

# KIC 008702921

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008702921-01	OBS	6187.01	19.384461	137.213629	3355.6	20.544	179.0	222.0	5.03	4968	28.42	466.84
008702921-02	OBS	No	19.384333	145.477623	166.5	8.010	11.3	10.3	5.03	4968	7.24	466.84
008702921-03	OBS	No	19.384461	145.912157	243.8	11.784	8.3	9.6	5.03	4968	9.26	466.84

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008702921-01	OBS	FP	0.00	0	1	0	0	HAS_SEC_TCE
008702921-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE
008702921-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_ZUMA—LPP_DV—MOD_TER_DV—SAME_NTL_PERIOD

**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 008702921-01

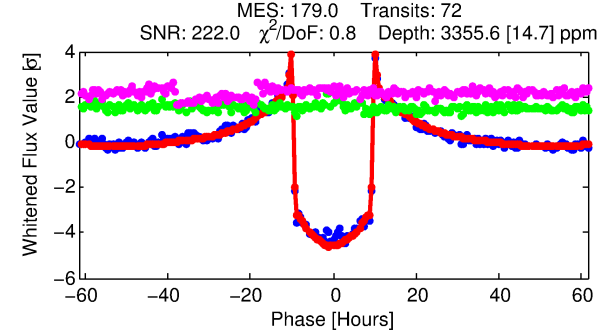
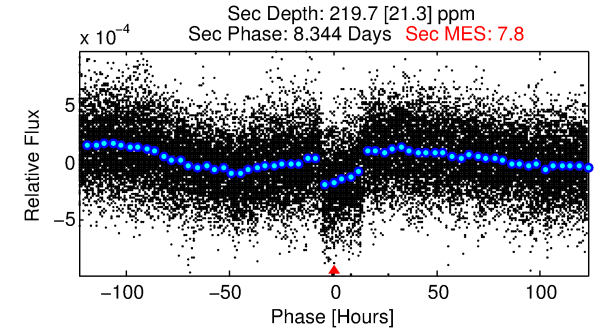
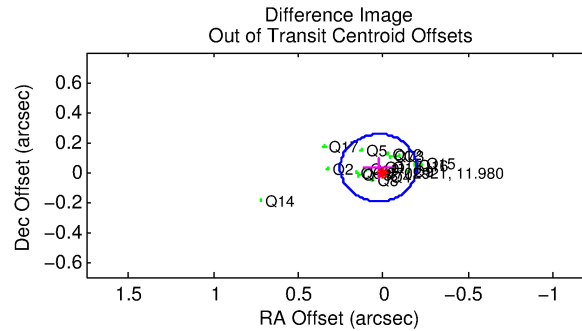
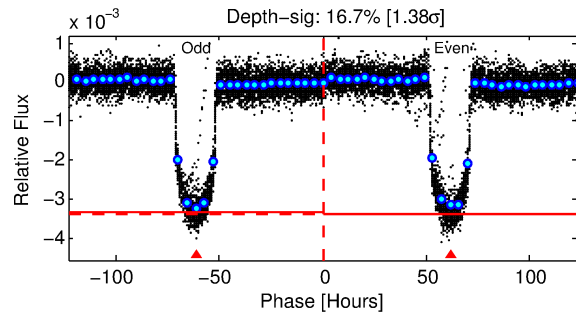
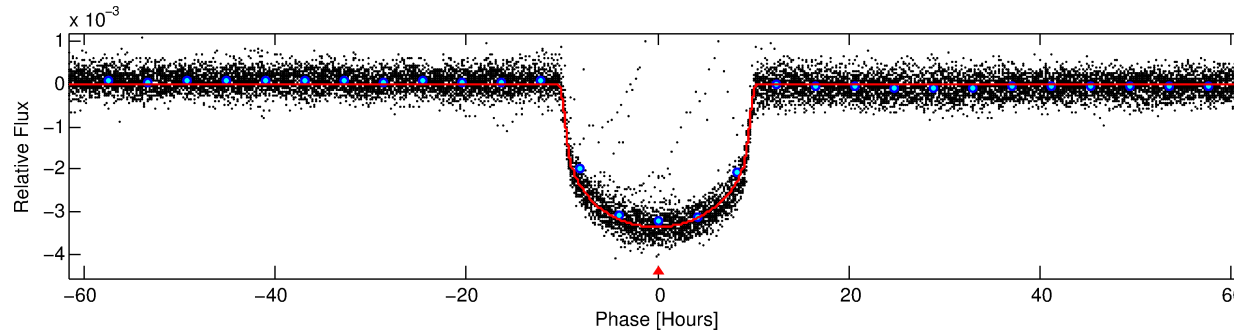
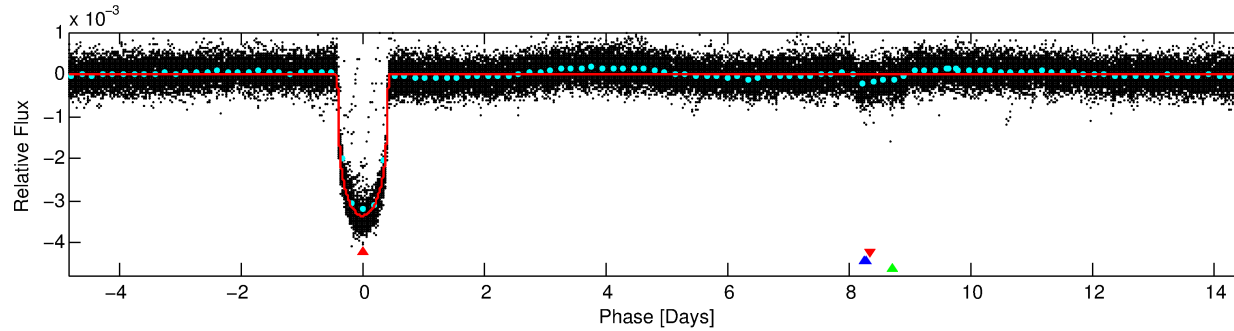
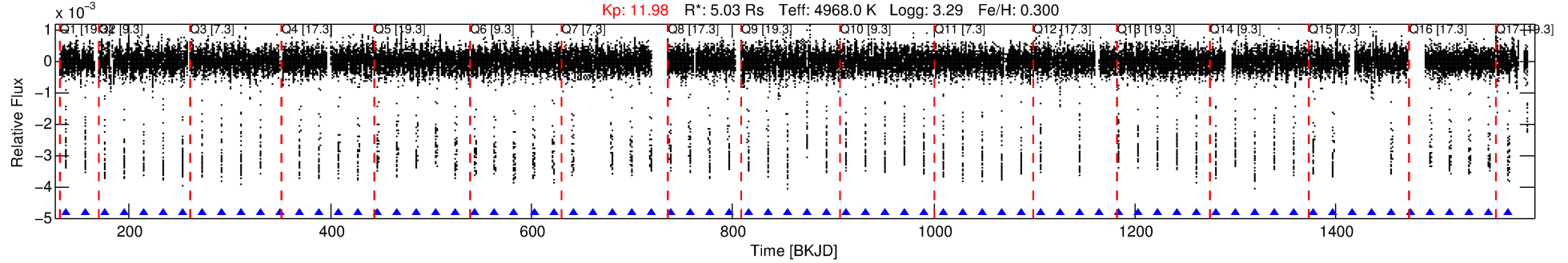
No Significant Match Found

# DV One-Page Summary

KIC: 8702921 Candidate: 1 of 3 Period: 19.384 d

KOI: K06187.01 Corr: 0.960

Kp: 11.98 R\*: 5.03 Rs Teff: 4968.0 K Logg: 3.29 Fe/H: 0.300



## DV Fit Results:

Period = 19.38446 [0.00002] d  
Epoch = 137.2136 [0.0006] BKJD  
Rp/R\* = 0.0518 [0.0003]  
a/R\* = 7.32 [0.10]  
b = 0.29 [0.05]  
Seff = 466.84 [175.30]  
Teq = 1185 [111] K  
Rp = 28.42 [8.76] Re  
a = 0.1718 [0.0437] AU  
Ag = 4.42 [1.66] [2.06σ]  
Teffp = 2657 [91] K [10.25σ]

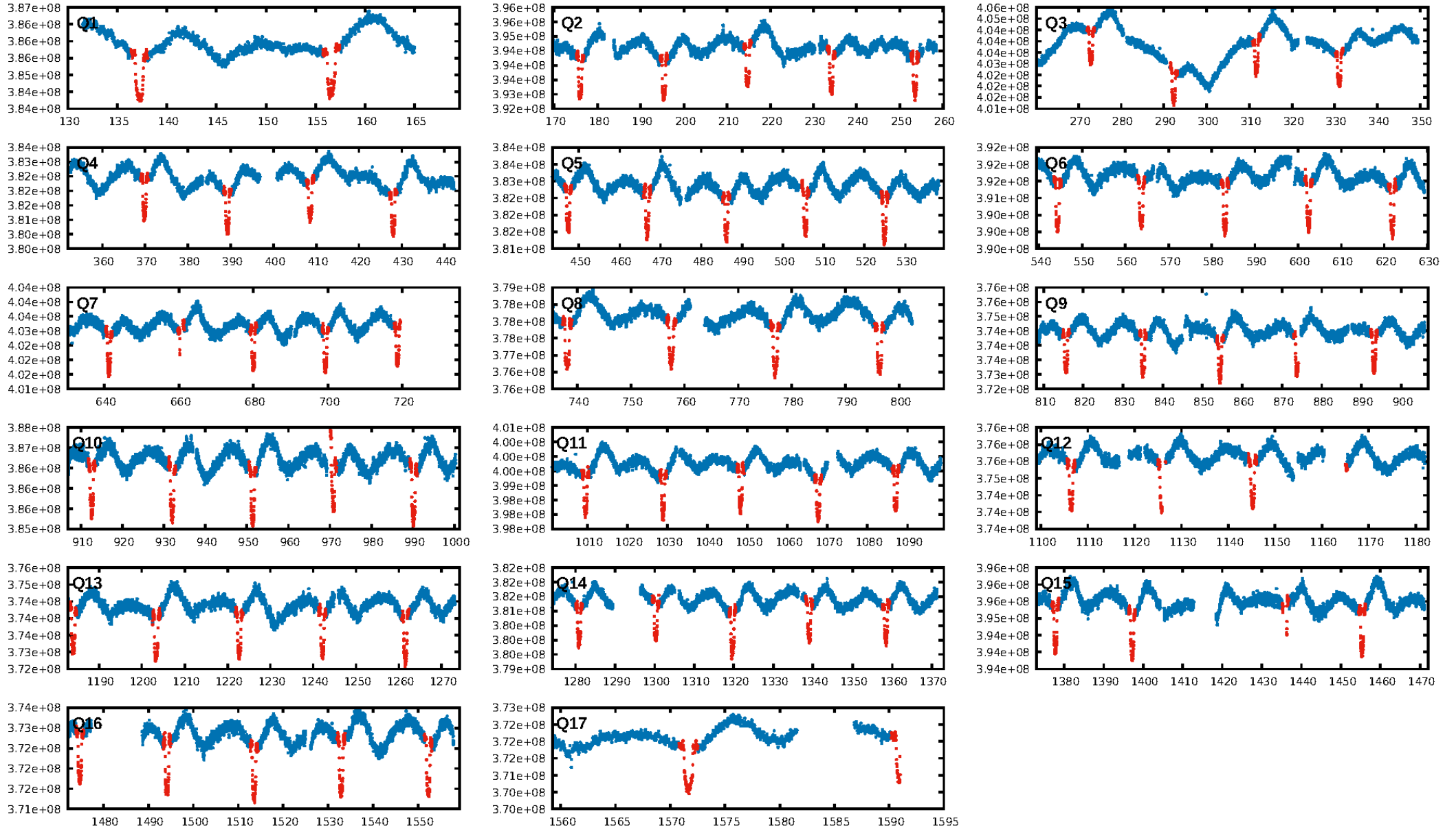
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: 53.4%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [68/68]  
GhostDiagnostic-chr: 2.654  
Centroid-sig: N/A  
Centroid-so: 0.162 arcsec [21.28σ]  
OotOffset-rm: 0.041 arcsec [0.55σ]  
KicOffset-rm: 0.059 arcsec [0.84σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 1.00 [17/17]

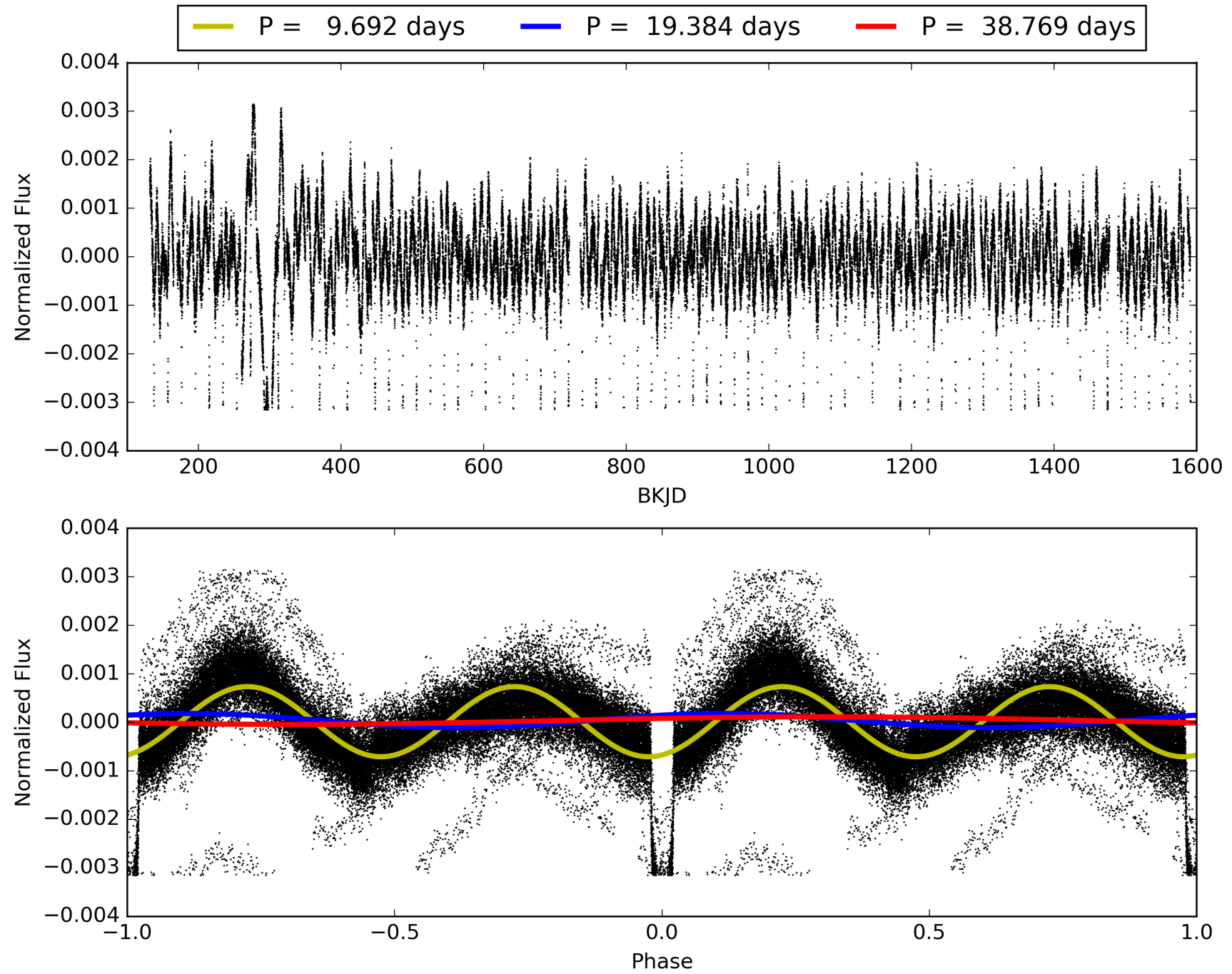
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 21:35:34 Z

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

# TCE 008702921-01, PDC Light Curves

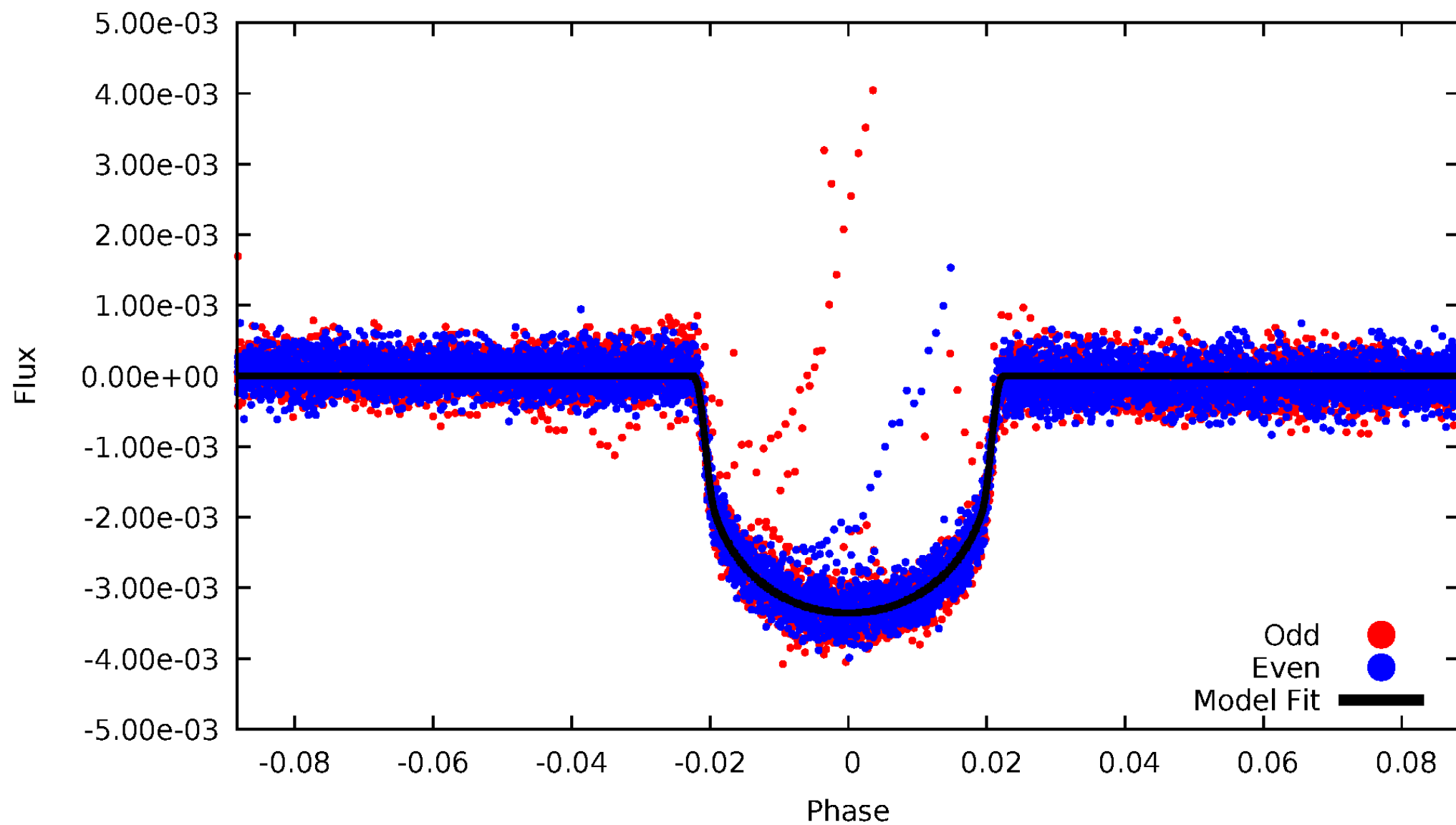


TCE 008702921-01



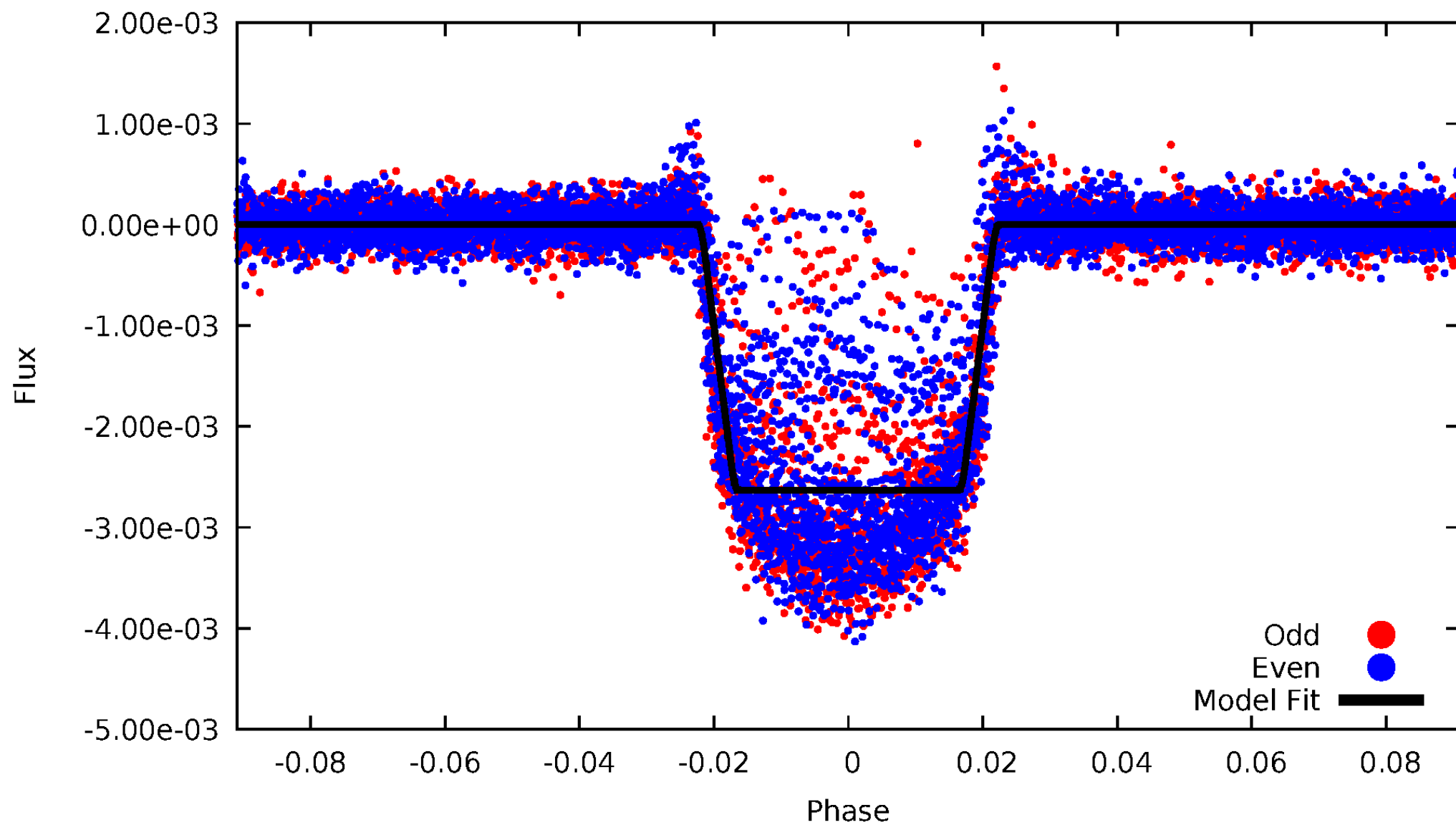
# DV Odd/Even

TCE 008702921-01



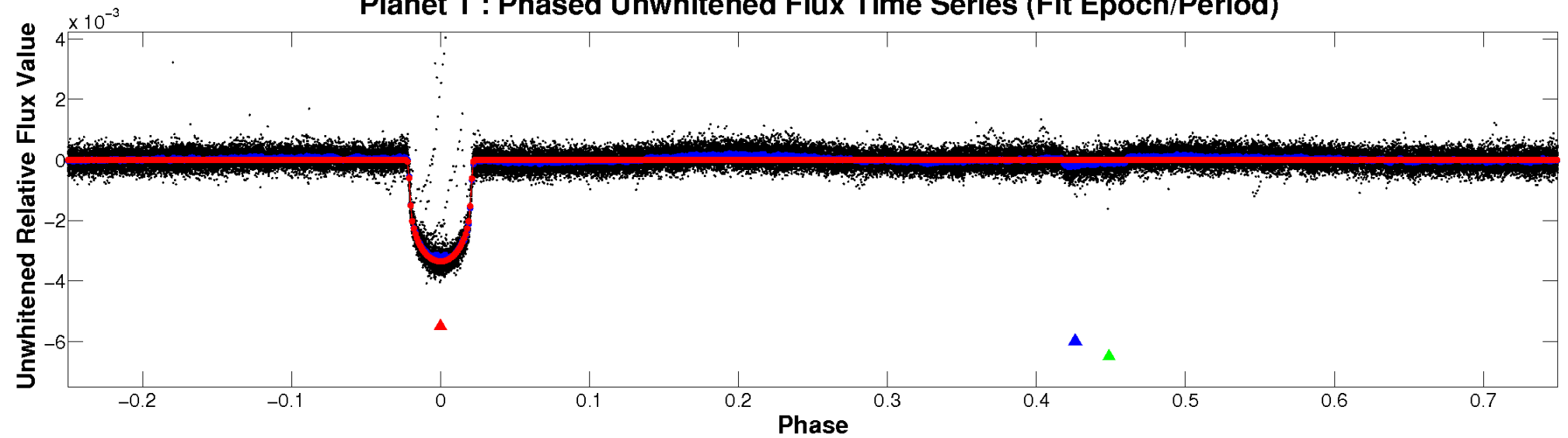
# ALT Odd/Even

TCE 008702921-01

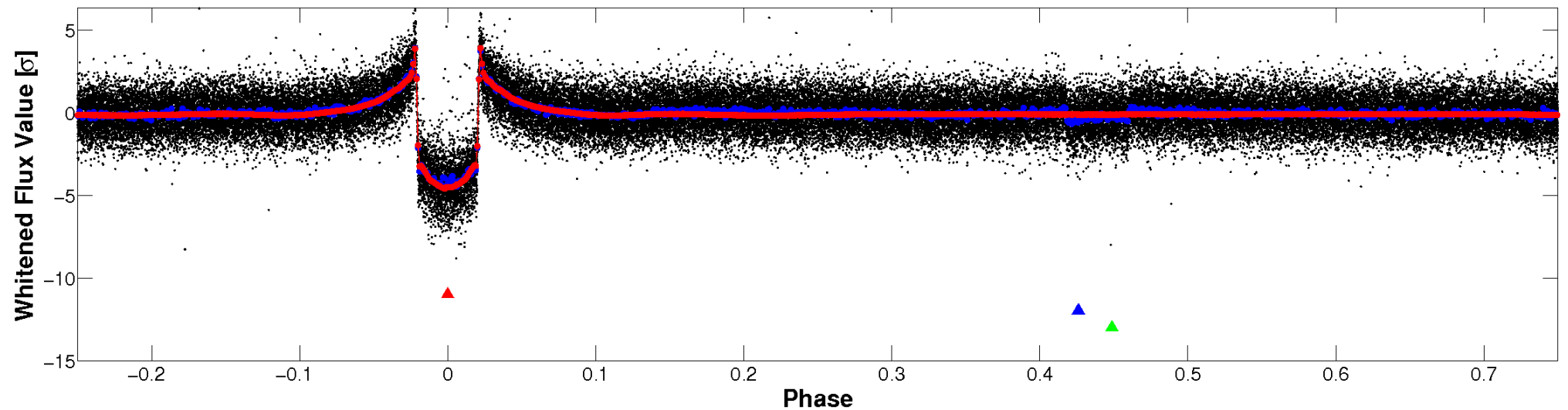


# Non-Whitened Vs. Whitened Light Curve

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



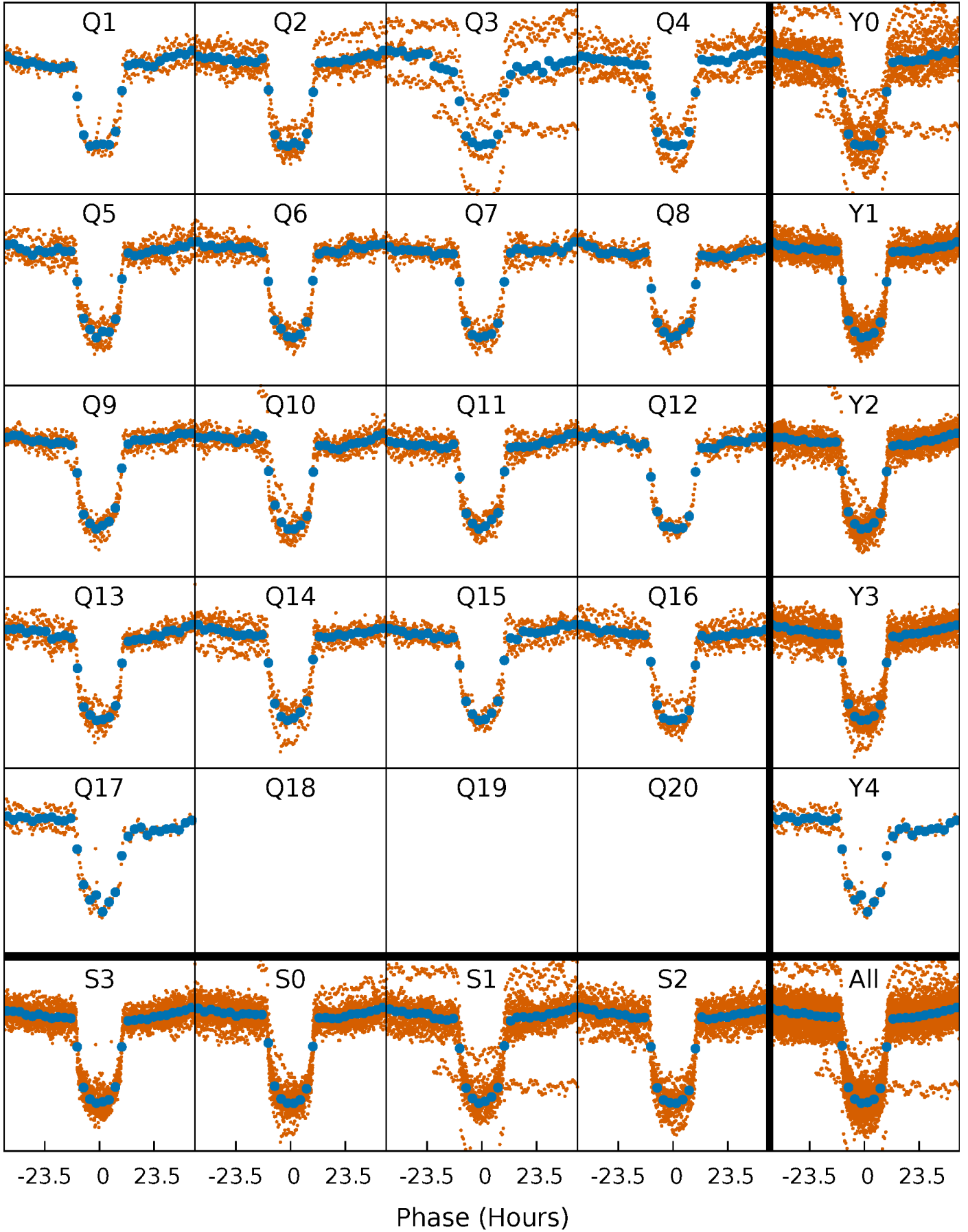
Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)





# PDC Quarter-Phased Transit Curves

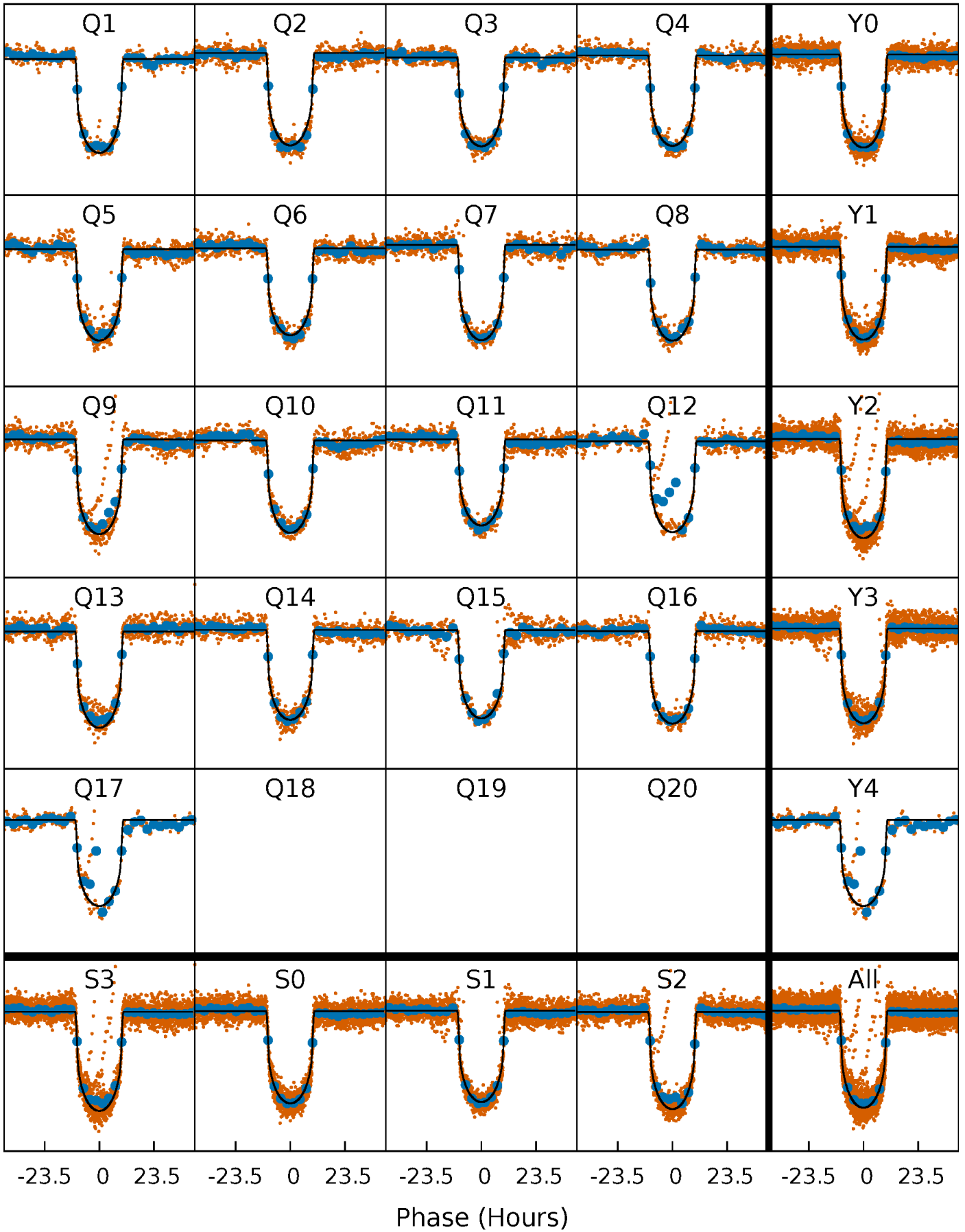
TCE 008702921-01 P= 19.384461 Days  $T_0=137.213629$  (BKJD)





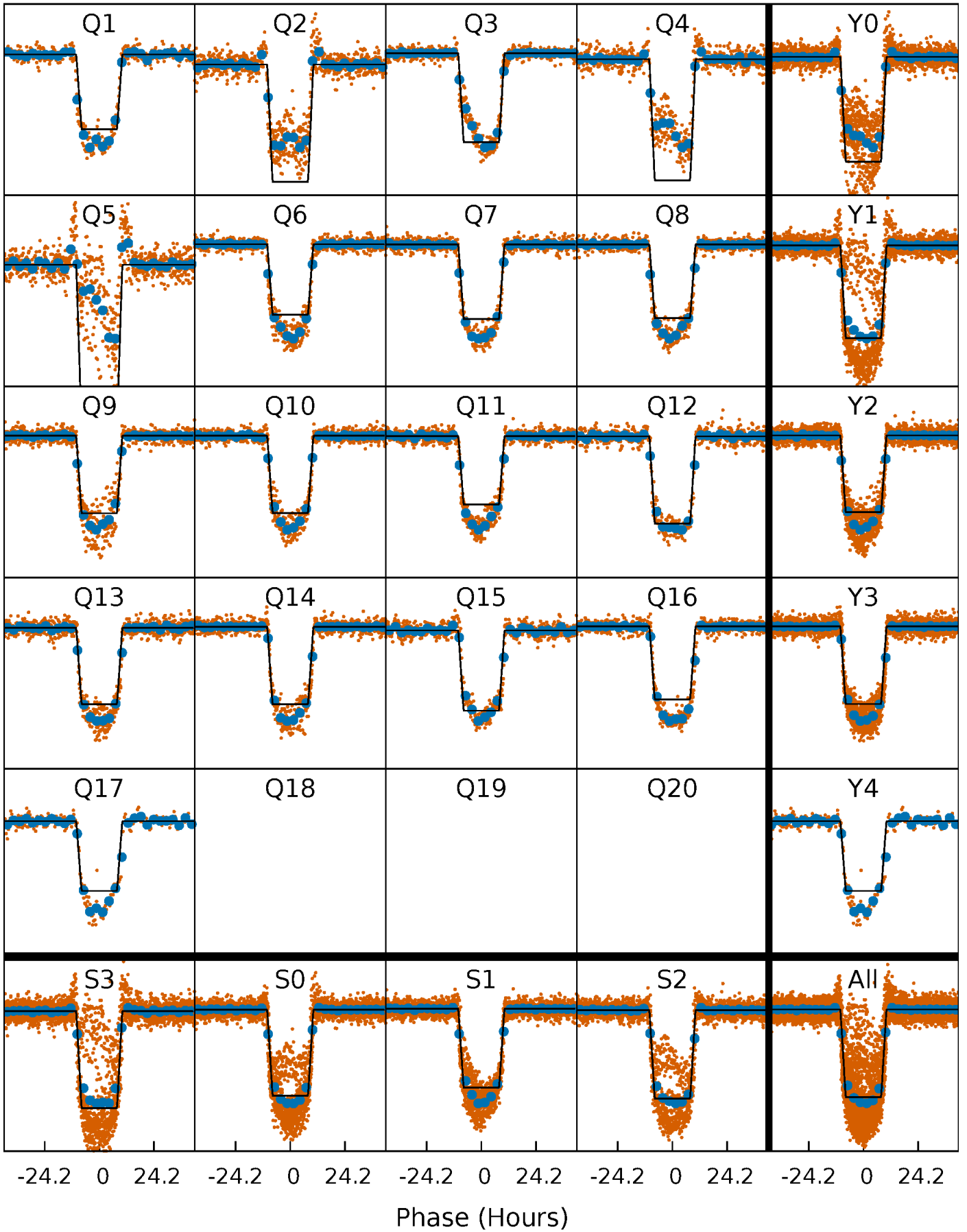
# DV Quarter-Phased Transit Curves

TCE 008702921-01 P= 19.384461 Days  $T_0=137.213629$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

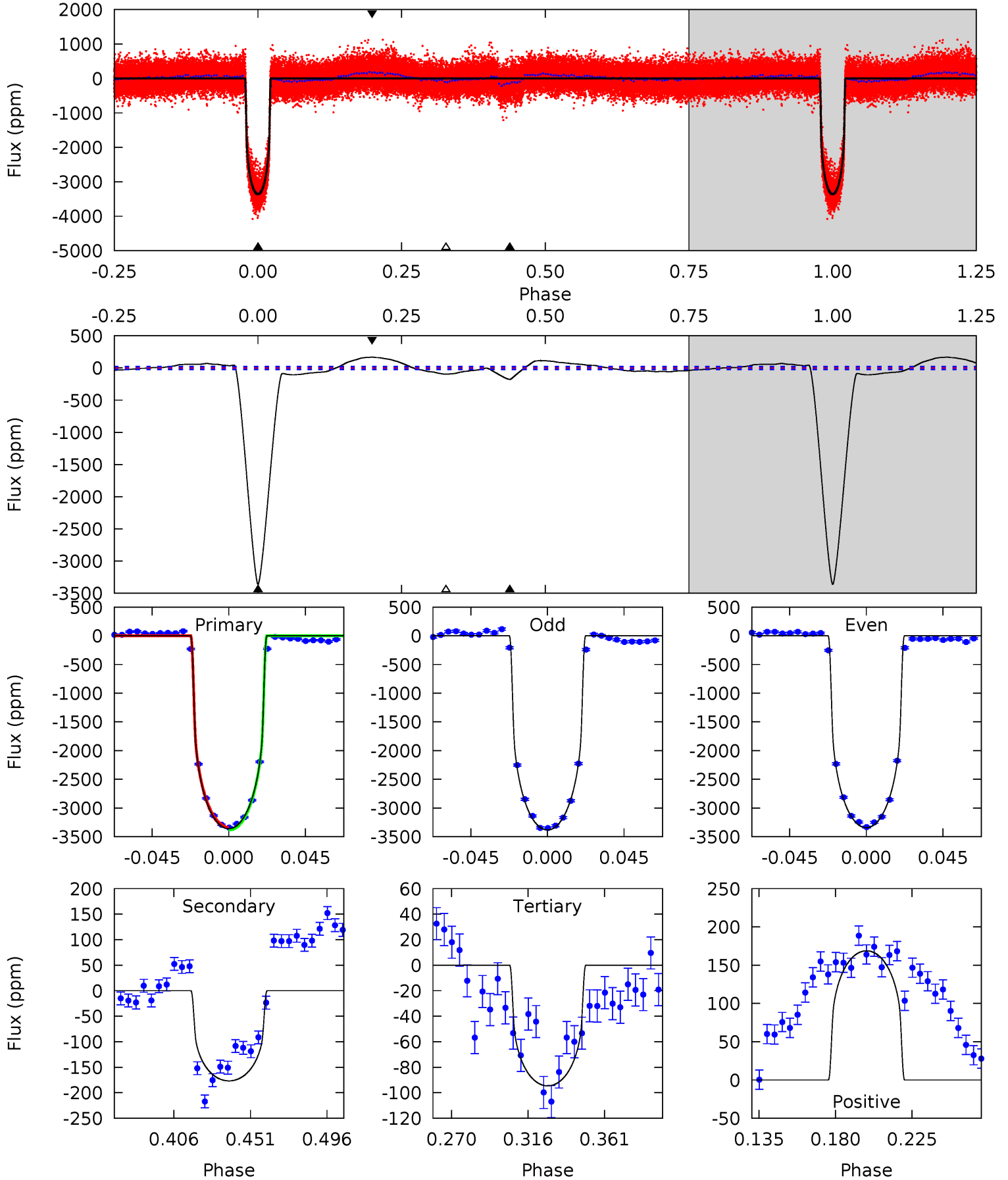
TCE 008702921-01 P= 19.383727 Days  $T_0=137.242849$  (BKJD)



# DV Model-Shift Uniqueness Test

008702921-01, P = 19.384461 Days, E = 117.829168 Days

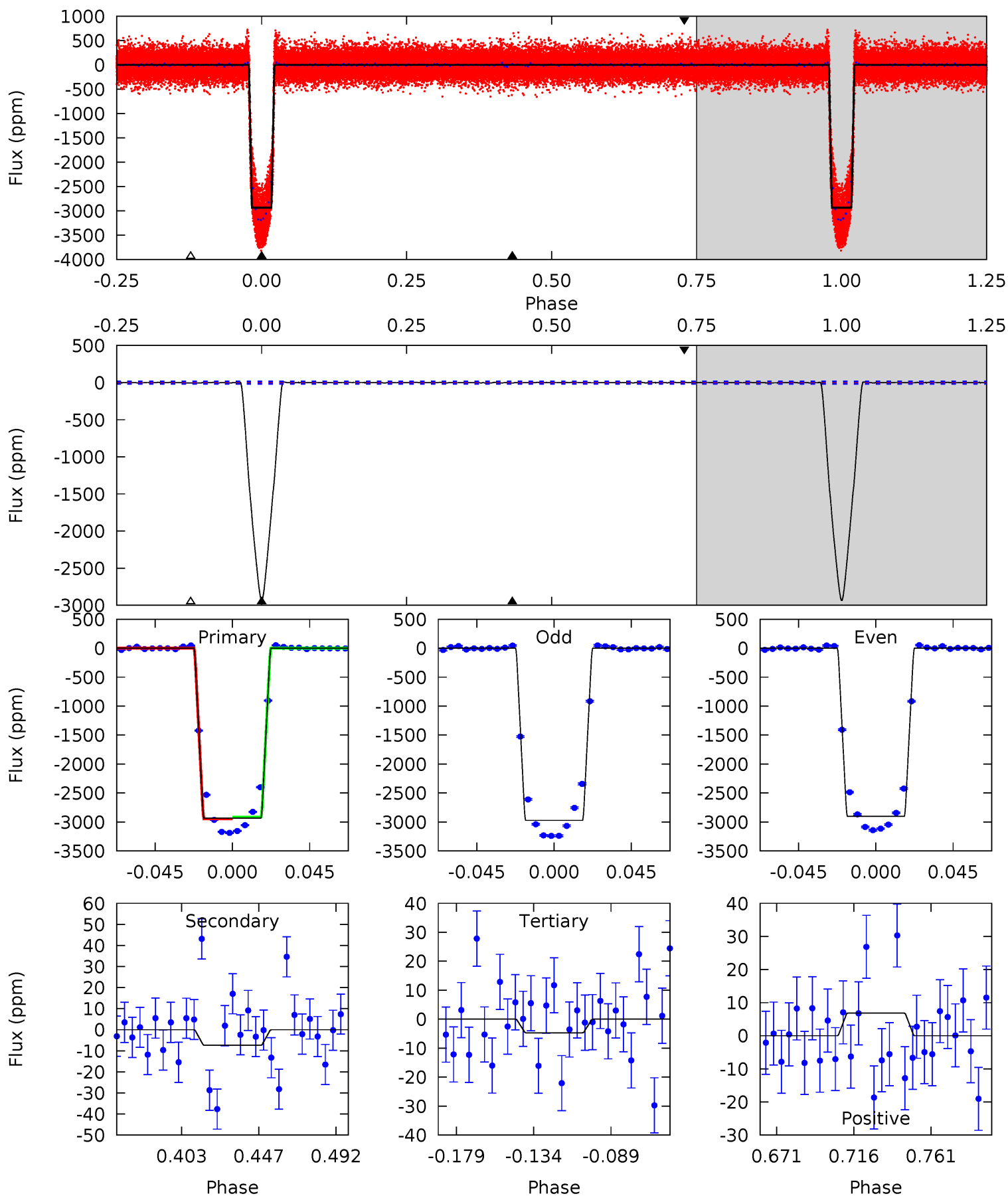
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
751.9	39.5	21.2	37.8	4.73	2.00	16.1	730.7	714.1	18.4	1.78	4.38	0.96	0.05	4.55



# Alt Model-Shift Uniqueness Test

008702921-01, P = 19.383727 Days, E = 117.859122 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
879.3	2.21	1.40	2.05	4.73	2.01	0.53	877.9	877.2	0.81	0.17	10.1	0.92	0.00	4.79



### Stellar Parameters For KIC 008702921

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$4968^{+49}_{-119}$	$3.291^{+0.195}_{-0.105}$	$0.300^{+0.100}_{-0.200}$	$5.026^{+0.715}_{-1.549}$	$1.800^{+0.200}_{-0.600}$	$0.020^{+0.026}_{-0.006}$
	+1%/-2%	+6%/-3%	+33%/-67%	+14%/-31%	+11%/-33%	+128%/-30%
Source	SPE74	SPE74	SPE74	DSEP		

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

### Secondary Eclipse Parameters for KIC 008702921-01 / KOI 6187.01

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-177 \pm 4$	$28.67^{+2.38}_{-4.84}$	$1644^{+71}_{-103}$	$3061^{+27}_{-46}$	$3.580^{+1.111}_{-0.507}$
Alt.	$-7 \pm 3$	$28.12^{+2.44}_{-4.45}$	$1639^{+70}_{-104}$	$-2080^{+224}_{-116}$	$0.157^{+0.088}_{-0.074}$

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

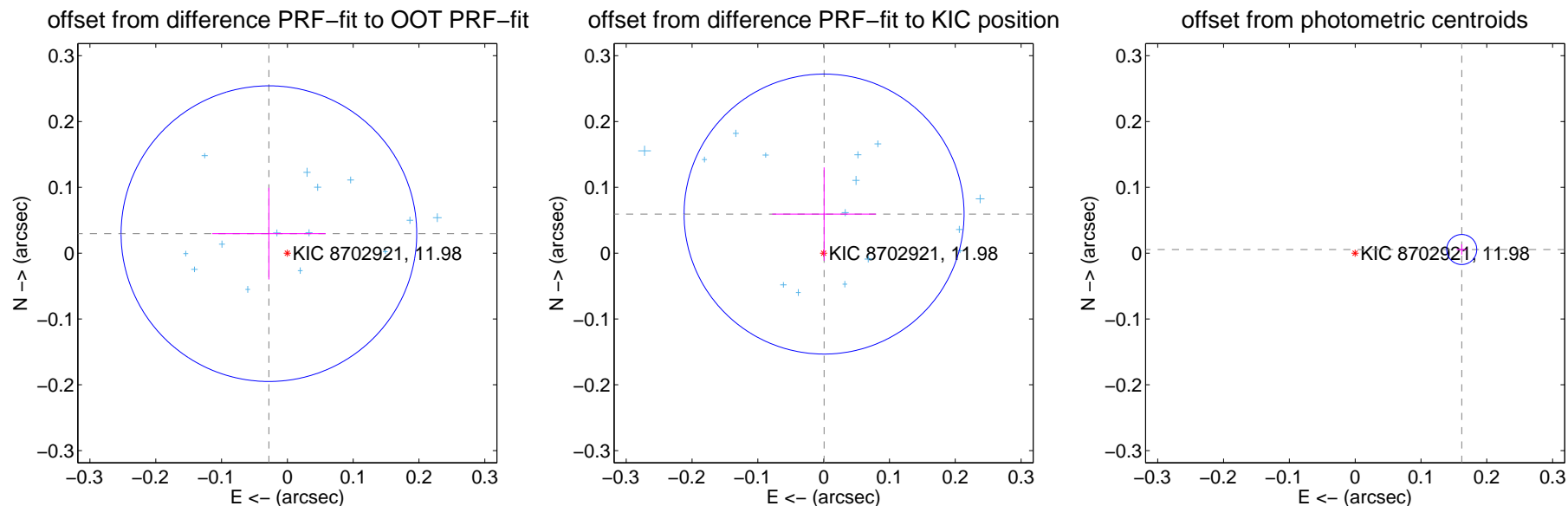
## DV Centroid Data

Supplemental centroid analysis for 008702921-01. **Kepler magnitude: 11.98.** Transit SNR 221.96

There are 17 quarters with good PRF difference image offsets

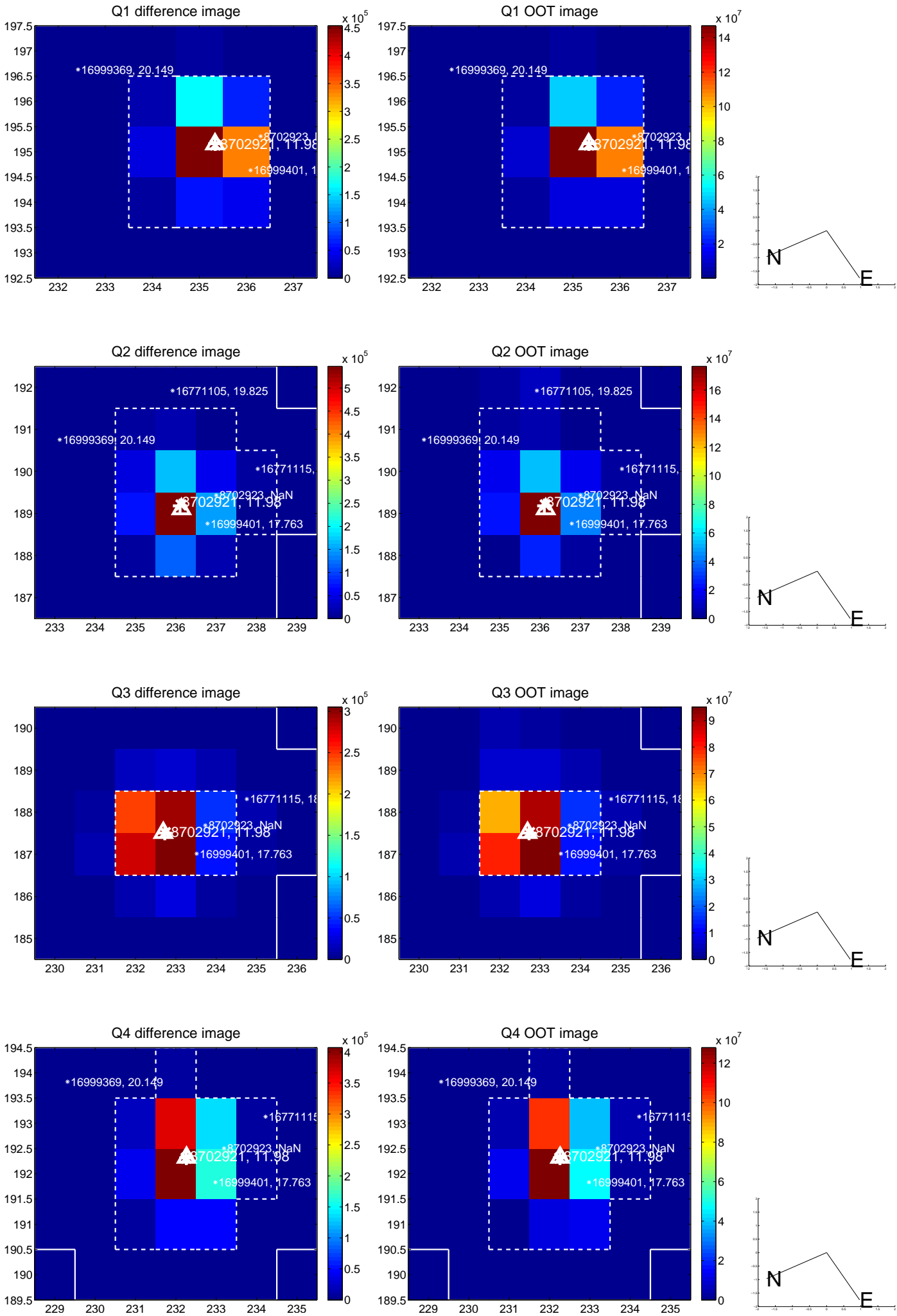
The direct PRF centroid is offset from the target star catalog position by about 0.07 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.041 \pm 0.075$	0.55	$0.028 \pm 0.086$	$0.030 \pm 0.070$
PRF-fit source offset from KIC position	$0.059 \pm 0.071$	0.84	$-0.001 \pm 0.079$	$0.059 \pm 0.071$
photometric centroid source offset	<b><math>0.16 \pm 0.01</math></b>	<b>21.28</b>	$-0.16 \pm 0.01$	$0.01 \pm 0.01$



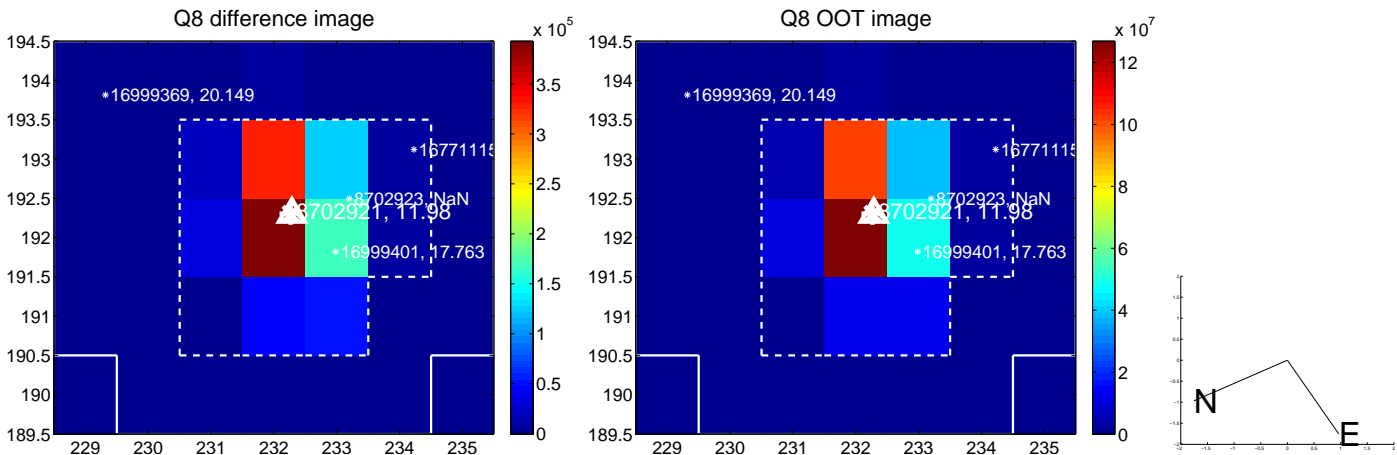
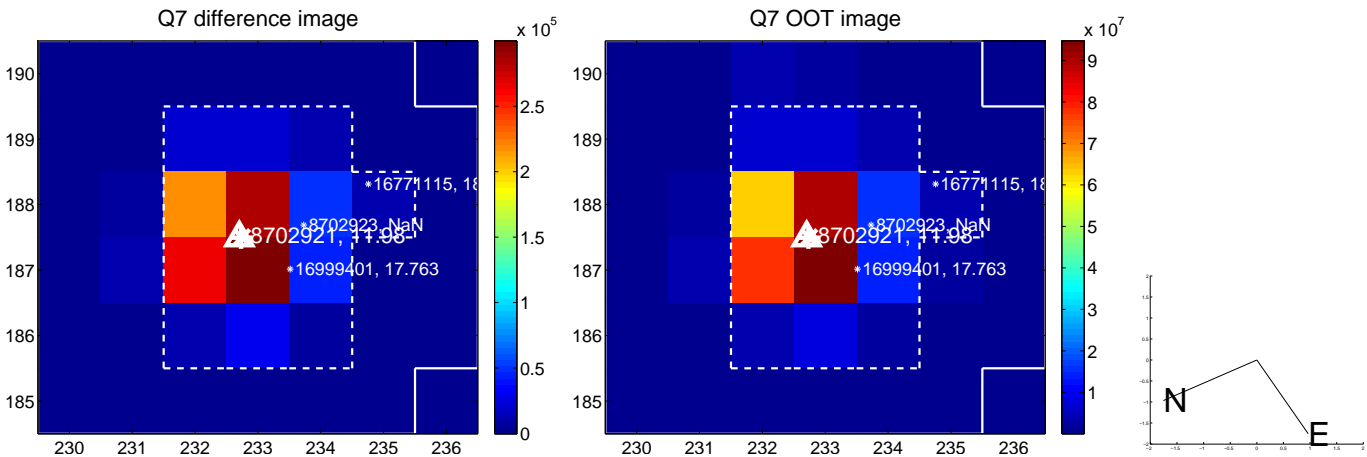
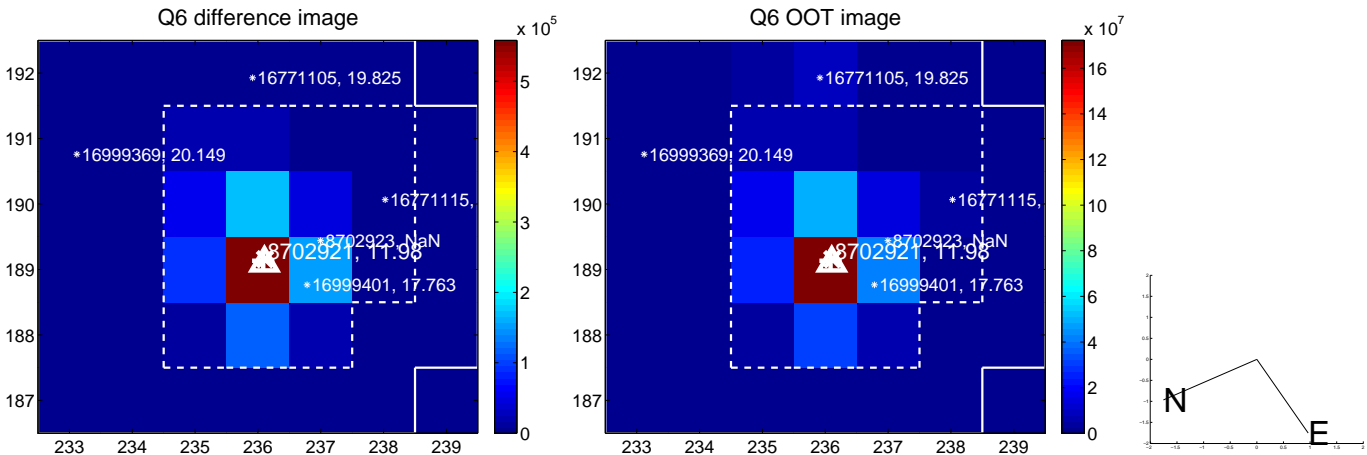
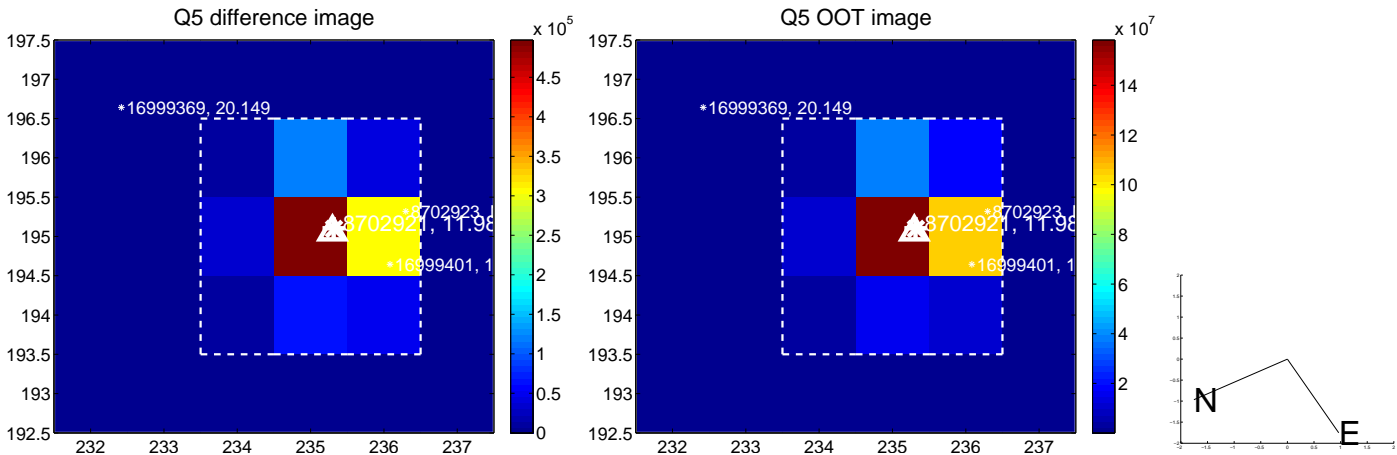
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

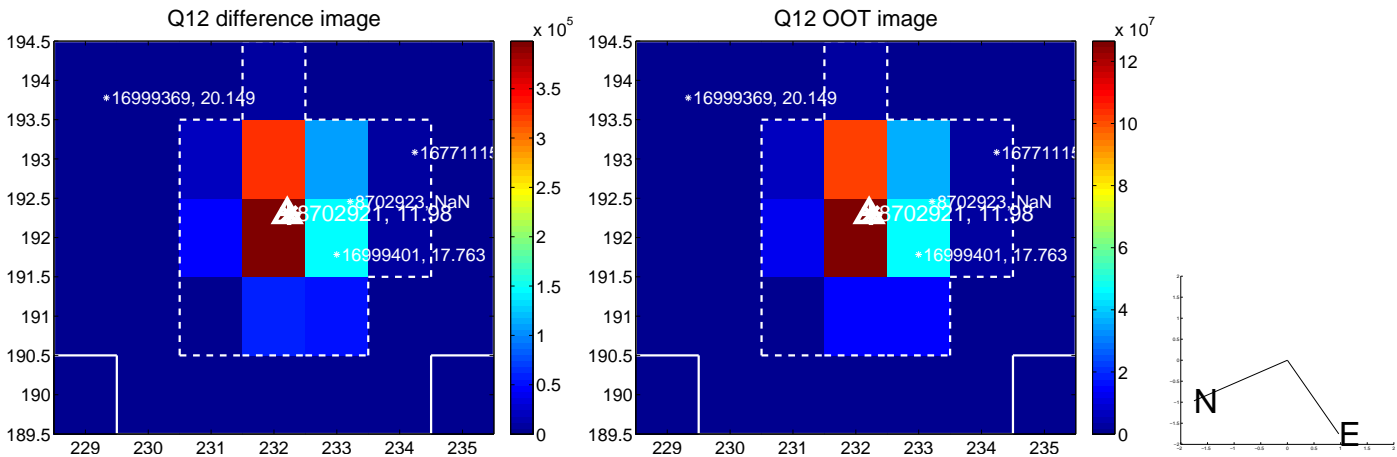
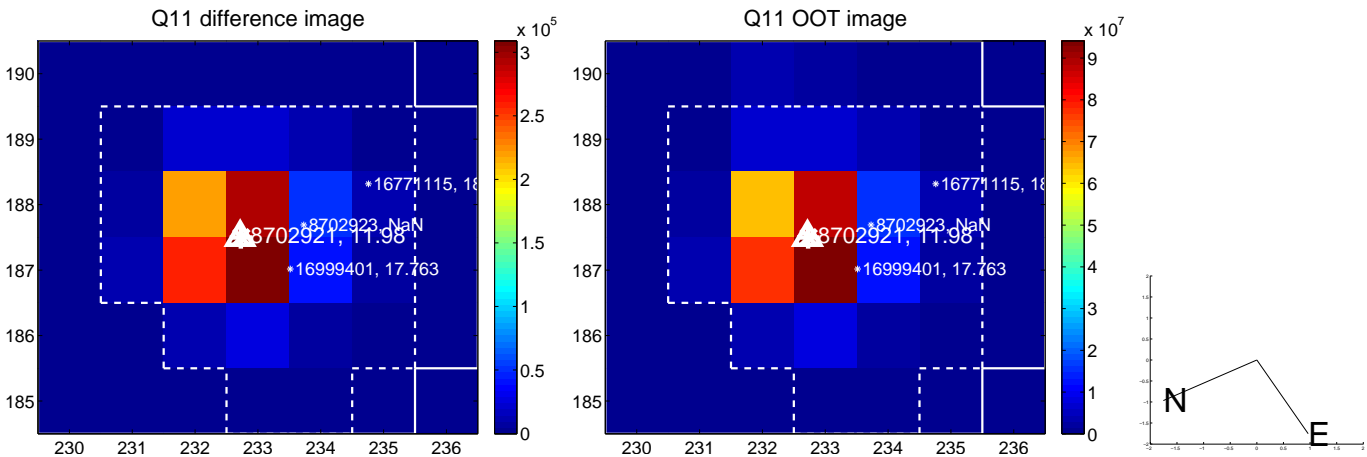
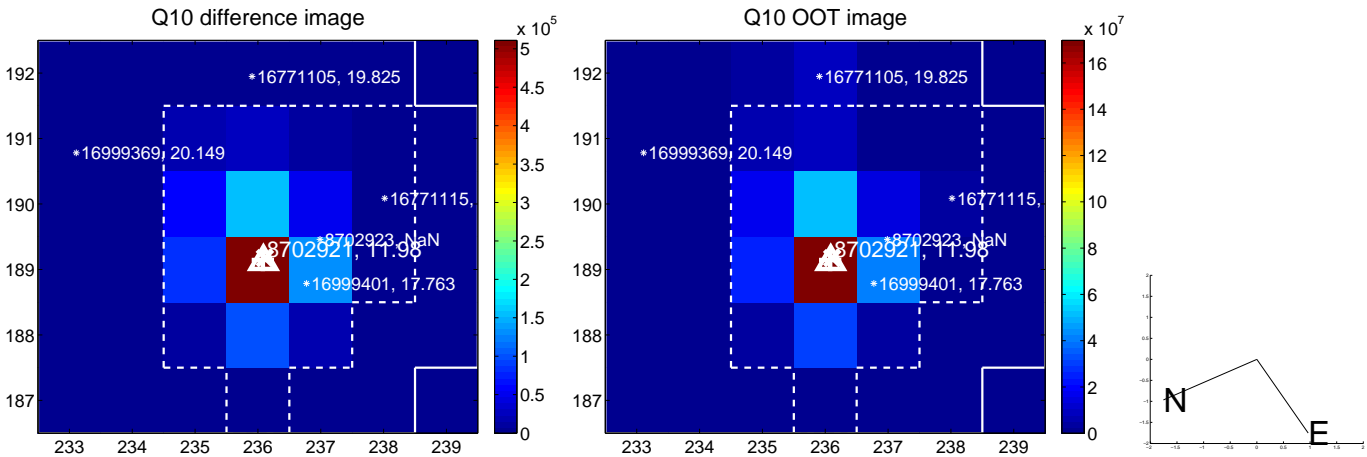
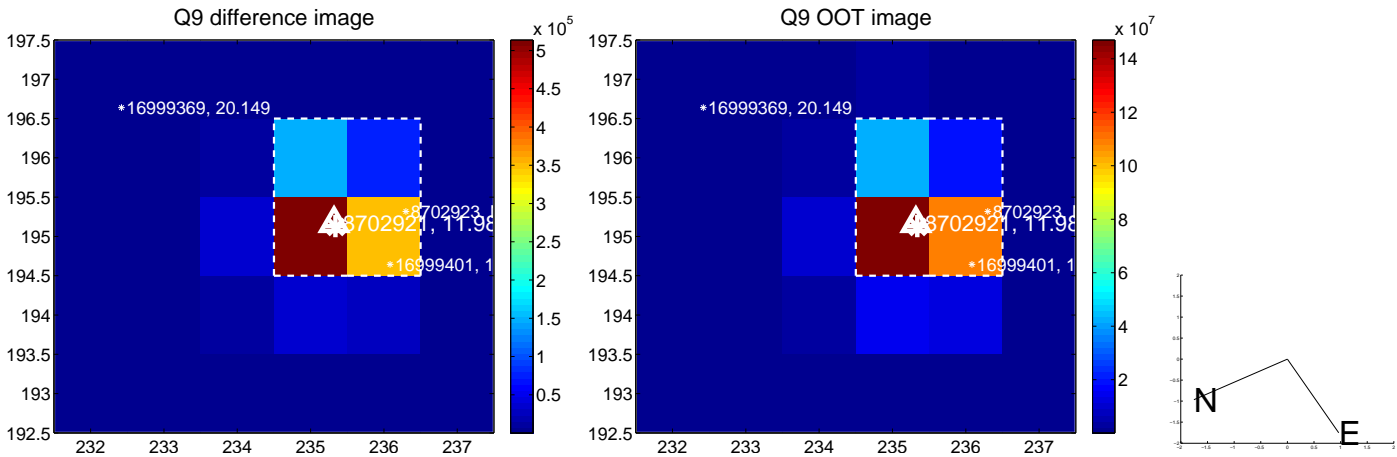




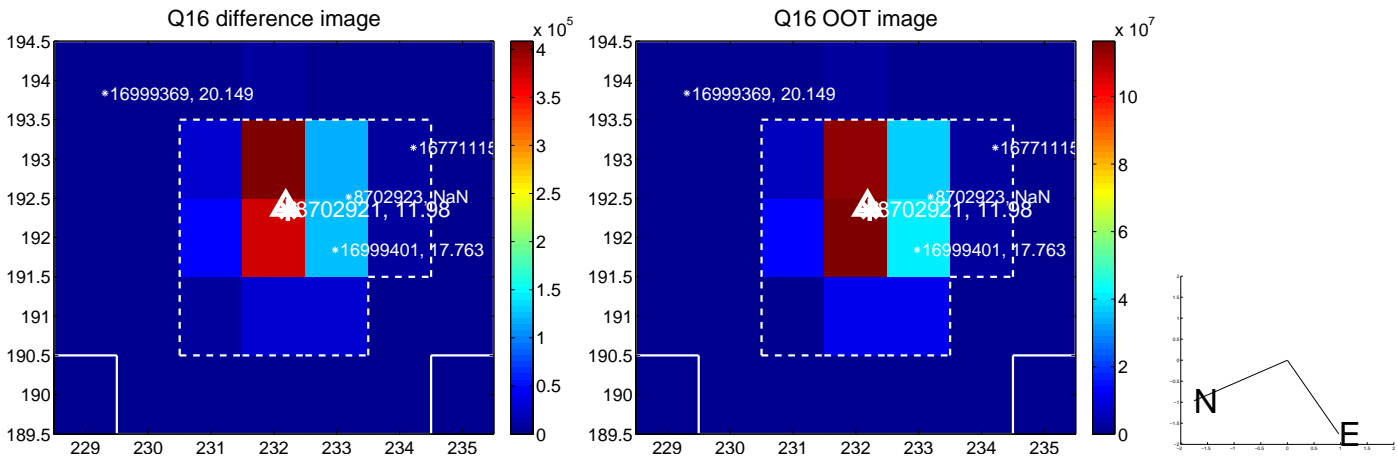
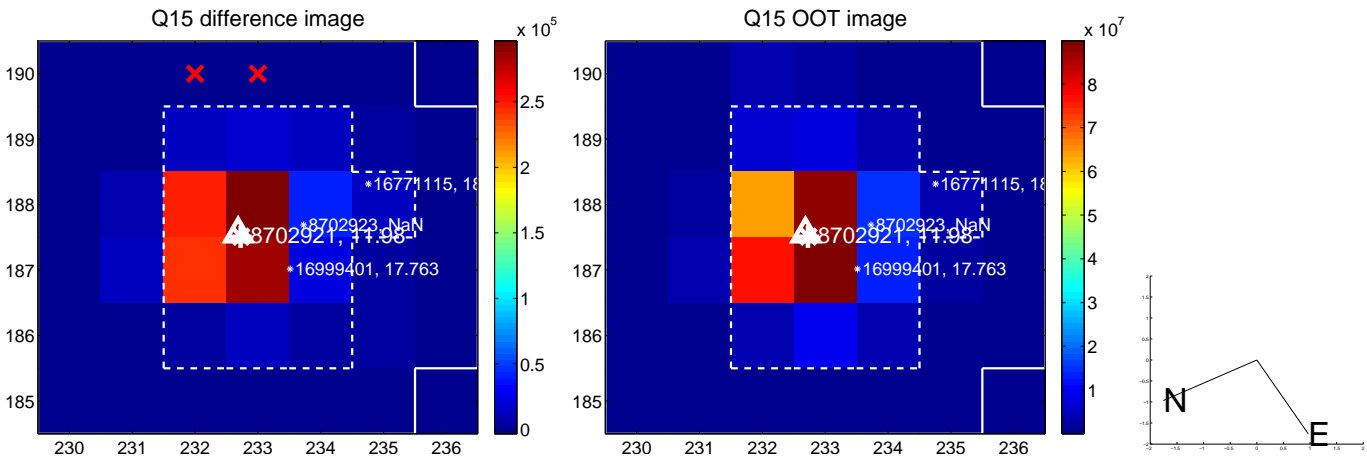
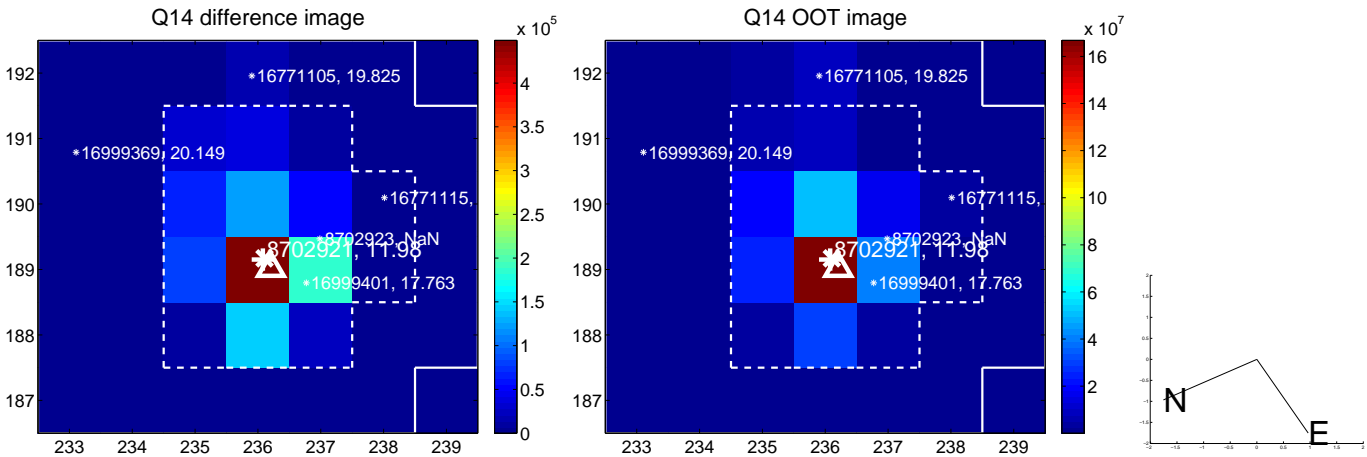
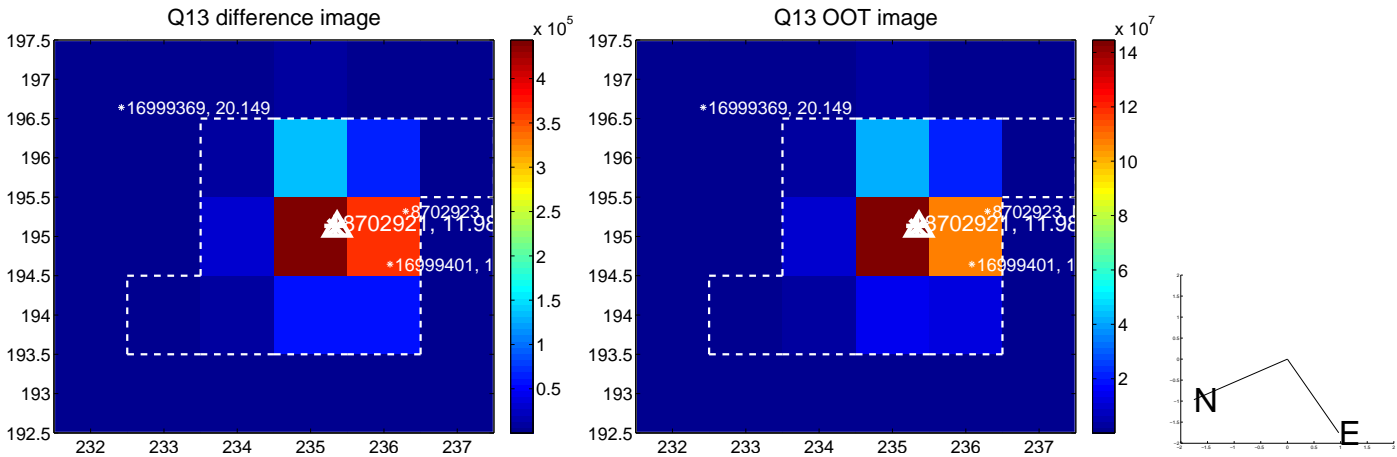
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



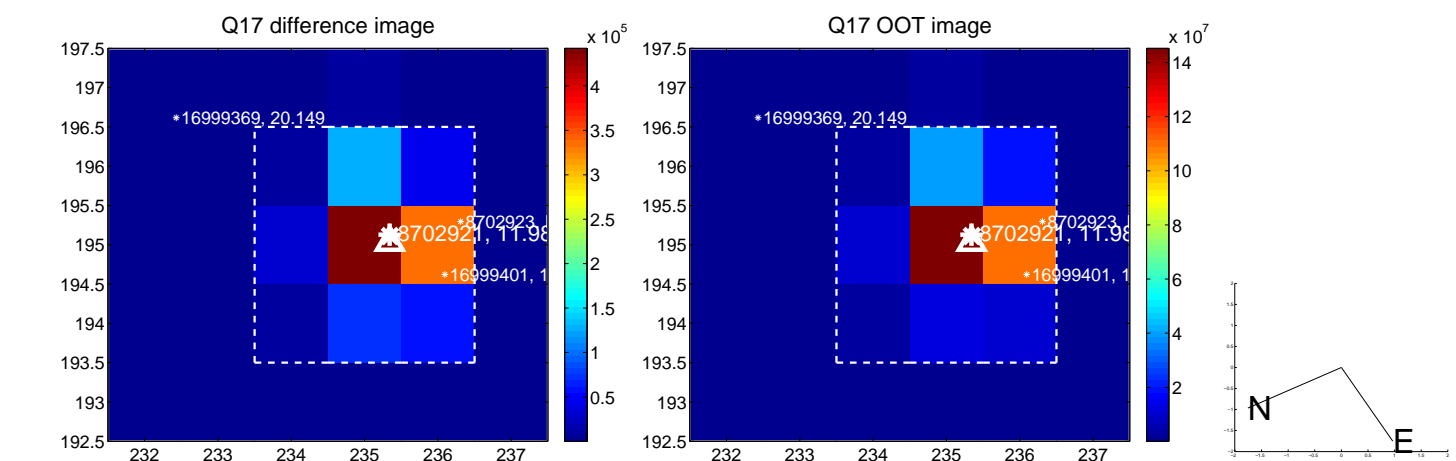
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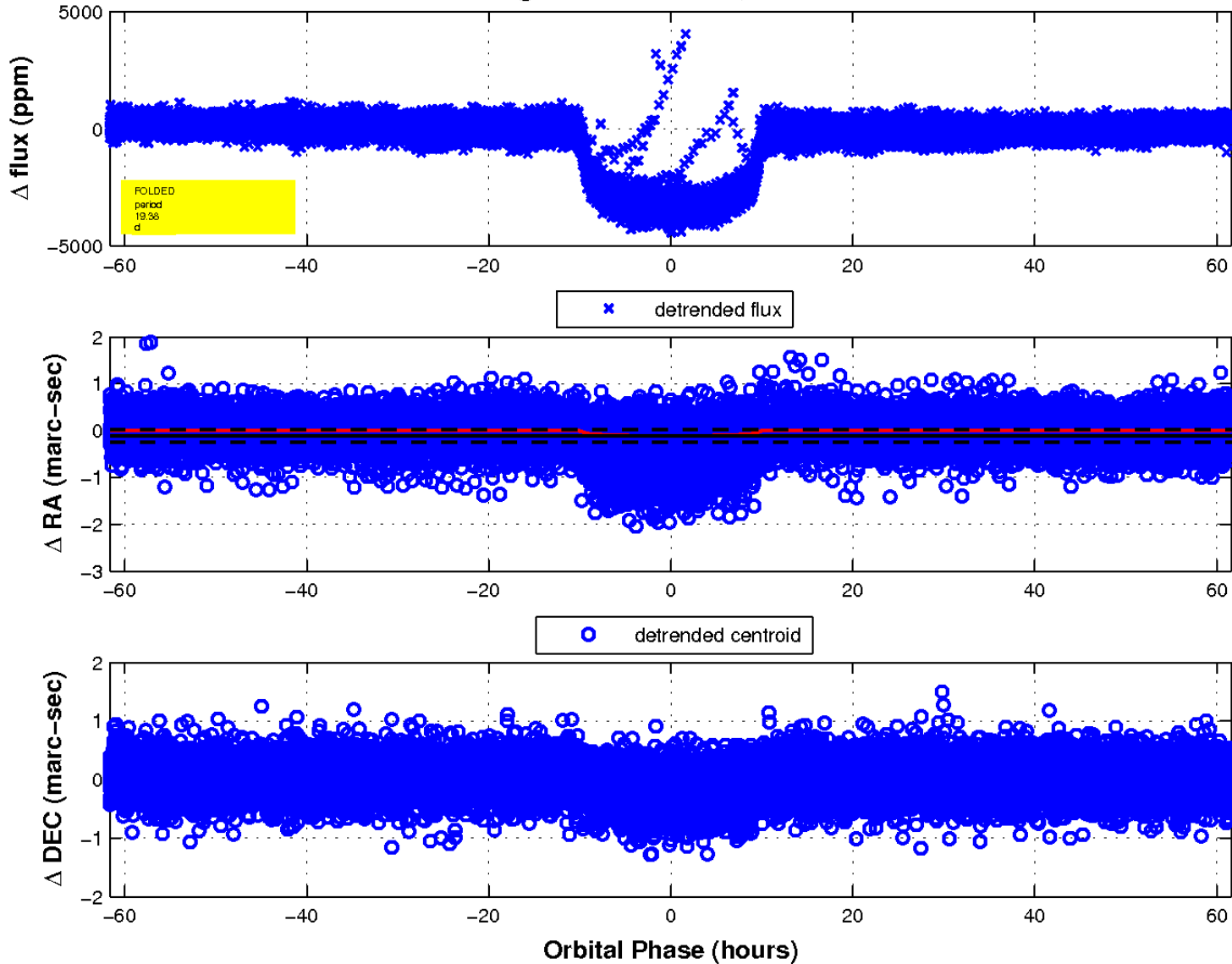
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

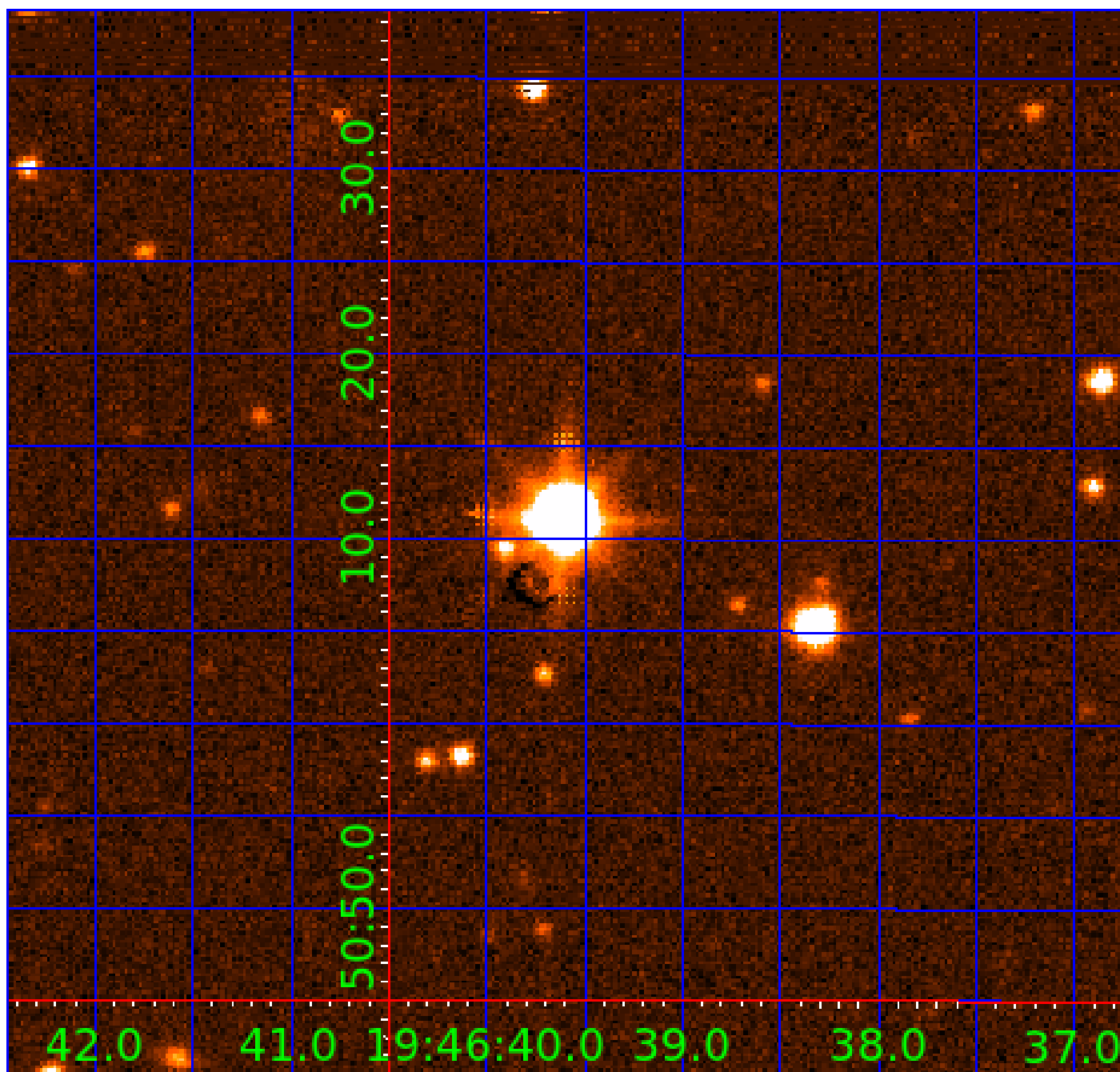


fluxWeightedCentroids, Planet 1 of 3



UKIRT Image

Declination



# KIC 008702921

## Q1-17 DR25 TCE Parameters

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

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008702921-01	OBS	FP	0.00	0	1	0	0	HAS_SEC_TCE
008702921-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE
008702921-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_ZUMA—LPP_DV—MOD_TER_DV—SAME_NTL_PERIOD

**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 008702921-02

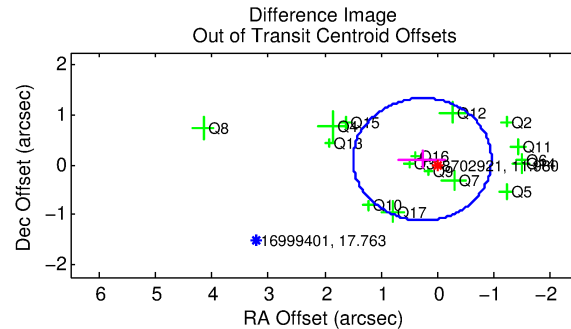
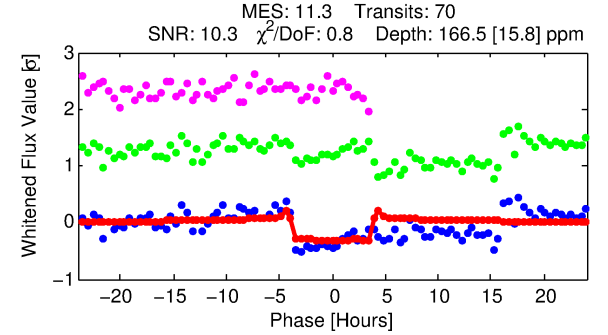
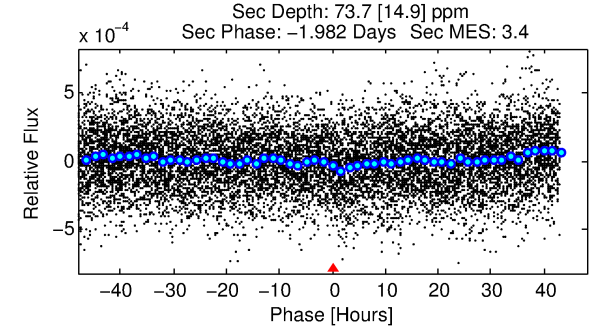
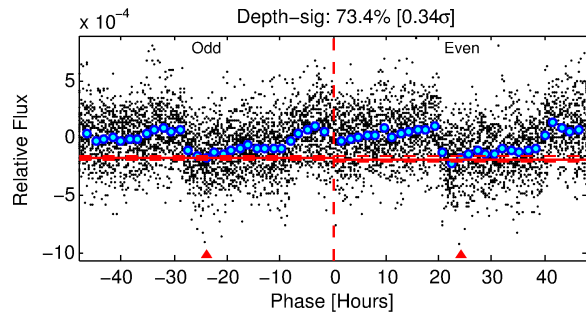
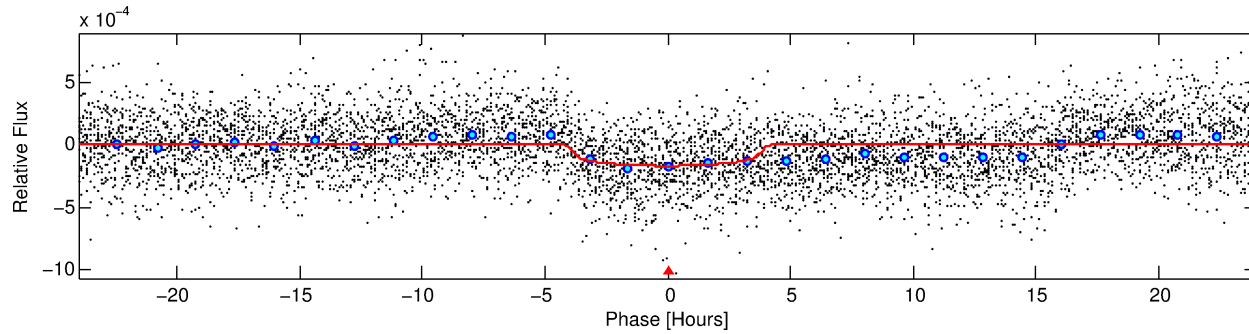
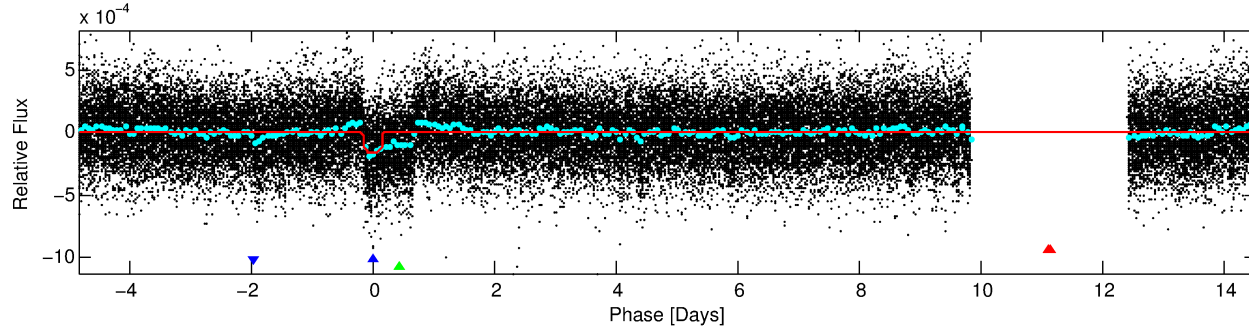
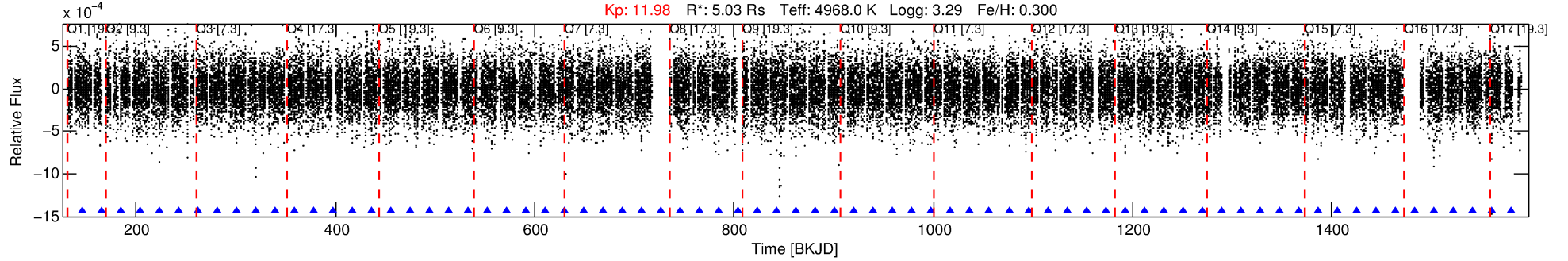
No Significant Match Found

# DV One-Page Summary

KIC: 8702921 Candidate: 2 of 3 Period: 19.384 d

KOI: K06187 Corr: No Ephemeris Match

Kp: 11.98 R\*: 5.03 Rs Teff: 4968.0 K Logg: 3.29 Fe/H: 0.300



## DV Fit Results:

Period = 19.38433 [0.00015] d  
Epoch = 145.4776 [0.0064] BKJD  
Rp/R\* = 0.0132 [0.0033]  
a/R\* = 11.66 [10.30]  
b = 0.79 [0.42]  
Seff = 466.84 [175.30]  
Teq = 1185 [111] K  
Rp = 7.24 [2.88] Re  
a = 0.1718 [0.0437] AU  
Ag = 22.81 [14.86] [1.47σ]  
Teffp = 4005 [550] K [5.03σ]

## DV Diagnostic Results:

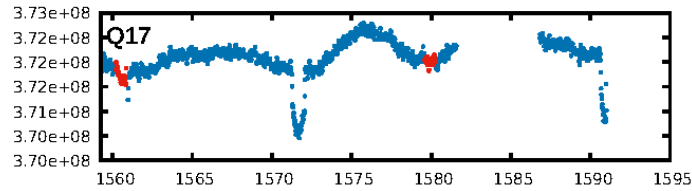
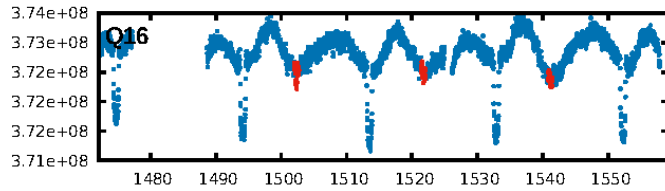
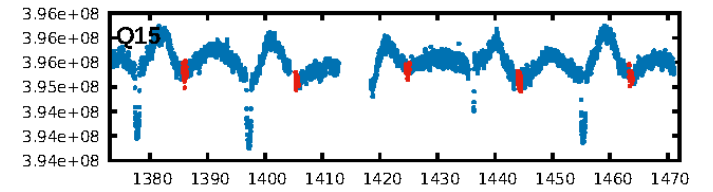
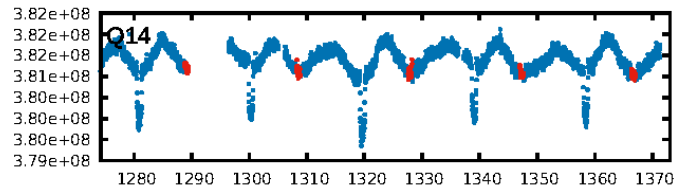
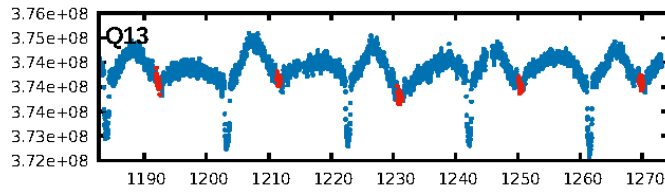
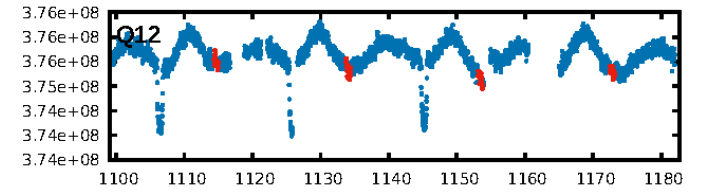
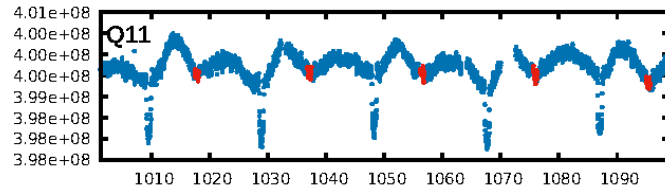
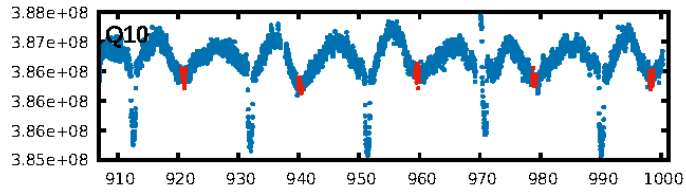
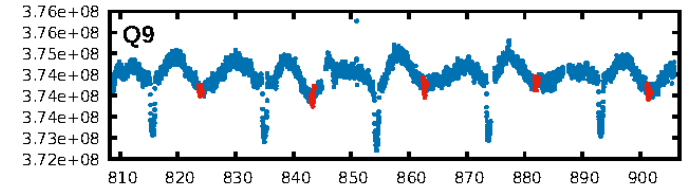
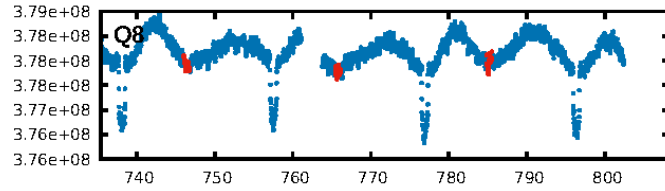
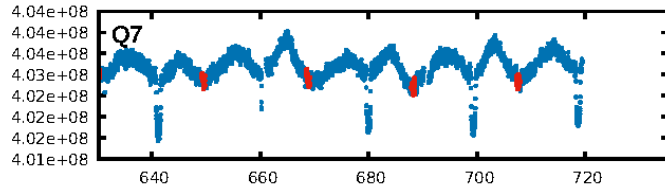
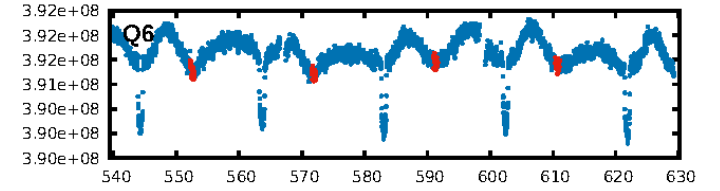
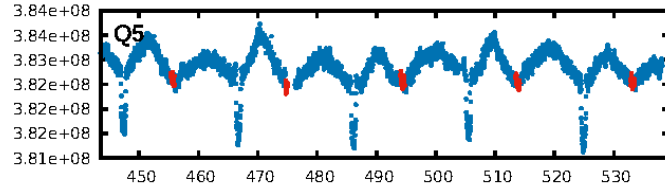
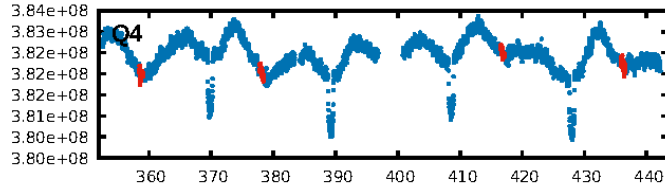
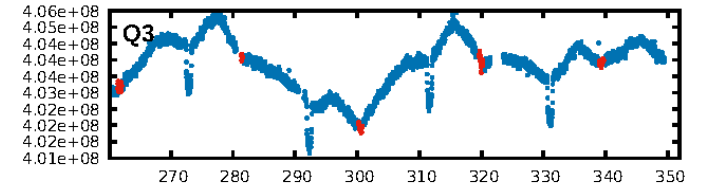
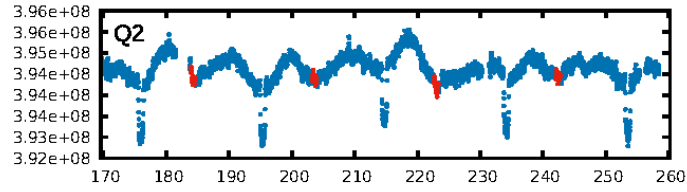
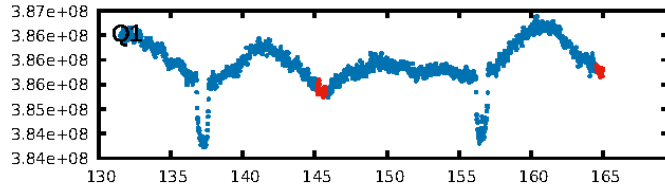
ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: 99.8%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 2.18e-26  
RollingBand-fgt: 1.00 [66/66]  
GhostDiagnostic-chr: 1.842  
Centroid-sig: N/A  
Centroid-so: 0.252 arcsec [1.27σ]  
OotOffset-rm: 0.292 arcsec [0.72σ]  
KicOffset-rm: 0.289 arcsec [0.82σ]  
OotOffset-st: 4/4/4/4 [16]  
KicOffset-st: 4/4/4/4 [16]  
DiffImageQuality-fgm: 0.94 [15/16]  
DiffImageOverlap-fno: 0.00 [0/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 21:35:41 Z

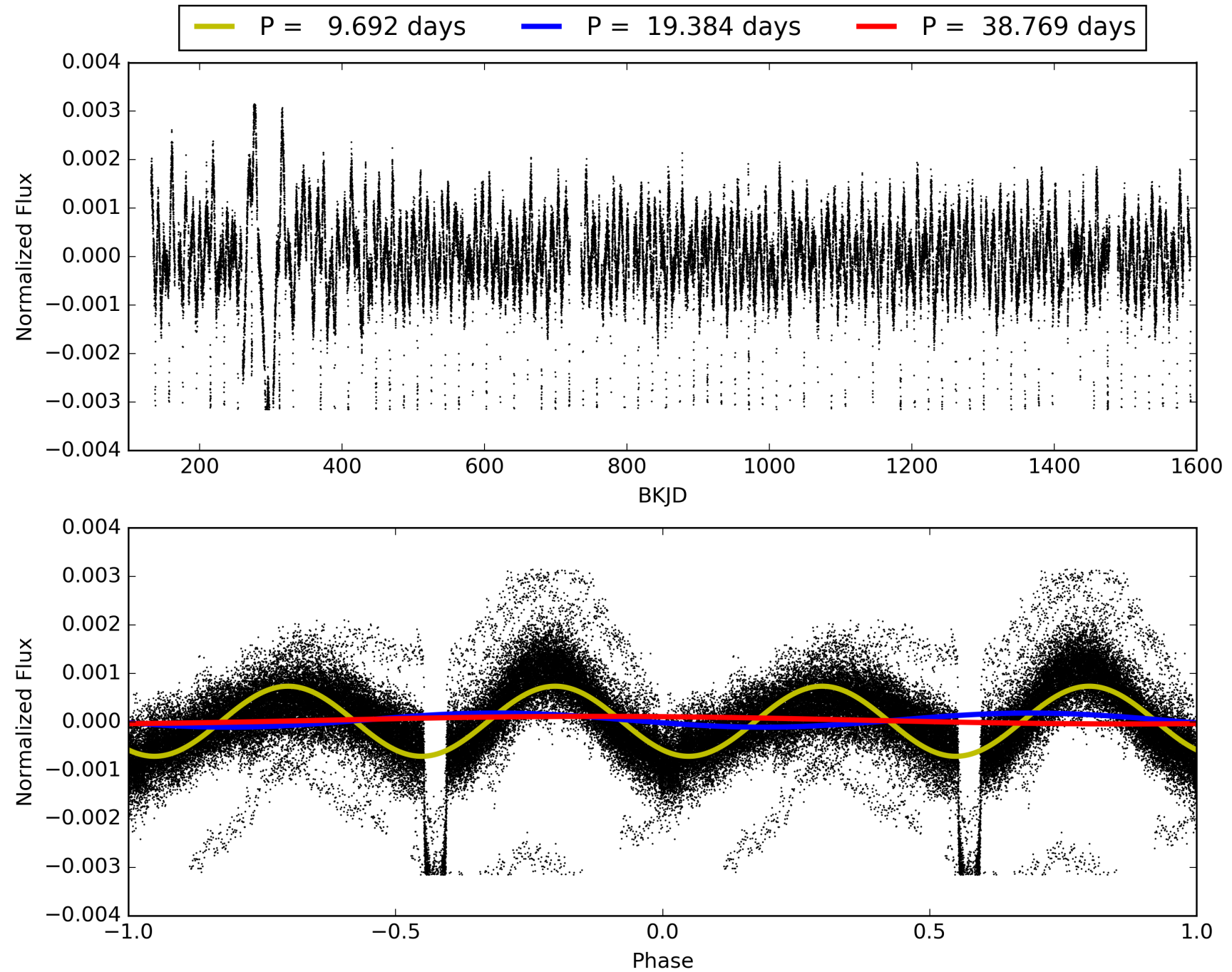
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 008702921-02, PDC Light Curves

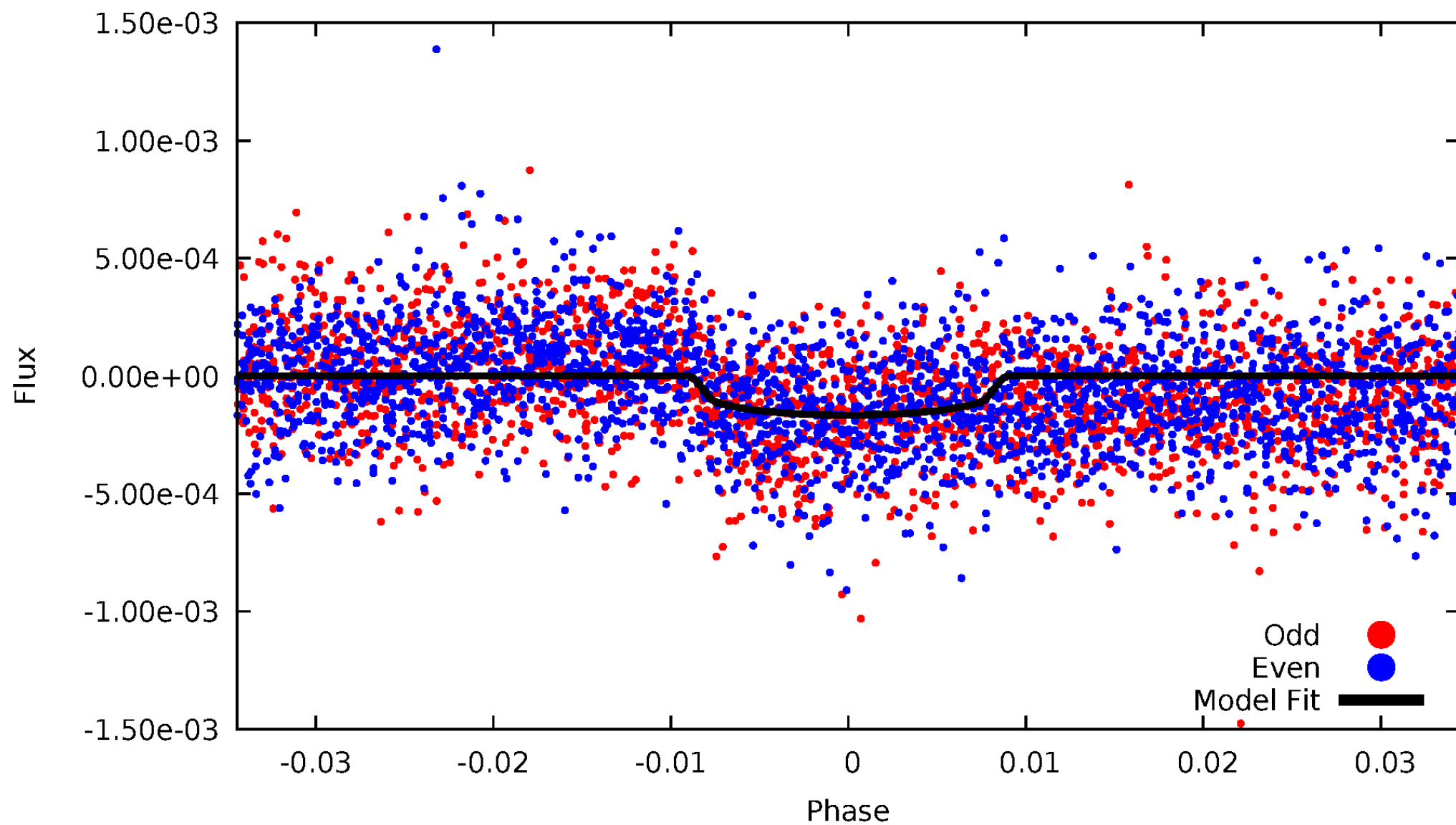


TCE 008702921-02



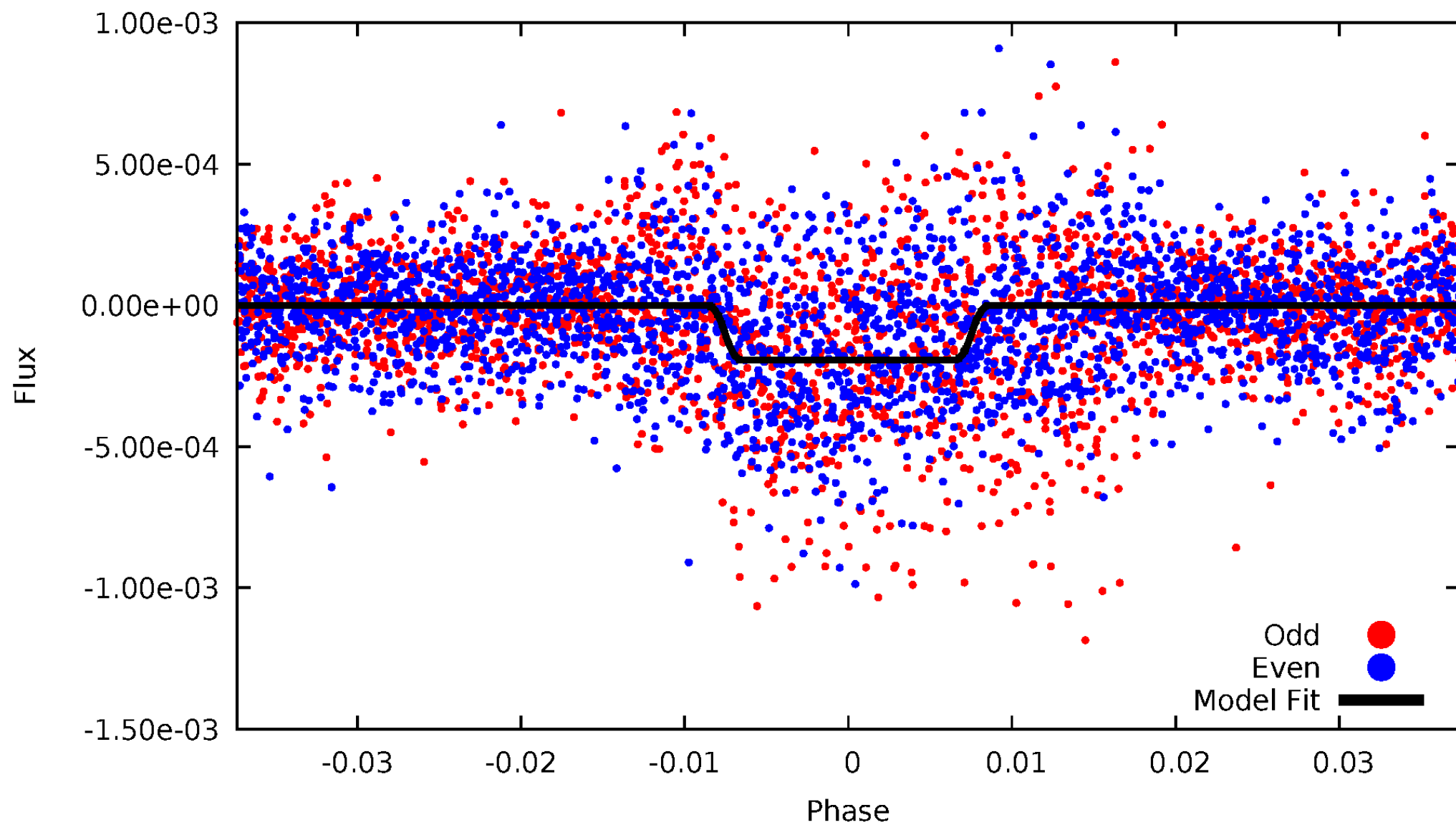
DV Odd/Even

TCE 008702921-02



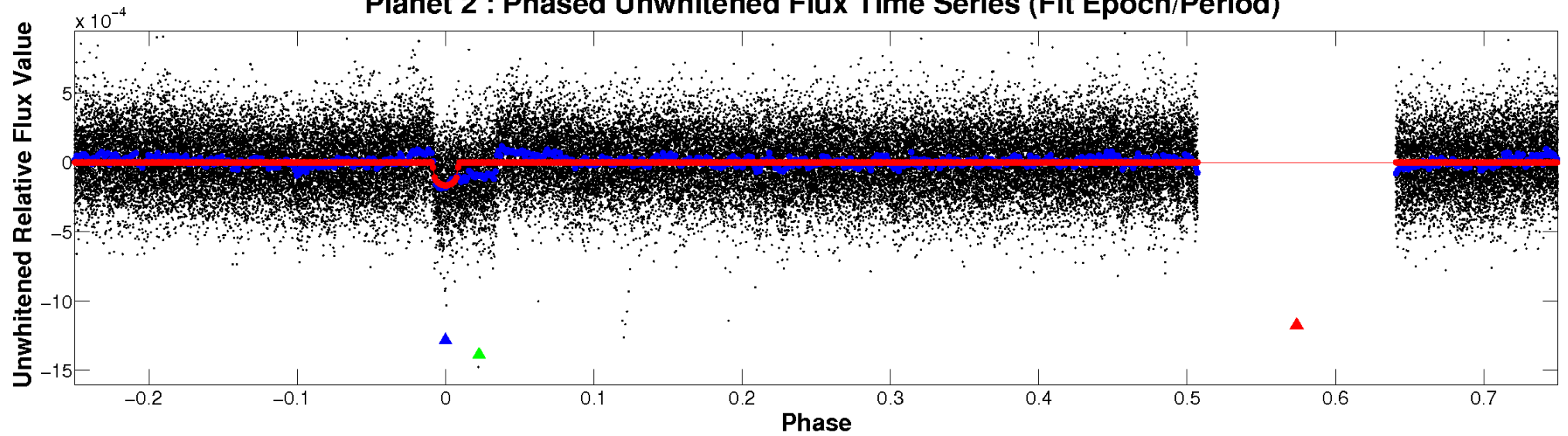
# ALT Odd/Even

TCE 008702921-02

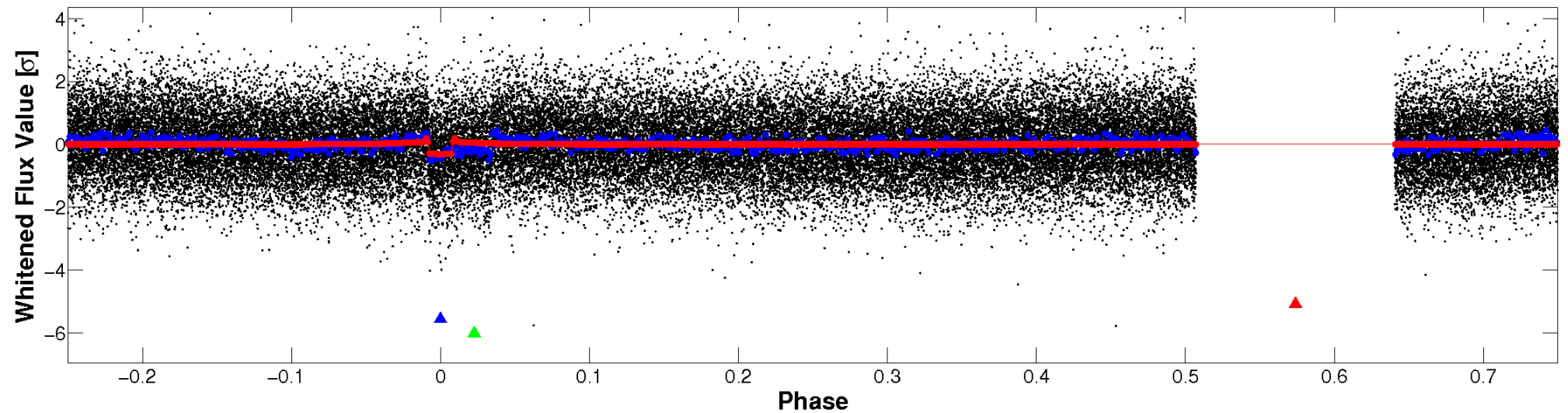


# Non-Whitened Vs. Whitened Light Curve

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



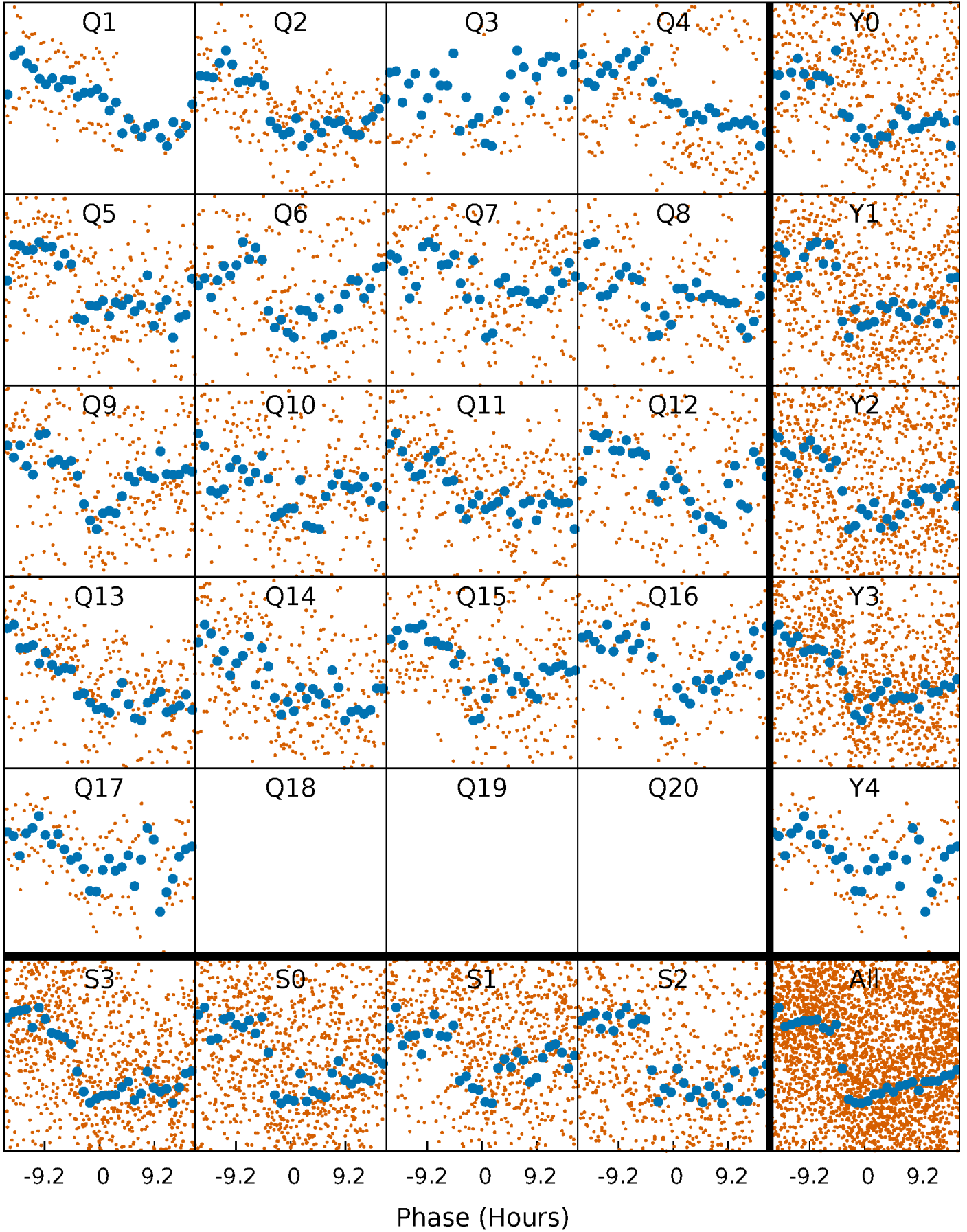
## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)





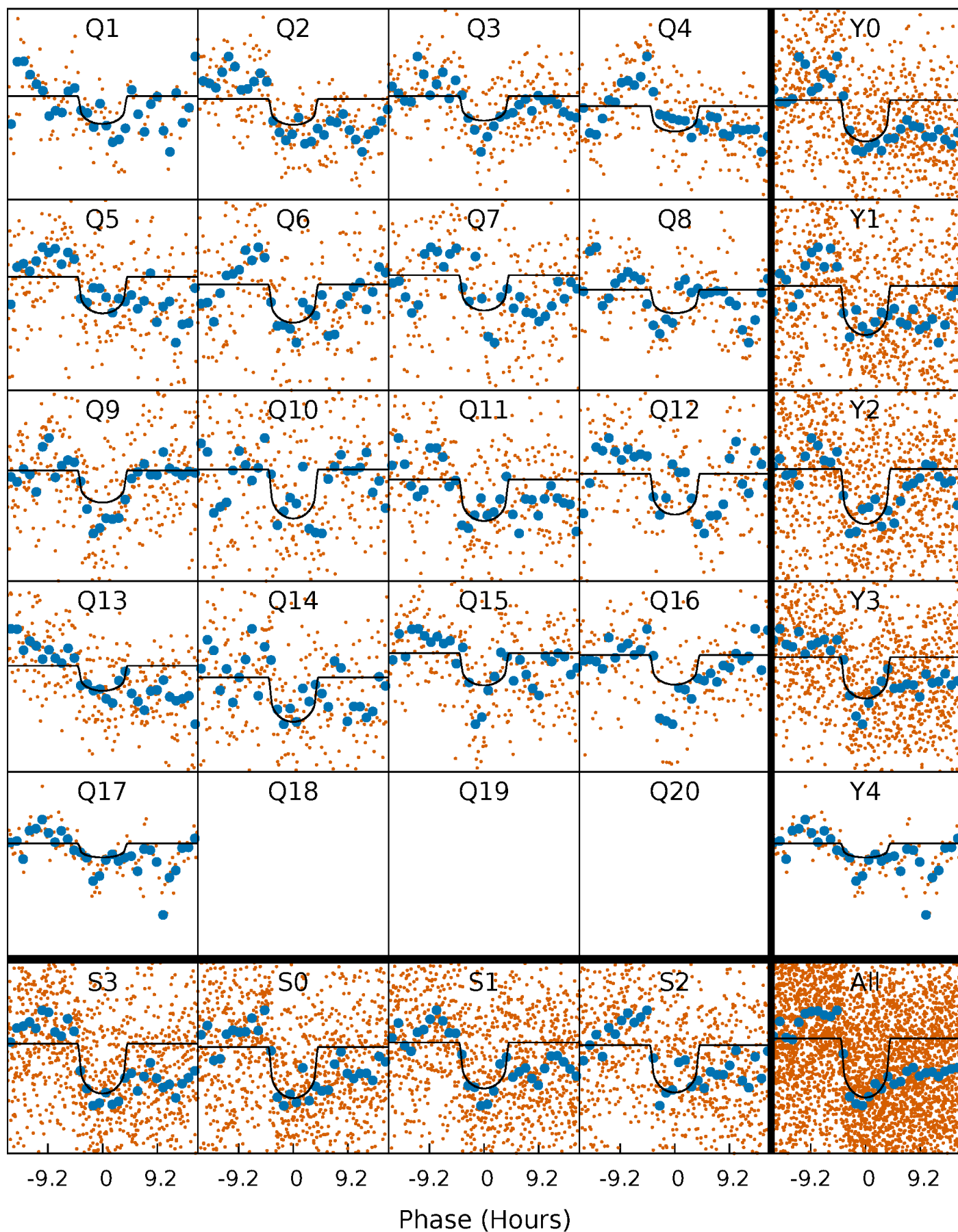
# PDC Quarter-Phased Transit Curves

TCE 008702921-02 P= 19.384333 Days  $T_0=145.477623$  (BKJD)



# DV Quarter-Phased Transit Curves

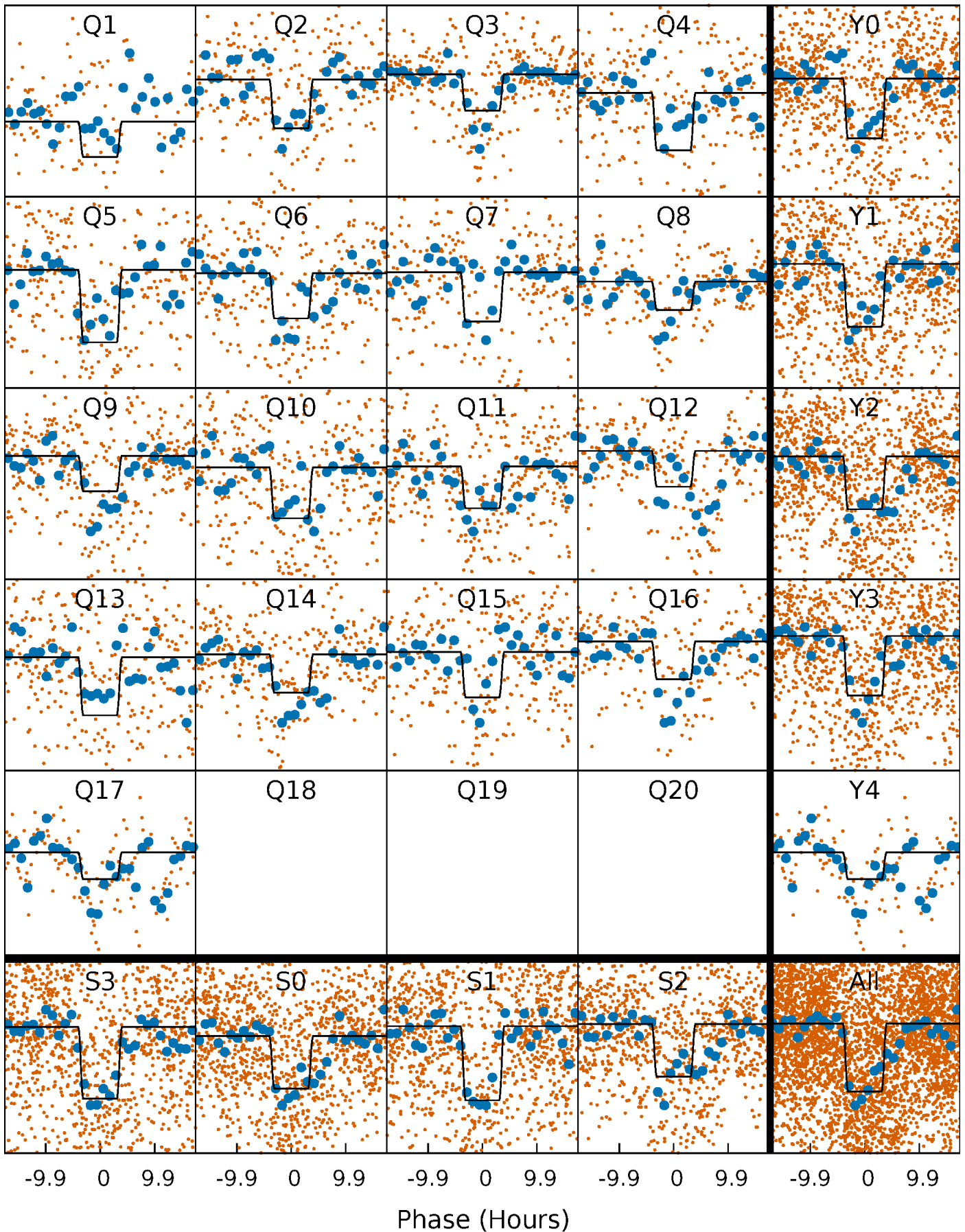
TCE 008702921-02 P= 19.384333 Days  $T_0=145.477623$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

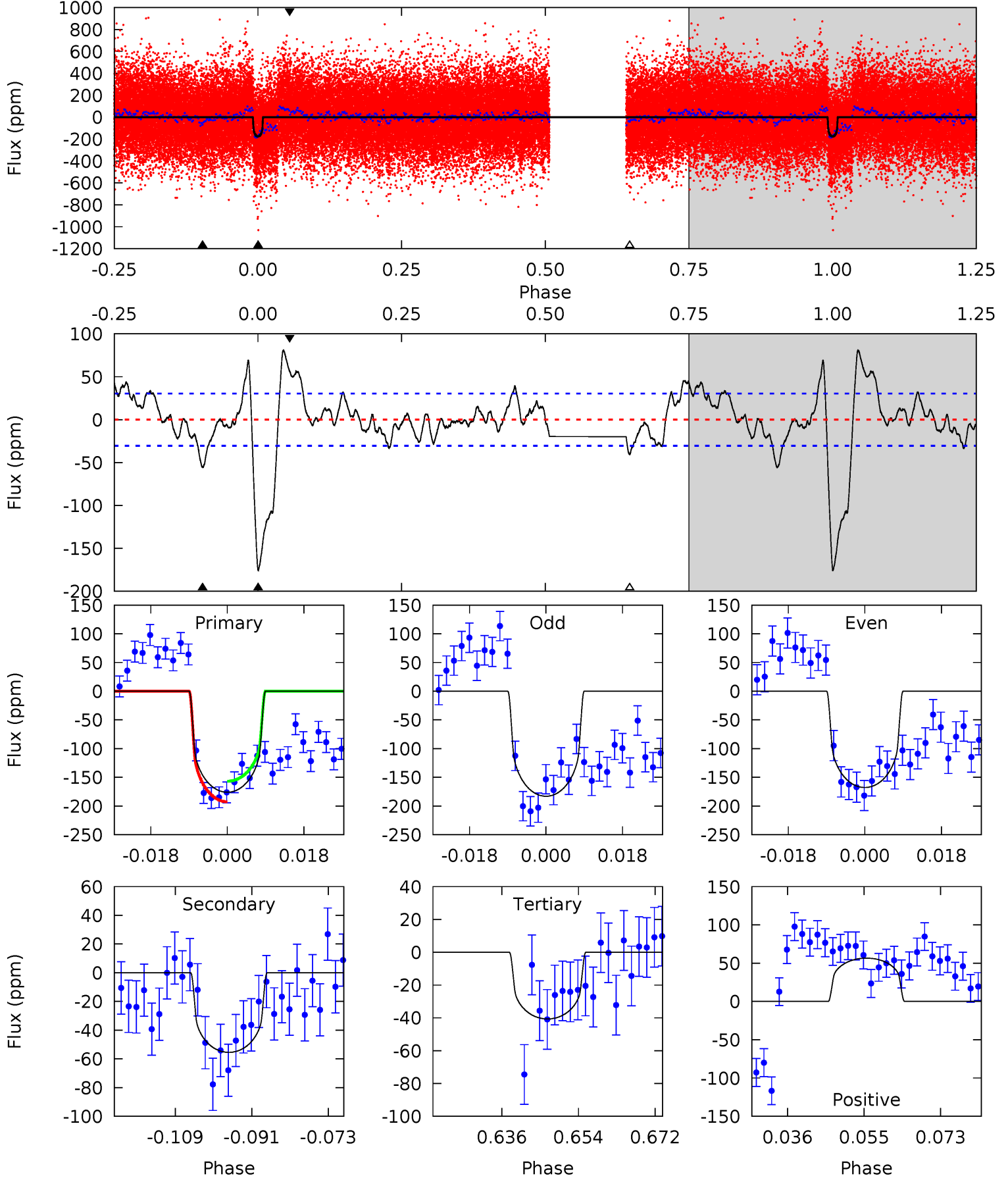
TCE 008702921-02 P= 19.384287 Days  $T_0=145.470743$  (BKJD)



# DV Model-Shift Uniqueness Test

008702921-02, P = 19.384333 Days, E = 126.093290 Days

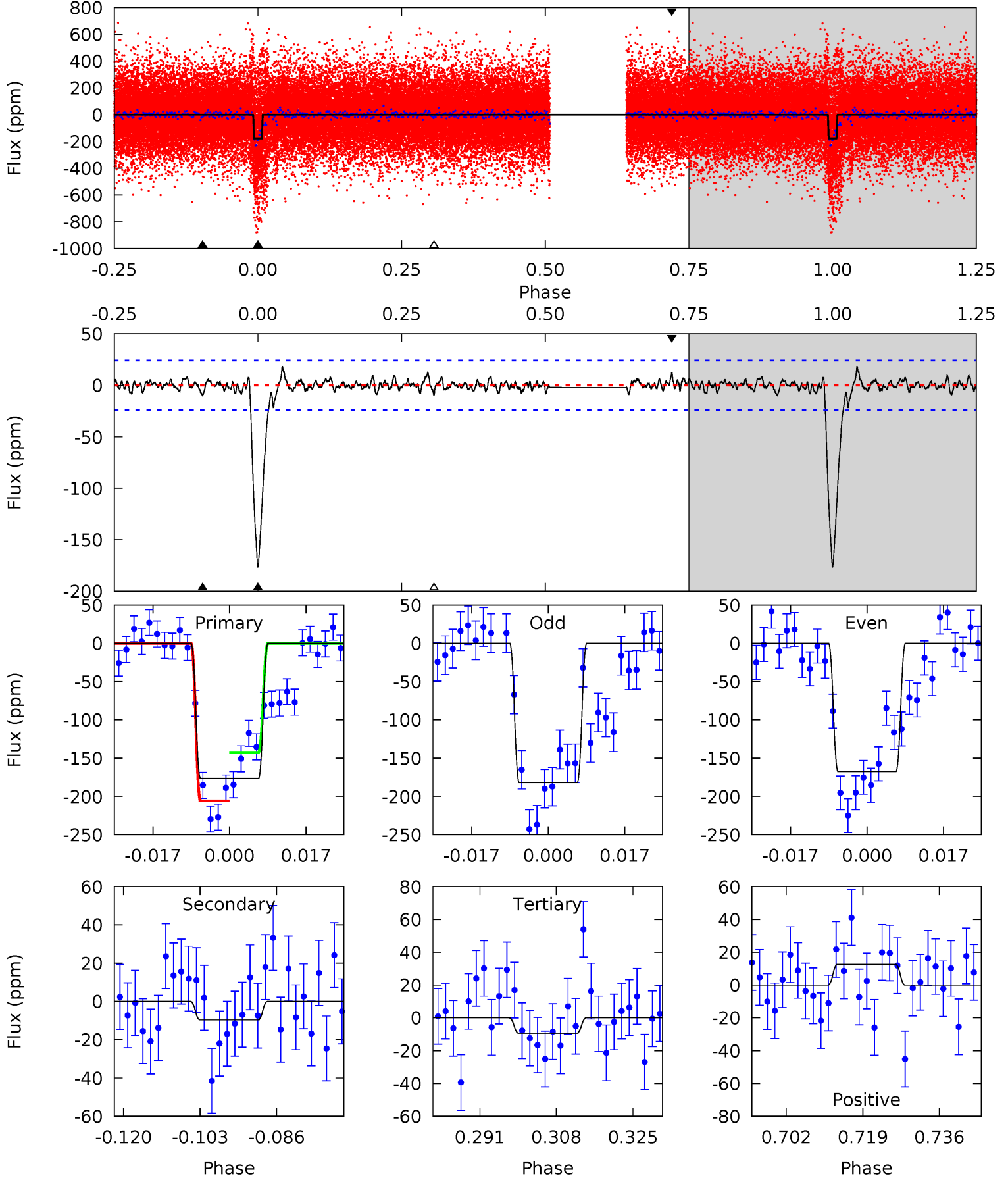
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
28.4	8.96	6.57	9.14	4.91	2.36	4.07	21.9	19.3	2.39	-0.18	1.23	1.13	0.31	2.90



# Alt Model-Shift Uniqueness Test

008702921-02, P = 19.384287 Days, E = 126.086456 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
36.0	1.98	1.92	2.57	4.92	2.38	0.88	34.1	33.4	0.05	-0.59	1.49	0.85	0.09	6.51



### Stellar Parameters For KIC 008702921

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$4968^{+49}_{-119}$	$3.291^{+0.195}_{-0.105}$	$0.300^{+0.100}_{-0.200}$	$5.026^{+0.715}_{-1.549}$	$1.800^{+0.200}_{-0.600}$	$0.020^{+0.026}_{-0.006}$
	+1%/-2%	+6%/-3%	+33%/-67%	+14%/-31%	+11%/-33%	+128%/-30%
Source	SPE74	SPE74	SPE74	DSEP		

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

### Secondary Eclipse Parameters for KIC 008702921-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-55 \pm 6$	$6.92^{+2.25}_{-1.88}$	$1641^{+75}_{-107}$	$3952^{+484}_{-306}$	$18^{+18}_{-7}$
Alt.	$-10 \pm 5$	$7.32^{+2.24}_{-2.03}$	$1639^{+80}_{-106}$	$2918^{+338}_{-335}$	$2.788^{+3.044}_{-1.546}$

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

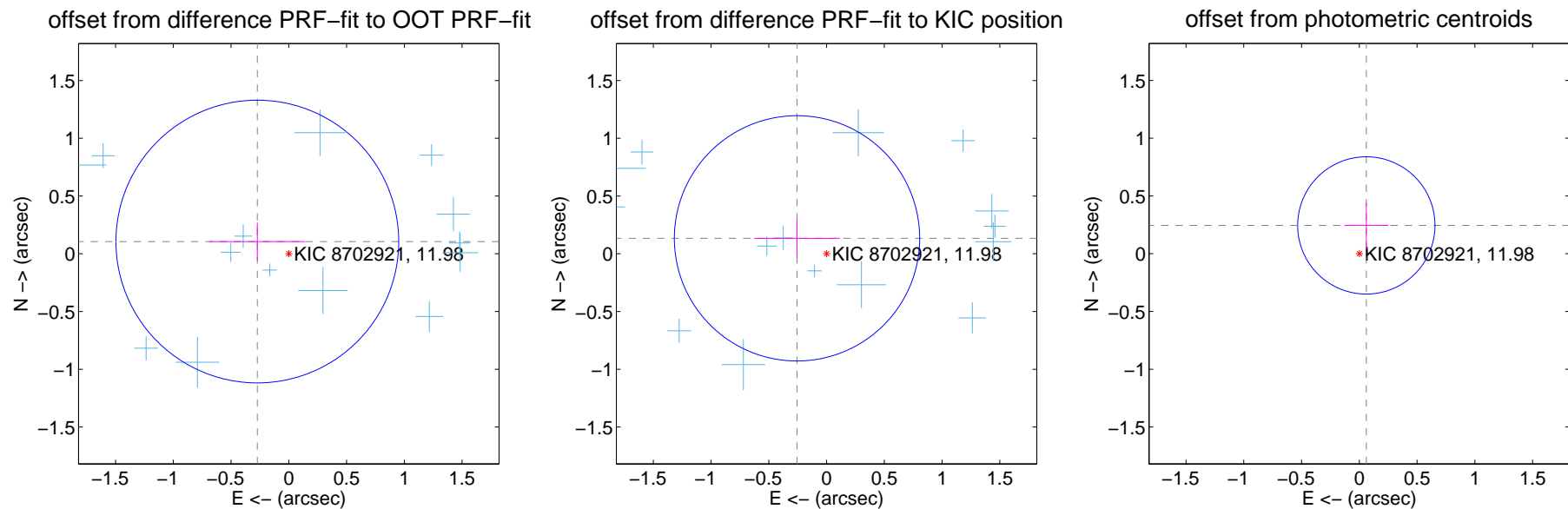
## DV Centroid Data

Supplemental centroid analysis for 008702921-02. **Kepler magnitude: 11.98.** Transit SNR 10.32

There are 15 quarters with good PRF difference image offsets

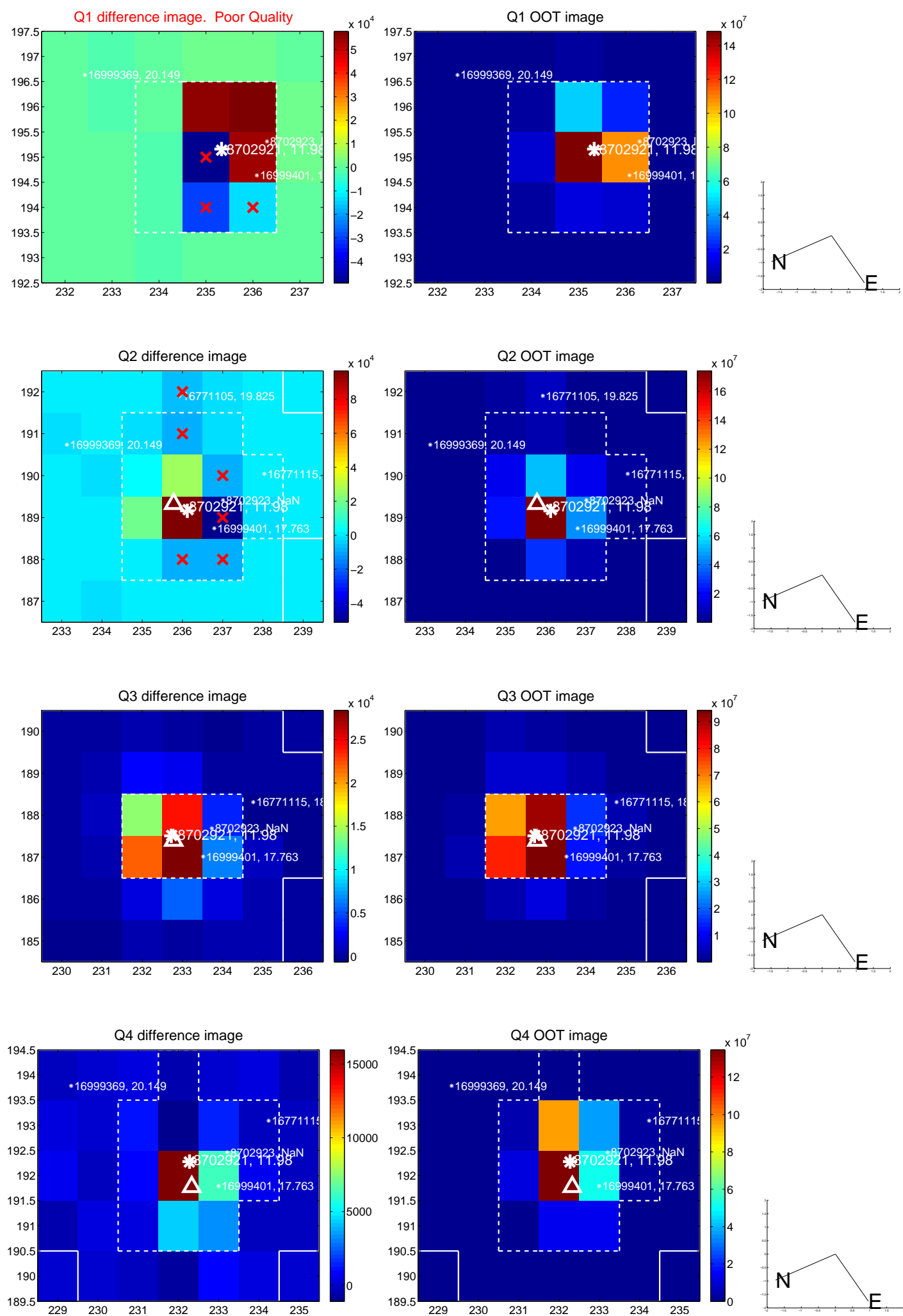
The direct PRF centroid is offset from the target star catalog position by about 0.07 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.292 \pm 0.408$	0.72	$0.273 \pm 0.415$	$0.106 \pm 0.164$
PRF-fit source offset from KIC position	$0.289 \pm 0.354$	0.82	$0.256 \pm 0.371$	$0.134 \pm 0.168$
photometric centroid source offset	$0.25 \pm 0.20$	1.27	$-0.06 \pm 0.19$	$0.24 \pm 0.20$

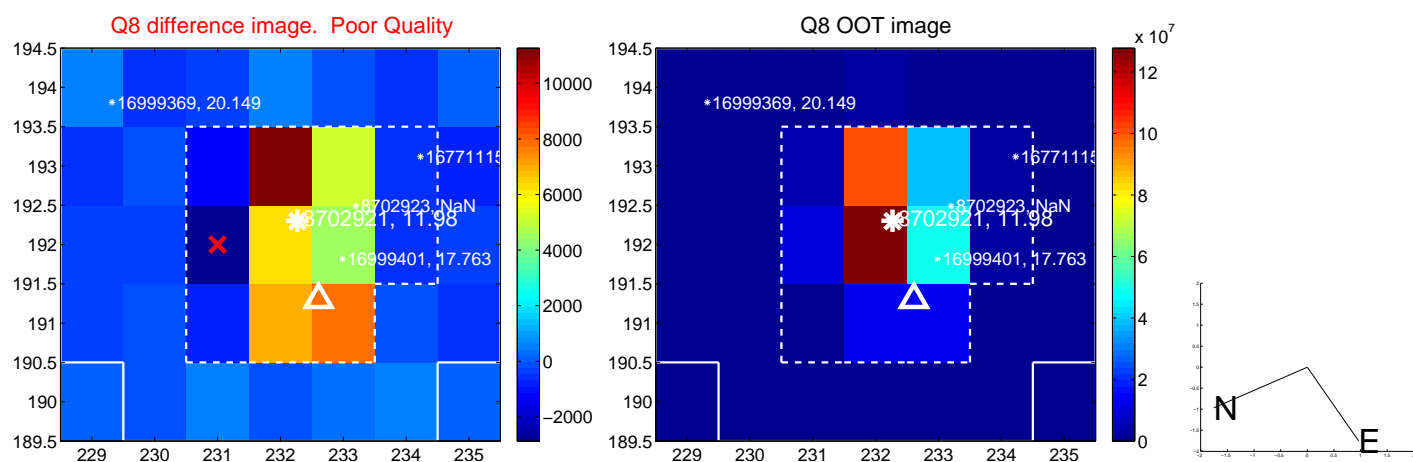
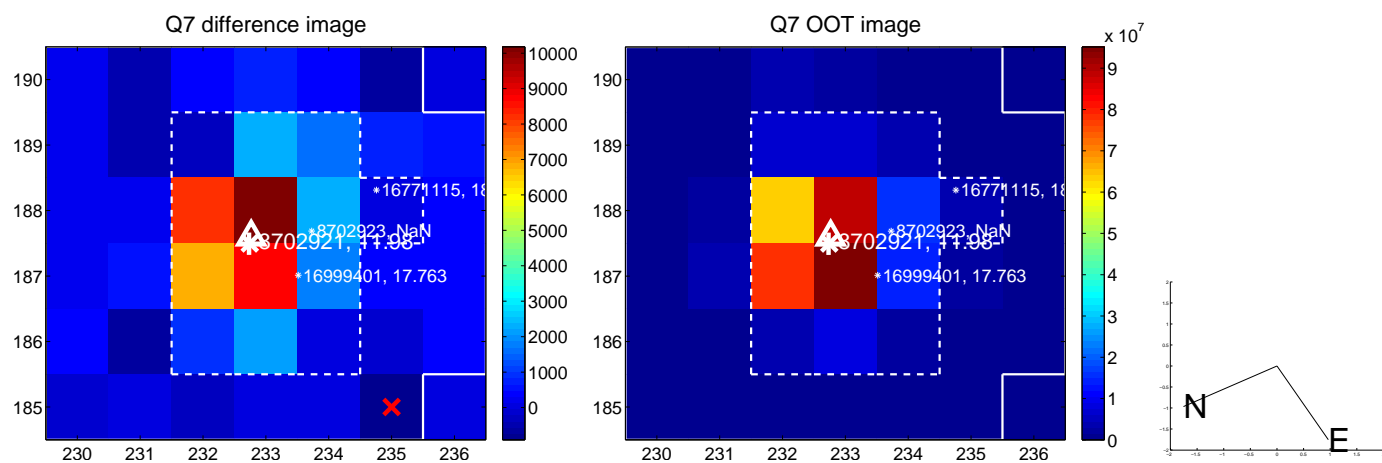
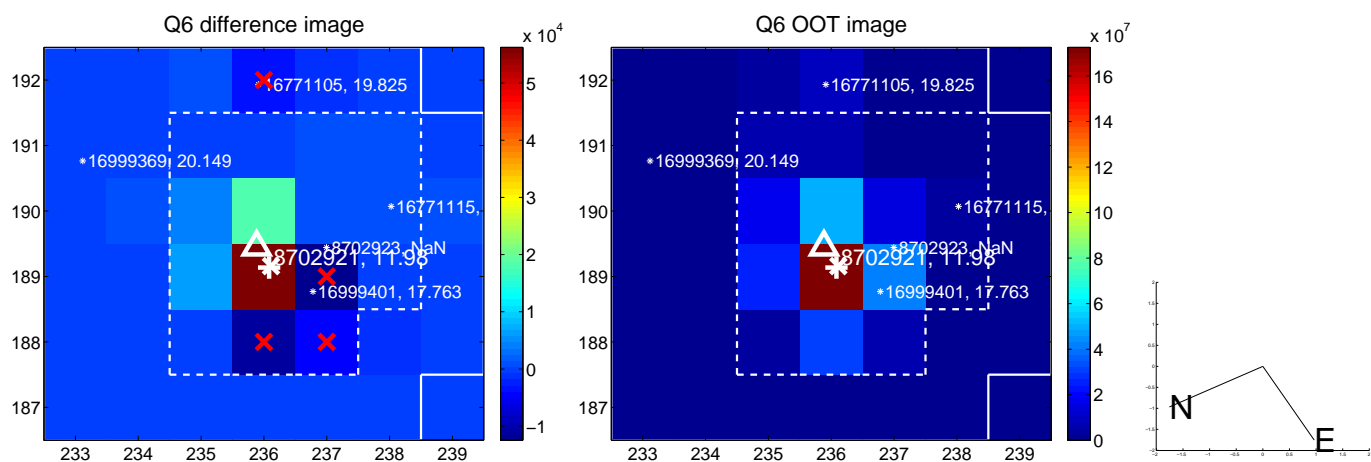
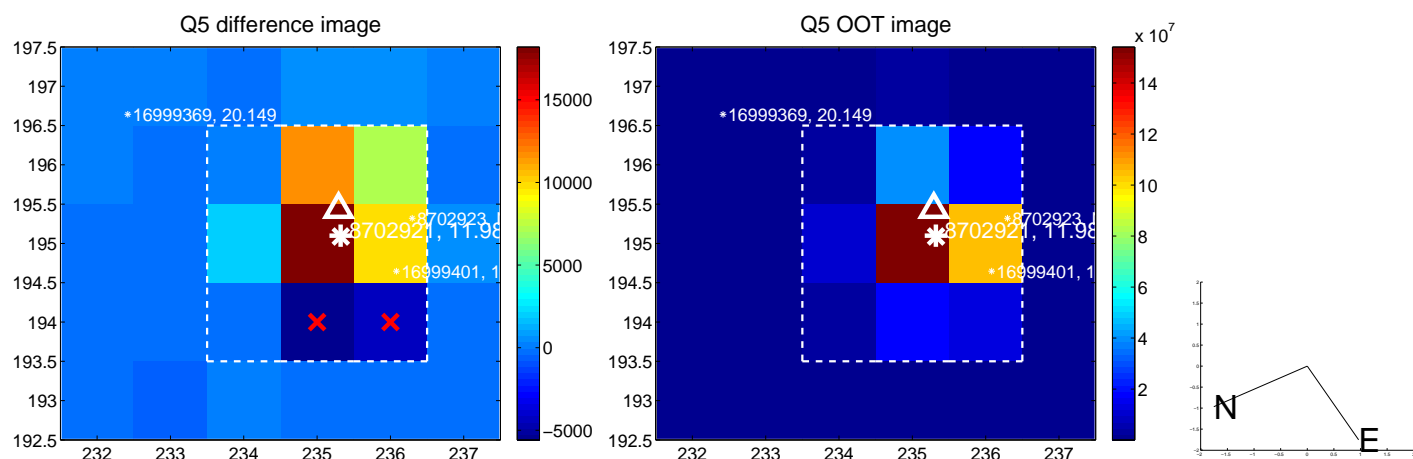


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

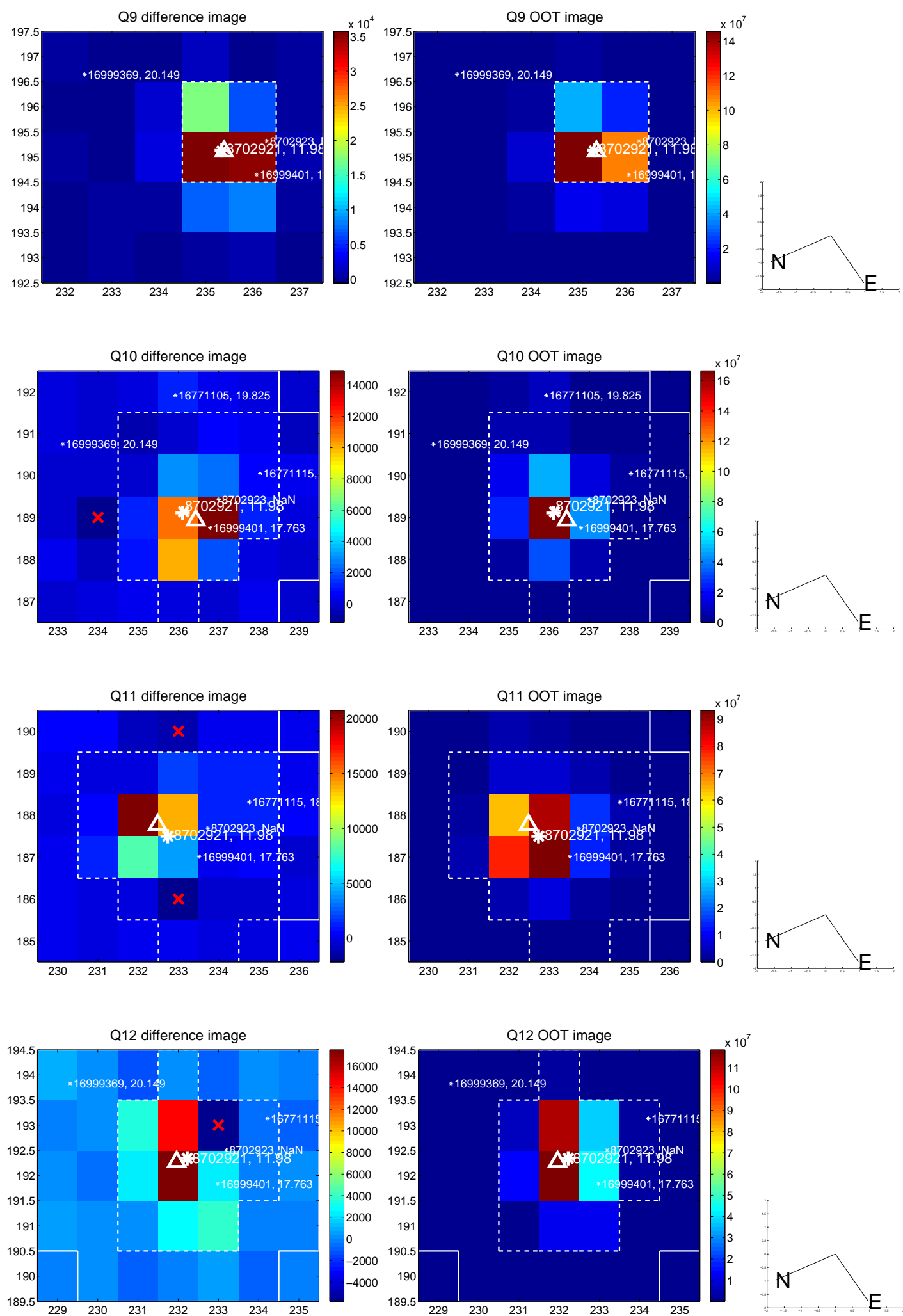


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

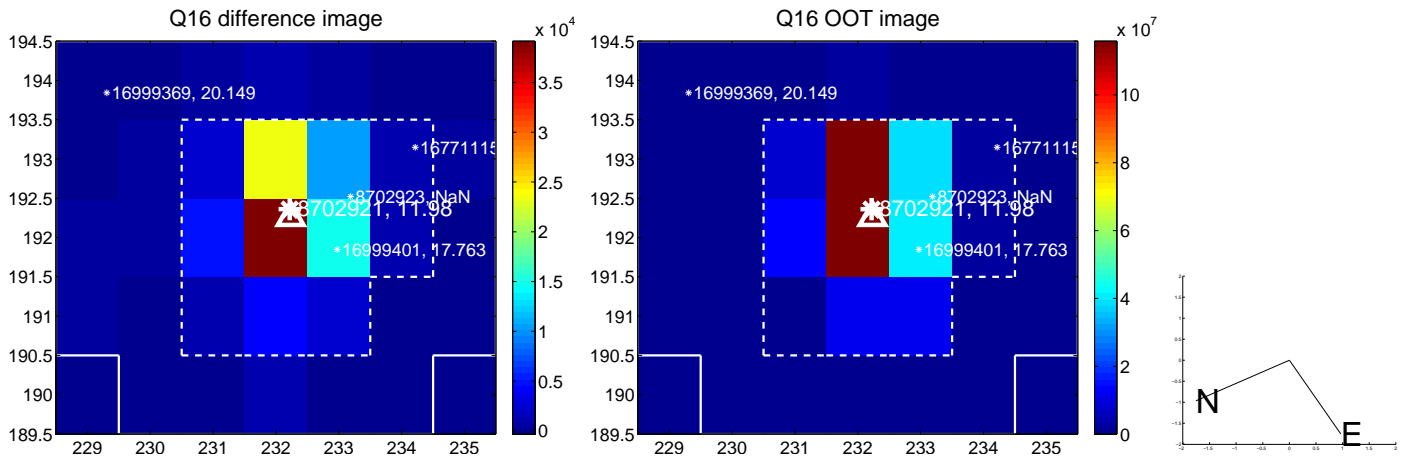
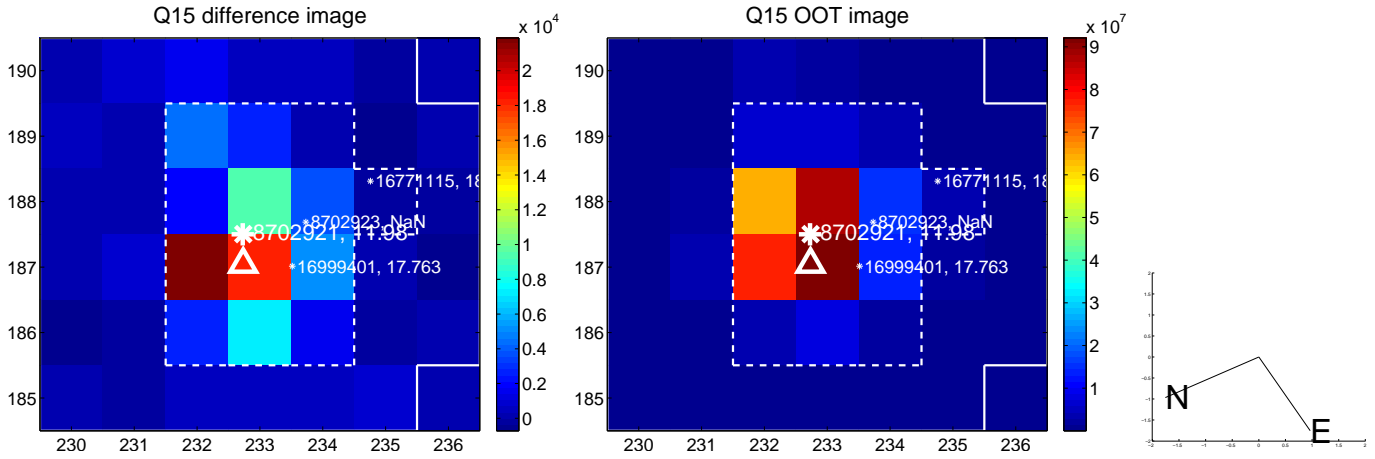
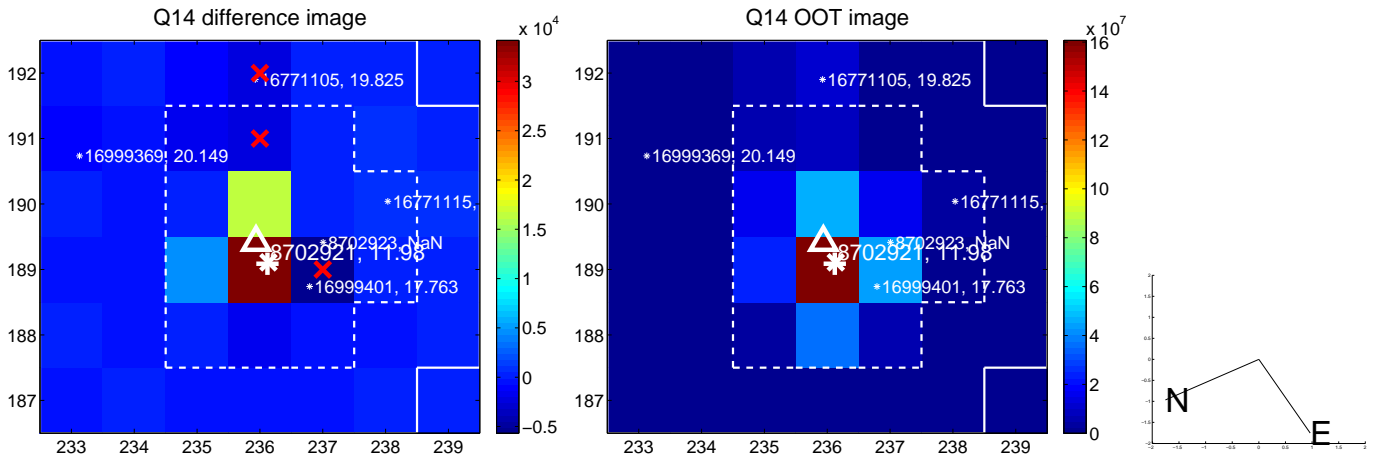
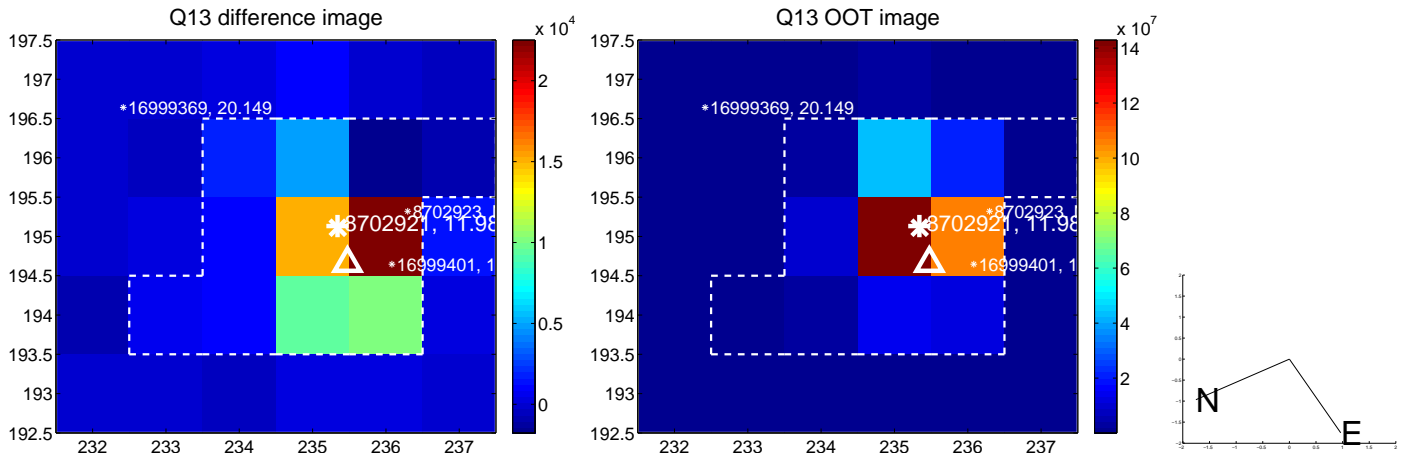




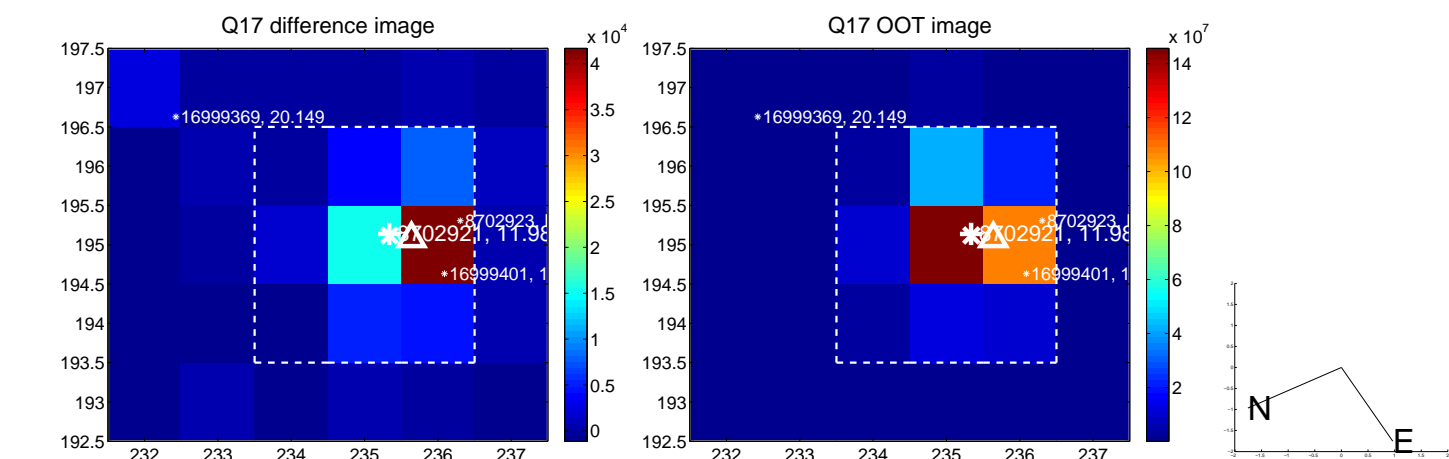
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



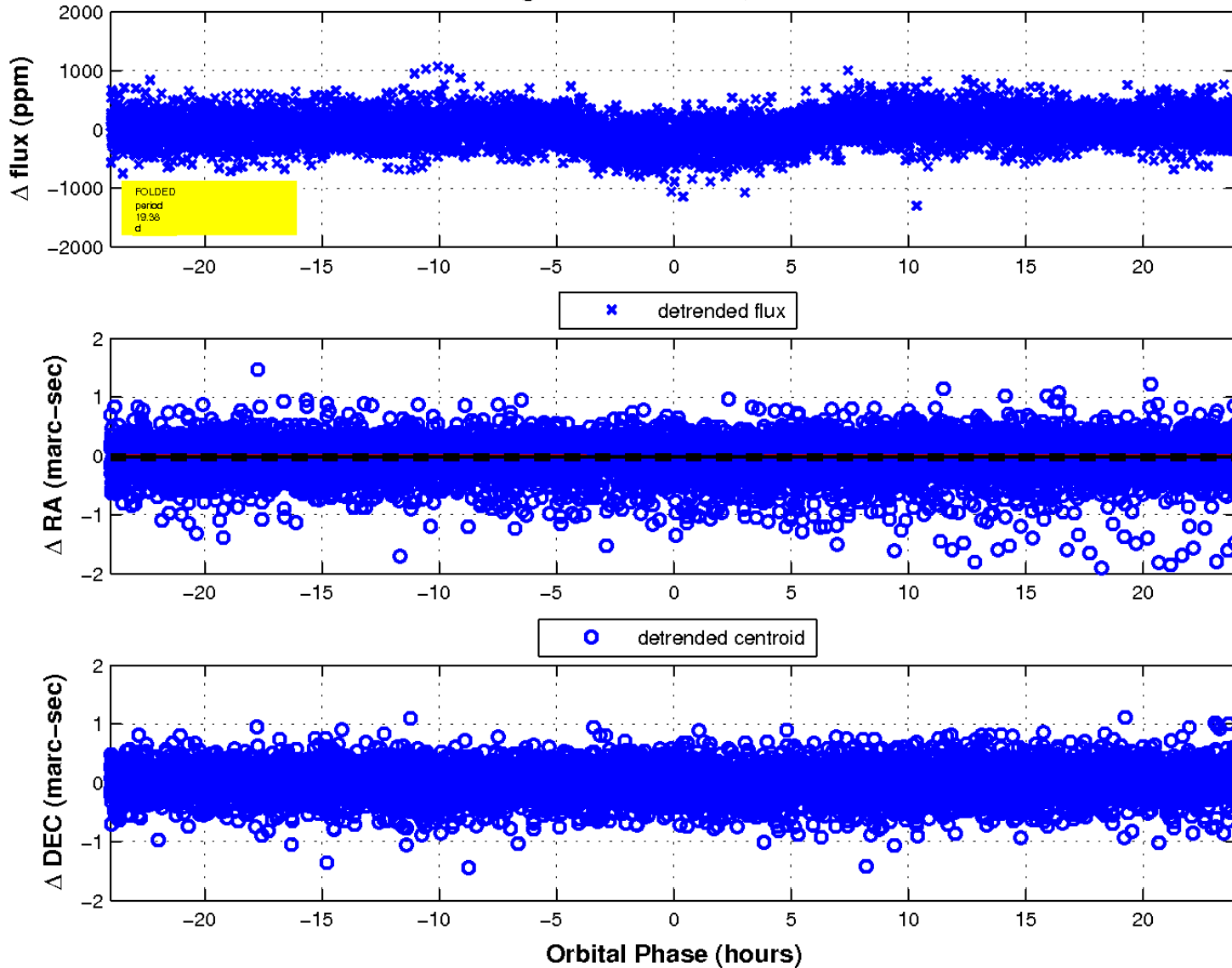
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

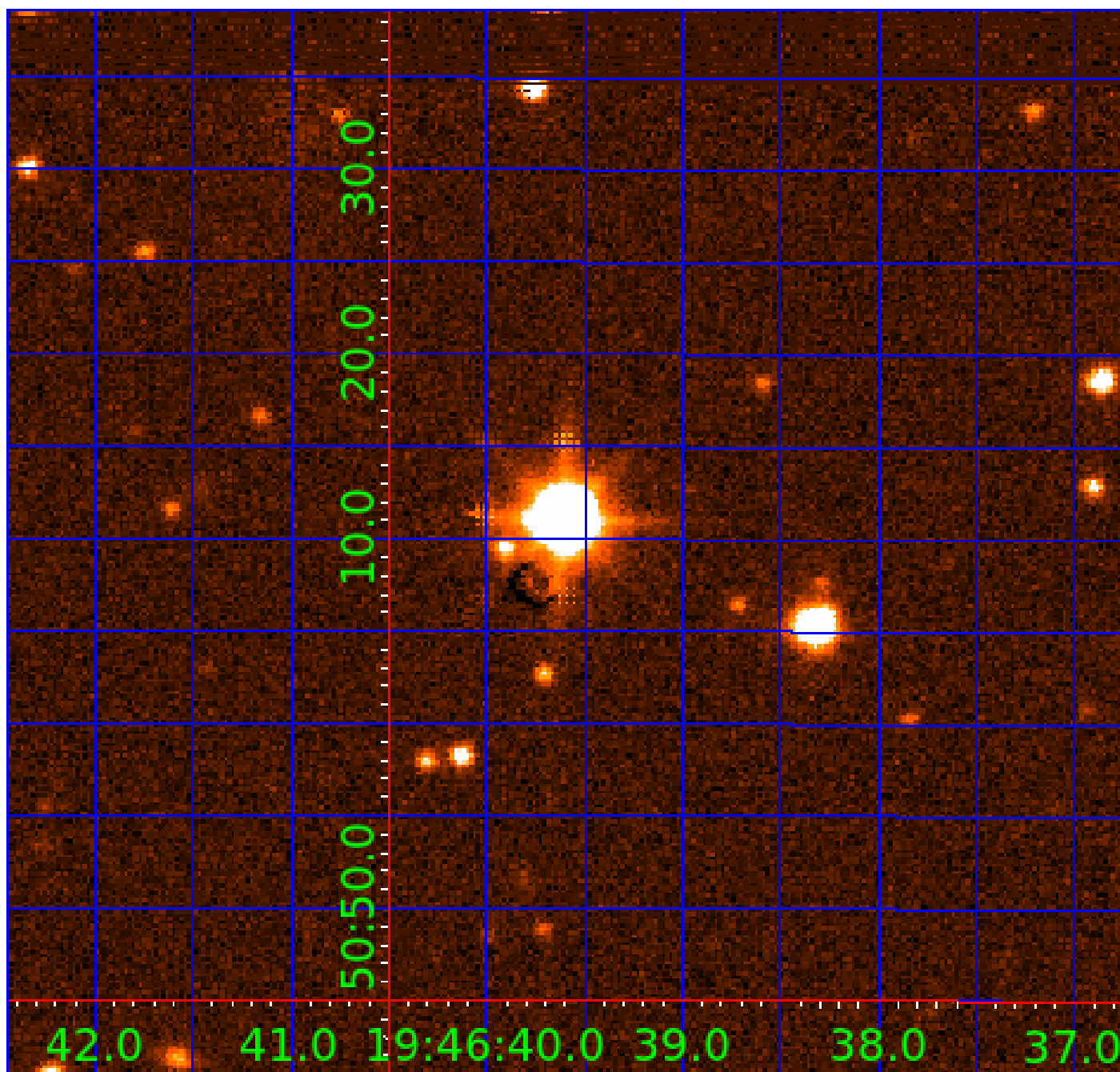


fluxWeightedCentroids, Planet 2 of 3



UKIRT Image

Declination



# KIC 008702921

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008702921-01	OBS	6187.01	19.384461	137.213629	3355.6	20.544	179.0	222.0	5.03	4968	28.42	466.84
008702921-02	OBS	No	19.384333	145.477623	166.5	8.010	11.3	10.3	5.03	4968	7.24	466.84
008702921-03	OBS	No	19.384461	145.912157	243.8	11.784	8.3	9.6	5.03	4968	9.26	466.84

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008702921-01	OBS	FP	0.00	0	1	0	0	HAS_SEC_TCE
008702921-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE
008702921-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_ZUMA—LPP_DV—MOD_TER_DV—SAME_NTL_PERIOD

**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 008702921-03

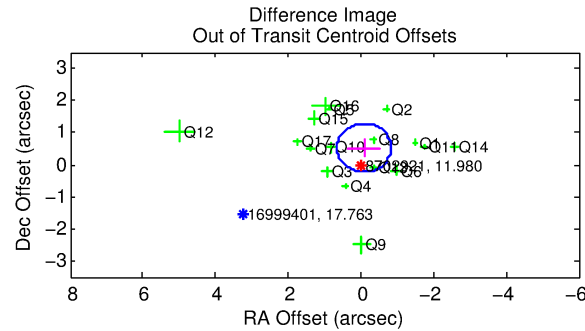
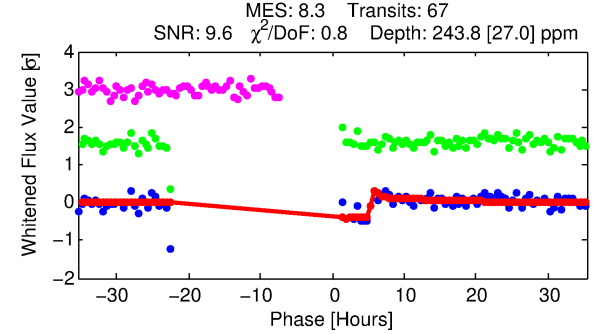
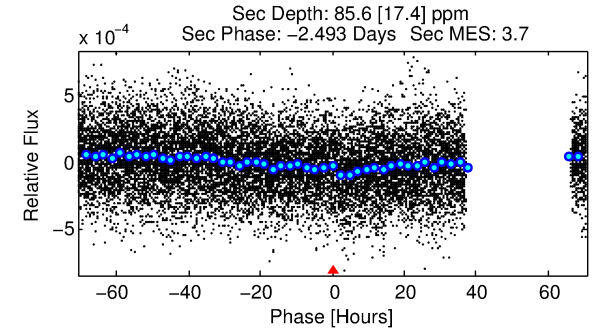
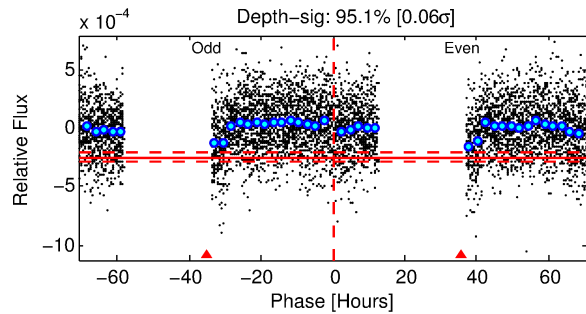
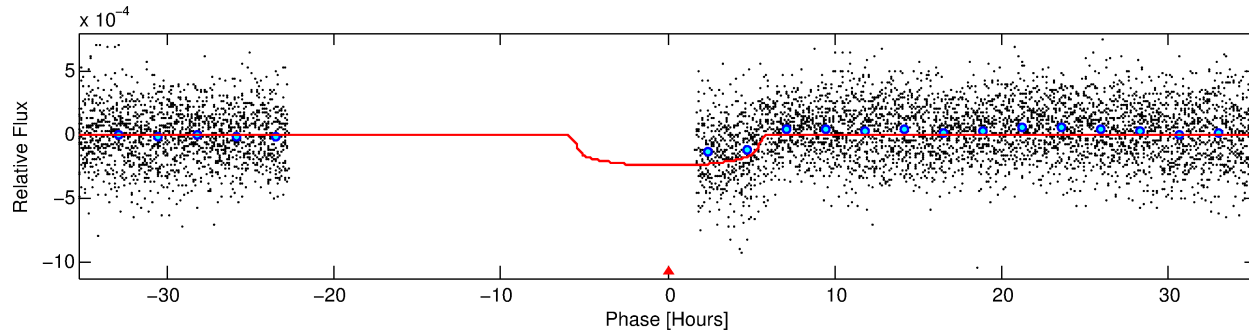
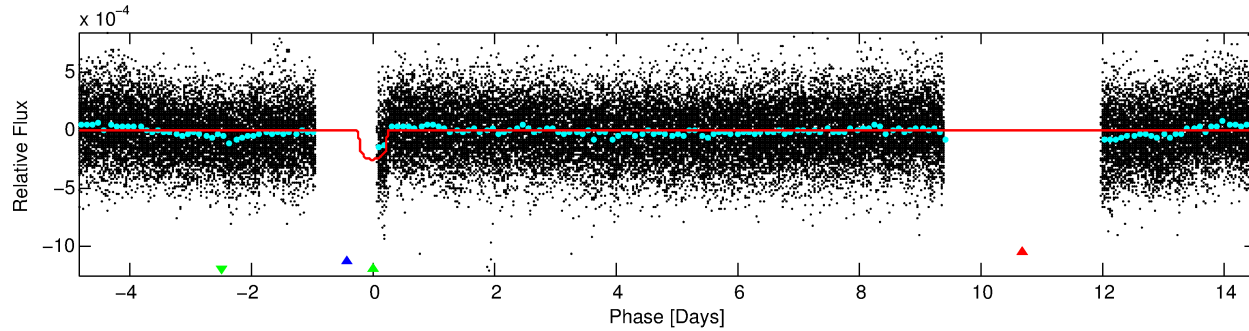
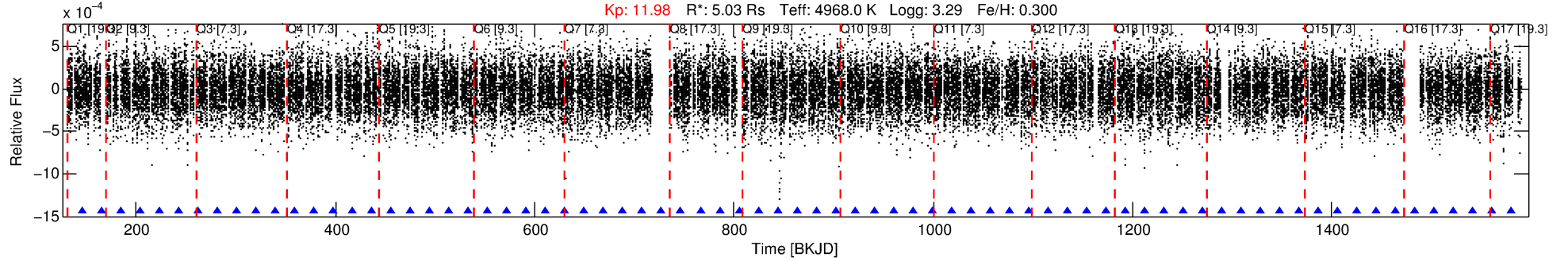
No Significant Match Found

# DV One-Page Summary

KIC: 8702921 Candidate: 3 of 3 Period: 19.384 d

KOI: K06187 Corr: No Ephemeris Match

Kp: 11.98 R\*: 5.03 Rs Teff: 4968.0 K Logg: 3.29 Fe/H: 0.300



## DV Fit Results:

Period = 19.38446 [0.00019] d  
Epoch = 145.9122 [0.0475] BKJD  
Rp/R\* = 0.0169 [0.0026]  
a/R\* = 6.73 [4.37]  
b = 0.87 [0.14]  
Seff = 466.84 [175.30]  
Teq = 1185 [111] K  
Rp = 9.26 [3.20] Re  
a = 0.1718 [0.0437] AU  
Ag = 16.23 [8.44] [1.80σ]  
Teffp = 3678 [354] K [6.72σ]

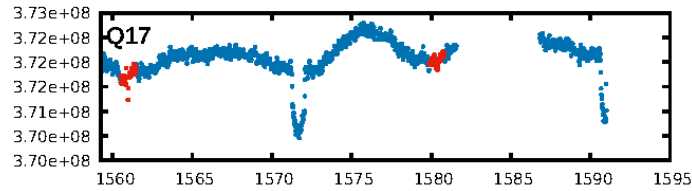
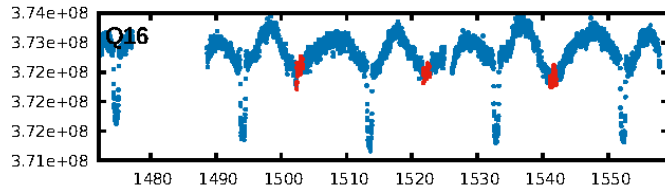
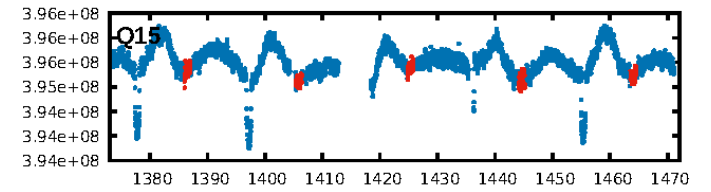
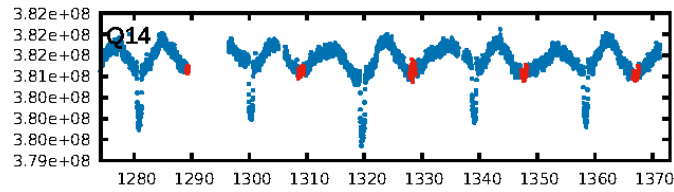
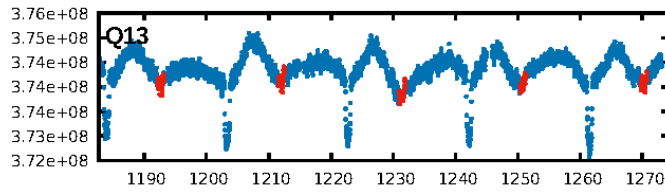
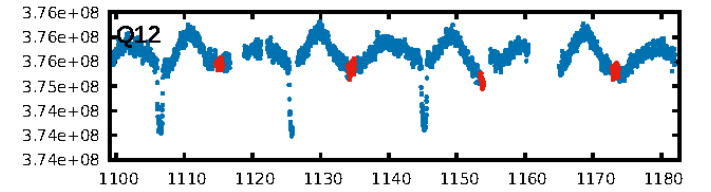
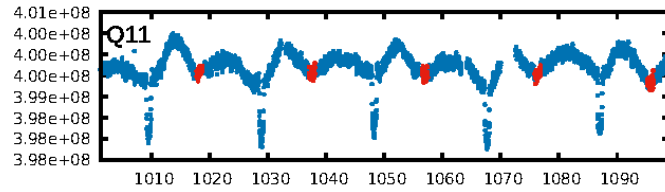
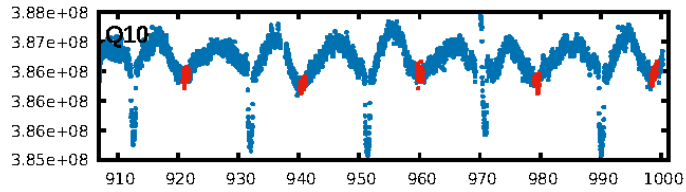
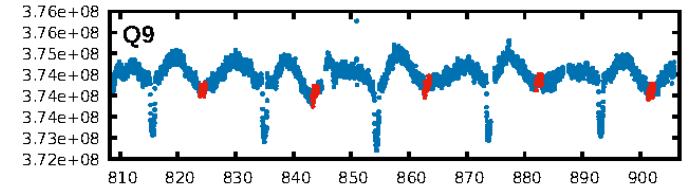
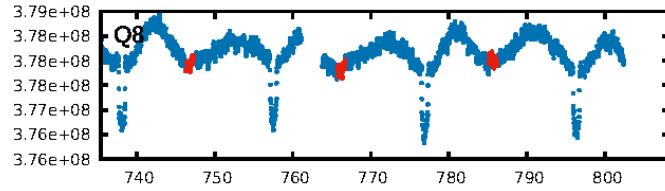
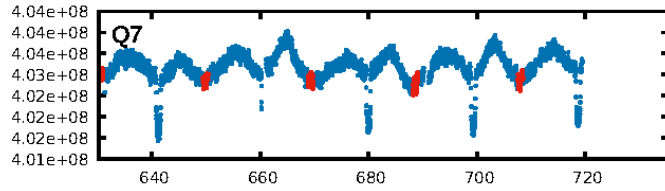
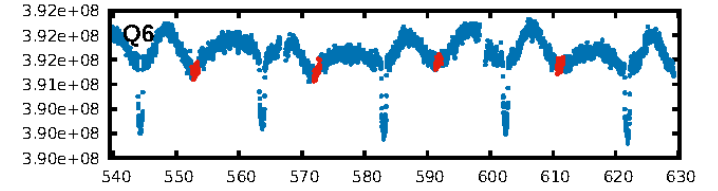
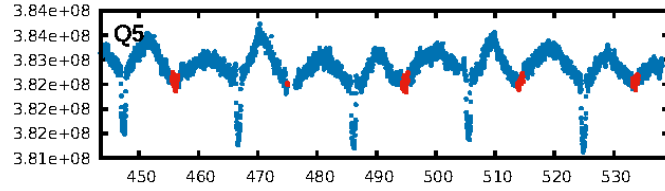
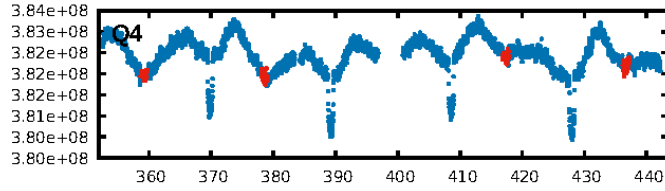
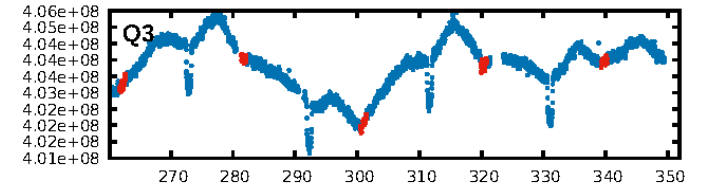
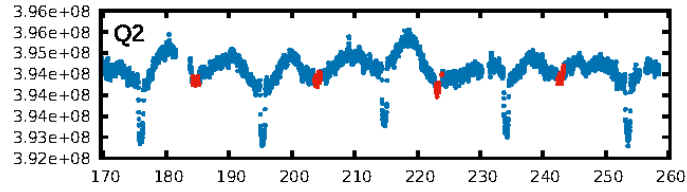
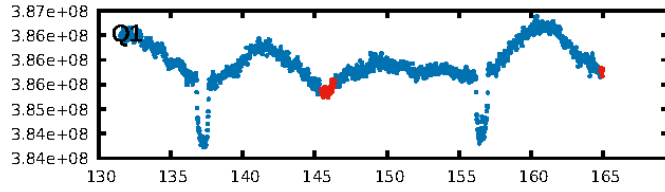
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 99.6%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 4.47e-14  
RollingBand-fgt: 1.00 [64/64]  
GhostDiagnostic-chr: 1.732  
Centroid-sig: N/A  
Centroid-so: 0.035 arcsec [0.29σ]  
OotOffset-rm: 0.528 arcsec [2.11σ]  
KicOffset-rm: 0.416 arcsec [1.50σ]  
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 21:35:48 Z

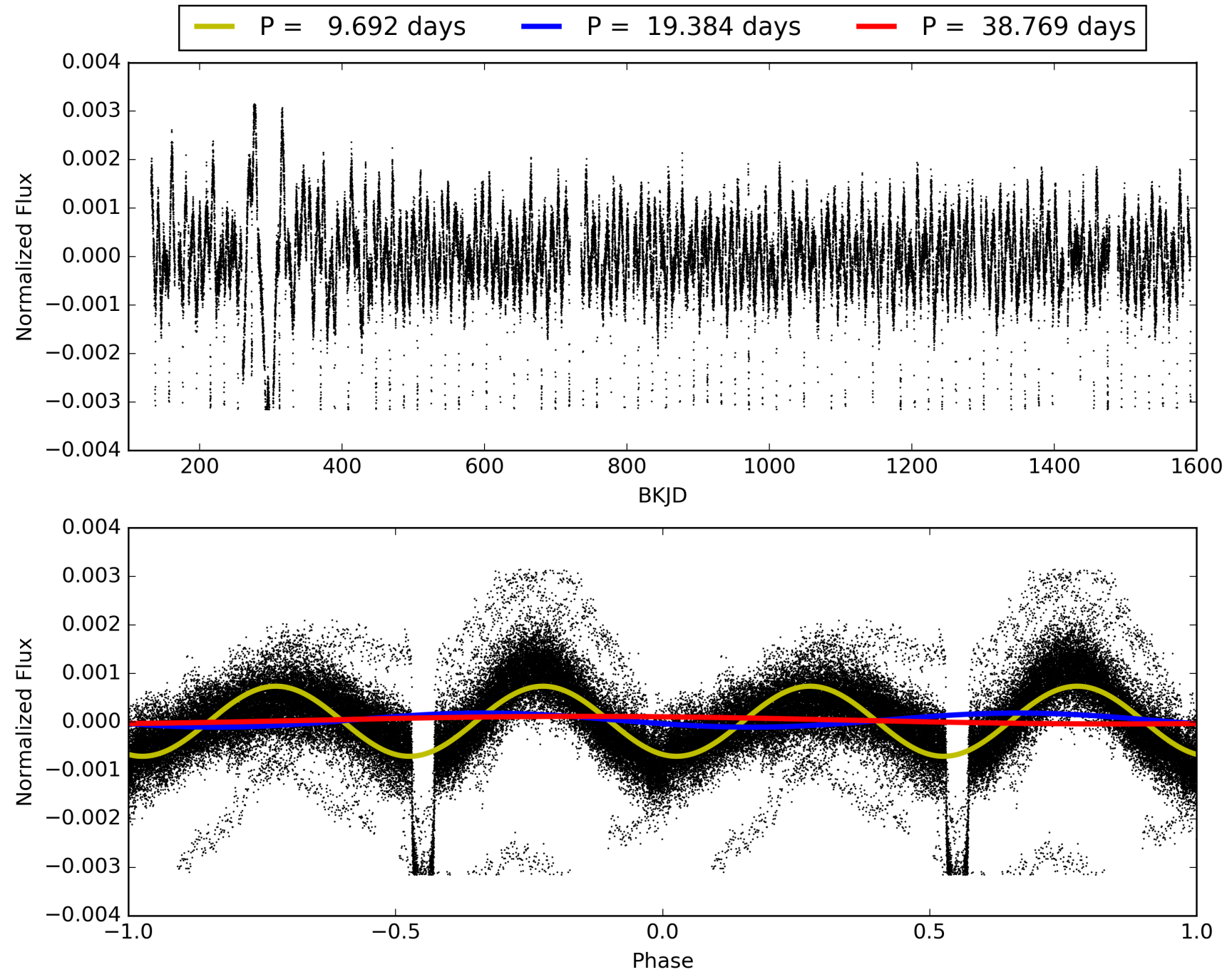
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 008702921-03, PDC Light Curves



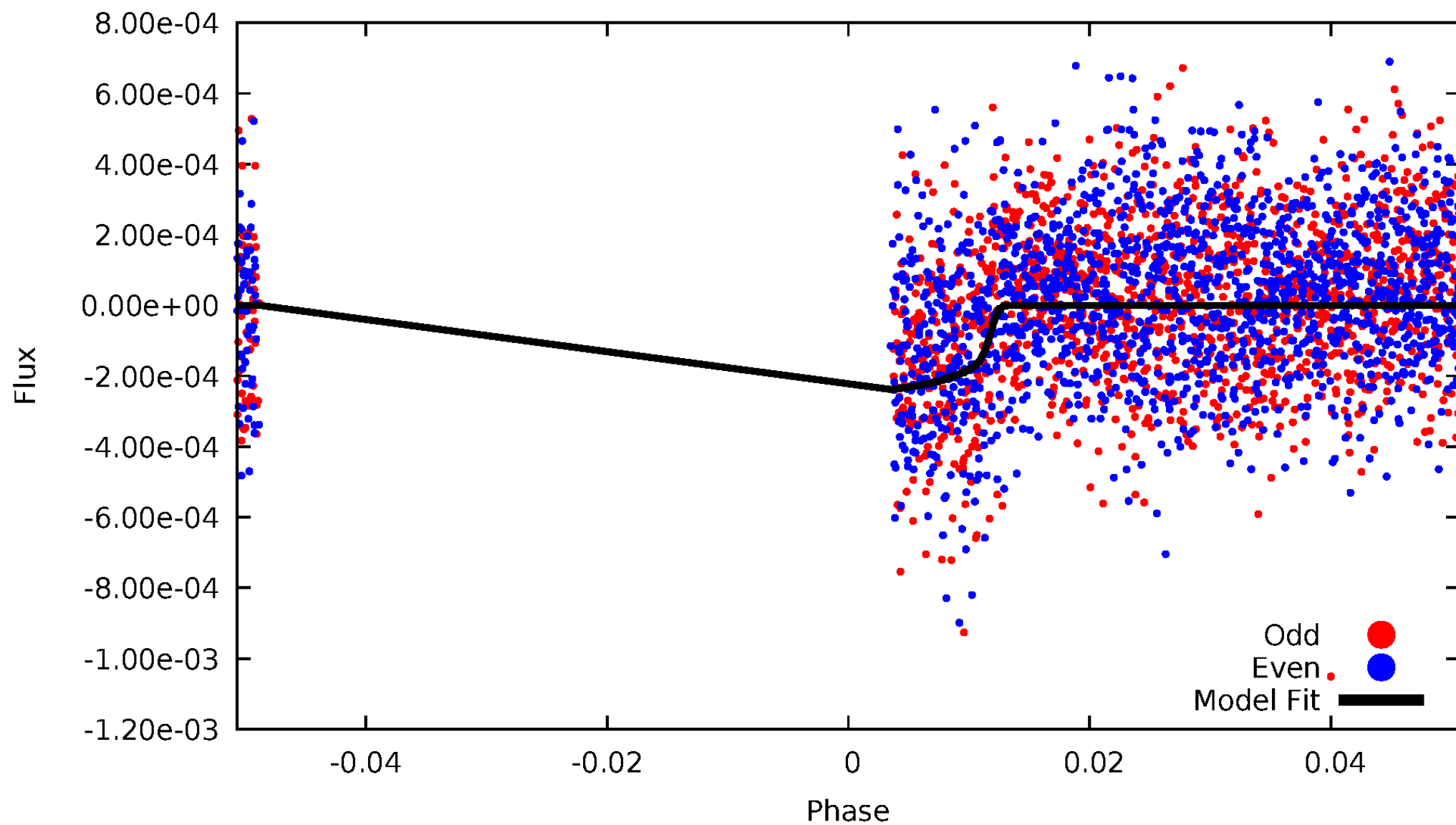


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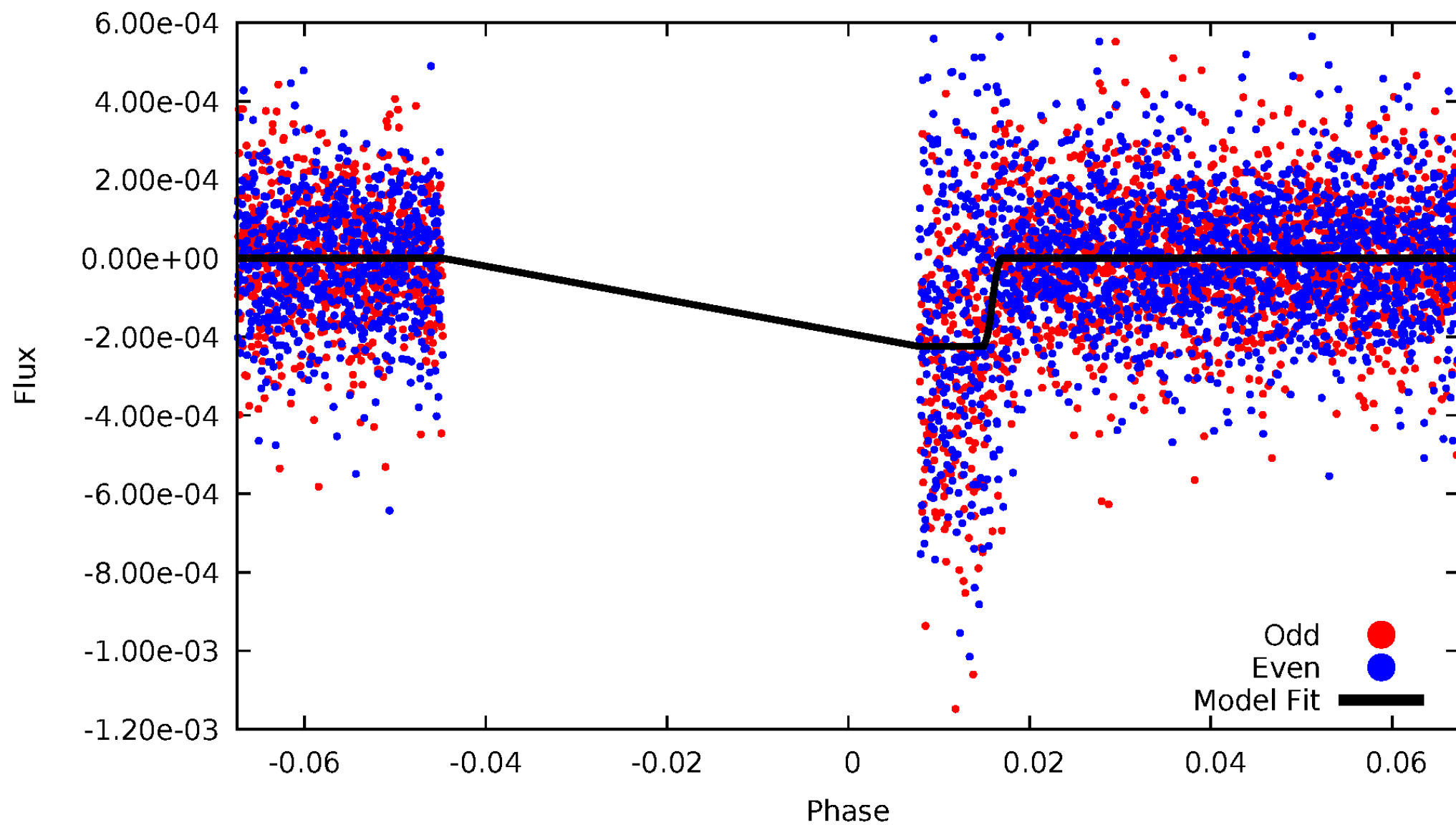
DV Odd/Even

TCE 008702921-03



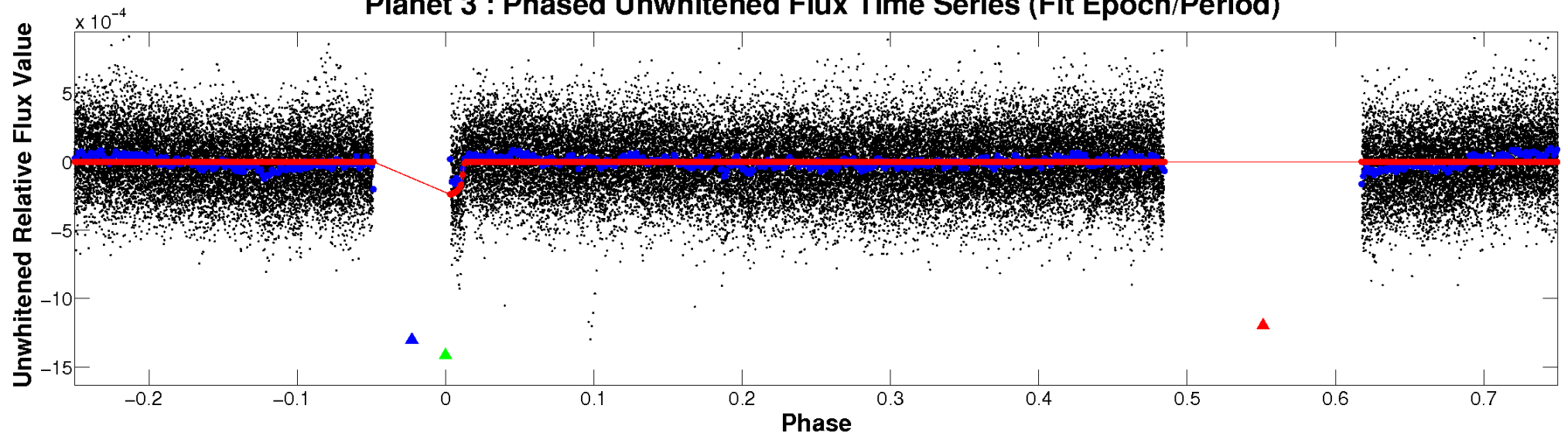
ALT Odd/Even

TCE 008702921-03

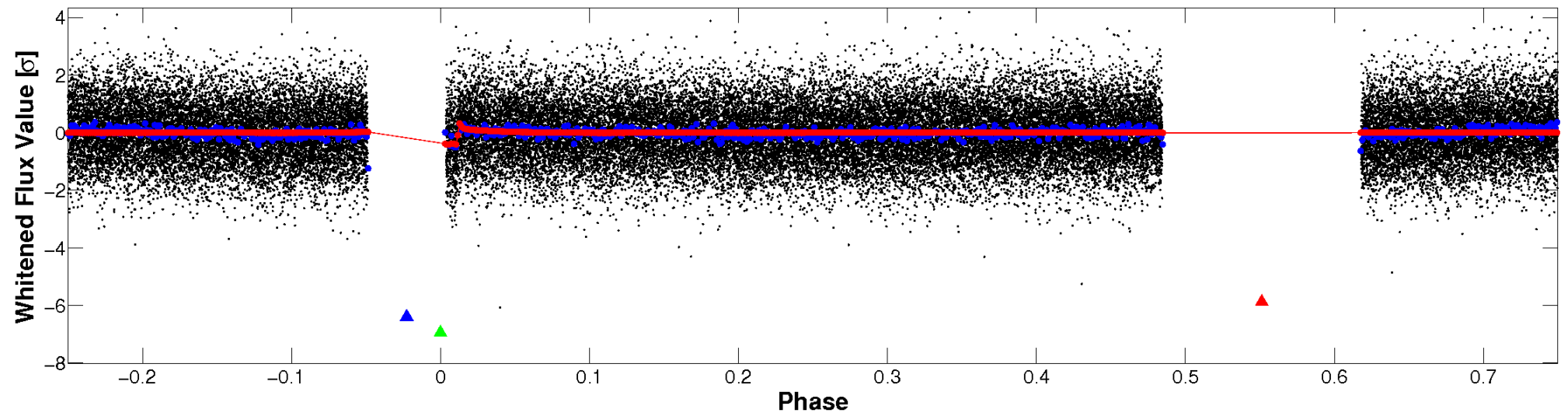


# Non-Whitened Vs. Whitened Light Curve

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

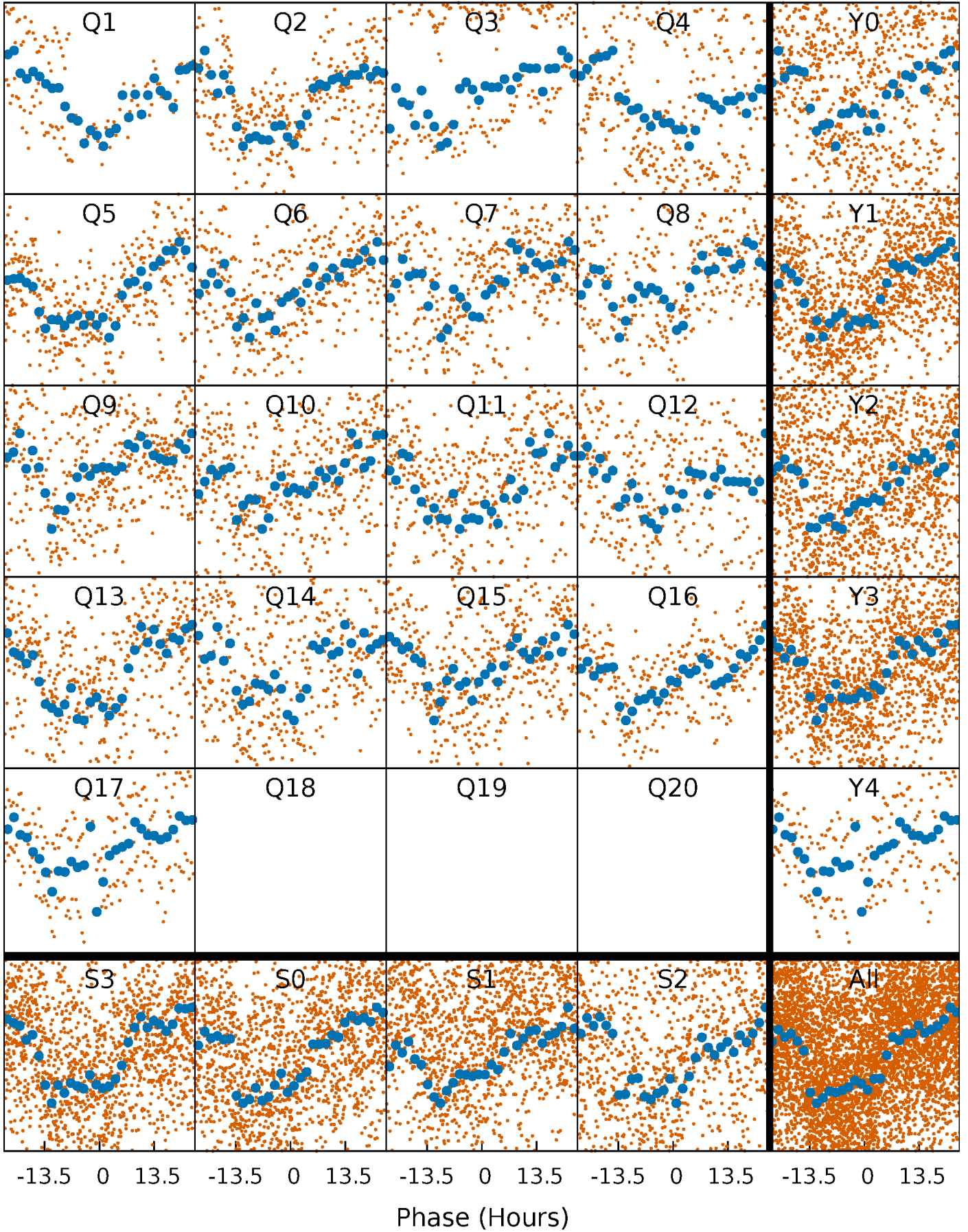


**Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

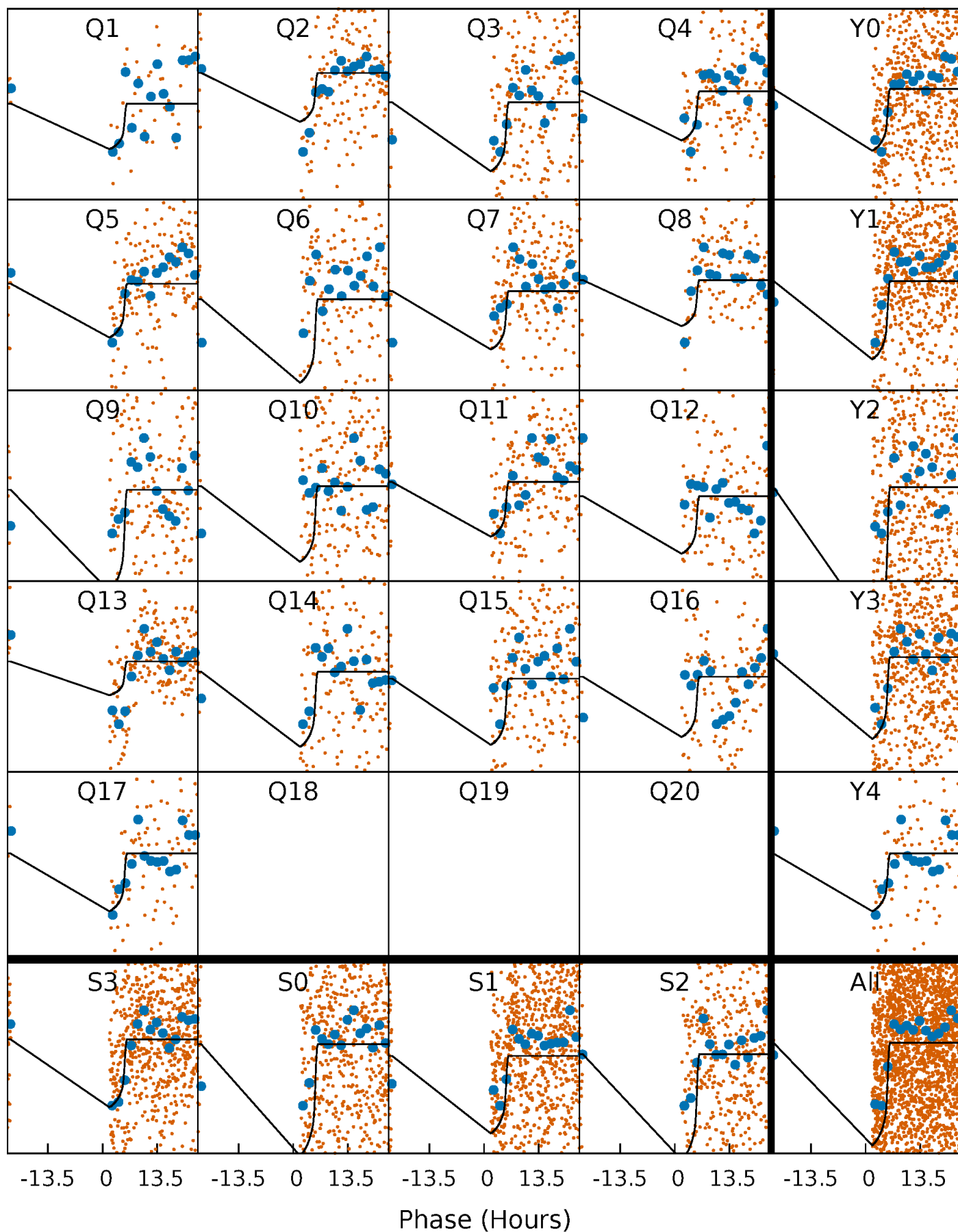
TCE 008702921-03   P= 19.384461 Days    $T_0=145.912158$  (BKJD)





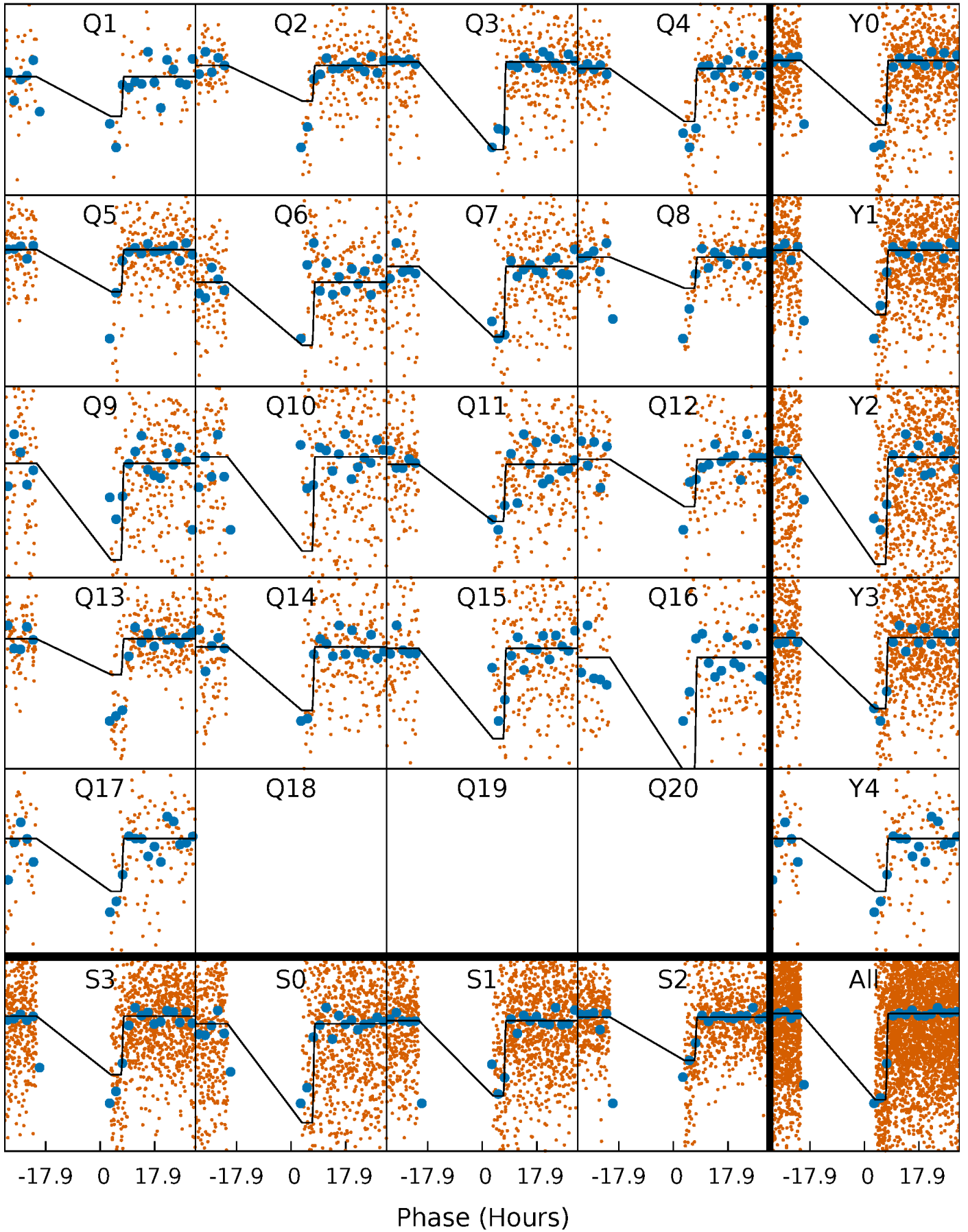
# DV Quarter-Phased Transit Curves

TCE 008702921-03 P= 19.384461 Days  $T_0=145.912158$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 008702921-03 P= 19.384425 Days  $T_0=145.833059$  (BKJD)

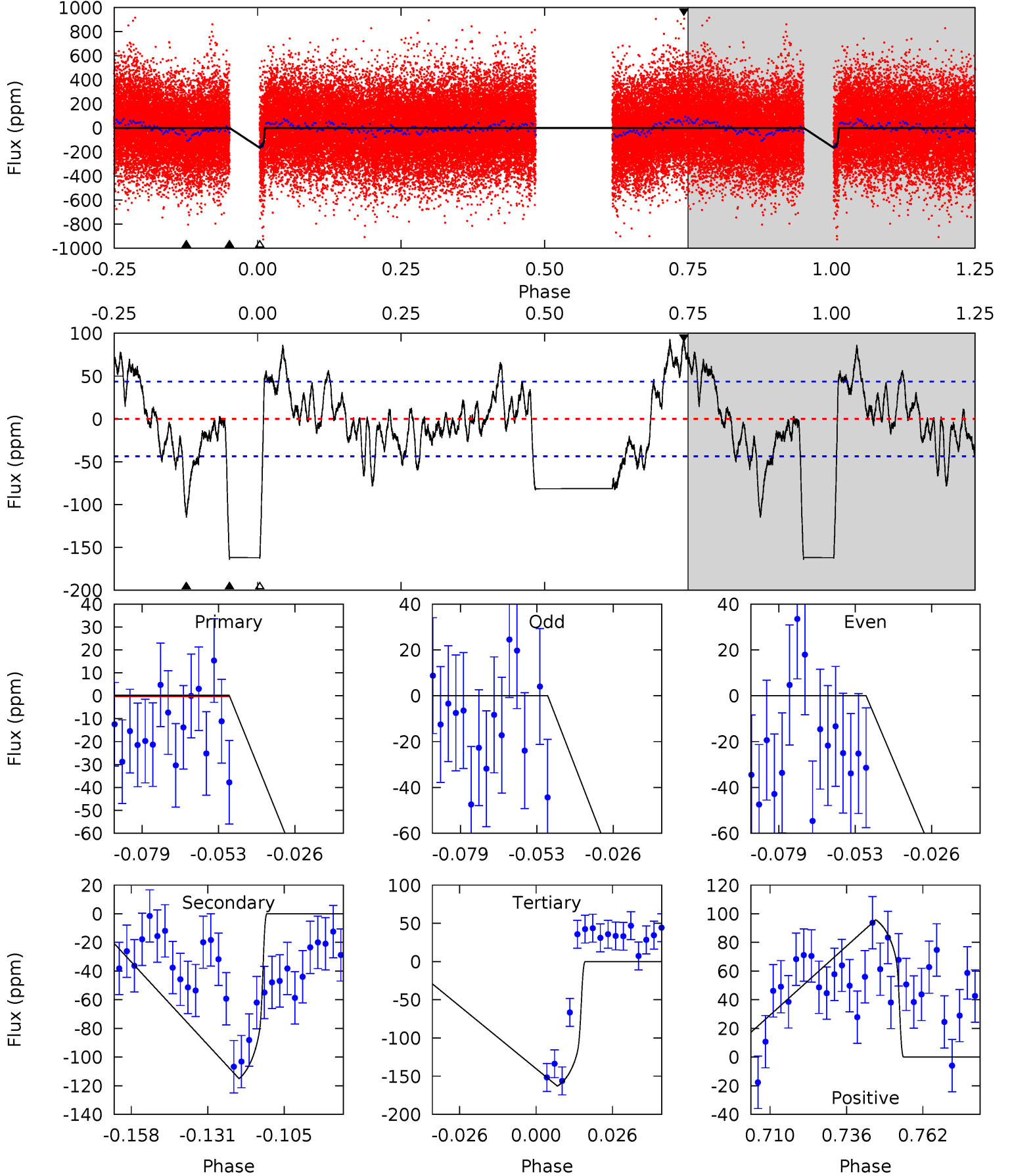




# DV Model-Shift Uniqueness Test

008702921-03, P = 19.384461 Days, E = 126.527697 Days

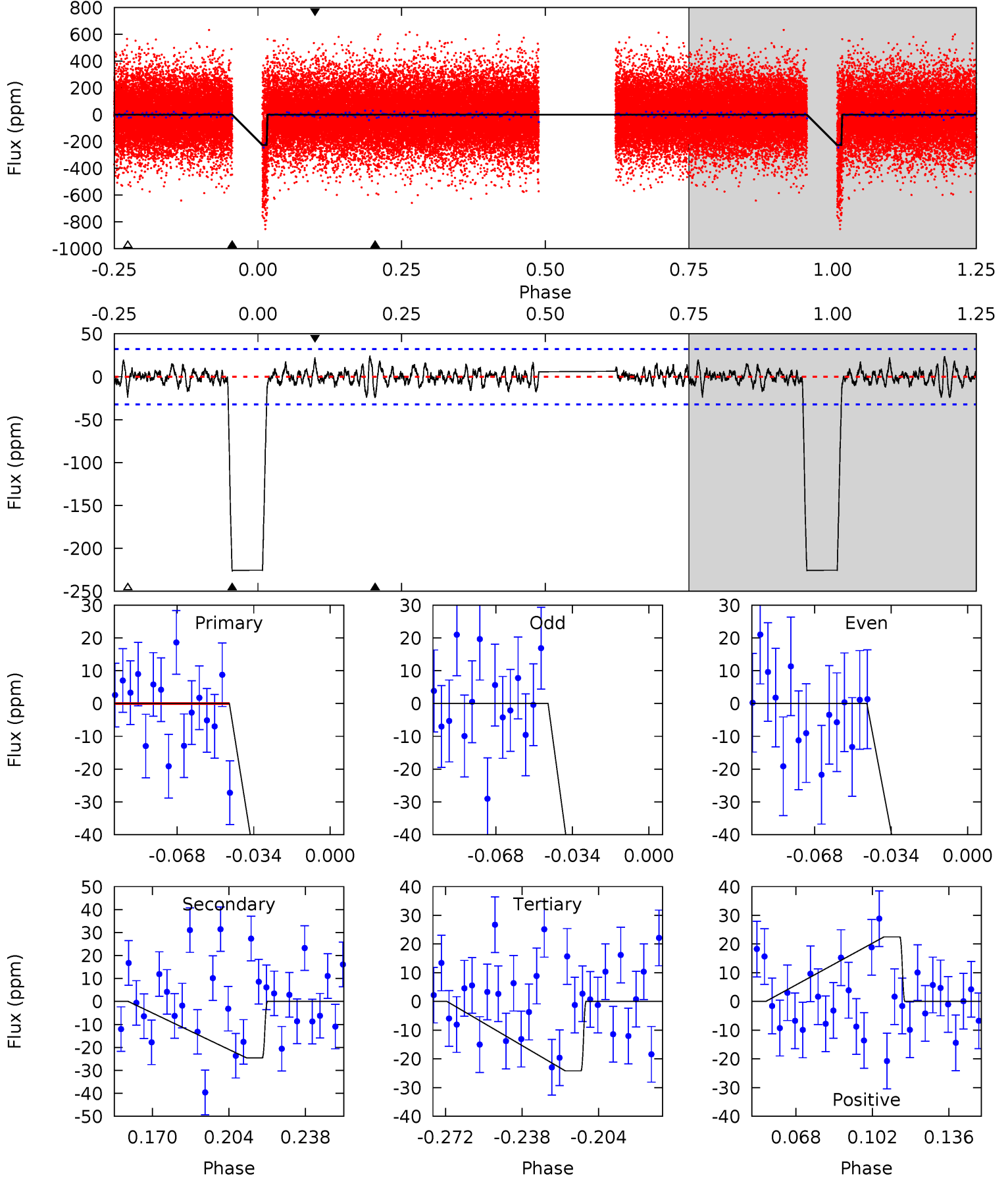
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
18.2	12.7	18.0	10.6	4.84	2.22	4.18	0.15	7.58	-5.30	2.13	0.81	1.03	0.37	0



# Alt Model-Shift Uniqueness Test

008702921-03, P = 19.384425 Days, E = 126.448634 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
33.7	3.65	3.59	3.35	4.79	2.12	2.25	30.1	30.4	0.06	0.31	5.75	1.01	0.10	0



### Stellar Parameters For KIC 008702921

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$4968^{+49}_{-119}$	$3.291^{+0.195}_{-0.105}$	$0.300^{+0.100}_{-0.200}$	$5.026^{+0.715}_{-1.549}$	$1.800^{+0.200}_{-0.600}$	$0.020^{+0.026}_{-0.006}$
	+1%/-2%	+6%/-3%	+33%/-67%	+14%/-31%	+11%/-33%	+128%/-30%
Source	SPE74	SPE74	SPE74	DSEP		

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

### Secondary Eclipse Parameters for KIC 008702921-03 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-115 \pm 9$	$9.01^{+1.92}_{-1.85}$	$1641^{+76}_{-107}$	$4118^{+286}_{-210}$	$23^{+12}_{-7}$
Alt.	$-25 \pm 7$	$8.09^{+1.70}_{-1.91}$	$1637^{+83}_{-101}$	$3296^{+290}_{-258}$	$5.981^{+4.661}_{-2.325}$

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

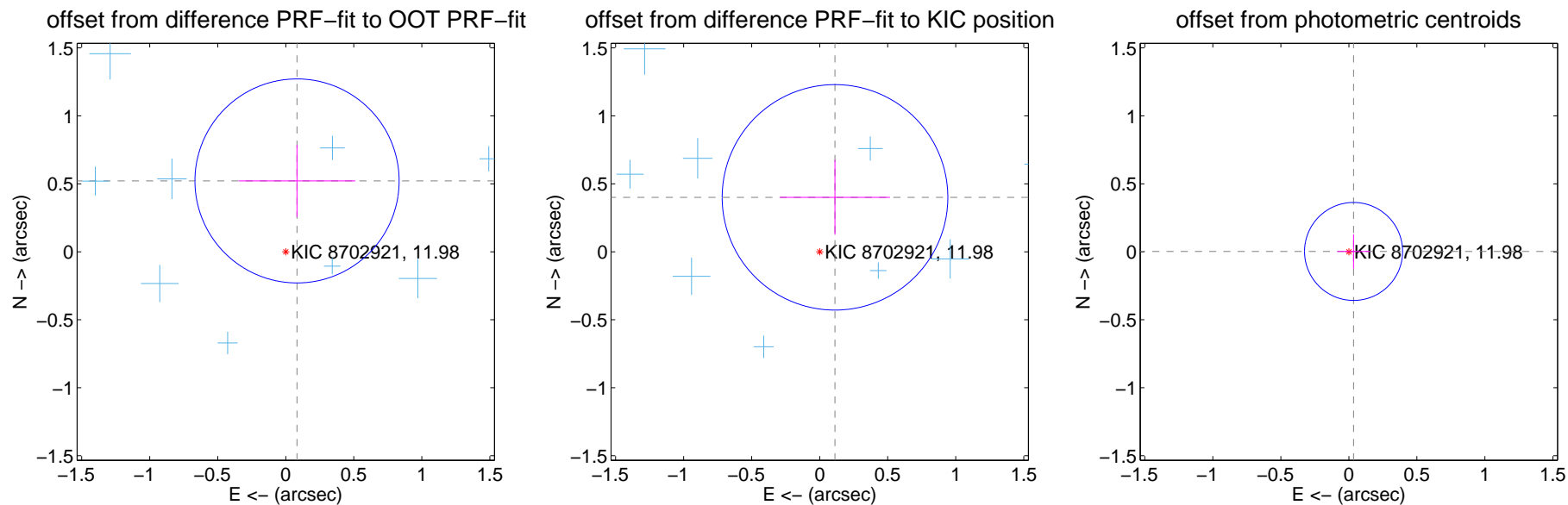
## DV Centroid Data

Supplemental centroid analysis for 008702921-03. **Kepler magnitude: 11.98.** Transit SNR 9.59

There are 17 quarters with good PRF difference image offsets

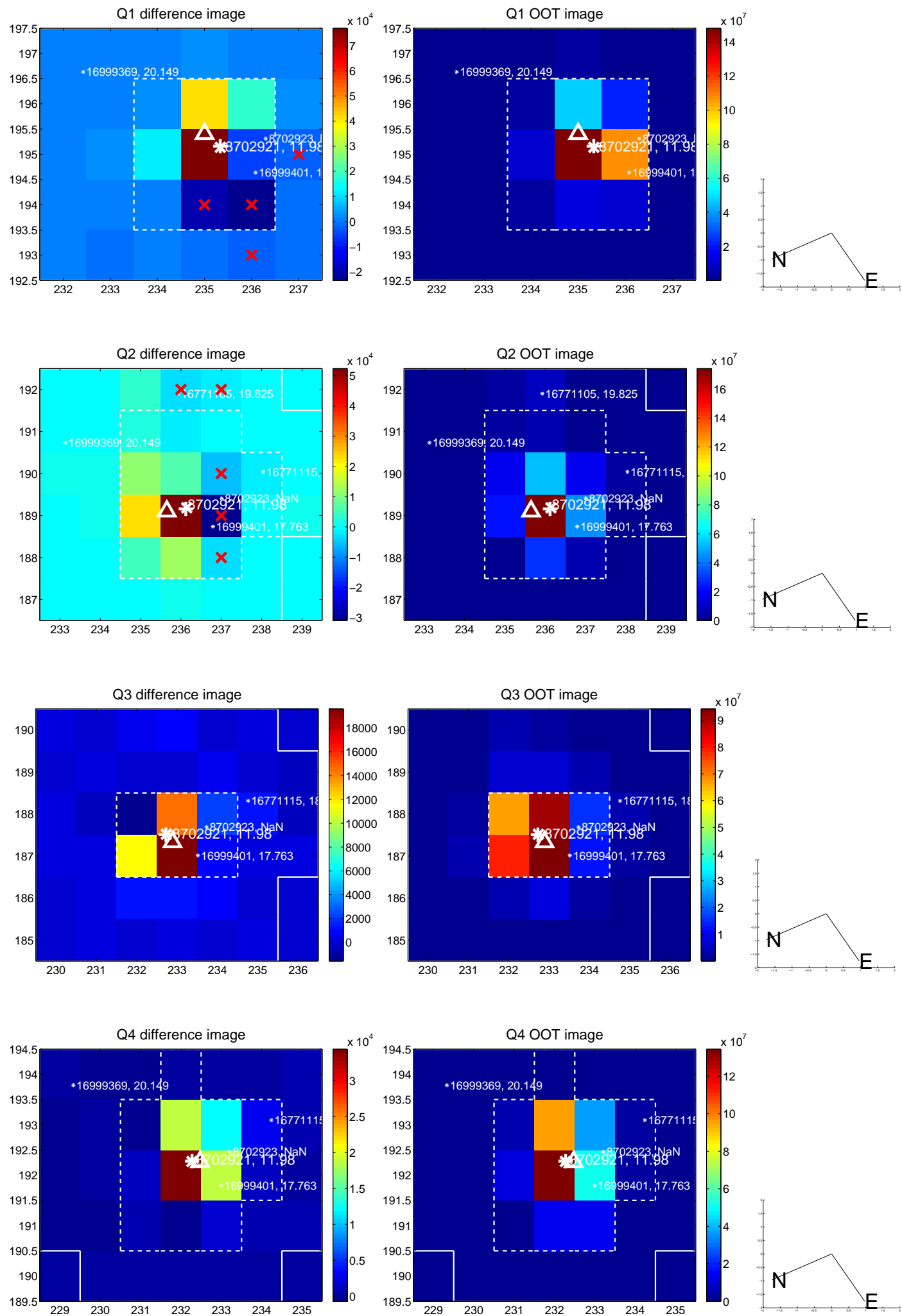
The direct PRF centroid is offset from the target star catalog position by about 0.07 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.528 \pm 0.250$	2.11	$-0.083 \pm 0.428$	$0.521 \pm 0.265$
PRF-fit source offset from KIC position	$0.416 \pm 0.276$	1.50	$-0.112 \pm 0.404$	$0.401 \pm 0.275$
photometric centroid source offset	$0.03 \pm 0.12$	0.29	$-0.03 \pm 0.12$	$0.00 \pm 0.13$

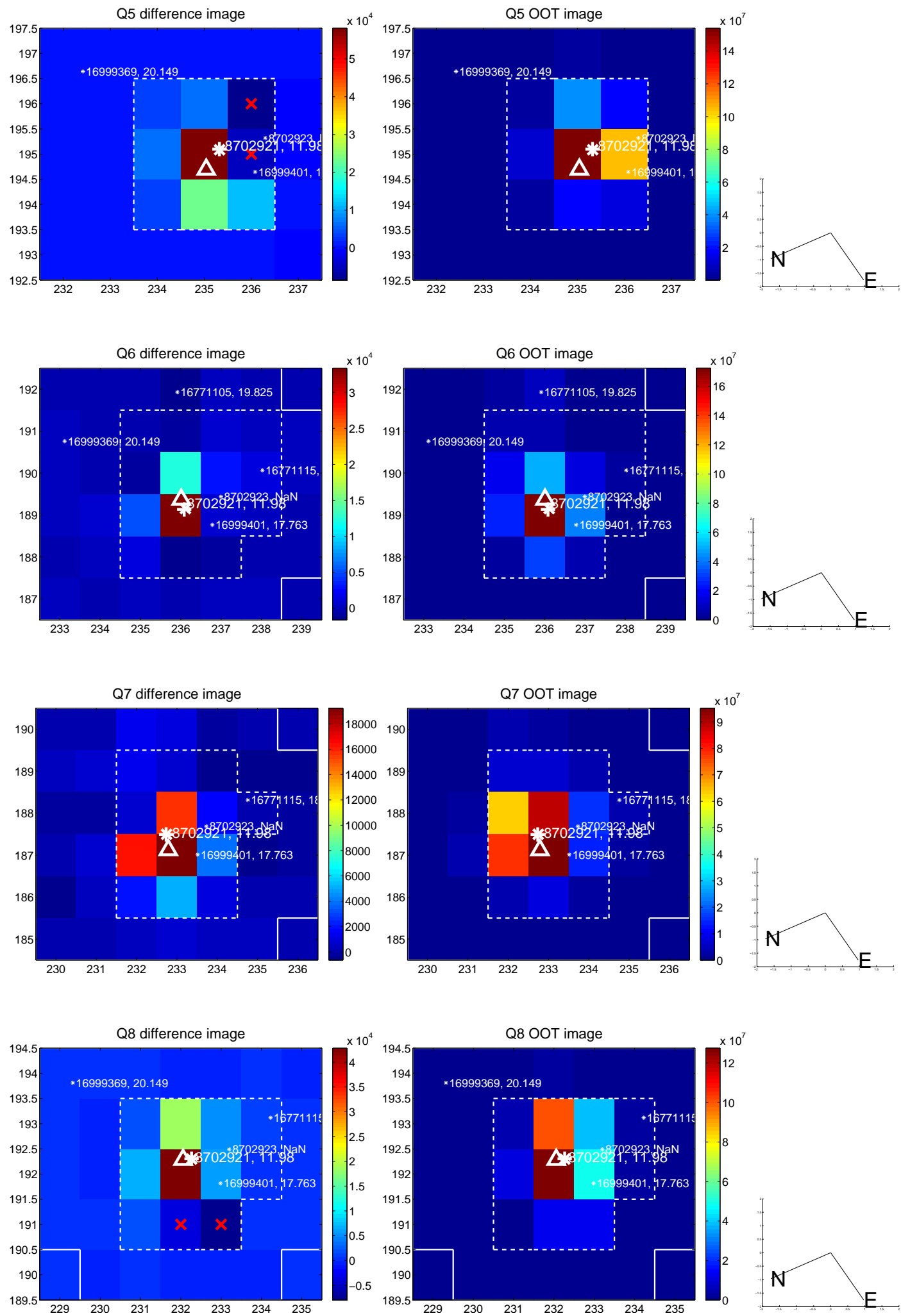


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

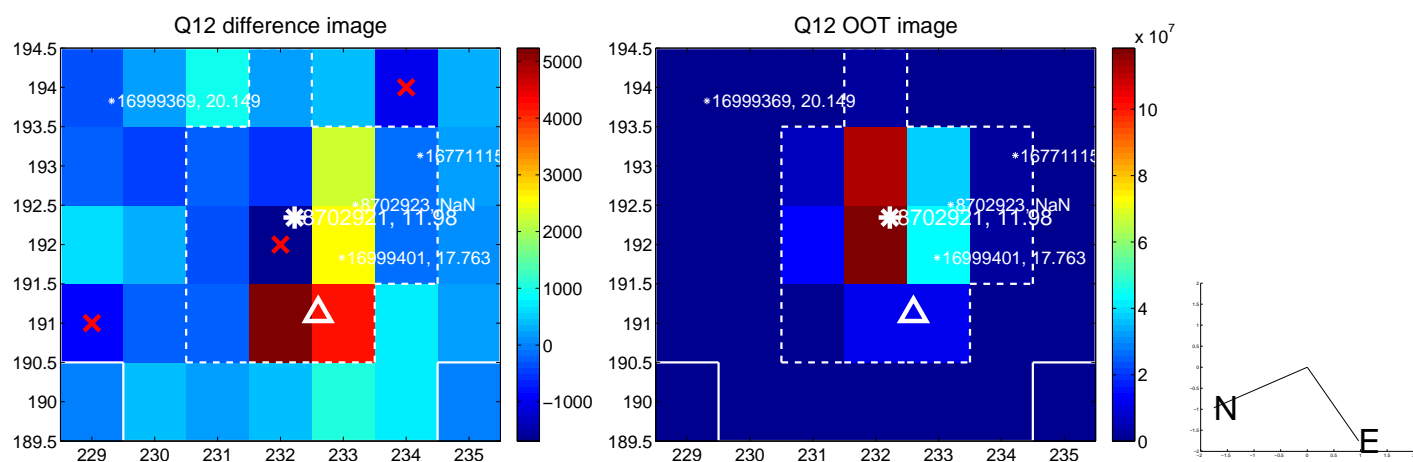
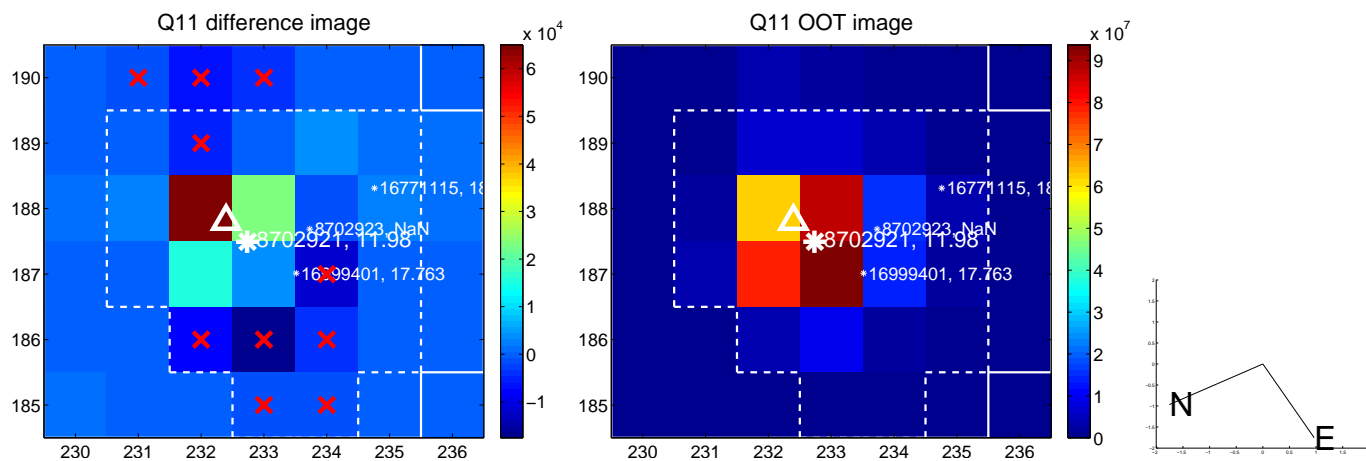
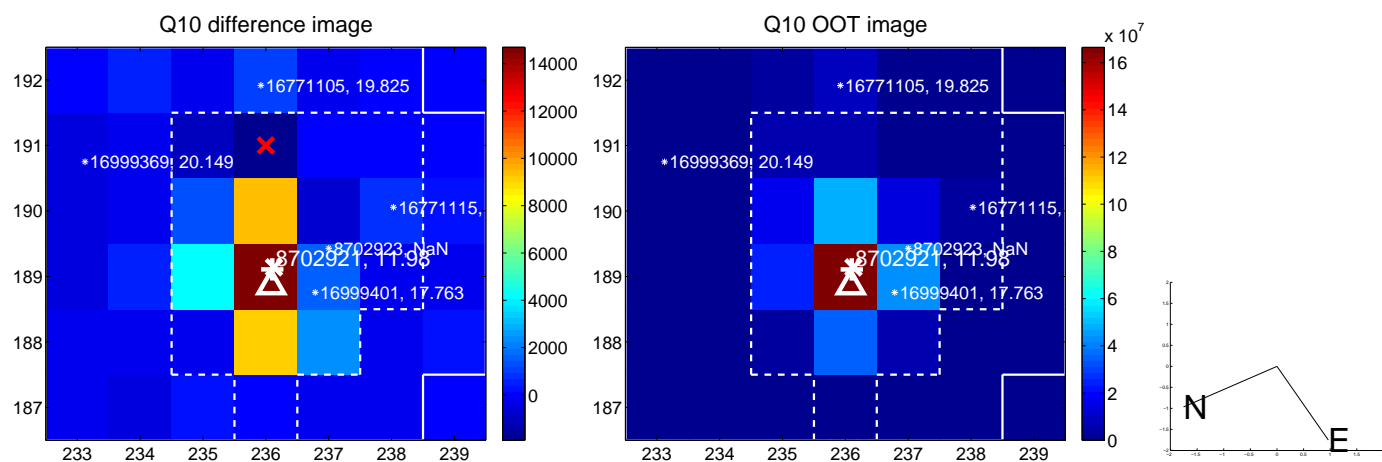
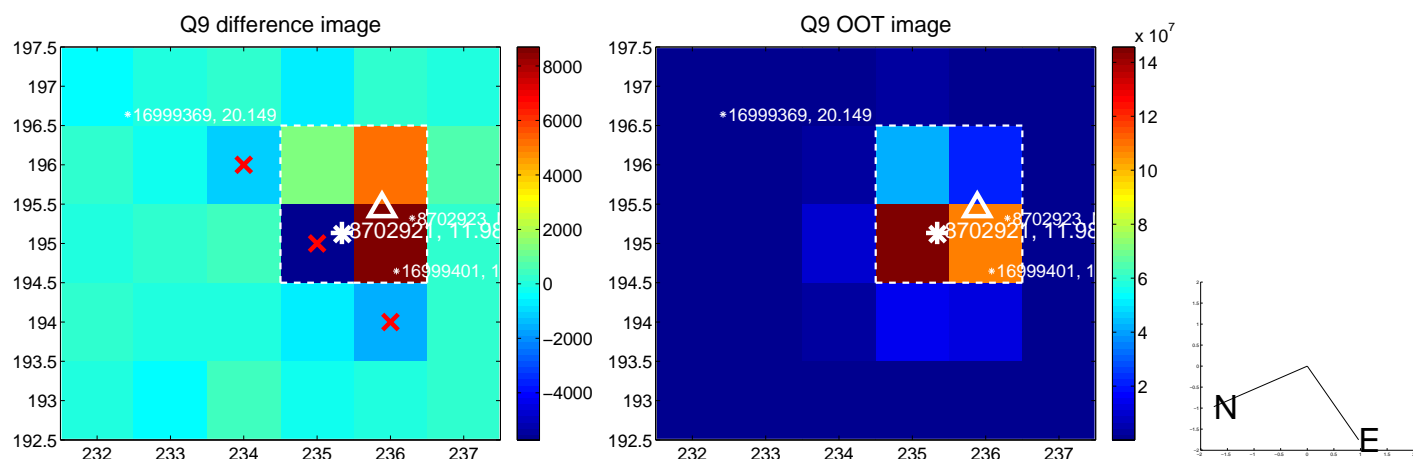
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

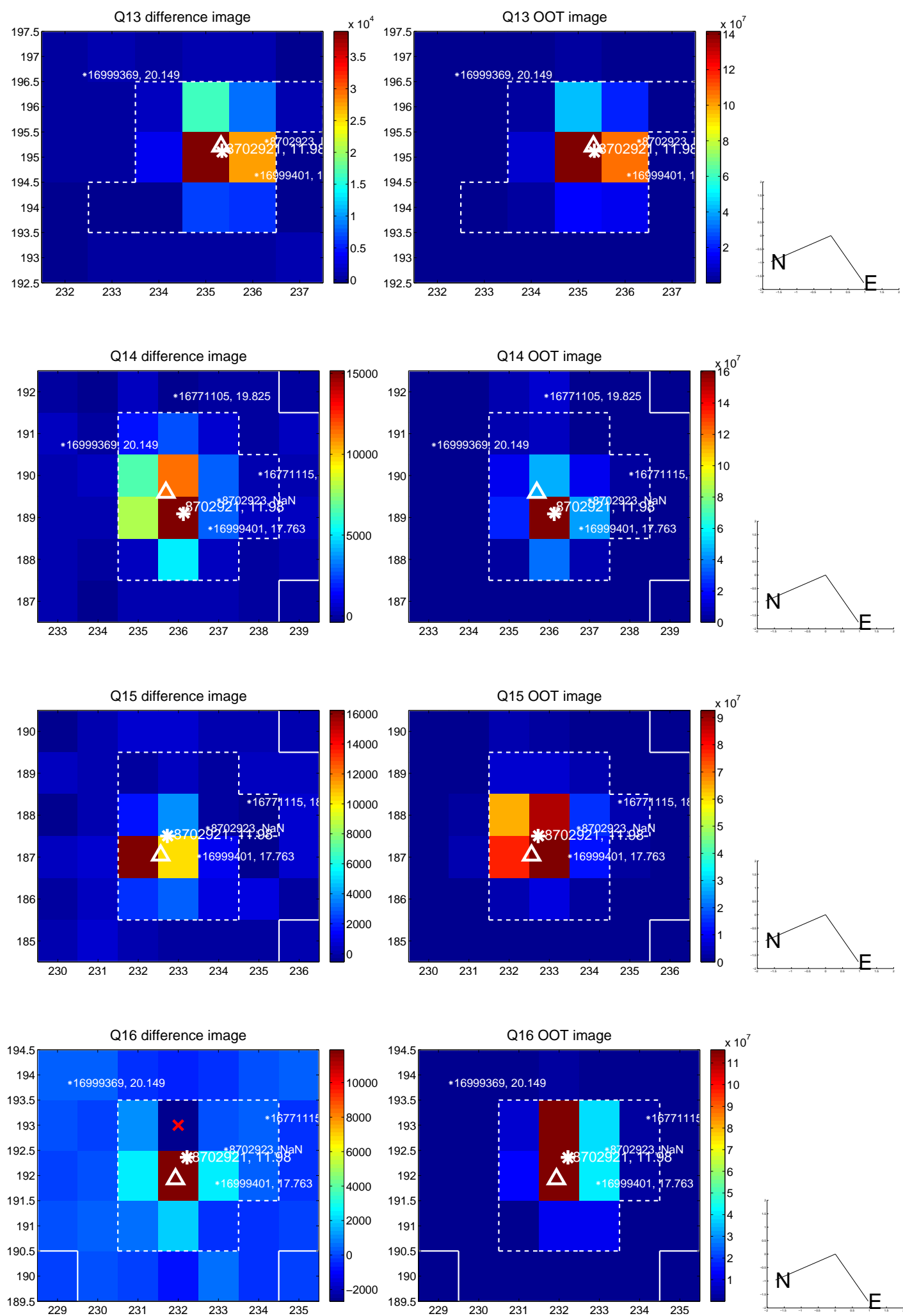


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

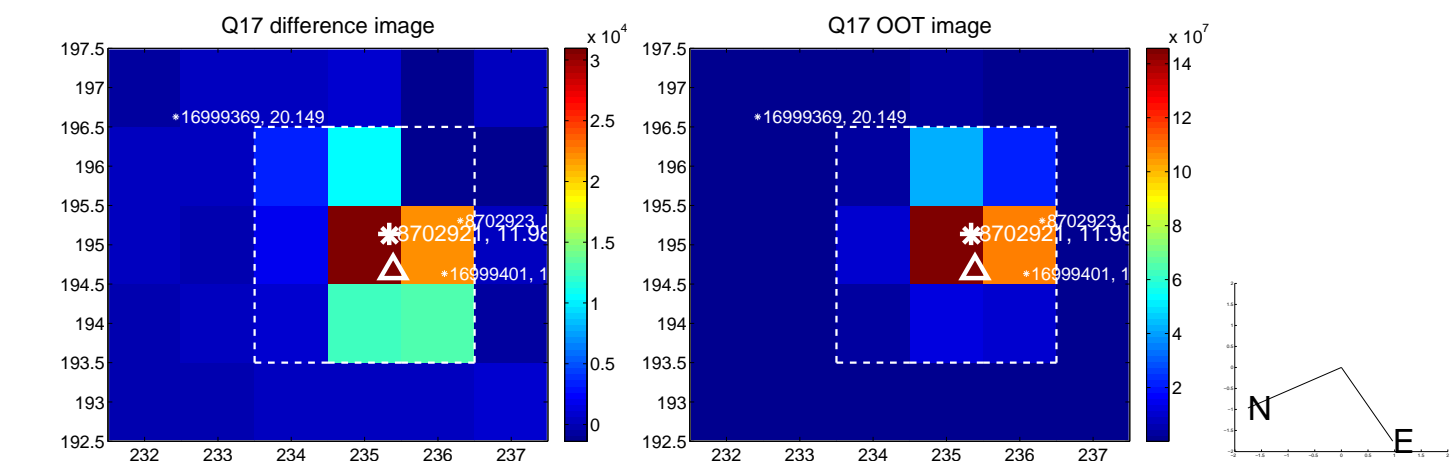




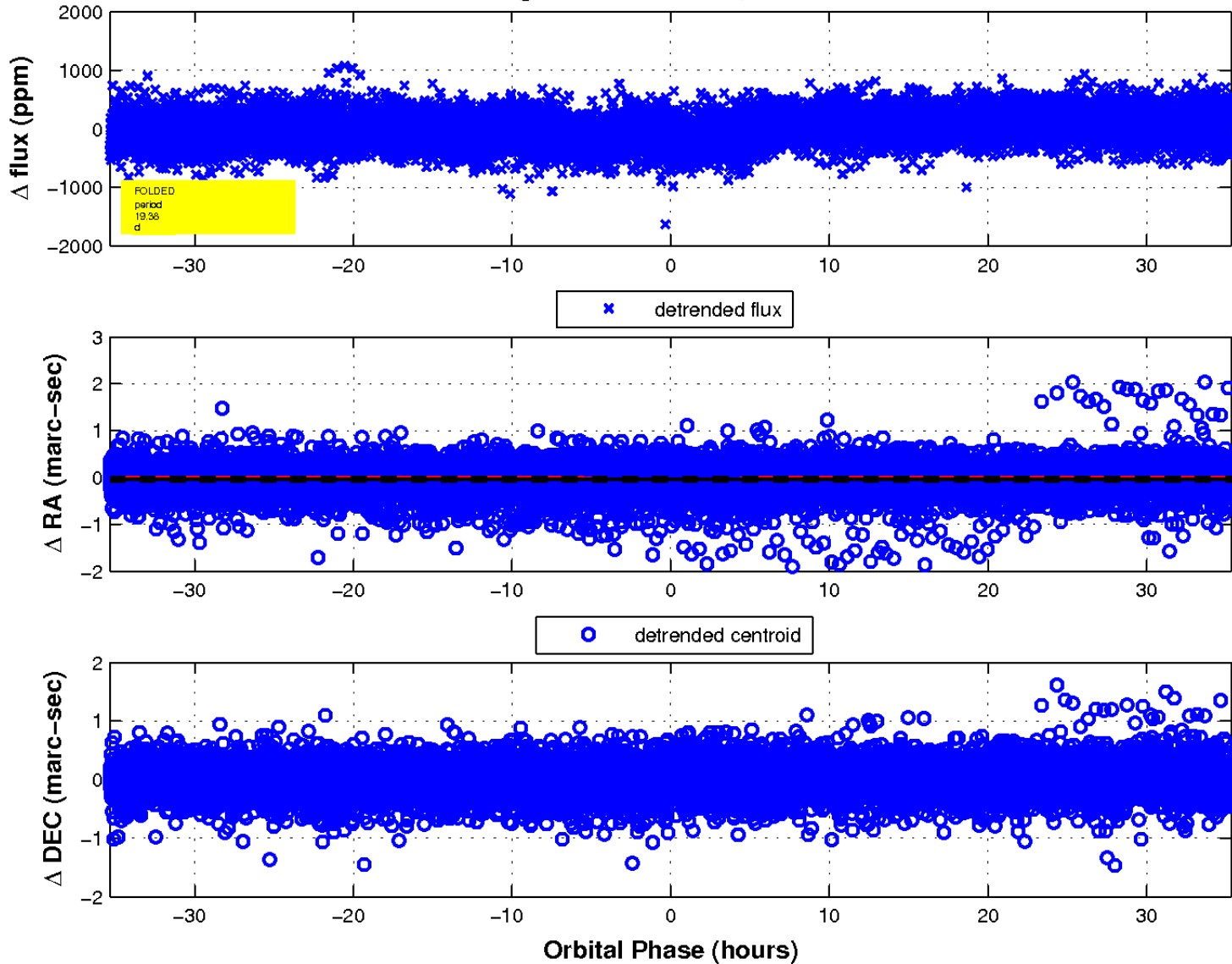
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 3 of 3



UKIRT Image

Declination

