

# KIC 009655155

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009655155-01	OBS	No	0.976512	132.120673	3.7	6.883	7.8	5.0	2.76	7643	0.54	40208.60
009655155-02	OBS	No	36.246576	144.109840	68.9	13.162	16.4	5.6	2.76	7643	2.54	324.74
009655155-03	OBS	No	50.849347	169.620394	217.9	1.083	12.1	8.4	2.76	7643	4.93	206.78
009655155-04	OBS	No	40.986762	167.812024	279.4	7.076	9.2	11.5	2.76	7643	8.52	275.65

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009655155-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT
009655155-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT
009655155-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009655155-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—CENT_FEW_DIFFS

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

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

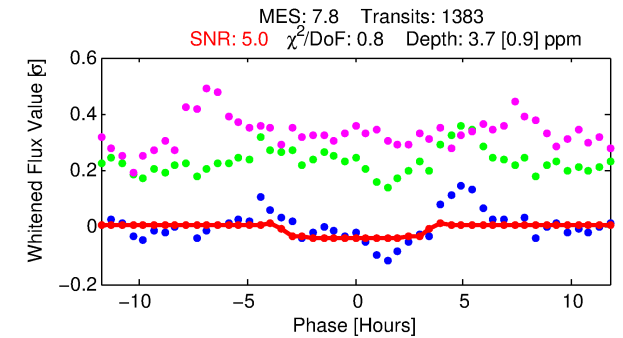
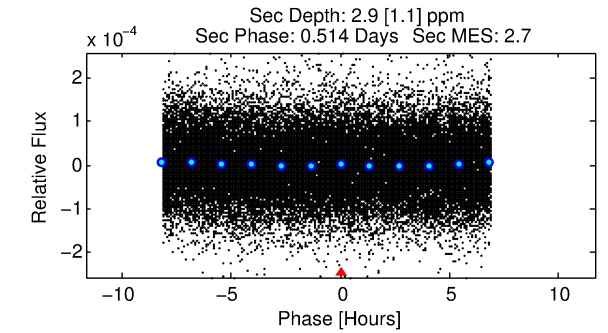
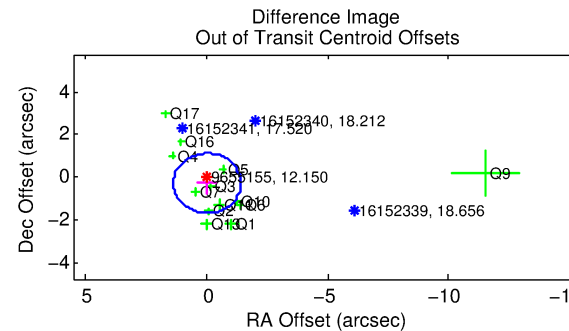
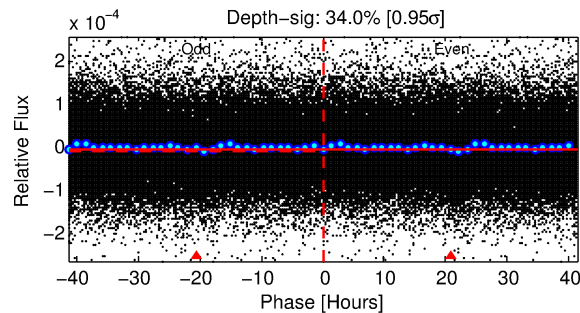
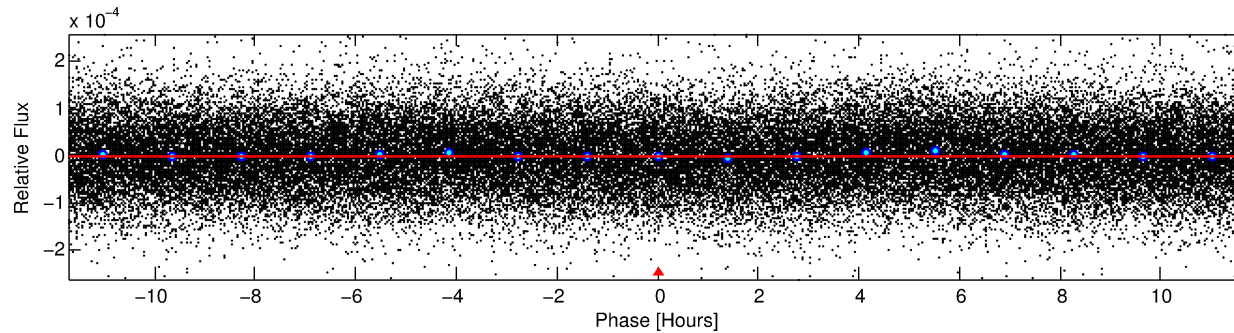
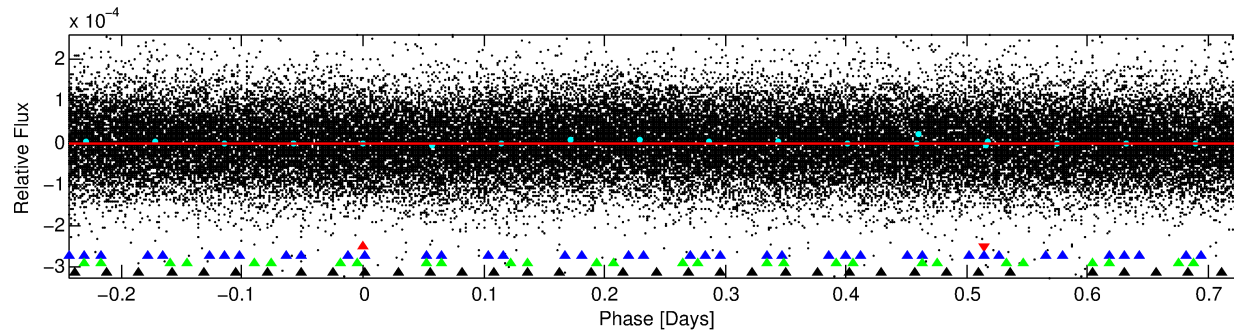
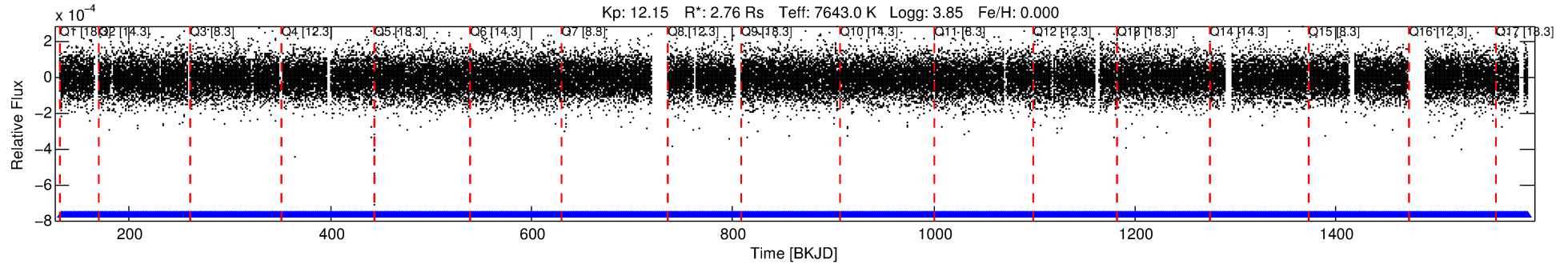
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 009655155-01

No Significant Match Found

# DV One-Page Summary

KIC: 9655155 Candidate: 1 of 4 Period: 0.977 d



## DV Fit Results:

Period = 0.97651 [0.00003] d  
Epoch = 132.1207 [0.0110] BKJD  
Rp/R\* = 0.0018 [0.0028]  
a/R\* = 1.26 [4.29]  
b = 0.04 [212.91]  
Seff = 40208.60 [14590.87]  
Teq = 3611 [328] K  
Rp = 0.54 [0.86] Re  
a = 0.0241 [0.0057] AU  
Ag = 3.19 [10.24] [0.21 $\sigma$ ]  
Teffp = 7461 [5950] K [0.65 $\sigma$ ]

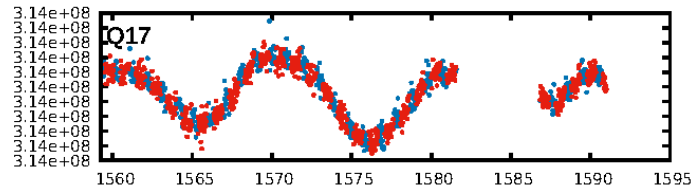
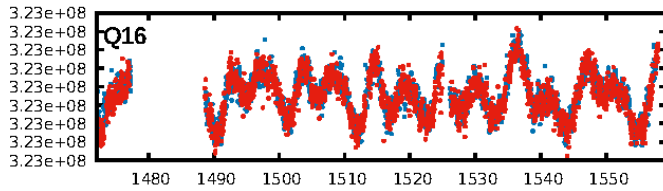
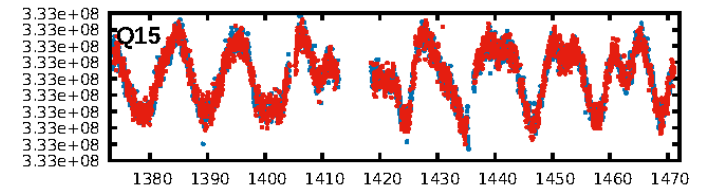
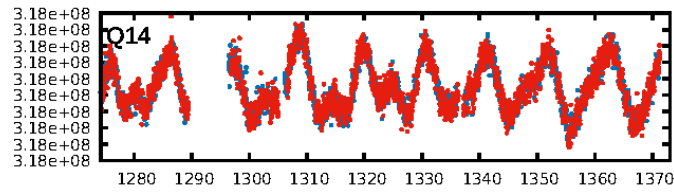
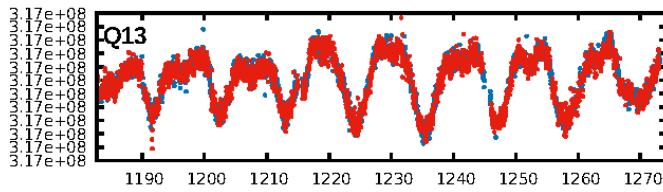
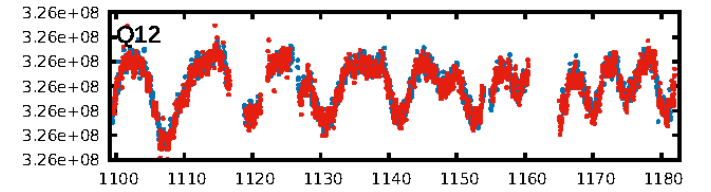
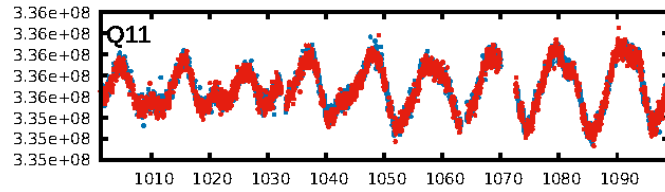
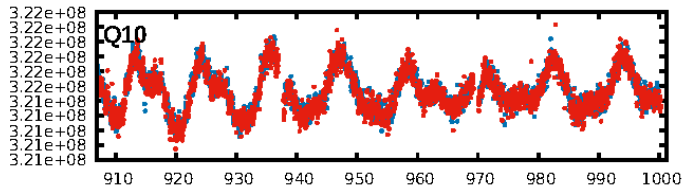
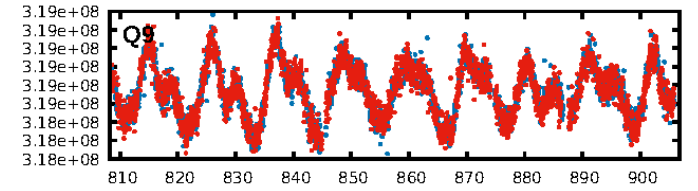
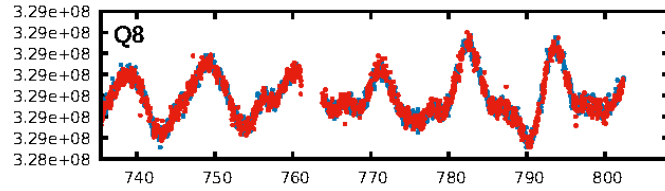
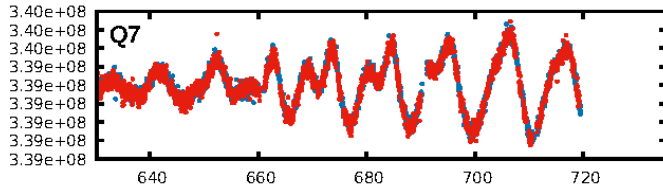
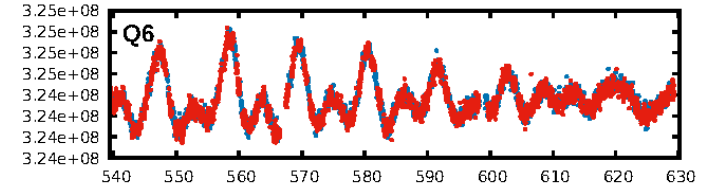
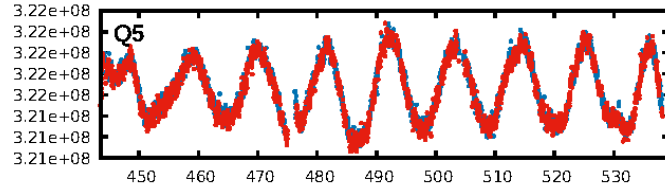
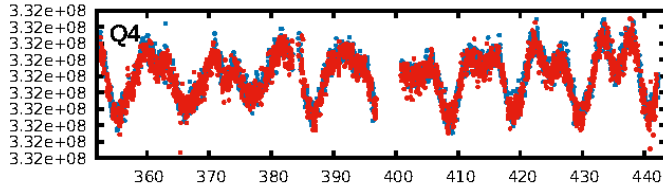
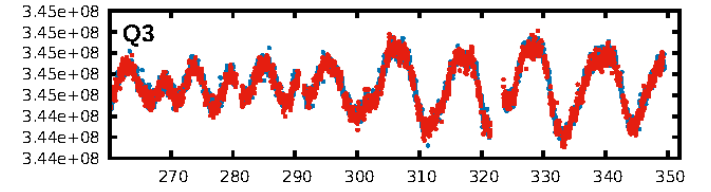
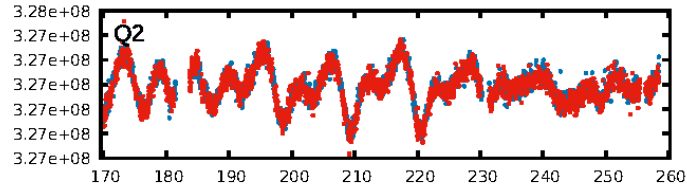
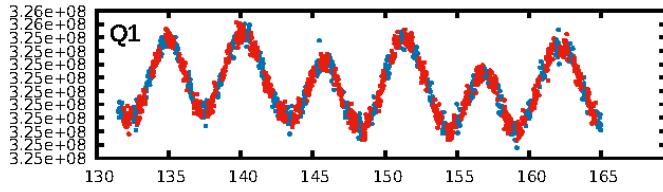
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [56.99 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 5.22e-08  
RollingBand-fgt: 1.00 [1321/1321]  
GhostDiagnostic-chr: N/A  
Centroid-sig: N/A  
Centroid-so: N/A  
OotOffset-rm: 0.277 arcsec [0.59 $\sigma$ ]  
KicOffset-rm: 0.295 arcsec [0.65 $\sigma$ ]  
OotOffset-st: 3/3/2/5 [13]  
KicOffset-st: 3/3/2/5 [13]  
DiffImageQuality-fgm: 0.69 [9/13]  
DiffImageOverlap-fno: 1.00 [17/17]

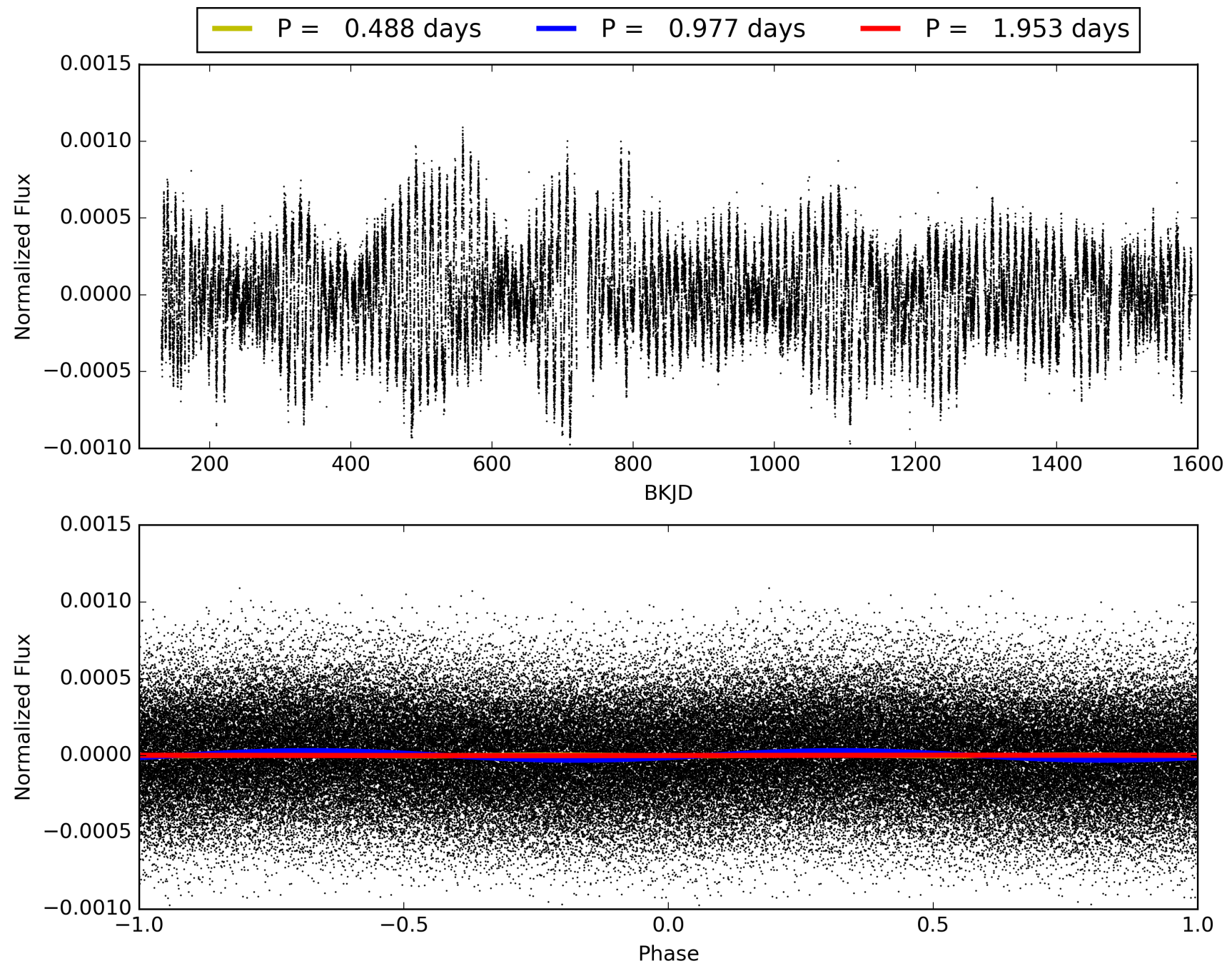
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This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 009655155-01, PDC Light Curves



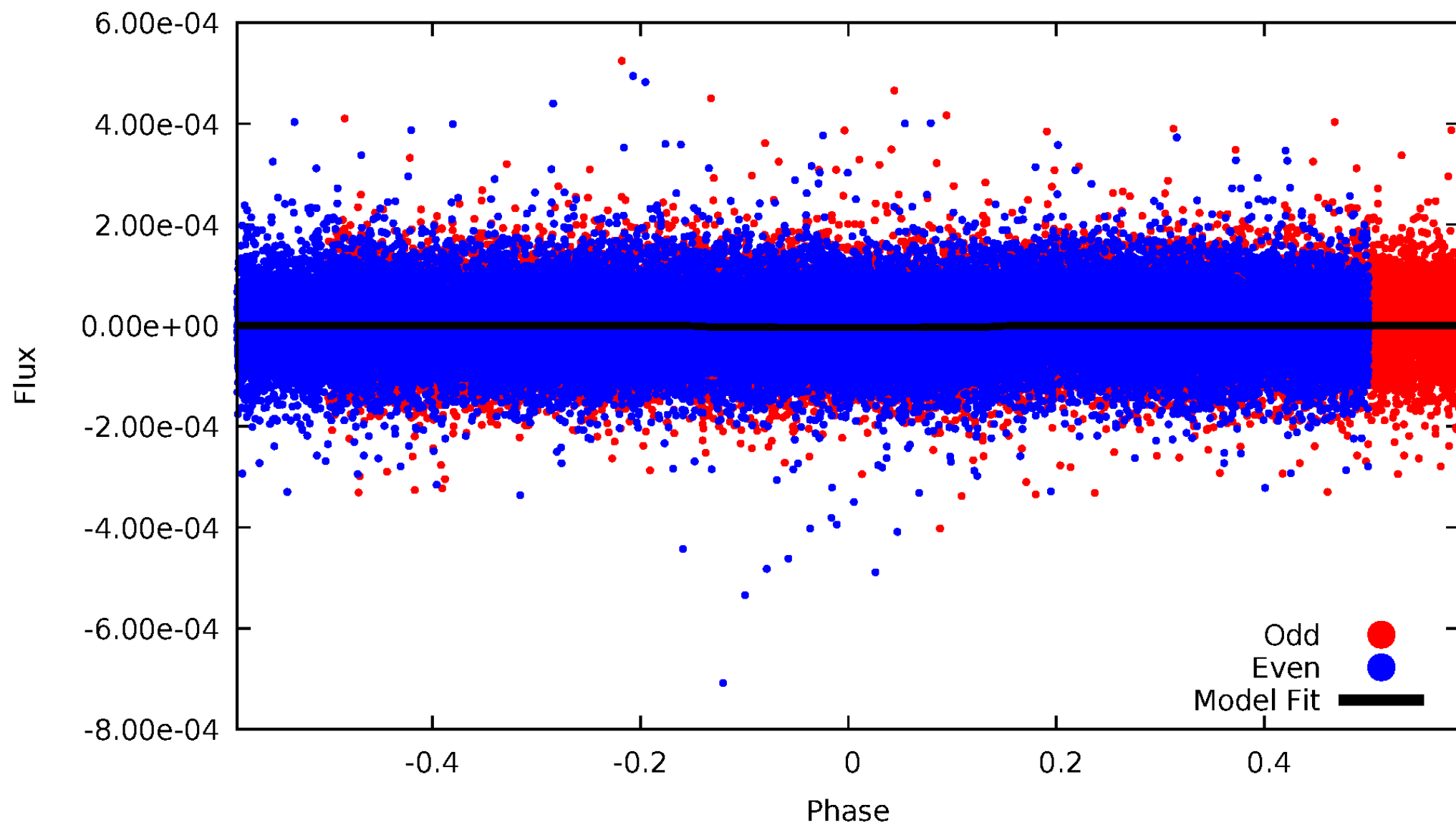
TCE 009655155-01





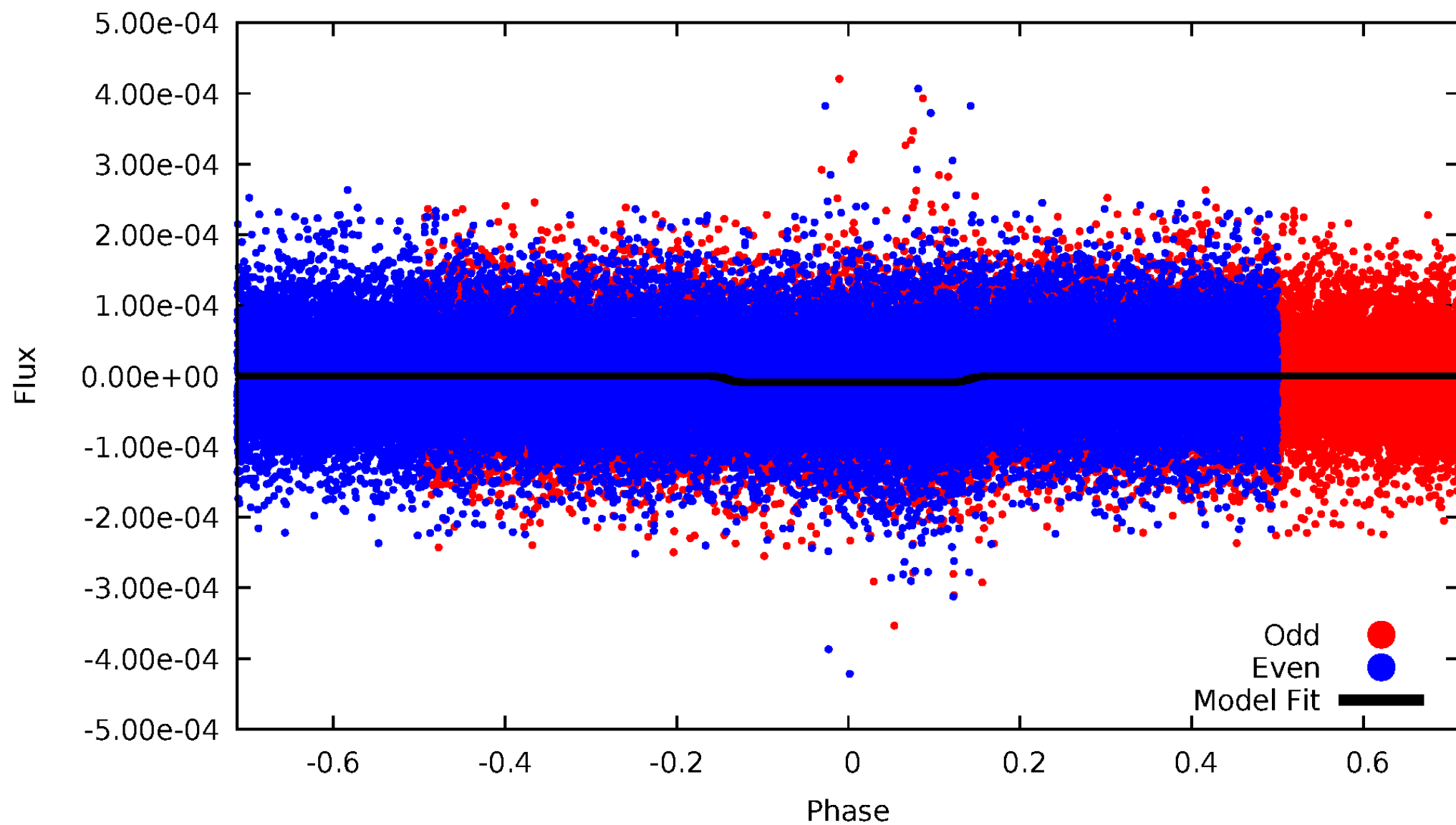
# DV Odd/Even

TCE 009655155-01

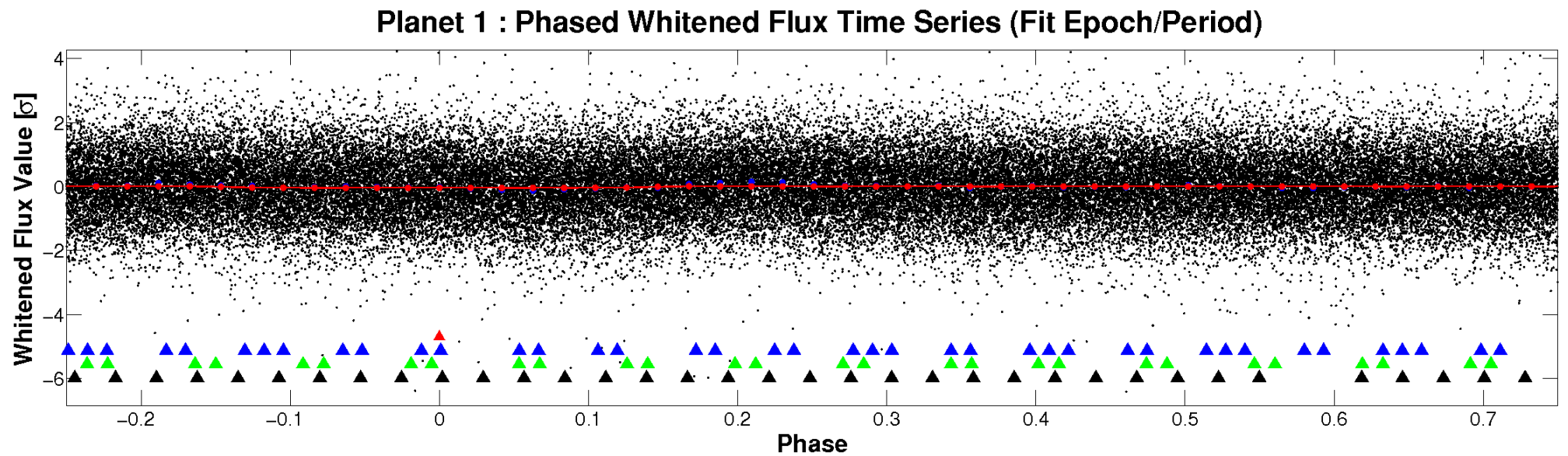
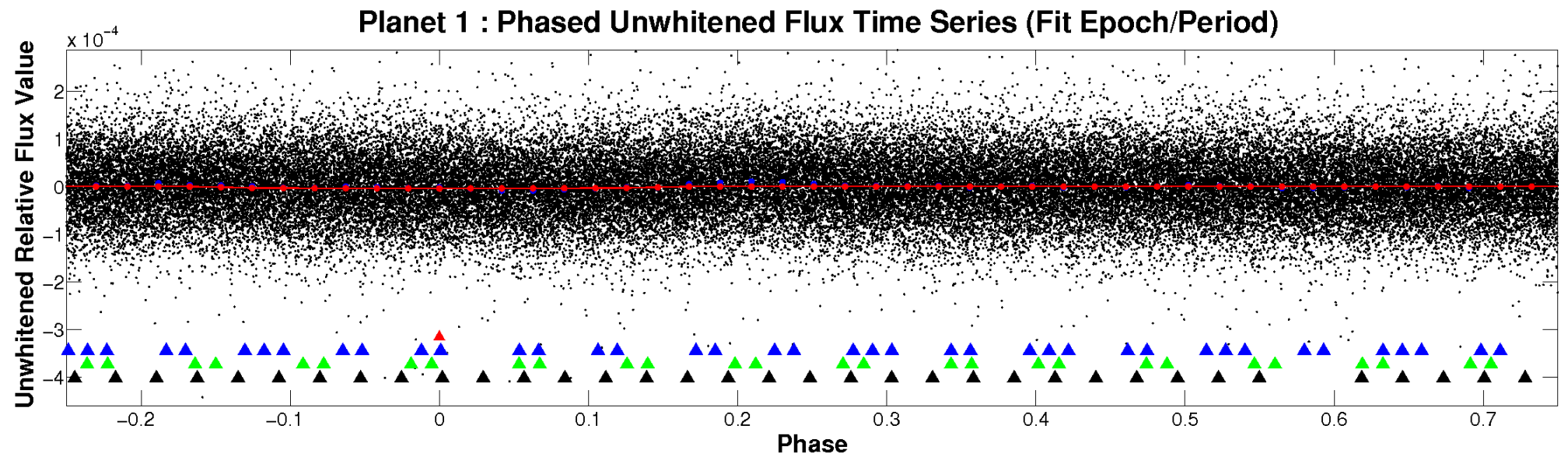


# ALT Odd/Even

TCE 009655155-01

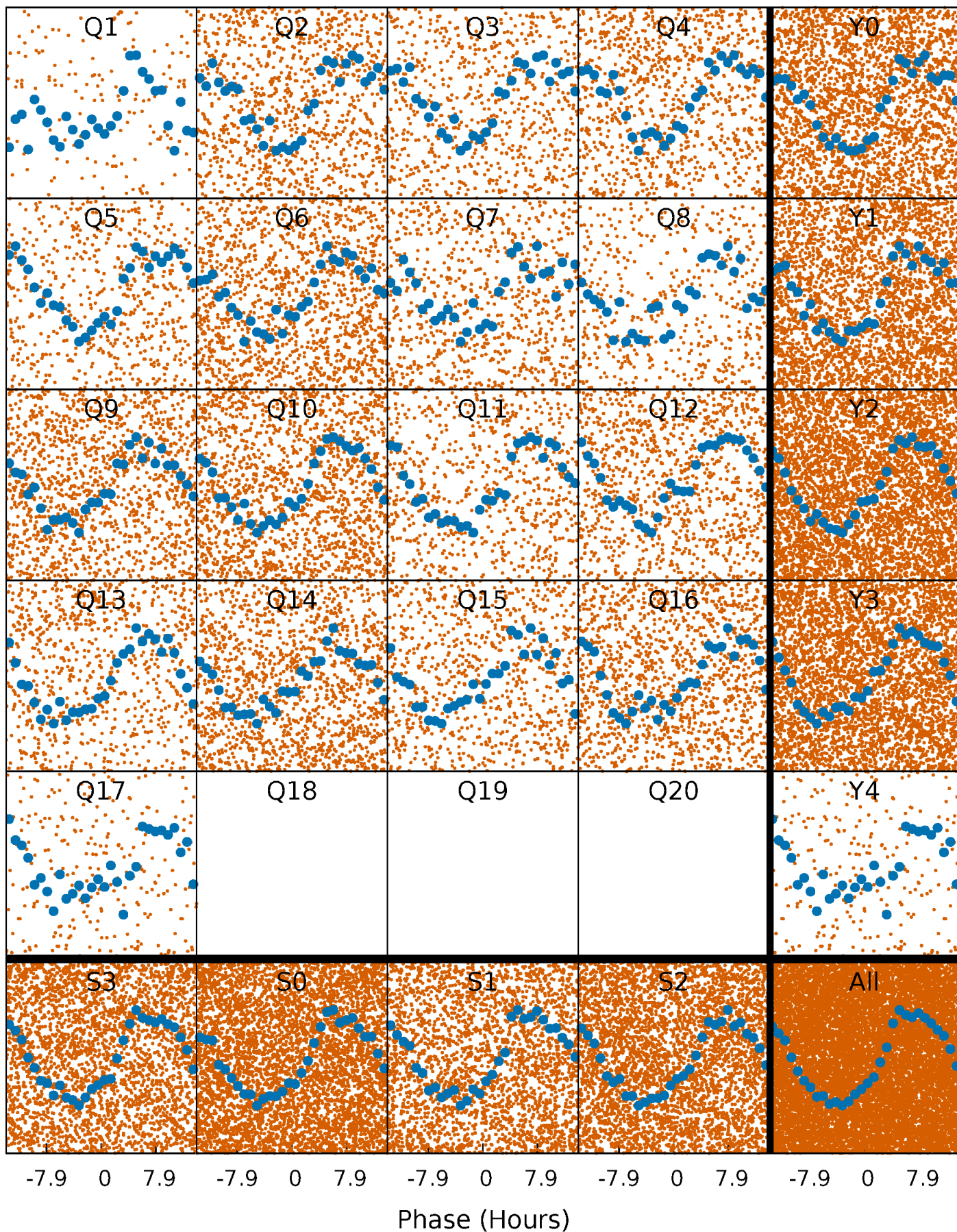


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

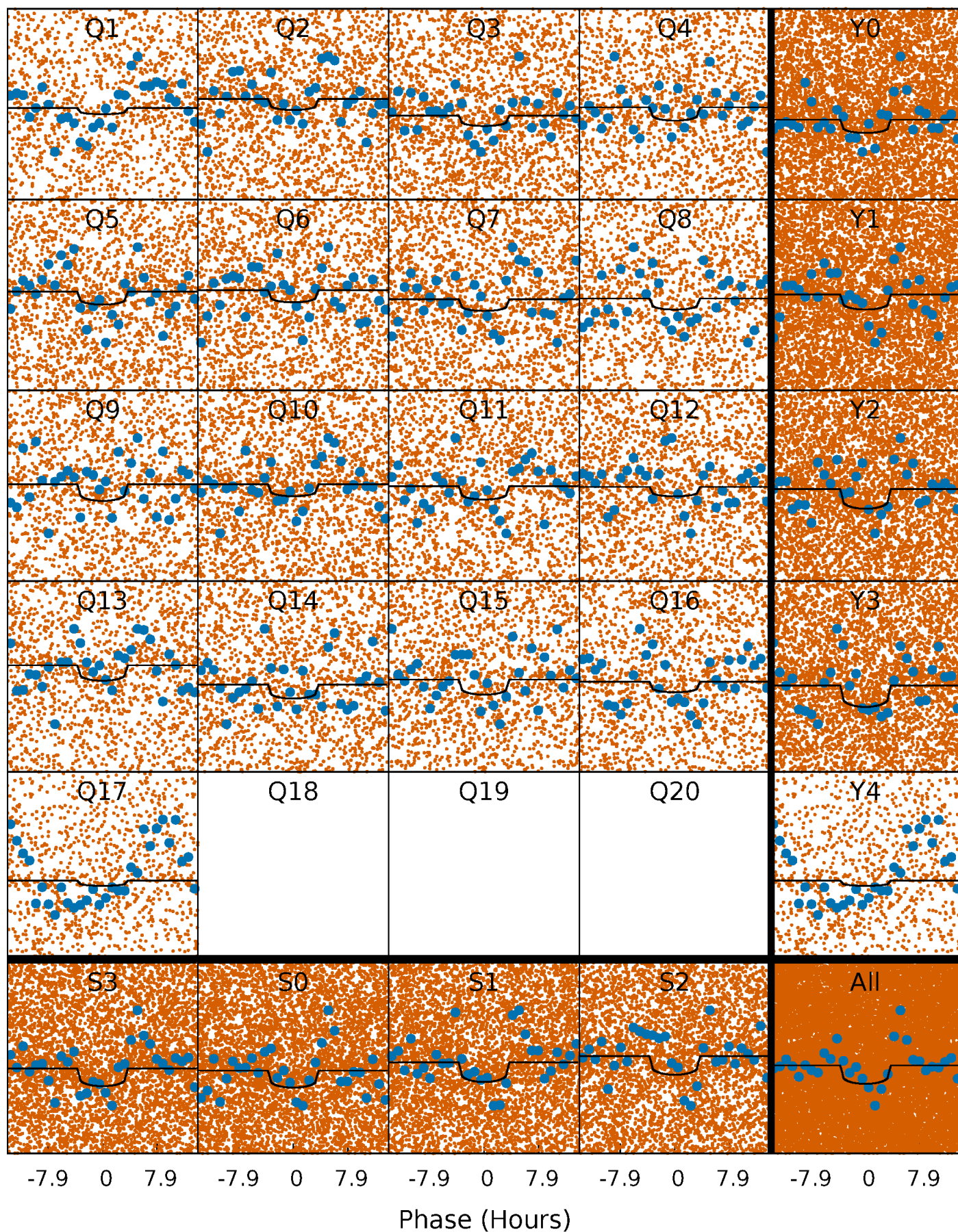
TCE 009655155-01 P= 0.976512 Days  $T_0=132.120673$  (BKJD)





# DV Quarter-Phased Transit Curves

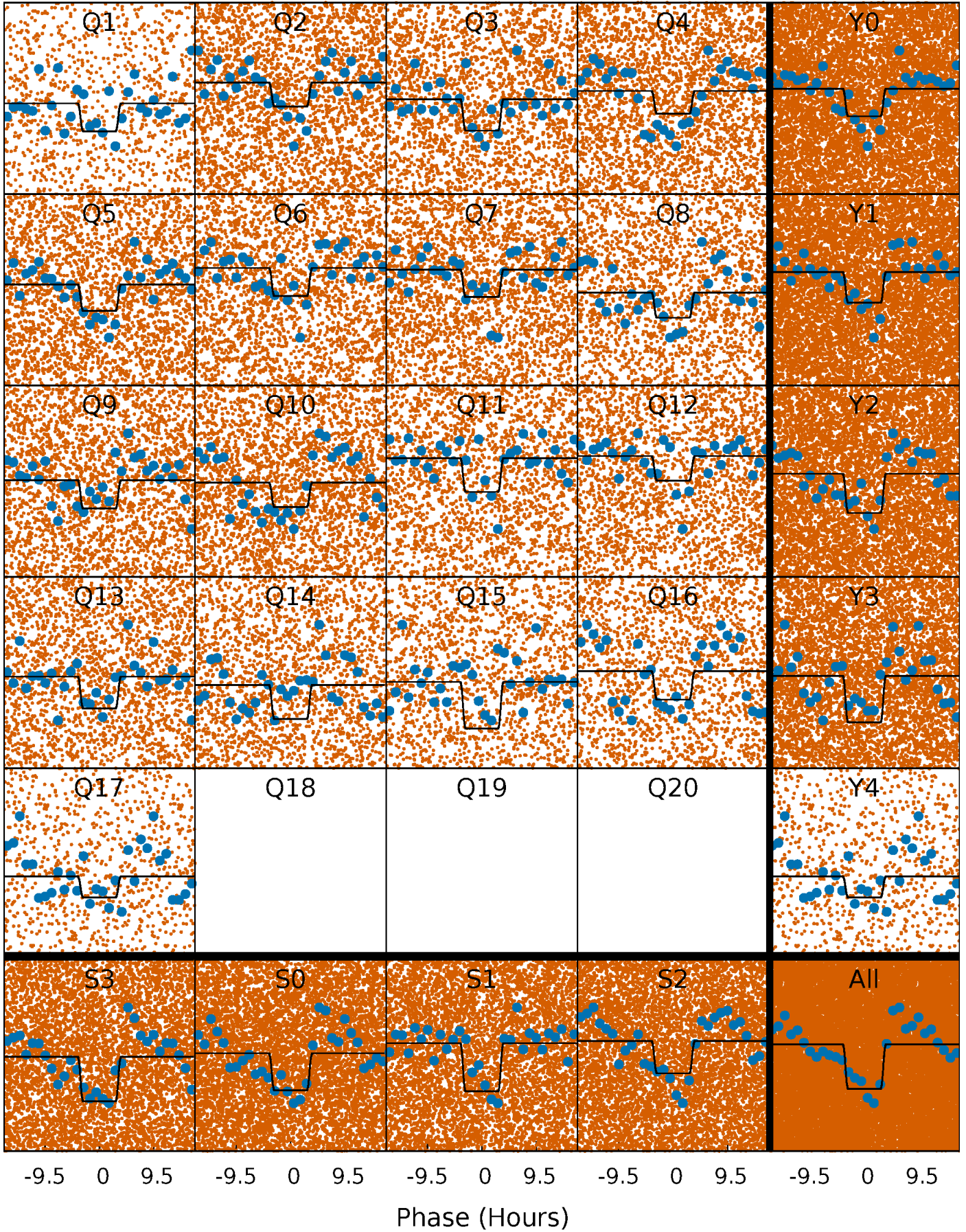
TCE 009655155-01 P= 0.976512 Days  $T_0=132.120673$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

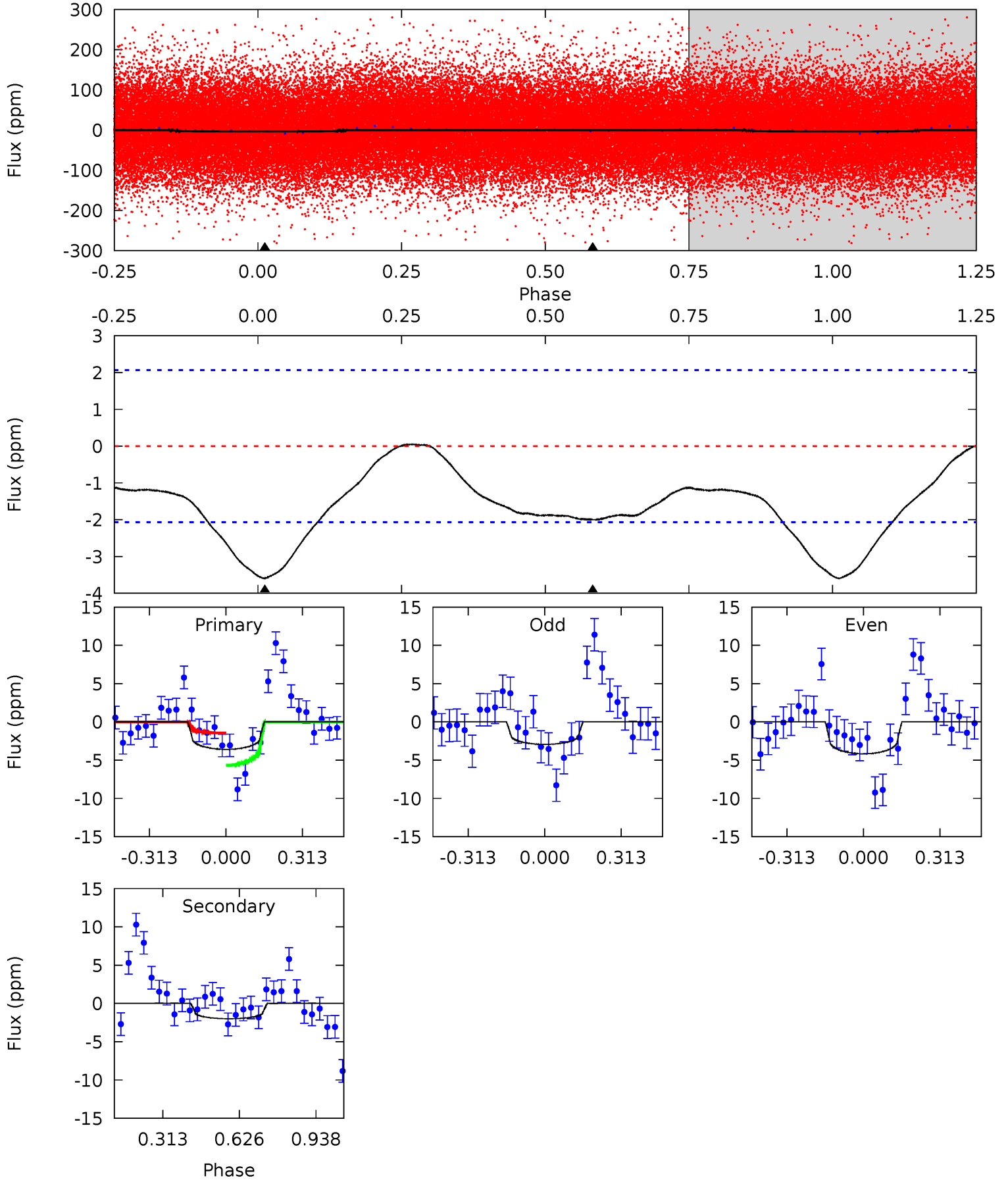
TCE 009655155-01 P= 0.976576 Days  $T_0=132.063460$  (BKJD)



# DV Model-Shift Uniqueness Test

009655155-01, P = 0.976512 Days, E = 131.144161 Days

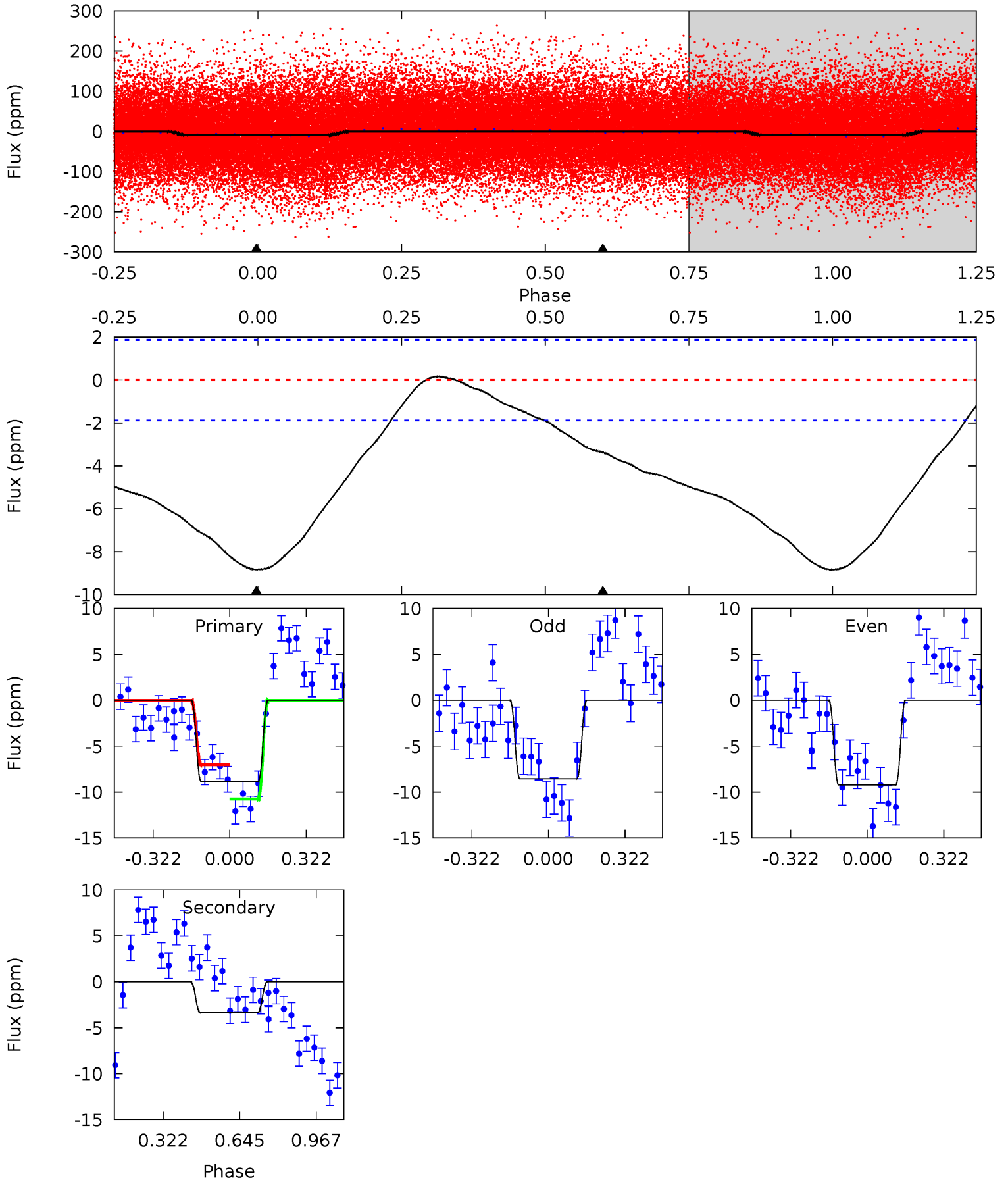
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.50	4.17	0	0	4.32	1.01	0.50	7.50	7.50	4.17	4.17	1.29	0.97	0.01	4.38



# Alt Model-Shift Uniqueness Test

009655155-01, P = 0.976576 Days, E = 131.086884 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	7.74	0	0	4.31	0.99	0.96	20.3	20.3	7.74	7.74	0.79	0.92	0.02	4.23





### Stellar Parameters For KIC 009655155

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7643^{+68}_{-84}$	$3.846^{+0.203}_{-0.068}$	$0.000^{+0.100}_{-0.150}$	$2.760^{+0.249}_{-0.748}$	$1.951^{+0.031}_{-0.262}$	$0.131^{+0.147}_{-0.029}$
	+1%/-1%	+5%/-2%	+inf%/-inf%	+9%/-27%	+2%/-13%	+113%/-22%
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 009655155-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-2 \pm 0$	$0.79^{+0.68}_{-0.51}$	$5003^{+167}_{-308}$	$4922^{+4882}_{-7767}$	$0.952^{+7.432}_{-0.677}$
Alt.	$-3 \pm 0$	$1.03^{+0.83}_{-0.61}$	$5007^{+174}_{-319}$	$4942^{+3669}_{-3327}$	$0.967^{+4.968}_{-0.667}$

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

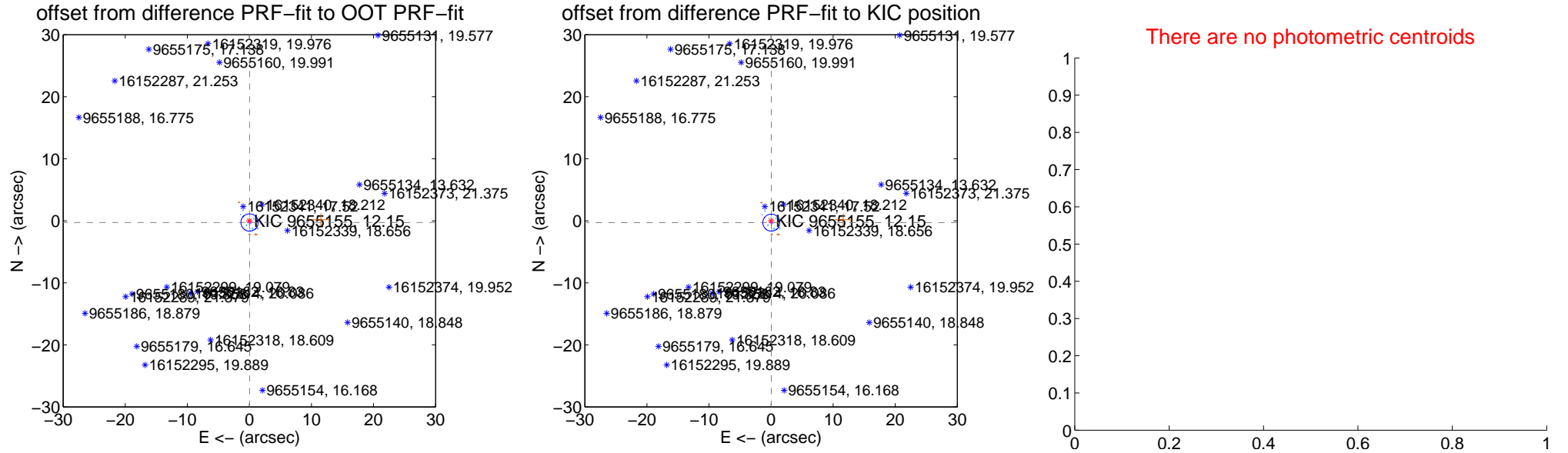
## DV Centroid Data

Supplemental centroid analysis for 009655155-01. Kepler magnitude: 12.15. Transit SNR 4.99

There are 9 quarters with good PRF difference image offsets

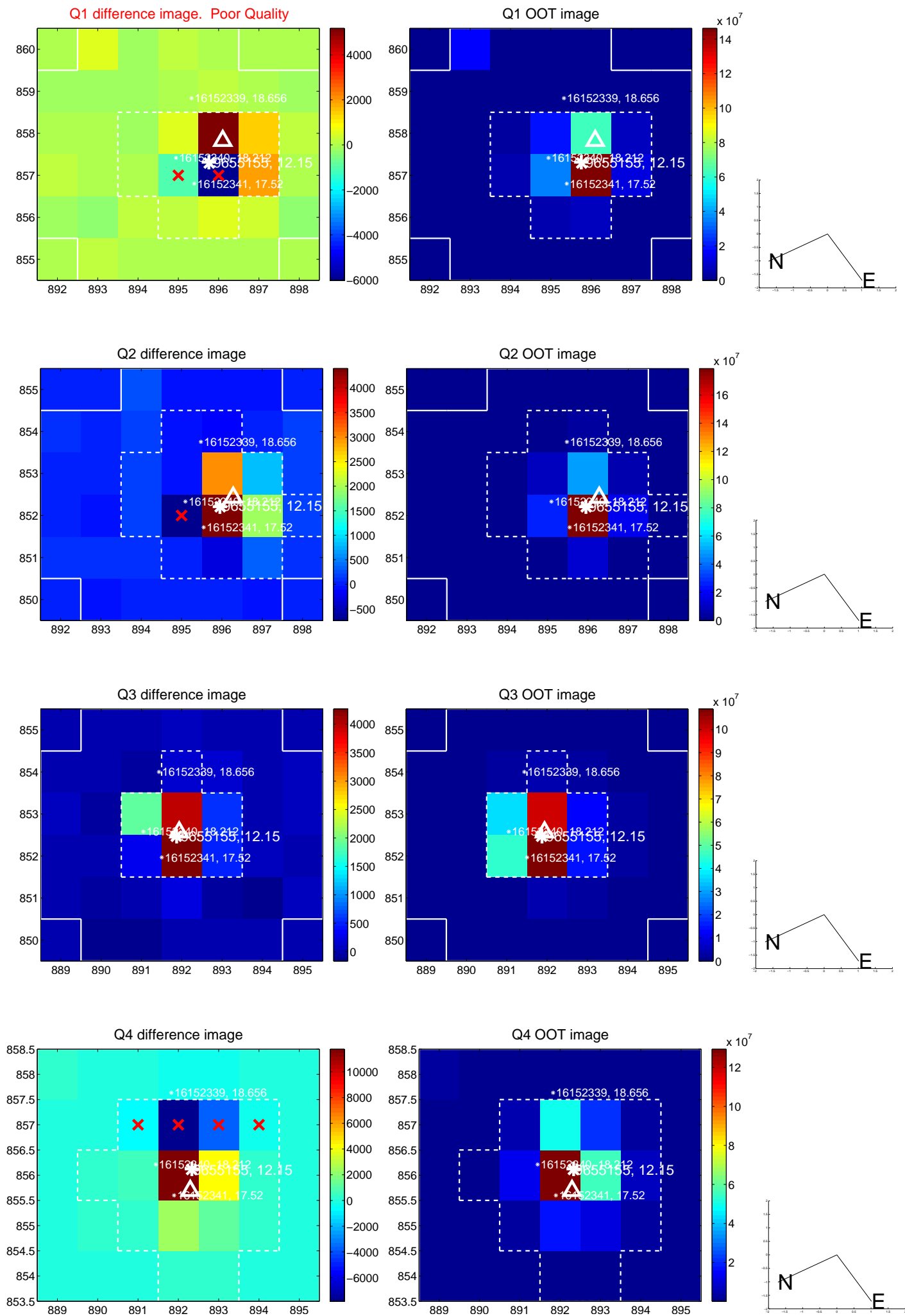
The direct PRF centroid is offset from the target star catalog position by about 0.12 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.277 \pm 0.465$	0.59	$-0.030 \pm 0.359$	$-0.275 \pm 0.466$
PRF-fit source offset from KIC position	$0.295 \pm 0.456$	0.65	$-0.039 \pm 0.354$	$-0.292 \pm 0.458$
photometric centroid source offset	—	—	—	—

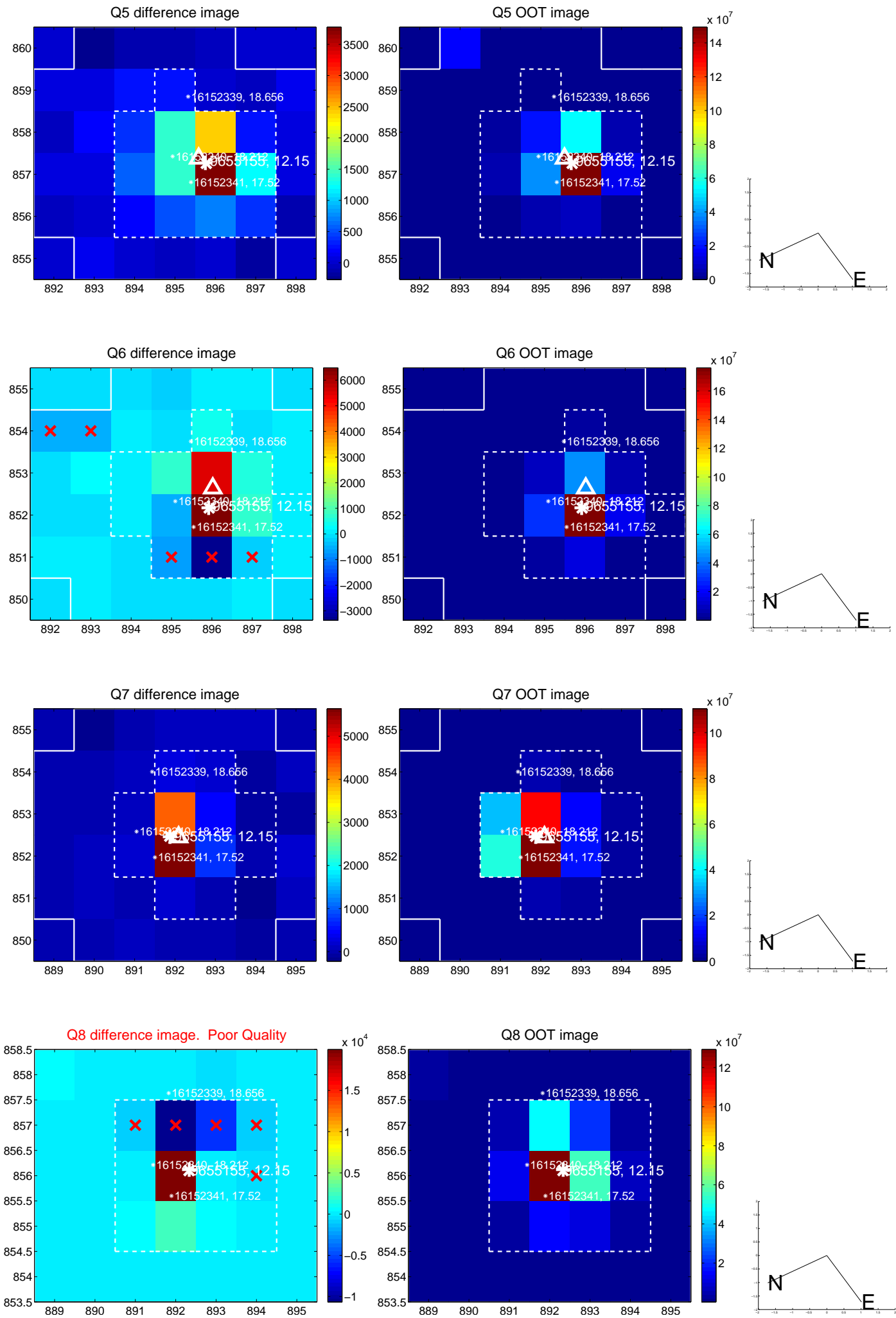


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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



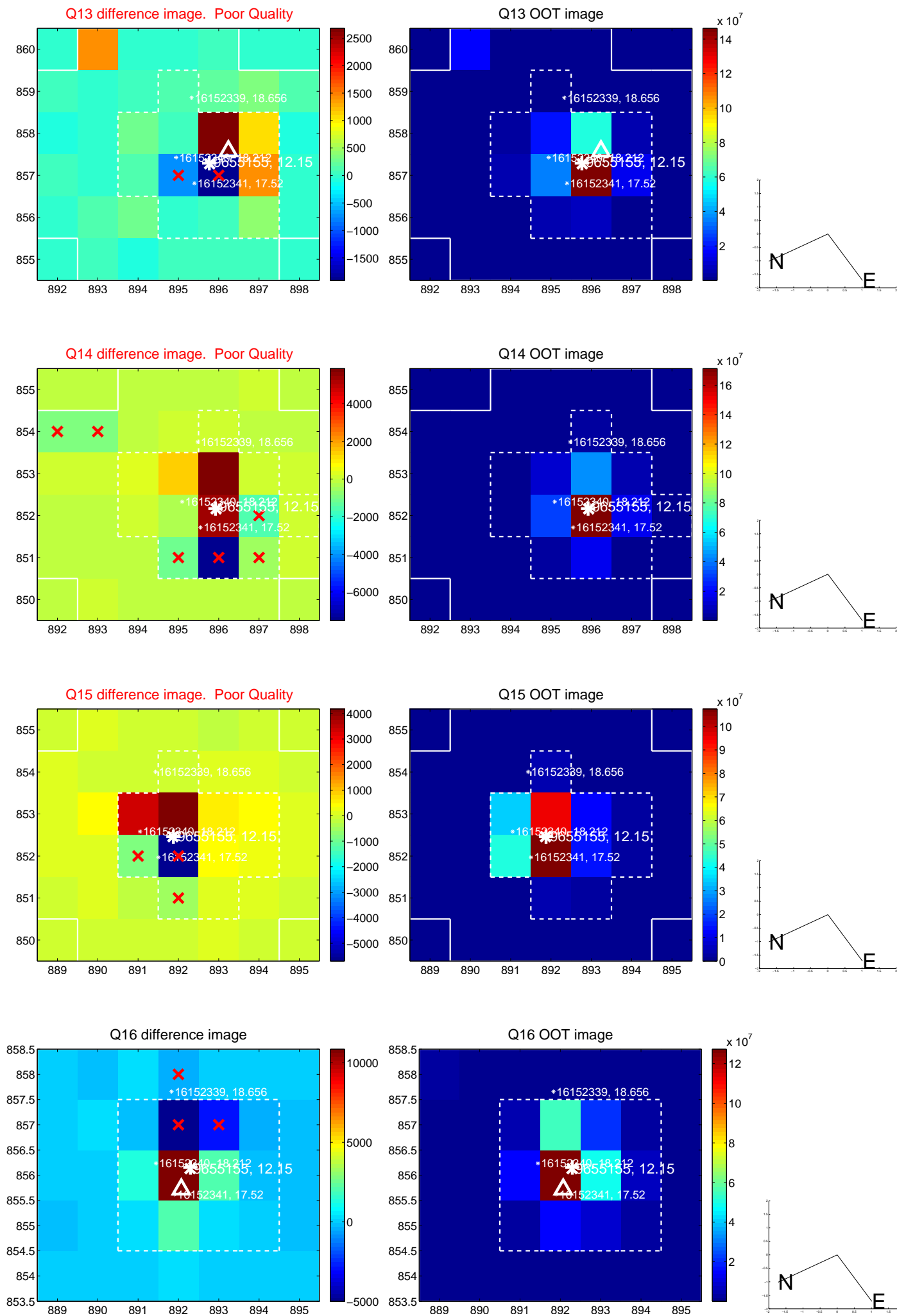
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



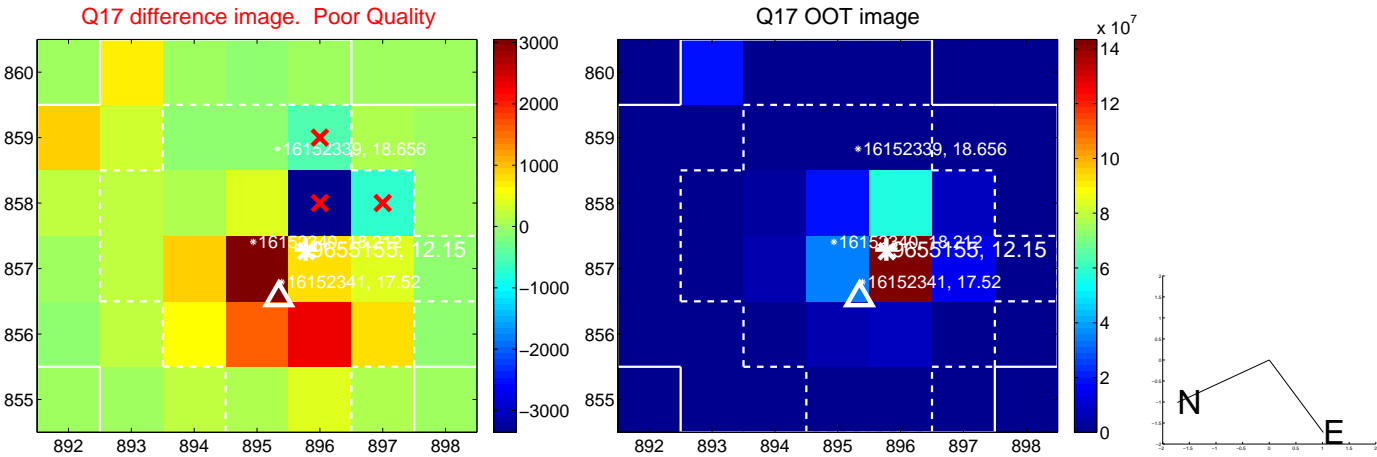




white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



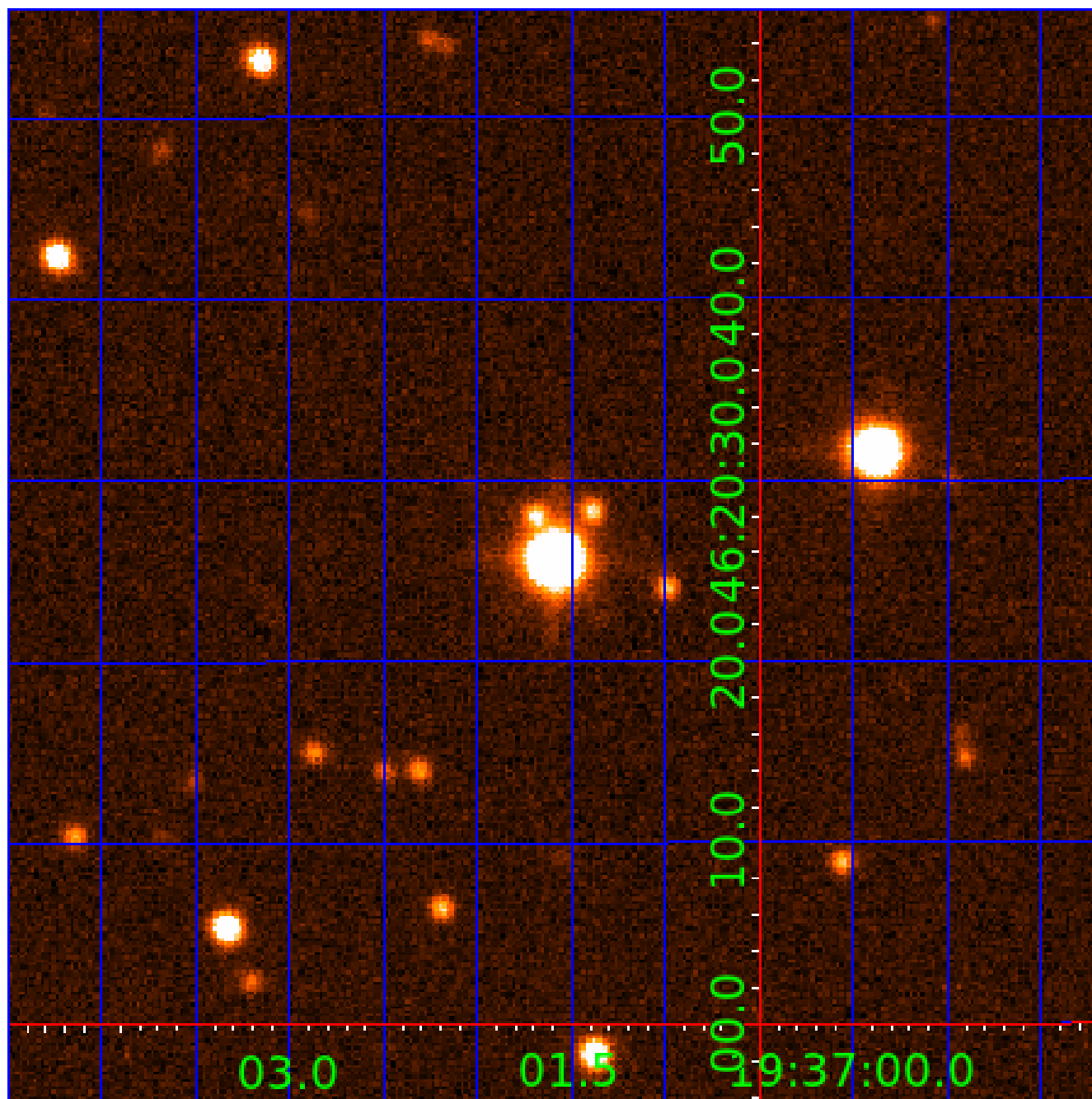
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



folded centroid time series figure for this object.

UKIRT Image

Declination





# KIC 009655155

## Q1-17 DR25 TCE Parameters

TCE	Run Type	KOI?	Period (Days)	Epoch (BKJD)	Depth (ppm)	Duration (Hours)	MES	SNR	$R_{\star}$ ( $R_{\odot}$ )	$T_{\star}$ (K)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
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## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
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009655155-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT
009655155-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009655155-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—CENT_FEW_DIFFS

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

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

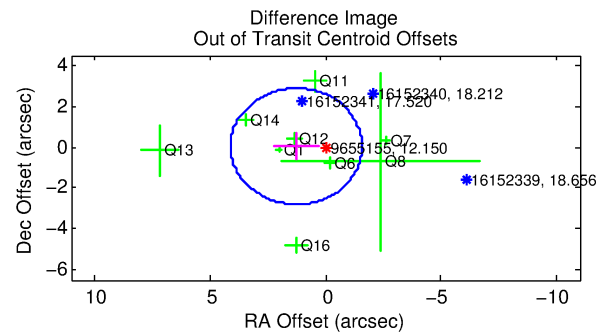
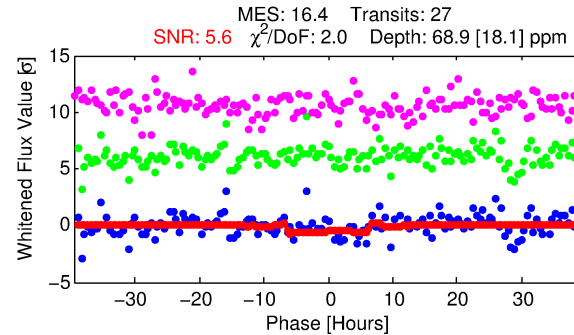
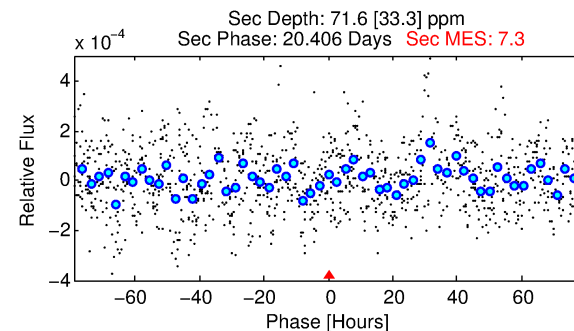
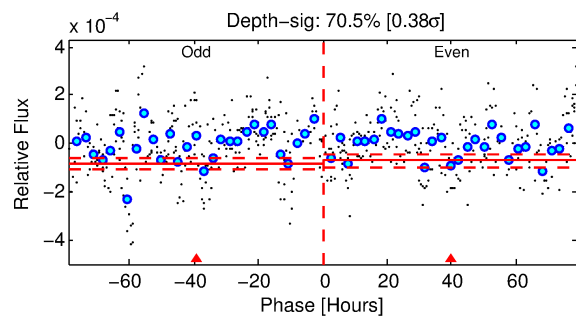
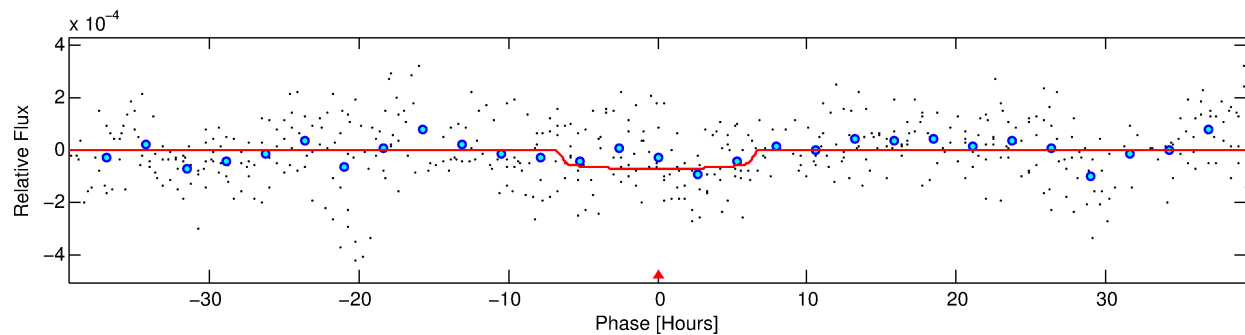
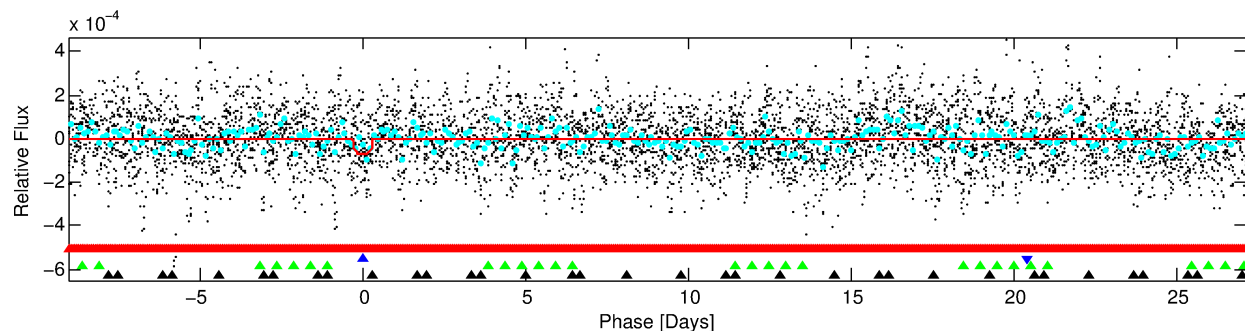
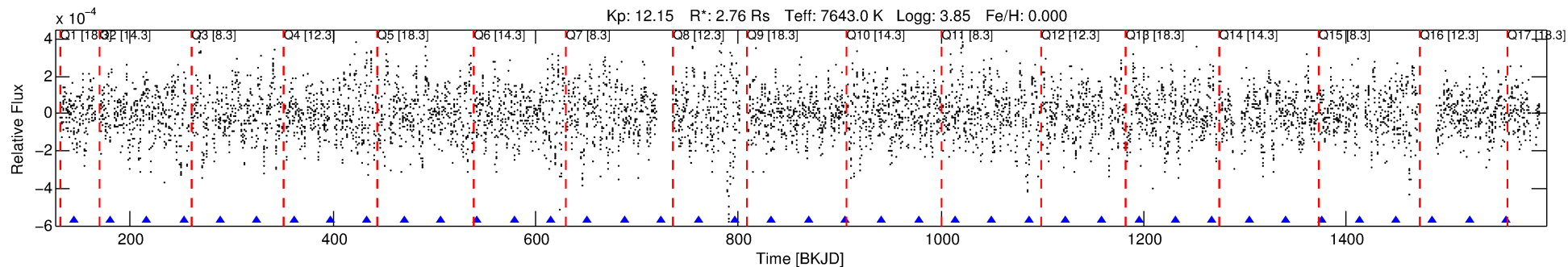
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 009655155-02

No Significant Match Found

# DV One-Page Summary

KIC: 965155 Candidate: 2 of 4 Period: 36.247 d



## DV Fit Results:

Period = 36.24658 [0.00111] d  
Epoch = 144.1098 [0.0284] BKJD  
Rp/R\* = 0.0084 [0.0027]  
a/R\* = 12.53 [22.05]  
b = 0.81 [0.72]  
Seff = 324.74 [117.84]  
Teq = 1082 [98] K  
Rp = 2.54 [1.07] Re  
a = 0.2678 [0.0639] AU  
Ag = 437.98 [381.23] [1.15 $\sigma$ ]  
Teffp = 7656 [1519] K [4.32 $\sigma$ ]

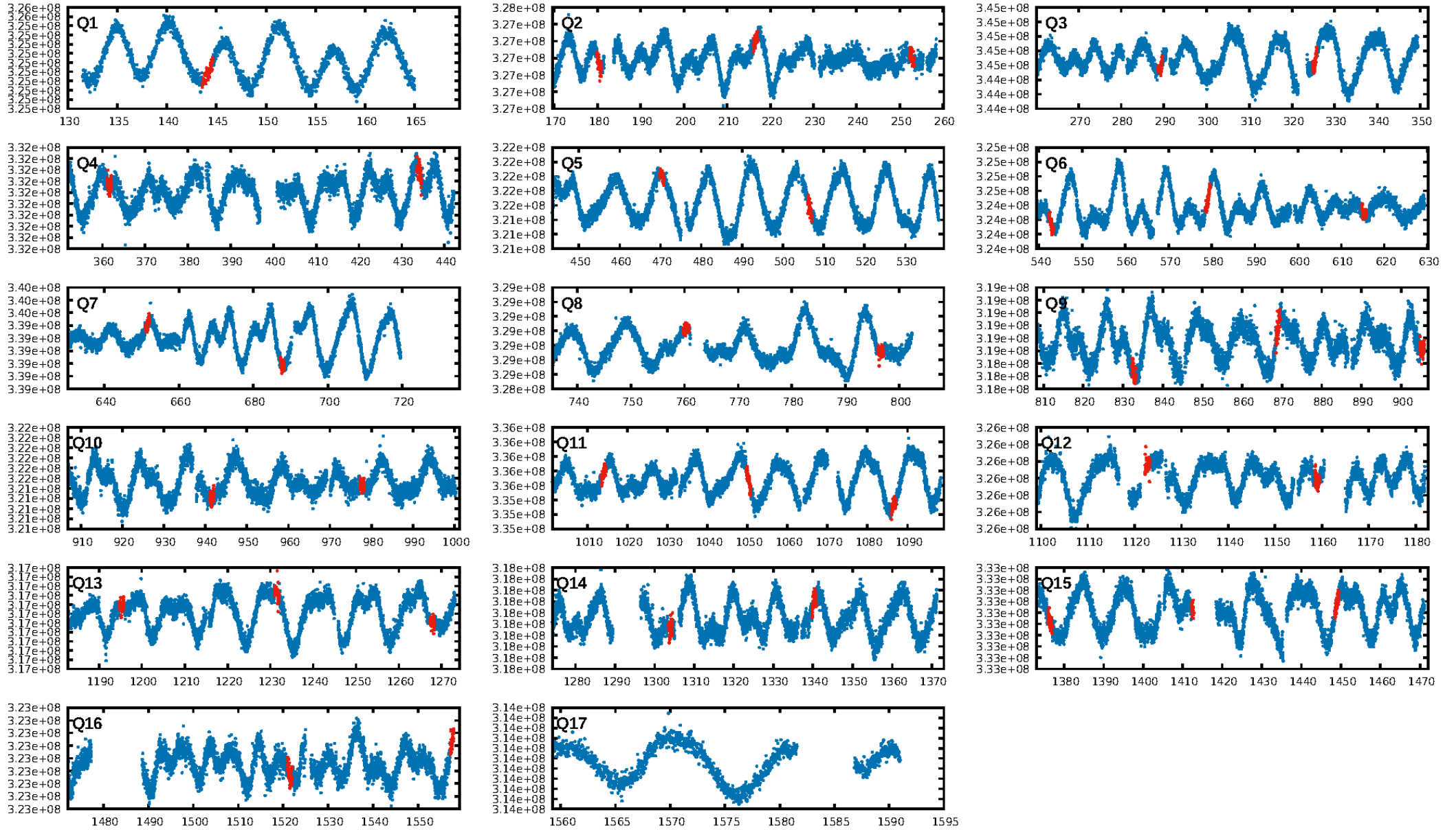
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [56.99 $\sigma$ ]  
LongPeriod-sig: 100.0% [7.61 $\sigma$ ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 3.38e-43  
RollingBand-fgt: 1.00 [26/26]  
GhostDiagnostic-chr: -10.24  
Centroid-sig: 22.9%  
Centroid-so: 0.958 arcsec [1.66 $\sigma$ ]  
OotOffset-rm: 1.267 arcsec [1.34 $\sigma$ ]  
OotOffset-st: 2/2/3/2 [9]  
KicOffset-rm: 1.207 arcsec [1.31 $\sigma$ ]  
KicOffset-st: 2/2/3/2 [9]  
DiffImageQuality-fgm: 0.33 [3/9]  
DiffImageOverlap-fno: 0.00 [0/16]

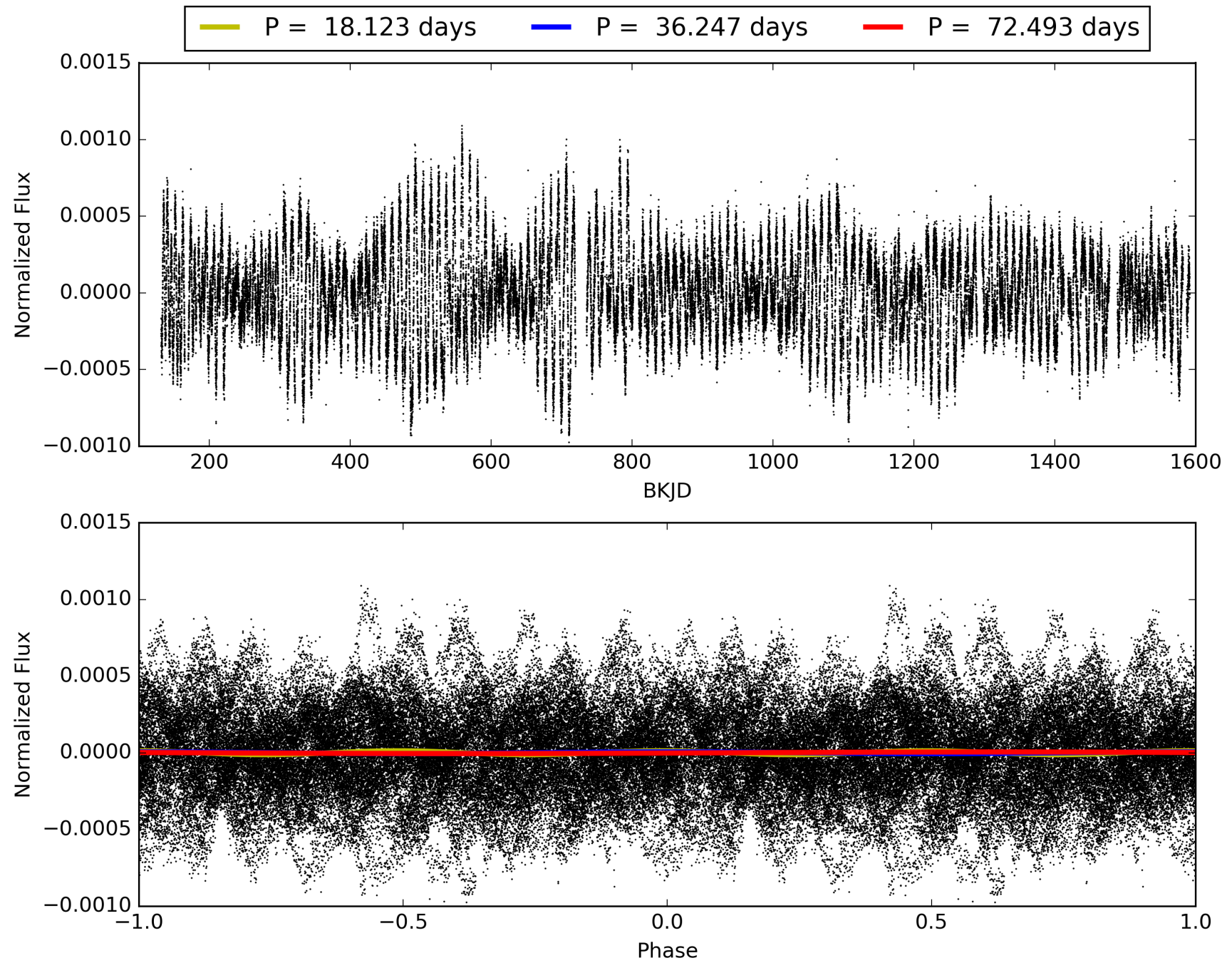
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This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 009655155-02, PDC Light Curves

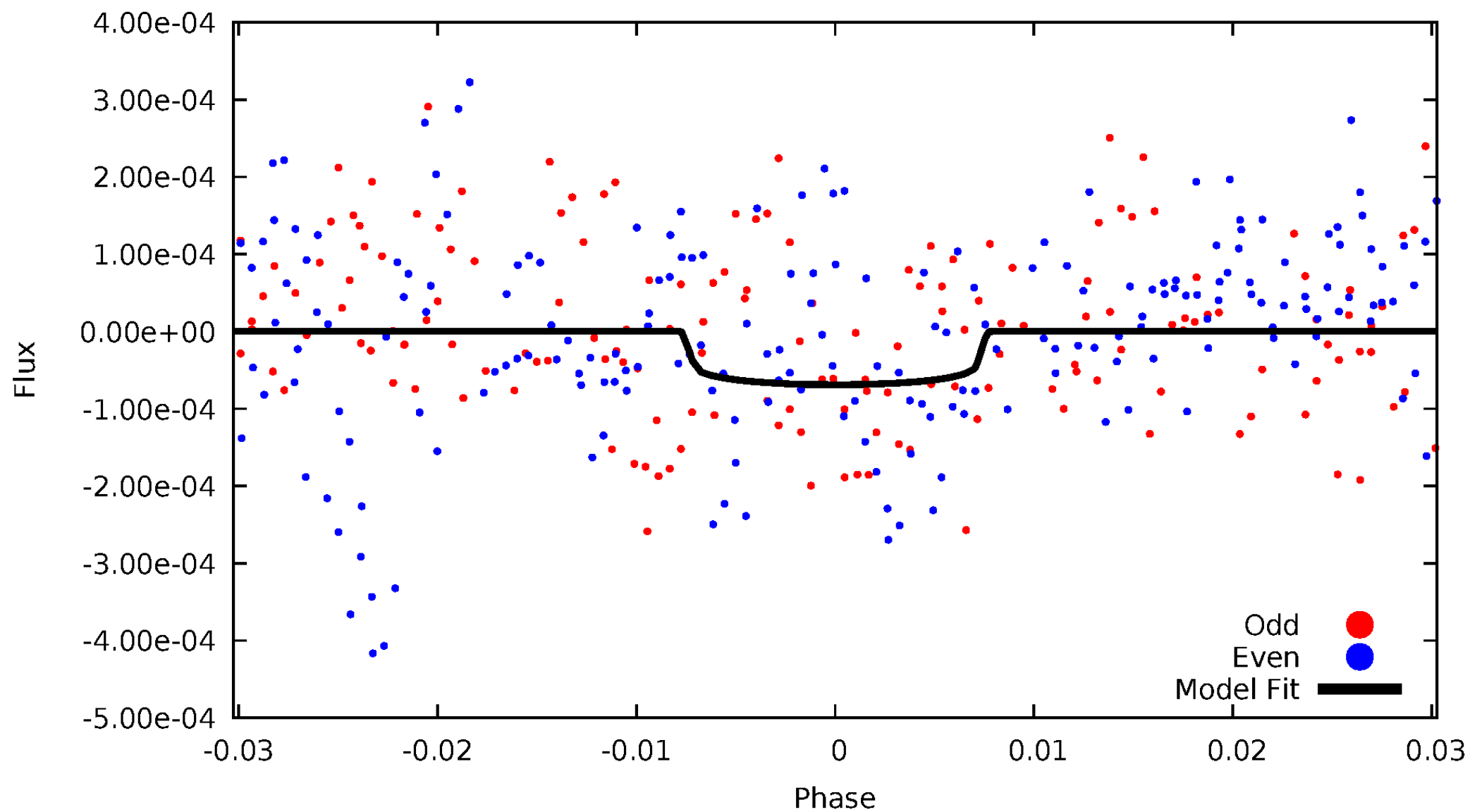


TCE 009655155-02



# DV Odd/Even

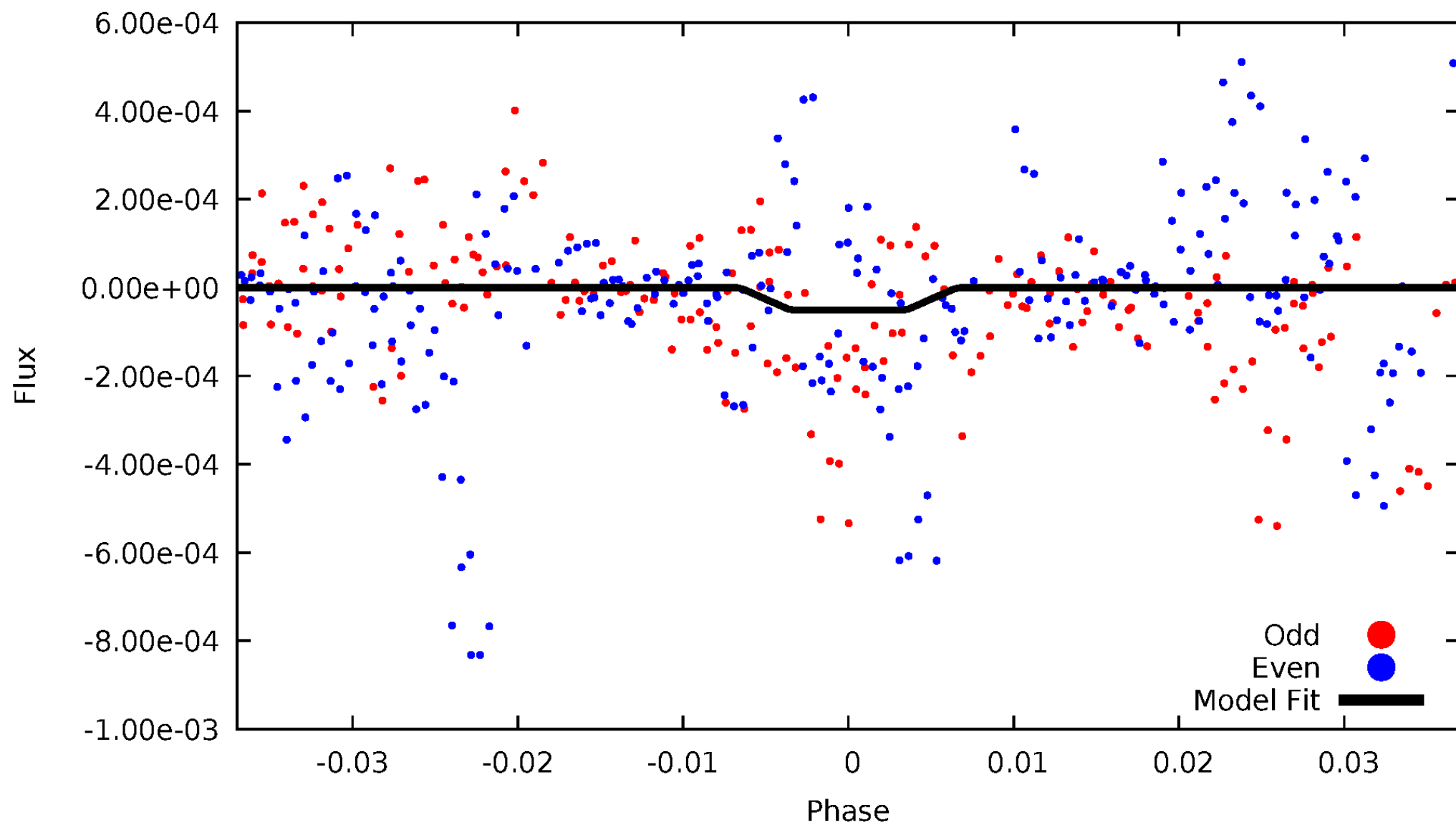
TCE 009655155-02





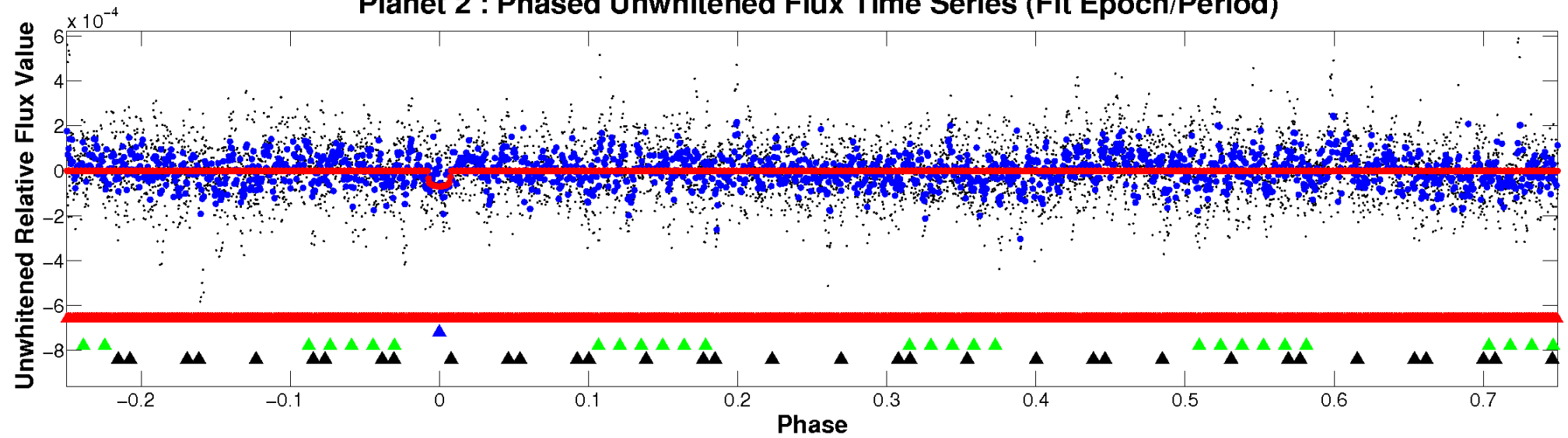
# ALT Odd/Even

TCE 009655155-02

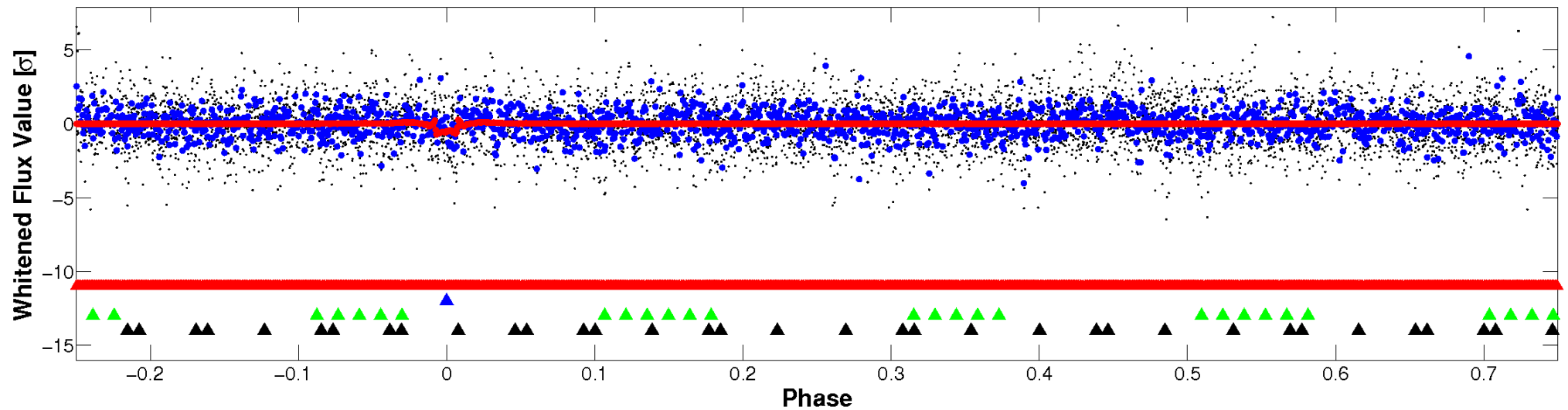


# Non-Whitened Vs. Whitened Light Curve

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

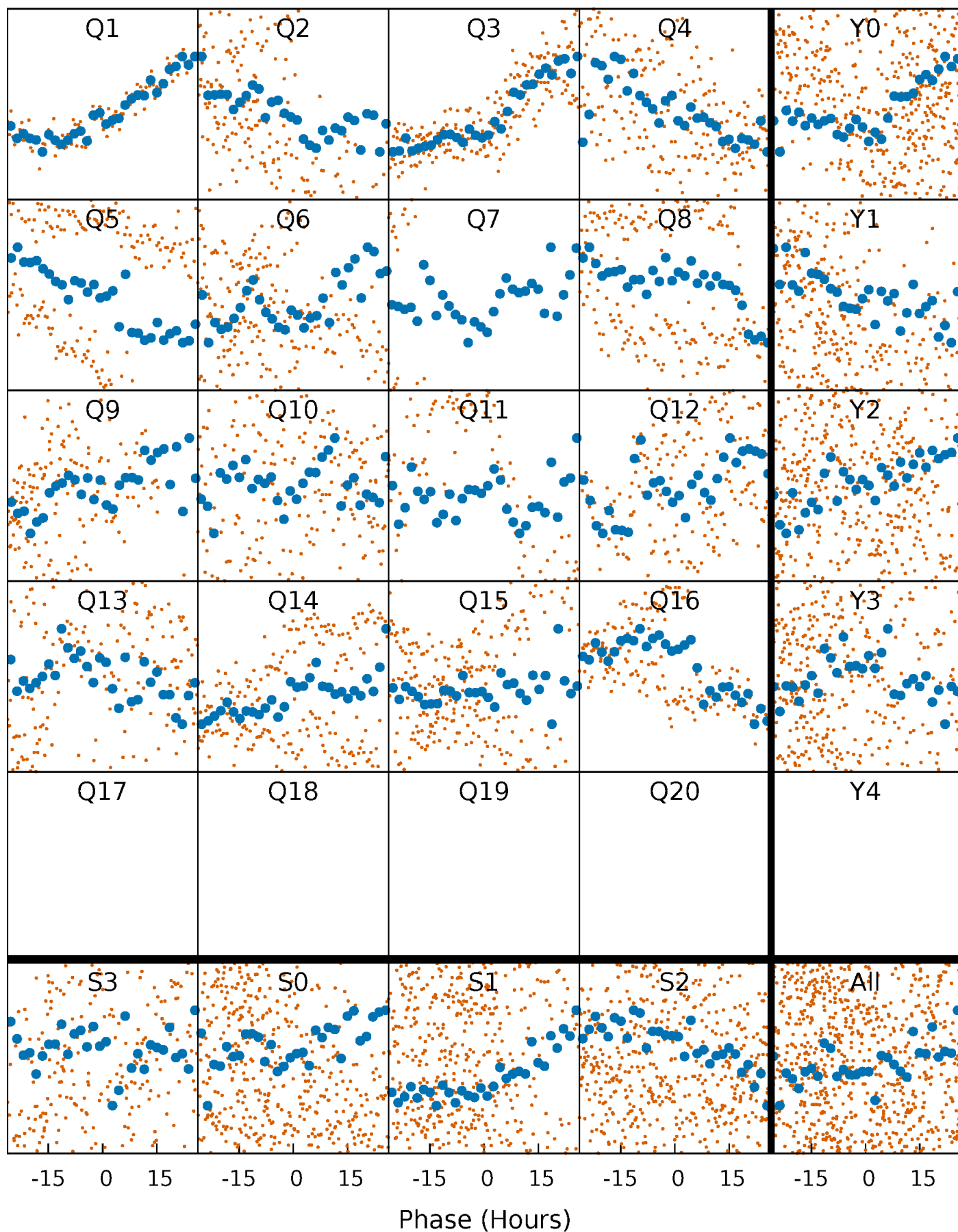


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



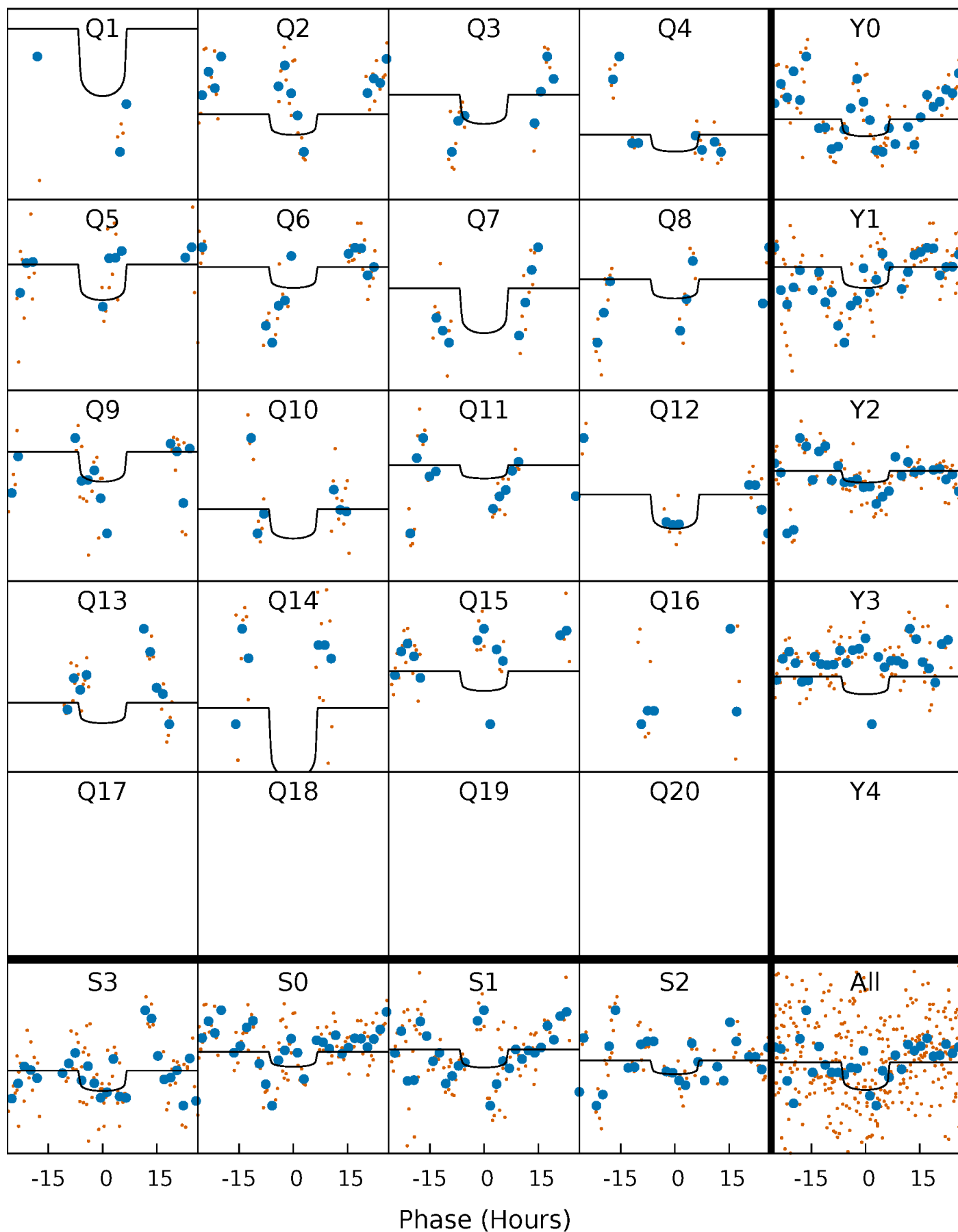
# PDC Quarter-Phased Transit Curves

TCE 009655155-02 P= 36.246576 Days  $T_0=144.109840$  (BKJD)



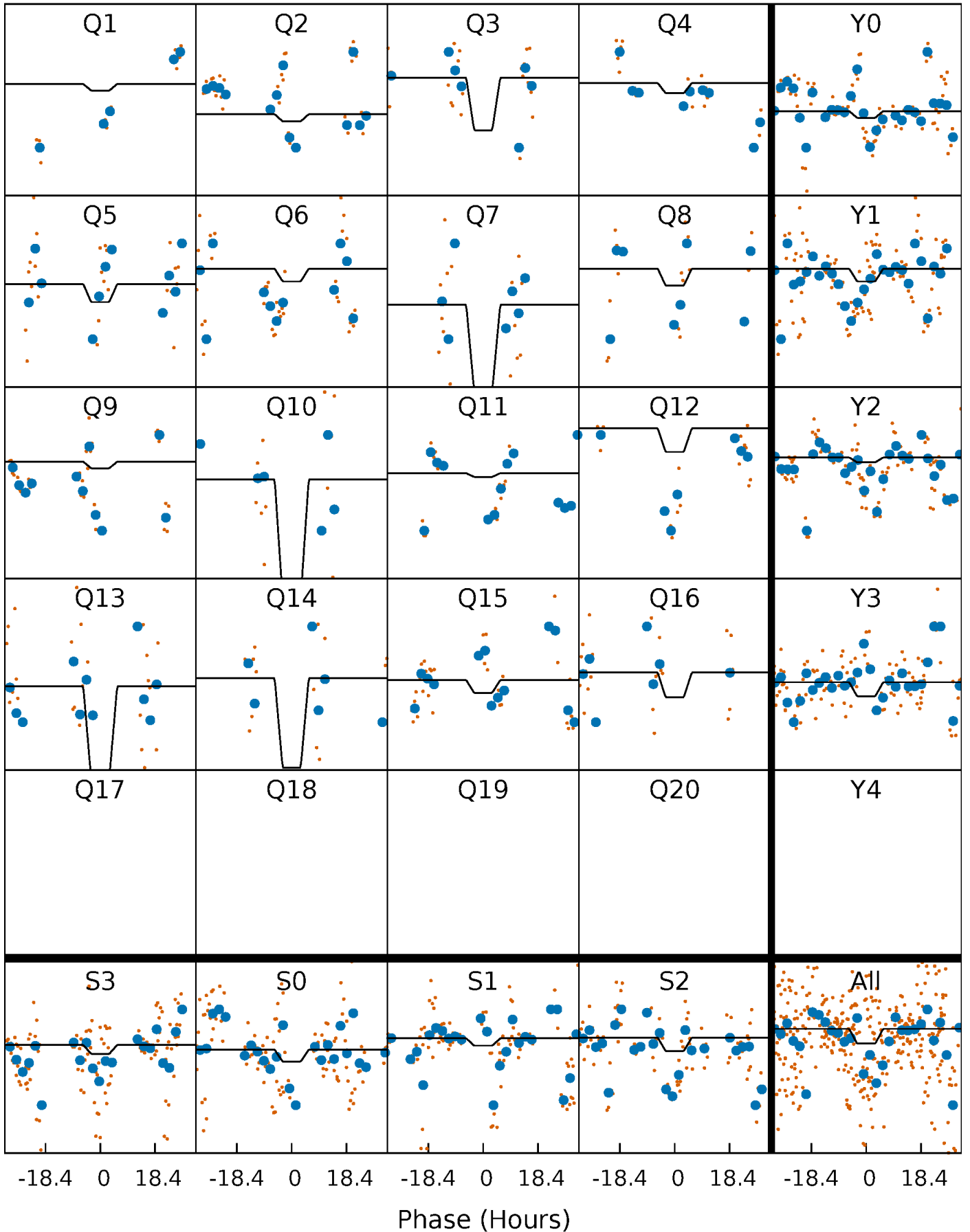
# DV Quarter-Phased Transit Curves

TCE 009655155-02 P= 36.246576 Days  $T_0=144.109840$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 009655155-02 P= 36.242005 Days  $T_0=144.213643$  (BKJD)

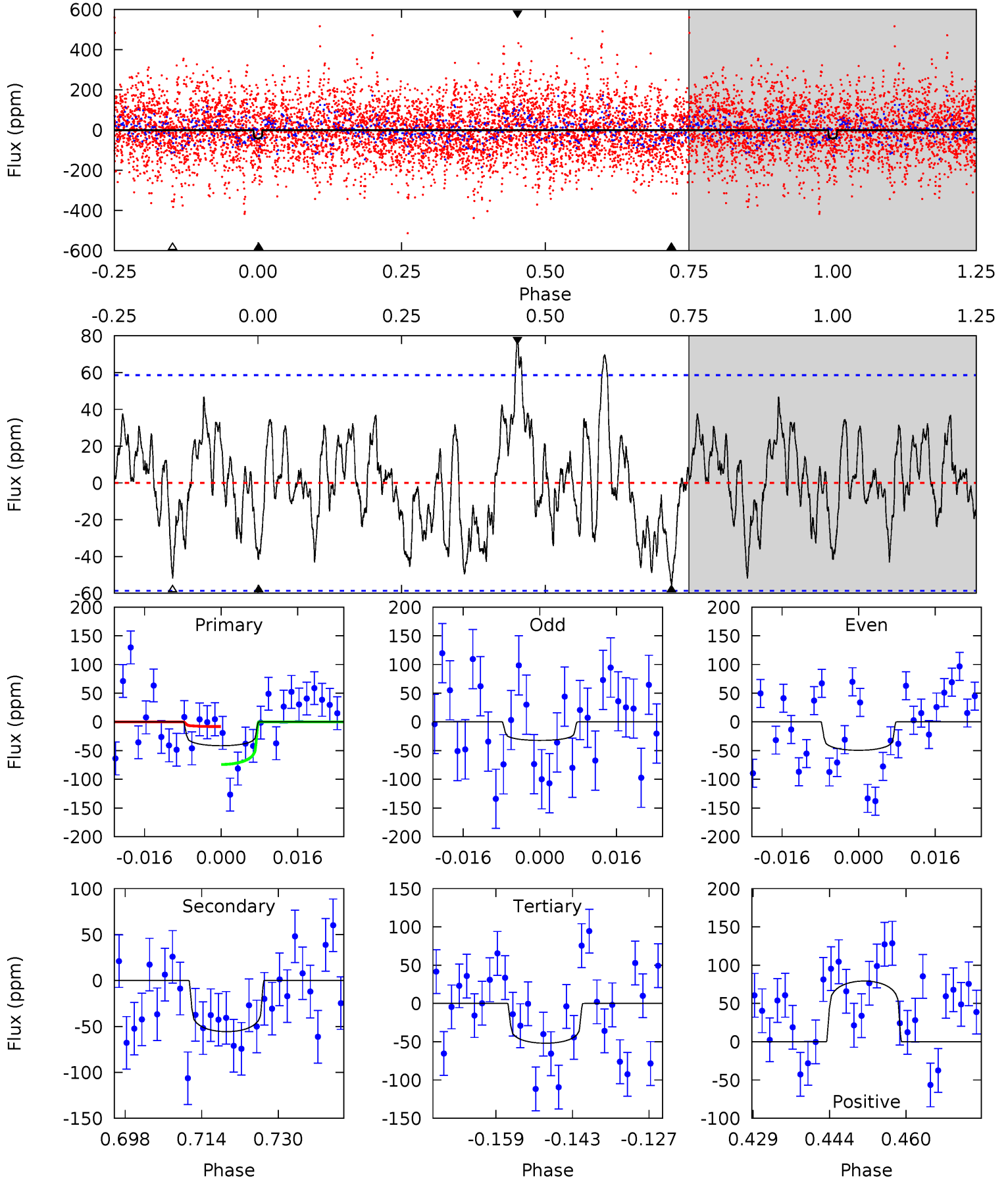




# DV Model-Shift Uniqueness Test

009655155-02, P = 36.246576 Days, E = 107.863264 Days

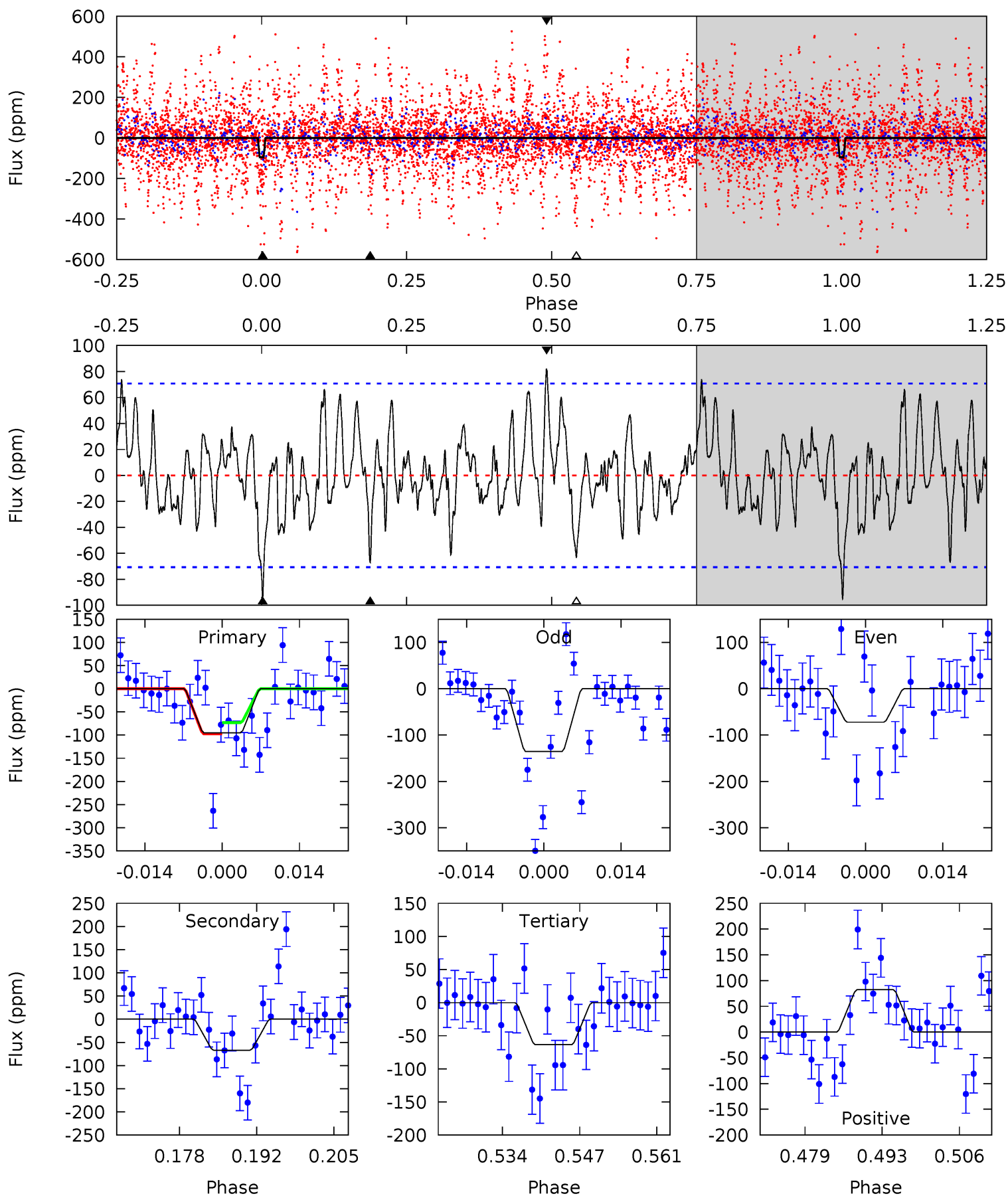
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
3.49	4.69	4.37	6.68	4.94	2.41	2.02	-0.88	-3.18	0.32	-1.98	0.72	0.62	0.59	2.82



# Alt Model-Shift Uniqueness Test

009655155-02, P = 36.242005 Days, E = 107.971638 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.67	4.69	4.45	5.76	4.97	2.47	1.78	2.22	0.91	0.24	-1.07	2.12	1.06	0.46	0.86



### Stellar Parameters For KIC 009655155

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7643^{+68}_{-84}$	$3.846^{+0.203}_{-0.068}$	$0.000^{+0.100}_{-0.150}$	$2.760^{+0.249}_{-0.748}$	$1.951^{+0.031}_{-0.262}$	$0.131^{+0.147}_{-0.029}$
	+1%/-1%	+5%/-2%	+inf%/-inf%	+9%/-27%	+2%/-13%	+113%/-22%
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 009655155-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-56 \pm 12$	$2.39^{+0.86}_{-0.80}$	$1497^{+54}_{-98}$	$7118^{+1939}_{-1093}$	$370^{+452}_{-179}$
Alt.	$-67 \pm 14$	$2.05^{+0.82}_{-0.82}$	$1505^{+49}_{-106}$	$8283^{+3512}_{-1513}$	$608^{+1114}_{-309}$

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

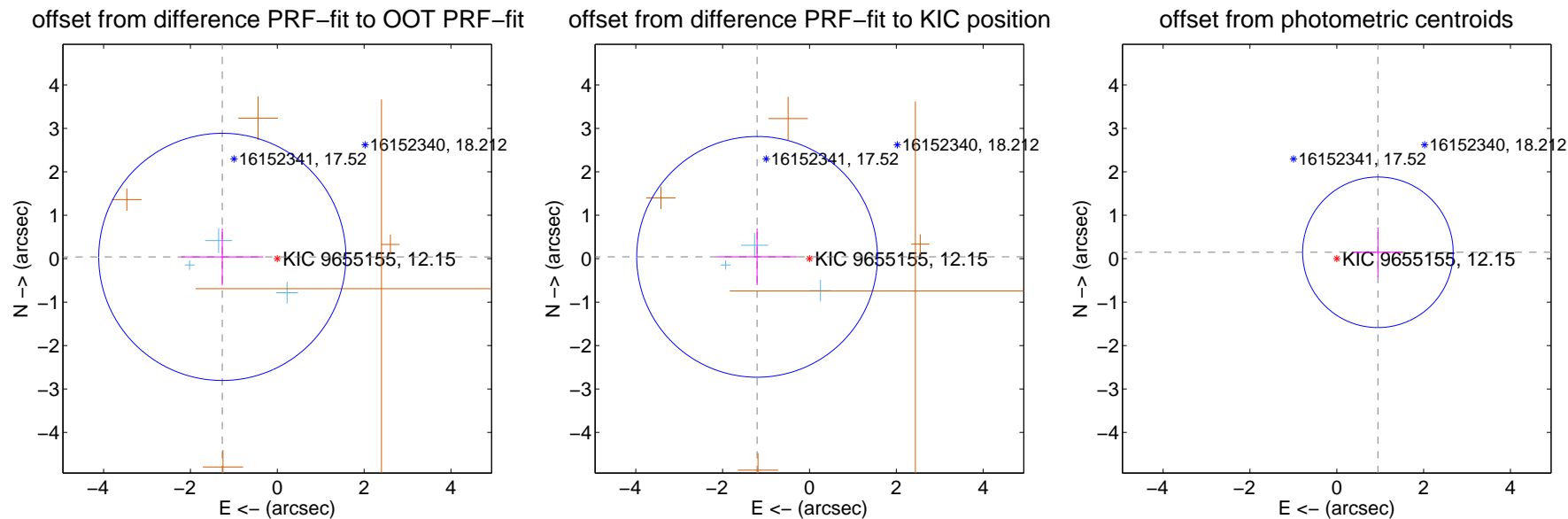
## DV Centroid Data

Supplemental centroid analysis for 009655155-02. Kepler magnitude: 12.15. Transit SNR 5.62

There are 3 quarters with good PRF difference image offsets

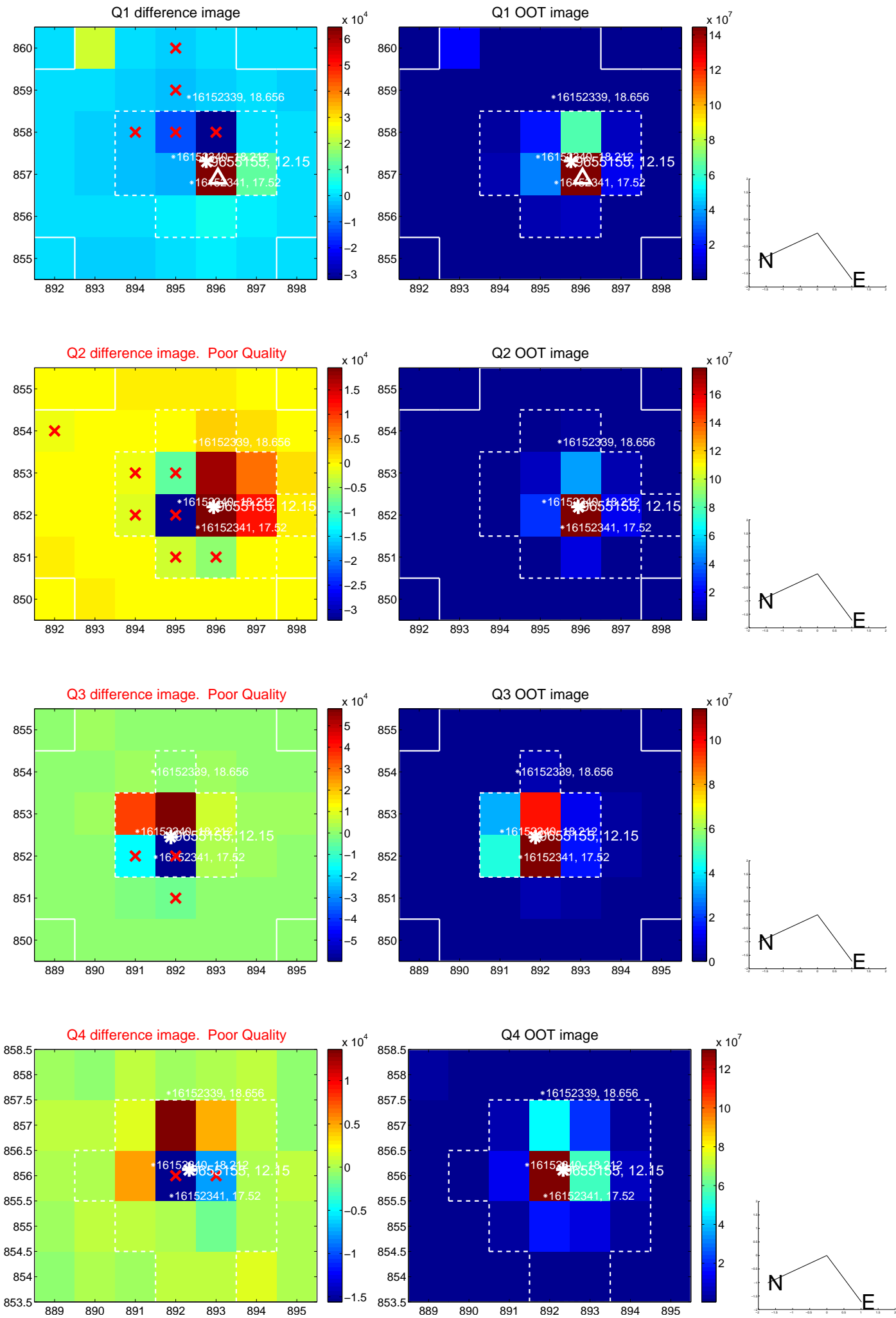
The direct PRF centroid is offset from the target star catalog position by about 0.10 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.267 \pm 0.948$	1.34	$1.266 \pm 0.946$	$0.042 \pm 0.655$
PRF-fit source offset from KIC position	$1.207 \pm 0.924$	1.31	$1.207 \pm 0.923$	$0.042 \pm 0.652$
photometric centroid source offset	$0.96 \pm 0.58$	1.66	$-0.95 \pm 0.58$	$0.15 \pm 0.57$



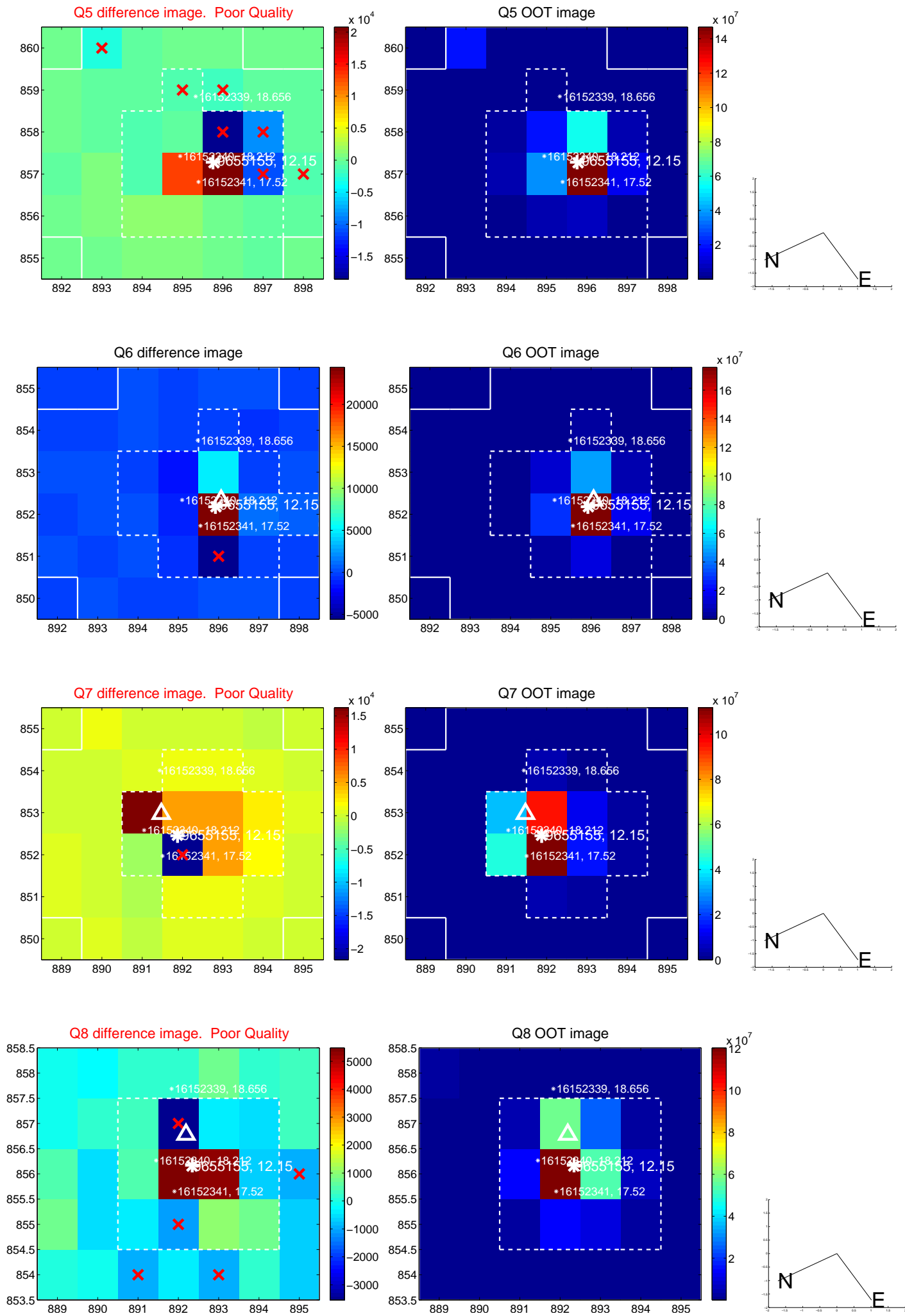
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

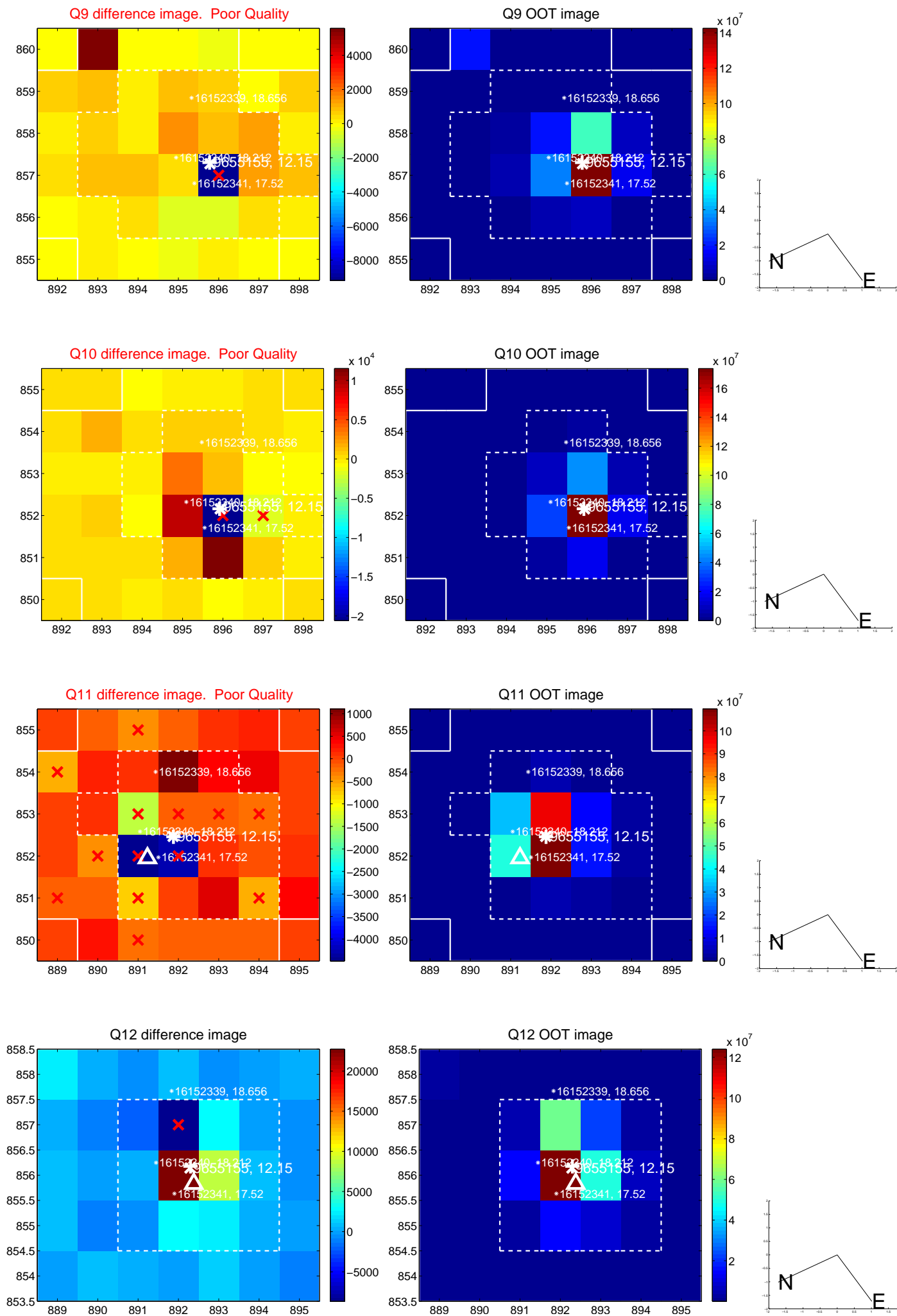




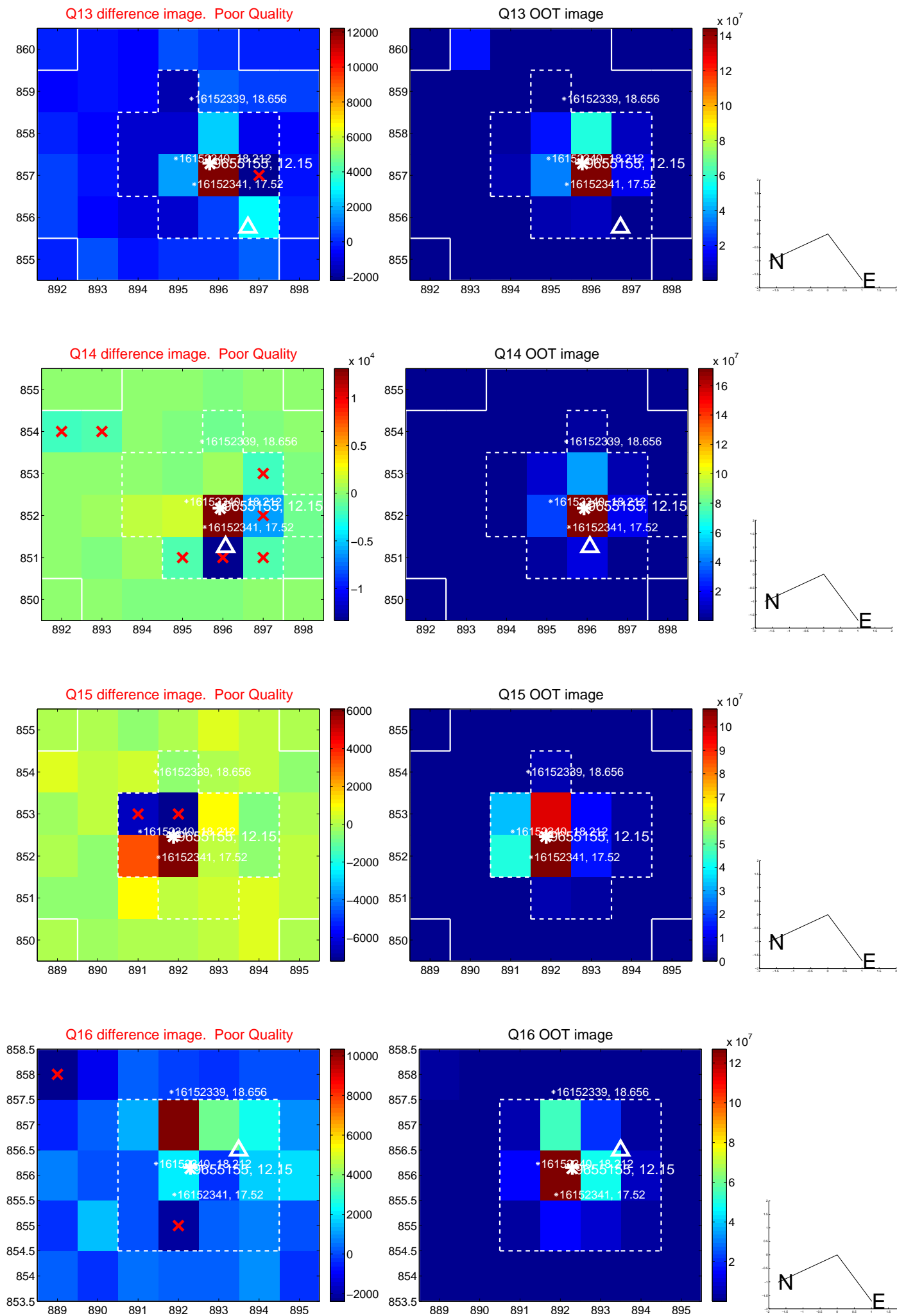
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



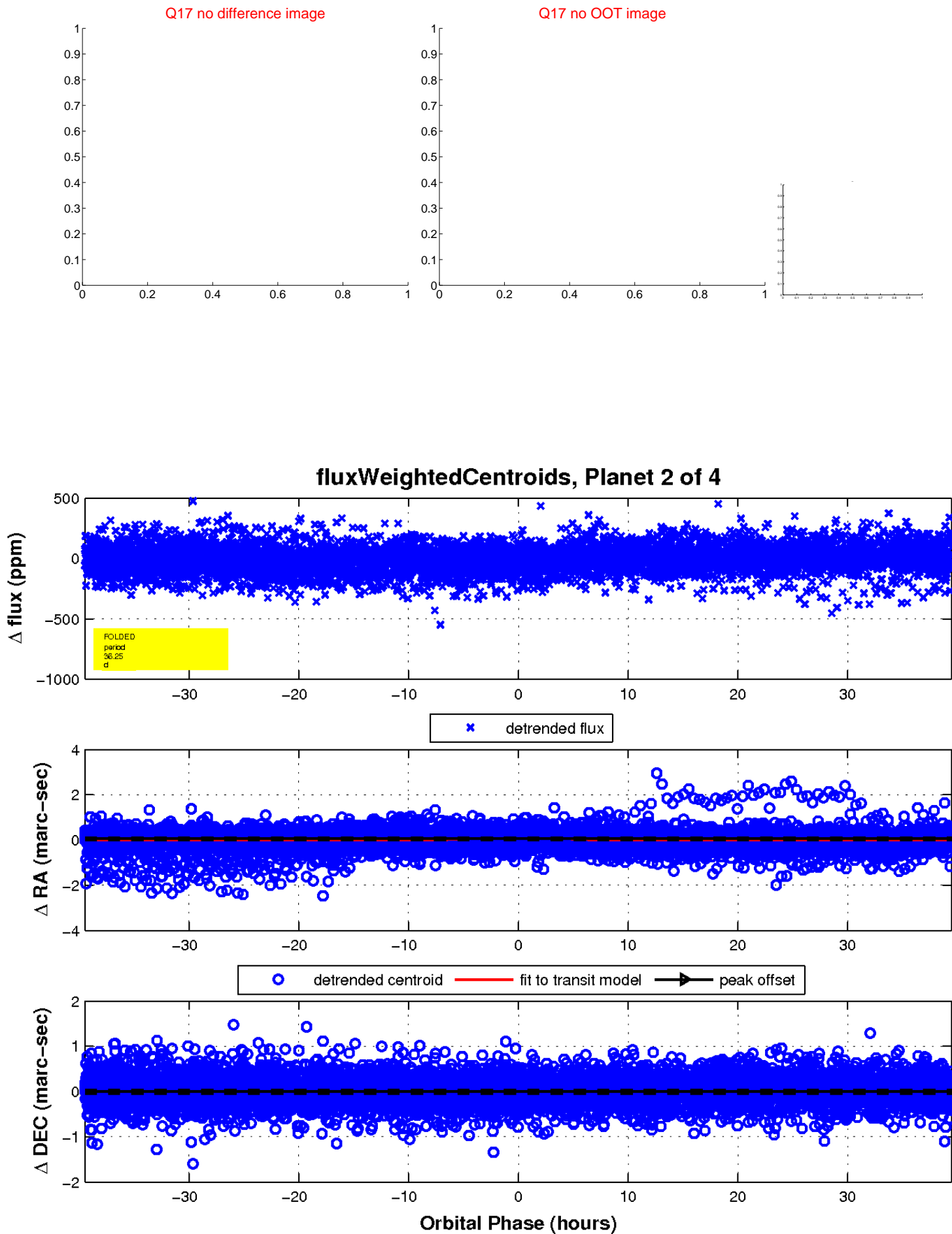
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

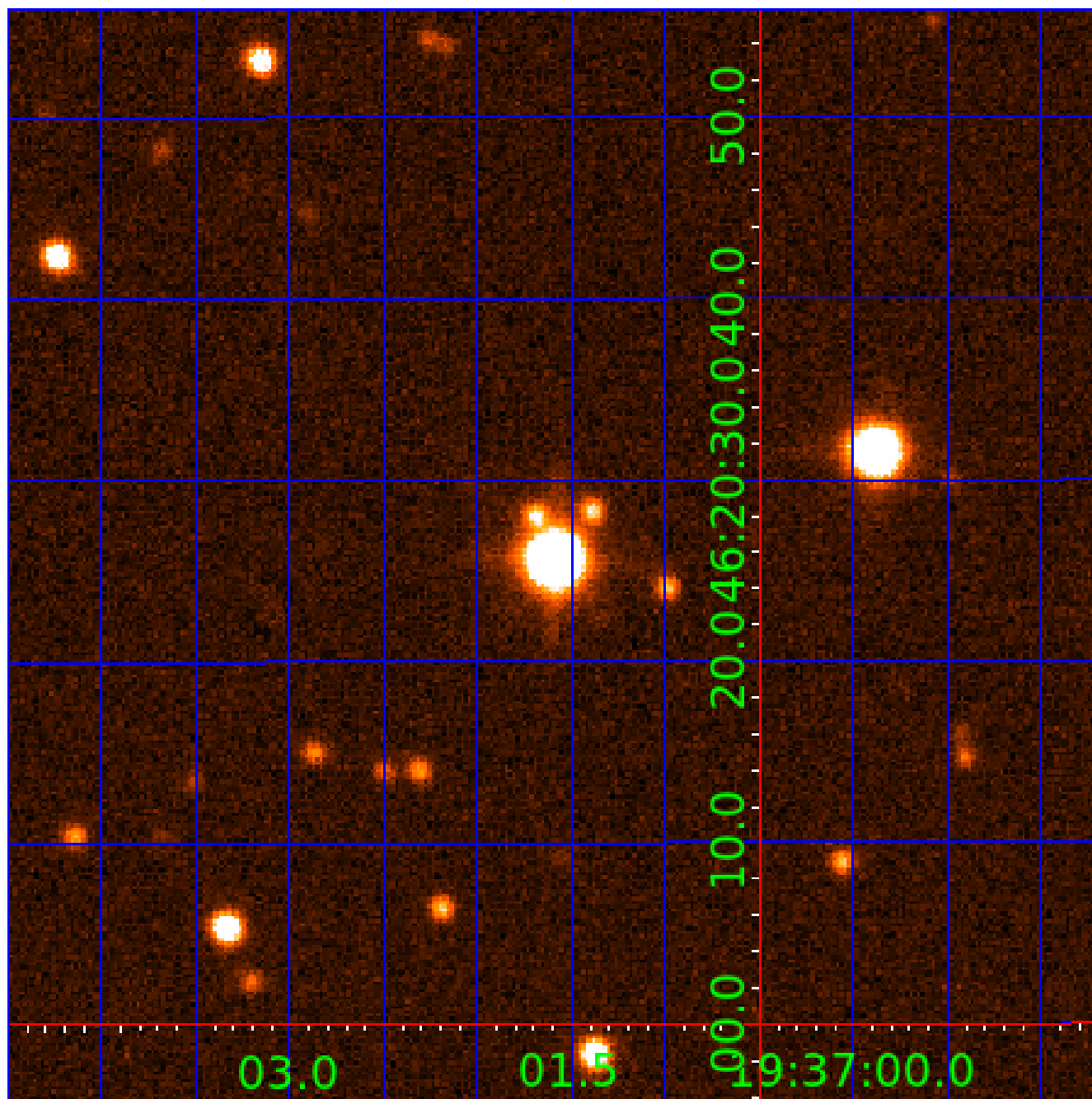


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 009655155

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009655155-01	OBS	No	0.976512	132.120673	3.7	6.883	7.8	5.0	2.76	7643	0.54	40208.60
009655155-02	OBS	No	36.246576	144.109840	68.9	13.162	16.4	5.6	2.76	7643	2.54	324.74
009655155-03	OBS	No	50.849347	169.620394	217.9	1.083	12.1	8.4	2.76	7643	4.93	206.78
009655155-04	OBS	No	40.986762	167.812024	279.4	7.076	9.2	11.5	2.76	7643	8.52	275.65

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009655155-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT
009655155-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT
009655155-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009655155-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—CENT_FEW_DIFFS

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

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

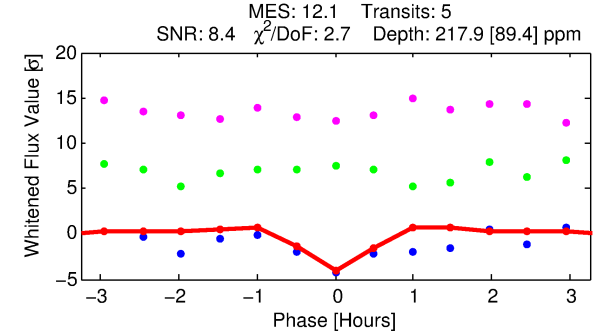
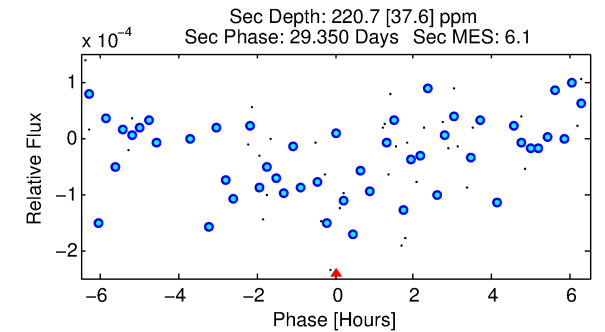
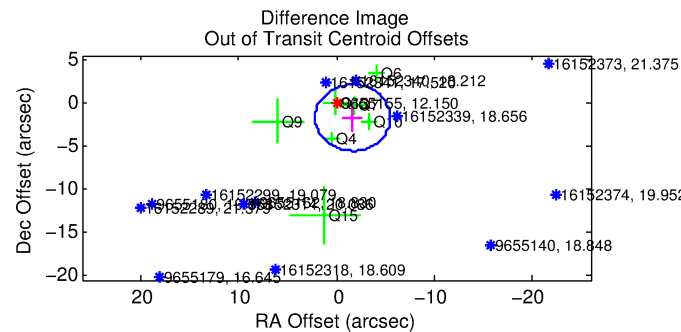
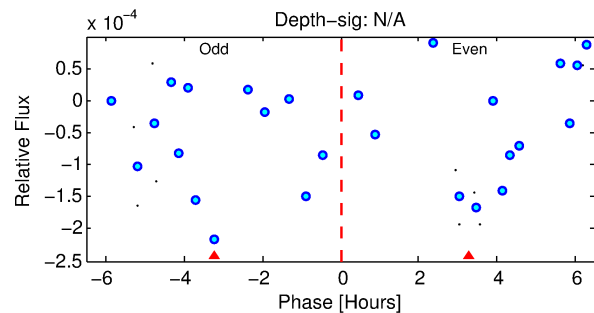
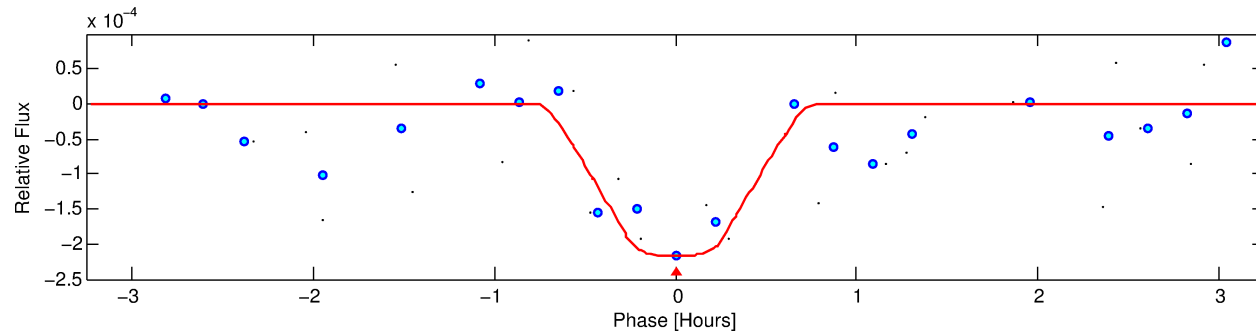
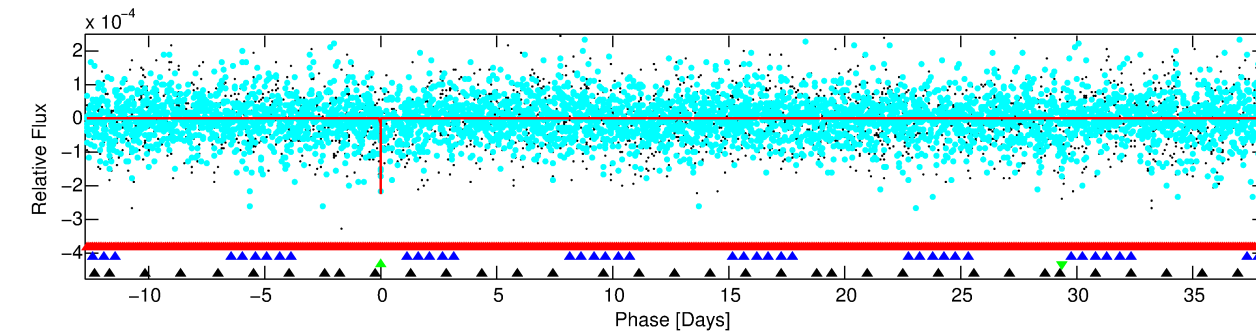
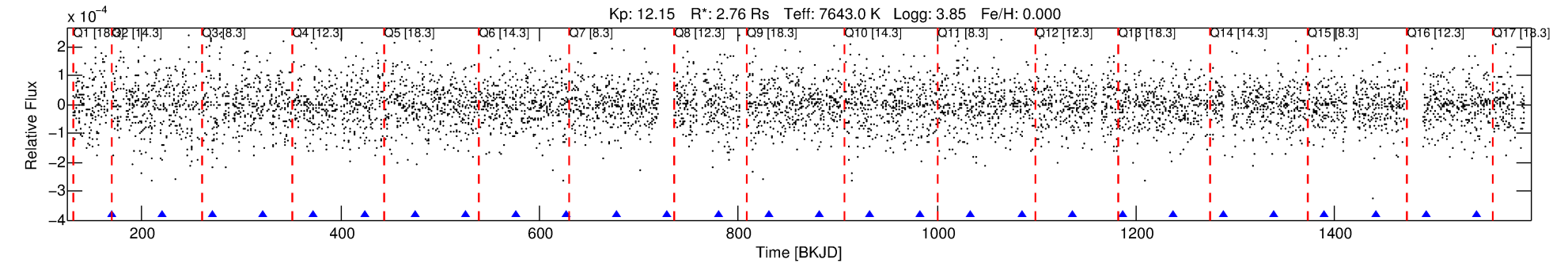
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 009655155-03

No Significant Match Found

# DV One-Page Summary

KIC: 9655155 Candidate: 3 of 4 Period: 50.849 d



## DV Fit Results:

Period = 50.84935 [0.00063] d  
Epoch = 169.6204 [0.0071] BKJD  
Rp/R\* = 0.0164 [0.0257]  
a/R\* = 140.24 [1379.21]  
b = 0.94 [1.28]  
Seff = 206.78 [75.04]  
Teff = 967 [88] K  
Rp = 4.93 [7.87] Re  
a = 0.3356 [0.0801] AU  
Ag = 563.51 [1788.19] [0.31σ]  
Teffp = 7284 [5742] K [1.10σ]

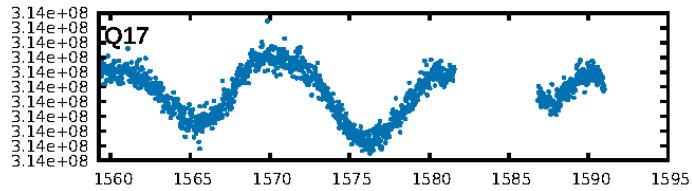
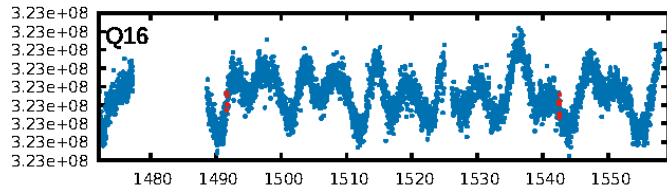
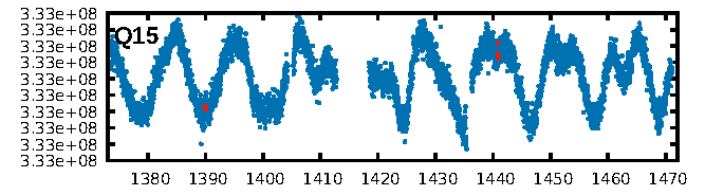
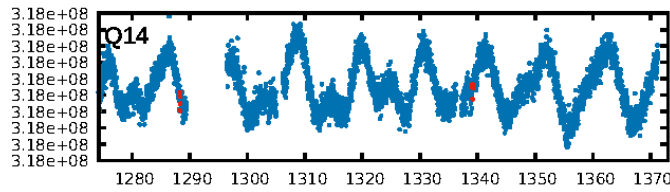
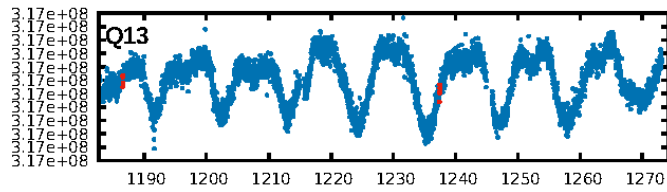
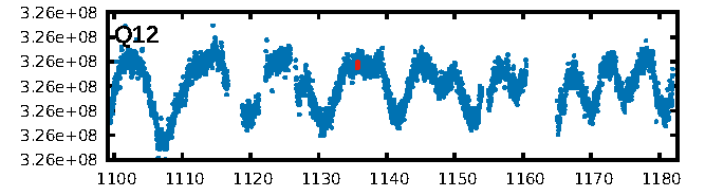
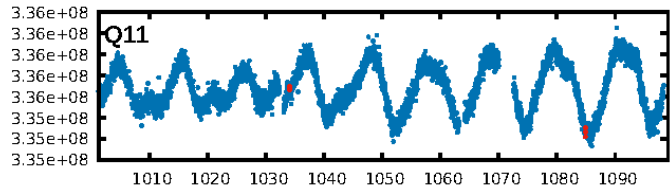
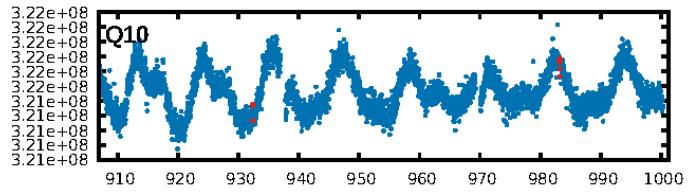
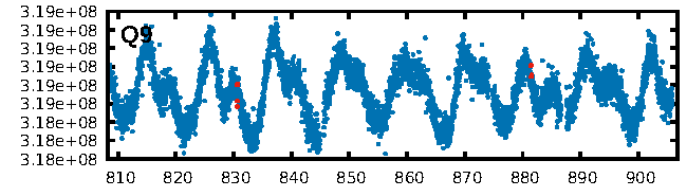
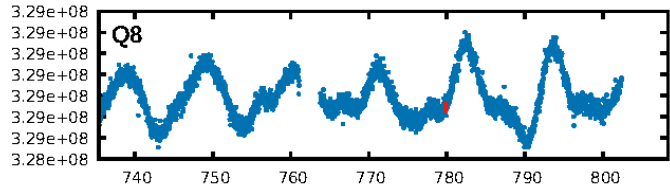
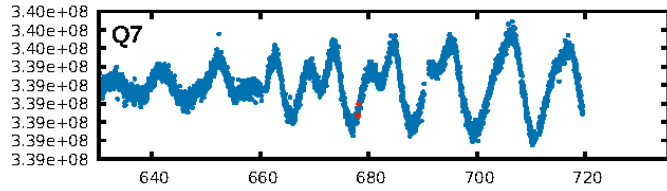
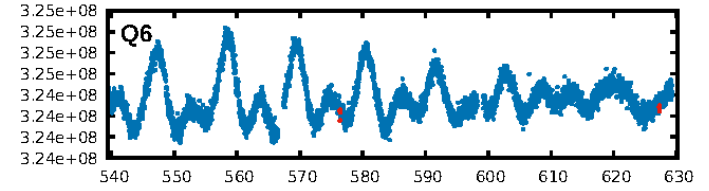
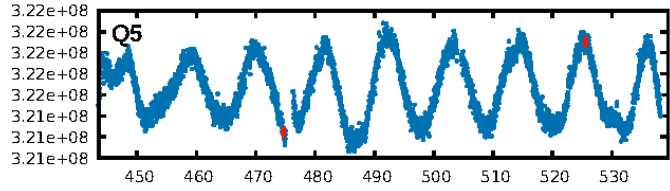
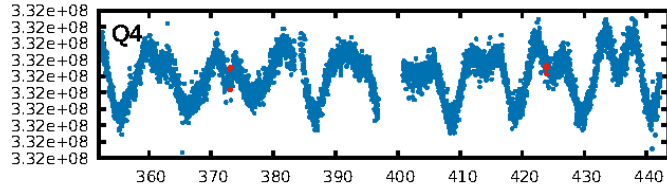
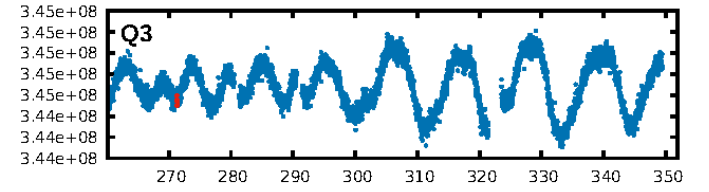
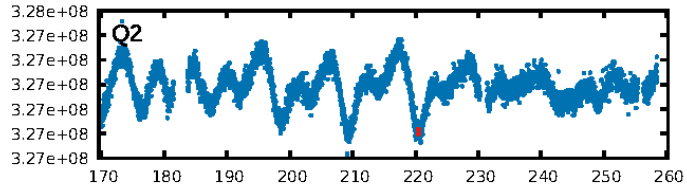
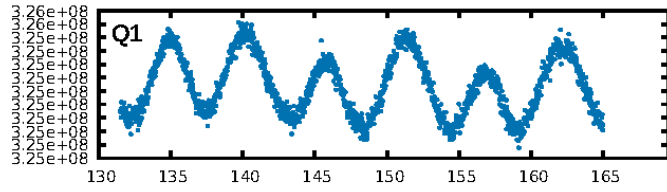
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [33.07σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 72.2%  
ModelChiSquareGof-sig: 97.6%  
Bootstrap-pfa: 5.77e-16  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: 1.815  
Centroid-sig: 46.8%  
Centroid-so: 0.465 arcsec [0.72σ]  
OotOffset-rm: 2.389 arcsec [1.87σ]  
OotOffset-st: 2/2/1/2 [7]  
KicOffset-rm: 2.390 arcsec [1.86σ]  
KicOffset-st: 2/2/1/2 [7]  
DiffImageQuality-fgm: 0.29 [2/7]  
DiffImageOverlap-fno: 0.27 [4/15]

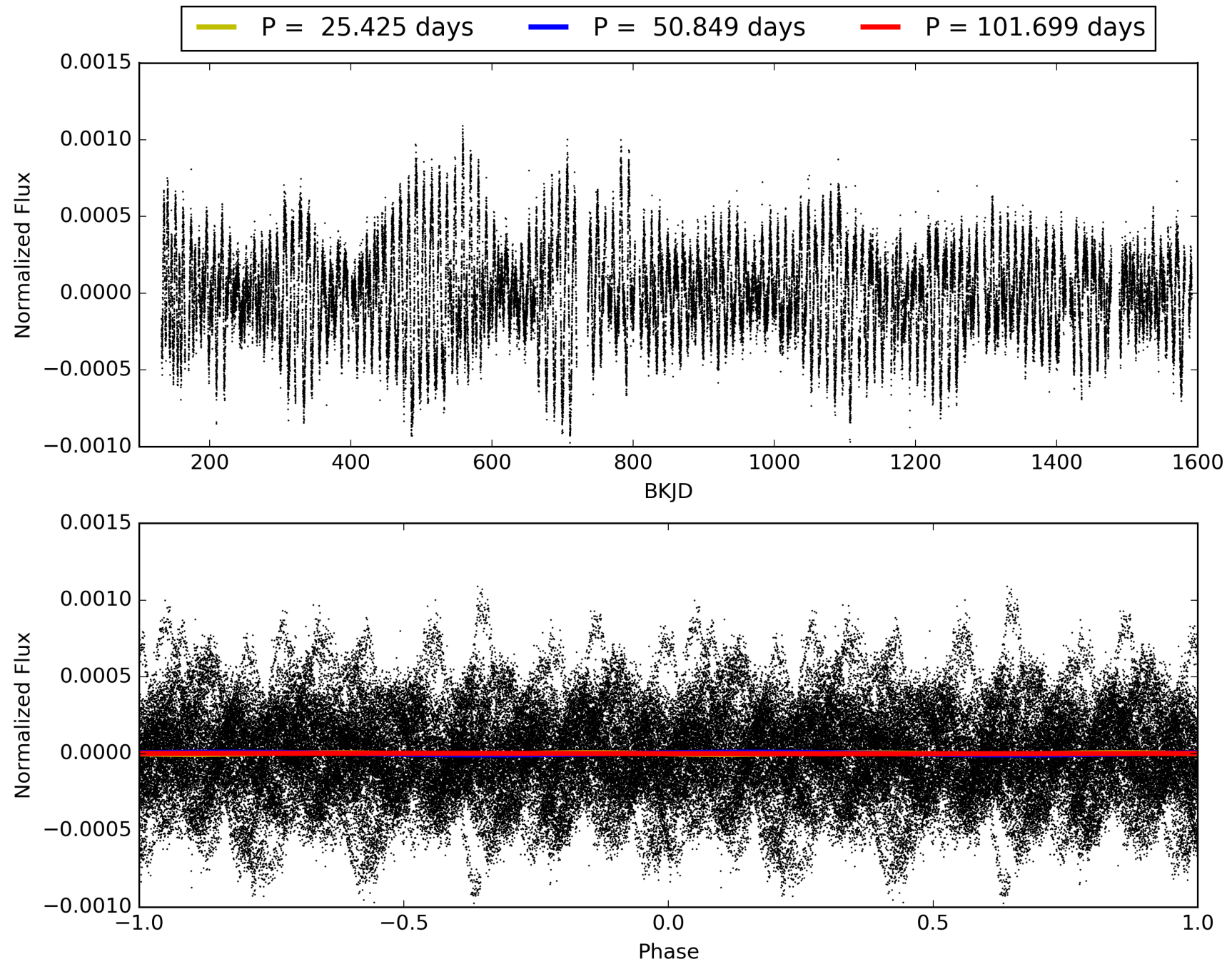
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 04:43:38 Z

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

## TCE 009655155-03, PDC Light Curves

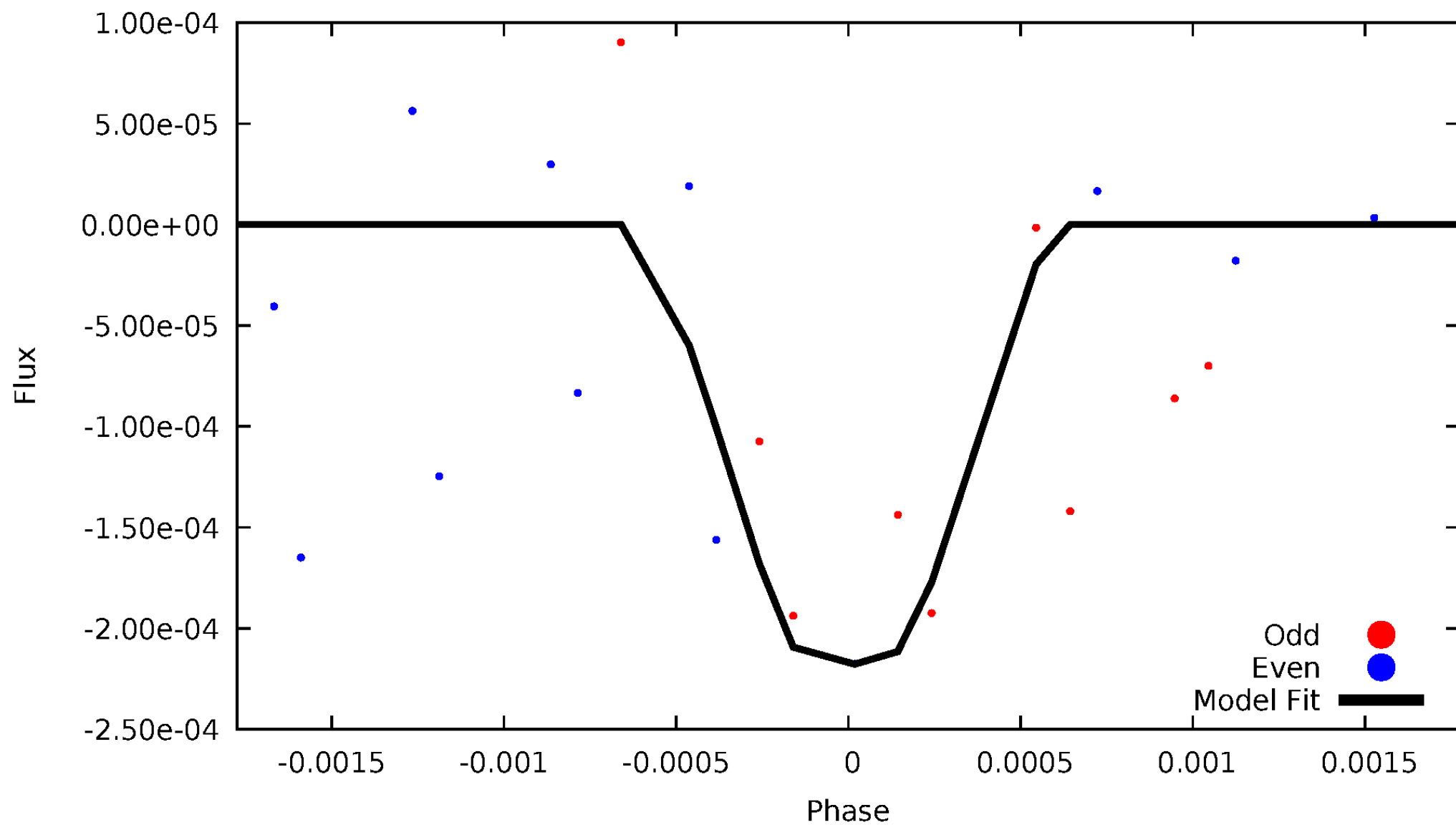


TCE 009655155-03



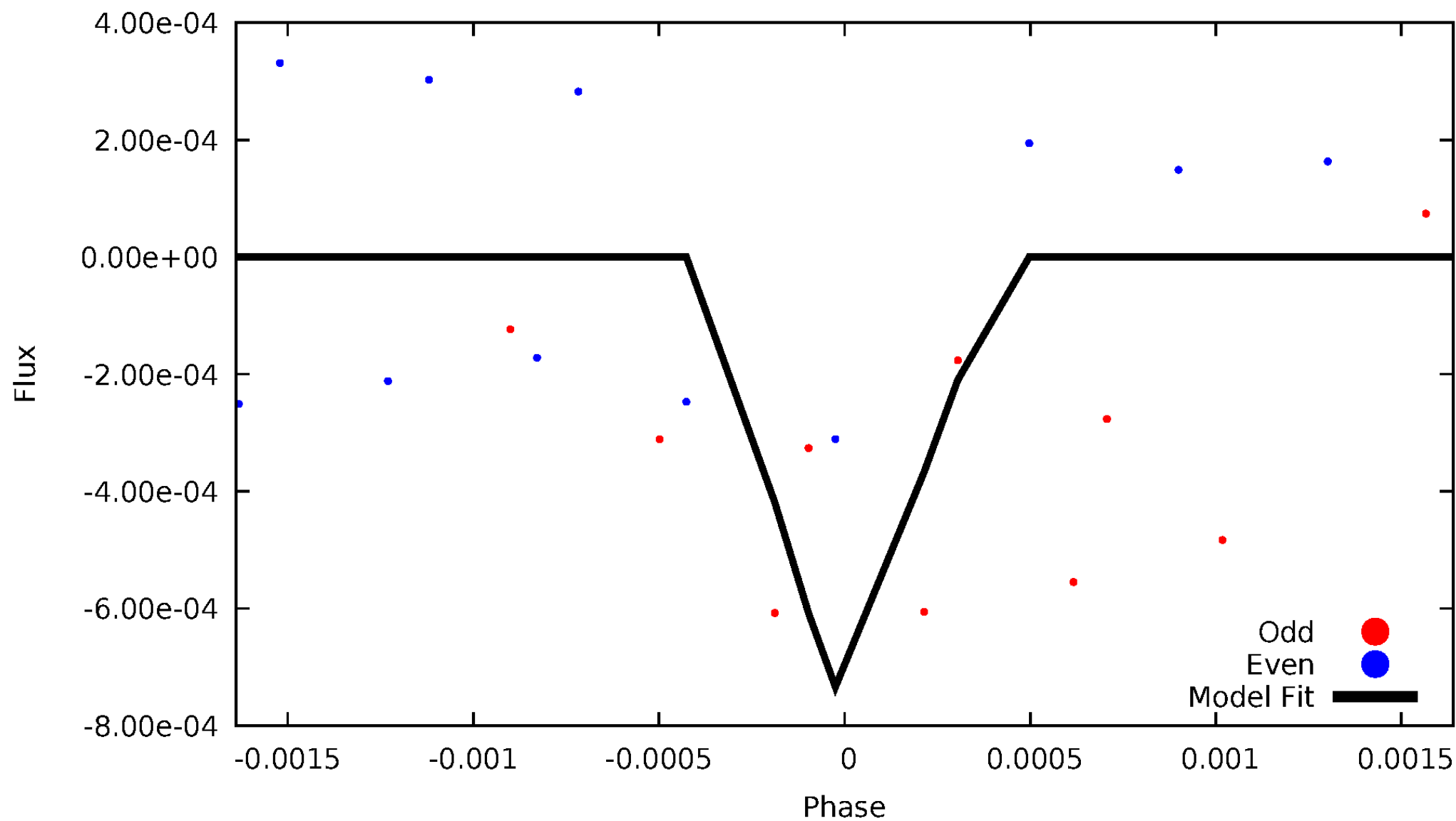
# DV Odd/Even

TCE 009655155-03



# ALT Odd/Even

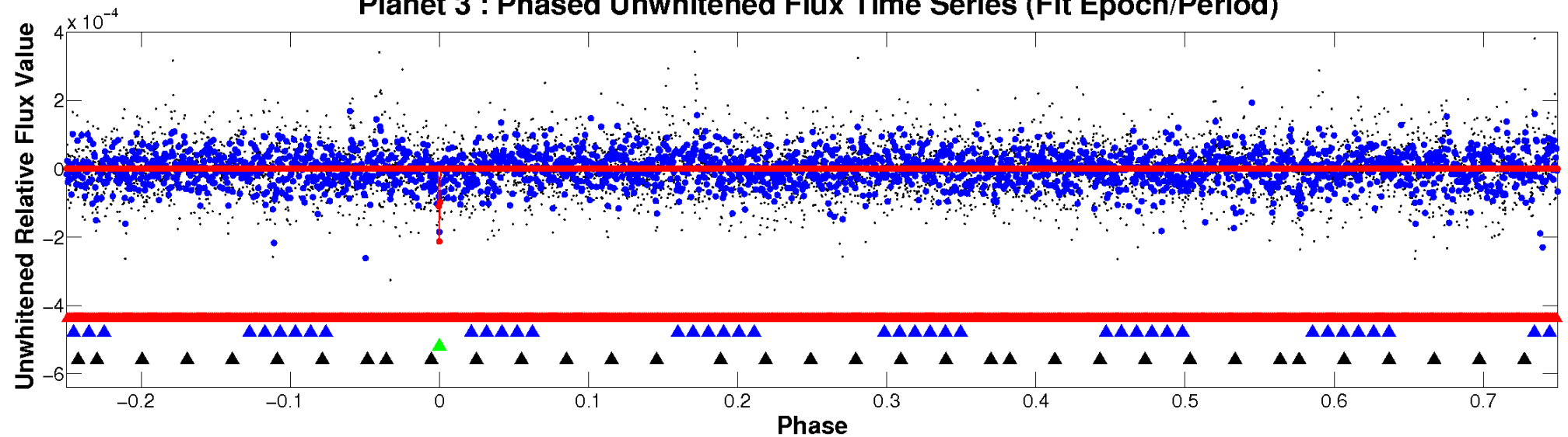
TCE 009655155-03



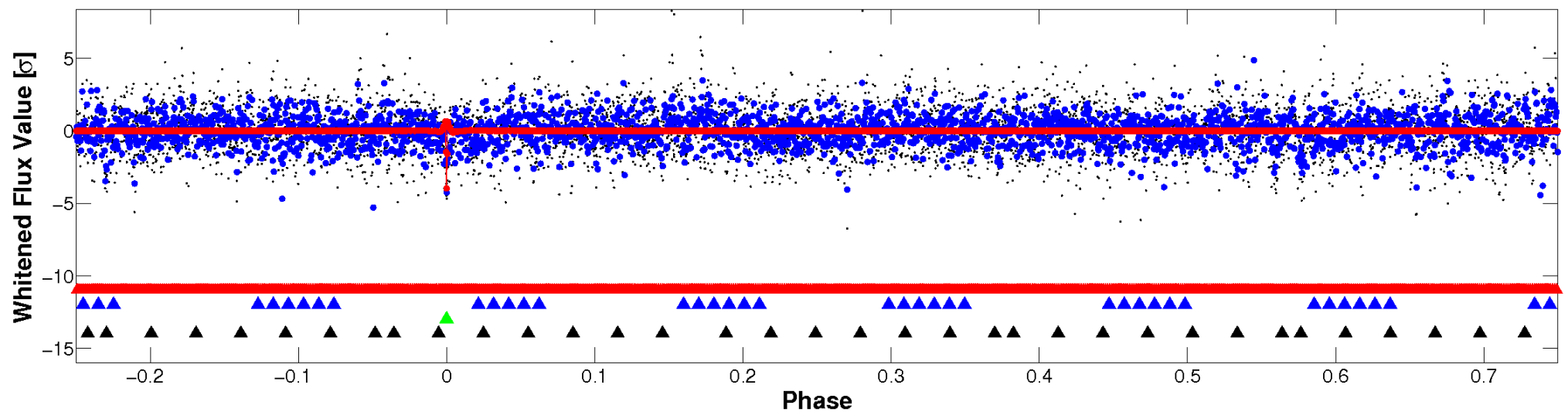


# Non-Whitened Vs. Whitened Light Curve

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

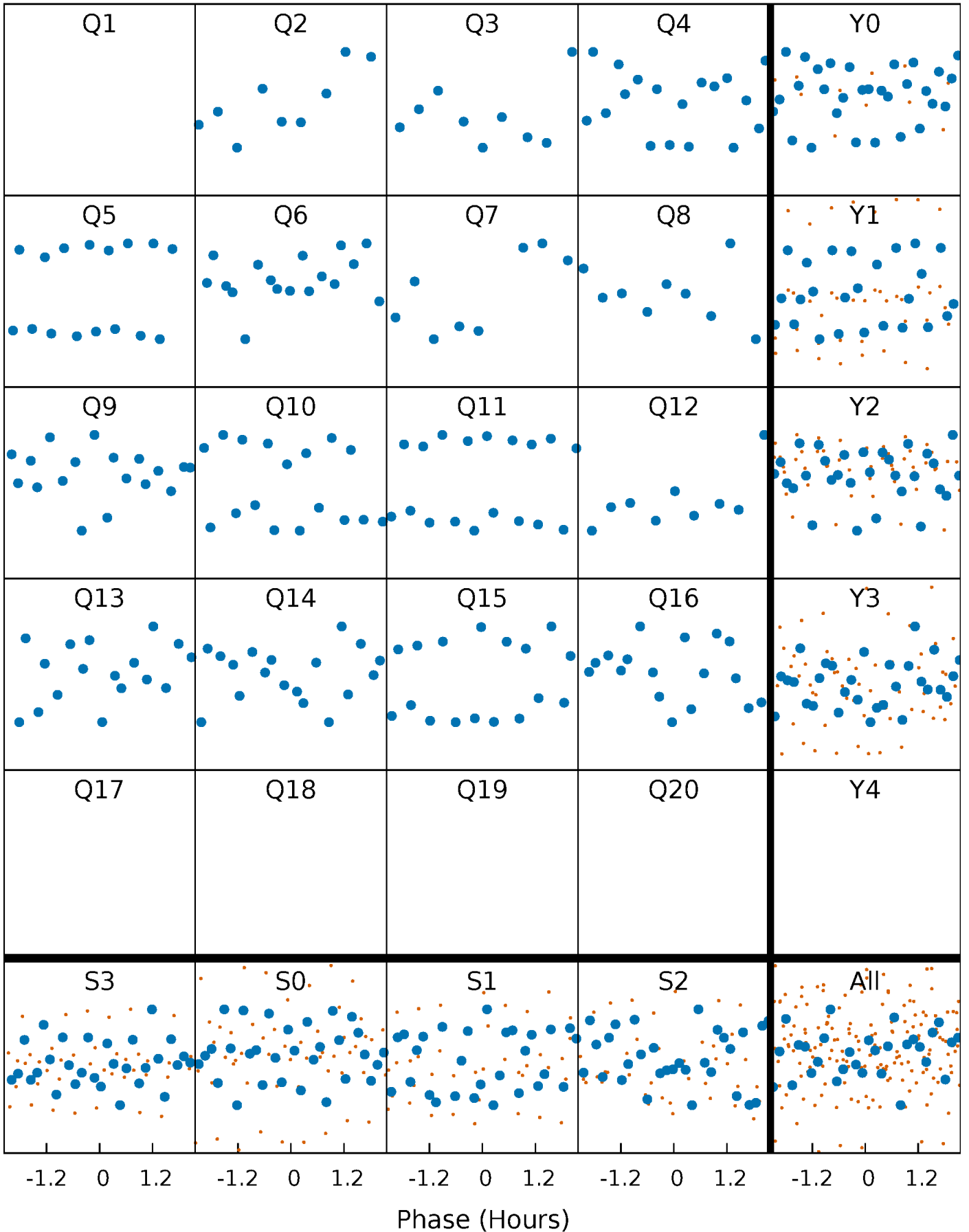


Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



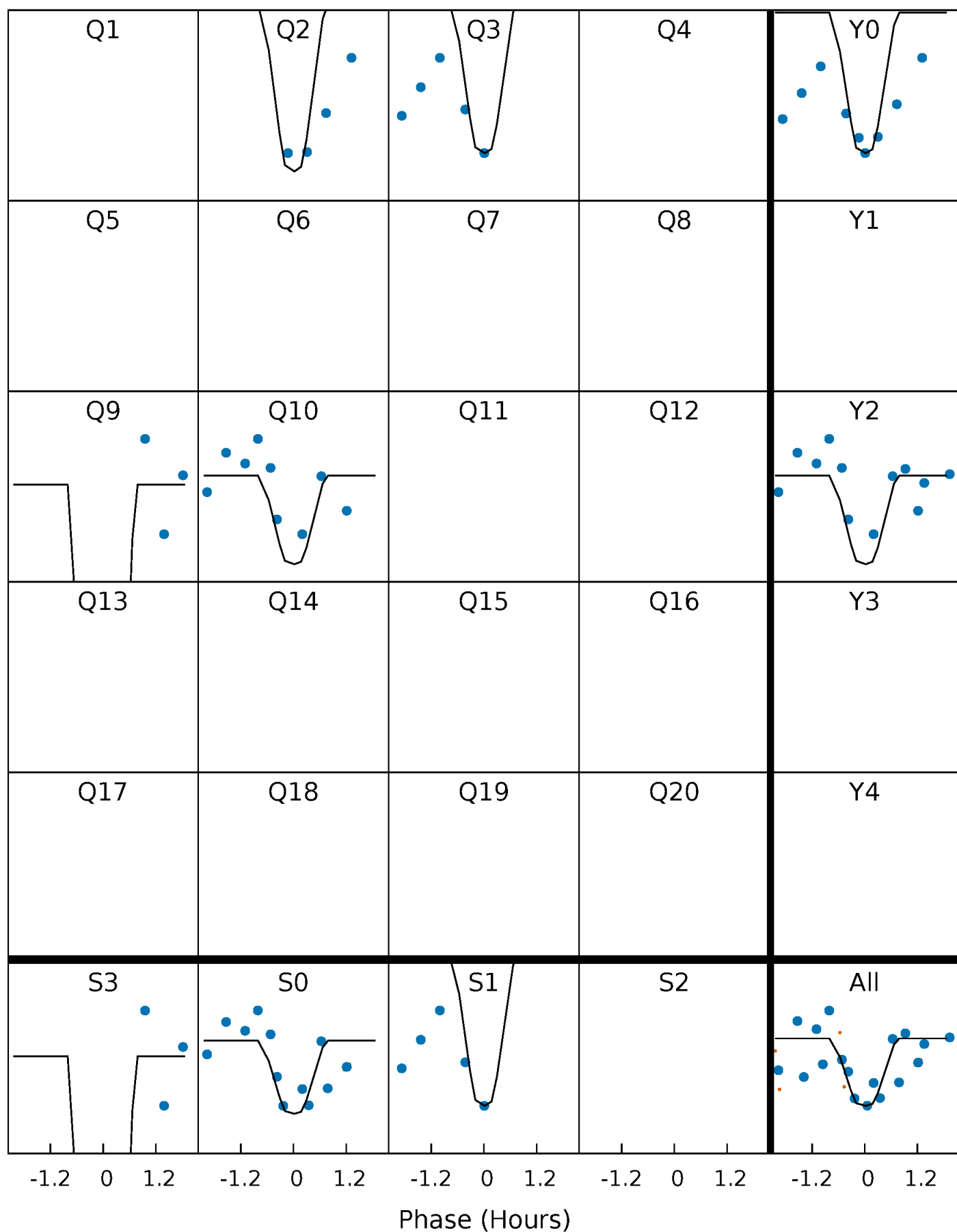
# PDC Quarter-Phased Transit Curves

TCE 009655155-03 P= 50.849347 Days  $T_0=169.620394$  (BKJD)



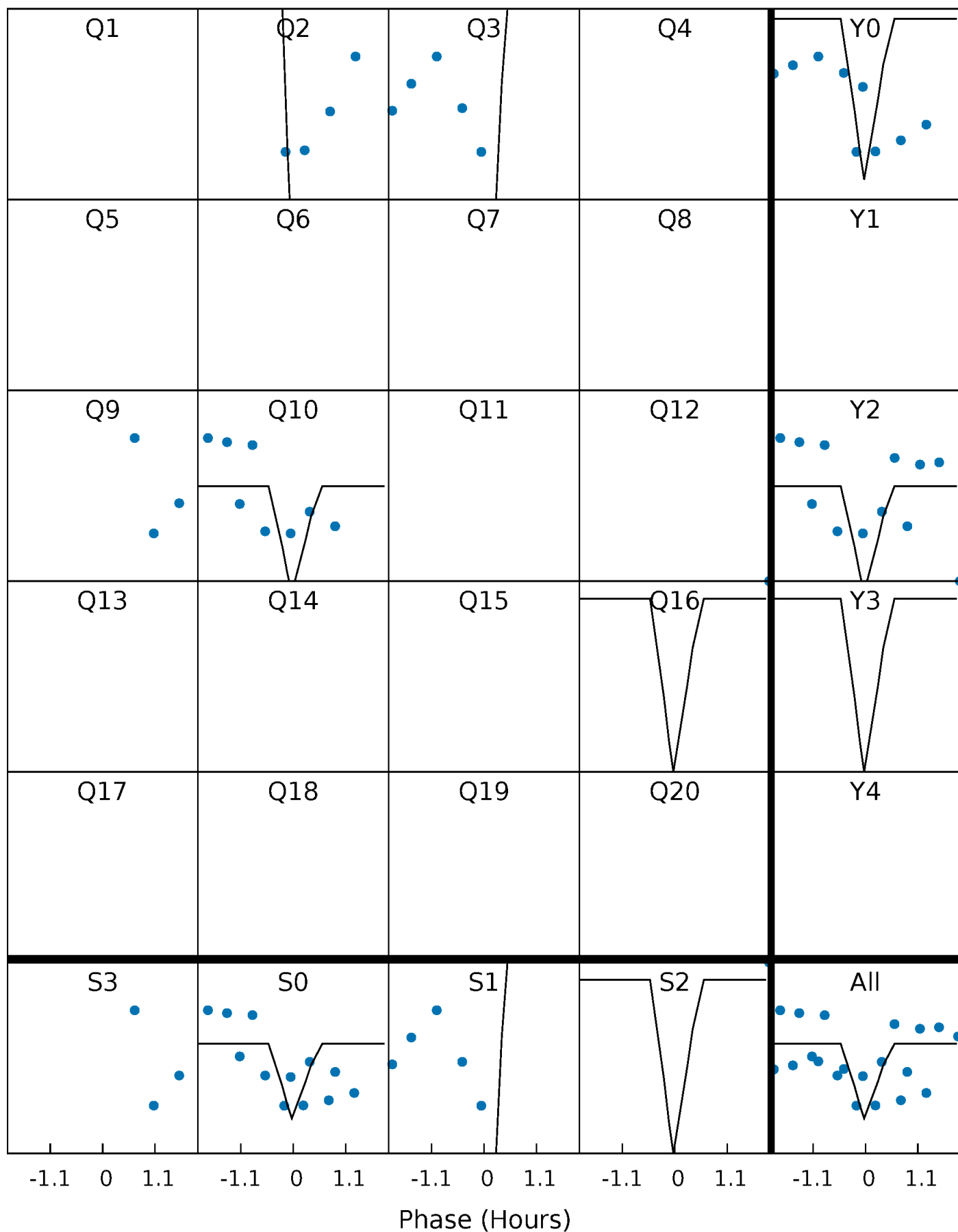
# DV Quarter-Phased Transit Curves

TCE 009655155-03 P= 50.849347 Days  $T_0=169.620394$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

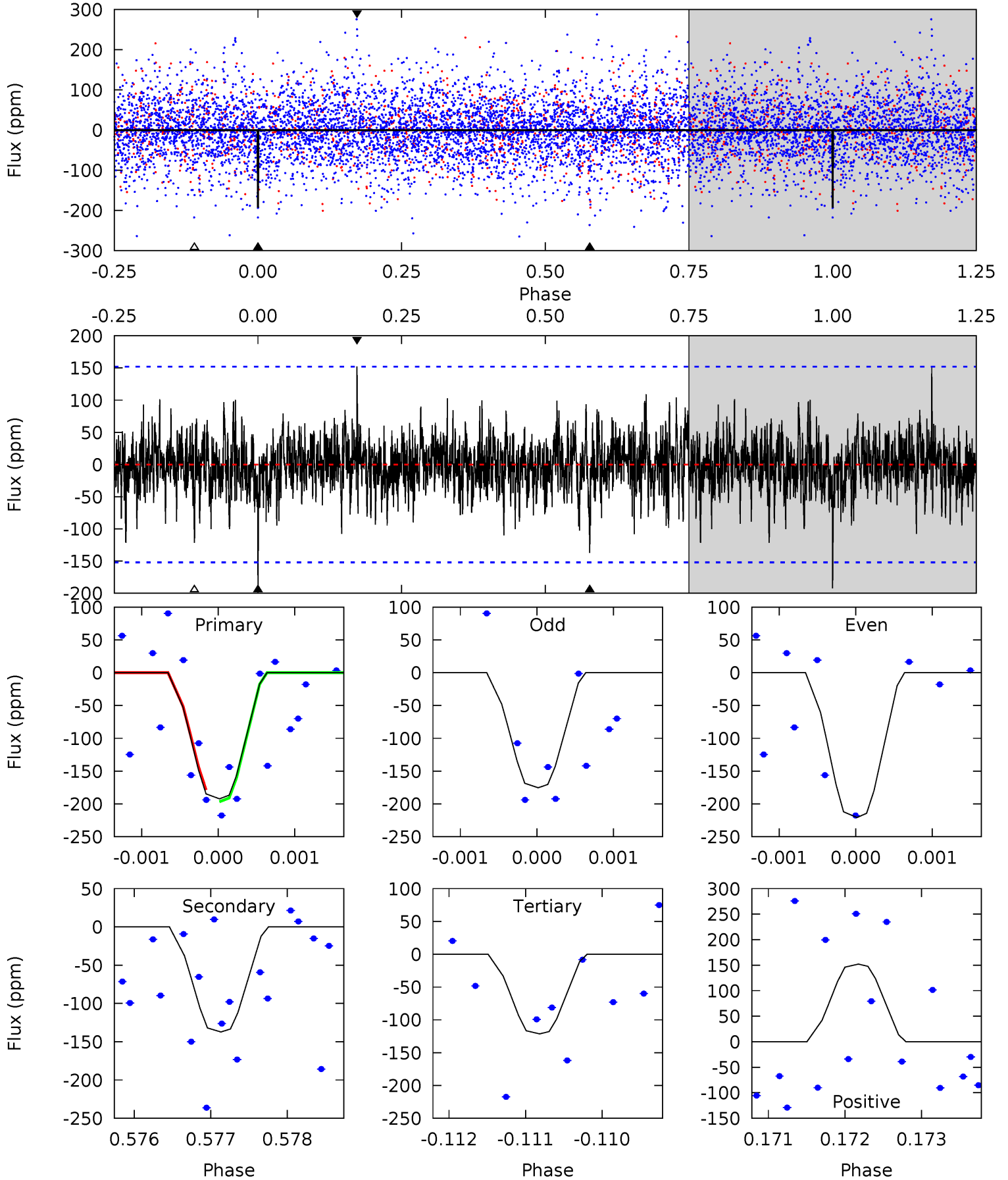
TCE 009655155-03 P= 50.850119 Days  $T_0=169.621032$  (BKJD)



# DV Model-Shift Uniqueness Test

009655155-03, P = 50.849347 Days, E = 118.771047 Days

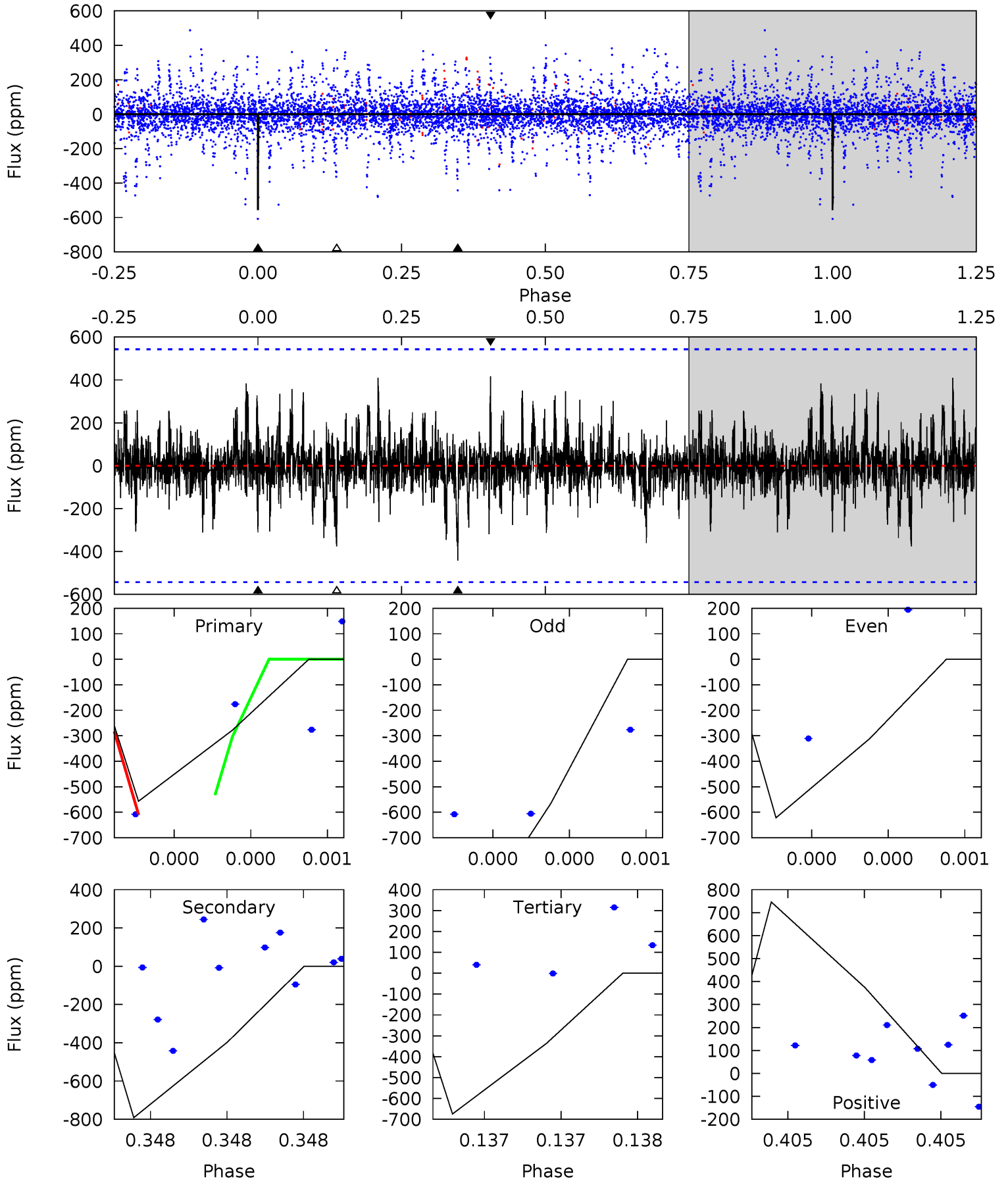
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.90	4.92	4.35	5.45	5.45	3.29	1.22	2.54	1.44	0.57	-0.53	0.76	0.92	0.44	0.32



# Alt Model-Shift Uniqueness Test

009655155-03, P = 50.850119 Days, E = 118.770913 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
3.21	4.57	3.89	4.31	5.61	3.54	0.99	-0.68	-1.09	0.68	0.26	1.58	1.00	0.46	0





### Stellar Parameters For KIC 009655155

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7643^{+68}_{-84}$	$3.846^{+0.203}_{-0.068}$	$0.000^{+0.100}_{-0.150}$	$2.760^{+0.249}_{-0.748}$	$1.951^{+0.031}_{-0.262}$	$0.131^{+0.147}_{-0.029}$
	+1%/-1%	+5%/-2%	+inf%/-inf%	+9%/-27%	+2%/-13%	+113%/-22%
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 009655155-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-137 \pm 28$	$6.99^{+6.71}_{-4.59}$	$1341^{+43}_{-89}$	$5190^{+4308}_{-1162}$	$163^{+1296}_{-120}$
Alt.	$-396 \pm 97$	$9.21^{+7.30}_{-5.63}$	$1344^{+43}_{-95}$	$5846^{+4900}_{-1317}$	$276^{+1575}_{-196}$

$T_{max}$  = 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

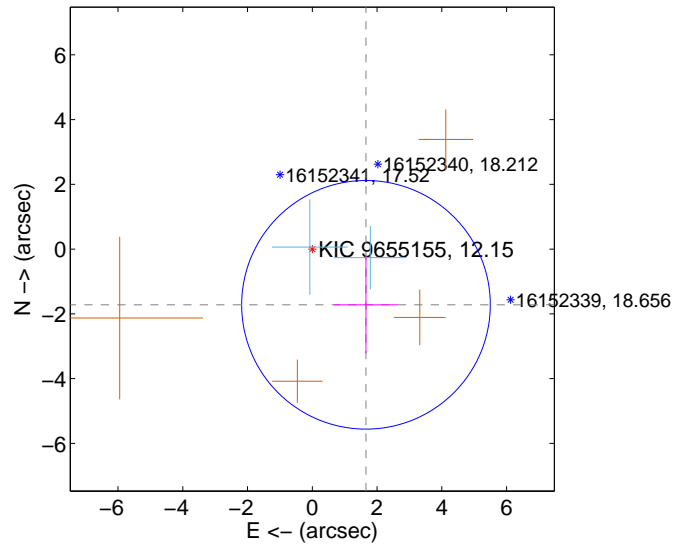
Supplemental centroid analysis for 009655155-03. Kepler magnitude: 12.15. Transit SNR 8.44

There are 2 quarters with good PRF difference image offsets

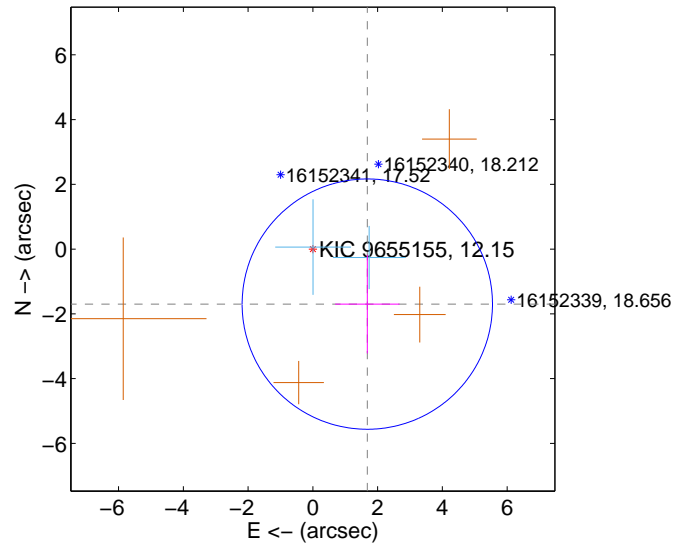
The direct PRF centroid is offset from the target star catalog position by about 0.04 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.389 \pm 1.280$	1.87	$-1.658 \pm 0.991$	$-1.721 \pm 1.499$
PRF-fit source offset from KIC position	$2.390 \pm 1.288$	1.86	$-1.682 \pm 0.993$	$-1.699 \pm 1.523$
photometric centroid source offset	$0.46 \pm 0.65$	0.72	$-0.08 \pm 0.63$	$0.46 \pm 0.65$

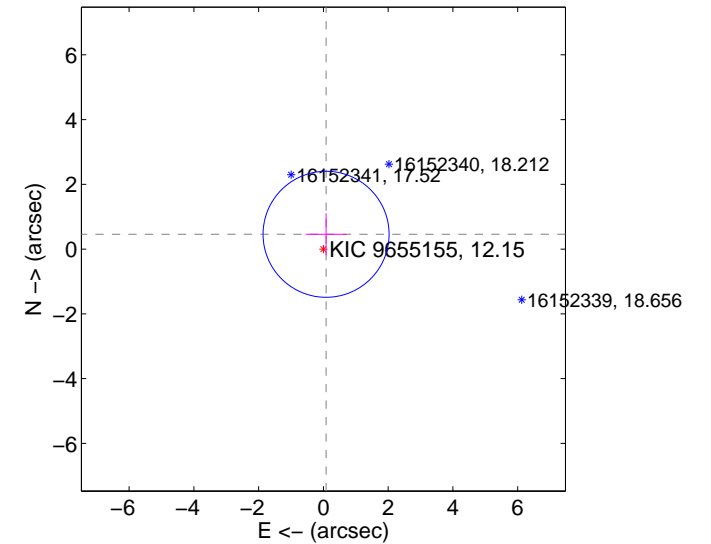
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

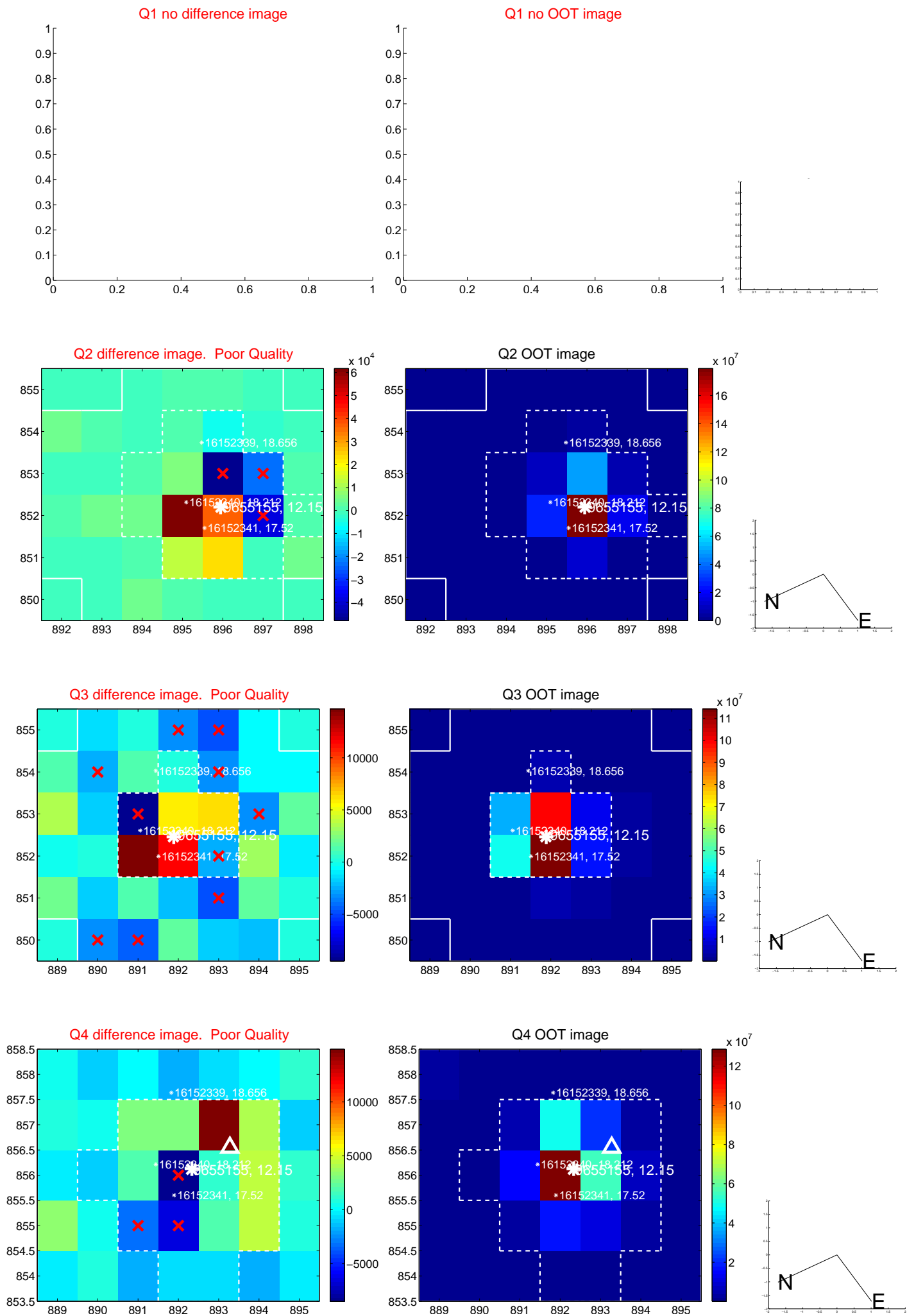


offset from photometric centroids

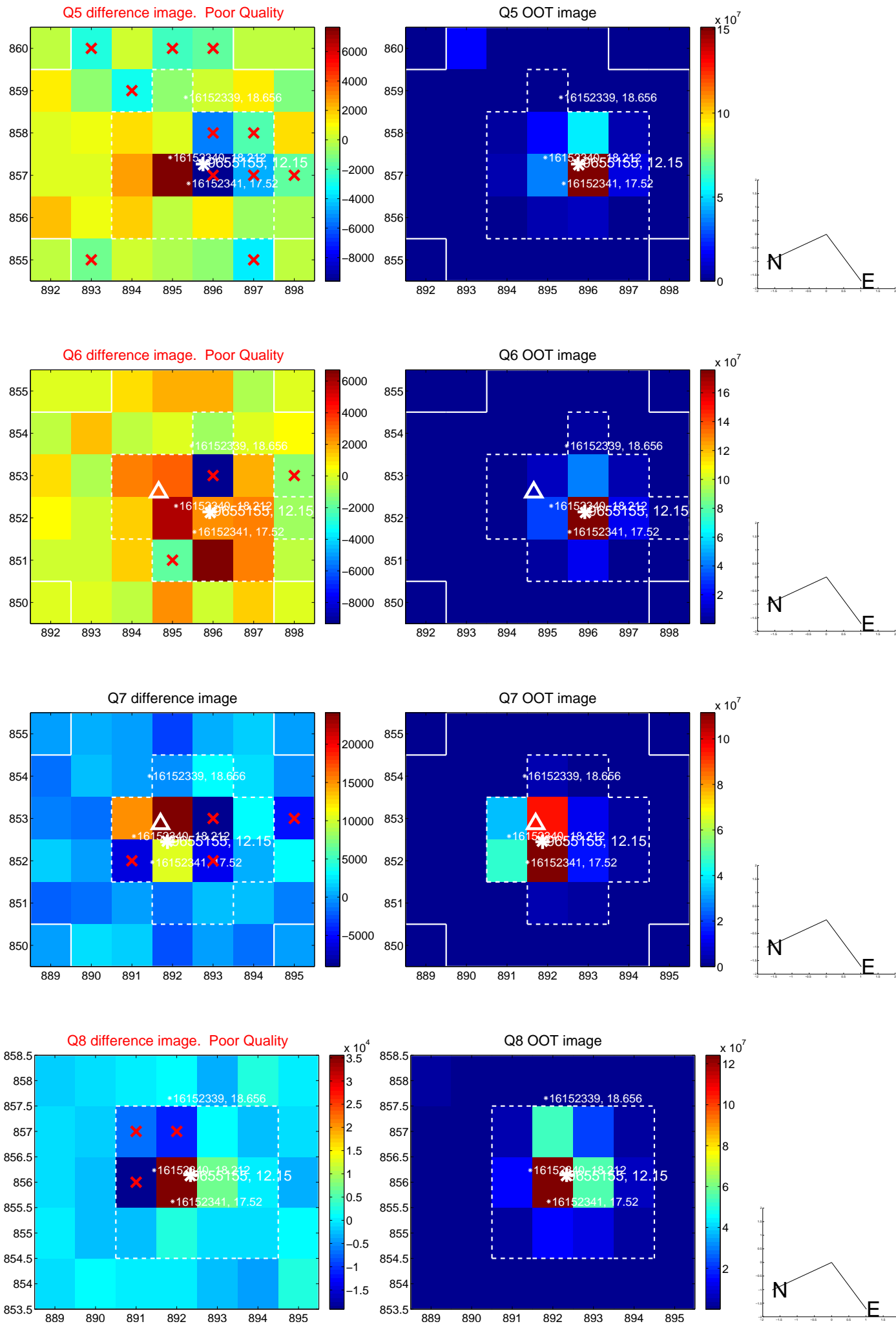


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

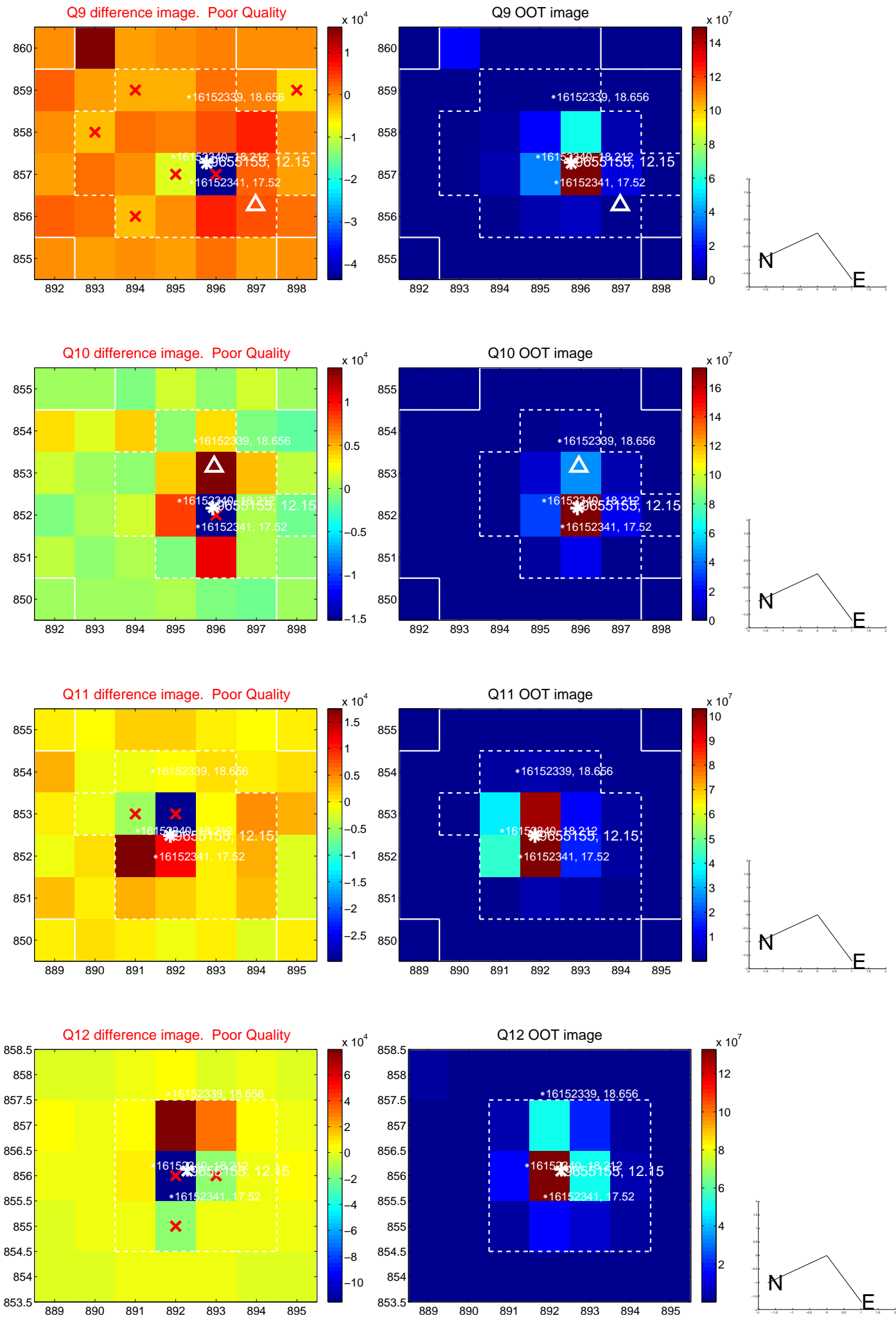
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



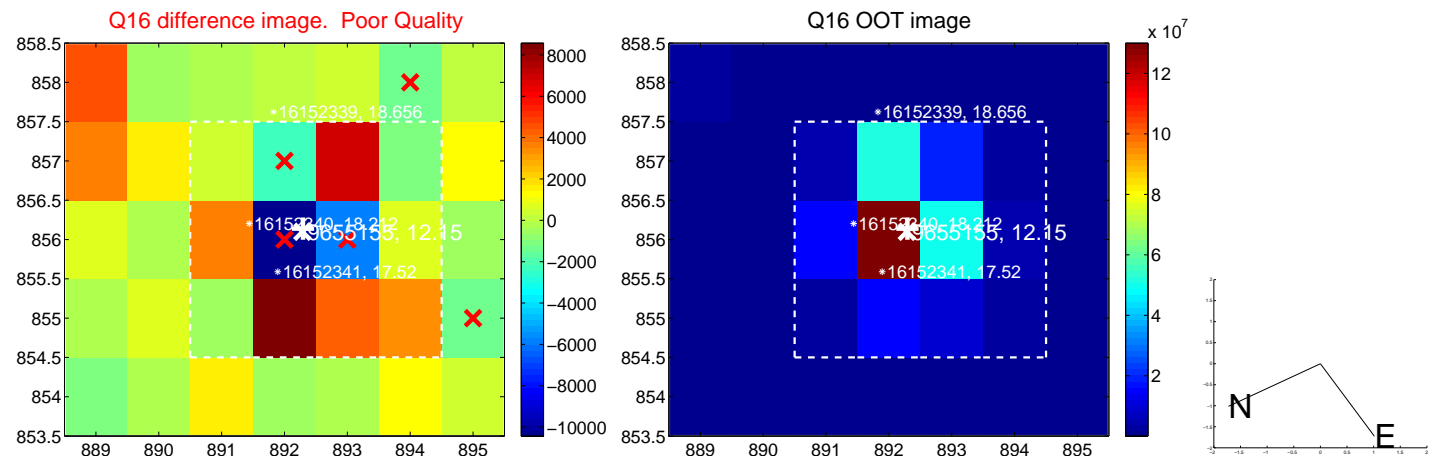
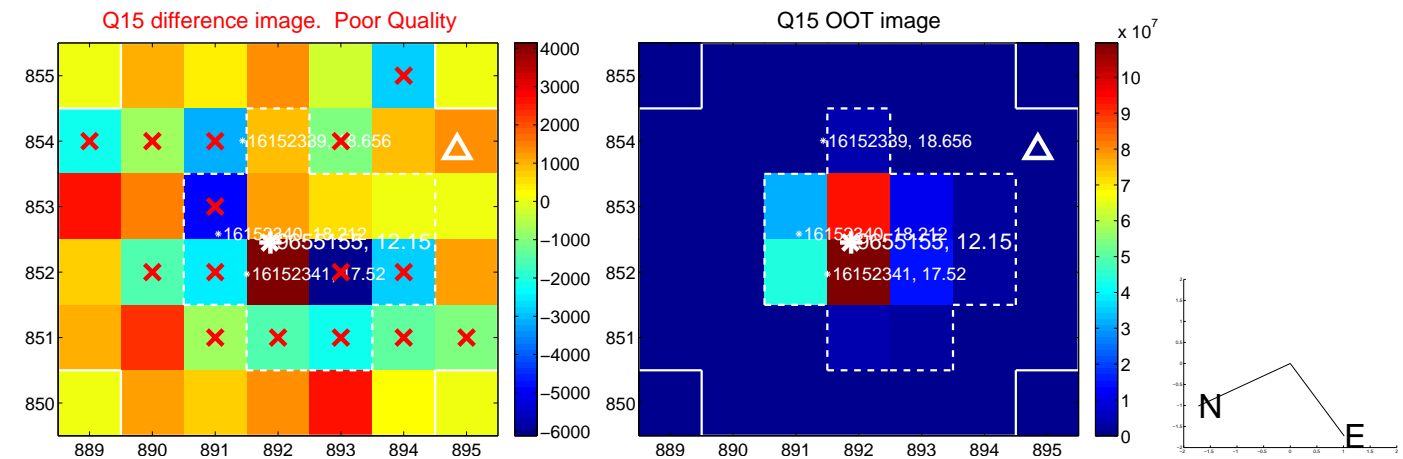
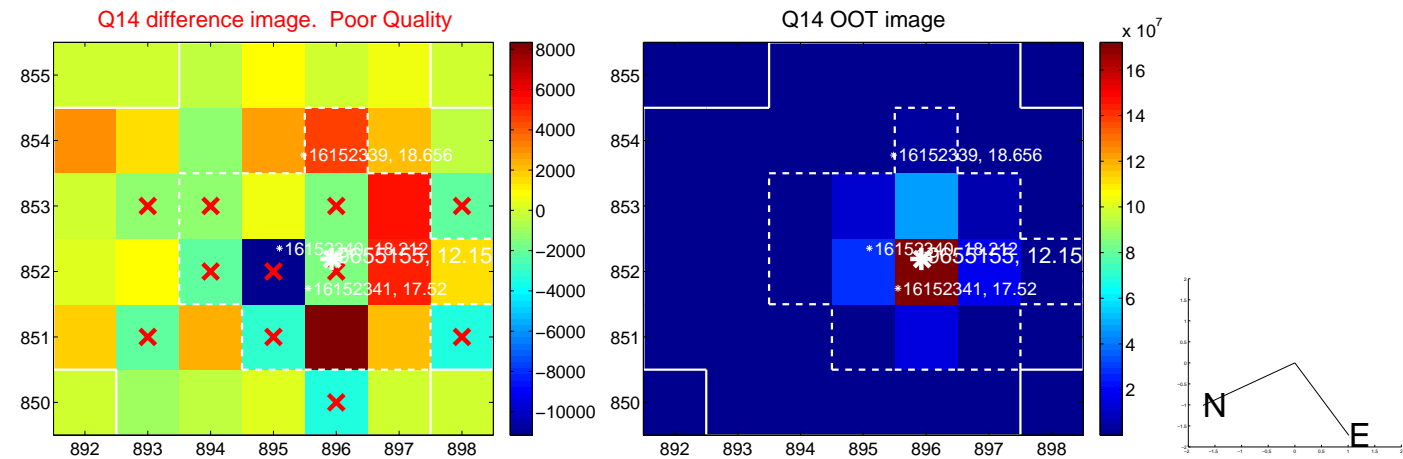
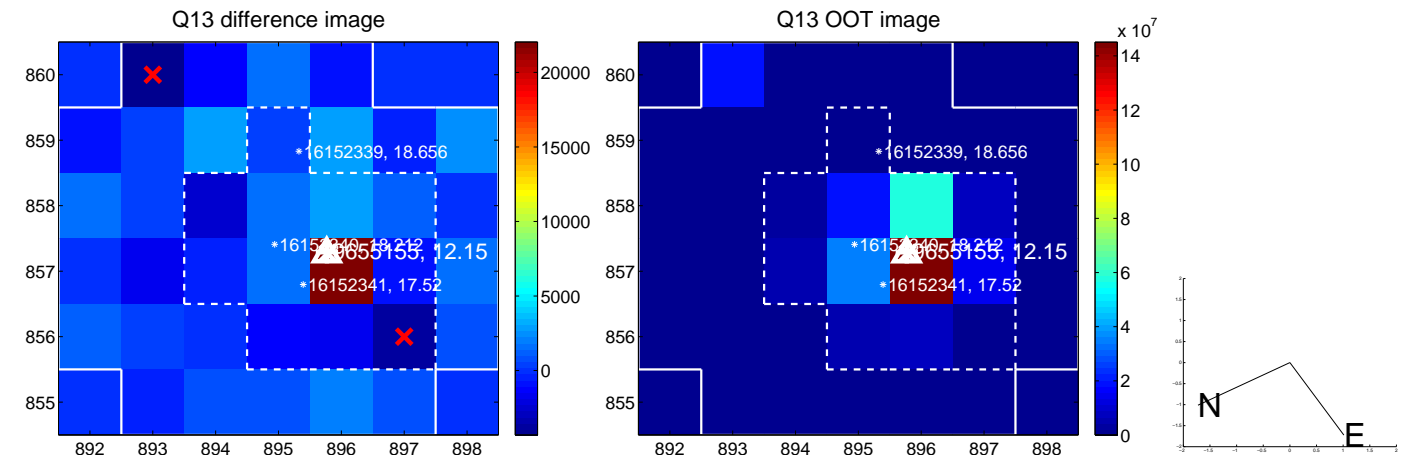
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

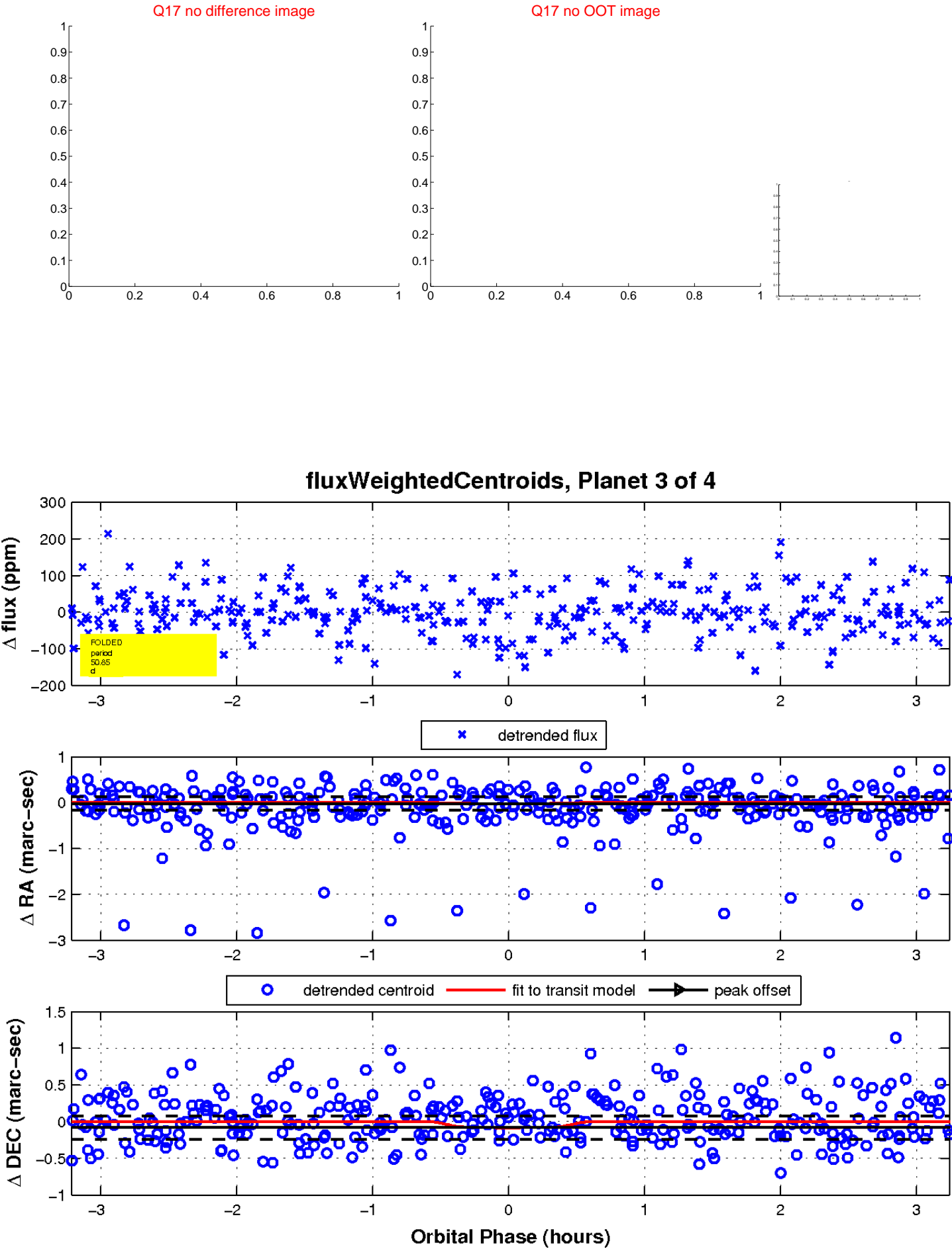


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



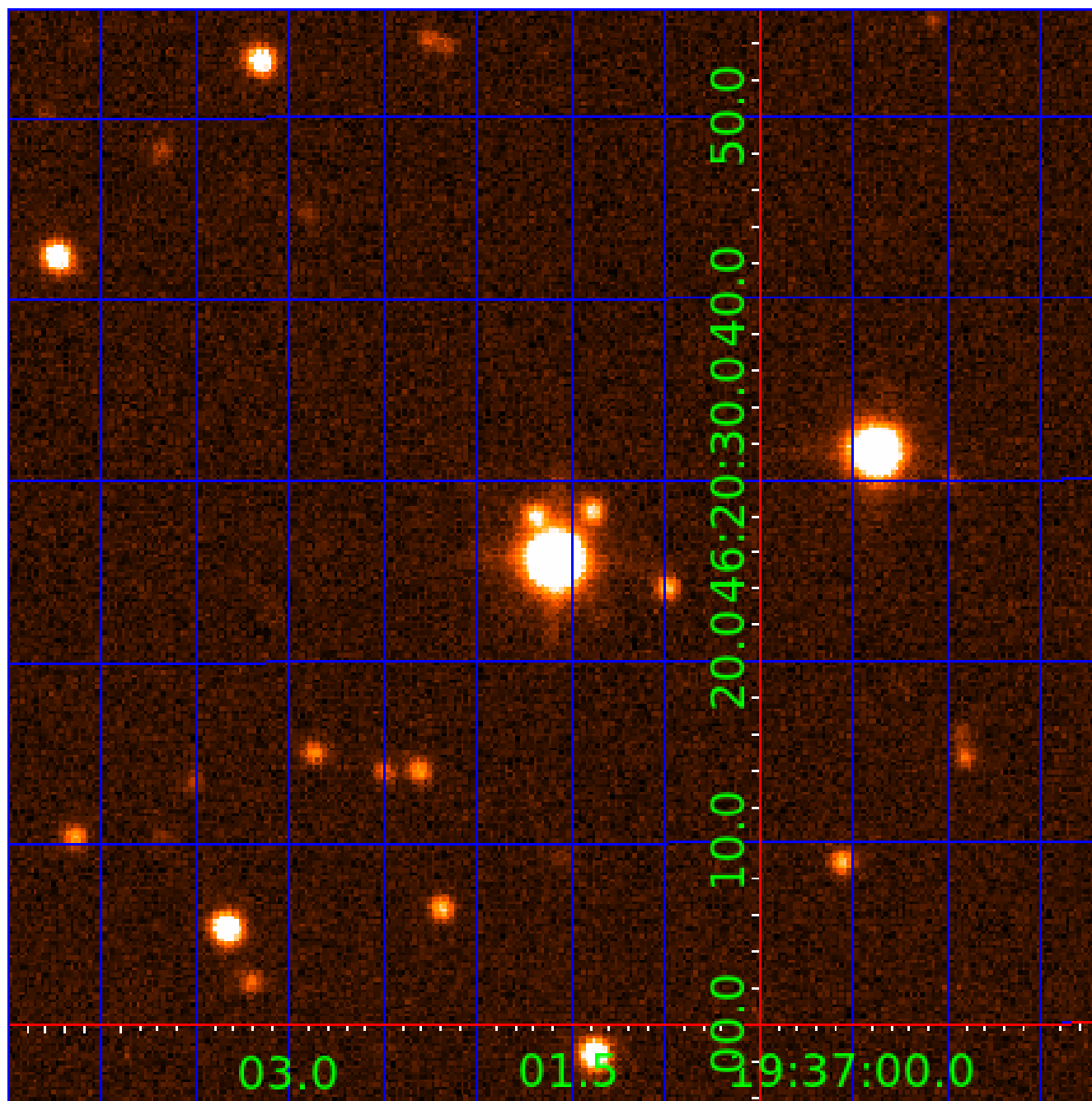


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 009655155

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009655155-01	OBS	No	0.976512	132.120673	3.7	6.883	7.8	5.0	2.76	7643	0.54	40208.60
009655155-02	OBS	No	36.246576	144.109840	68.9	13.162	16.4	5.6	2.76	7643	2.54	324.74
009655155-03	OBS	No	50.849347	169.620394	217.9	1.083	12.1	8.4	2.76	7643	4.93	206.78
009655155-04	OBS	No	40.986762	167.812024	279.4	7.076	9.2	11.5	2.76	7643	8.52	275.65

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009655155-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT
009655155-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT
009655155-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009655155-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—CENT_FEW_DIFFS

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

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

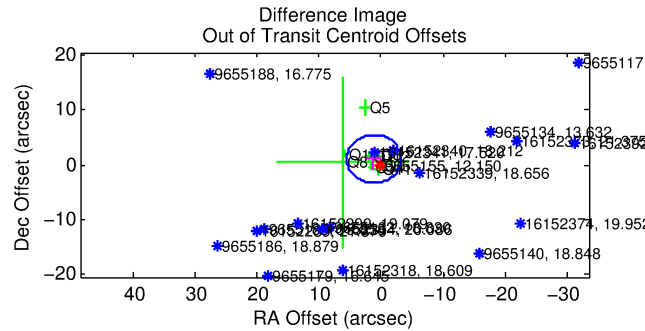
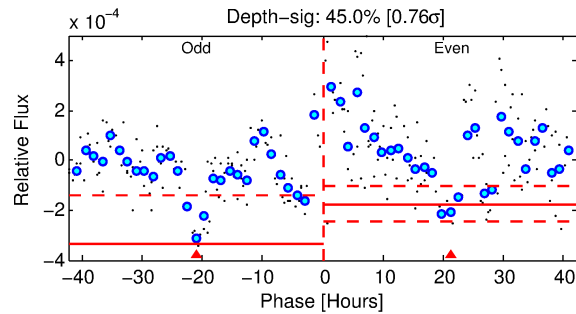
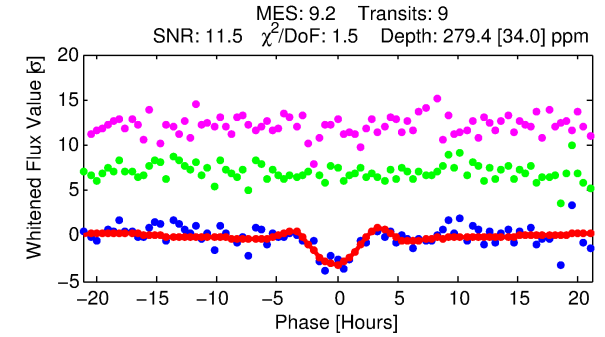
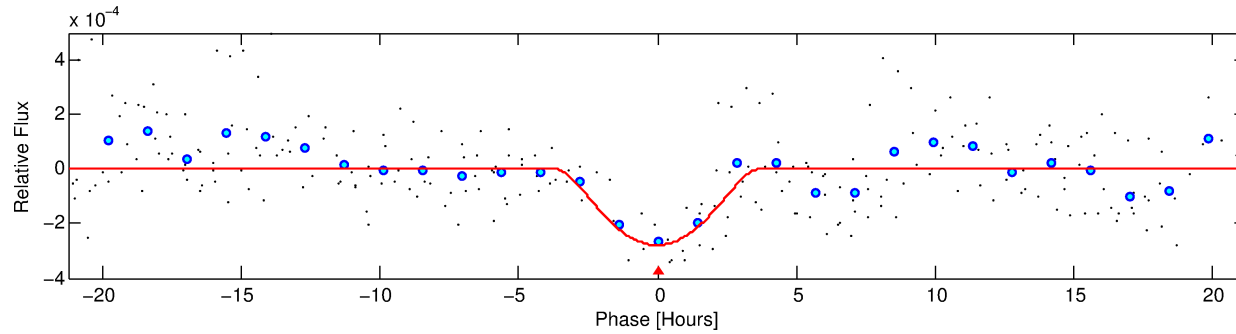
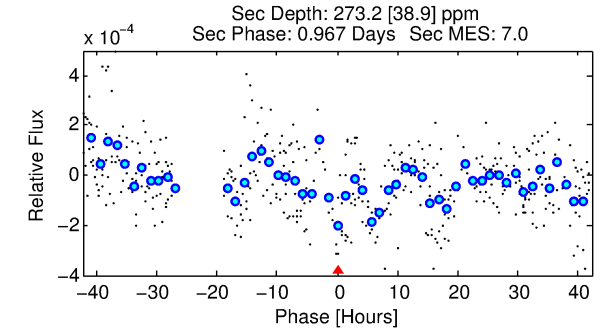
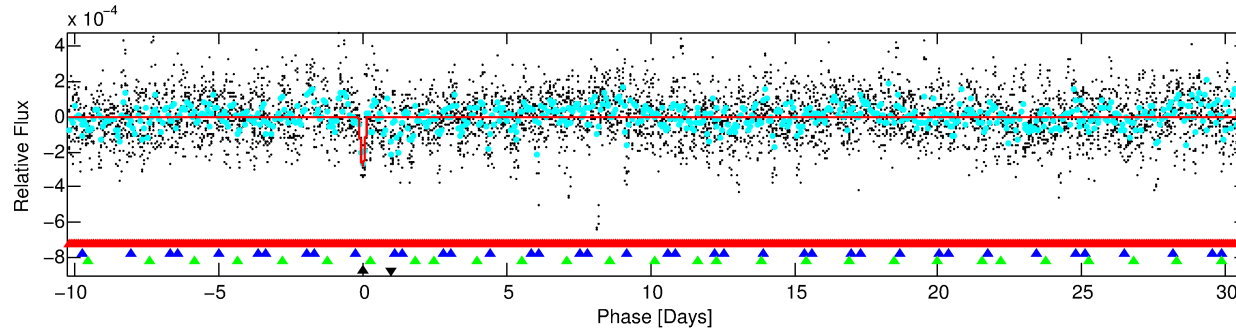
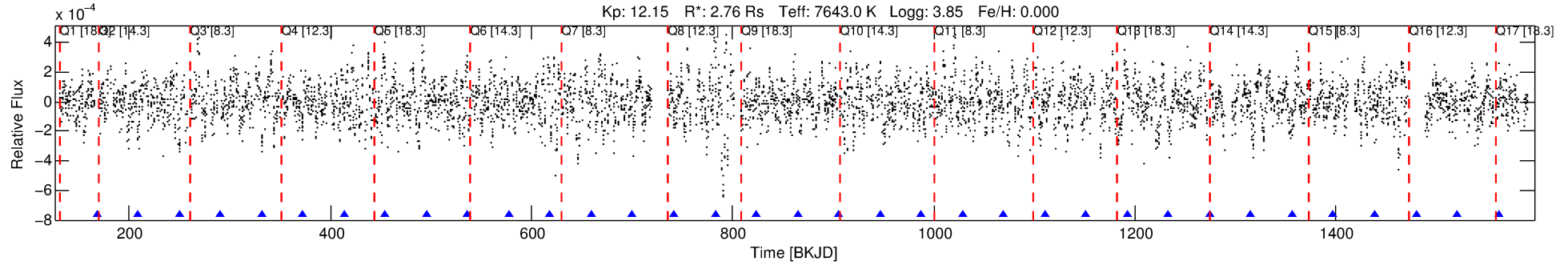
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 009655155-04

No Significant Match Found

# DV One-Page Summary

KIC: 9655155 Candidate: 4 of 4 Period: 40.987 d



## DV Fit Results:

Period = 40.98676 [0.00099] d  
Epoch = 167.8120 [0.0174] BKJD  
Rp/R\* = 0.0283 [0.0565]  
a/R\* = 10.95 [5.97]  
b = 1.00 [0.09]  
Seff = 275.65 [100.03]  
Teq = 1039 [94] K  
Rp = 8.52 [17.18] Re  
a = 0.2907 [0.0693] AU  
Ag = 175.12 [703.37] [0.25σ]  
Teffp = 5844 [5845] K [0.82σ]

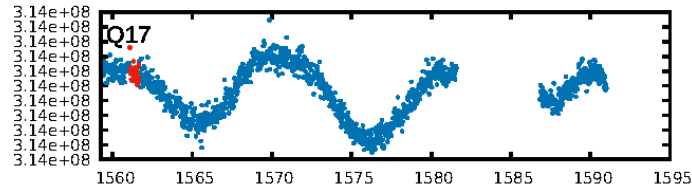
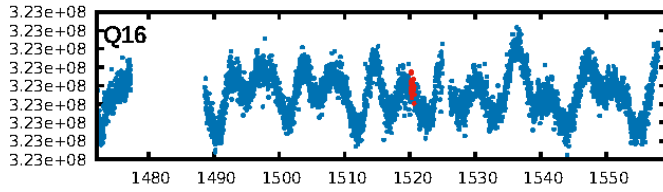
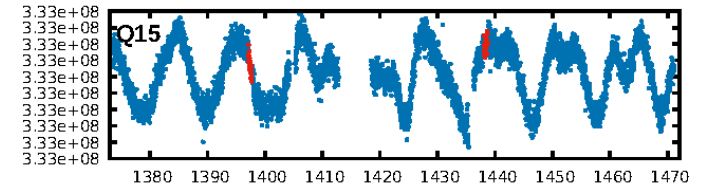
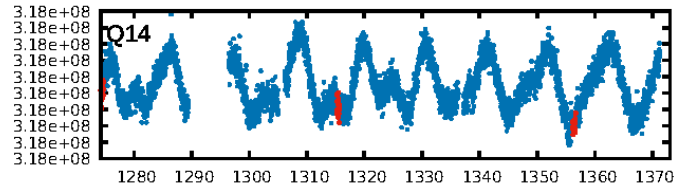
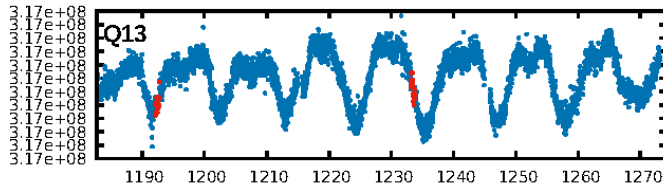
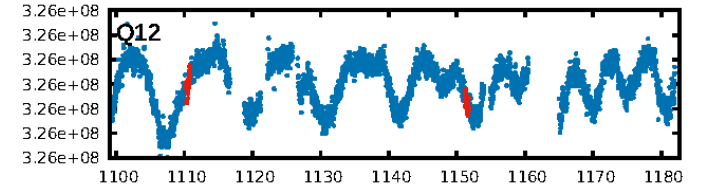
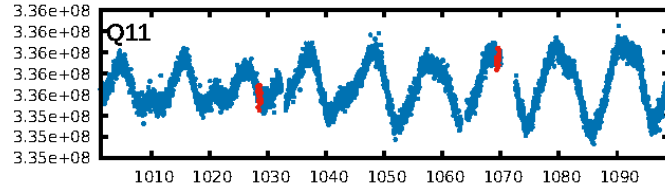
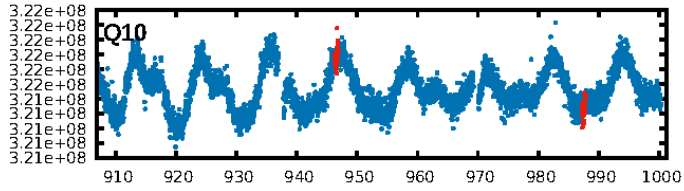
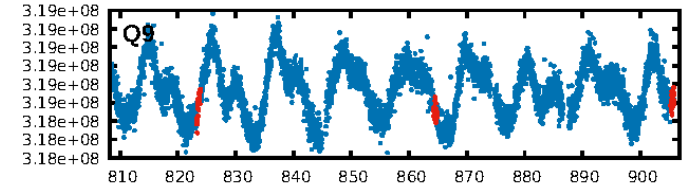
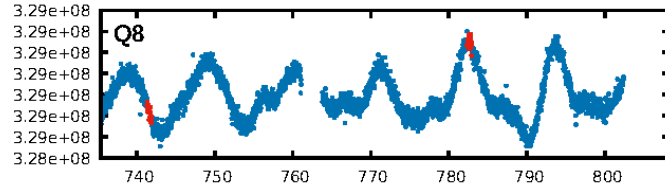
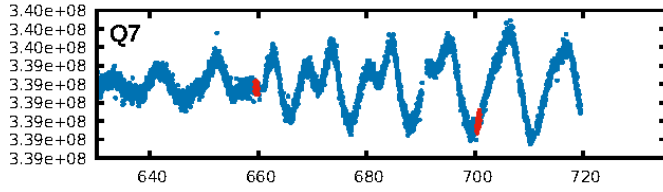
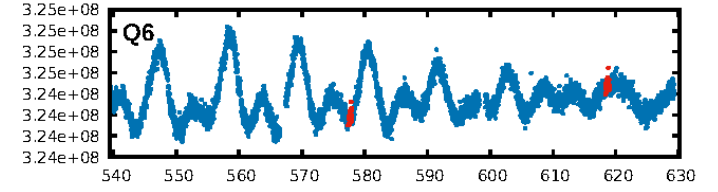
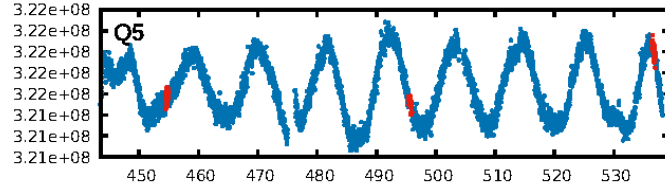
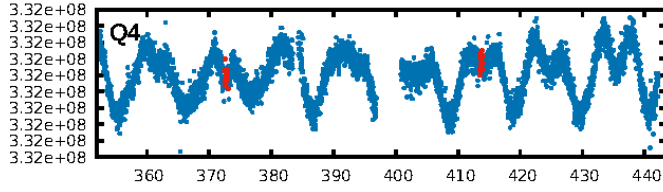
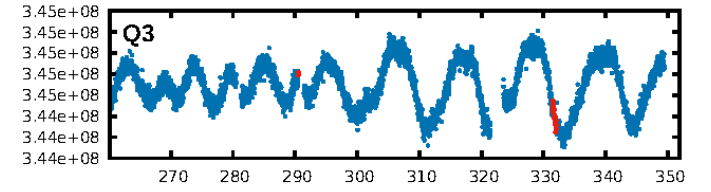
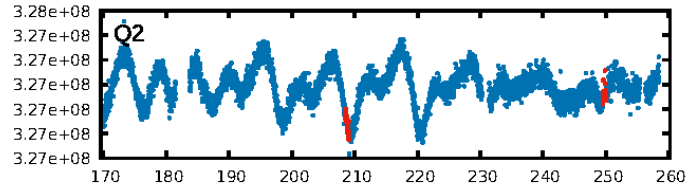
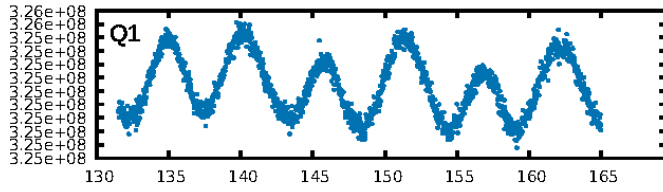
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [7.61σ]  
LongPeriod-sig: 100.0% [33.07σ]  
ModelChiSquare2-sig: 21.5%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 2.06e-10**  
RollingBand-fgt: 1.00 [8/8]  
**GhostDiagnostic-chr: -0.5181**  
Centroid-sig: 89.0%  
Centroid-so: 0.134 arcsec [0.55σ]  
OotOffset-rm: 1.581 arcsec [1.08σ]  
OotOffset-st: 2/3/3/1 [9]  
KicOffset-rm: 1.537 arcsec [1.05σ]  
KicOffset-st: 2/3/3/1 [9]  
DiffImageQuality-fgm: 0.33 [3/9]  
DiffImageOverlap-fno: 0.00 [0/15]

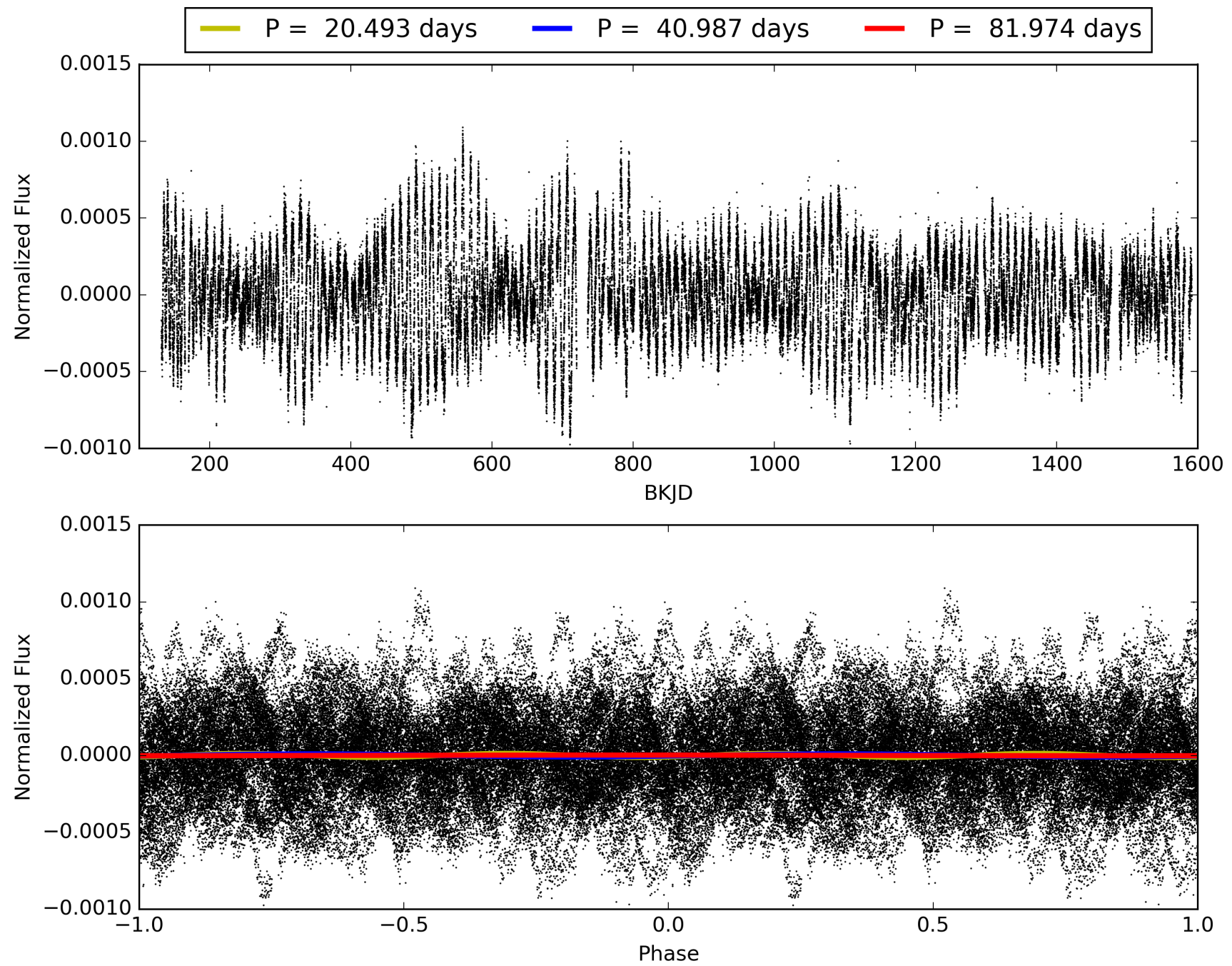
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 04:43:44 Z

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

# TCE 009655155-04, PDC Light Curves



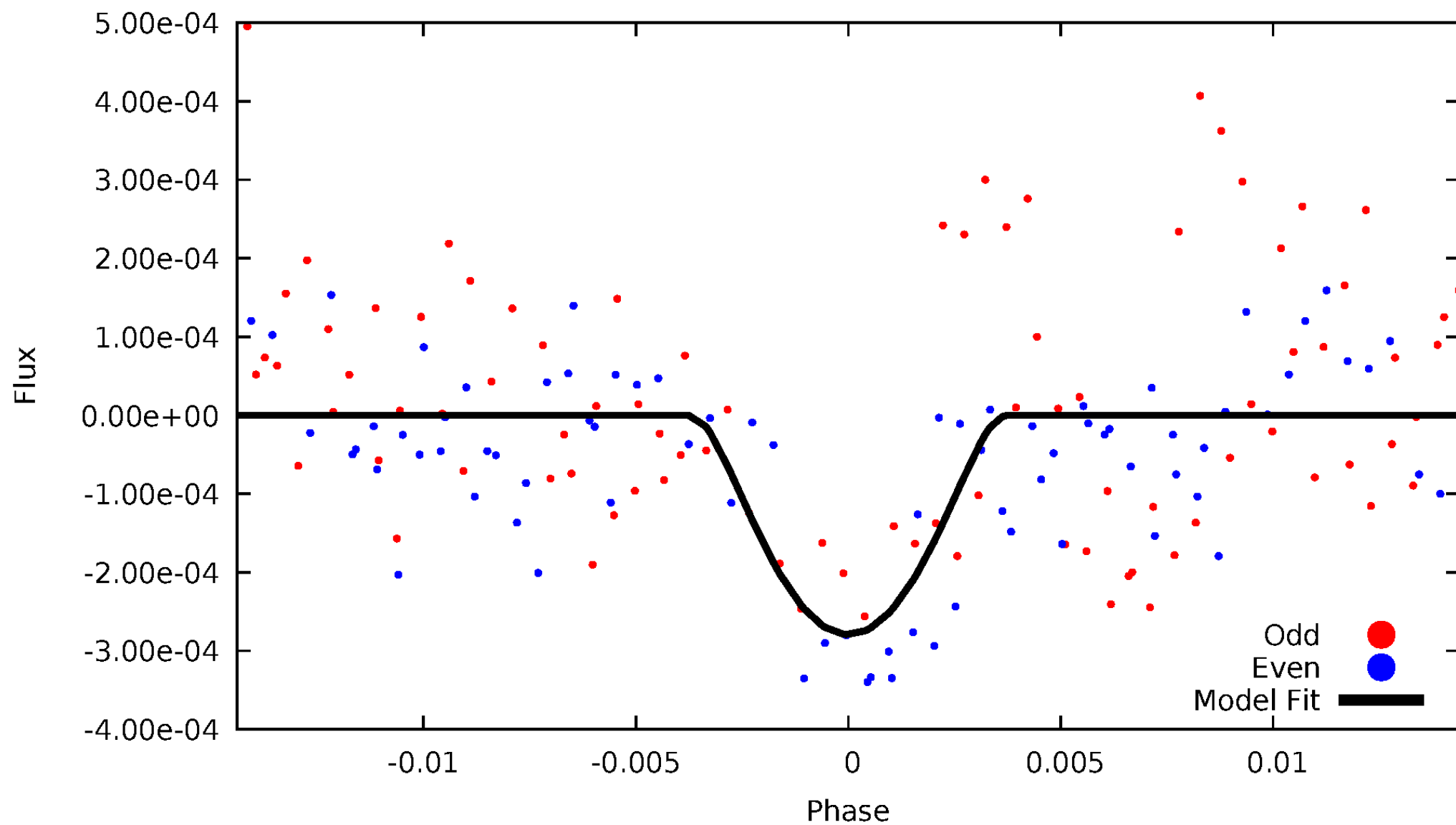
TCE 009655155-04





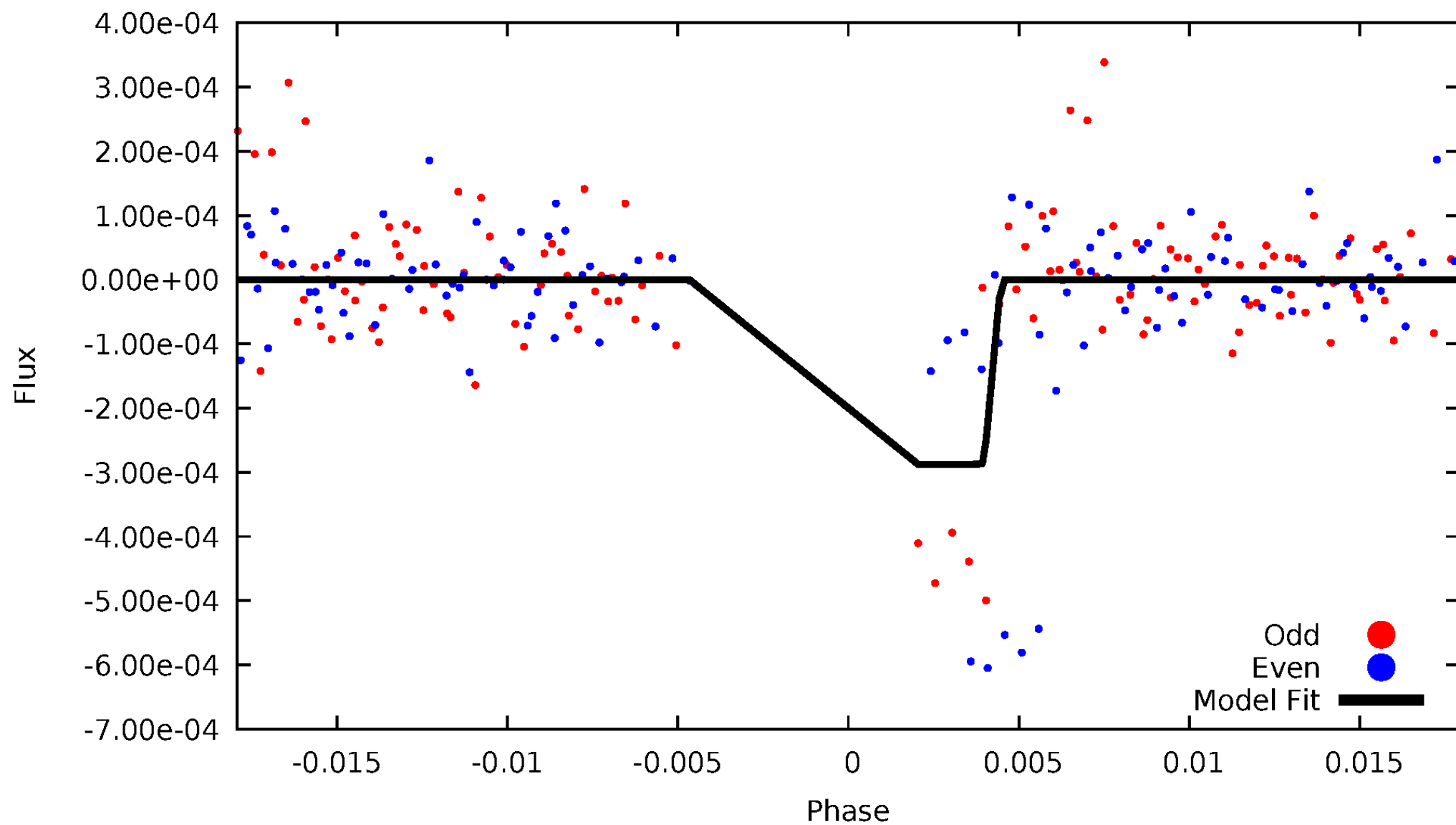
# DV Odd/Even

TCE 009655155-04



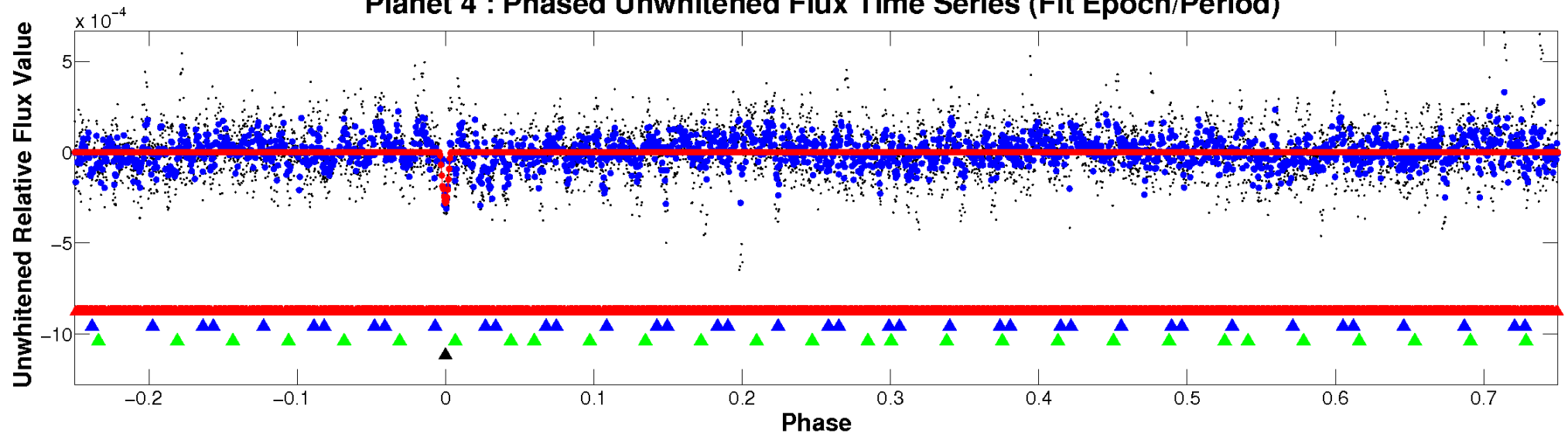
# ALT Odd/Even

TCE 009655155-04

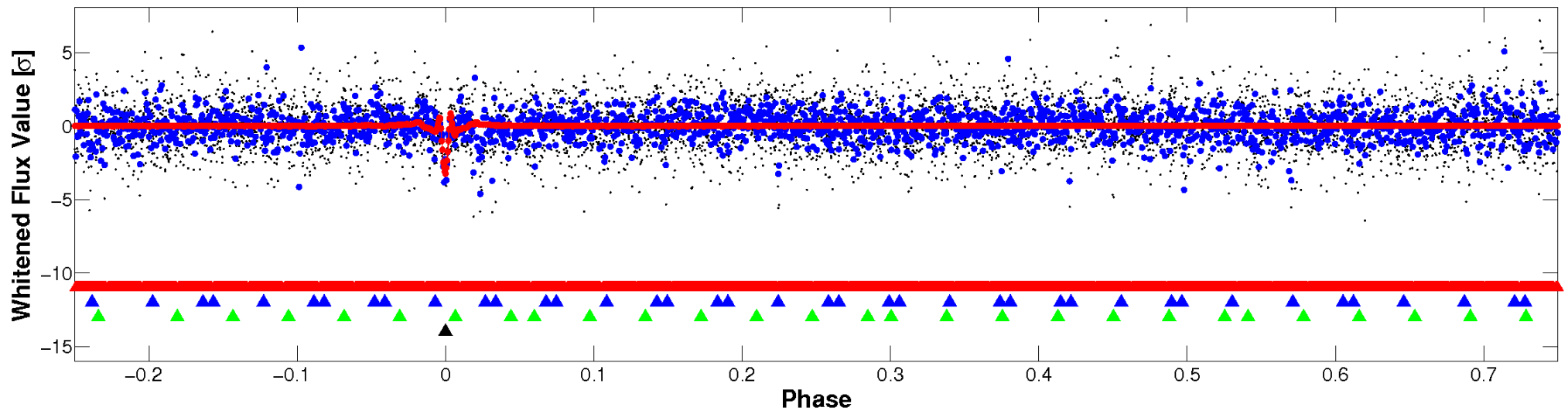


# Non-Whitened Vs. Whitened Light Curve

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

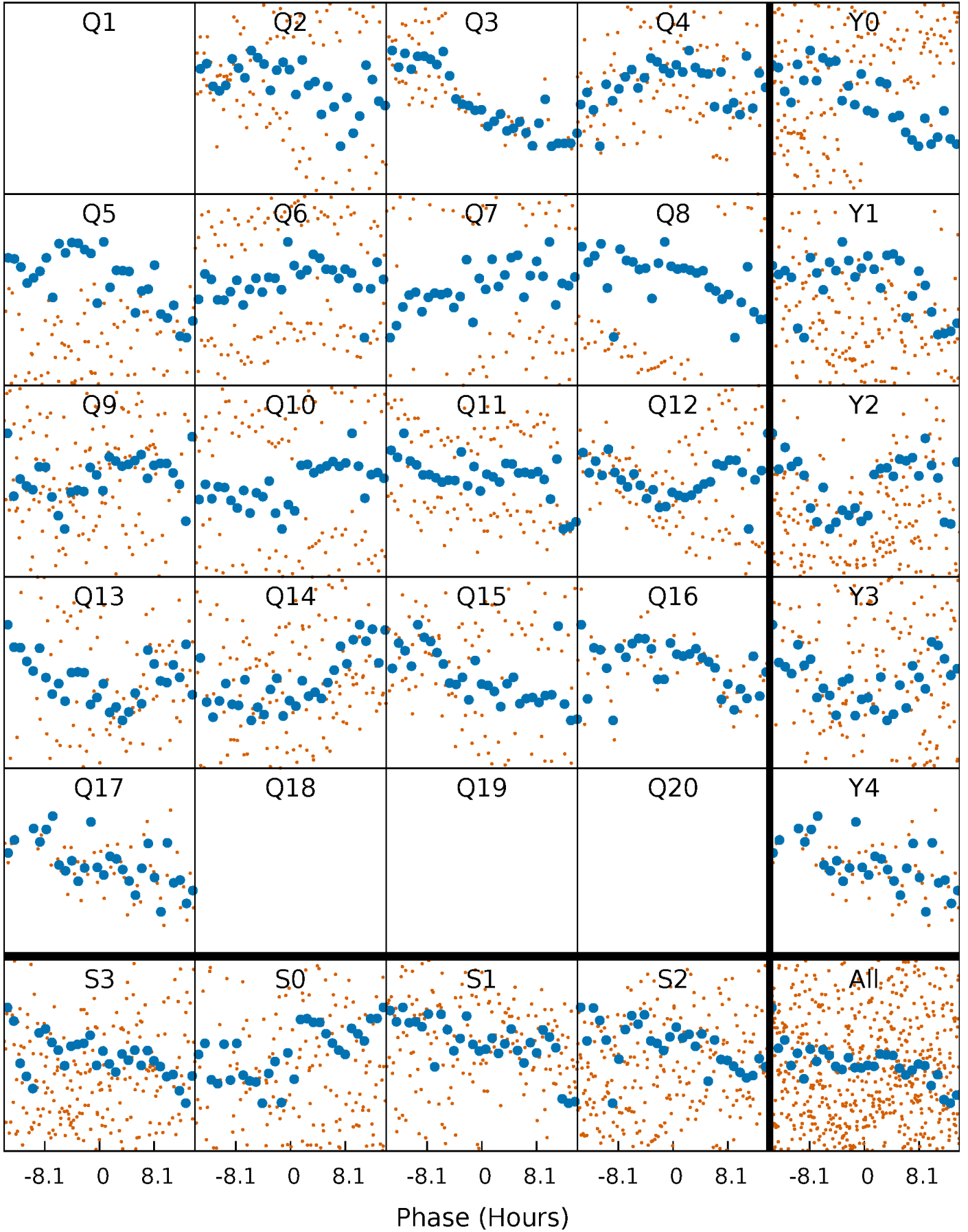


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



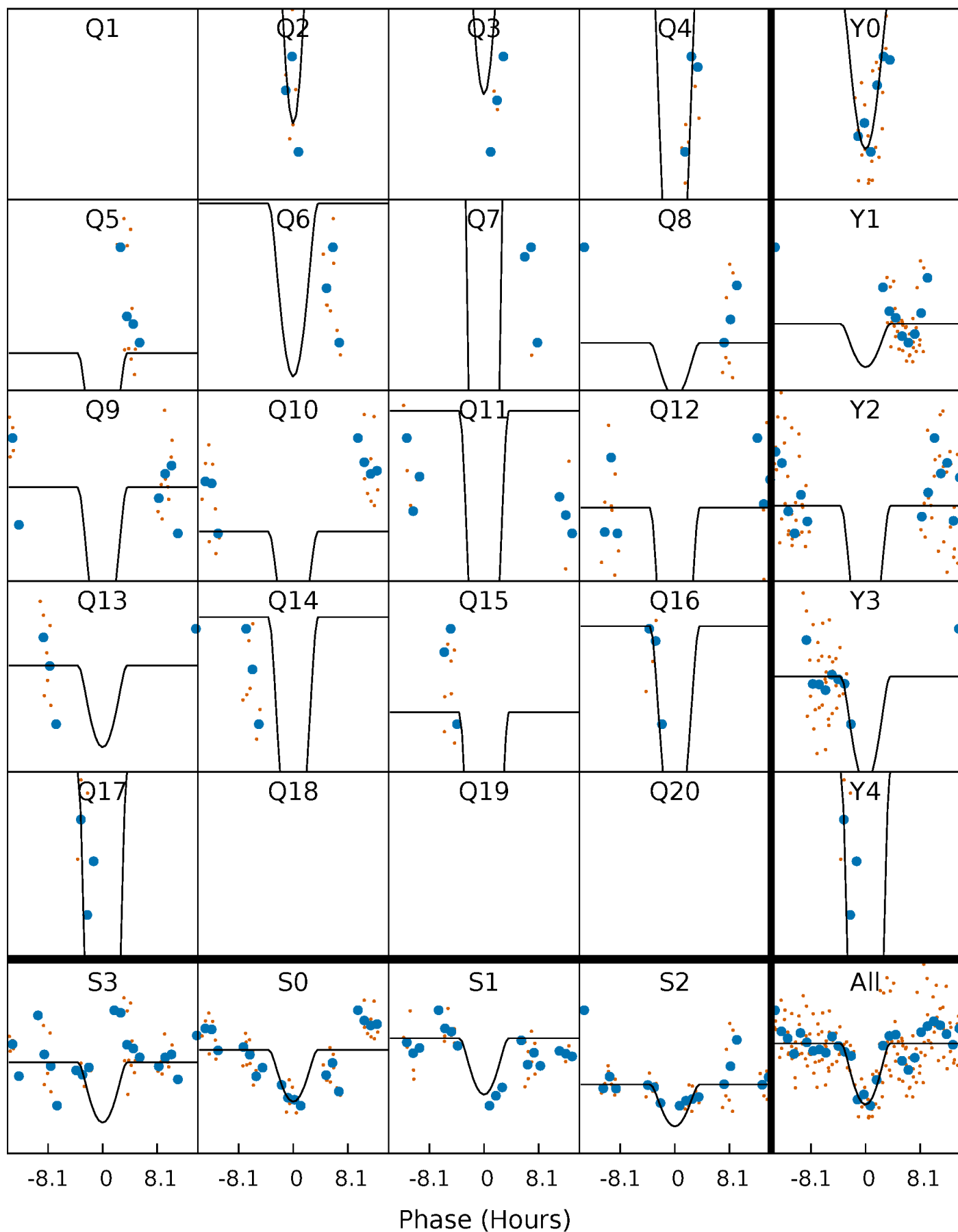
# PDC Quarter-Phased Transit Curves

TCE 009655155-04 P= 40.986762 Days  $T_0=167.812024$  (BKJD)



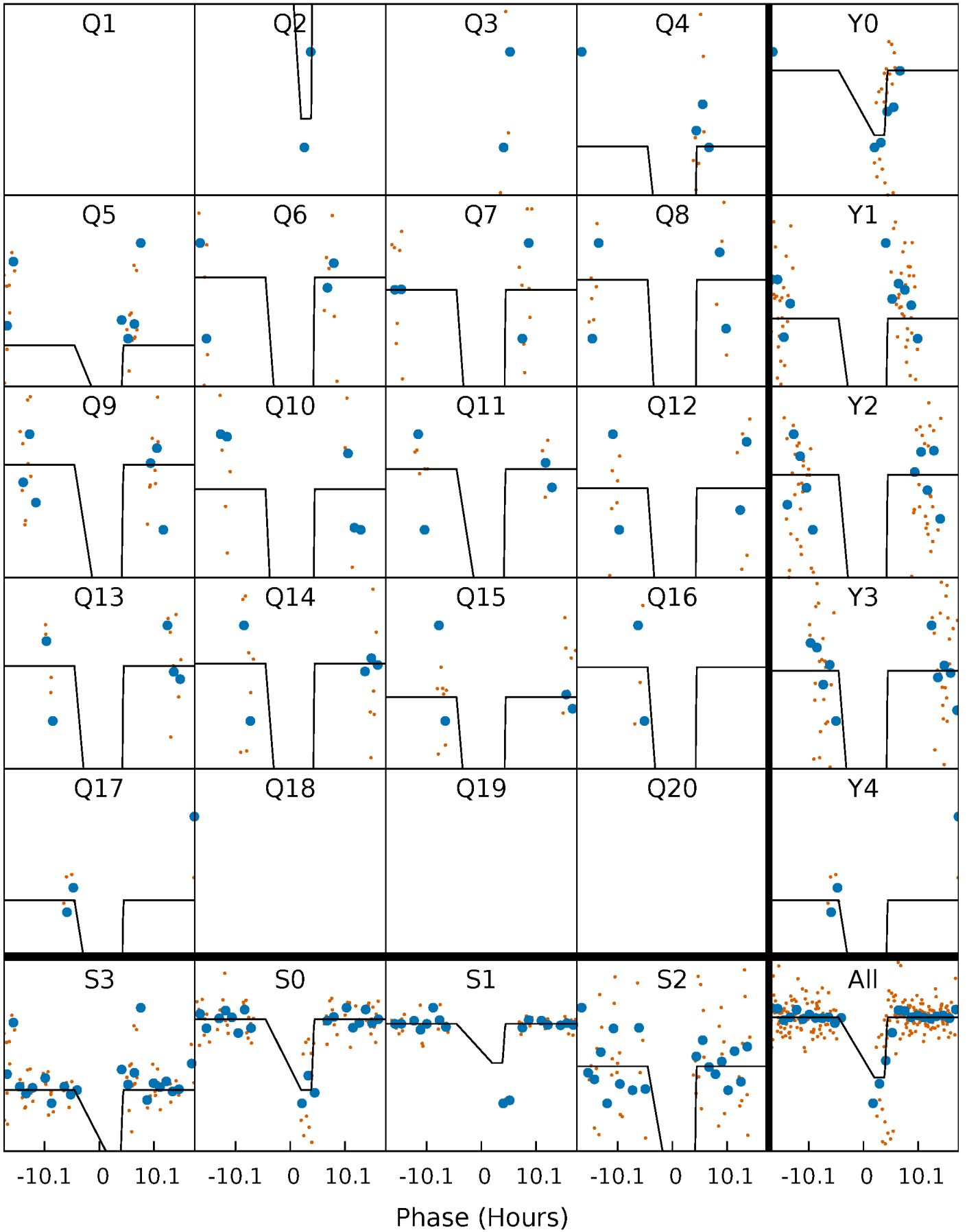
# DV Quarter-Phased Transit Curves

TCE 009655155-04 P= 40.986762 Days  $T_0=167.812024$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

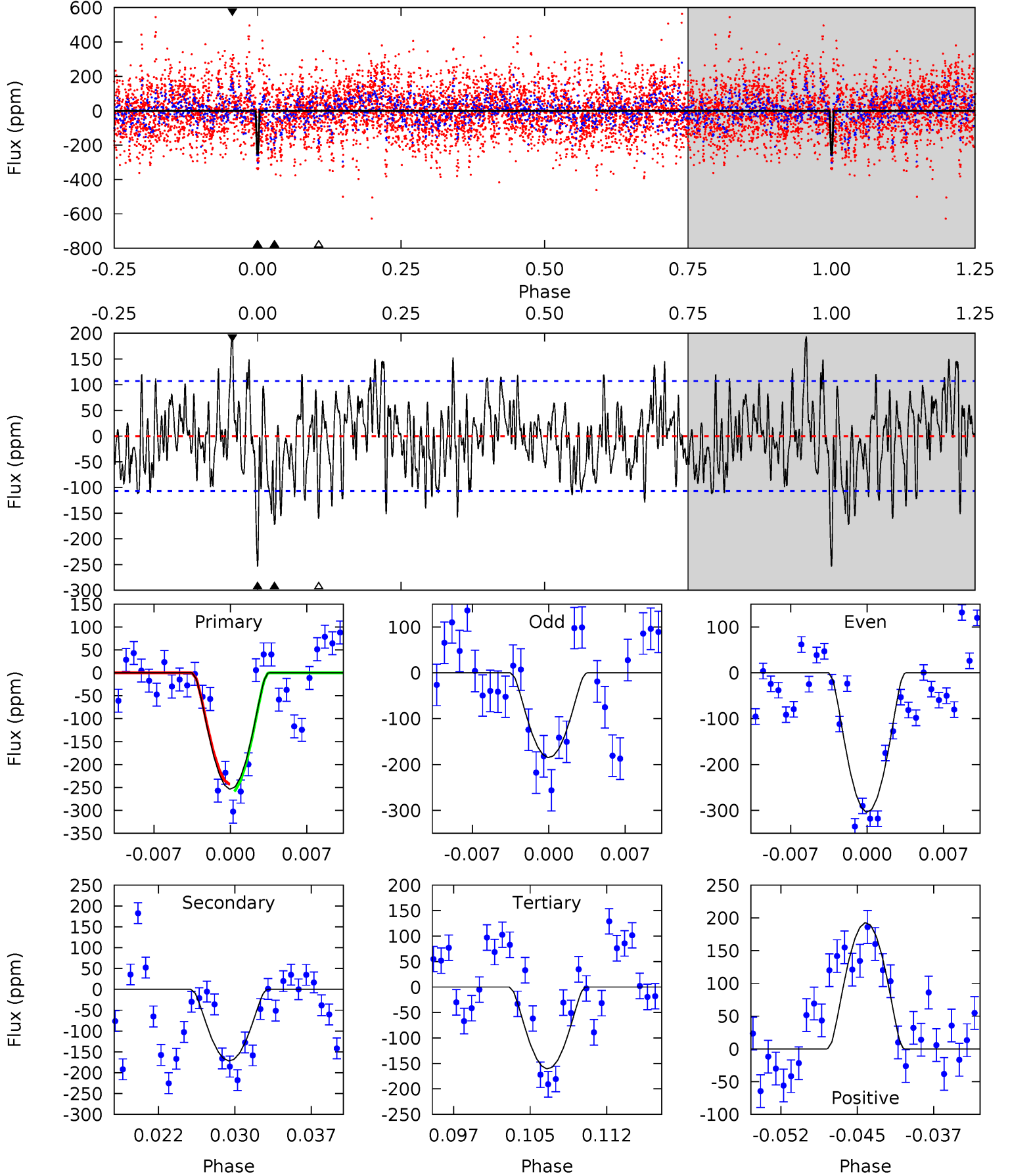
TCE 009655155-04   P= 40.994911 Days    $T_0=167.653829$  (BKJD)



# DV Model-Shift Uniqueness Test

009655155-04, P = 40.986762 Days, E = 126.825262 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	8.13	7.61	9.13	5.08	2.67	2.80	4.42	2.90	0.52	-1.00	2.75	0.53	0.43	0.36

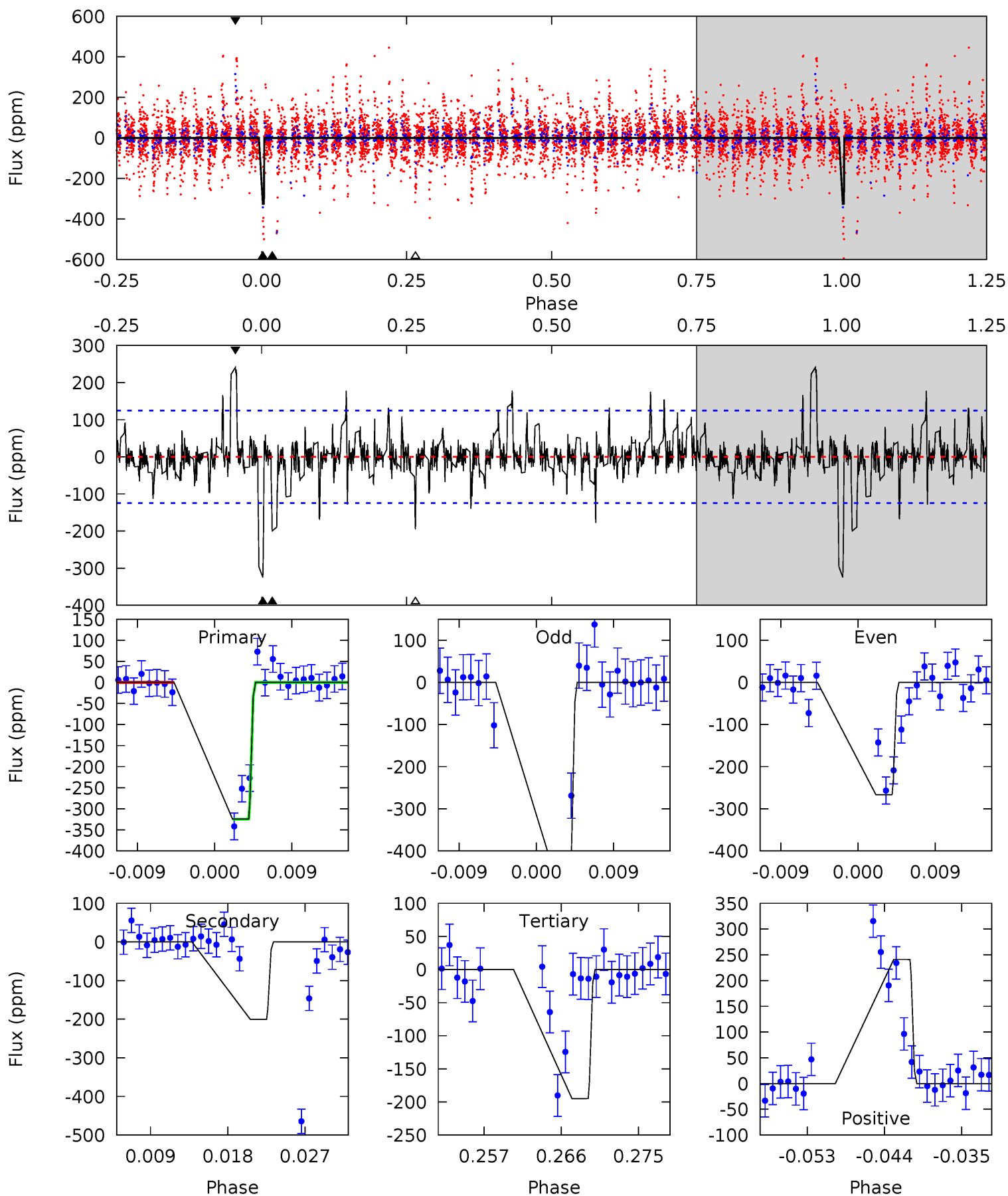




# Alt Model-Shift Uniqueness Test

009655155-04, P = 40.994911 Days, E = 126.658918 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
13.2	8.13	7.90	9.77	5.05	2.62	1.50	5.26	3.39	0.23	-1.63	3.32	1.10	0.43	0



### Stellar Parameters For KIC 009655155

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7643^{+68}_{-84}$	$3.846^{+0.203}_{-0.068}$	$0.000^{+0.100}_{-0.150}$	$2.760^{+0.249}_{-0.748}$	$1.951^{+0.031}_{-0.262}$	$0.131^{+0.147}_{-0.029}$
	+1%/-1%	+5%/-2%	+inf%/-inf%	+9%/-27%	+2%/-13%	+113%/-22%
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 009655155-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-171 \pm 21$	$14.21^{+15.60}_{-9.83}$	$1442^{+47}_{-97}$	$4085^{+2749}_{-821}$	$38^{+366}_{-29}$
Alt.	$-201 \pm 25$	$12.80^{+13.38}_{-9.06}$	$1440^{+48}_{-89}$	$4397^{+3801}_{-932}$	$57^{+596}_{-44}$

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

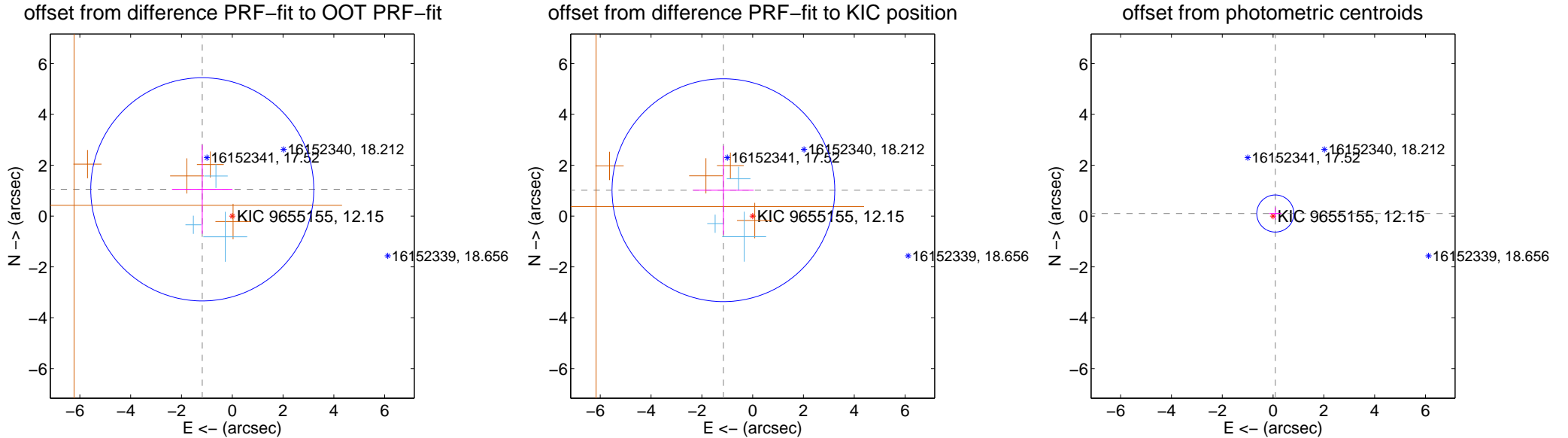
## DV Centroid Data

Supplemental centroid analysis for 009655155-04. Kepler magnitude: 12.15. Transit SNR 11.46

There are 3 quarters with good PRF difference image offsets

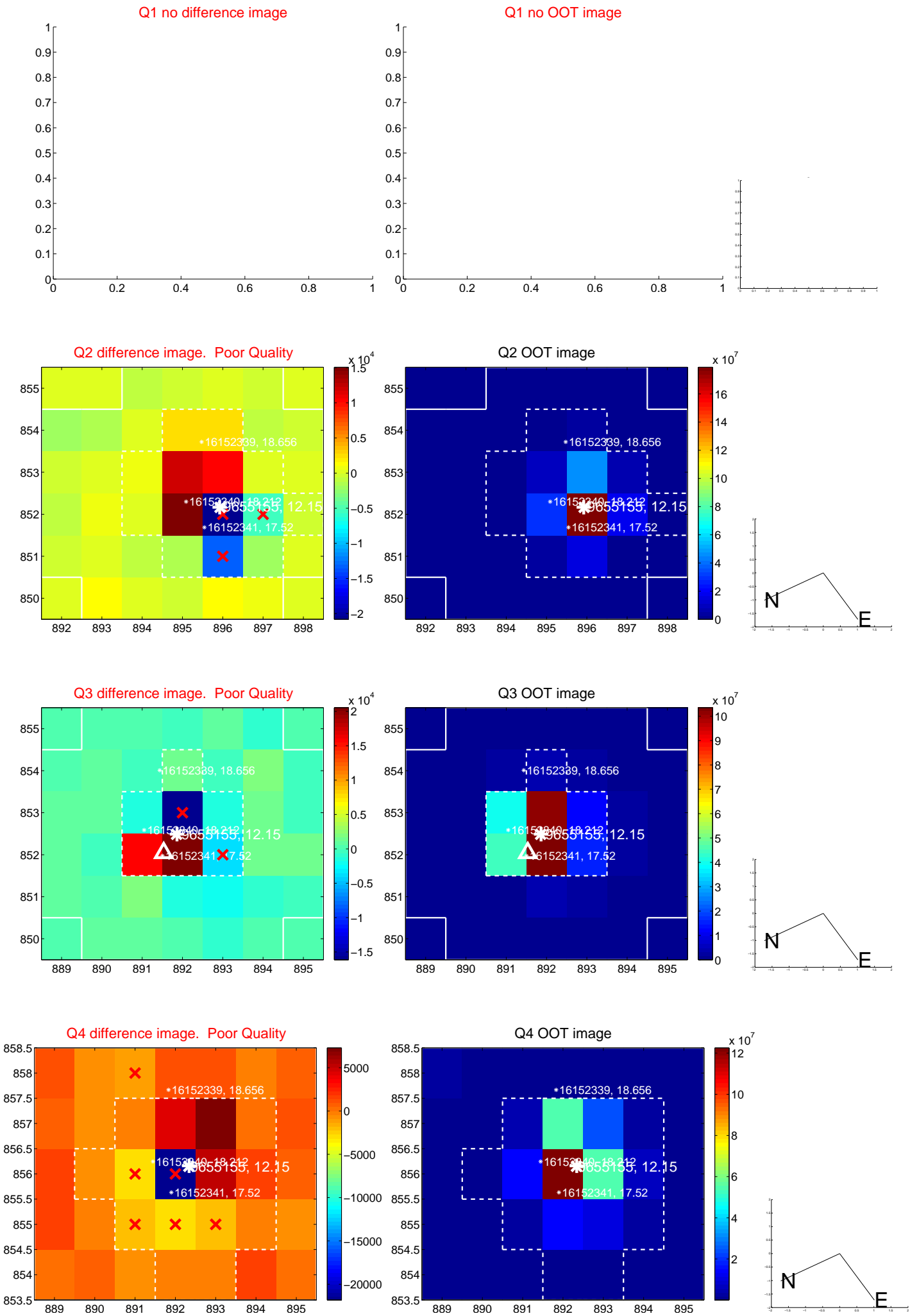
The direct PRF centroid is offset from the target star catalog position by about 0.10 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.581 \pm 1.464$	1.08	$1.181 \pm 1.191$	$1.052 \pm 1.748$
PRF-fit source offset from KIC position	$1.537 \pm 1.462$	1.05	$1.152 \pm 1.191$	$1.018 \pm 1.748$
photometric centroid source offset	$0.13 \pm 0.24$	0.55	$-0.09 \pm 0.24$	$0.10 \pm 0.24$

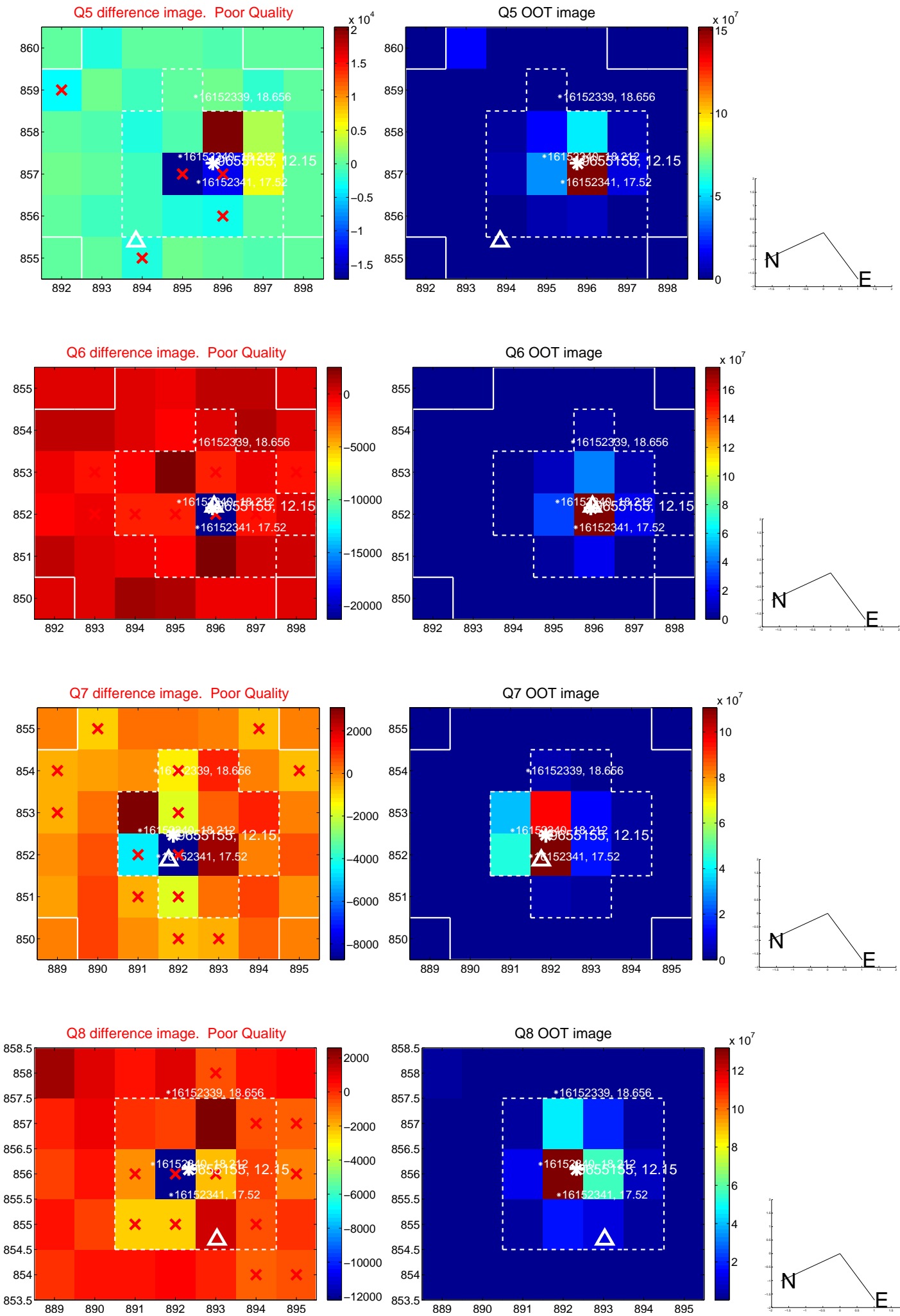


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

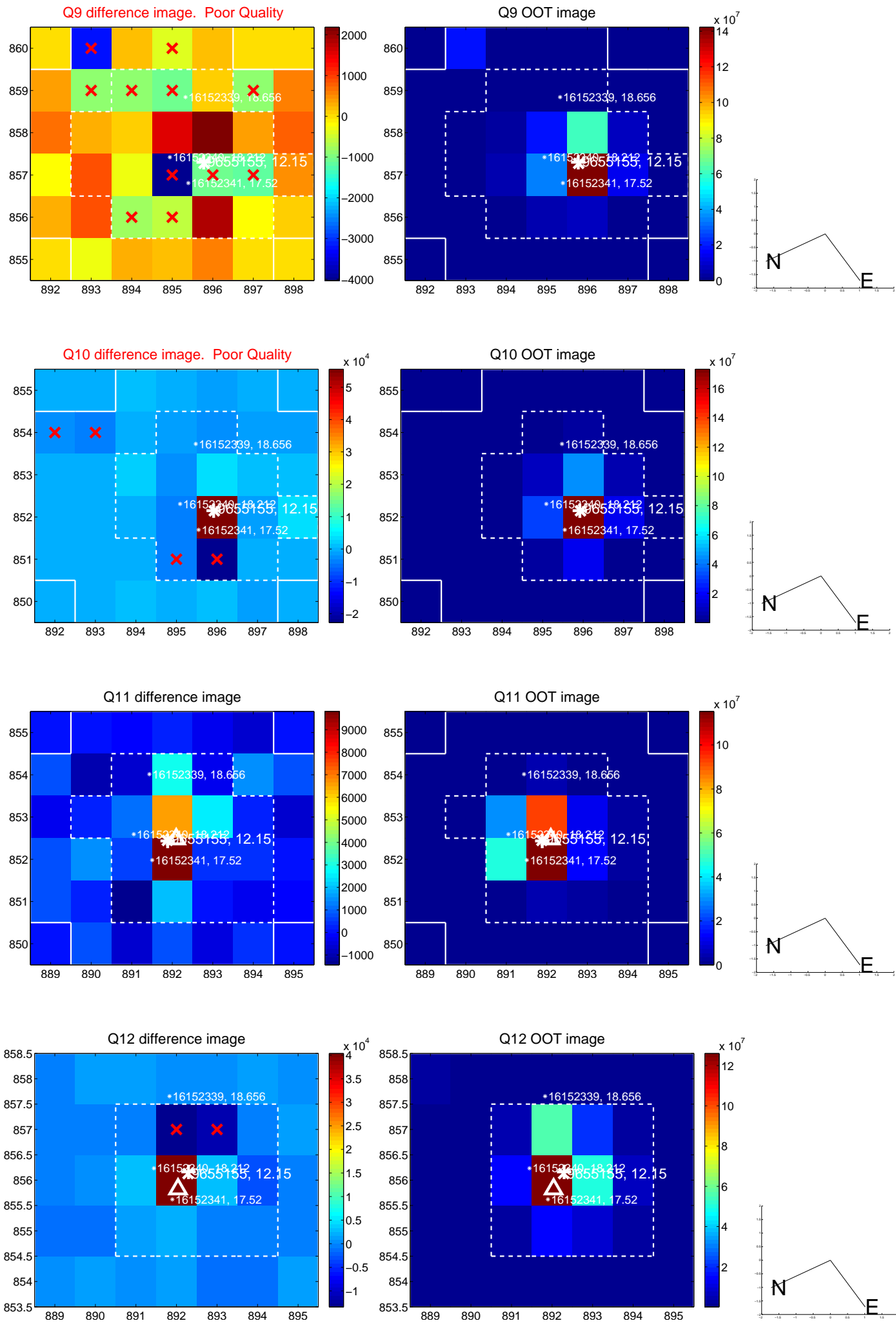
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



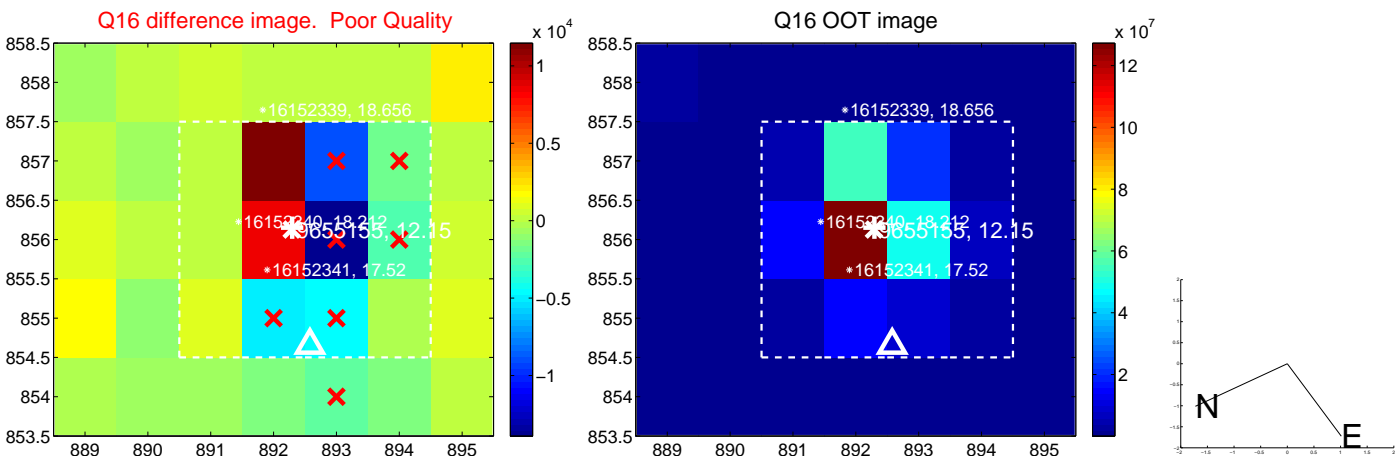
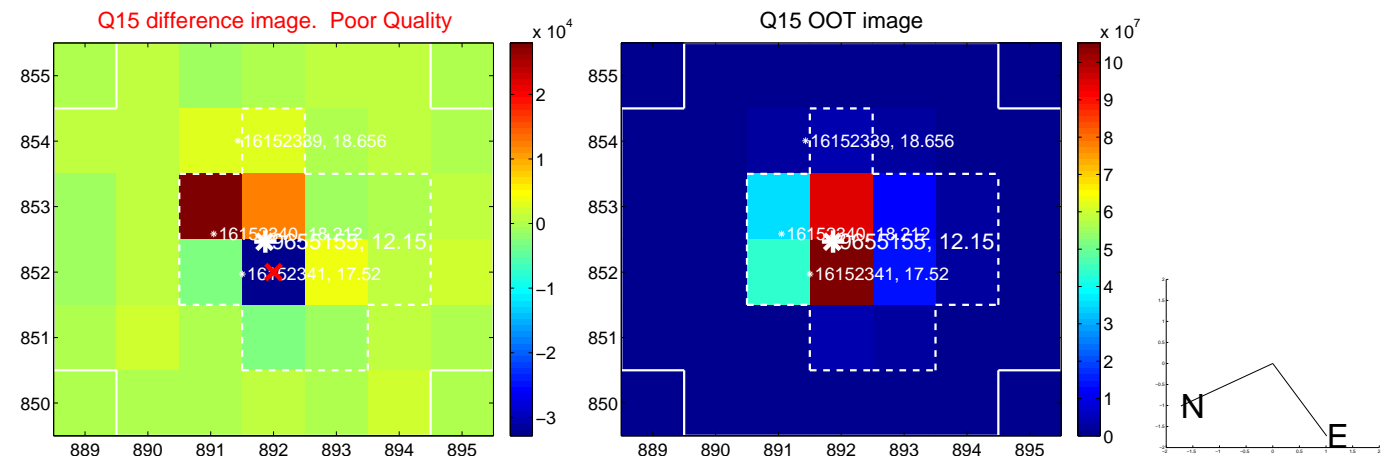
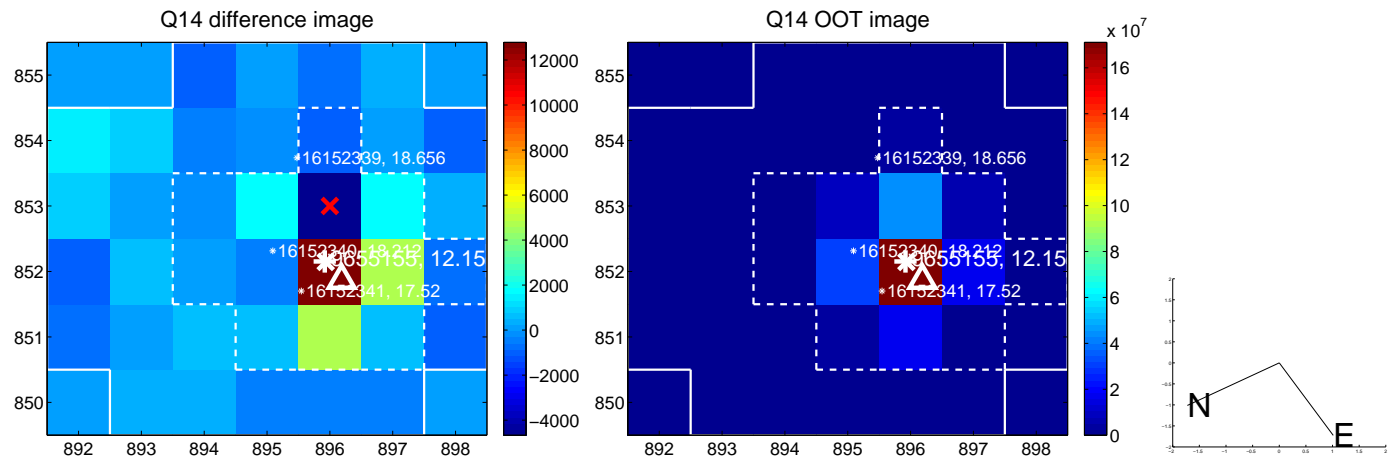
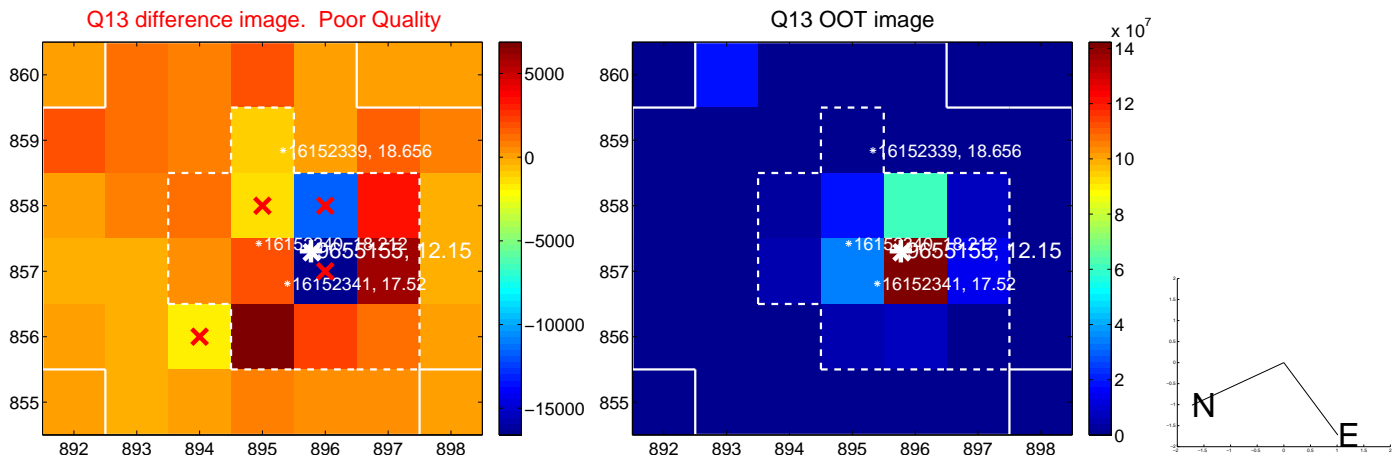
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

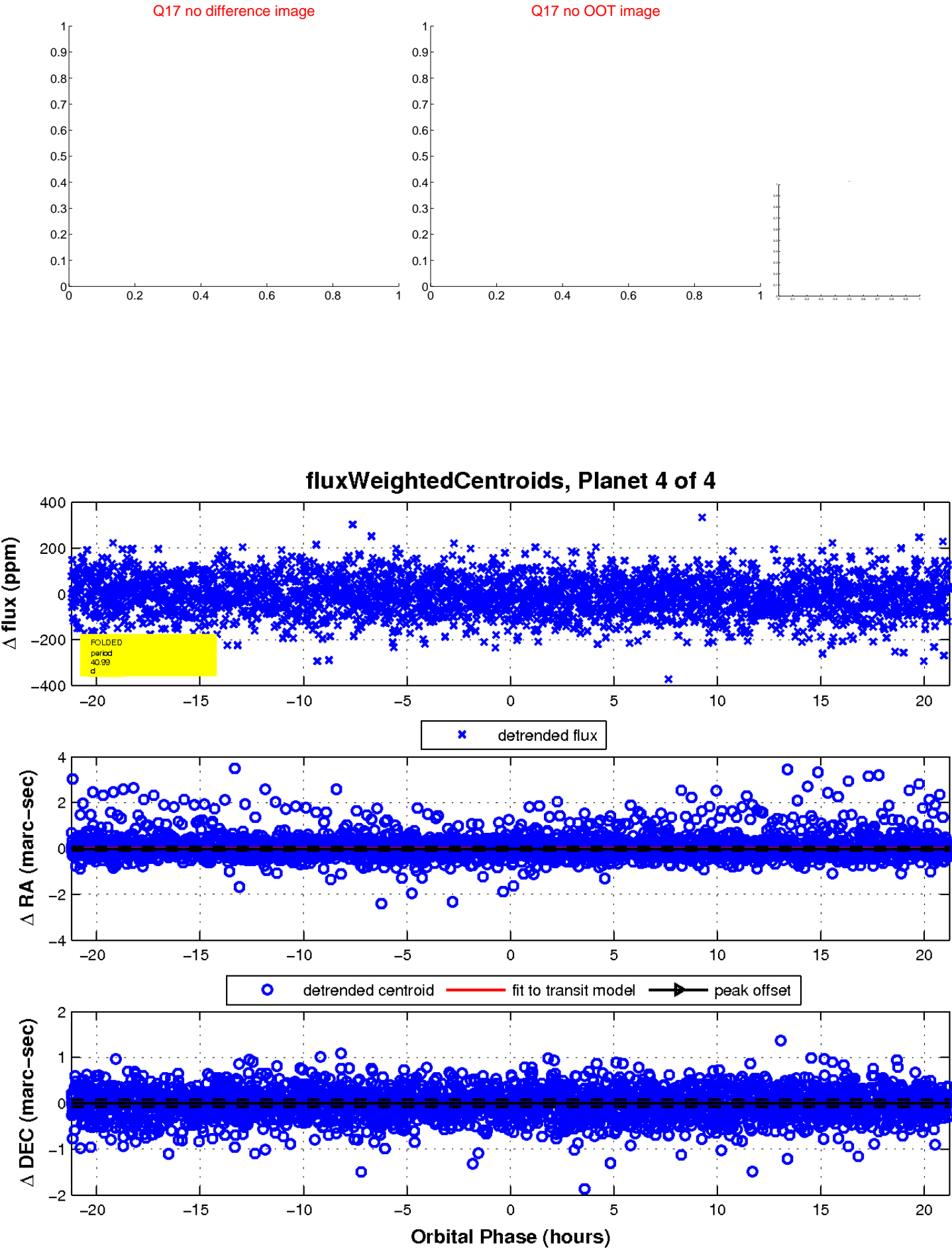


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





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



UKIRT Image

Declination

