

# KIC 009048949

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009048949-01	OBS	No	500.399138	133.824339	412.1	1.215	21.7	4.6	0.82	5190	1.95	0.34
009048949-03	OBS	No	466.188841	529.505757	555.3	5.335	15.7	4.8	0.82	5190	1.89	0.38
009048949-04	OBS	No	203.986021	322.053941	257.7	3.500	13.5	-1.0	0.82	5190	1.29	1.14

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009048949-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV— MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009048949-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_ZUMA—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009048949-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—CENT_NOFITS

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

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

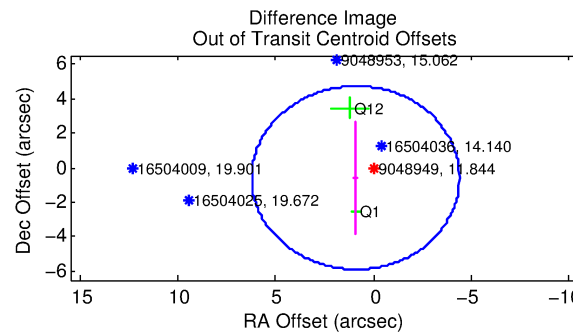
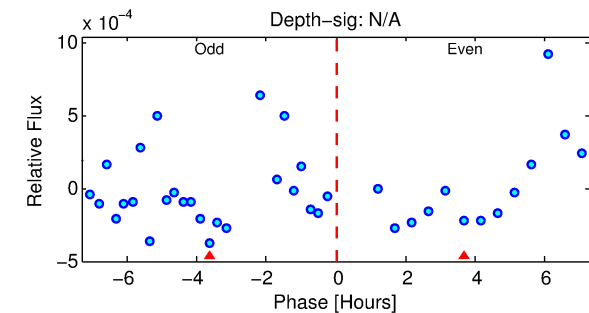
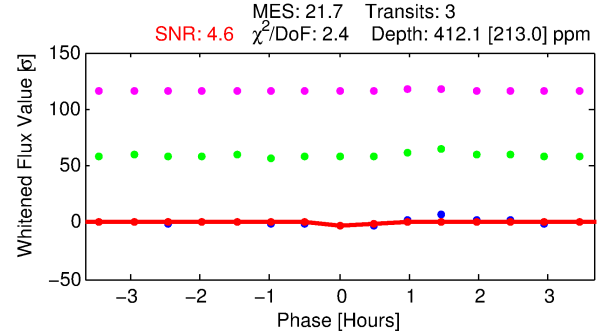
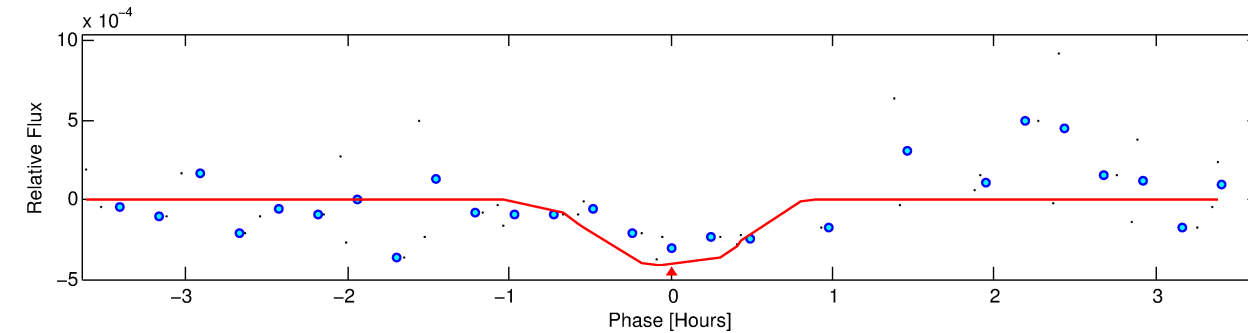
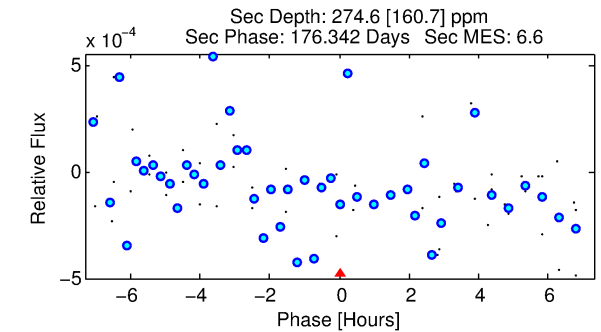
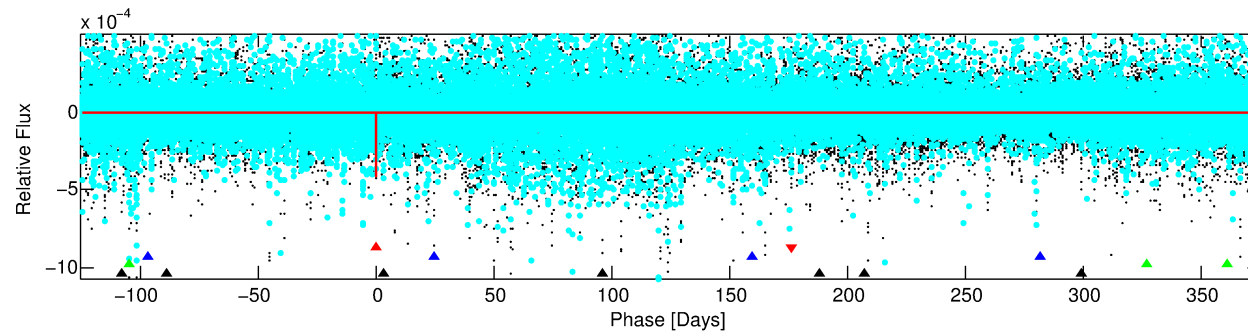
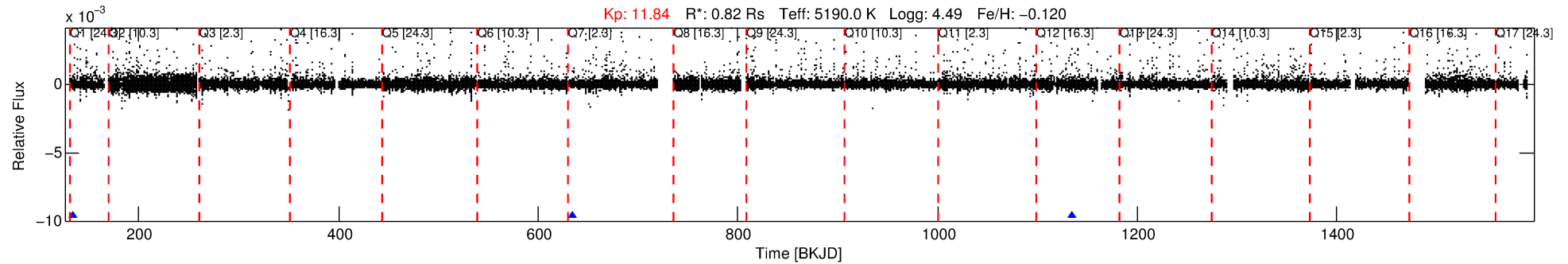
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009048949-01

No Significant Match Found

# DV One-Page Summary

KIC: 9048949 Candidate: 1 of 4 Period: 500.399 d



## DV Fit Results:

Period = 500.39914 [0.00923] d  
Epoch = 133.8243 [0.0086] BKJD  
Rp/R\* = 0.0217 [0.1384]  
a/R\* = 1765.53 [44112.97]  
b = 0.85 [8.14]  
Seff = 0.34 [0.08]  
Teq = 195 [11] K  
Rp = 1.95 [12.40] Re  
a = 1.1284 [0.1317] AU  
Ag = 50768.46 [647353.55] [0.08] $\sigma$   
Teffp = 4533 [14448] K [0.30] $\sigma$

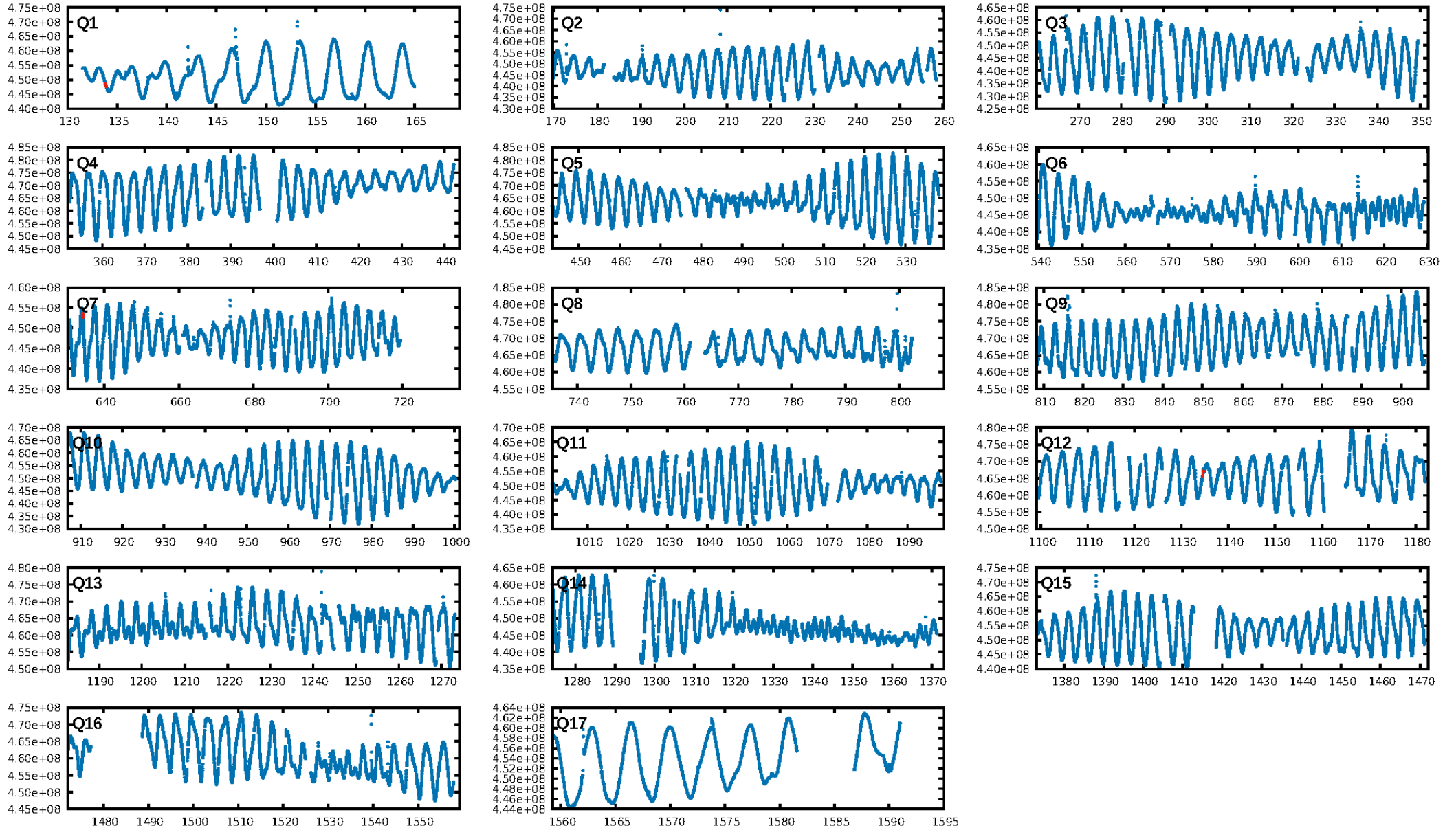
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [150.04 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.3%  
ModelChiSquareGof-sig: 12.4%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [2/2]  
GhostDiagnostic-chr: 1.214  
Centroid-sig: 91.8%  
Centroid-so: 0.467 arcsec [0.27 $\sigma$ ]  
OotOffset-rm: 1.088 arcsec [0.61 $\sigma$ ]  
OotOffset-st: 0/0/1/1 [2]  
KicOffset-rm: 1.354 arcsec [0.52 $\sigma$ ]  
KicOffset-st: 0/0/1/1 [2]  
DiffImageQuality-fgm: 0.50 [1/2]  
DiffImageOverlap-fno: 1.00 [2/2]

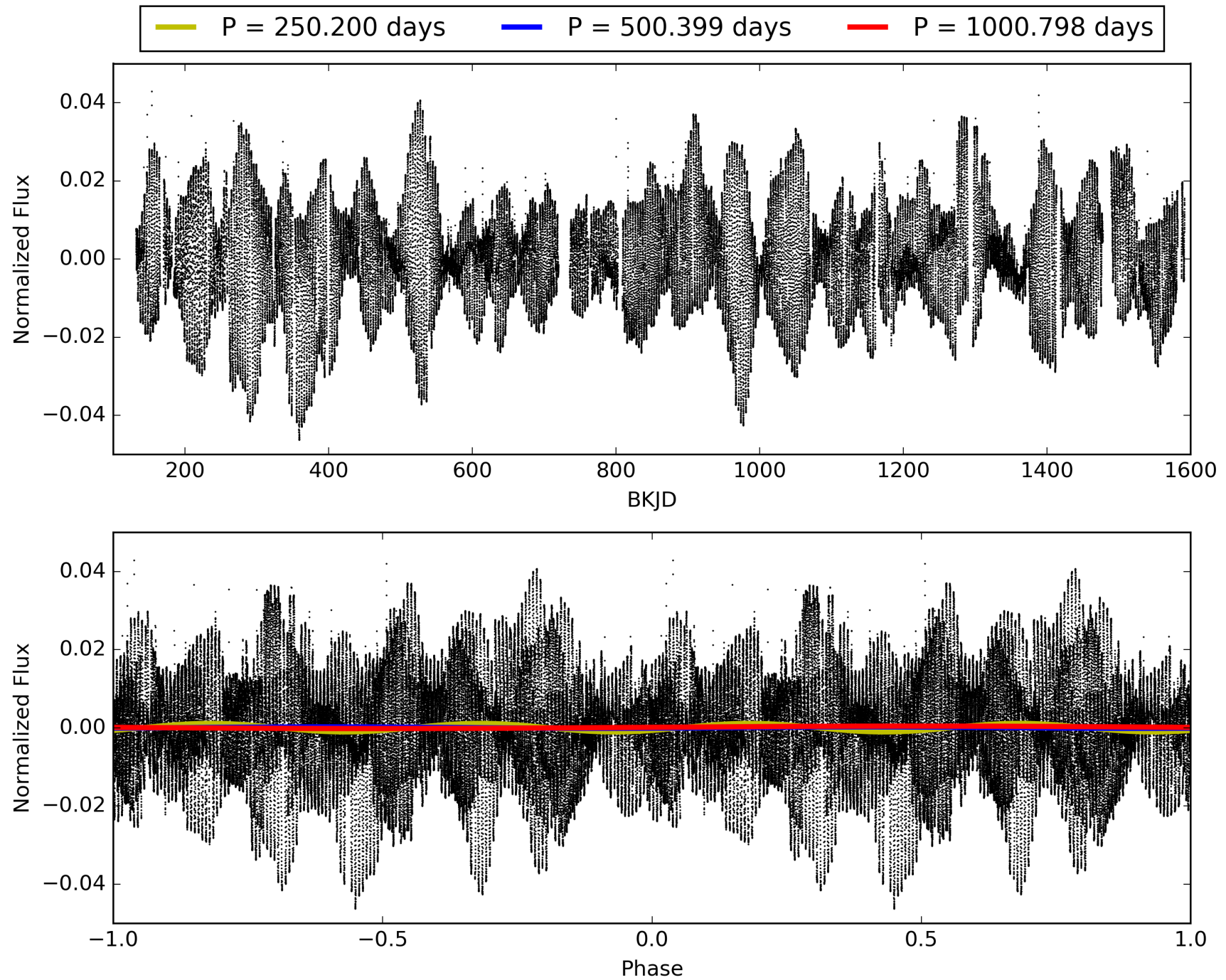
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 13:04:20 Z

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

# TCE 009048949-01, PDC Light Curves

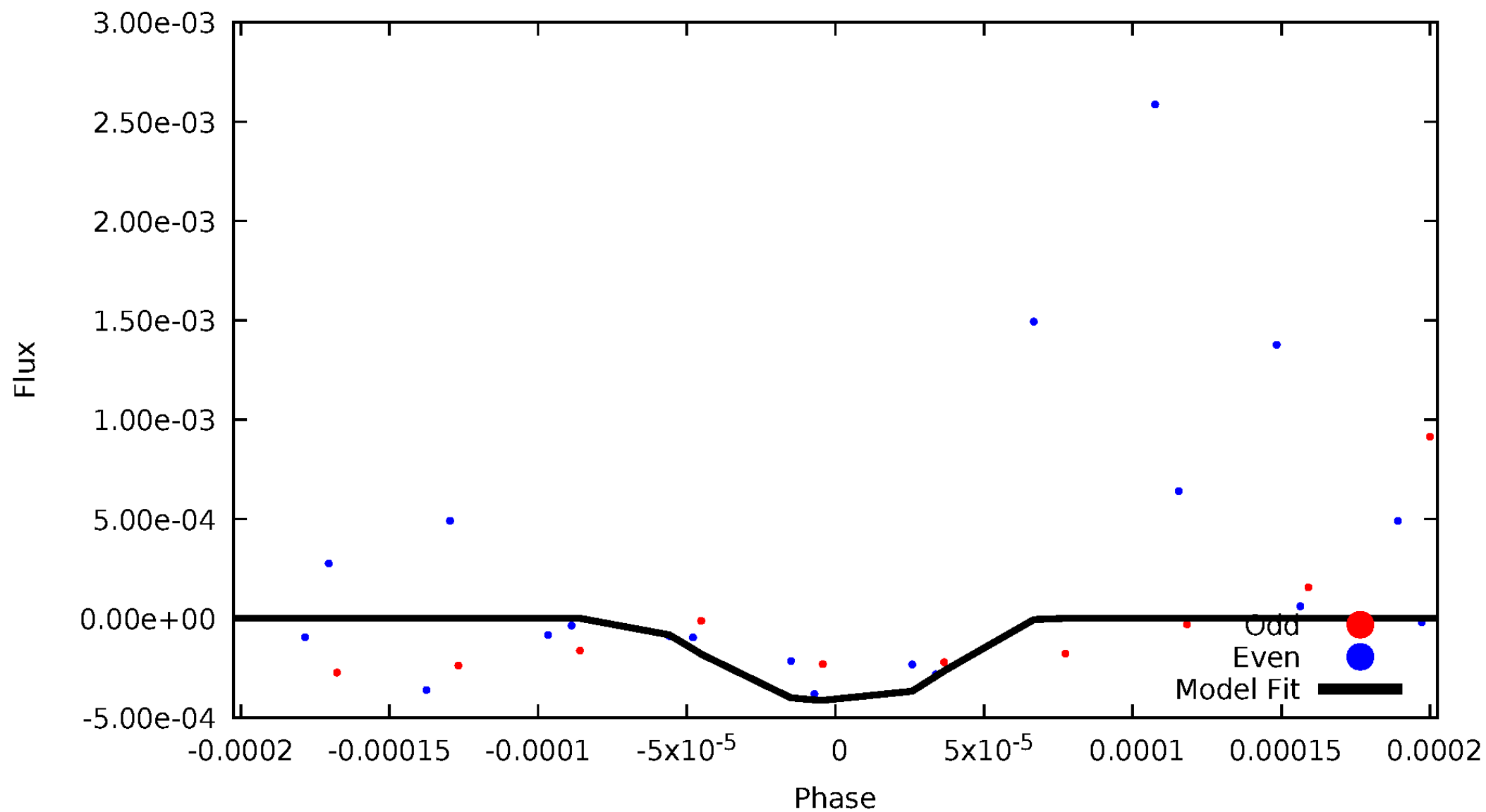


TCE 009048949-01



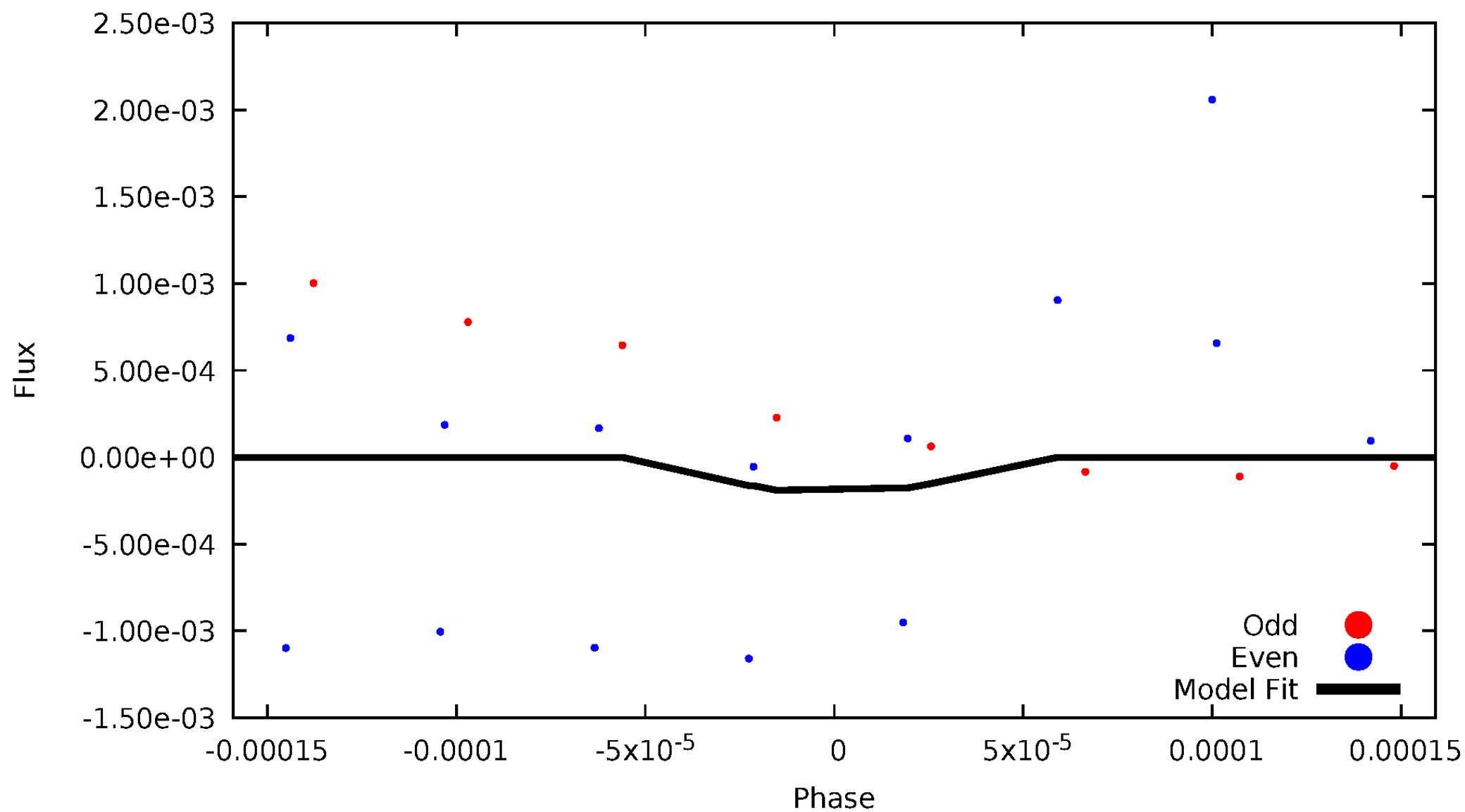
# DV Odd/Even

TCE 009048949-01



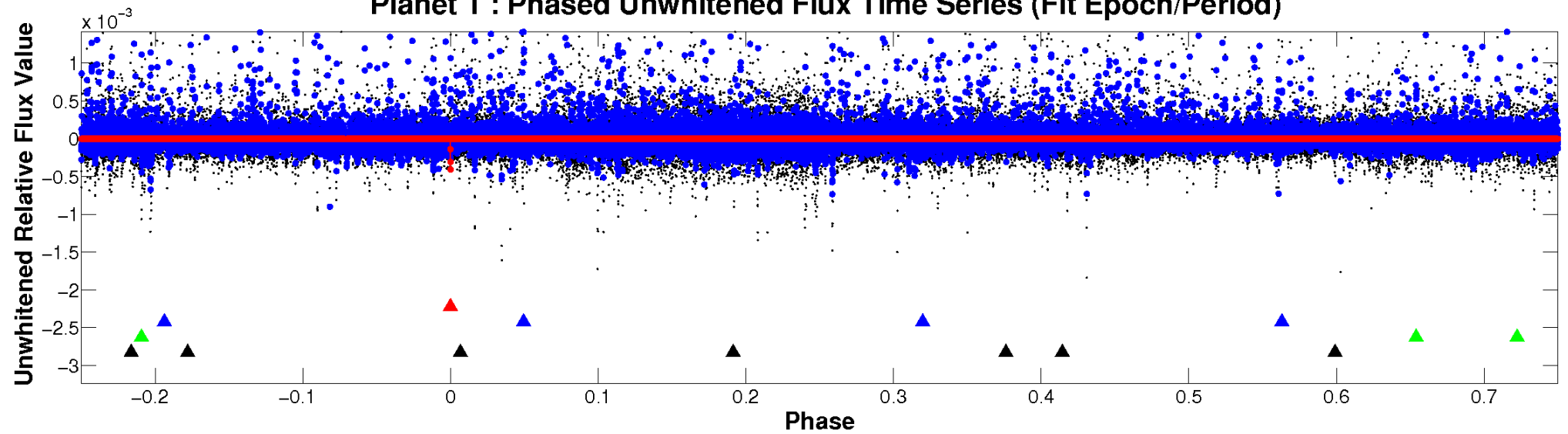
# ALT Odd/Even

TCE 009048949-01

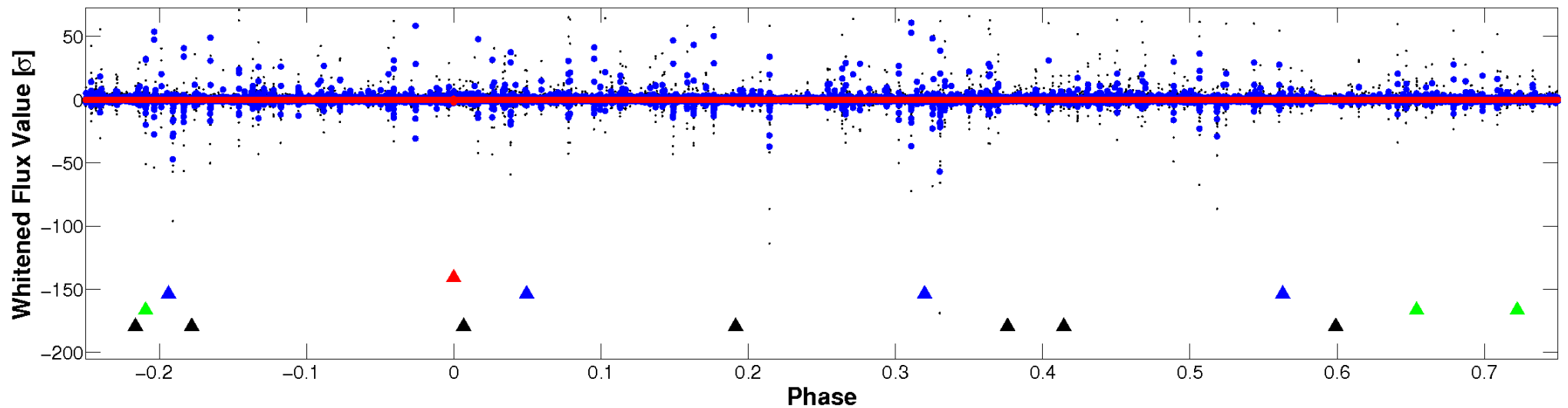


# Non-Whitened Vs. Whitened Light Curve

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

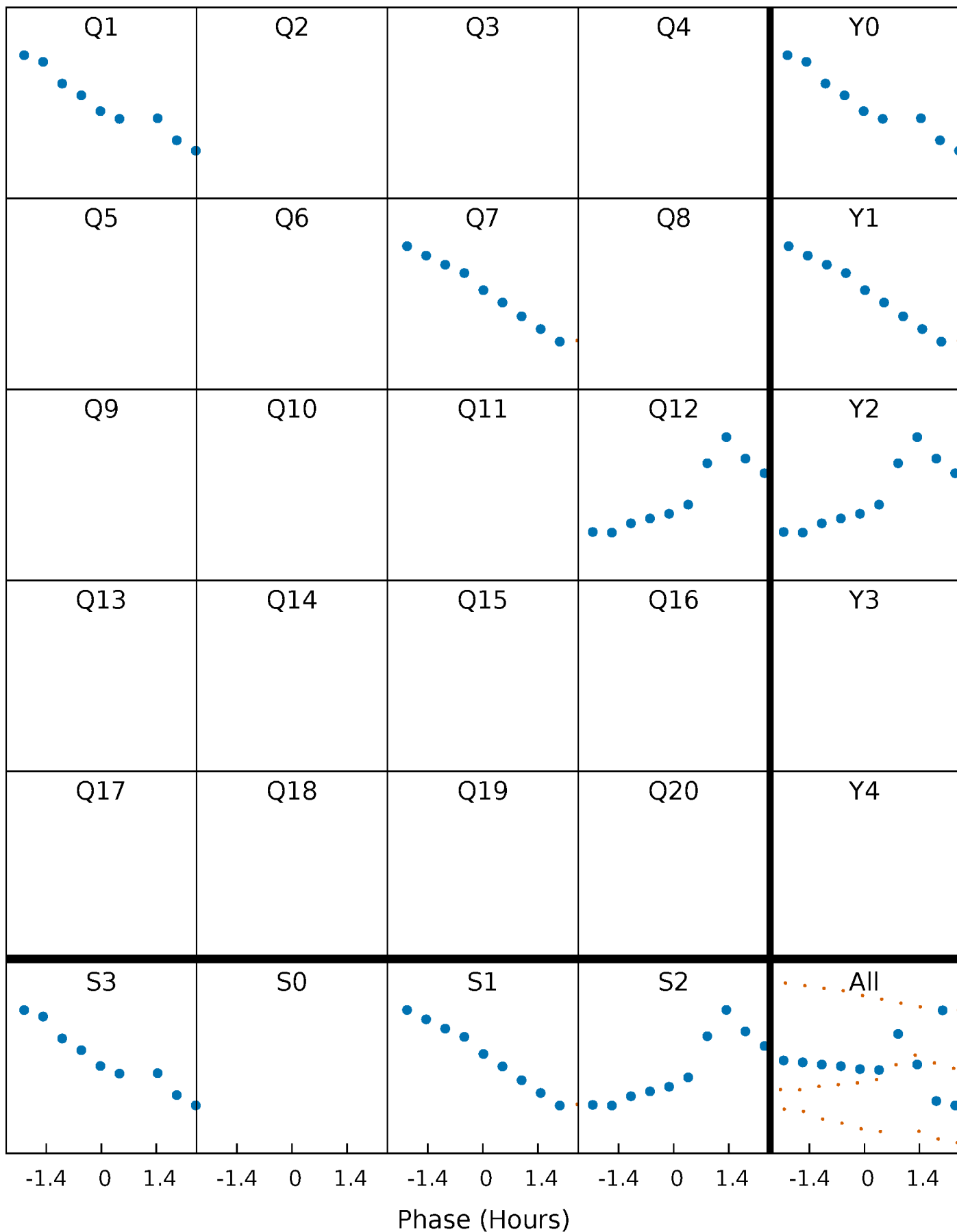


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



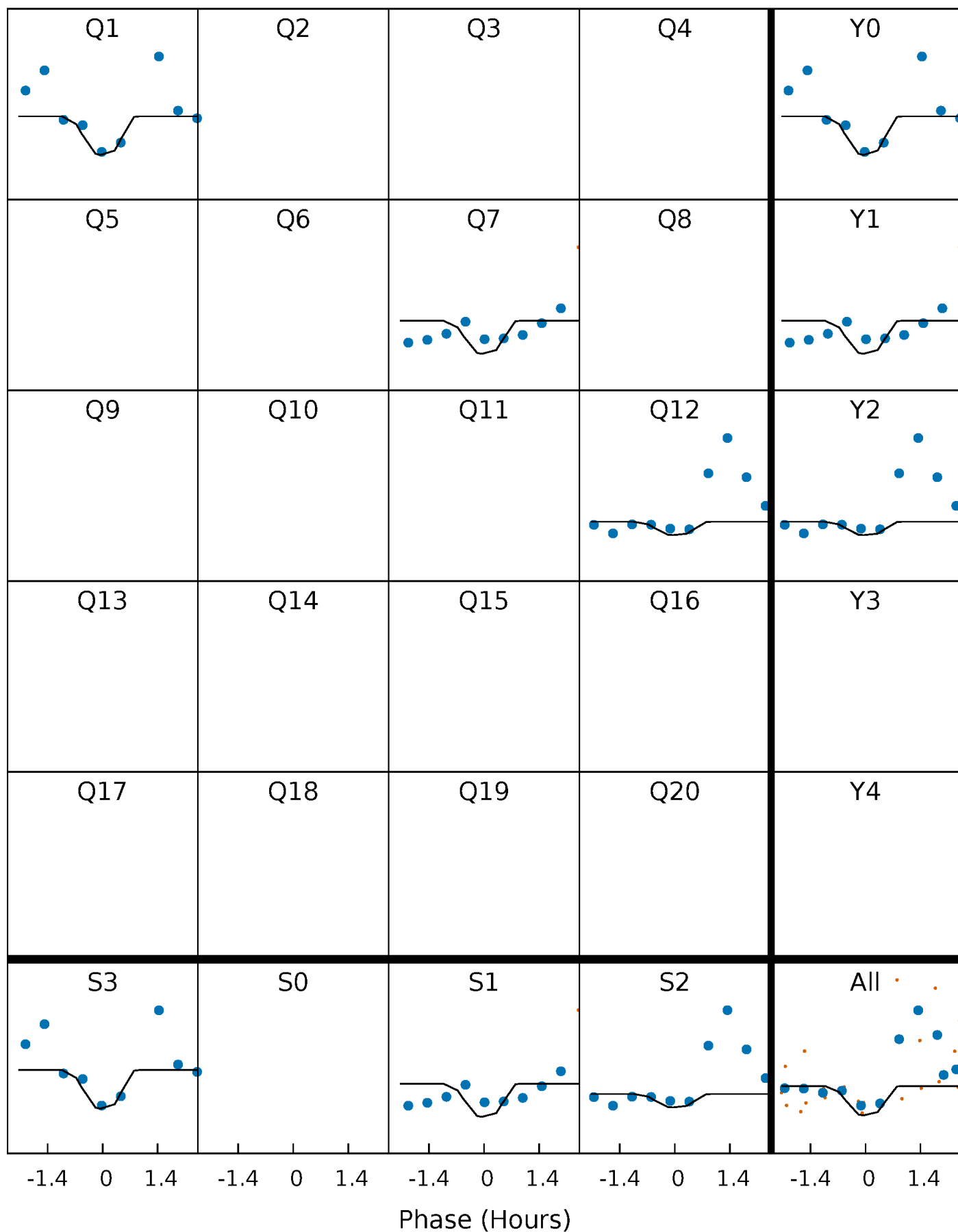
# PDC Quarter-Phased Transit Curves

TCE 009048949-01 P=500.399138 Days  $T_0=133.824339$  (BKJD)



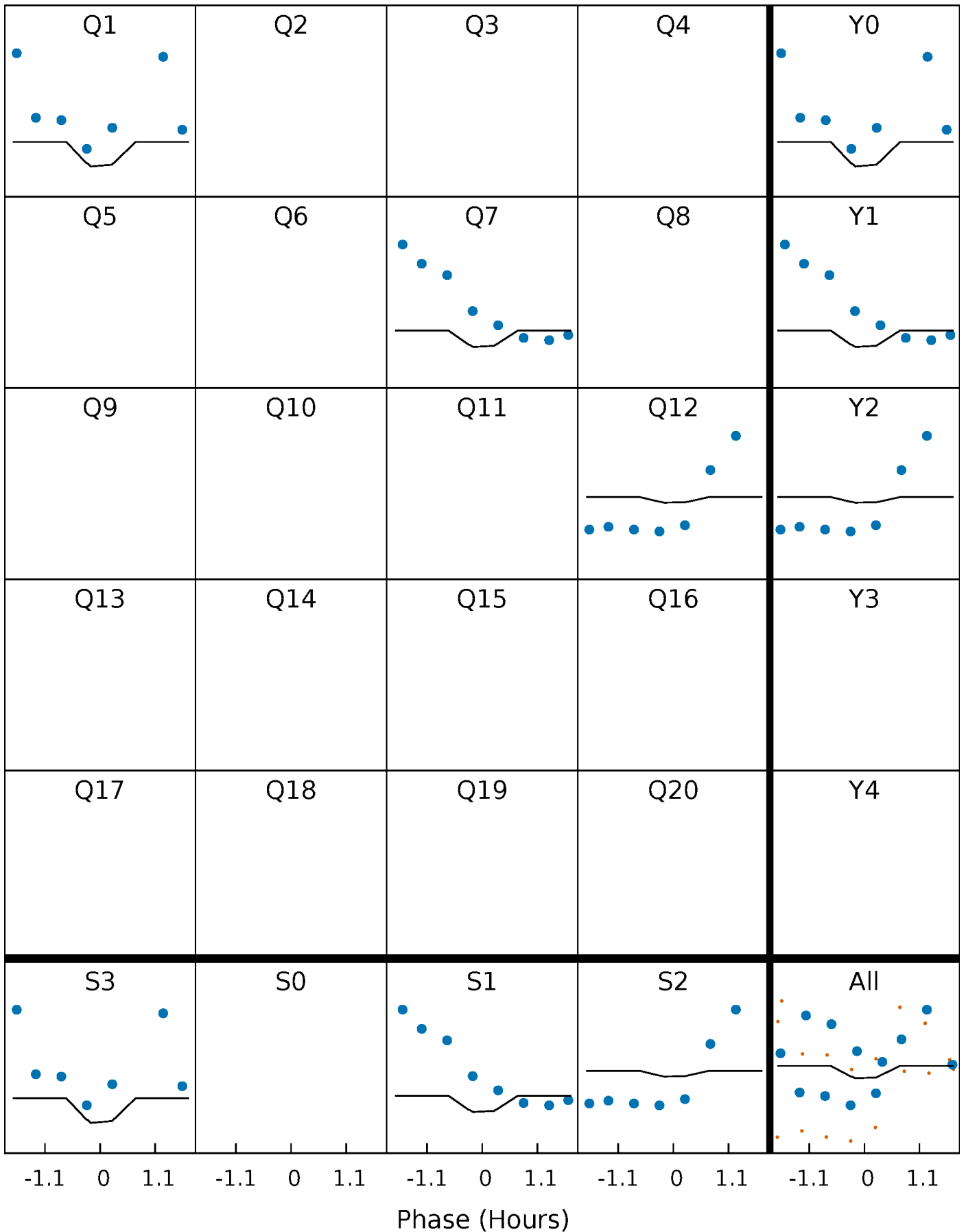
# DV Quarter-Phased Transit Curves

TCE 009048949-01 P=500.399138 Days  $T_0=133.824339$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

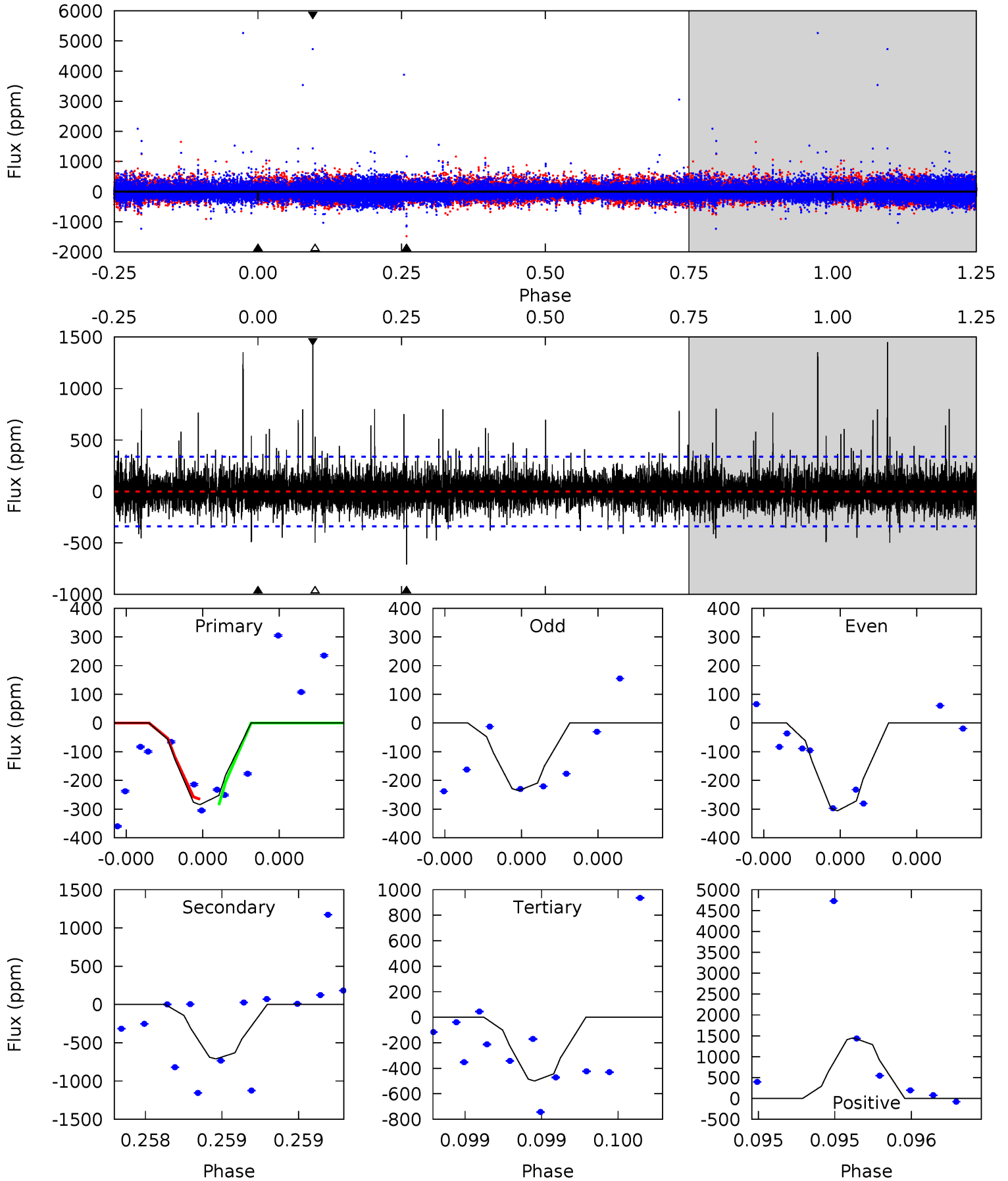
TCE 009048949-01 P=500.397451 Days  $T_0=133.831512$  (BKJD)



# DV Model-Shift Uniqueness Test

009048949-01, P = 500.399138 Days, E = 133.824339 Days

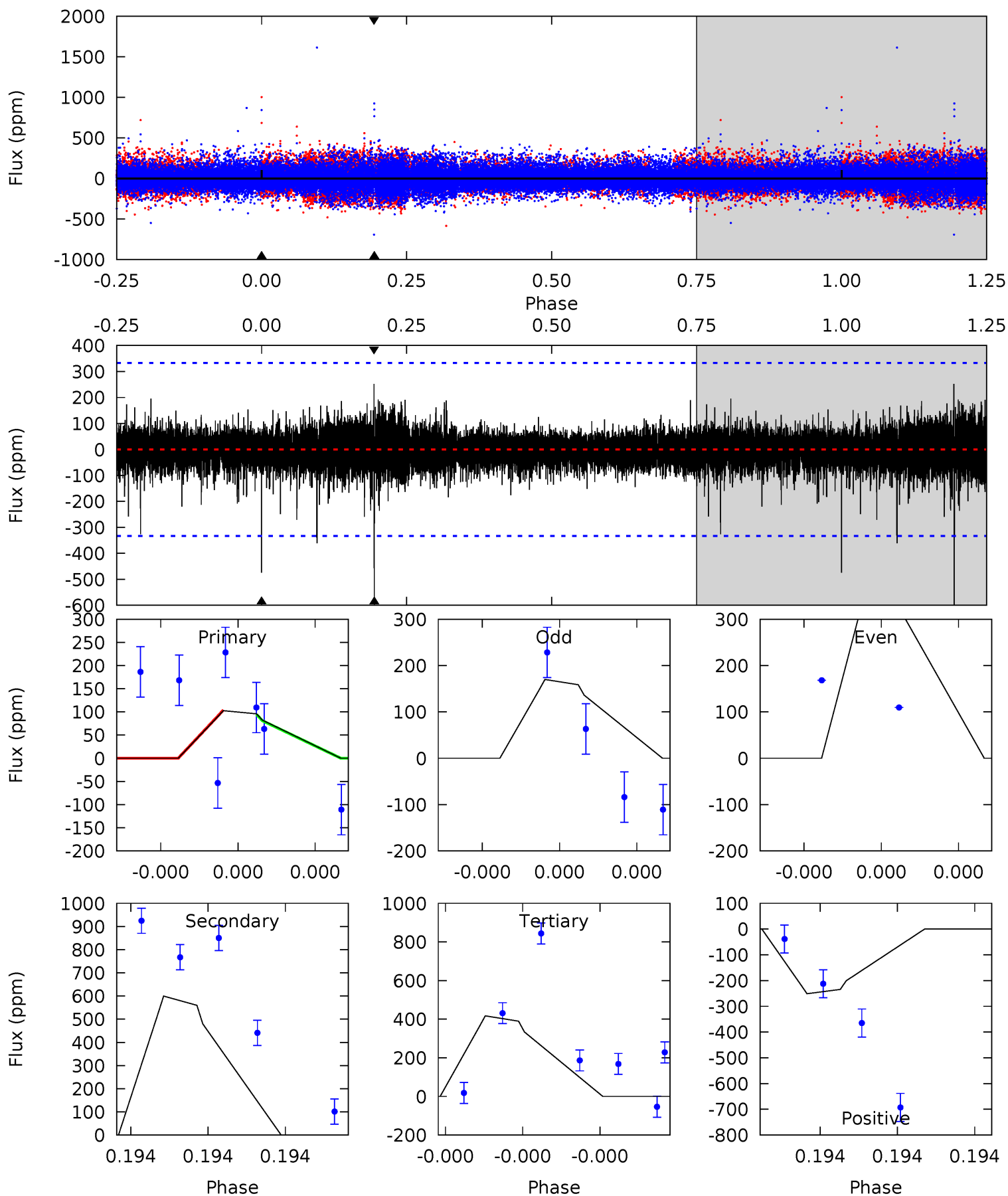
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
4.88	12.2	8.56	24.9	5.81	3.84	1.62	-3.68	-20.0	3.62	-12.7	0.28	1.19	0.67	0.17



# Alt Model-Shift Uniqueness Test

009048949-01, P = 500.397451 Days, E = 133.831512 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
1.81	10.6	7.37	4.44	5.88	3.94	0.70	-5.56	-2.62	3.22	6.16	1.94	-9.30	0.30	0.08



### Stellar Parameters For KIC 009048949

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5190^{+169}_{-154}$	$4.493^{+0.105}_{-0.095}$	$-0.120^{+0.300}_{-0.300}$	$0.821^{+0.104}_{-0.094}$	$0.766^{+0.107}_{-0.058}$	$1.946^{+0.777}_{-0.557}$
	+3%/-3%	+2%/-2%	+250%/-250%	+13%/-11%	+14%/-8%	+40%/-29%
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 009048949-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-709 \pm 58$	$9.59^{+9.39}_{-6.89}$	$272^{+14}_{-13}$	$3183^{+1604}_{-553}$	$5526^{+64476}_{-4129}$
Alt.	$-600 \pm 57$	$8.70^{+8.55}_{-5.79}$	$273^{+12}_{-12}$	$3188^{+1464}_{-539}$	$5467^{+46016}_{-4053}$

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

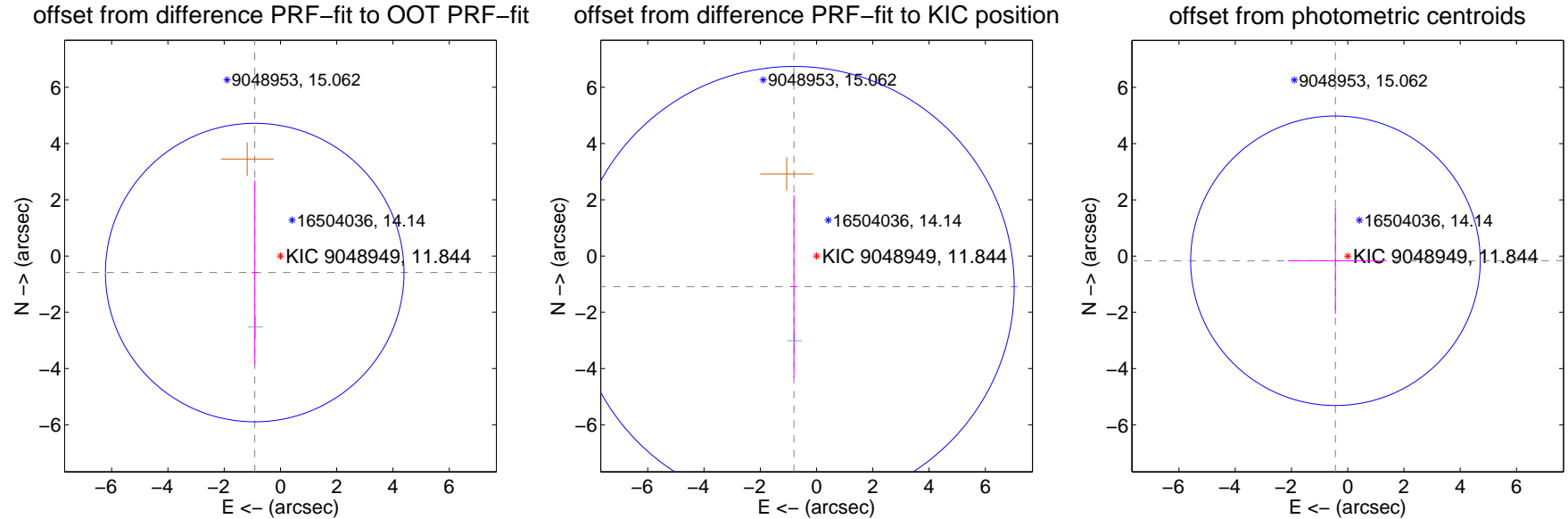
## DV Centroid Data

Supplemental centroid analysis for 009048949-01. **Kepler magnitude: 11.84.** Transit SNR 4.61

**There are 1 quarters with good PRF difference image offsets**

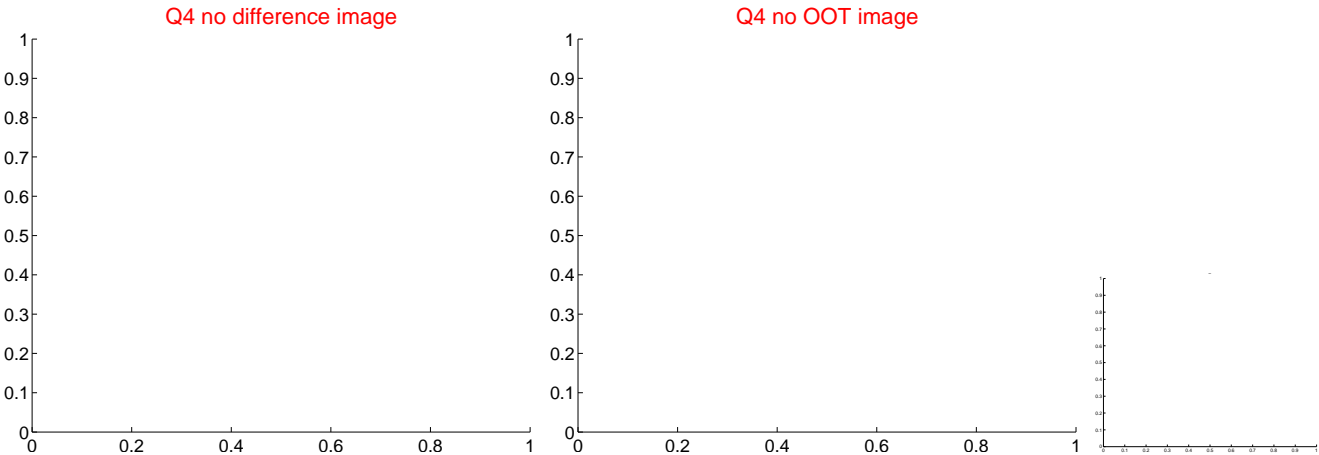
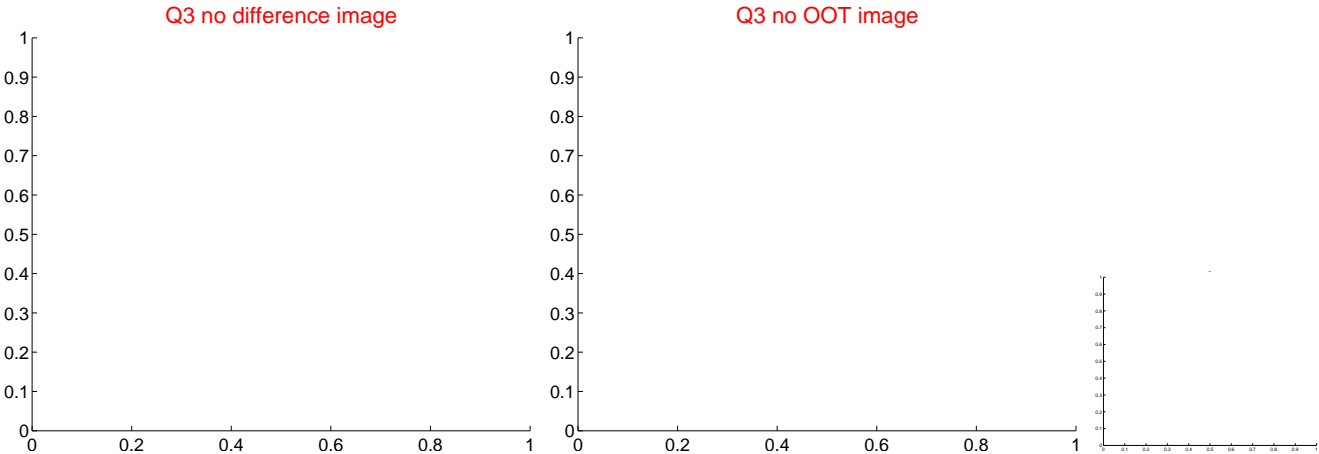
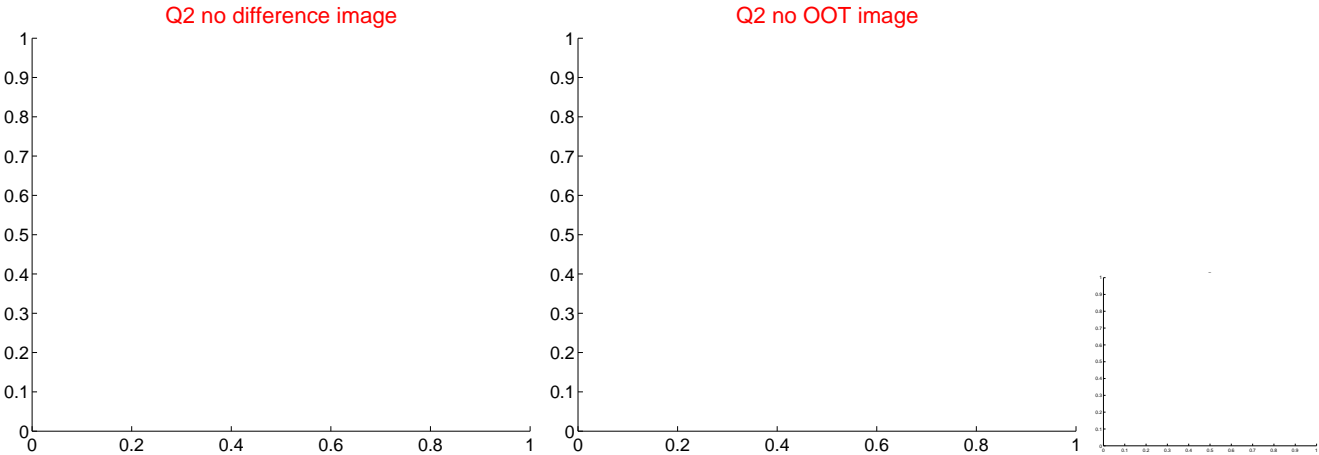
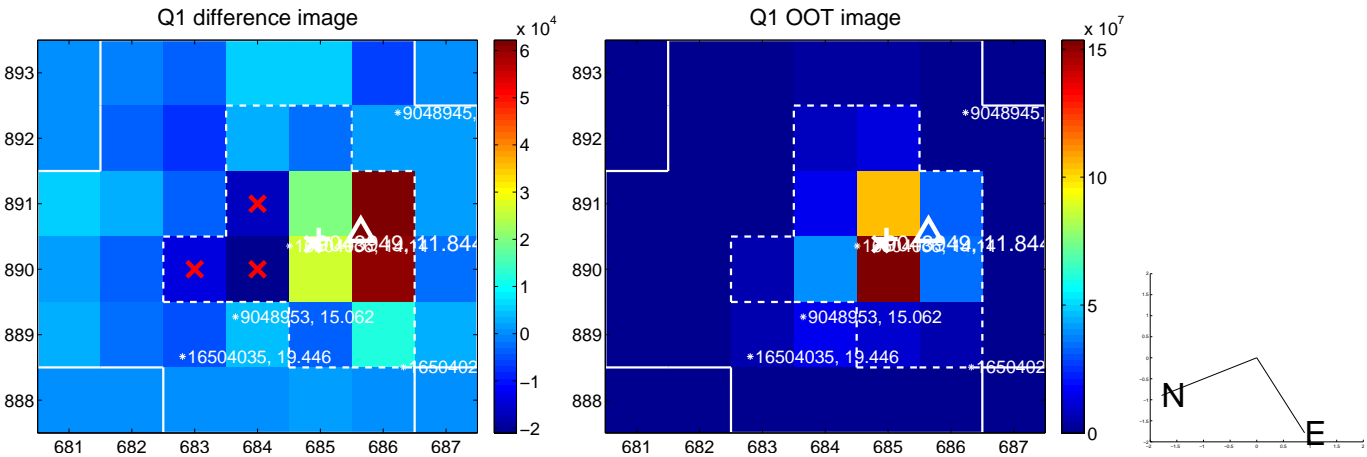
The direct PRF centroid is offset from the target star catalog position by about 0.54 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.088 \pm 1.769$	0.61	$0.915 \pm 0.109$	$-0.588 \pm 3.267$
PRF-fit source offset from KIC position	$1.354 \pm 2.610$	0.52	$0.805 \pm 0.107$	$-1.089 \pm 3.245$
photometric centroid source offset	$0.47 \pm 1.72$	0.27	$0.44 \pm 1.69$	$-0.17 \pm 1.89$



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 are from the UKIRT catalog.

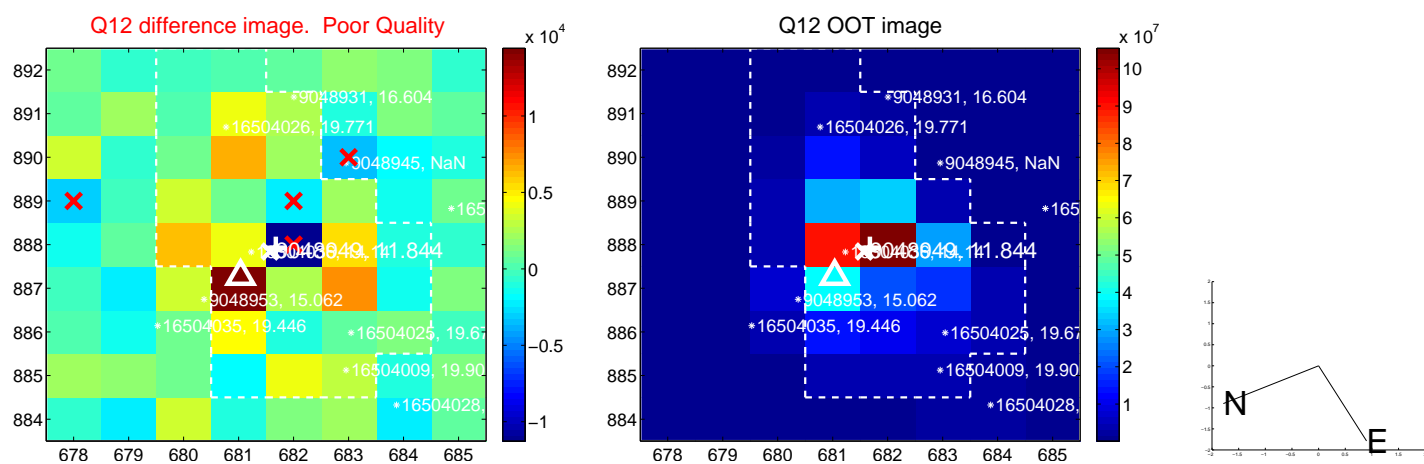
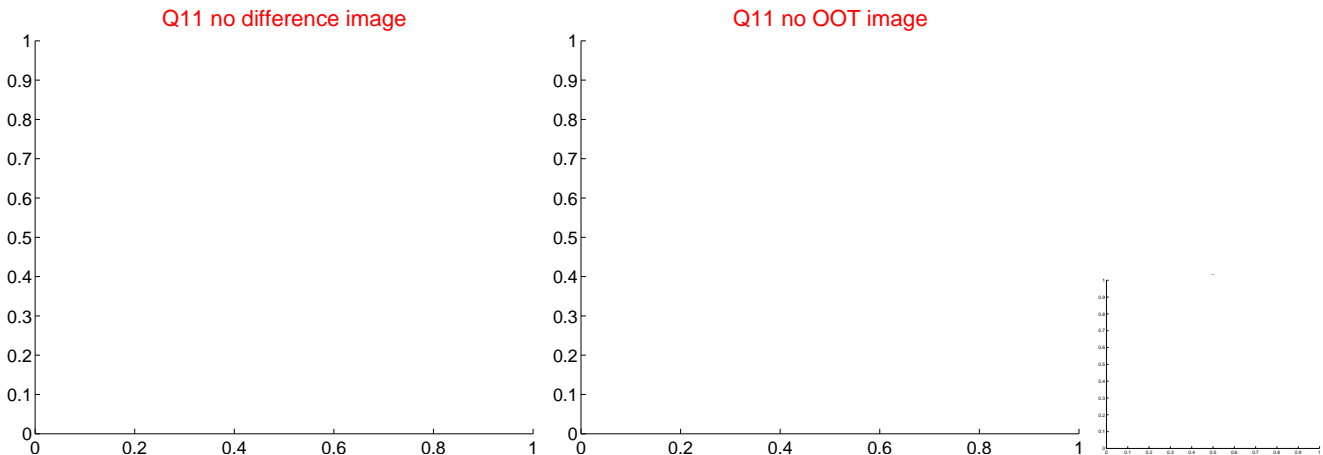
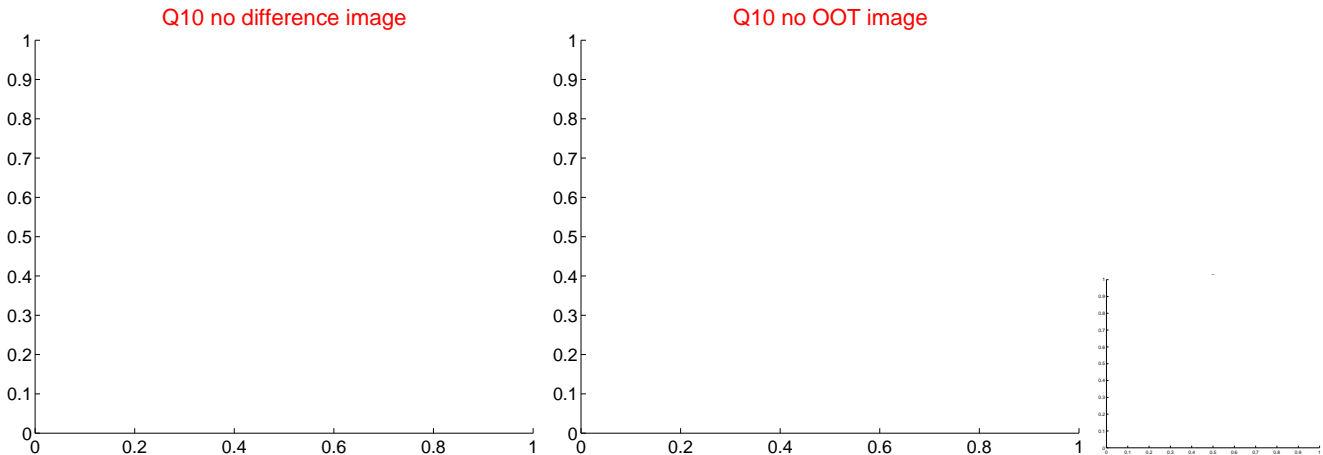
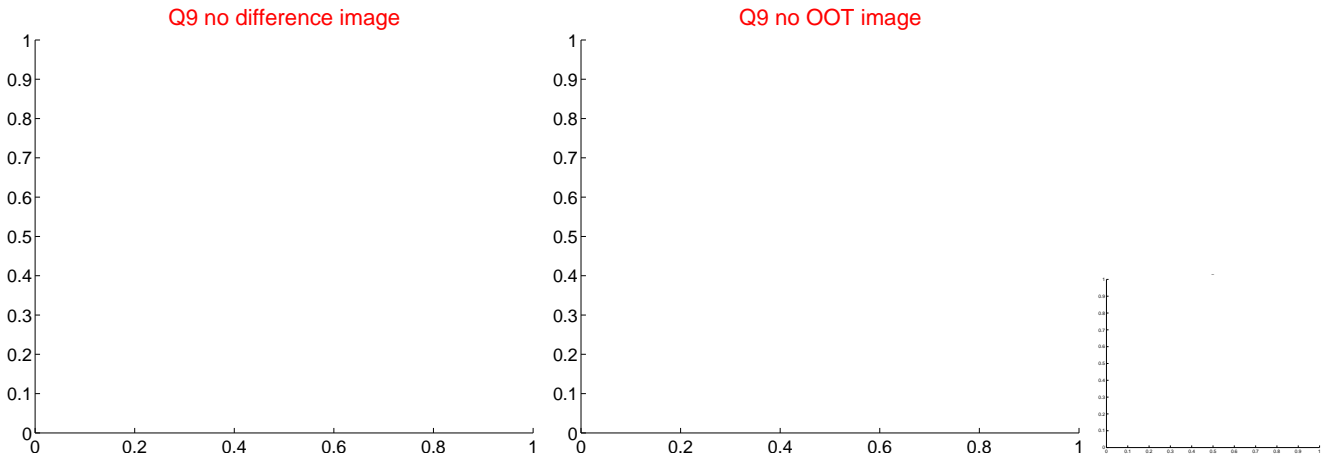
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



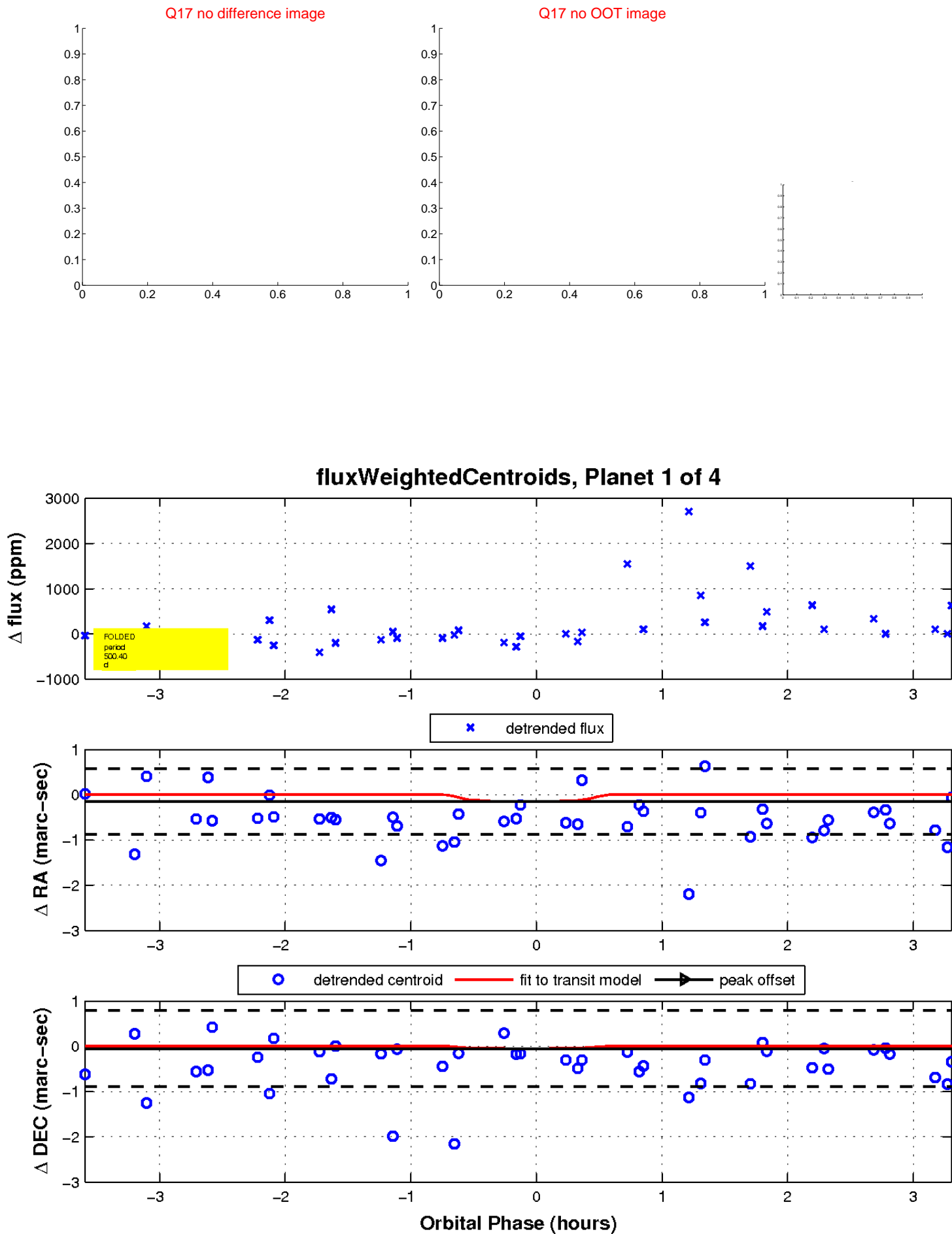
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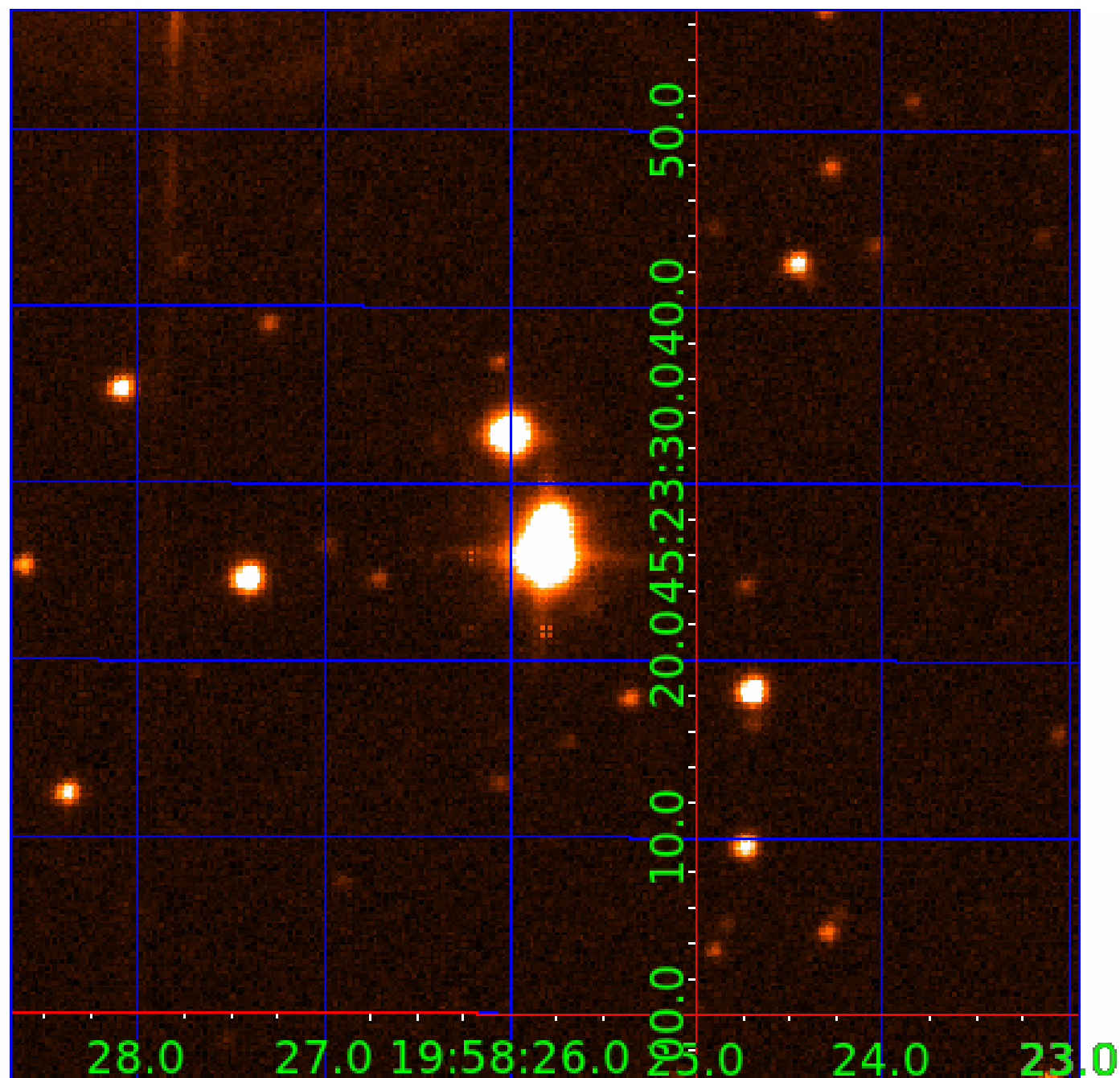


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 009048949

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009048949-01	OBS	No	500.399138	133.824339	412.1	1.215	21.7	4.6	0.82	5190	1.95	0.34
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## Robovetter Results

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009048949-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_ZUMA—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009048949-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—CENT_NOFITS

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

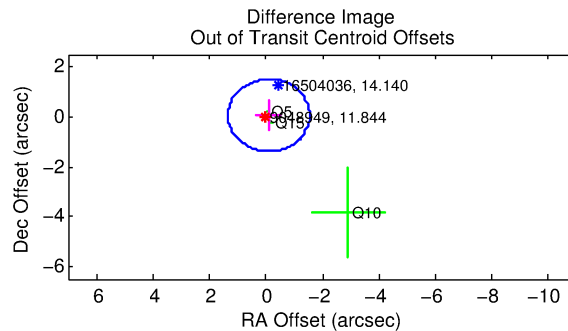
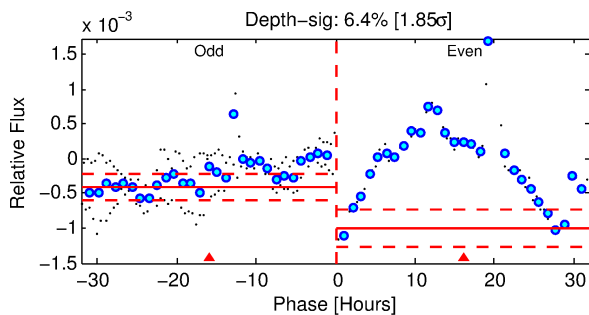
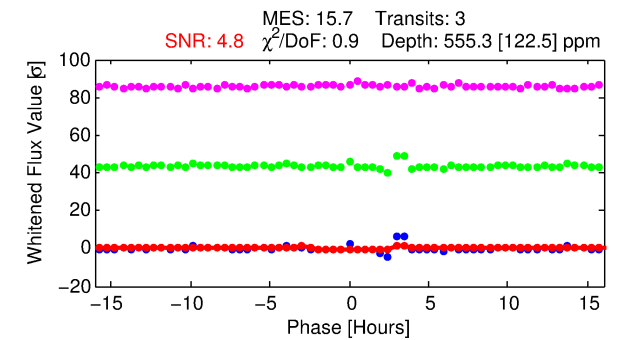
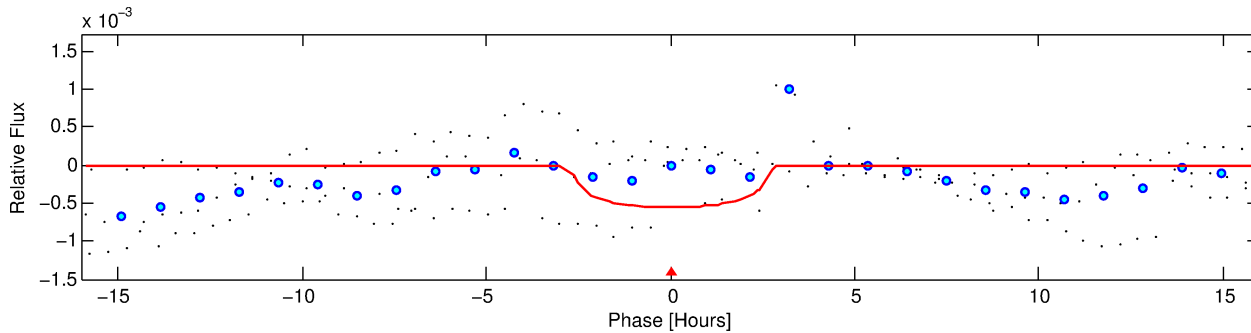
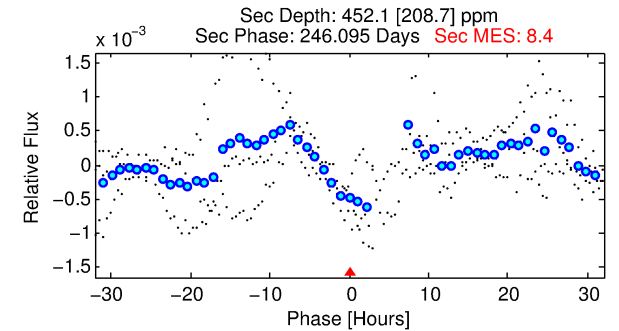
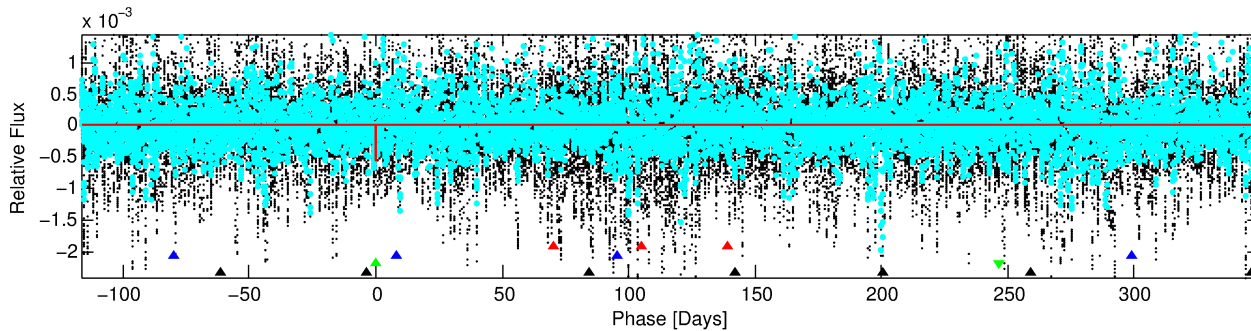
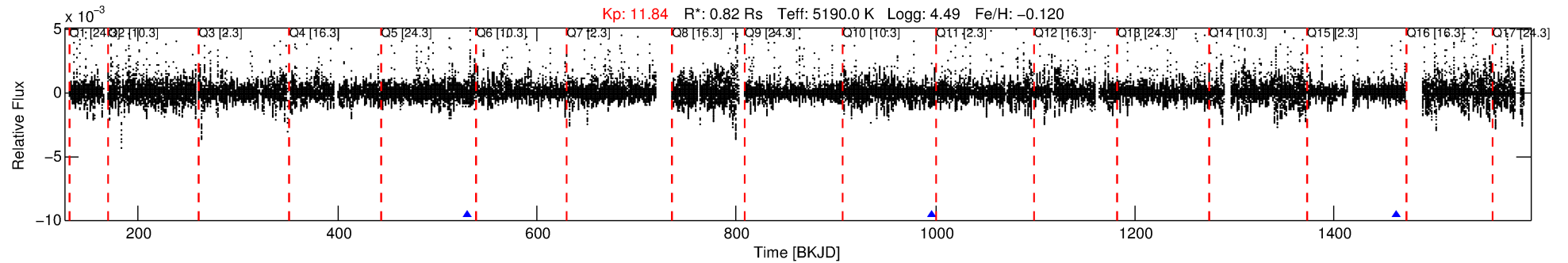
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## Ephemeris Match Information For 009048949-03

No Significant Match Found

# DV One-Page Summary

KIC: 9048949 Candidate: 3 of 4 Period: 466.189 d



## DV Fit Results:

Period = 466.18884 [0.00349] d  
Epoch = 529.5058 [0.0060] BKJD  
Rp/R\* = 0.0210 [0.0275]  
a/R\* = 681.50 [3279.65]  
b = 0.01 [397.76]  
Seff = 0.38 [0.08]  
Teq = 200 [11] K  
Rp = 1.88 [2.48] Re  
a = 1.0764 [0.1256] AU  
Ag = 81105.60 [216116.79] [0.38 $\sigma$ ]  
Teffp = 5217 [3472] K [1.45 $\sigma$ ]

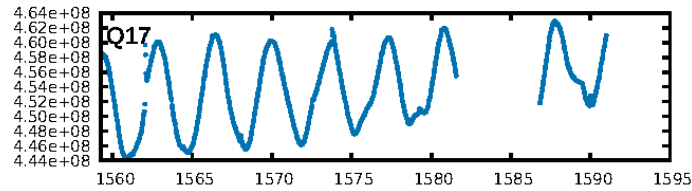
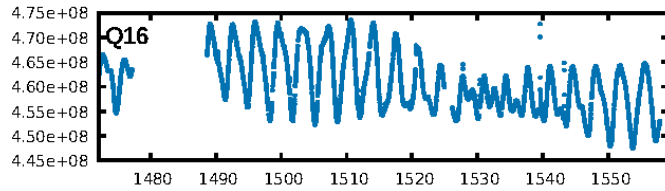
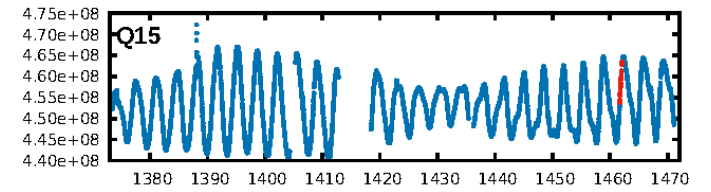
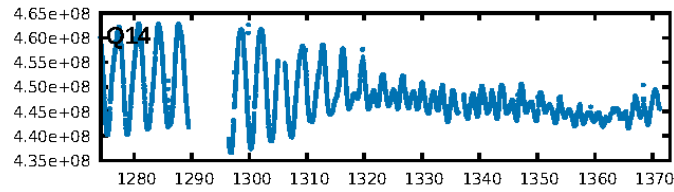
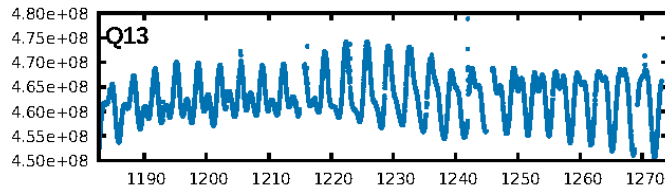
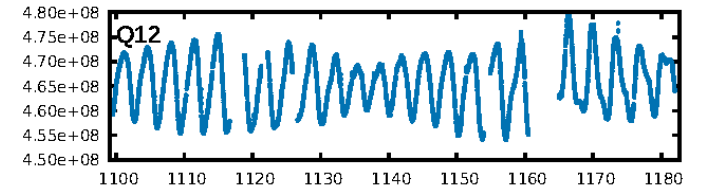
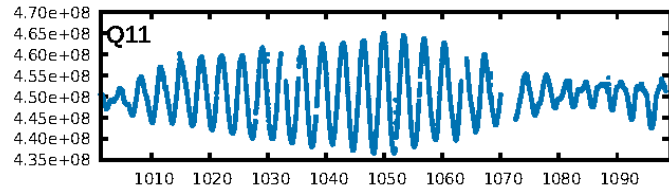
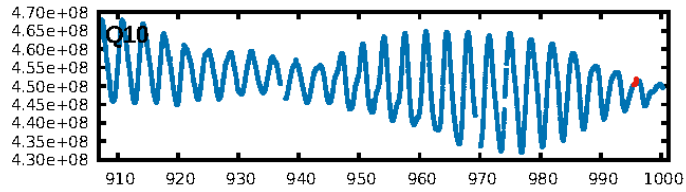
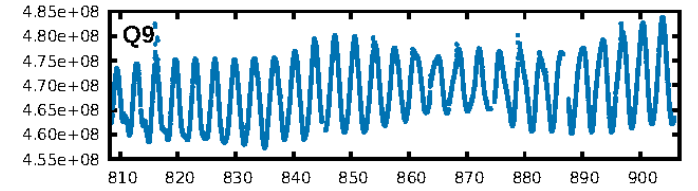
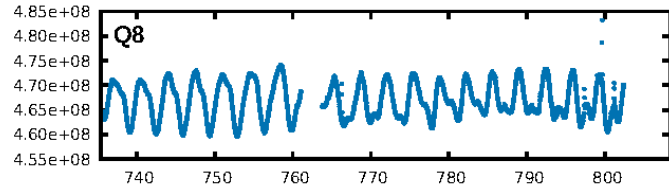
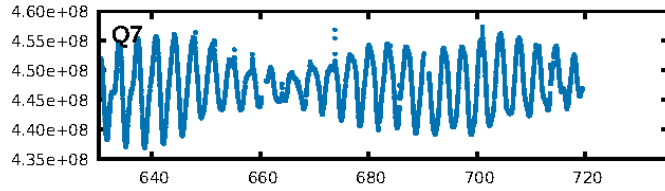
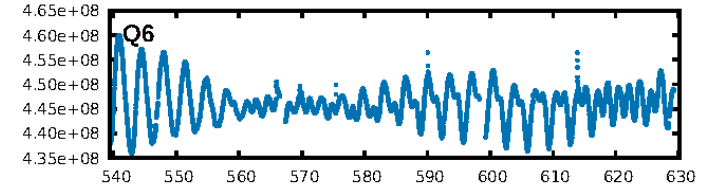
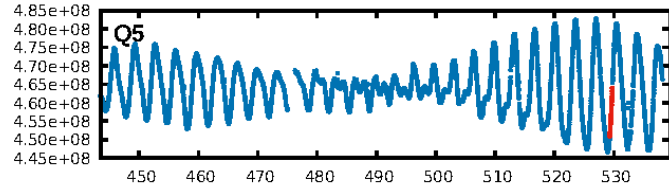
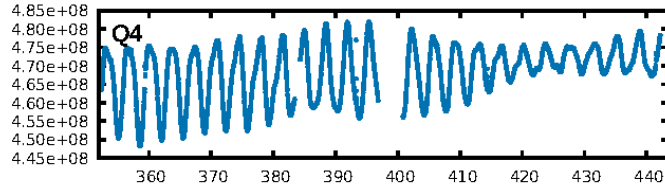
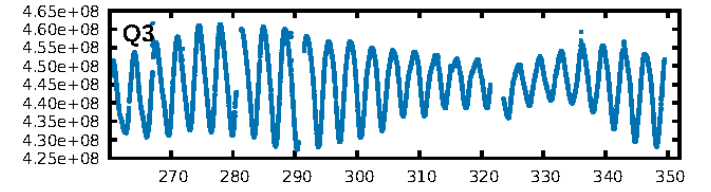
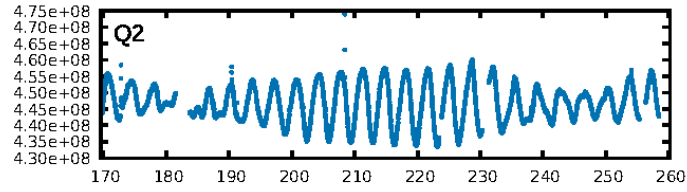
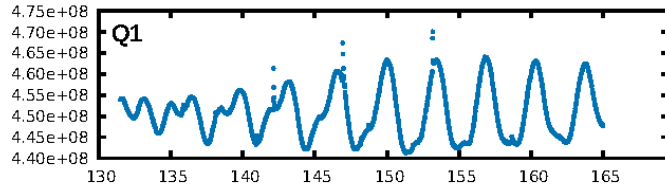
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [369.13 $\sigma$ ]  
LongPeriod-sig: 100.0% [150.04 $\sigma$ ]  
ModelChiSquare2-sig: 0.7%  
ModelChiSquareGof-sig: 99.2%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -1.571  
Centroid-sig: 4.9%  
Centroid-so: 1.801 arcsec [1.44 $\sigma$ ]  
OotOffset-rm: 0.117 arcsec [0.24 $\sigma$ ]  
OotOffset-st: 1/1/0/1 [3]  
KicOffset-rm: 0.525 arcsec [0.49 $\sigma$ ]  
KicOffset-st: 1/1/0/1 [3]  
DiffImageQuality-fgm: 0.33 [1/3]  
DiffImageOverlap-fno: 1.00 [3/3]

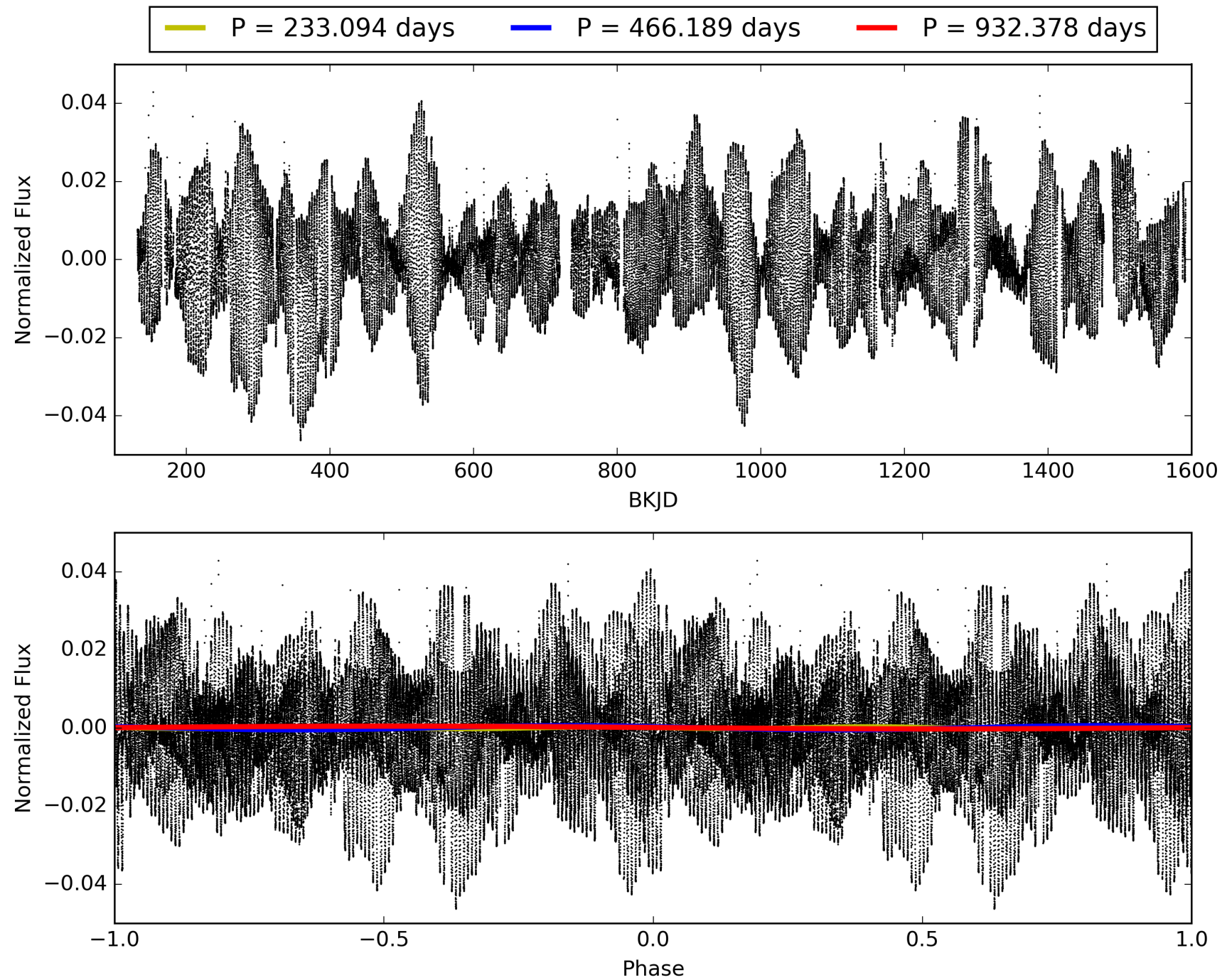
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 13:05:00 Z

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

# TCE 009048949-03, PDC Light Curves

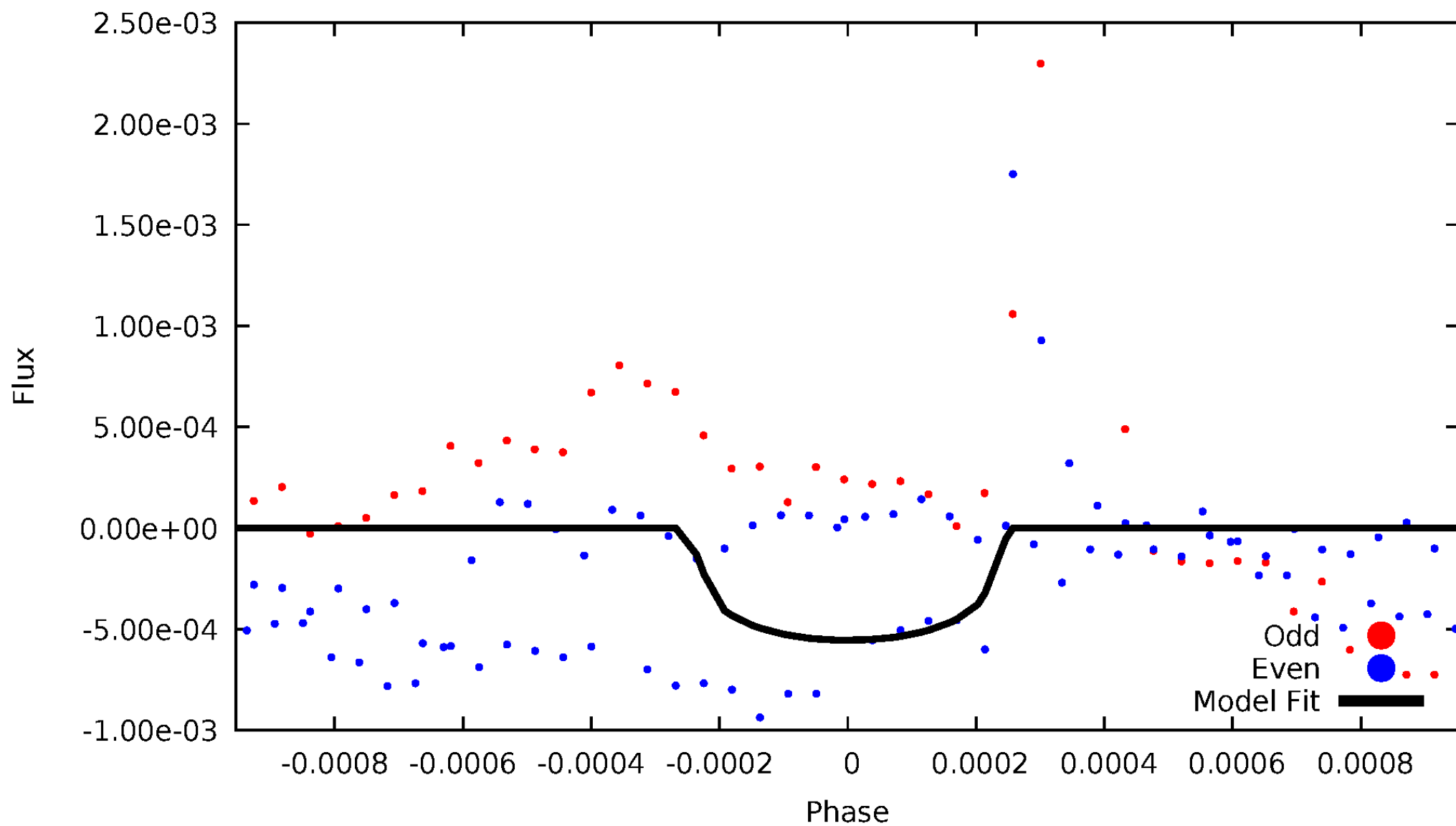


TCE 009048949-03



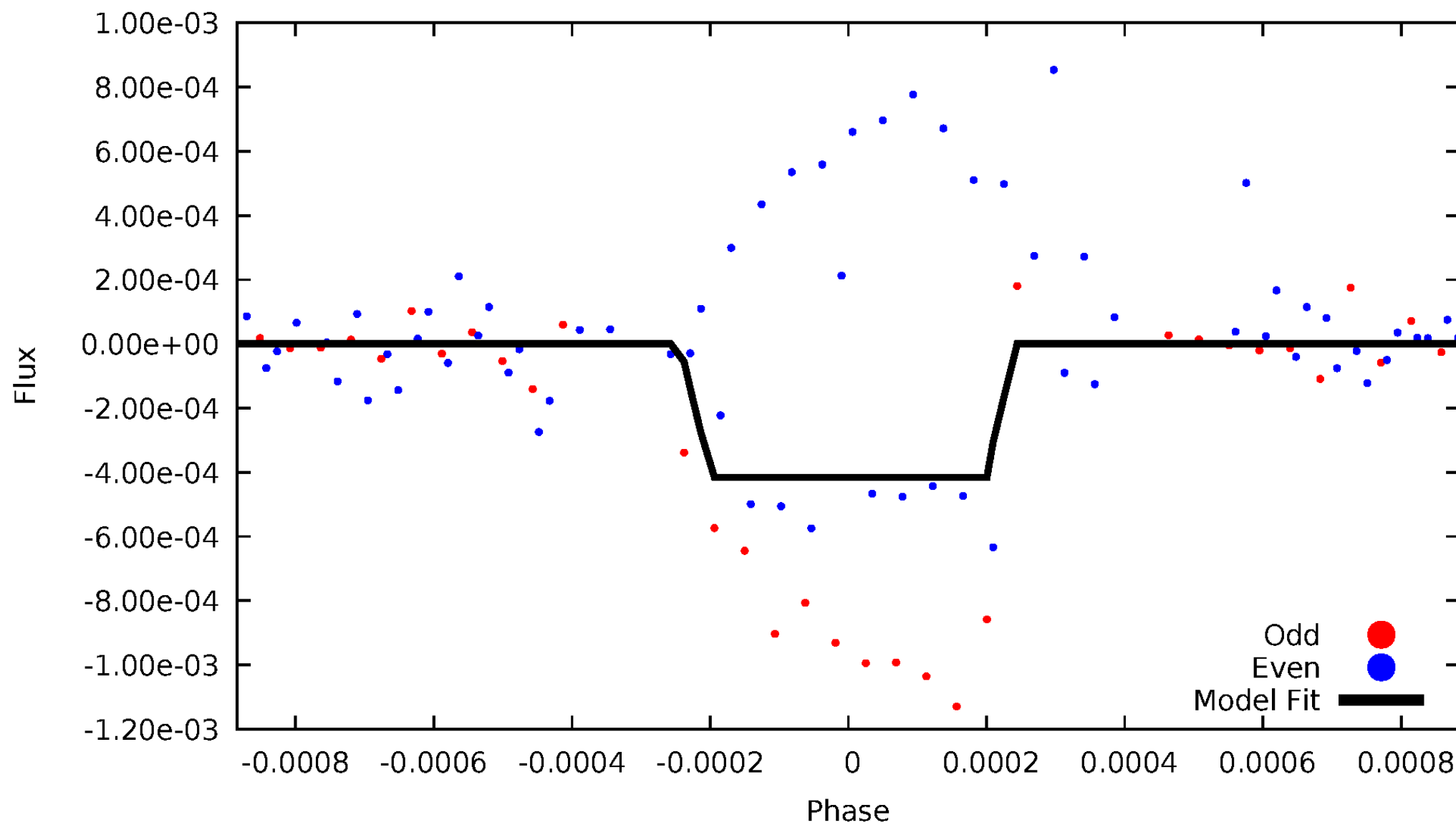
# DV Odd/Even

TCE 009048949-03



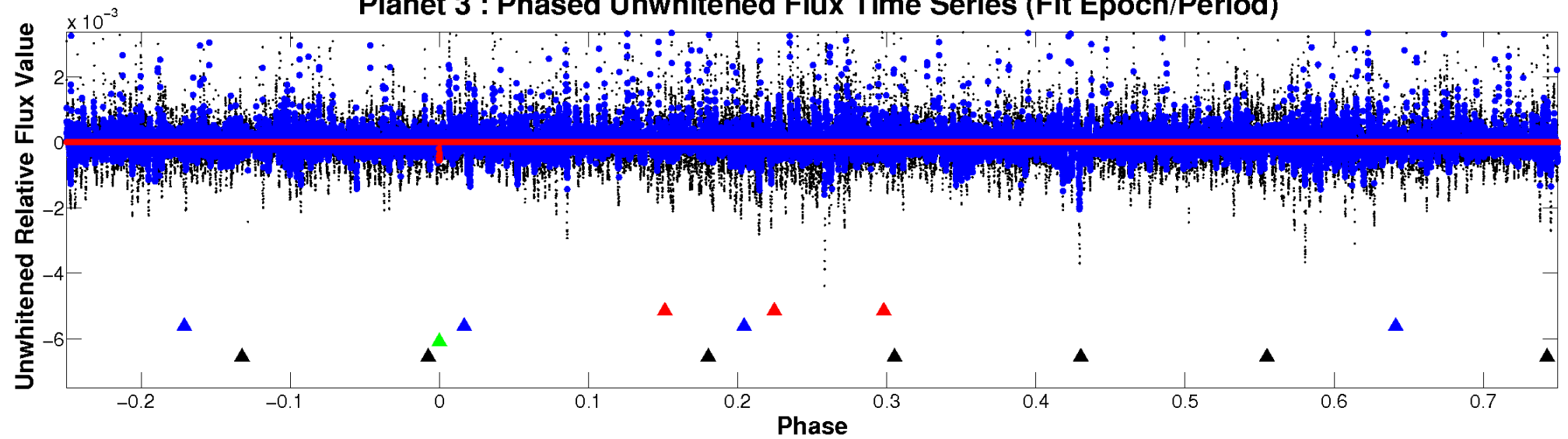
# ALT Odd/Even

TCE 009048949-03

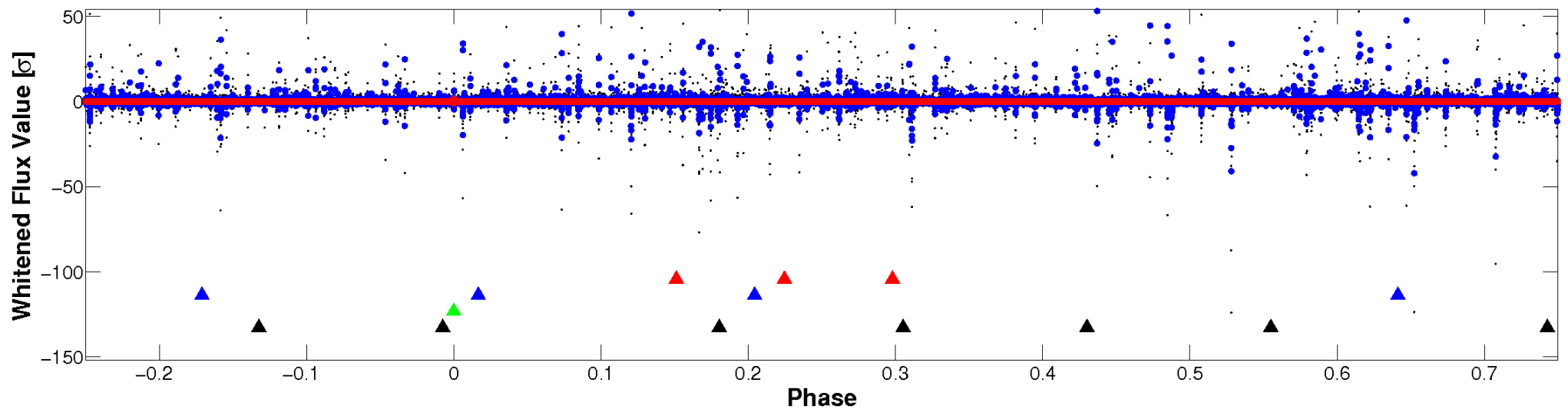


# Non-Whitened Vs. Whitened Light Curve

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

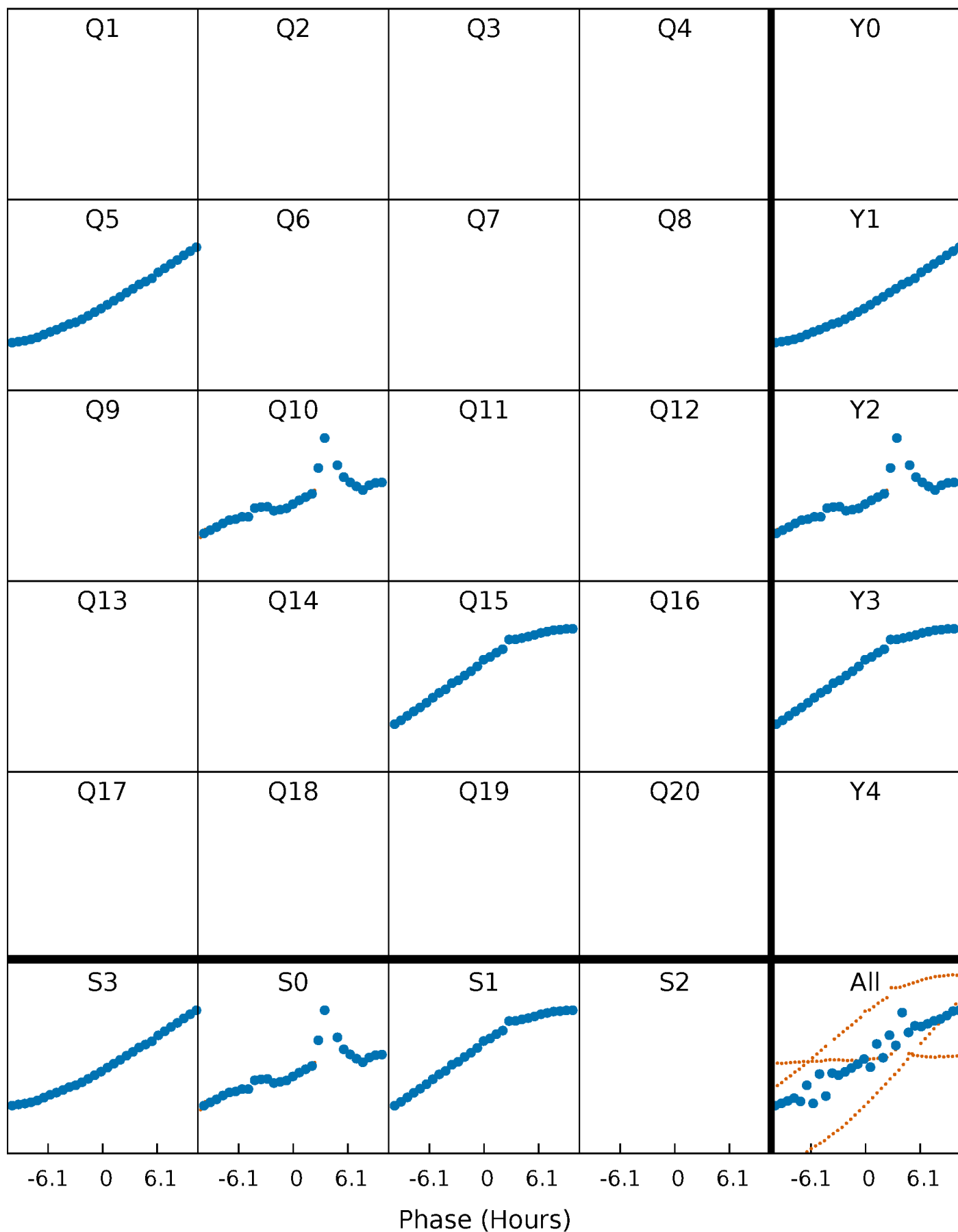


Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



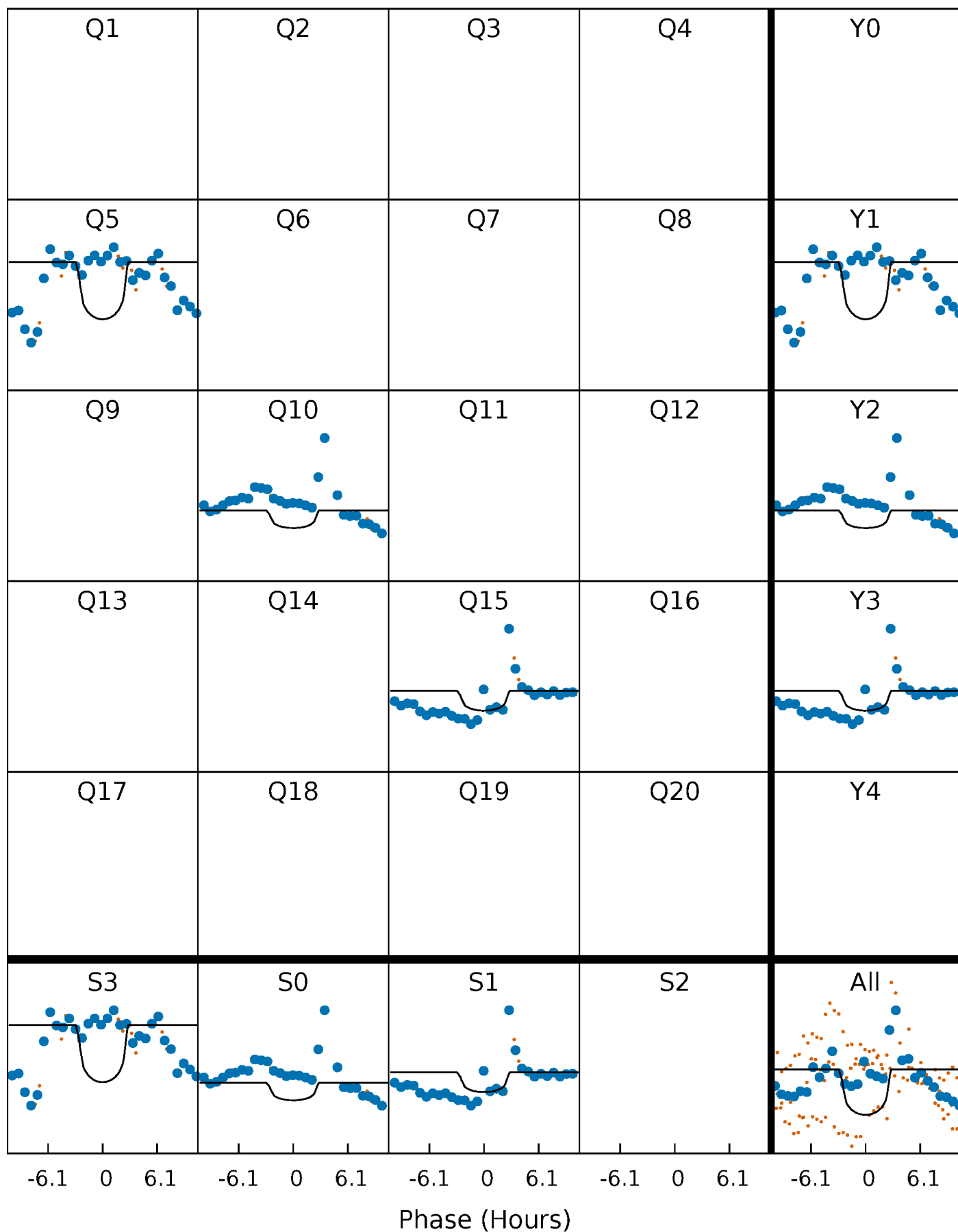
# PDC Quarter-Phased Transit Curves

TCE 009048949-03 P=466.188841 Days  $T_0=529.505757$  (BKJD)



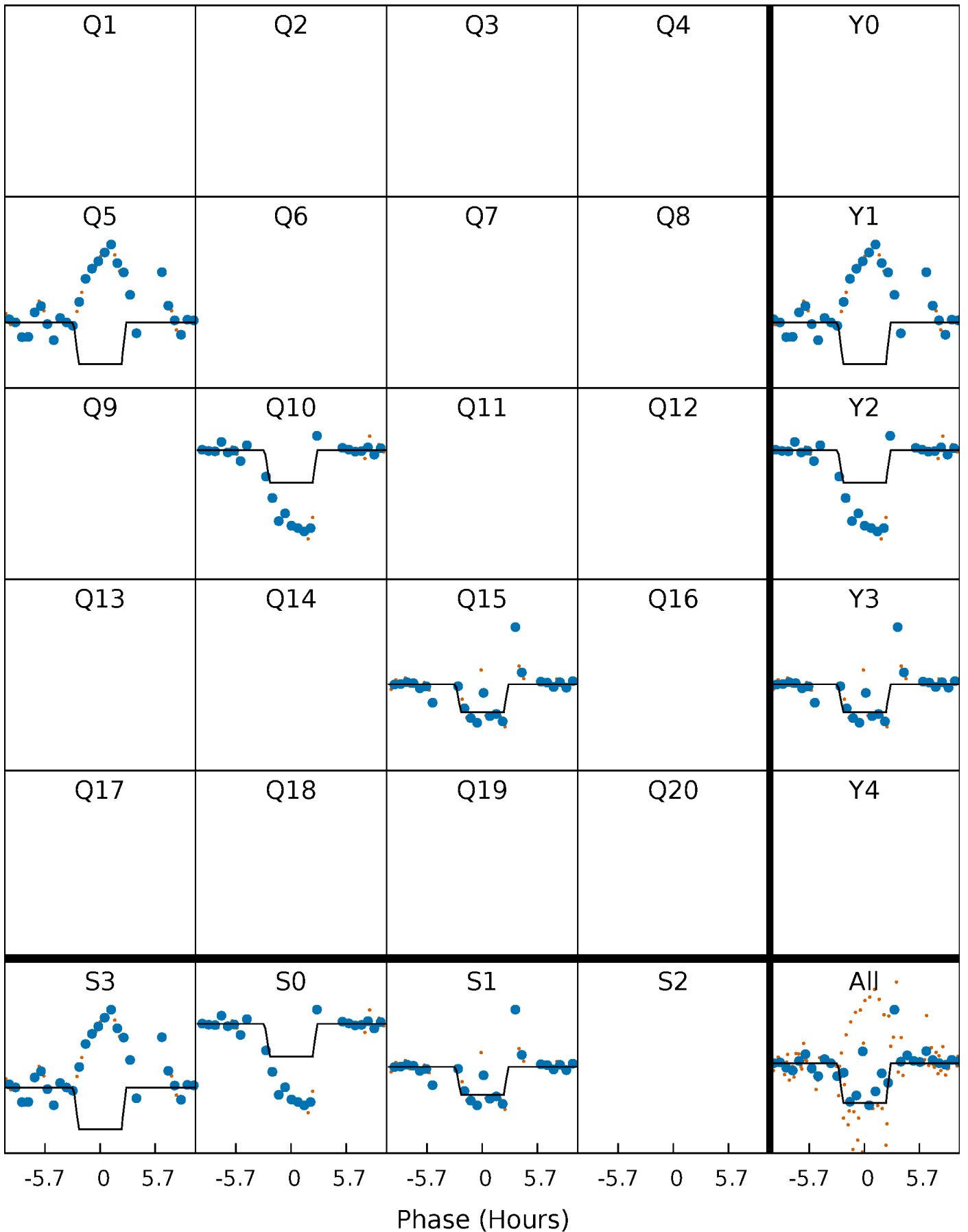
# DV Quarter-Phased Transit Curves

TCE 009048949-03     $P=466.188841$  Days     $T_0=529.505757$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

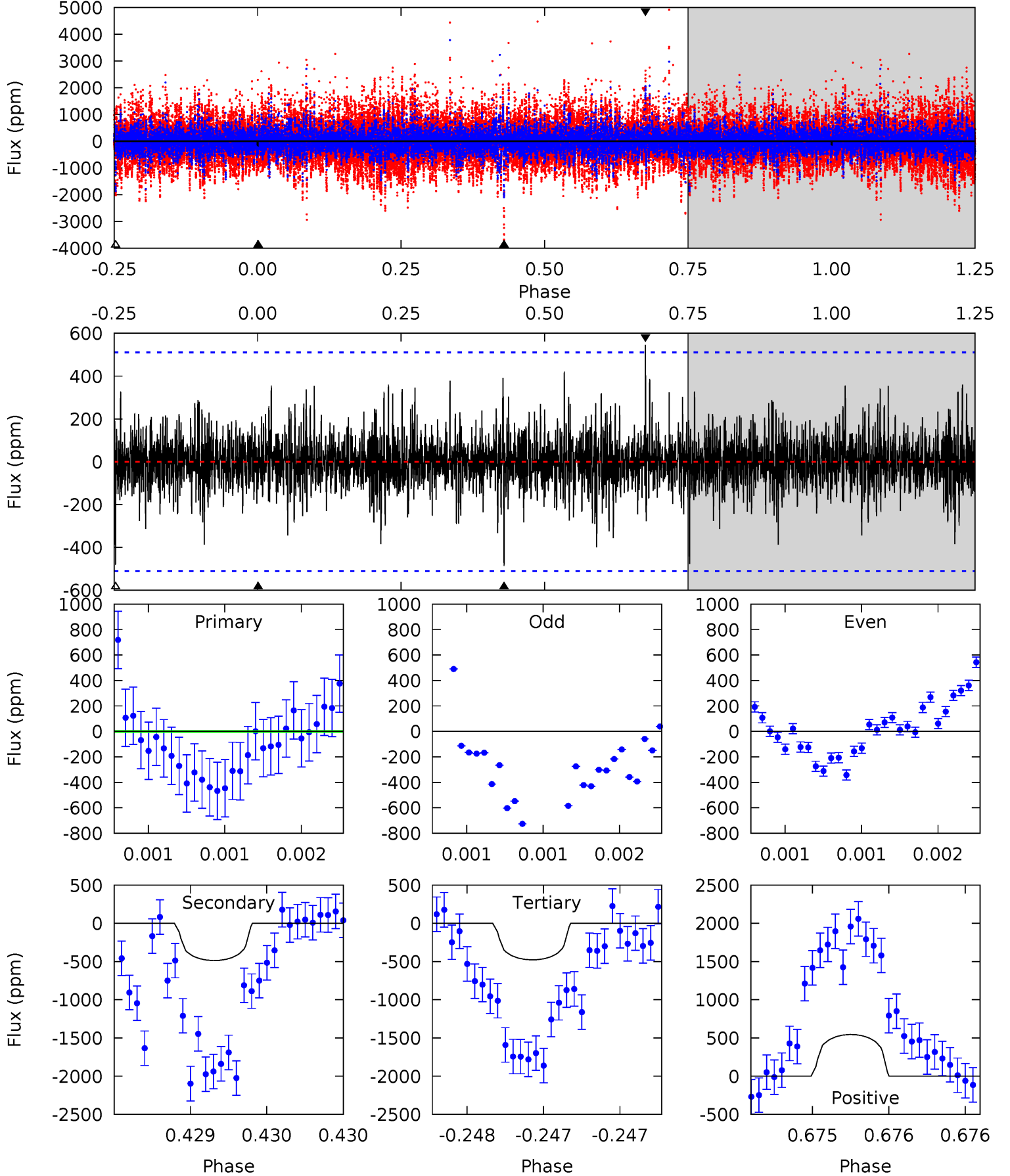
TCE 009048949-03     $P=466.184860$  Days     $T_0=529.515710$  (BKJD)



# DV Model-Shift Uniqueness Test

009048949-03, P = 466.188841 Days, E = 63.316916 Days

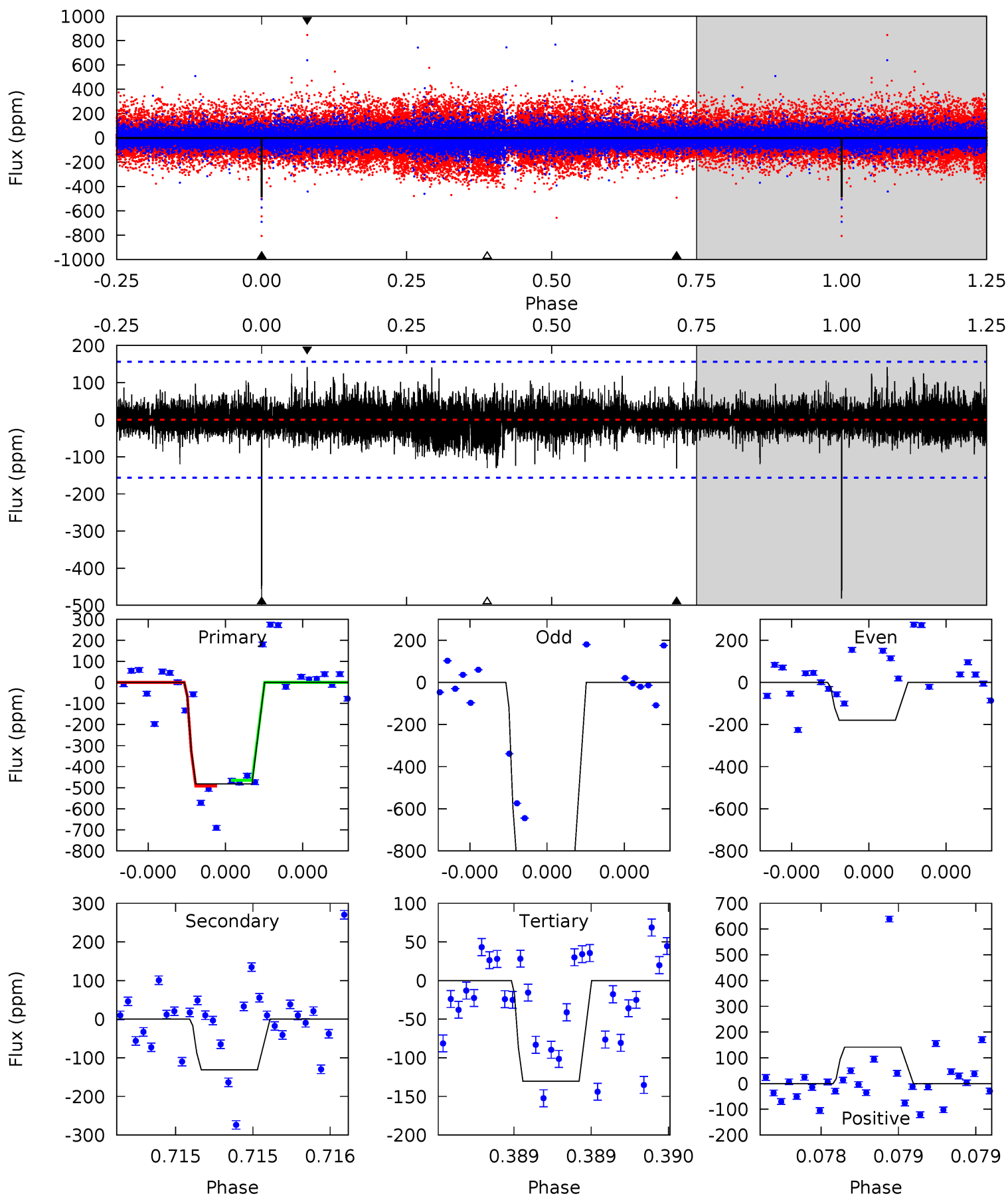
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
1.40	5.30	5.20	5.94	5.57	3.47	1.06	-3.80	-4.54	0.10	-0.64	0.28	-3.68	0.53	0.24



# Alt Model-Shift Uniqueness Test

009048949-03, P = 466.184860 Days, E = 63.330850 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
17.2	4.68	4.66	5.05	5.58	3.49	0.94	12.6	12.2	0.02	-0.38	16.5	0.60	0.23	0



### Stellar Parameters For KIC 009048949

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5190^{+169}_{-154}$	$4.493^{+0.105}_{-0.095}$	$-0.120^{+0.300}_{-0.300}$	$0.821^{+0.104}_{-0.094}$	$0.766^{+0.107}_{-0.058}$	$1.946^{+0.777}_{-0.557}$
	+3%/-3%	+2%/-2%	+250%/-250%	+13%/-11%	+14%/-8%	+40%/-29%
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 009048949-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-487 \pm 92$	$2.57^{+2.17}_{-1.68}$	$279^{+14}_{-13}$	$4708^{+2929}_{-962}$	$49524^{+316182}_{-35744}$
Alt.	$-131 \pm 28$	$2.55^{+2.17}_{-1.68}$	$279^{+13}_{-14}$	$3701^{+1885}_{-679}$	$13233^{+98262}_{-9619}$

$T_{max}$  = 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

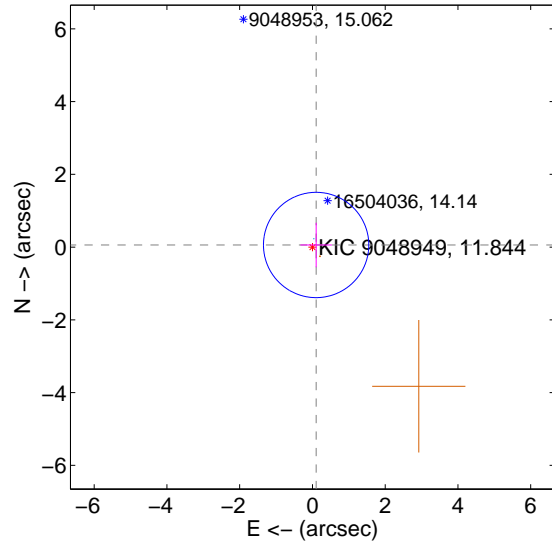
Supplemental centroid analysis for 009048949-03. **Kepler magnitude: 11.84.** Transit SNR 4.82

**There are 1 quarters with good PRF difference image offsets**

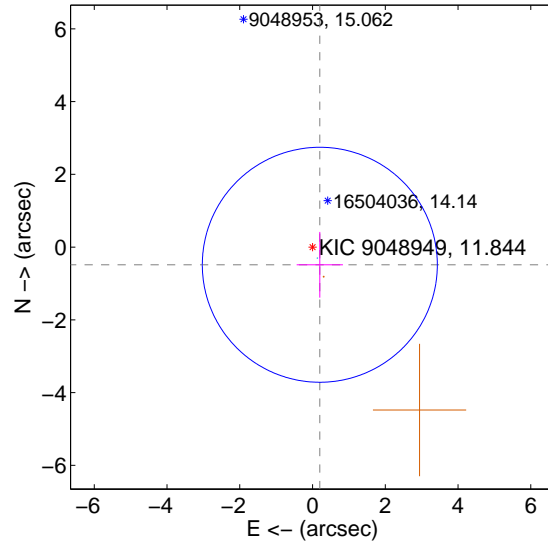
The direct PRF centroid is offset from the target star catalog position by about 0.57 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.117 \pm 0.482$	0.24	$-0.102 \pm 0.432$	$0.058 \pm 0.610$
PRF-fit source offset from KIC position	$0.525 \pm 1.077$	0.49	$-0.200 \pm 0.636$	$-0.486 \pm 0.904$
photometric centroid source offset	$1.80 \pm 1.25$	1.44	$-0.51 \pm 0.74$	$-1.73 \pm 1.28$

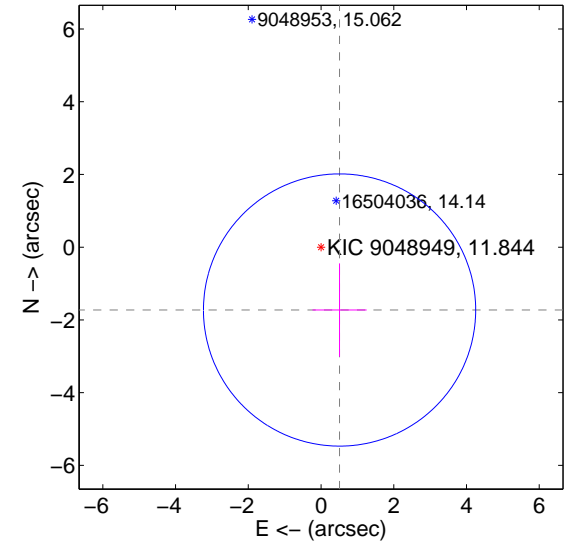
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

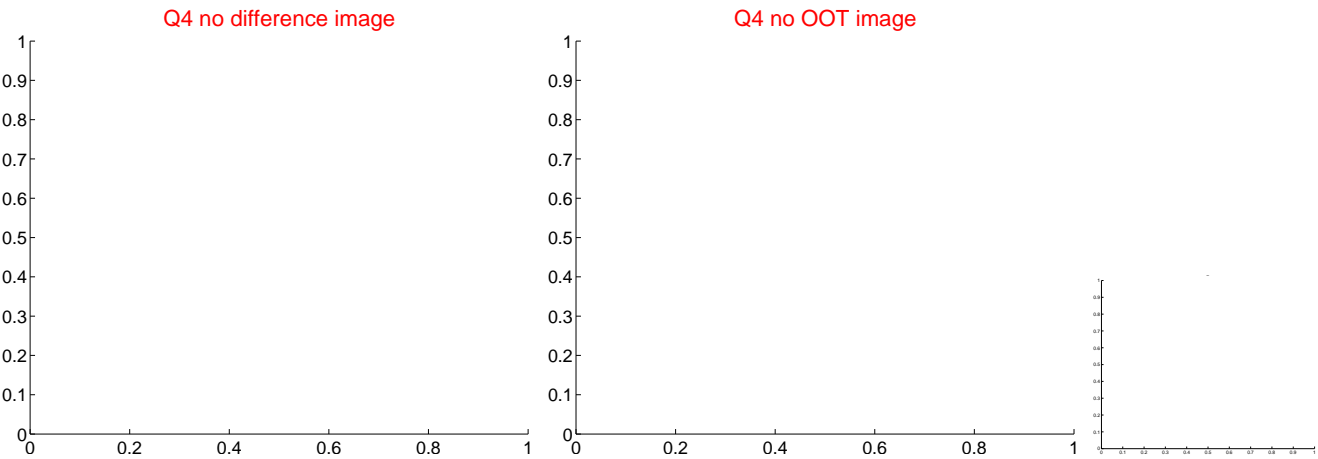
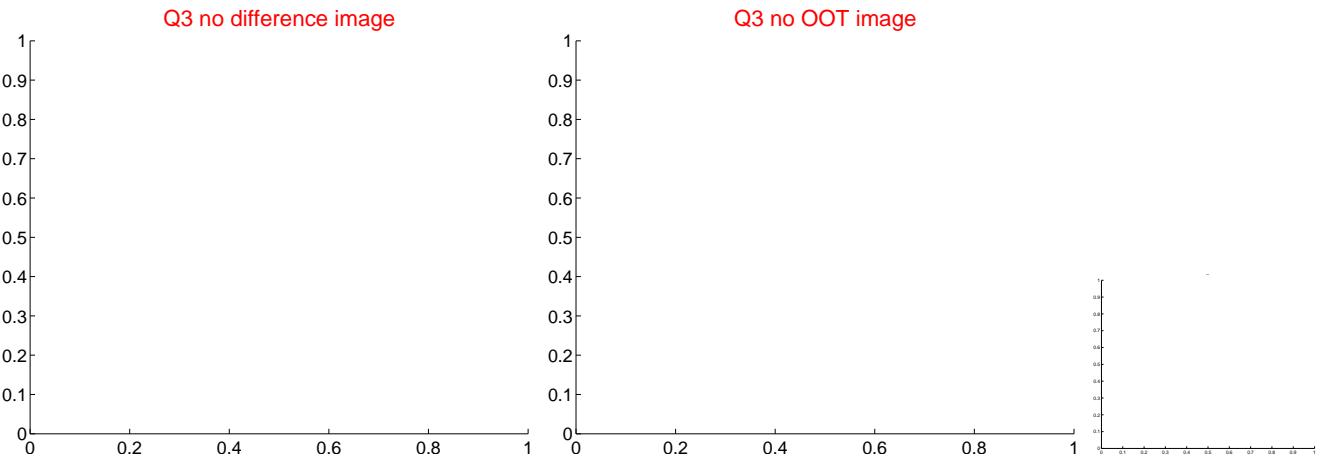
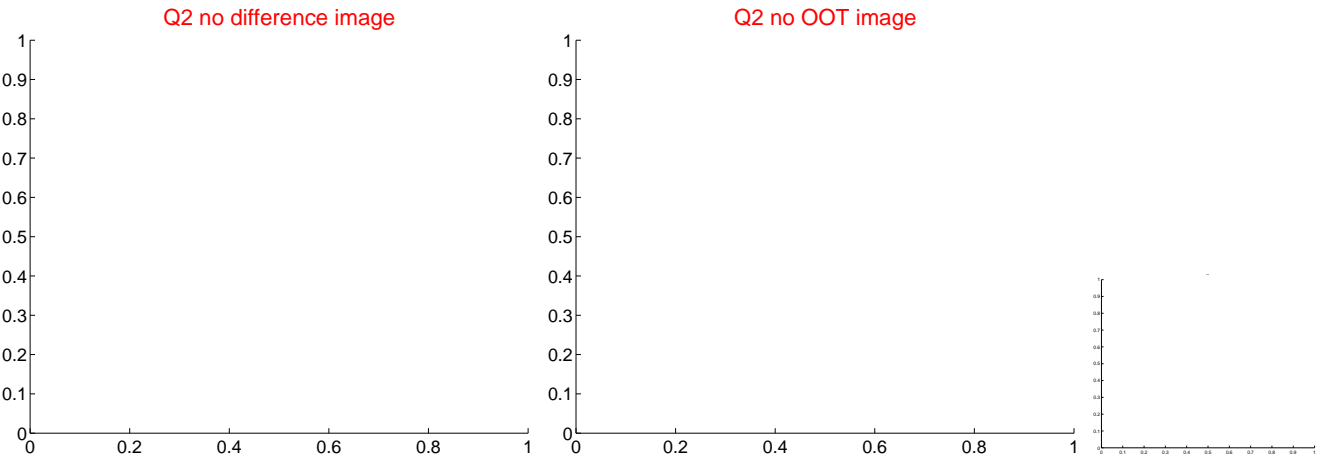
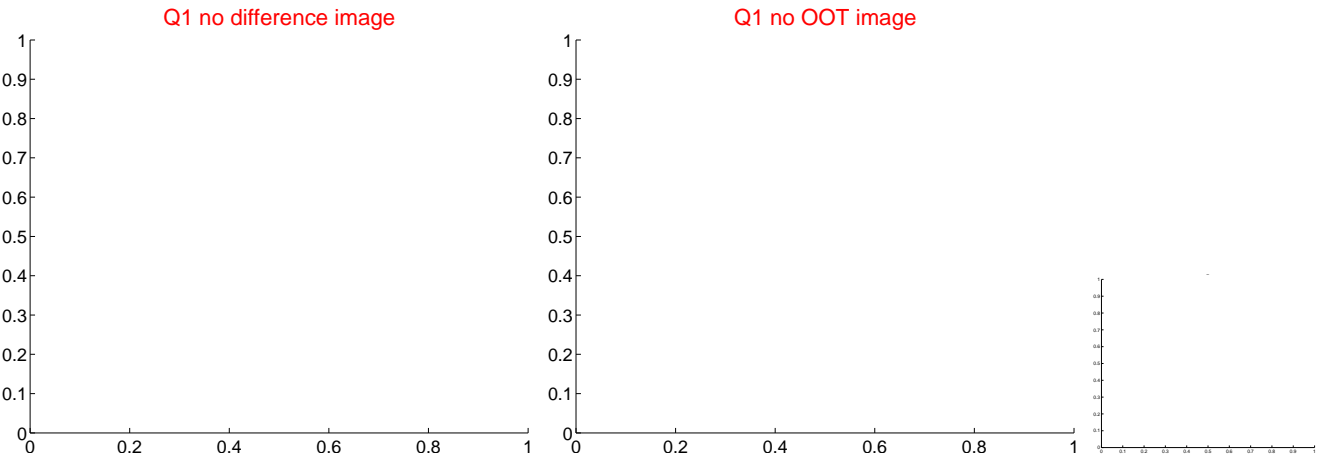


offset from photometric centroids

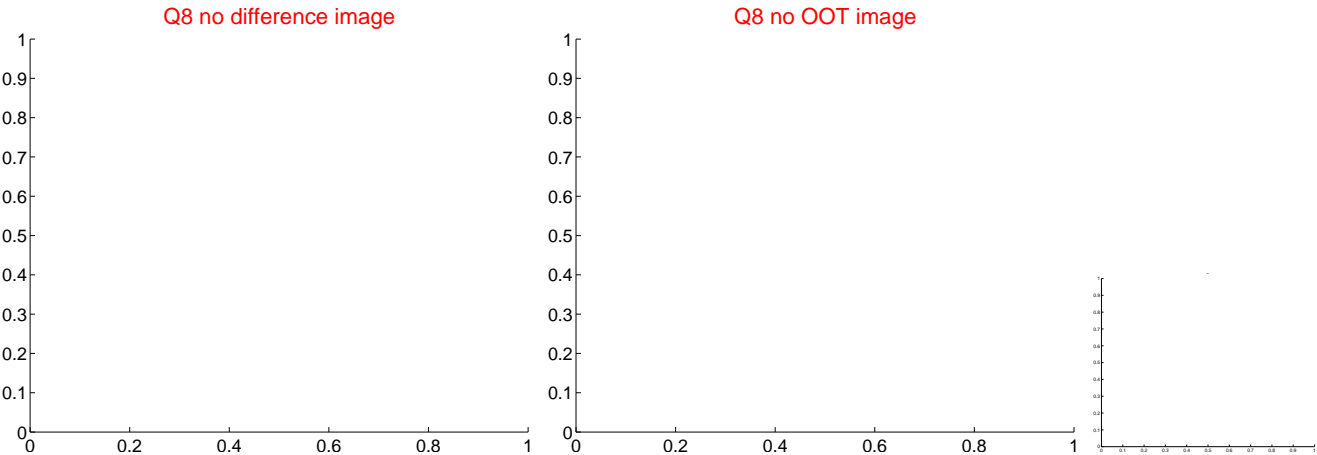
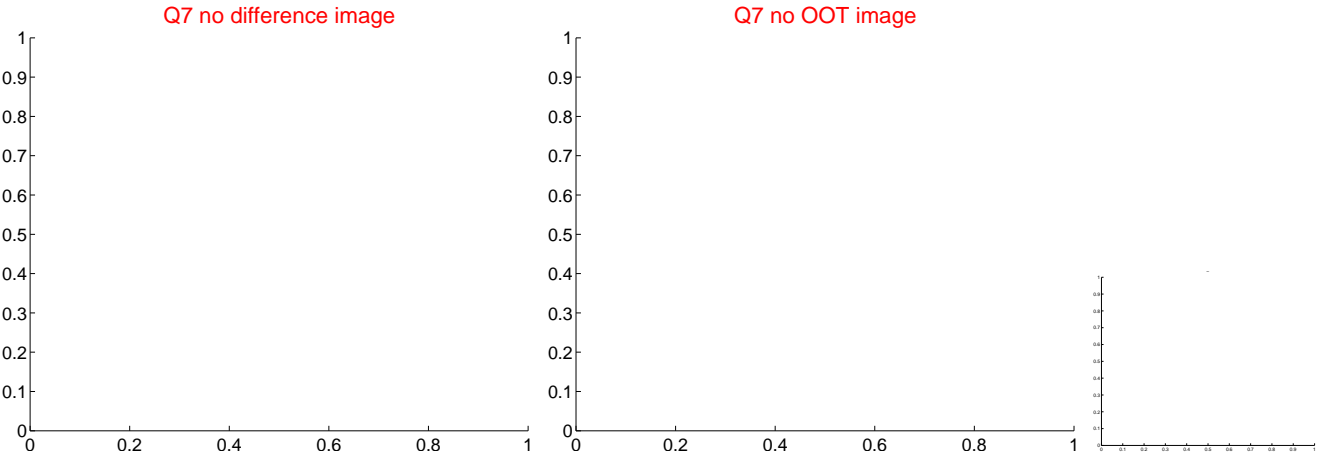
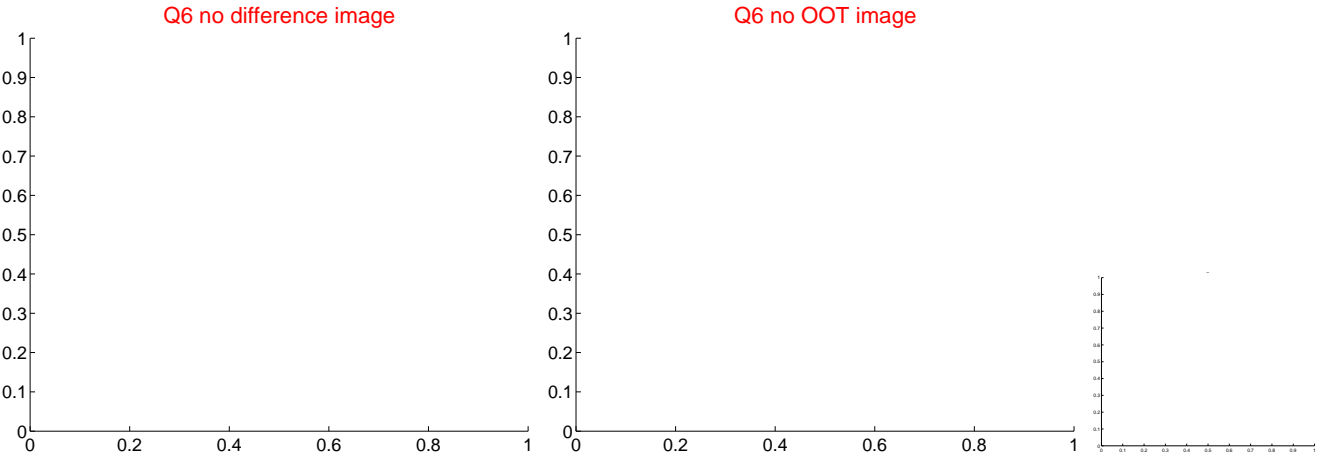
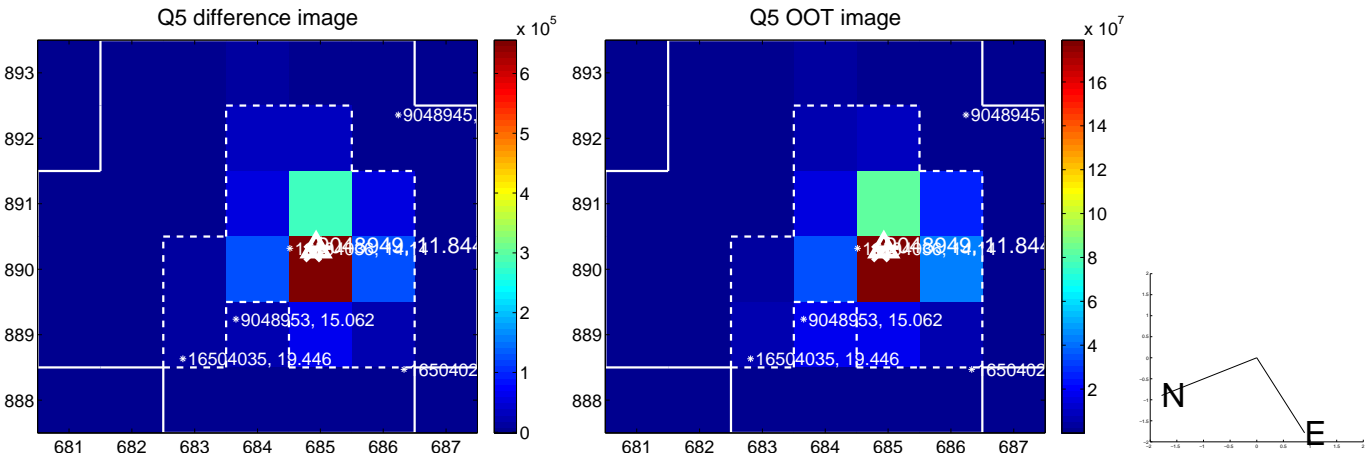


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

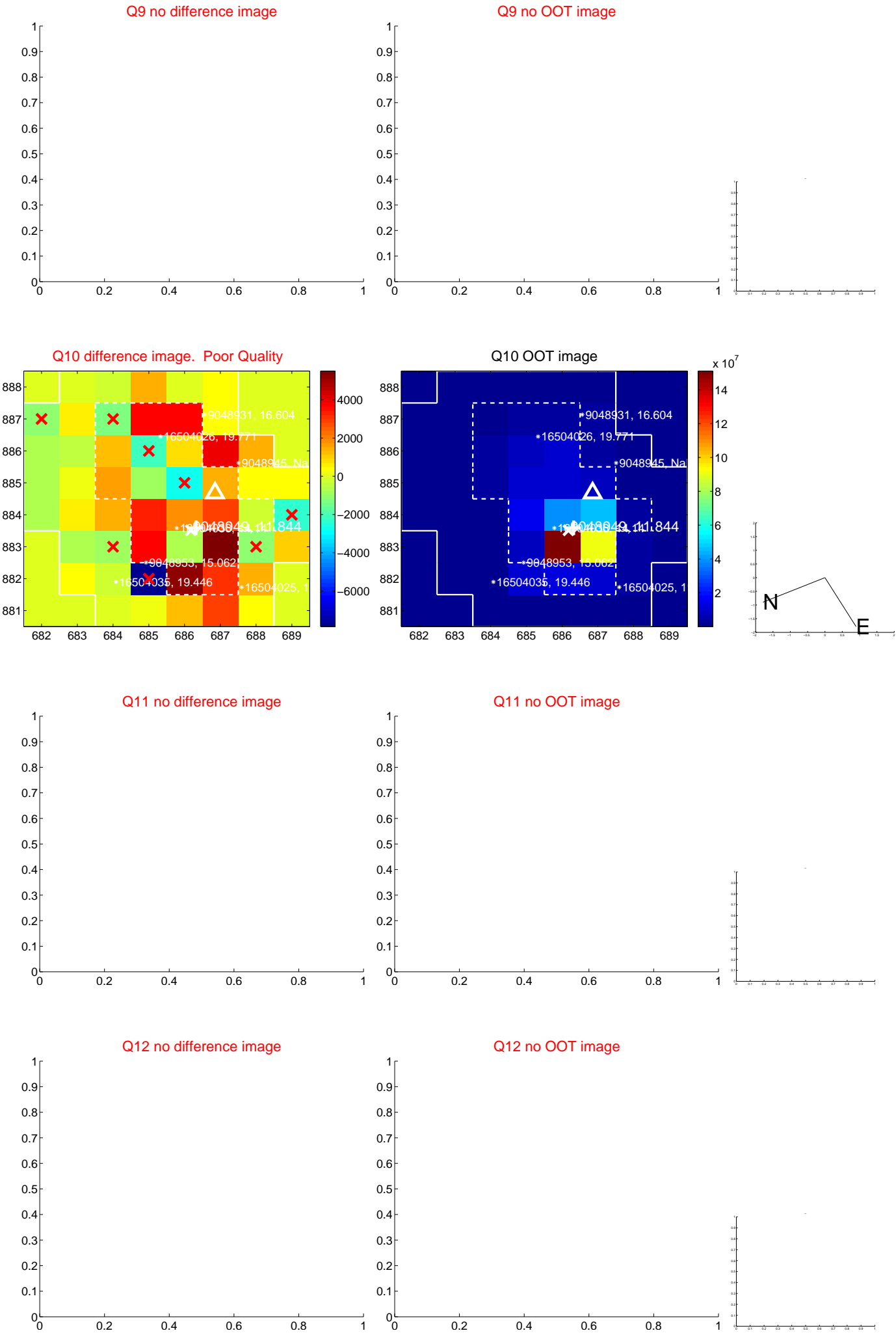
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



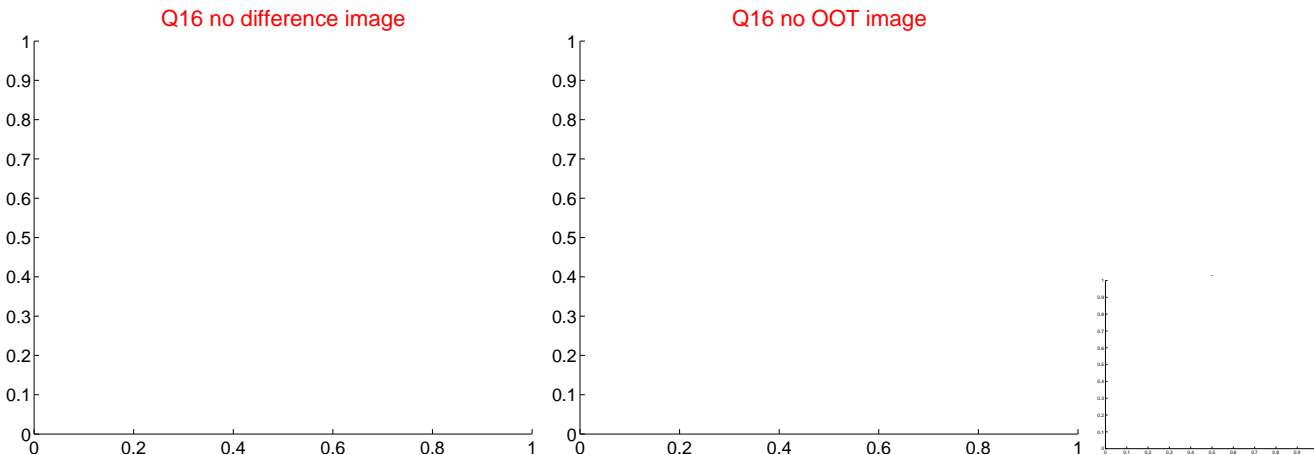
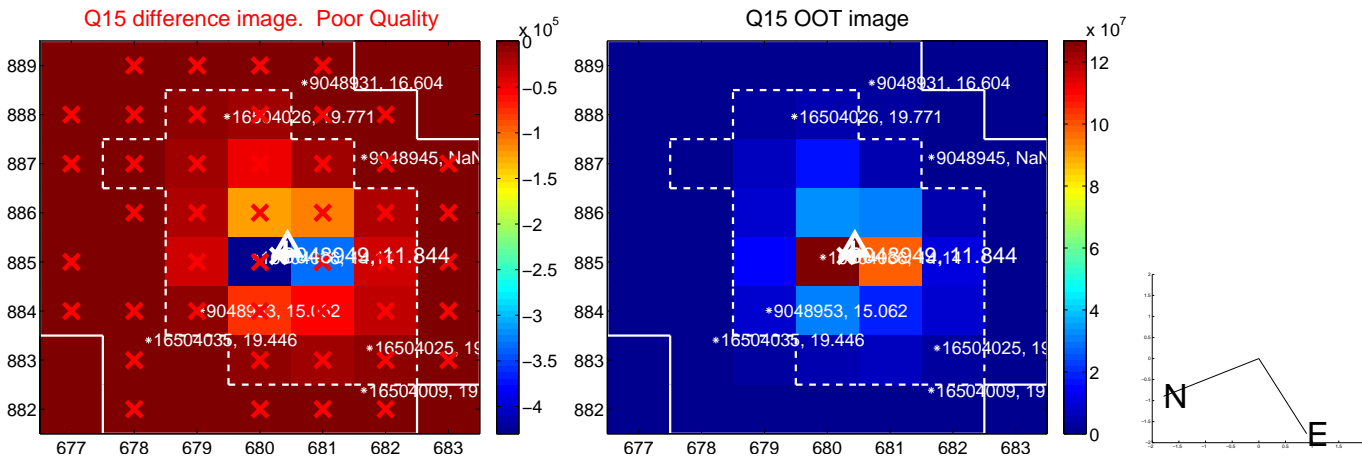
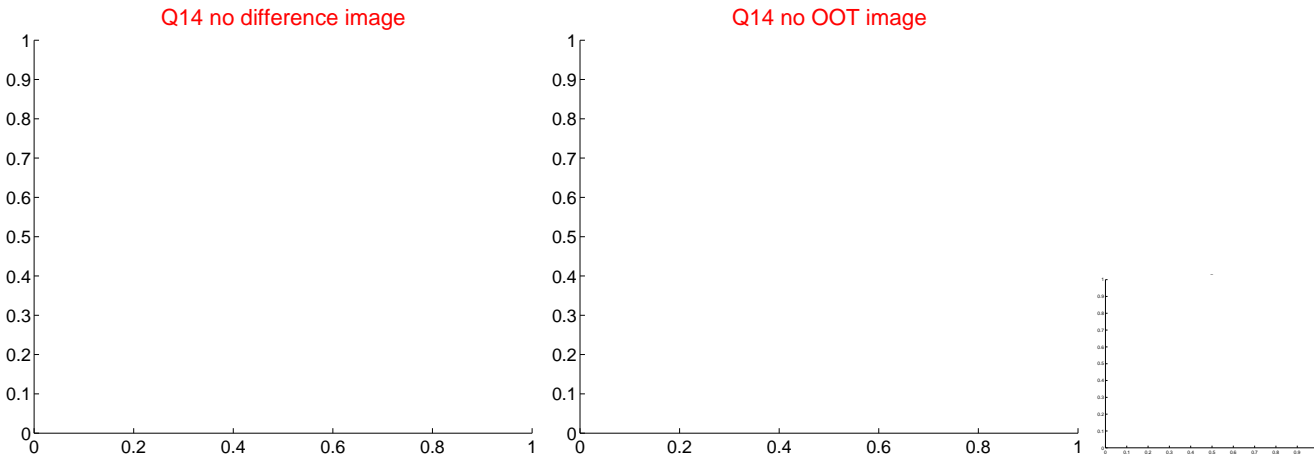
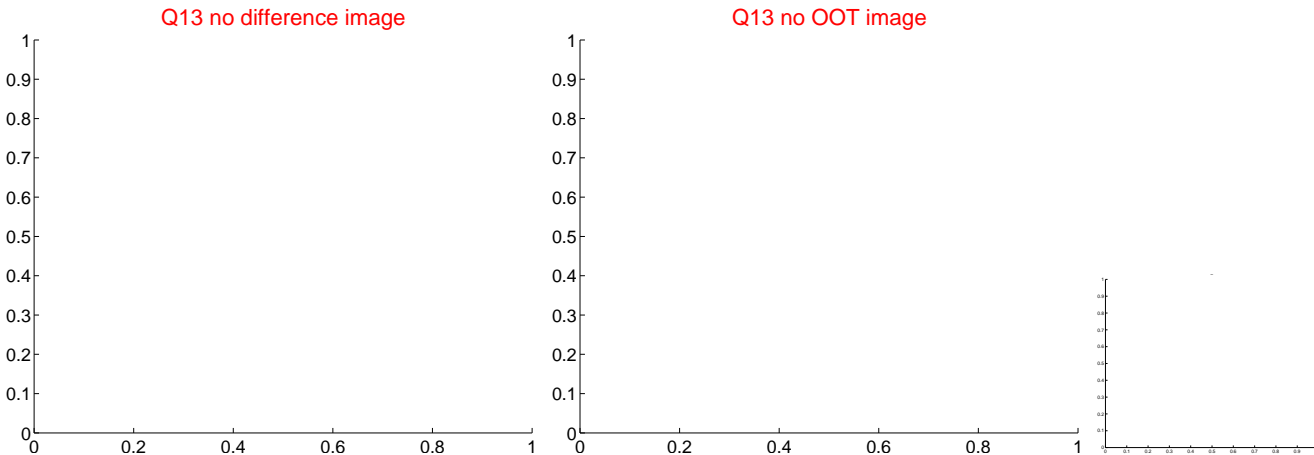
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



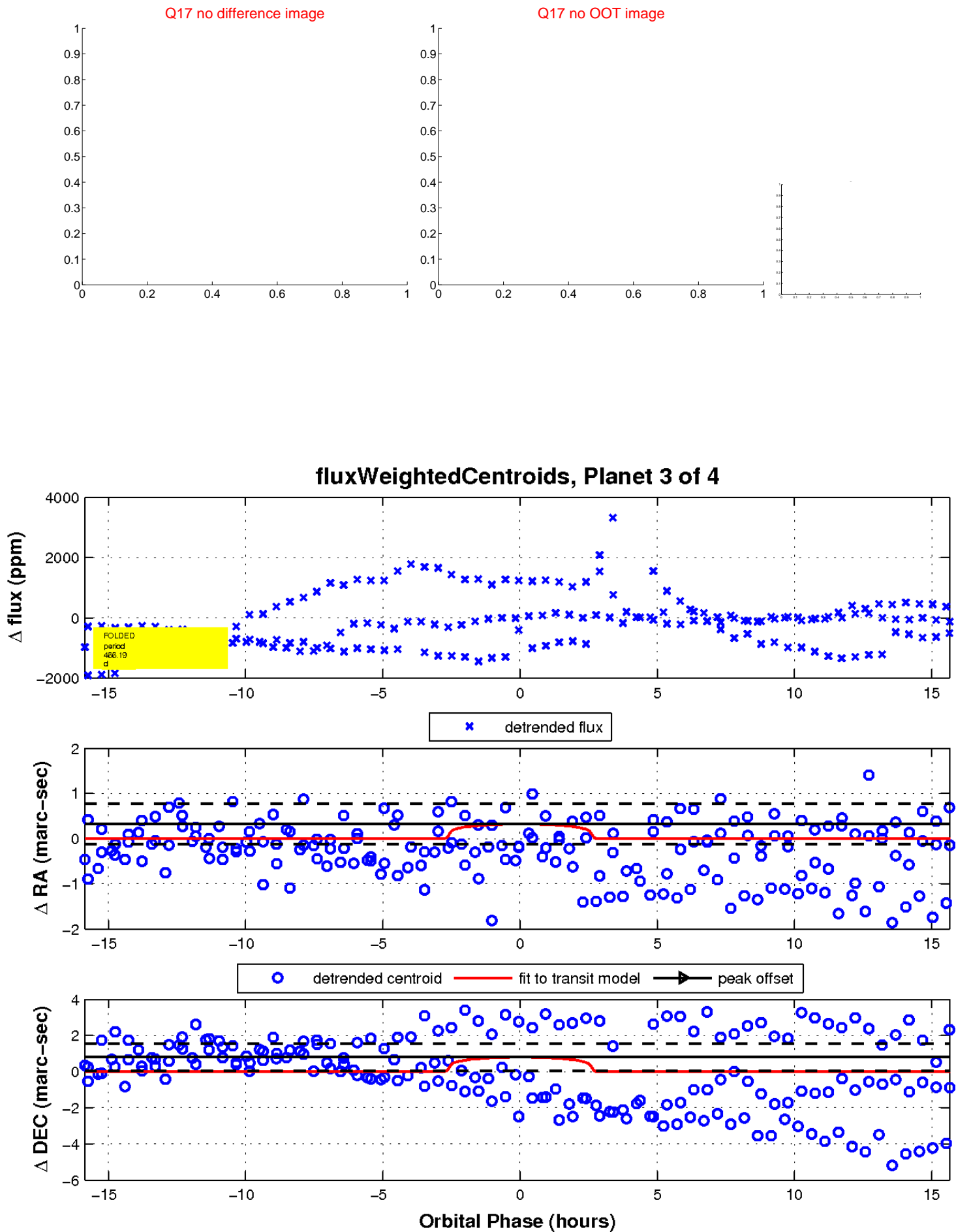
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

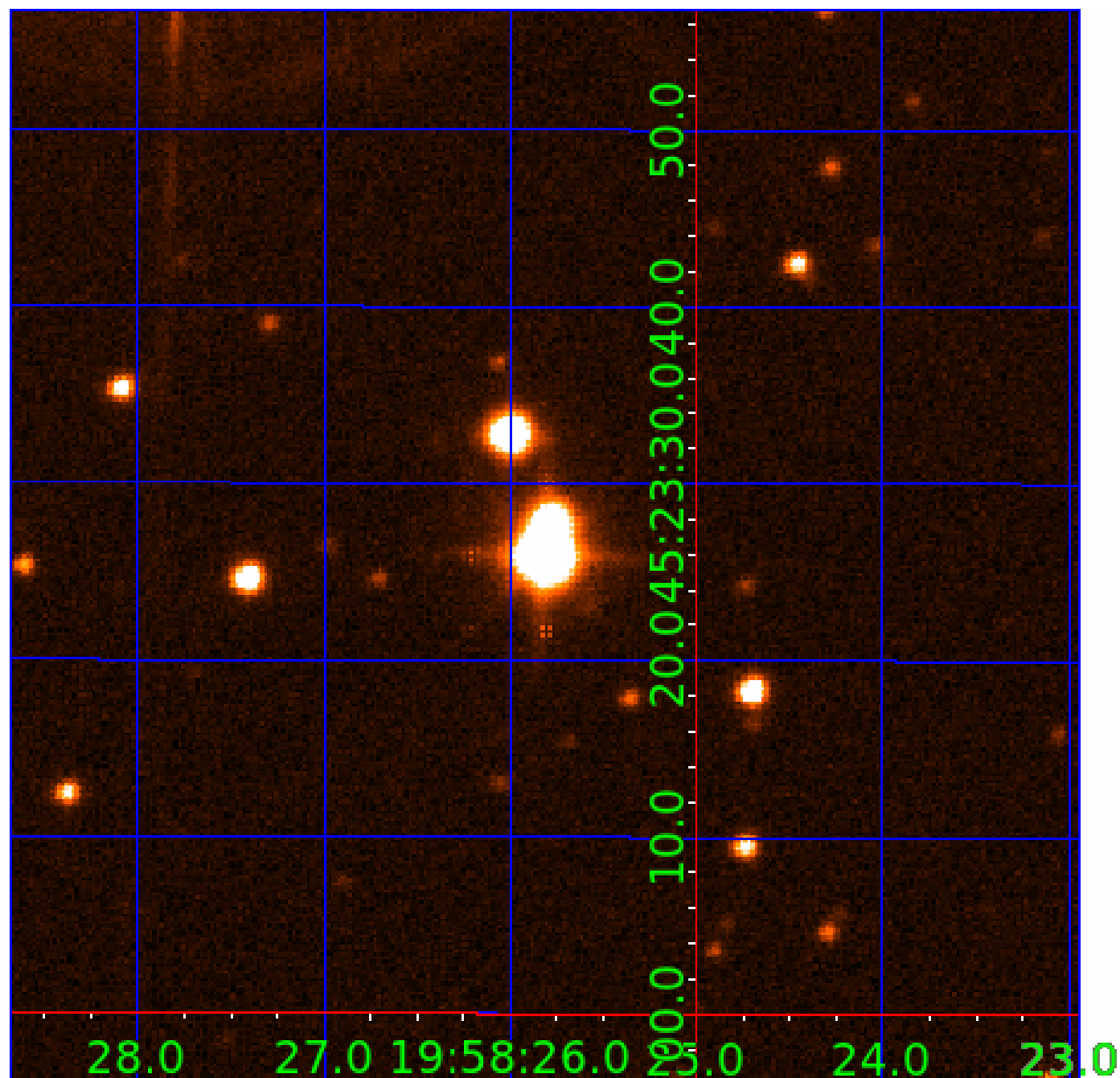


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 009048949

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009048949-01	OBS	No	500.399138	133.824339	412.1	1.215	21.7	4.6	0.82	5190	1.95	0.34
009048949-03	OBS	No	466.188841	529.505757	555.3	5.335	15.7	4.8	0.82	5190	1.89	0.38
009048949-04	OBS	No	203.986021	322.053941	257.7	3.500	13.5	-1.0	0.82	5190	1.29	1.14

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009048949-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009048949-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_ZUMA—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009048949-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—CENT_NOFITS

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

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

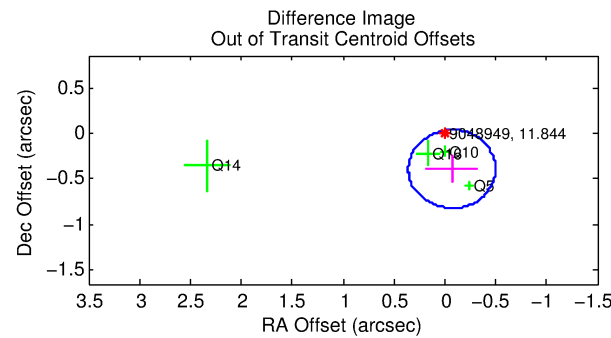
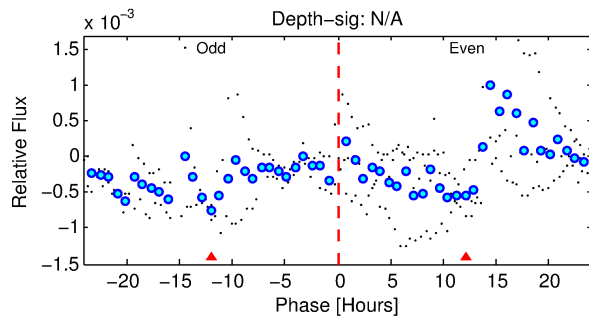
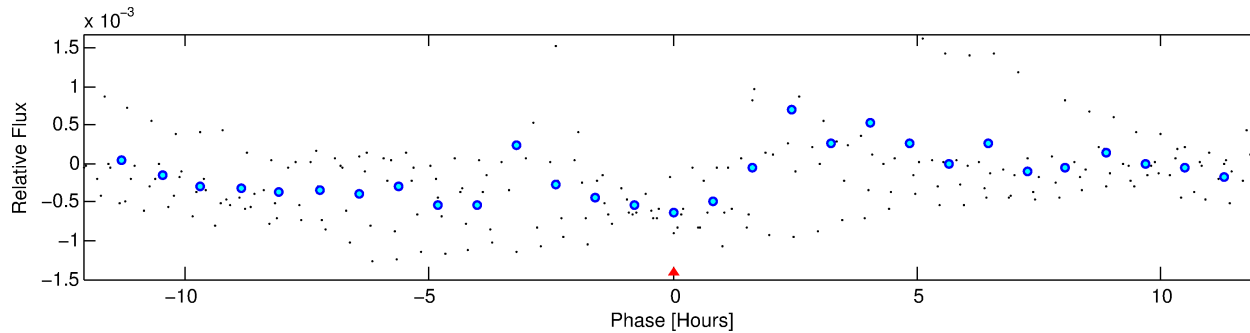
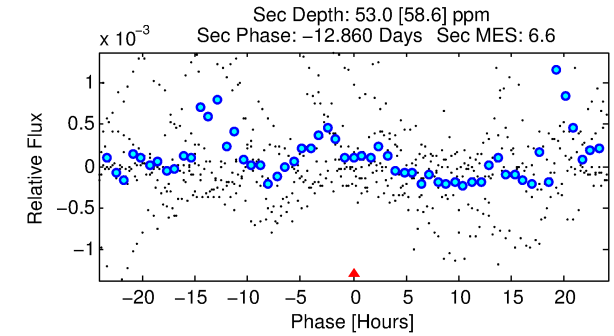
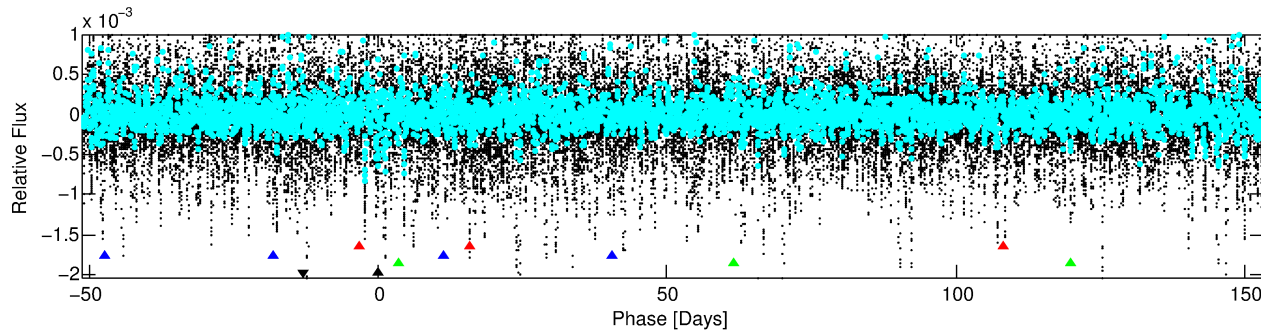
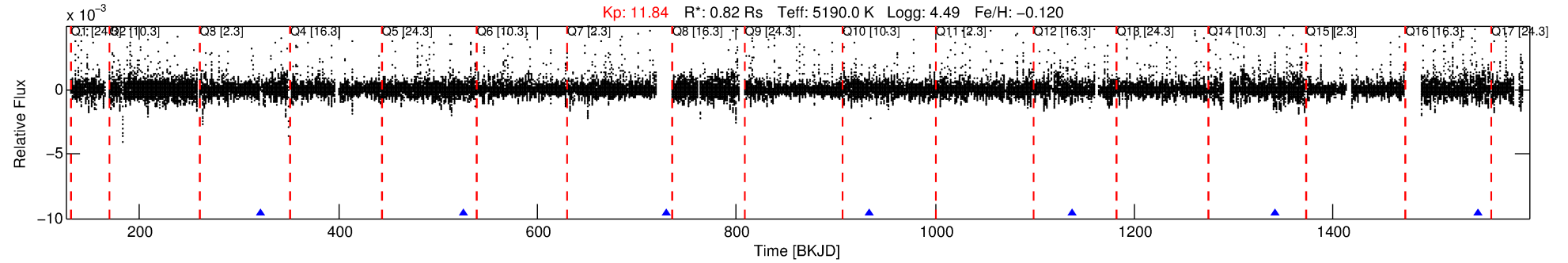
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 009048949-04

No Significant Match Found

# DV One-Page Summary

KIC: 9048949 Candidate: 4 of 4 Period: 203.986 d



## TPS TCE Results:

Period = 203.98602 d  
Epoch = 322.0539 BKJD

DV fit results are unavailable

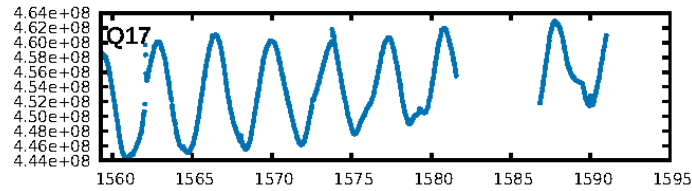
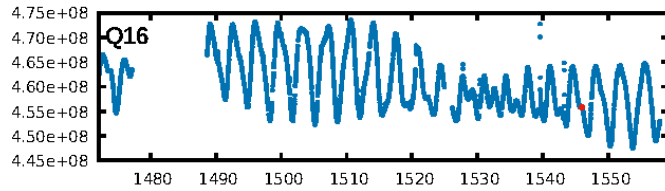
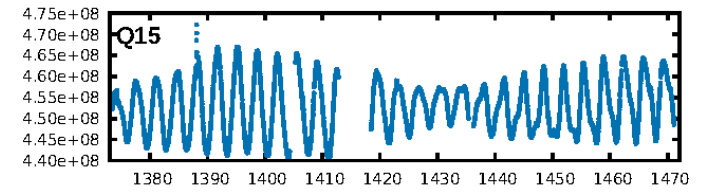
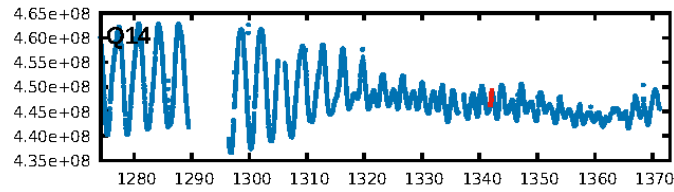
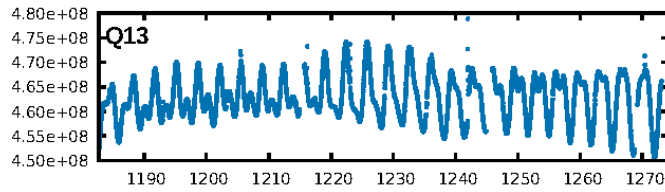
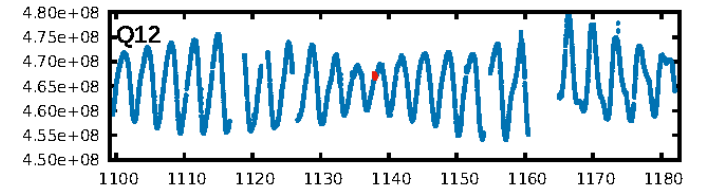
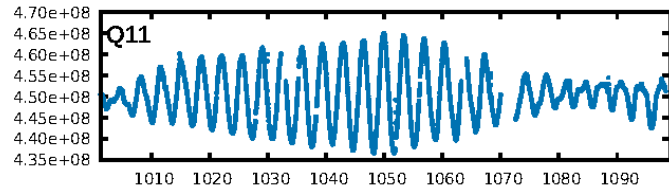
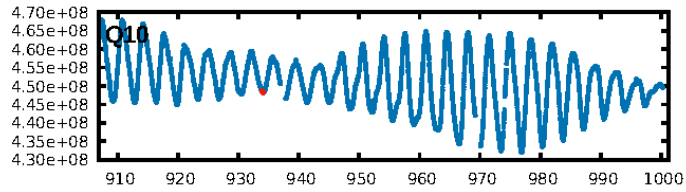
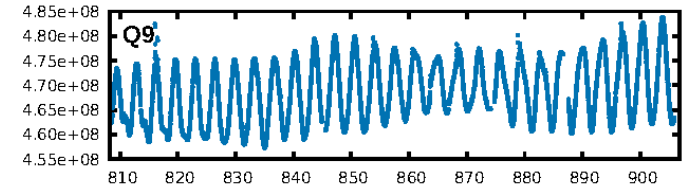
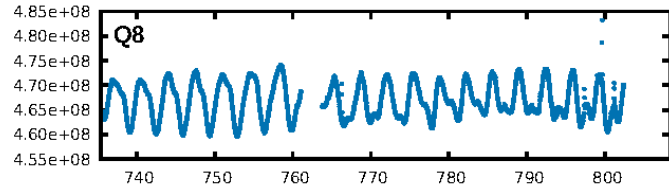
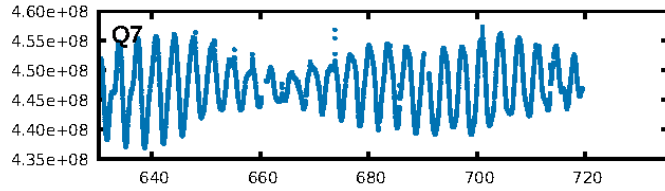
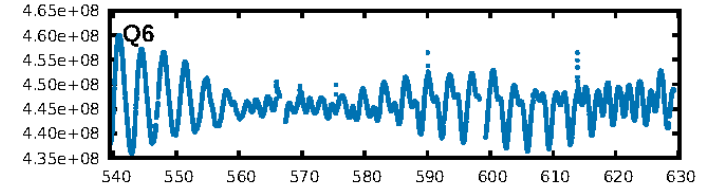
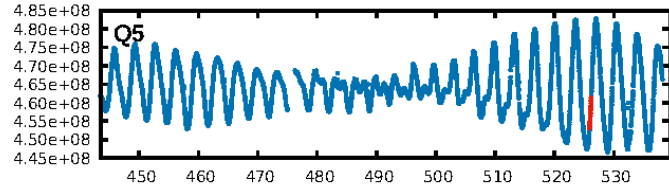
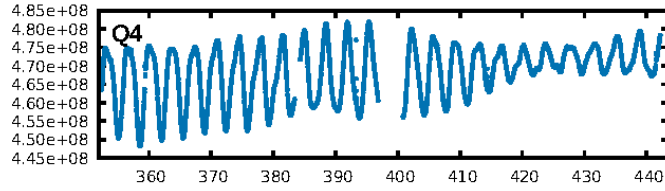
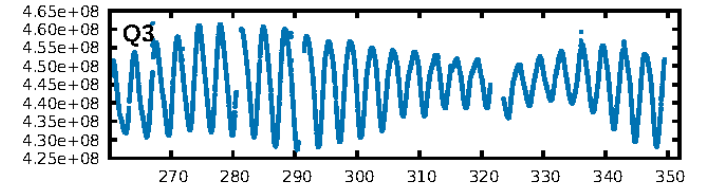
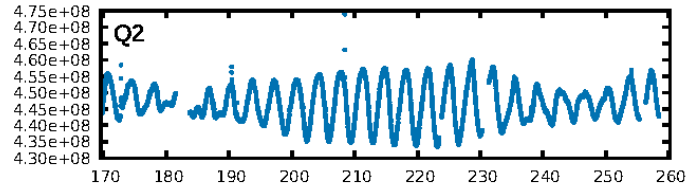
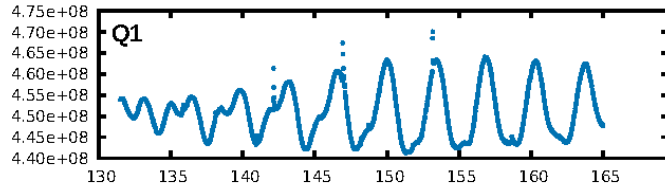
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [1043.40σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: -0.9138  
Centroid-sig: 40.6%  
Centroid-so: 0.604 arcsec [1.13σ]  
QotOffset-rm: 0.398 arcsec [2.79σ]  
QotOffset-st: 2/0/1/1 [4]  
KicOffset-rm: 1.010 arcsec [9.16σ]  
KicOffset-st: 2/0/1/1 [4]  
DiffImageQuality-fgm: 0.50 [2/4]  
DiffImageOverlap-fno: 1.00 [5/5]

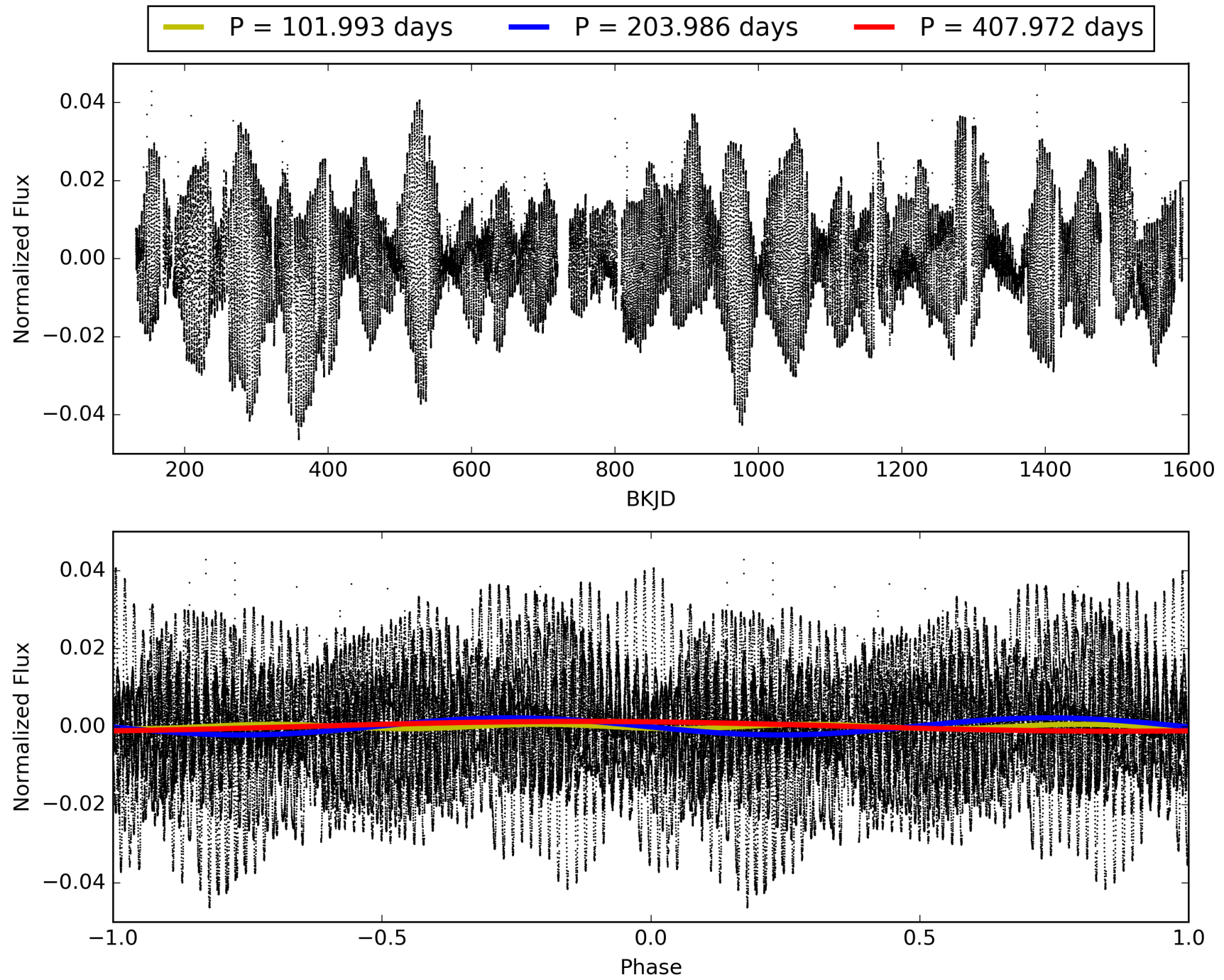
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 13:05:11 Z

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

# TCE 009048949-04, PDC Light Curves

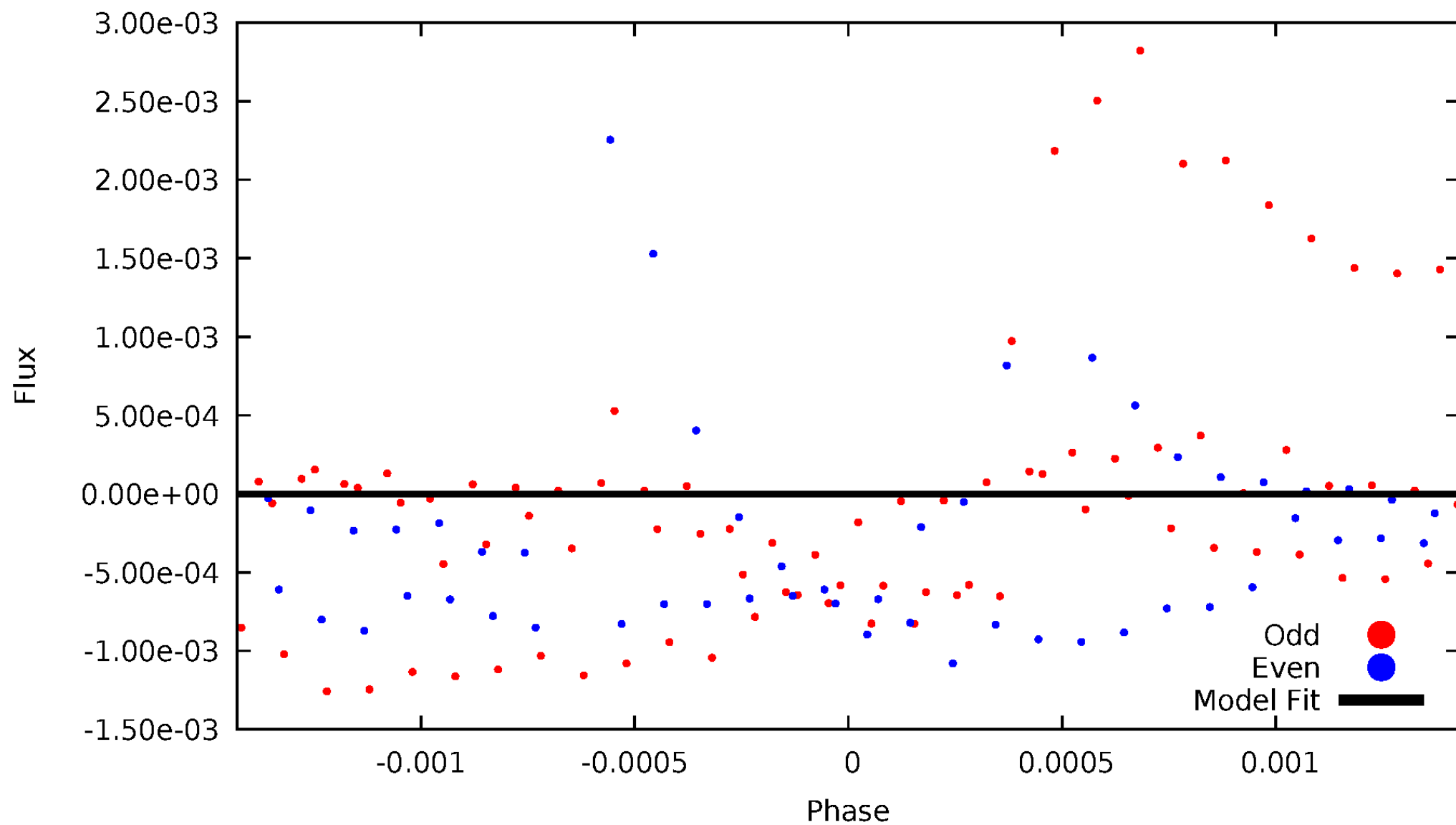


TCE 009048949-04



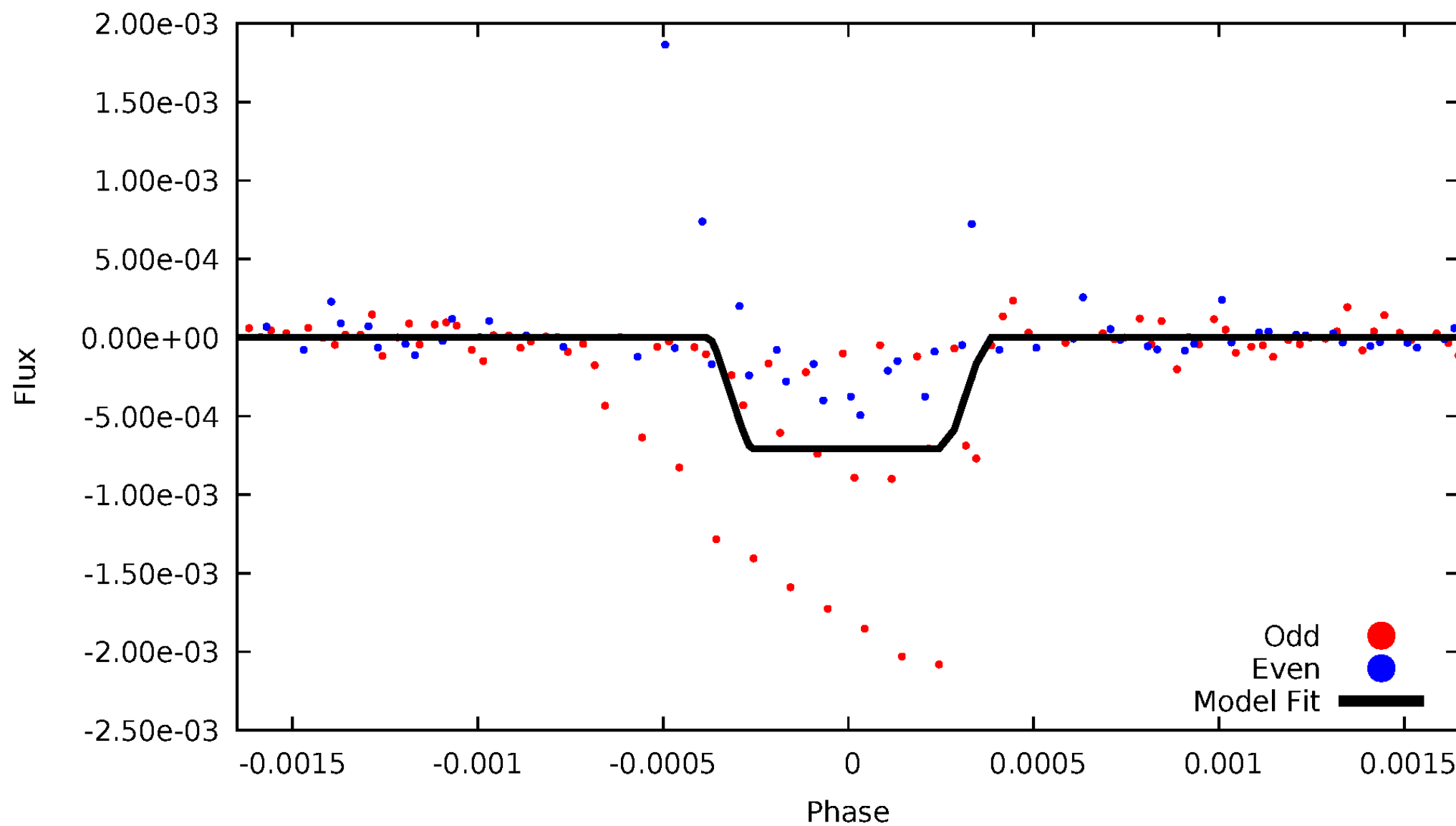
# DV Odd/Even

TCE 009048949-04



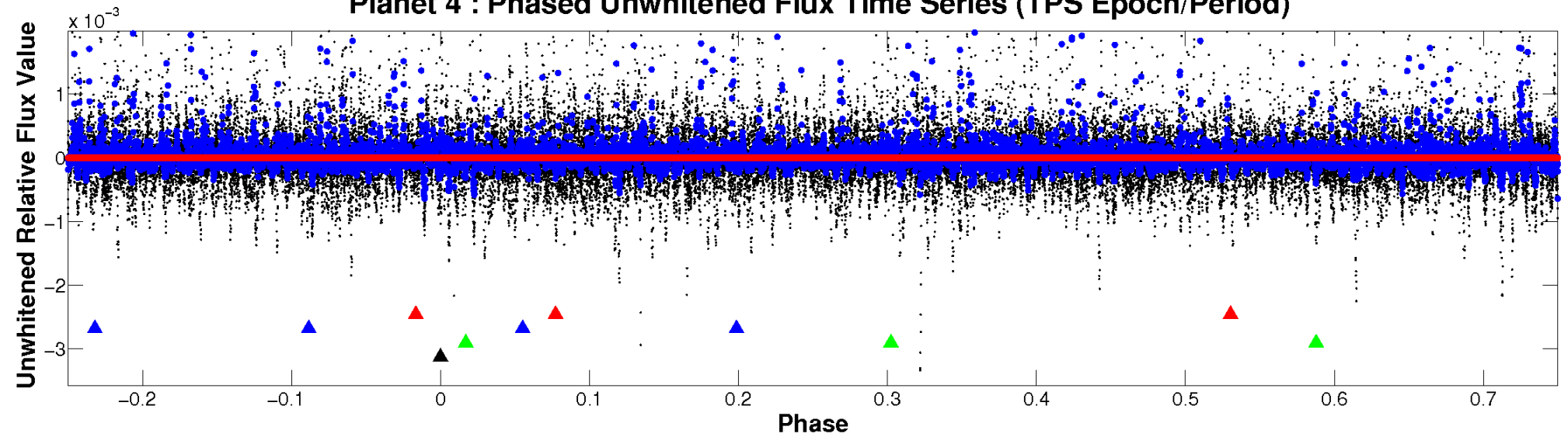
# ALT Odd/Even

TCE 009048949-04

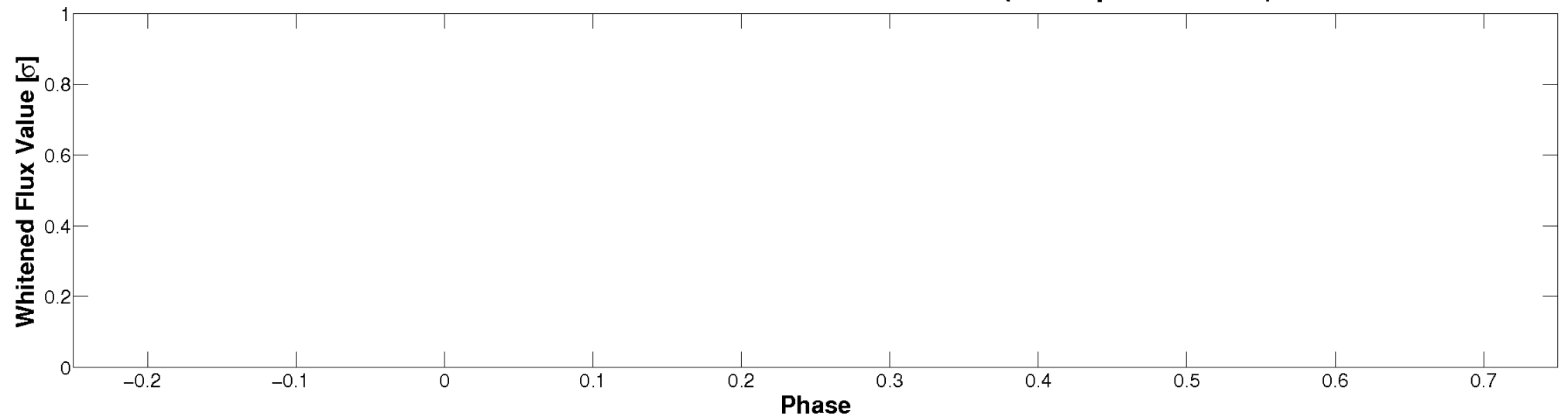


# Non-Whitened Vs. Whitened Light Curve

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

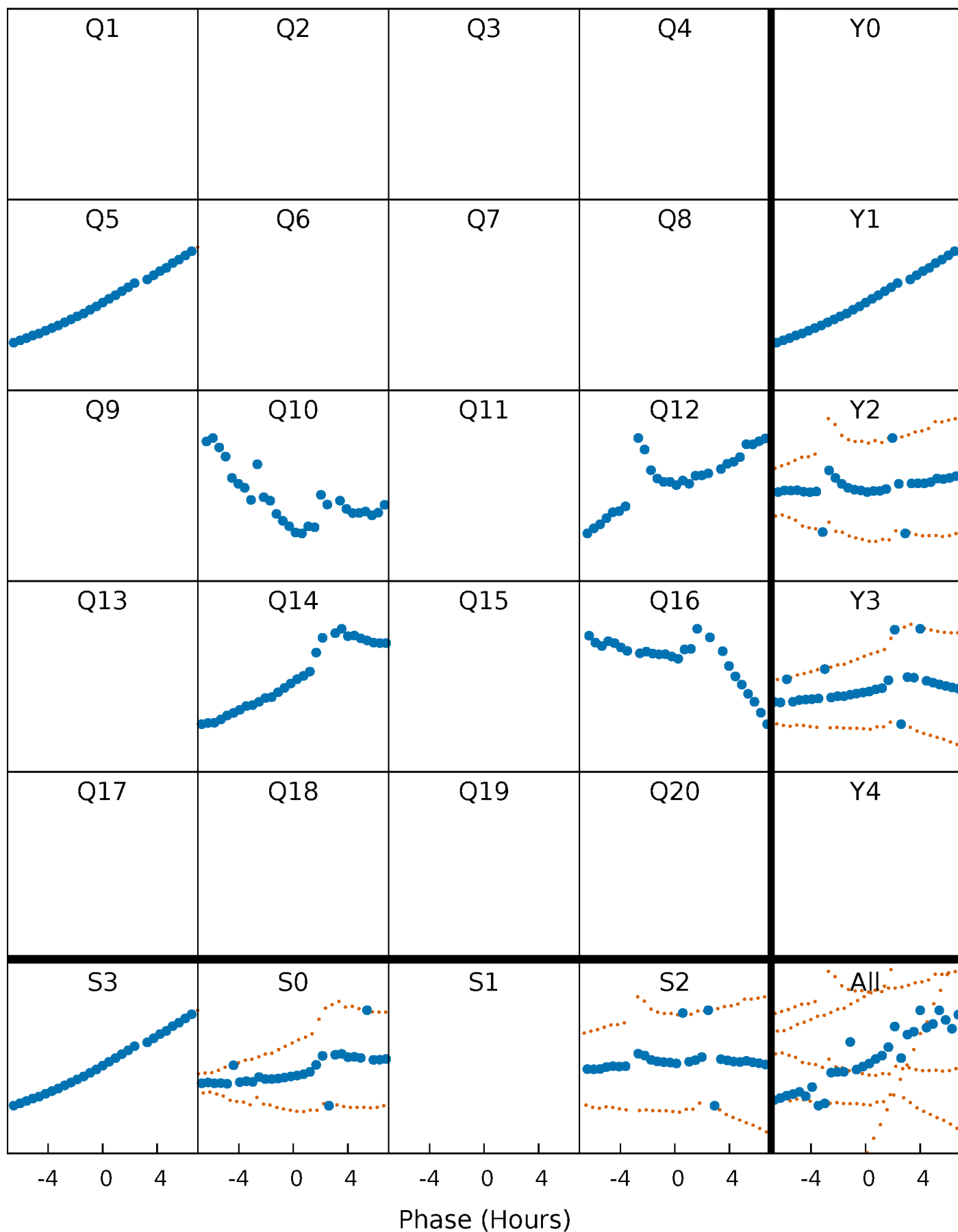


**Planet 4 : Phased Whitened Flux Time Series (TPS Epoch/Period)**



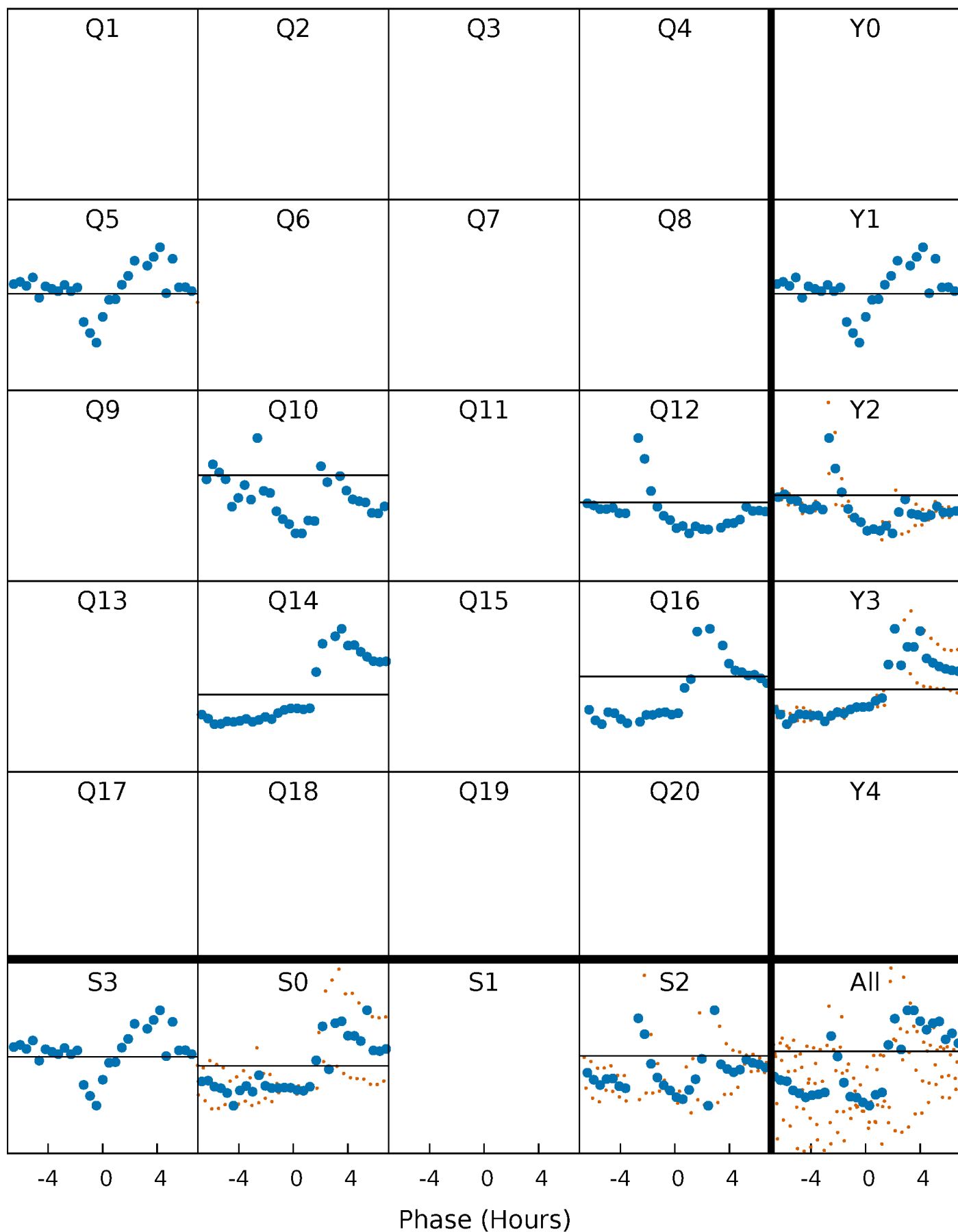
# PDC Quarter-Phased Transit Curves

TCE 009048949-04 P=203.986021 Days  $T_0=322.053941$  (BKJD)



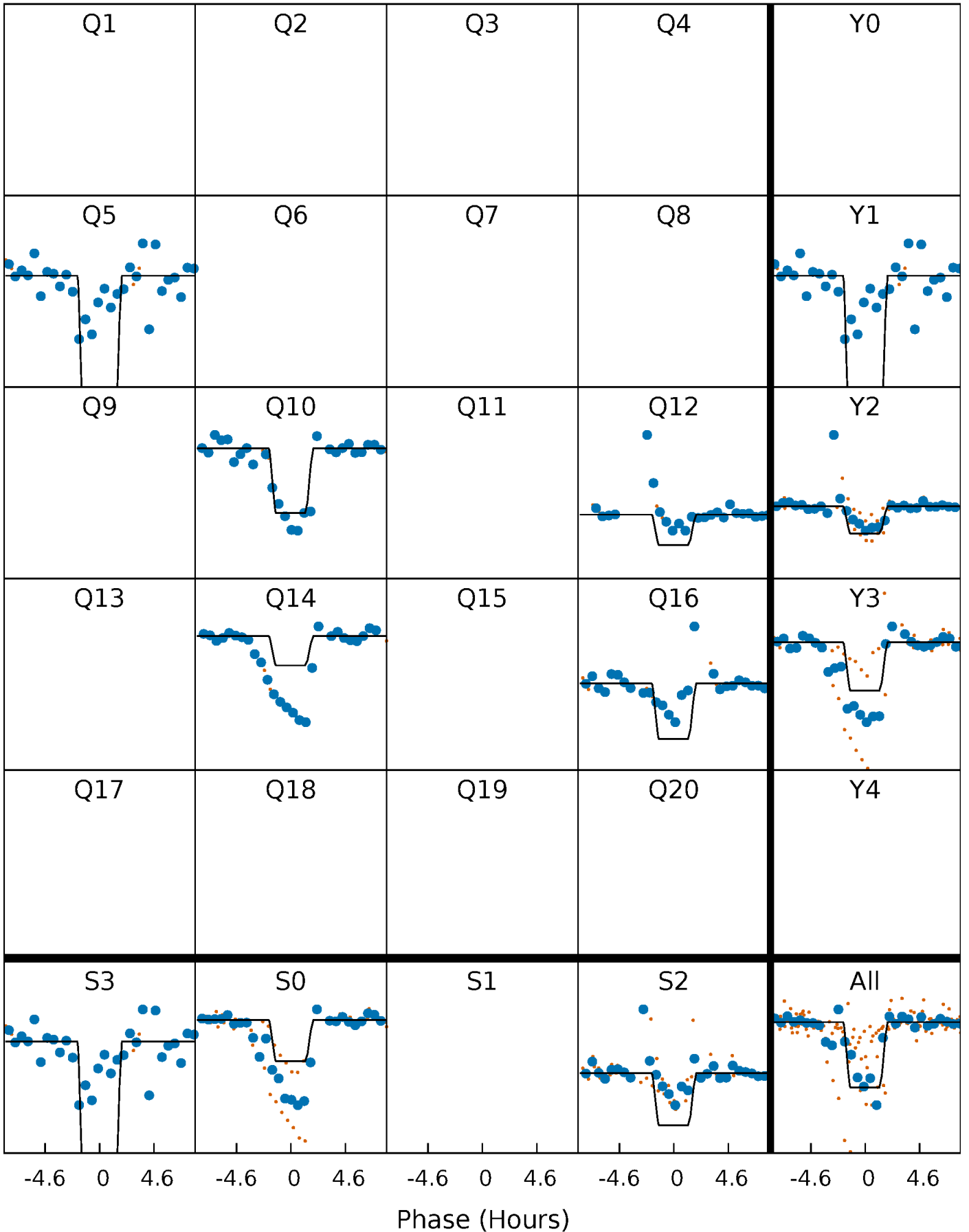
# DV Quarter-Phased Transit Curves

TCE 009048949-04 P=203.986021 Days  $T_0=322.053941$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

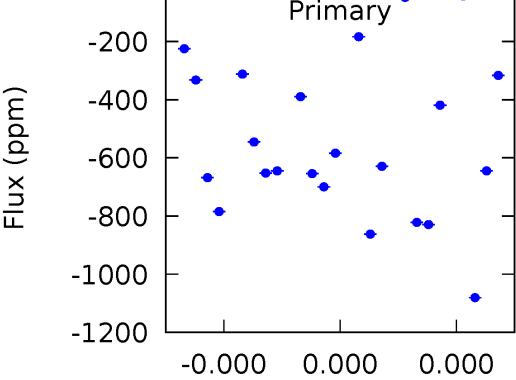
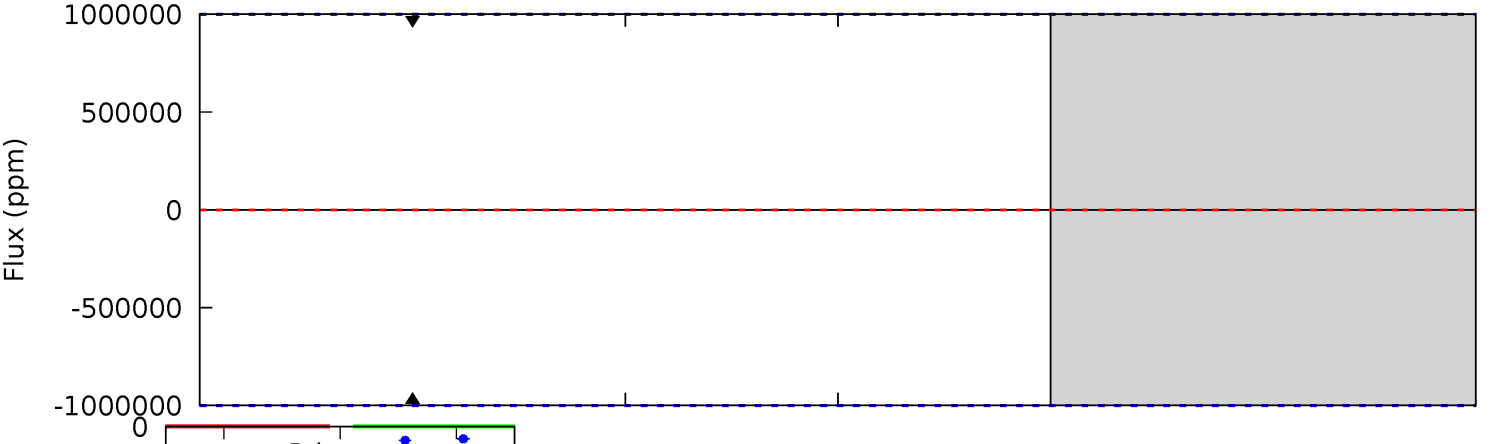
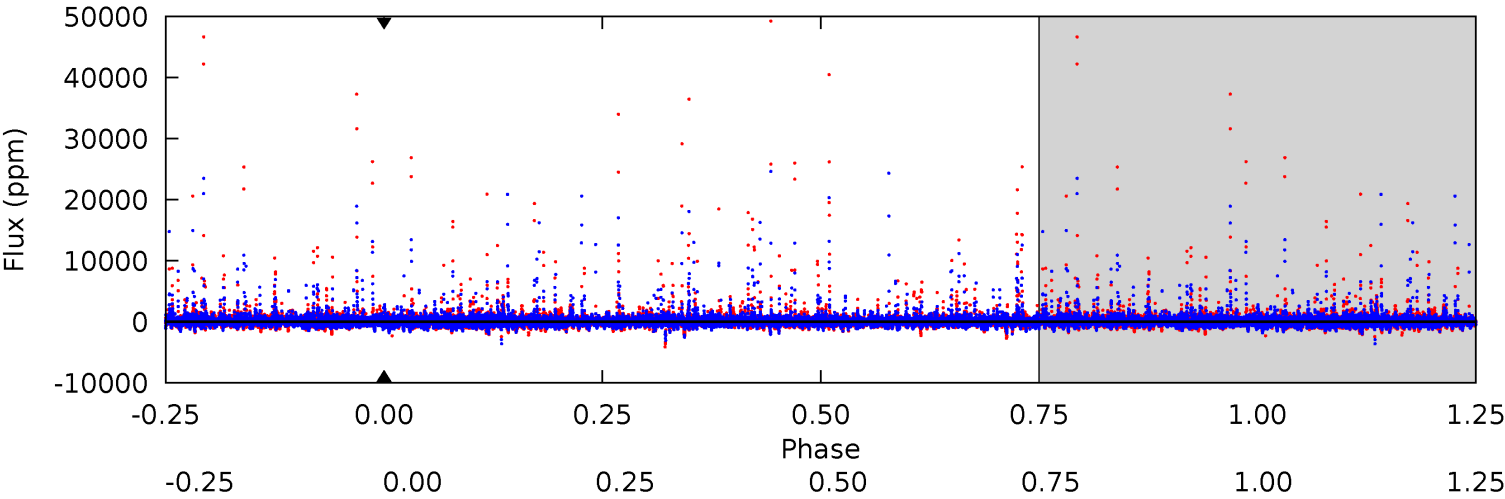
TCE 009048949-04 P=203.986021 Days  $T_0=322.061592$  (BKJD)



# DV Model-Shift Uniqueness Test

009048949-04, P = 203.986021 Days, E = 118.067920 Days

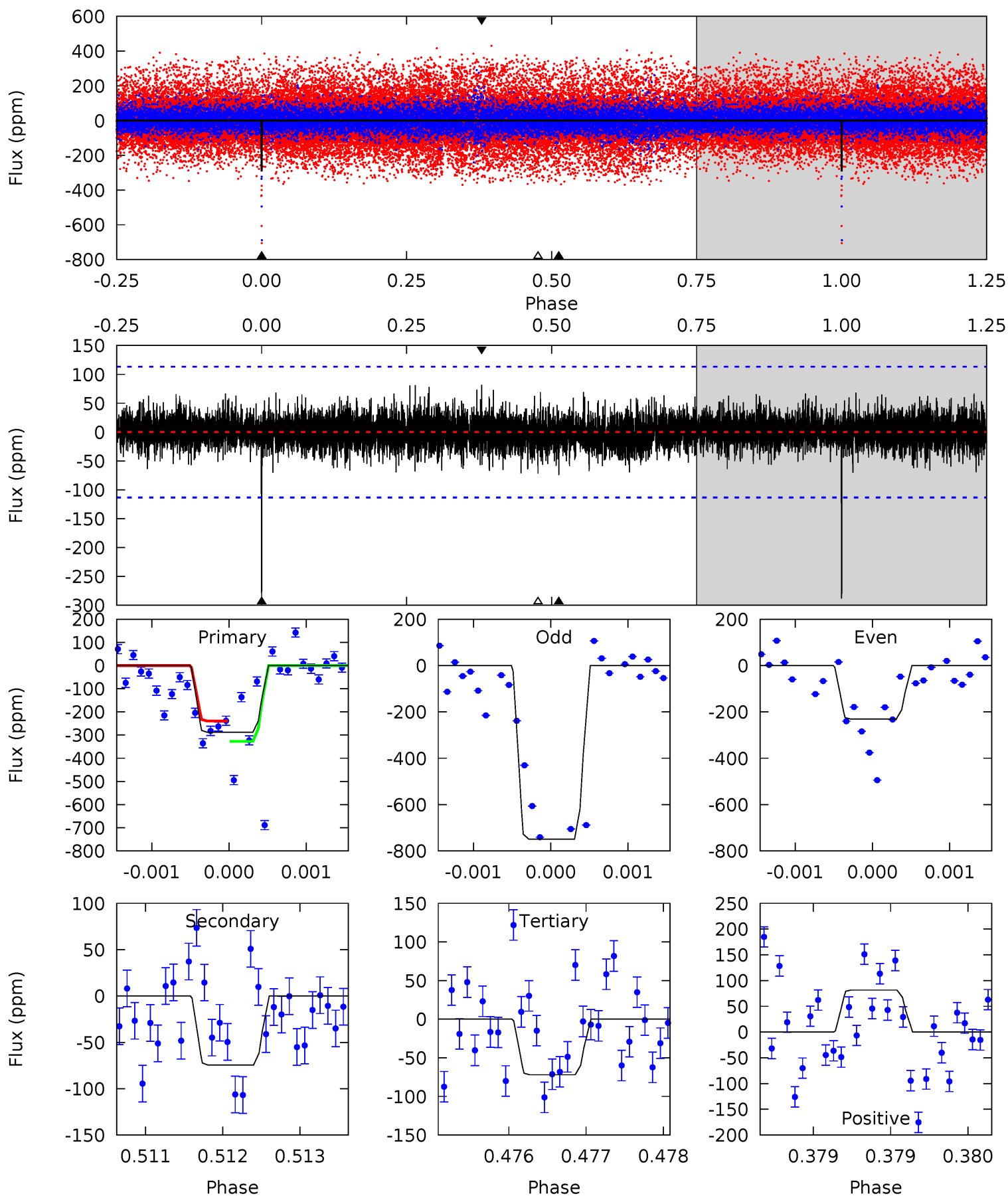
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



# Alt Model-Shift Uniqueness Test

009048949-04, P = 203.986021 Days, E = 118.075571 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
14.0	3.61	3.49	3.96	5.50	3.37	0.94	10.5	10.0	0.12	-0.35	11.9	2.73	0.22	2.06



### Stellar Parameters For KIC 009048949

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (g \cdot \text{cm}^{-3})$
	$5190^{+169}_{-154}$	$4.493^{+0.105}_{-0.095}$	$-0.120^{+0.300}_{-0.300}$	$0.821^{+0.104}_{-0.094}$	$0.766^{+0.107}_{-0.058}$	$1.946^{+0.777}_{-0.557}$
	+3%/-3%	+2%/-2%	+250%/-250%	+13%/-11%	+14%/-8%	+40%/-29%
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 009048949-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$0 \pm 1000000$	$6.07^{+7.10}_{-4.26}$	$368^{+17}_{-17}$	$3964^{+14614}_{-21261}$	$7244^{+1246135}_{-1058174}$
Alt.	$-74 \pm 21$	$7.28^{+7.33}_{-5.22}$	$368^{+17}_{-18}$	$2524^{+1043}_{-383}$	$312^{+3437}_{-239}$

$T_{max}$  = 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

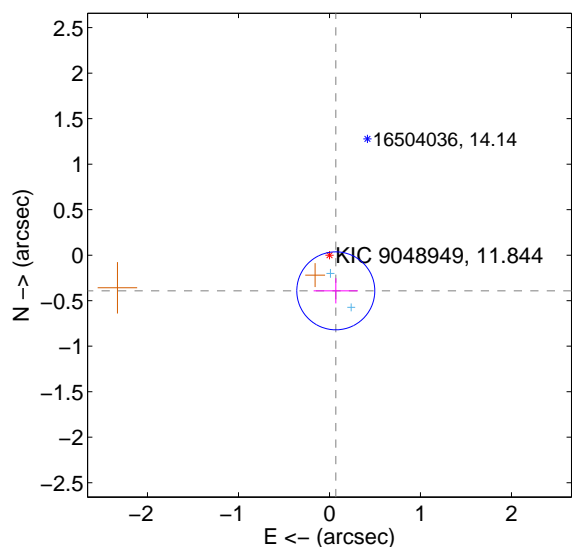
Supplemental centroid analysis for 009048949-04. **Kepler magnitude: 11.84.** Transit SNR -1.00

**There are 2 quarters with good PRF difference image offsets**

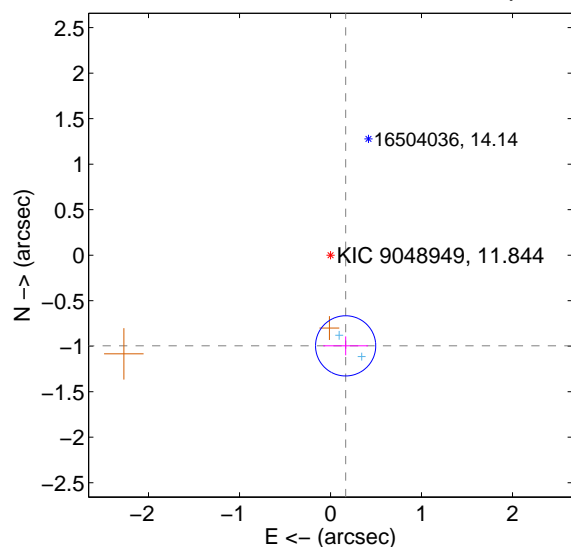
The direct PRF centroid is offset from the target star catalog position by about 0.60 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.398 \pm 0.143$	2.79	$-0.069 \pm 0.243$	$-0.392 \pm 0.138$
PRF-fit source offset from KIC position	<b><math>1.010 \pm 0.110</math></b>	<b>9.16</b>	$-0.166 \pm 0.246$	$-0.996 \pm 0.104$
photometric centroid source offset	$0.60 \pm 0.54$	1.13	$-0.40 \pm 0.51$	$-0.46 \pm 0.56$

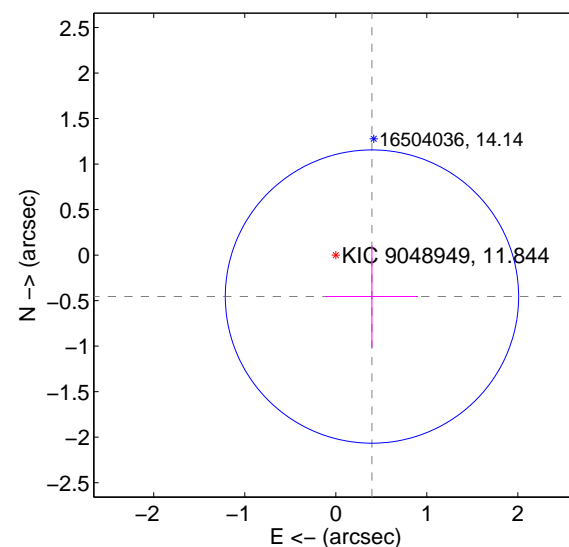
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

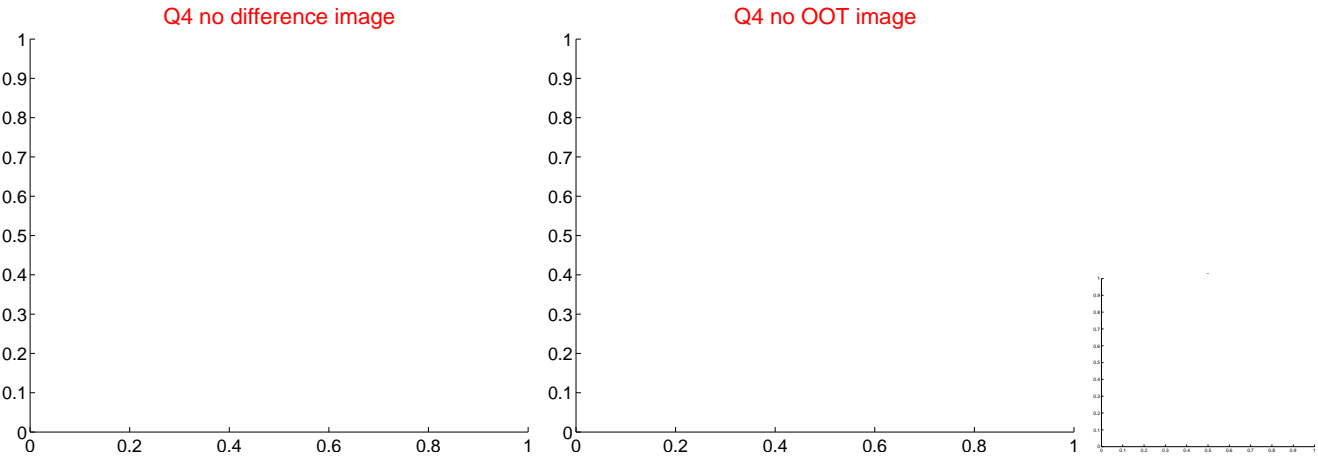
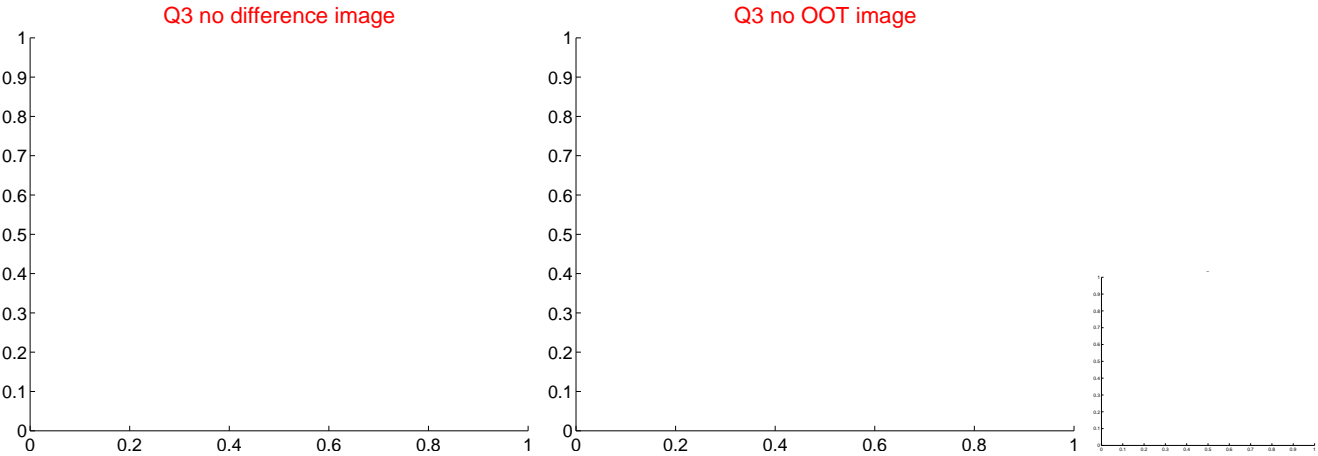
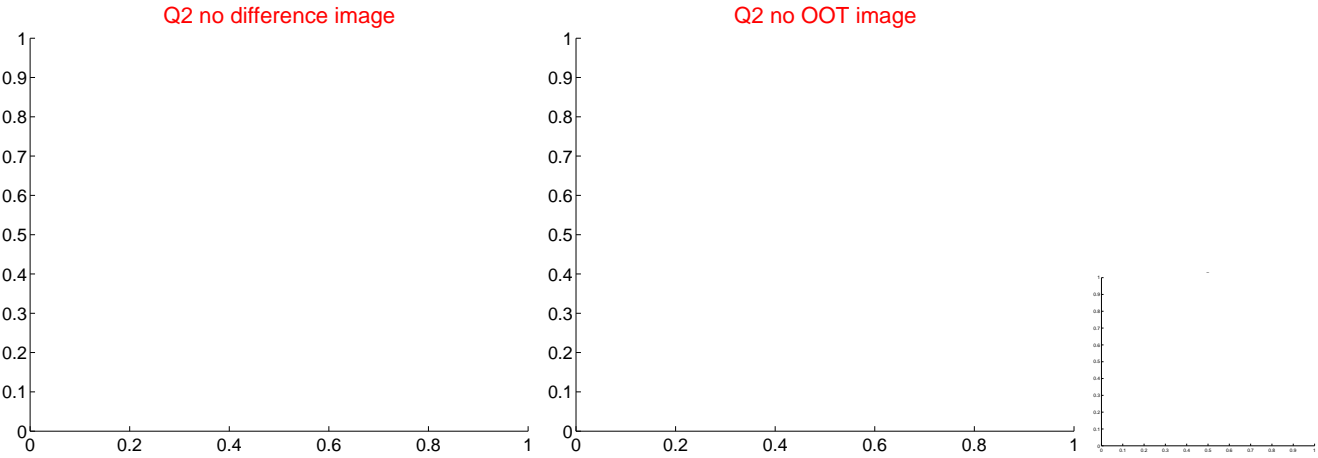
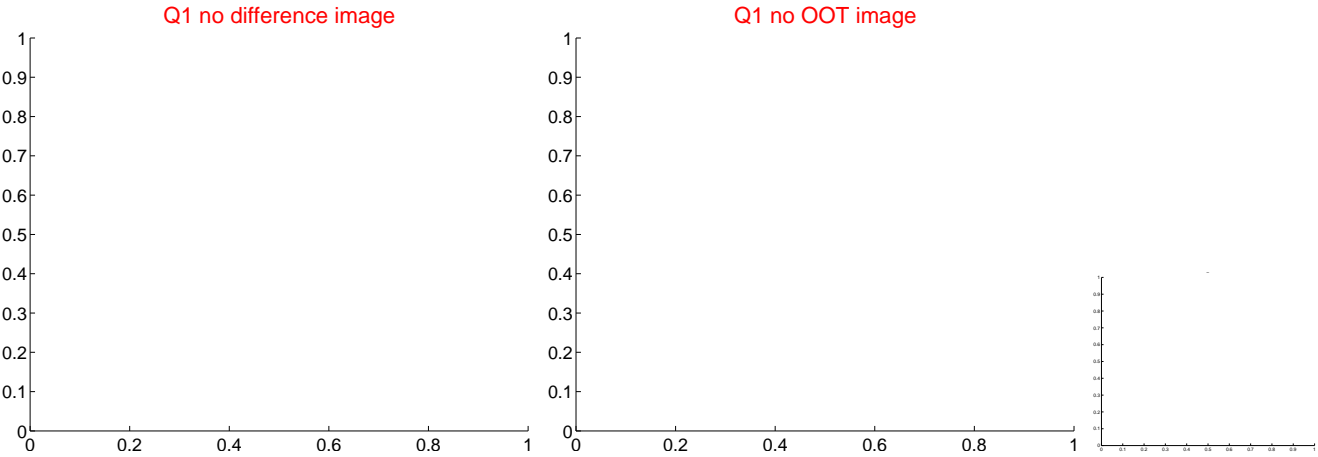


offset from photometric centroids

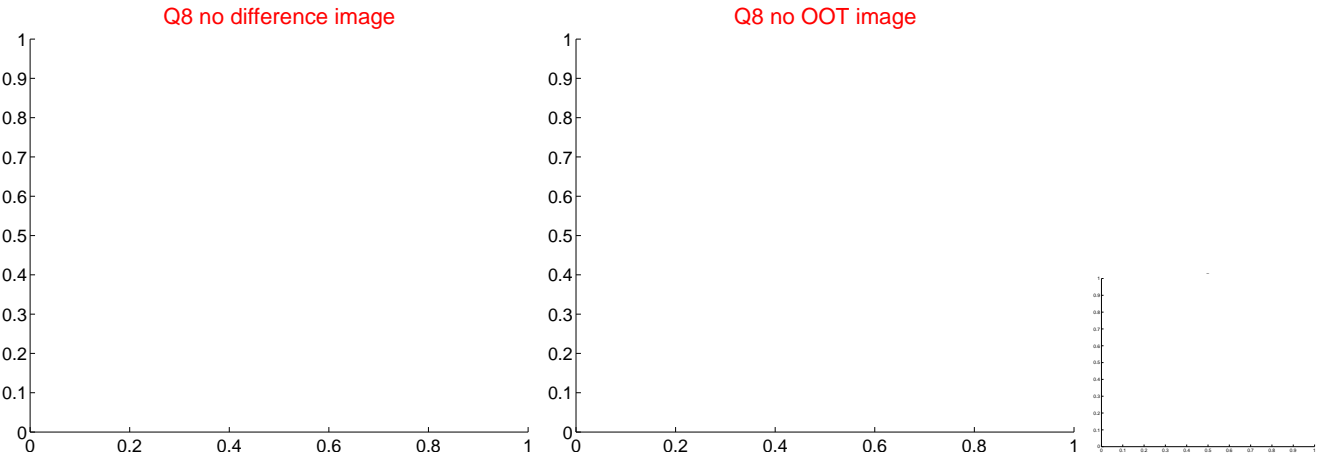
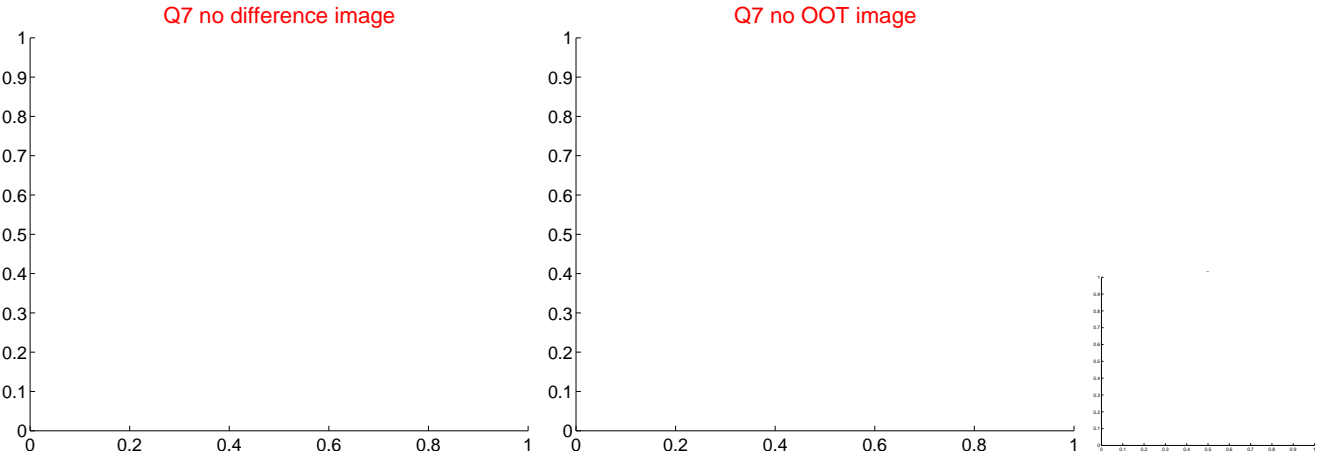
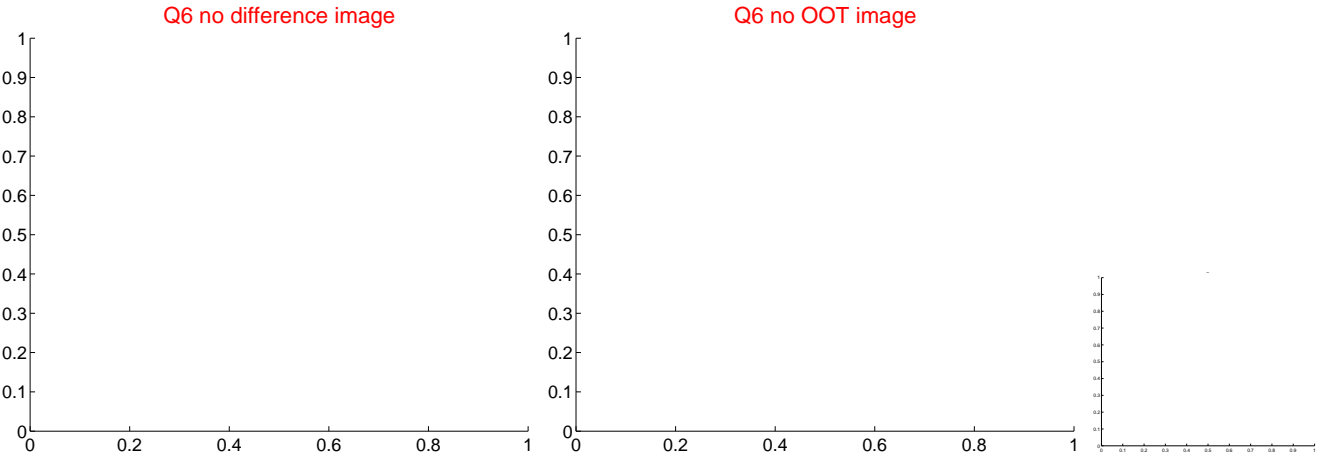
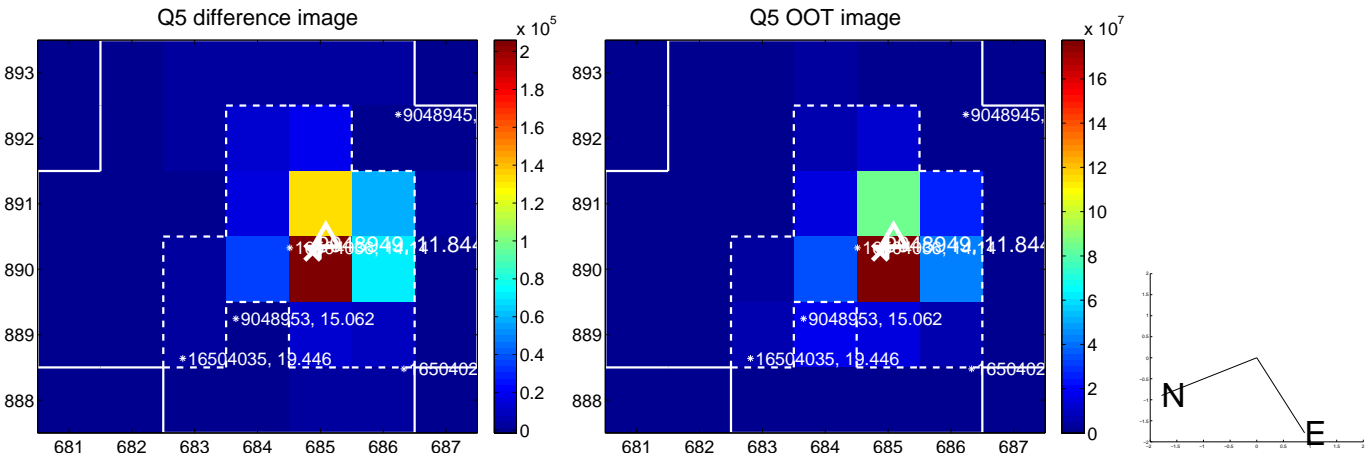


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

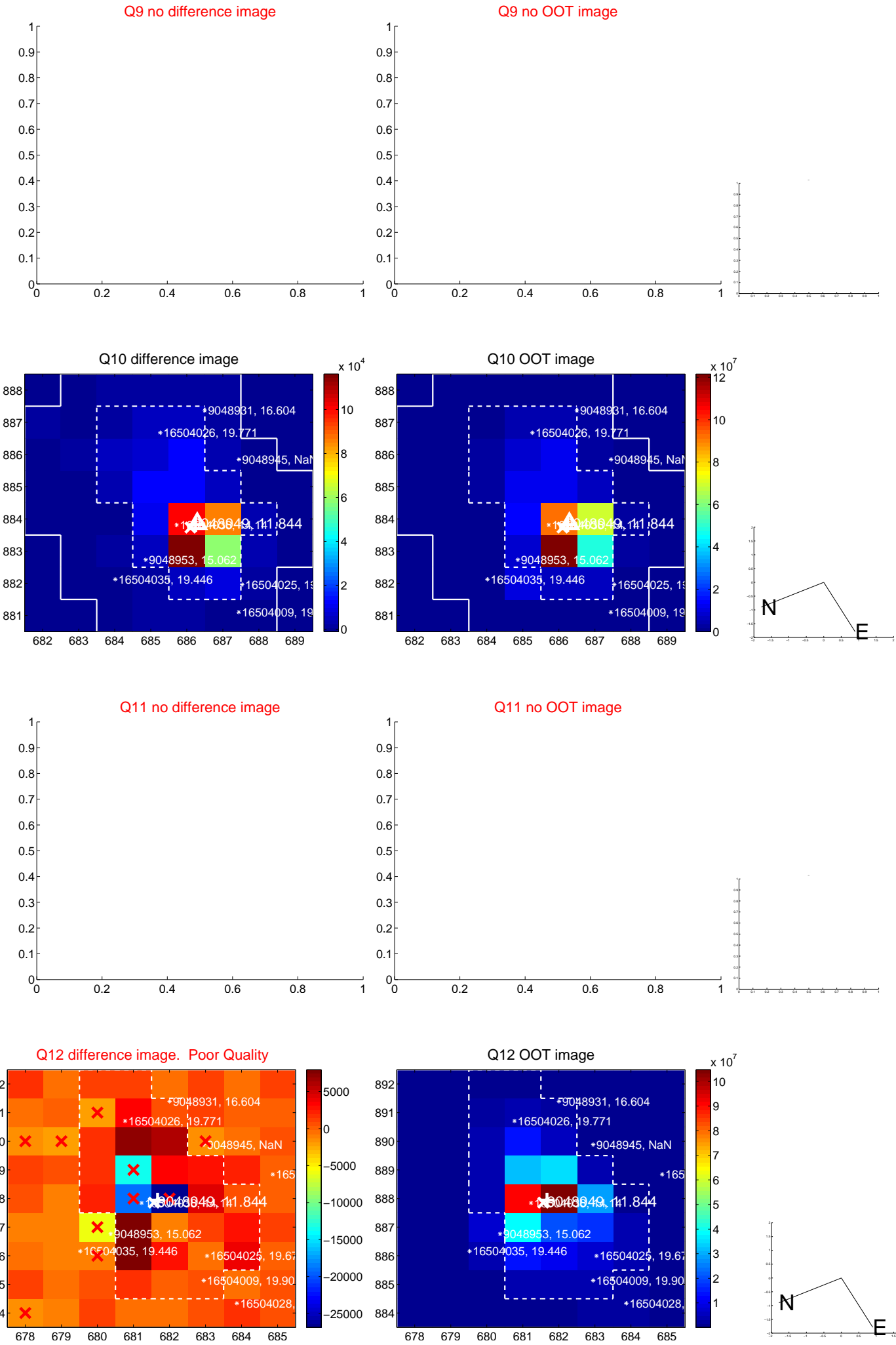
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

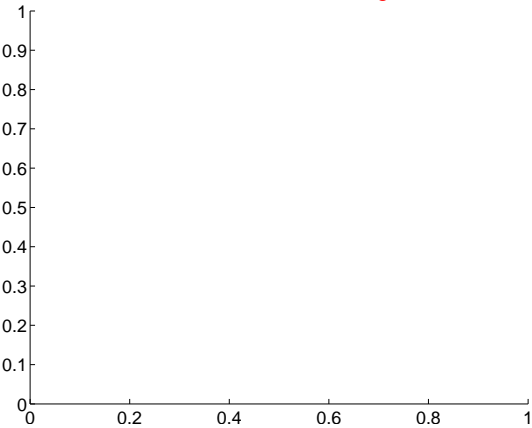


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

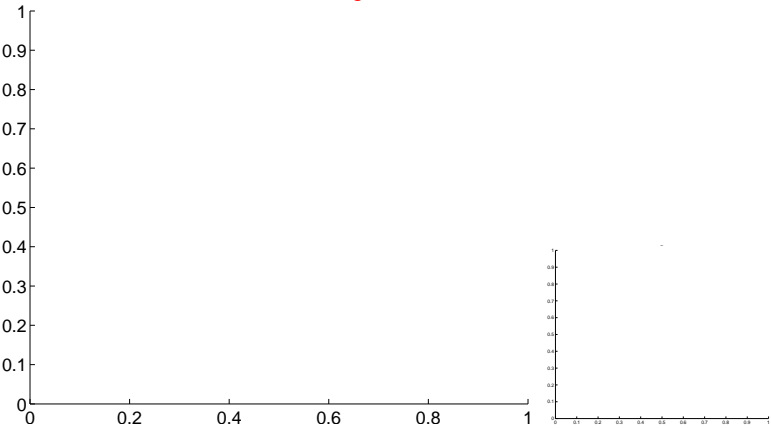


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

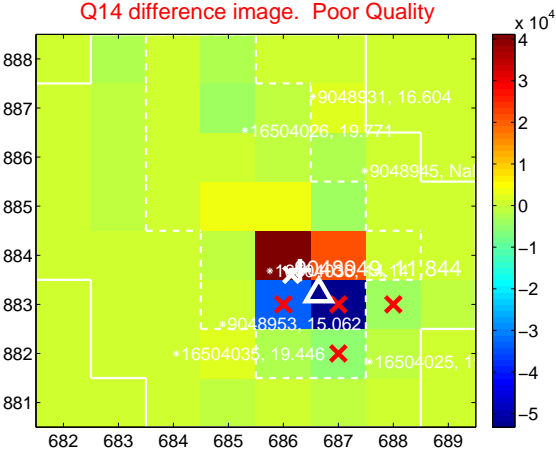
Q13 no difference image



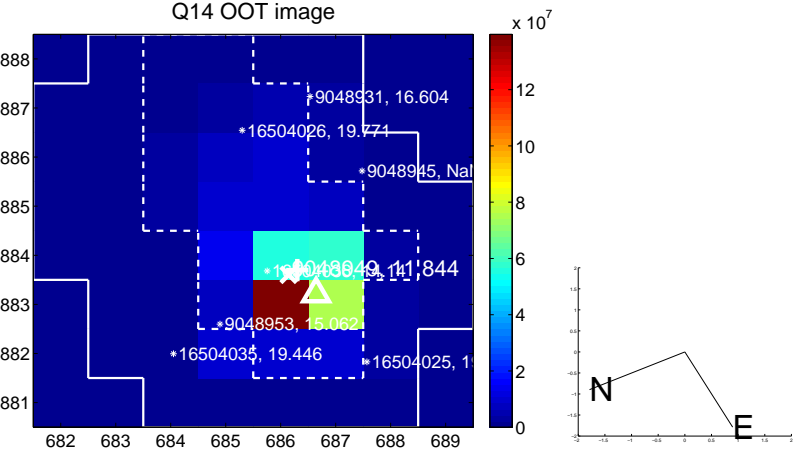
Q13 no OOT image



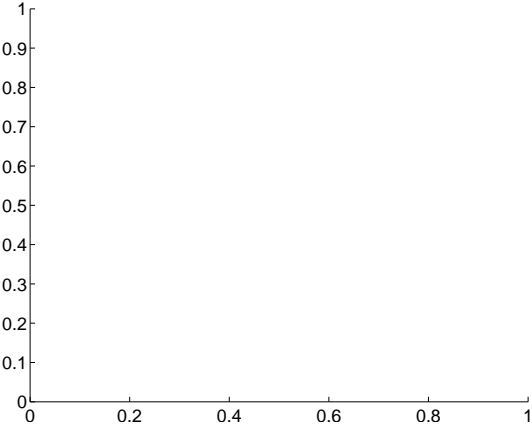
Q14 difference image. Poor Quality



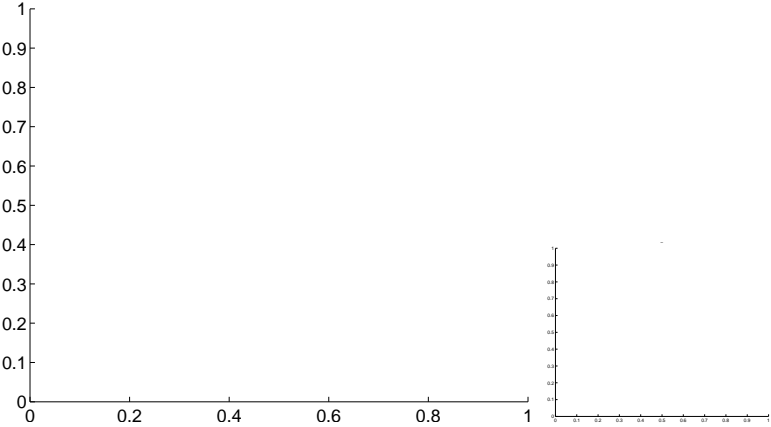
Q14 OOT image



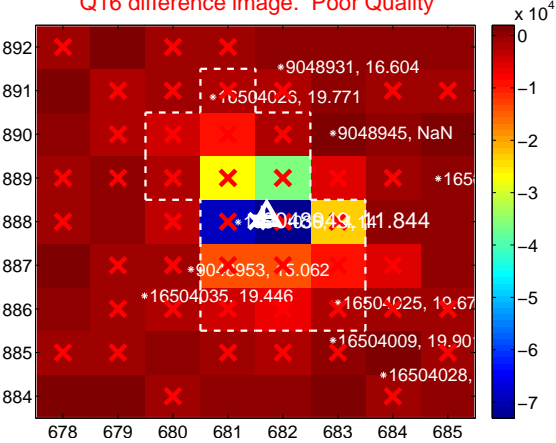
Q15 no difference image



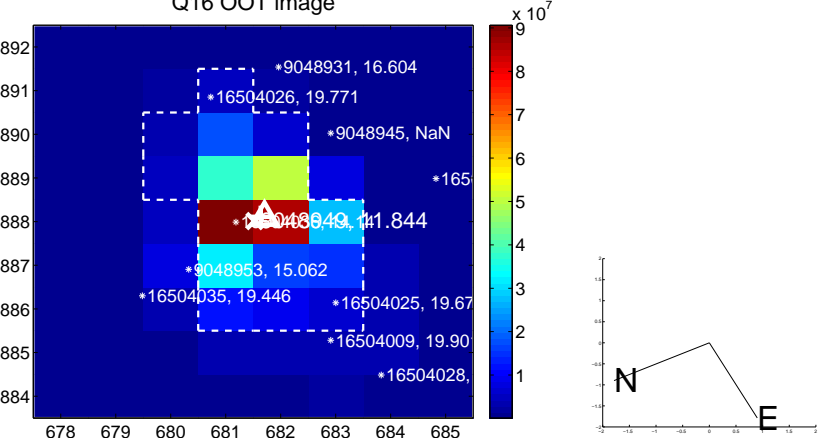
Q15 no OOT image



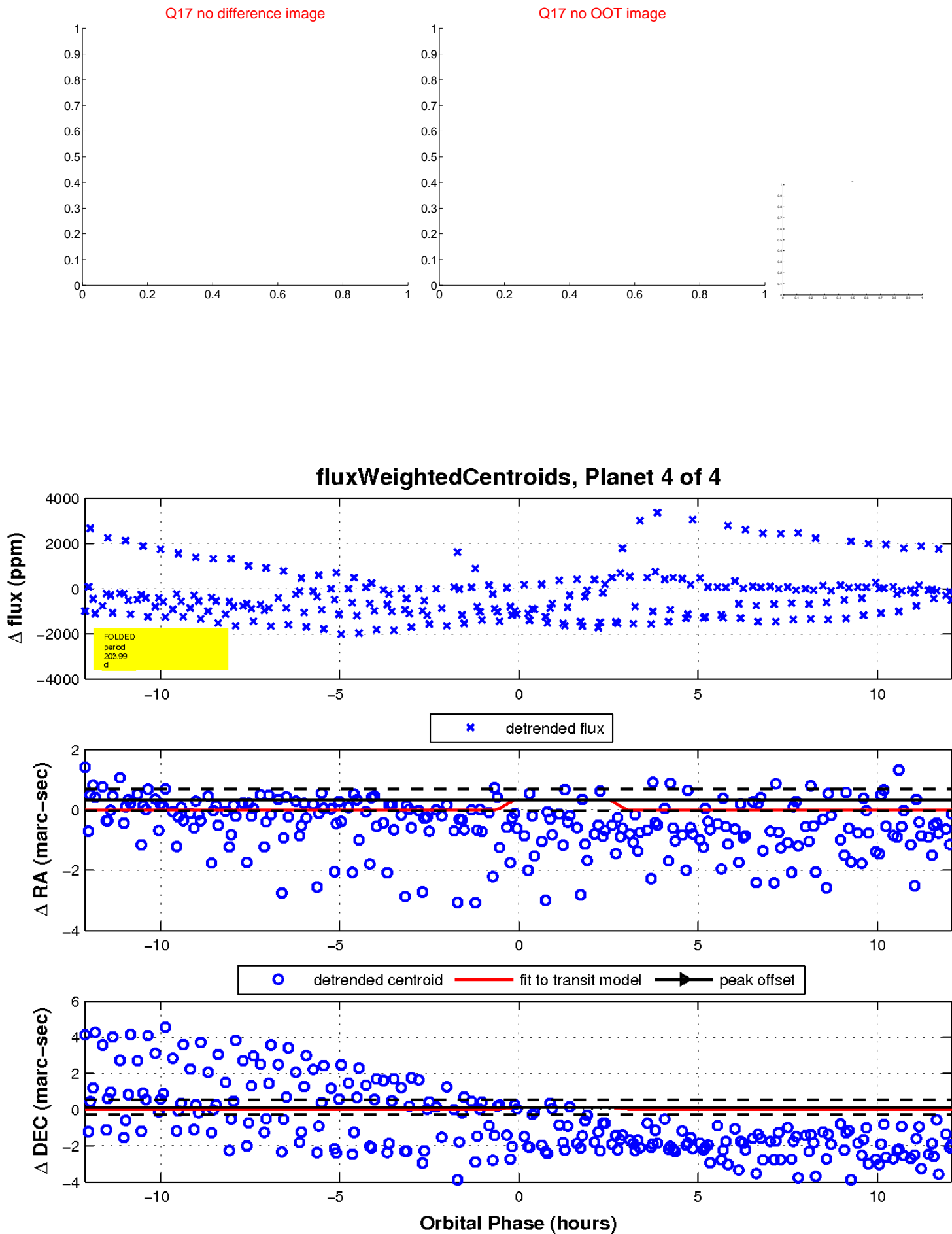
Q16 difference image. Poor Quality



Q16 OOT image



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



UKIRT Image

Declination

