

# KIC 005951140

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005951140-02	OBS	No	429.952283	219.805522	1739.3	4.157	16.0	7.4	0.41	3581	1.67	0.04
005951140-03	OBS	No	415.427096	177.055354	2772.7	4.553	15.7	9.4	0.41	3581	2.69	0.04
005951140-04	OBS	No	523.453177	330.034242	1637.7	4.165	14.9	5.7	0.41	3581	1.78	0.03
005951140-06	OBS	No	484.214071	492.531132	1211.8	3.500	14.3	-1.0	0.41	3581	1.40	0.03

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005951140-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
005951140-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE_TRACKER—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
005951140-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_KIC_POS
005951140-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_NOFITS

**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 005951140-02

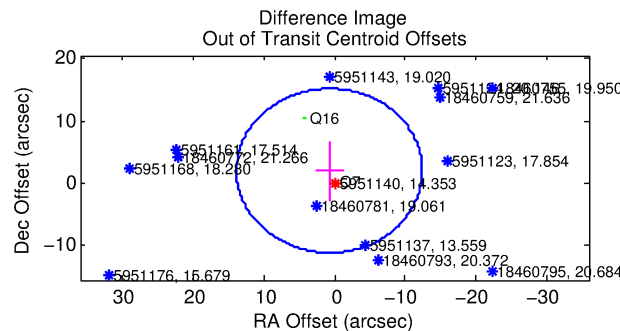
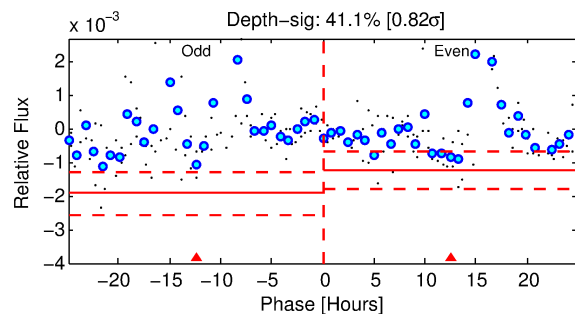
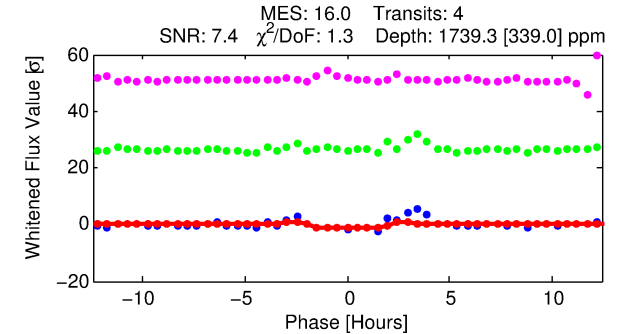
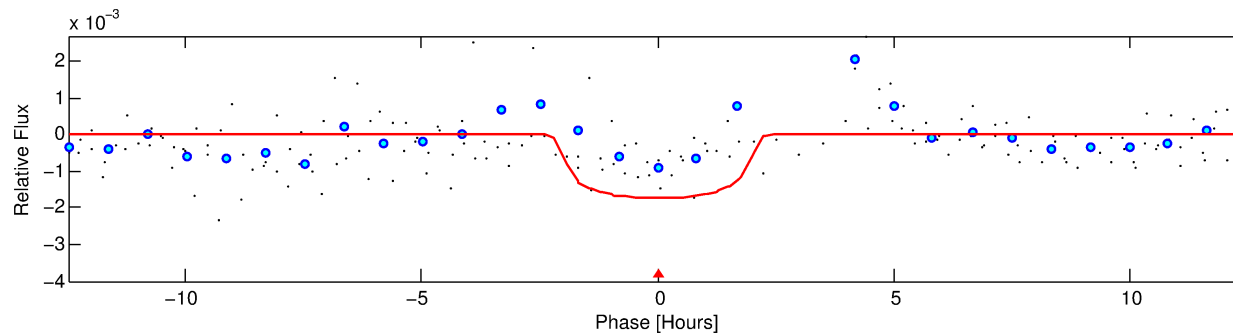
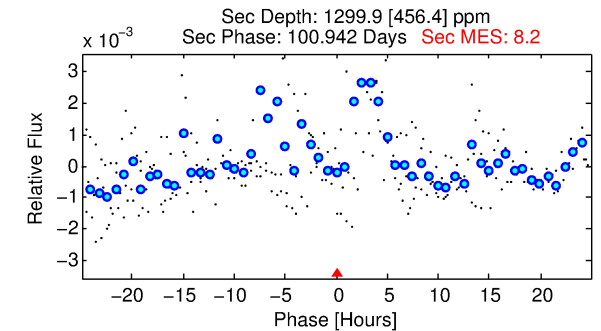
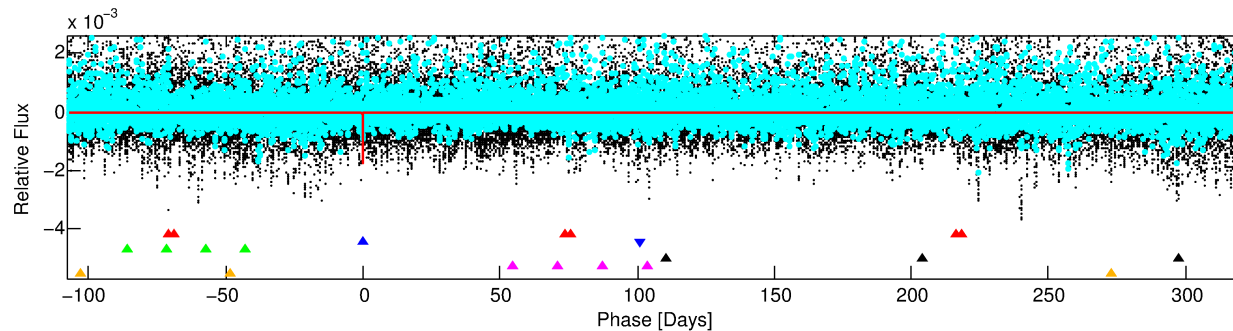
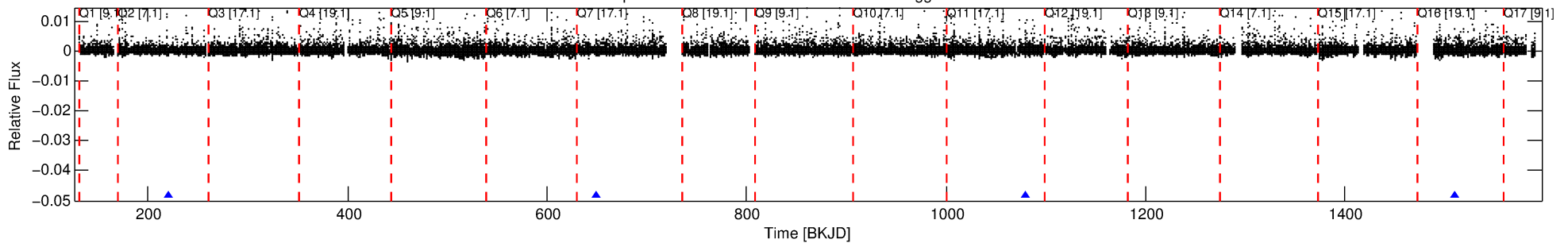
No Significant Match Found

# DV One-Page Summary

KIC: 5951140 Candidate: 2 of 6 Period: 429.952 d

KOI: K06635 Corr: No Ephemeris Match

Kp: 14.35 R\*: 0.41 Rs Teff: 3581.0 K Logg: 4.85 Fe/H: -0.100



## DV Fit Results:

Period = 429.95228 [0.00351] d  
Epoch = 219.8055 [0.0058] BKJD  
Rp/R\* = 0.0378 [0.0457]  
a/R\* = 816.49 [4243.91]  
b = 0.10 [54.21]  
Seff = 0.03 [0.00]  
Teq = 110 [3] K  
Rp = 1.67 [2.03] Re  
a = 0.8362 [0.0533] AU  
Ag = 178461.02 [436237.78] [0.41σ]  
Teffp = 3498 [2137] K [1.59σ]

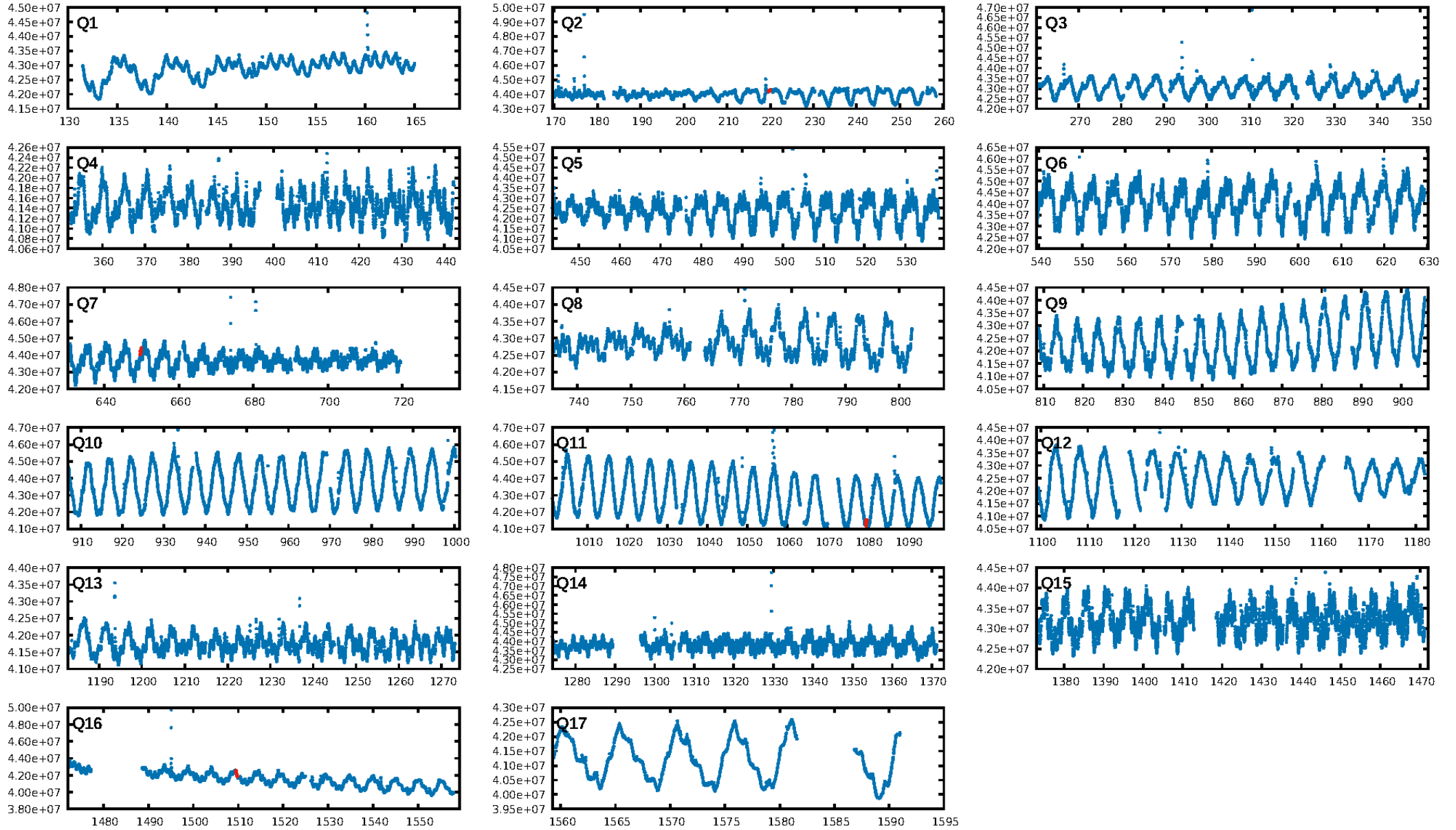
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [56.54σ]  
LongPeriod-sig: 100.0% [239.64σ]  
ModelChiSquare2-sig: 2.7%  
ModelChiSquareGof-sig: 74.1%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: 2.682  
Centroid-sig: 0.1%  
Centroid-so: 0.473 arcsec [0.60σ]  
OotOffset-rm: 2.140 arcsec [0.49σ]  
KicOffset-rm: 0.175 arcsec [1.65σ]  
OotOffset-st: 0/1/1/0 [2]  
KicOffset-st: 0/2/1/0 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 1.00 [4/4]

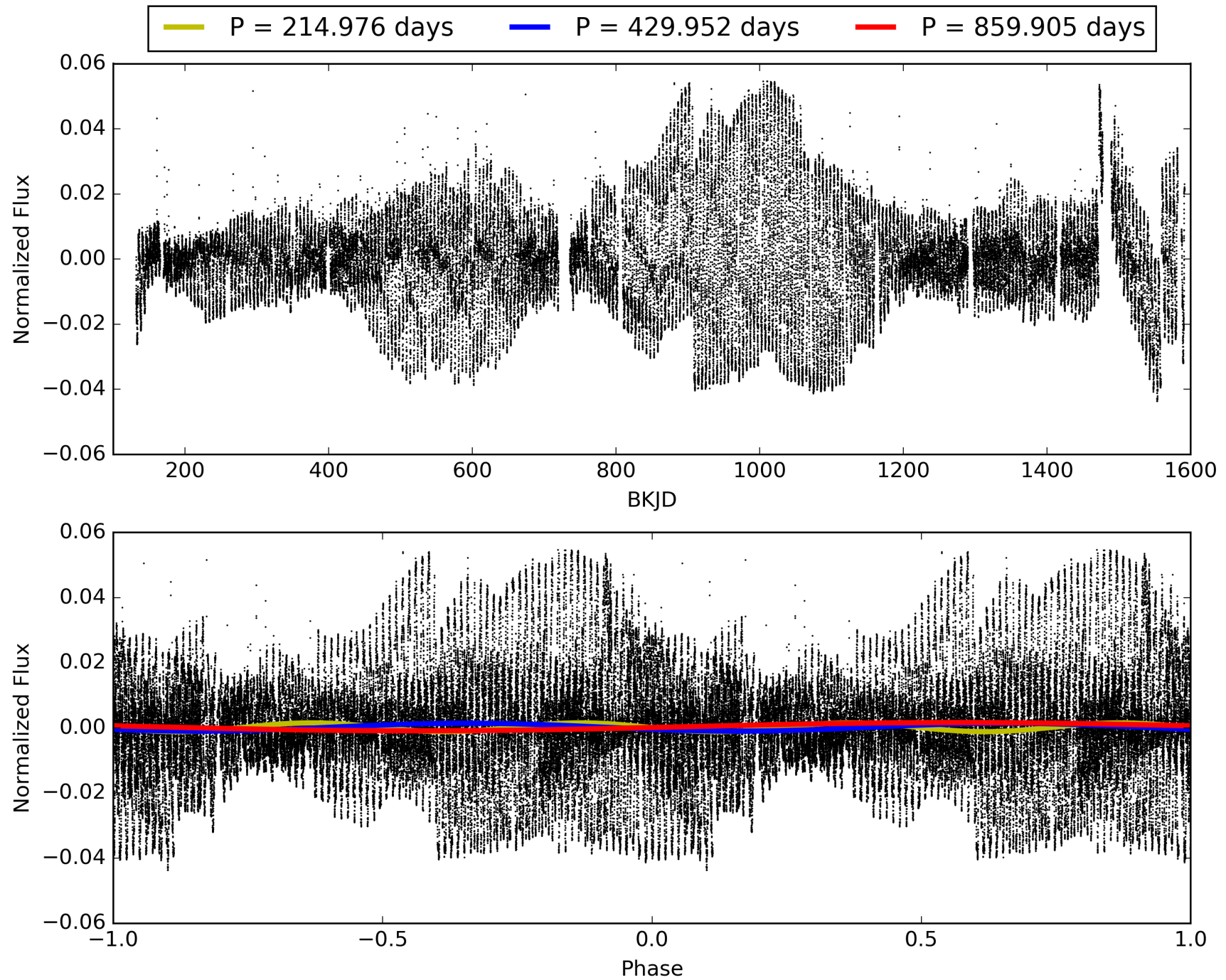
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 00:27:55 Z

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

# TCE 005951140-02, PDC Light Curves



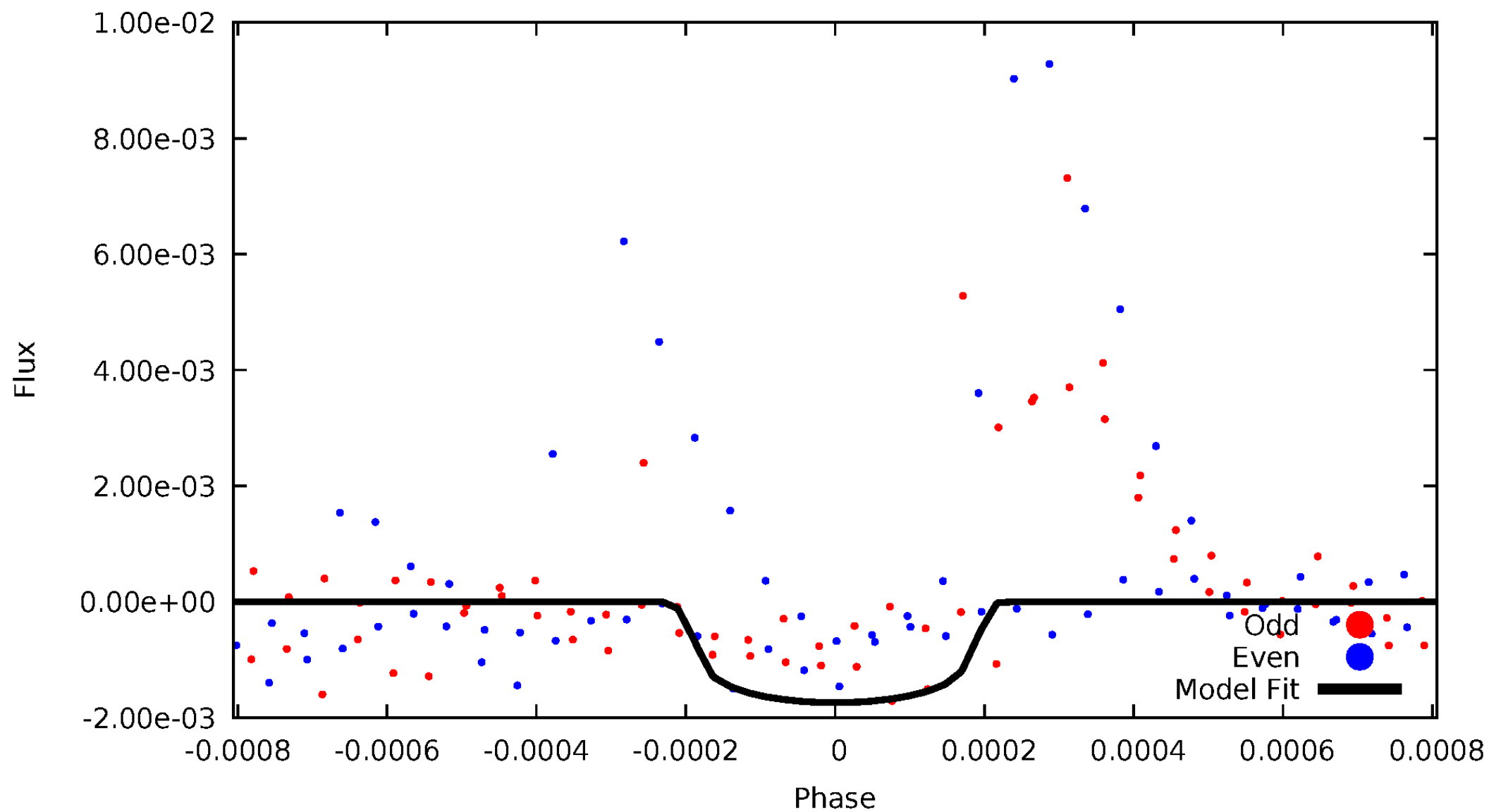
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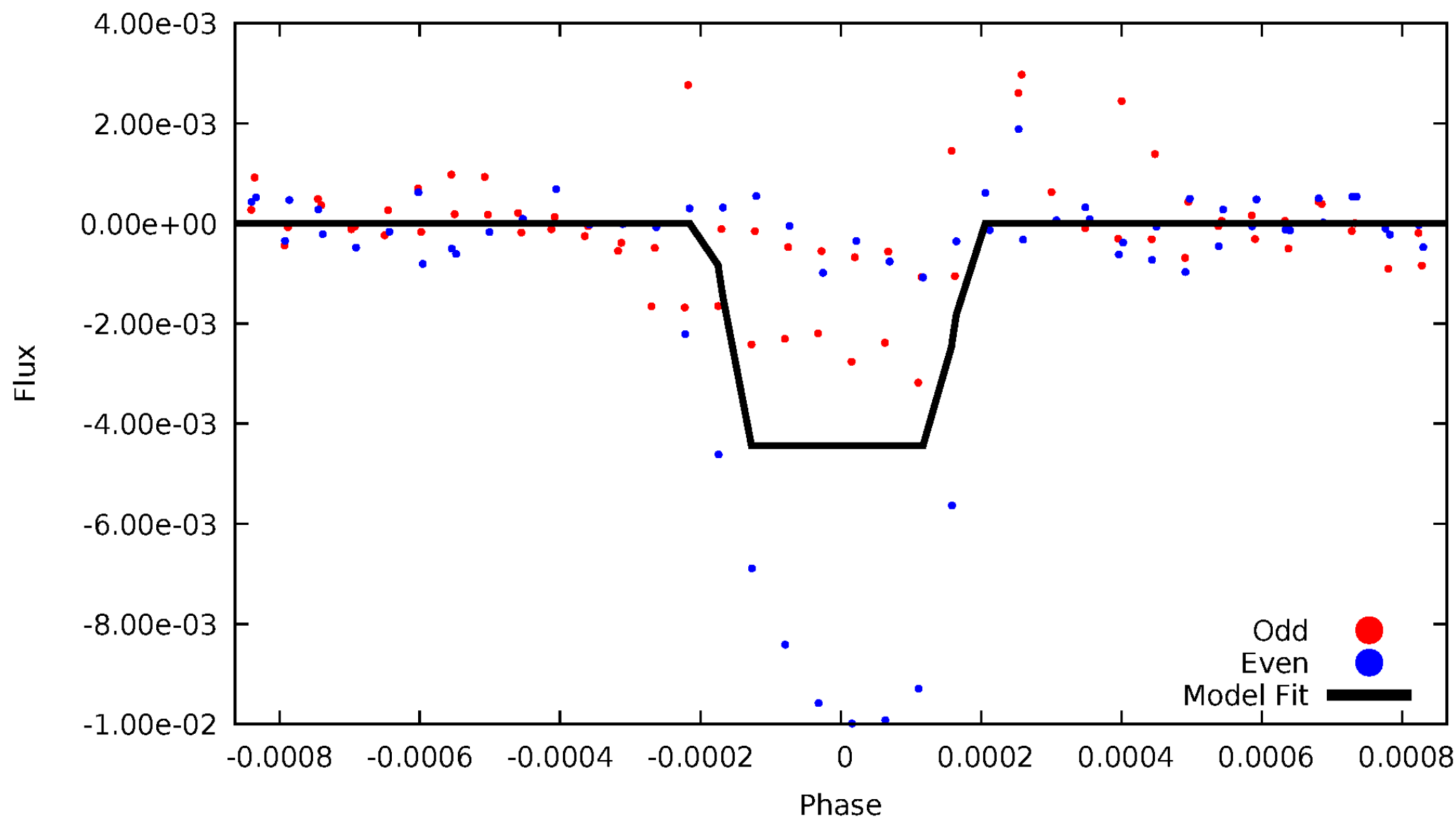
# DV Odd/Even

TCE 005951140-02



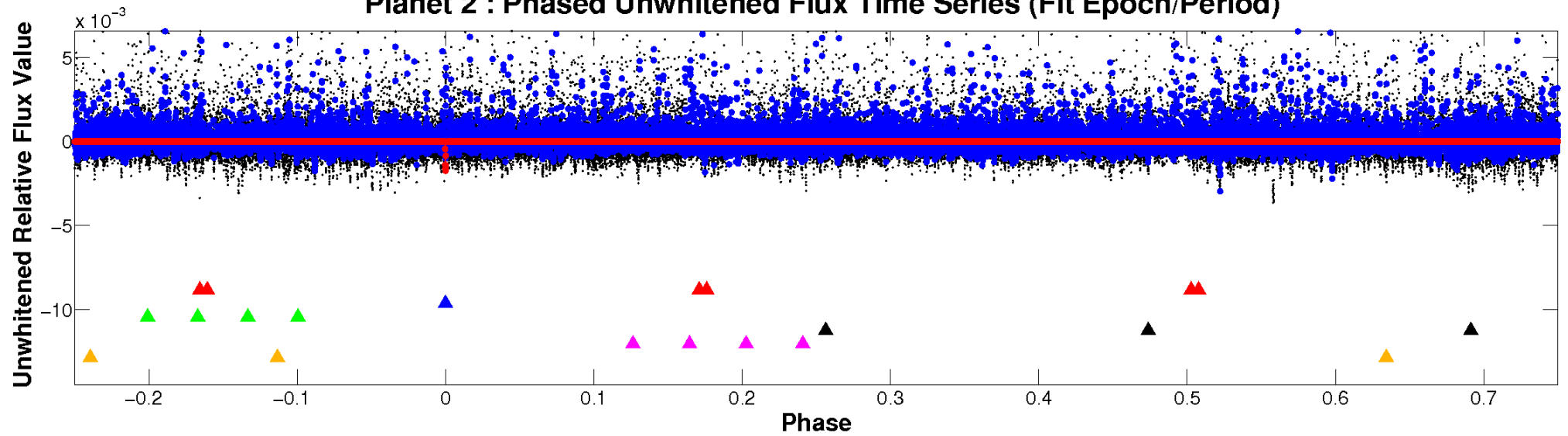
# ALT Odd/Even

TCE 005951140-02

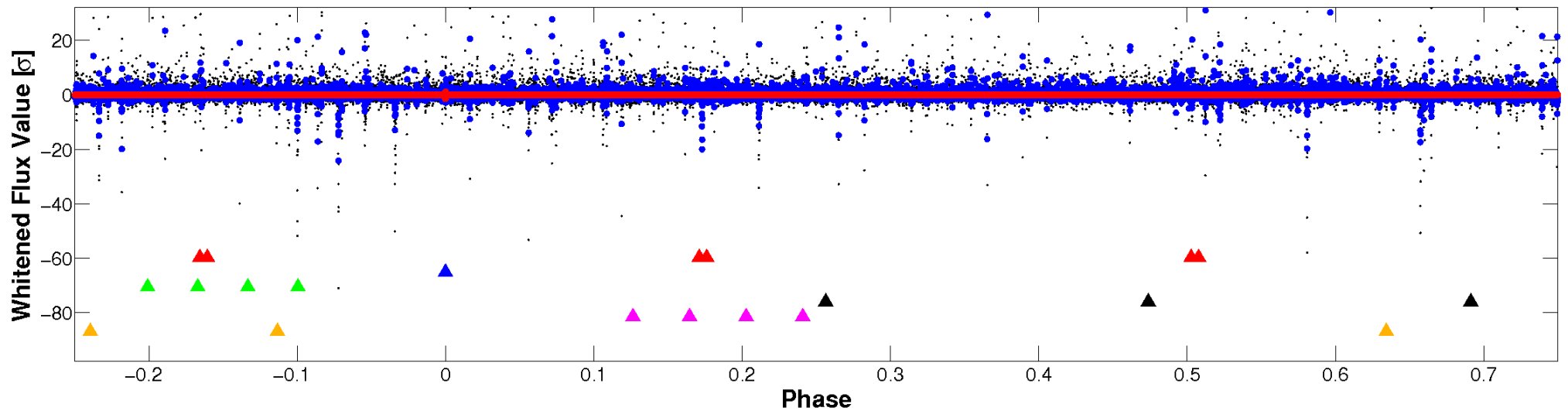


# Non-Whitened Vs. Whitened Light Curve

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

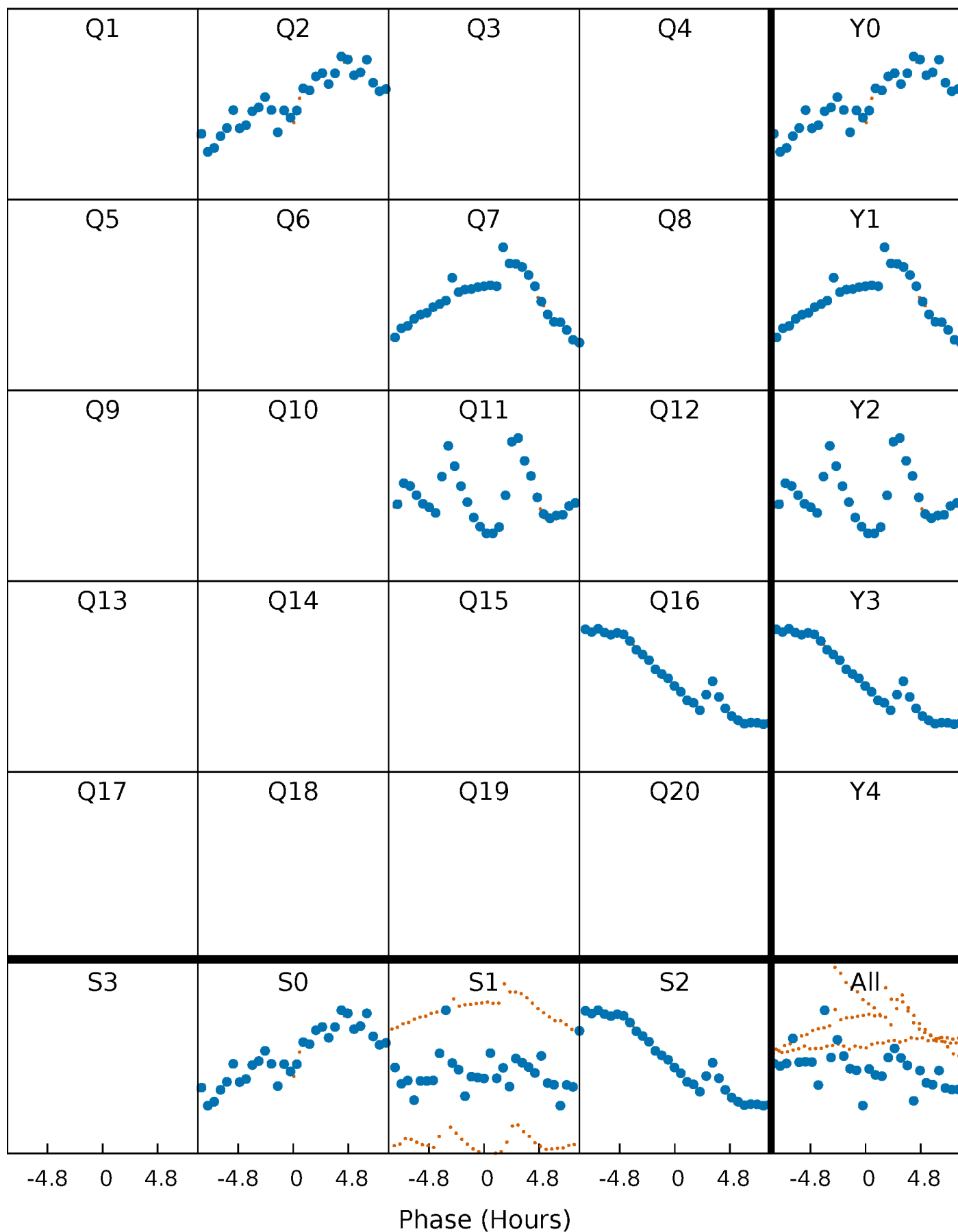


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



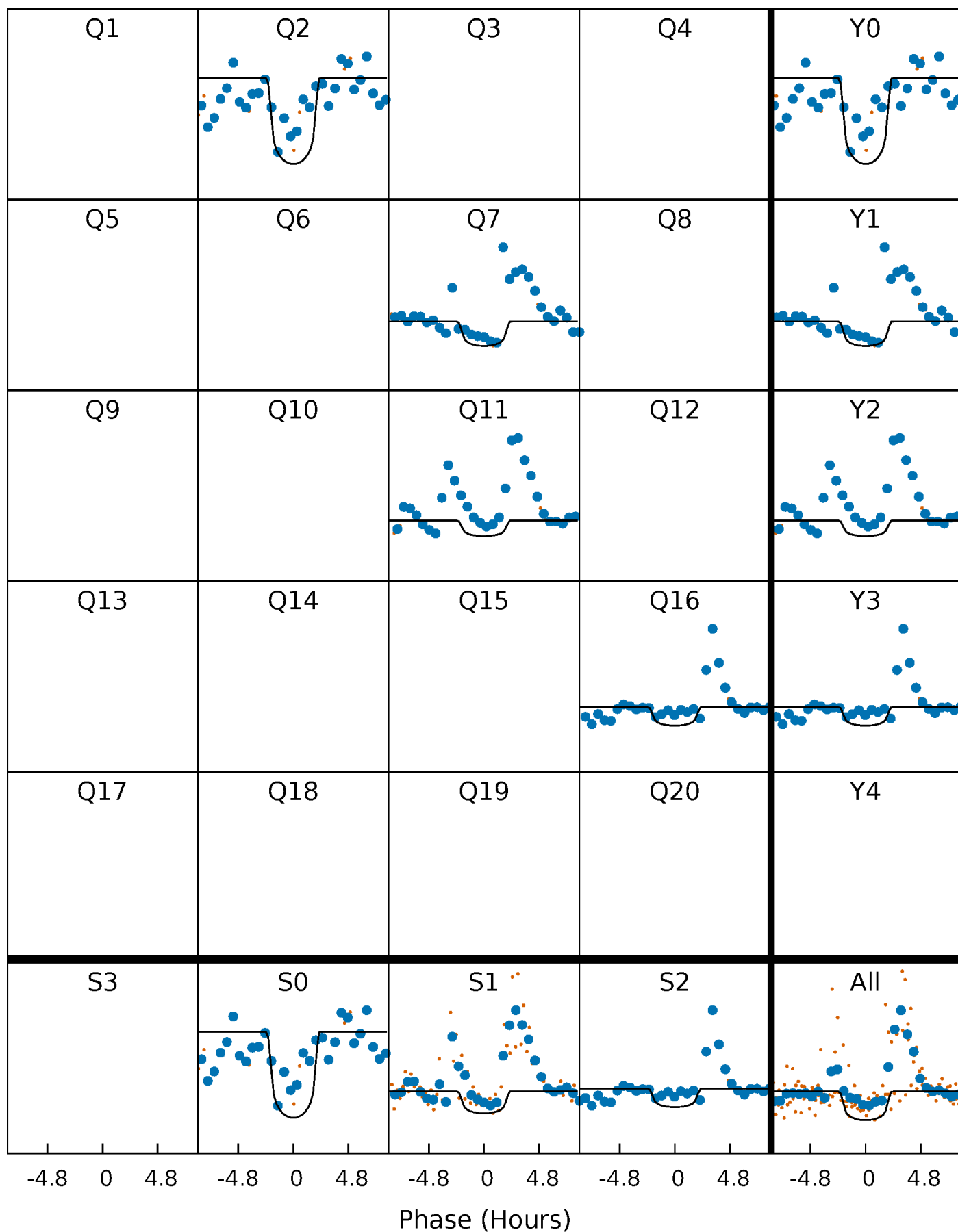
# PDC Quarter-Phased Transit Curves

TCE 005951140-02     $P=429.952283$  Days     $T_0=219.805522$  (BKJD)



# DV Quarter-Phased Transit Curves

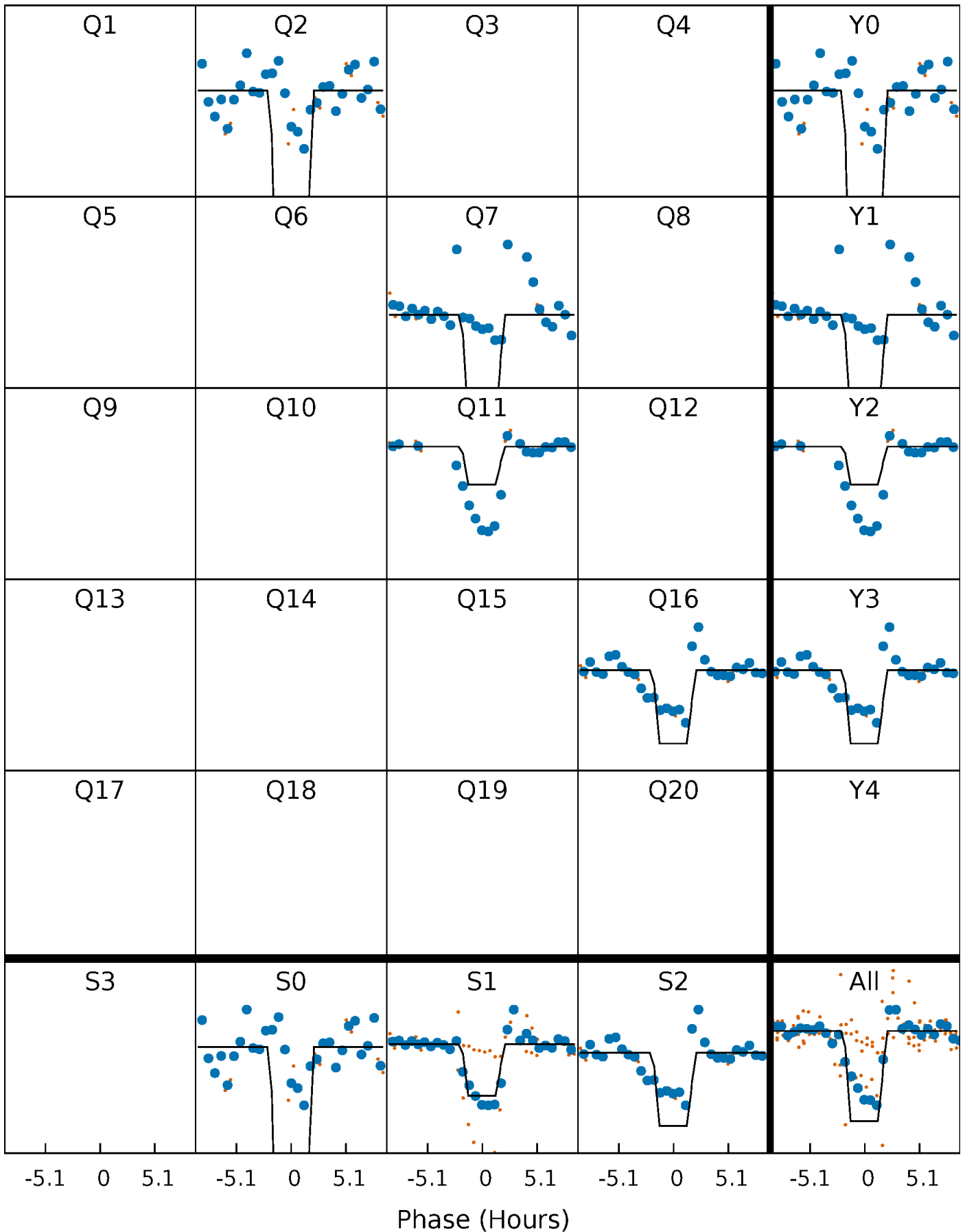
TCE 005951140-02 P=429.952283 Days  $T_0=219.805522$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

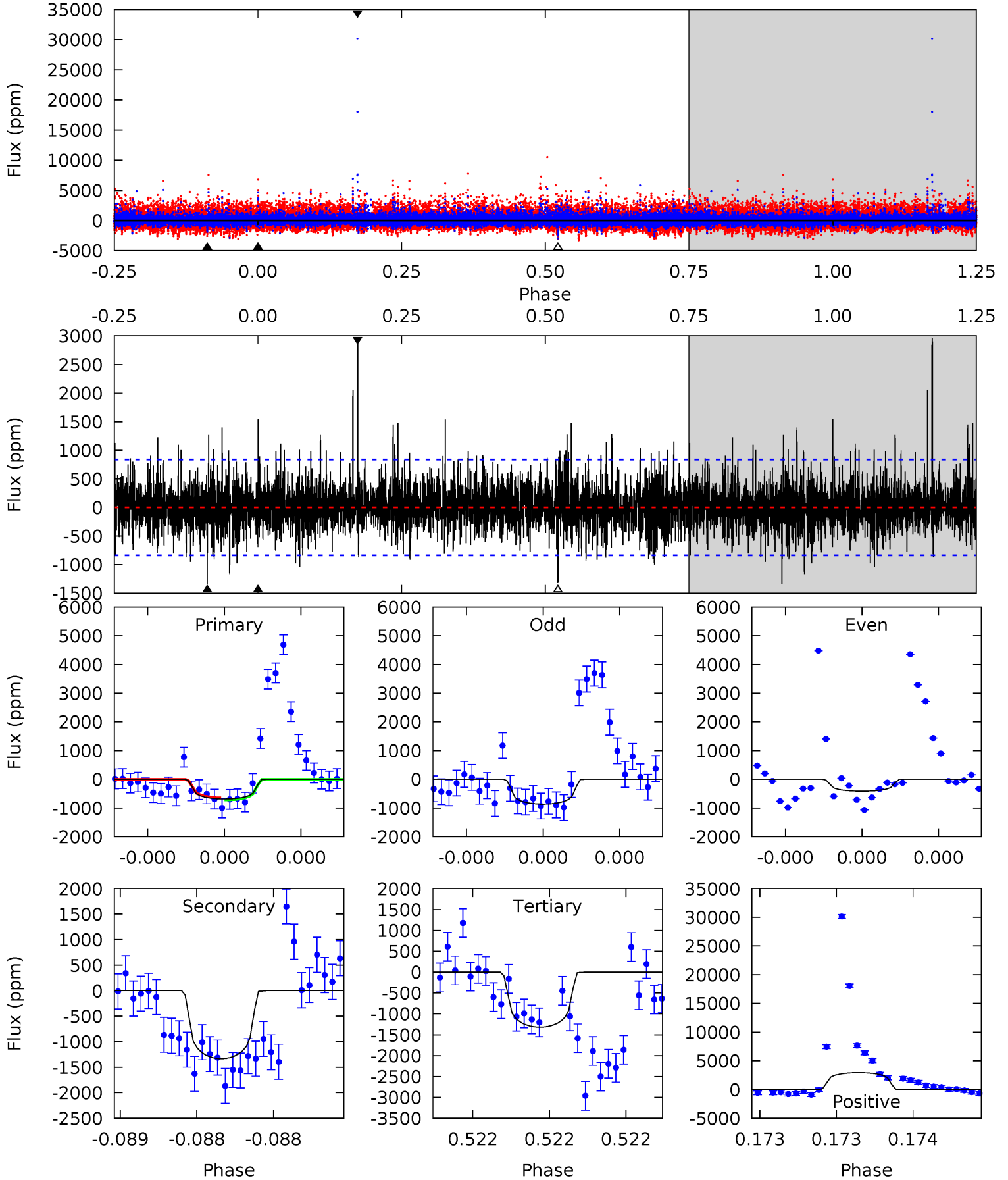
TCE 005951140-02 P=429.983403 Days  $T_0=219.757752$  (BKJD)



# DV Model-Shift Uniqueness Test

005951140-02, P = 429.952283 Days, E = 219.805522 Days

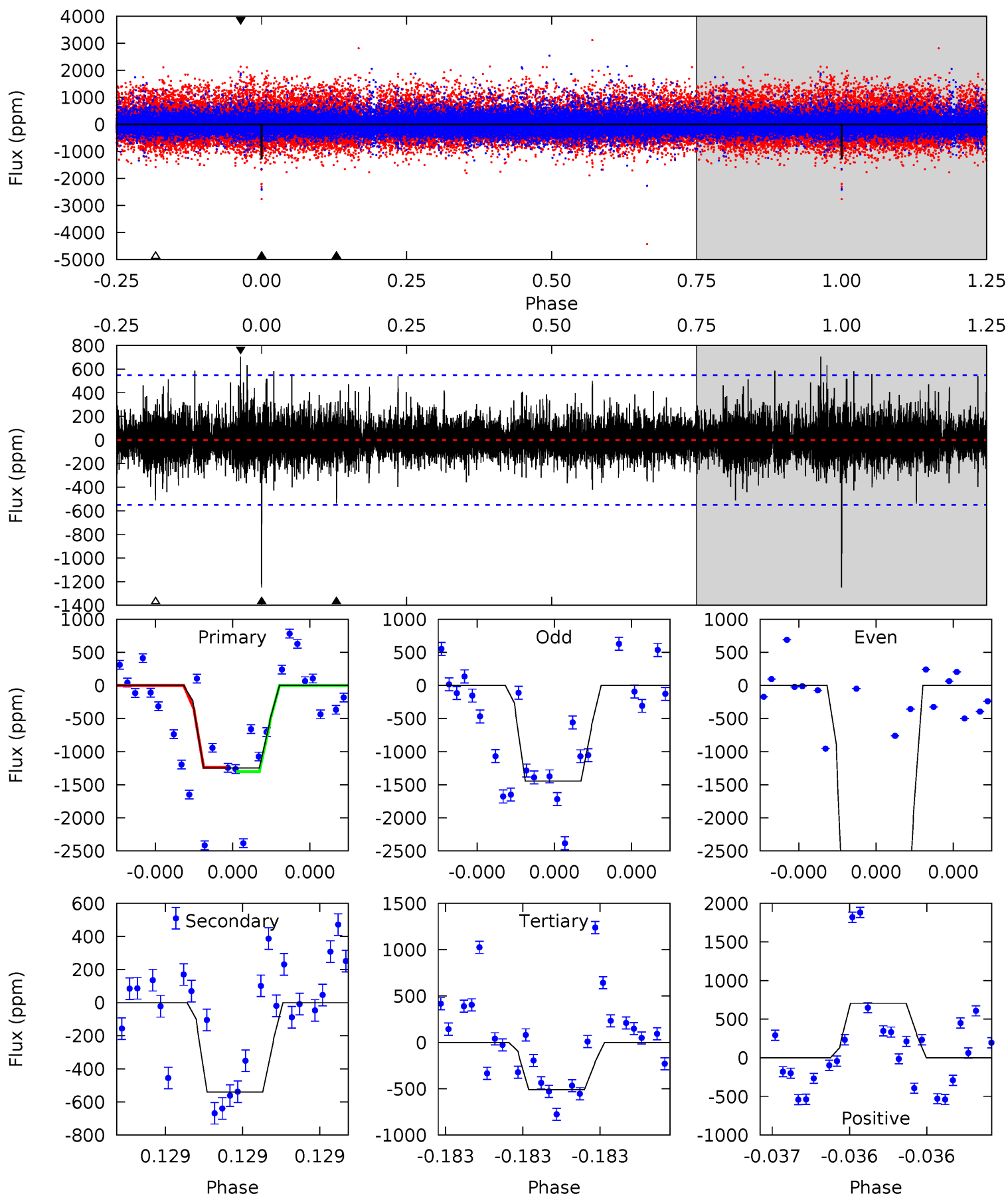
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
4.60	8.92	8.82	19.8	5.59	3.51	2.15	-4.23	-15.2	0.10	-10.8	1.21	0.78	0.69	0.23



# Alt Model-Shift Uniqueness Test

005951140-02, P = 429.983403 Days, E = 219.757752 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.8	5.54	5.23	7.24	5.64	3.58	1.11	7.59	5.58	0.30	-1.70	17.7	2.12	0.36	0.32



### Stellar Parameters For KIC 005951140

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3581^{+43}_{-48}$	$4.846^{+0.036}_{-0.030}$	$-0.100^{+0.100}_{-0.100}$	$0.406^{+0.029}_{-0.035}$	$0.424^{+0.031}_{-0.038}$	$8.915^{+1.741}_{-1.115}$
	+1%/-1%	+1%/-1%	+100%/-100%	+7%/-9%	+7%/-9%	+20%/-13%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 005951140-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-1333 \pm 149$	$2.25^{+1.83}_{-1.42}$	$153^{+3}_{-3}$	$3232^{+1309}_{-507}$	$102293^{+648512}_{-71672}$
Alt.	$-539 \pm 97$	$3.18^{+1.95}_{-1.80}$	$153^{+3}_{-3}$	$2595^{+651}_{-291}$	$20332^{+84376}_{-12566}$

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

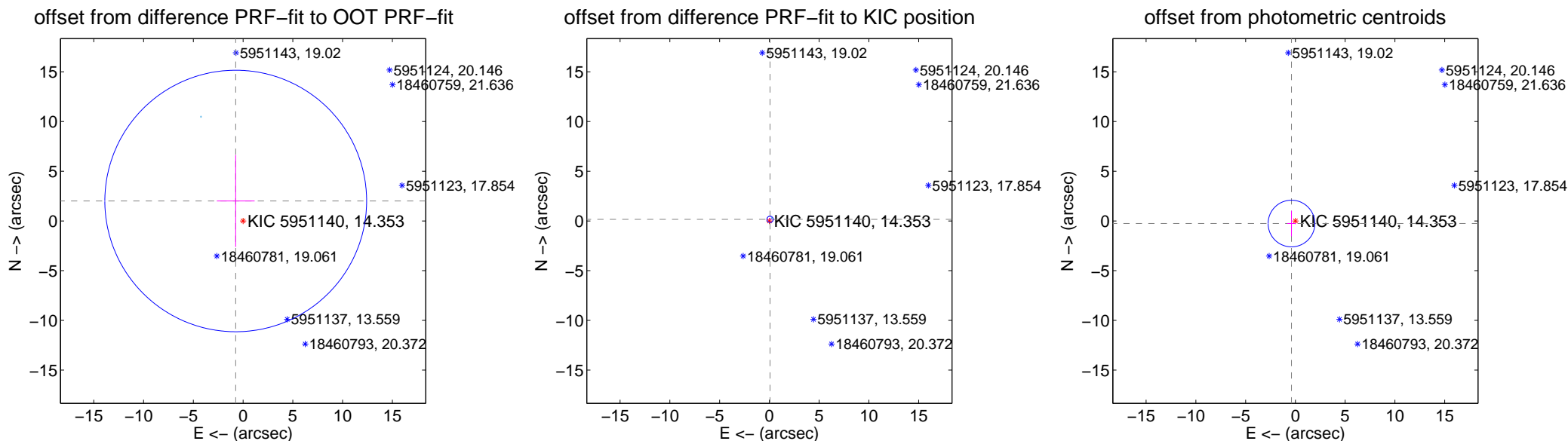
## DV Centroid Data

Supplemental centroid analysis for 005951140-02. Kepler magnitude: 14.35. Transit SNR 7.44

There are 2 quarters with good PRF difference image offsets

The OOT PRF centroid is offset from the target star catalog position by about 11.13 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

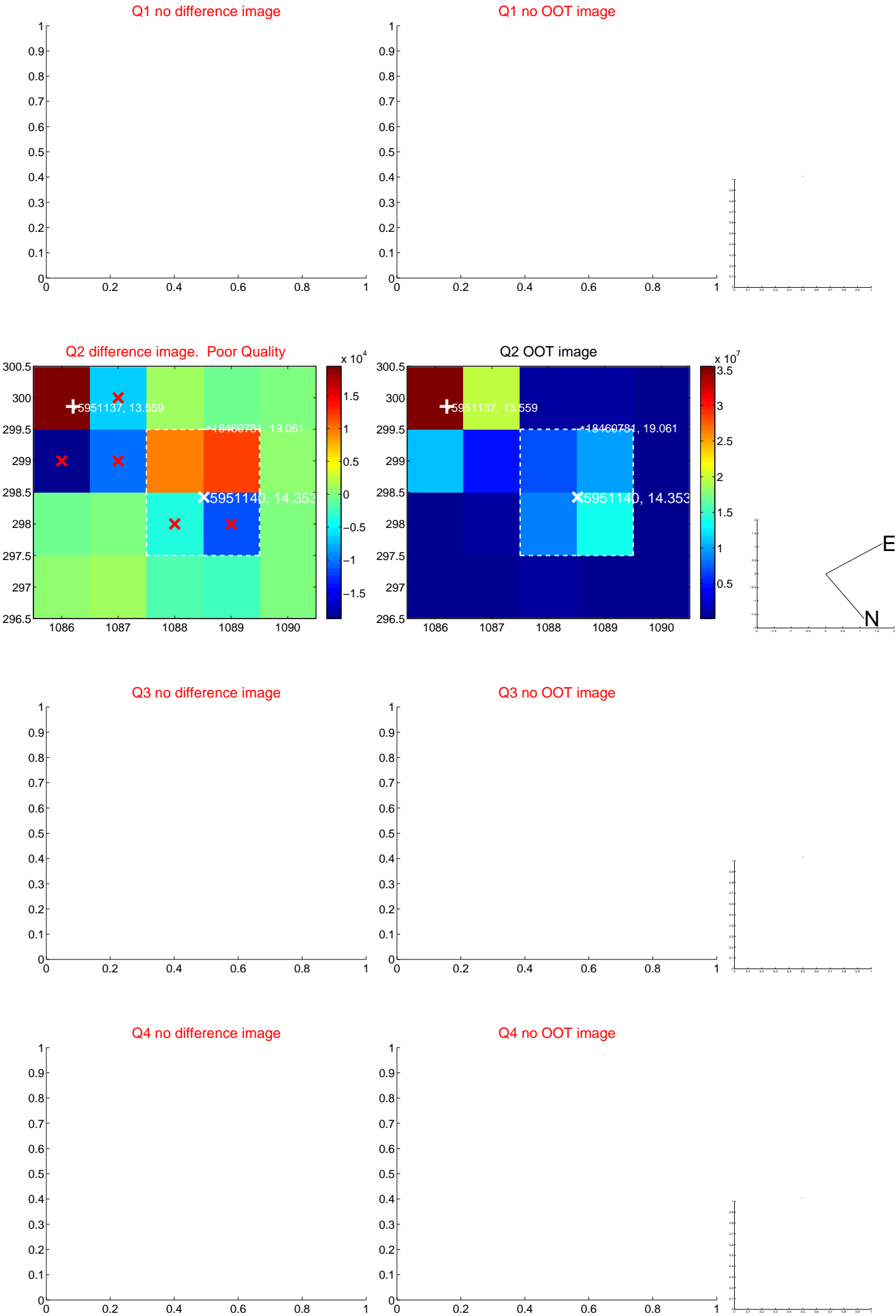
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.140 \pm 4.384$	0.49	$0.739 \pm 1.898$	$2.008 \pm 4.619$
PRF-fit source offset from KIC position	$0.175 \pm 0.106$	1.65	$-0.068 \pm 0.090$	$0.162 \pm 0.093$
photometric centroid source offset	$0.47 \pm 0.78$	0.60	$0.40 \pm 0.42$	$-0.26 \pm 1.28$



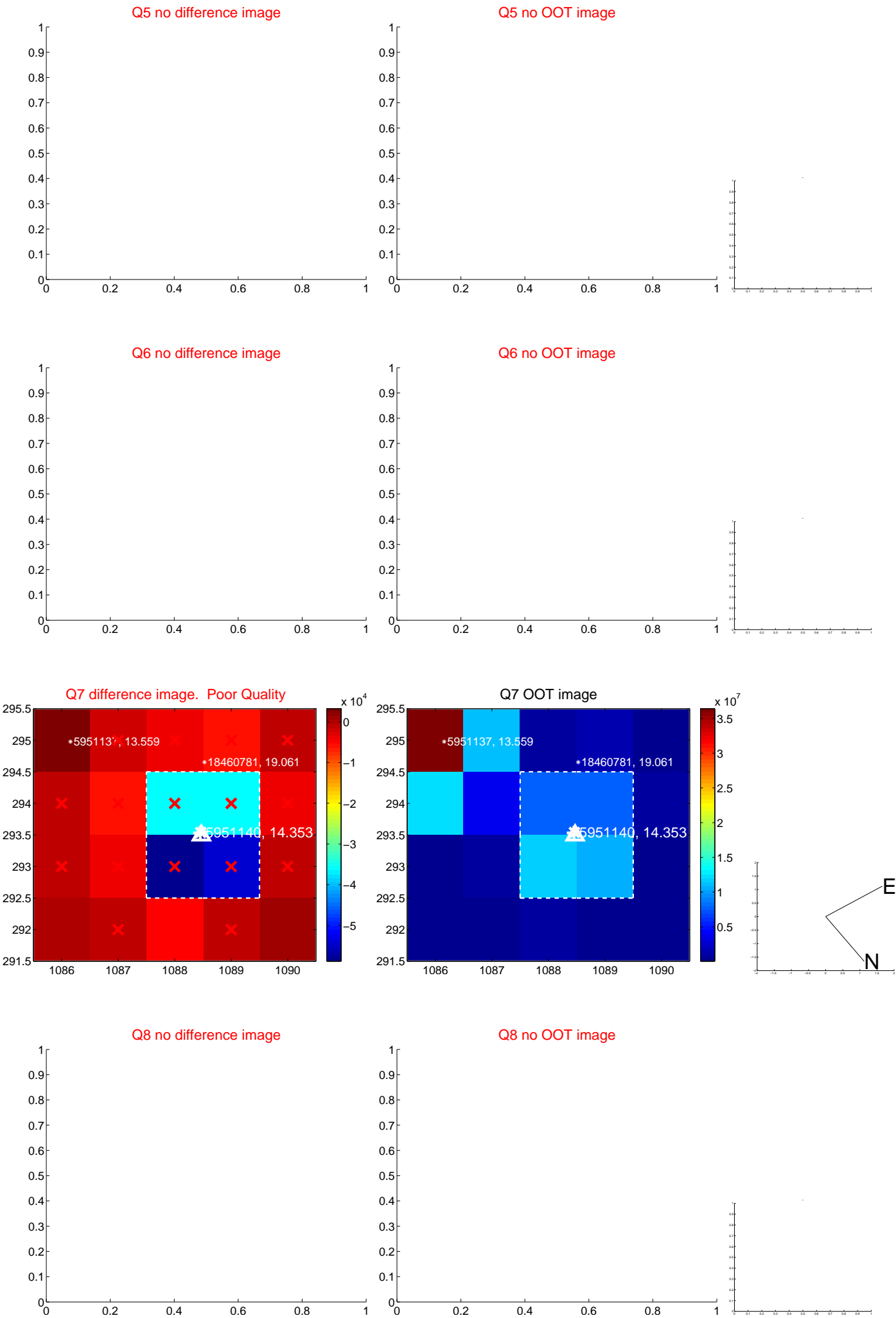
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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



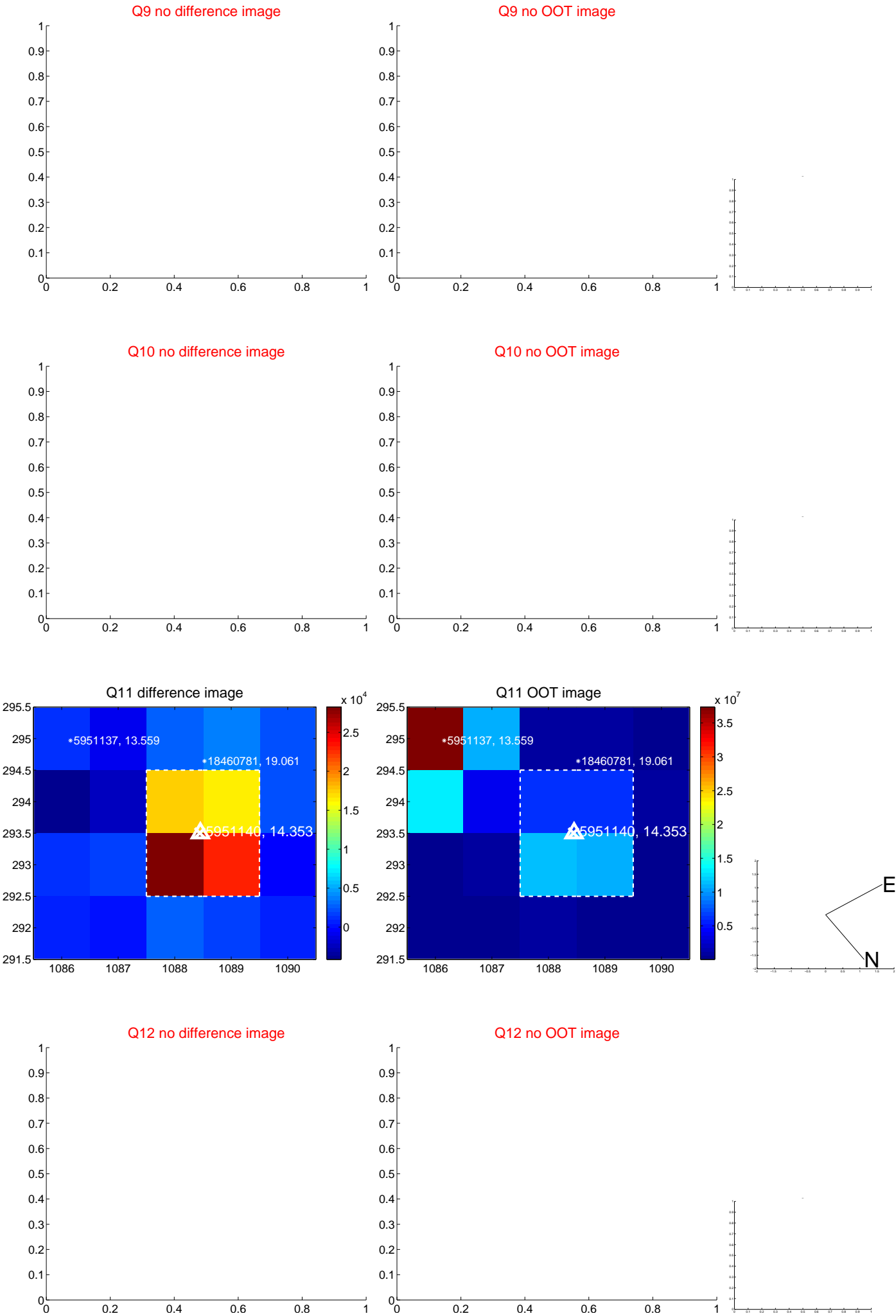
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



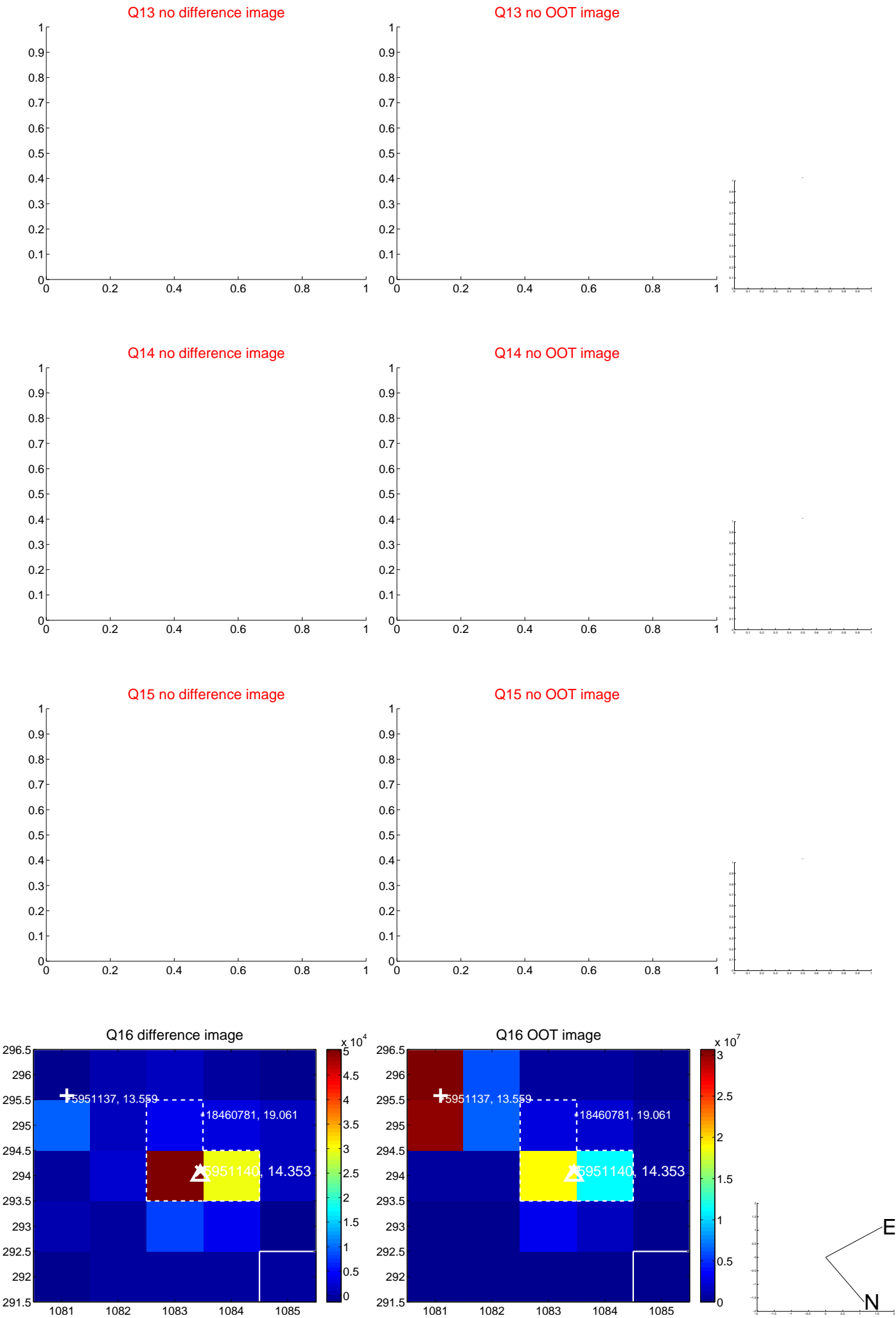
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



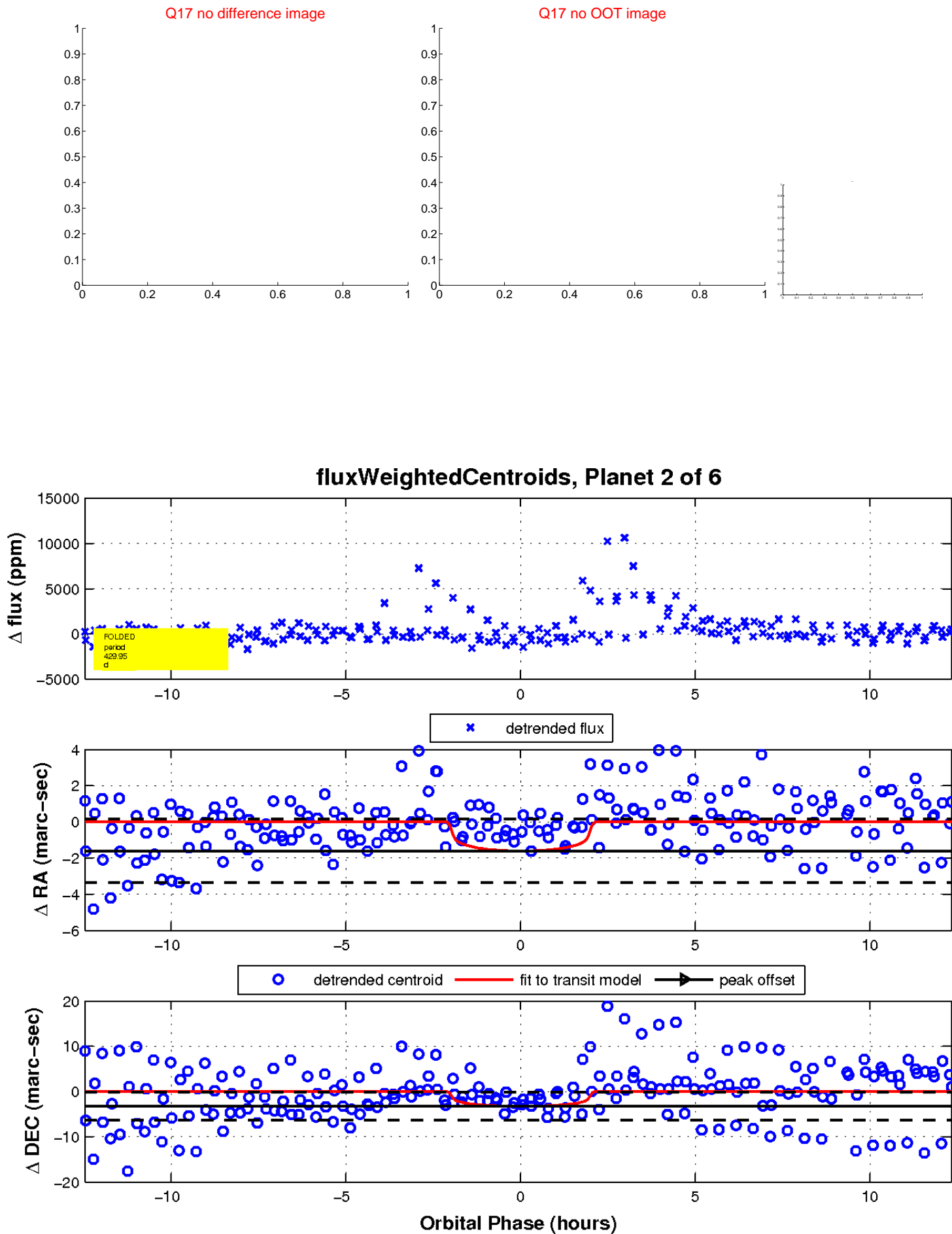
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



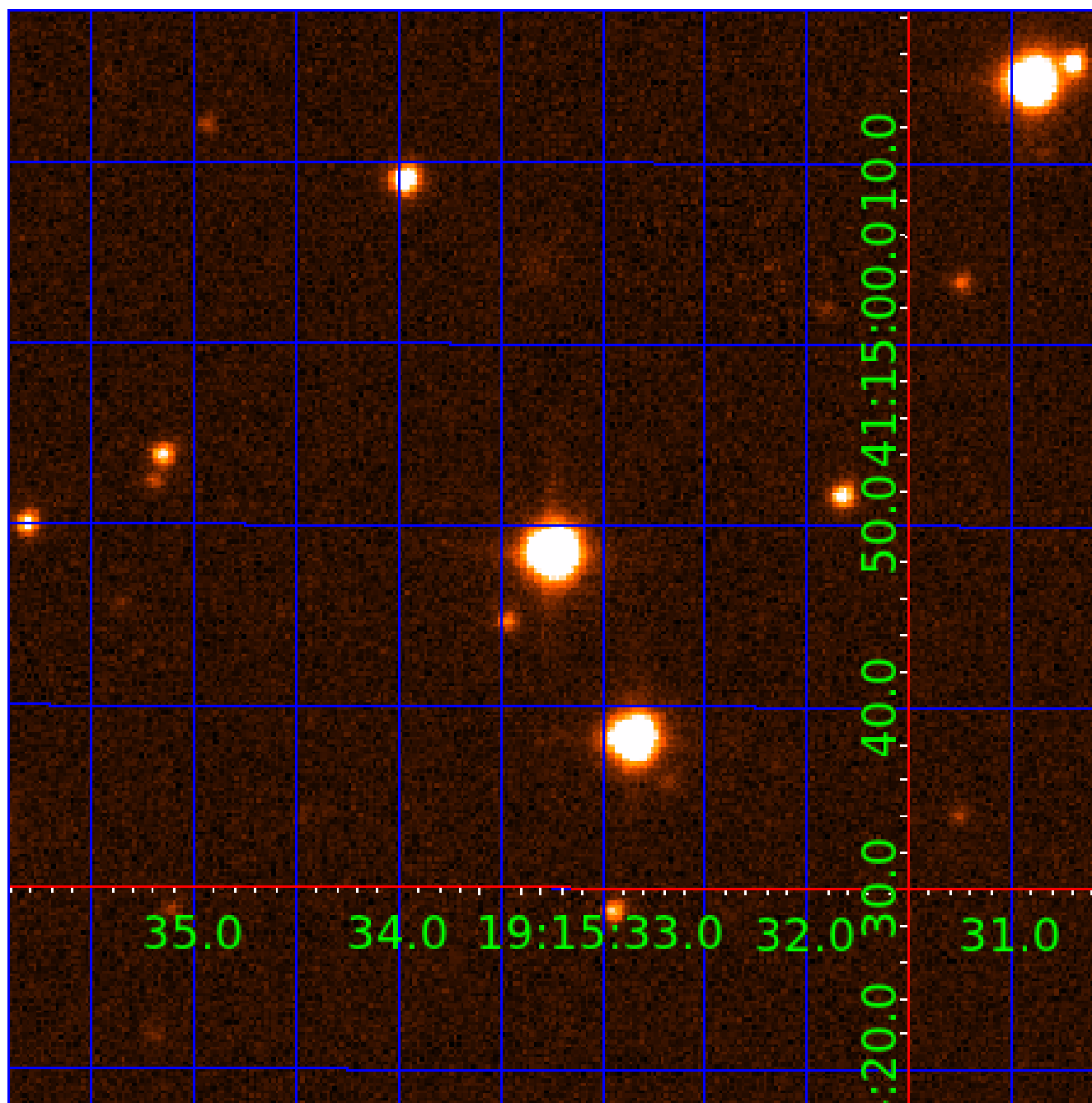
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image

Declination



# KIC 005951140

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005951140-02	OBS	No	429.952283	219.805522	1739.3	4.157	16.0	7.4	0.41	3581	1.67	0.04
005951140-03	OBS	No	415.427096	177.055354	2772.7	4.553	15.7	9.4	0.41	3581	2.69	0.04
005951140-04	OBS	No	523.453177	330.034242	1637.7	4.165	14.9	5.7	0.41	3581	1.78	0.03
005951140-06	OBS	No	484.214071	492.531132	1211.8	3.500	14.3	-1.0	0.41	3581	1.40	0.03

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005951140-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
005951140-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE_TRACKER—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
005951140-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_KIC_POS
005951140-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_NOFITS

**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.

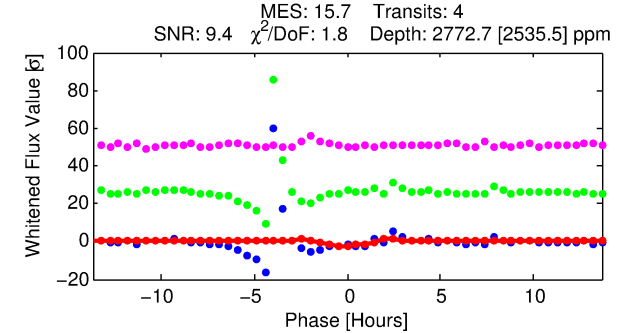
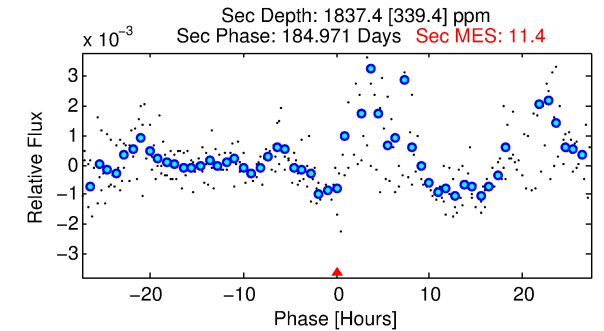
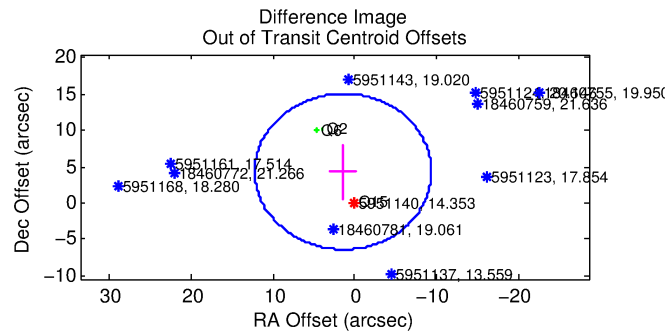
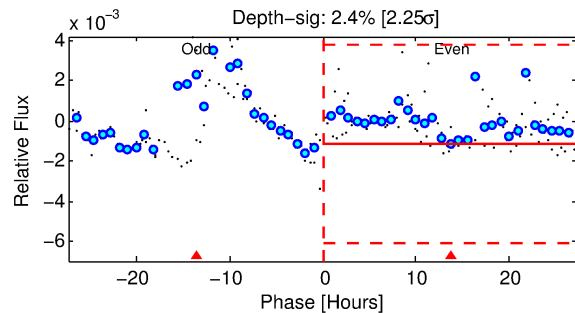
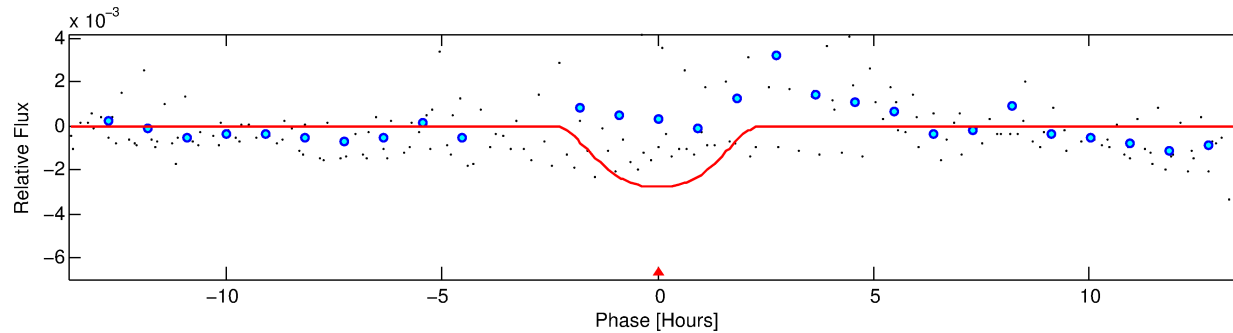
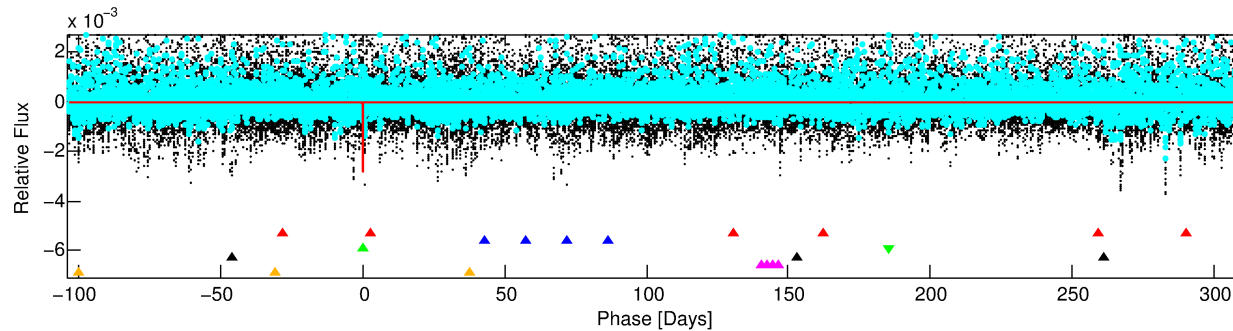
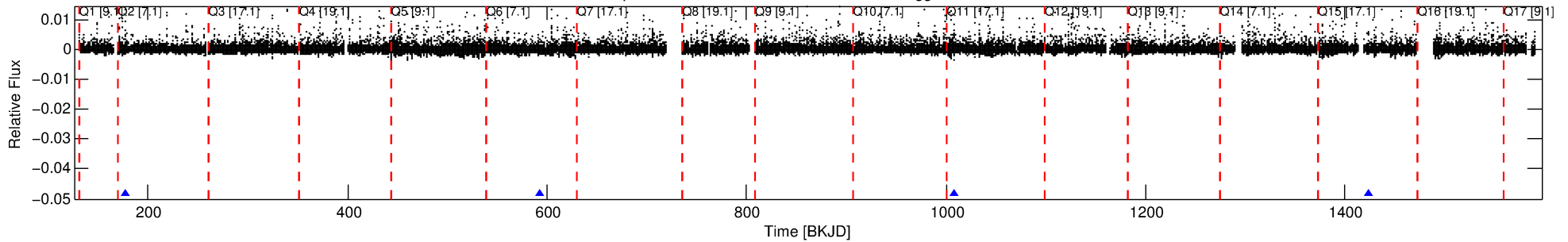
## Ephemeris Match Information For 005951140-03

No Significant Match Found

# DV One-Page Summary

KIC: 5951140 Candidate: 3 of 6 Period: 415.427 d  
KOI: K06635 Corr: No Ephemeris Match

Kp: 14.35 R\*: 0.41 Rs Teff: 3581.0 K Logg: 4.85 Fe/H: -0.100



## DV Fit Results:

Period = 415.42710 [0.02254] d  
Epoch = 177.0554 [0.0421] BKJD  
Rp/R\* = 0.0608 [0.0398]  
a/R\* = 348.86 [291.83]  
b = 0.94 [0.14]  
Seff = 0.04 [0.00]  
Teq = 111 [3] K  
Rp = 2.70 [1.78] Re  
a = 0.8173 [0.0521] AU  
Ag = 92958.70 [123059.82] [0.76σ]  
Teffp = 3006 [994] K [2.91σ]

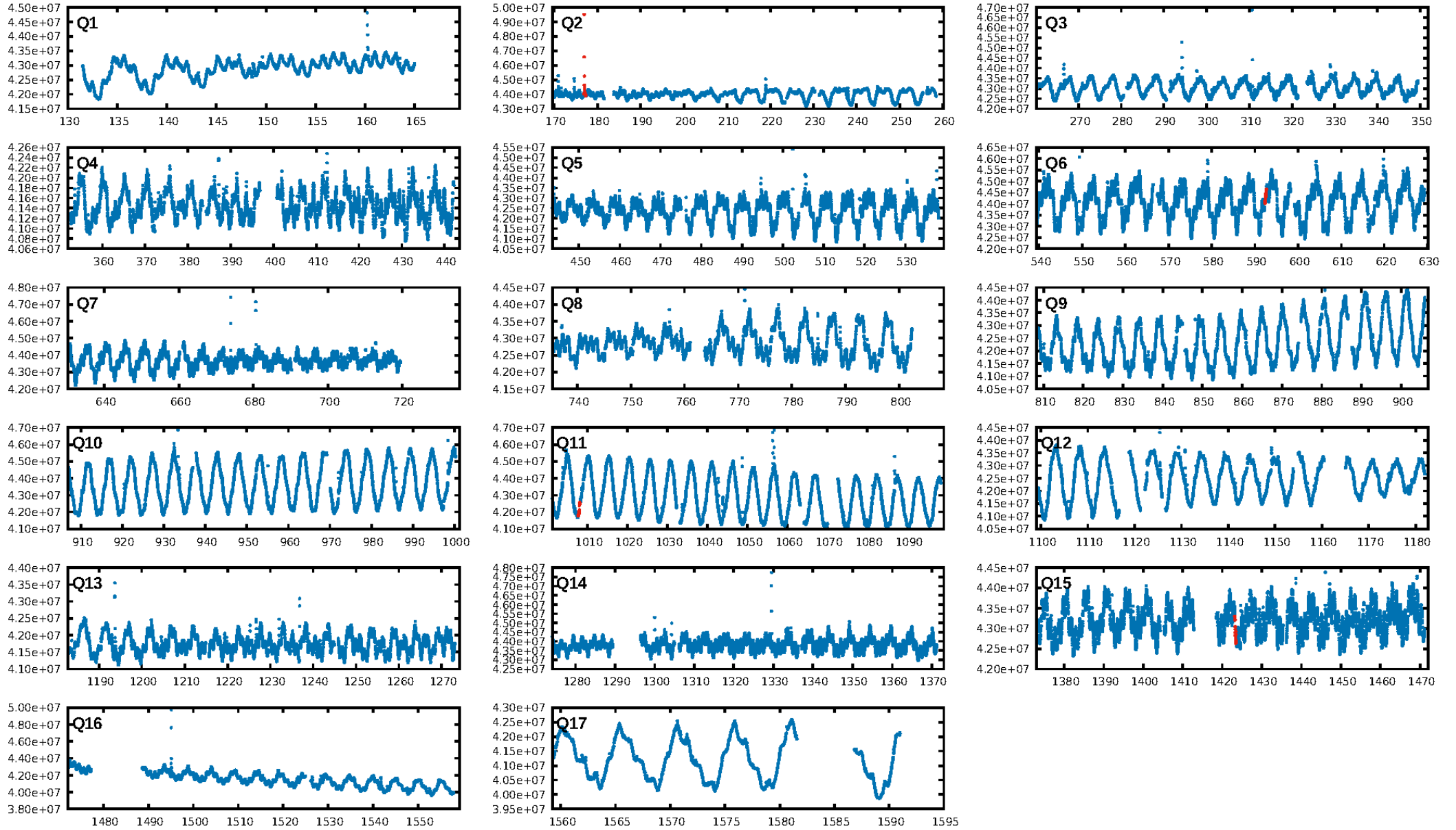
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [4.18σ]  
LongPeriod-sig: 100.0% [56.54σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 17.3%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: 0.3974  
Centroid-sig: 0.0%  
Centroid-so: 1.796 arcsec [1.76σ]  
OotOffset-rm: 4.549 arcsec [1.27σ]  
OotOffset-st: 2/1/0/0 [3]  
KicOffset-rm: 0.337 arcsec [2.42σ]  
KicOffset-st: 2/2/0/0 [4]  
DiffImageQuality-fgm: 0.50 [2/4]  
DiffImageOverlap-fno: 1.00 [4/4]

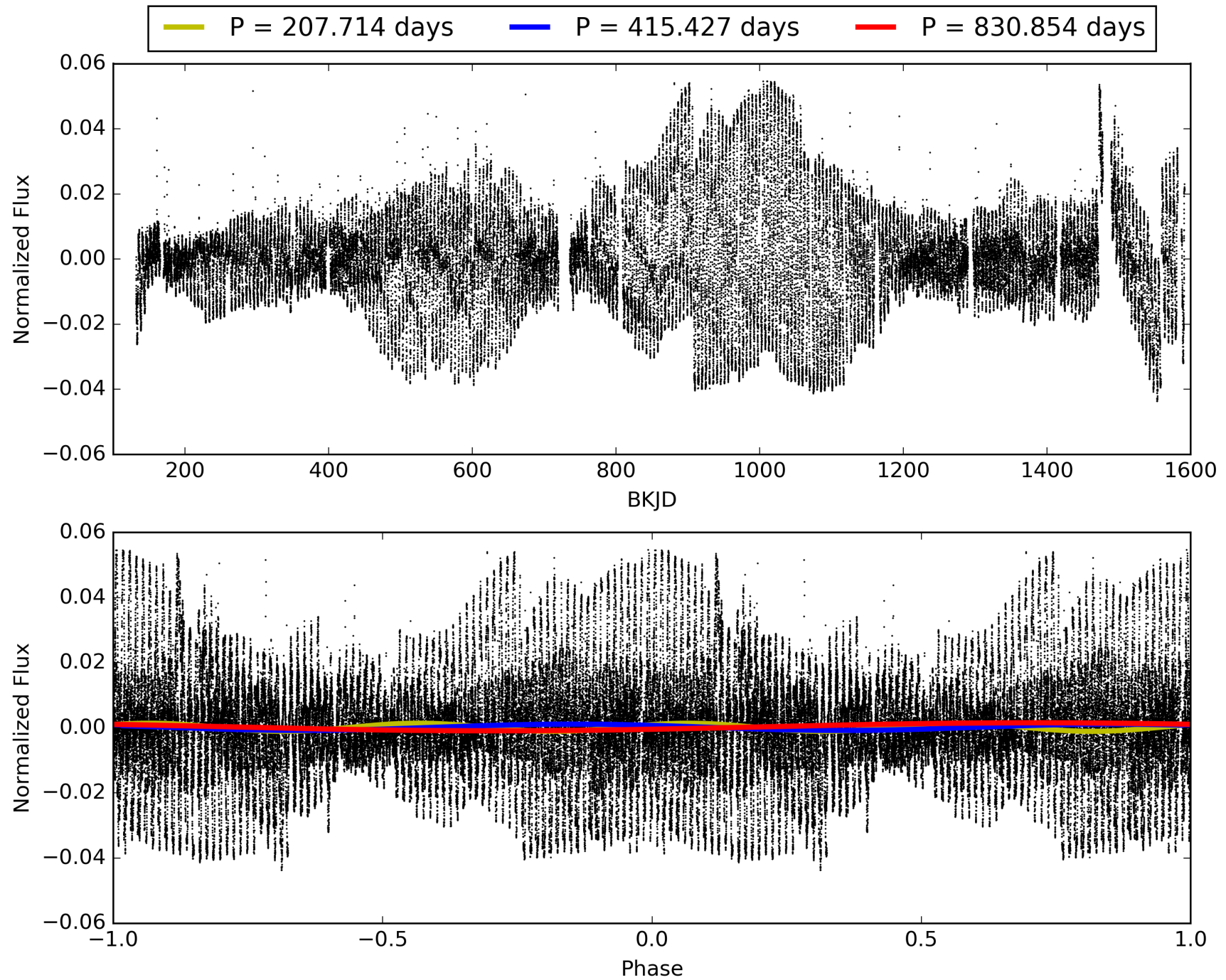
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 00:28:10 Z

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

# TCE 005951140-03, PDC Light Curves



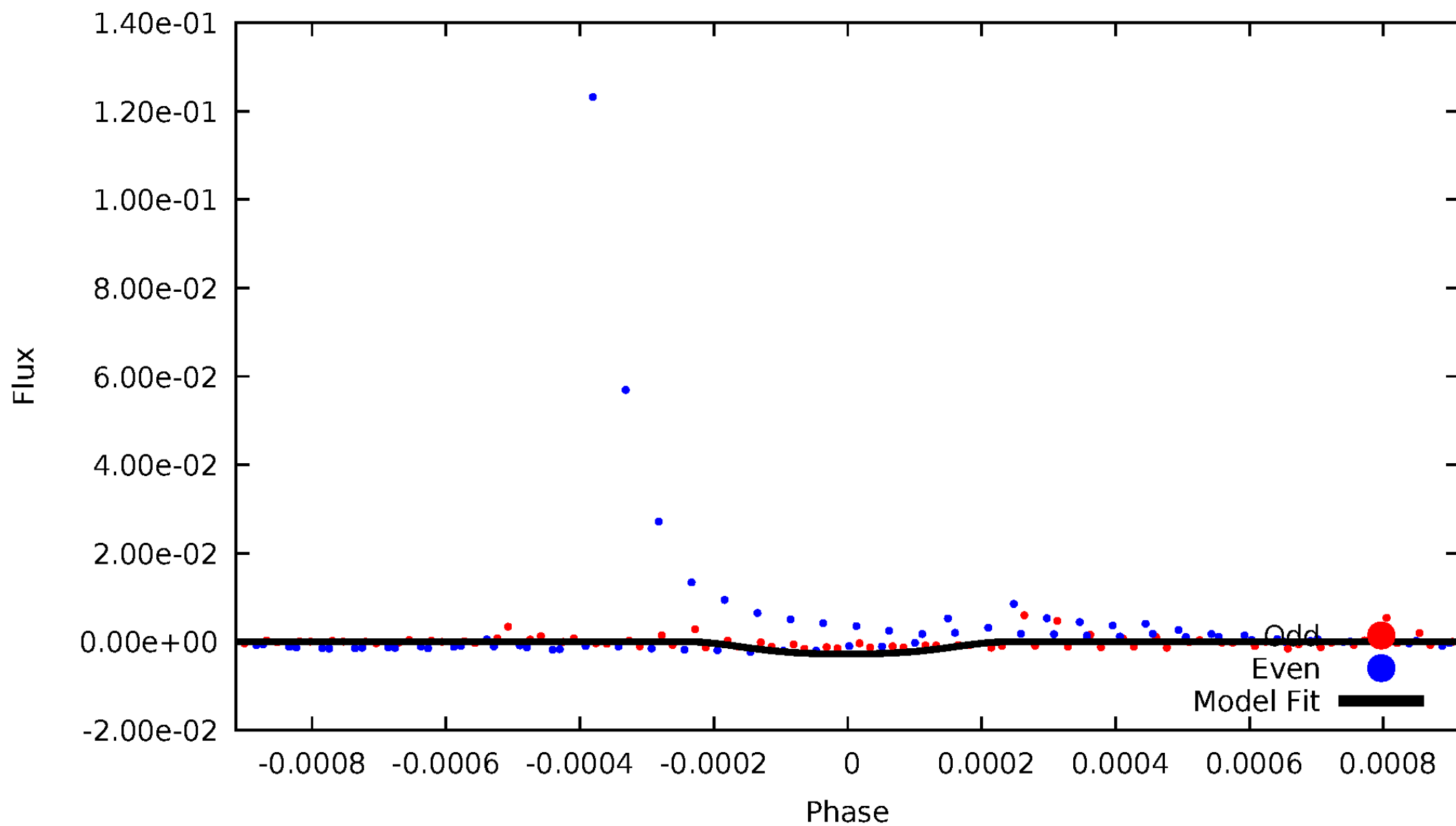
TCE 005951140-03





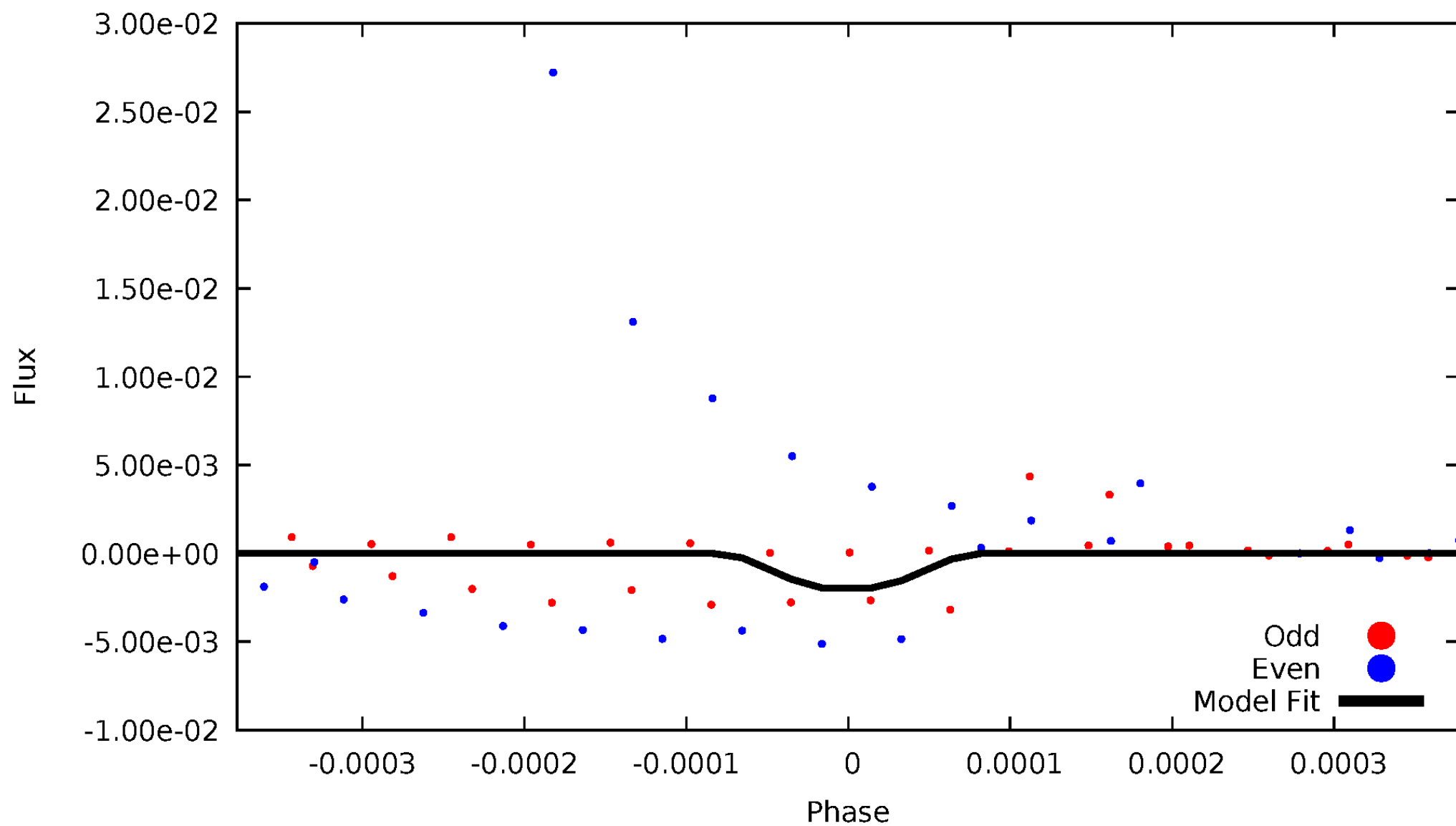
# DV Odd/Even

TCE 005951140-03



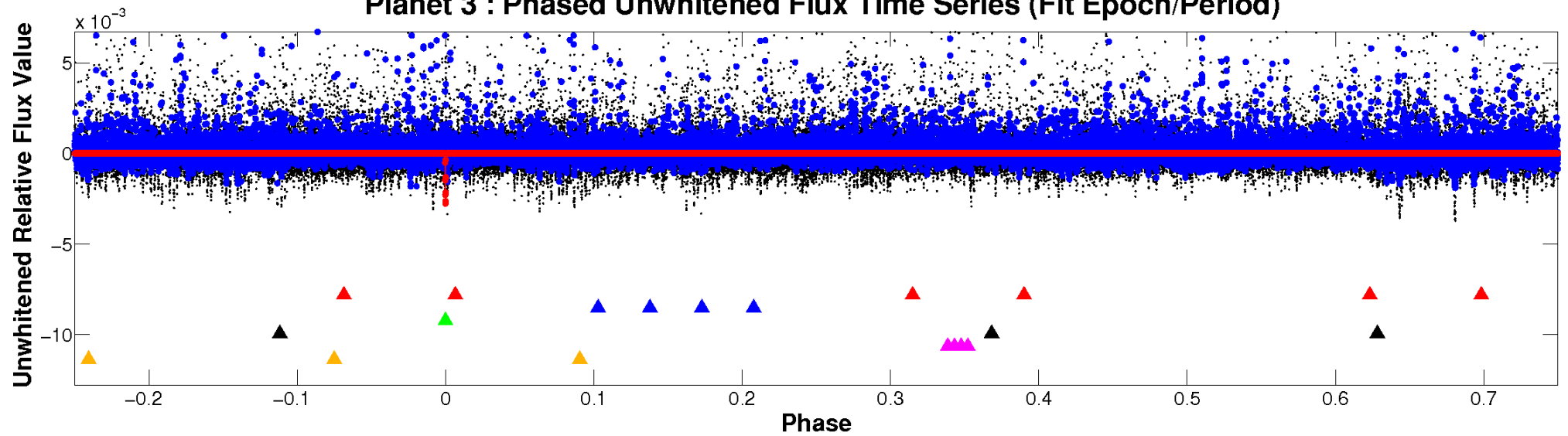
# ALT Odd/Even

TCE 005951140-03

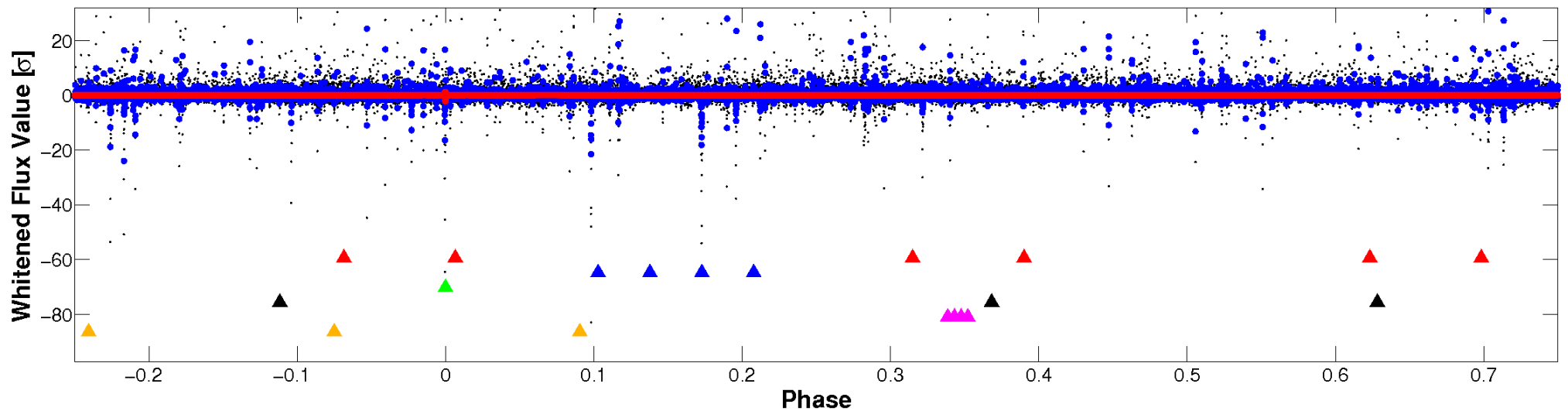


# Non-Whitened Vs. Whitened Light Curve

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

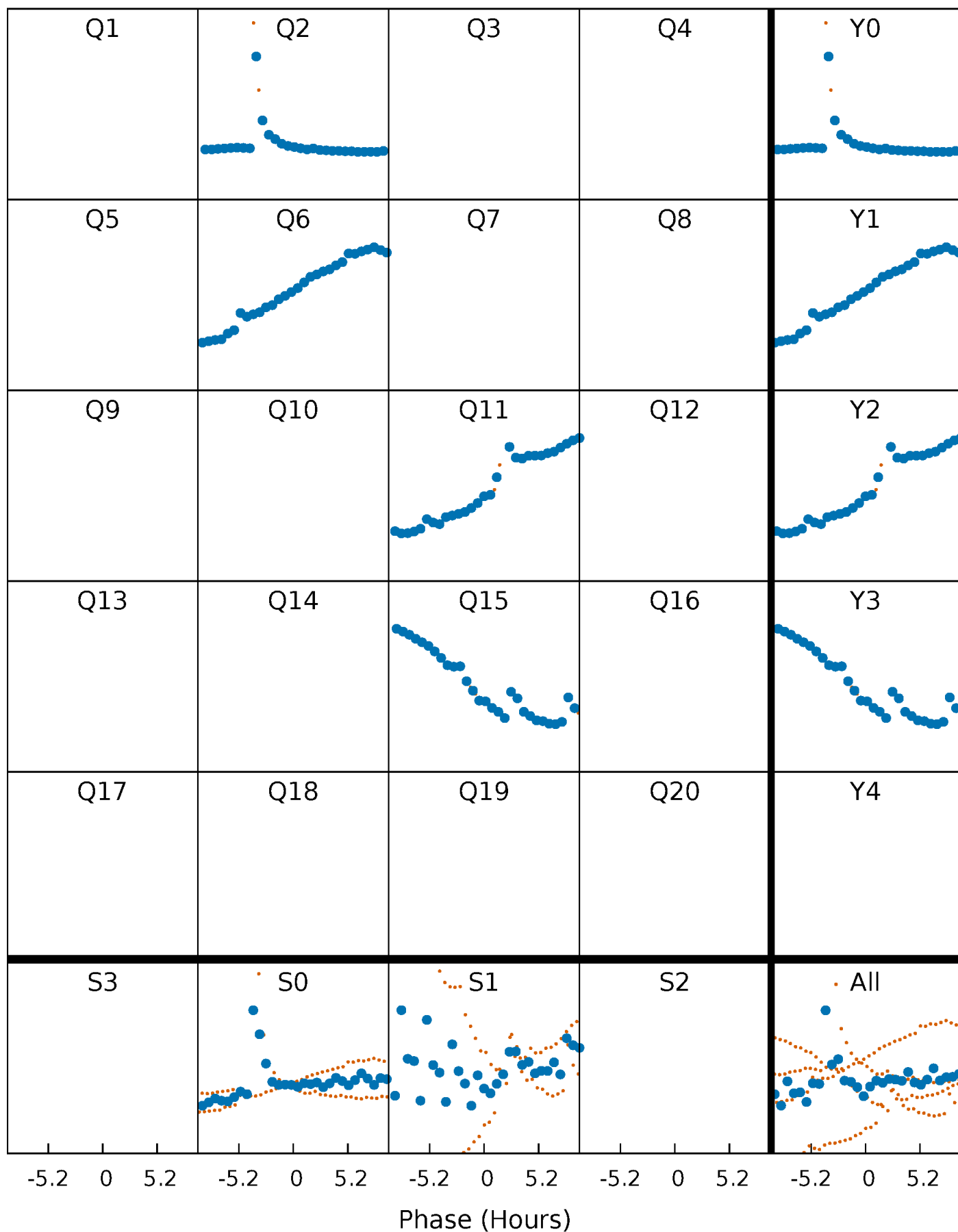


Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



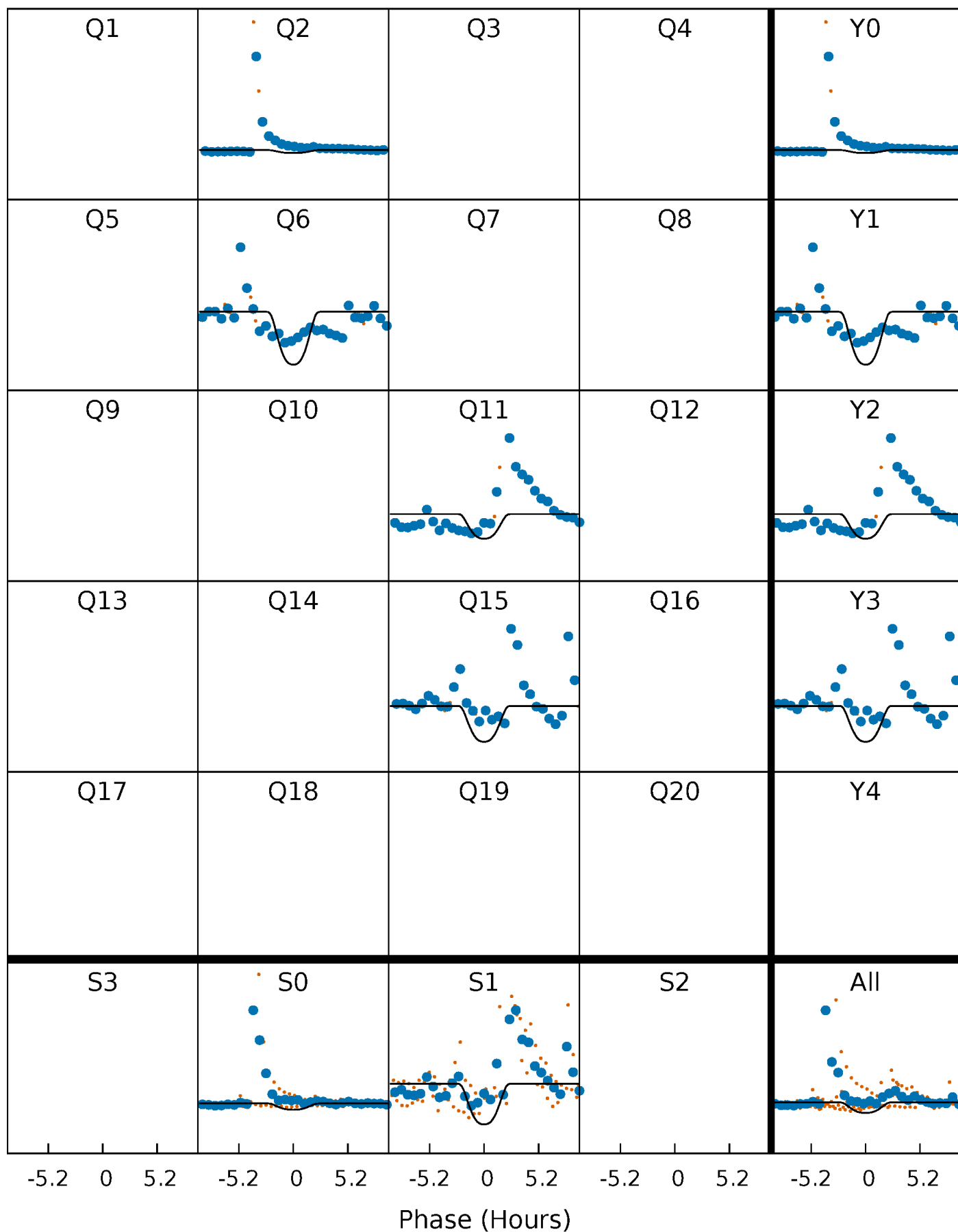
# PDC Quarter-Phased Transit Curves

TCE 005951140-03 P=415.427096 Days  $T_0=177.055354$  (BKJD)



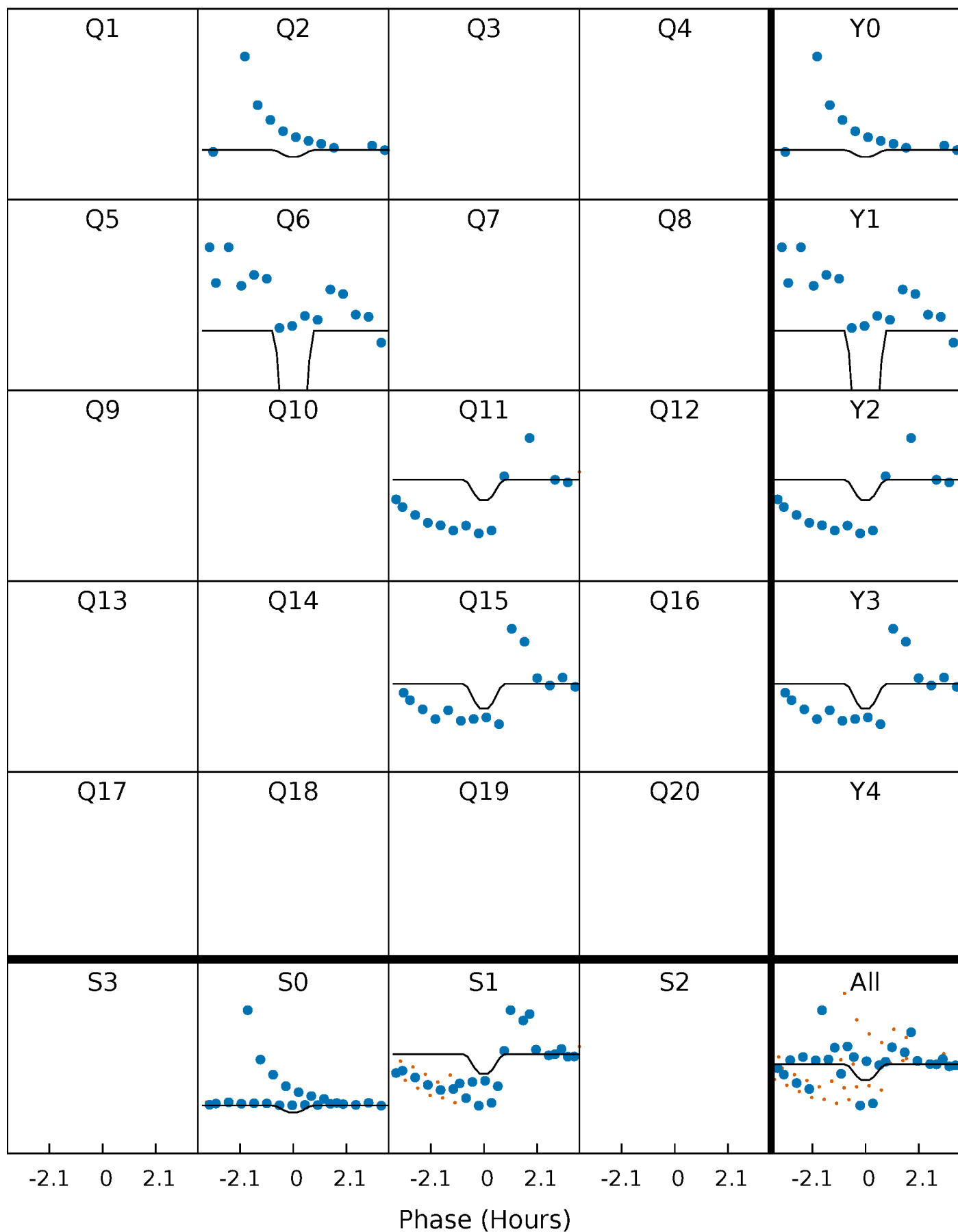
# DV Quarter-Phased Transit Curves

TCE 005951140-03 P=415.427096 Days  $T_0=177.055354$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

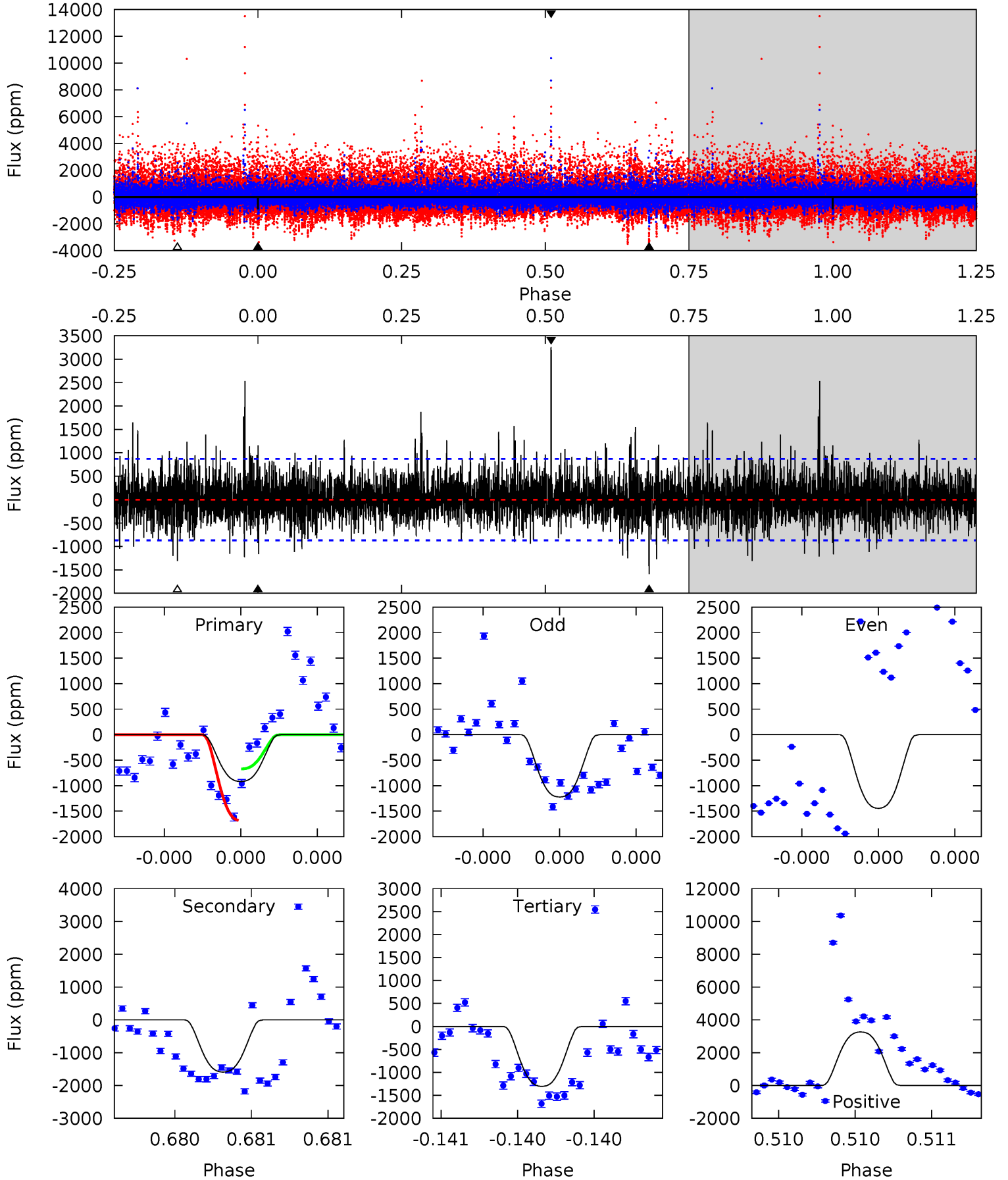
TCE 005951140-03 P=415.461953 Days  $T_0=177.013756$  (BKJD)



# DV Model-Shift Uniqueness Test

005951140-03, P = 415.427096 Days, E = 177.055354 Days

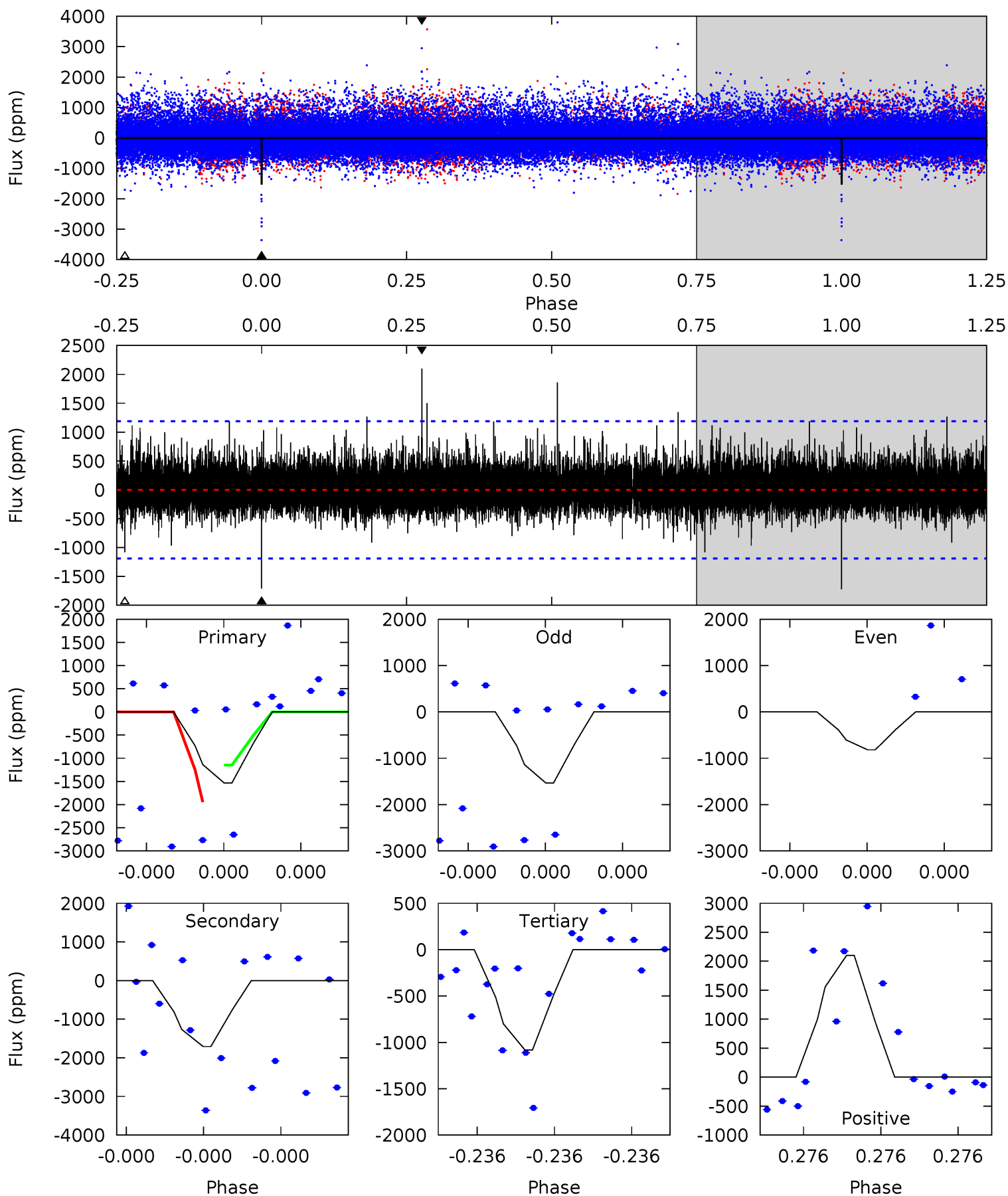
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.89	10.2	8.37	20.9	5.58	3.49	2.22	-2.48	-15.0	1.83	-10.7	0.61	-0.37	0.67	3.19



# Alt Model-Shift Uniqueness Test

005951140-03, P = 415.461953 Days, E = 177.013756 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.48	8.33	5.27	10.2	5.80	3.83	1.07	2.21	-2.76	3.06	-1.91	1.97	0.58	0.55	0





### Stellar Parameters For KIC 005951140

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3581^{+43}_{-48}$	$4.846^{+0.036}_{-0.030}$	$-0.100^{+0.100}_{-0.100}$	$0.406^{+0.029}_{-0.035}$	$0.424^{+0.031}_{-0.038}$	$8.915^{+1.741}_{-1.115}$
	+1%/-1%	+1%/-1%	+100%/-100%	+7%/-9%	+7%/-9%	+20%/-13%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 005951140-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-1590 \pm 156$	$2.84^{+1.66}_{-1.50}$	$155^{+3}_{-3}$	$3105^{+813}_{-386}$	$75192^{+248165}_{-47116}$
Alt.	$-1708 \pm 205$	$2.23^{+1.84}_{-1.37}$	$155^{+3}_{-3}$	$3338^{+1359}_{-512}$	$121269^{+735567}_{-83358}$

$T_{max}$  = 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

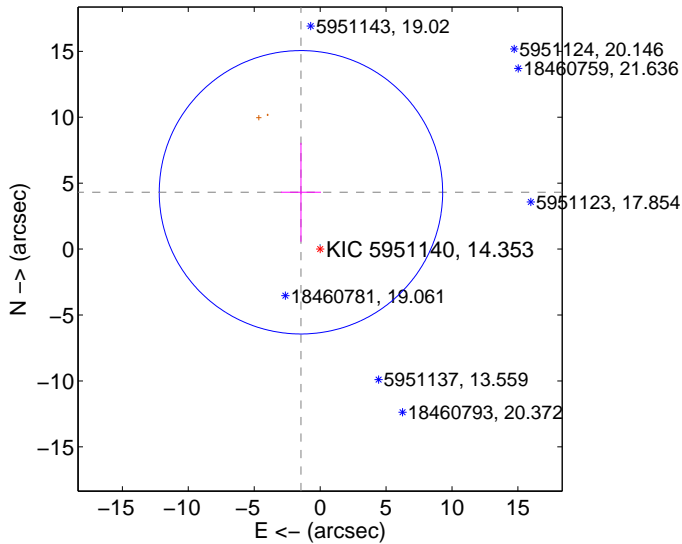
Supplemental centroid analysis for 005951140-03. Kepler magnitude: 14.35. Transit SNR 9.40

There are 2 quarters with good PRF difference image offsets

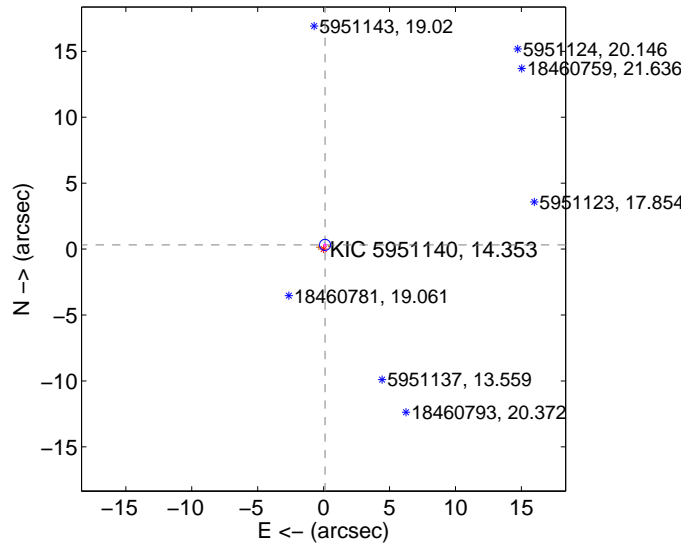
The direct PRF centroid is offset from the target star catalog position by about 0.18 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$4.549 \pm 3.583$	1.27	$1.457 \pm 1.521$	$4.310 \pm 3.747$
PRF-fit source offset from KIC position	$0.337 \pm 0.140$	2.42	$-0.108 \pm 0.156$	$0.320 \pm 0.138$
photometric centroid source offset	$1.80 \pm 1.02$	1.76	$0.10 \pm 0.37$	$1.79 \pm 1.02$

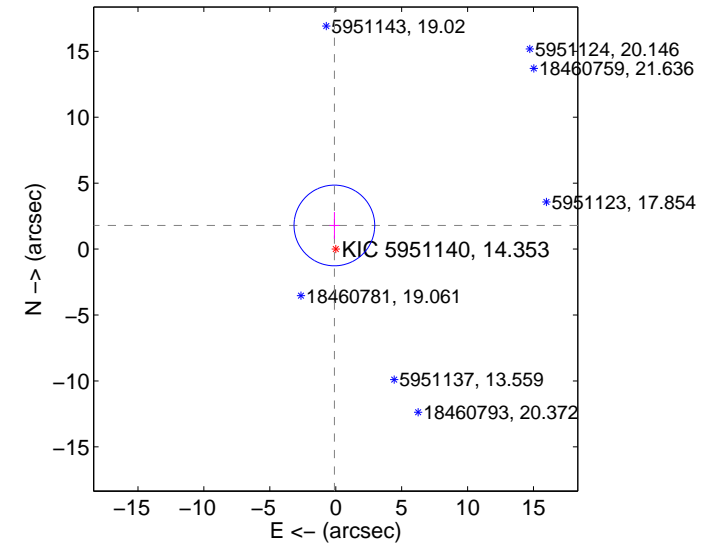
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

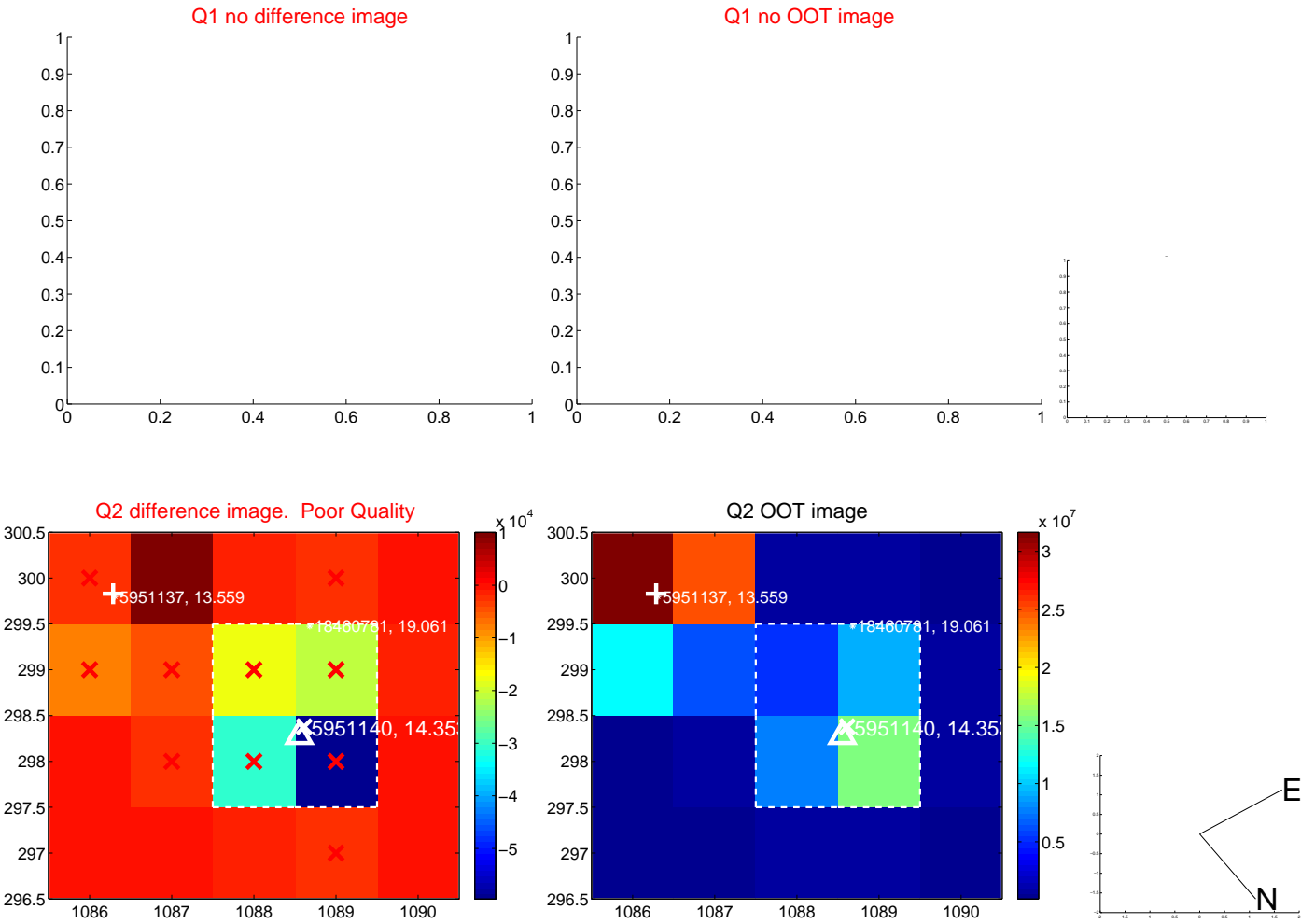


offset from photometric centroids



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

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



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

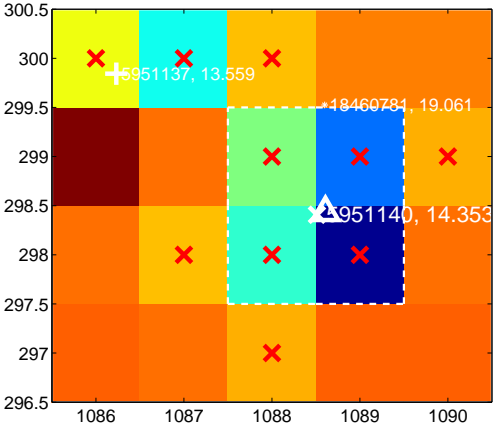
Q5 no difference image



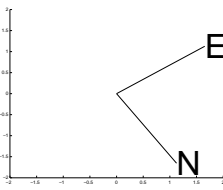
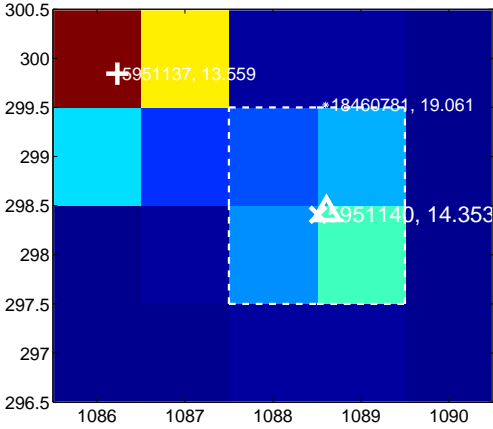
Q5 no OOT image



Q6 difference image. Poor Quality



Q6 OOT image



Q7 no difference image



Q7 no OOT image



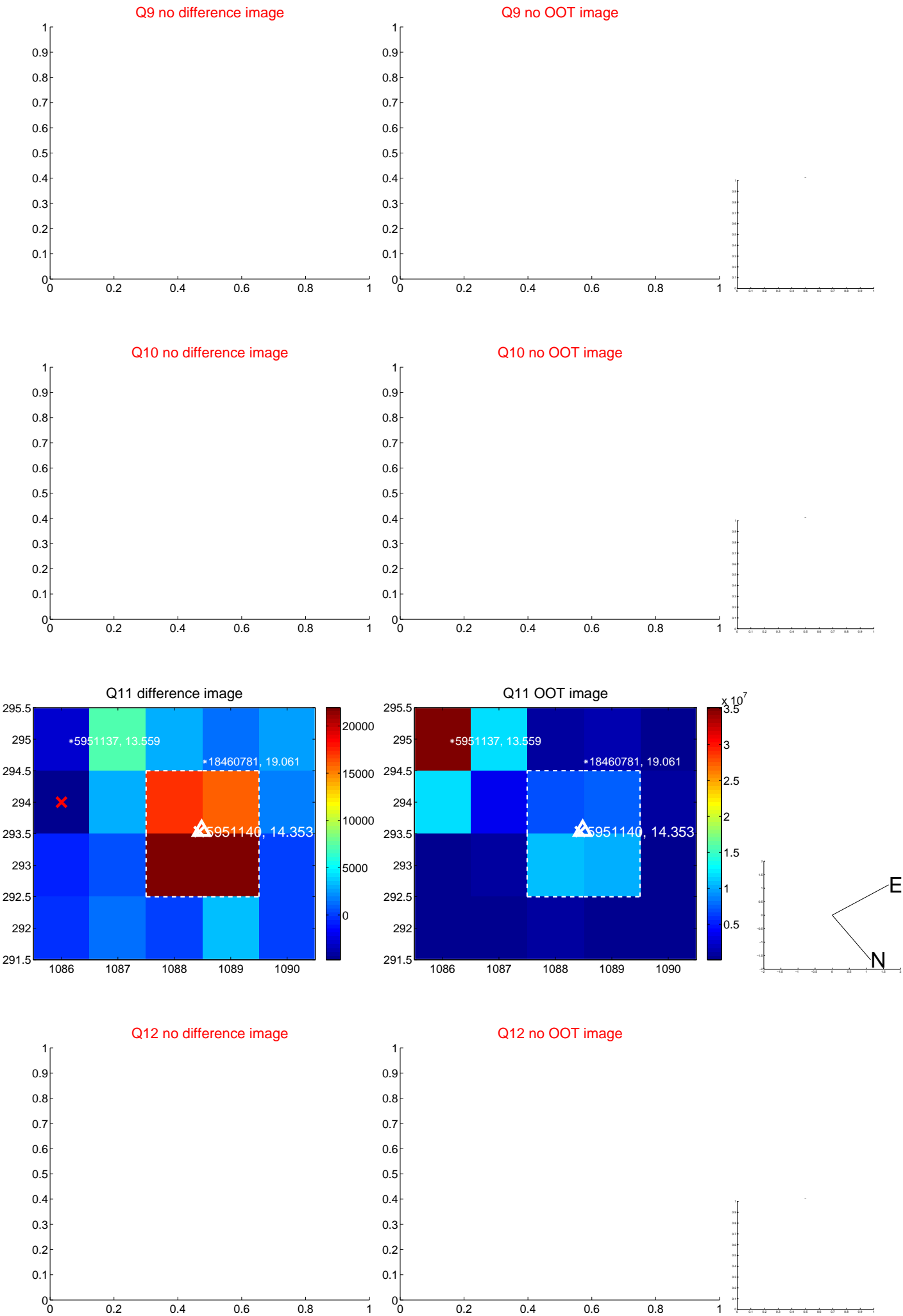
Q8 no difference image



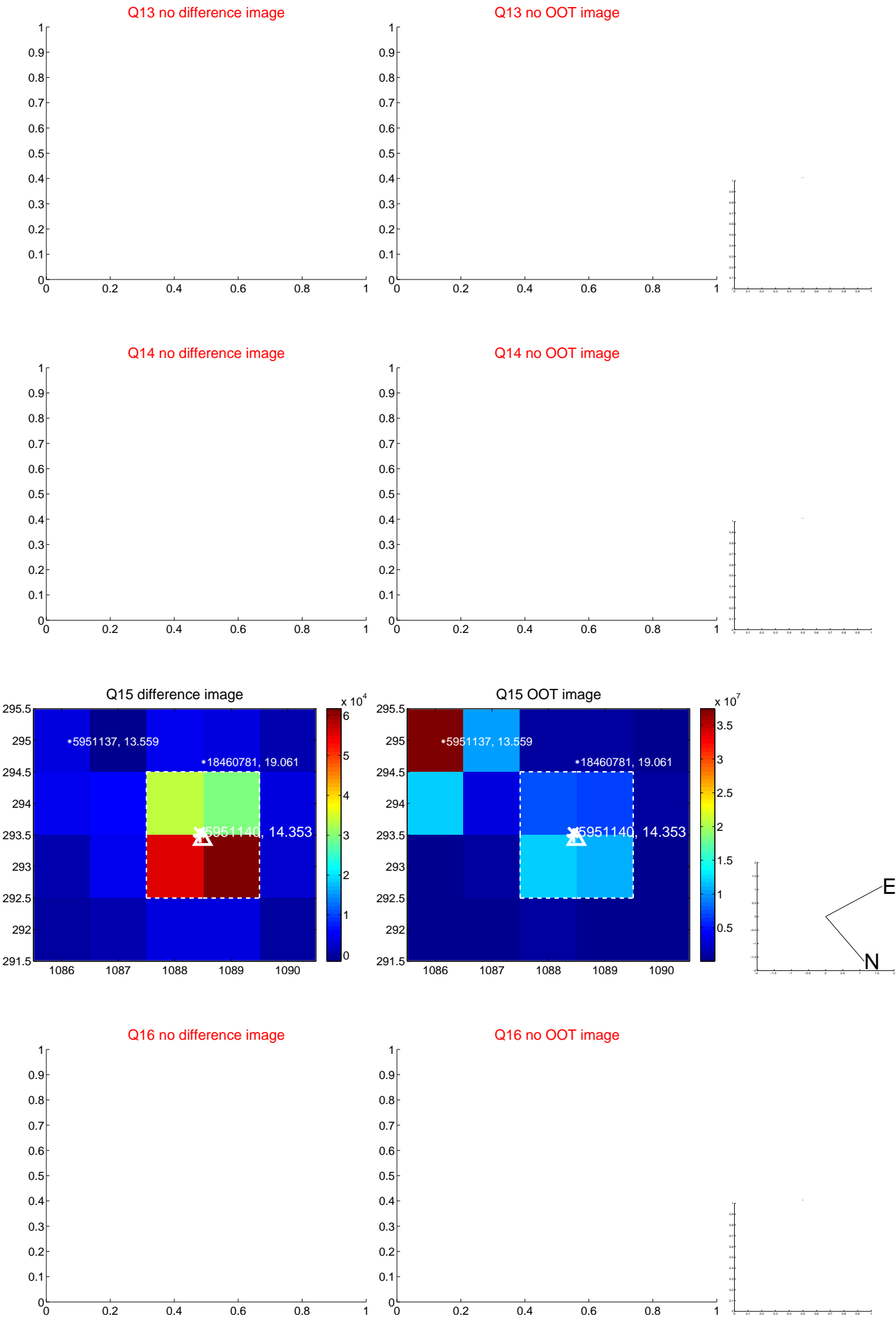
Q8 no OOT image



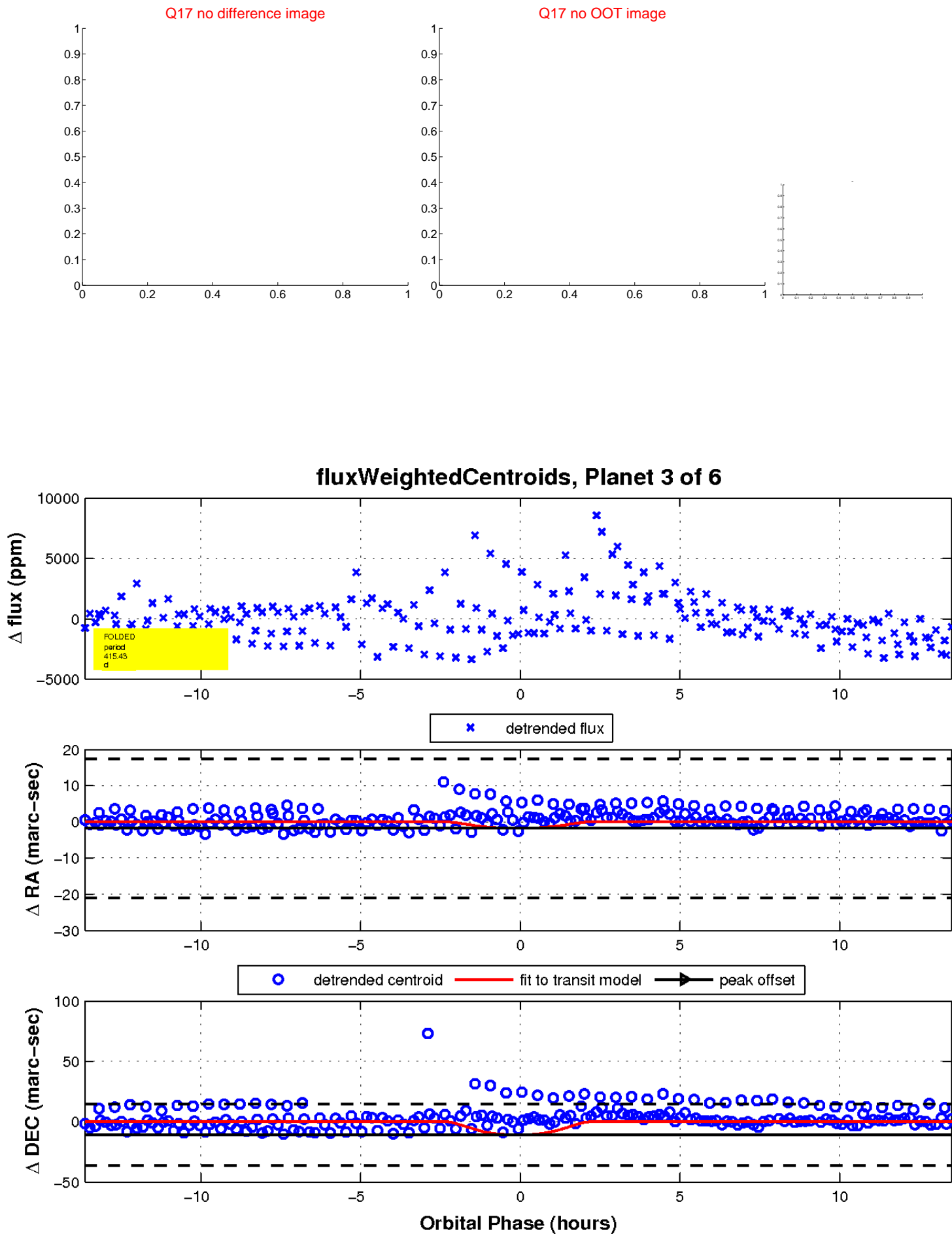
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

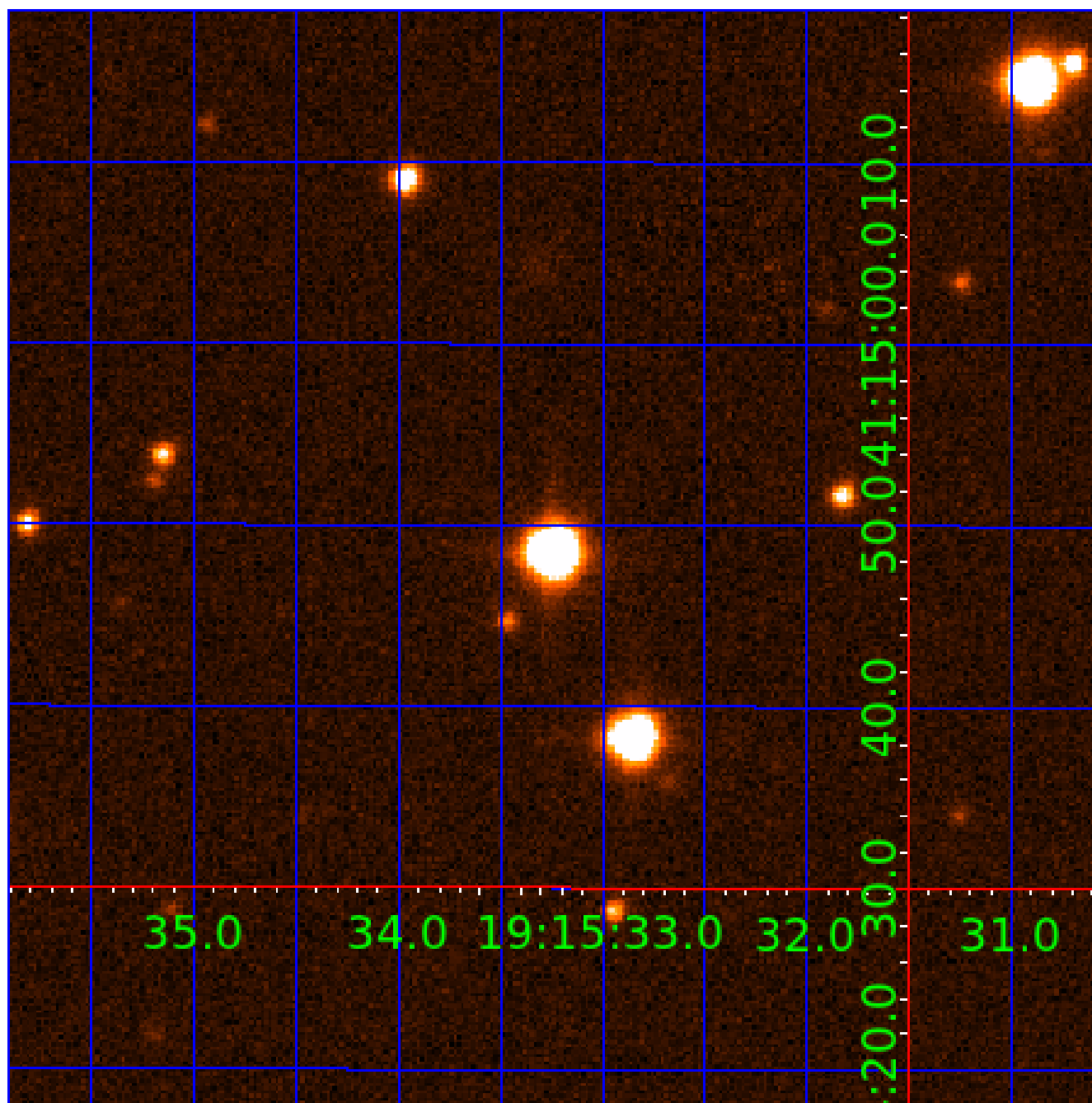


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 005951140

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005951140-02	OBS	No	429.952283	219.805522	1739.3	4.157	16.0	7.4	0.41	3581	1.67	0.04
005951140-03	OBS	No	415.427096	177.055354	2772.7	4.553	15.7	9.4	0.41	3581	2.69	0.04
005951140-04	OBS	No	523.453177	330.034242	1637.7	4.165	14.9	5.7	0.41	3581	1.78	0.03
005951140-06	OBS	No	484.214071	492.531132	1211.8	3.500	14.3	-1.0	0.41	3581	1.40	0.03

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005951140-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
005951140-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE_TRACKER—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
005951140-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_KIC_POS
005951140-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_NOFITS

**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 005951140-04

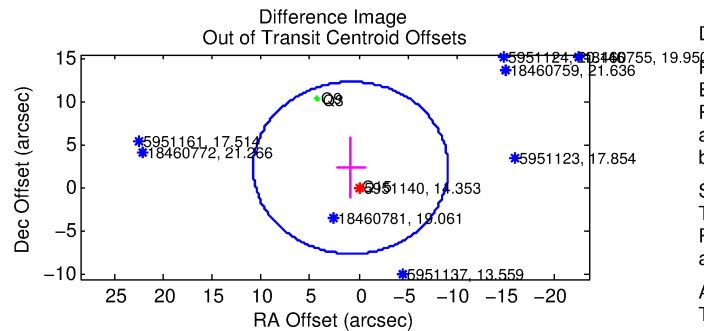
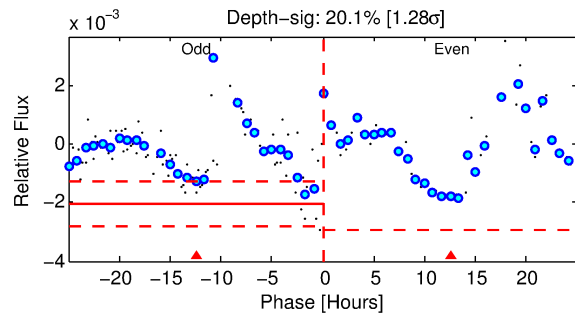
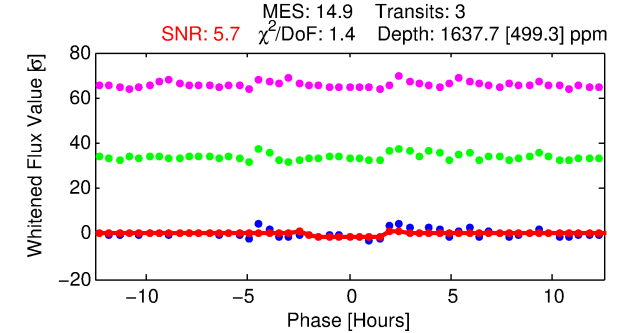
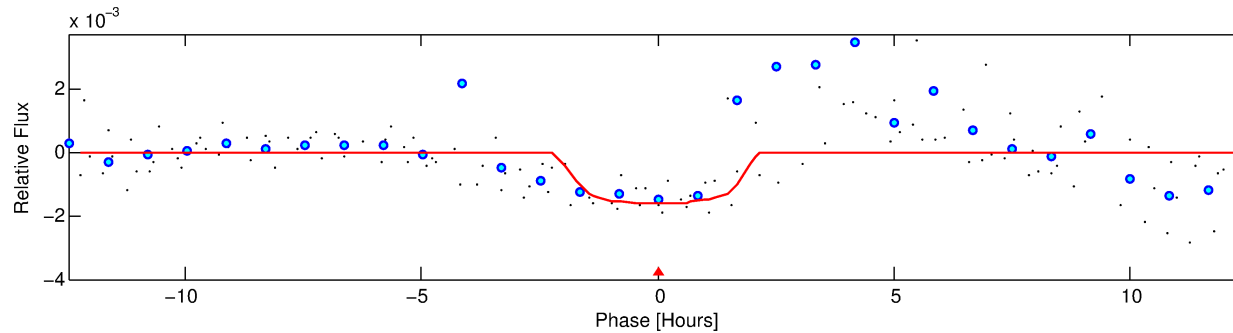
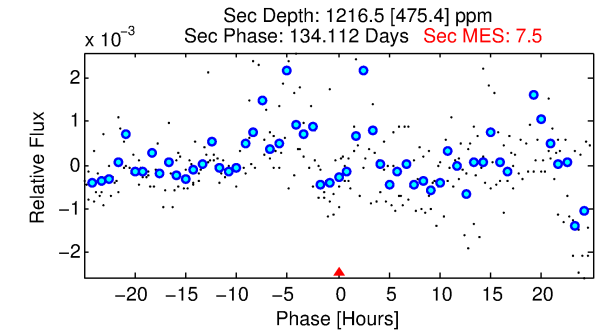
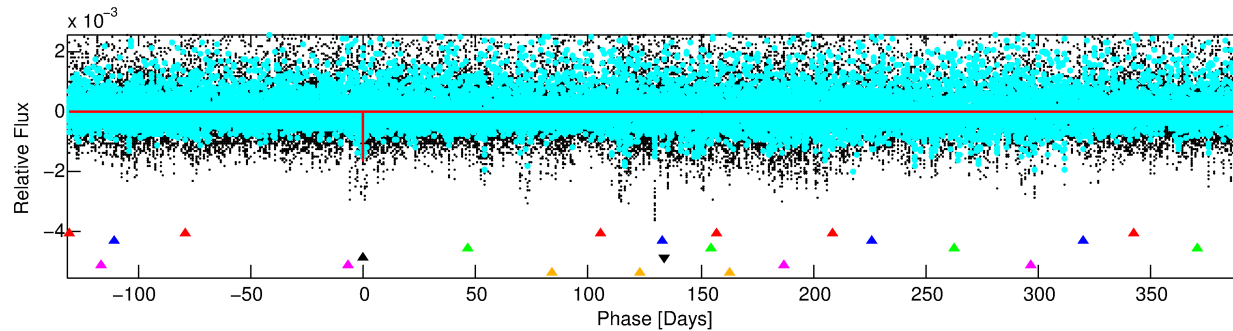
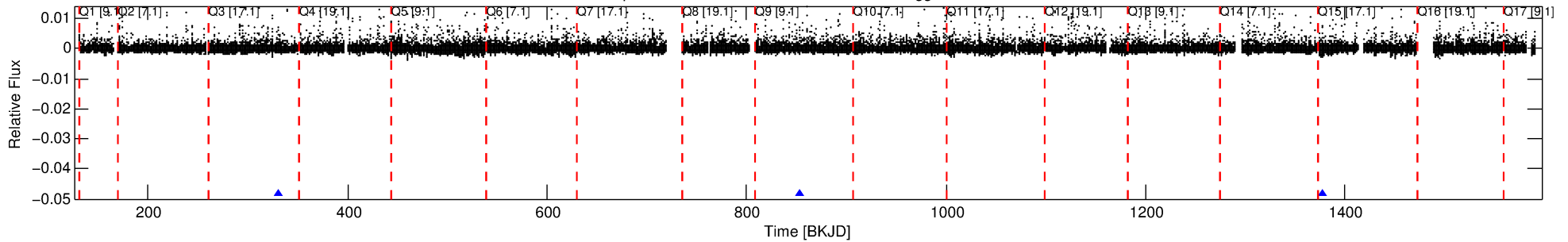
No Significant Match Found

# DV One-Page Summary

KIC: 5951140 Candidate: 4 of 6 Period: 523.453 d

KOI: K06635 Corr: No Ephemeris Match

Kp: 14.35 R\*: 0.41 Rs Teff: 3581.0 K Logg: 4.85 Fe/H: -0.100



## DV Fit Results:

Period = 523.45318 [0.00811] d  
Epoch = 330.0342 [0.0111] BKJD  
Rp/R\* = 0.0401 [0.0247]  
a/R\* = 697.99 [1678.89]  
b = 0.74 [1.46]  
Seff = 0.03 [0.00]  
Teq = 103 [2] K  
Rp = 1.78 [1.11] Re  
a = 0.9535 [0.0608] AU  
Ag = 192486.07 [249464.06] [0.77σ]  
Teffp = 3339 [1081] K [2.99σ]

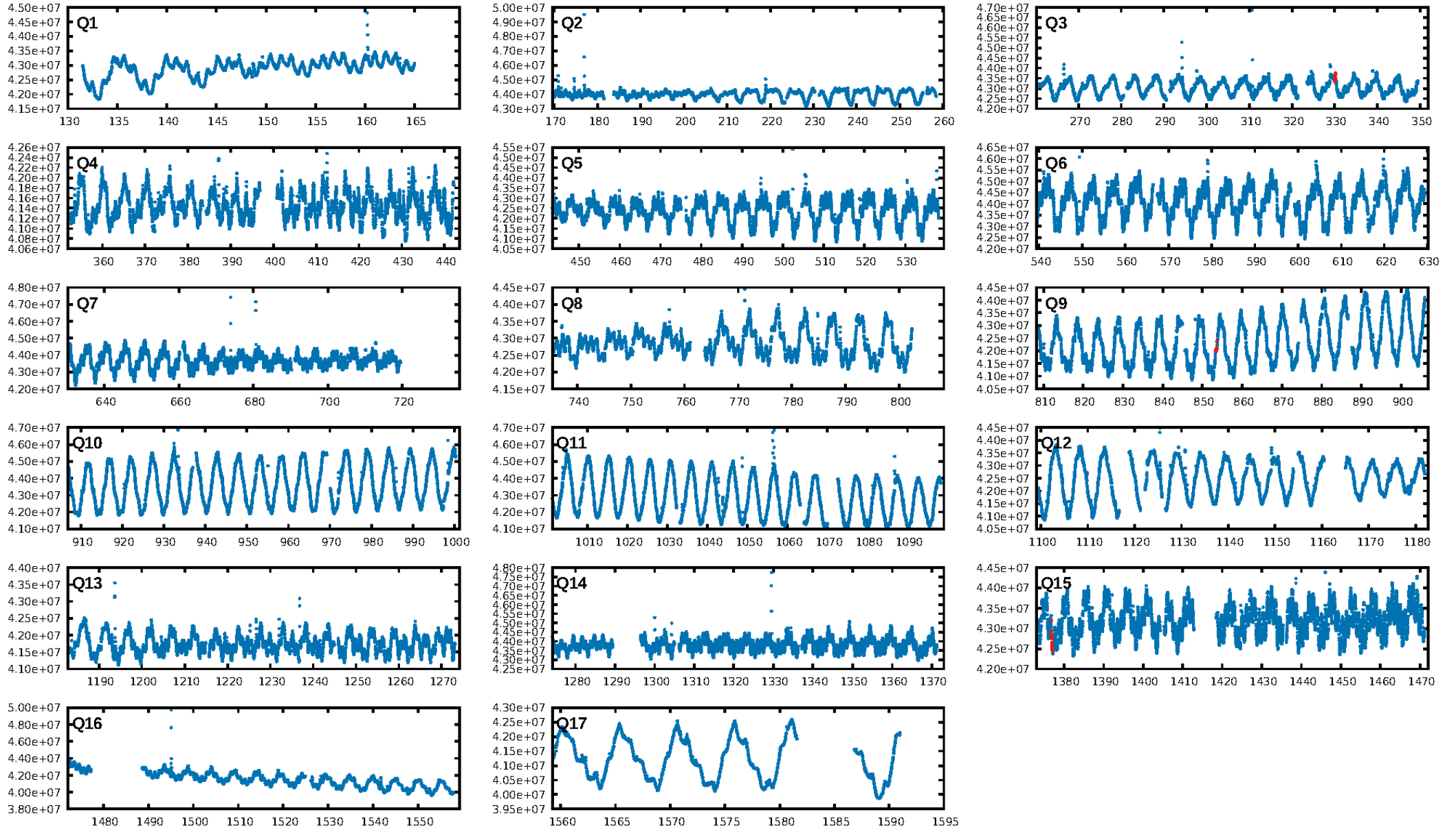
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [173.11σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 13.1%  
ModelChiSquareGof-sig: 87.6%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 7.72  
Centroid-sig: 1.5%  
Centroid-so: 0.669 arcsec [0.58σ]  
OotOffset-rm: 2.507 arcsec [0.76σ]  
OotOffset-st: 0/2/0/1 [3]  
KicOffset-rm: 0.246 arcsec [2.82σ]  
KicOffset-st: 0/2/0/1 [3]  
DiffImageQuality-fgm: 1.00 [3/3]  
DiffImageOverlap-fno: 1.00 [3/3]

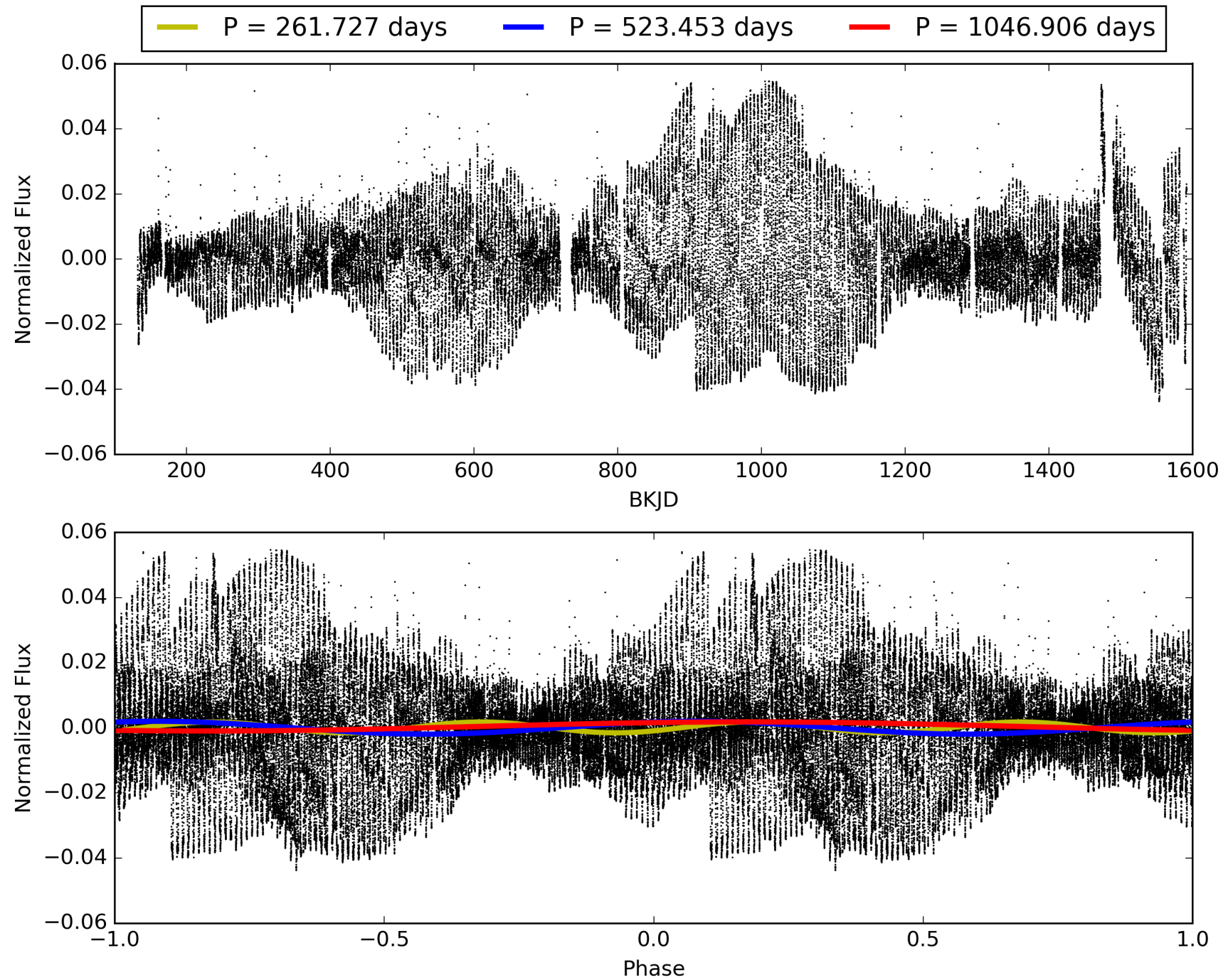
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 00:28:28 Z

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

# TCE 005951140-04, PDC Light Curves

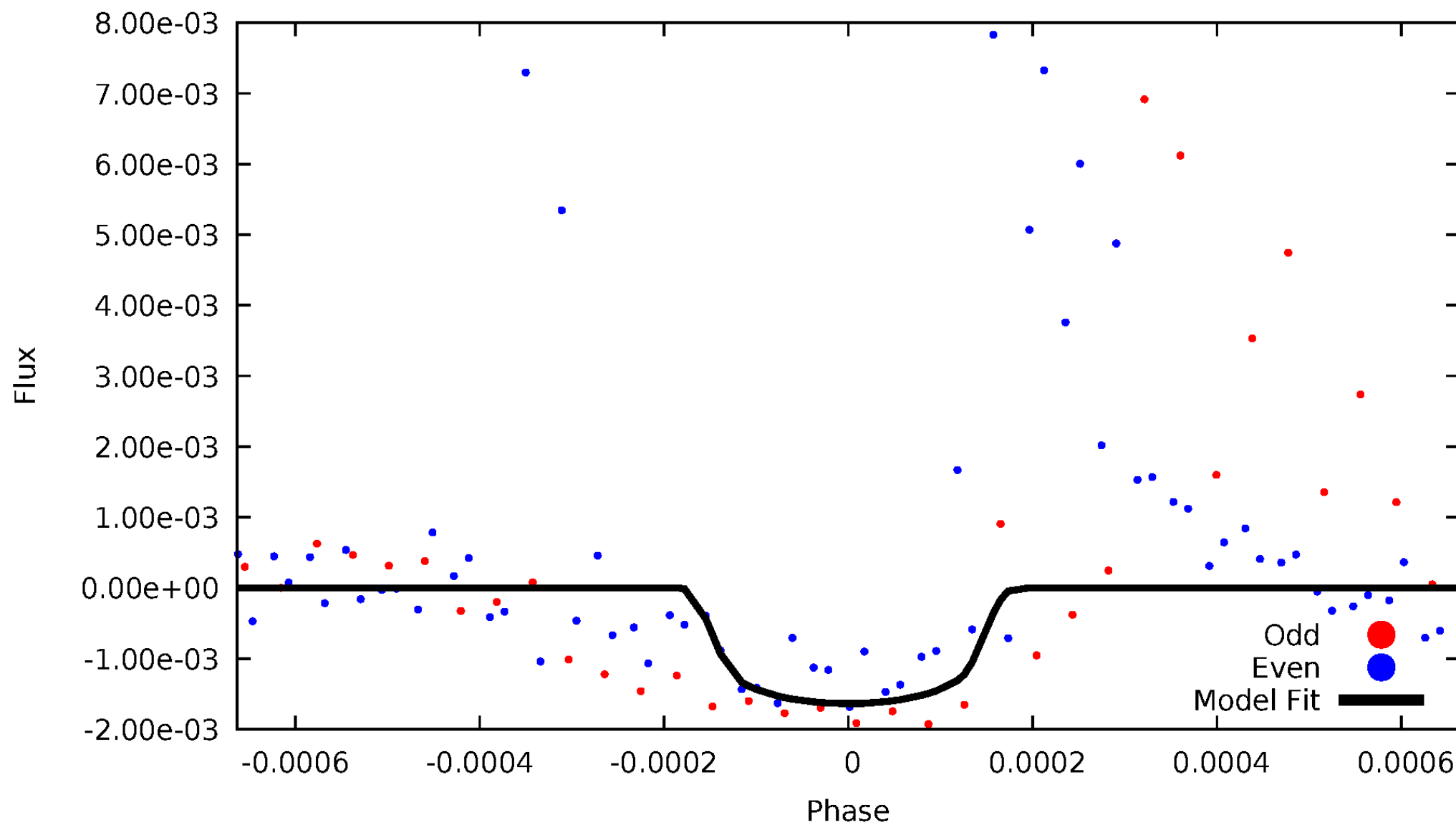


TCE 005951140-04



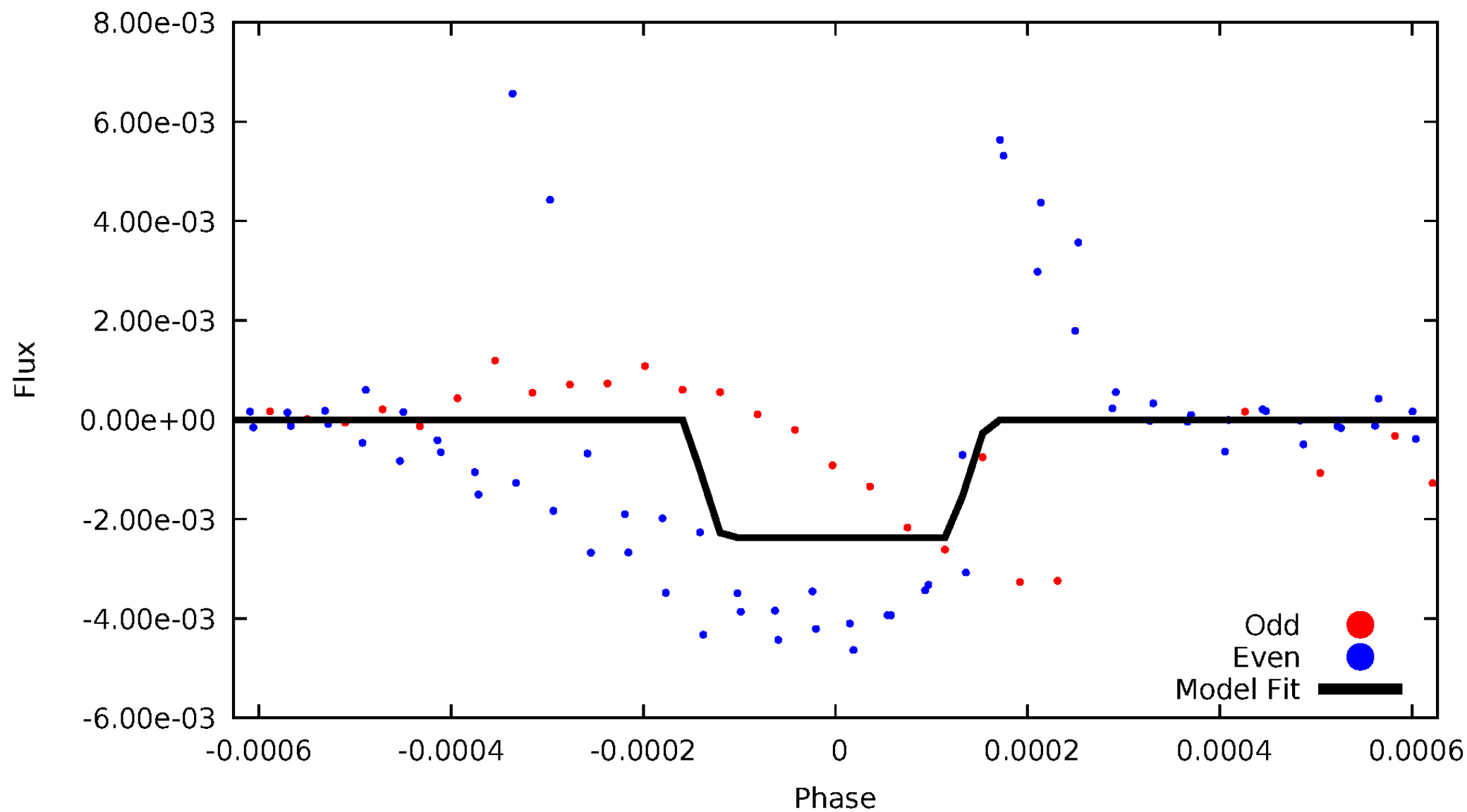
# DV Odd/Even

TCE 005951140-04



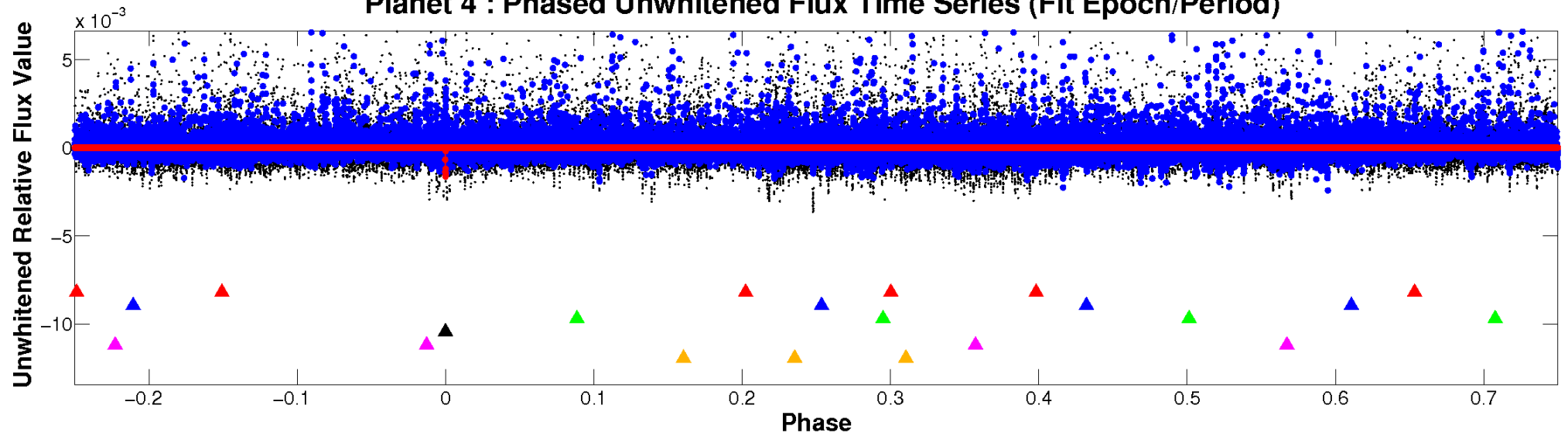
# ALT Odd/Even

TCE 005951140-04

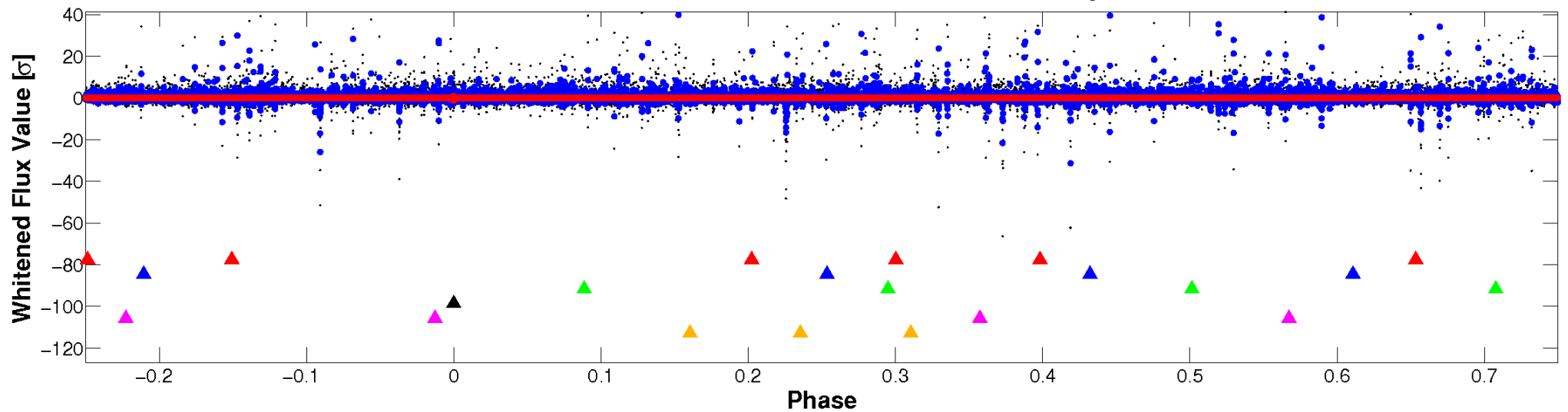


# Non-Whitened Vs. Whitened Light Curve

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

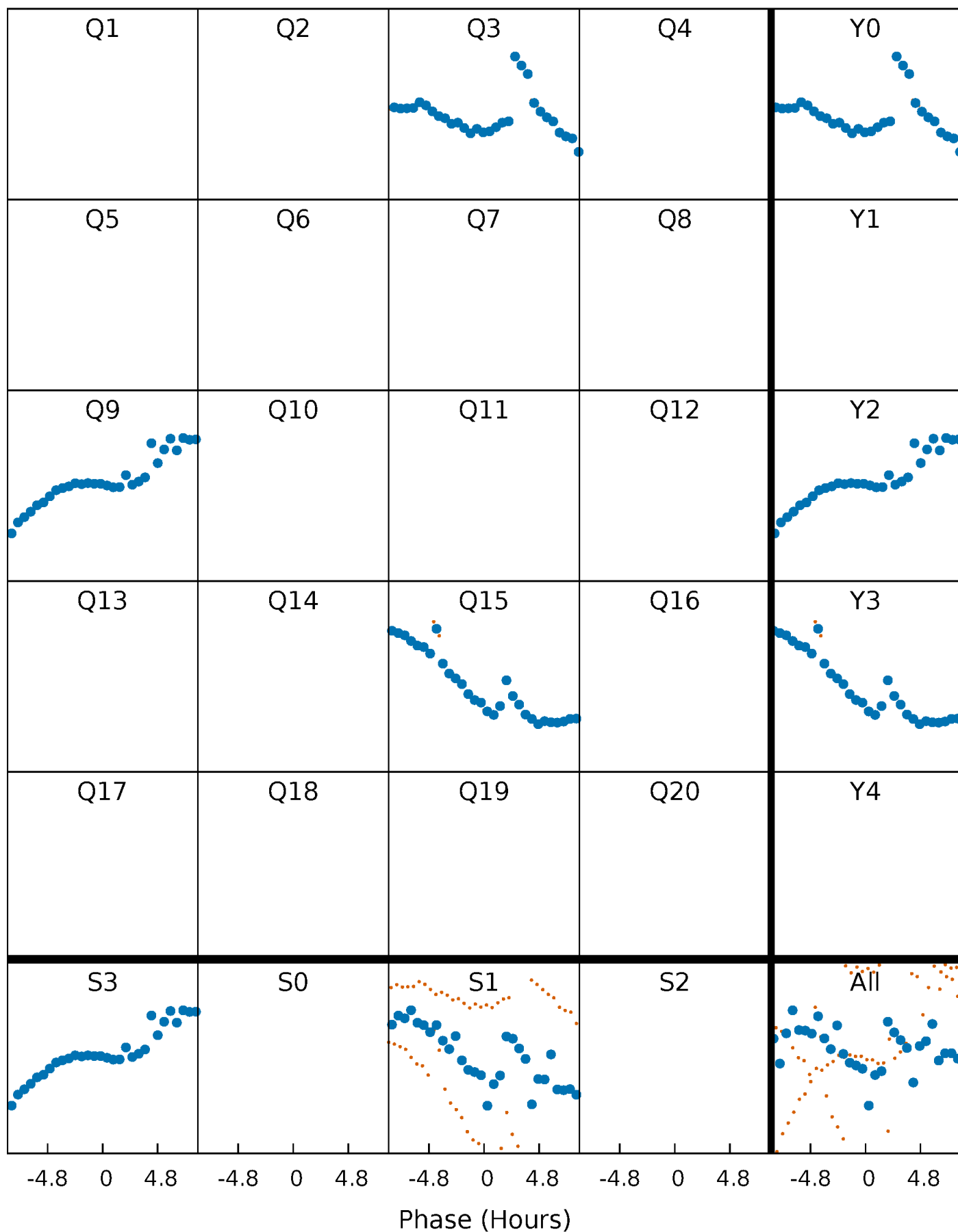


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

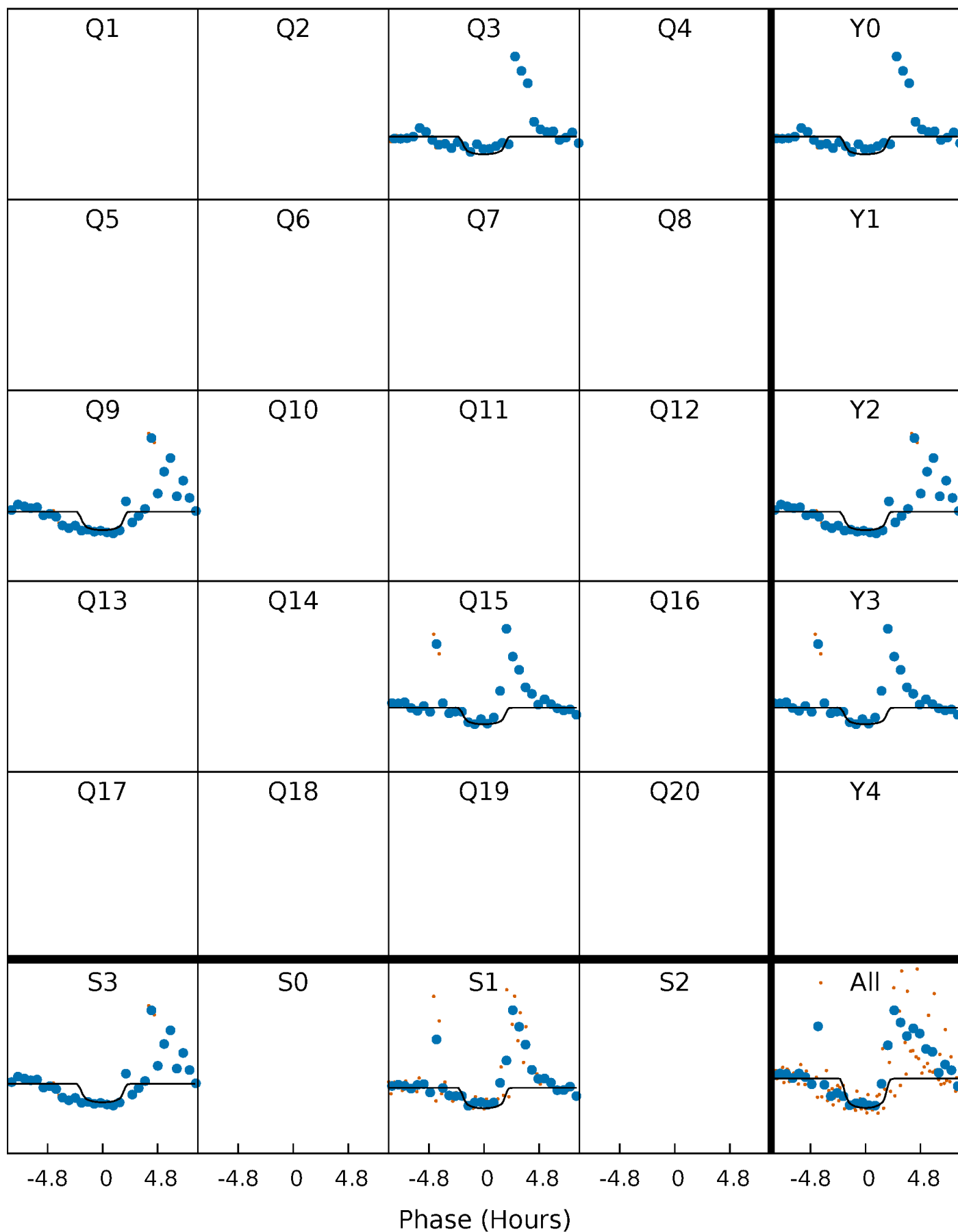
TCE 005951140-04 P=523.453177 Days  $T_0=330.034242$  (BKJD)





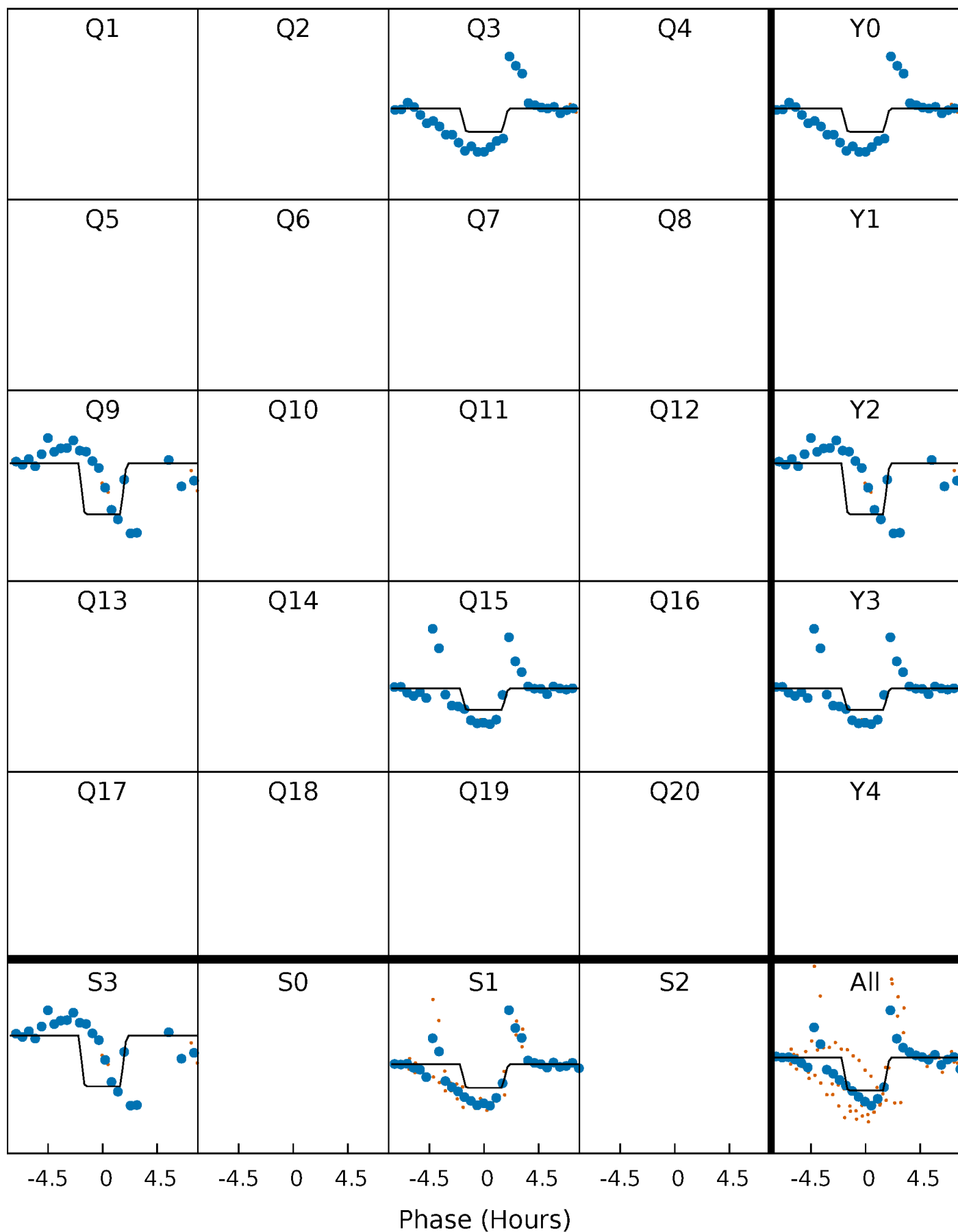
# DV Quarter-Phased Transit Curves

TCE 005951140-04     $P=523.453177$  Days     $T_0=330.034242$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

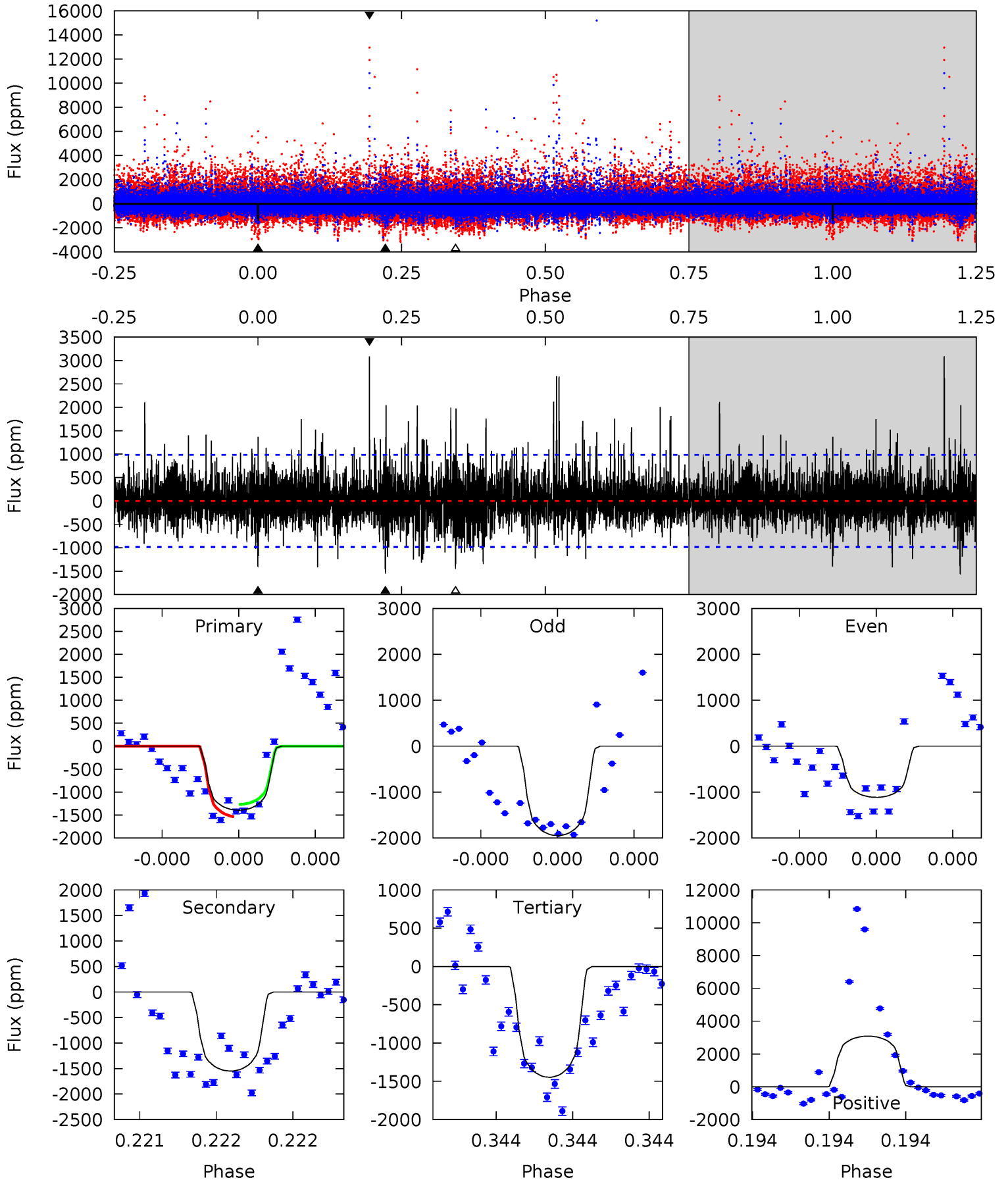
TCE 005951140-04 P=523.439695 Days  $T_0=330.053974$  (BKJD)



# DV Model-Shift Uniqueness Test

005951140-04, P = 523.453177 Days, E = 330.034242 Days

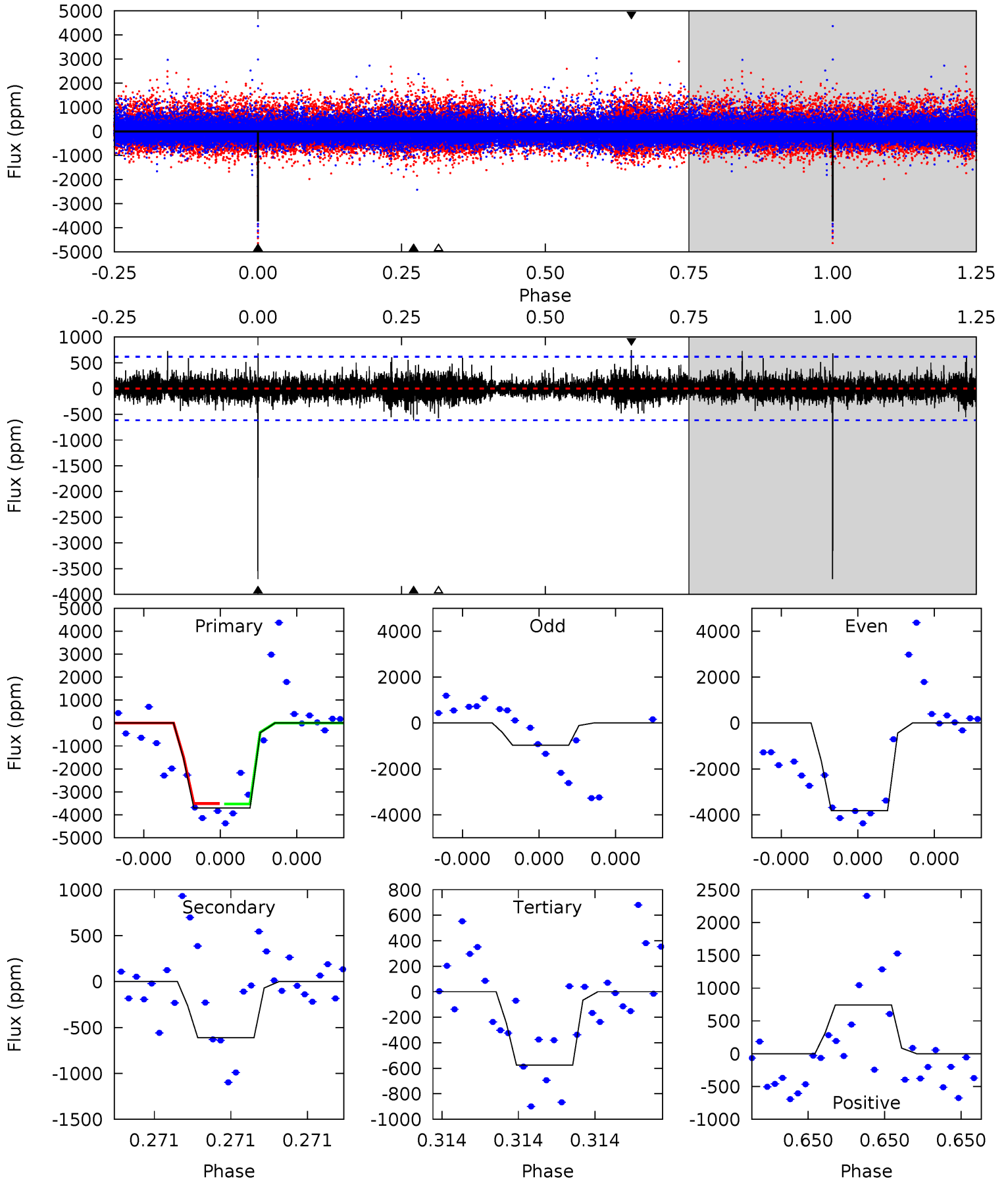
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.99	8.87	8.29	17.7	5.63	3.57	2.22	-0.30	-9.71	0.58	-8.83	1.38	1.14	0.67	0.78



# Alt Model-Shift Uniqueness Test

005951140-04, P = 523.439695 Days, E = 330.053974 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
33.9	5.61	5.28	6.82	5.66	3.62	1.05	28.7	27.1	0.33	-1.21	13.9	0.82	0.17	0.08



### Stellar Parameters For KIC 005951140

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3581^{+43}_{-48}$	$4.846^{+0.036}_{-0.030}$	$-0.100^{+0.100}_{-0.100}$	$0.406^{+0.029}_{-0.035}$	$0.424^{+0.031}_{-0.038}$	$8.915^{+1.741}_{-1.115}$
	+1%/-1%	+1%/-1%	+100%/-100%	+7%/-9%	+7%/-9%	+20%/-13%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 005951140-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-1549 \pm 175$	$1.84^{+0.97}_{-0.93}$	$144^{+3}_{-3}$	$3520^{+1010}_{-437}$	$228826^{+755819}_{-131518}$
Alt.	$-612 \pm 109$	$2.14^{+1.14}_{-1.02}$	$144^{+3}_{-3}$	$2926^{+594}_{-320}$	$67038^{+161918}_{-39838}$

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

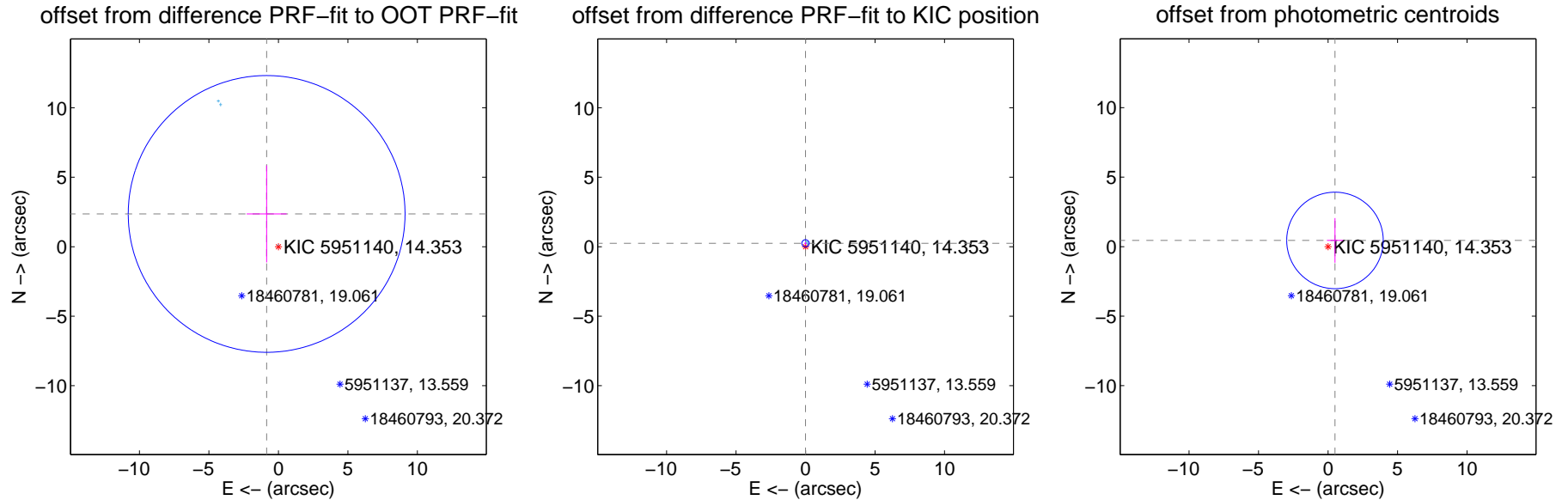
## DV Centroid Data

Supplemental centroid analysis for 005951140-04. Kepler magnitude: 14.35. Transit SNR 5.72

There are 3 quarters with good PRF difference image offsets

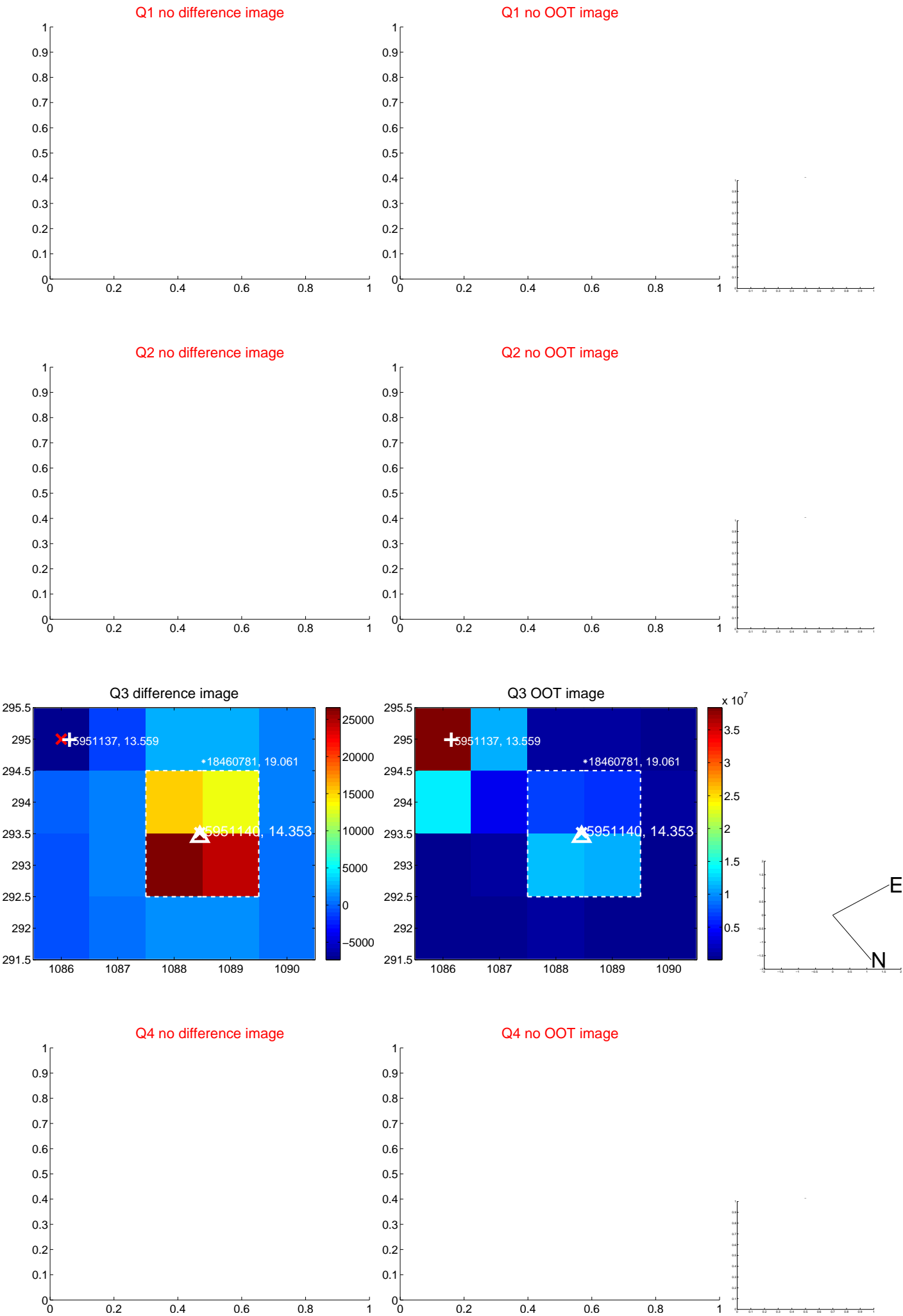
The direct PRF centroid is offset from the target star catalog position by about 0.11 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.507 \pm 3.320$	0.76	$0.846 \pm 1.435$	$2.360 \pm 3.489$
PRF-fit source offset from KIC position	$0.246 \pm 0.087$	2.82	$0.003 \pm 0.083$	$0.245 \pm 0.087$
photometric centroid source offset	$0.67 \pm 1.16$	0.58	$-0.50 \pm 0.58$	$0.45 \pm 1.61$



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

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

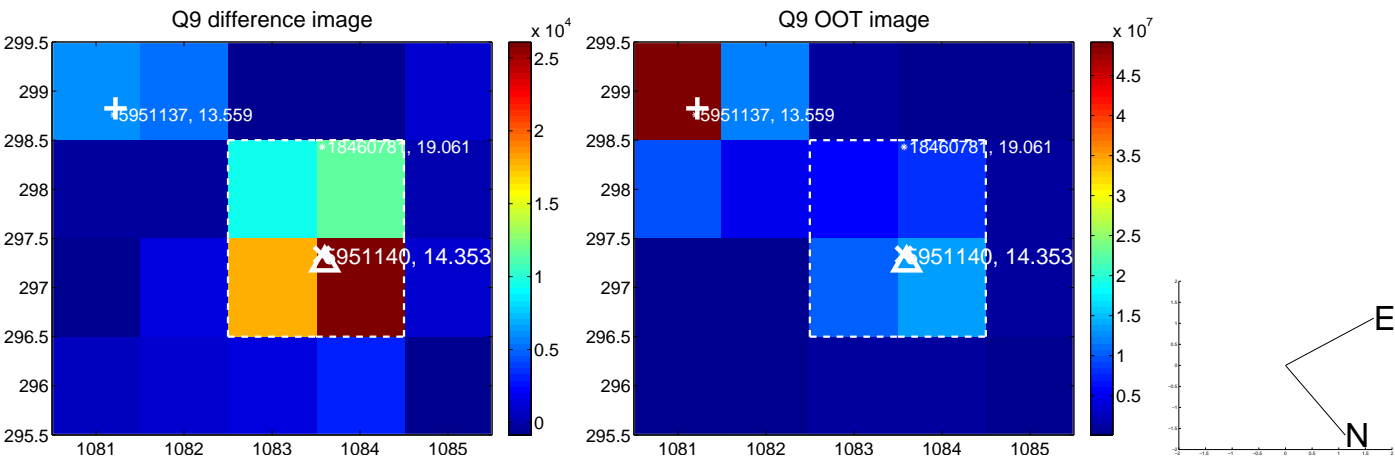


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

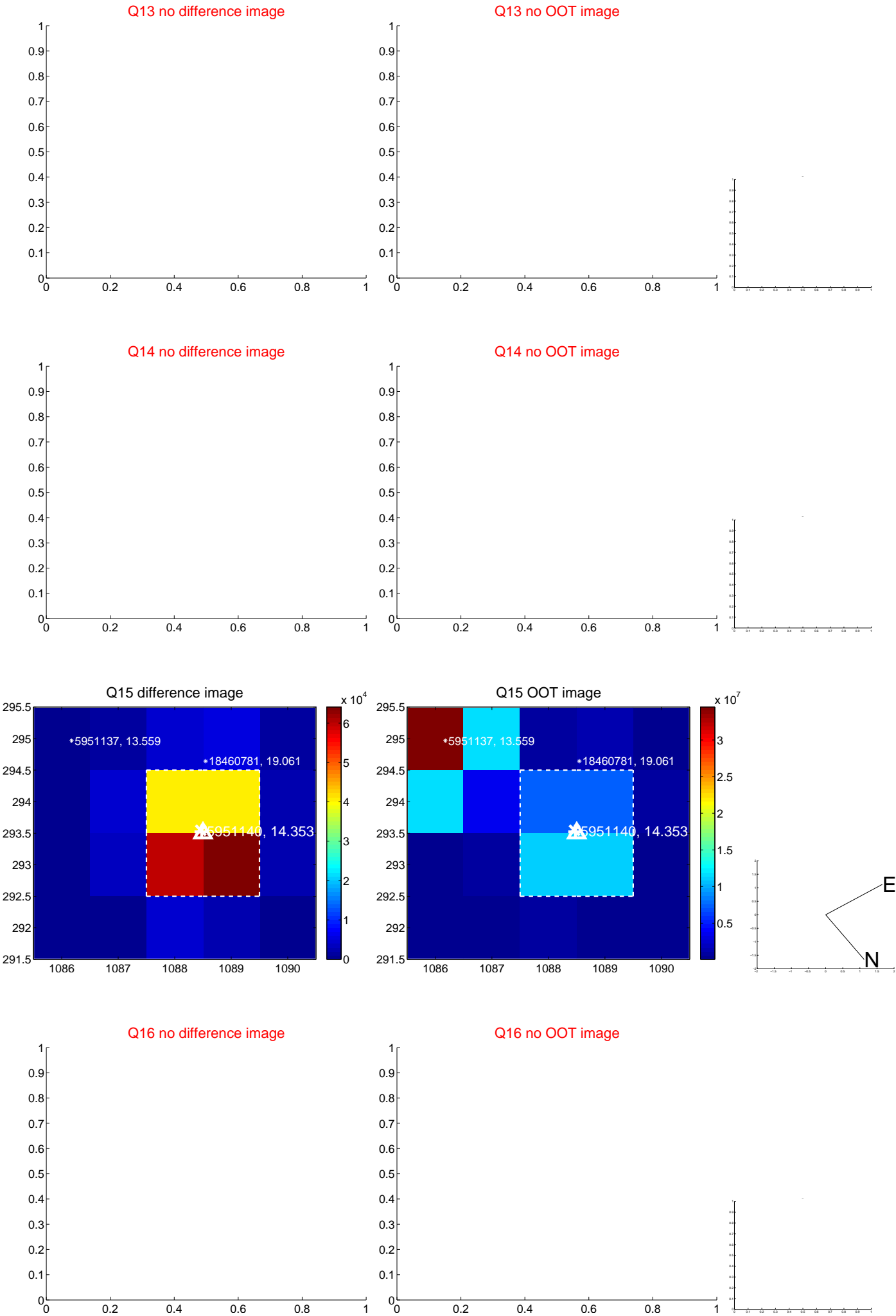




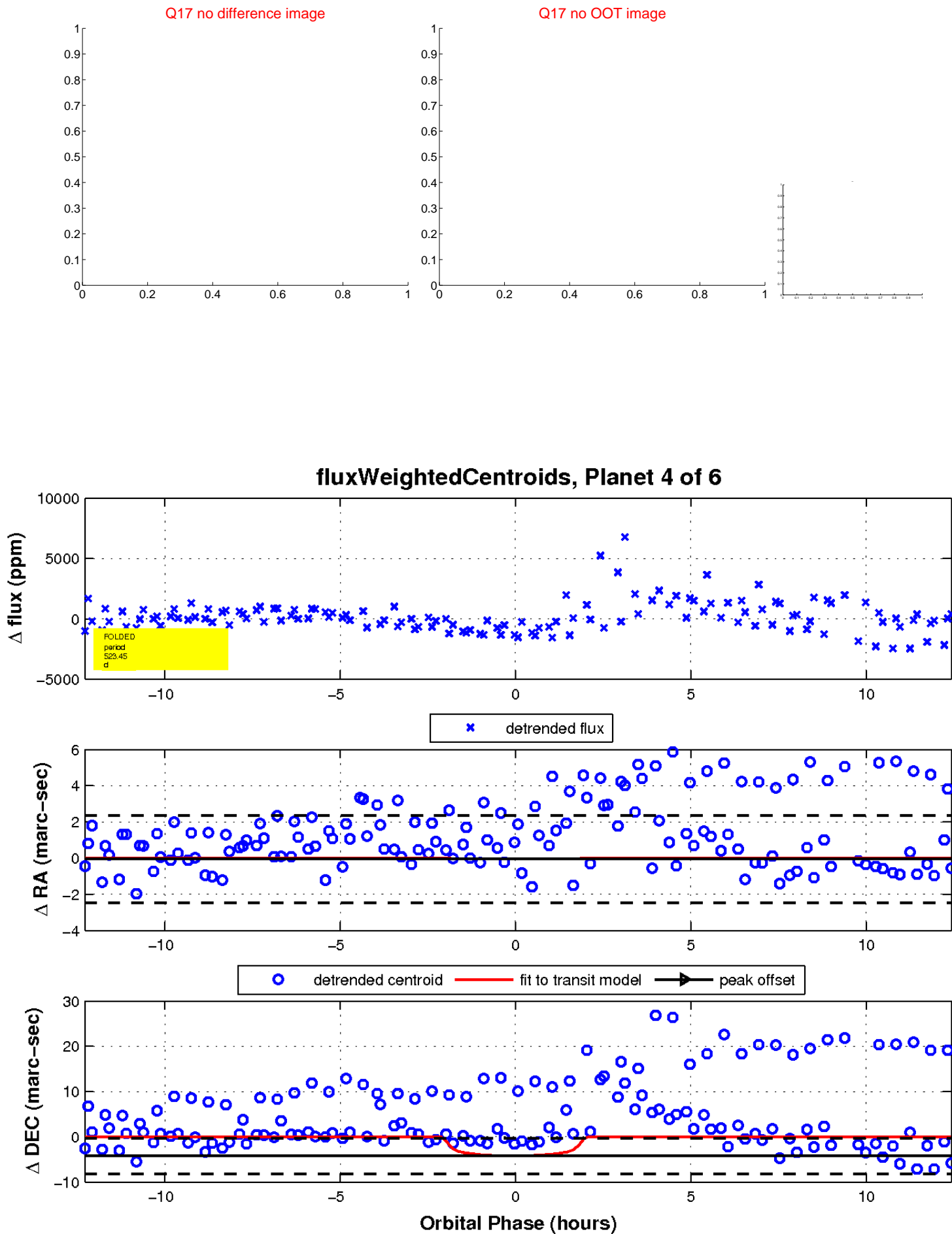
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

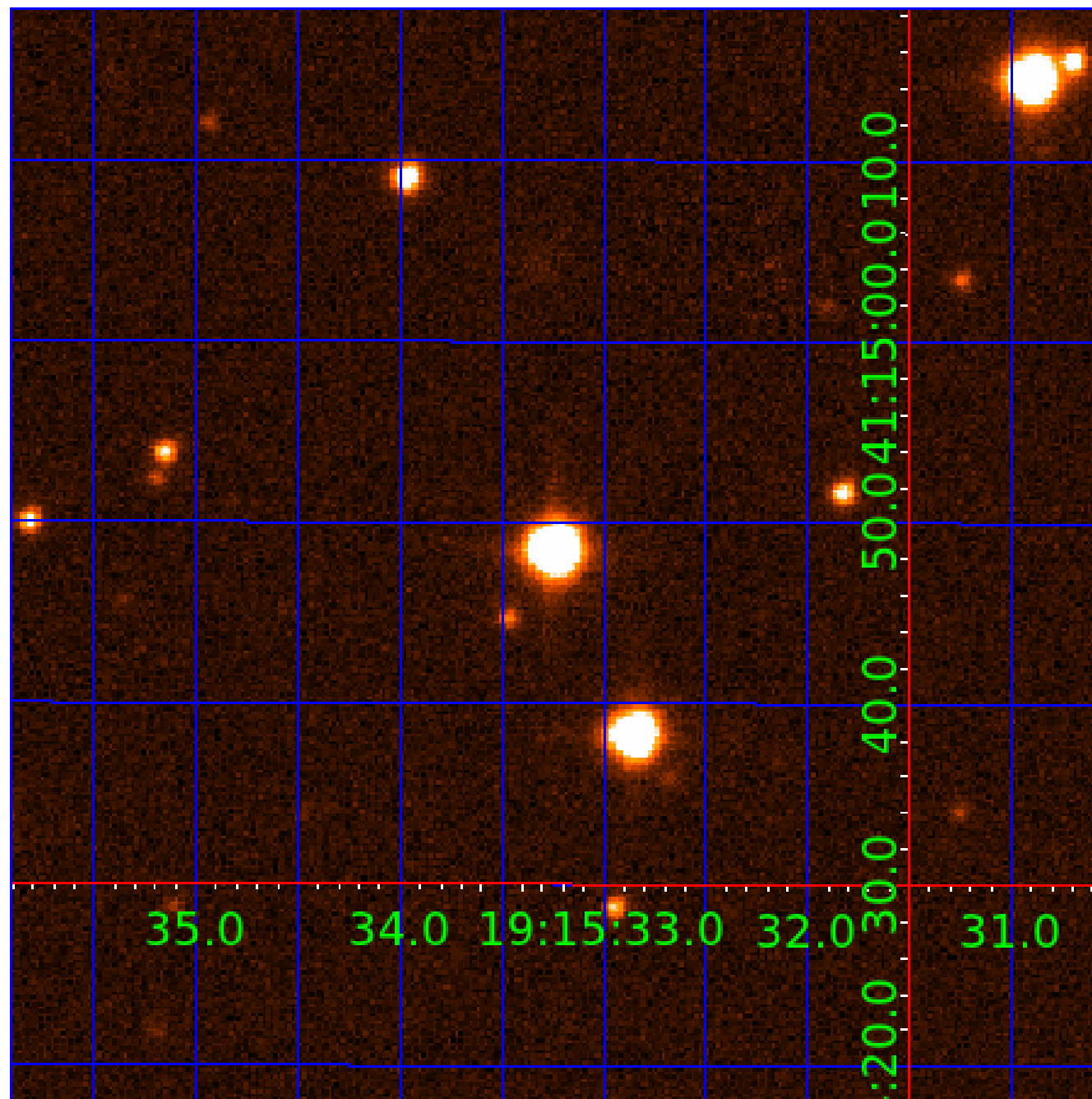


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 005951140

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005951140-02	OBS	No	429.952283	219.805522	1739.3	4.157	16.0	7.4	0.41	3581	1.67	0.04
005951140-03	OBS	No	415.427096	177.055354	2772.7	4.553	15.7	9.4	0.41	3581	2.69	0.04
005951140-04	OBS	No	523.453177	330.034242	1637.7	4.165	14.9	5.7	0.41	3581	1.78	0.03
005951140-06	OBS	No	484.214071	492.531132	1211.8	3.500	14.3	-1.0	0.41	3581	1.40	0.03

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005951140-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
005951140-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE_TRACKER—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
005951140-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_KIC_POS
005951140-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_NOFITS

**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 005951140-06

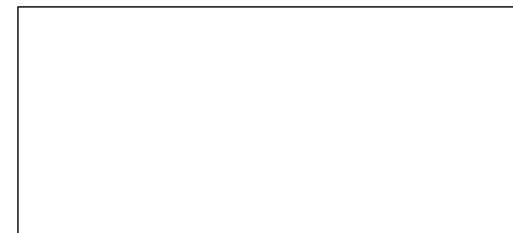
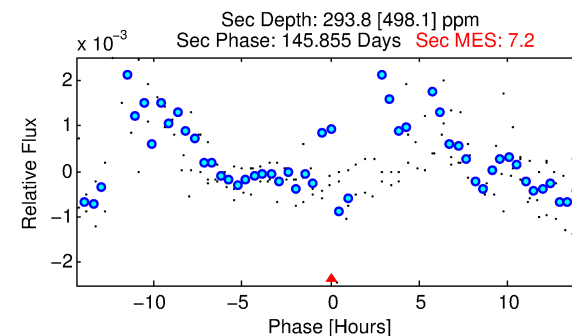
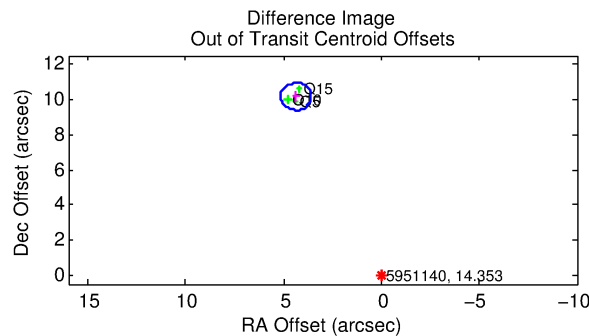
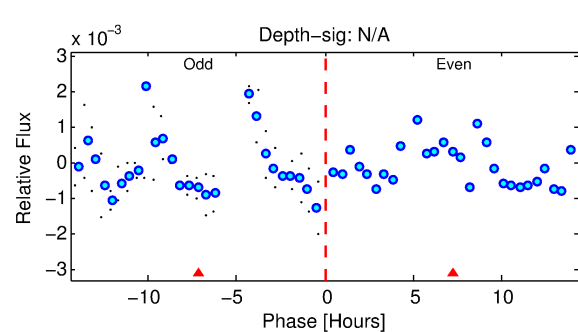
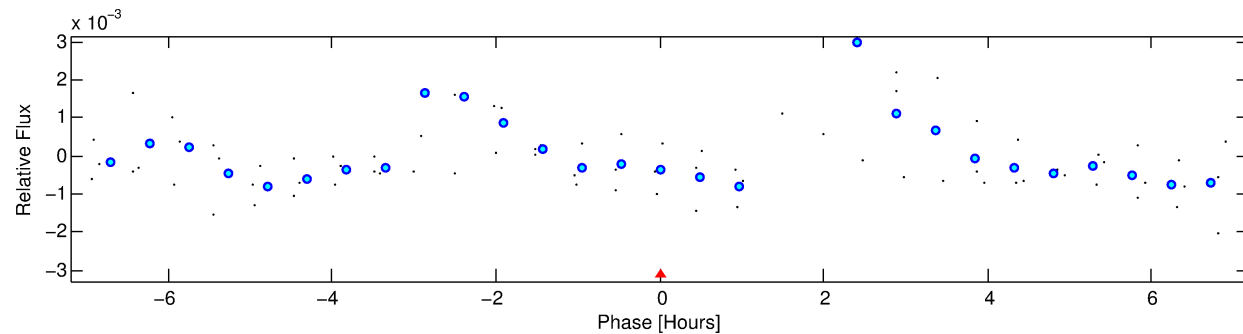
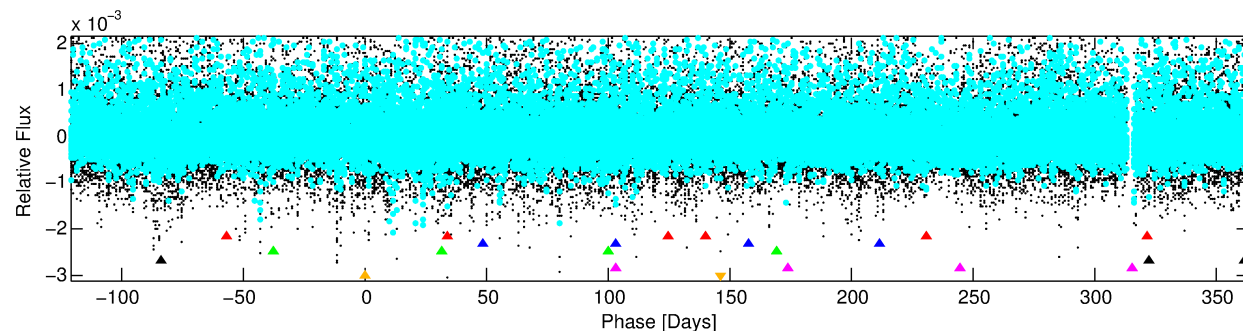
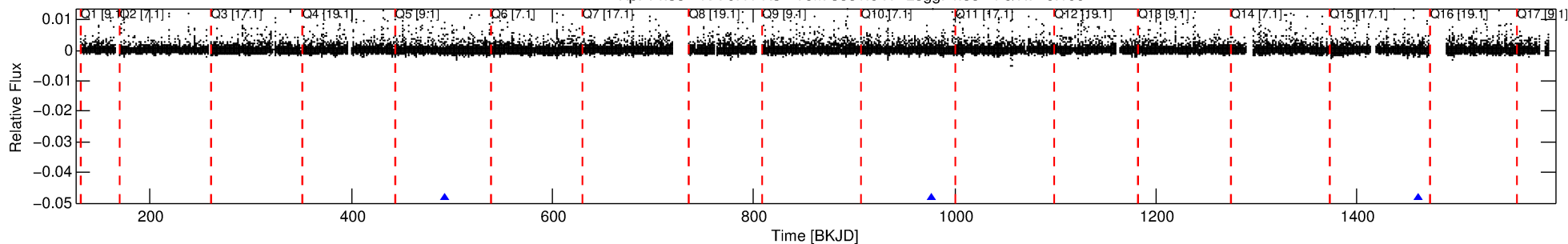
No Significant Match Found

# DV One-Page Summary

KIC: 5951140 Candidate: 6 of 6 Period: 484.214 d

KOI: K06635 Corr: No Ephemeris Match

Kp: 14.35 R\*: 0.41 Rs Teff: 3581.0 K Logg: 4.85 Fe/H: -0.100



## TPS TCE Results:

Period = 484.21407 d  
Epoch = 492.5311 BKJD

DV fit results are unavailable

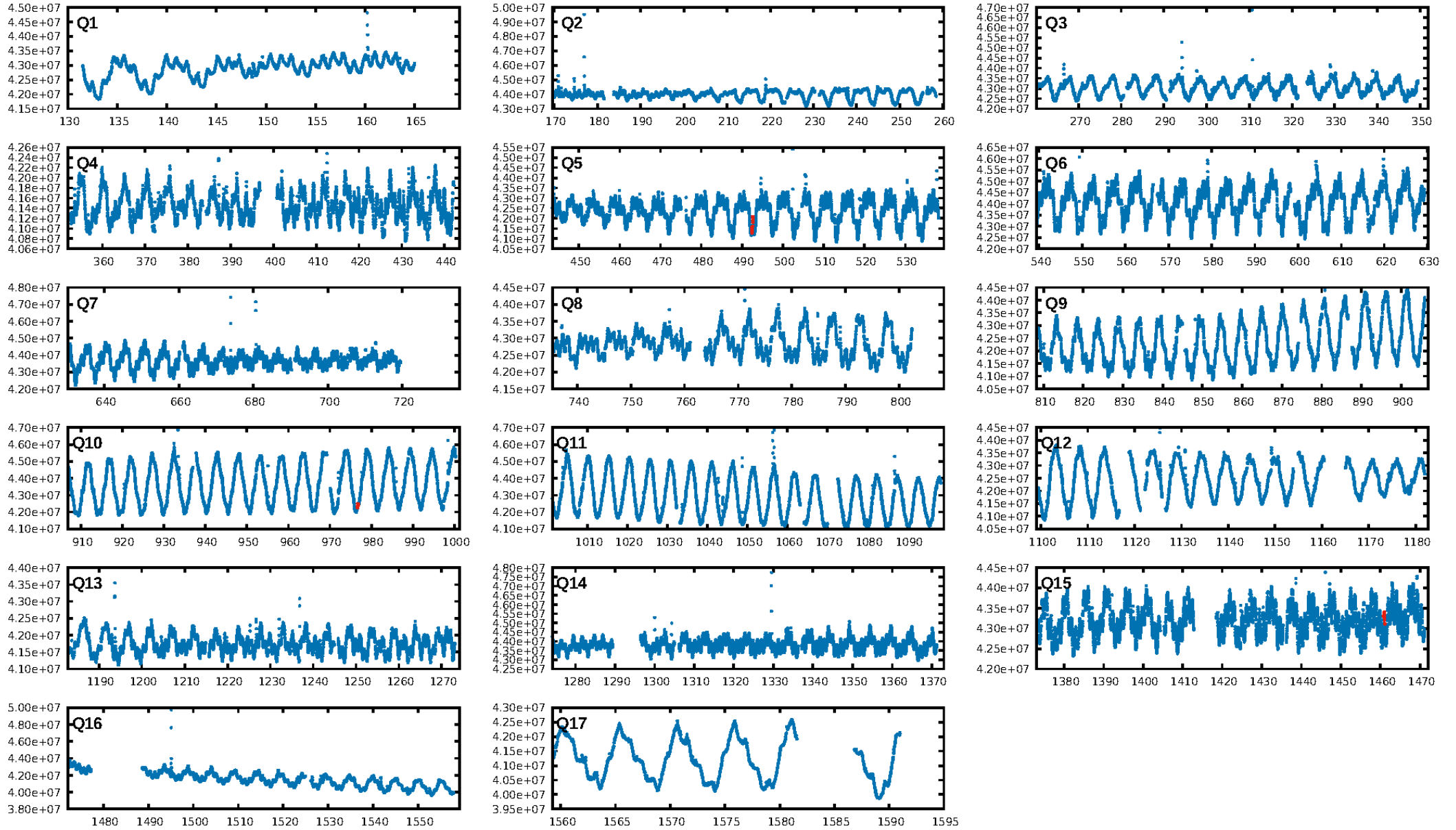
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [239.64σ]  
LongPeriod-sig: 100.0% [173.11σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 0.2502  
Centroid-sig: 93.5%  
Centroid-so: 6.436 arcsec [0.35σ]  
OotOffset-rm: 11.066 arcsec [43.00σ]  
KicOffset-rm: 0.133 arcsec [0.49σ]  
OotOffset-st: 1/1/0/1 [3]  
KicOffset-st: 1/1/0/1 [3]  
DiffImageQuality-fgm: 0.00 [0/3]  
DiffImageOverlap-fno: 1.00 [3/3]

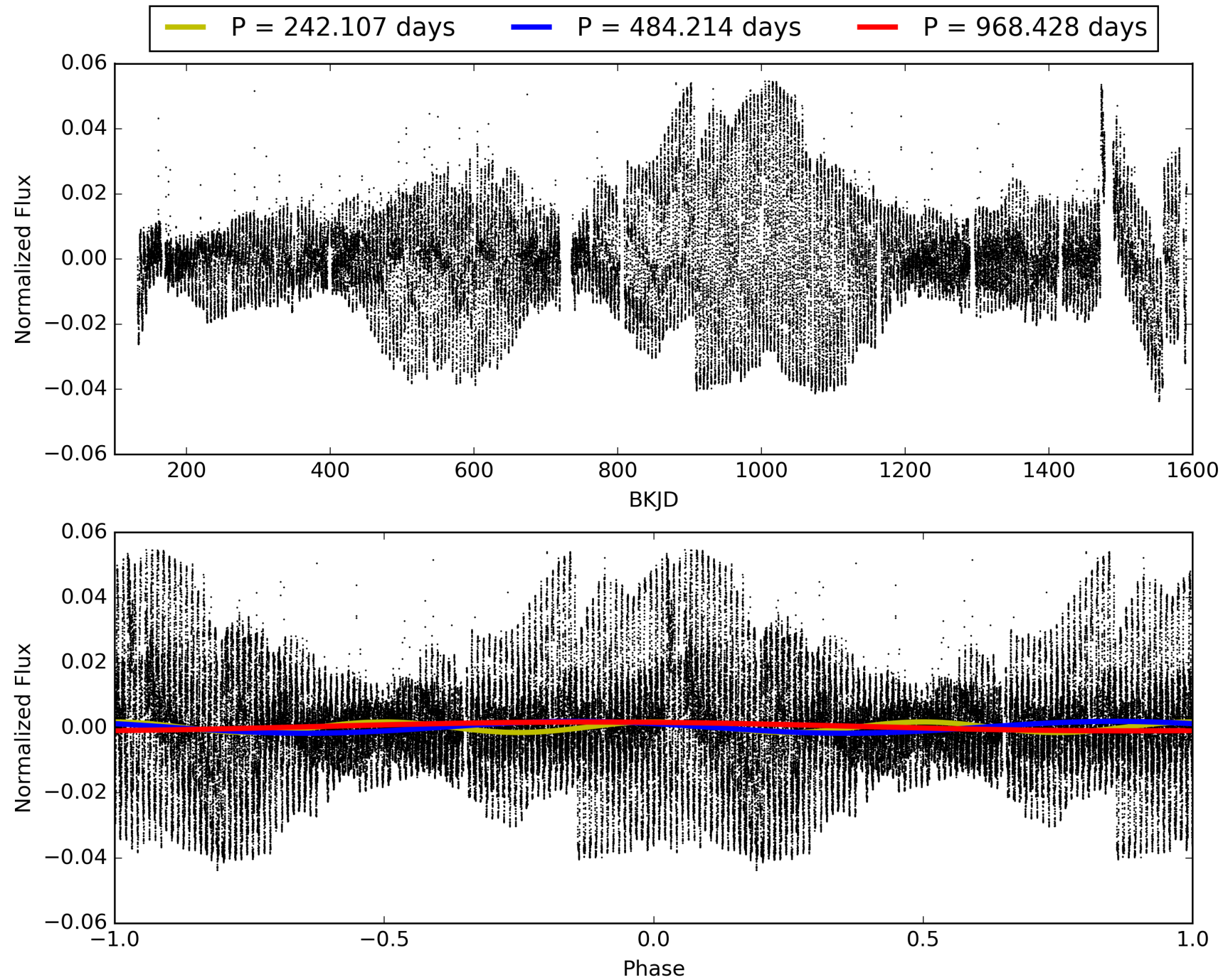
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 00:29:03 Z

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

# TCE 005951140-06, PDC Light Curves



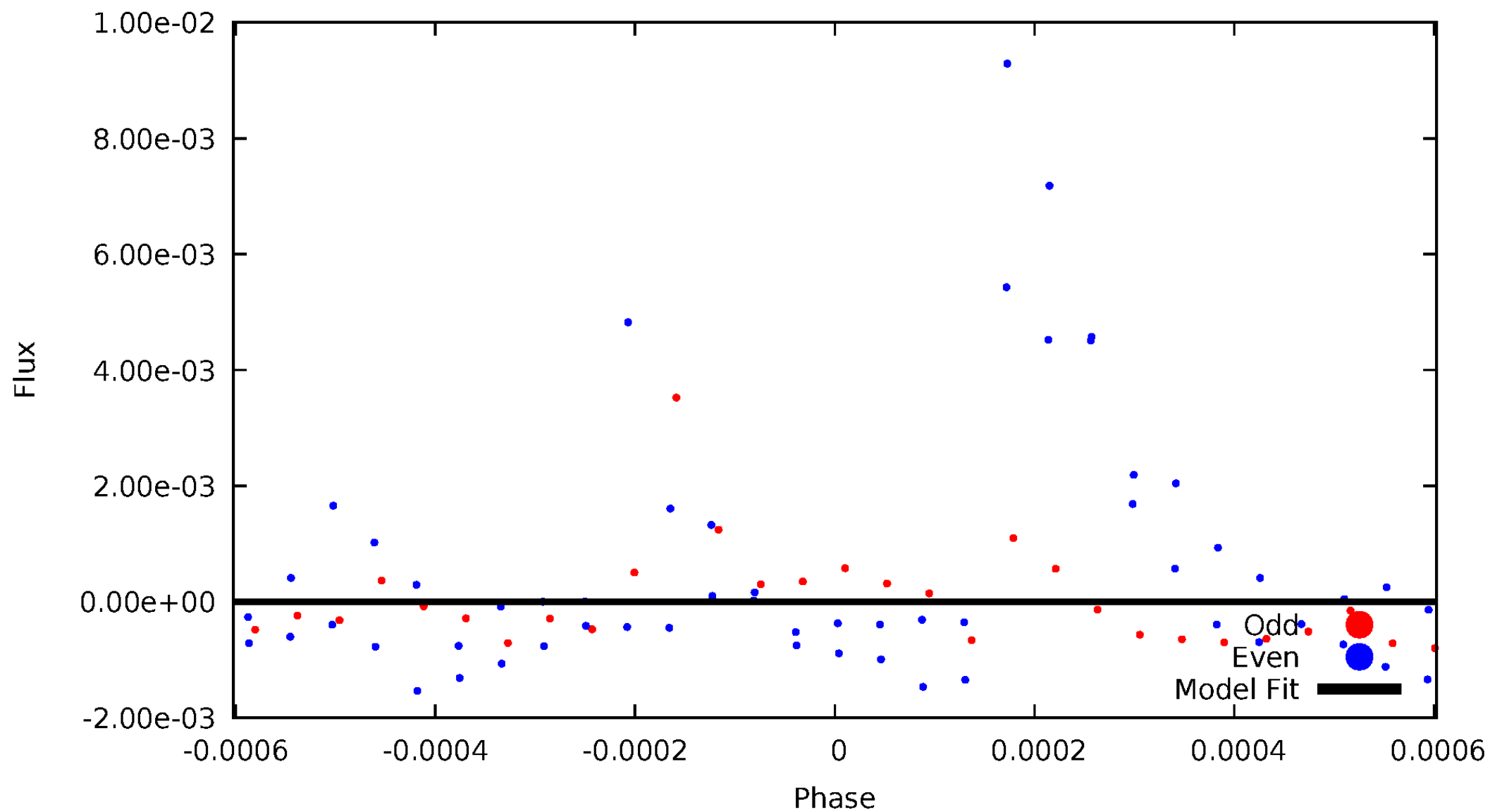
# TCE 005951140-06





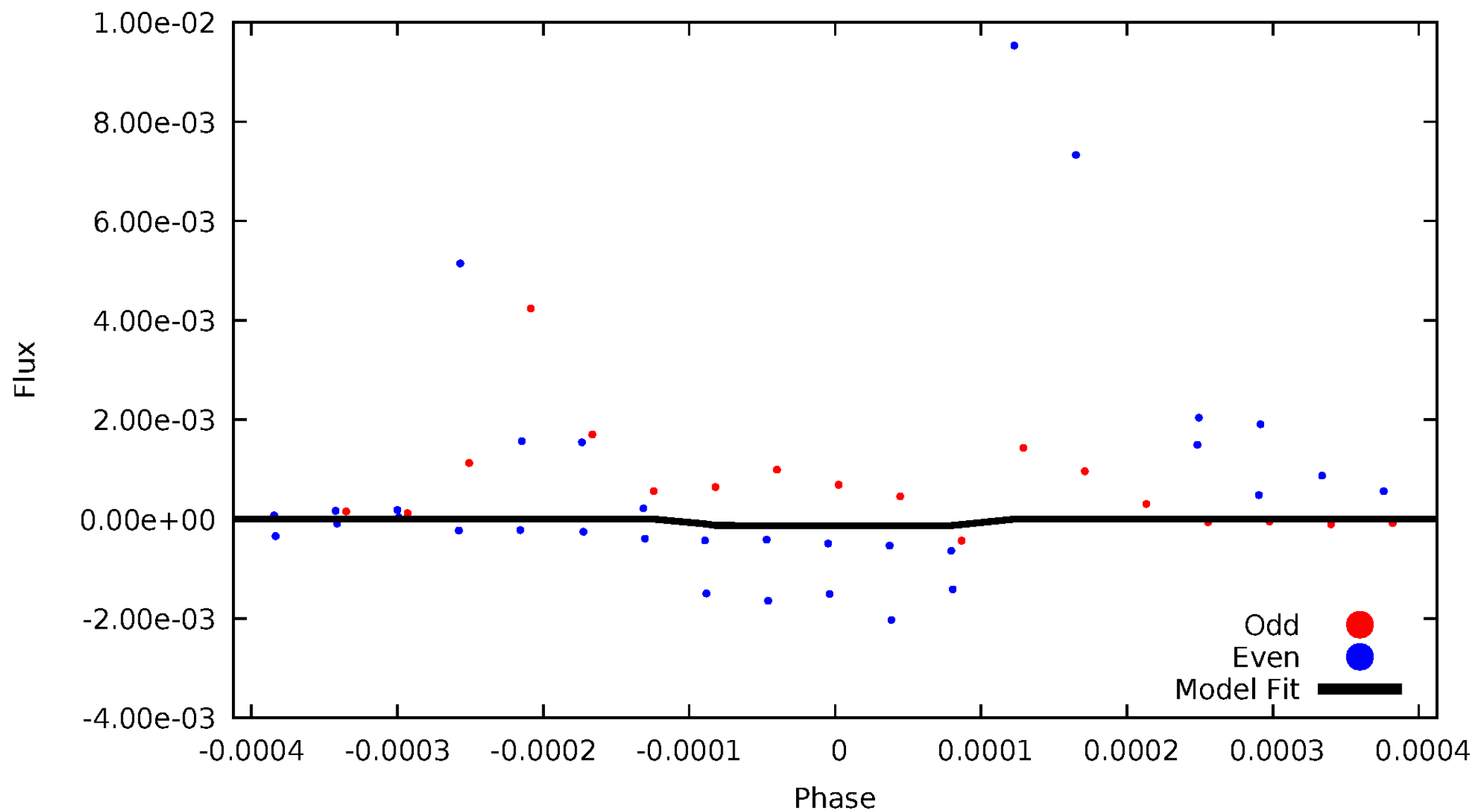
# DV Odd/Even

TCE 005951140-06



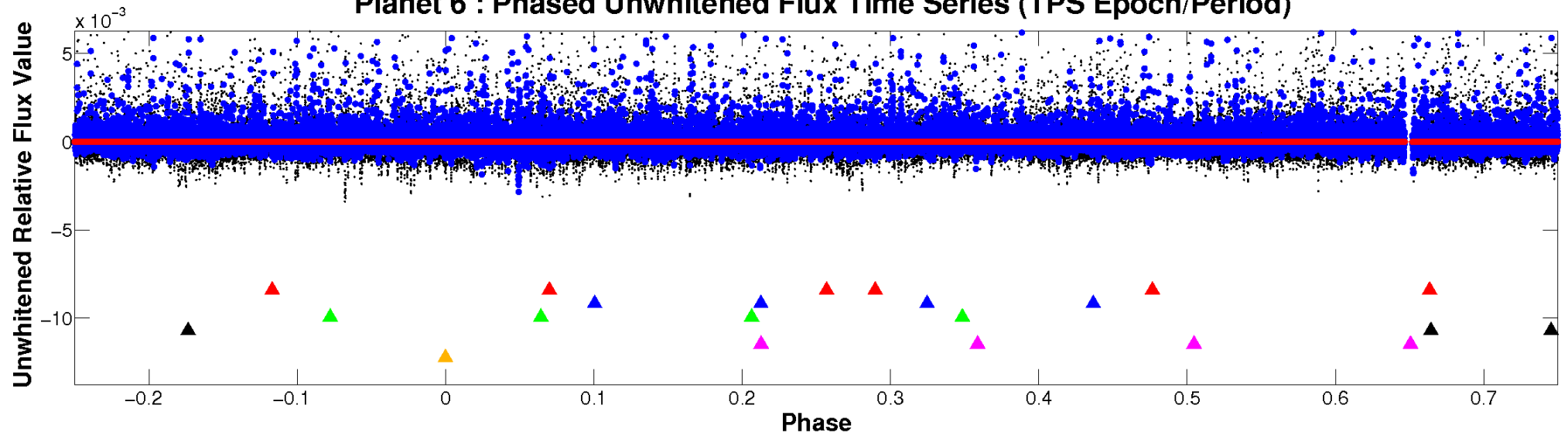
# ALT Odd/Even

TCE 005951140-06



# Non-Whitened Vs. Whitened Light Curve

**Planet 6 : Phased Unwhitened Flux Time Series (TPS Epoch/Period)**

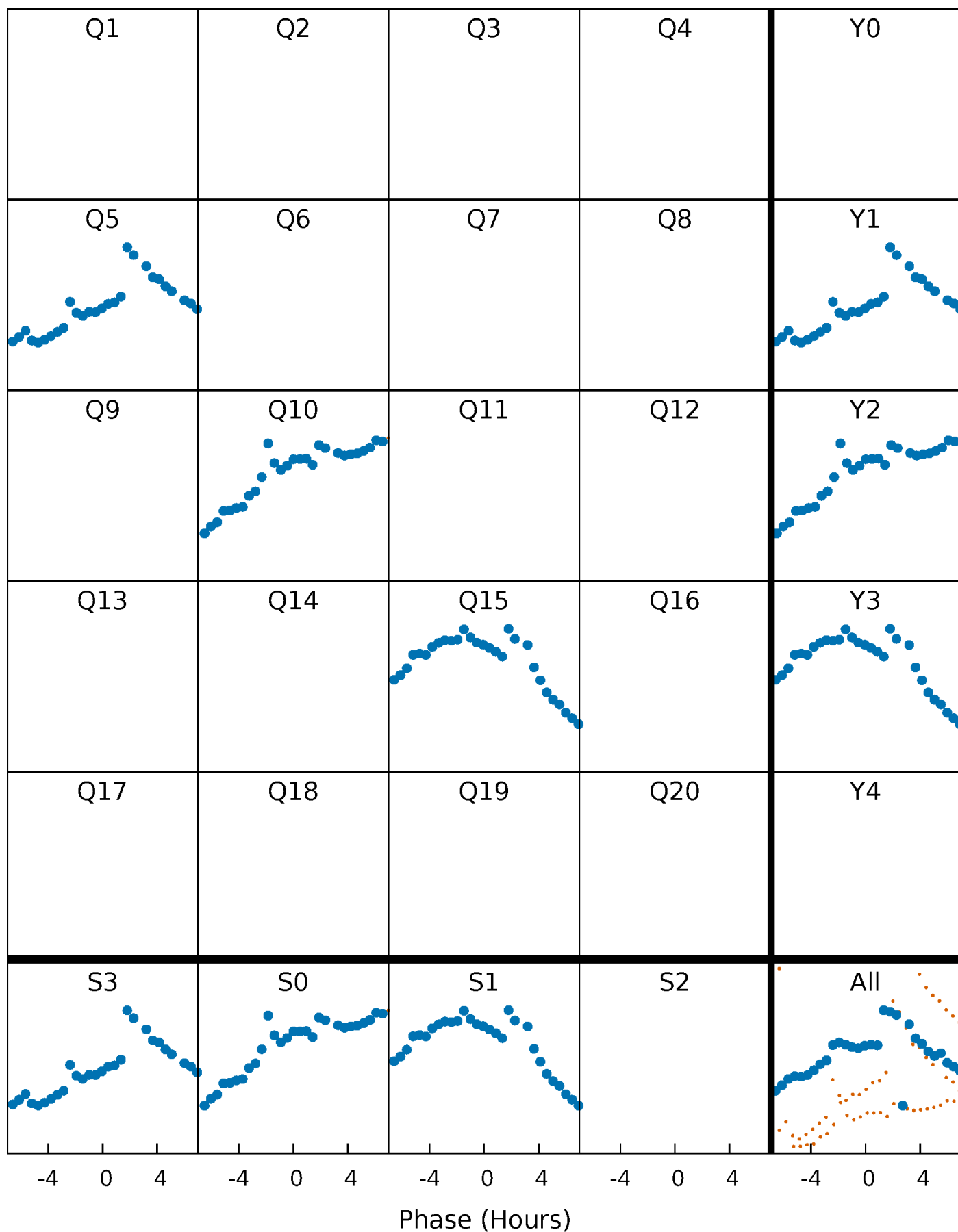


**Planet 6 : Phased Whitened Flux Time Series (TPS Epoch/Period)**



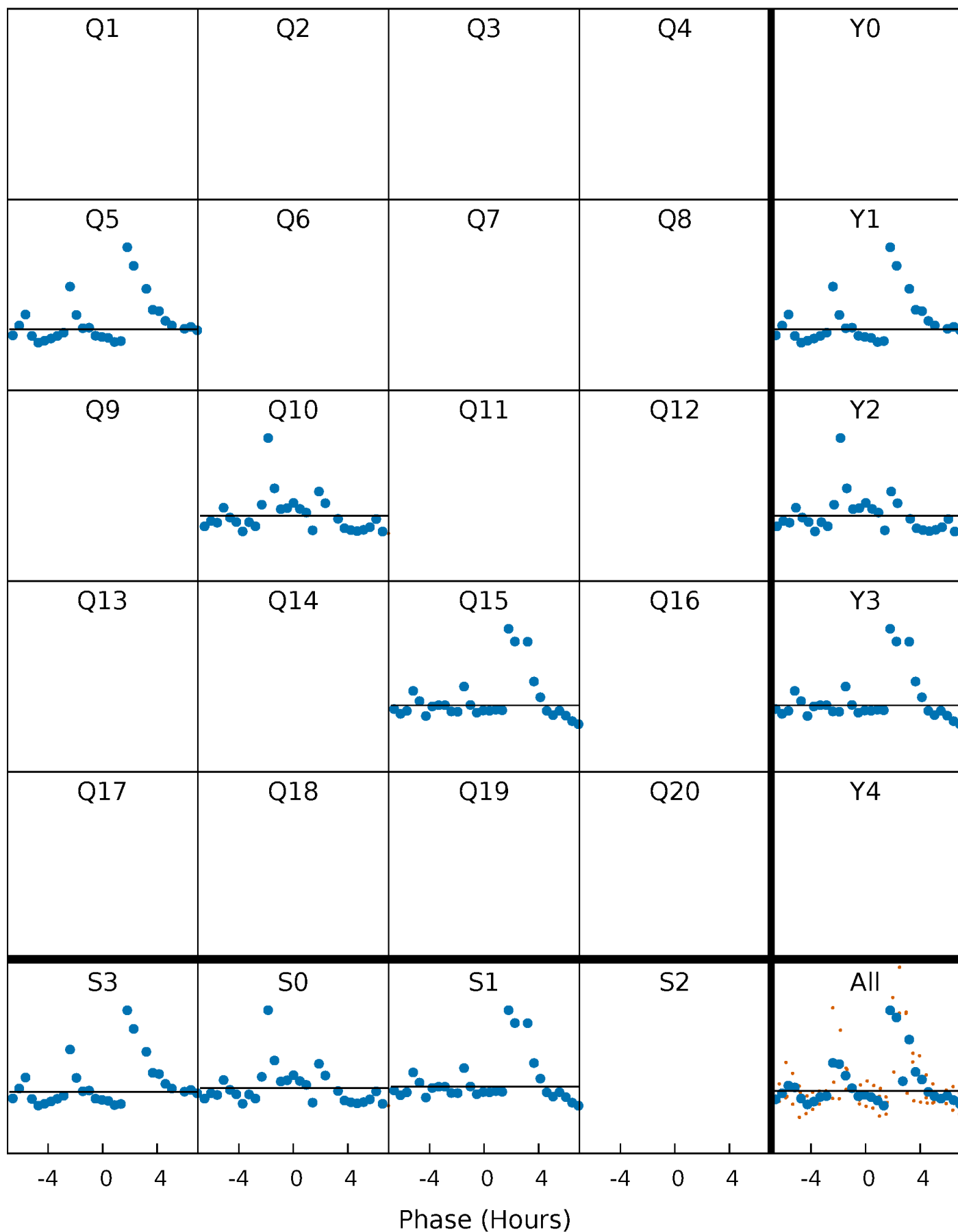
# PDC Quarter-Phased Transit Curves

TCE 005951140-06 P=484.214071 Days  $T_0=492.531132$  (BKJD)



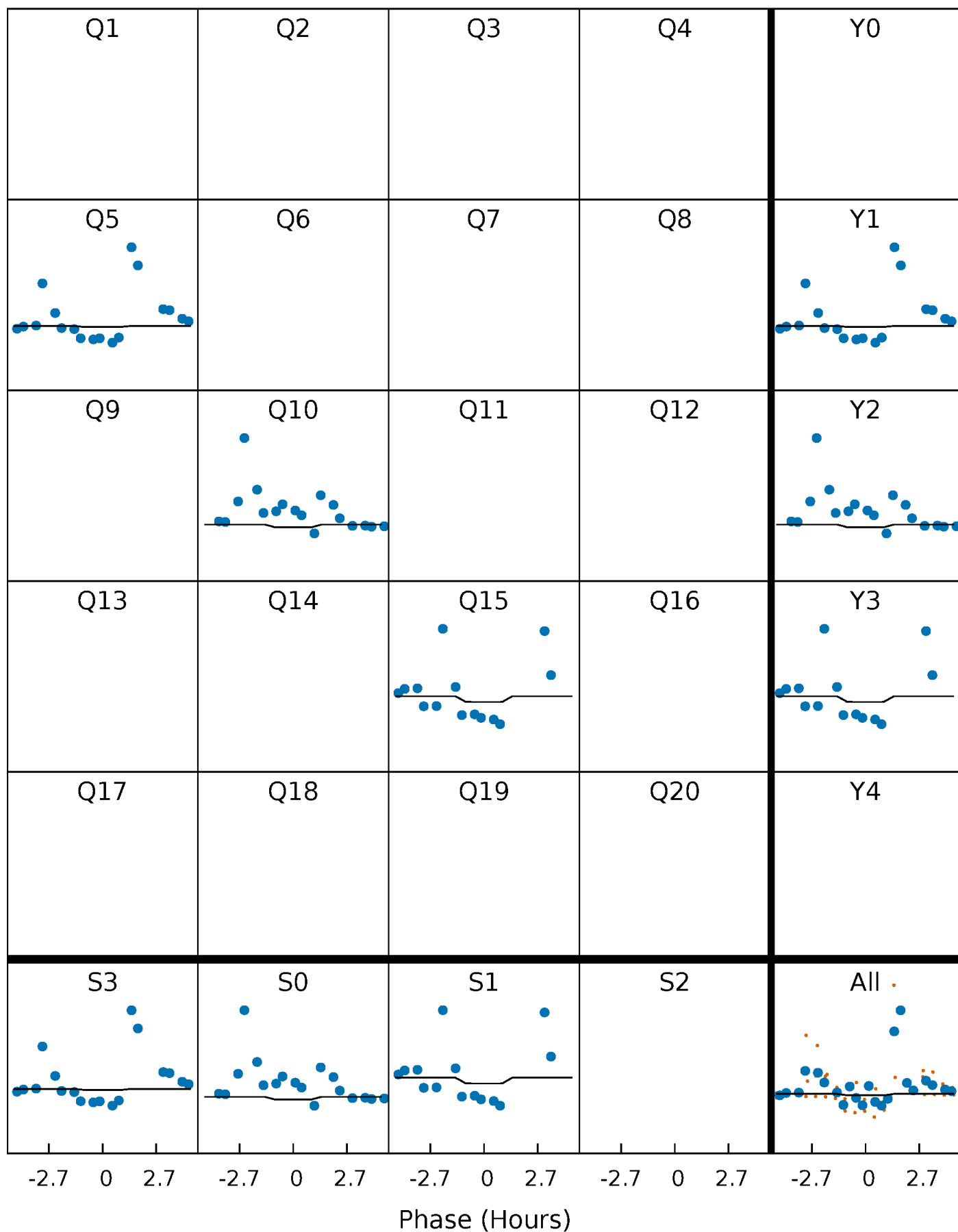
# DV Quarter-Phased Transit Curves

TCE 005951140-06 P=484.214071 Days  $T_0=492.531132$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

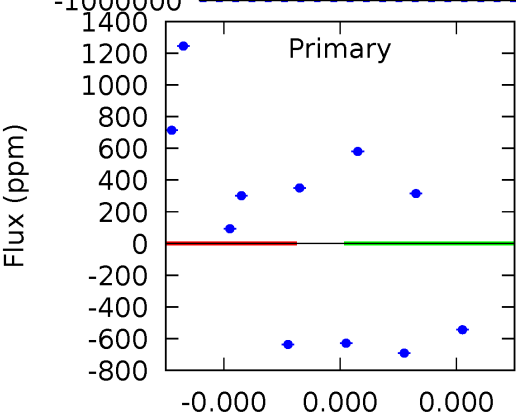
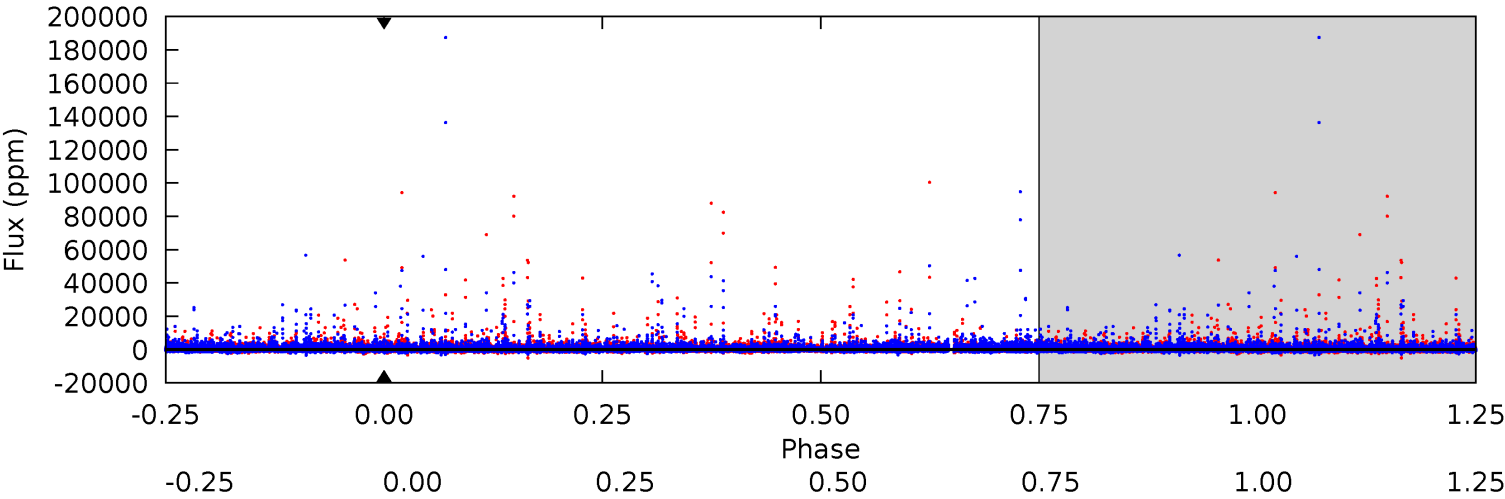
TCE 005951140-06 P=484.214071 Days  $T_0=492.555327$  (BKJD)



# DV Model-Shift Uniqueness Test

005951140-06, P = 484.214071 Days, E = 8.317061 Days

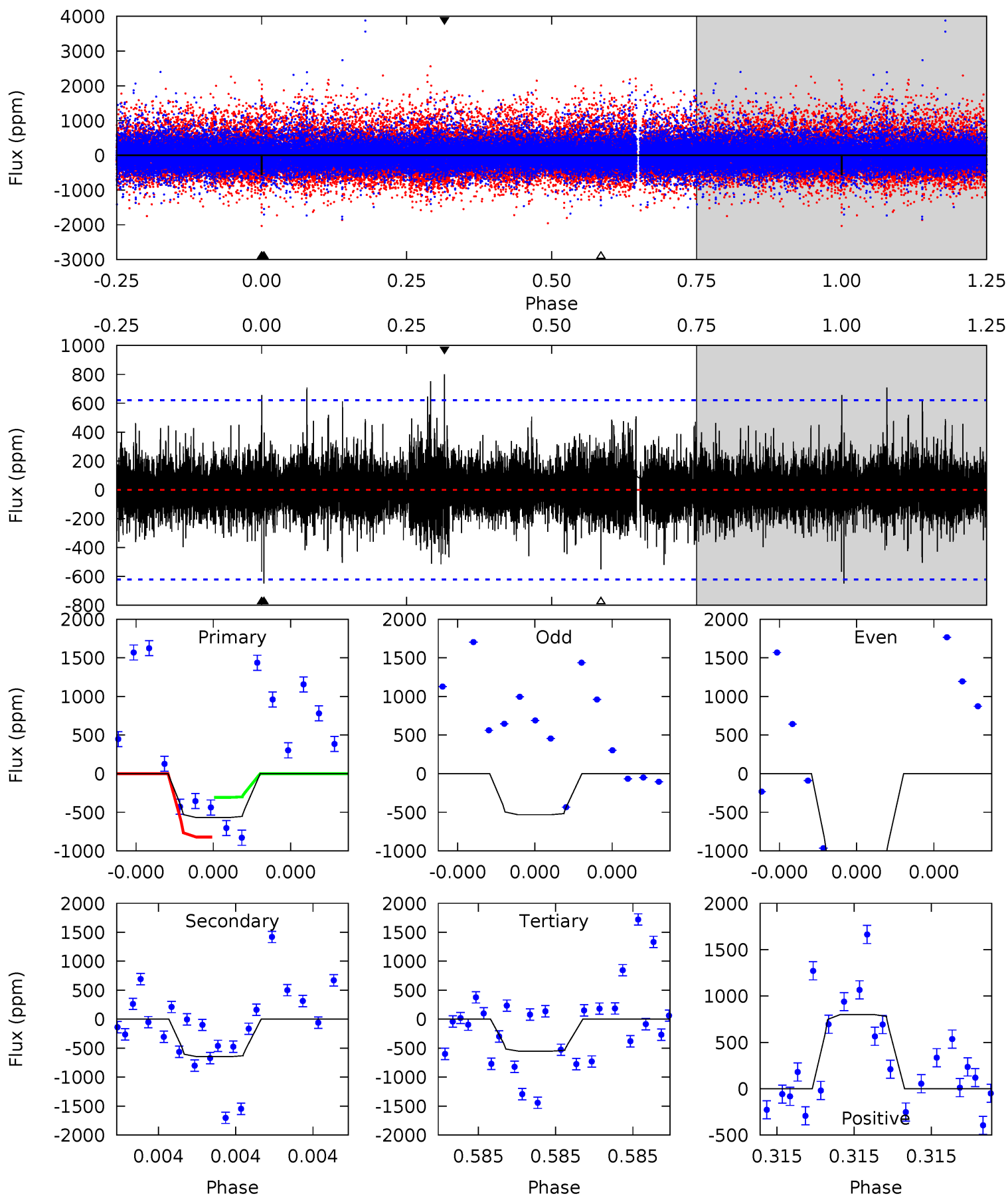
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



# Alt Model-Shift Uniqueness Test

005951140-06, P = 484.214071 Days, E = 8.341256 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
5.23	5.97	5.08	7.37	5.72	3.70	1.11	0.14	-2.15	0.89	-1.41	2.58	1.08	0.55	2.21





### Stellar Parameters For KIC 005951140

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3581^{+43}_{-48}$	$4.846^{+0.036}_{-0.030}$	$-0.100^{+0.100}_{-0.100}$	$0.406^{+0.029}_{-0.035}$	$0.424^{+0.031}_{-0.038}$	$8.915^{+1.741}_{-1.115}$
	+1%/-1%	+1%/-1%	+100%/-100%	+7%/-9%	+7%/-9%	+20%/-13%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 005951140-06 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$0 \pm 1000000$	$3.66^{+3.66}_{-2.56}$	$148^{+3}_{-3}$	$-2771^{+9950}_{-3920}$	$-43213.995^{+6128269.733}_{-4747835.919}$
Alt.	$-648 \pm 109$	$3.15^{+3.56}_{-2.15}$	$148^{+3}_{-3}$	$2668^{+1064}_{-450}$	$28913^{+254573}_{-22768}$

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

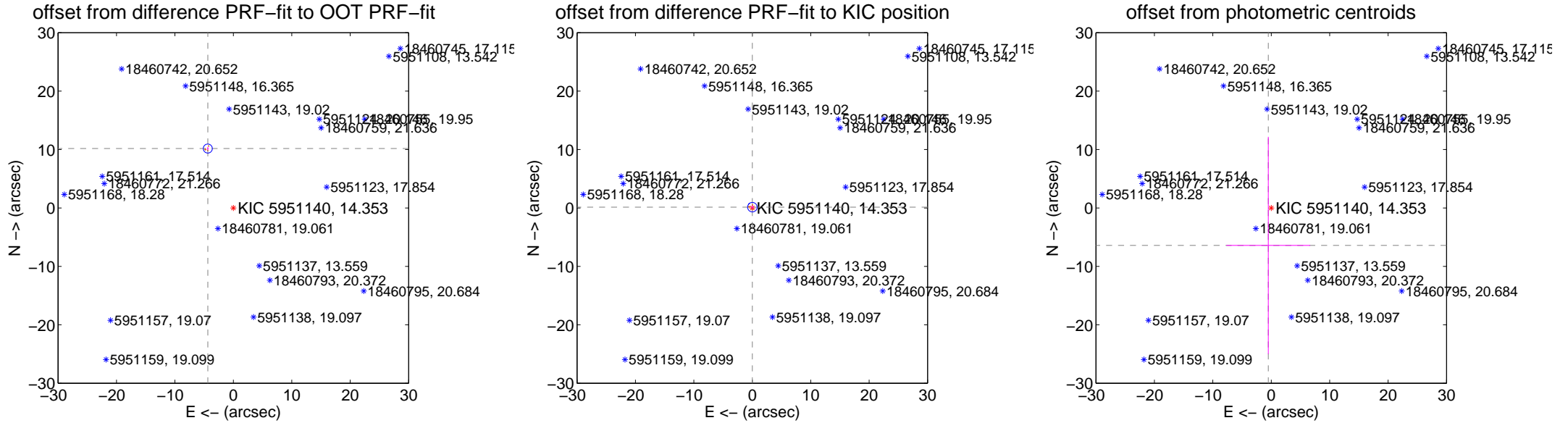
## DV Centroid Data

Supplemental centroid analysis for 005951140-06. Kepler magnitude: 14.35. Transit SNR -1.00

There are 0 quarters with good PRF difference image offsets

The OOT PRF centroid is offset from the target star catalog position by about 10.93 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$11.066 \pm 0.257$	43.00	$4.370 \pm 0.157$	$10.166 \pm 0.272$
PRF-fit source offset from KIC position	$0.133 \pm 0.271$	0.49	$-0.012 \pm 0.096$	$0.133 \pm 0.272$
photometric centroid source offset	$6.44 \pm 18.53$	0.35	$0.51 \pm 7.17$	$-6.42 \pm 18.58$

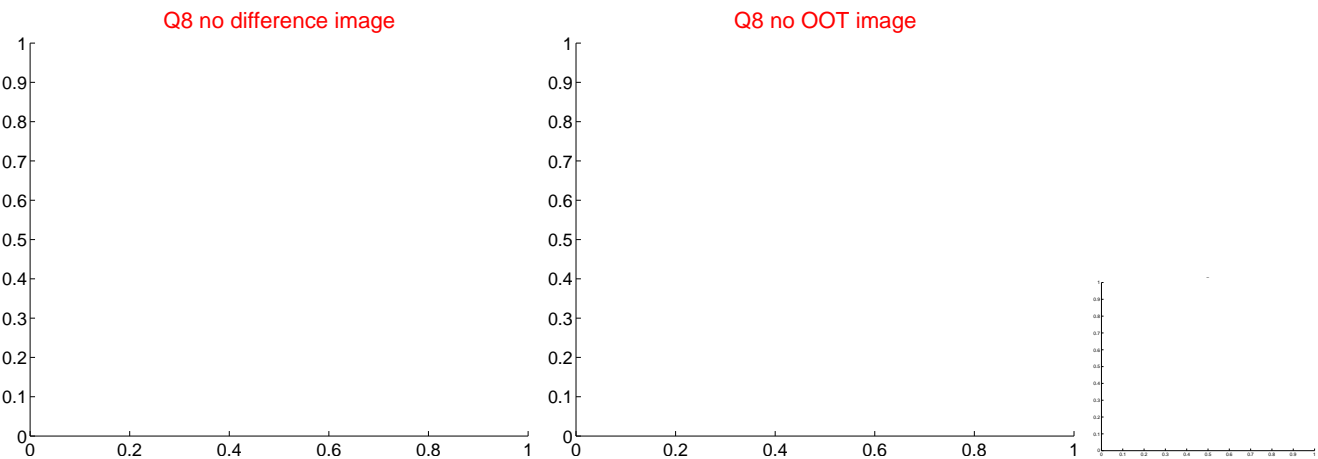
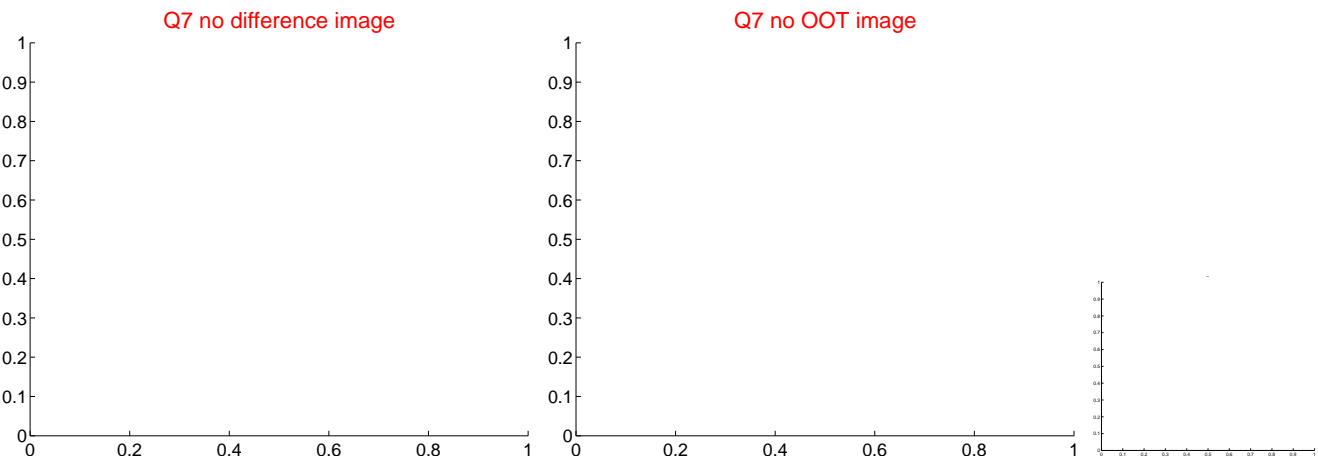
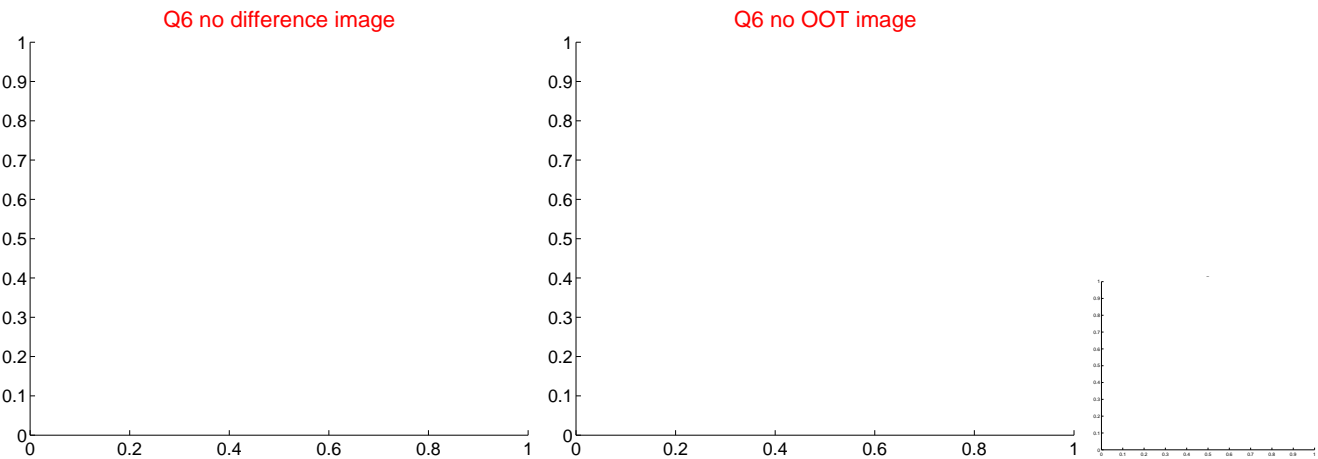
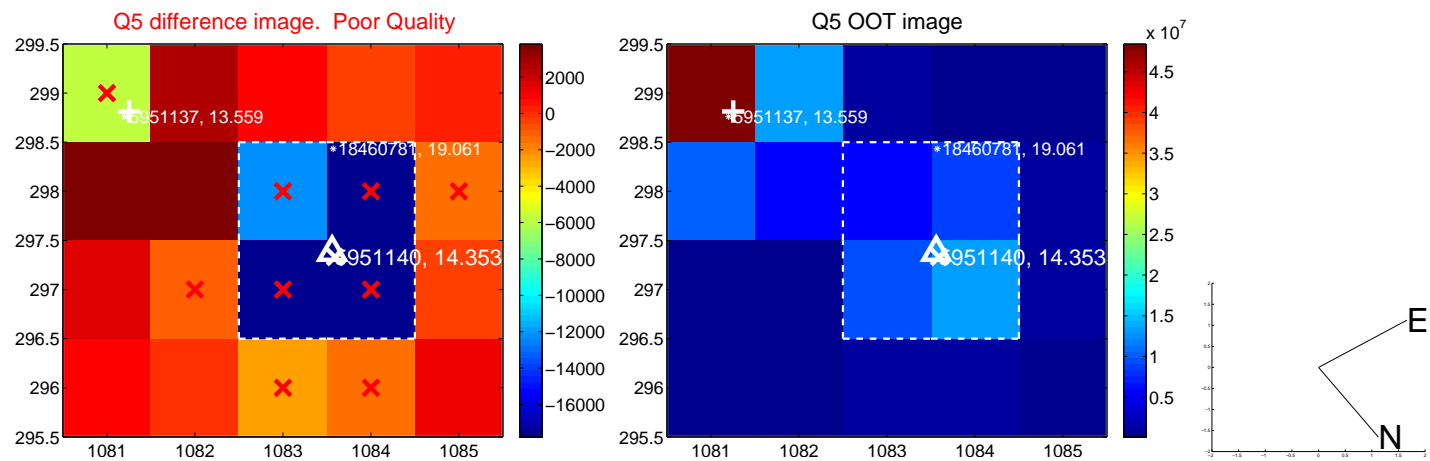


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

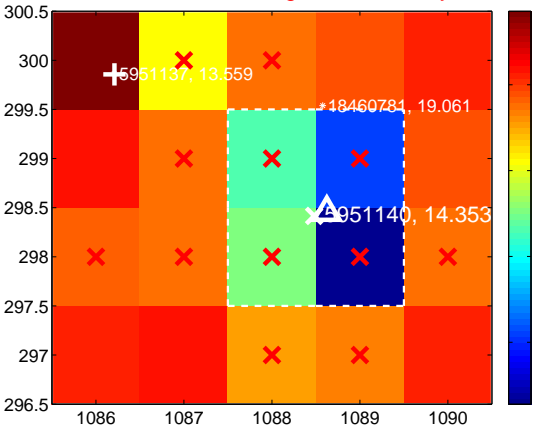
Q9 no difference image



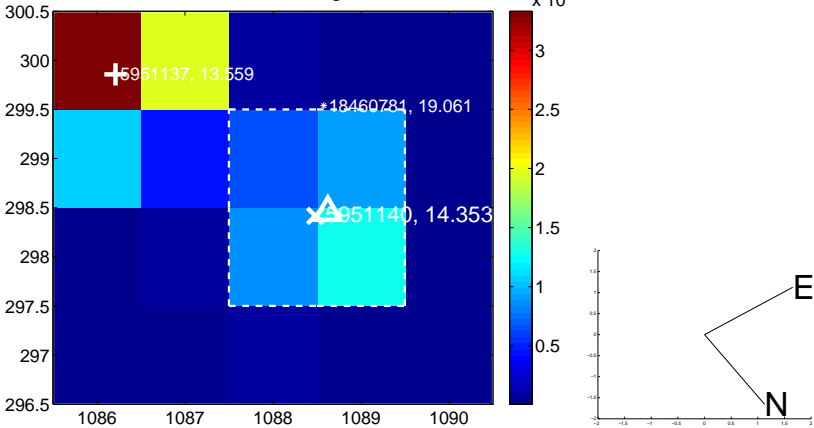
Q9 no OOT image



Q10 difference image. Poor Quality



Q10 OOT image



Q11 no difference image



Q11 no OOT image



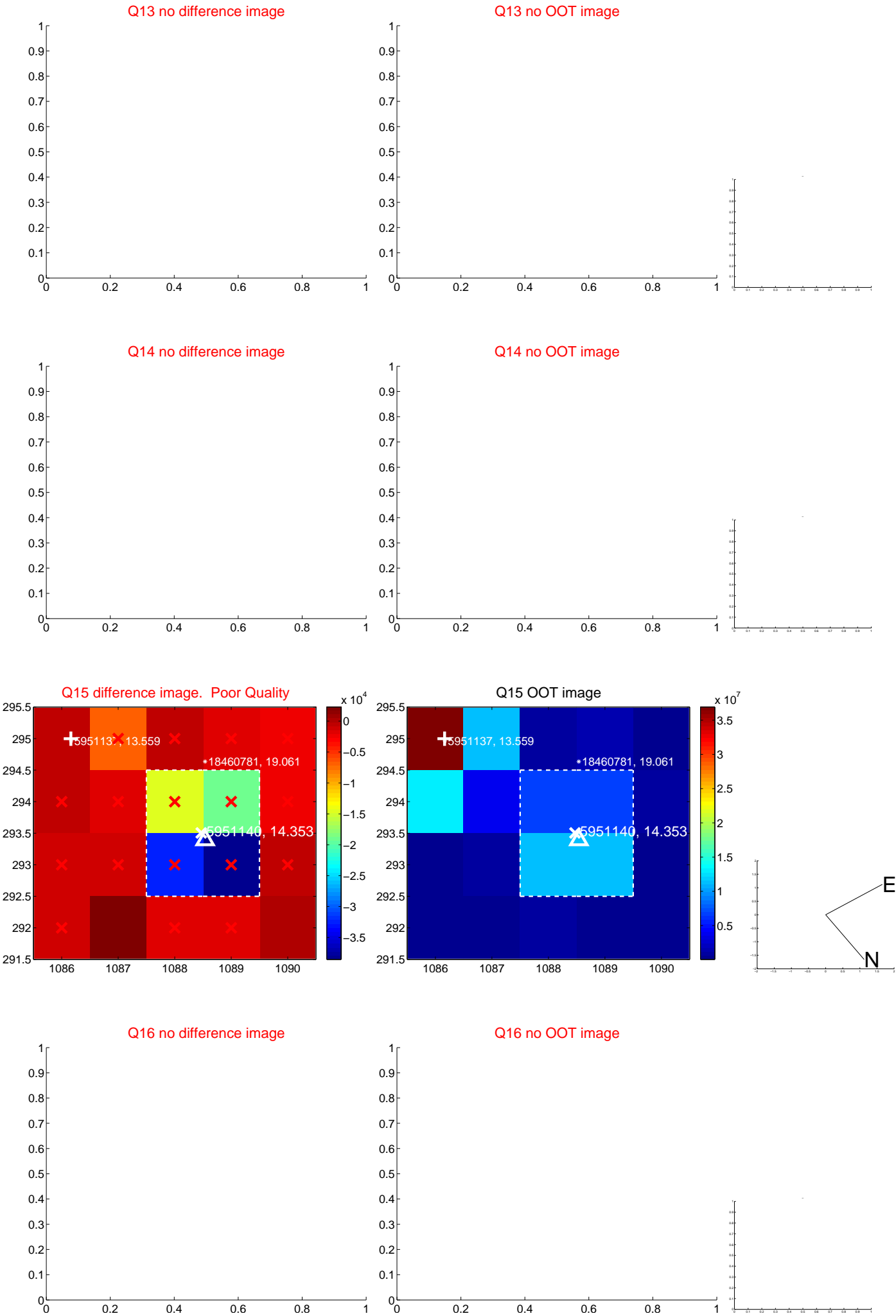
Q12 no difference image



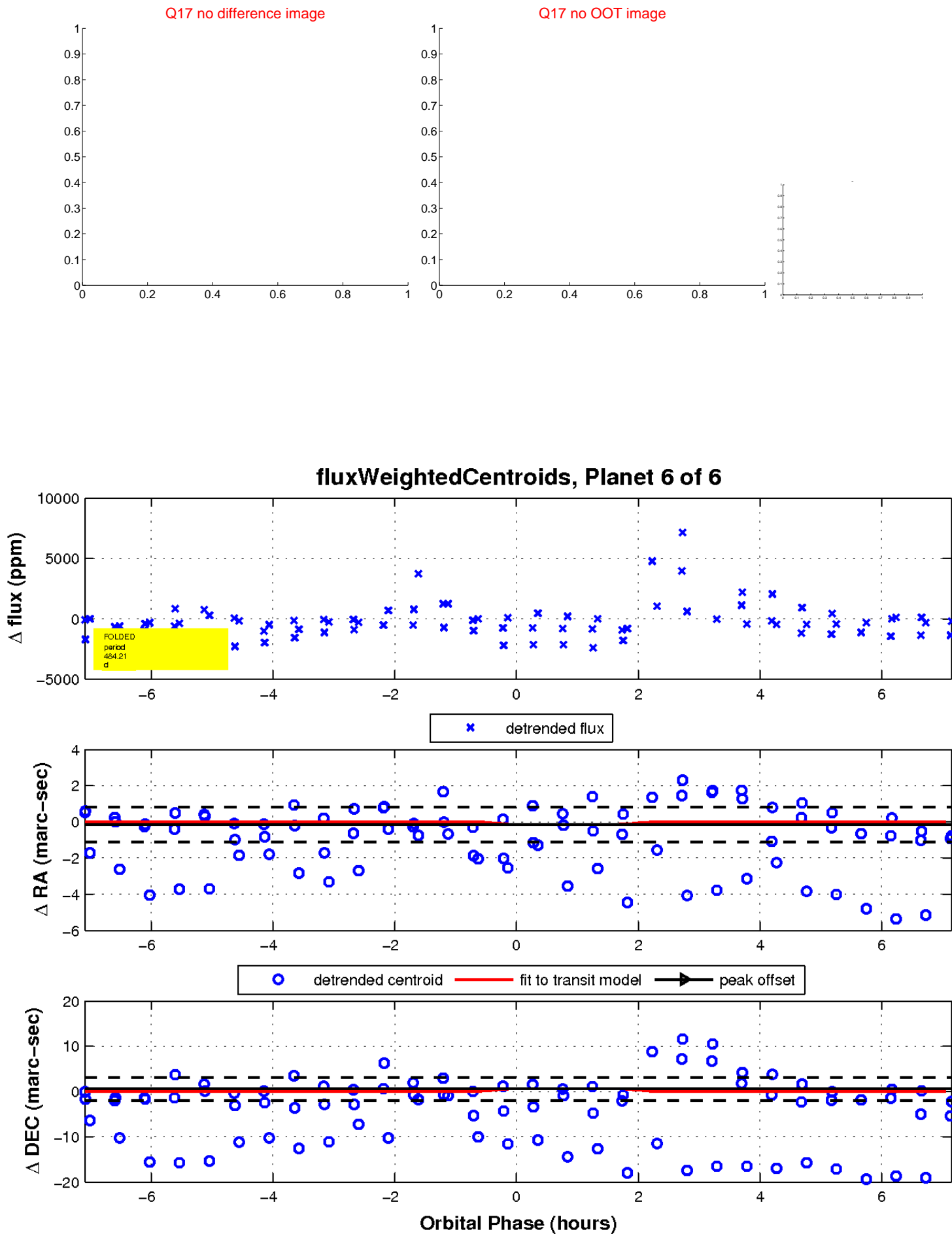
Q12 no OOT image



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

