

# KIC 006946871

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006946871-01	OBS	No	2.172871	131.892727	30.7	10.249	10.2	9.3	3.63	6739	2.71	15447.19
006946871-02	OBS	No	134.258834	158.480872	297.0	13.437	11.2	9.4	3.63	6739	6.65	63.24
006946871-03	OBS	No	10.401104	131.732484	109.4	6.649	7.9	9.6	3.63	6739	7.49	1914.79
006946871-04	OBS	No	2.173139	132.399594	51.9	26.078	10.3	14.3	3.63	6739	2.65	15444.65

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006946871-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_SATURATED
006946871-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_SATURATED
006946871-03	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_SATURATED
006946871-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—SAME_NTL_PERIOD—CENT_SATURATED

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

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

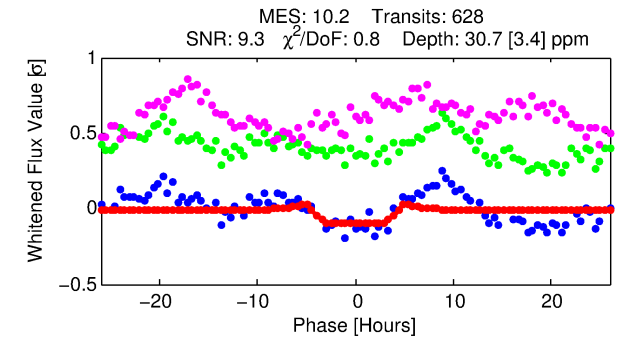
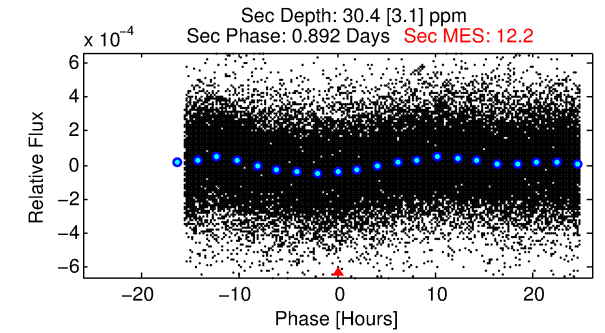
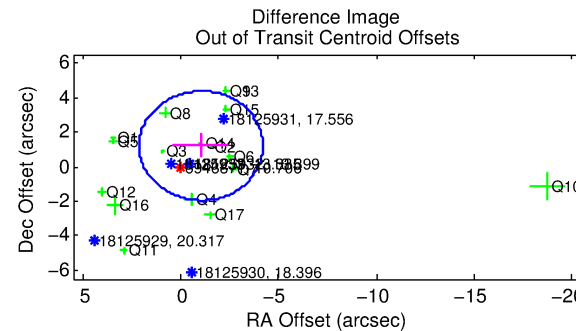
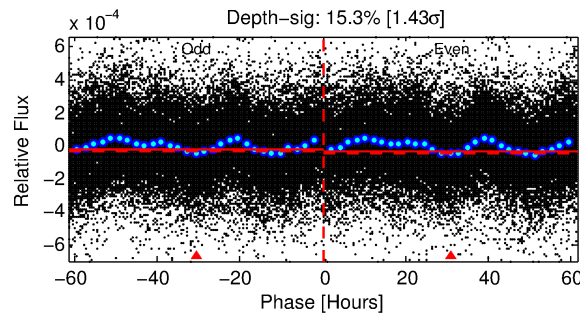
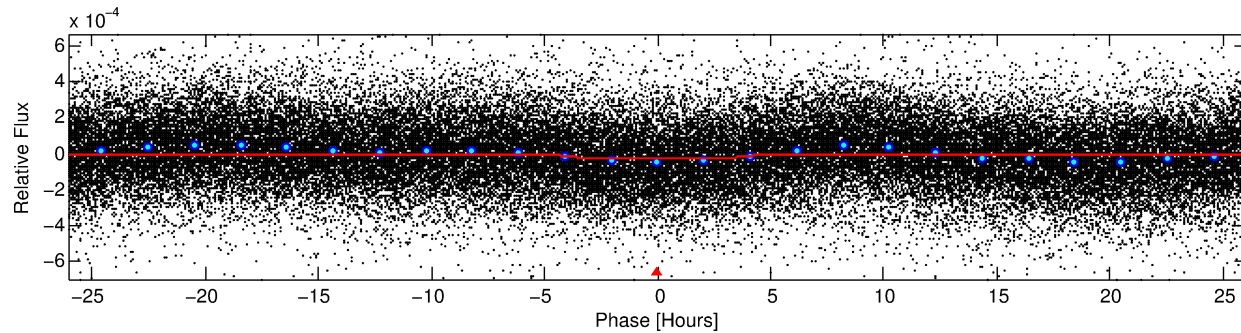
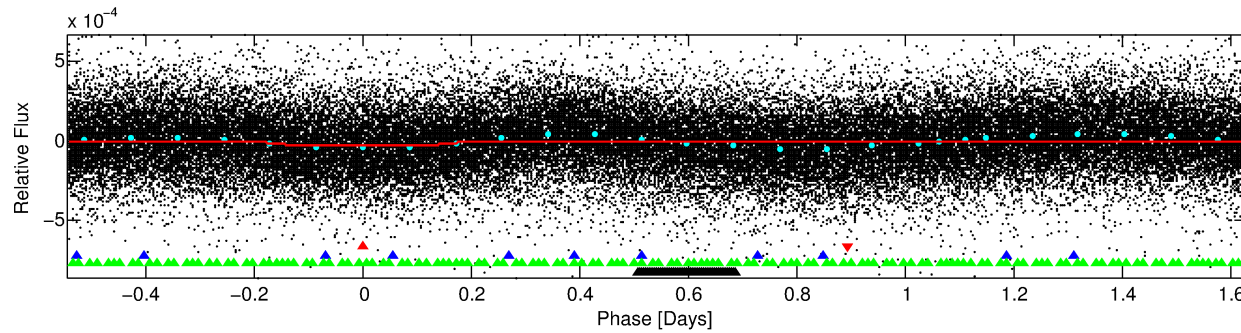
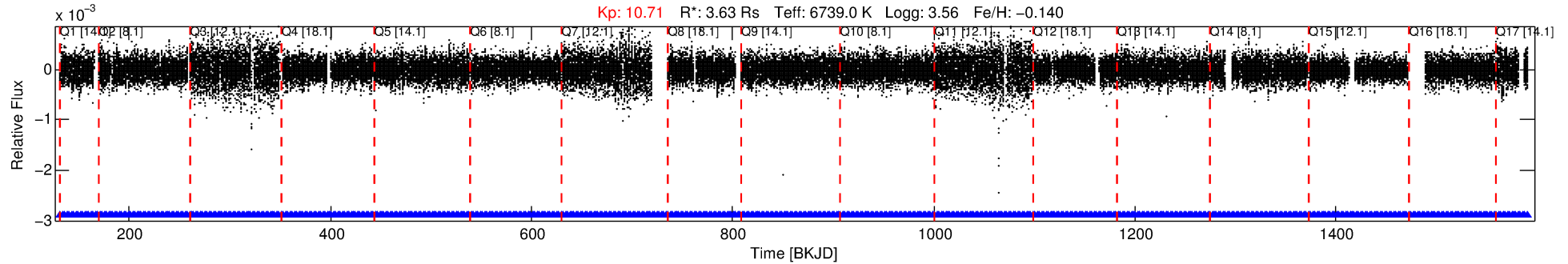
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 006946871-01

No Significant Match Found

# DV One-Page Summary

KIC: 6946871 Candidate: 1 of 4 Period: 2.173 d



## DV Fit Results:

Period = 2.17287 [0.00004] d  
Epoch = 131.8927 [0.0132] BKJD  
Rp/R\* = 0.0069 [0.0004]  
a/R\* = 1.05 [0.02]  
b = 0.99 [0.01]  
Seff = 15447.19 [9292.13]  
Teq = 2843 [428] K  
Rp = 2.71 [1.02] Re  
a = 0.0397 [0.0144] AU  
Ag = 3.58 [2.19] [1.18 $\sigma$ ]  
Teffp = 6045 [308] K [6.08 $\sigma$ ]

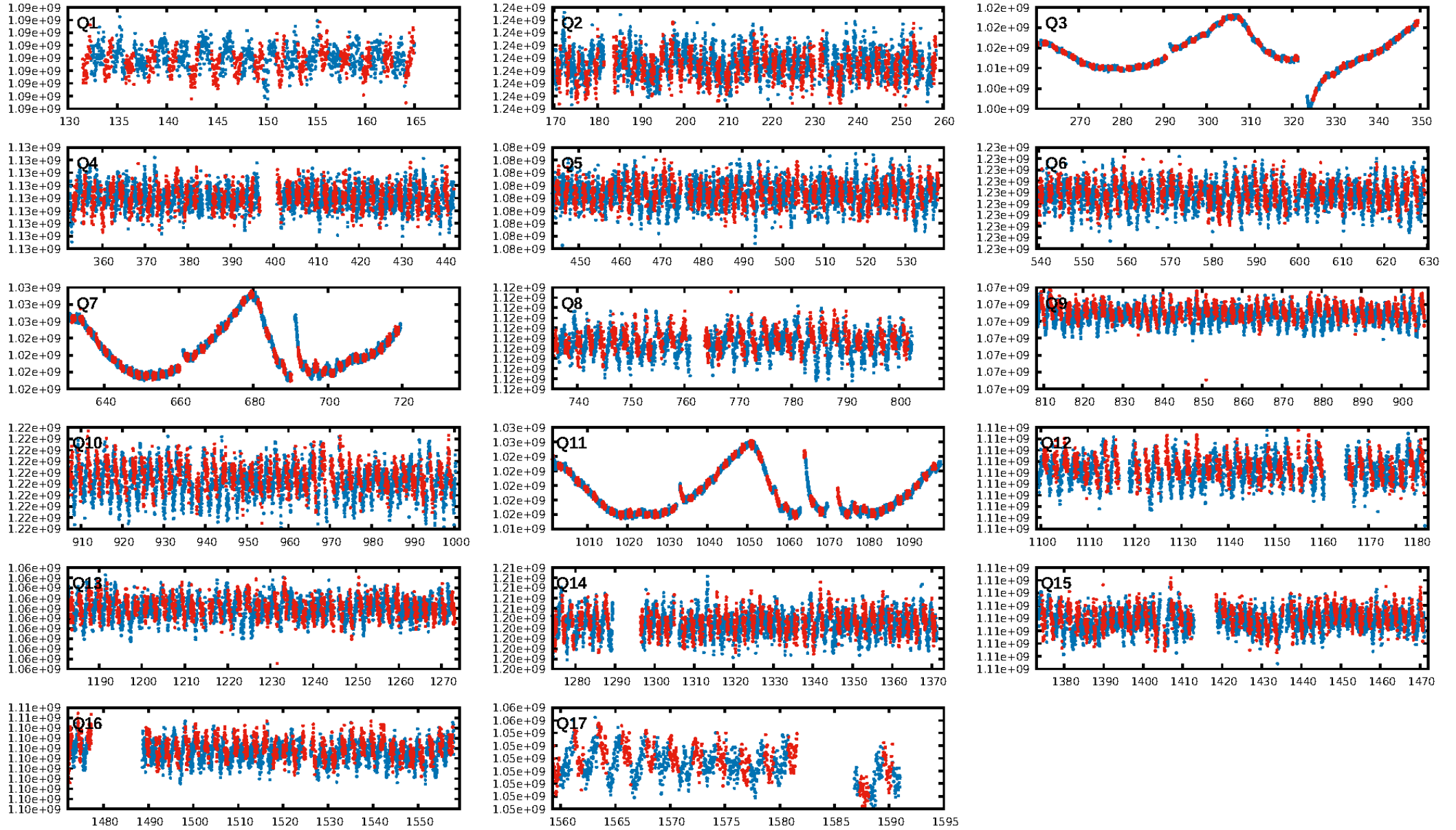
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [599/599]  
GhostDiagnostic-chr: 2.457  
Centroid-sig: N/A  
Centroid-so: 2.713 arcsec [7.26 $\sigma$ ]  
OotOffset-rm: 1.586 arcsec [1.50 $\sigma$ ]  
KicOffset-rm: 2.610 arcsec [2.97 $\sigma$ ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.35 [6/17]  
DiffImageOverlap-fno: 0.00 [0/17]

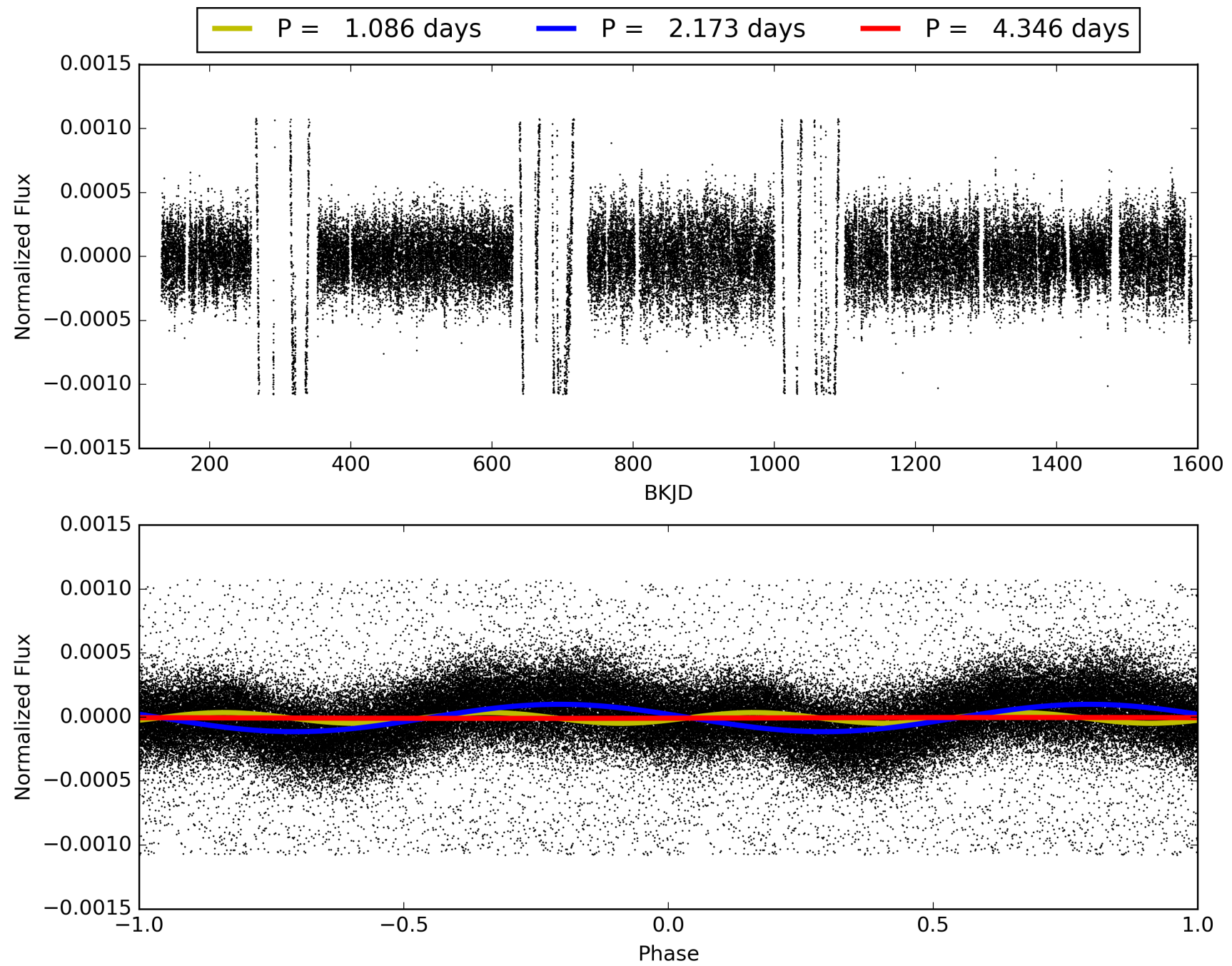
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 02:57:12 Z

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

# TCE 006946871-01, PDC Light Curves



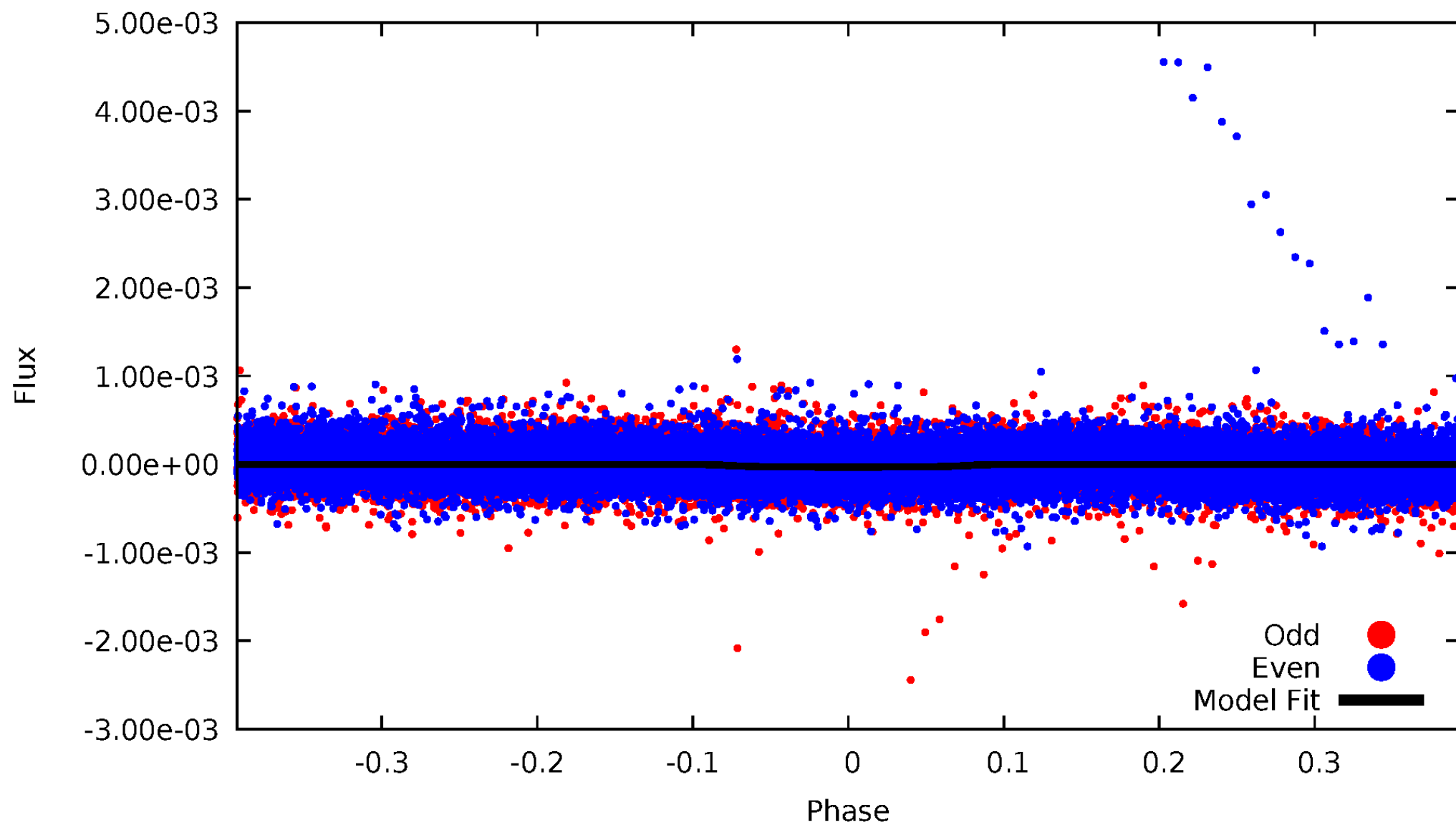
TCE 006946871-01





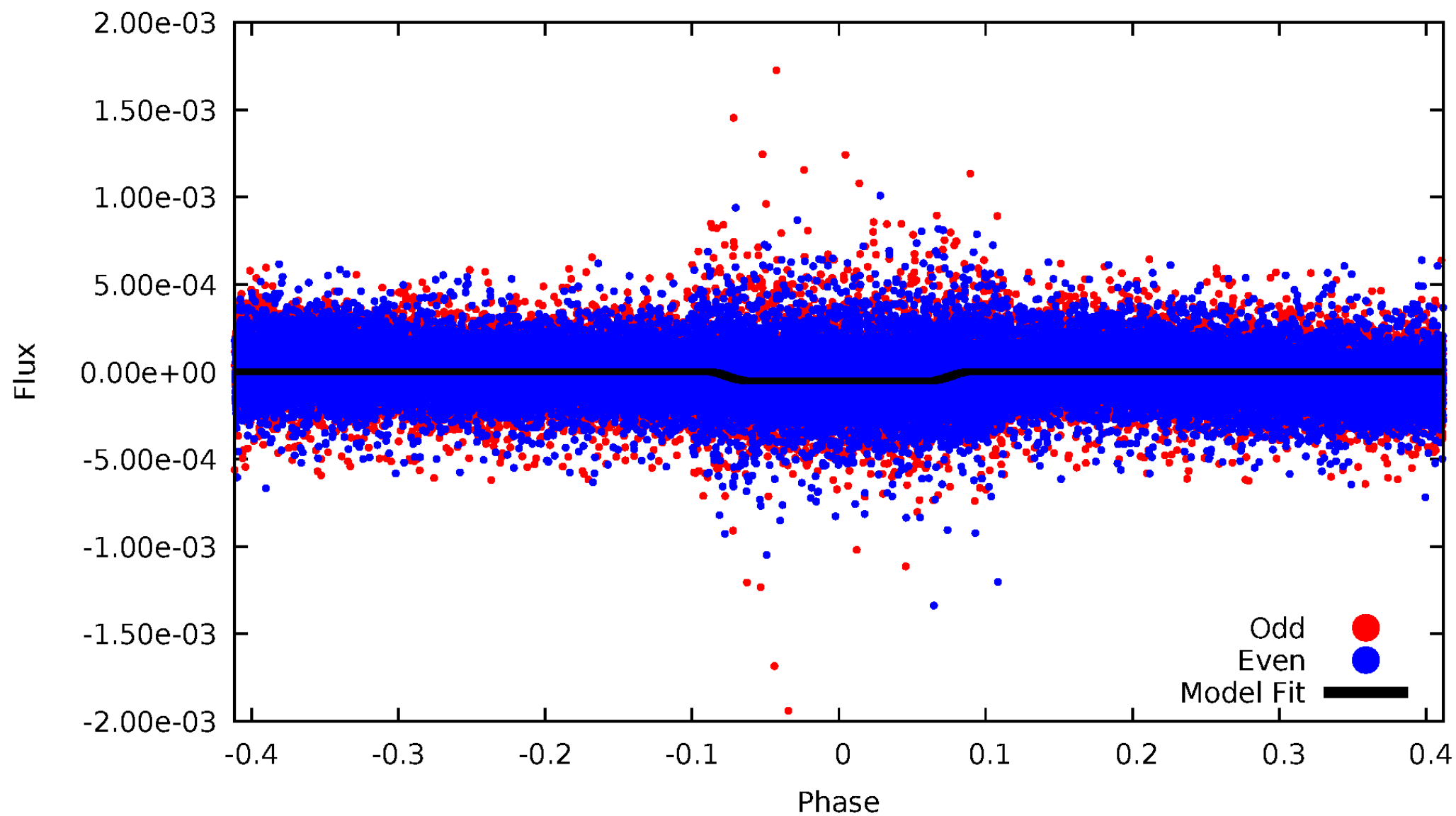
# DV Odd/Even

TCE 006946871-01

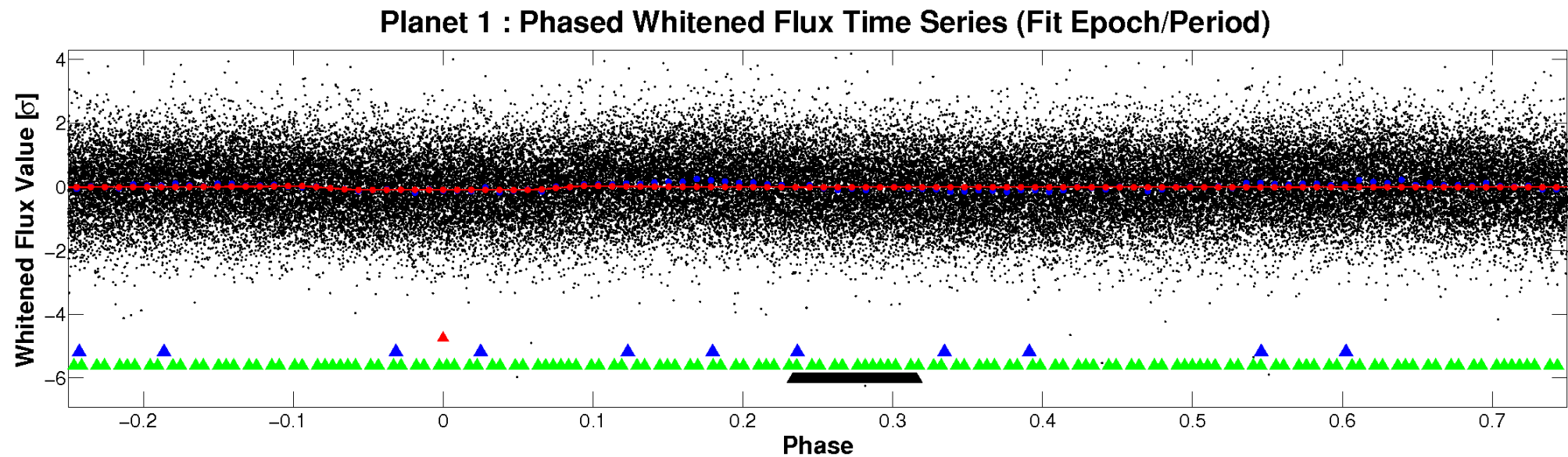
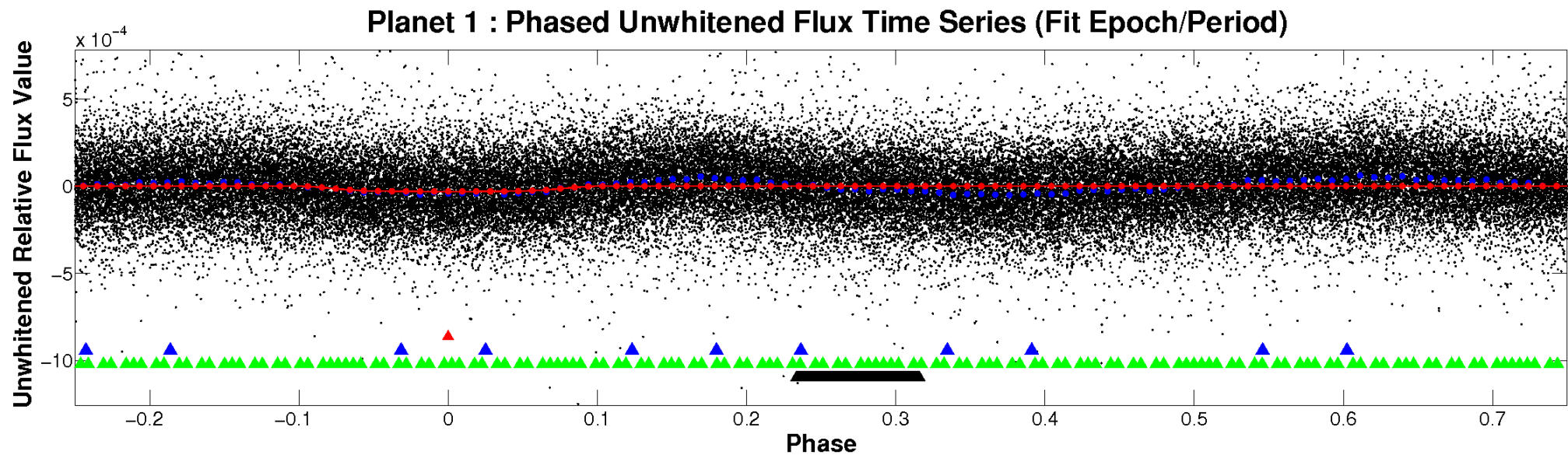


# ALT Odd/Even

TCE 006946871-01

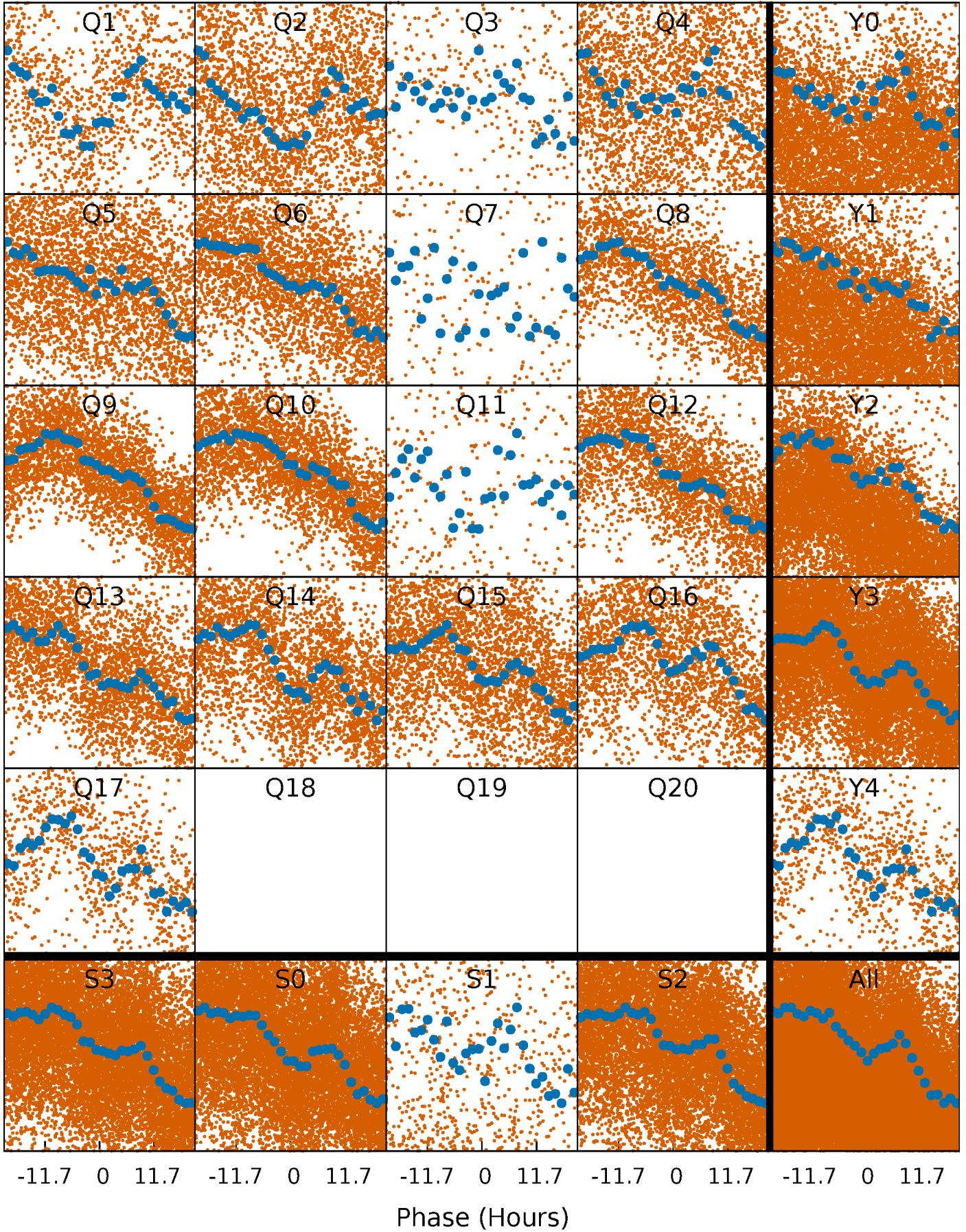


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

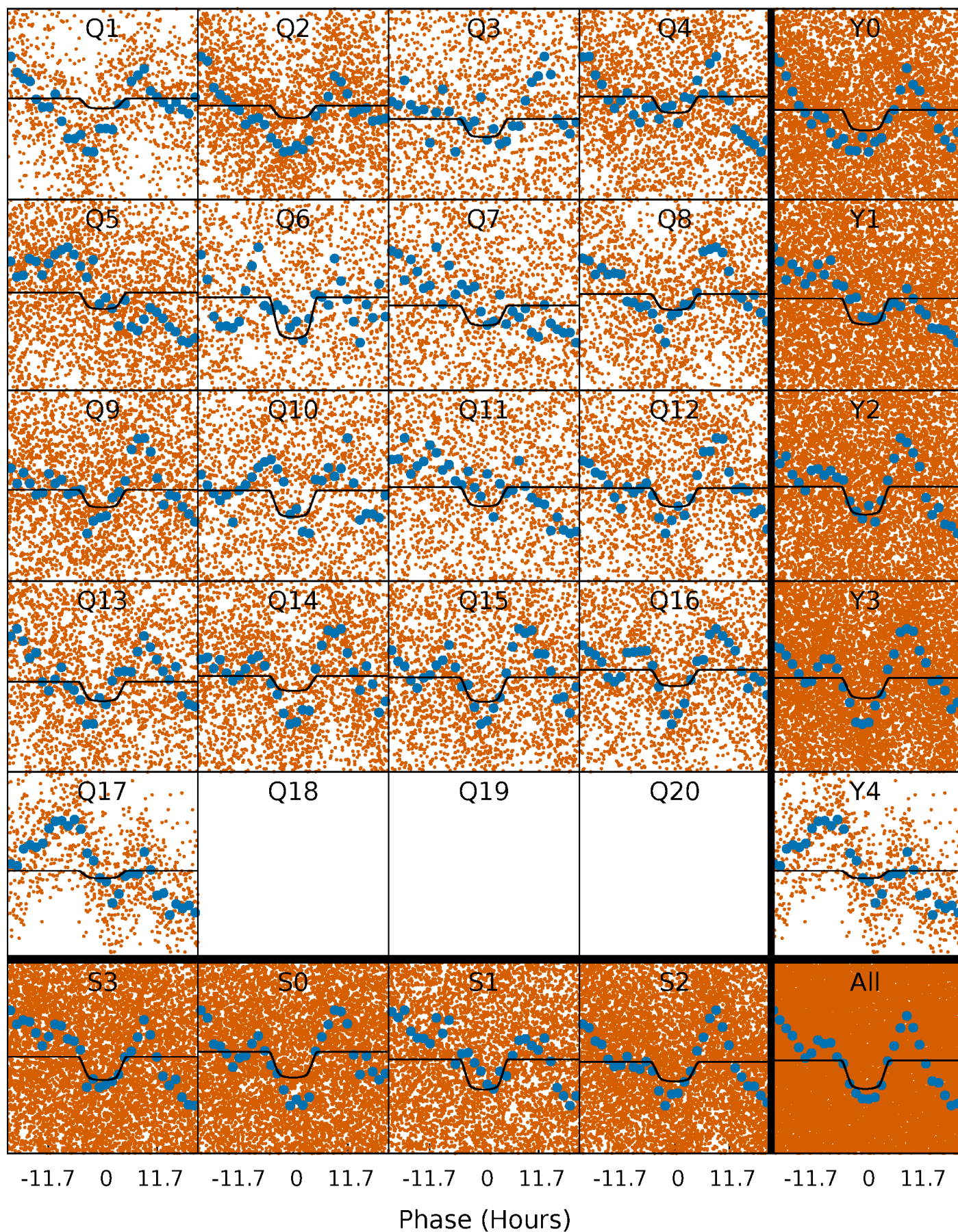
TCE 006946871-01   P= 2.172871 Days    $T_0=131.892727$  (BKJD)





# DV Quarter-Phased Transit Curves

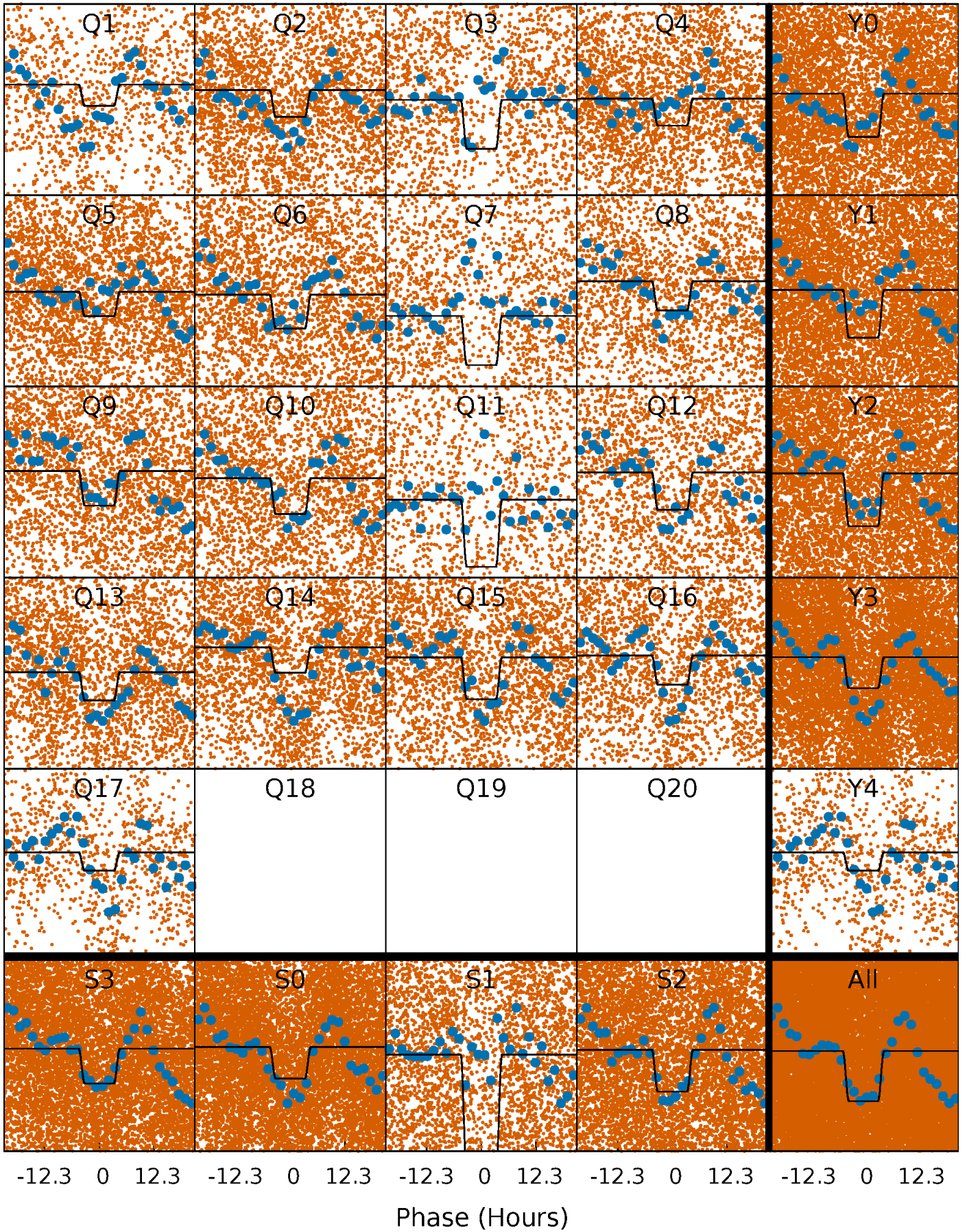
TCE 006946871-01 P= 2.172871 Days  $T_0=131.892727$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

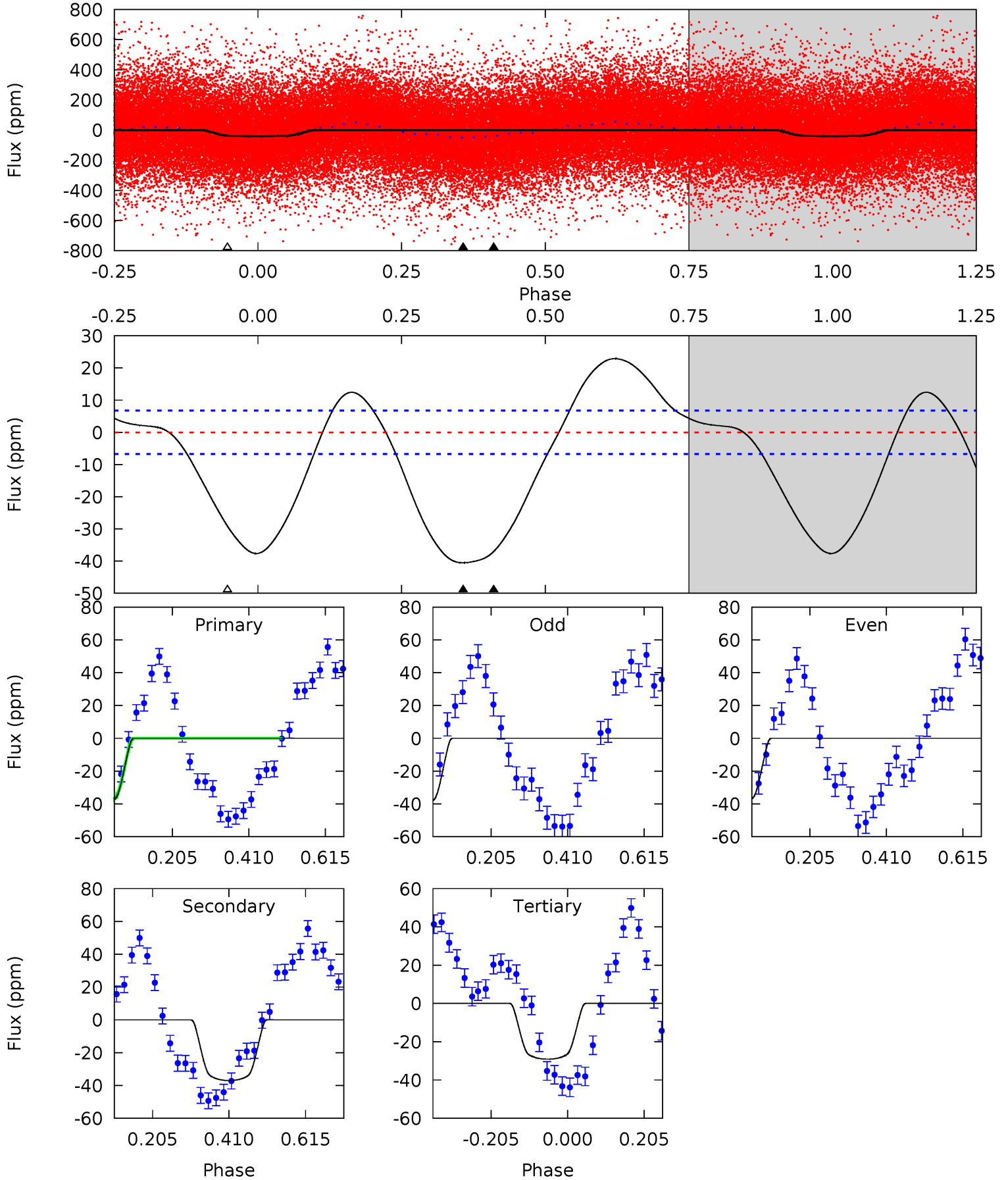
TCE 006946871-01 P= 2.172817 Days  $T_0=131.904175$  (BKJD)



# DV Model-Shift Uniqueness Test

006946871-01, P = 2.172871 Days, E = 129.719856 Days

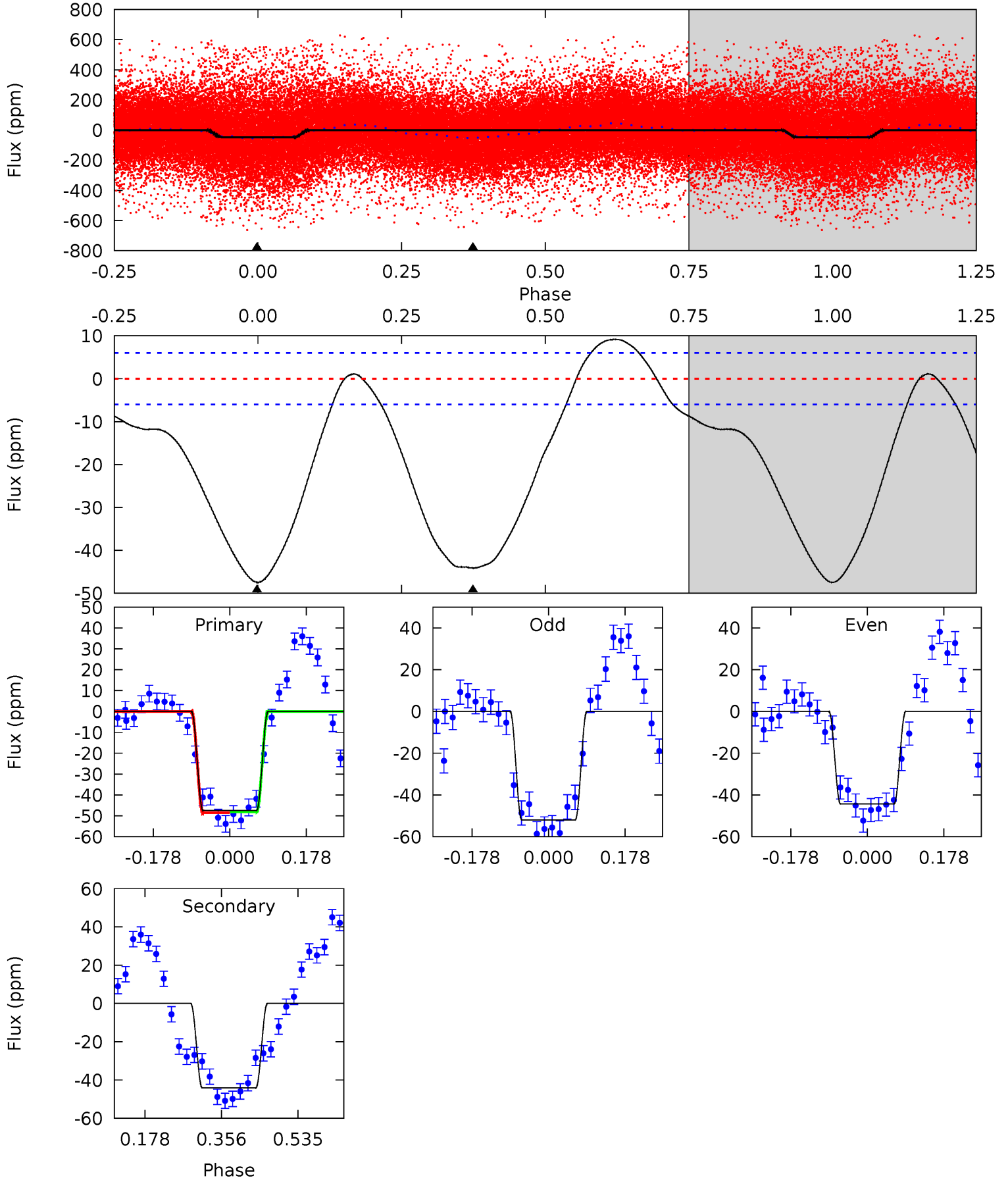
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
26.5	24.2	19.1	0	4.41	1.27	12.0	7.46	26.5	5.16	24.2	0.36	0.99	0.36	0.44



# Alt Model-Shift Uniqueness Test

006946871-01, P = 2.172817 Days, E = 129.731358 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
35.2	32.7	0	0	4.44	1.35	5.62	35.2	35.2	32.7	32.7	2.83	0.96	0.16	0.16





### Stellar Parameters For KIC 006946871

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6739^{+151}_{-201}$	$3.565^{+0.349}_{-0.082}$	$-0.140^{+0.300}_{-0.250}$	$3.626^{+0.357}_{-1.339}$	$1.762^{+0.160}_{-0.373}$	$0.052^{+0.134}_{-0.011}$
	+2%/-3%	+10%/-2%	+214%/-179%	+10%/-37%	+9%/-21%	+257%/-20%
Source	PHO1	FLK73	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 006946871-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-37 \pm 2$	$2.63^{+0.33}_{-0.50}$	$3910^{+196}_{-357}$	$6216^{+280}_{-270}$	$4.656^{+2.149}_{-0.955}$
Alt.	$-44 \pm 1$	$2.71^{+0.34}_{-0.54}$	$3877^{+216}_{-351}$	$6388^{+283}_{-247}$	$5.282^{+2.463}_{-1.093}$

$T_{\text{max}}$  = 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

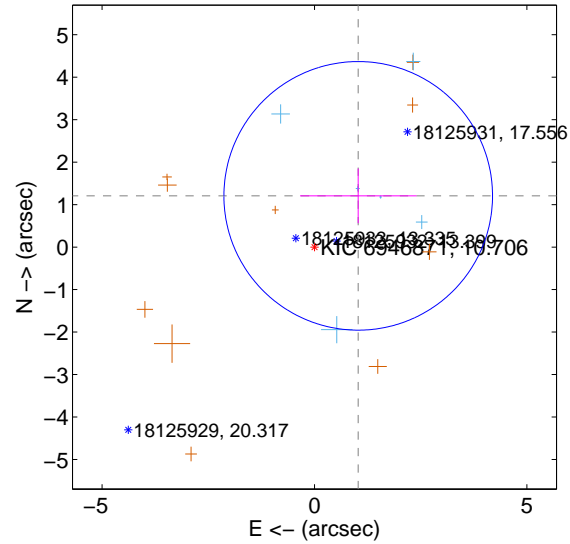
Supplemental centroid analysis for 006946871-01. **Kepler magnitude: 10.71.** Transit SNR 9.35

There are 6 quarters with good PRF difference image offsets

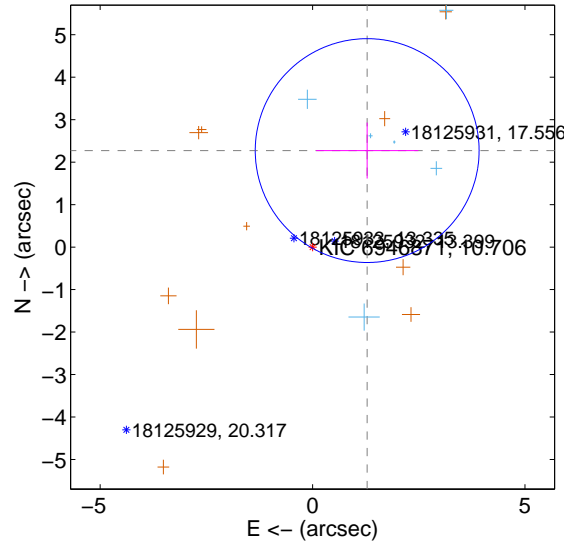
The direct PRF centroid is offset from the target star catalog position by about 1.48 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.586 \pm 1.054$	1.50	$-1.030 \pm 1.371$	$1.206 \pm 0.643$
PRF-fit source offset from KIC position	$2.610 \pm 0.878$	2.97	$-1.286 \pm 1.204$	$2.272 \pm 0.659$
photometric centroid source offset	<b><math>2.71 \pm 0.37</math></b>	<b>7.26</b>	$-1.33 \pm 0.39$	$2.37 \pm 0.37$

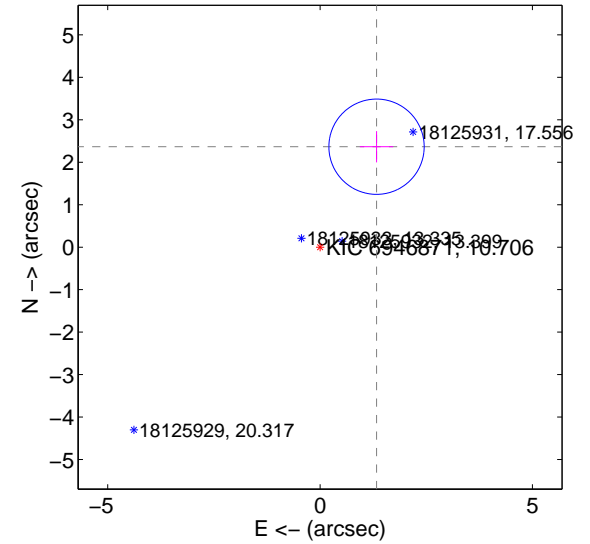
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

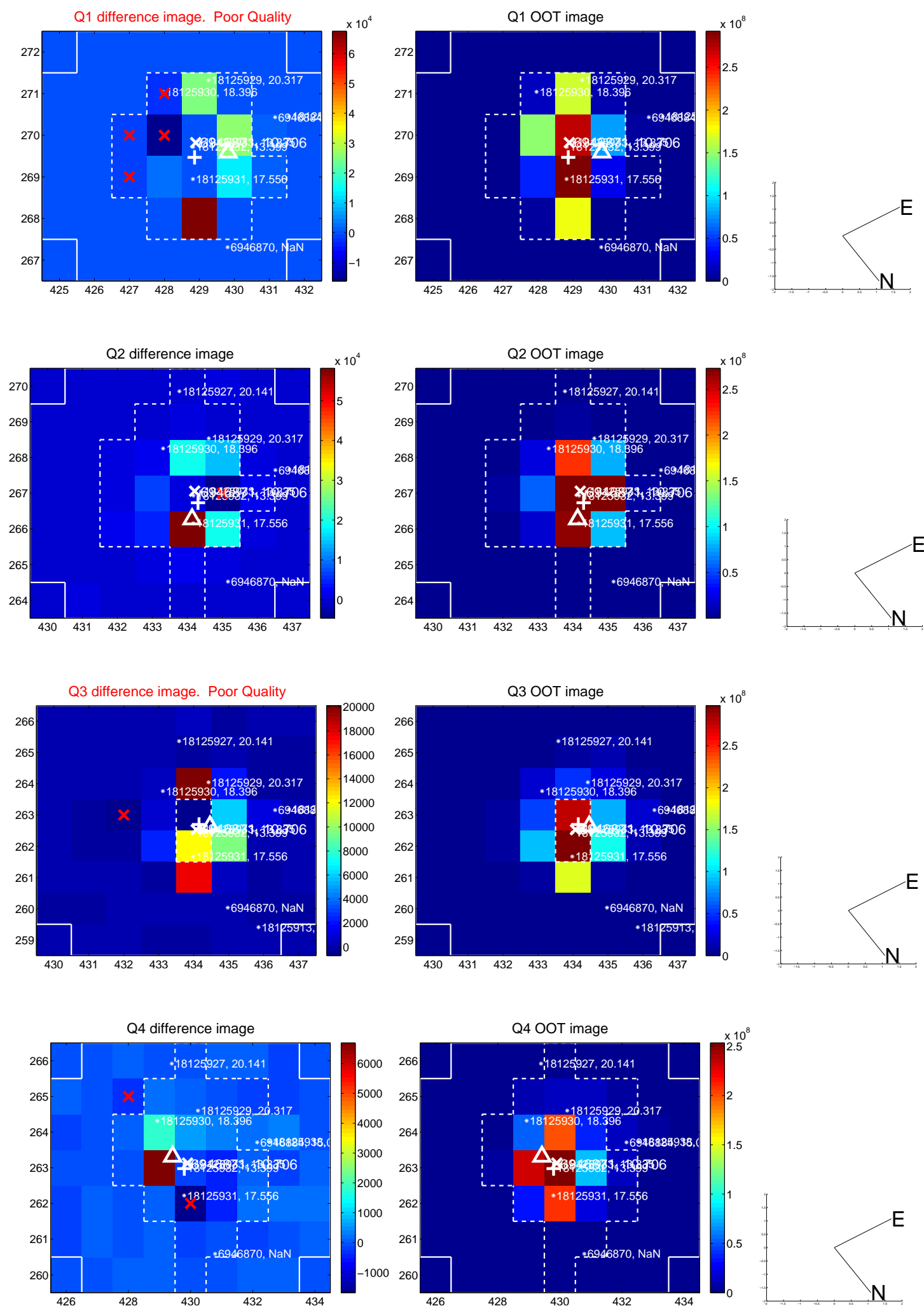


offset from photometric centroids

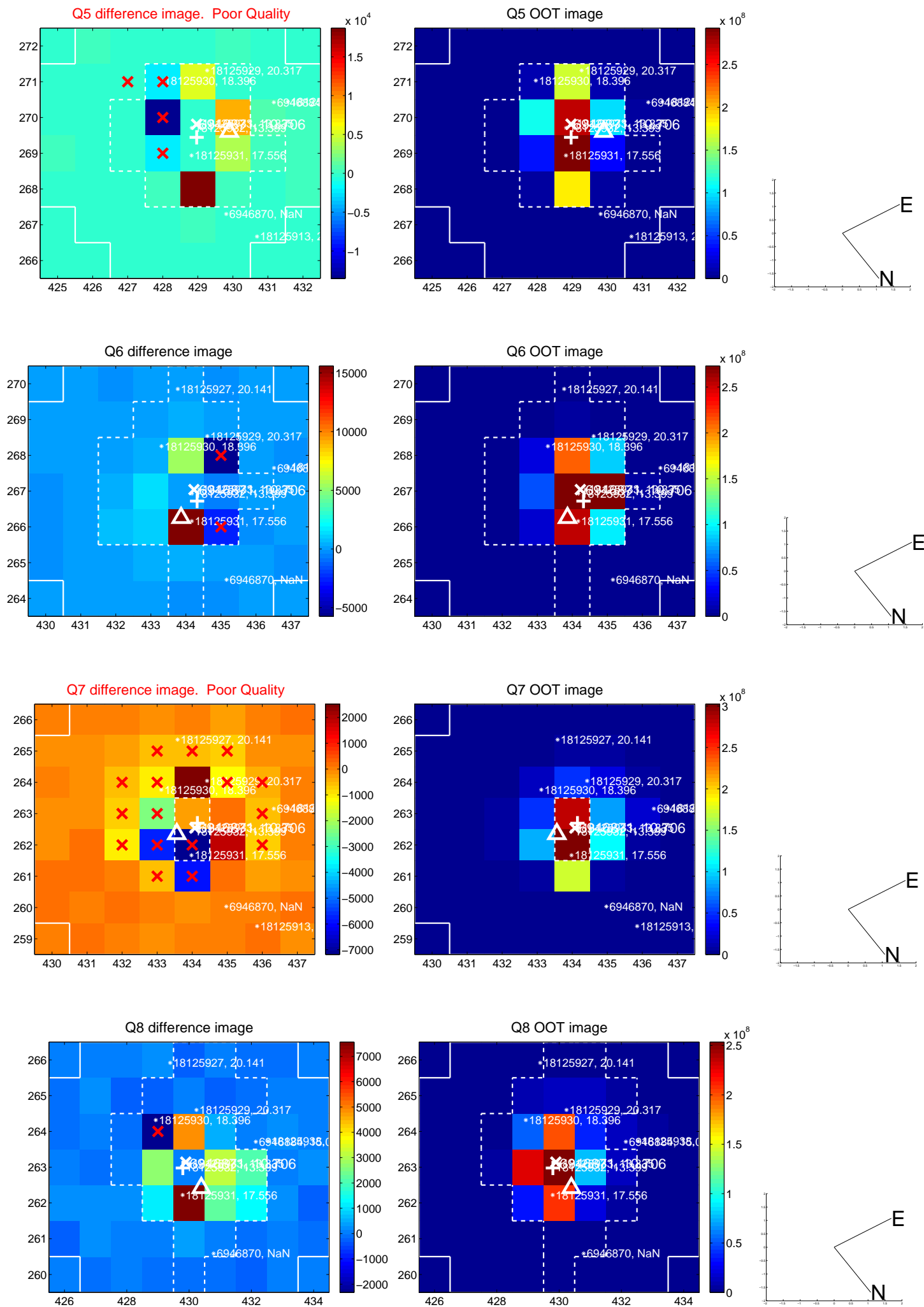


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

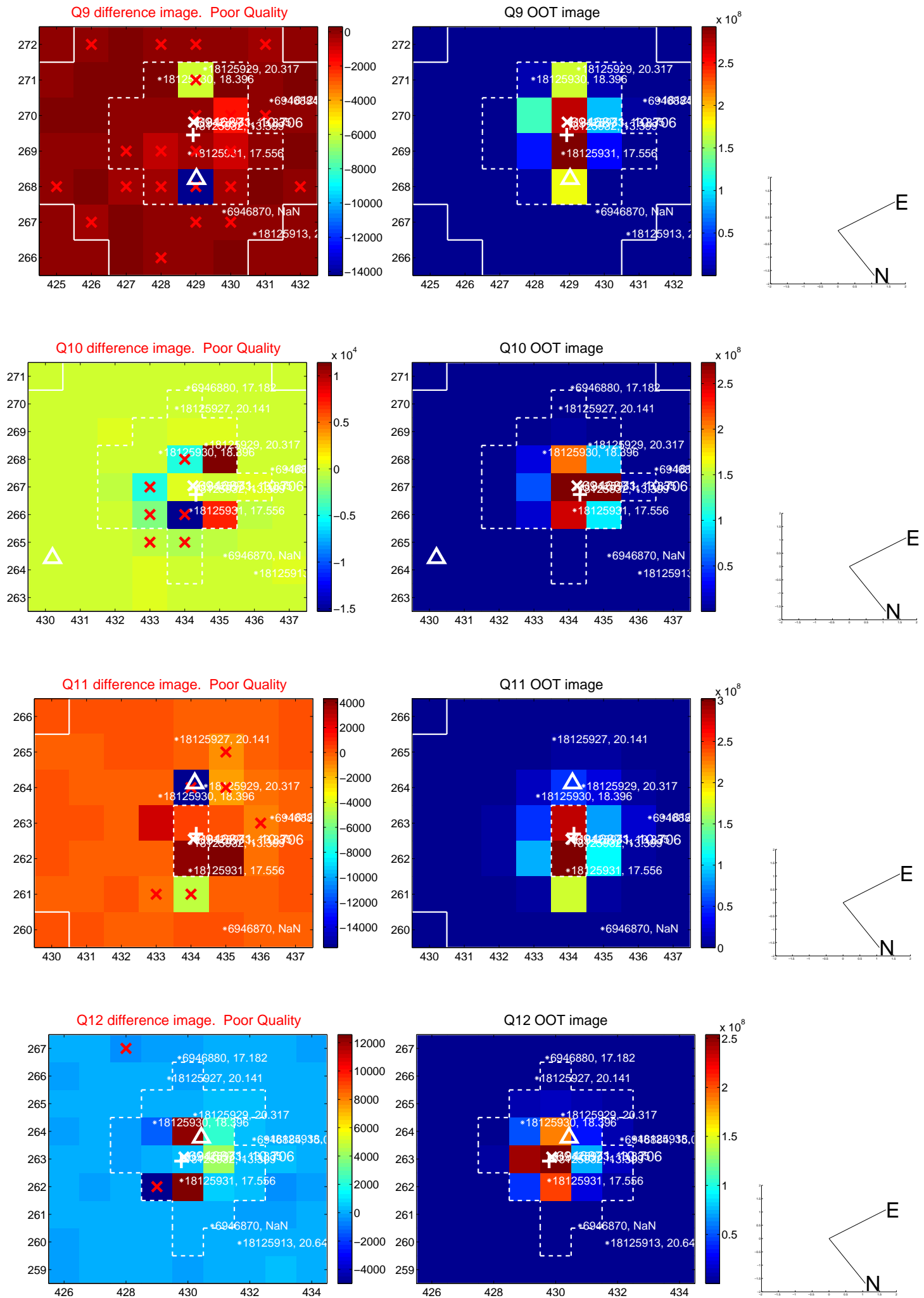


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

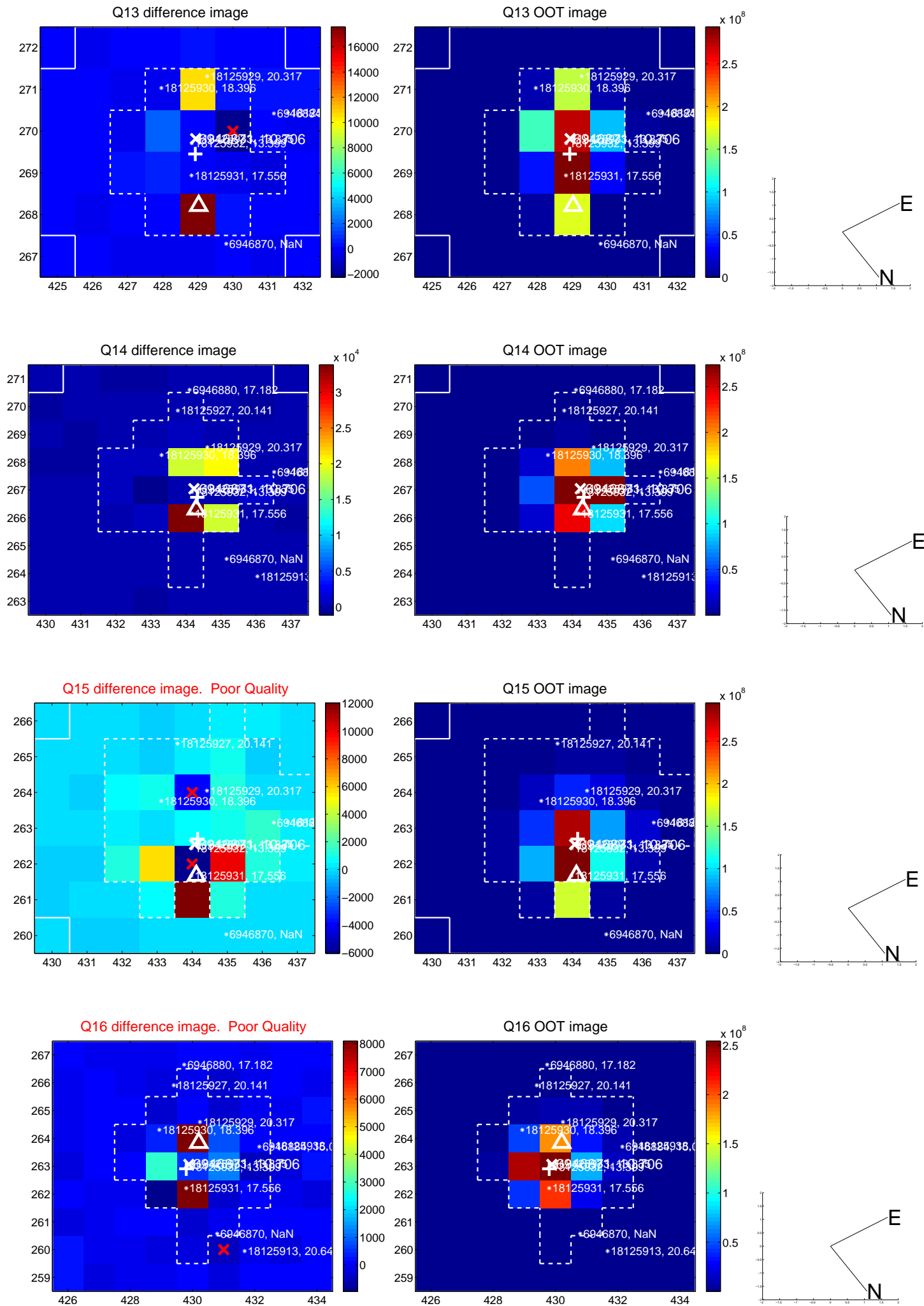




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



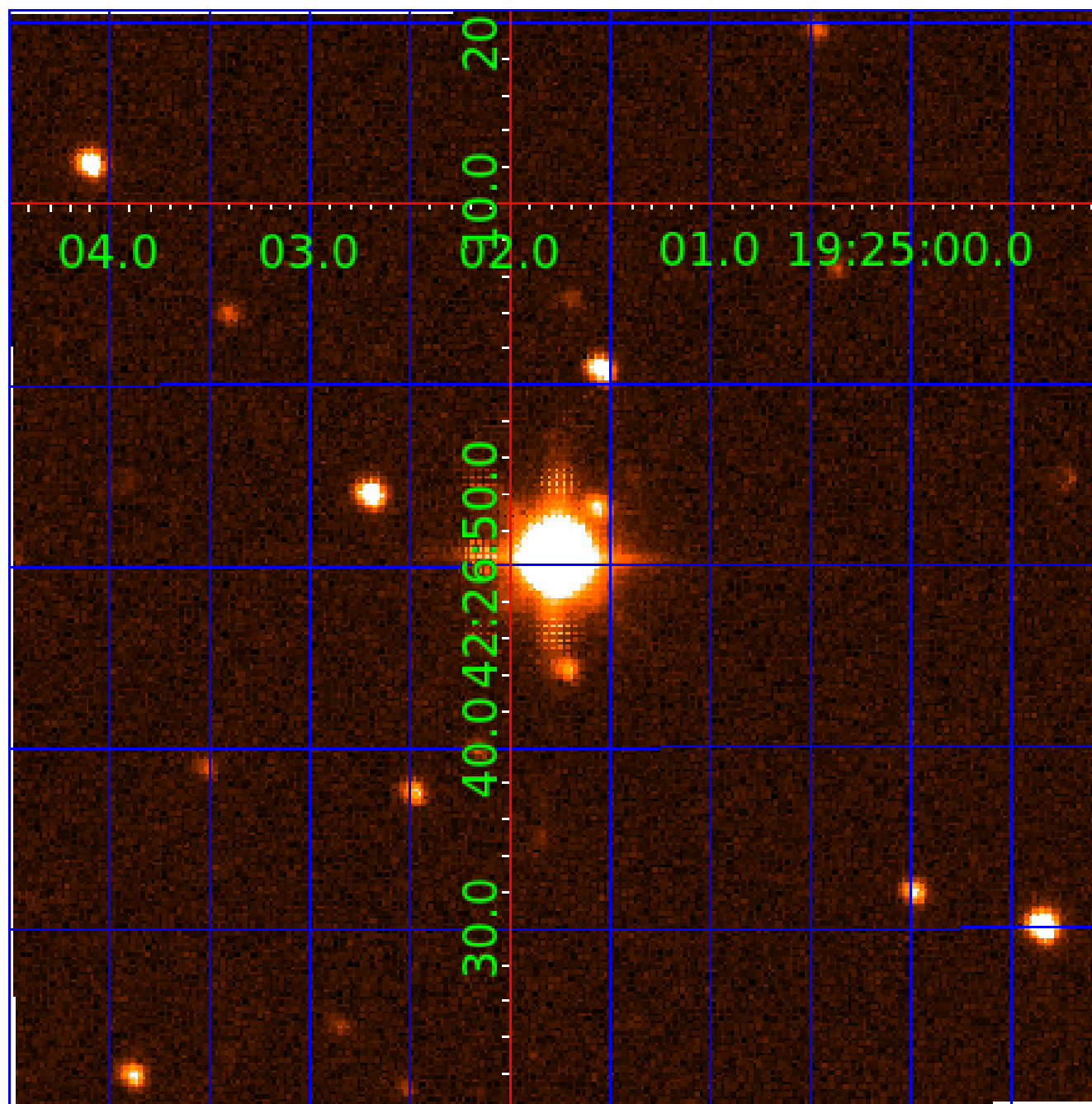
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image

Declination





# KIC 006946871

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006946871-01	OBS	No	2.172871	131.892727	30.7	10.249	10.2	9.3	3.63	6739	2.71	15447.19
006946871-02	OBS	No	134.258834	158.480872	297.0	13.437	11.2	9.4	3.63	6739	6.65	63.24
006946871-03	OBS	No	10.401104	131.732484	109.4	6.649	7.9	9.6	3.63	6739	7.49	1914.79
006946871-04	OBS	No	2.173139	132.399594	51.9	26.078	10.3	14.3	3.63	6739	2.65	15444.65

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006946871-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_SATURATED
006946871-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_SATURATED
006946871-03	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_SATURATED
006946871-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—SAME_NTL_PERIOD—CENT_SATURATED

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

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

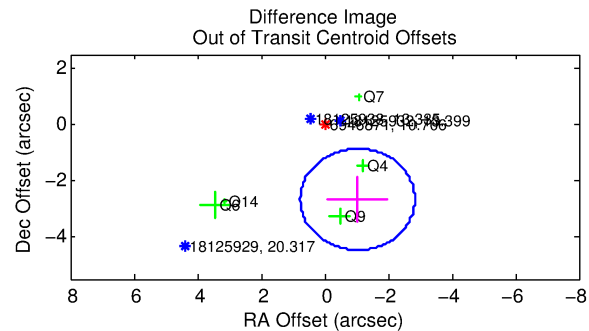
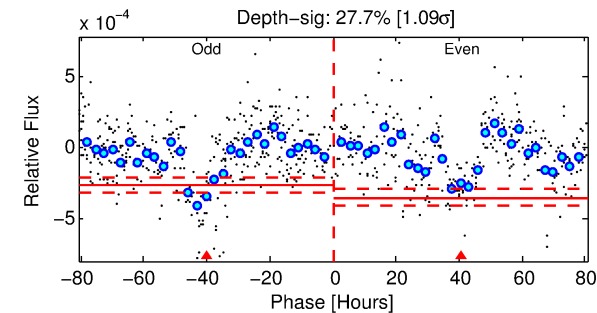
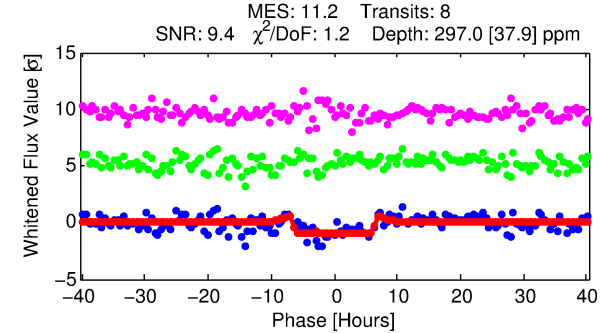
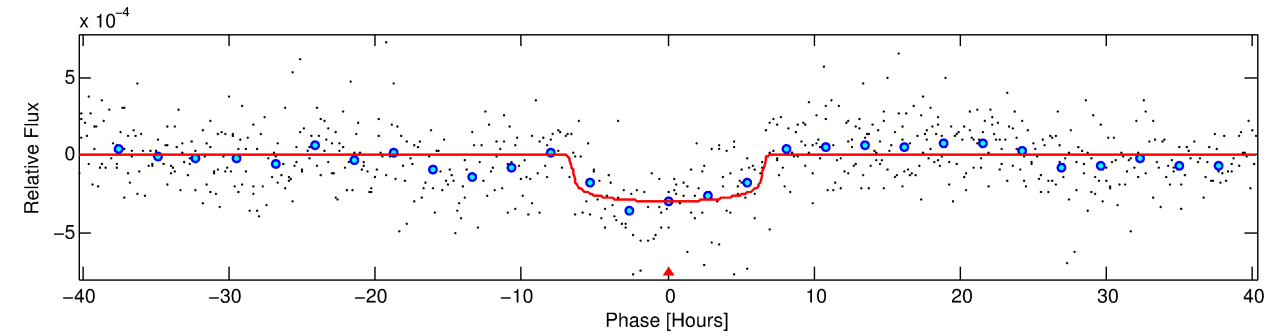
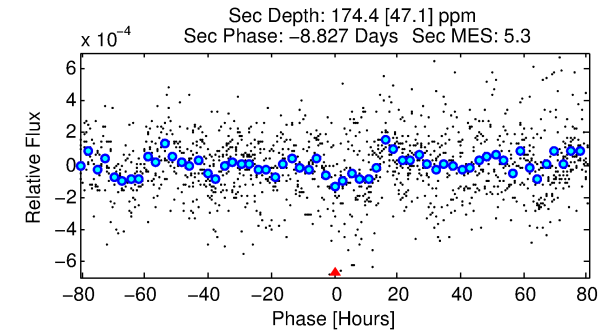
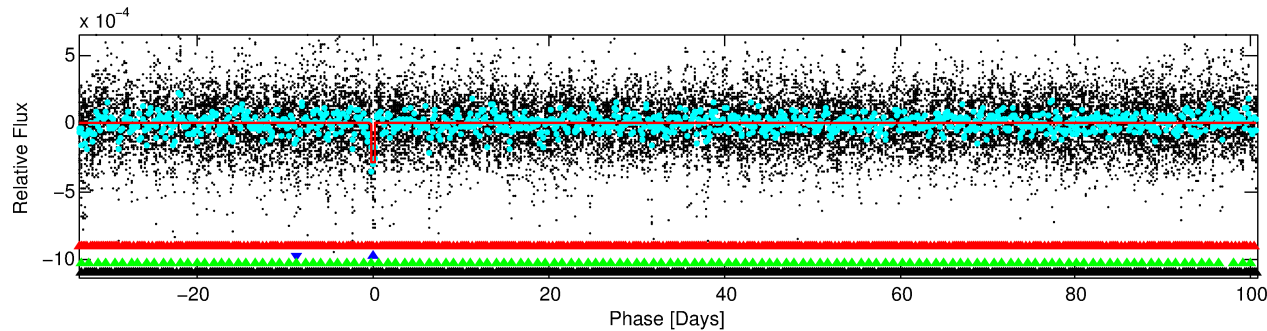
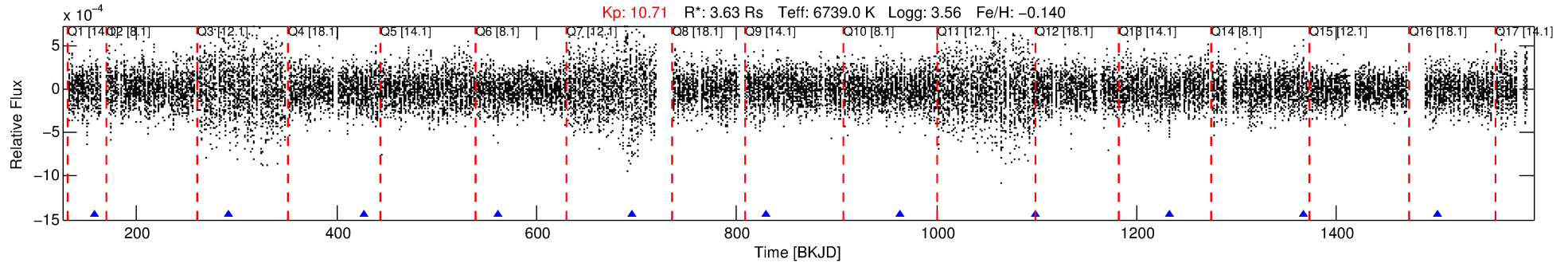
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 006946871-02

No Significant Match Found

# DV One-Page Summary

KIC: 6946871 Candidate: 2 of 4 Period: 134.259 d



## DV Fit Results:

Period = 134.25883 [0.00187] d  
Epoch = 158.4809 [0.0107] BKJD  
Rp/R\* = 0.0168 [0.0034]  
a/R\* = 57.96 [61.31]  
b = 0.68 [0.85]  
Seff = 63.24 [38.04]  
Teq = 719 [108] K  
Rp = 6.65 [2.80] Re  
a = 0.6198 [0.2255] AU  
Ag = 832.23 [634.65] [1.31σ]  
Teffp = 5971 [744] K [6.99σ]

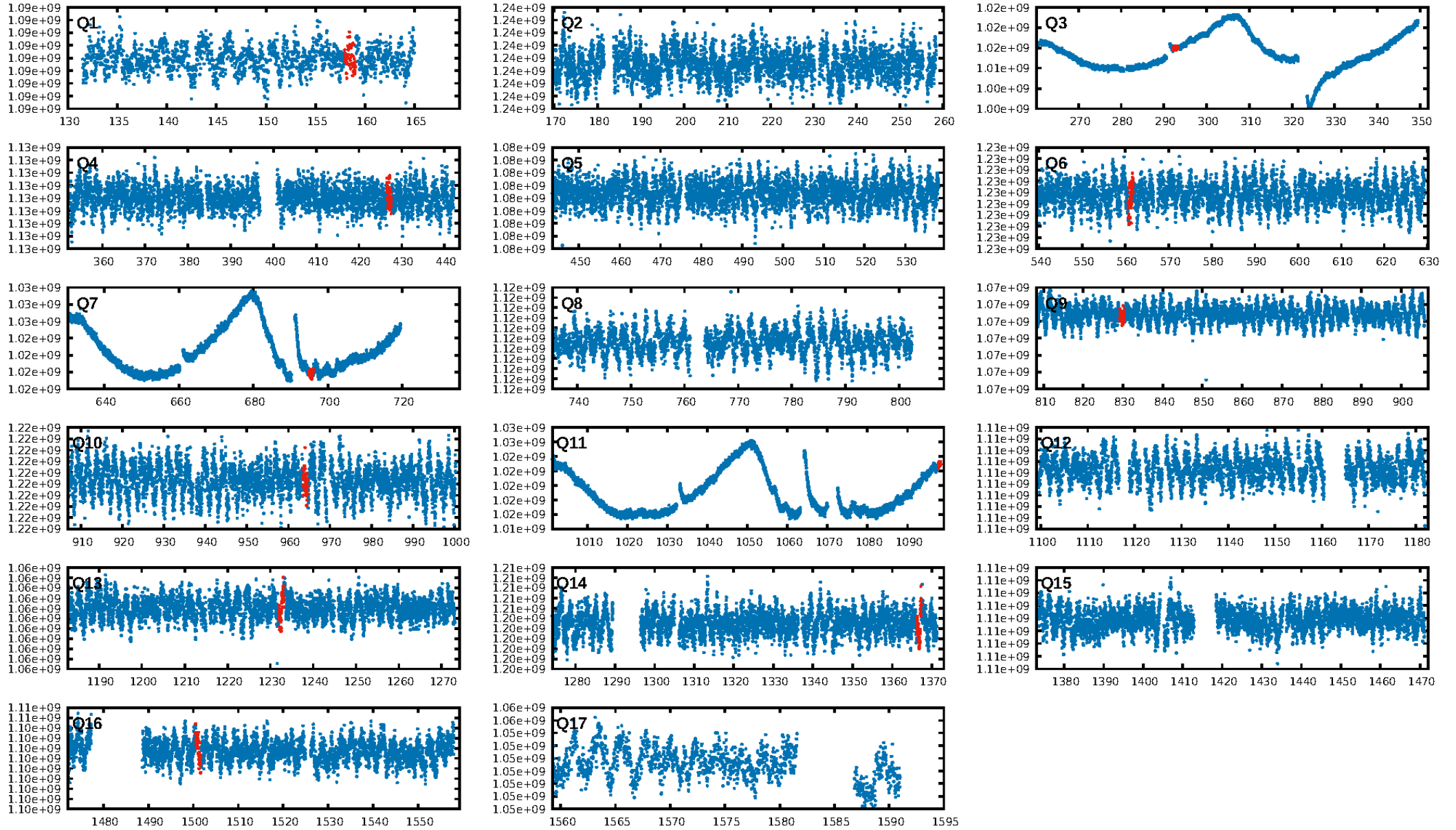
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [198.28σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 56.5%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [7/7]  
GhostDiagnostic-chr: 0.9307  
Centroid-sig: N/A  
Centroid-so: 1.165 arcsec [4.40σ]  
OotOffset-rm: 2.861 arcsec [4.75σ]  
KicOffset-rm: 1.785 arcsec [2.46σ]  
OotOffset-st: 2/1/1/1 [5]  
KicOffset-st: 2/1/1/1 [5]  
DiffImageQuality-fgm: 0.60 [3/5]  
DiffImageOverlap-fno: 0.00 [0/8]

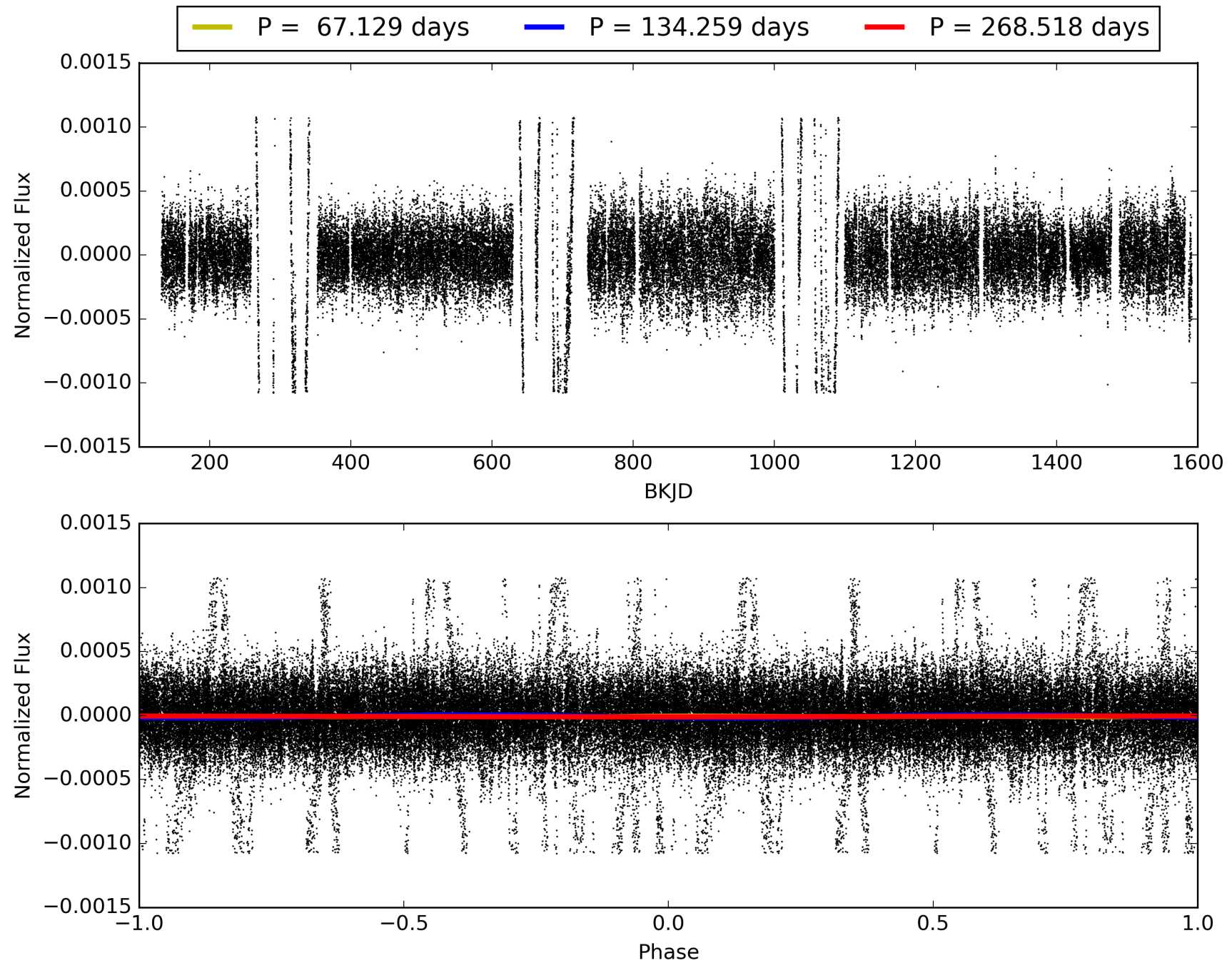
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 02:57:23 Z

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

# TCE 006946871-02, PDC Light Curves

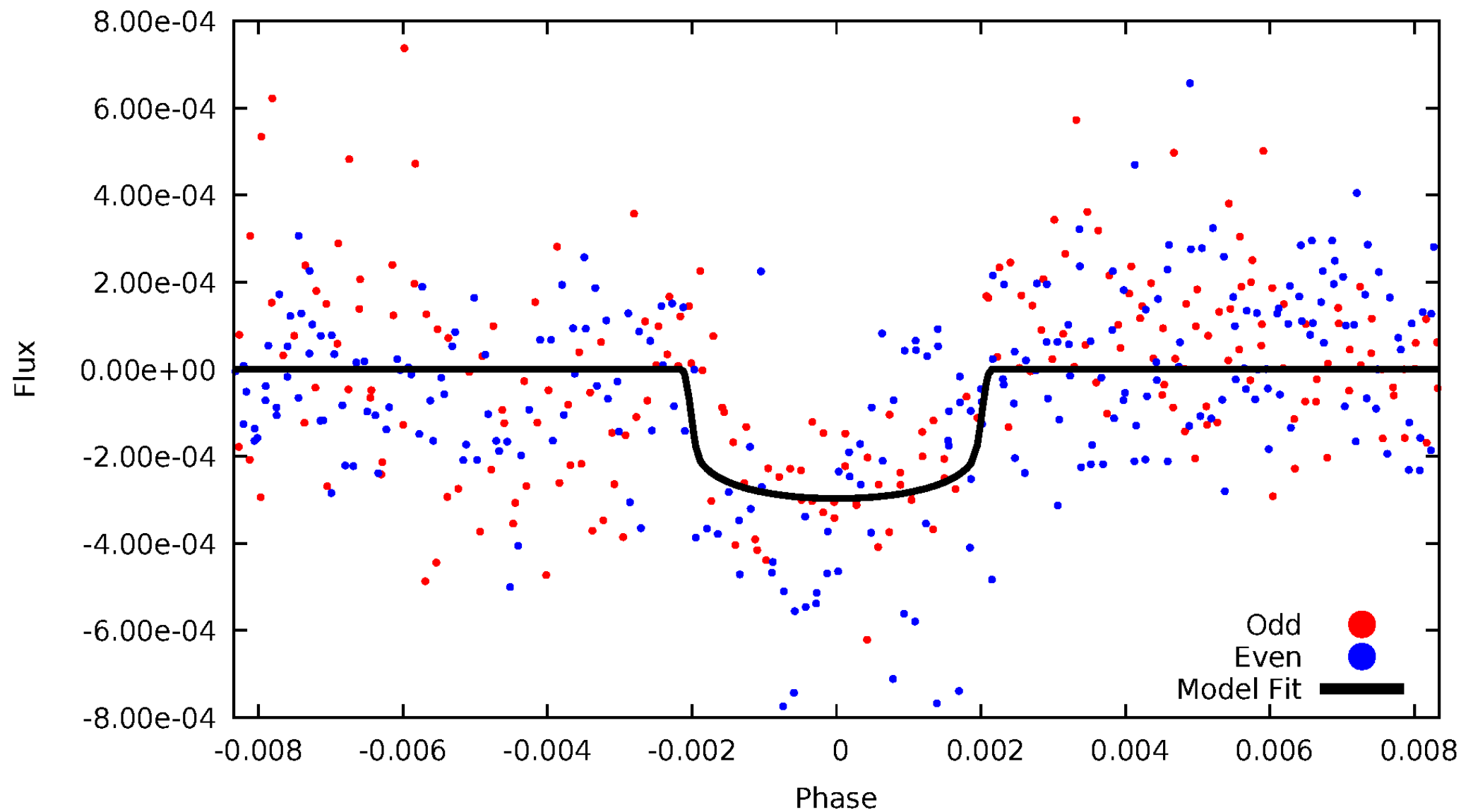


TCE 006946871-02



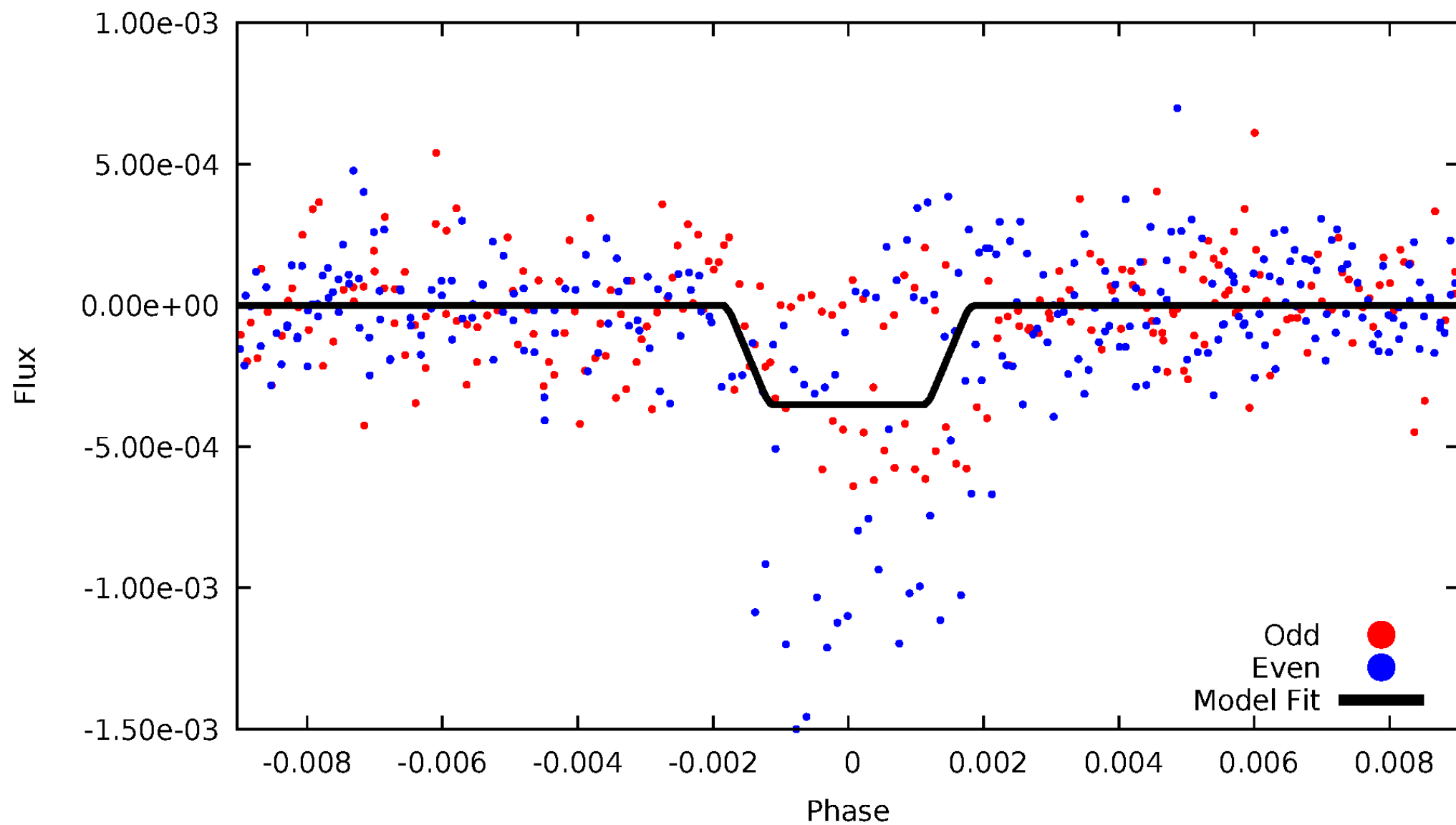
# DV Odd/Even

TCE 006946871-02



# ALT Odd/Even

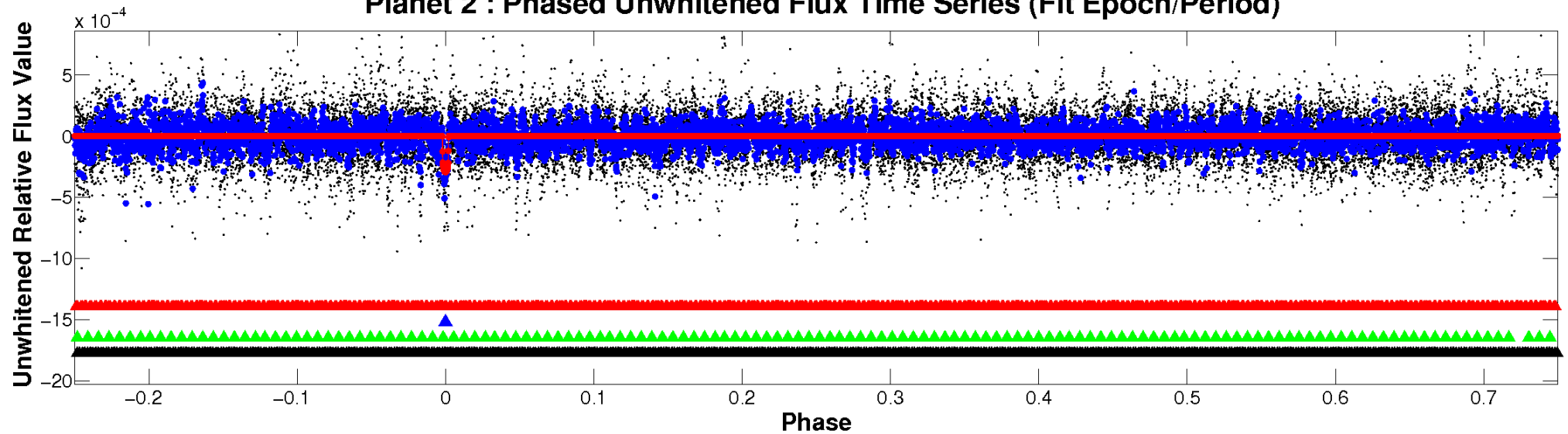
TCE 006946871-02



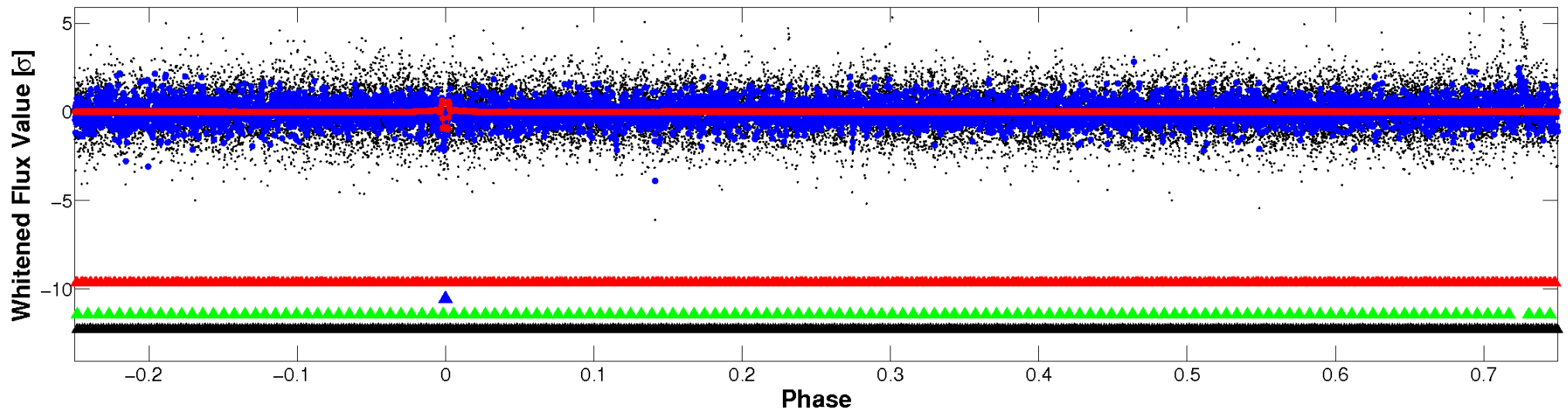


# Non-Whitened Vs. Whitened Light Curve

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

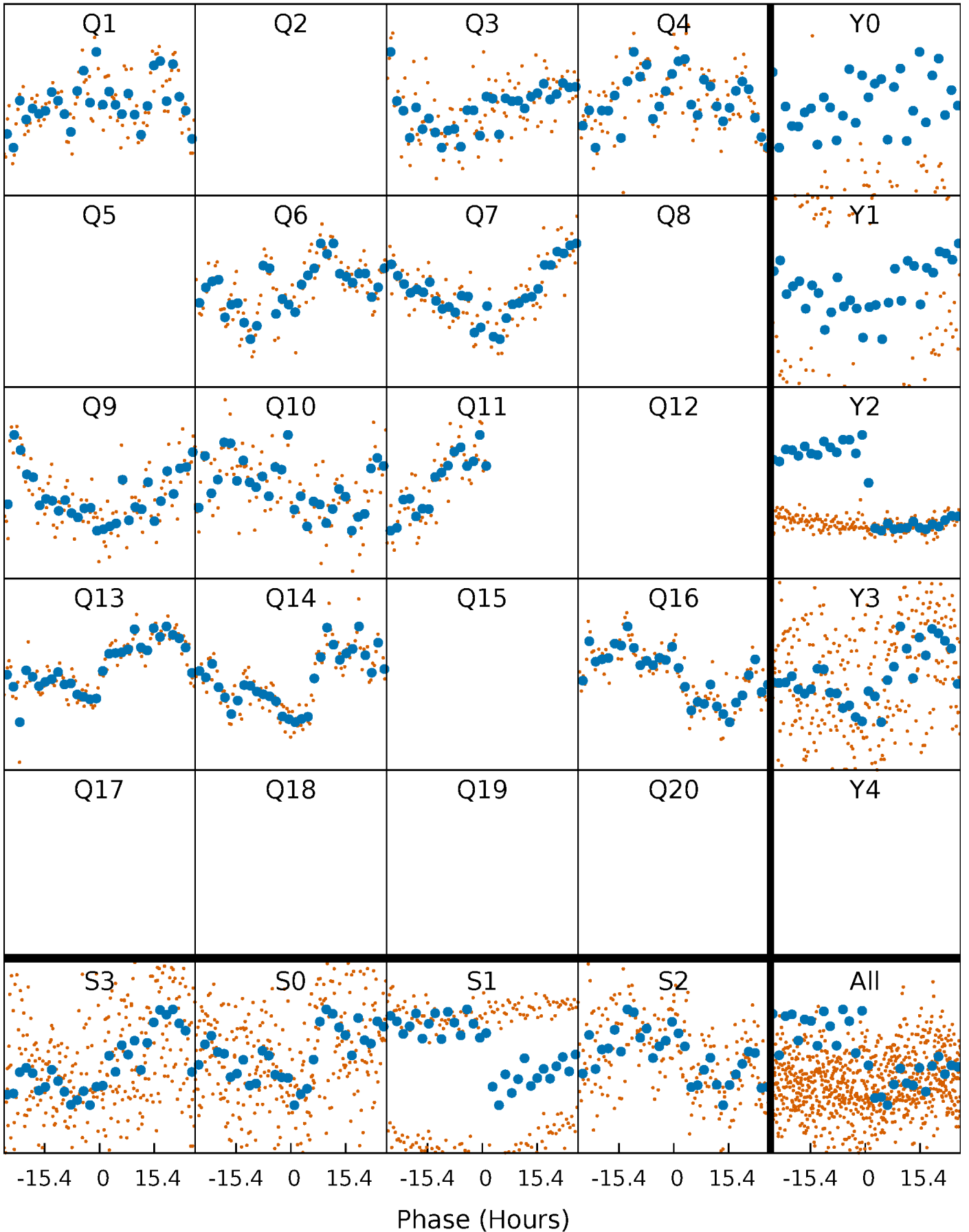


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



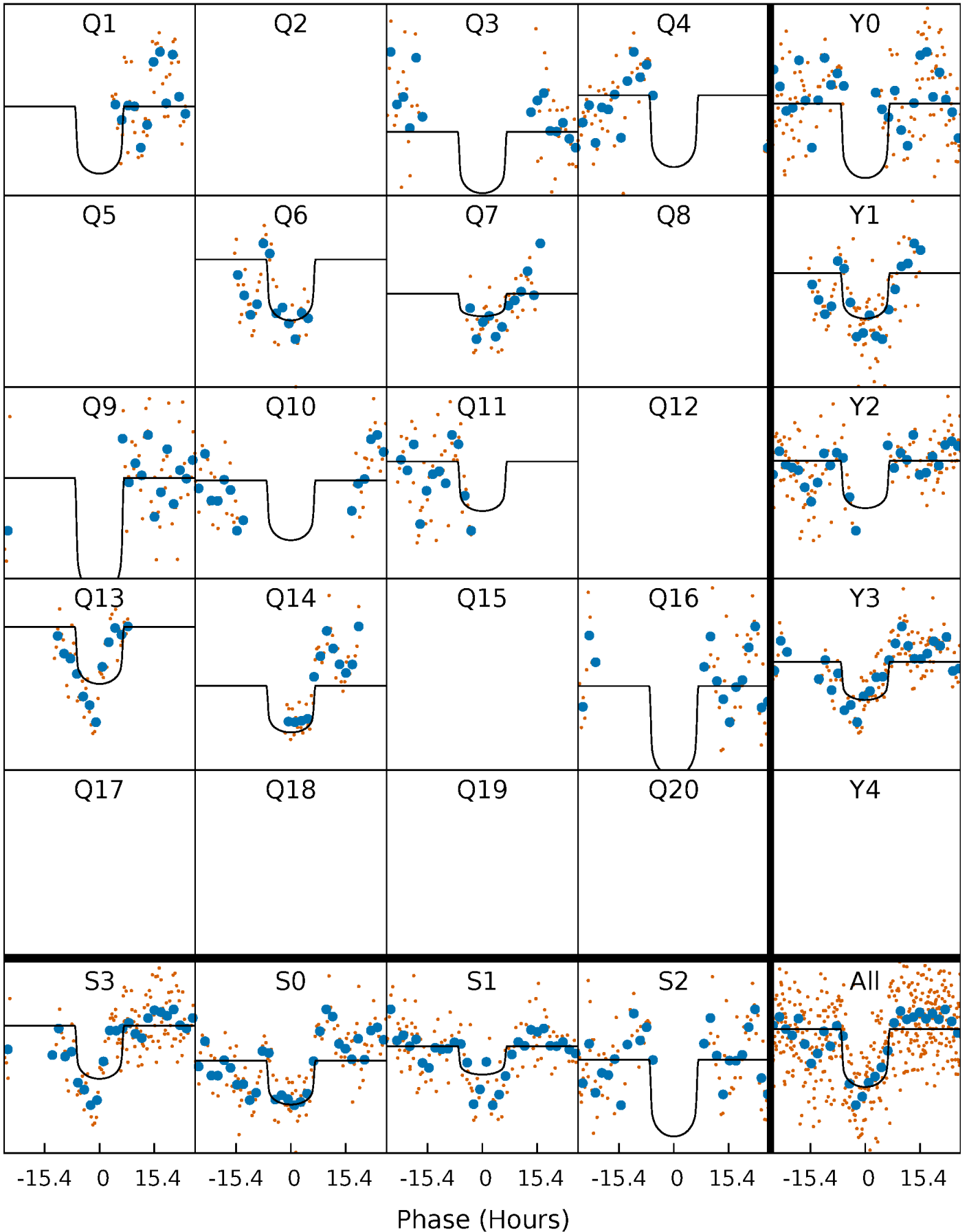
# PDC Quarter-Phased Transit Curves

TCE 006946871-02   P=134.258834 Days    $T_0=158.480872$  (BKJD)



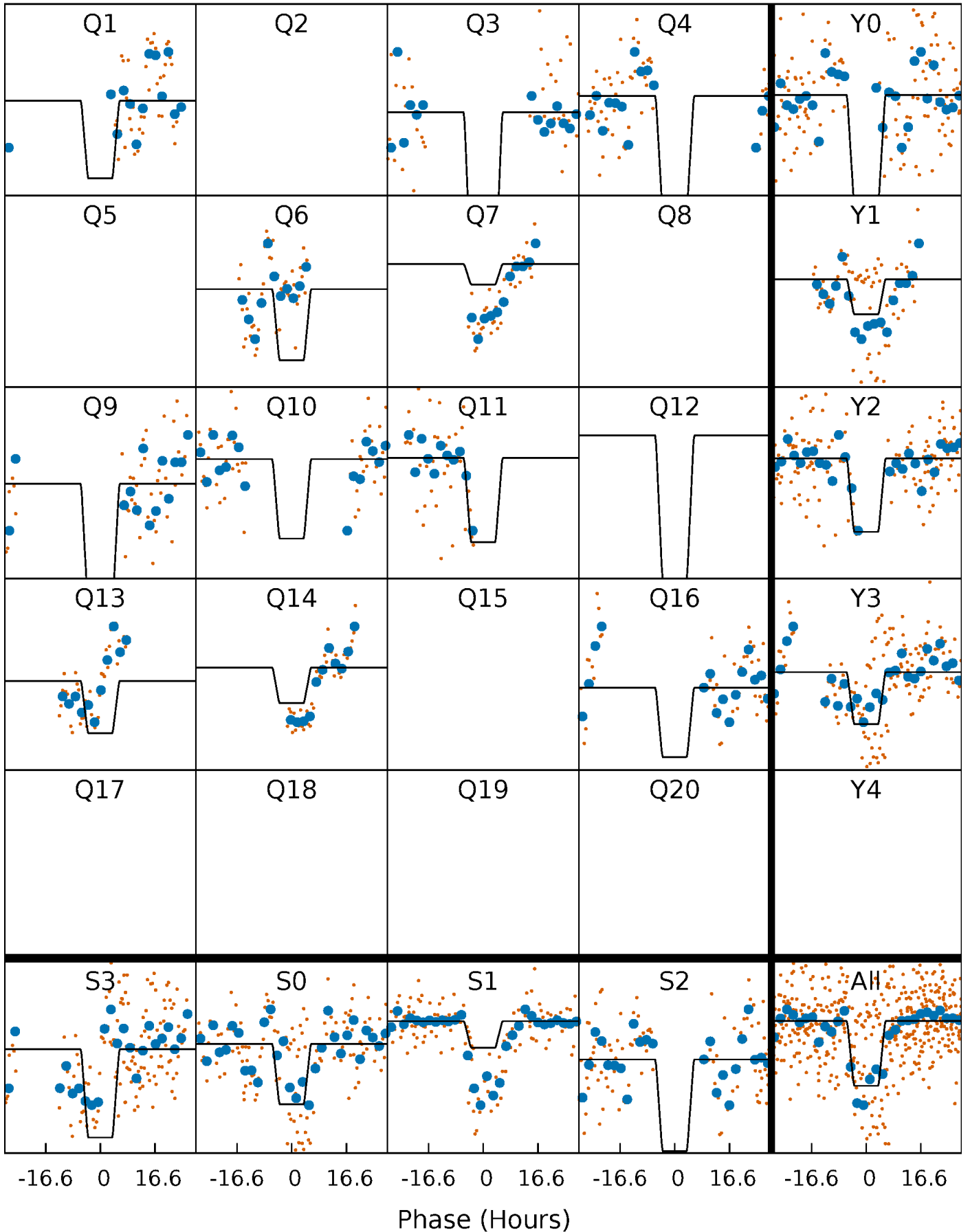
# DV Quarter-Phased Transit Curves

TCE 006946871-02 P=134.258834 Days  $T_0=158.480872$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

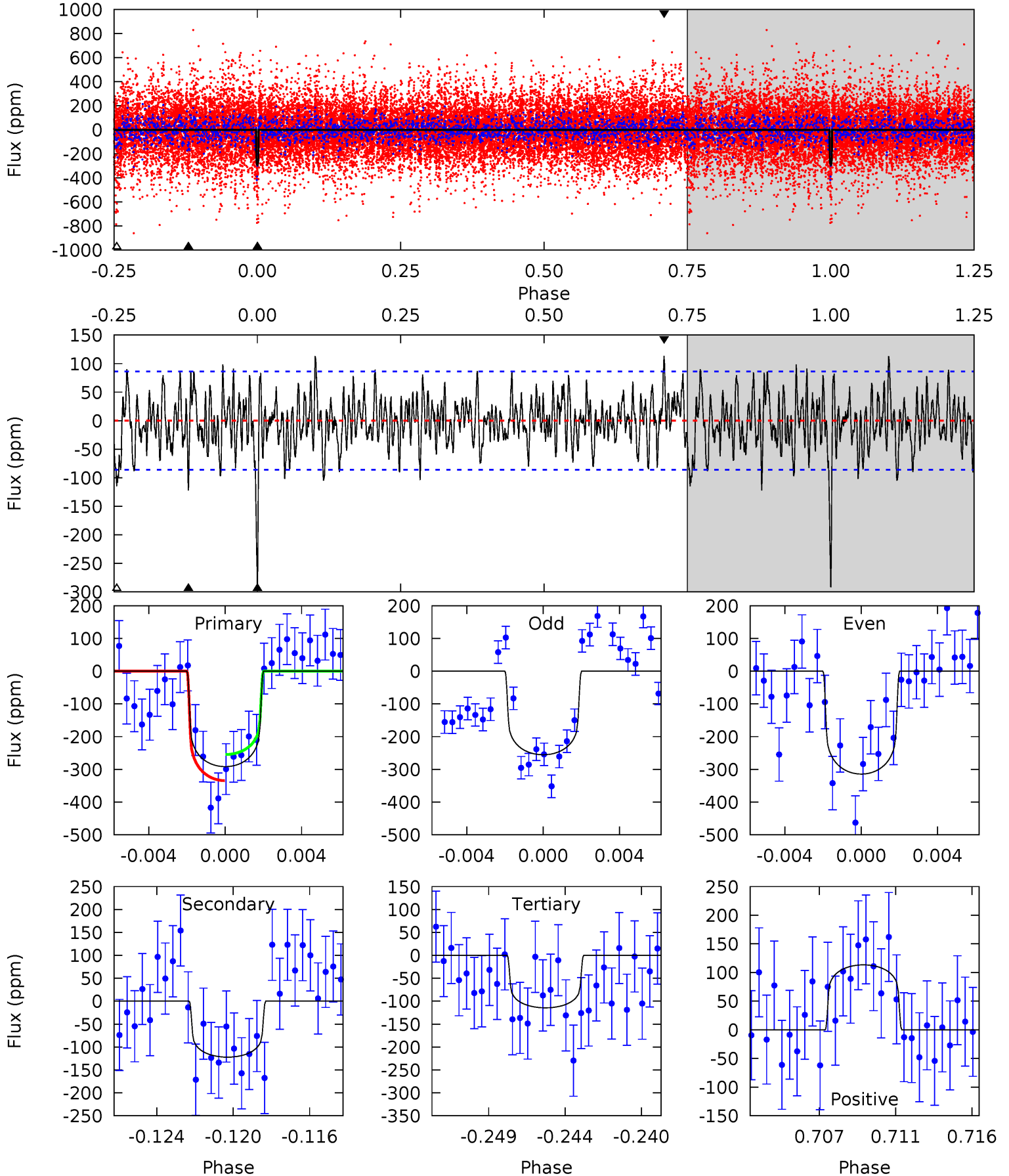
TCE 006946871-02 P=134.255300 Days  $T_0=158.499092$  (BKJD)



# DV Model-Shift Uniqueness Test

006946871-02,  $P = 134.258834$  Days,  $E = 24.222038$  Days

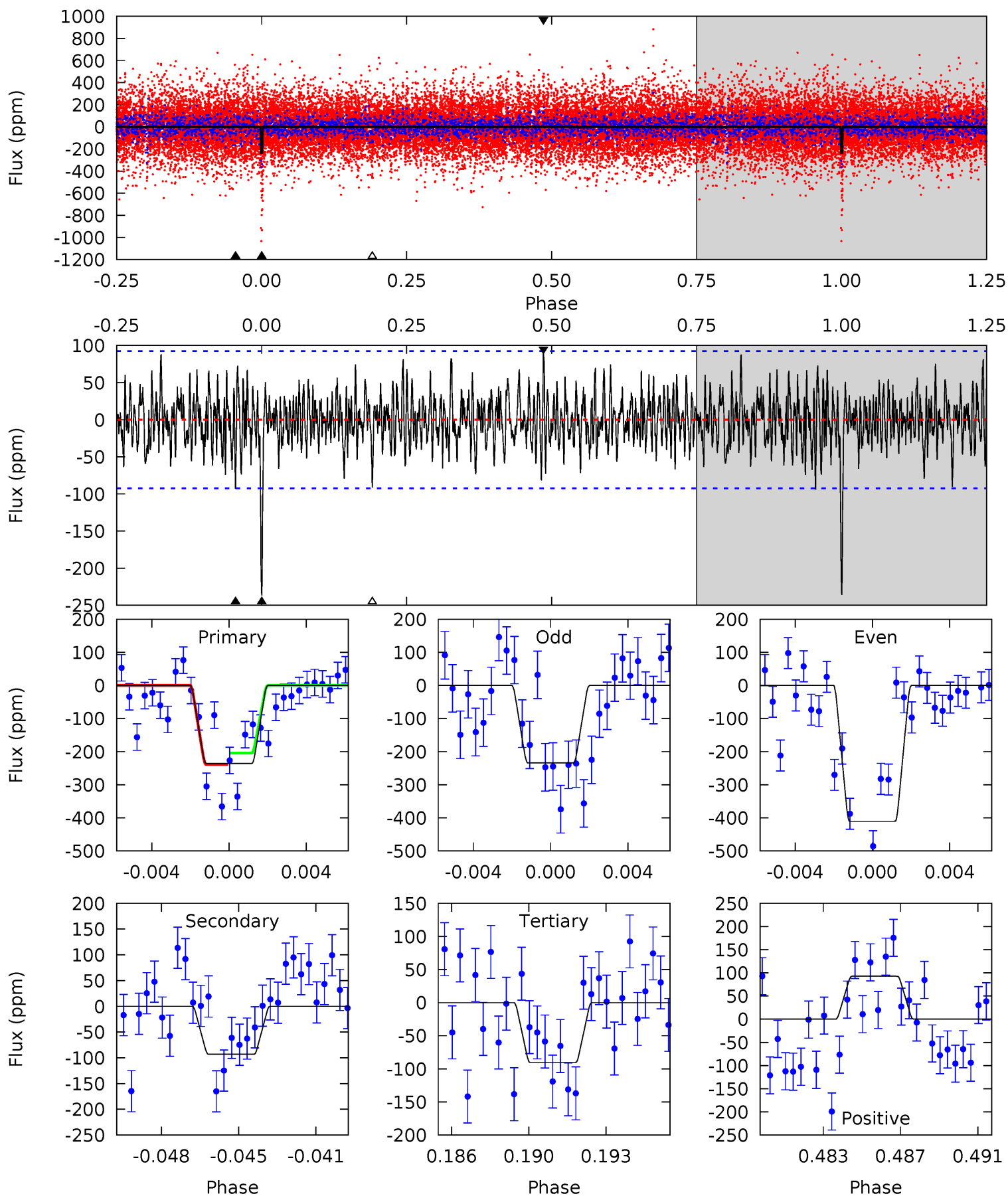
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
17.6	7.36	6.90	6.83	5.19	2.86	2.25	10.7	10.7	0.46	0.53	1.75	0.89	0.28	2.39



# Alt Model-Shift Uniqueness Test

006946871-02, P = 134.255300 Days, E = 24.243792 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
13.3	5.25	5.10	5.22	5.21	2.90	1.61	8.20	8.08	0.15	0.03	5.12	1.94	0.28	0





### Stellar Parameters For KIC 006946871

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6739^{+151}_{-201}$	$3.565^{+0.349}_{-0.082}$	$-0.140^{+0.300}_{-0.250}$	$3.626^{+0.357}_{-1.339}$	$1.762^{+0.160}_{-0.373}$	$0.052^{+0.134}_{-0.011}$
	+2%/-3%	+10%/-2%	+214%/-179%	+10%/-37%	+9%/-21%	+257%/-20%
Source	PHO1	FLK73	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 006946871-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-122 \pm 17$	$6.29^{+1.58}_{-1.60}$	$987^{+48}_{-94}$	$5402^{+641}_{-428}$	$646^{+489}_{-236}$
Alt.	$-93 \pm 18$	$6.99^{+1.57}_{-1.69}$	$983^{+52}_{-106}$	$4885^{+492}_{-381}$	$396^{+293}_{-142}$

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

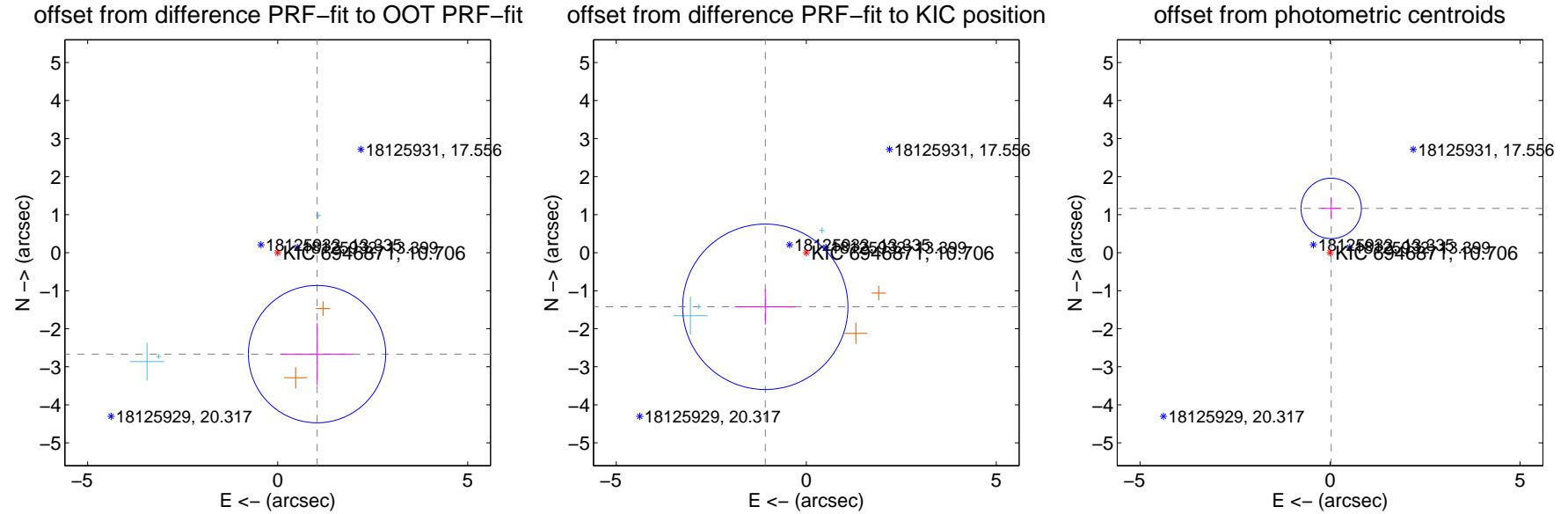
## DV Centroid Data

Supplemental centroid analysis for 006946871-02. **Kepler magnitude: 10.71.** Transit SNR 9.36

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

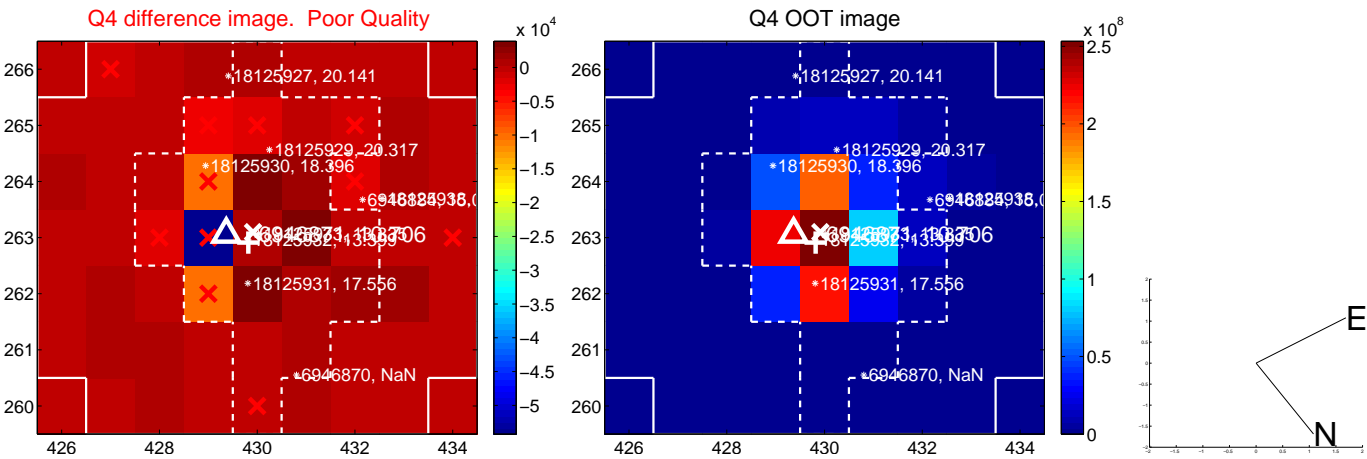
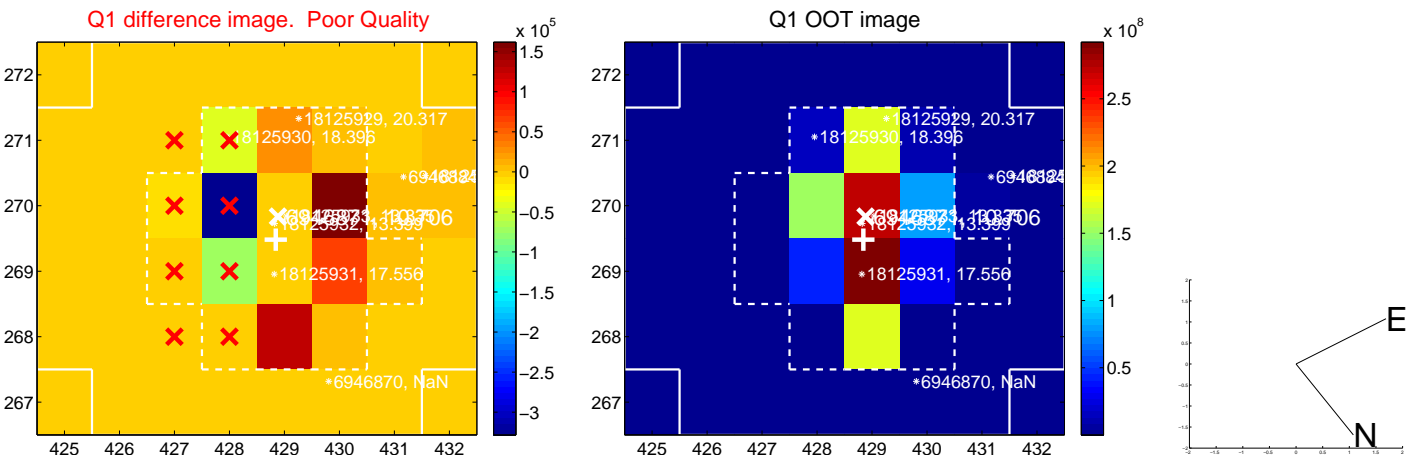
The direct PRF centroid is offset from the target star catalog position by about 1.34 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b><math>2.861 \pm 0.602</math></b>	<b>4.75</b>	$-1.036 \pm 0.952$	$-2.667 \pm 0.814$
PRF-fit source offset from KIC position	$1.785 \pm 0.725$	2.46	$1.078 \pm 0.807$	$-1.423 \pm 0.465$
photometric centroid source offset	<b><math>1.16 \pm 0.26</math></b>	<b>4.40</b>	$-0.03 \pm 0.27$	$1.16 \pm 0.26$



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.

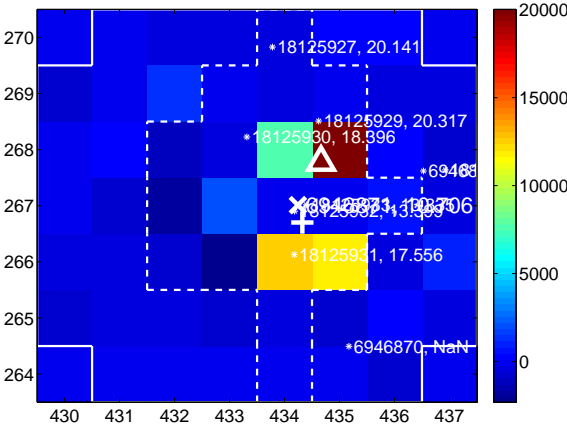
Q5 no difference image



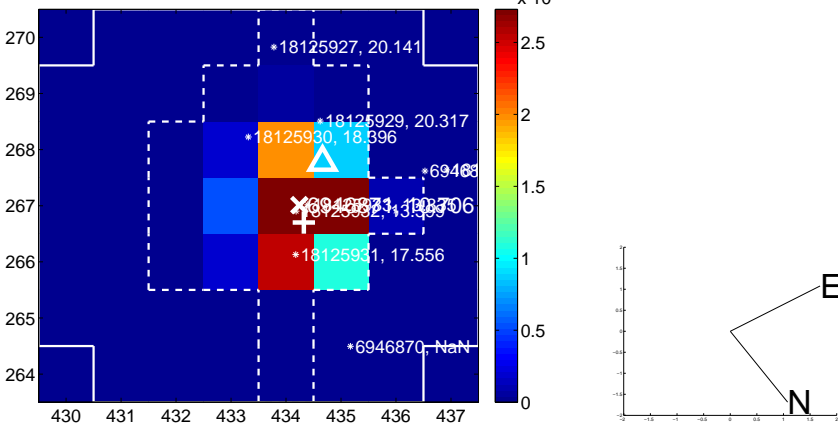
Q5 no OOT image



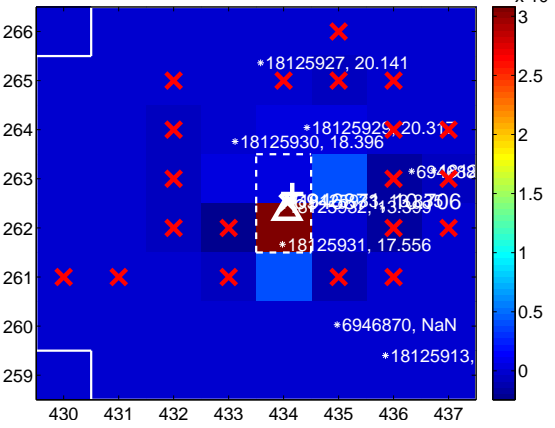
Q6 difference image



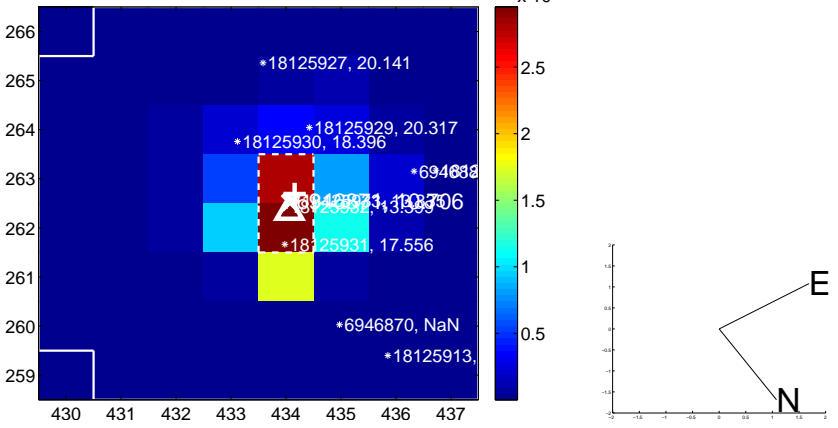
Q6 OOT image



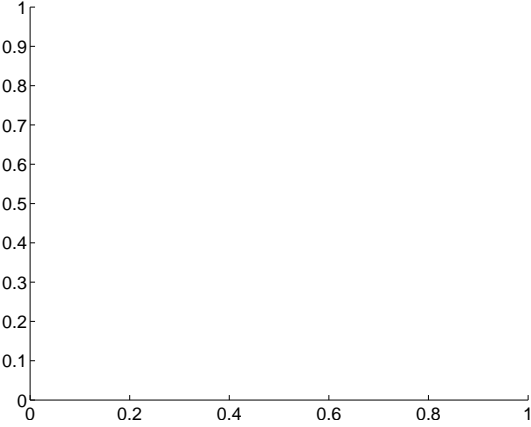
Q7 difference image



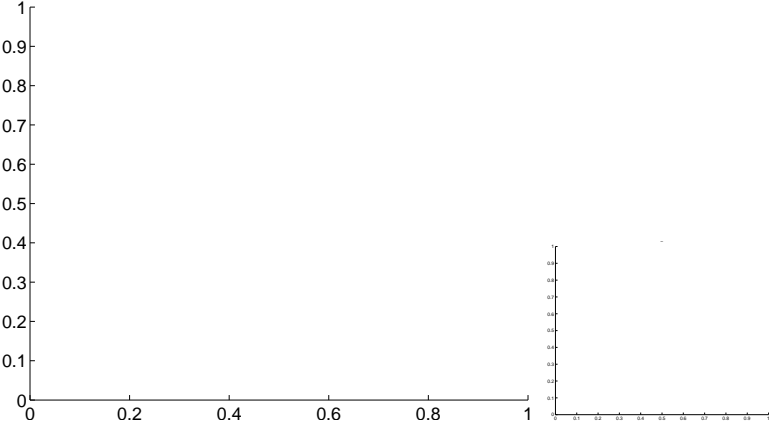
Q7 OOT image



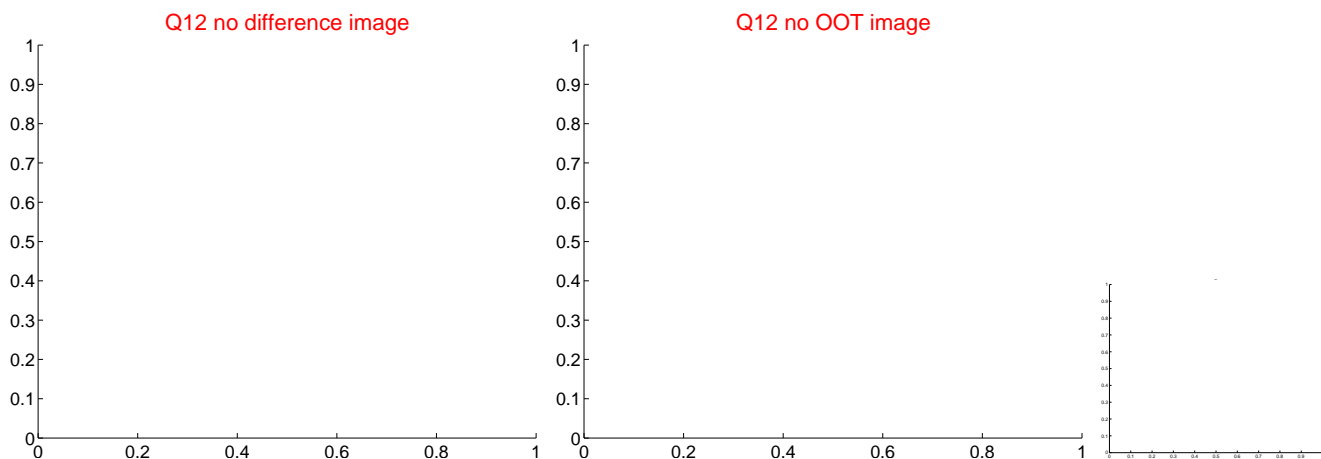
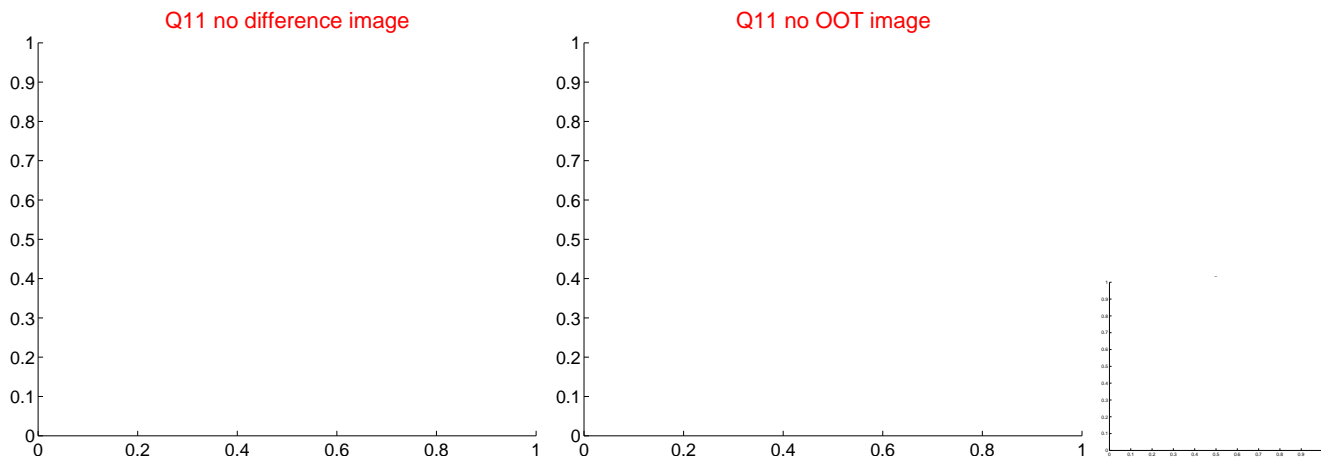
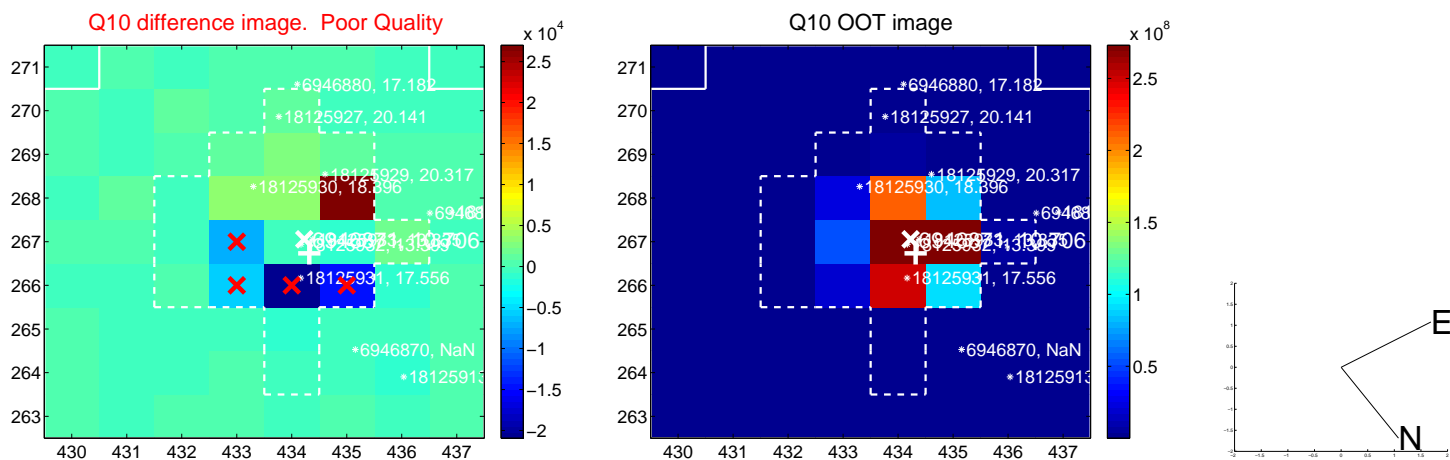
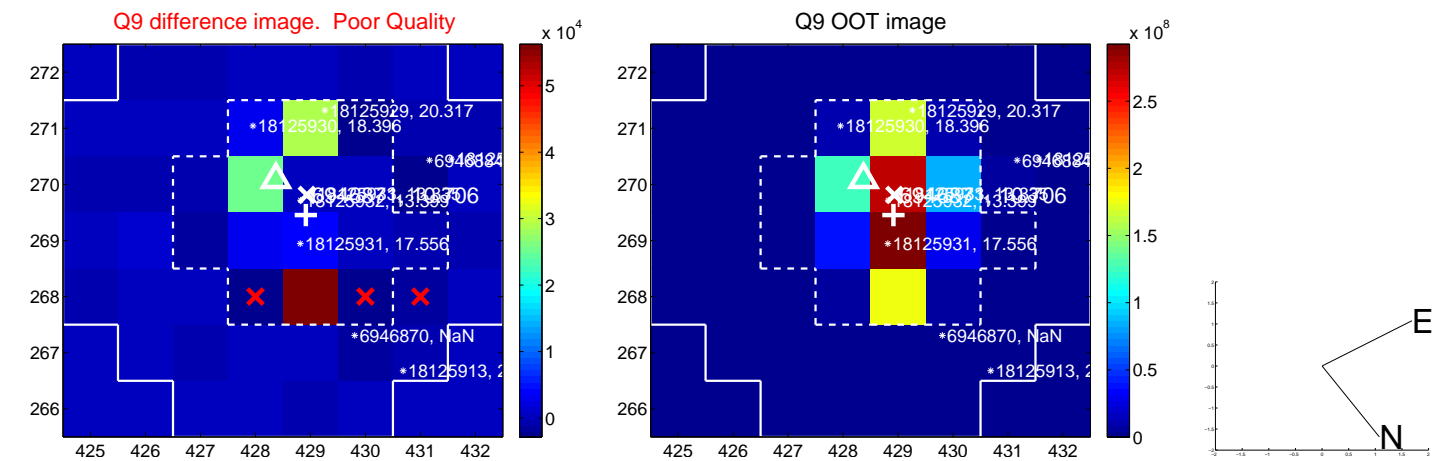
Q8 no difference image



Q8 no OOT image



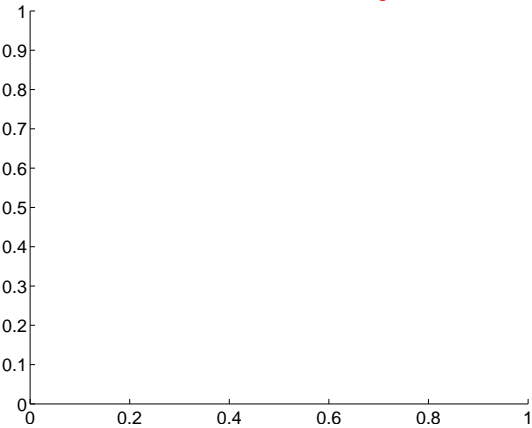
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



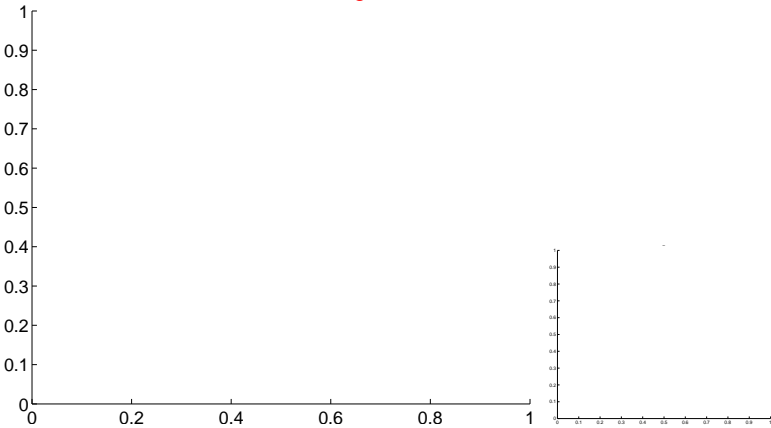


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

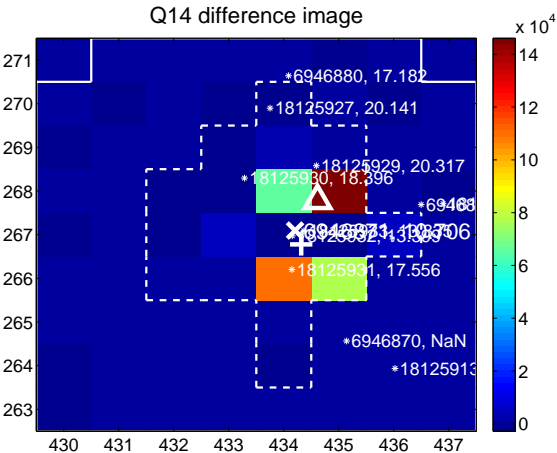
Q13 no difference image



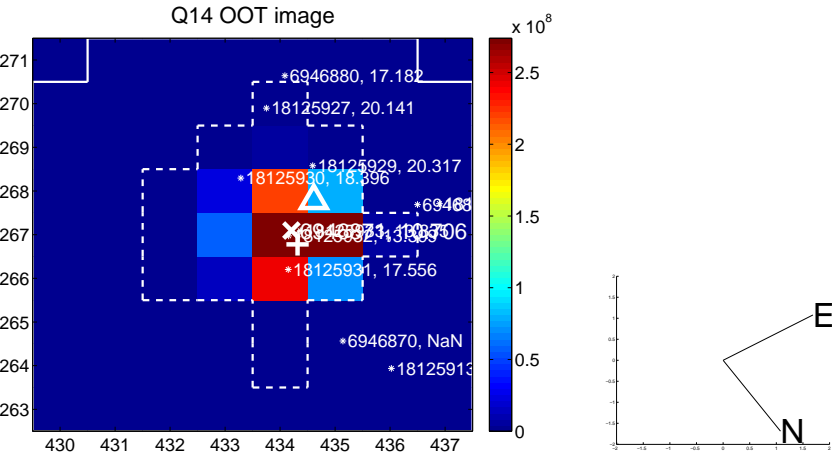
Q13 no OOT image



Q14 difference image



Q14 OOT image



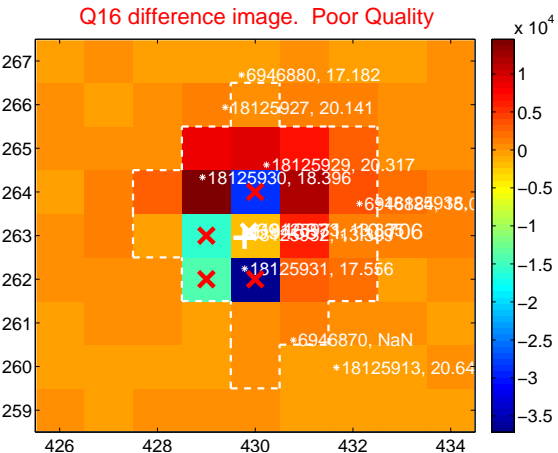
Q15 no difference image



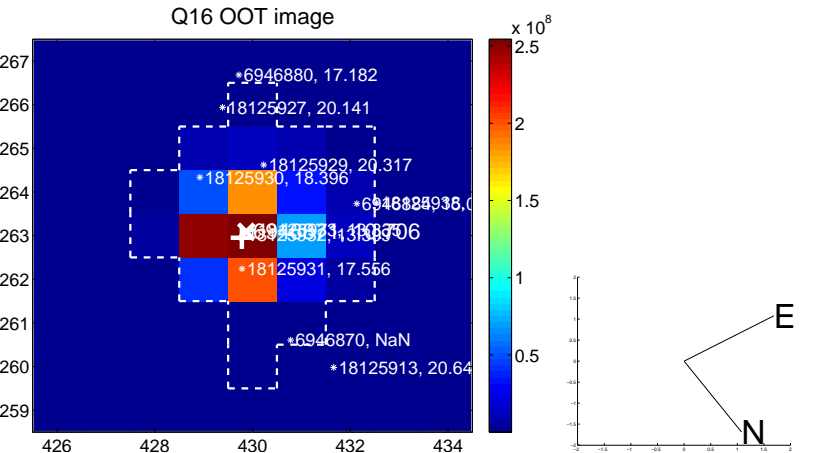
Q15 no OOT image



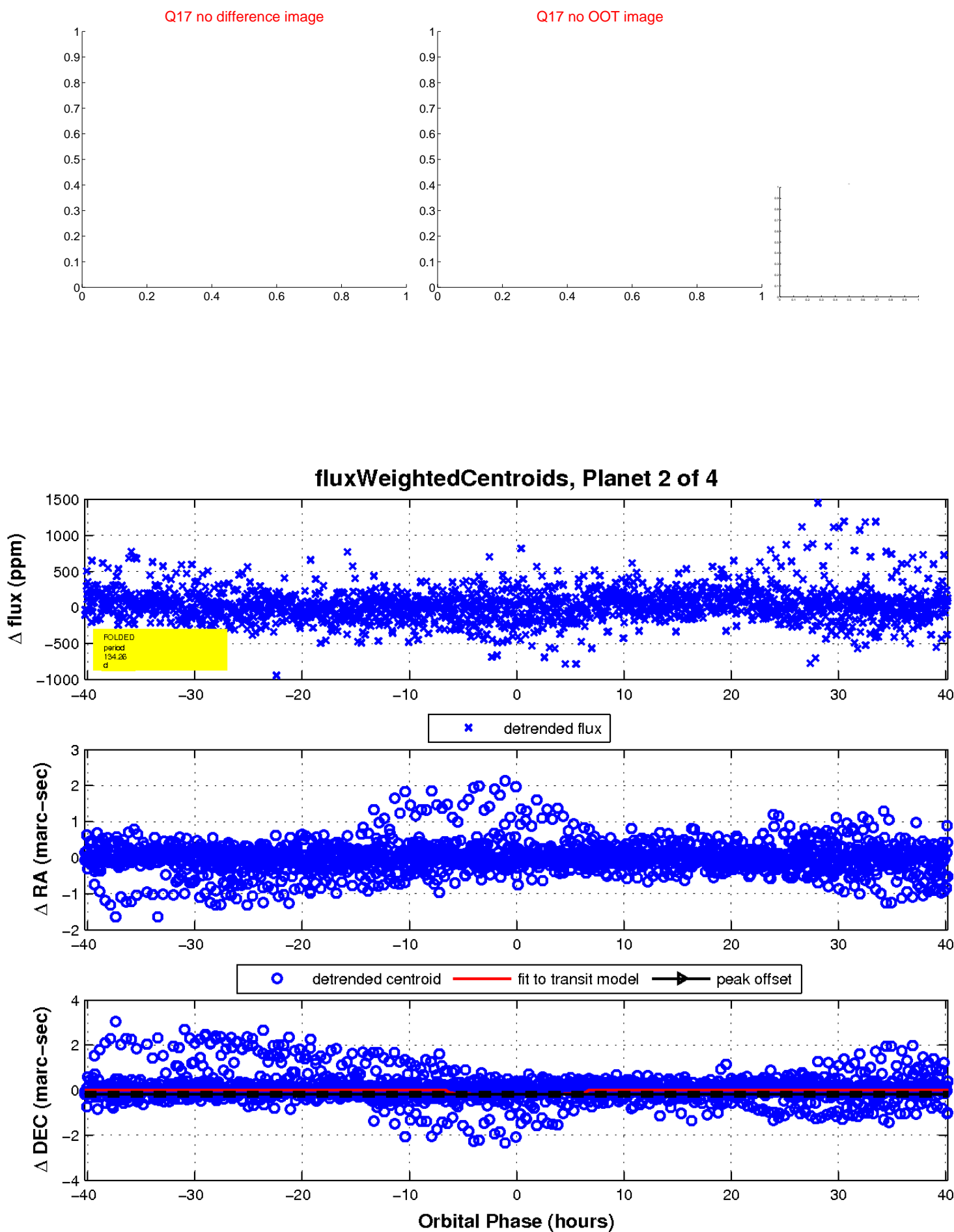
Q16 difference image. Poor Quality



Q16 OOT image

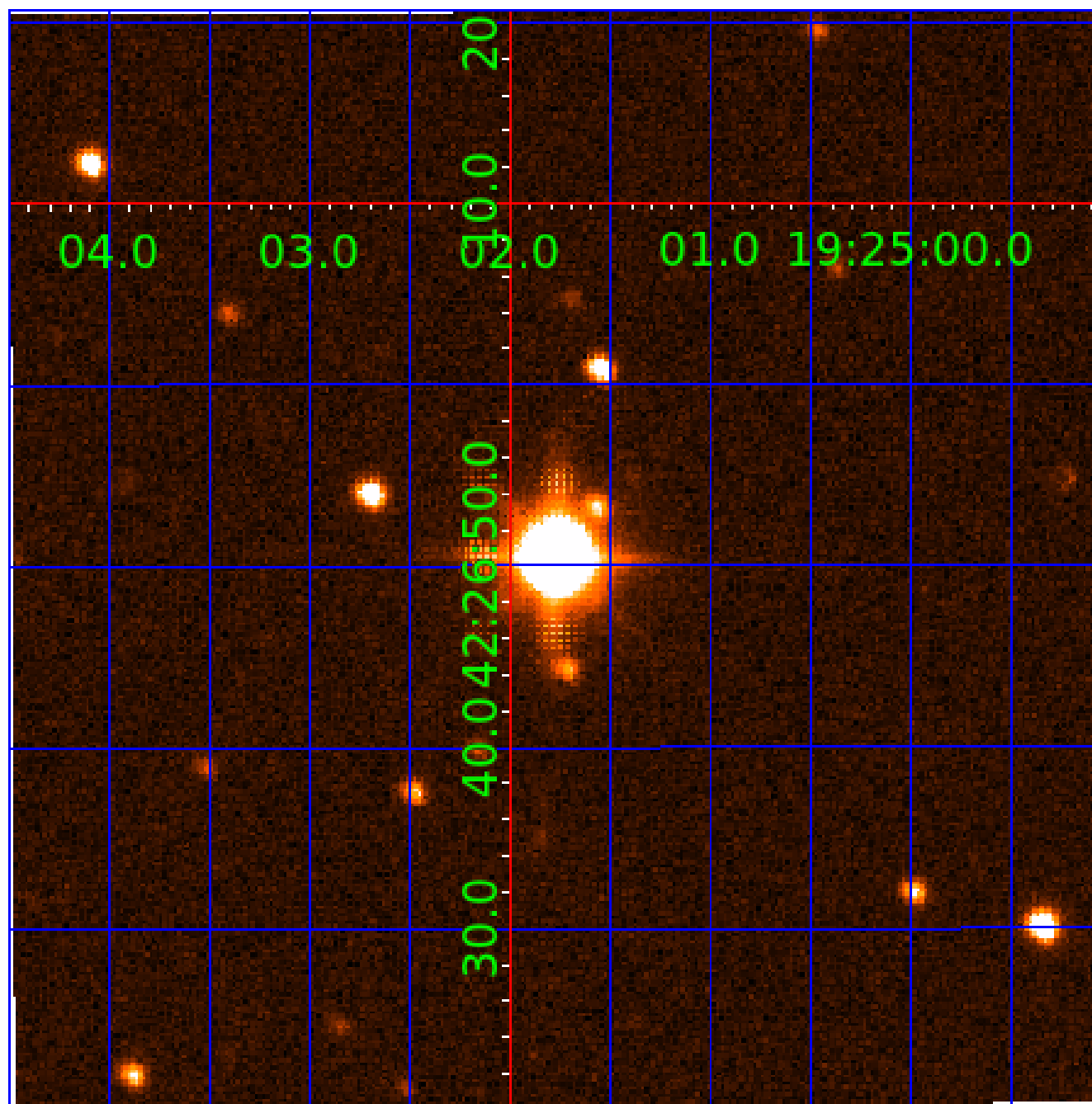


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 006946871

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006946871-01	OBS	No	2.172871	131.892727	30.7	10.249	10.2	9.3	3.63	6739	2.71	15447.19
006946871-02	OBS	No	134.258834	158.480872	297.0	13.437	11.2	9.4	3.63	6739	6.65	63.24
006946871-03	OBS	No	10.401104	131.732484	109.4	6.649	7.9	9.6	3.63	6739	7.49	1914.79
006946871-04	OBS	No	2.173139	132.399594	51.9	26.078	10.3	14.3	3.63	6739	2.65	15444.65

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006946871-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_SATURATED
006946871-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_SATURATED
006946871-03	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_SATURATED
006946871-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—SAME_NTL_PERIOD—CENT_SATURATED

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

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

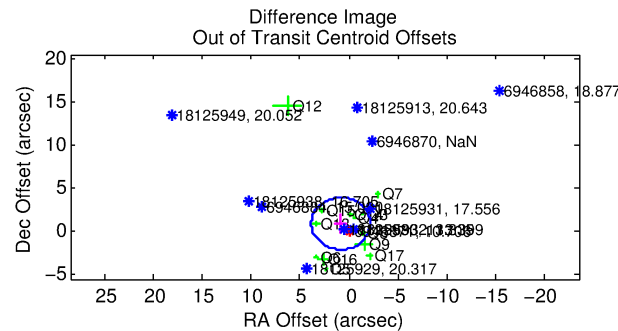
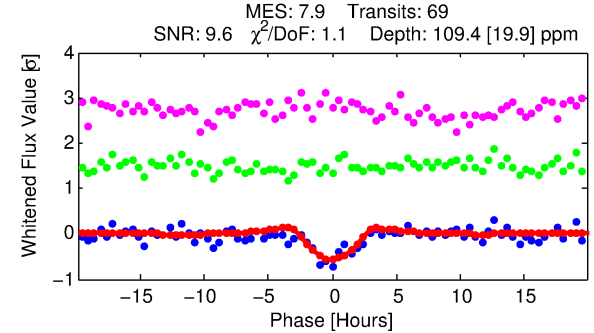
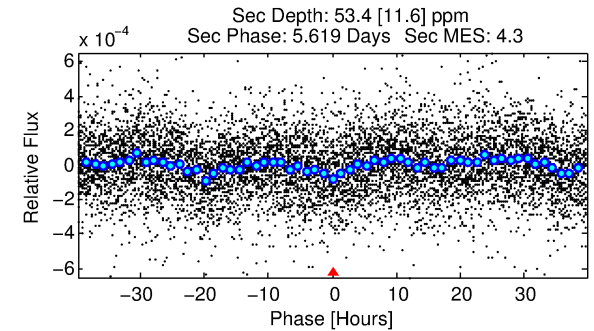
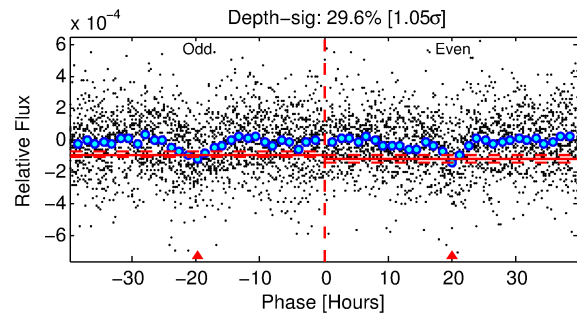
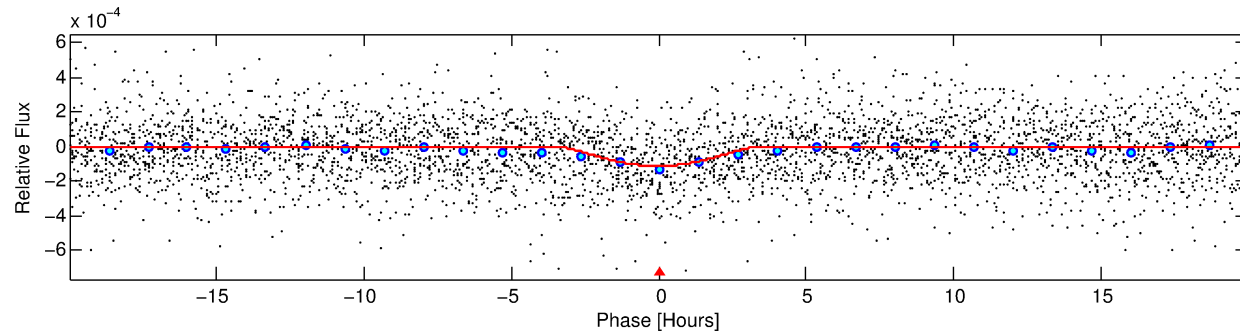
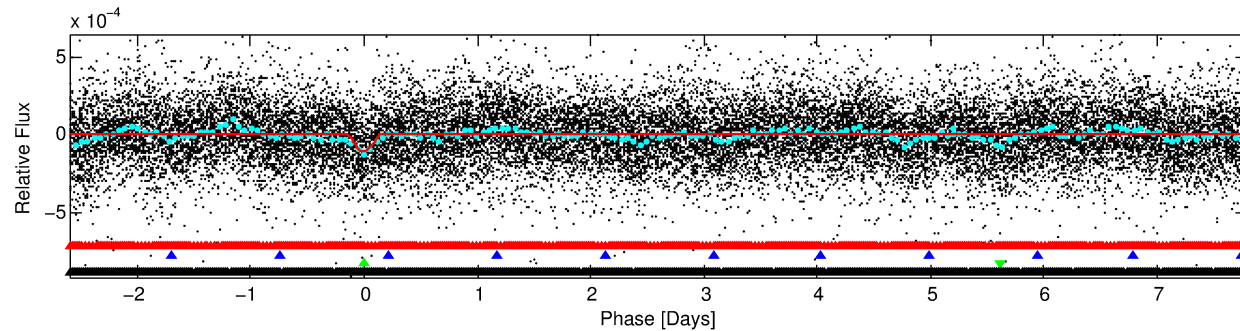
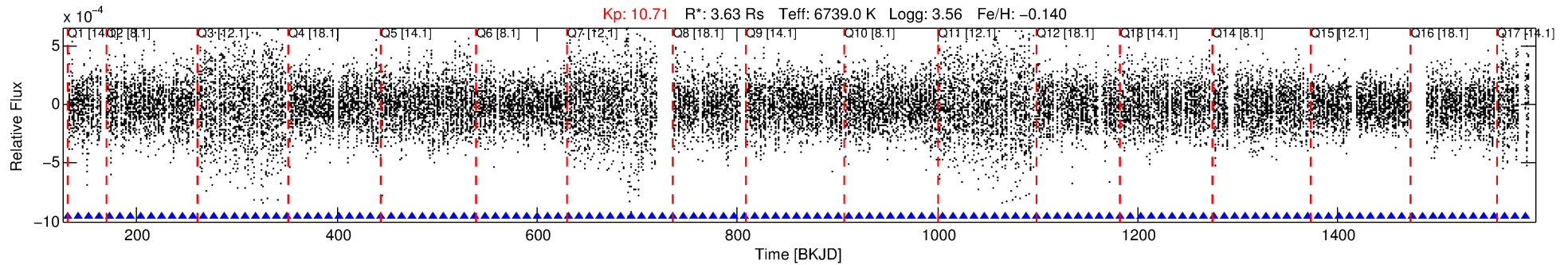
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 006946871-03

No Significant Match Found

# DV One-Page Summary

KIC: 6946871 Candidate: 3 of 4 Period: 10.401 d



## DV Fit Results:

Period = 10.40110 [0.00018] d  
Epoch = 131.7325 [0.0153] BKJD  
Rp/R\* = 0.0189 [0.0489]  
a/R\* = 2.56 [1.54]  
b = 1.00 [0.08]  
Seff = 1914.79 [1151.83]  
Teq = 1687 [254] K  
Rp = 7.49 [19.54] Re  
a = 0.1126 [0.0410] AU  
Ag = 6.64 [34.55] [0.16 $\sigma$ ]  
Teffp = 4186 [5413] K [0.46 $\sigma$ ]

## DV Diagnostic Results:

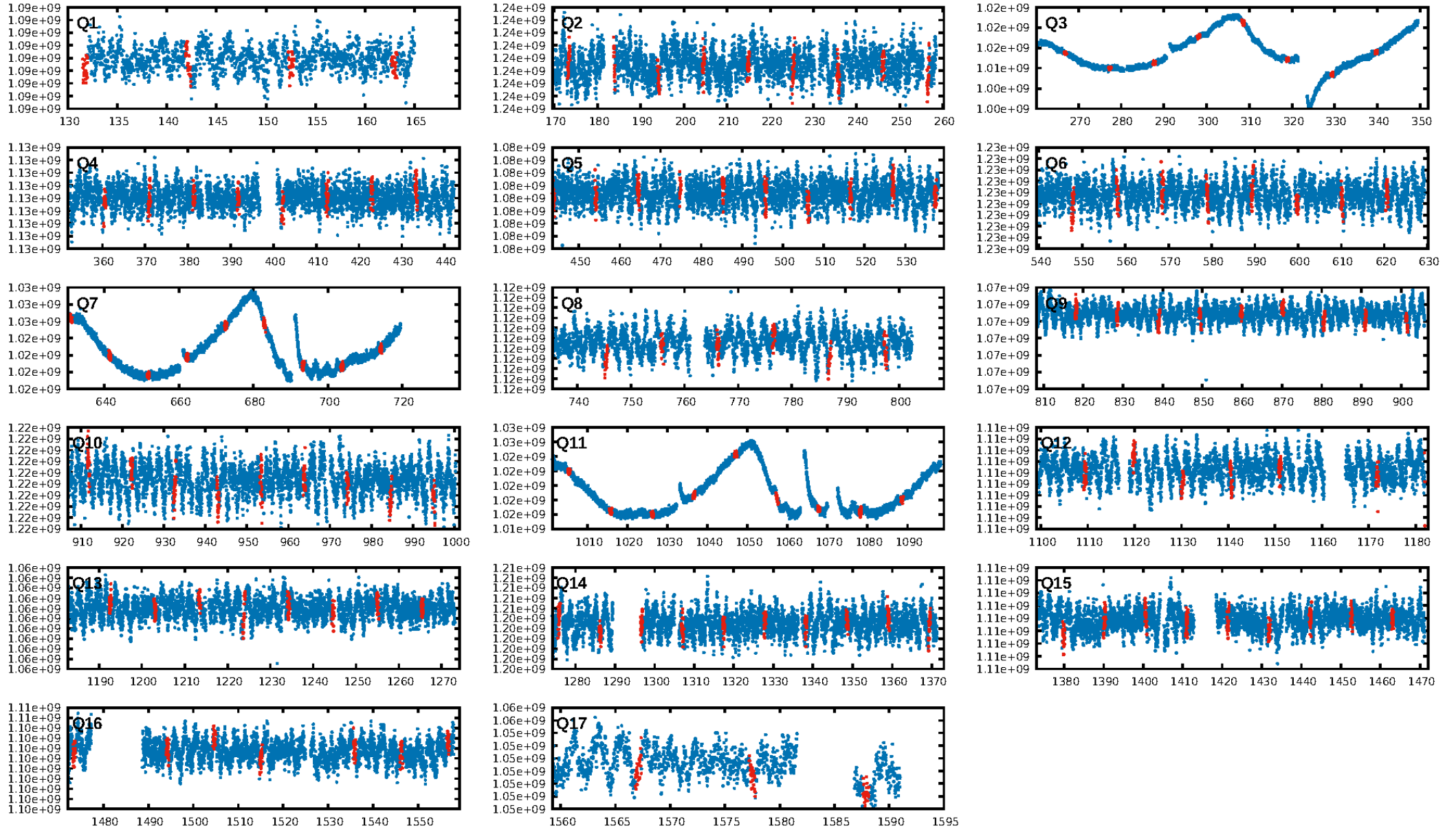
ShortPeriod-sig: 100.0% [7.34 $\sigma$ ]  
LongPeriod-sig: 100.0% [198.28 $\sigma$ ]  
ModelChiSquare2-sig: 81.2%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [64/64]  
GhostDiagnostic-chr: -4.759  
Centroid-sig: N/A  
Centroid-so: 0.473 arcsec [1.59 $\sigma$ ]  
OotOffset-rm: 1.268 arcsec [1.26 $\sigma$ ]  
KicOffset-rm: 1.357 arcsec [1.10 $\sigma$ ]  
OotOffset-st: 2/3/4/4 [13]  
KicOffset-st: 2/3/4/4 [13]  
DiffImageQuality-fgm: 0.46 [6/13]  
DiffImageOverlap-fno: 0.00 [0/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 02:57:27 Z

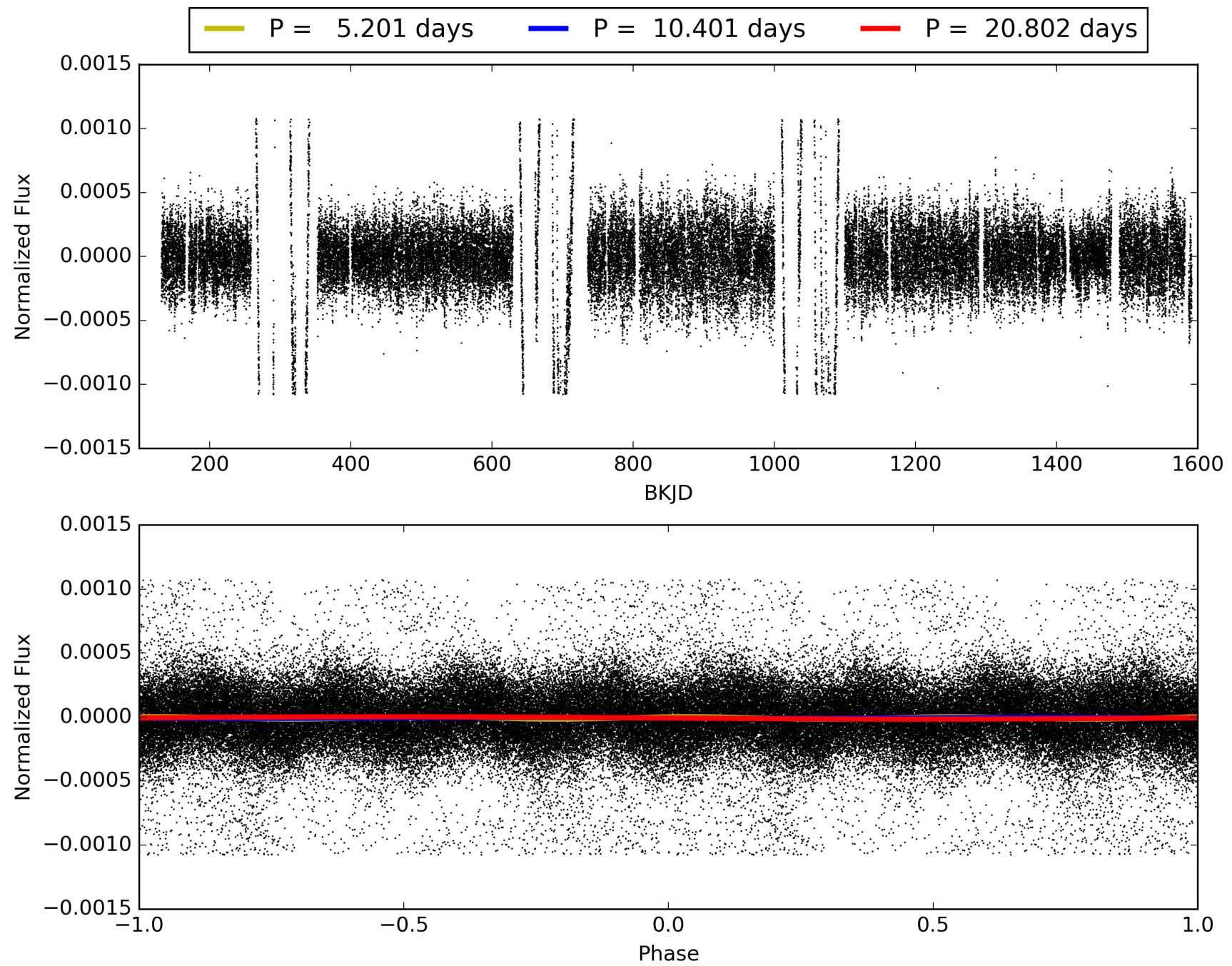
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 006946871-03, PDC Light Curves

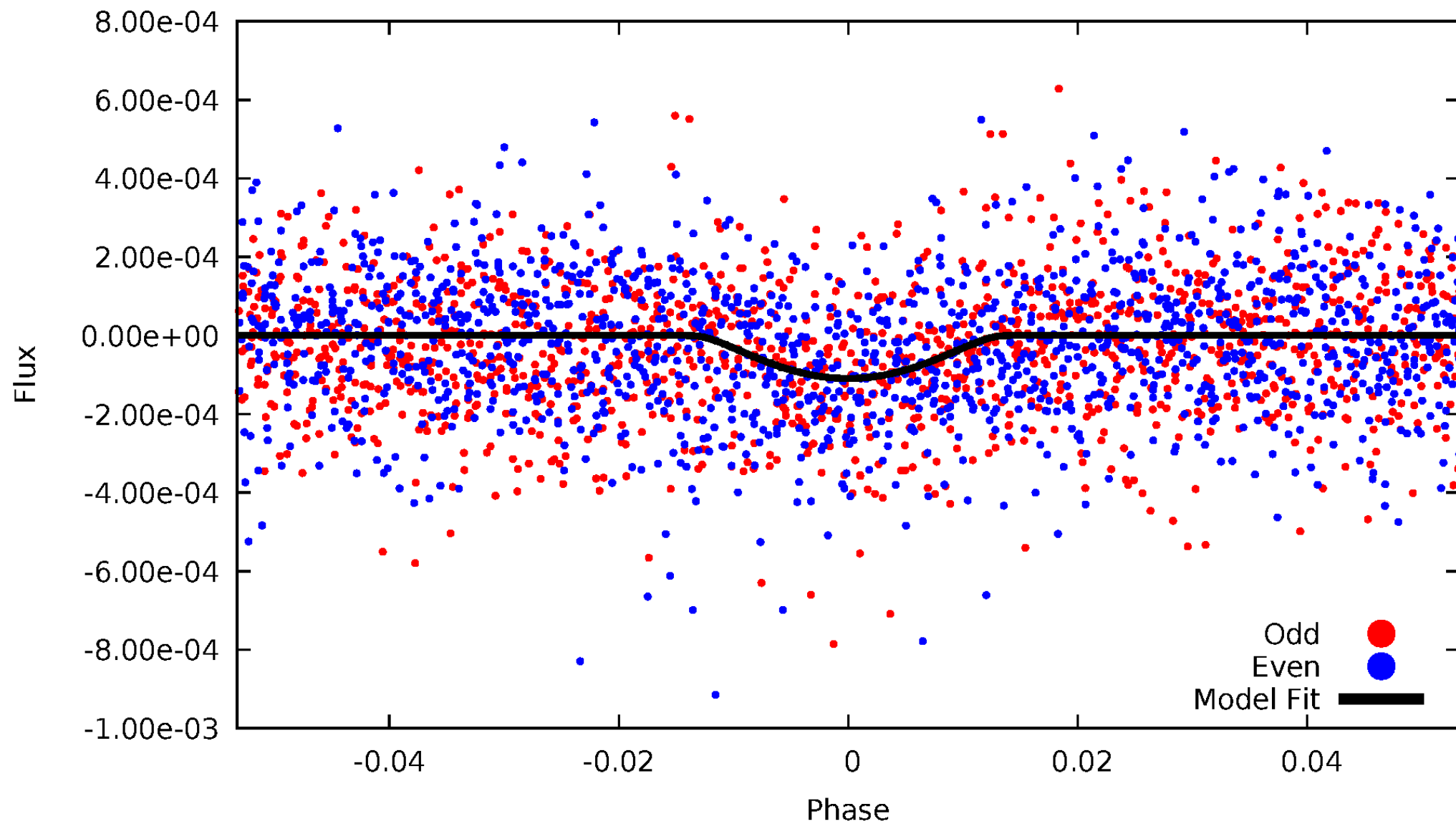


TCE 006946871-03



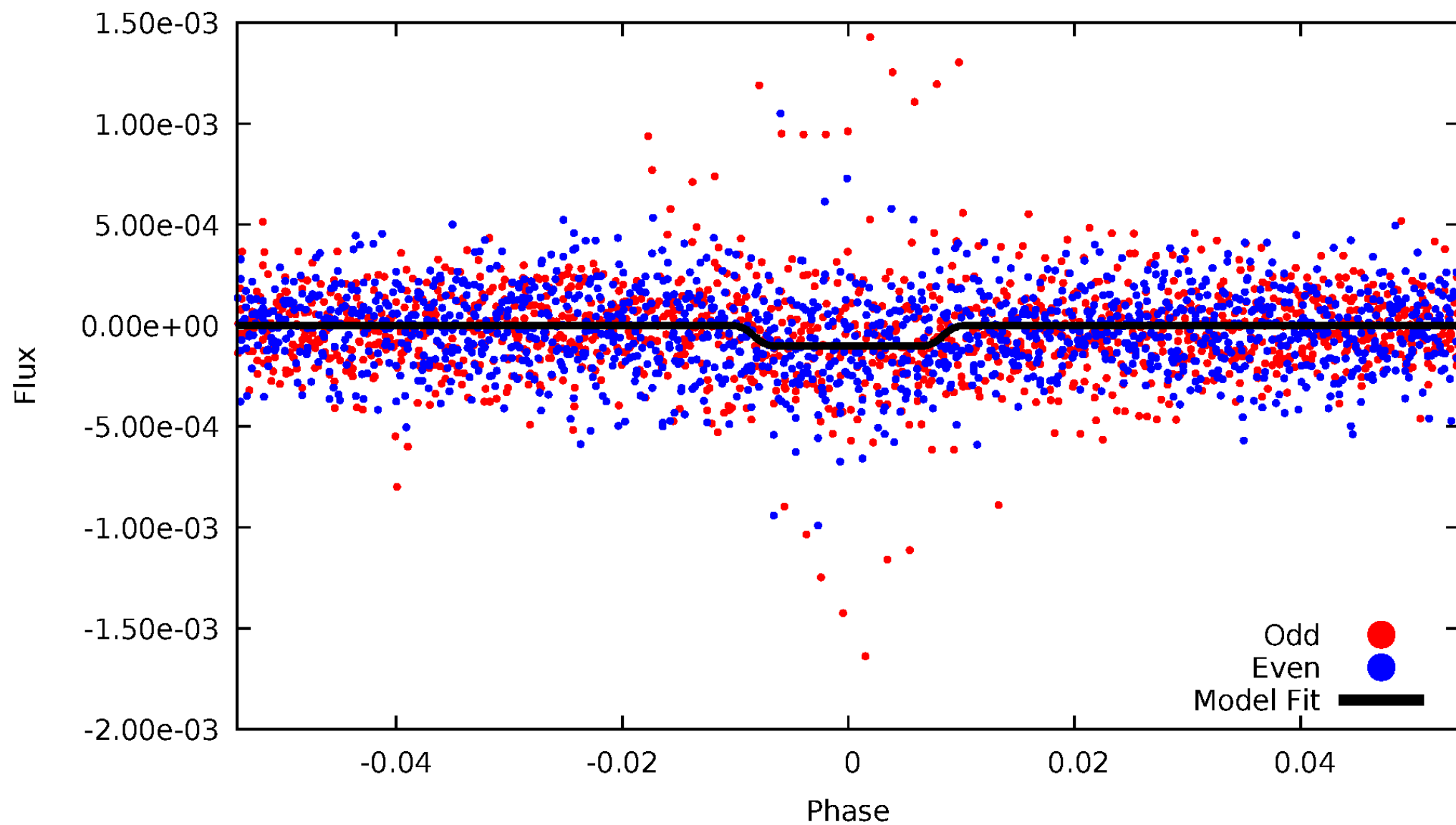
# DV Odd/Even

TCE 006946871-03

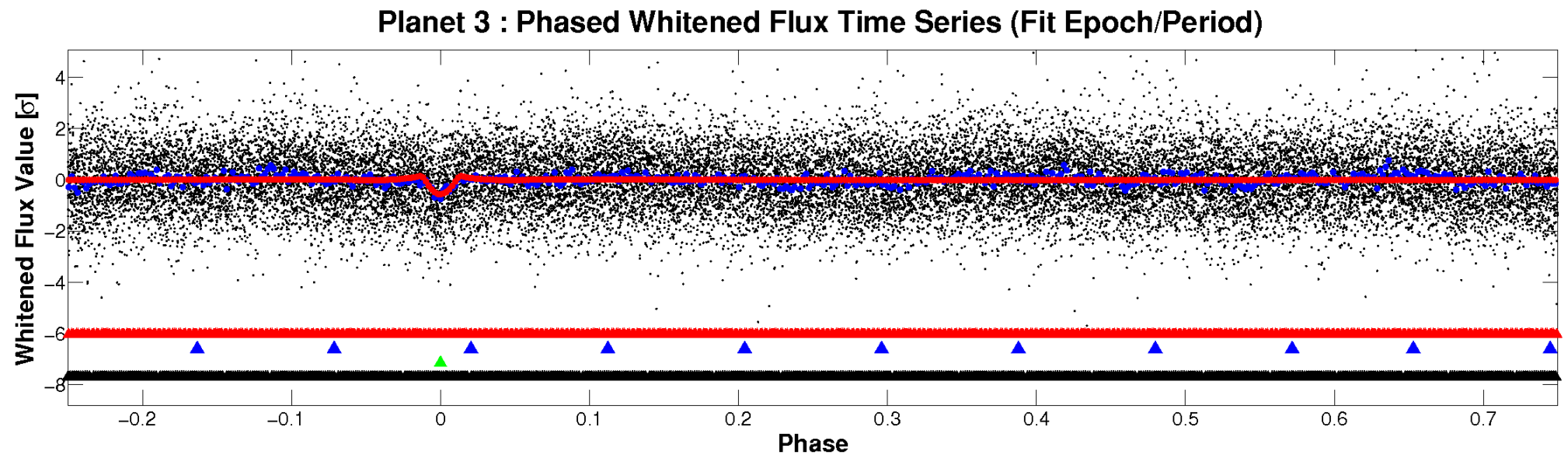
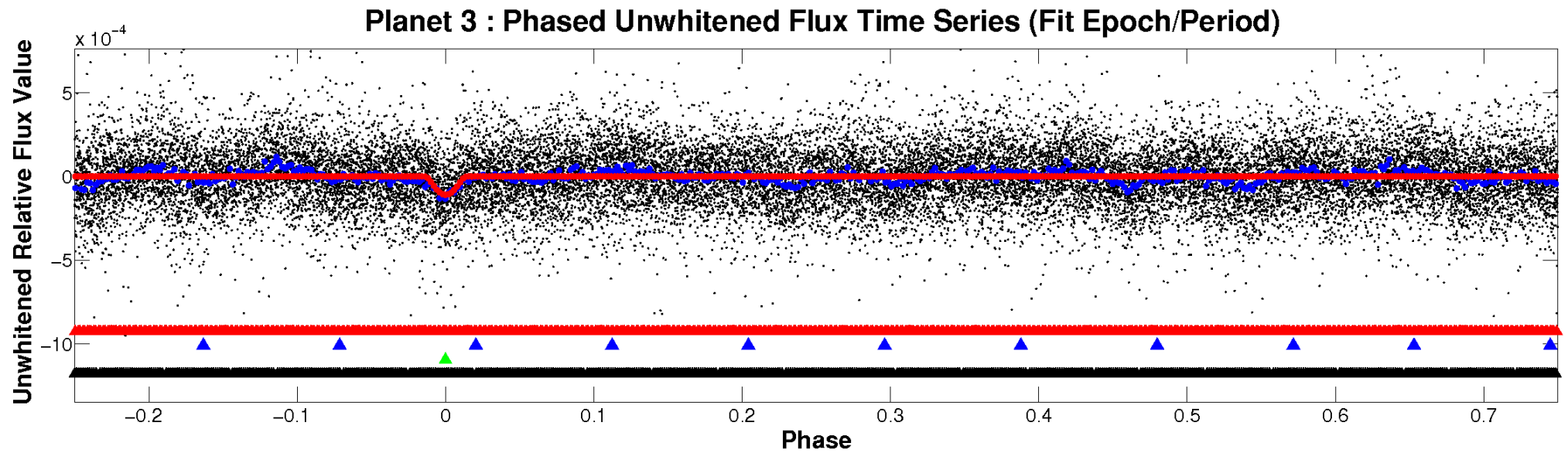


# ALT Odd/Even

TCE 006946871-03



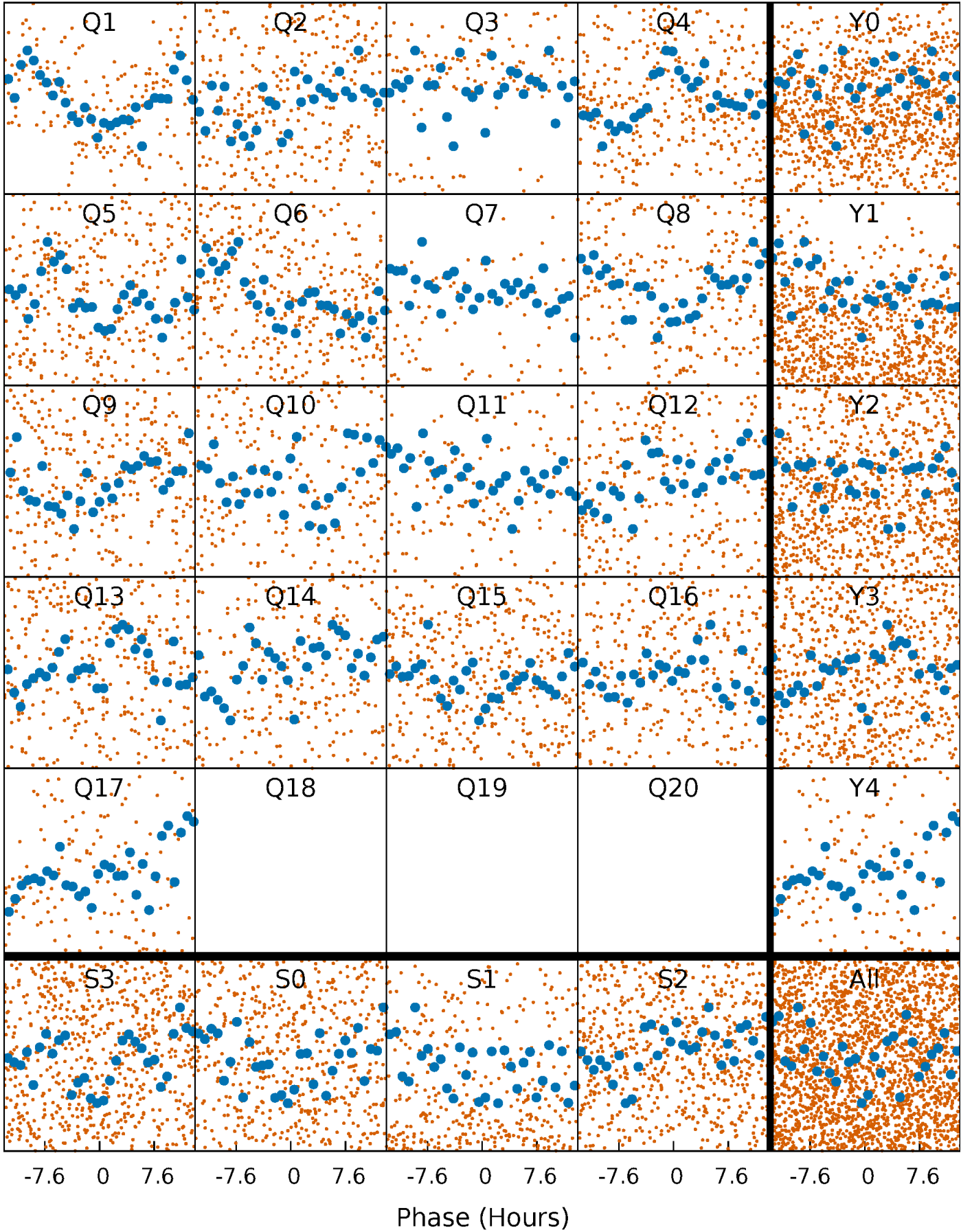
# Non-Whitened Vs. Whitened Light Curve





# PDC Quarter-Phased Transit Curves

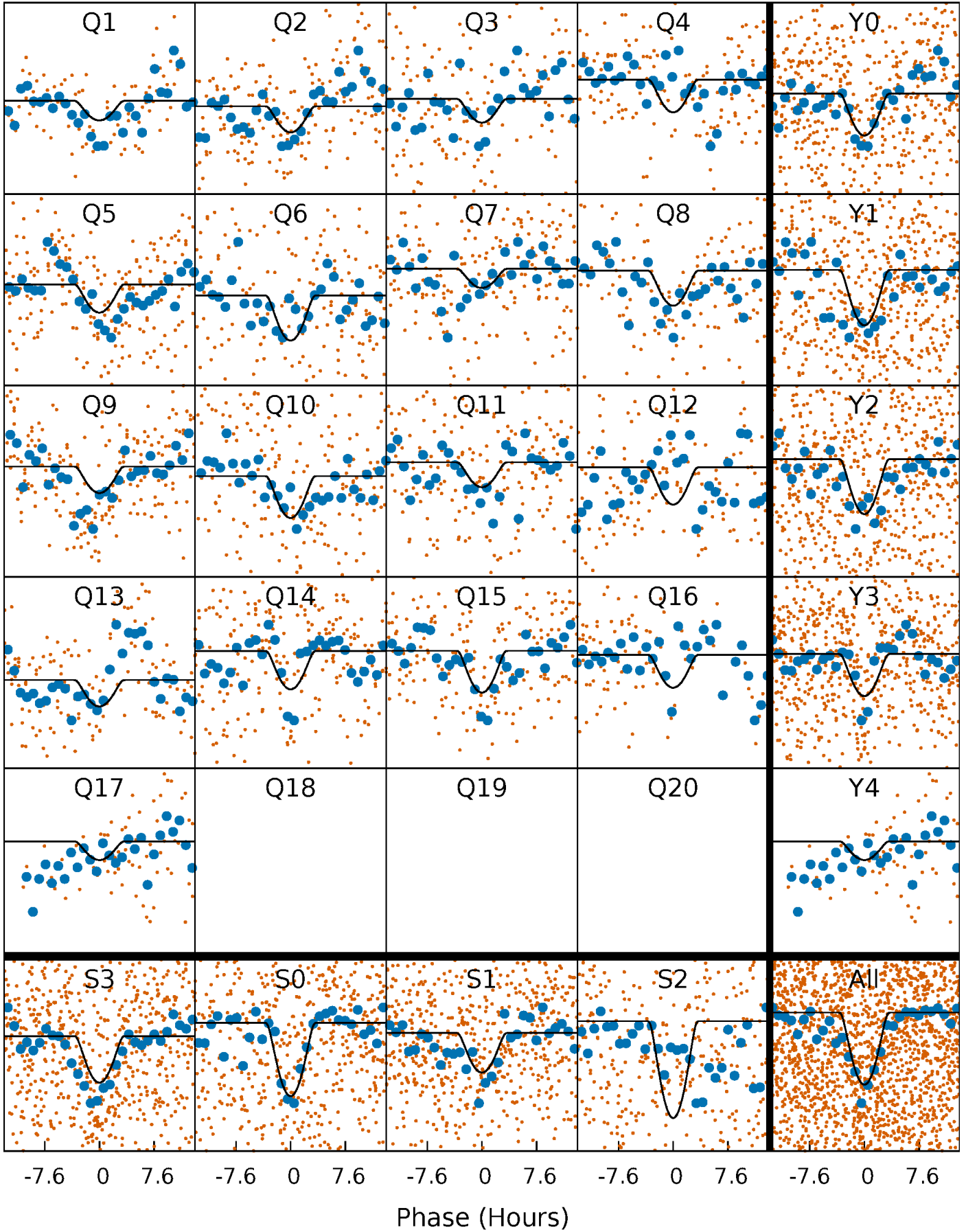
TCE 006946871-03   P= 10.401104 Days    $T_0=131.732484$  (BKJD)





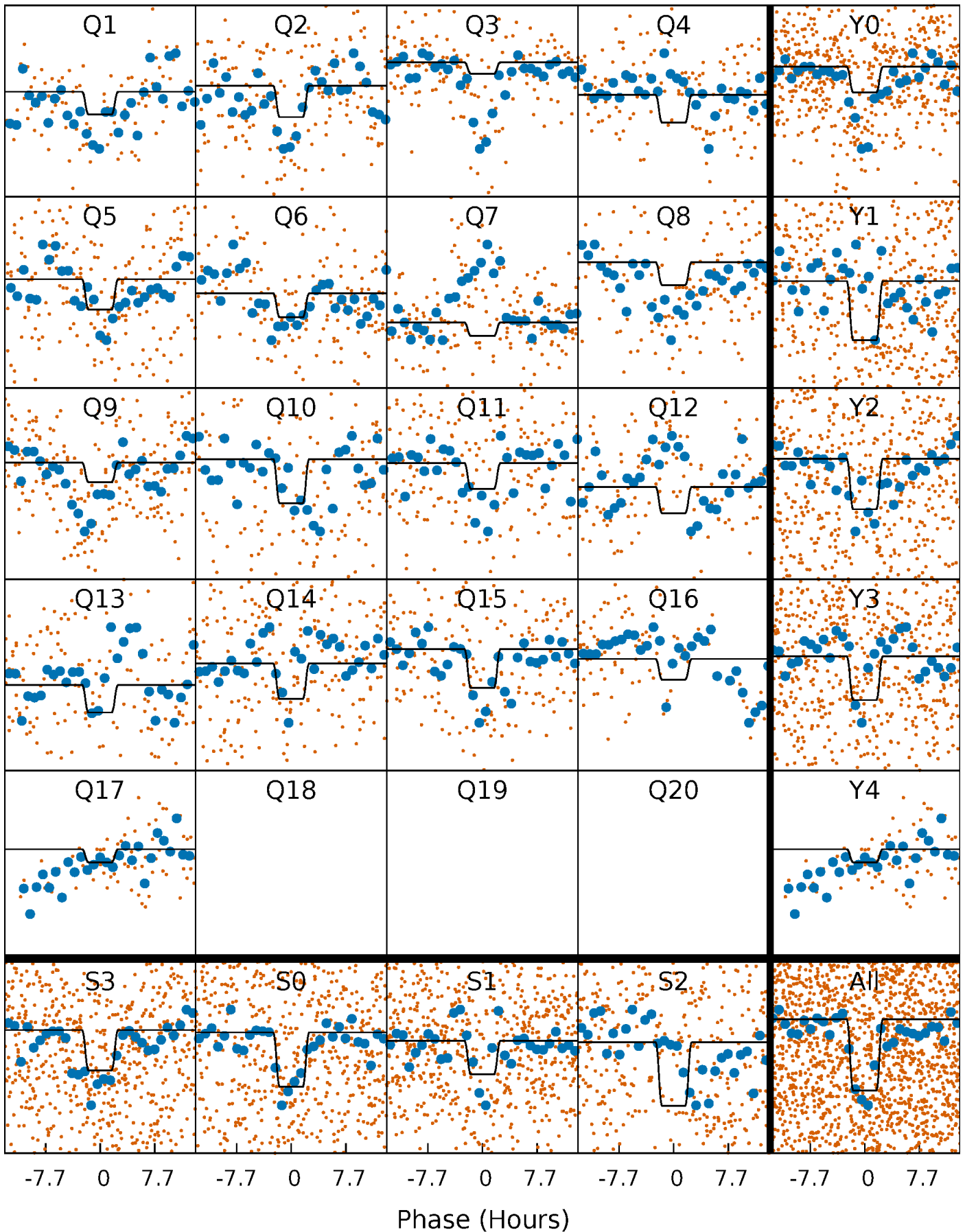
# DV Quarter-Phased Transit Curves

TCE 006946871-03 P= 10.401104 Days  $T_0=131.732484$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

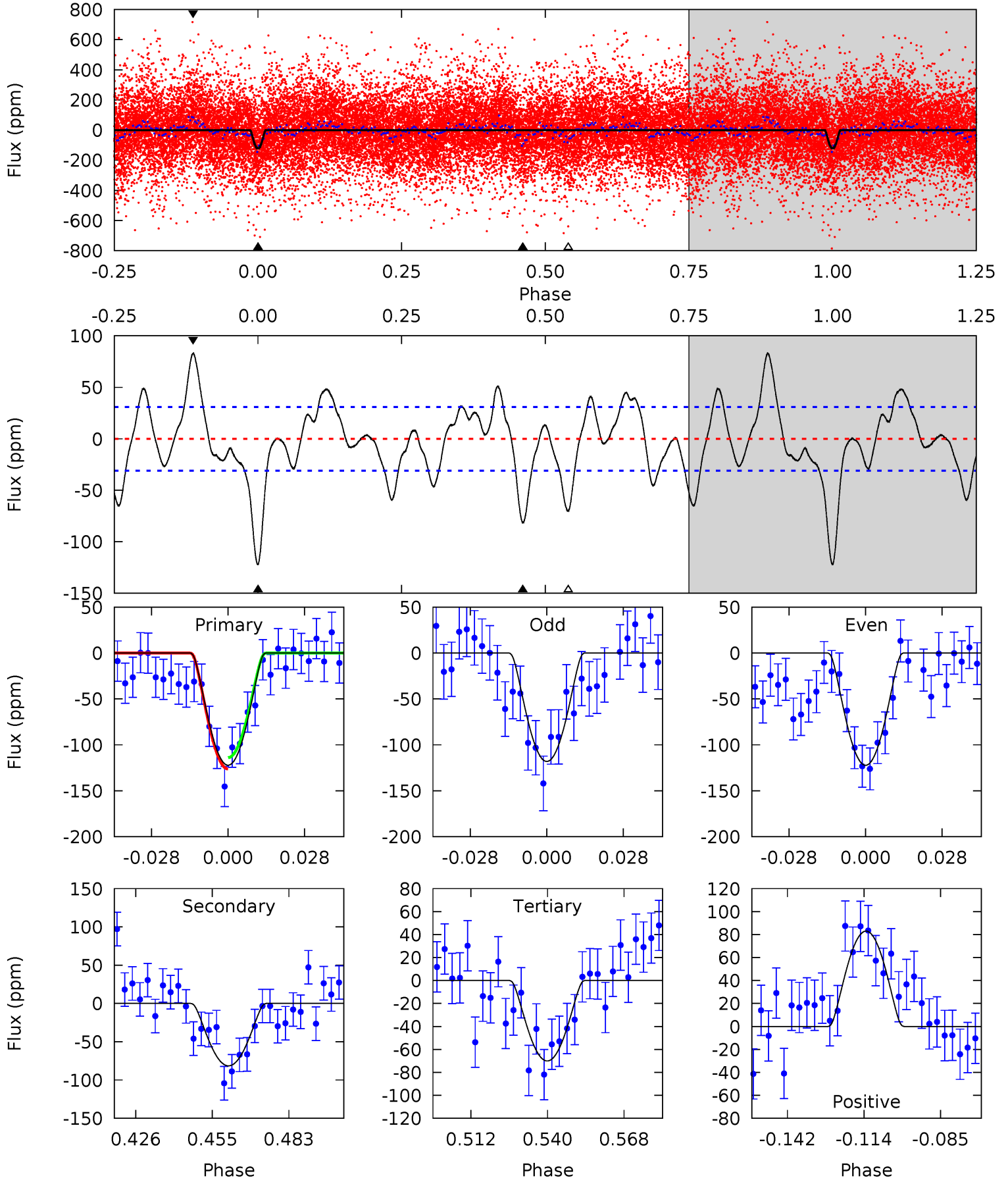
TCE 006946871-03 P= 10.401141 Days  $T_0=131.754143$  (BKJD)



# DV Model-Shift Uniqueness Test

006946871-03,  $P = 10.401104$  Days,  $E = 131.732484$  Days

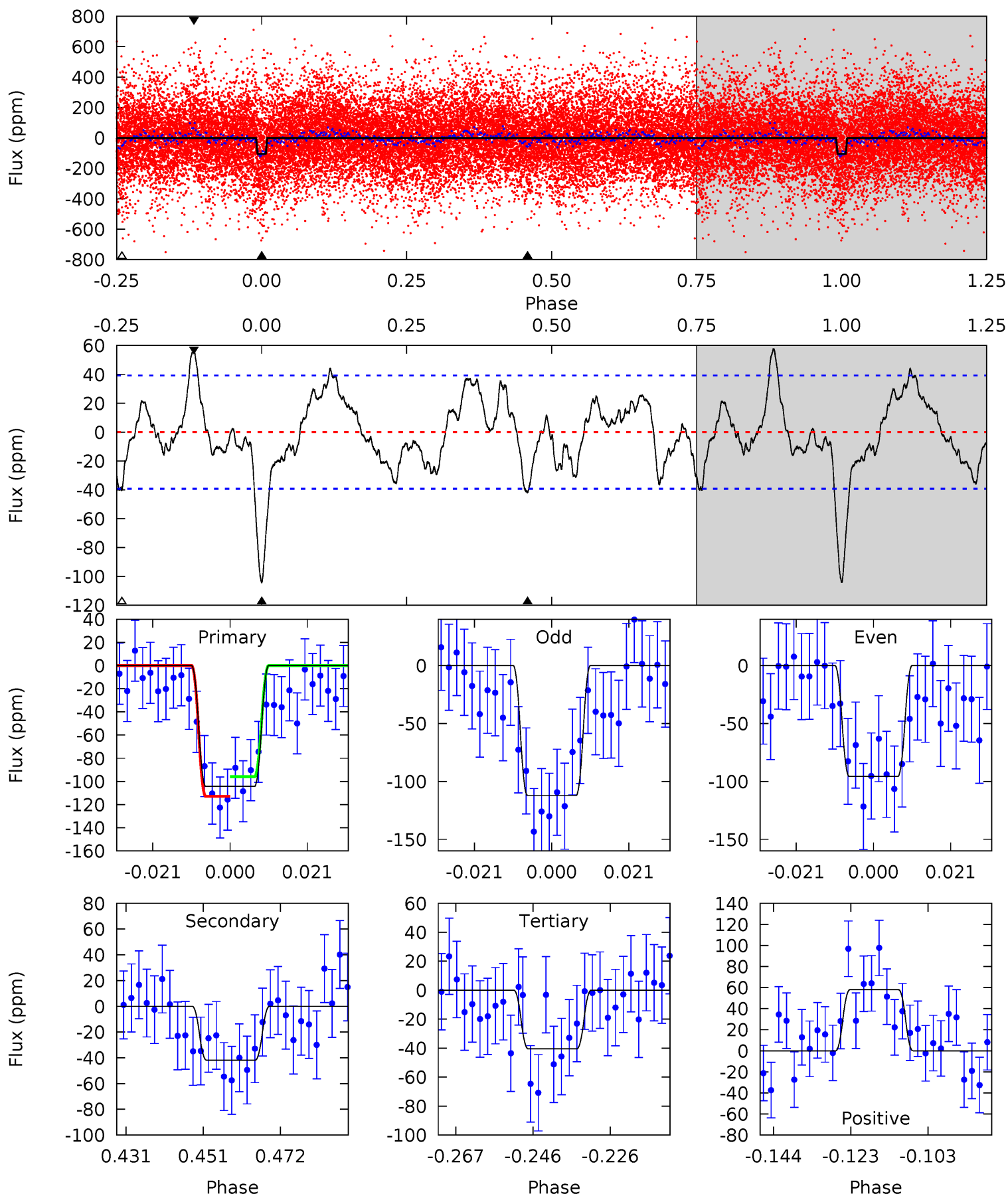
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
19.1	12.7	10.9	12.9	4.82	2.19	4.56	8.13	6.11	1.78	-0.24	0.33	0.96	0.40	0.97



# Alt Model-Shift Uniqueness Test

006946871-03, P = 10.401141 Days, E = 131.754143 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
13.0	5.21	5.04	7.21	4.89	2.32	2.44	7.96	5.78	0.17	-2.00	1.02	0.94	0.36	0



### Stellar Parameters For KIC 006946871

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6739^{+151}_{-201}$	$3.565^{+0.349}_{-0.082}$	$-0.140^{+0.300}_{-0.250}$	$3.626^{+0.357}_{-1.339}$	$1.762^{+0.160}_{-0.373}$	$0.052^{+0.134}_{-0.011}$
	+2%/-3%	+10%/-2%	+214%/-179%	+10%/-37%	+9%/-21%	+257%/-20%
Source	PHO1	FLK73	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 006946871-03 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-81 \pm 6$	$15.89^{+15.09}_{-10.91}$	$2320^{+117}_{-231}$	$3449^{+1914}_{-810}$	$2.320^{+21.344}_{-1.735}$
Alt.	$-42 \pm 8$	$12.95^{+14.67}_{-8.88}$	$2312^{+116}_{-208}$	$3277^{+1830}_{-1029}$	$1.641^{+15.734}_{-1.263}$

$T_{\text{max}}$  = 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

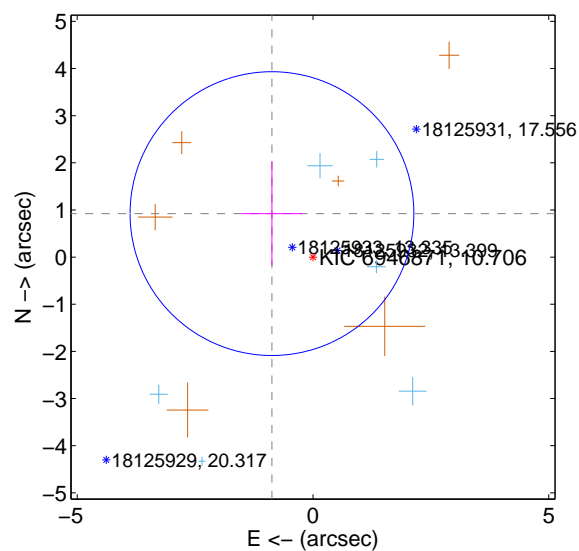
Supplemental centroid analysis for 006946871-03. **Kepler magnitude: 10.71.** Transit SNR 9.61

There are 6 quarters with good PRF difference image offsets

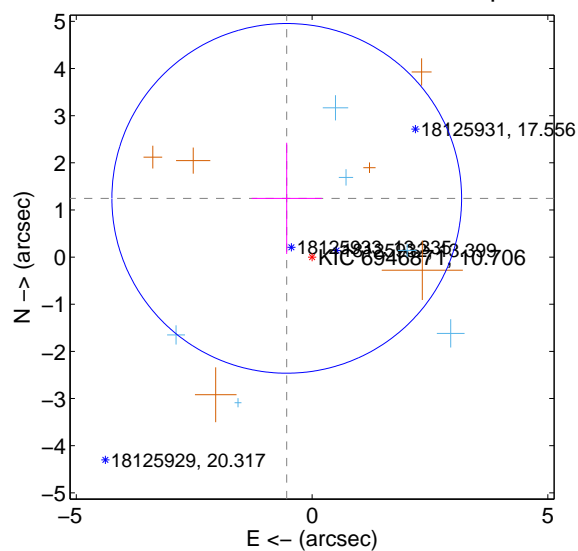
The direct PRF centroid is offset from the target star catalog position by about 1.48 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.268 \pm 1.003$	1.26	$0.870 \pm 0.648$	$0.923 \pm 1.102$
PRF-fit source offset from KIC position	$1.357 \pm 1.236$	1.10	$0.537 \pm 0.744$	$1.246 \pm 1.180$
photometric centroid source offset	$0.47 \pm 0.30$	1.59	$0.22 \pm 0.30$	$0.42 \pm 0.30$

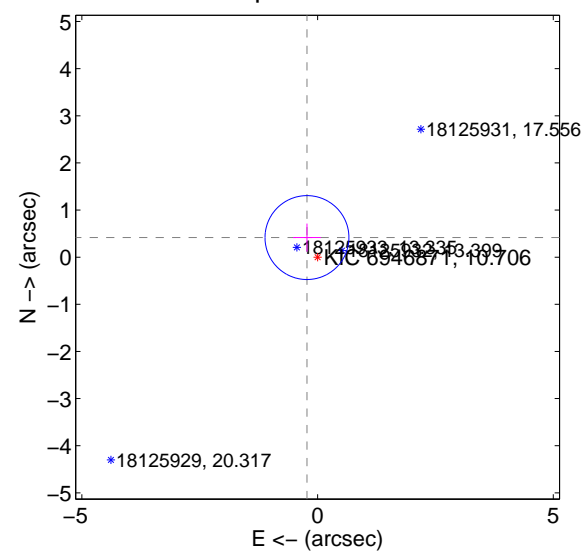
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



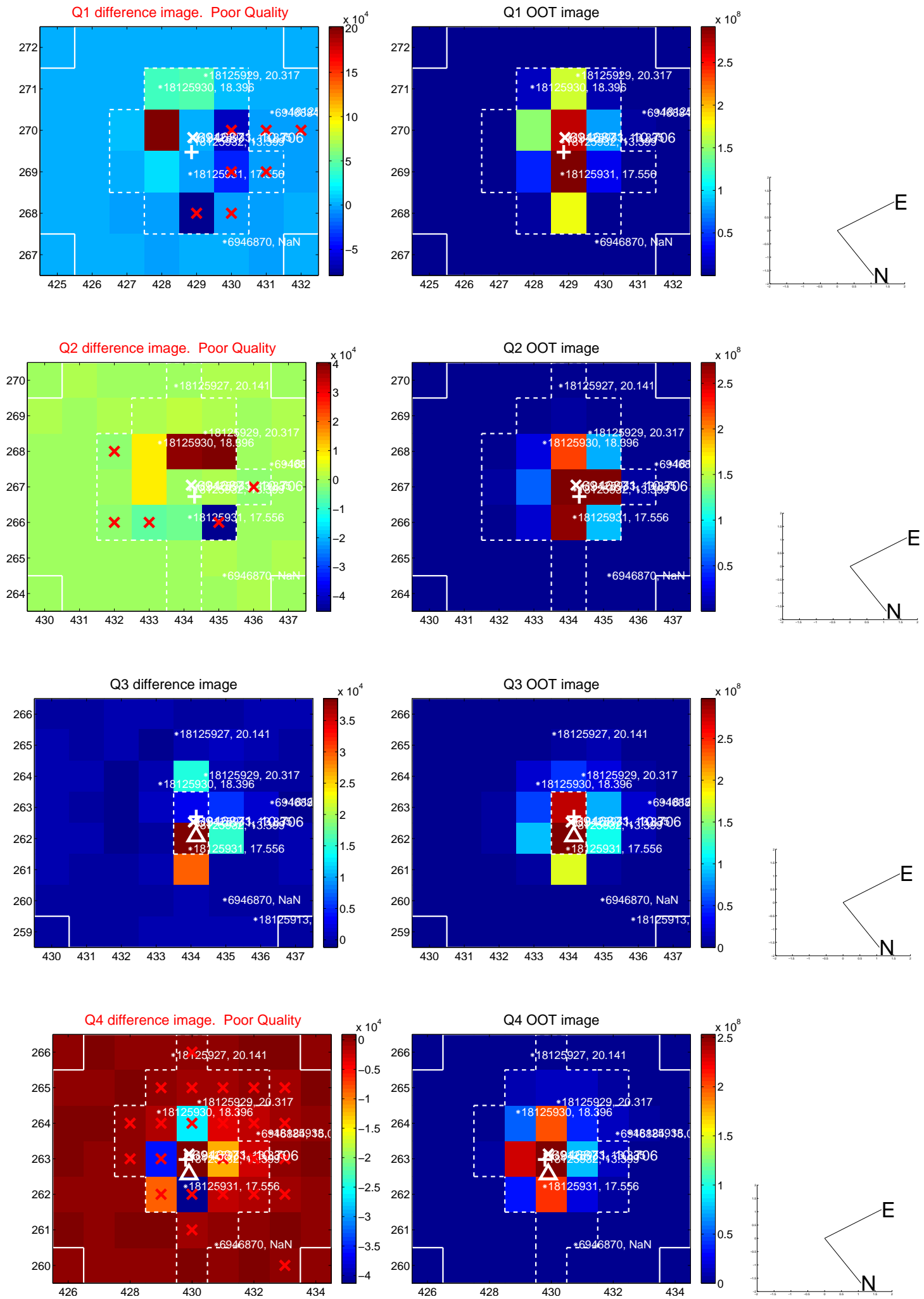
offset from photometric centroids



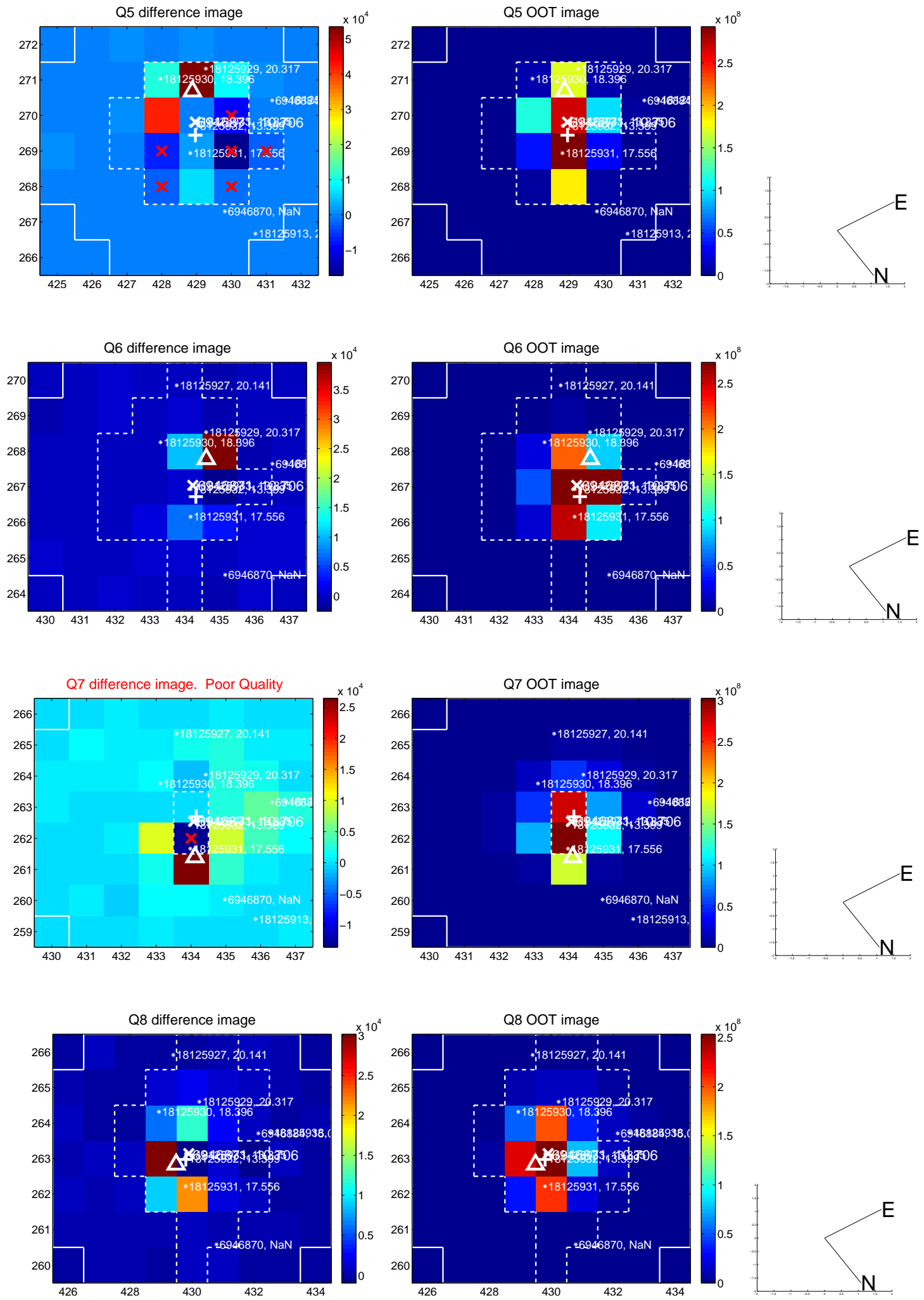
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



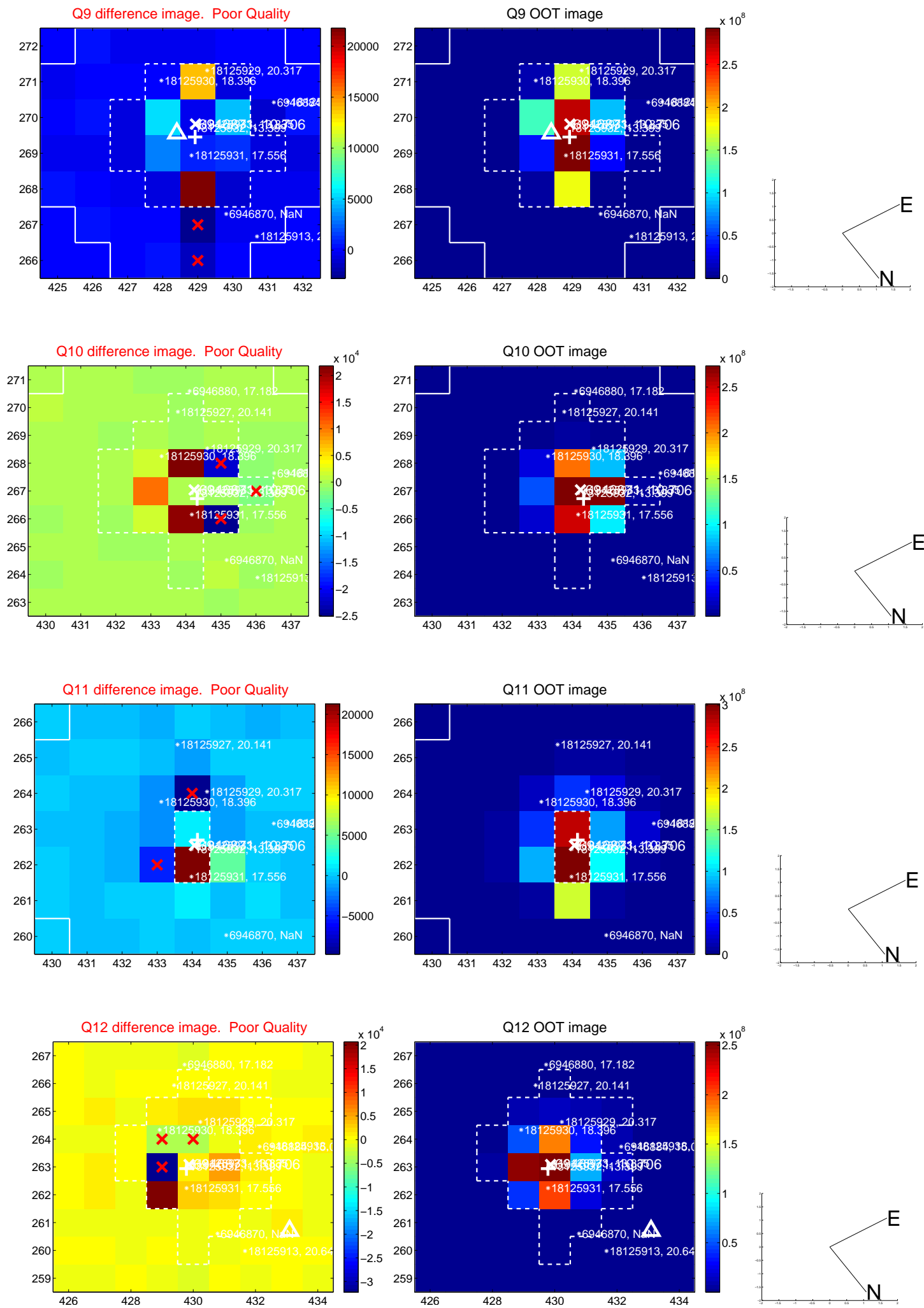
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



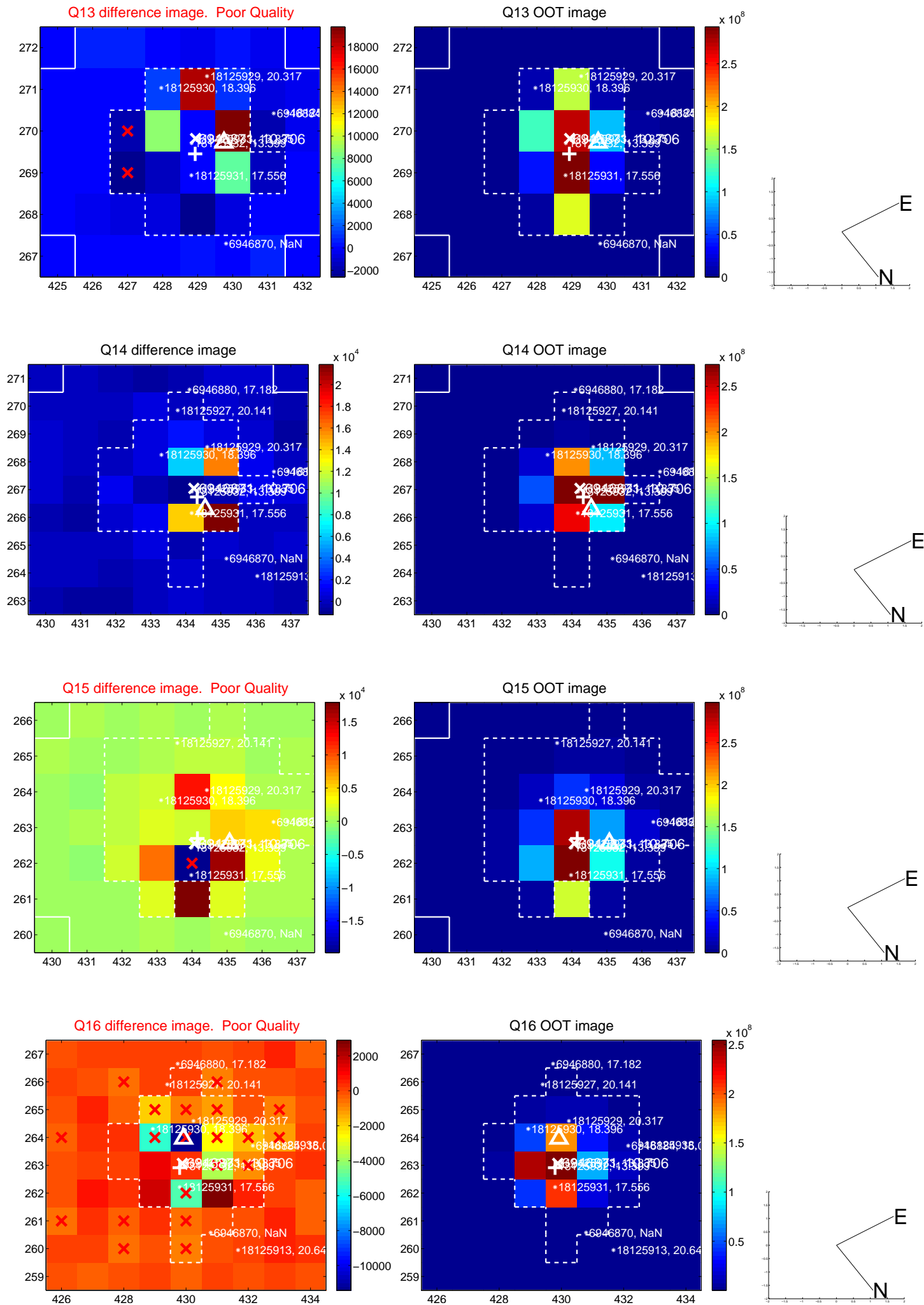
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



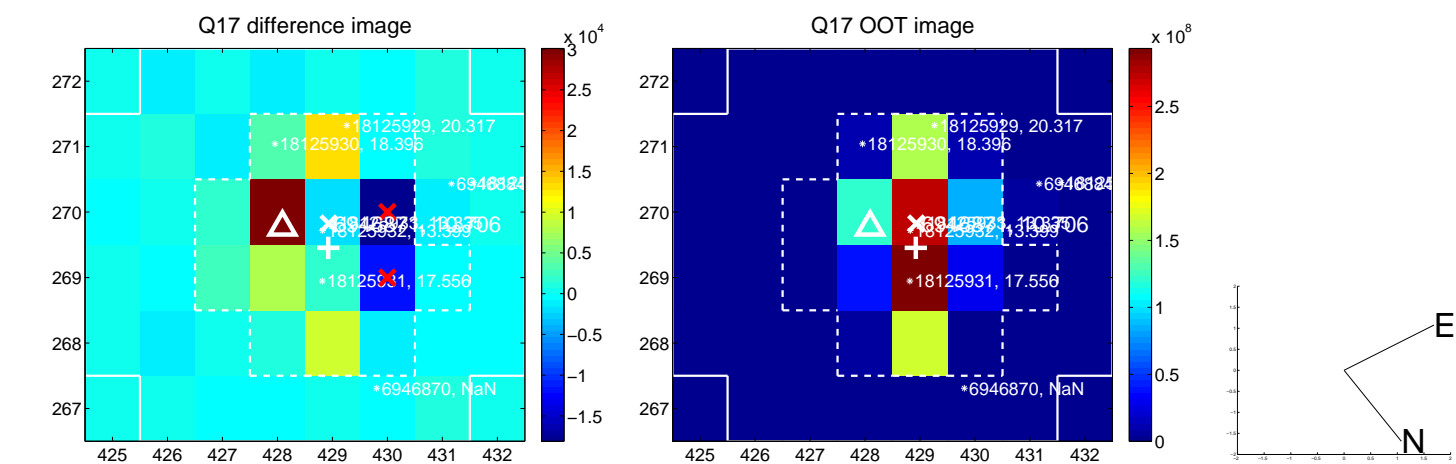
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



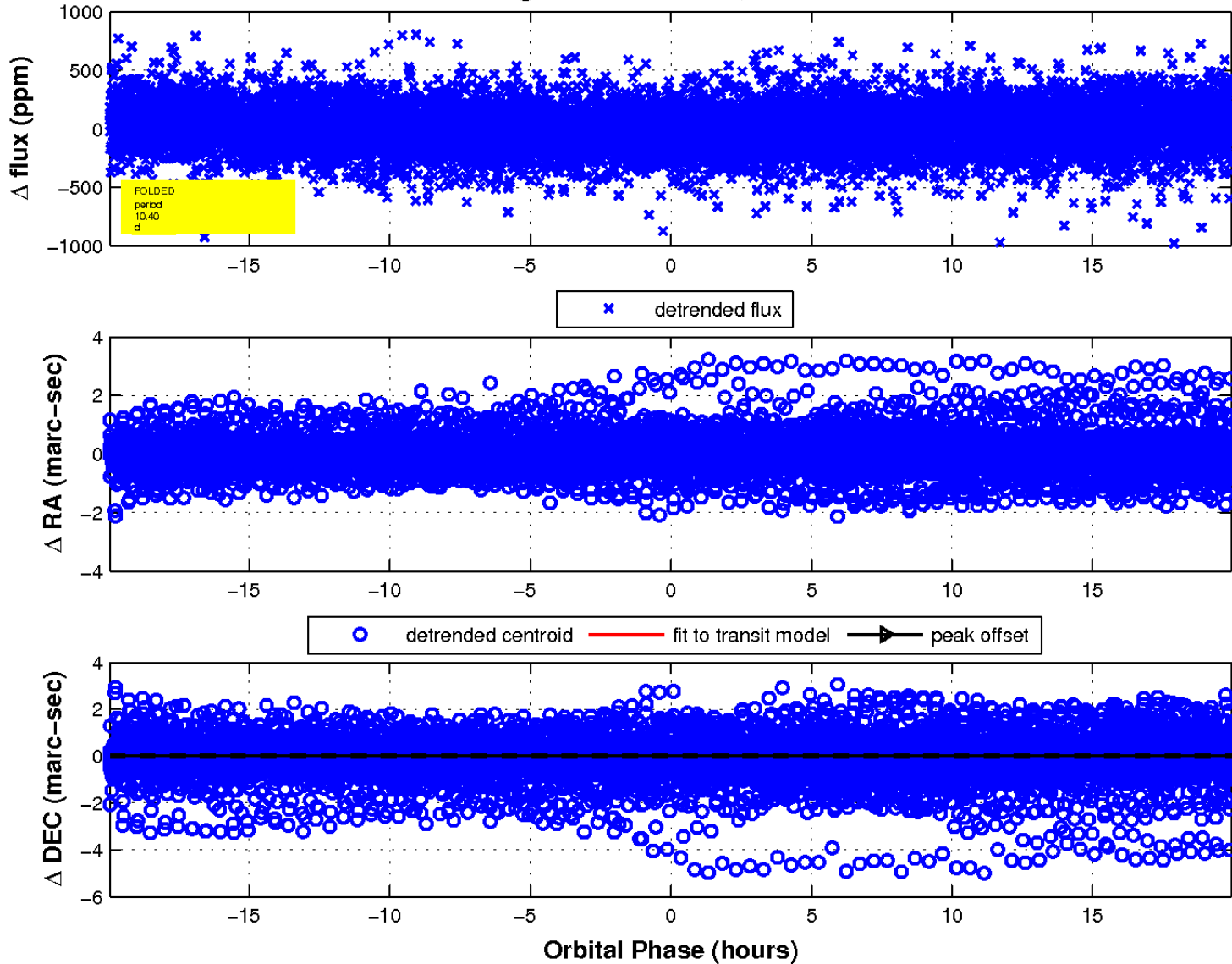
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

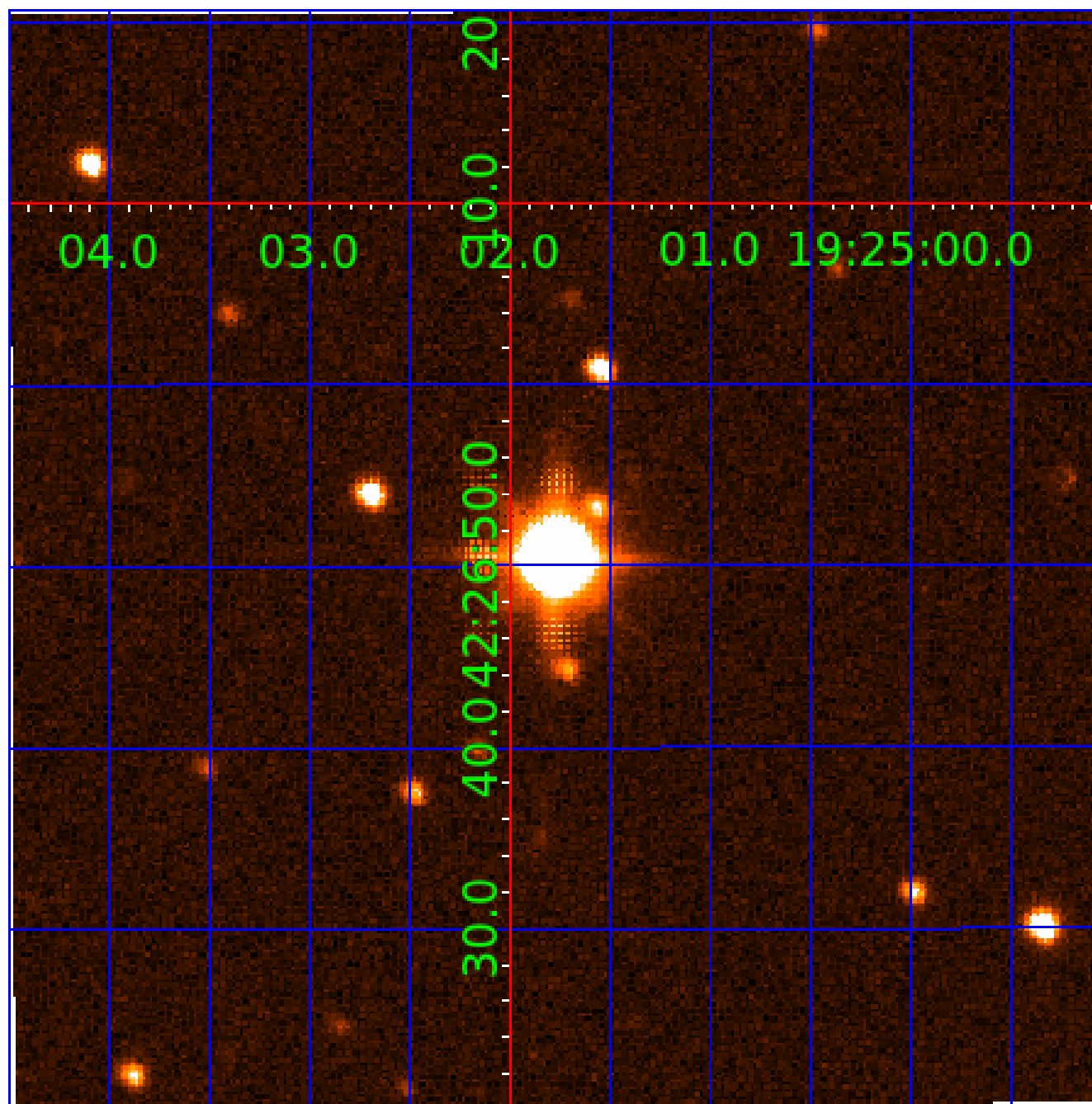


fluxWeightedCentroids, Planet 3 of 4



UKIRT Image

Declination





# KIC 006946871

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006946871-01	OBS	No	2.172871	131.892727	30.7	10.249	10.2	9.3	3.63	6739	2.71	15447.19
006946871-02	OBS	No	134.258834	158.480872	297.0	13.437	11.2	9.4	3.63	6739	6.65	63.24
006946871-03	OBS	No	10.401104	131.732484	109.4	6.649	7.9	9.6	3.63	6739	7.49	1914.79
006946871-04	OBS	No	2.173139	132.399594	51.9	26.078	10.3	14.3	3.63	6739	2.65	15444.65

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006946871-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_SATURATED
006946871-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_SATURATED
006946871-03	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_SATURATED
006946871-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—SAME_NTL_PERIOD—CENT_SATURATED

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

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

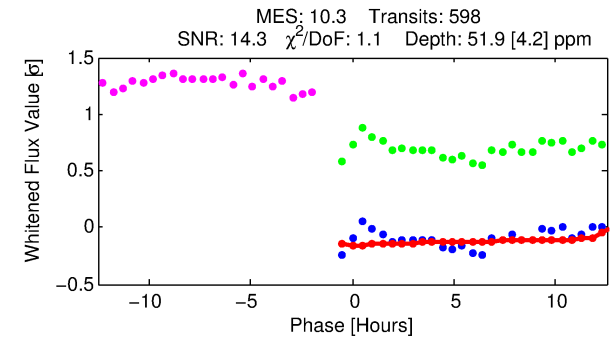
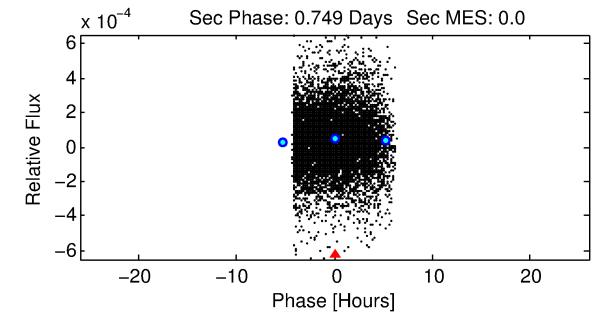
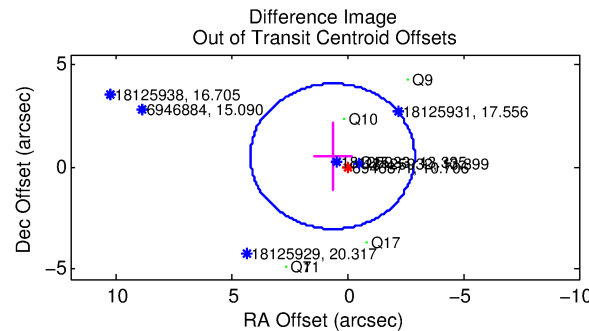
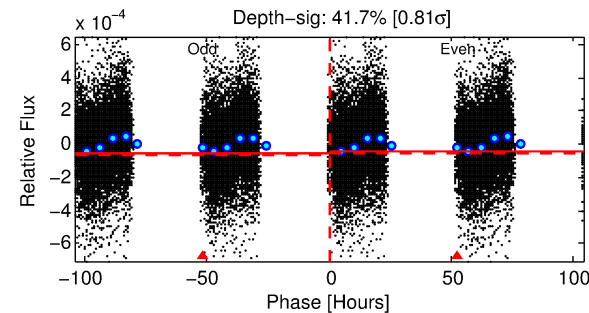
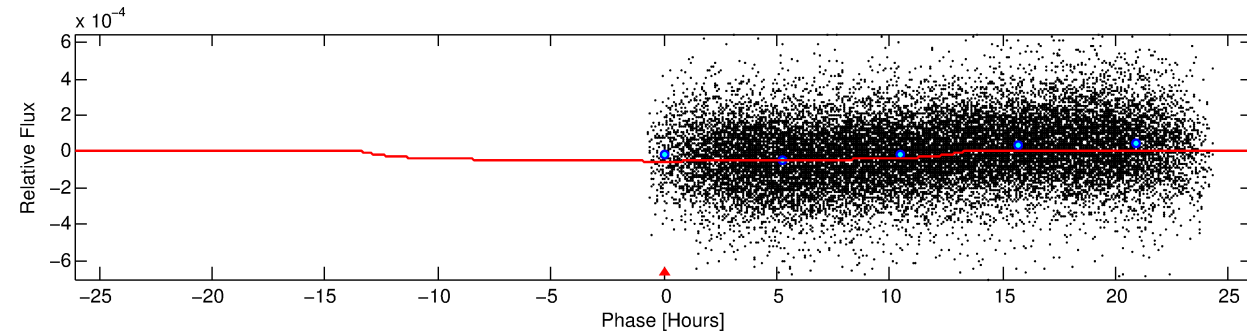
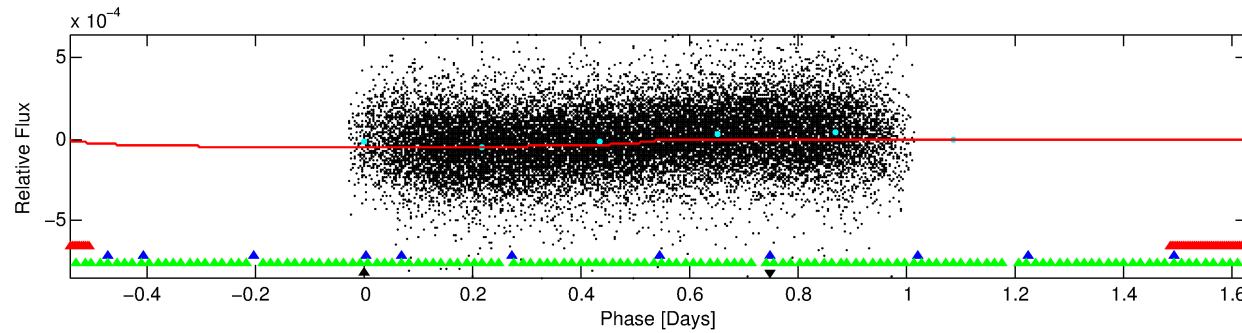
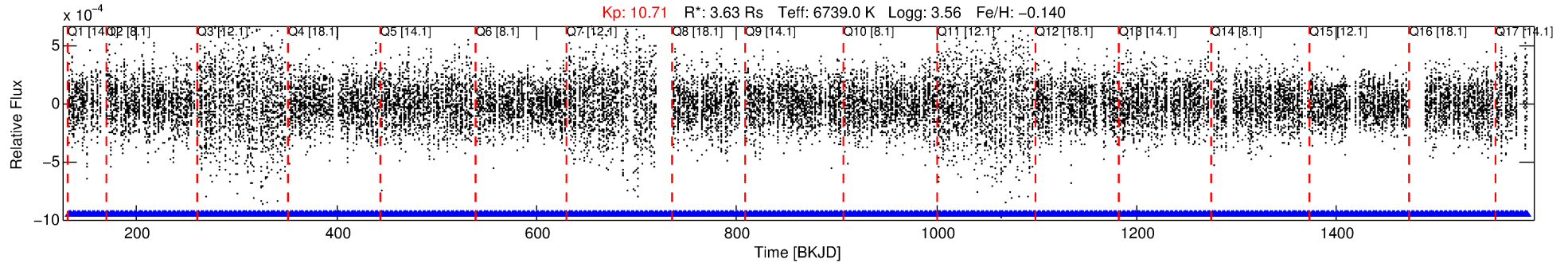
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 006946871-04

No Significant Match Found

# DV One-Page Summary

KIC: 6946871 Candidate: 4 of 4 Period: 2.173 d



## DV Fit Results:

Period = 2.17314 [0.00004] d  
Epoch = 132.3996 [0.0142] BKJD  
Rp/R\* = 0.0067 [0.0008]  
a/R\* = 1.00 [0.00]  
b = 0.30 [2.10]  
Seff = 15444.65 [9290.60]  
Teq = 2843 [427] K  
Rp = 2.65 [1.04] Re  
a = 0.0397 [0.0144] AU  
Ag = N/A  
Teffp = N/A

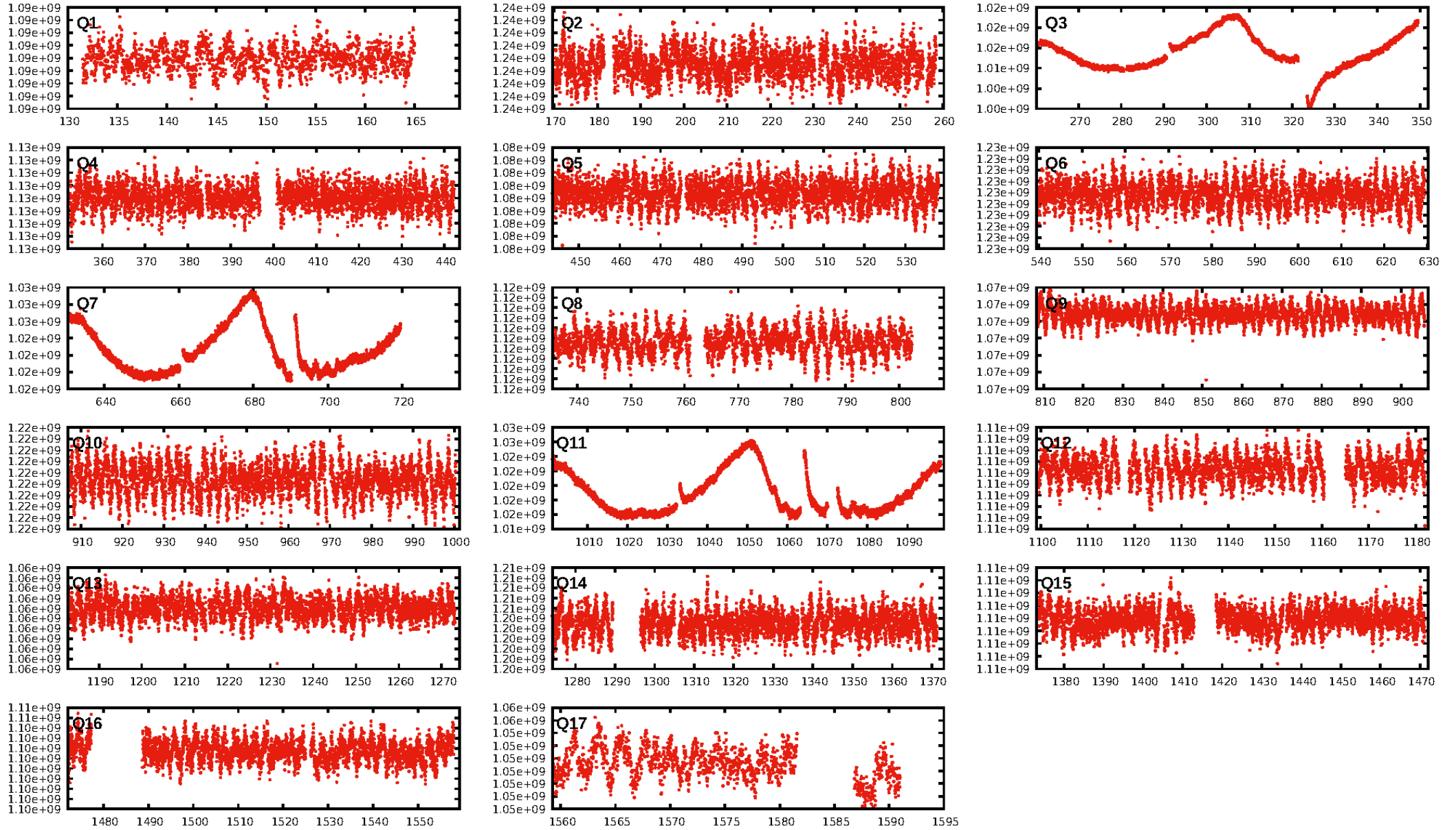
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00 $\sigma$ ]  
LongPeriod-sig: 100.0% [7.34 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [573/573]  
GhostDiagnostic-chr: 0.6182  
Centroid-sig: N/A  
Centroid-so: 1.718 arcsec [12.13 $\sigma$ ]  
OotOffset-rm: 0.828 arcsec [0.70 $\sigma$ ]  
KicOffset-rm: 1.429 arcsec [0.77 $\sigma$ ]  
OotOffset-st: 1/3/0/2 [6]  
KicOffset-st: 1/3/0/2 [6]  
DiffImageQuality-fgm: 0.83 [5/6]  
DiffImageOverlap-fno: 0.00 [0/17]

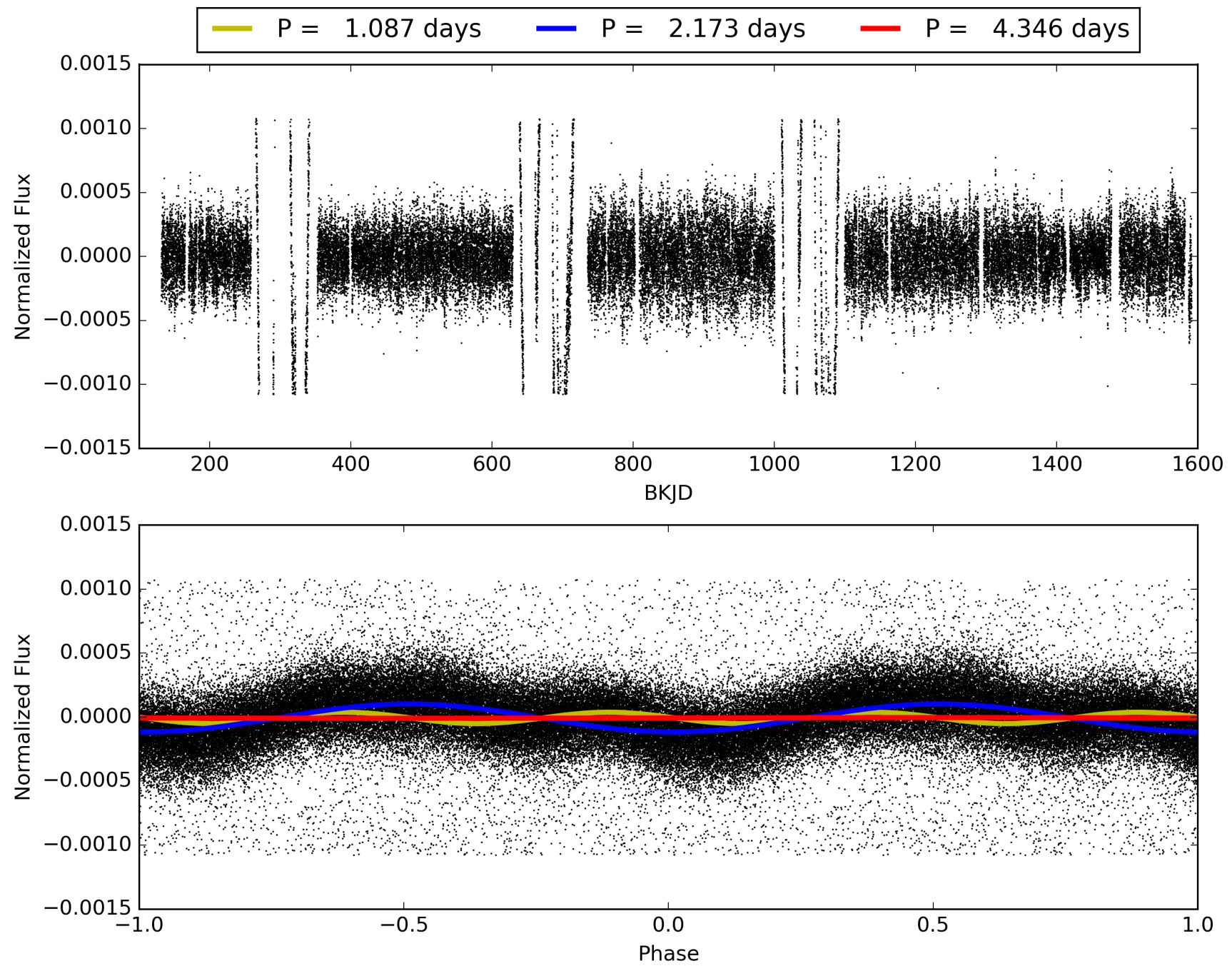
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 02:57:38 Z

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

# TCE 006946871-04, PDC Light Curves

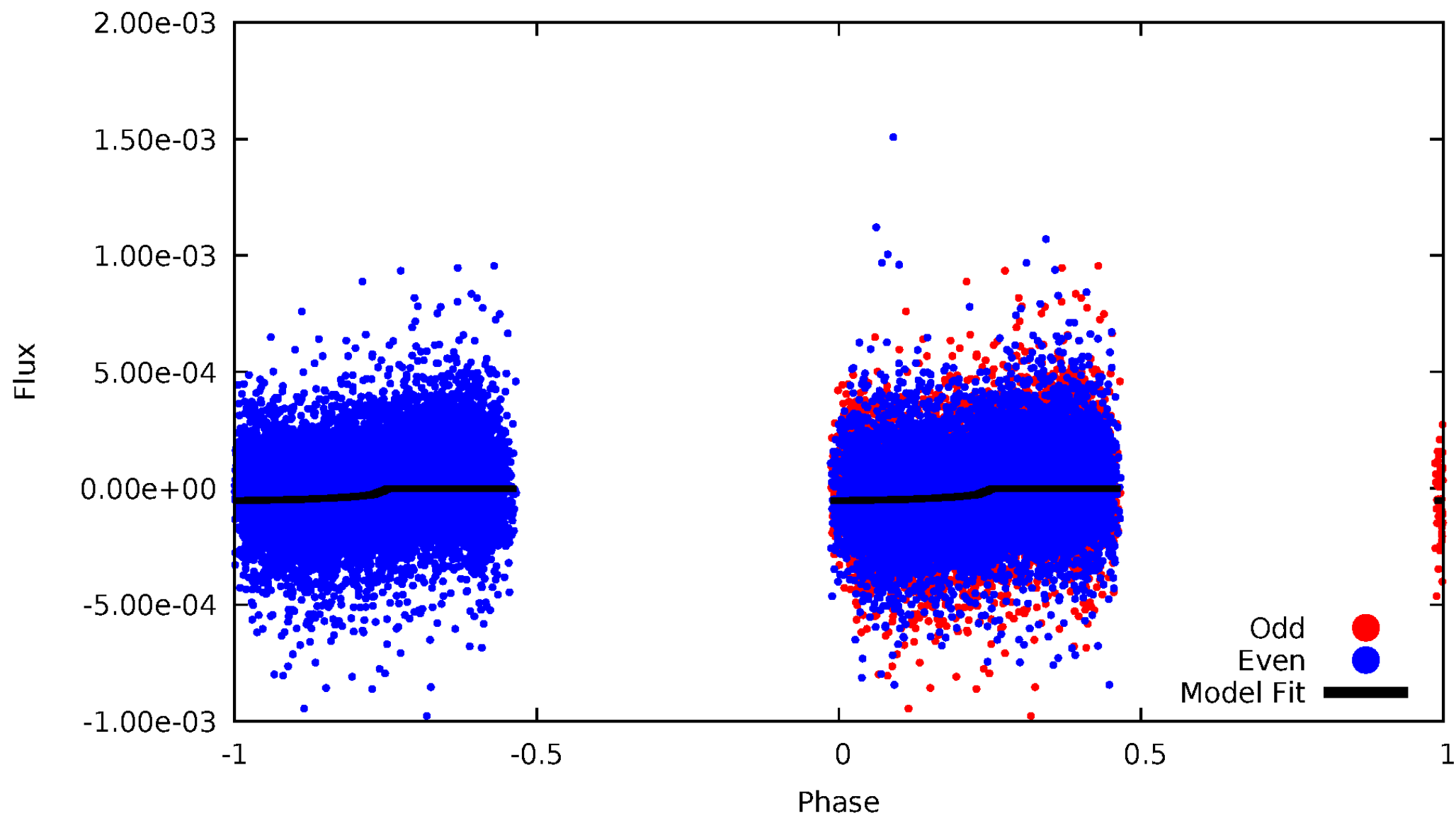


TCE 006946871-04



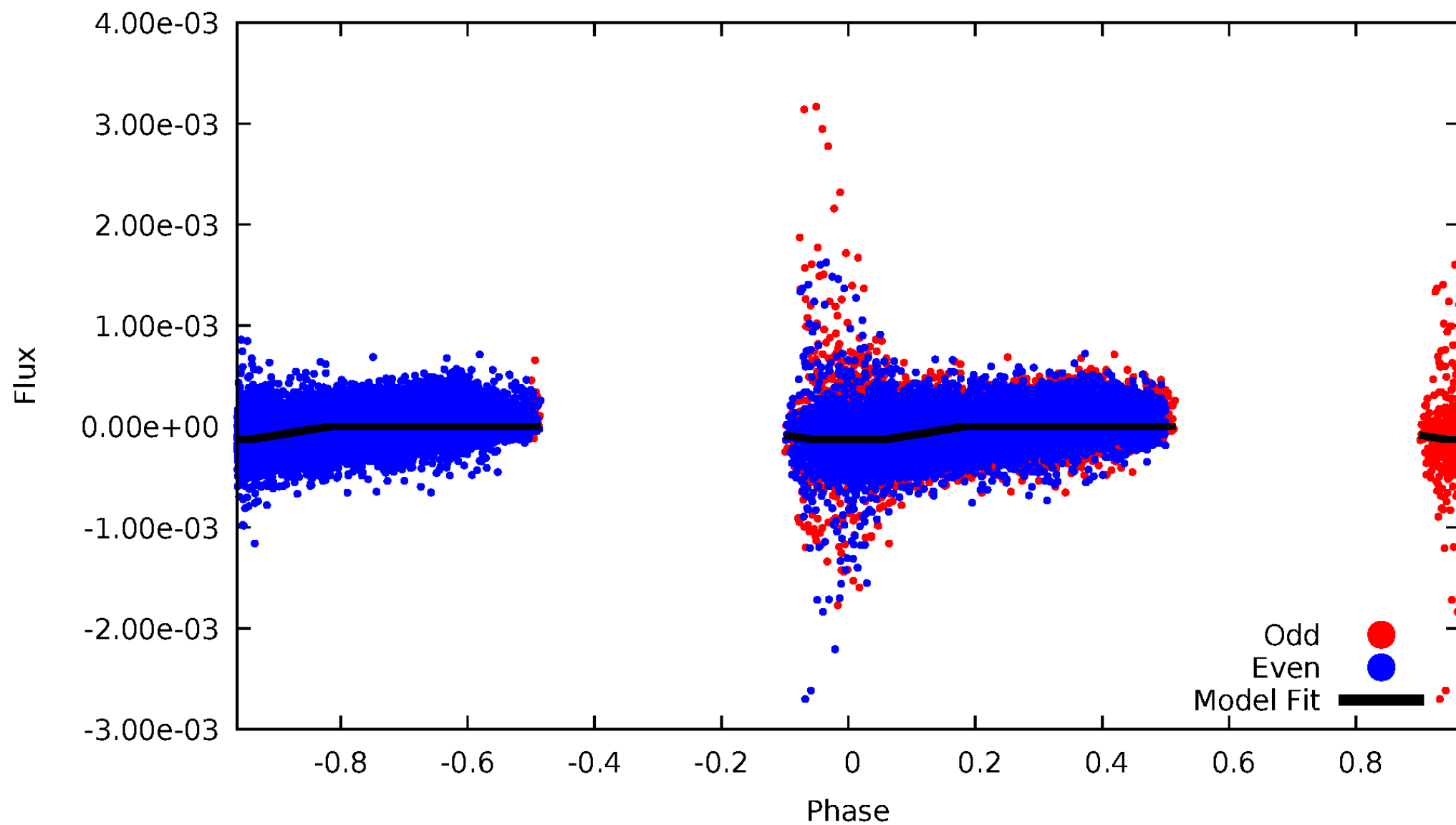
# DV Odd/Even

TCE 006946871-04



# ALT Odd/Even

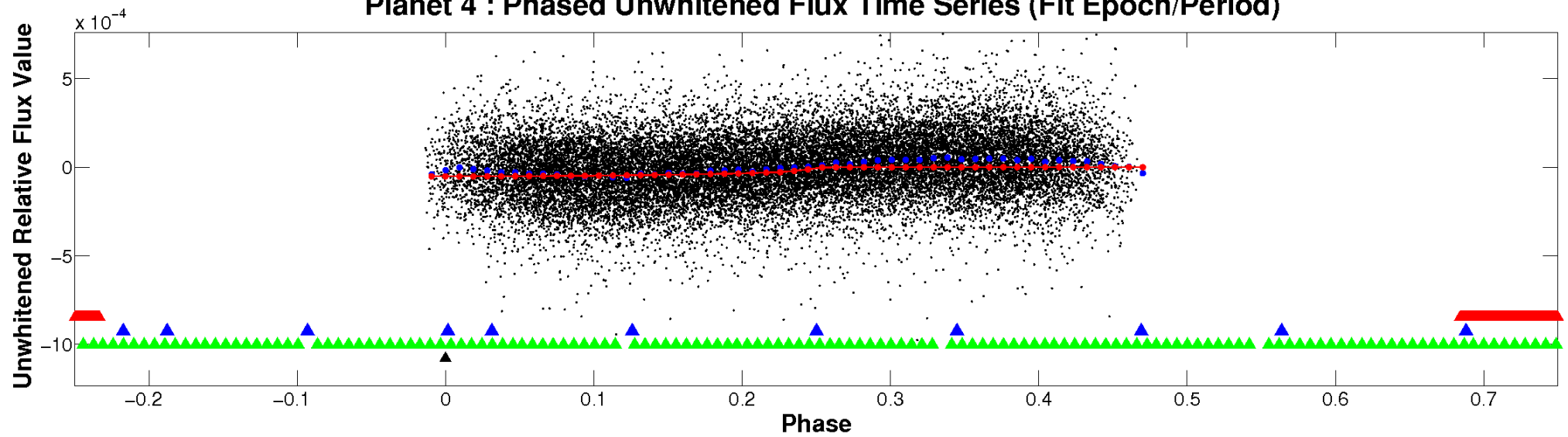
TCE 006946871-04



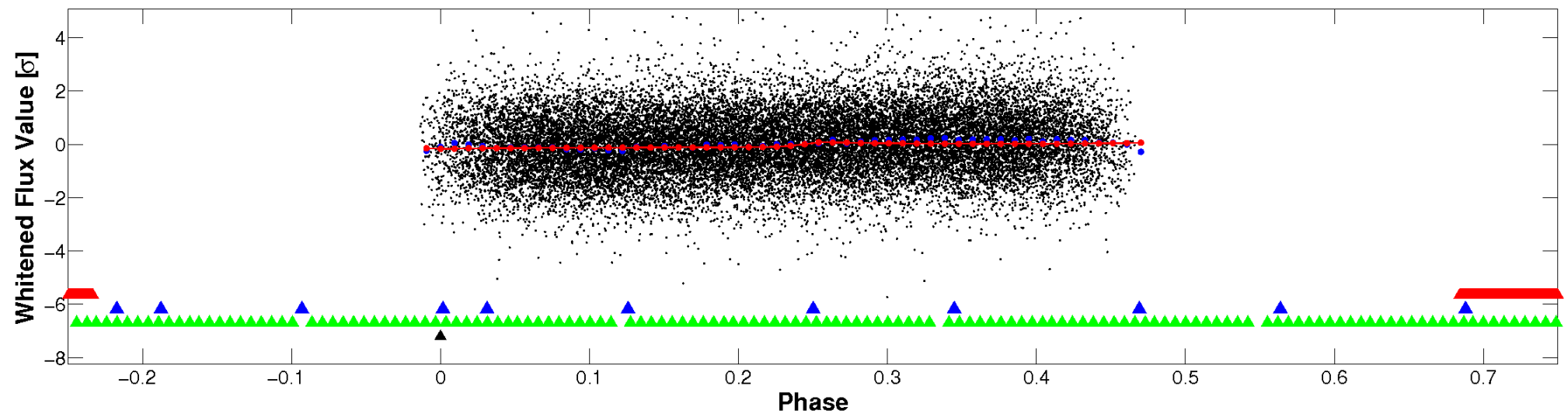


# Non-Whitened Vs. Whitened Light Curve

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

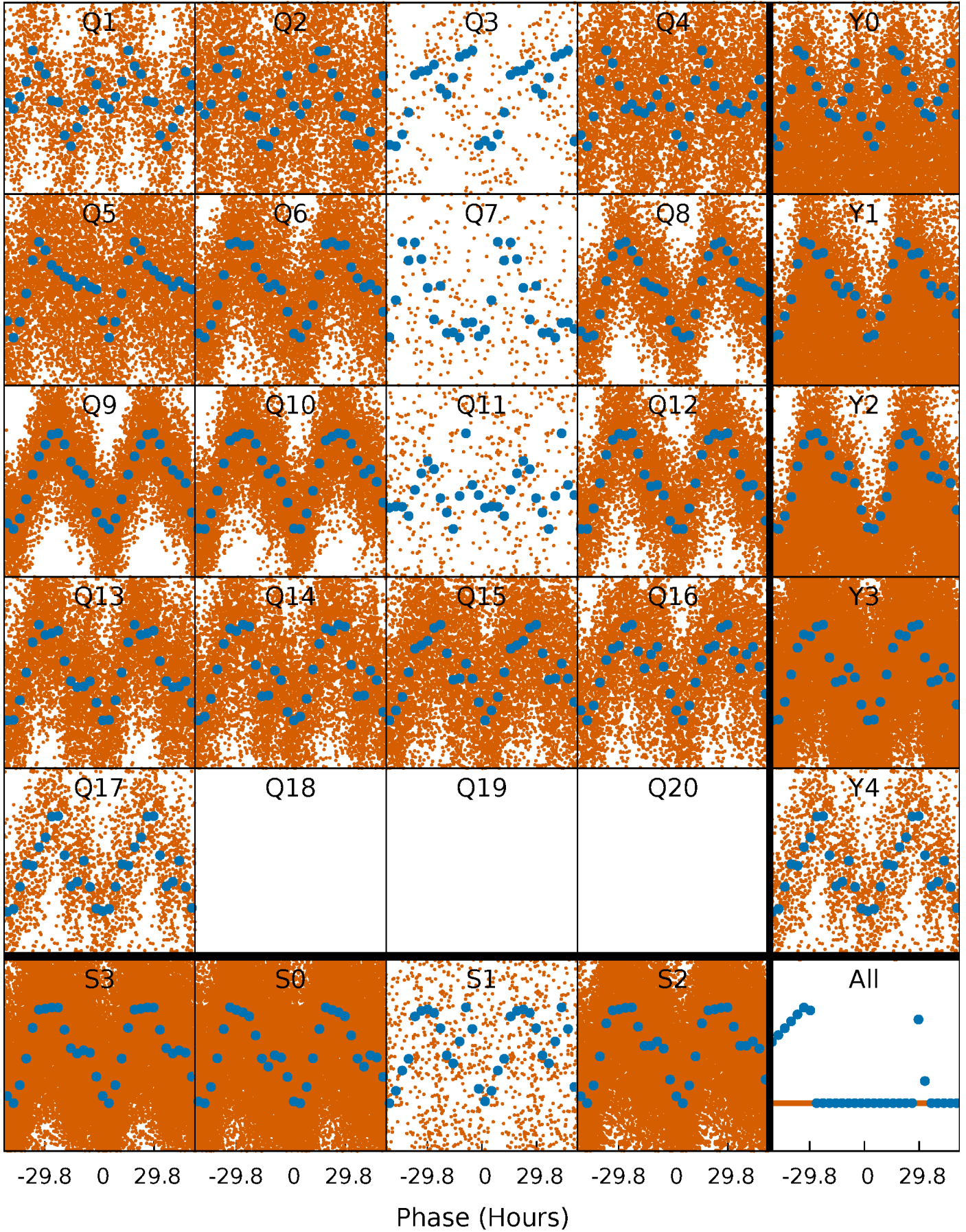


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



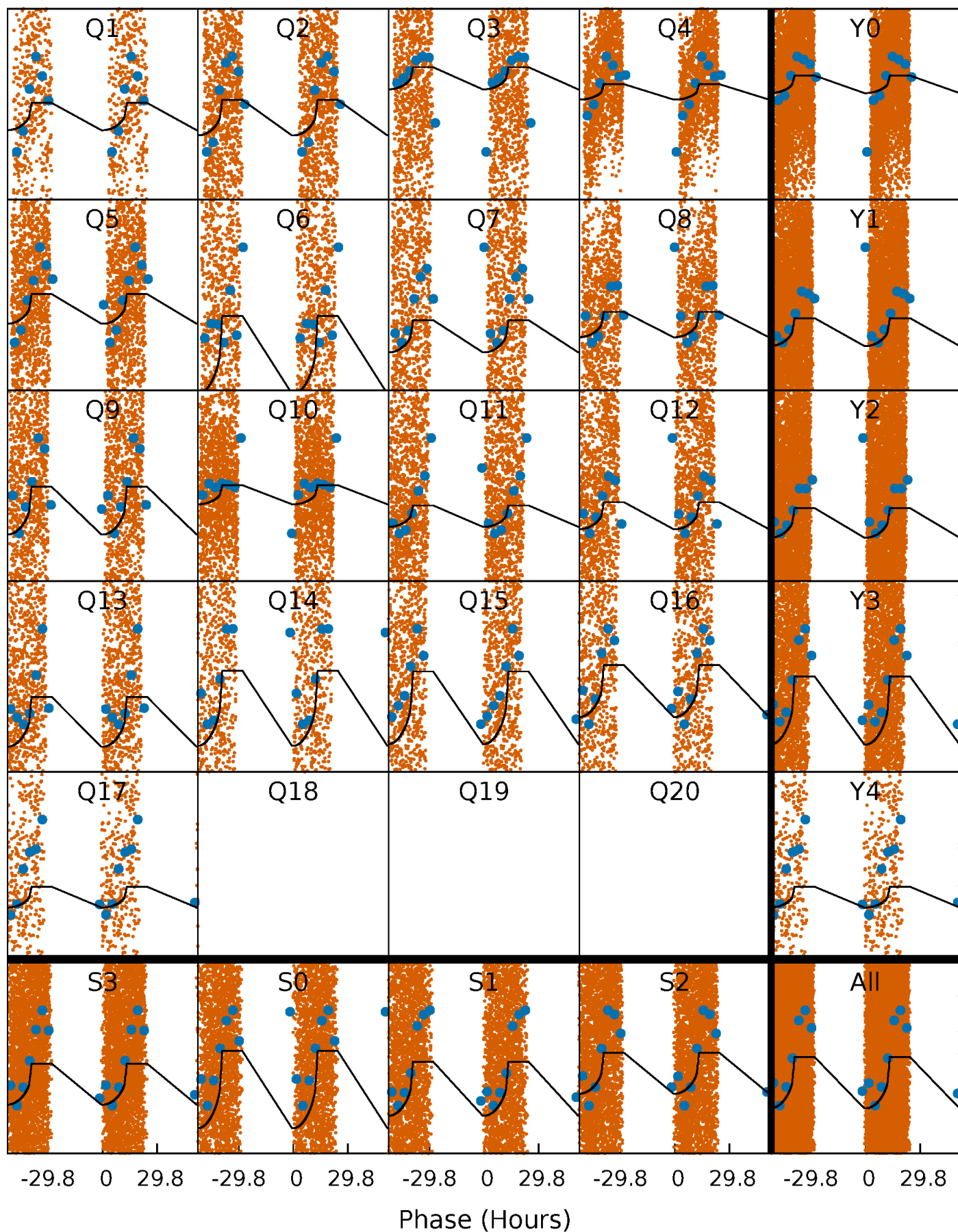
# PDC Quarter-Phased Transit Curves

TCE 006946871-04   P= 2.173139 Days    $T_0=132.399594$  (BKJD)



# DV Quarter-Phased Transit Curves

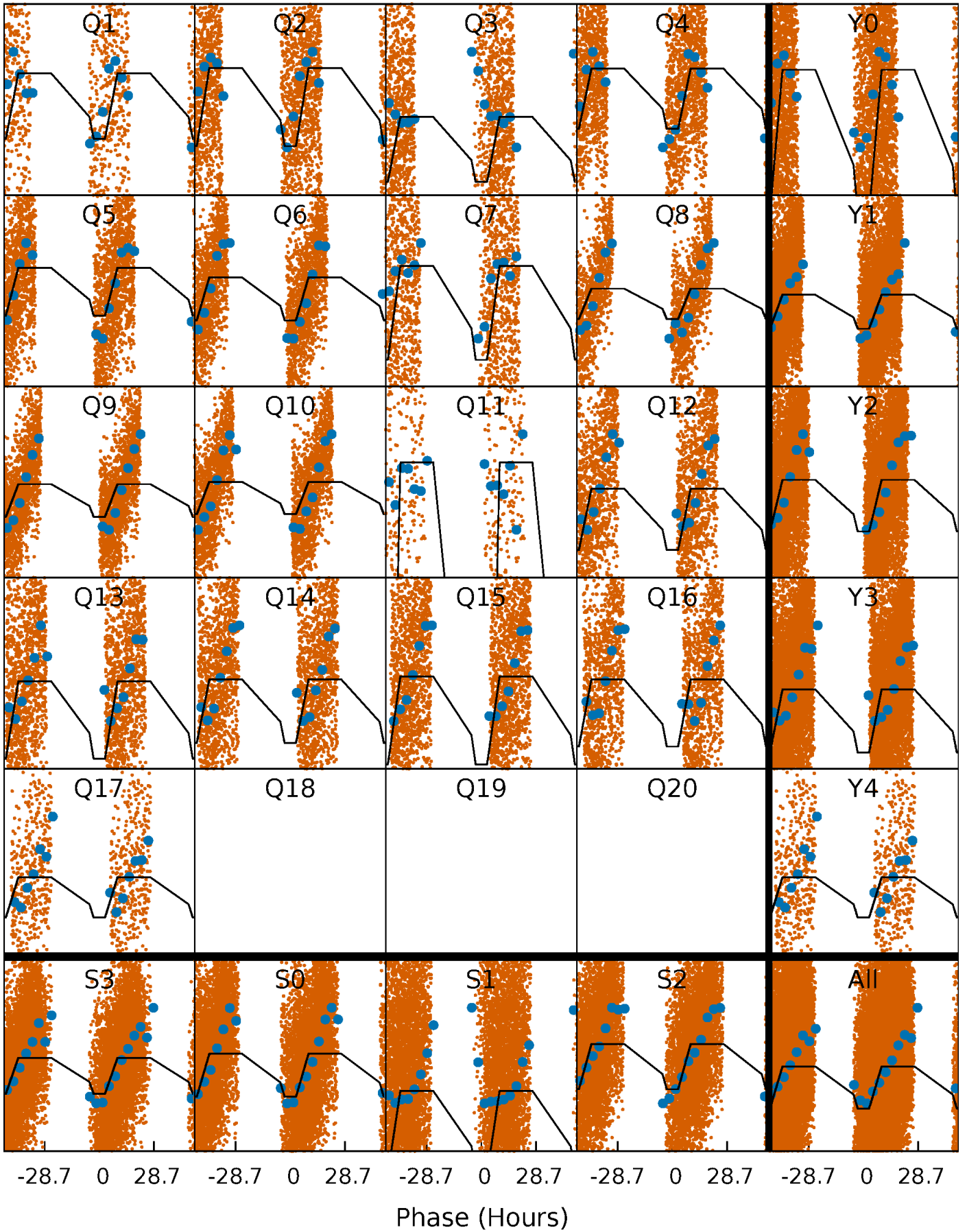
TCE 006946871-04 P= 2.173139 Days  $T_0=132.399594$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

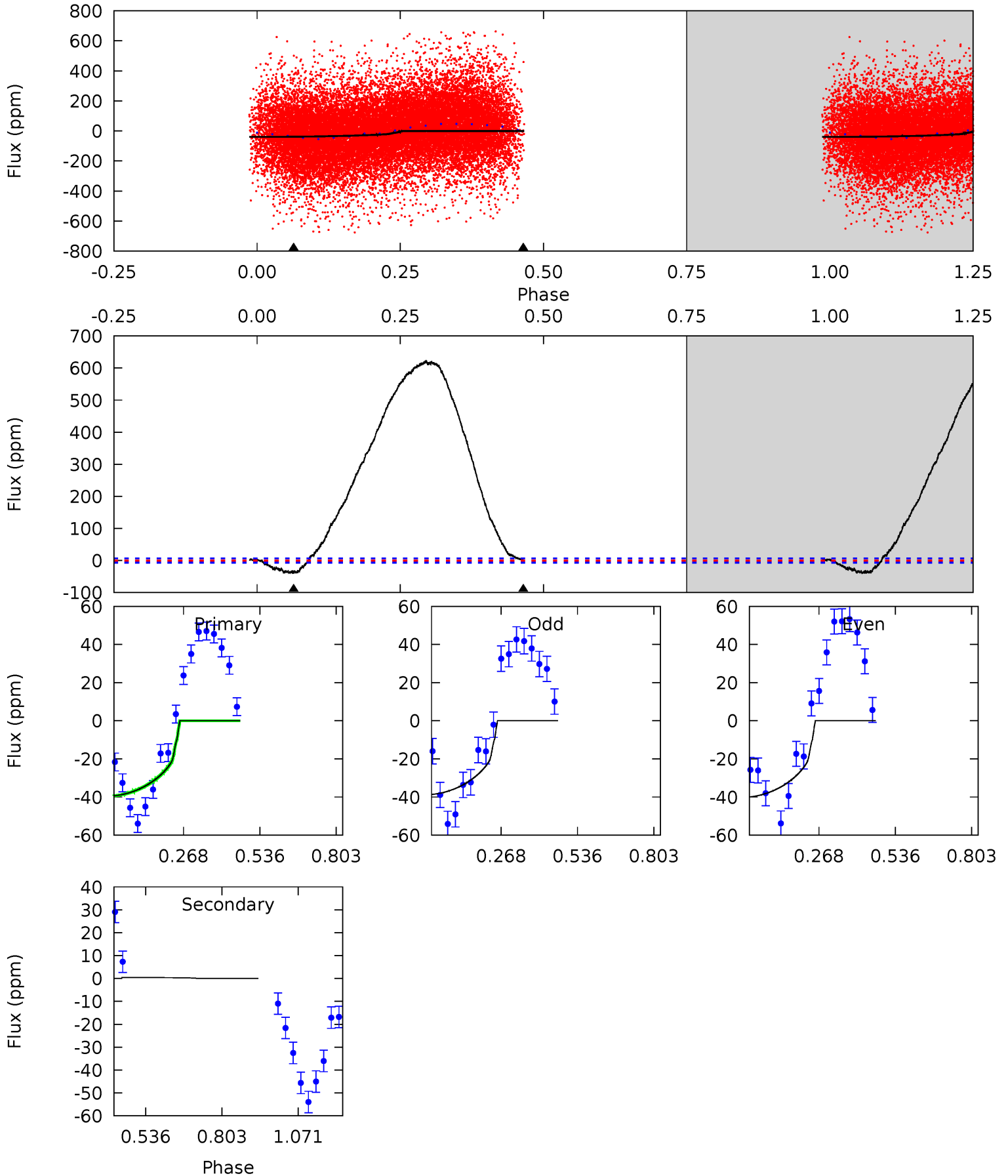
TCE 006946871-04 P= 2.172165 Days  $T_0=132.764655$  (BKJD)



# DV Model-Shift Uniqueness Test

006946871-04, P = 2.173139 Days, E = 132.399594 Days

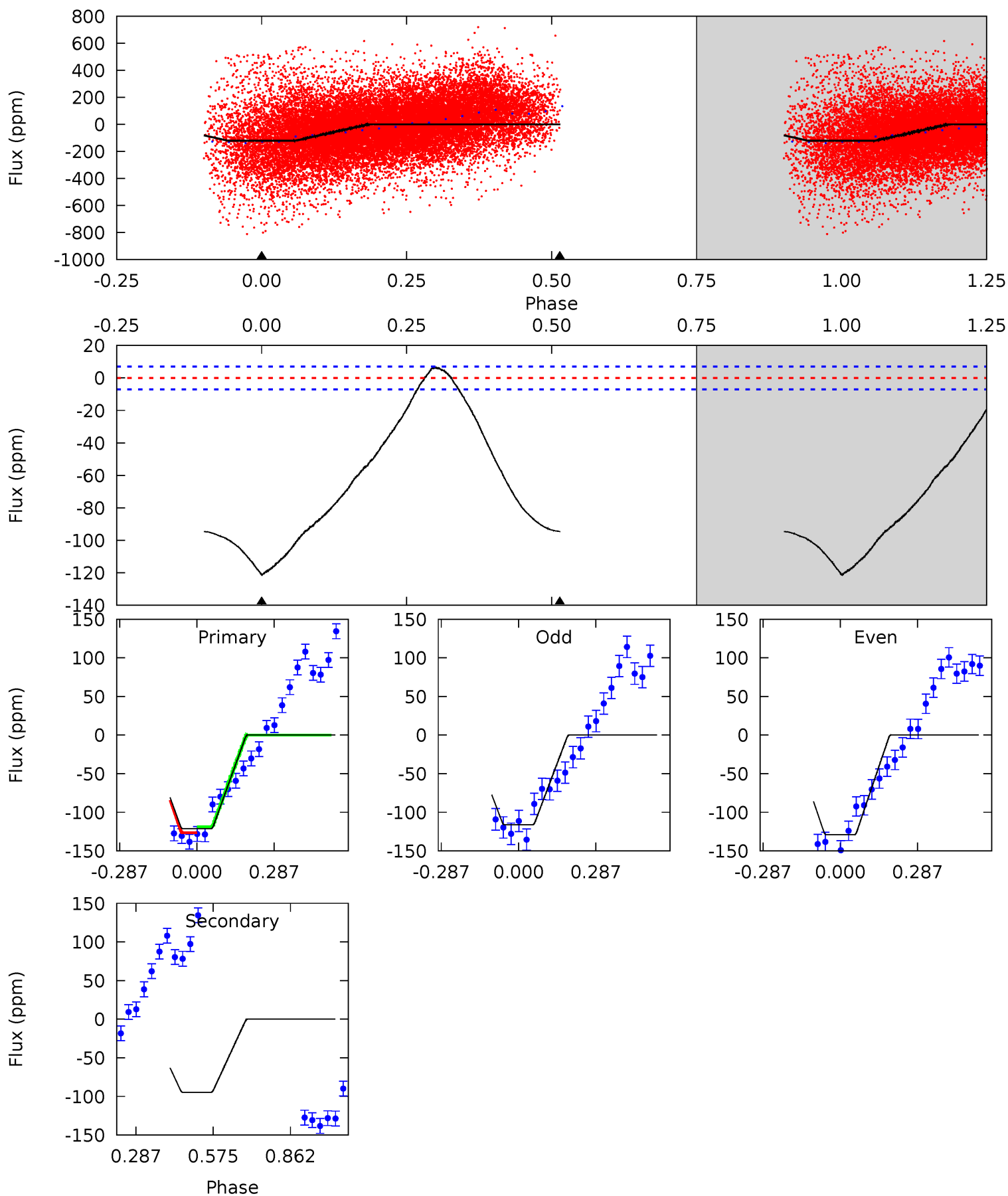
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
25.9	-0.29	0	0	4.35	1.11	31.7	25.9	25.9	-0.29	-0.29	0.43	1.04	0.94	0.12



# Alt Model-Shift Uniqueness Test

006946871-04, P = 2.172165 Days, E = 130.592490 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
74.9	58.5	0	0	4.34	1.06	3.89	74.9	74.9	58.5	58.5	4.01	1.04	0.05	1.04





### Stellar Parameters For KIC 006946871

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6739^{+151}_{-201}$	$3.565^{+0.349}_{-0.082}$	$-0.140^{+0.300}_{-0.250}$	$3.626^{+0.357}_{-1.339}$	$1.762^{+0.160}_{-0.373}$	$0.052^{+0.134}_{-0.011}$
	+2%/-3%	+10%/-2%	+214%/-179%	+10%/-37%	+9%/-21%	+257%/-20%
Source	PHO1	FLK73	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 006946871-04 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$0 \pm 2$	$2.46^{+0.53}_{-0.51}$	$3885^{+213}_{-384}$	$-3716^{+529}_{-347}$	$-0.062^{+0.219}_{-0.250}$
Alt.	$-95 \pm 2$	$4.33^{+0.57}_{-0.82}$	$3896^{+193}_{-336}$	$6093^{+290}_{-275}$	$4.369^{+1.841}_{-0.889}$

$T_{max}$  = 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

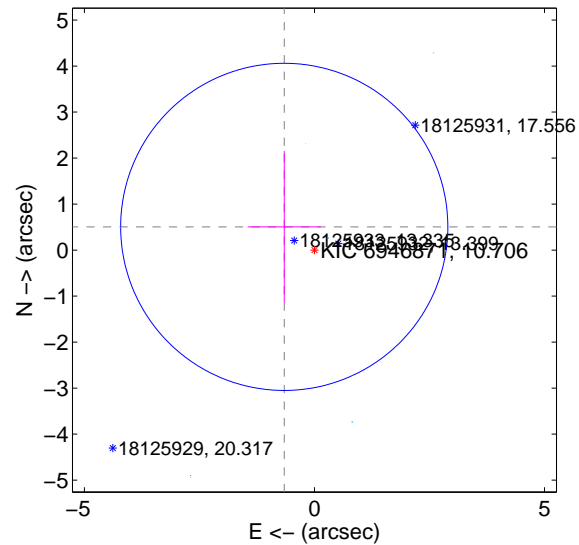
Supplemental centroid analysis for 006946871-04. **Kepler magnitude: 10.71.** Transit SNR 14.30

There are 5 quarters with good PRF difference image offsets

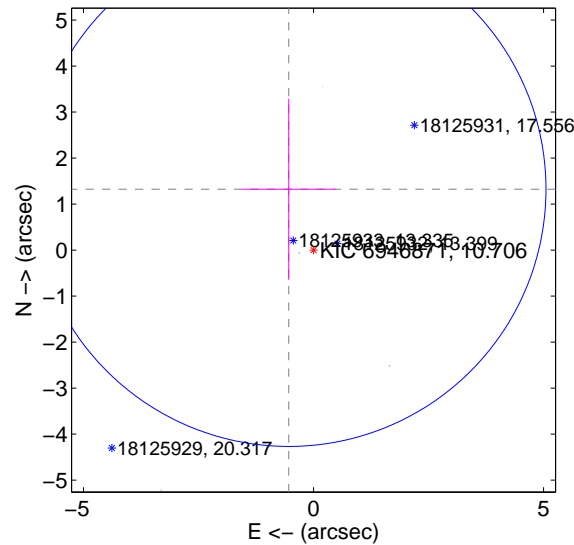
The direct PRF centroid is offset from the target star catalog position by about 1.48 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.828 \pm 1.185$	0.70	$0.656 \pm 0.794$	$0.505 \pm 1.647$
PRF-fit source offset from KIC position	$1.429 \pm 1.864$	0.77	$0.539 \pm 1.019$	$1.323 \pm 1.969$
photometric centroid source offset	<b><math>1.72 \pm 0.14</math></b>	<b>12.13</b>	$-0.75 \pm 0.16$	$1.55 \pm 0.14$

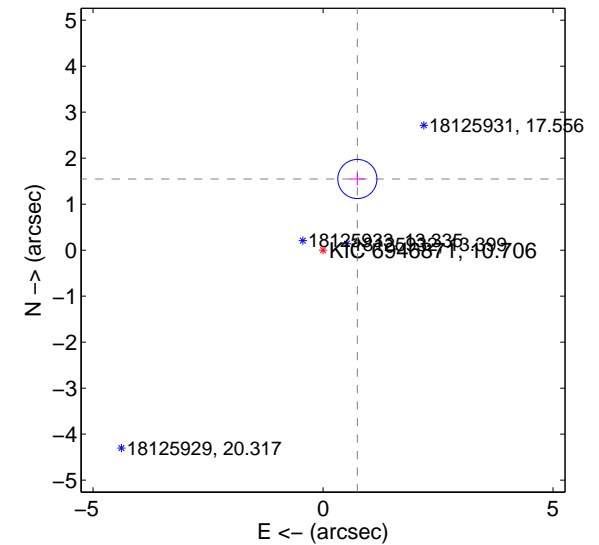
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

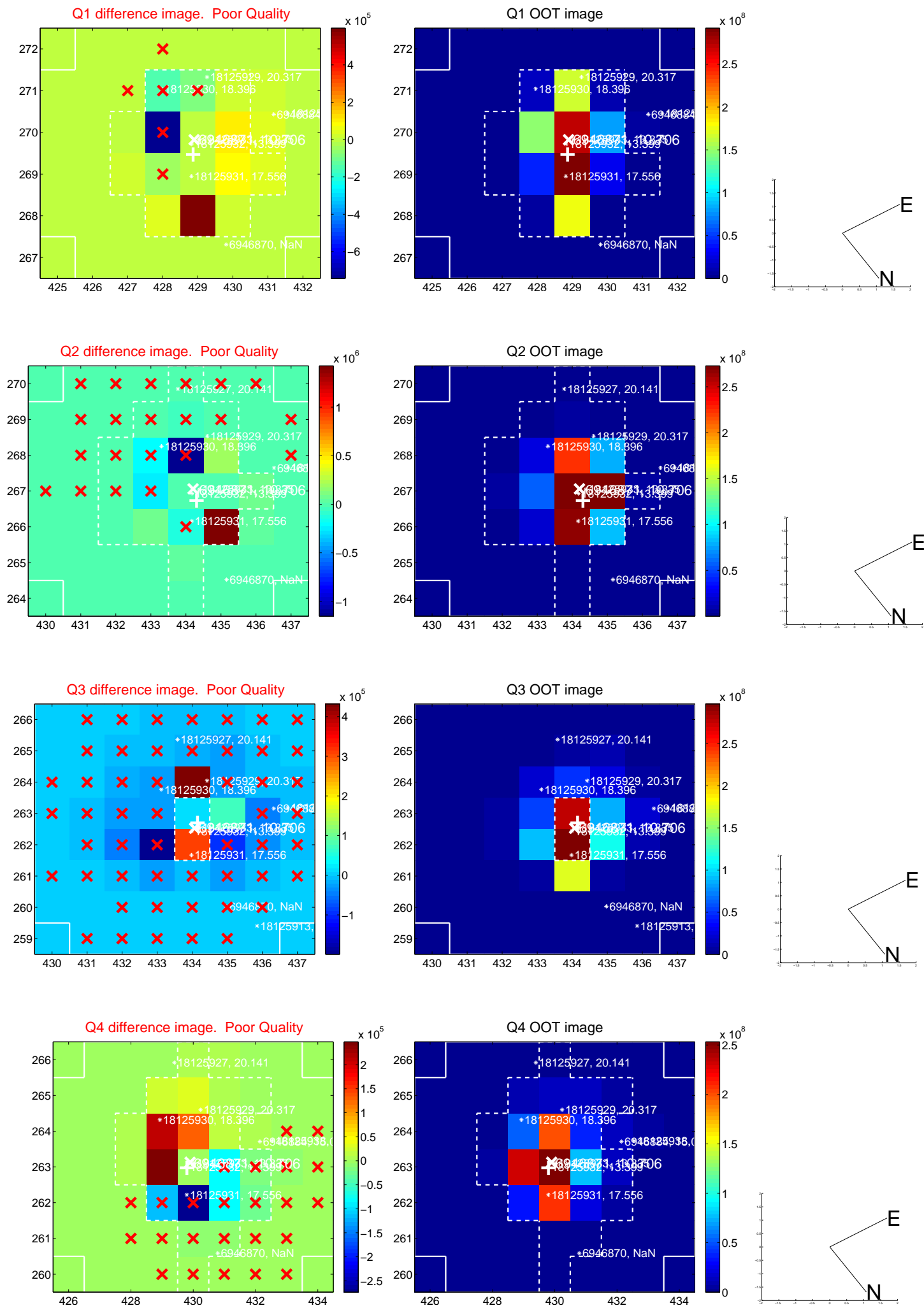


offset from photometric centroids

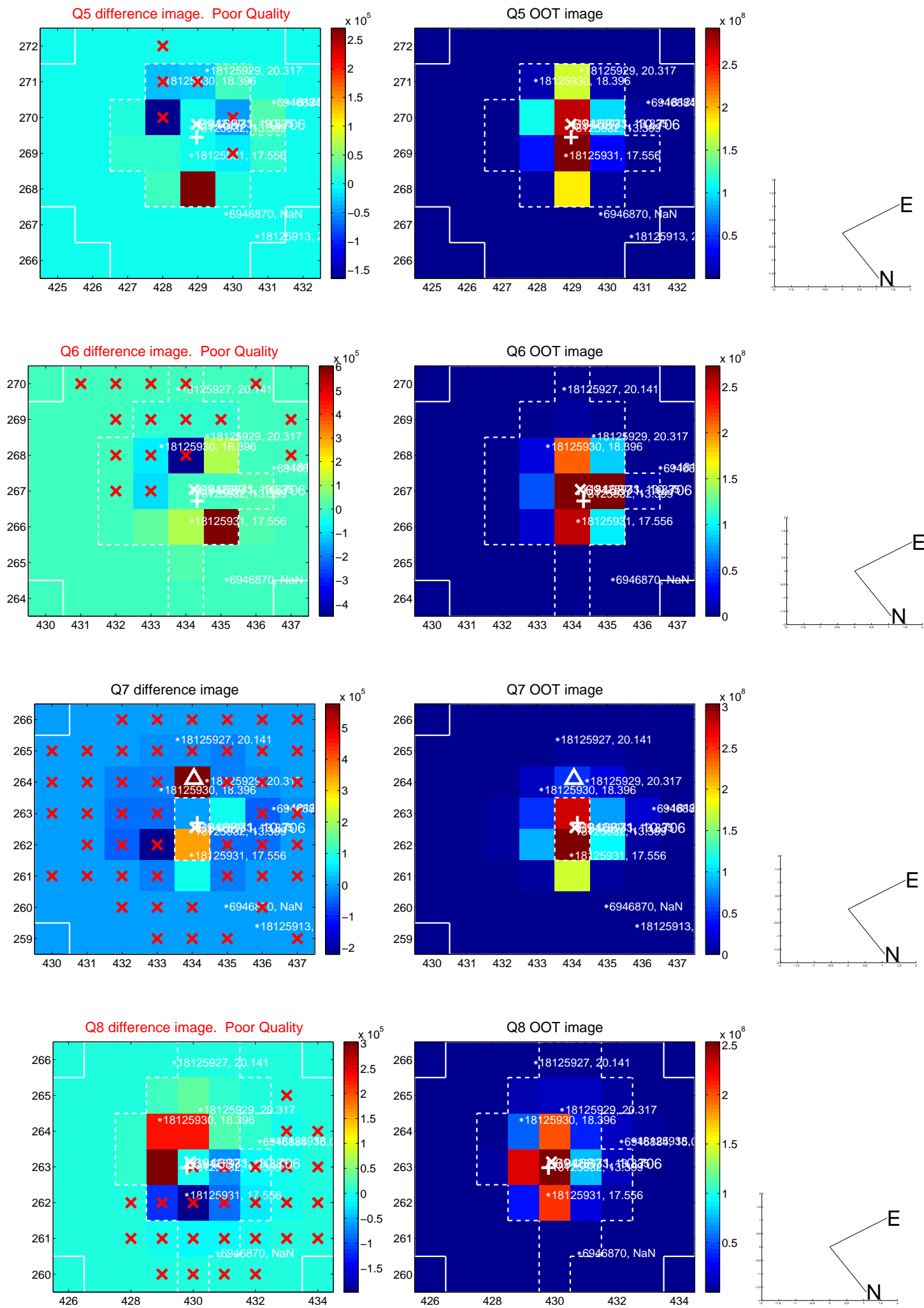


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

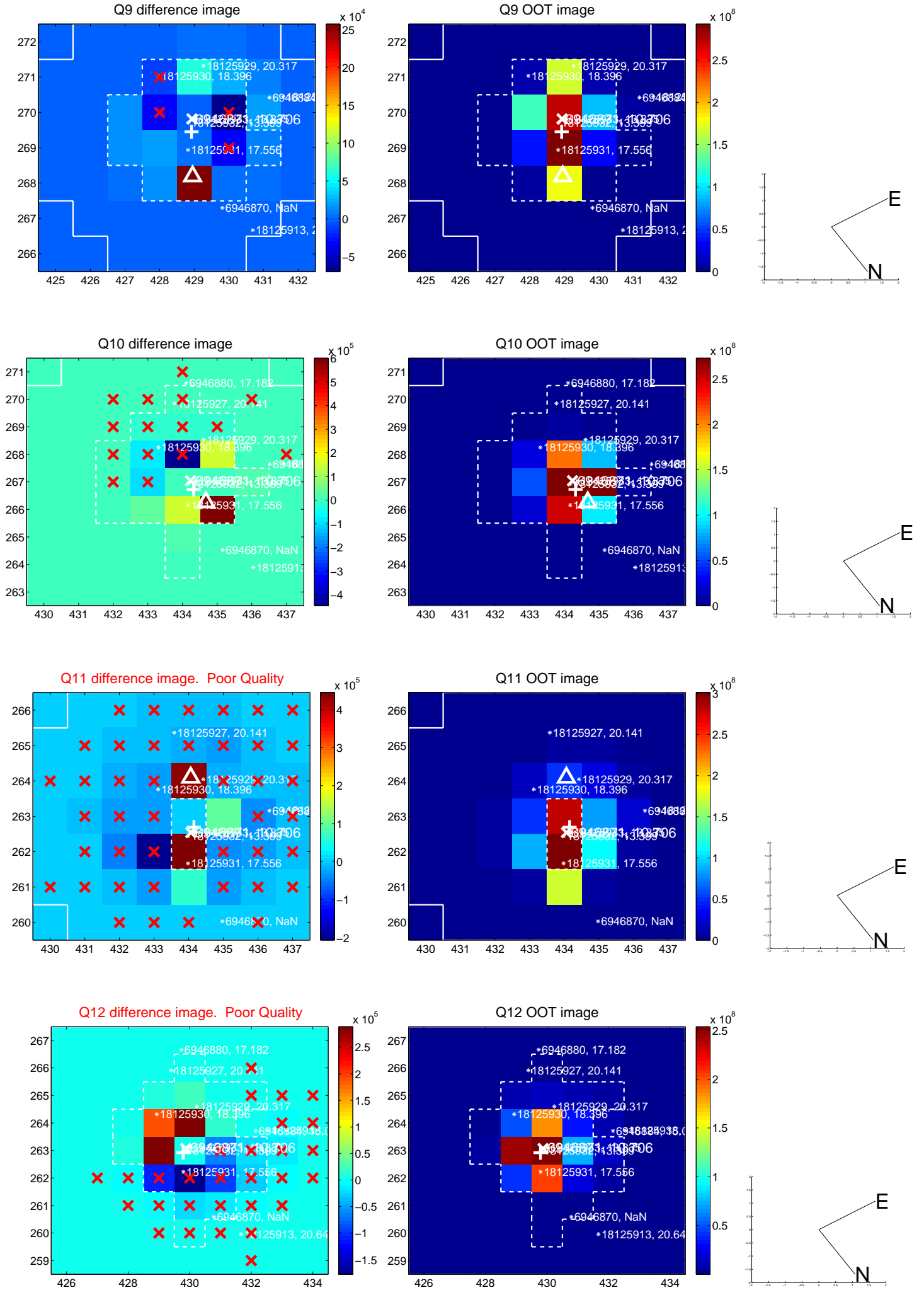
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



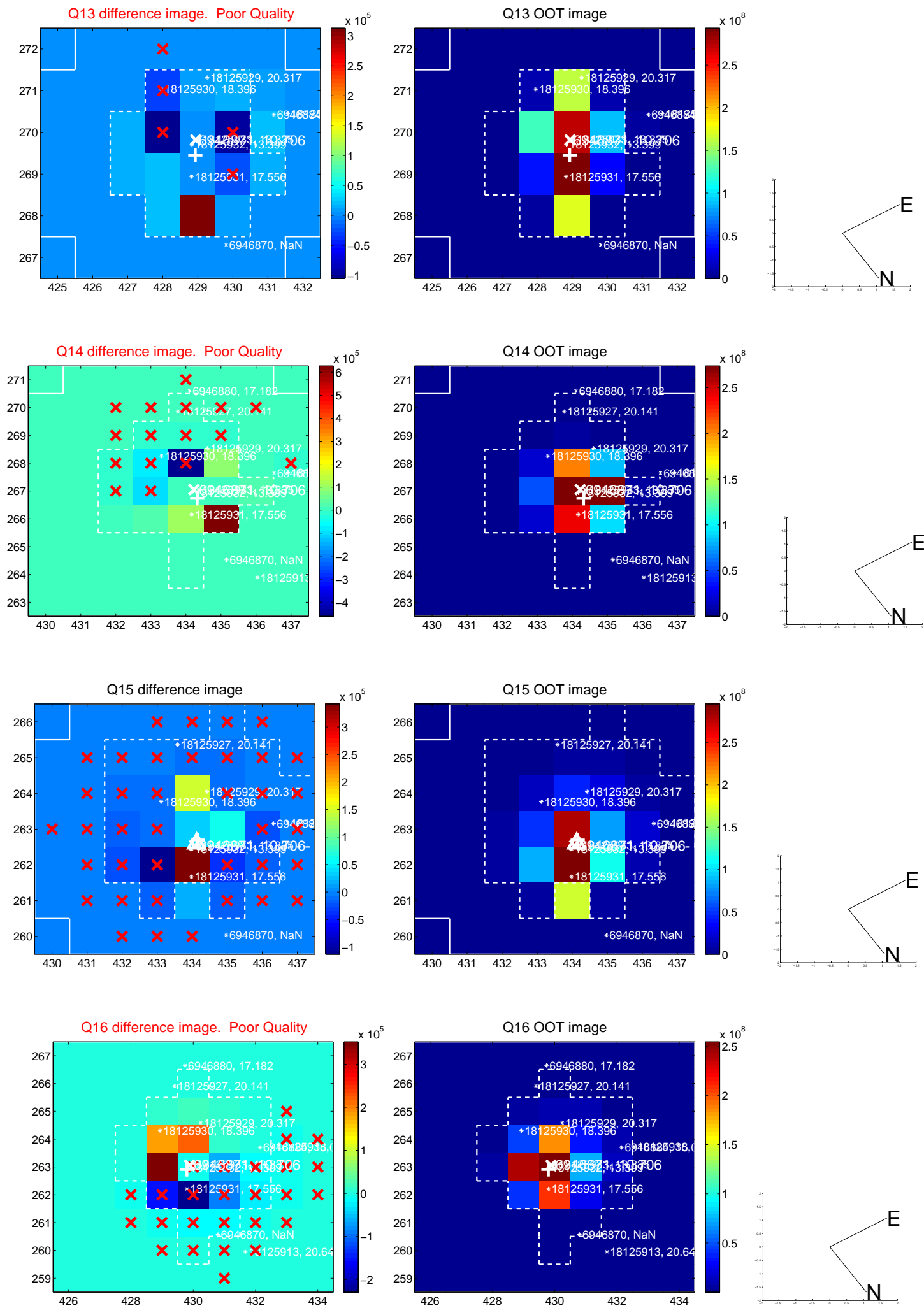
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

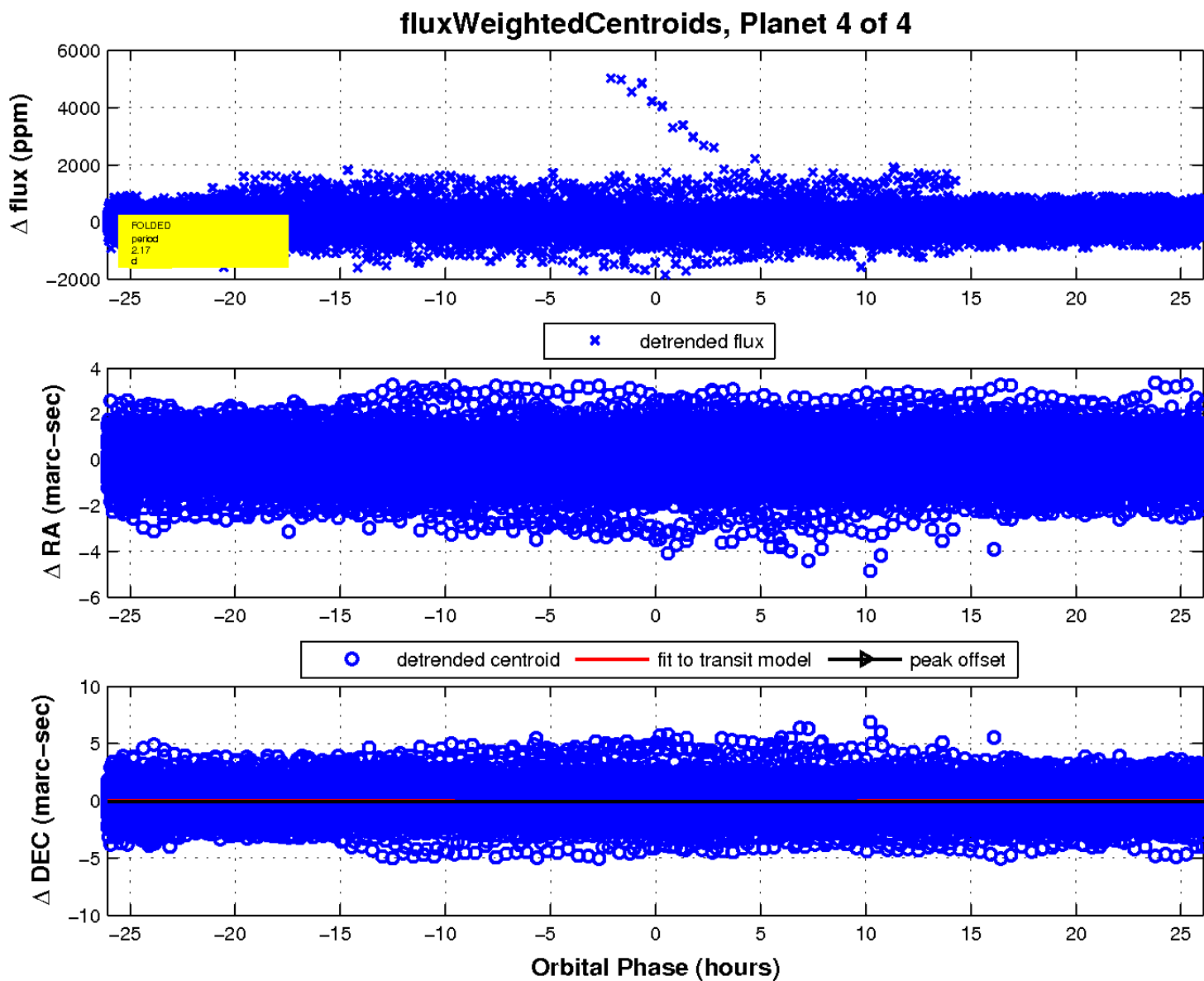
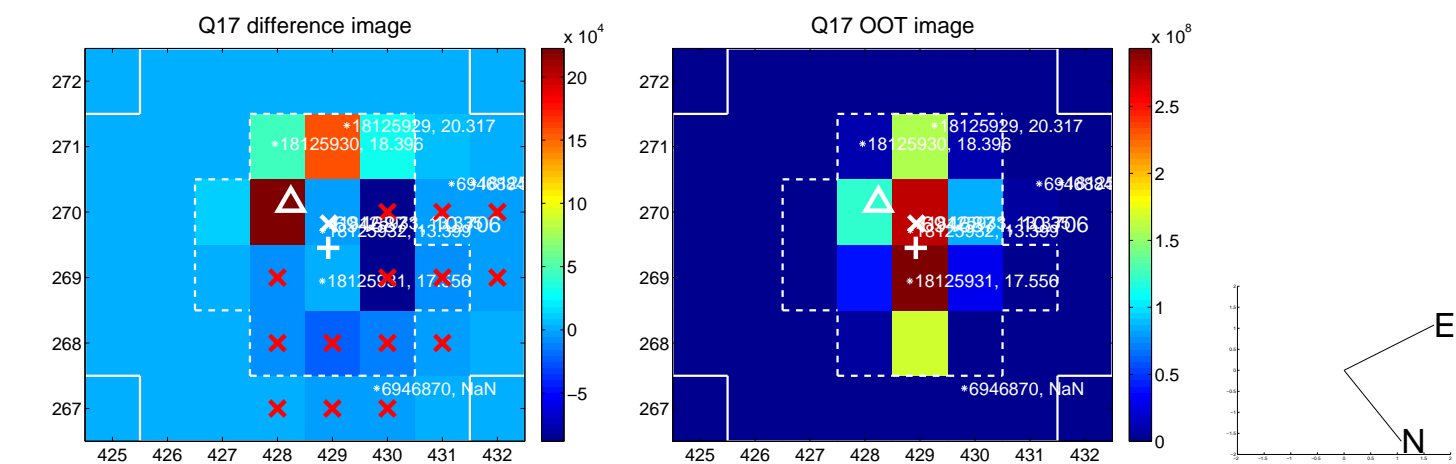


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





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



UKIRT Image

Declination

