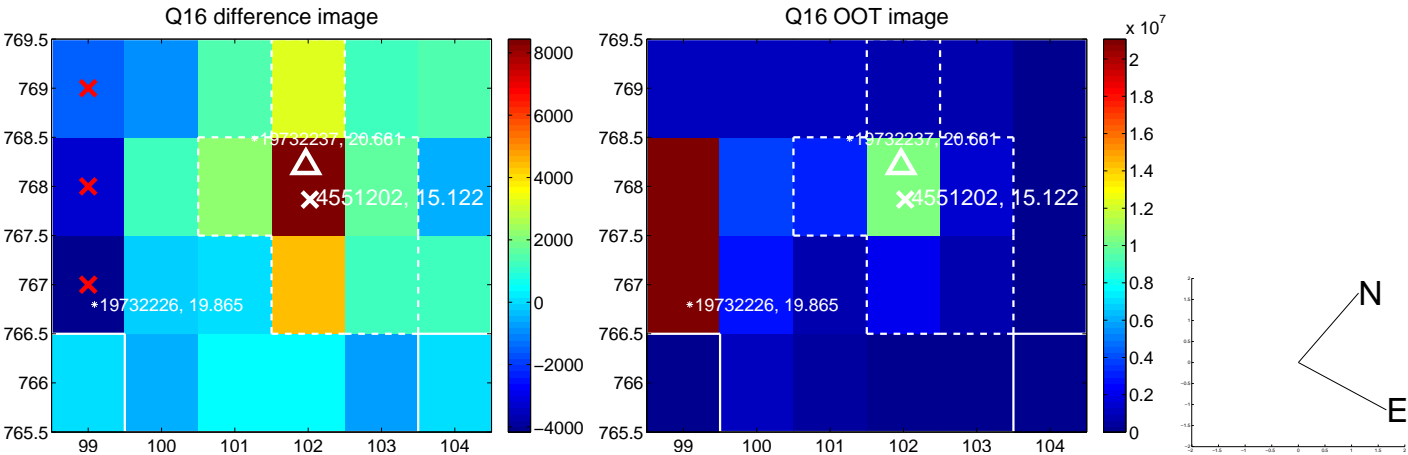
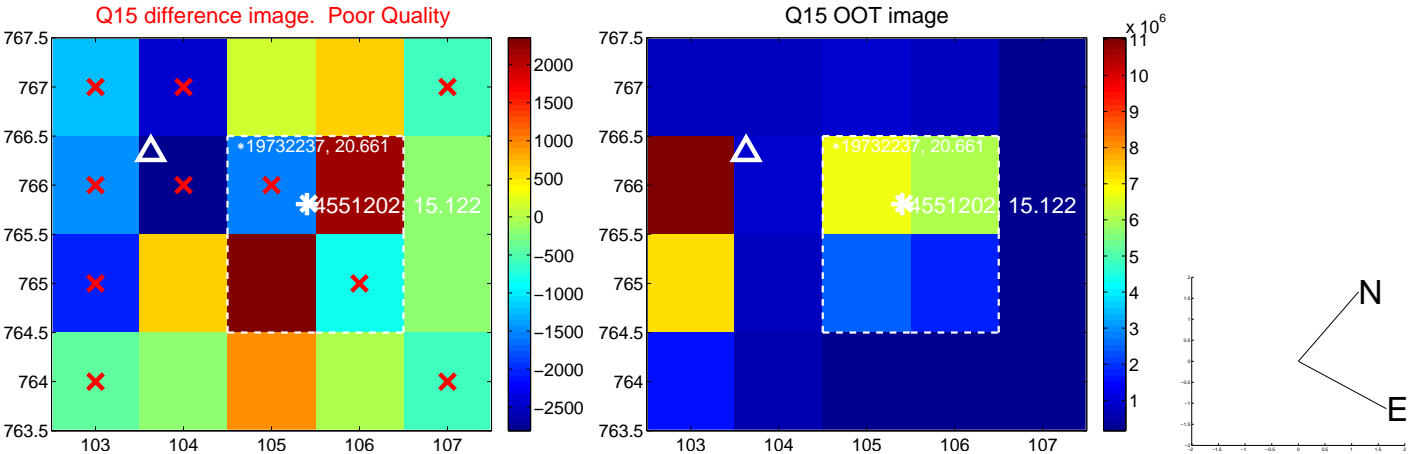
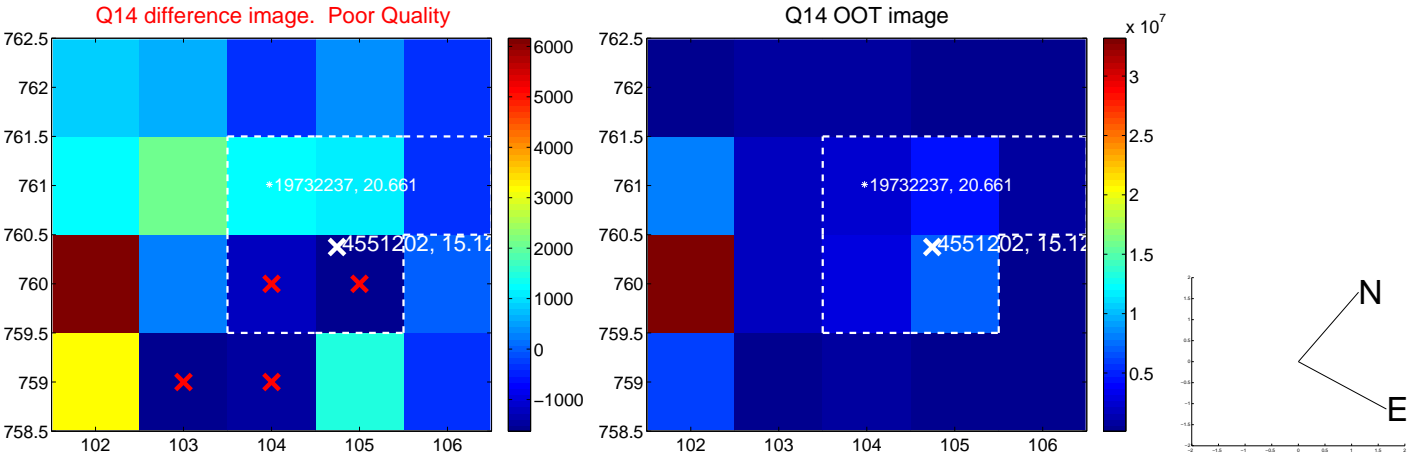
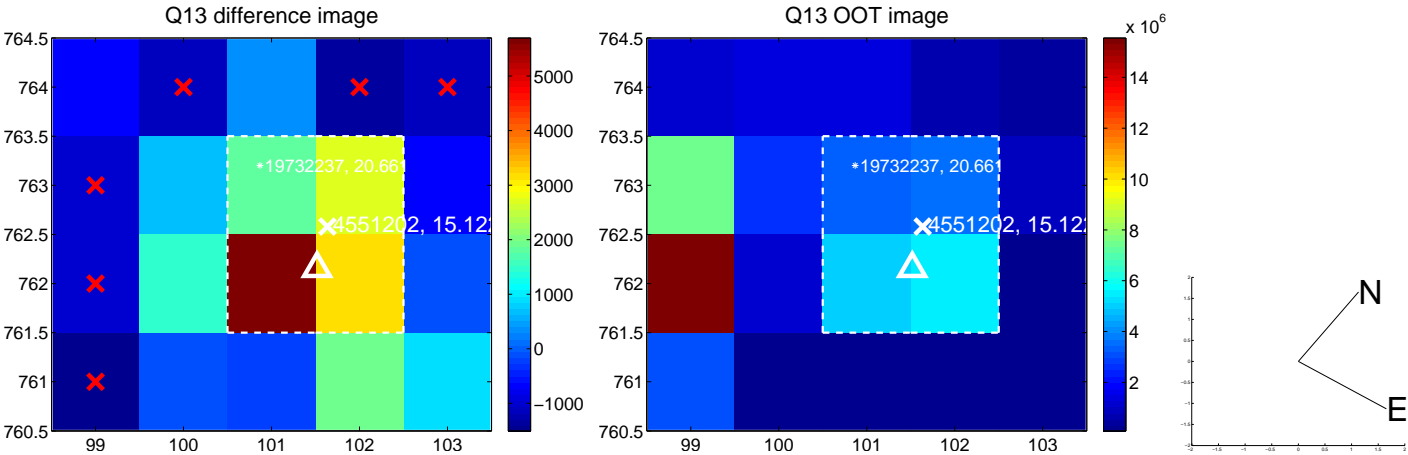
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



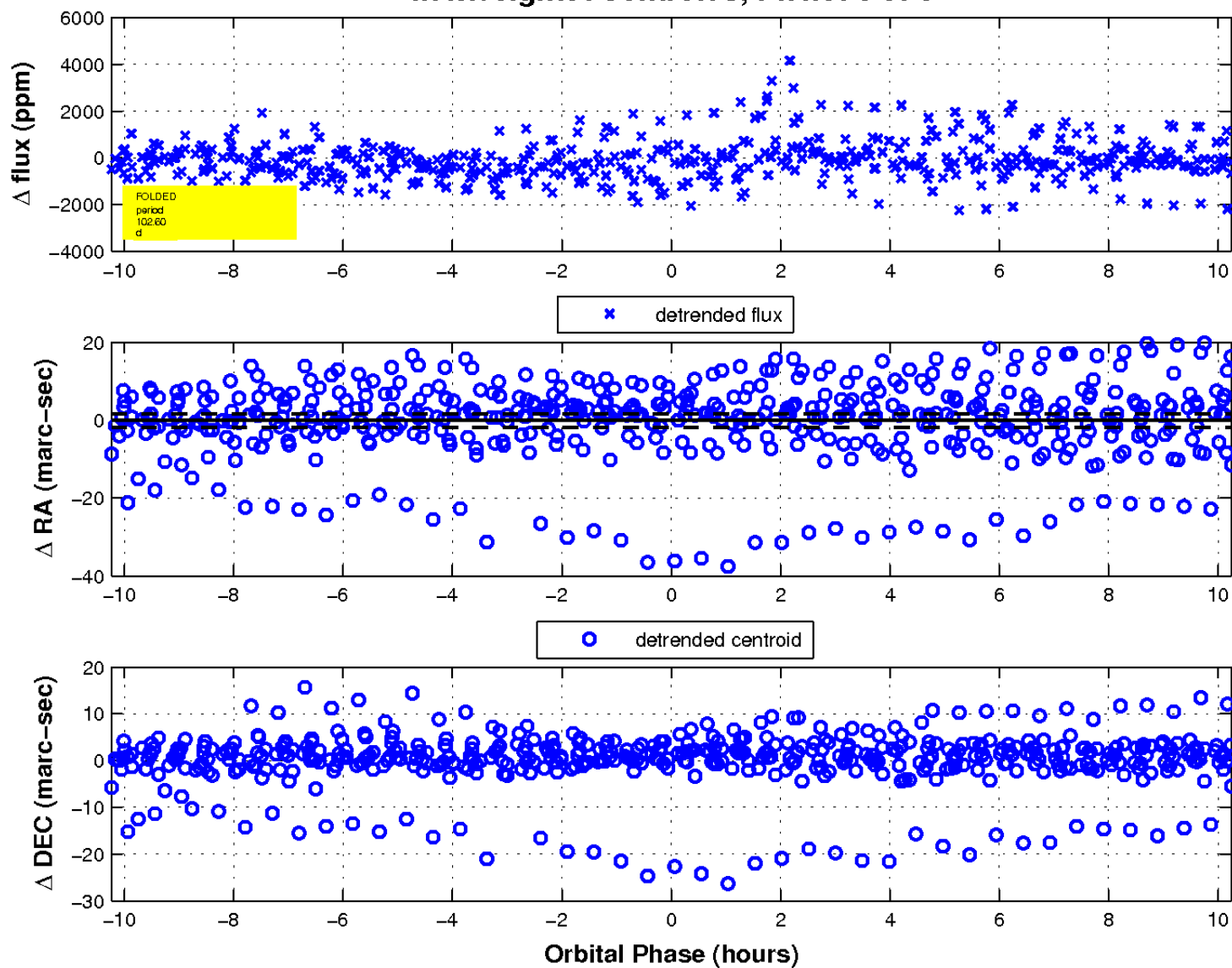
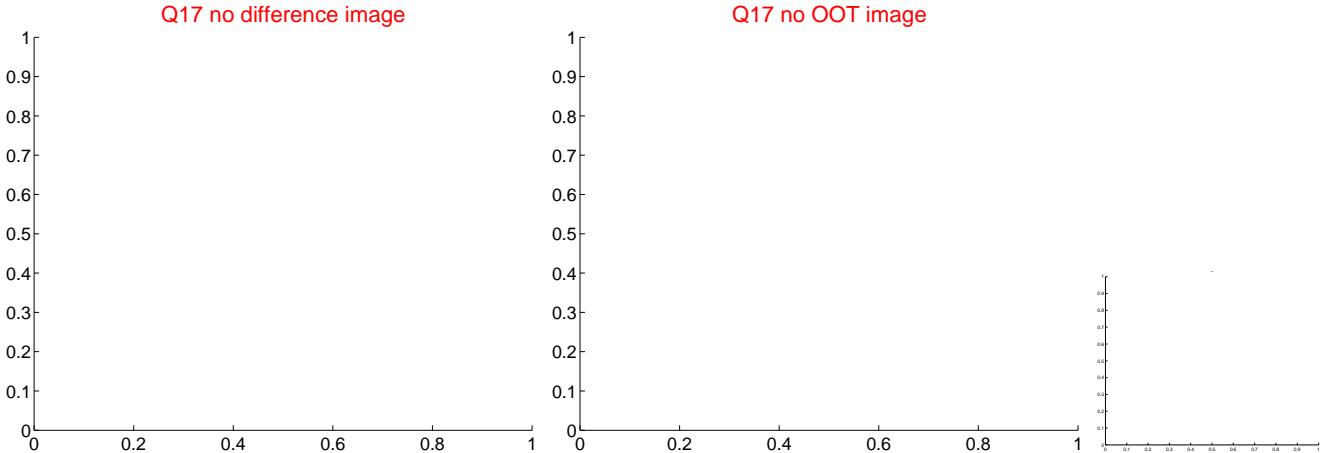
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



white  $\times$ : KIC target position;  $\oplus$ : OO1 centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



UKIRT Image

Declination

