

# KIC 010397751

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010397751-01	OBS	2859.01	3.446210	132.228850	82.0	2.151	13.2	14.8	0.72	5374	0.79	251.72
010397751-02	OBS	2859.02	2.005467	133.234777	53.5	1.889	10.7	11.8	0.72	5374	0.63	518.11
010397751-03	OBS	2859.05	5.431032	134.415503	80.8	2.612	9.4	11.3	0.72	5374	0.76	137.26
010397751-04	OBS	2859.04	2.905115	132.564184	47.7	2.277	8.6	8.7	0.72	5374	0.53	316.10
010397751-05	OBS	2859.03	4.288980	132.363420	55.5	2.712	7.4	8.2	0.72	5374	0.61	188.03

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010397751-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
010397751-02	OBS	PC	0.83	0	0	0	0	NO_COMMENT
010397751-03	OBS	PC	0.86	0	0	0	0	NO_COMMENT
010397751-04	OBS	PC	0.96	0	0	0	0	NO_COMMENT
010397751-05	OBS	PC	1.00	0	0	0	0	NO_COMMENT

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

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

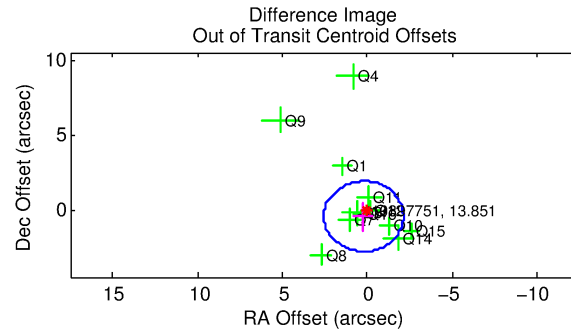
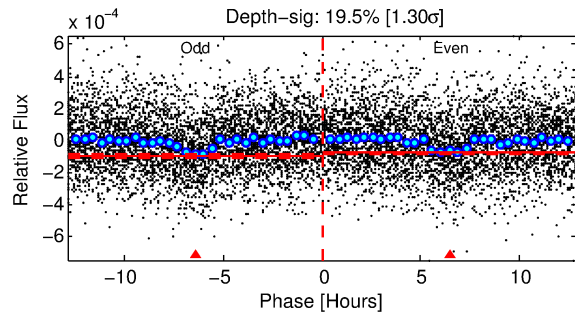
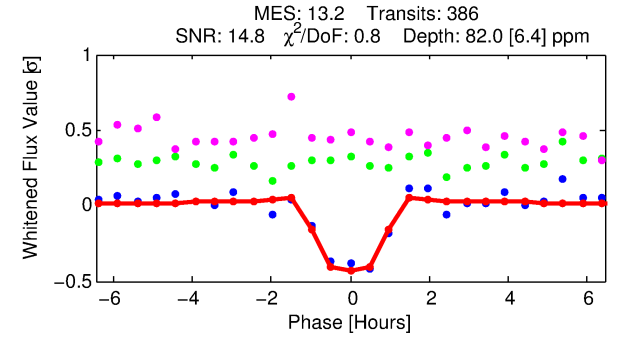
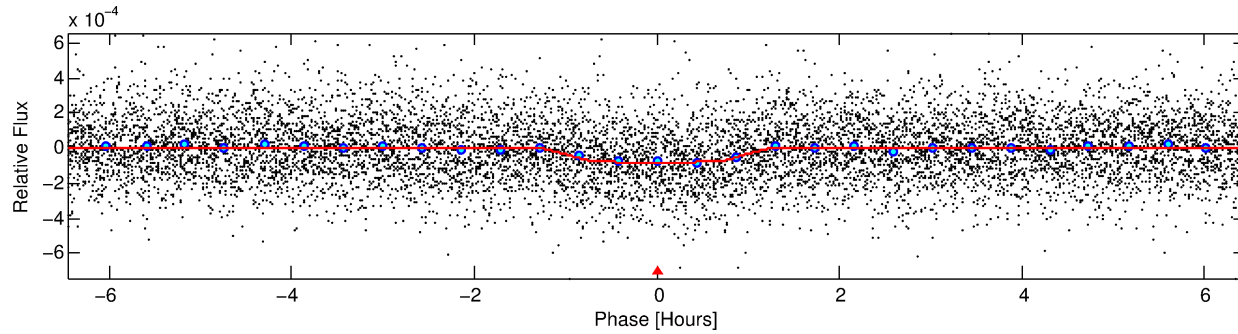
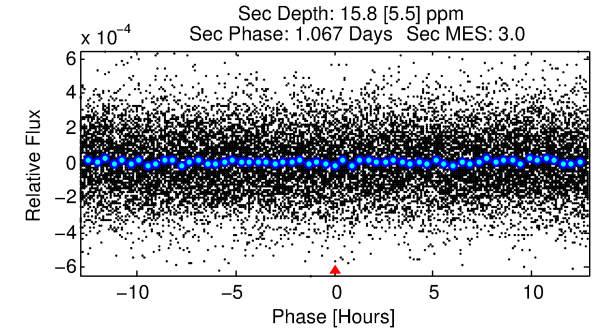
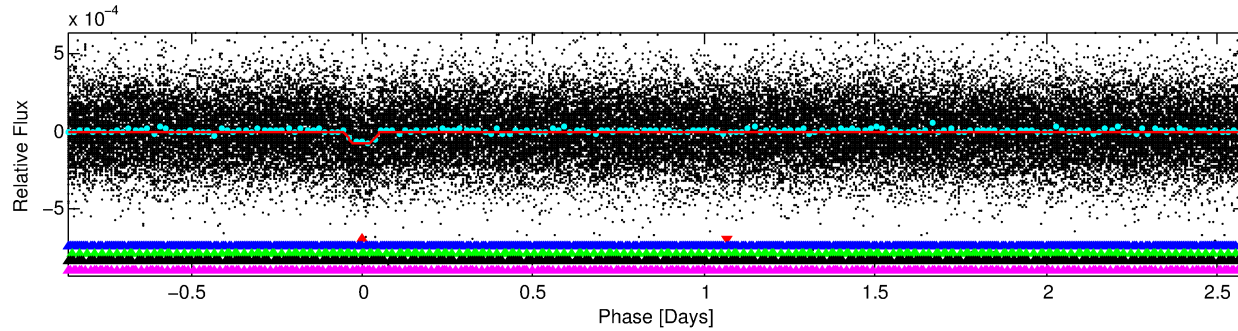
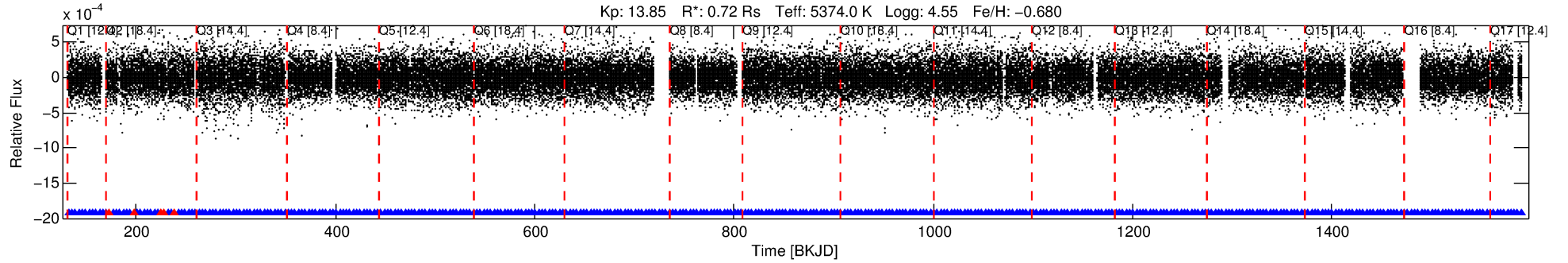
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010397751-01

No Significant Match Found

# DV One-Page Summary

KIC: 10397751 Candidate: 1 of 5 Period: 3.446 d  
KOI: K02859.01 Corr: 0.965



## DV Fit Results:

Period = 3.44621 [0.00001] d  
Epoch = 132.2289 [0.0024] BKJD  
Rp/R\* = 0.0100 [0.0048]  
a/R\* = 5.47 [12.05]  
b = 0.91 [0.45]  
Seff = 251.72 [49.19]  
Teq = 1016 [50] K  
Rp = 0.79 [0.39] Re  
a = 0.0393 [0.0040] AU  
Ag = 21.71 [22.53] [0.92σ]  
Teffp = 3390 [875] K [2.71σ]

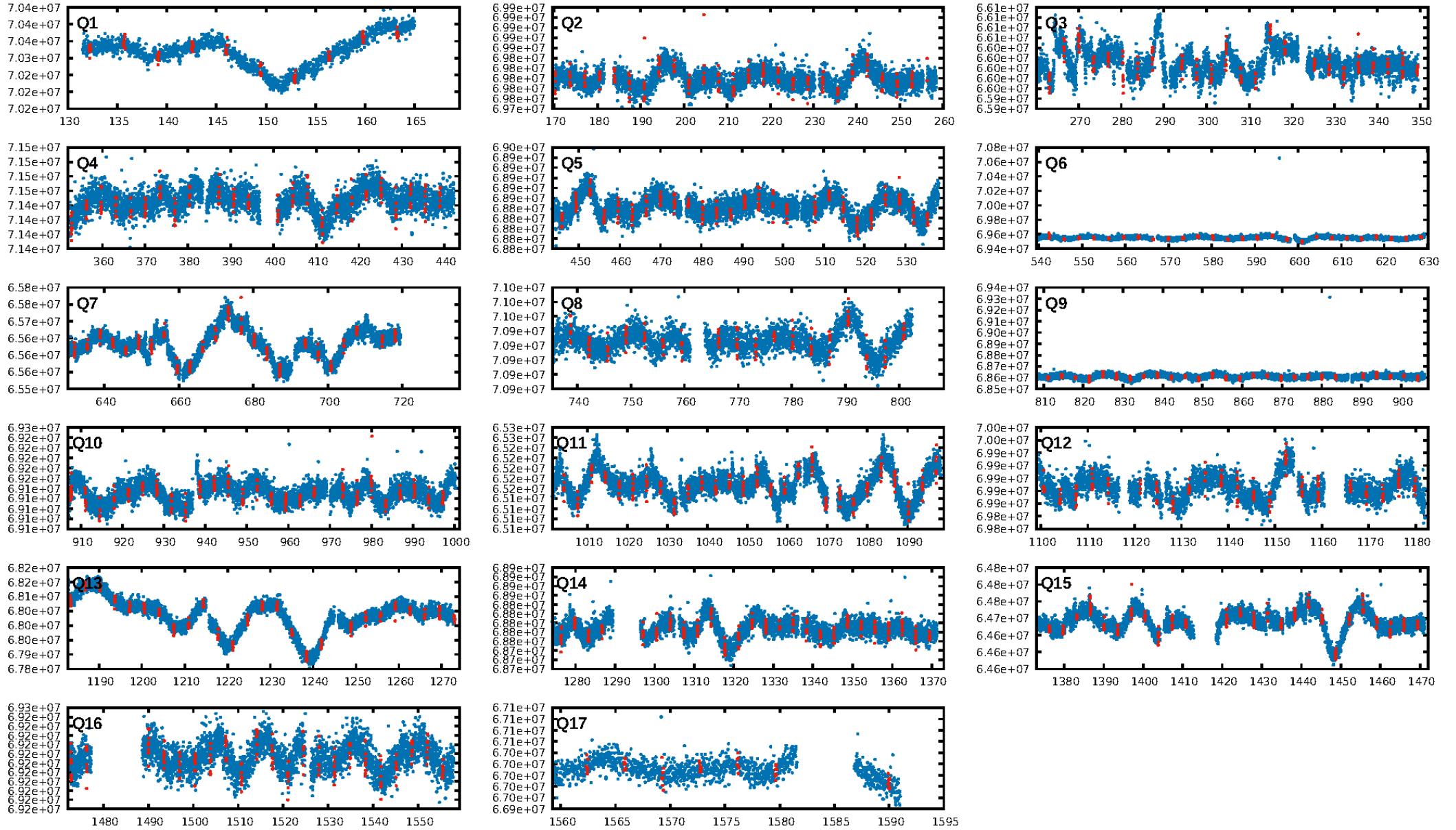
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [4.15σ]  
LongPeriod-sig: 100.0% [5.84σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 5.44e-38  
RollingBand-fgt: 0.99 [364/369]  
GhostDiagnostic-chr: 5.404  
Centroid-sig: 3.0%  
Centroid-so: 1.200 arcsec [1.54σ]  
OotOffset-rm: 0.500 arcsec [0.64σ]  
KicOffset-rm: 0.600 arcsec [0.82σ]  
OotOffset-st: 2/4/4/2 [12]  
KicOffset-st: 2/4/4/2 [12]  
DiffImageQuality-fgm: 0.58 [7/12]  
DiffImageOverlap-fno: 1.00 [17/17]

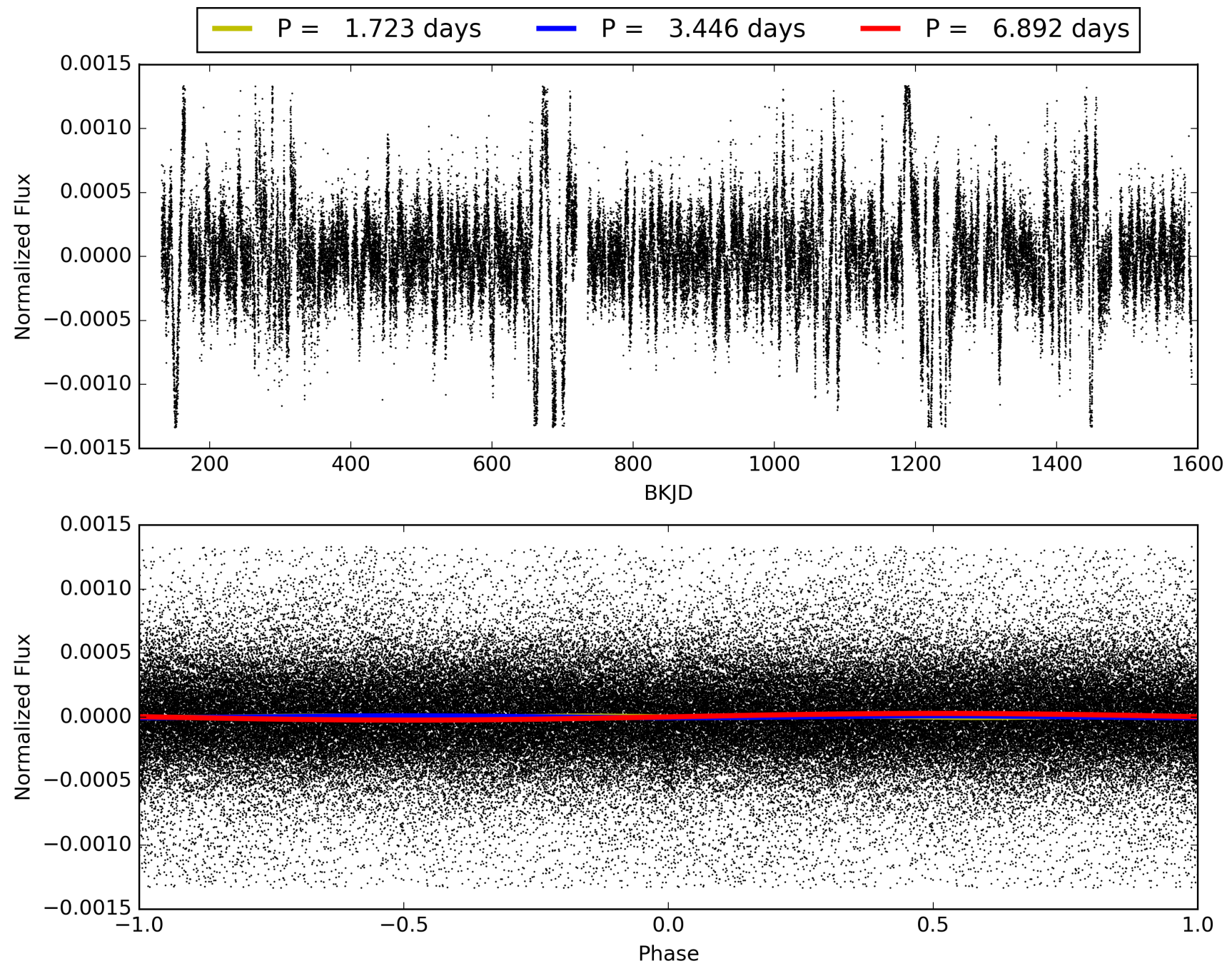
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 16:55:31 Z

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

# TCE 010397751-01, PDC Light Curves



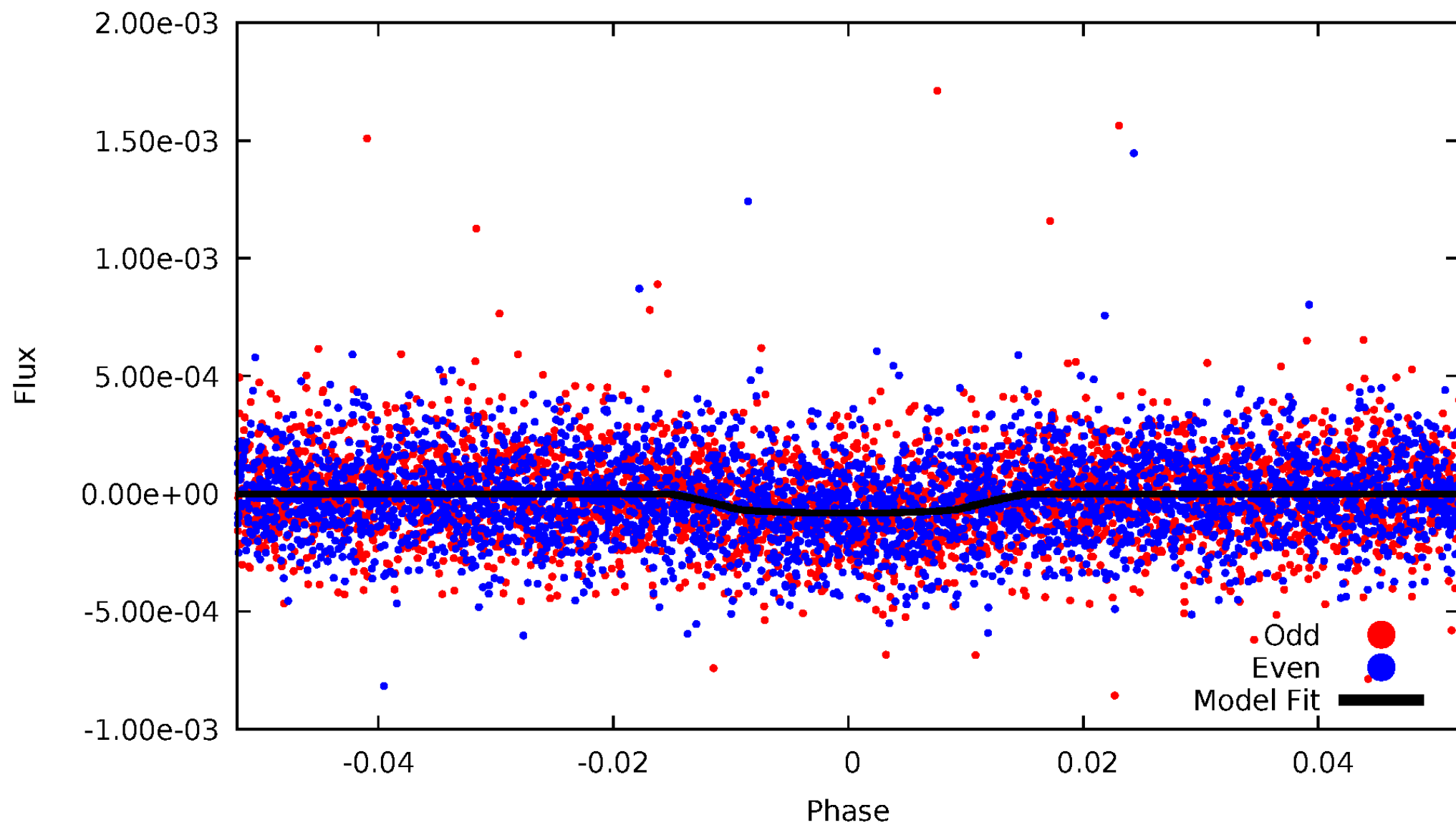
# TCE 010397751-01





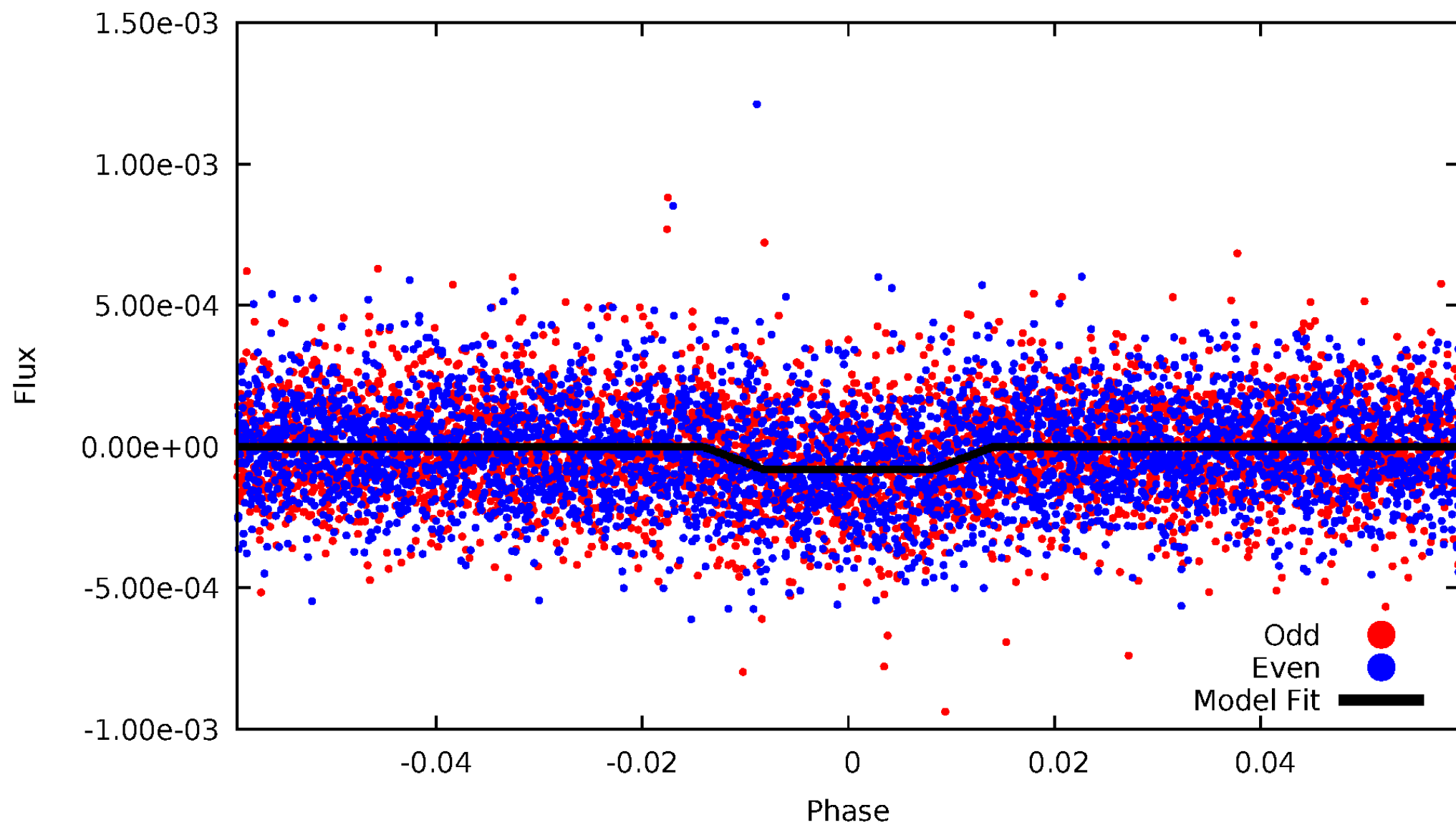
# DV Odd/Even

TCE 010397751-01

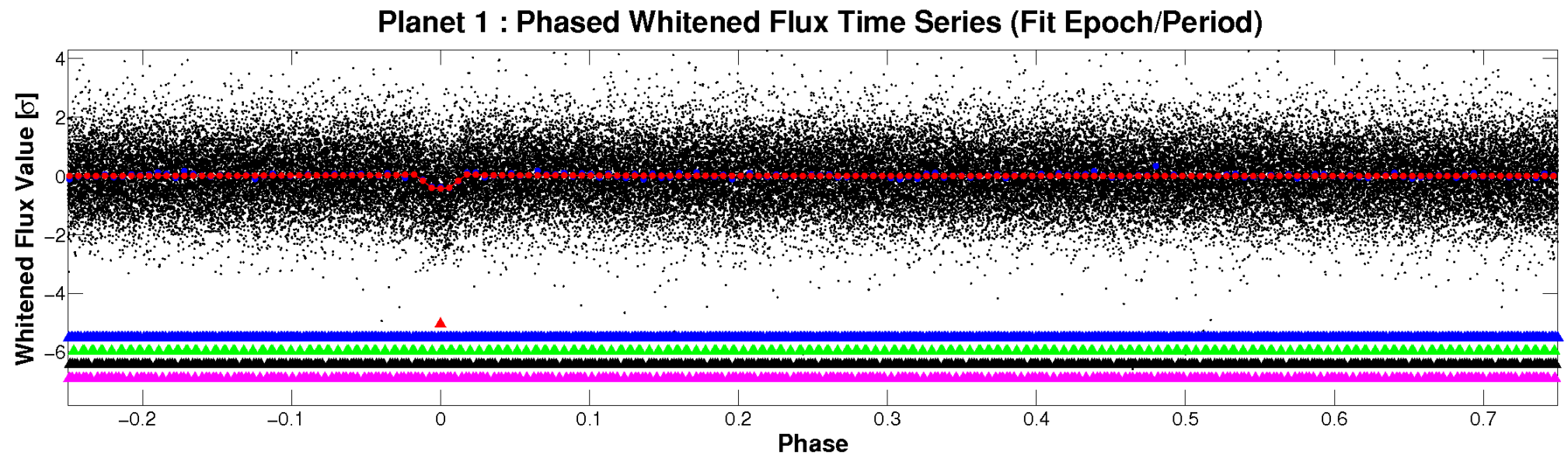
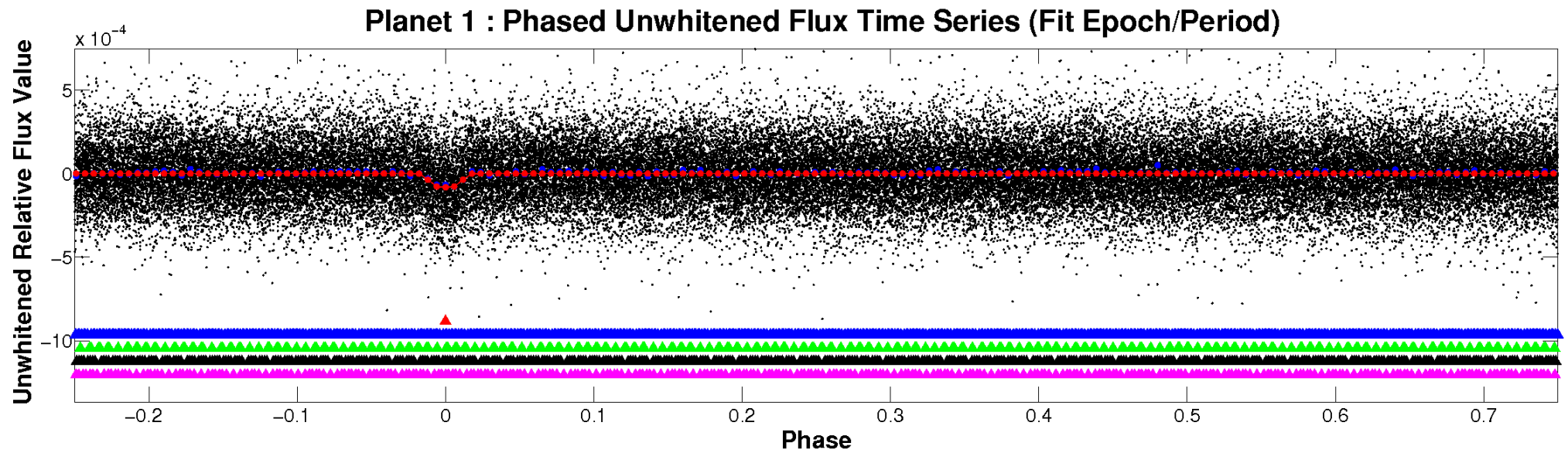


# ALT Odd/Even

TCE 010397751-01

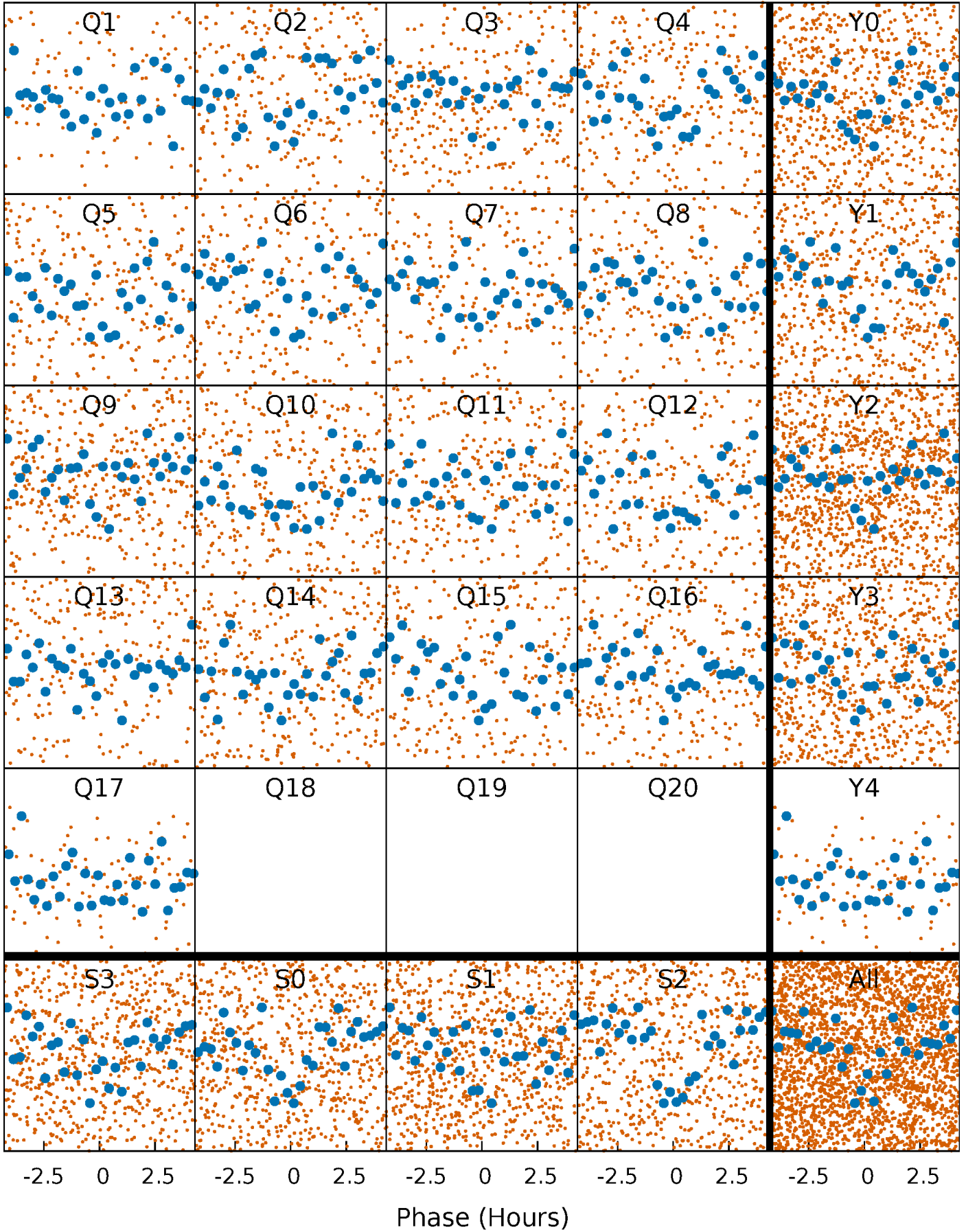


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

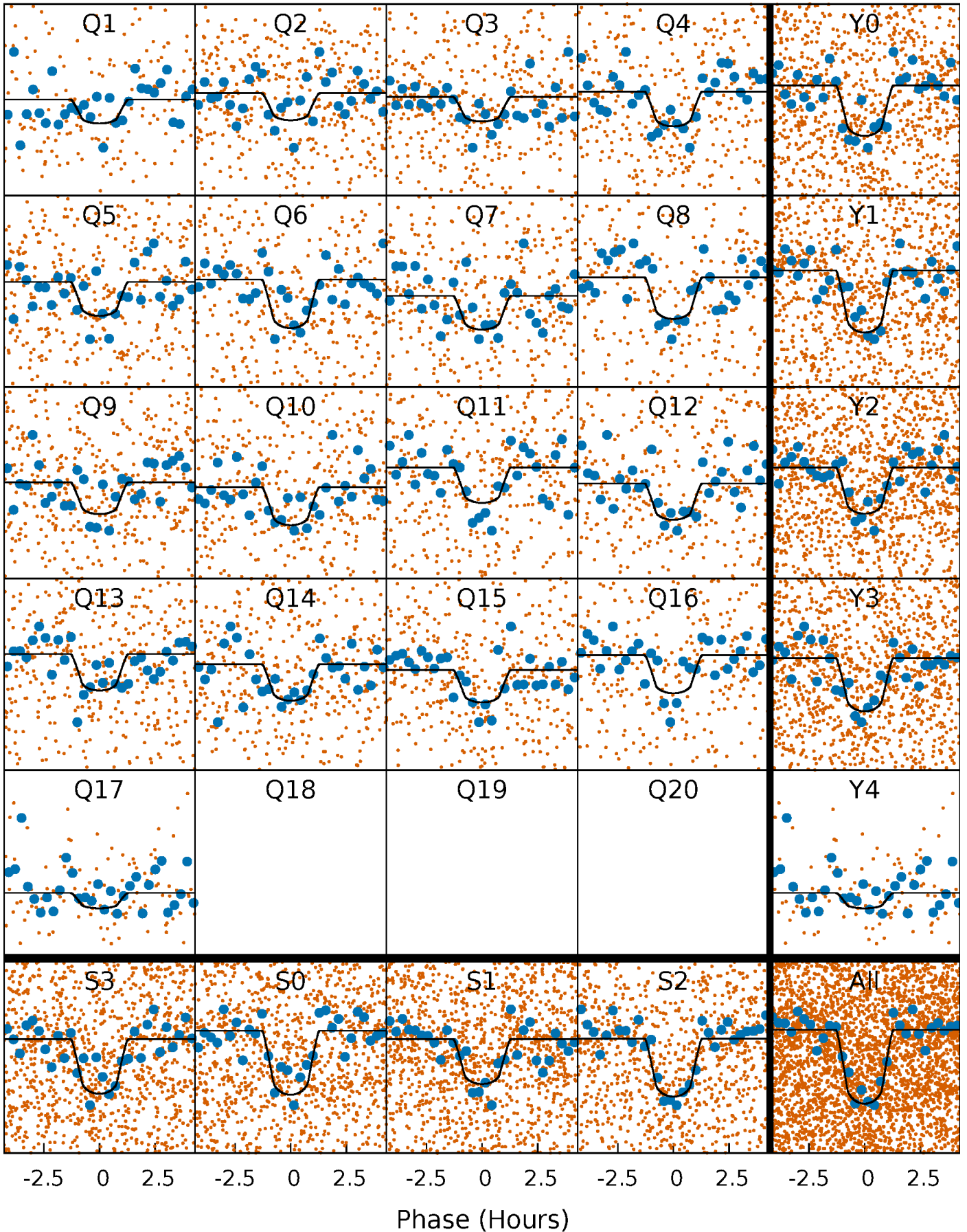
TCE 010397751-01 P= 3.446210 Days  $T_0=132.228850$  (BKJD)





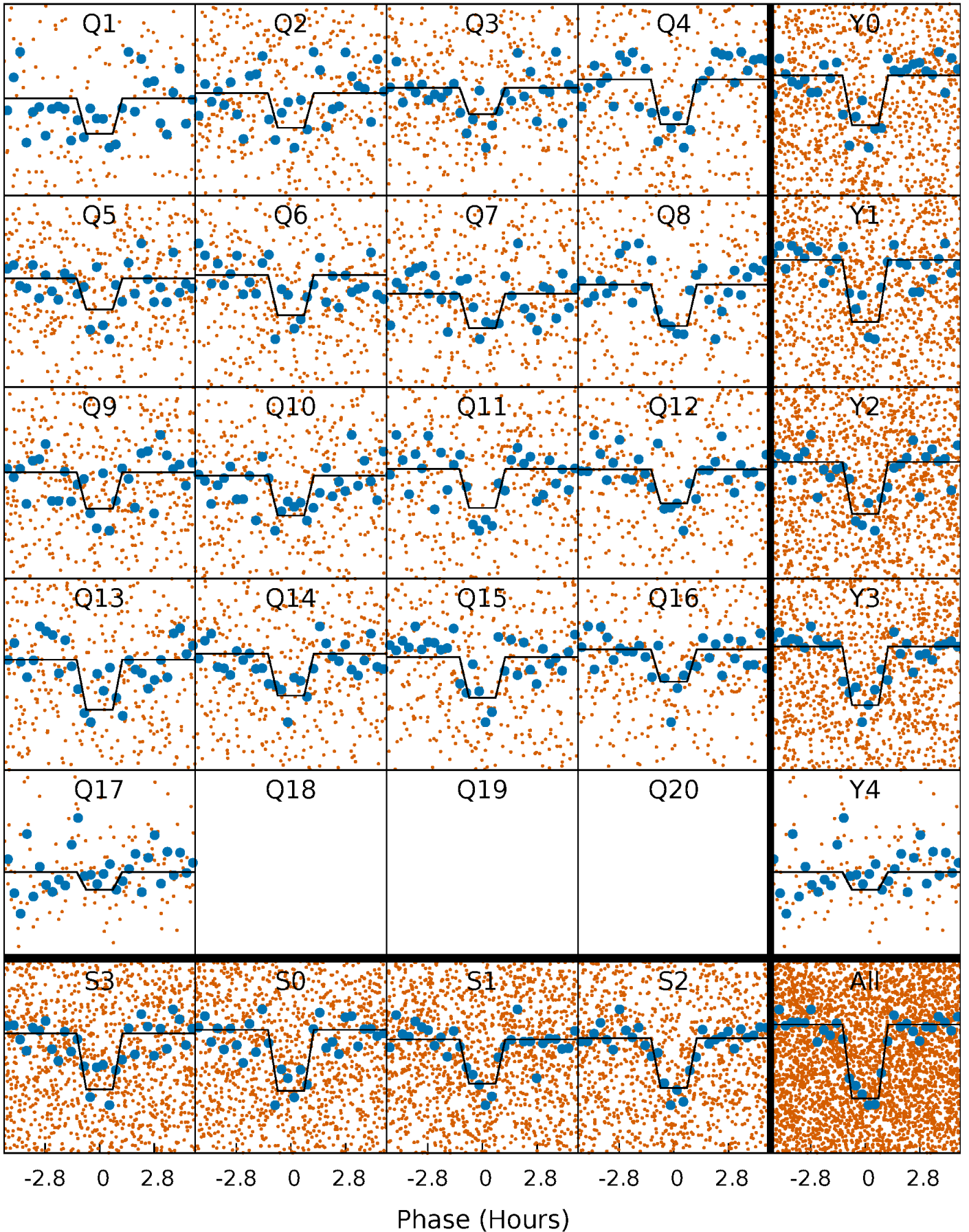
# DV Quarter-Phased Transit Curves

TCE 010397751-01   P= 3.446210 Days    $T_0=132.228850$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

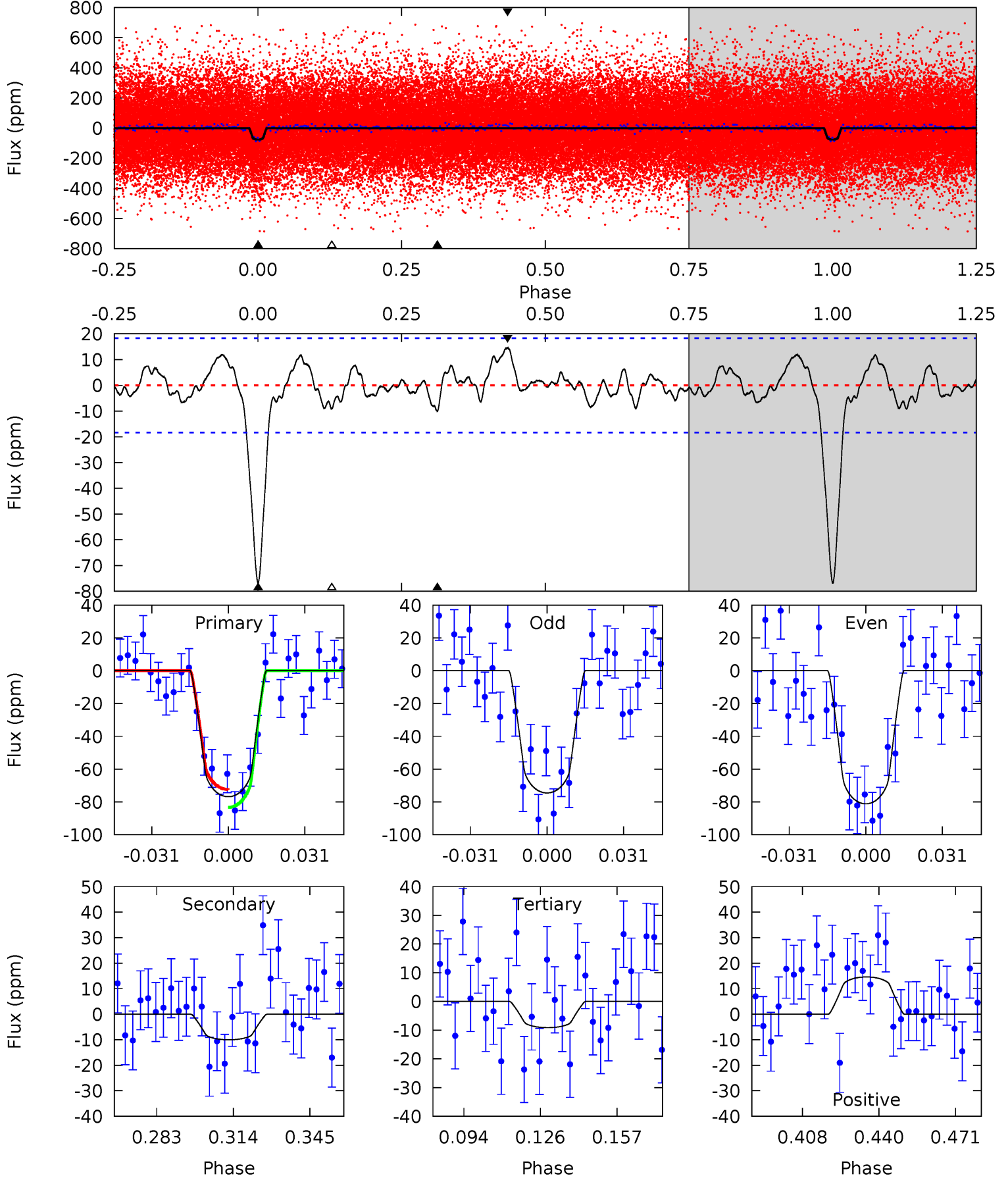
TCE 010397751-01 P= 3.446178 Days  $T_0=132.235149$  (BKJD)



# DV Model-Shift Uniqueness Test

010397751-01,  $P = 3.446210$  Days,  $E = 128.782640$  Days

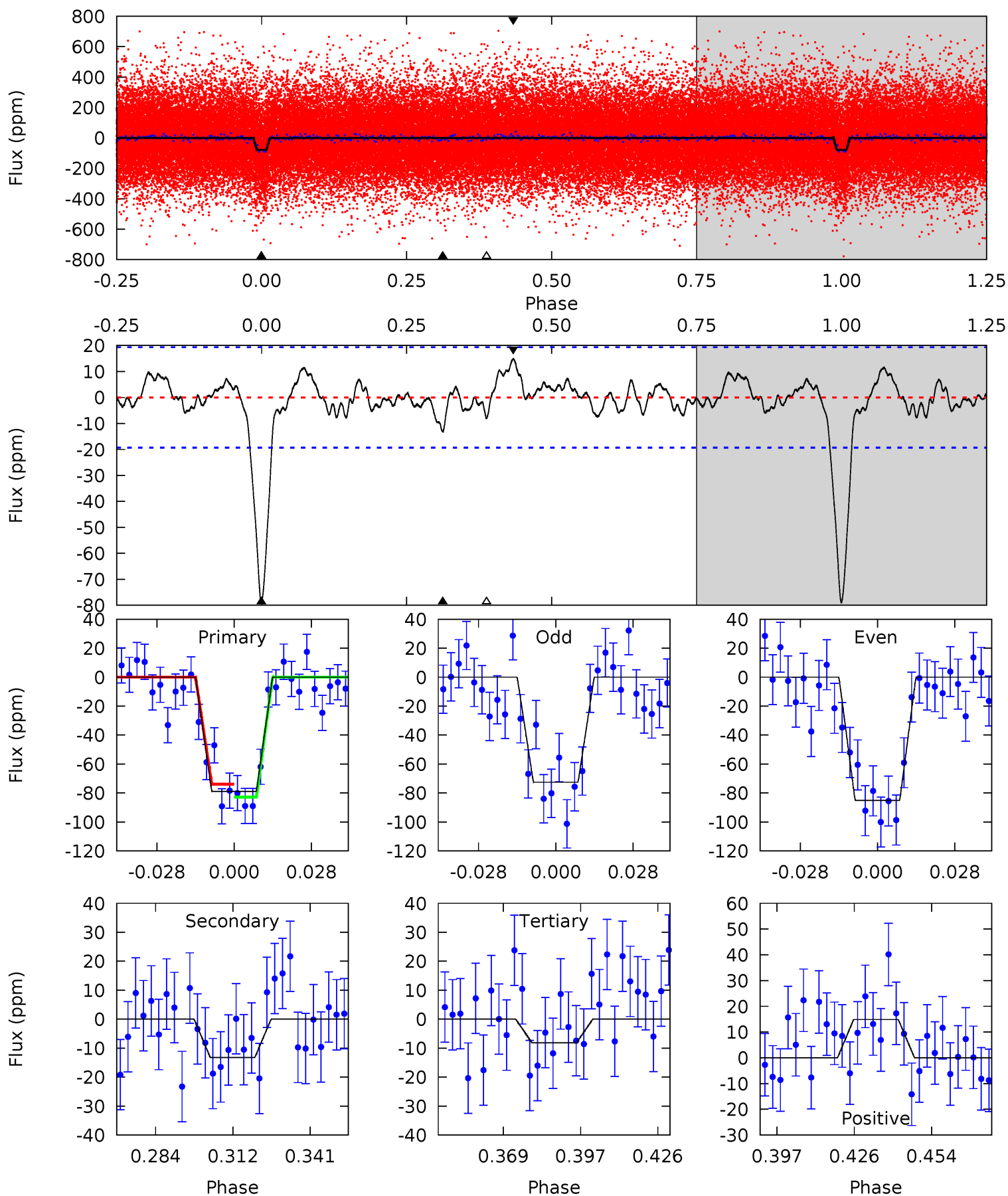
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
20.1	2.63	2.39	3.83	4.80	2.15	1.30	17.7	16.3	0.24	-1.20	0.87	0.95	0.16	1.43



# Alt Model-Shift Uniqueness Test

010397751-01, P = 3.446178 Days, E = 128.788971 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
19.7	3.29	2.02	3.71	4.82	2.19	1.17	17.7	16.0	1.26	-0.43	1.56	0.90	0.16	1.11





### Stellar Parameters For KIC 010397751

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5374^{+160}_{-144}$	$4.555^{+0.088}_{-0.064}$	$-0.680^{+0.300}_{-0.300}$	$0.721^{+0.082}_{-0.073}$	$0.680^{+0.086}_{-0.034}$	$2.557^{+0.950}_{-0.582}$
	+3%/-3%	+2%/-1%	+44%/-44%	+11%/-10%	+13%/-5%	+37%/-23%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 010397751-01 / KOI 2859.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-10 \pm 4$	$0.80^{+0.38}_{-0.40}$	$1415^{+59}_{-57}$	$3455^{+947}_{-438}$	$14^{+40}_{-8}$
Alt.	$-13 \pm 4$	$0.72^{+0.38}_{-0.38}$	$1412^{+60}_{-56}$	$3748^{+1252}_{-524}$	$22^{+78}_{-14}$

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

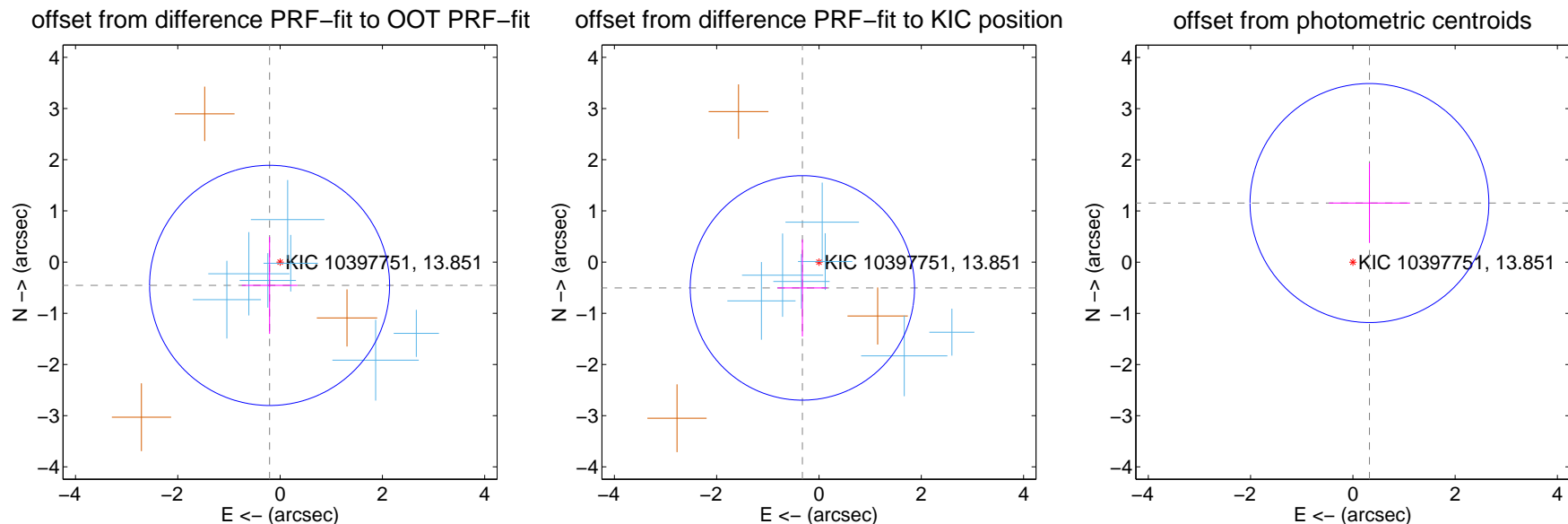
## DV Centroid Data

Supplemental centroid analysis for 010397751-01. Kepler magnitude: 13.85. Transit SNR 14.77

There are 7 quarters with good PRF difference image offsets

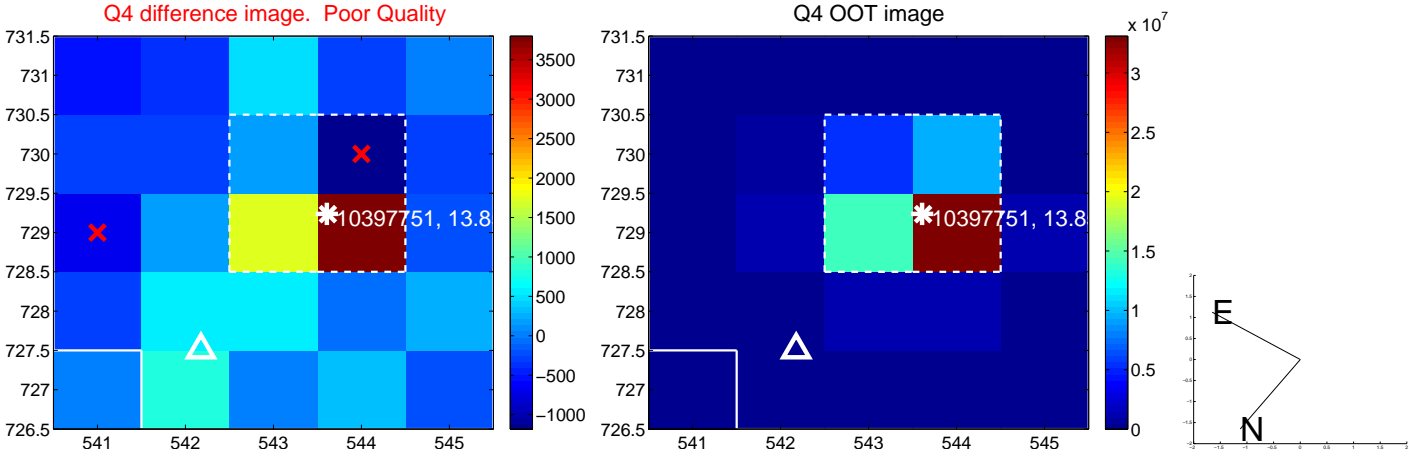
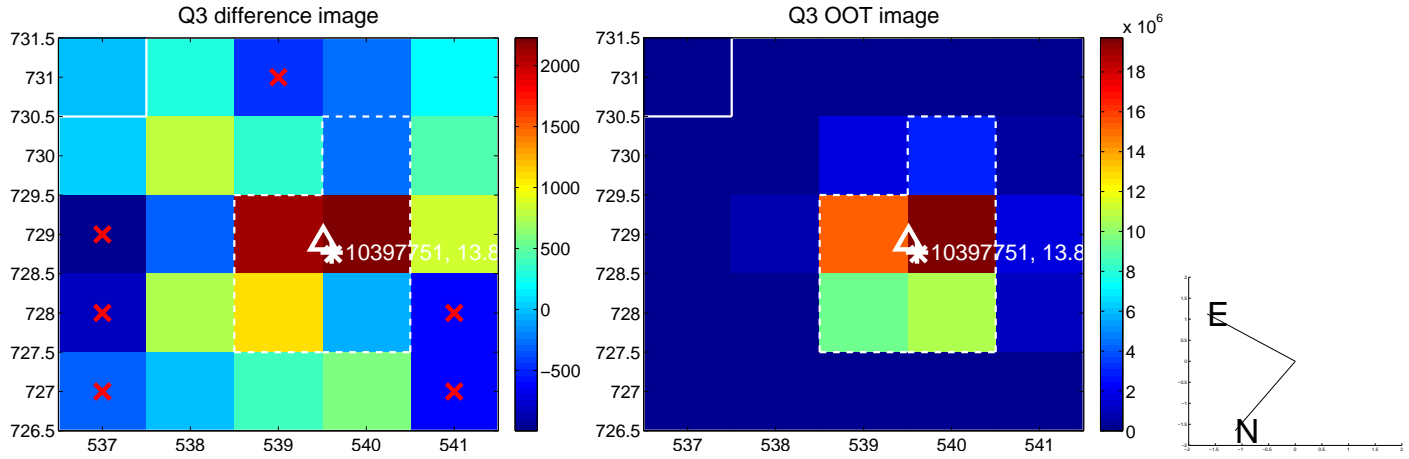
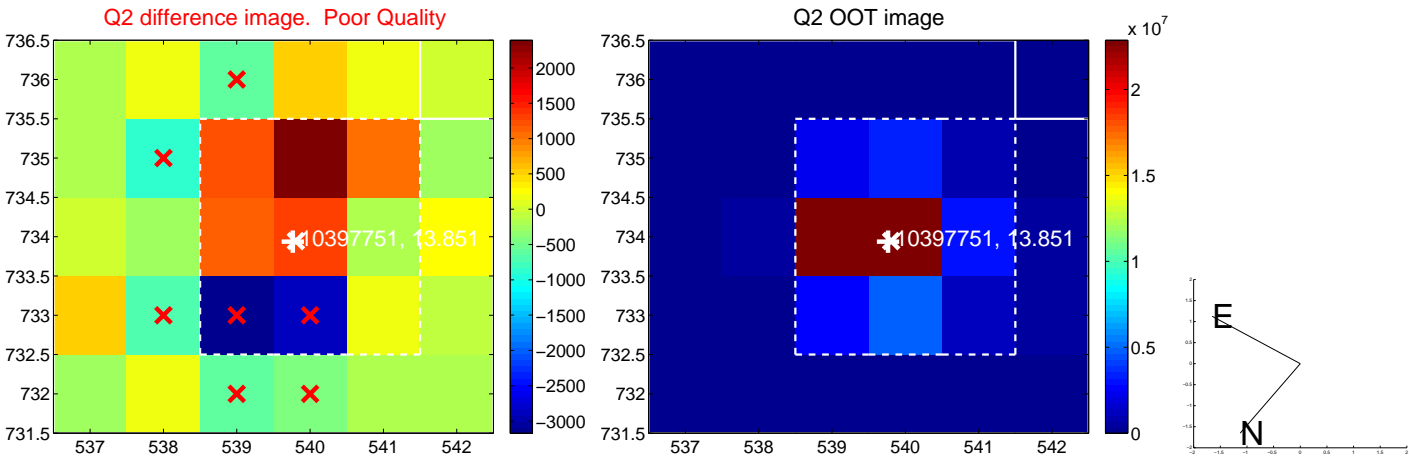
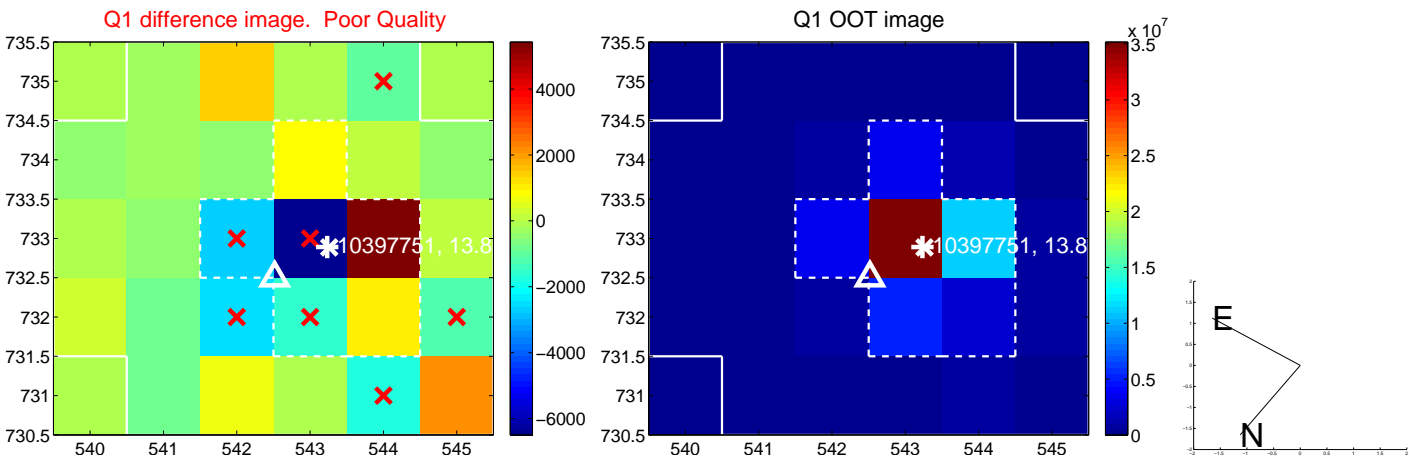
The direct PRF centroid is offset from the target star catalog position by about 0.10 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.500 \pm 0.782$	0.64	$0.206 \pm 0.544$	$-0.455 \pm 0.947$
PRF-fit source offset from KIC position	$0.600 \pm 0.731$	0.82	$0.325 \pm 0.487$	$-0.504 \pm 0.948$
photometric centroid source offset	$1.20 \pm 0.78$	1.54	$-0.32 \pm 0.79$	$1.16 \pm 0.78$

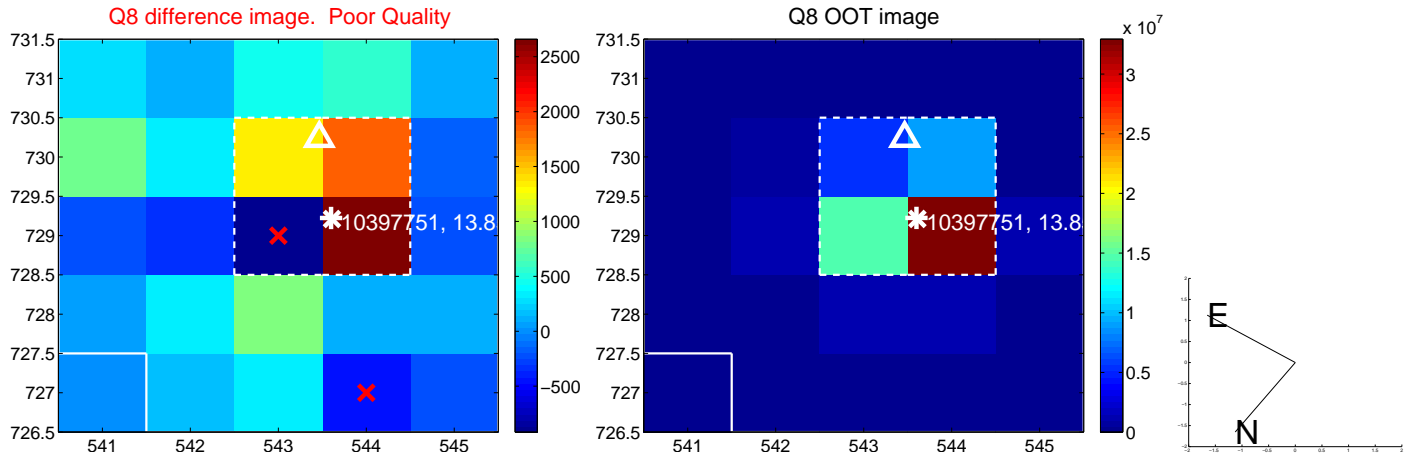
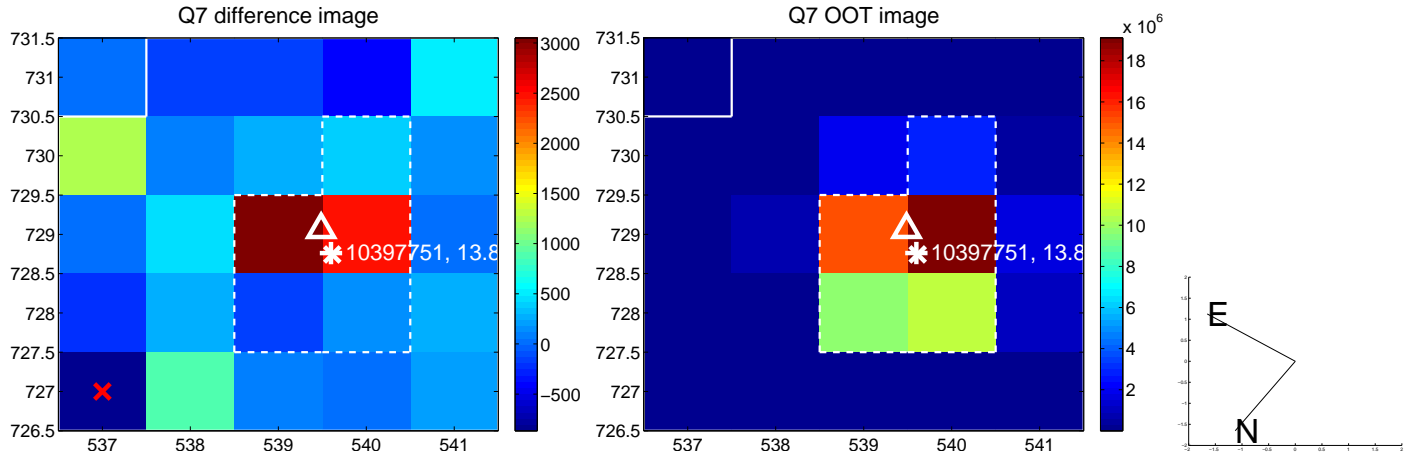
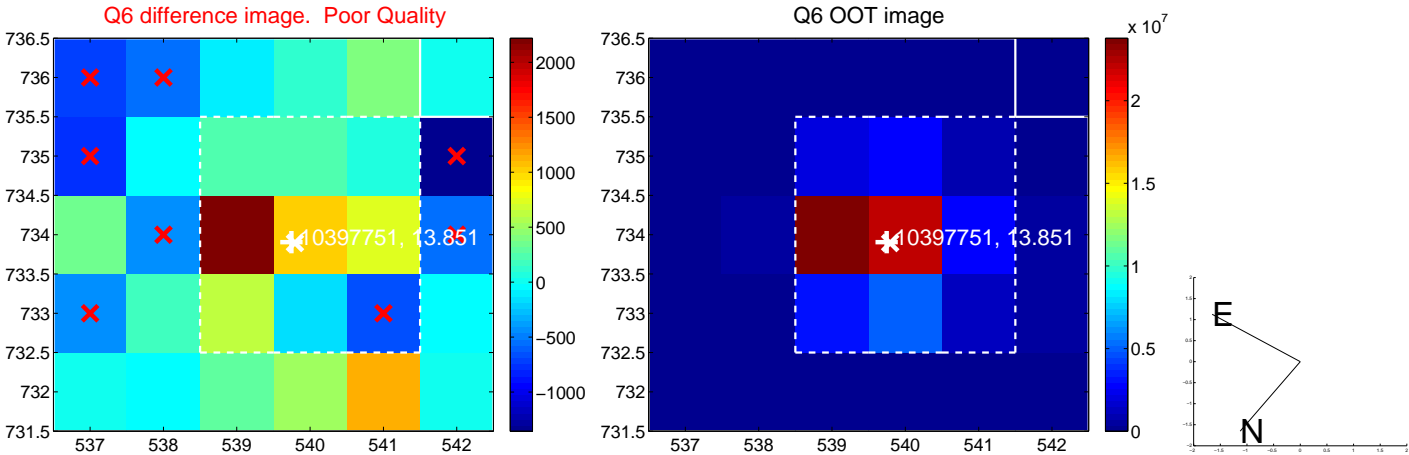
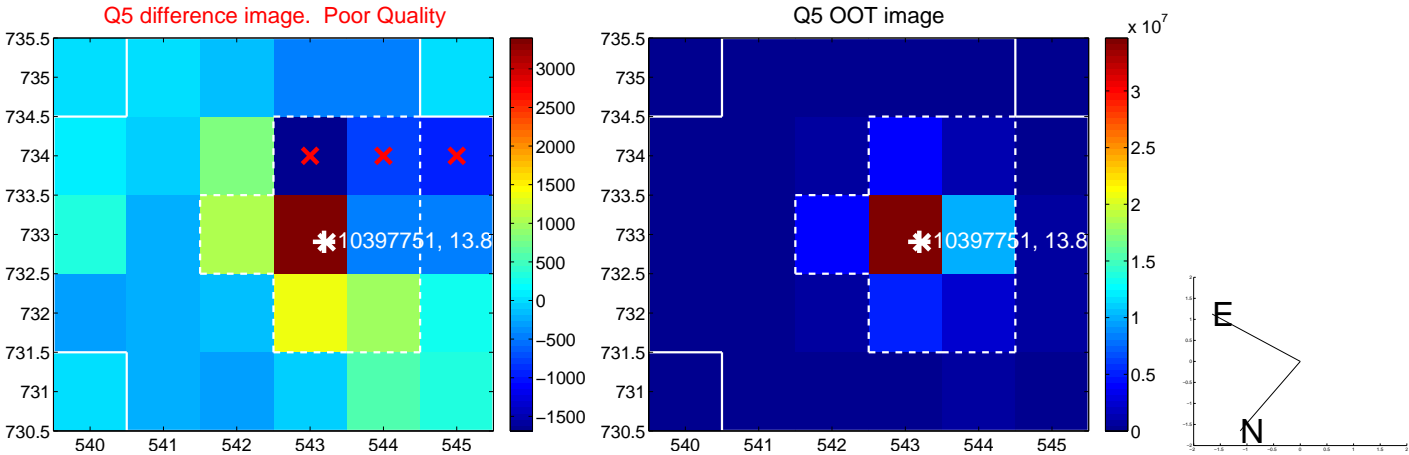


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

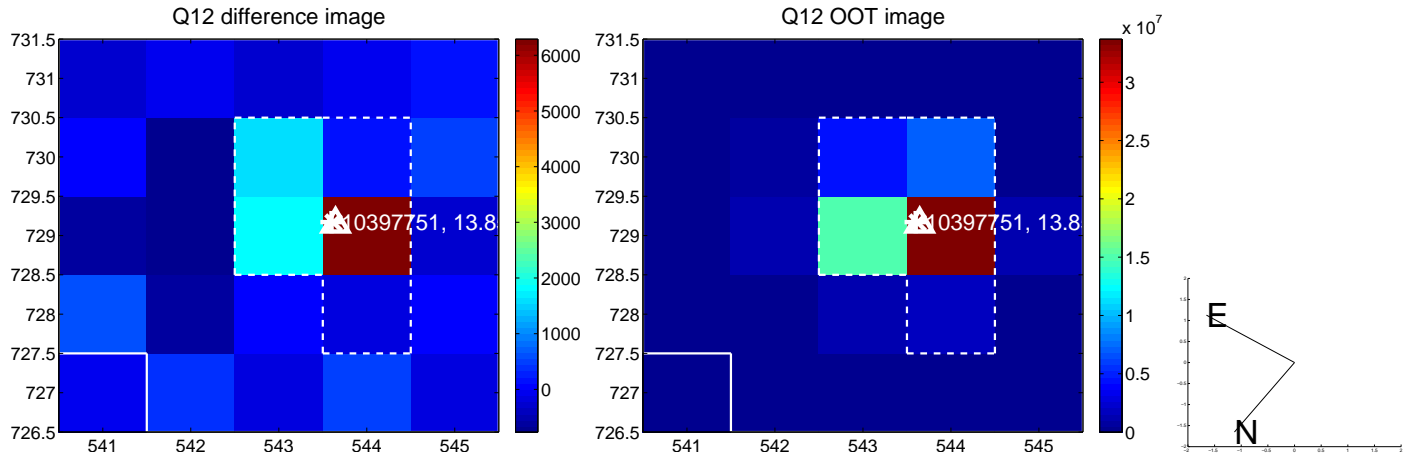
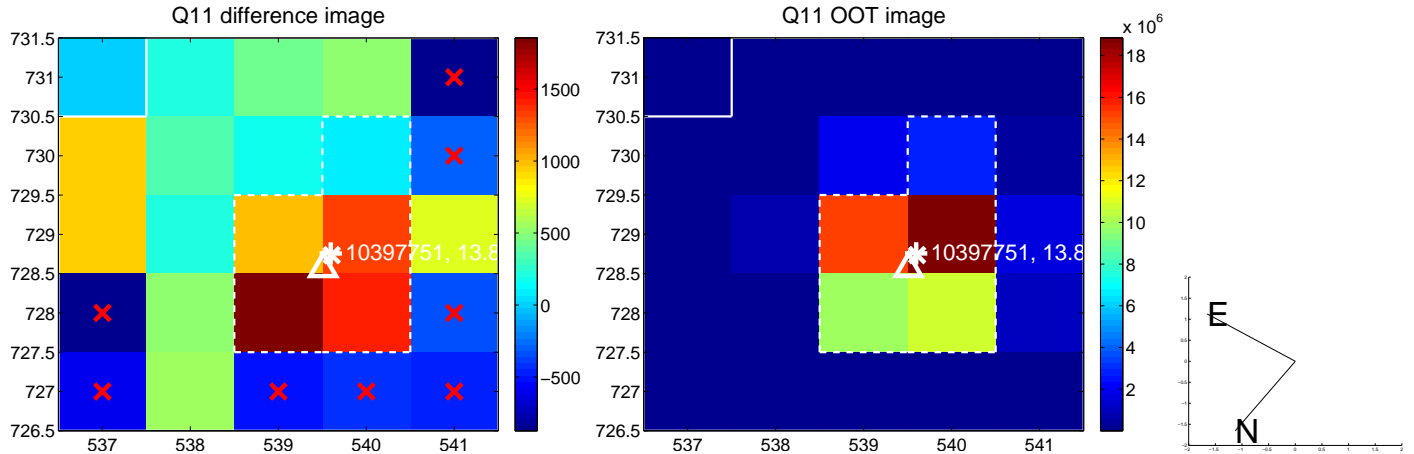
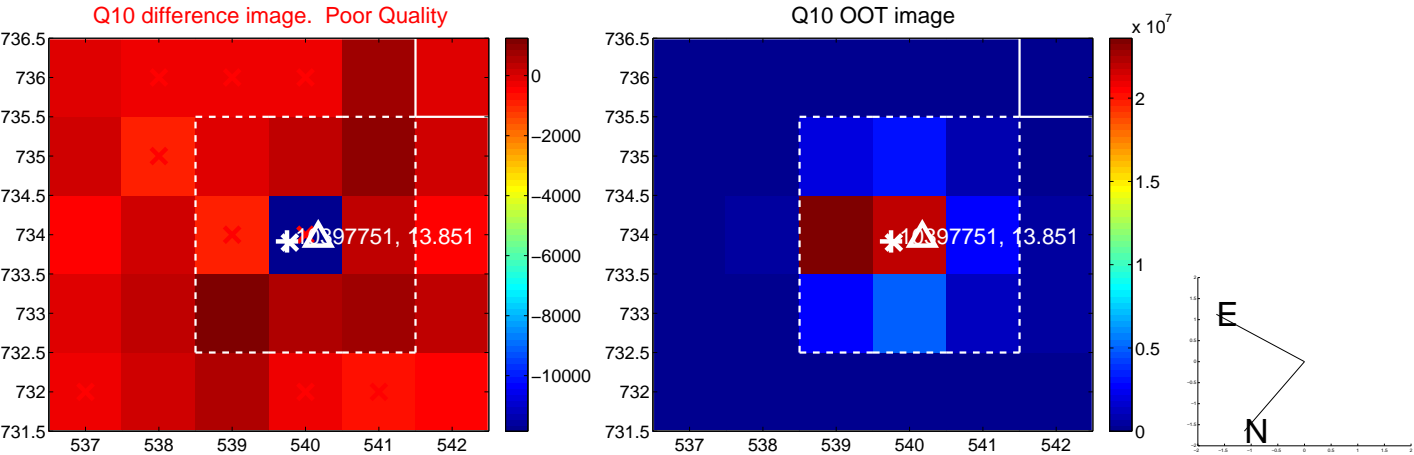
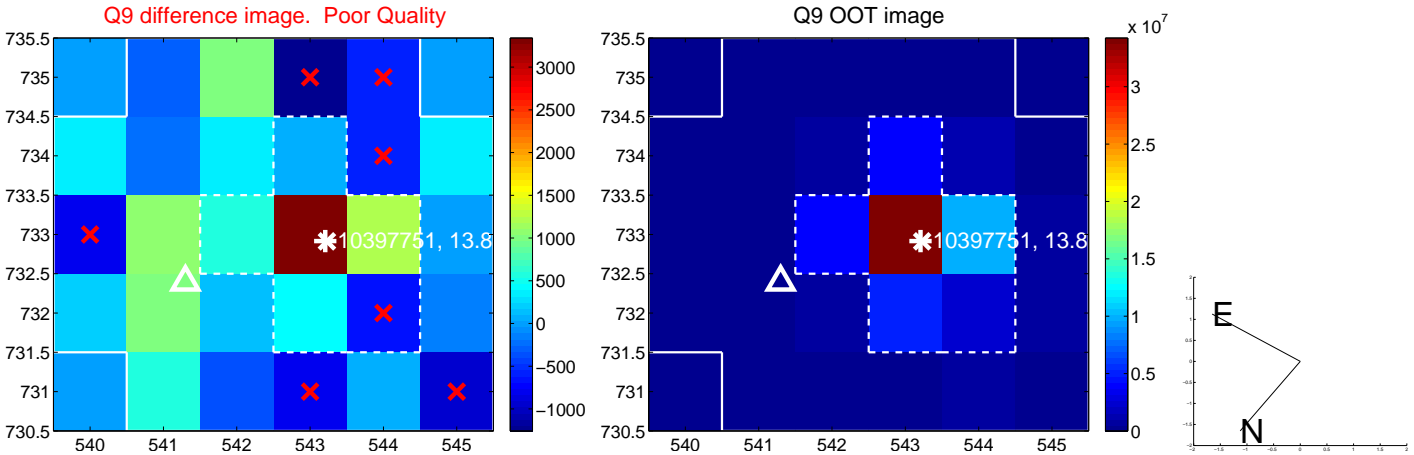


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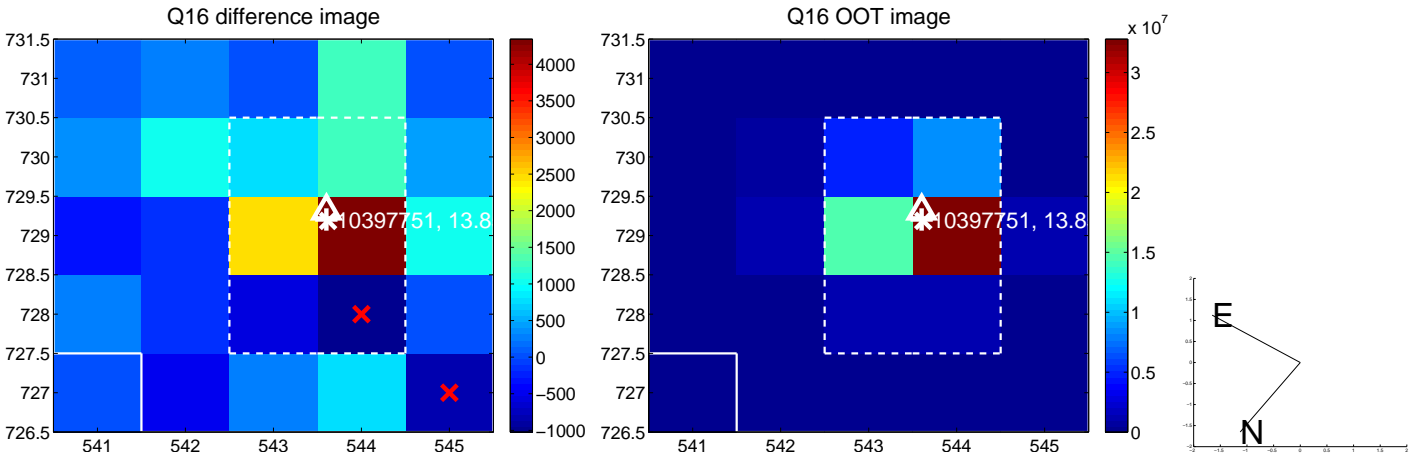
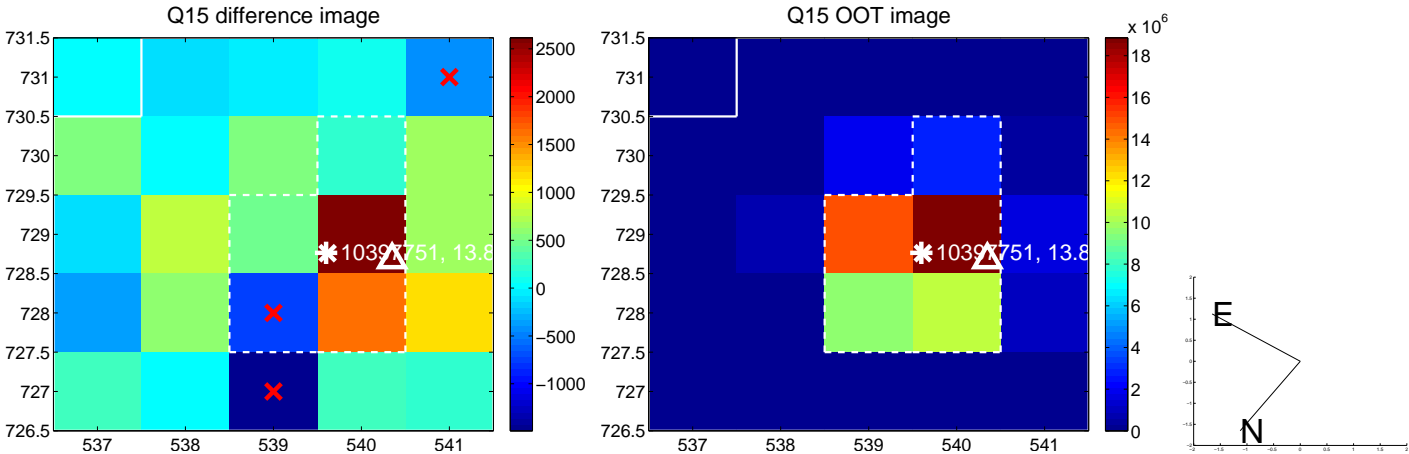
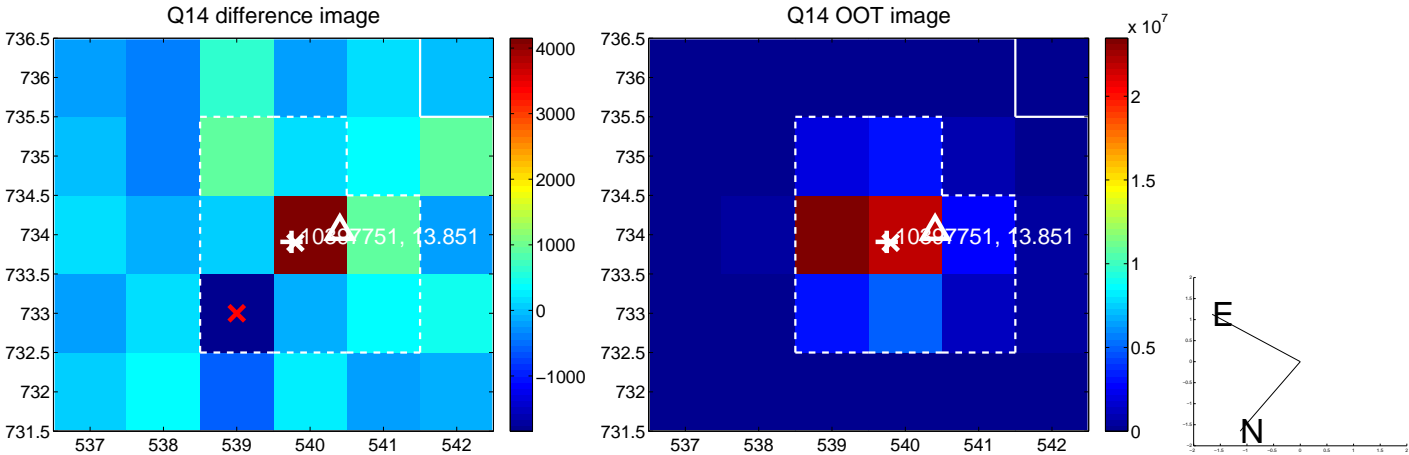
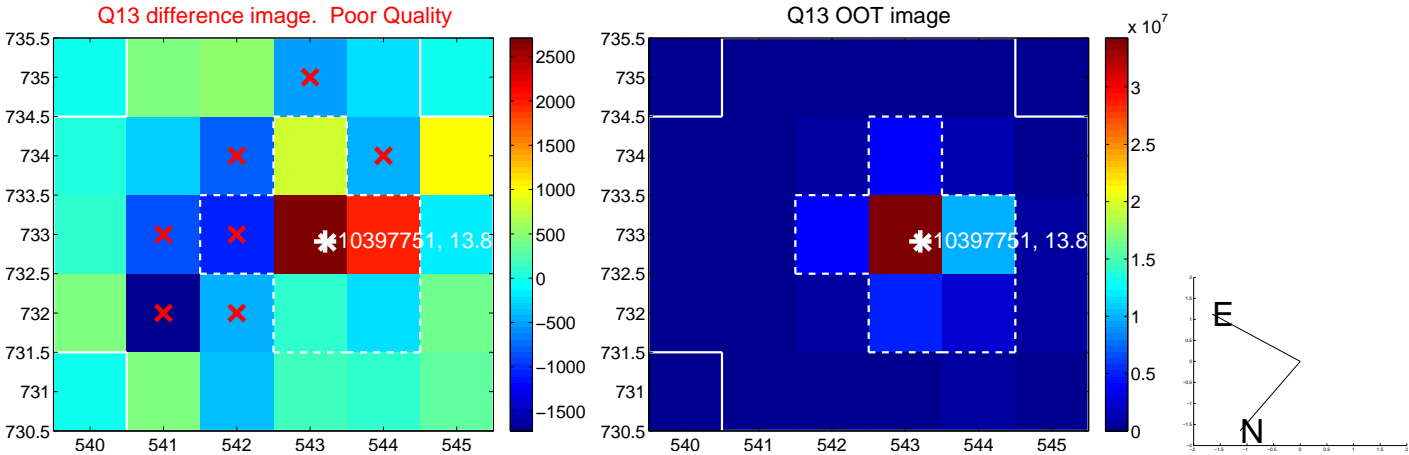




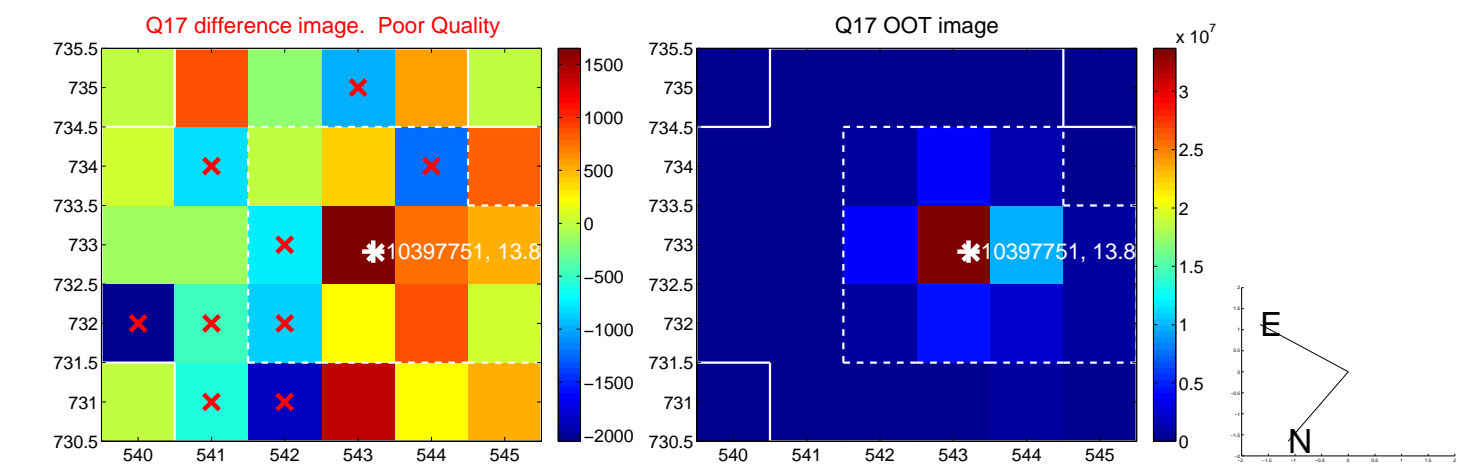
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



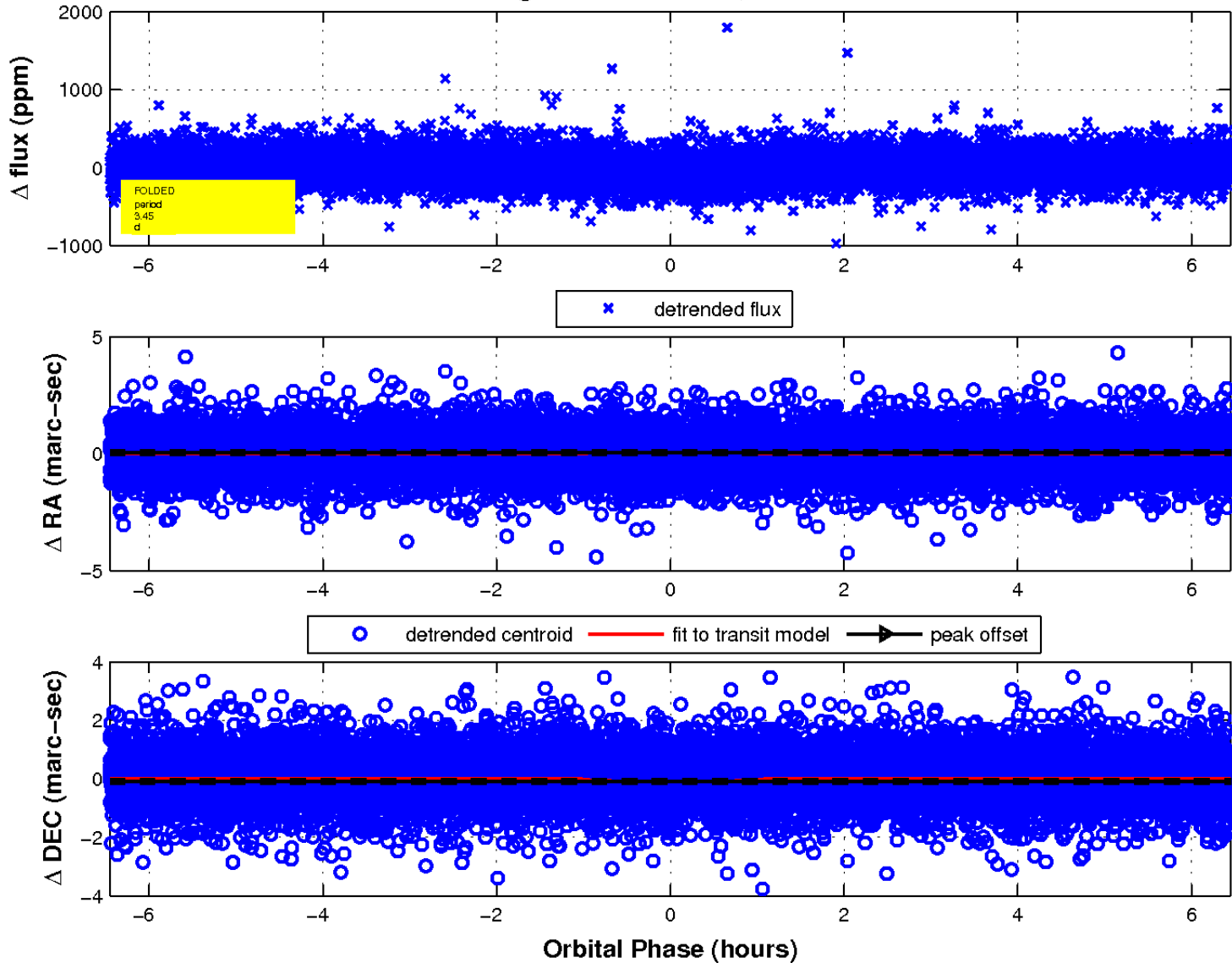
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

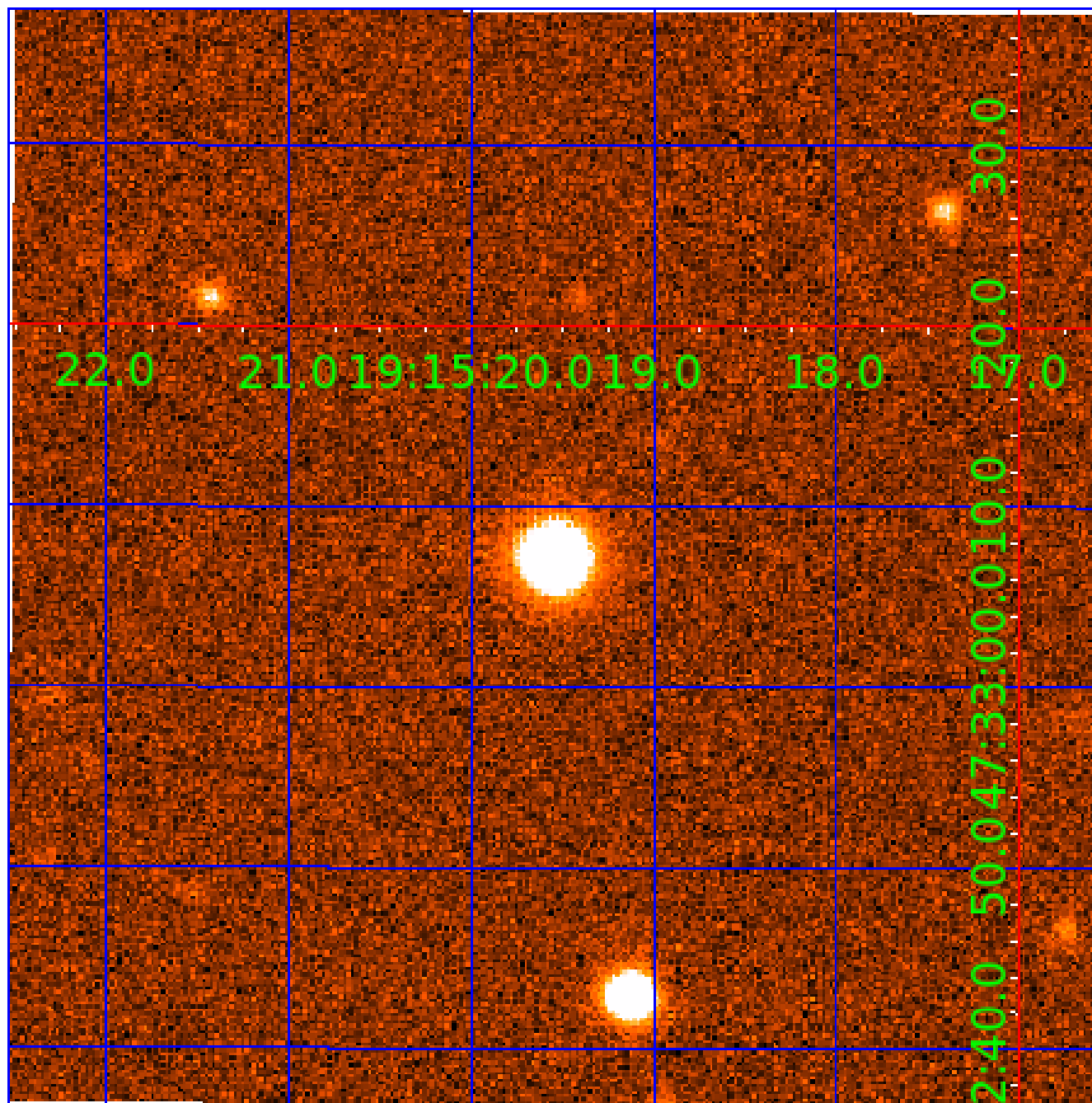


fluxWeightedCentroids, Planet 1 of 5



UKIRT Image

Declination





# KIC 010397751

## 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

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010397751-02	OBS	PC	0.83	0	0	0	0	NO_COMMENT
010397751-03	OBS	PC	0.86	0	0	0	0	NO_COMMENT
010397751-04	OBS	PC	0.96	0	0	0	0	NO_COMMENT
010397751-05	OBS	PC	1.00	0	0	0	0	NO_COMMENT

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

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

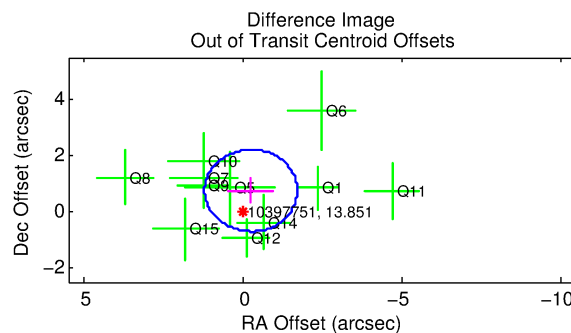
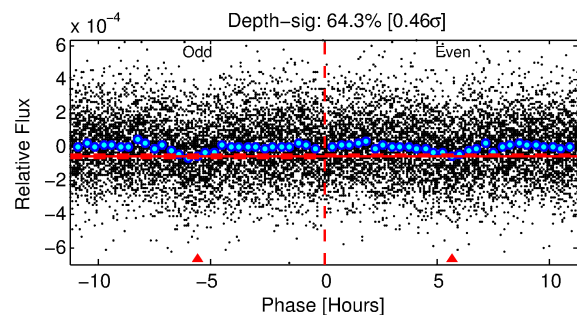
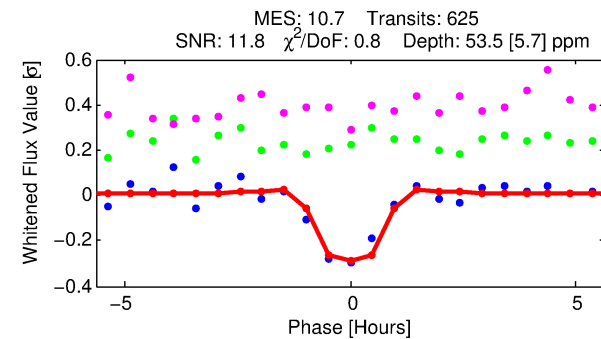
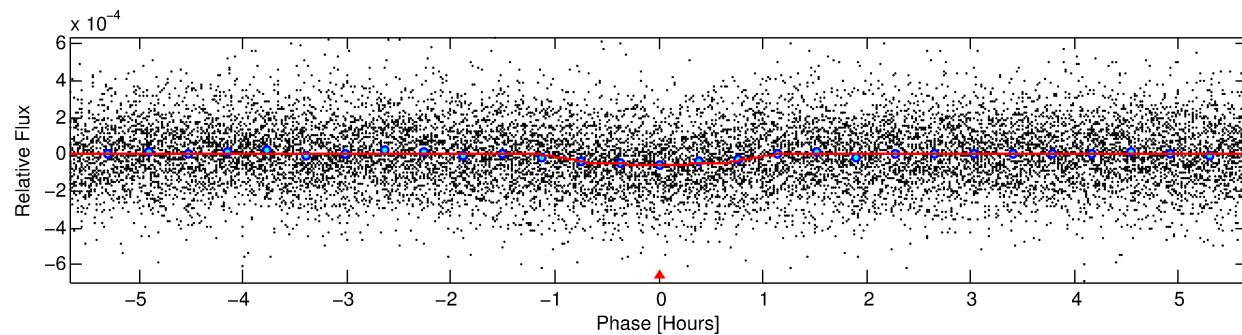
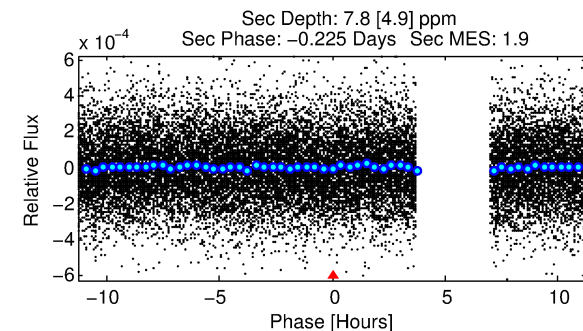
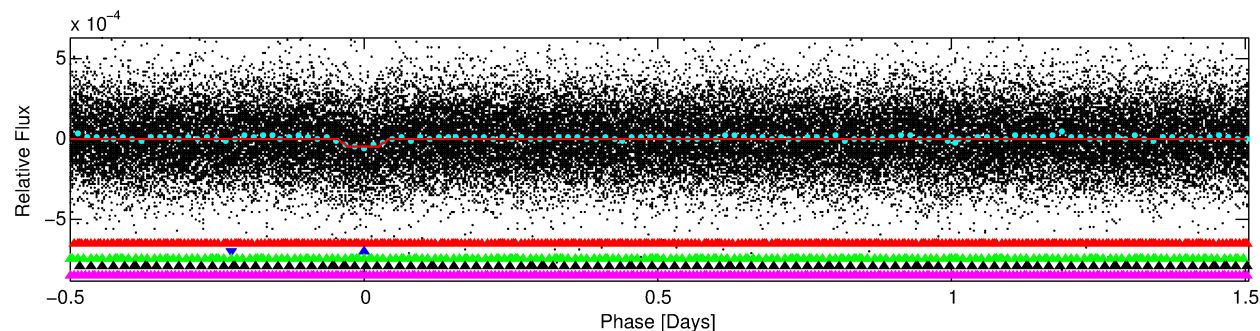
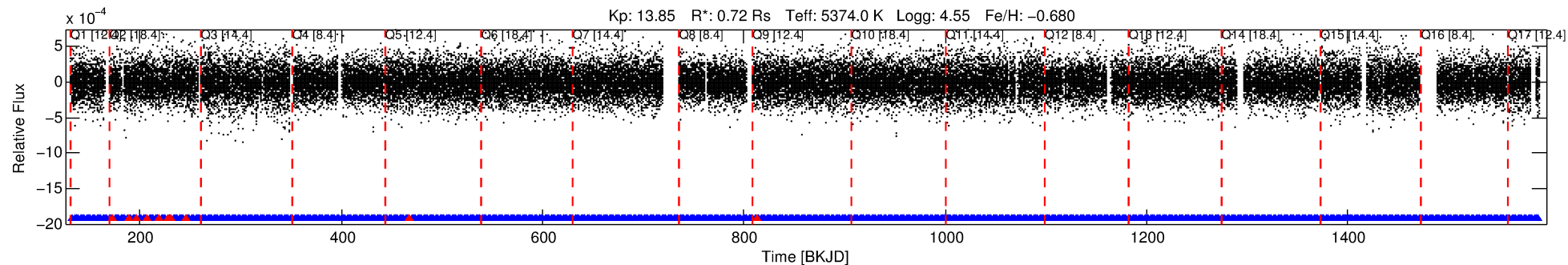
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010397751-02

No Significant Match Found

# DV One-Page Summary

KIC: 10397751 Candidate: 2 of 5 Period: 2.005 d  
KOI: K02859.02 Corr: 0.841



## DV Fit Results:

Period = 2.00547 [0.00001] d  
Epoch = 133.2348 [0.0024] BKJD  
Rp/R\* = 0.0080 [0.0042]  
a/R\* = 3.85 [8.77]  
b = 0.90 [0.55]  
Seff = 518.11 [101.24]  
Teq = 1217 [59] K  
Rp = 0.63 [0.34] Re  
a = 0.0274 [0.0028] AU  
Ag = 8.22 [10.09] [0.72σ]  
Teffp = 3184 [974] K [2.02σ]

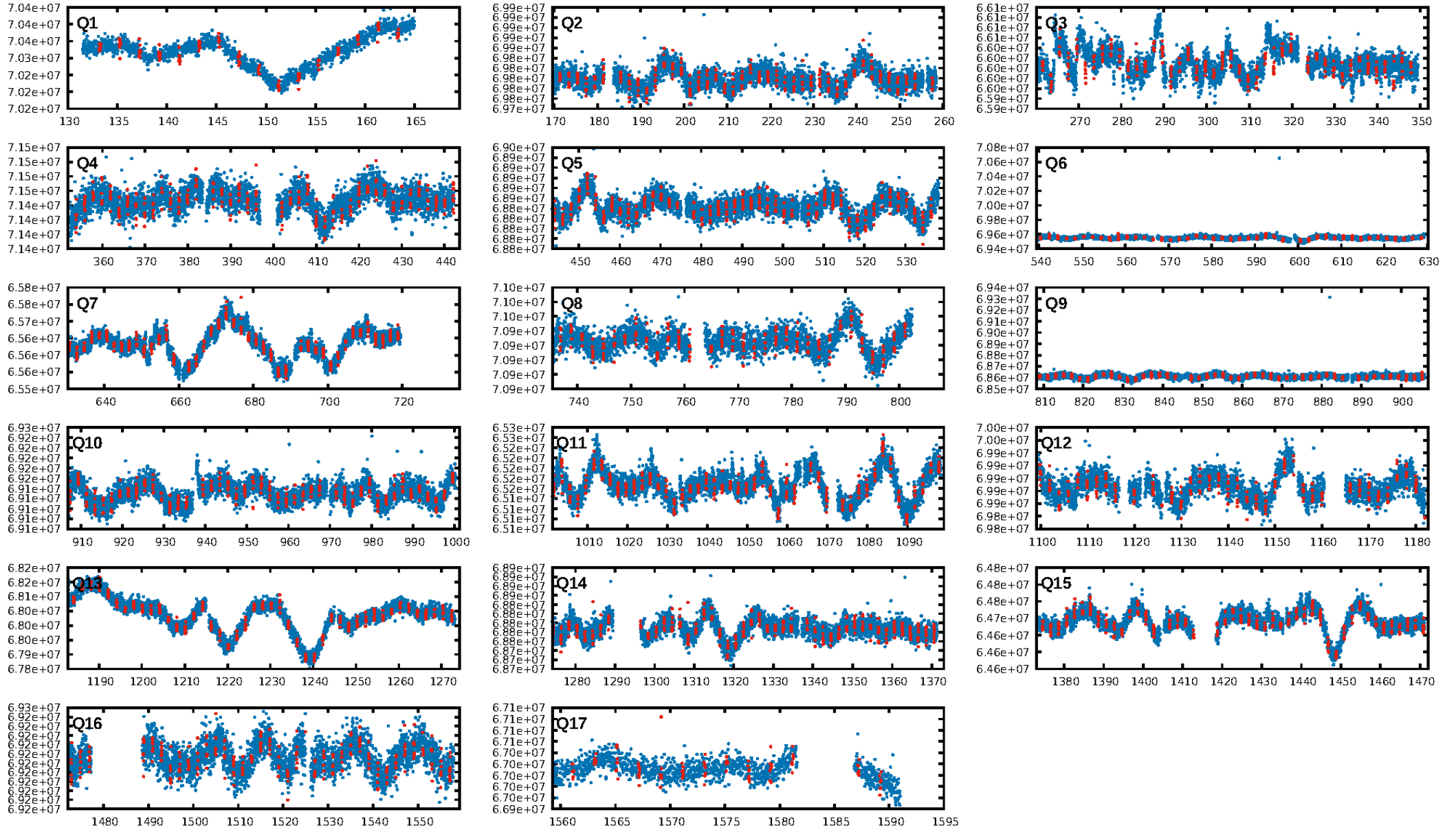
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [7.30σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGoF-sig: N/A  
Bootstrap-pfa: 2.97e-26  
RollingBand-fgt: 0.98 [587/597]  
GhostDiagnostic-chr: -9.341  
Centroid-sig: 40.9%  
Centroid-so: 0.760 arcsec [0.79σ]  
OotOffset-rm: 0.793 arcsec [1.63σ]  
KicOffset-rm: 0.954 arcsec [2.41σ]  
OotOffset-st: 3/3/2/3 [11]  
KicOffset-st: 3/3/2/3 [11]  
DiffImageQuality-fgm: 0.64 [7/11]  
DiffImageOverlap-fno: 1.00 [17/17]

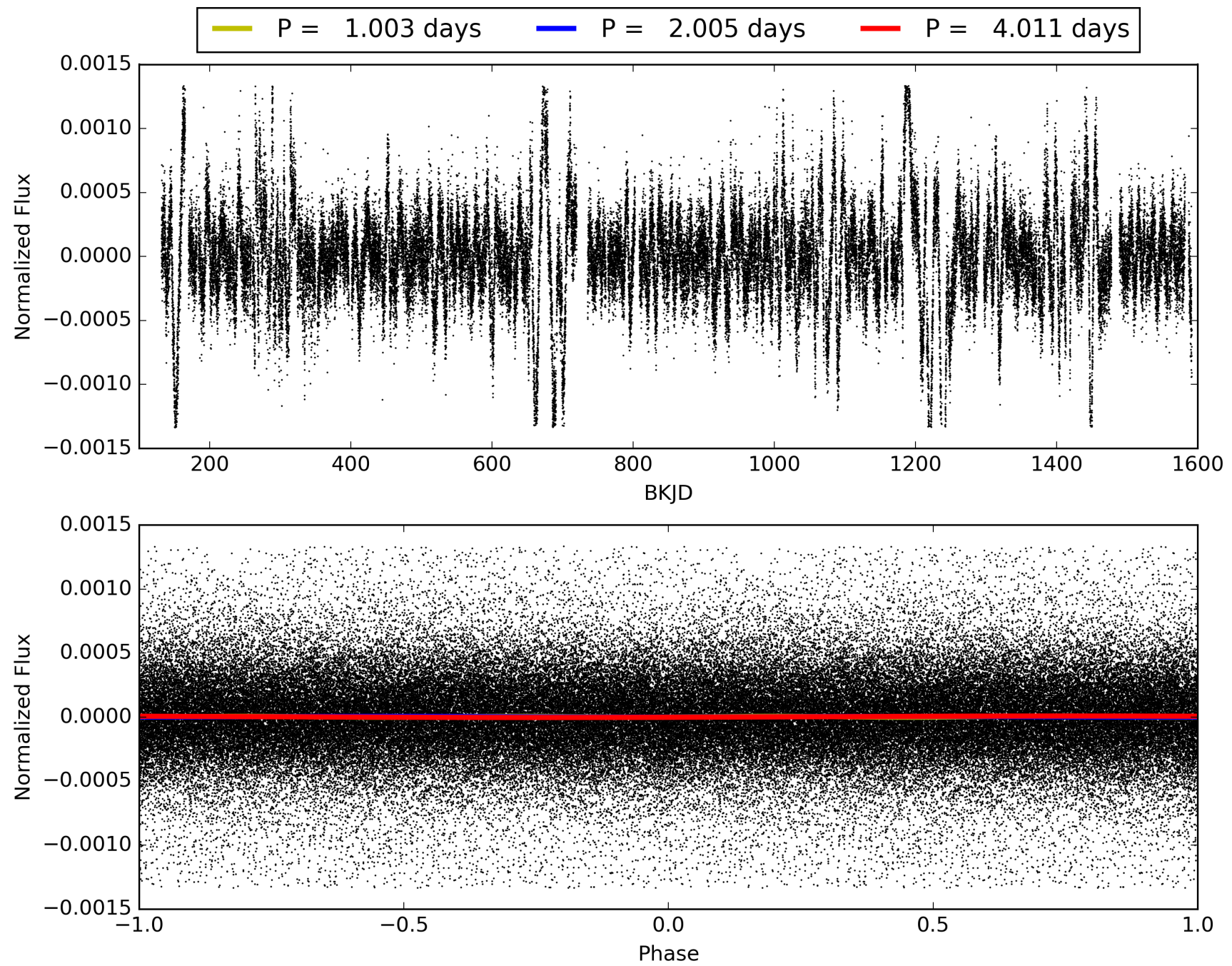
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 16:55:39 Z

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

# TCE 010397751-02, PDC Light Curves



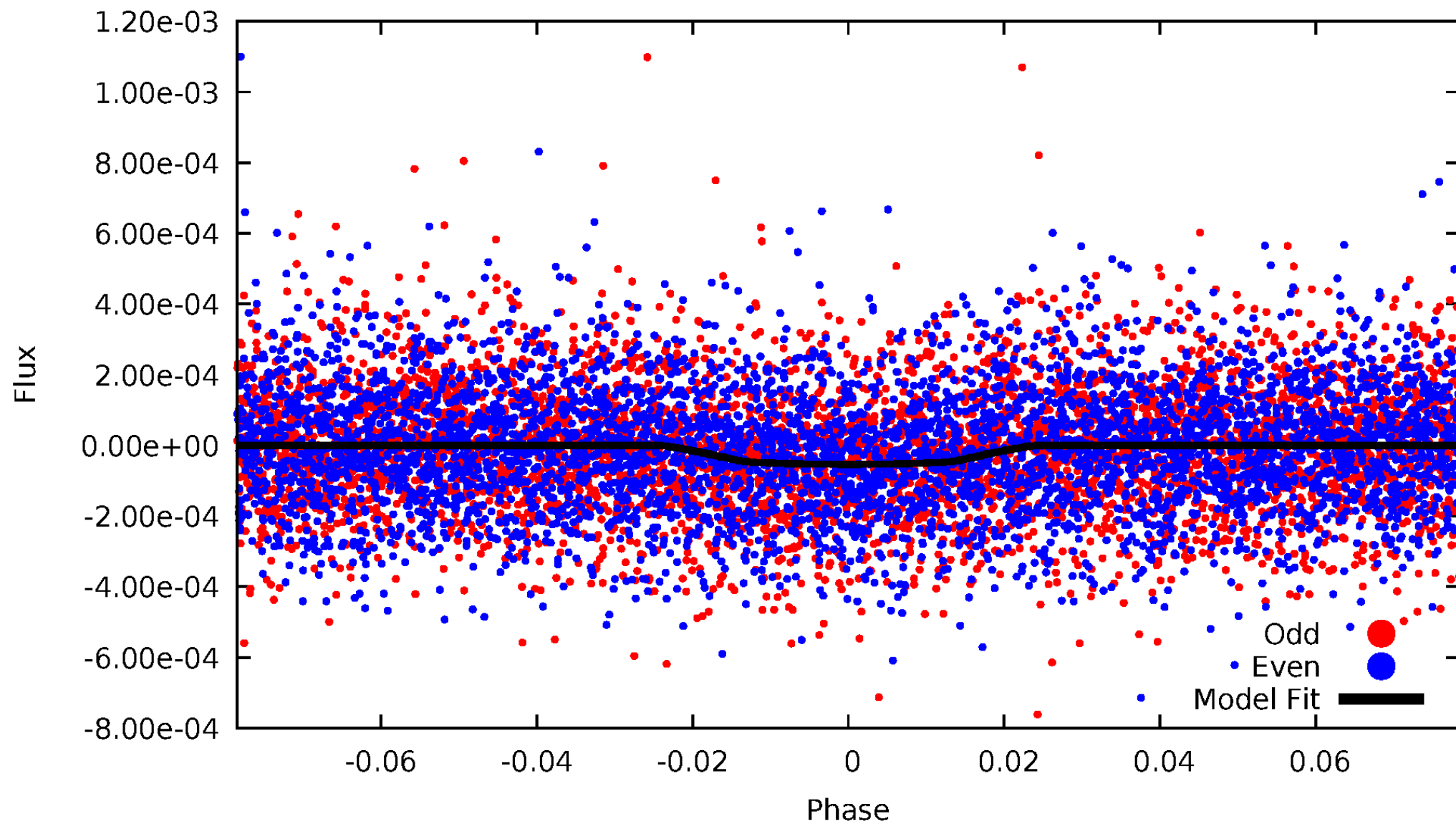
TCE 010397751-02





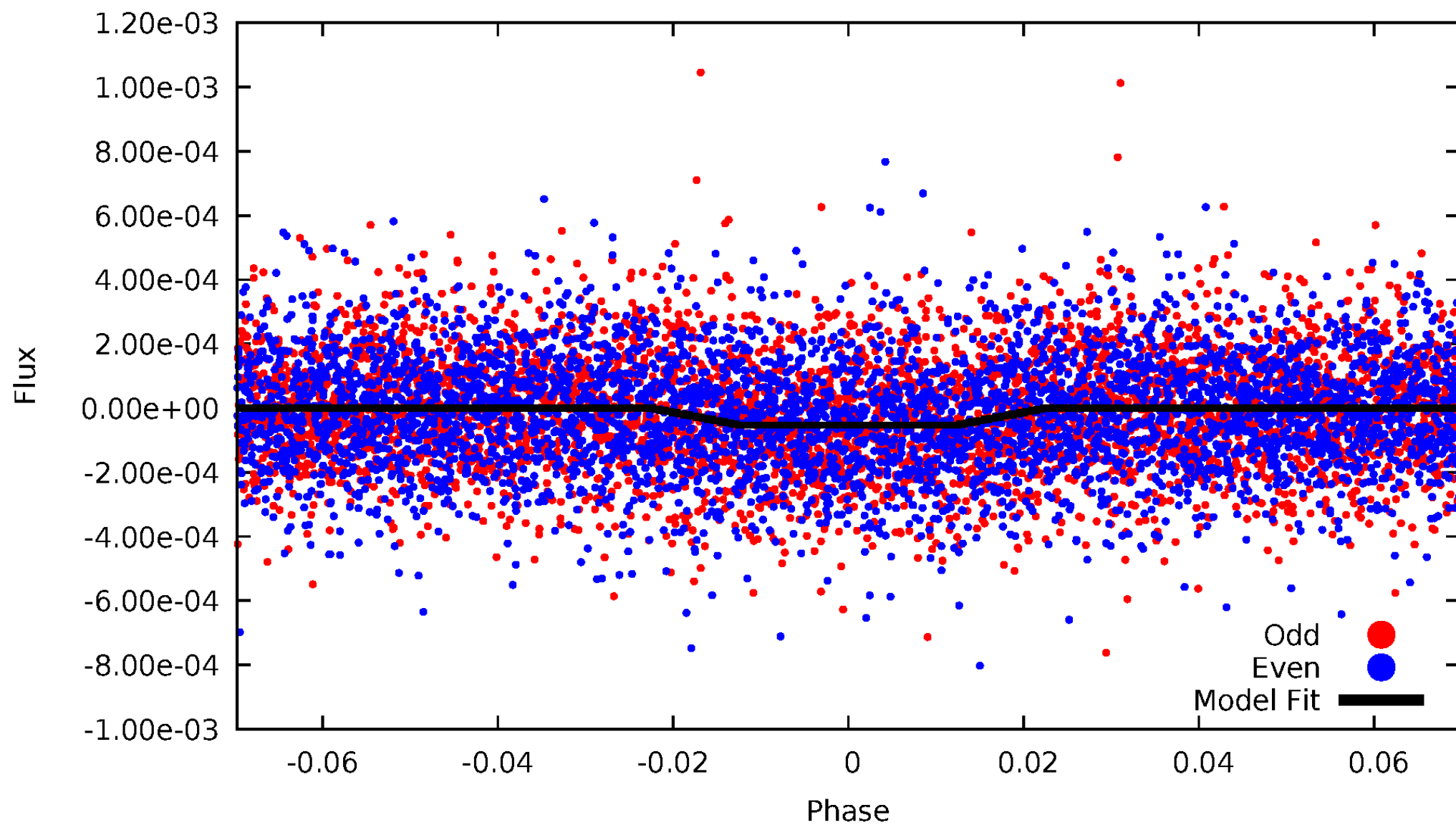
# DV Odd/Even

TCE 010397751-02



# ALT Odd/Even

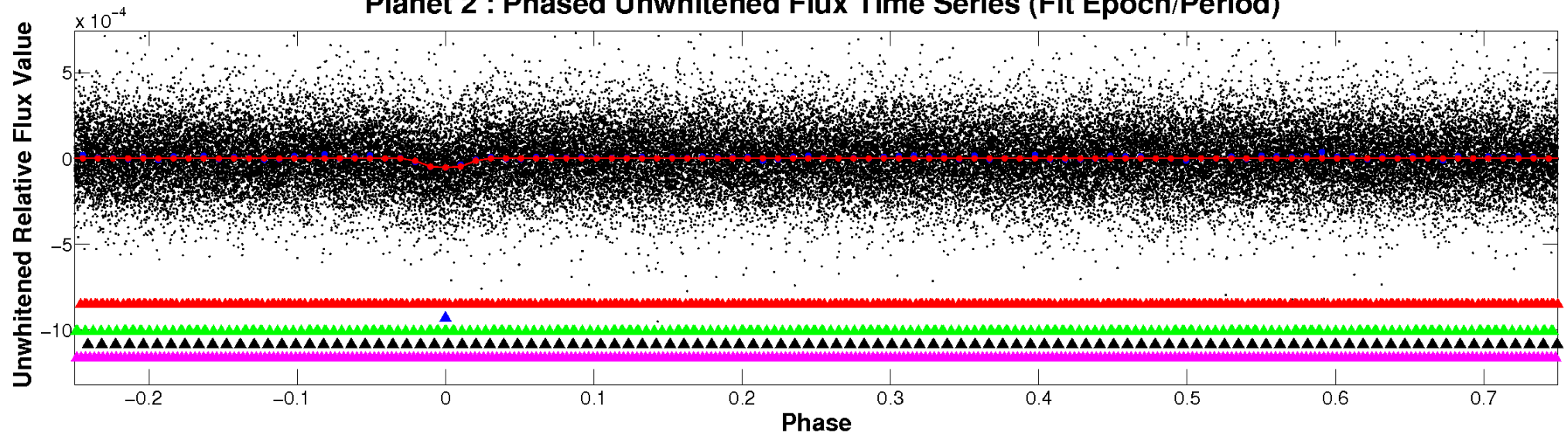
TCE 010397751-02



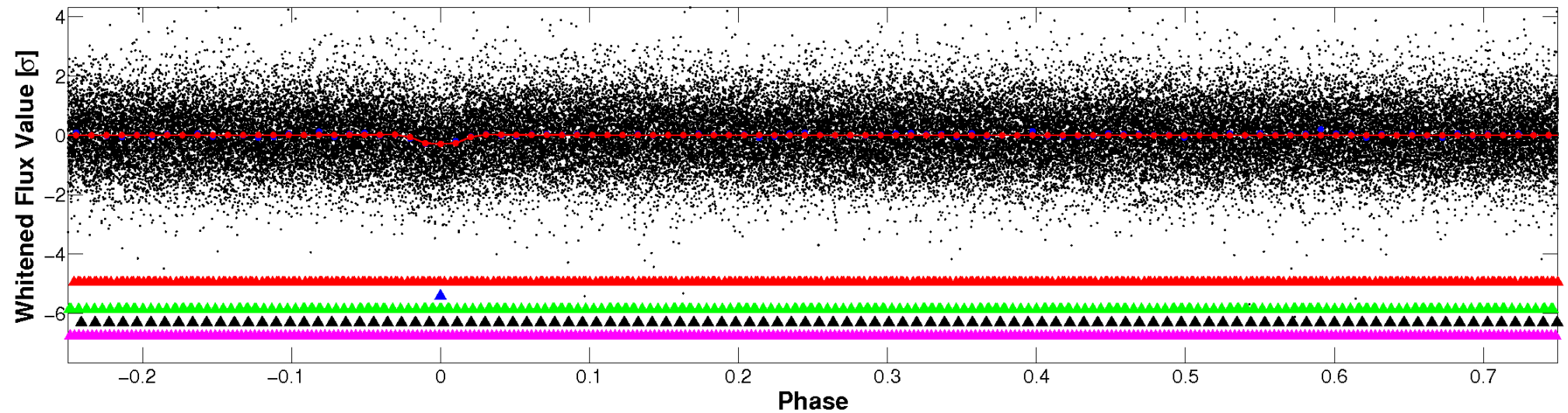


# Non-Whitened Vs. Whitened Light Curve

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

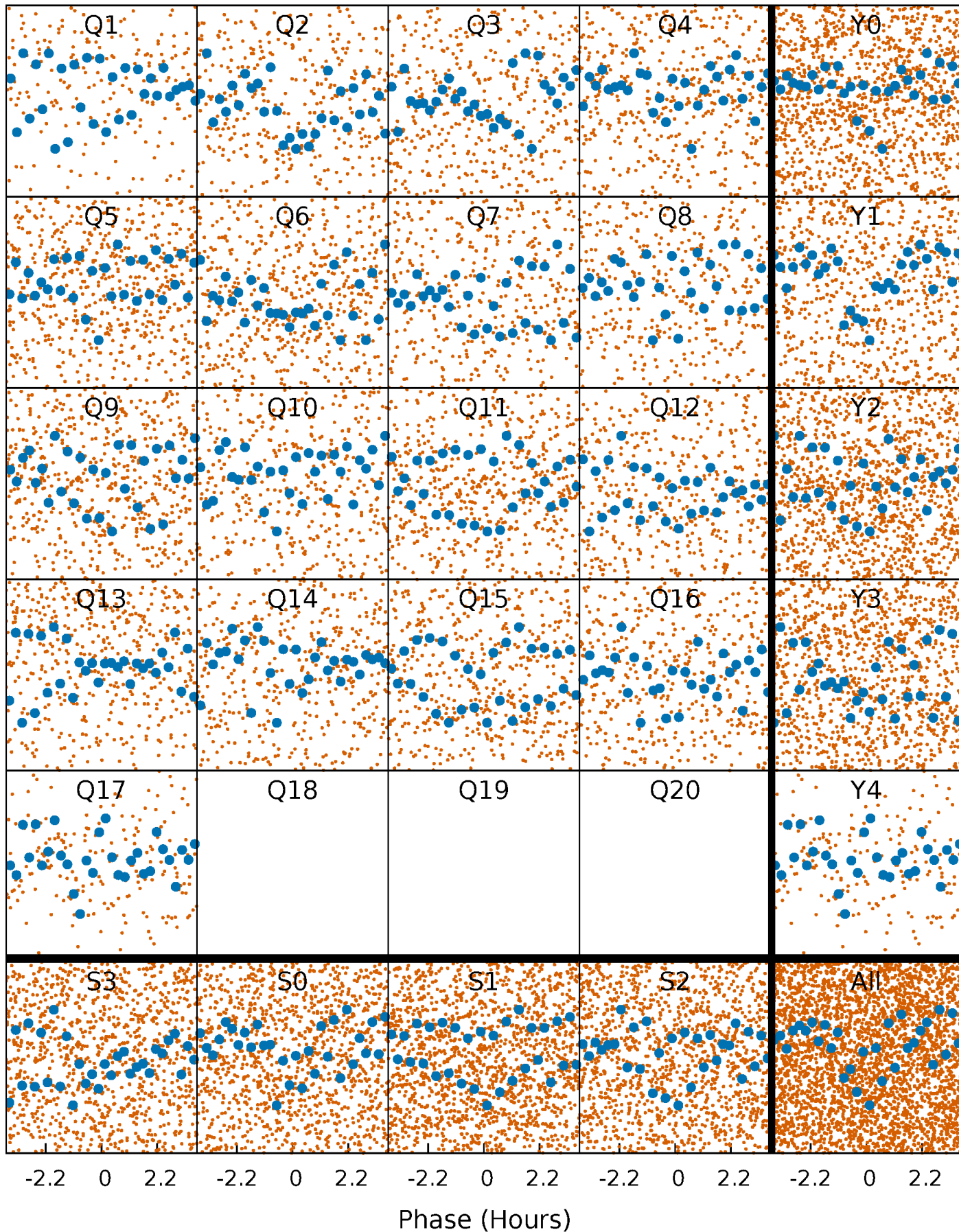


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



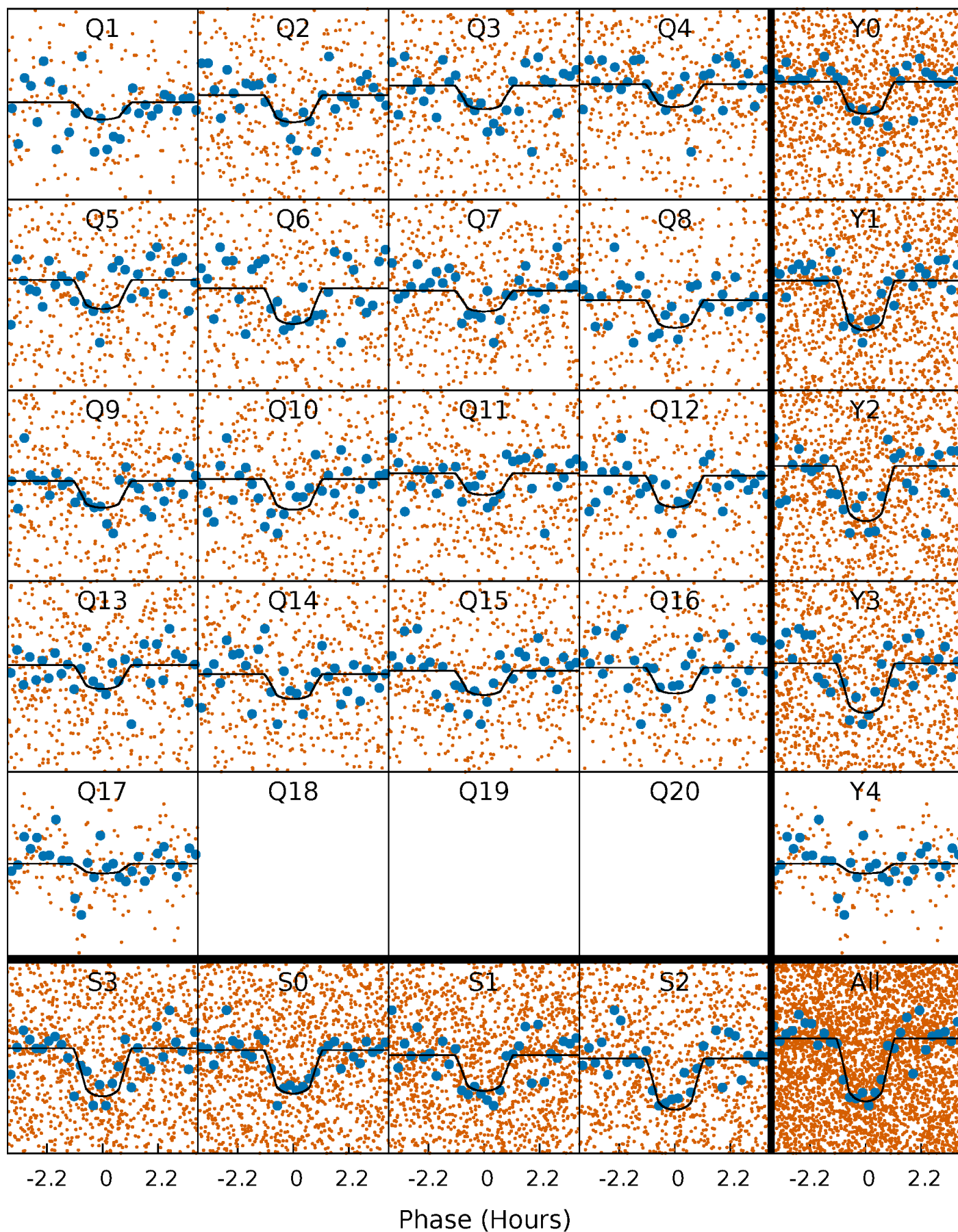
# PDC Quarter-Phased Transit Curves

TCE 010397751-02 P= 2.005467 Days  $T_0=133.234777$  (BKJD)



# DV Quarter-Phased Transit Curves

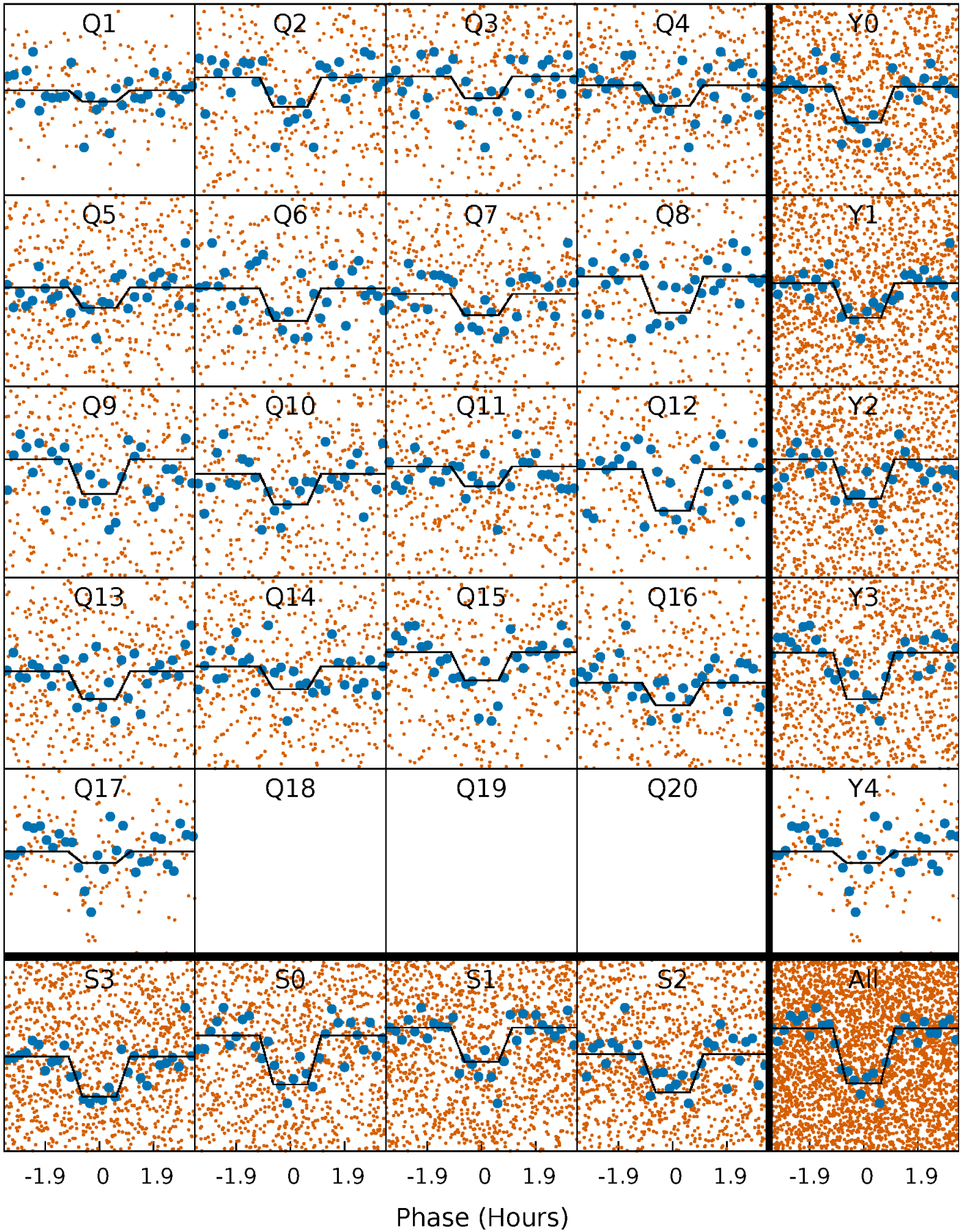
TCE 010397751-02 P= 2.005467 Days  $T_0=133.234777$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

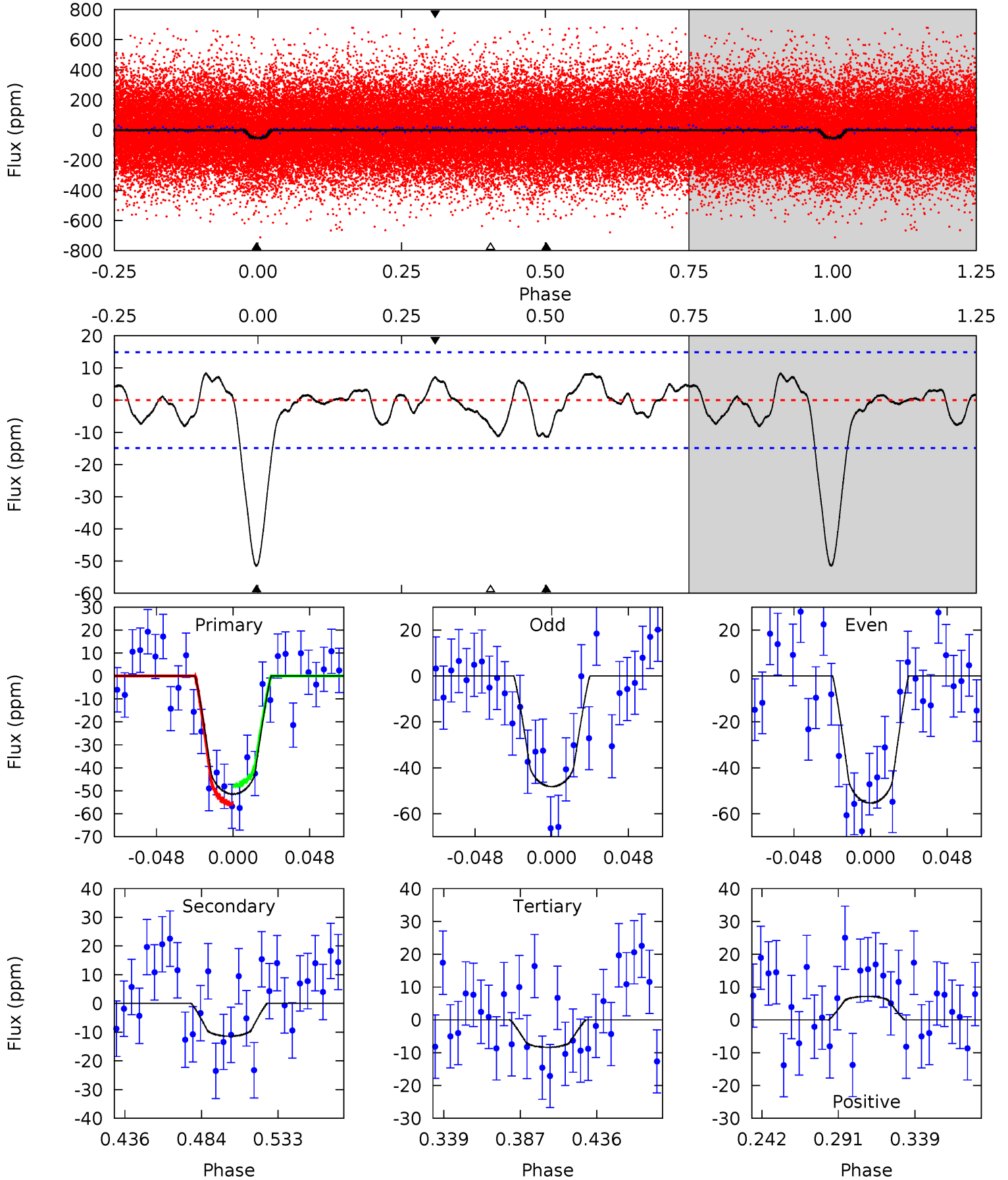
TCE 010397751-02     $P = 2.005424$  Days     $T_0 = 133.242218$  (BKJD)



# DV Model-Shift Uniqueness Test

010397751-02, P = 2.005467 Days, E = 131.229310 Days

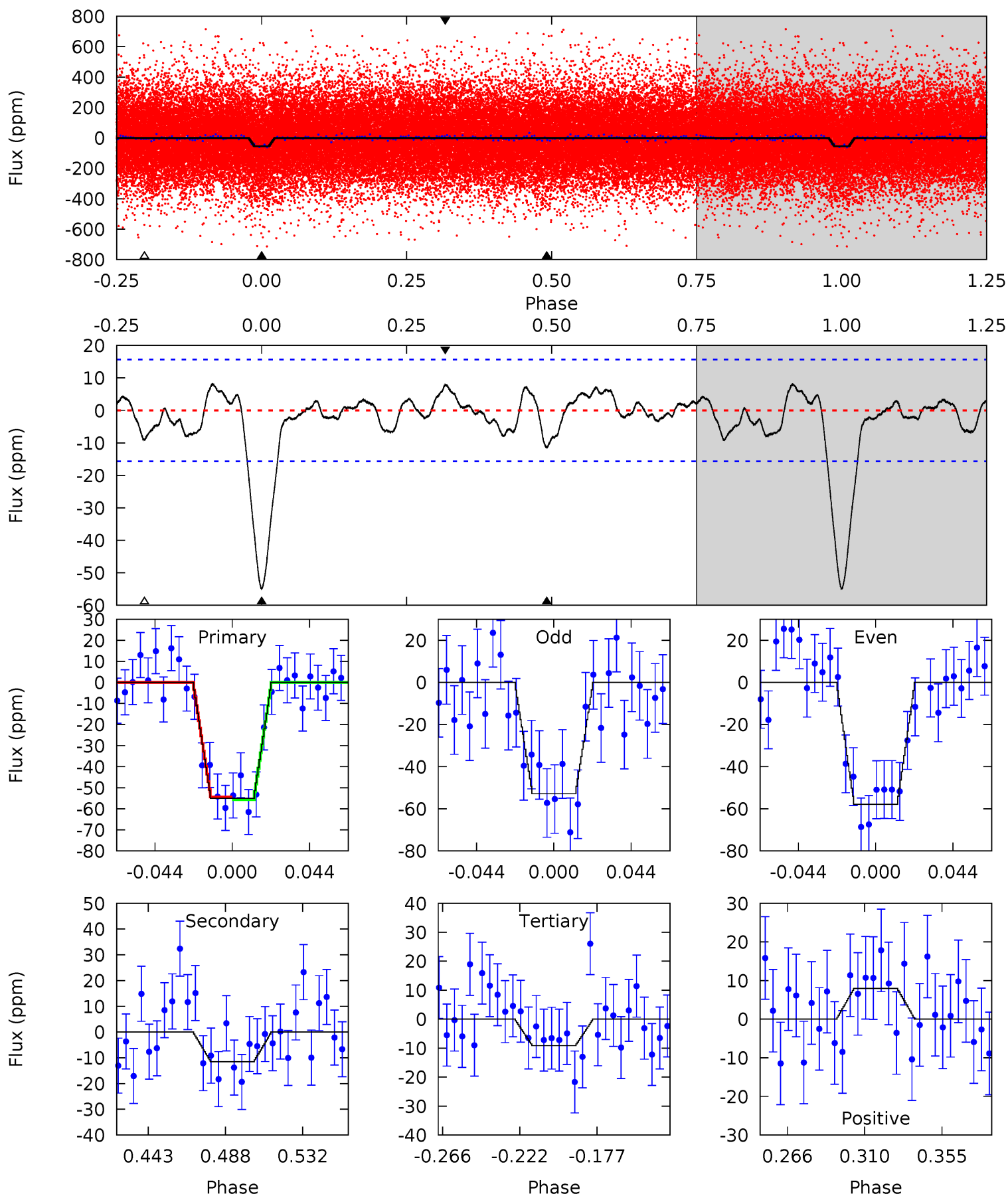
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
16.3	3.61	2.65	2.26	4.71	1.97	1.39	13.6	14.0	0.96	1.35	1.13	1.05	0.14	1.27



# Alt Model-Shift Uniqueness Test

010397751-02, P = 2.005424 Days, E = 131.236794 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
16.6	3.48	2.76	2.41	4.73	2.01	1.18	13.8	14.2	0.72	1.07	0.76	0.91	0.13	0.18





### Stellar Parameters For KIC 010397751

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5374^{+160}_{-144}$	$4.555^{+0.088}_{-0.064}$	$-0.680^{+0.300}_{-0.300}$	$0.721^{+0.082}_{-0.073}$	$0.680^{+0.086}_{-0.034}$	$2.557^{+0.950}_{-0.582}$
	+3%/-3%	+2%/-1%	+44%/-44%	+11%/-10%	+13%/-5%	+37%/-23%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 010397751-02 / KOI 2859.02

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-11 \pm 3$	$0.62^{+0.32}_{-0.33}$	$1695^{+66}_{-68}$	$3817^{+1276}_{-542}$	$12^{+41}_{-7}$
Alt.	$-12 \pm 3$	$0.61^{+0.32}_{-0.32}$	$1692^{+72}_{-66}$	$3868^{+1263}_{-550}$	$13^{+42}_{-8}$

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

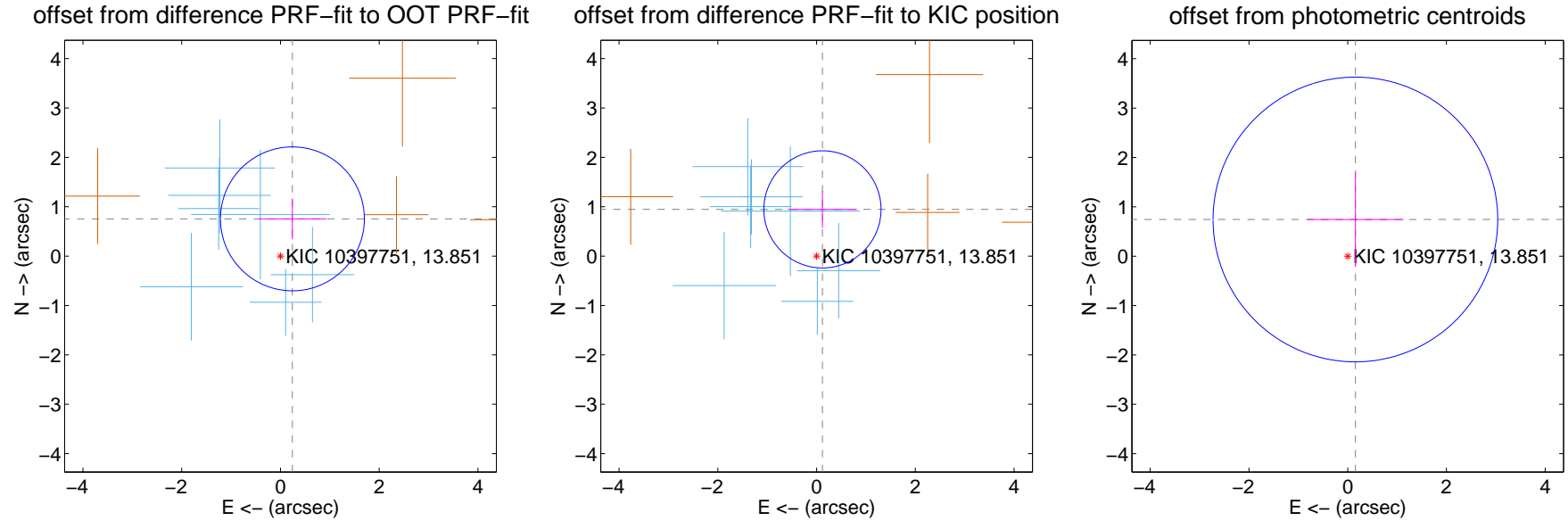
## DV Centroid Data

Supplemental centroid analysis for 010397751-02. Kepler magnitude: 13.85. Transit SNR 11.79

There are 7 quarters with good PRF difference image offsets

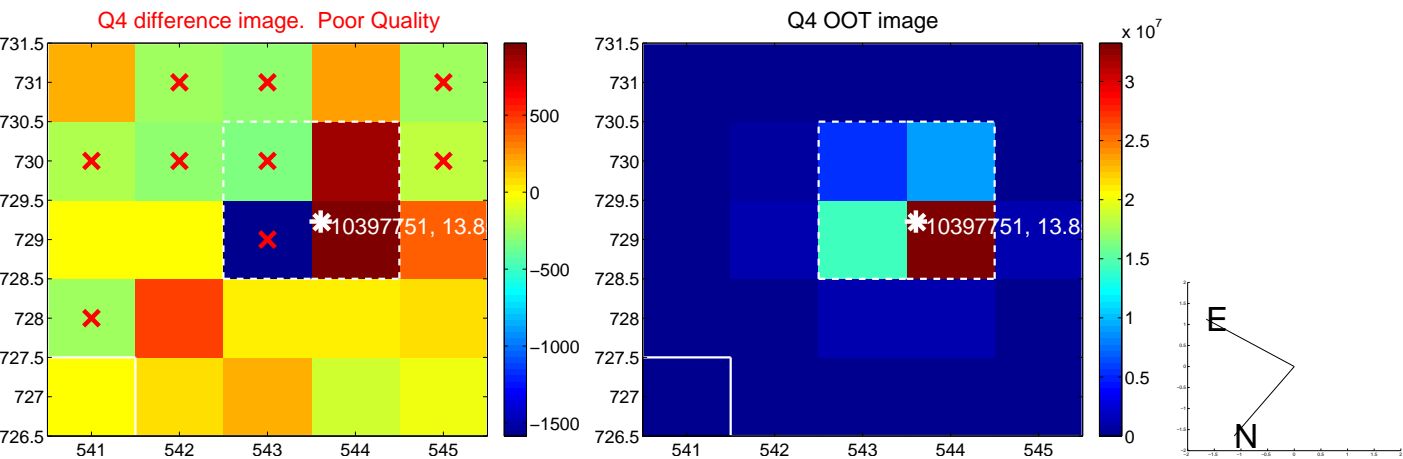
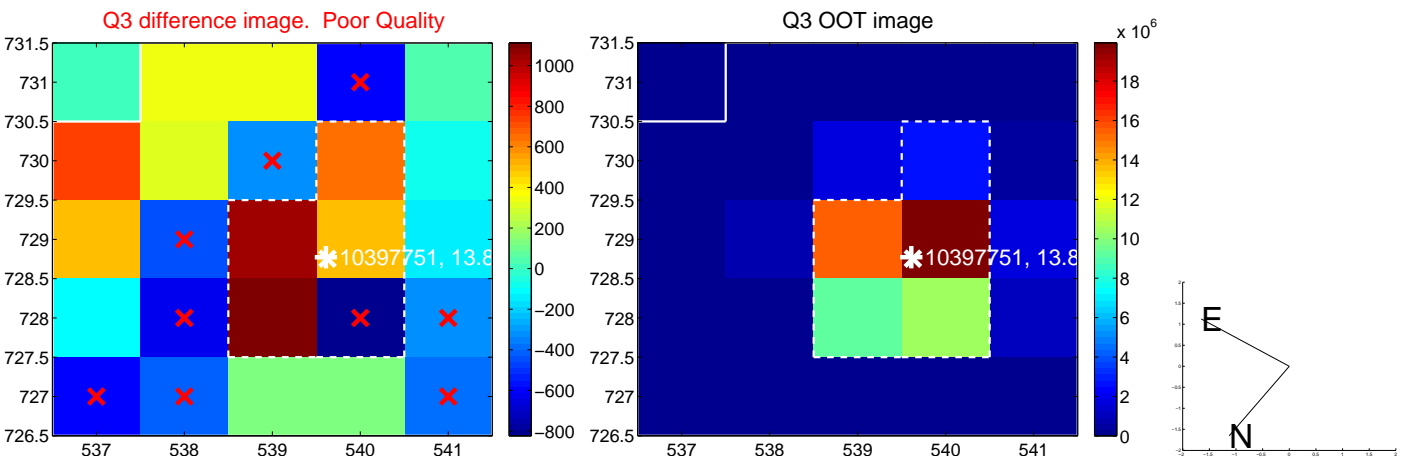
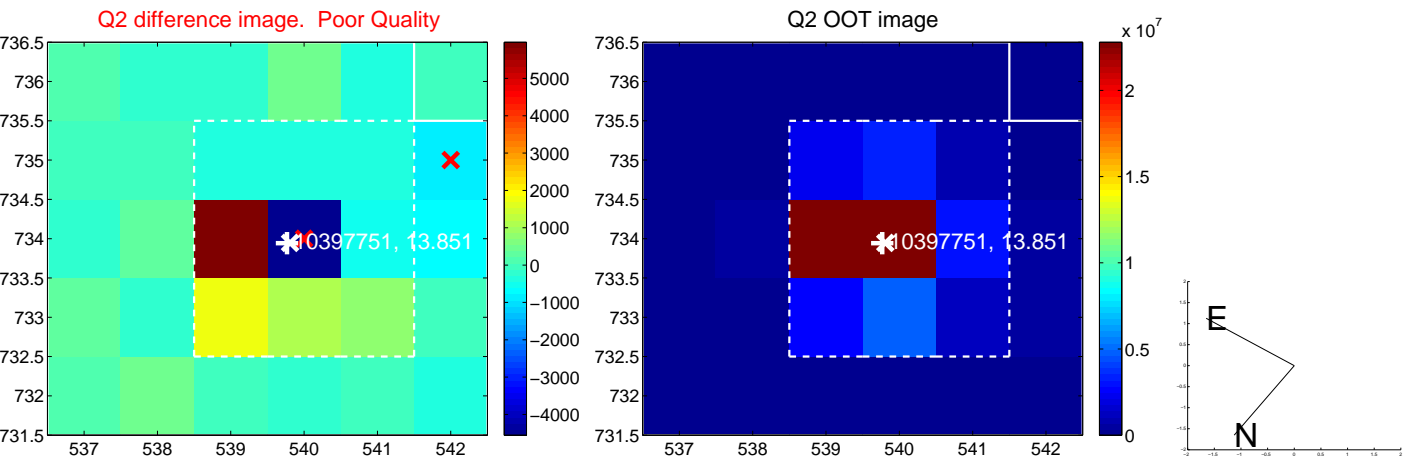
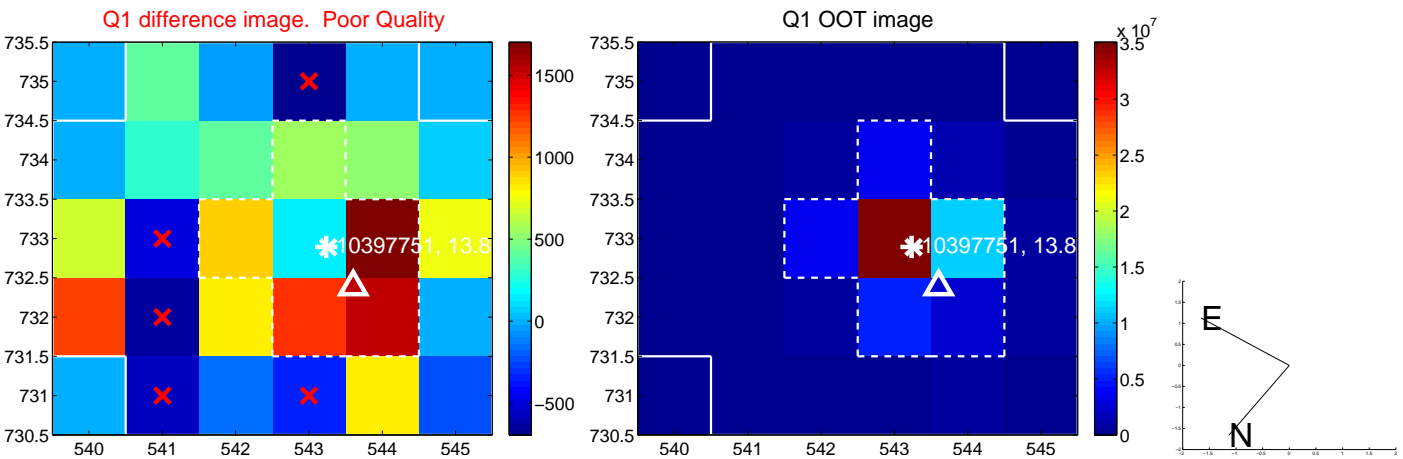
The direct PRF centroid is offset from the target star catalog position by about 0.07 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.793 \pm 0.486$	1.63	$-0.242 \pm 0.690$	$0.755 \pm 0.413$
PRF-fit source offset from KIC position	$0.954 \pm 0.396$	2.41	$-0.119 \pm 0.698$	$0.947 \pm 0.372$
photometric centroid source offset	$0.76 \pm 0.96$	0.79	$-0.16 \pm 0.98$	$0.74 \pm 0.96$

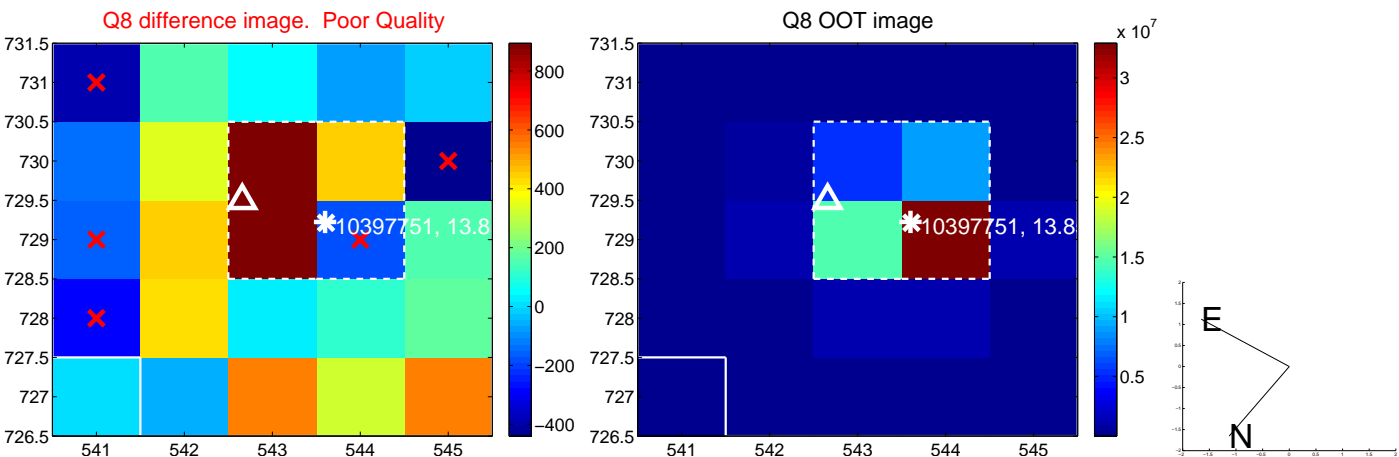
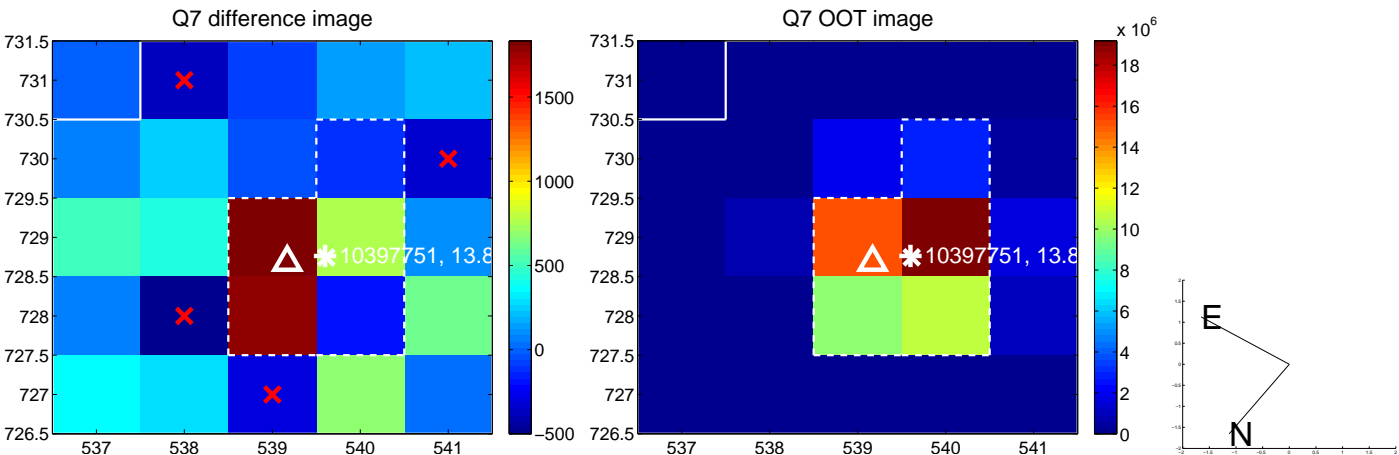
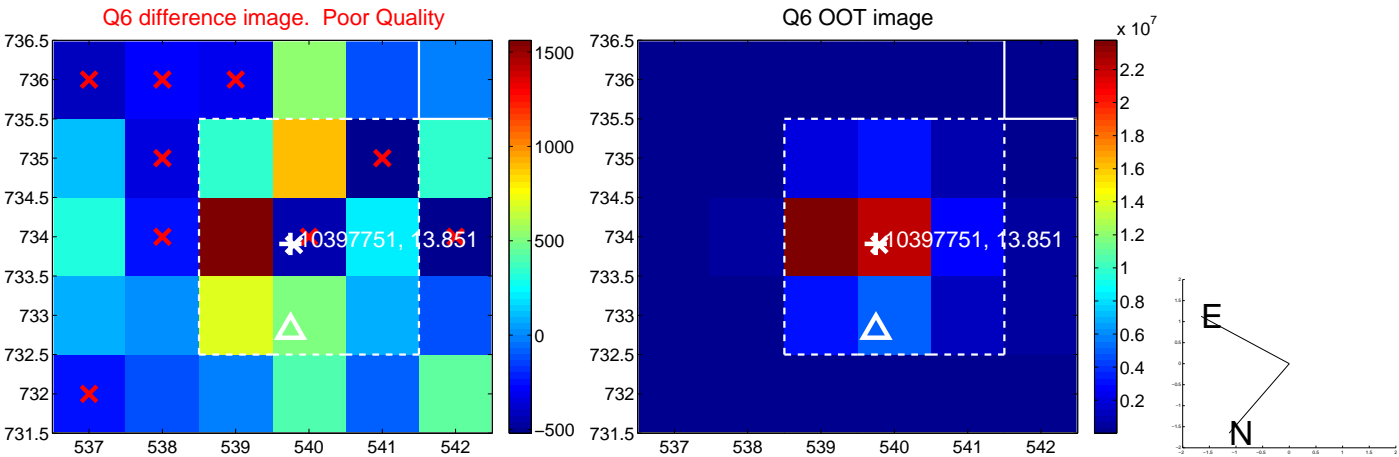
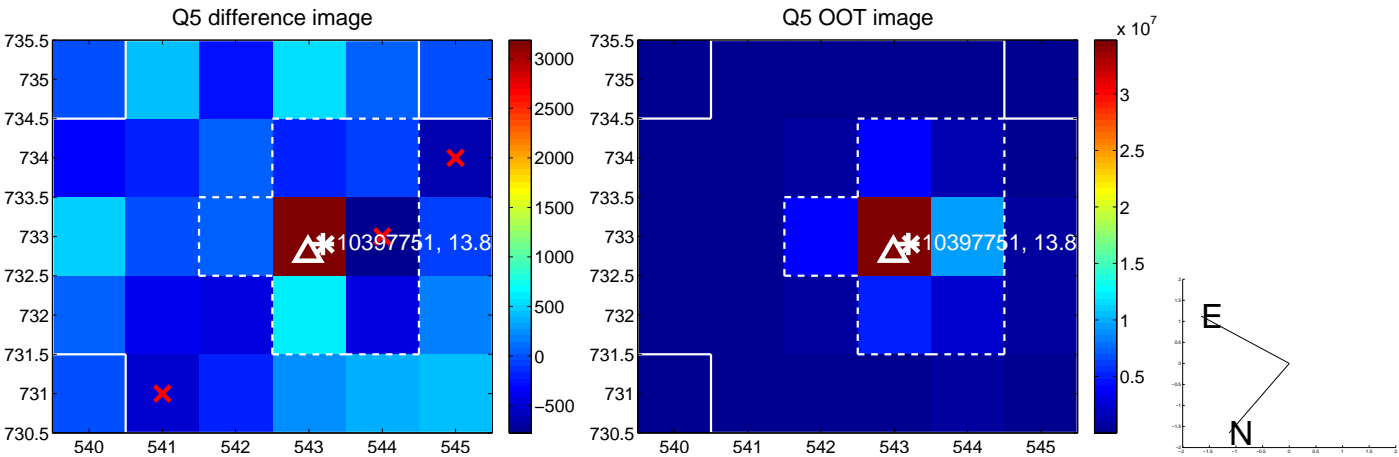


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

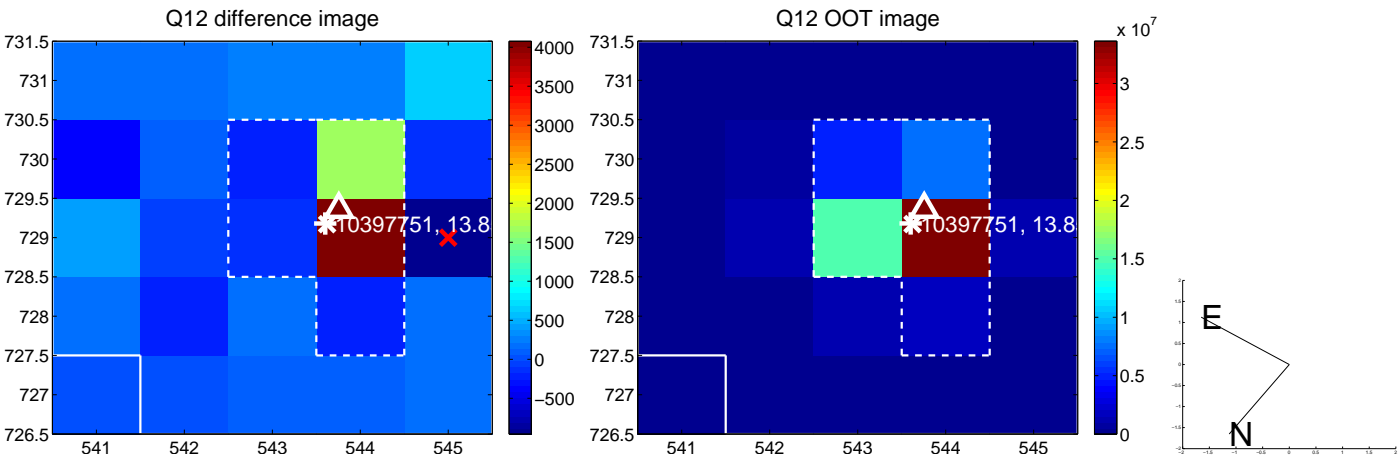
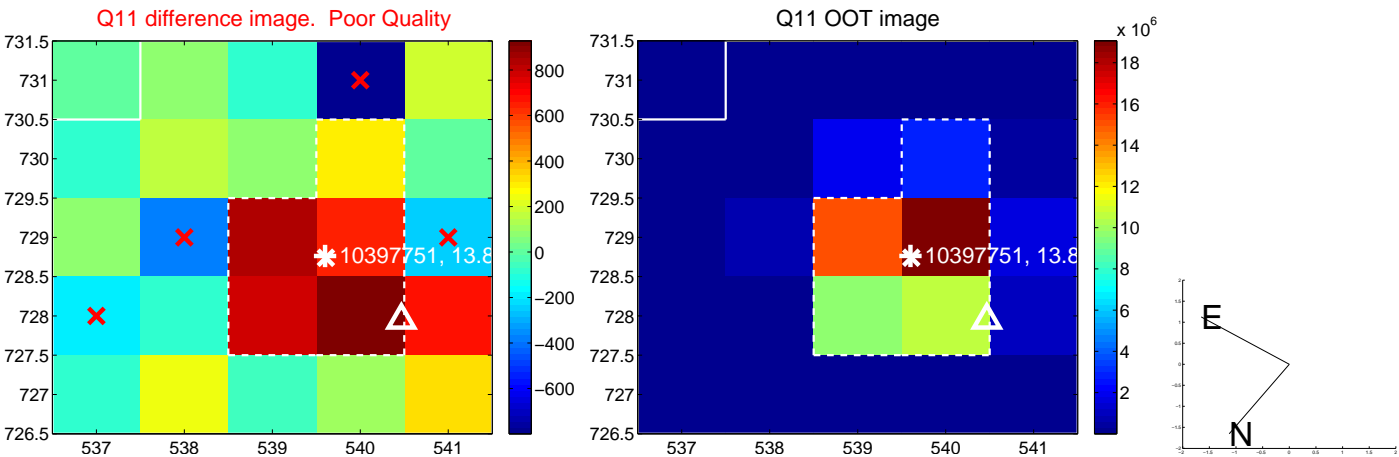
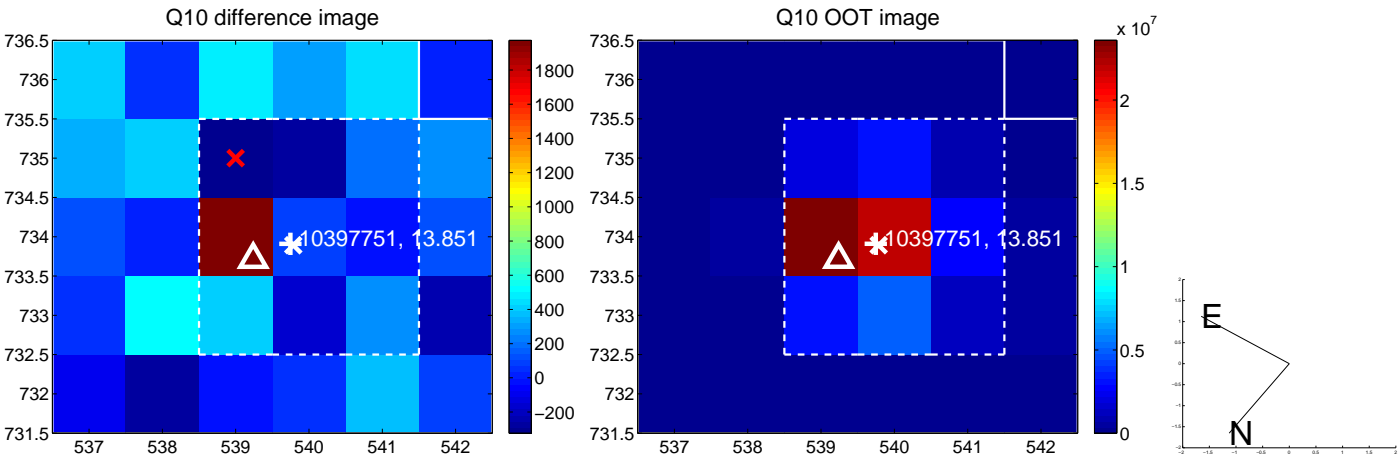
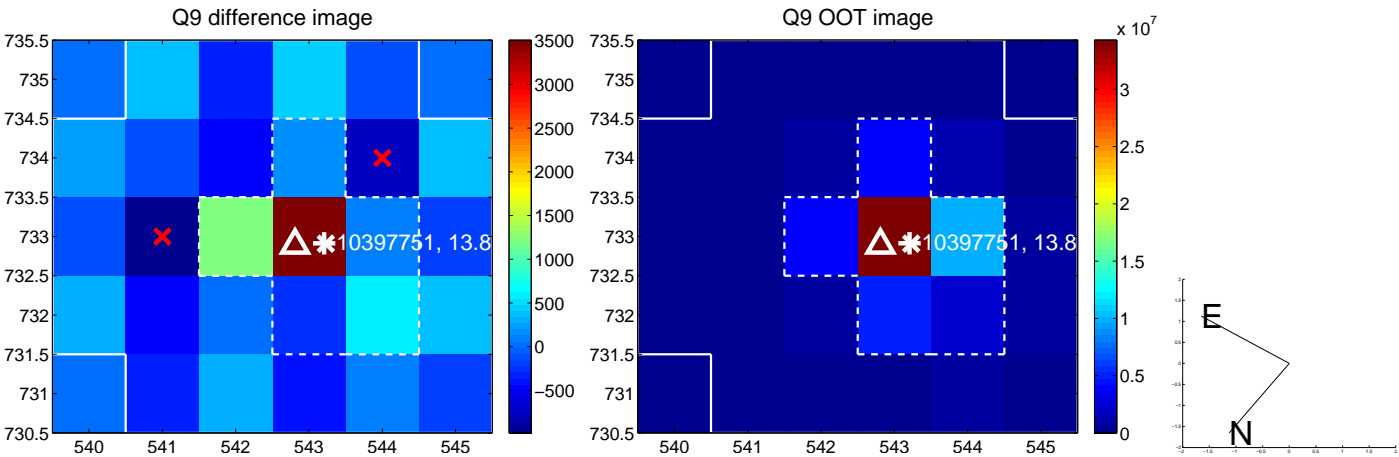
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



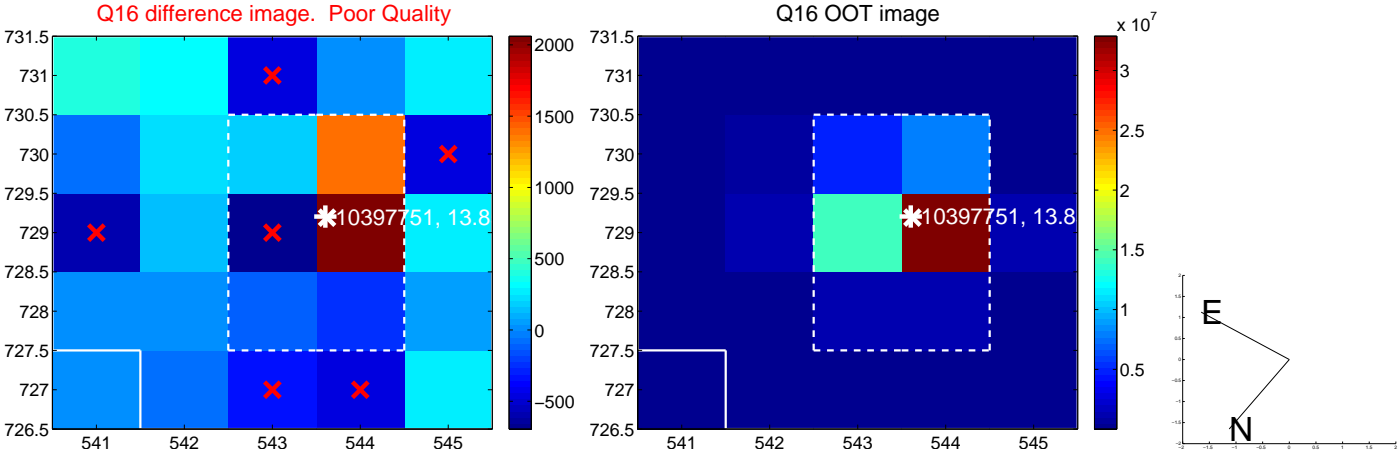
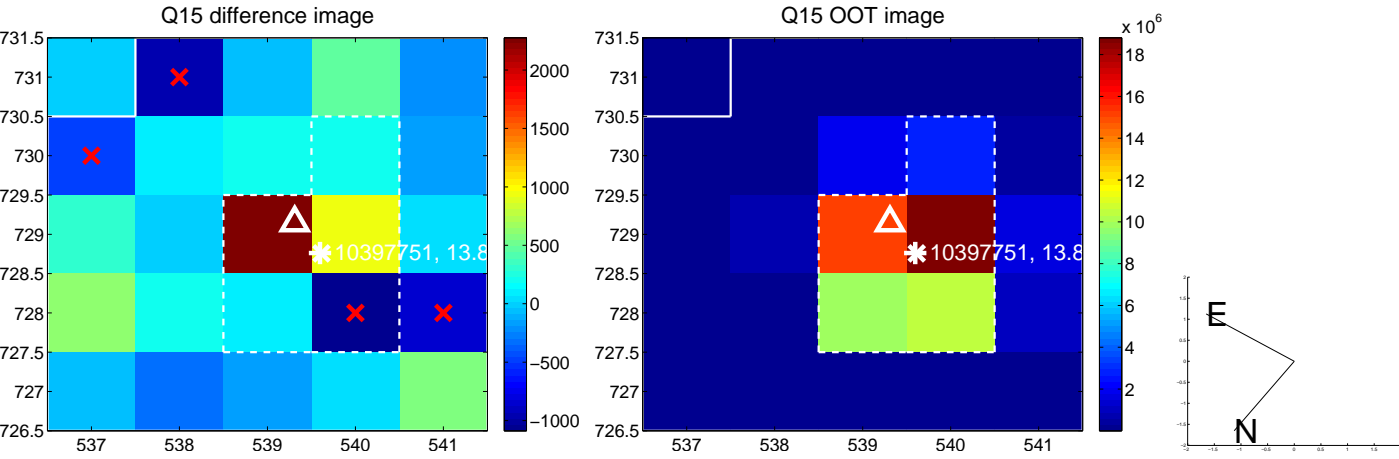
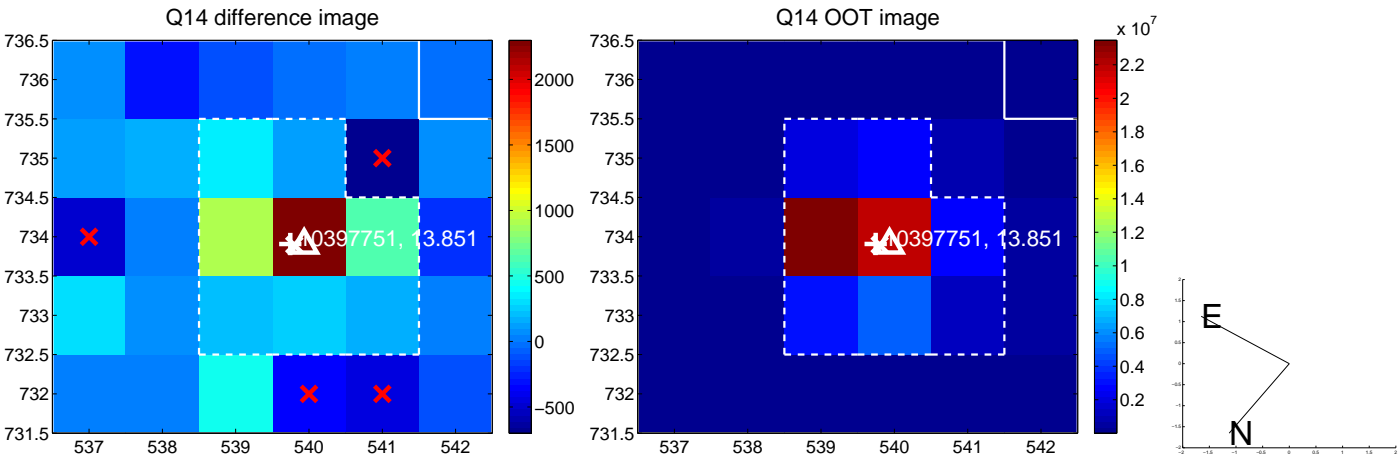
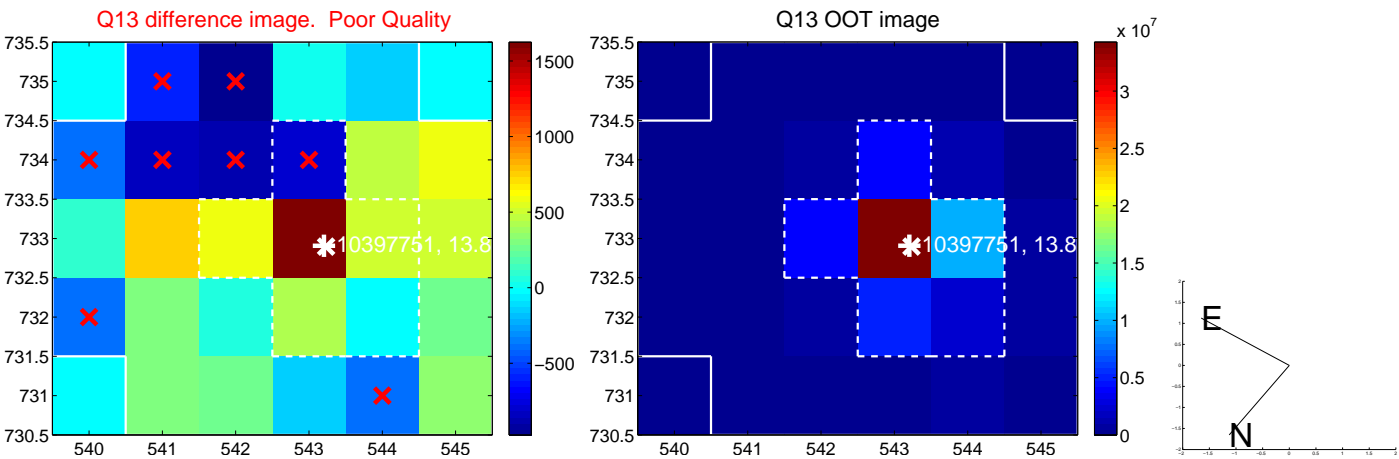
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

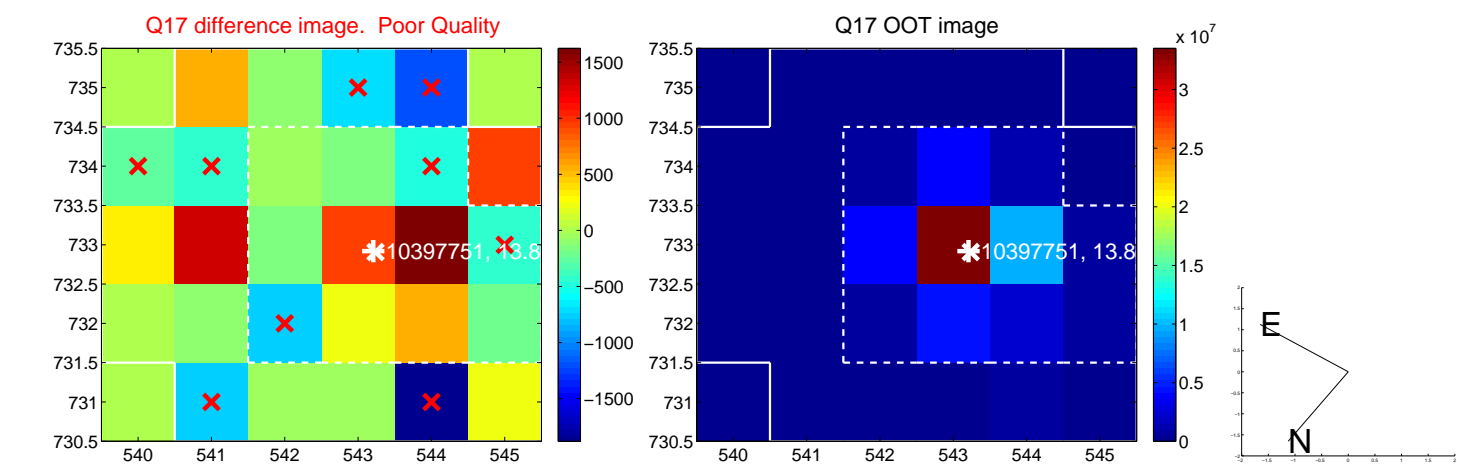


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

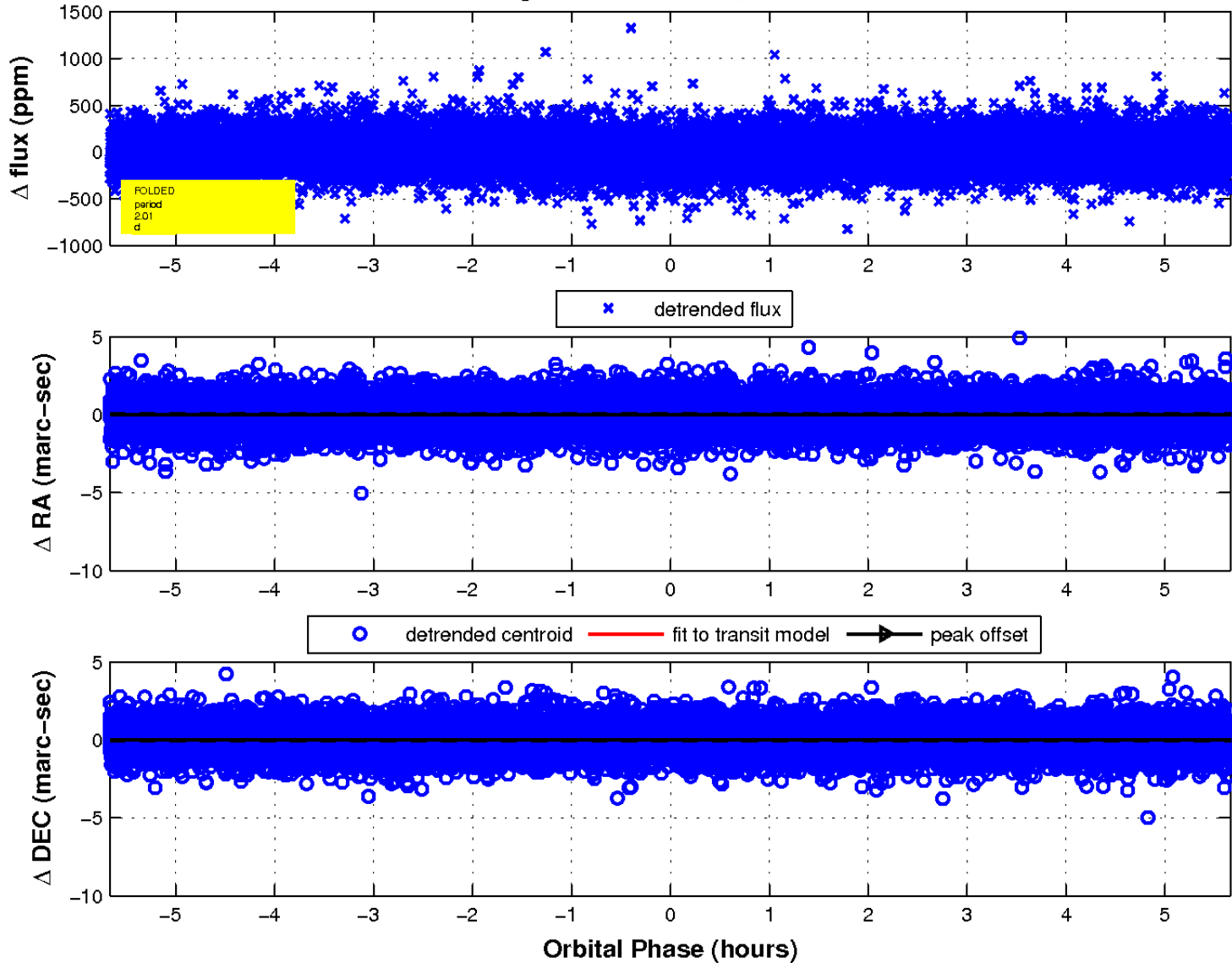




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

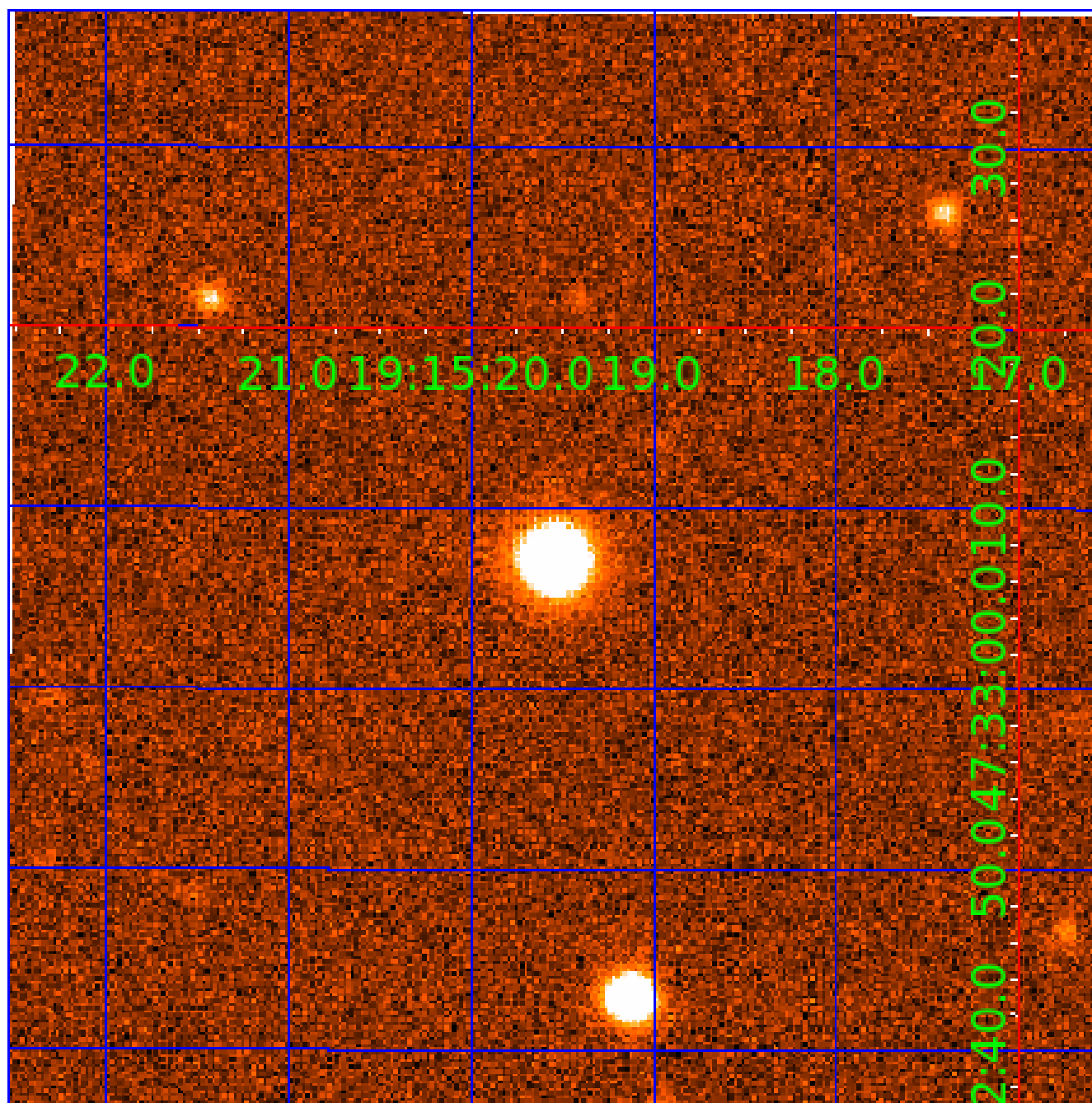


fluxWeightedCentroids, Planet 2 of 5



UKIRT Image

Declination



# KIC 010397751

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010397751-01	OBS	2859.01	3.446210	132.228850	82.0	2.151	13.2	14.8	0.72	5374	0.79	251.72
010397751-02	OBS	2859.02	2.005467	133.234777	53.5	1.889	10.7	11.8	0.72	5374	0.63	518.11
010397751-03	OBS	2859.05	5.431032	134.415503	80.8	2.612	9.4	11.3	0.72	5374	0.76	137.26
010397751-04	OBS	2859.04	2.905115	132.564184	47.7	2.277	8.6	8.7	0.72	5374	0.53	316.10
010397751-05	OBS	2859.03	4.288980	132.363420	55.5	2.712	7.4	8.2	0.72	5374	0.61	188.03

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010397751-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
010397751-02	OBS	PC	0.83	0	0	0	0	NO_COMMENT
010397751-03	OBS	PC	0.86	0	0	0	0	NO_COMMENT
010397751-04	OBS	PC	0.96	0	0	0	0	NO_COMMENT
010397751-05	OBS	PC	1.00	0	0	0	0	NO_COMMENT

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

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

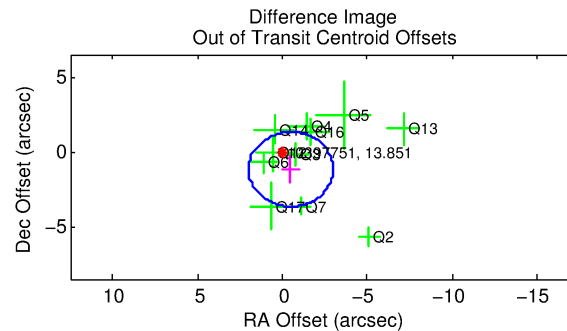
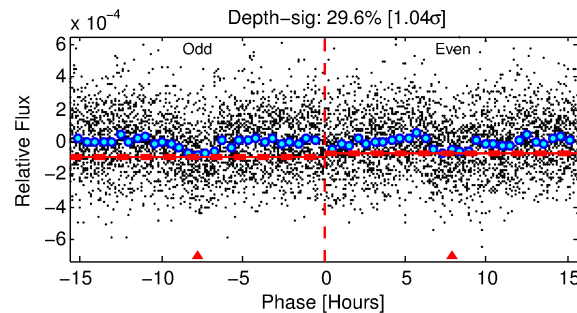
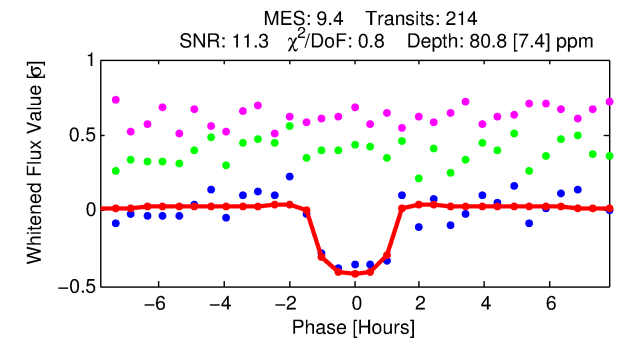
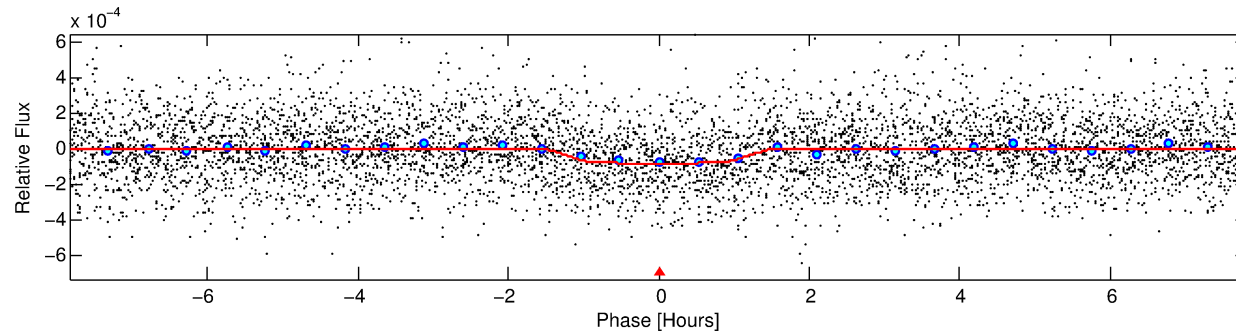
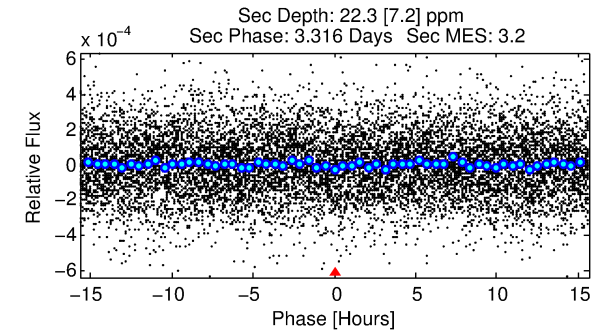
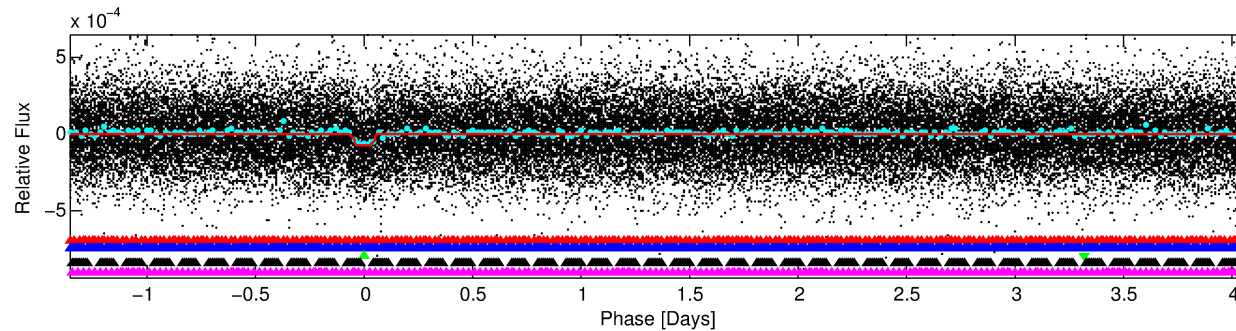
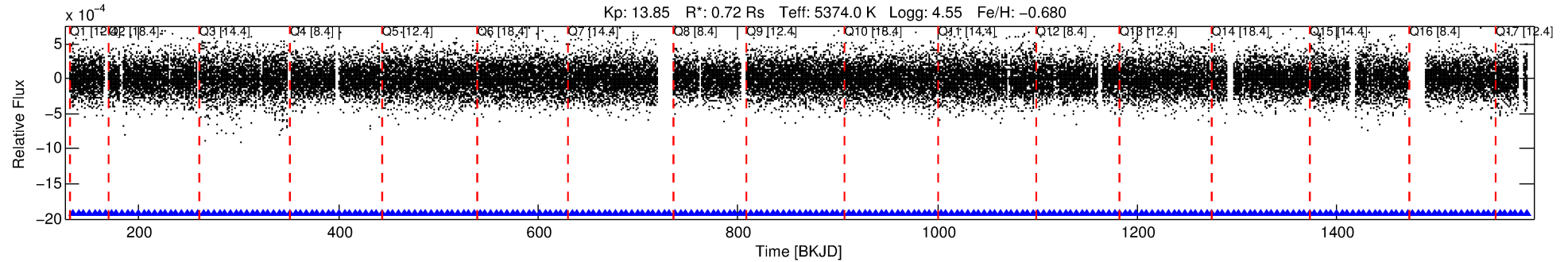
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010397751-03

No Significant Match Found

# DV One-Page Summary

KIC: 10397751 Candidate: 3 of 5 Period: 5.431 d  
KOI: K02859.05 Corr: 0.976



## DV Fit Results:

Period = 5.43103 [0.00003] d  
Epoch = 134.4155 [0.0039] BKJD  
Rp/R\* = 0.0096 [0.0059]  
a/R\* = 8.04 [22.48]  
b = 0.88 [0.77]  
Seff = 137.26 [26.82]  
Teq = 873 [43] K  
Rp = 0.76 [0.47] Re  
a = 0.0532 [0.0054] AU  
Ag = 60.96 [78.34] [0.77σ]  
Teffp = 3771 [1208] K [2.40σ]

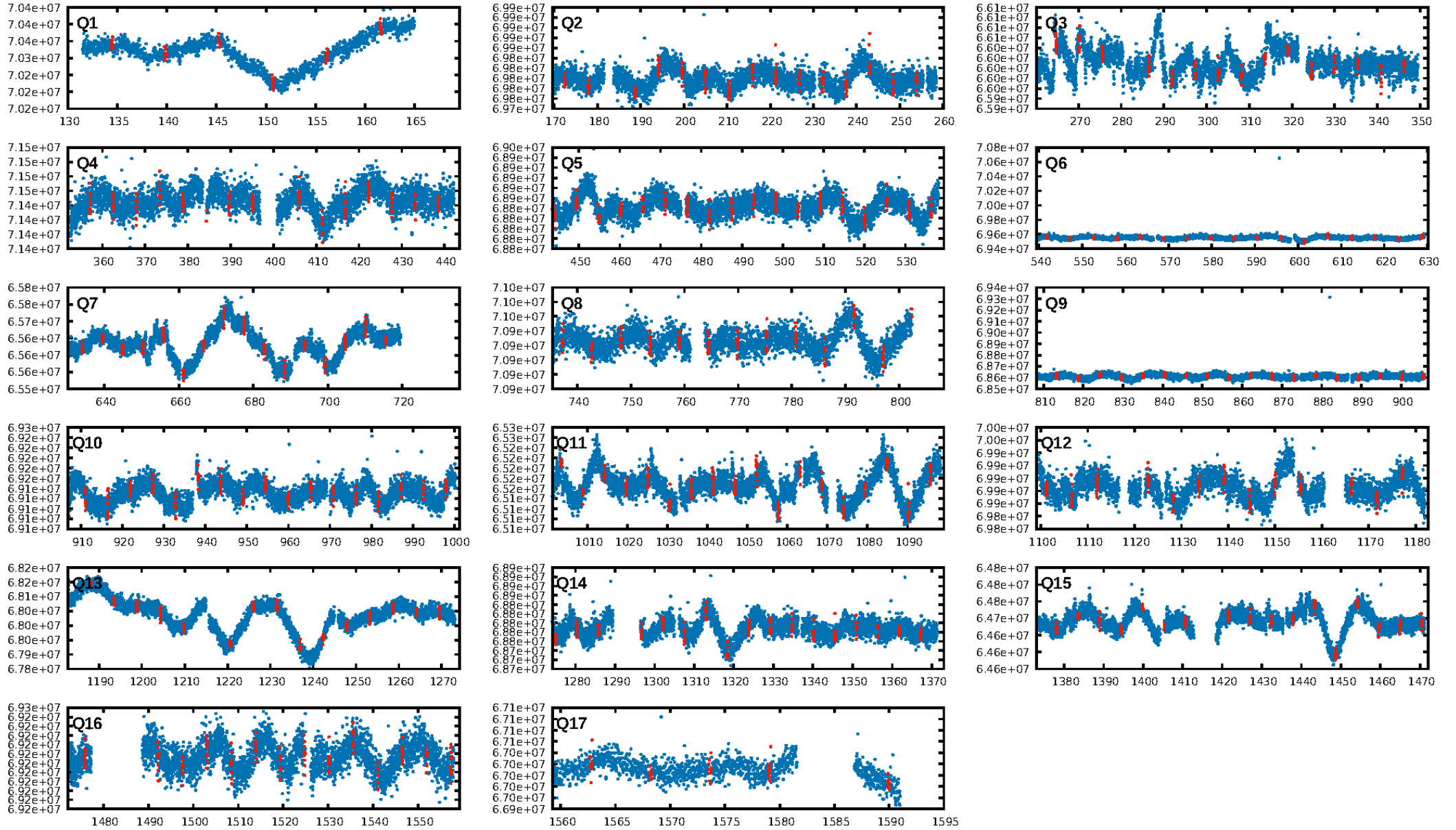
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [7.28σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 5.76e-20  
RollingBand-fgt: 1.00 [205/205]  
GhostDiagnostic-chr: -4.251  
Centroid-sig: 1.8%  
Centroid-so: 1.314 arcsec [1.47σ]  
OotOffset-rm: 1.279 arcsec [1.54σ]  
KicOffset-rm: 1.230 arcsec [1.45σ]  
OotOffset-st: 3/2/3/3 [11]  
KicOffset-st: 3/2/3/3 [11]  
DiffImageQuality-fgm: 0.45 [5/11]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 16:55:46 Z

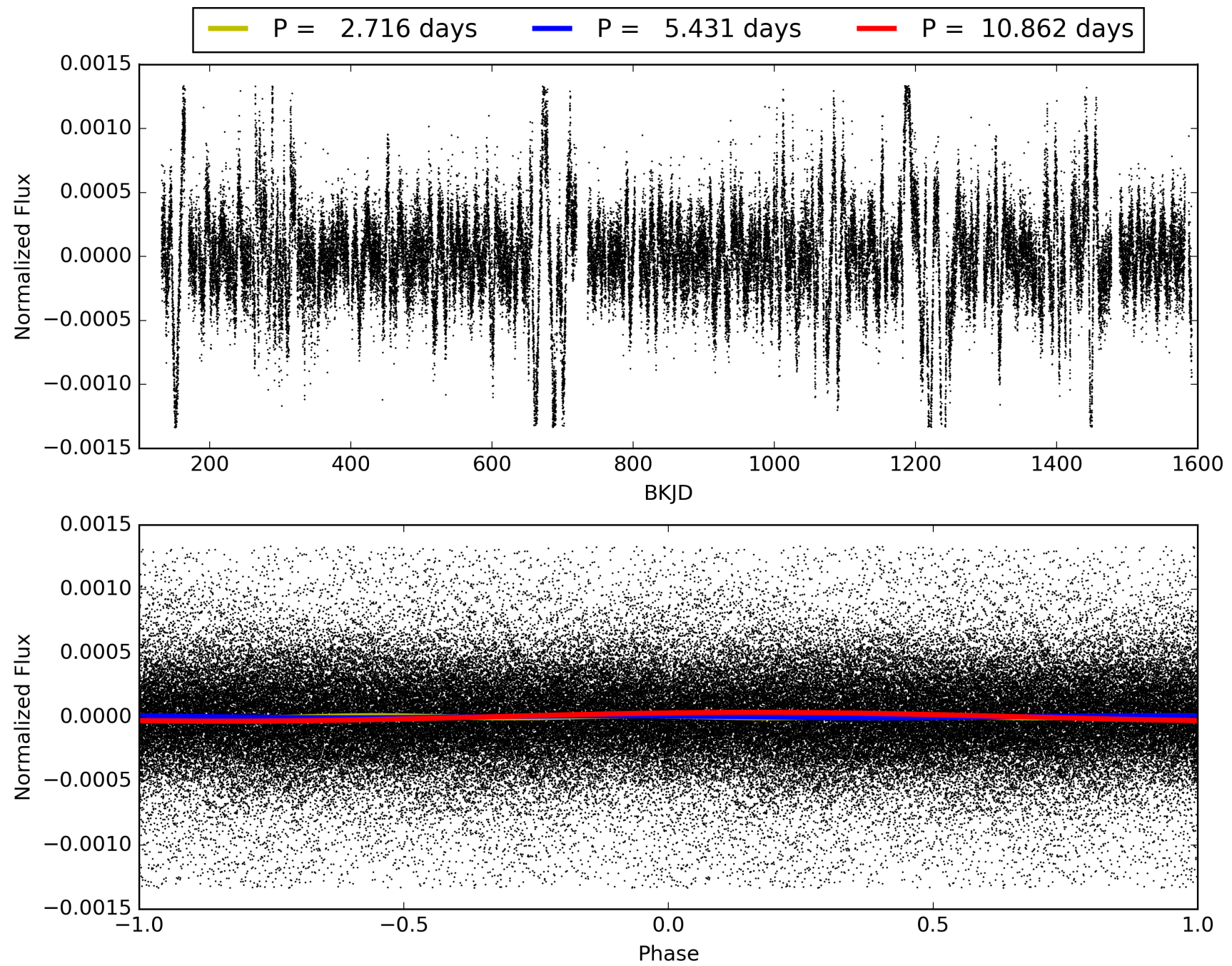
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 010397751-03, PDC Light Curves





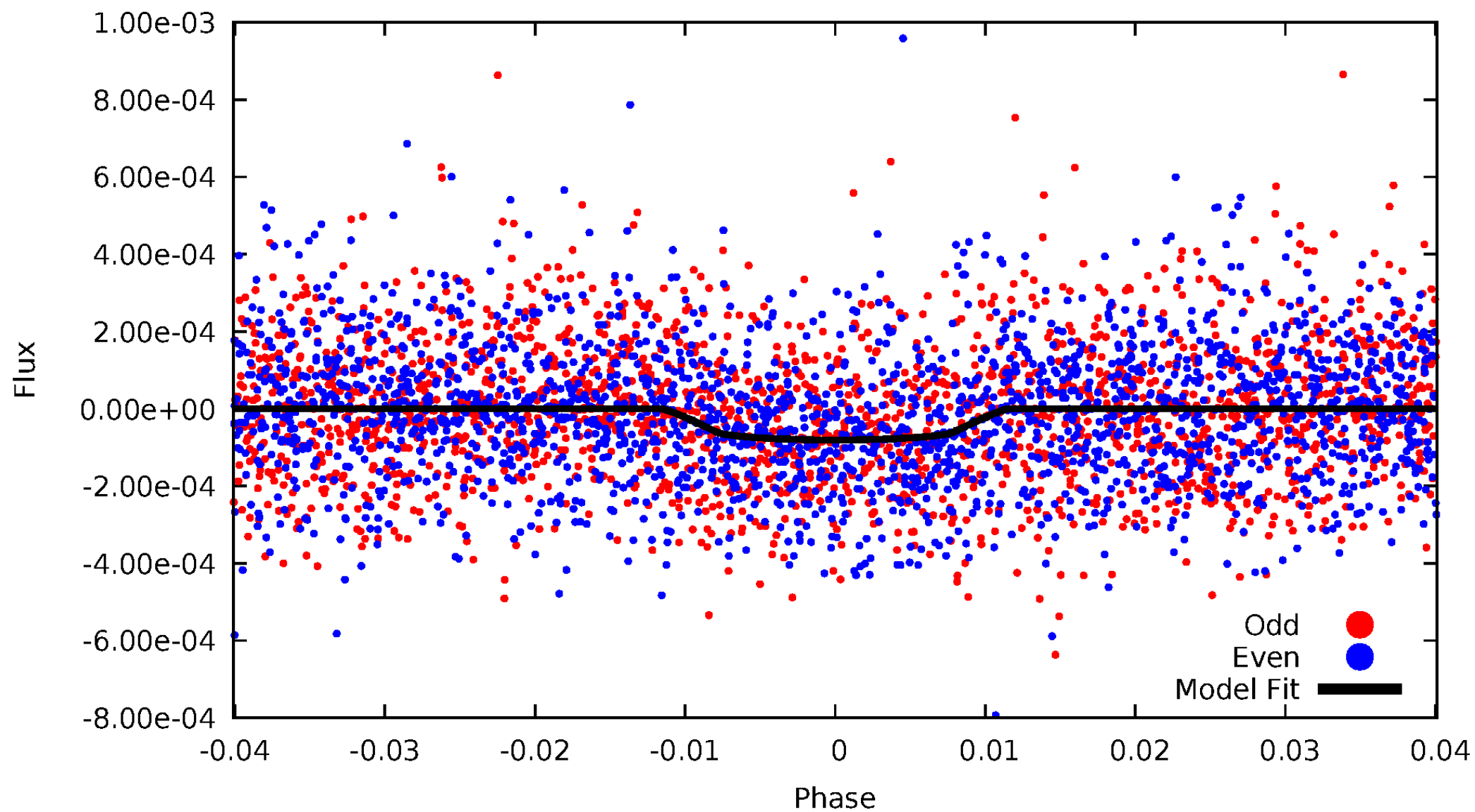
# TCE 010397751-03





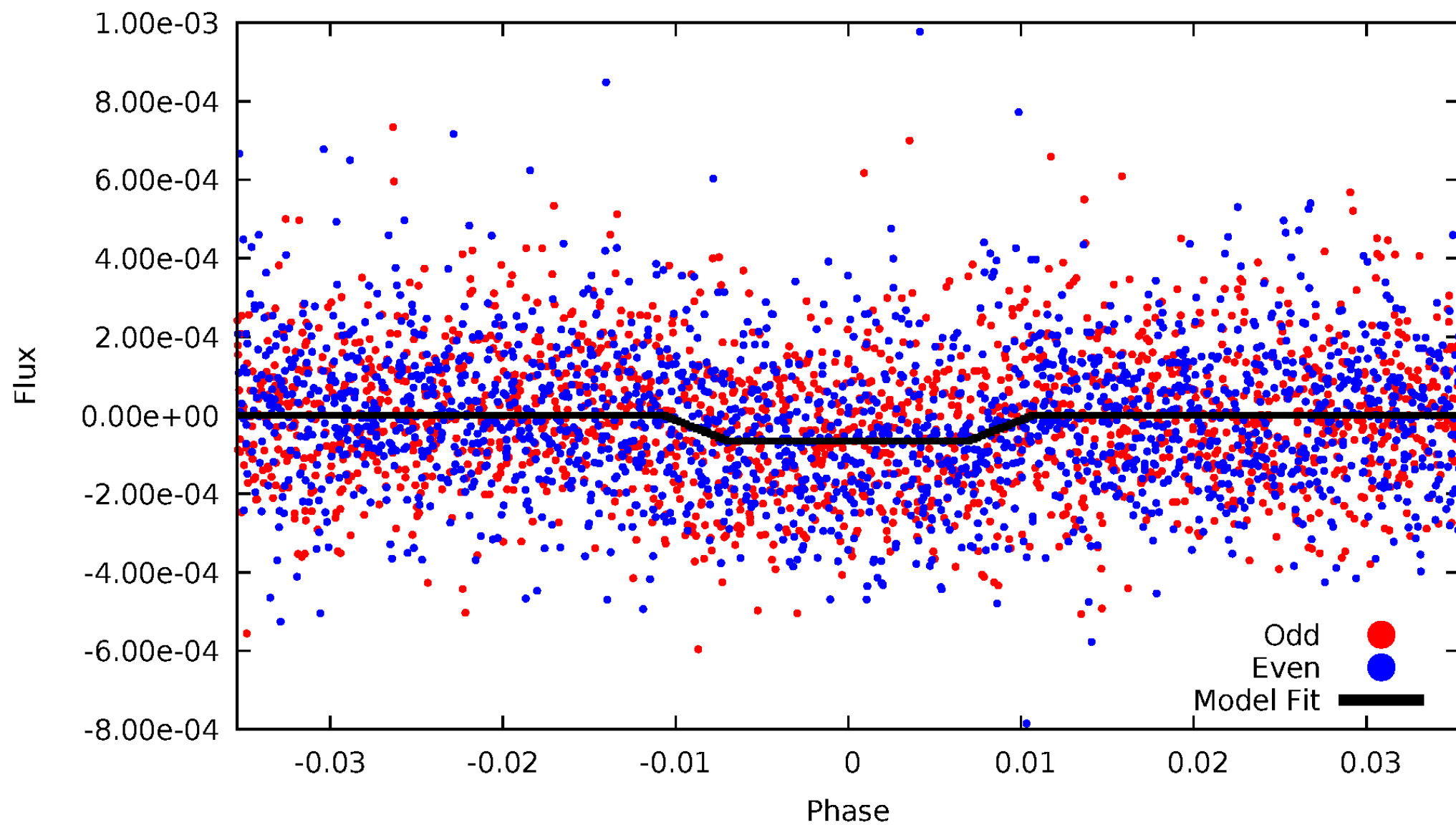
# DV Odd/Even

TCE 010397751-03

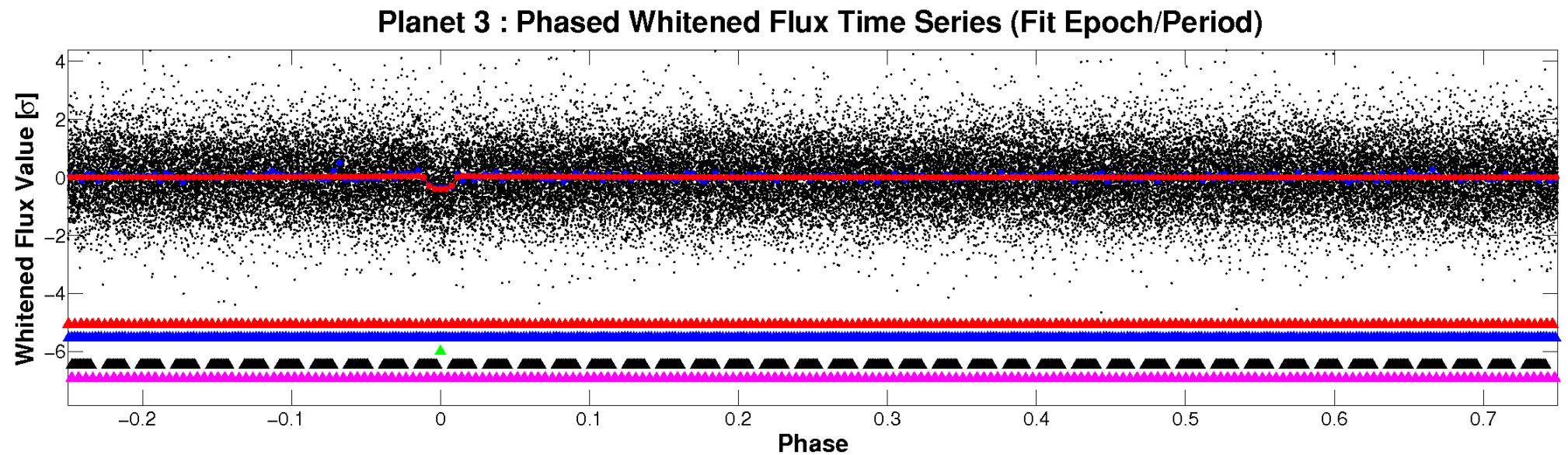
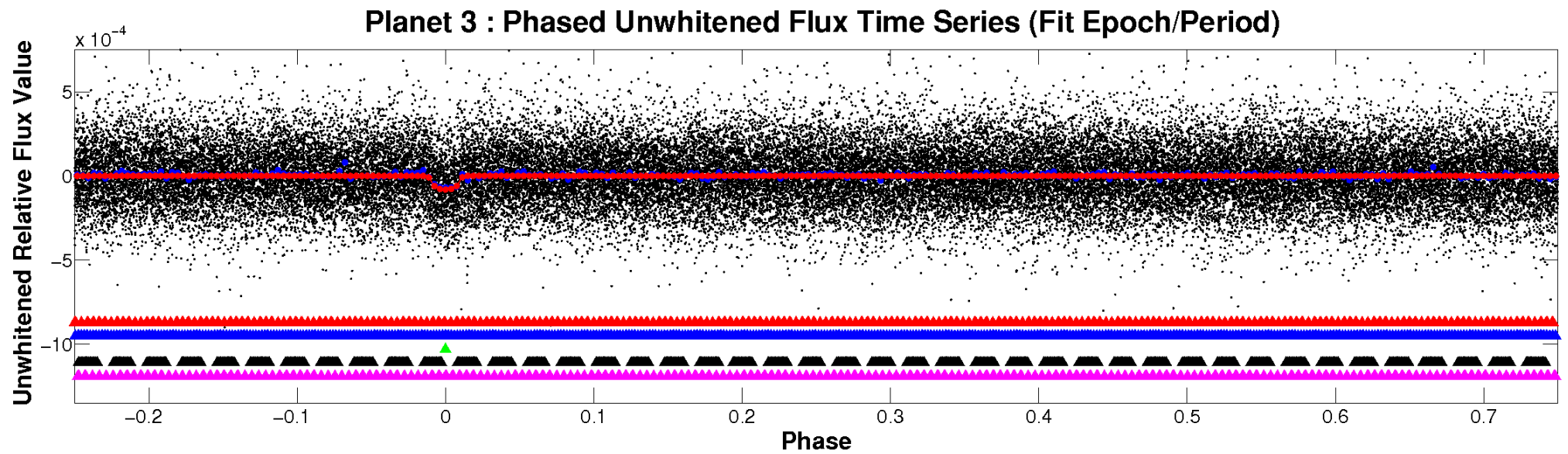


# ALT Odd/Even

TCE 010397751-03

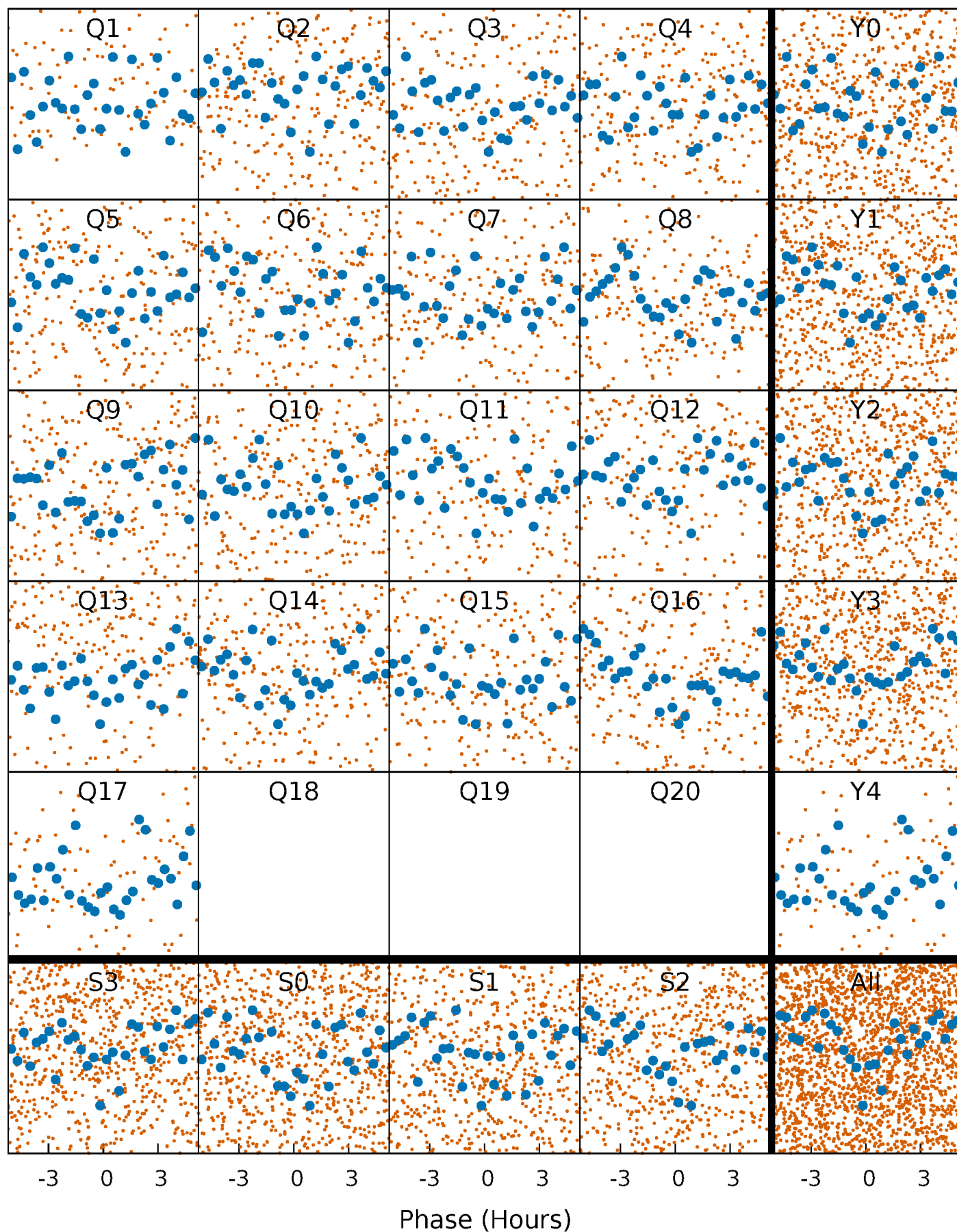


# Non-Whitened Vs. Whitened Light Curve



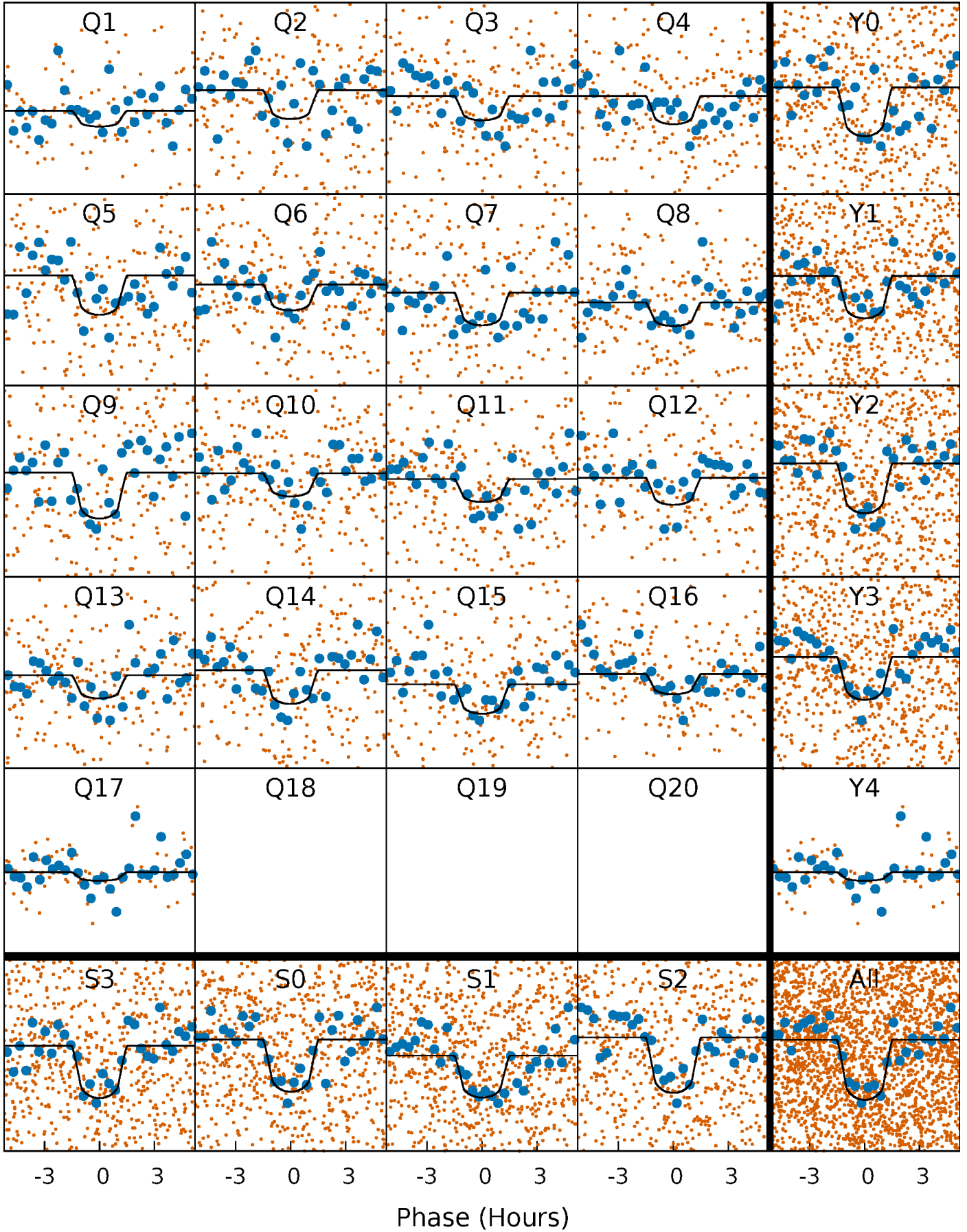
## PDC Quarter-Phased Transit Curves

TCE 010397751-03    P= 5.431032 Days     $T_0=134.415503$  (BKJD)



# DV Quarter-Phased Transit Curves

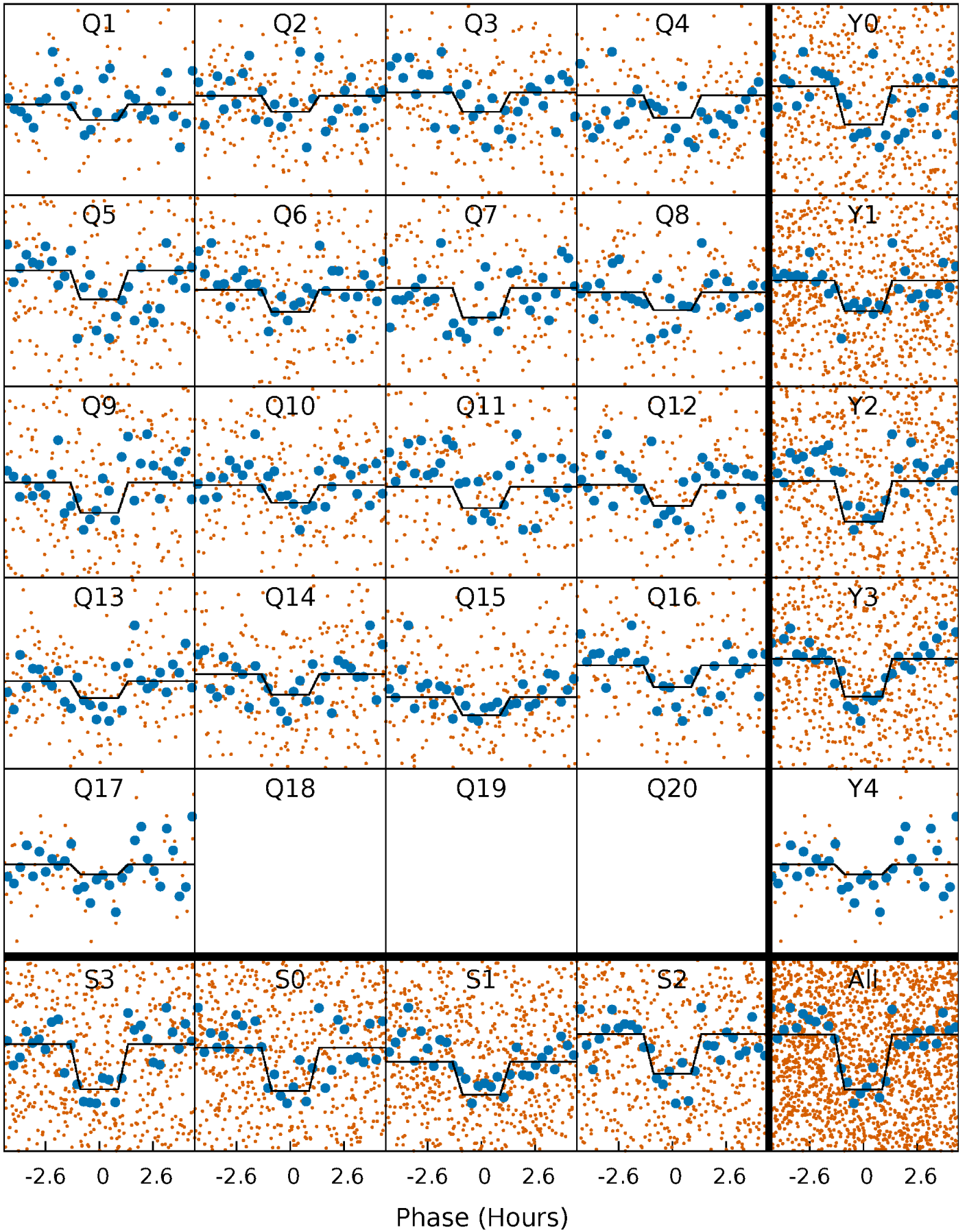
TCE 010397751-03 P= 5.431032 Days  $T_0=134.415503$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

TCE 010397751-03 P= 5.431026 Days  $T_0=134.417668$  (BKJD)

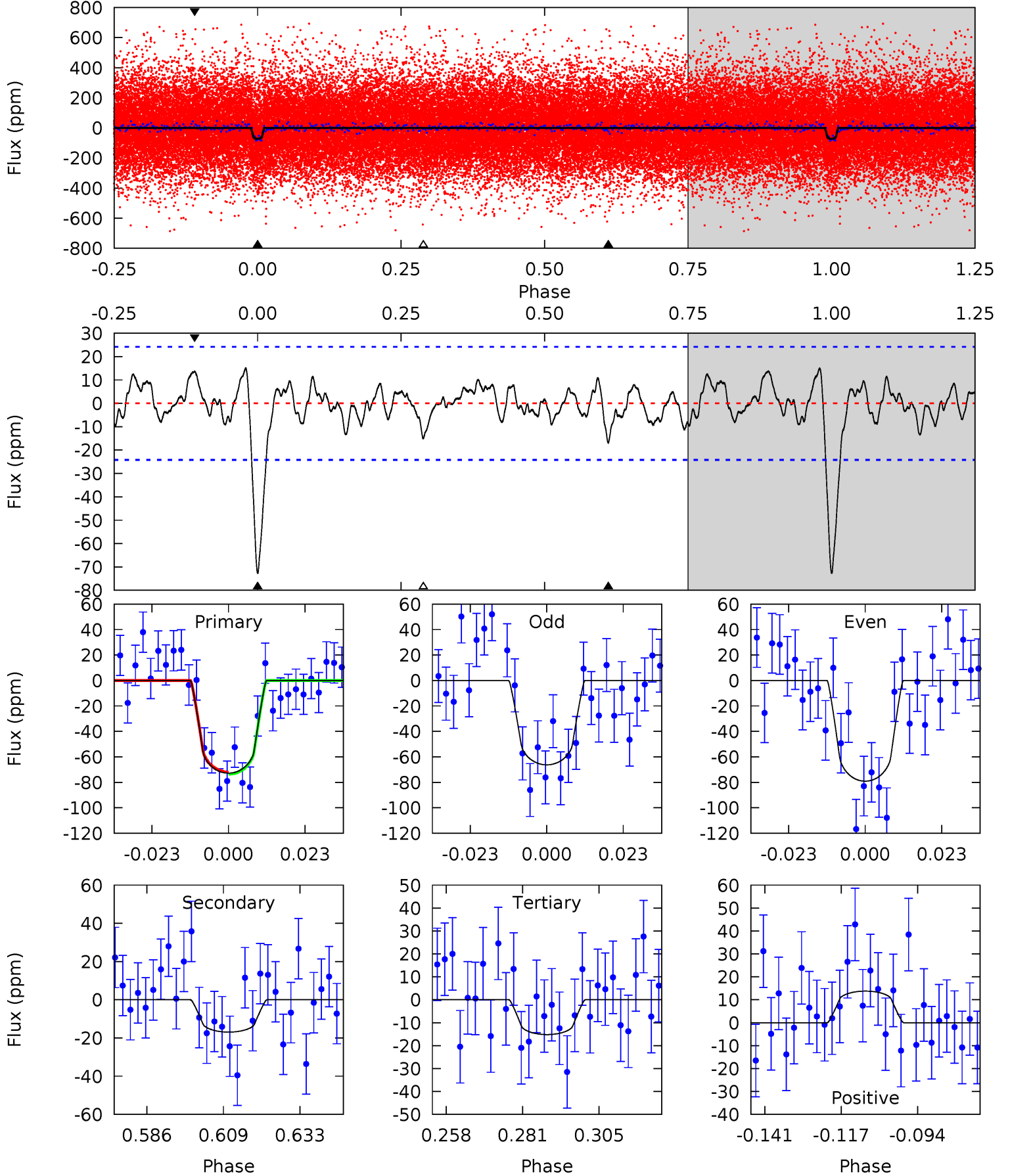




# DV Model-Shift Uniqueness Test

010397751-03, P = 5.431032 Days, E = 128.984471 Days

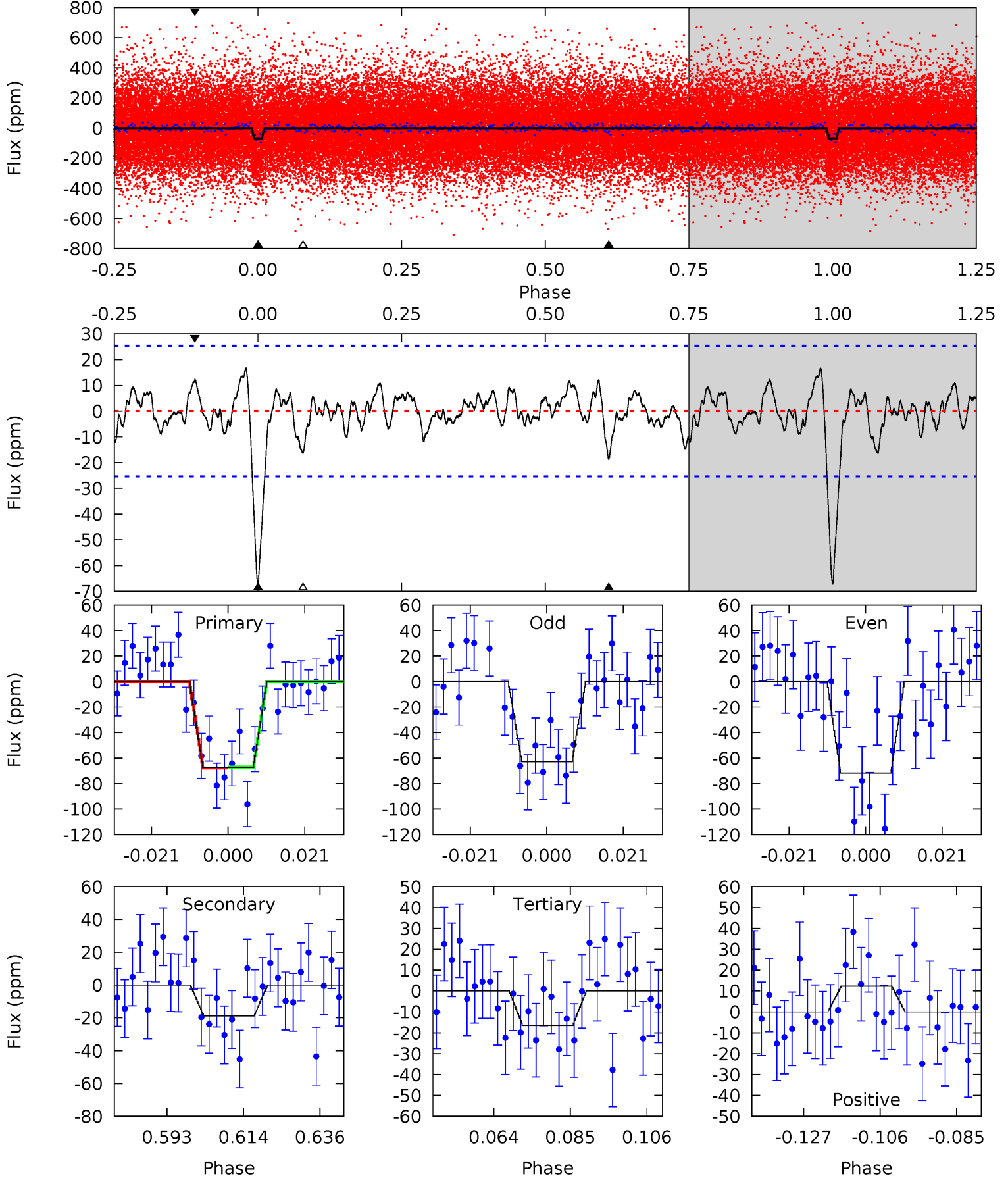
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
14.6	3.40	3.05	2.77	4.86	2.27	1.14	11.6	11.9	0.35	0.63	1.29	1.01	0.17	0.15



# Alt Model-Shift Uniqueness Test

010397751-03, P = 5.431026 Days, E = 128.986642 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
12.9	3.62	3.16	2.38	4.88	2.30	1.06	9.79	10.6	0.46	1.24	0.85	0.84	0.20	0.07



### Stellar Parameters For KIC 010397751

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5374^{+160}_{-144}$	$4.555^{+0.088}_{-0.064}$	$-0.680^{+0.300}_{-0.300}$	$0.721^{+0.082}_{-0.073}$	$0.680^{+0.086}_{-0.034}$	$2.557^{+0.950}_{-0.582}$
	+3%/-3%	+2%/-1%	+44%/-44%	+11%/-10%	+13%/-5%	+37%/-23%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 010397751-03 / KOI 2859.05

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-17 \pm 5$	$0.78^{+0.46}_{-0.40}$	$1215^{+51}_{-46}$	$3780^{+1192}_{-549}$	$41^{+136}_{-25}$
Alt.	$-19 \pm 5$	$0.71^{+0.44}_{-0.38}$	$1213^{+49}_{-46}$	$4033^{+1454}_{-666}$	$60^{+213}_{-39}$

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

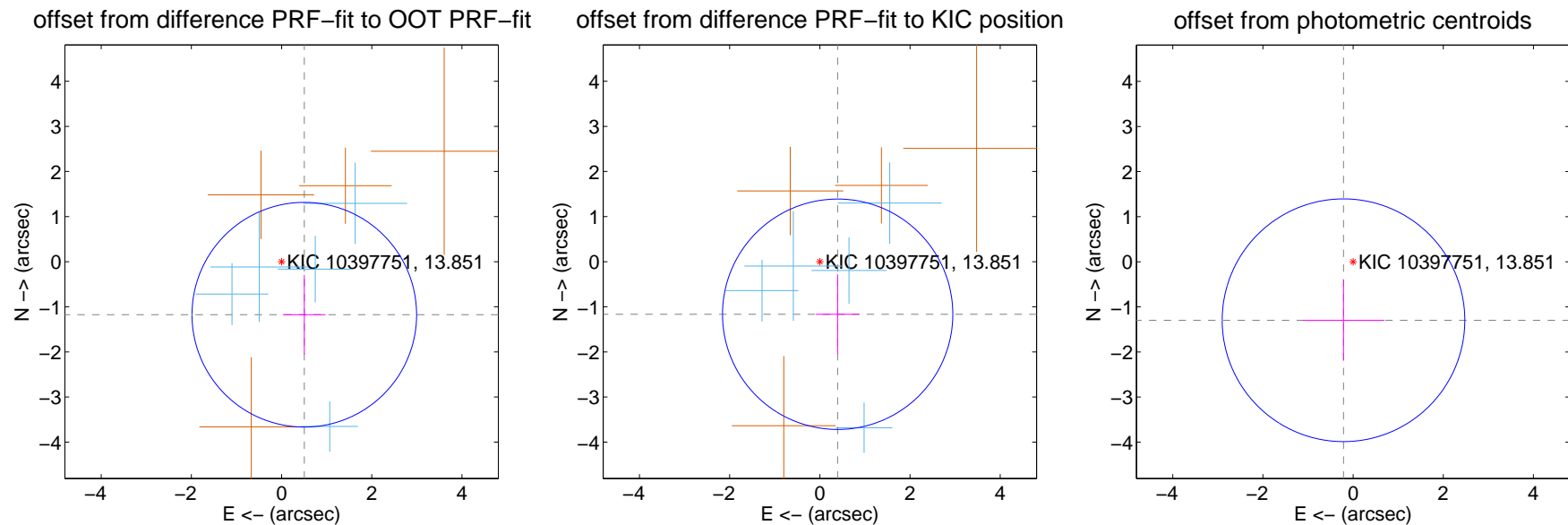
## DV Centroid Data

Supplemental centroid analysis for 010397751-03. Kepler magnitude: 13.85. Transit SNR 11.34

There are 5 quarters with good PRF difference image offsets

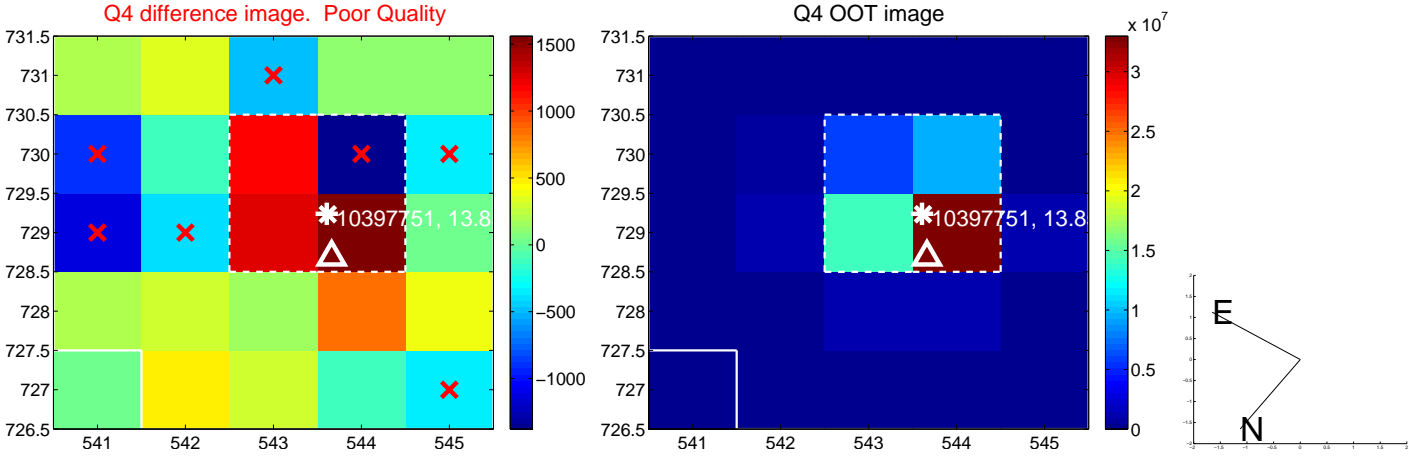
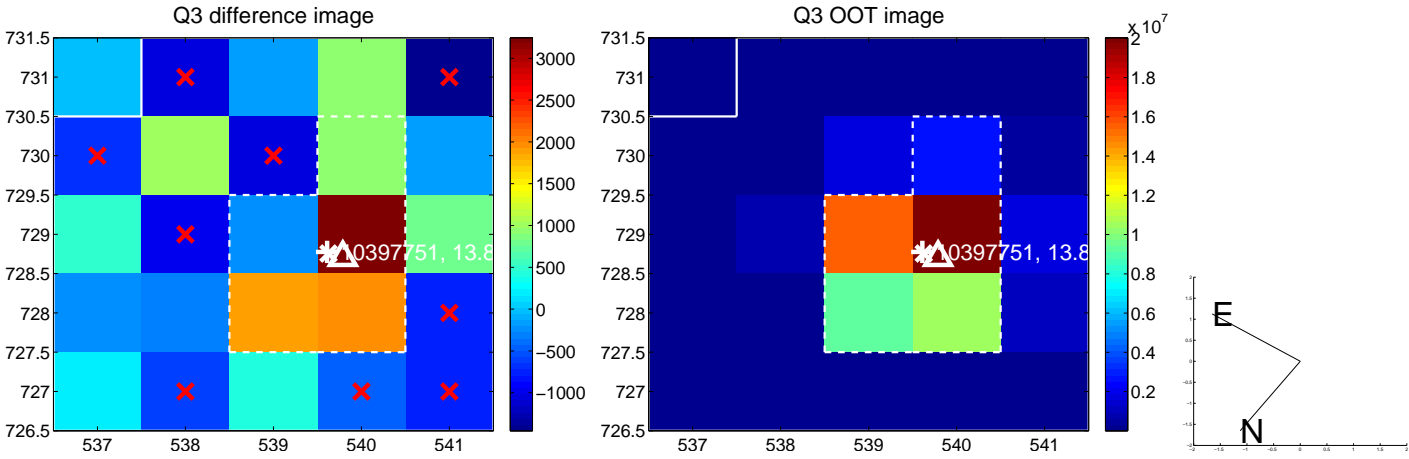
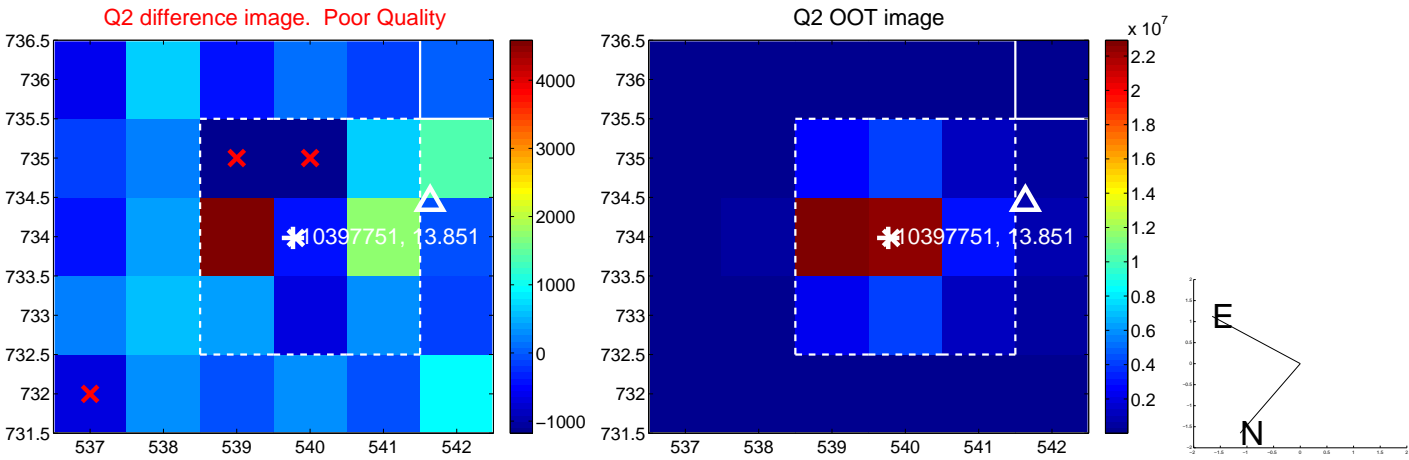
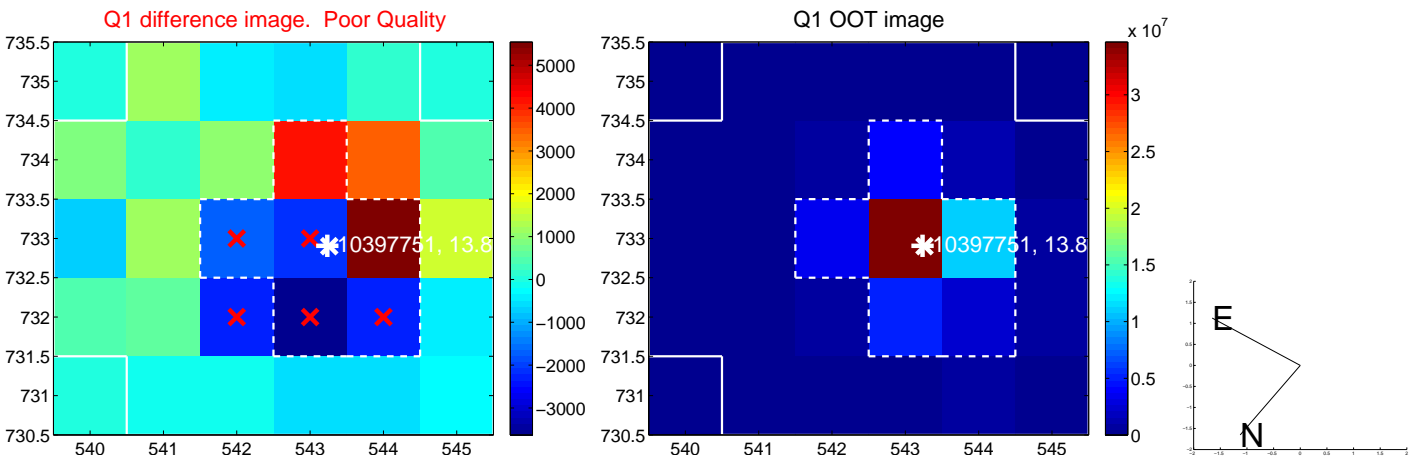
The direct PRF centroid is offset from the target star catalog position by about 0.13 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.279 \pm 0.830$	1.54	$-0.504 \pm 0.474$	$-1.176 \pm 0.880$
PRF-fit source offset from KIC position	$1.230 \pm 0.851$	1.45	$-0.395 \pm 0.484$	$-1.165 \pm 0.884$
photometric centroid source offset	$1.31 \pm 0.90$	1.47	$0.21 \pm 0.90$	$-1.30 \pm 0.90$



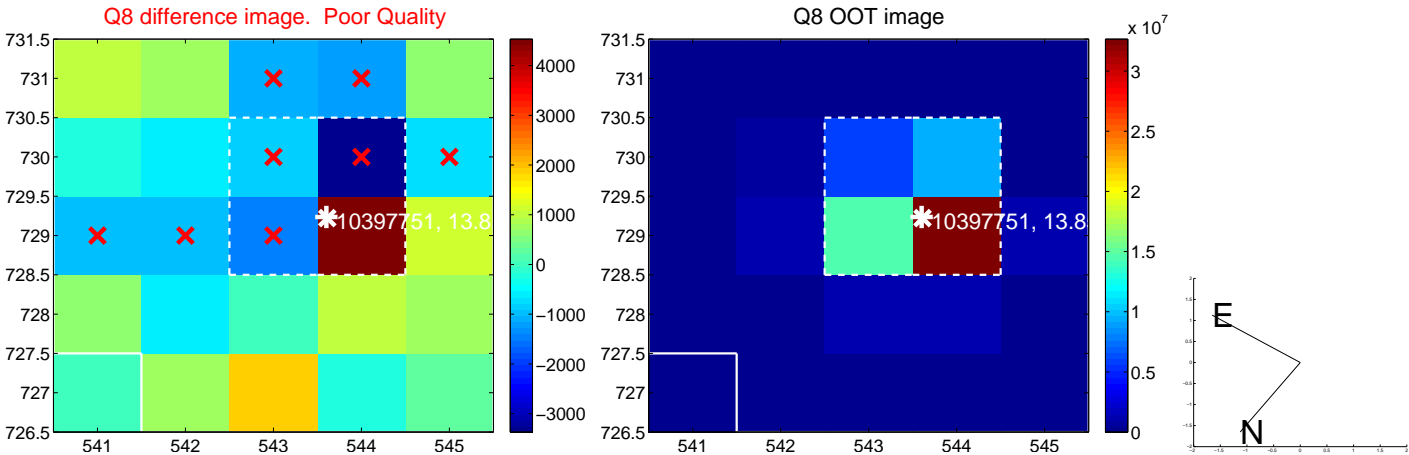
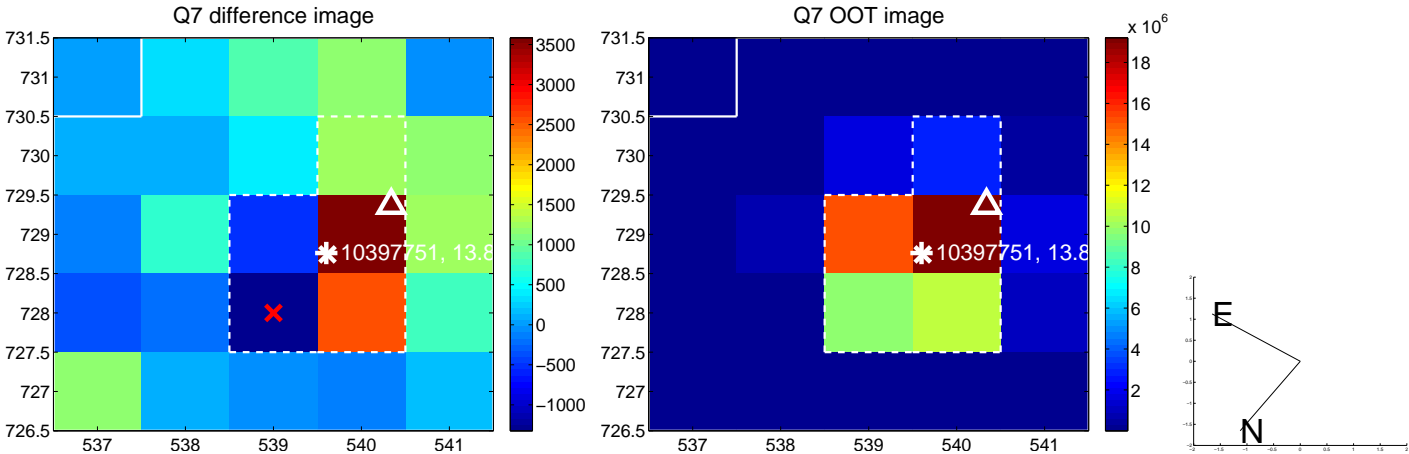
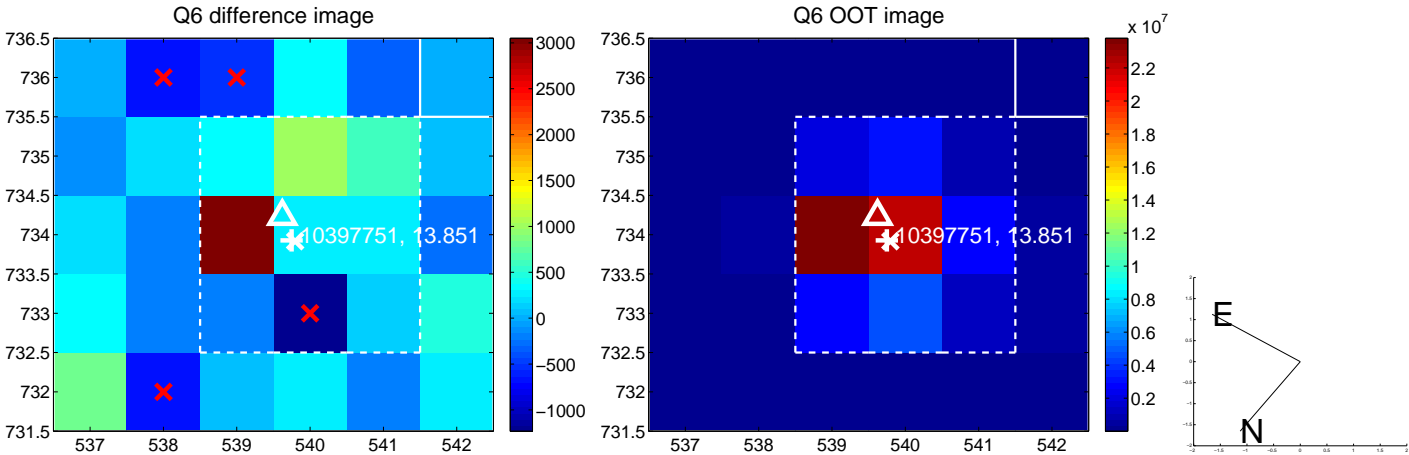
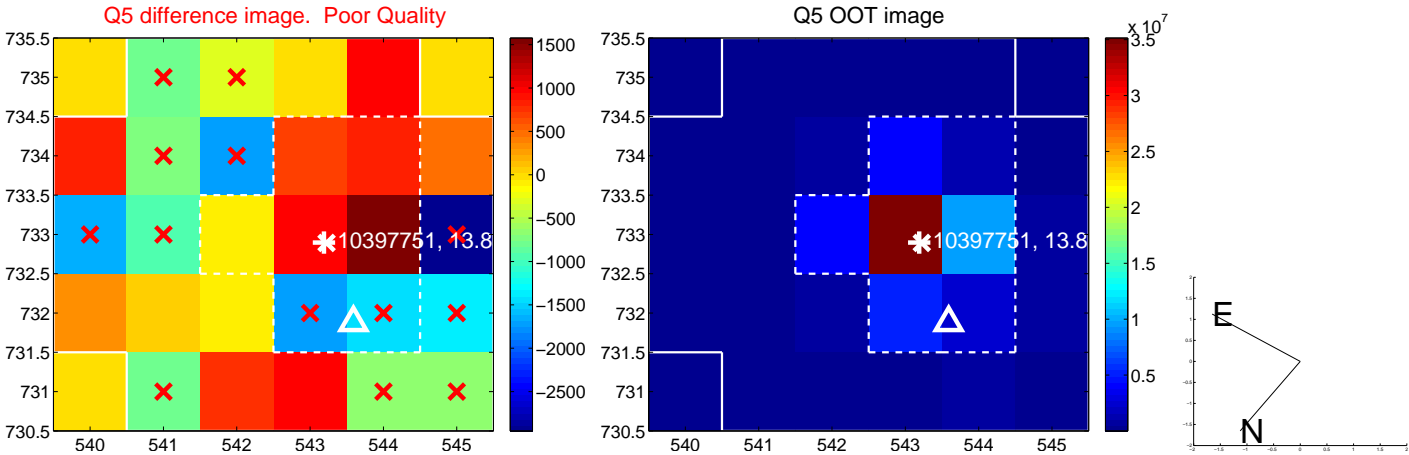
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

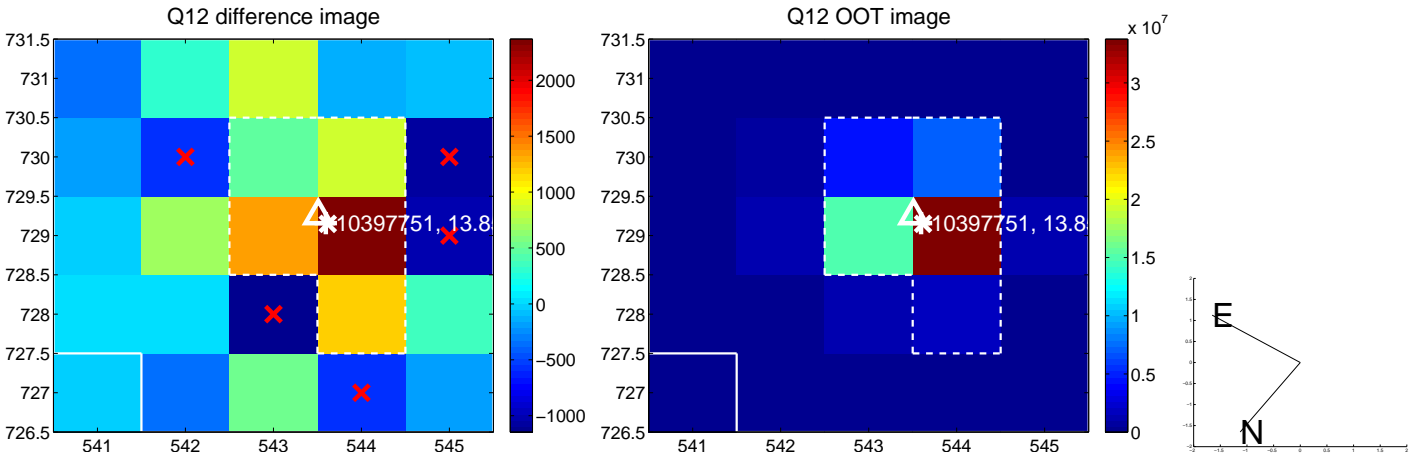
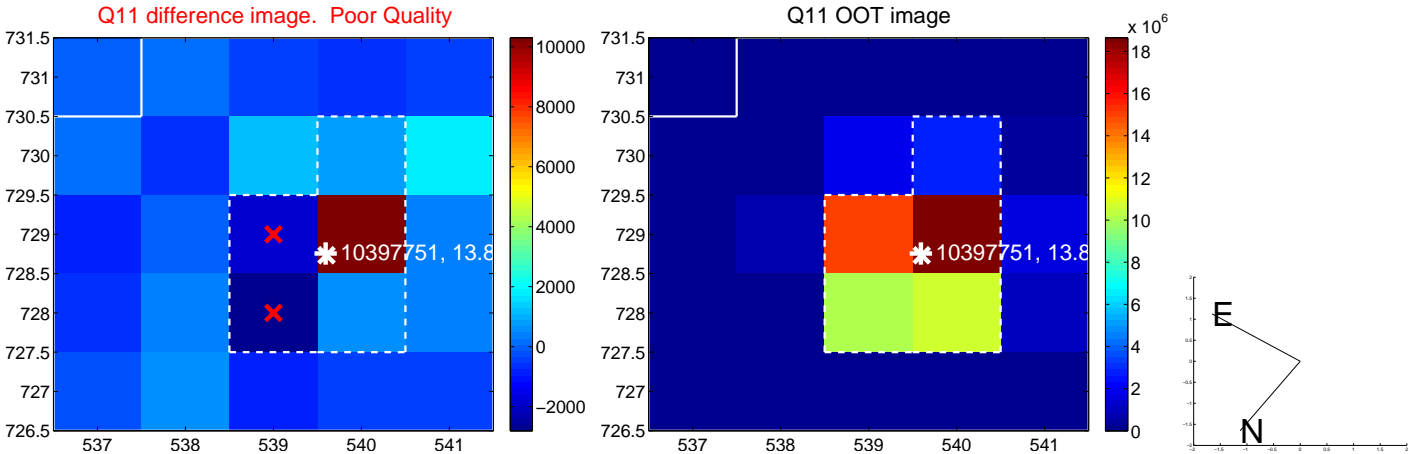
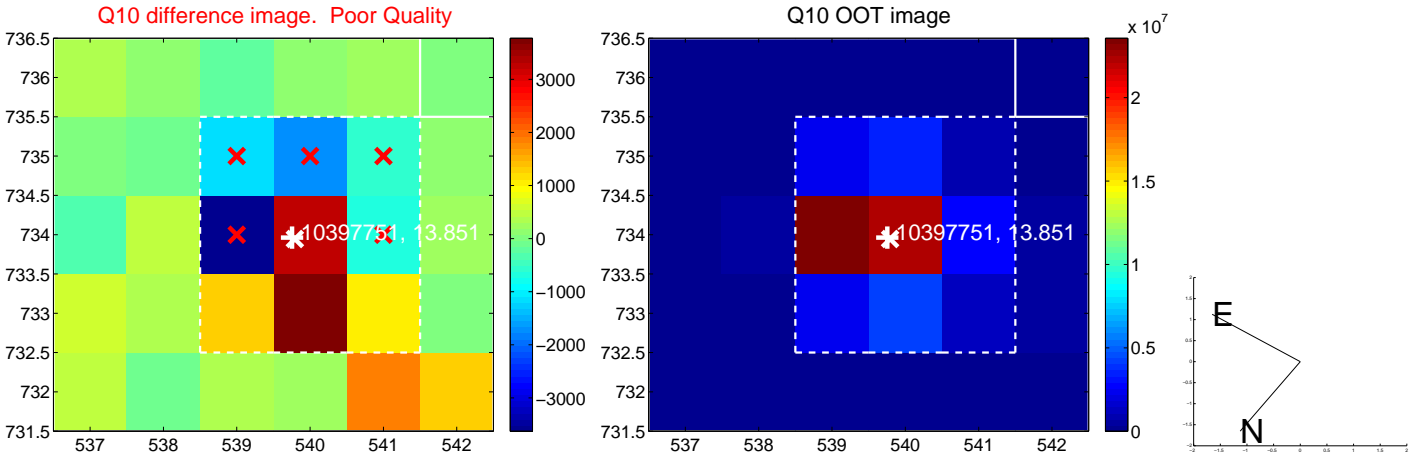
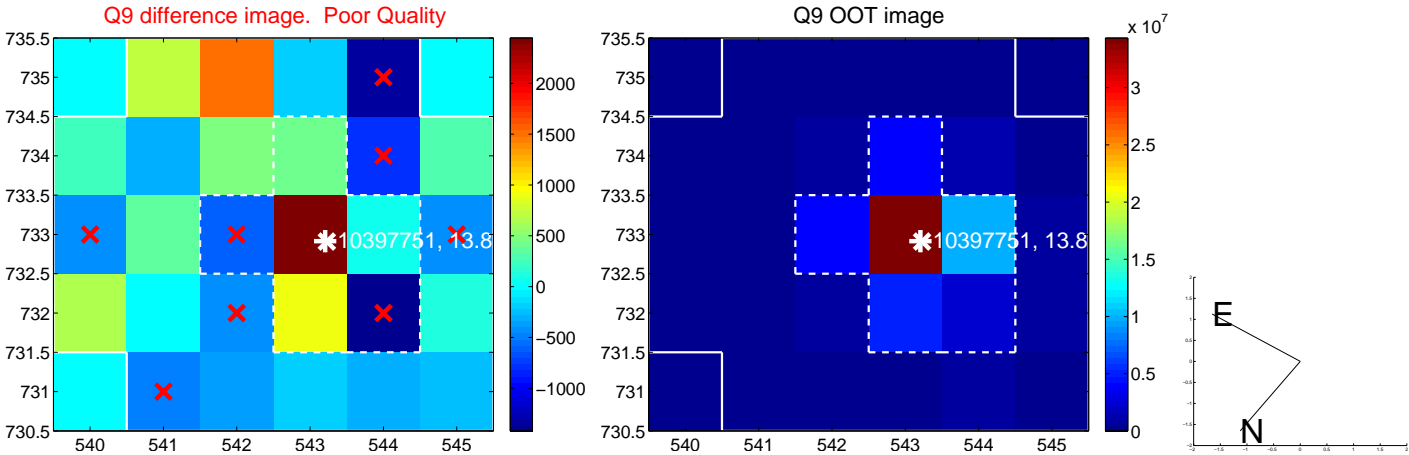




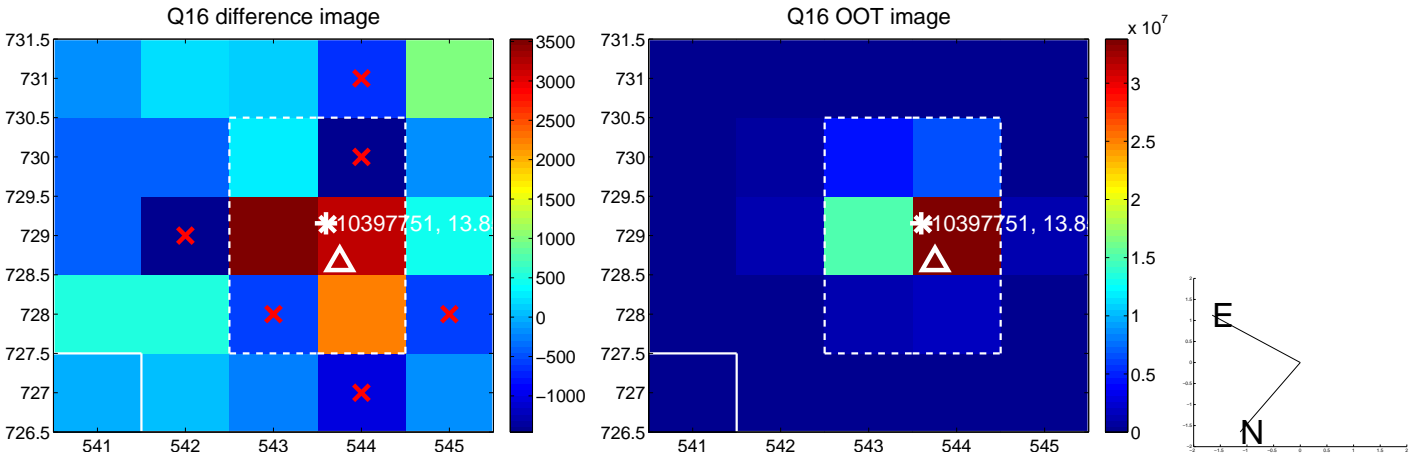
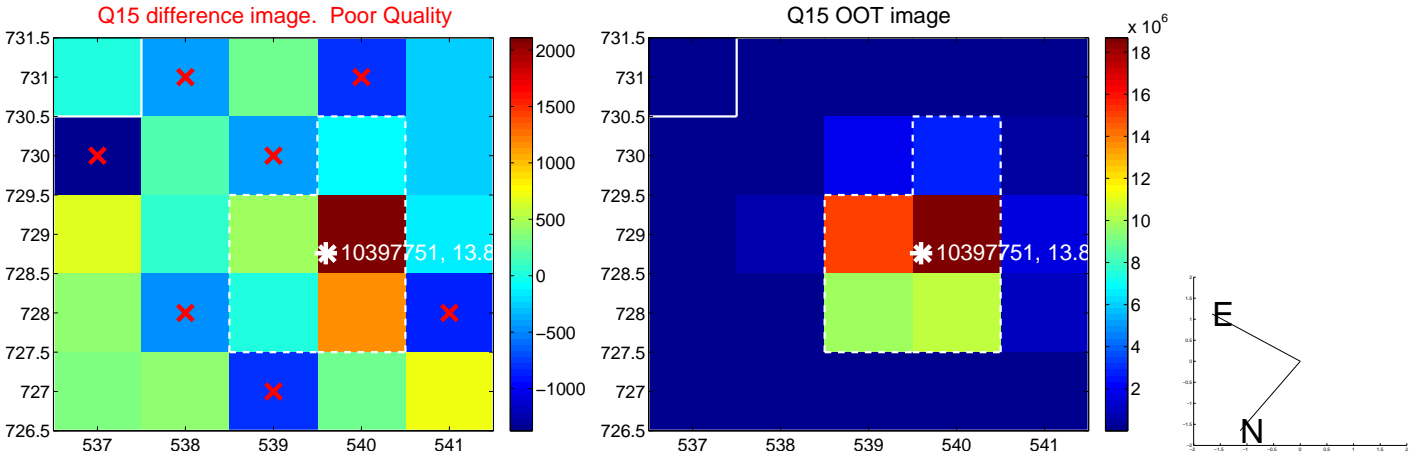
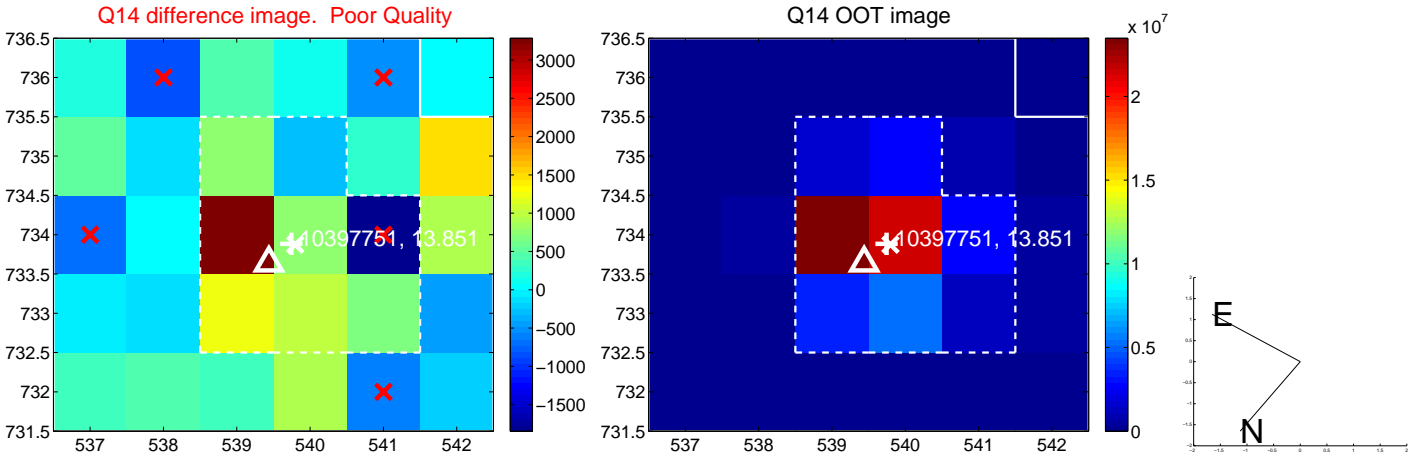
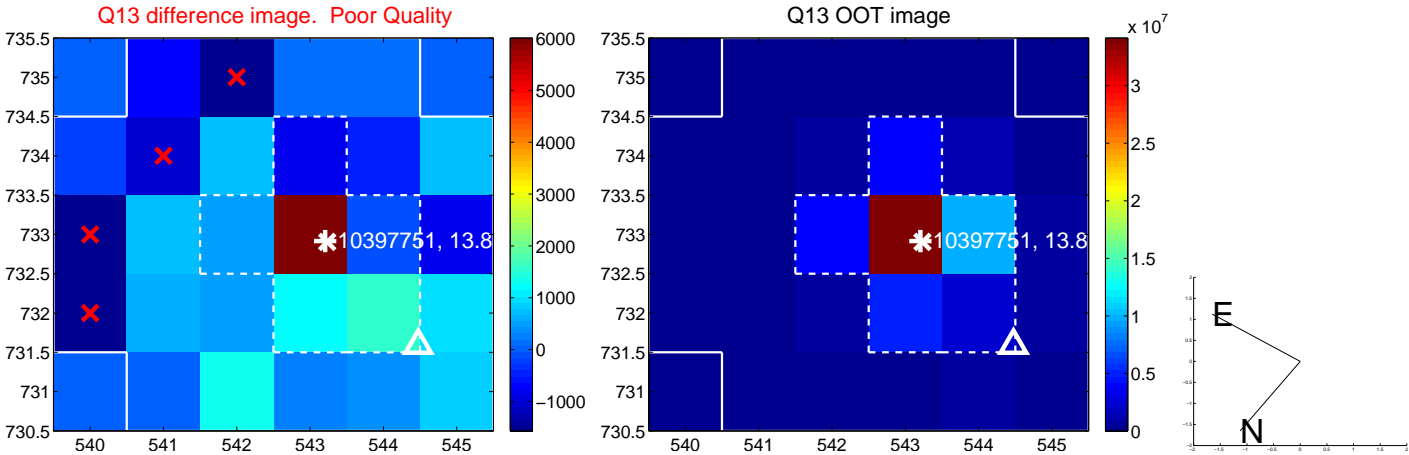
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



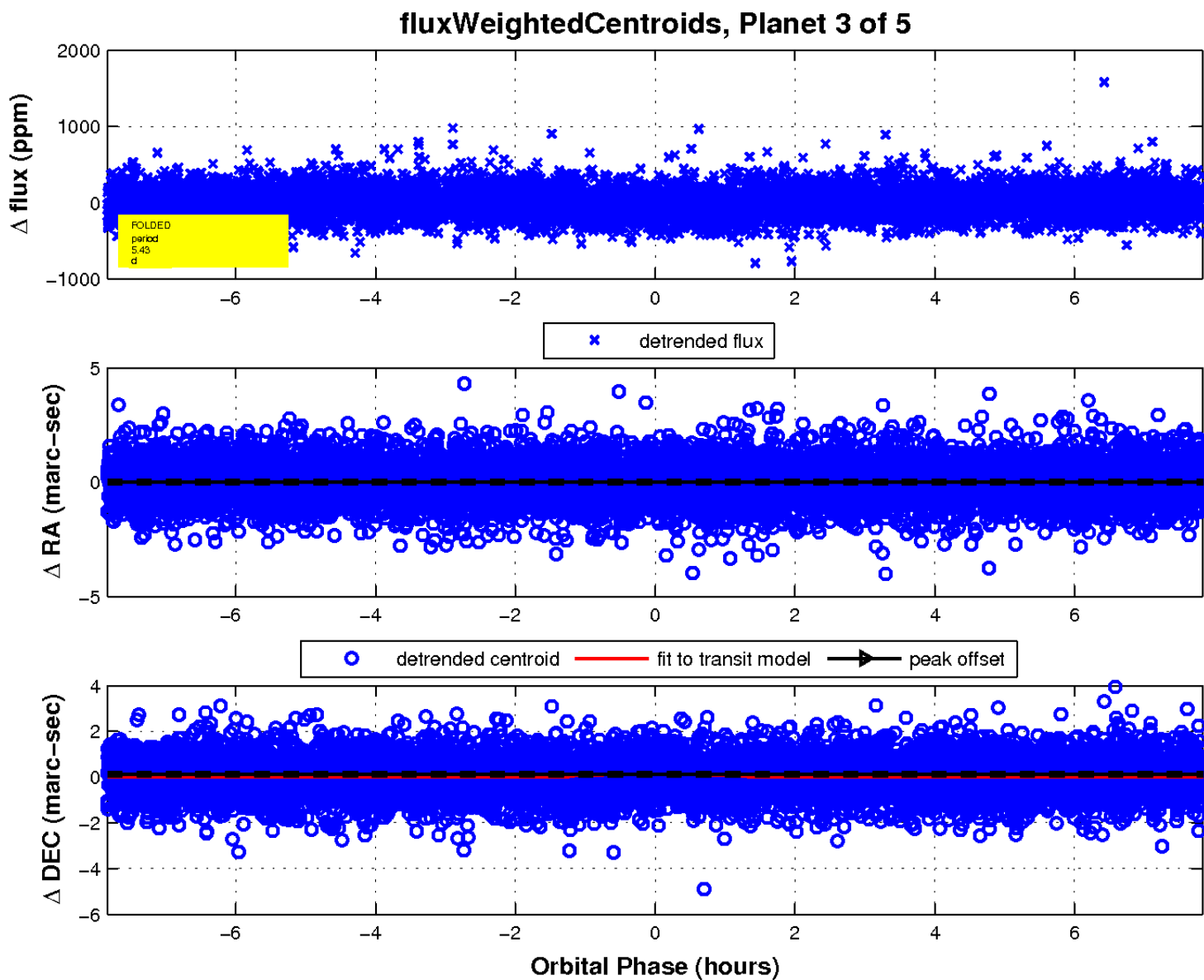
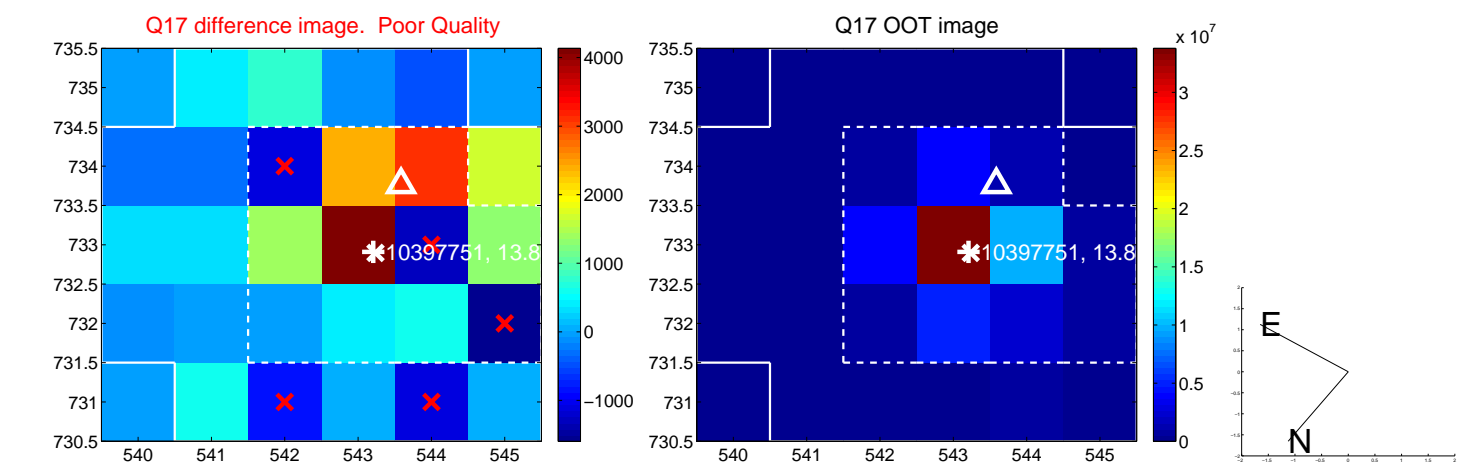
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

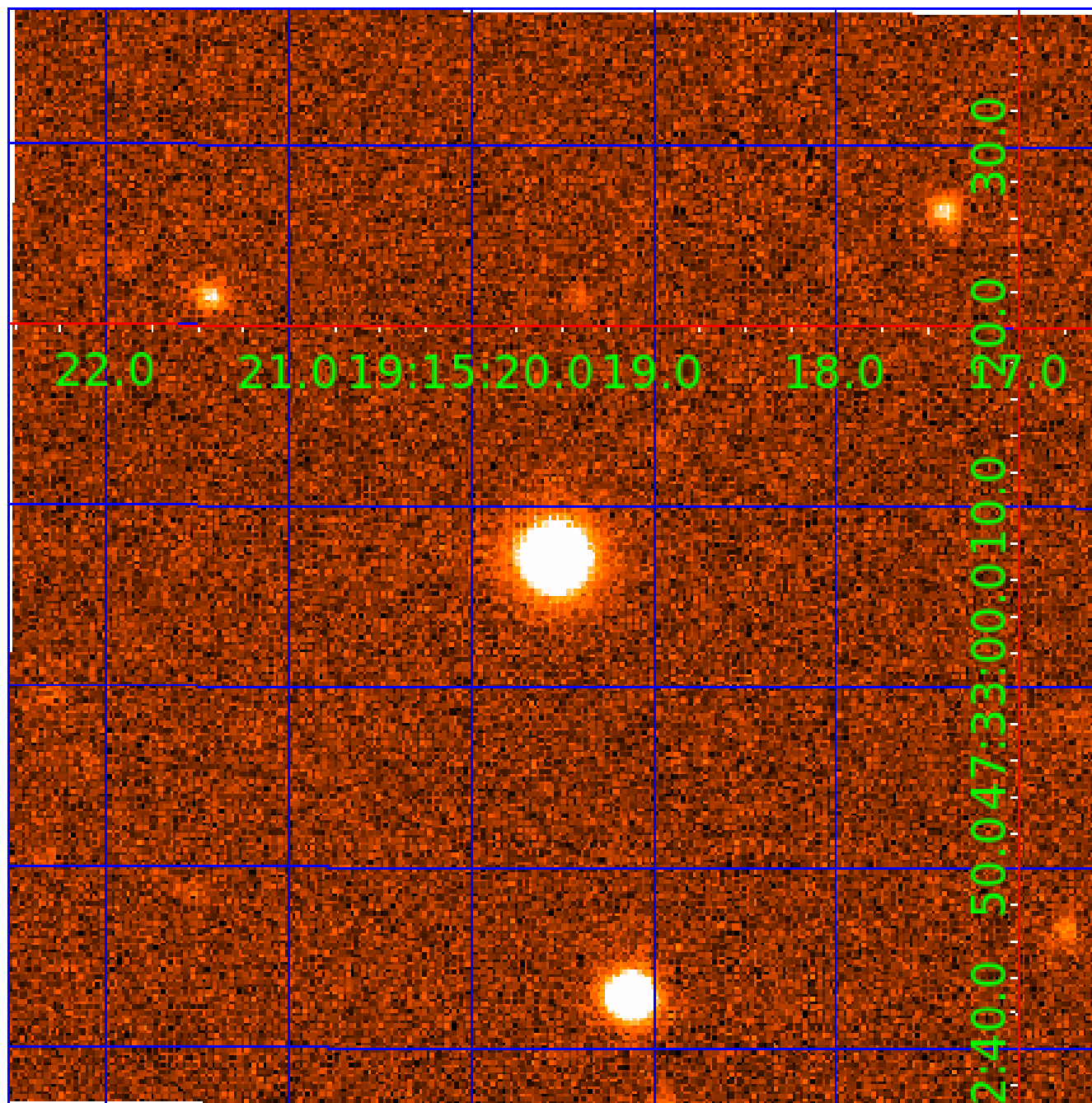


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 010397751

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010397751-01	OBS	2859.01	3.446210	132.228850	82.0	2.151	13.2	14.8	0.72	5374	0.79	251.72
010397751-02	OBS	2859.02	2.005467	133.234777	53.5	1.889	10.7	11.8	0.72	5374	0.63	518.11
010397751-03	OBS	2859.05	5.431032	134.415503	80.8	2.612	9.4	11.3	0.72	5374	0.76	137.26
010397751-04	OBS	2859.04	2.905115	132.564184	47.7	2.277	8.6	8.7	0.72	5374	0.53	316.10
010397751-05	OBS	2859.03	4.288980	132.363420	55.5	2.712	7.4	8.2	0.72	5374	0.61	188.03

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010397751-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
010397751-02	OBS	PC	0.83	0	0	0	0	NO_COMMENT
010397751-03	OBS	PC	0.86	0	0	0	0	NO_COMMENT
010397751-04	OBS	PC	0.96	0	0	0	0	NO_COMMENT
010397751-05	OBS	PC	1.00	0	0	0	0	NO_COMMENT

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

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

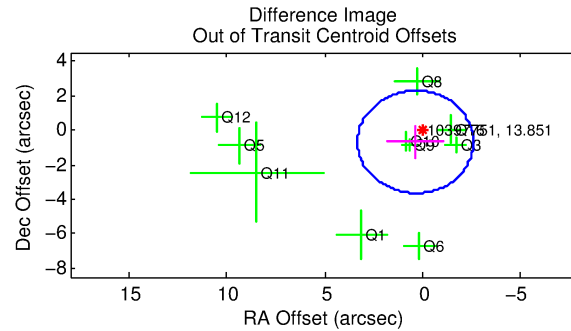
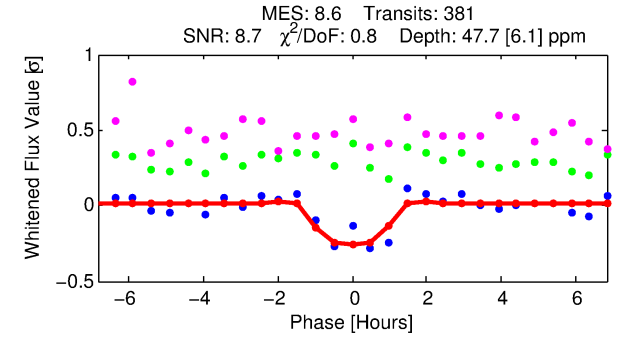
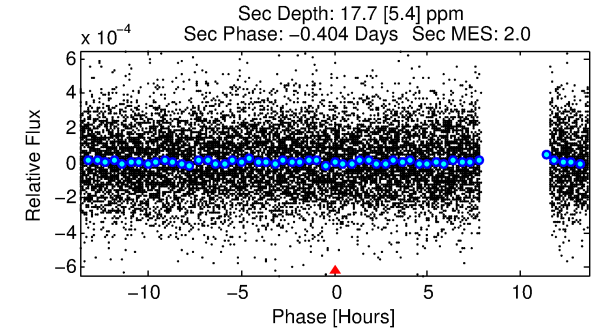
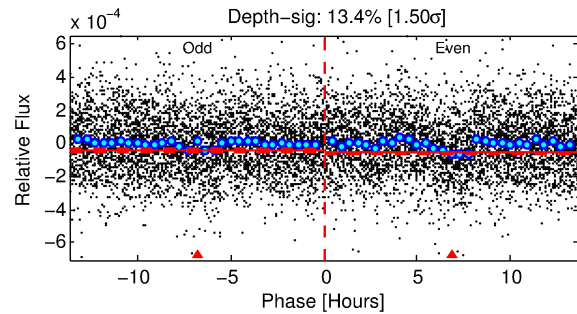
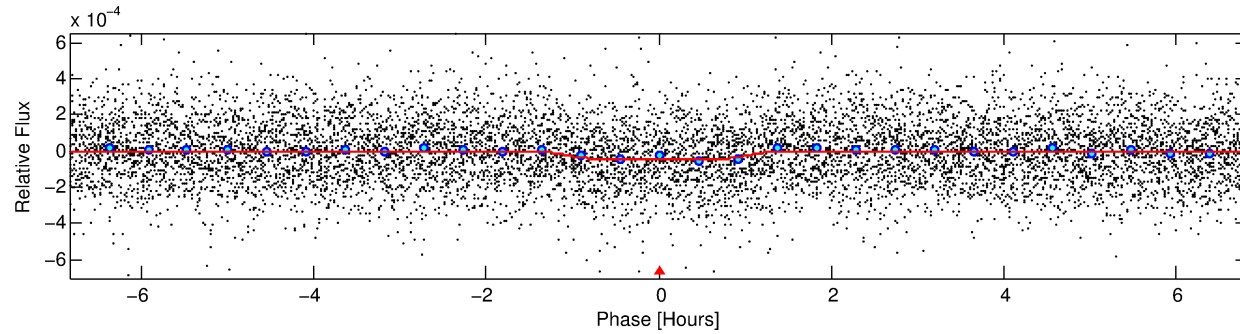
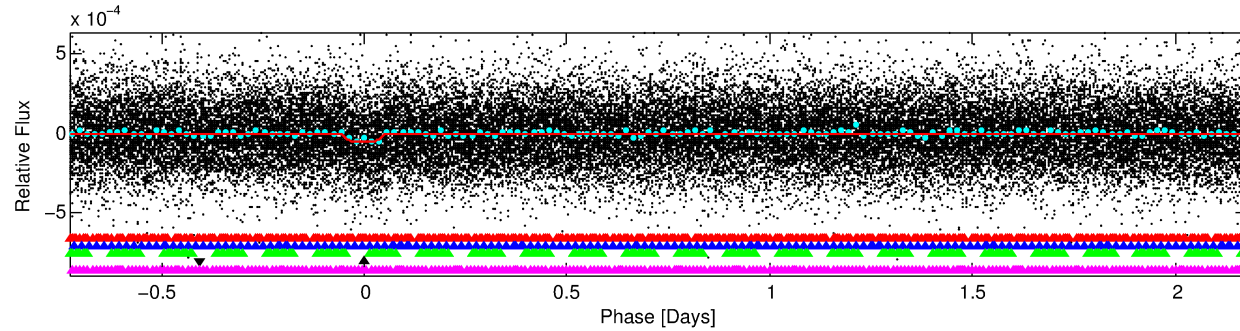
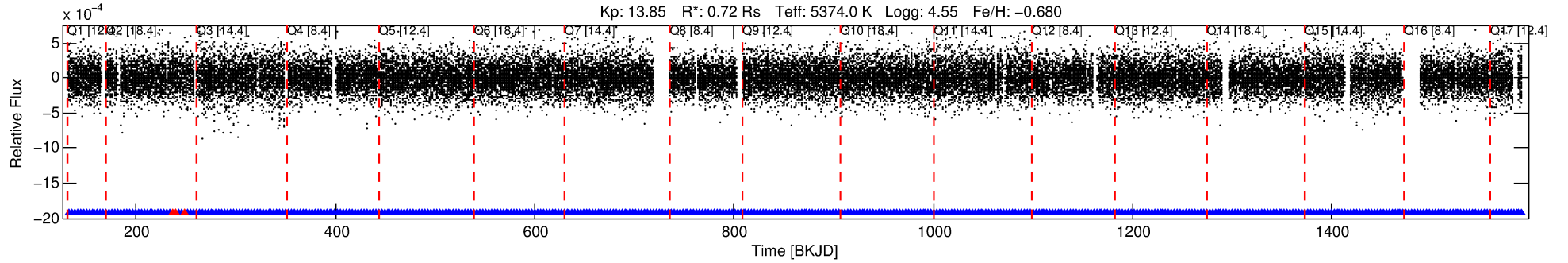
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010397751-04

No Significant Match Found

# DV One-Page Summary

KIC: 10397751 Candidate: 4 of 5 Period: 2.905 d  
KOI: K02859.04 Corr: 0.960



## DV Fit Results:

Period = 2.90512 [0.00002] d  
Epoch = 132.5642 [0.0042] BKJD  
Rp/R\* = 0.0067 [0.0029]  
a/R\* = 7.26 [13.22]  
b = 0.68 [1.47]  
Seff = 316.10 [61.76]  
Teff = 1075 [53] K  
Rp = 0.53 [0.24] Re  
a = 0.0351 [0.0036] AU  
Ag = 42.71 [39.55] [1.05 $\sigma$ ]  
Teffp = 4250 [978] K [3.24 $\sigma$ ]

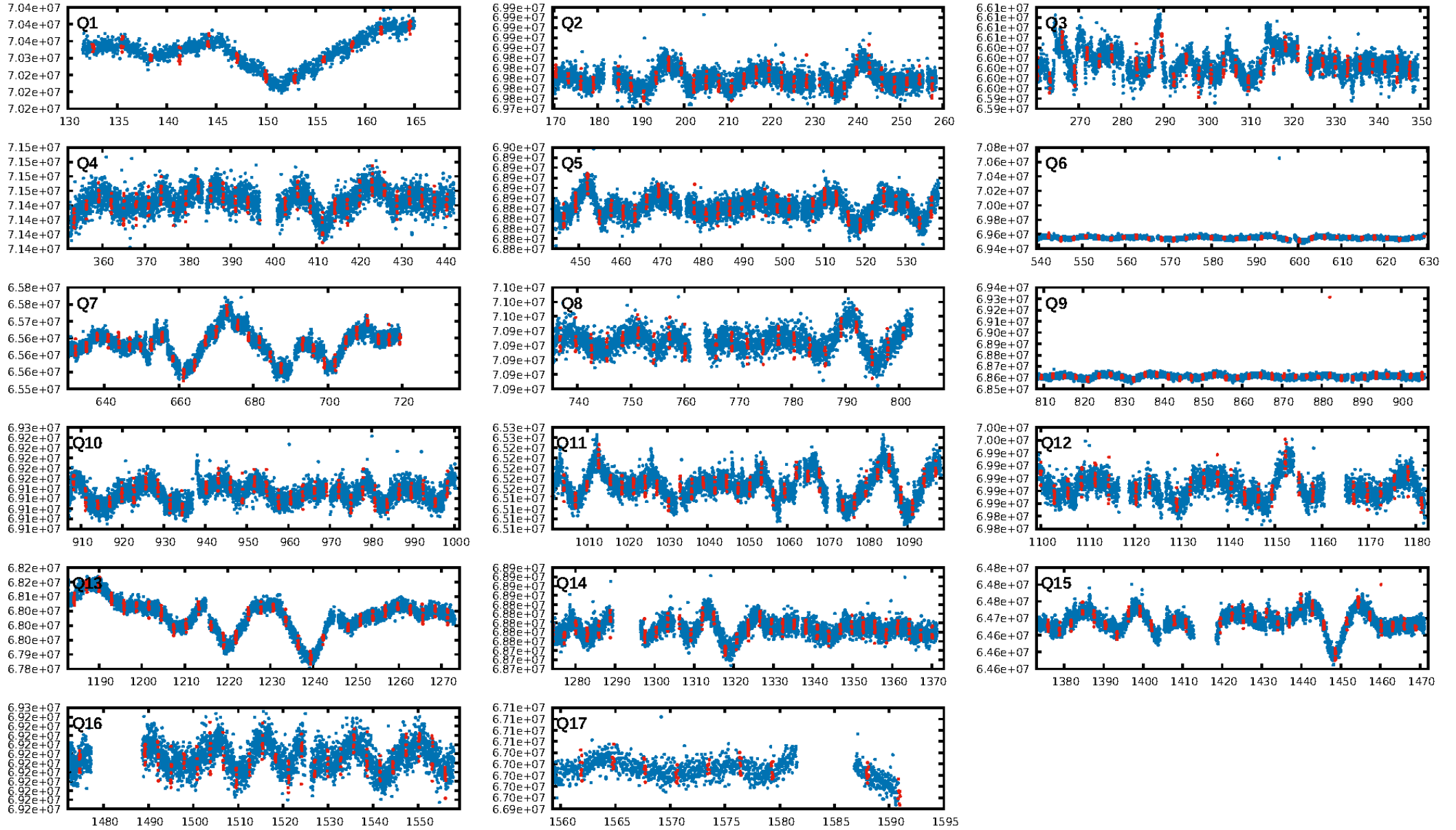
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [7.30 $\sigma$ ]  
LongPeriod-sig: 100.0% [4.15 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 1.53e-17  
RollingBand-fgt: 0.99 [360/363]  
GhostDiagnostic-chr: 79.83  
Centroid-sig: 1.0%  
Centroid-so: 2.160 arcsec [1.83 $\sigma$ ]  
OotOffset-rm: 0.771 arcsec [0.78 $\sigma$ ]  
OotOffset-st: 2/2/3/3 [10]  
KicOffset-rm: 0.815 arcsec [0.85 $\sigma$ ]  
KicOffset-st: 2/2/3/3 [10]  
DiffImageQuality-fgm: 0.40 [4/10]  
DiffImageOverlap-fno: 1.00 [17/17]

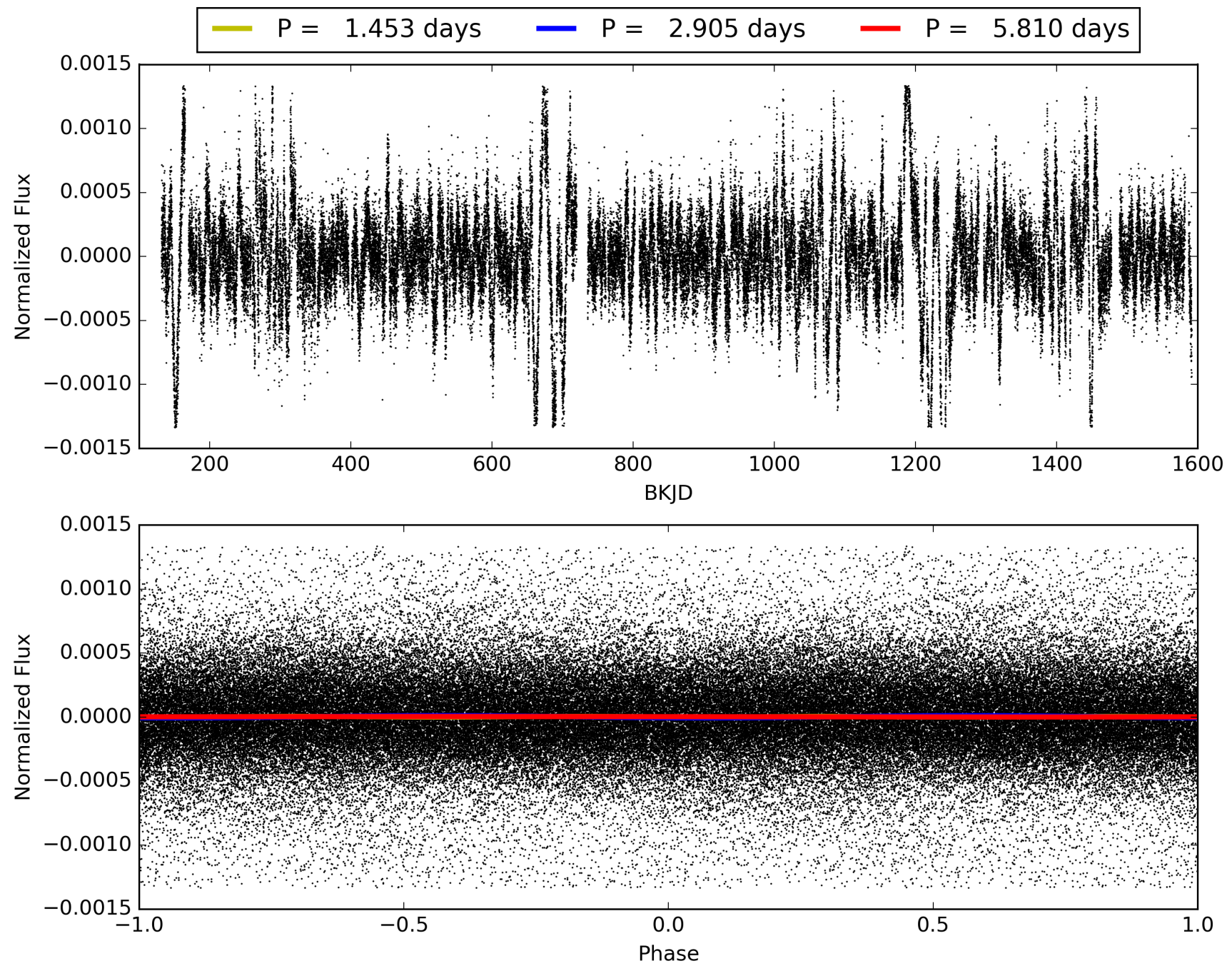
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 16:55:53 Z

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

# TCE 010397751-04, PDC Light Curves

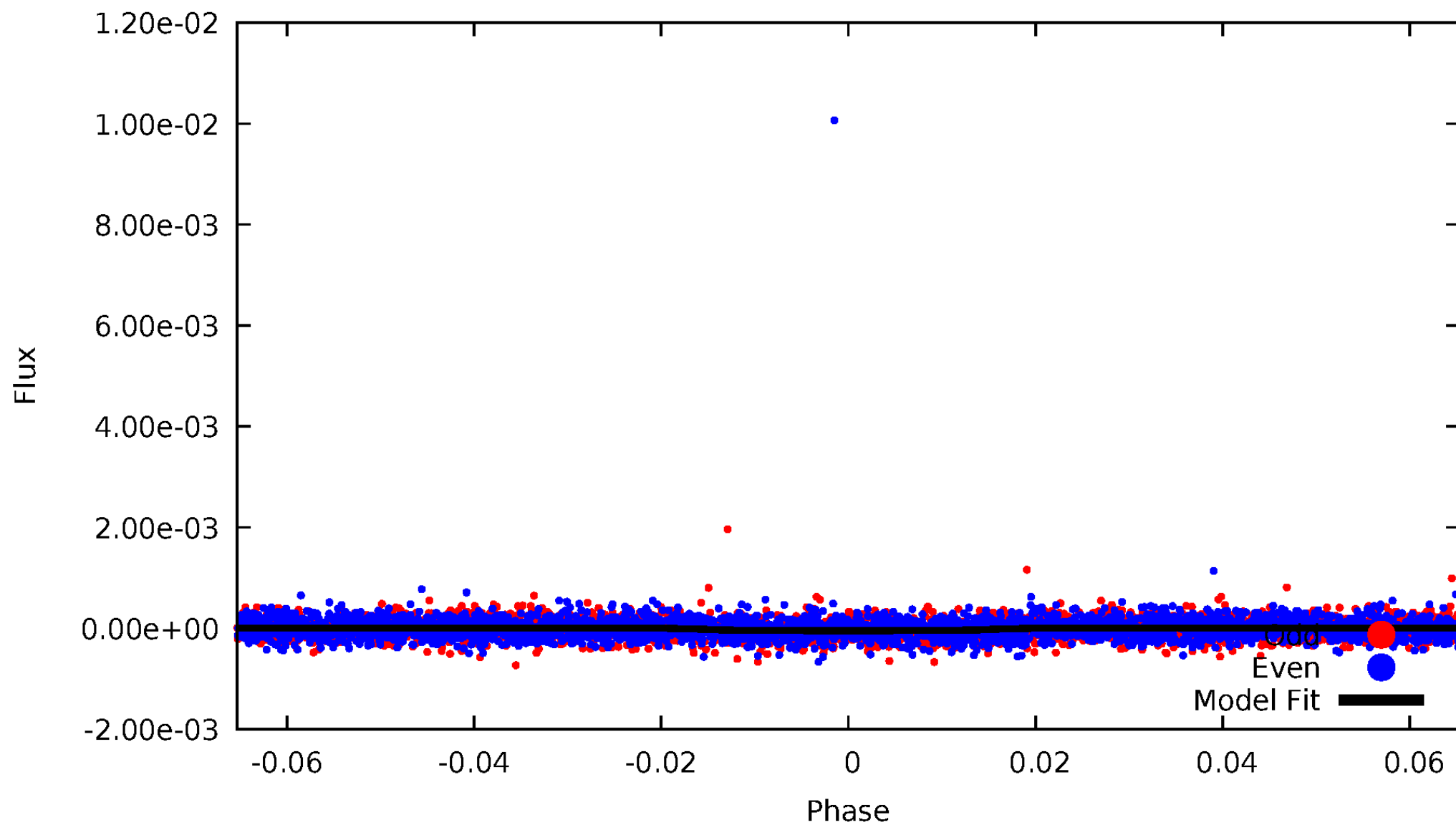


TCE 010397751-04



# DV Odd/Even

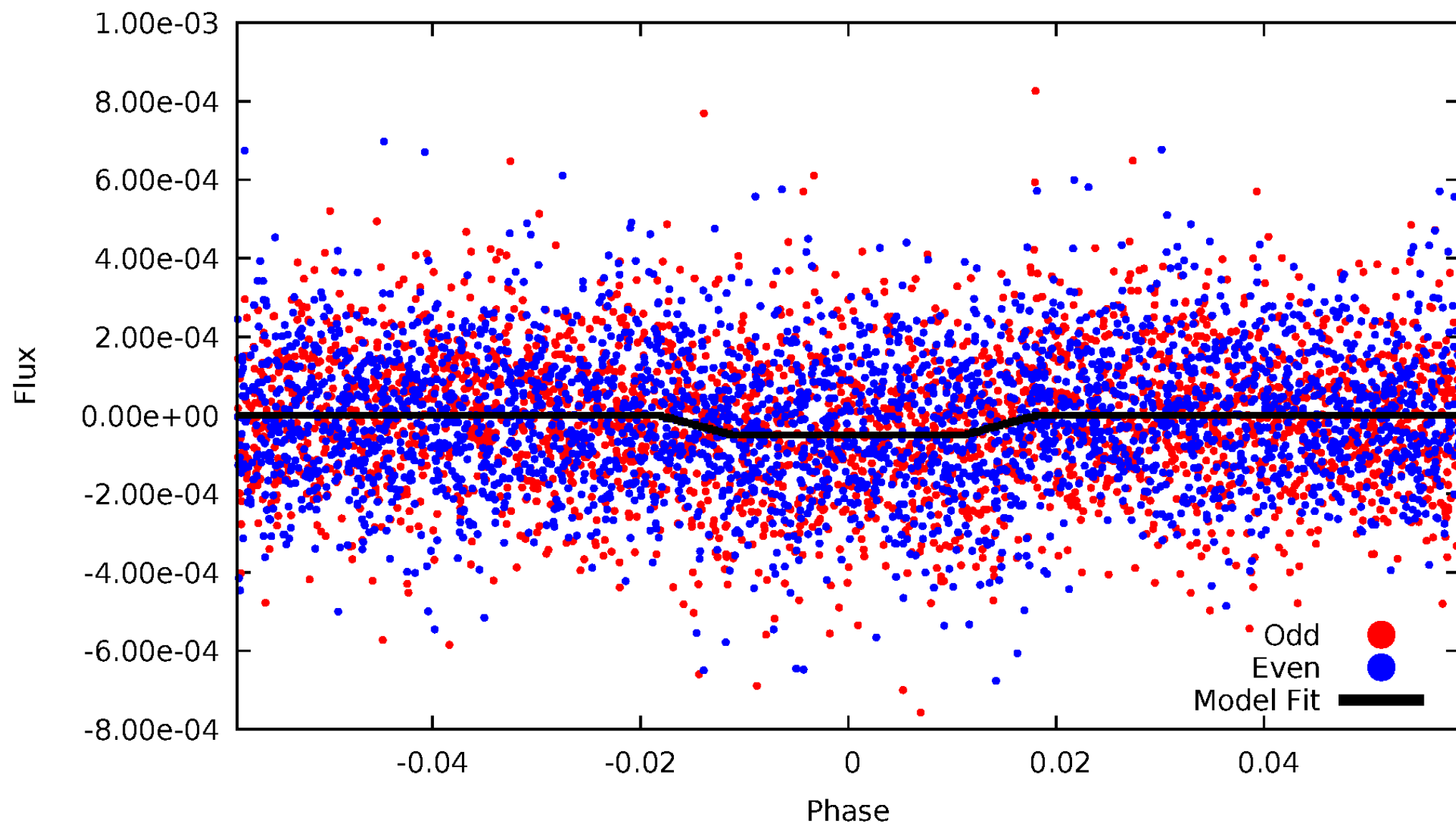
TCE 010397751-04





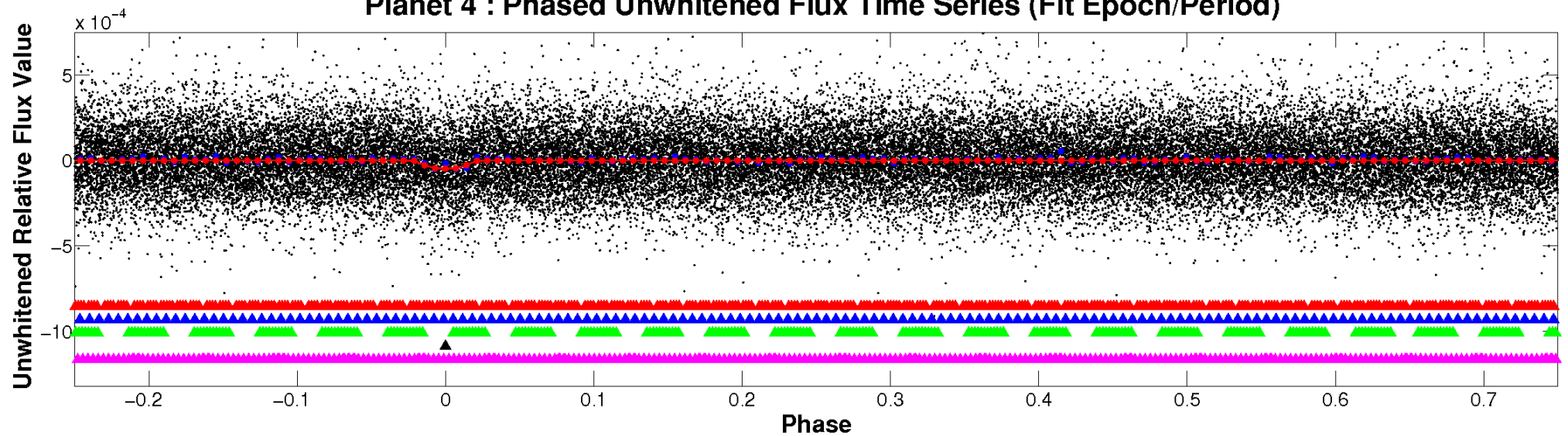
# ALT Odd/Even

TCE 010397751-04

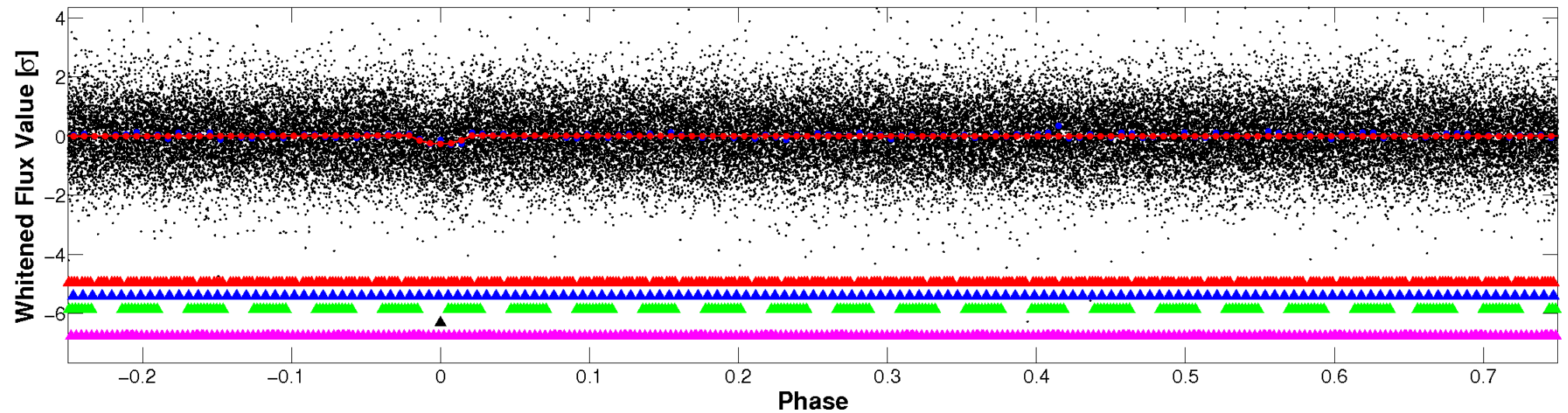


# Non-Whitened Vs. Whitened Light Curve

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

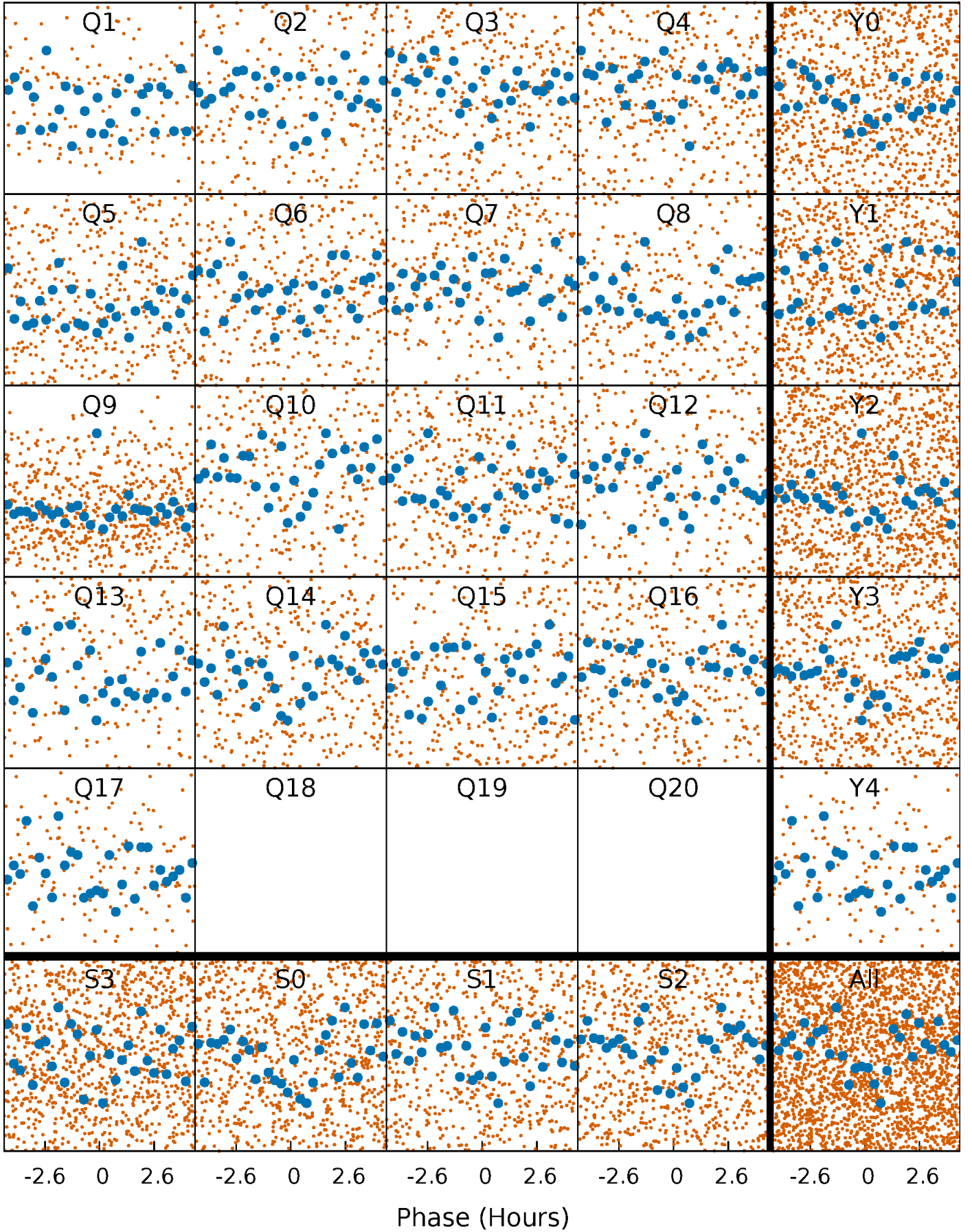


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



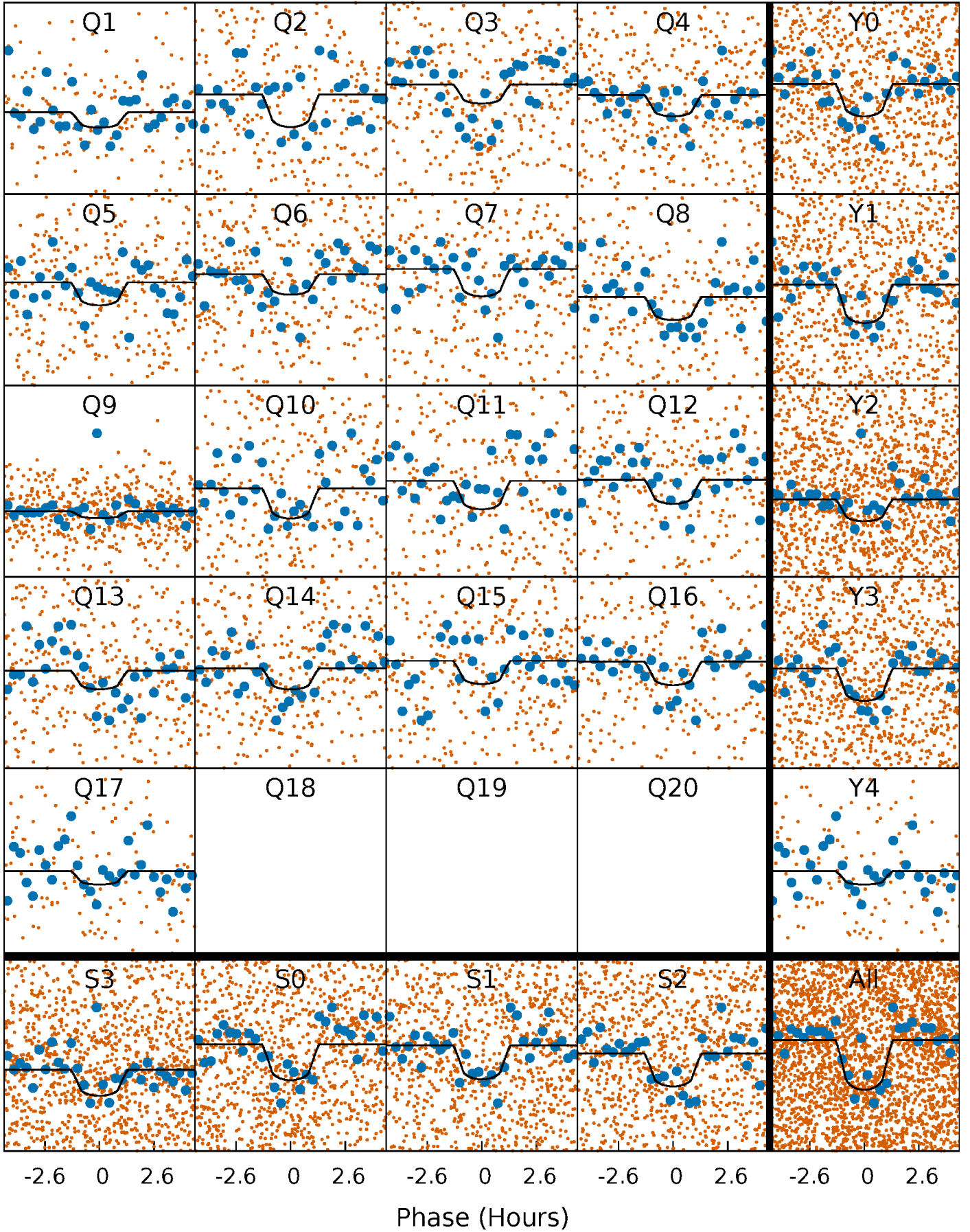
# PDC Quarter-Phased Transit Curves

TCE 010397751-04   P= 2.905115 Days    $T_0=132.564184$  (BKJD)



# DV Quarter-Phased Transit Curves

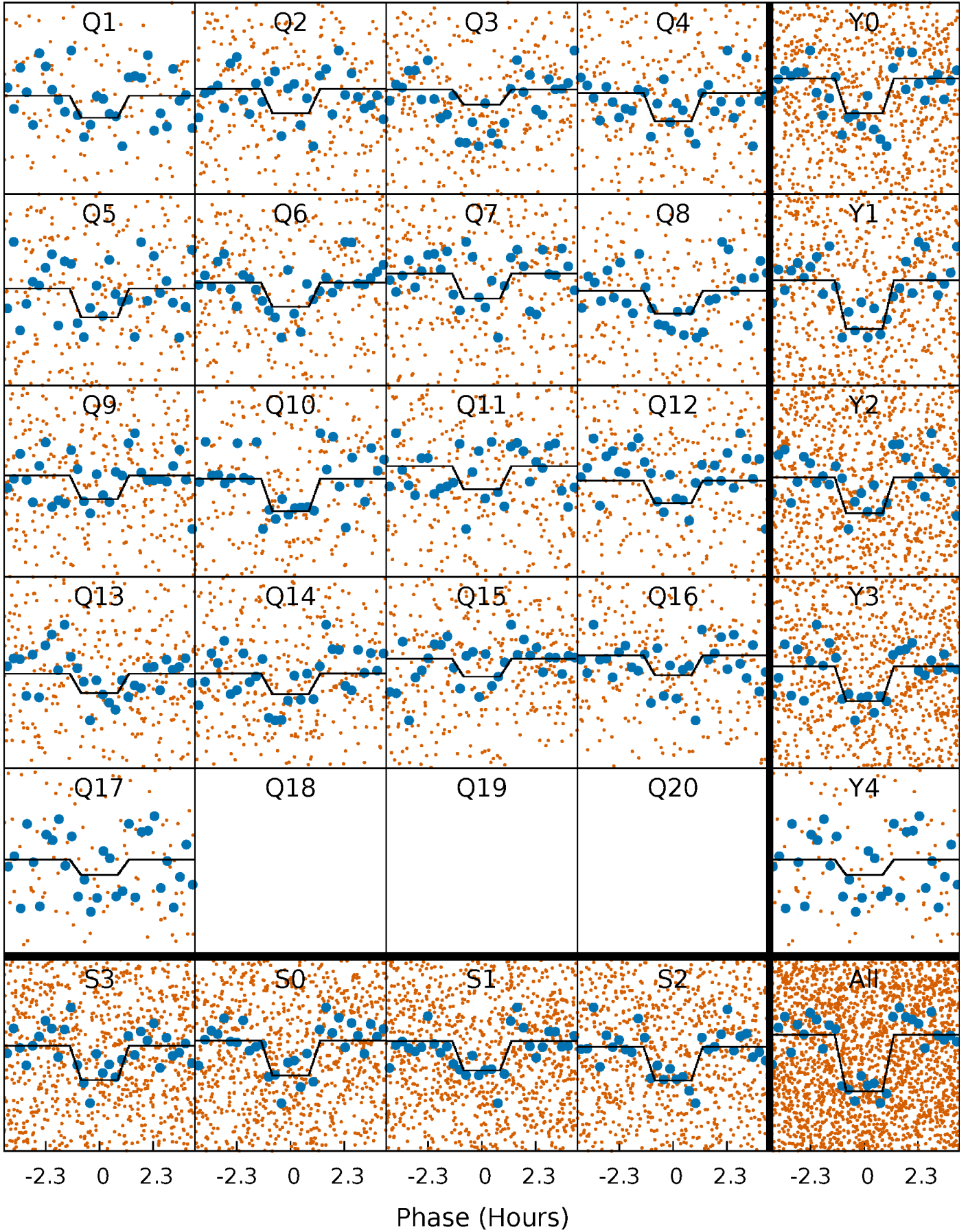
TCE 010397751-04 P= 2.905115 Days  $T_0=132.564184$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

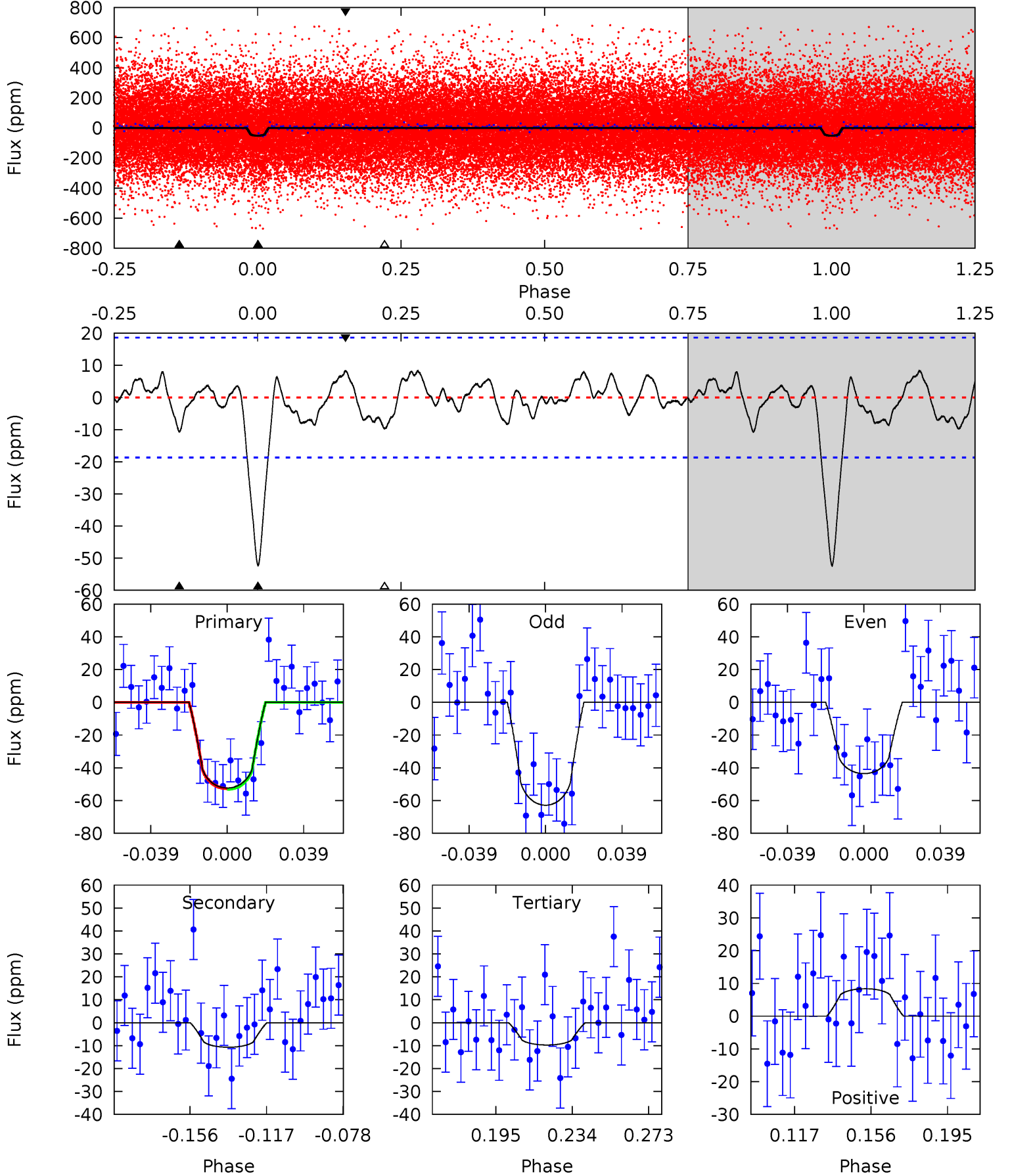
TCE 010397751-04 P= 2.905138 Days  $T_0=132.560336$  (BKJD)



# DV Model-Shift Uniqueness Test

010397751-04, P = 2.905115 Days, E = 129.659069 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
13.3	2.73	2.48	2.13	4.76	2.06	1.10	10.9	11.2	0.25	0.60	2.47	0.91	0.14	0.06

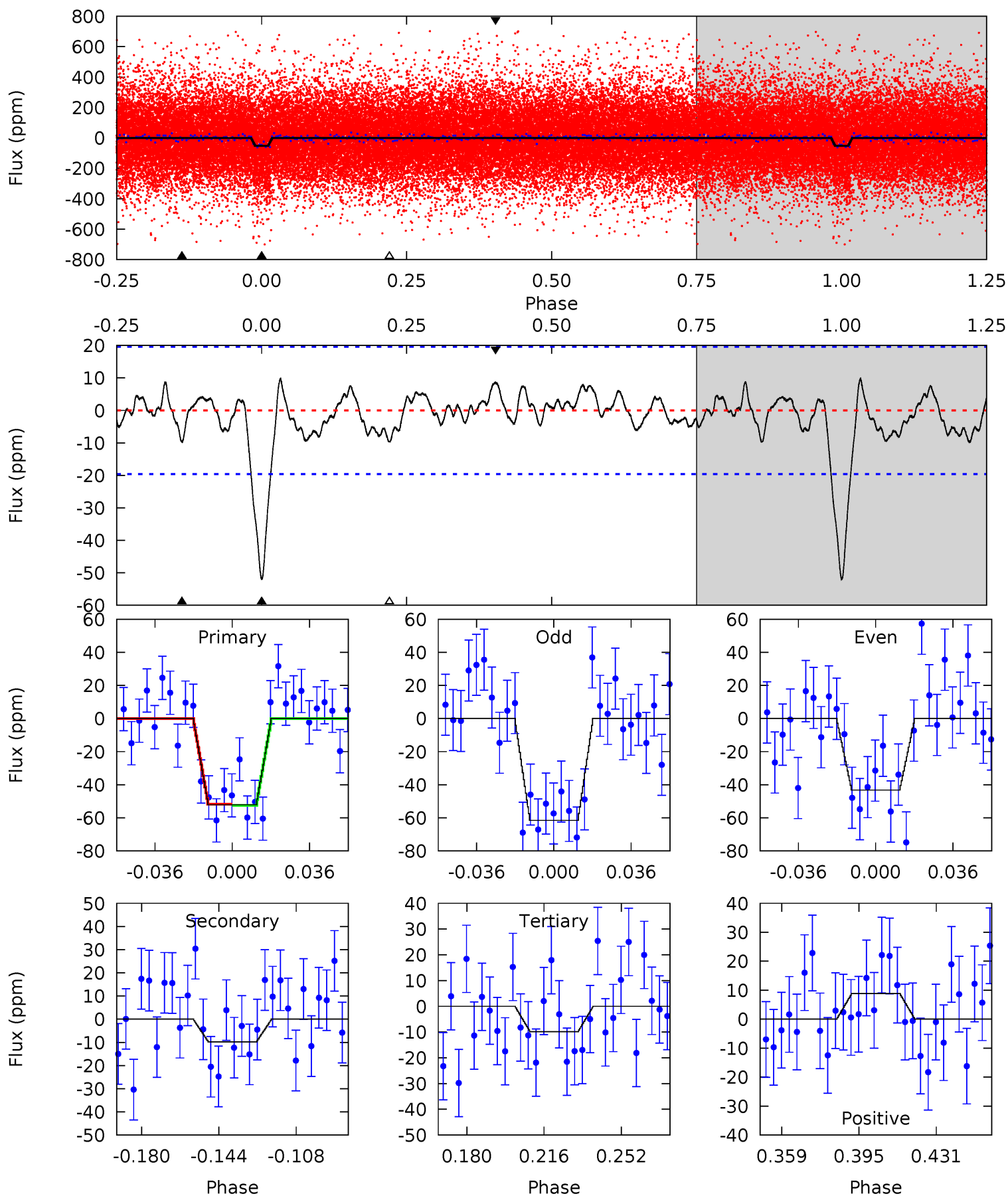




# Alt Model-Shift Uniqueness Test

010397751-04, P = 2.905138 Days, E = 129.655198 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	2.40	2.39	2.15	4.77	2.10	1.01	10.3	10.6	0.00	0.25	2.23	1.07	0.16	0.09



### Stellar Parameters For KIC 010397751

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5374^{+160}_{-144}$	$4.555^{+0.088}_{-0.064}$	$-0.680^{+0.300}_{-0.300}$	$0.721^{+0.082}_{-0.073}$	$0.680^{+0.086}_{-0.034}$	$2.557^{+0.950}_{-0.582}$
	+3%/-3%	+2%/-1%	+44%/-44%	+11%/-10%	+13%/-5%	+37%/-23%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 010397751-04 / KOI 2859.04

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-11 \pm 4$	$0.52^{+0.23}_{-0.23}$	$1496^{+59}_{-62}$	$4024^{+1046}_{-579}$	$26^{+60}_{-15}$
Alt.	$-10 \pm 4$	$0.56^{+0.22}_{-0.23}$	$1500^{+56}_{-60}$	$3877^{+881}_{-512}$	$21^{+43}_{-12}$

$T_{max}$  = 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

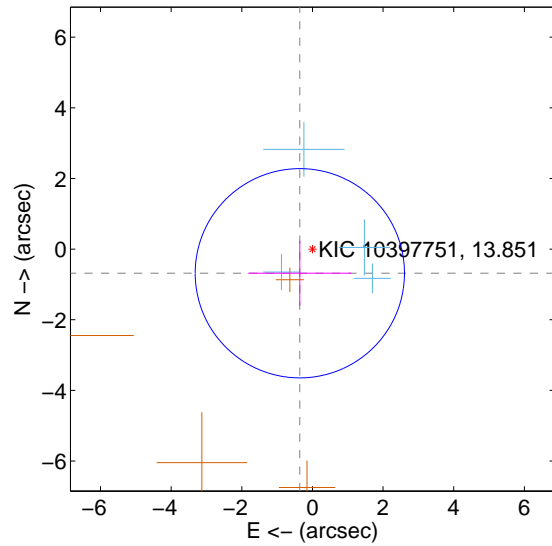
Supplemental centroid analysis for 010397751-04. Kepler magnitude: 13.85. Transit SNR 8.75

There are 4 quarters with good PRF difference image offsets

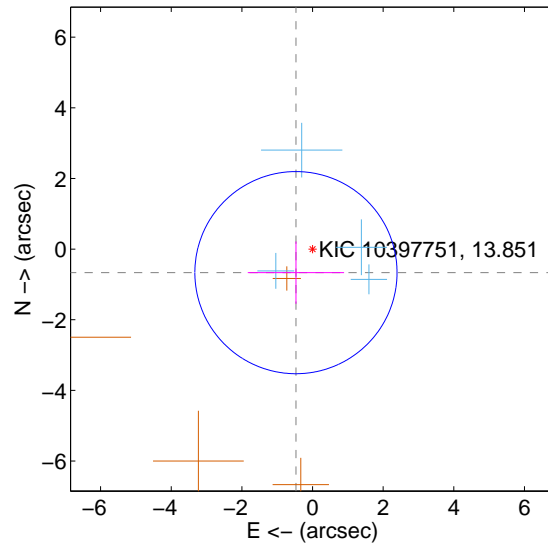
The direct PRF centroid is offset from the target star catalog position by about 0.09 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.771 \pm 0.987$	0.78	$0.357 \pm 1.459$	$-0.684 \pm 0.920$
PRF-fit source offset from KIC position	$0.815 \pm 0.954$	0.85	$0.469 \pm 1.363$	$-0.667 \pm 0.882$
photometric centroid source offset	$2.16 \pm 1.18$	1.83	$-1.29 \pm 1.19$	$1.73 \pm 1.18$

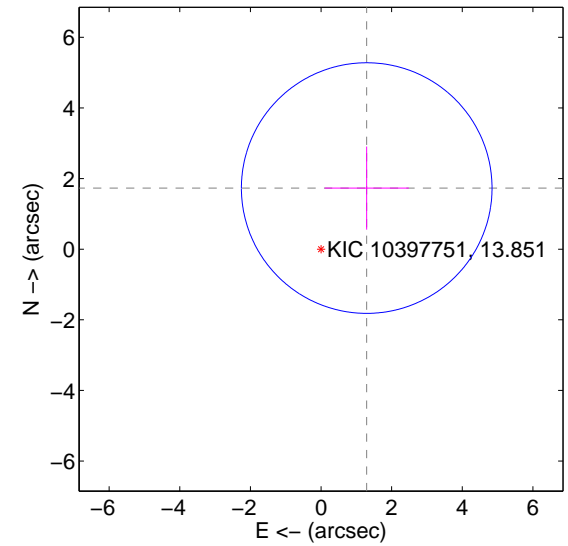
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

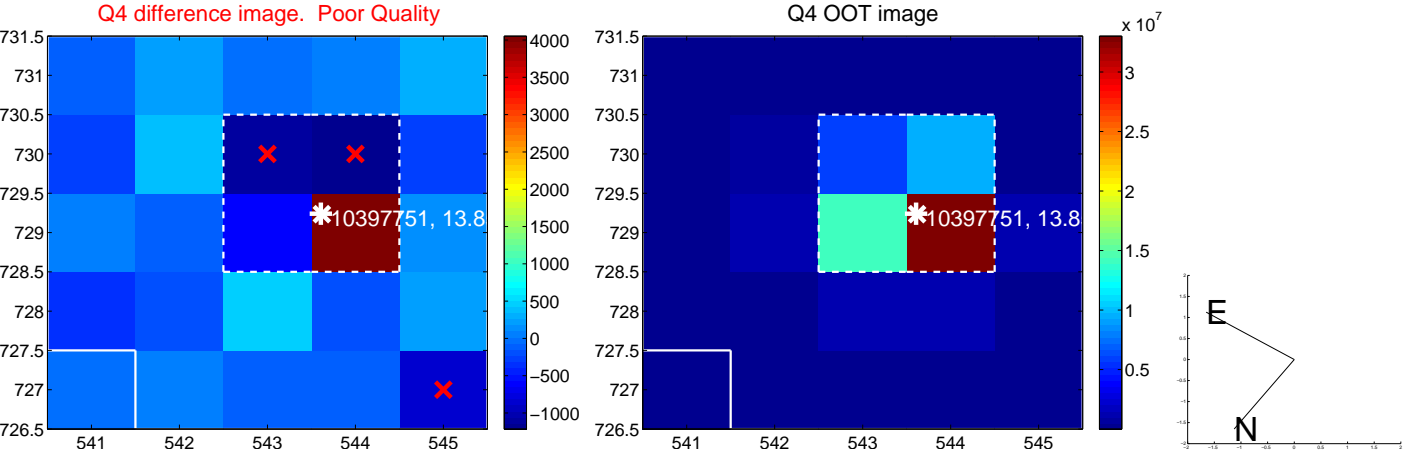
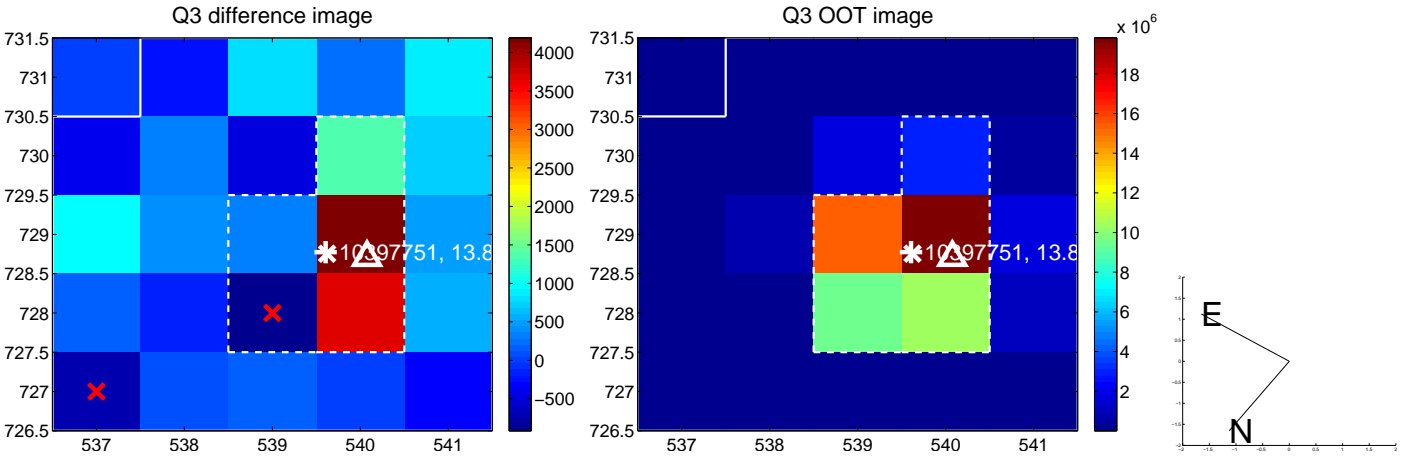
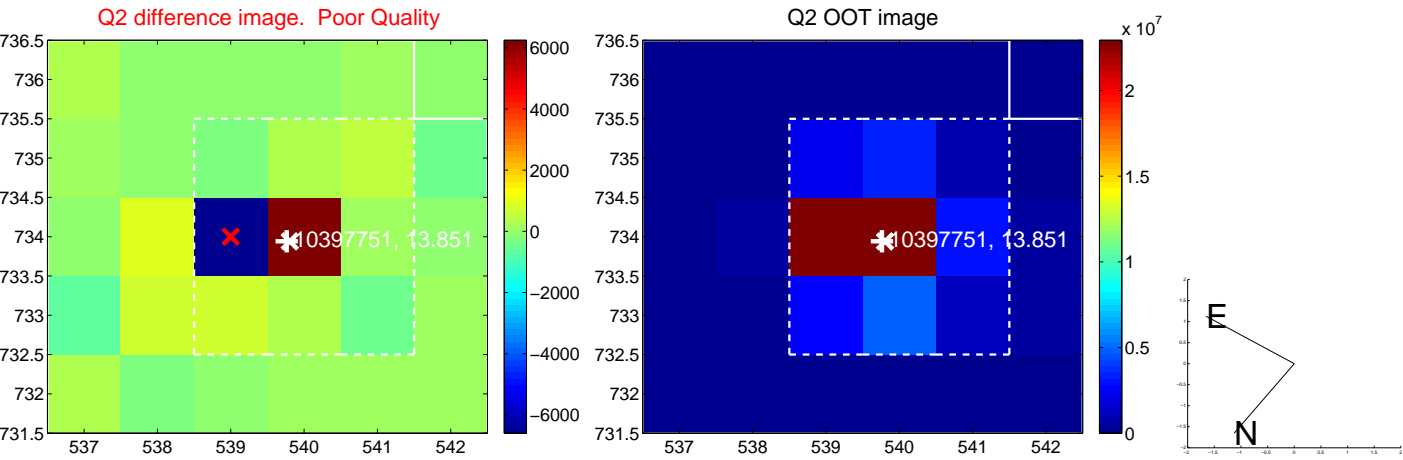
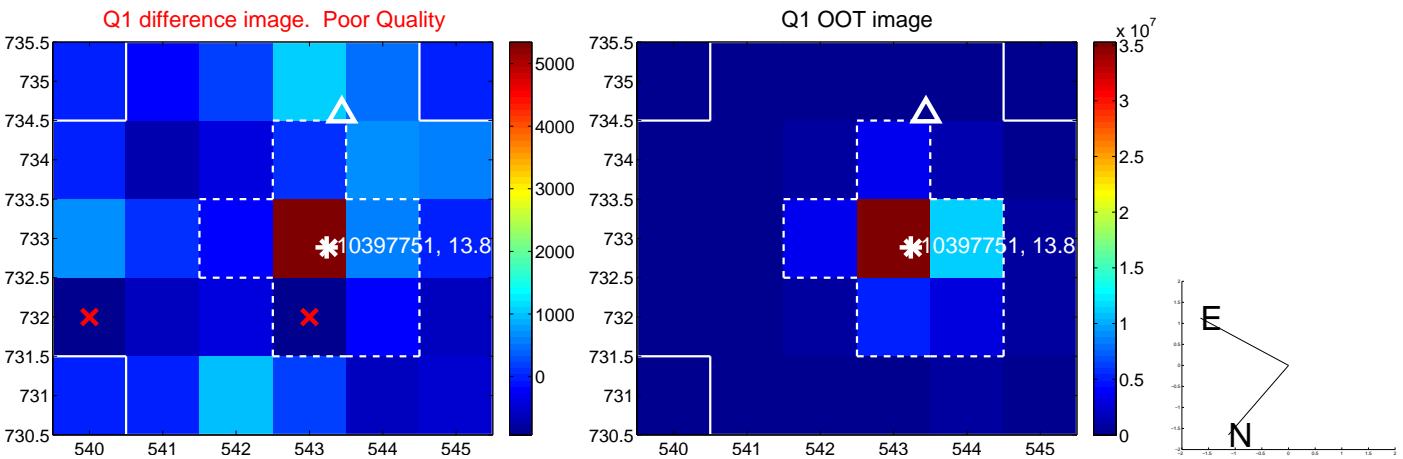


offset from photometric centroids

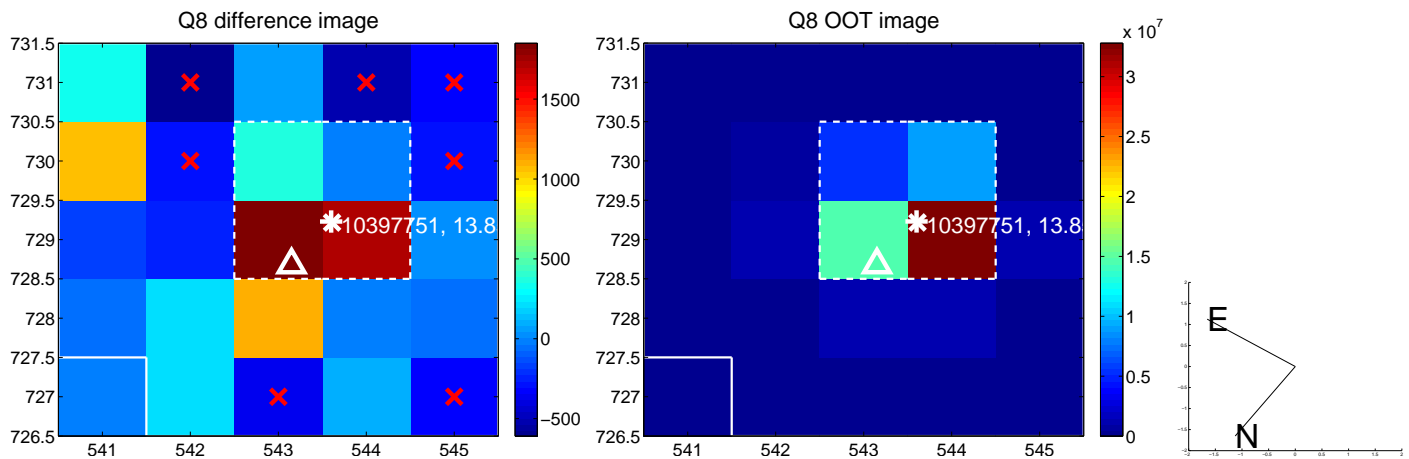
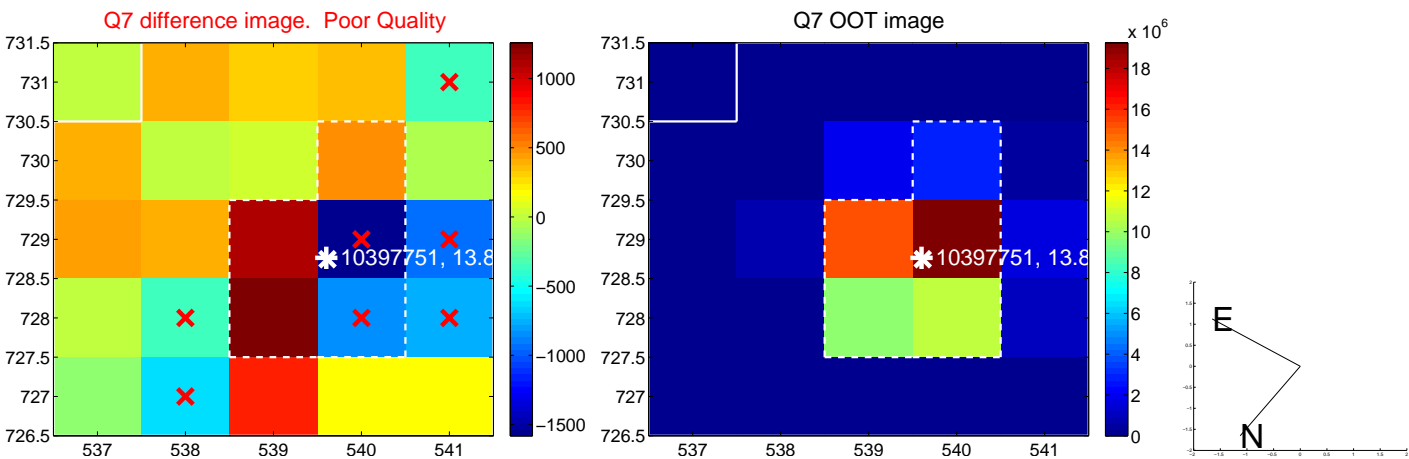
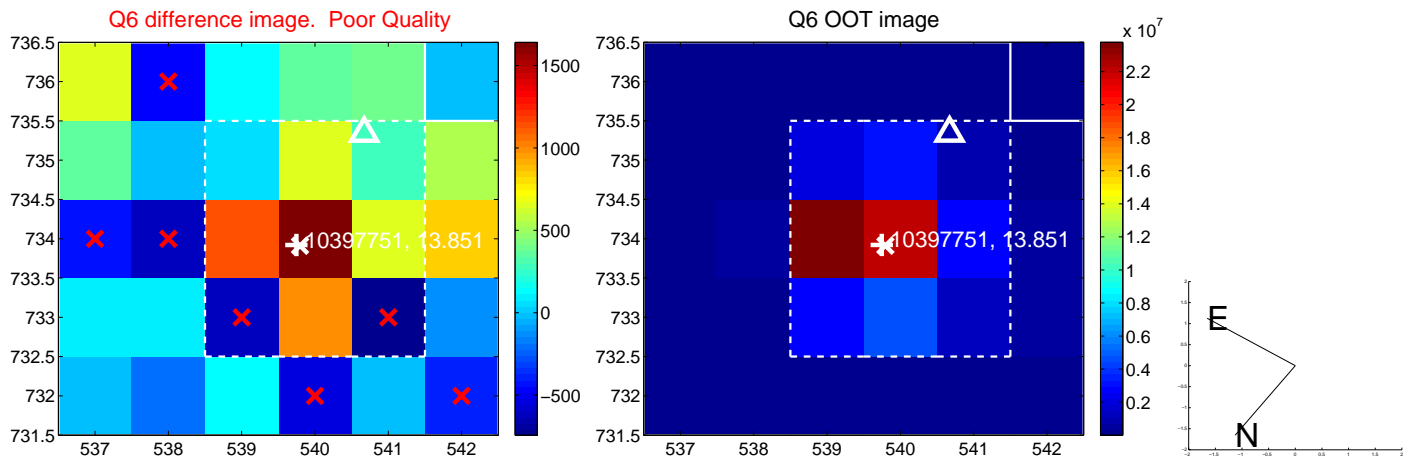
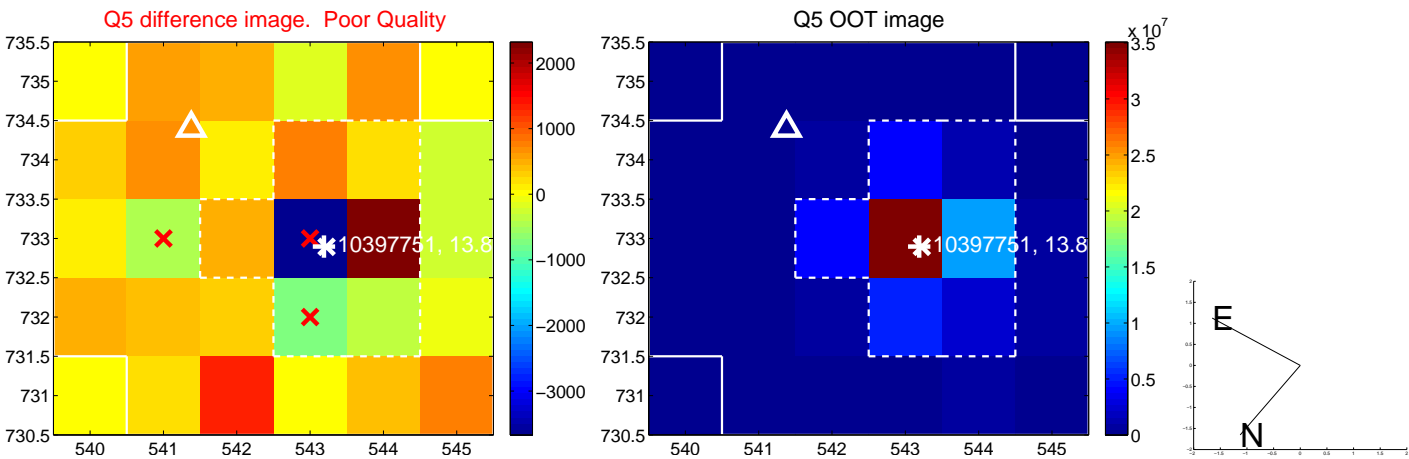


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

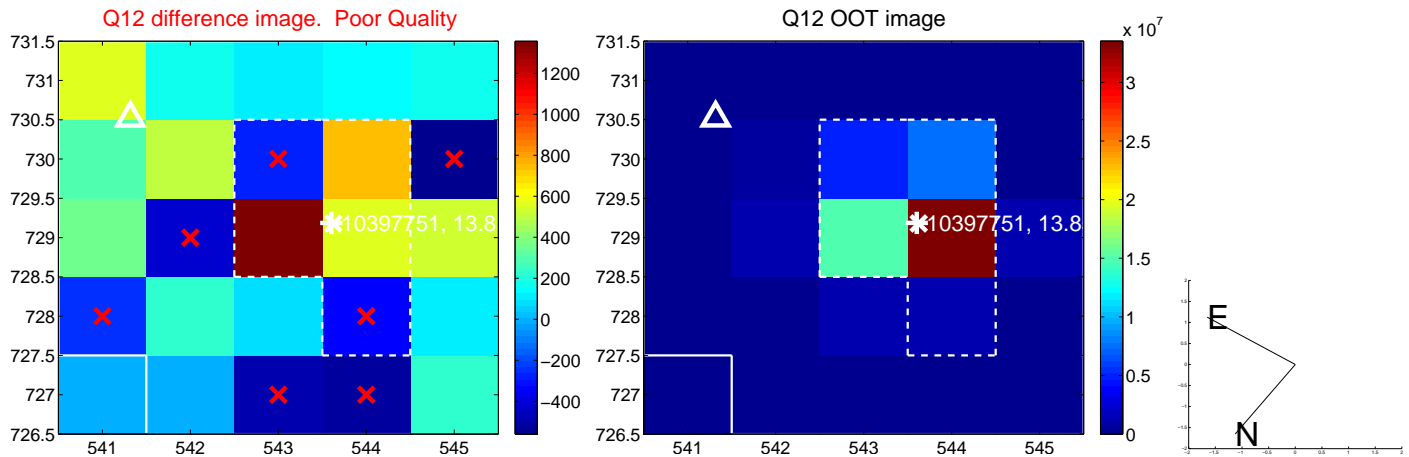
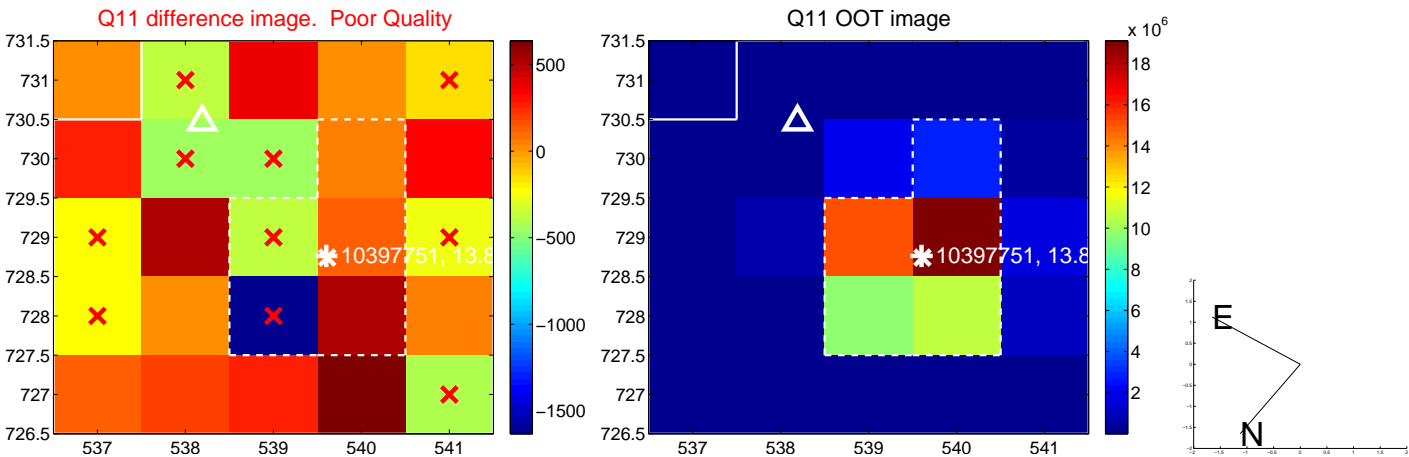
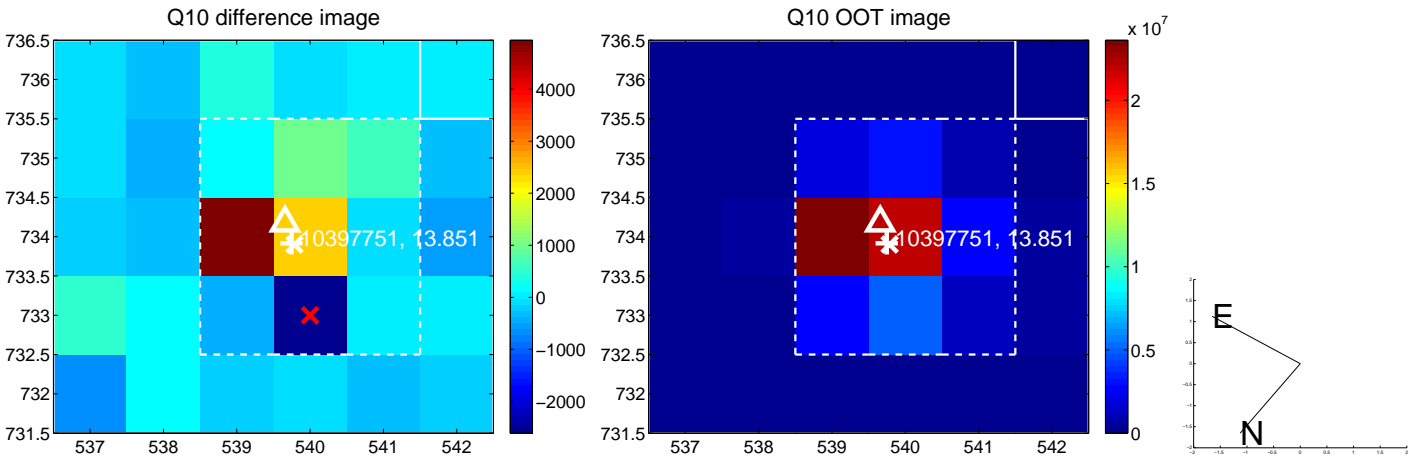
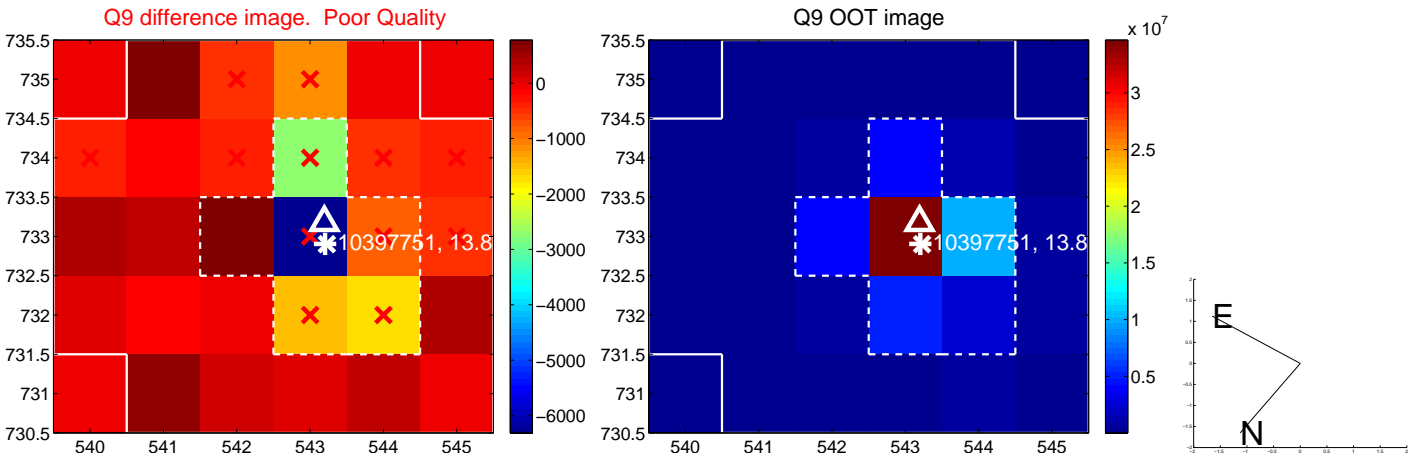
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

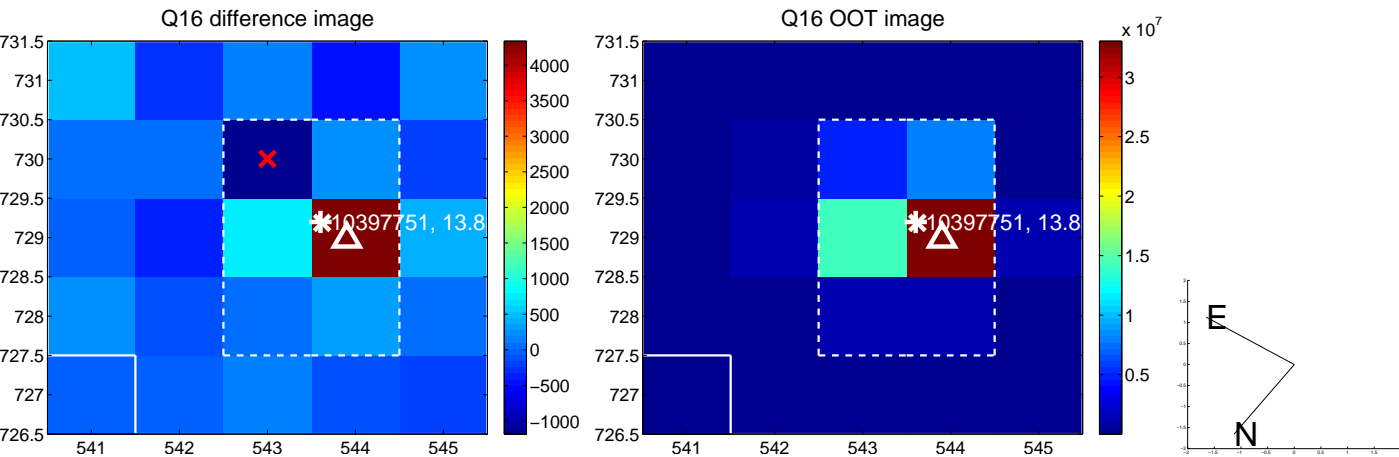
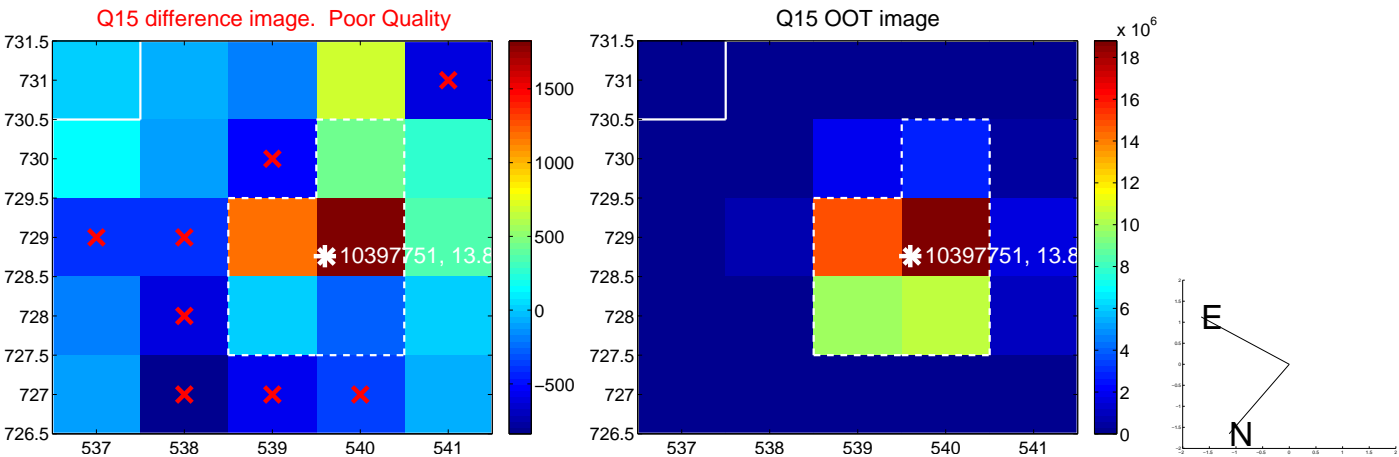
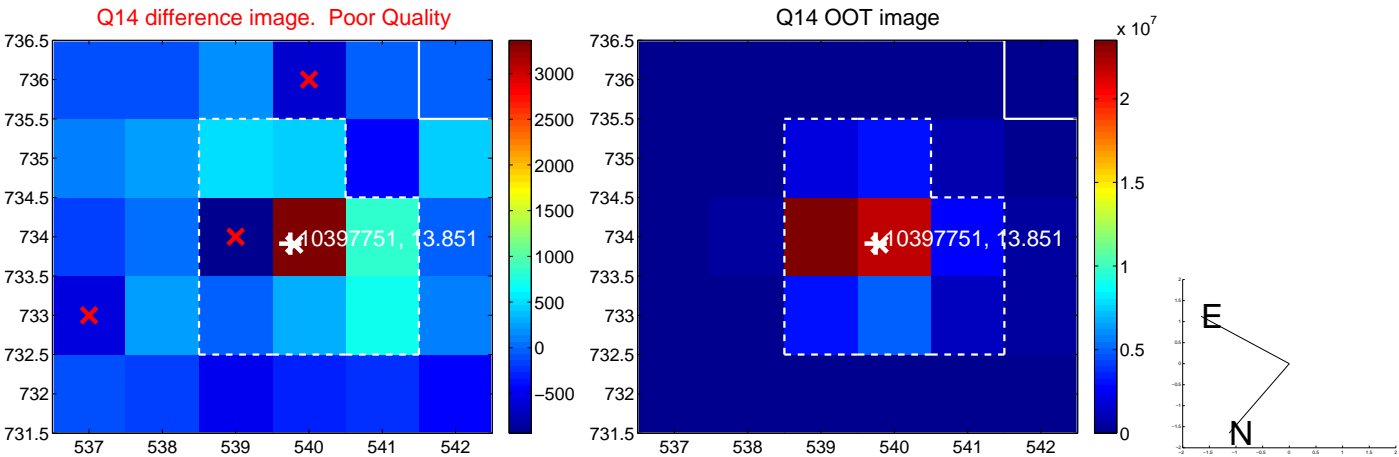
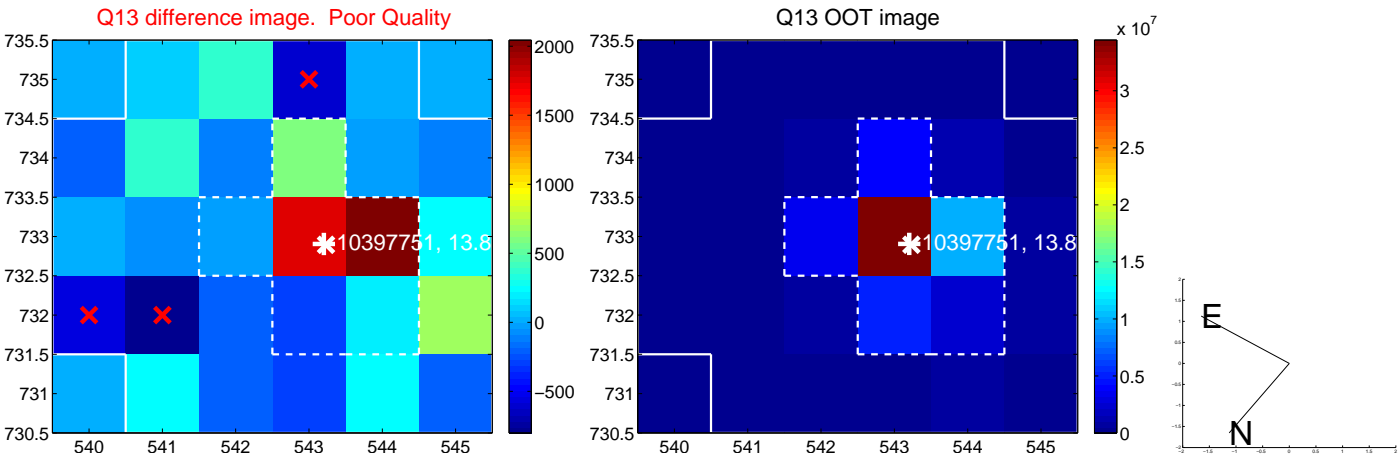


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

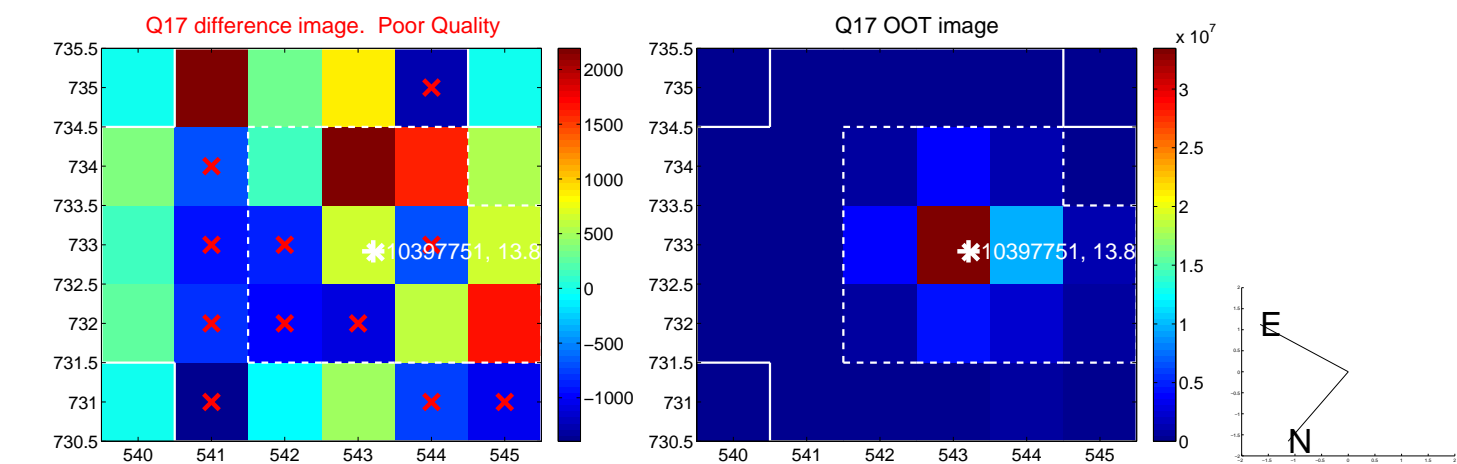




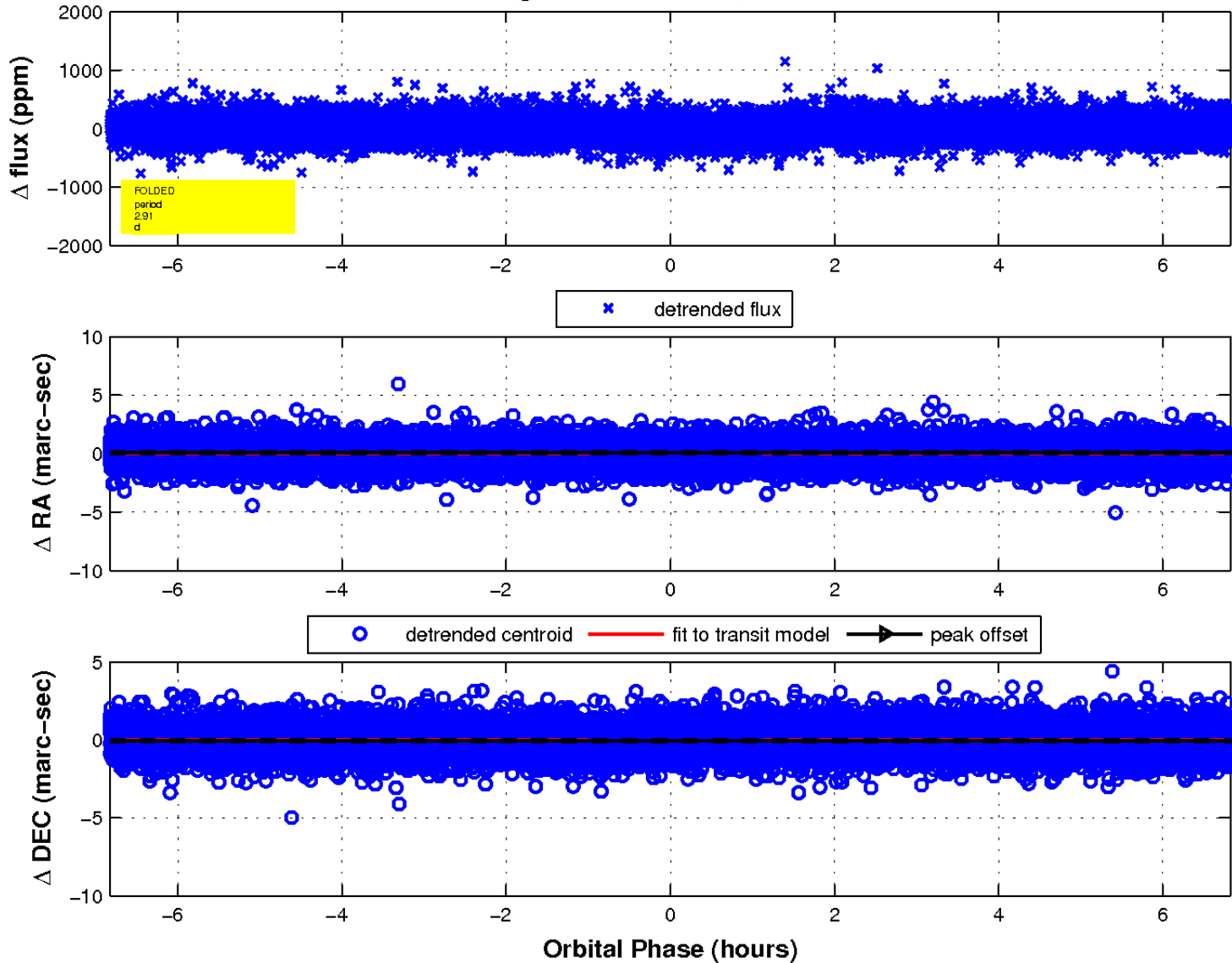
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

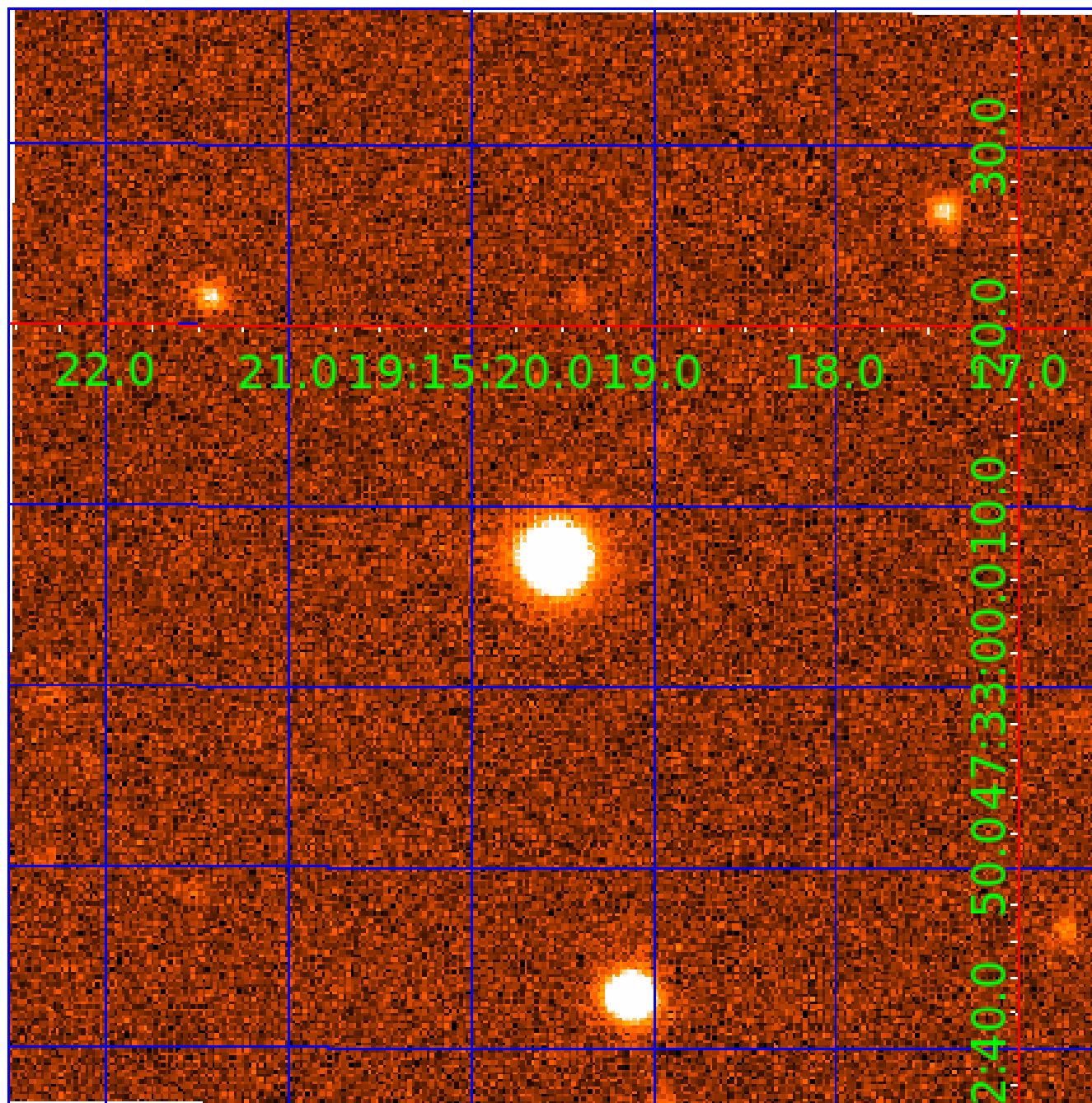


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# KIC 010397751

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010397751-01	OBS	2859.01	3.446210	132.228850	82.0	2.151	13.2	14.8	0.72	5374	0.79	251.72
010397751-02	OBS	2859.02	2.005467	133.234777	53.5	1.889	10.7	11.8	0.72	5374	0.63	518.11
010397751-03	OBS	2859.05	5.431032	134.415503	80.8	2.612	9.4	11.3	0.72	5374	0.76	137.26
010397751-04	OBS	2859.04	2.905115	132.564184	47.7	2.277	8.6	8.7	0.72	5374	0.53	316.10
010397751-05	OBS	2859.03	4.288980	132.363420	55.5	2.712	7.4	8.2	0.72	5374	0.61	188.03

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010397751-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
010397751-02	OBS	PC	0.83	0	0	0	0	NO_COMMENT
010397751-03	OBS	PC	0.86	0	0	0	0	NO_COMMENT
010397751-04	OBS	PC	0.96	0	0	0	0	NO_COMMENT
010397751-05	OBS	PC	1.00	0	0	0	0	NO_COMMENT

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

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

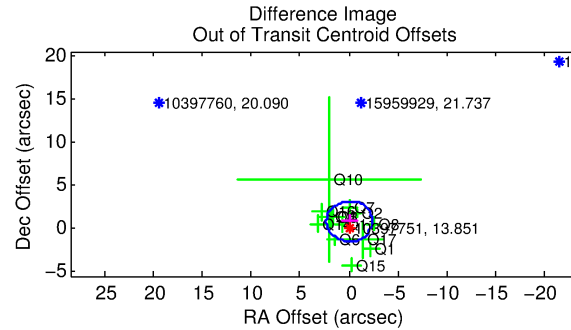
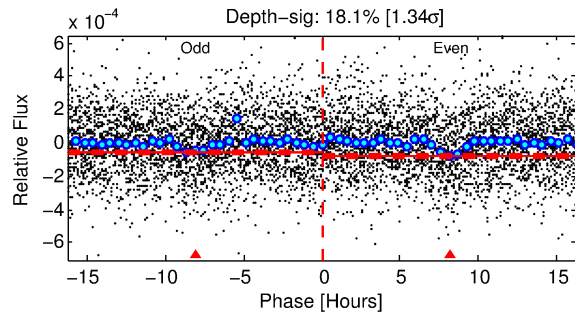
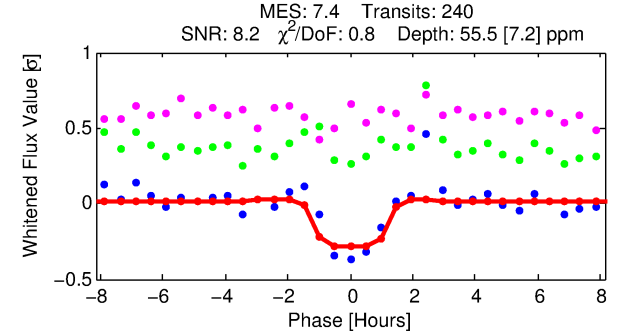
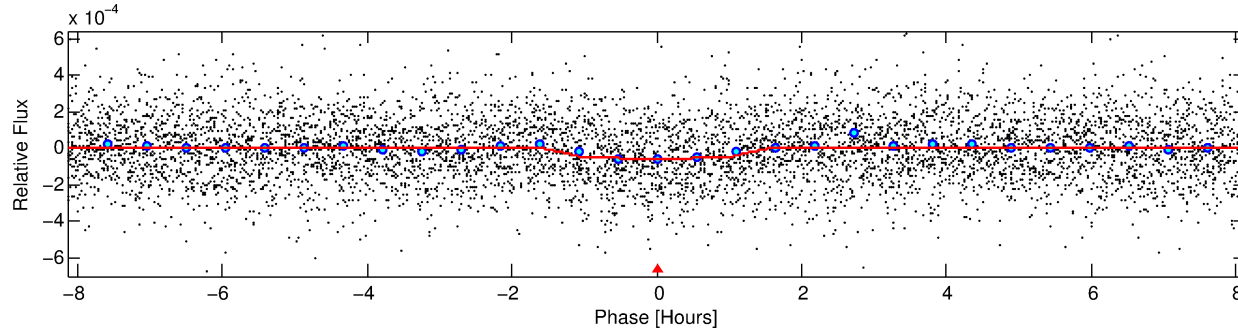
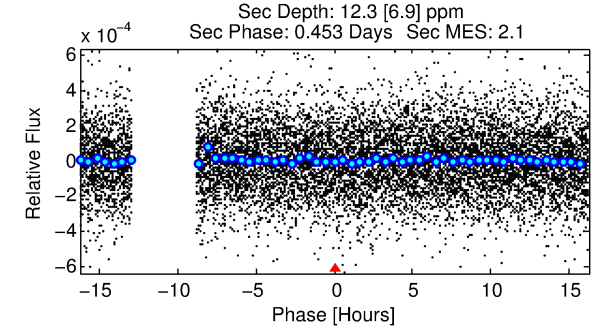
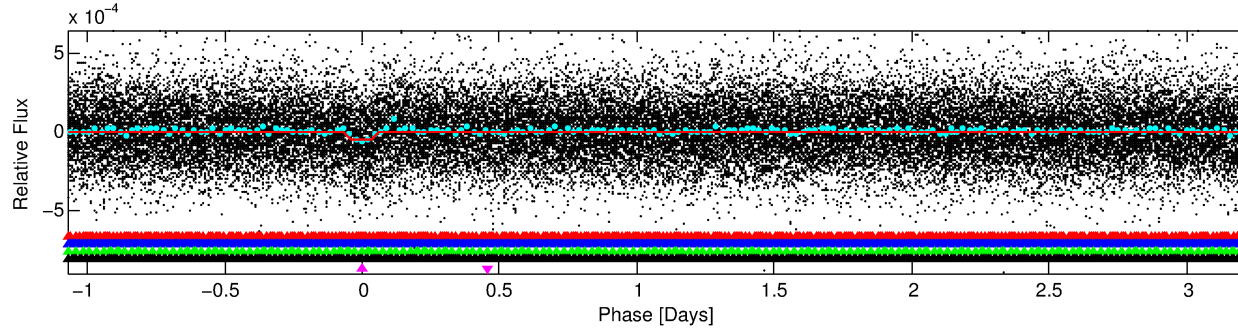
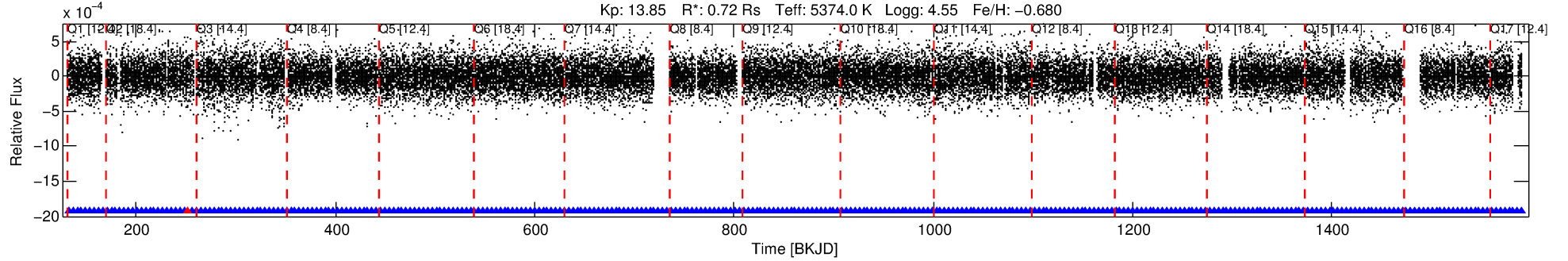
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010397751-05

No Significant Match Found

# DV One-Page Summary

KIC: 10397751 Candidate: 5 of 5 Period: 4.289 d  
KOI: K02859.03 Corr: 0.892



## DV Fit Results:

Period = 4.28898 [0.00003] d  
Epoch = 132.3634 [0.0054] BKJD  
Rp/R\* = 0.0078 [0.0050]  
a/R\* = 6.60 [18.64]  
b = 0.85 [0.96]  
Seff = 188.03 [36.74]  
Teq = 944 [46] K  
Rp = 0.61 [0.40] Re  
a = 0.0455 [0.0046] AU  
Ag = 37.13 [52.07] [0.69σ]  
Teffp = 3604 [1260] K [2.11σ]

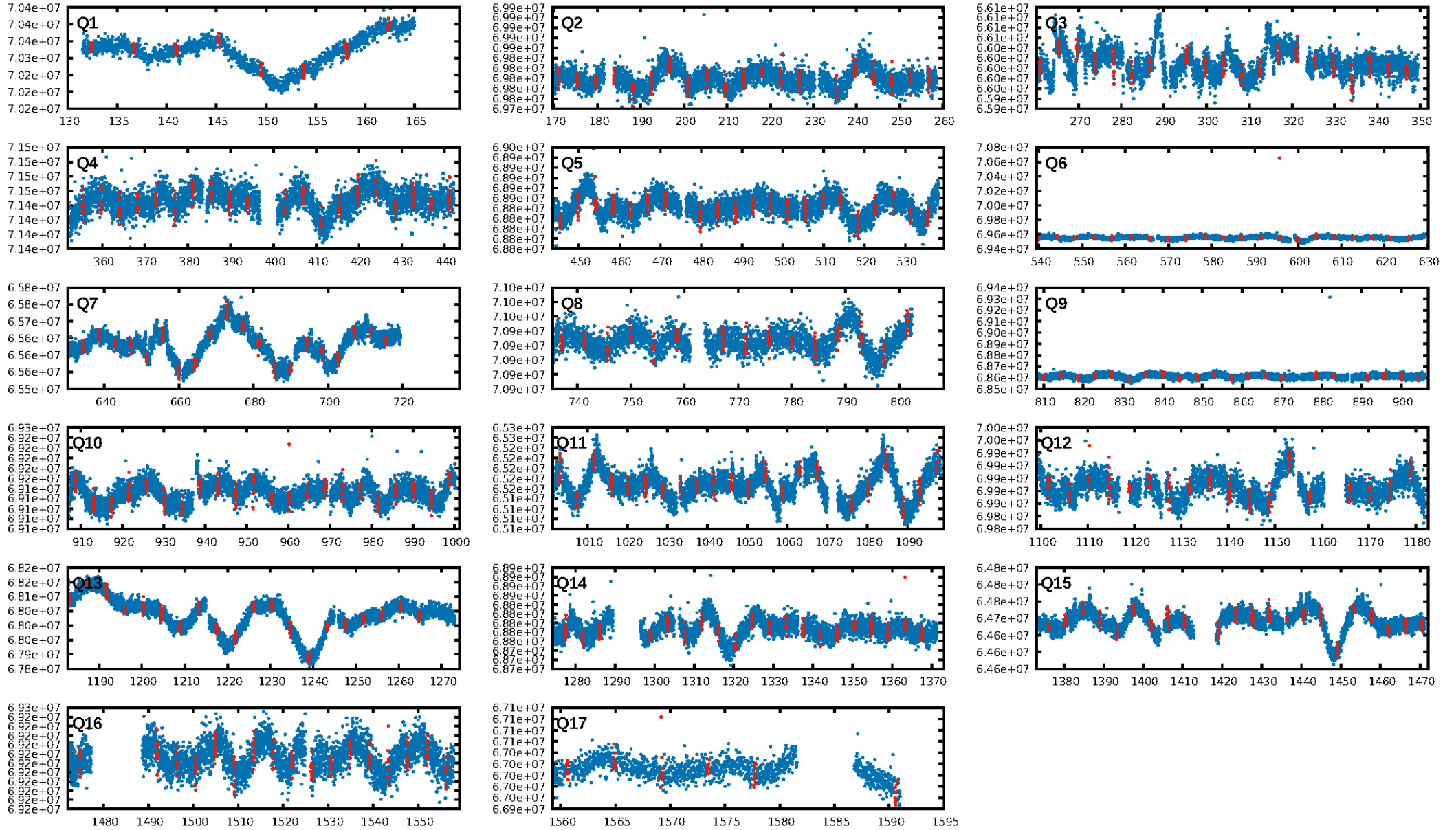
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [5.84σ]  
LongPeriod-sig: 100.0% [7.28σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 1.63e-13  
RollingBand-fgt: 1.00 [229/230]  
GhostDiagnostic-chr: -275.9  
Centroid-sig: 0.0%  
Centroid-so: 2.887 arcsec [2.53σ]  
OotOffset-rm: 0.821 arcsec [1.05σ]  
KicOffset-rm: 0.834 arcsec [1.07σ]  
OotOffset-st: 4/4/3/2 [13]  
KicOffset-st: 4/4/3/2 [13]  
DiffImageQuality-fgm: 0.54 [7/13]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 16:55:59 Z

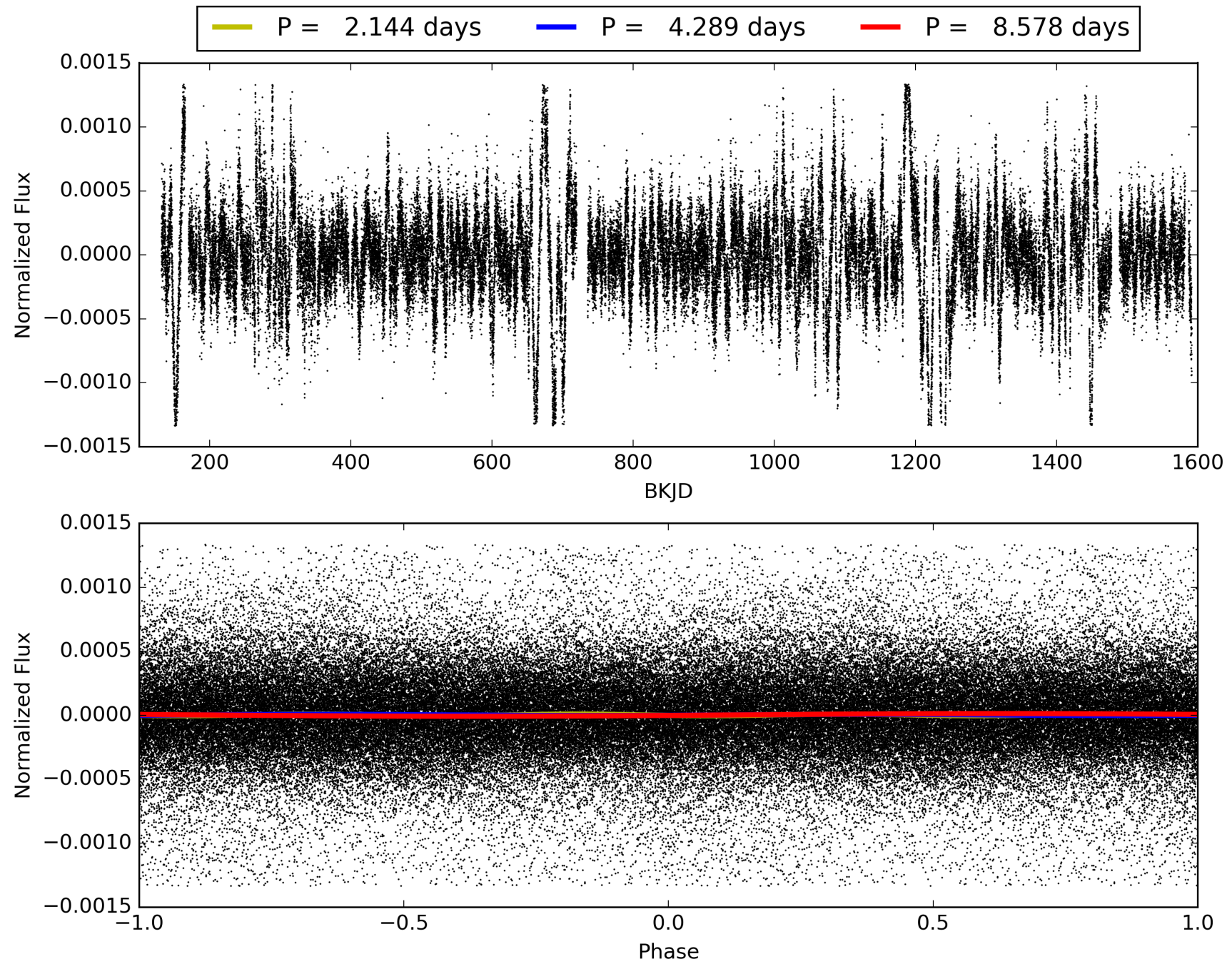
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 010397751-05, PDC Light Curves



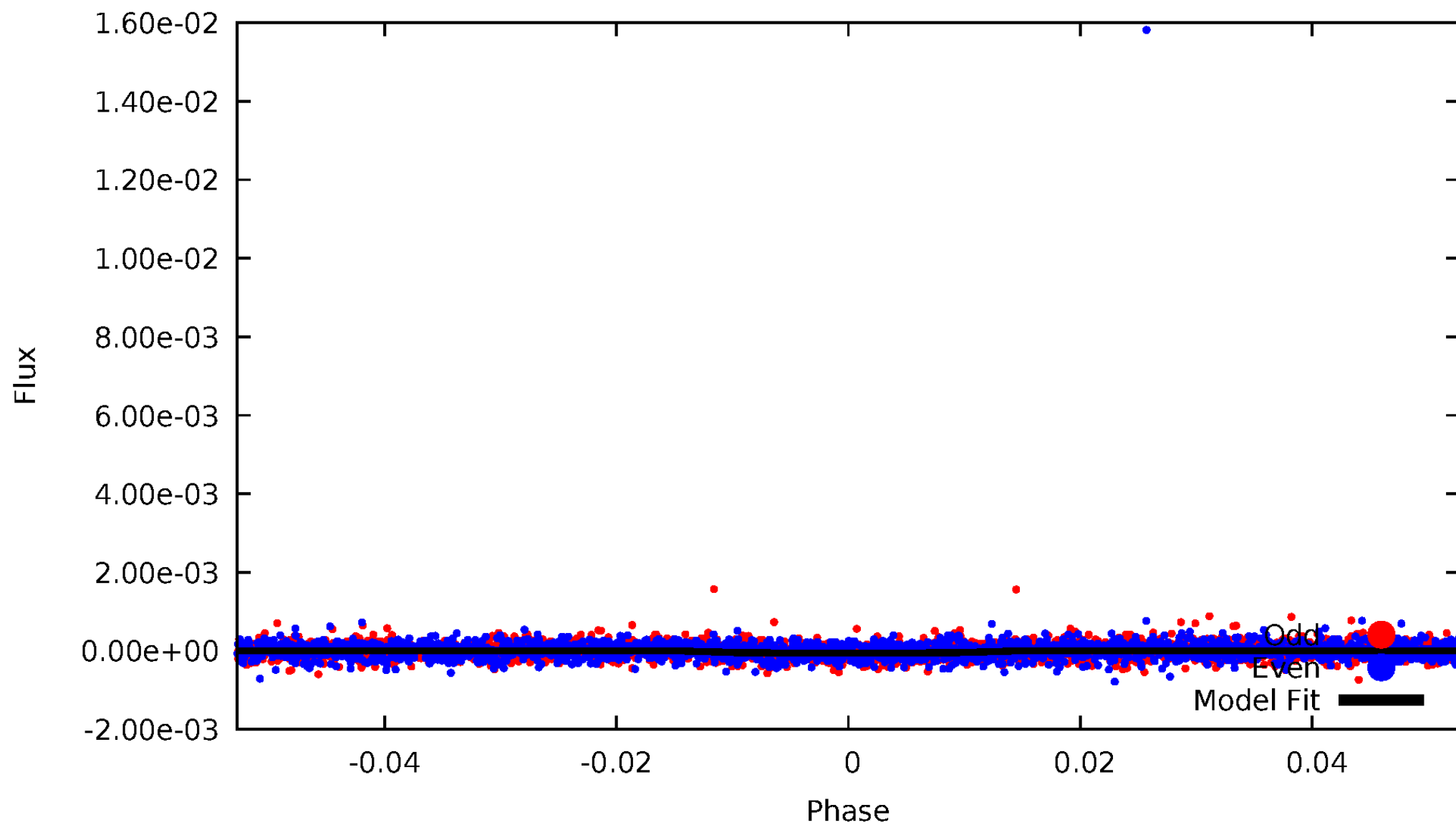


TCE 010397751-05



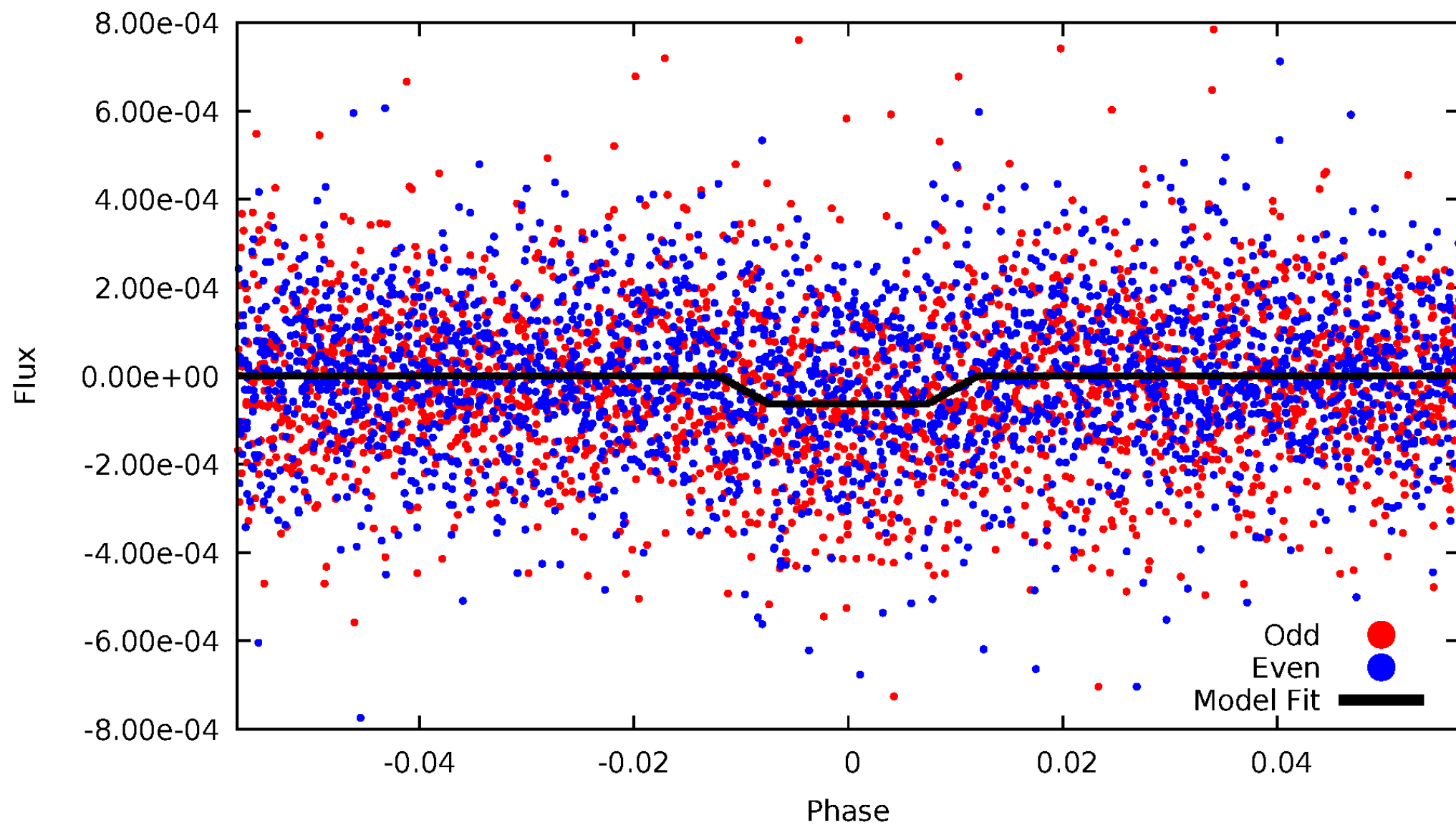
# DV Odd/Even

TCE 010397751-05



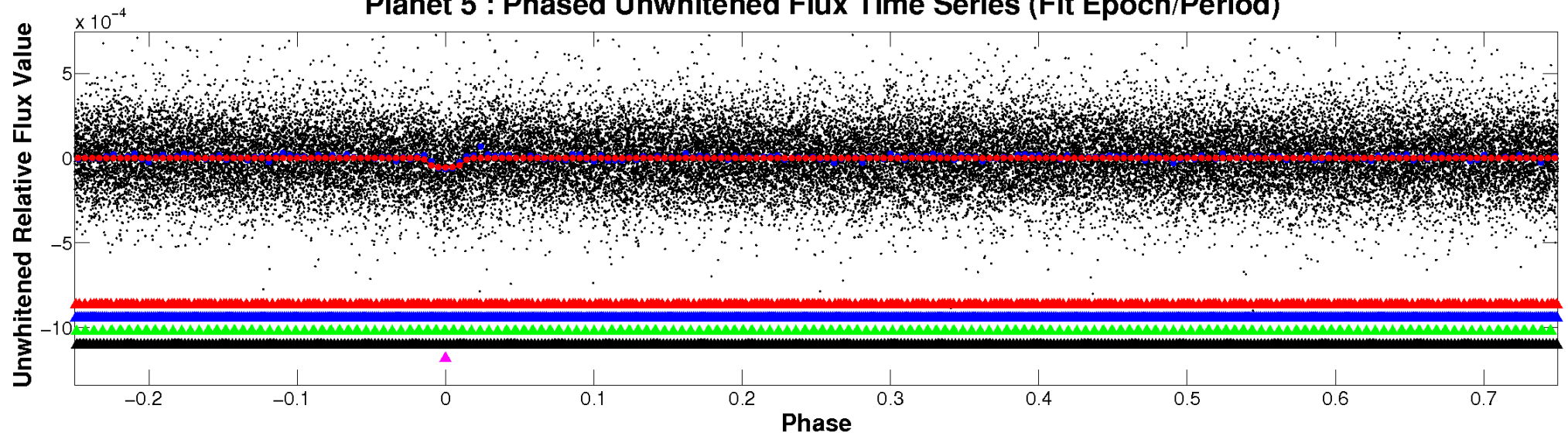
# ALT Odd/Even

TCE 010397751-05

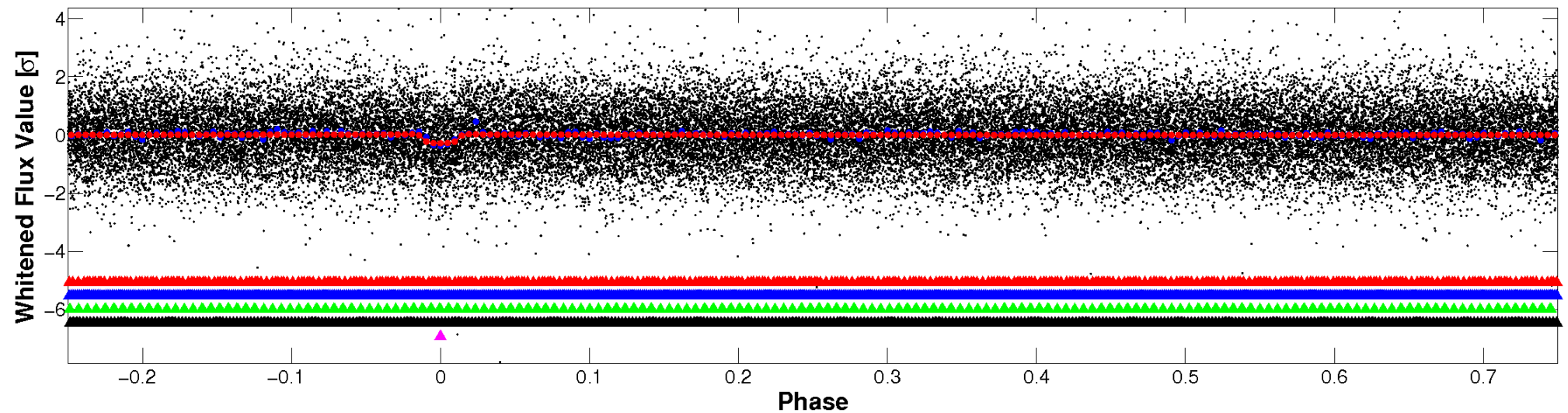


# Non-Whitened Vs. Whitened Light Curve

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



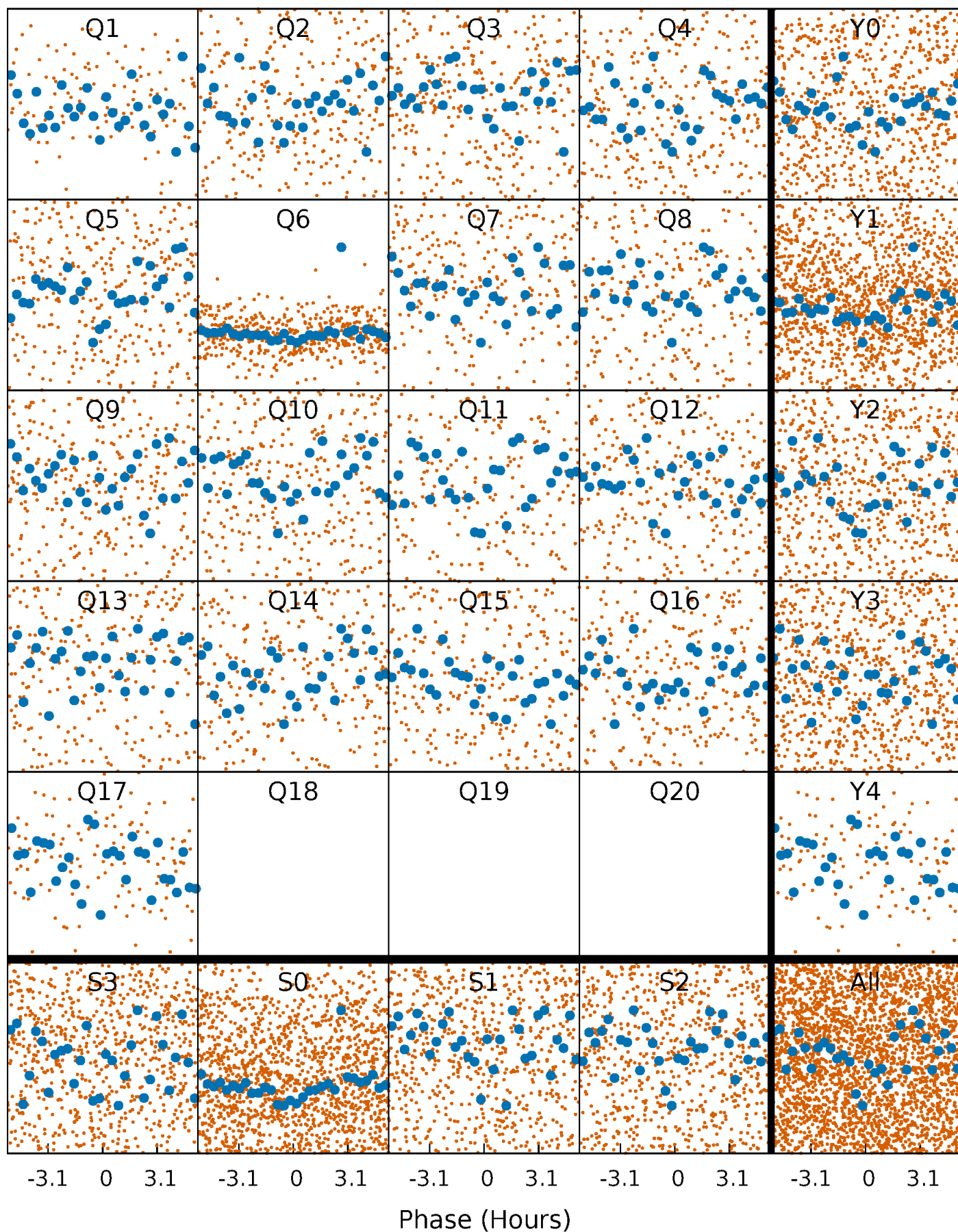
## Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)





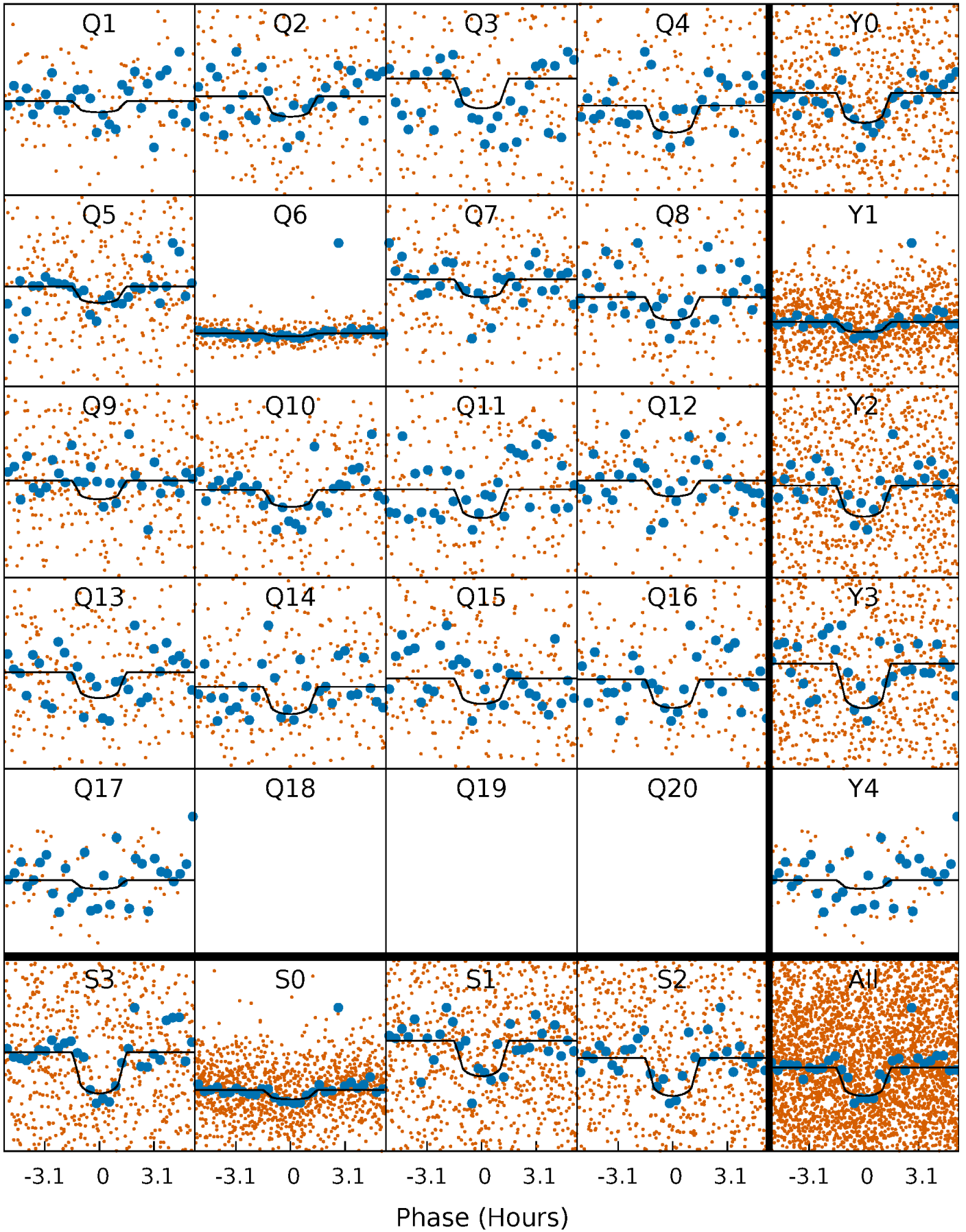
# PDC Quarter-Phased Transit Curves

TCE 010397751-05     $P = 4.288980$  Days     $T_0 = 132.363420$  (BKJD)



# DV Quarter-Phased Transit Curves

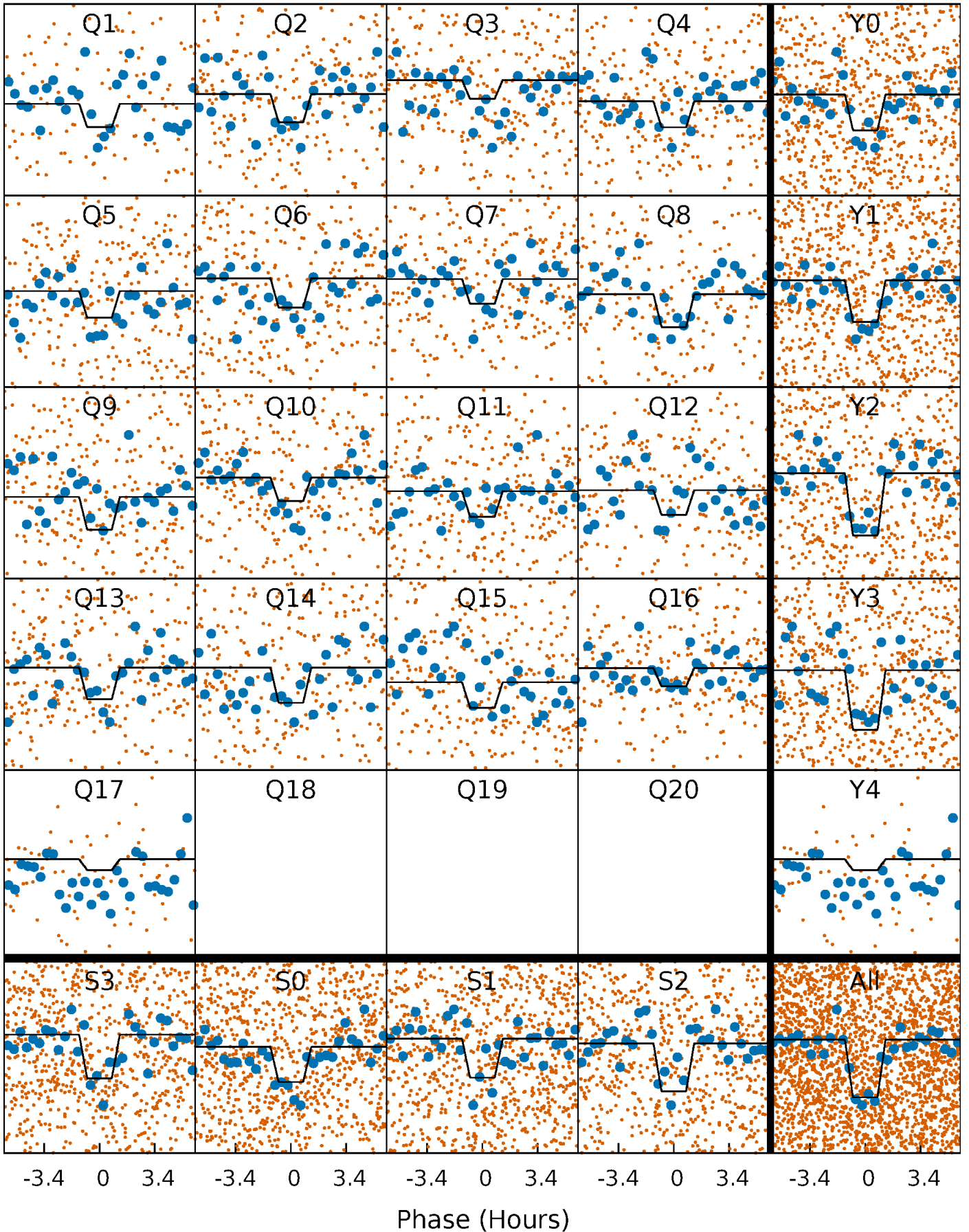
TCE 010397751-05     $P = 4.288980$  Days     $T_0 = 132.363420$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

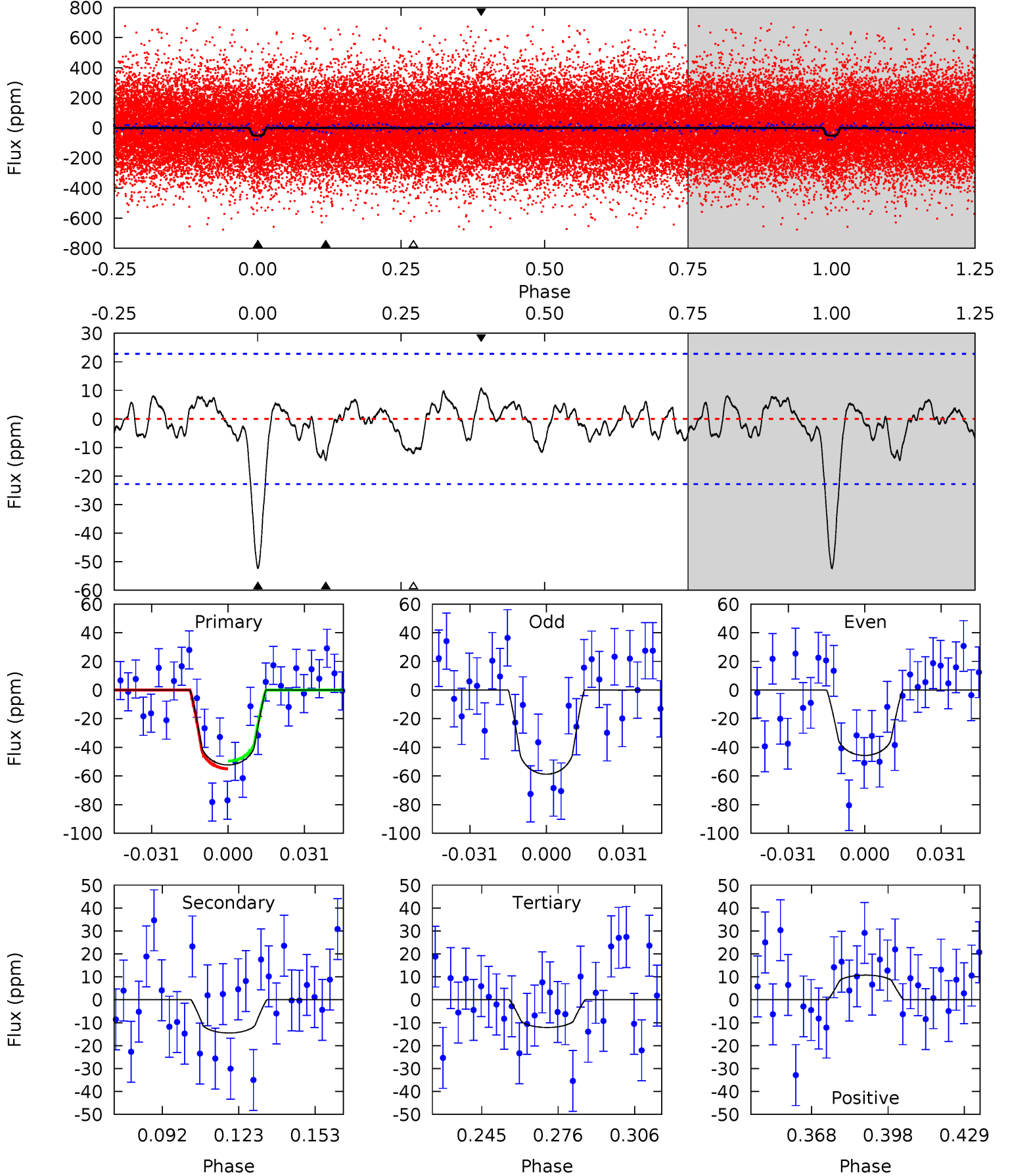
TCE 010397751-05     $P = 4.288942$  Days     $T_0 = 132.368315$  (BKJD)



# DV Model-Shift Uniqueness Test

010397751-05, P = 4.288980 Days, E = 128.074440 Days

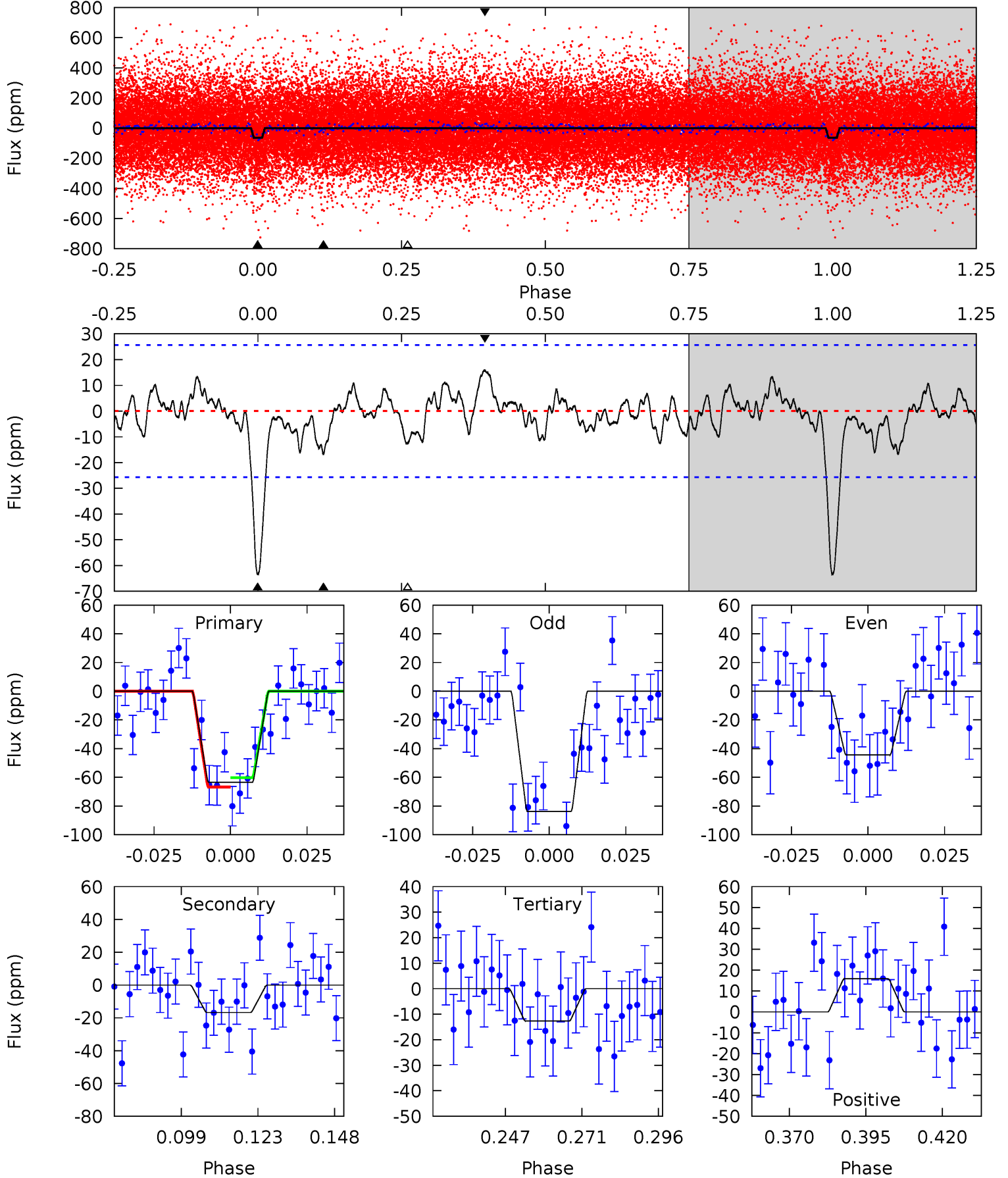
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.0	3.05	2.55	2.26	4.81	2.16	1.03	8.47	8.75	0.50	0.79	1.39	1.17	0.17	0.57



# Alt Model-Shift Uniqueness Test

010397751-05, P = 4.288942 Days, E = 128.079373 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
12.0	3.16	2.40	3.00	4.85	2.25	1.12	9.60	9.00	0.76	0.16	3.71	1.25	0.20	0.63



### Stellar Parameters For KIC 010397751

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5374^{+160}_{-144}$	$4.555^{+0.088}_{-0.064}$	$-0.680^{+0.300}_{-0.300}$	$0.721^{+0.082}_{-0.073}$	$0.680^{+0.086}_{-0.034}$	$2.557^{+0.950}_{-0.582}$
	+3%/-3%	+2%/-1%	+44%/-44%	+11%/-10%	+13%/-5%	+37%/-23%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 010397751-05 / KOI 2859.03

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-14 \pm 5$	$0.64^{+0.36}_{-0.33}$	$1317^{+53}_{-55}$	$3933^{+1340}_{-561}$	$40^{+137}_{-25}$
Alt.	$-17 \pm 5$	$0.63^{+0.38}_{-0.34}$	$1316^{+50}_{-54}$	$4073^{+1465}_{-631}$	$46^{+167}_{-29}$

$T_{\text{max}}$  = 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

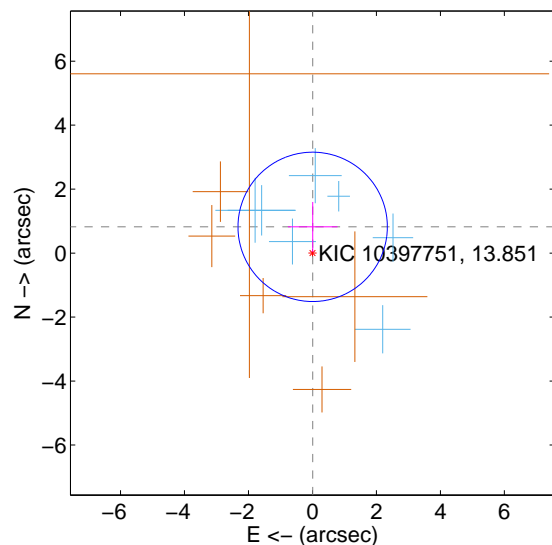
Supplemental centroid analysis for 010397751-05. Kepler magnitude: 13.85. Transit SNR 8.24

There are 7 quarters with good PRF difference image offsets

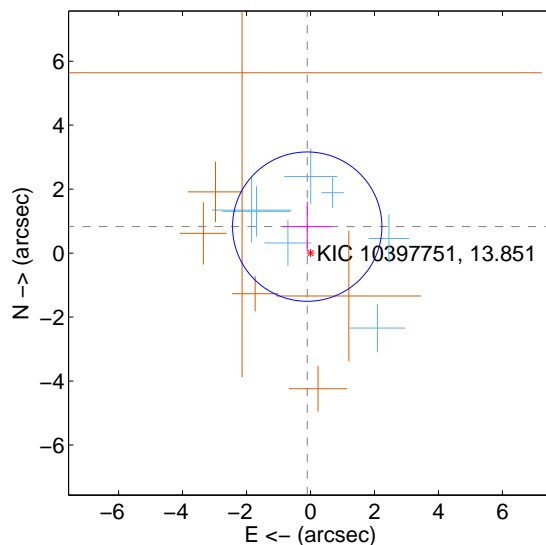
The direct PRF centroid is offset from the target star catalog position by about 0.13 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.821 \pm 0.778$	1.05	$-0.007 \pm 0.775$	$0.821 \pm 0.778$
PRF-fit source offset from KIC position	$0.834 \pm 0.778$	1.07	$0.103 \pm 0.775$	$0.828 \pm 0.778$
photometric centroid source offset	$2.89 \pm 1.14$	2.53	$1.73 \pm 1.15$	$2.31 \pm 1.14$

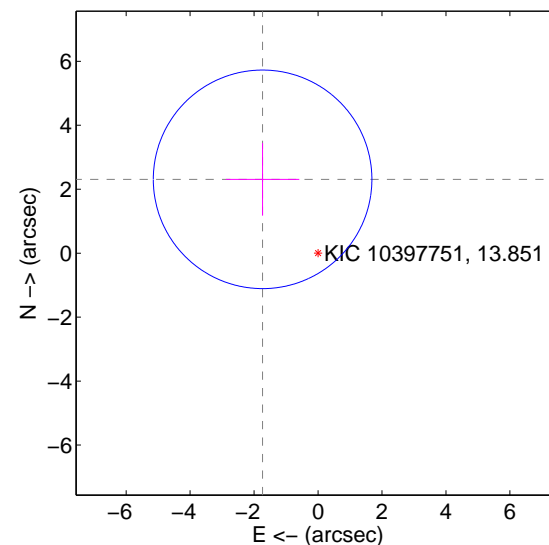
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

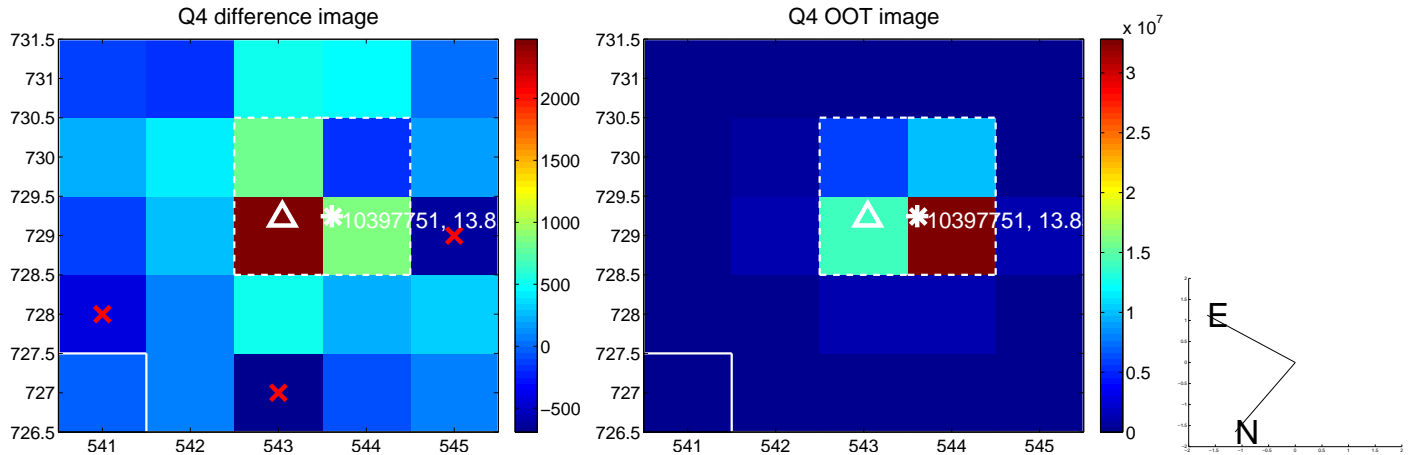
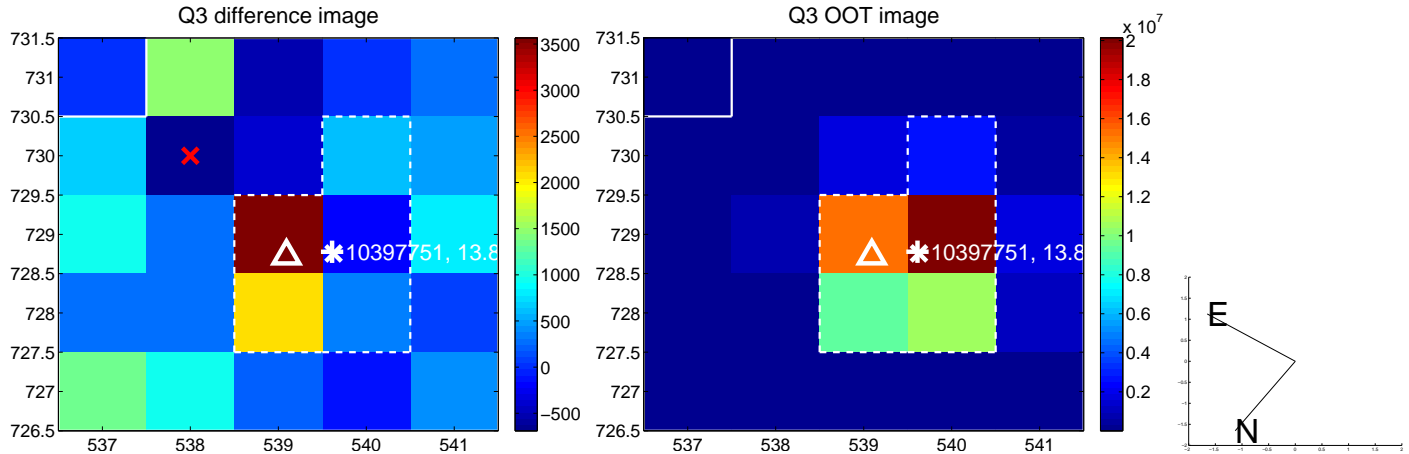
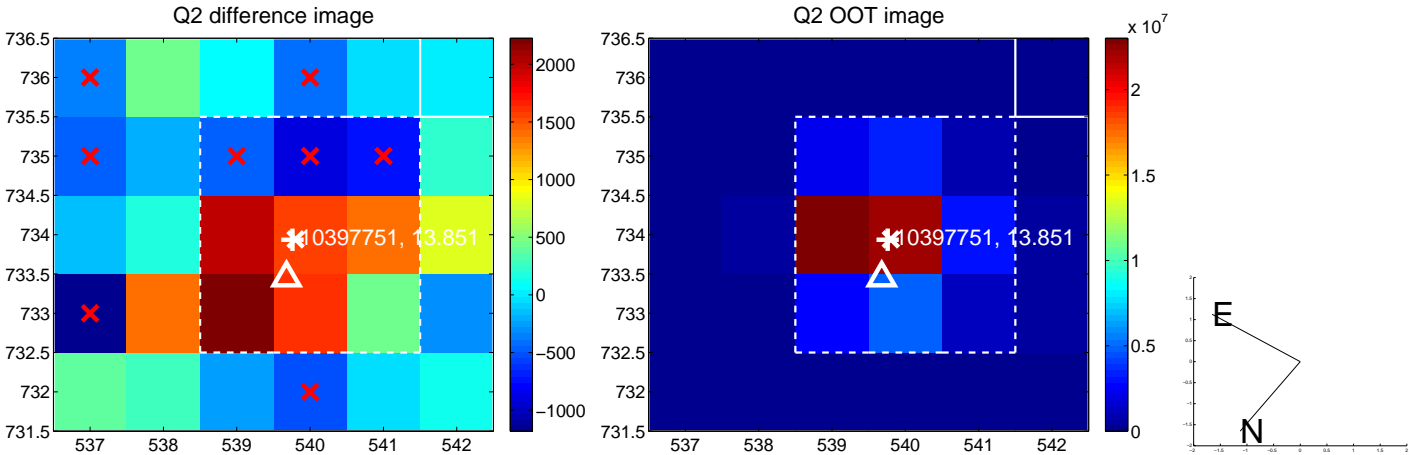
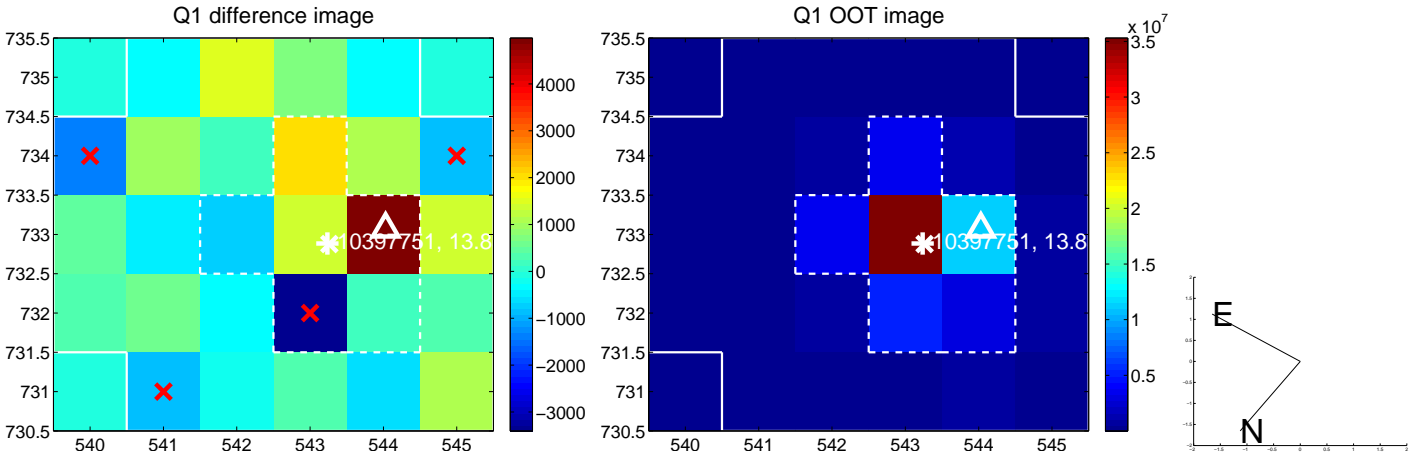


offset from photometric centroids



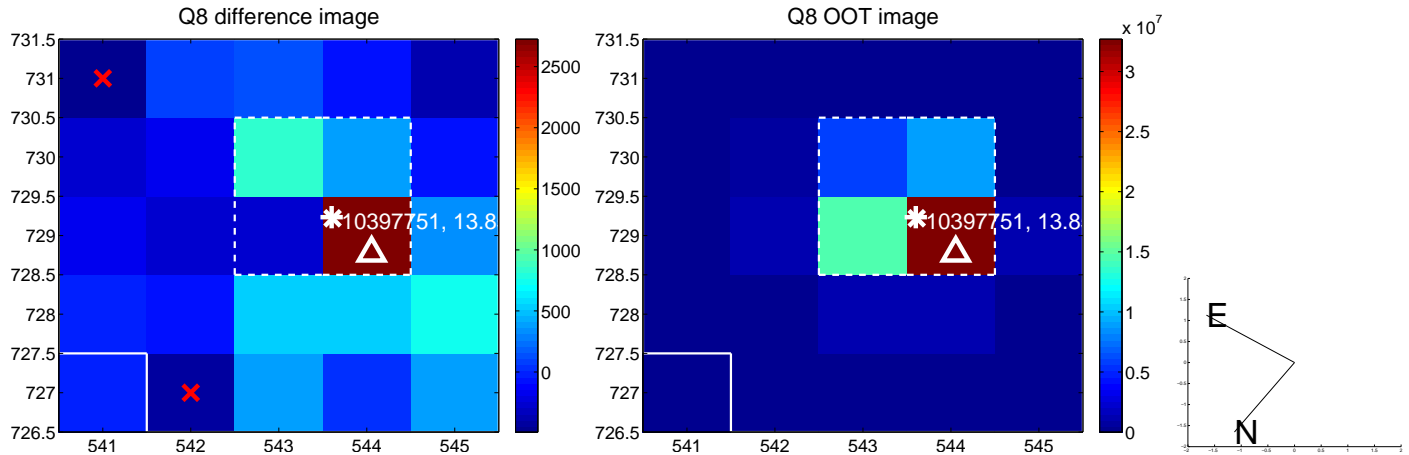
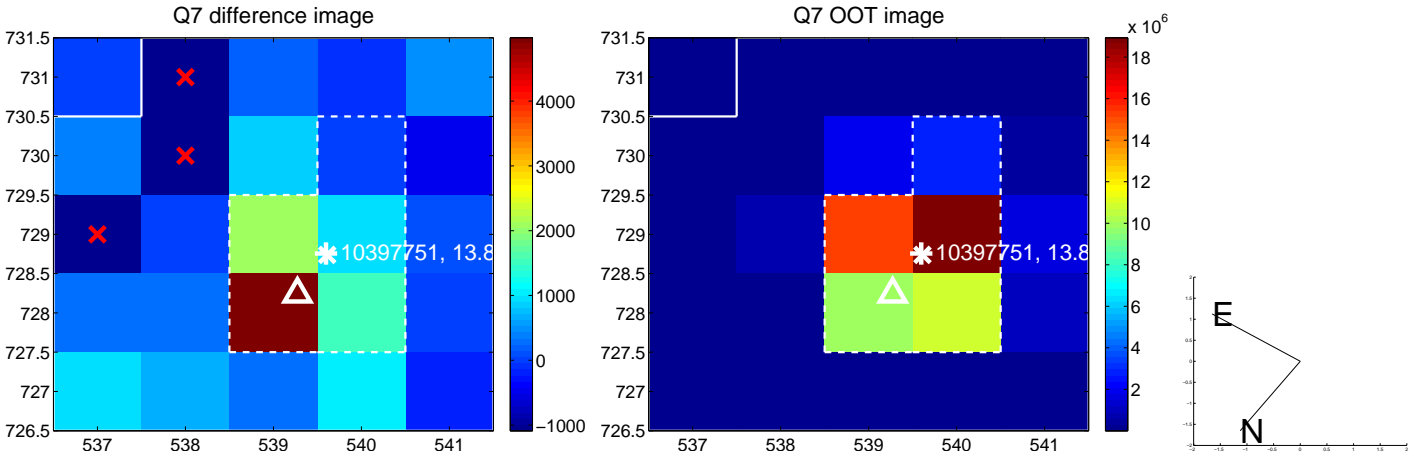
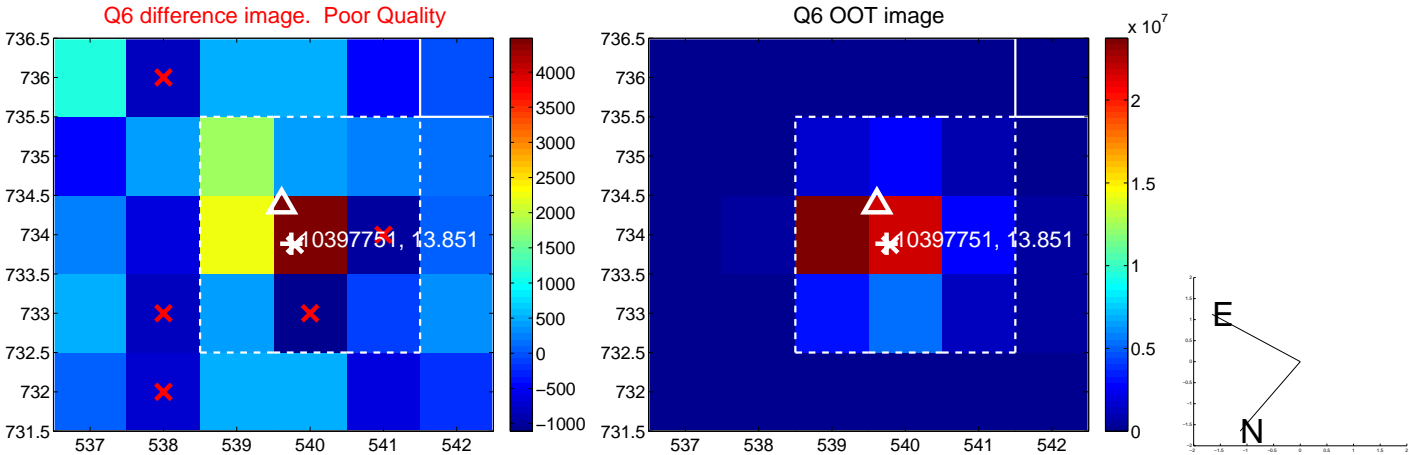
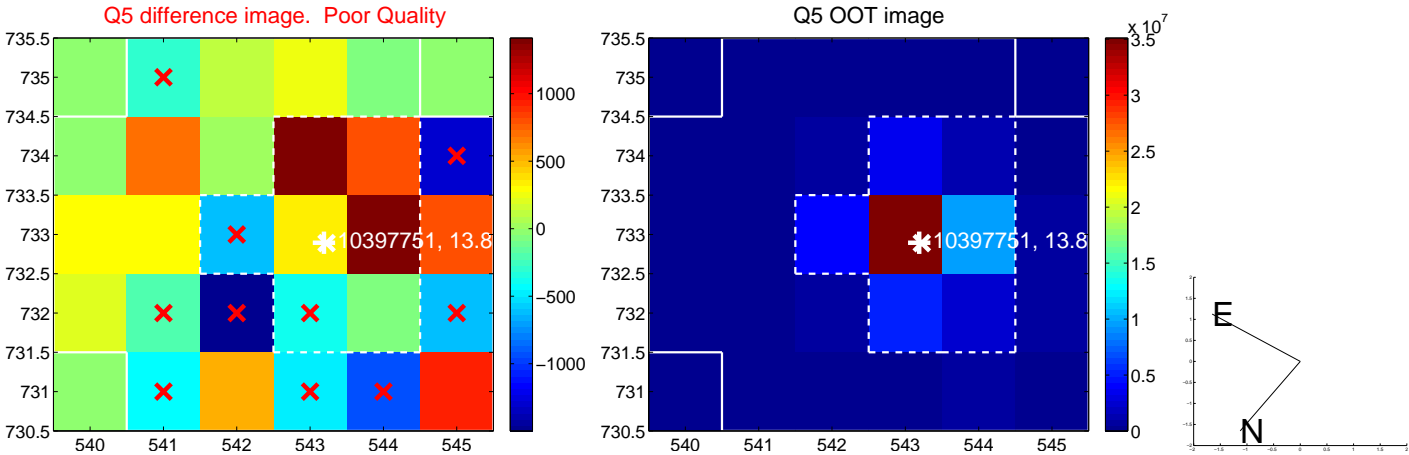
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

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

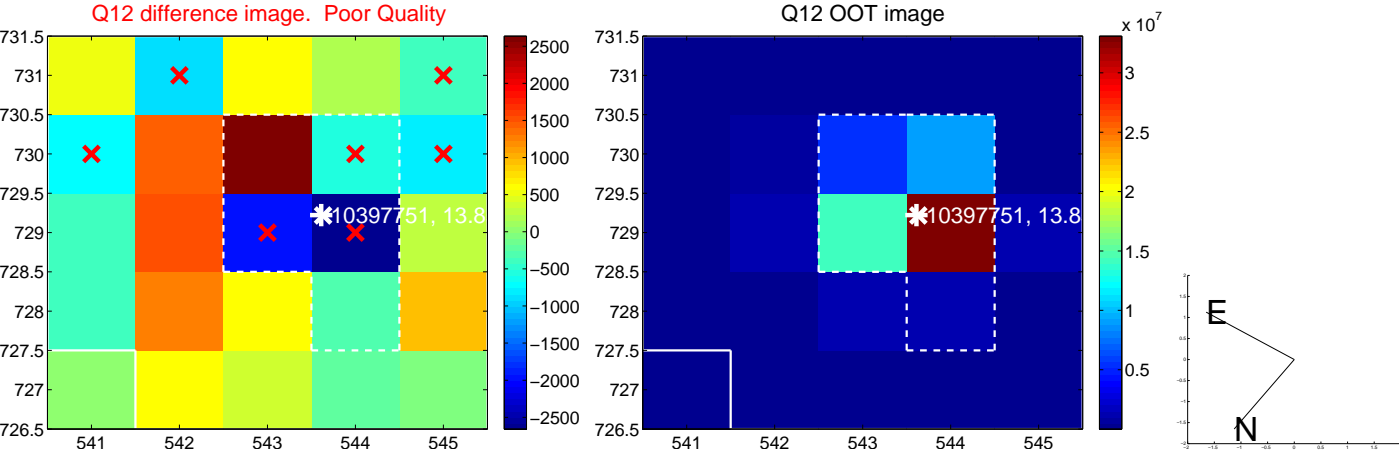
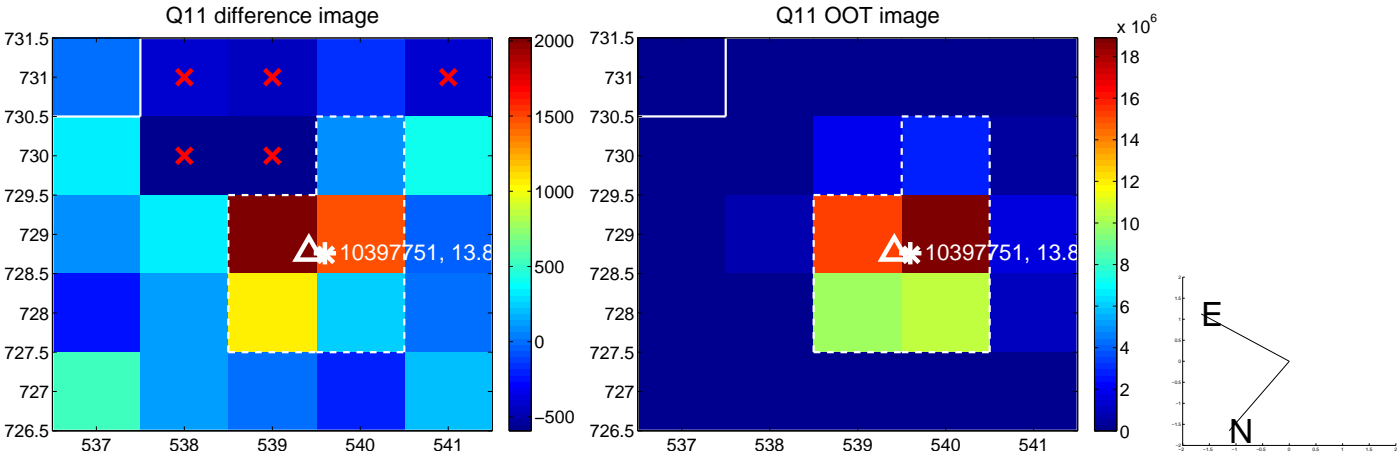
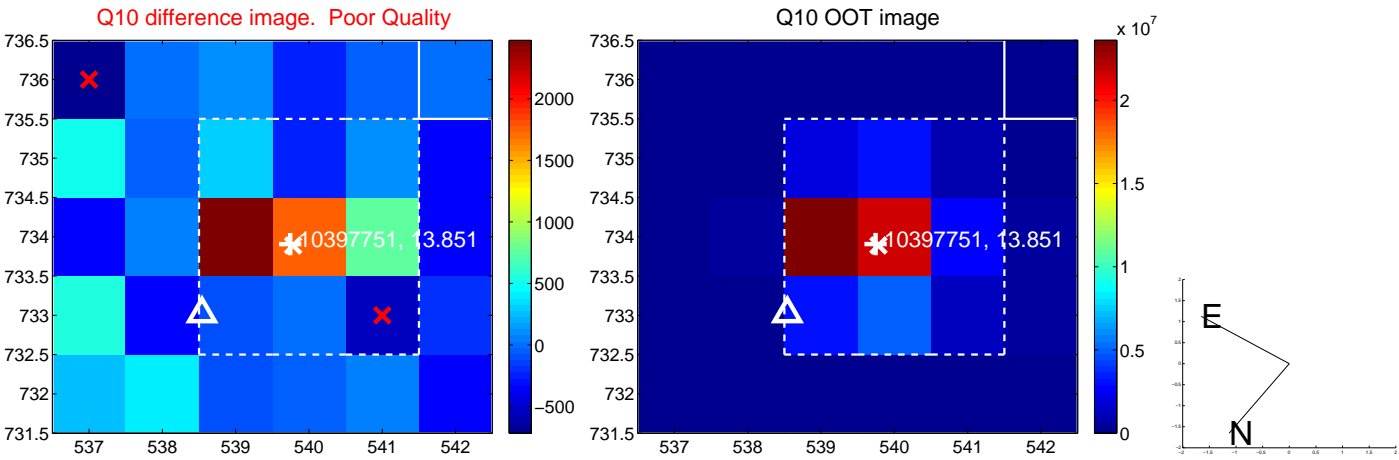
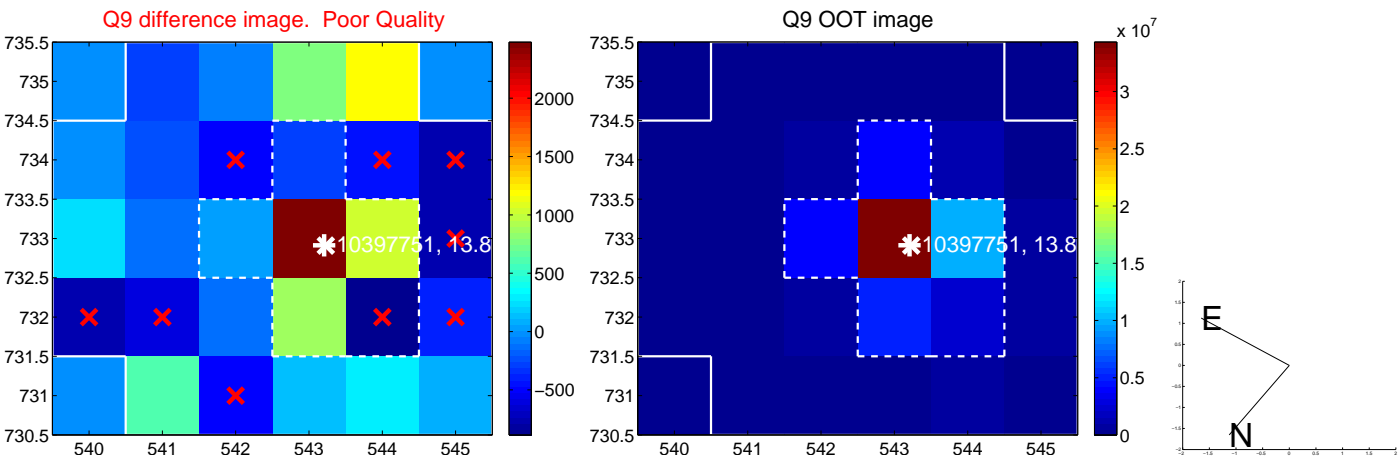




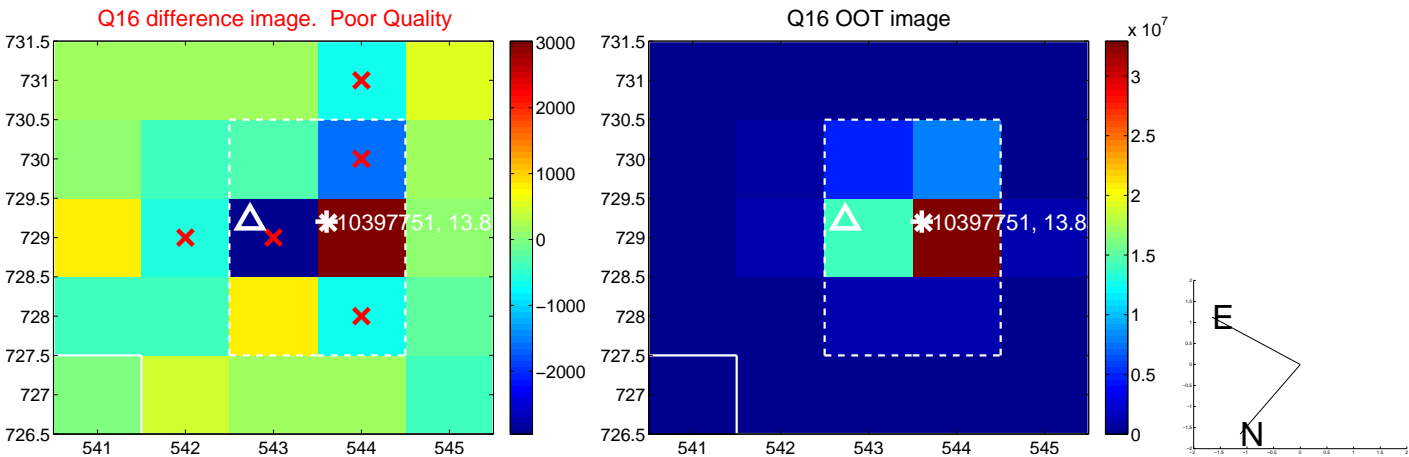
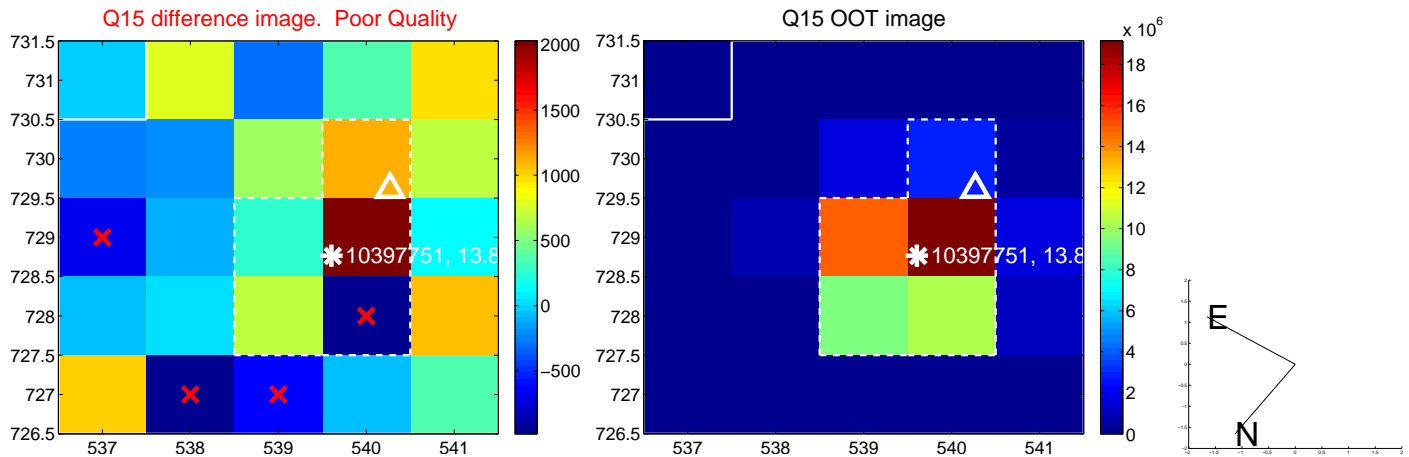
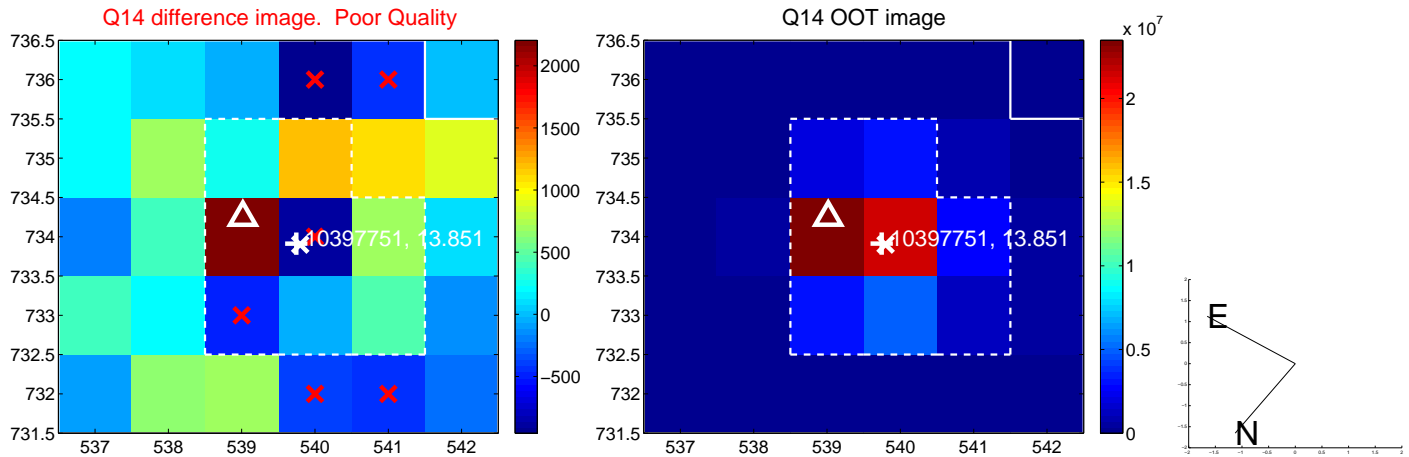
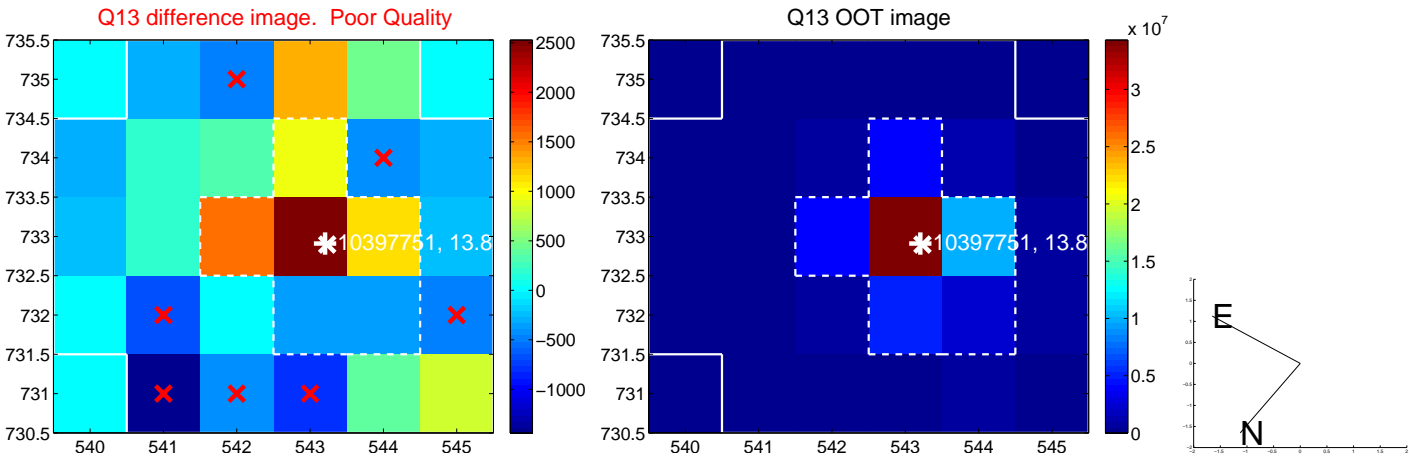
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



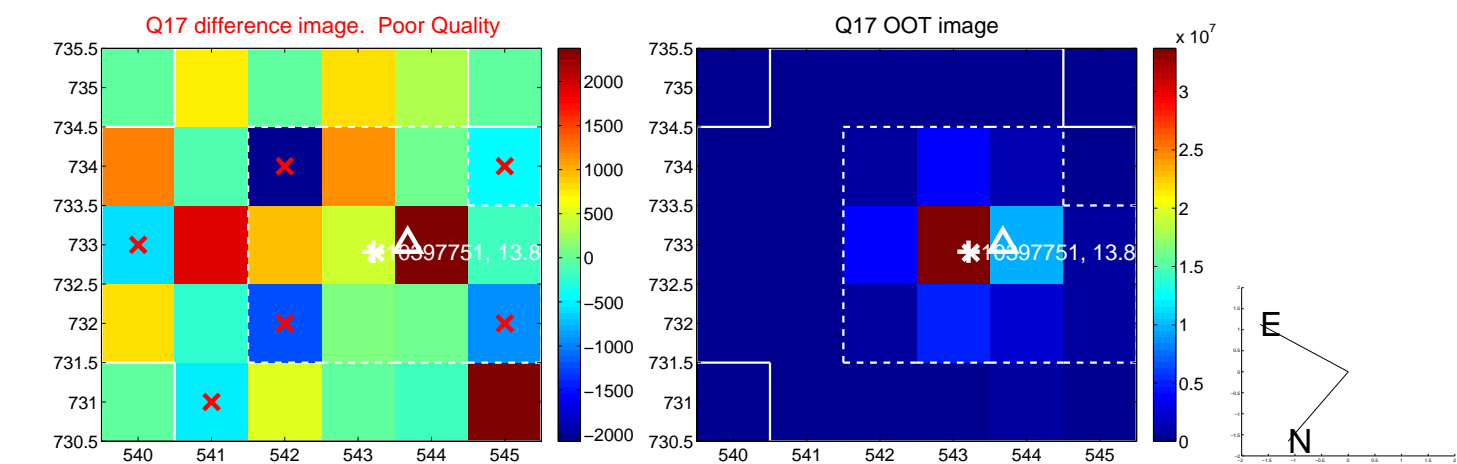
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



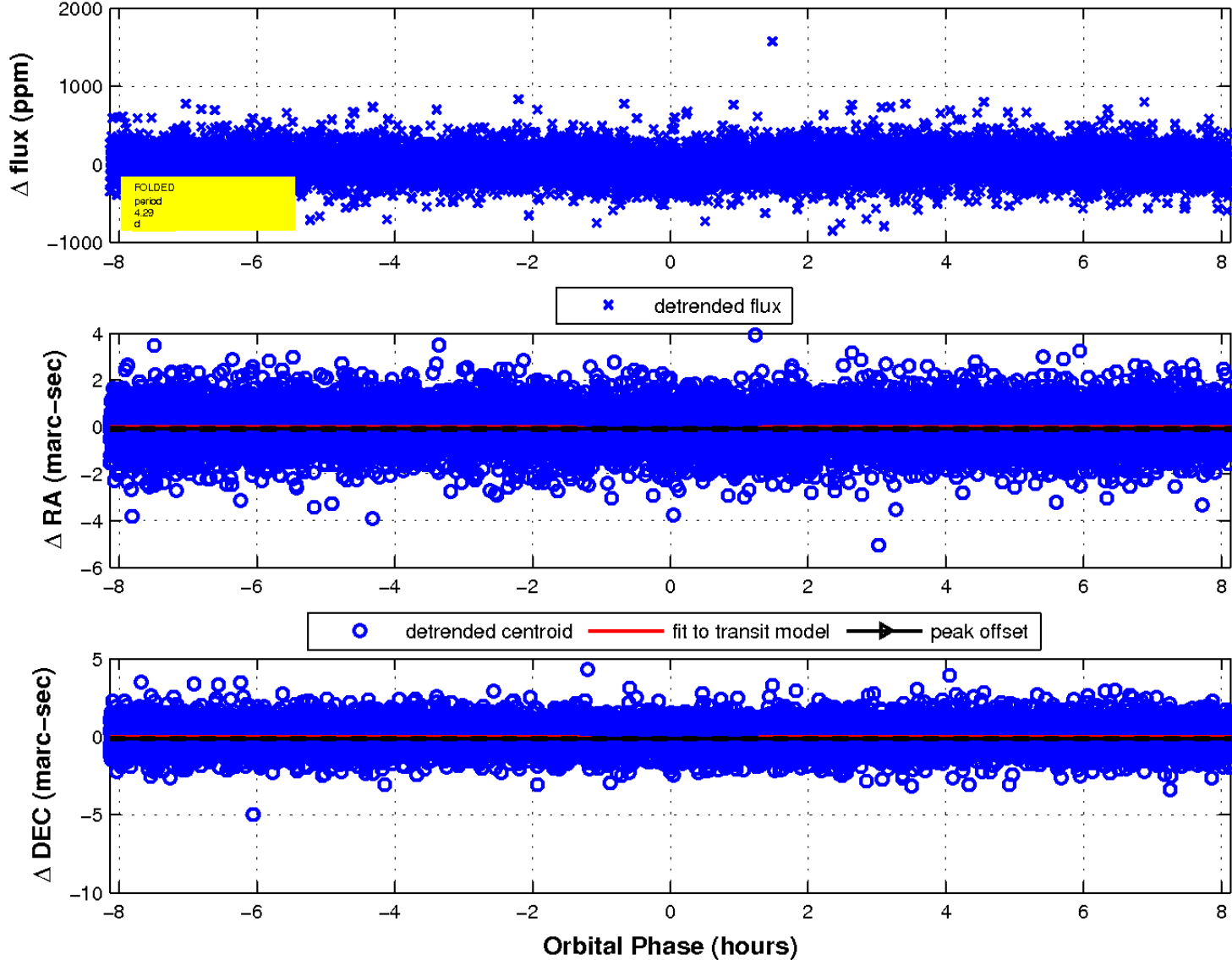
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 5 of 5



UKIRT Image

Declination

