

# KIC 003659186

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
003659186-01	OBS	No	2.364245	133.404349	161.9	9.214	9.4	9.8	0.69	4770	1.08	239.81
003659186-02	OBS	No	600.521832	198.861593	1575.9	8.510	17.9	7.6	0.69	4770	2.85	0.15
003659186-04	OBS	No	2.364331	132.209370	139.8	8.632	8.4	9.2	0.69	4770	0.79	239.80
003659186-05	OBS	No	8.582651	139.632626	1325.9	2.507	7.8	6.9	0.69	4770	2.74	42.98

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003659186-01	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV
003659186-02	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT— INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
003659186-04	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—SAME_NTL_PERIOD
003659186-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—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.

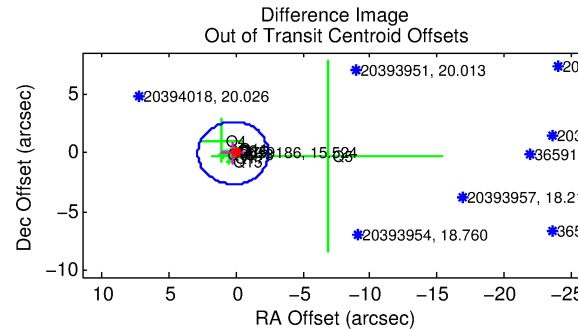
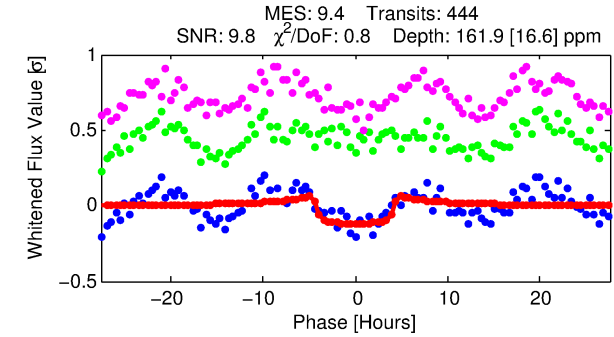
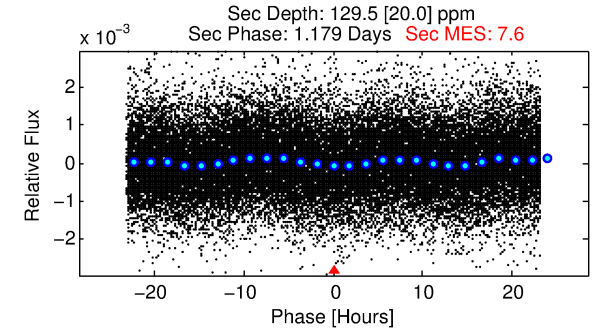
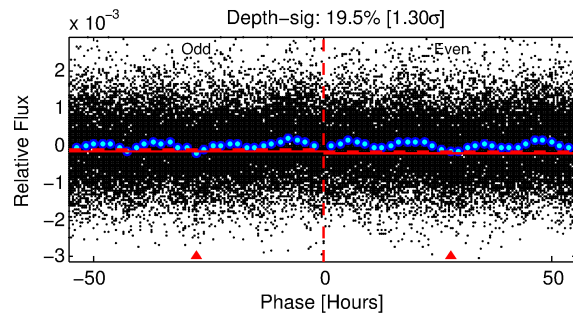
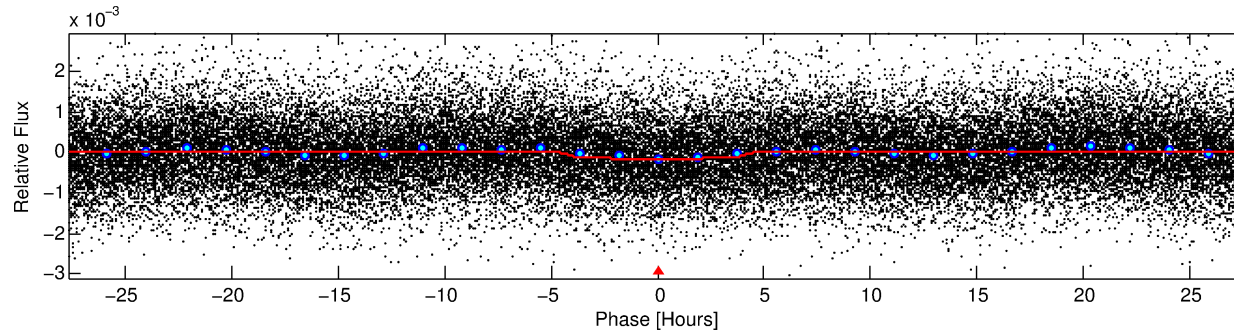
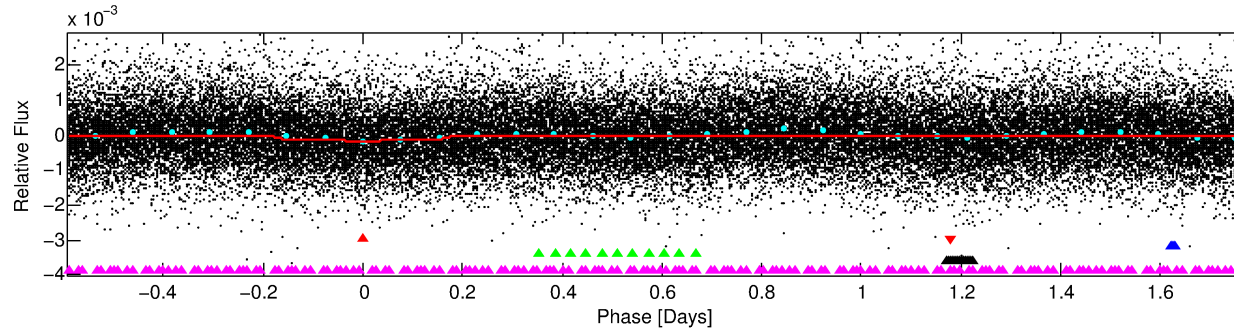
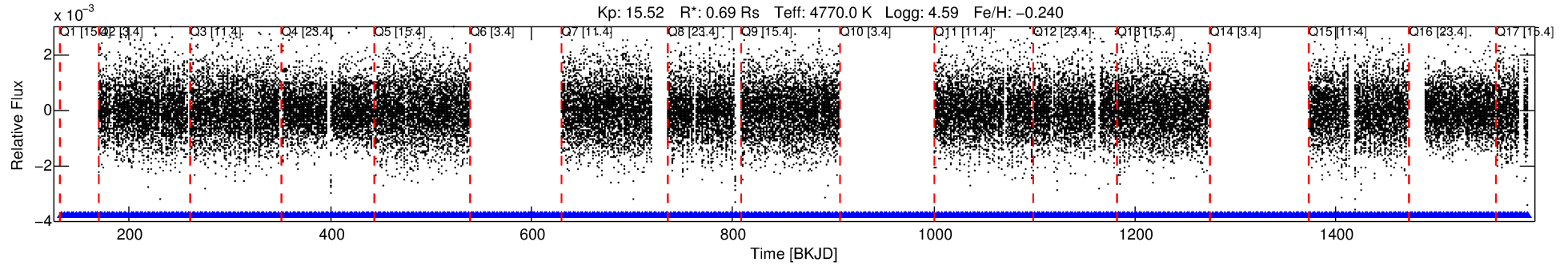
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 003659186-01

No Significant Match Found

# DV One-Page Summary

KIC: 3659186 Candidate: 1 of 5 Period: 2.364 d



## DV Fit Results:

Period = 2.36424 [0.00003] d  
Epoch = 133.4043 [0.0075] BKJD  
Rp/R\* = 0.0143 [0.0023]  
a/R\* = 1.31 [0.33]  
b = 0.90 [0.13]  
Seff = 239.81 [51.29]  
Teq = 1003 [54] K  
Rp = 1.08 [0.21] Re  
a = 0.0305 [0.0024] AU  
Ag = 56.37 [21.34] [2.59 $\sigma$ ]  
Teff = 4251 [430] K [7.49 $\sigma$ ]

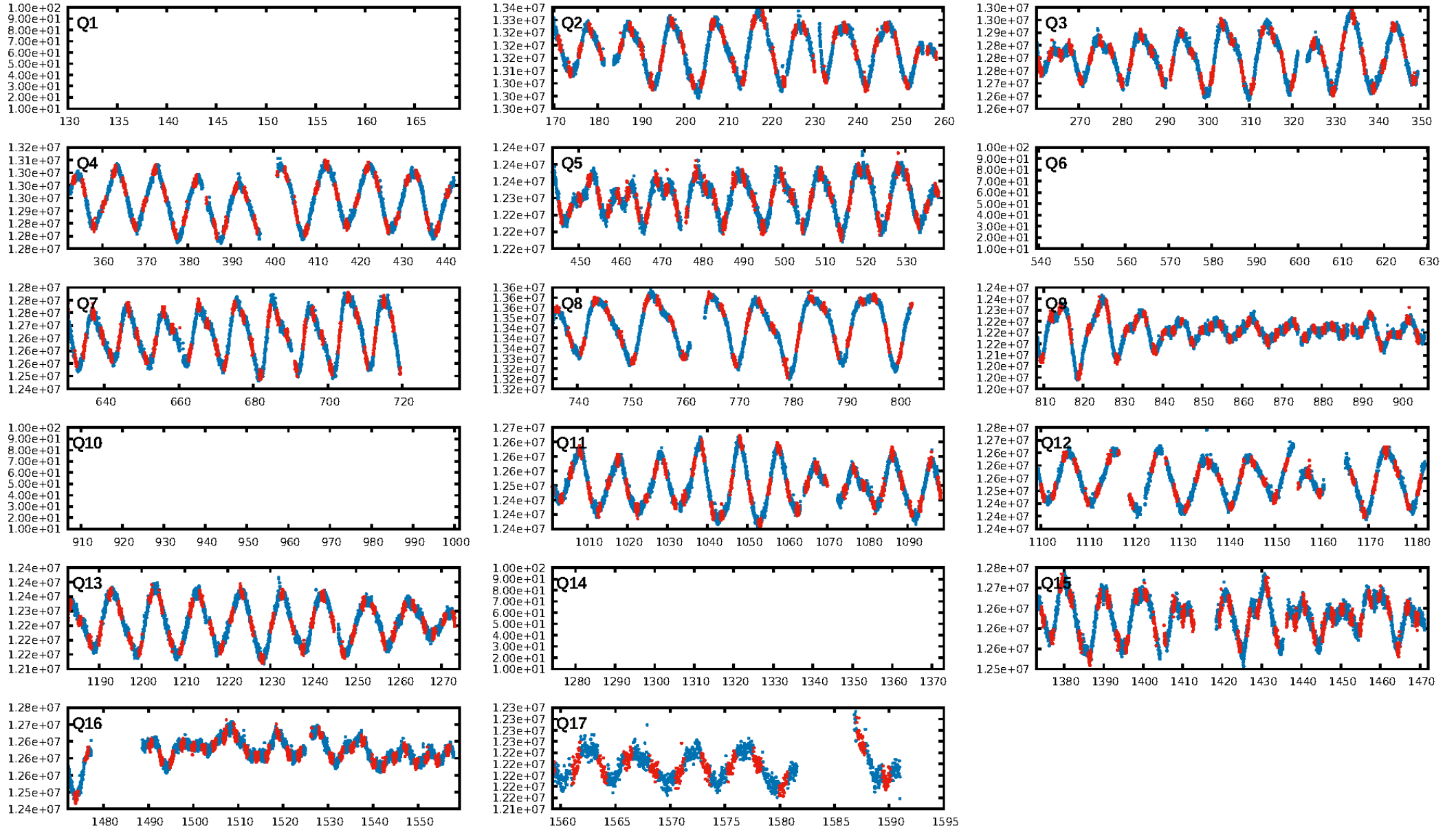
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 2.09e-60  
RollingBand-fgt: 1.00 [432/432]  
GhostDiagnostic-chr: 3.153  
Centroid-sig: 0.1%  
Centroid-so: 2.346 arcsec [2.14 $\sigma$ ]  
OotOffset-rm: 0.227 arcsec [0.26 $\sigma$ ]  
KicOffset-rm: 0.201 arcsec [0.23 $\sigma$ ]  
OotOffset-st: 0/3/3/4 [10]  
KicOffset-st: 0/3/3/4 [10]  
DiffImageQuality-fgm: 0.50 [5/10]  
DiffImageOverlap-fno: 1.00 [13/13]

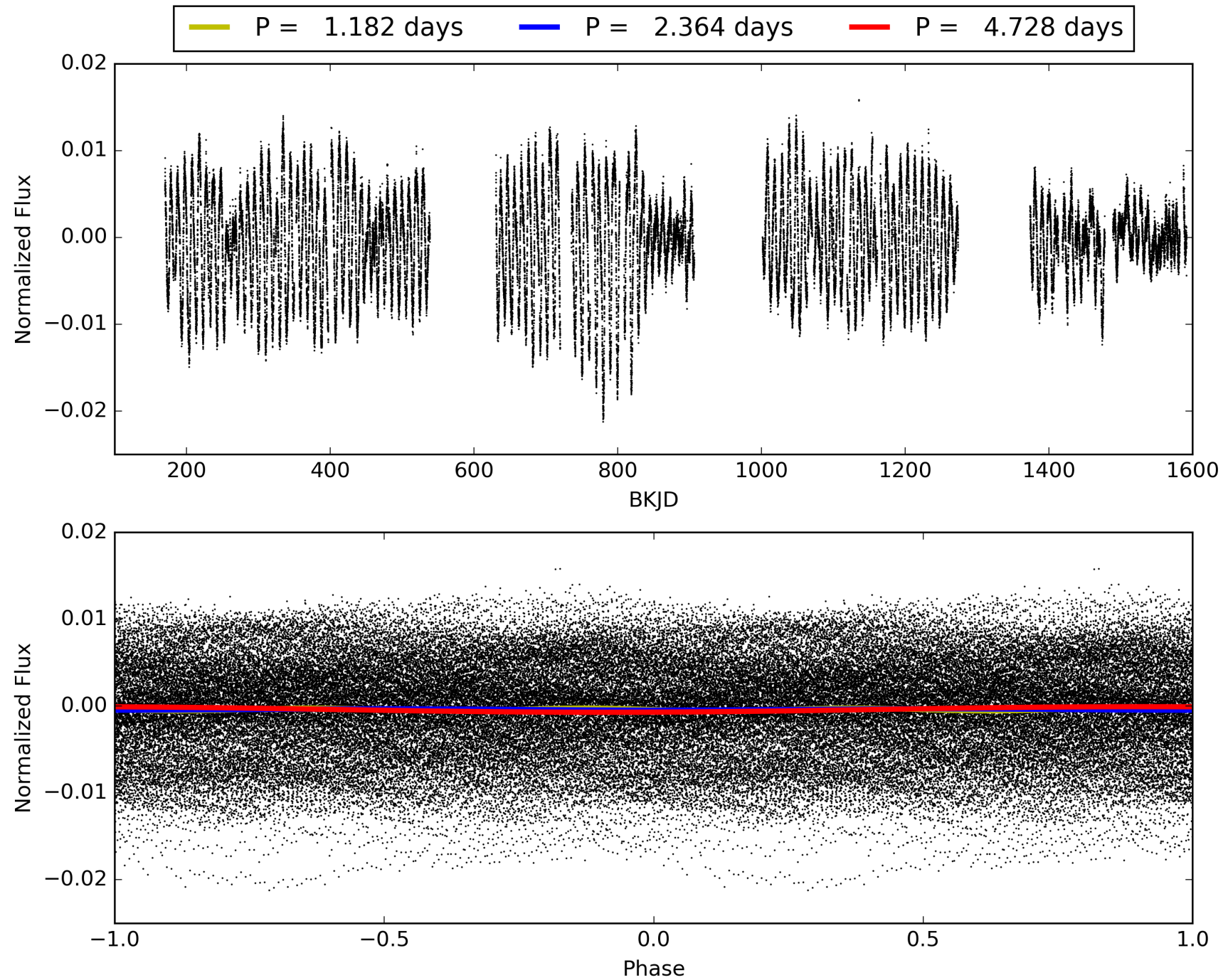
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 06:46:36 Z

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

# TCE 003659186-01, PDC Light Curves



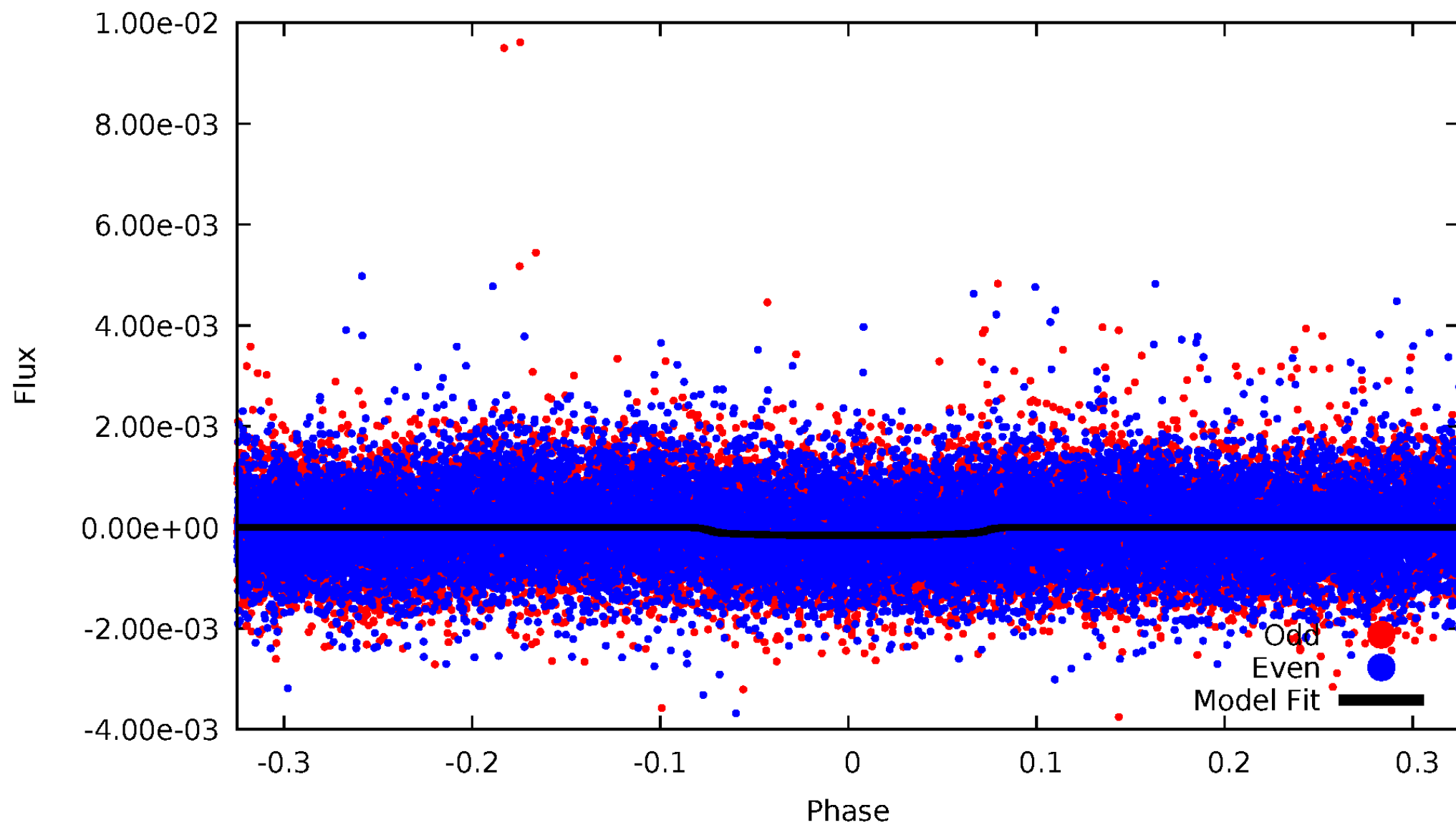
TCE 003659186-01





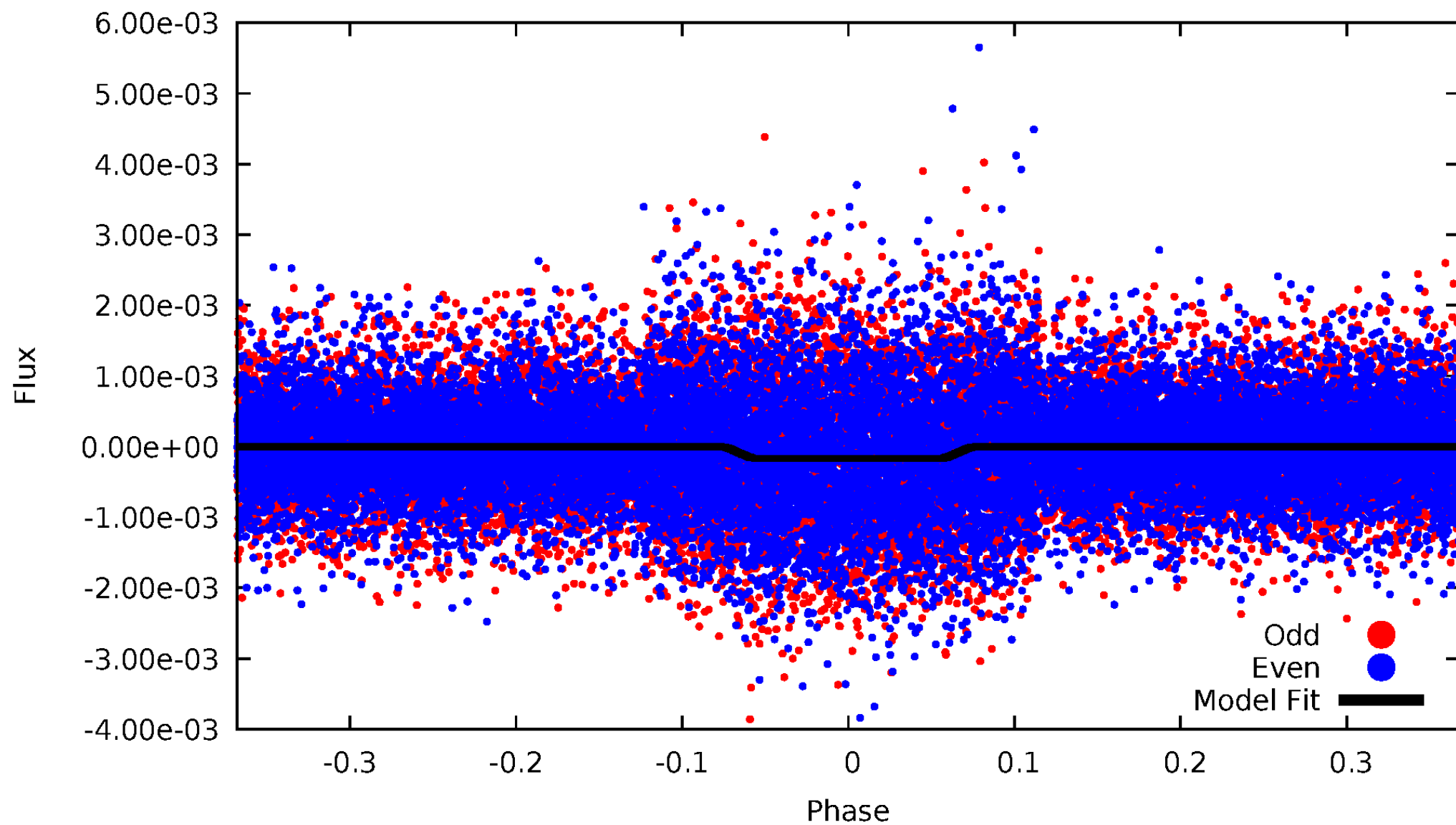
# DV Odd/Even

TCE 003659186-01



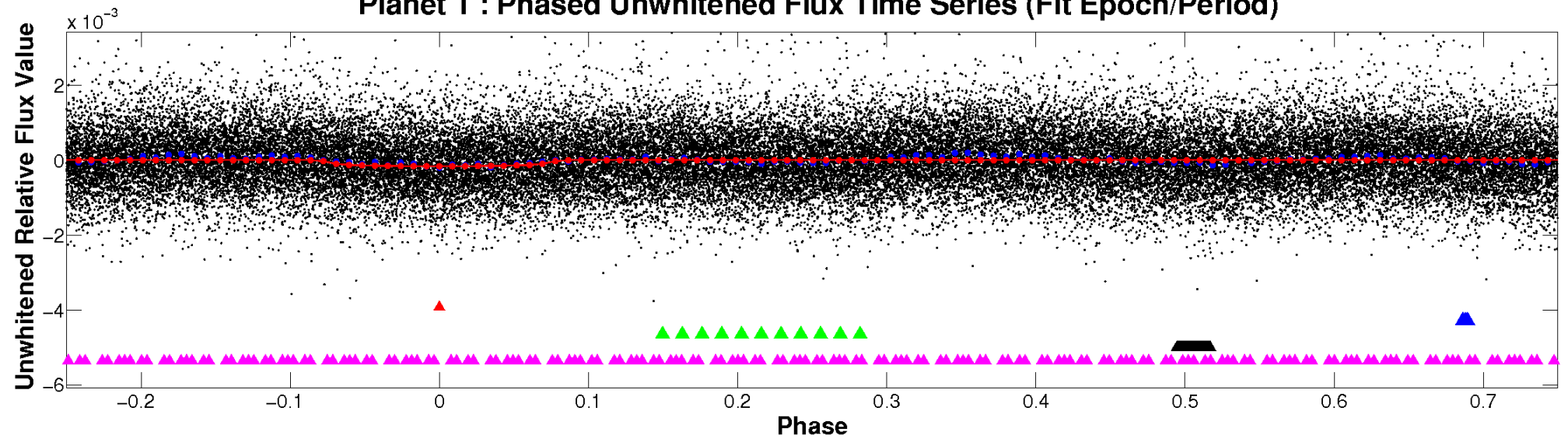
# ALT Odd/Even

TCE 003659186-01

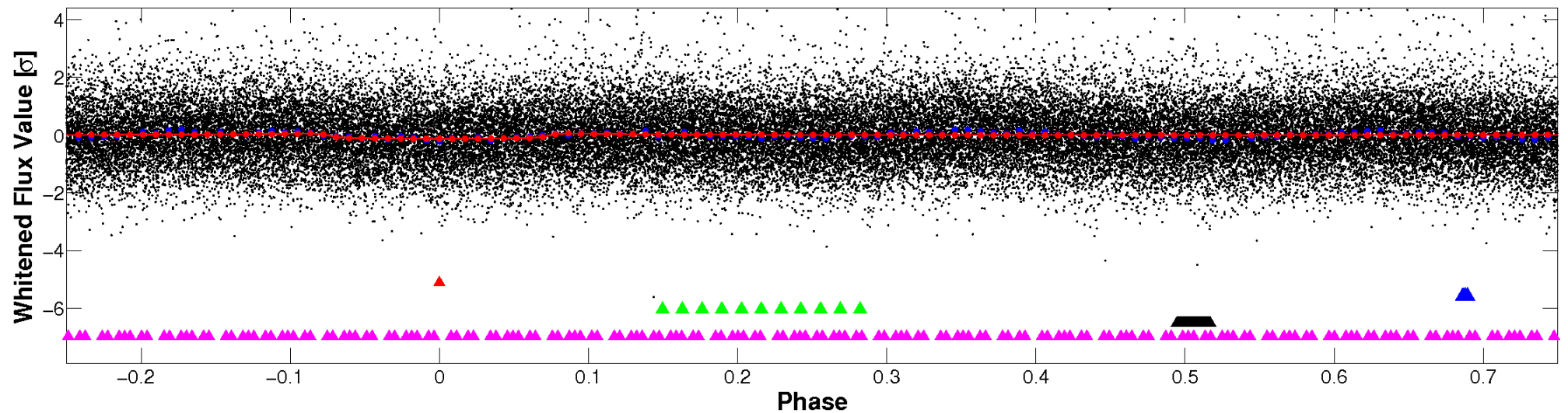


# Non-Whitened Vs. Whitened Light Curve

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

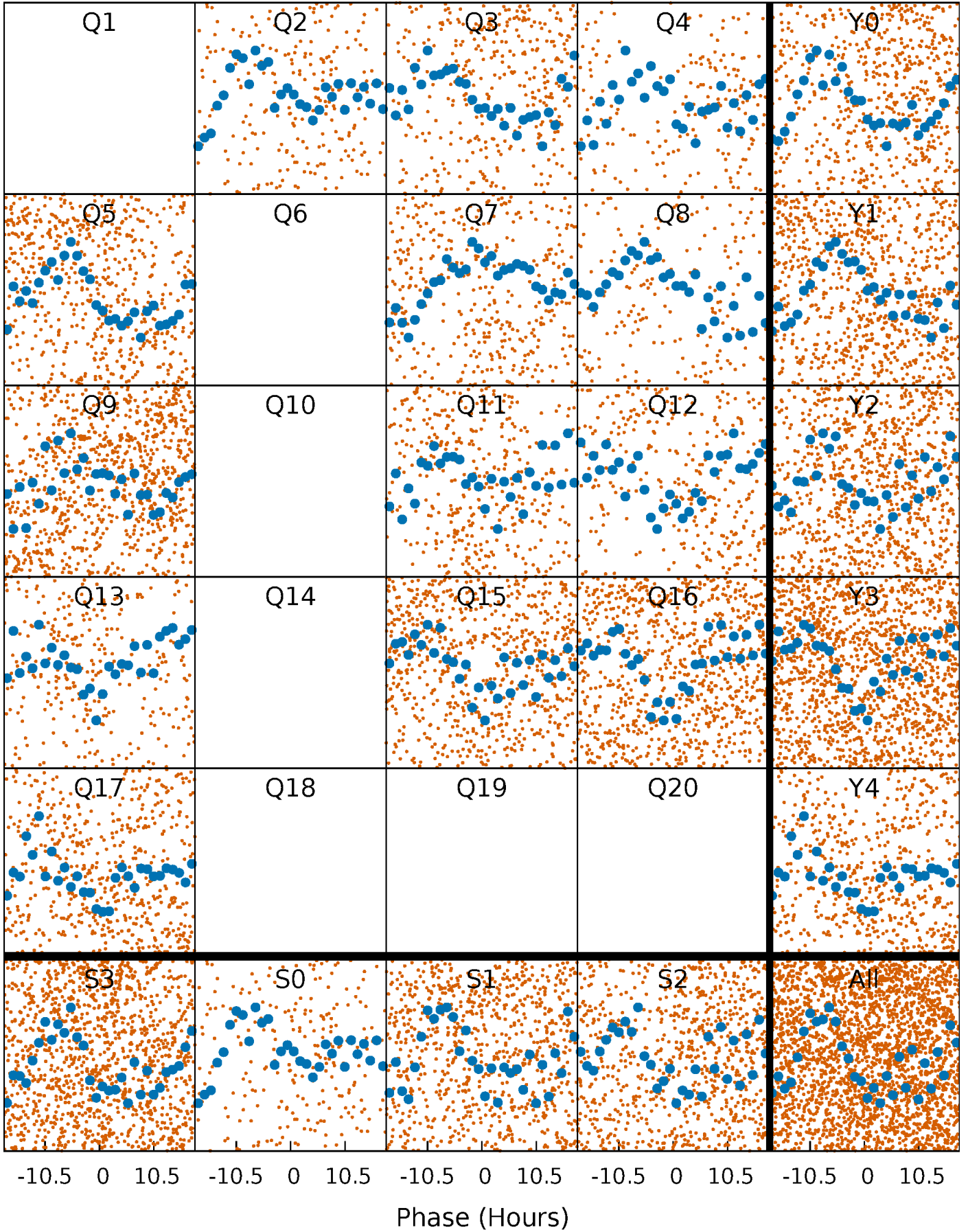


## Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

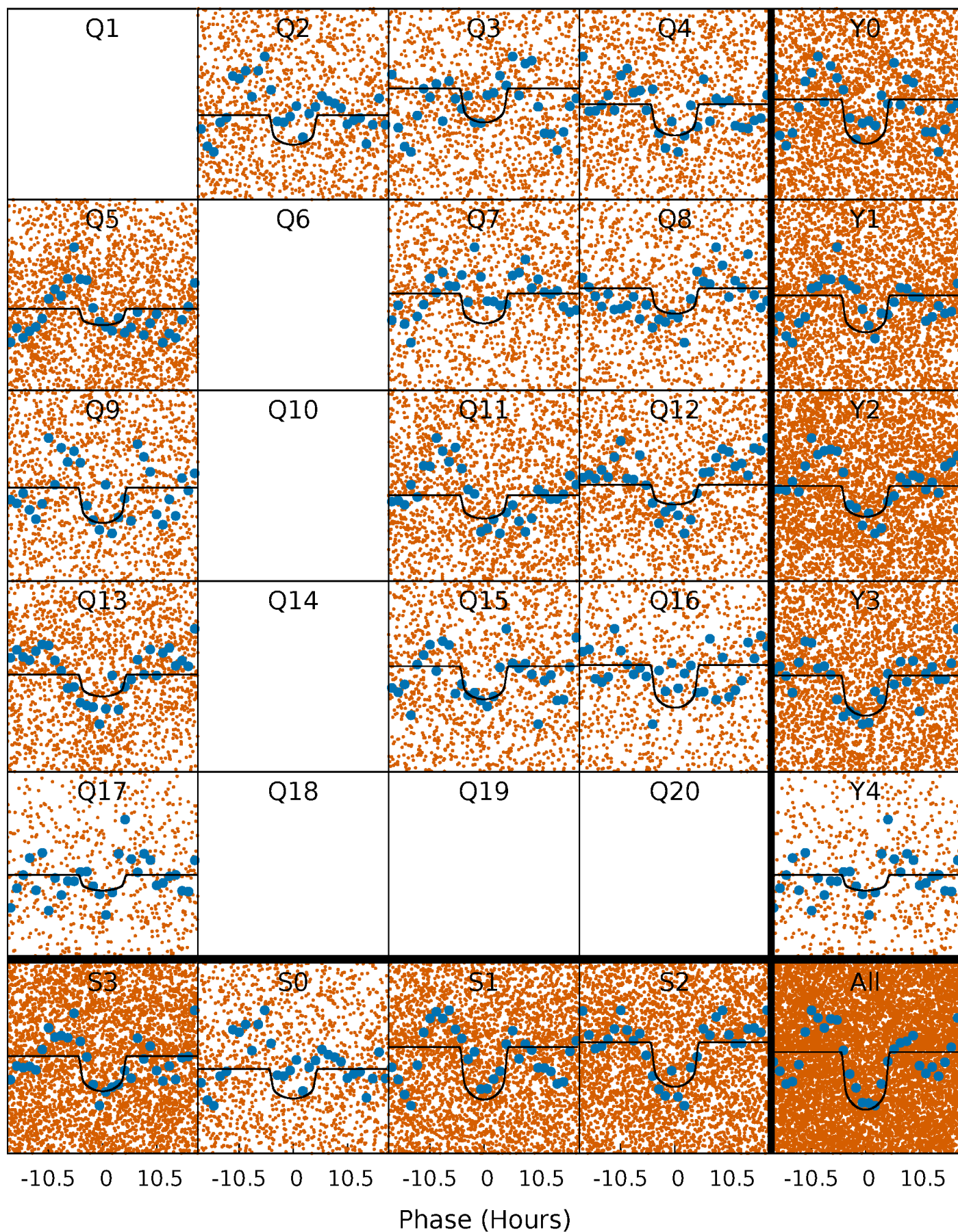
TCE 003659186-01   P= 2.364245 Days    $T_0=133.404349$  (BKJD)





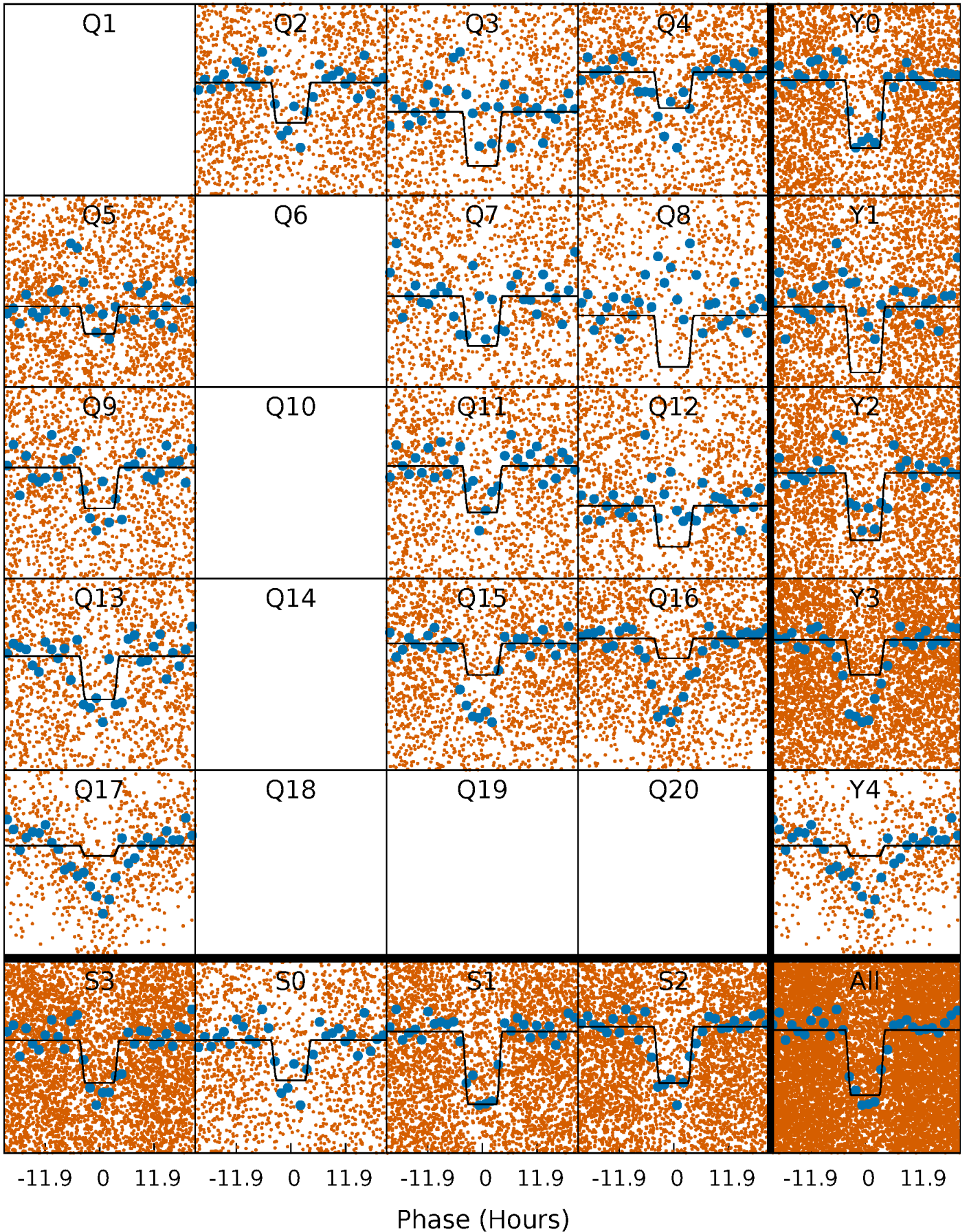
# DV Quarter-Phased Transit Curves

TCE 003659186-01 P= 2.364245 Days  $T_0=133.404349$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 003659186-01 P= 2.364176 Days  $T_0=133.422966$  (BKJD)

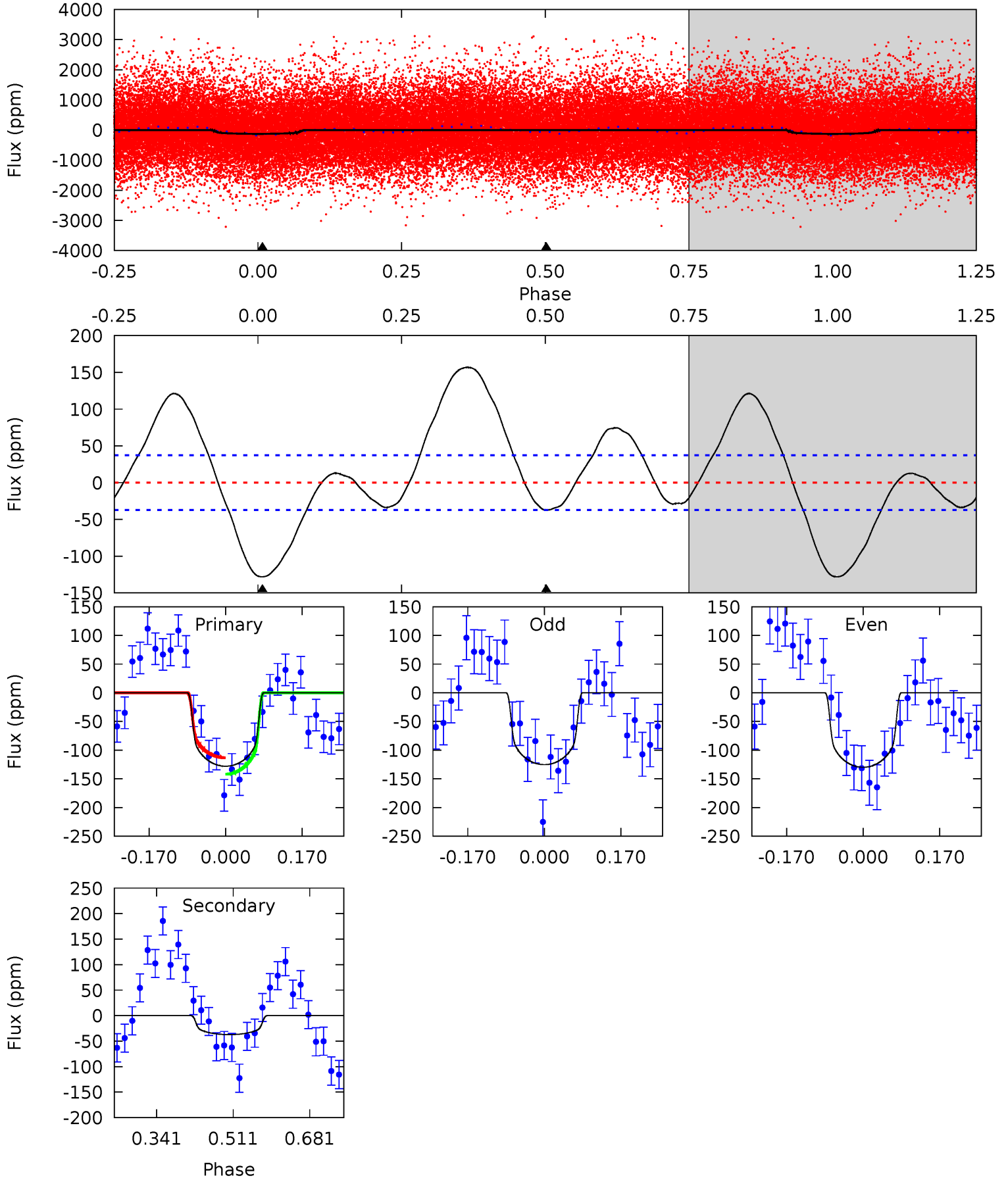




# DV Model-Shift Uniqueness Test

003659186-01, P = 2.364245 Days, E = 133.404349 Days

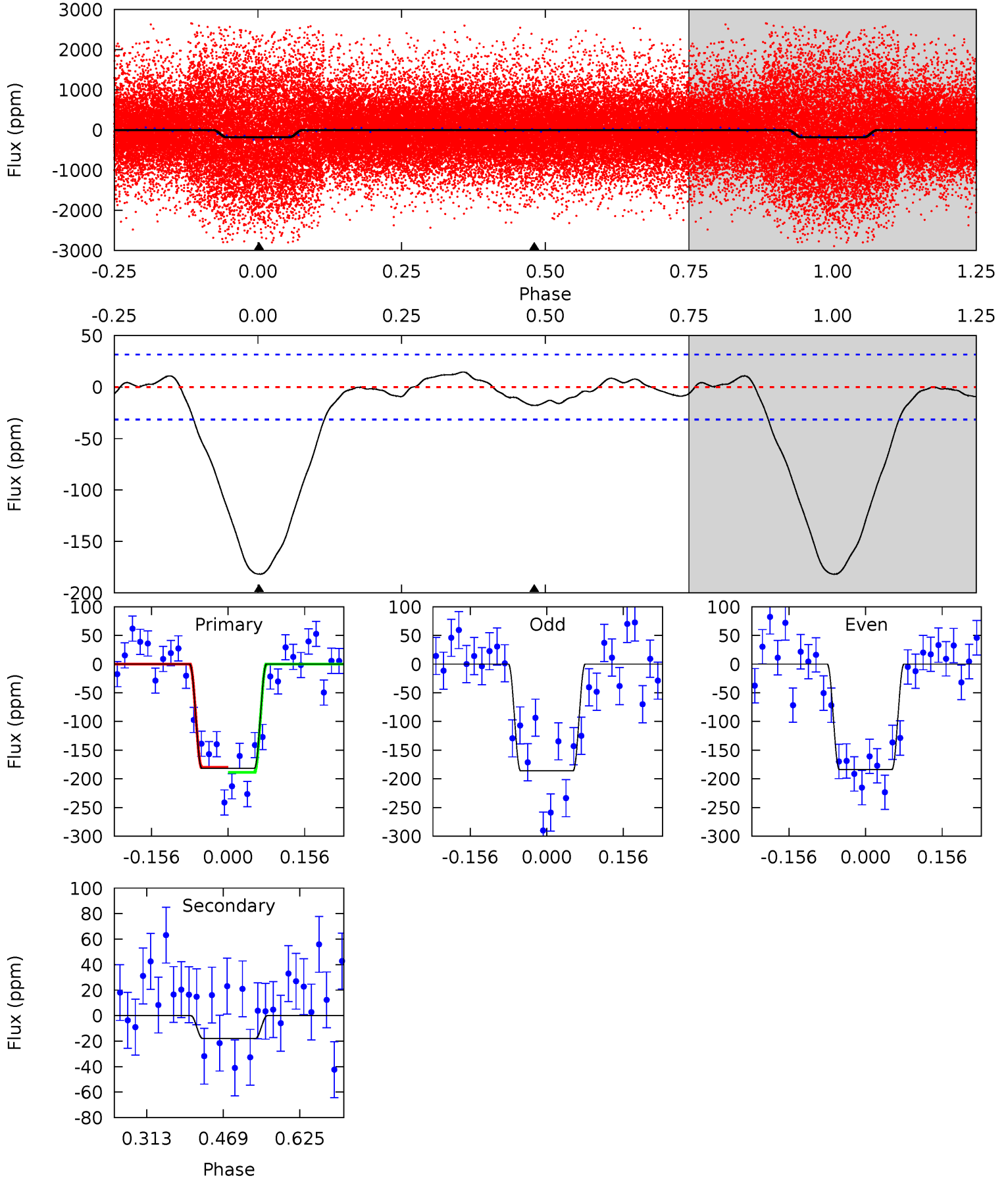
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
15.3	4.45	0	0	4.45	1.37	5.65	15.3	15.3	4.45	4.45	0.28	1.10	0.55	1.71



# Alt Model-Shift Uniqueness Test

003659186-01, P = 2.364176 Days, E = 133.422966 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
25.7	2.54	0	0	4.47	1.42	0.82	25.7	25.7	2.54	2.54	0.15	0.89	0.07	0.61





### Stellar Parameters For KIC 003659186

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4770^{+217}_{-195}$	$4.586^{+0.060}_{-0.035}$	$-0.240^{+0.300}_{-0.300}$	$0.693^{+0.060}_{-0.067}$	$0.676^{+0.088}_{-0.051}$	$2.855^{+0.756}_{-0.414}$
	+5%/-4%	+1%/-1%	+125%/-125%	+9%/-10%	+13%/-8%	+26%/-15%
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 003659186-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-37 \pm 8$	$1.08^{+0.19}_{-0.19}$	$1401^{+67}_{-69}$	$3509^{+306}_{-262}$	$17^{+10}_{-6}$
Alt.	$-18 \pm 7$	$0.98^{+0.18}_{-0.18}$	$1395^{+71}_{-66}$	$3229^{+287}_{-306}$	$9.908^{+6.548}_{-4.503}$

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

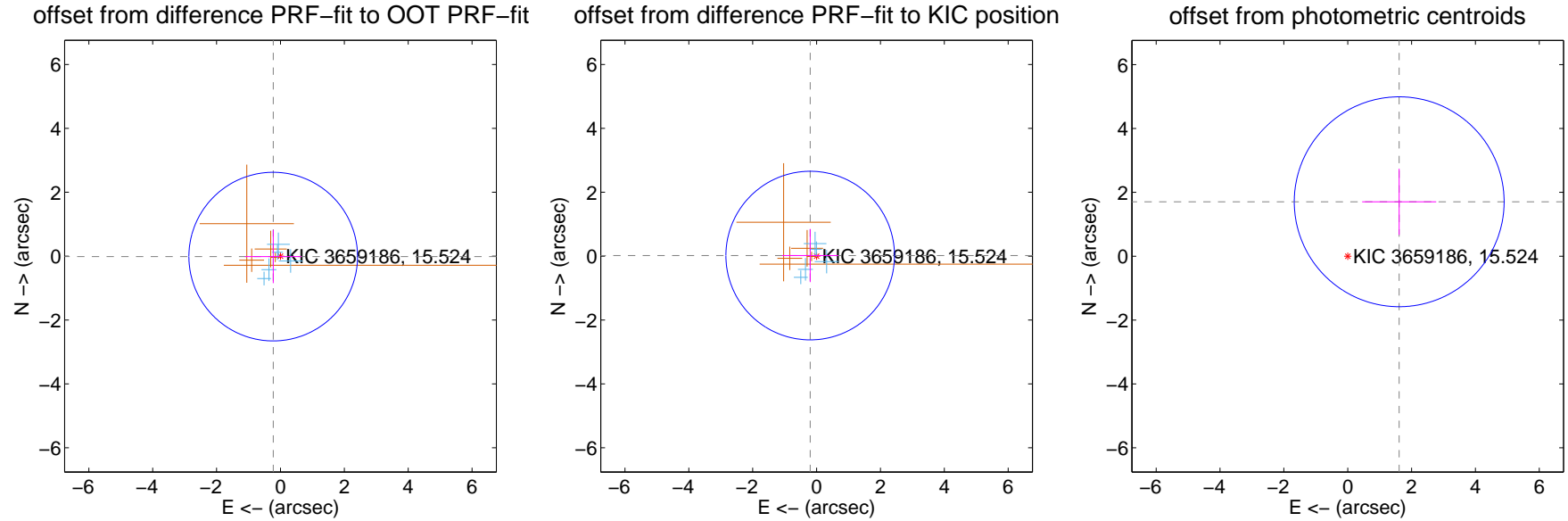
## DV Centroid Data

Supplemental centroid analysis for 003659186-01. Kepler magnitude: 15.52. Transit SNR 9.82

There are 5 quarters with good PRF difference image offsets

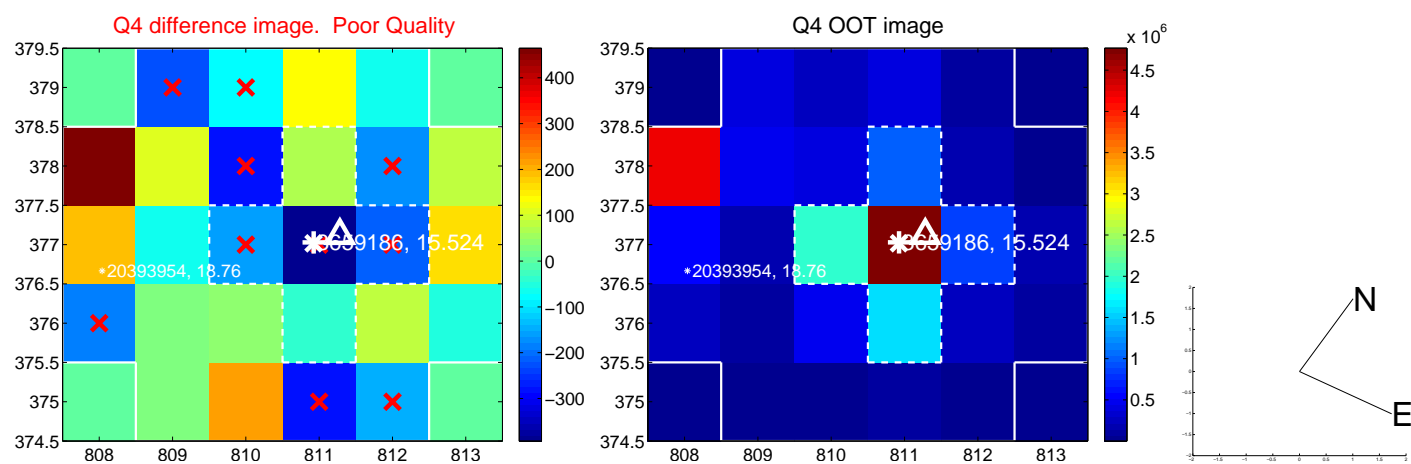
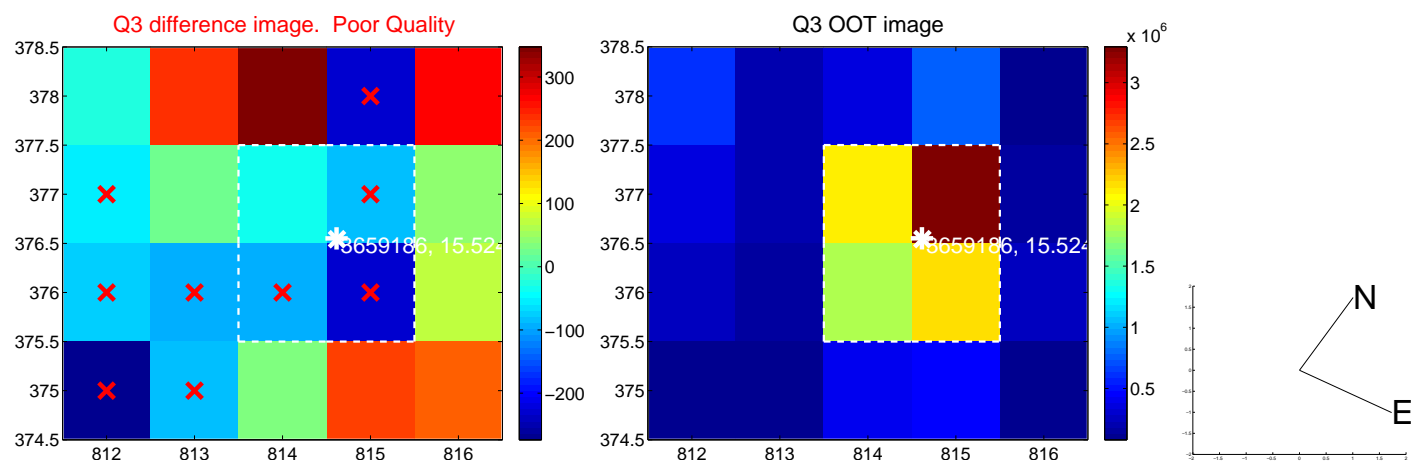
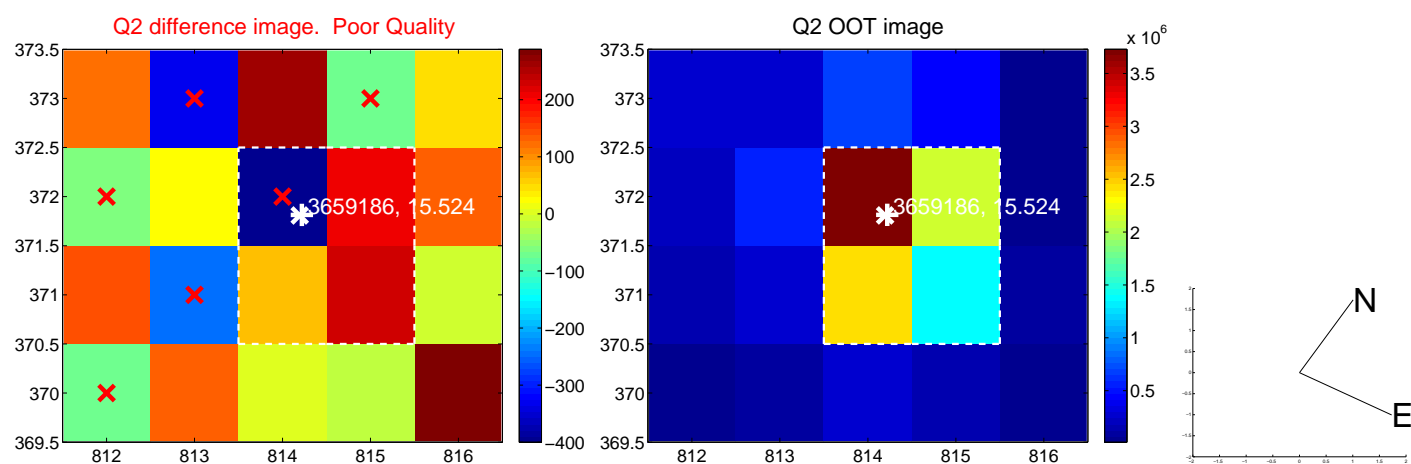
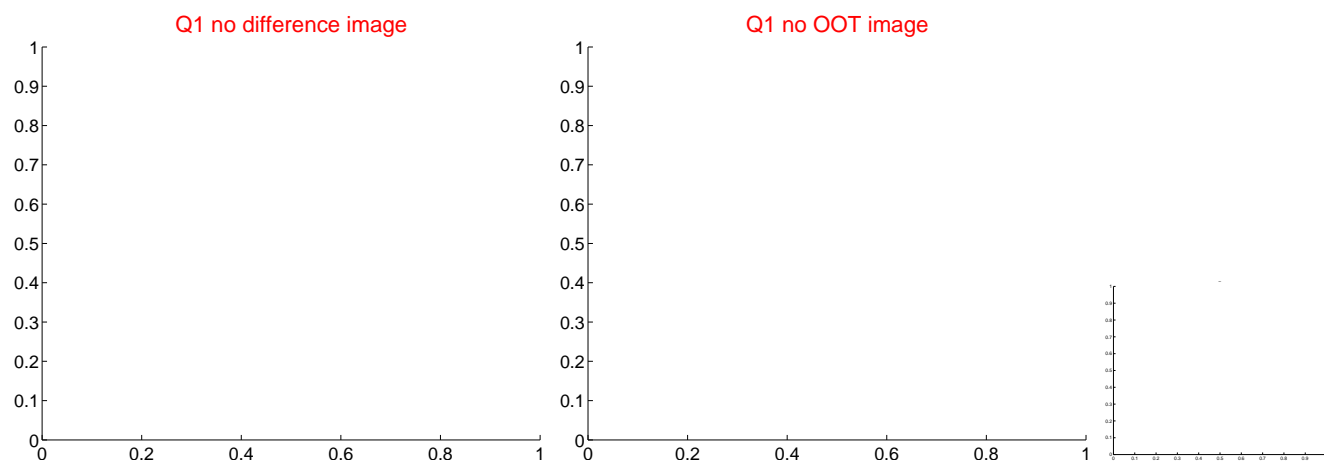
The direct PRF centroid is offset from the target star catalog position by about 0.01 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.227 \pm 0.880$	0.26	$0.227 \pm 0.880$	$-0.015 \pm 0.832$
PRF-fit source offset from KIC position	$0.201 \pm 0.880$	0.23	$0.200 \pm 0.880$	$0.018 \pm 0.832$
photometric centroid source offset	$2.35 \pm 1.10$	2.14	$-1.61 \pm 1.16$	$1.70 \pm 1.03$

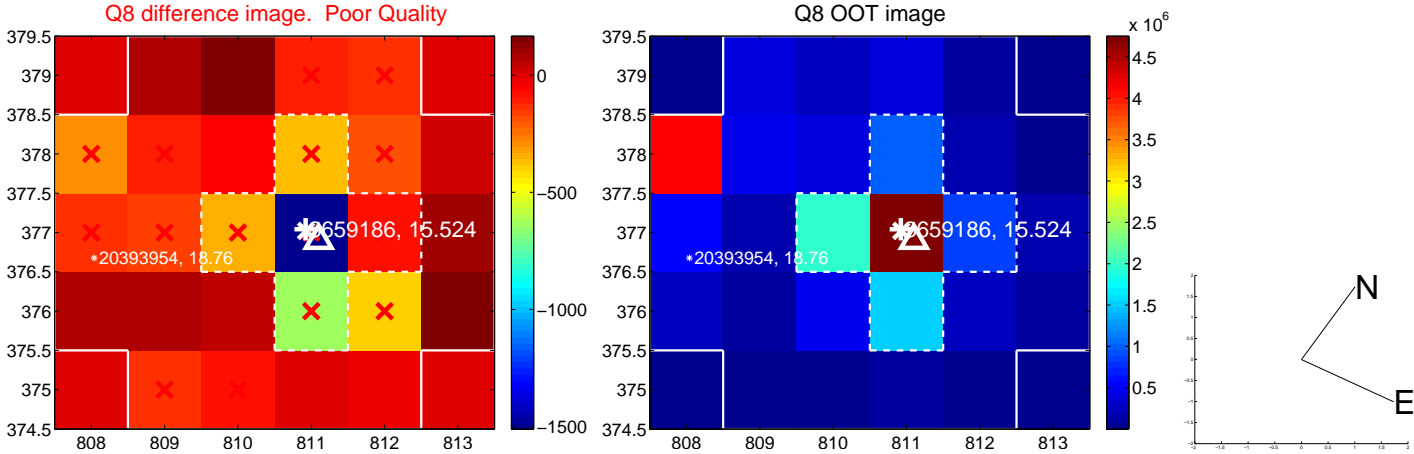
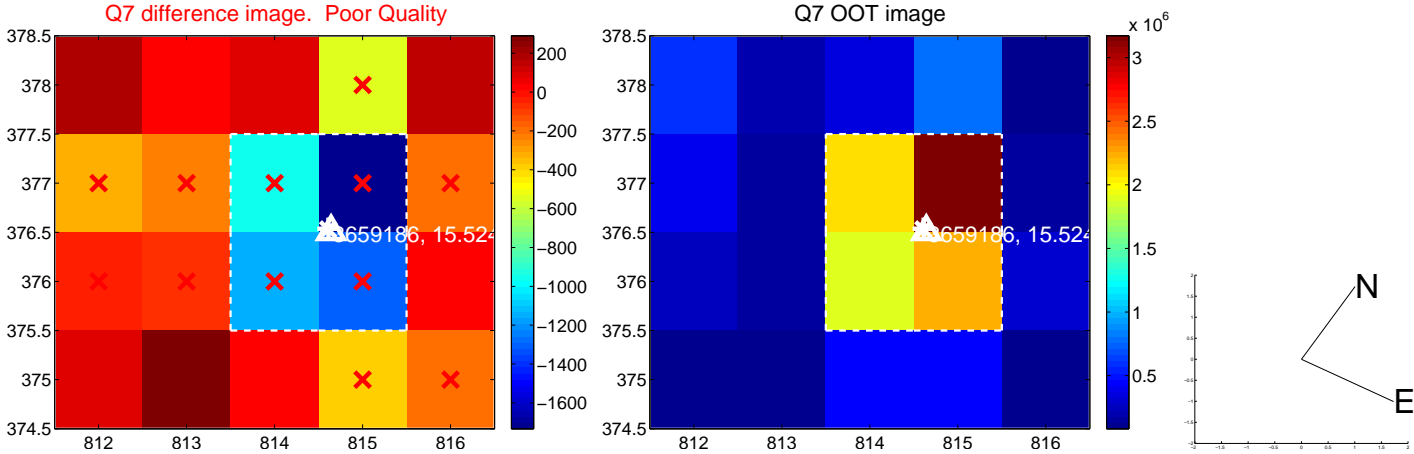
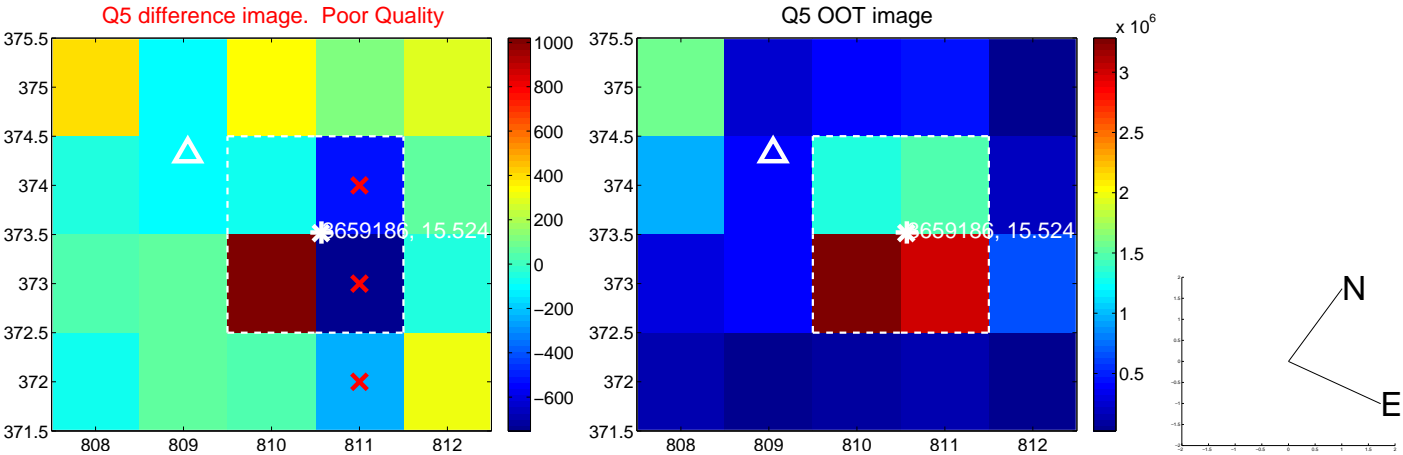


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

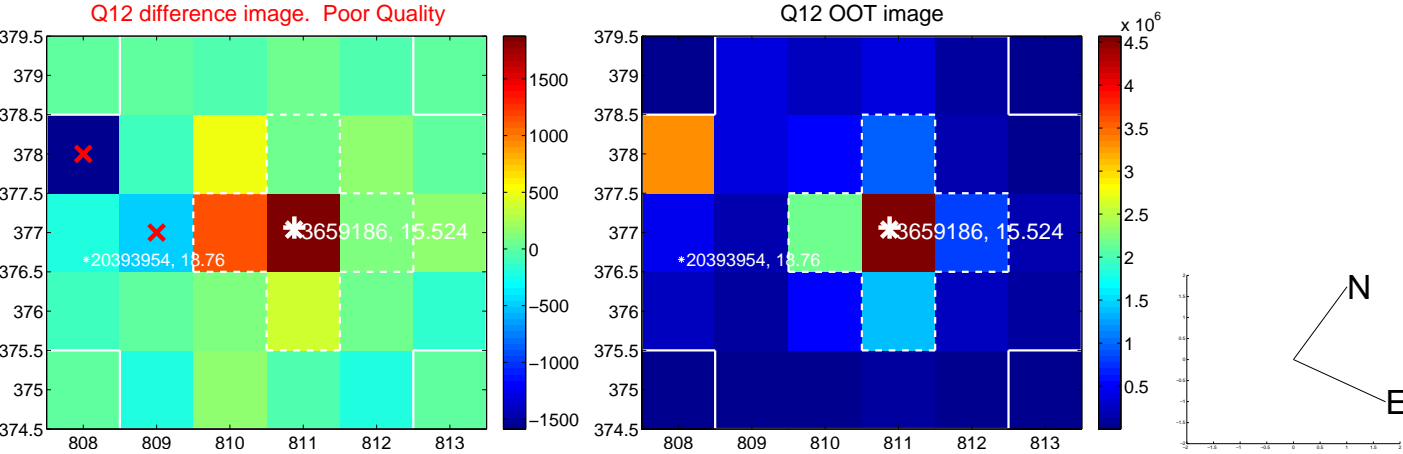
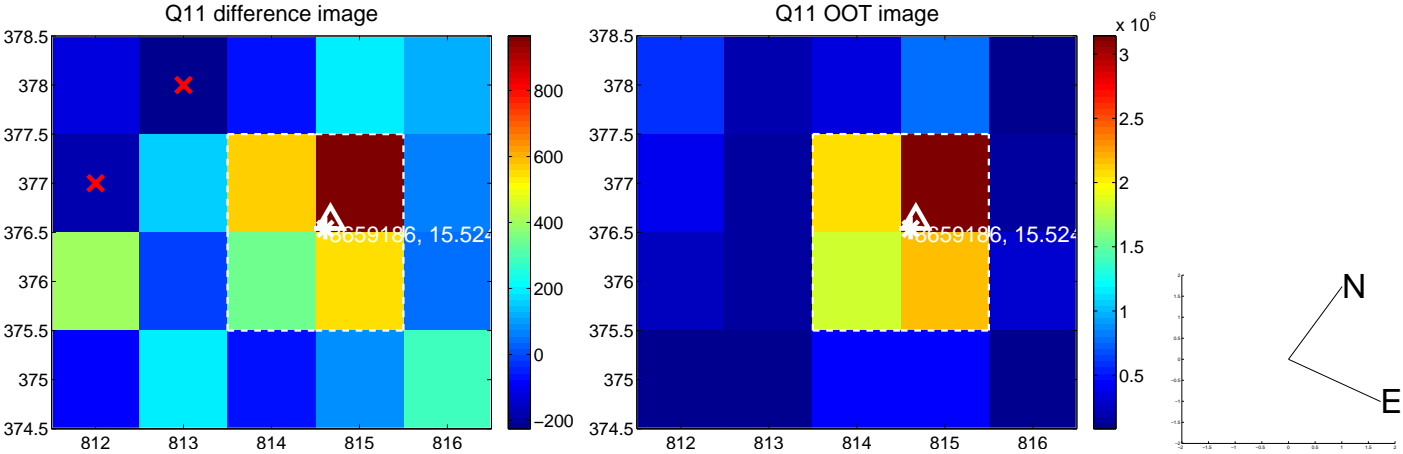
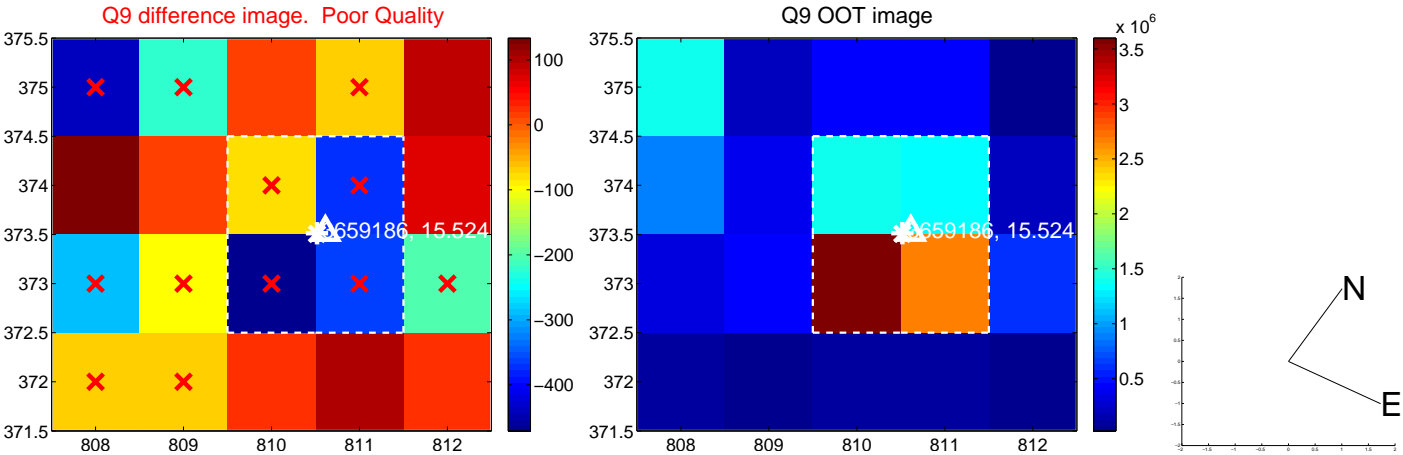


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

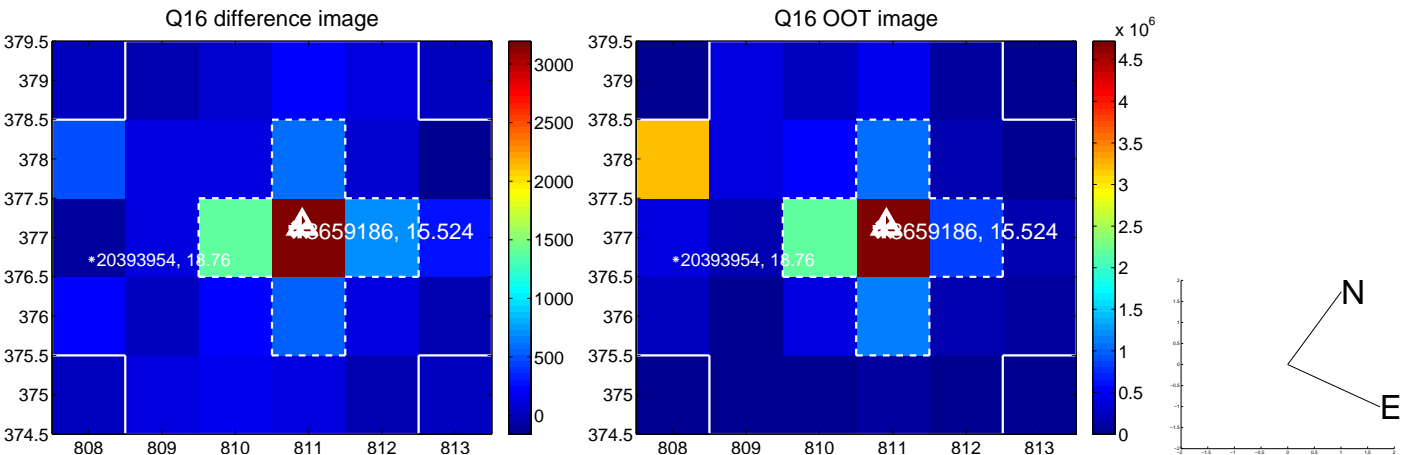
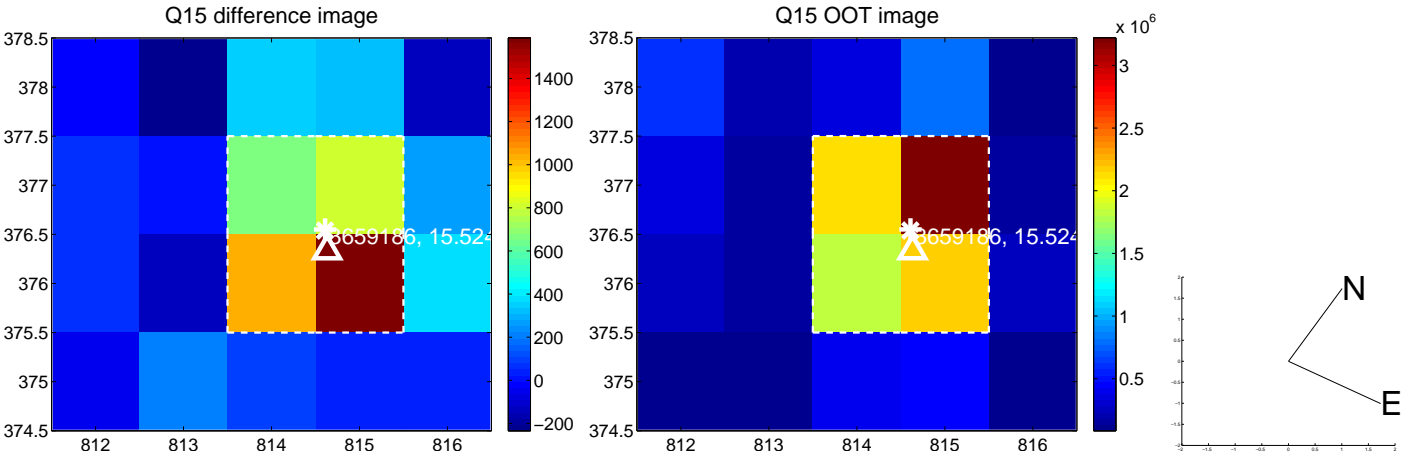
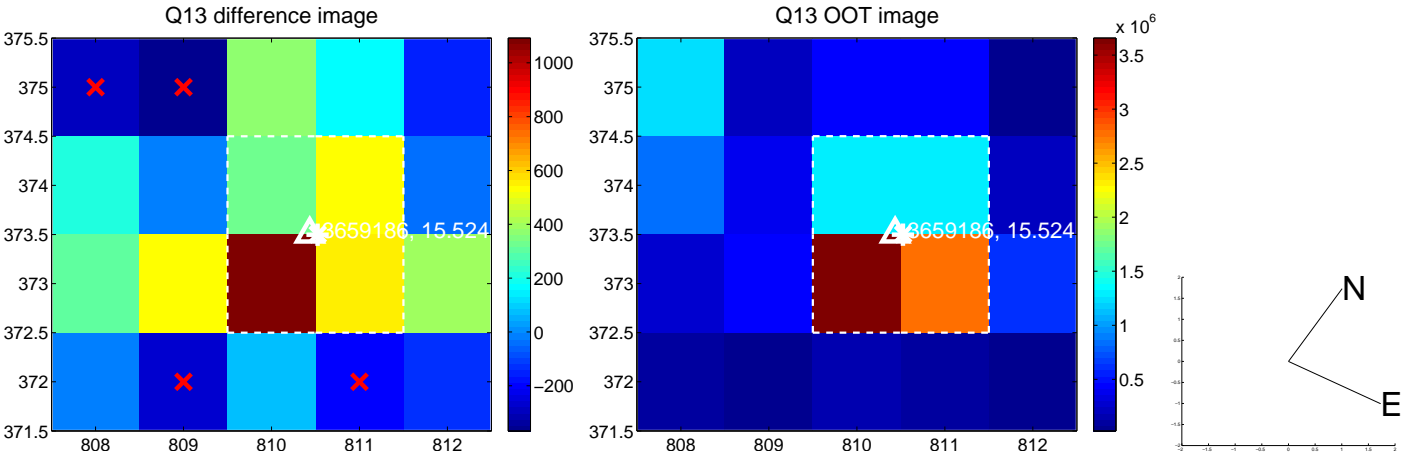




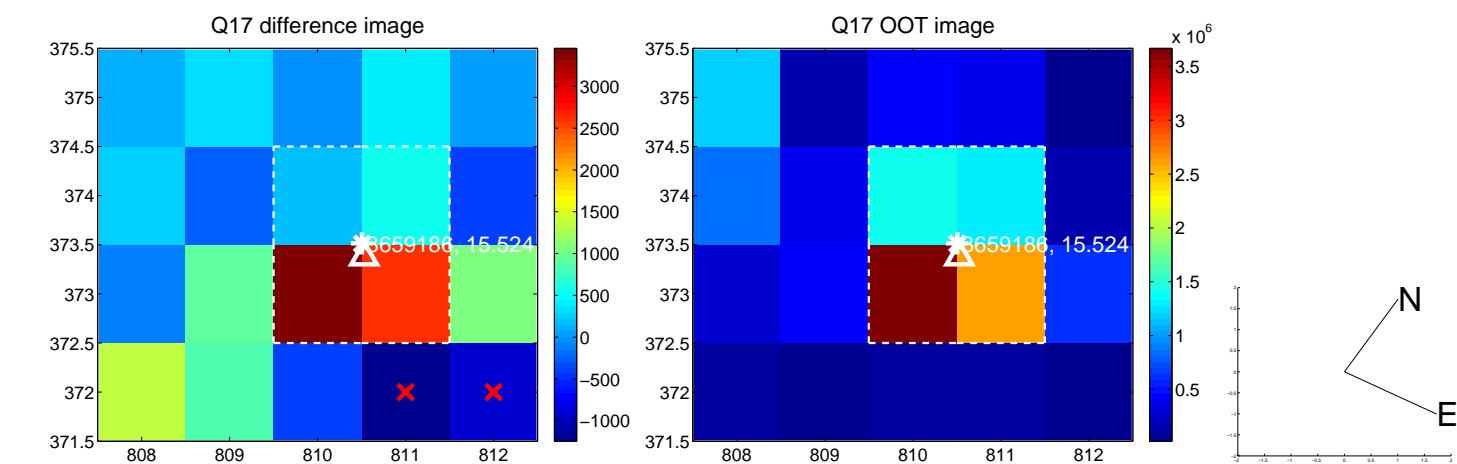
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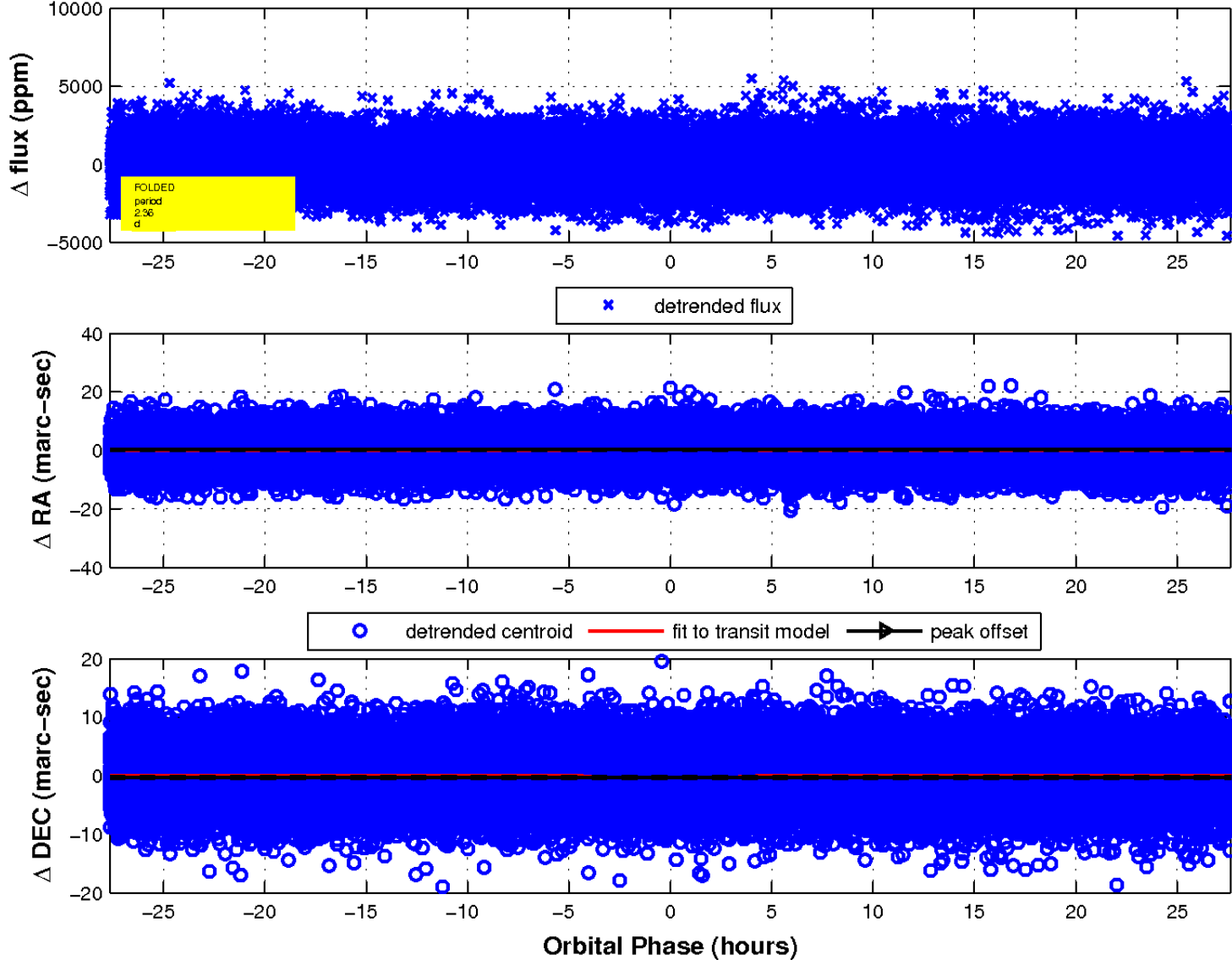
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

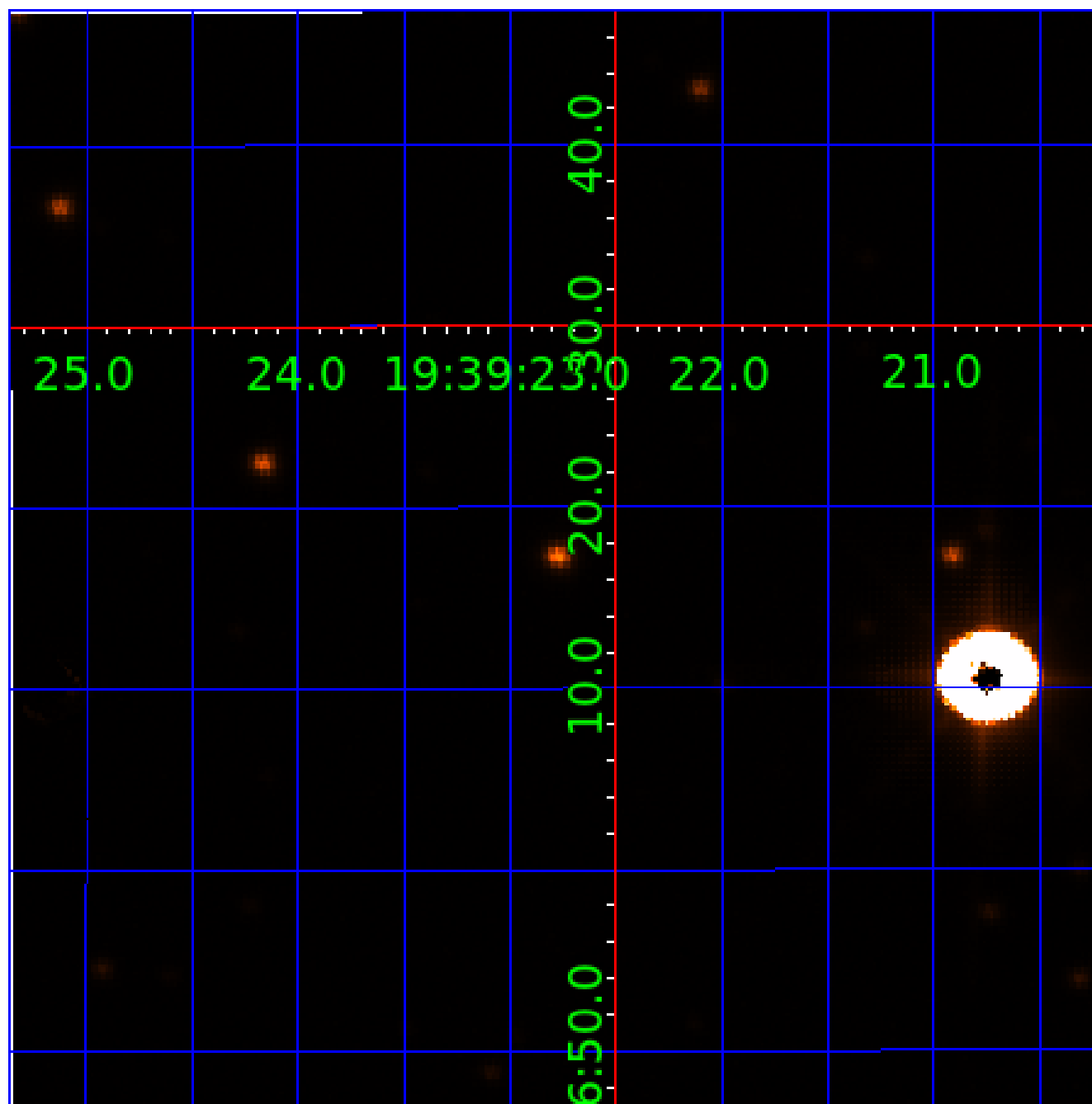


fluxWeightedCentroids, Planet 1 of 5



UKIRT Image

Declination





# KIC 003659186

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
003659186-01	OBS	No	2.364245	133.404349	161.9	9.214	9.4	9.8	0.69	4770	1.08	239.81
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003659186-04	OBS	No	2.364331	132.209370	139.8	8.632	8.4	9.2	0.69	4770	0.79	239.80
003659186-05	OBS	No	8.582651	139.632626	1325.9	2.507	7.8	6.9	0.69	4770	2.74	42.98

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003659186-01	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV
003659186-02	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT— INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
003659186-04	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—SAME_NTL_PERIOD
003659186-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—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.

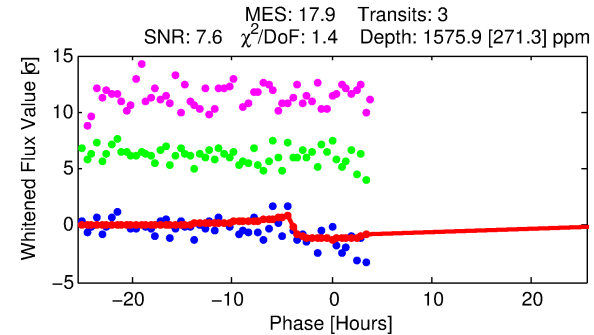
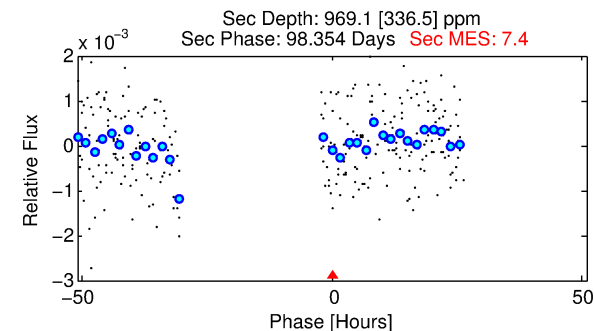
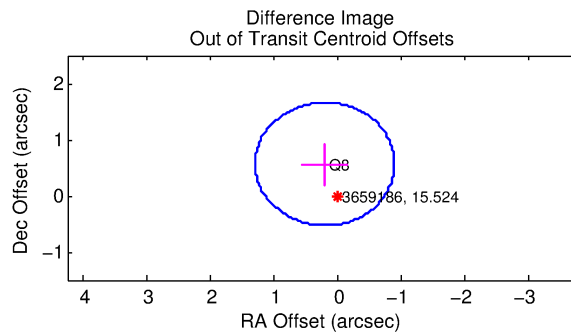
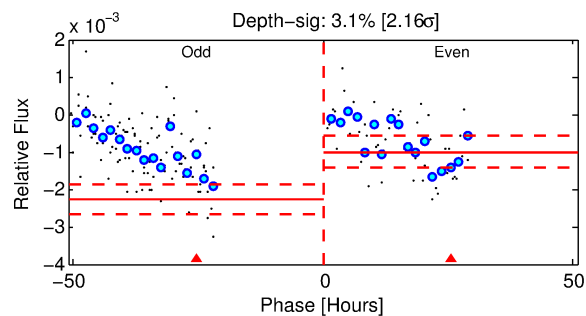
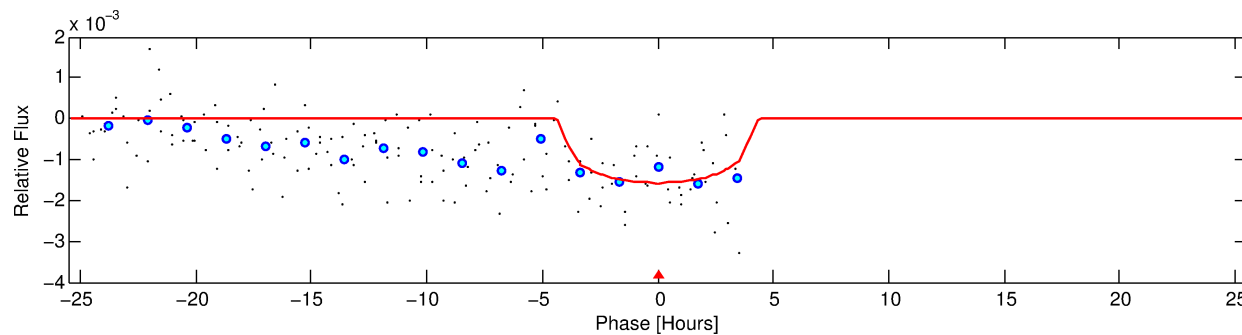
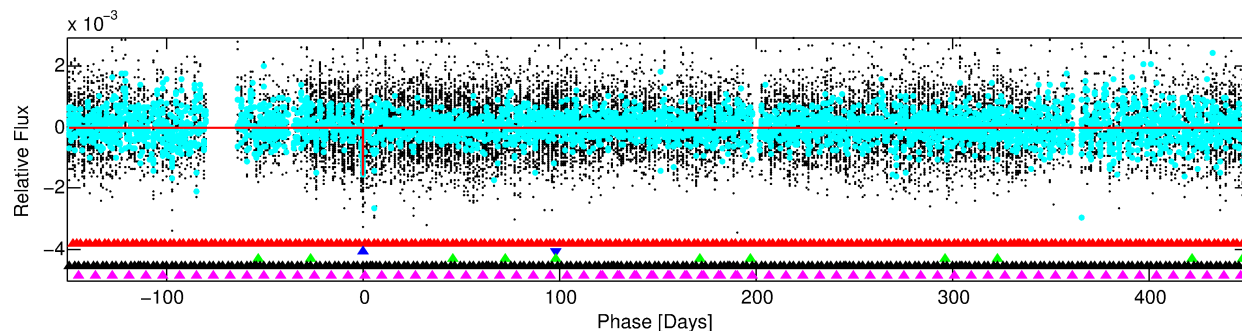
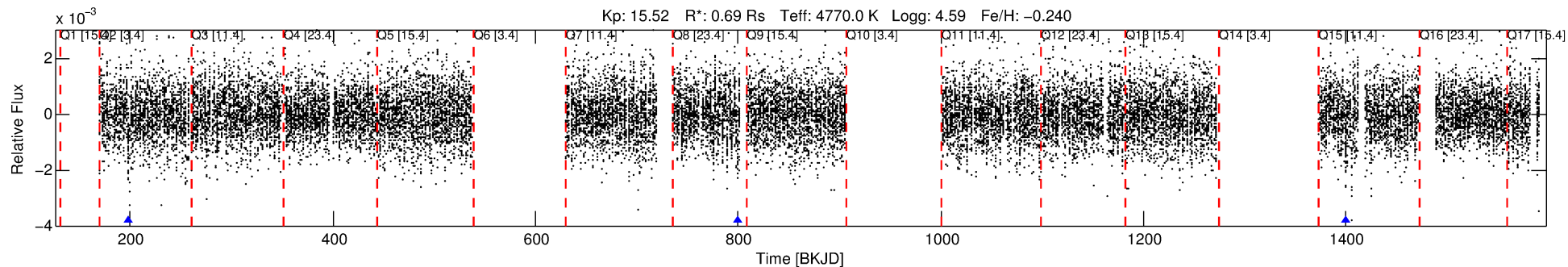
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 003659186-02

No Significant Match Found

# DV One-Page Summary

KIC: 3659186 Candidate: 2 of 5 Period: 600.522 d



## DV Fit Results:

Period = 600.52183 [0.01428] d  
Epoch = 198.8616 [0.0329] BKJD  
Rp/R\* = 0.0376 [0.0360]  
a/R\* = 451.07 [1395.37]  
b = 0.61 [3.27]  
Seff = 0.15 [0.03]  
Teq = 158 [8] K  
Rp = 2.85 [2.74] Re  
a = 1.2224 [0.0968] AU  
Ag = 98340.08 [191748.70] [0.51 $\sigma$ ]  
Teff = 4338 [2120] K [1.97 $\sigma$ ]

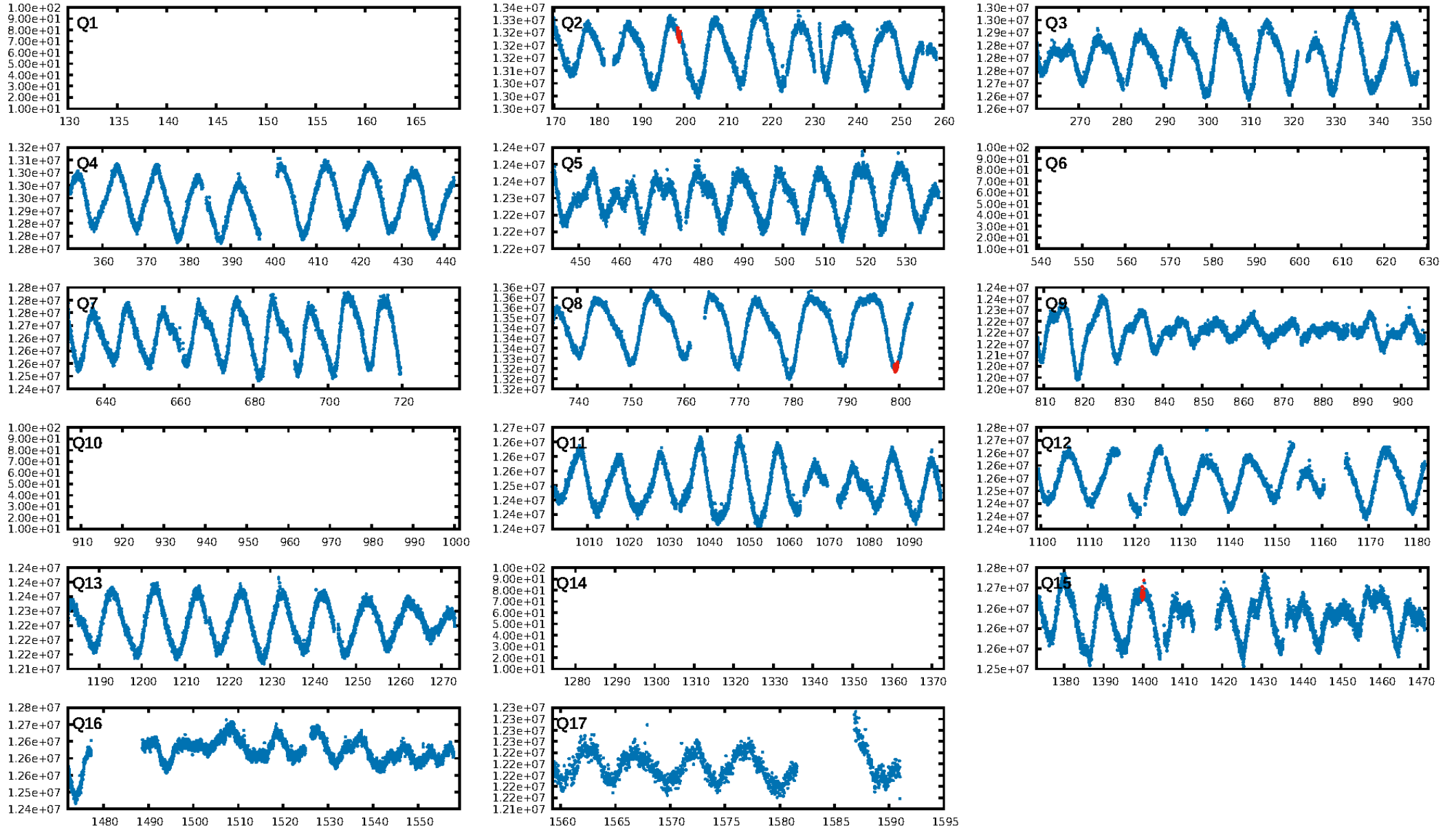
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [1199.79 $\sigma$ ]  
LongPeriod-sig: N/A  
**ModelChiSquare2-sig: 0.0%**  
ModelChiSquareGof-sig: 69.6%  
Bootstrap-pfa: 1.04e-98  
RollingBand-fgt: 1.00 [3/3]  
**GhostDiagnostic-chr: 0.1385**  
Centroid-sig: 15.0%  
Centroid-so: 1.918 arcsec [1.35 $\sigma$ ]  
OotOffset-rm: 0.601 arcsec [1.64 $\sigma$ ]  
KicOffset-rm: 0.637 arcsec [1.73 $\sigma$ ]  
OotOffset-st: 0/0/1/0 [1]  
KicOffset-st: 0/0/1/0 [1]  
DiffImageQuality-fgm: 1.00 [1/1]  
DiffImageOverlap-fno: 0.00 [0/3]

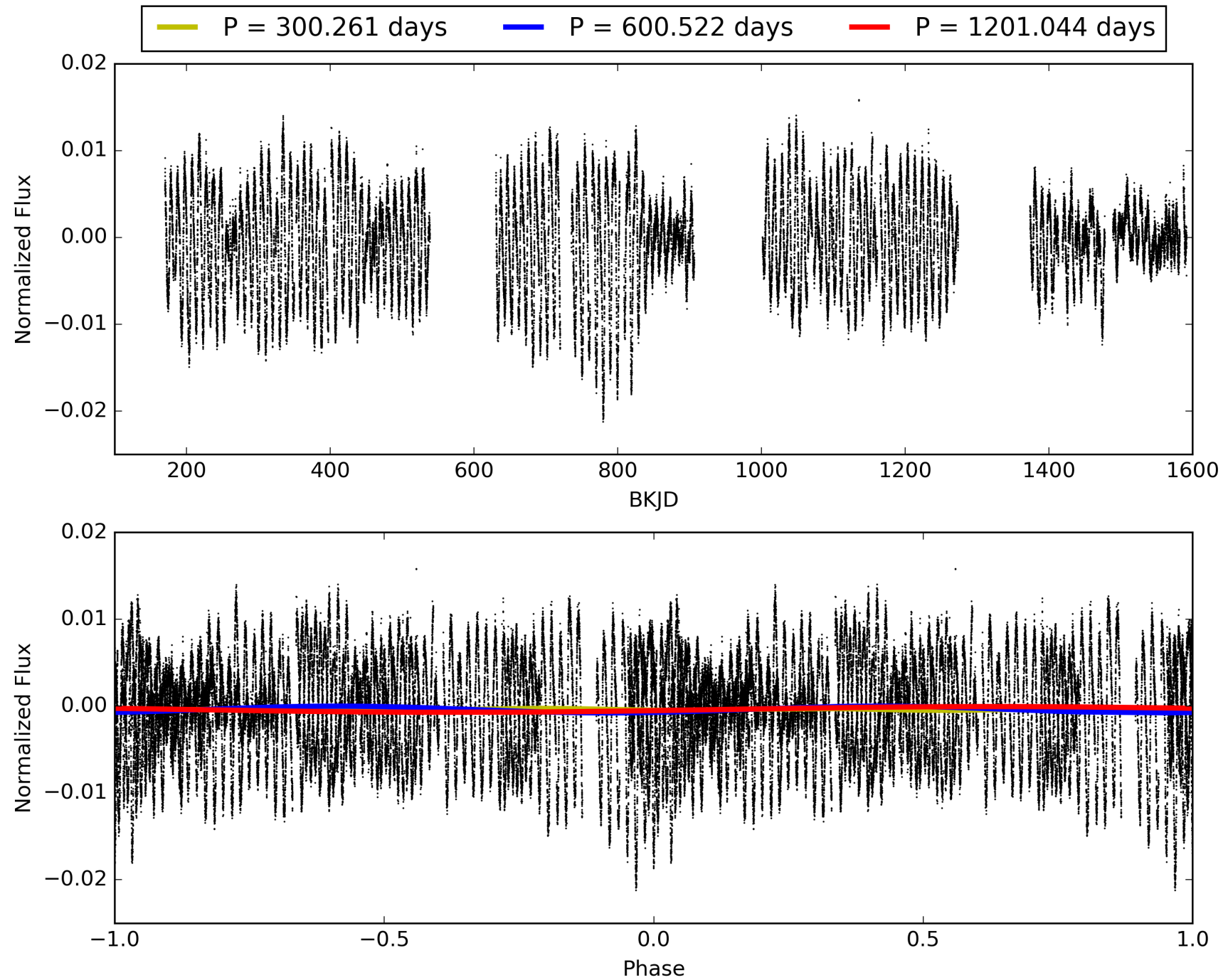
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 06:46:48 Z

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

# TCE 003659186-02, PDC Light Curves

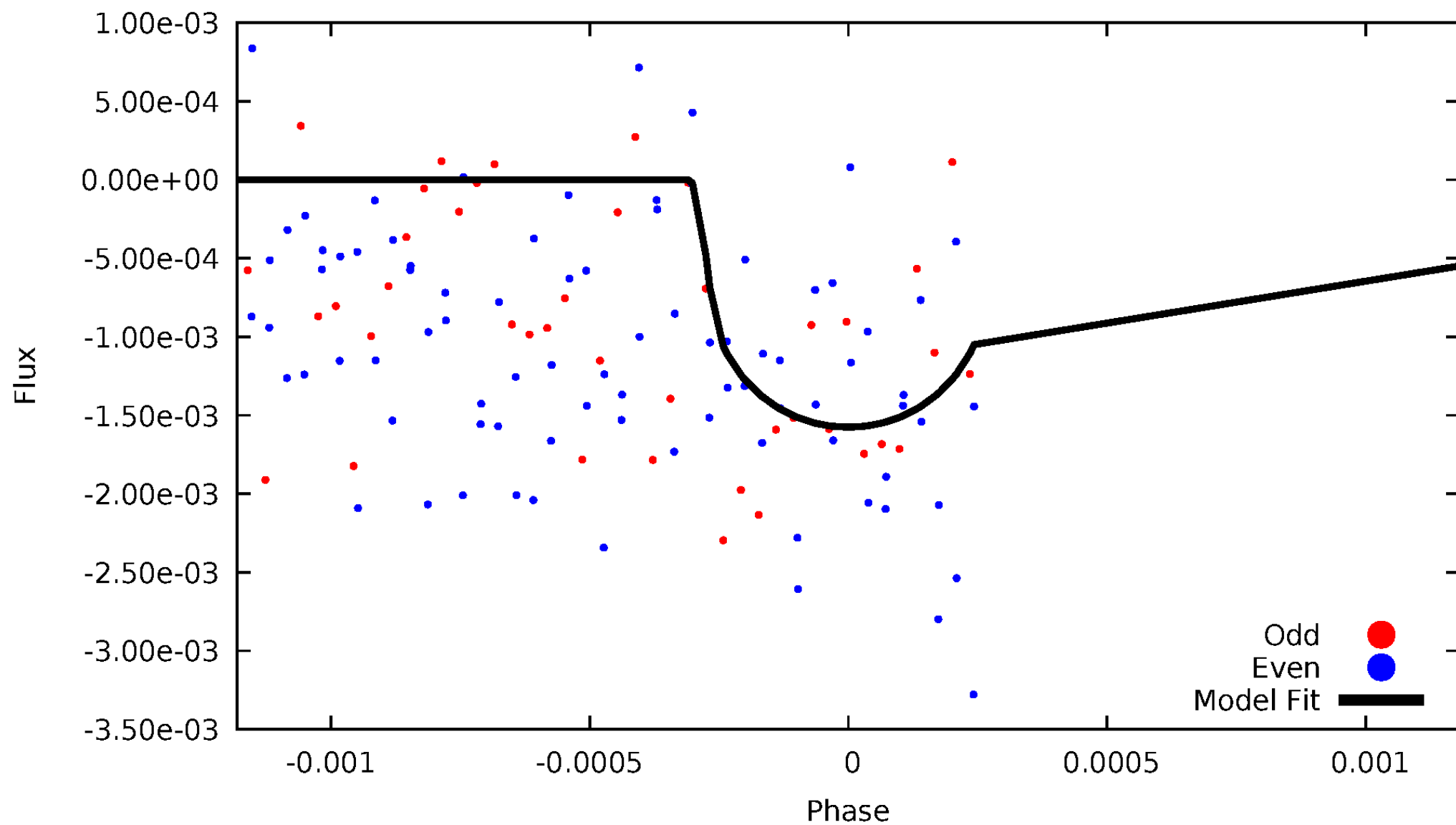


TCE 003659186-02



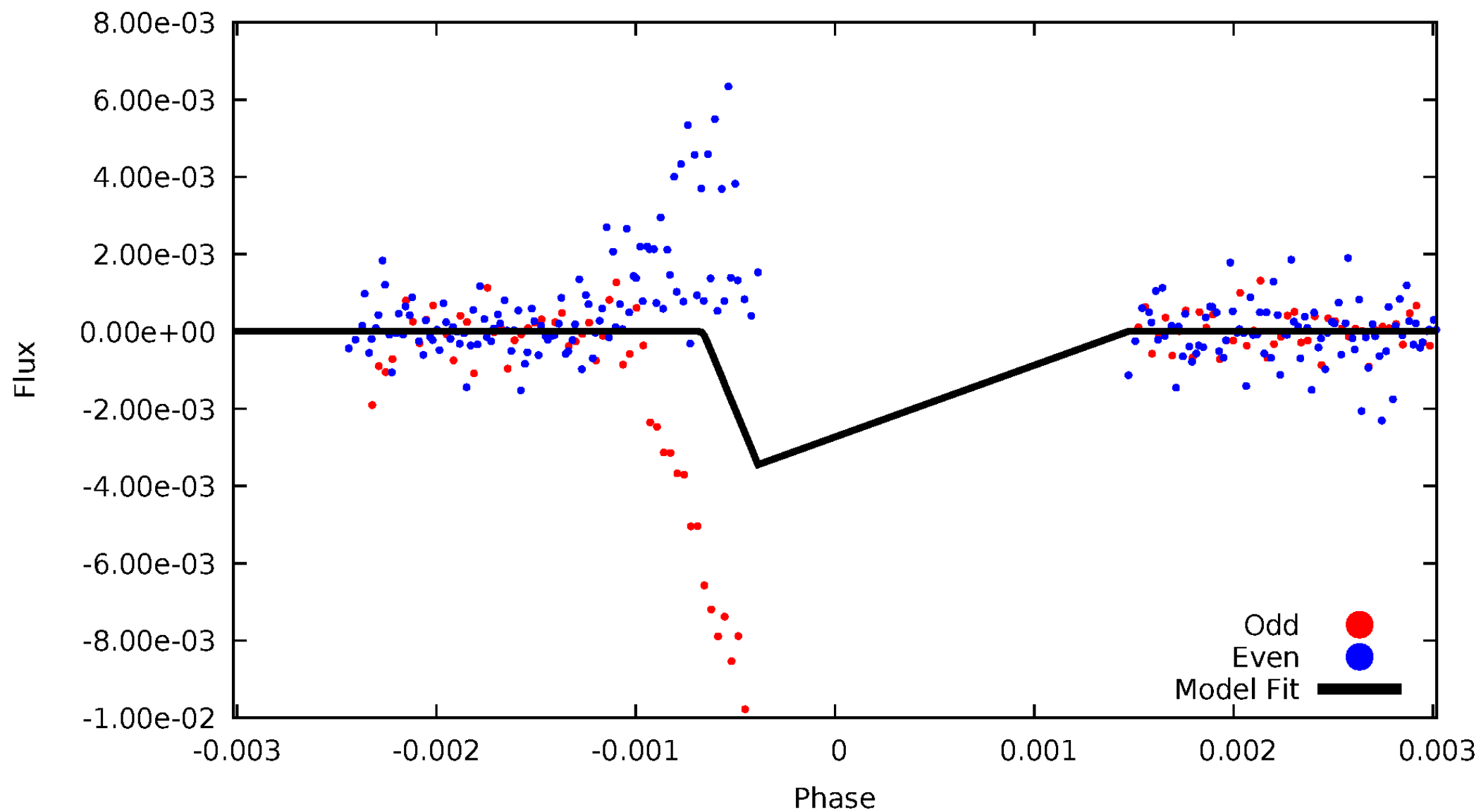
# DV Odd/Even

TCE 003659186-02



# ALT Odd/Even

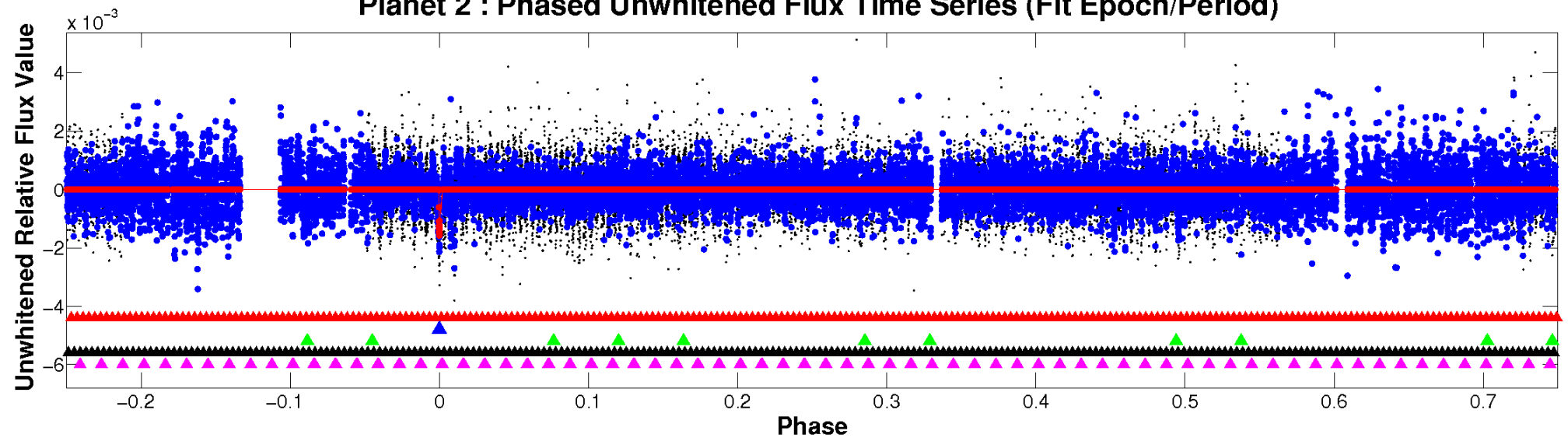
TCE 003659186-02



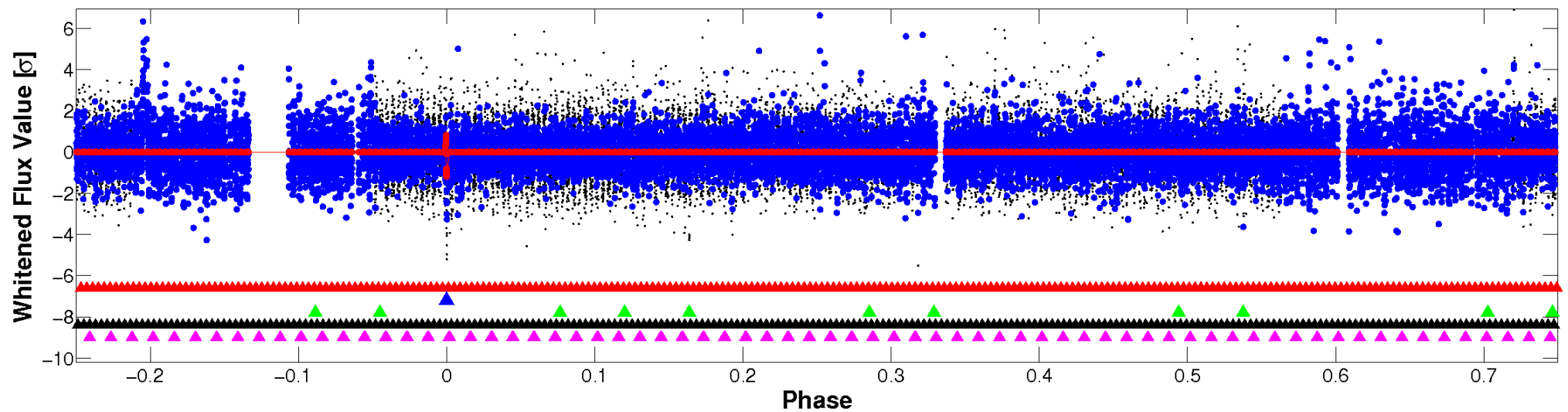


# Non-Whitened Vs. Whitened Light Curve

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

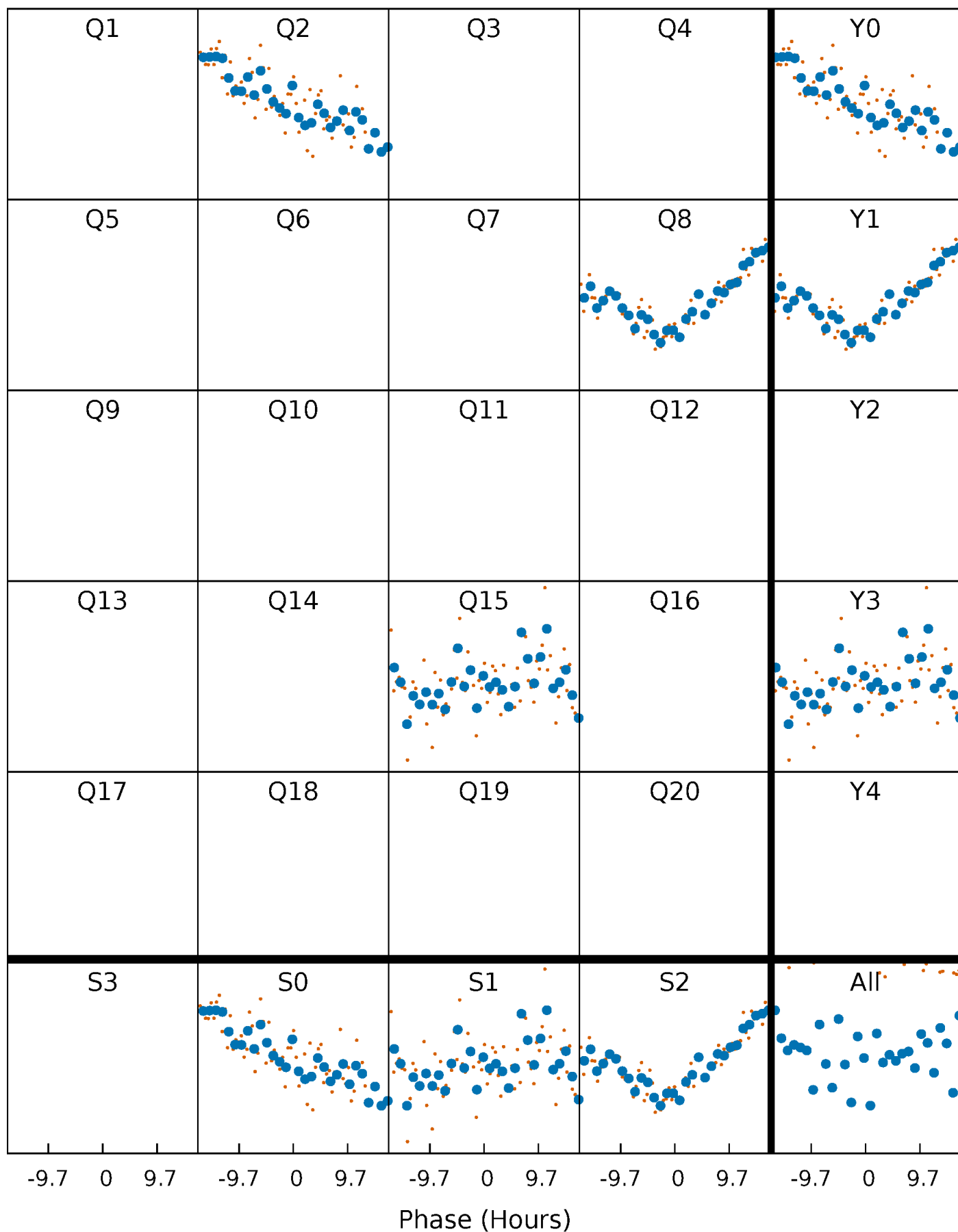


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



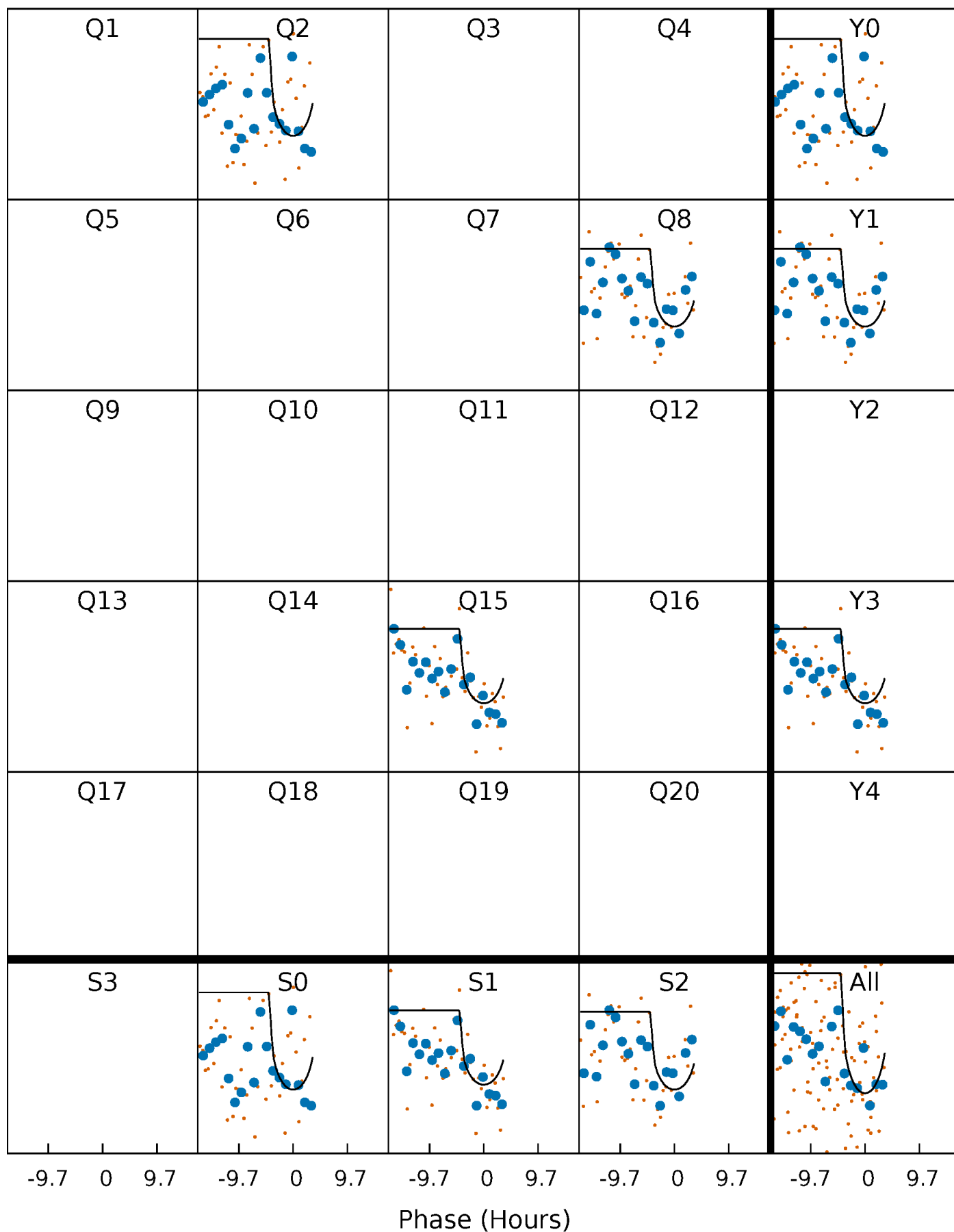
# PDC Quarter-Phased Transit Curves

TCE 003659186-02 P=600.521832 Days  $T_0=198.861593$  (BKJD)



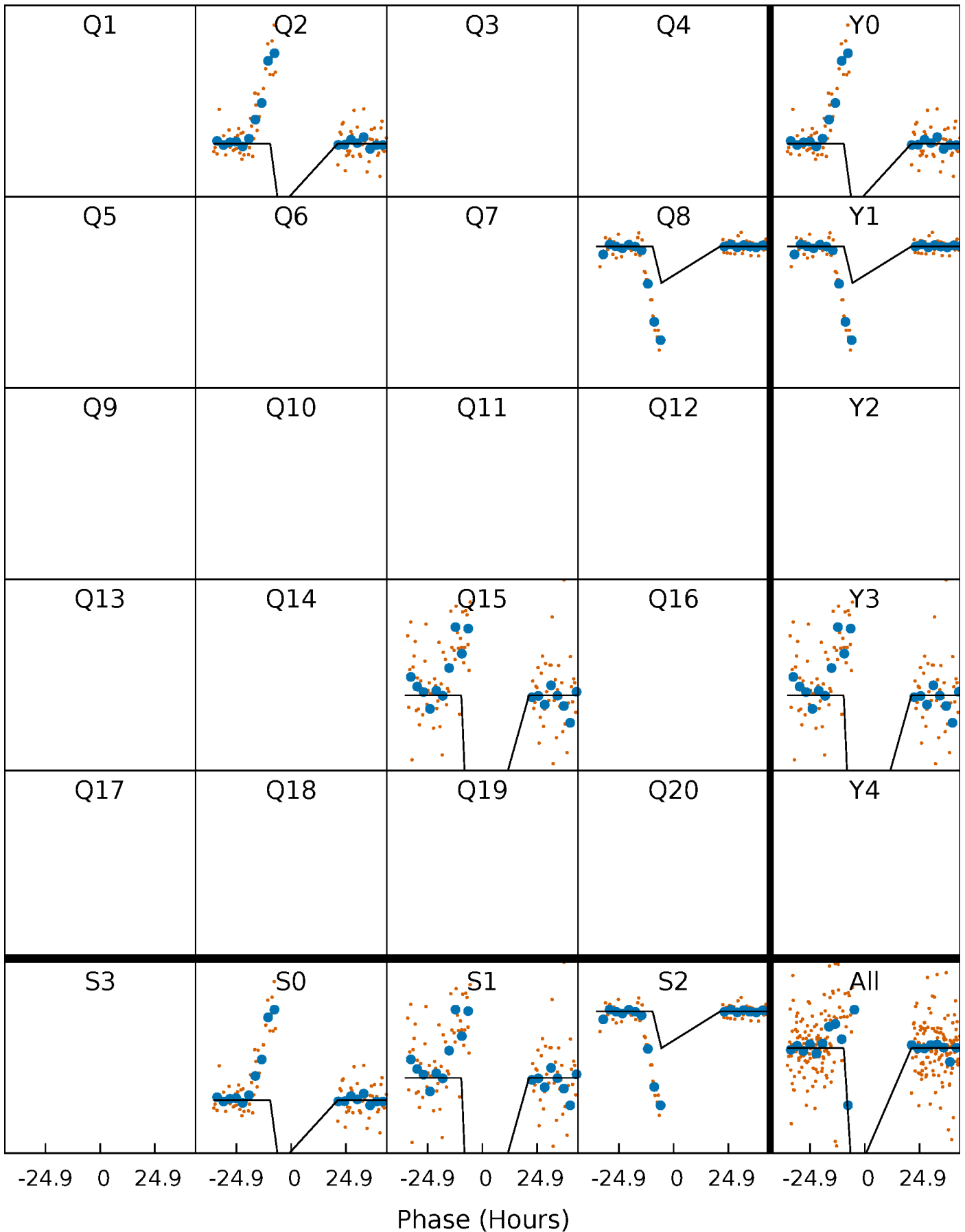
# DV Quarter-Phased Transit Curves

TCE 003659186-02 P=600.521832 Days  $T_0=198.861593$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

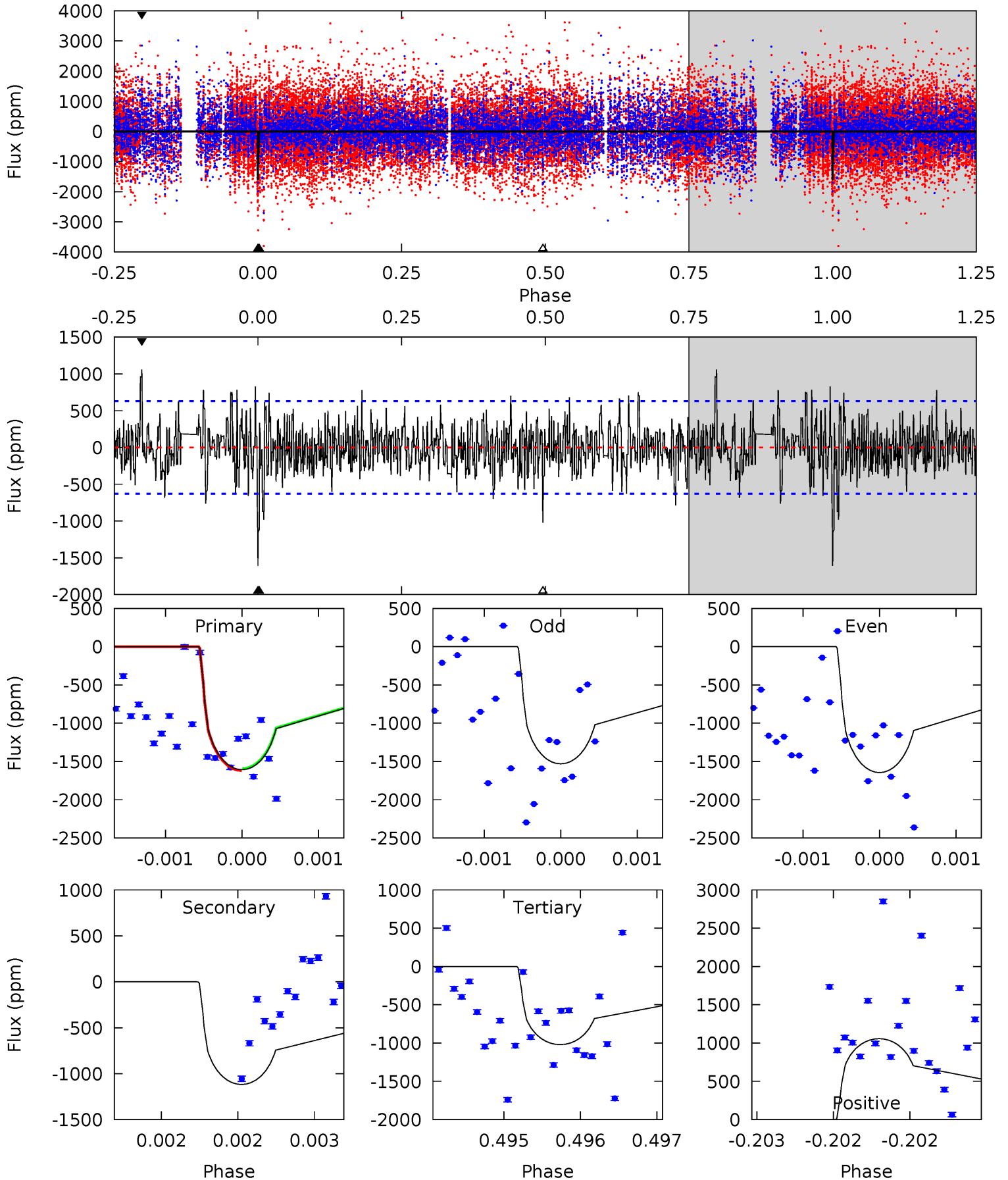
TCE 003659186-02     $P=600.487839$  Days     $T_0=199.307383$  (BKJD)



# DV Model-Shift Uniqueness Test

003659186-02, P = 600.521832 Days, E = 198.861593 Days

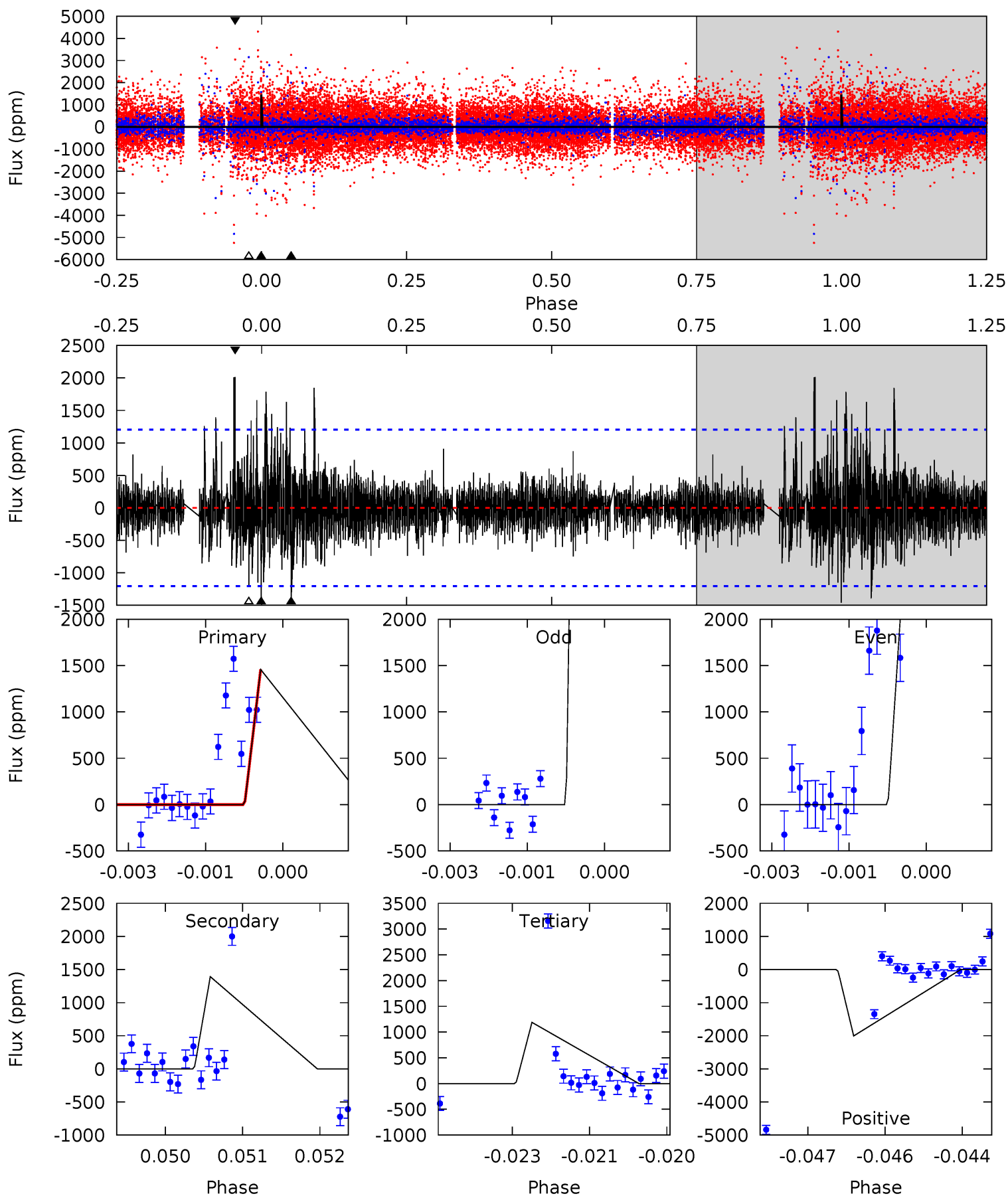
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
14.2	9.86	9.00	9.32	5.56	3.46	2.22	5.17	4.85	0.86	0.53	0.47	1.05	0.40	0.10



# Alt Model-Shift Uniqueness Test

003659186-02, P = 600.487839 Days, E = 199.307383 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.53	6.24	5.32	8.99	5.40	3.21	0.93	1.21	-2.46	0.92	-2.75	28.4	0	0.58	0



### Stellar Parameters For KIC 003659186

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4770^{+217}_{-195}$	$4.586^{+0.060}_{-0.035}$	$-0.240^{+0.300}_{-0.300}$	$0.693^{+0.060}_{-0.067}$	$0.676^{+0.088}_{-0.051}$	$2.855^{+0.756}_{-0.414}$
	+5%/-4%	+1%/-1%	+125%/-125%	+9%/-10%	+13%/-8%	+26%/-15%
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 003659186-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-1117 \pm 113$	$3.39^{+2.47}_{-2.20}$	$221^{+11}_{-10}$	$4250^{+2533}_{-748}$	$80048^{+555141}_{-53148}$
Alt.	$-1393 \pm 223$	$4.84^{+2.57}_{-2.64}$	$221^{+10}_{-10}$	$3909^{+1445}_{-555}$	$48991^{+206593}_{-28692}$

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



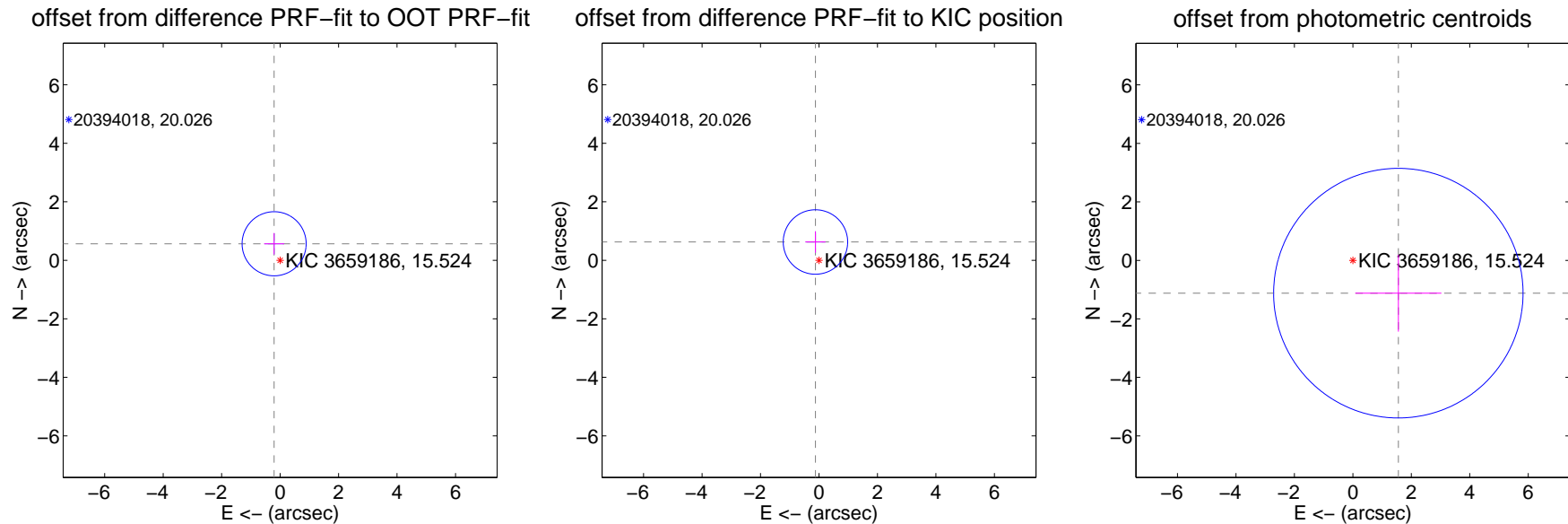
## DV Centroid Data

Supplemental centroid analysis for 003659186-02. Kepler magnitude: 15.52. Transit SNR 7.55

There are 1 quarters with good PRF difference image offsets

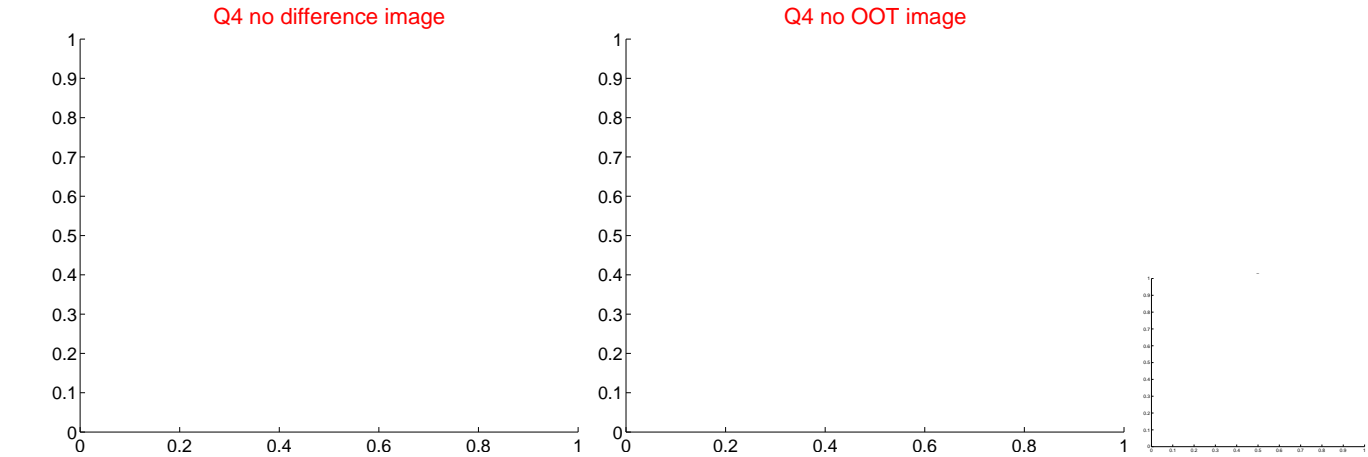
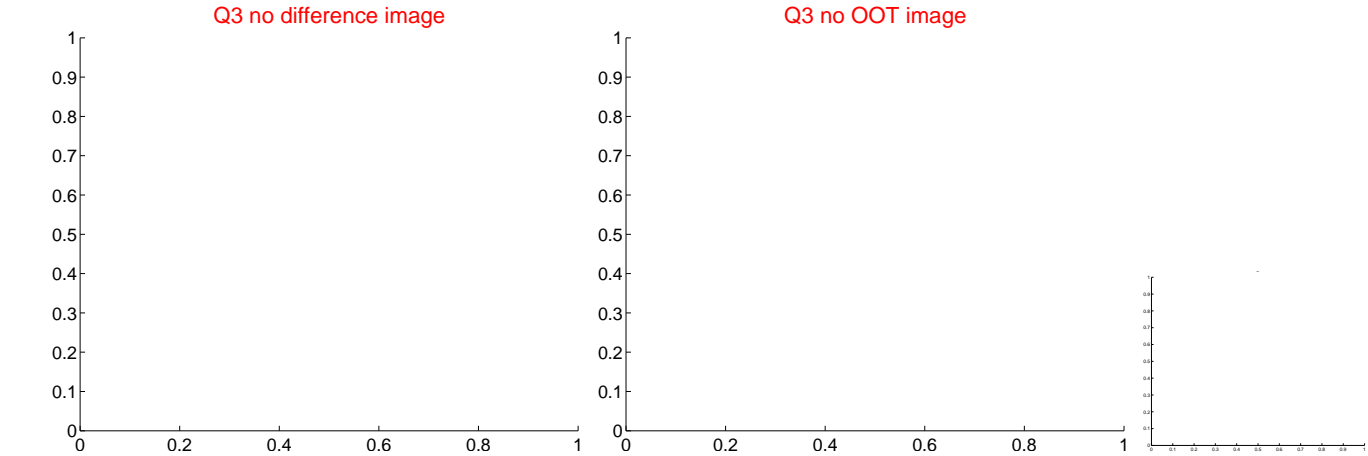
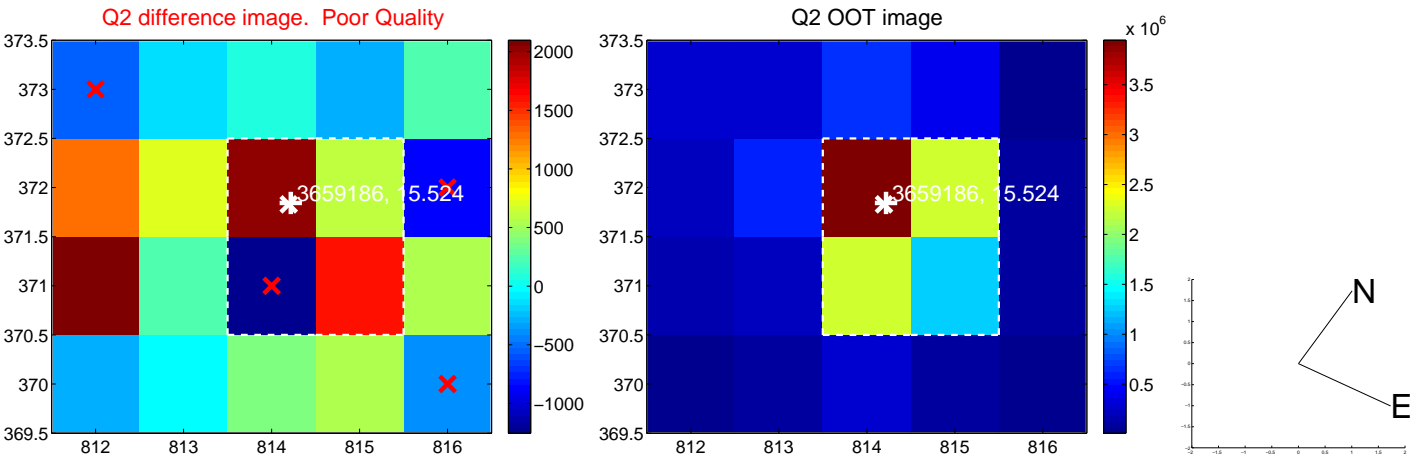
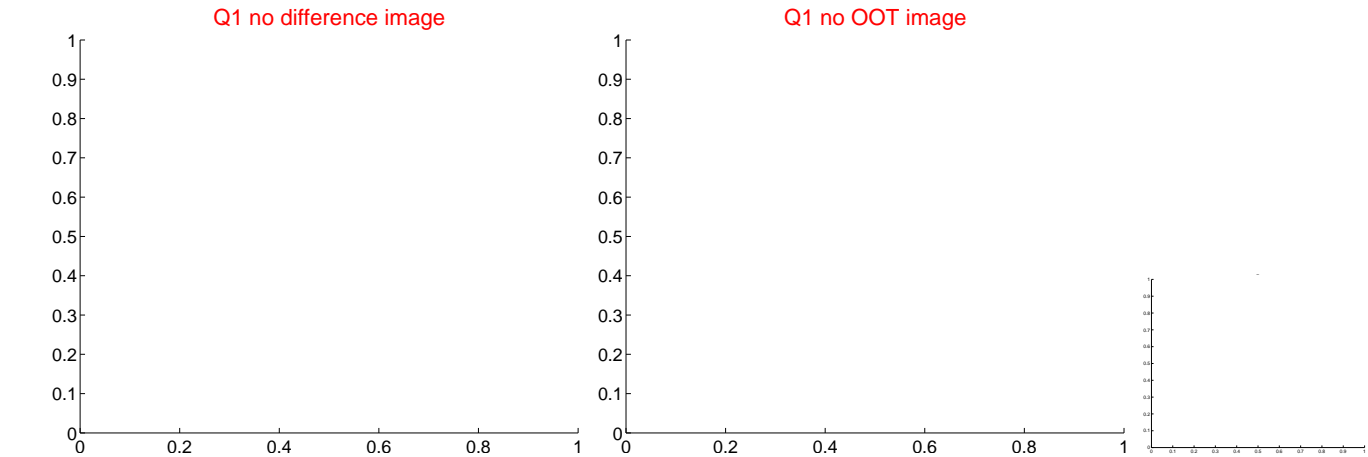
The direct PRF centroid is offset from the target star catalog position by about 0.10 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.601 \pm 0.365$	1.64	$0.204 \pm 0.343$	$0.565 \pm 0.368$
PRF-fit source offset from KIC position	$0.637 \pm 0.367$	1.73	$0.121 \pm 0.343$	$0.625 \pm 0.368$
photometric centroid source offset	$1.92 \pm 1.42$	1.35	$-1.56 \pm 1.48$	$-1.12 \pm 1.31$



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

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



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

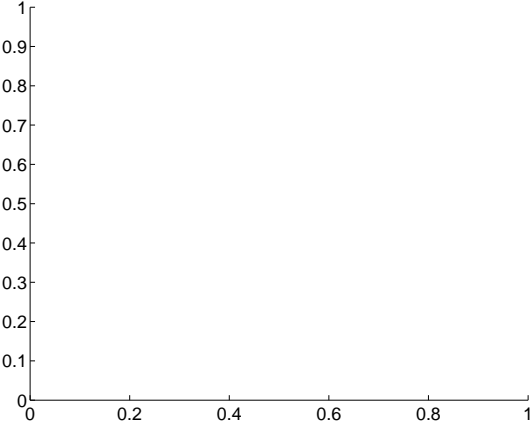
Q5 no difference image



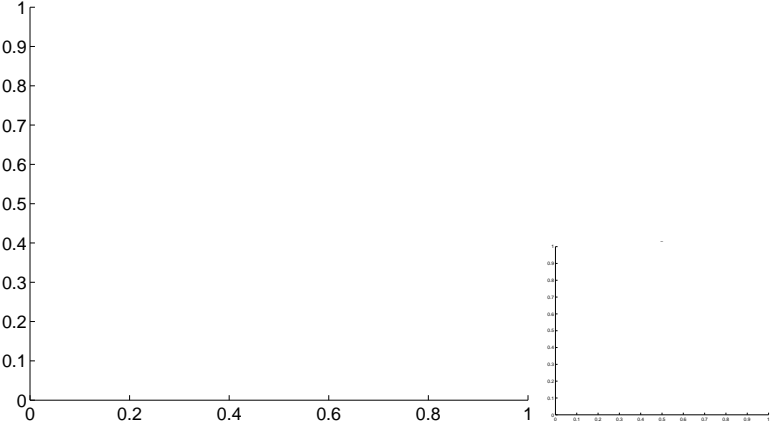
Q5 no OOT image



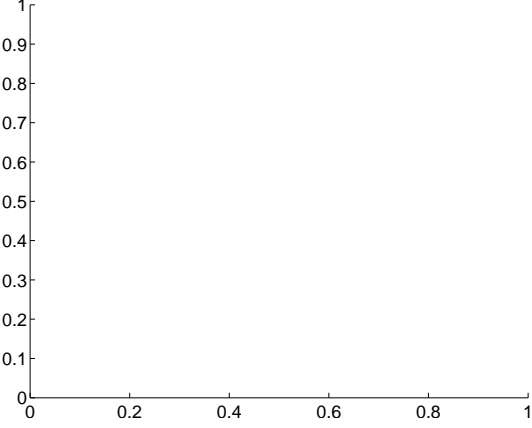
Q6 no difference image



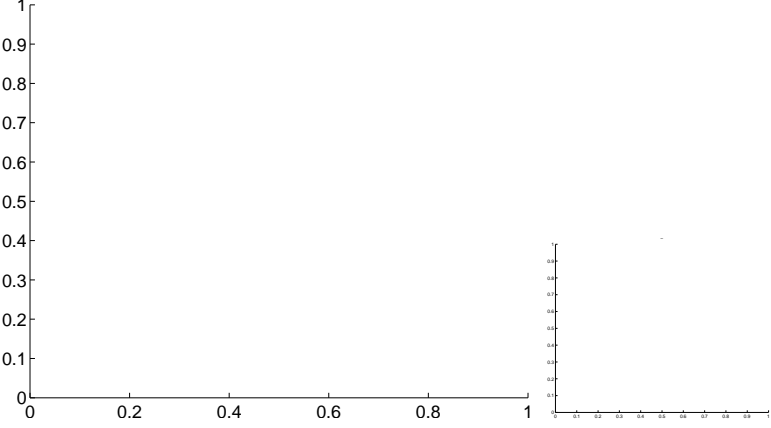
Q6 no OOT image



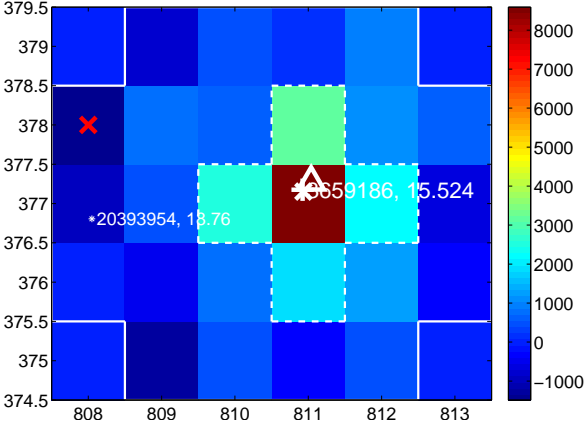
Q7 no difference image



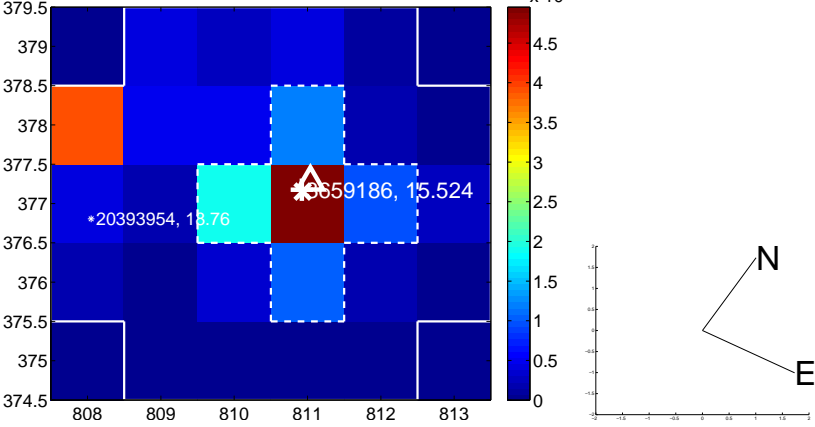
Q7 no OOT image



Q8 difference image



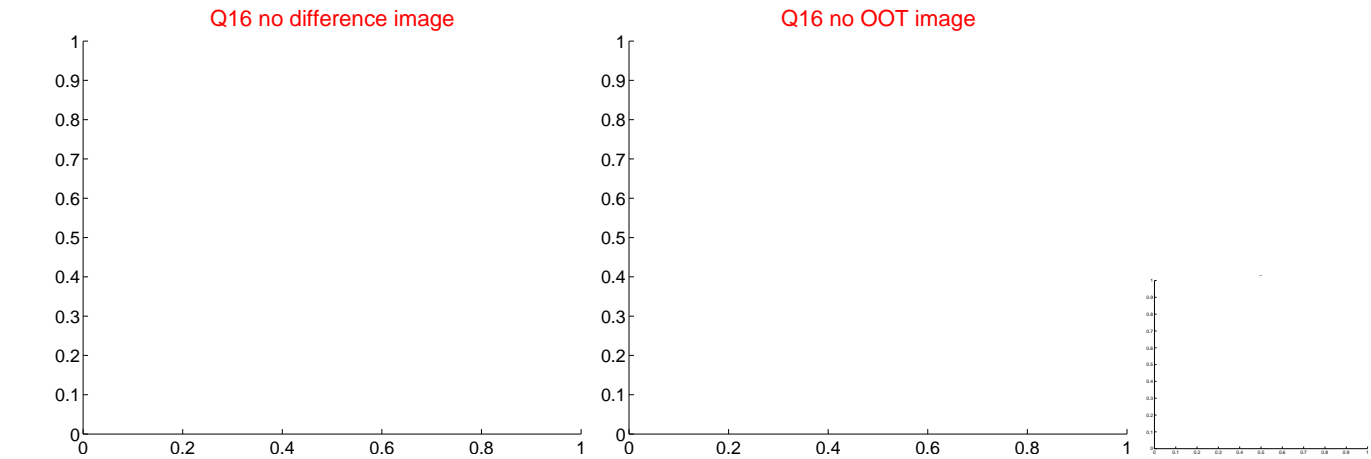
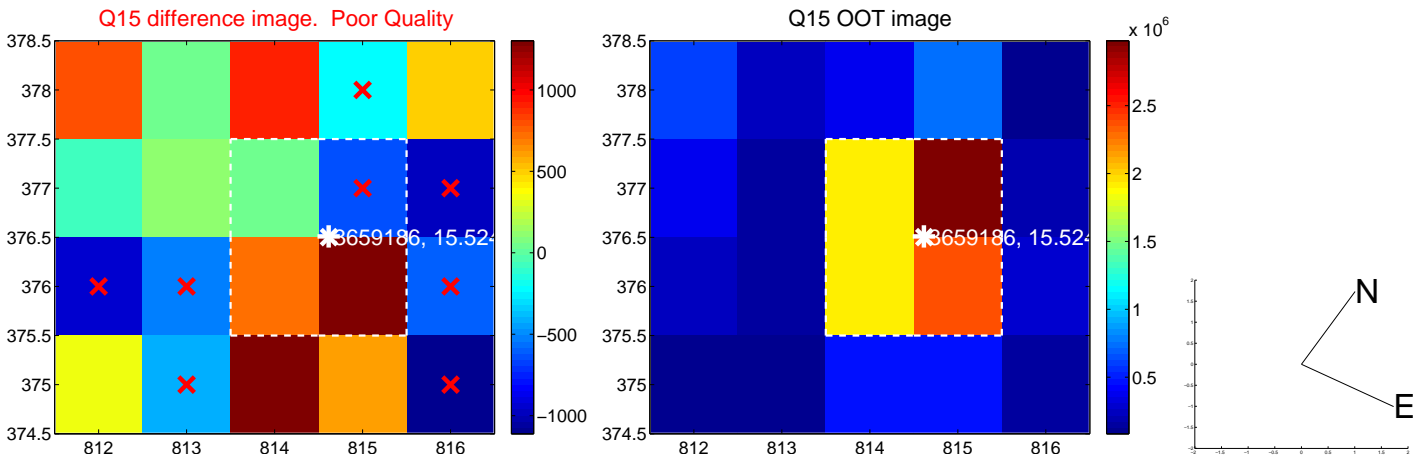
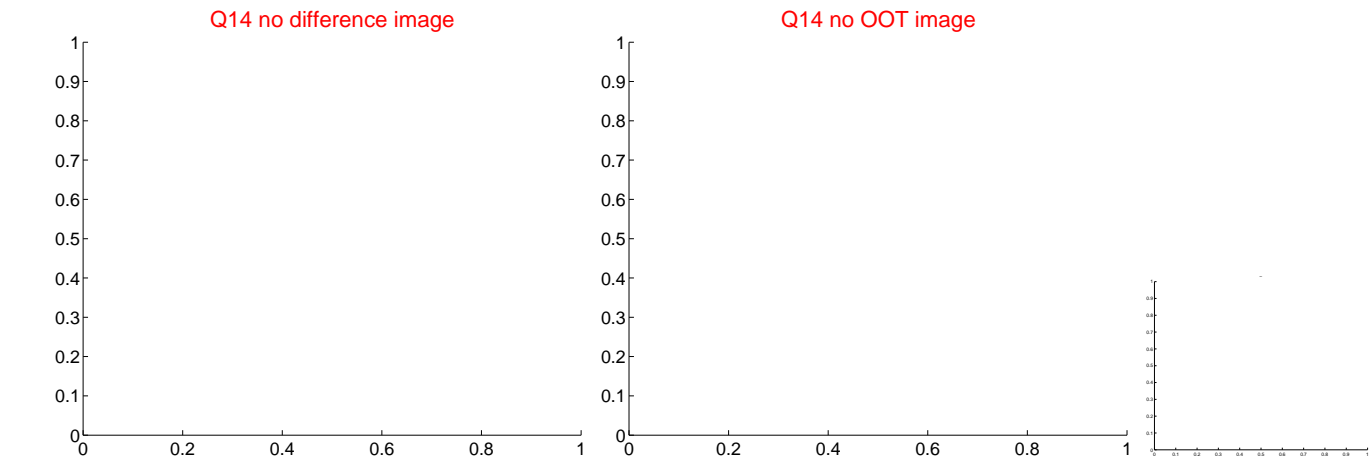
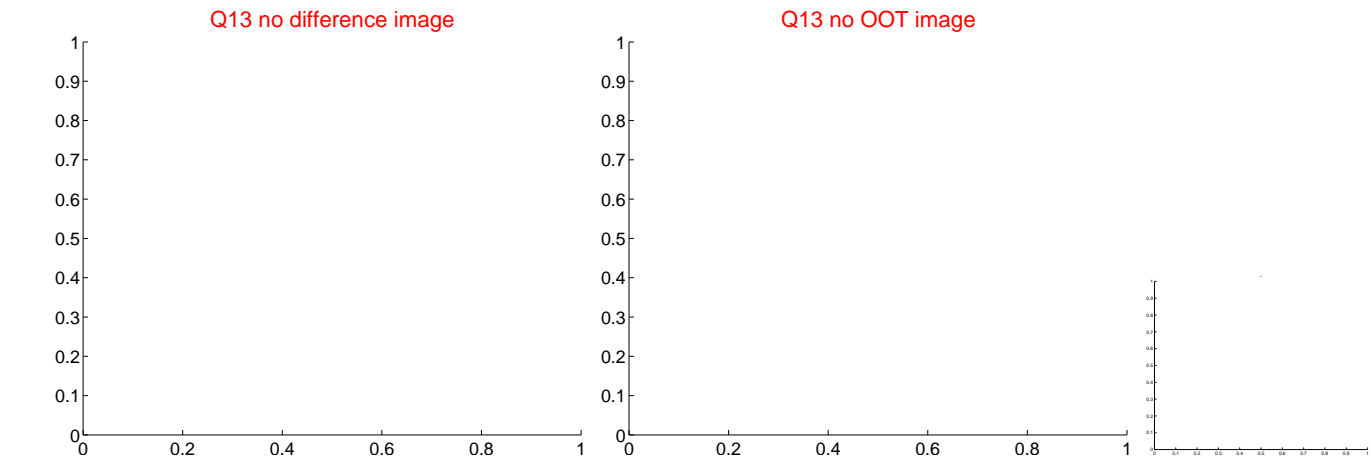
Q8 OOT image



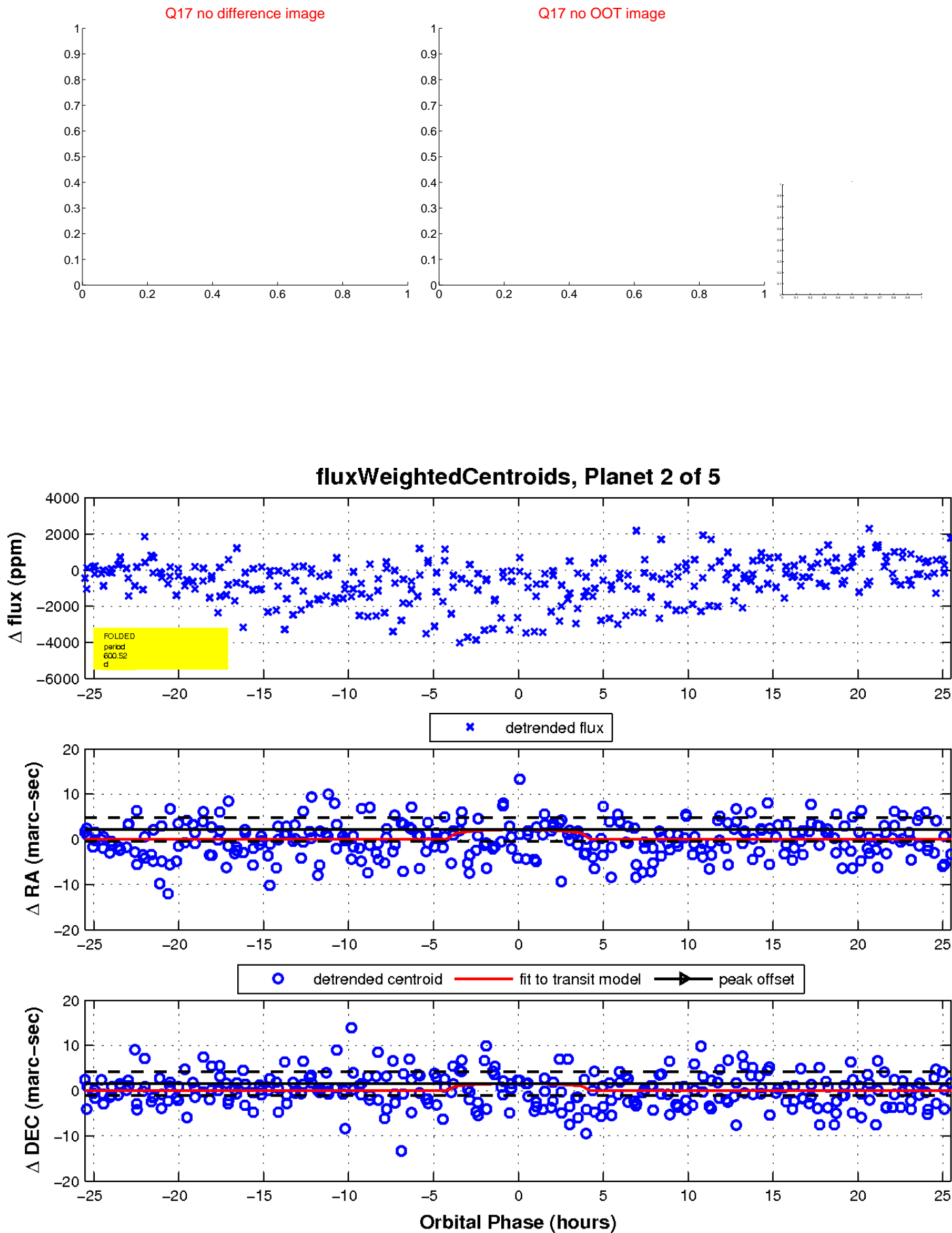
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.

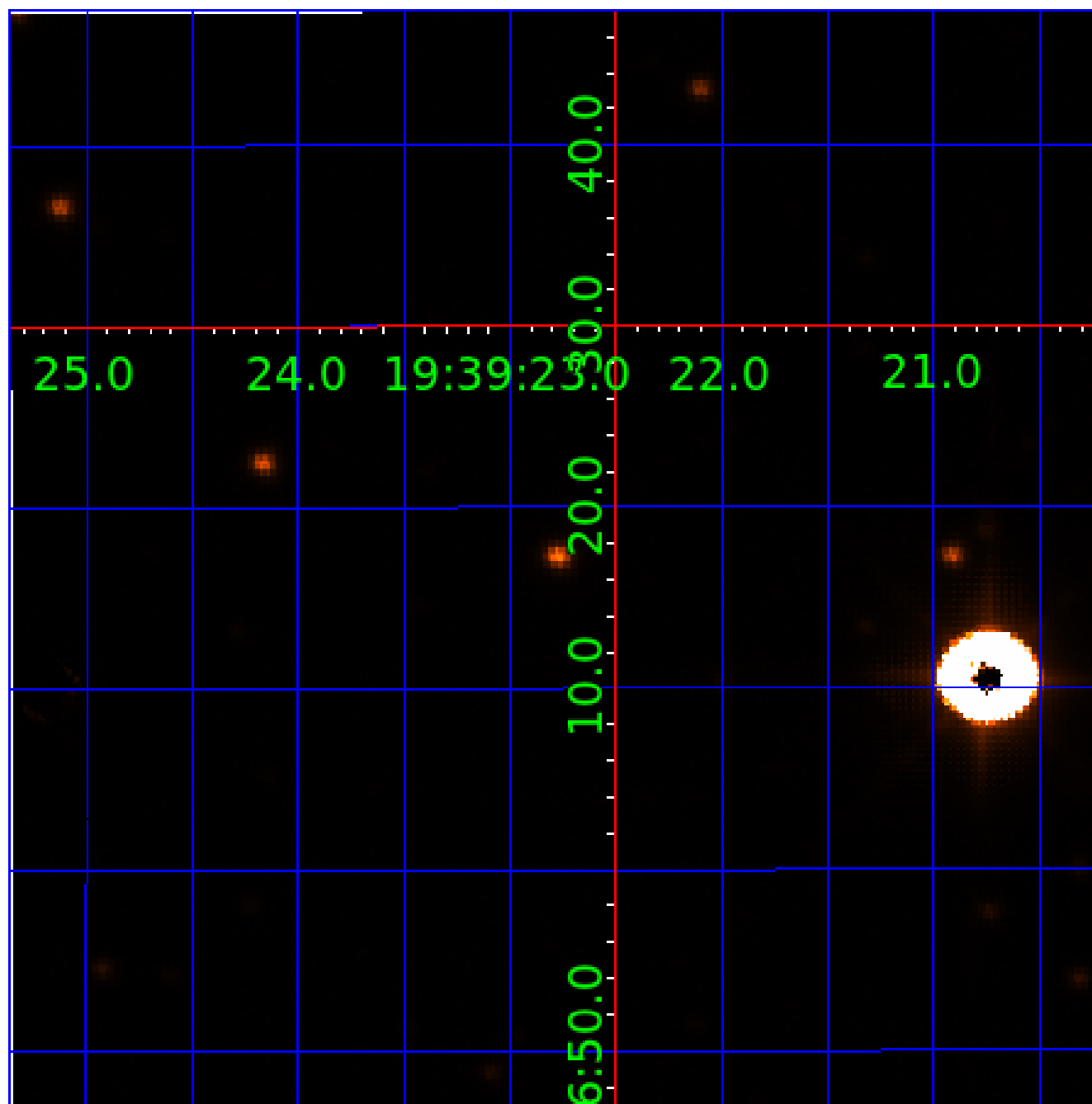


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 003659186

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
003659186-01	OBS	No	2.364245	133.404349	161.9	9.214	9.4	9.8	0.69	4770	1.08	239.81
003659186-02	OBS	No	600.521832	198.861593	1575.9	8.510	17.9	7.6	0.69	4770	2.85	0.15
003659186-04	OBS	No	2.364331	132.209370	139.8	8.632	8.4	9.2	0.69	4770	0.79	239.80
003659186-05	OBS	No	8.582651	139.632626	1325.9	2.507	7.8	6.9	0.69	4770	2.74	42.98

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003659186-01	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV
003659186-02	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
003659186-04	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—SAME_NTL_PERIOD
003659186-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—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.

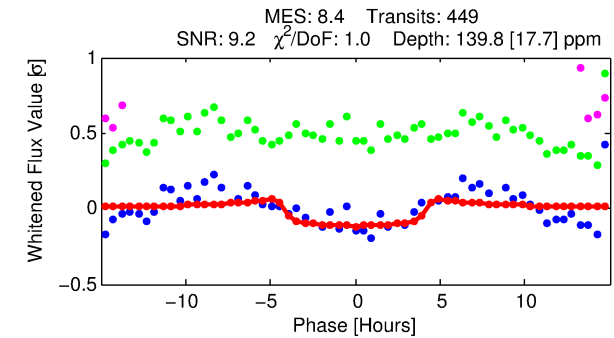
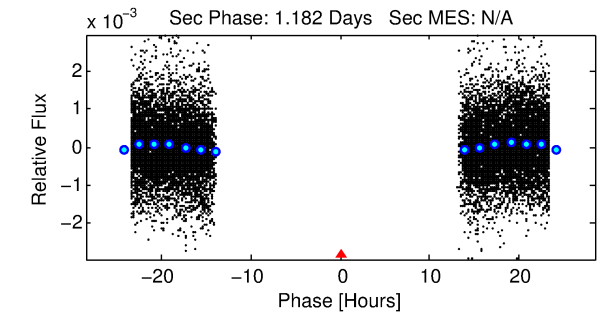
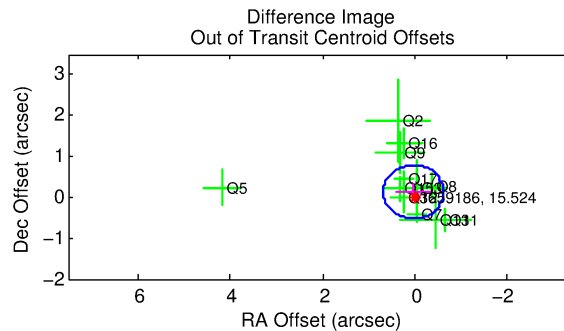
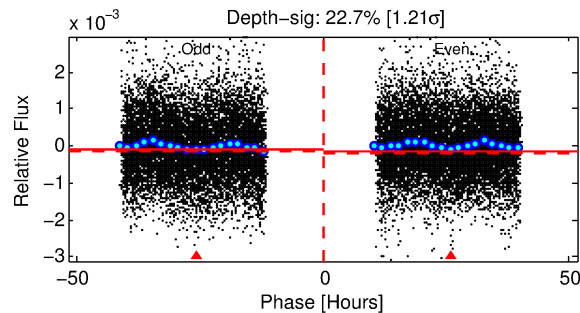
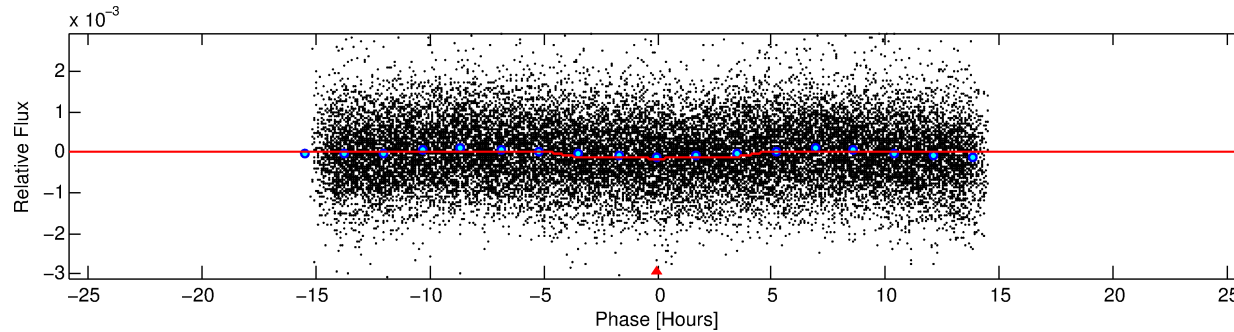
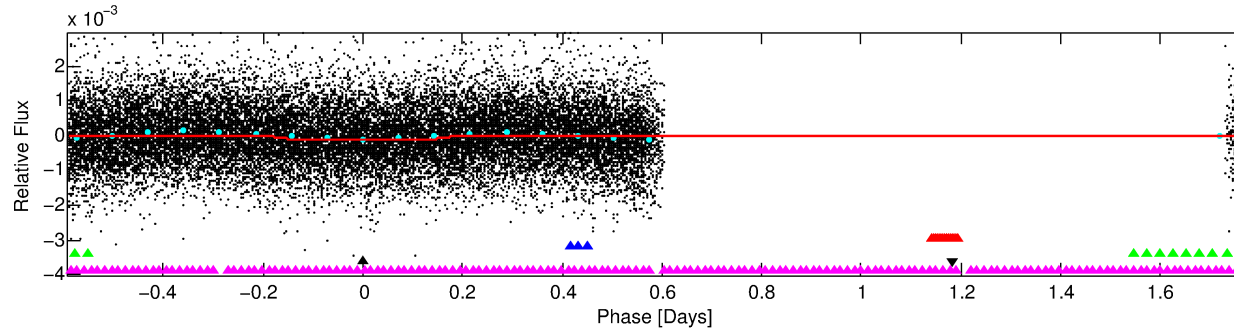
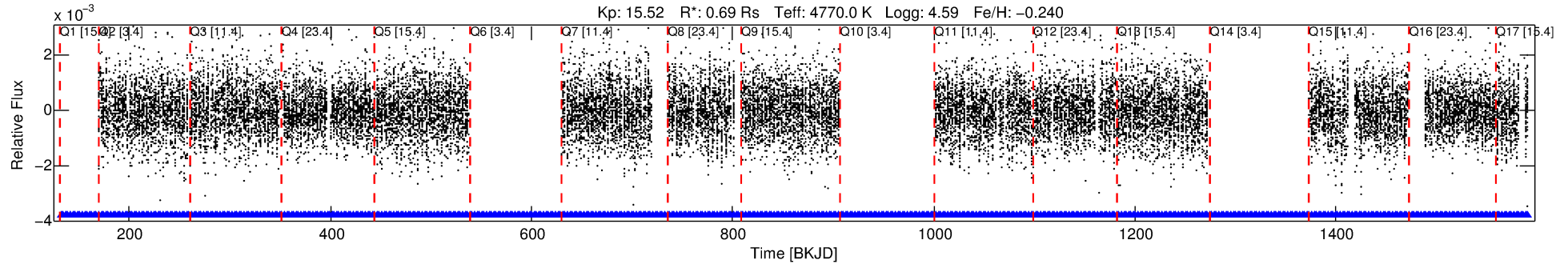
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 003659186-04

No Significant Match Found

# DV One-Page Summary

KIC: 3659186 Candidate: 4 of 5 Period: 2.364 d



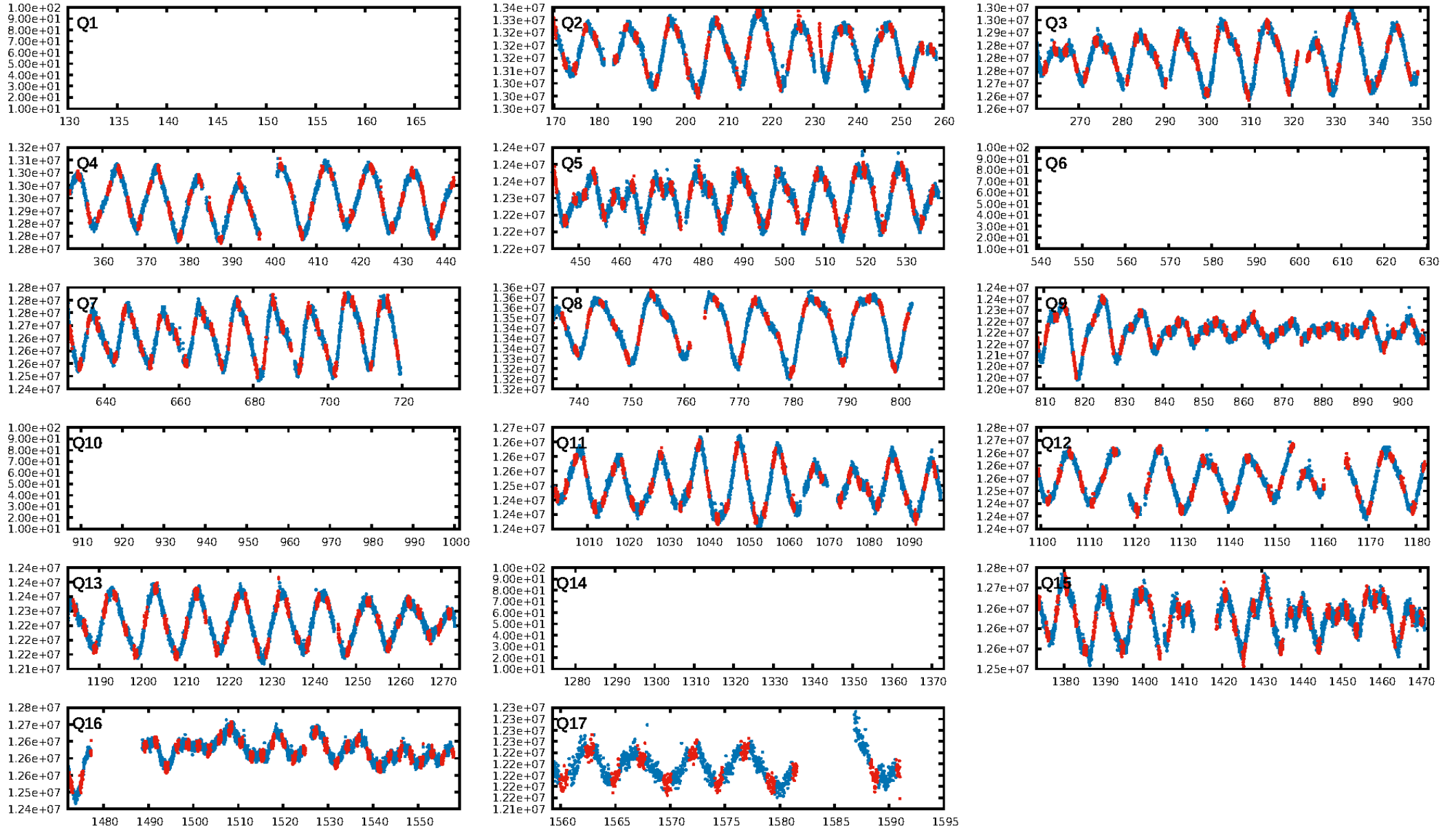
## DV Fit Results:

Period = 2.36433 [0.00003] d  
Epoch = 132.2094 [0.0082] BKJD  
Rp/R\* = 0.0104 [0.0117]  
a/R\* = 2.20 [6.34]  
b = 0.02 [176.08]  
Seff = 239.80 [51.29]  
Teq = 1003 [54] K  
Rp = 0.79 [0.89] Re  
a = 0.0305 [0.0024] AU

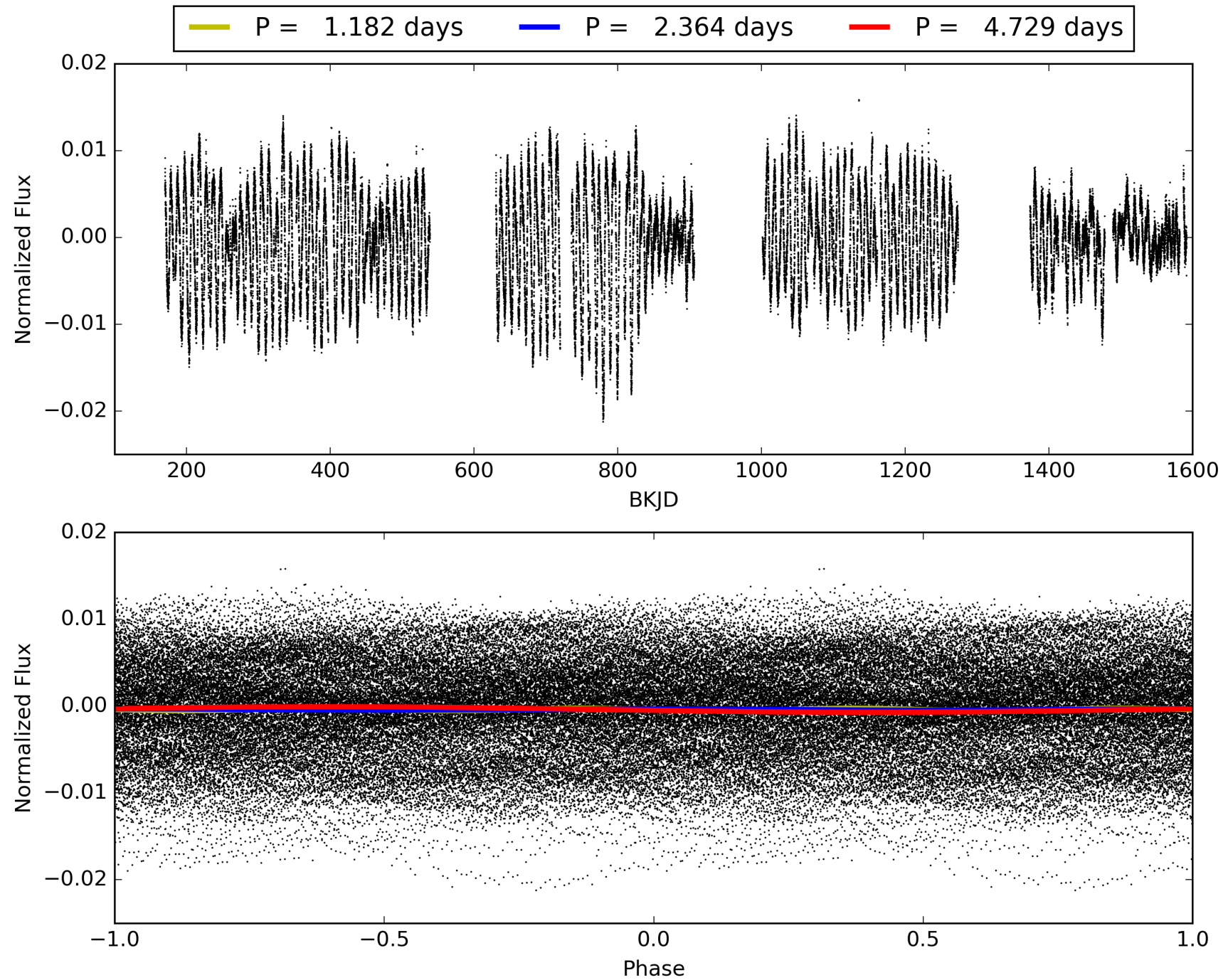
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00 $\sigma$ ]  
LongPeriod-sig: 100.0% [16.60 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 2.44e-49  
RollingBand-fgt: 1.00 [437/437]  
GhostDiagnostic-chr: 0.3879  
Centroid-sig: 13.2%  
Centroid-so: 1.353 arcsec [1.02 $\sigma$ ]  
OotOffset-rm: 0.137 arcsec [0.63 $\sigma$ ]  
KicOffset-rm: 0.173 arcsec [0.78 $\sigma$ ]  
OotOffset-st: 1/4/3/4 [12]  
KicOffset-st: 1/4/3/4 [12]  
DiffImageQuality-fgm: 0.58 [7/12]  
DiffImageOverlap-fno: 1.00 [13/13]

# TCE 003659186-04, PDC Light Curves

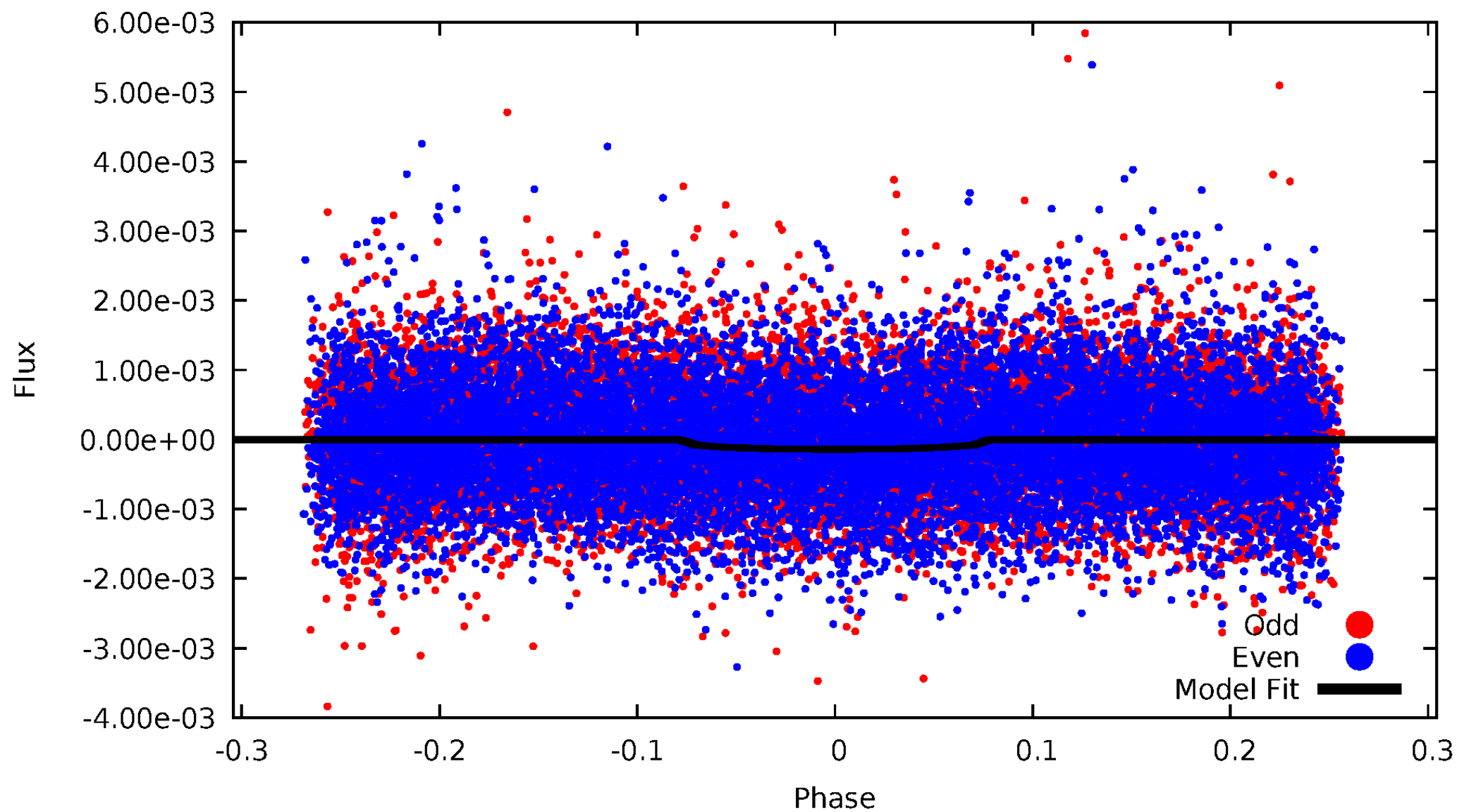


TCE 003659186-04



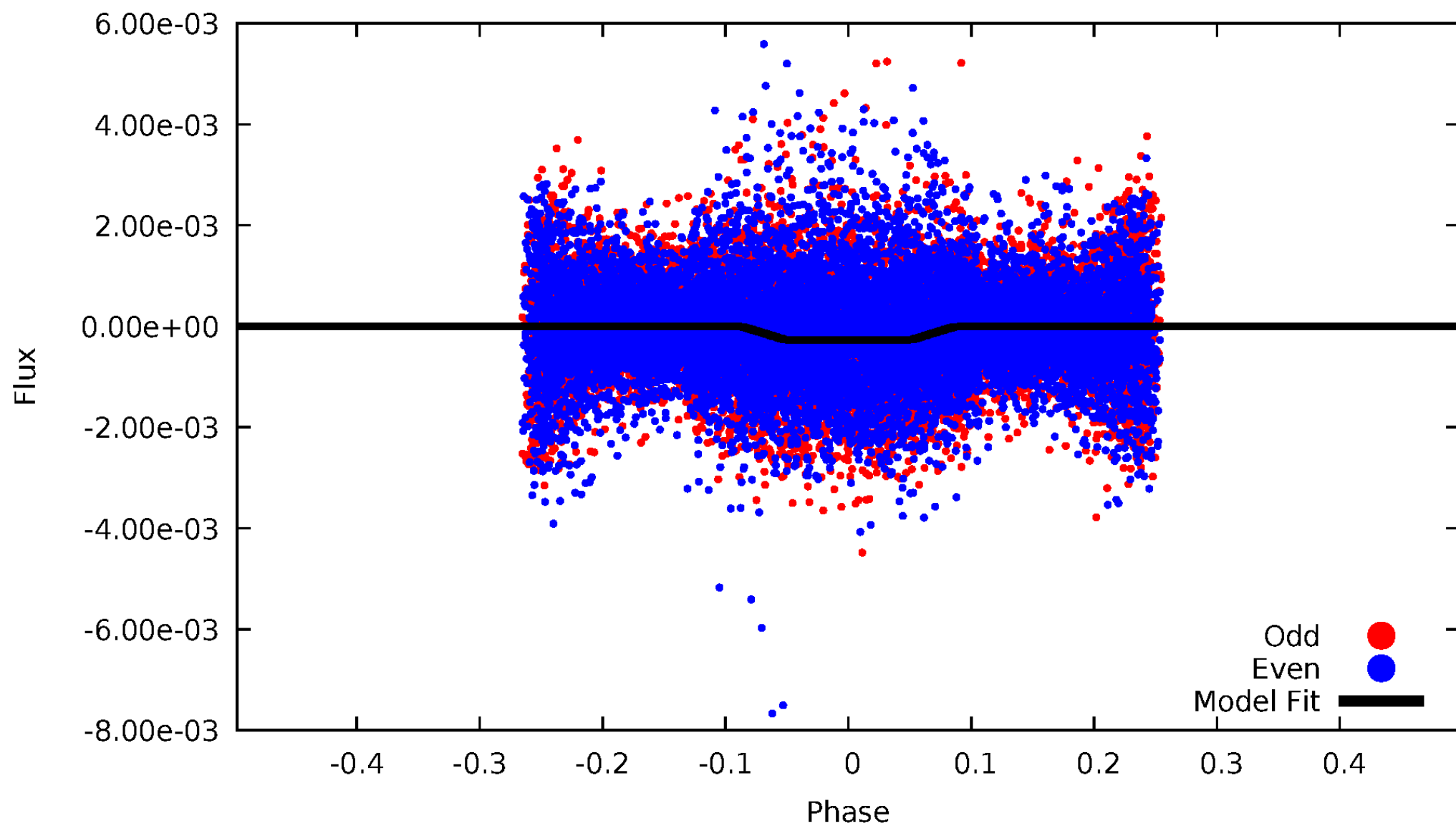
# DV Odd/Even

TCE 003659186-04



# ALT Odd/Even

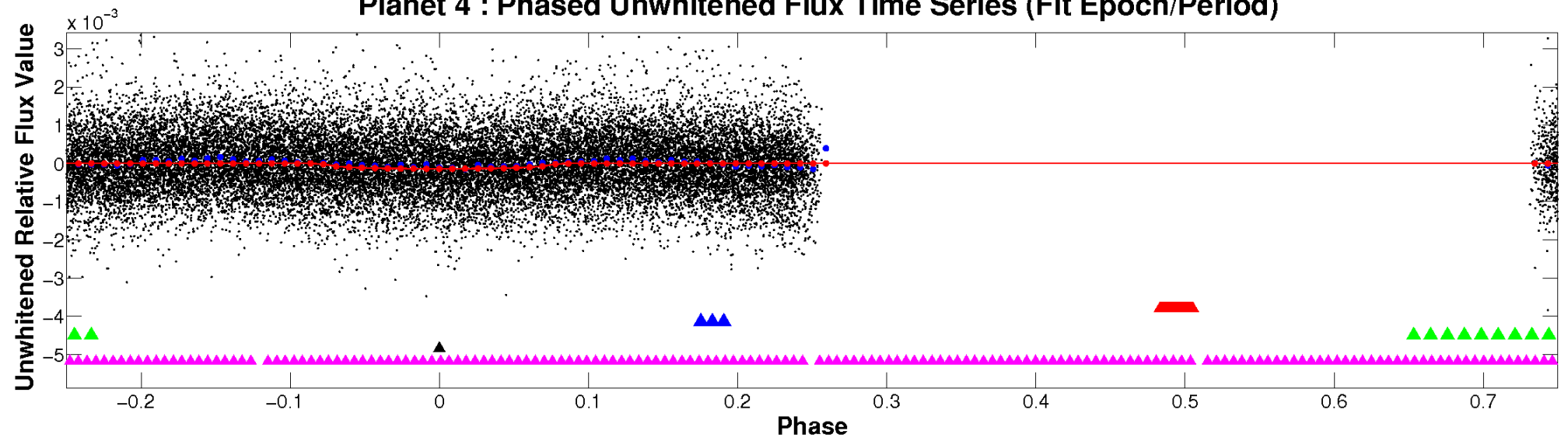
TCE 003659186-04



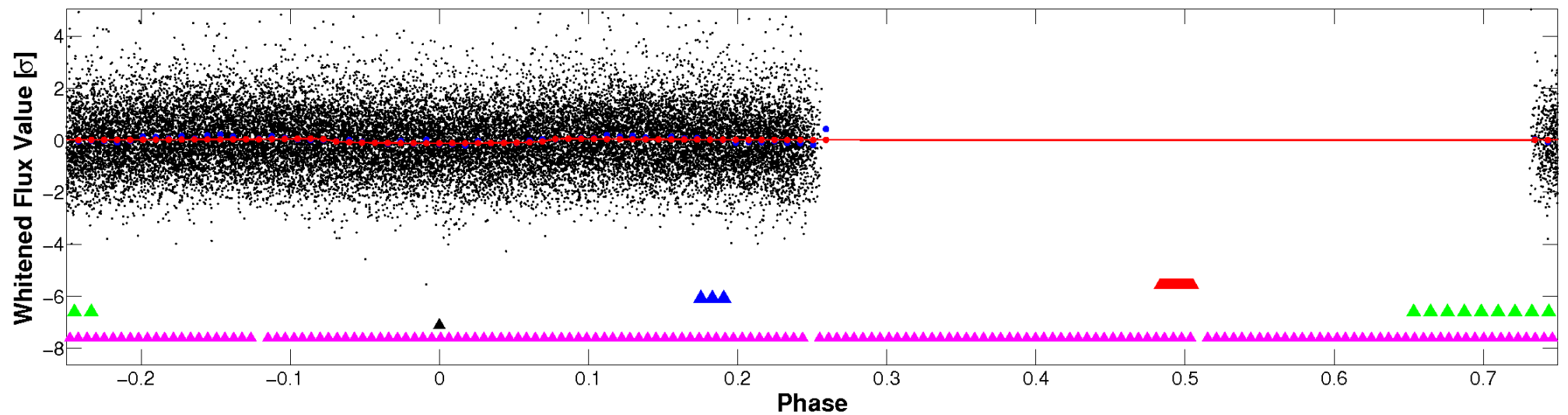


# Non-Whitened Vs. Whitened Light Curve

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

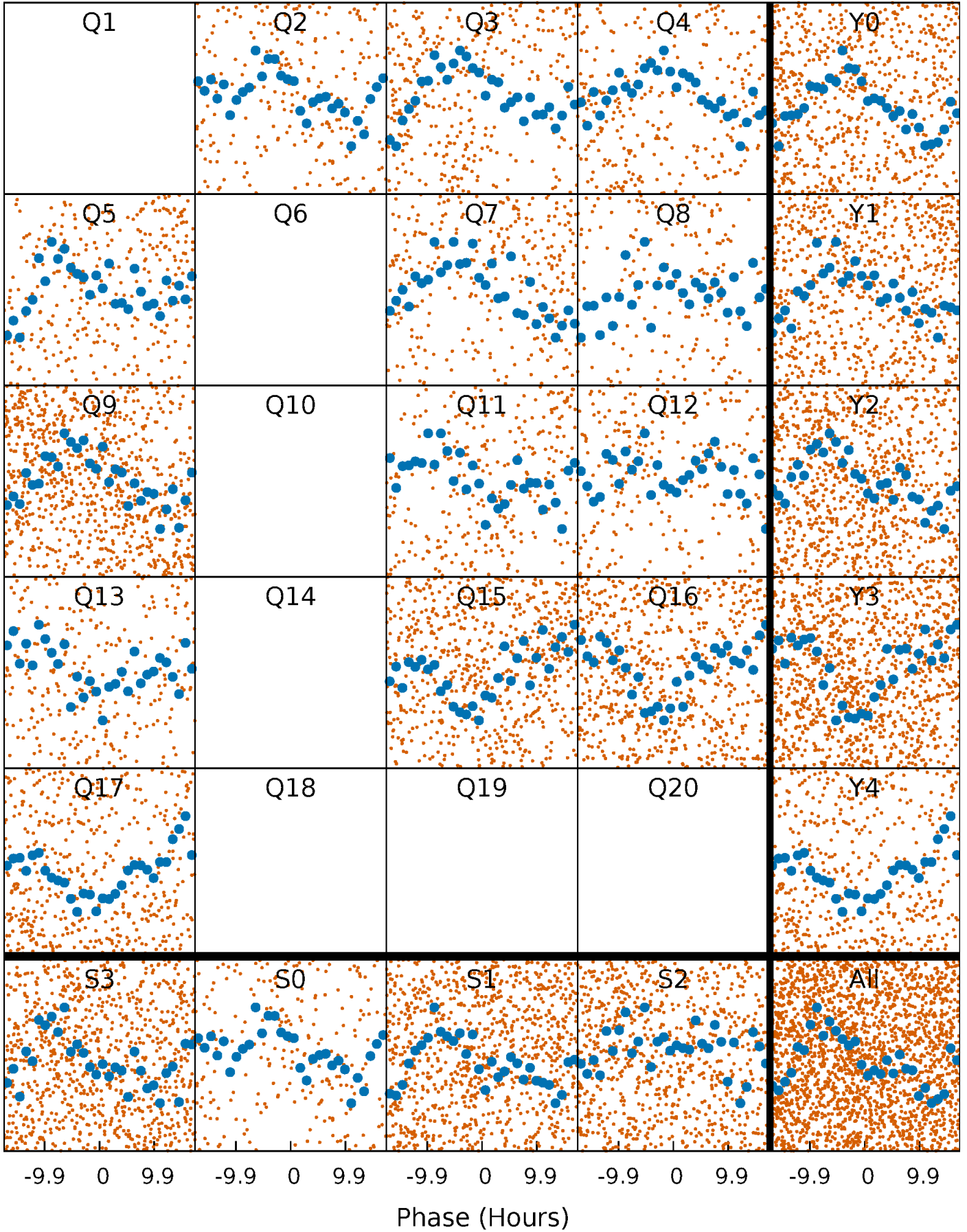


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



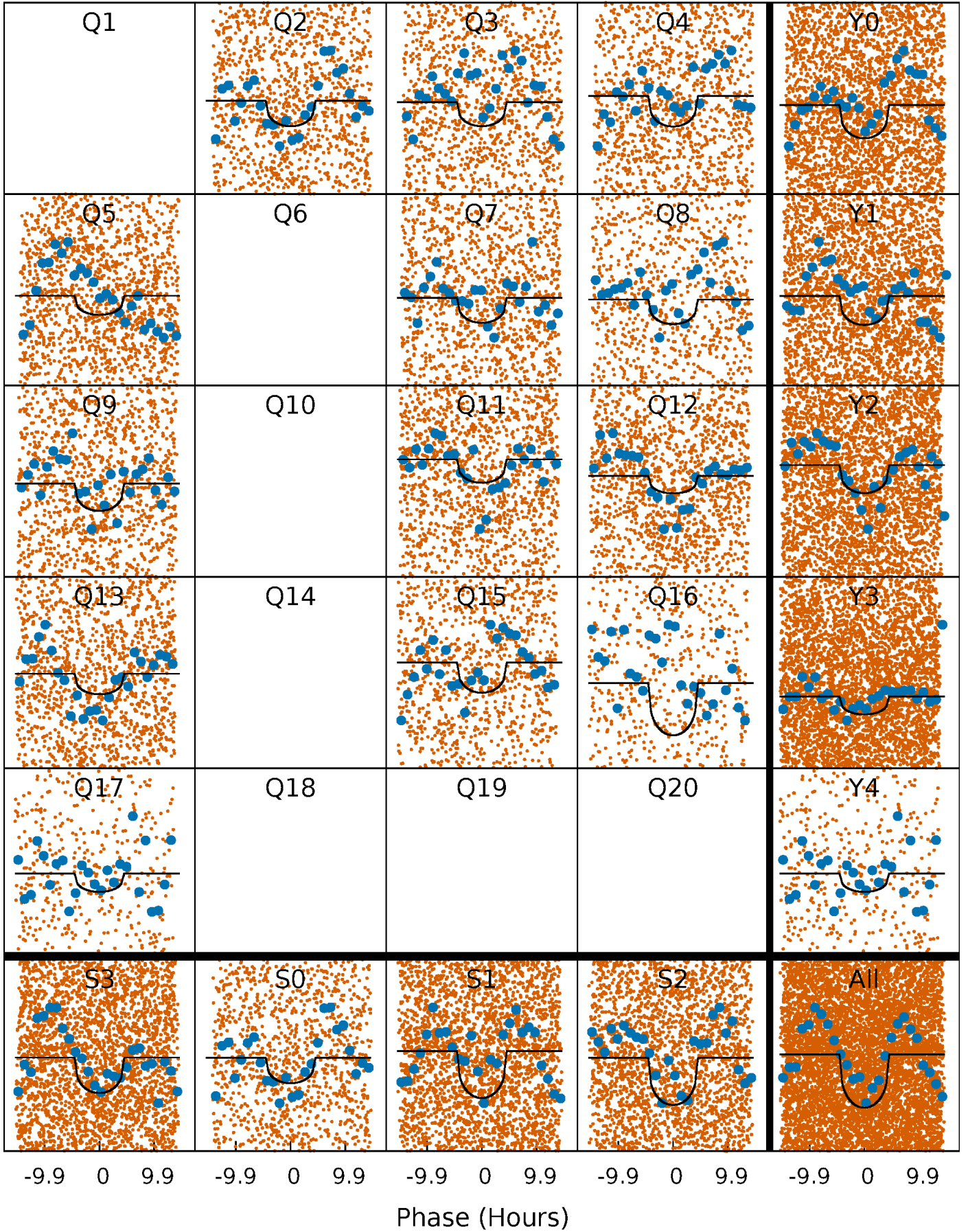
# PDC Quarter-Phased Transit Curves

TCE 003659186-04   P= 2.364331 Days    $T_0=132.209370$  (BKJD)



# DV Quarter-Phased Transit Curves

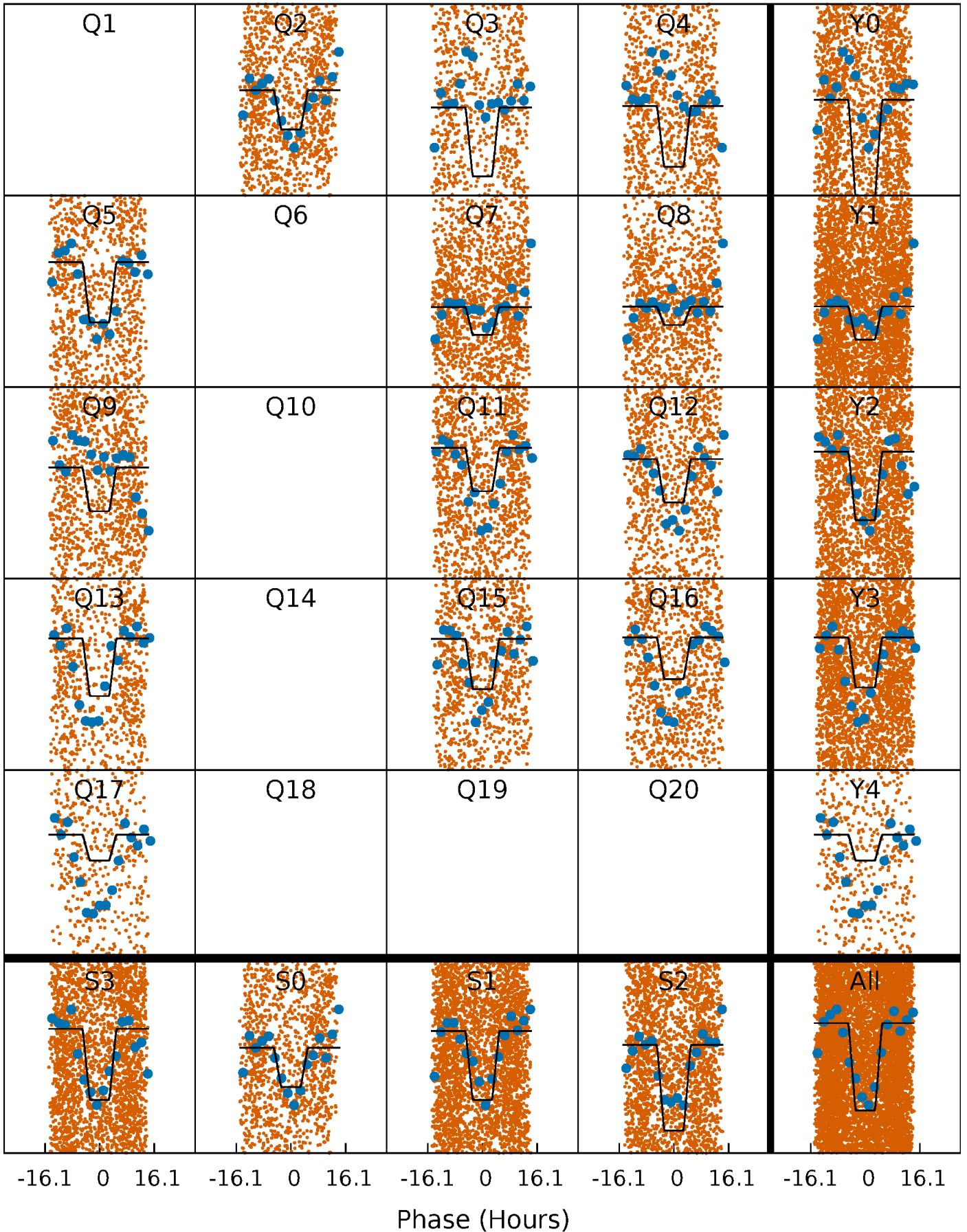
TCE 003659186-04     $P = 2.364331$  Days     $T_0 = 132.209370$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

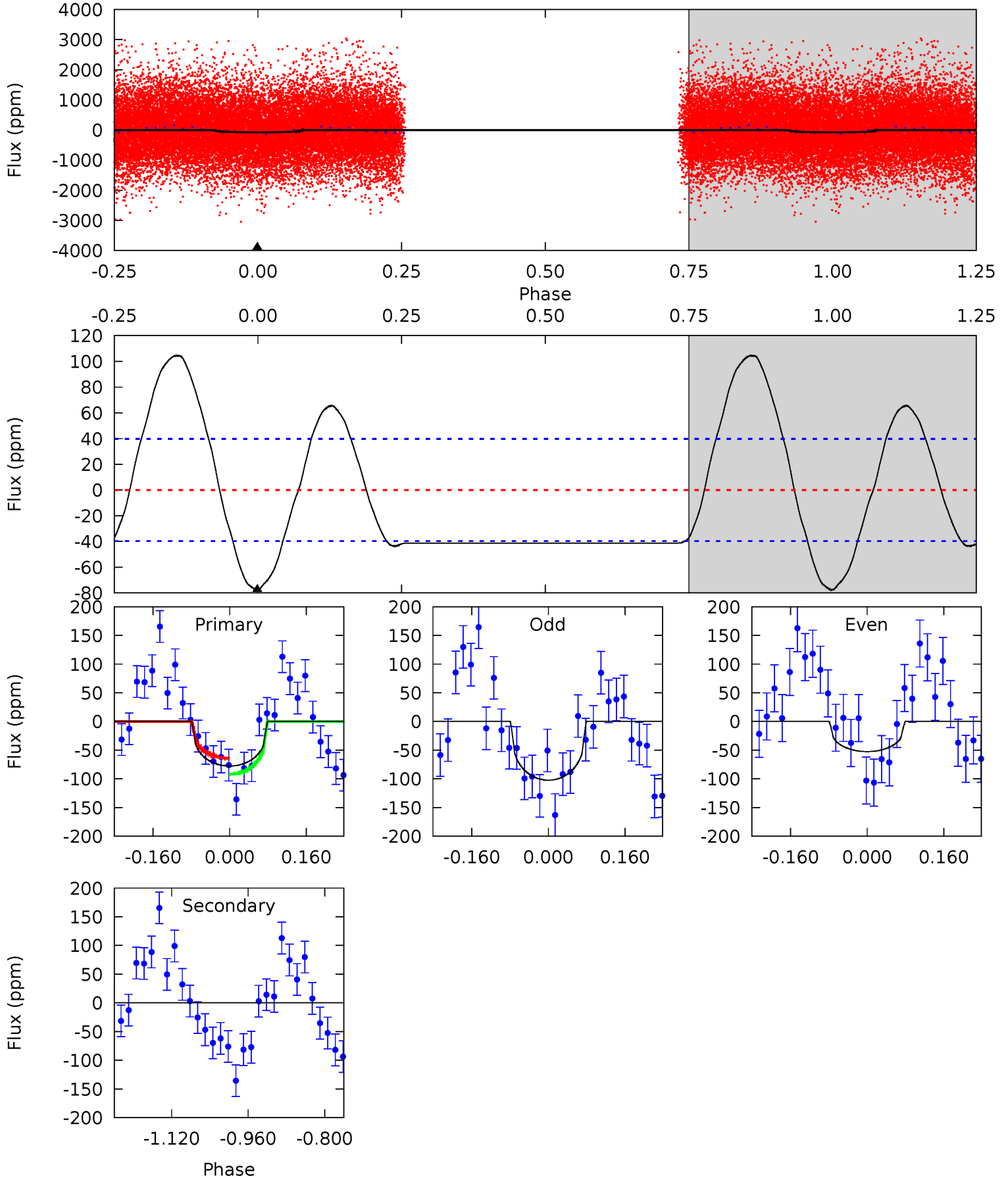
TCE 003659186-04   P= 2.364176 Days    $T_0=132.257567$  (BKJD)



# DV Model-Shift Uniqueness Test

003659186-04, P = 2.364331 Days, E = 132.209370 Days

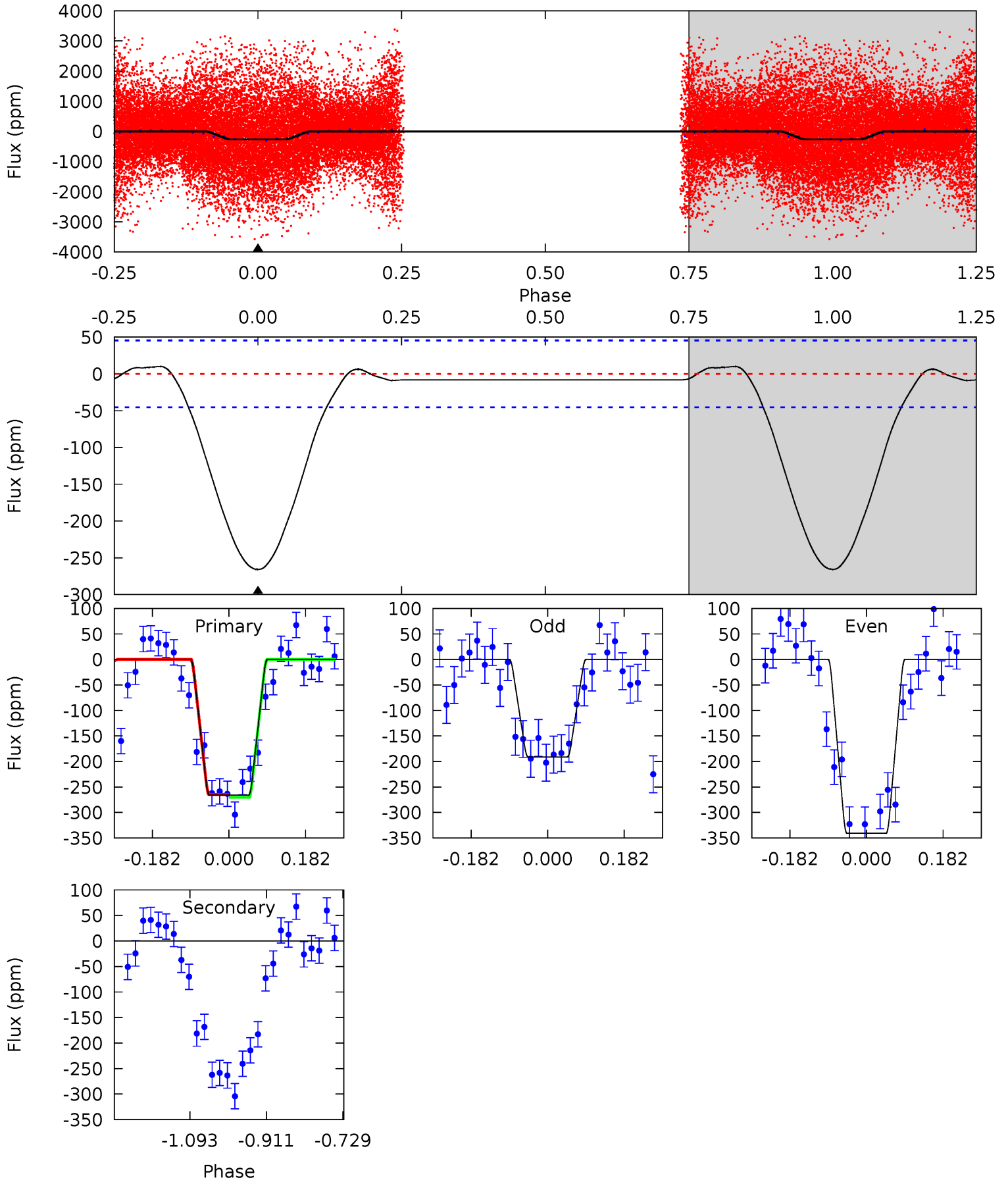
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.73	0	0	0	4.47	1.40	4.85	8.73	8.73	0	0	2.82	0.85	0.57	1.61



# Alt Model-Shift Uniqueness Test

003659186-04, P = 2.364176 Days, E = 132.257567 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
26.0	0	0	0	4.44	1.33	0.64	26.0	26.0	0	0	7.37	0.81	0.04	0.26



### Stellar Parameters For KIC 003659186

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4770^{+217}_{-195}$	$4.586^{+0.060}_{-0.035}$	$-0.240^{+0.300}_{-0.300}$	$0.693^{+0.060}_{-0.067}$	$0.676^{+0.088}_{-0.051}$	$2.855^{+0.756}_{-0.414}$
	+5%/-4%	+1%/-1%	+125%/-125%	+9%/-10%	+13%/-8%	+26%/-15%
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 003659186-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$0 \pm 9$	$0.96^{+0.86}_{-0.62}$	$1393^{+63}_{-66}$	$-2177^{+5155}_{-1111}$	$-0.166^{+6.028}_{-9.644}$
Alt.	$0 \pm 10$	$1.32^{+0.85}_{-0.79}$	$1397^{+66}_{-63}$	$-2046^{+4949}_{-794}$	$0.050^{+4.682}_{-3.687}$

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



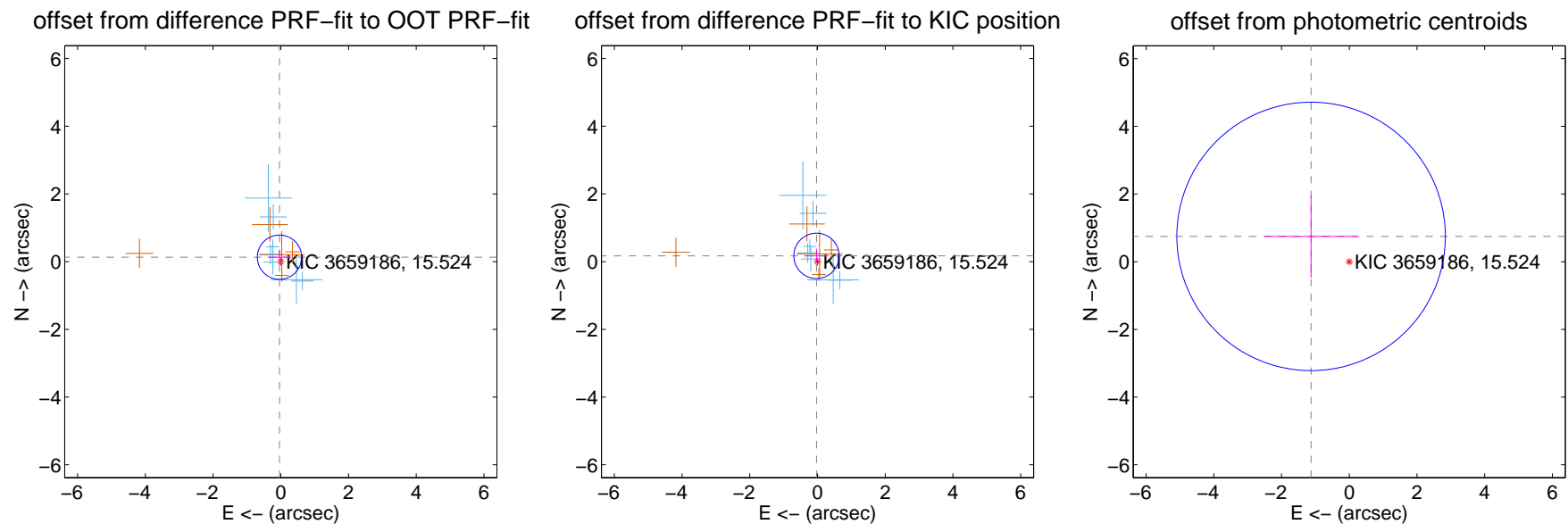
## DV Centroid Data

Supplemental centroid analysis for 003659186-04. Kepler magnitude: 15.52. Transit SNR 9.20

There are 7 quarters with good PRF difference image offsets

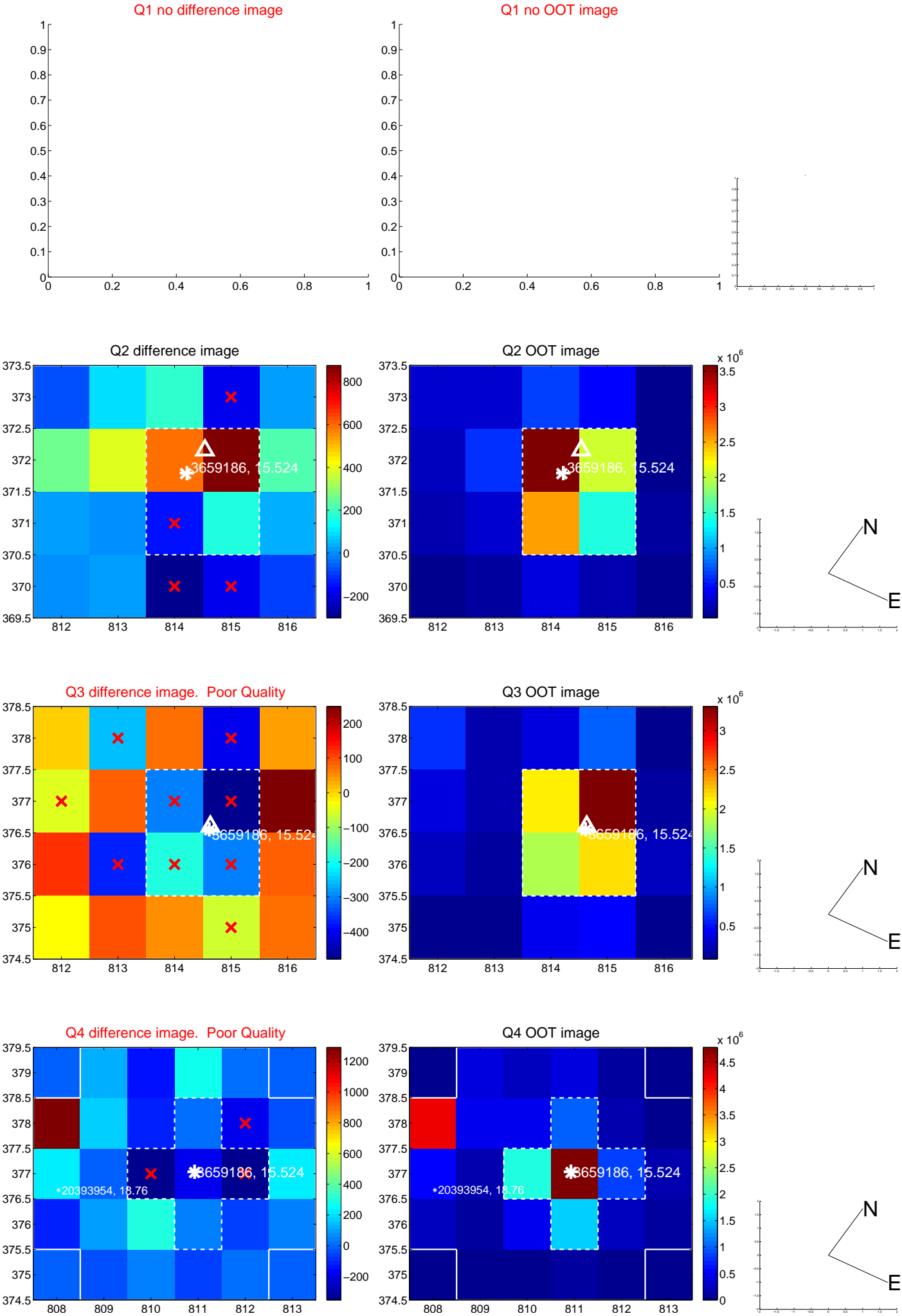
The direct PRF centroid is offset from the target star catalog position by about 0.02 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.137 \pm 0.218$	0.63	$0.038 \pm 0.350$	$0.131 \pm 0.205$
PRF-fit source offset from KIC position	$0.173 \pm 0.223$	0.78	$0.030 \pm 0.366$	$0.171 \pm 0.210$
photometric centroid source offset	$1.35 \pm 1.32$	1.02	$1.13 \pm 1.37$	$0.75 \pm 1.22$

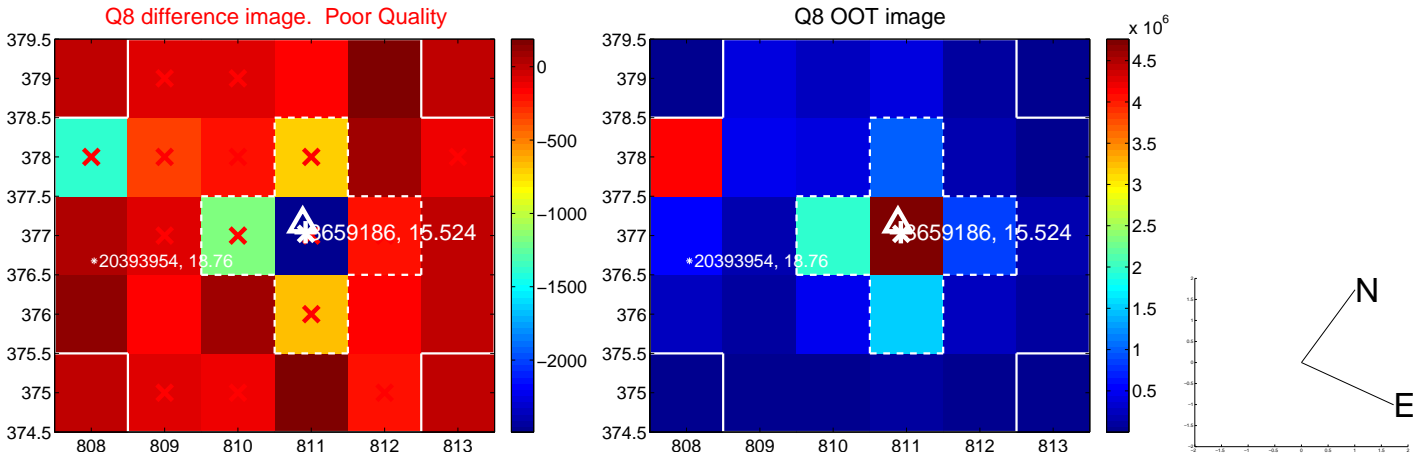
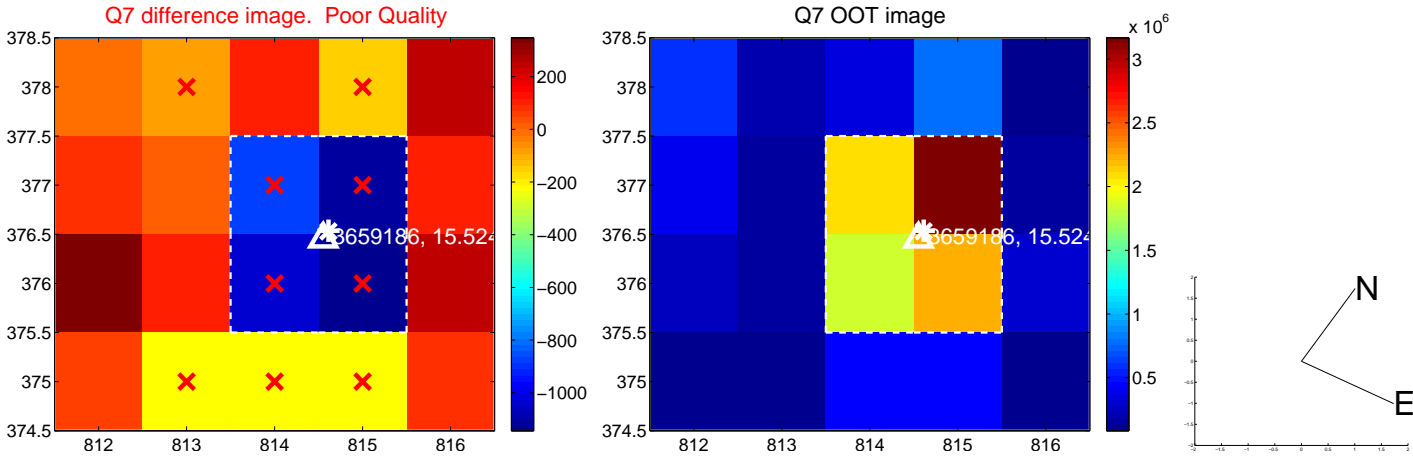
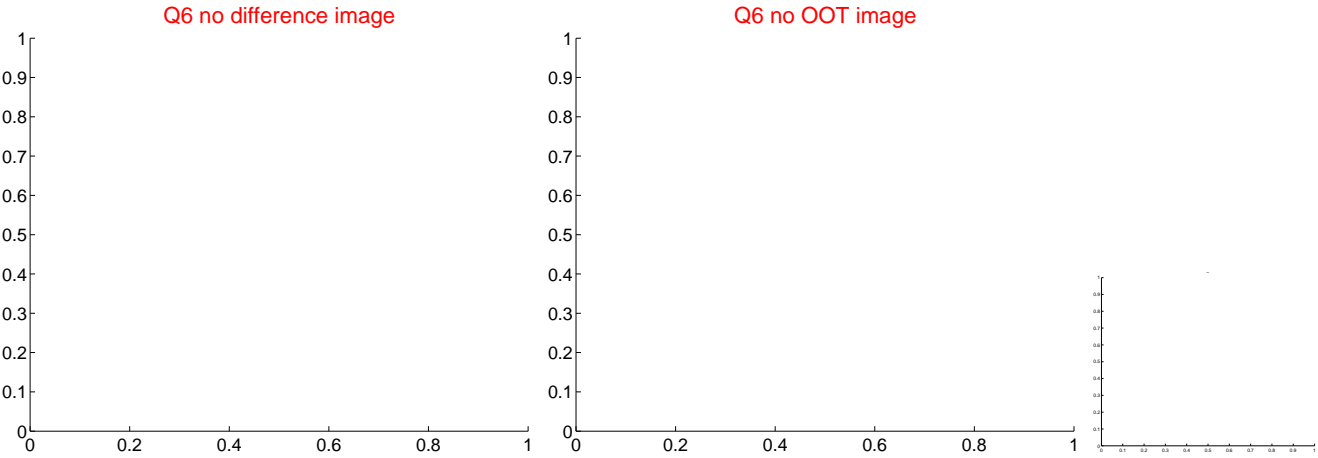
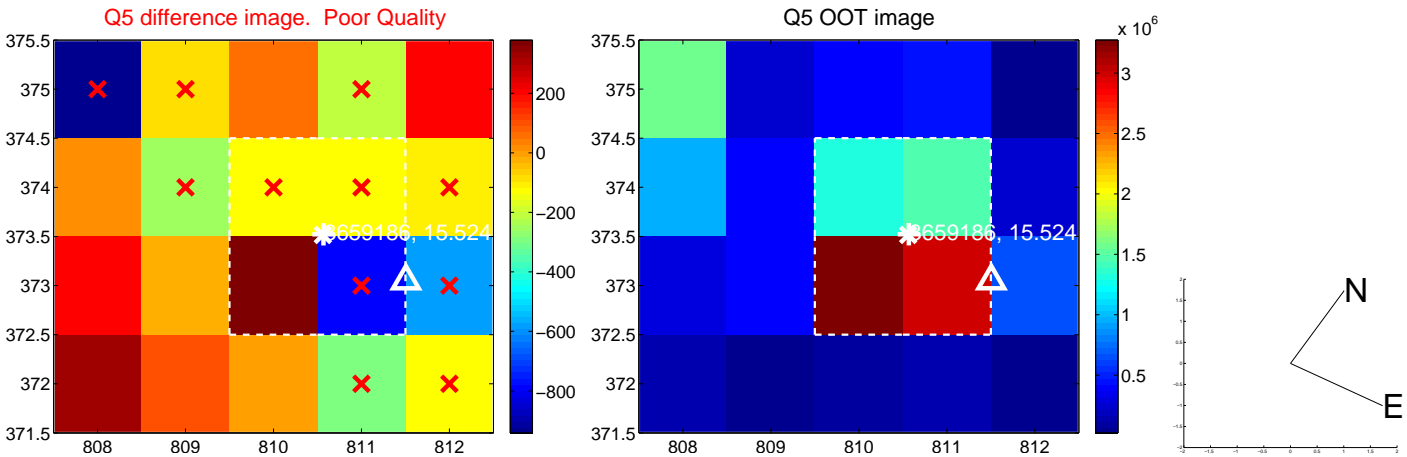


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

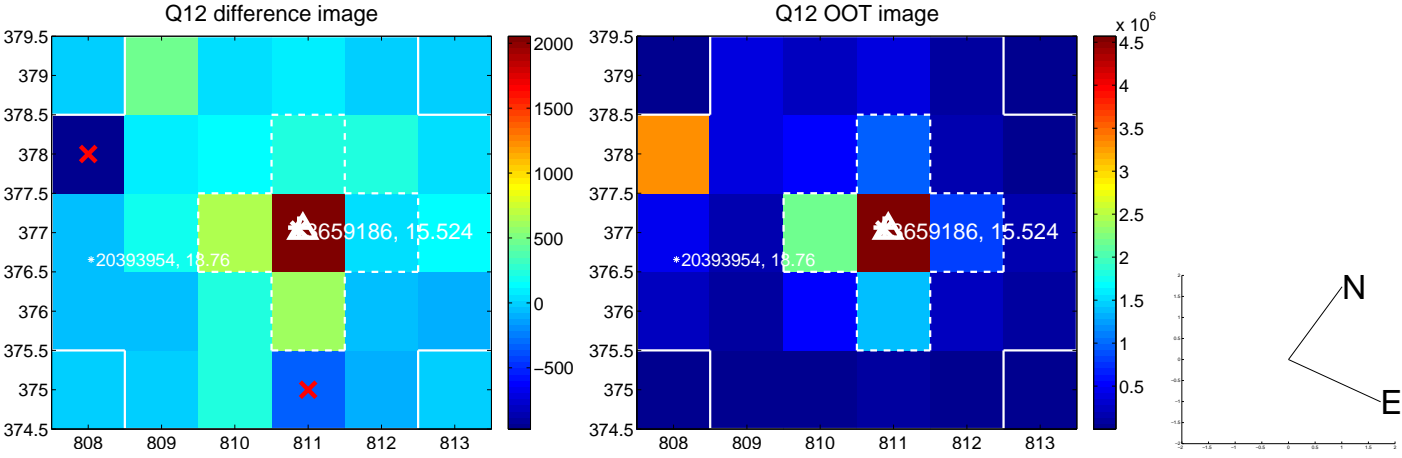
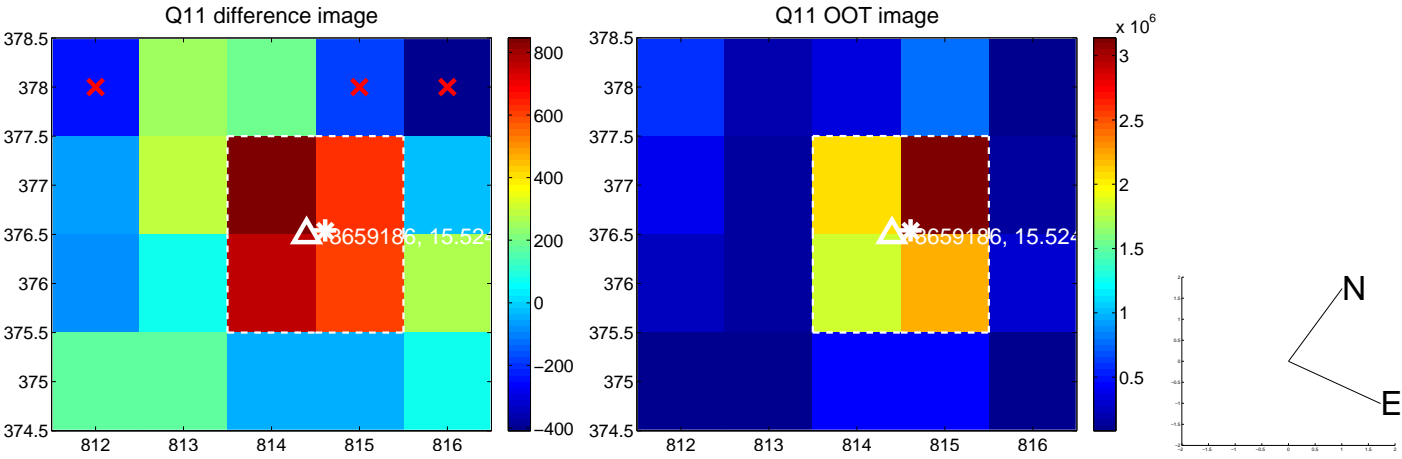
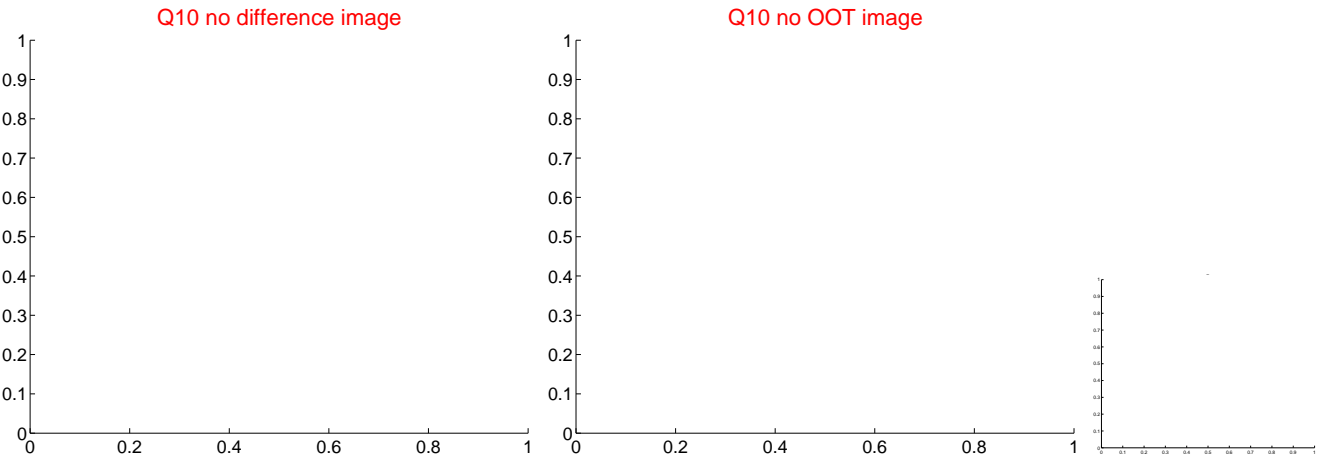
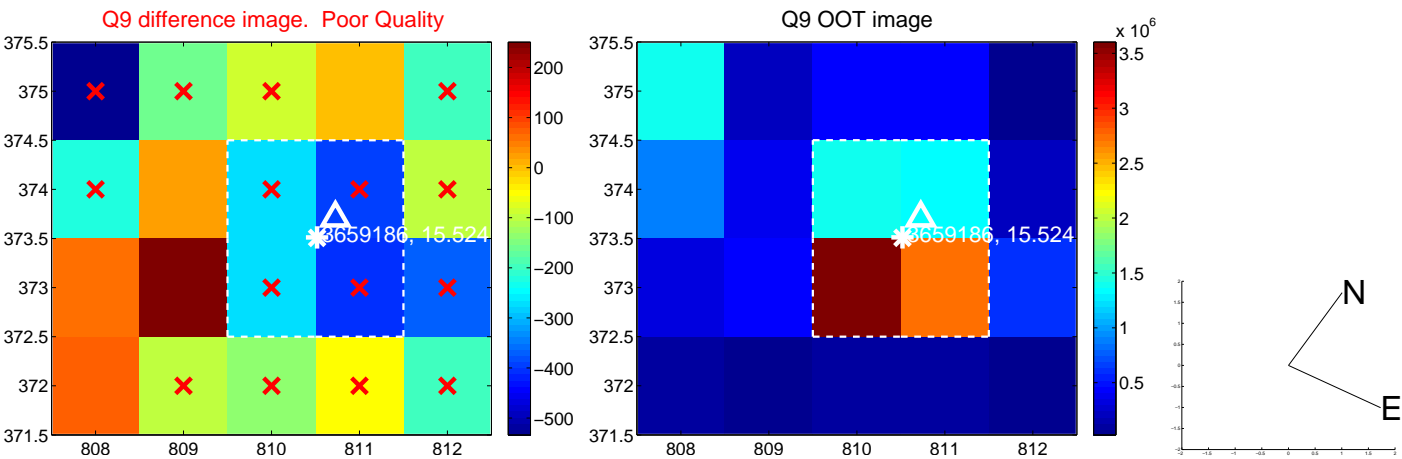
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



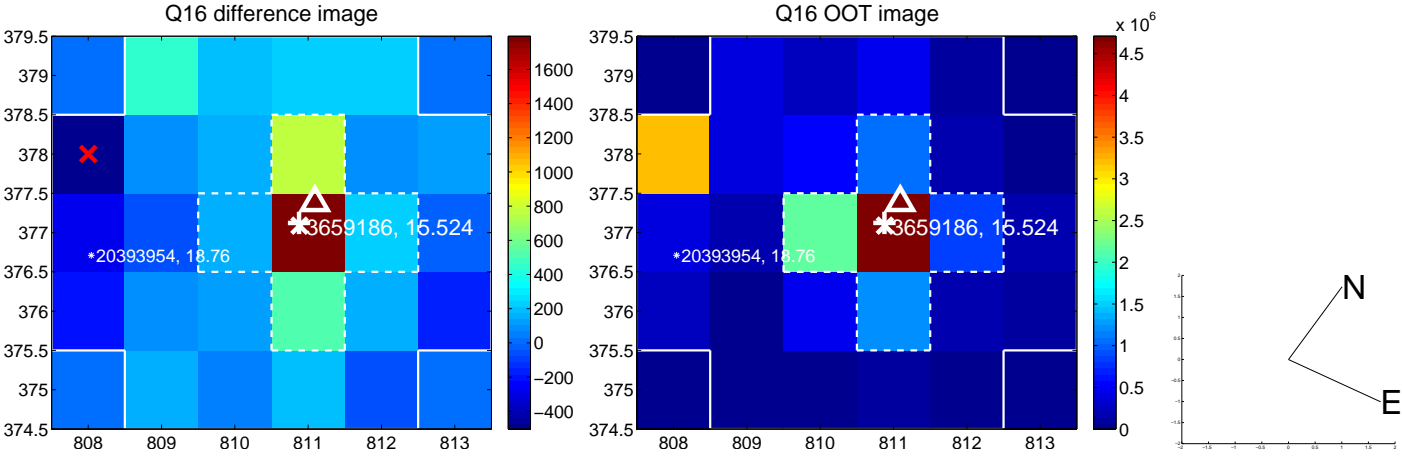
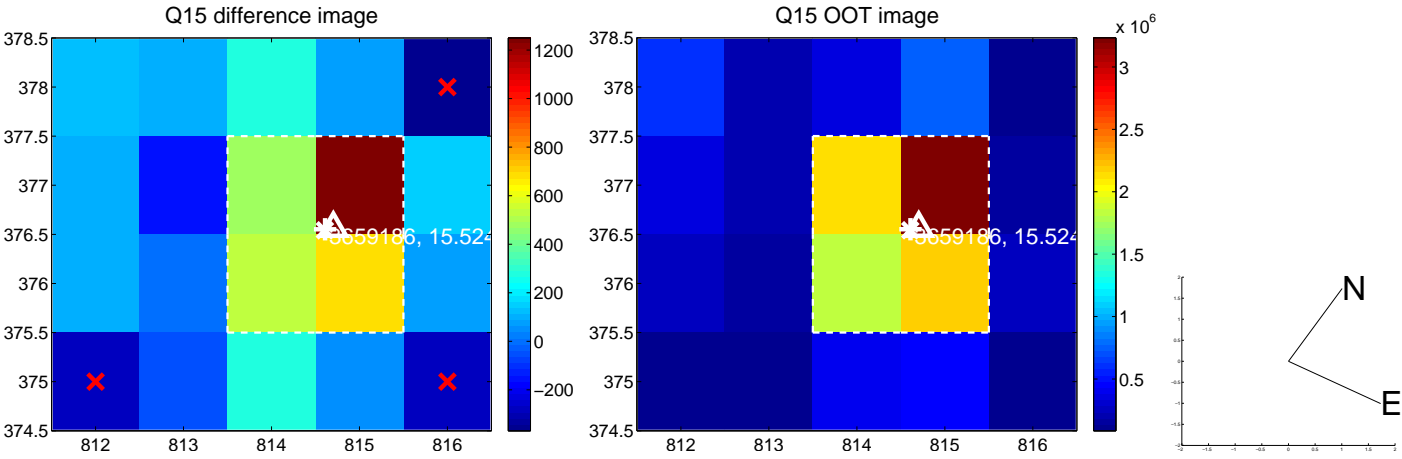
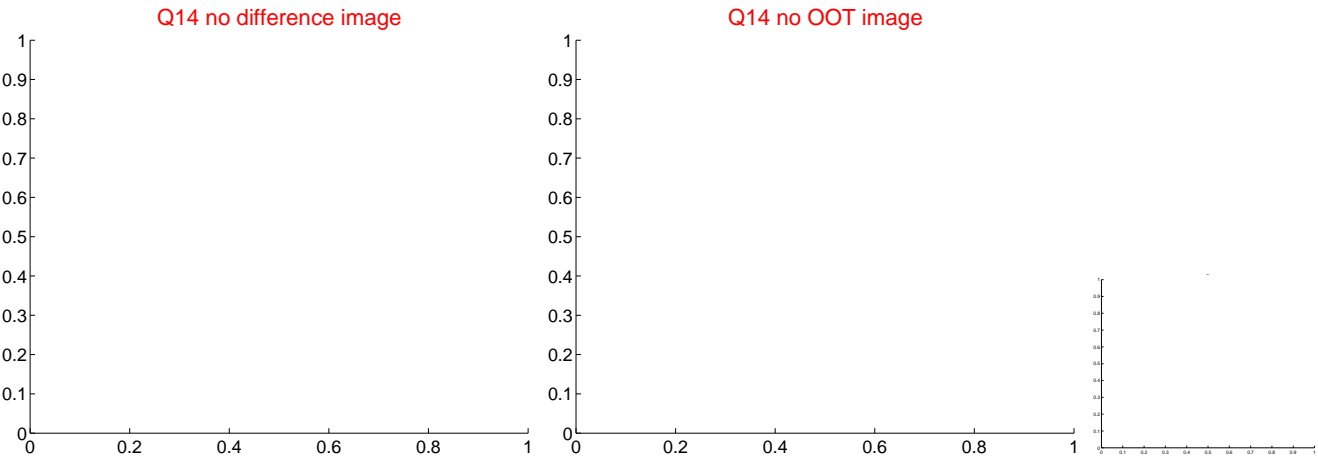
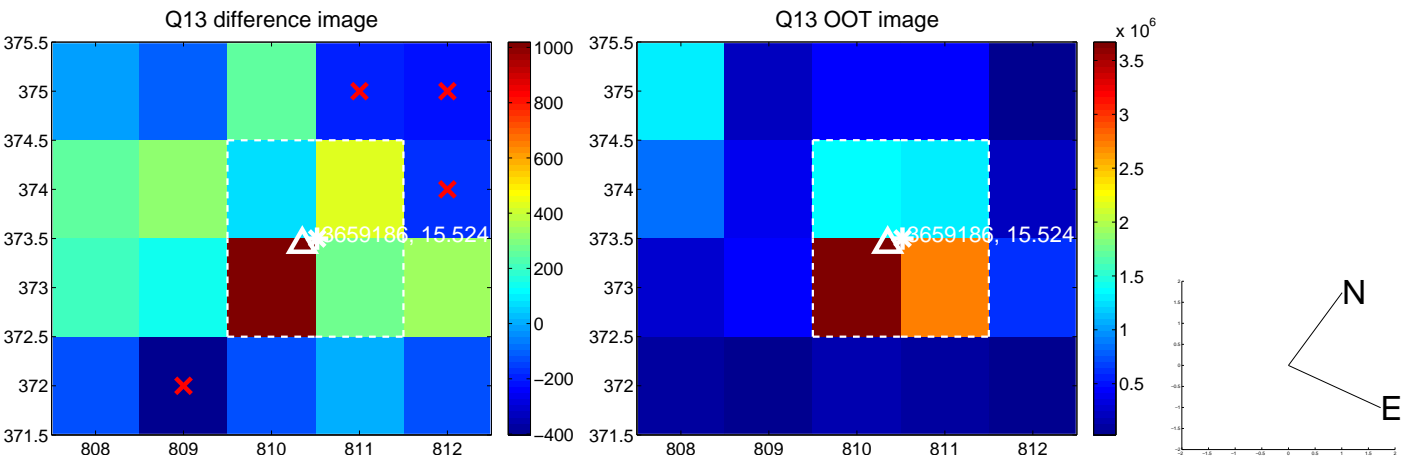
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



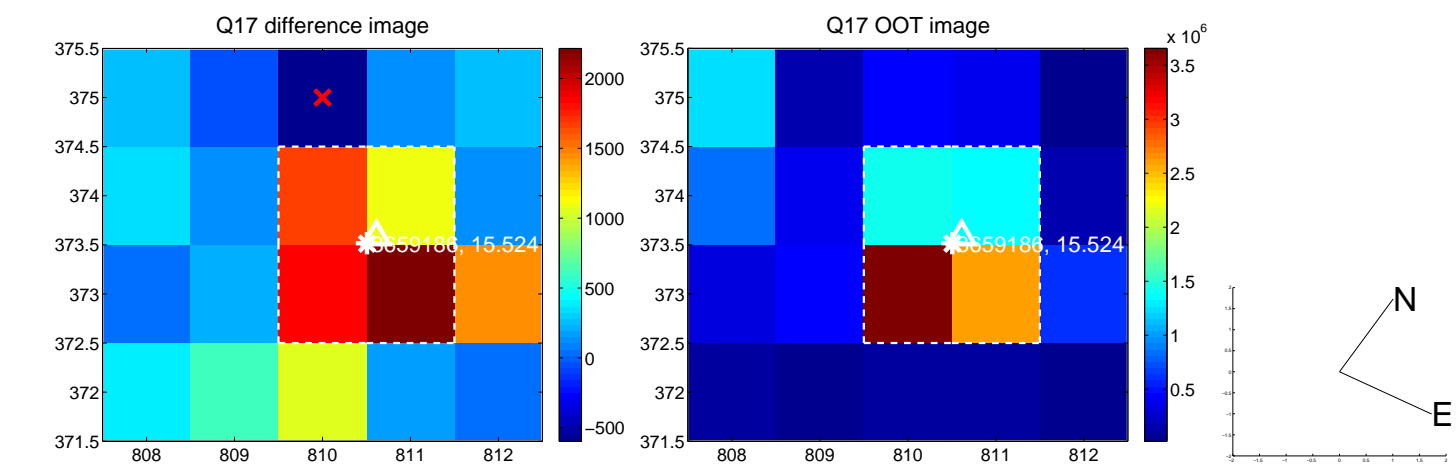
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



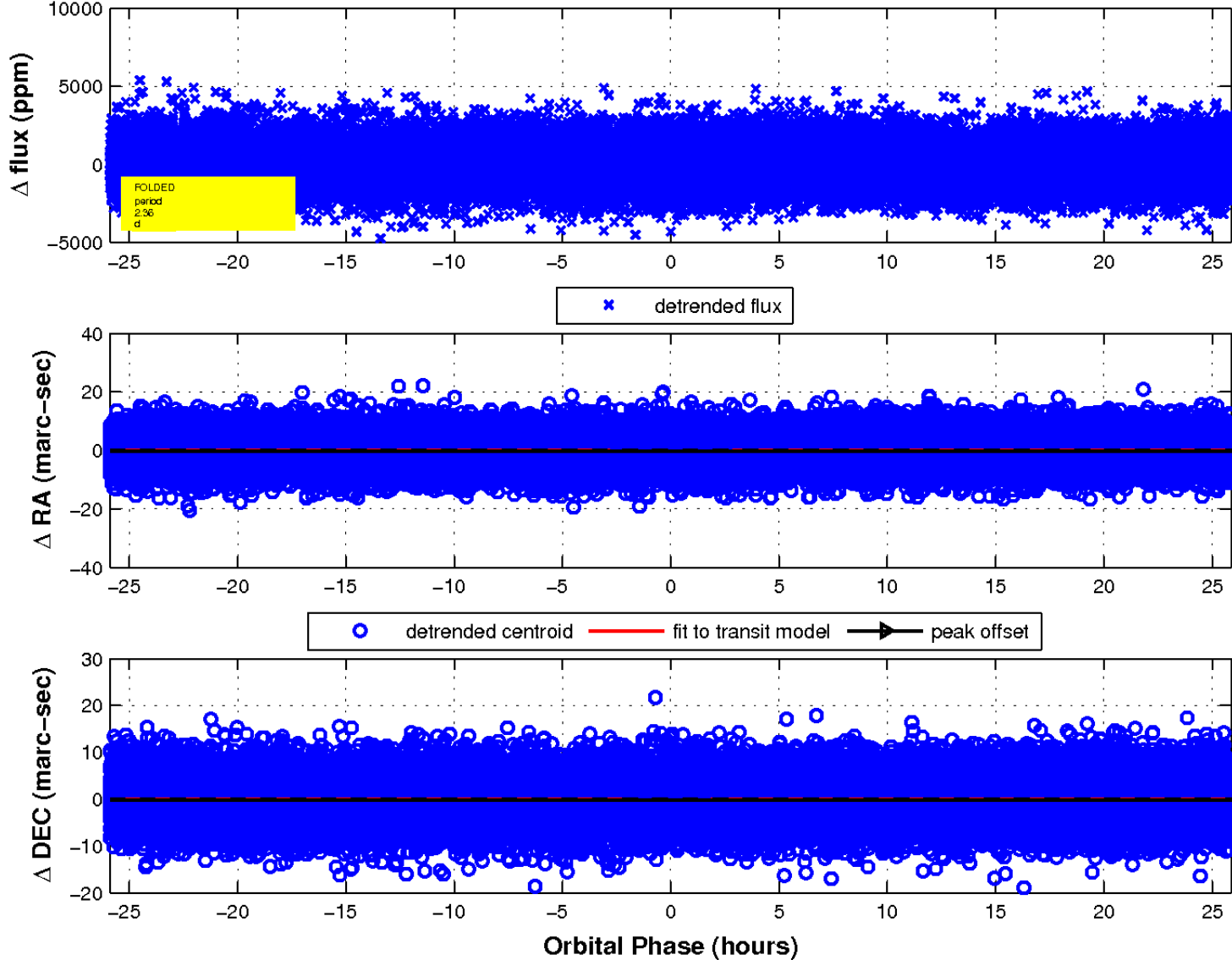
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.



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

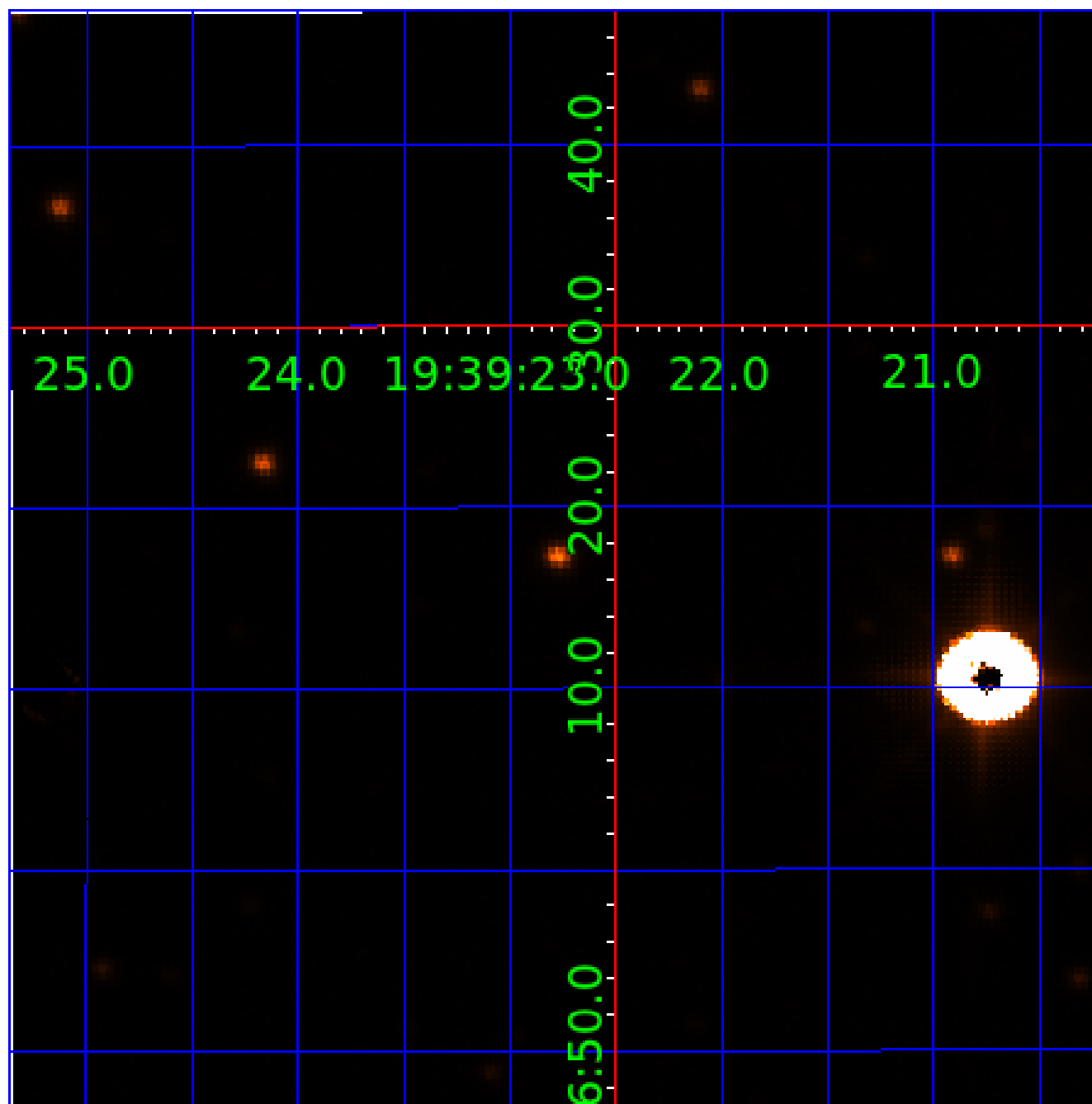


fluxWeightedCentroids, Planet 4 of 5



UKIRT Image

Declination





# KIC 003659186

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
003659186-01	OBS	No	2.364245	133.404349	161.9	9.214	9.4	9.8	0.69	4770	1.08	239.81
003659186-02	OBS	No	600.521832	198.861593	1575.9	8.510	17.9	7.6	0.69	4770	2.85	0.15
003659186-04	OBS	No	2.364331	132.209370	139.8	8.632	8.4	9.2	0.69	4770	0.79	239.80
003659186-05	OBS	No	8.582651	139.632626	1325.9	2.507	7.8	6.9	0.69	4770	2.74	42.98

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003659186-01	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV
003659186-02	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
003659186-04	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—SAME_NTL_PERIOD
003659186-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—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.

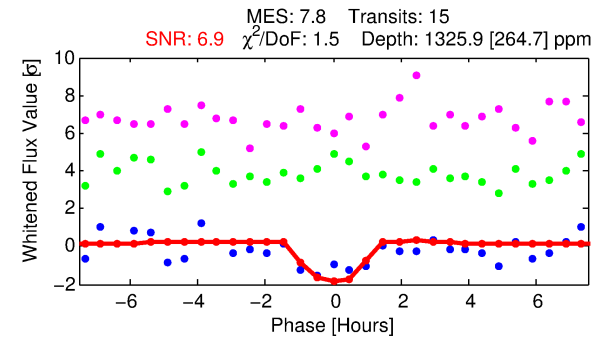
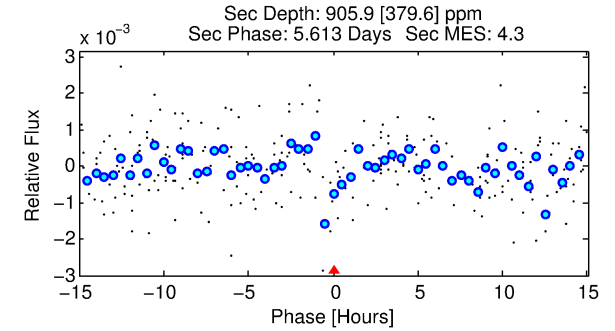
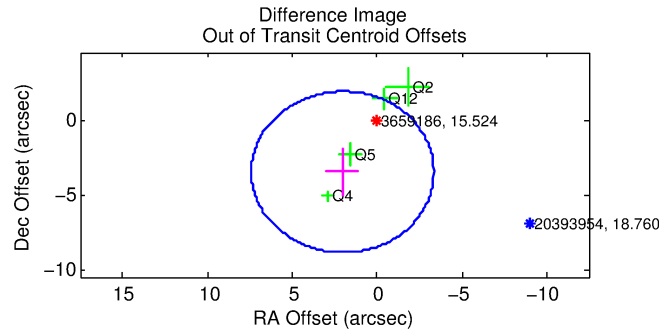
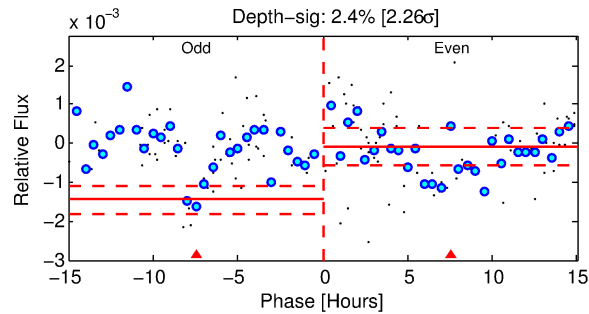
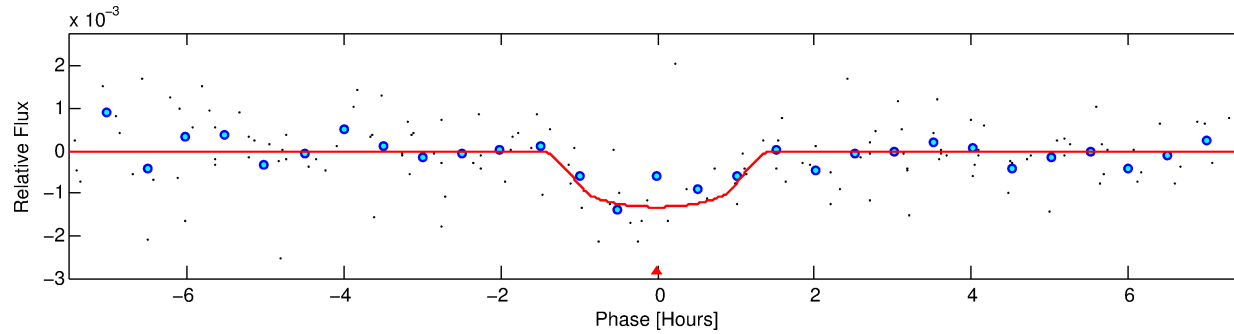
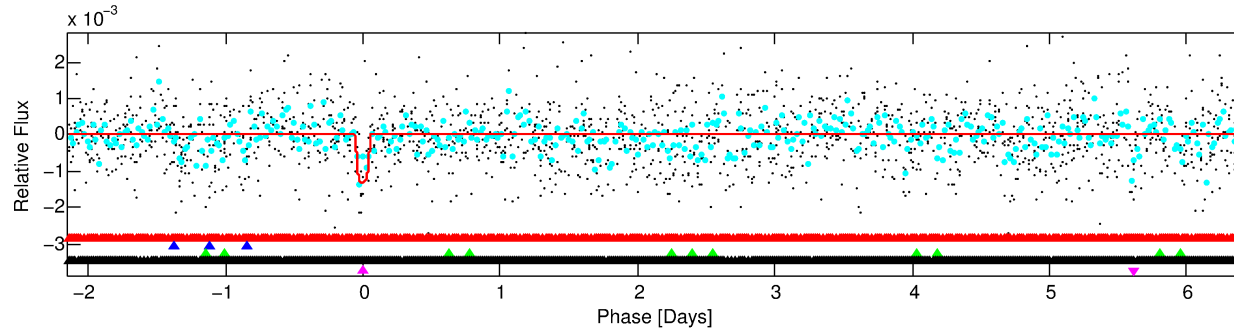
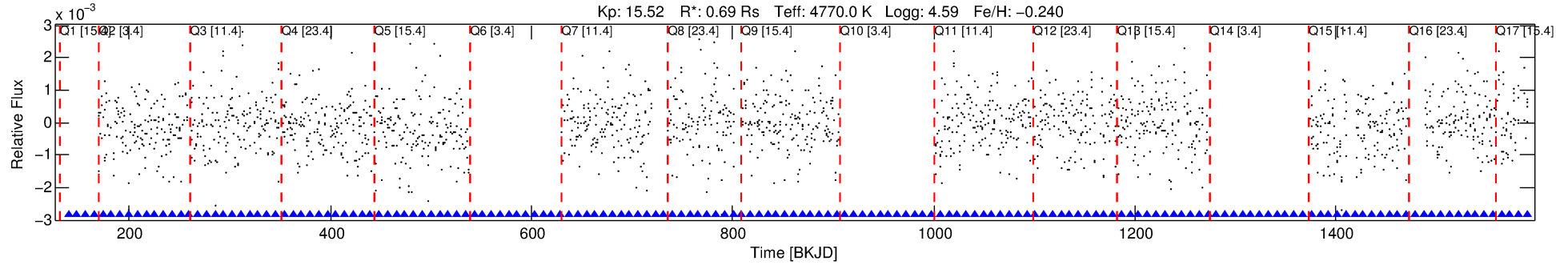
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 003659186-05

No Significant Match Found

# DV One-Page Summary

KIC: 3659186 Candidate: 5 of 5 Period: 8.583 d



## DV Fit Results:

Period = 8.58265 [0.00009] d  
Epoch = 139.6326 [0.0079] BKJD  
Rp/R\* = 0.0362 [0.1079]  
a/R\* = 19.06 [187.52]  
b = 0.74 [6.33]  
Seff = 42.98 [9.19]  
Teq = 653 [35] K  
Rp = 2.74 [8.17] Re  
a = 0.0720 [0.0057] AU  
Ag = 343.87 [2053.46] [0.17 $\sigma$ ]  
Teffp = 4347 [6491] K [0.57 $\sigma$ ]

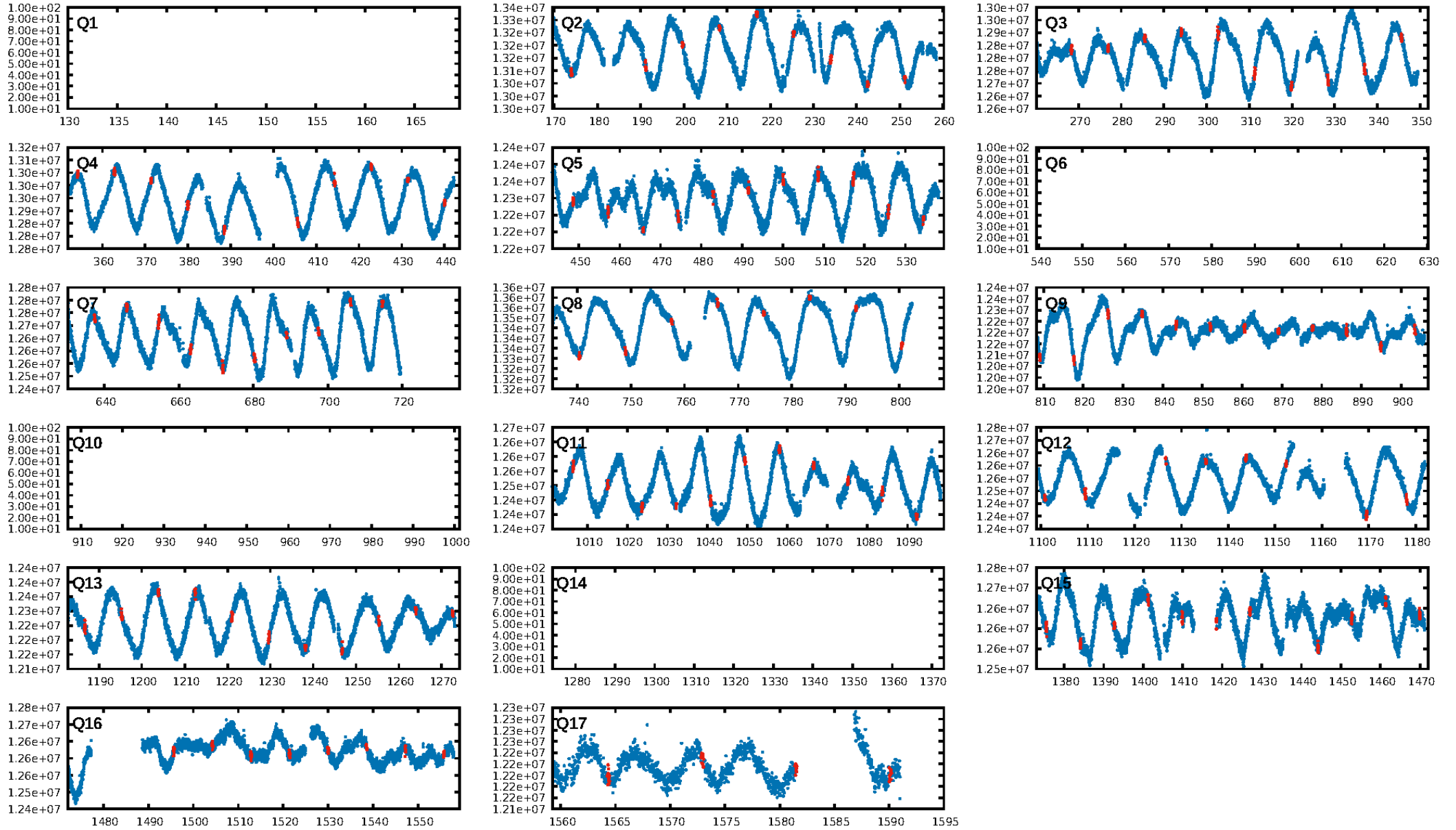
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [16.60 $\sigma$ ]  
LongPeriod-sig: 100.0% [569.35 $\sigma$ ]  
ModelChiSquare2-sig: 63.8%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 5.05e-22  
RollingBand-fgt: 1.00 [14/14]  
**GhostDiagnostic-chr: -0.7698**  
Centroid-sig: 9.0%  
Centroid-so: 0.853 arcsec [1.79 $\sigma$ ]  
OotOffset-rm: 4.037 arcsec [2.25 $\sigma$ ]  
KicOffset-rm: 3.960 arcsec [2.07 $\sigma$ ]  
OotOffset-st: 1/0/2/1 [4]  
KicOffset-st: 1/0/2/1 [4]  
DiffImageQuality-fgm: 0.00 [0/4]  
DiffImageOverlap-fno: 0.92 [12/13]

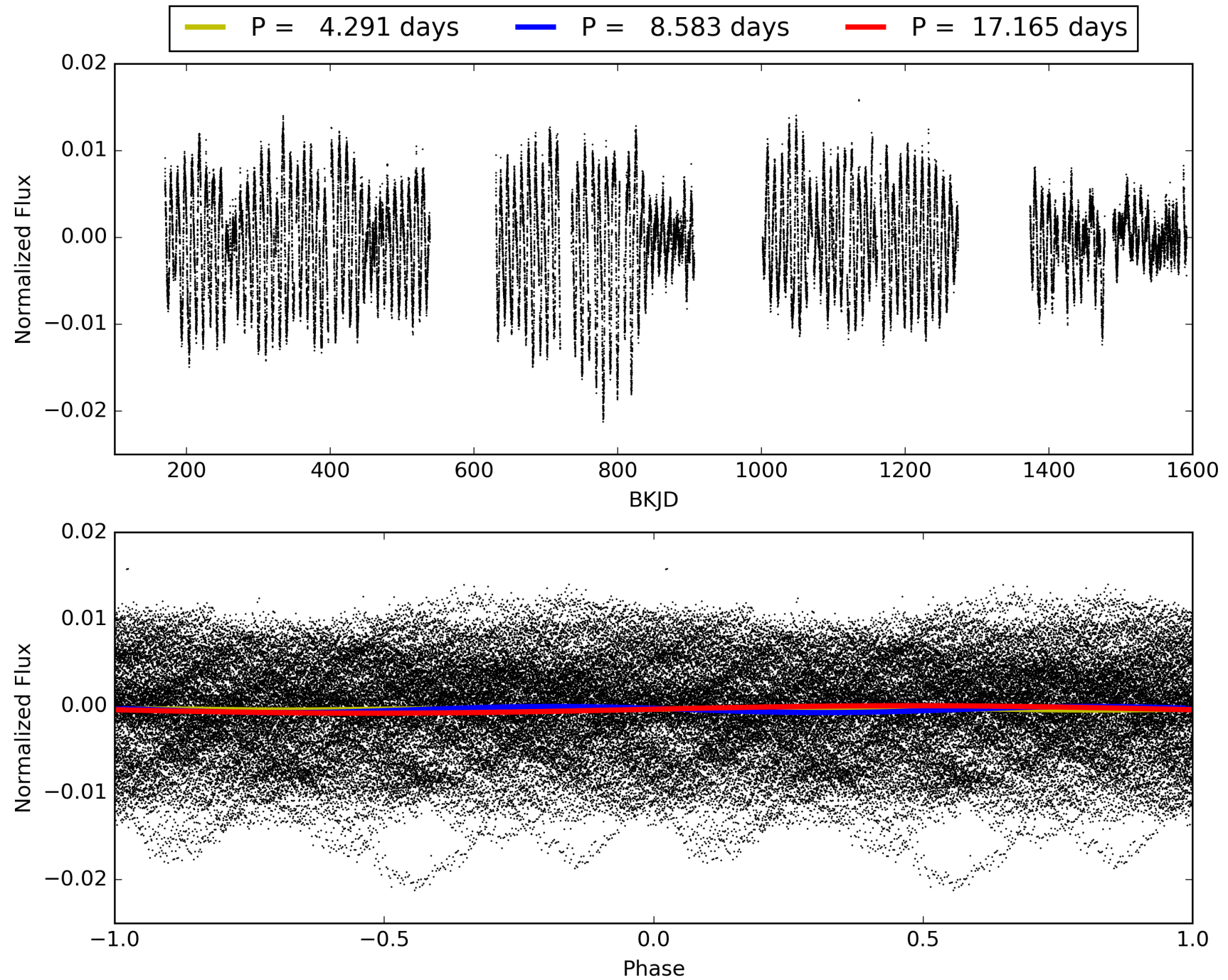
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 06:47:05 Z

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

# TCE 003659186-05, PDC Light Curves

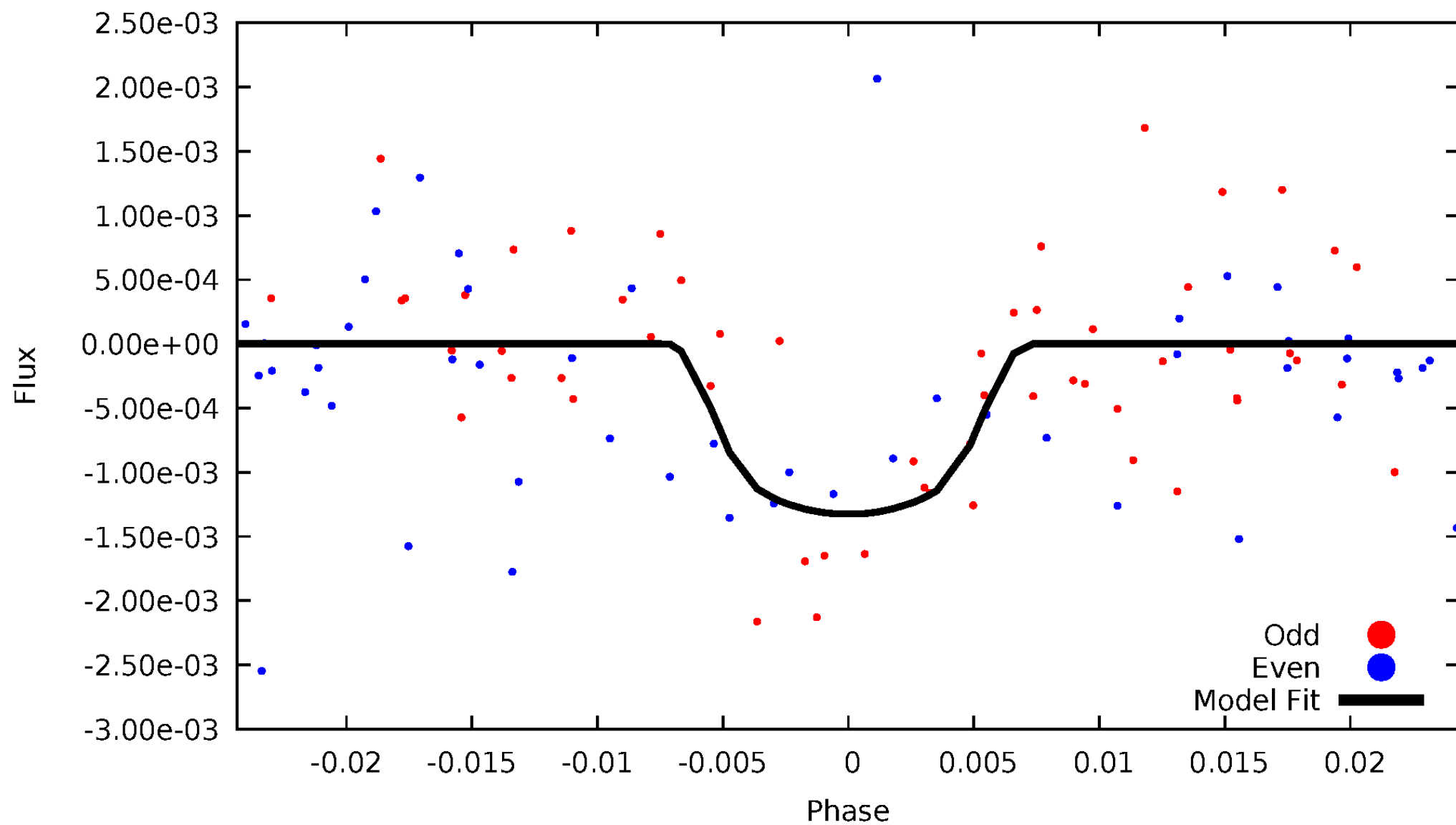


TCE 003659186-05



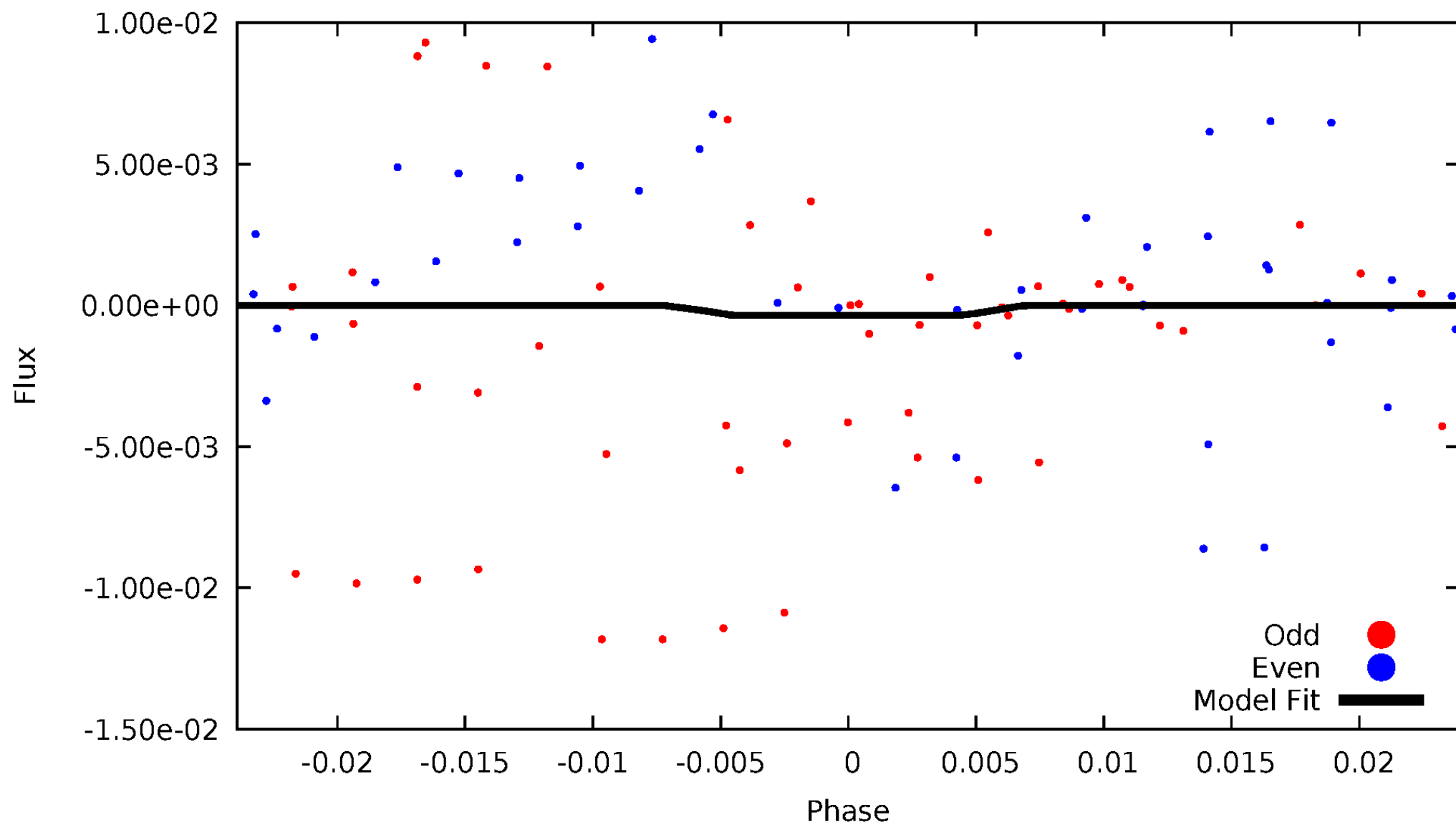
# DV Odd/Even

TCE 003659186-05



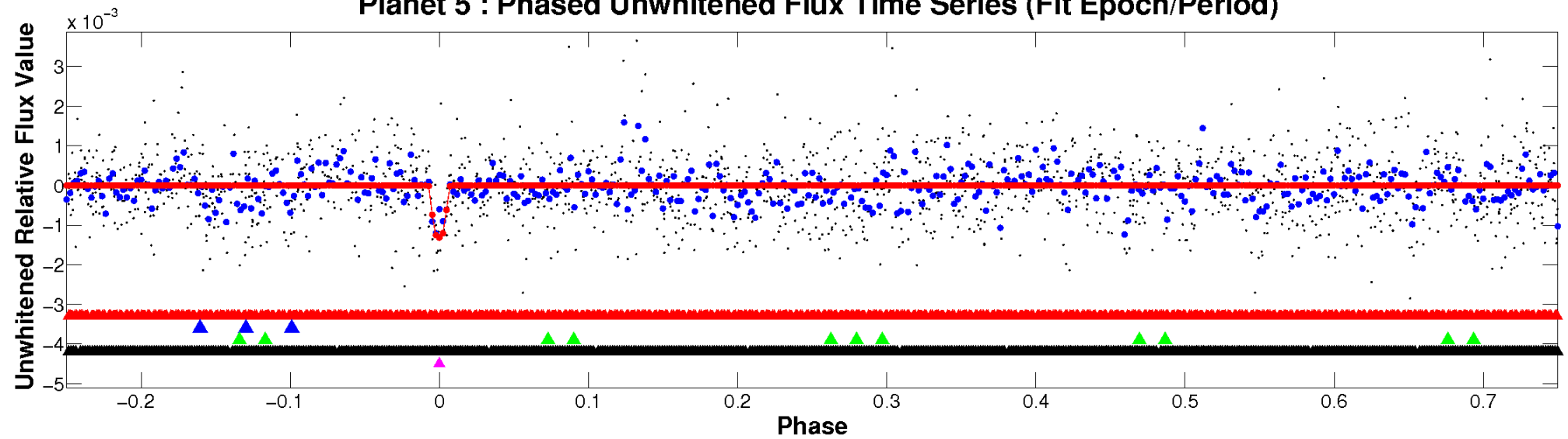
# ALT Odd/Even

TCE 003659186-05

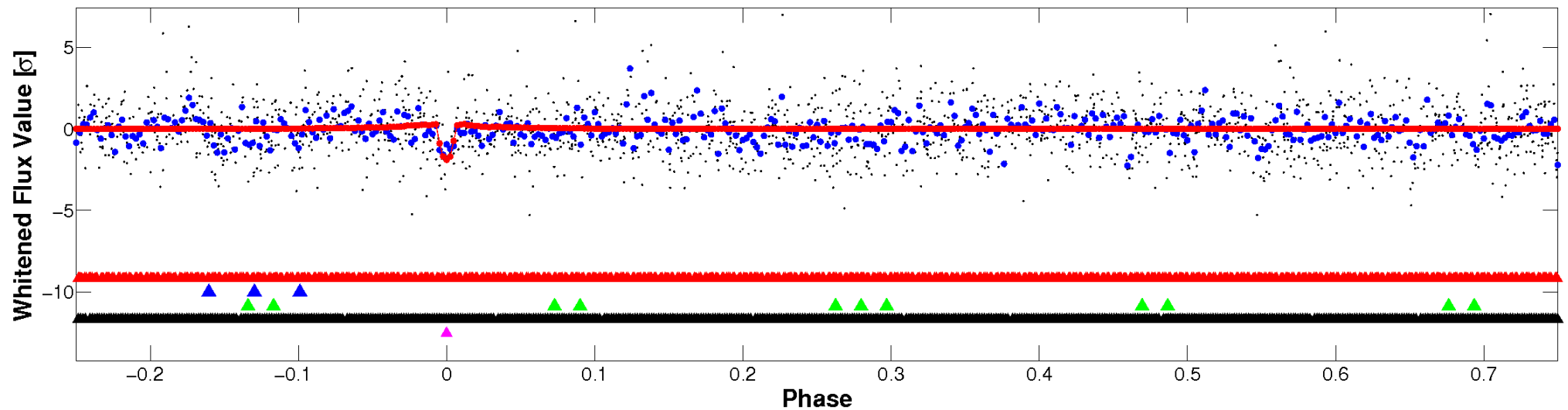


# Non-Whitened Vs. Whitened Light Curve

## Planet 5 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)



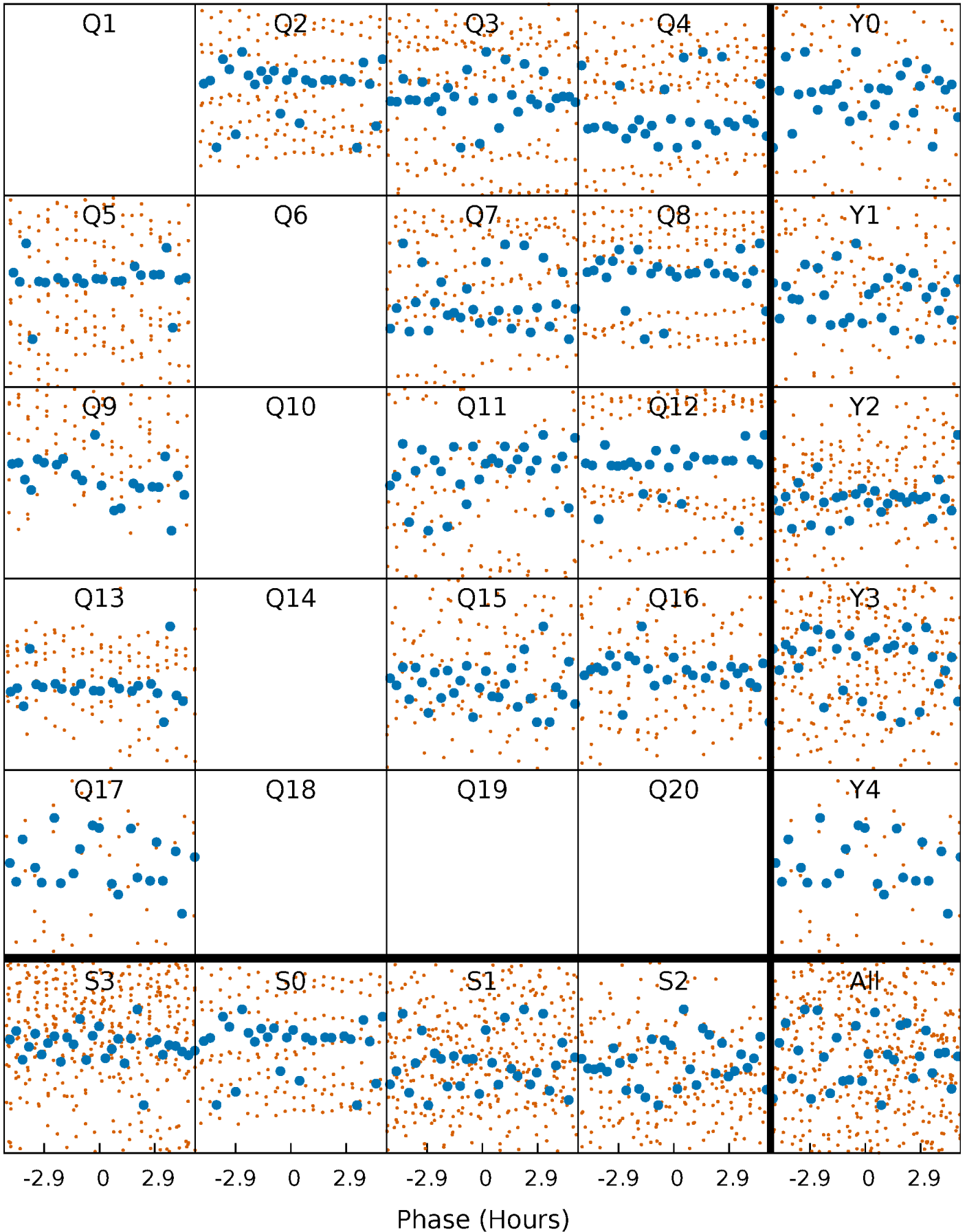
## Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)





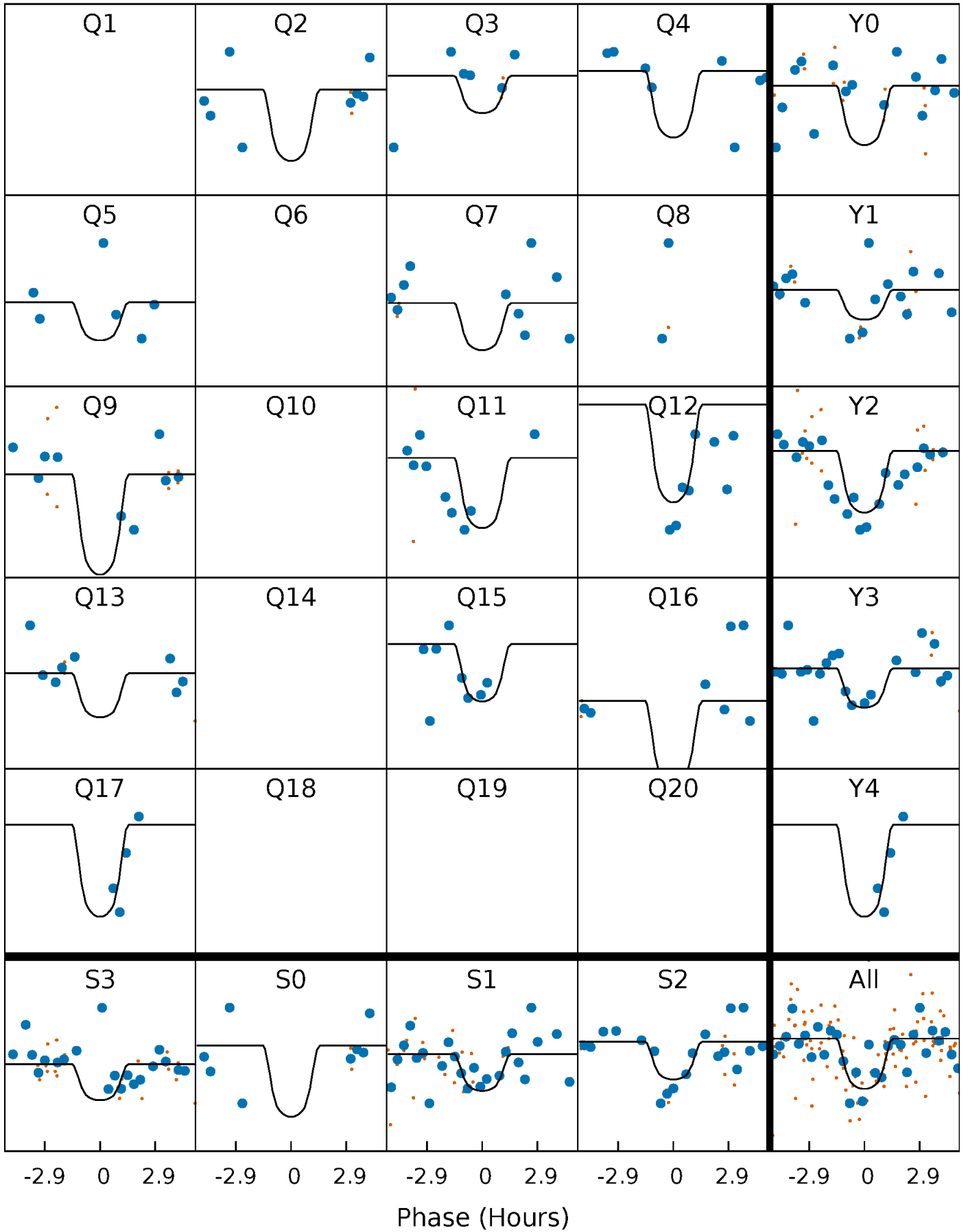
# PDC Quarter-Phased Transit Curves

TCE 003659186-05   P= 8.582651 Days    $T_0=139.632626$  (BKJD)



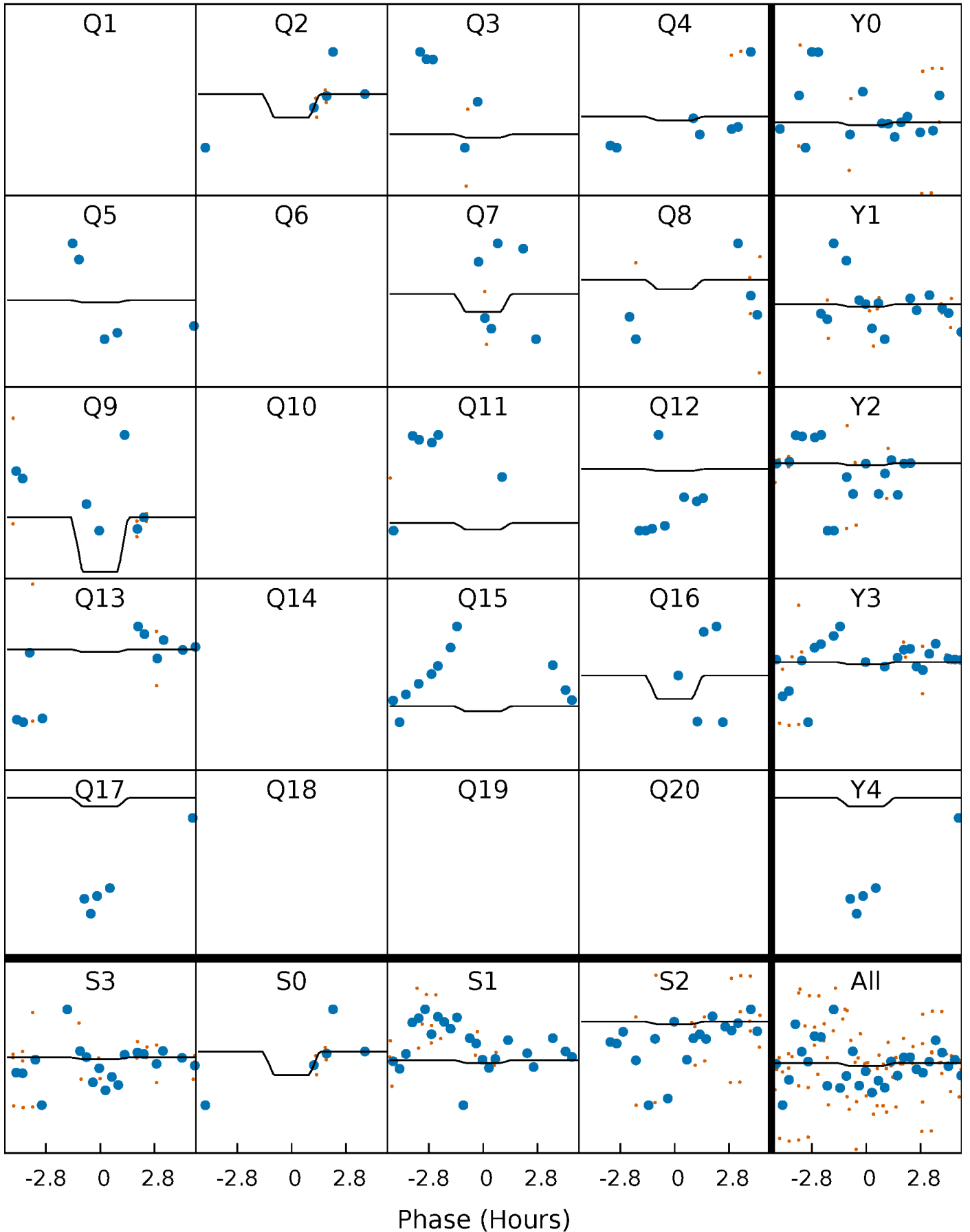
# DV Quarter-Phased Transit Curves

TCE 003659186-05   P= 8.582651 Days    $T_0=139.632626$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

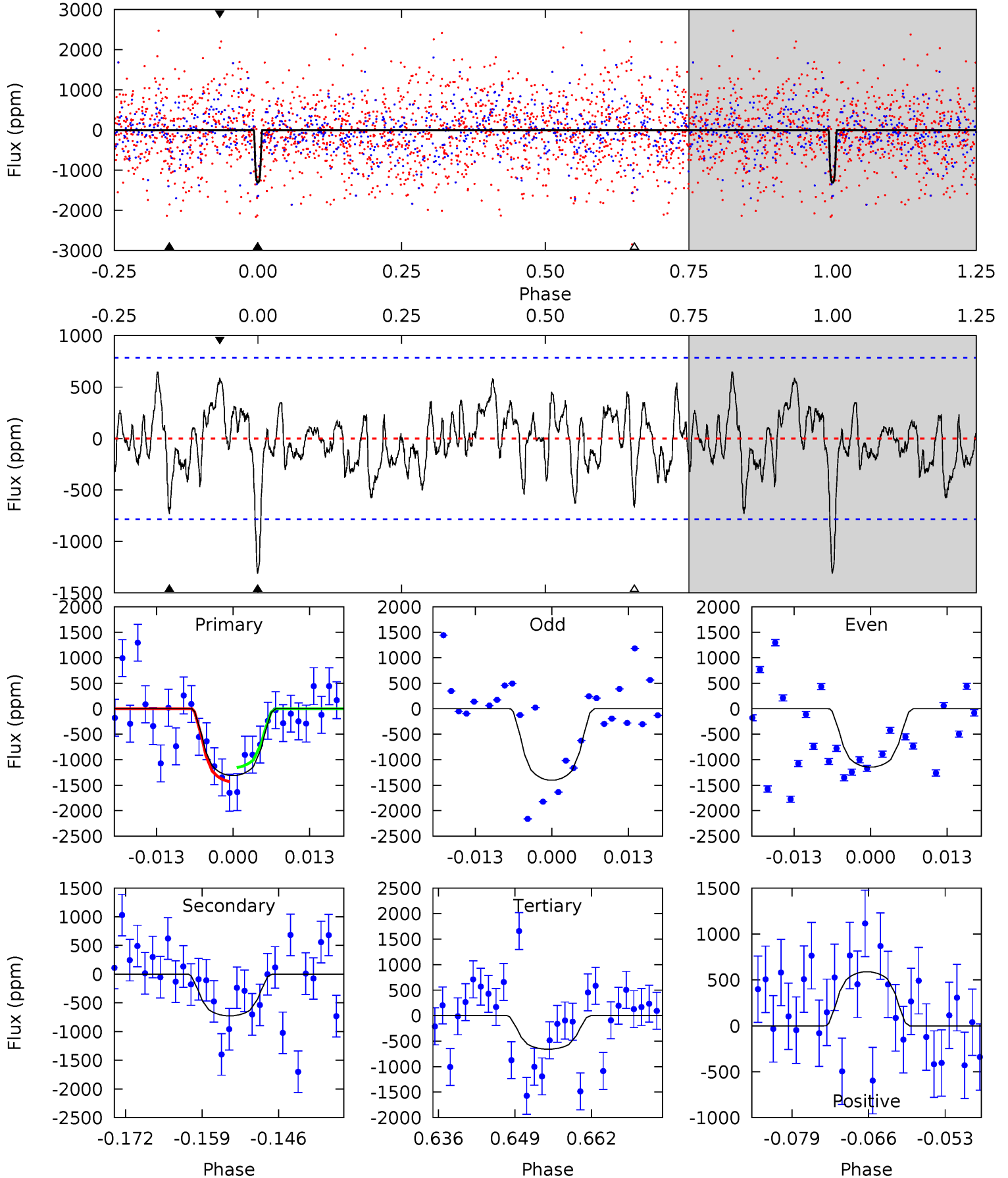
TCE 003659186-05   P= 8.582550 Days    $T_0=139.712764$  (BKJD)



# DV Model-Shift Uniqueness Test

003659186-05, P = 8.582651 Days, E = 139.632626 Days

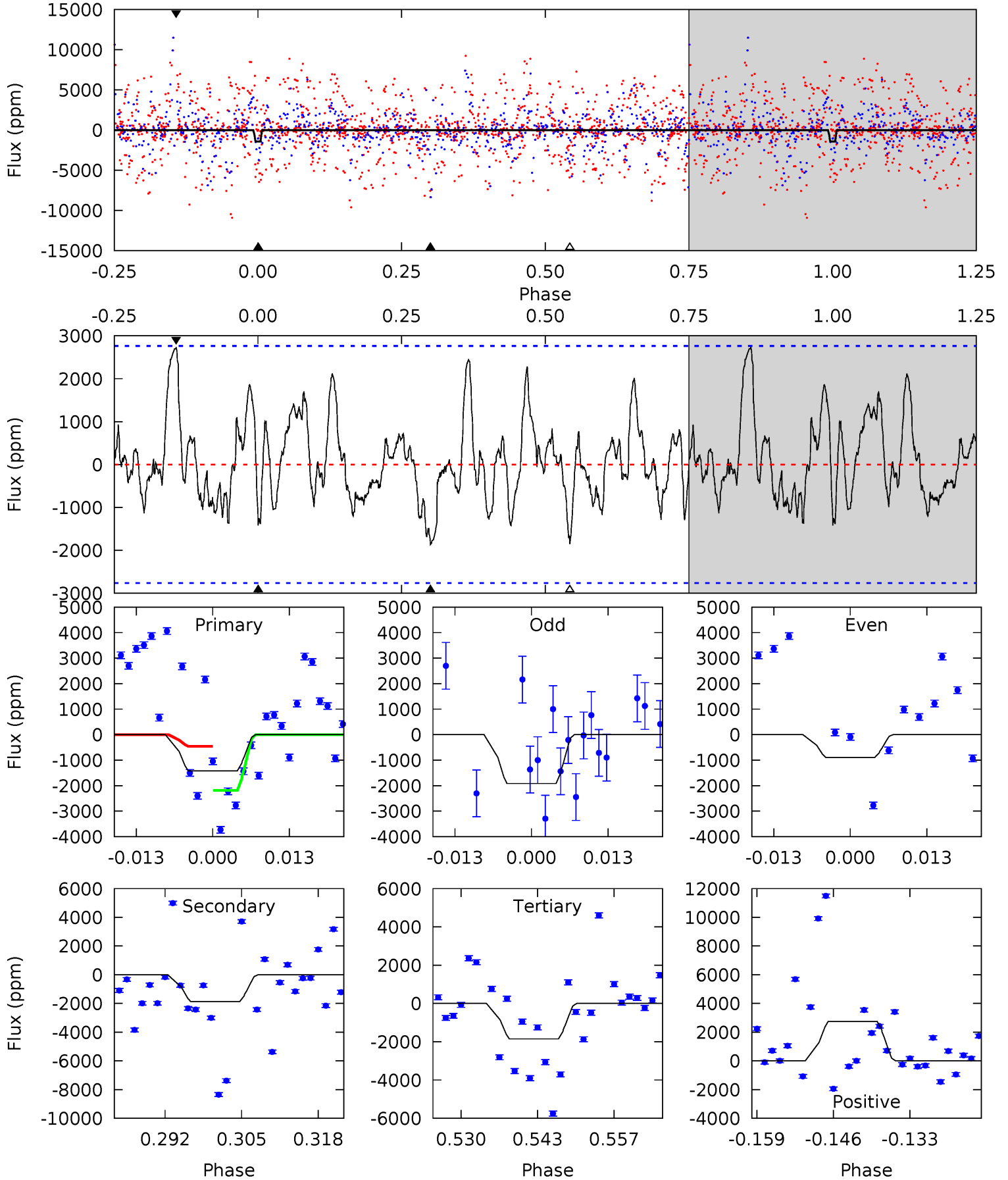
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.30	4.59	4.16	3.72	4.97	2.48	1.51	4.14	4.57	0.43	0.86	0.77	0.73	0.33	0.87



# Alt Model-Shift Uniqueness Test

003659186-05, P = 8.582550 Days, E = 139.712764 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
2.55	3.35	3.33	4.92	4.97	2.48	1.43	-0.78	-2.37	0.02	-1.57	0.75	8.40	0.59	1.52



### Stellar Parameters For KIC 003659186

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4770^{+217}_{-195}$	$4.586^{+0.060}_{-0.035}$	$-0.240^{+0.300}_{-0.300}$	$0.693^{+0.060}_{-0.067}$	$0.676^{+0.088}_{-0.051}$	$2.855^{+0.756}_{-0.414}$
	+5%/-4%	+1%/-1%	+125%/-125%	+9%/-10%	+13%/-8%	+26%/-15%
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 003659186-05 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-725 \pm 158$	$6.65^{+6.72}_{-4.12}$	$911^{+43}_{-40}$	$3179^{+1269}_{-565}$	$46^{+294}_{-35}$
Alt.	$-1863 \pm 556$	$6.12^{+6.31}_{-4.24}$	$906^{+43}_{-42}$	$3767^{+2240}_{-797}$	$144^{+1323}_{-113}$

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

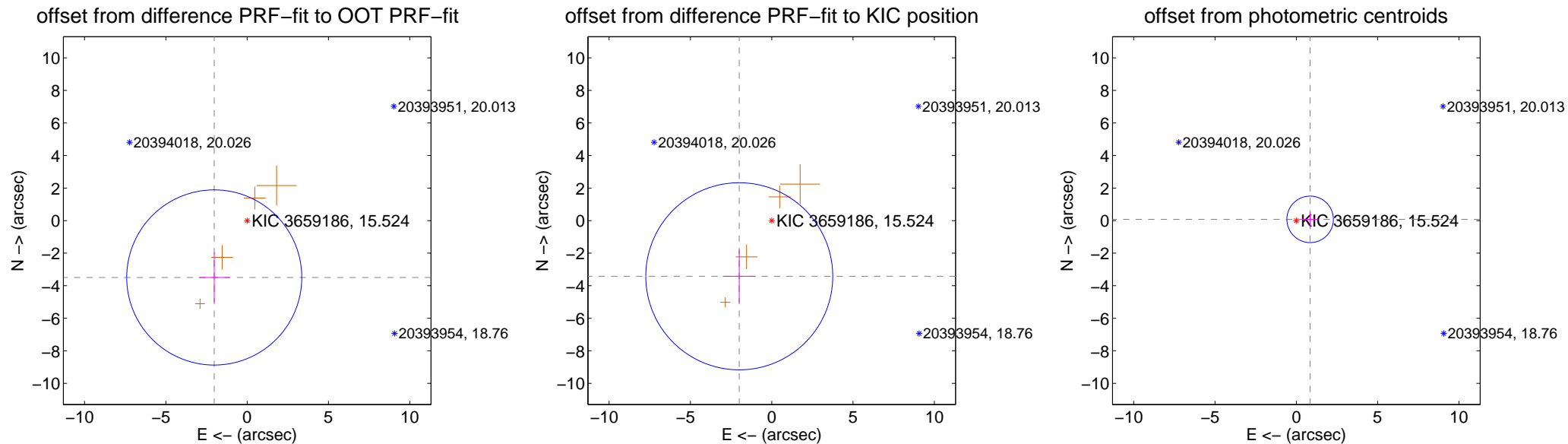
## DV Centroid Data

Supplemental centroid analysis for 003659186-05. Kepler magnitude: 15.52. Transit SNR 6.93

There are 0 quarters with good PRF difference image offsets

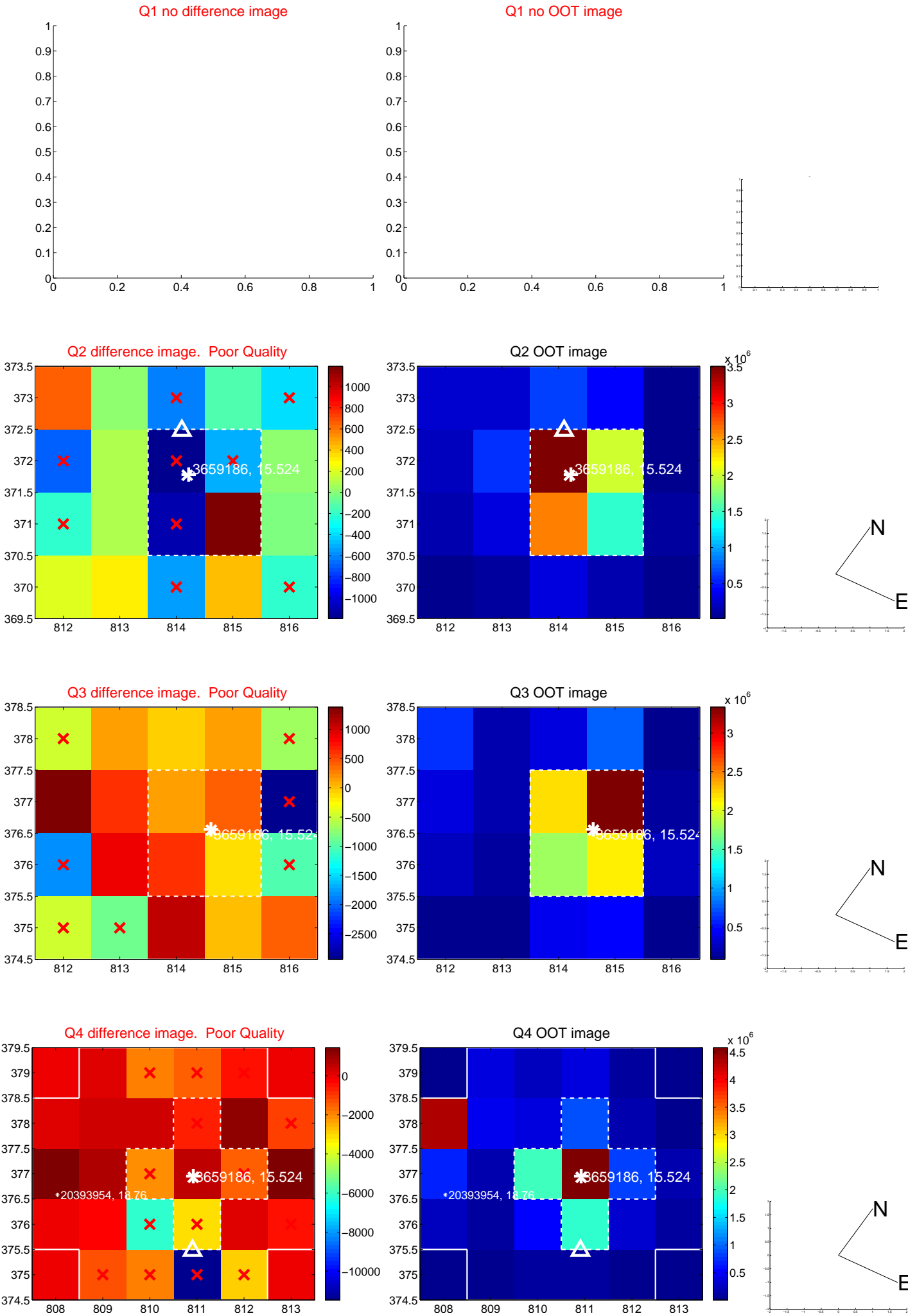
The direct PRF centroid is offset from the target star catalog position by about 0.07 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$4.037 \pm 1.794$	2.25	$2.023 \pm 0.939$	$-3.493 \pm 1.536$
PRF-fit source offset from KIC position	$3.960 \pm 1.916$	2.07	$1.996 \pm 1.017$	$-3.420 \pm 1.630$
photometric centroid source offset	$0.85 \pm 0.48$	1.79	$-0.85 \pm 0.48$	$0.08 \pm 0.45$



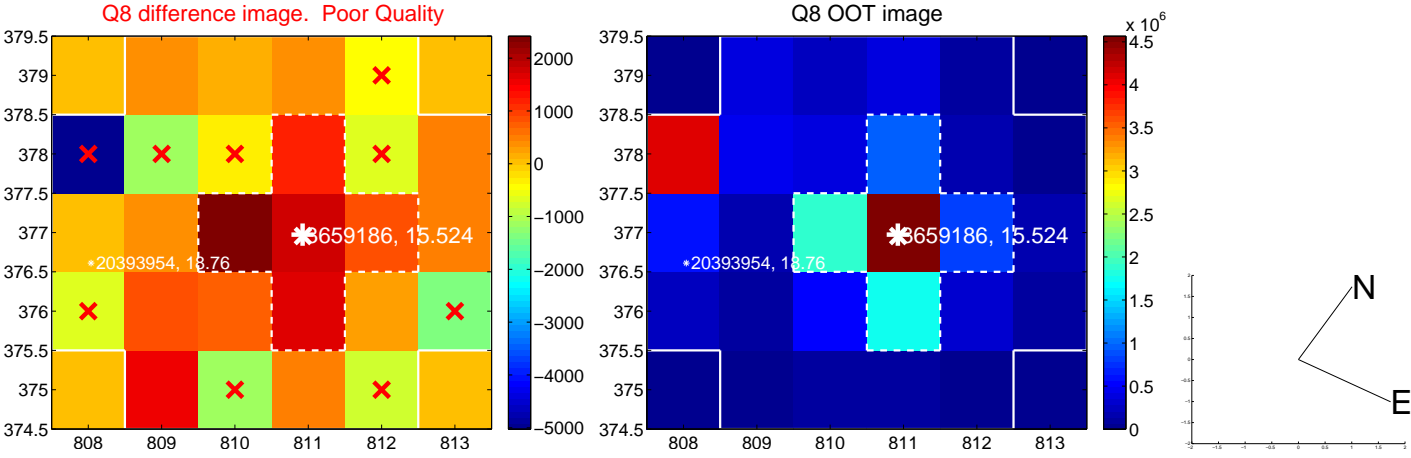
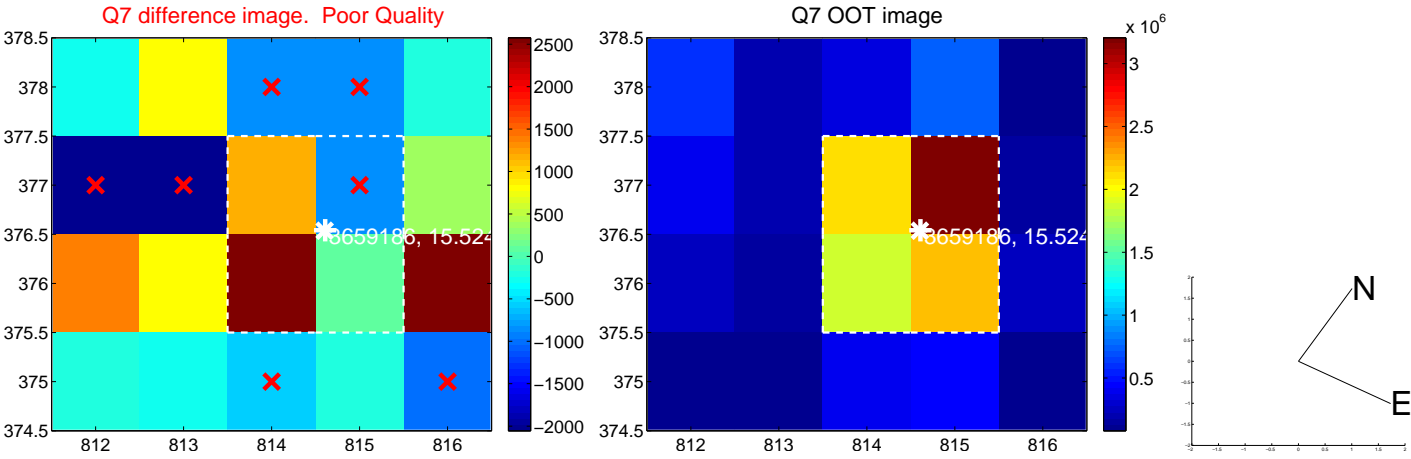
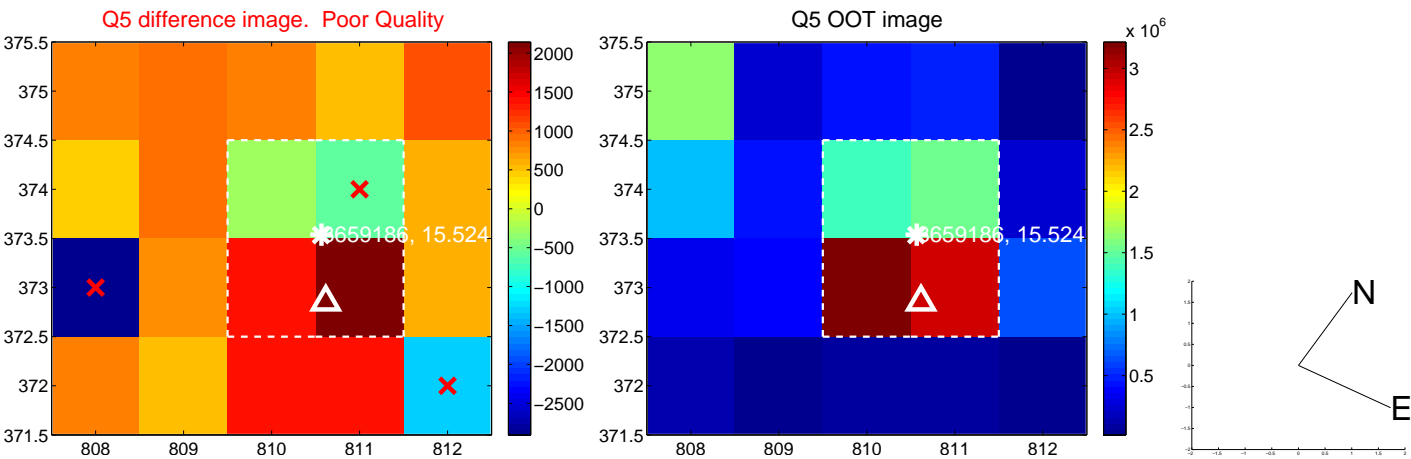
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

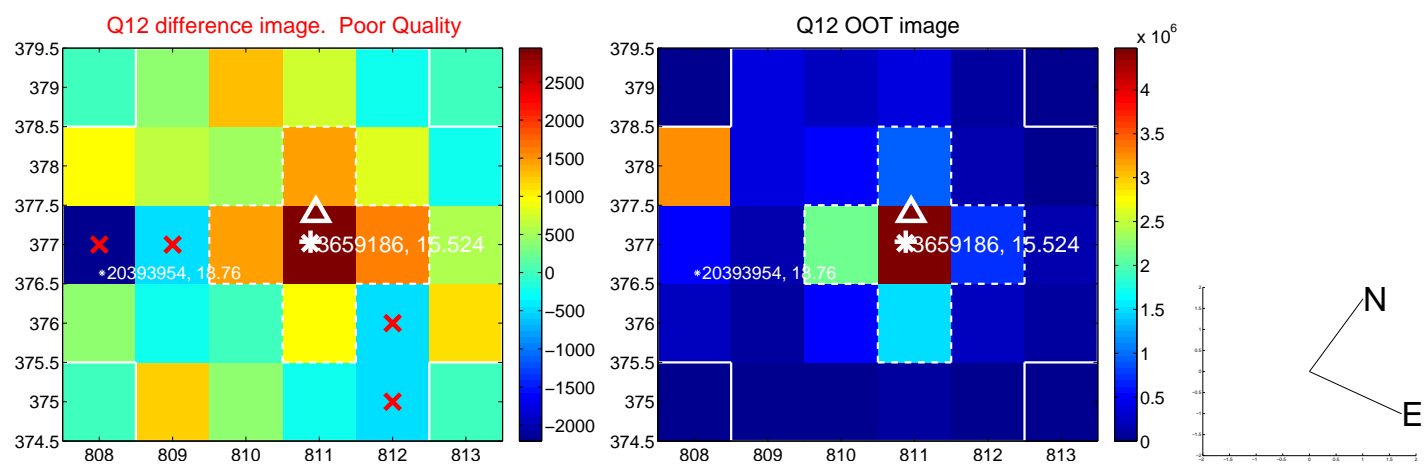
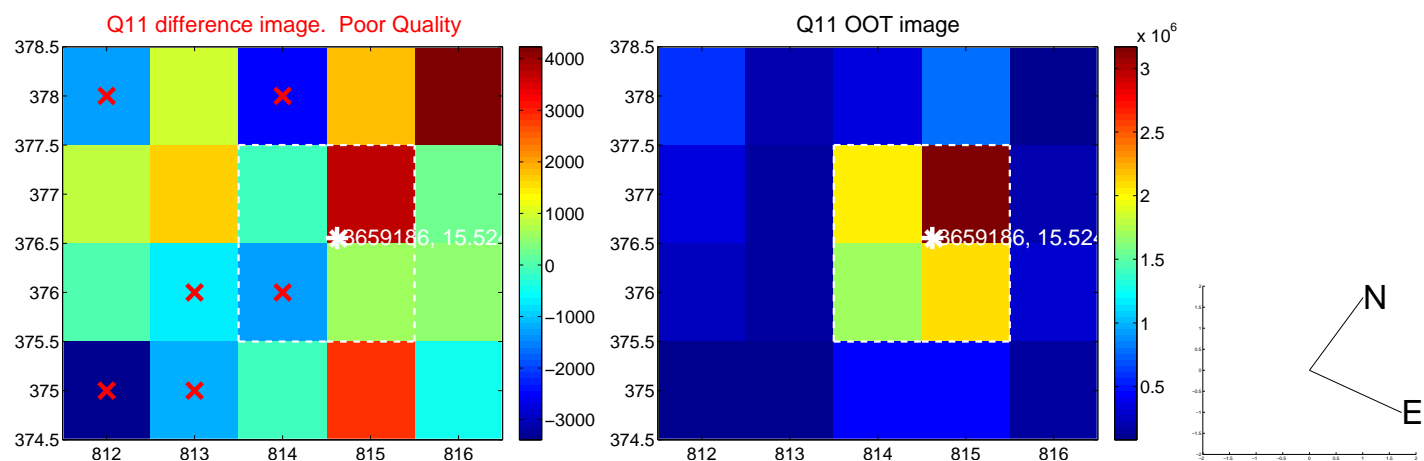
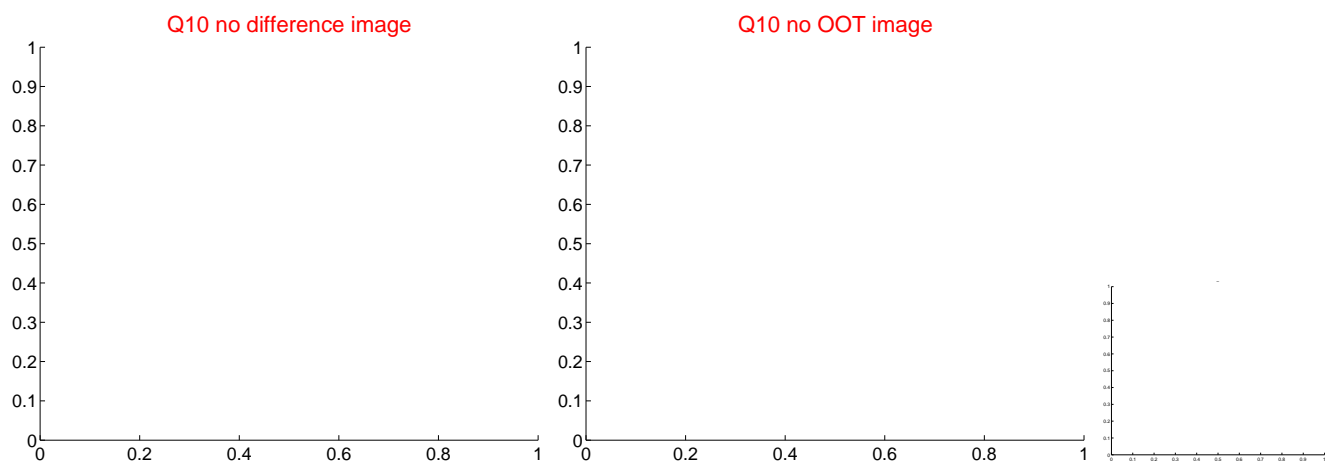
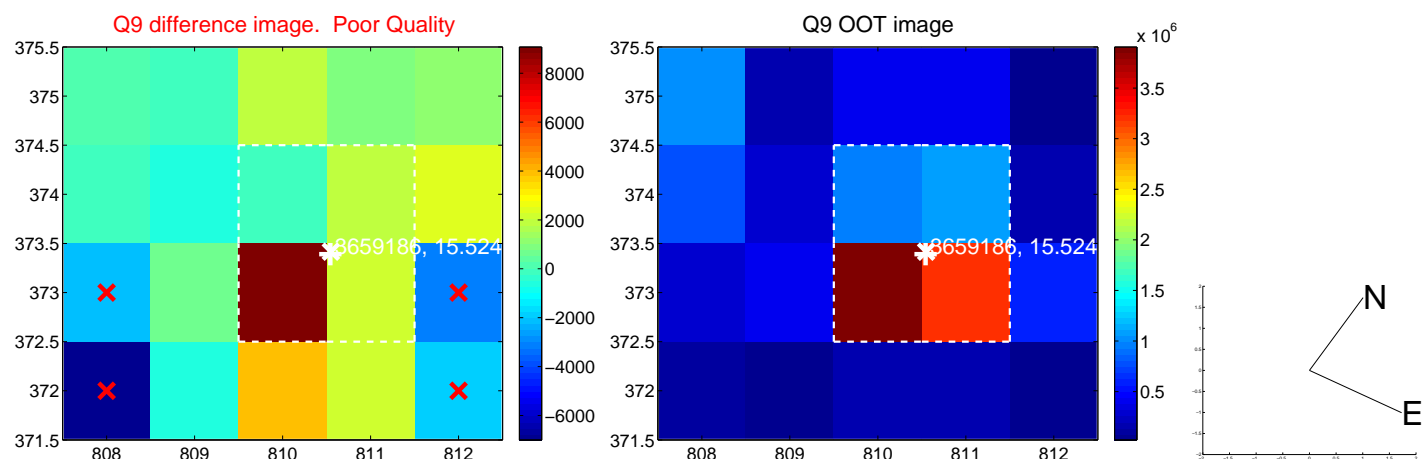




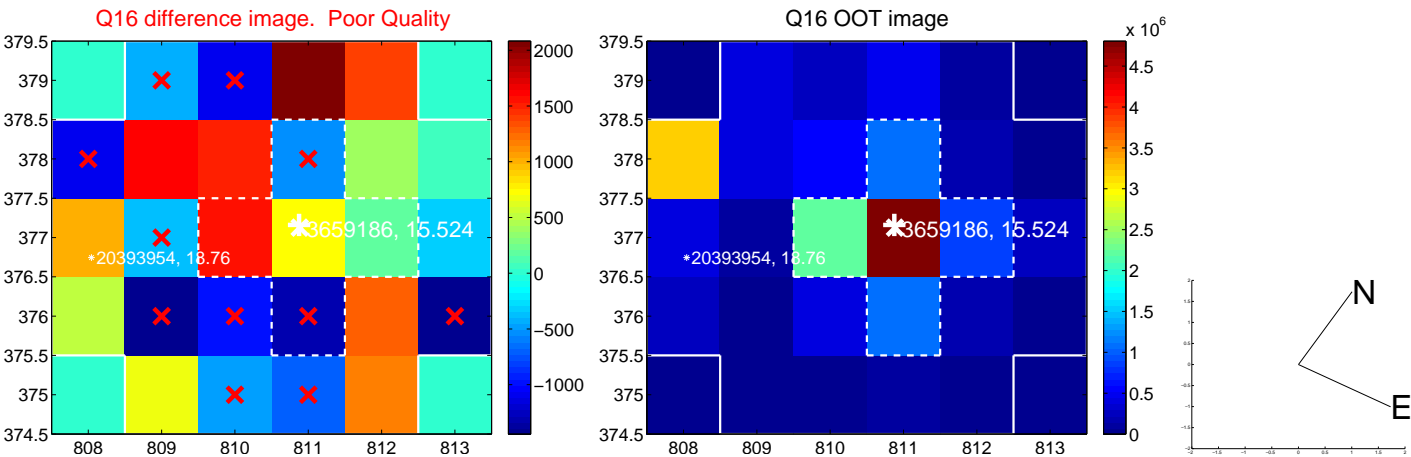
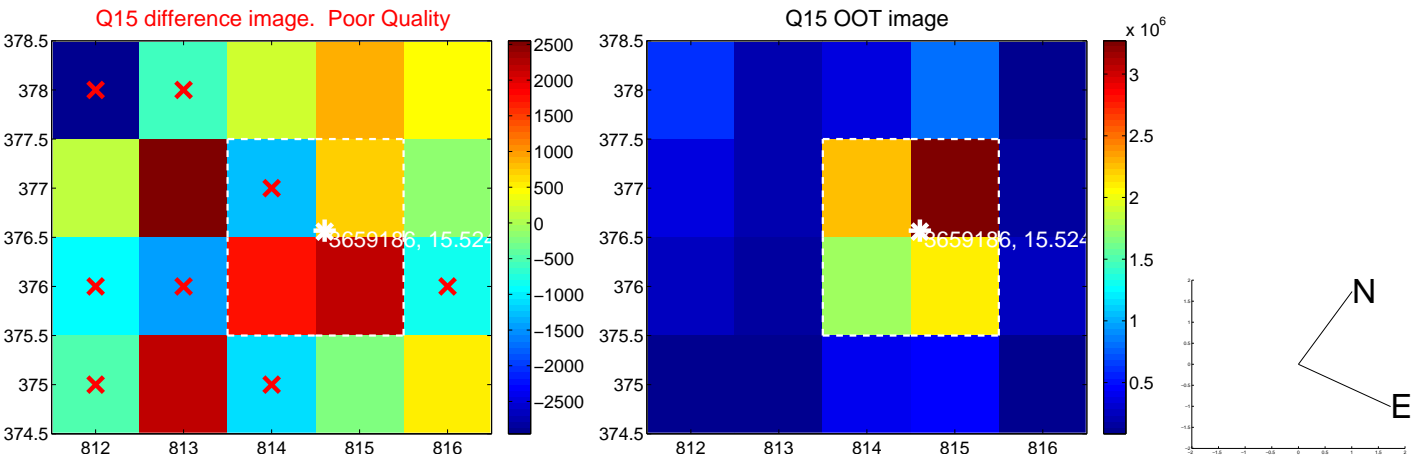
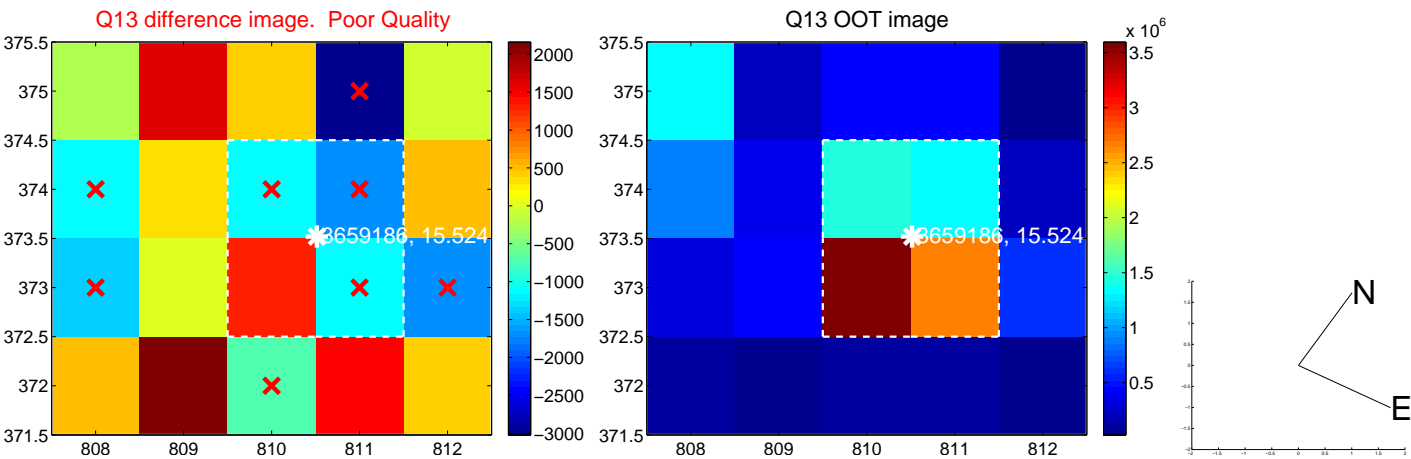
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



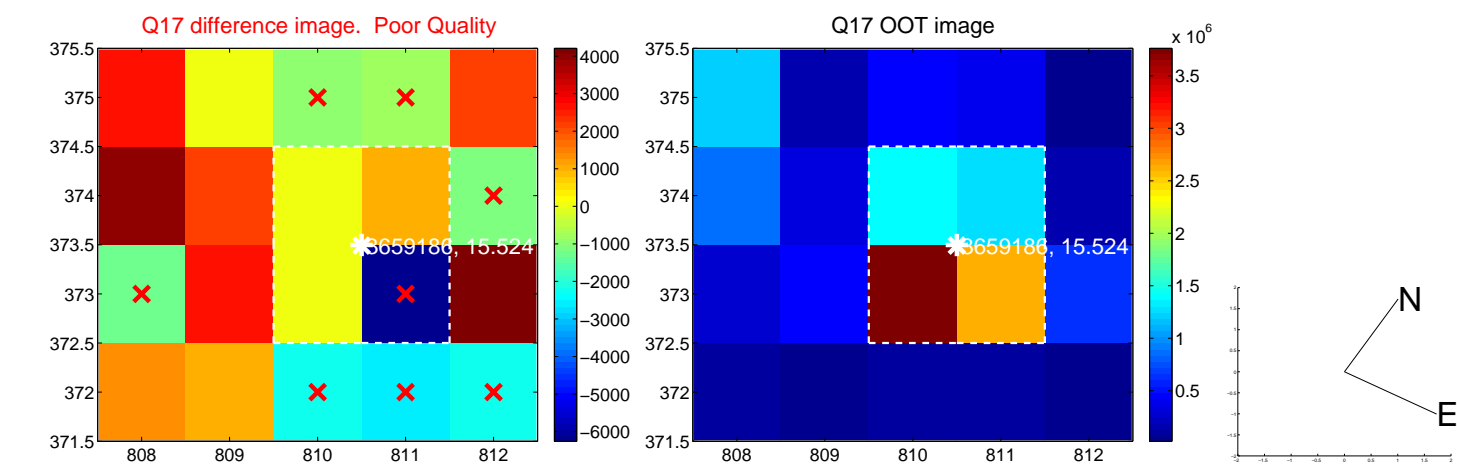
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



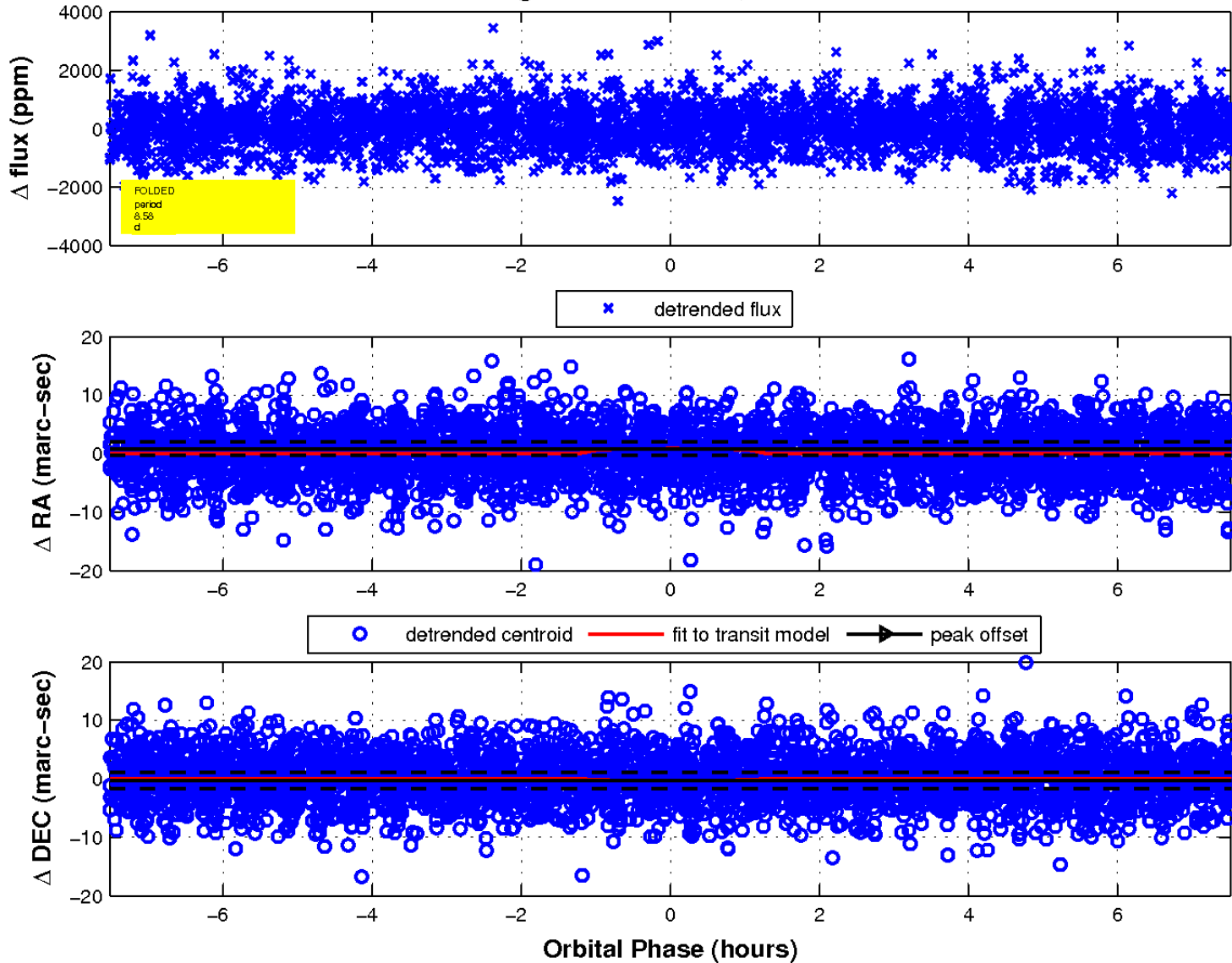
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 5 of 5



UKIRT Image

Declination

