

# KIC 010220707

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010220707-01	OBS	No	0.912795	131.798446	56.8	3.724	13.4	13.3	2.41	7798	2.10	37250.10
010220707-02	OBS	No	2.858307	131.670452	182.3	11.632	11.8	14.5	2.41	7798	6.30	8131.06
010220707-03	OBS	No	5.719017	132.081636	184.7	43.369	9.3	13.6	2.41	7798	4.02	3225.00

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010220707-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—CENT_SATURATED
010220707-02	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—CENT_SATURATED
010220707-03	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—CENT_SATURATED

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

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

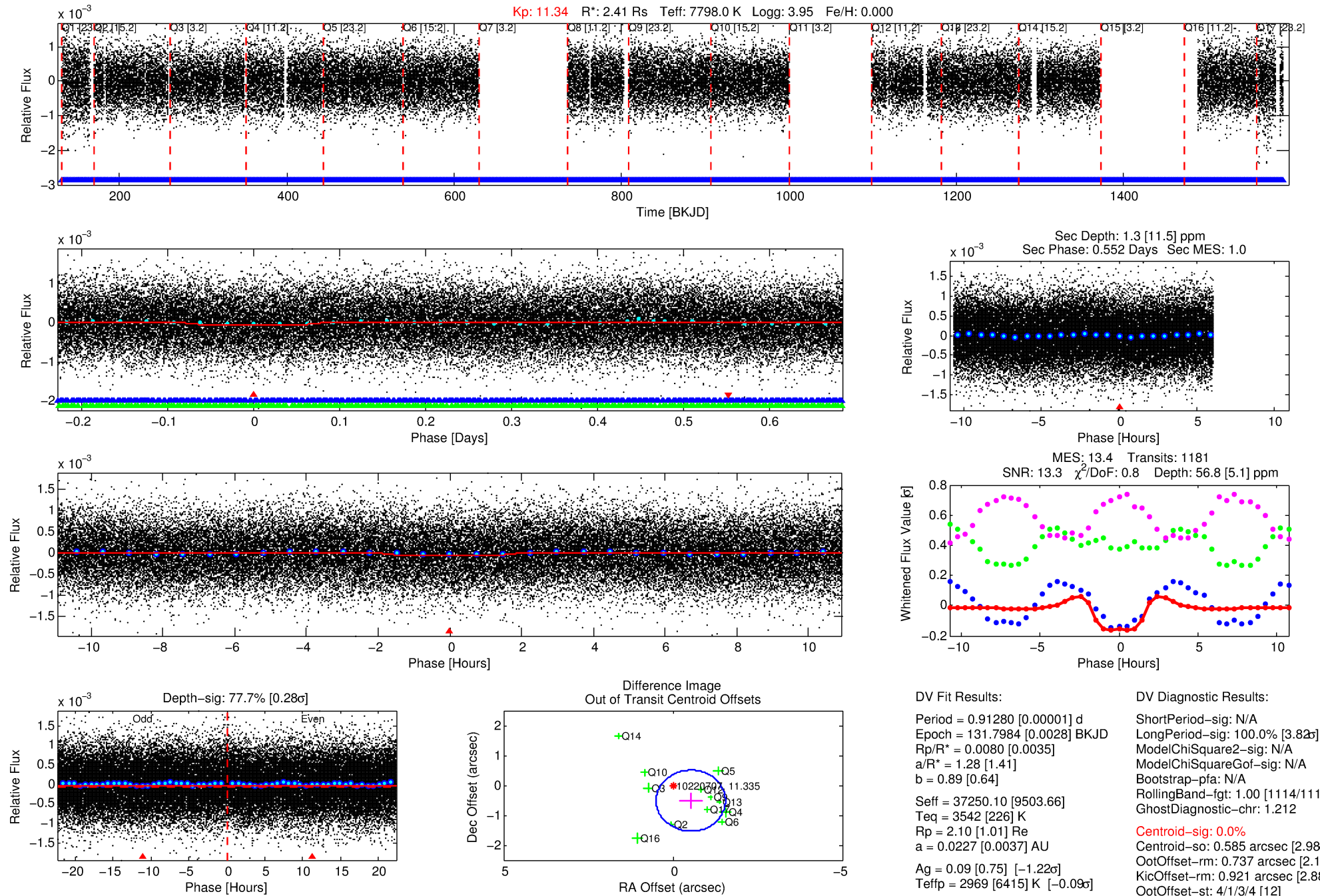
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 010220707-01

No Significant Match Found

# DV One-Page Summary

KIC: 10220707 Candidate: 1 of 3 Period: 0.913 d



## DV Fit Results:

Period = 0.91280 [0.00001] d  
Epoch = 131.7984 [0.0028] BKJD  
Rp/R\* = 0.0080 [0.0035]  
a/R\* = 1.28 [1.41]  
b = 0.89 [0.64]  
Seff = 37250.10 [9503.66]  
Teff = 3542 [226] K  
Rp = 2.10 [1.01] Re  
a = 0.0227 [0.0037] AU  
Ag = 0.09 [0.75] [-1.22σ]  
Teffp = 2969 [6415] K [-0.09σ]

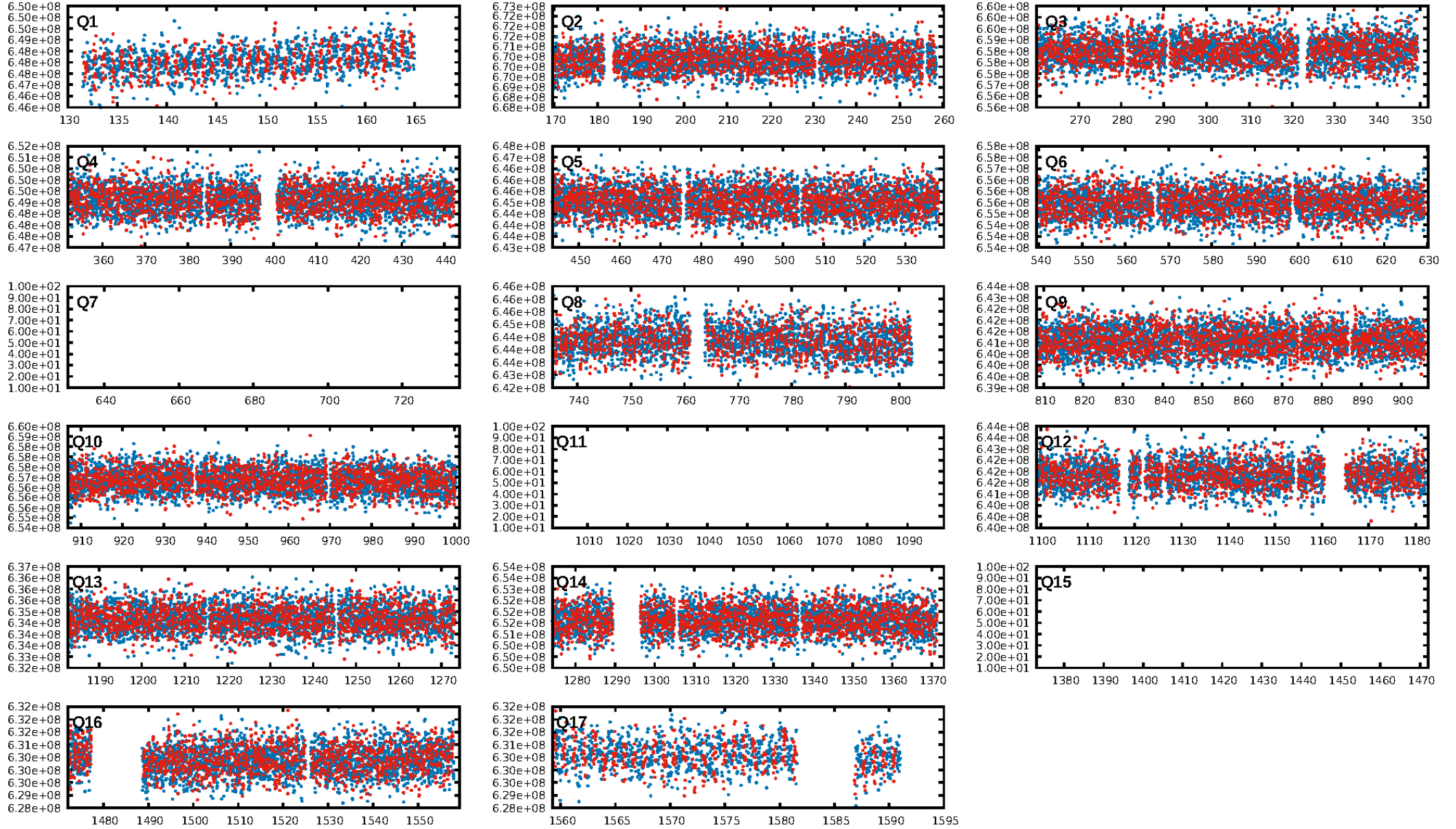
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [3.82σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [1114/1114]  
GhostDiagnostic-chr: 1.212  
**Centroid-sig: 0.0%**  
Centroid-so: 0.585 arcsec [2.98σ]  
OotOffset-rm: 0.737 arcsec [2.16σ]  
KicOffset-rm: 0.921 arcsec [2.88σ]  
OotOffset-st: 4/1/3/4 [12]  
KicOffset-st: 4/1/3/4 [12]  
DiffImageQuality-fgm: 0.42 [5/12]  
DiffImageOverlap-fno: 1.00 [14/14]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:33:38 Z

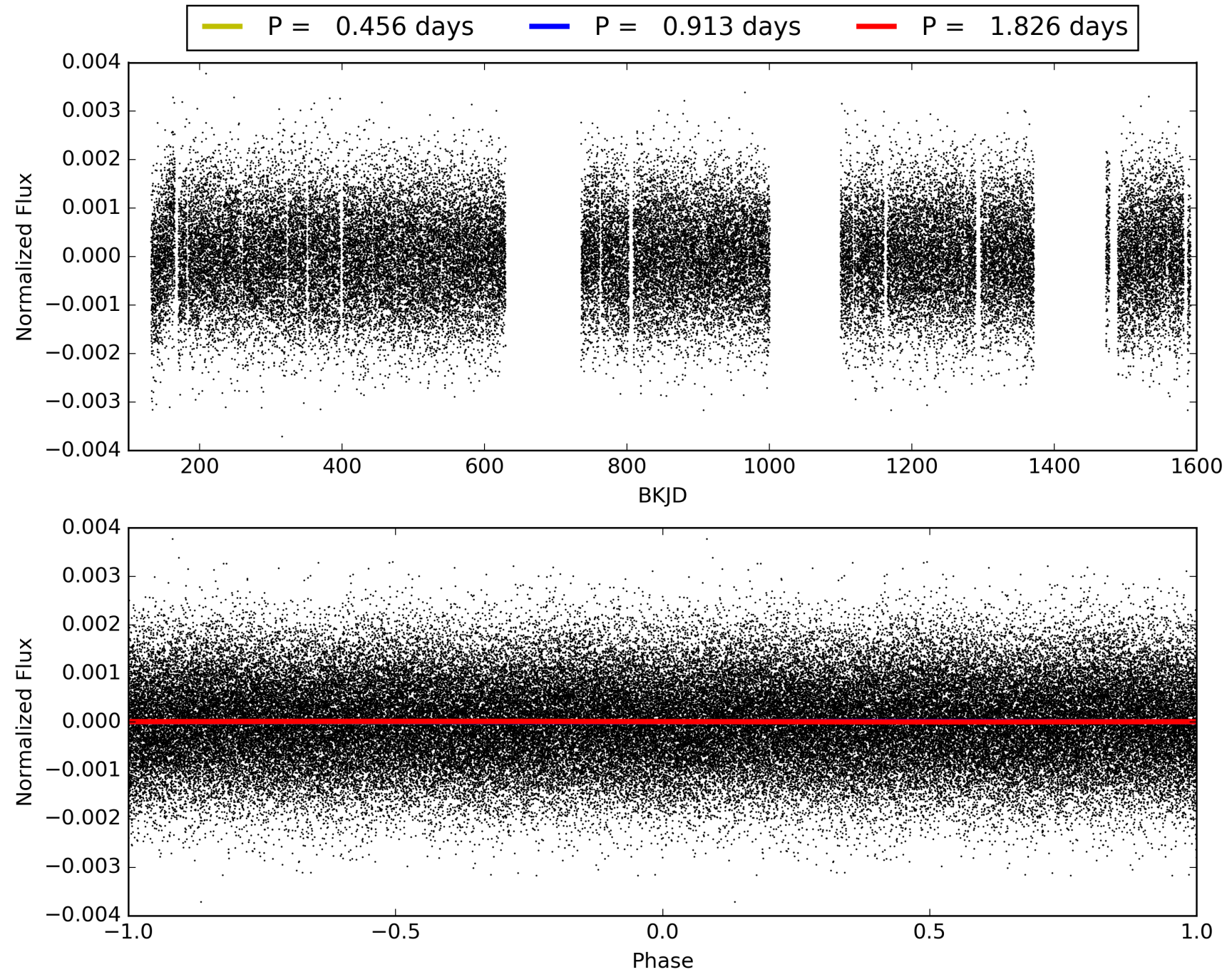
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 010220707-01, PDC Light Curves





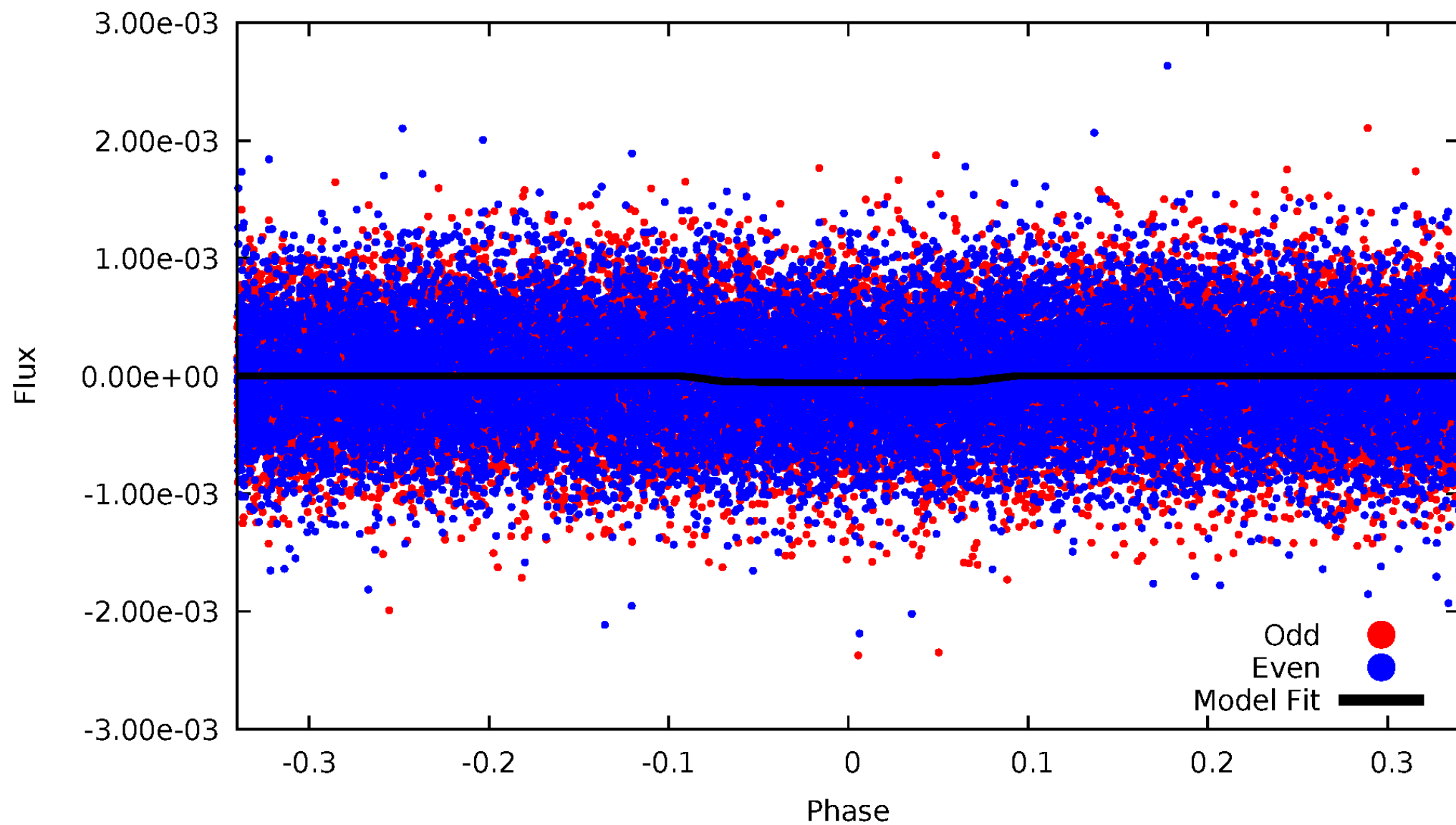
TCE 010220707-01





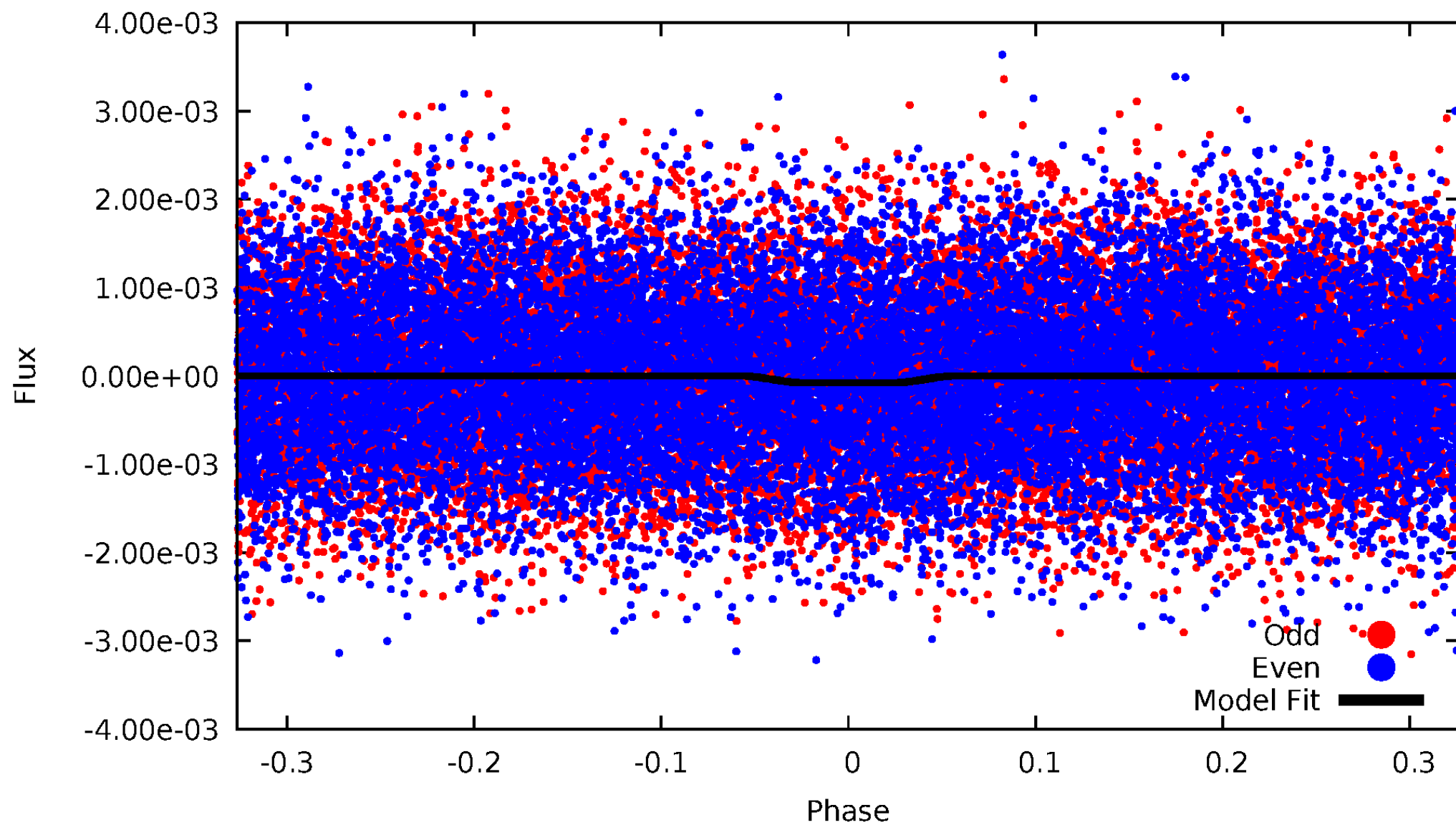
# DV Odd/Even

TCE 010220707-01

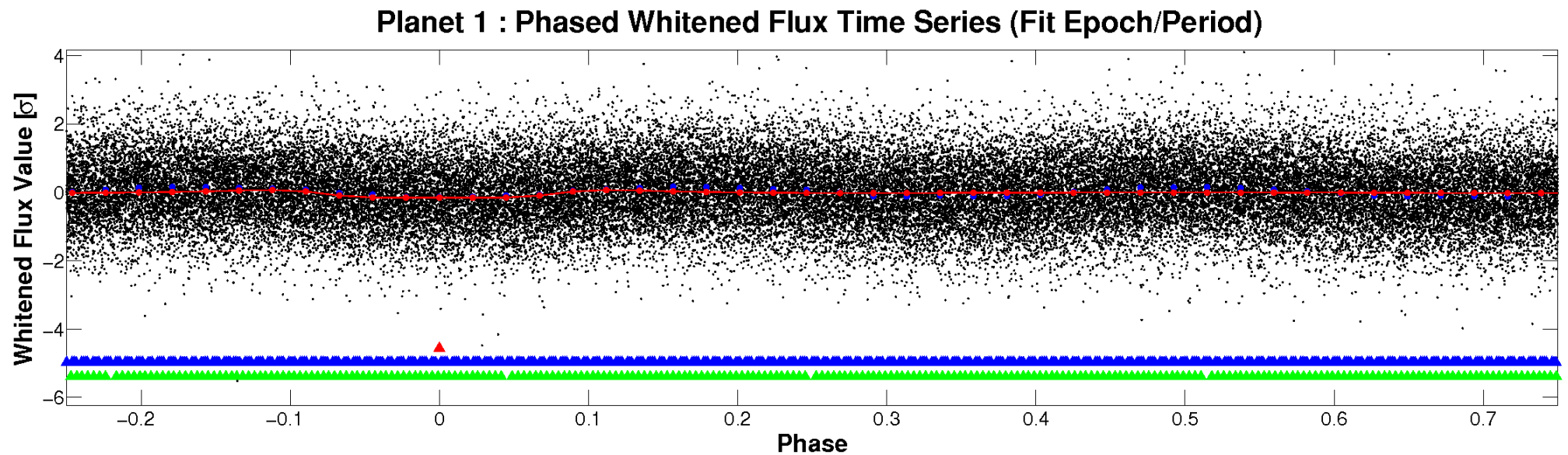
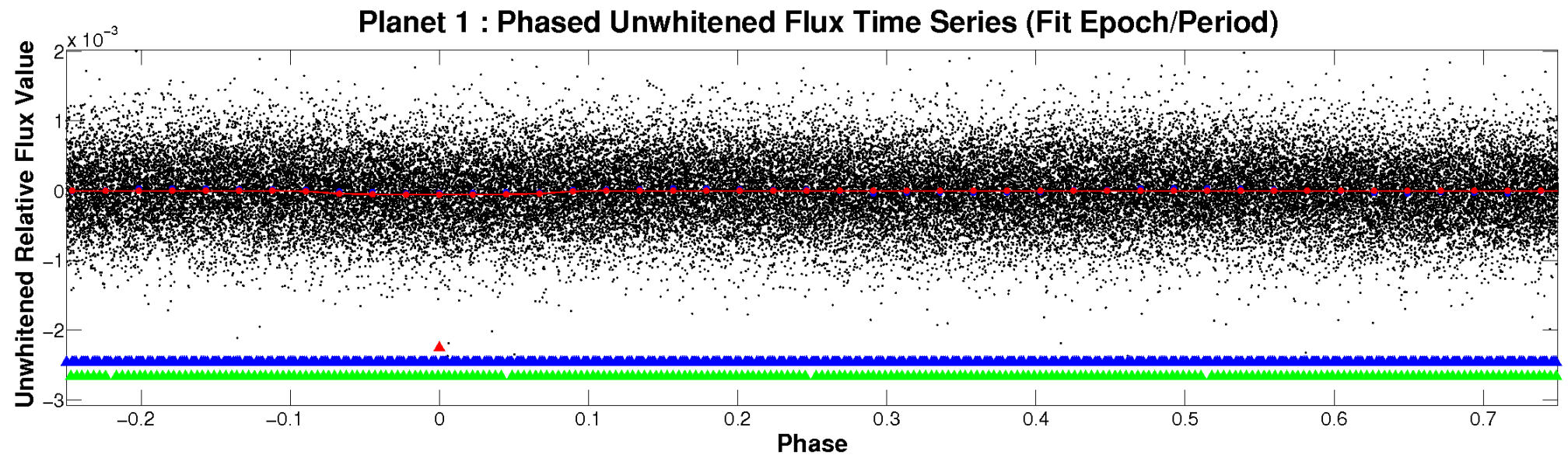


# ALT Odd/Even

TCE 010220707-01



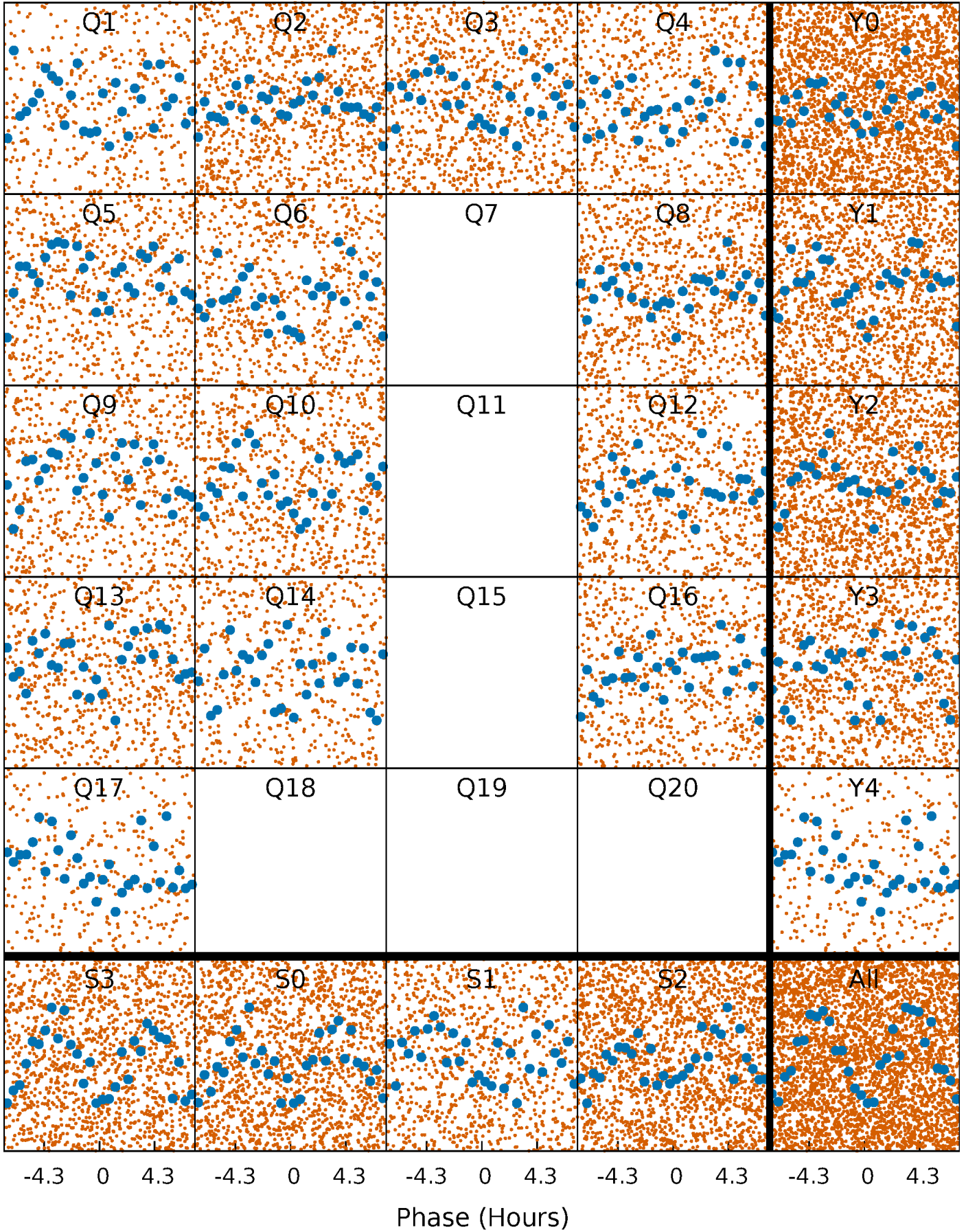
# Non-Whitened Vs. Whitened Light Curve





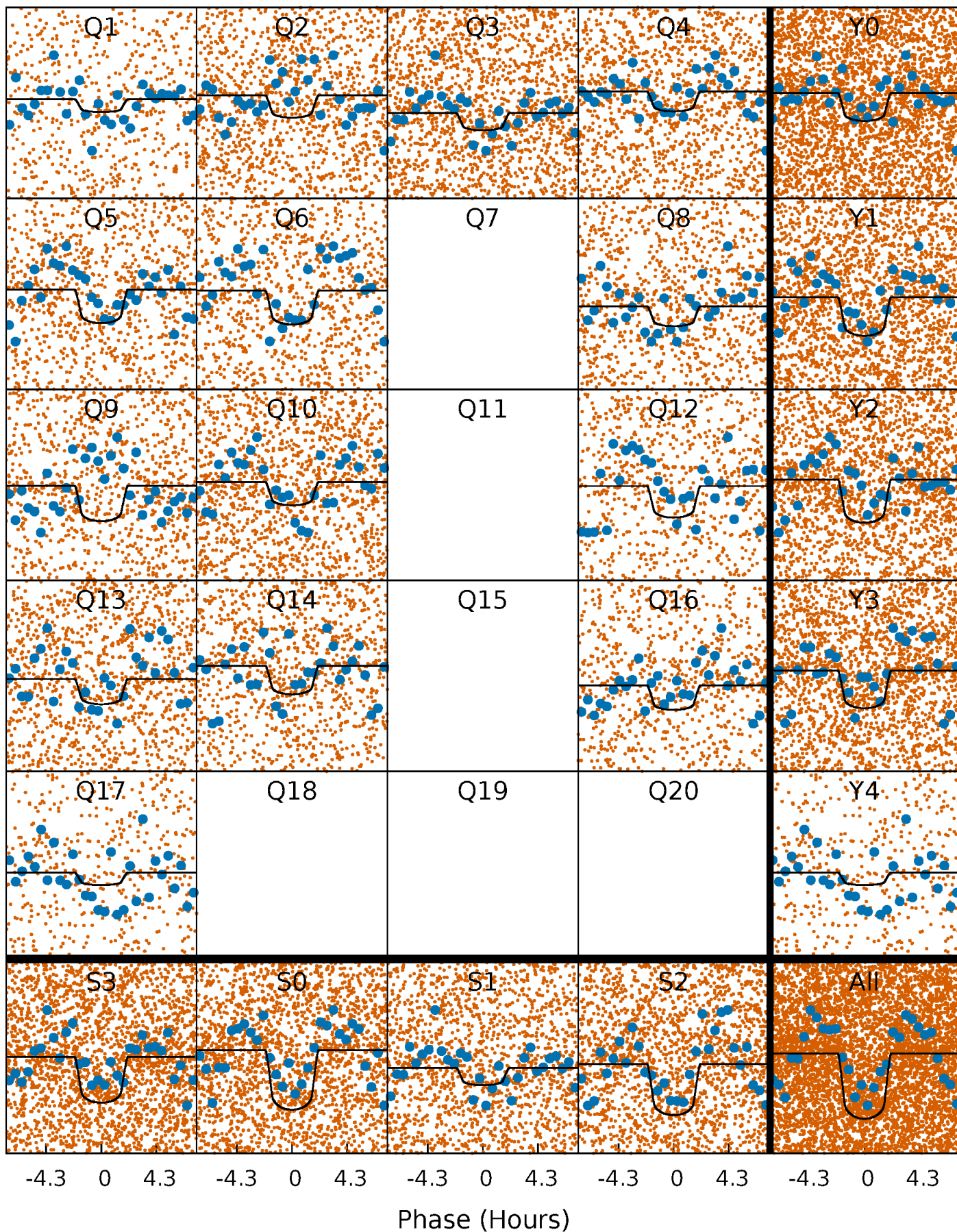
# PDC Quarter-Phased Transit Curves

TCE 010220707-01 P= 0.912795 Days  $T_0=131.798446$  (BKJD)



# DV Quarter-Phased Transit Curves

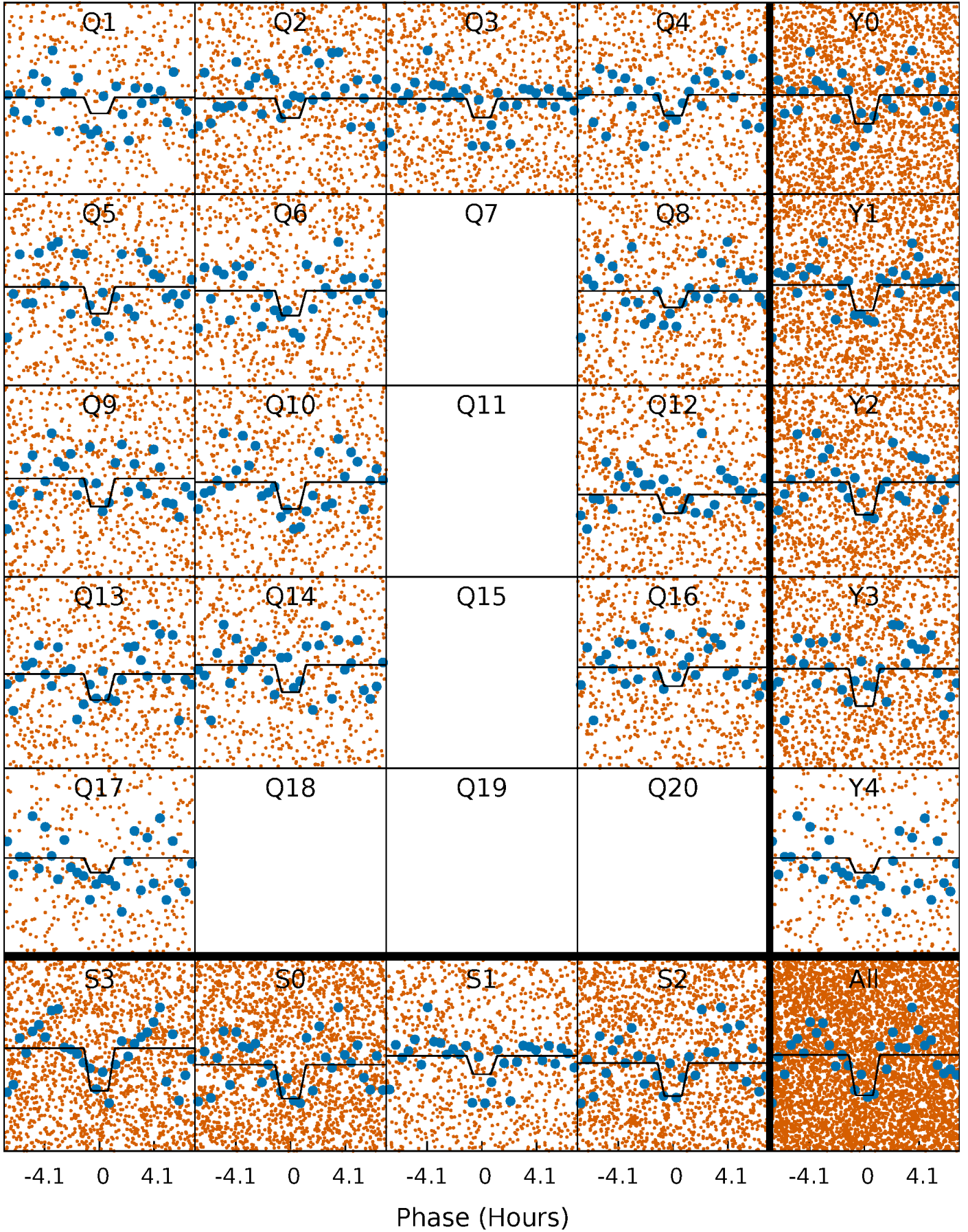
TCE 010220707-01 P= 0.912795 Days  $T_0=131.798446$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

TCE 010220707-01 P= 0.912807 Days  $T_0=131.797787$  (BKJD)

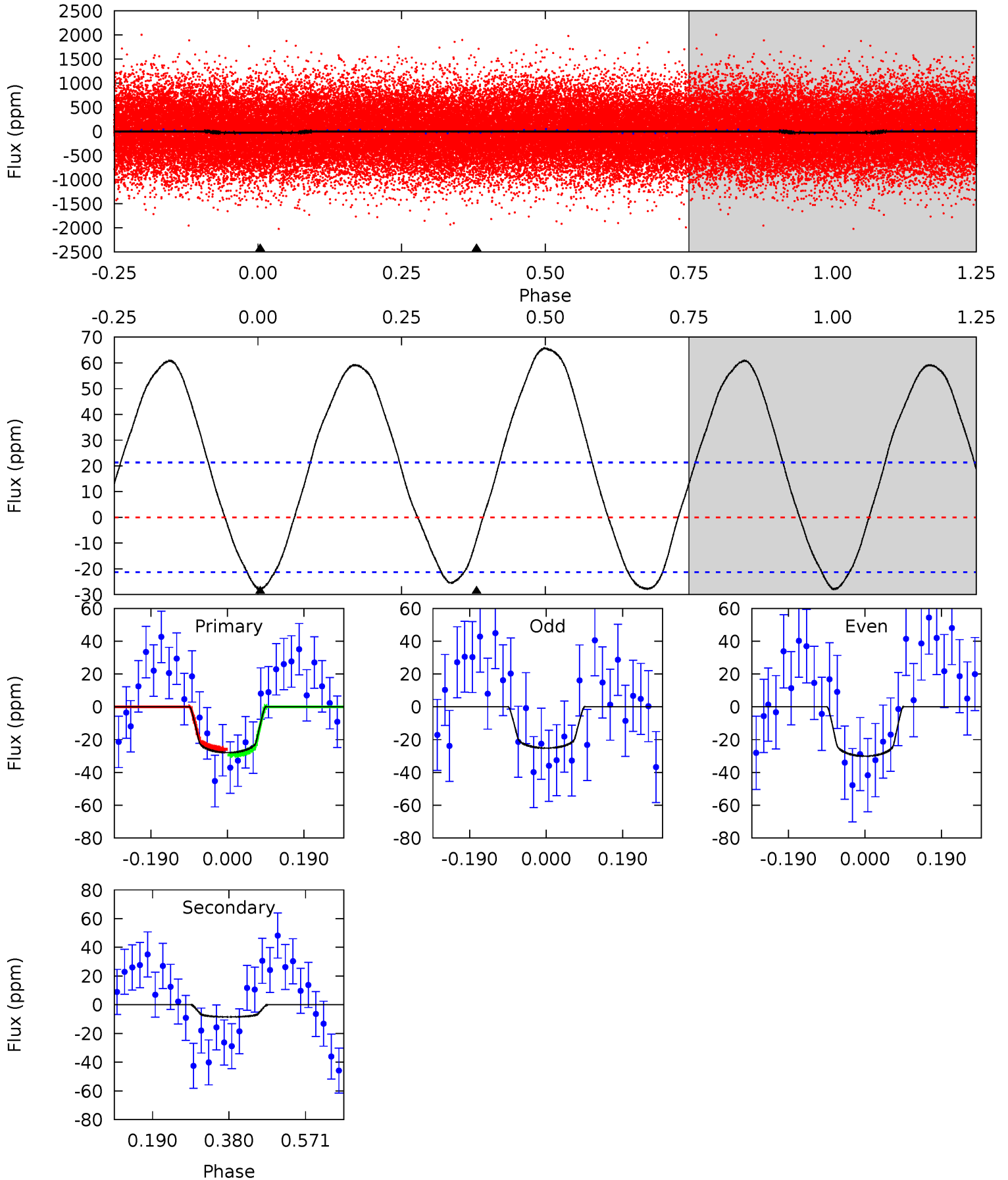




# DV Model-Shift Uniqueness Test

010220707-01, P = 0.912795 Days, E = 130.885651 Days

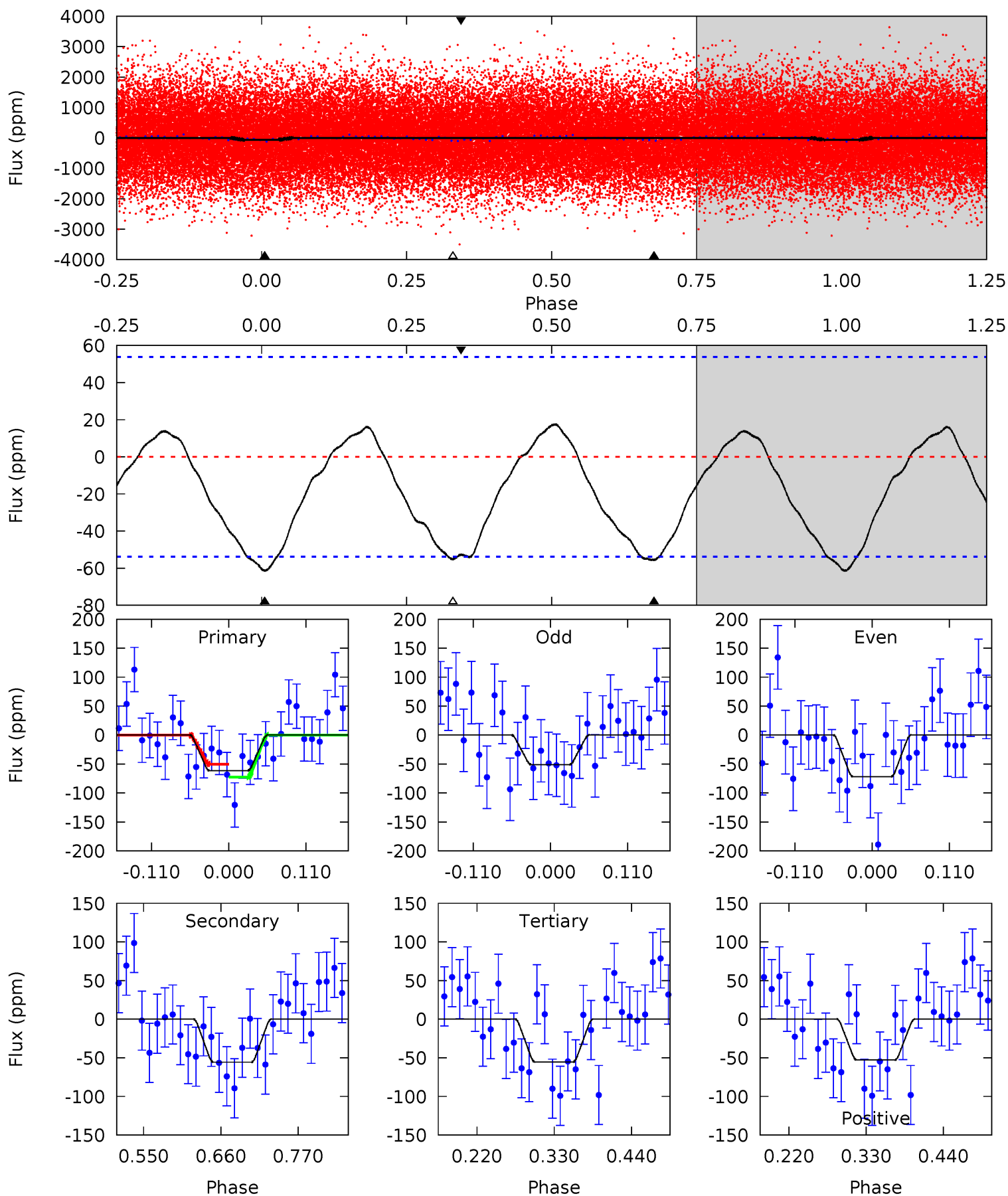
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.80	1.77	0	0	4.43	1.31	5.13	5.80	5.80	1.77	1.77	0.51	1.02	0.70	0.36



# Alt Model-Shift Uniqueness Test

010220707-01, P = 0.912807 Days, E = 130.884980 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
5.19	4.69	4.67	-4.45	4.54	1.60	1.95	0.52	9.64	0.02	9.14	0.88	1.01	0.22	0.95



### Stellar Parameters For KIC 010220707

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$7798^{+77}_{-85}$	$3.948^{+0.143}_{-0.077}$	$0.000^{+0.050}_{-0.150}$	$2.411^{+0.295}_{-0.443}$	$1.881^{+0.056}_{-0.189}$	$0.189^{+0.134}_{-0.047}$
	+1%/-1%	+4%/-2%	+inf%/-inf%	+12%/-18%	+3%/-10%	+71%/-25%
Source	SPE68	SPE68	SPE68	DSEP		

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

### Secondary Eclipse Parameters for KIC 010220707-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-8 \pm 5$	$2.02^{+0.99}_{-0.85}$	$4927^{+184}_{-234}$	$4018^{+1860}_{-7657}$	$0.545^{+1.185}_{-0.381}$
Alt.	$-56 \pm 12$	$2.18^{+0.88}_{-0.84}$	$4922^{+177}_{-233}$	$7023^{+2842}_{-1311}$	$3.226^{+5.548}_{-1.644}$

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



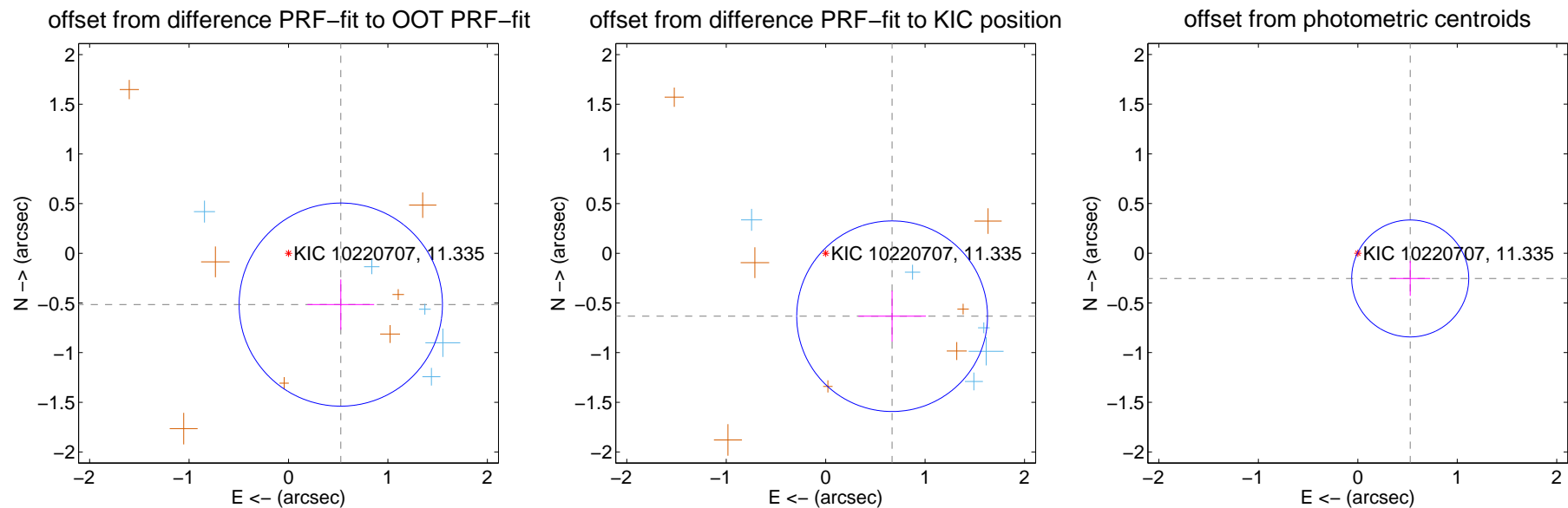
## DV Centroid Data

Supplemental centroid analysis for 010220707-01. **Kepler magnitude: 11.34.** Transit SNR 13.32

There are 5 quarters with good PRF difference image offsets

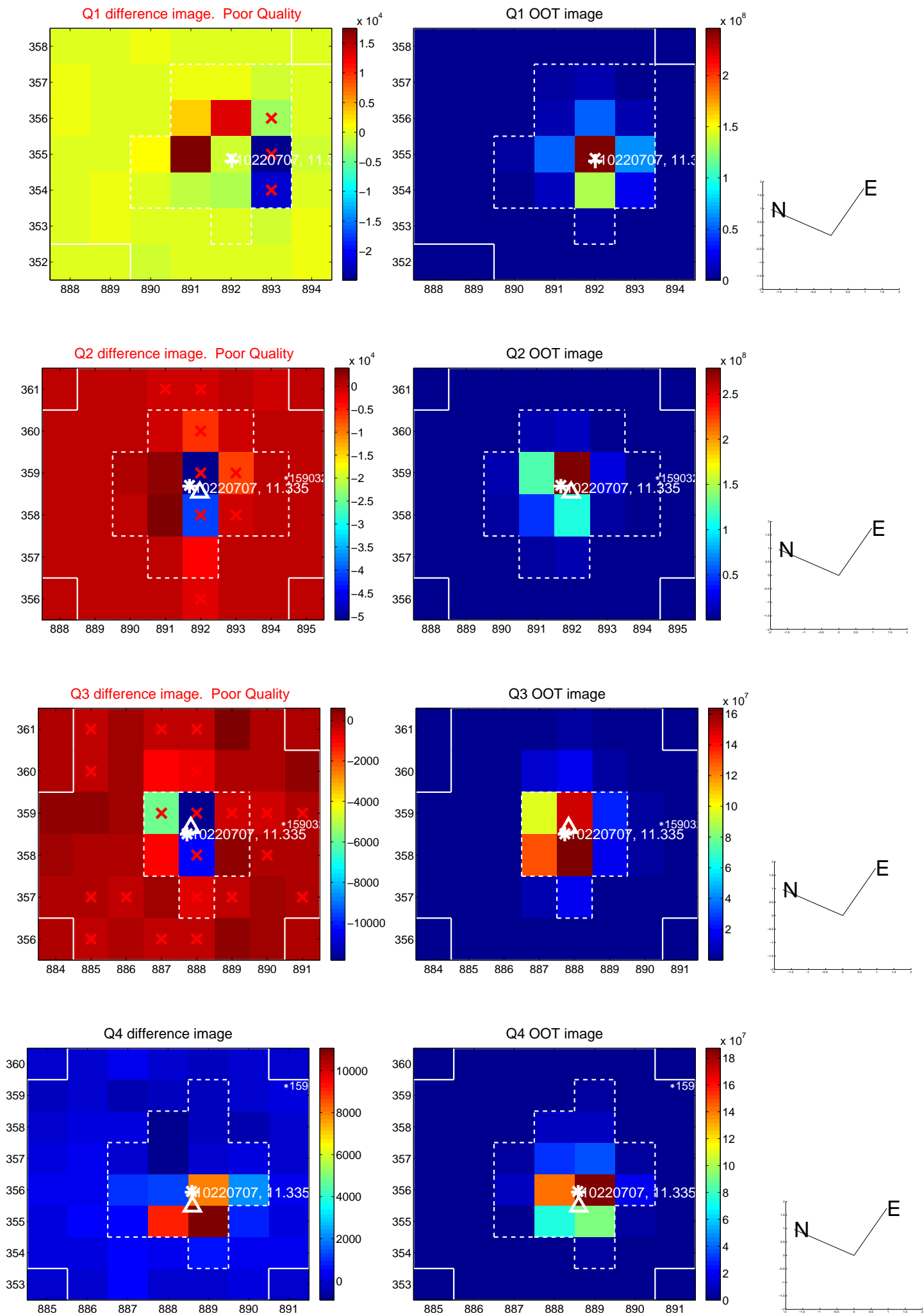
The direct PRF centroid is offset from the target star catalog position by about 0.34 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.737 \pm 0.341$	2.16	$-0.526 \pm 0.336$	$-0.517 \pm 0.253$
PRF-fit source offset from KIC position	$0.921 \pm 0.320$	2.88	$-0.668 \pm 0.339$	$-0.633 \pm 0.256$
photometric centroid source offset	$0.58 \pm 0.20$	2.98	$-0.53 \pm 0.20$	$-0.25 \pm 0.18$

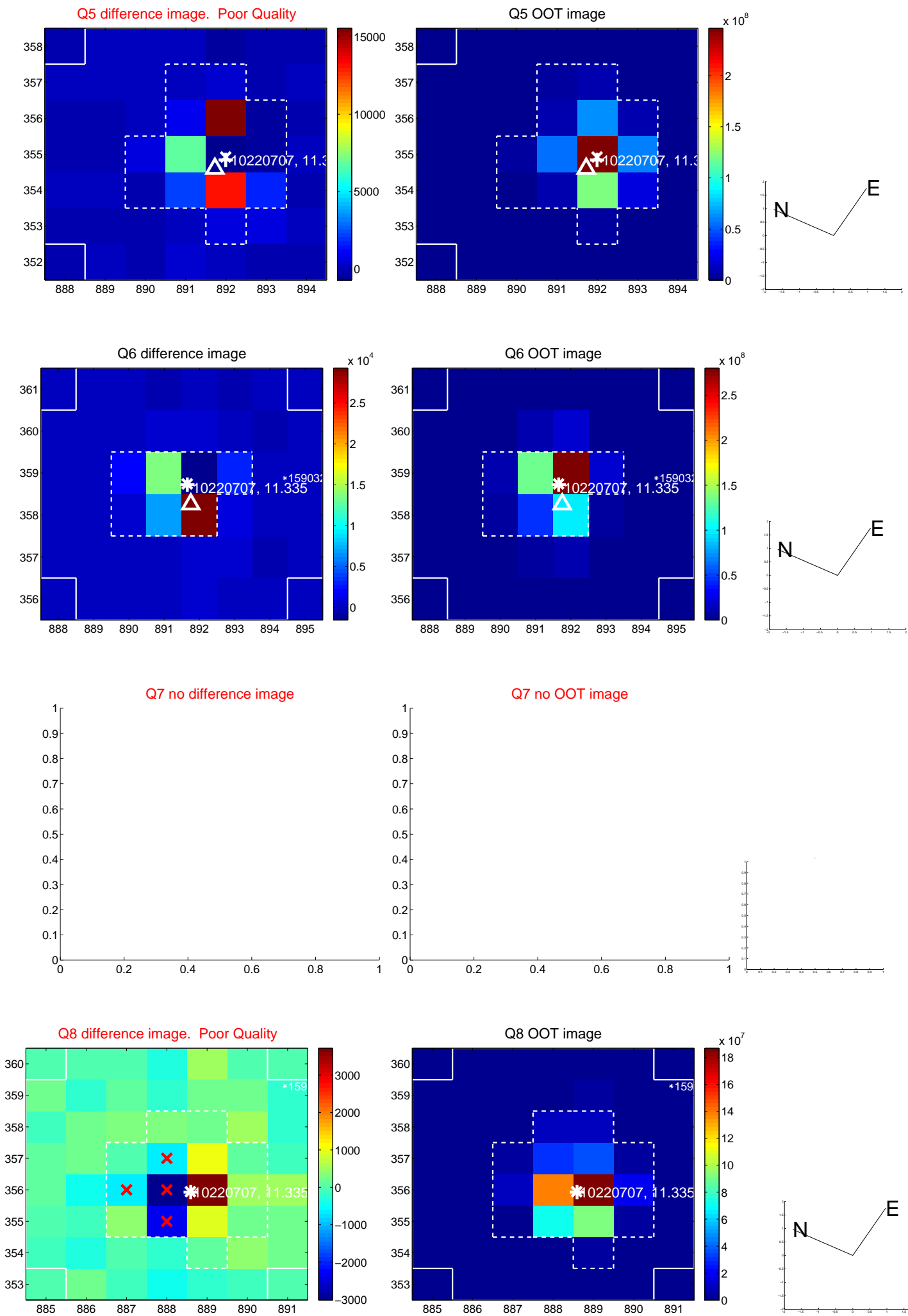


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

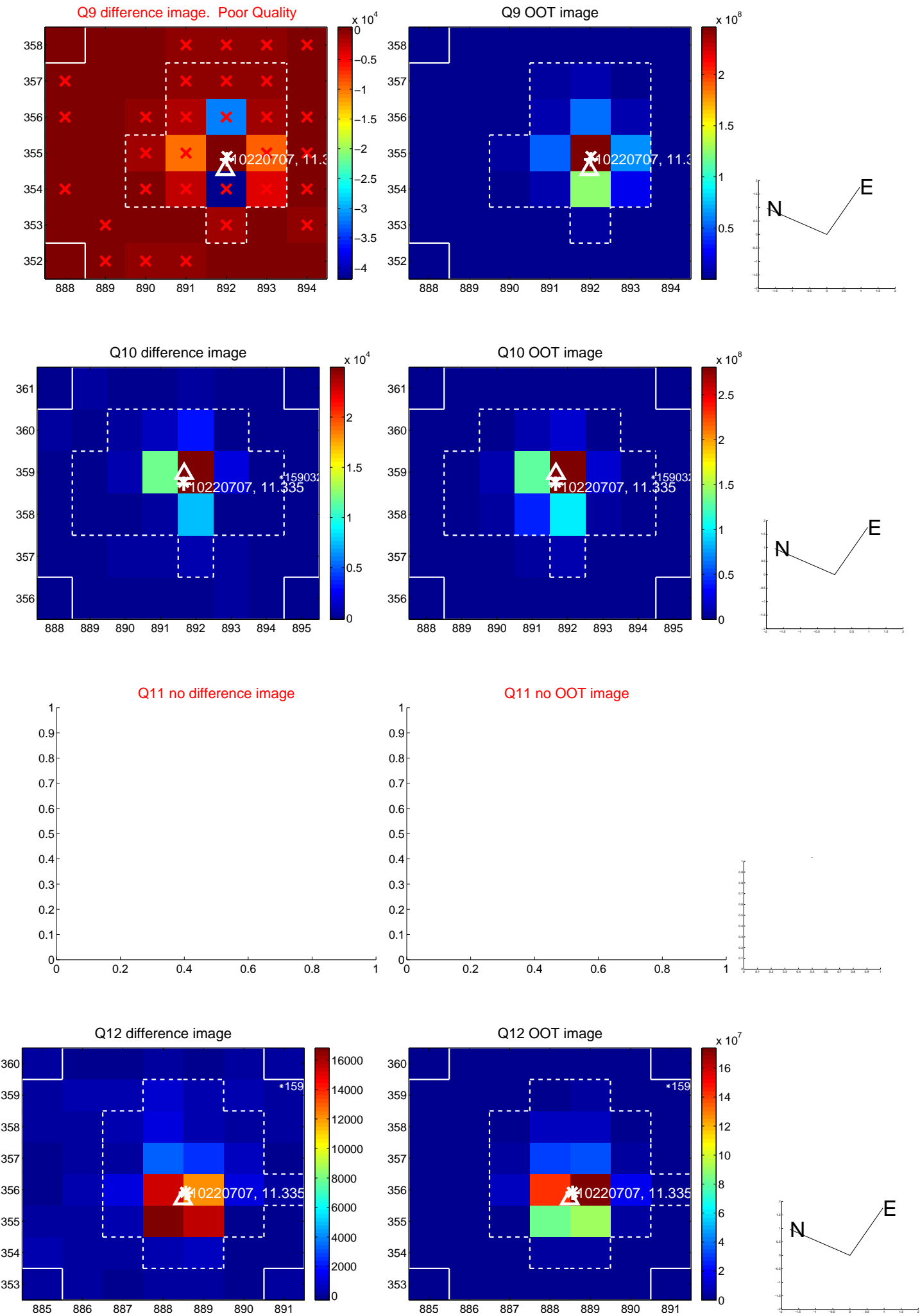


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

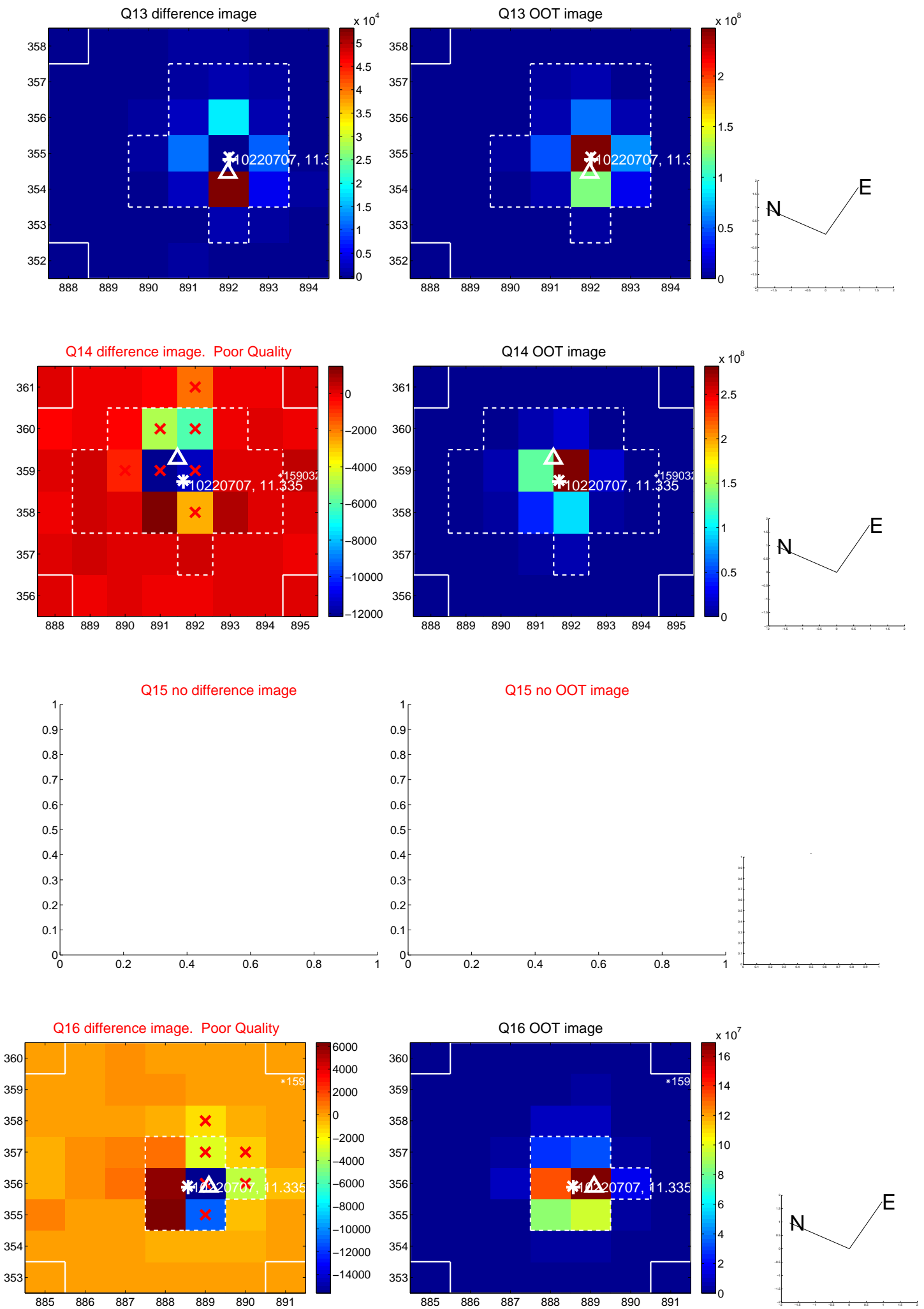




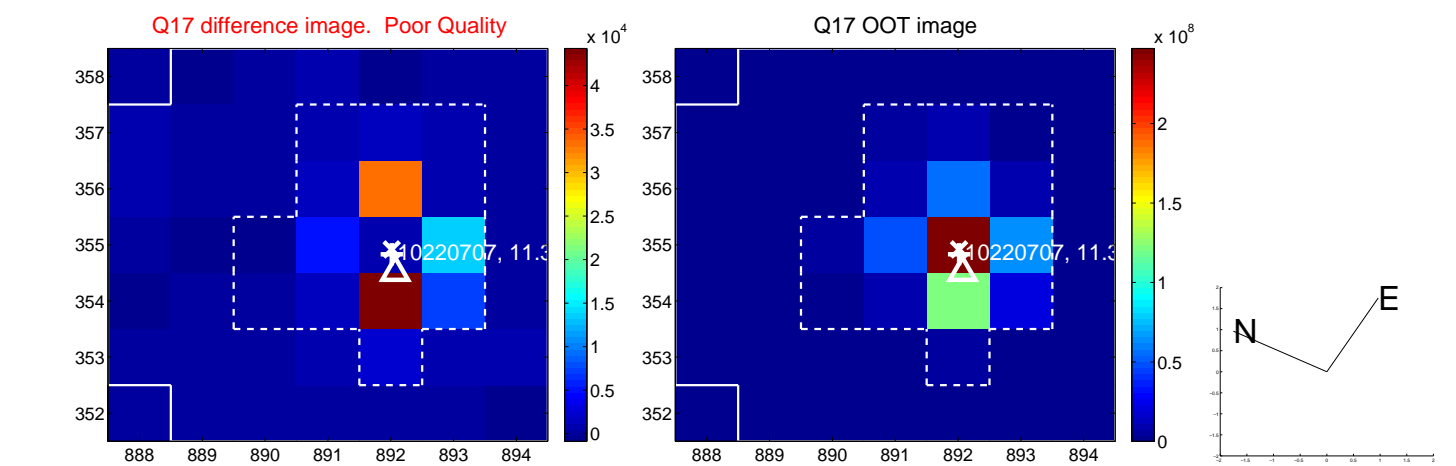
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



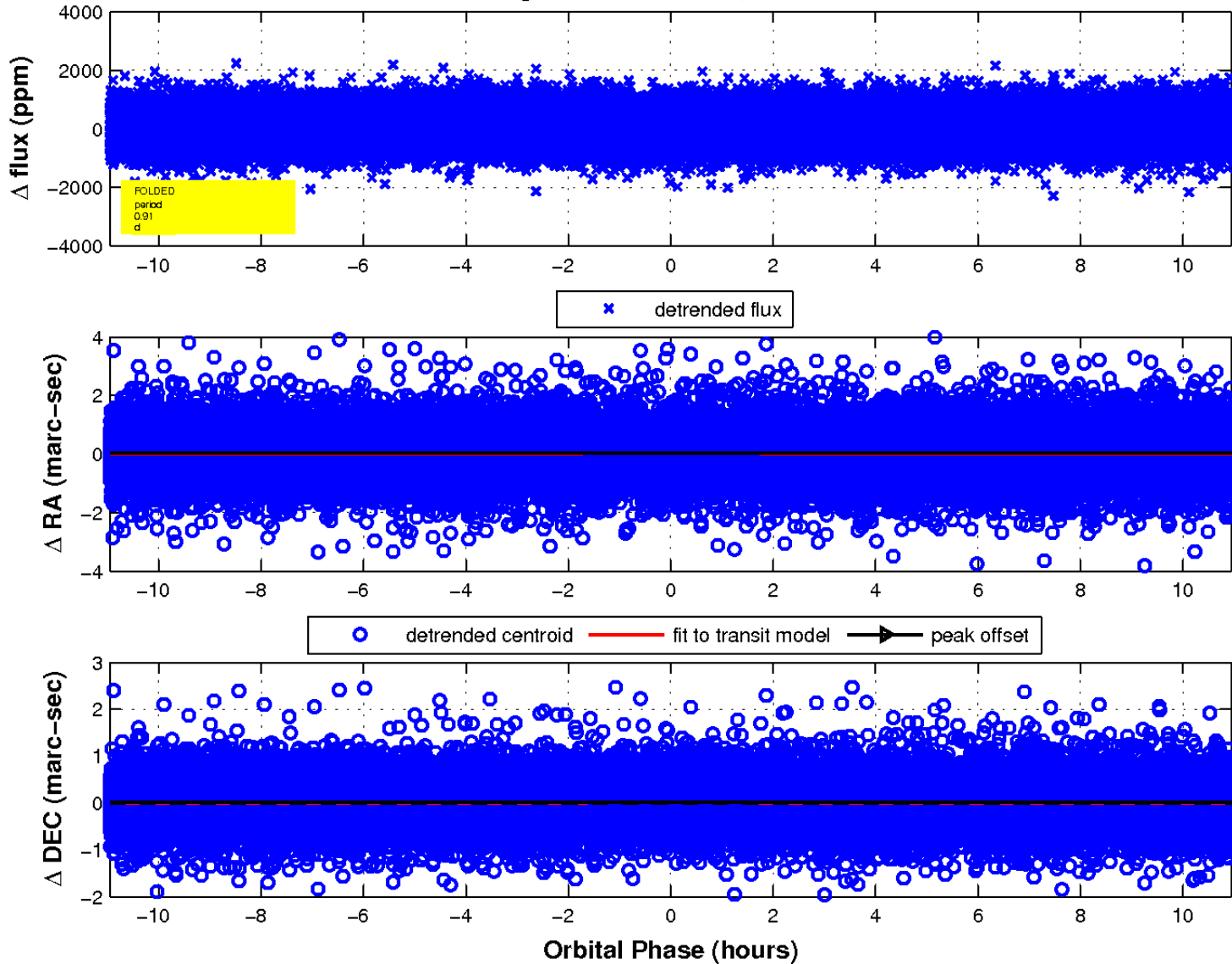
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



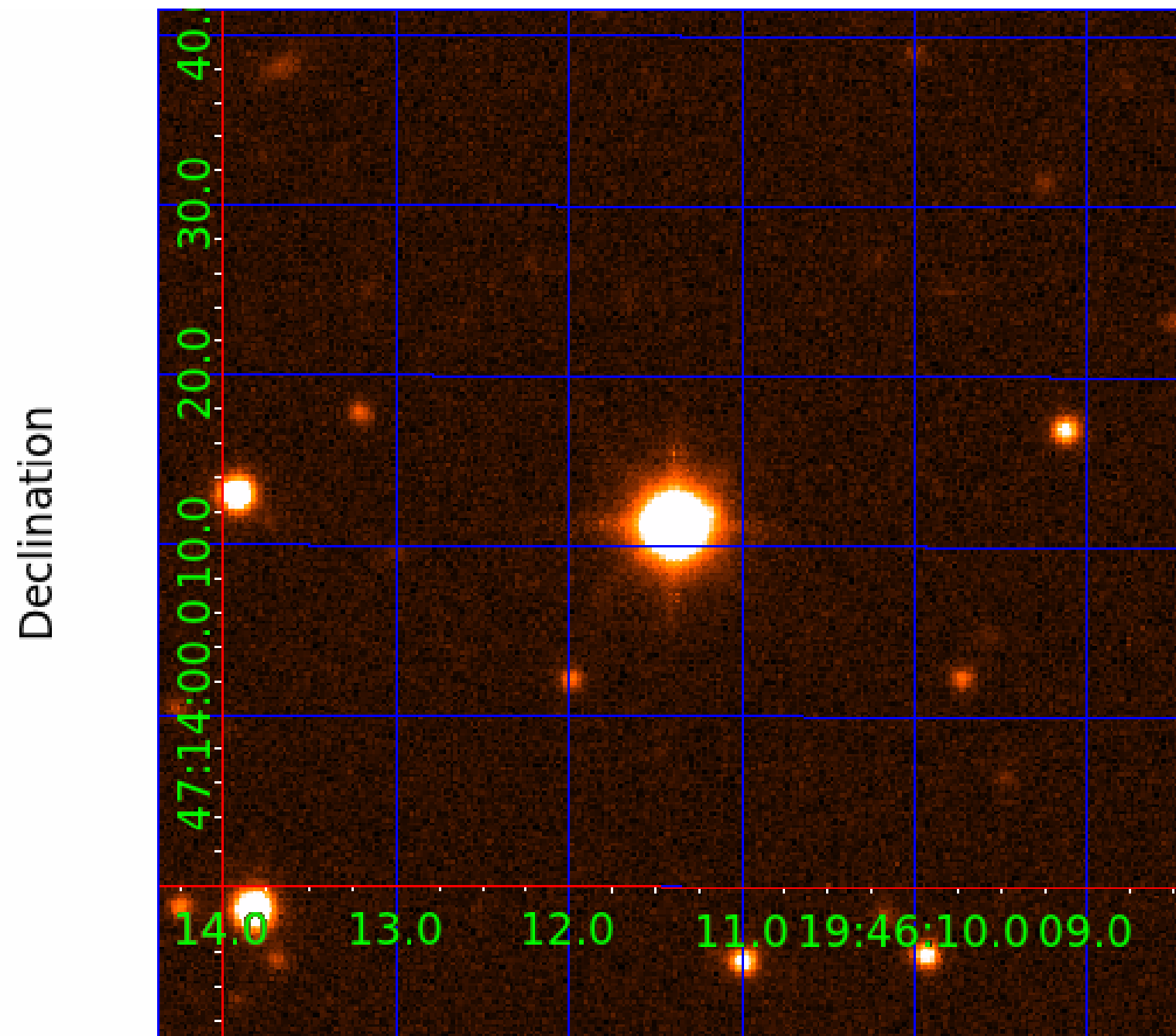
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



fluxWeightedCentroids, Planet 1 of 3



UKIRT Image





# KIC 010220707

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010220707-01	OBS	No	0.912795	131.798446	56.8	3.724	13.4	13.3	2.41	7798	2.10	37250.10
010220707-02	OBS	No	2.858307	131.670452	182.3	11.632	11.8	14.5	2.41	7798	6.30	8131.06
010220707-03	OBS	No	5.719017	132.081636	184.7	43.369	9.3	13.6	2.41	7798	4.02	3225.00

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010220707-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—CENT_SATURATED
010220707-02	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—CENT_SATURATED
010220707-03	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—CENT_SATURATED

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

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

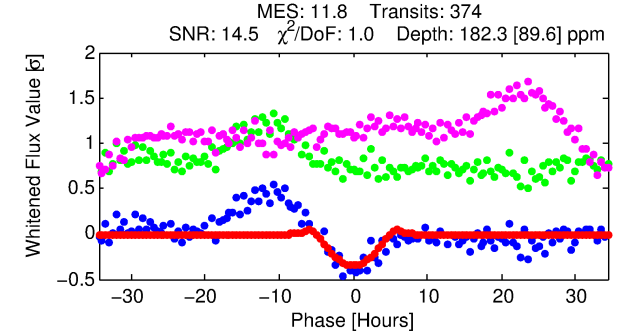
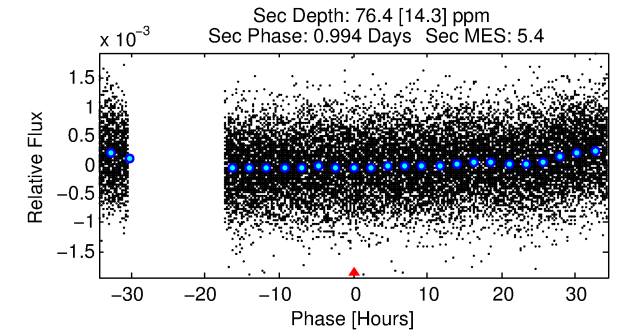
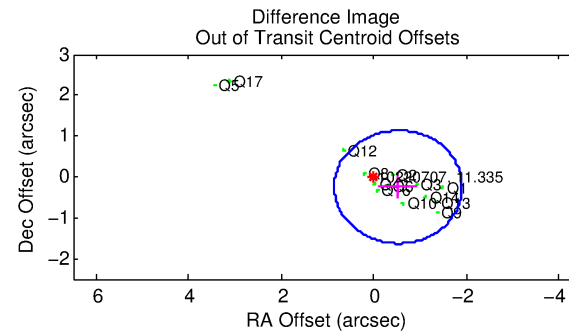
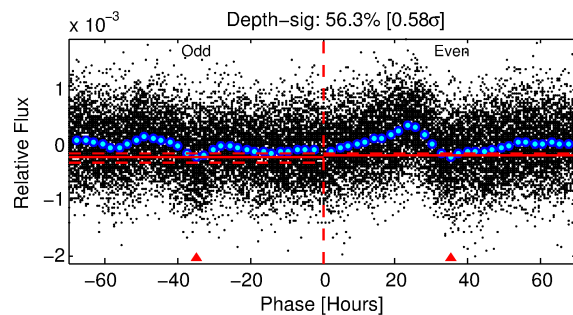
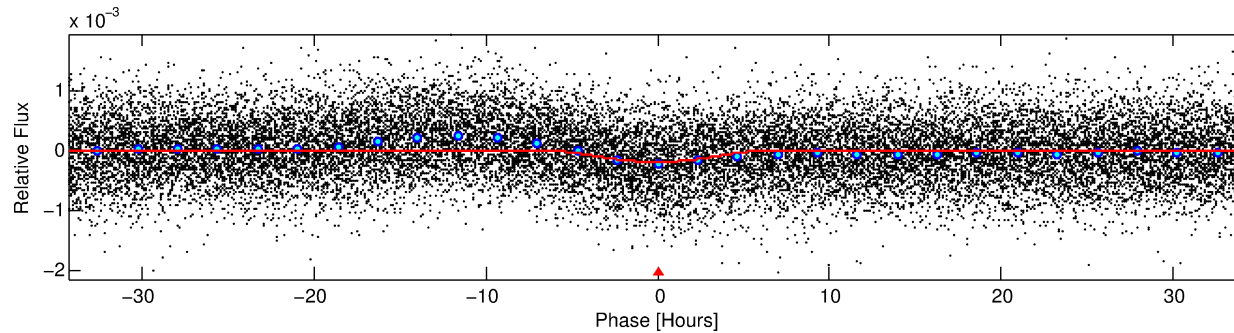
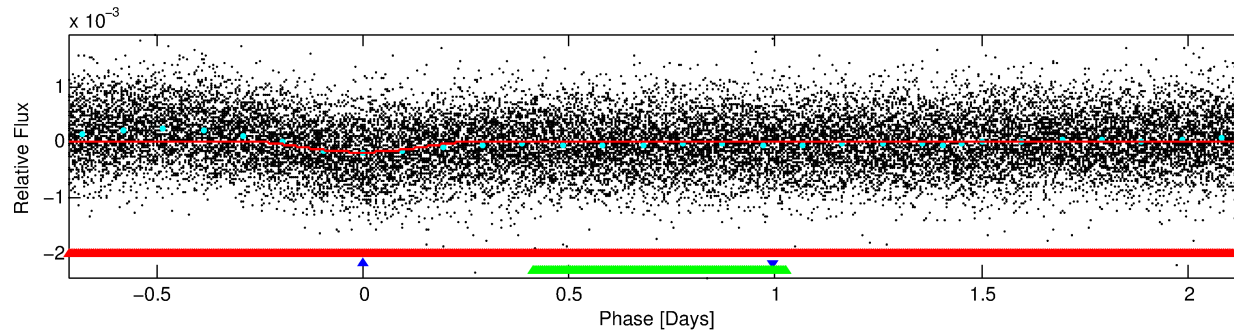
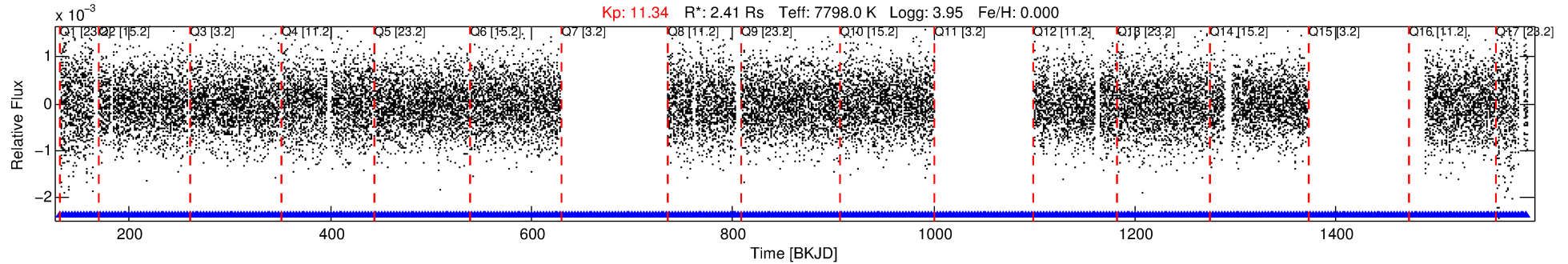
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010220707-02

No Significant Match Found

# DV One-Page Summary

KIC: 10220707 Candidate: 2 of 3 Period: 2.858 d



## DV Fit Results:

Period = 2.85831 [0.00006] d  
Epoch = 131.6705 [0.0172] BKJD  
Rp/R\* = 0.0239 [0.0359]  
a/R\* = 1.09 [0.02]  
b = 1.00 [0.06]  
Seff = 8131.06 [2074.49]  
Teq = 2421 [154] K  
Rp = 6.30 [9.52] Re  
a = 0.0487 [0.0080] AU  
Ag = 2.51 [7.57] [0.20 $\sigma$ ]  
Teffp = 4712 [3541] K [0.65 $\sigma$ ]

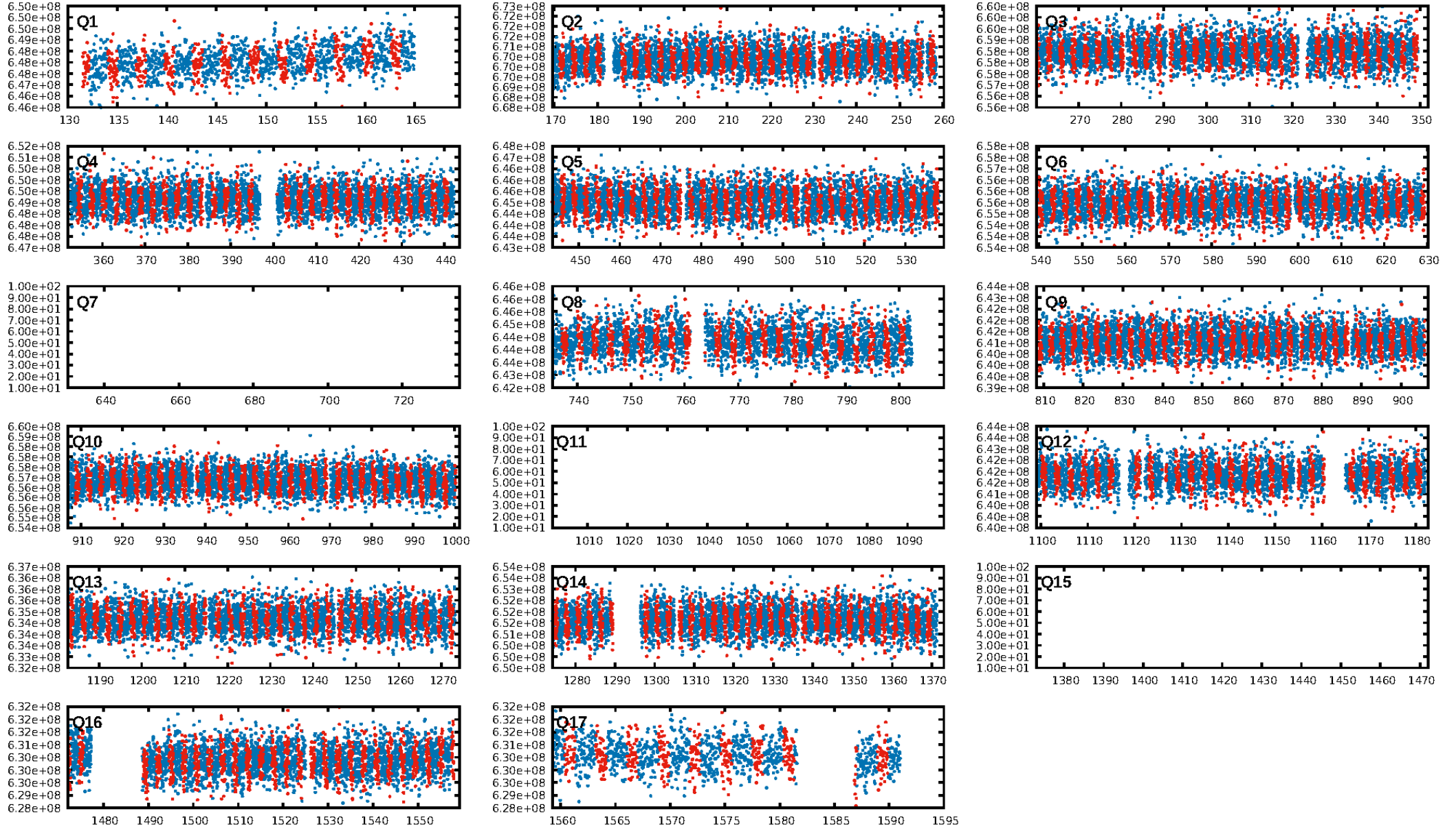
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [3.82 $\sigma$ ]  
LongPeriod-sig: 87.4% [1.53 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [353/353]  
GhostDiagnostic-chr: 1.221  
Centroid-sig: 0.0%  
Centroid-so: 0.338 arcsec [3.37 $\sigma$ ]  
OotOffset-rm: 0.583 arcsec [1.27 $\sigma$ ]  
KicOffset-rm: 0.679 arcsec [1.55 $\sigma$ ]  
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 06:33:50 Z

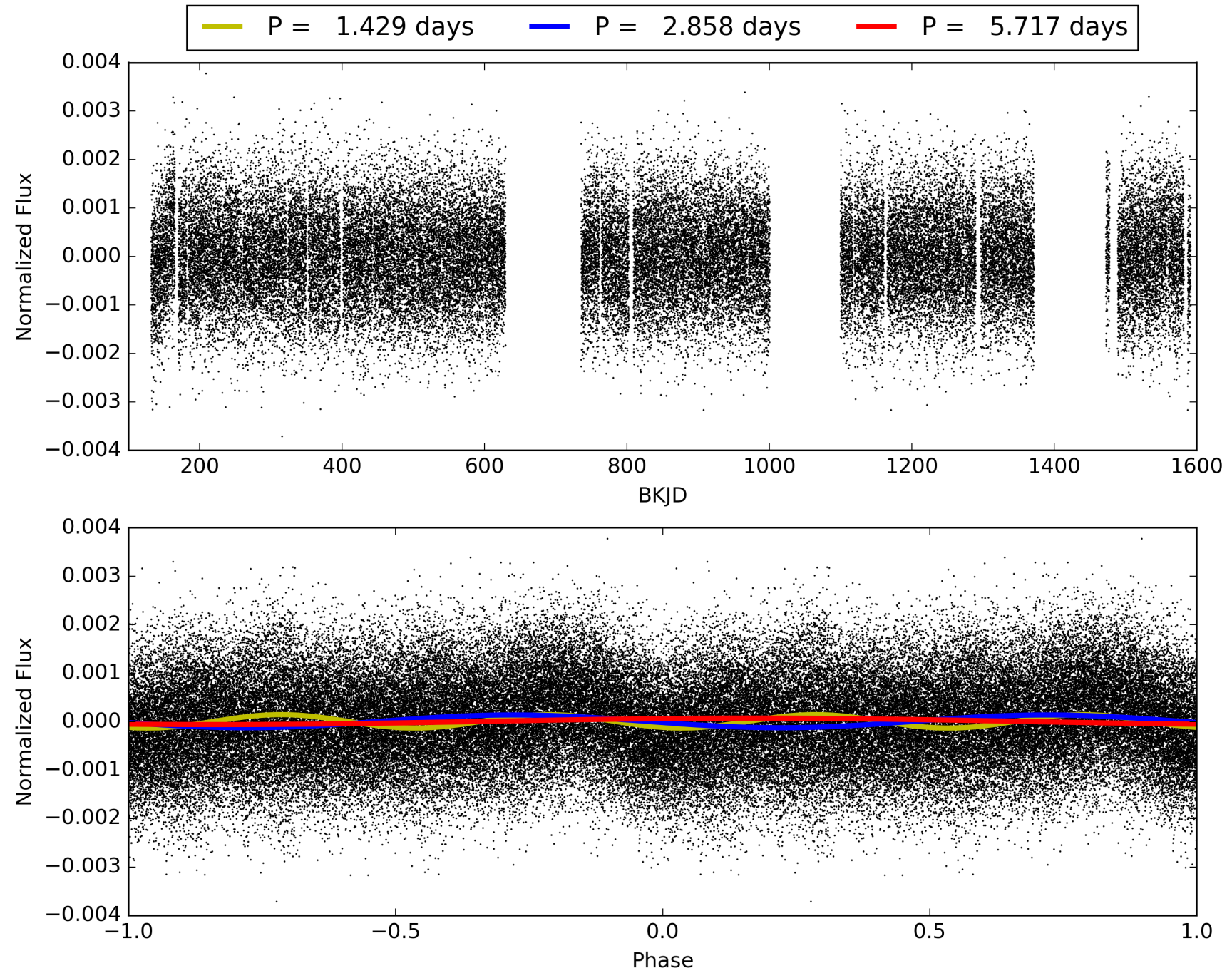
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 010220707-02, PDC Light Curves





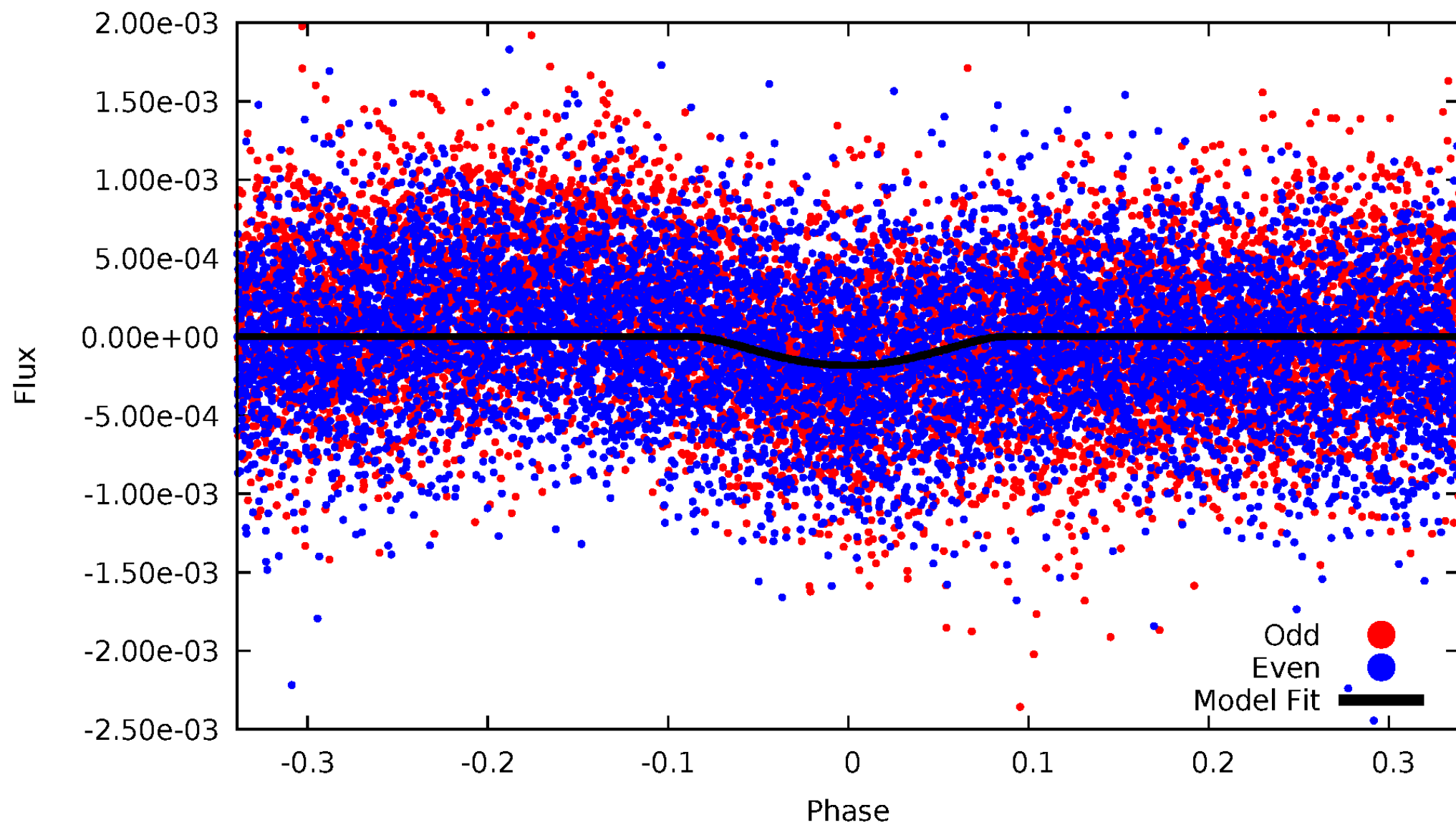
TCE 010220707-02





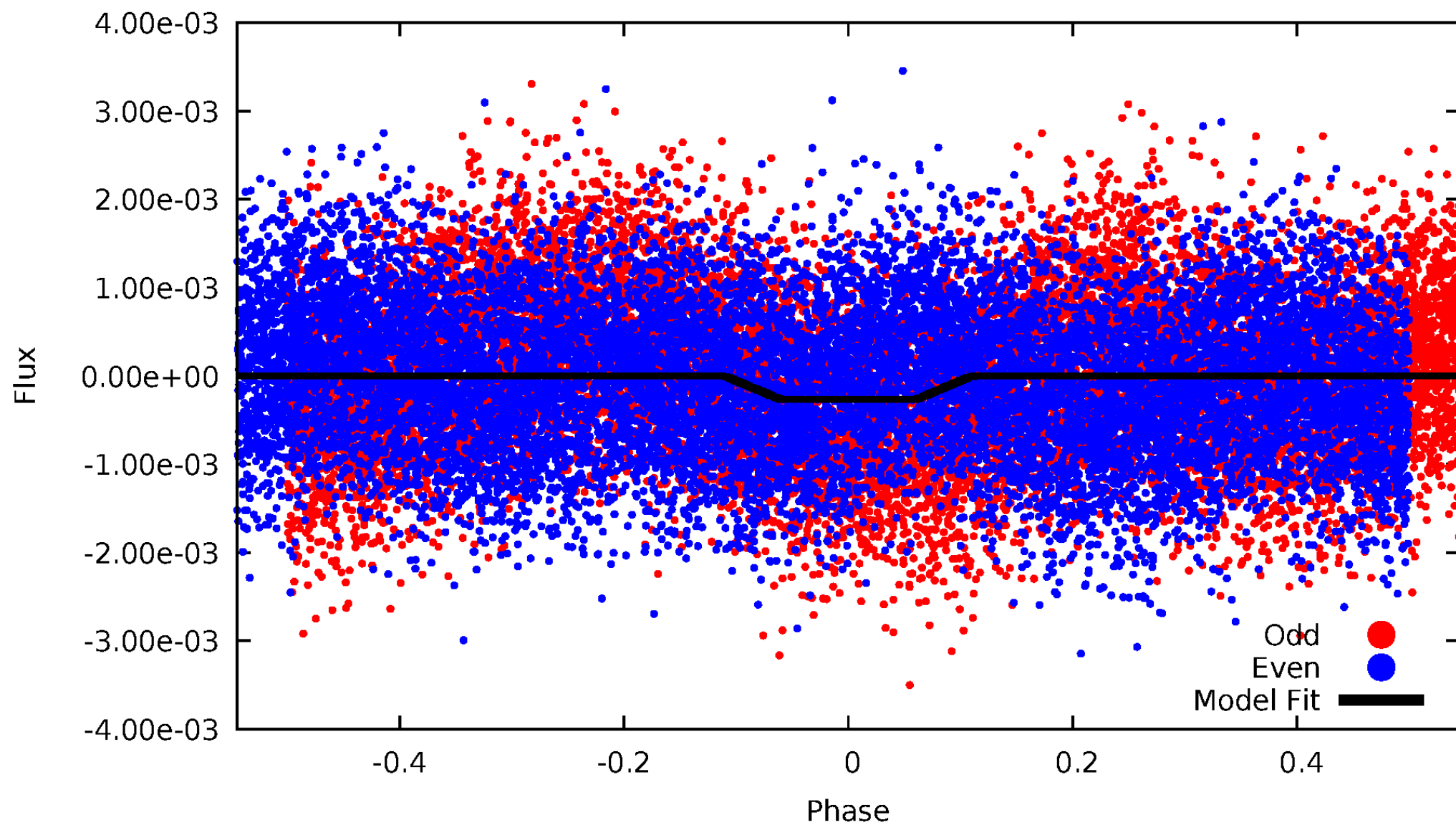
# DV Odd/Even

TCE 010220707-02



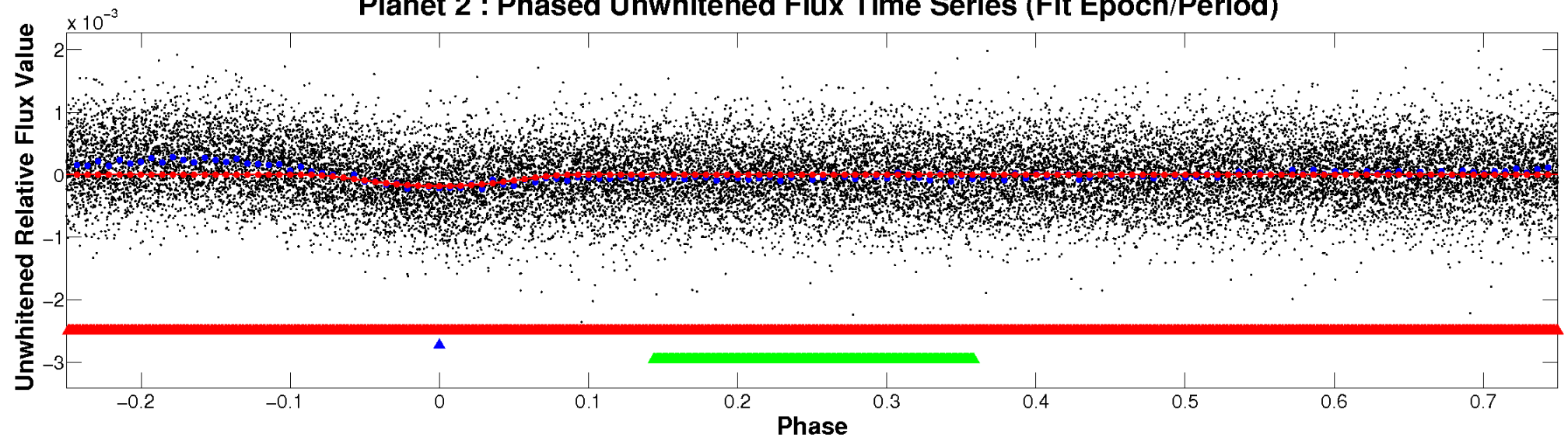
# ALT Odd/Even

TCE 010220707-02

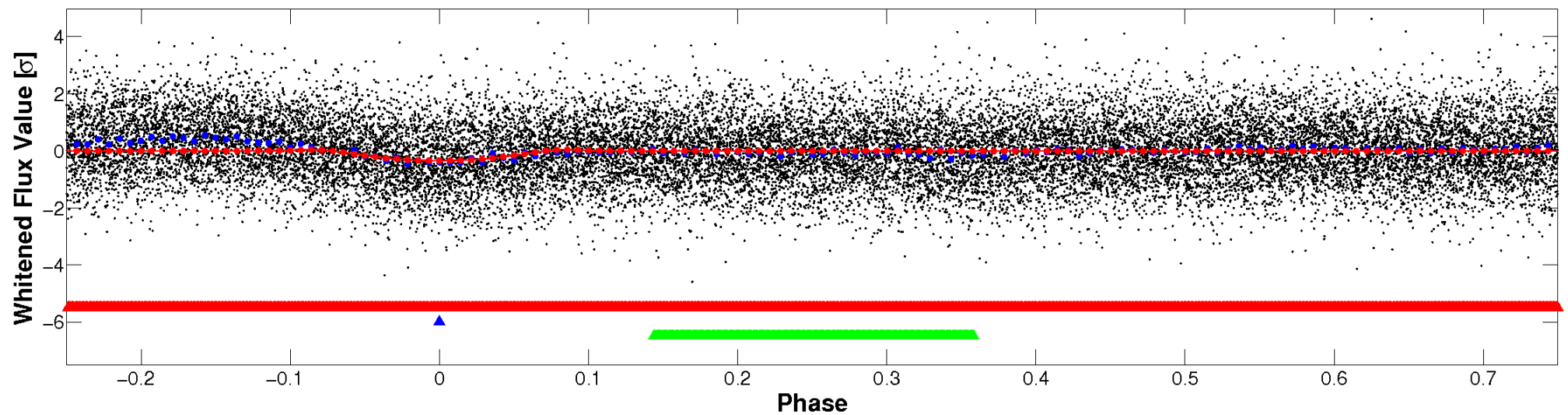


# Non-Whitened Vs. Whitened Light Curve

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

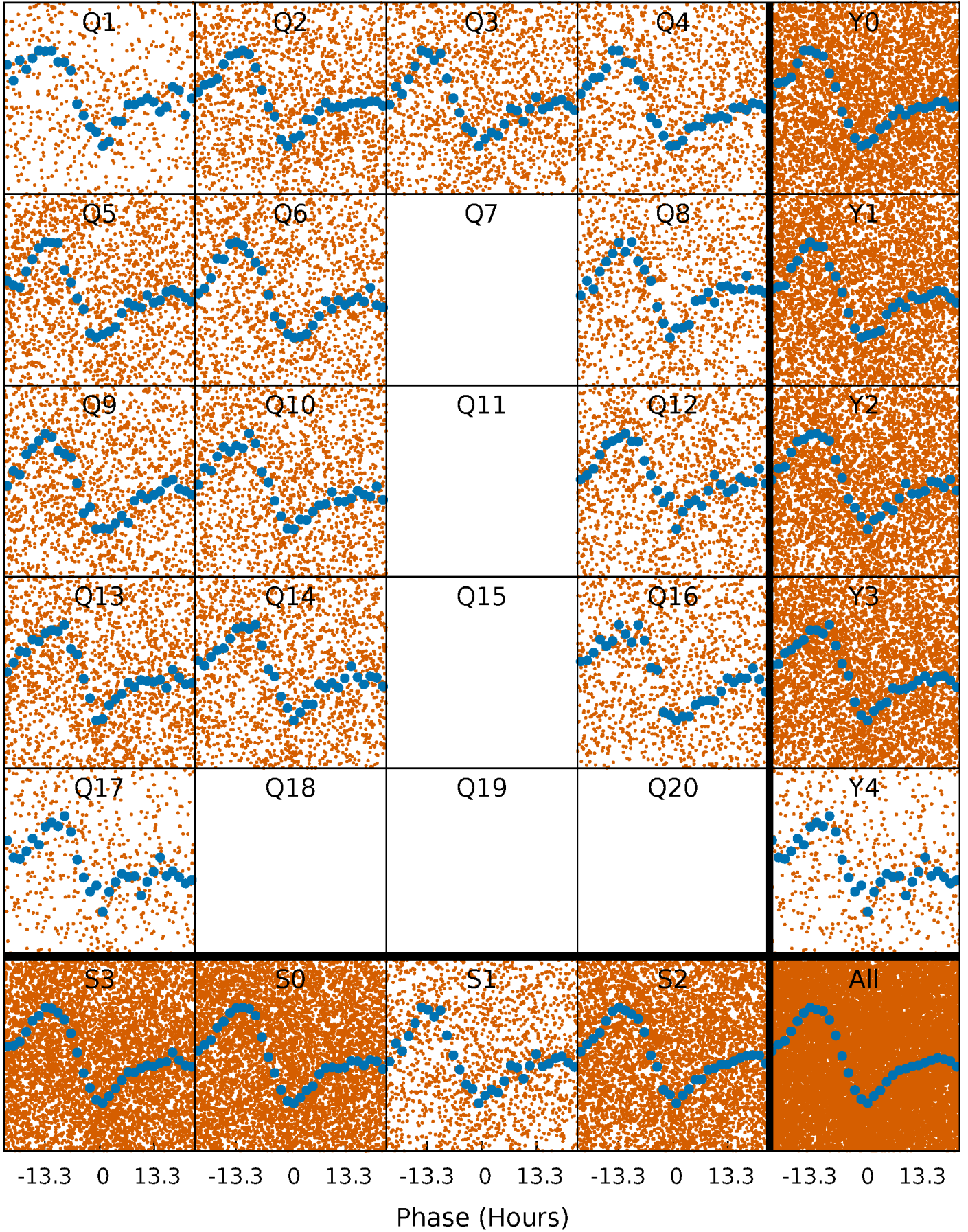


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

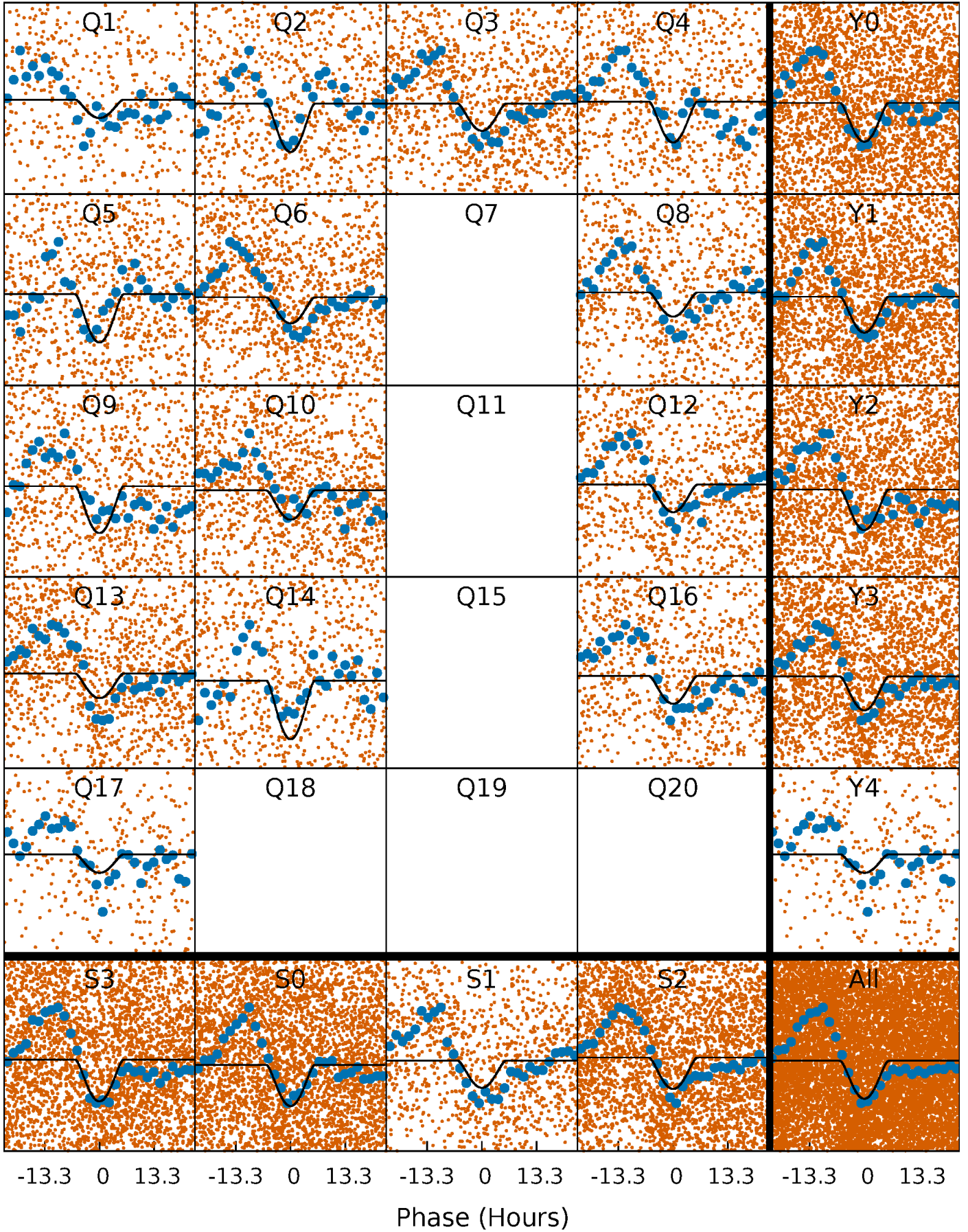
TCE 010220707-02   P= 2.858307 Days    $T_0=131.670452$  (BKJD)





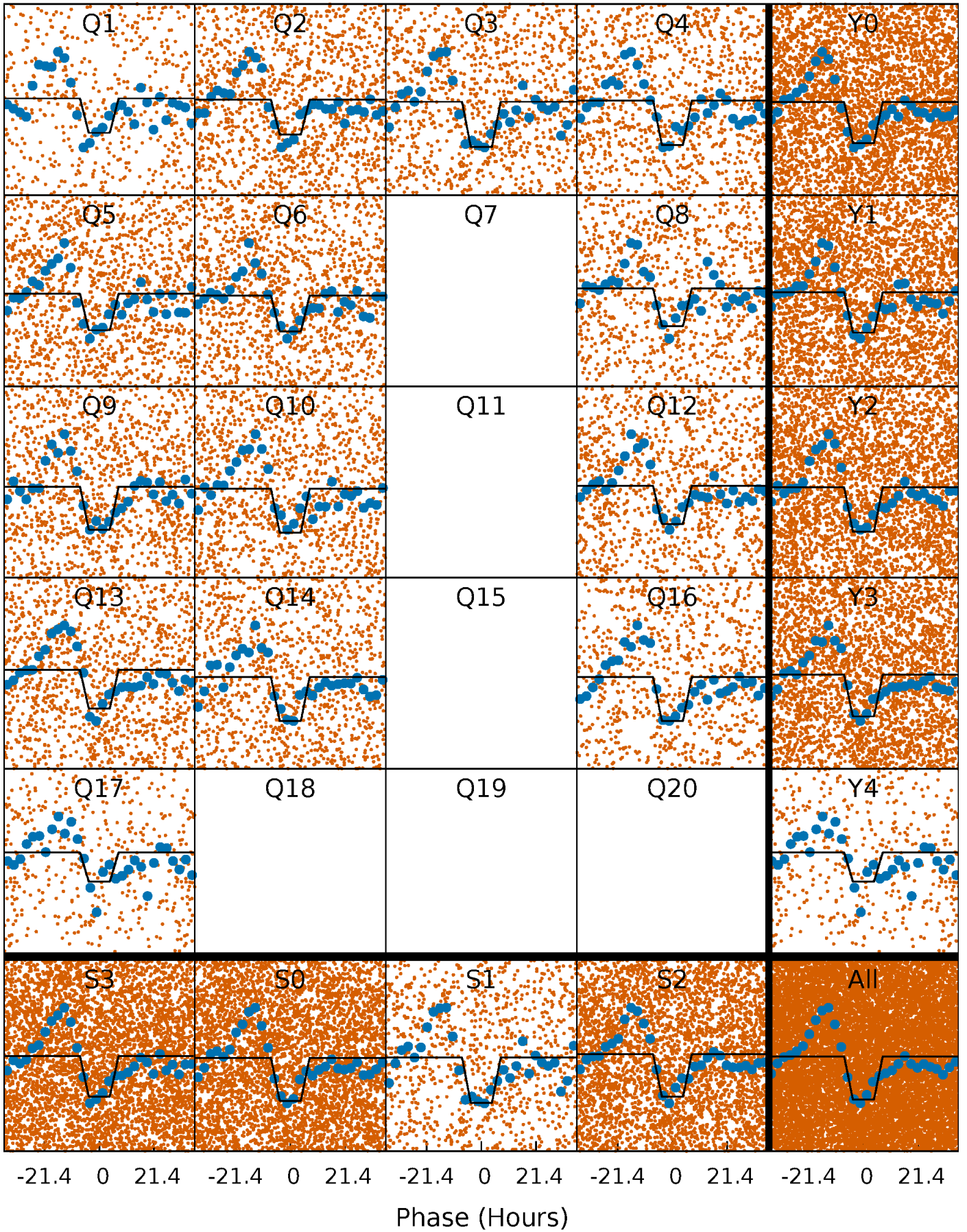
# DV Quarter-Phased Transit Curves

TCE 010220707-02 P= 2.858307 Days  $T_0=131.670452$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

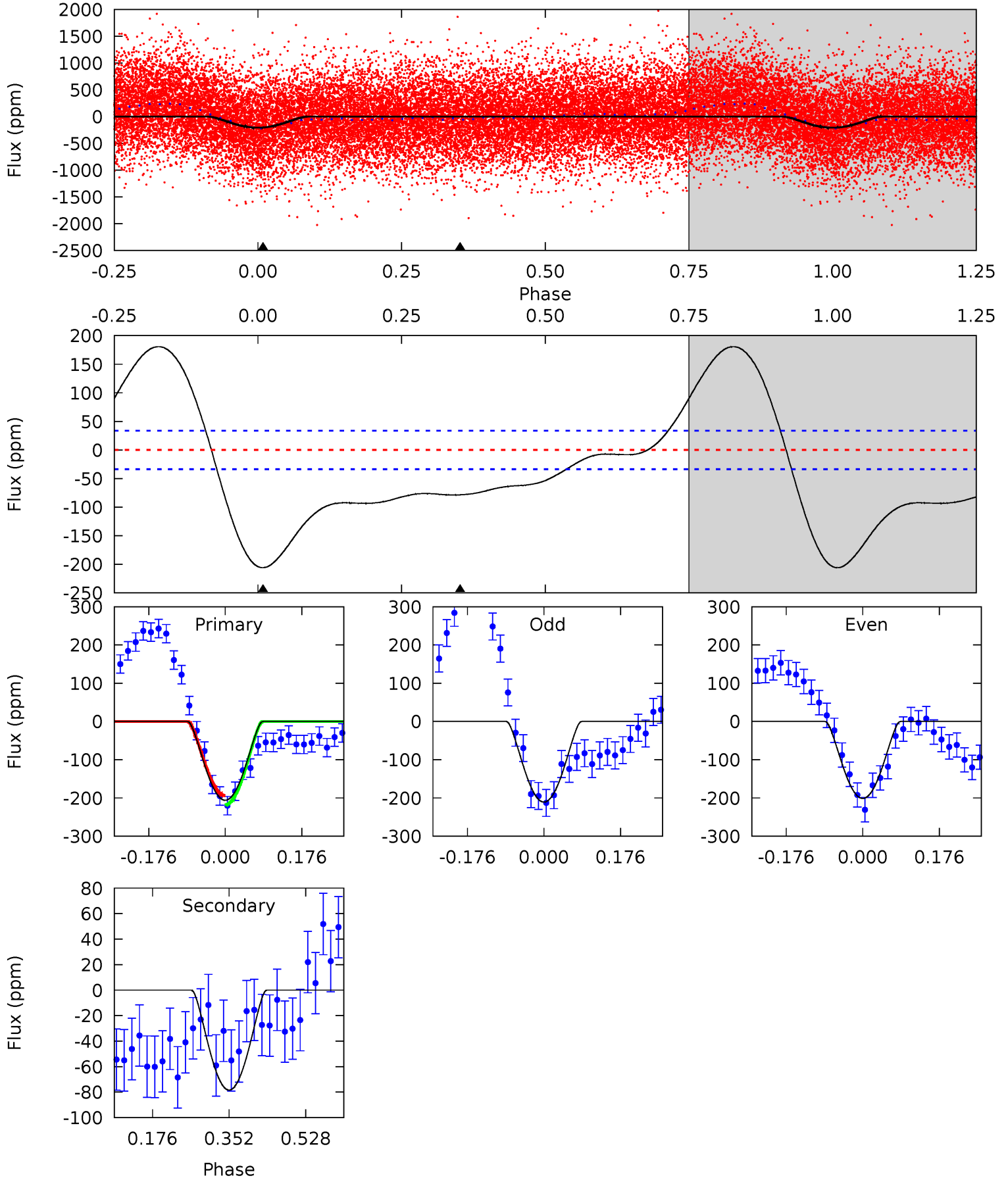
TCE 010220707-02    P= 2.858269 Days     $T_0=131.787213$  (BKJD)



# DV Model-Shift Uniqueness Test

010220707-02, P = 2.858307 Days, E = 128.812145 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
27.1	10.3	0	0	4.44	1.35	9.27	27.1	27.1	10.3	10.3	0.62	-0.23	0.47	1.58

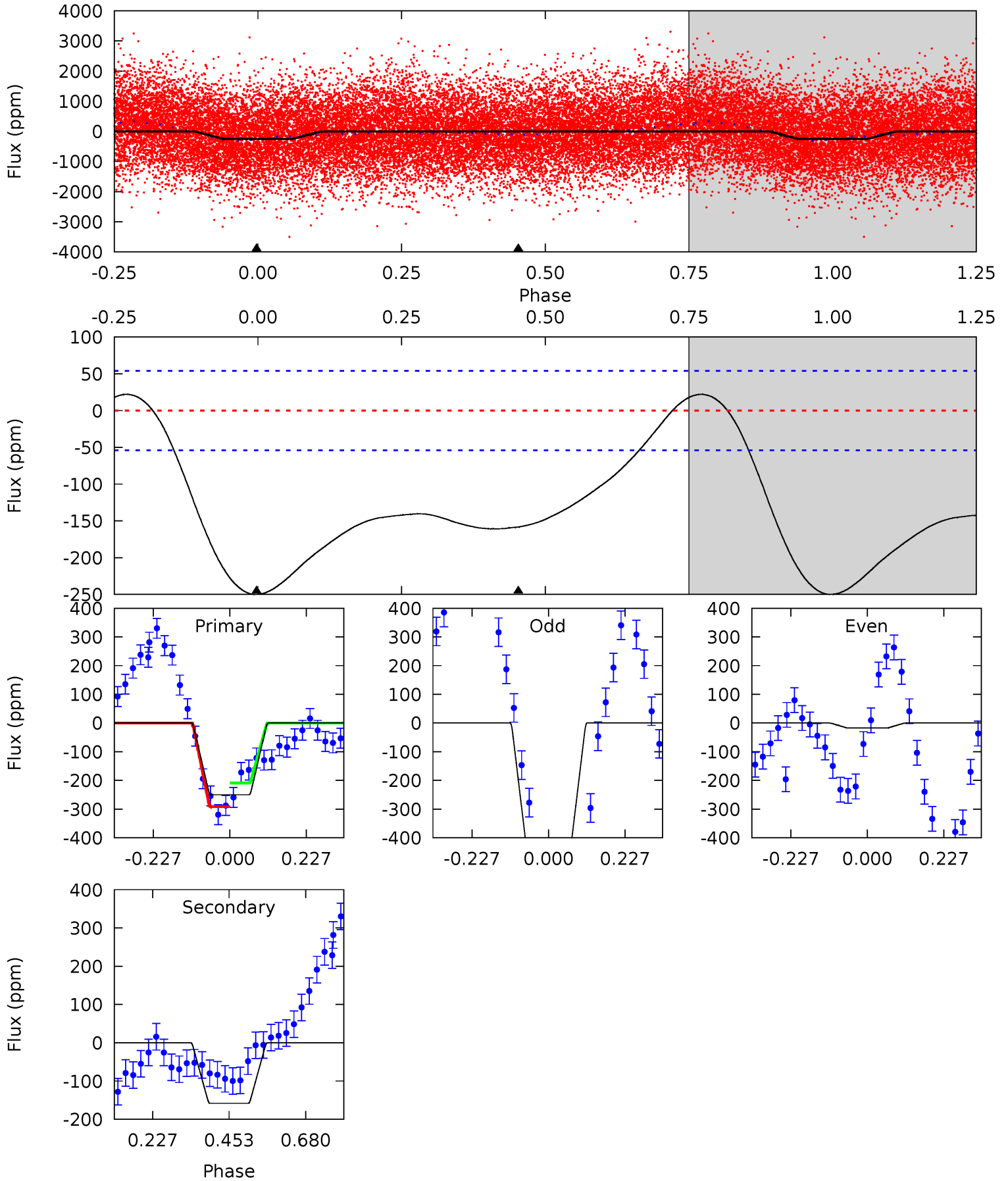




# Alt Model-Shift Uniqueness Test

010220707-02, P = 2.858269 Days, E = 128.928944 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
20.3	12.9	0	0	4.39	1.21	3.27	20.3	20.3	12.9	12.9	19.1	1.17	0.08	3.24





### Stellar Parameters For KIC 010220707

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$7798^{+77}_{-85}$	$3.948^{+0.143}_{-0.077}$	$0.000^{+0.050}_{-0.150}$	$2.411^{+0.295}_{-0.443}$	$1.881^{+0.056}_{-0.189}$	$0.189^{+0.134}_{-0.047}$
	+1%/-1%	+4%/-2%	+inf%/-inf%	+12%/-18%	+3%/-10%	+71%/-25%
Source	SPE68	SPE68	SPE68	DSEP		

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

### Secondary Eclipse Parameters for KIC 010220707-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-78 \pm 8$	$8.88^{+8.17}_{-5.76}$	$3359^{+113}_{-152}$	$3911^{+2502}_{-1443}$	$1.241^{+9.348}_{-0.900}$
Alt.	$-158 \pm 12$	$8.04^{+7.86}_{-5.50}$	$3372^{+118}_{-155}$	$4797^{+4419}_{-1266}$	$3.086^{+30.155}_{-2.296}$

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

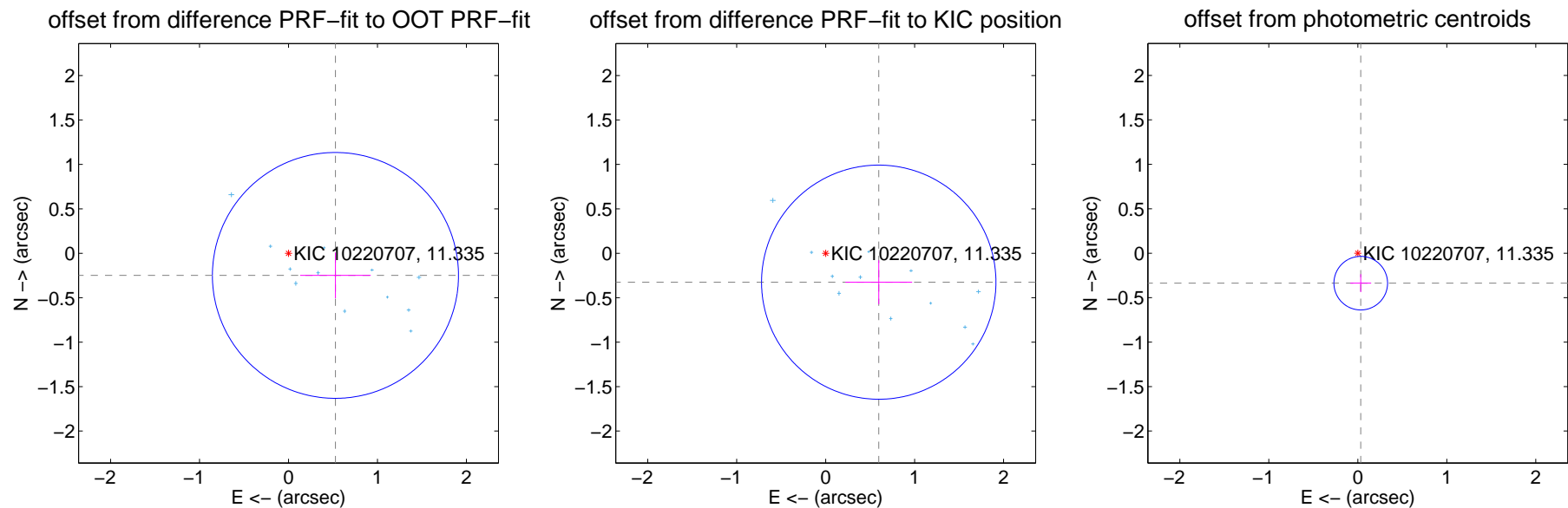
## DV Centroid Data

Supplemental centroid analysis for 010220707-02. **Kepler magnitude: 11.34.** Transit SNR 14.55

There are 13 quarters with good PRF difference image offsets

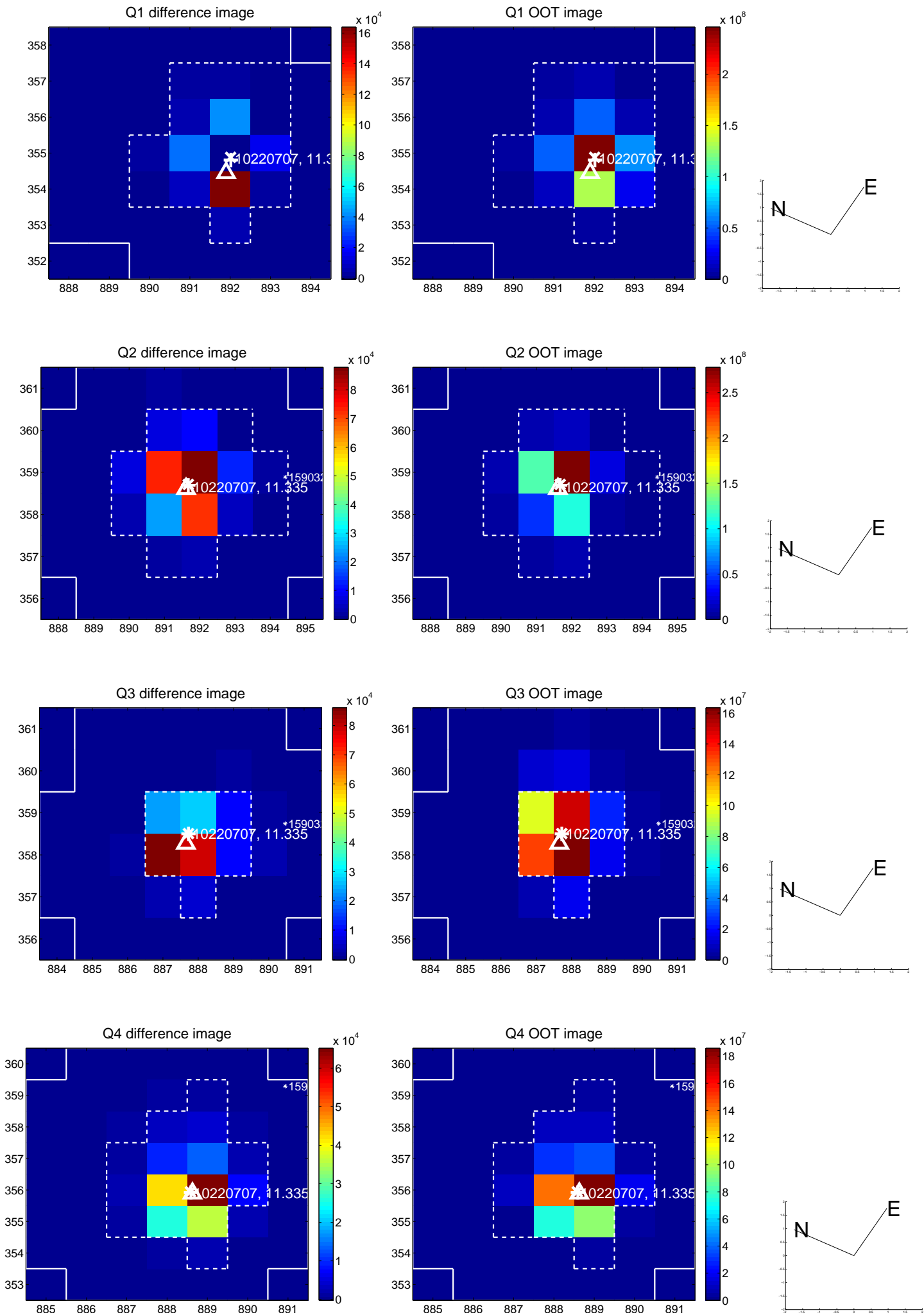
The direct PRF centroid is offset from the target star catalog position by about 0.34 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.583 \pm 0.461$	1.27	$-0.528 \pm 0.396$	$-0.249 \pm 0.257$
PRF-fit source offset from KIC position	$0.679 \pm 0.439$	1.55	$-0.597 \pm 0.375$	$-0.325 \pm 0.247$
photometric centroid source offset	<b><math>0.34 \pm 0.10</math></b>	<b>3.37</b>	$-0.03 \pm 0.12$	$-0.34 \pm 0.10$

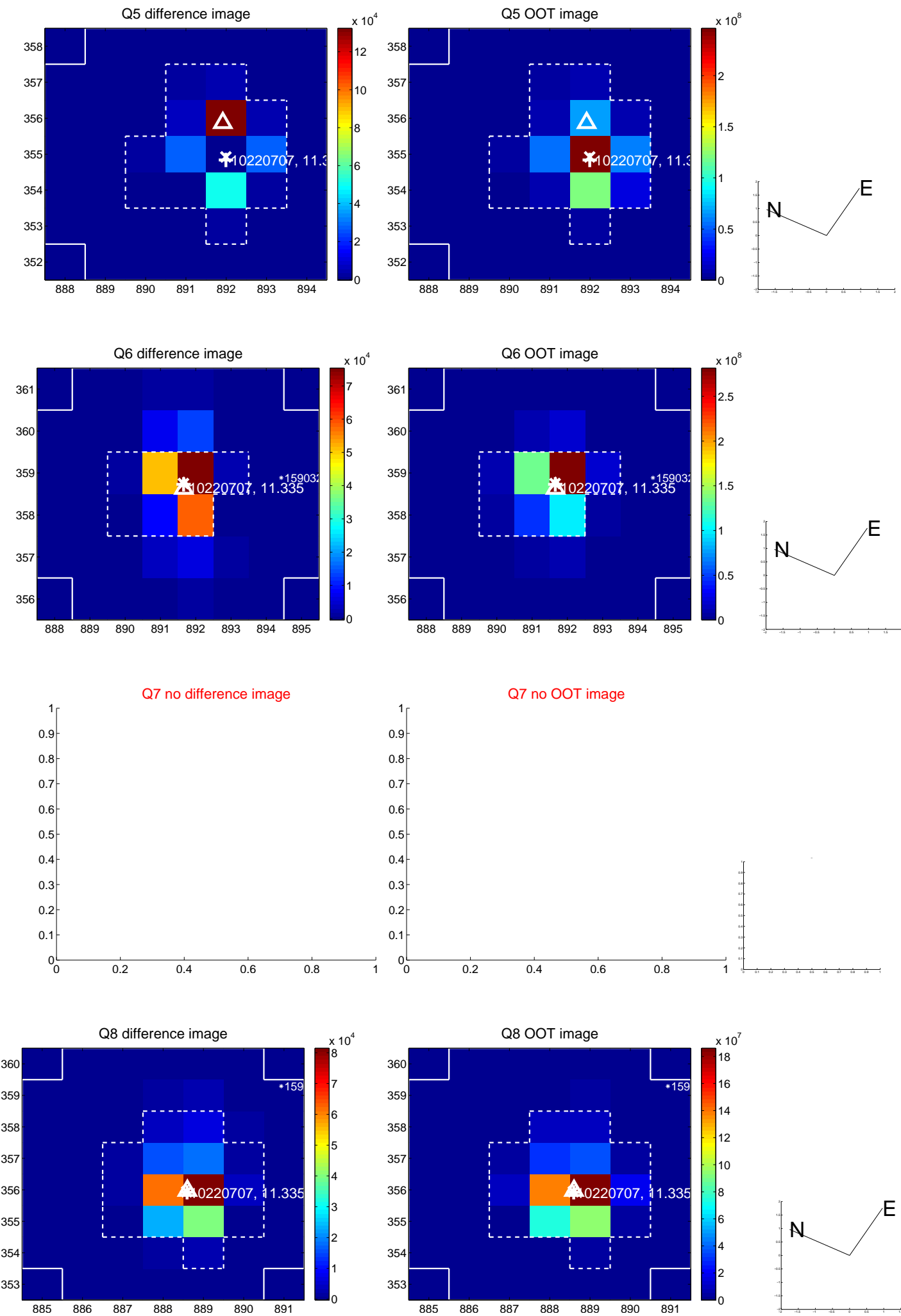


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

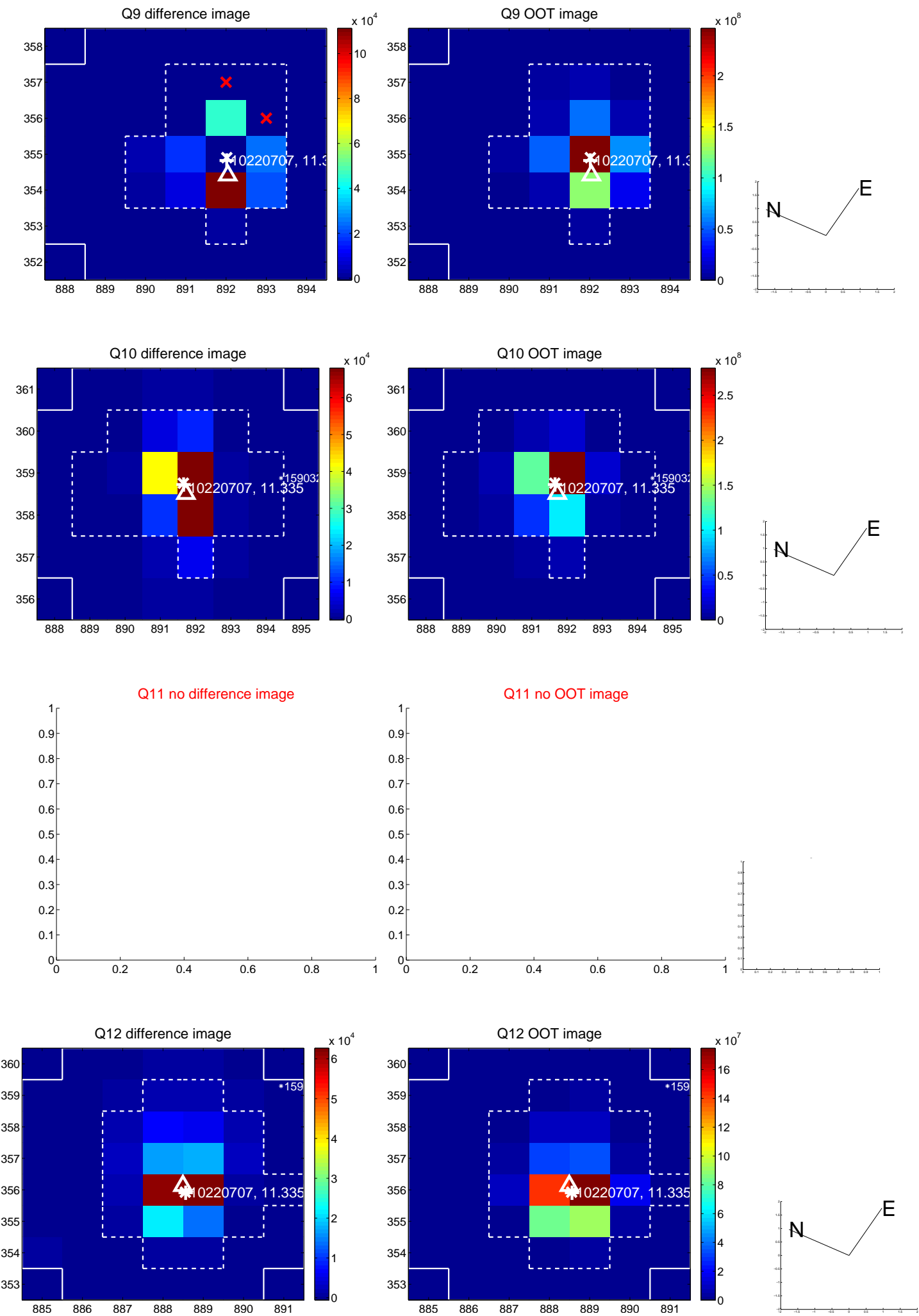
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

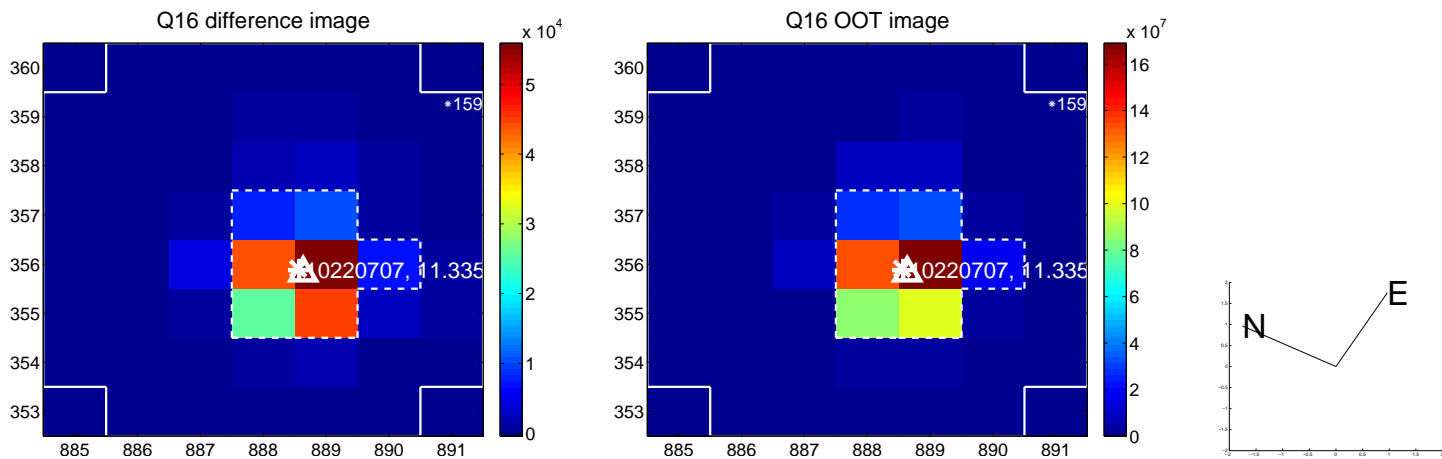
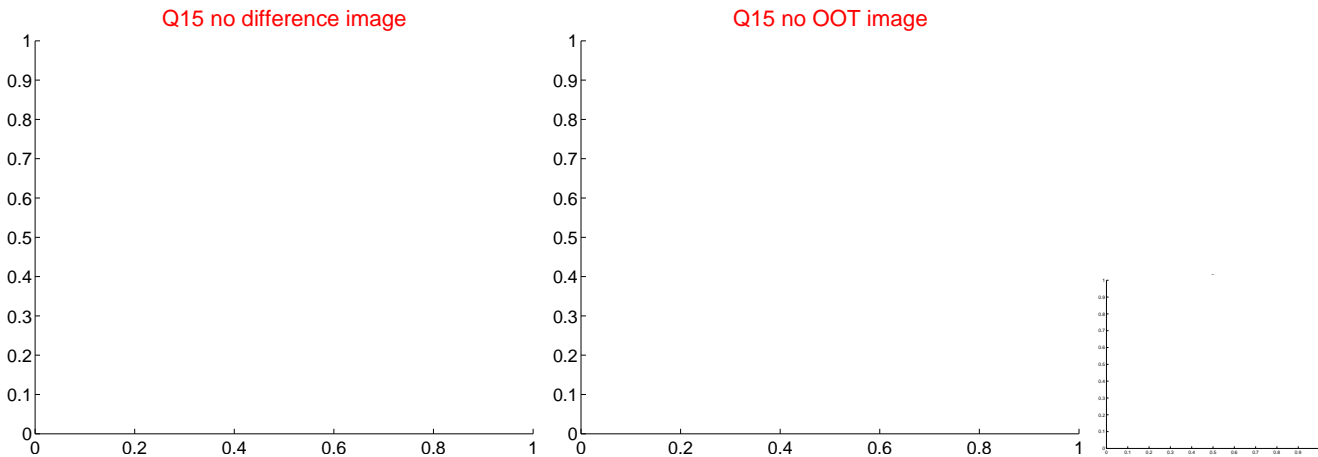
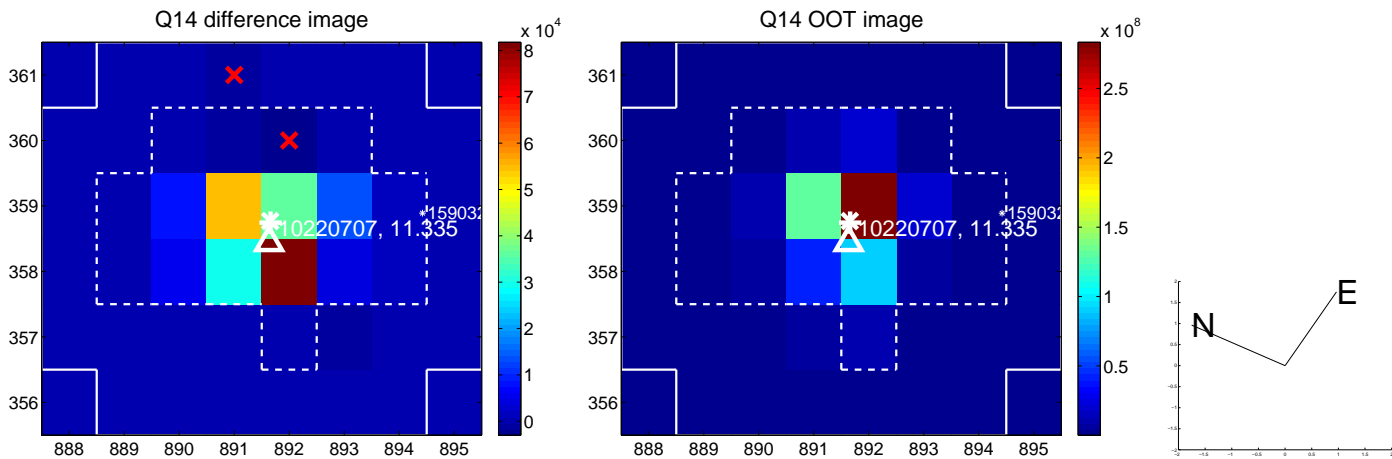
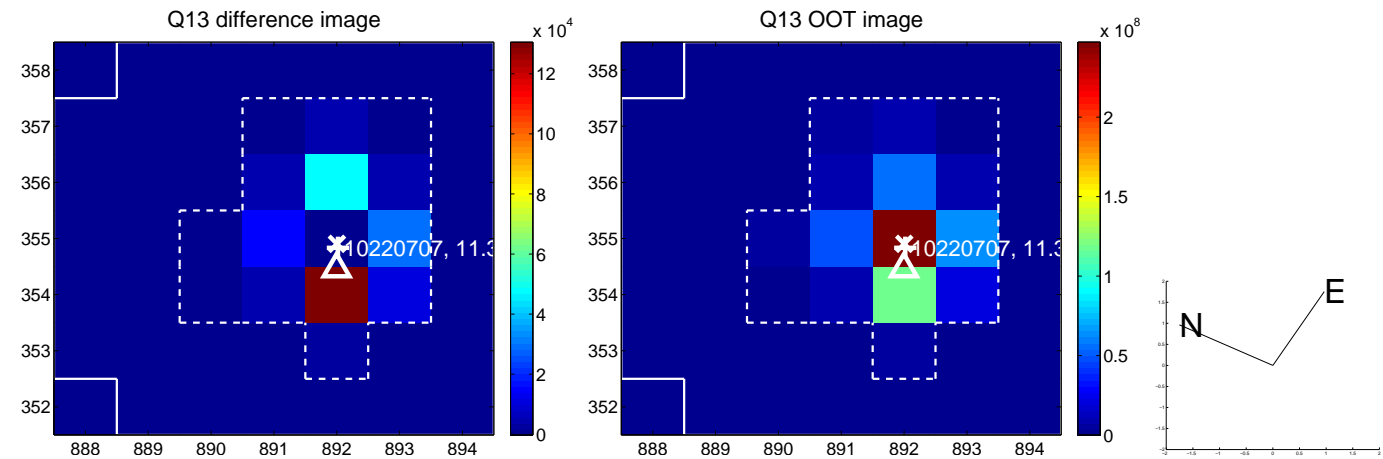


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

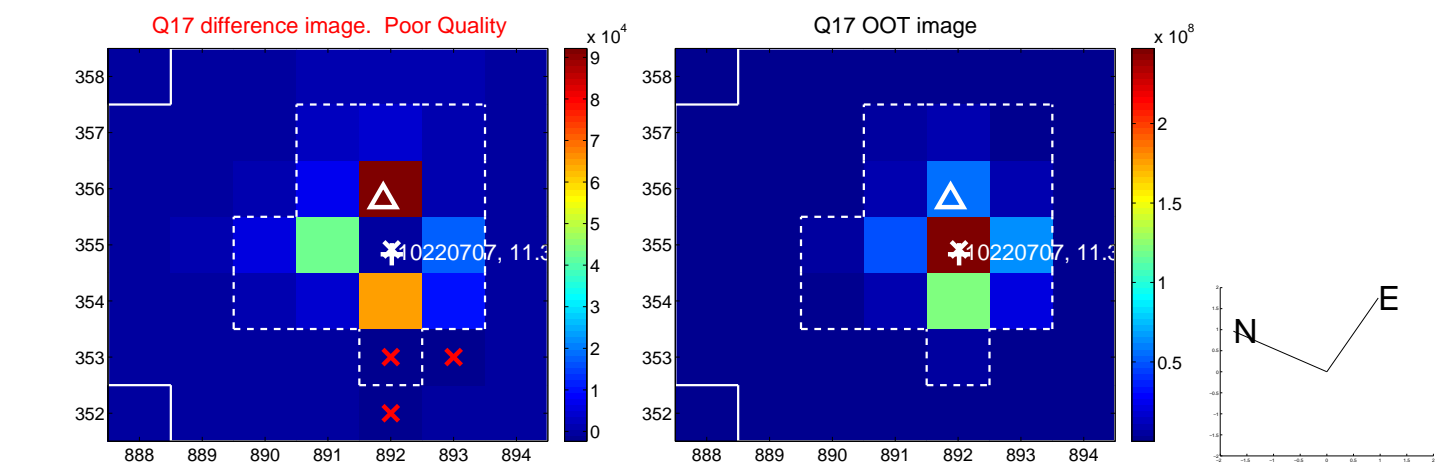




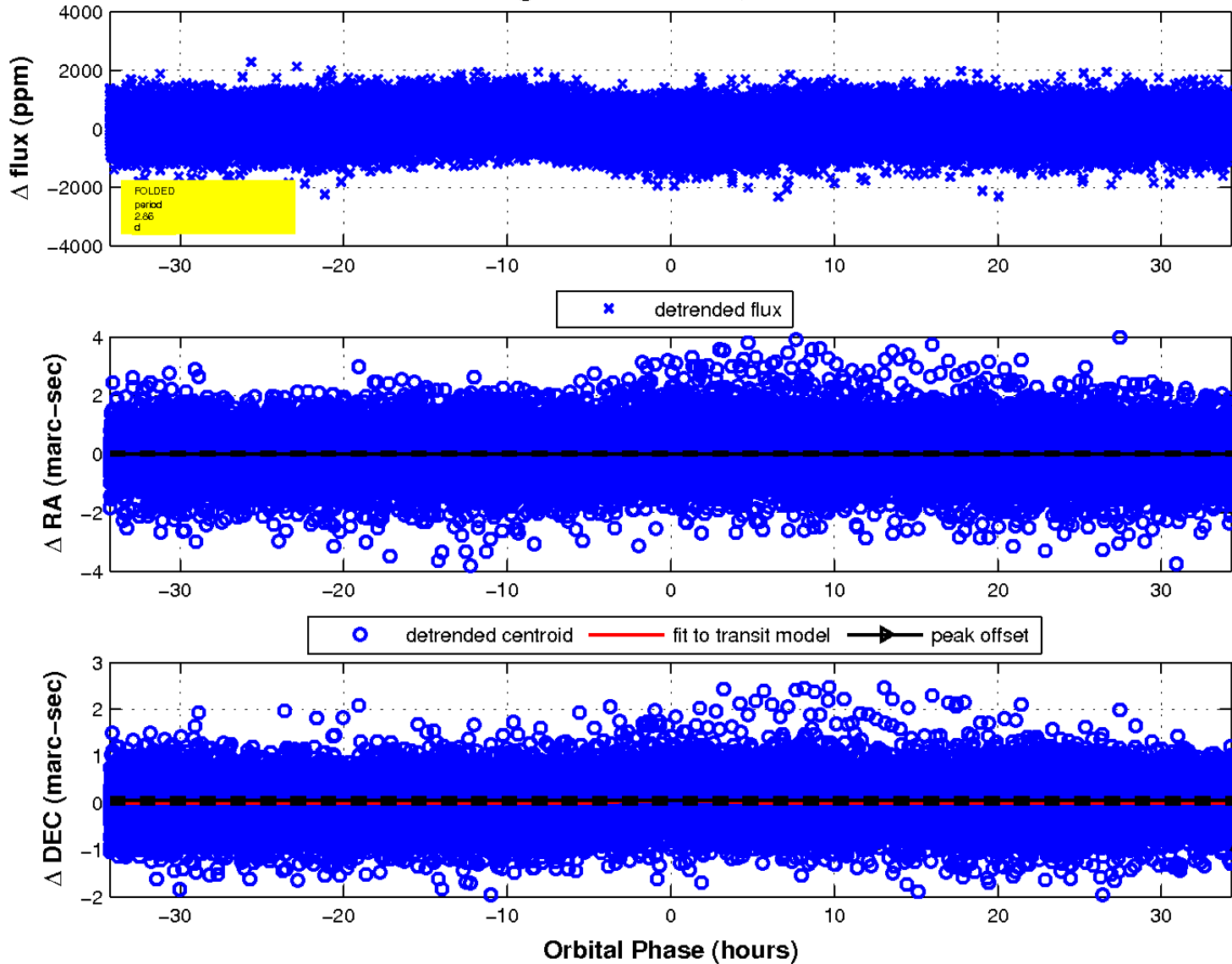
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



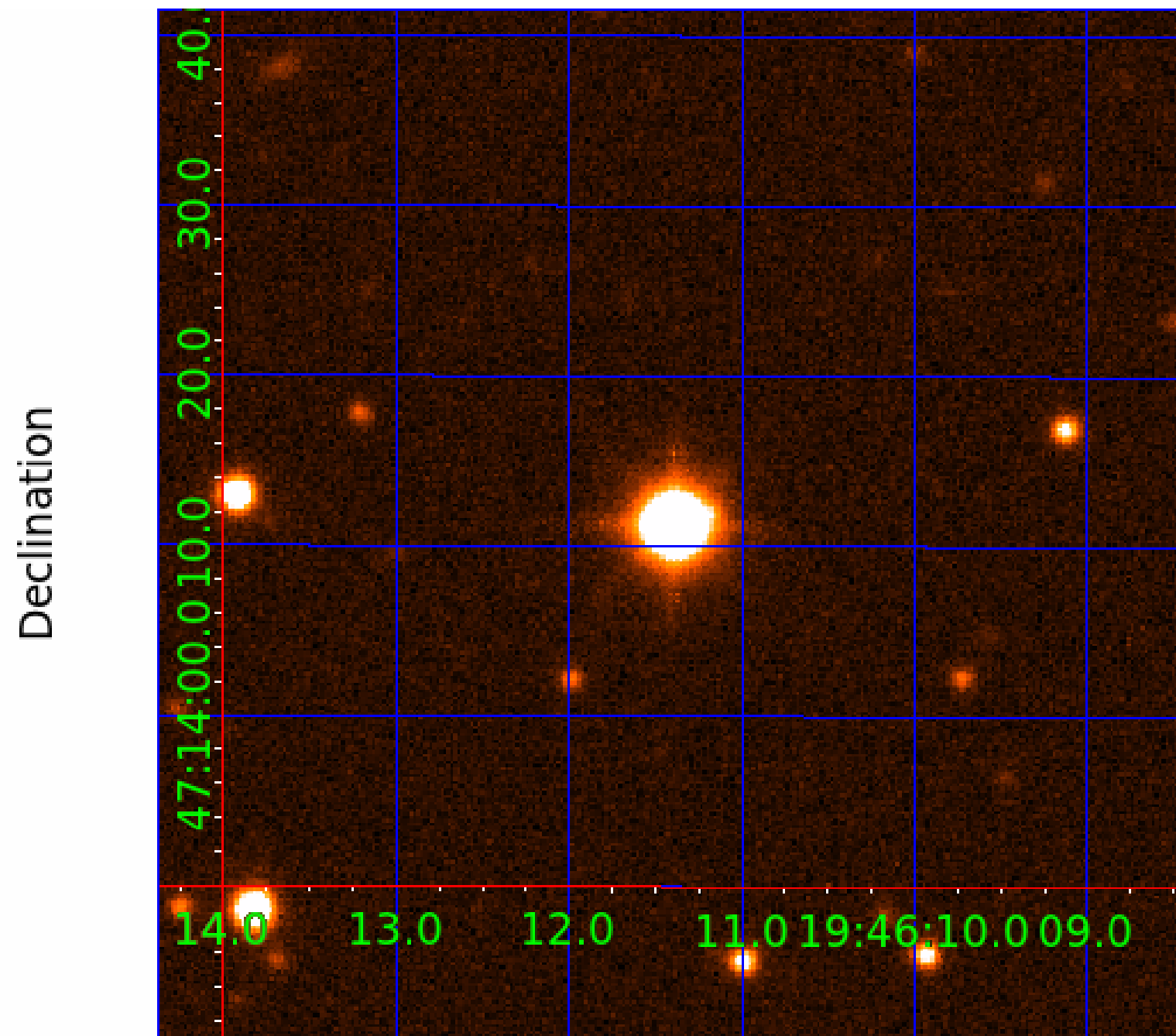
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



fluxWeightedCentroids, Planet 2 of 3



UKIRT Image



# KIC 010220707

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010220707-01	OBS	No	0.912795	131.798446	56.8	3.724	13.4	13.3	2.41	7798	2.10	37250.10
010220707-02	OBS	No	2.858307	131.670452	182.3	11.632	11.8	14.5	2.41	7798	6.30	8131.06
010220707-03	OBS	No	5.719017	132.081636	184.7	43.369	9.3	13.6	2.41	7798	4.02	3225.00

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010220707-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—CENT_SATURATED
010220707-02	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—CENT_SATURATED
010220707-03	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—CENT_SATURATED

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

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

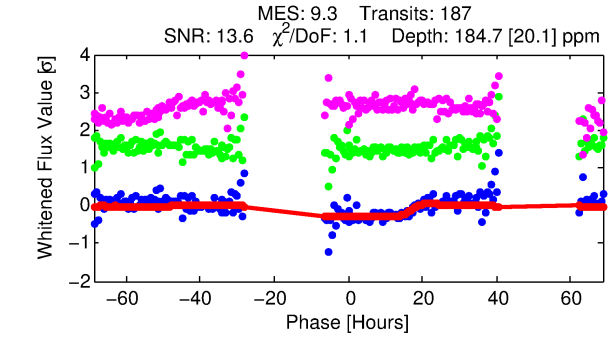
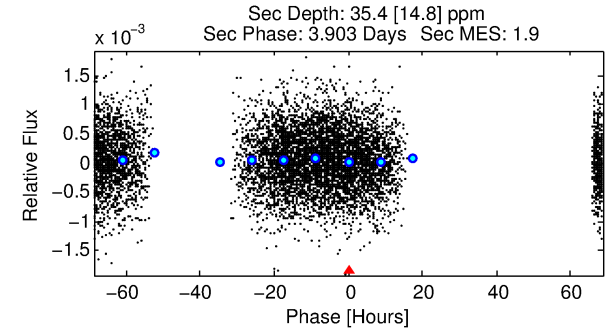
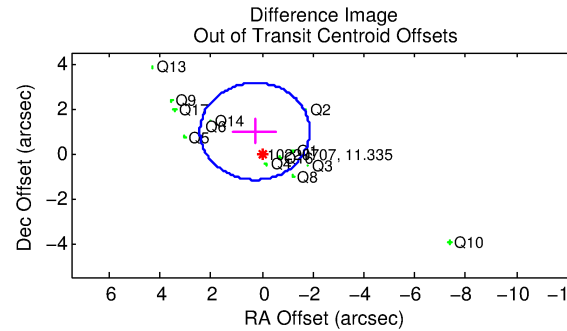
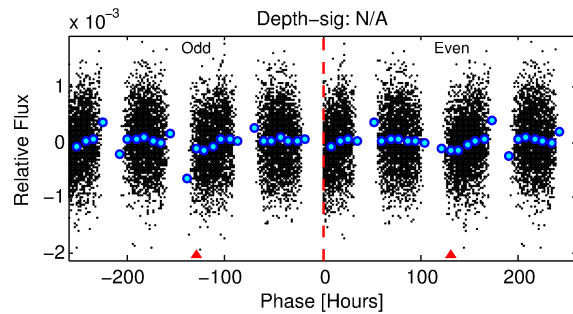
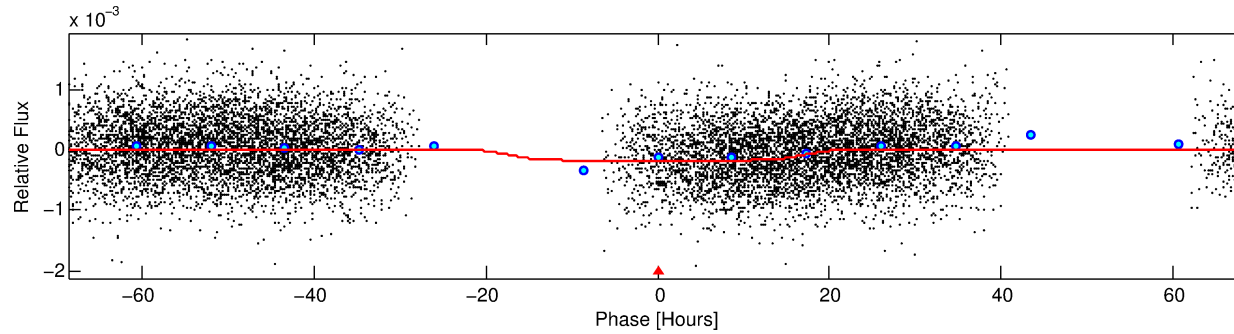
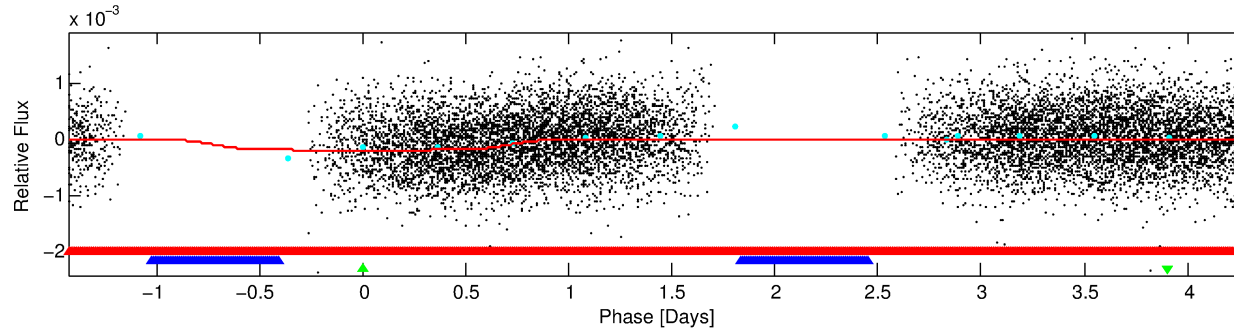
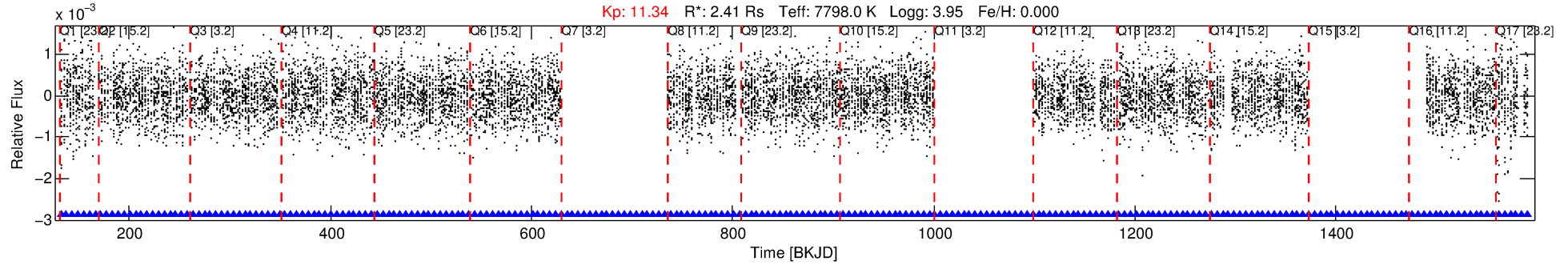
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 010220707-03

No Significant Match Found

# DV One-Page Summary

KIC: 10220707 Candidate: 3 of 3 Period: 5.719 d



## DV Fit Results:

Period = 5.71902 [0.00041] d  
Epoch = 132.0816 [0.2770] BKJD  
Rp/R\* = 0.0153 [0.0008]  
a/R\* = 1.04 [0.03]  
b = 0.95 [0.03]  
Seff = 3225.00 [822.80]  
Teq = 1922 [123] K  
Rp = 4.02 [0.77] Re  
a = 0.0773 [0.0127] AU  
Ag = 7.19 [3.59] [1.73σ]  
Teffp = 4866 [527] K [5.44σ]

## DV Diagnostic Results:

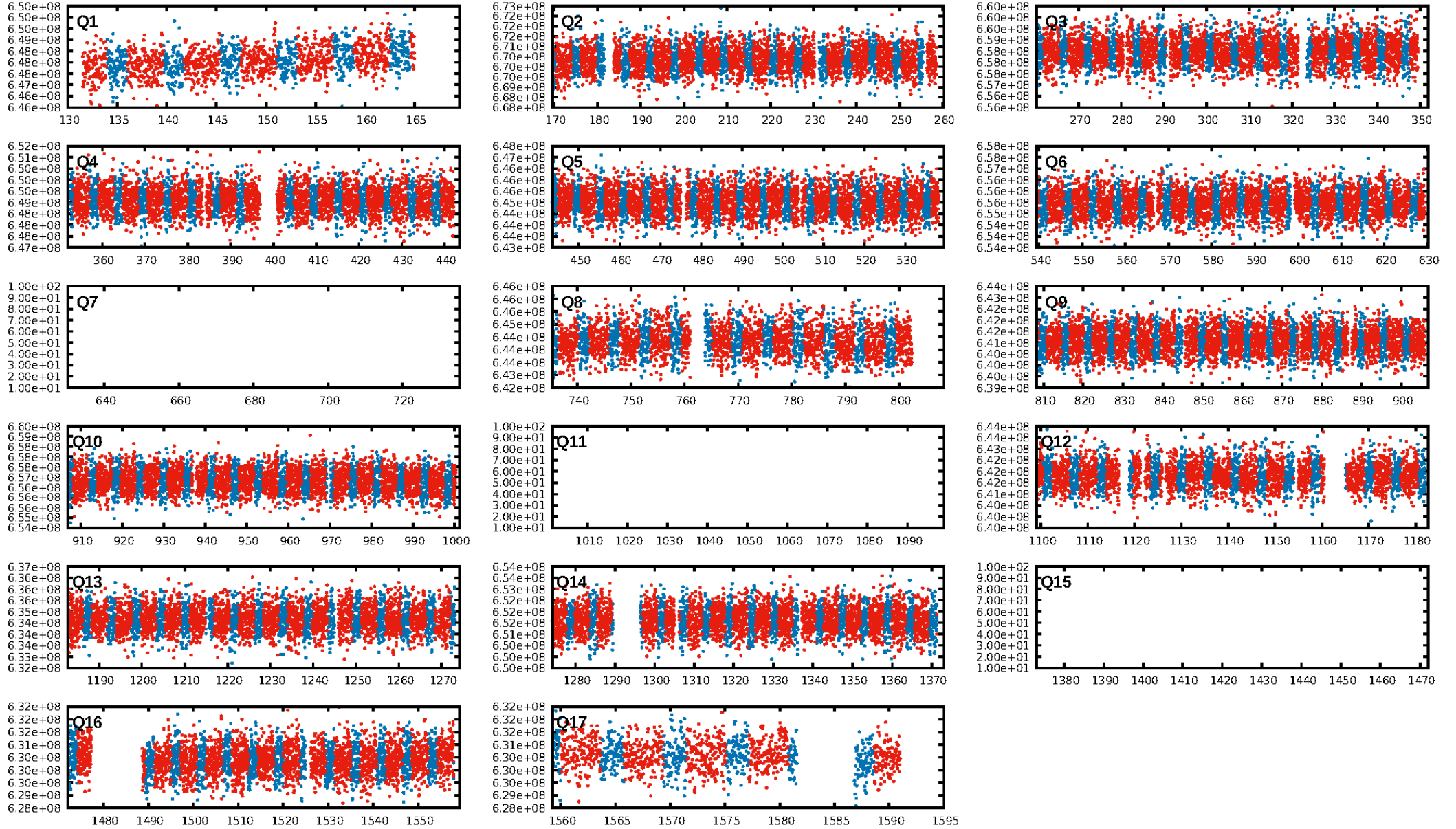
ShortPeriod-sig: 87.4% [1.53σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 95.6%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [176/176]  
GhostDiagnostic-chr: 3.047  
Centroid-sig: 0.0%  
Centroid-so: 0.292 arcsec [3.58σ]  
OotOffset-rm: 1.023 arcsec [1.42σ]  
KicOffset-rm: 0.915 arcsec [1.27σ]  
OotOffset-st: 4/1/3/5 [13]  
KicOffset-st: 4/1/3/5 [13]  
DiffImageQuality-fgm: 0.69 [9/13]  
DiffImageOverlap-fno: 0.00 [0/14]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:34:01 Z

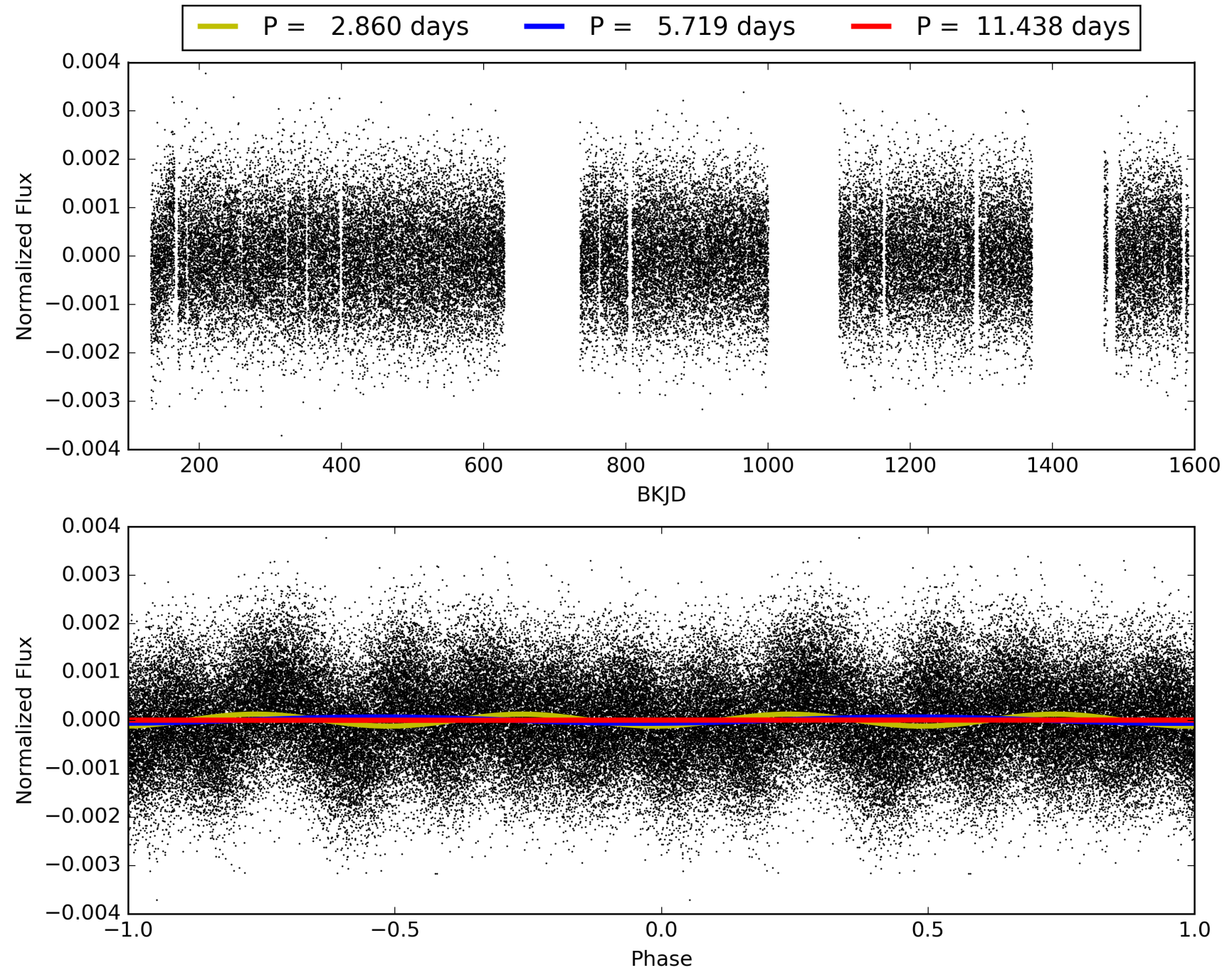
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 010220707-03, PDC Light Curves

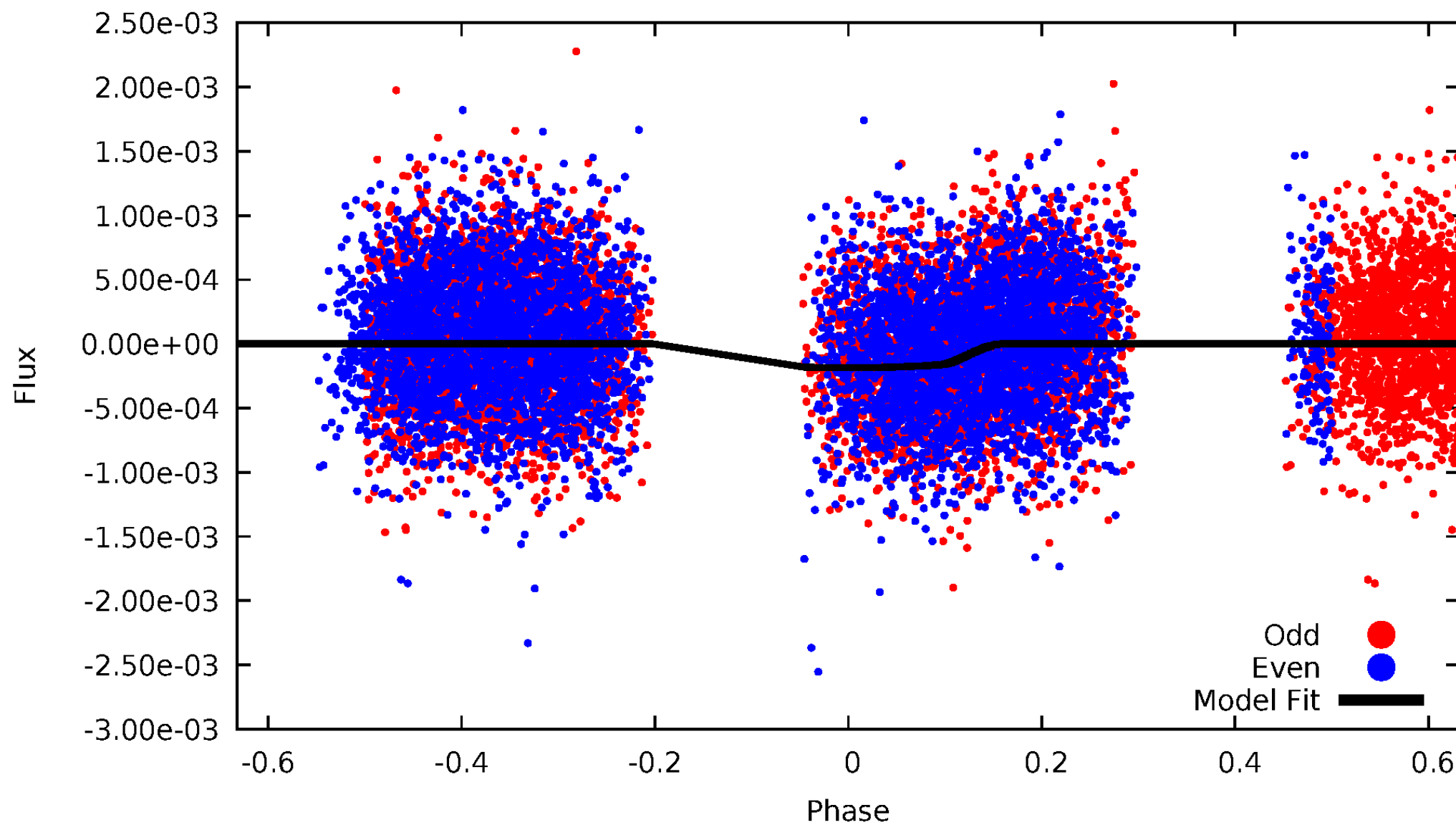


# TCE 010220707-03



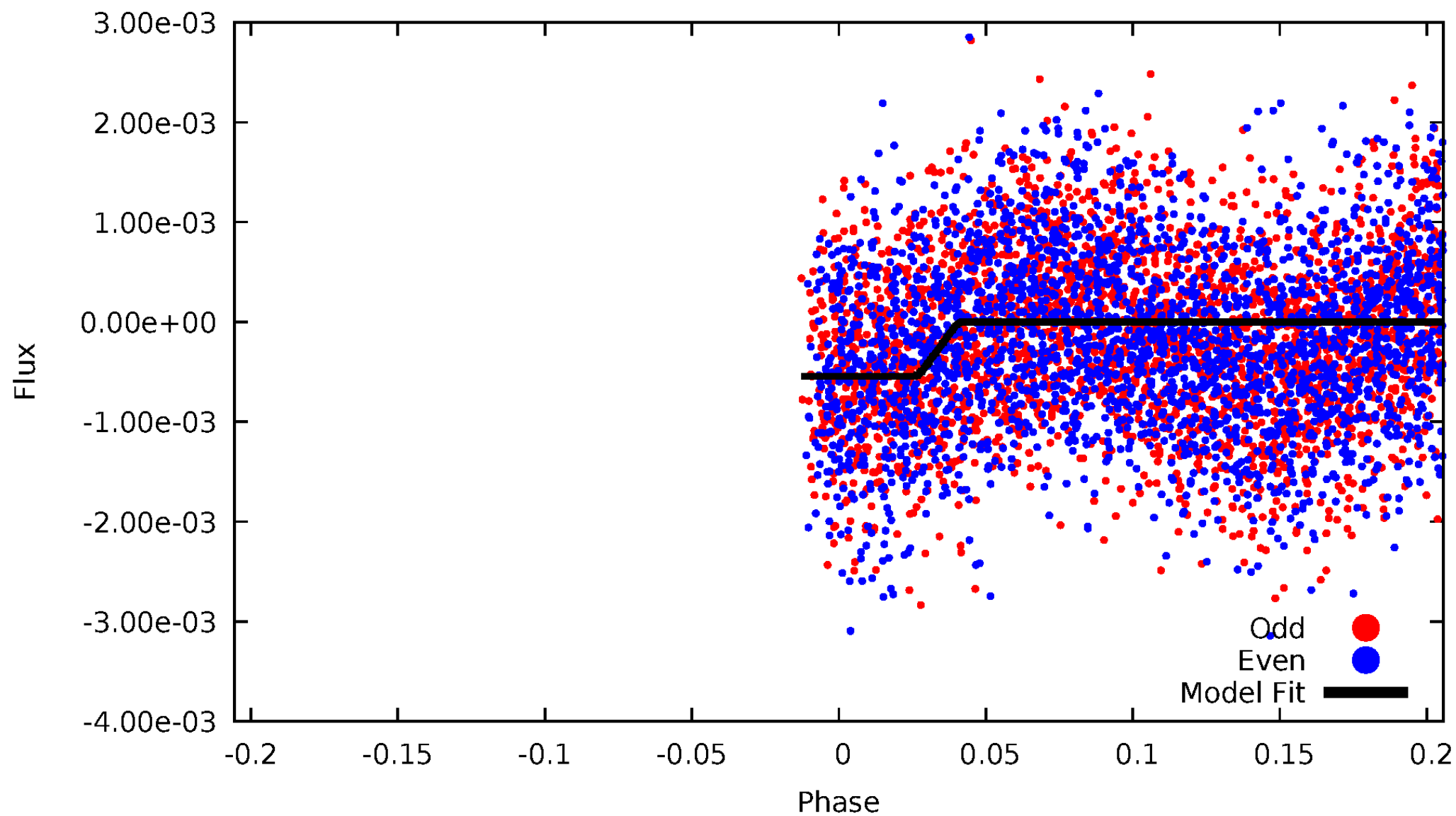
DV Odd/Even

TCE 010220707-03



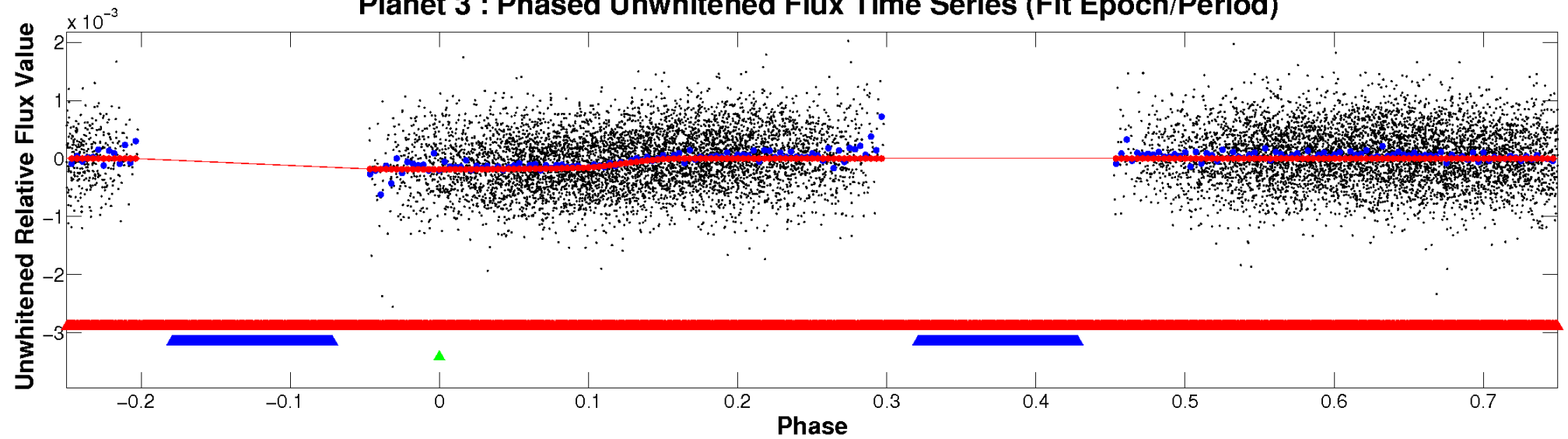
# ALT Odd/Even

TCE 010220707-03

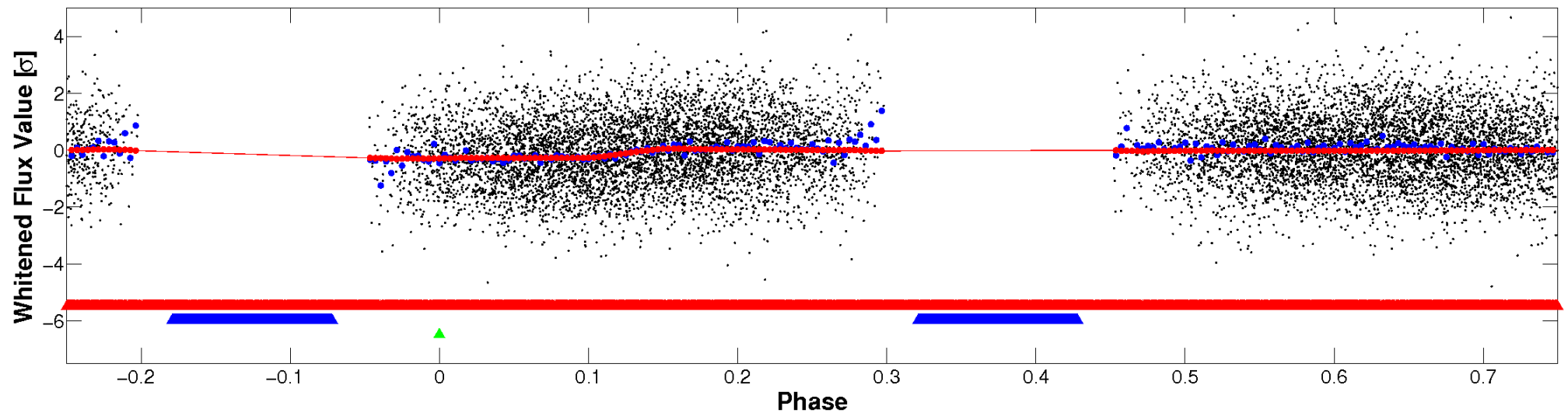


# Non-Whitened Vs. Whitened Light Curve

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



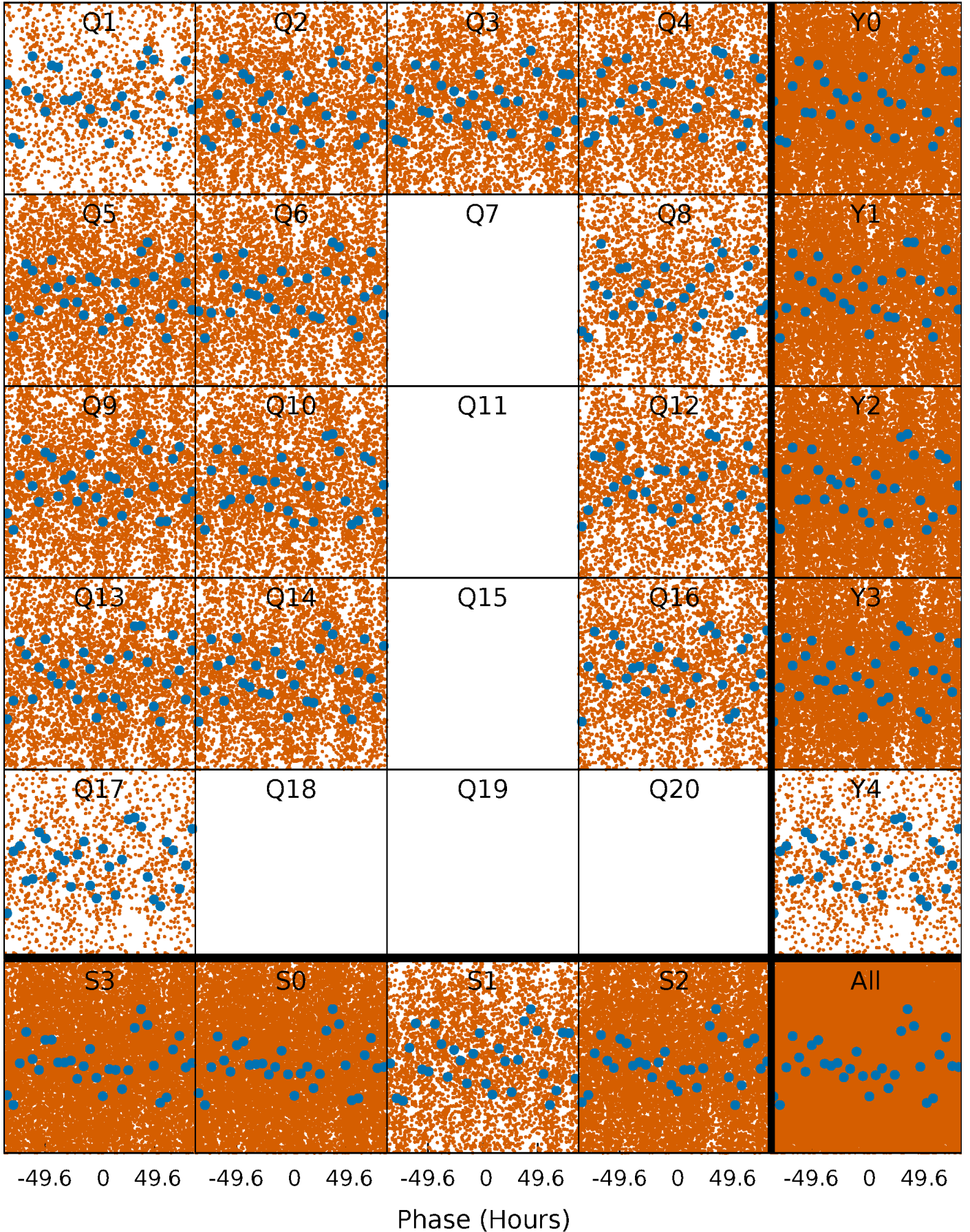
## Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)





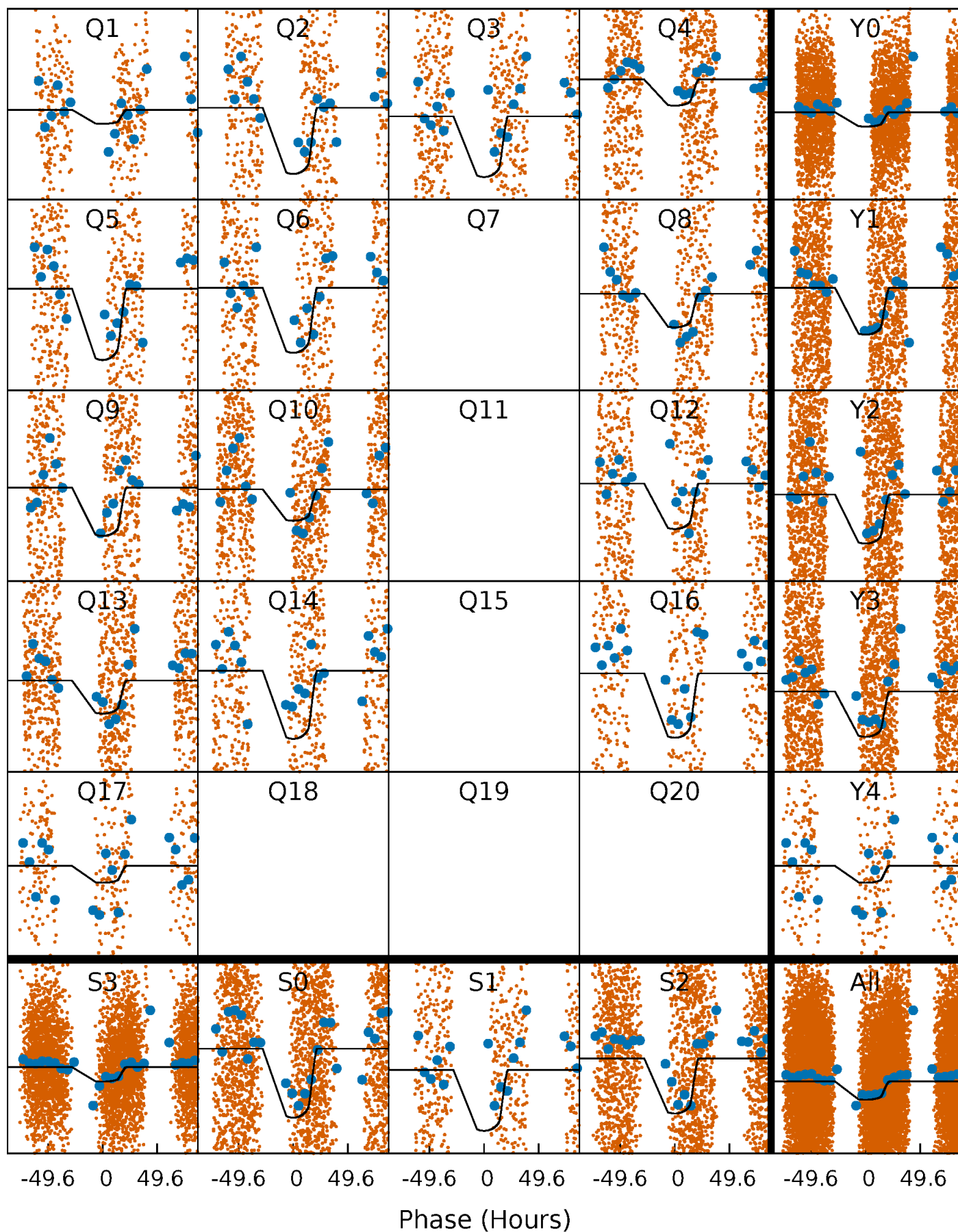
# PDC Quarter-Phased Transit Curves

TCE 010220707-03 P= 5.719017 Days  $T_0=132.081636$  (BKJD)



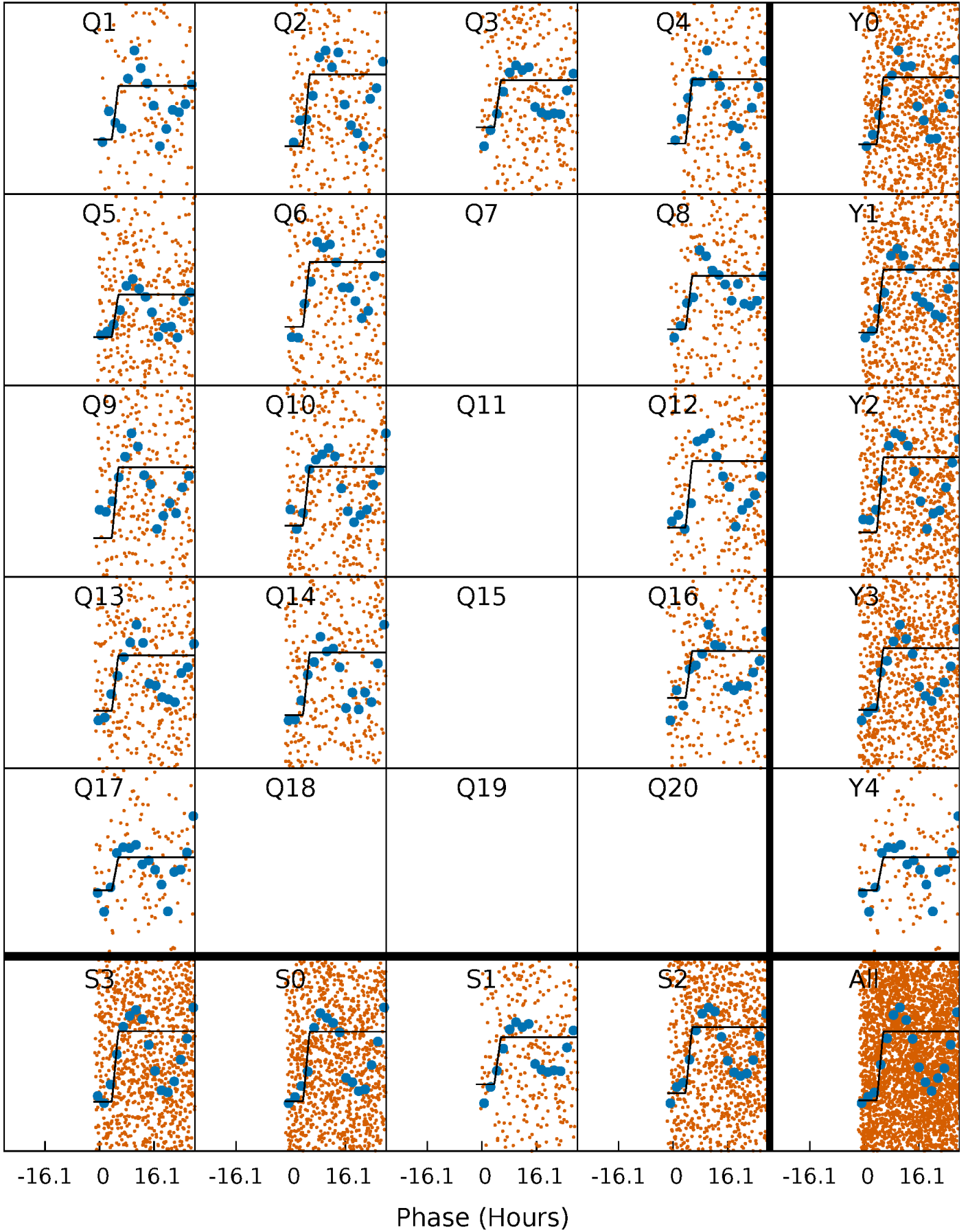
# DV Quarter-Phased Transit Curves

TCE 010220707-03 P= 5.719017 Days  $T_0=132.081636$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 010220707-03    P= 5.716892 Days     $T_0=132.411714$  (BKJD)

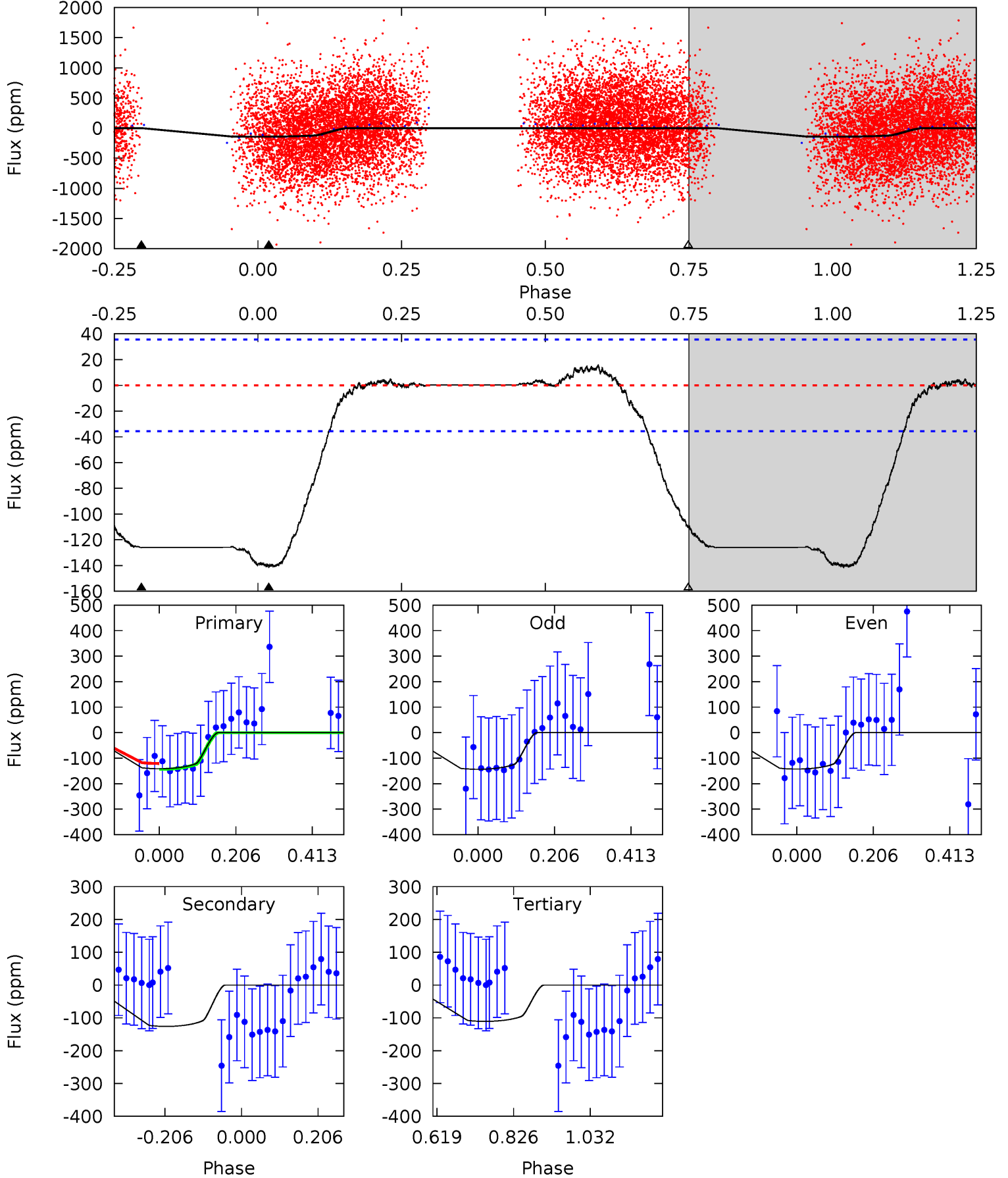




# DV Model-Shift Uniqueness Test

010220707-03, P = 5.719017 Days, E = 132.081636 Days

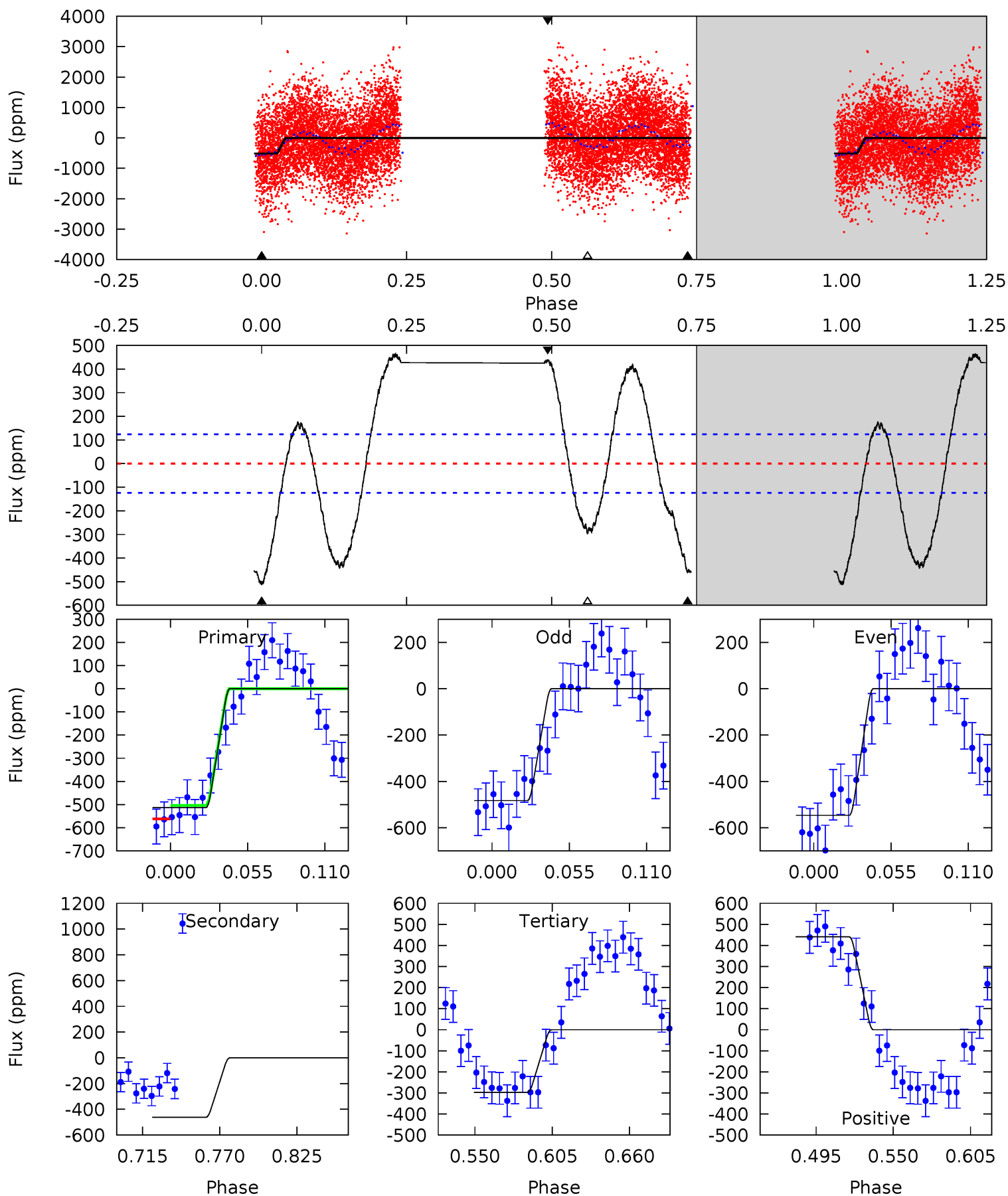
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
17.5	15.6	13.7	0	4.41	1.26	4.51	3.80	17.5	1.90	15.6	0.05	1.08	0.10	0.71



# Alt Model-Shift Uniqueness Test

010220707-03, P = 5.716892 Days, E = 126.694822 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
19.4	17.5	11.3	16.7	4.69	1.92	10.5	8.18	2.75	6.22	0.79	1.20	1.02	0.48	0.76





### Stellar Parameters For KIC 010220707

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$7798^{+77}_{-85}$	$3.948^{+0.143}_{-0.077}$	$0.000^{+0.050}_{-0.150}$	$2.411^{+0.295}_{-0.443}$	$1.881^{+0.056}_{-0.189}$	$0.189^{+0.134}_{-0.047}$
	+1%/-1%	+4%/-2%	+inf%/-inf%	+12%/-18%	+3%/-10%	+71%/-25%
Source	SPE68	SPE68	SPE68	DSEP		

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

### Secondary Eclipse Parameters for KIC 010220707-03 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-126 \pm 8$	$3.95^{+0.36}_{-0.43}$	$2672^{+93}_{-121}$	$6537^{+229}_{-230}$	$26^{+7}_{-5}$
Alt.	$-462 \pm 26$	$6.06^{+0.52}_{-0.62}$	$2678^{+91}_{-140}$	$7397^{+216}_{-220}$	$41^{+9}_{-6}$

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

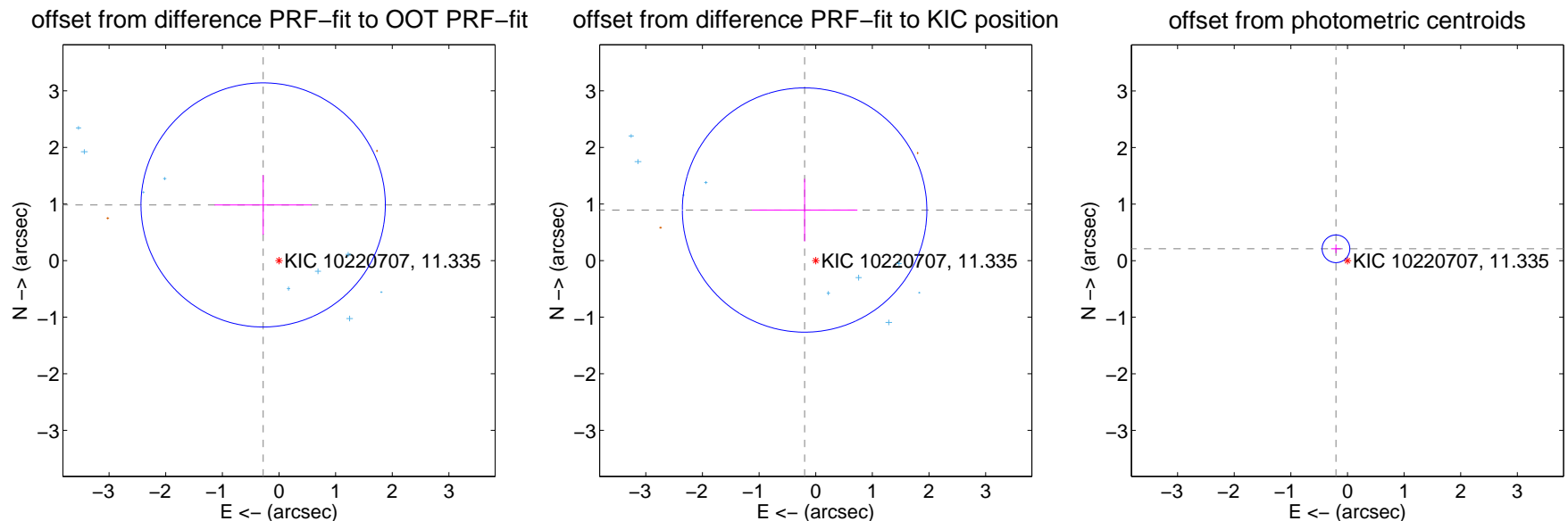
## DV Centroid Data

Supplemental centroid analysis for 010220707-03. **Kepler magnitude: 11.34**. Transit SNR 13.64

There are 9 quarters with good PRF difference image offsets

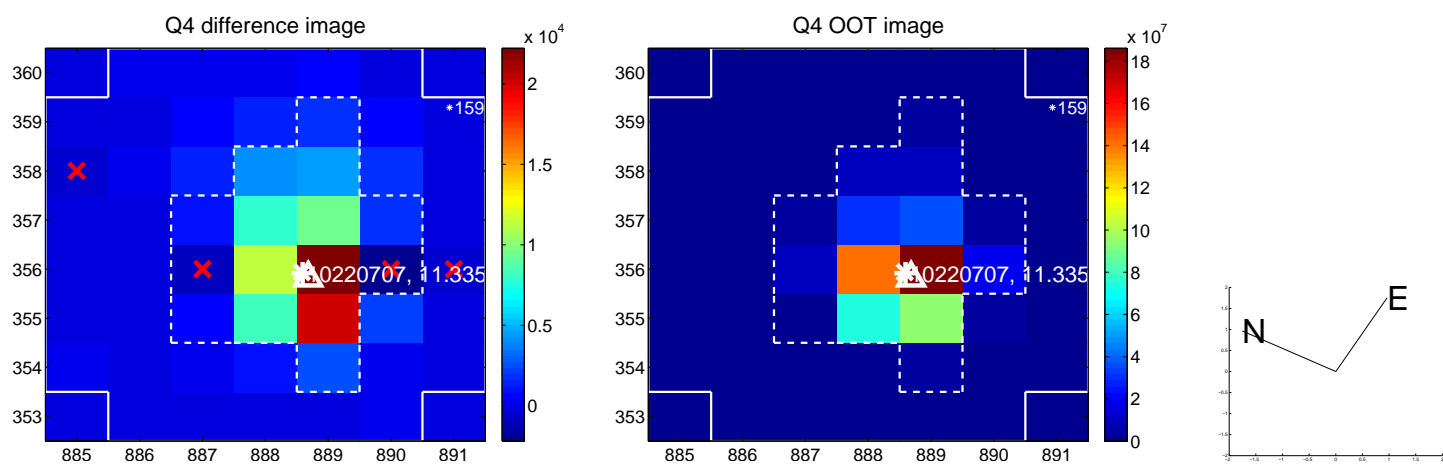
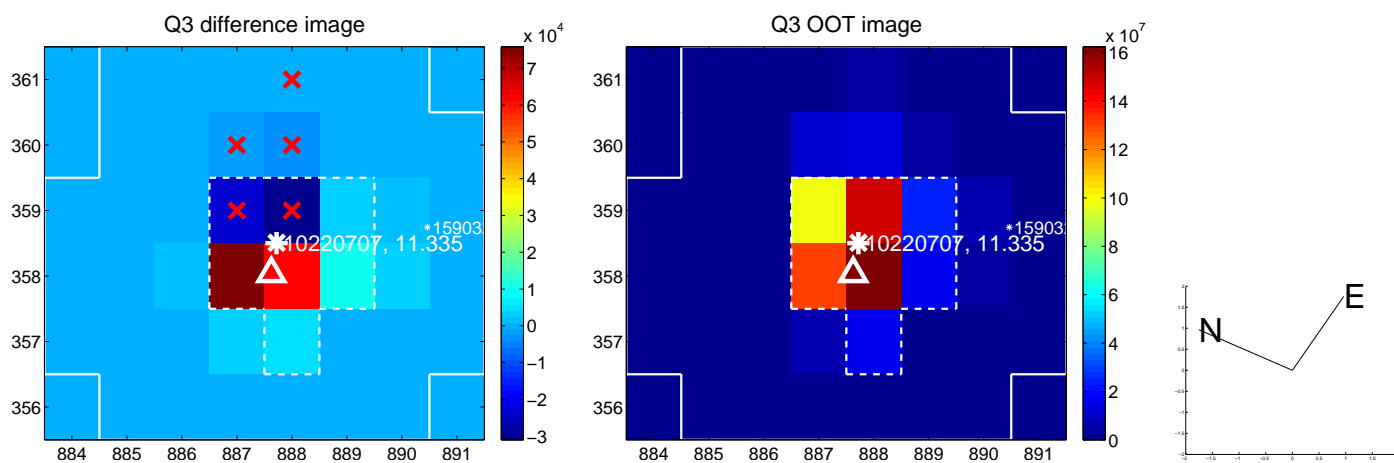
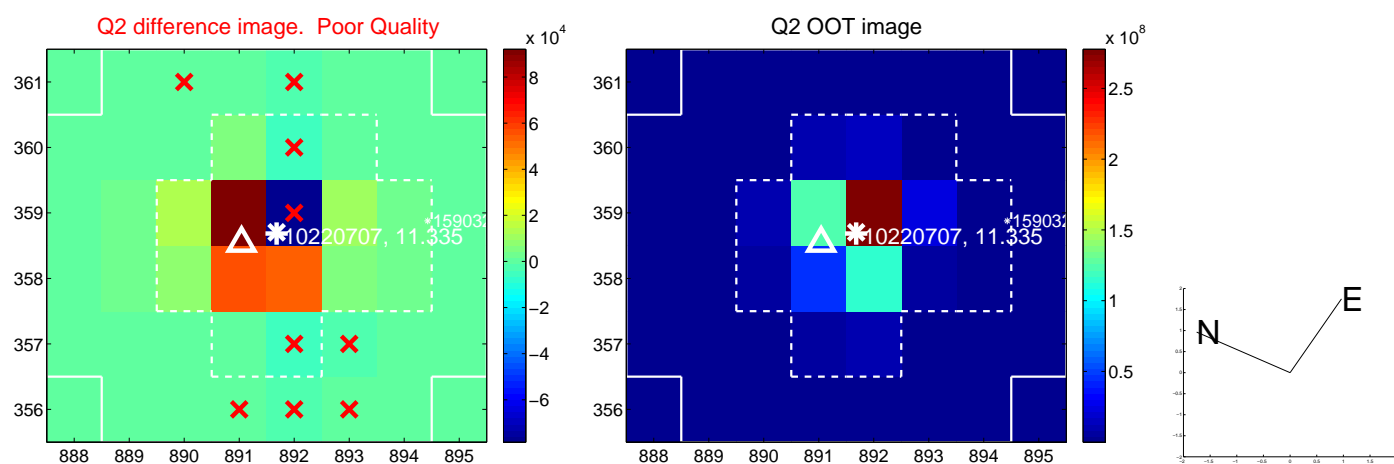
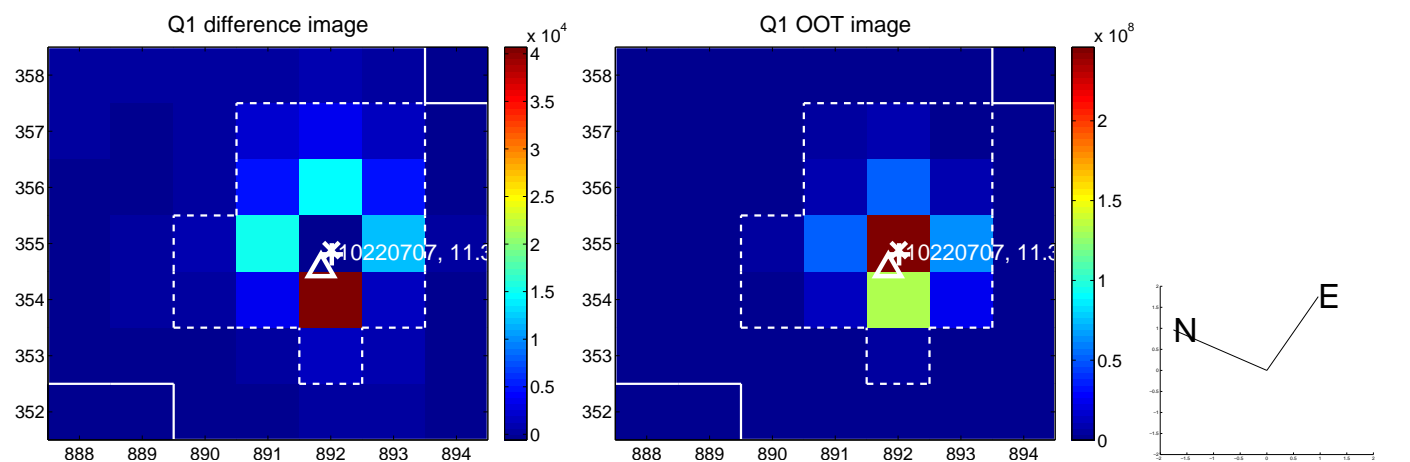
The direct PRF centroid is offset from the target star catalog position by about 0.35 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.023 \pm 0.719$	1.42	$0.279 \pm 0.856$	$0.984 \pm 0.525$
PRF-fit source offset from KIC position	$0.915 \pm 0.719$	1.27	$0.196 \pm 0.931$	$0.893 \pm 0.552$
photometric centroid source offset	<b><math>0.29 \pm 0.08</math></b>	<b>3.58</b>	$0.20 \pm 0.09$	$0.21 \pm 0.08$

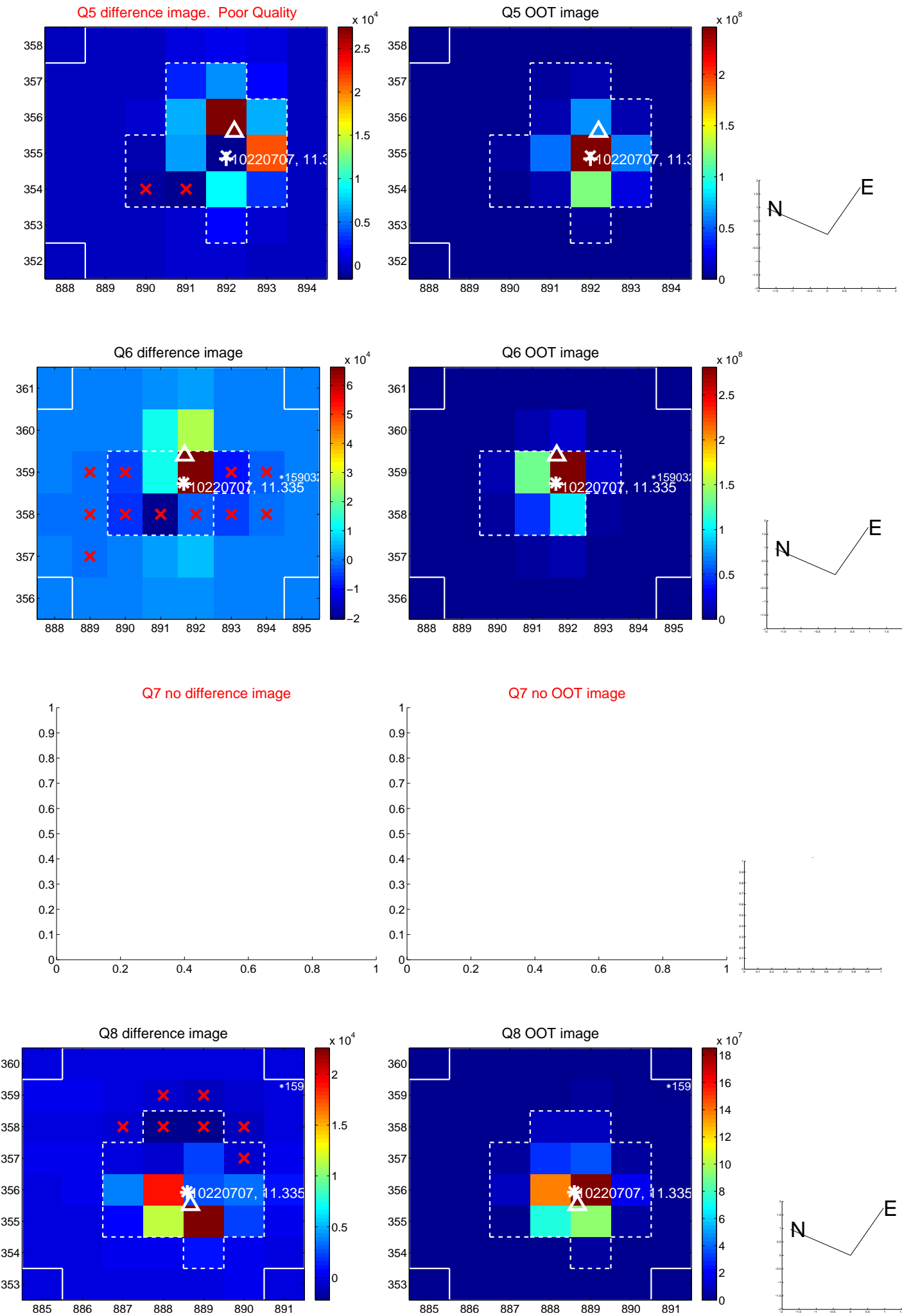


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

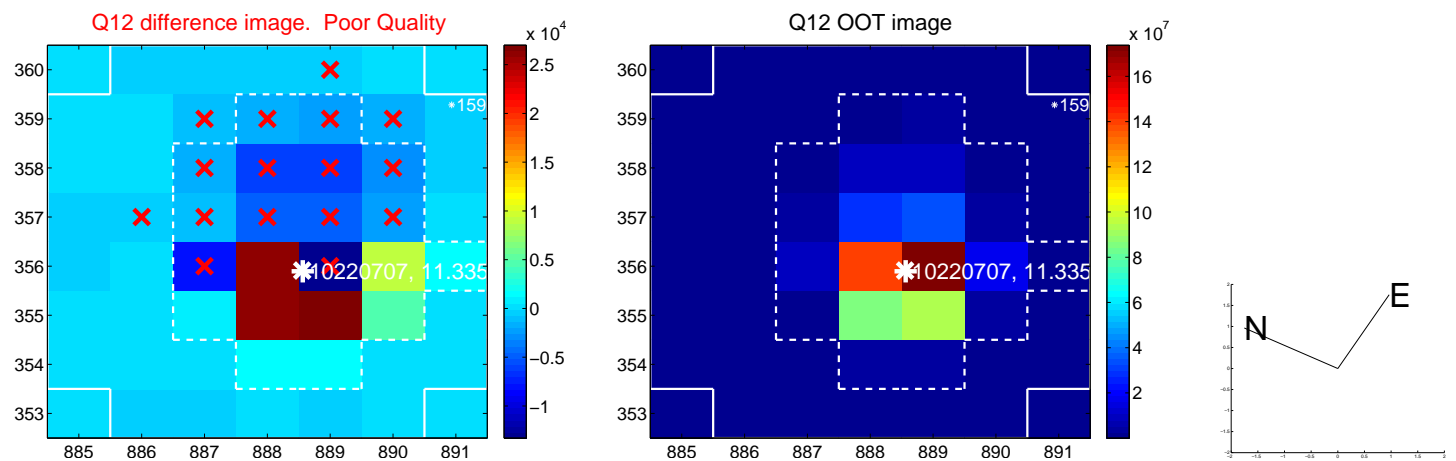
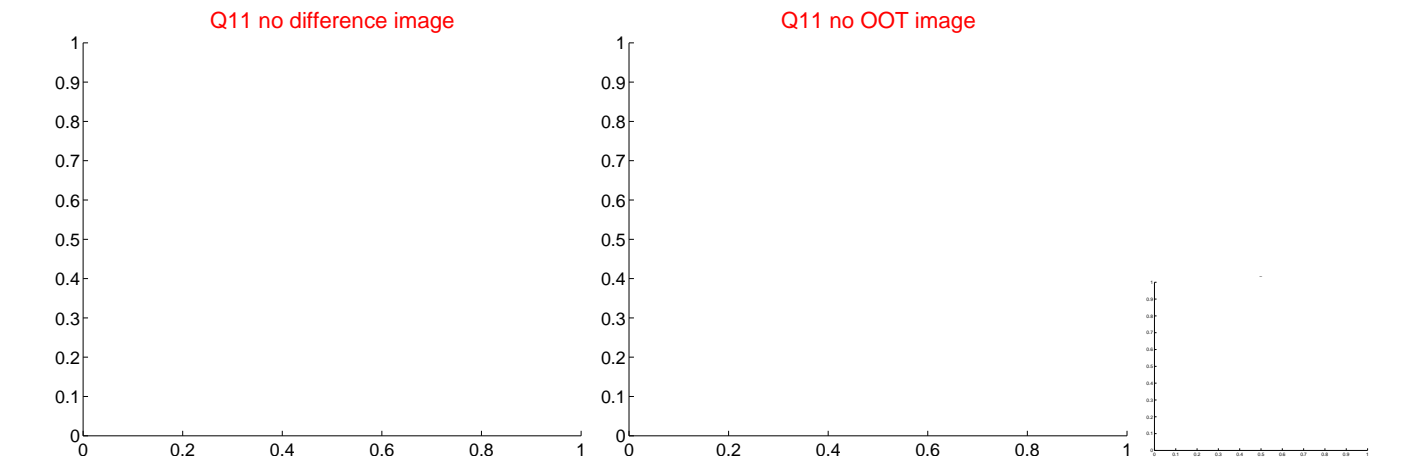
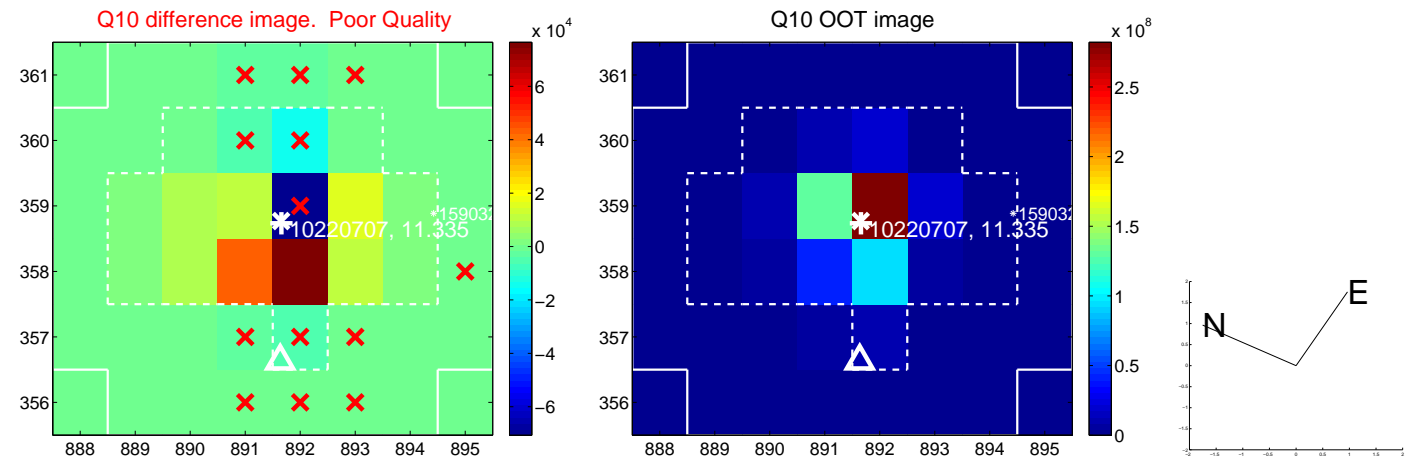
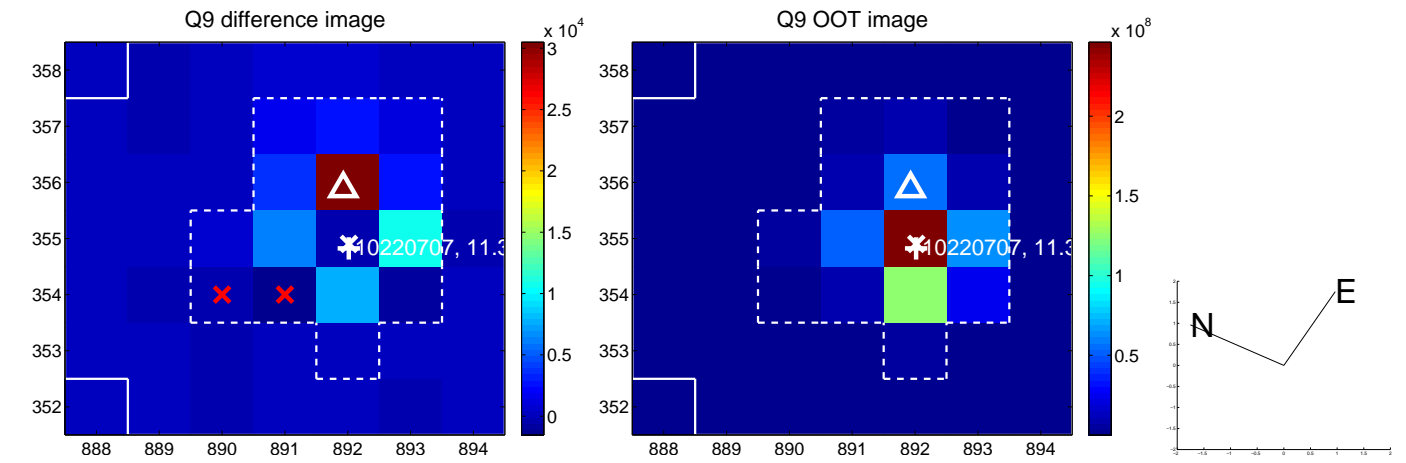
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



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

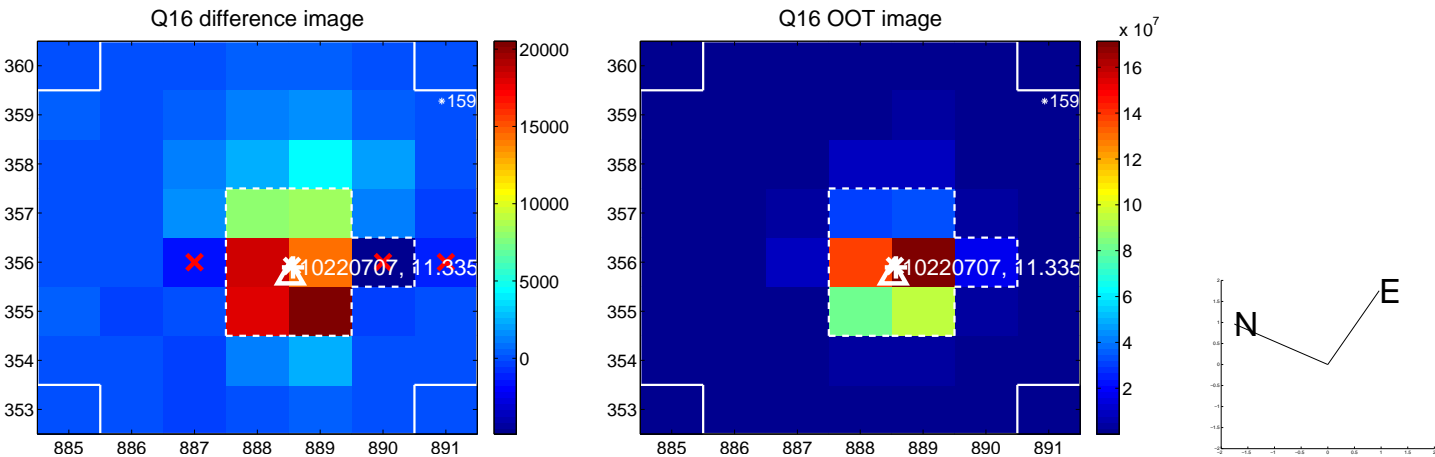
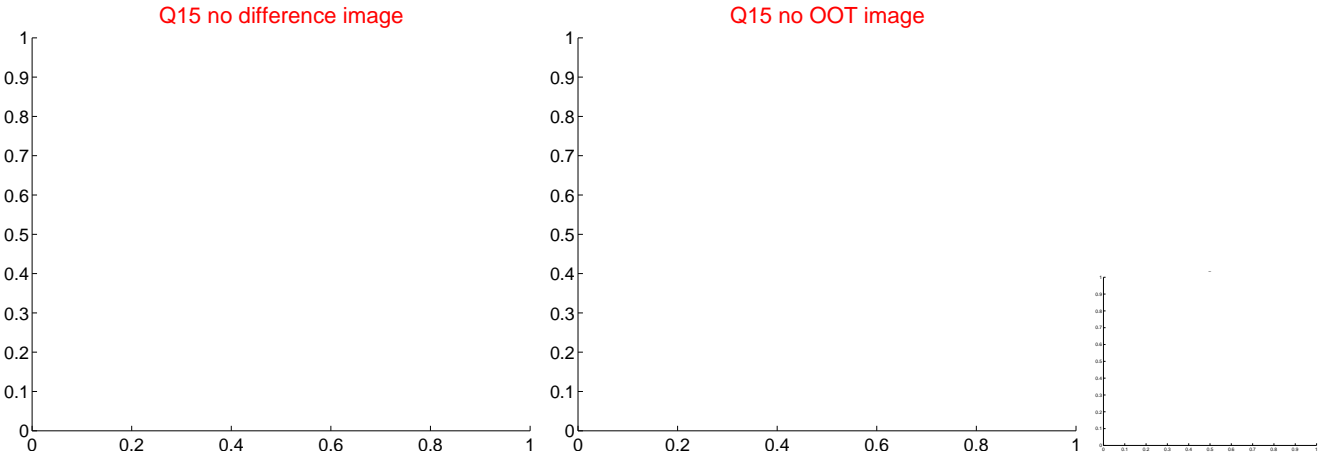
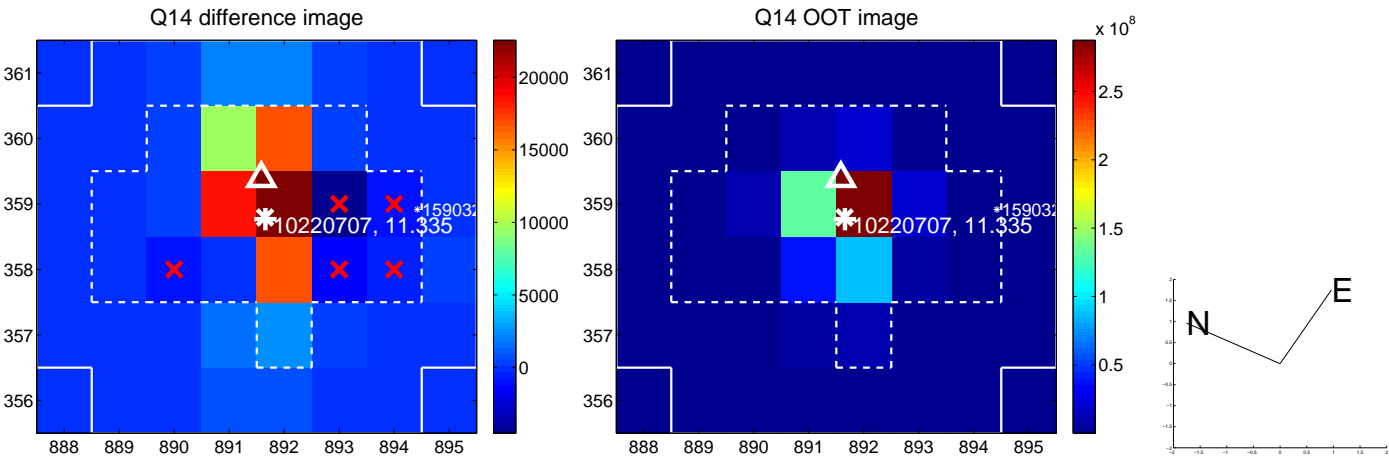
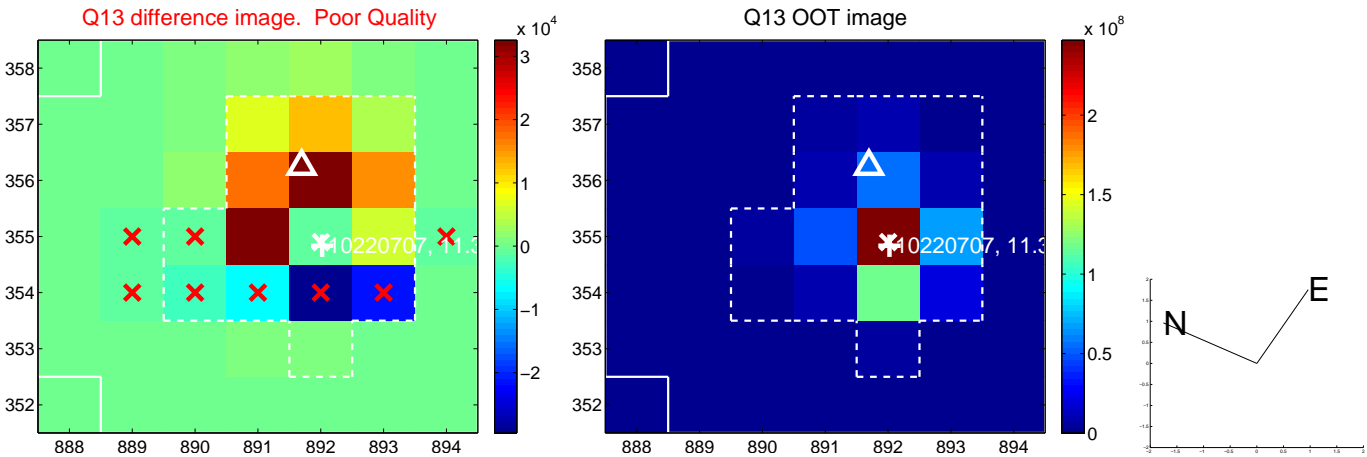


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

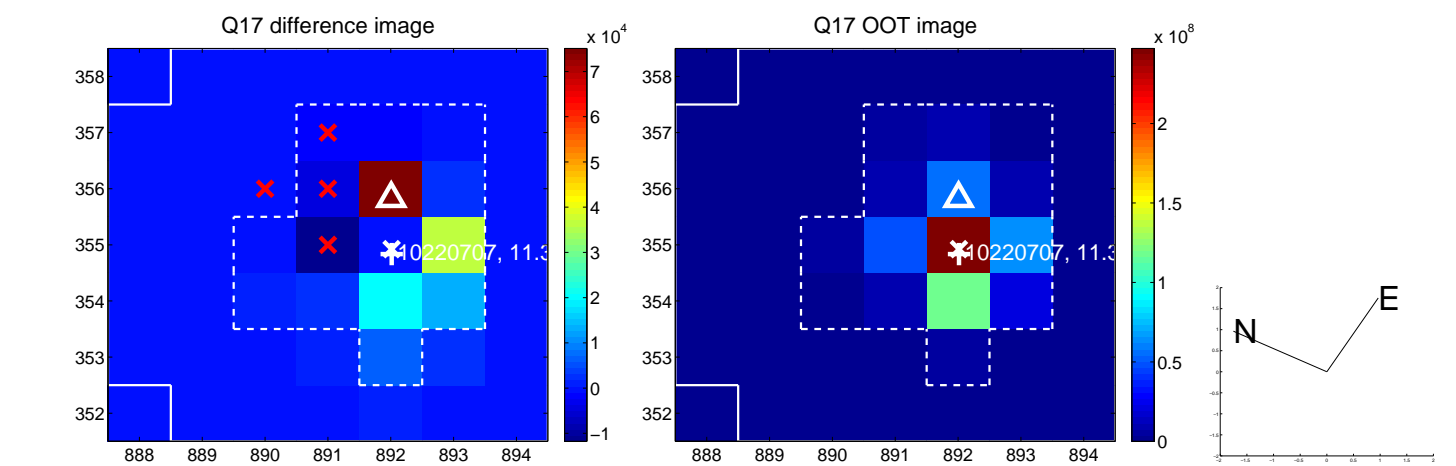




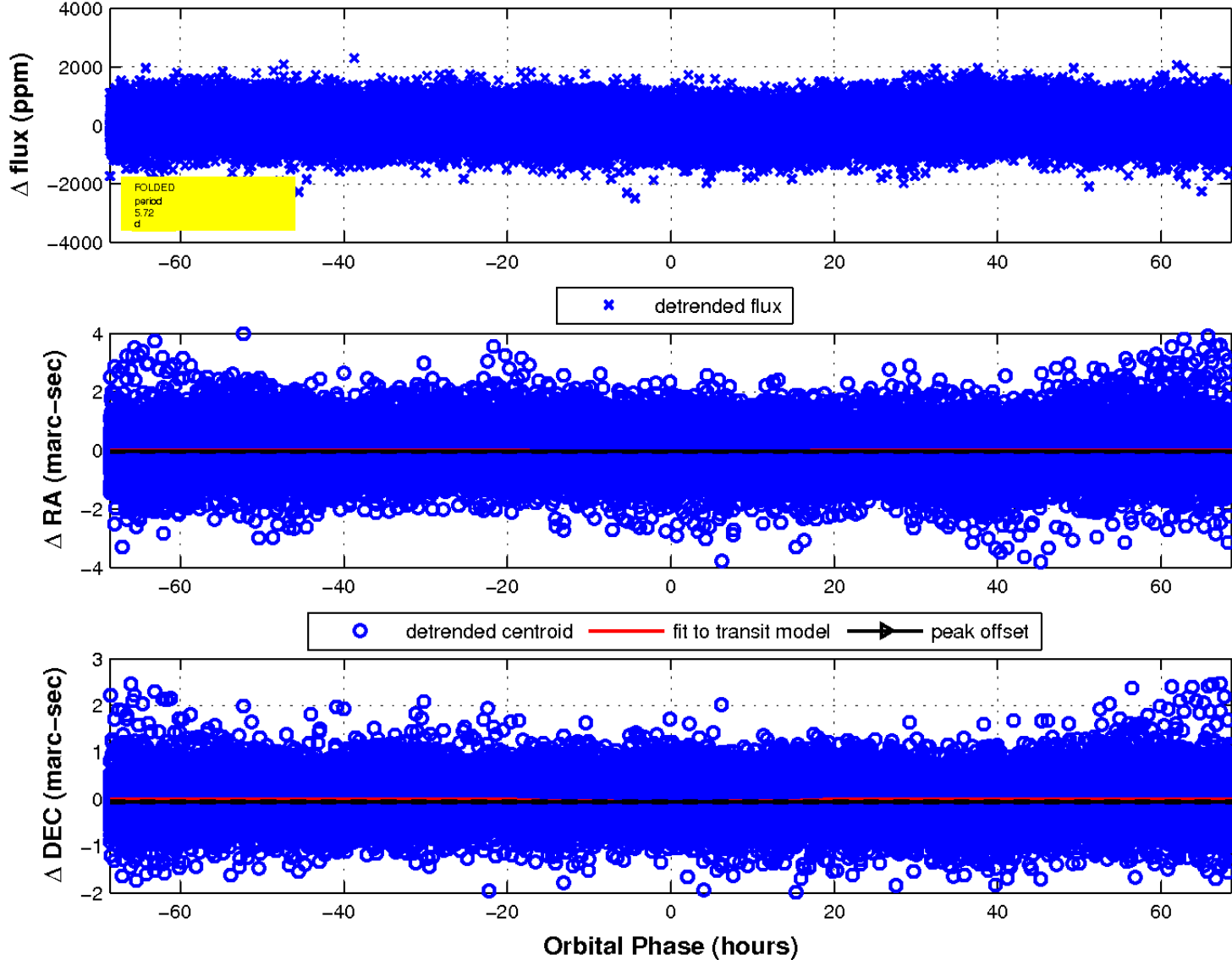
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 3 of 3



UKIRT Image

