

# KIC 010416779

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010416779-01	OBS	No	0.763288	131.838551	37.9	3.006	11.1	9.8	2.61	7751	1.86	53231.43
010416779-02	OBS	No	0.763305	132.095228	47.5	2.885	9.3	12.3	2.61	7751	2.09	53229.80
010416779-03	OBS	No	291.432184	336.577583	617.2	9.933	9.3	7.9	2.61	7751	7.54	19.22
010416779-04	OBS	No	70.386449	158.763957	555.7	4.353	8.5	8.0	2.61	7751	7.83	127.77
010416779-05	OBS	No	2.692681	133.883826	130.3	6.531	10.0	10.6	2.61	7751	3.49	9912.26

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010416779-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
010416779-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD
010416779-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS—HALO_GHOST
010416779-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
010416779-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT

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

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

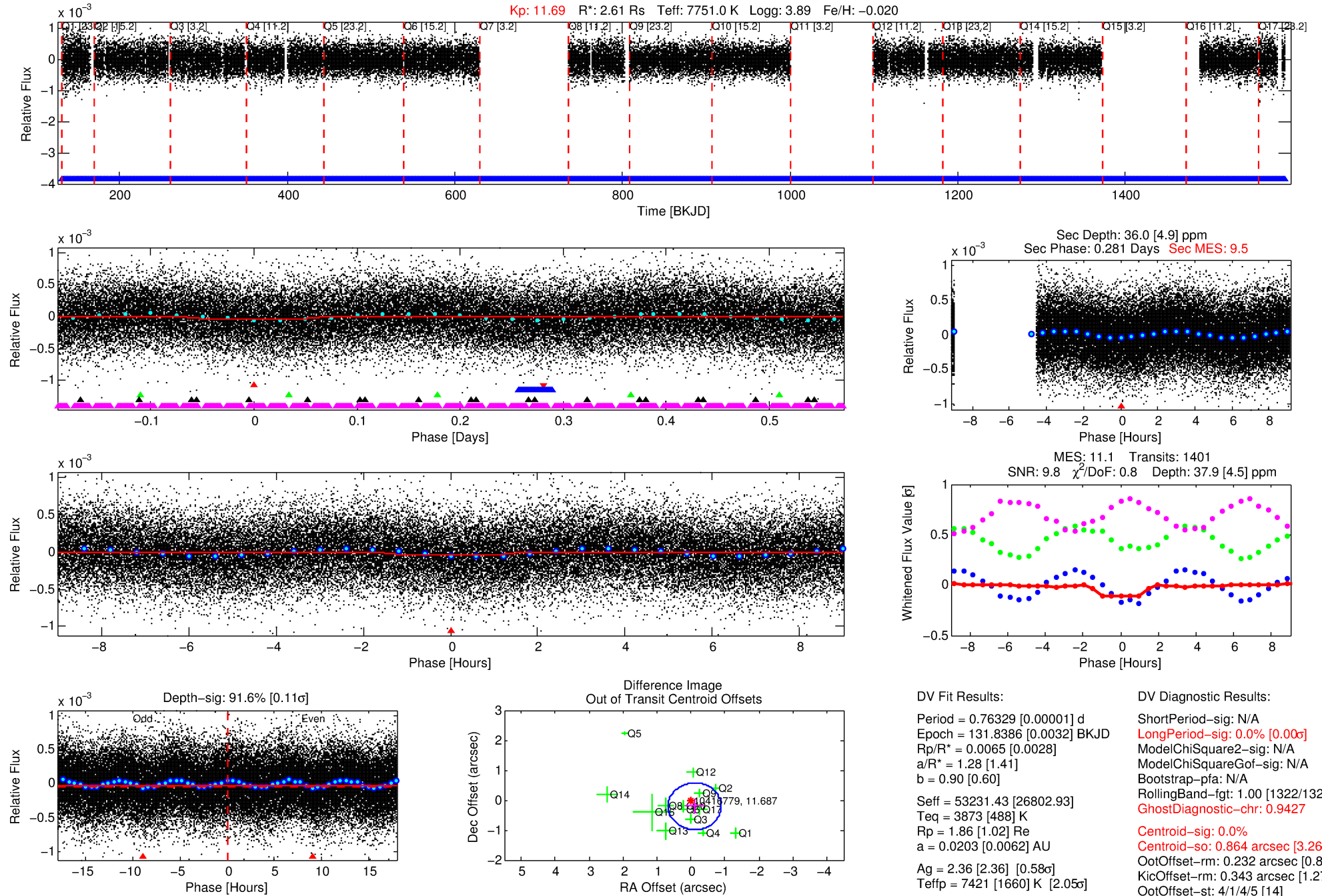
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010416779-01

No Significant Match Found

# DV One-Page Summary

KIC: 10416779 Candidate: 1 of 5 Period: 0.763 d



## DV Fit Results:

Period = 0.76329 [0.00001] d  
 Epoch = 131.8386 [0.0032] BKJD  
 Rp/R\* = 0.0065 [0.0028]  
 a/R\* = 1.28 [1.41]  
 b = 0.90 [0.60]  
 Seff = 53231.43 [26802.93]  
 Teq = 3873 [488] K  
 Rp = 1.86 [1.02] Re  
 a = 0.0203 [0.0062] AU  
 Ag = 2.36 [2.36] [0.58σ]  
 Tefp = 7421 [1660] K [2.05σ]

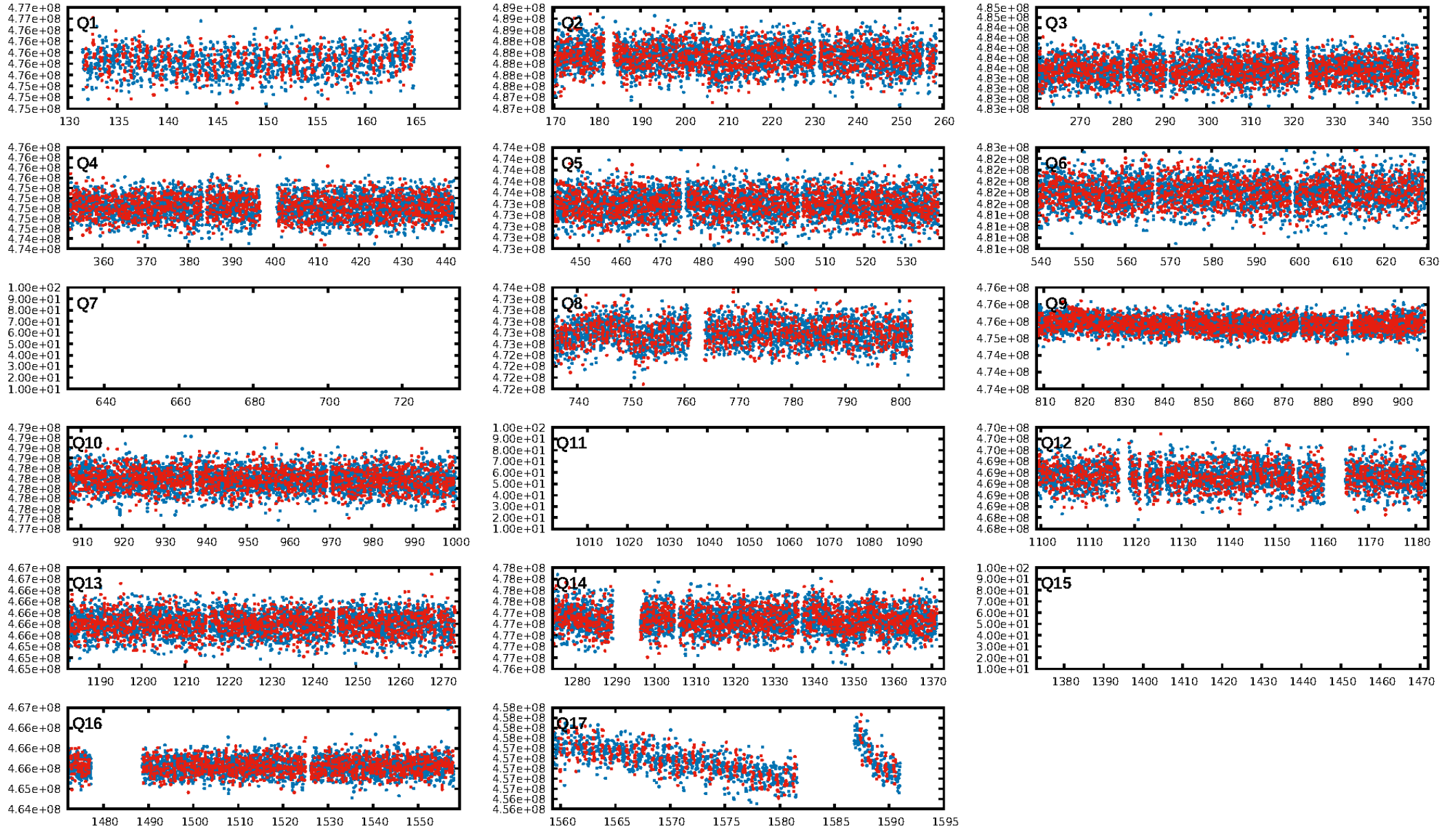
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
 LongPeriod-sig: 0.0% [0.00σ]  
 ModelChiSquare2-sig: N/A  
 ModelChiSquareGof-sig: N/A  
 Bootstrap-pfa: N/A  
 RollingBand-fgt: 1.00 [1322/1322]  
 GhostDiagnostic-chr: 0.9427  
 Centroid-sig: 0.0%  
 Centroid-so: 0.864 arcsec [3.26σ]  
 OotOffset-rm: 0.232 arcsec [0.89σ]  
 KicOffset-rm: 0.343 arcsec [1.27σ]  
 OotOffset-st: 4/1/4/5 [14]  
 KicOffset-st: 4/1/4/5 [14]  
 DiffImageQuality-fgm: 0.93 [13/14]  
 DiffImageOverlap-fno: 0.00 [0/14]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:55:20 Z

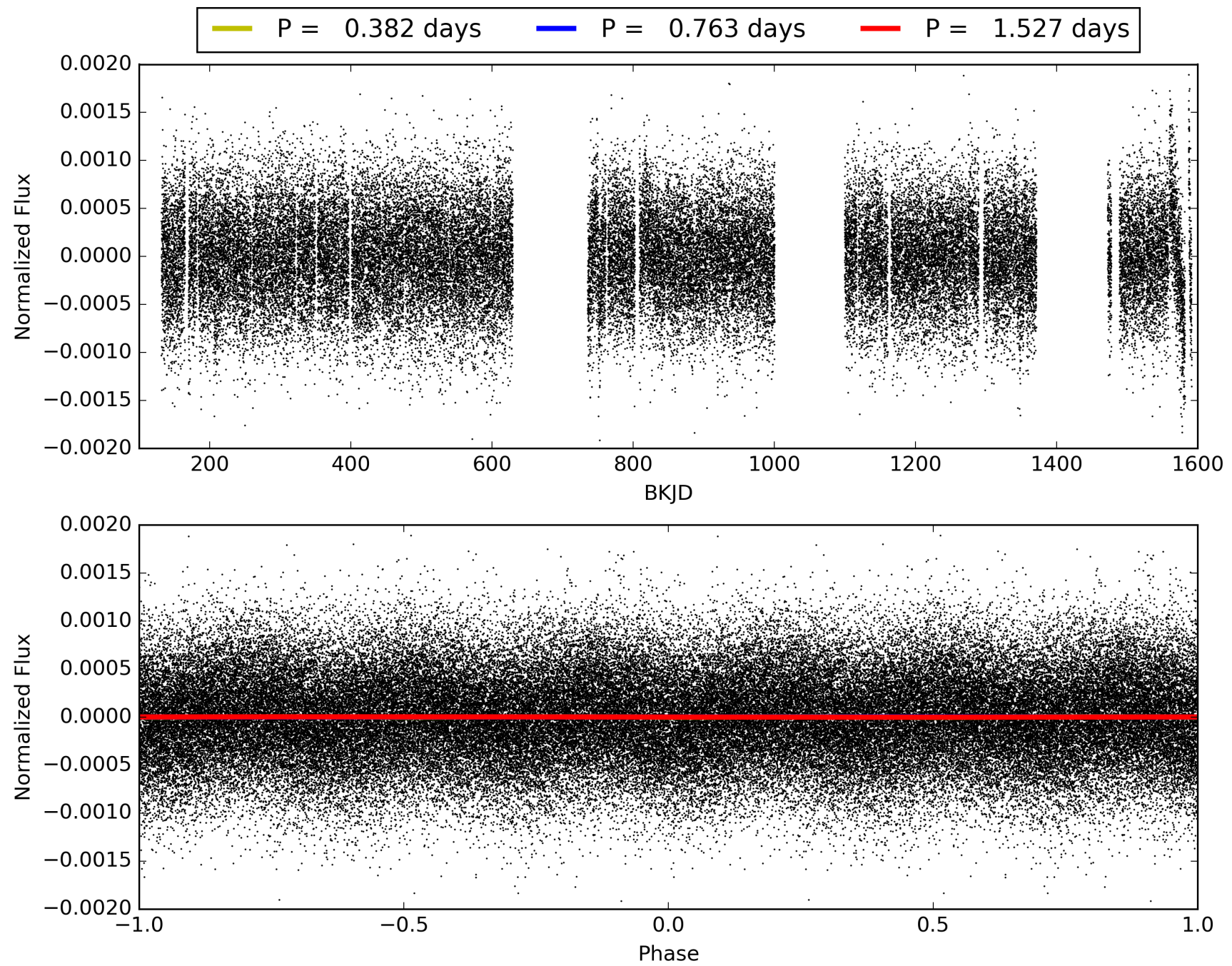
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 010416779-01, PDC Light Curves





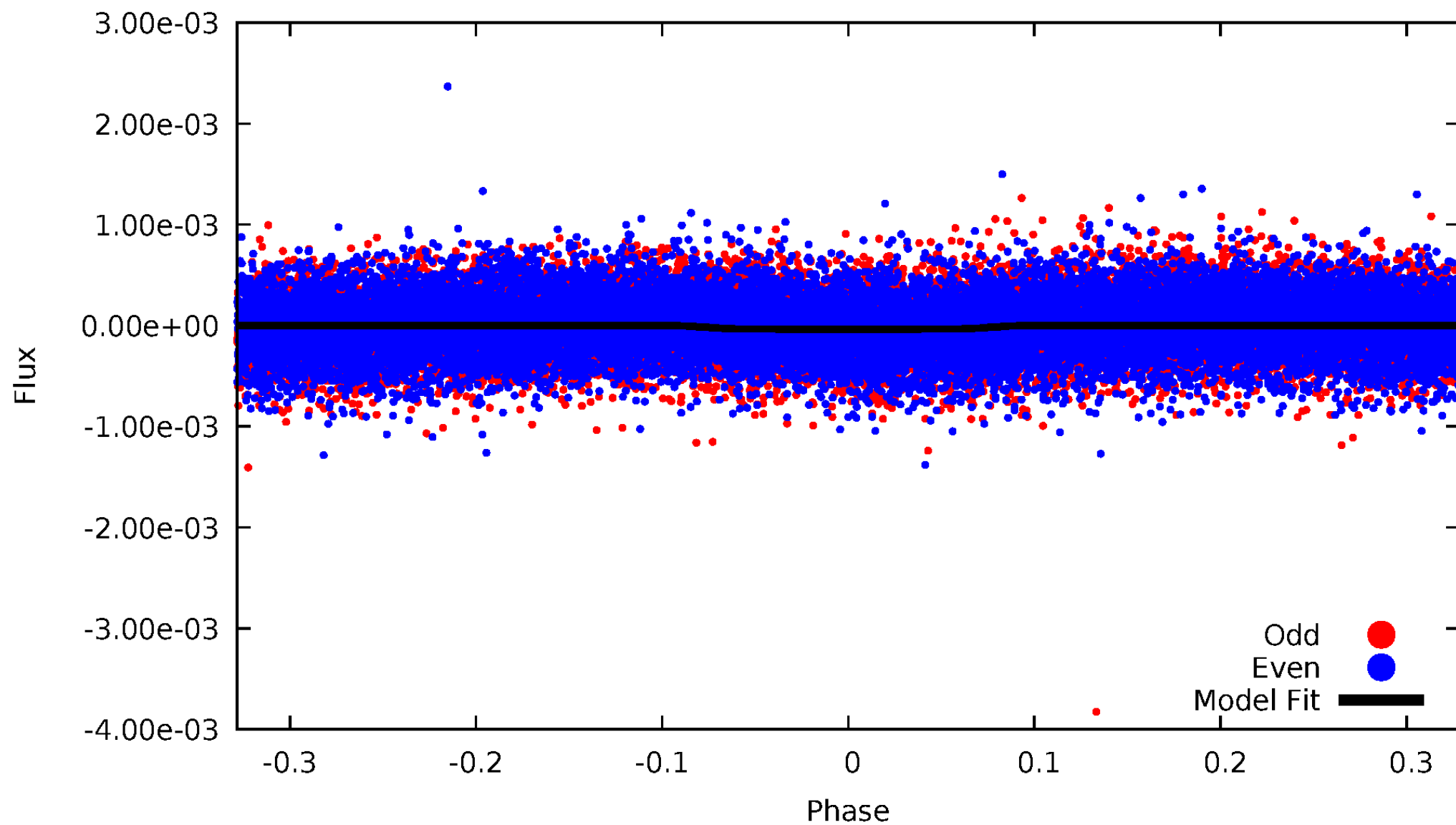
TCE 010416779-01





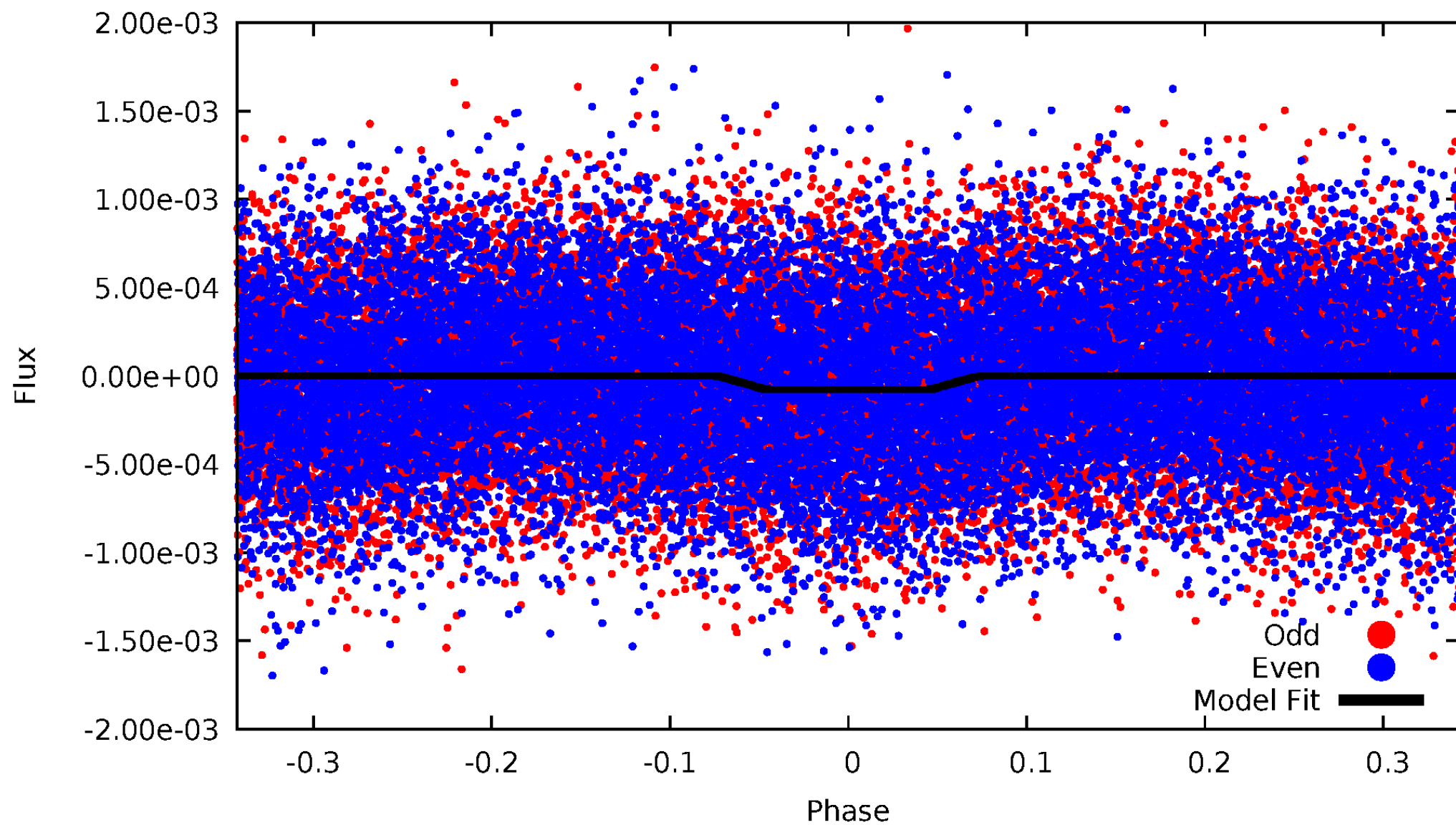
# DV Odd/Even

TCE 010416779-01

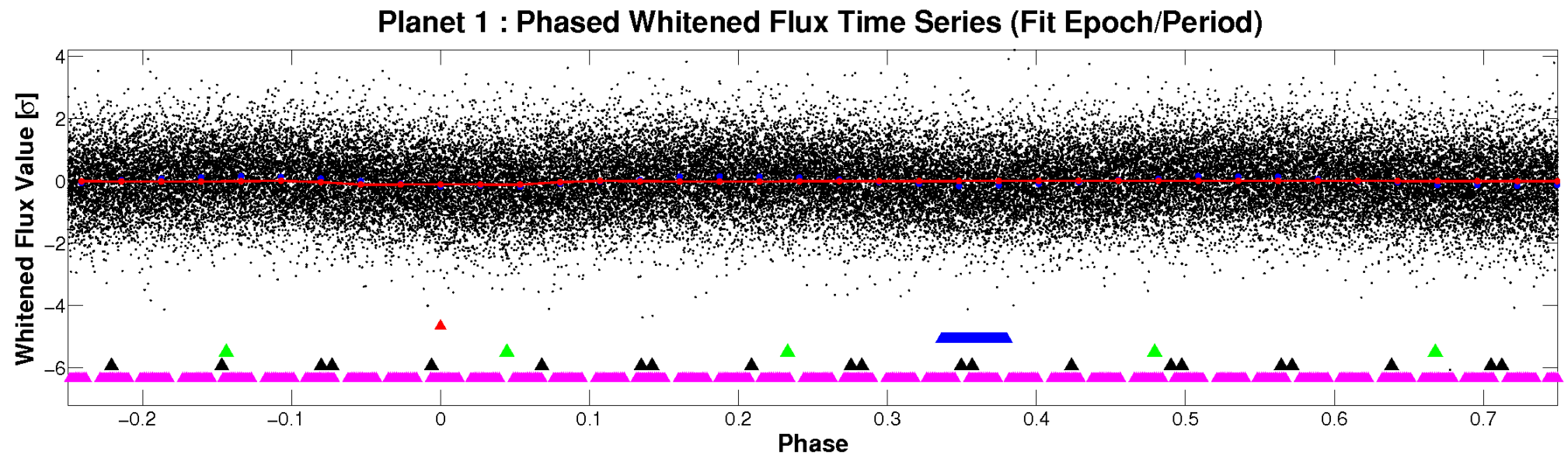
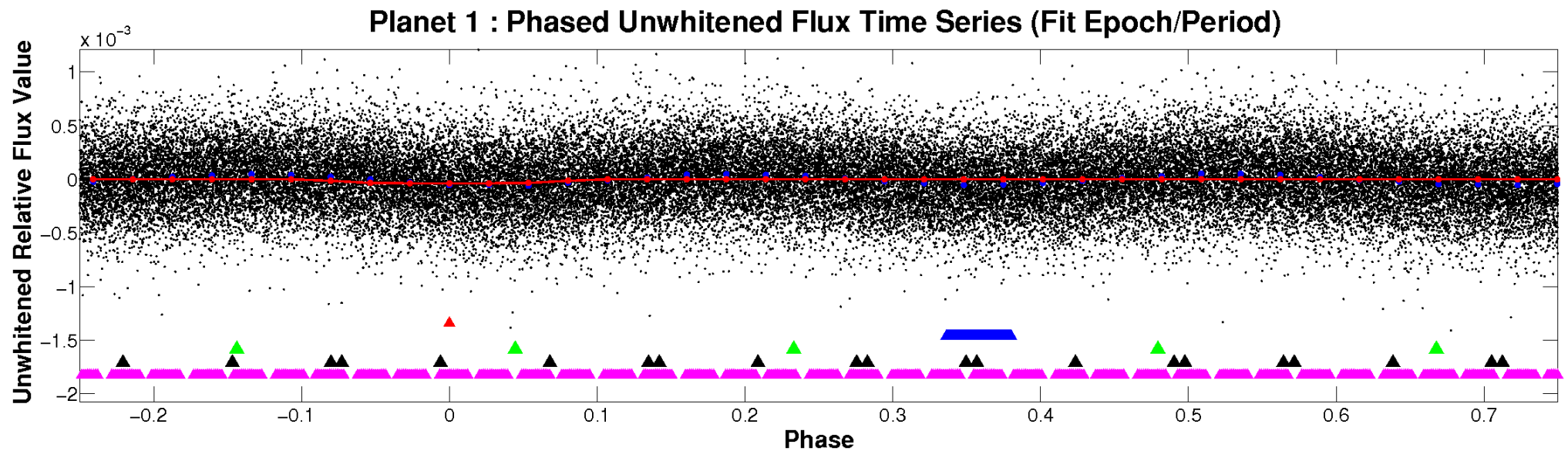


# ALT Odd/Even

TCE 010416779-01



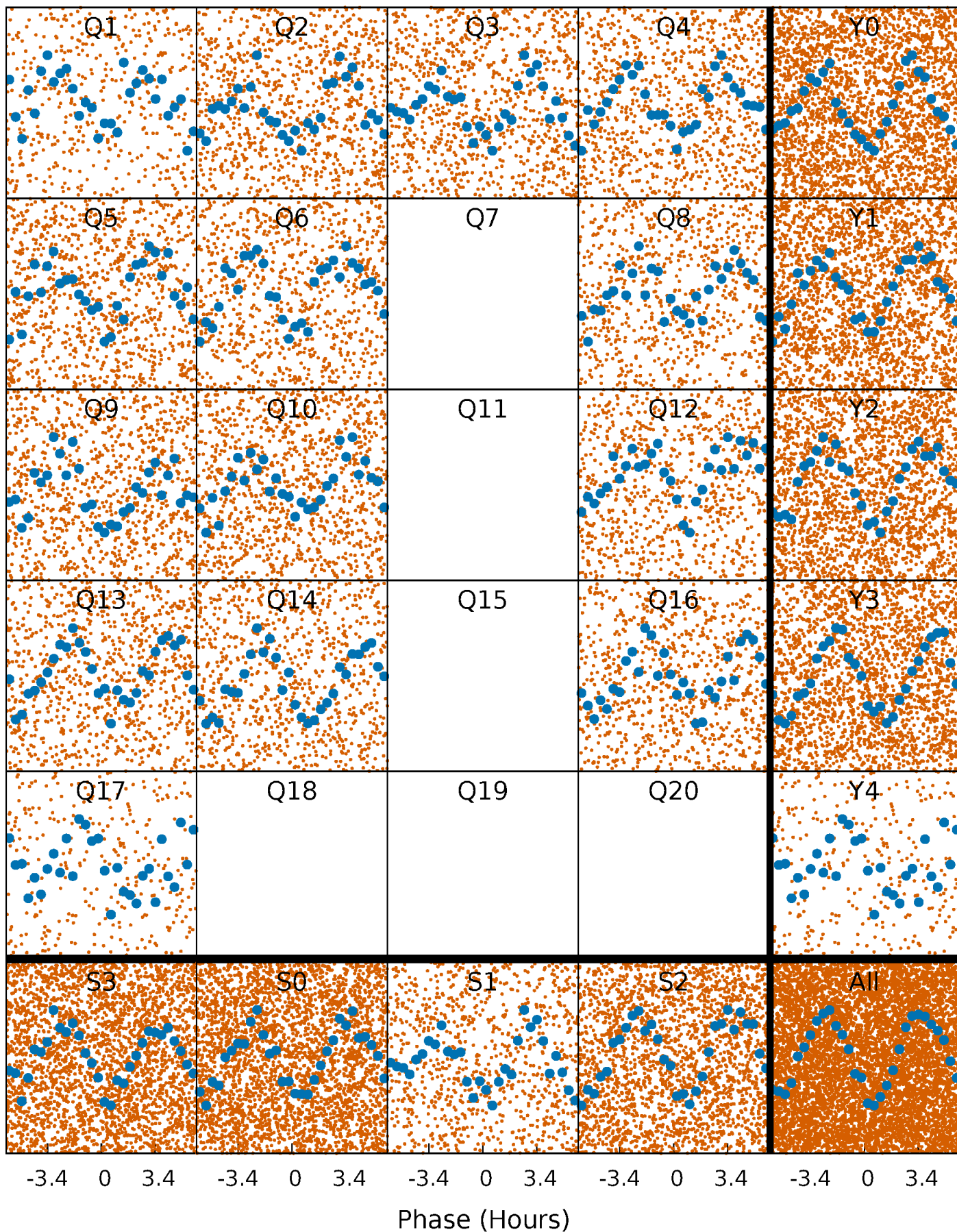
# Non-Whitened Vs. Whitened Light Curve





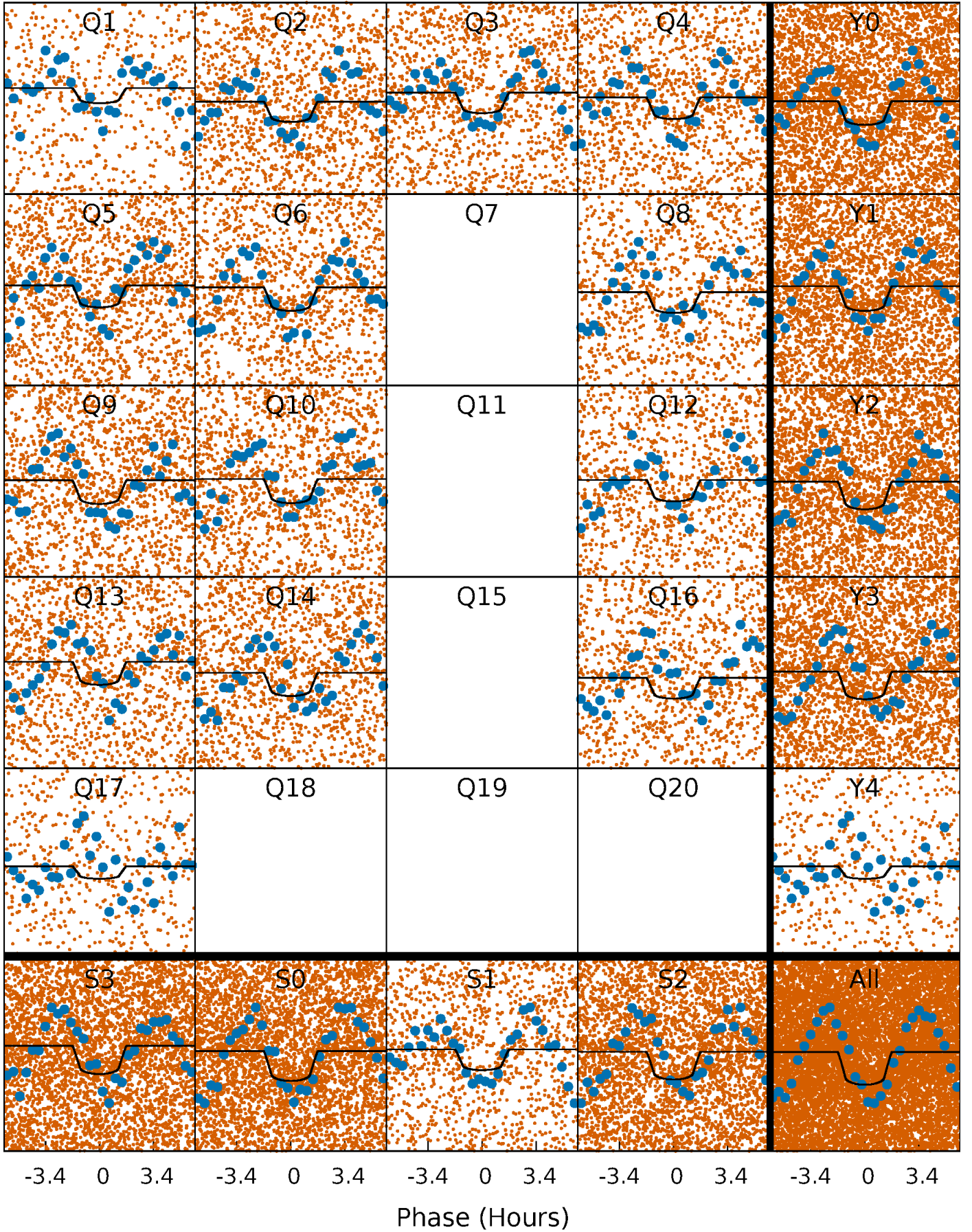
# PDC Quarter-Phased Transit Curves

TCE 010416779-01 P= 0.763288 Days  $T_0=131.838551$  (BKJD)



# DV Quarter-Phased Transit Curves

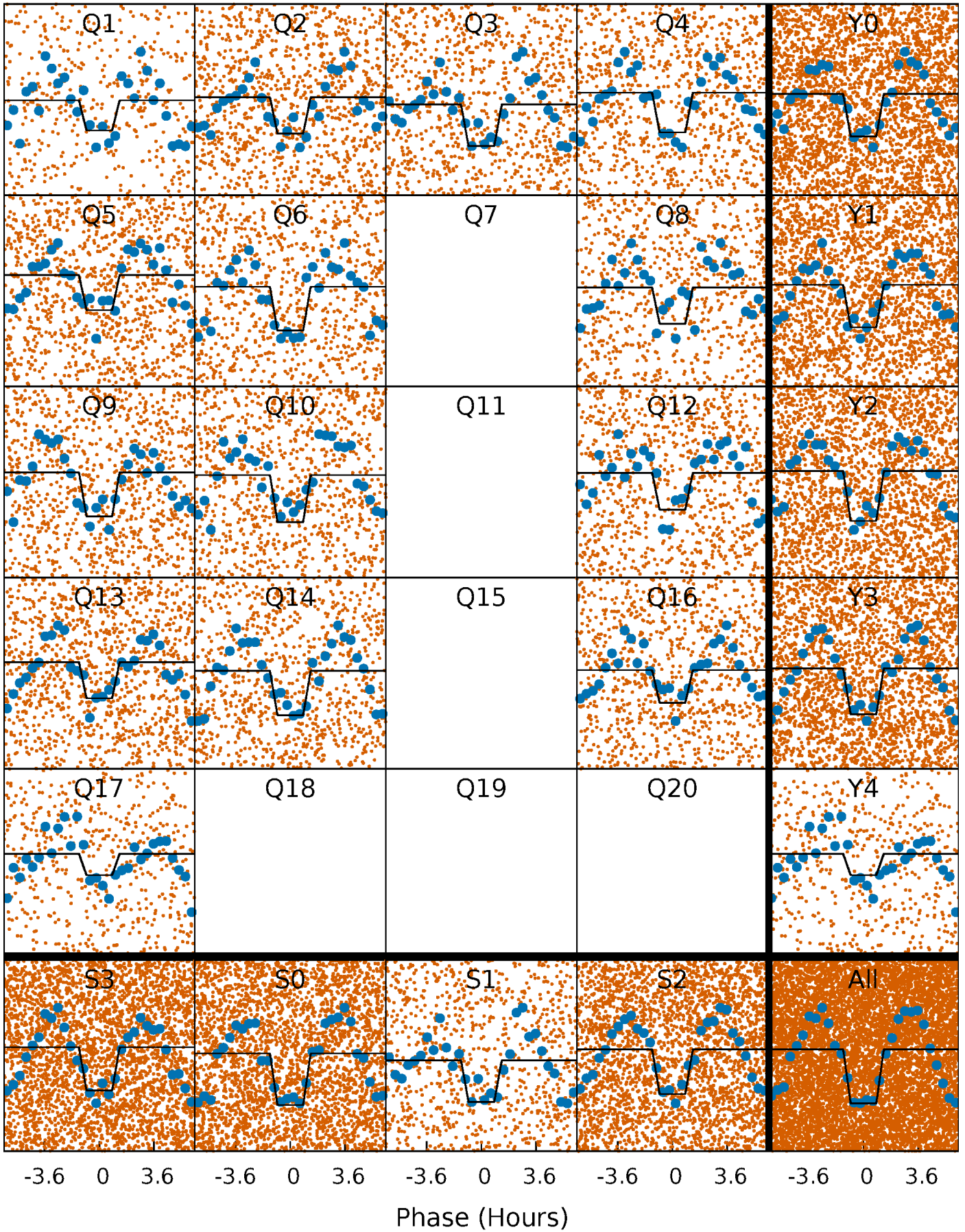
TCE 010416779-01   P= 0.763288 Days    $T_0=131.838551$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

TCE 010416779-01 P= 0.763320 Days  $T_0=131.836418$  (BKJD)

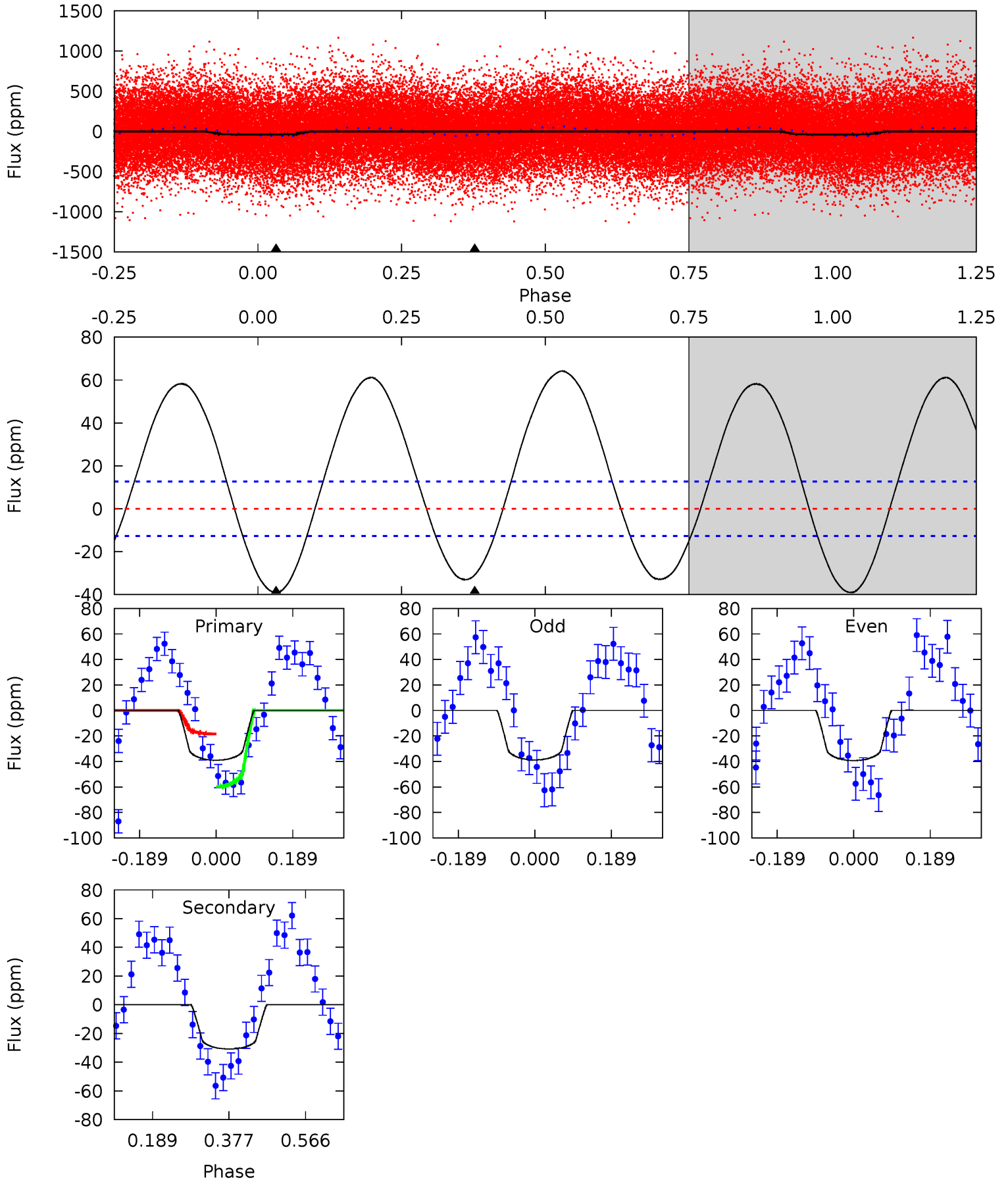




# DV Model-Shift Uniqueness Test

010416779-01, P = 0.763288 Days, E = 131.075263 Days

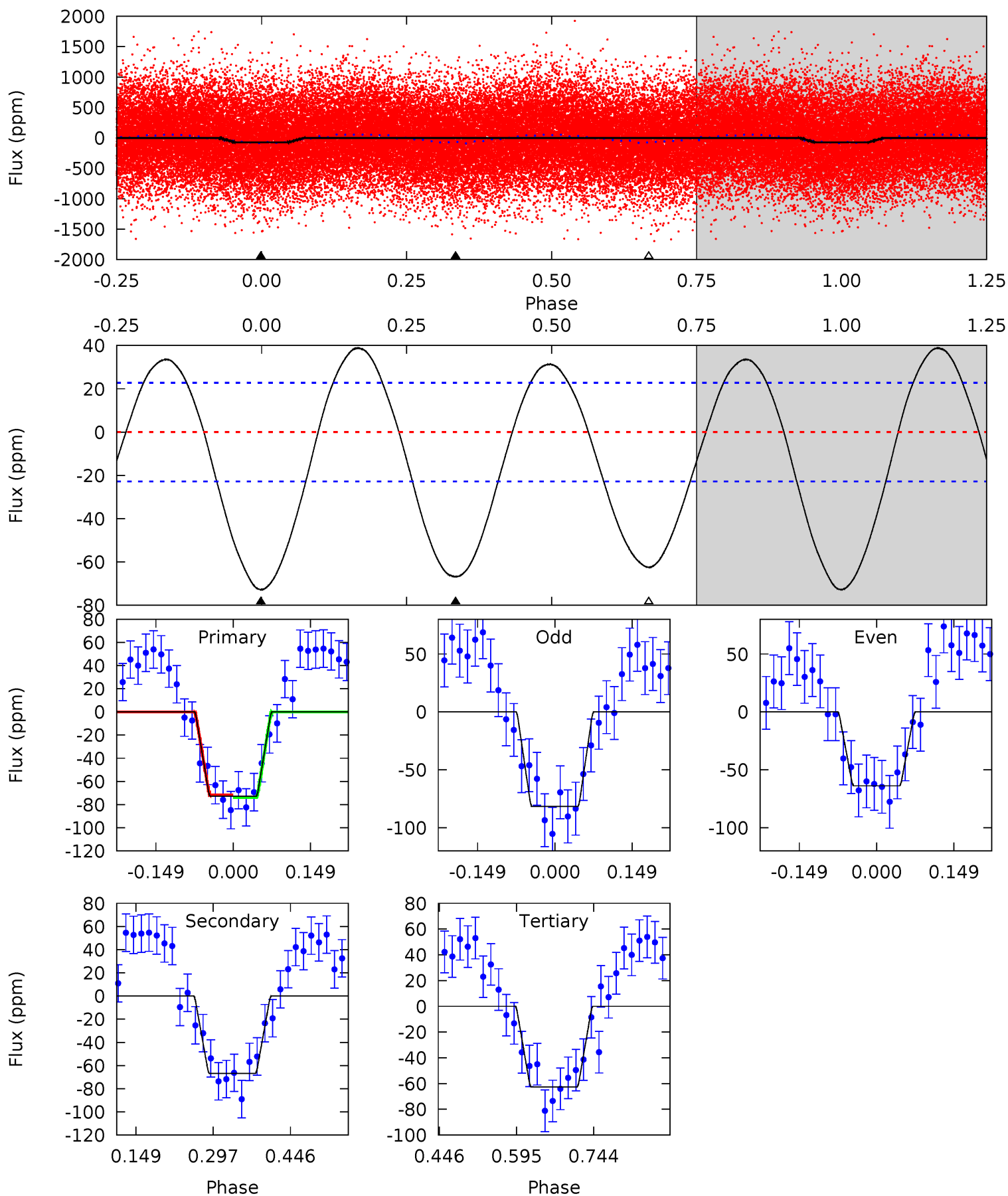
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
13.6	10.8	0	0	4.43	1.31	10.0	13.6	13.6	10.8	10.8	0.09	1.21	0.62	7.22



# Alt Model-Shift Uniqueness Test

010416779-01, P = 0.763320 Days, E = 131.073098 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
14.3	13.1	12.3	0	4.48	1.44	7.02	2.01	14.3	0.84	13.1	1.75	0.90	0.35	0.22



### Stellar Parameters For KIC 010416779

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7751^{+214}_{-322}$	$3.889^{+0.273}_{-0.117}$	$-0.020^{+0.200}_{-0.350}$	$2.607^{+0.472}_{-0.877}$	$1.922^{+0.121}_{-0.412}$	$0.153^{+0.270}_{-0.053}$
	+3%/-4%	+7%/-3%	+1000%/-1750%	+18%/-34%	+6%/-21%	+176%/-35%
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 010416779-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-31 \pm 3$	$1.75^{+0.89}_{-0.79}$	$5312^{+365}_{-430}$	$6760^{+3081}_{-1431}$	$2.254^{+5.053}_{-1.282}$
Alt.	$-67 \pm 5$	$2.29^{+0.91}_{-0.80}$	$5300^{+365}_{-514}$	$7185^{+2273}_{-1228}$	$2.819^{+3.813}_{-1.406}$

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



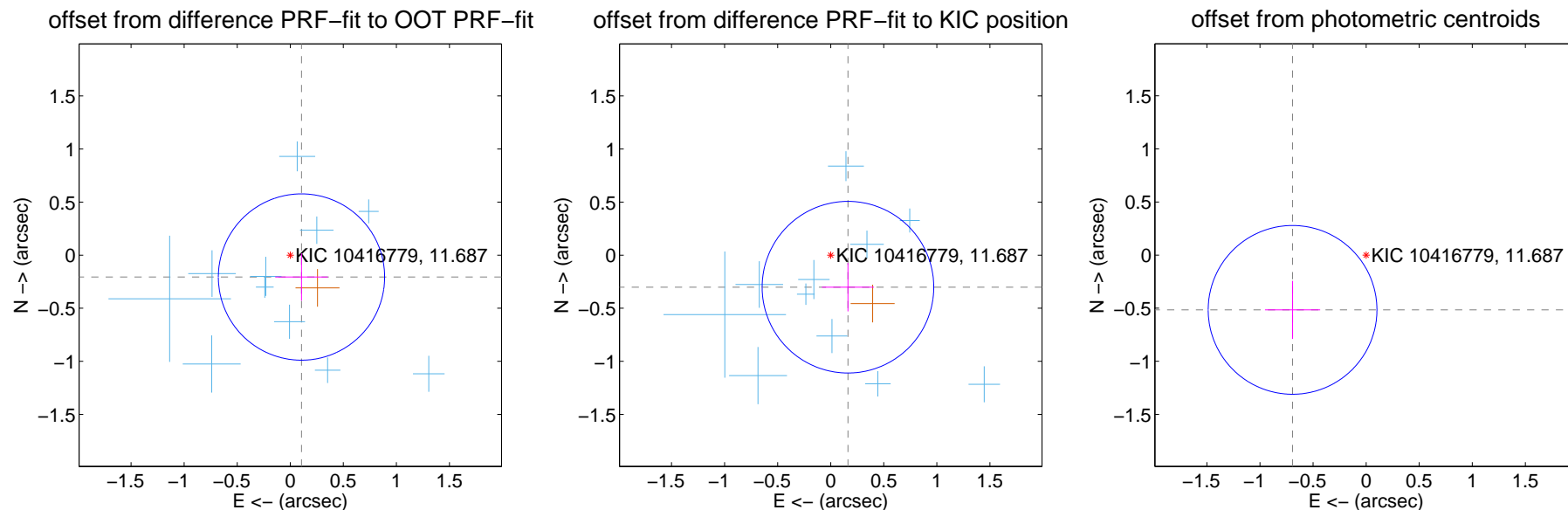
## DV Centroid Data

Supplemental centroid analysis for 010416779-01. **Kepler magnitude: 11.69.** Transit SNR 9.76

There are 13 quarters with good PRF difference image offsets

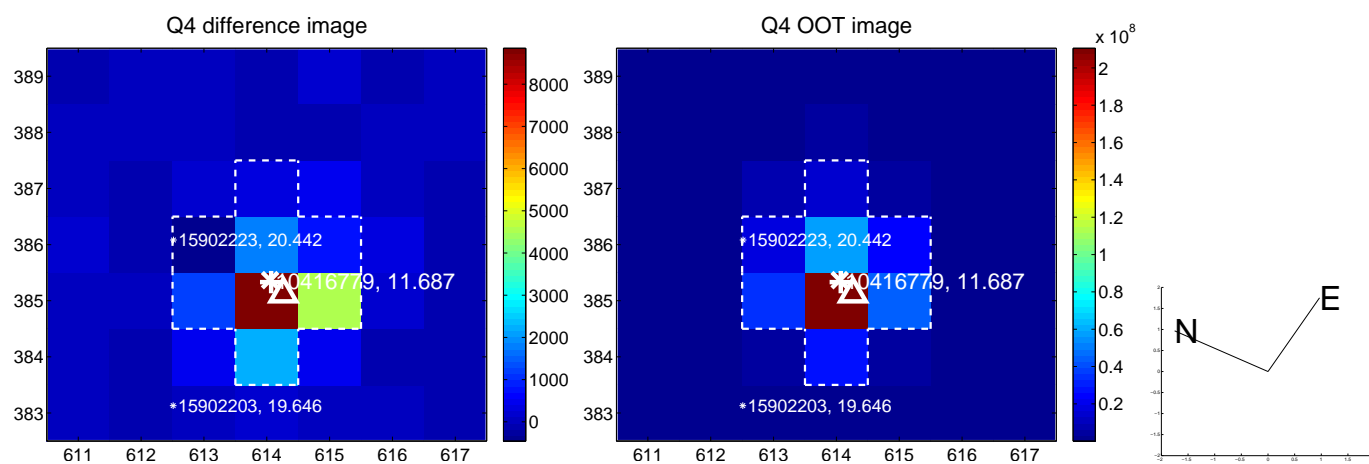
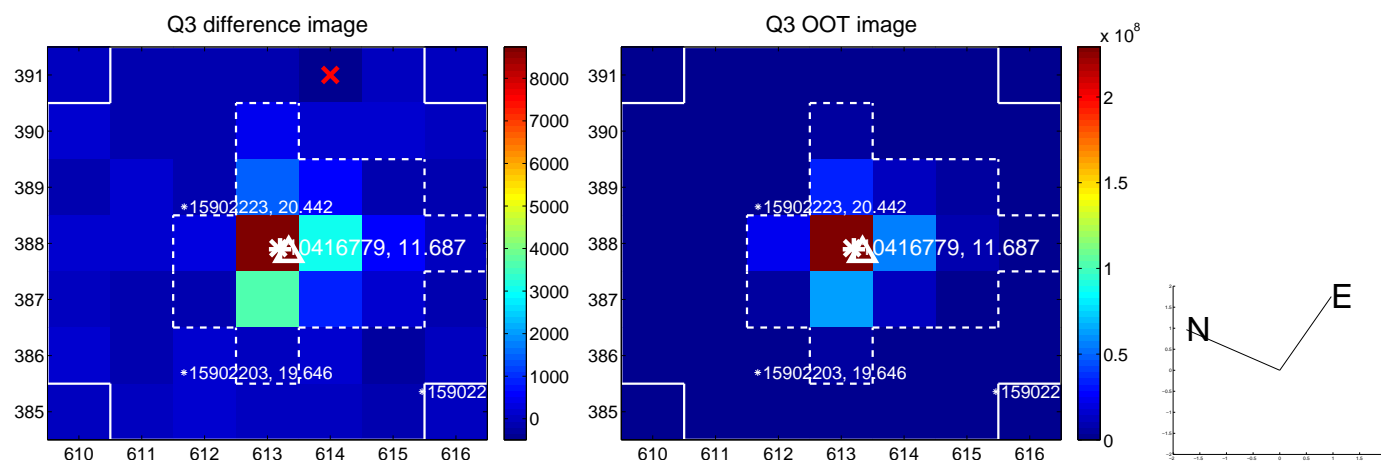
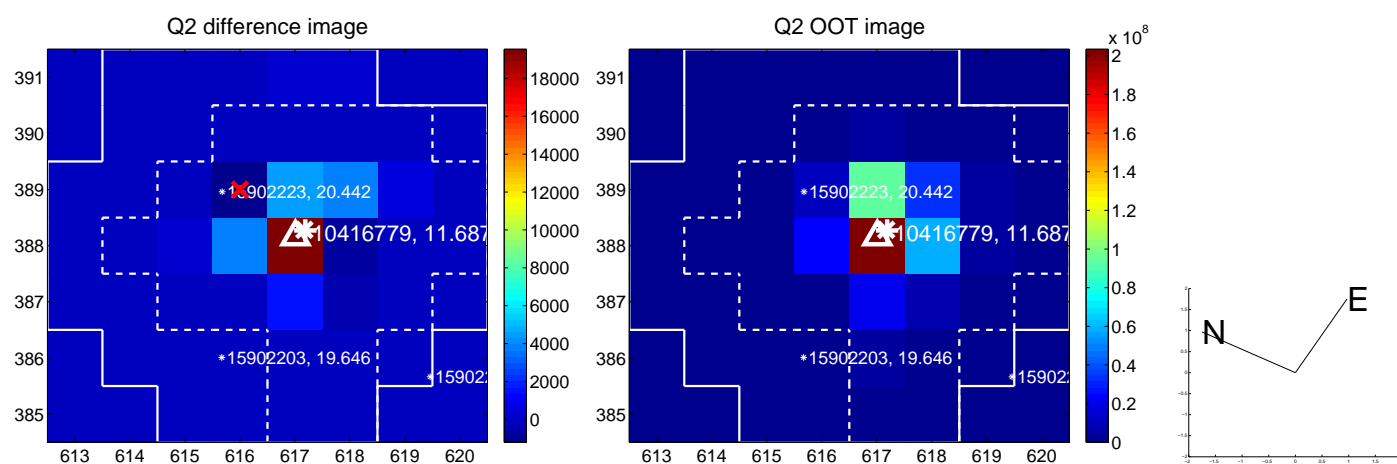
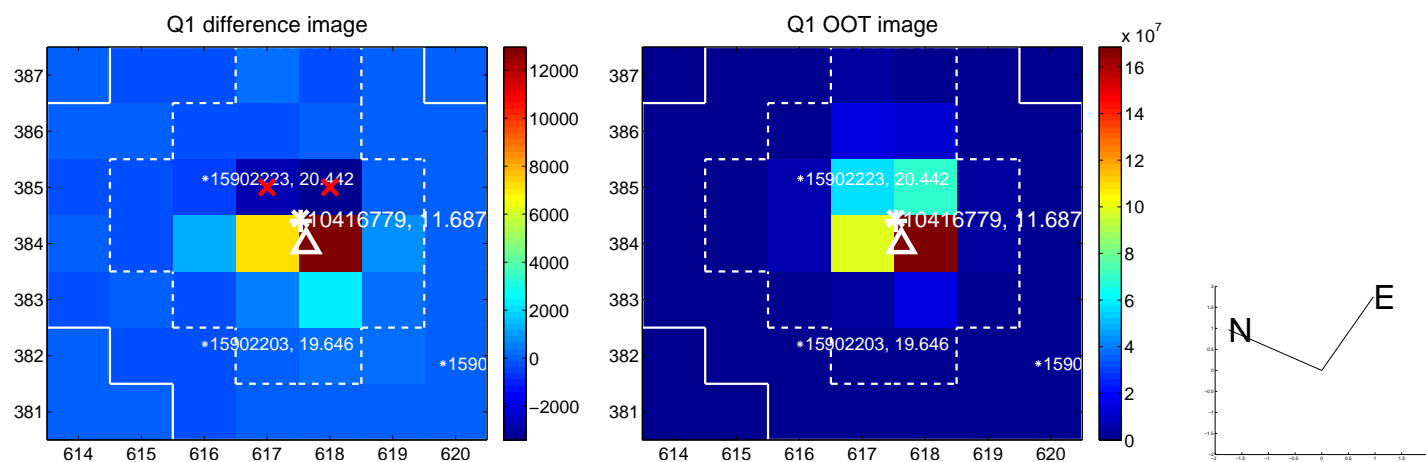
The direct PRF centroid is offset from the target star catalog position by about 0.20 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.232 \pm 0.261$	0.89	$-0.106 \pm 0.248$	$-0.206 \pm 0.223$
PRF-fit source offset from KIC position	$0.343 \pm 0.269$	1.27	$-0.162 \pm 0.244$	$-0.302 \pm 0.228$
photometric centroid source offset	<b><math>0.86 \pm 0.26</math></b>	<b>3.26</b>	$0.69 \pm 0.26$	$-0.52 \pm 0.27$

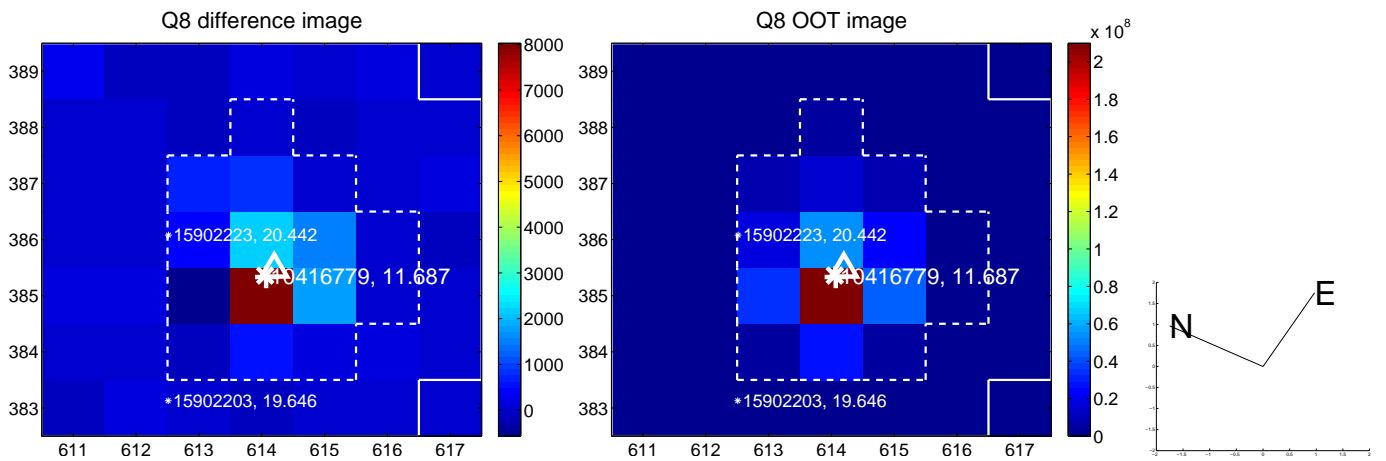
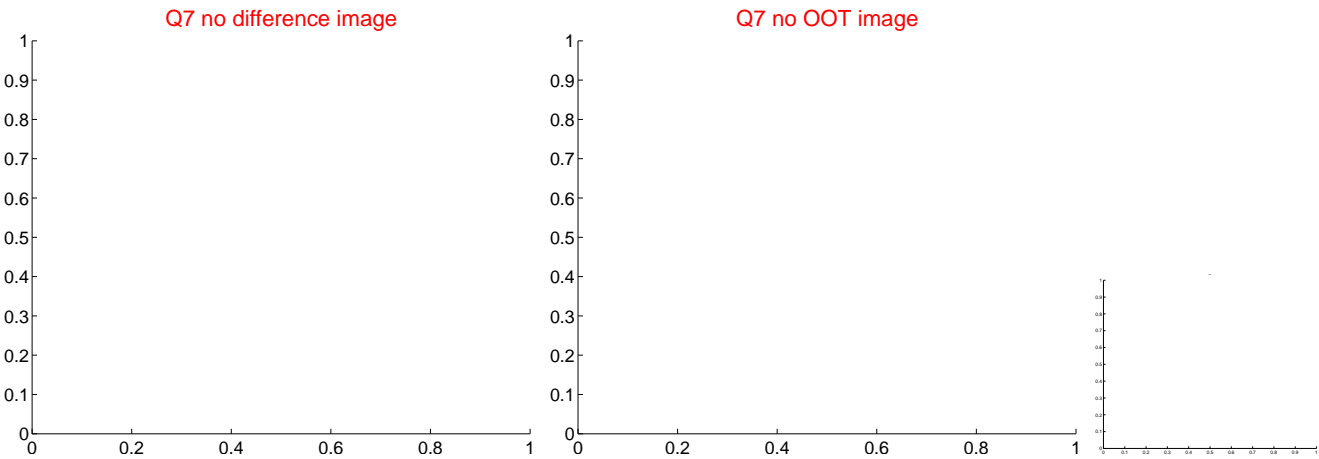
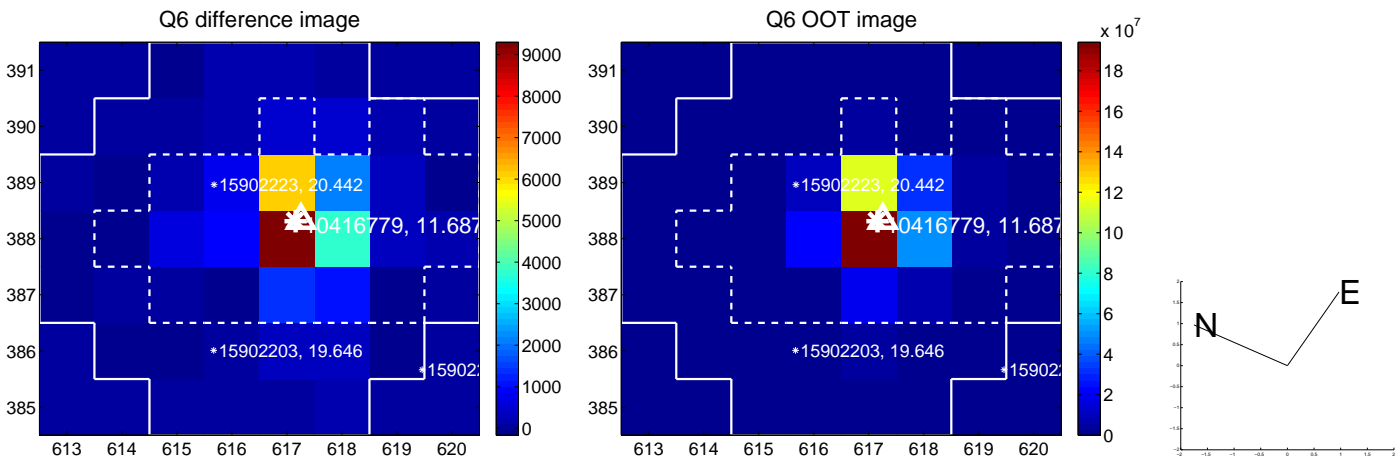
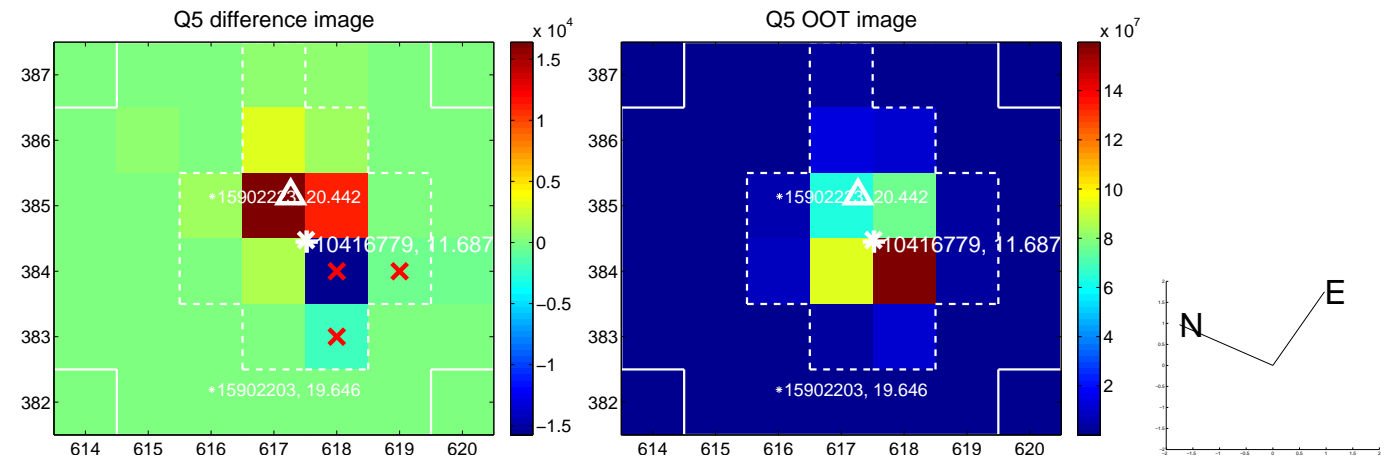


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

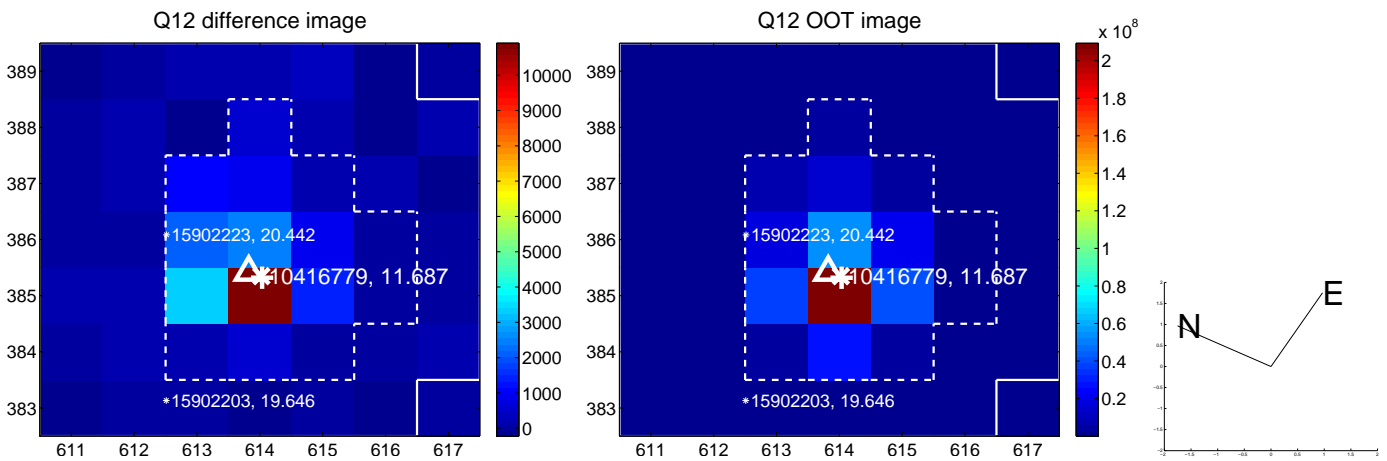
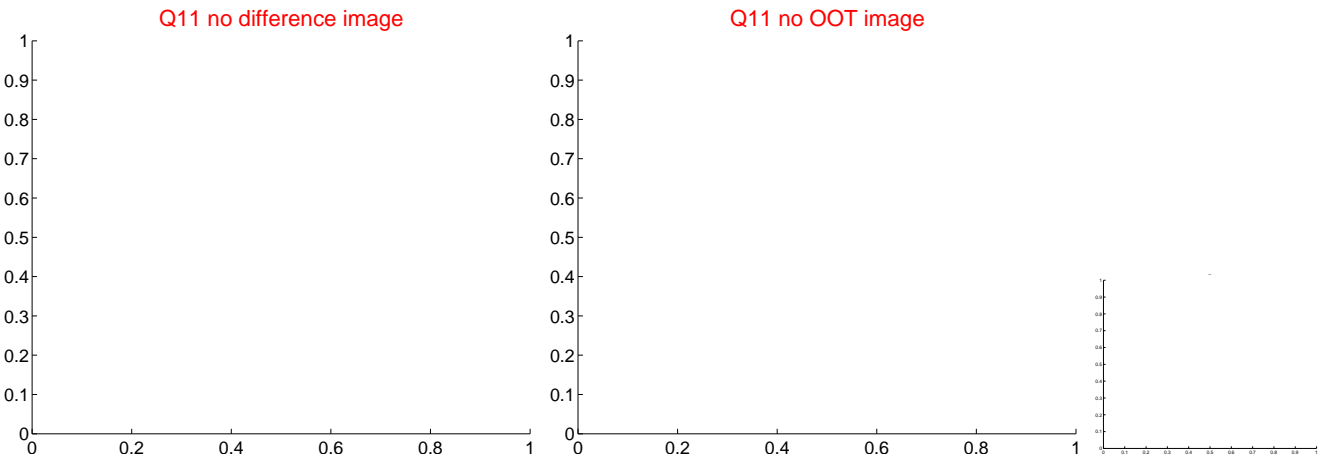
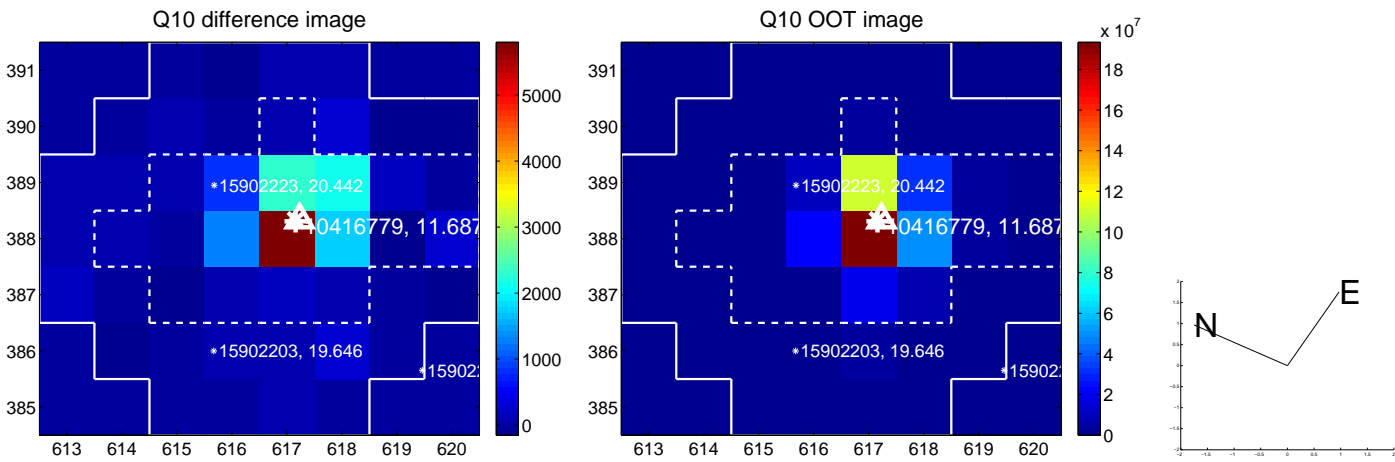
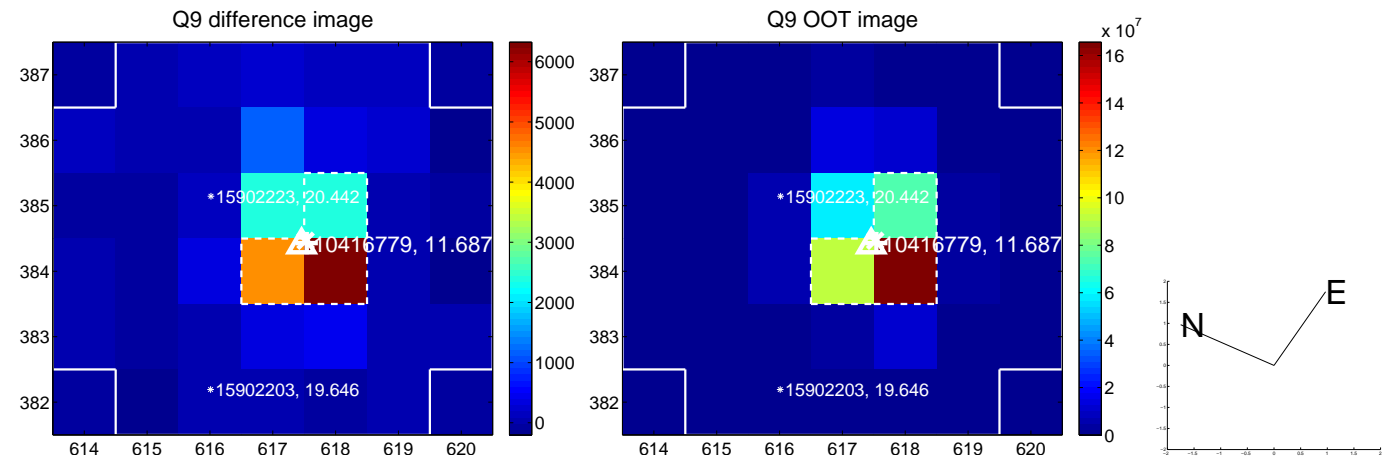


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

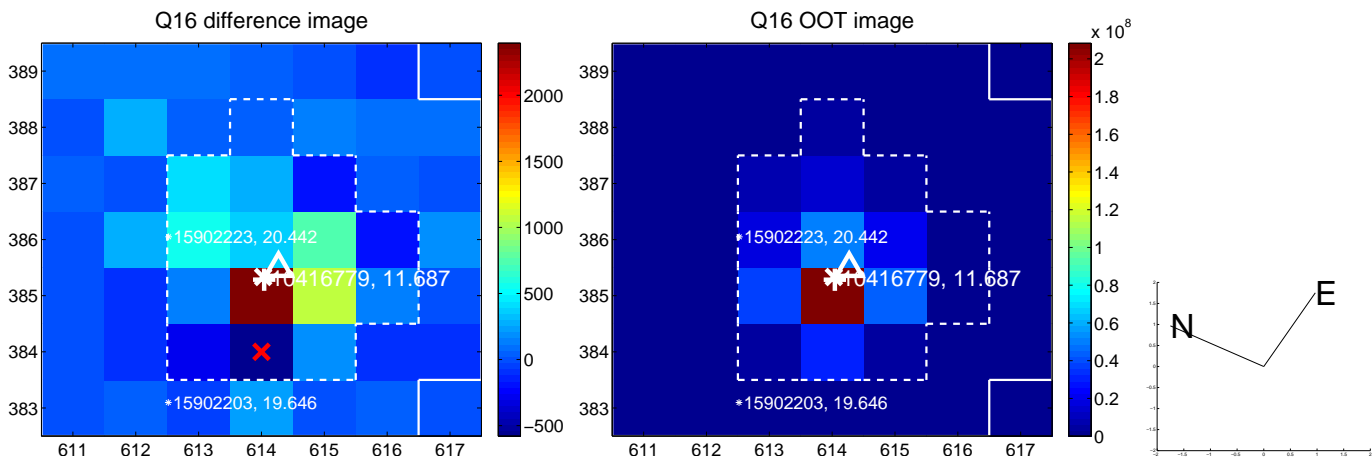
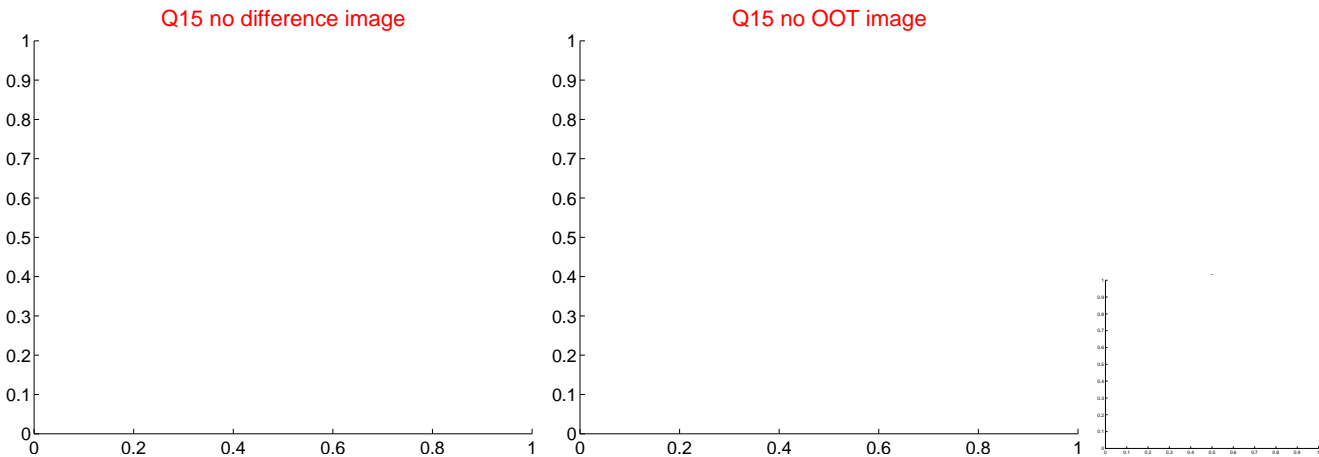
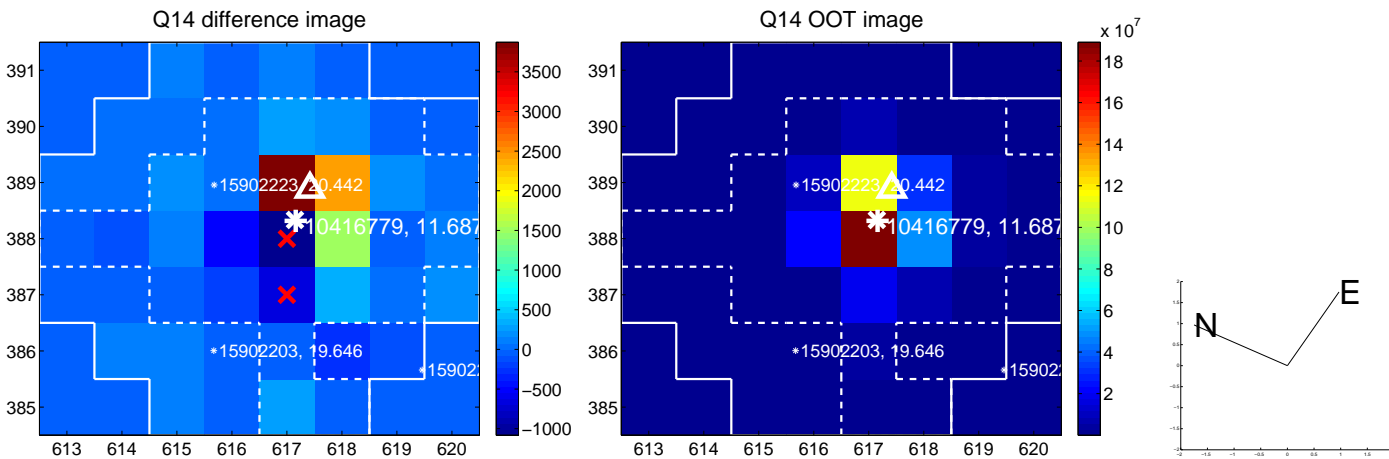
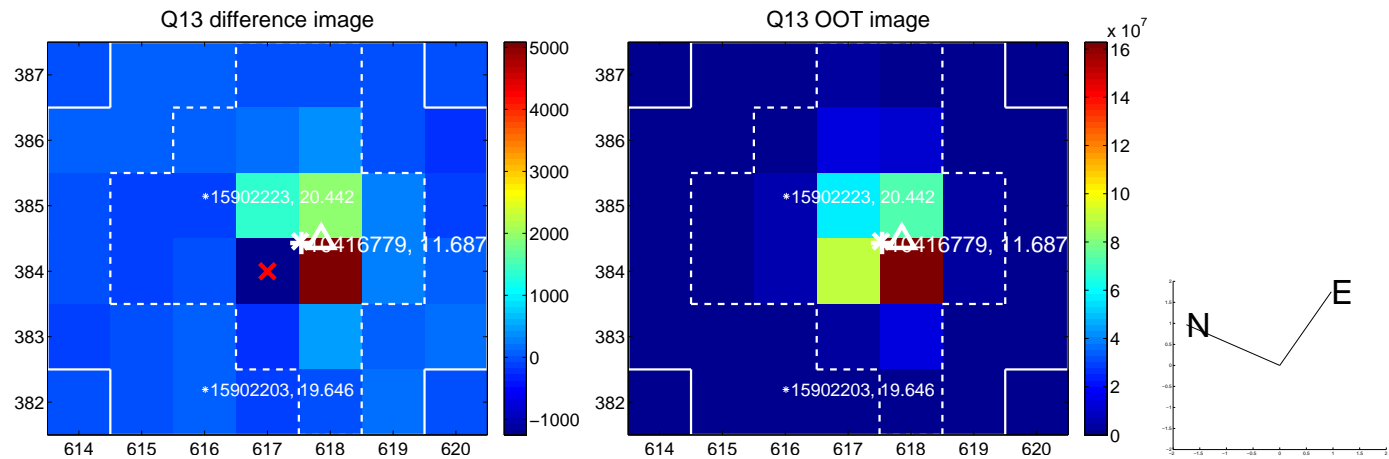




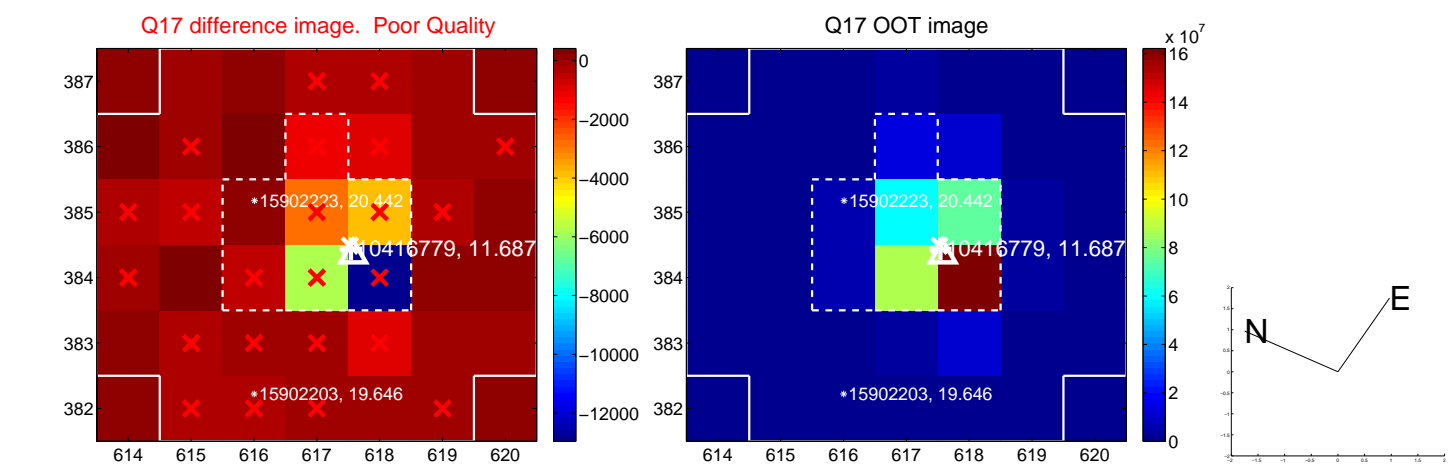
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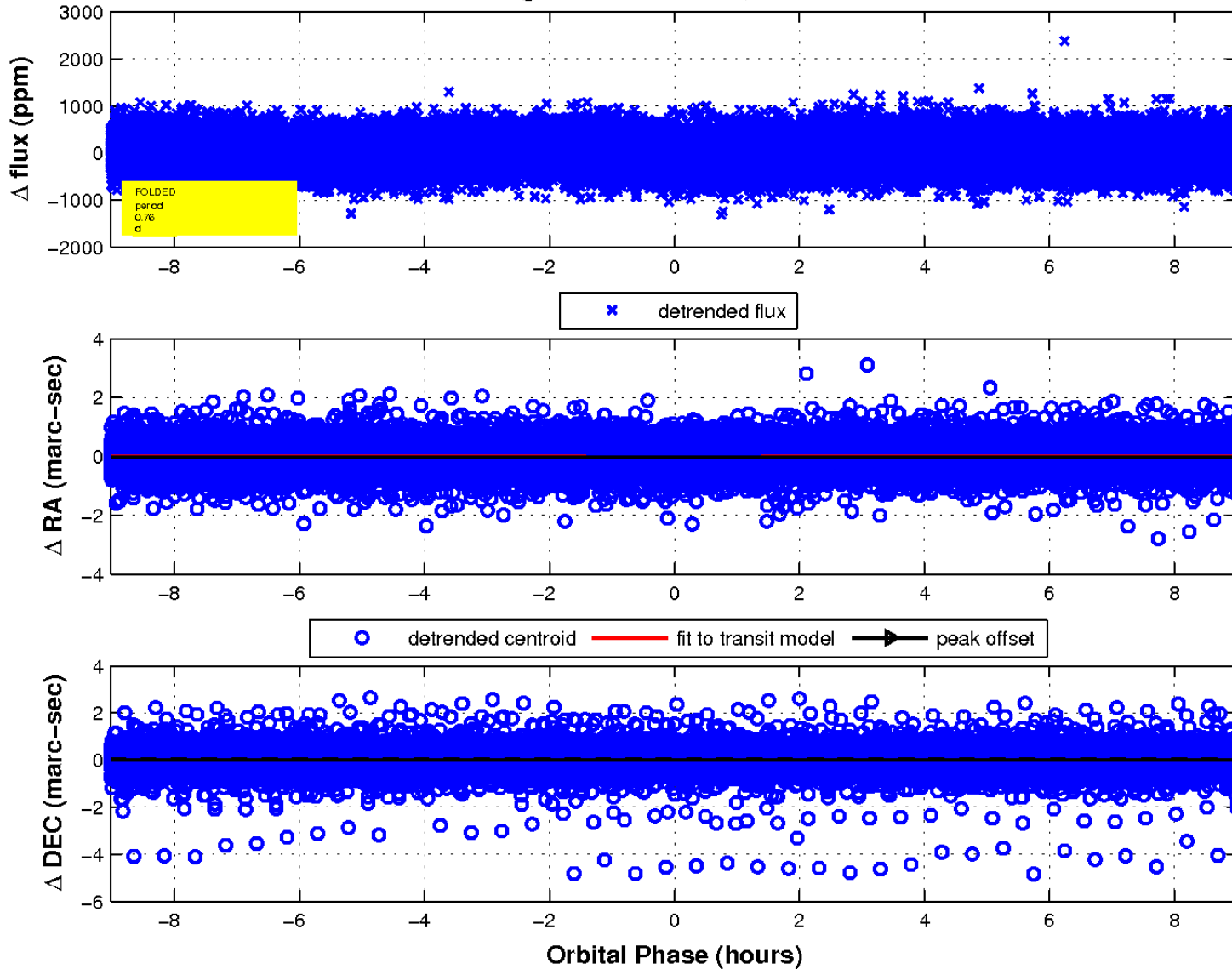
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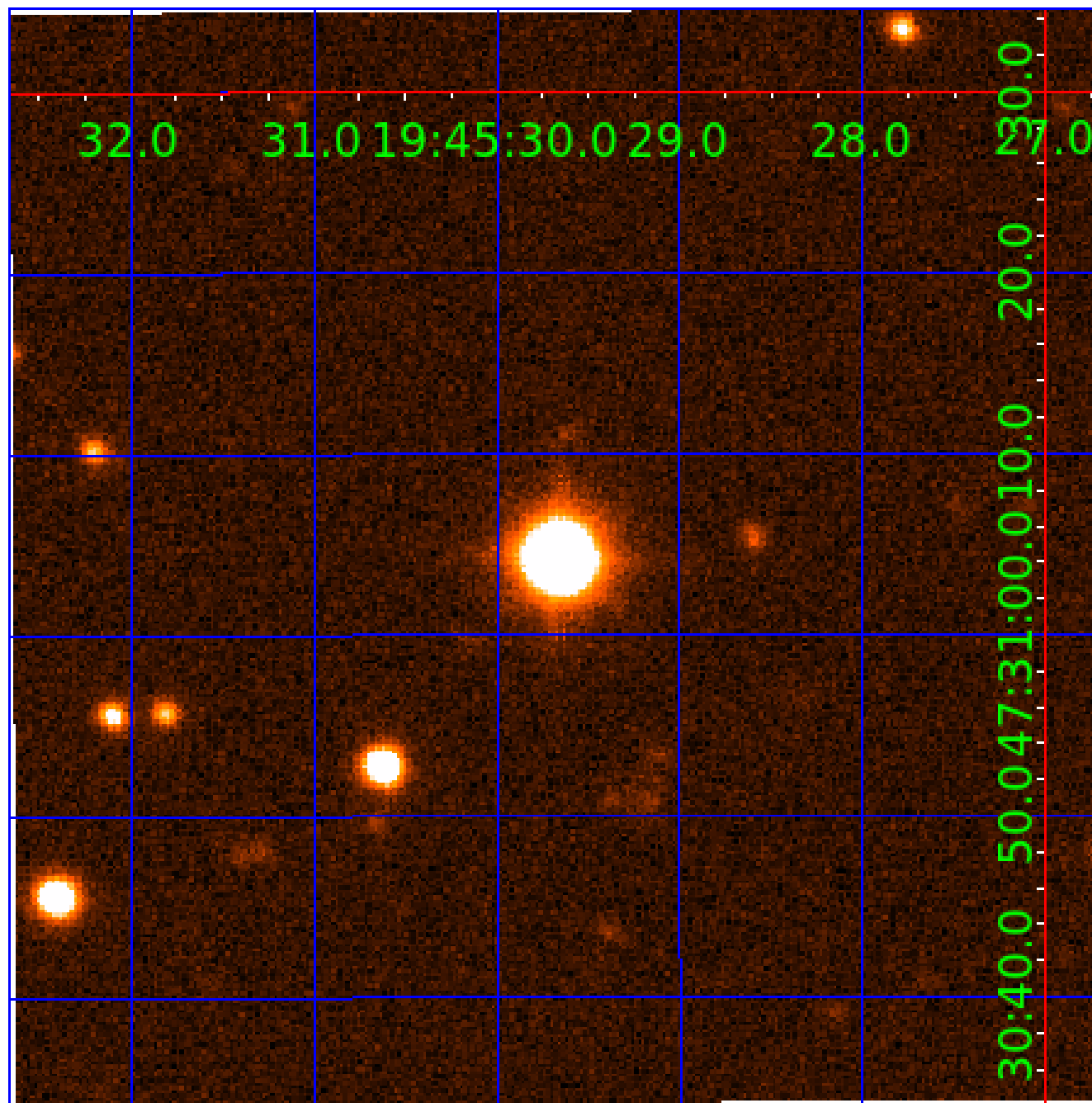


fluxWeightedCentroids, Planet 1 of 5



UKIRT Image

Declination



# KIC 010416779

## 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
010416779-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
010416779-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD
010416779-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS—HALO_GHOST
010416779-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
010416779-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT

**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.

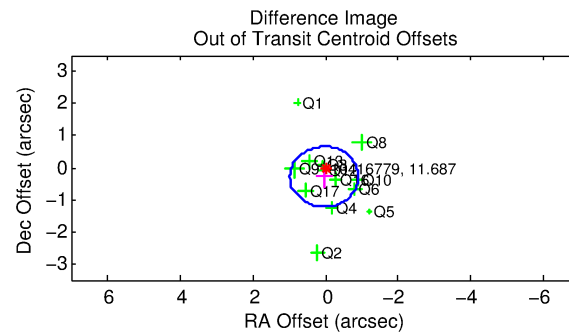
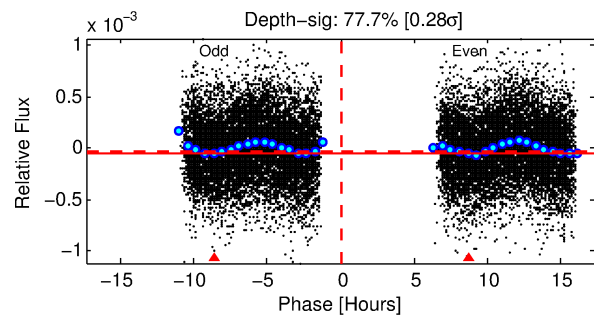
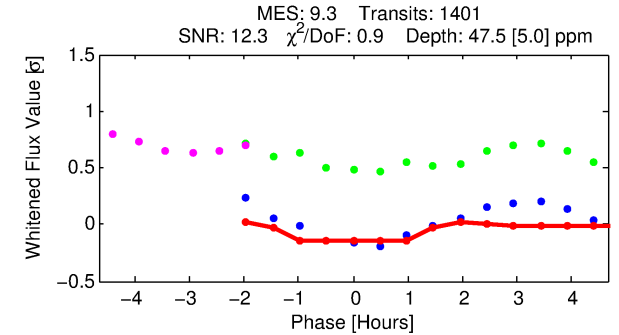
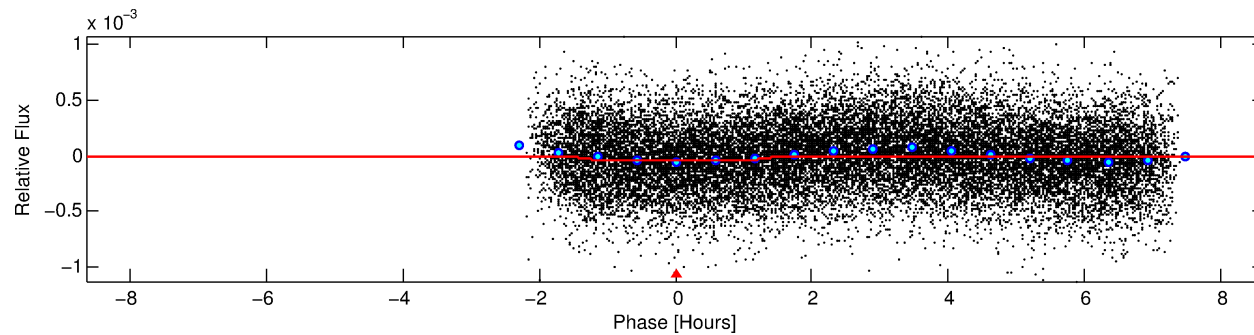
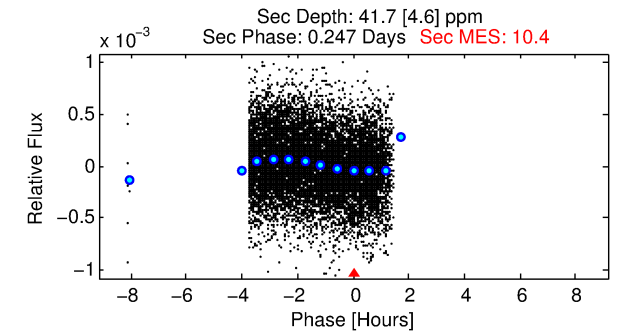
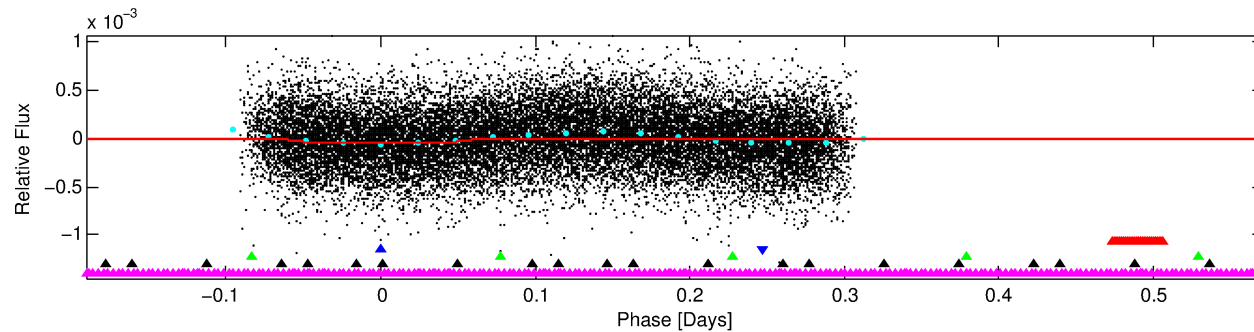
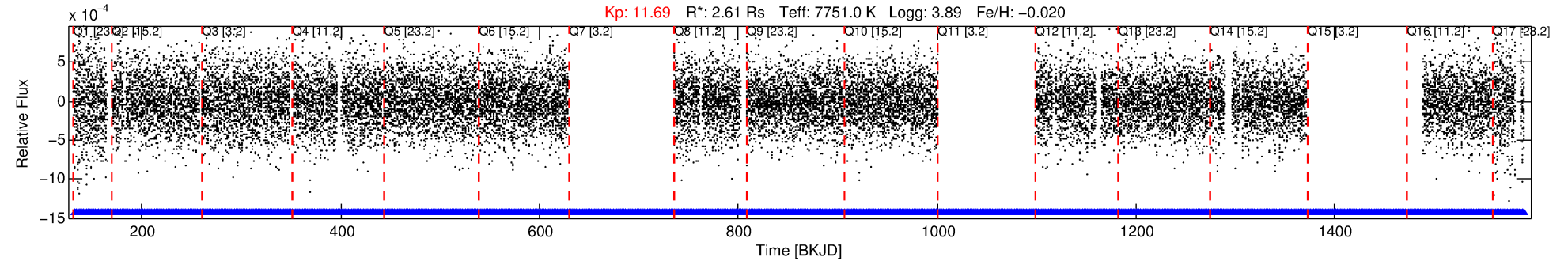
## Ephemeris Match Information For 010416779-02

No Significant Match Found



# DV One-Page Summary

KIC: 10416779 Candidate: 2 of 5 Period: 0.763 d



## DV Fit Results:

Period = 0.76331 [0.00001] d  
Epoch = 132.0952 [0.0025] BKJD  
Rp/R\* = 0.0074 [0.0026]  
a/R\* = 1.30 [1.20]  
b = 0.91 [0.46]  
Seff = 53229.80 [26802.11]  
Teq = 3873 [488] K  
Rp = 2.09 [1.02] Re  
a = 0.0203 [0.0062] AU  
Ag = 2.16 [1.86] [0.63σ]  
Teffp = 7263 [1333] K [2.39σ]

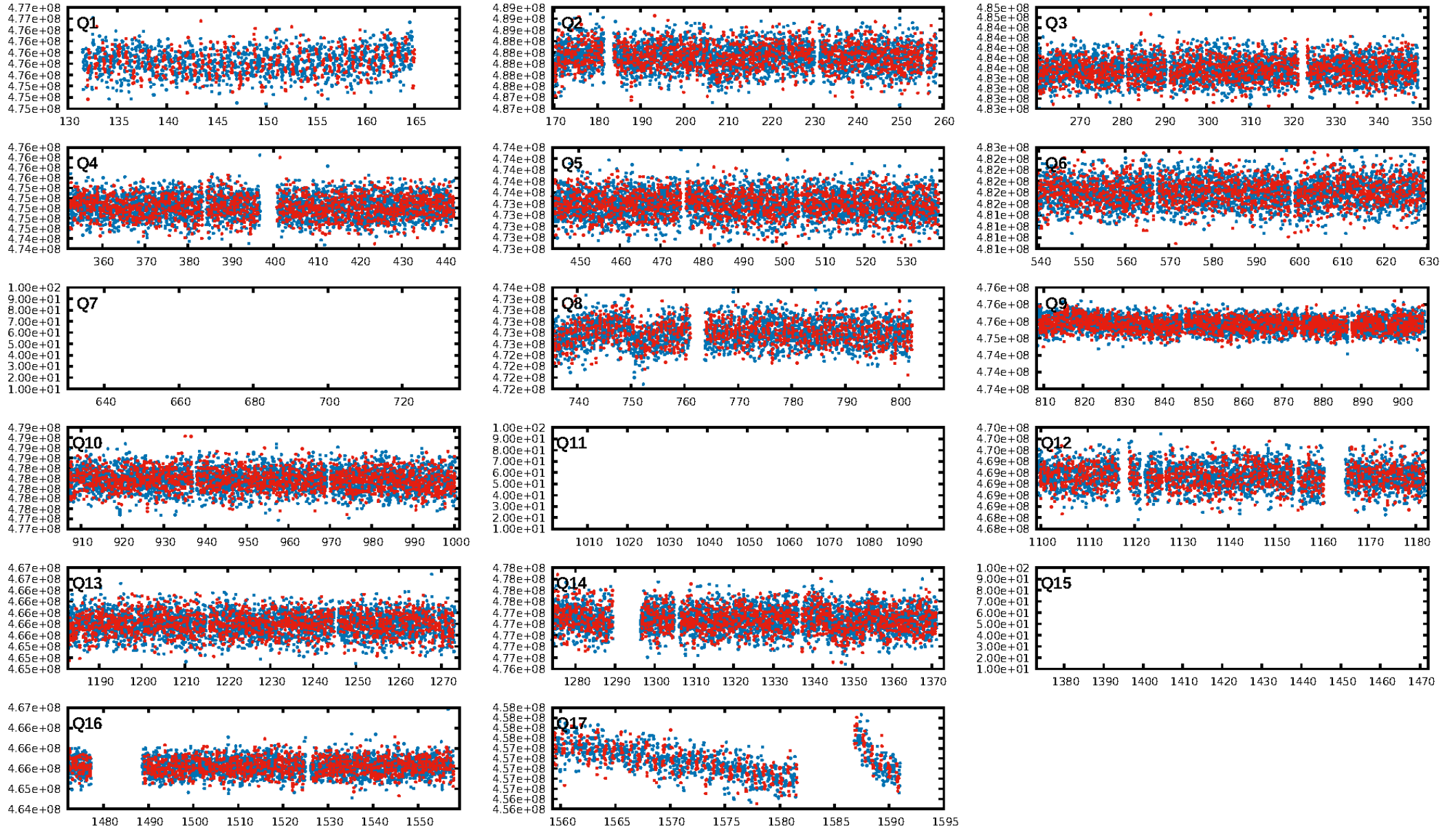
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: 100.0% [6.49σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [1321/1321]  
GhostDiagnostic-chr: 9.748  
Centroid-sig: 40.0%  
Centroid-so: 0.176 arcsec [0.81σ]  
OotOffset-rm: 0.286 arcsec [0.92σ]  
KicOffset-rm: 0.378 arcsec [1.17σ]  
OotOffset-st: 3/1/4/5 [13]  
KicOffset-st: 3/1/4/5 [13]  
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DiffImageOverlap-fno: 0.00 [0/14]

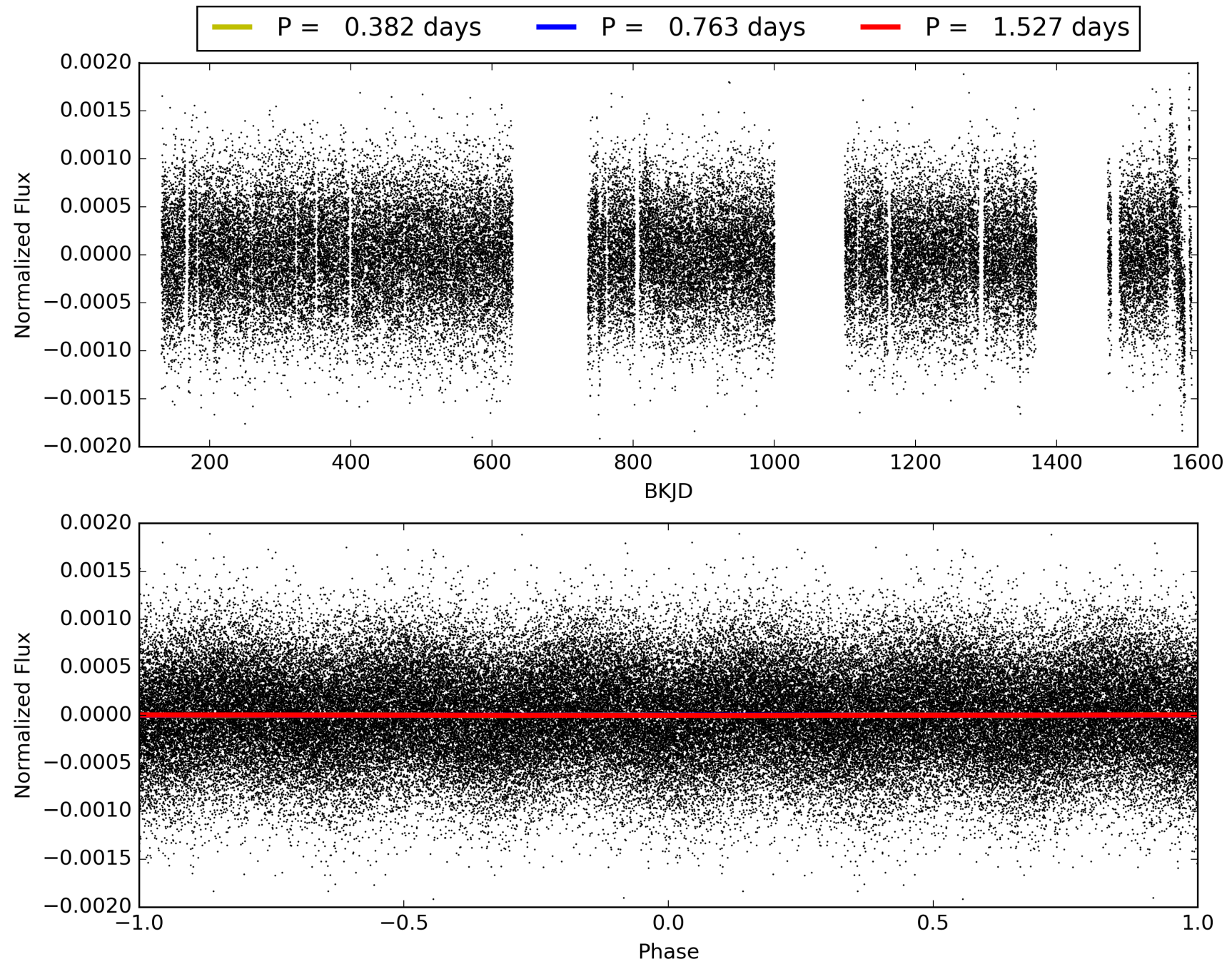
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:55:32 Z

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

# TCE 010416779-02, PDC Light Curves



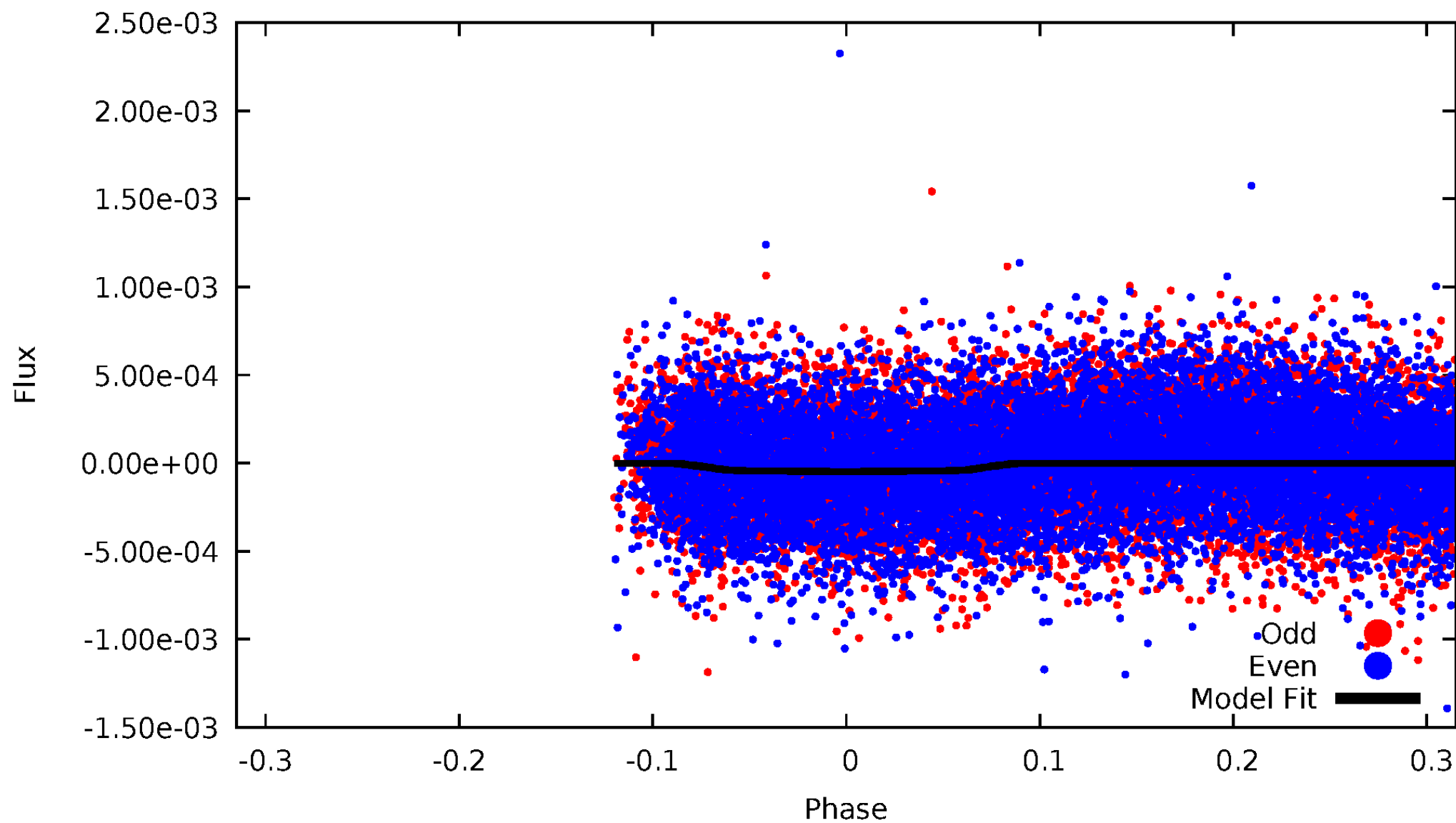
TCE 010416779-02





# DV Odd/Even

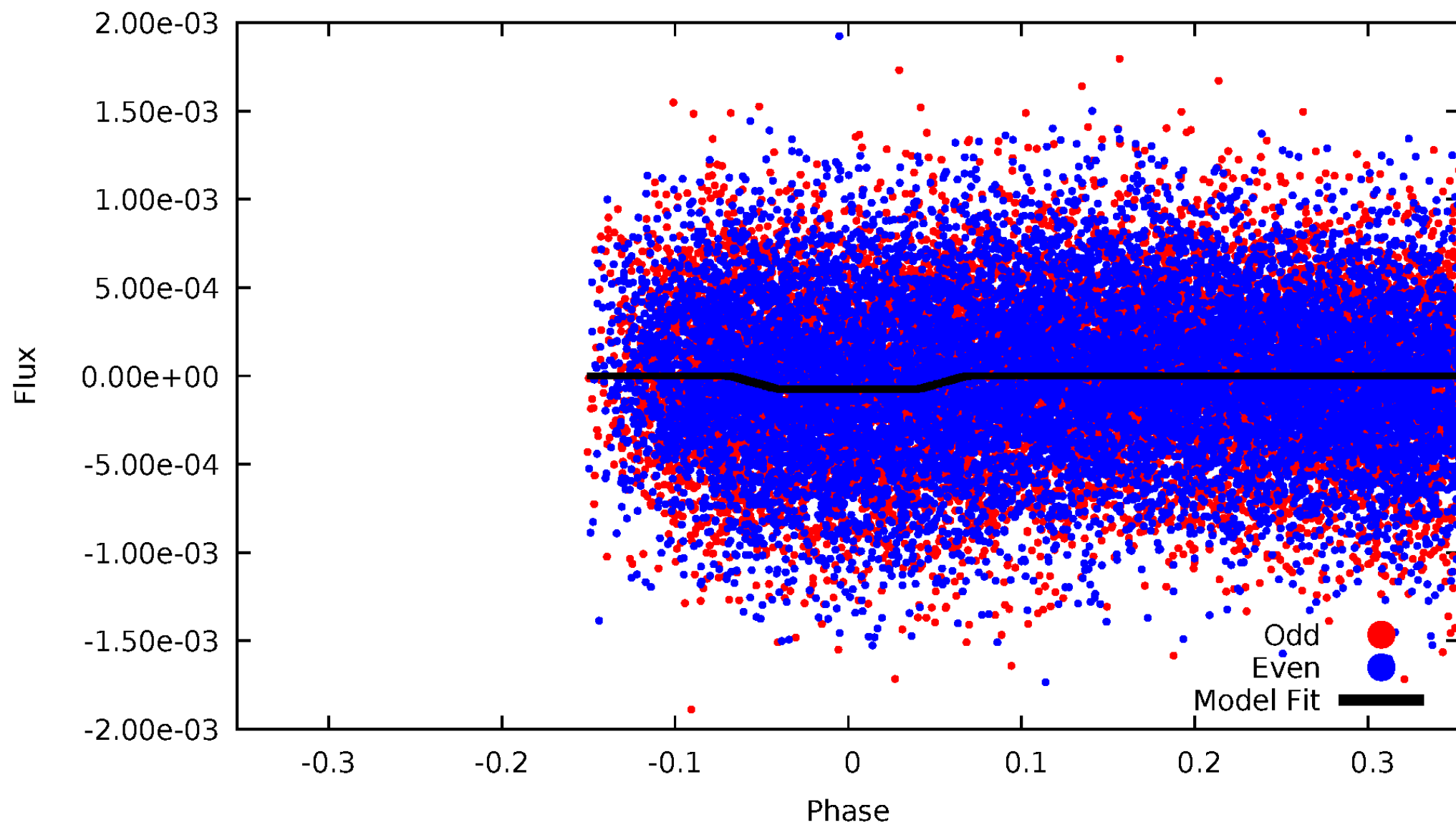
TCE 010416779-02





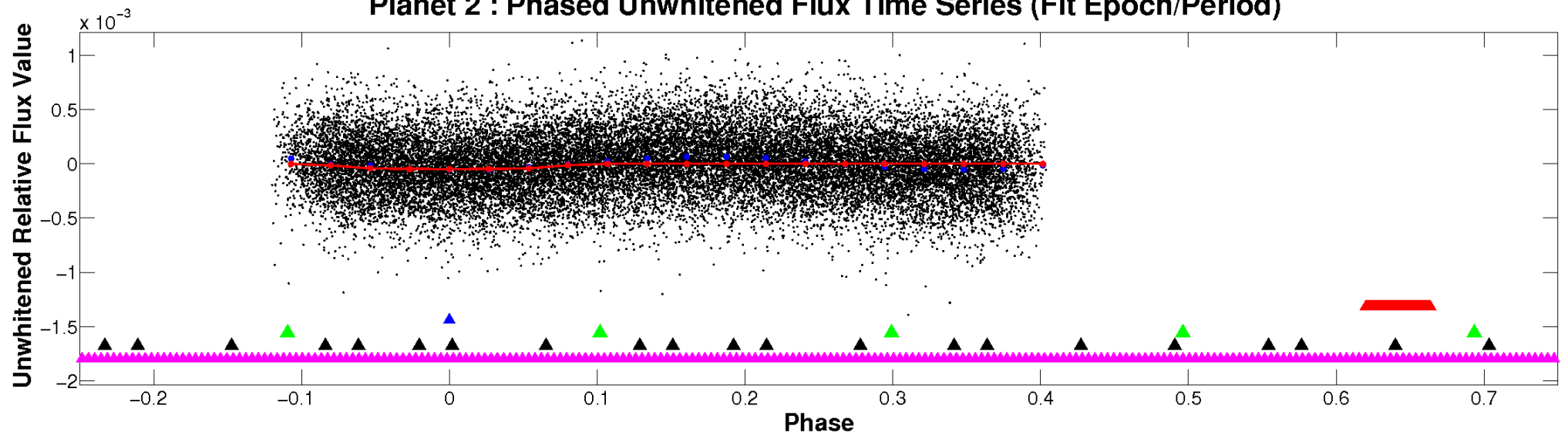
# ALT Odd/Even

TCE 010416779-02

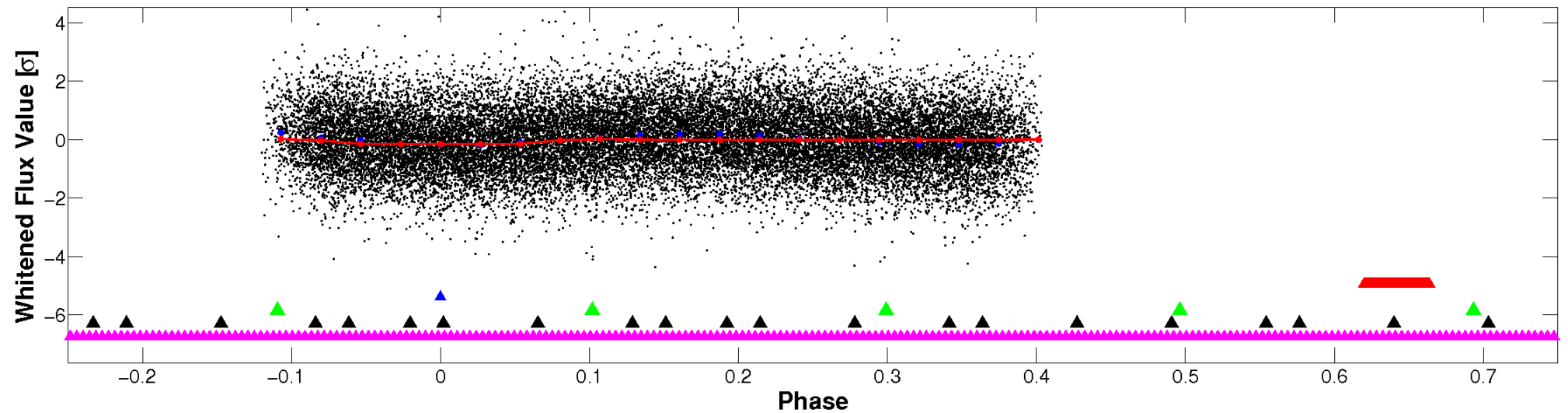


# Non-Whitened Vs. Whitened Light Curve

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

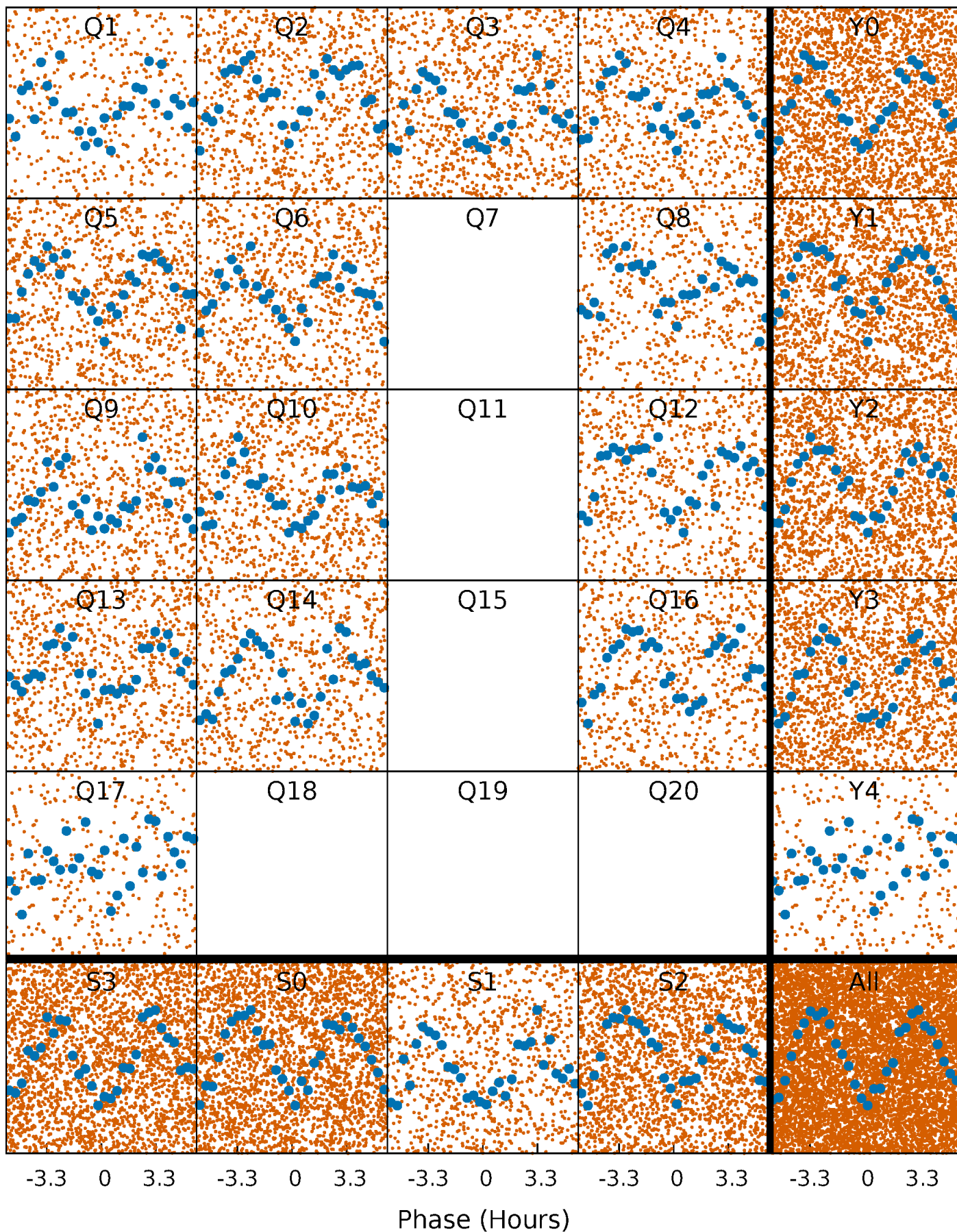


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



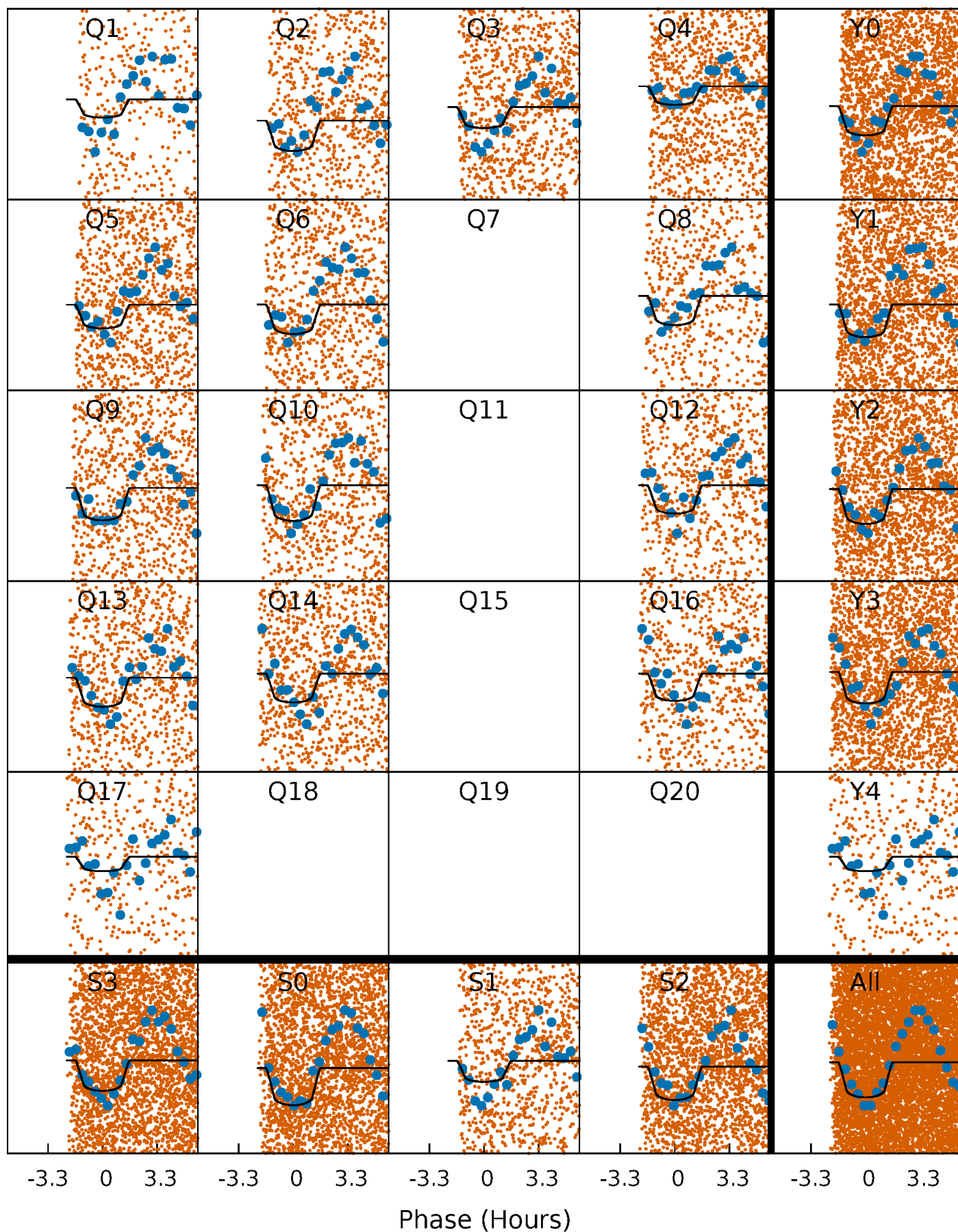
# PDC Quarter-Phased Transit Curves

TCE 010416779-02   P= 0.763305 Days    $T_0=132.095228$  (BKJD)



# DV Quarter-Phased Transit Curves

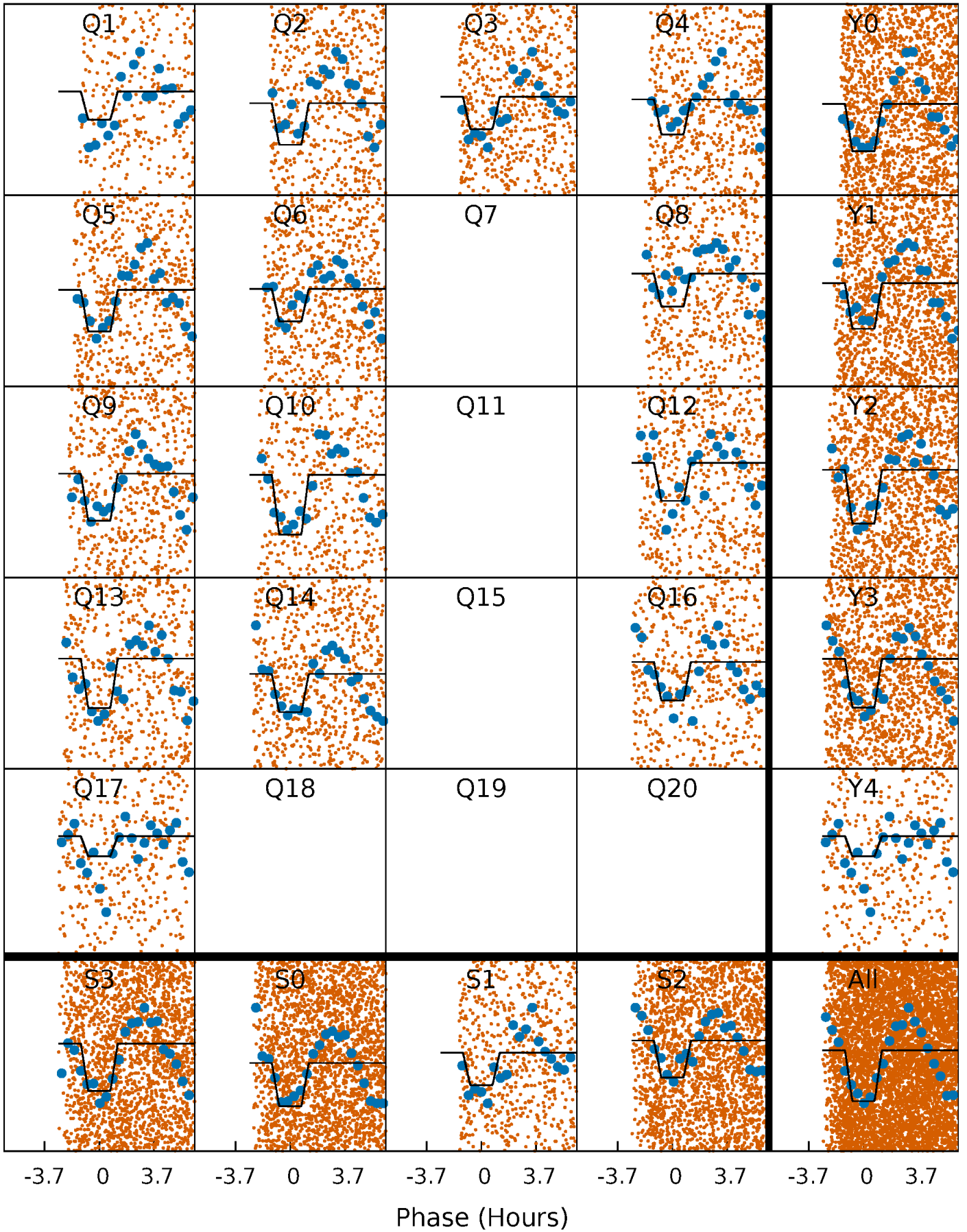
TCE 010416779-02     $P = 0.763305$  Days     $T_0 = 132.095228$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

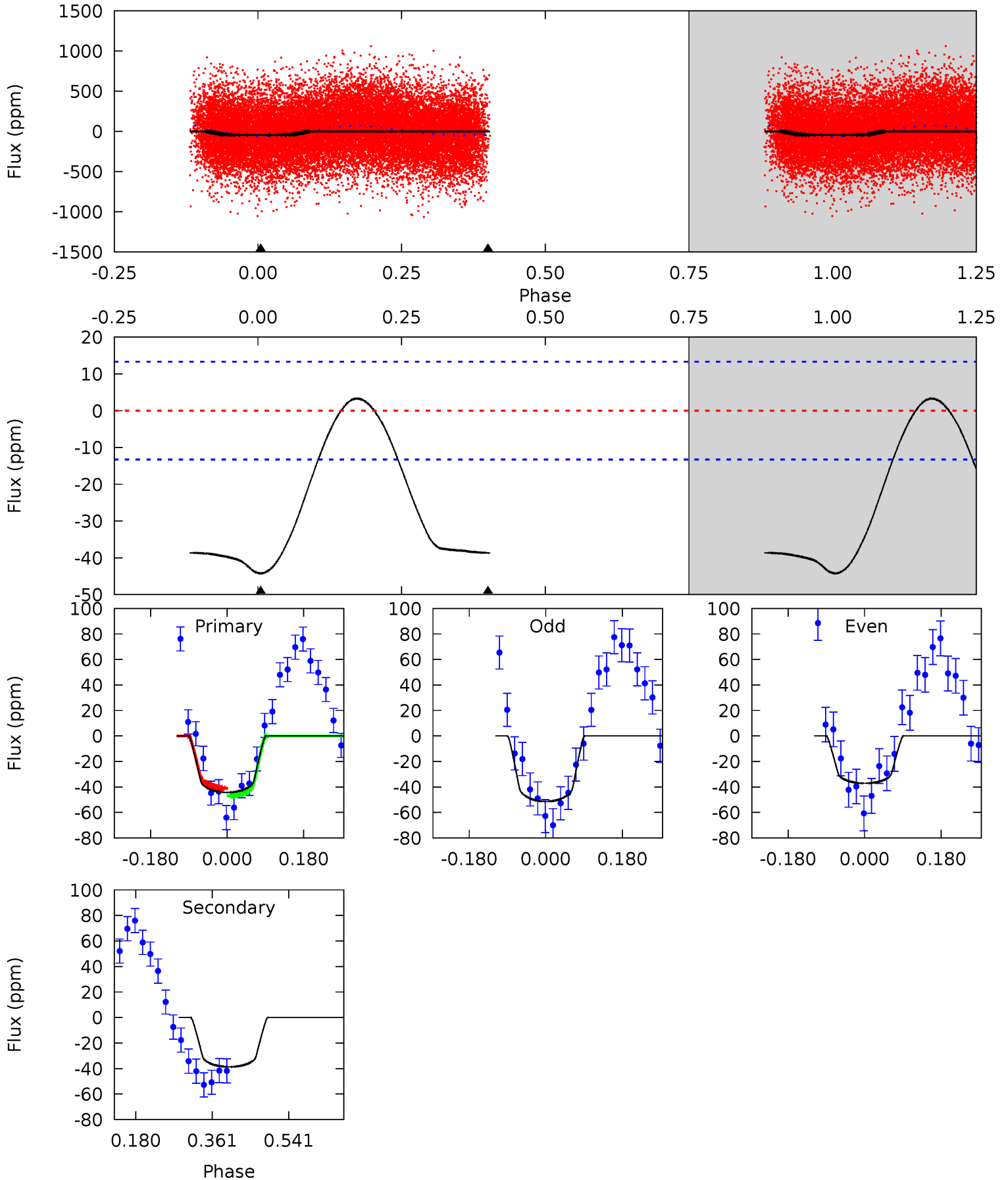
TCE 010416779-02   P= 0.763320 Days    $T_0=132.091526$  (BKJD)



# DV Model-Shift Uniqueness Test

010416779-02, P = 0.763305 Days, E = 131.331923 Days

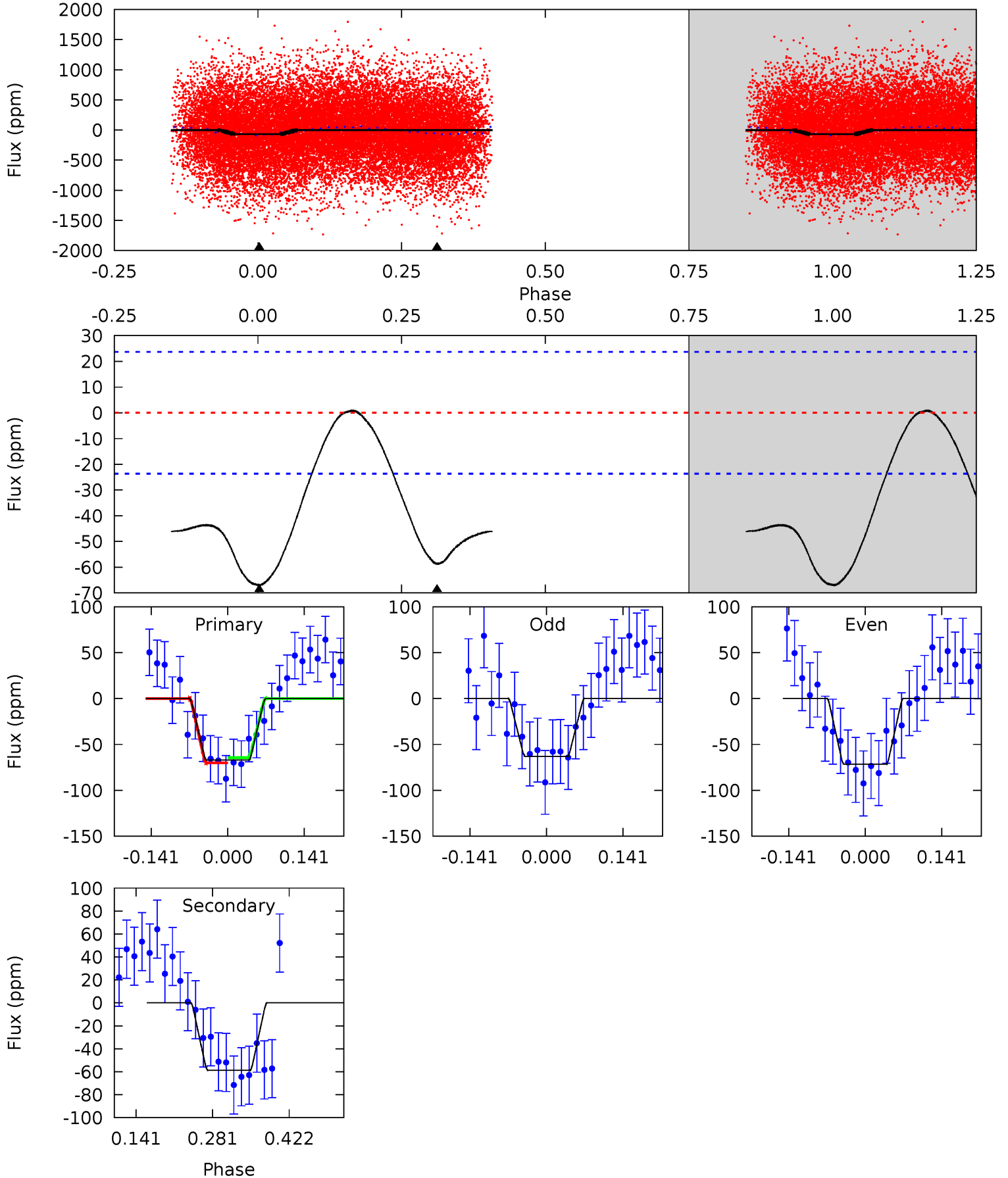
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
14.8	12.9	0	0	4.44	1.34	1.00	14.8	14.8	12.9	12.9	2.39	1.09	0.07	1.02



# Alt Model-Shift Uniqueness Test

010416779-02, P = 0.763320 Days, E = 131.328206 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.7	11.1	0	0	4.49	1.47	1.99	12.7	12.7	11.1	11.1	0.82	0.99	0.01	0.53



### Stellar Parameters For KIC 010416779

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$7751^{+214}_{-322}$	$3.889^{+0.273}_{-0.117}$	$-0.020^{+0.200}_{-0.350}$	$2.607^{+0.472}_{-0.877}$	$1.922^{+0.121}_{-0.412}$	$0.153^{+0.270}_{-0.053}$
	+3%/-4%	+7%/-3%	+1000%/-1750%	+18%/-34%	+6%/-21%	+176%/-35%
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 010416779-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-39 \pm 3$	$1.95^{+0.85}_{-0.72}$	$5312^{+349}_{-457}$	$6697^{+2218}_{-1188}$	$2.236^{+3.301}_{-1.143}$
Alt.	$-59 \pm 5$	$2.29^{+0.79}_{-0.74}$	$5318^{+360}_{-464}$	$6941^{+1788}_{-1069}$	$2.485^{+3.008}_{-1.126}$

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



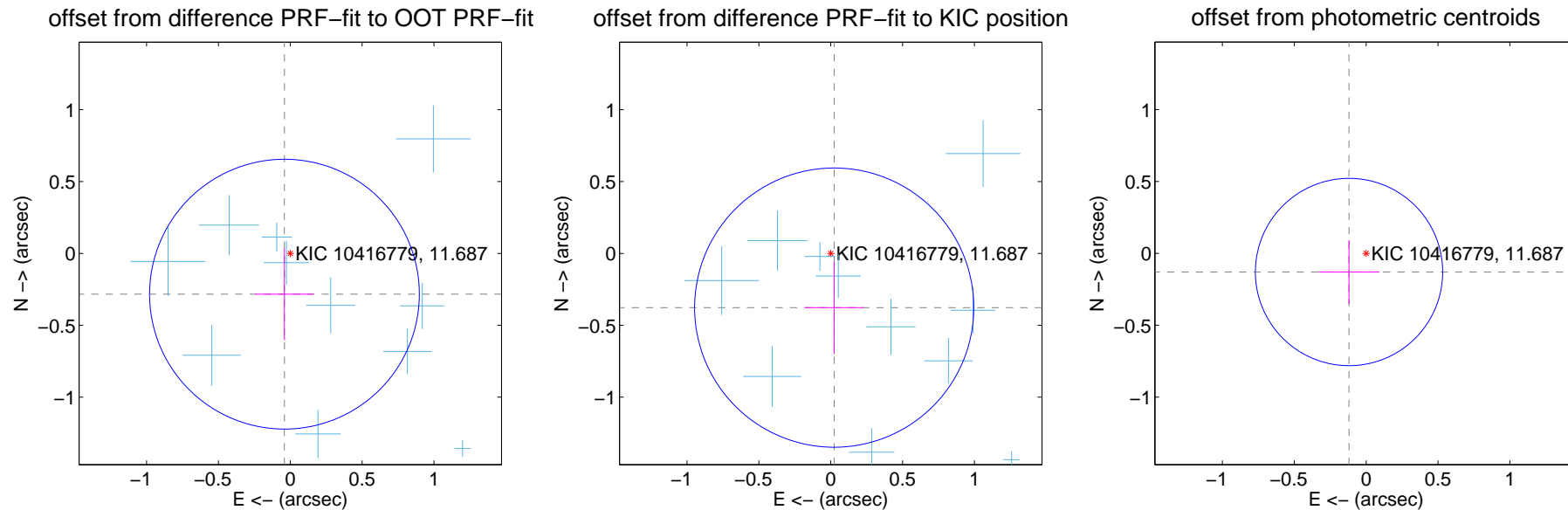
## DV Centroid Data

Supplemental centroid analysis for 010416779-02. **Kepler magnitude: 11.69.** Transit SNR 12.30

There are 13 quarters with good PRF difference image offsets

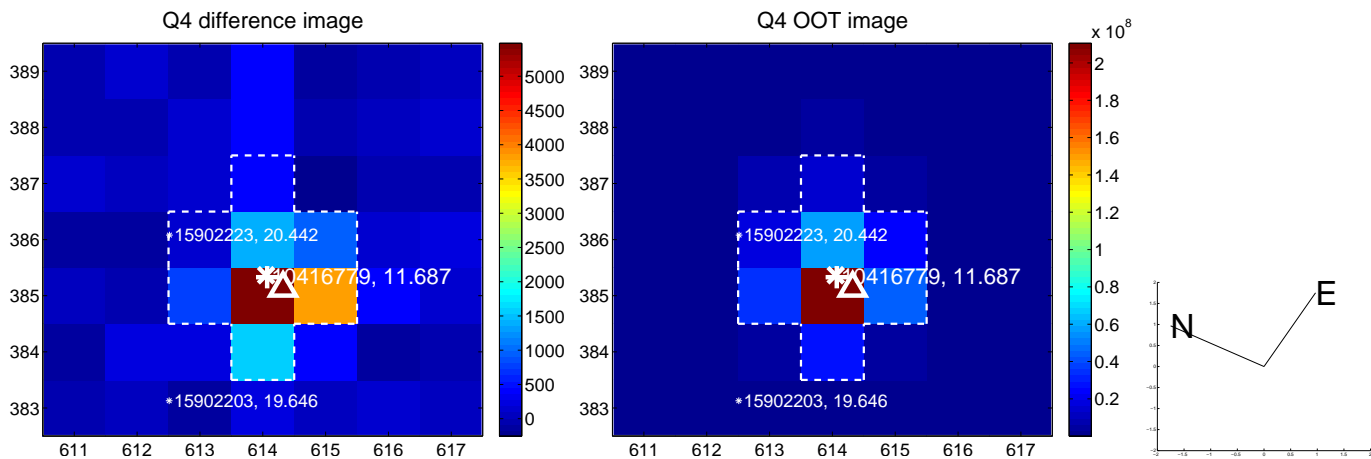
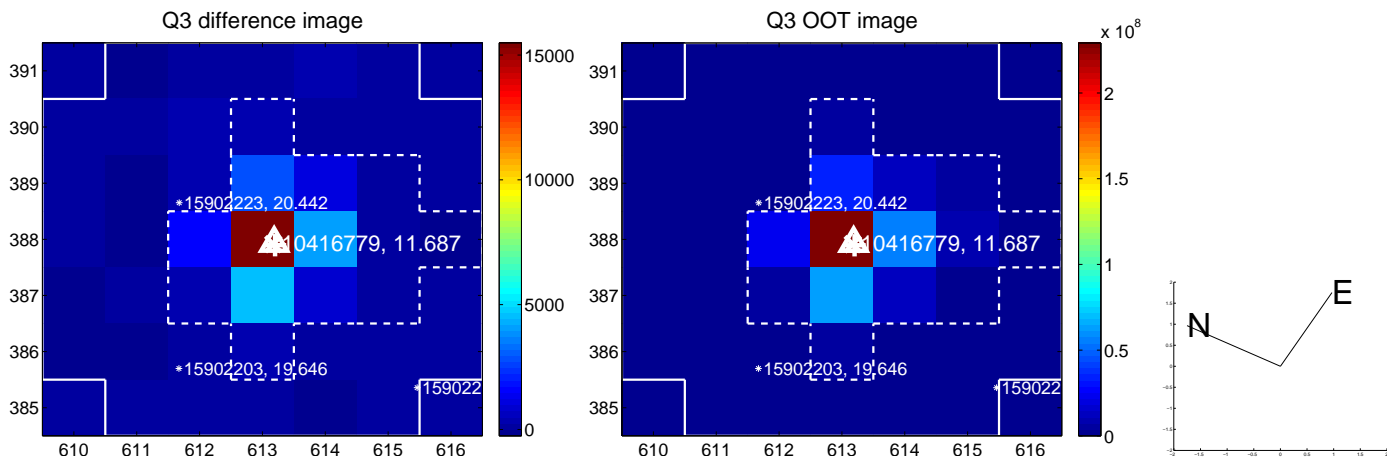
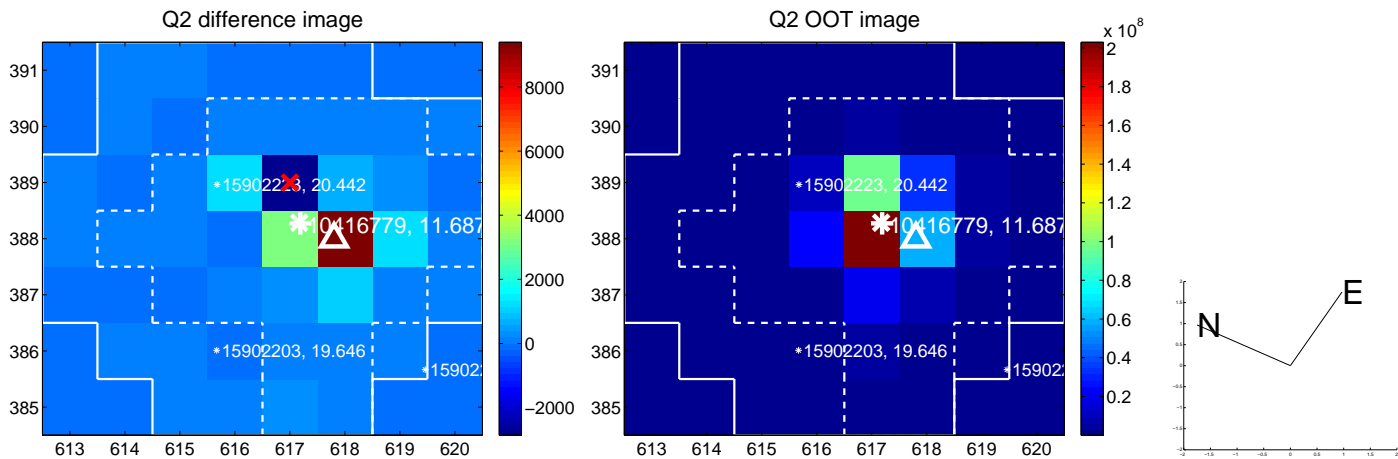
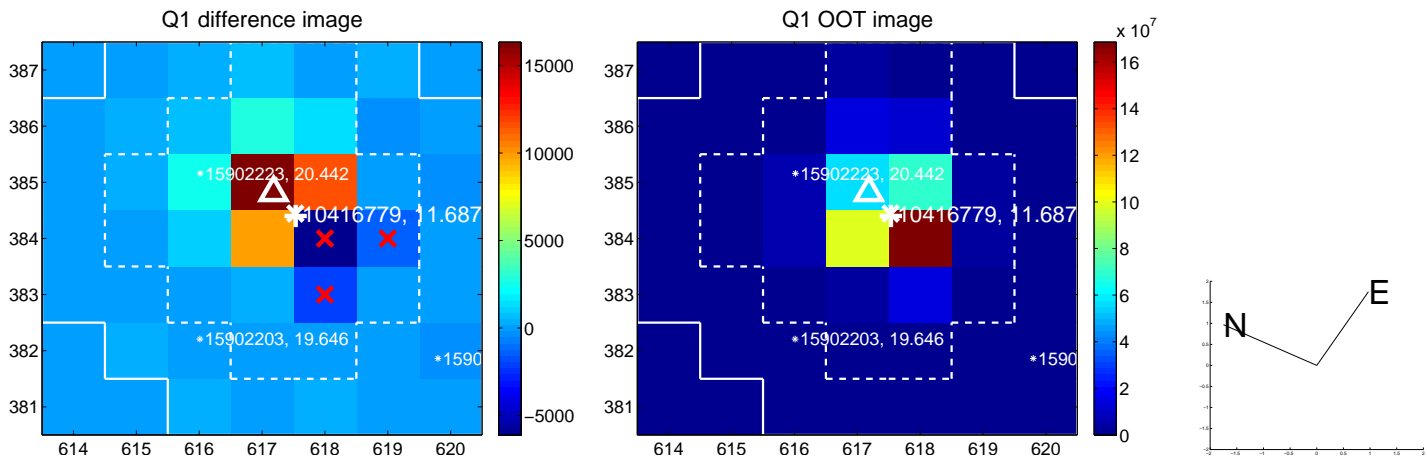
The direct PRF centroid is offset from the target star catalog position by about 0.20 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.286 \pm 0.313$	0.92	$0.040 \pm 0.203$	$-0.284 \pm 0.320$
PRF-fit source offset from KIC position	$0.378 \pm 0.324$	1.17	$-0.024 \pm 0.205$	$-0.377 \pm 0.321$
photometric centroid source offset	$0.18 \pm 0.22$	0.81	$0.12 \pm 0.21$	$-0.13 \pm 0.22$

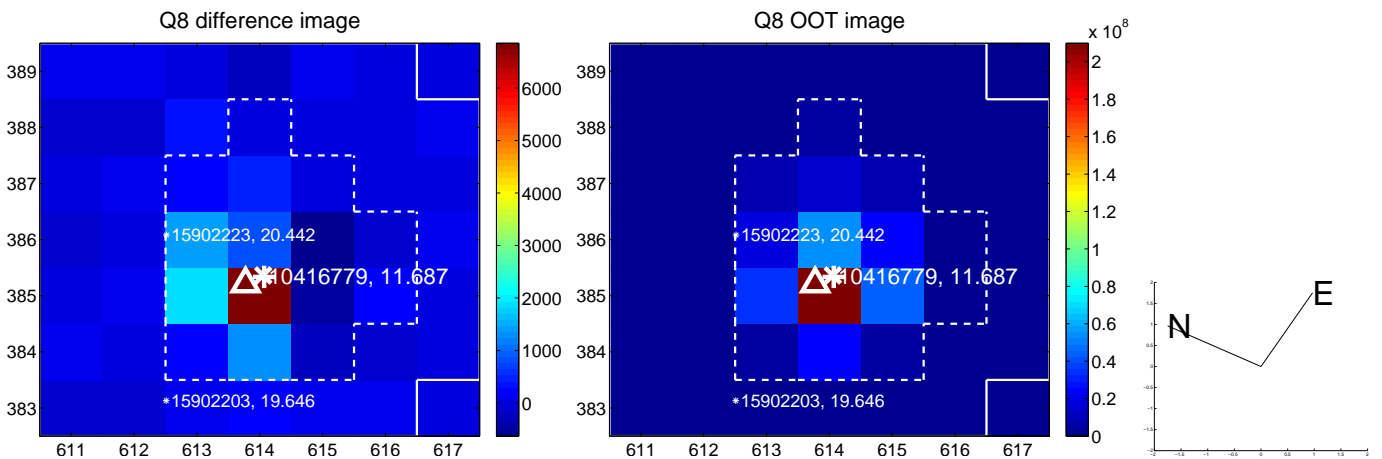
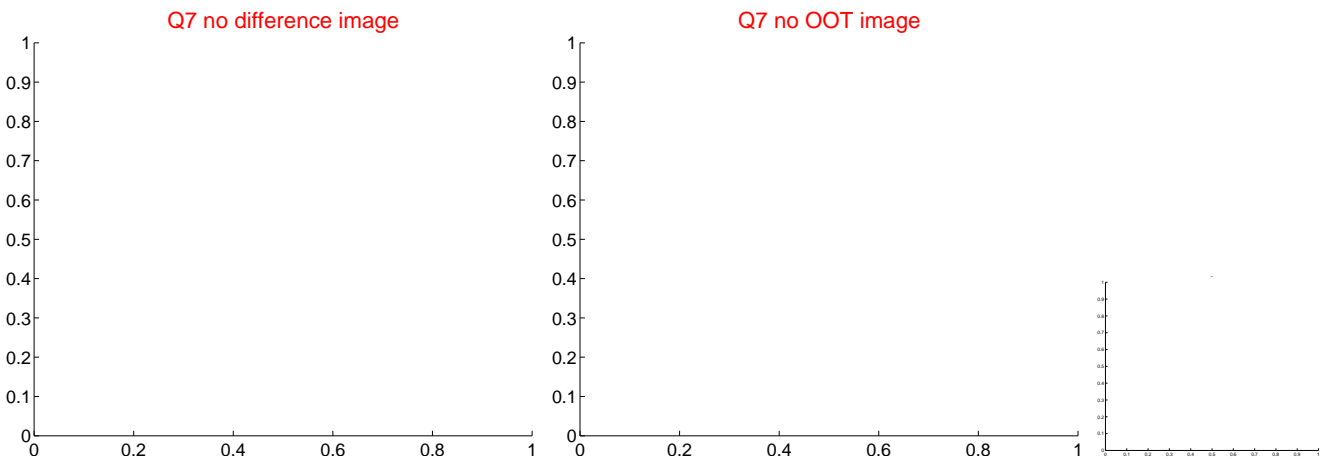
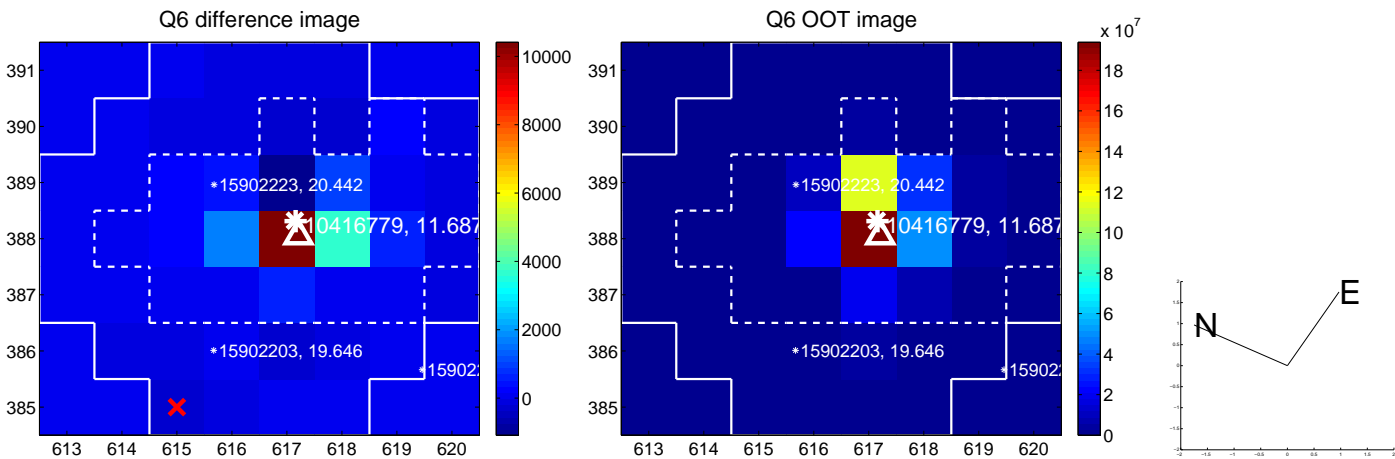
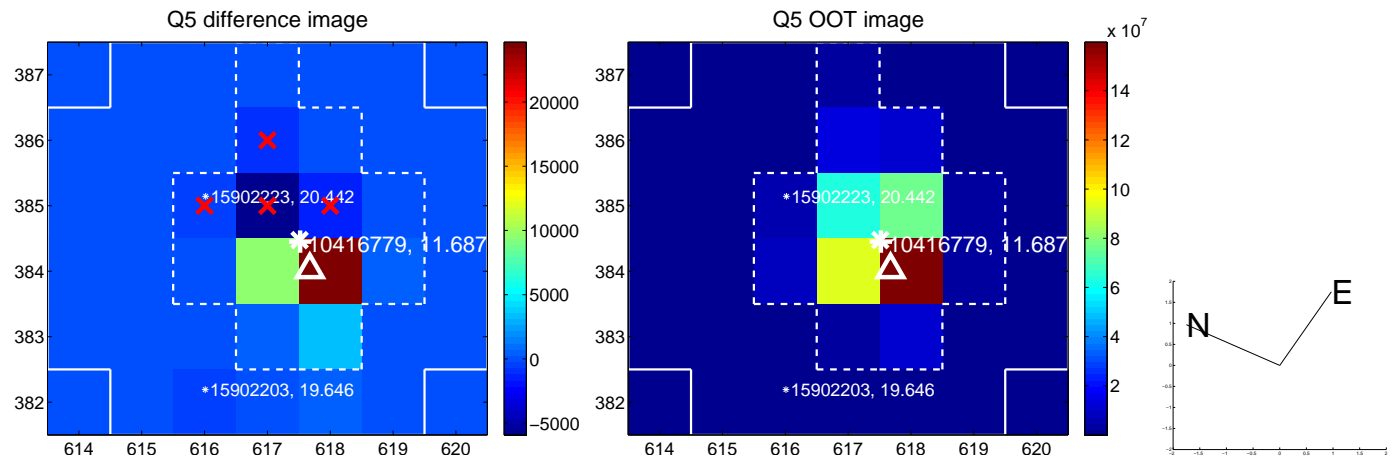


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

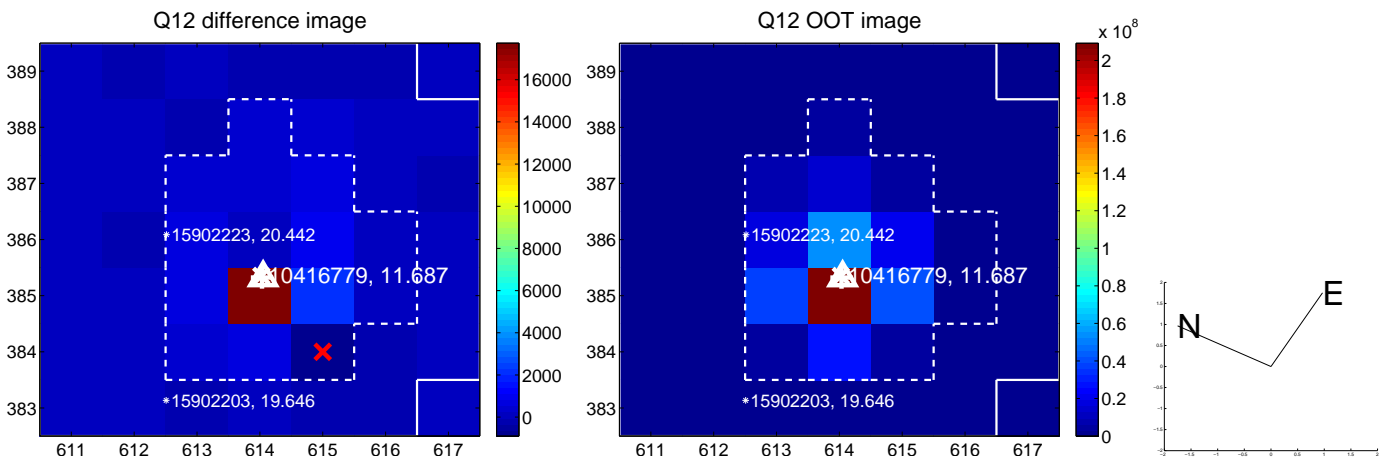
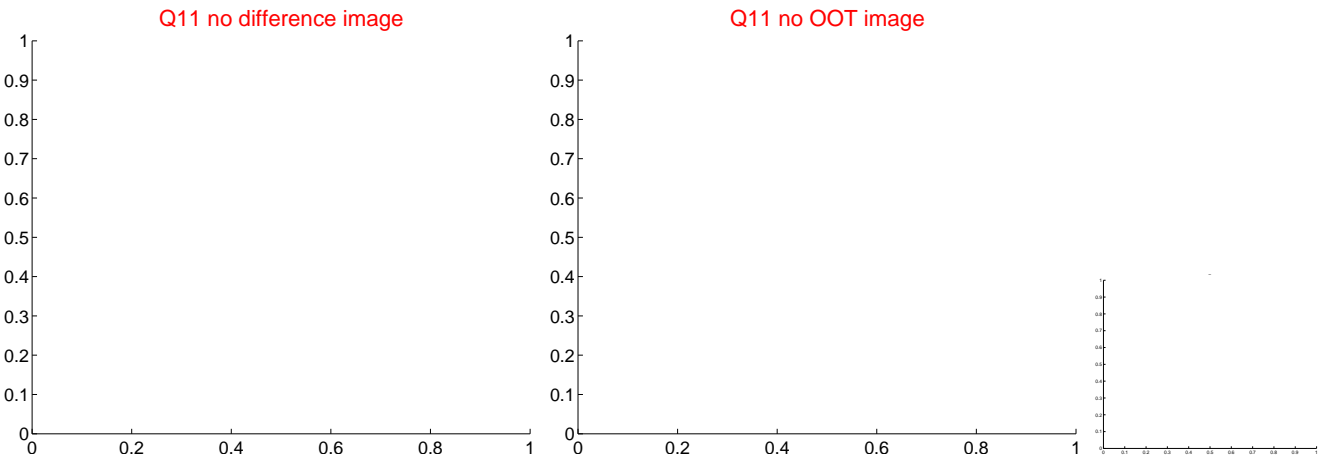
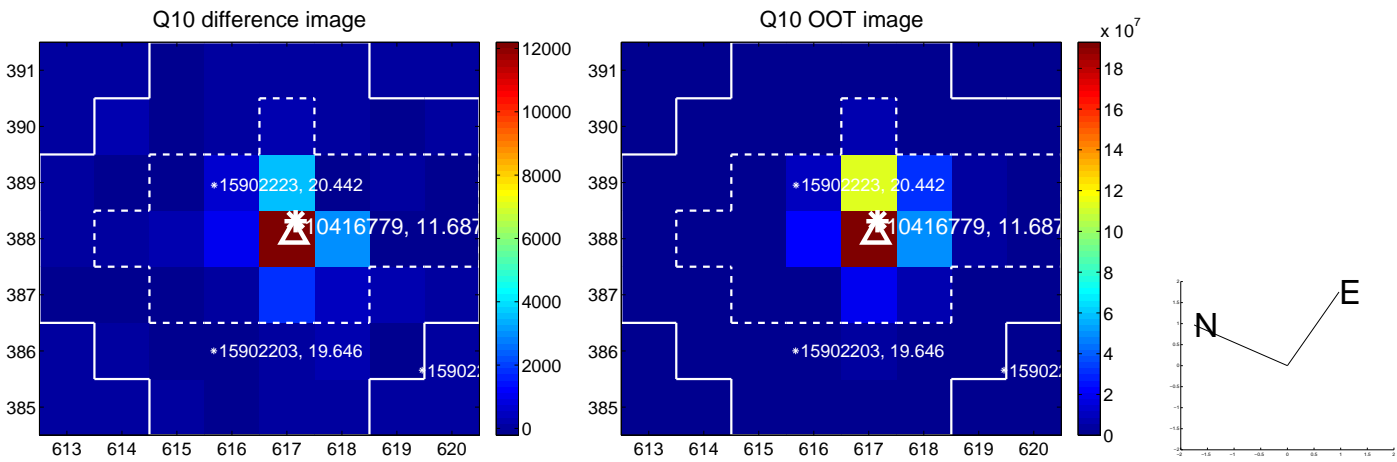
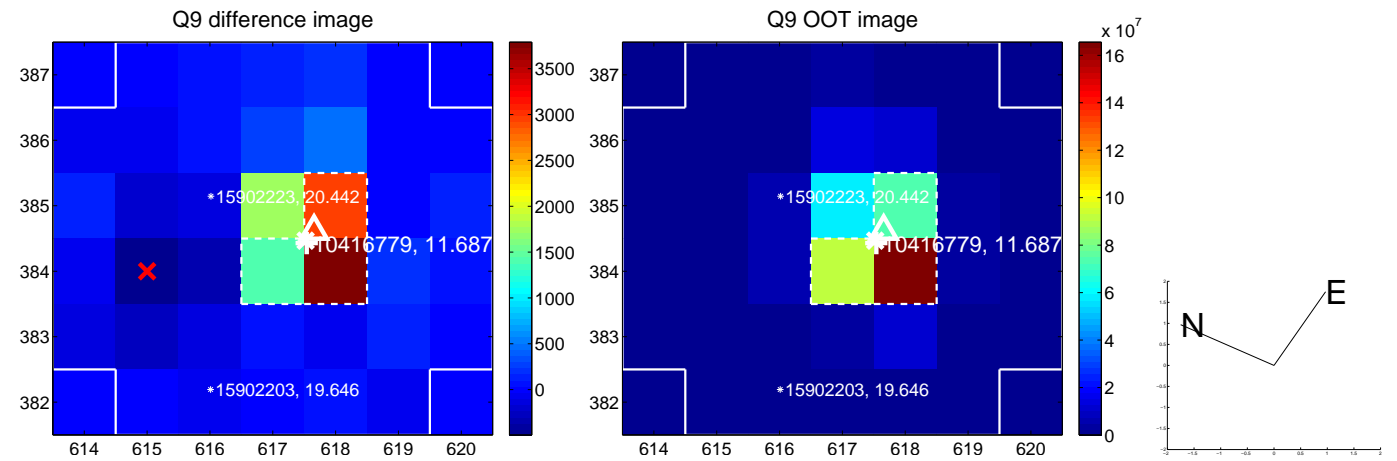
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



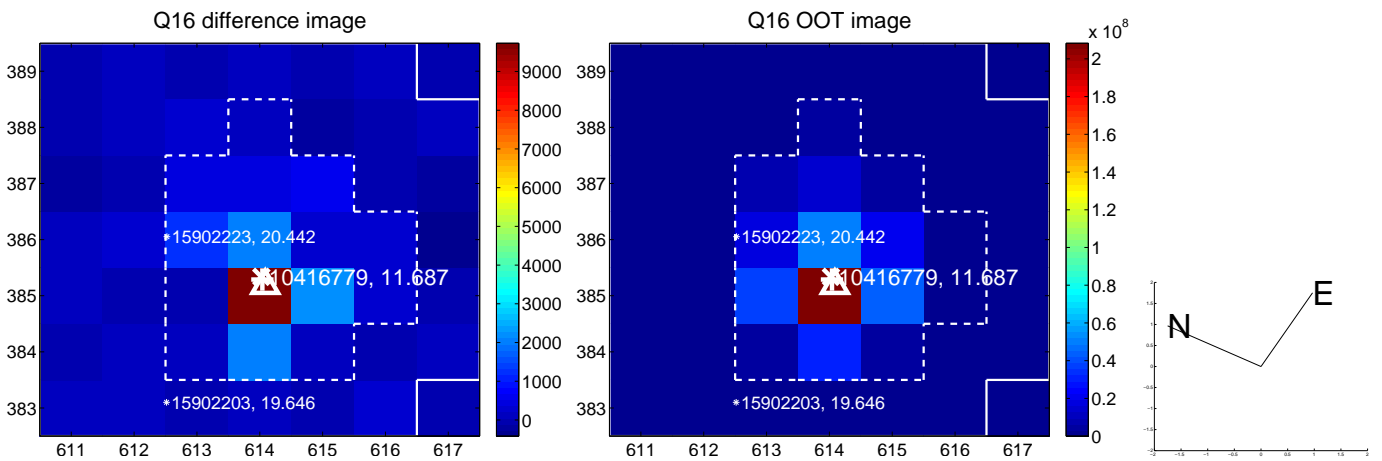
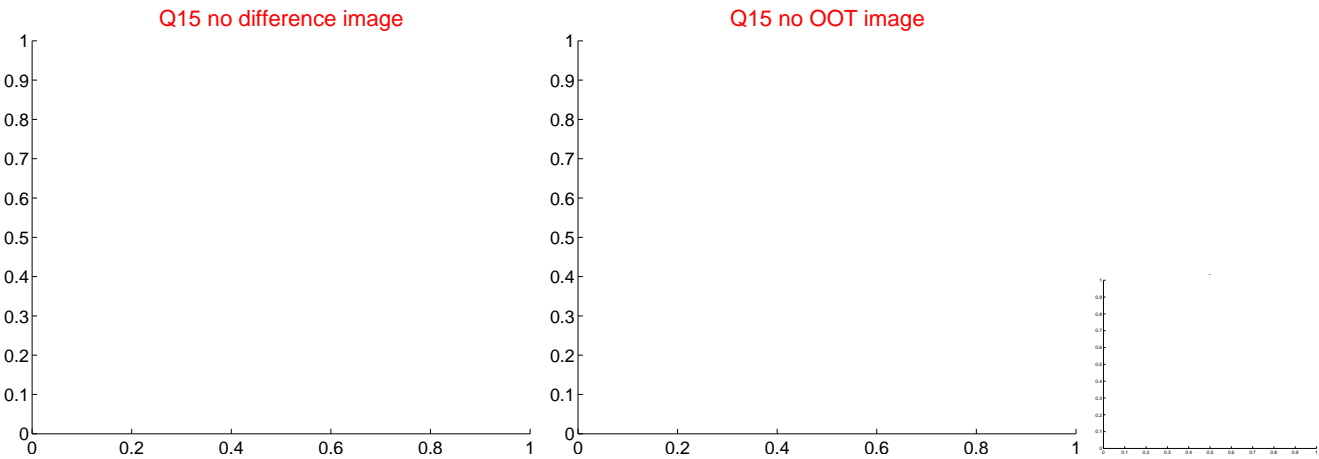
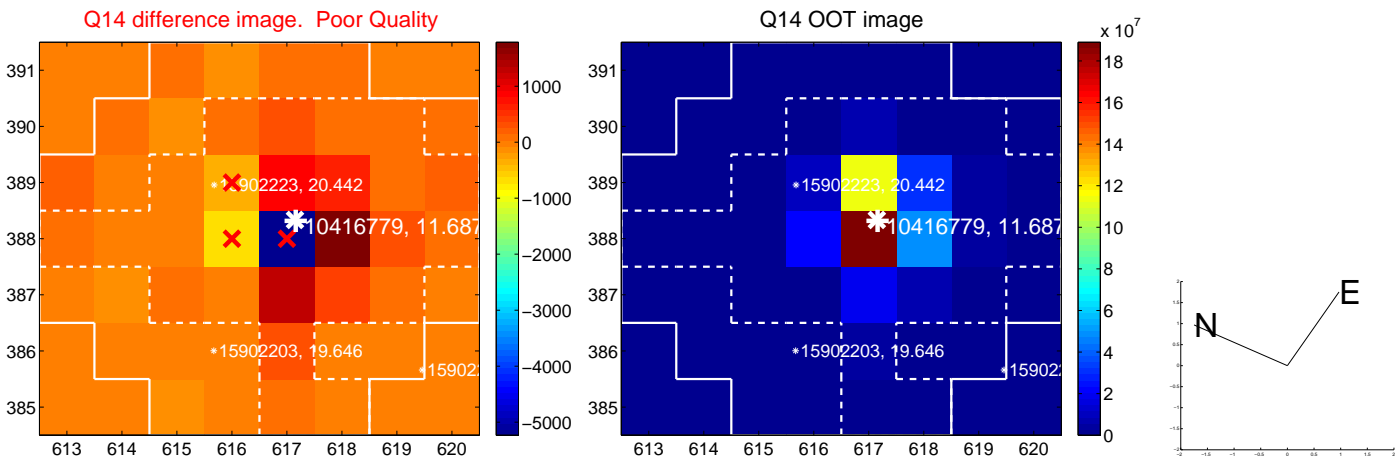
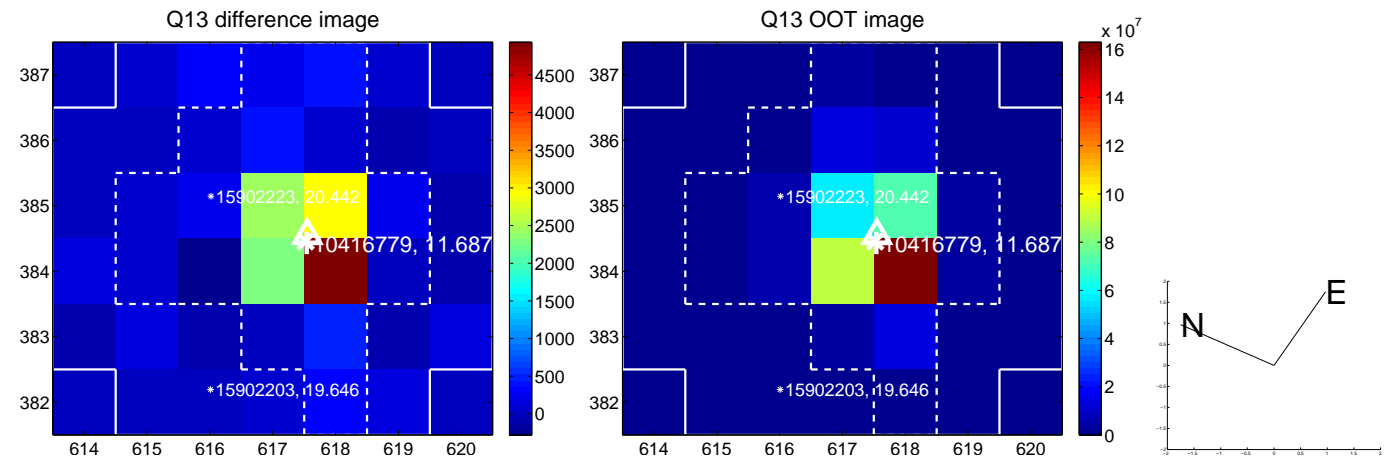
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

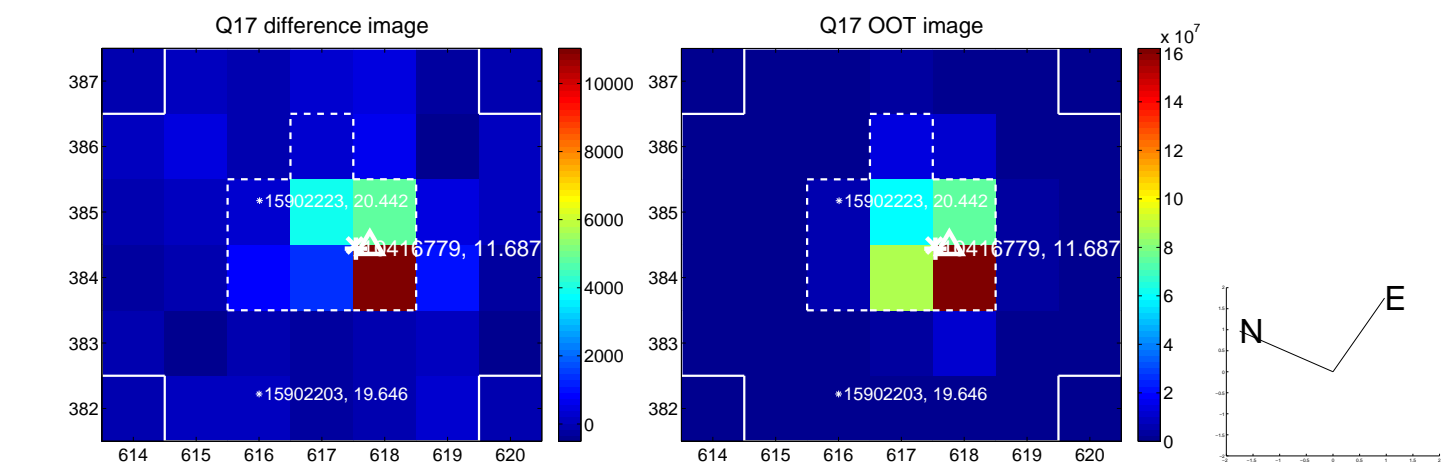


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

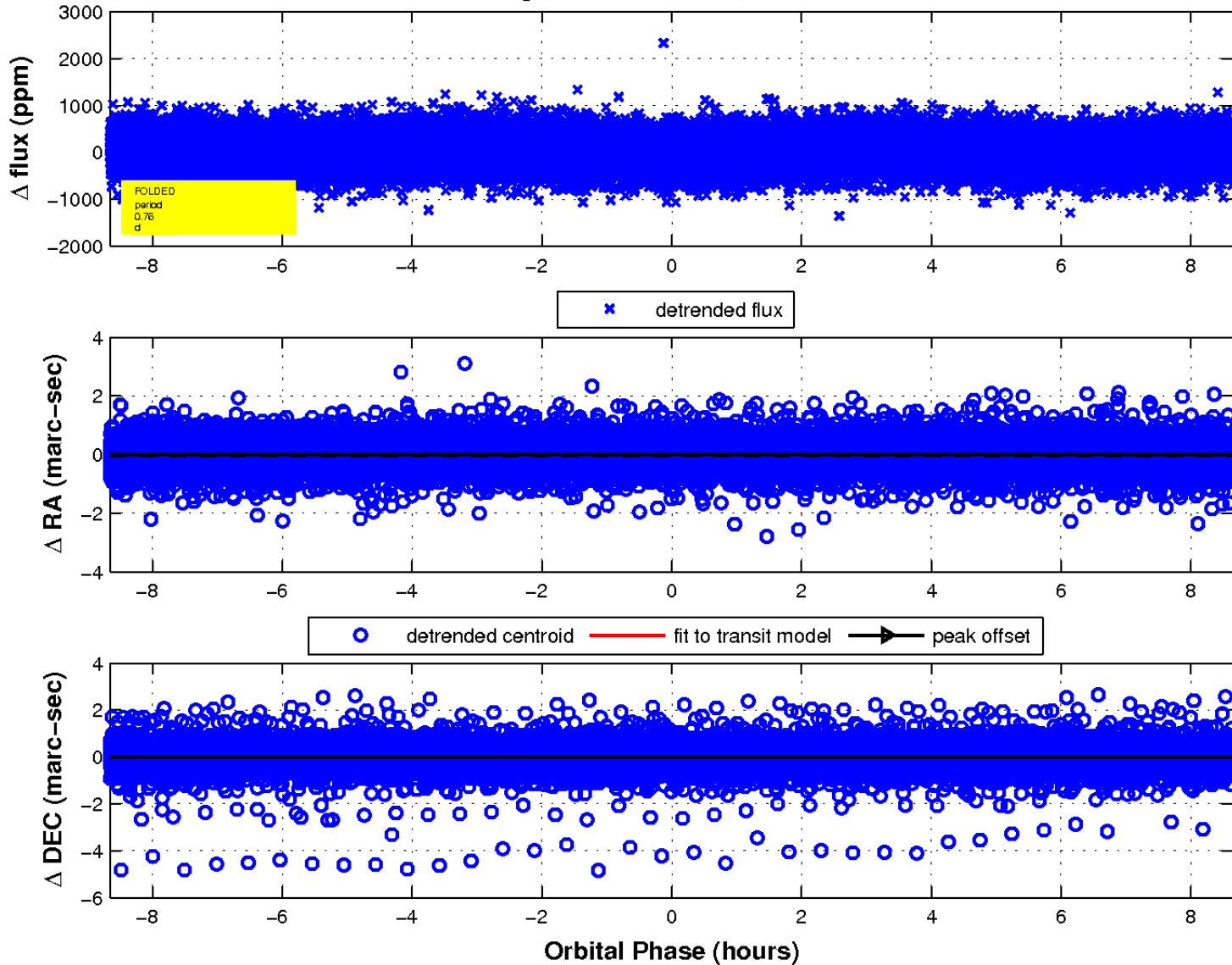




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

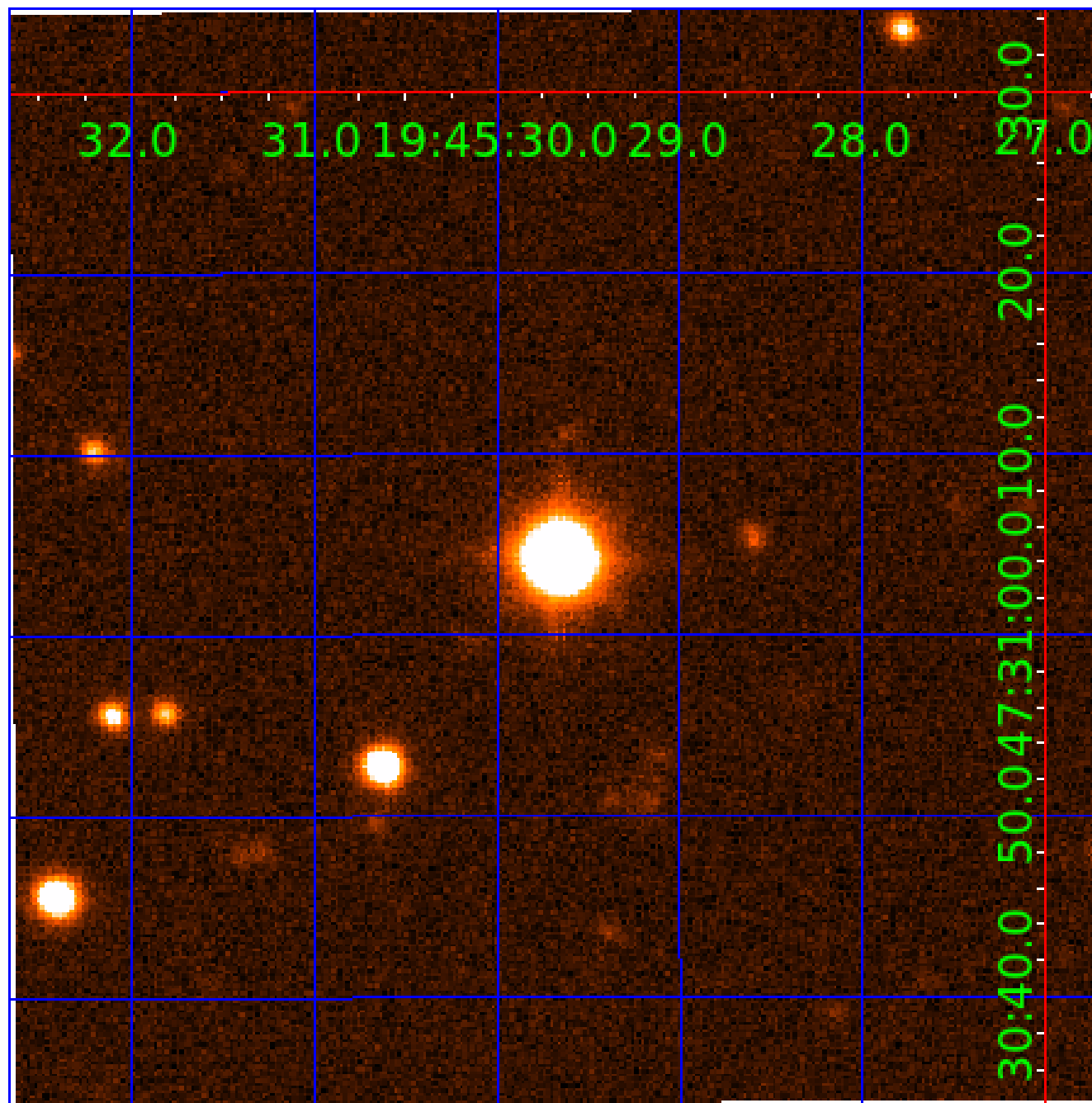


fluxWeightedCentroids, Planet 2 of 5



UKIRT Image

Declination



# KIC 010416779

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010416779-01	OBS	No	0.763288	131.838551	37.9	3.006	11.1	9.8	2.61	7751	1.86	53231.43
010416779-02	OBS	No	0.763305	132.095228	47.5	2.885	9.3	12.3	2.61	7751	2.09	53229.80
010416779-03	OBS	No	291.432184	336.577583	617.2	9.933	9.3	7.9	2.61	7751	7.54	19.22
010416779-04	OBS	No	70.386449	158.763957	555.7	4.353	8.5	8.0	2.61	7751	7.83	127.77
010416779-05	OBS	No	2.692681	133.883826	130.3	6.531	10.0	10.6	2.61	7751	3.49	9912.26

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010416779-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
010416779-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD
010416779-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS—HALO_GHOST
010416779-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
010416779-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT

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

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

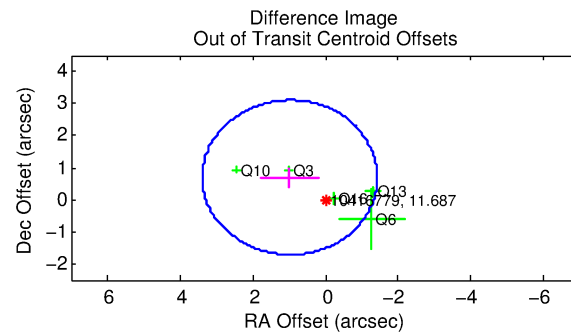
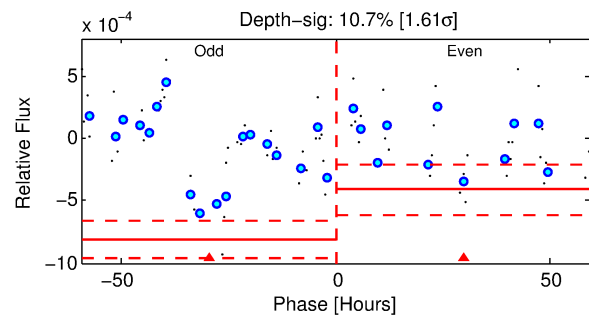
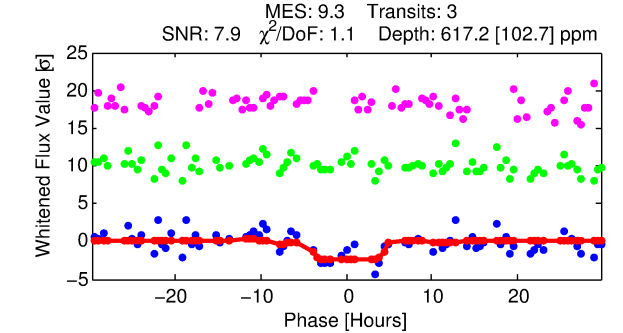
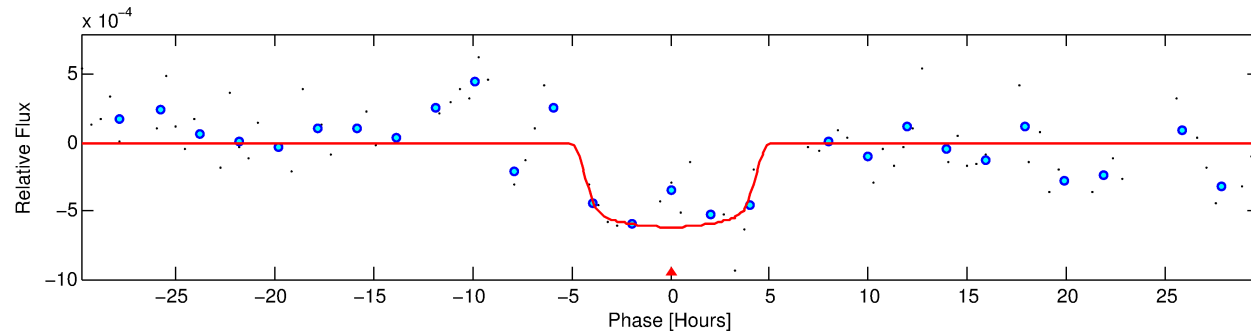
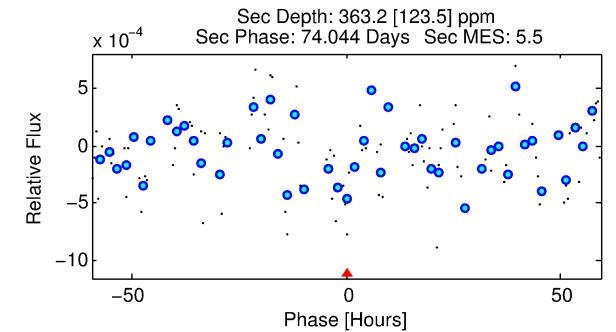
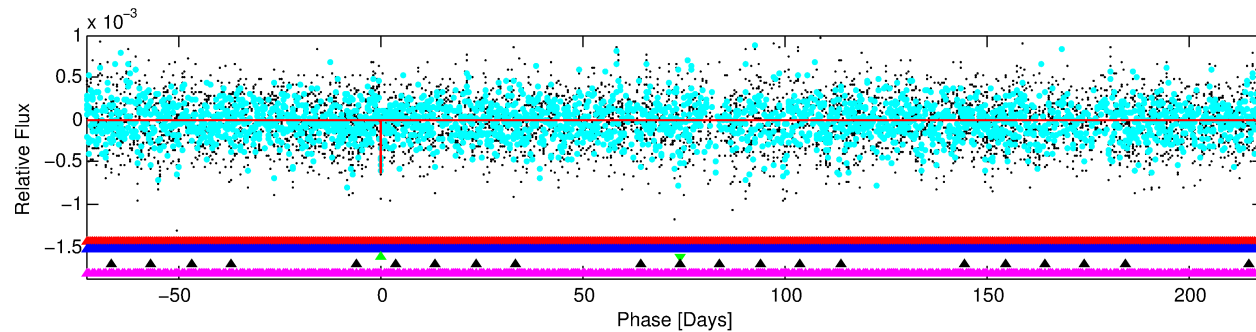
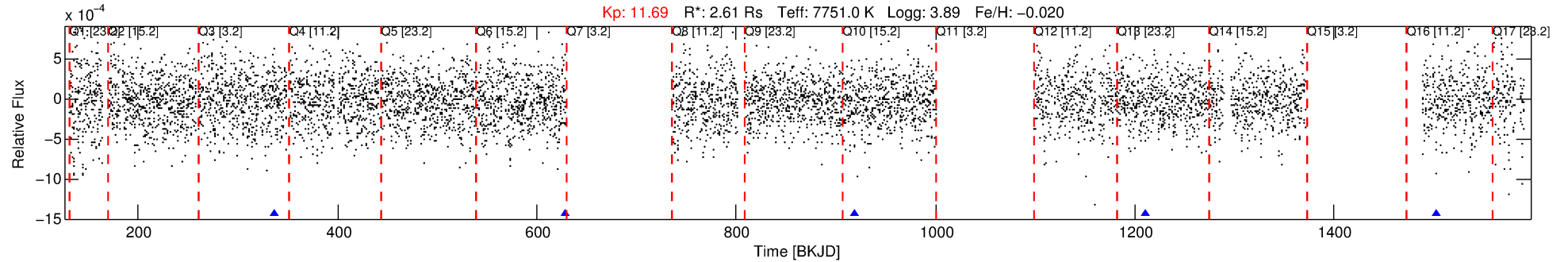
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010416779-03

No Significant Match Found

# DV One-Page Summary

KIC: 10416779 Candidate: 3 of 5 Period: 291.432 d



## DV Fit Results:

Period = 291.43218 [0.06156] d  
Epoch = 336.5776 [0.1858] BKJD  
Rp/R\* = 0.0265 [0.0046]  
a/R\* = 108.67 [89.70]  
b = 0.90 [0.21]  
Seff = 19.22 [9.68]  
Teq = 534 [67] K  
Rp = 7.54 [2.85] Re  
a = 1.0694 [0.3282] AU  
Ag = 4019.63 [2732.91] [1.47σ]  
Teffp = 6573 [844] K [7.13σ]

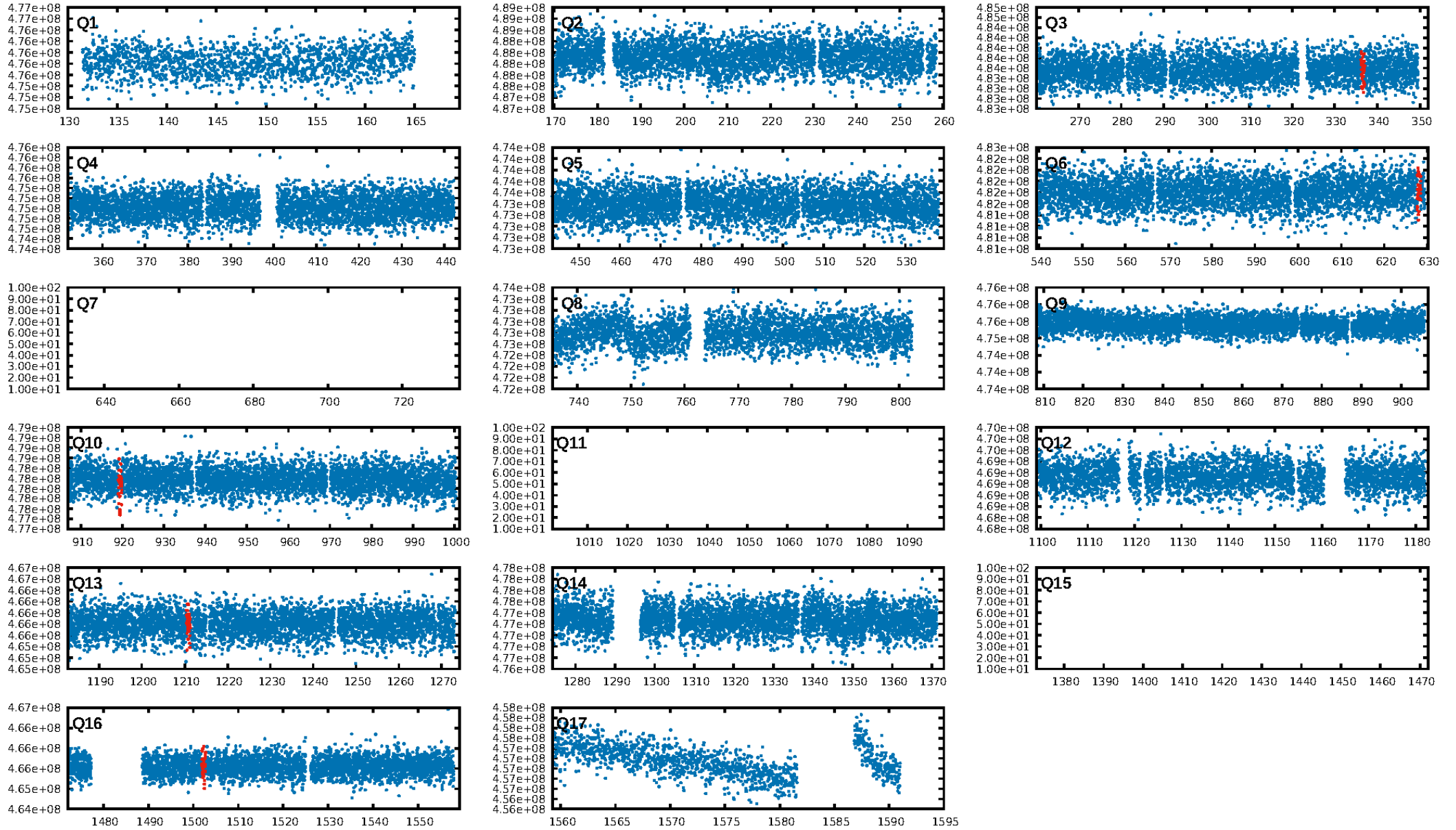
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [489.17σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 11.7%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -0.02639  
Centroid-sig: 22.3%  
Centroid-so: 0.059 arcsec [0.27σ]  
OotOffset-rm: 1.202 arcsec [1.50σ]  
KicOffset-rm: 1.114 arcsec [1.91σ]  
OotOffset-st: 2/1/1/1 [5]  
KicOffset-st: 2/1/1/1 [5]  
DiffImageQuality-fgm: 0.60 [3/5]  
DiffImageOverlap-fno: 0.00 [0/5]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:55:38 Z

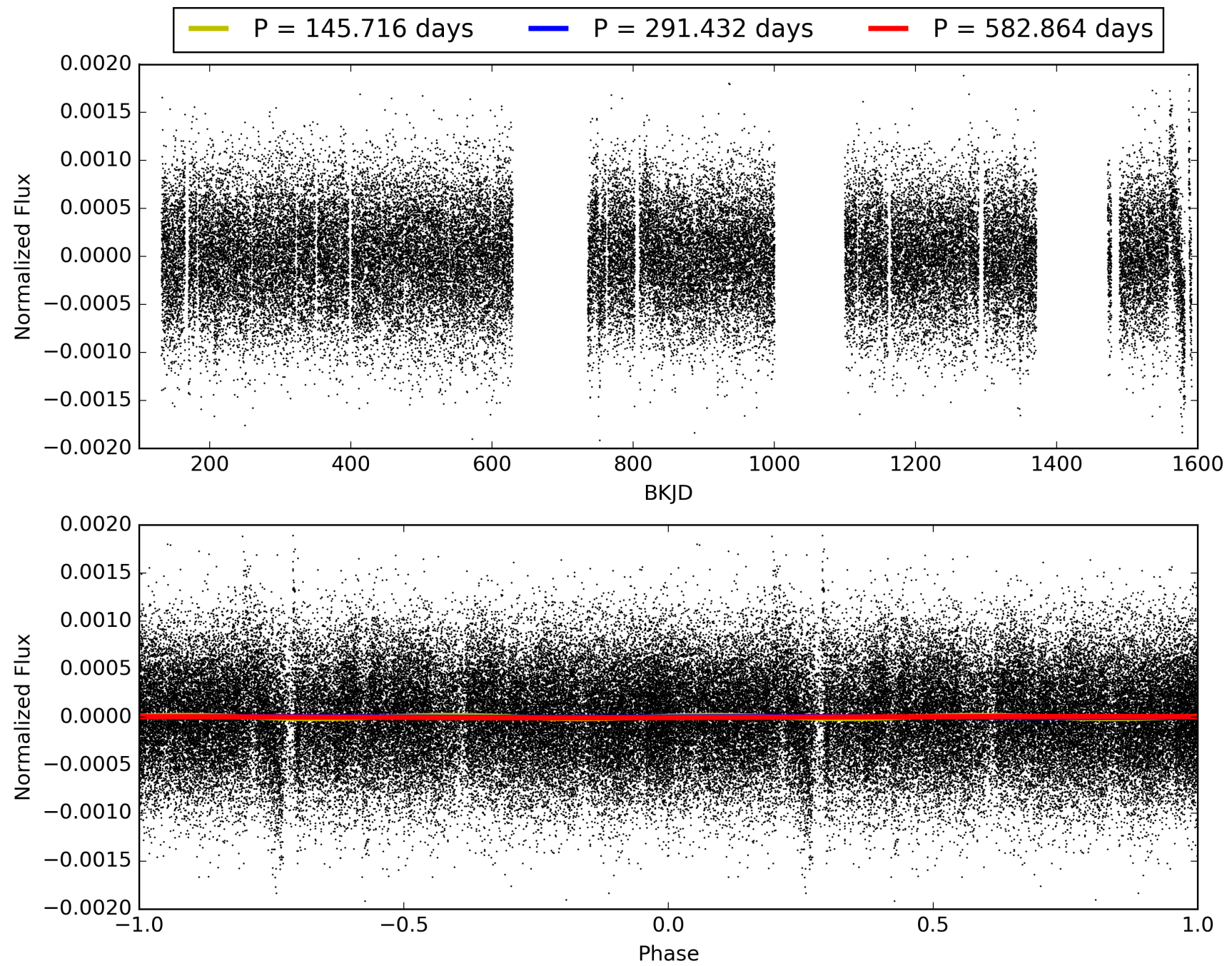
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 010416779-03, PDC Light Curves



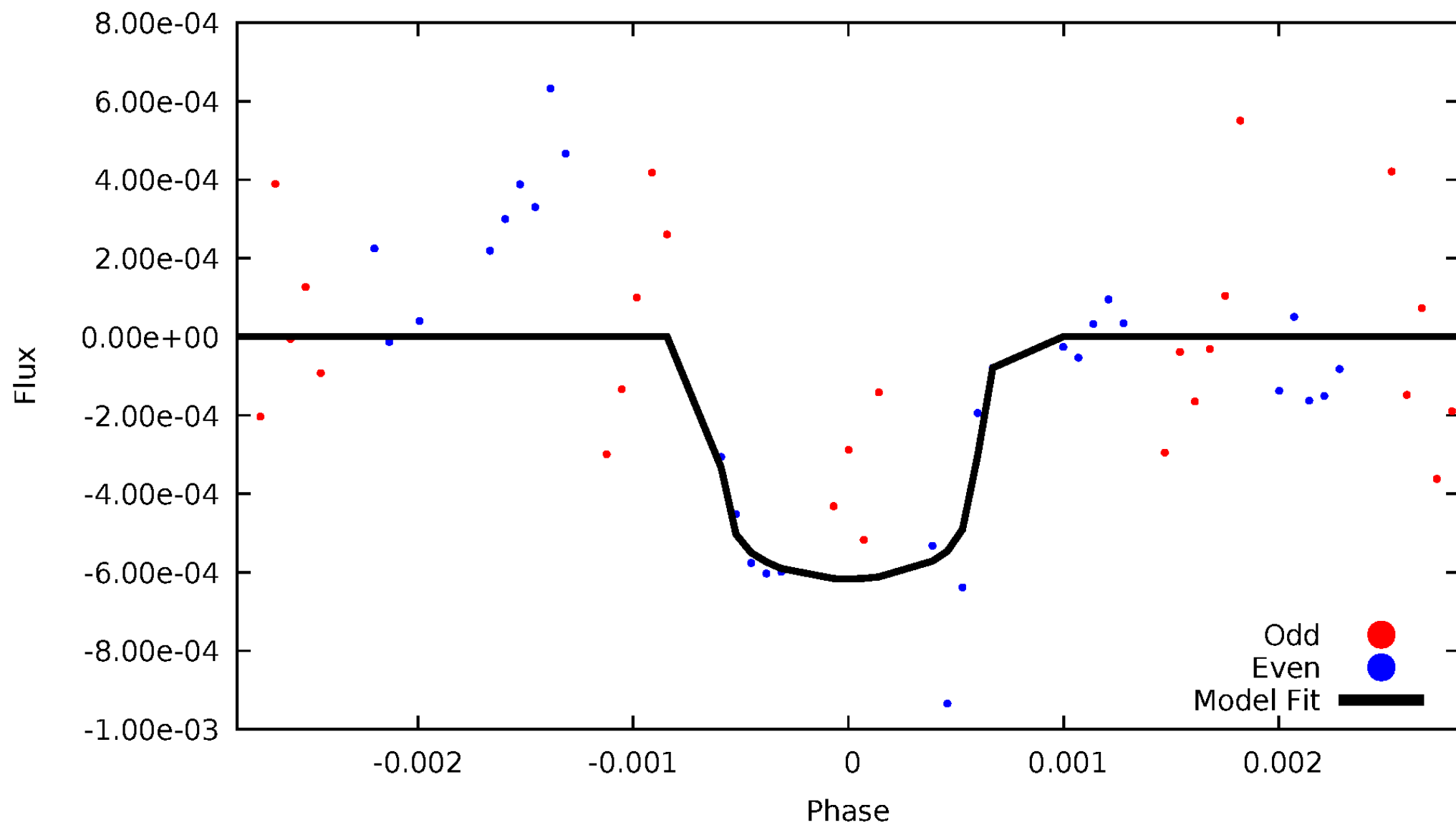


TCE 010416779-03



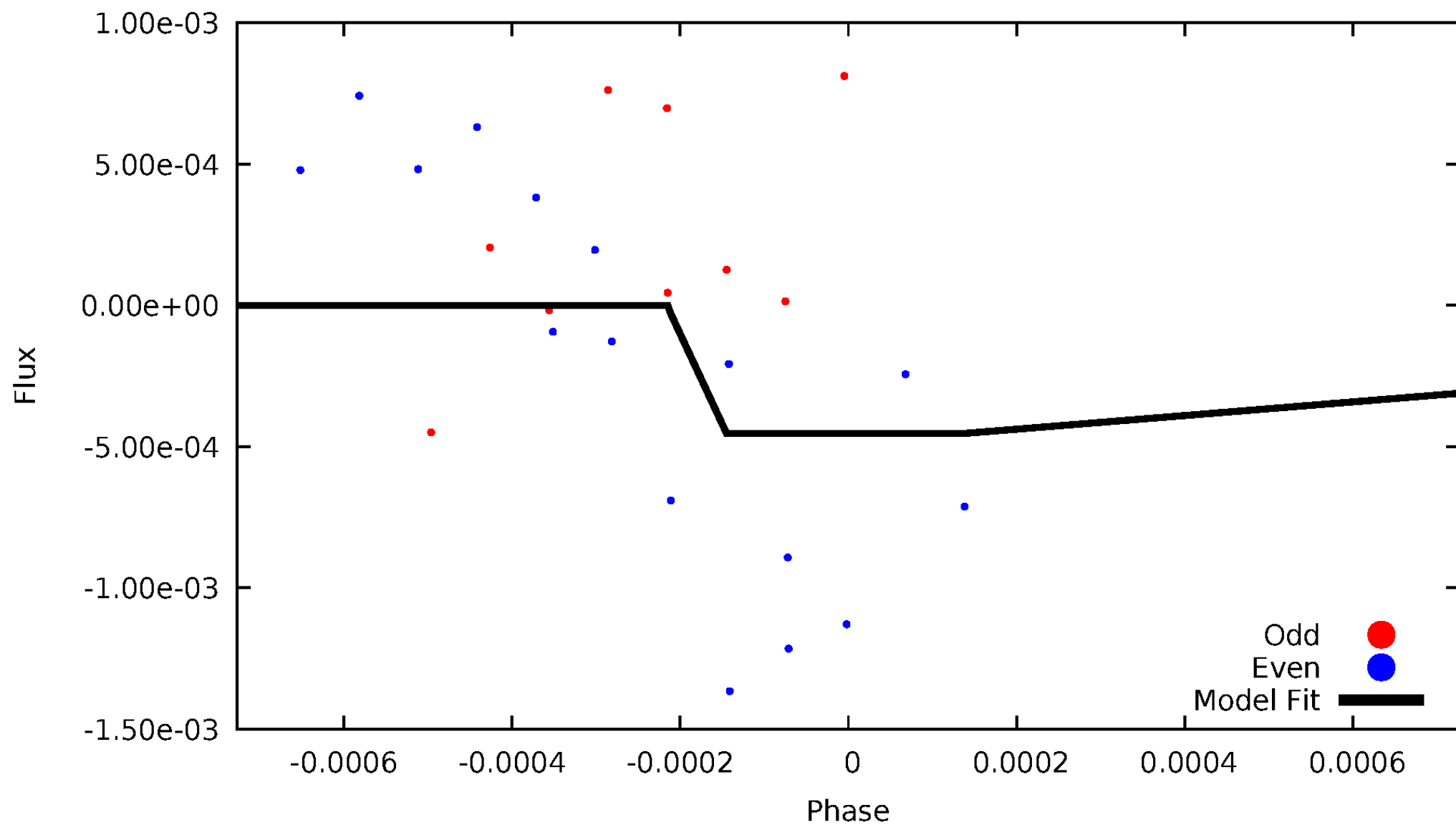
# DV Odd/Even

TCE 010416779-03

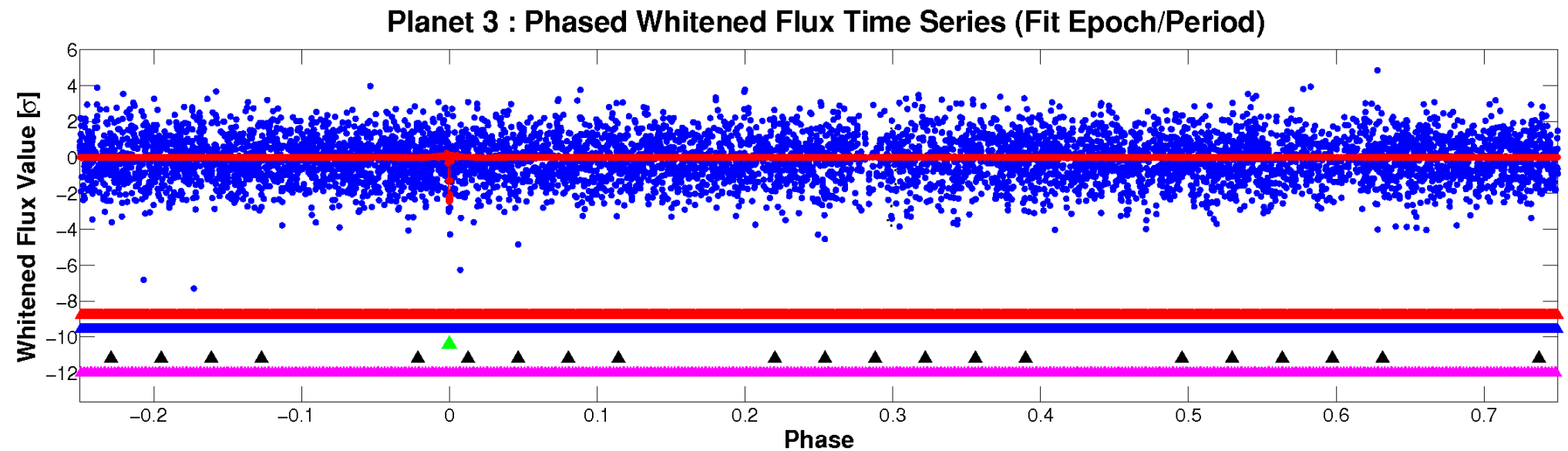
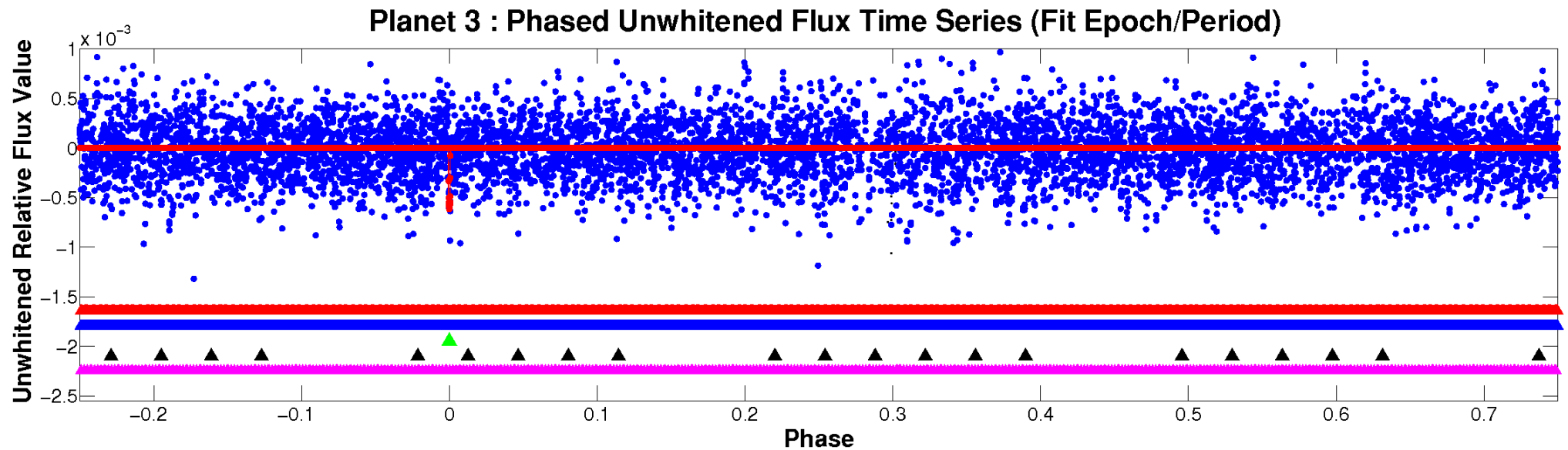


# ALT Odd/Even

TCE 010416779-03

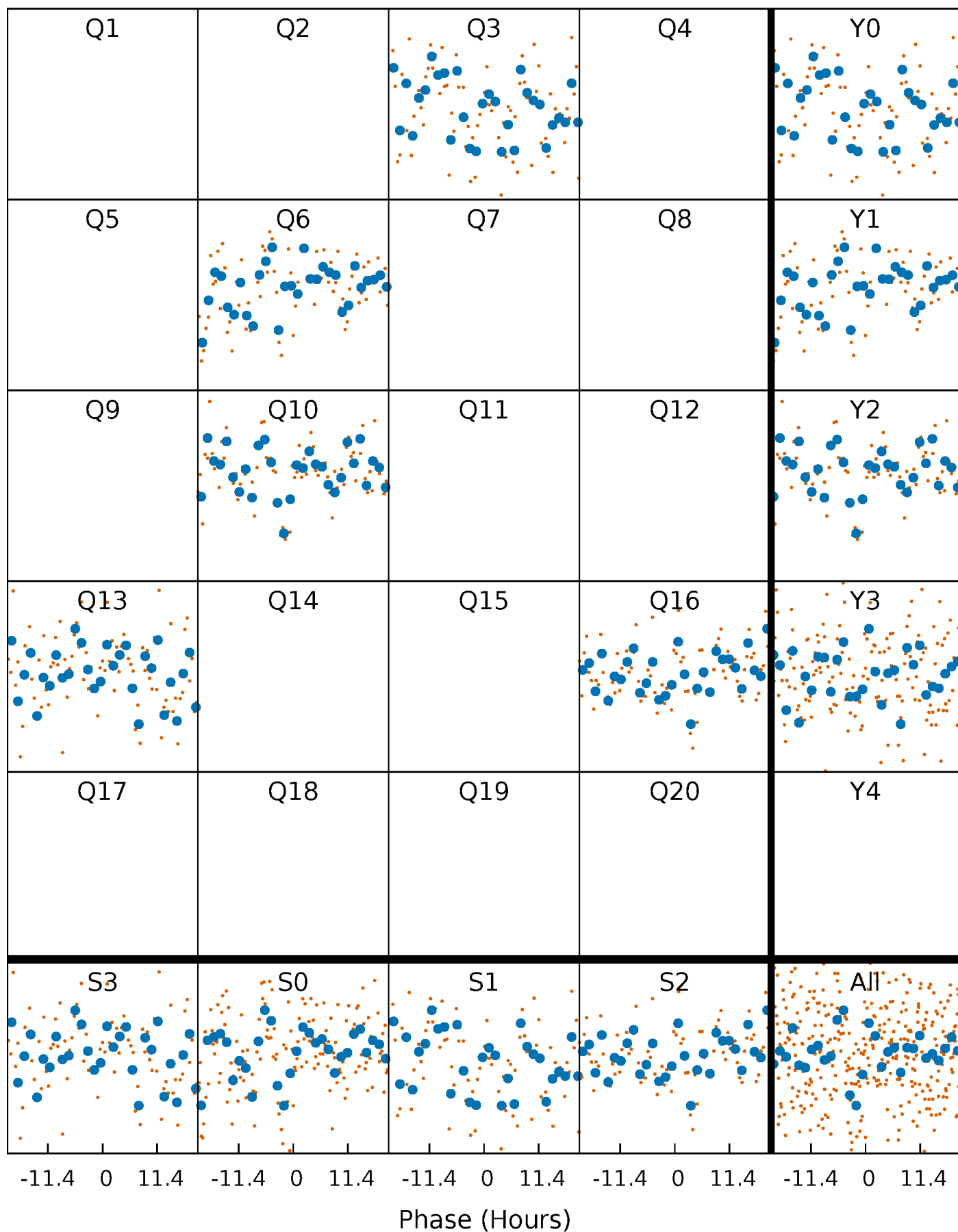


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

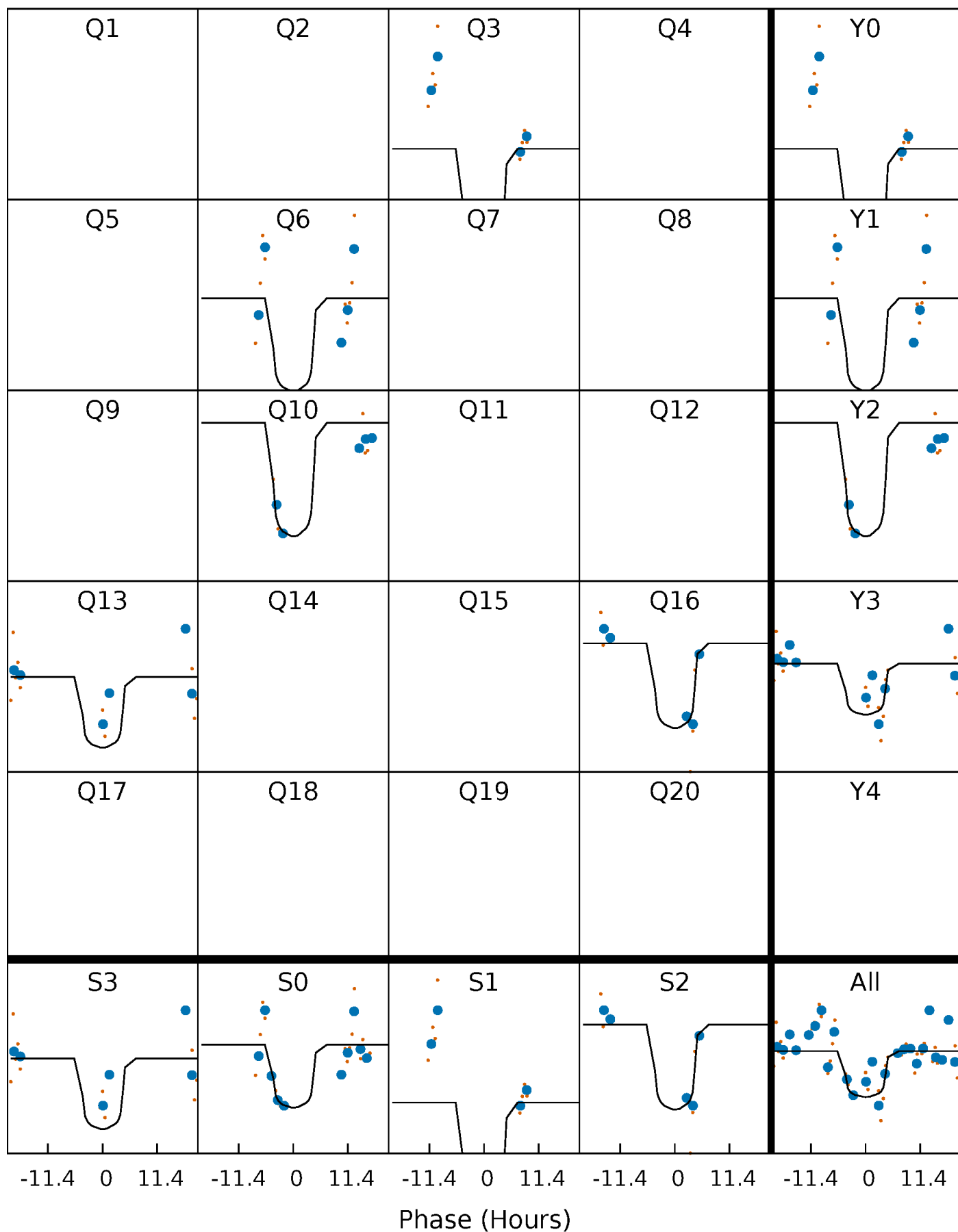
TCE 010416779-03     $P=291.432184$  Days     $T_0=336.577583$  (BKJD)





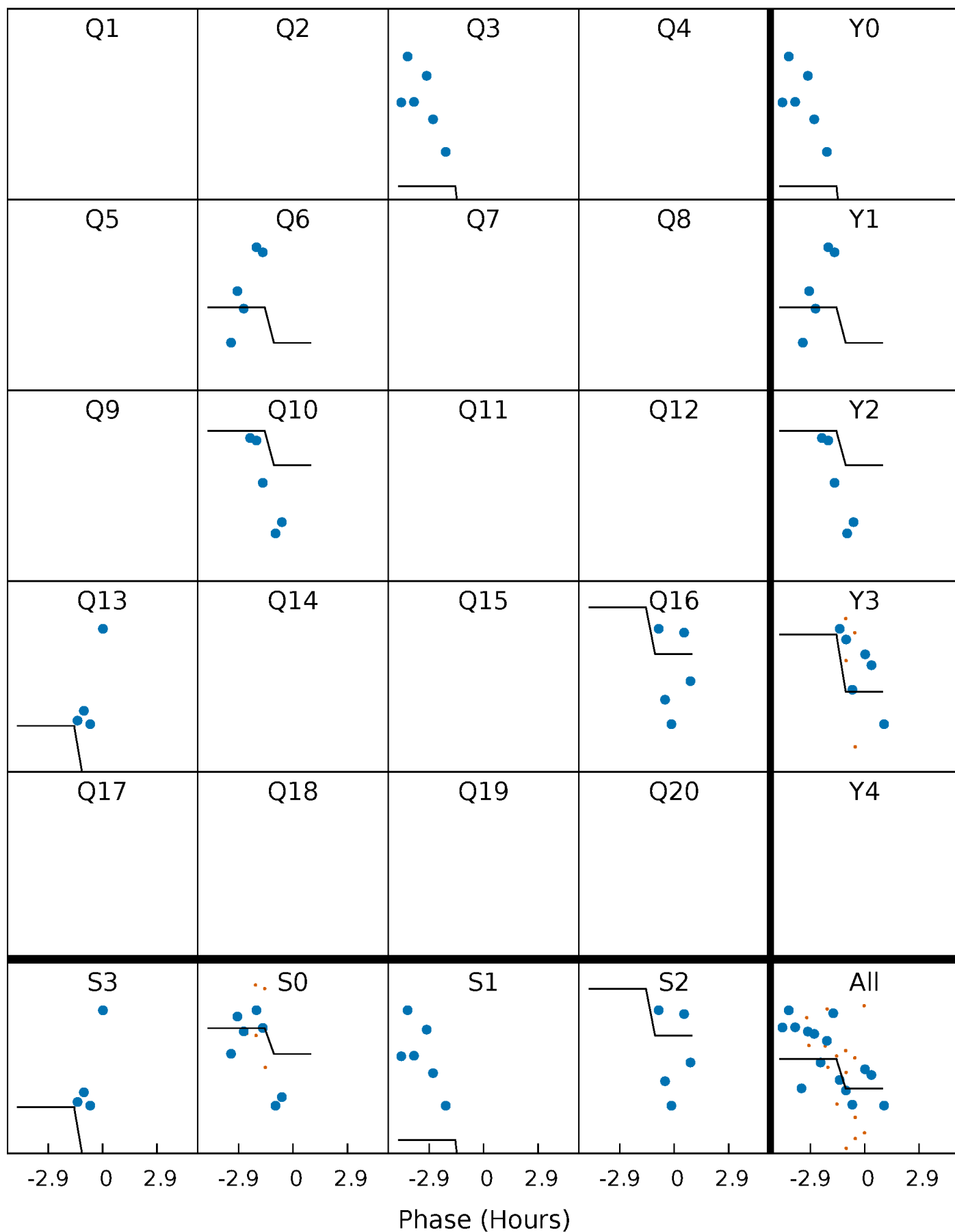
# DV Quarter-Phased Transit Curves

TCE 010416779-03 P=291.432184 Days  $T_0=336.577583$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

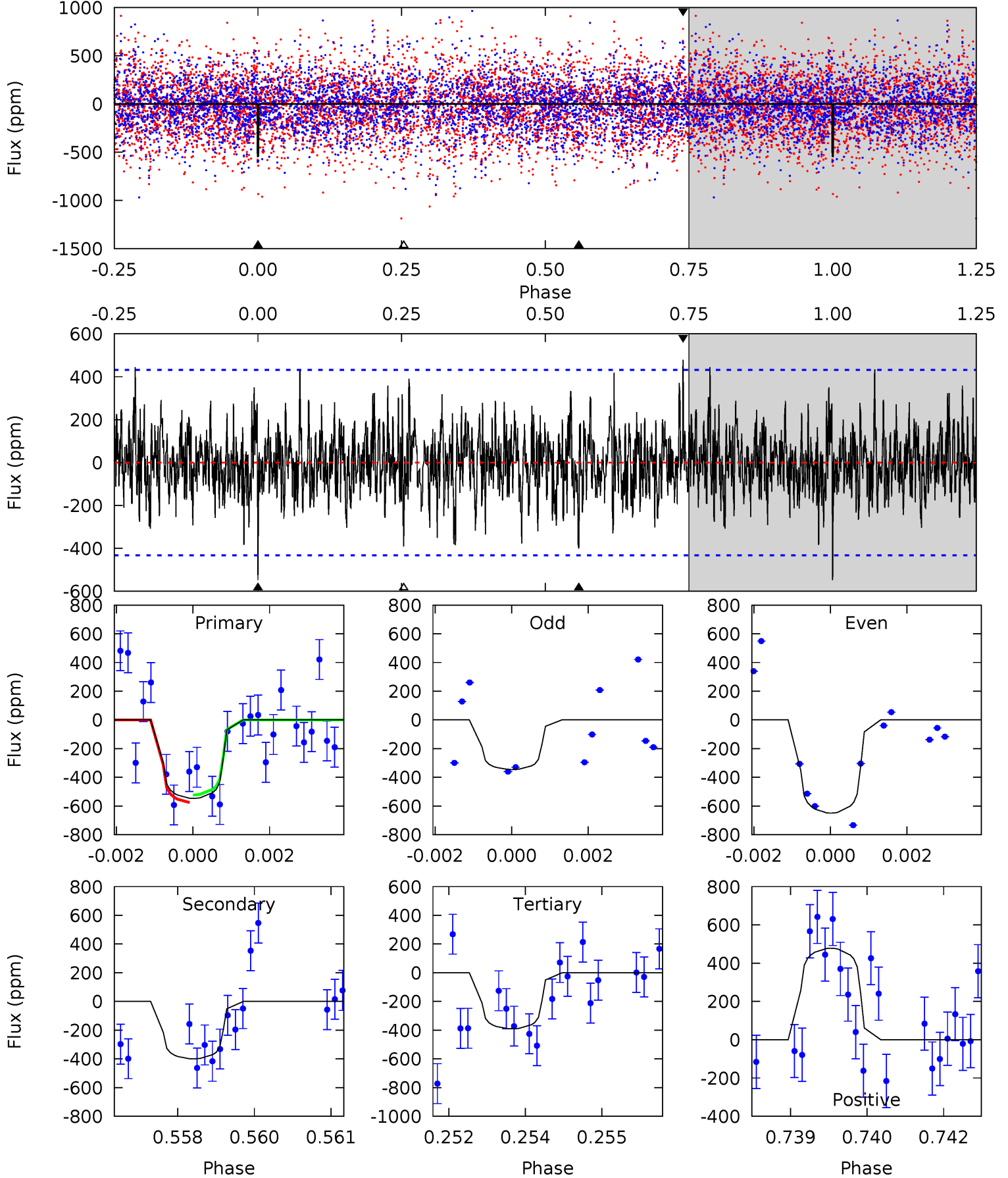
TCE 010416779-03 P=291.544836 Days  $T_0=336.282247$  (BKJD)



# DV Model-Shift Uniqueness Test

010416779-03, P = 291.432184 Days, E = 45.145399 Days

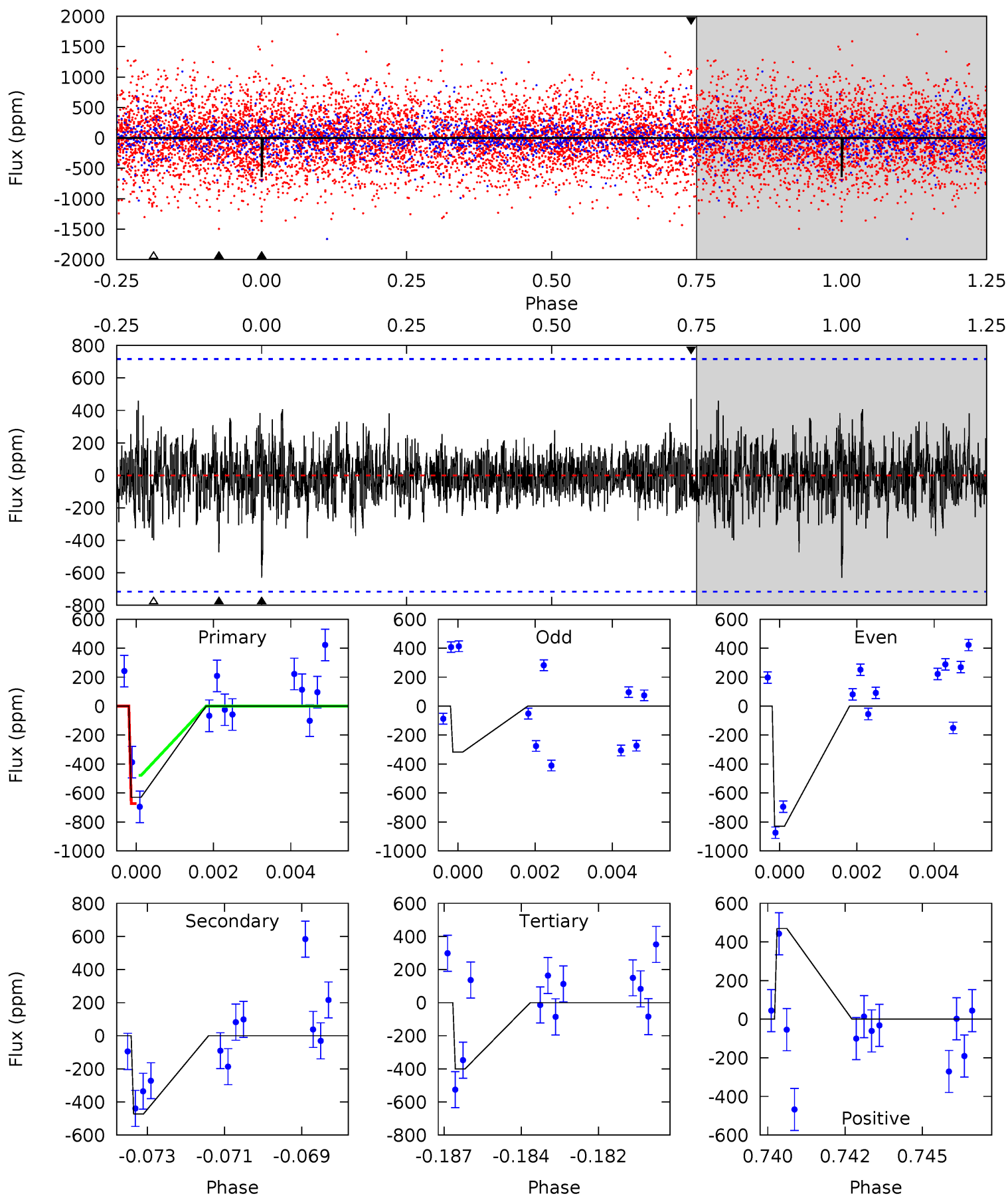
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.81	4.98	4.87	5.95	5.38	3.17	1.55	1.95	0.86	0.12	-0.97	1.84	0.93	0.47	0.32



# Alt Model-Shift Uniqueness Test

010416779-03, P = 291.544836 Days, E = 44.737411 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
4.67	3.50	2.96	3.48	5.31	3.06	0.82	1.70	1.19	0.54	0.03	1.84	0.85	0.43	0.61



### Stellar Parameters For KIC 010416779

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7751^{+214}_{-322}$	$3.889^{+0.273}_{-0.117}$	$-0.020^{+0.200}_{-0.350}$	$2.607^{+0.472}_{-0.877}$	$1.922^{+0.121}_{-0.412}$	$0.153^{+0.270}_{-0.053}$
	+3%/-4%	+7%/-3%	+1000%/-1750%	+18%/-34%	+6%/-21%	+176%/-35%
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 010416779-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-400 \pm 80$	$7.20^{+1.77}_{-1.67}$	$733^{+50}_{-62}$	$6562^{+806}_{-616}$	$4755^{+3125}_{-1827}$
Alt.	$-473 \pm 135$	$5.70^{+1.53}_{-1.50}$	$733^{+48}_{-68}$	$7785^{+1481}_{-1028}$	$8725^{+7918}_{-3644}$

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



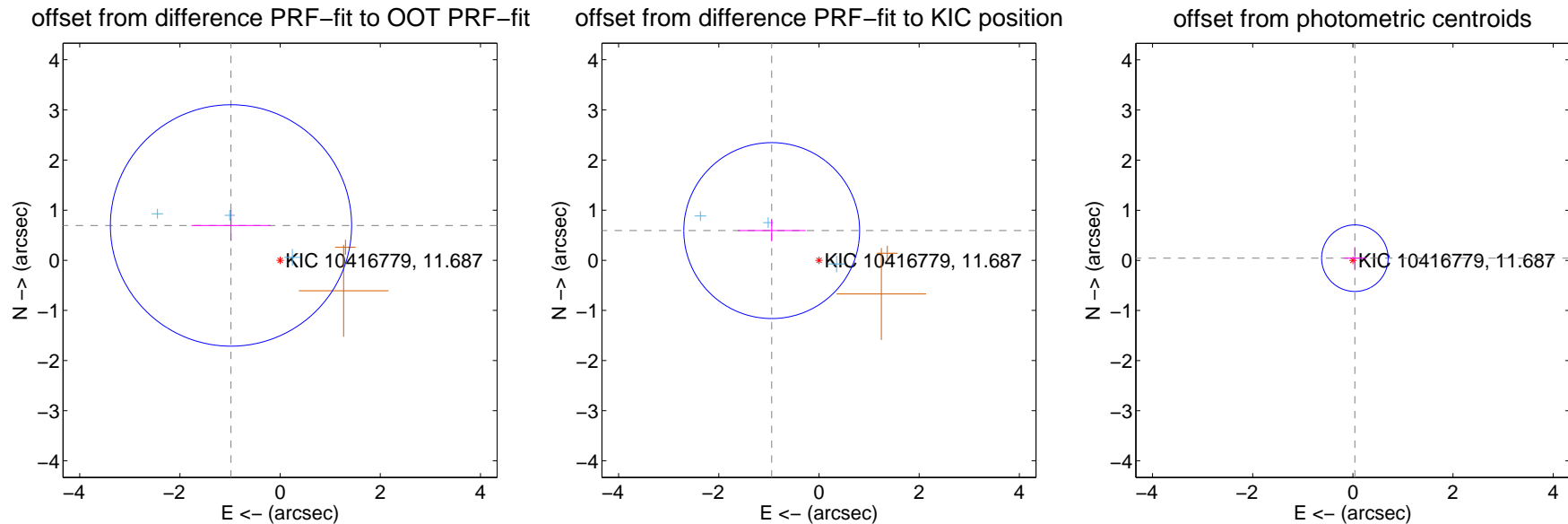
## DV Centroid Data

Supplemental centroid analysis for 010416779-03. **Kepler magnitude: 11.69.** Transit SNR 7.87

**There are 3 quarters with good PRF difference image offsets**

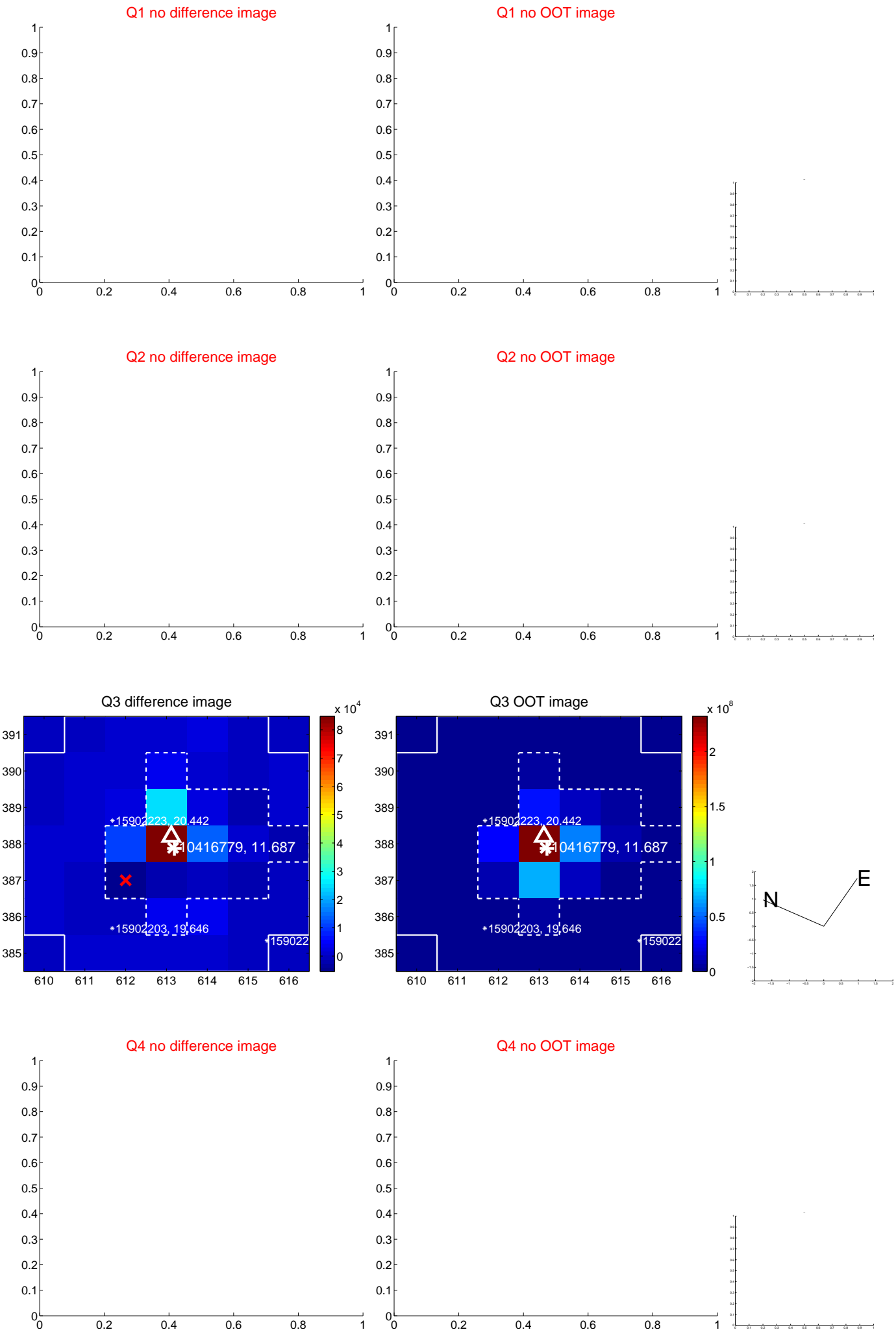
The direct PRF centroid is offset from the target star catalog position by about 0.17 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.202 \pm 0.803$	1.50	$0.981 \pm 0.790$	$0.695 \pm 0.304$
PRF-fit source offset from KIC position	$1.114 \pm 0.585$	1.91	$0.944 \pm 0.678$	$0.593 \pm 0.213$
photometric centroid source offset	$0.06 \pm 0.22$	0.27	$-0.04 \pm 0.22$	$0.04 \pm 0.22$

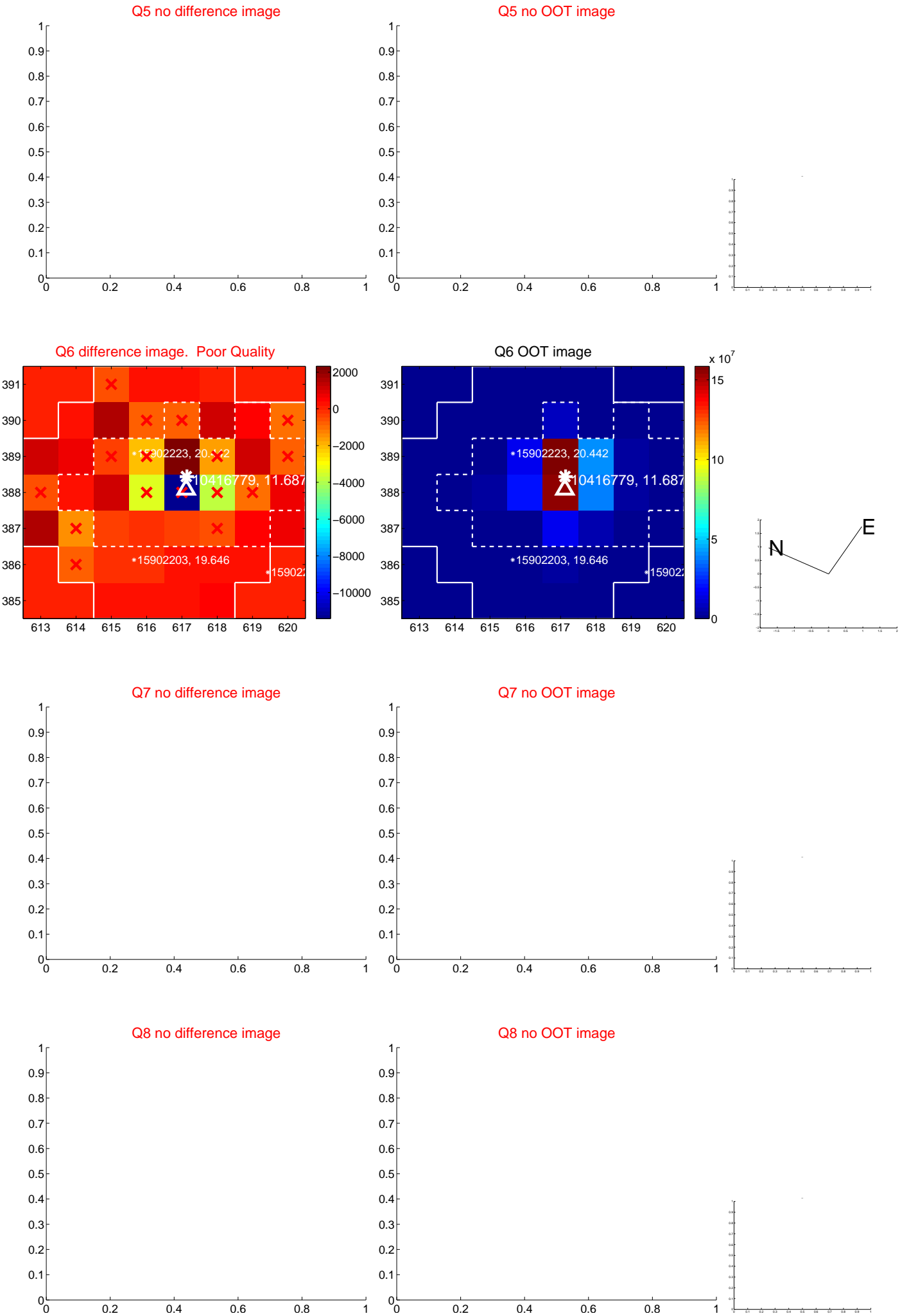


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

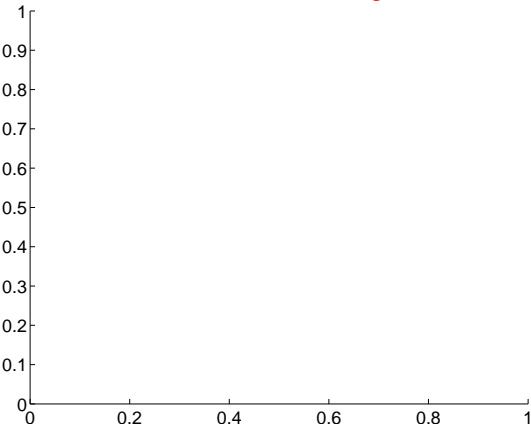


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

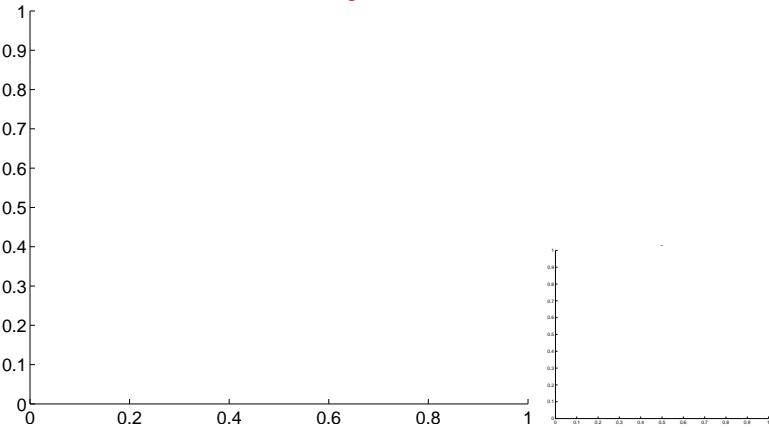


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

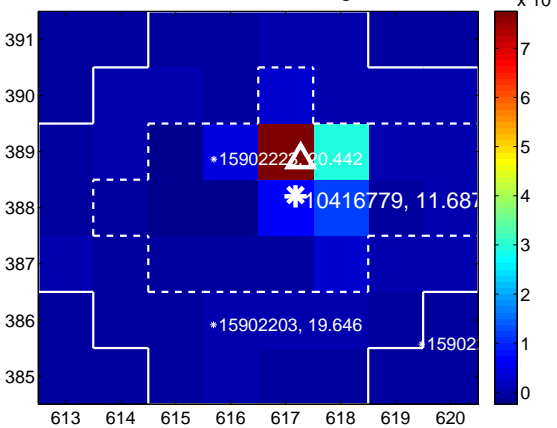
Q9 no difference image



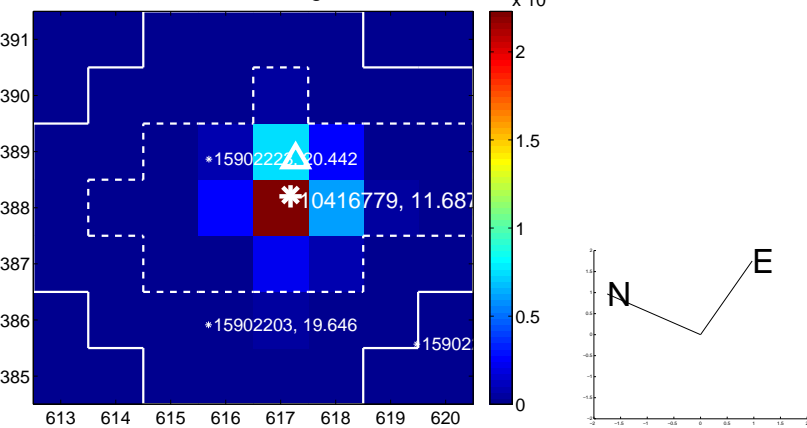
Q9 no OOT image



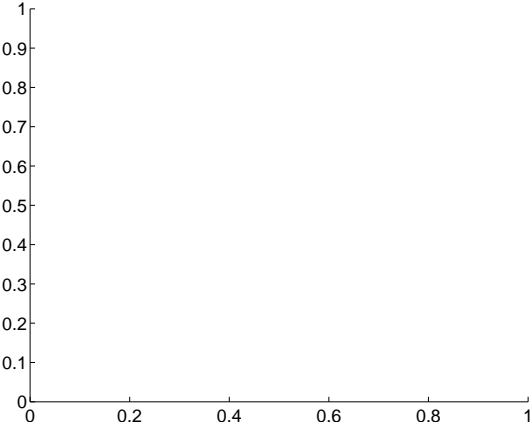
Q10 difference image



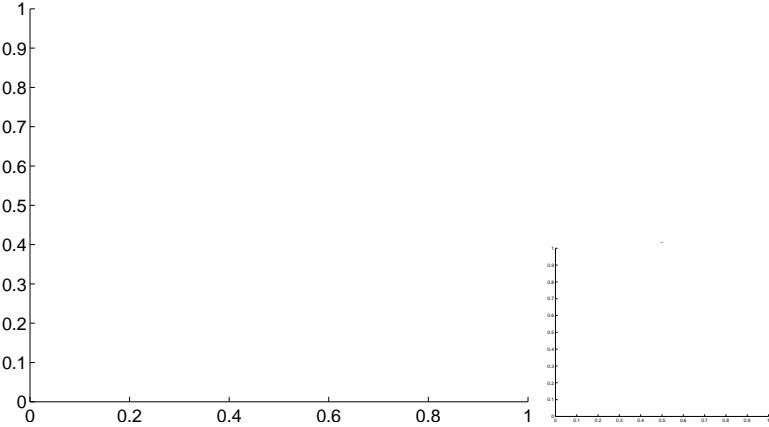
Q10 OOT image



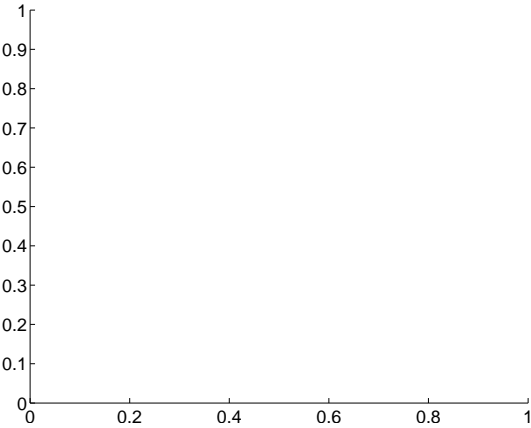
Q11 no difference image



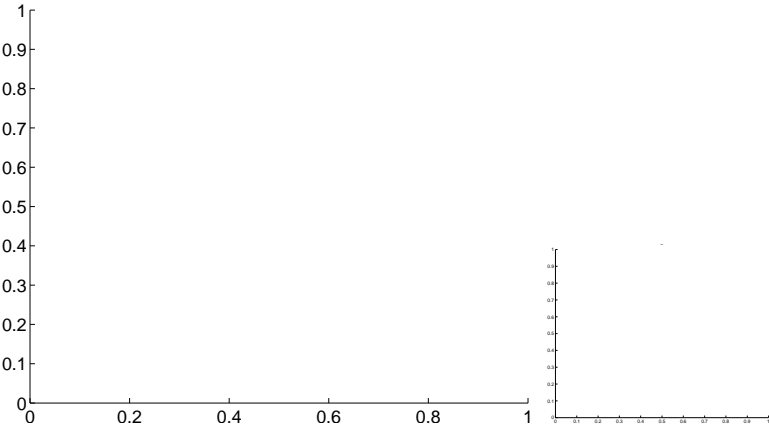
Q11 no OOT image



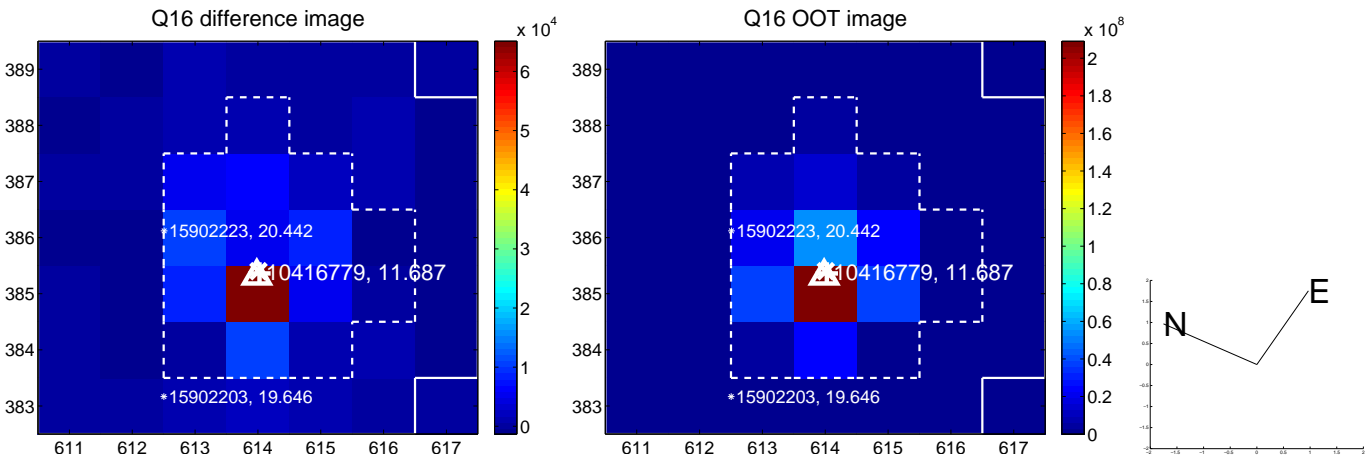
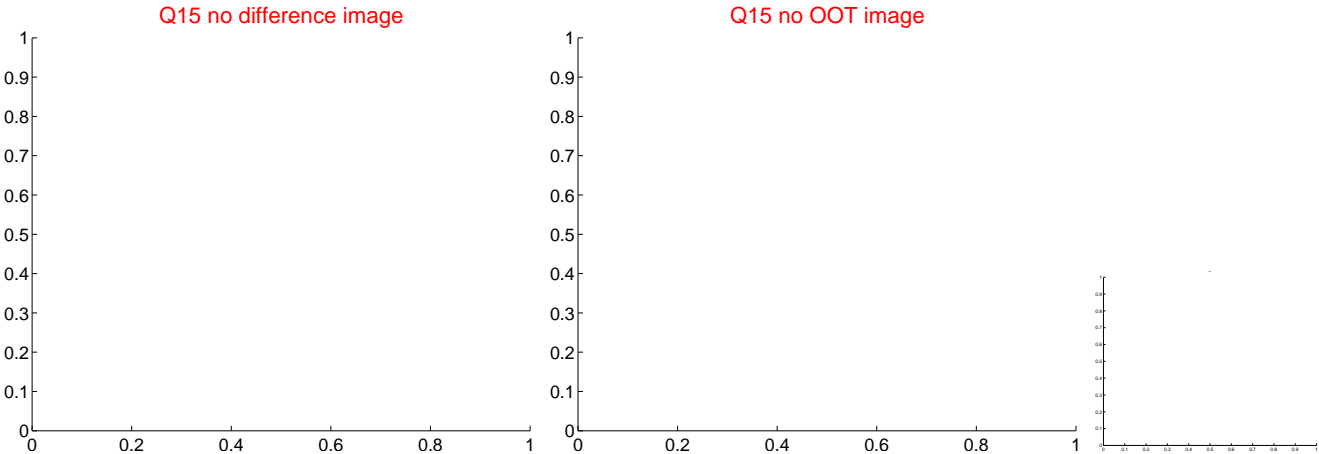
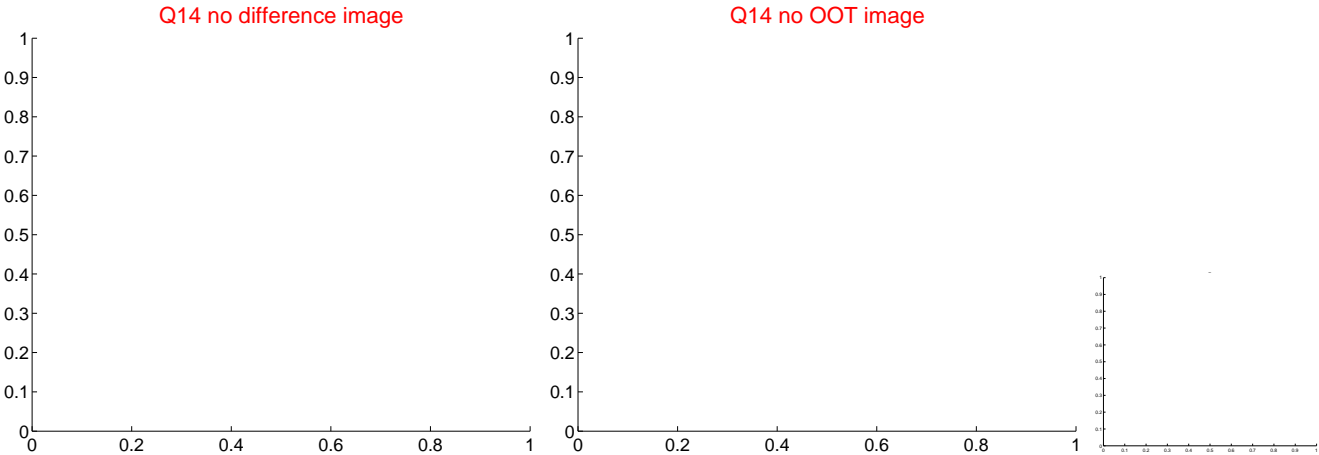
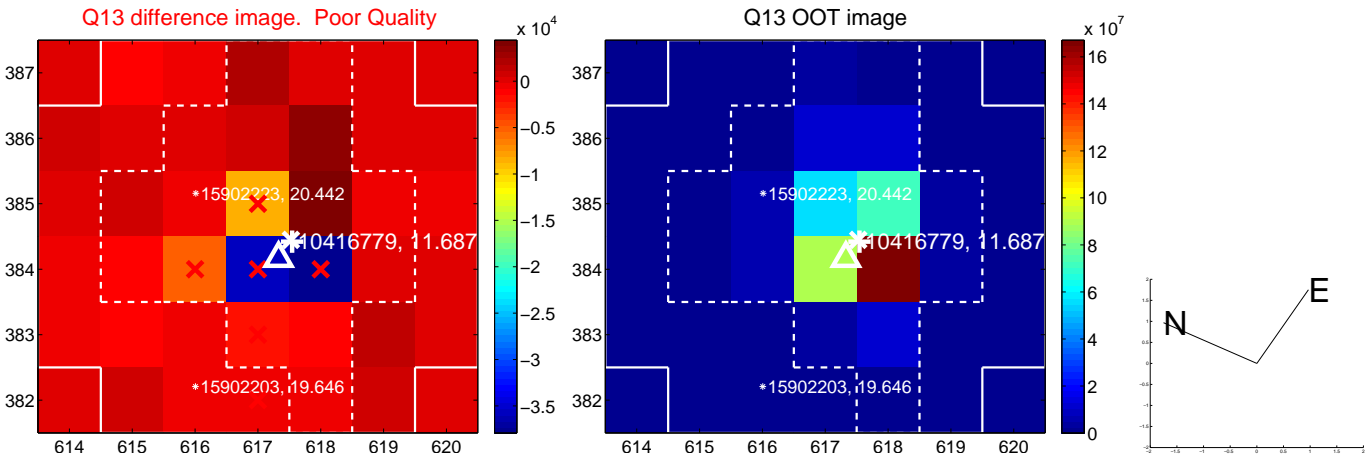
Q12 no difference image



Q12 no OOT image

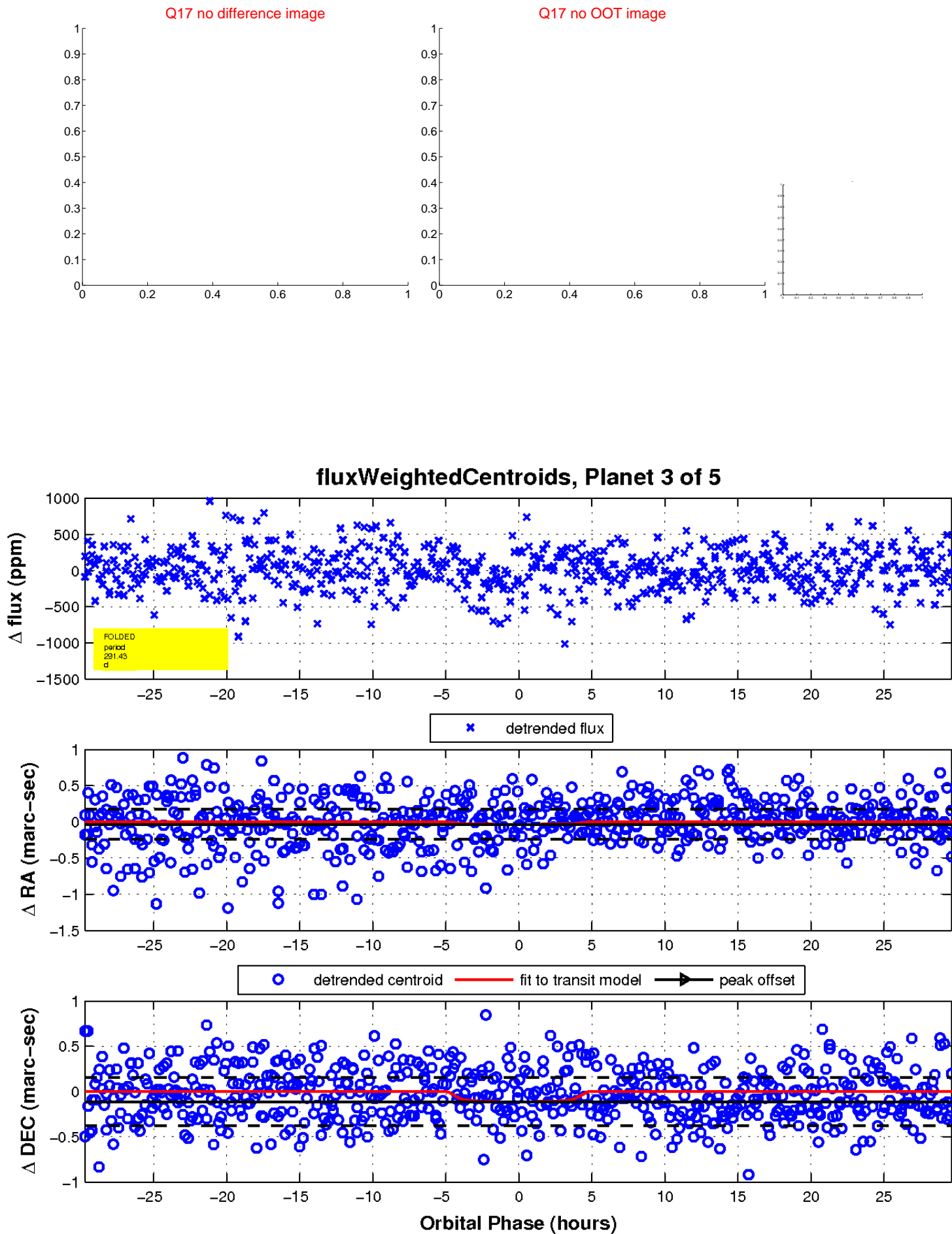


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



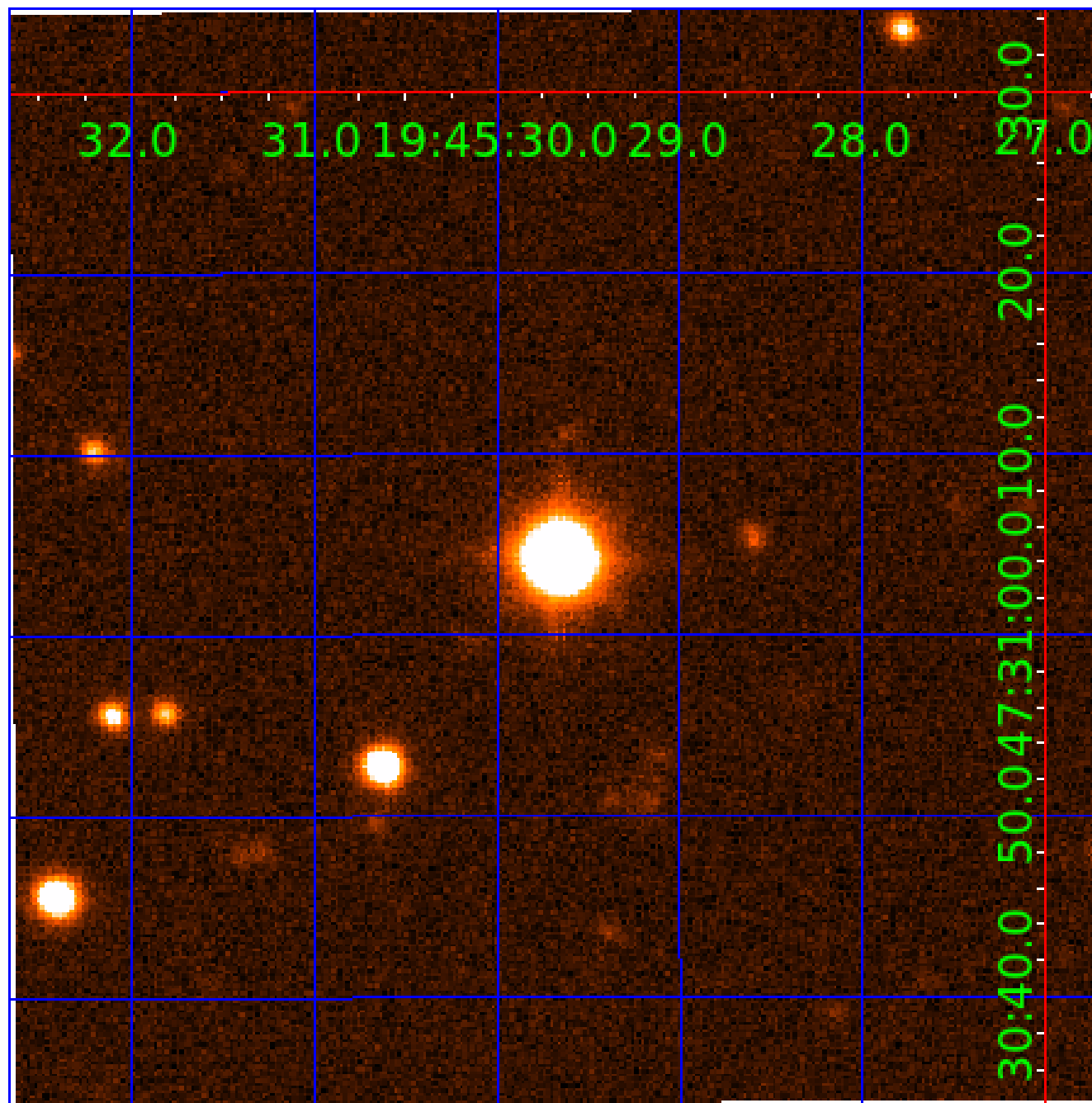


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 010416779

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010416779-01	OBS	No	0.763288	131.838551	37.9	3.006	11.1	9.8	2.61	7751	1.86	53231.43
010416779-02	OBS	No	0.763305	132.095228	47.5	2.885	9.3	12.3	2.61	7751	2.09	53229.80
010416779-03	OBS	No	291.432184	336.577583	617.2	9.933	9.3	7.9	2.61	7751	7.54	19.22
010416779-04	OBS	No	70.386449	158.763957	555.7	4.353	8.5	8.0	2.61	7751	7.83	127.77
010416779-05	OBS	No	2.692681	133.883826	130.3	6.531	10.0	10.6	2.61	7751	3.49	9912.26

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010416779-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
010416779-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD
010416779-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS—HALO_GHOST
010416779-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
010416779-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT

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

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

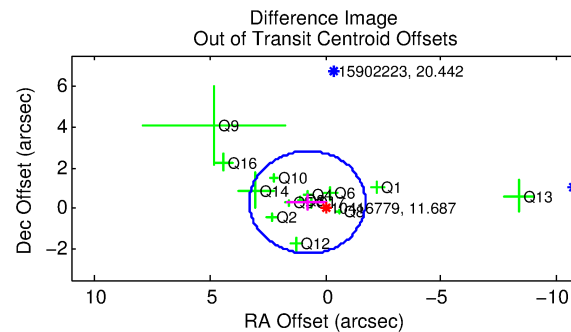
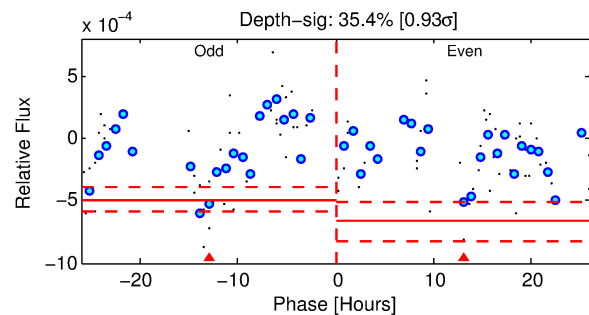
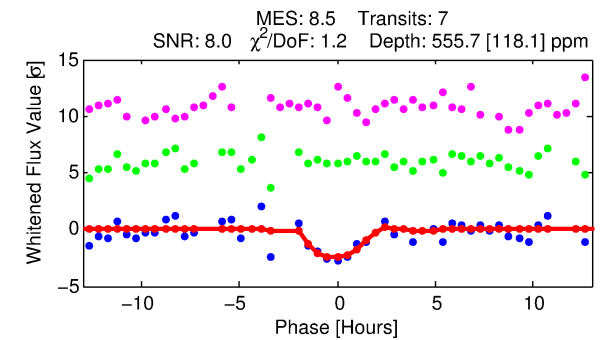
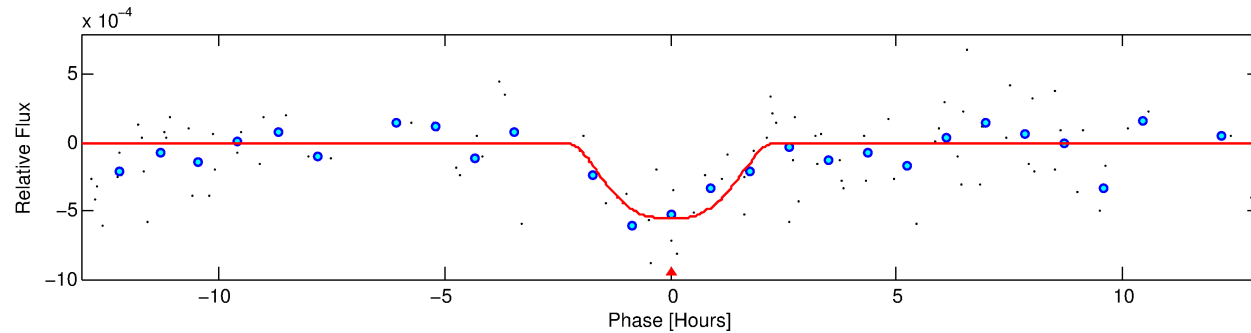
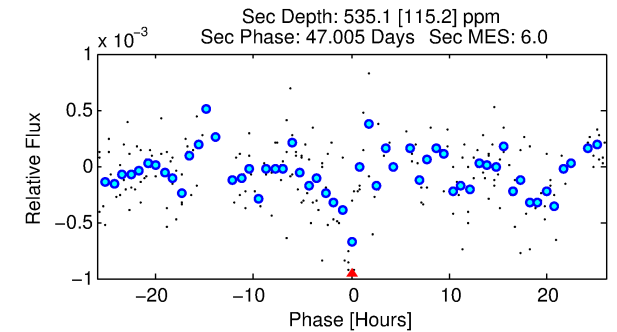
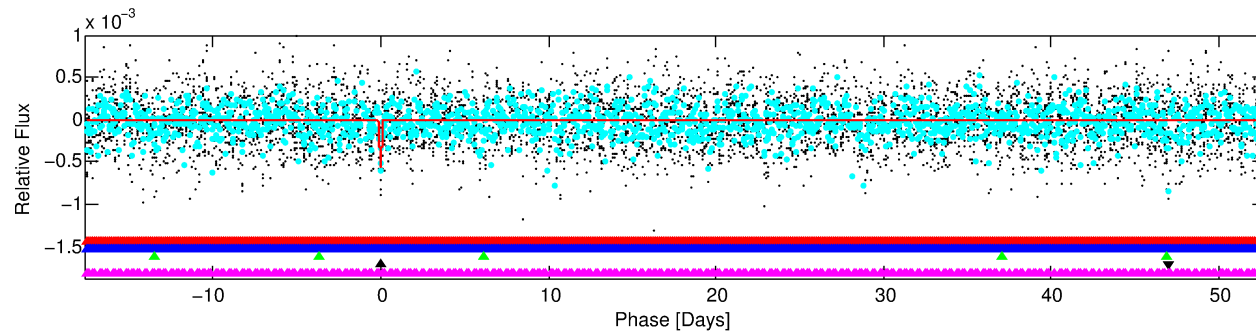
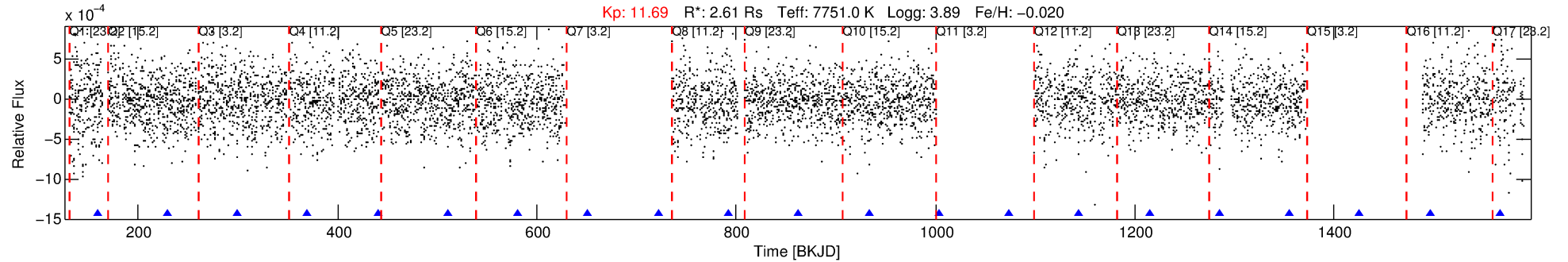
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010416779-04

No Significant Match Found

# DV One-Page Summary

KIC: 10416779 Candidate: 4 of 5 Period: 70.386 d



## DV Fit Results:

Period = 70.38645 [0.00135] d  
Epoch = 158.7640 [0.0145] BKJD  
Rp/R\* = 0.0275 [0.0041]  
a/R\* = 41.56 [13.10]  
b = 0.97 [0.02]  
Seff = 127.77 [64.34]  
Teff = 857 [108] K  
Rp = 7.83 [2.89] Re  
a = 0.4147 [0.1273] AU  
Ag = 825.09 [497.12] [1.66σ]  
Teffp = 7104 [721] K [8.57σ]

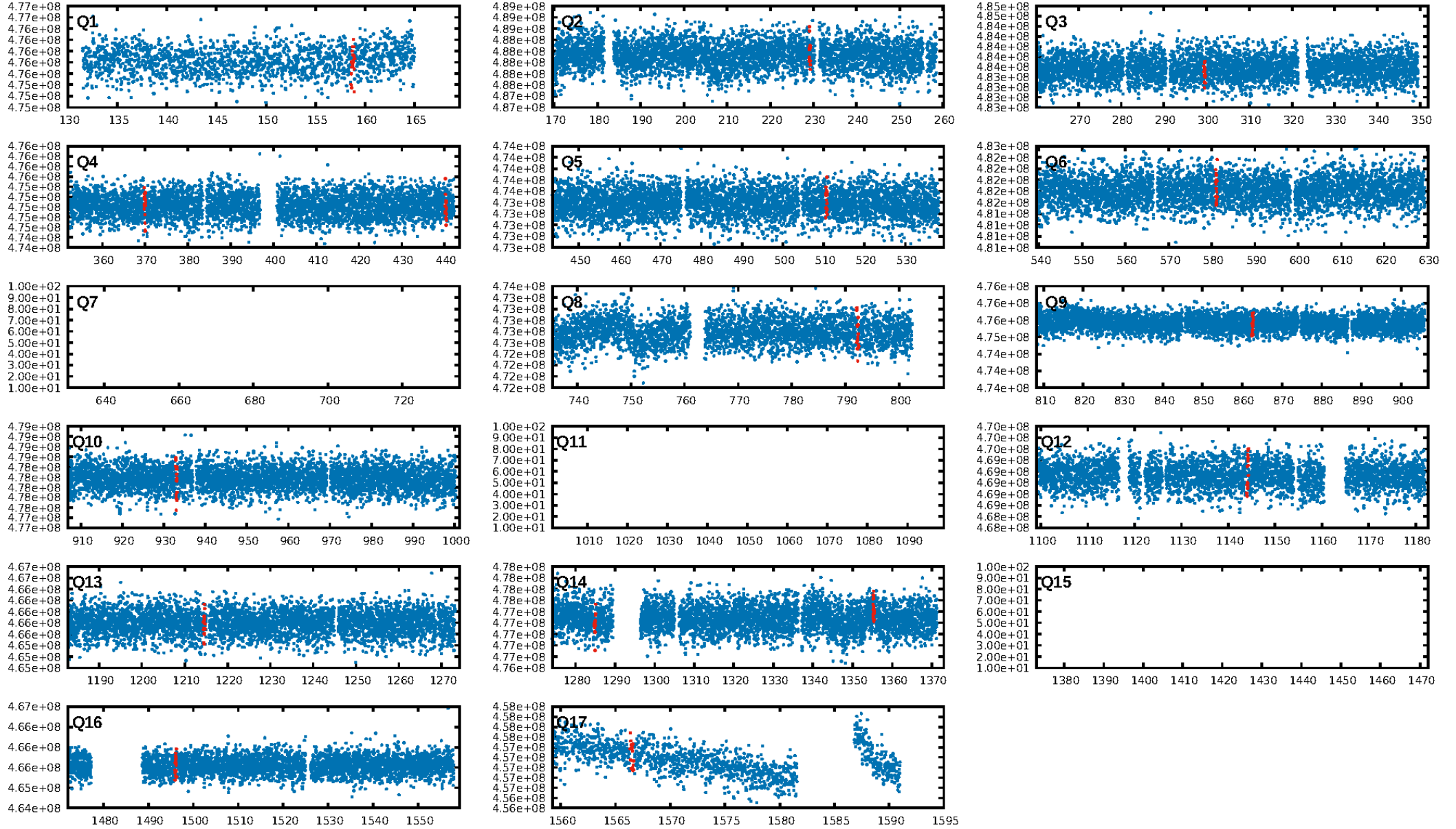
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [207.00σ]  
LongPeriod-sig: 100.0% [489.17σ]  
ModelChiSquare2-sig: 74.9%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [6/6]  
GhostDiagnostic-chr: 4.507  
Centroid-sig: 4.4%  
Centroid-so: 0.473 arcsec [2.61σ]  
OotOffset-rm: 0.834 arcsec [1.00σ]  
KicOffset-rm: 0.755 arcsec [0.92σ]  
OotOffset-st: 4/1/4/5 [14]  
KicOffset-st: 4/1/4/5 [14]  
DiffImageQuality-fgm: 0.29 [4/14]  
DiffImageOverlap-fno: 0.00 [0/14]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:55:41 Z

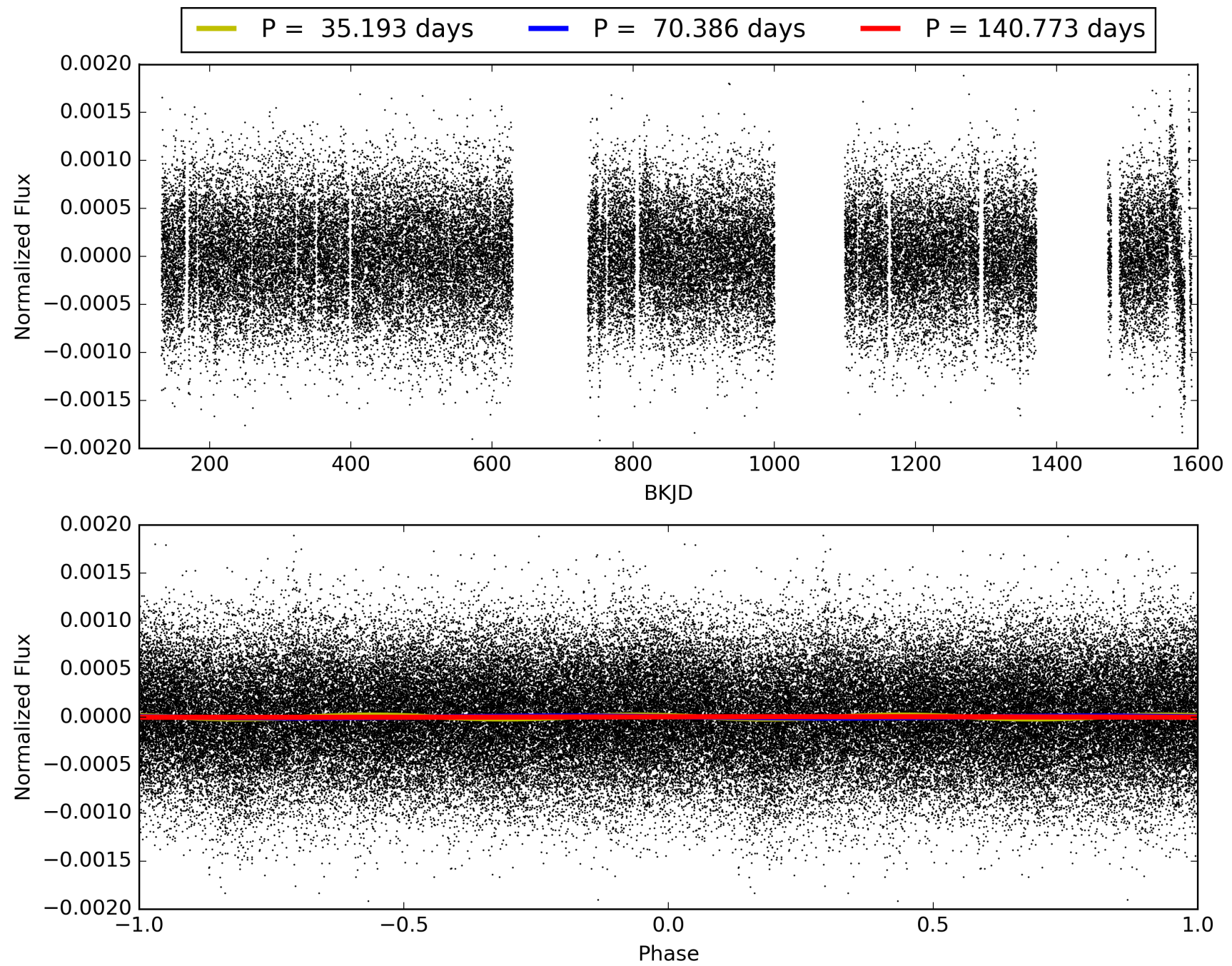
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 010416779-04, PDC Light Curves





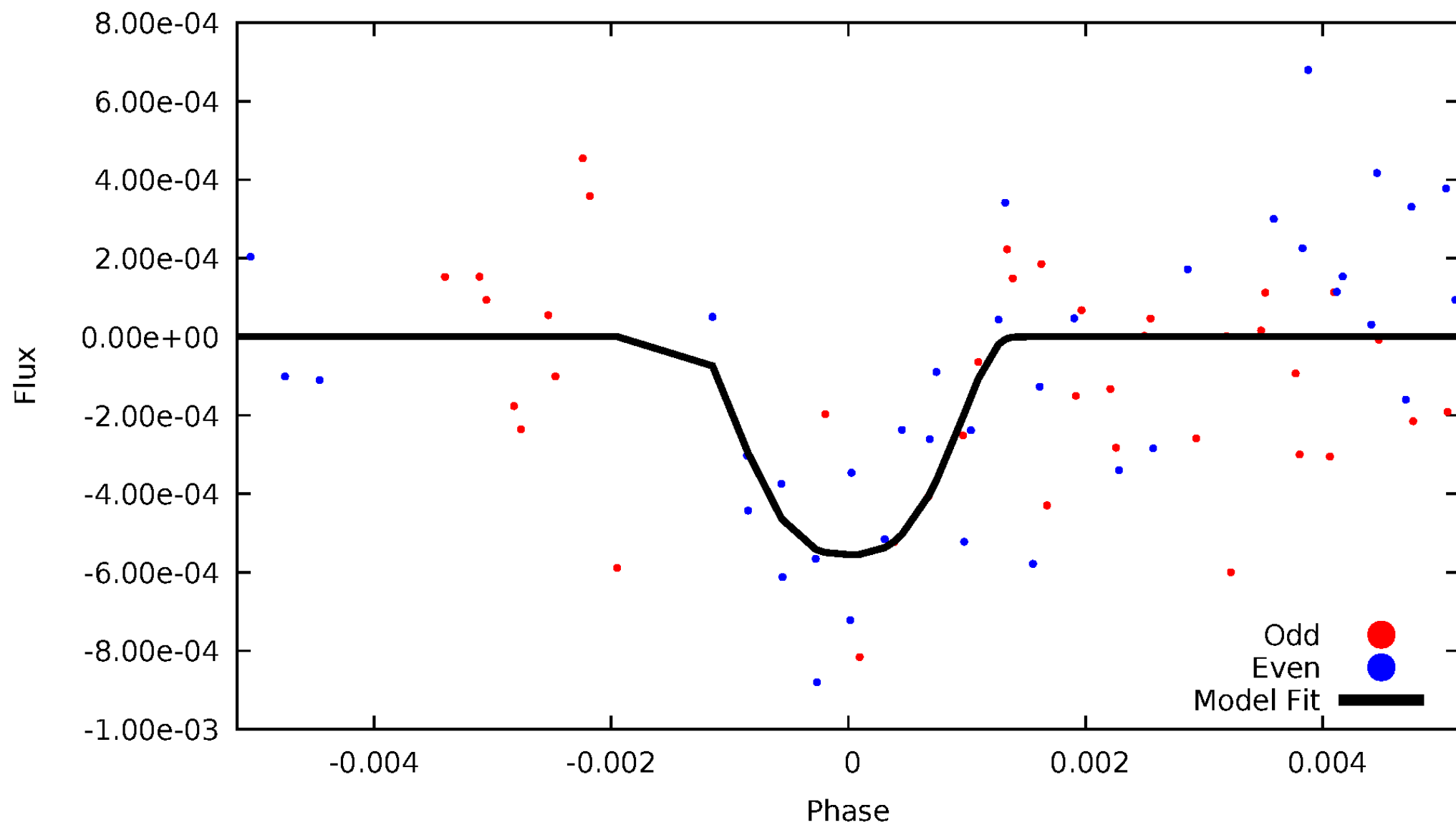
# TCE 010416779-04





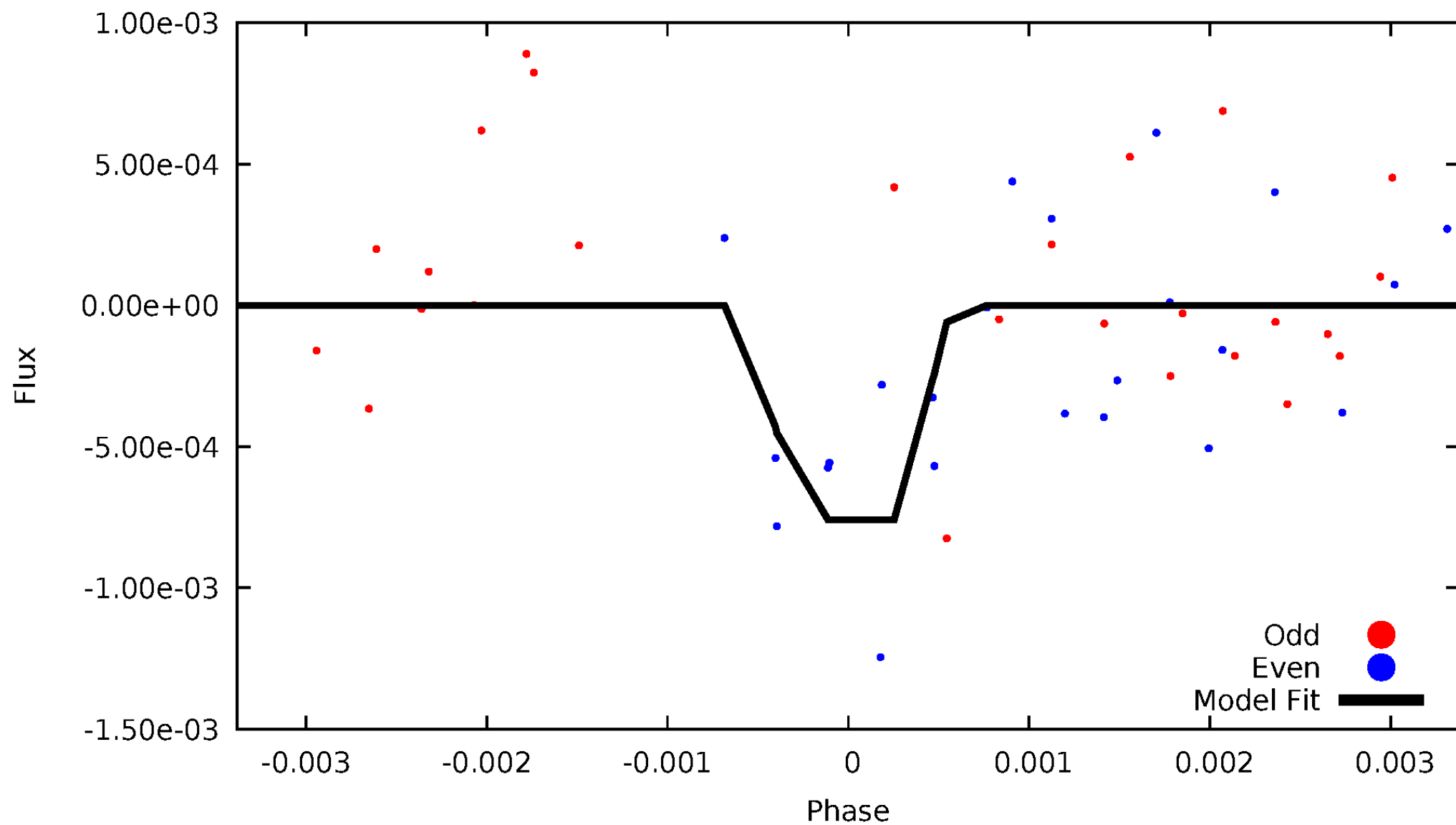
# DV Odd/Even

TCE 010416779-04



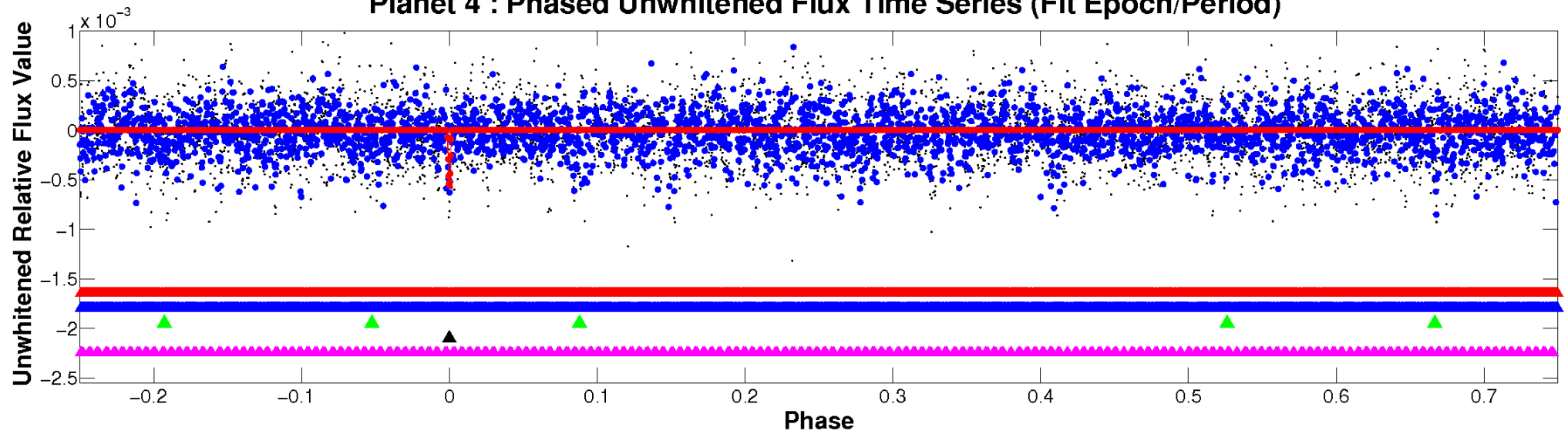
# ALT Odd/Even

TCE 010416779-04

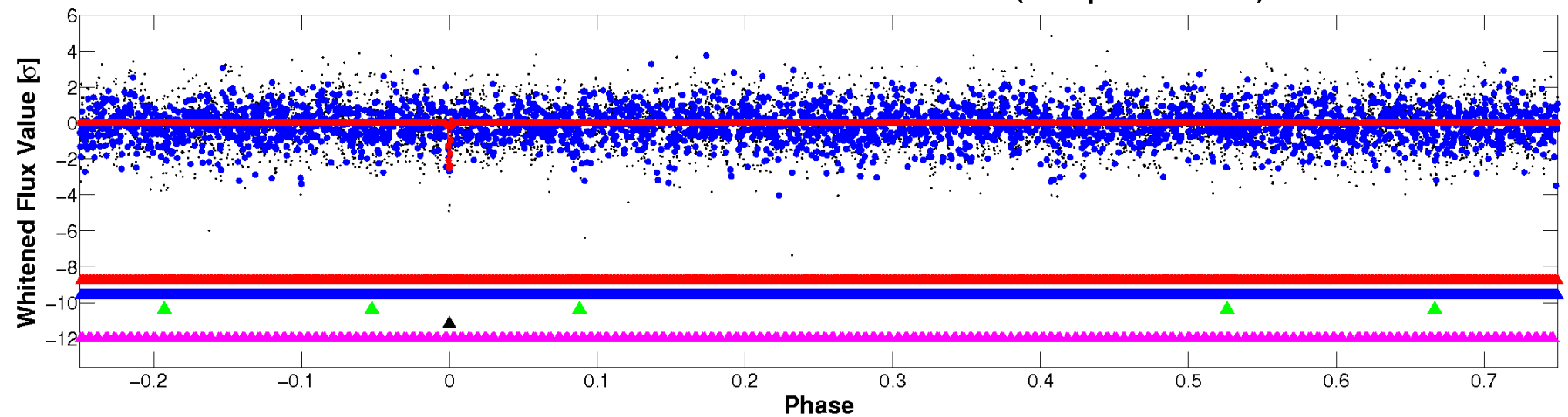


# Non-Whitened Vs. Whitened Light Curve

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

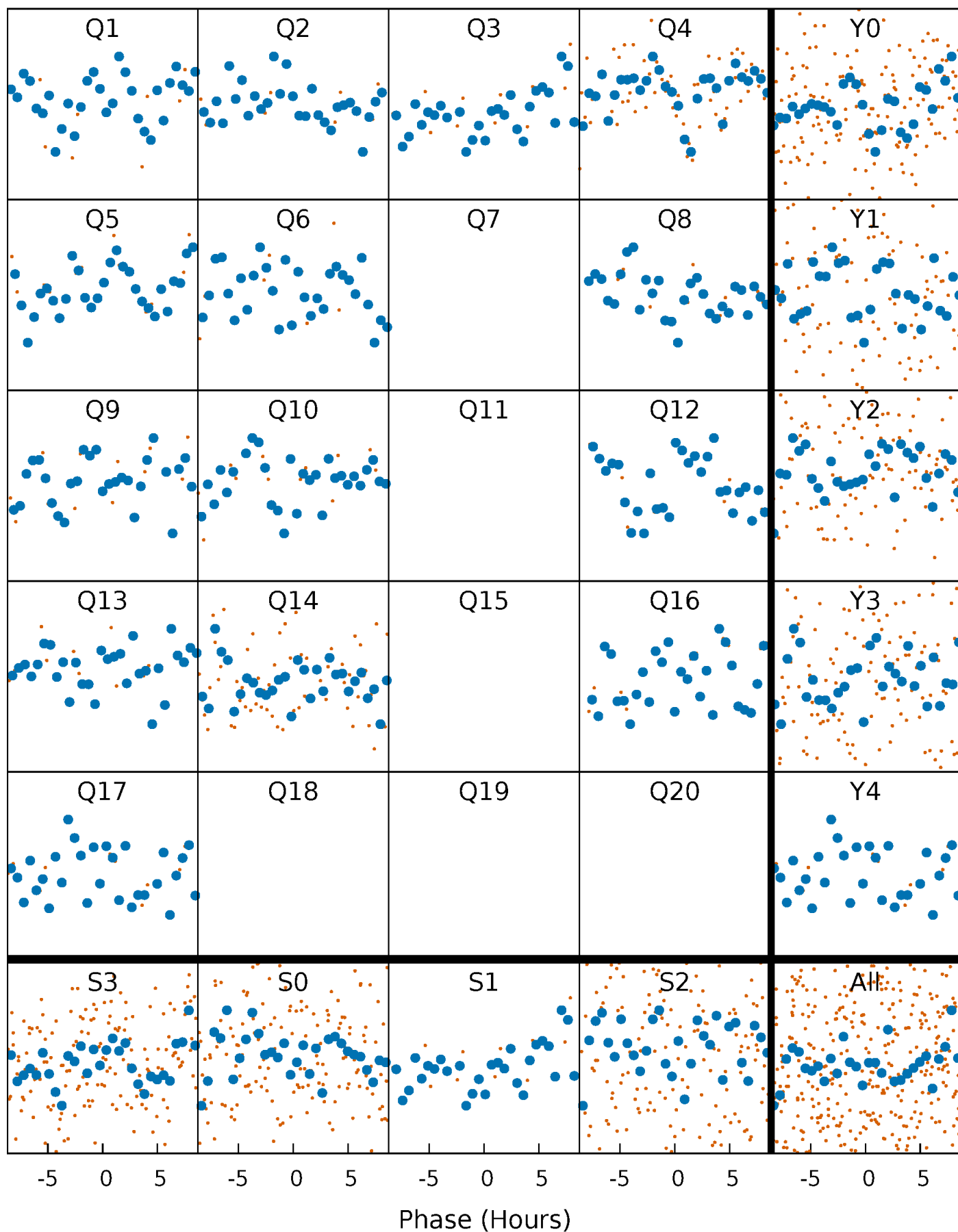


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



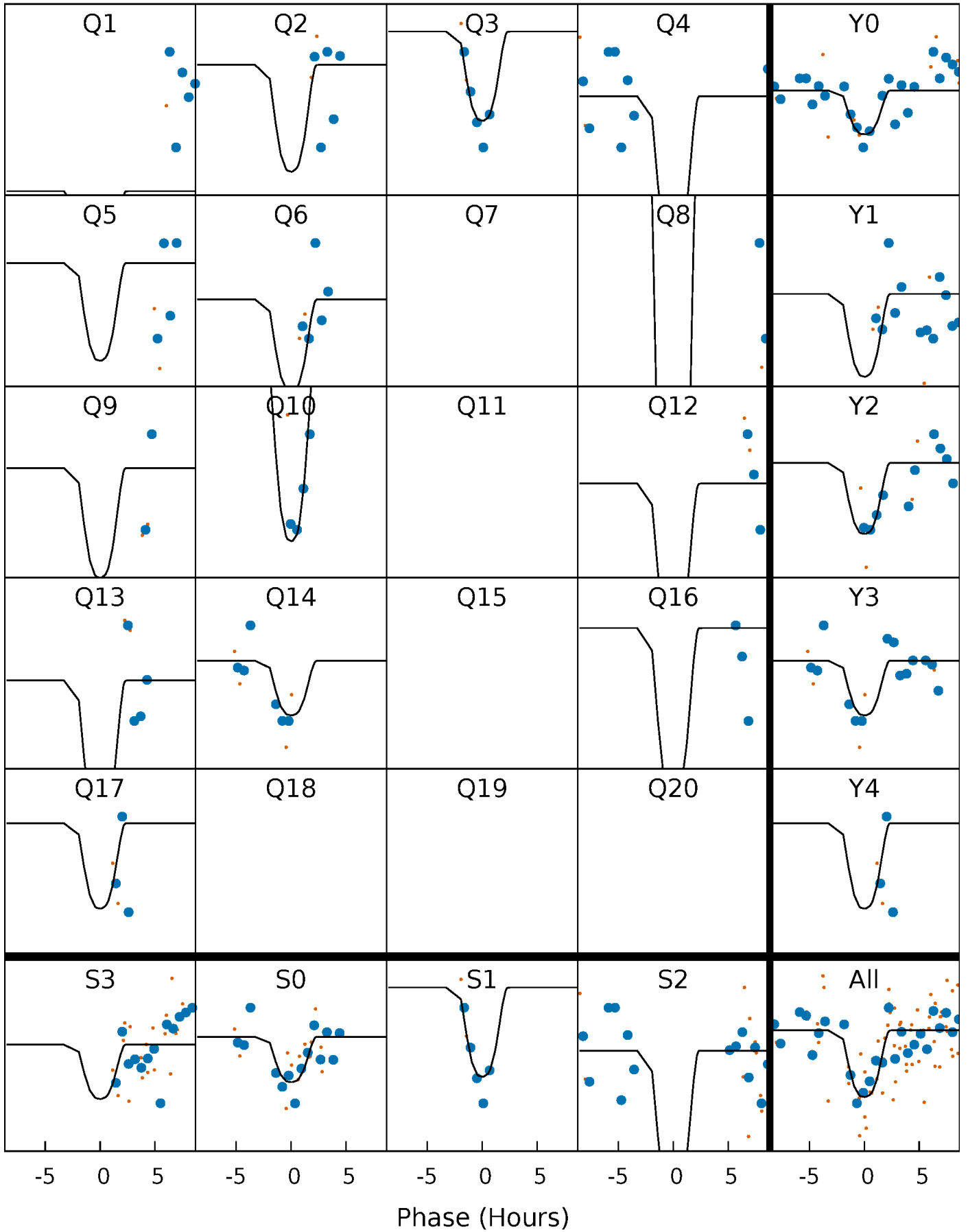
# PDC Quarter-Phased Transit Curves

TCE 010416779-04   P= 70.386449 Days    $T_0=158.763957$  (BKJD)



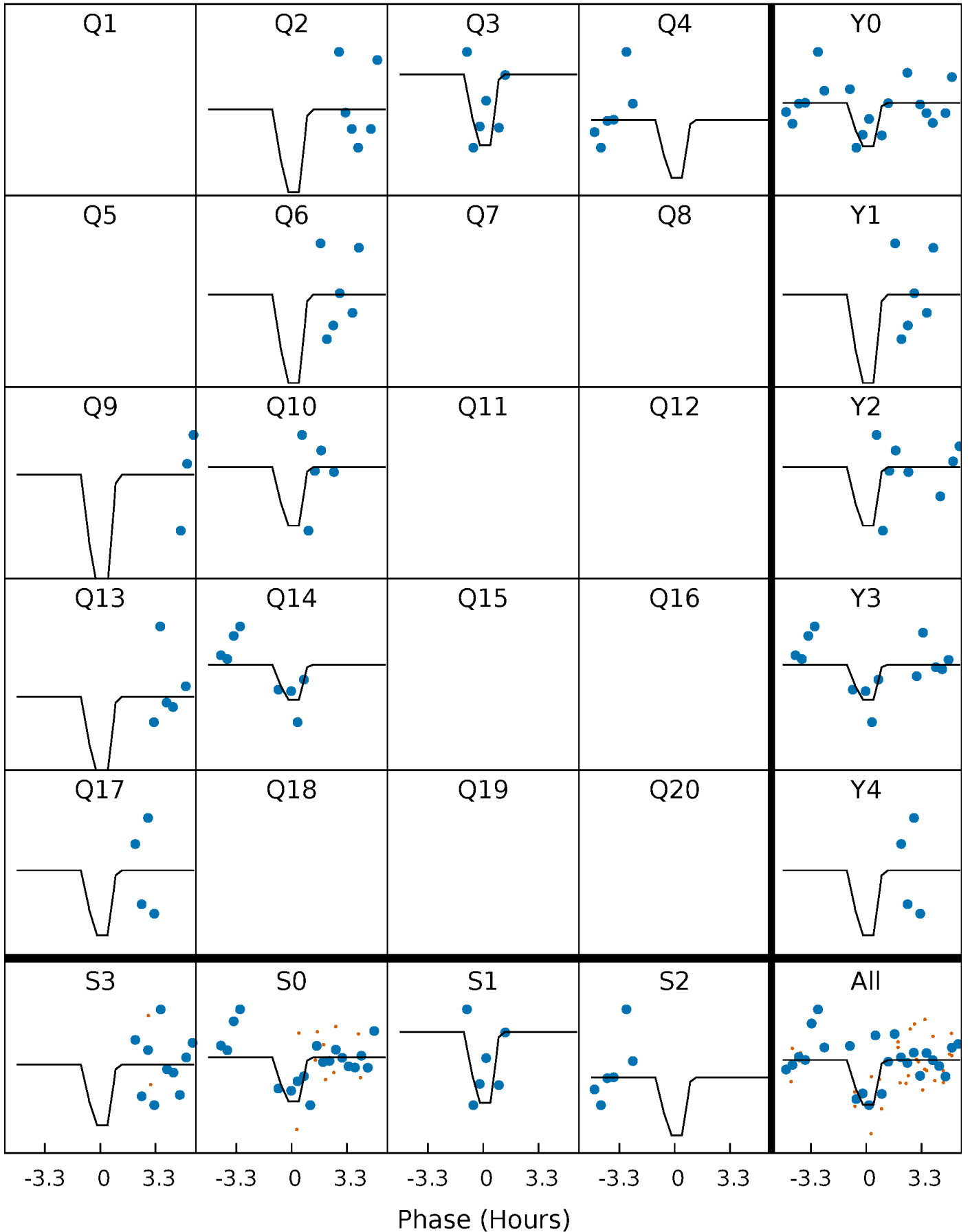
# DV Quarter-Phased Transit Curves

TCE 010416779-04 P= 70.386449 Days  $T_0=158.763957$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 010416779-04   P= 70.386539 Days    $T_0=158.731396$  (BKJD)

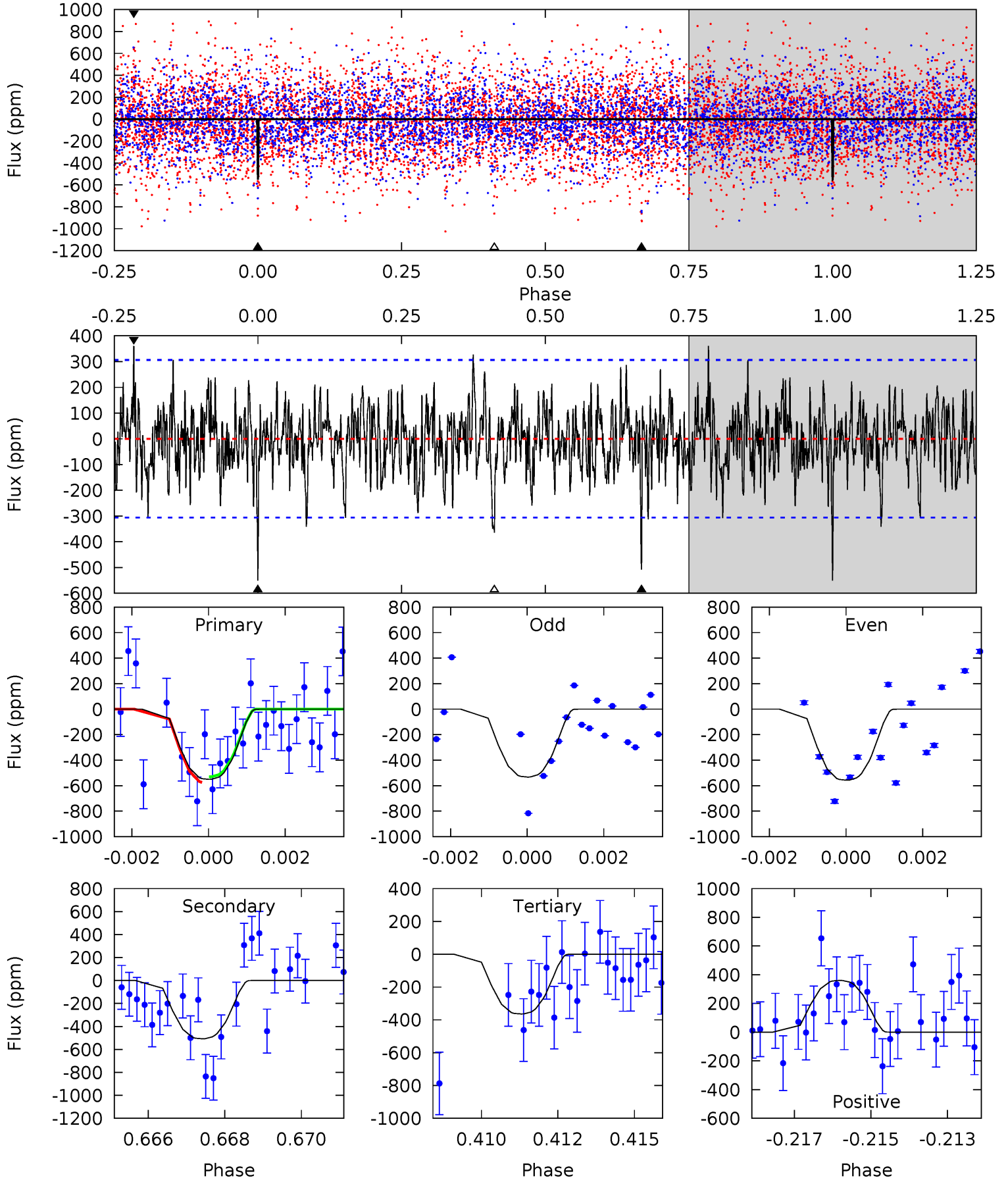




# DV Model-Shift Uniqueness Test

010416779-04, P = 70.386449 Days, E = 88.377508 Days

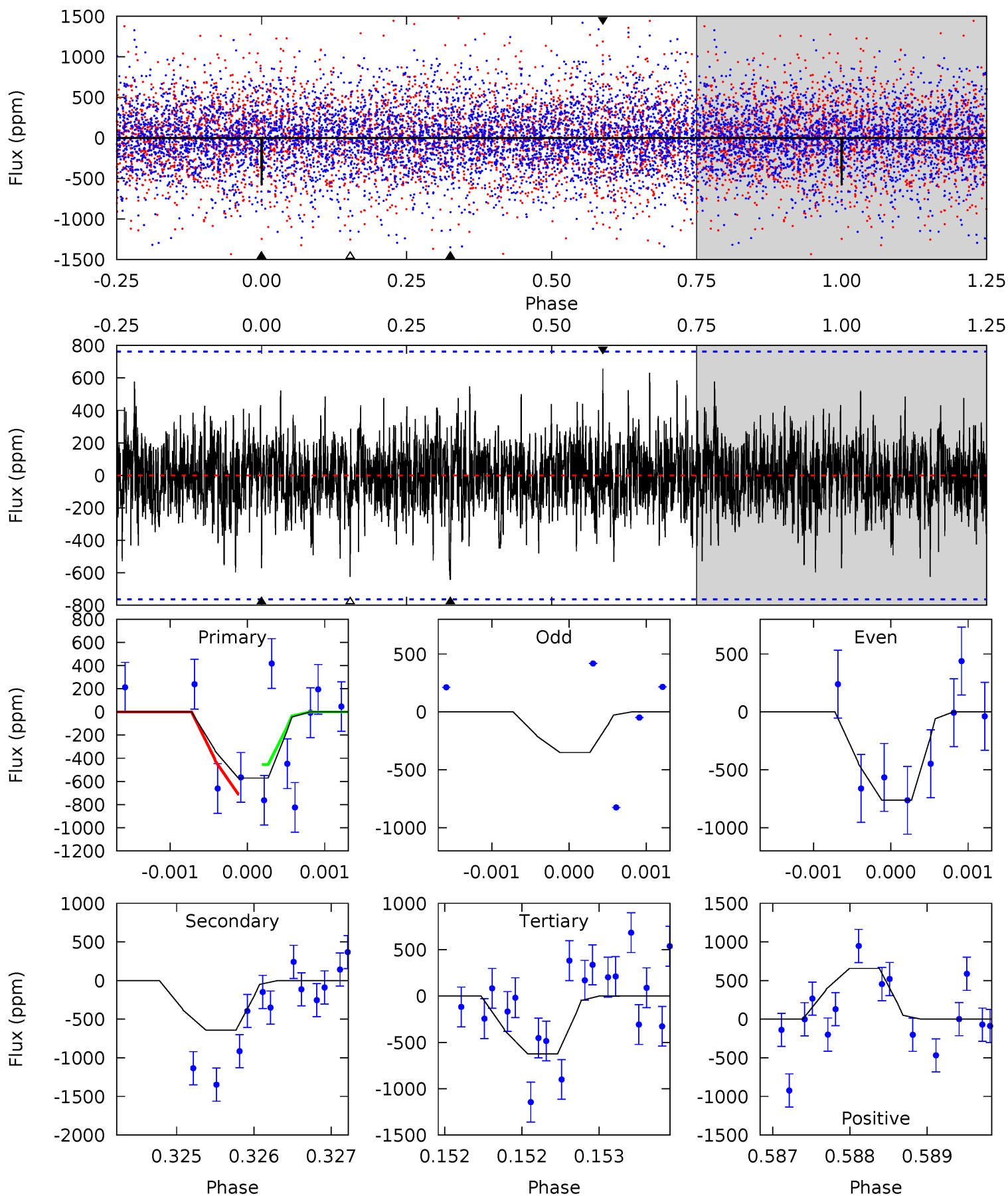
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.54	8.80	6.31	6.25	5.31	3.06	1.82	3.23	3.29	2.49	2.55	0.21	0.88	0.40	0.34



# Alt Model-Shift Uniqueness Test

010416779-04, P = 70.386539 Days, E = 88.344857 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
4.09	4.60	4.46	4.70	5.46	3.31	1.15	-0.38	-0.61	0.14	-0.10	0.98	0.65	0.51	0.89



### Stellar Parameters For KIC 010416779

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7751^{+214}_{-322}$	$3.889^{+0.273}_{-0.117}$	$-0.020^{+0.200}_{-0.350}$	$2.607^{+0.472}_{-0.877}$	$1.922^{+0.121}_{-0.412}$	$0.153^{+0.270}_{-0.053}$
	+3%/-4%	+7%/-3%	+1000%/-1750%	+18%/-34%	+6%/-21%	+176%/-35%
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 010416779-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-508 \pm 58$	$7.54^{+1.57}_{-1.61}$	$1181^{+76}_{-103}$	$6826^{+725}_{-514}$	$803^{+554}_{-243}$
Alt.	$-643 \pm 140$	$7.33^{+1.60}_{-1.50}$	$1171^{+85}_{-103}$	$7336^{+913}_{-745}$	$1100^{+661}_{-415}$

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

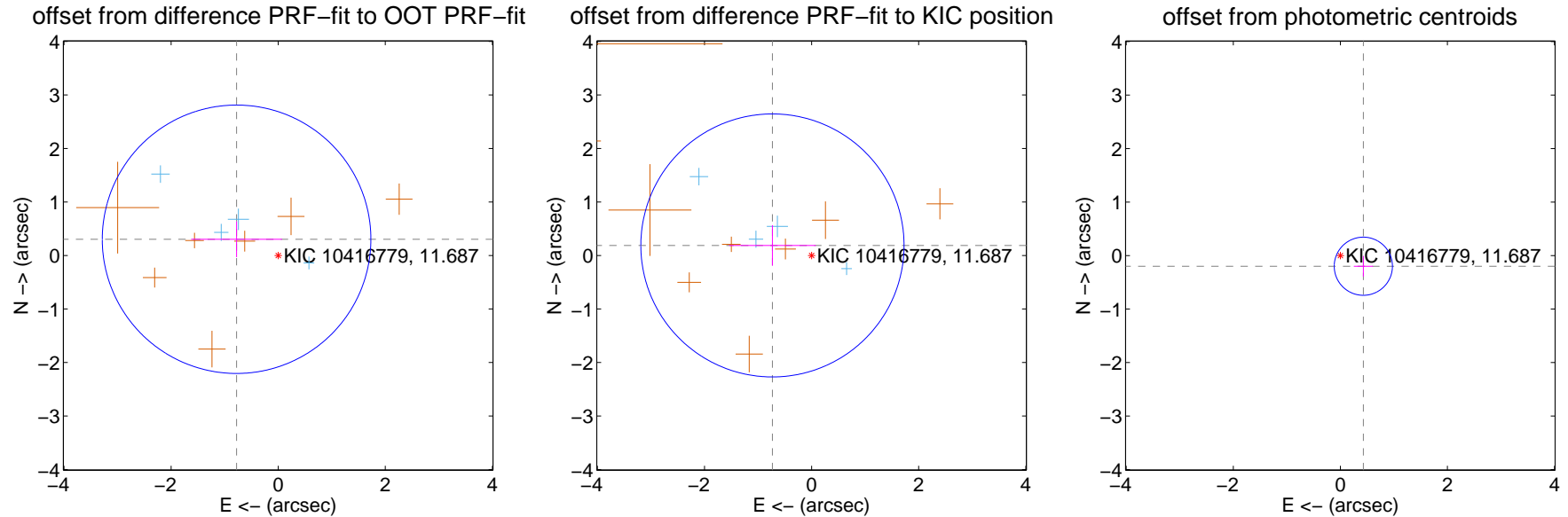
## DV Centroid Data

Supplemental centroid analysis for 010416779-04. **Kepler magnitude: 11.69.** Transit SNR 8.04

There are 4 quarters with good PRF difference image offsets

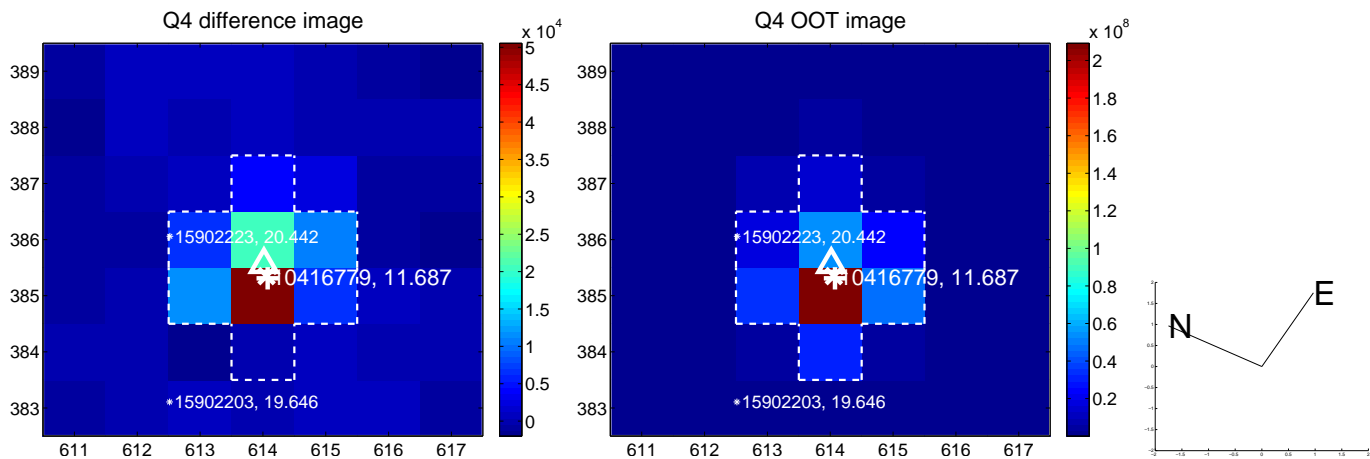
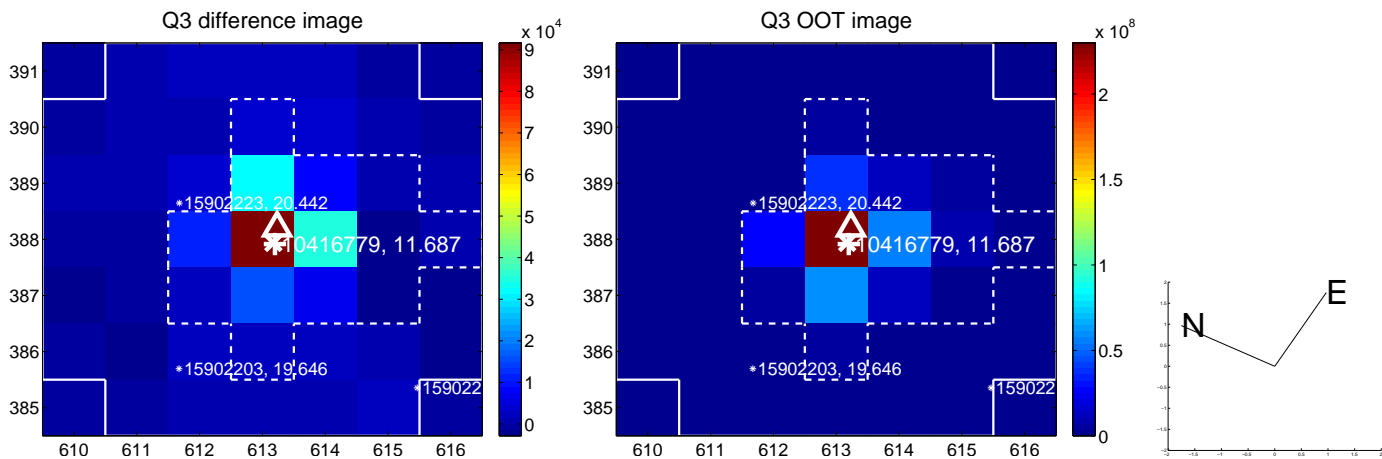
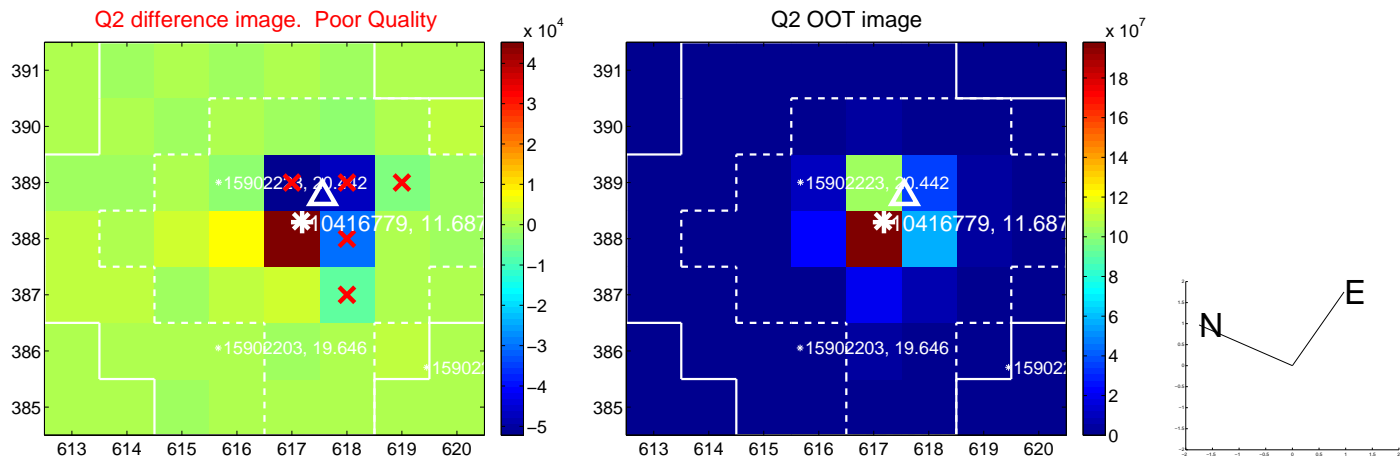
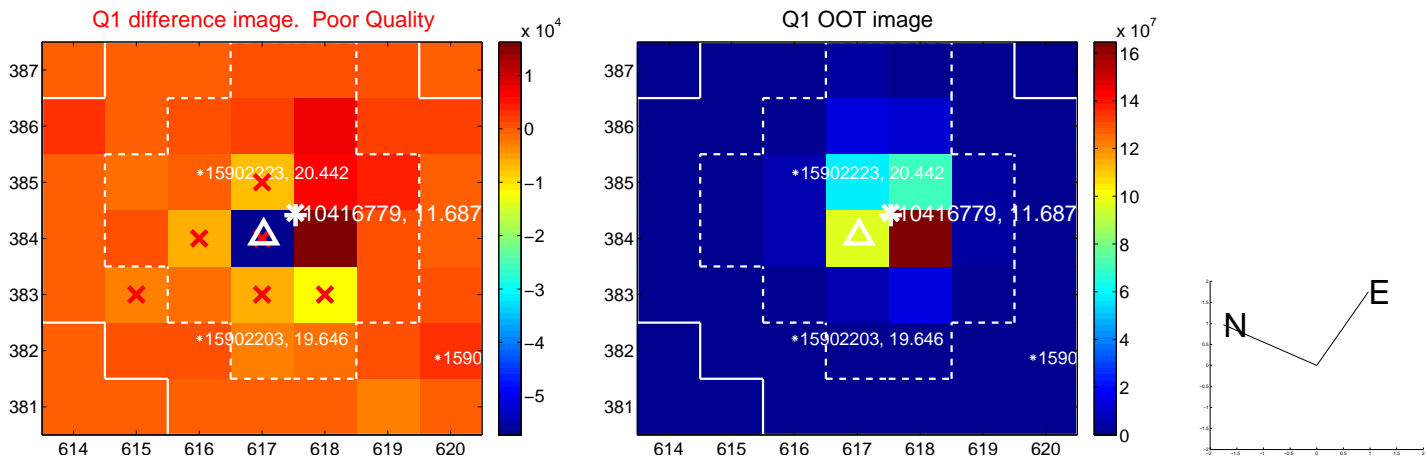
The direct PRF centroid is offset from the target star catalog position by about 0.20 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.834 \pm 0.836$	1.00	$0.777 \pm 0.848$	$0.303 \pm 0.334$
PRF-fit source offset from KIC position	$0.755 \pm 0.819$	0.92	$0.731 \pm 0.810$	$0.188 \pm 0.379$
photometric centroid source offset	$0.47 \pm 0.18$	2.61	$-0.43 \pm 0.18$	$-0.20 \pm 0.19$

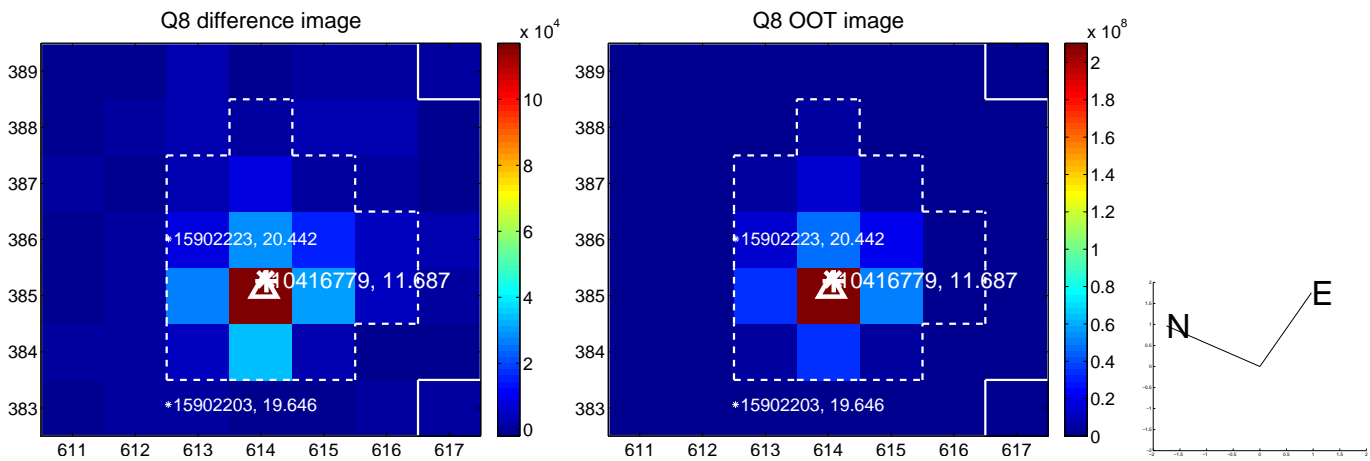
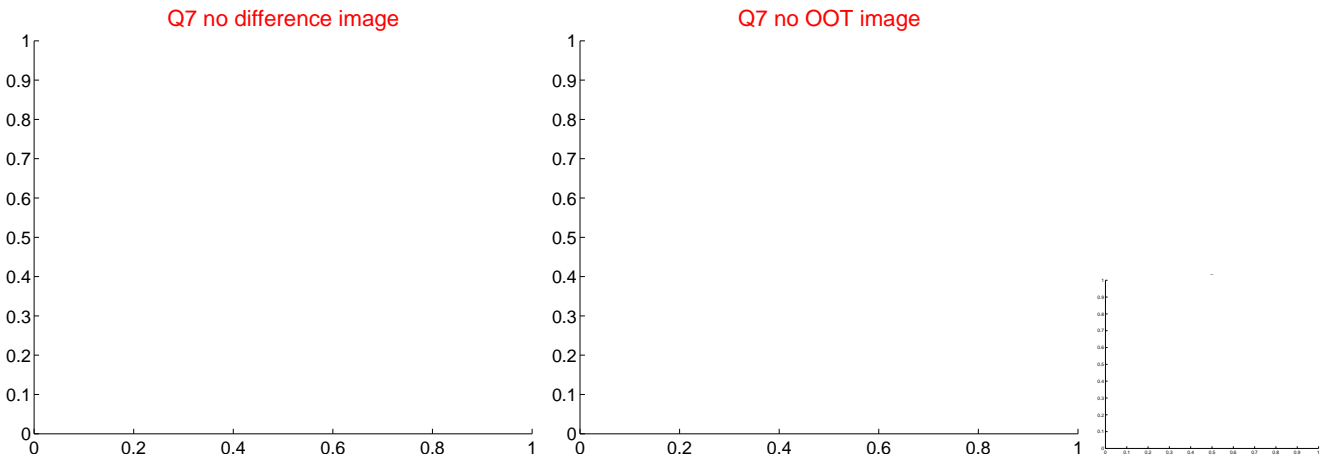
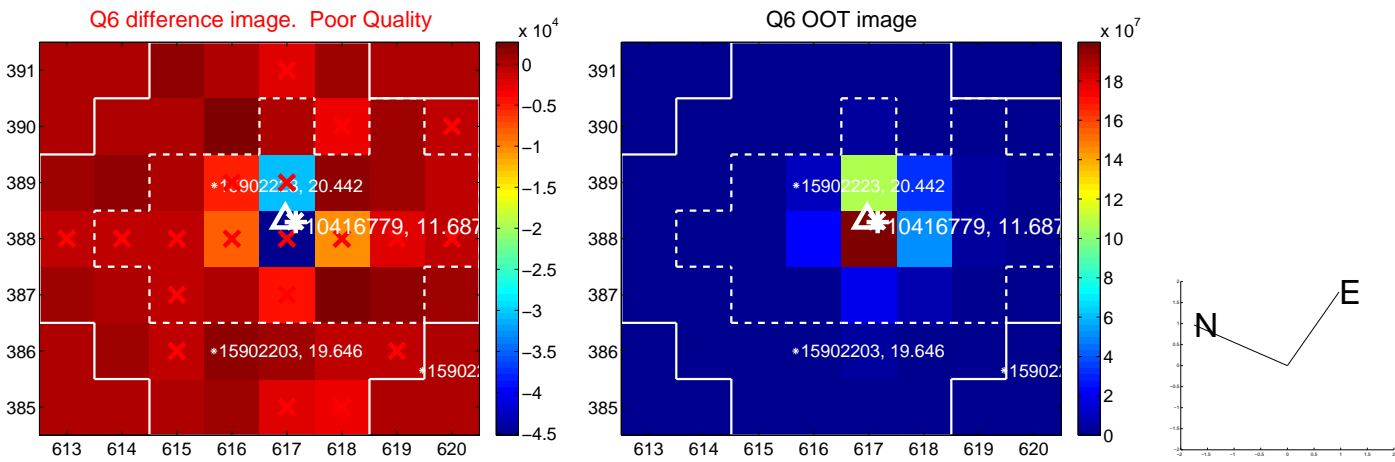
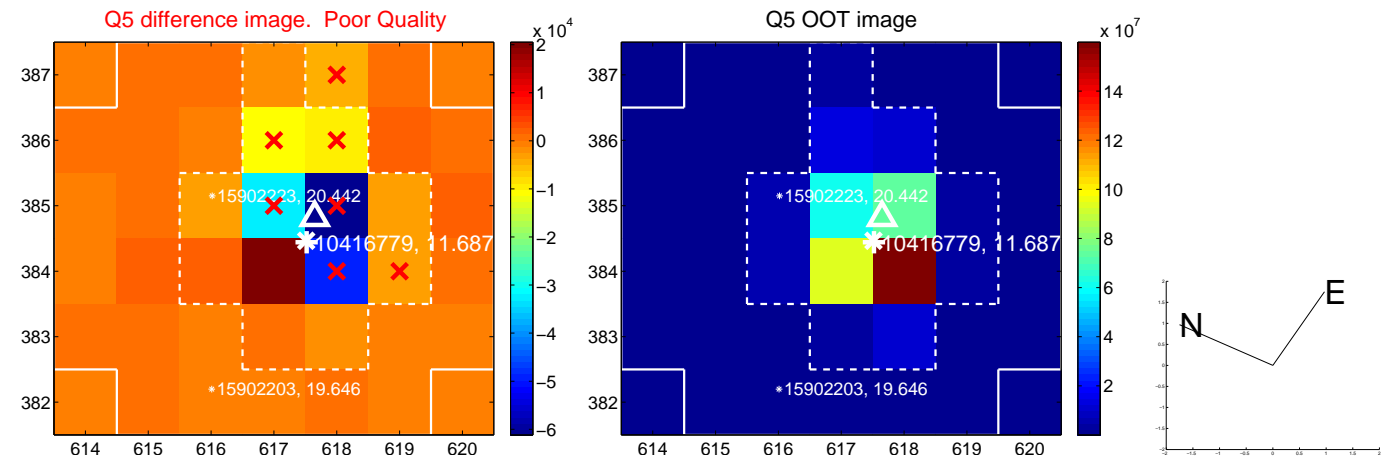


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

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

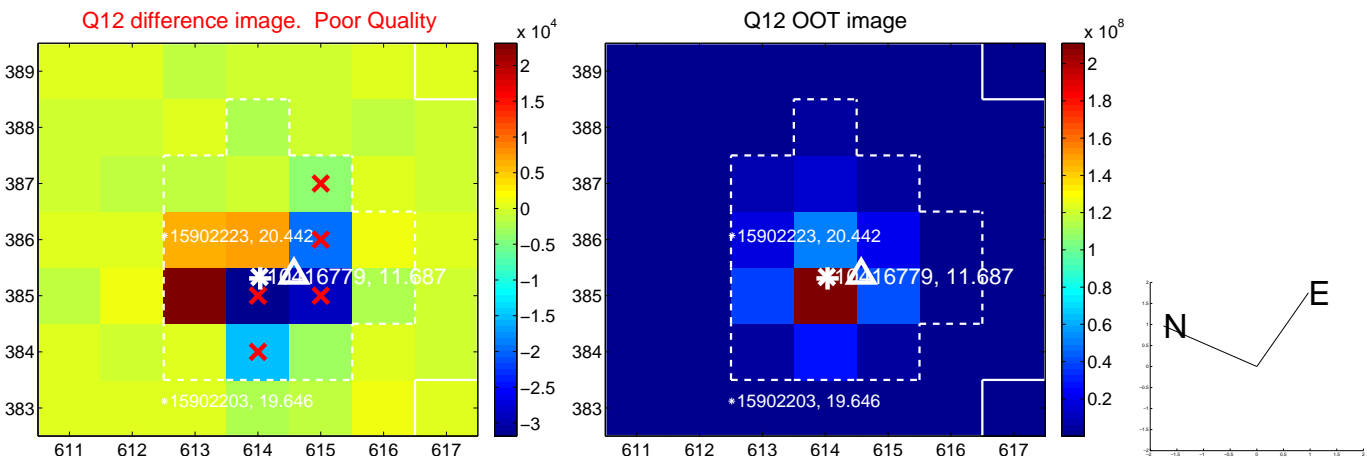
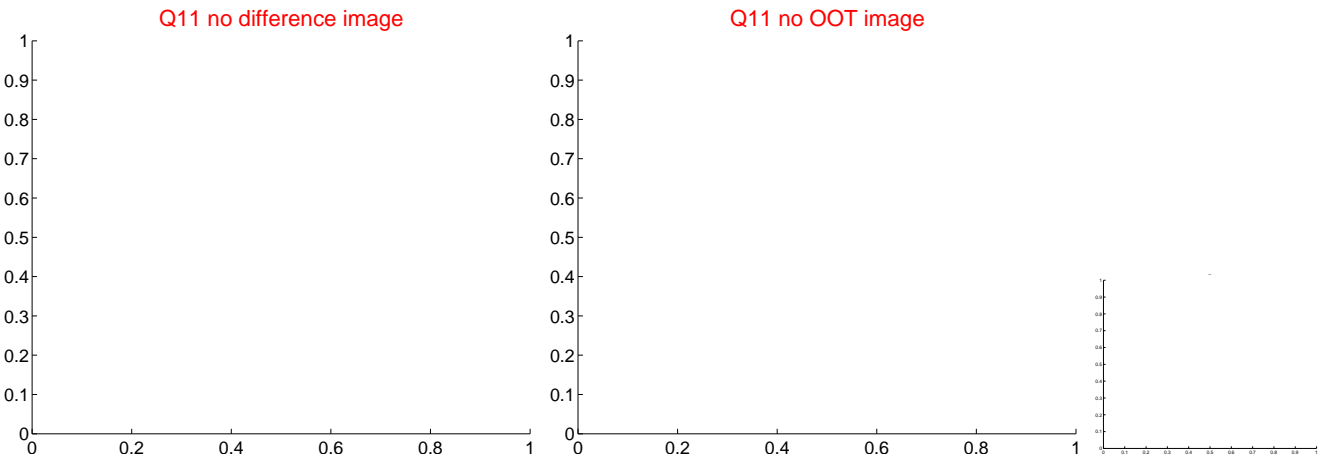
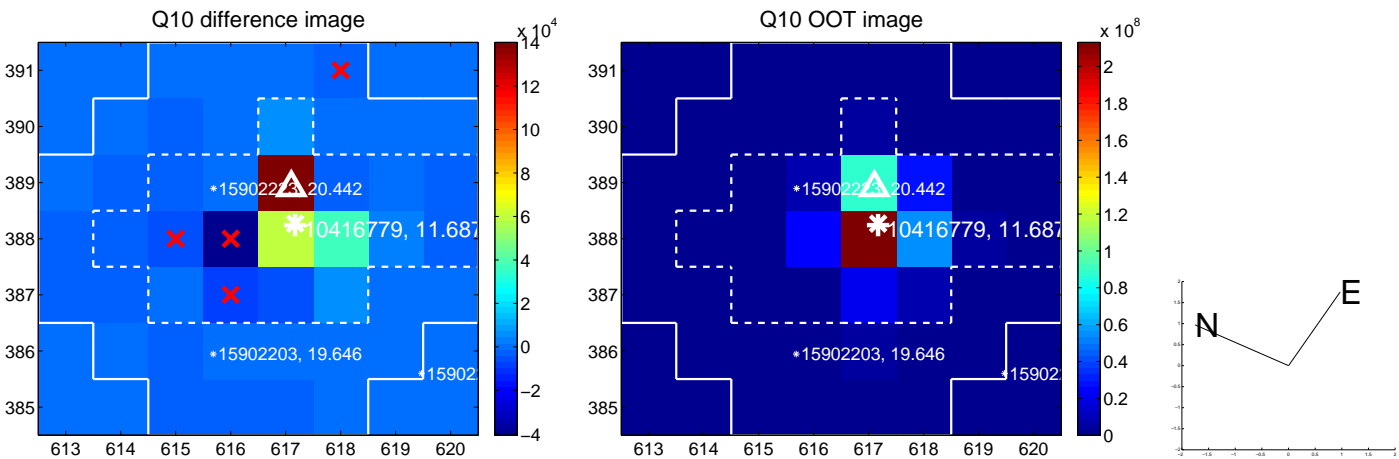
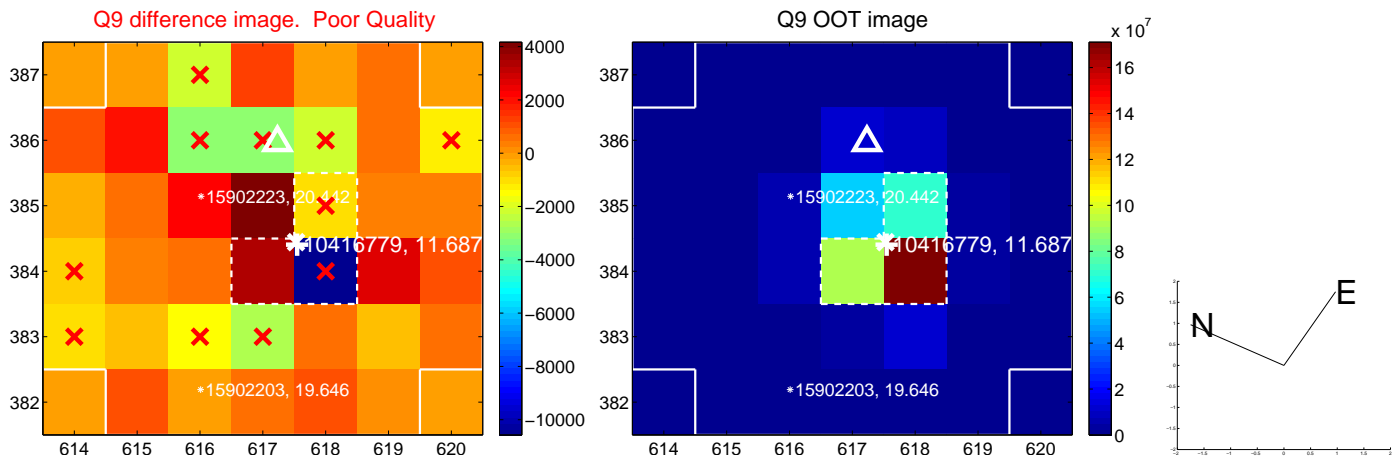


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

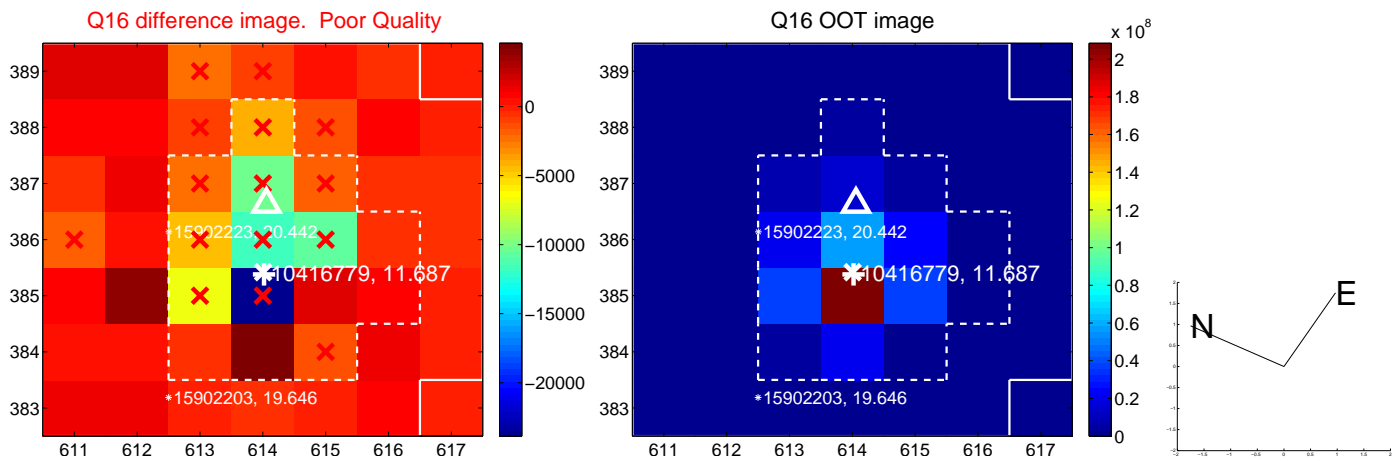
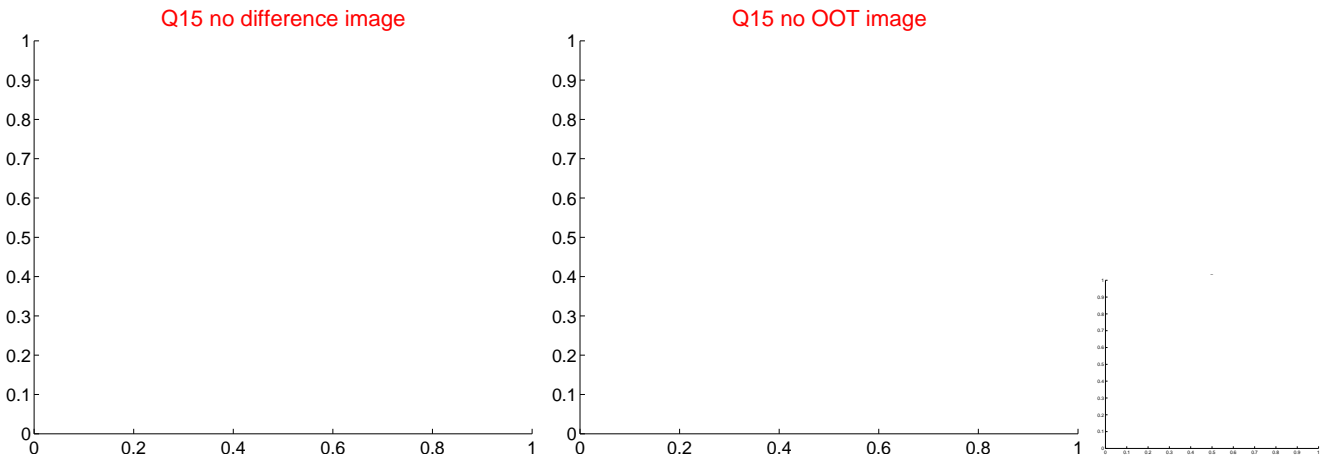
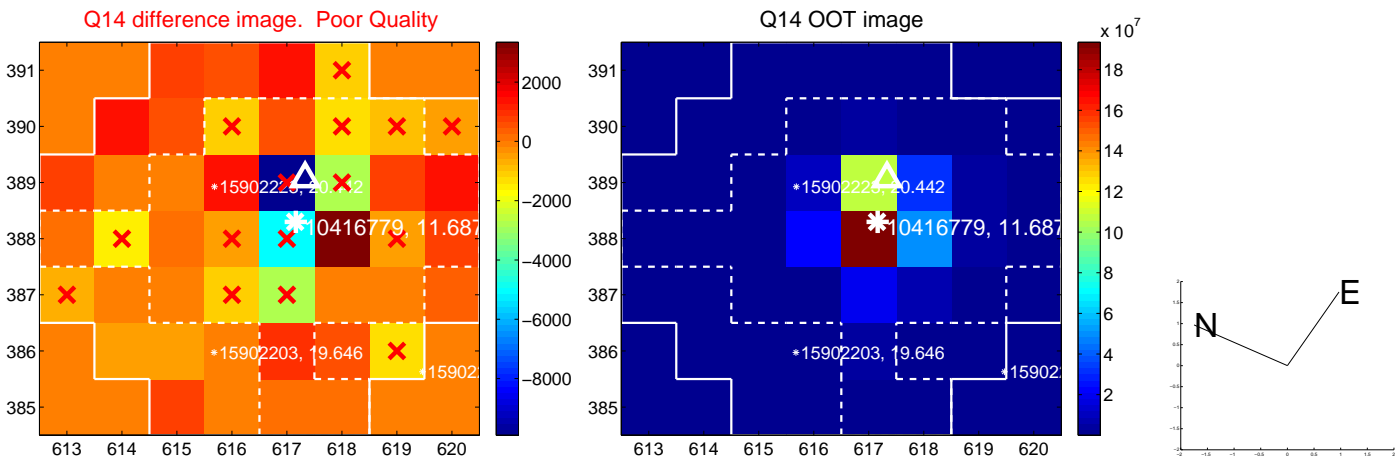
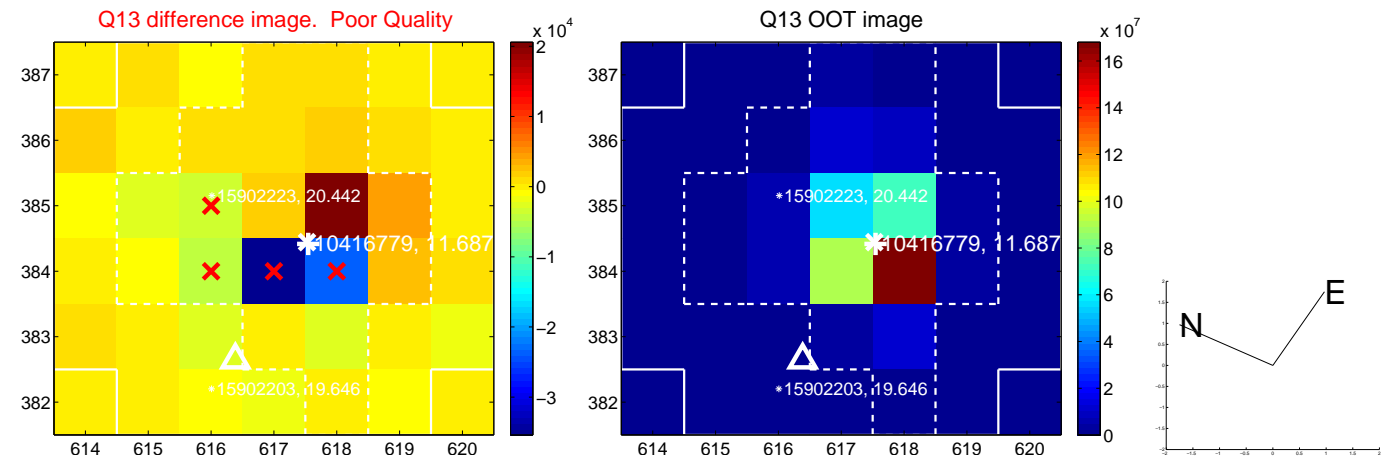




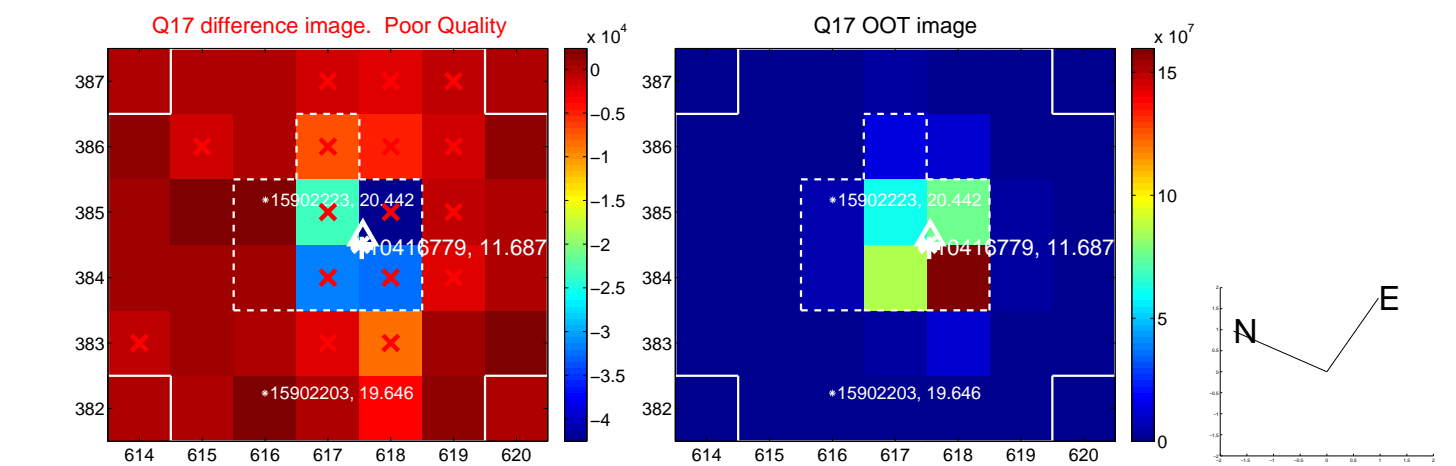
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



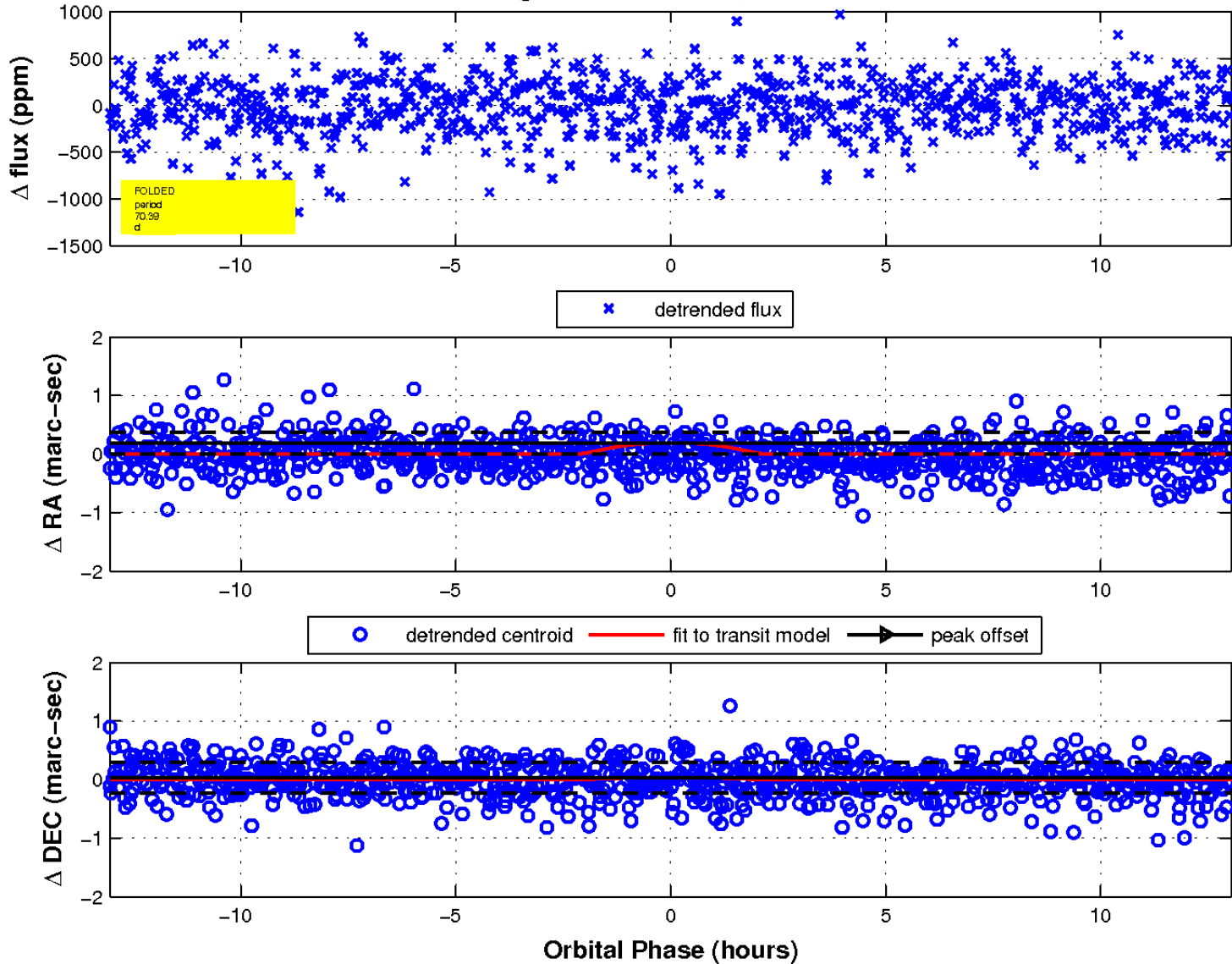
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

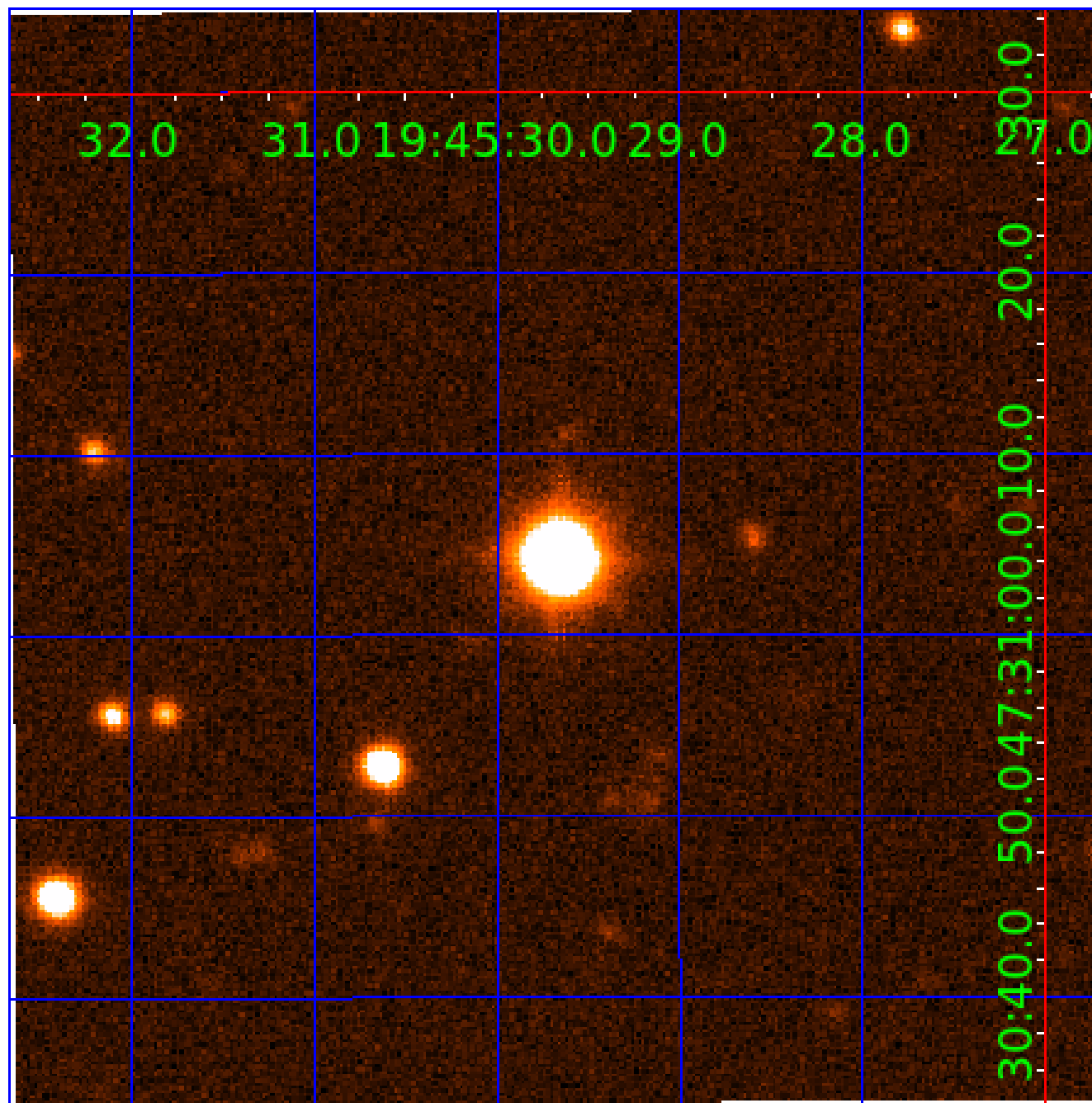


fluxWeightedCentroids, Planet 4 of 5



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Declination



# KIC 010416779

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010416779-01	OBS	No	0.763288	131.838551	37.9	3.006	11.1	9.8	2.61	7751	1.86	53231.43
010416779-02	OBS	No	0.763305	132.095228	47.5	2.885	9.3	12.3	2.61	7751	2.09	53229.80
010416779-03	OBS	No	291.432184	336.577583	617.2	9.933	9.3	7.9	2.61	7751	7.54	19.22
010416779-04	OBS	No	70.386449	158.763957	555.7	4.353	8.5	8.0	2.61	7751	7.83	127.77
010416779-05	OBS	No	2.692681	133.883826	130.3	6.531	10.0	10.6	2.61	7751	3.49	9912.26

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010416779-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
010416779-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD
010416779-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS—HALO_GHOST
010416779-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
010416779-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT

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

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

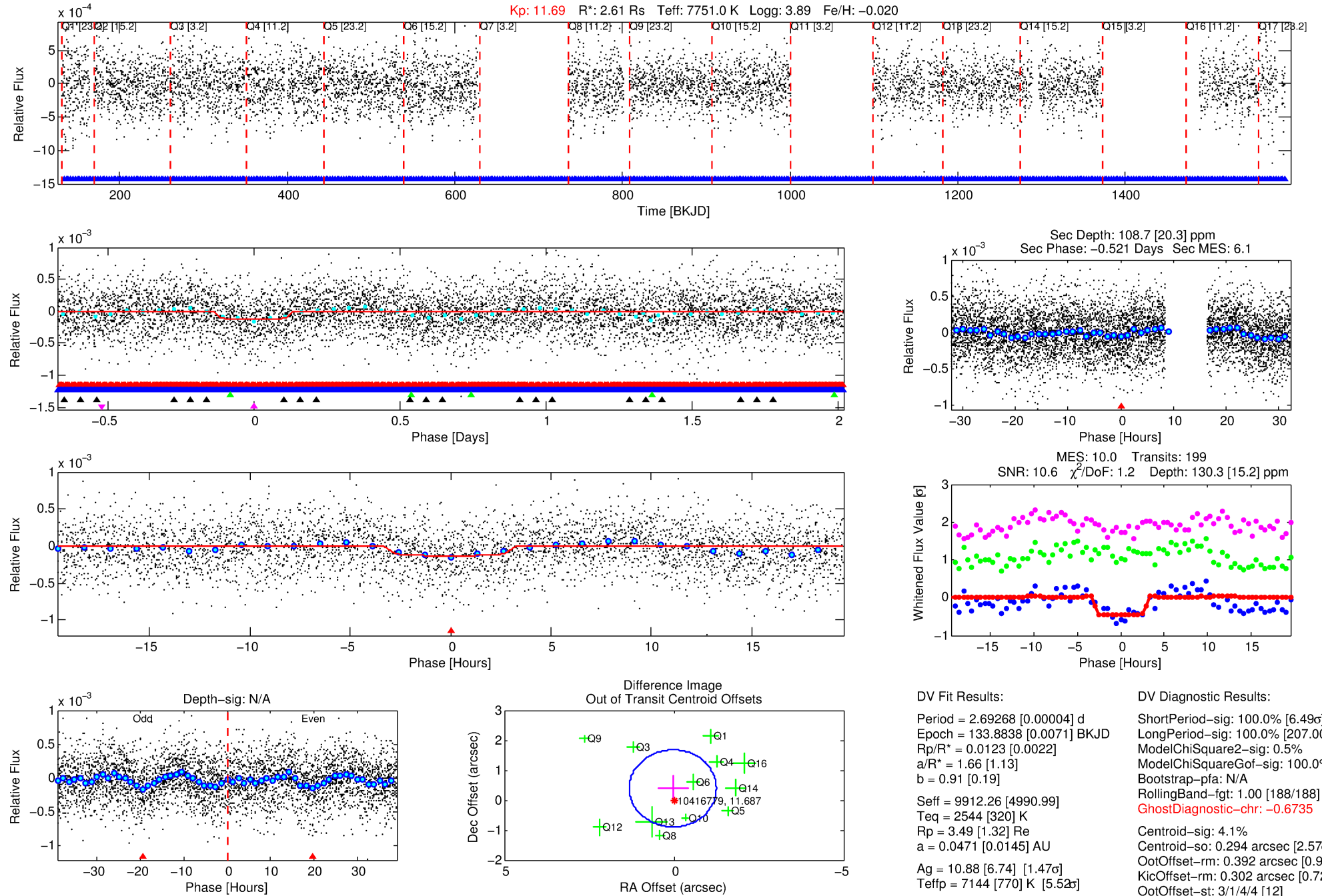
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010416779-05

No Significant Match Found

# DV One-Page Summary

KIC: 10416779 Candidate: 5 of 5 Period: 2.693 d



## DV Fit Results:

Period = 2.69268 [0.00004] d  
Epoch = 133.8838 [0.0071] BKJD  
Rp/R\* = 0.0123 [0.0022]  
a/R\* = 1.66 [1.13]  
b = 0.91 [0.19]  
Seff = 9912.26 [4990.99]  
Teq = 2544 [320] K  
Rp = 3.49 [1.32] Re  
a = 0.0471 [0.0145] AU  
Ag = 10.88 [6.74] [1.47 $\sigma$ ]  
Teffp = 7144 [770] K [5.52 $\sigma$ ]

## DV Diagnostic Results:

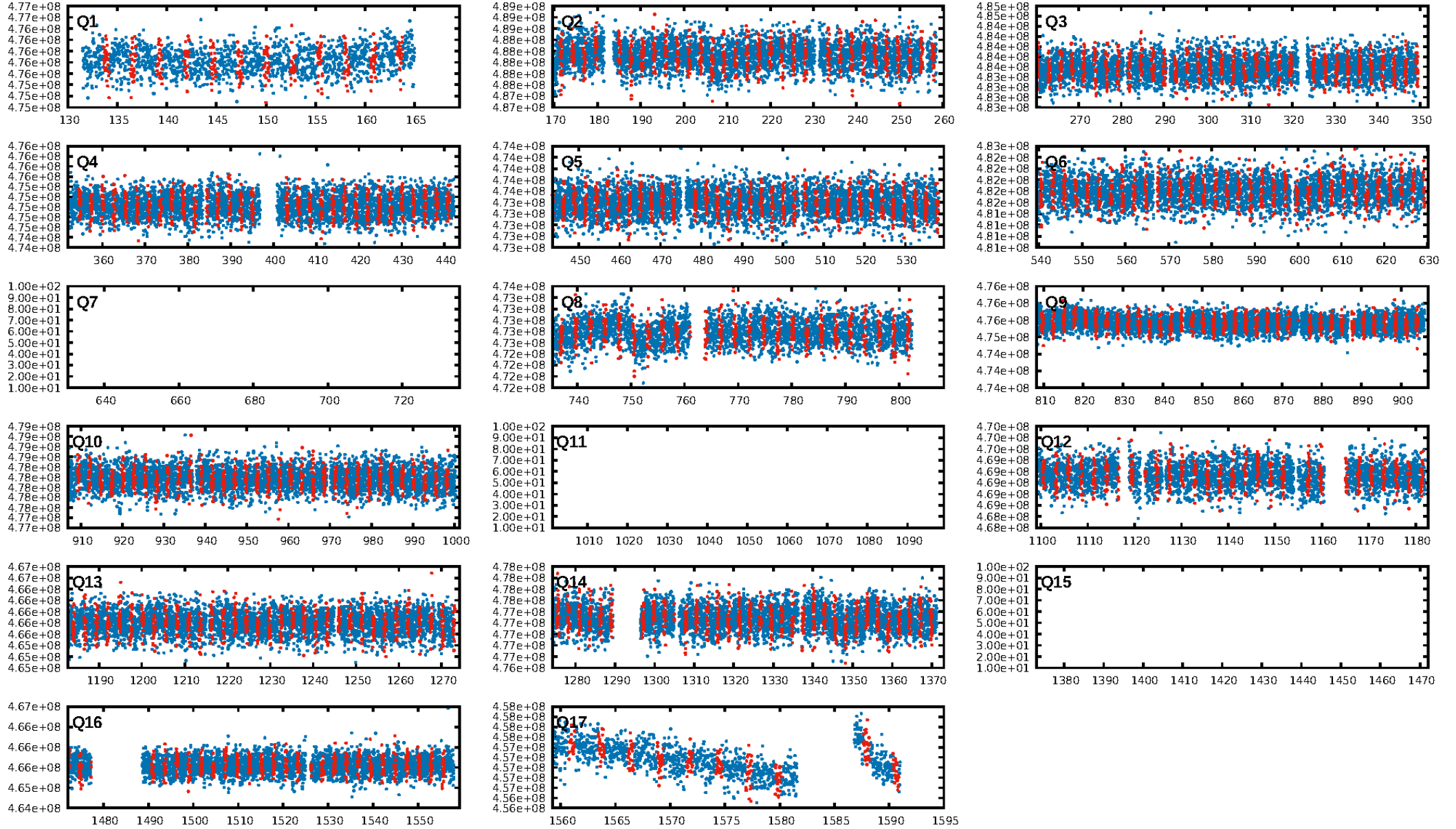
ShortPeriod-sig: 100.0% [6.49 $\sigma$ ]  
LongPeriod-sig: 100.0% [207.00 $\sigma$ ]  
ModelChiSquare2-sig: 0.5%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [188/188]  
GhostDiagnostic-chr: -0.6735  
Centroid-sig: 4.1%  
Centroid-so: 0.294 arcsec [2.57 $\sigma$ ]  
OotOffset-rm: 0.392 arcsec [0.91 $\sigma$ ]  
KicOffset-rm: 0.302 arcsec [0.72 $\sigma$ ]  
OotOffset-st: 3/1/4/4 [12]  
KicOffset-st: 3/1/4/4 [12]  
DiffImageQuality-fgm: 0.83 [10/12]  
DiffImageOverlap-fno: 0.00 [0/14]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:55:46 Z

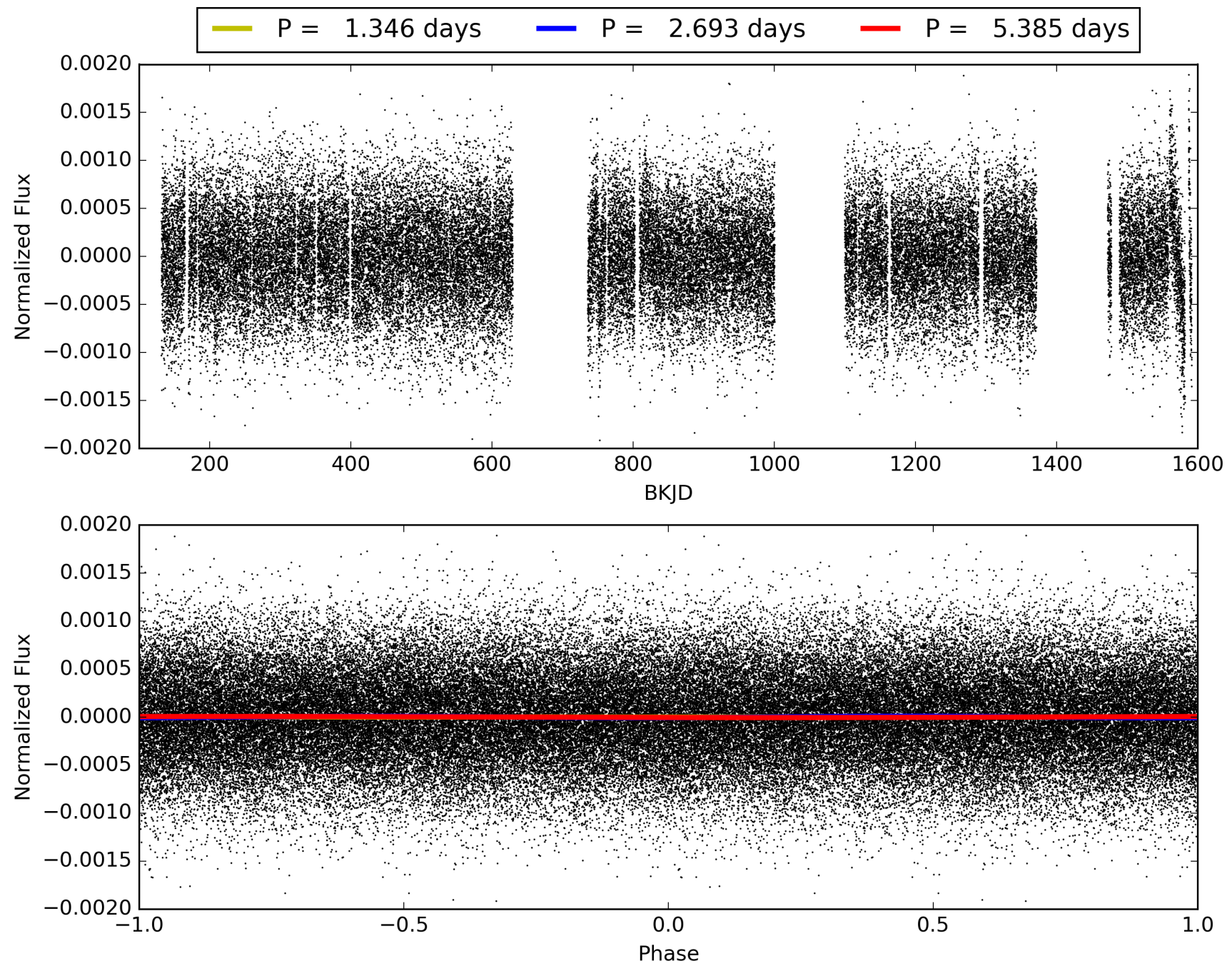
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 010416779-05, PDC Light Curves

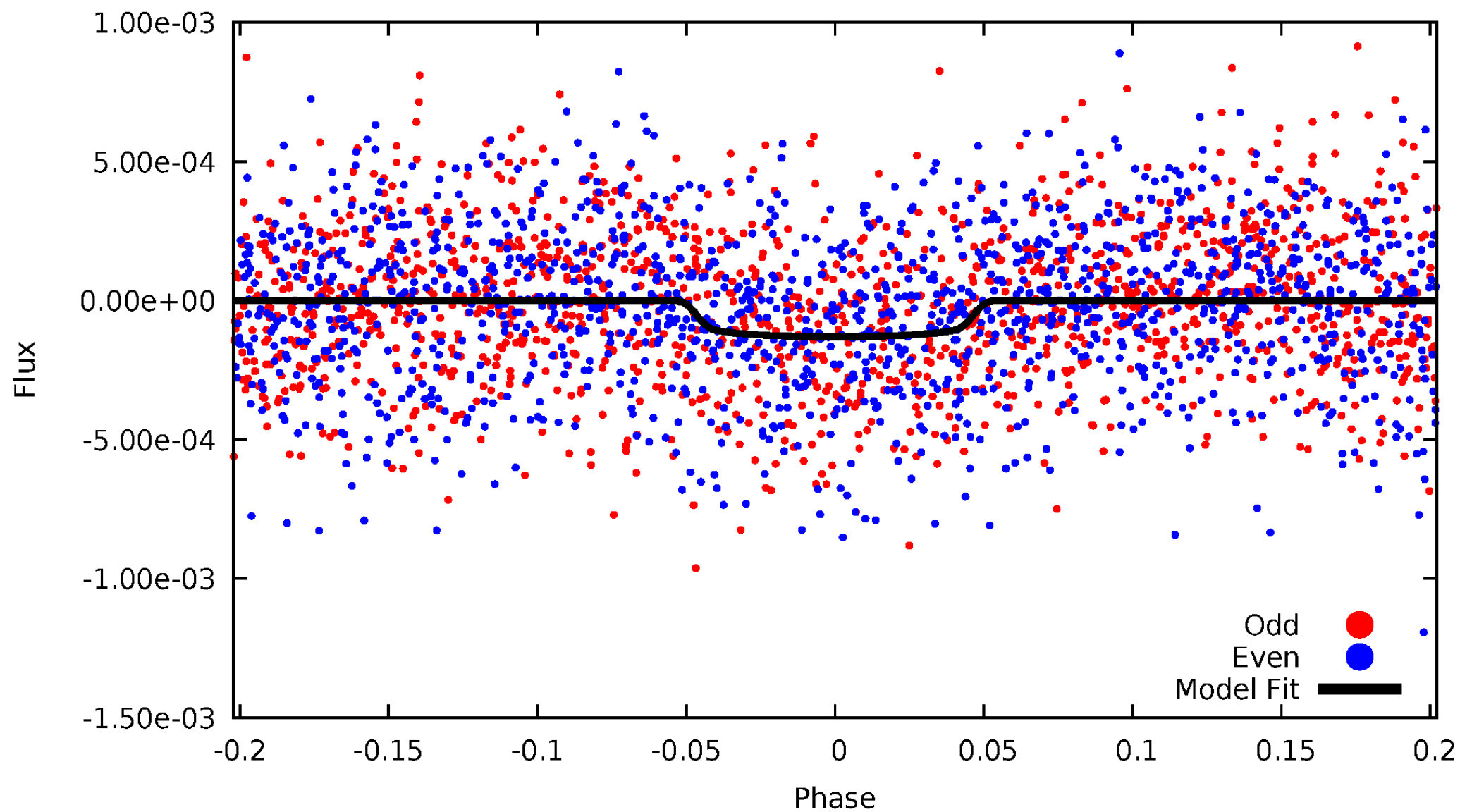


TCE 010416779-05



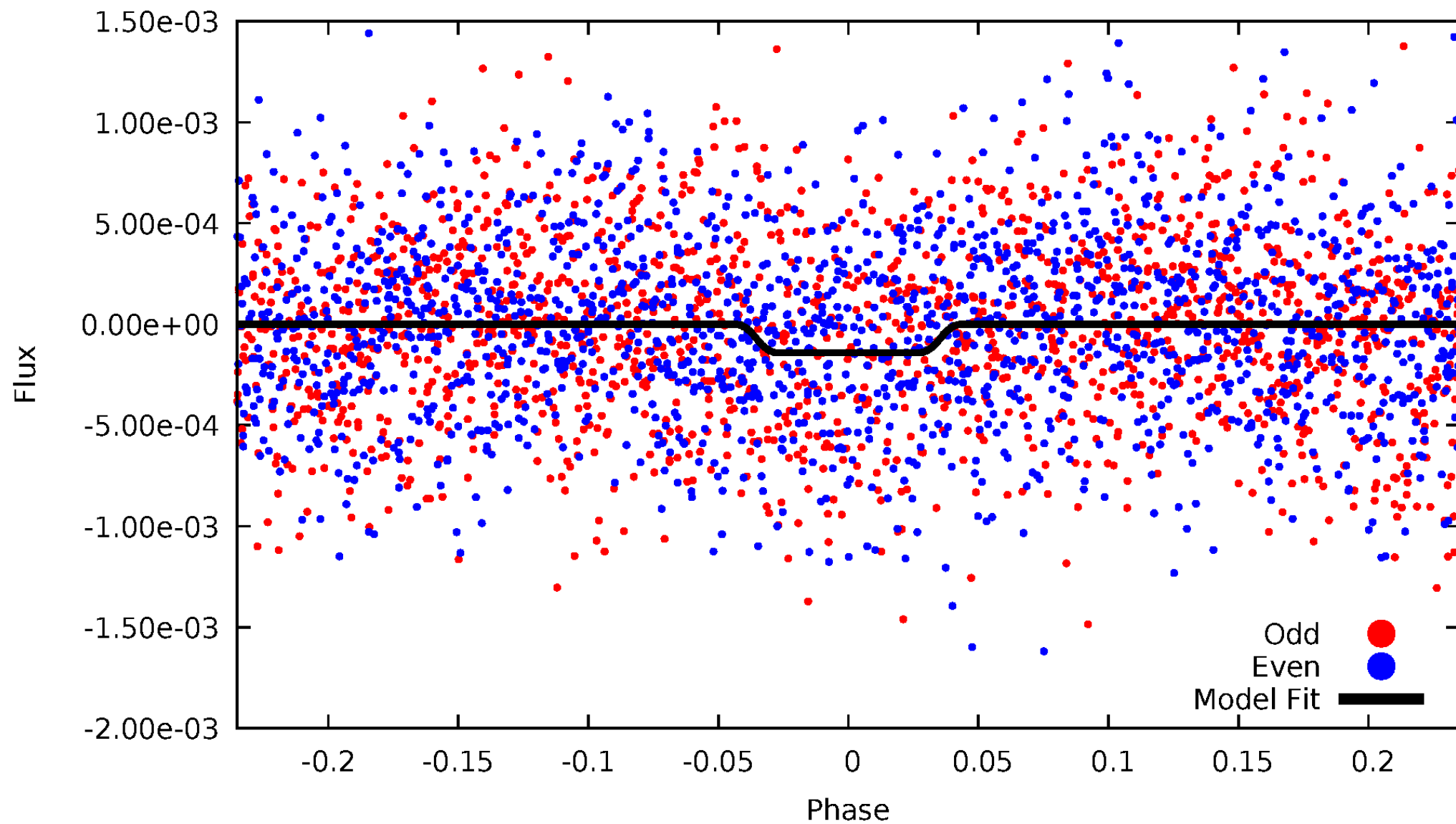
# DV Odd/Even

TCE 010416779-05



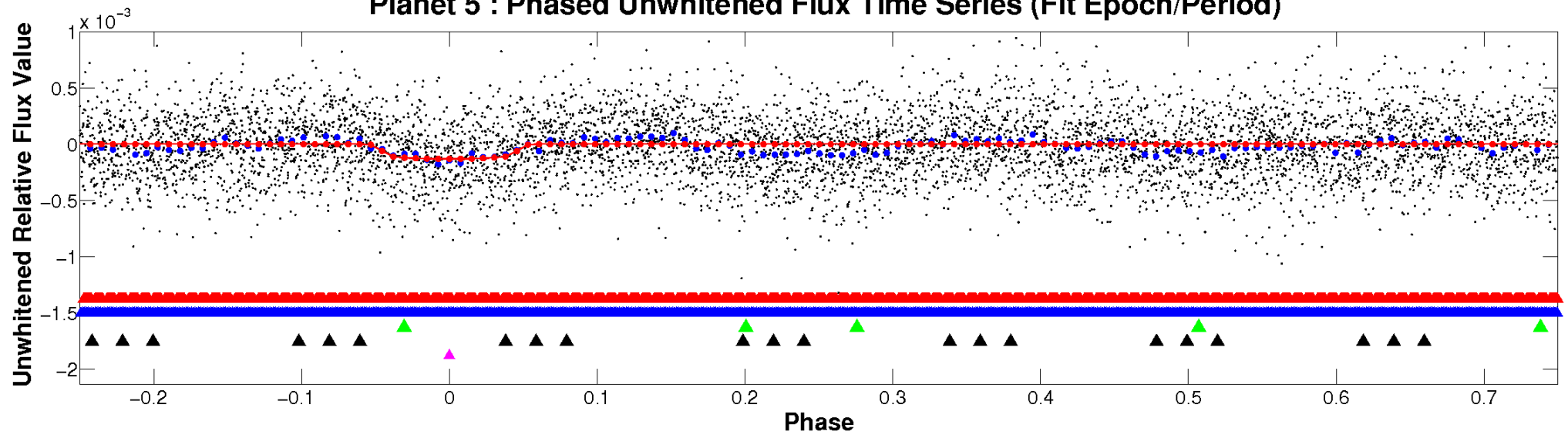
# ALT Odd/Even

TCE 010416779-05

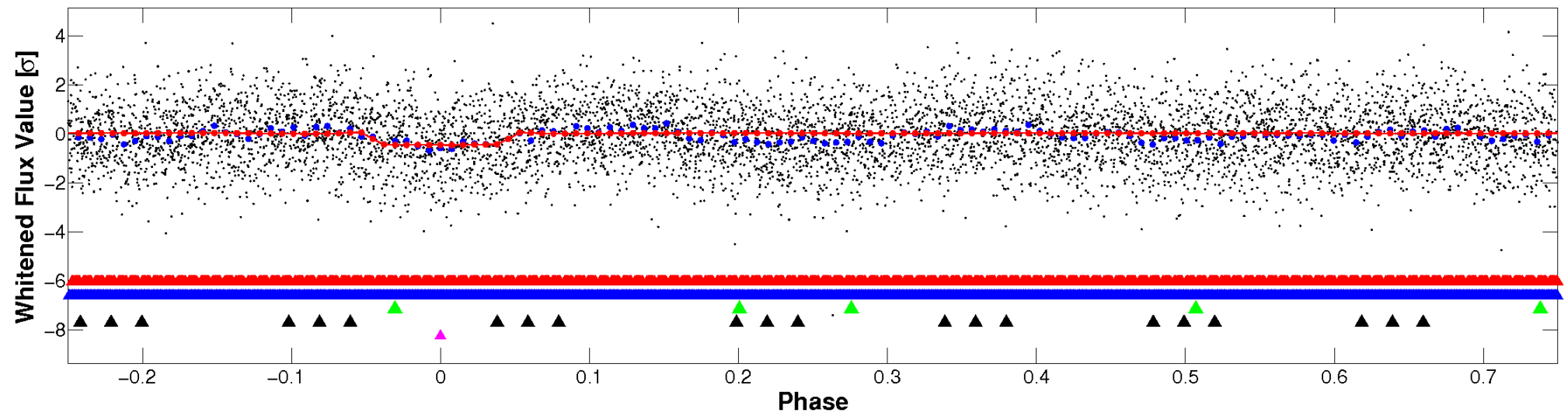


# Non-Whitened Vs. Whitened Light Curve

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



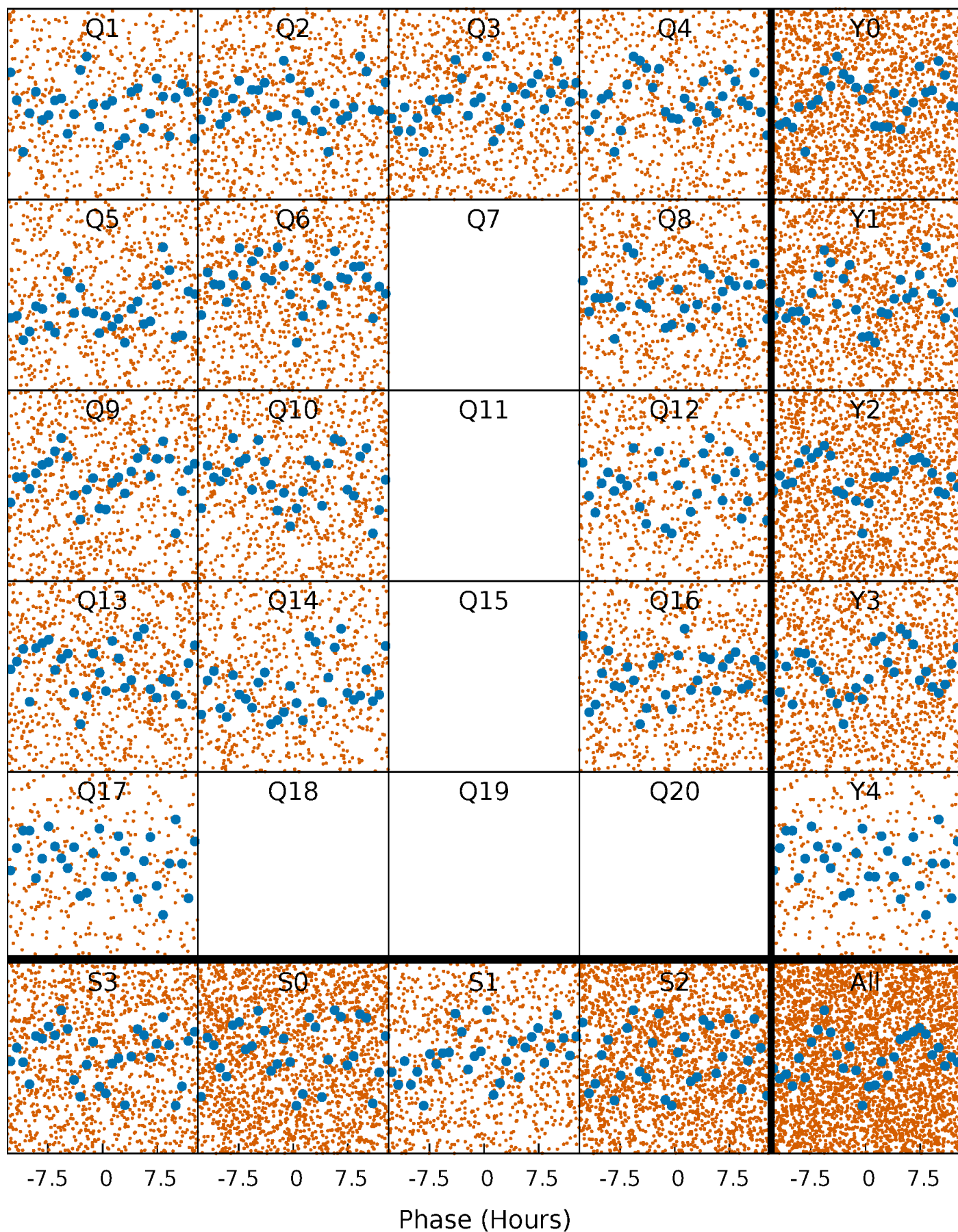
## Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)





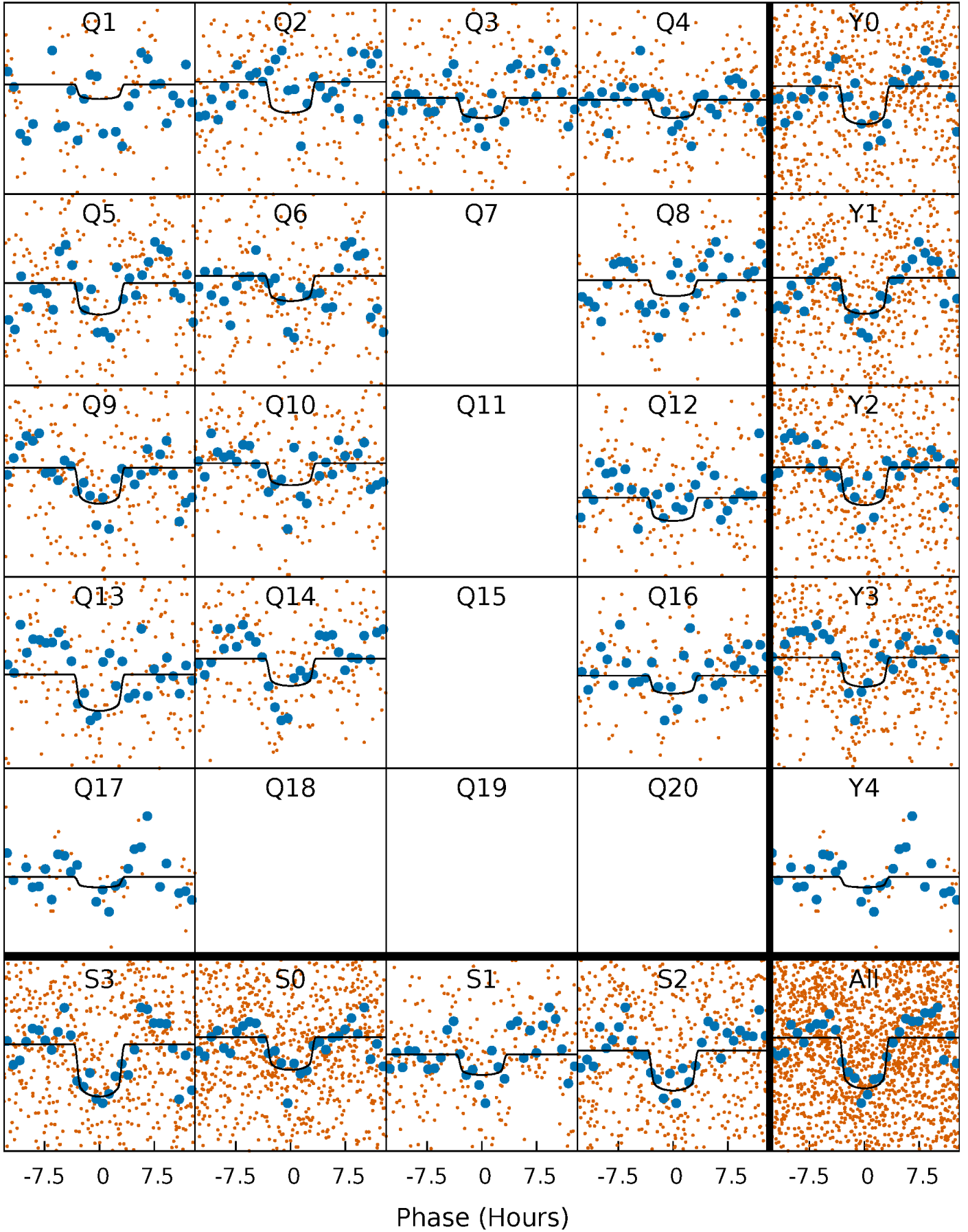
# PDC Quarter-Phased Transit Curves

TCE 010416779-05 P= 2.692681 Days  $T_0=133.883826$  (BKJD)



# DV Quarter-Phased Transit Curves

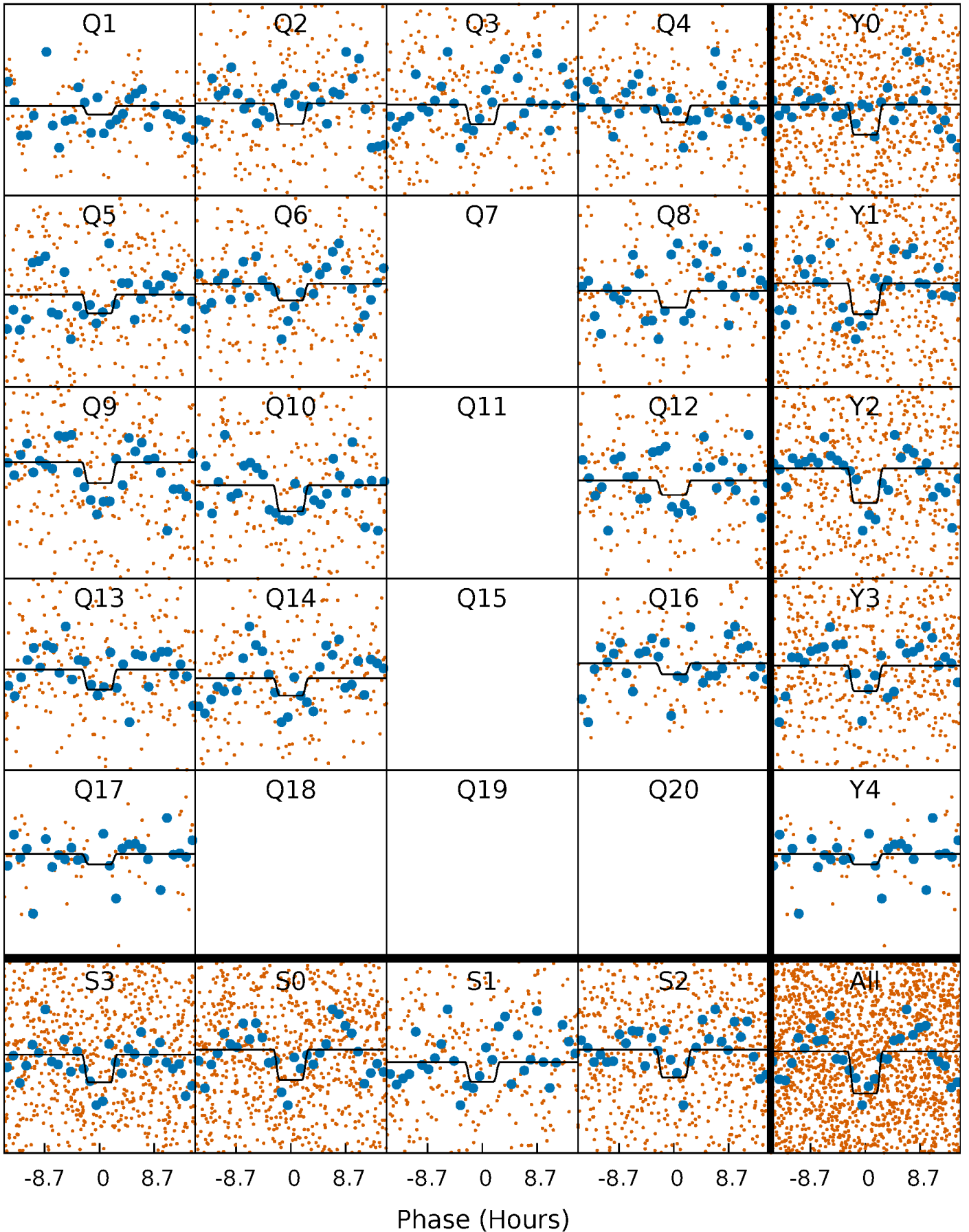
TCE 010416779-05   P= 2.692681 Days    $T_0=133.883826$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

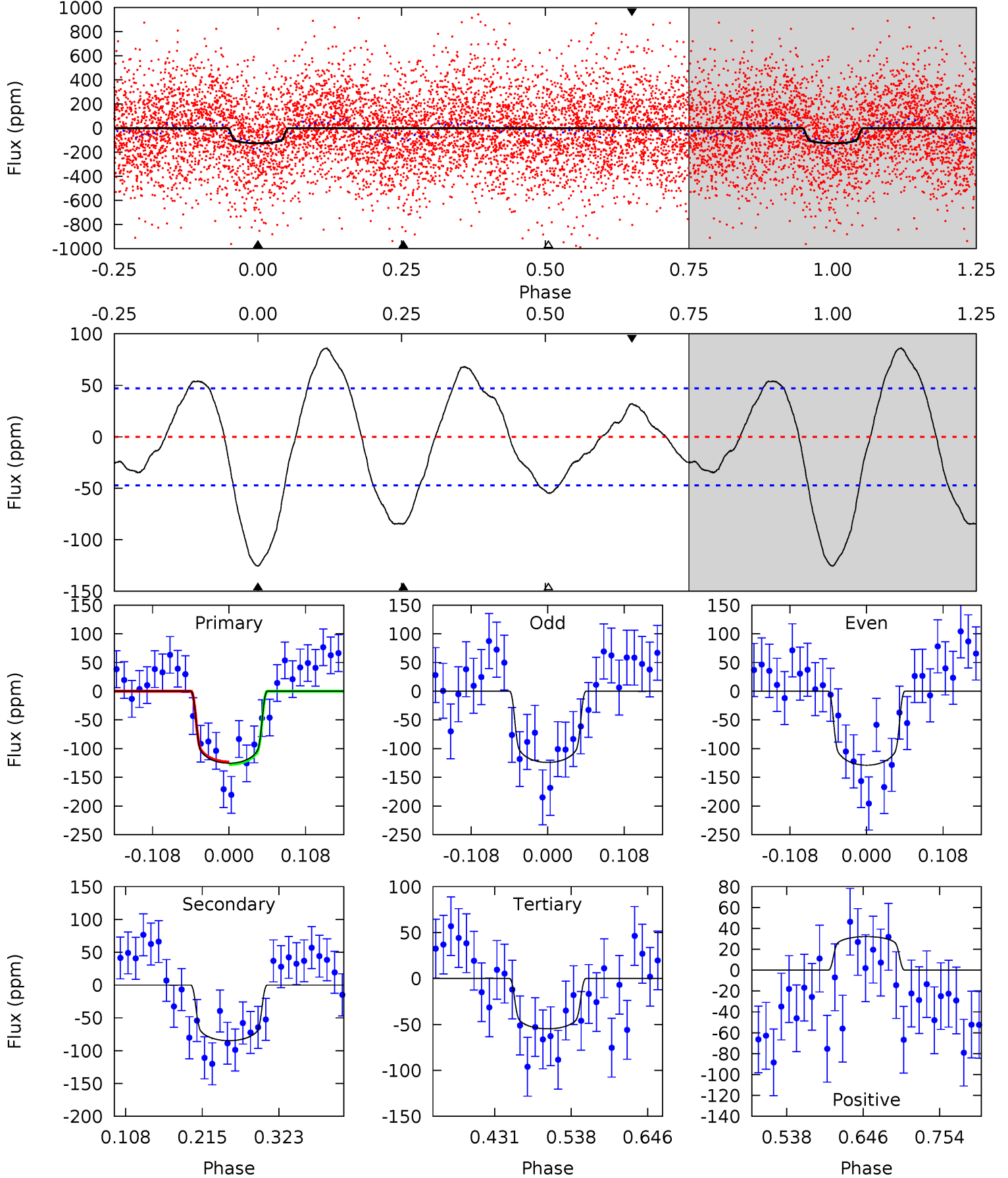
TCE 010416779-05     $P = 2.692448$  Days     $T_0 = 133.948956$  (BKJD)



# DV Model-Shift Uniqueness Test

010416779-05, P = 2.692681 Days, E = 131.191145 Days

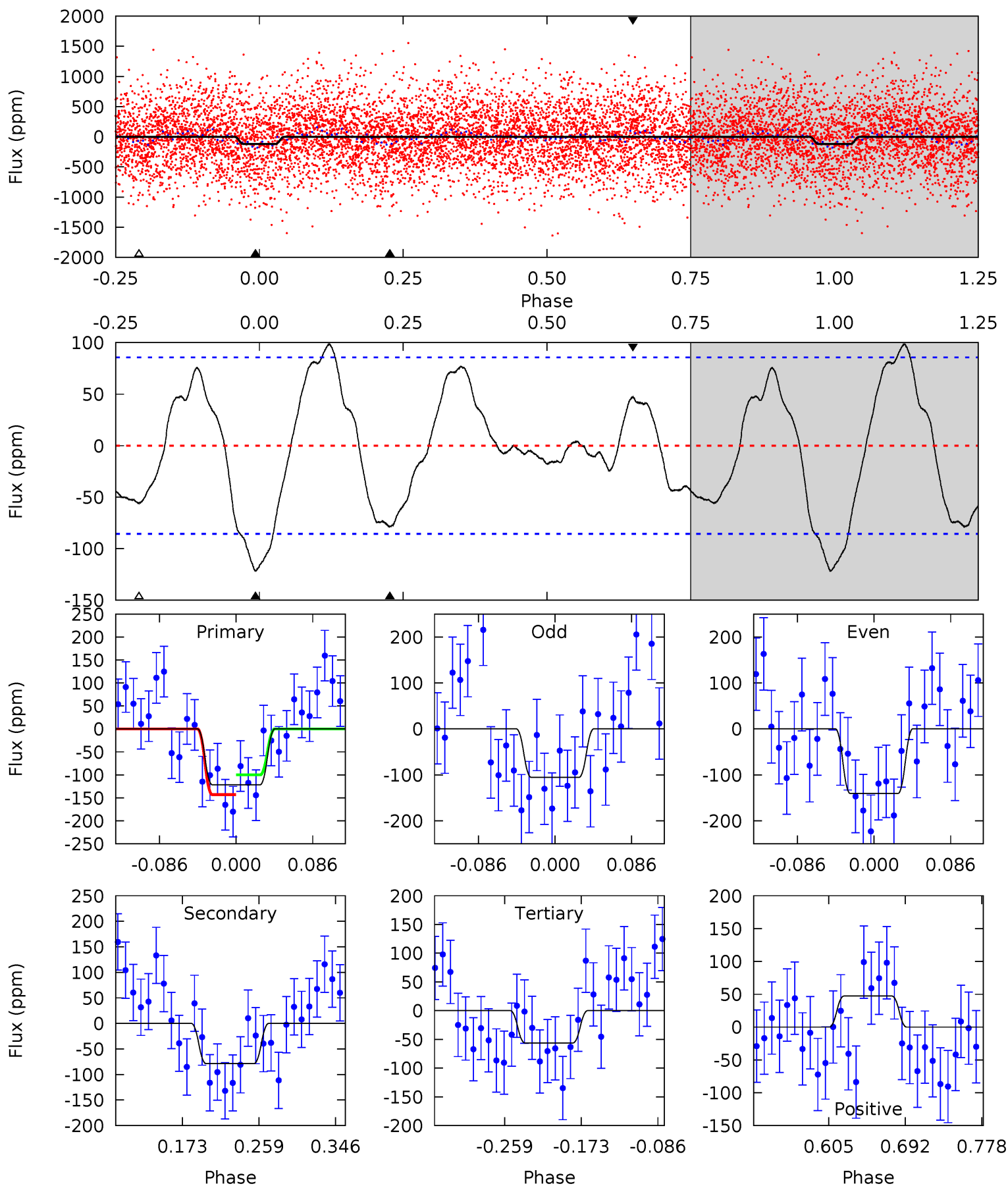
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.1	8.18	5.29	3.10	4.55	1.61	3.46	6.82	9.01	2.89	5.08	0.23	0.97	0.41	0.22



# Alt Model-Shift Uniqueness Test

010416779-05, P = 2.692448 Days, E = 131.256508 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
6.52	4.22	3.01	2.54	4.60	1.71	2.26	3.50	3.98	1.21	1.69	0.94	1.27	0.45	1.15



### Stellar Parameters For KIC 010416779

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7751^{+214}_{-322}$	$3.889^{+0.273}_{-0.117}$	$-0.020^{+0.200}_{-0.350}$	$2.607^{+0.472}_{-0.877}$	$1.922^{+0.121}_{-0.412}$	$0.153^{+0.270}_{-0.053}$
	+3%/-4%	+7%/-3%	+1000%/-1750%	+18%/-34%	+6%/-21%	+176%/-35%
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 010416779-05 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-85 \pm 10$	$3.31^{+0.88}_{-0.77}$	$3501^{+234}_{-313}$	$6494^{+786}_{-608}$	$9.130^{+6.631}_{-3.269}$
Alt.	$-79 \pm 19$	$3.18^{+0.76}_{-0.71}$	$3481^{+238}_{-299}$	$6496^{+861}_{-710}$	$9.388^{+6.685}_{-3.741}$

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

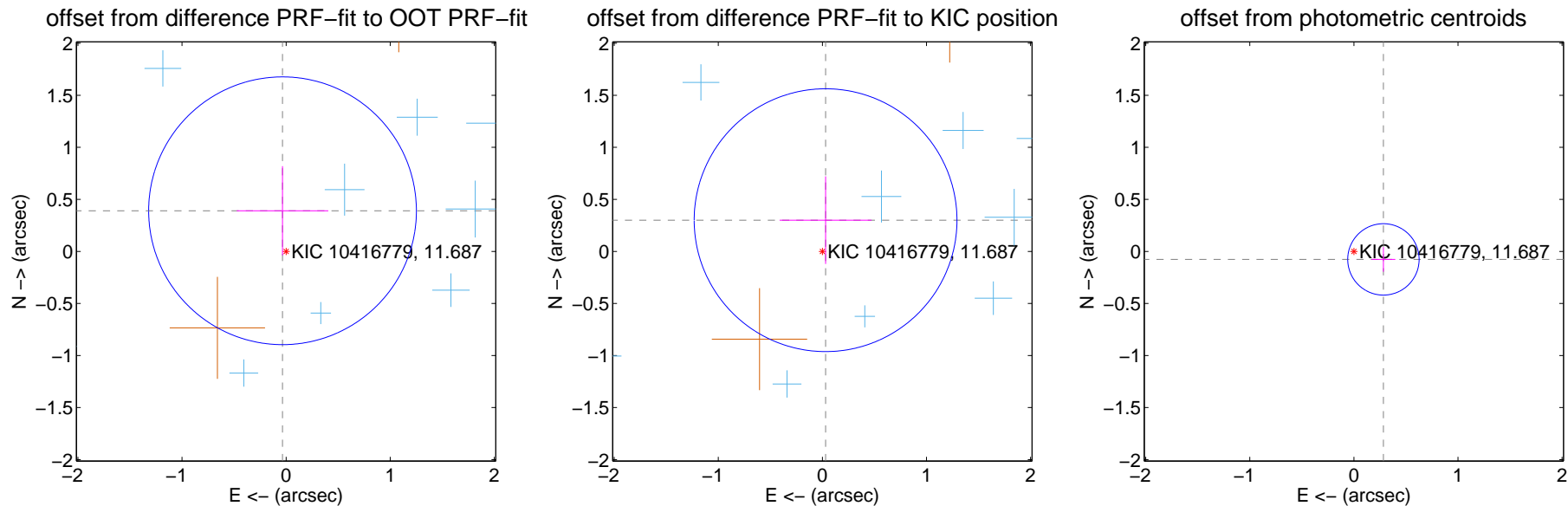
## DV Centroid Data

Supplemental centroid analysis for 010416779-05. **Kepler magnitude: 11.69.** Transit SNR 10.62

There are 10 quarters with good PRF difference image offsets

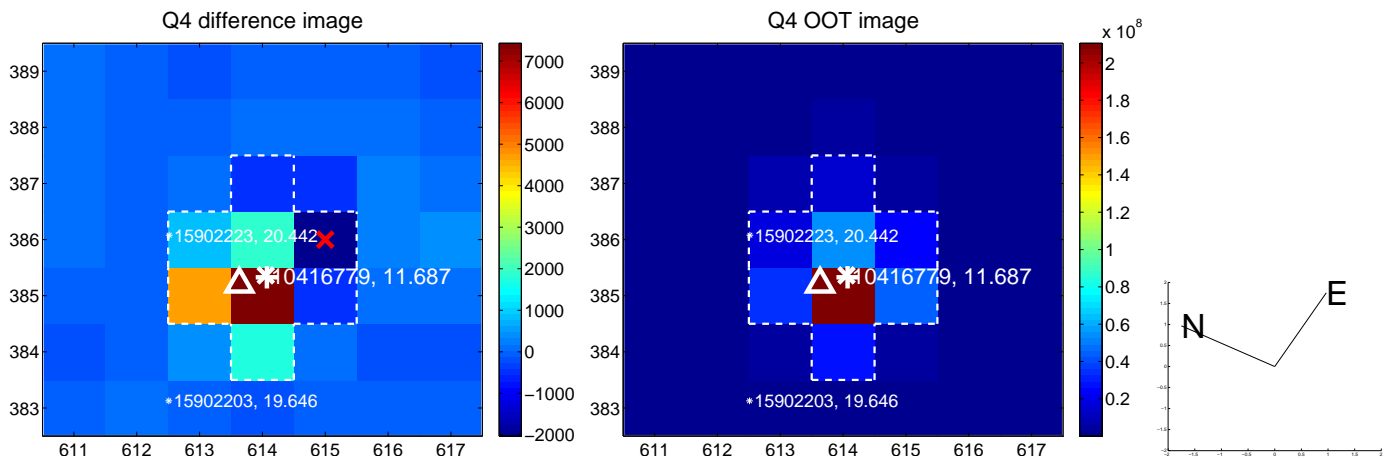
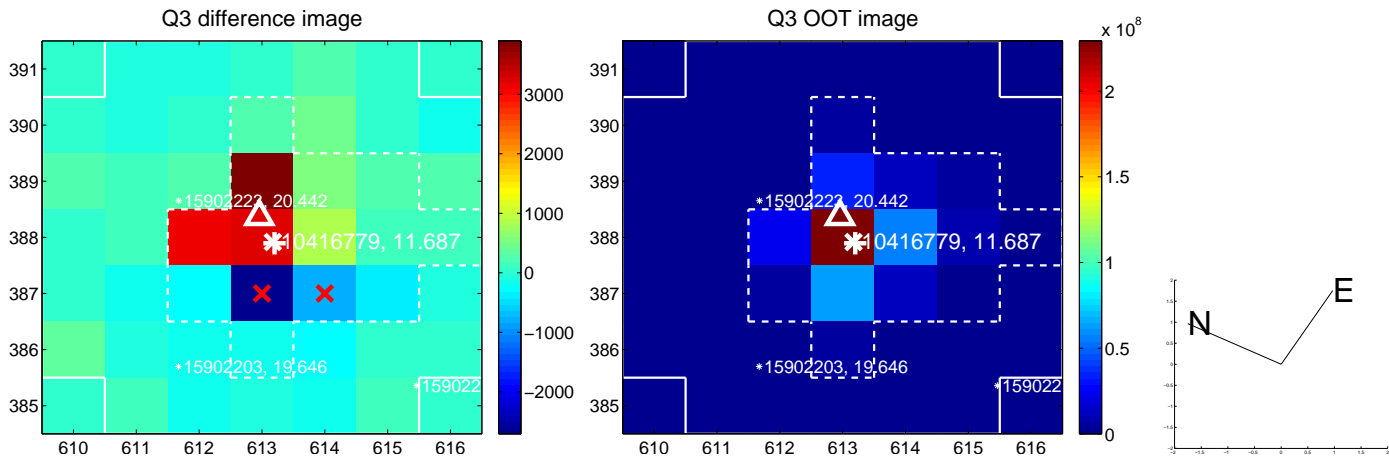
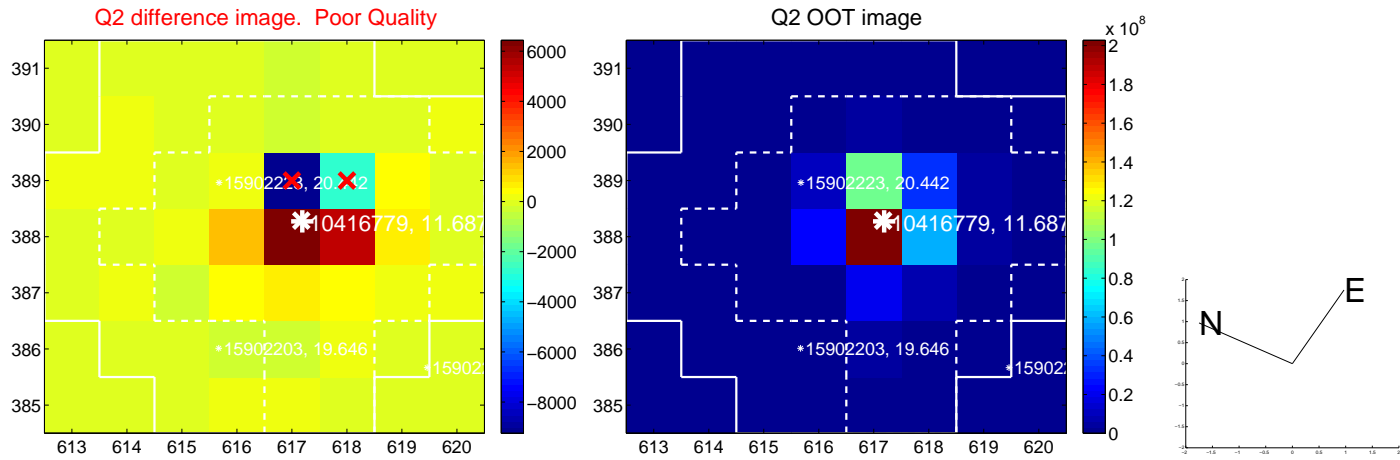
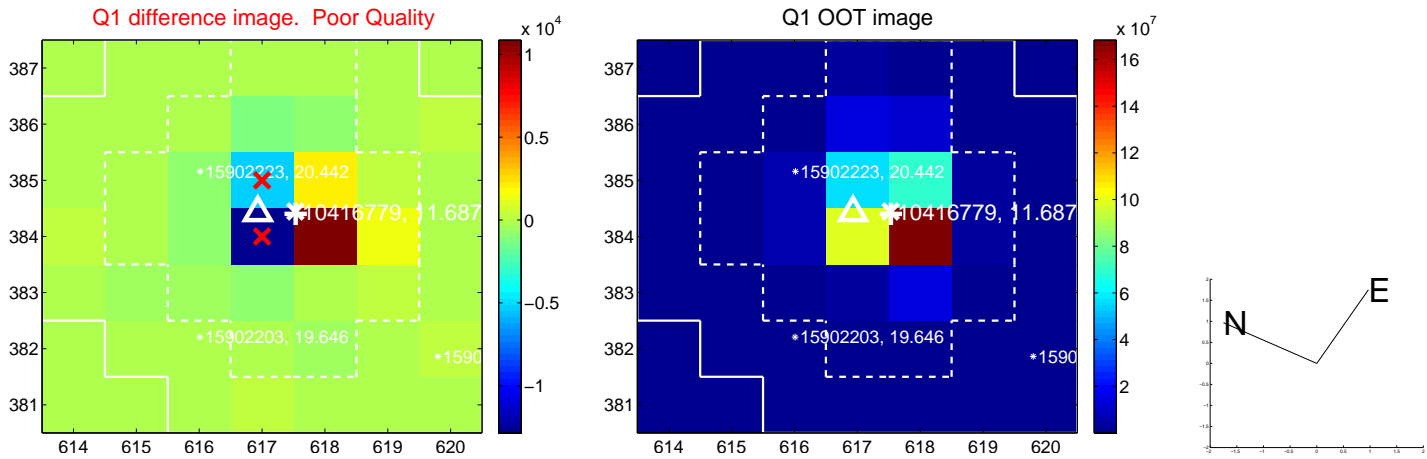
The direct PRF centroid is offset from the target star catalog position by about 0.20 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.392 \pm 0.429$	0.91	$0.034 \pm 0.440$	$0.391 \pm 0.429$
PRF-fit source offset from KIC position	$0.302 \pm 0.421$	0.72	$-0.031 \pm 0.442$	$0.300 \pm 0.421$
photometric centroid source offset	$0.29 \pm 0.11$	2.57	$-0.28 \pm 0.11$	$-0.08 \pm 0.12$

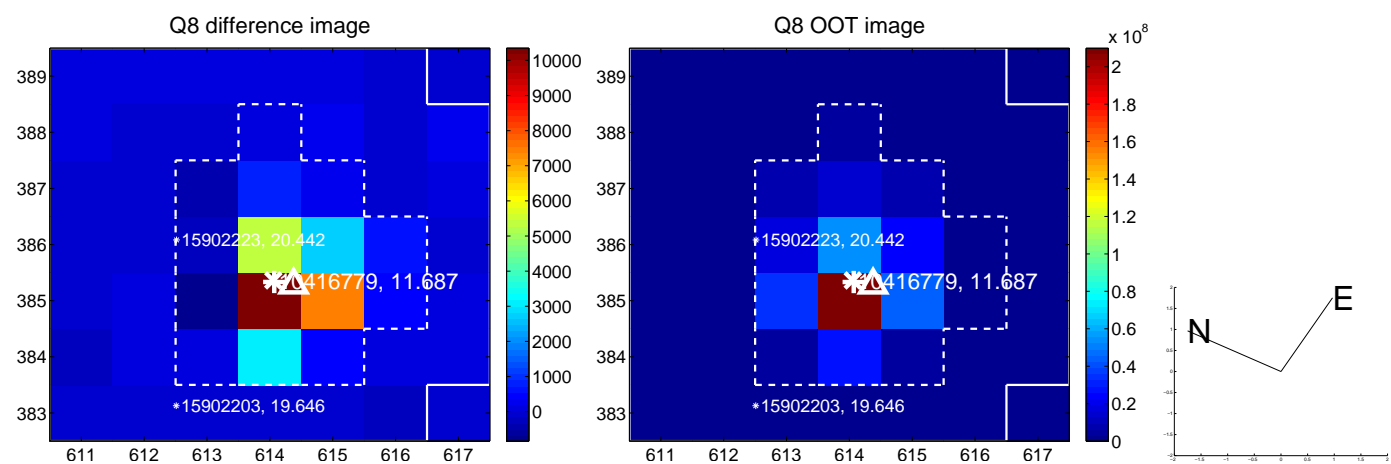
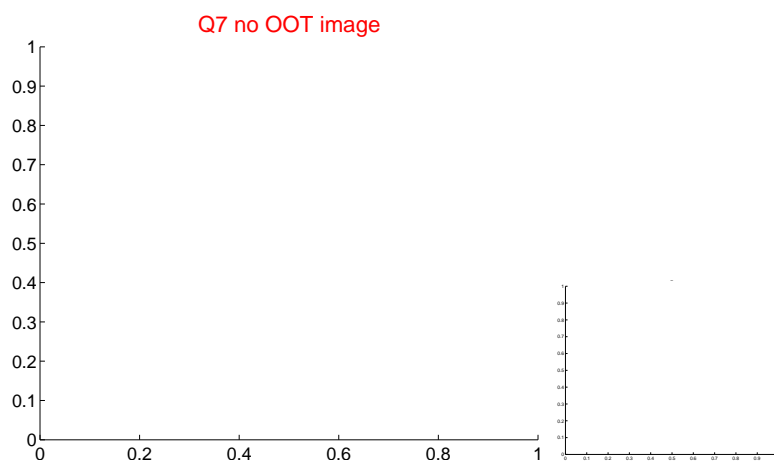
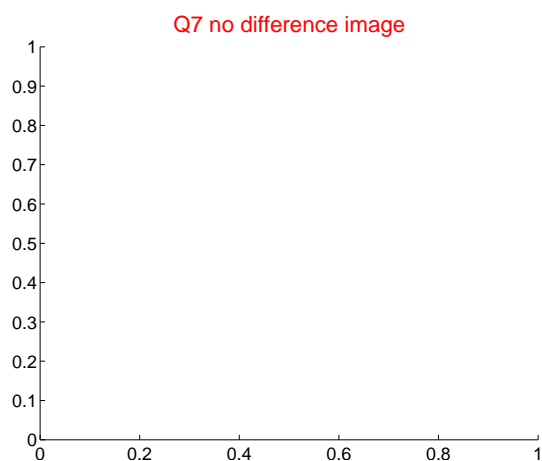
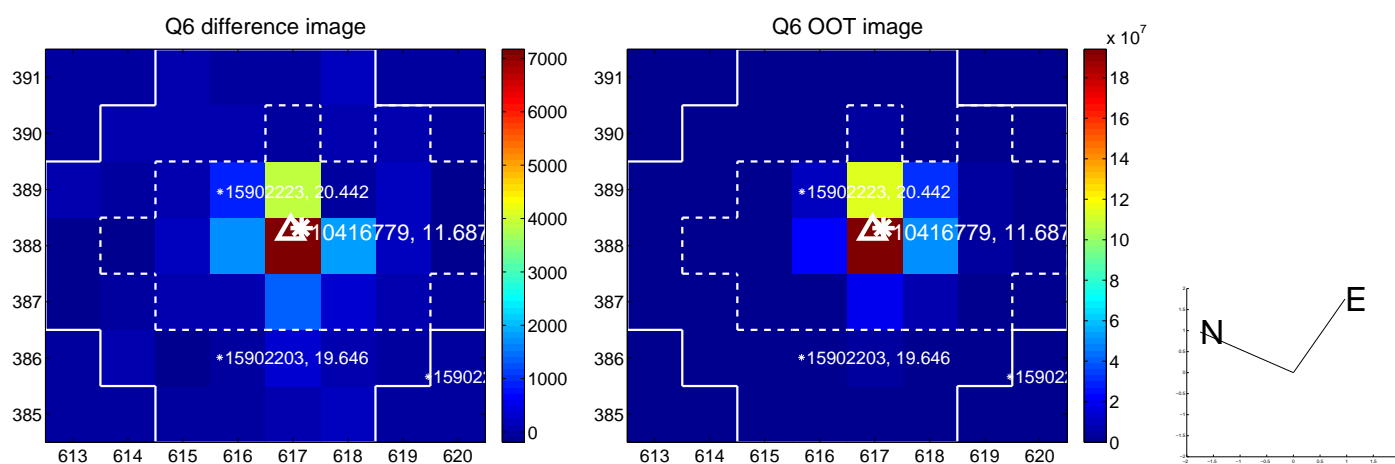
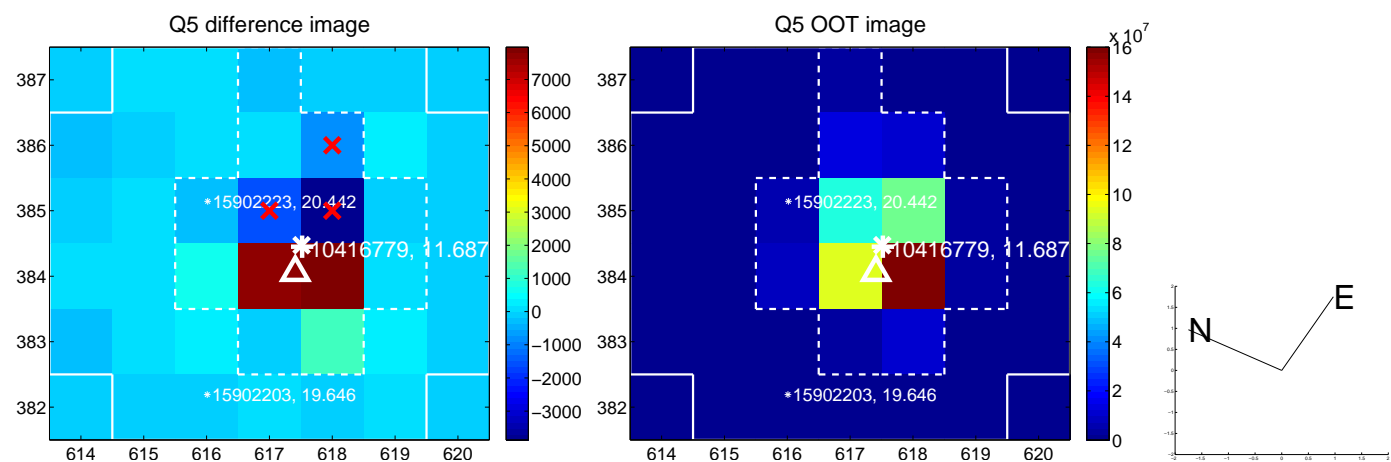


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

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

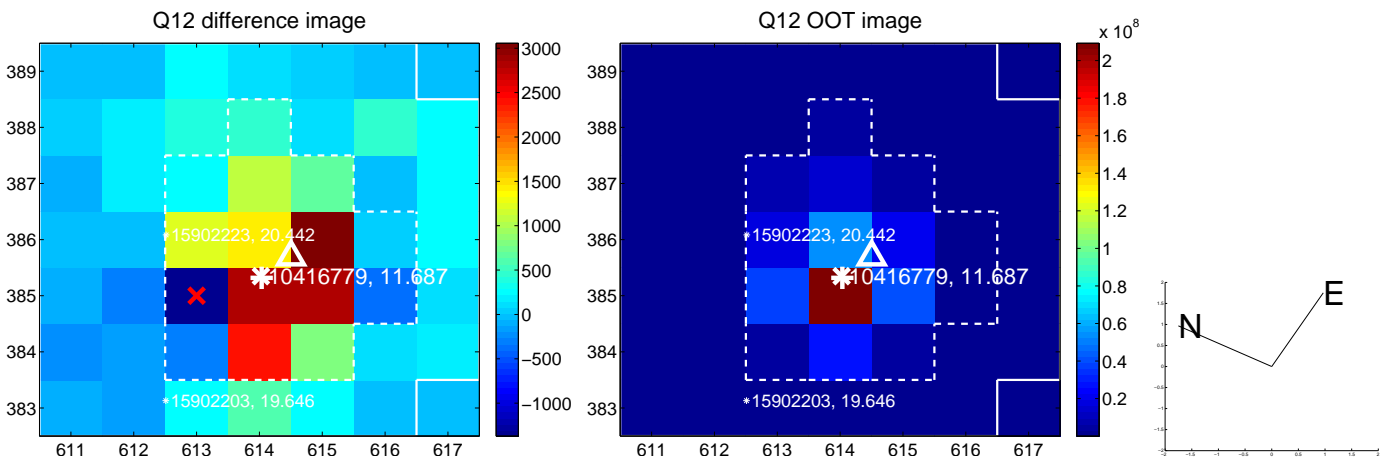
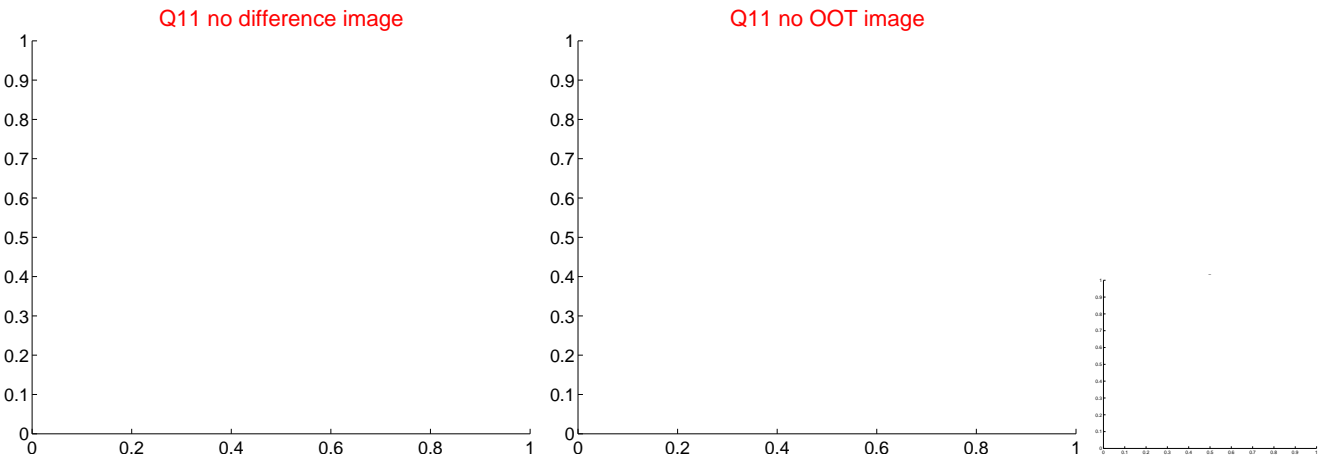
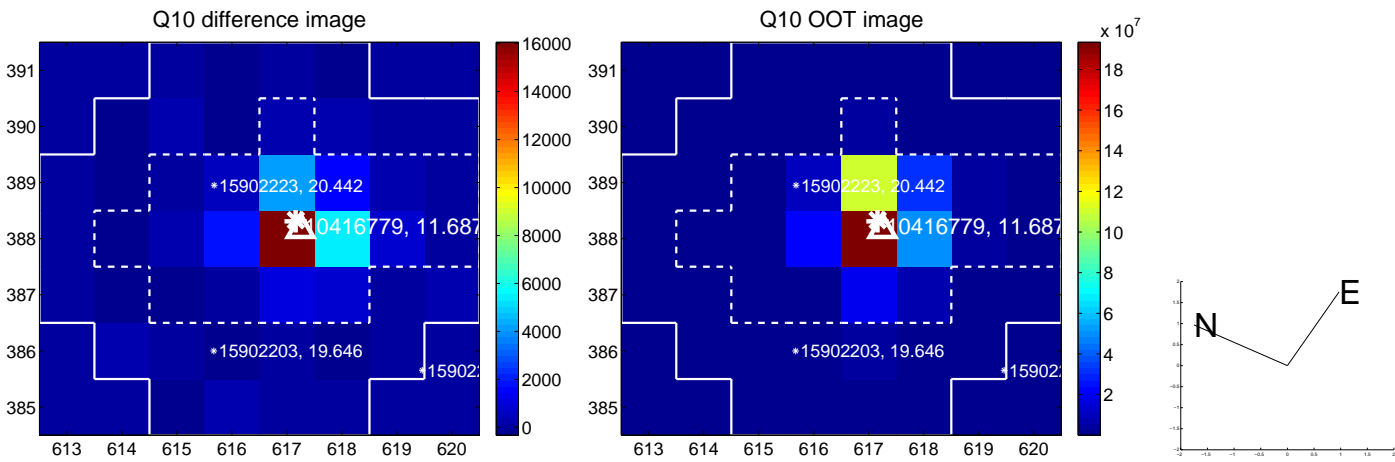
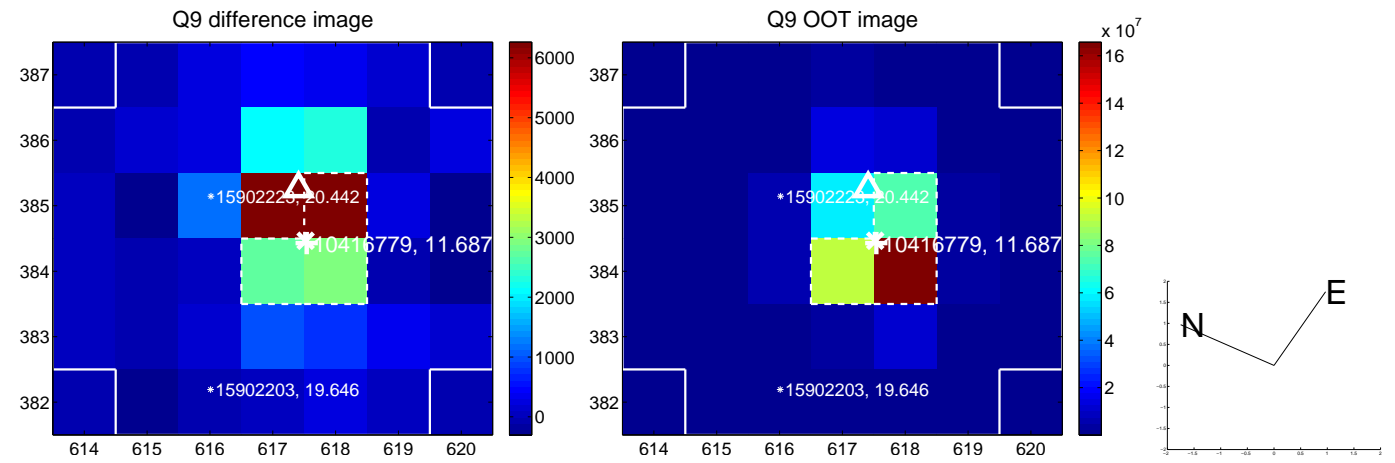


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

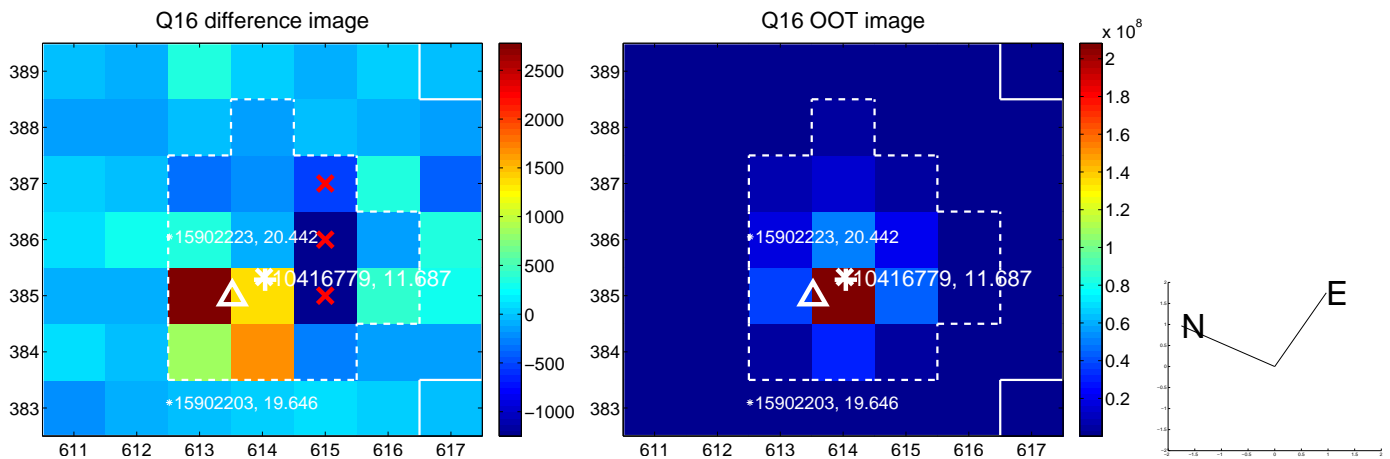
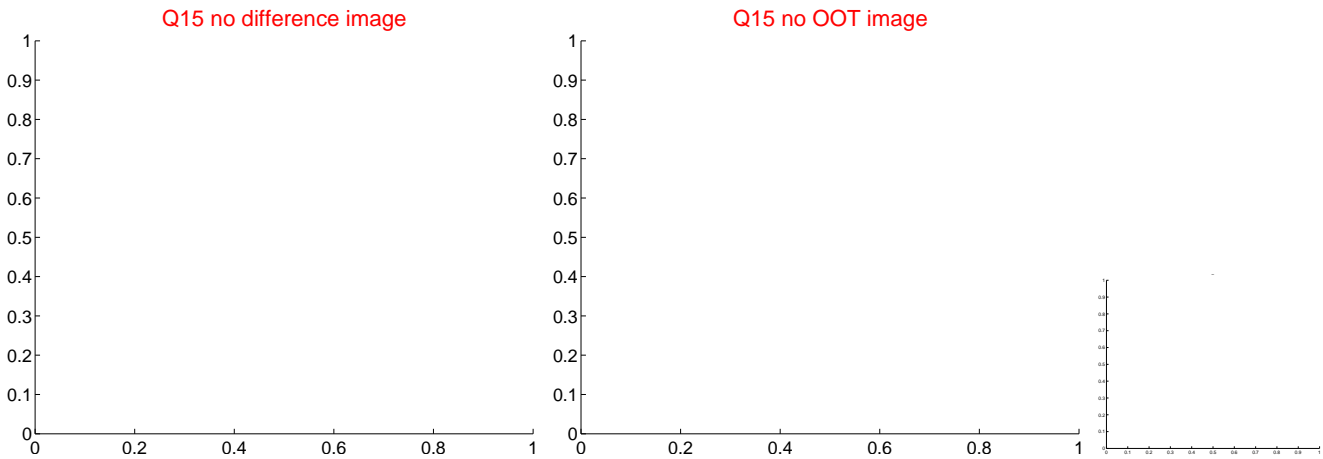
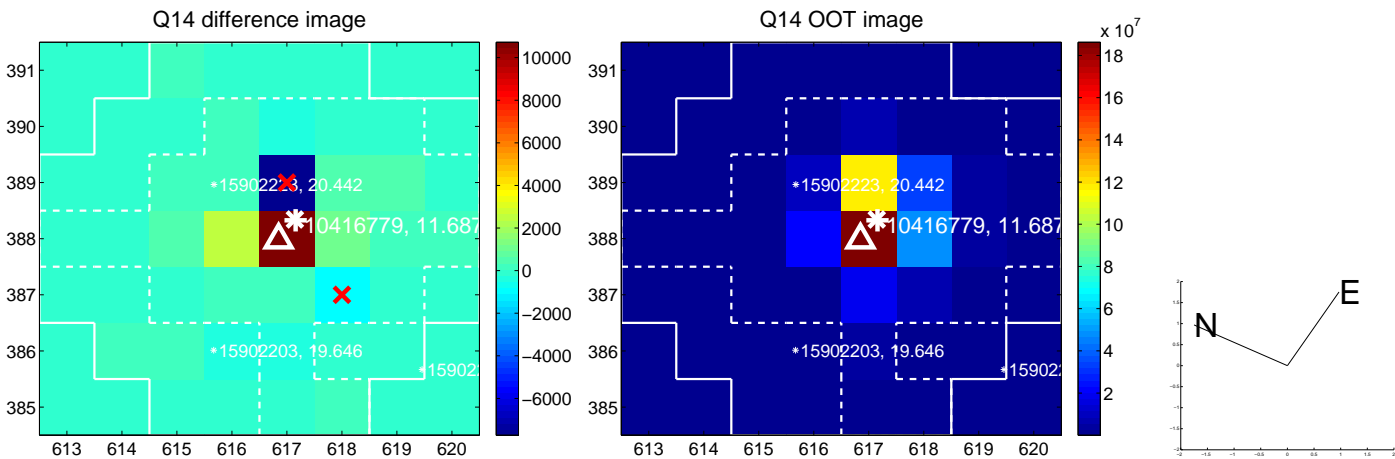
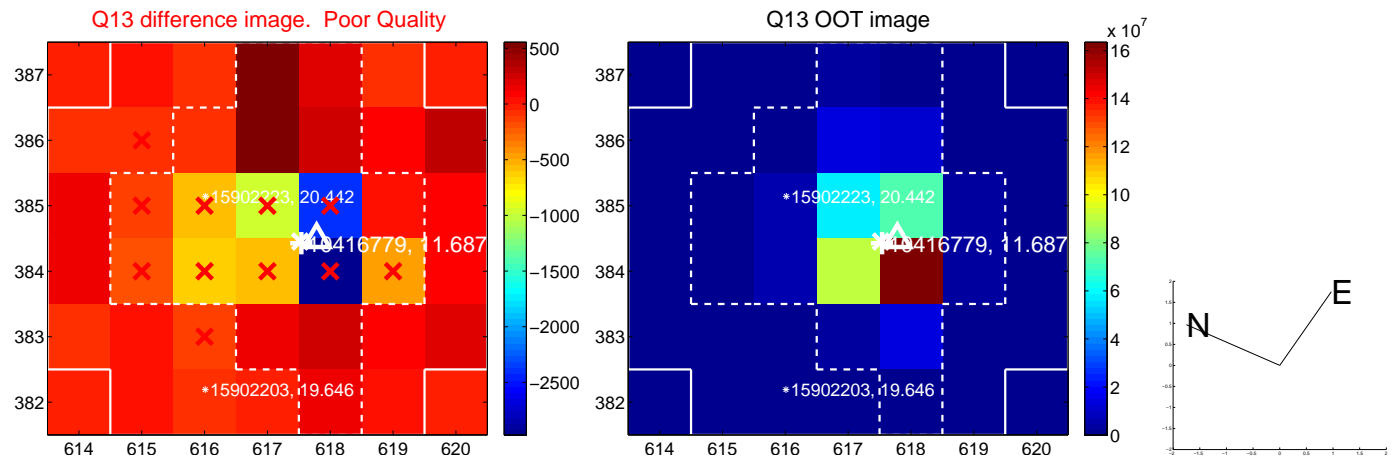




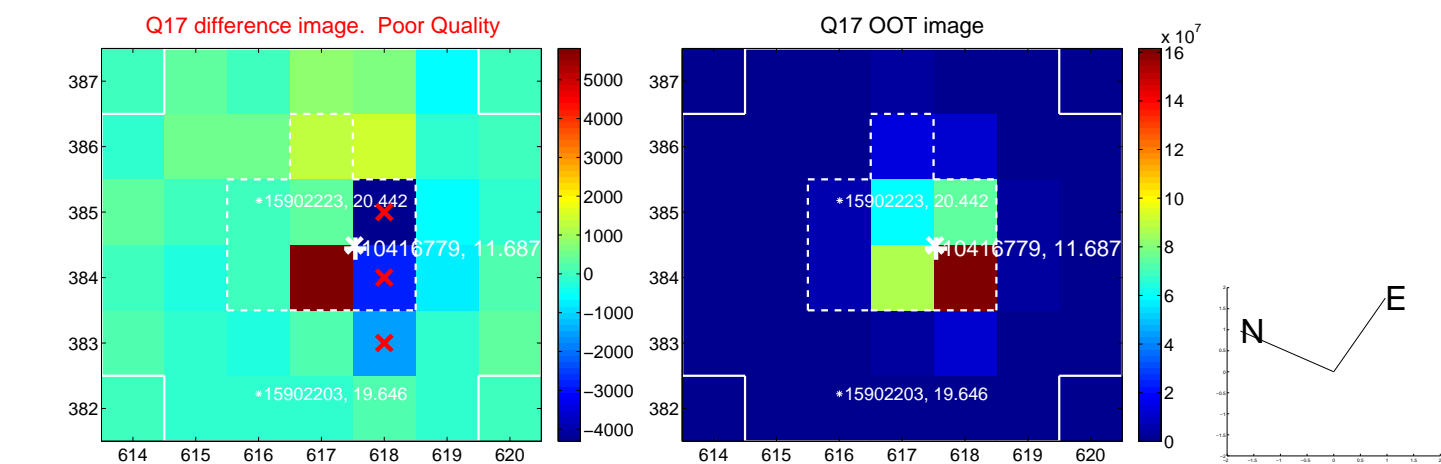
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



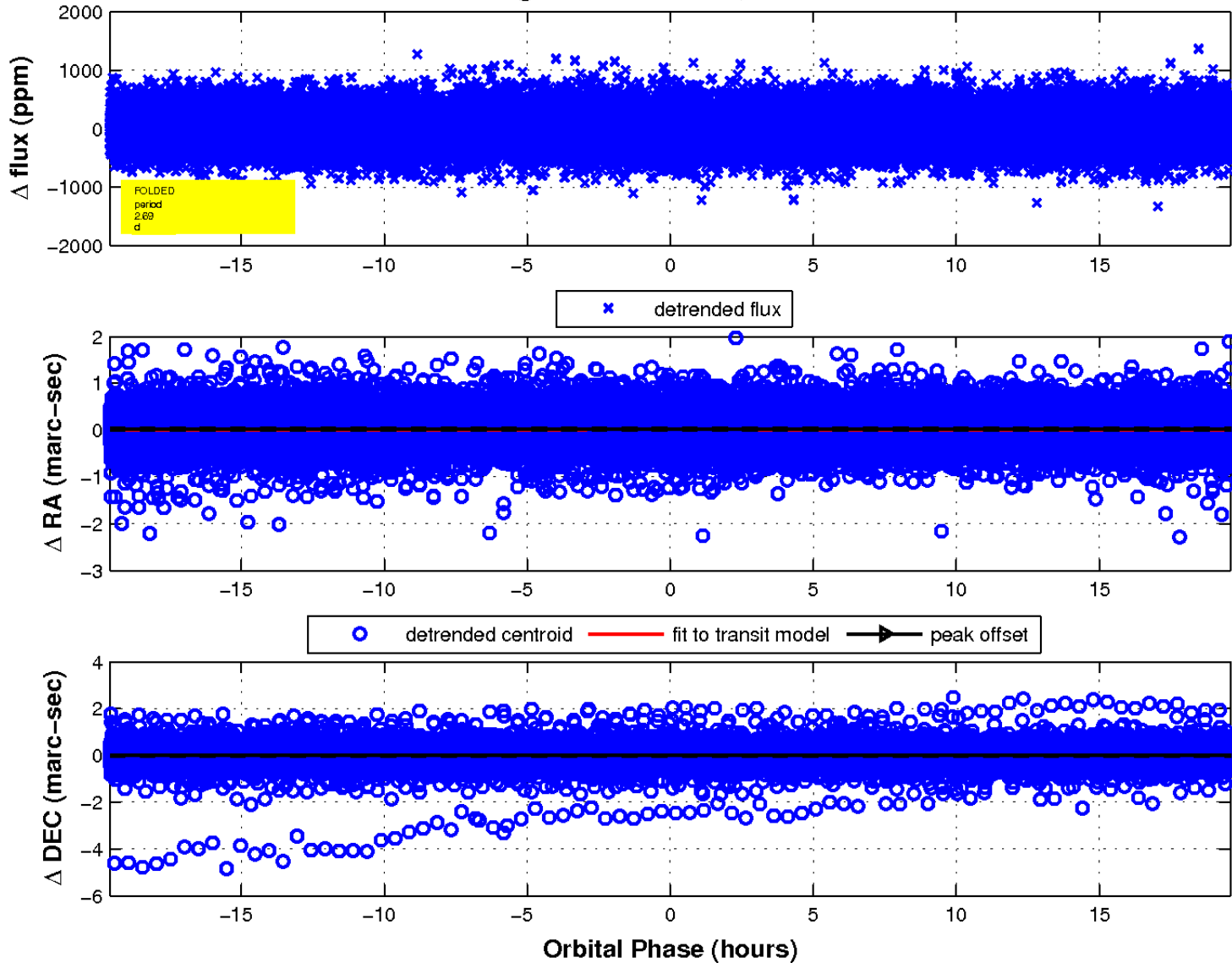
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 5 of 5



UKIRT Image

Declination

