

# KIC 004949187

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004949187-01	OBS	No	11.977951	140.758398	182.8	14.849	18.7	18.6	2.63	6622	5.97	860.28
004949187-02	OBS	No	11.979059	131.663800	91.0	15.489	11.8	11.4	2.63	6622	2.64	860.18
004949187-03	OBS	No	2.994879	134.693476	22.4	7.290	9.3	4.1	2.63	6622	1.42	5461.51
004949187-04	OBS	No	2.994785	134.514149	70.3	35.937	9.6	8.0	2.63	6622	2.22	5461.74

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004949187-01	OBS	FP	0.00	1	0	0	0	LPP_DV
004949187-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—SAME_NTL_PERIOD
004949187-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE_ZUMA_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—SAME_NTL_PERIOD
004949187-04	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_FEW_DIFFS

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

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

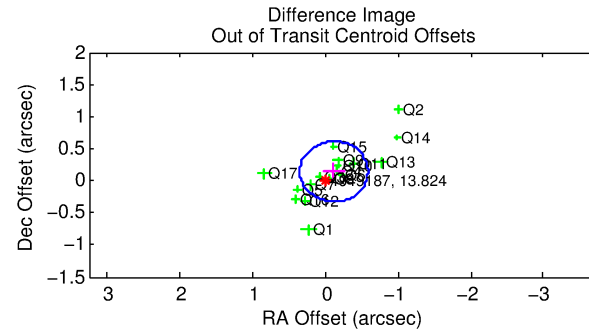
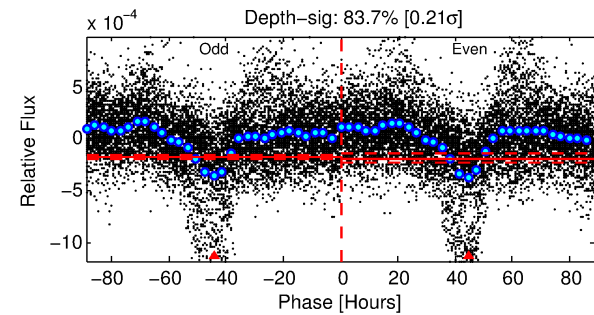
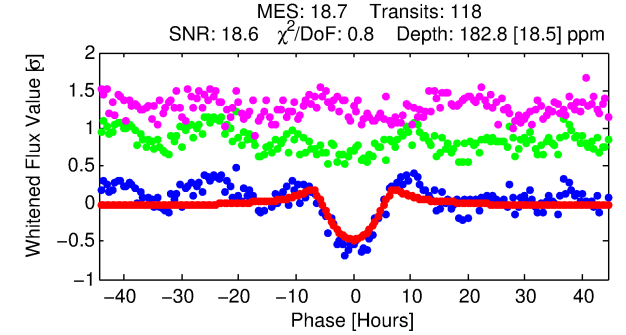
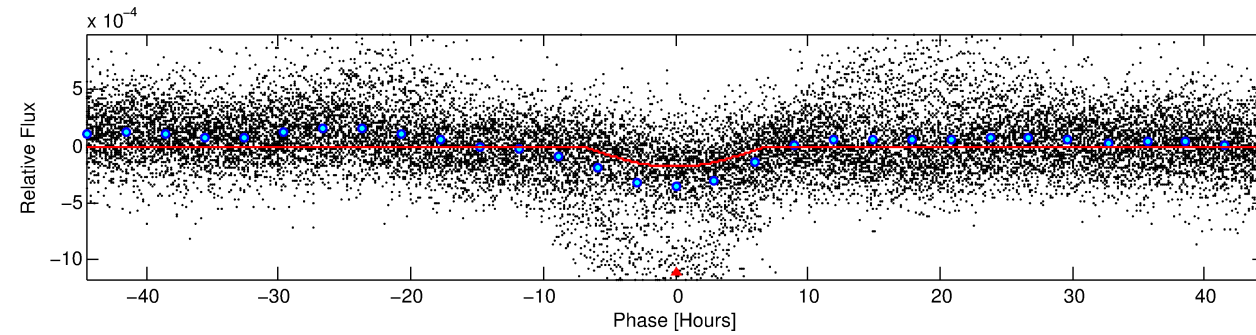
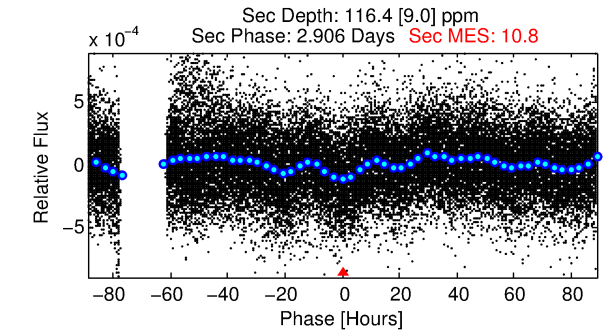
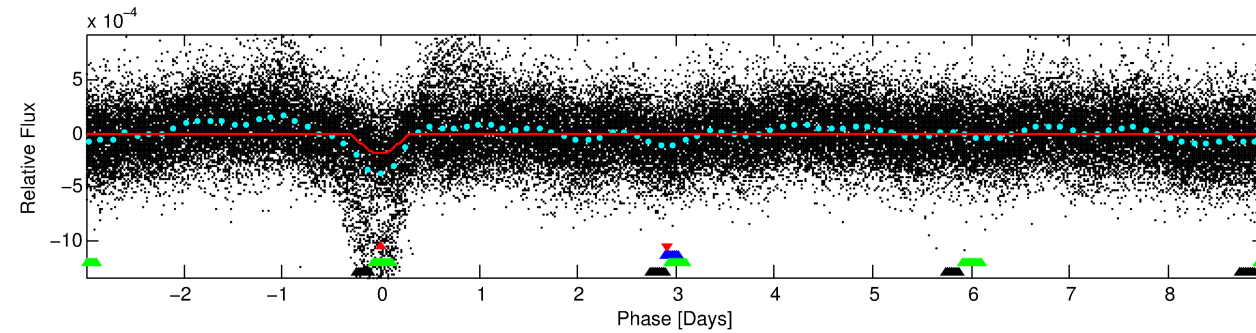
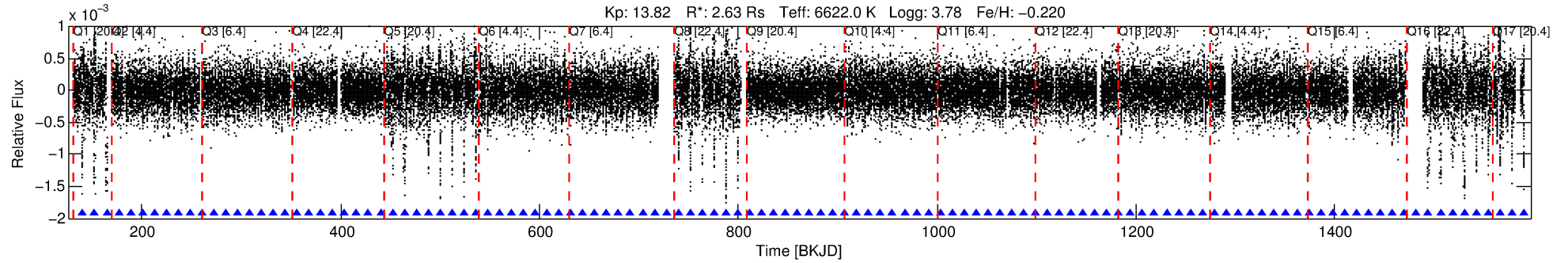
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004949187-01

No Significant Match Found

# DV One-Page Summary

KIC: 4949187 Candidate: 1 of 4 Period: 11.978 d



## DV Fit Results:

Period = 11.97795 [0.00020] d  
Epoch = 140.7584 [0.0139] BKJD  
Rp/R\* = 0.0208 [0.0112]  
a/R\* = 1.75 [0.21]  
b = 0.99 [0.02]  
Seff = 860.28 [731.72]  
Teff = 1381 [294] K  
Rp = 5.97 [4.33] Re  
a = 0.1178 [0.0594] AU  
Ag = 24.98 [34.09] [0.70σ]  
Teffp = 4773 [1300] K [2.54σ]

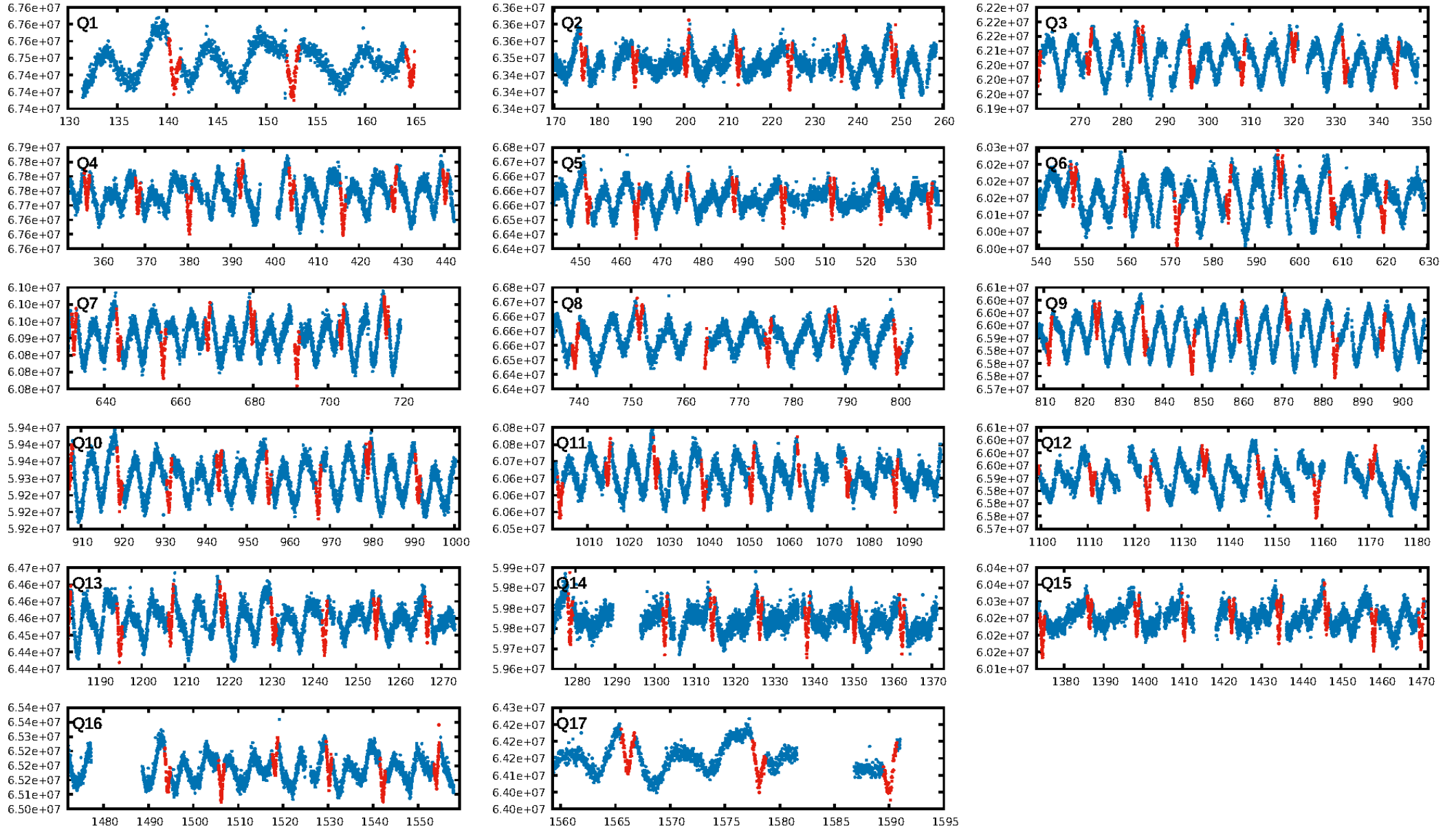
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [13.03σ]  
**LongPeriod-sig: 0.1% [0.00σ]**  
**ModelChiSquare2-sig: 0.0%**  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [112/112]  
GhostDiagnostic-chr: 1.649  
Centroid-sig: 3.3%  
Centroid-so: 0.740 arcsec [1.34σ]  
OotOffset-rm: 0.185 arcsec [1.18σ]  
KicOffset-rm: 0.160 arcsec [1.14σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 0.00 [0/17]

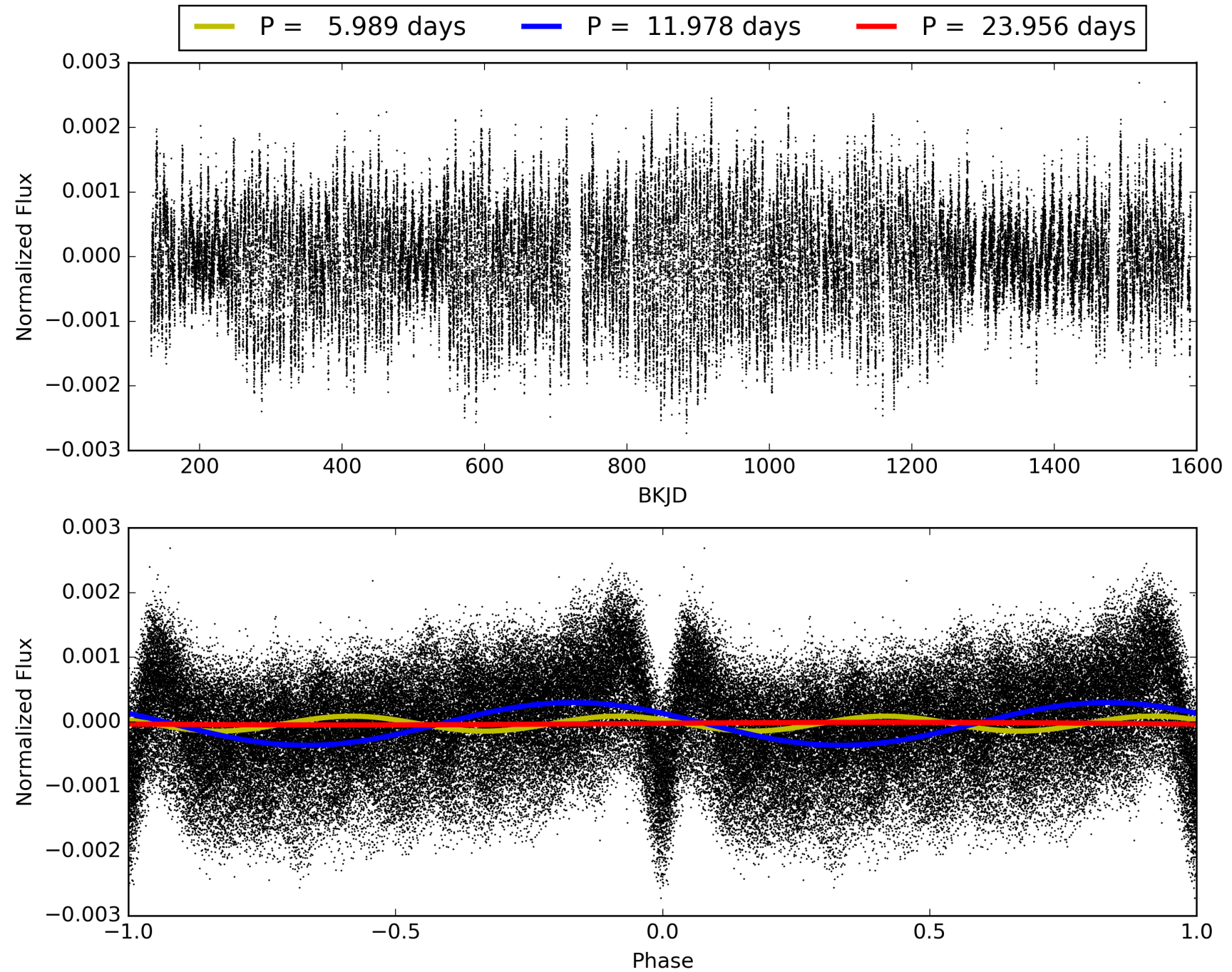
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 00:46:13 Z

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

# TCE 004949187-01, PDC Light Curves



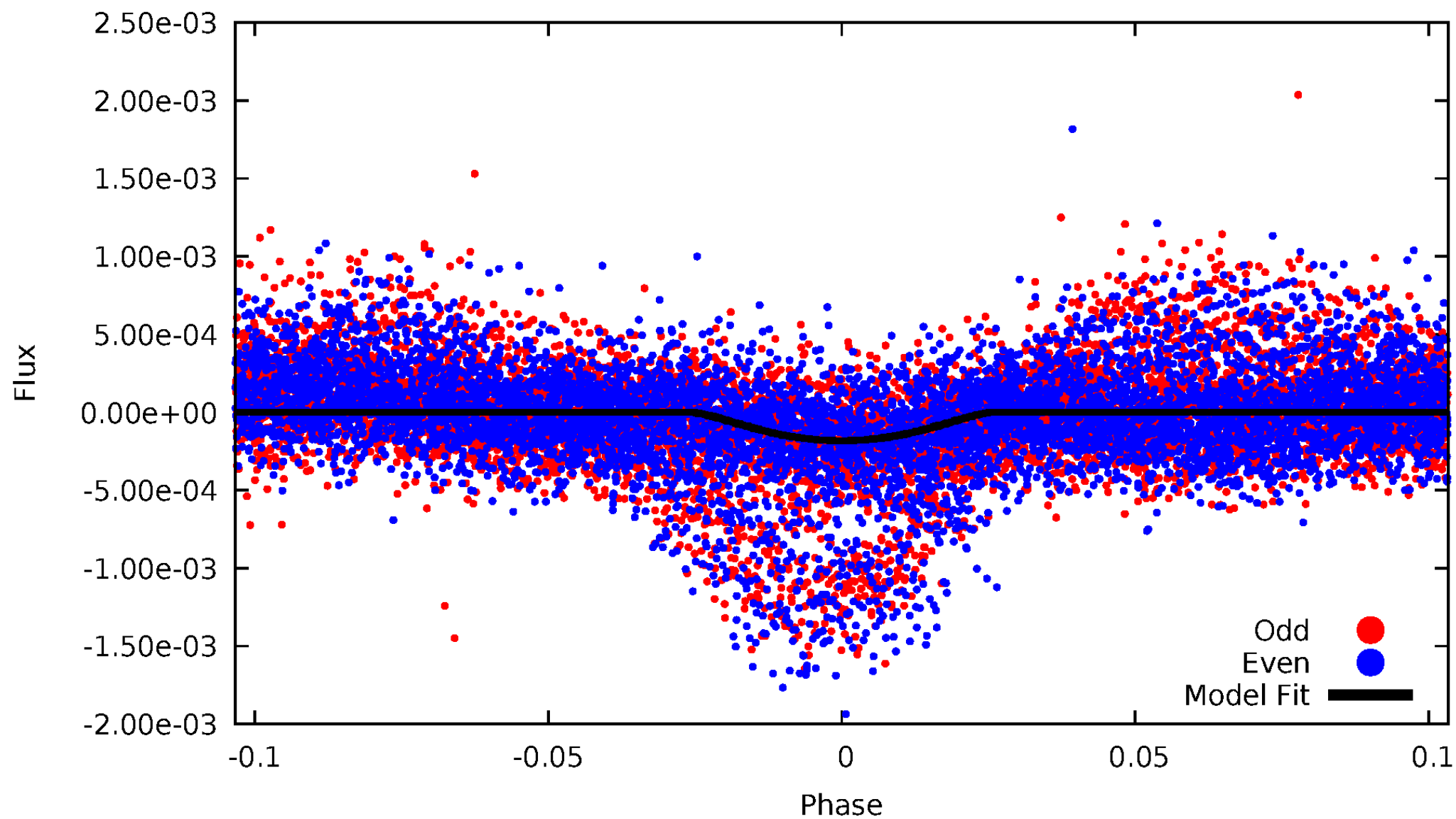
TCE 004949187-01





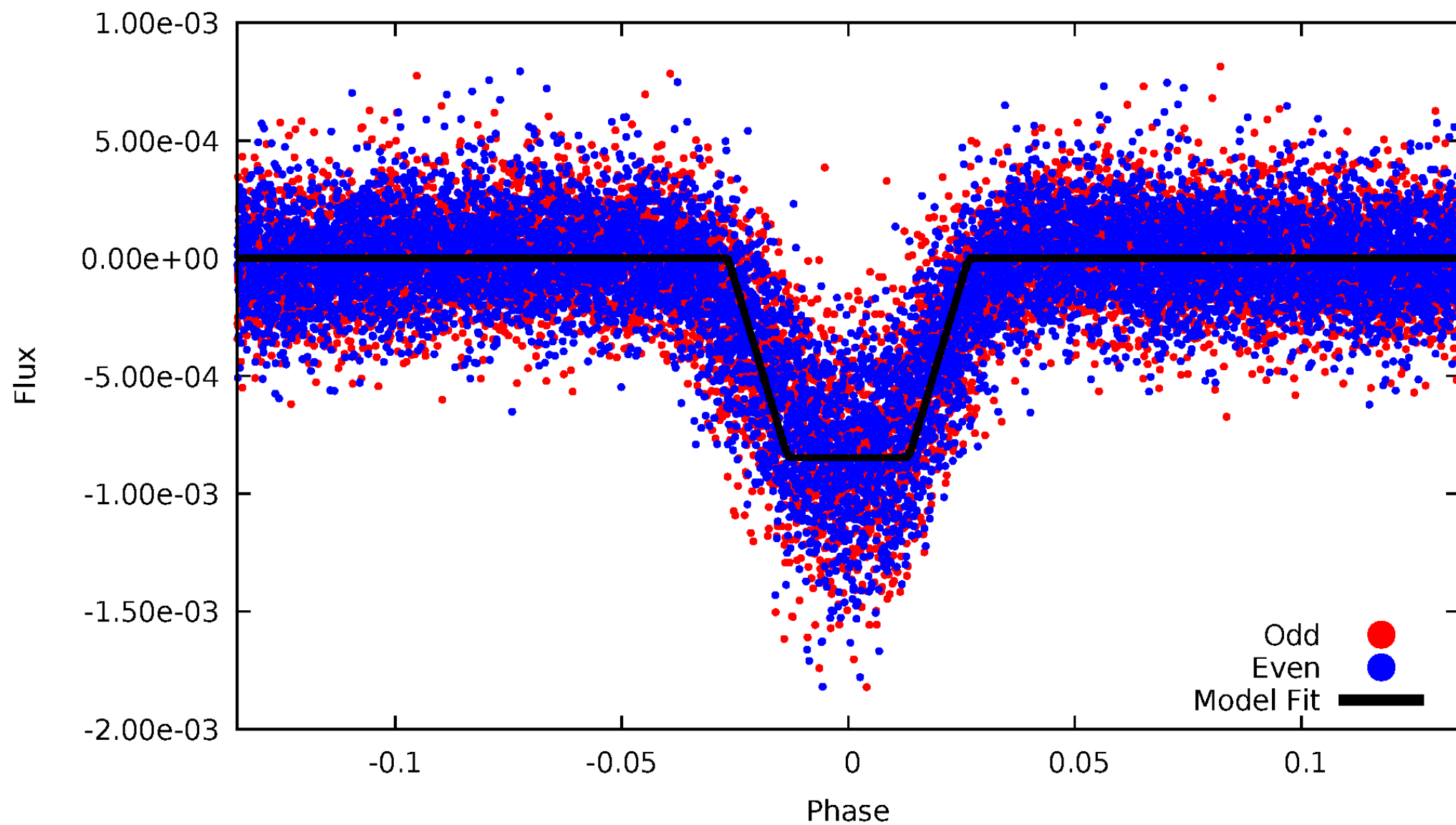
# DV Odd/Even

TCE 004949187-01



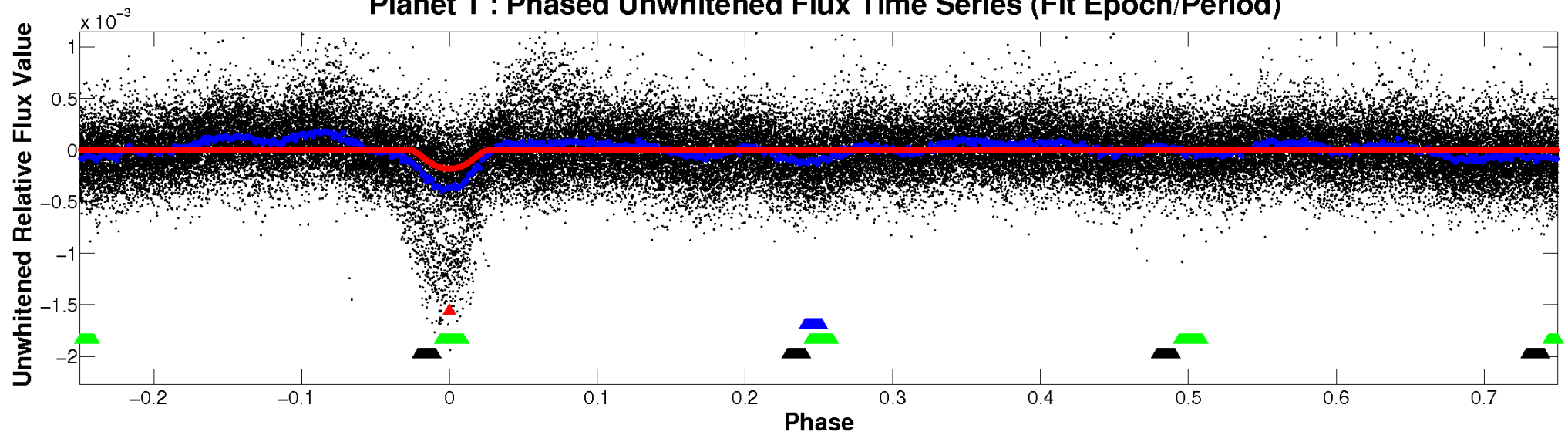
# ALT Odd/Even

TCE 004949187-01

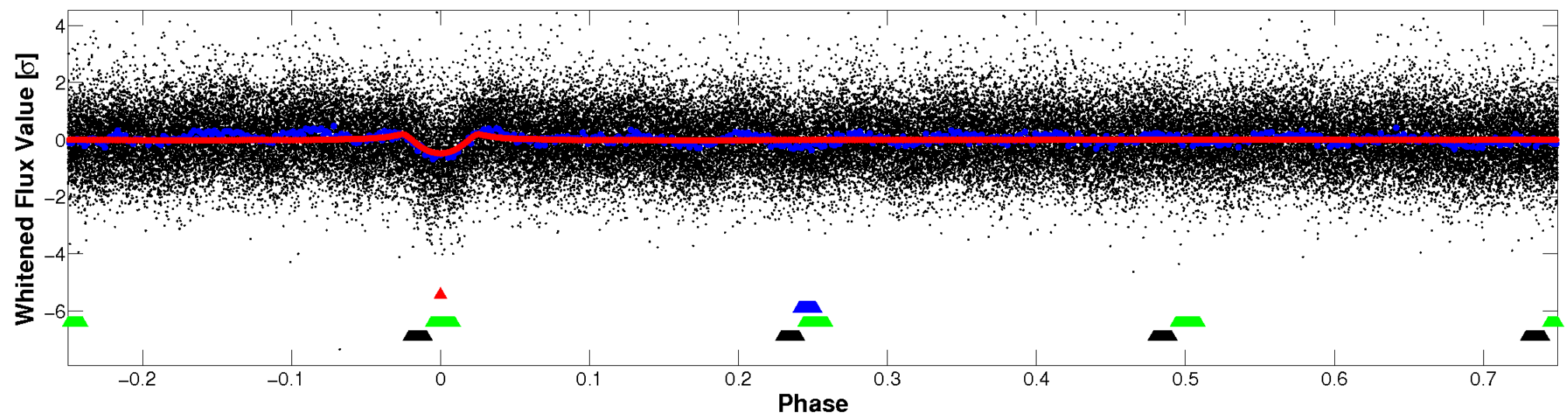


# Non-Whitened Vs. Whitened Light Curve

Planet 1 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

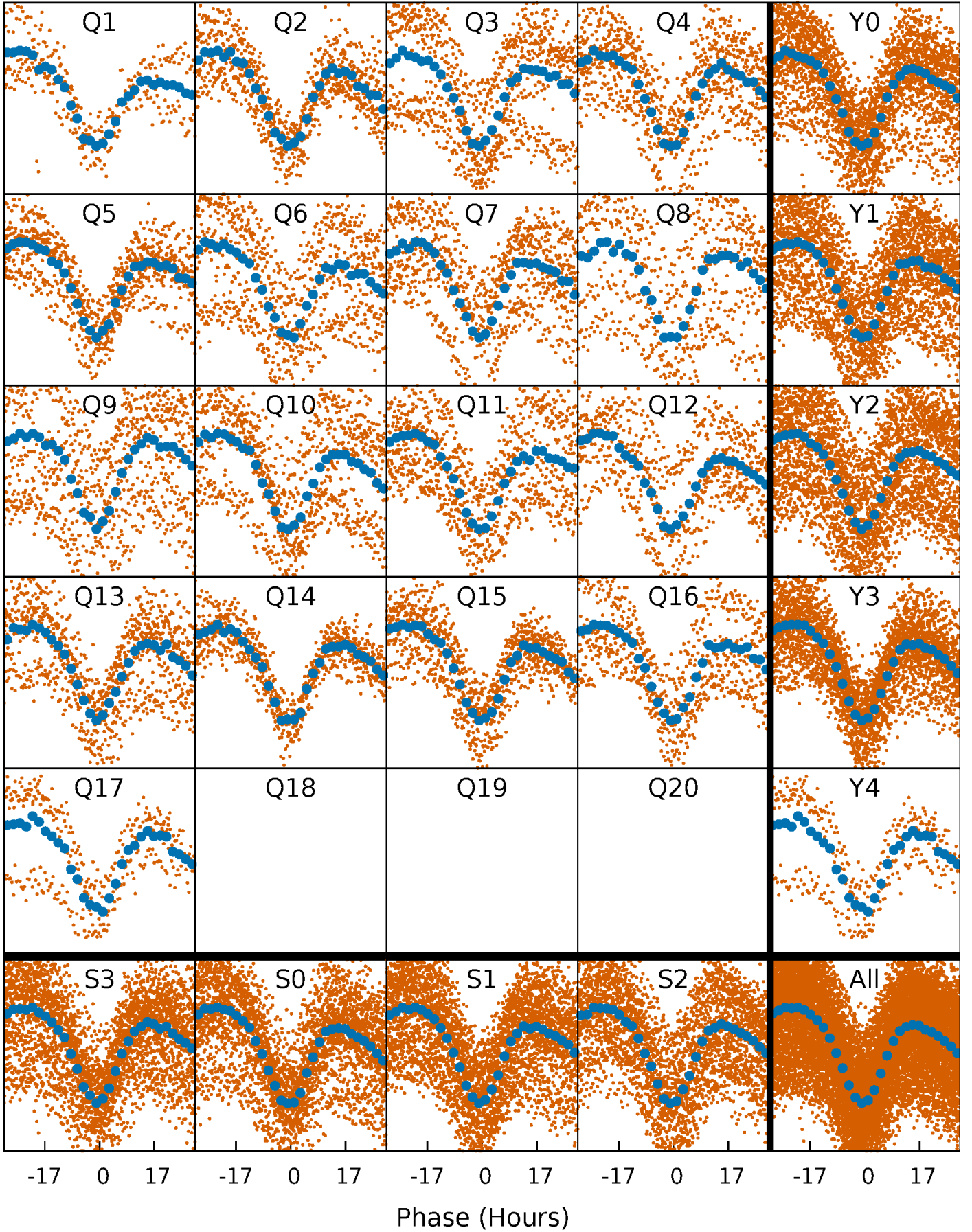


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

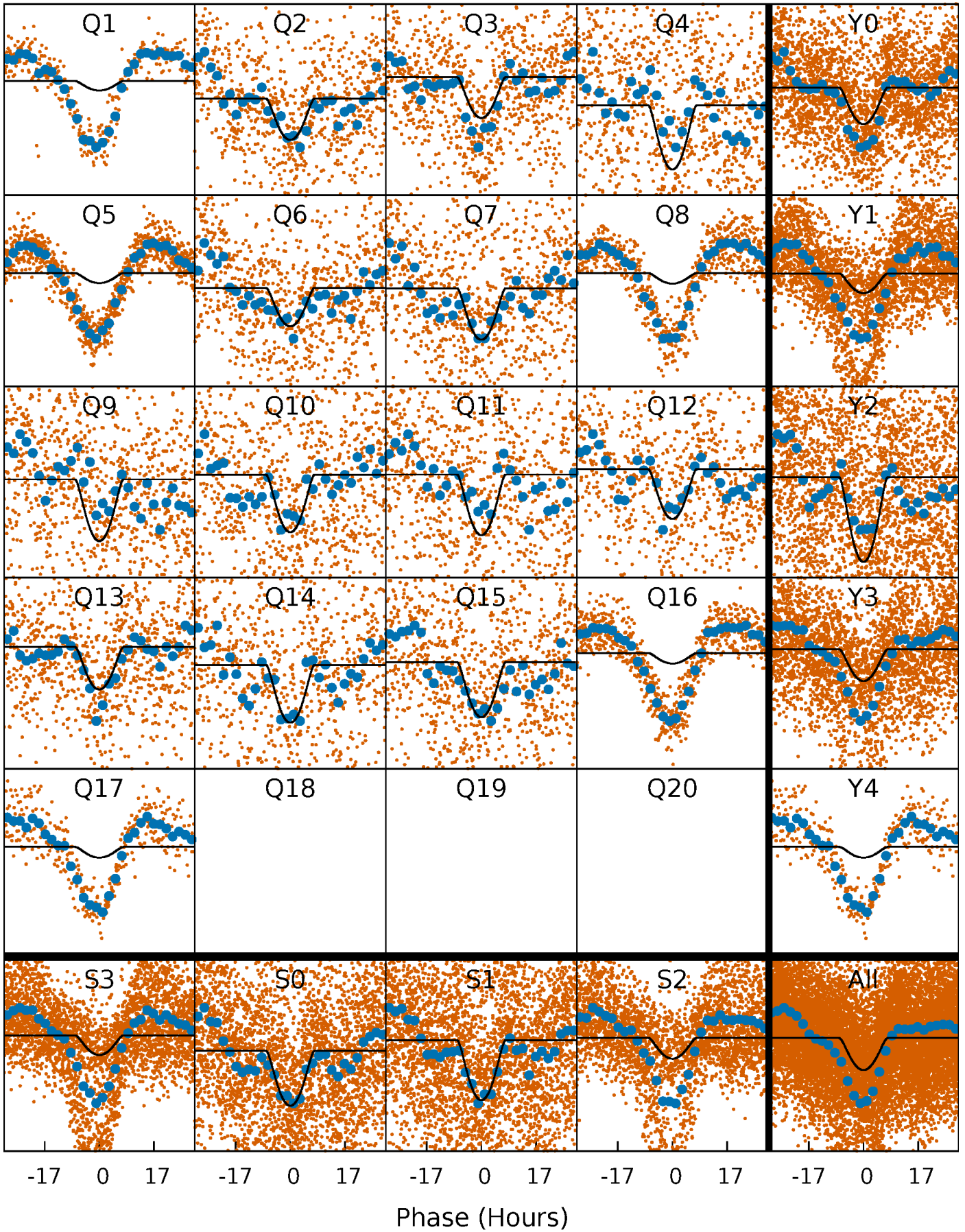
TCE 004949187-01   P= 11.977951 Days    $T_0=140.758398$  (BKJD)





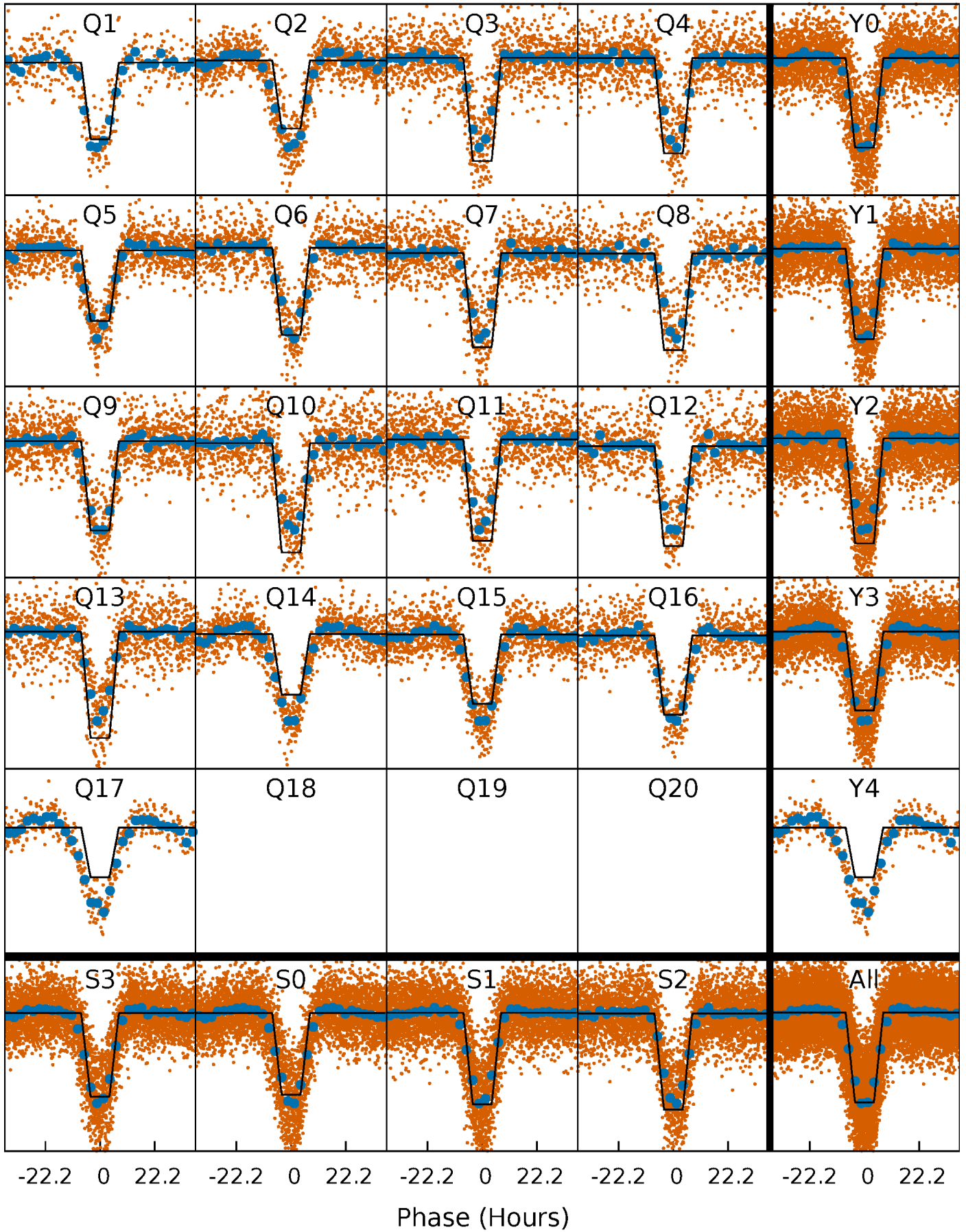
# DV Quarter-Phased Transit Curves

TCE 004949187-01 P= 11.977951 Days  $T_0=140.758398$  (BKJD)



## Alt. Detrend Quarter-Phased Transit Curves

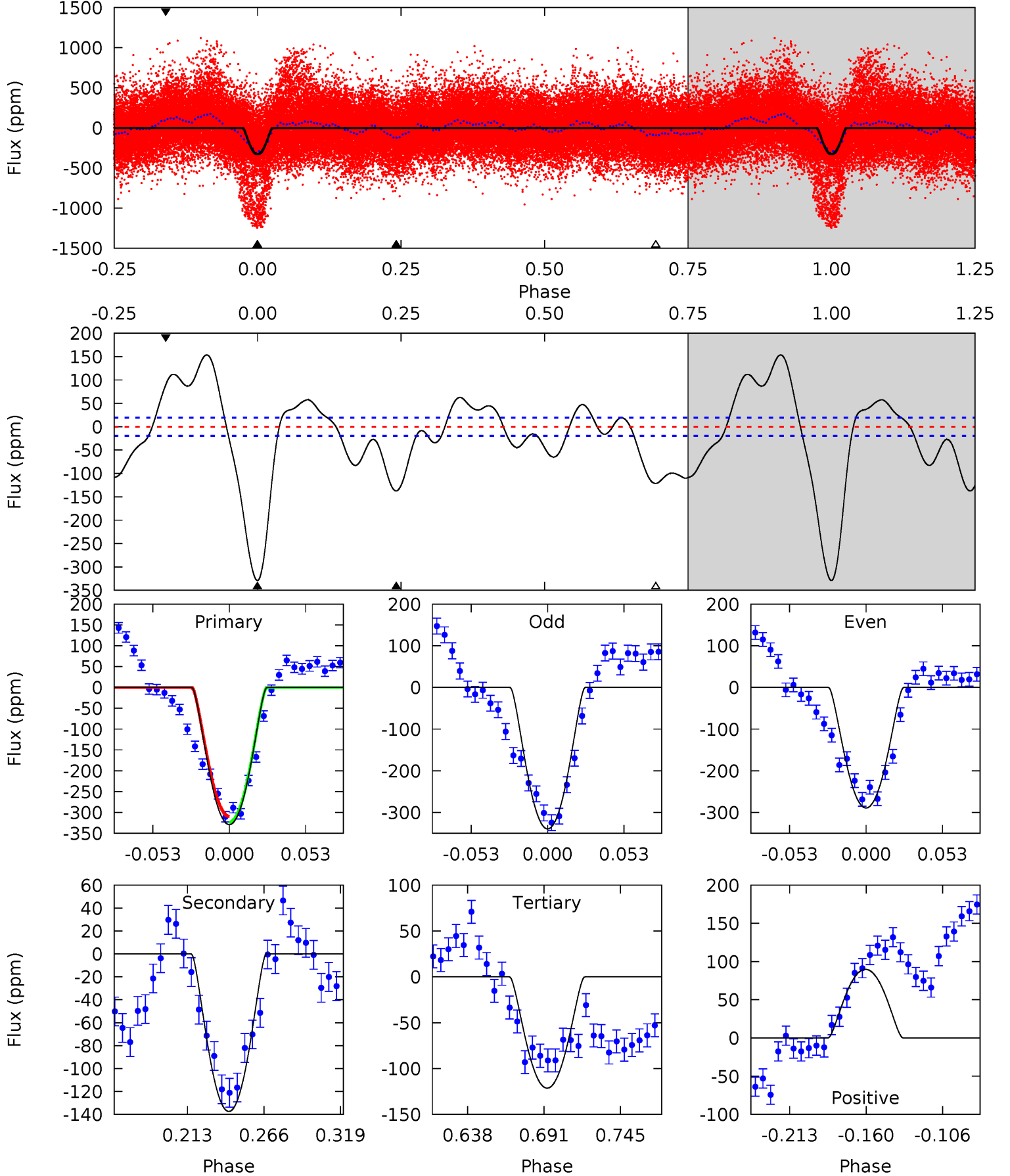
TCE 004949187-01 P= 11.978078 Days  $T_0=140.726419$  (BKJD)



# DV Model-Shift Uniqueness Test

004949187-01, P = 11.977951 Days, E = 128.780447 Days

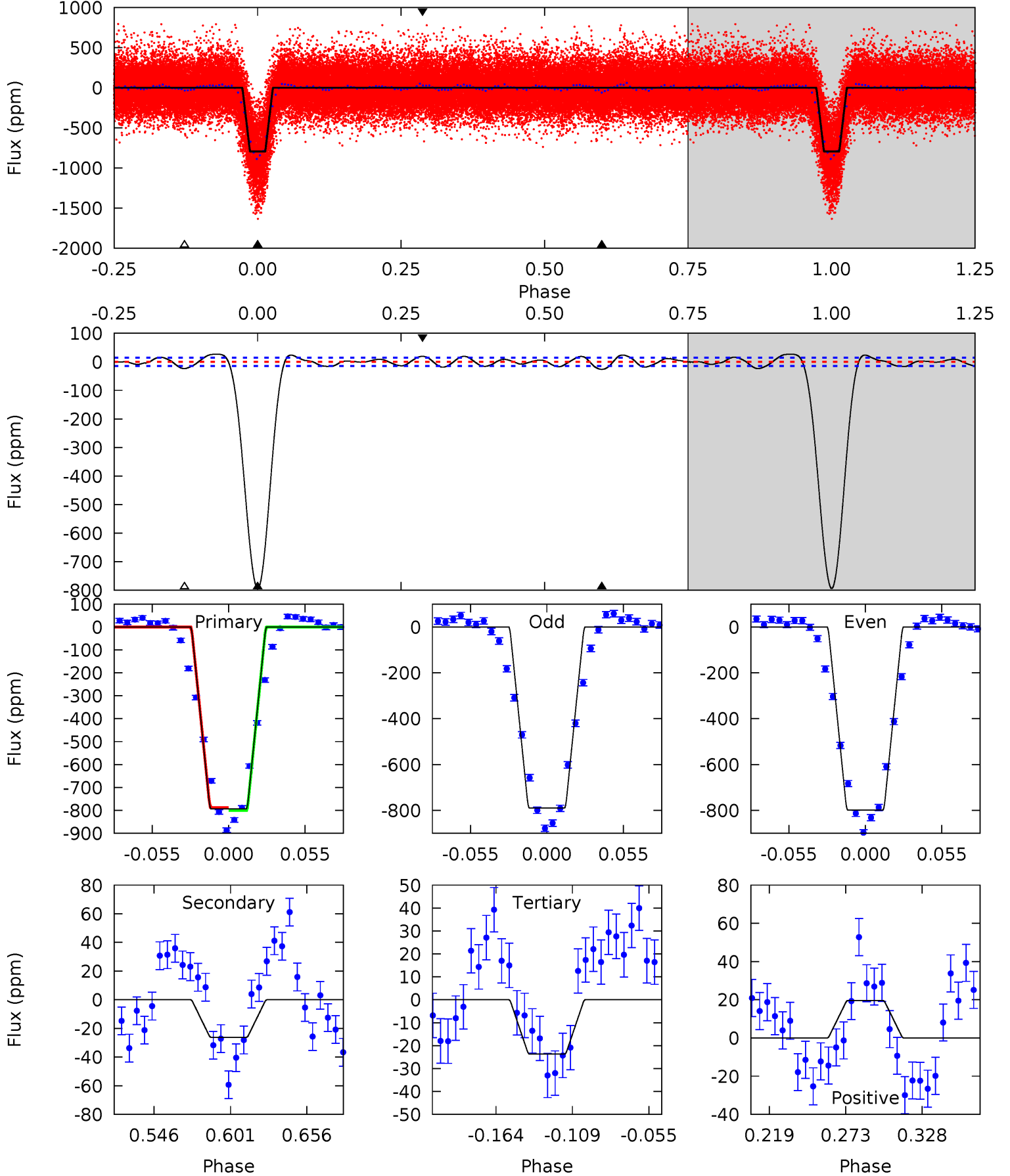
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
80.0	33.4	29.5	21.8	4.70	1.93	16.0	50.5	58.2	3.91	11.6	6.10	1.84	0.32	1.69



# Alt Model-Shift Uniqueness Test

004949187-01, P = 11.978078 Days, E = 128.748341 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
255.9	8.45	7.64	6.31	4.69	1.92	3.72	248.3	249.6	0.81	2.14	1.44	1.02	0.03	2.02





### Stellar Parameters For KIC 004949187

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6622^{+210}_{-257}$	$3.779^{+0.502}_{-0.089}$	$-0.220^{+0.300}_{-0.300}$	$2.633^{+0.550}_{-1.283}$	$1.519^{+0.212}_{-0.424}$	$0.117^{+0.640}_{-0.041}$
	+3%/-4%	+13%/-2%	+136%/-136%	+21%/-49%	+14%/-28%	+545%/-35%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 004949187-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-137 \pm 4$	$5.55^{+3.32}_{-2.90}$	$1850^{+148}_{-224}$	$4919^{+1733}_{-721}$	$33^{+112}_{-20}$
Alt.	$-26 \pm 3$	$7.50^{+3.57}_{-3.41}$	$1859^{+132}_{-234}$	$3264^{+651}_{-338}$	$3.531^{+8.085}_{-1.851}$

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

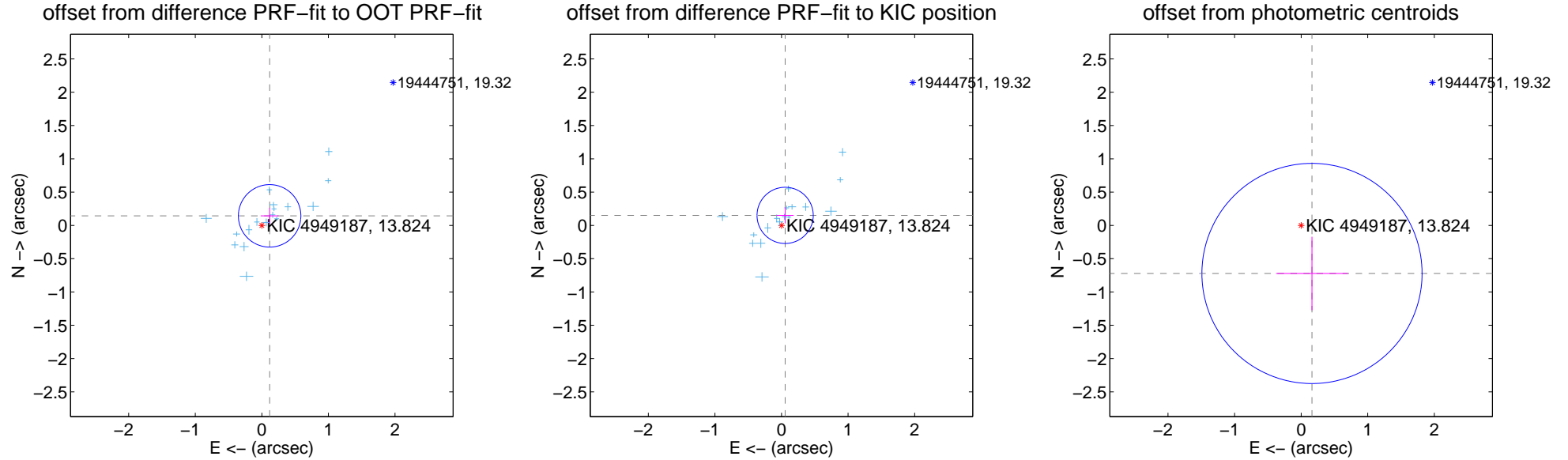
## DV Centroid Data

Supplemental centroid analysis for 004949187-01. Kepler magnitude: 13.82. Transit SNR 18.64

There are 17 quarters with good PRF difference image offsets

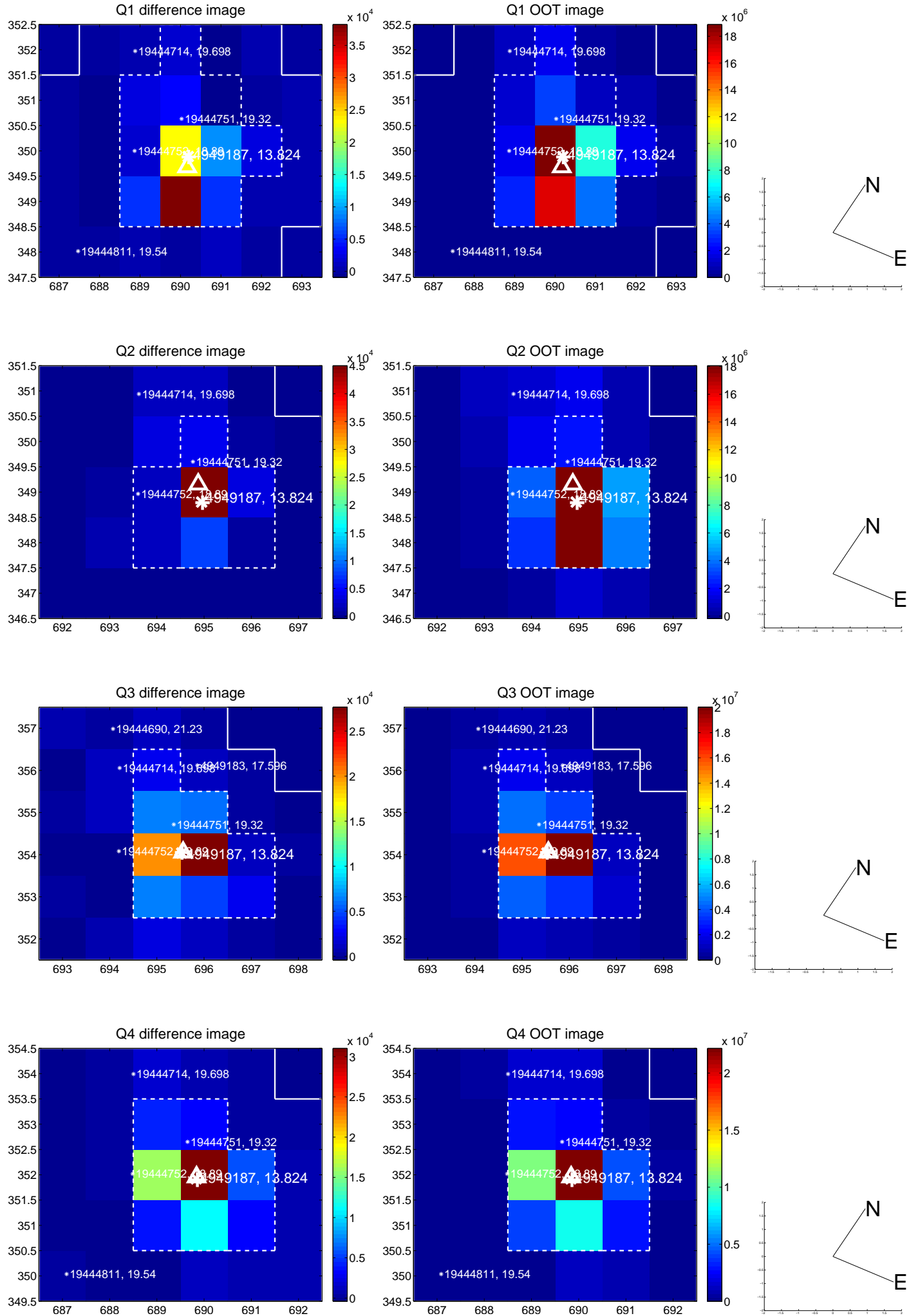
The direct PRF centroid is offset from the target star catalog position by about 0.06 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.185 \pm 0.156$	1.18	$-0.117 \pm 0.134$	$0.143 \pm 0.121$
PRF-fit source offset from KIC position	$0.160 \pm 0.141$	1.14	$-0.055 \pm 0.129$	$0.150 \pm 0.121$
photometric centroid source offset	$0.74 \pm 0.55$	1.34	$-0.16 \pm 0.54$	$-0.72 \pm 0.55$

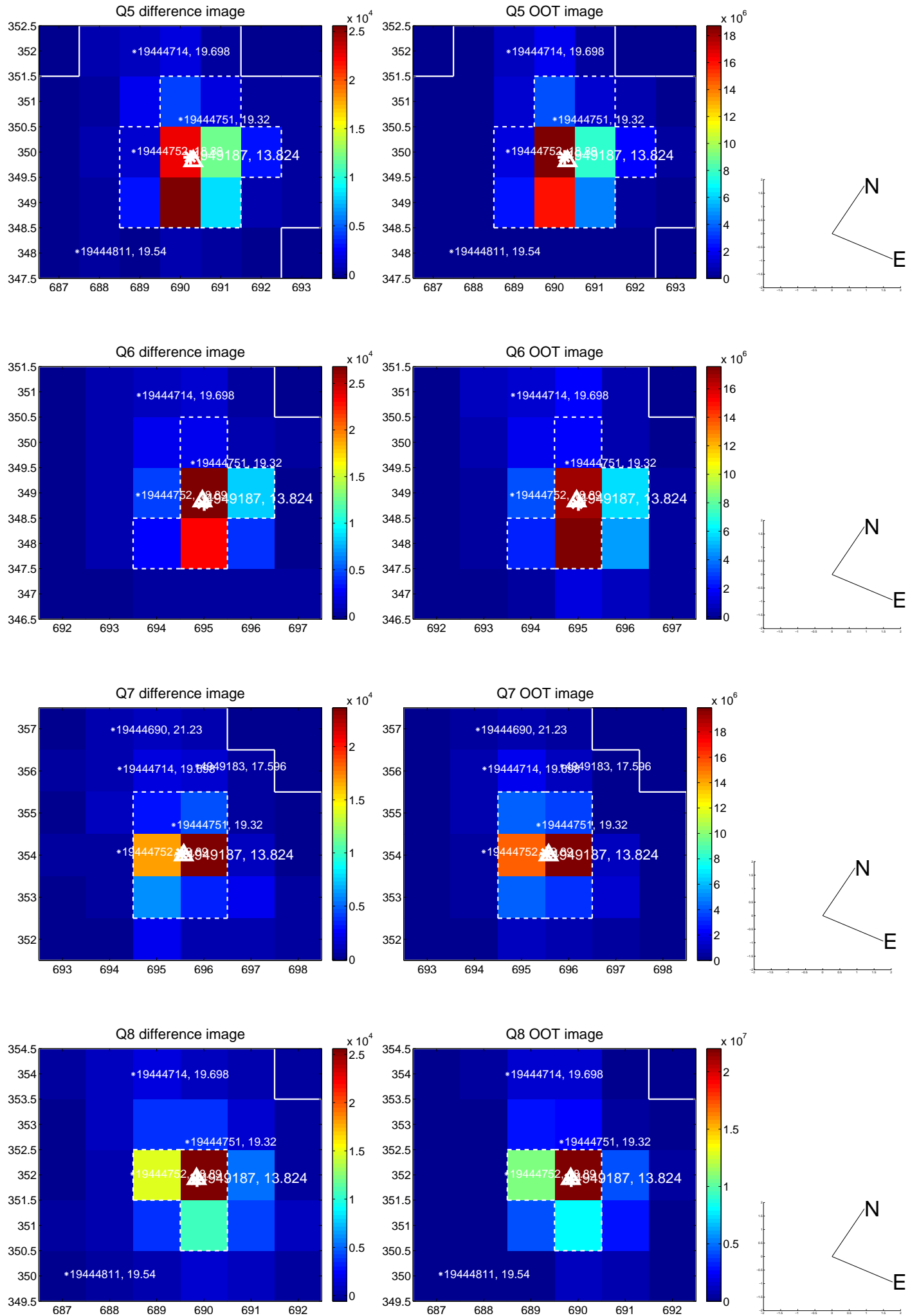


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

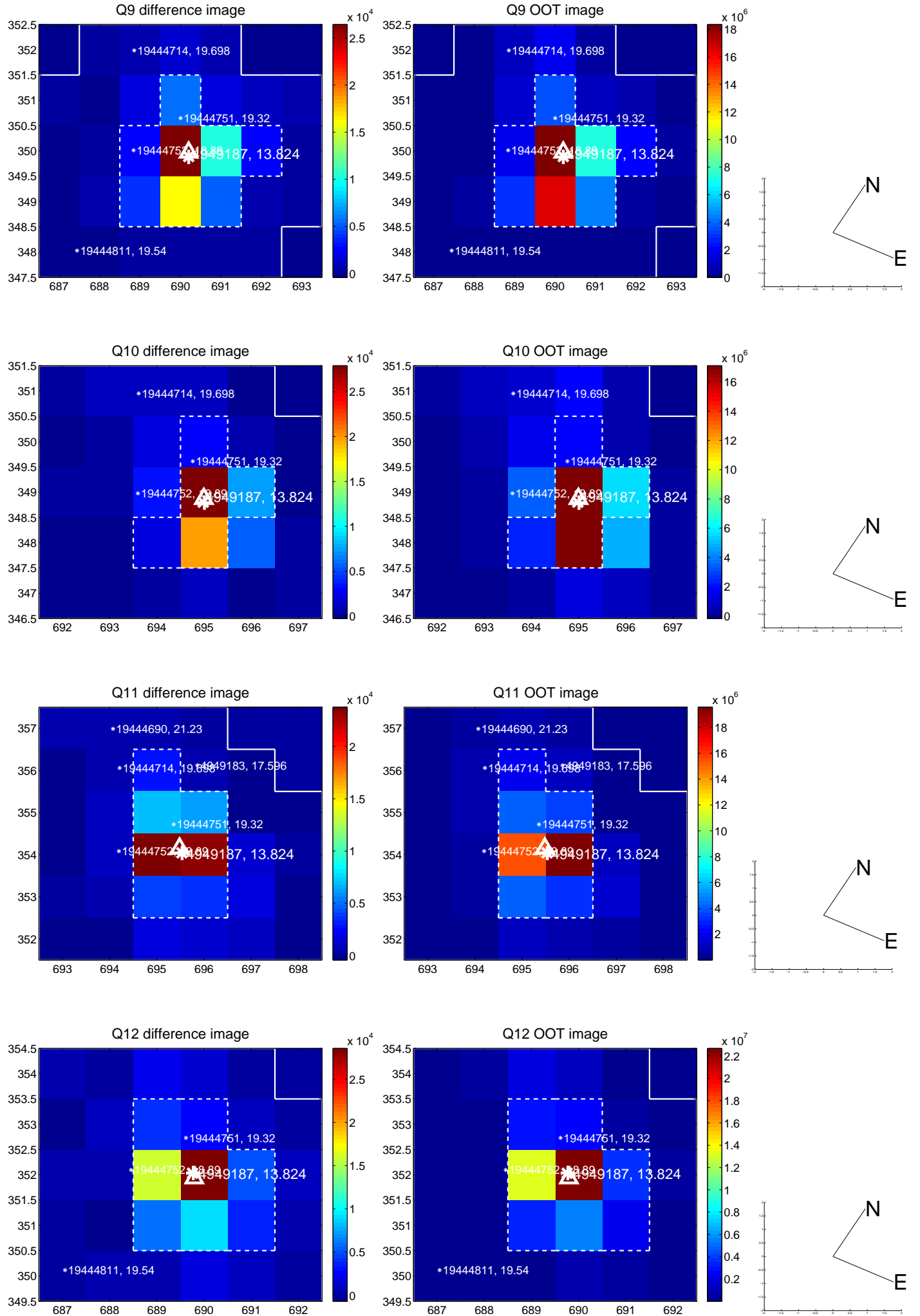


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

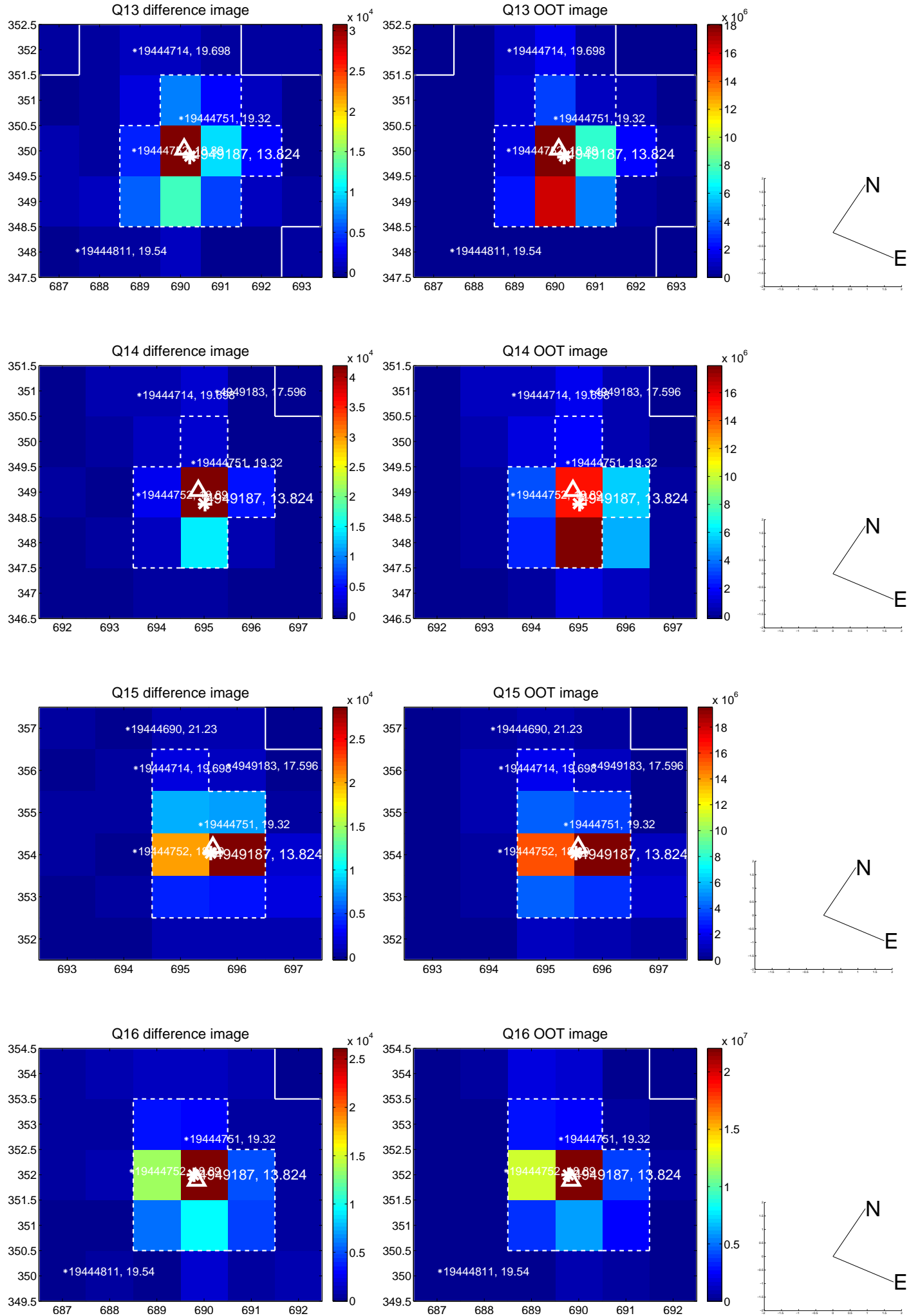




white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



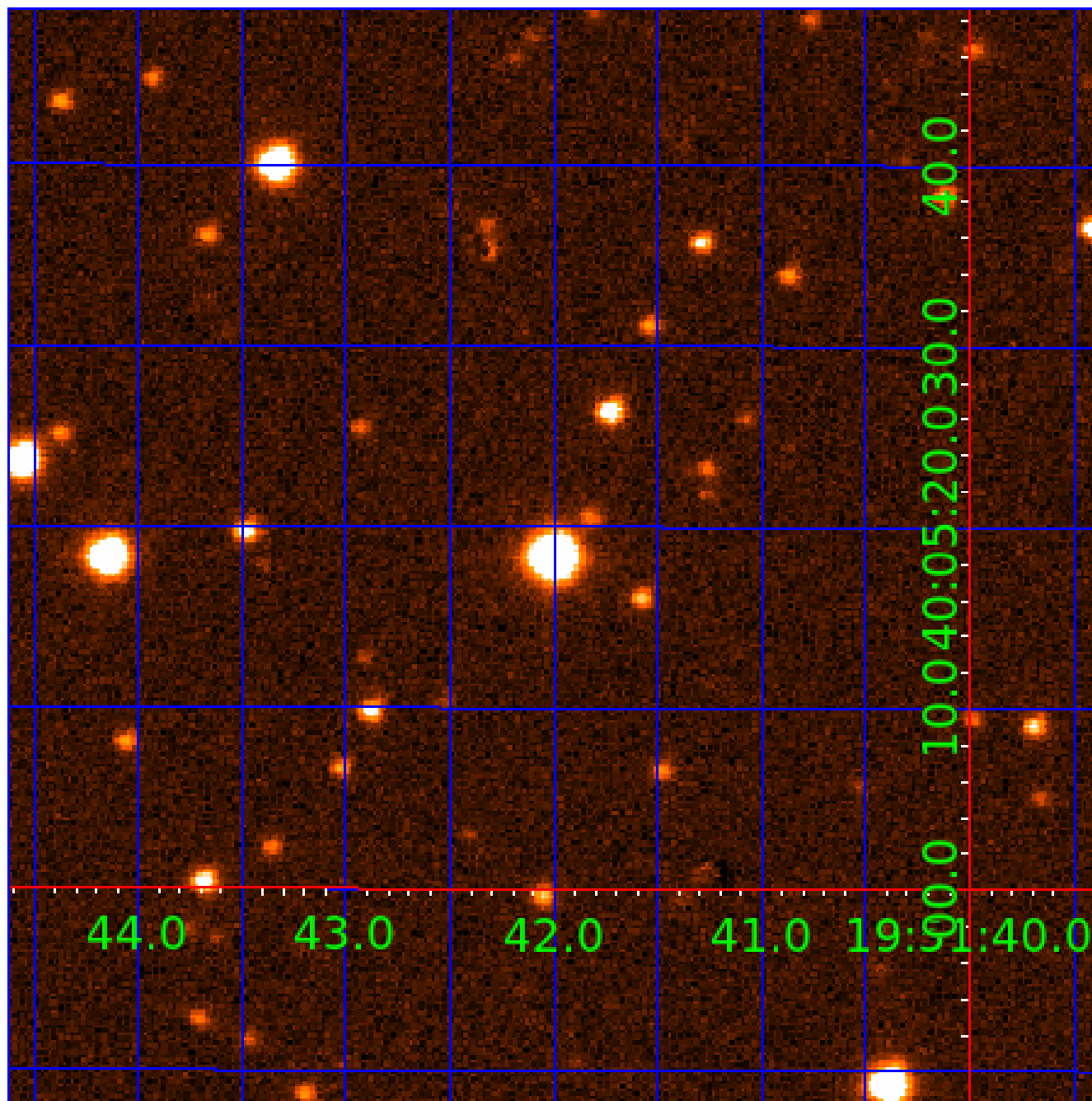
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image

Declination



# KIC 004949187

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004949187-01	OBS	No	11.977951	140.758398	182.8	14.849	18.7	18.6	2.63	6622	5.97	860.28
004949187-02	OBS	No	11.979059	131.663800	91.0	15.489	11.8	11.4	2.63	6622	2.64	860.18
004949187-03	OBS	No	2.994879	134.693476	22.4	7.290	9.3	4.1	2.63	6622	1.42	5461.51
004949187-04	OBS	No	2.994785	134.514149	70.3	35.937	9.6	8.0	2.63	6622	2.22	5461.74

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004949187-01	OBS	FP	0.00	1	0	0	0	LPP_DV
004949187-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—SAME_NTL_PERIOD
004949187-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE_ZUMA_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—SAME_NTL_PERIOD
004949187-04	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_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.

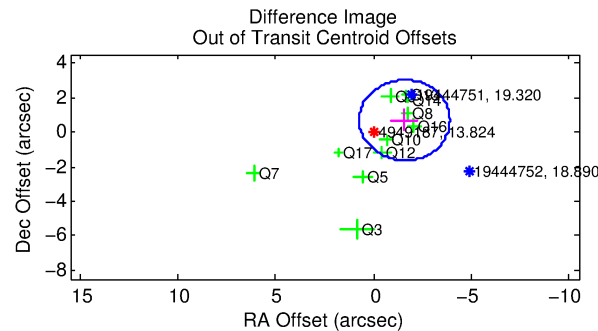
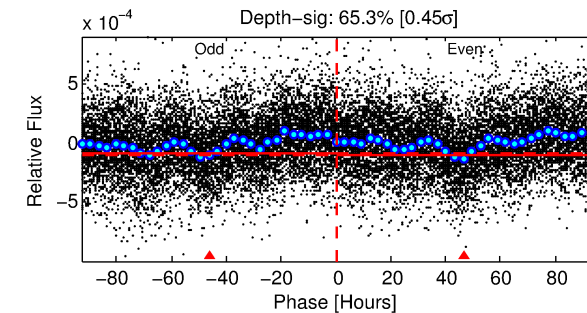
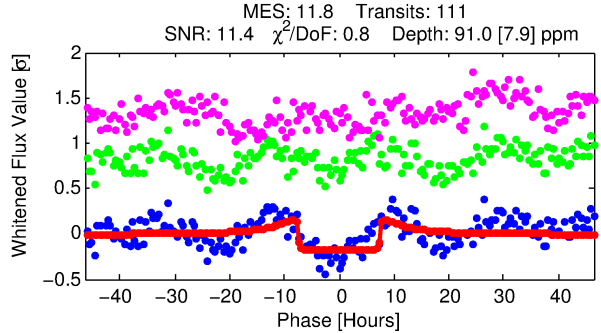
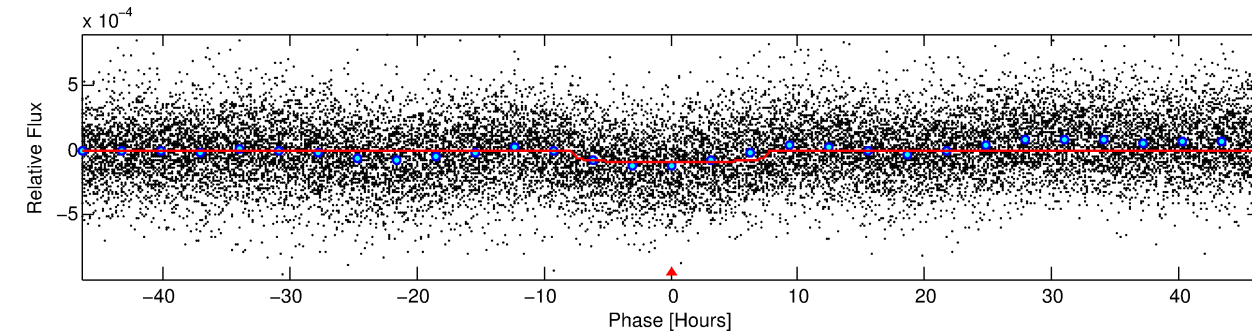
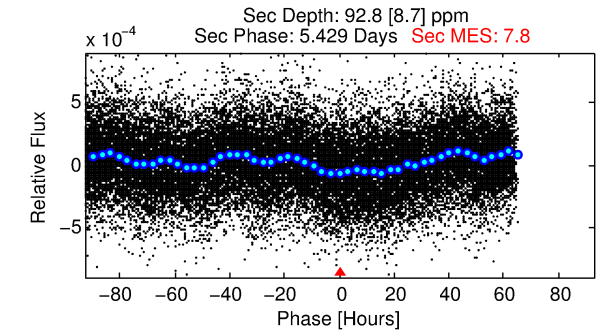
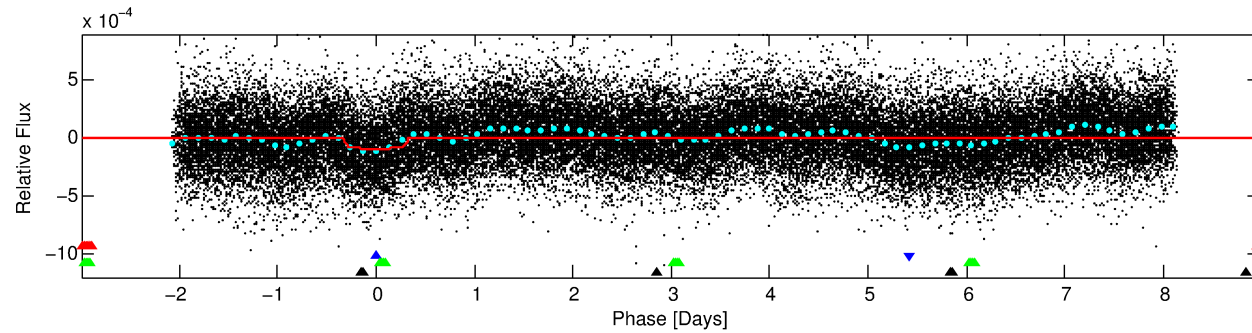
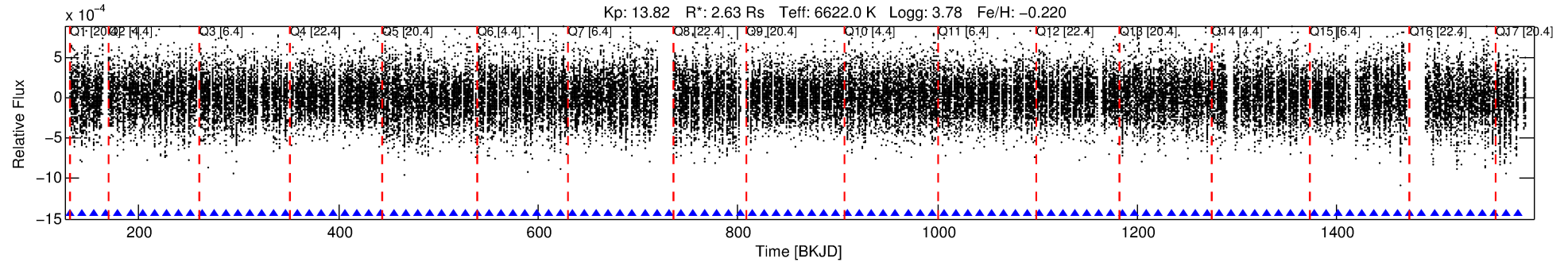
Ephemeris Match Information For 004949187-02

No Significant Match Found



# DV One-Page Summary

KIC: 4949187 Candidate: 2 of 4 Period: 11.979 d



## DV Fit Results:

Period = 11.97906 [0.00015] d  
Epoch = 131.6638 [0.0097] BKJD  
Rp/R\* = 0.0092 [0.0022]  
a/R\* = 4.76 [5.83]  
b = 0.62 [1.27]  
Seff = 860.18 [731.63]  
Teq = 1381 [294] K  
Rp = 2.64 [1.43] Re  
a = 0.1178 [0.0594] AU  
Ag = 101.50 [97.73] [1.03σ]  
Teffp = 6777 [850] K [6.00σ]

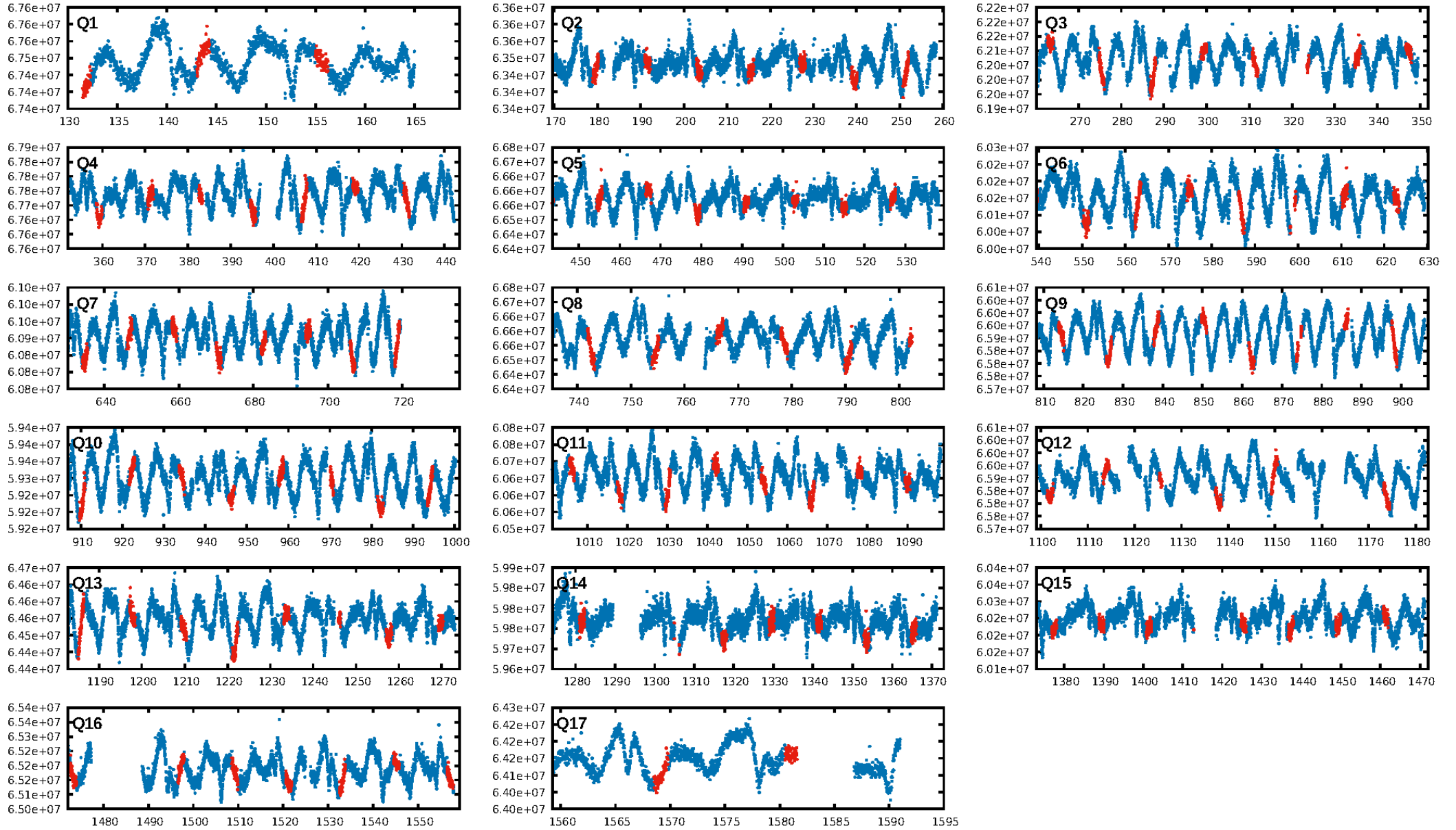
## DV Diagnostic Results:

ShortPeriod-sig: 0.1% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 96.4%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [106/106]  
GhostDiagnostic-chr: 1.896  
Centroid-sig: 17.6%  
Centroid-so: 0.662 arcsec [0.79σ]  
OotOffset-rm: 1.728 arcsec [2.23σ]  
OotOffset-st: 2/2/3/4 [11]  
KicOffset-rm: 1.640 arcsec [1.87σ]  
KicOffset-st: 2/2/3/4 [11]  
DiffImageQuality-fgm: 0.55 [6/11]  
DiffImageOverlap-fno: 0.00 [0/17]

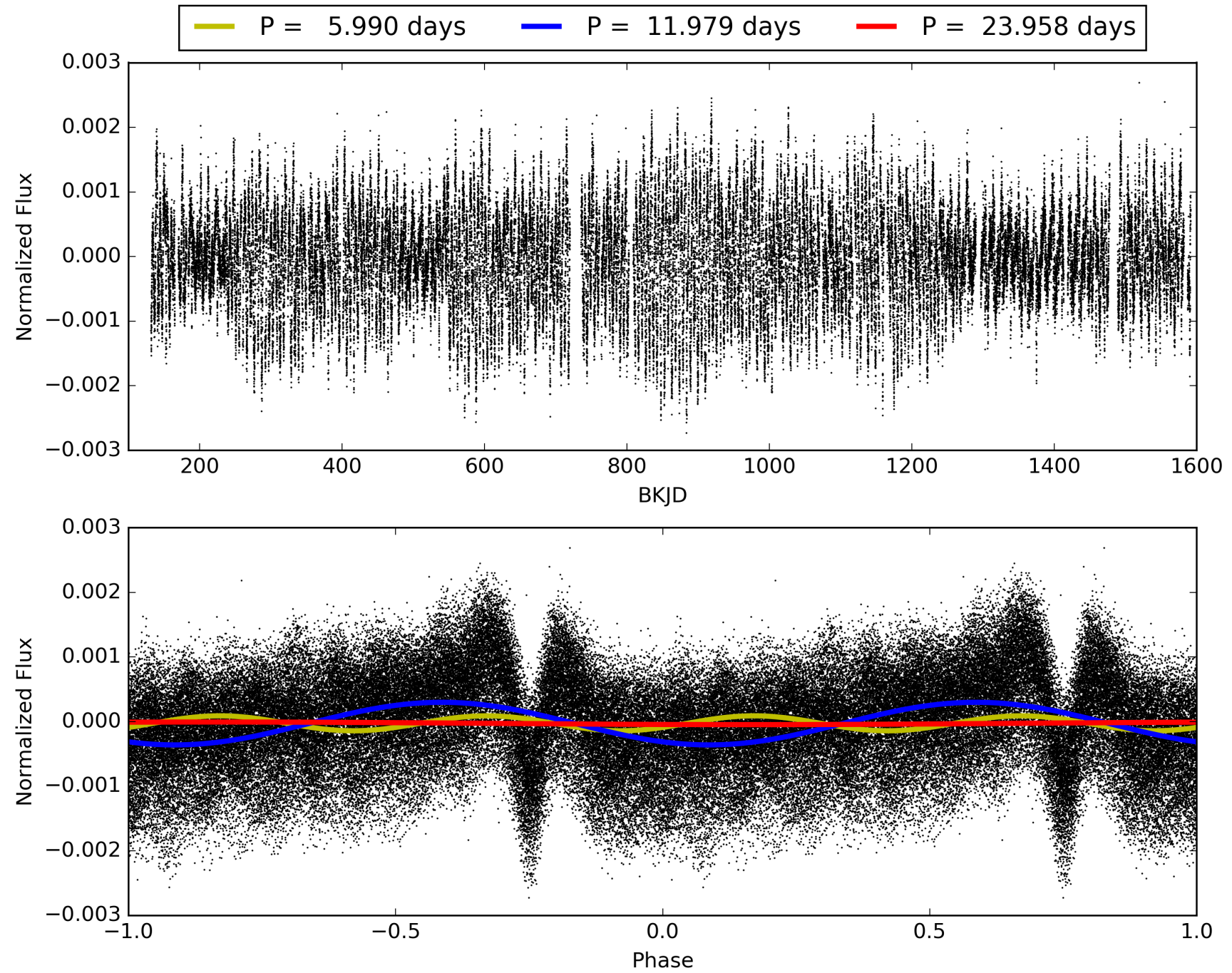
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 00:46:22 Z

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

# TCE 004949187-02, PDC Light Curves



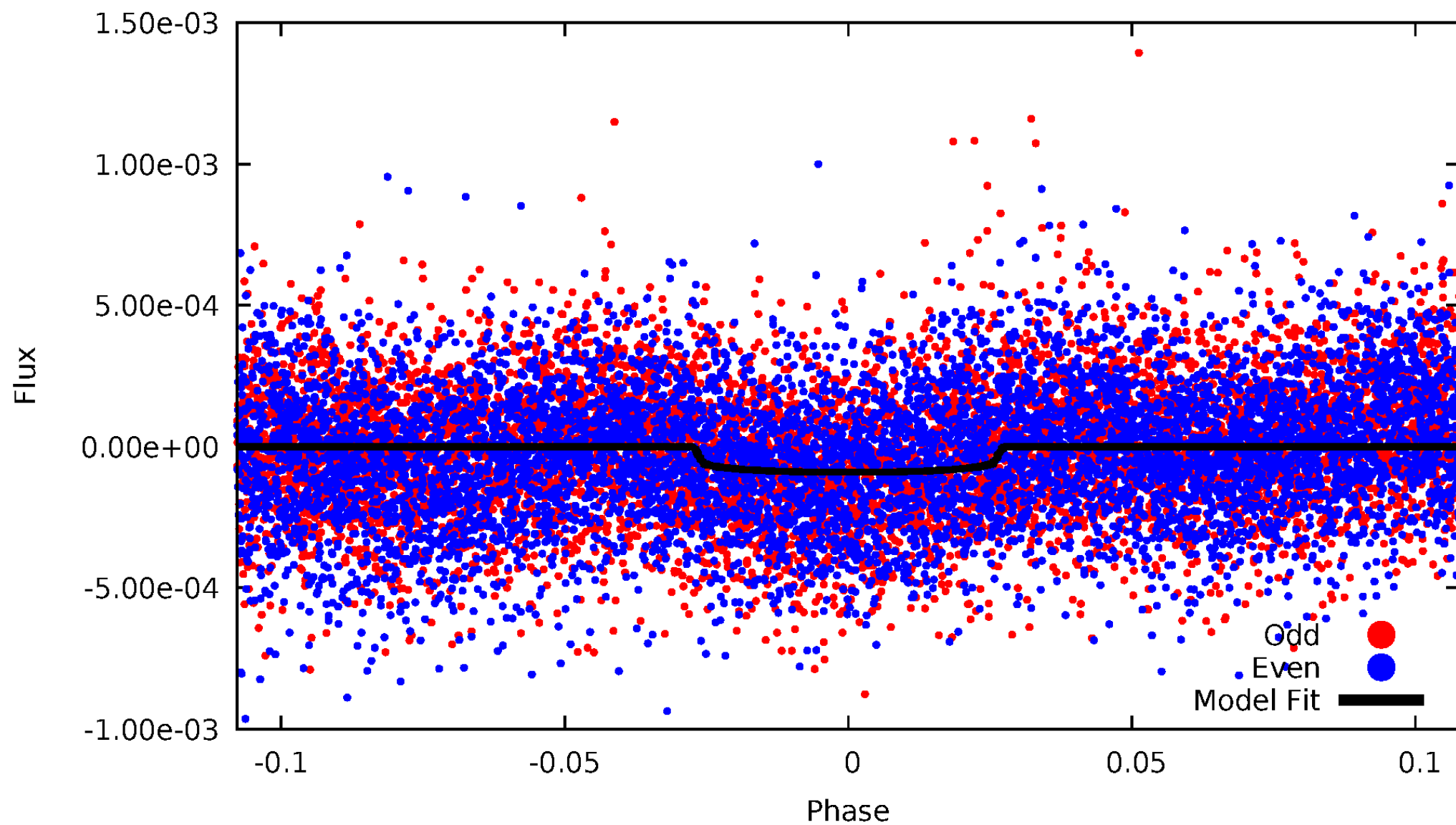
TCE 004949187-02





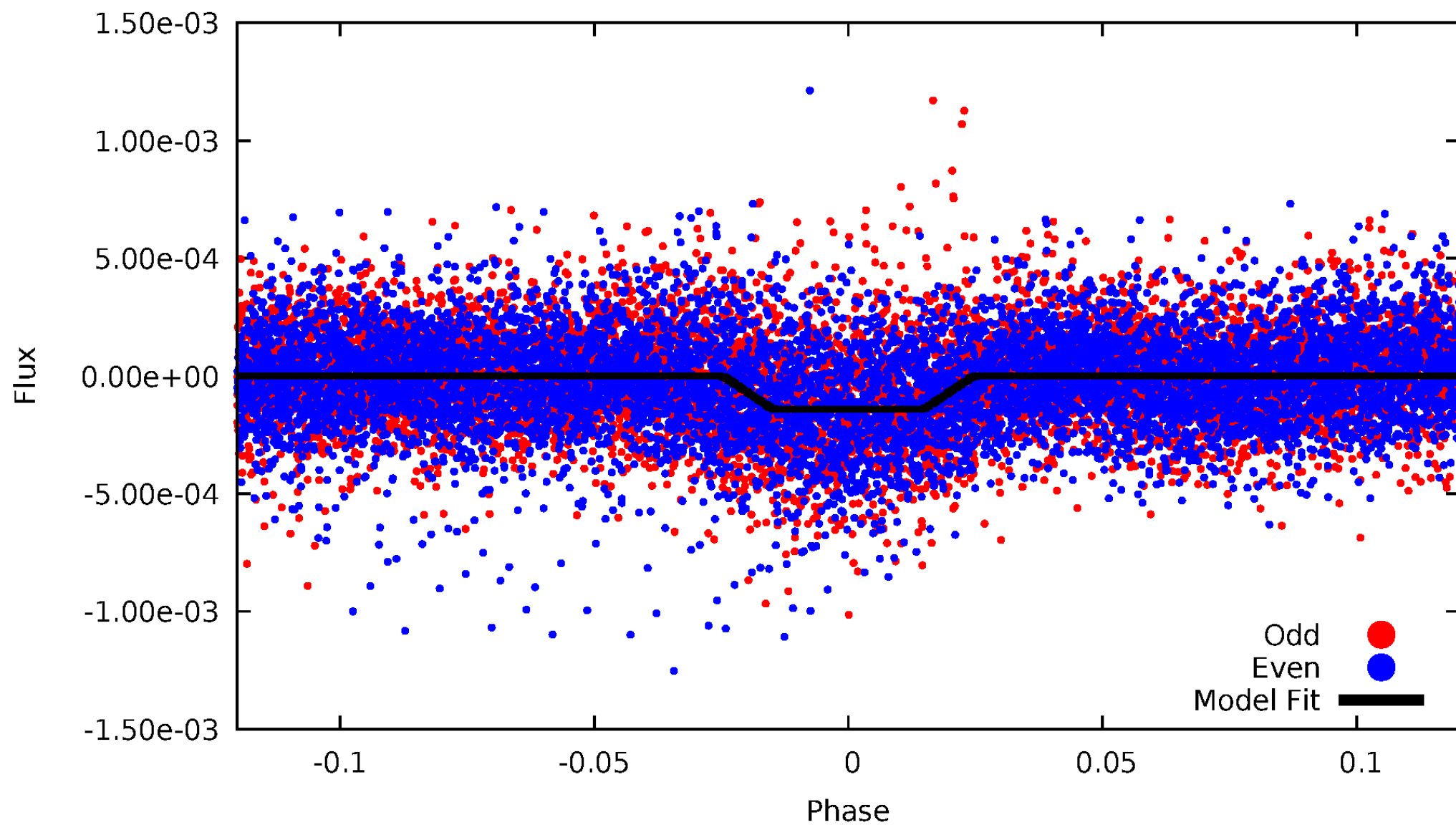
# DV Odd/Even

TCE 004949187-02



# ALT Odd/Even

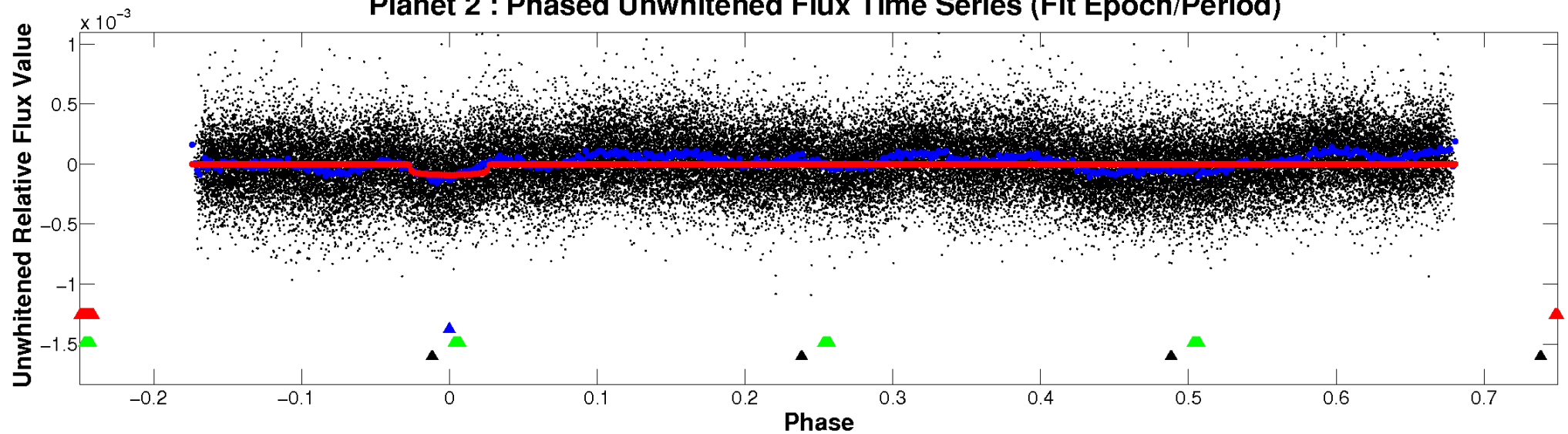
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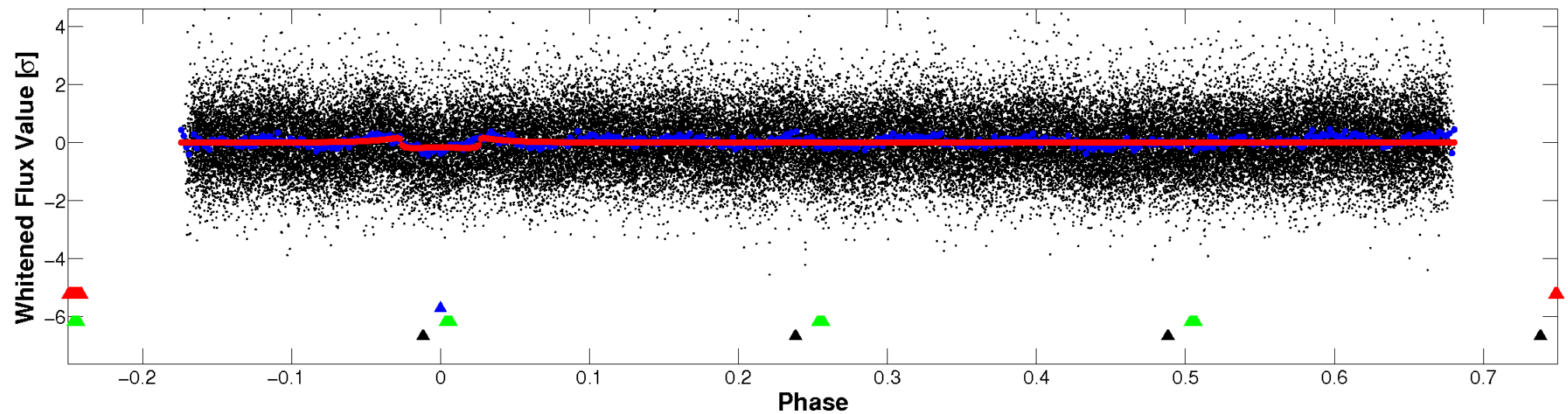


# Non-Whitened Vs. Whitened Light Curve

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

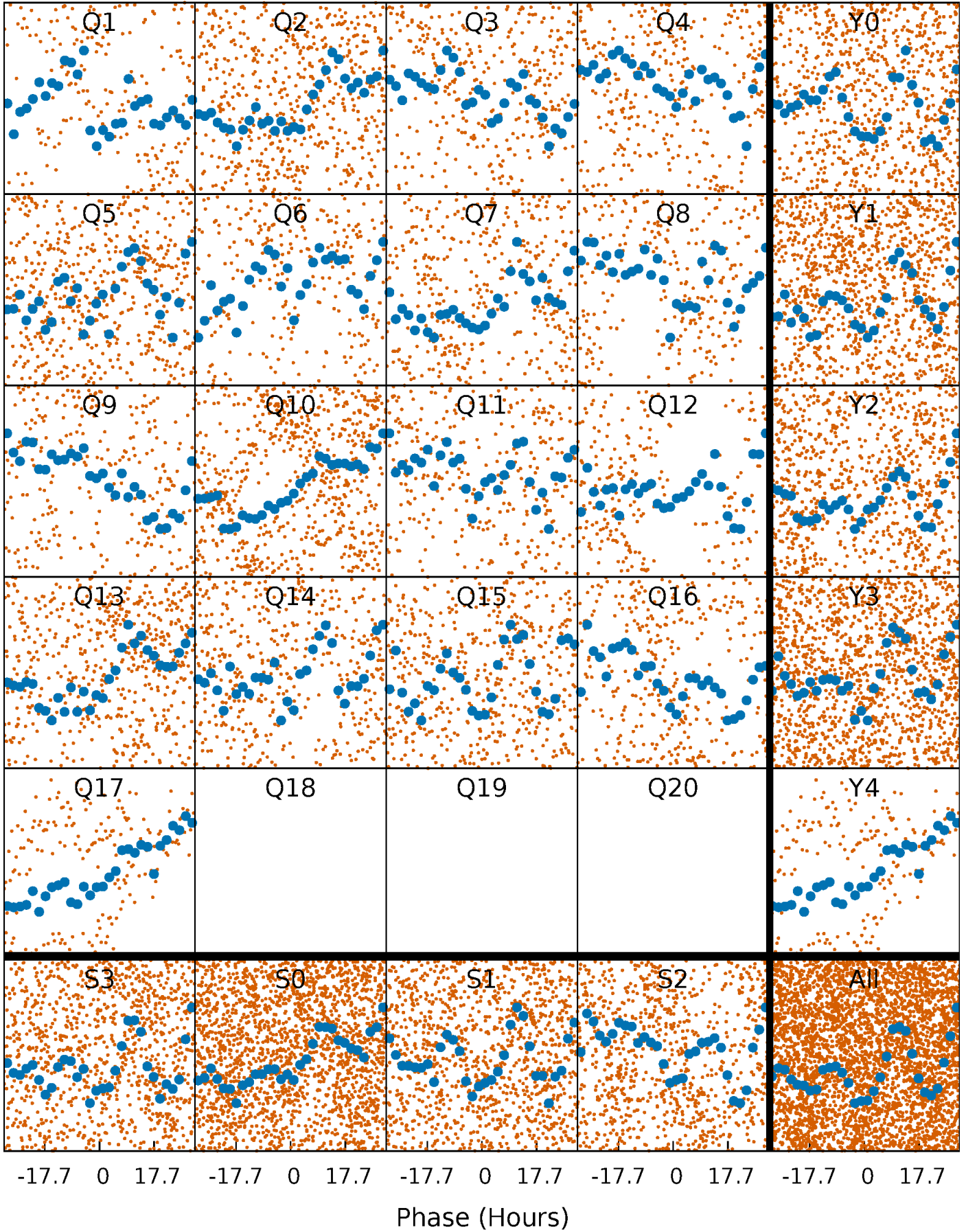


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



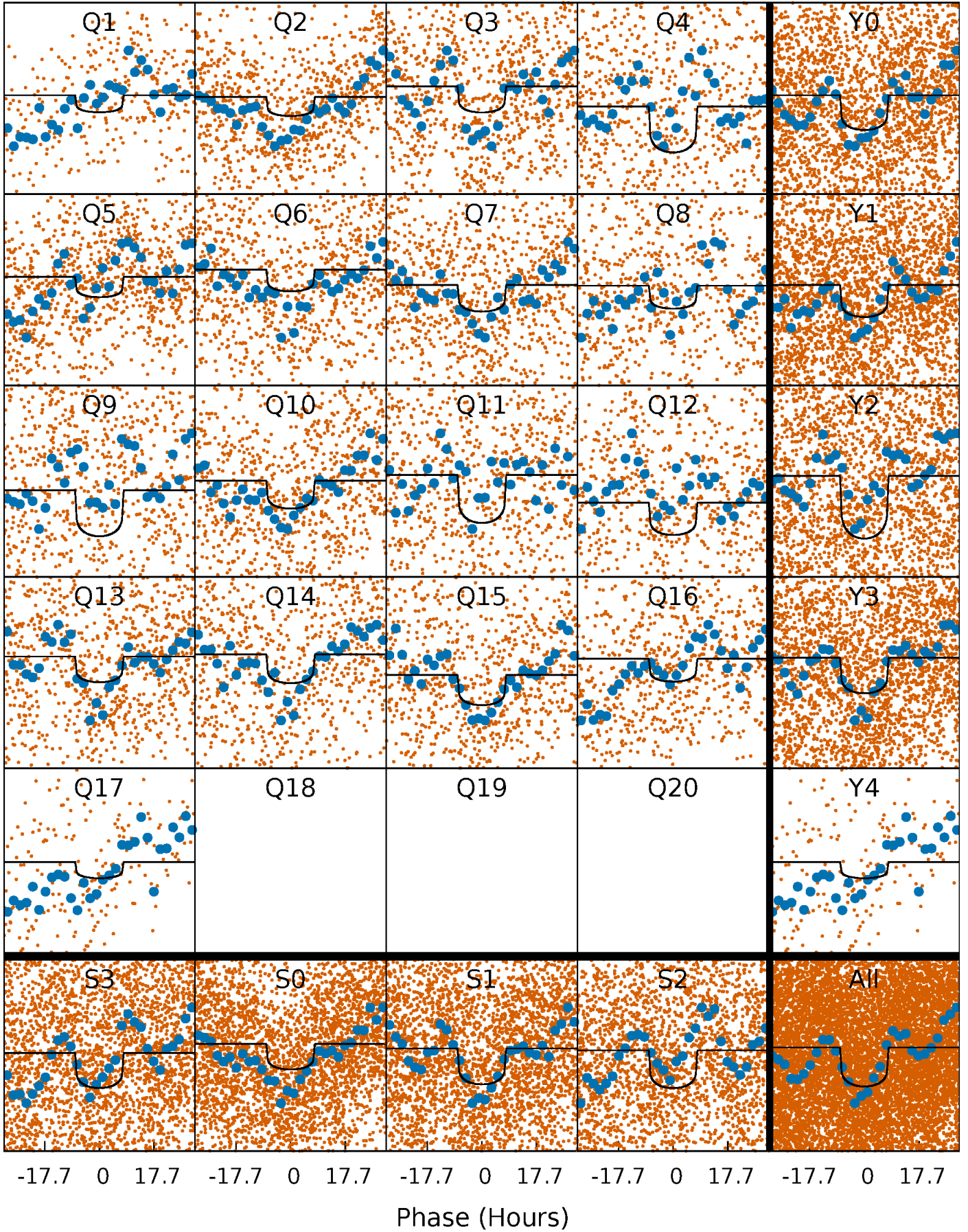
# PDC Quarter-Phased Transit Curves

TCE 004949187-02 P= 11.979059 Days  $T_0=131.663801$  (BKJD)



# DV Quarter-Phased Transit Curves

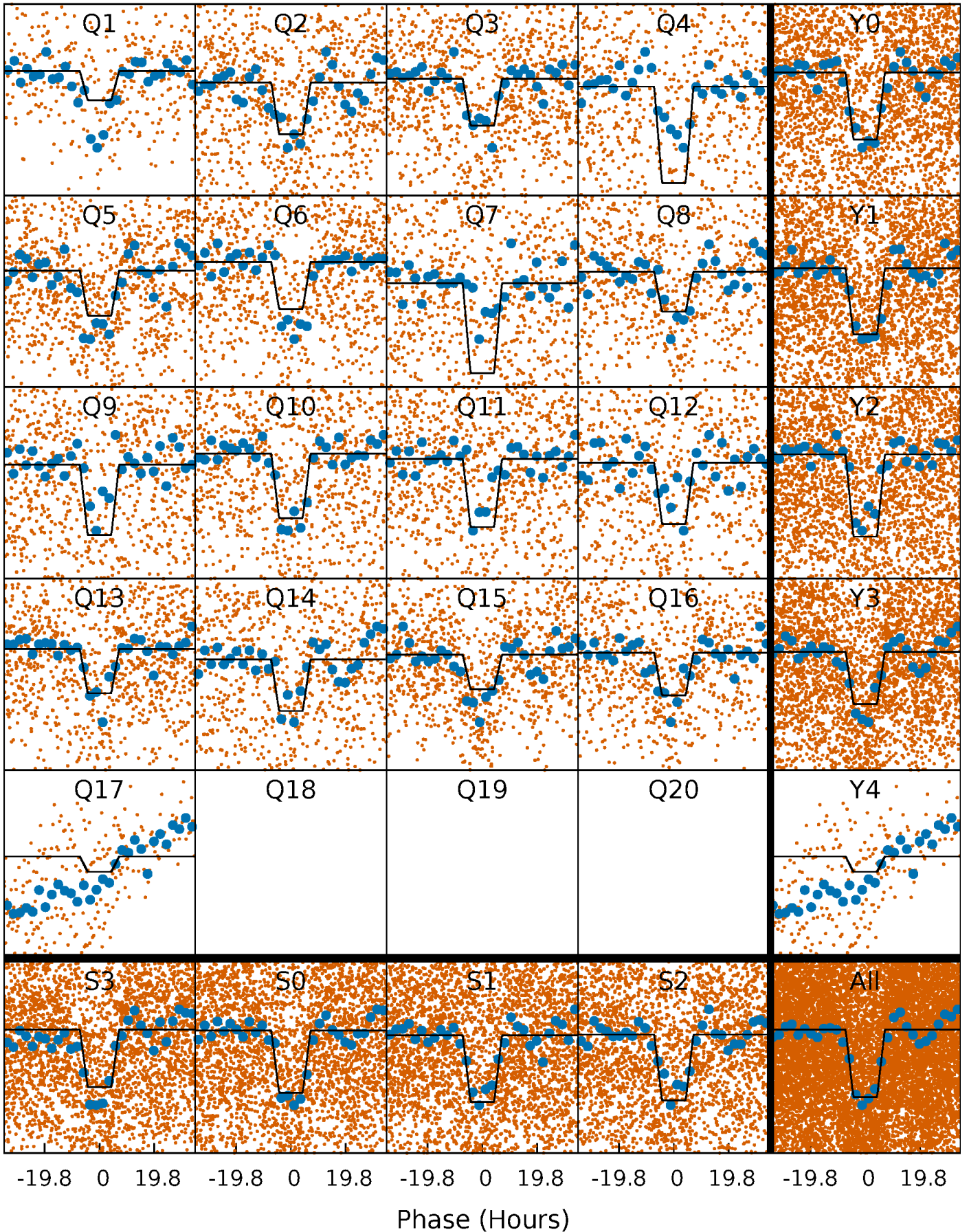
TCE 004949187-02     $P = 11.979059$  Days     $T_0 = 131.663801$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

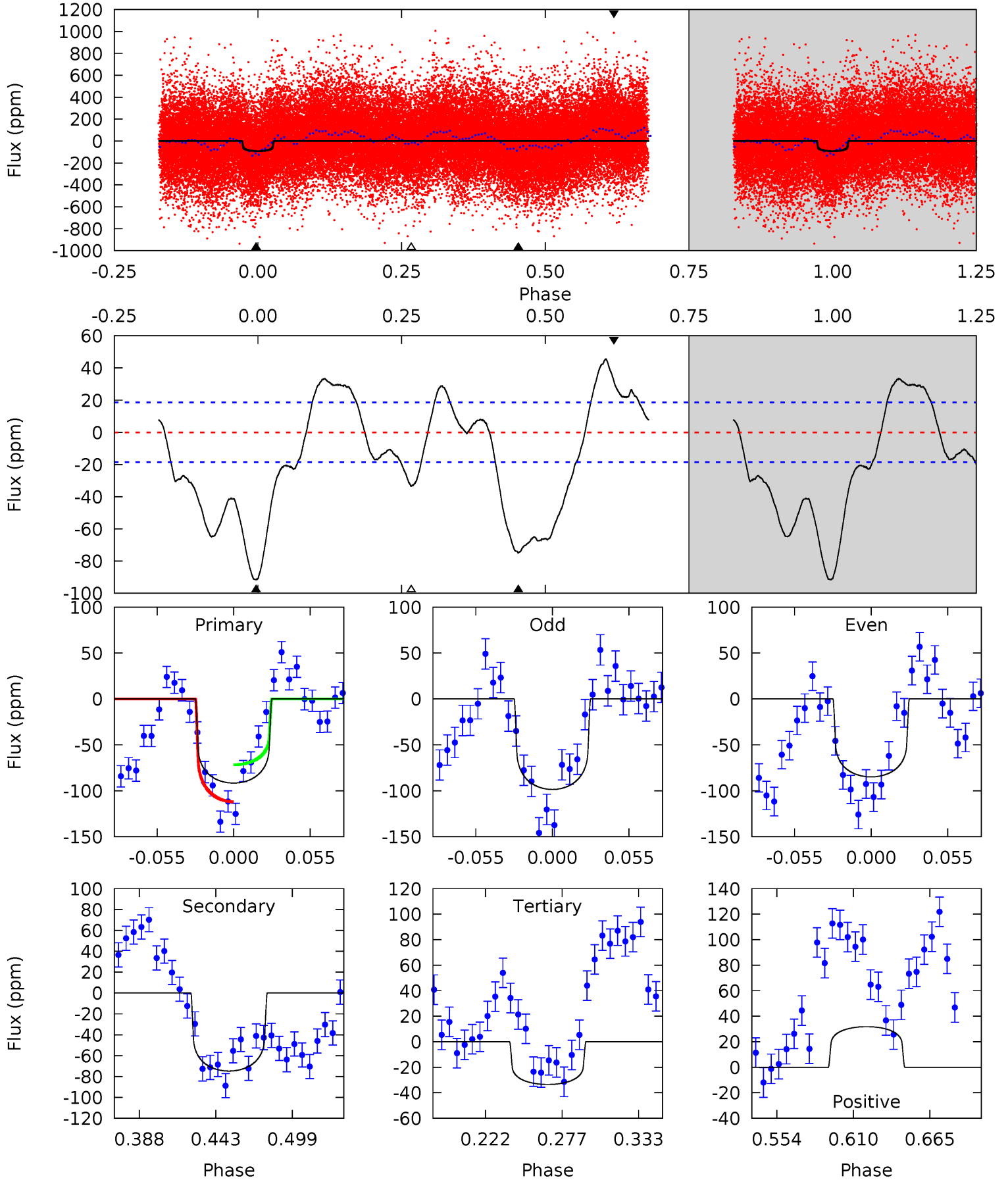
TCE 004949187-02 P= 11.979138 Days  $T_0=131.683110$  (BKJD)



# DV Model-Shift Uniqueness Test

004949187-02, P = 11.979059 Days, E = 119.684742 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
23.1	18.9	8.45	8.02	4.69	1.92	7.22	14.7	15.1	10.4	10.8	1.72	1.28	0.33	5.06

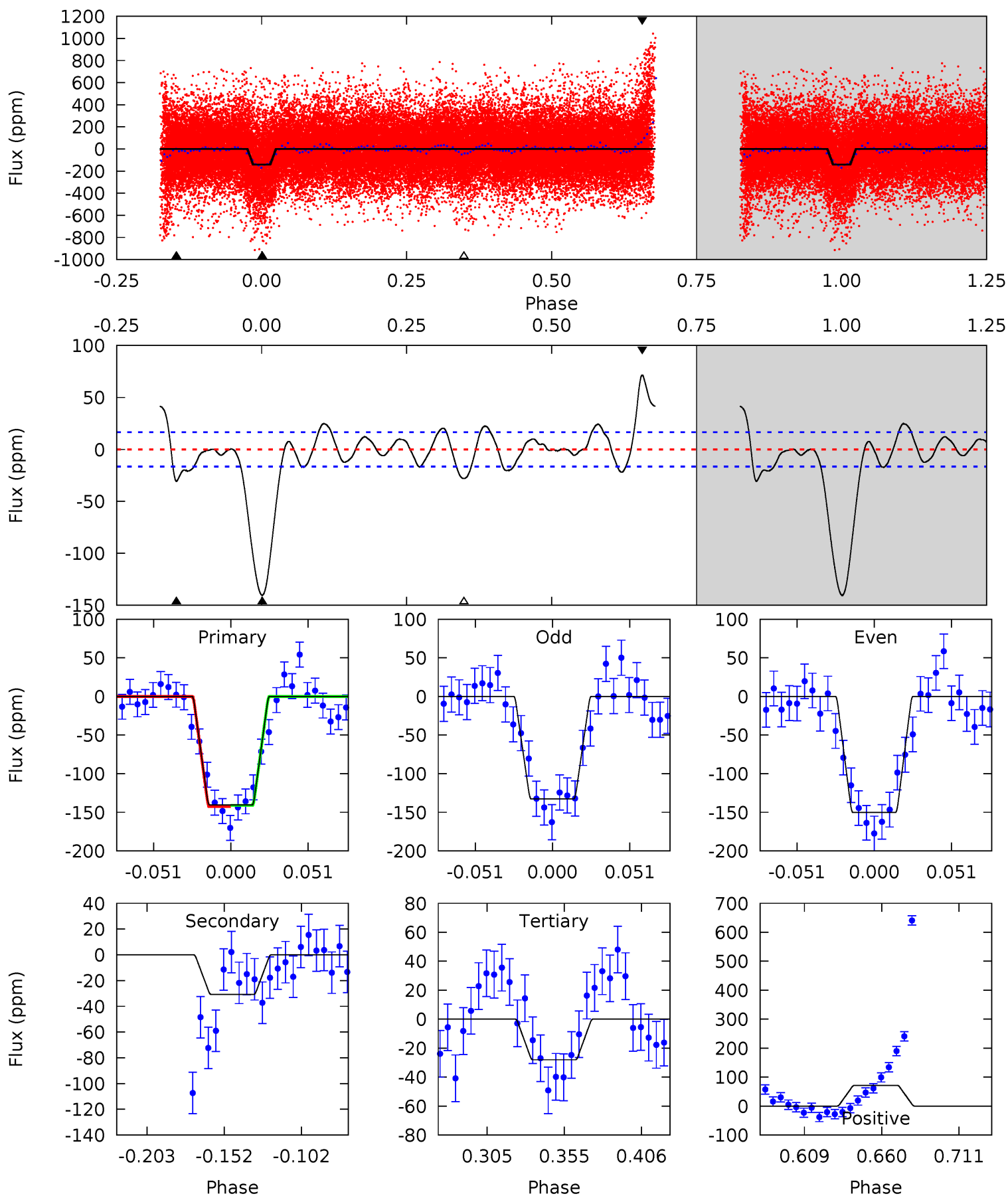




# Alt Model-Shift Uniqueness Test

004949187-02, P = 11.979138 Days, E = 119.703972 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
40.0	8.77	7.98	20.4	4.71	1.95	4.70	32.0	19.6	0.78	-11.6	2.48	0.80	0.34	0.22



### Stellar Parameters For KIC 004949187

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6622^{+210}_{-257}$	$3.779^{+0.502}_{-0.089}$	$-0.220^{+0.300}_{-0.300}$	$2.633^{+0.550}_{-1.283}$	$1.519^{+0.212}_{-0.424}$	$0.117^{+0.640}_{-0.041}$
	+3%/-4%	+13%/-2%	+136%/-136%	+21%/-49%	+14%/-28%	+545%/-35%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 004949187-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-75 \pm 4$	$2.30^{+0.80}_{-0.74}$	$1847^{+154}_{-248}$	$6397^{+1084}_{-679}$	$107^{+119}_{-47}$
Alt.	$-31 \pm 4$	$3.03^{+0.84}_{-0.89}$	$1851^{+142}_{-254}$	$4651^{+422}_{-348}$	$25^{+23}_{-10}$

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

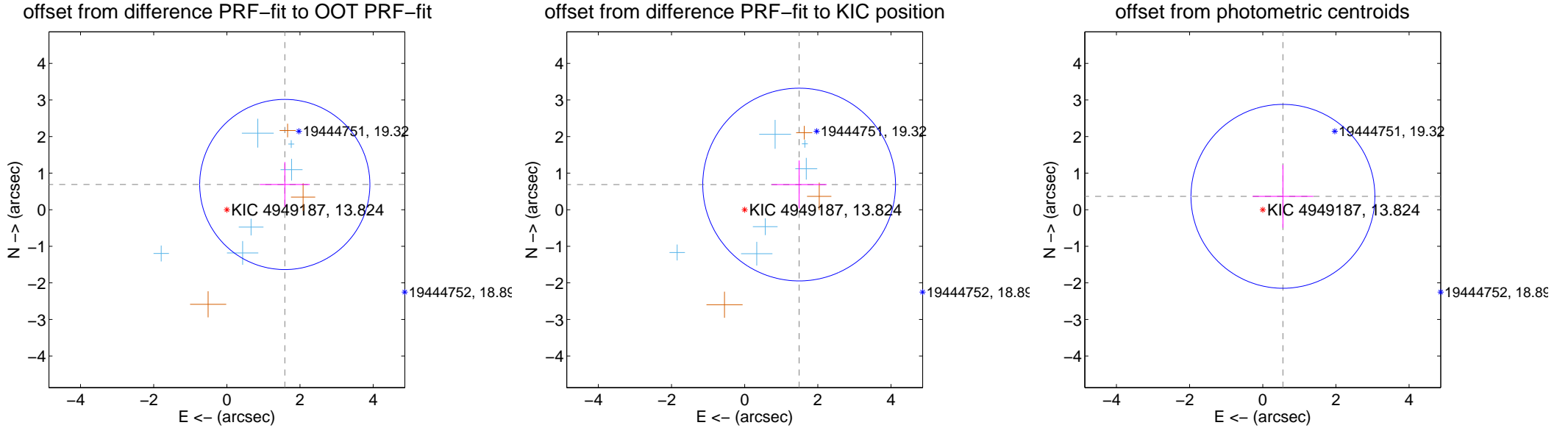
## DV Centroid Data

Supplemental centroid analysis for 004949187-02. Kepler magnitude: 13.82. Transit SNR 11.37

There are 6 quarters with good PRF difference image offsets

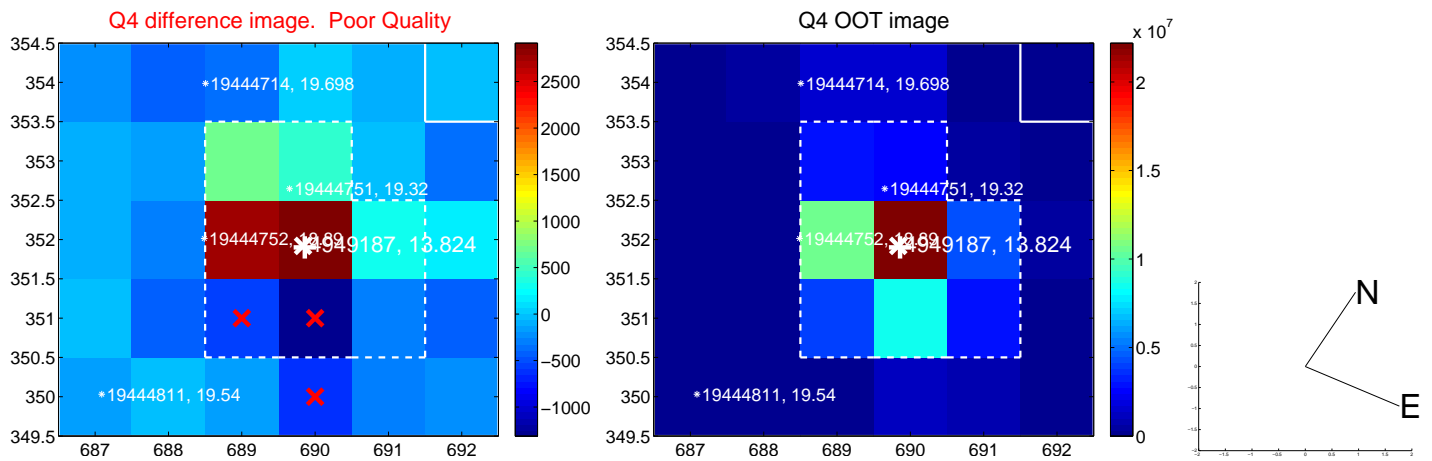
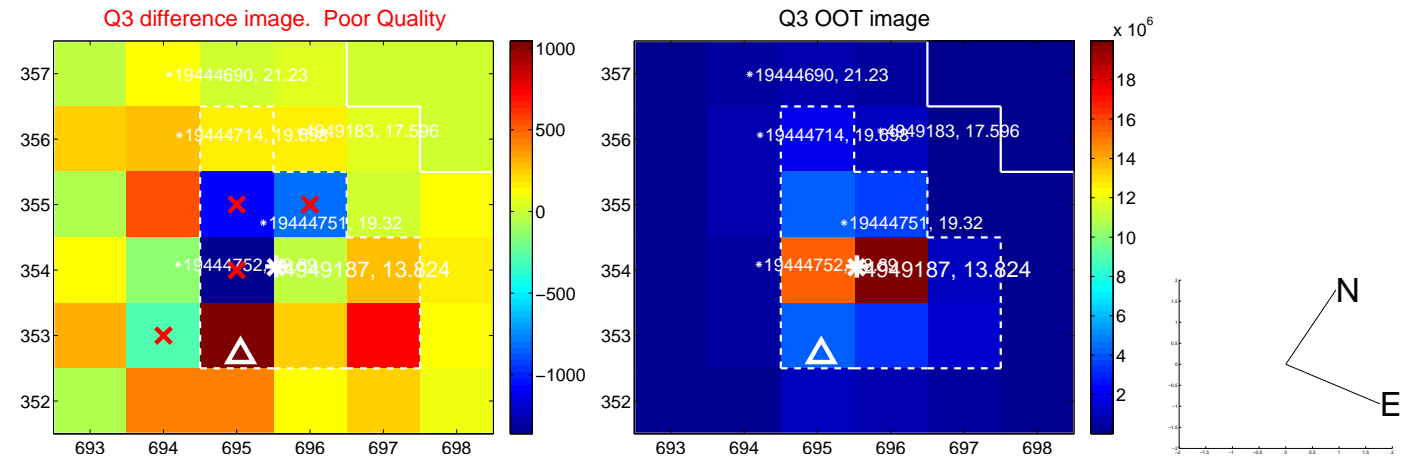
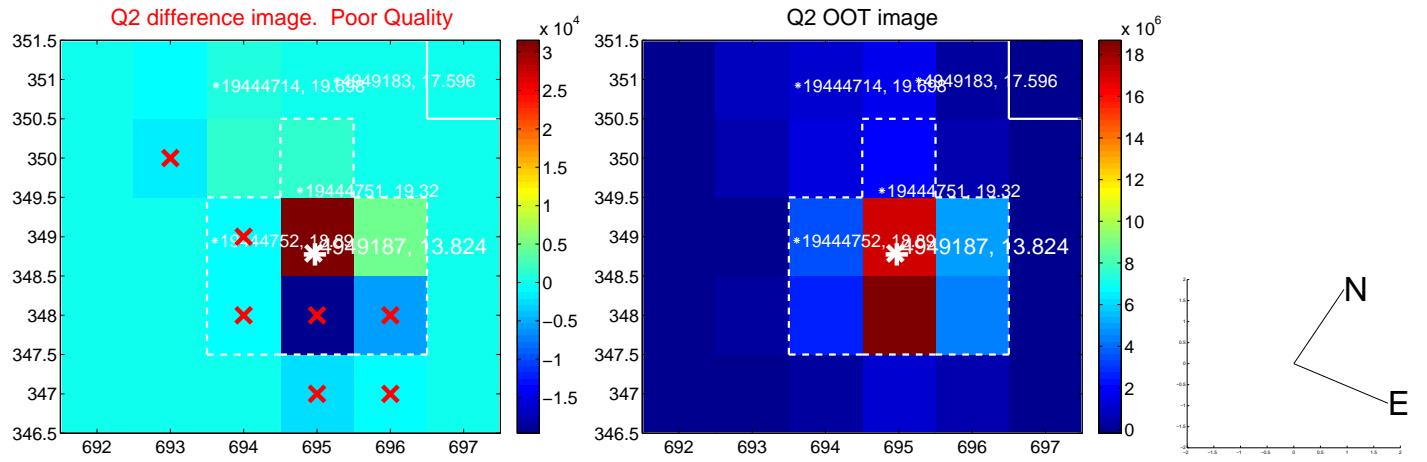
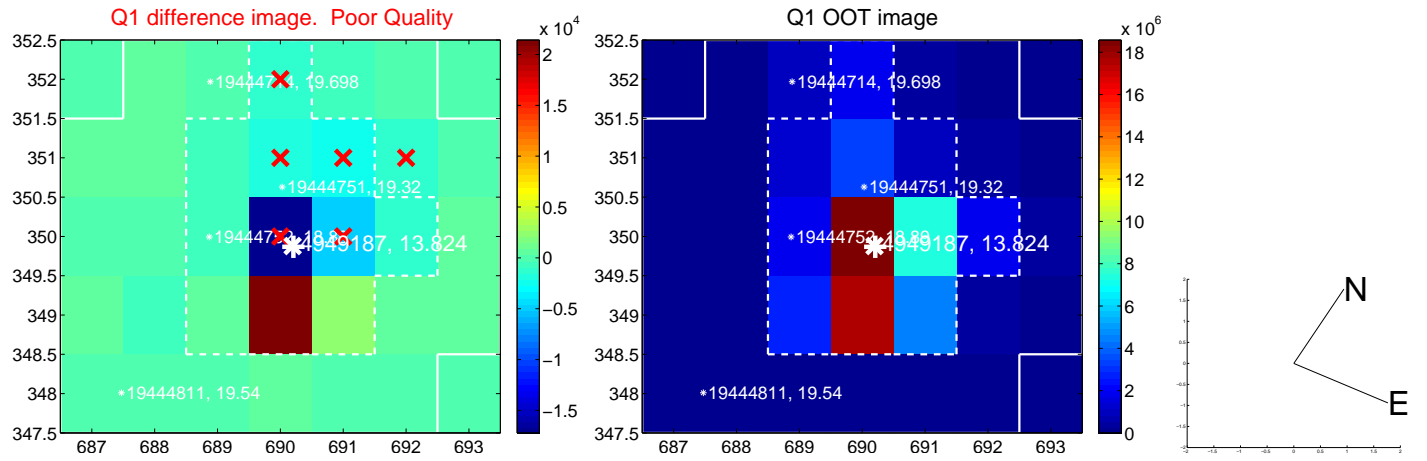
The direct PRF centroid is offset from the target star catalog position by about 0.06 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.728 \pm 0.775$	2.23	$-1.584 \pm 0.682$	$0.690 \pm 0.615$
PRF-fit source offset from KIC position	$1.640 \pm 0.878$	1.87	$-1.489 \pm 0.752$	$0.688 \pm 0.657$
photometric centroid source offset	$0.66 \pm 0.84$	0.79	$-0.55 \pm 0.83$	$0.37 \pm 0.86$

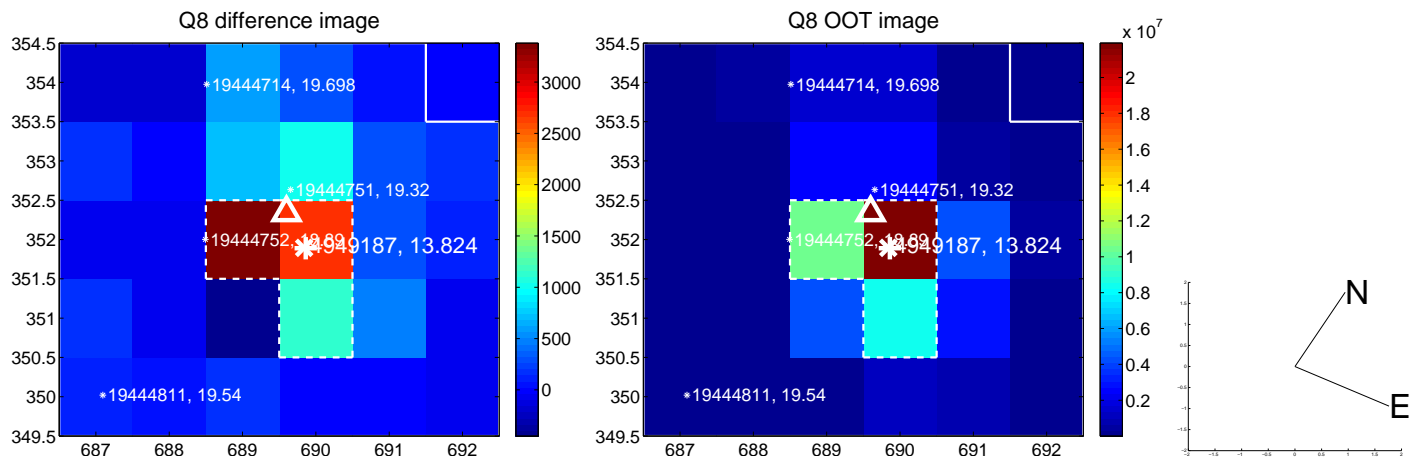
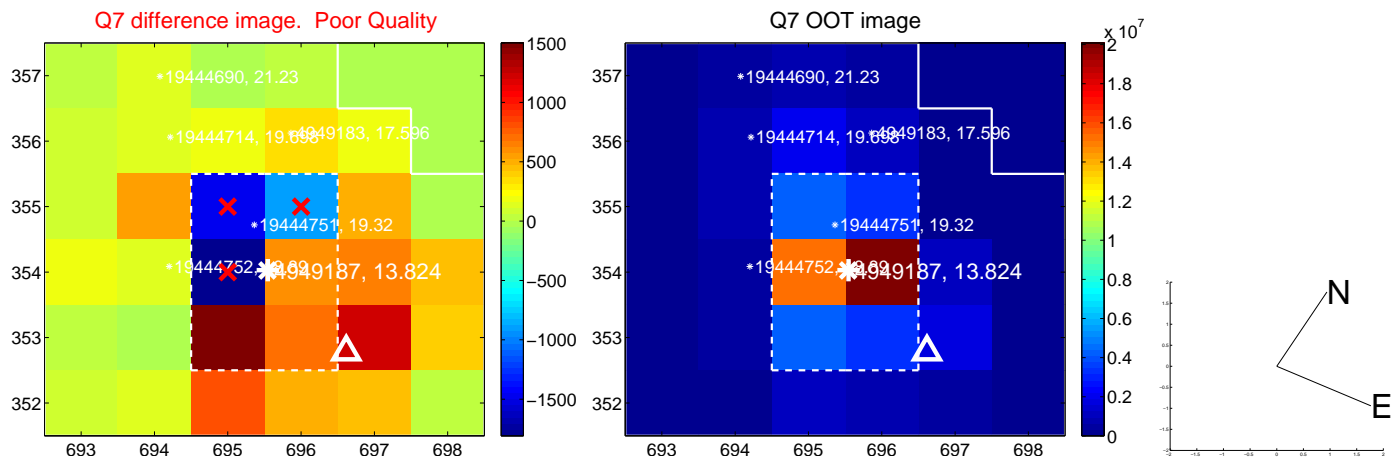
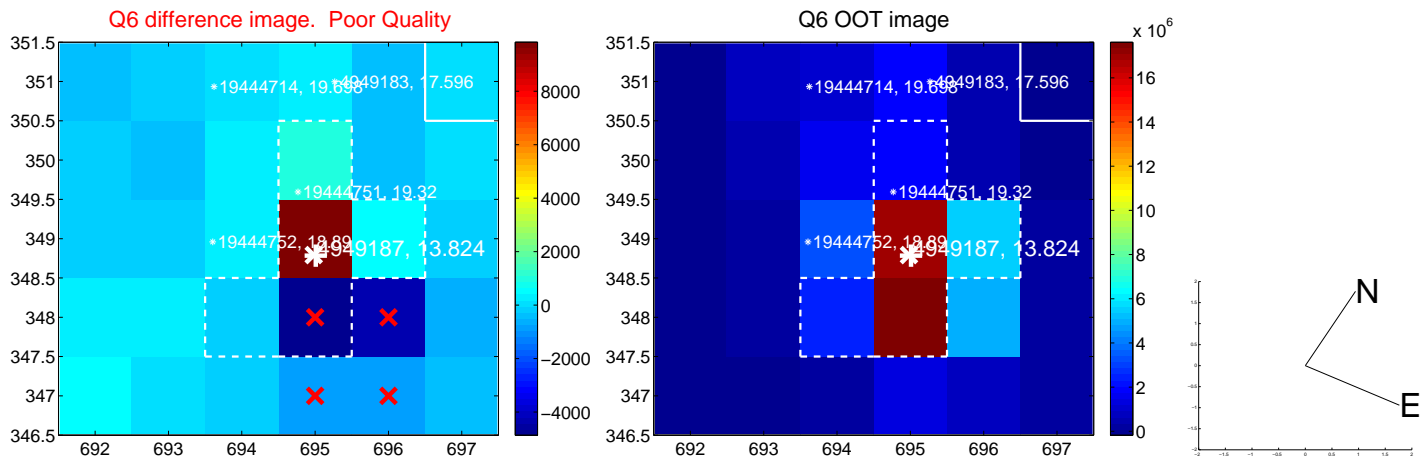
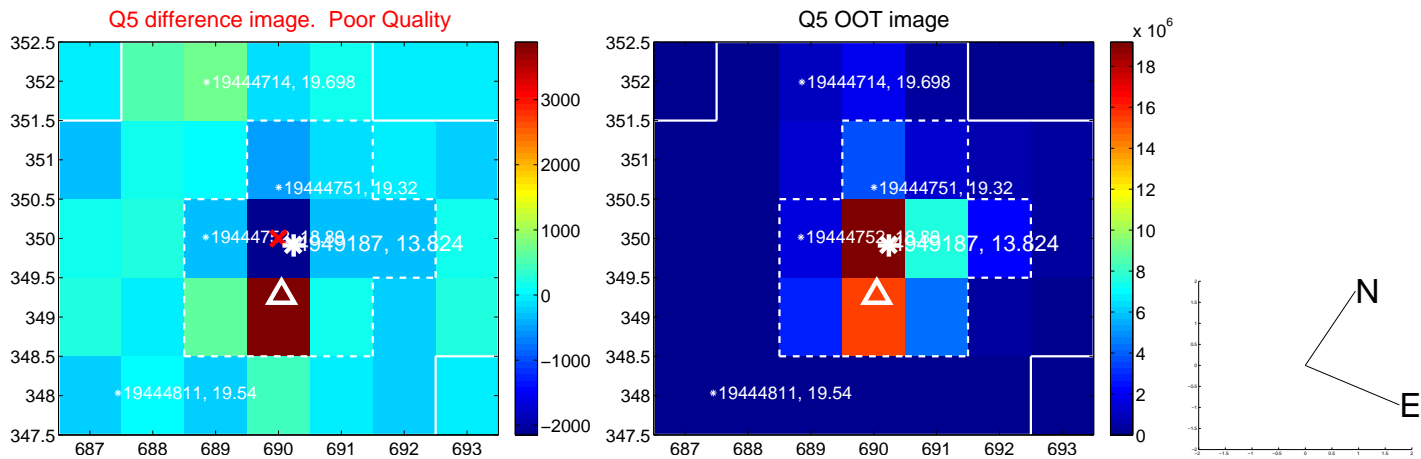


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

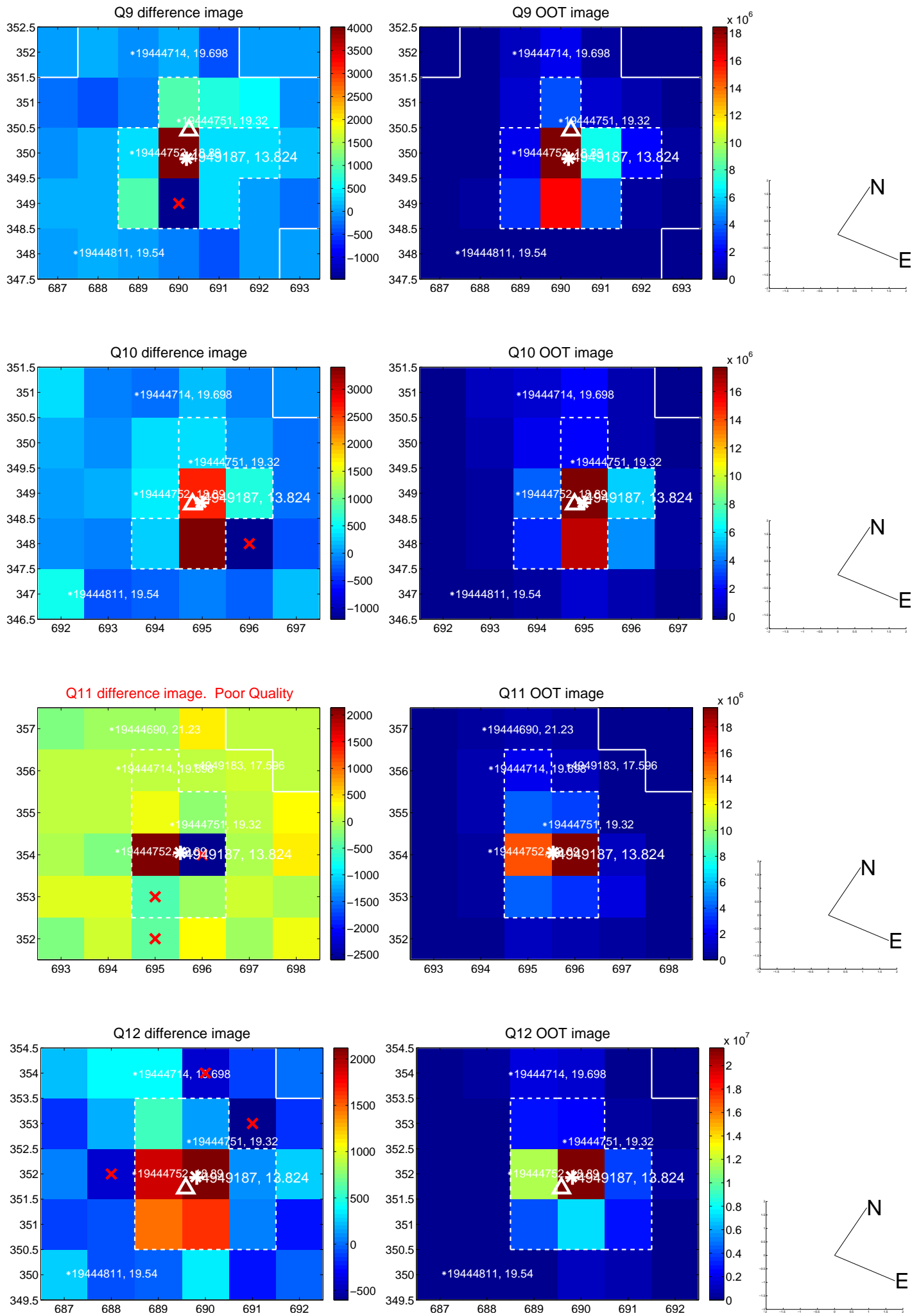


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

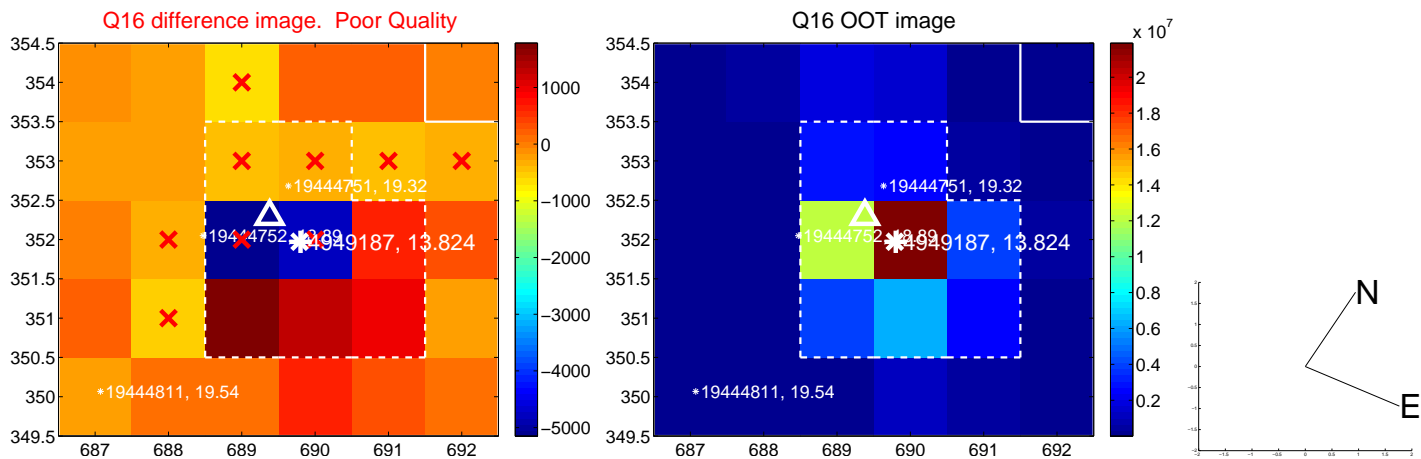
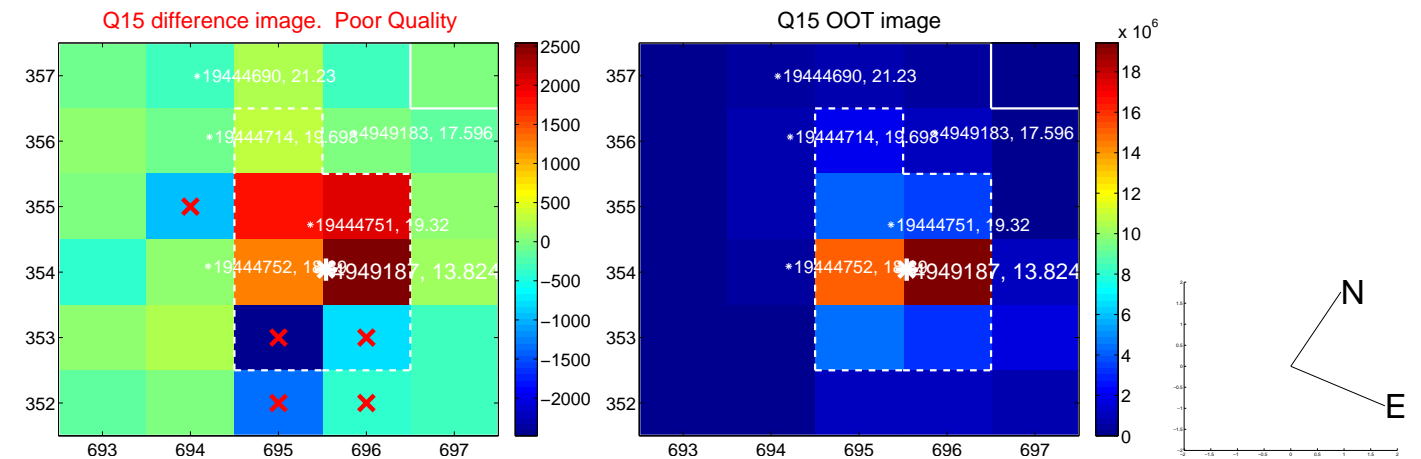
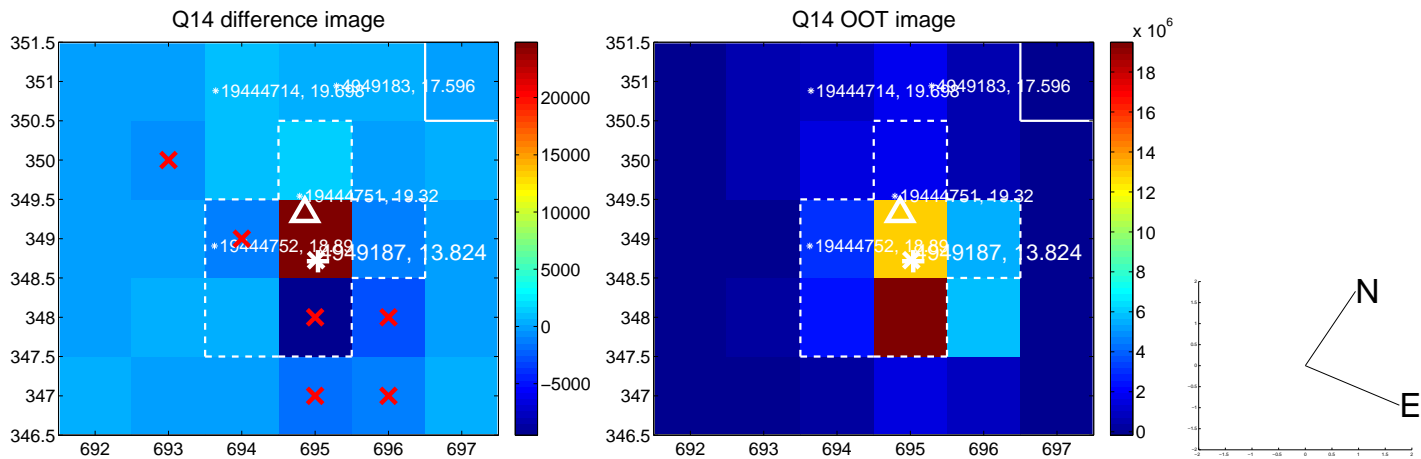
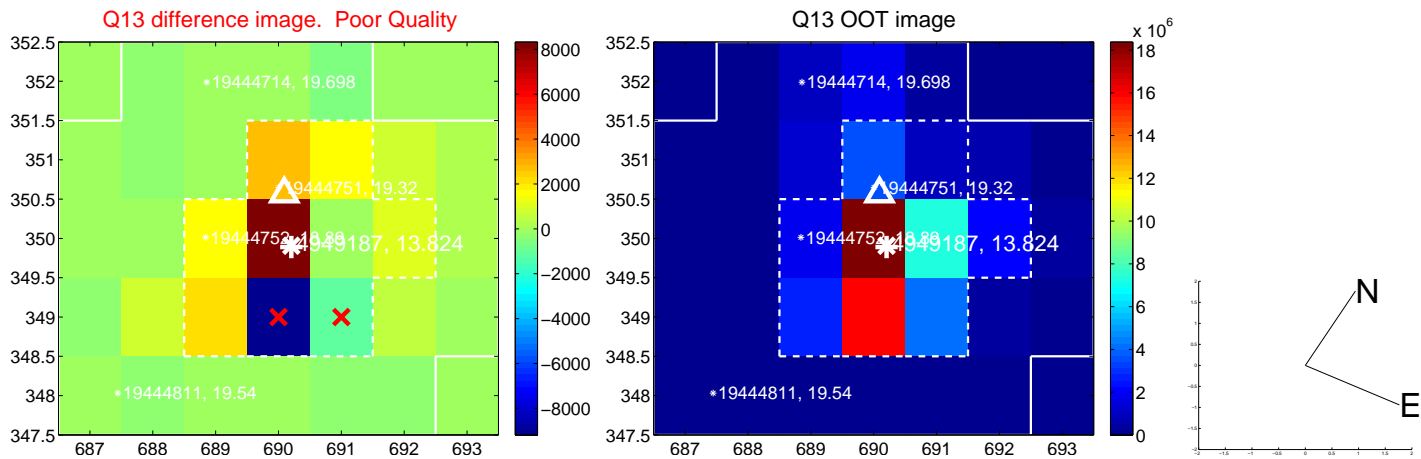




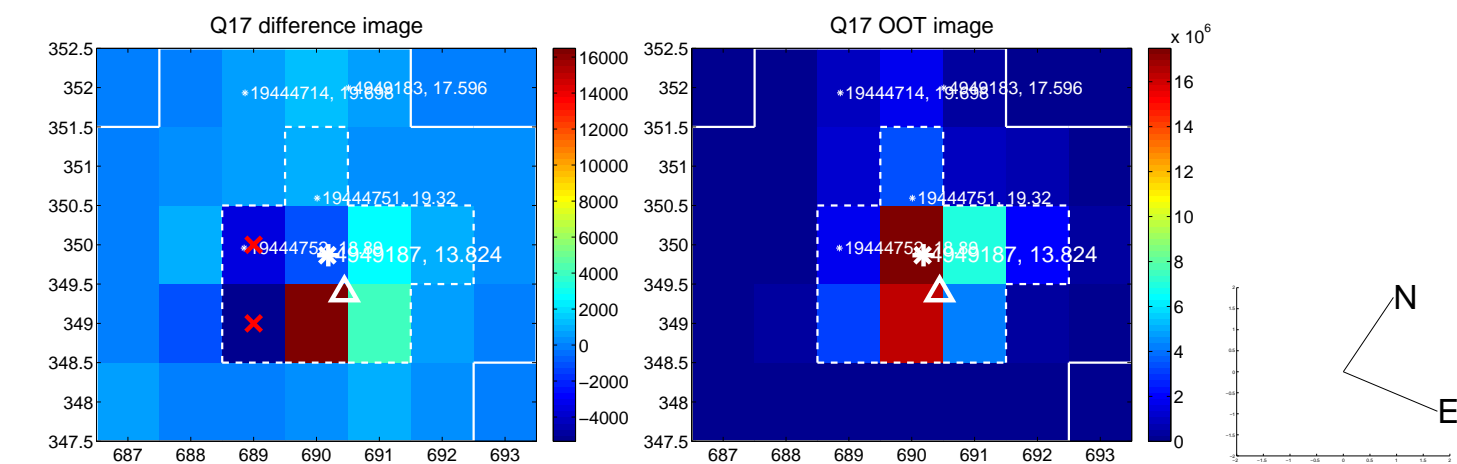
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



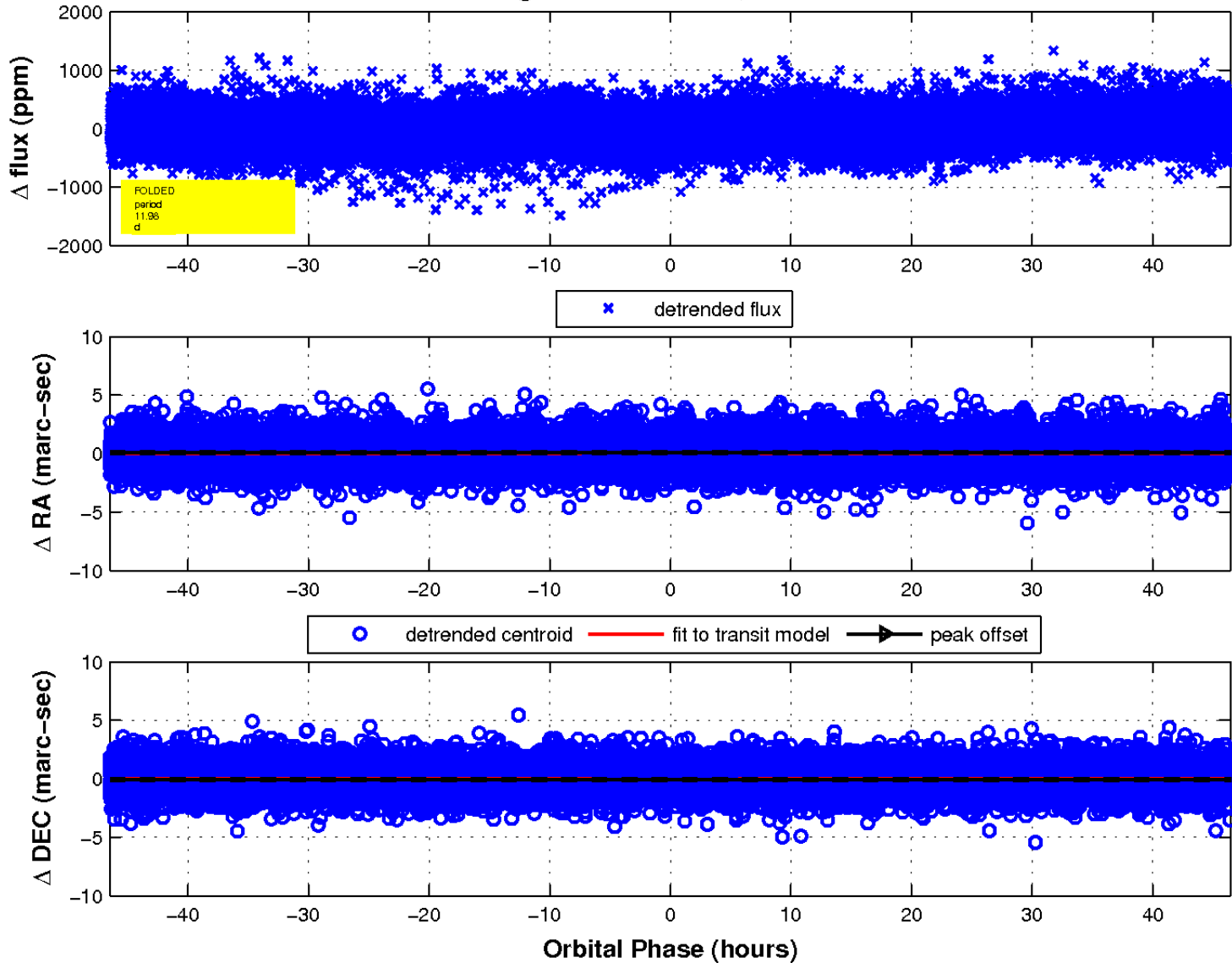
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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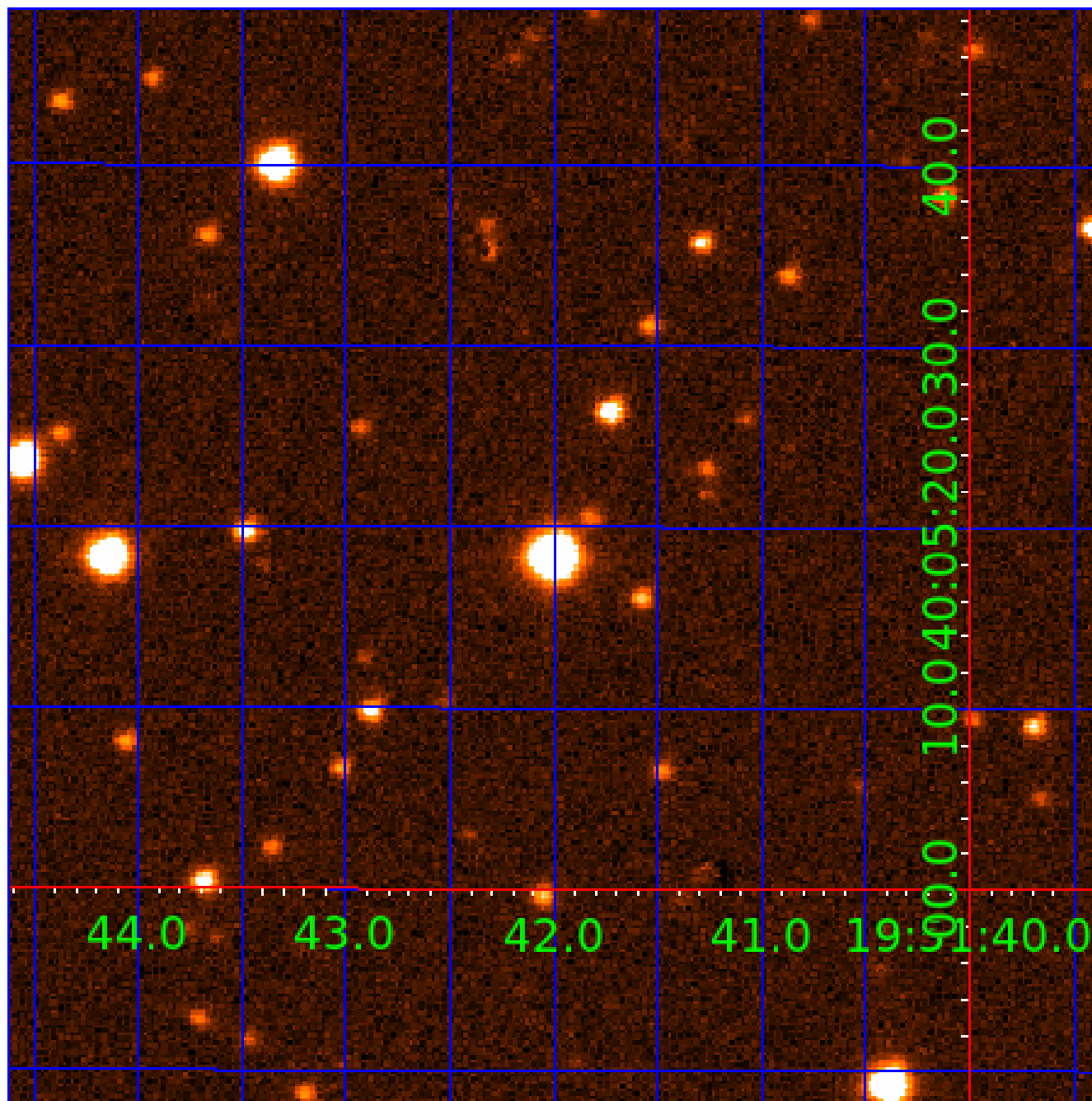


fluxWeightedCentroids, Planet 2 of 4



UKIRT Image

Declination



# KIC 004949187

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004949187-01	OBS	No	11.977951	140.758398	182.8	14.849	18.7	18.6	2.63	6622	5.97	860.28
004949187-02	OBS	No	11.979059	131.663800	91.0	15.489	11.8	11.4	2.63	6622	2.64	860.18
004949187-03	OBS	No	2.994879	134.693476	22.4	7.290	9.3	4.1	2.63	6622	1.42	5461.51
004949187-04	OBS	No	2.994785	134.514149	70.3	35.937	9.6	8.0	2.63	6622	2.22	5461.74

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004949187-01	OBS	FP	0.00	1	0	0	0	LPP_DV
004949187-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—SAME_NTL_PERIOD
004949187-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE_ZUMA_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—SAME_NTL_PERIOD
004949187-04	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_FEW_DIFFS

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

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

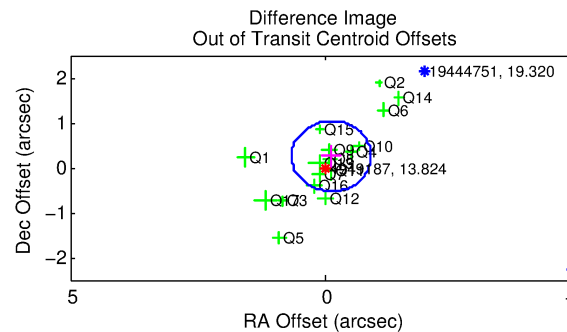
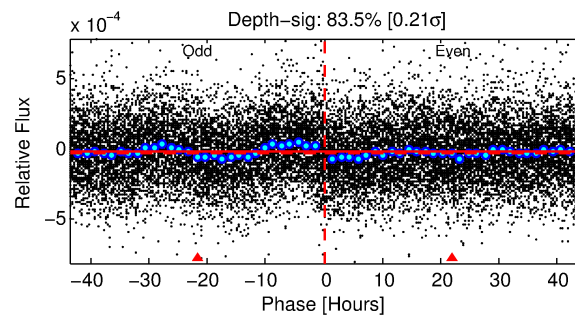
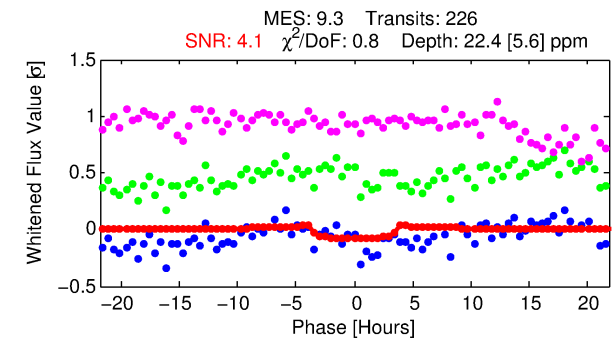
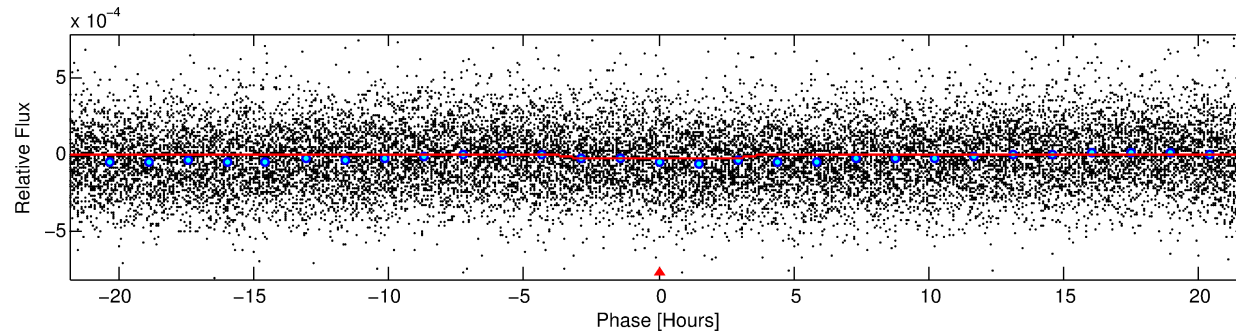
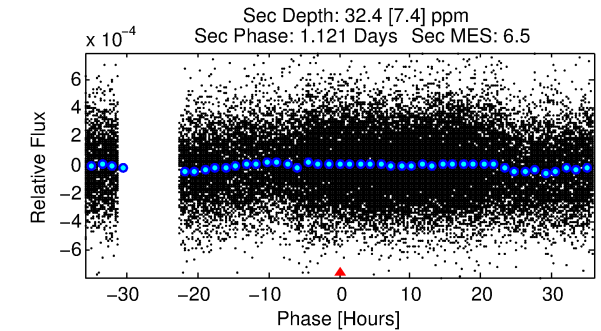
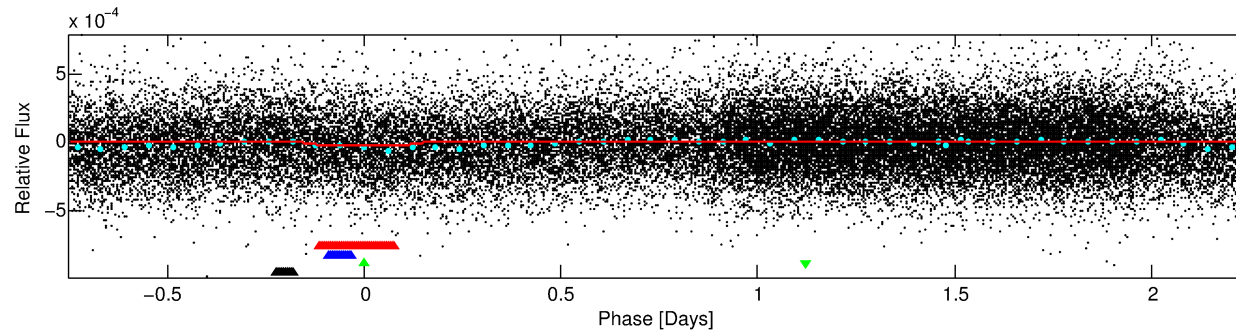
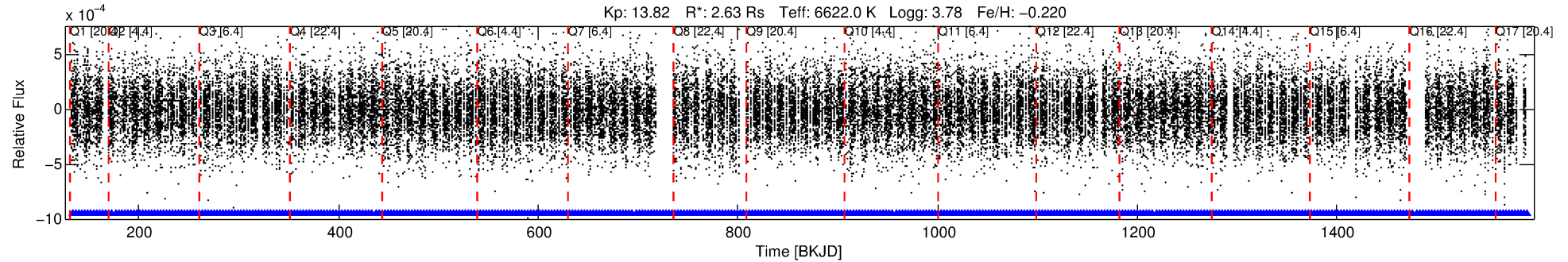
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004949187-03

No Significant Match Found

# DV One-Page Summary

KIC: 4949187 Candidate: 3 of 4 Period: 2.995 d



## DV Fit Results:

Period = 2.99488 [0.00007] d  
Epoch = 134.6935 [0.0155] BKJD  
Rp/R\* = 0.0049 [0.0033]  
a/R\* = 1.83 [4.89]  
b = 0.87 [1.08]  
Seff = 5461.51 [4645.33]  
Teq = 2192 [466] K  
Rp = 1.42 [1.17] Re  
a = 0.0468 [0.0236] AU  
Ag = 19.29 [30.50] [0.60σ]  
Teffp = 7102 [2399] K [2.01σ]

## DV Diagnostic Results:

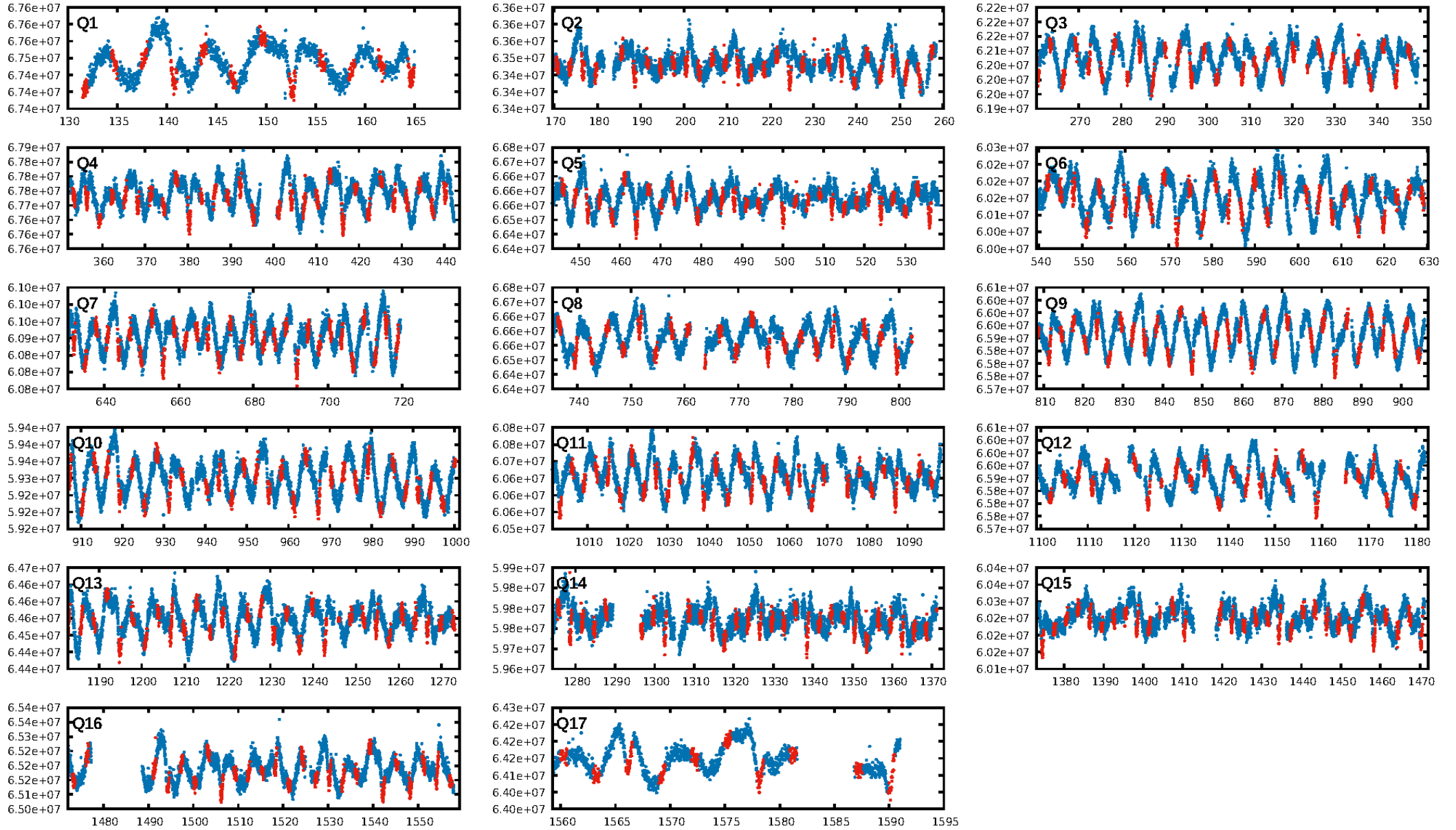
ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: 100.0% [13.03σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [215/215]  
GhostDiagnostic-chr: -0.5518  
Centroid-sig: 3.0%  
Centroid-so: 2.593 arcsec [1.04σ]  
OotOffset-rm: 0.288 arcsec [1.10σ]  
KicOffset-rm: 0.253 arcsec [1.05σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 0.00 [0/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 00:46:31 Z

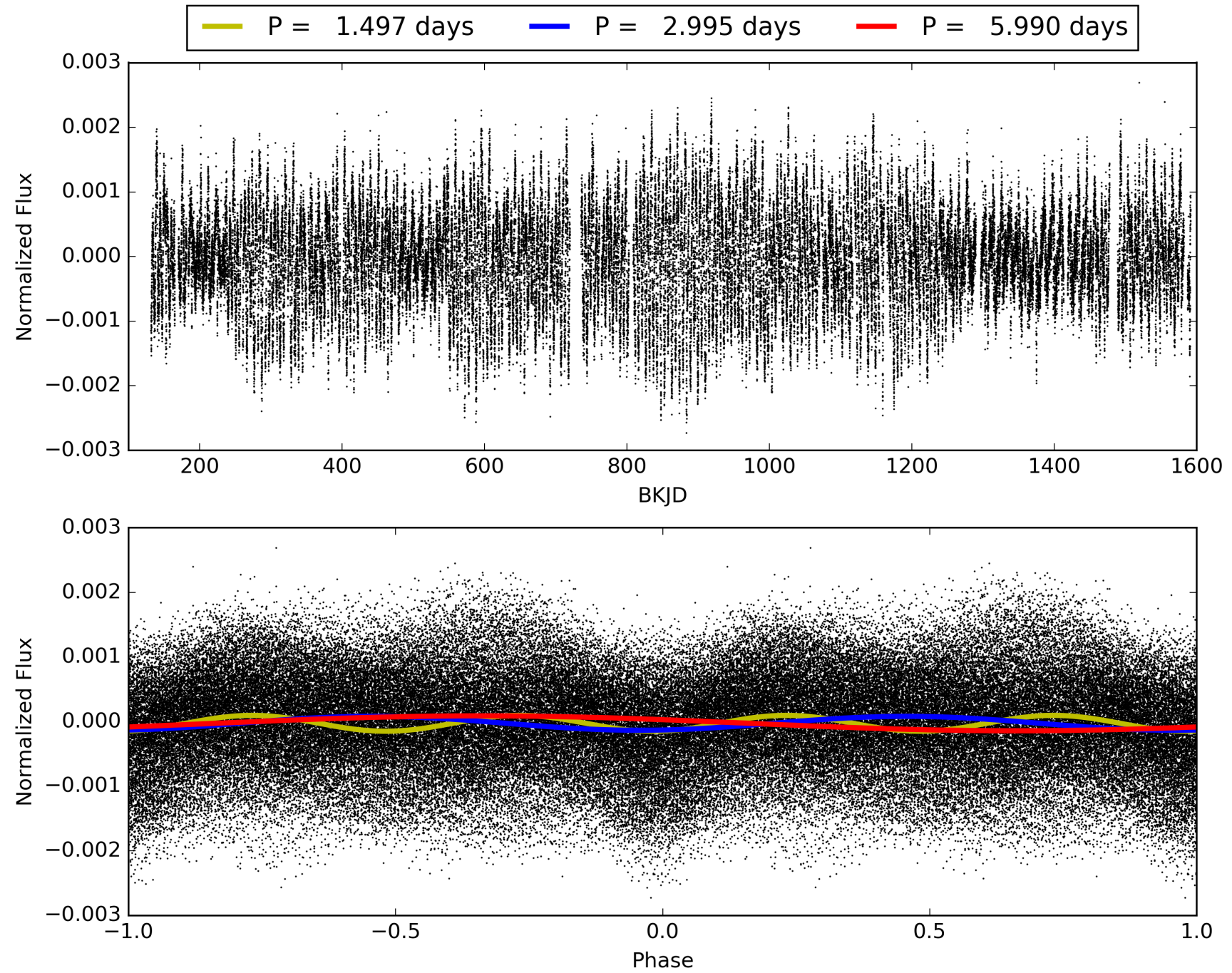
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 004949187-03, PDC Light Curves

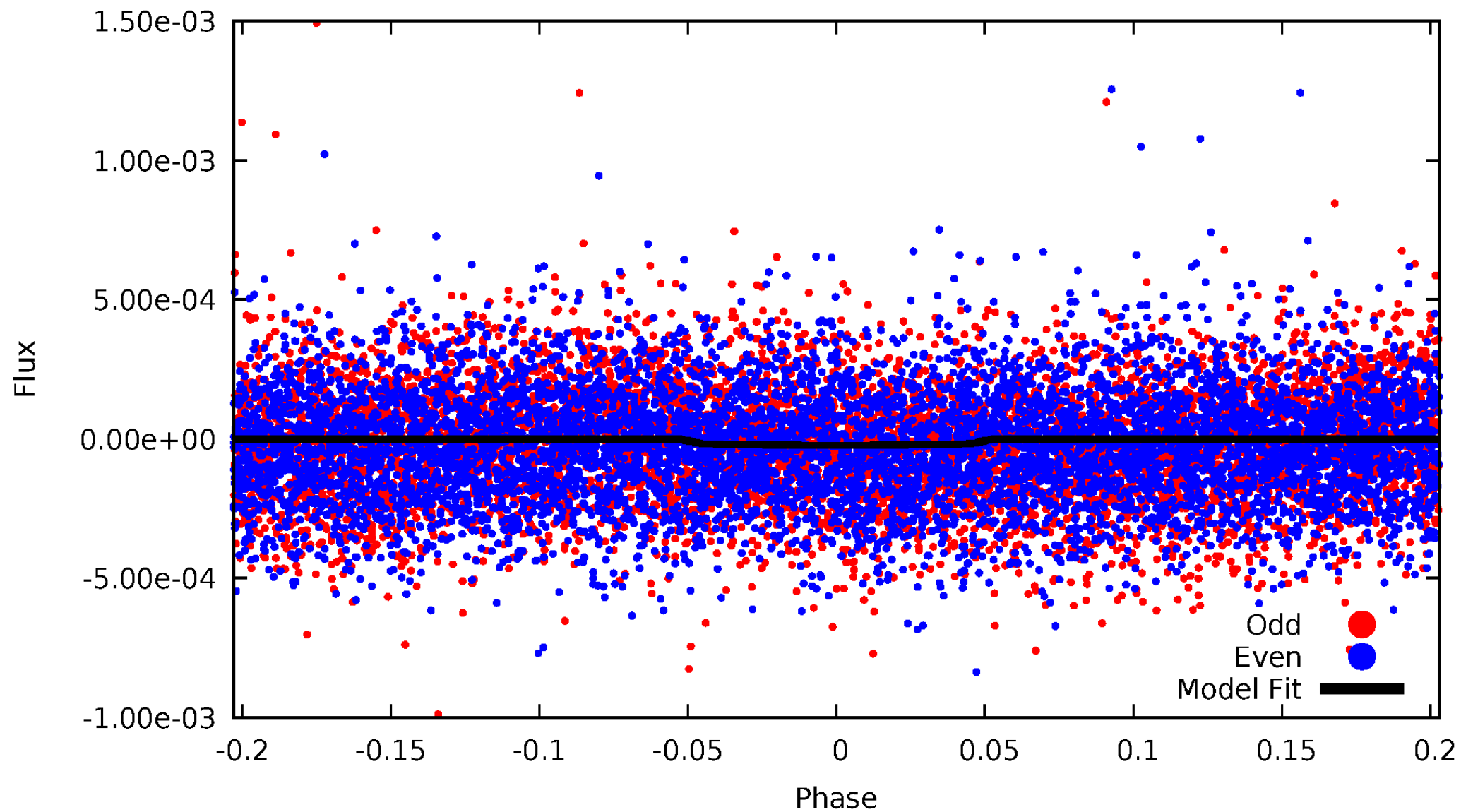


TCE 004949187-03



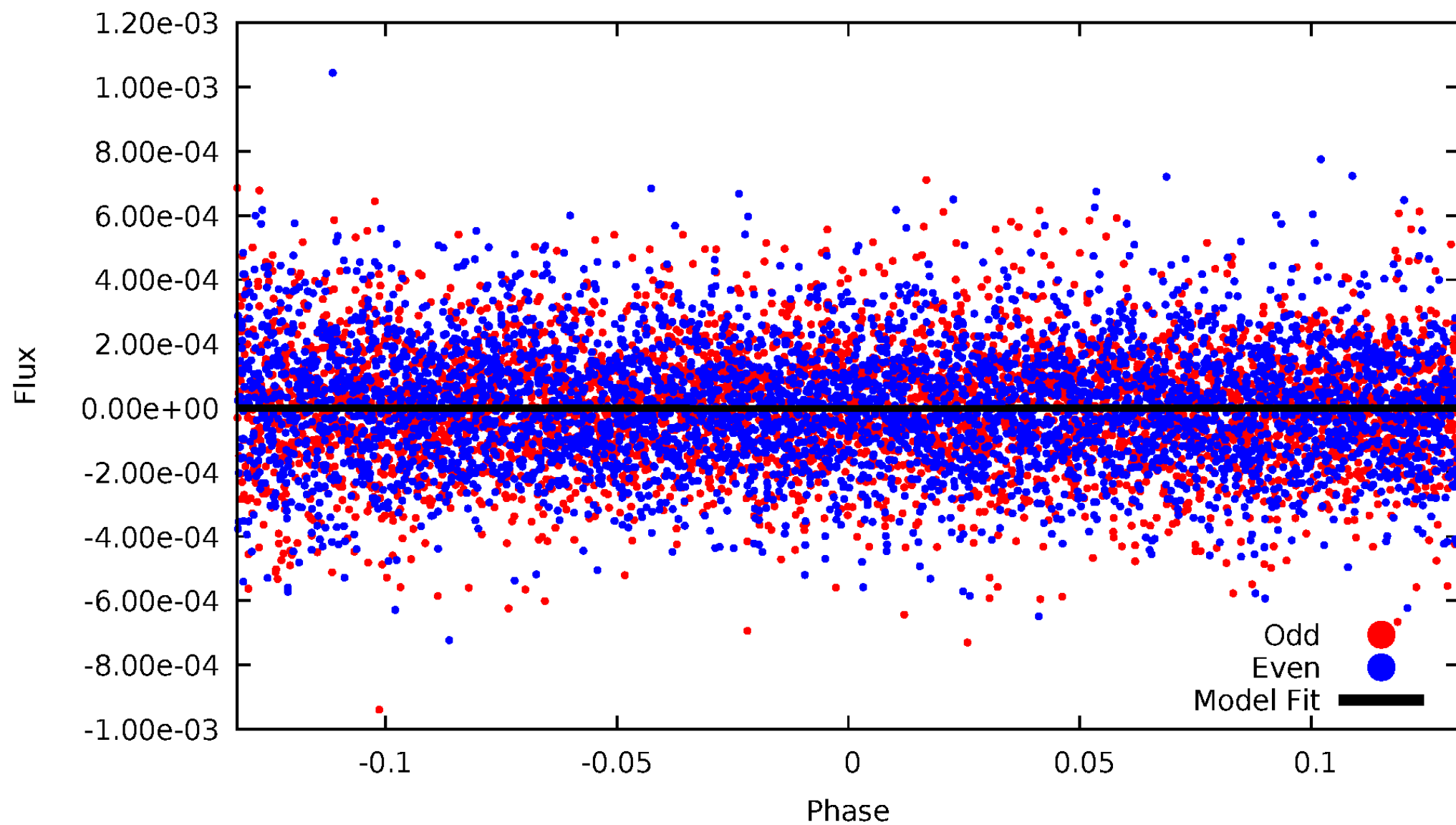
# DV Odd/Even

TCE 004949187-03



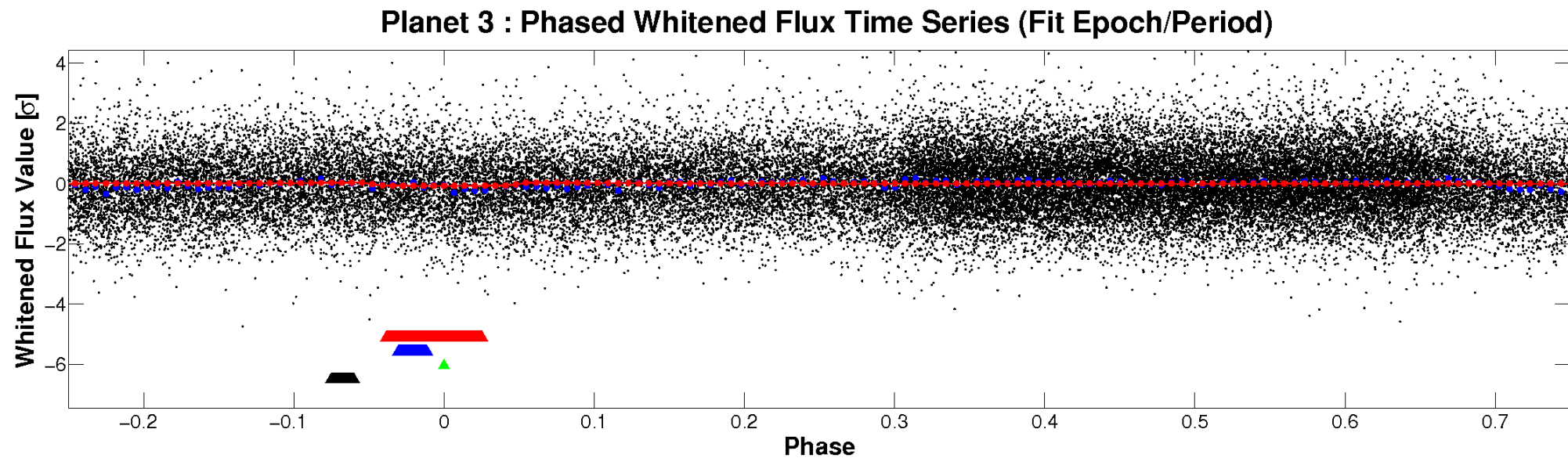
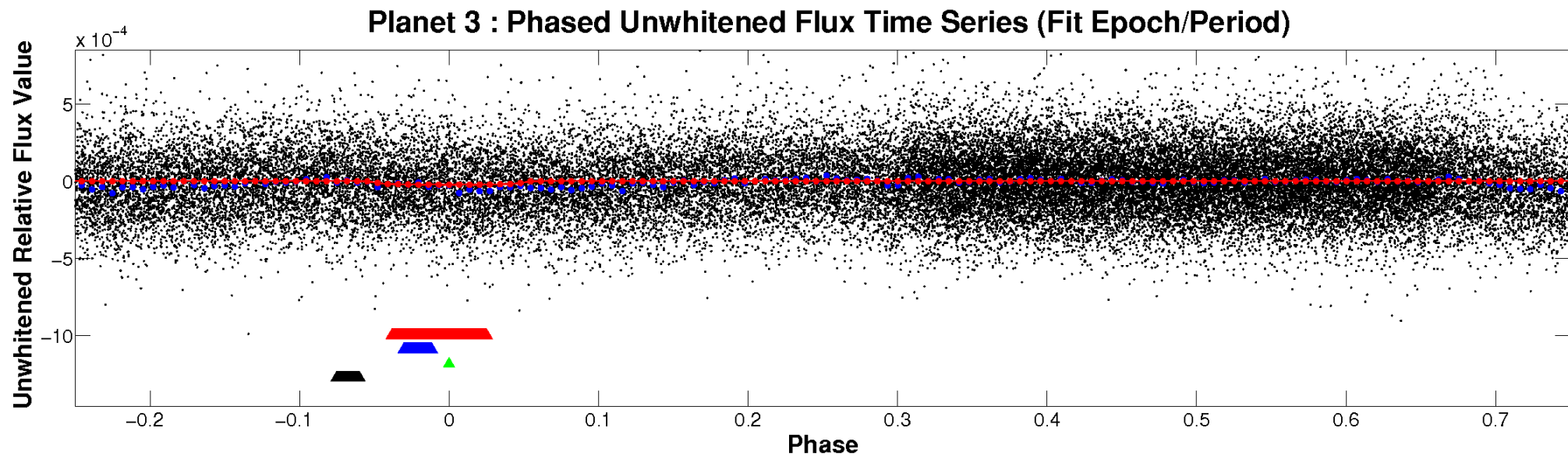
# ALT Odd/Even

TCE 004949187-03



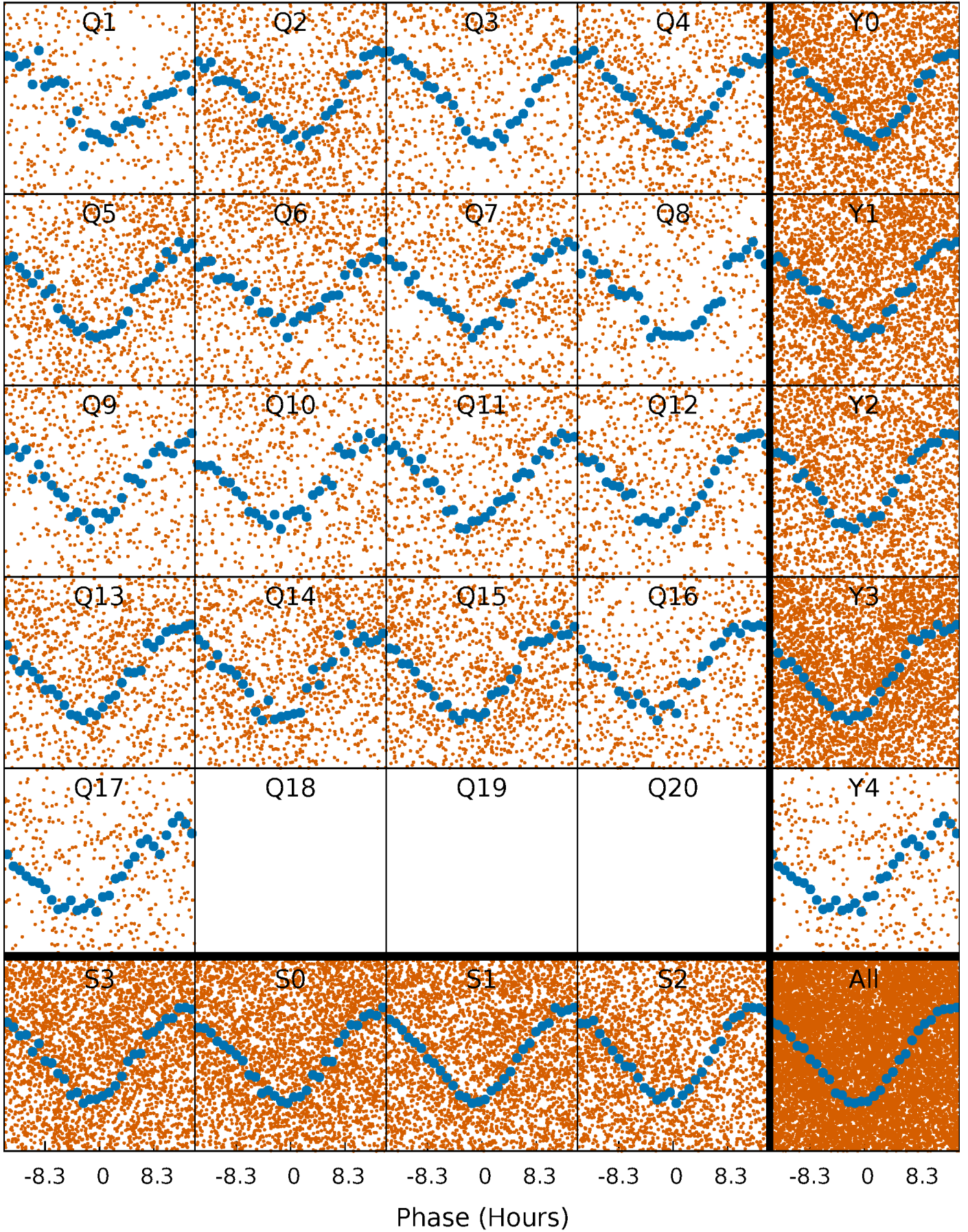


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

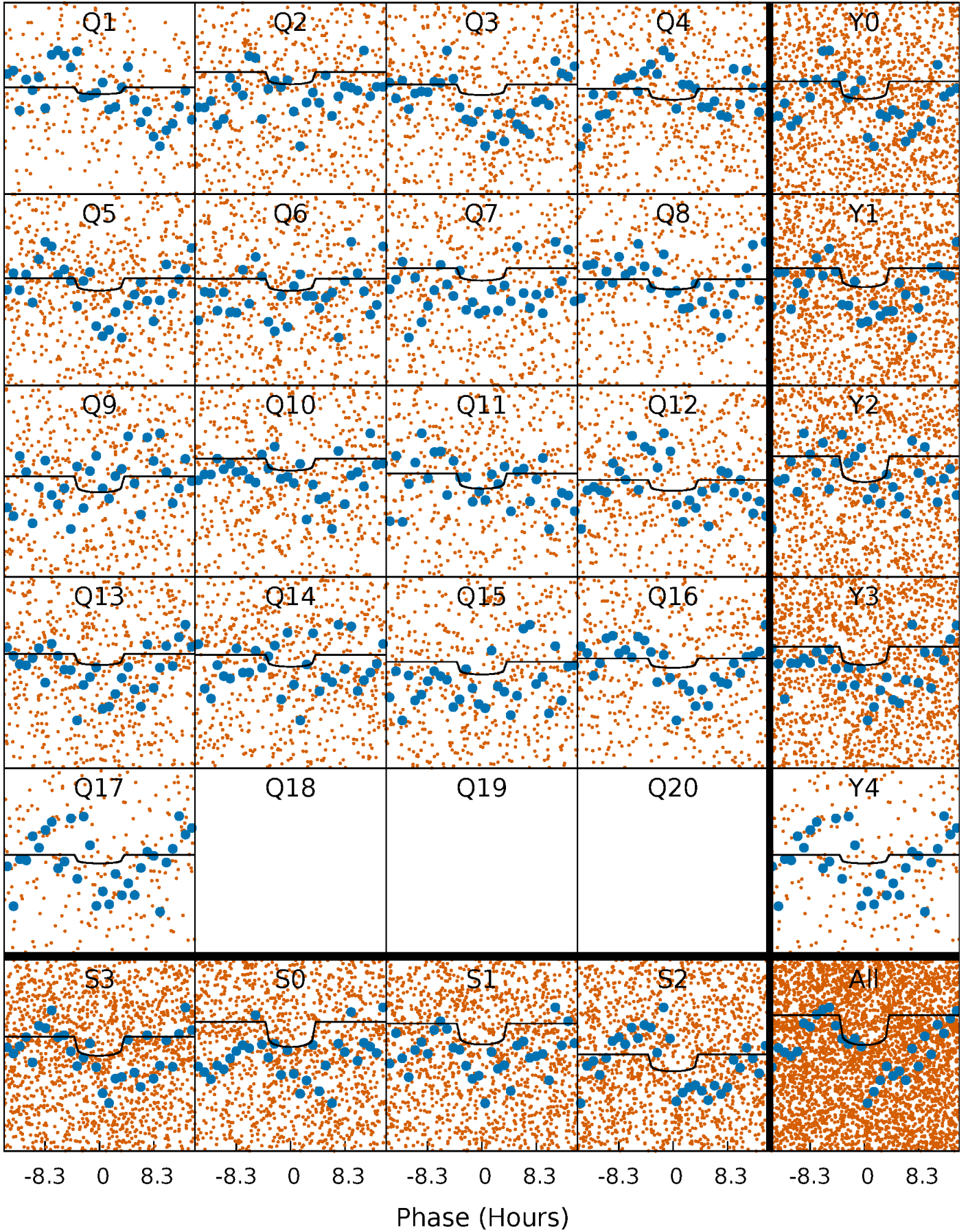
TCE 004949187-03   P= 2.994879 Days    $T_0=134.693476$  (BKJD)





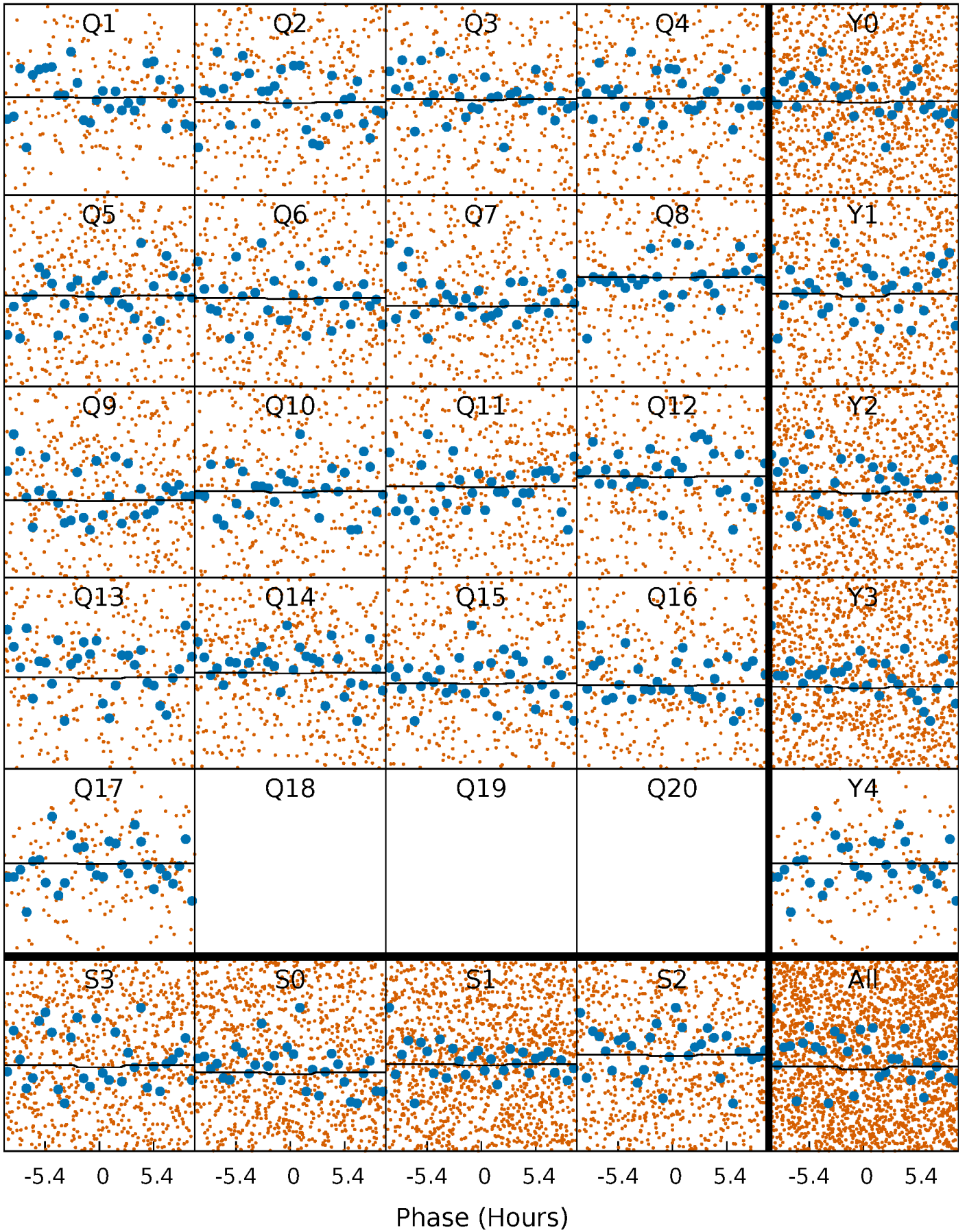
# DV Quarter-Phased Transit Curves

TCE 004949187-03   P= 2.994879 Days    $T_0=134.693476$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

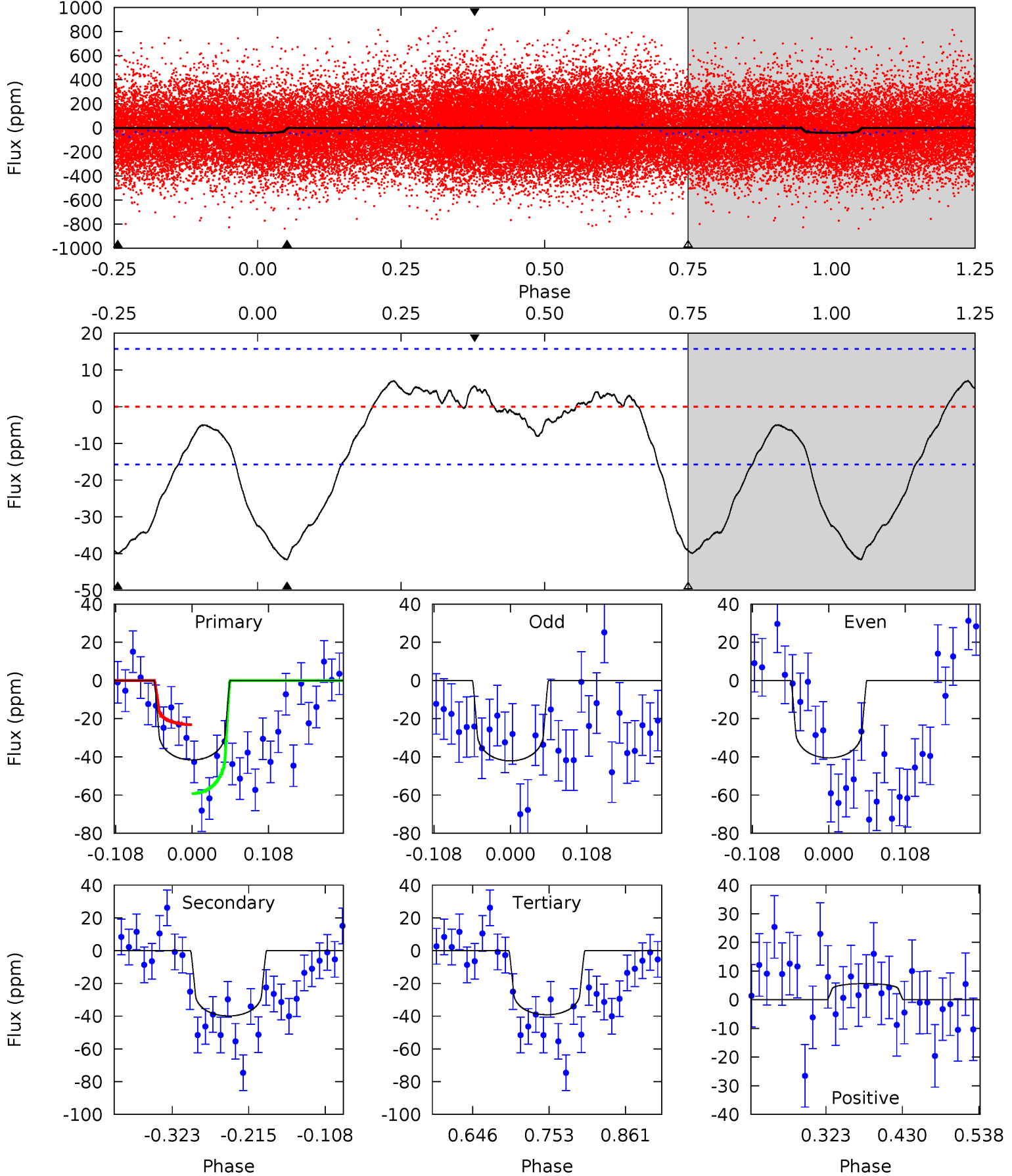
TCE 004949187-03   P= 2.994442 Days    $T_0=134.661681$  (BKJD)



# DV Model-Shift Uniqueness Test

004949187-03, P = 2.994879 Days, E = 131.698597 Days

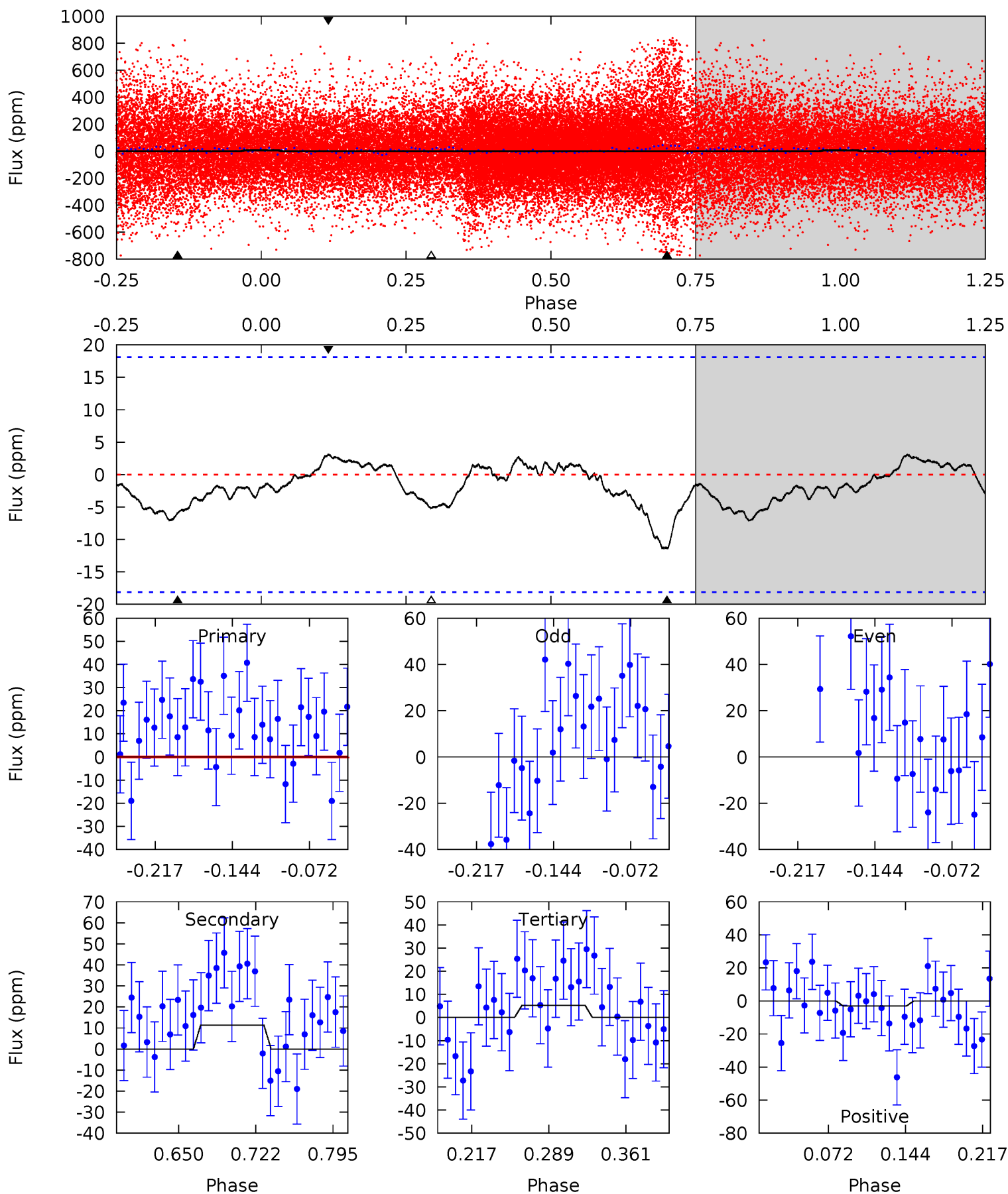
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.0	11.5	11.3	1.63	4.55	1.61	2.27	0.72	10.4	0.22	9.90	0.22	1.09	0.14	5.23



# Alt Model-Shift Uniqueness Test

004949187-03, P = 2.994442 Days, E = 131.667239 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
1.53	2.92	1.33	0.79	4.63	1.80	0.52	0.19	0.74	1.58	2.13	1.58	2.96	0.21	0.29





### Stellar Parameters For KIC 004949187

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6622^{+210}_{-257}$	$3.779^{+0.502}_{-0.089}$	$-0.220^{+0.300}_{-0.300}$	$2.633^{+0.550}_{-1.283}$	$1.519^{+0.212}_{-0.424}$	$0.117^{+0.640}_{-0.041}$
	+3%/-4%	+13%/-2%	+136%/-136%	+21%/-49%	+14%/-28%	+545%/-35%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 004949187-03 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-40 \pm 3$	$1.24^{+0.98}_{-0.72}$	$2935^{+246}_{-391}$	$7378^{+7071}_{-1725}$	$31^{+149}_{-22}$
Alt.	$-11 \pm 4$	$0.68^{+0.74}_{-0.47}$	$2944^{+226}_{-361}$	$7329^{+10767}_{-2250}$	$28^{+280}_{-22}$

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



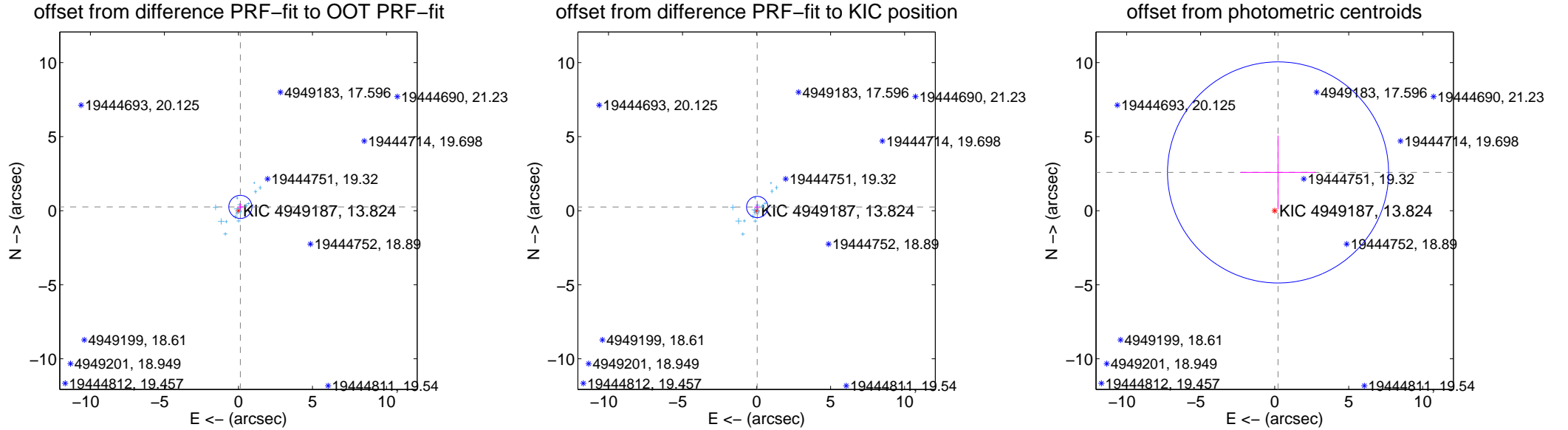
## DV Centroid Data

Supplemental centroid analysis for 004949187-03. Kepler magnitude: 13.82. Transit SNR 4.07

There are 17 quarters with good PRF difference image offsets

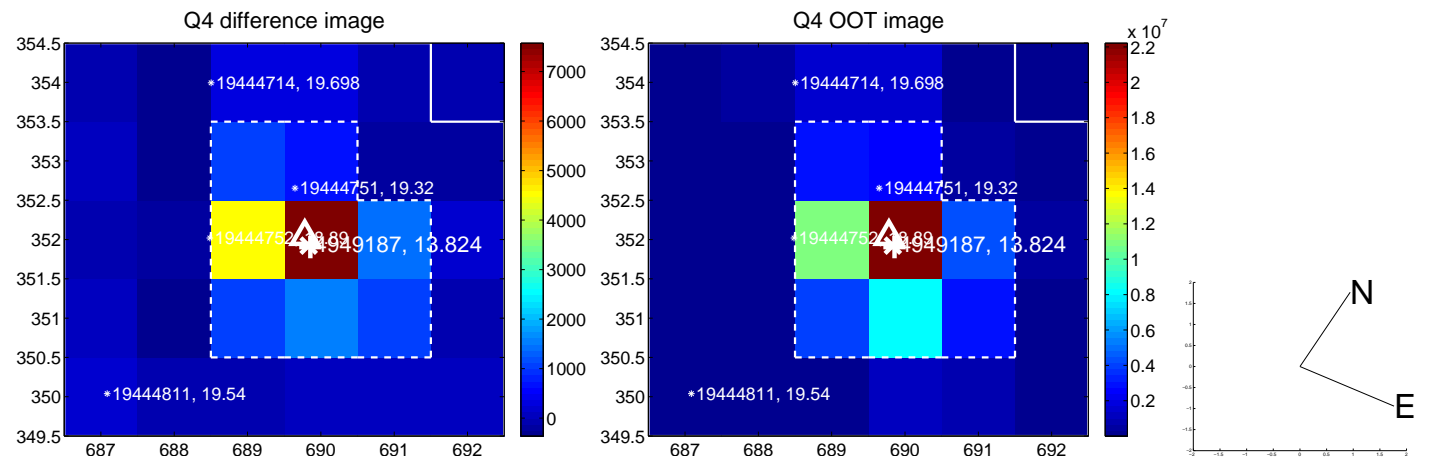
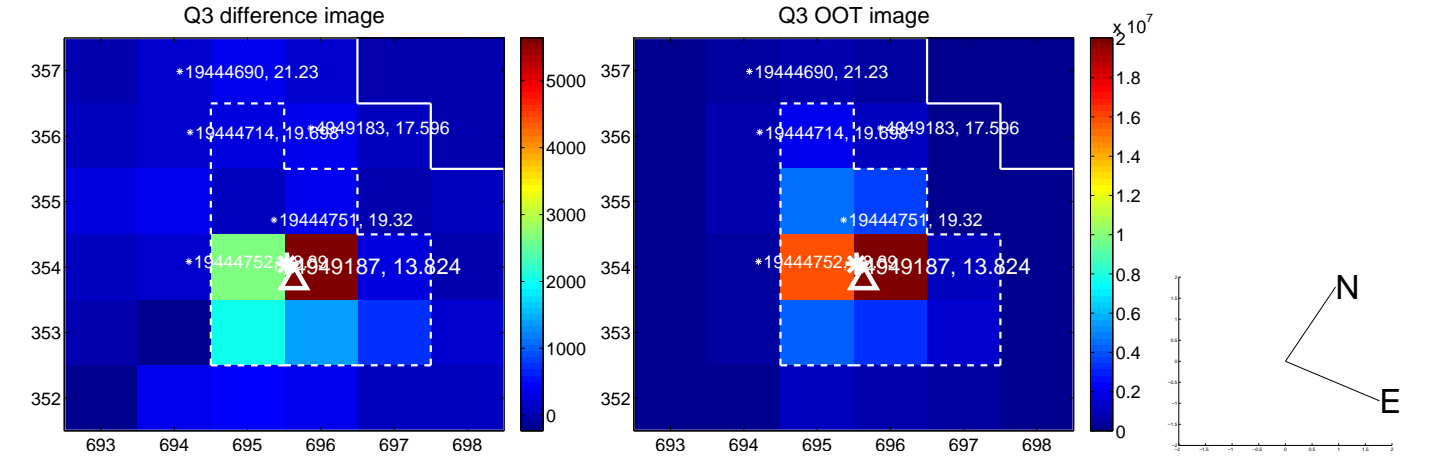
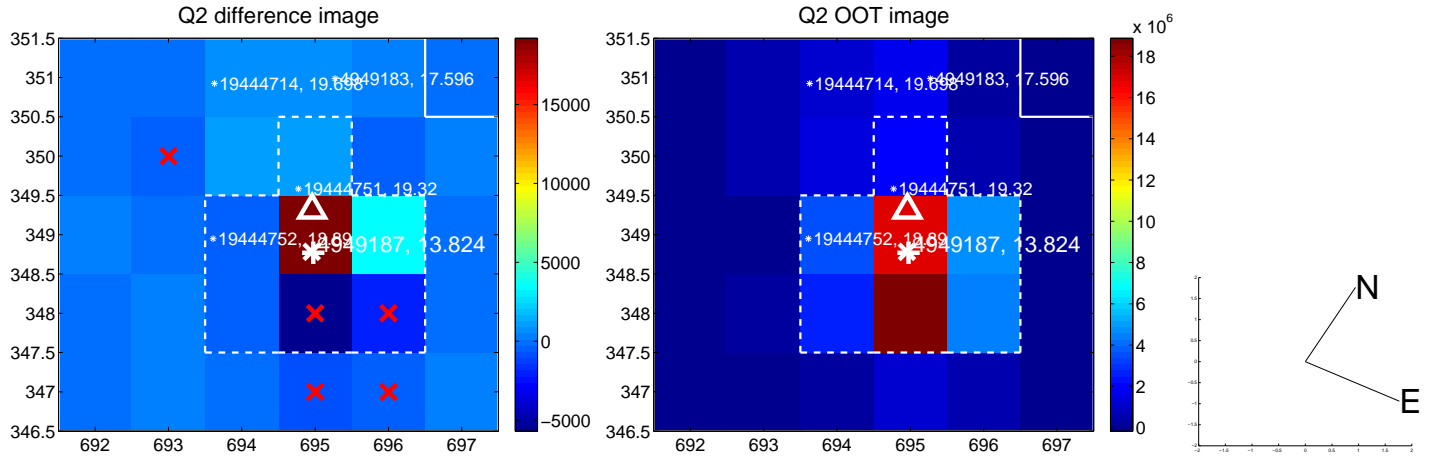
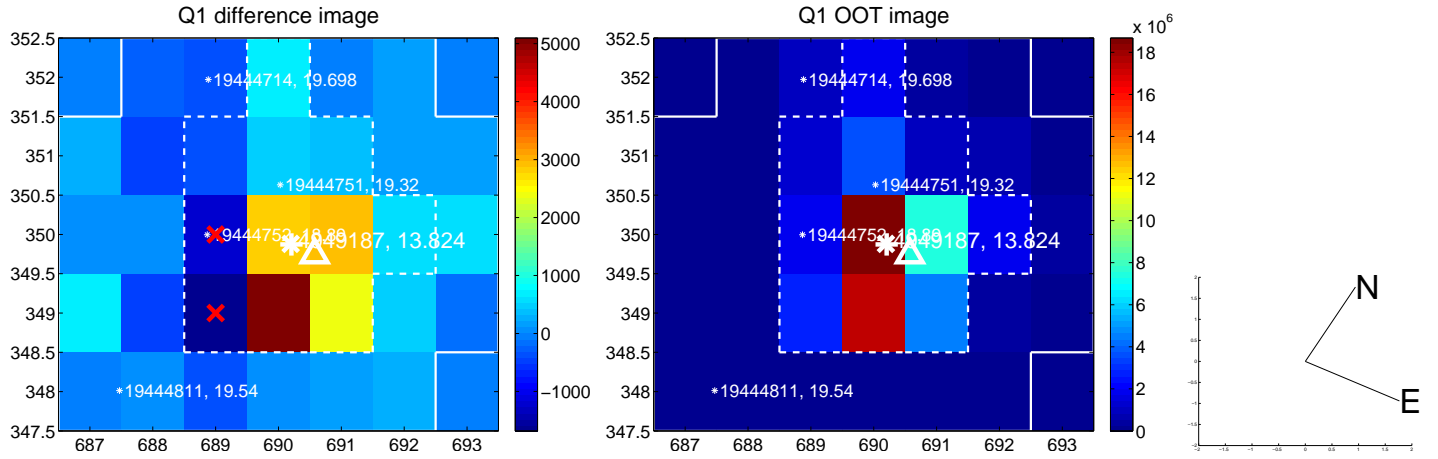
The direct PRF centroid is offset from the target star catalog position by about 0.06 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.288 \pm 0.261$	1.10	$-0.130 \pm 0.198$	$0.256 \pm 0.215$
PRF-fit source offset from KIC position	$0.253 \pm 0.240$	1.05	$-0.044 \pm 0.193$	$0.249 \pm 0.219$
photometric centroid source offset	$2.59 \pm 2.49$	1.04	$-0.23 \pm 2.55$	$2.58 \pm 2.49$

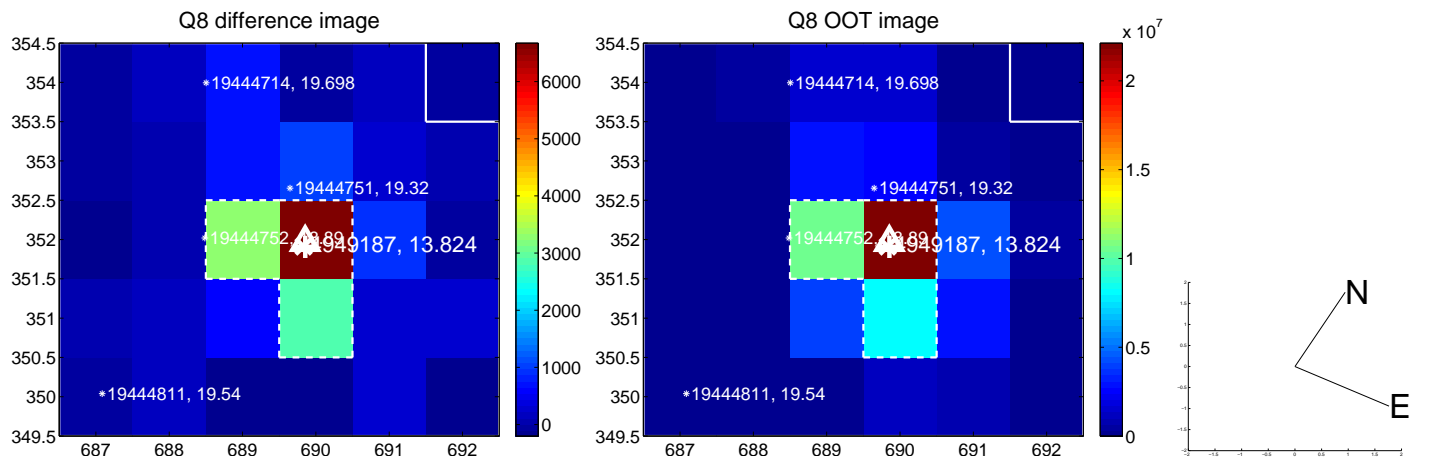
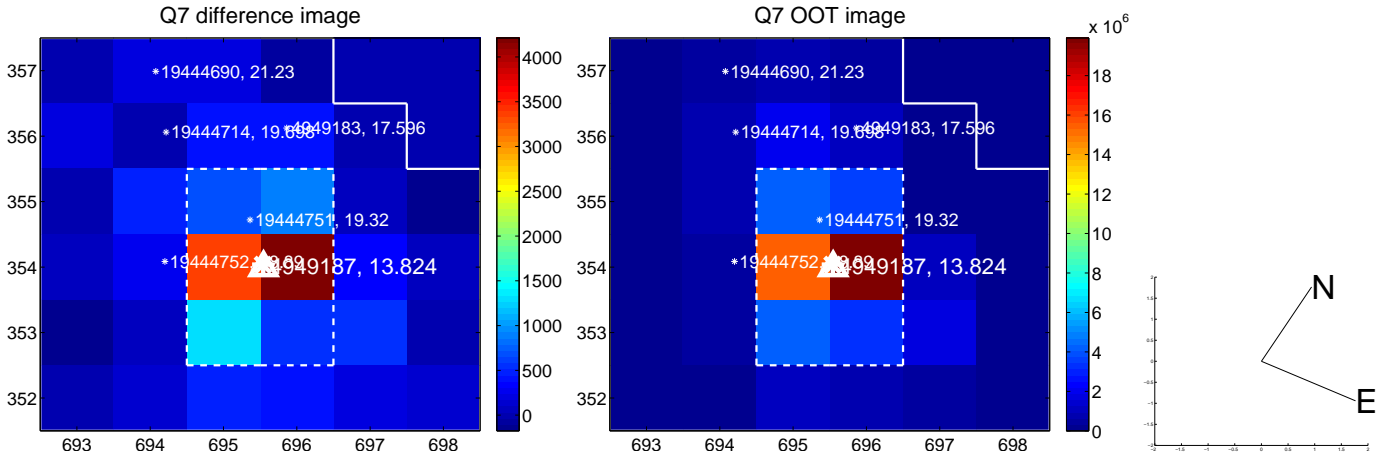
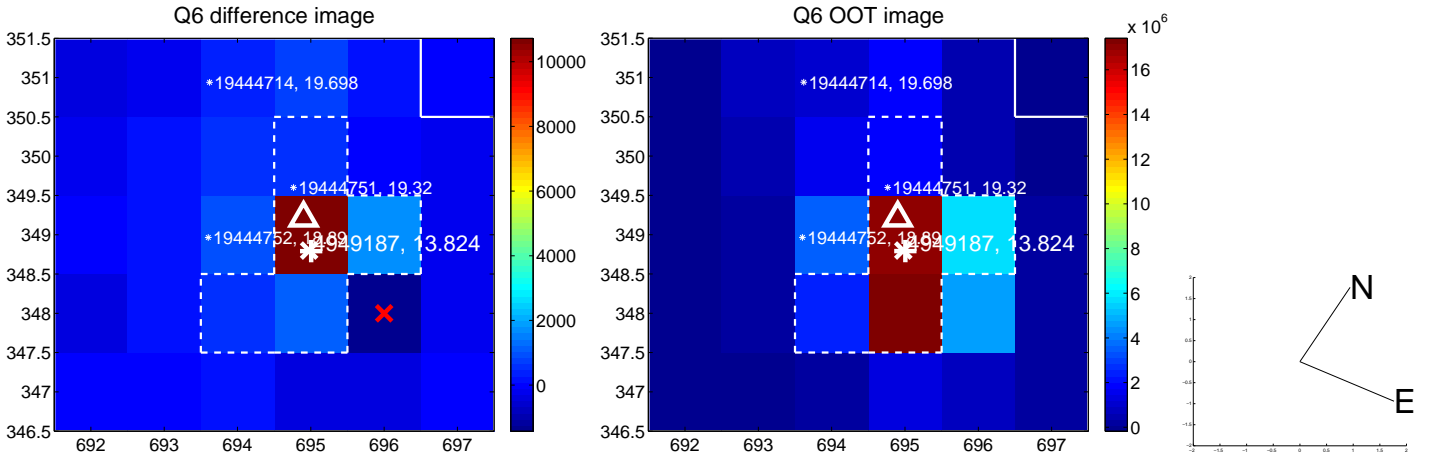
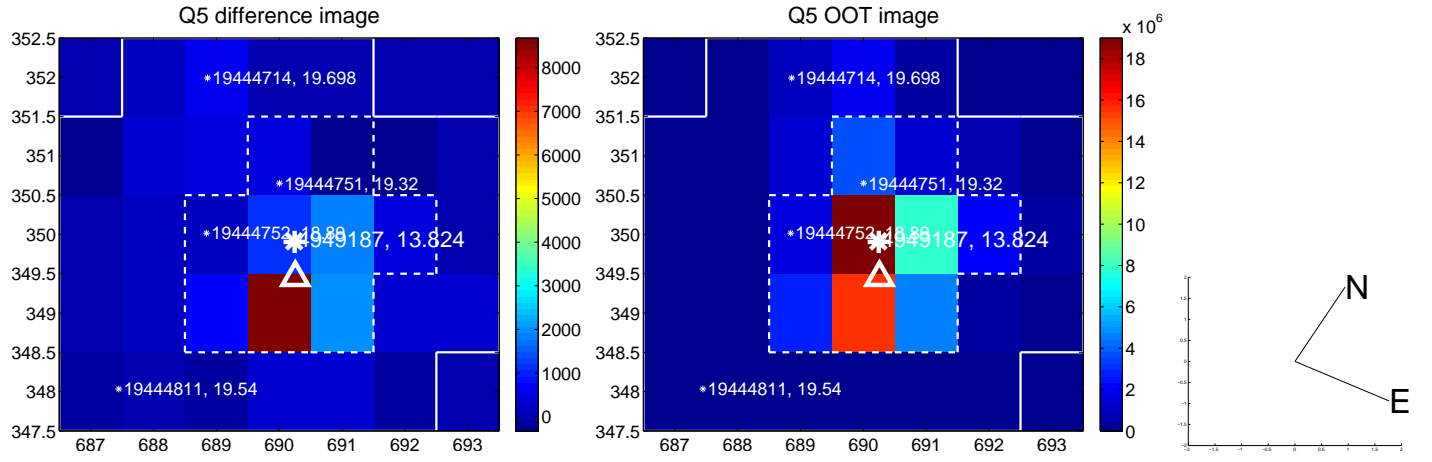


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

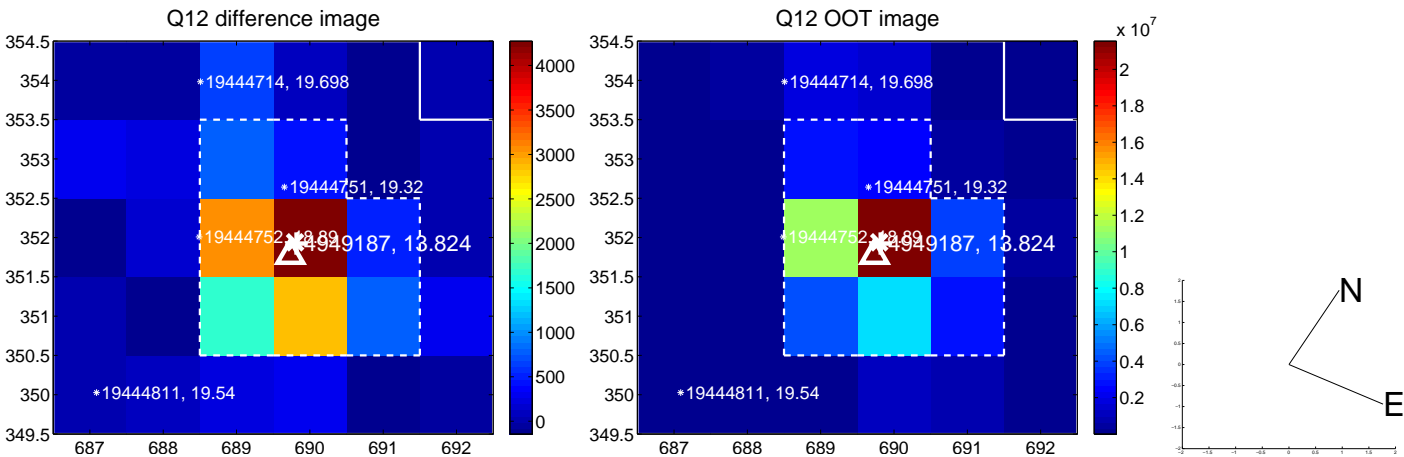
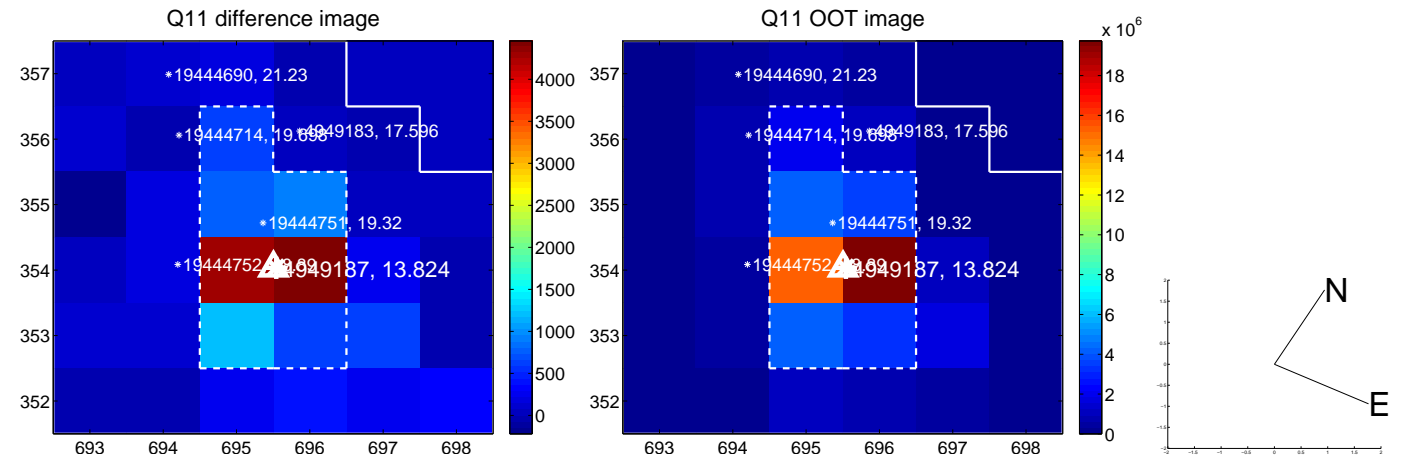
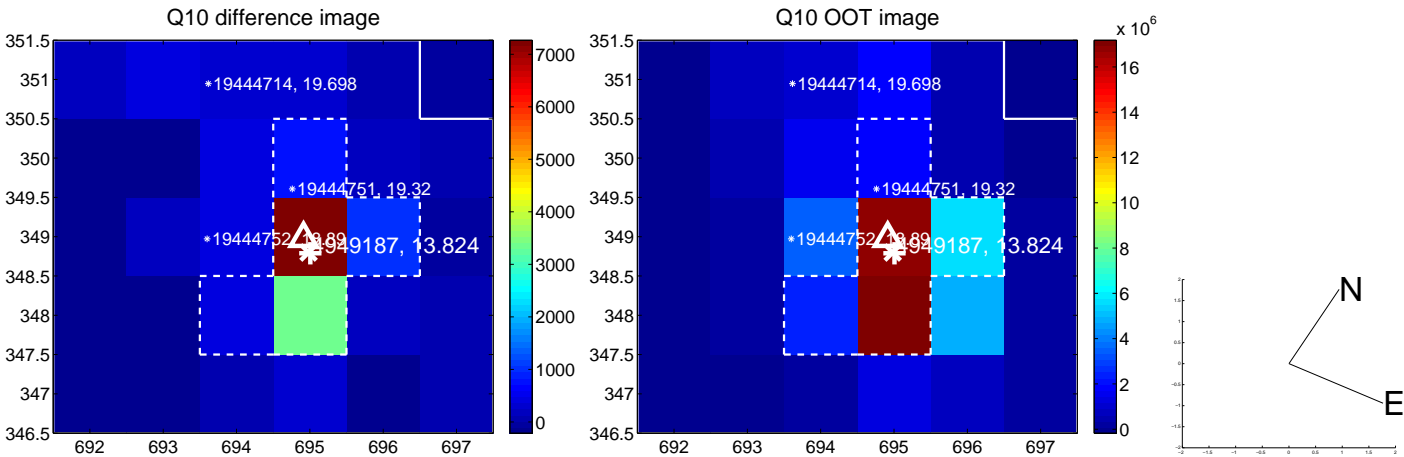
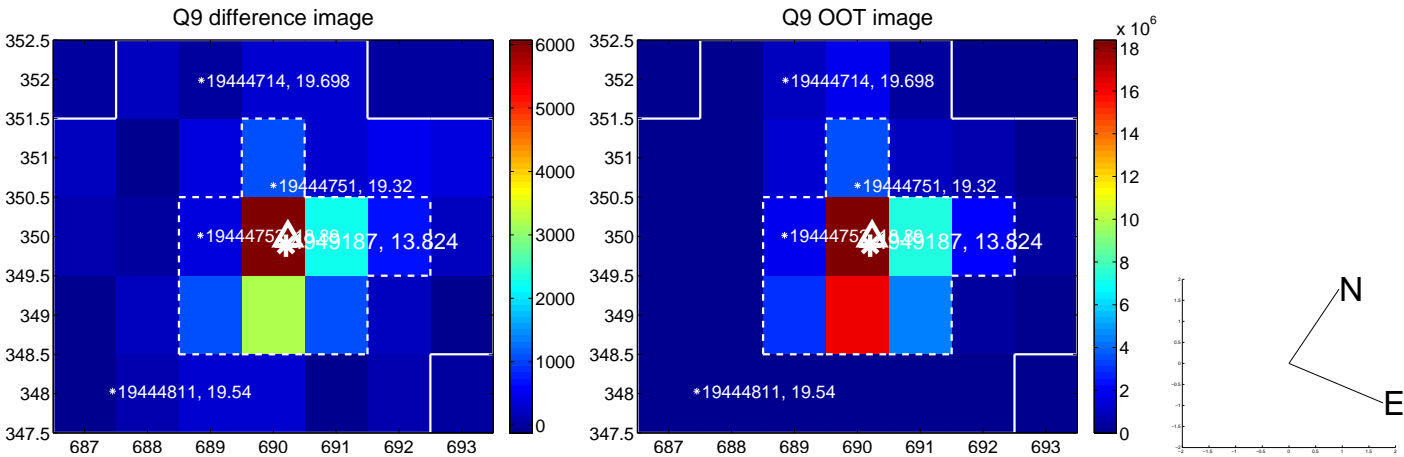
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



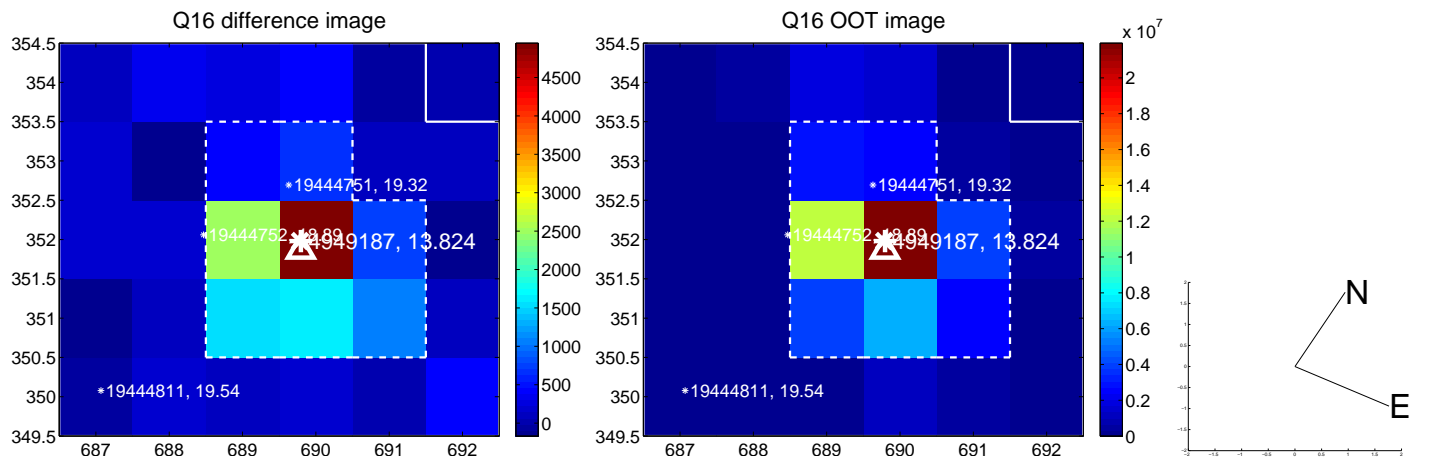
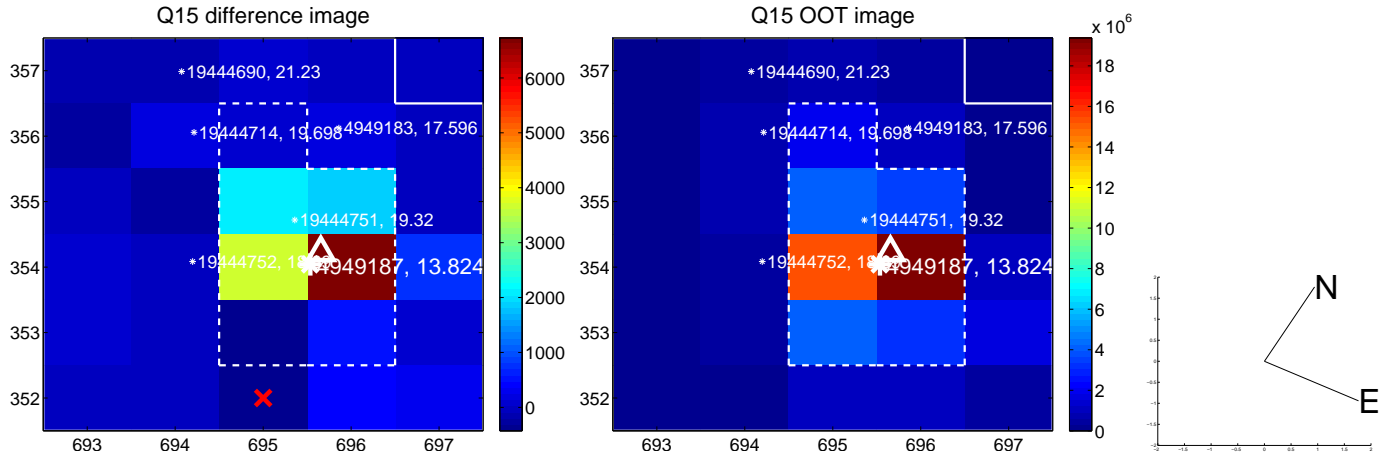
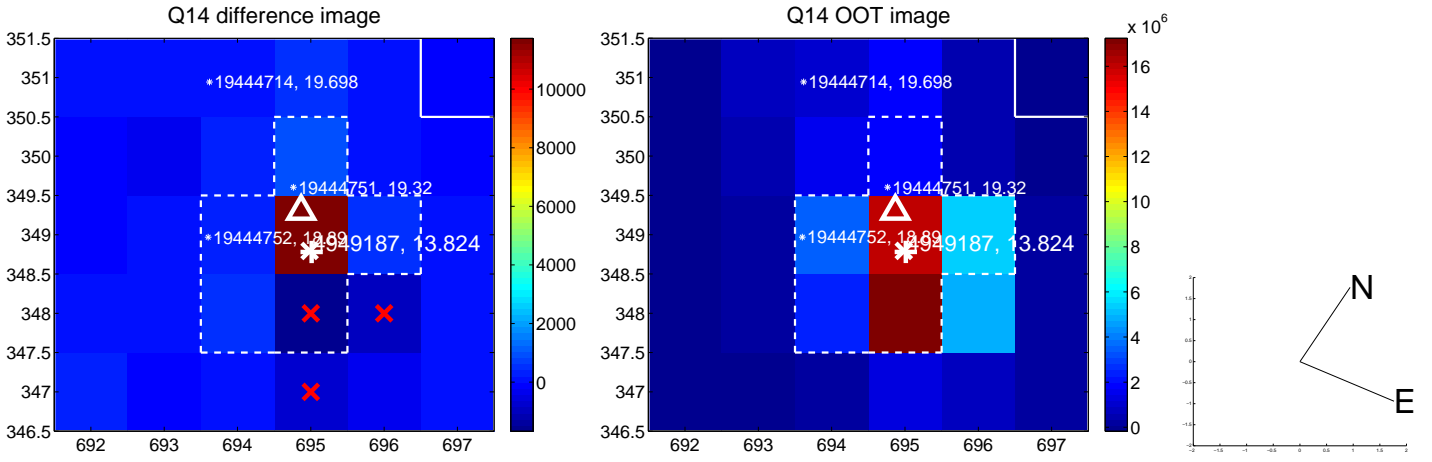
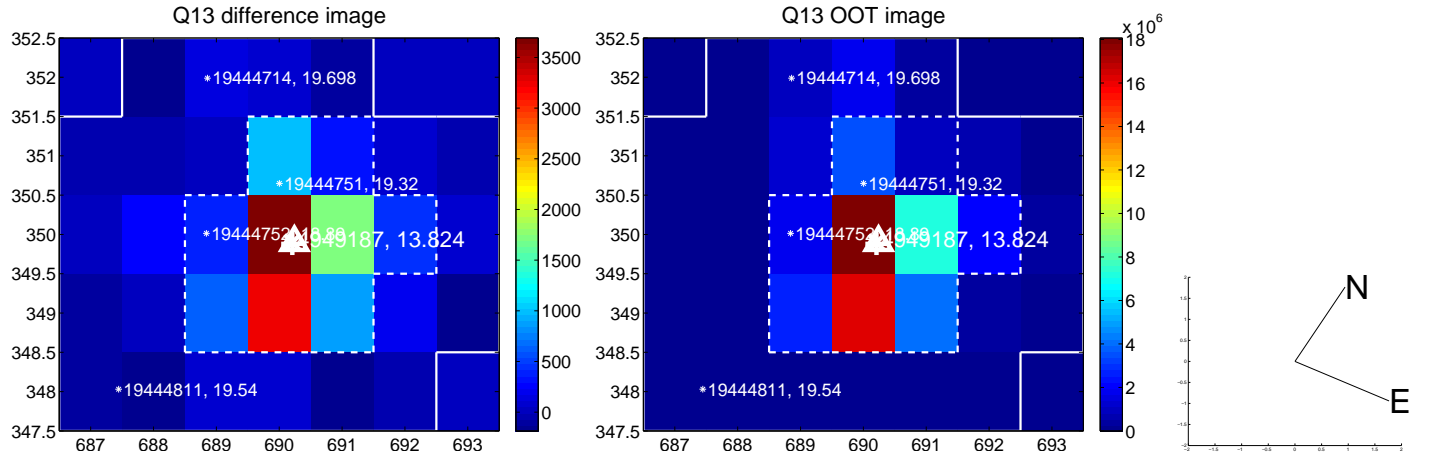
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

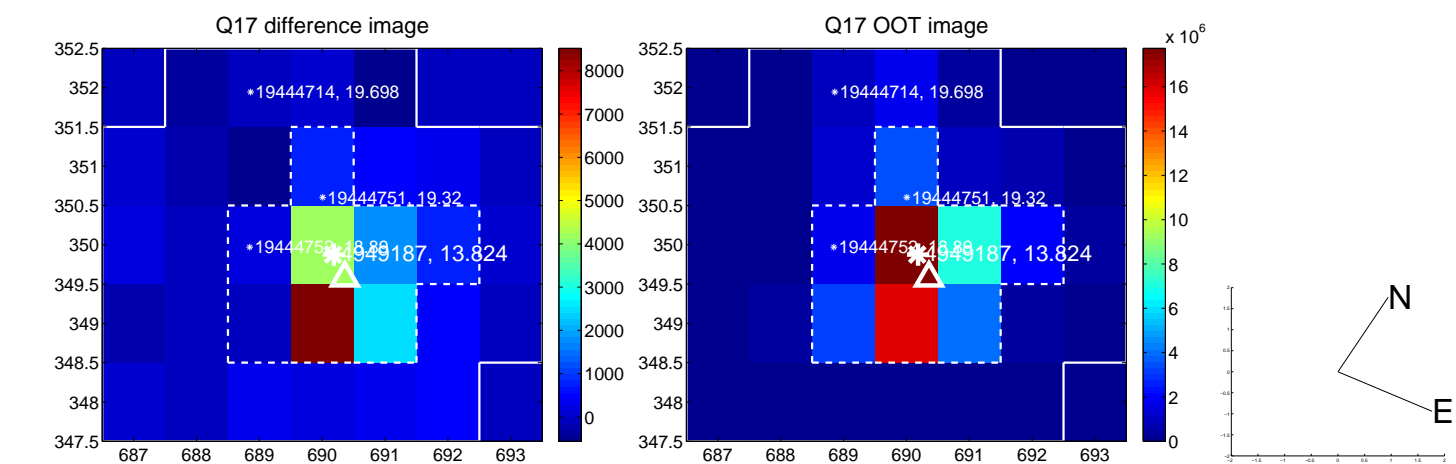


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

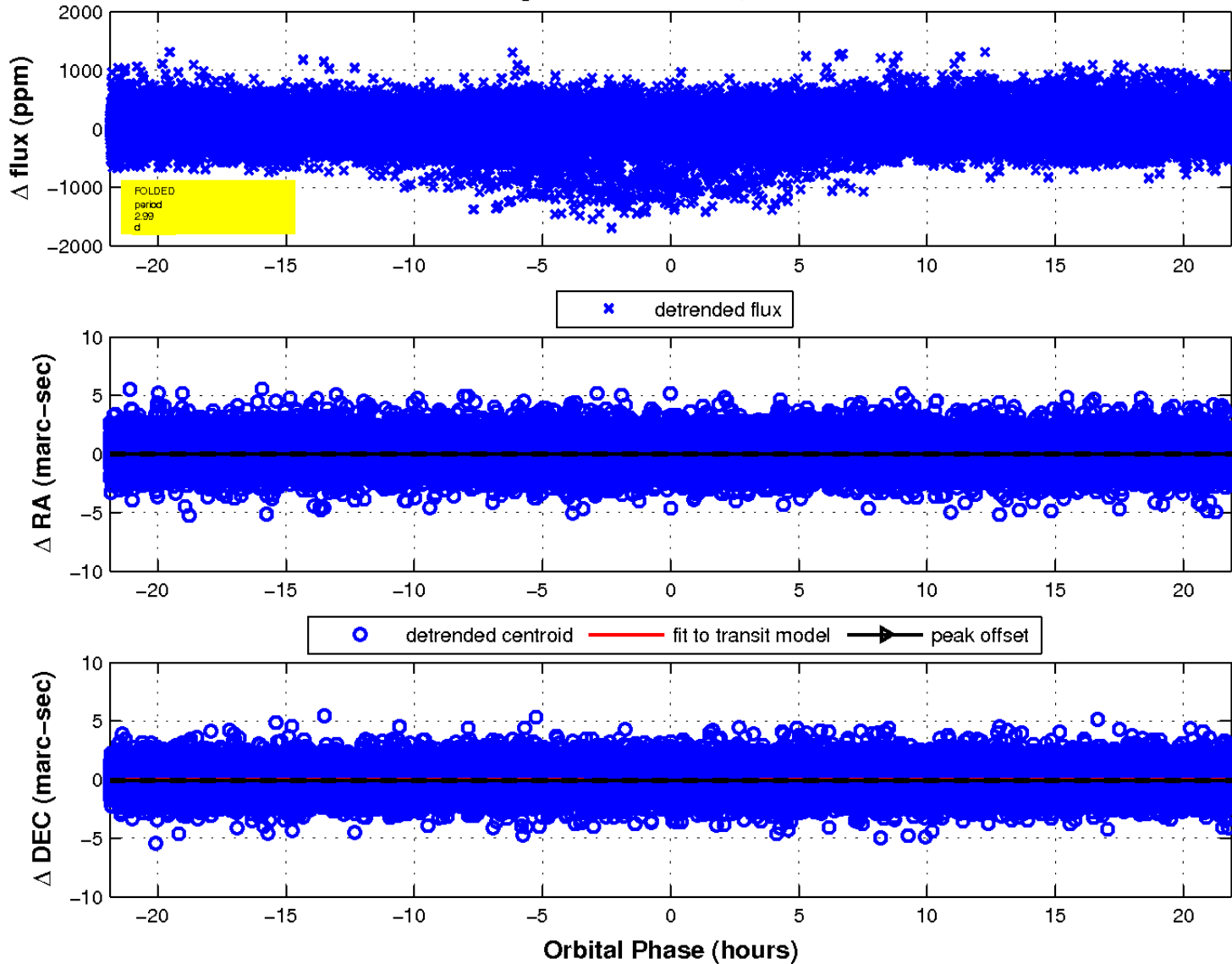




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

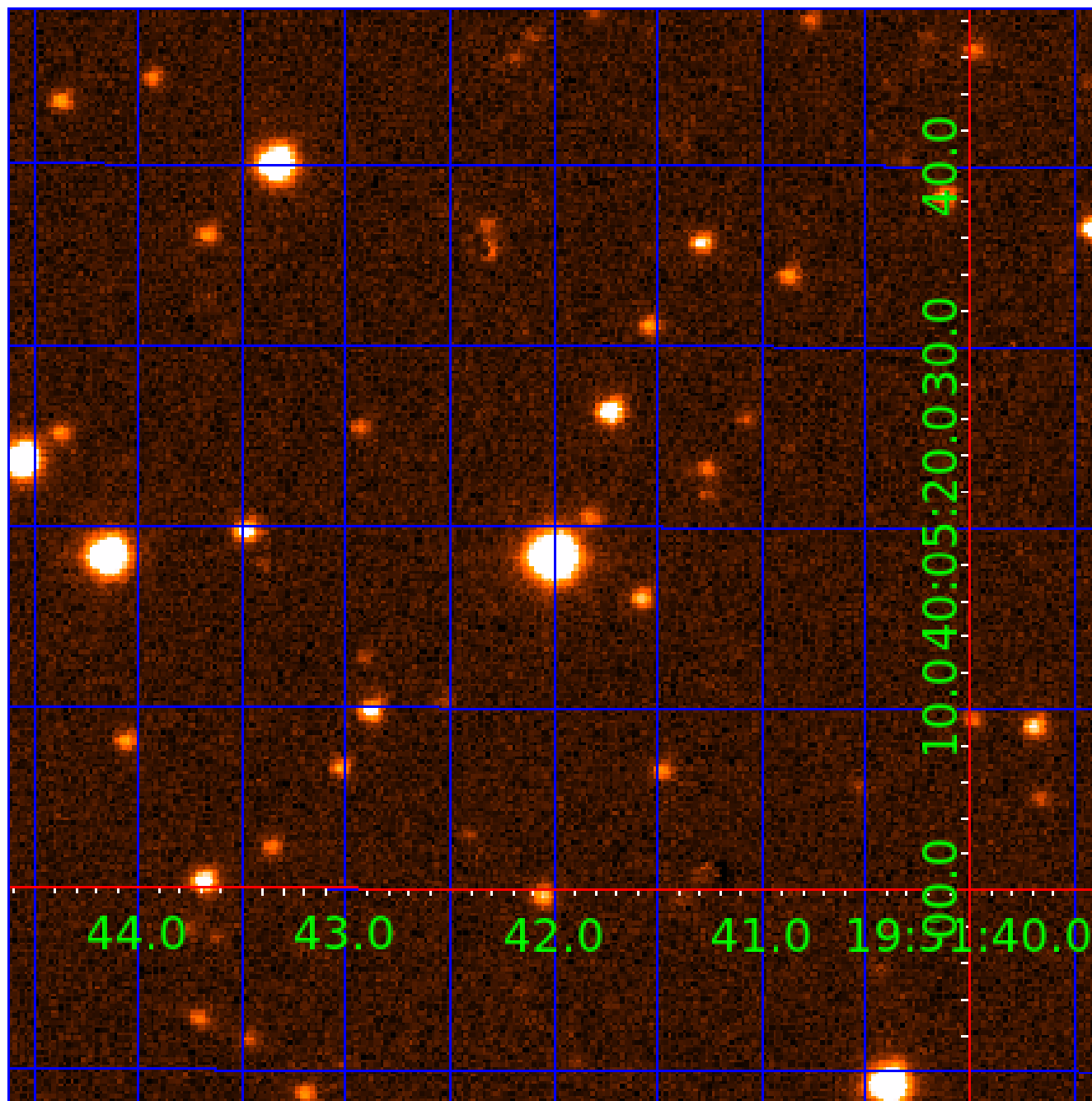


fluxWeightedCentroids, Planet 3 of 4



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# KIC 004949187

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004949187-01	OBS	No	11.977951	140.758398	182.8	14.849	18.7	18.6	2.63	6622	5.97	860.28
004949187-02	OBS	No	11.979059	131.663800	91.0	15.489	11.8	11.4	2.63	6622	2.64	860.18
004949187-03	OBS	No	2.994879	134.693476	22.4	7.290	9.3	4.1	2.63	6622	1.42	5461.51
004949187-04	OBS	No	2.994785	134.514149	70.3	35.937	9.6	8.0	2.63	6622	2.22	5461.74

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004949187-01	OBS	FP	0.00	1	0	0	0	LPP_DV
004949187-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—SAME_NTL_PERIOD
004949187-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE_ZUMA_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—SAME_NTL_PERIOD
004949187-04	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_FEW_DIFFS

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

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

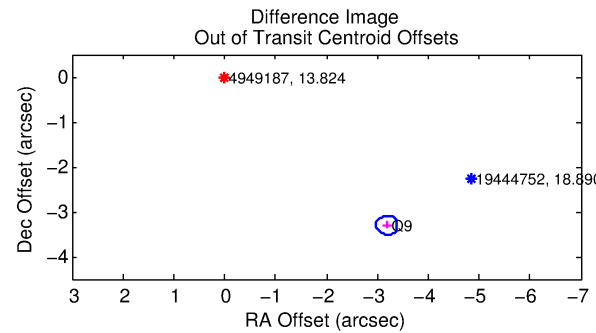
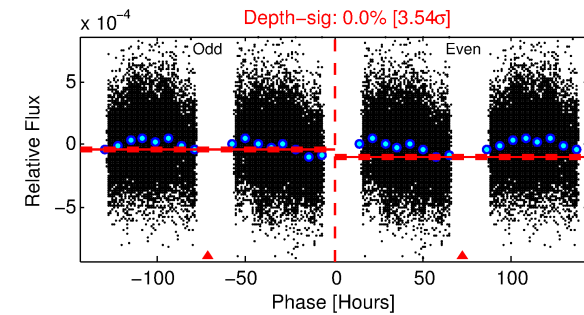
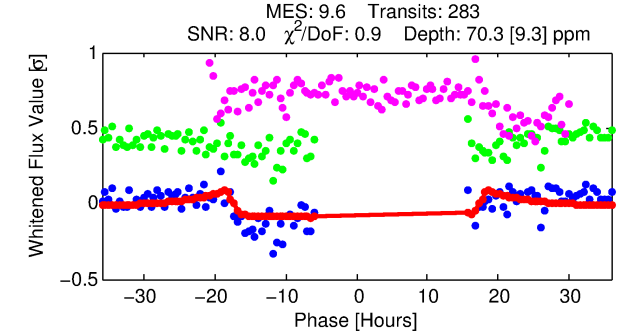
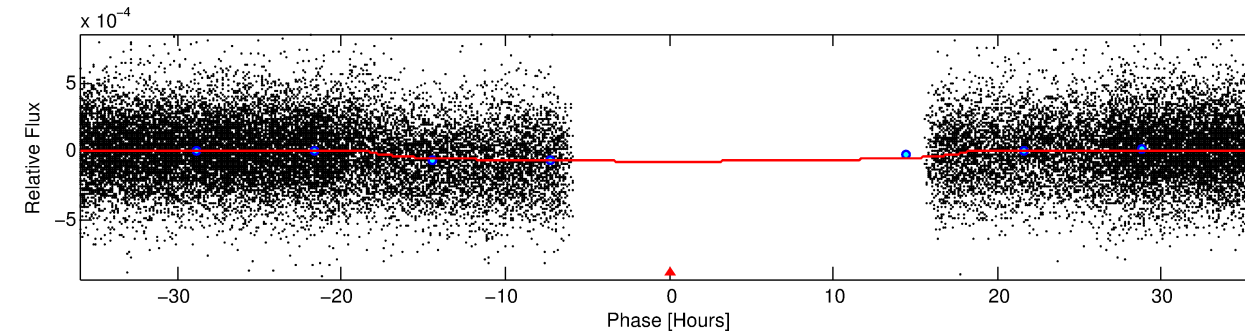
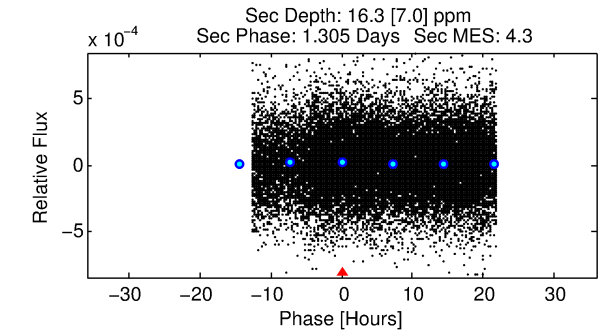
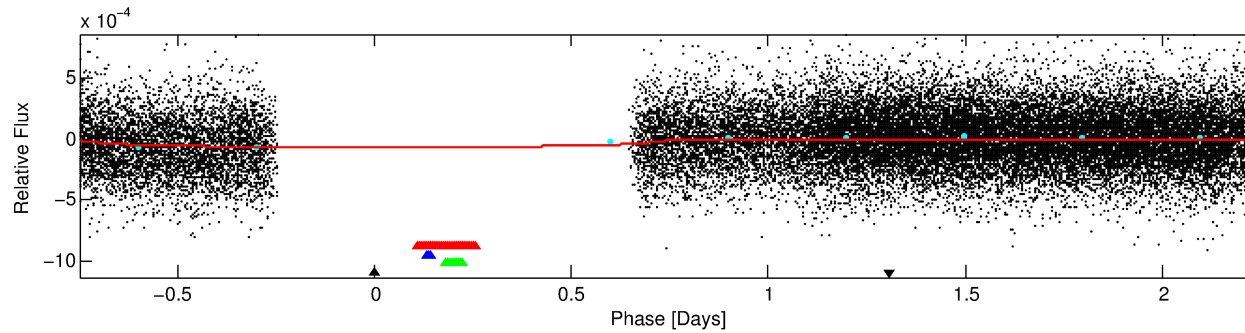
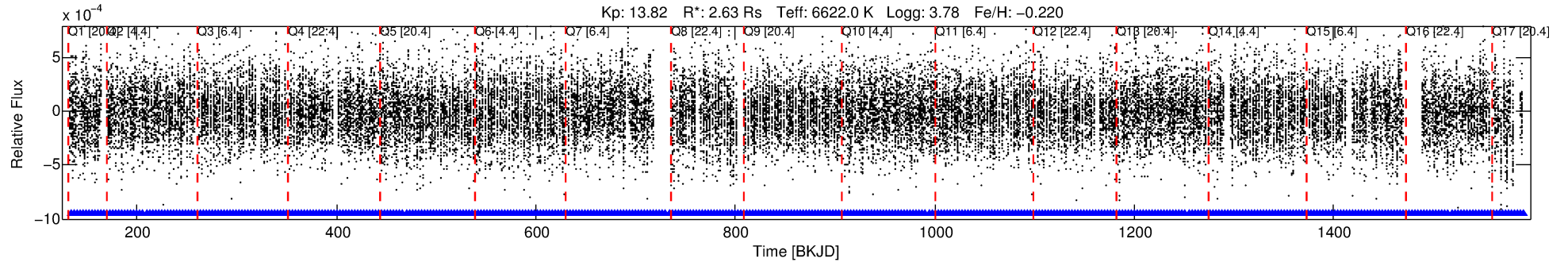
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004949187-04

No Significant Match Found

# DV One-Page Summary

KIC: 4949187 Candidate: 4 of 4 Period: 2.995 d



## DV Fit Results:

Period = 2.99478 [0.00007] d  
Epoch = 134.5141 [0.0148] BKJD  
Rp/R\* = 0.0077 [0.0010]  
a/R\* = 1.00 [0.00]  
b = 0.06 [9.57]  
Seff = 5461.74 [4645.53]  
Teq = 2192 [466] K  
Rp = 2.22 [1.12] Re  
a = 0.0468 [0.0236] AU  
Ag = 3.97 [3.86] [0.77σ]  
Teffp = 4784 [623] K [3.33σ]

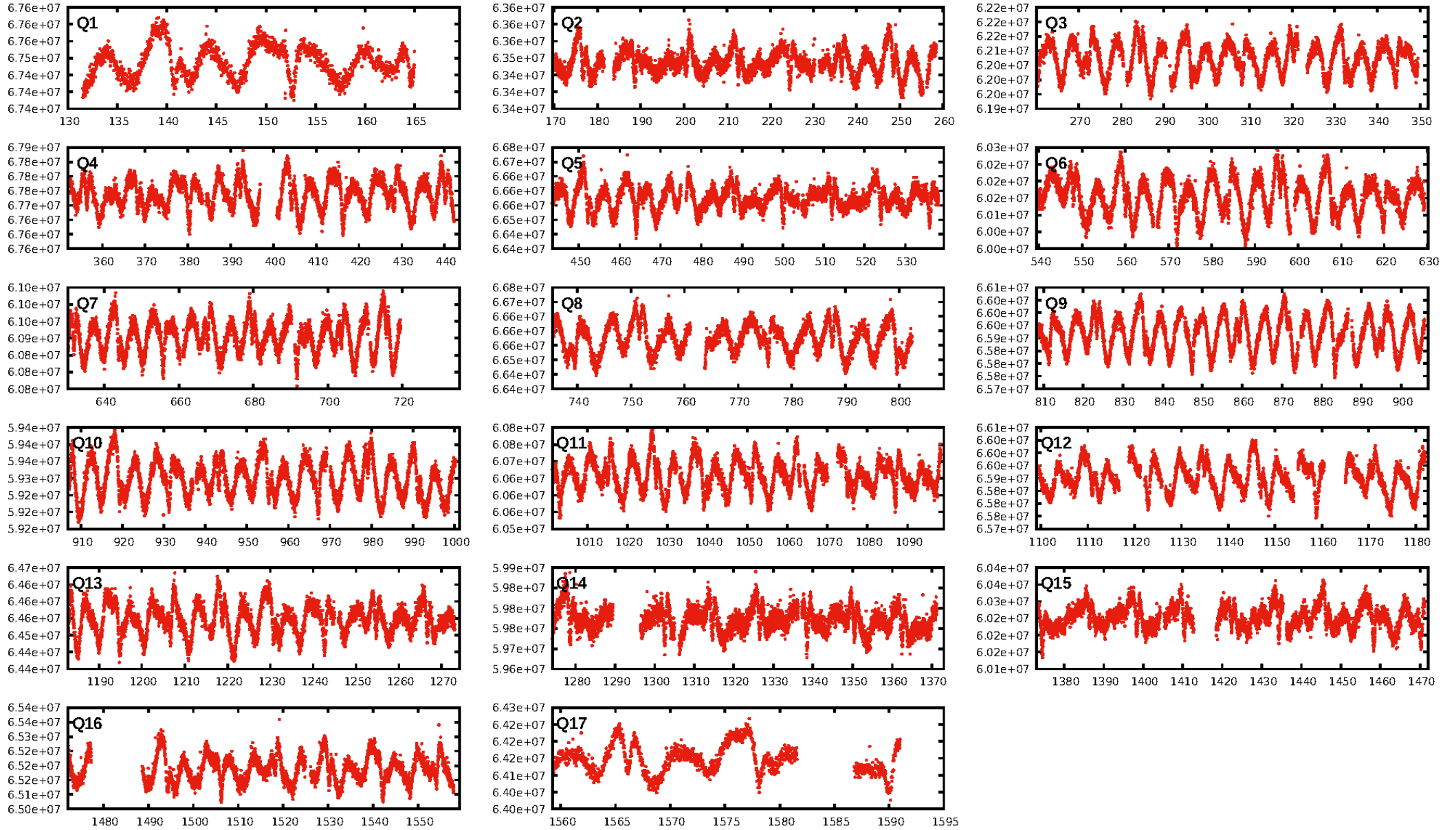
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [269/269]  
GhostDiagnostic-chr: 0.7576  
Centroid-sig: 25.2%  
Centroid-so: 0.565 arcsec [1.43σ]  
OotOffset-rm: 4.589 arcsec [65.97σ]  
KicOffset-rm: 4.607 arcsec [66.24σ]  
OotOffset-st: 0/0/0/1 [1]  
KicOffset-st: 0/0/0/1 [1]  
DiffImageQuality-fgm: 0.00 [0/1]  
DiffImageOverlap-fno: 0.00 [0/17]

Software Revision: svn-ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 00:46:45 Z

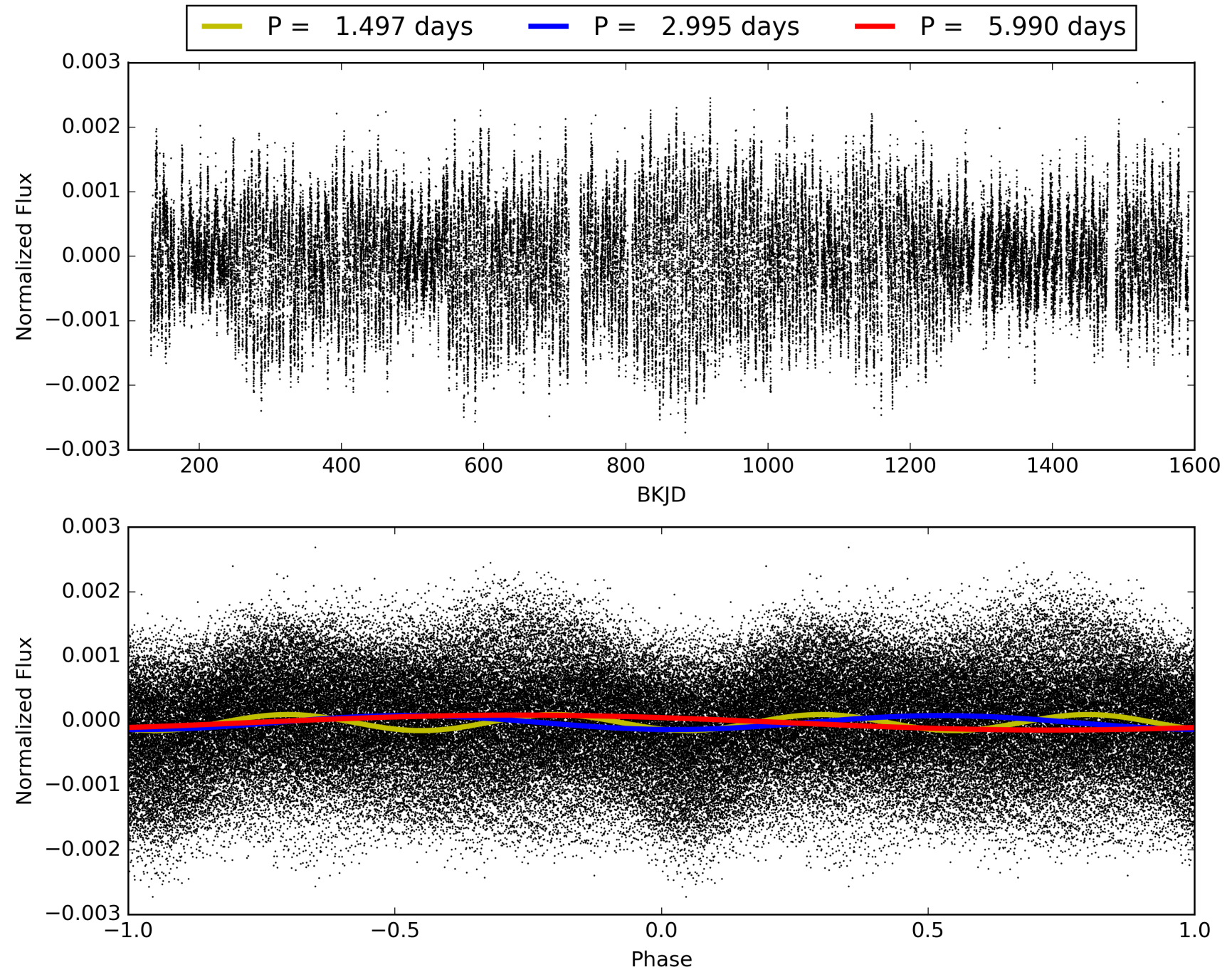
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 004949187-04, PDC Light Curves



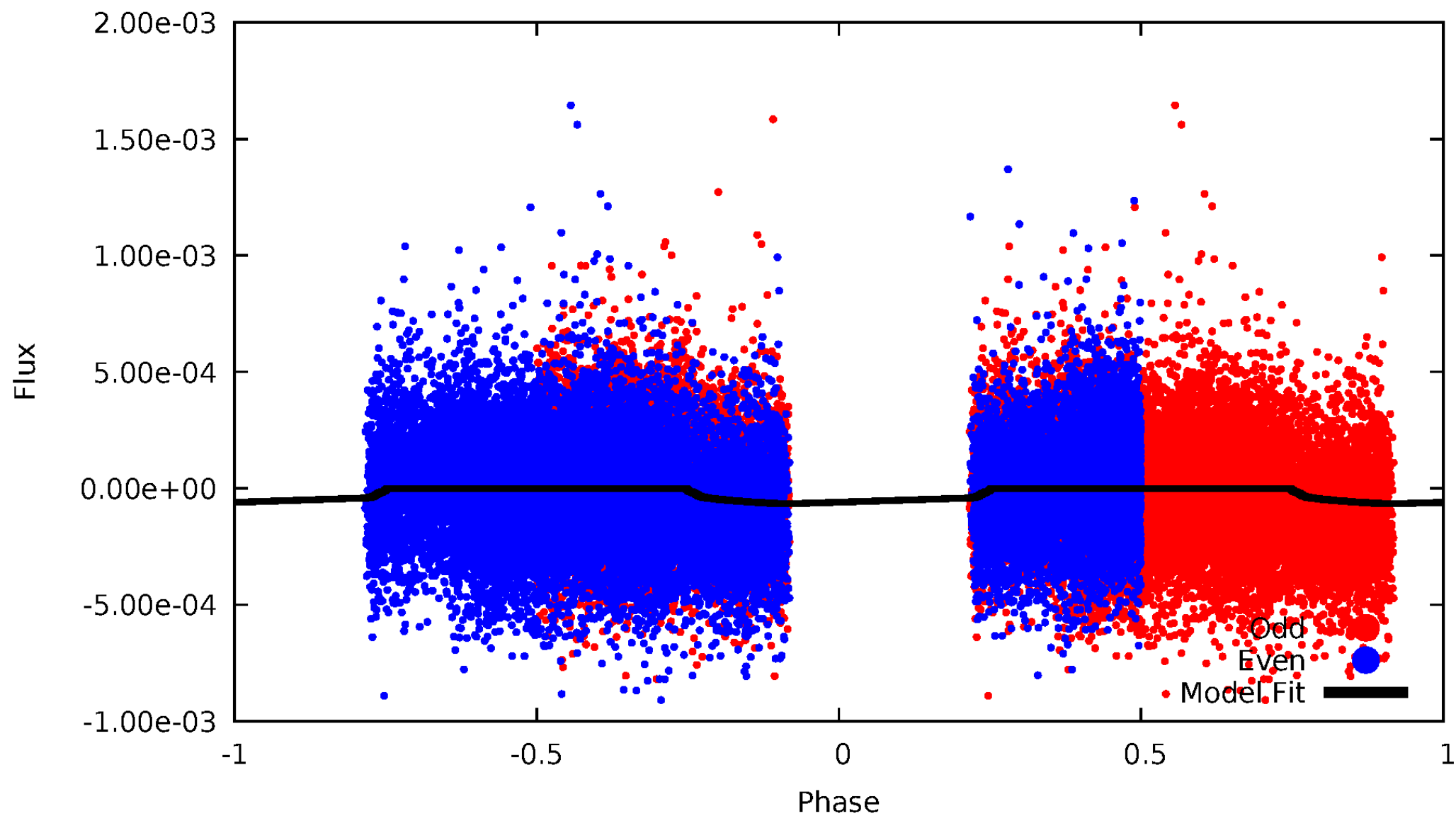


# TCE 004949187-04



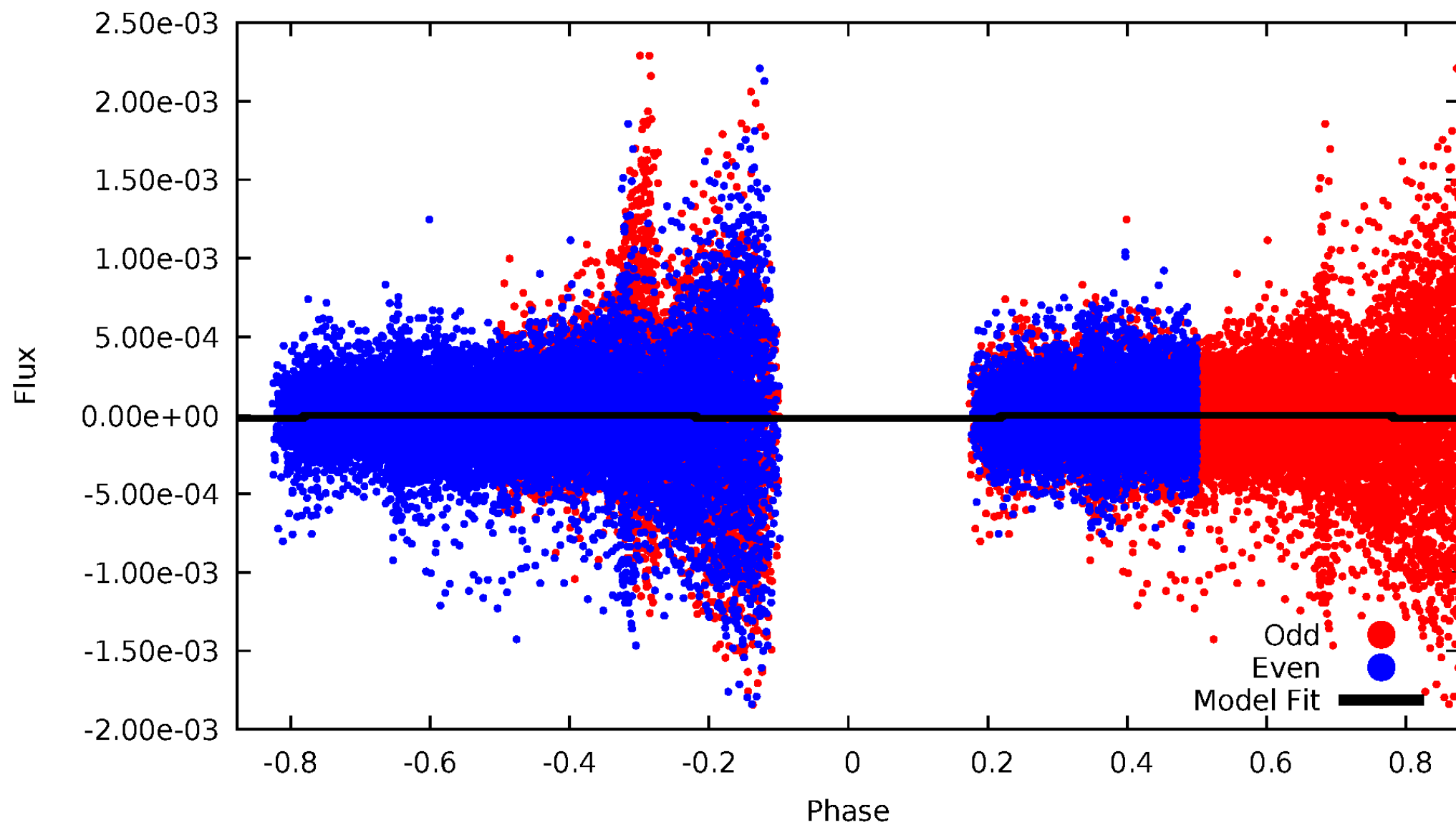
# DV Odd/Even

TCE 004949187-04



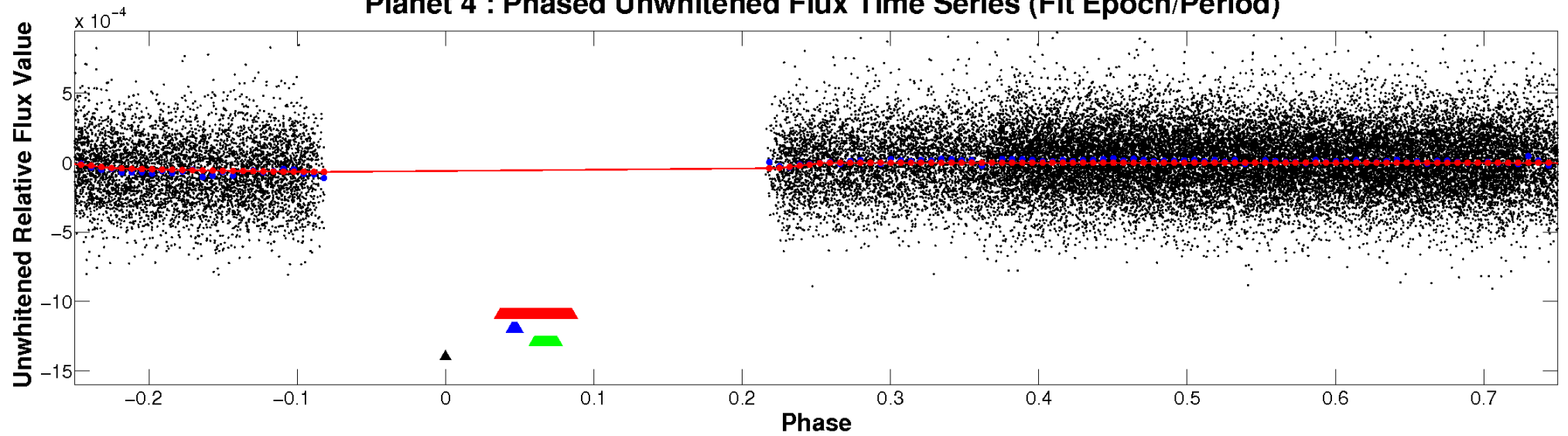
# ALT Odd/Even

TCE 004949187-04

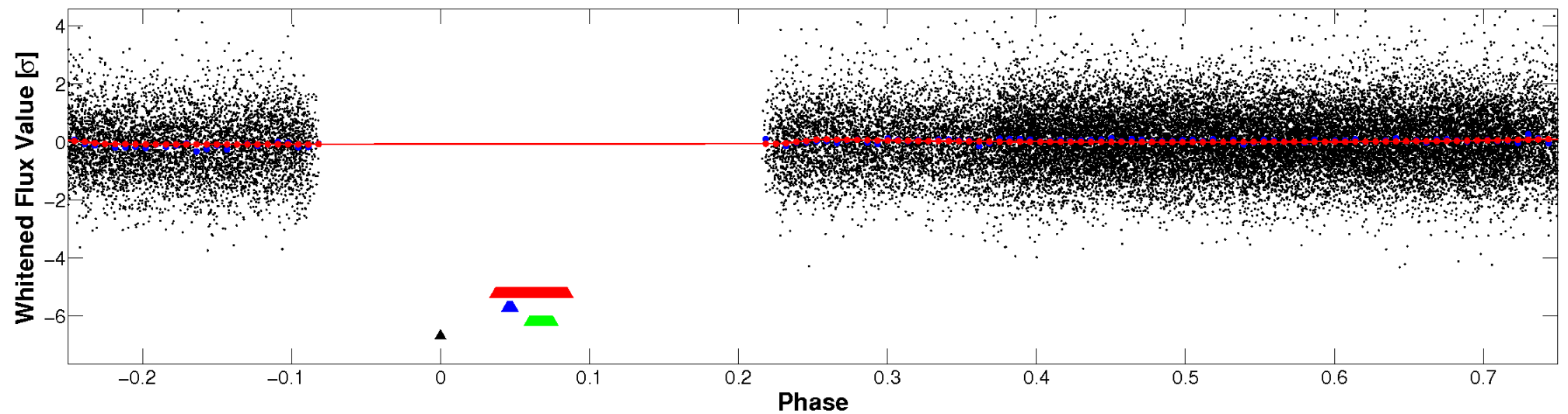


# Non-Whitened Vs. Whitened Light Curve

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



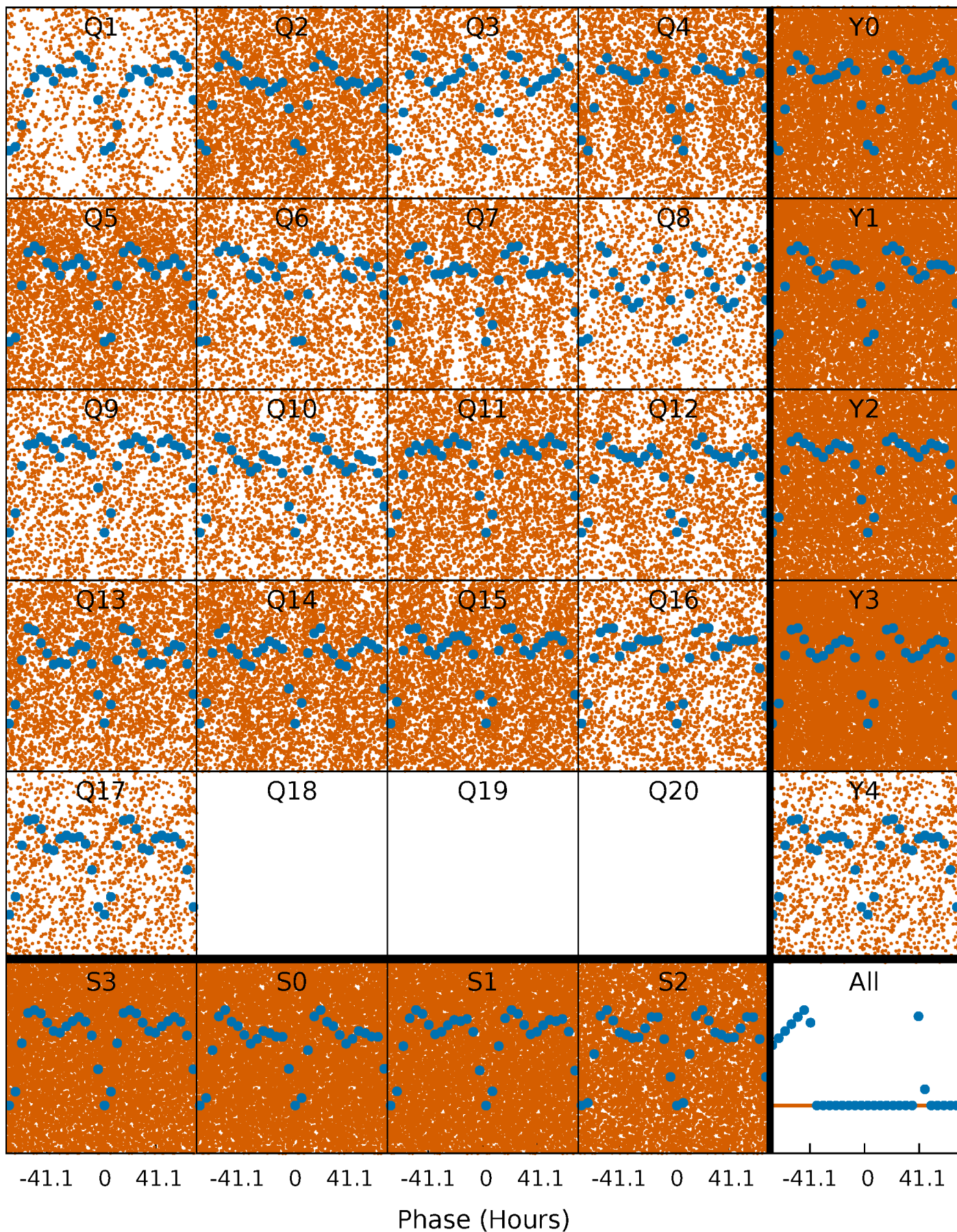
**Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)**





# PDC Quarter-Phased Transit Curves

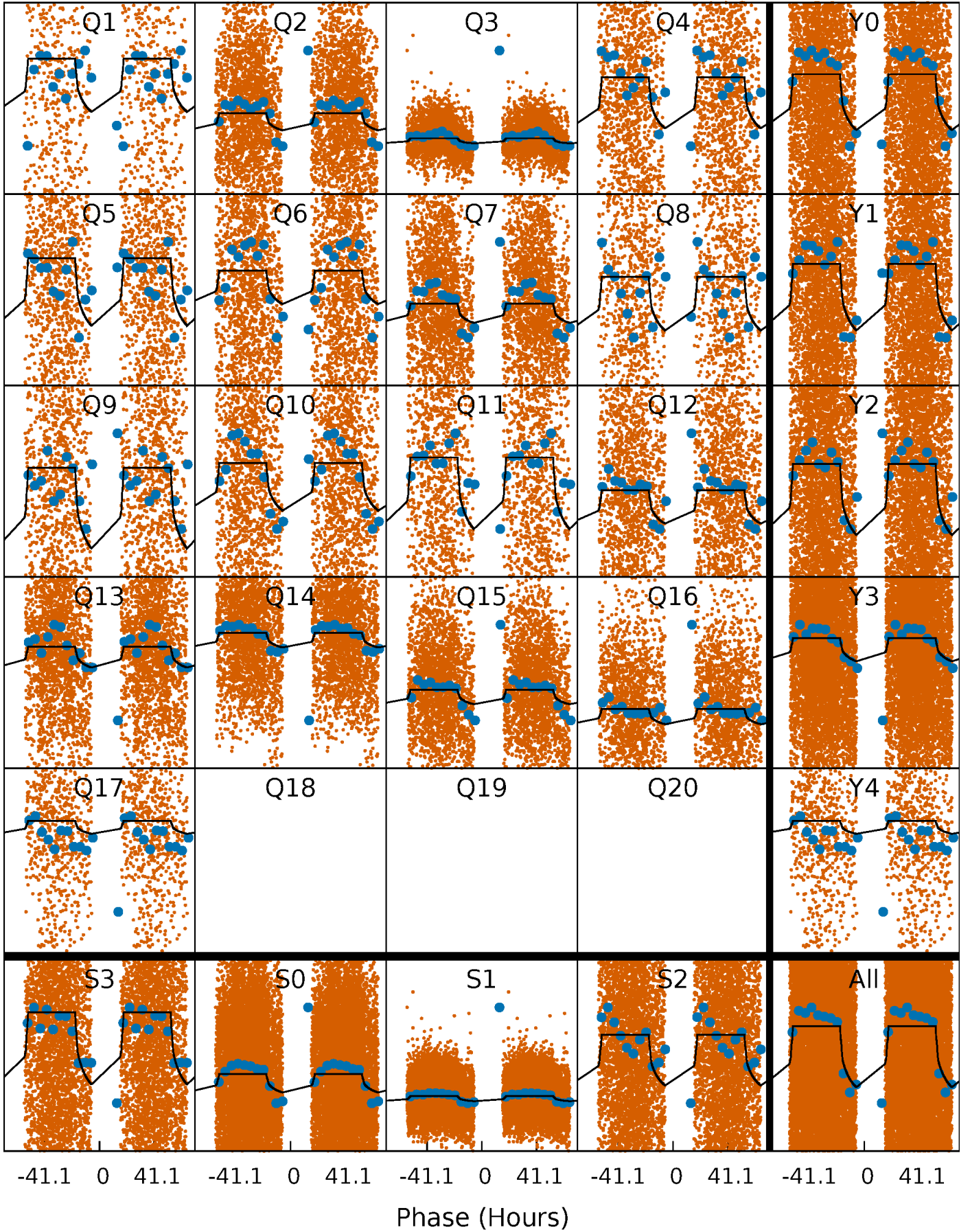
TCE 004949187-04   P= 2.994785 Days    $T_0=134.514149$  (BKJD)





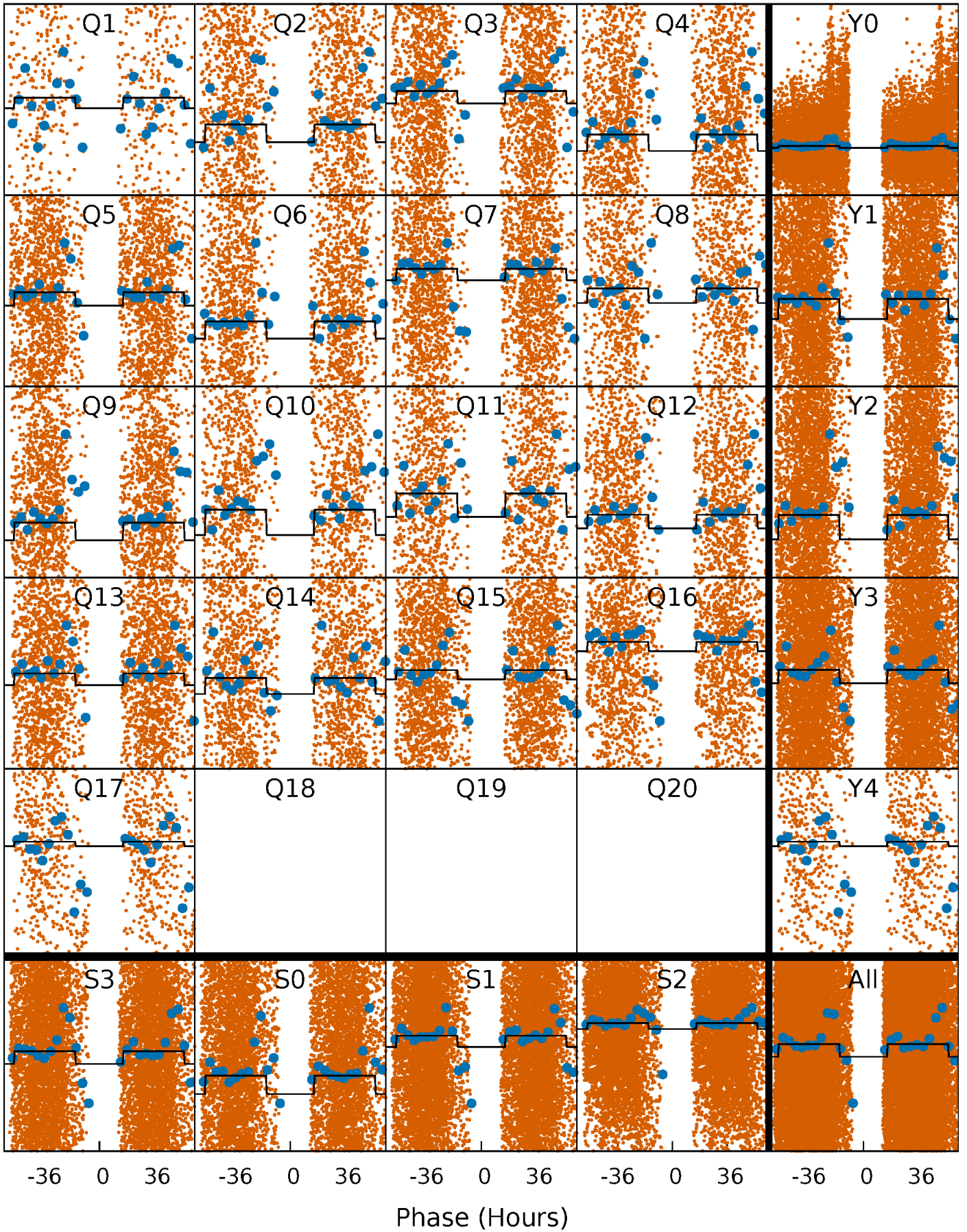
# DV Quarter-Phased Transit Curves

TCE 004949187-04   P= 2.994785 Days    $T_0=134.514149$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

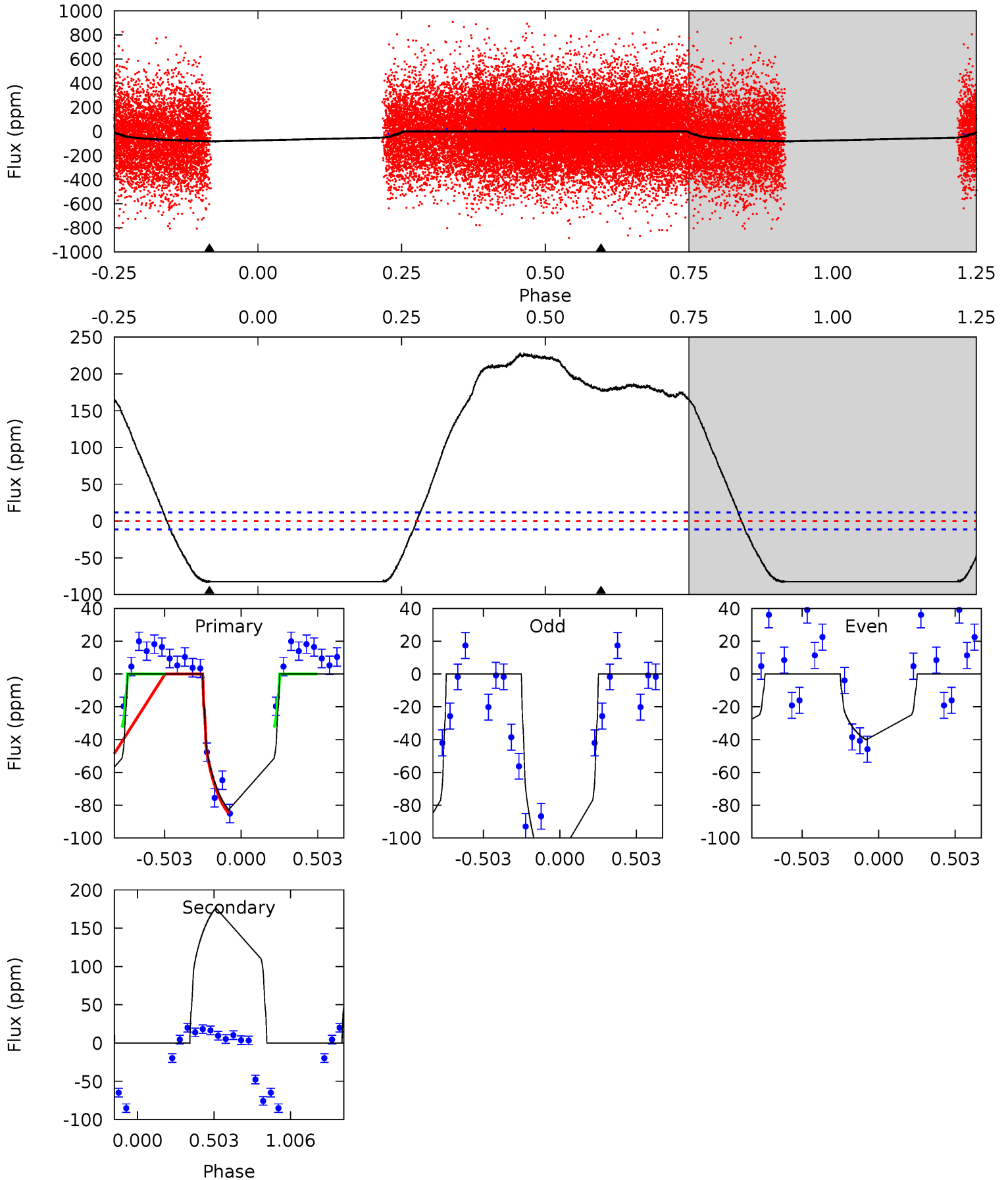
TCE 004949187-04     $P = 2.994621$  Days     $T_0 = 134.640908$  (BKJD)



# DV Model-Shift Uniqueness Test

004949187-04, P = 2.994785 Days, E = 131.519364 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
30.1	-64.1	0	0	4.21	0.67	21.1	30.1	30.1	-64.1	-64.1	15.2	0.98	0.73	6.65

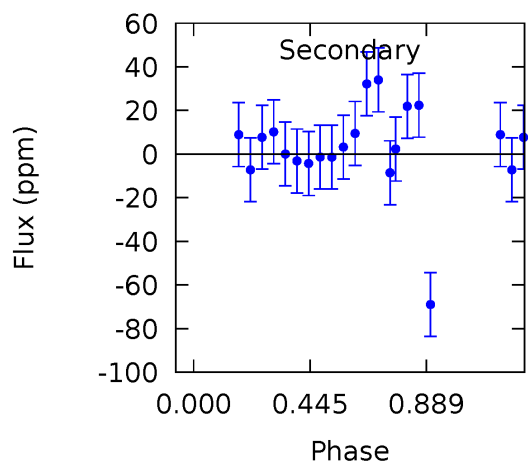
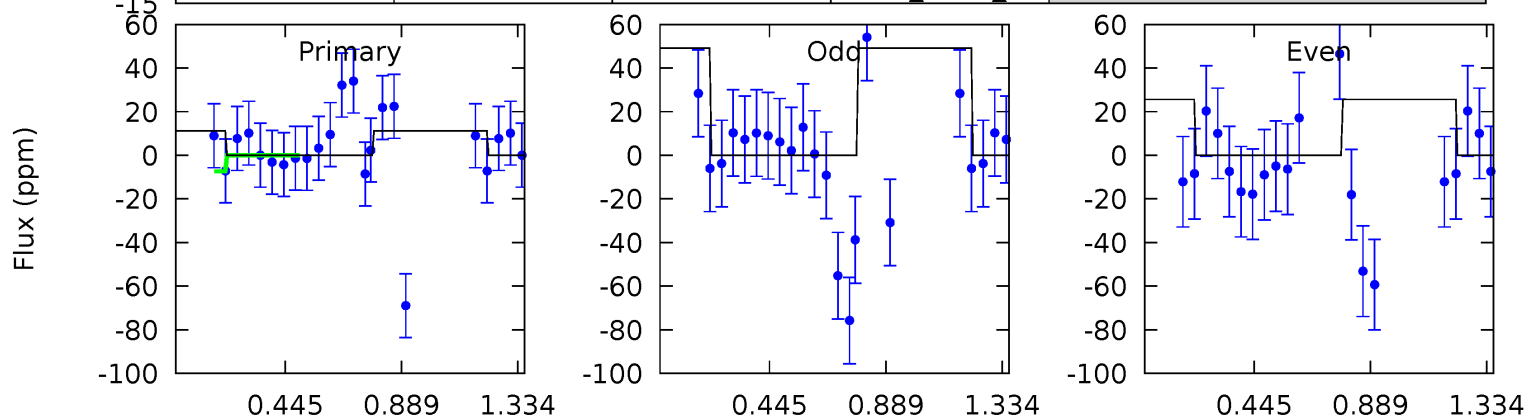
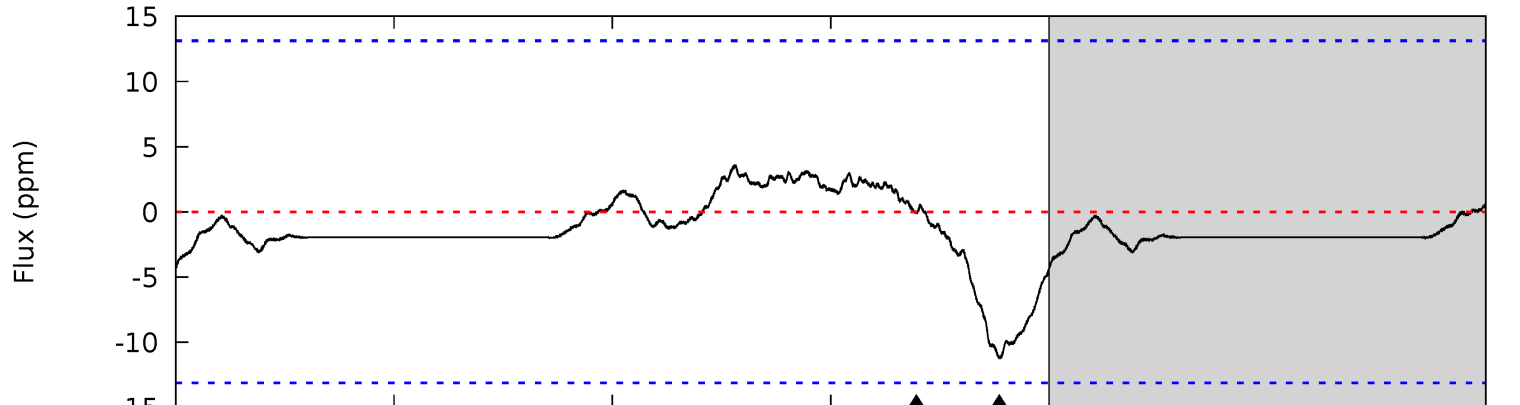
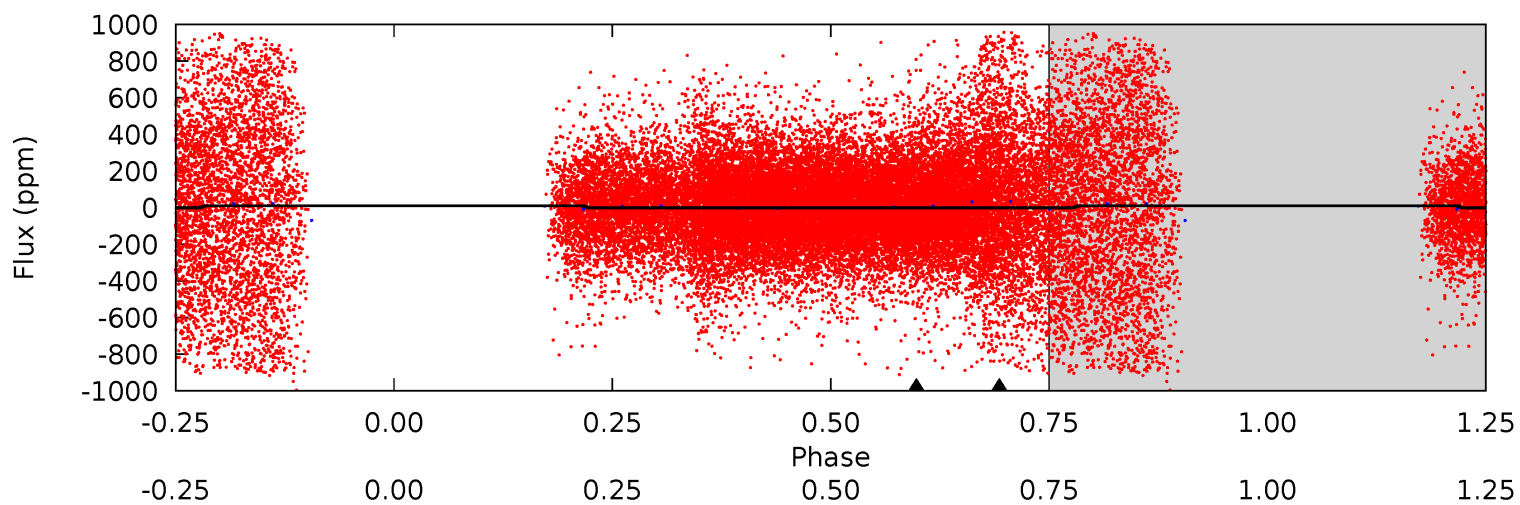




# Alt Model-Shift Uniqueness Test

004949187-04, P = 2.994621 Days, E = 131.646287 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
3.62	0.02	0	0	4.24	0.76	0.32	3.62	3.62	0.02	0.02	1.71	-3.87	0.24	0.56



### Stellar Parameters For KIC 004949187

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$\rho_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6622^{+210}_{-257}$	$3.779^{+0.502}_{-0.089}$	$-0.220^{+0.300}_{-0.300}$	$2.633^{+0.550}_{-1.283}$	$1.519^{+0.212}_{-0.424}$	$0.117^{+0.640}_{-0.041}$
	+3%/-4%	+13%/-2%	+136%/-136%	+21%/-49%	+14%/-28%	+545%/-35%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 004949187-04 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$176 \pm 3$	$1.99^{+0.48}_{-0.56}$	$2919^{+237}_{-395}$	$-9164^{+788}_{-915}$	$-52.715^{+16.793}_{-45.152}$
Alt.	$-0 \pm 3$	$1.13^{+0.34}_{-0.36}$	$2928^{+229}_{-331}$	$-2717^{+7087}_{-1728}$	$0.150^{+3.248}_{-3.024}$

$T_{\text{max}}$  = 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

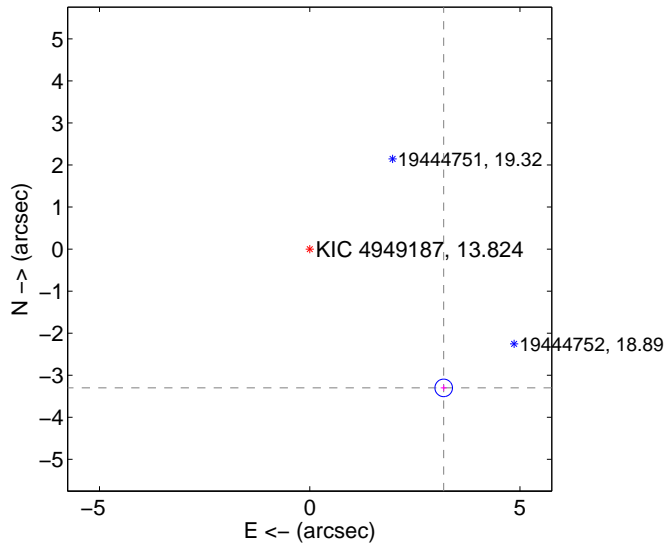
Supplemental centroid analysis for 004949187-04. Kepler magnitude: 13.82. Transit SNR 8.03

There are 0 quarters with good PRF difference image offsets

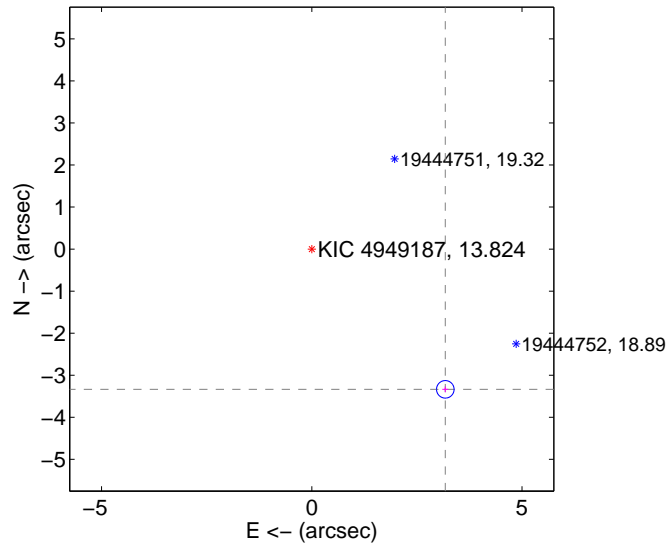
The direct PRF centroid is offset from the target star catalog position by about 0.04 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$4.589 \pm 0.070$	65.97	$-3.187 \pm 0.071$	$-3.302 \pm 0.069$
PRF-fit source offset from KIC position	$4.607 \pm 0.070$	66.24	$-3.176 \pm 0.071$	$-3.336 \pm 0.069$
photometric centroid source offset	$0.56 \pm 0.39$	1.43	$0.52 \pm 0.39$	$-0.23 \pm 0.39$

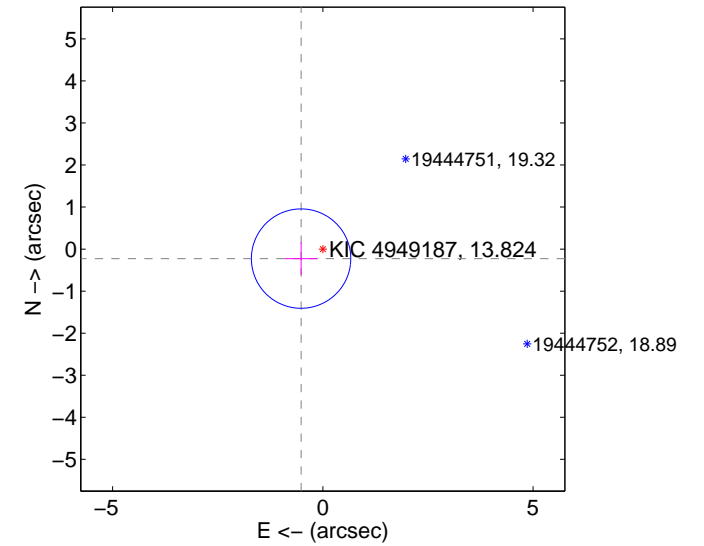
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

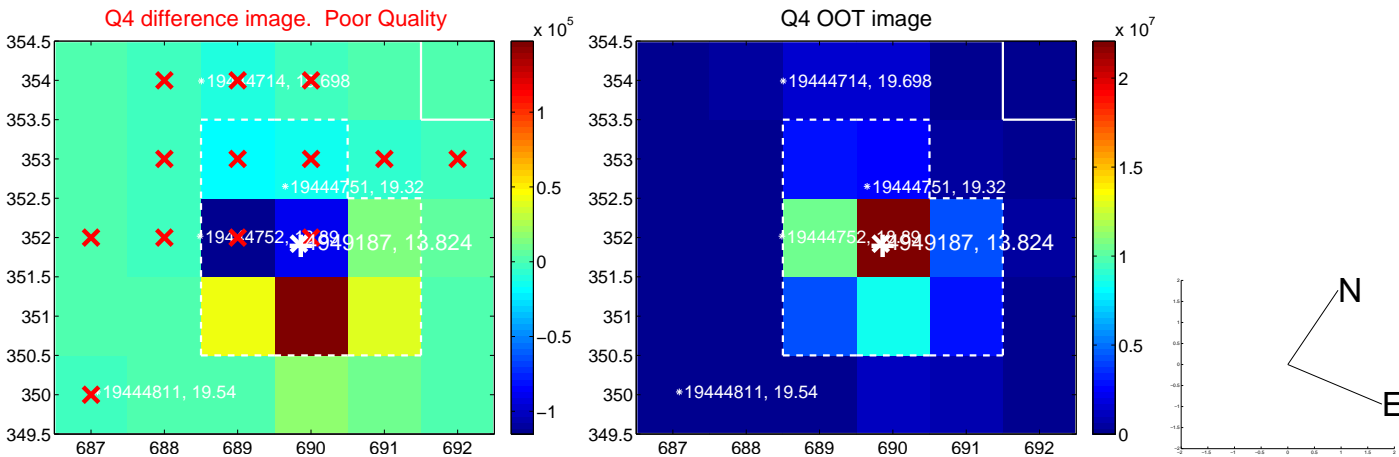
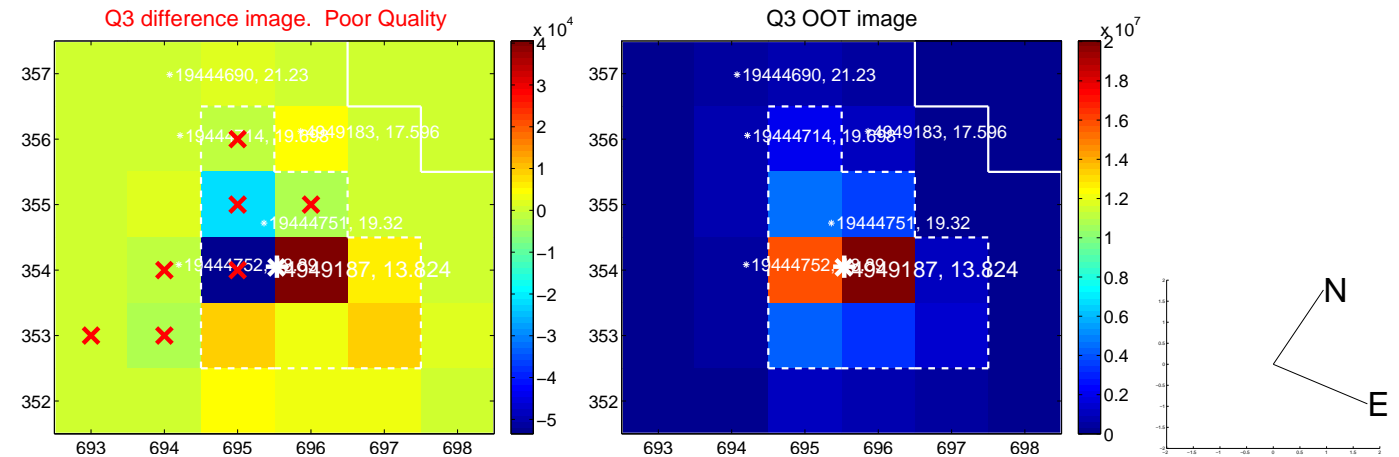
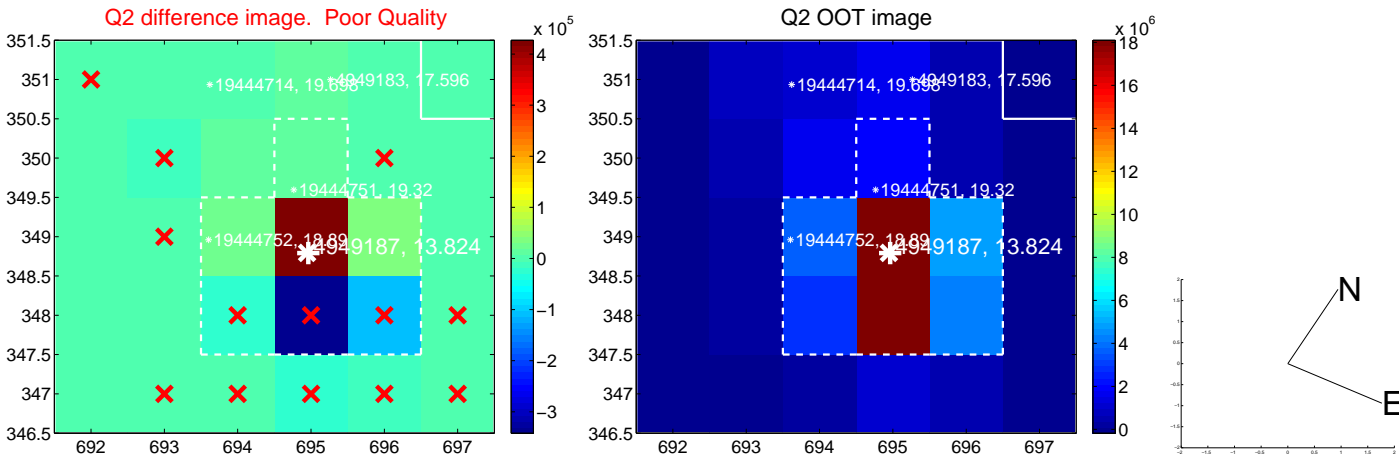
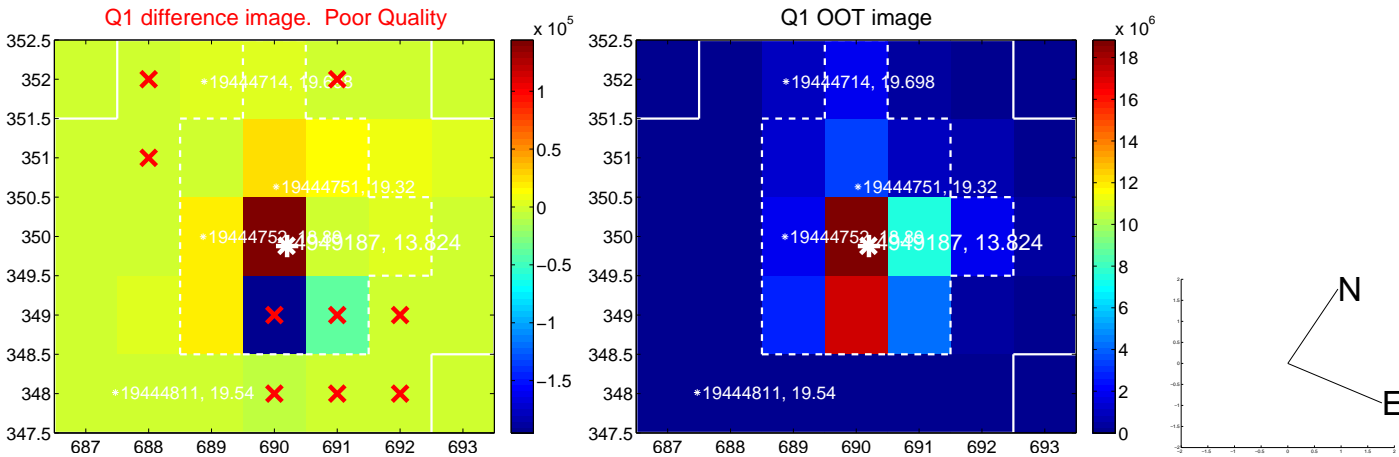


offset from photometric centroids

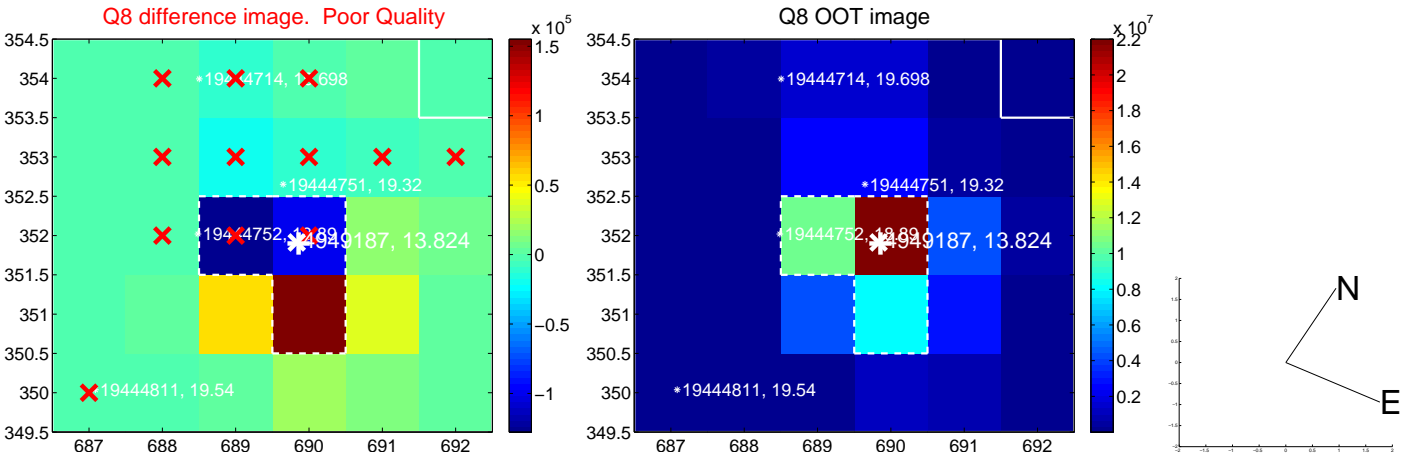
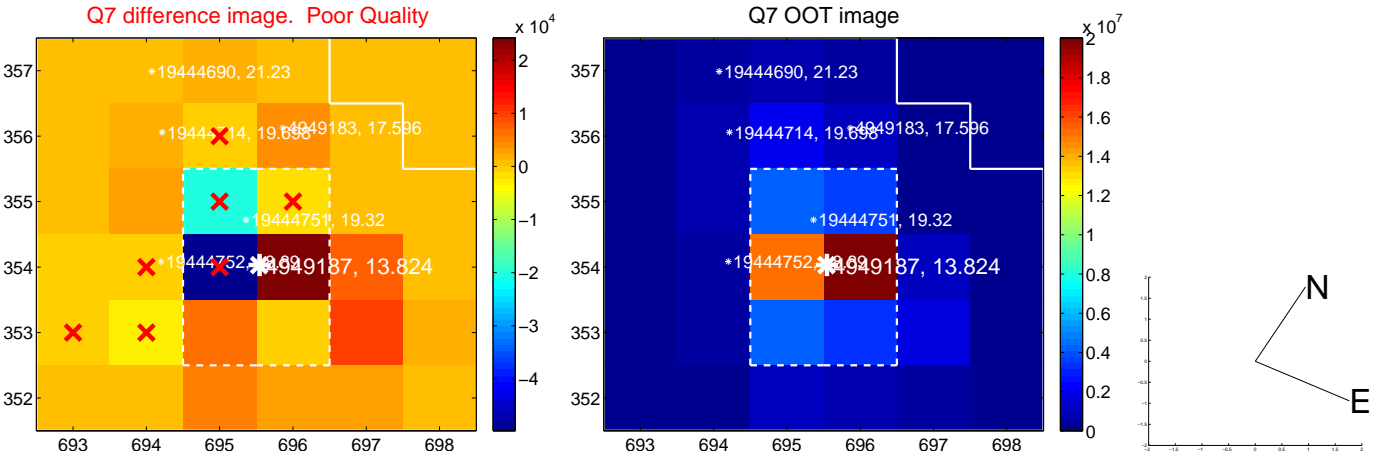
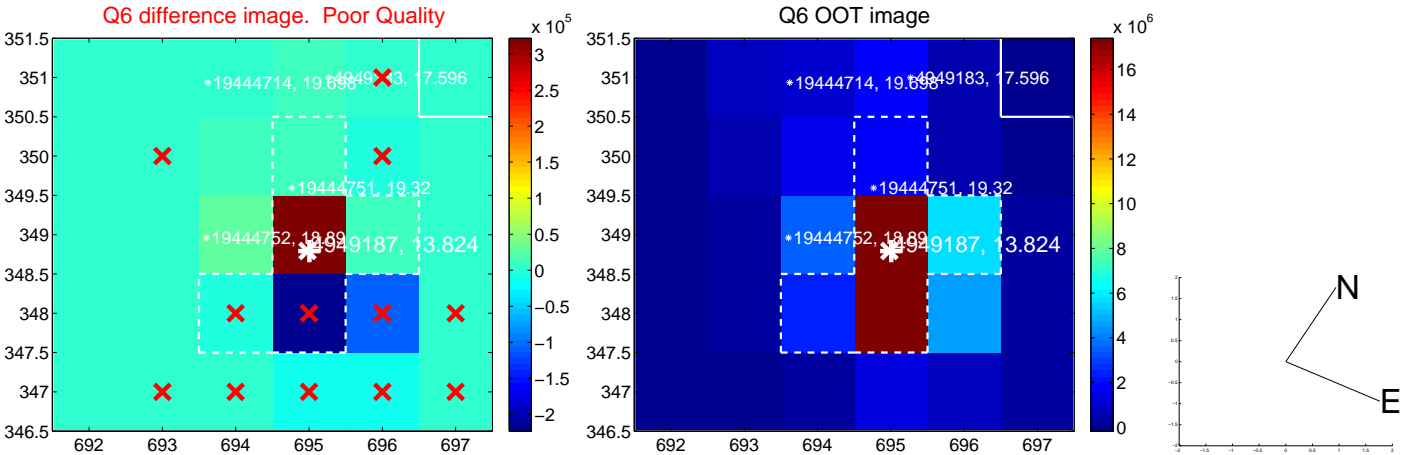
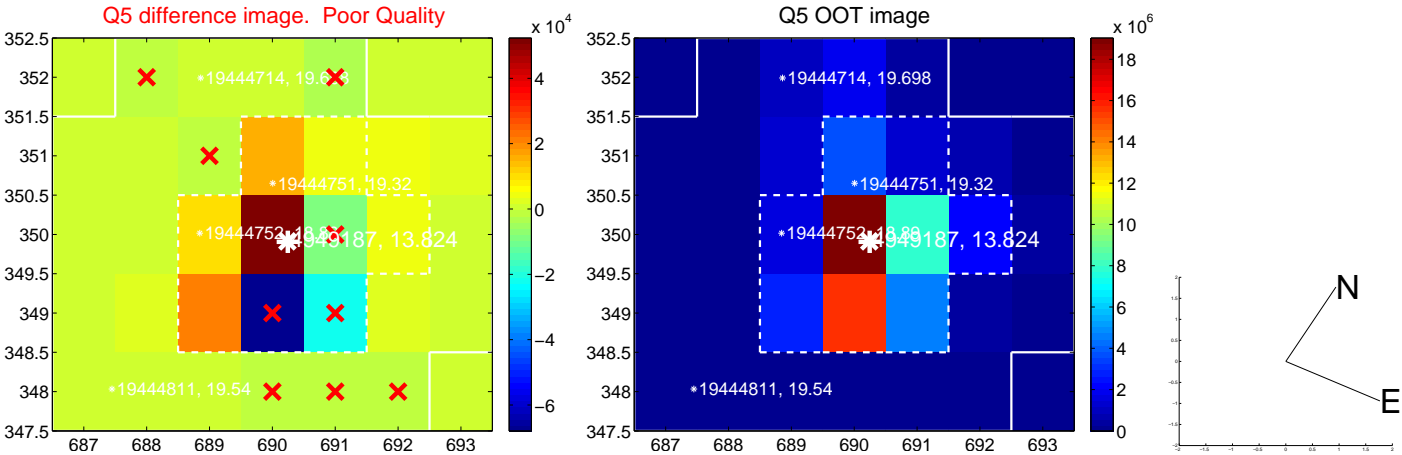


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

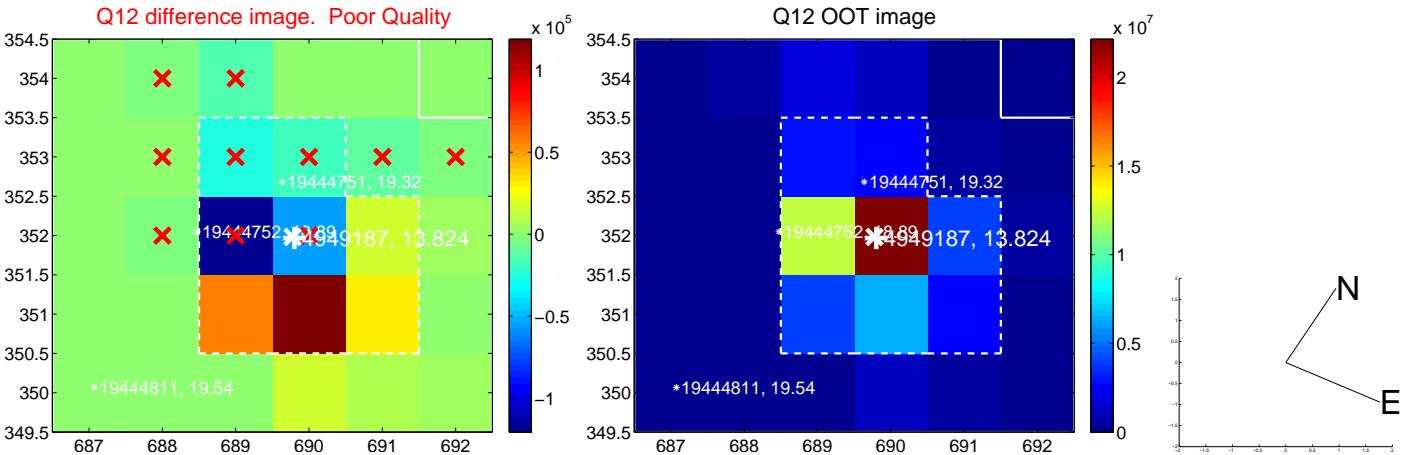
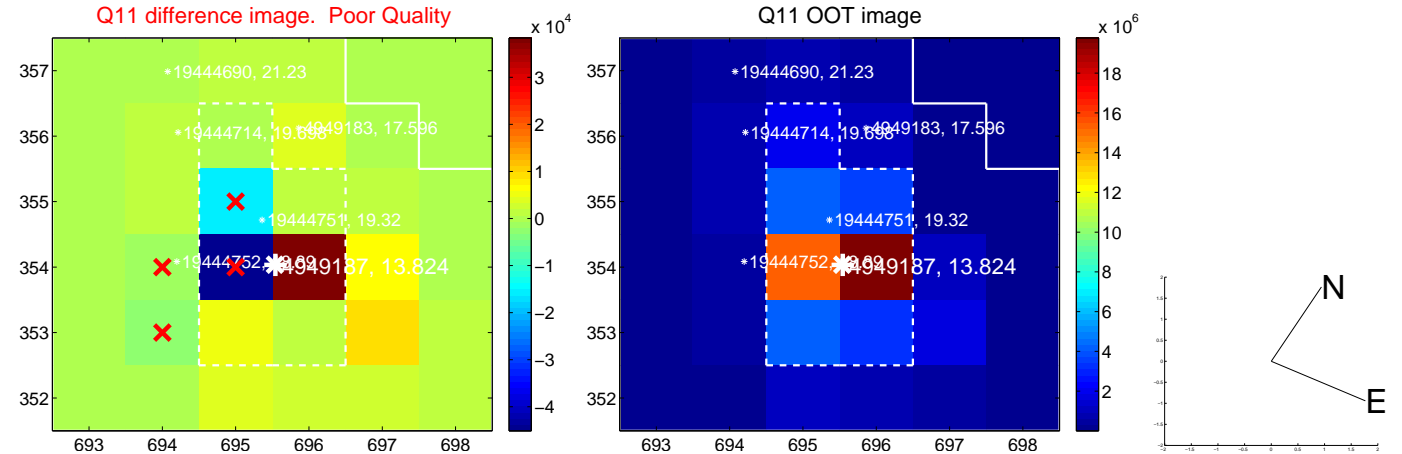
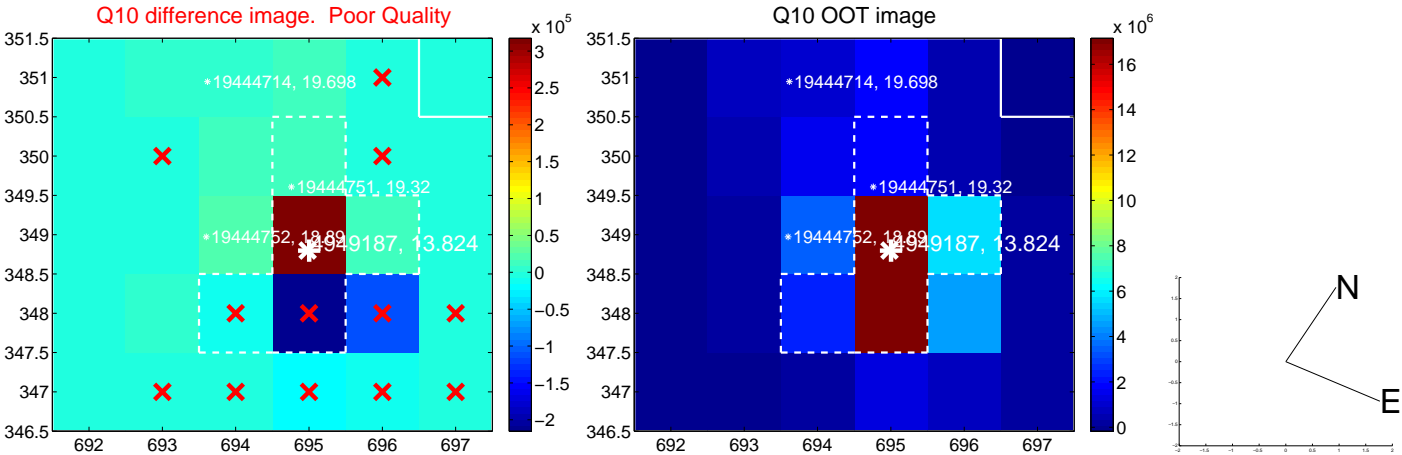
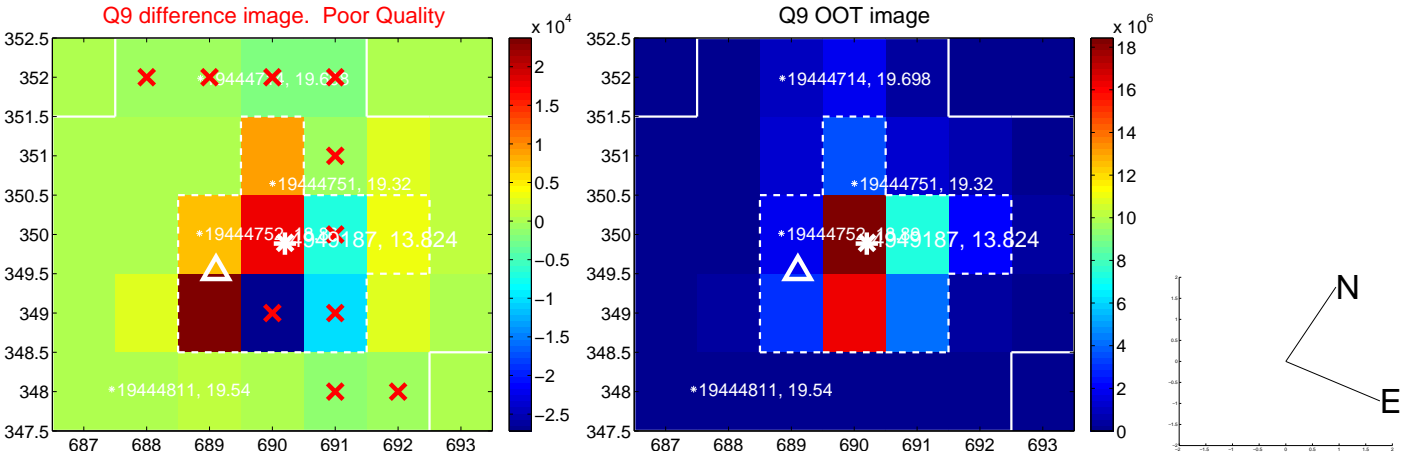
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



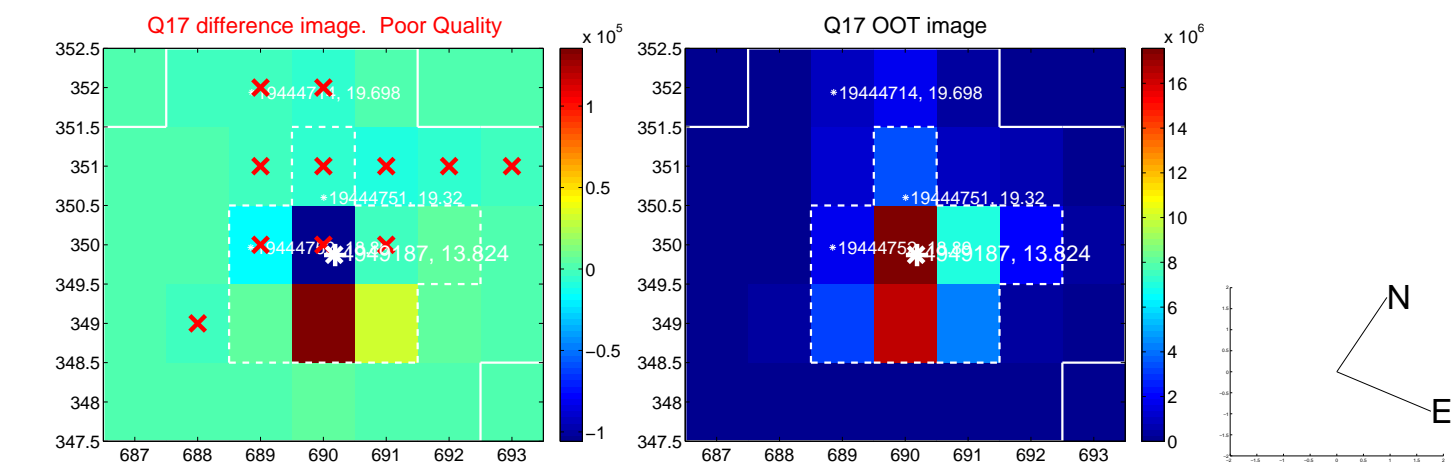
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



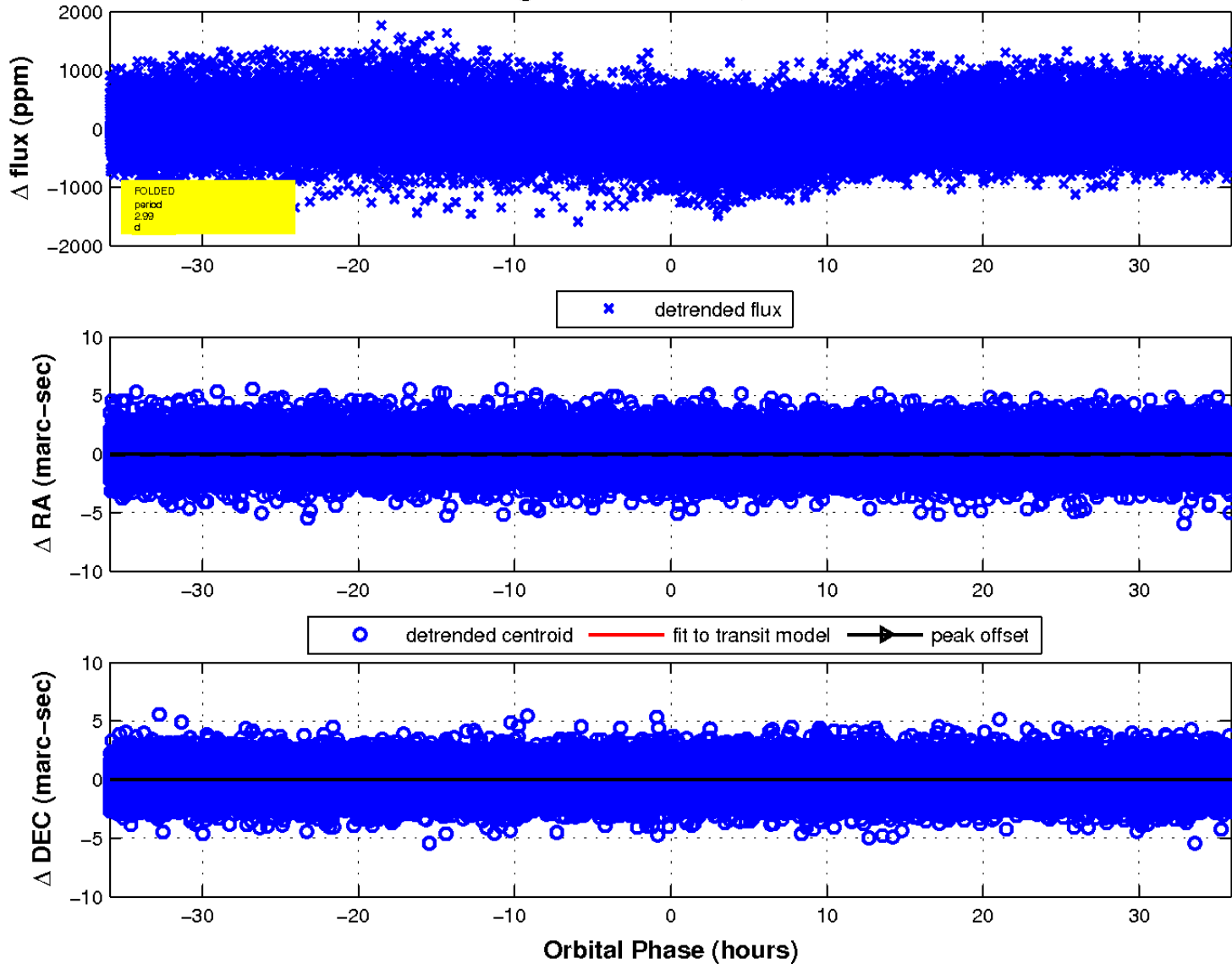




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



fluxWeightedCentroids, Planet 4 of 4



UKIRT Image

Declination

