

# KIC 009479539

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009479539-01	OBS	No	162.639005	244.790255	5258.5	2.456	15.0	10.6	0.25	3315	1.81	0.05
009479539-02	OBS	No	246.799853	219.538476	3329.3	7.747	13.3	6.0	0.25	3315	1.43	0.03
009479539-03	OBS	No	237.343409	358.737781	4727.6	5.531	13.5	9.5	0.25	3315	2.18	0.03
009479539-04	OBS	No	1.853919	131.933167	10.4	17.403	12.4	0.3	0.25	3315	0.08	20.75

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009479539-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_ZUMA_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009479539-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—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
009479539-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT
009479539-04	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV

**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.

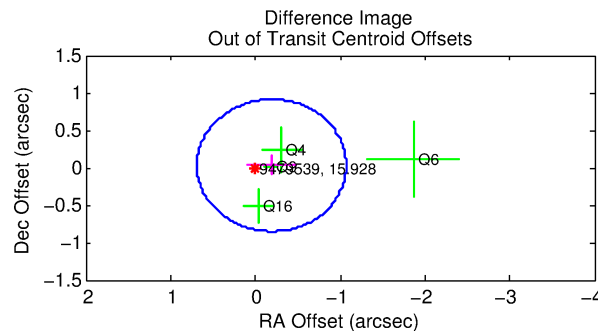
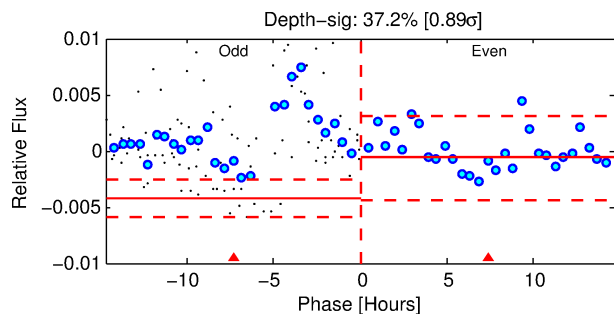
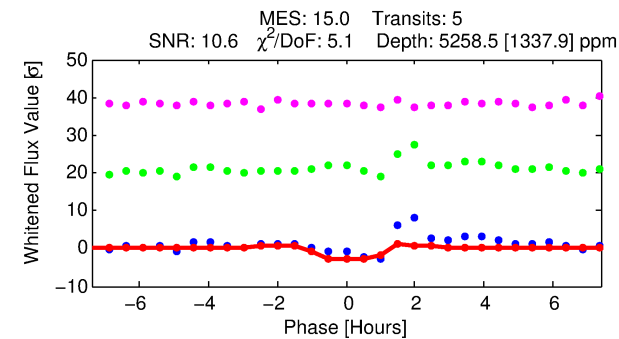
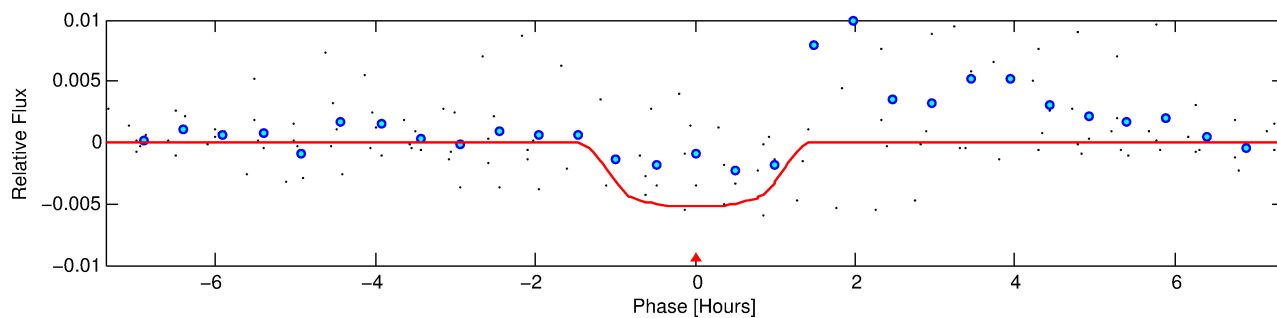
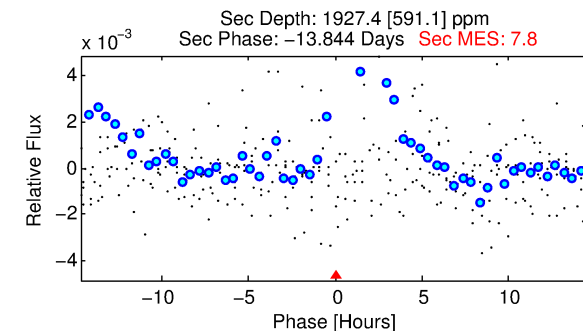
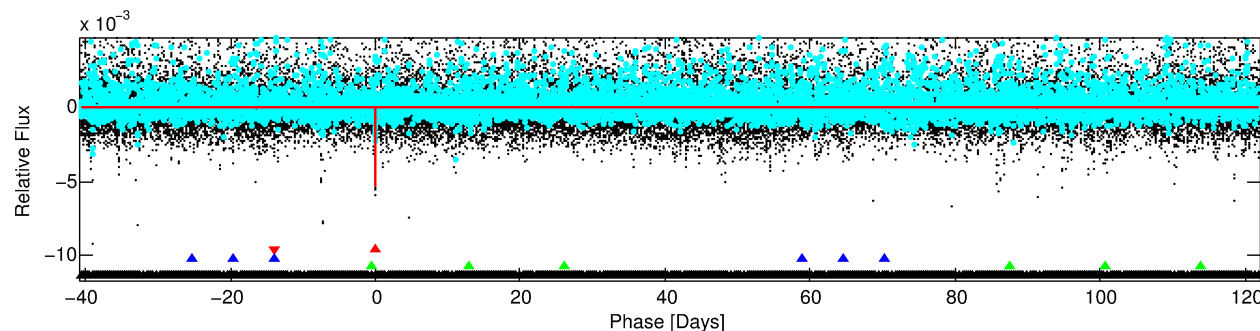
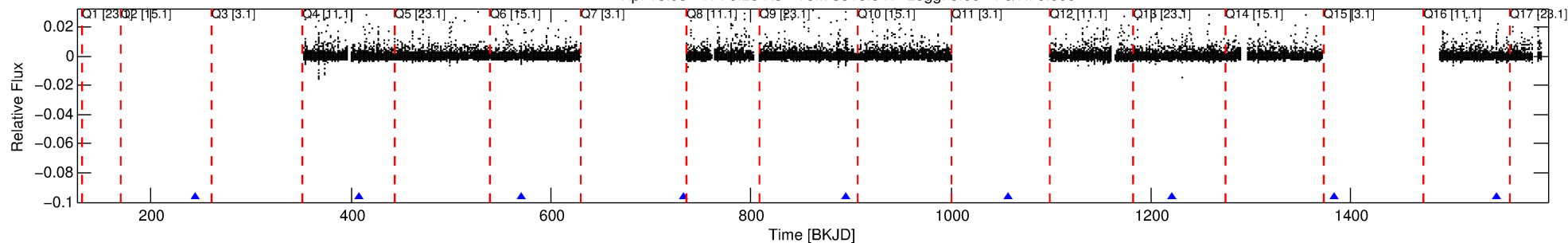
## Ephemeris Match Information For 009479539-01

No Significant Match Found

# DV One-Page Summary

KIC: 9479539 Candidate: 1 of 4 Period: 162.639 d

Kp: 15.93 R\*: 0.25 Rs Teff: 3315.0 K Logg: 5.00 Fe/H: 0.000



## DV Fit Results:

Period = 162.63900 [0.00205] d  
Epoch = 244.7903 [0.0124] BKJD  
Rp/R\* = 0.0657 [0.1239]  
a/R\* = 538.72 [4384.68]  
b = 0.04 [218.68]  
Seff = 0.05 [0.01]  
Teq = 122 [4] K  
Rp = 1.81 [3.42] Re  
a = 0.3593 [0.0354] AU  
Ag = 41987.63 [159065.72] [0.26σ]  
Teff = 2711 [2566] K [1.01σ]

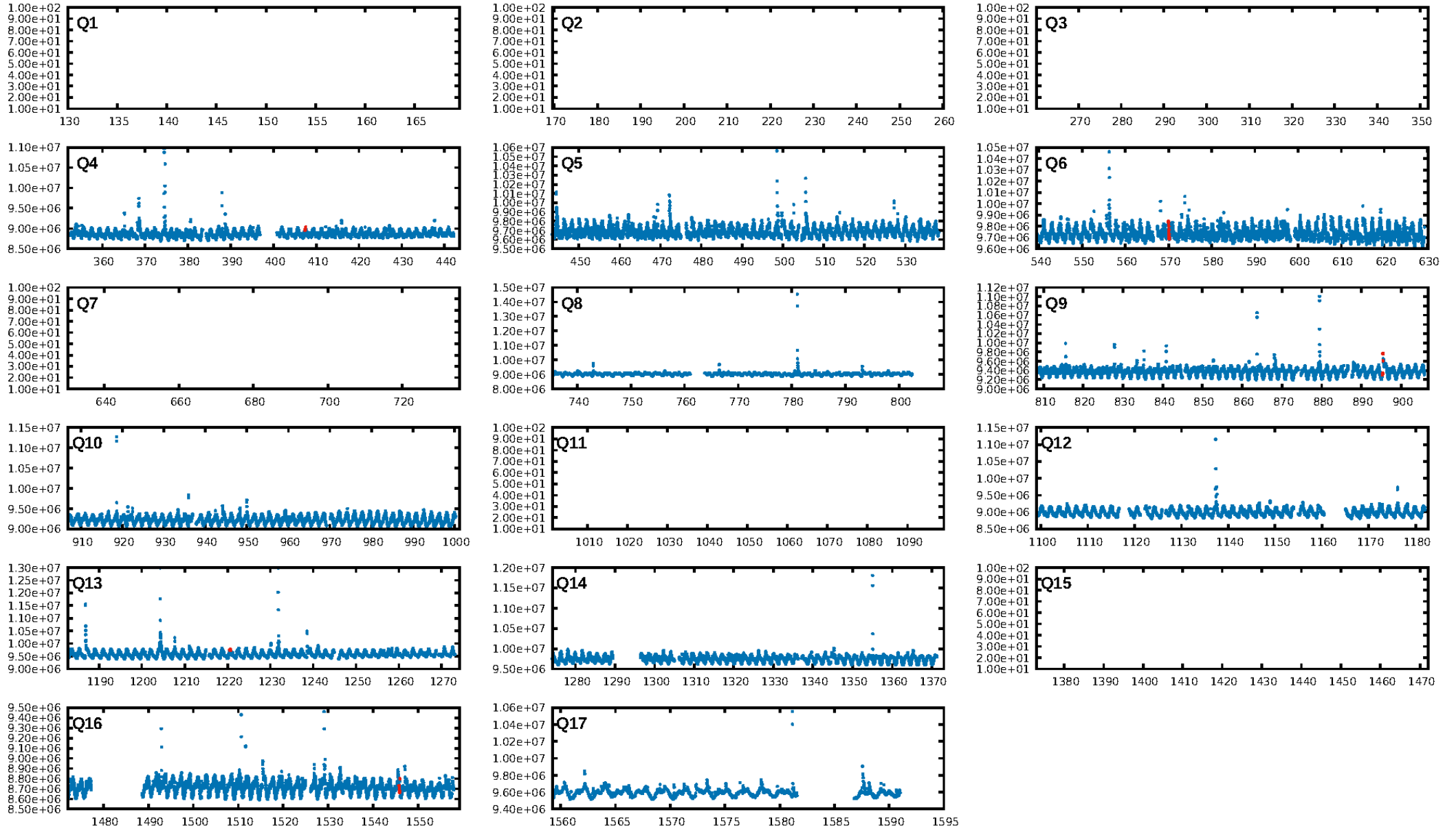
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [219.56σ]  
LongPeriod-sig: 100.0% [296.24σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 0.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: 6.75  
Centroid-sig: 78.4%  
Centroid-so: 0.382 arcsec [0.69σ]  
OotOffset-rm: 0.194 arcsec [0.66σ]  
KicOffset-st: 1/0/2/1 [4]  
KicOffset-st: 1/0/2/1 [4]  
DiffImageQuality-fgm: 0.75 [3/4]  
DiffImageOverlap-fno: 0.25 [1/4]

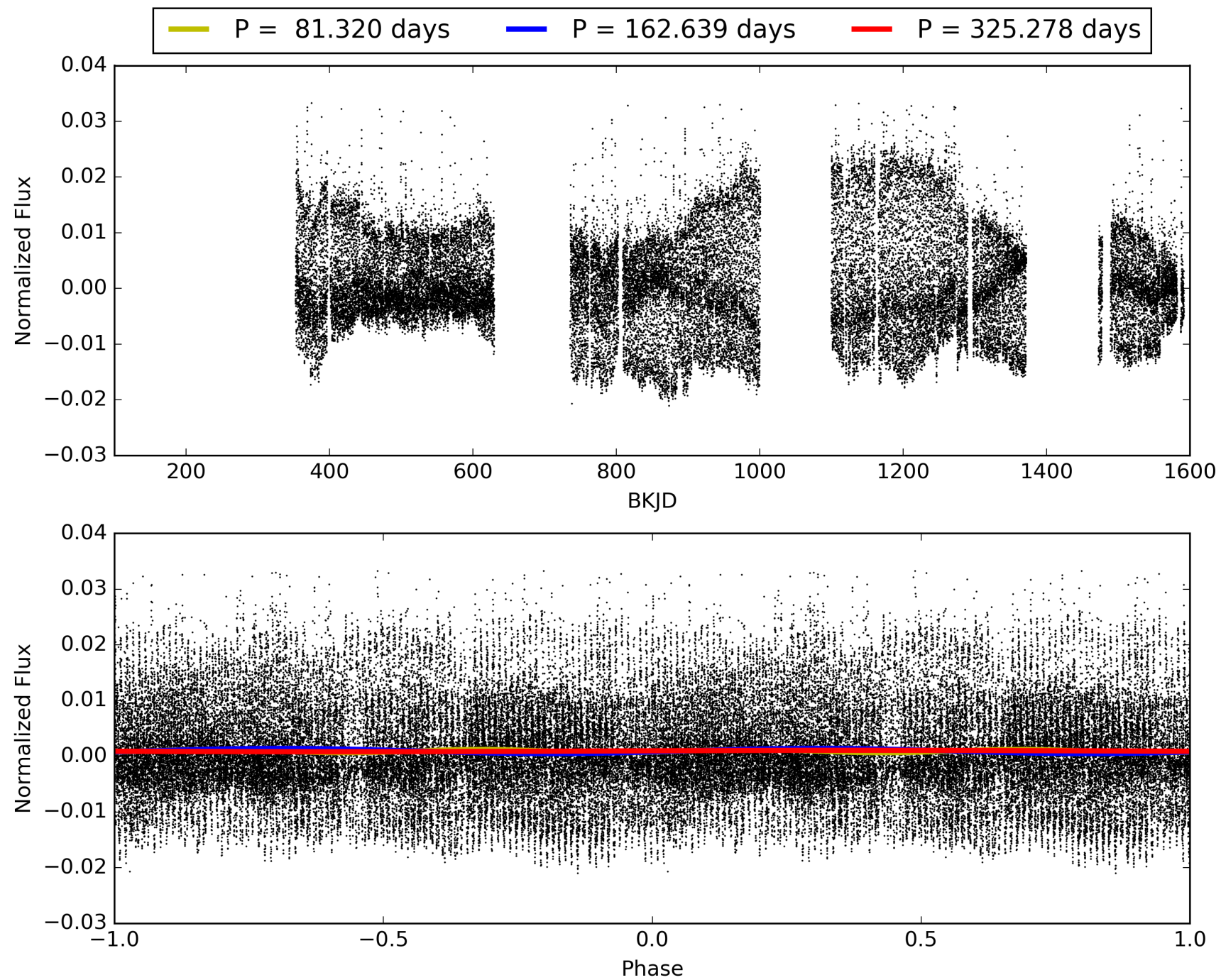
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 10:44:26 Z

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

# TCE 009479539-01, PDC Light Curves



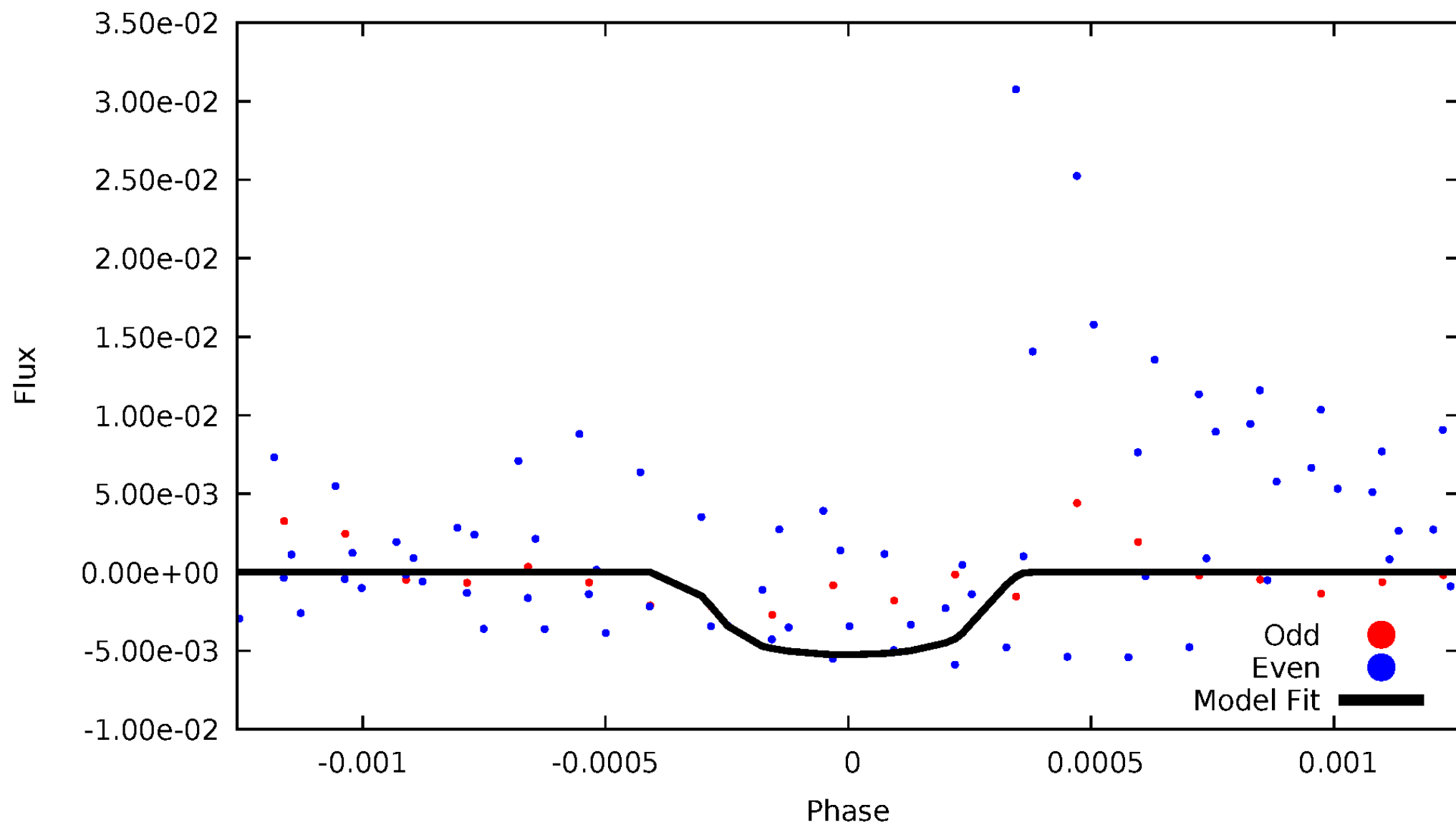
TCE 009479539-01





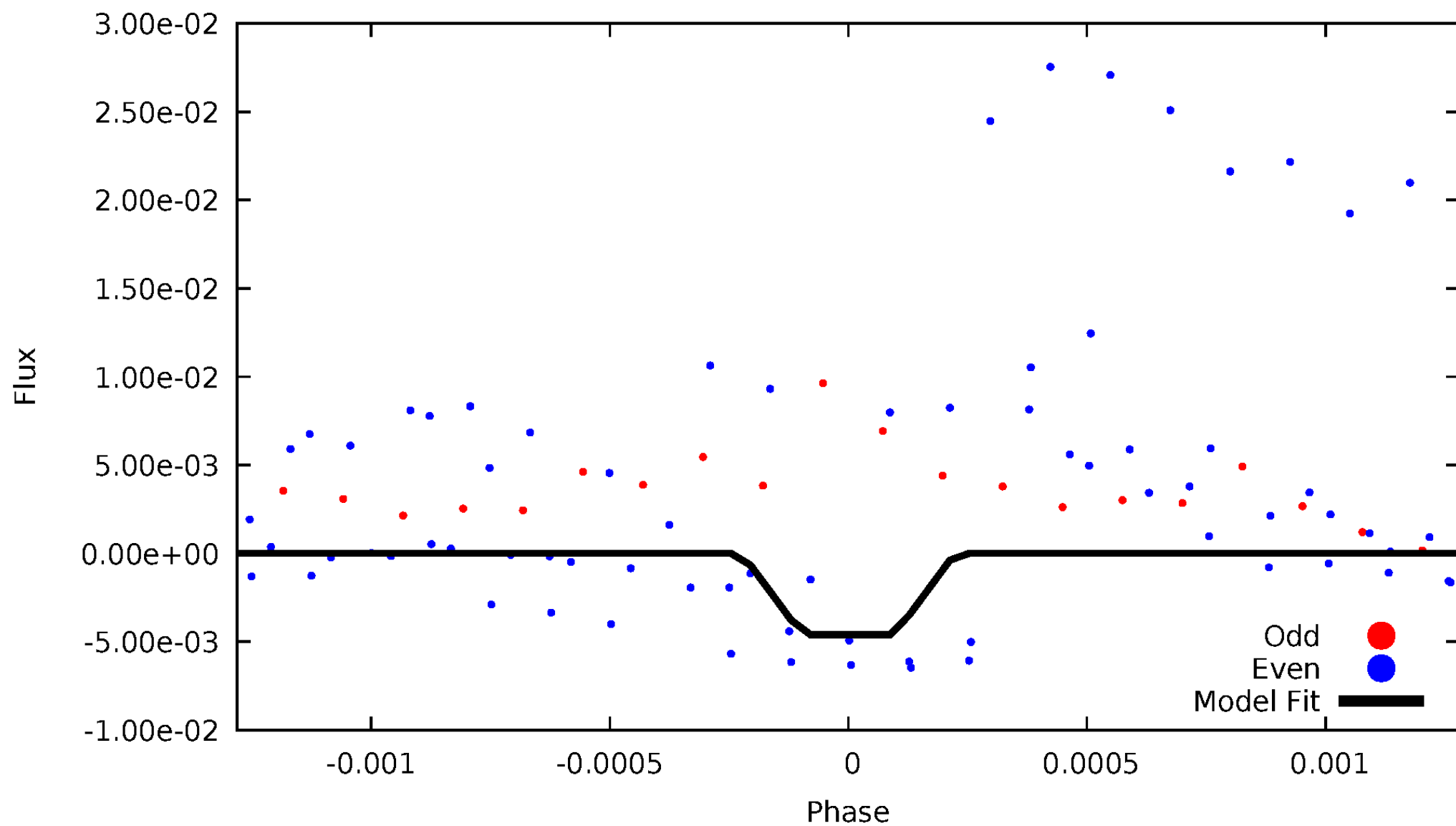
# DV Odd/Even

TCE 009479539-01



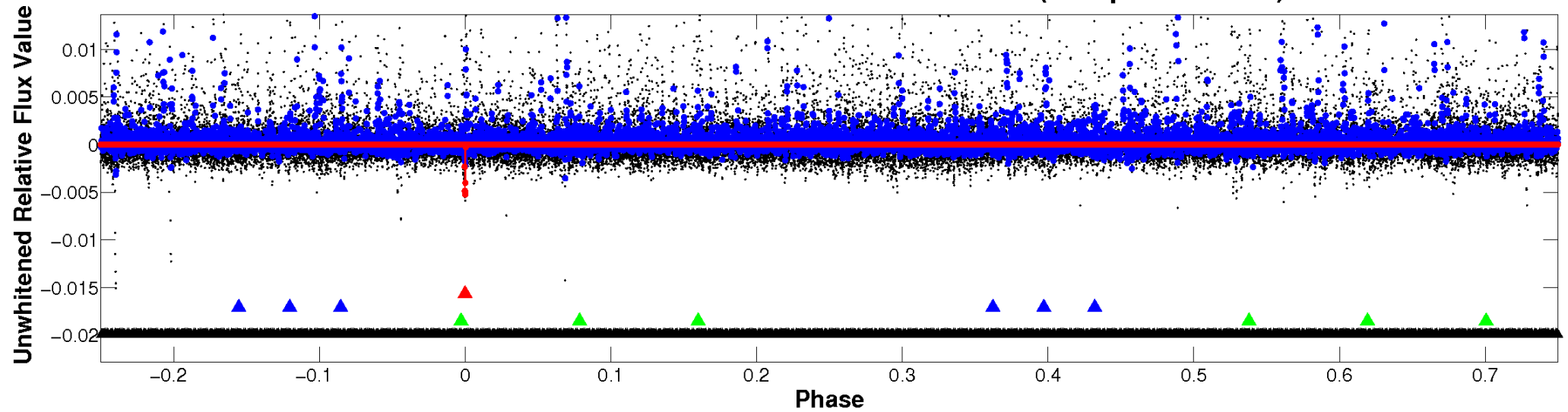
# ALT Odd/Even

TCE 009479539-01

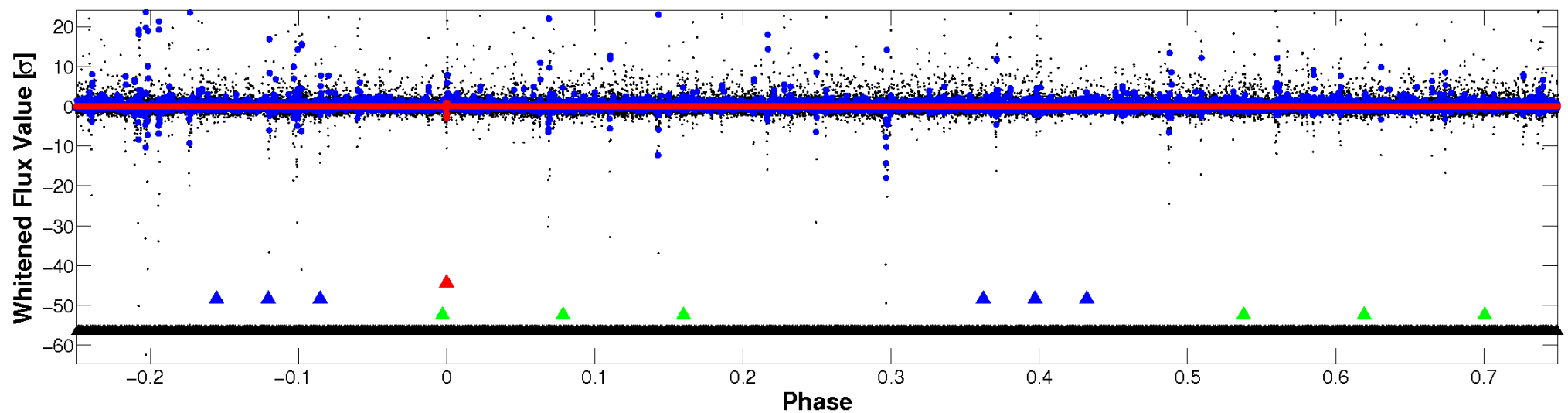


# Non-Whitened Vs. Whitened Light Curve

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

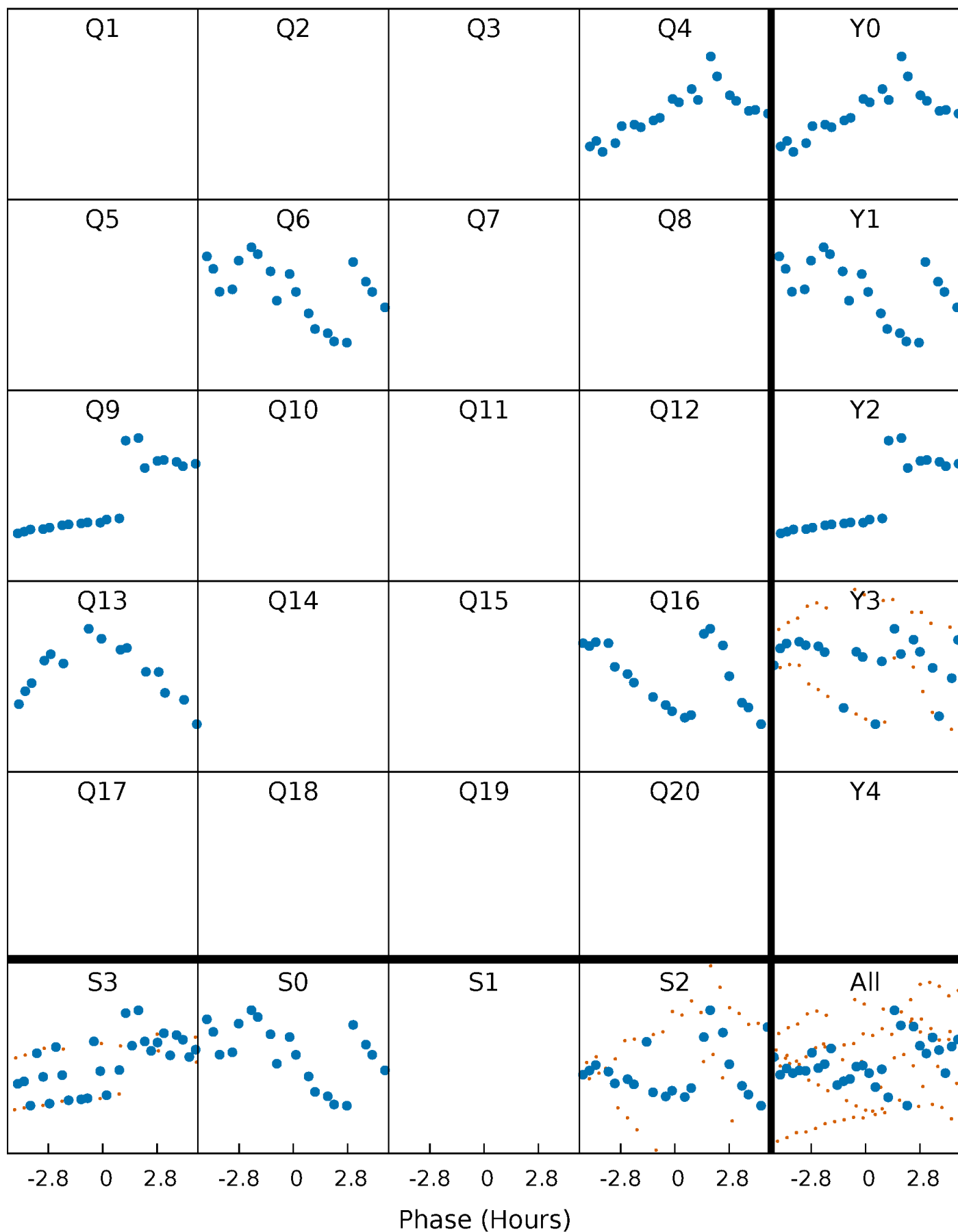


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



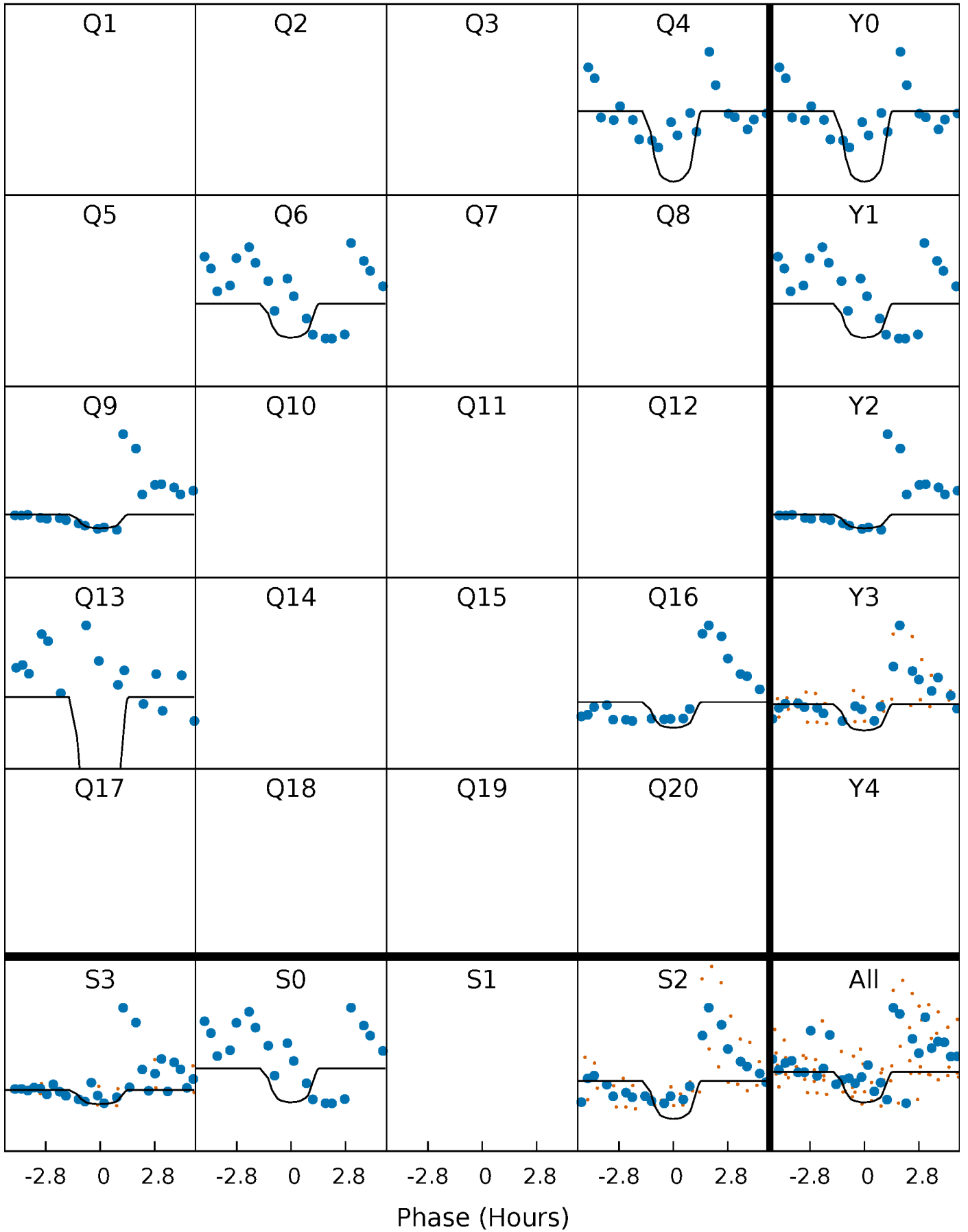
# PDC Quarter-Phased Transit Curves

TCE 009479539-01 P=162.639005 Days  $T_0=244.790255$  (BKJD)



# DV Quarter-Phased Transit Curves

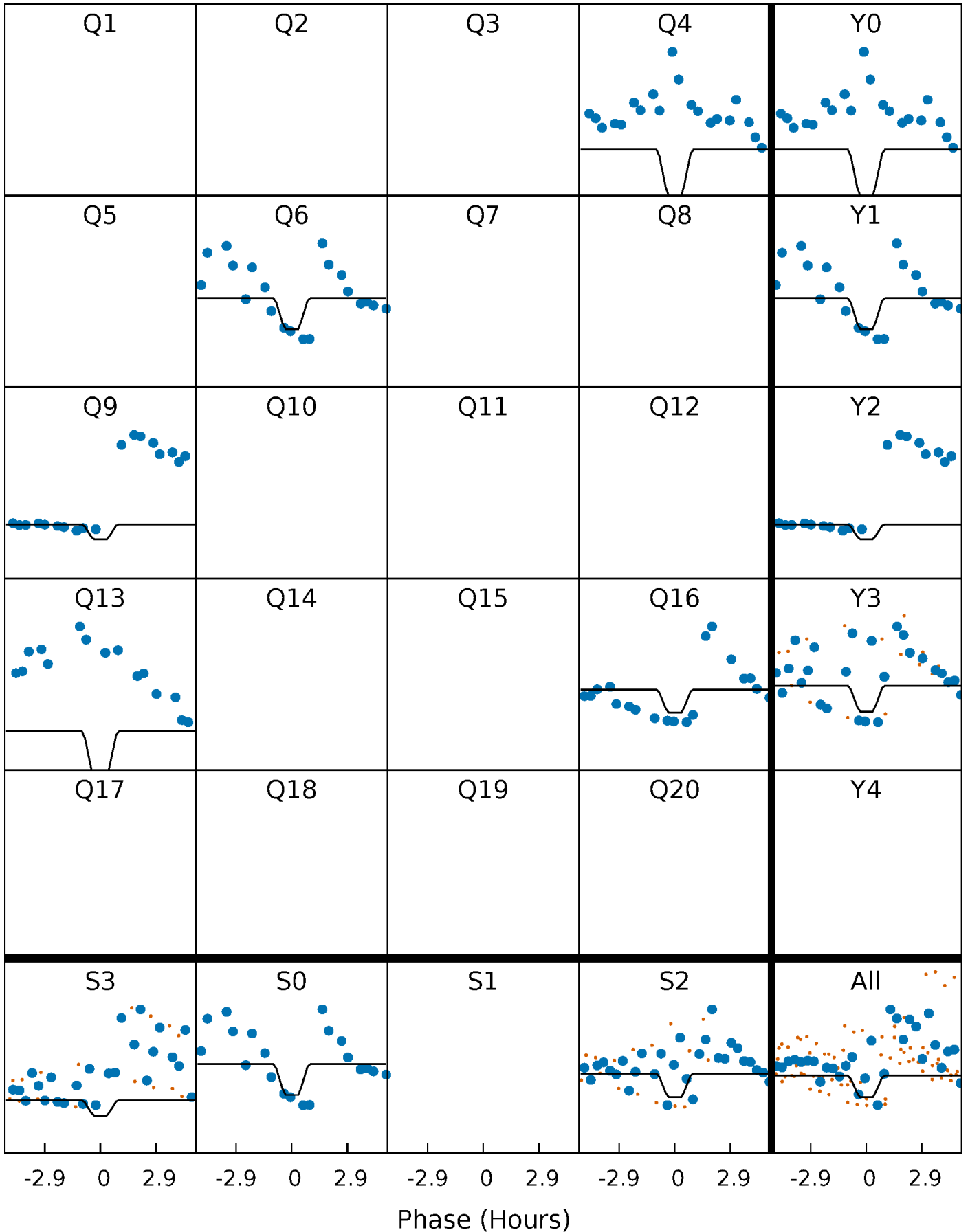
TCE 009479539-01 P=162.639005 Days  $T_0=244.790255$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

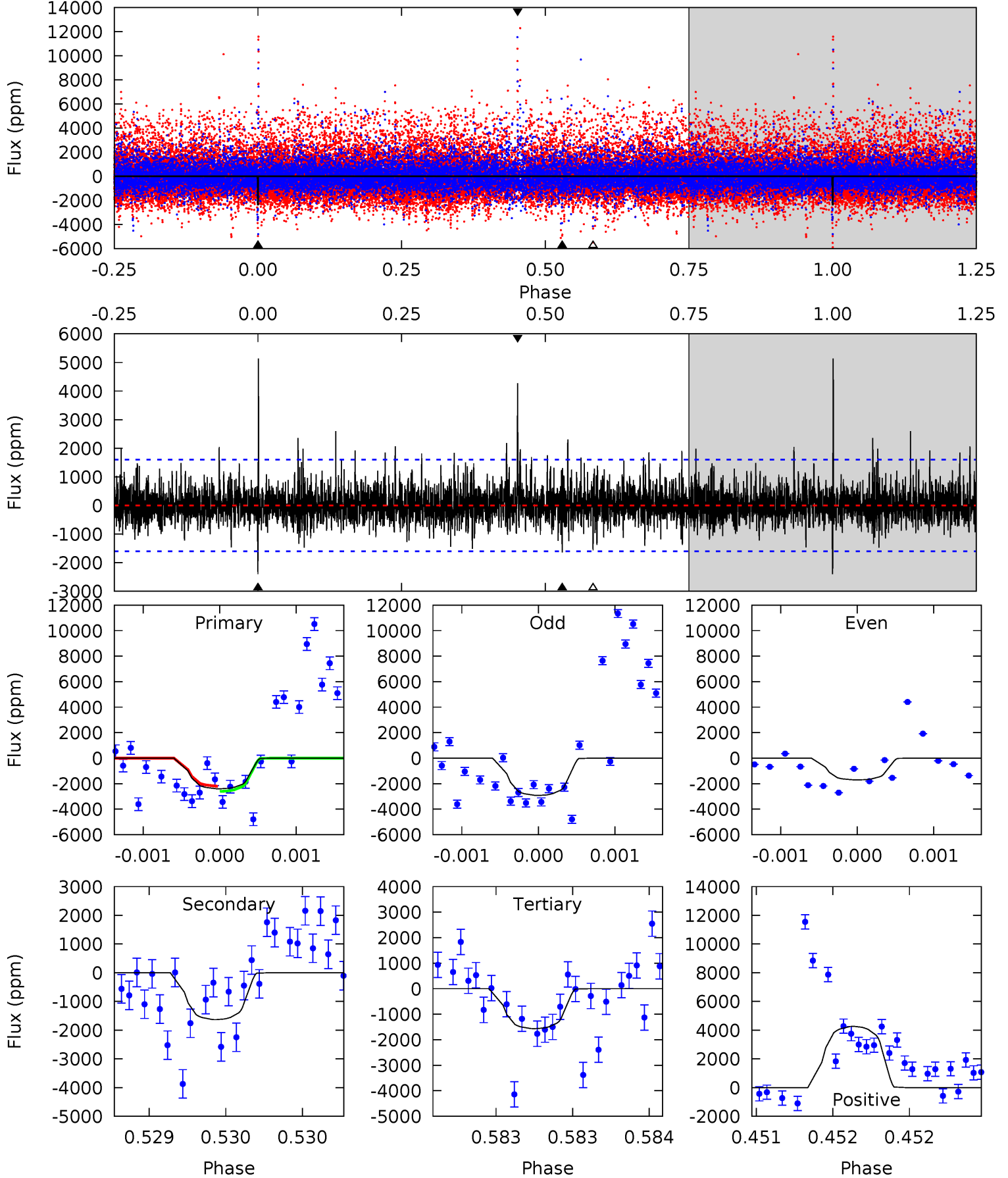
TCE 009479539-01 P=162.626750 Days  $T_0=244.887841$  (BKJD)



# DV Model-Shift Uniqueness Test

009479539-01, P = 162.639005 Days, E = 244.790255 Days

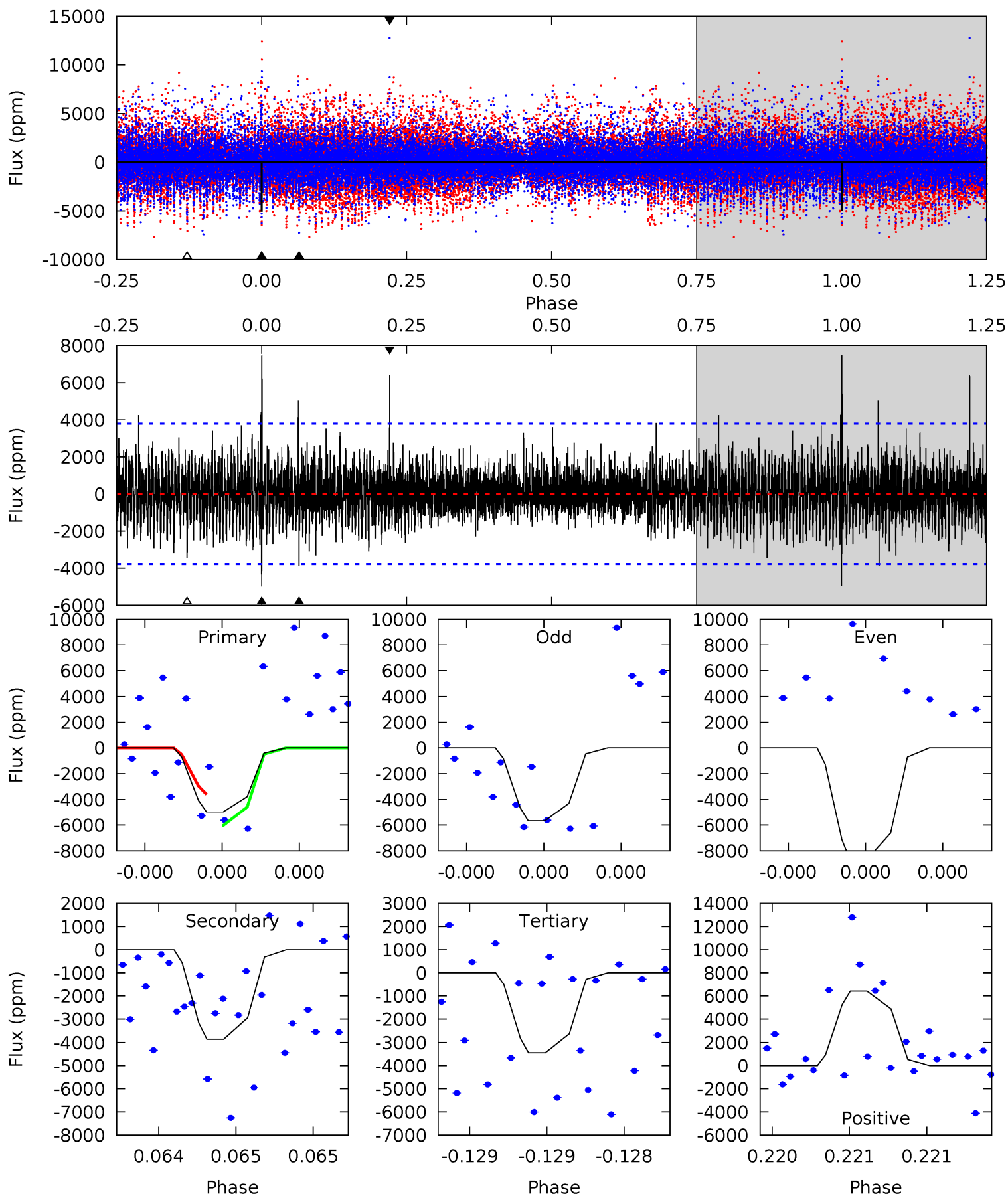
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.26	5.63	5.39	14.7	5.52	3.40	1.67	2.87	-6.42	0.23	-9.05	1.45	0.94	0.68	0.71



# Alt Model-Shift Uniqueness Test

009479539-01, P = 162.626750 Days, E = 244.887841 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
7.37	5.73	5.12	9.51	5.62	3.55	1.34	2.25	-2.14	0.61	-3.78	2.10	-0.56	0.60	0



### Stellar Parameters For KIC 009479539

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3315^{+43}_{-39}$	$5.004^{+0.044}_{-0.040}$	$0.000^{+0.100}_{-0.100}$	$0.252^{+0.035}_{-0.029}$	$0.233^{+0.043}_{-0.029}$	$20.580^{+5.047}_{-4.056}$
	+1%/-1%	+1%/-1%	+inf%/-inf%	+14%/-12%	+18%/-12%	+25%/-20%
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 009479539-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-1635 \pm 291$	$3.16^{+2.80}_{-2.17}$	$171^{+4}_{-4}$	$2501^{+919}_{-340}$	$11877^{+104238}_{-8539}$
Alt.	$-3865 \pm 675$	$3.24^{+2.94}_{-2.08}$	$171^{+4}_{-4}$	$2779^{+999}_{-427}$	$26580^{+187439}_{-19556}$

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

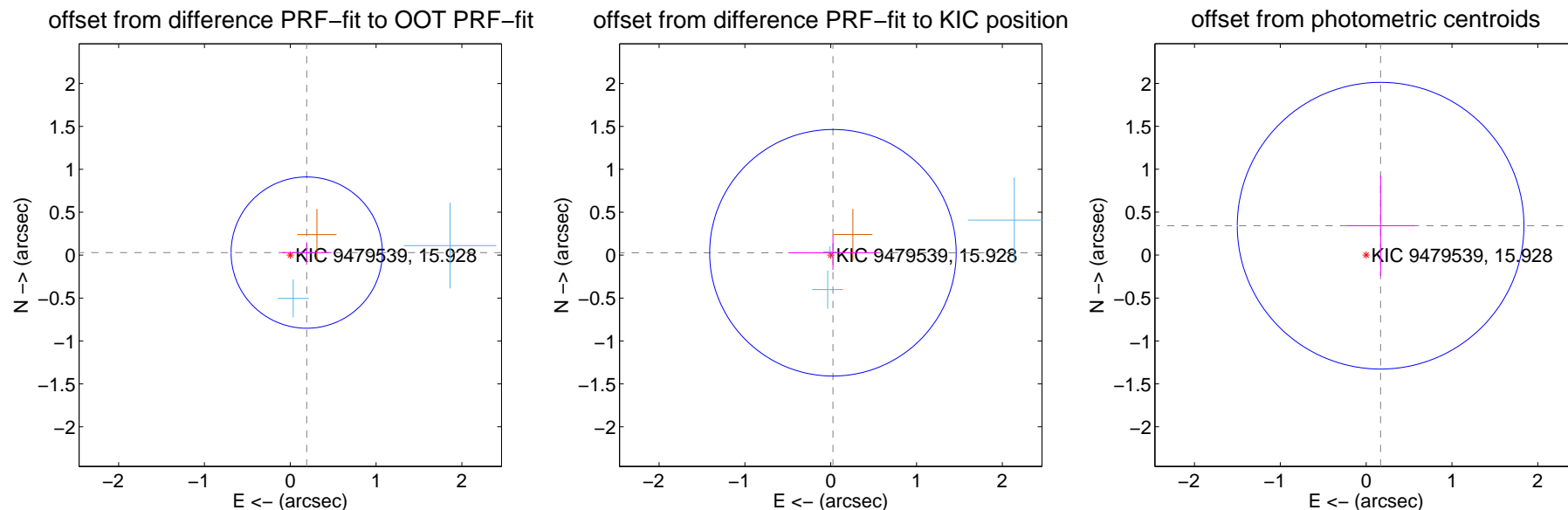
## DV Centroid Data

Supplemental centroid analysis for 009479539-01. Kepler magnitude: 15.93. Transit SNR 10.59

There are 3 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.12 arcsec

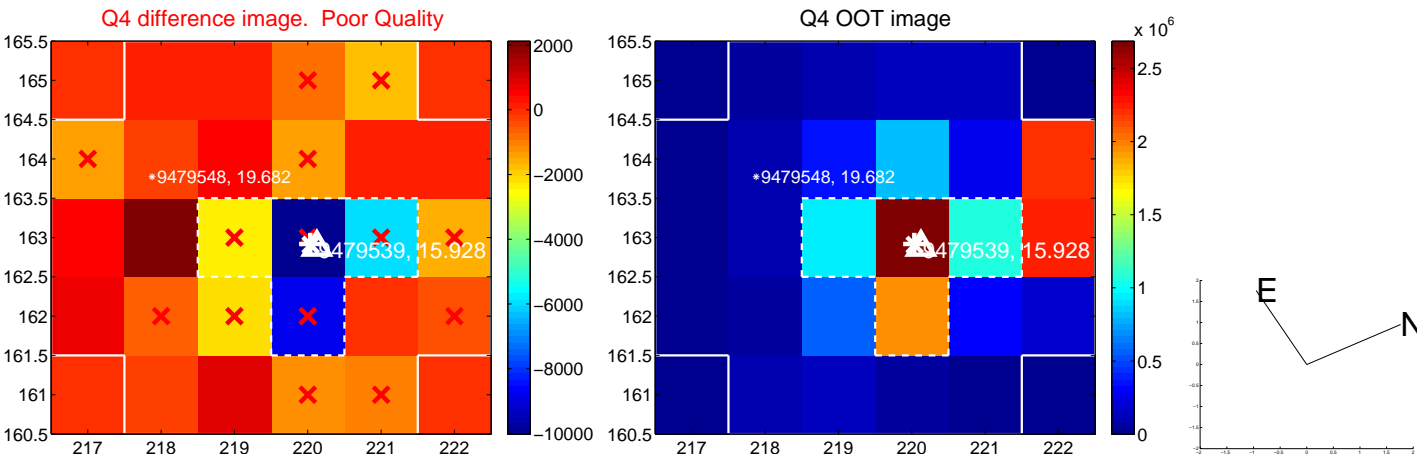
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.194 \pm 0.294$	0.66	$-0.192 \pm 0.289$	$0.030 \pm 0.122$
PRF-fit source offset from KIC position	$0.038 \pm 0.479$	0.08	$-0.026 \pm 0.521$	$0.028 \pm 0.200$
photometric centroid source offset	$0.38 \pm 0.56$	0.69	$-0.17 \pm 0.40$	$0.34 \pm 0.59$



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 ×: 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.

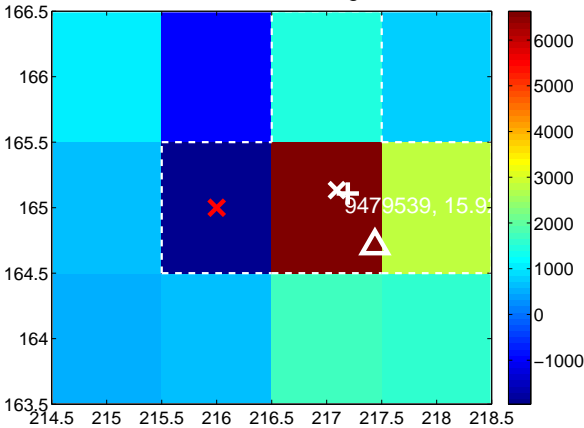
Q5 no difference image



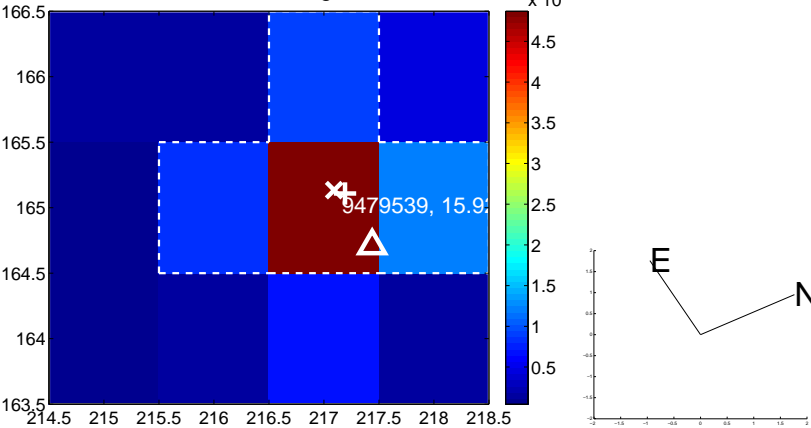
Q5 no OOT image



Q6 difference image



Q6 OOT image



Q7 no difference image



Q7 no OOT image



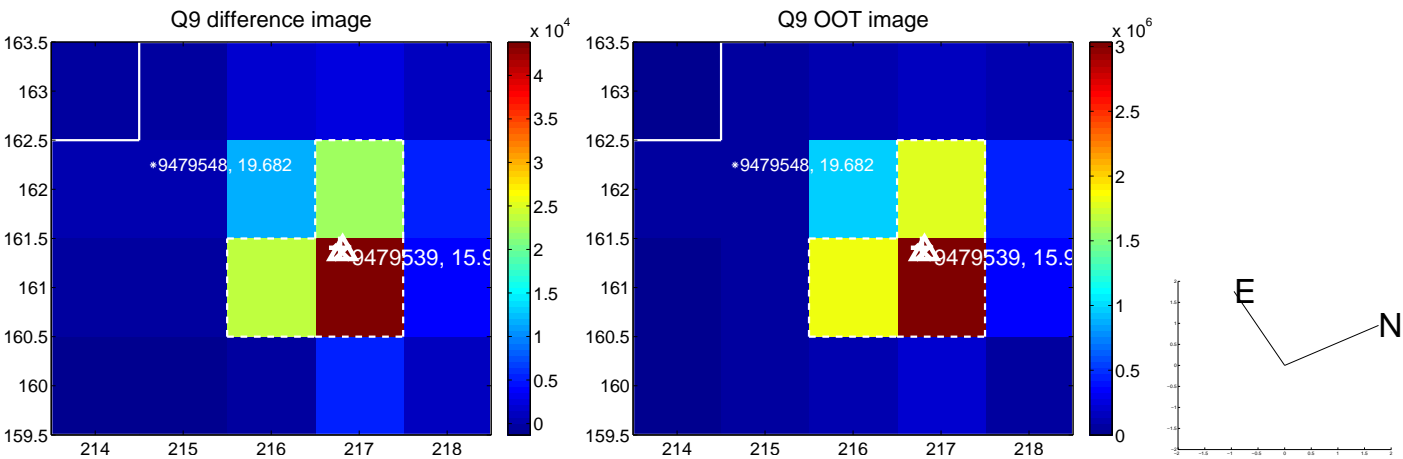
Q8 no difference image



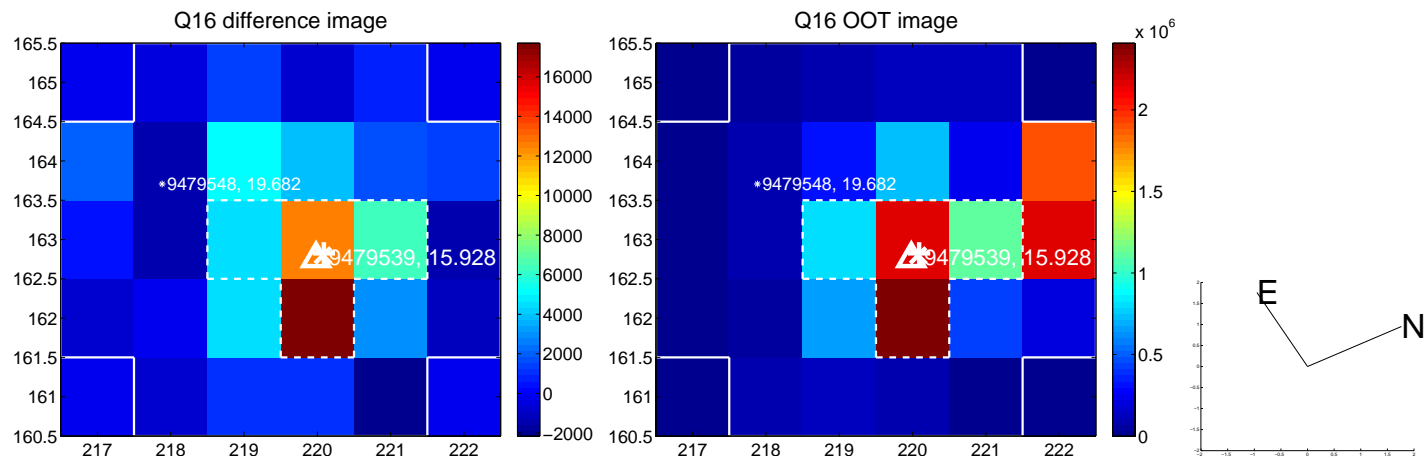
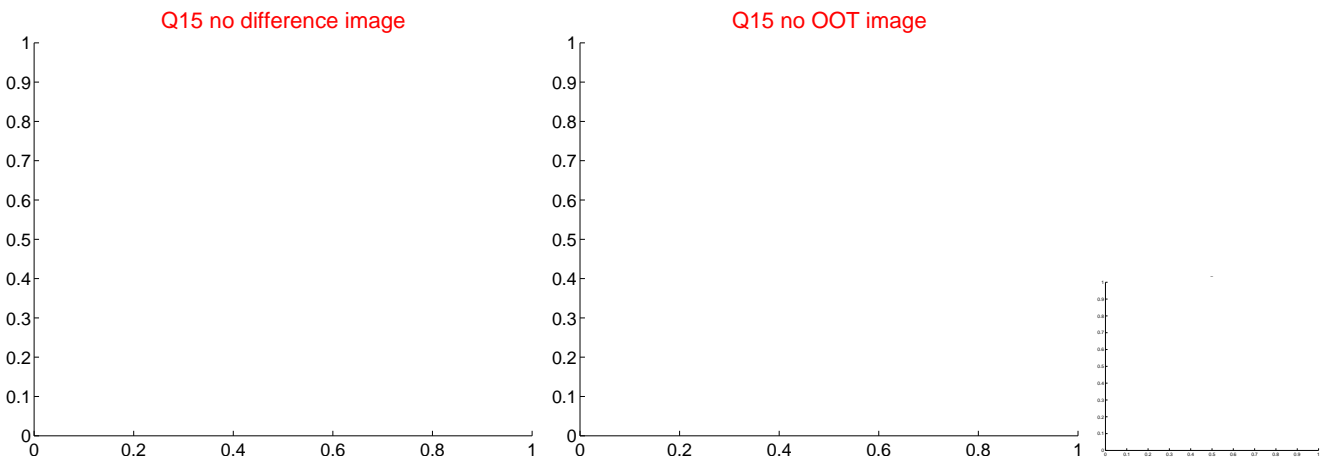
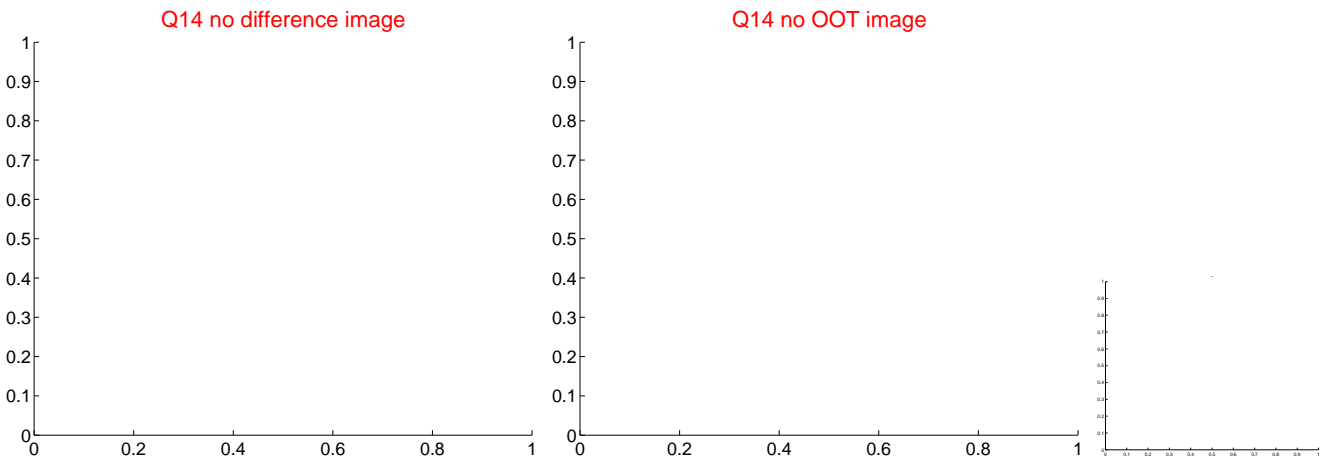
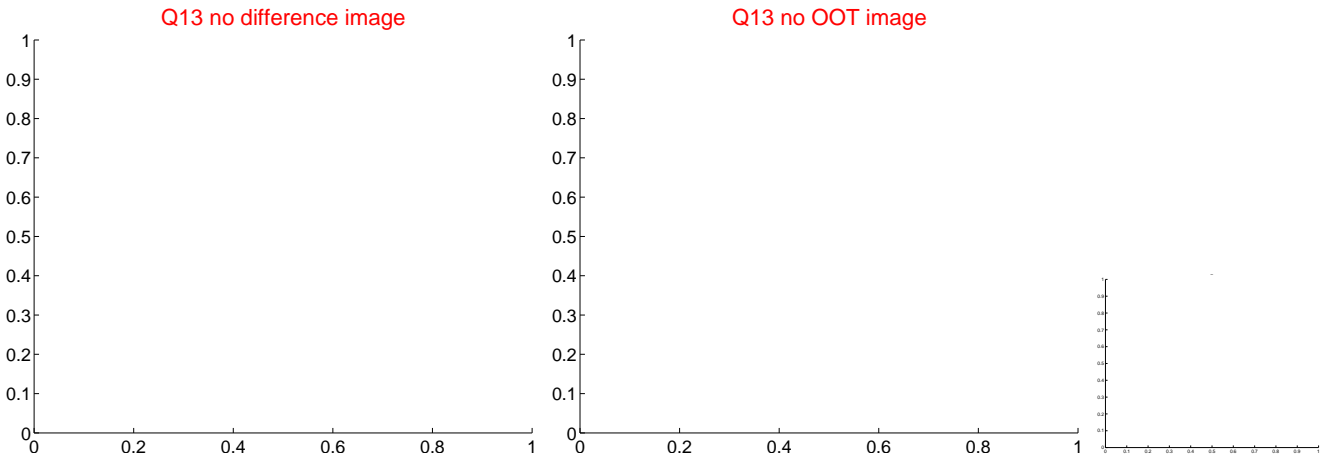
Q8 no OOT image



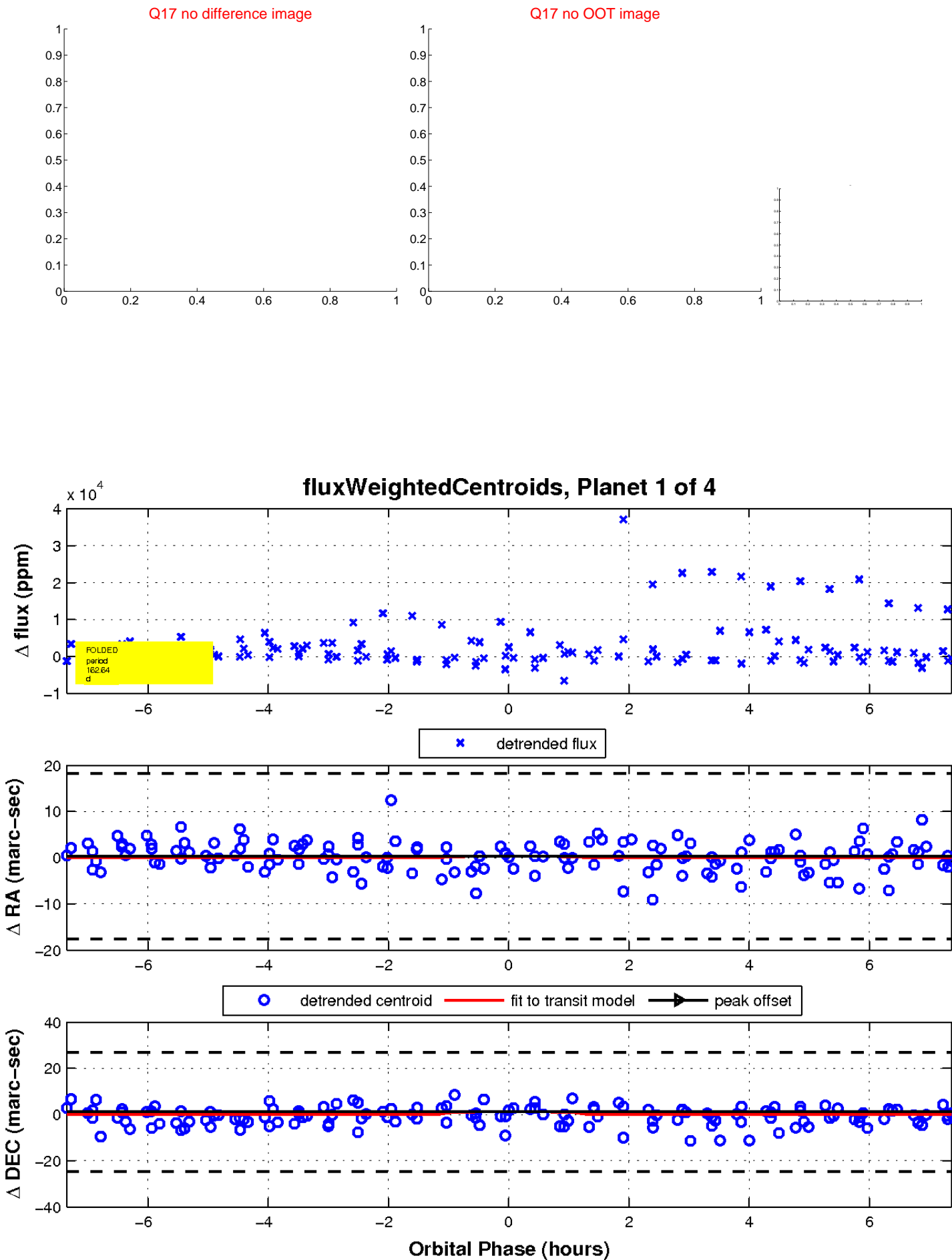
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



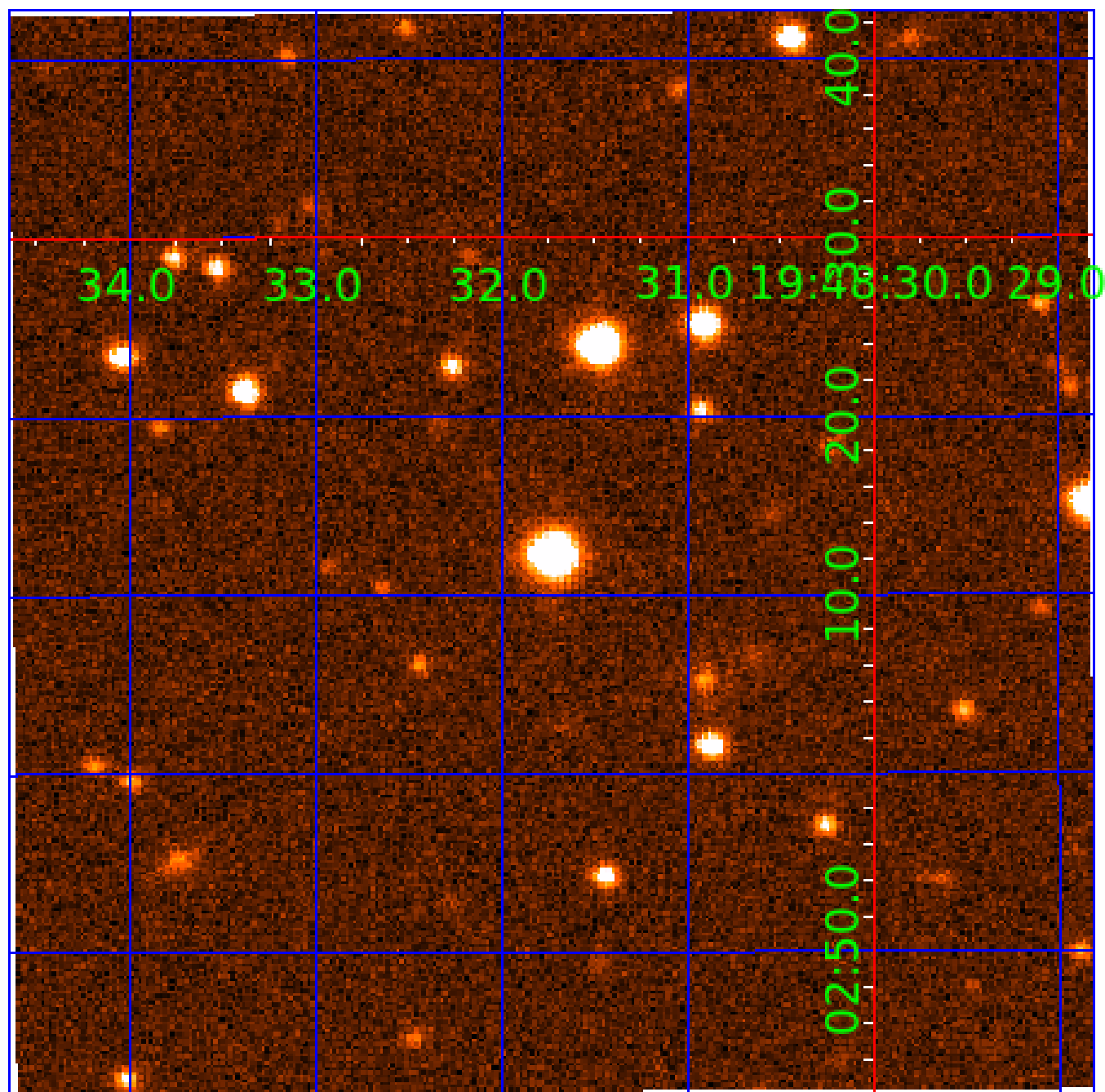
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image

Declination



# KIC 009479539

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009479539-01	OBS	No	162.639005	244.790255	5258.5	2.456	15.0	10.6	0.25	3315	1.81	0.05
009479539-02	OBS	No	246.799853	219.538476	3329.3	7.747	13.3	6.0	0.25	3315	1.43	0.03
009479539-03	OBS	No	237.343409	358.737781	4727.6	5.531	13.5	9.5	0.25	3315	2.18	0.03
009479539-04	OBS	No	1.853919	131.933167	10.4	17.403	12.4	0.3	0.25	3315	0.08	20.75

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009479539-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_ZUMA_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009479539-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—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
009479539-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT
009479539-04	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV

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

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

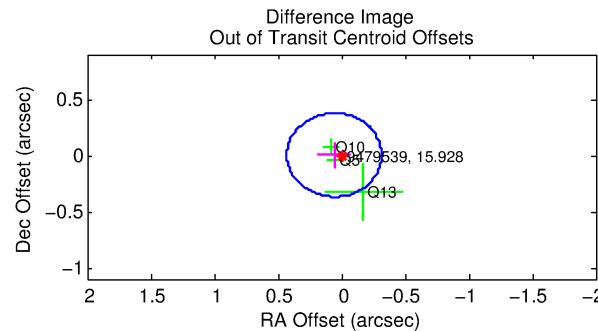
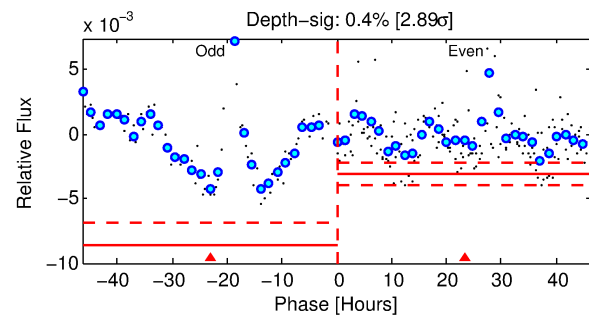
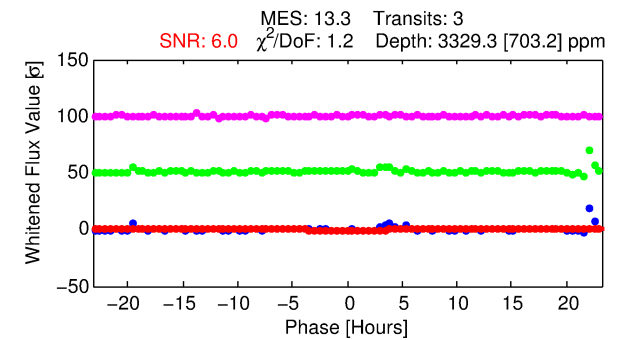
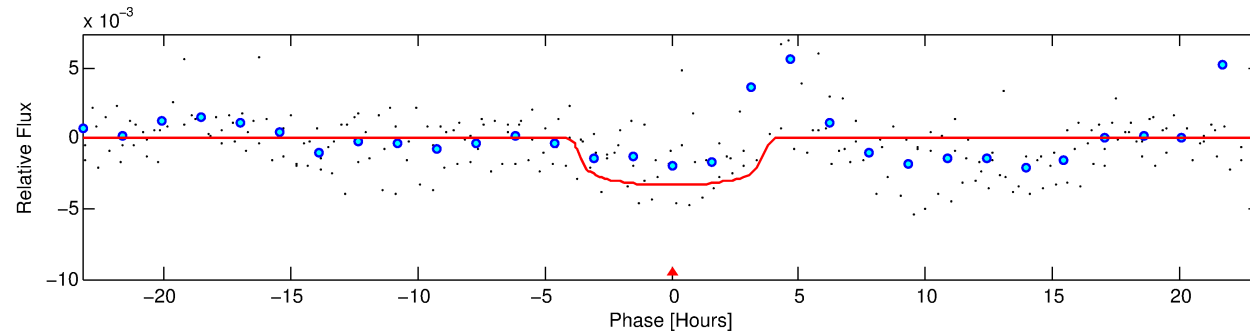
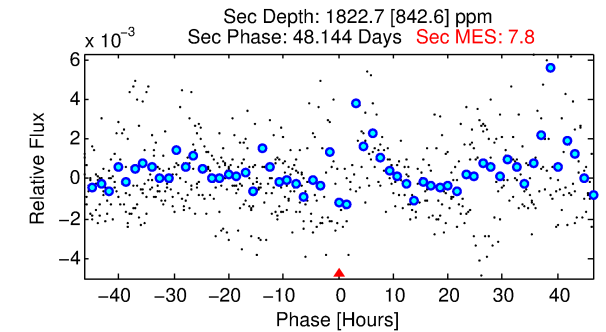
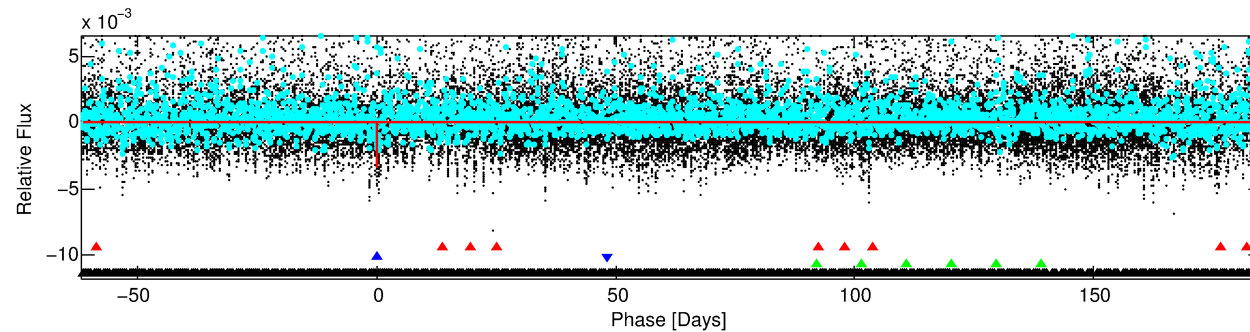
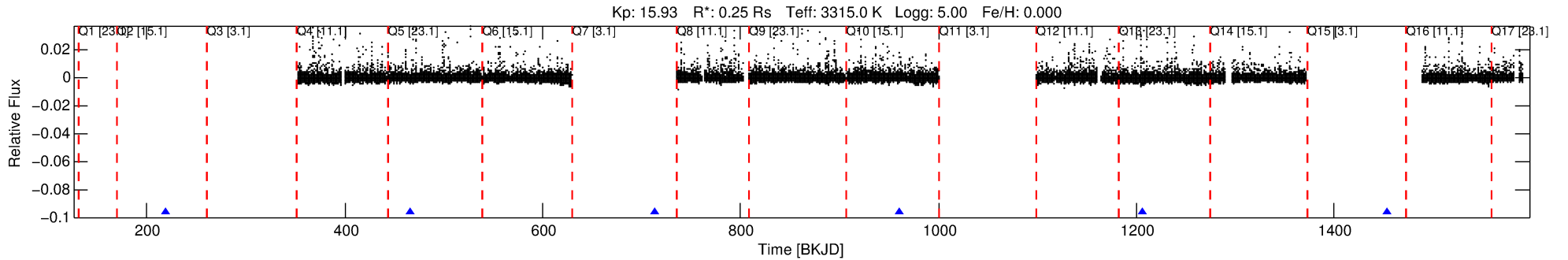
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009479539-02

No Significant Match Found

# DV One-Page Summary

KIC: 9479539 Candidate: 2 of 4 Period: 246.800 d



## DV Fit Results:

Period = 246.79985 [0.00489] d  
Epoch = 219.5385 [0.0160] BKJD  
Rp/R\* = 0.0522 [0.0301]  
a/R\* = 256.01 [609.05]  
b = 0.03 [95.37]  
Seff = 0.03 [0.00]  
Teq = 107 [3] K  
Rp = 1.43 [0.85] Re  
a = 0.4745 [0.0468] AU  
Ag = 109731.19 [137196.94] [0.80σ]  
**Teffp = 2999 [934] K [3.10σ]**

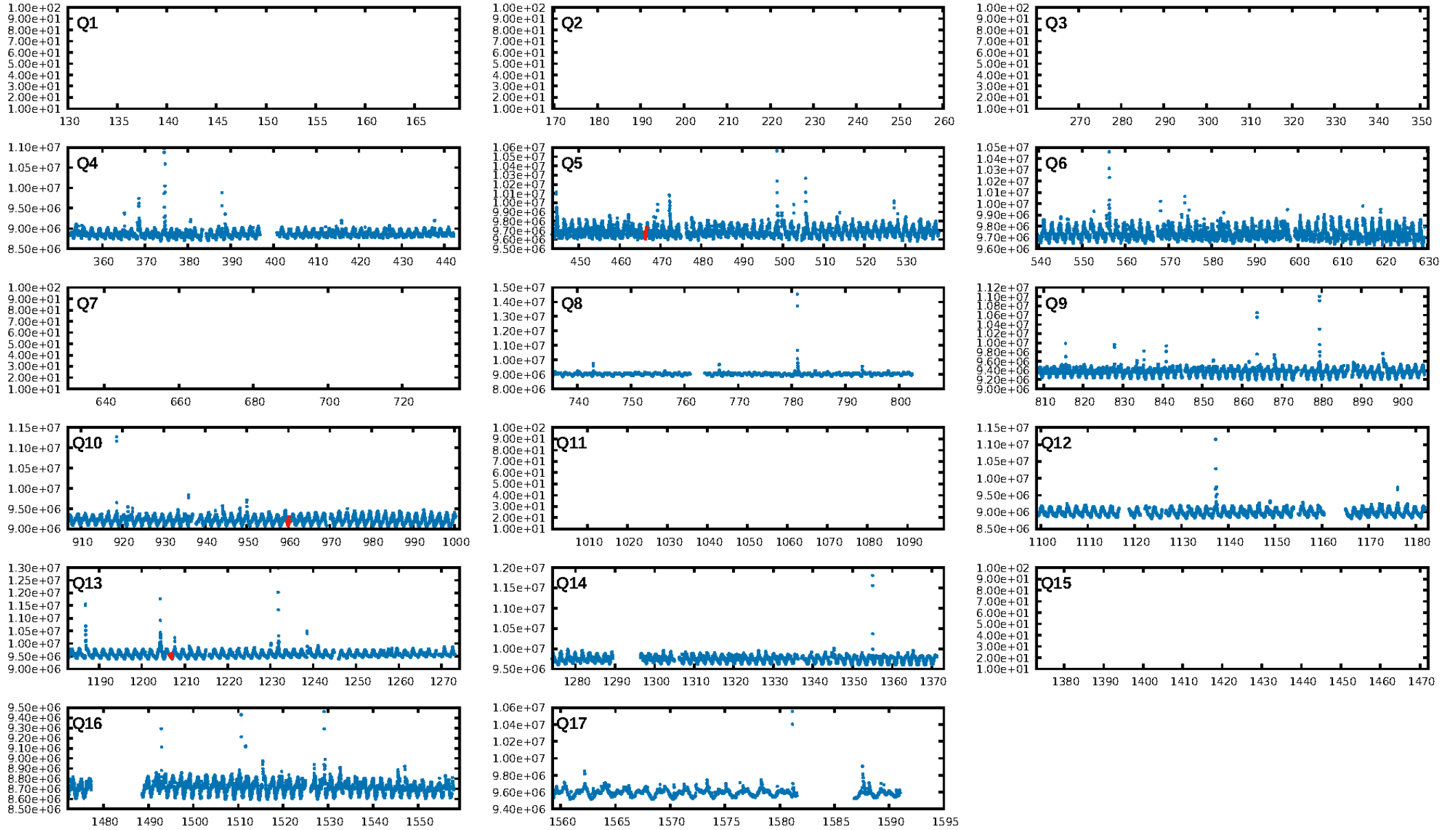
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [23.84σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 12.3%  
ModelChiSquareGof-sig: 59.1%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -1.393  
Centroid-sig: 59.6%  
Centroid-so: 0.306 arcsec [0.56σ]  
OotOffset-rm: 0.058 arcsec [0.47σ]  
KicOffset-rm: 0.081 arcsec [0.34σ]  
OotOffset-st: 1/0/0/2 [3]  
KicOffset-st: 1/0/0/2 [3]  
DiffImageQuality-fgm: 1.00 [3/3]  
DiffImageOverlap-fno: 0.00 [0/3]

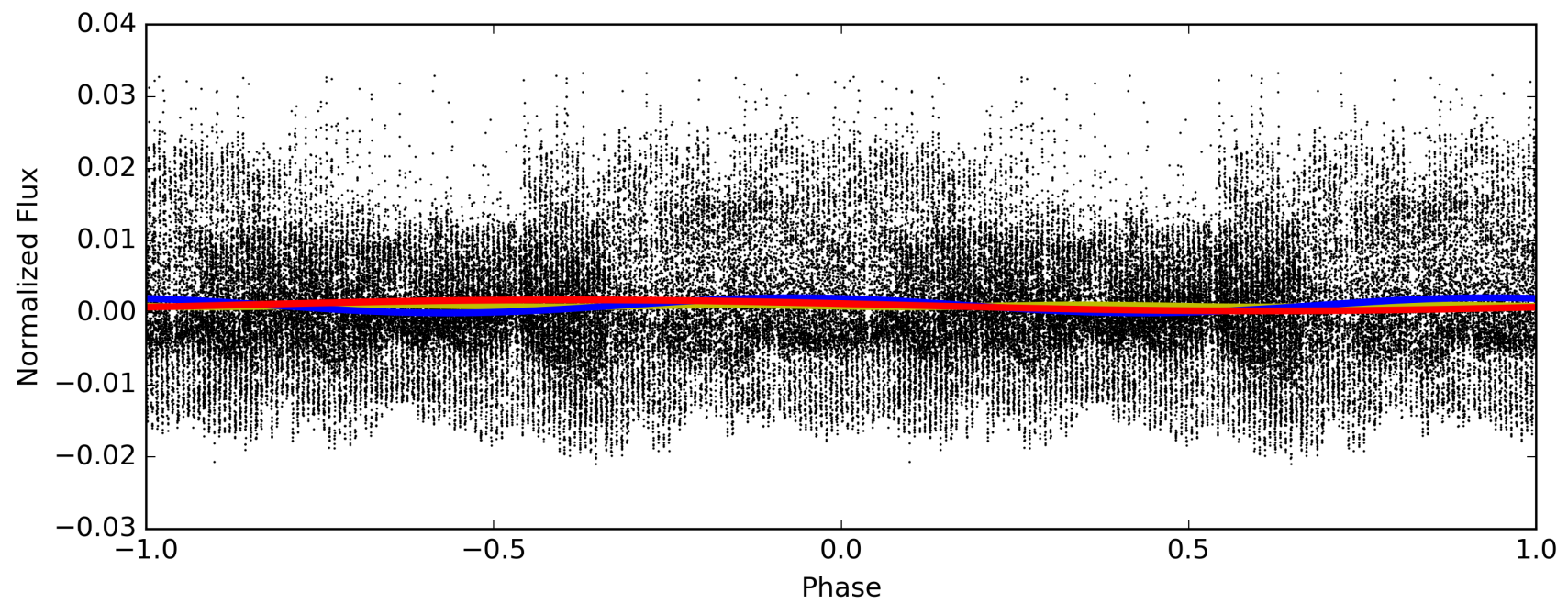
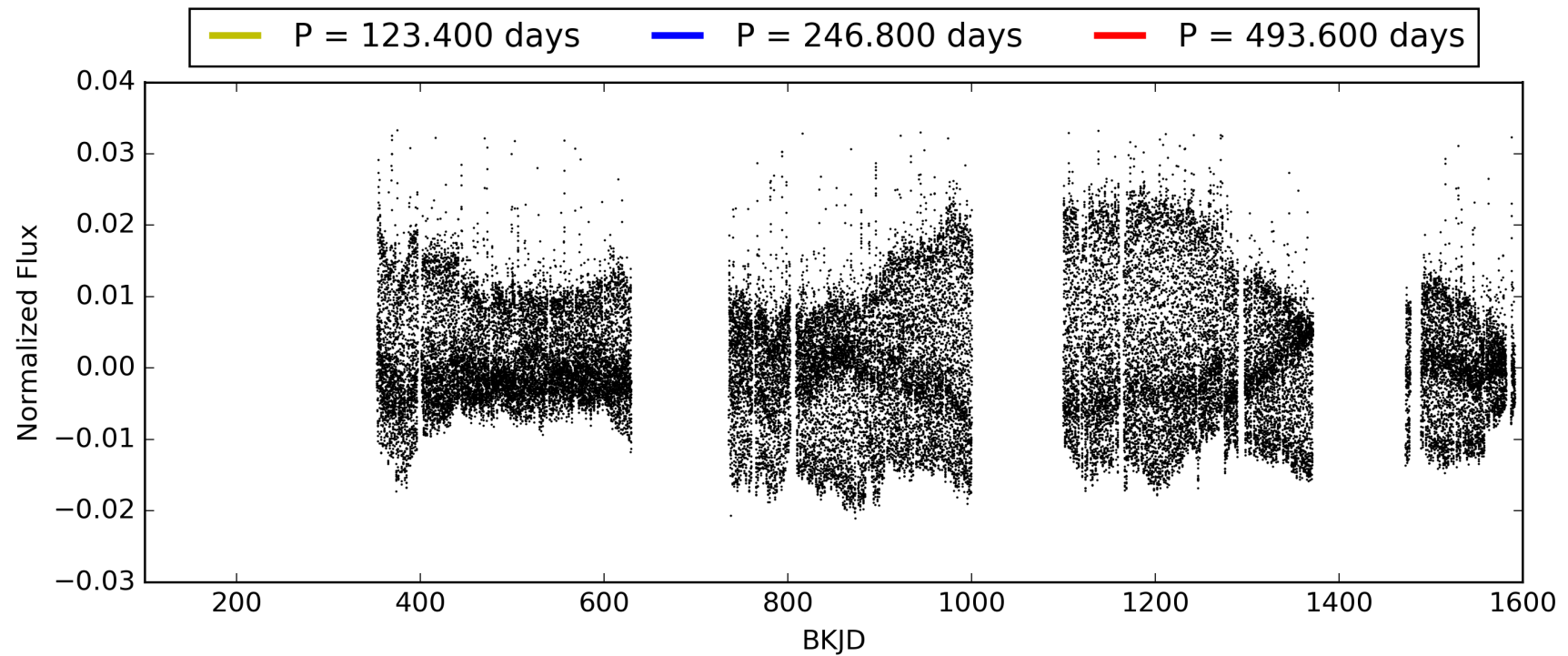
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 10:44:33 Z

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

# TCE 009479539-02, PDC Light Curves



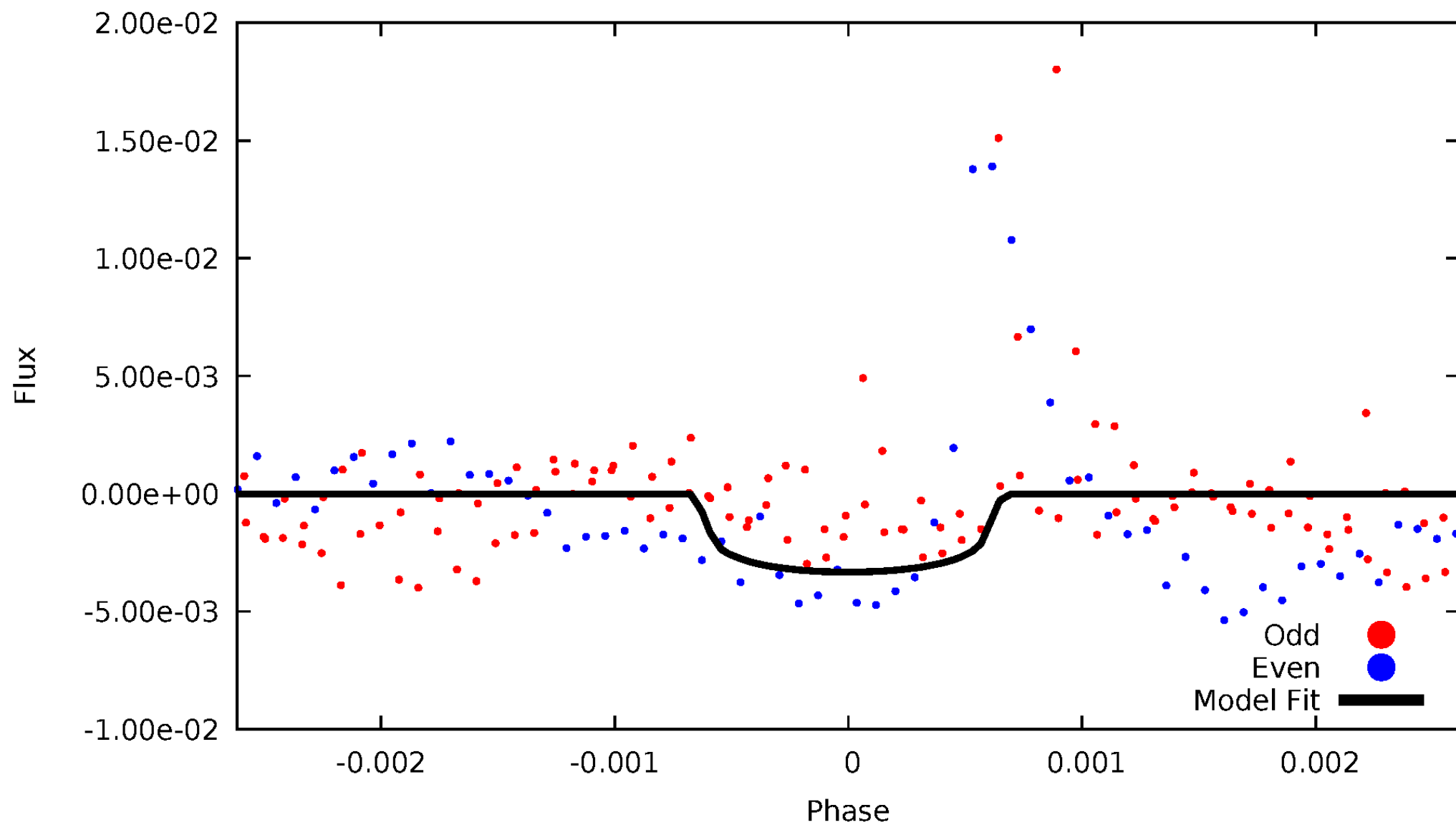
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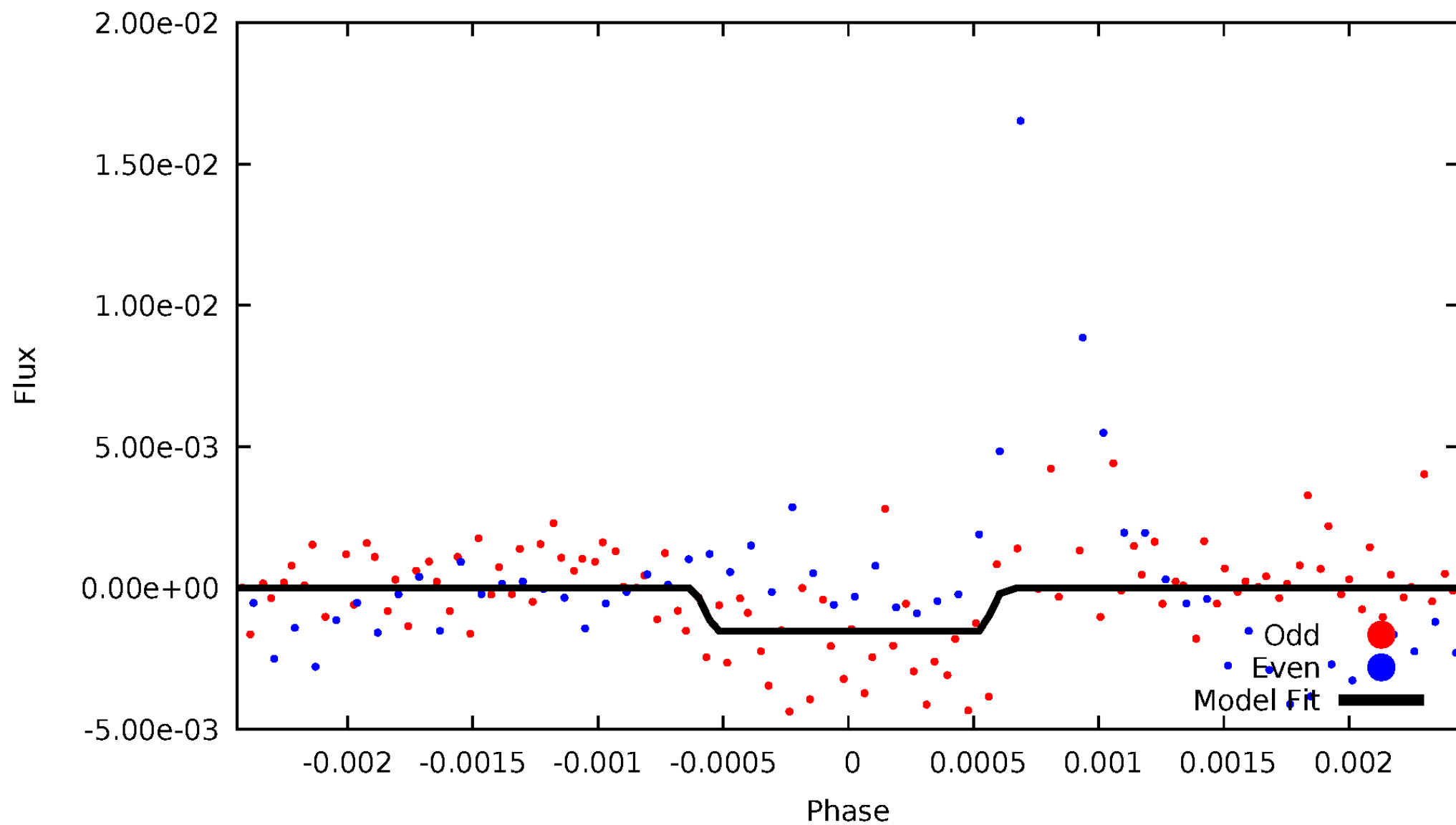
# DV Odd/Even

TCE 009479539-02



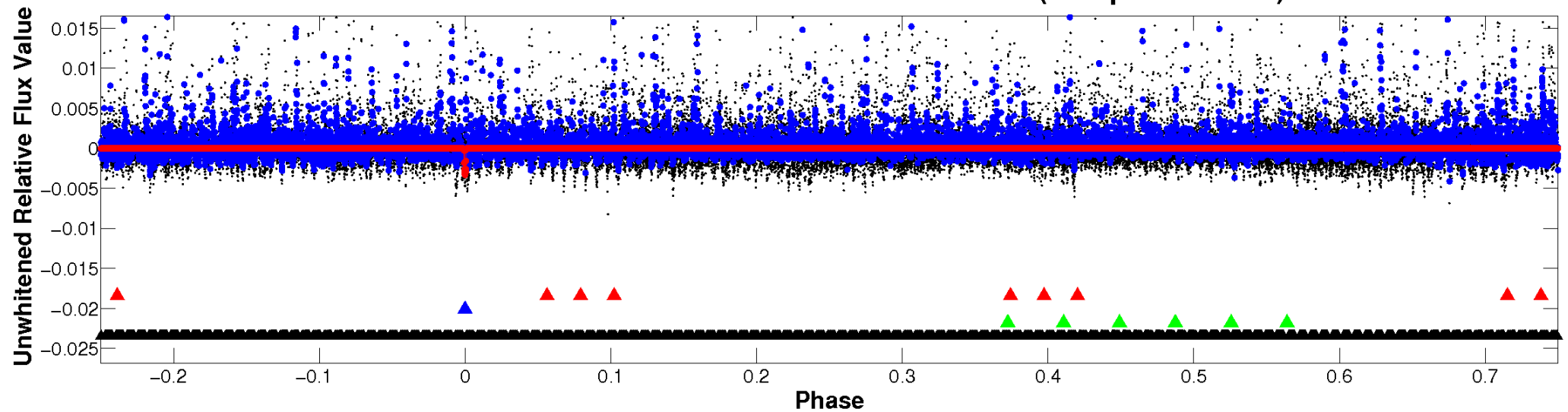
# ALT Odd/Even

TCE 009479539-02

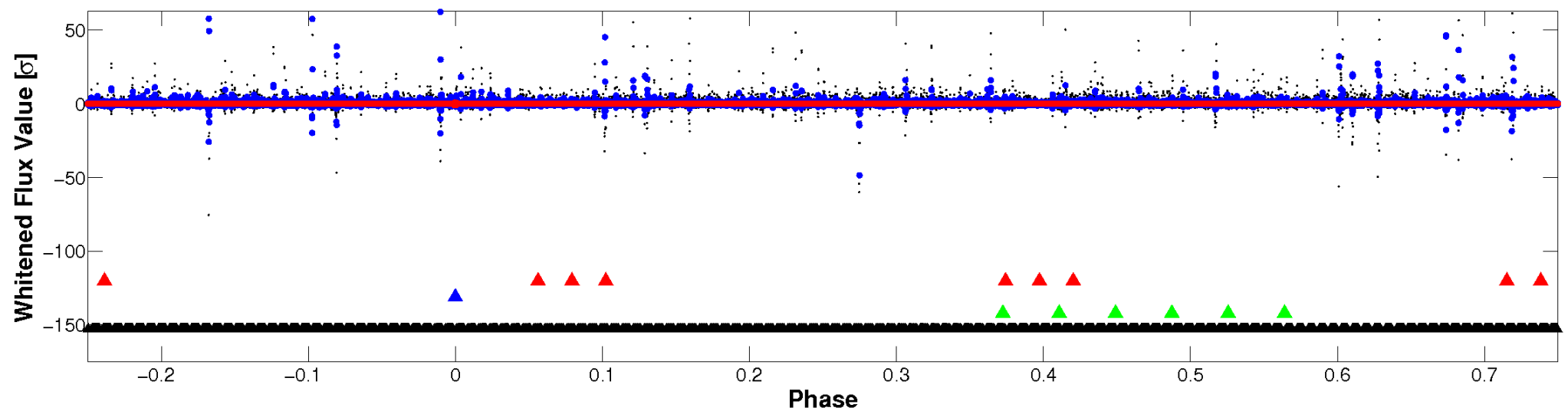


# Non-Whitened Vs. Whitened Light Curve

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

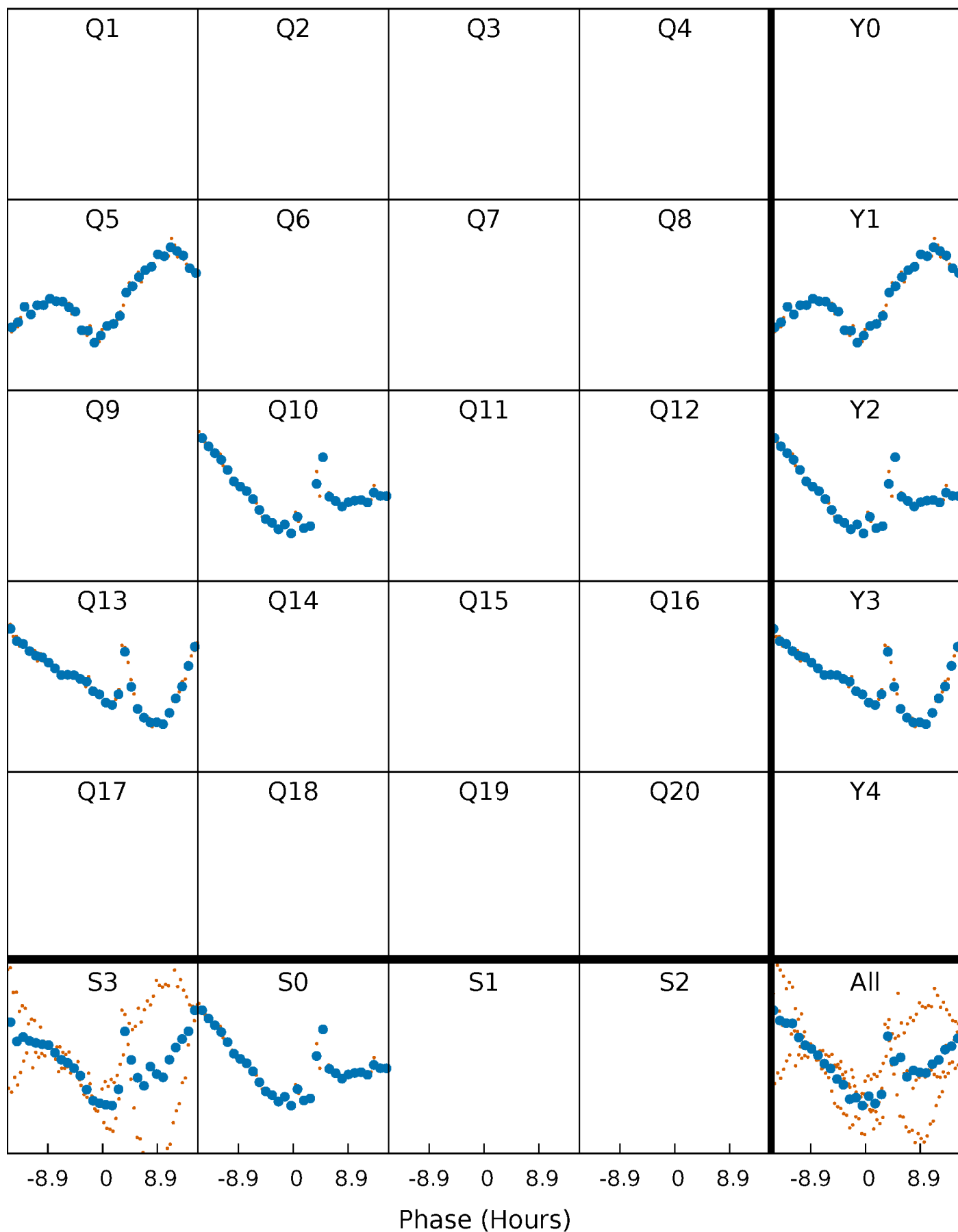


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



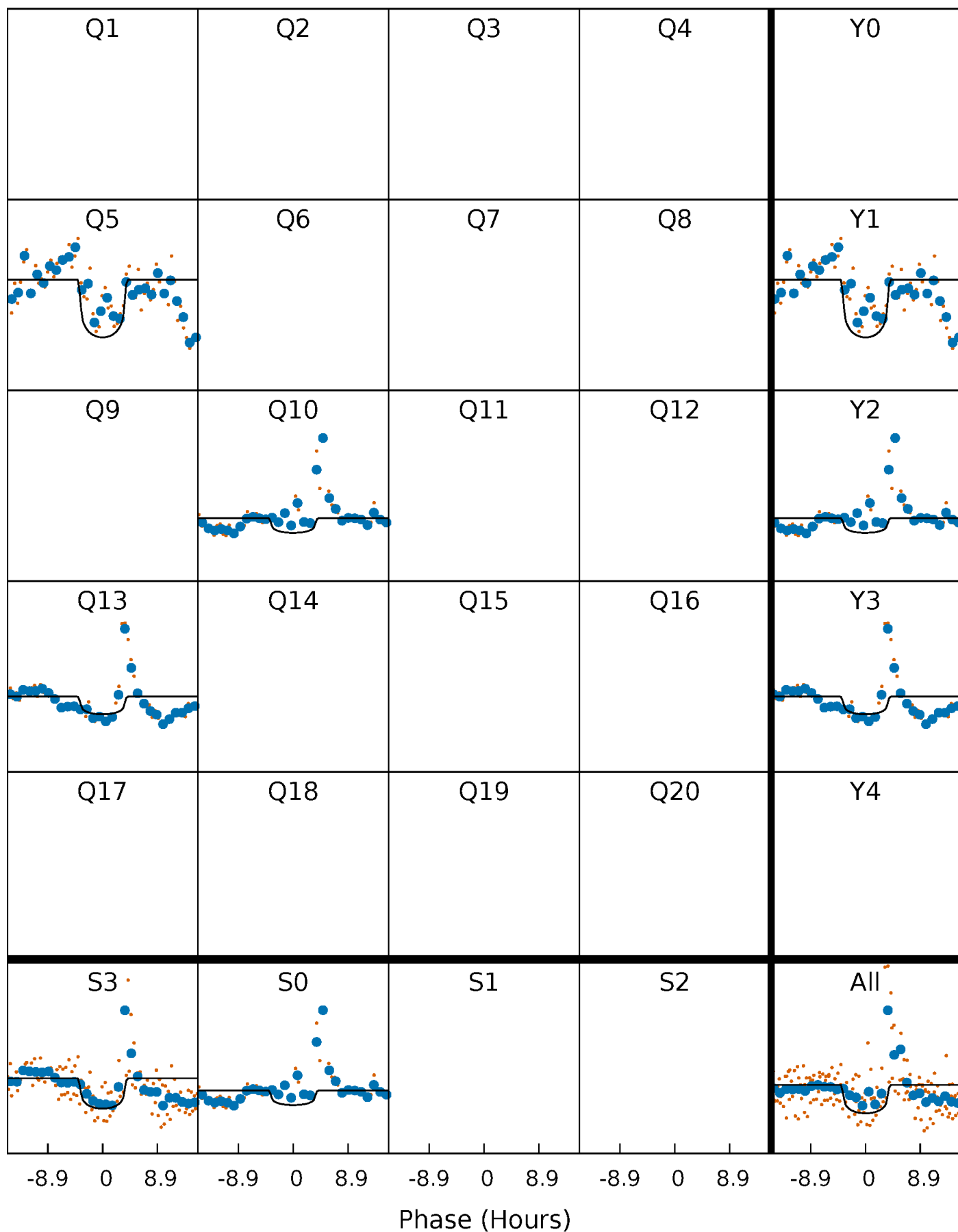
# PDC Quarter-Phased Transit Curves

TCE 009479539-02     $P=246.799853$  Days     $T_0=219.538477$  (BKJD)



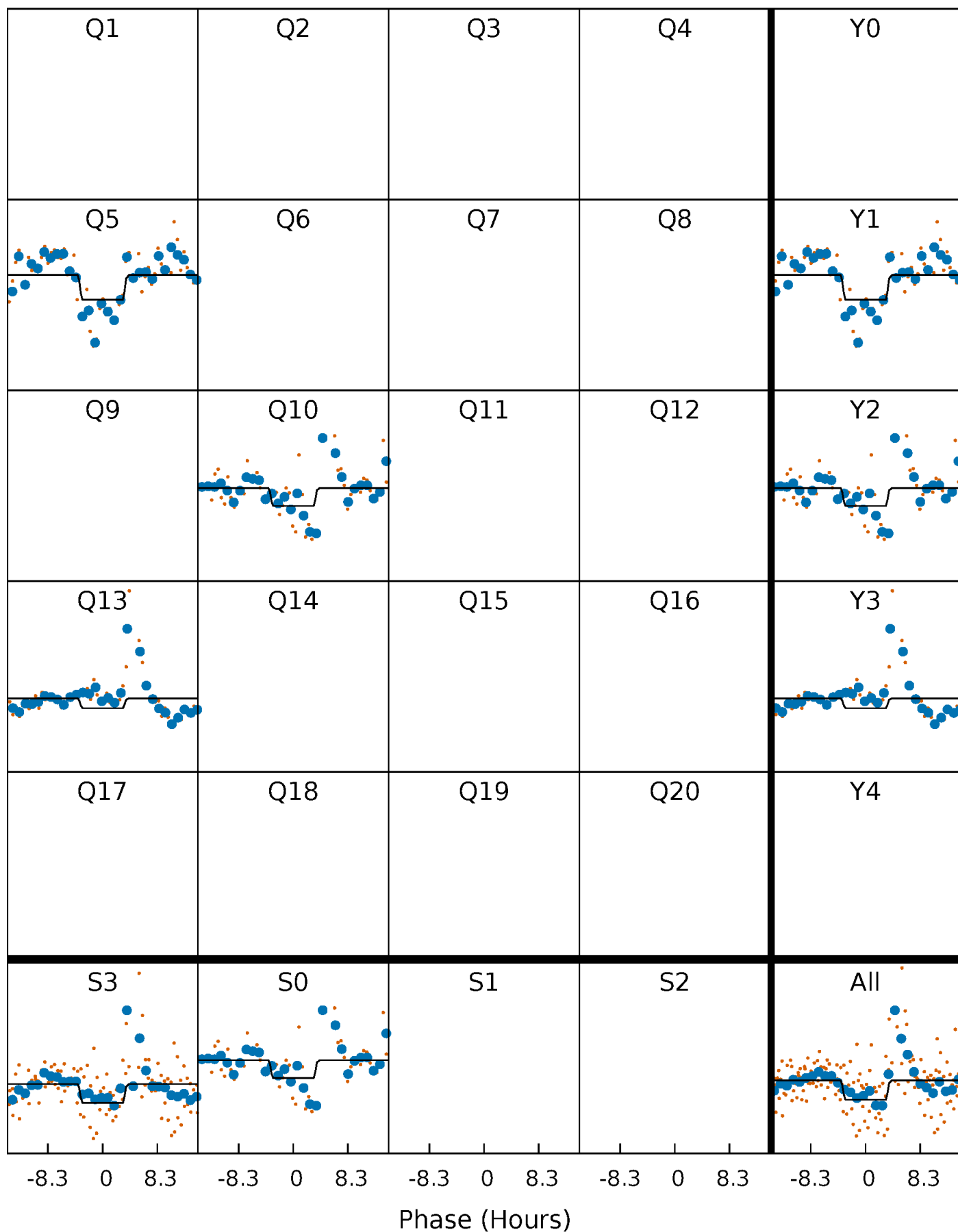
# DV Quarter-Phased Transit Curves

TCE 009479539-02     $P=246.799853$  Days     $T_0=219.538477$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

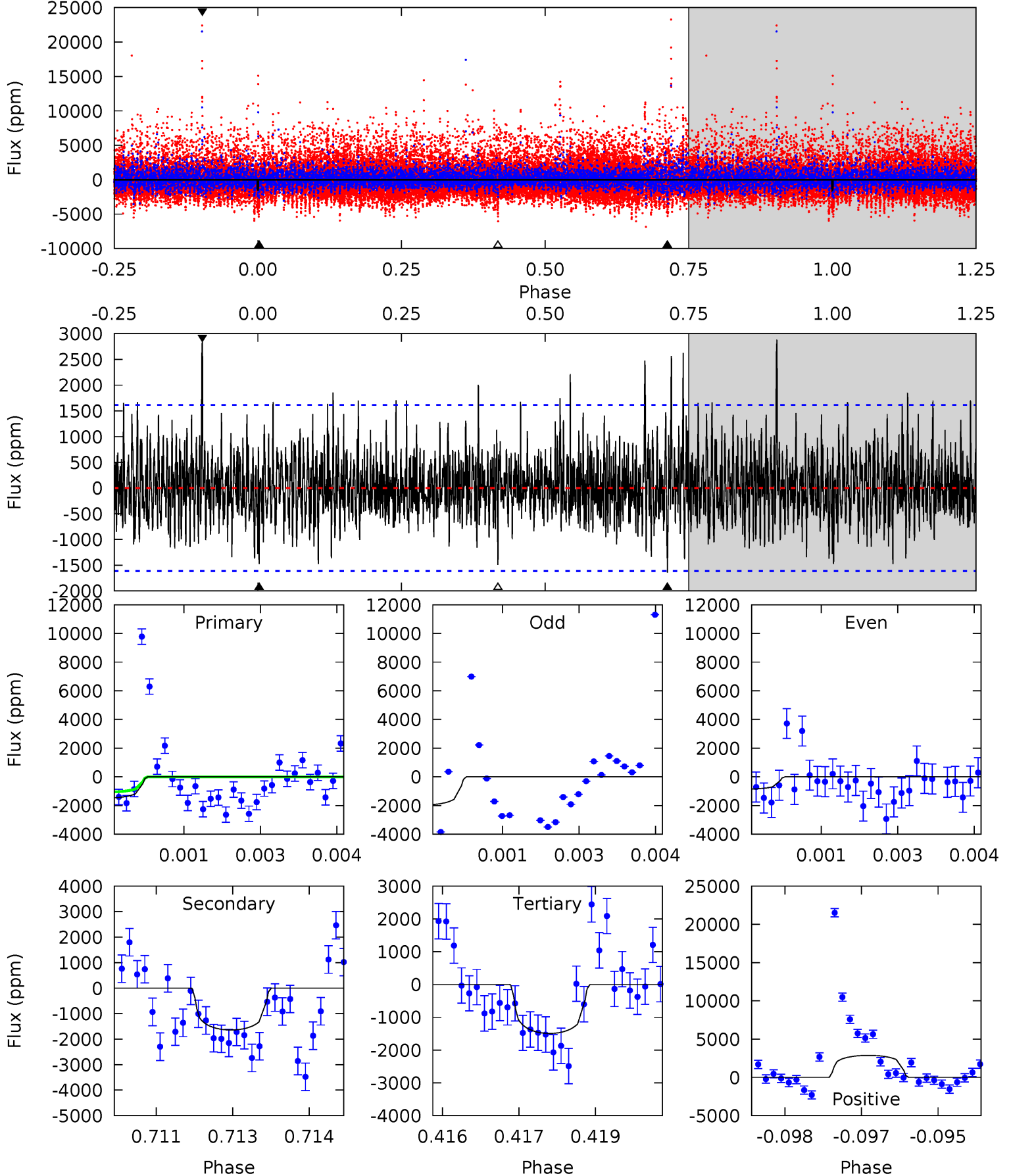
TCE 009479539-02 P=246.782325 Days  $T_0=219.570325$  (BKJD)



# DV Model-Shift Uniqueness Test

009479539-02, P = 246.799853 Days, E = 219.538477 Days

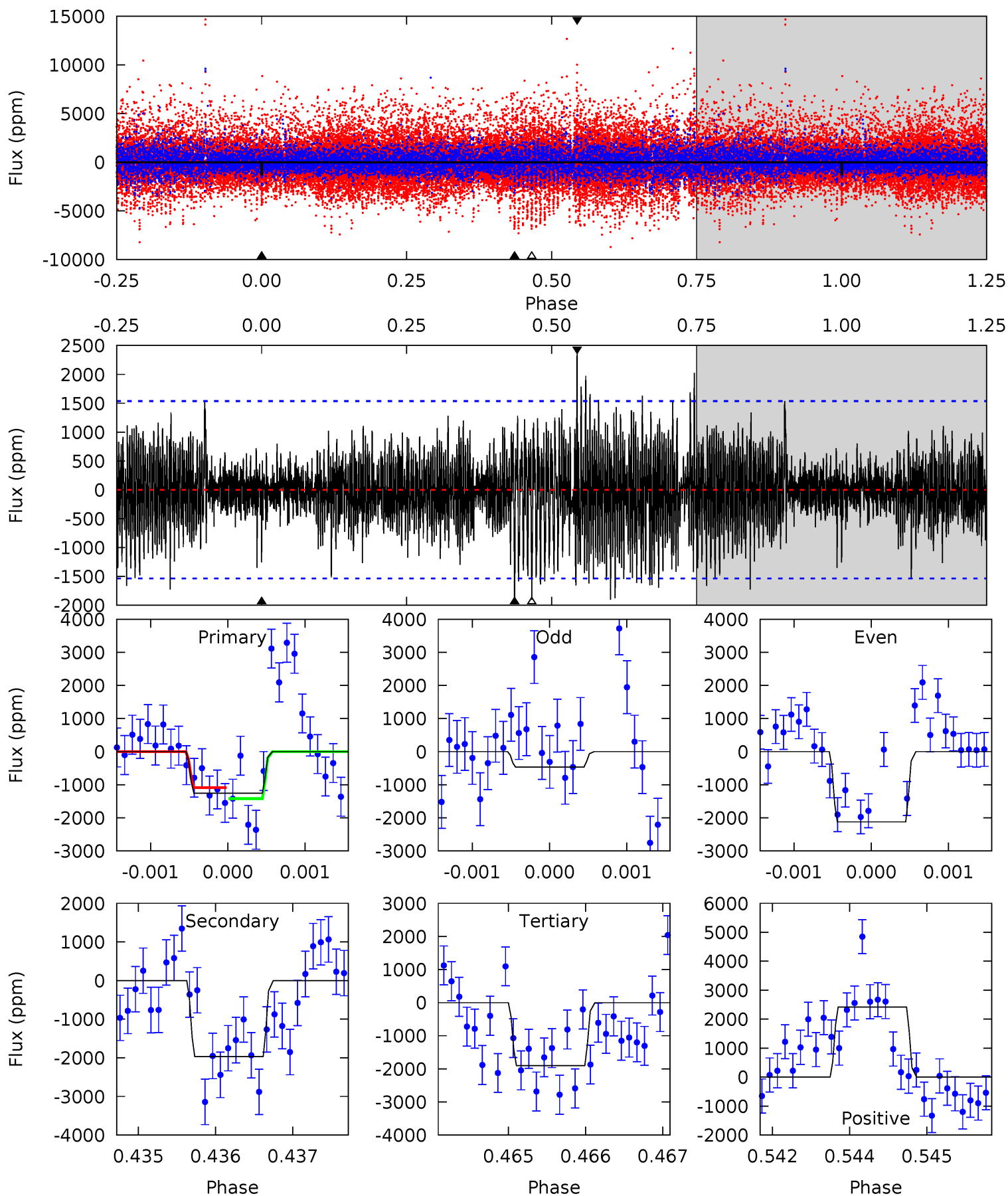
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
4.93	5.49	4.99	9.62	5.40	3.21	1.71	-0.07	-4.70	0.50	-4.13	0.84	0.68	0.64	1.31



# Alt Model-Shift Uniqueness Test

009479539-02, P = 246.782325 Days, E = 219.570325 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
4.43	6.96	6.72	8.54	5.42	3.25	2.04	-2.28	-4.11	0.25	-1.58	2.51	0.71	0.55	0.59





### Stellar Parameters For KIC 009479539

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3315^{+43}_{-39}$	$5.004^{+0.044}_{-0.040}$	$0.000^{+0.100}_{-0.100}$	$0.252^{+0.035}_{-0.029}$	$0.233^{+0.043}_{-0.029}$	$20.580^{+5.047}_{-4.056}$
	+1%/-1%	+1%/-1%	+inf%/-inf%	+14%/-12%	+18%/-12%	+25%/-20%
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 009479539-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-1642 \pm 299$	$1.51^{+0.81}_{-0.77}$	$149^{+3}_{-3}$	$3029^{+716}_{-328}$	$87105^{+279614}_{-50112}$
Alt.	$-1972 \pm 283$	$1.12^{+0.81}_{-0.62}$	$149^{+4}_{-4}$	$3412^{+1138}_{-495}$	$192977^{+835270}_{-127119}$

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

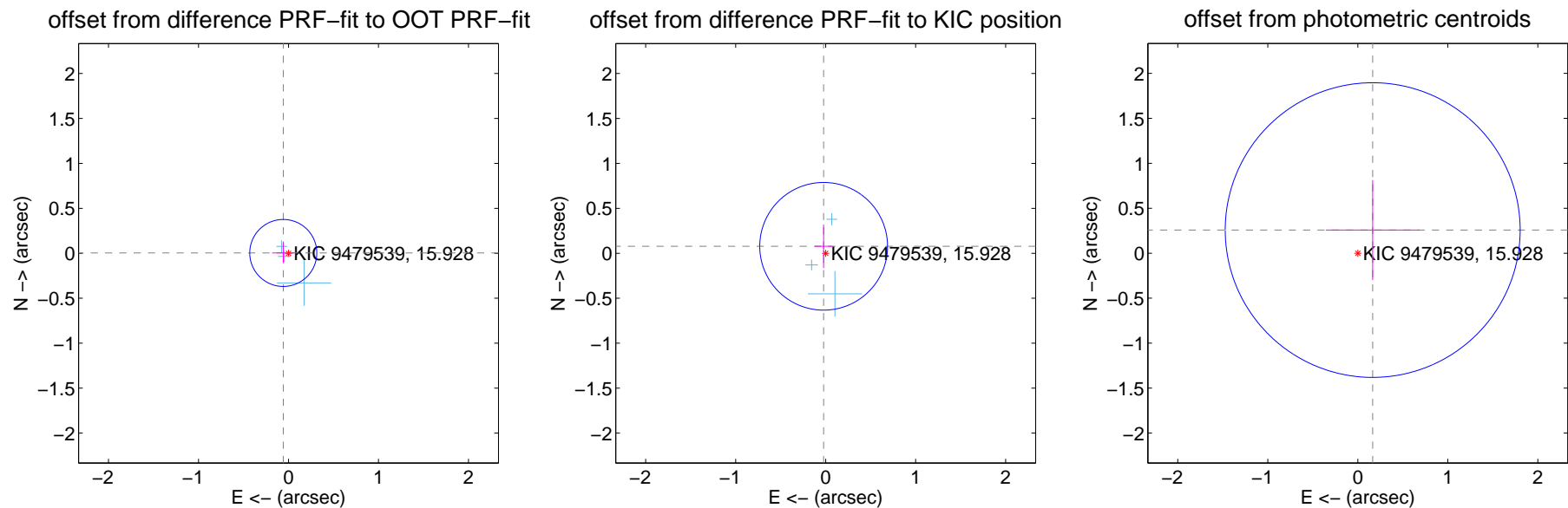
## DV Centroid Data

Supplemental centroid analysis for 009479539-02. Kepler magnitude: 15.93. Transit SNR 6.04

There are 3 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.14 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.058 \pm 0.124$	0.47	$0.058 \pm 0.124$	$0.004 \pm 0.112$
PRF-fit source offset from KIC position	$0.081 \pm 0.237$	0.34	$0.022 \pm 0.098$	$0.078 \pm 0.243$
photometric centroid source offset	$0.31 \pm 0.55$	0.56	$-0.17 \pm 0.52$	$0.26 \pm 0.56$

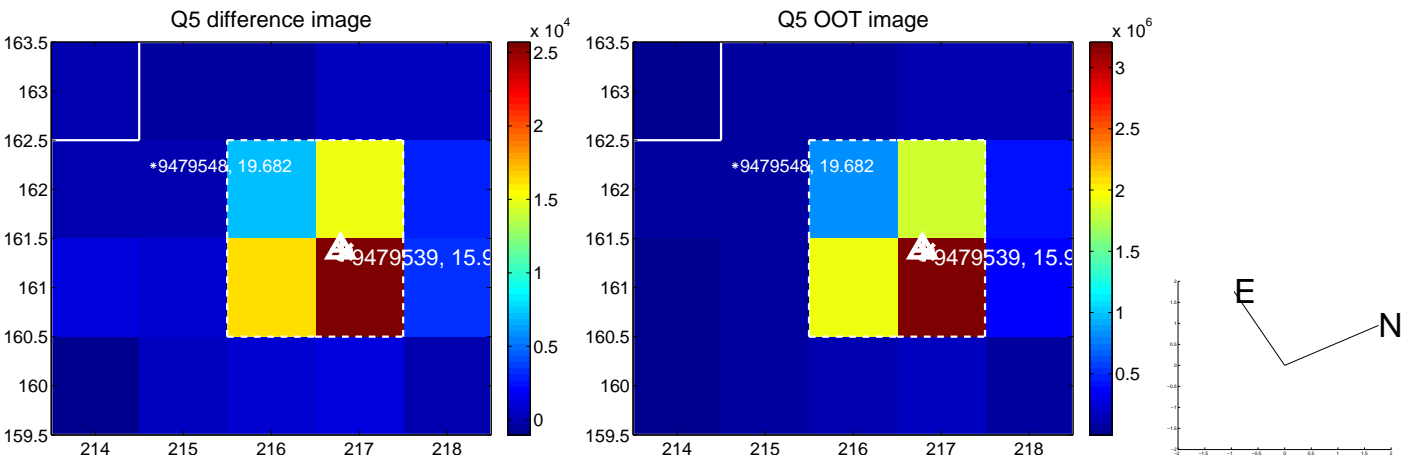


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

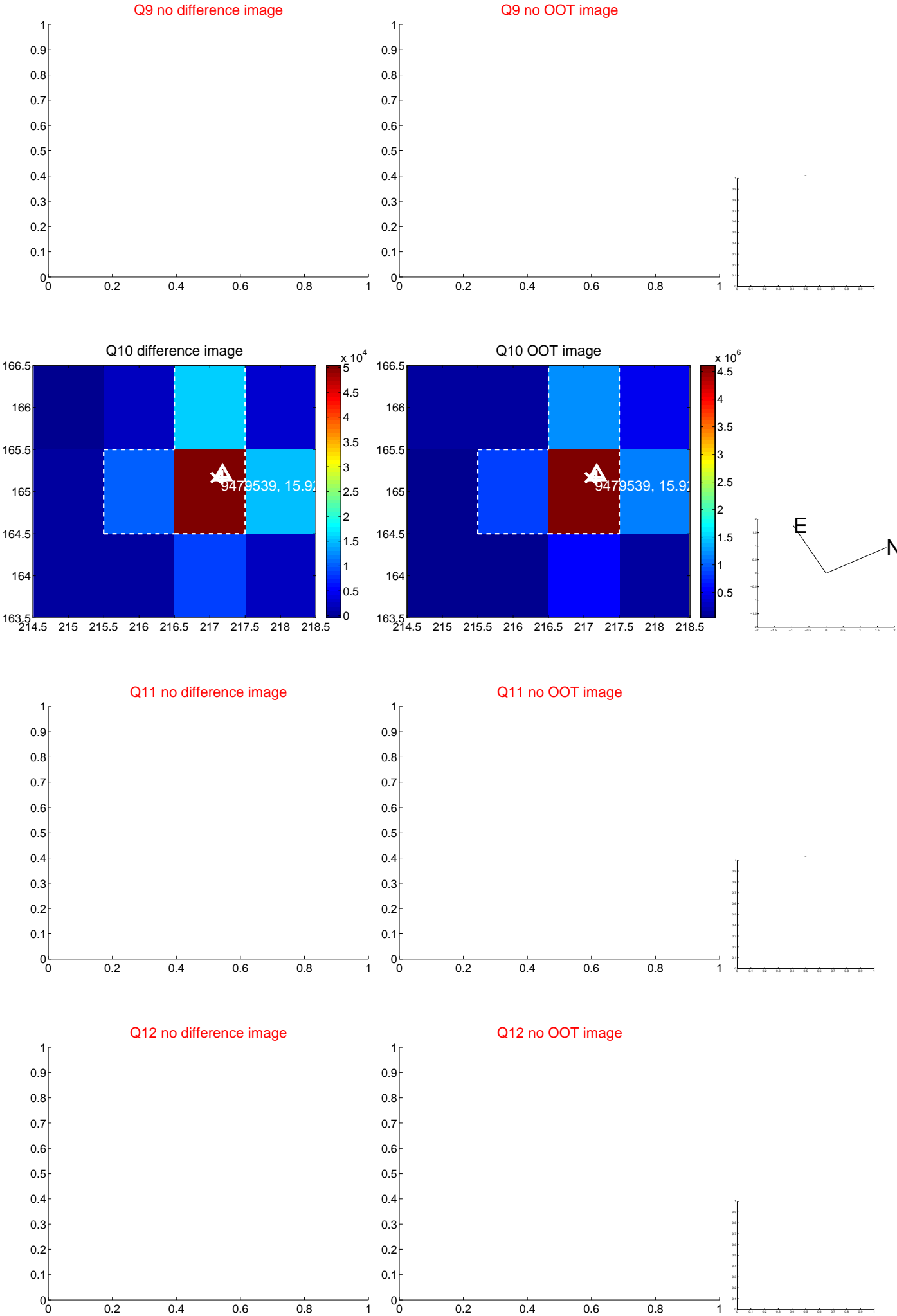
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



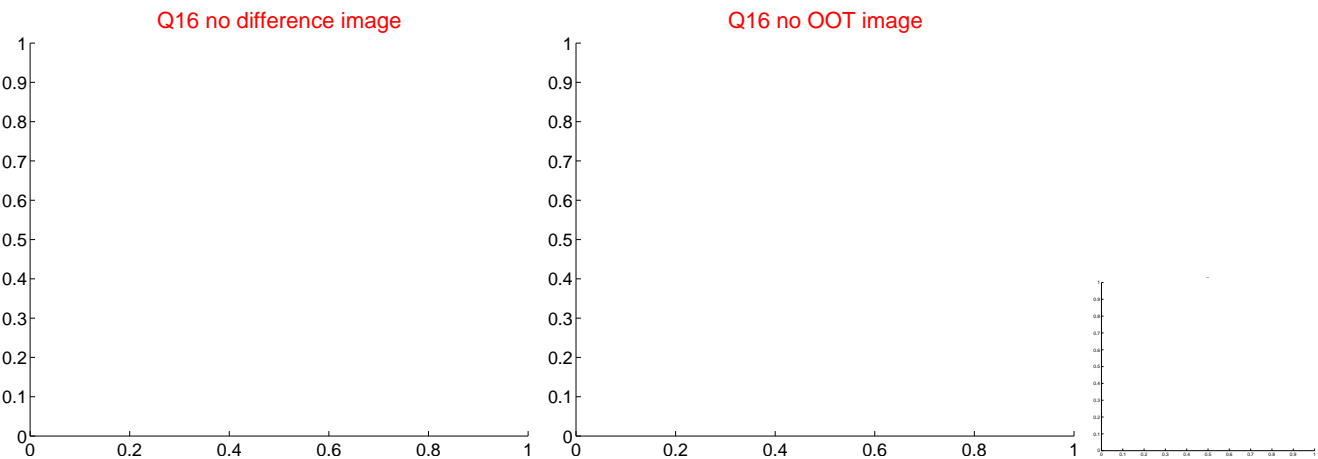
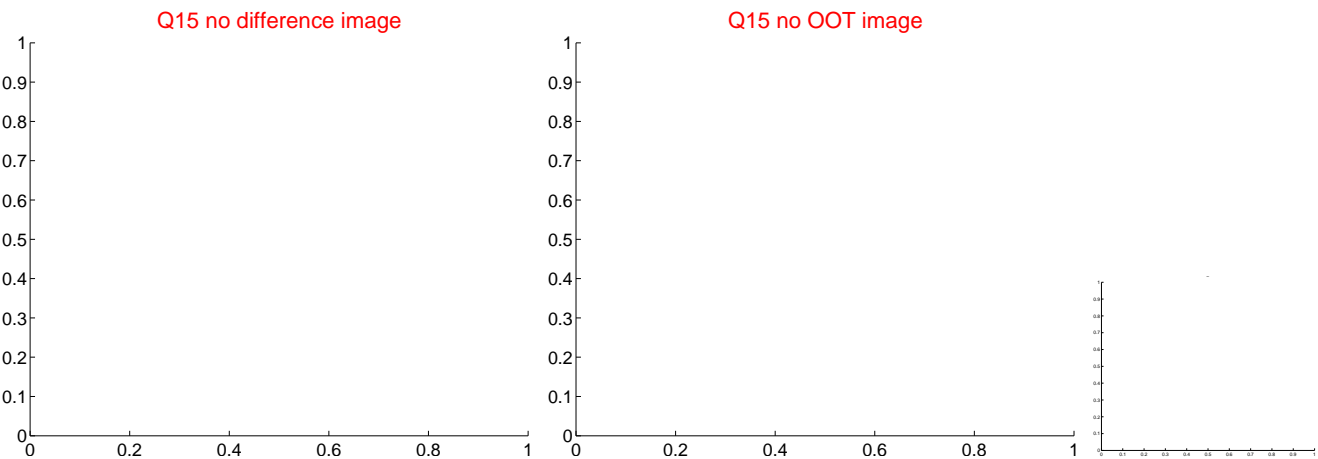
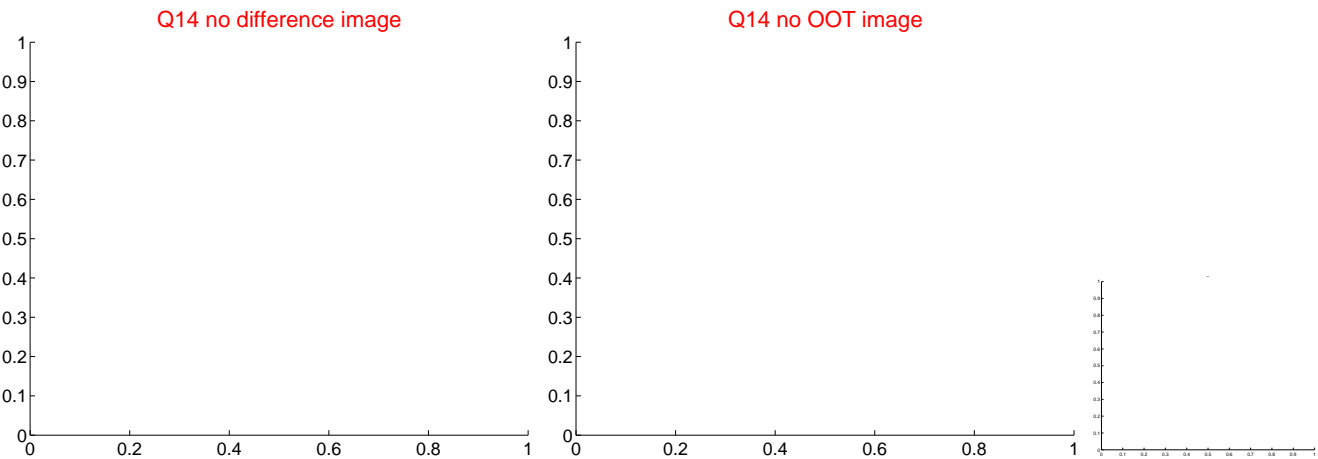
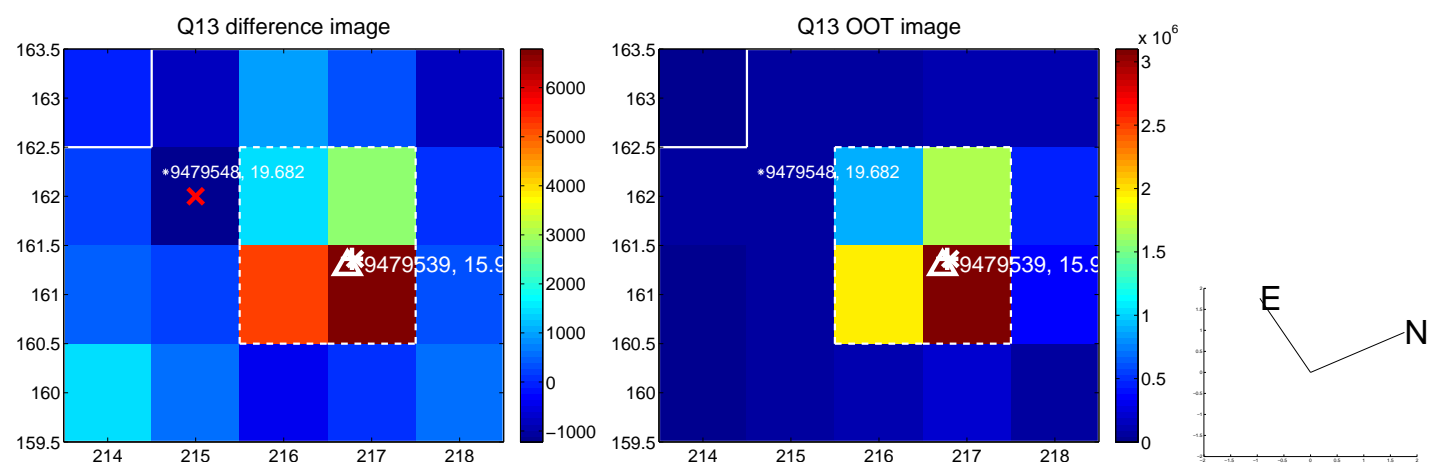
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



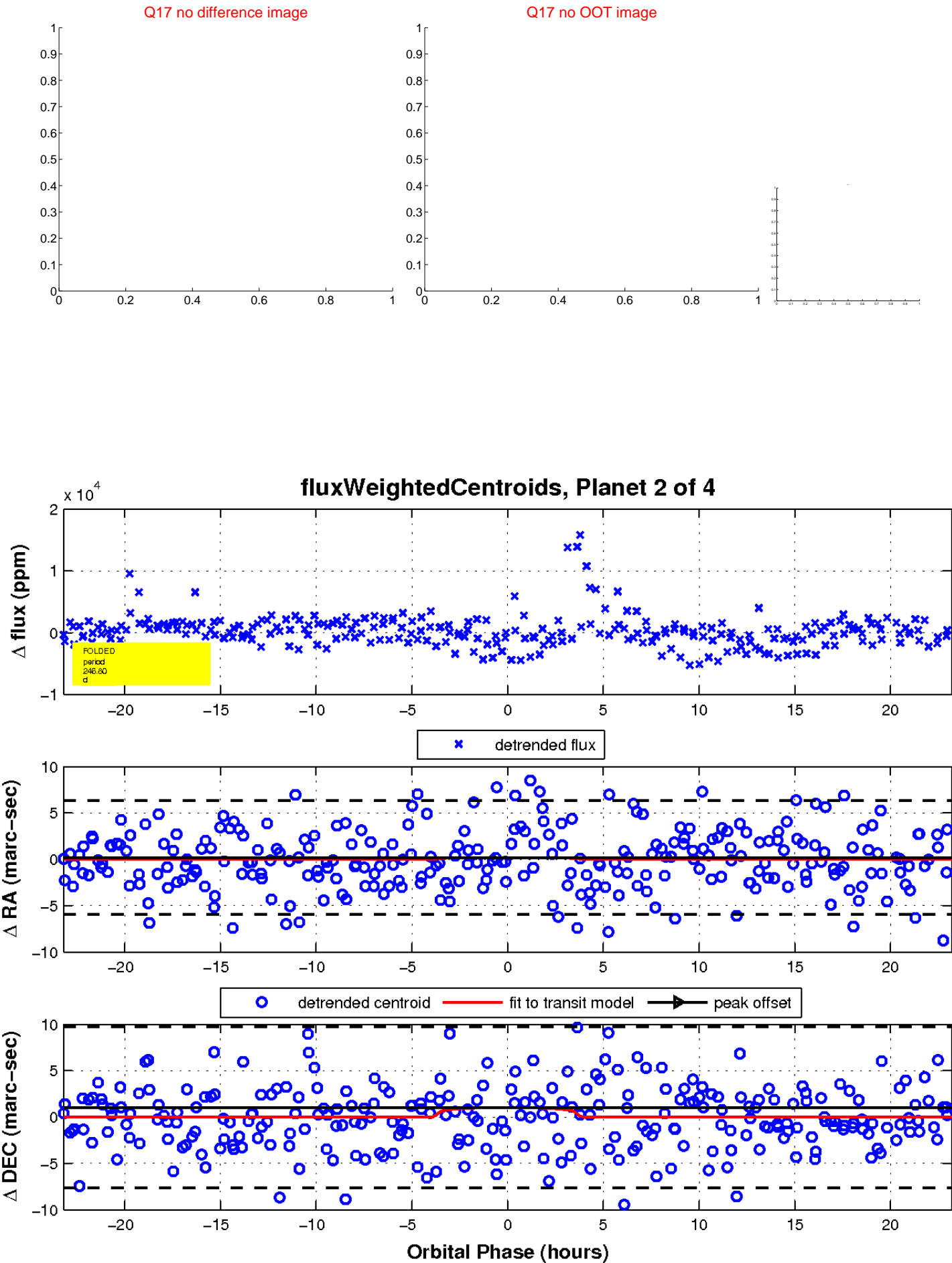
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

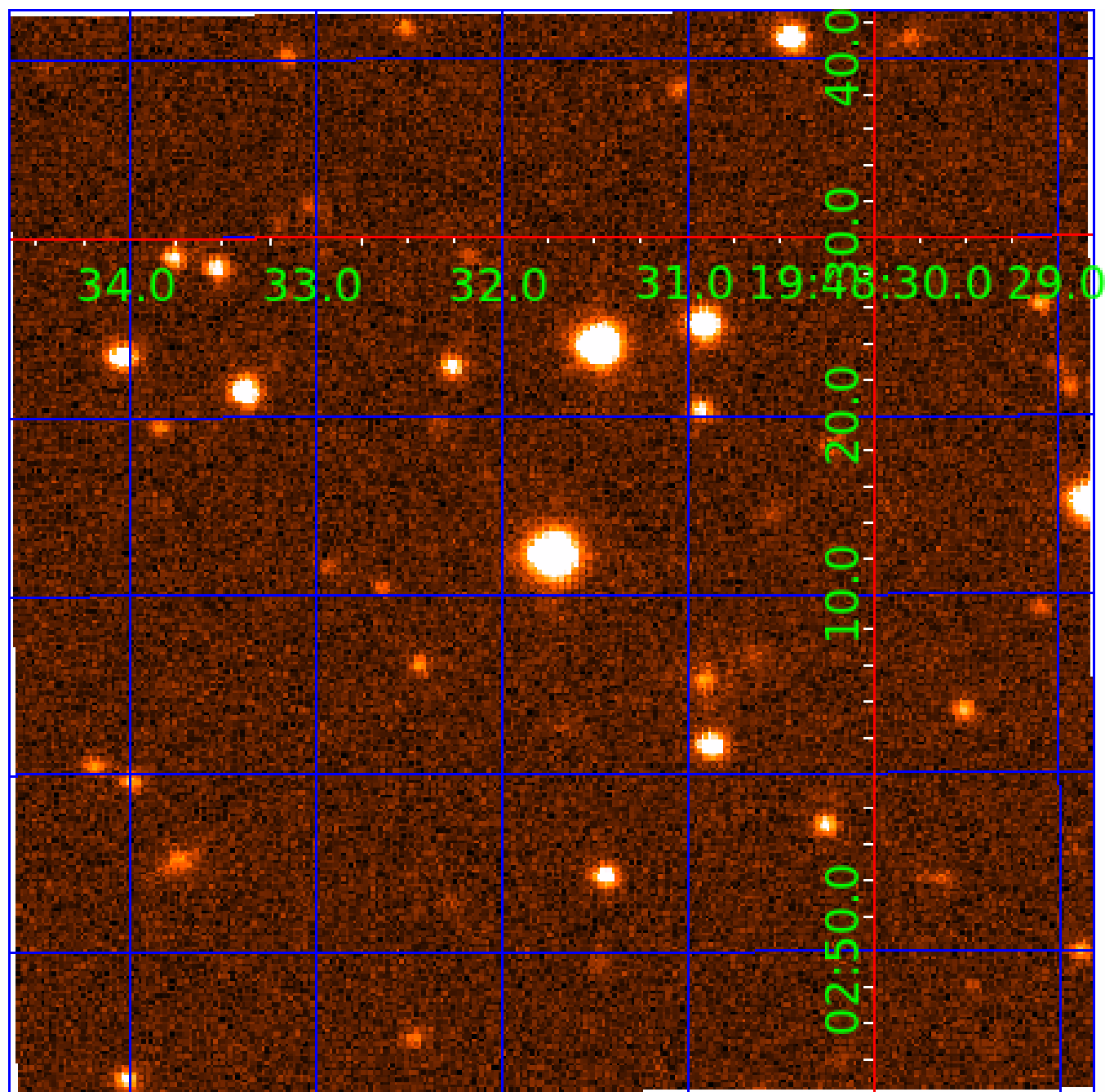


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 009479539

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009479539-01	OBS	No	162.639005	244.790255	5258.5	2.456	15.0	10.6	0.25	3315	1.81	0.05
009479539-02	OBS	No	246.799853	219.538476	3329.3	7.747	13.3	6.0	0.25	3315	1.43	0.03
009479539-03	OBS	No	237.343409	358.737781	4727.6	5.531	13.5	9.5	0.25	3315	2.18	0.03
009479539-04	OBS	No	1.853919	131.933167	10.4	17.403	12.4	0.3	0.25	3315	0.08	20.75

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009479539-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_ZUMA_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009479539-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—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
009479539-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT
009479539-04	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV

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

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

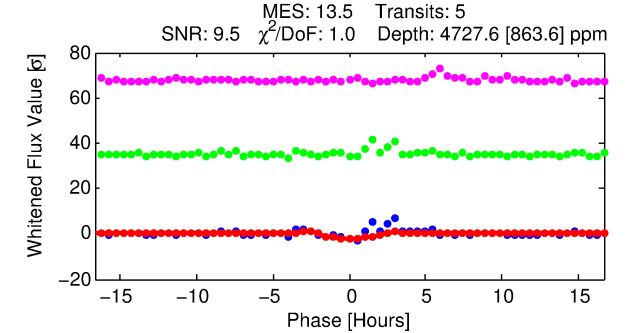
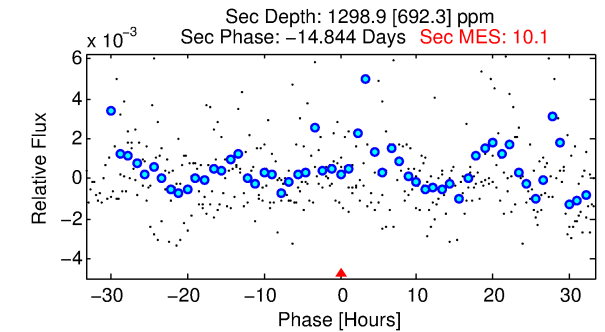
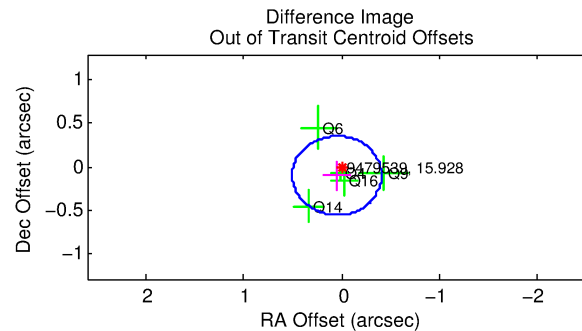
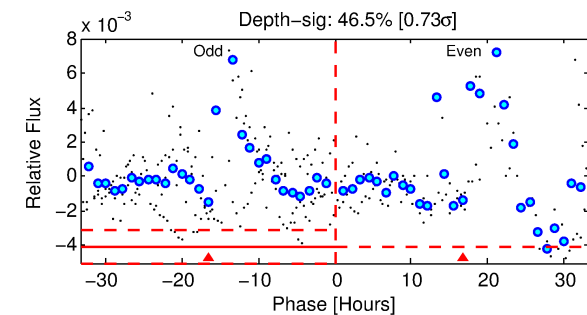
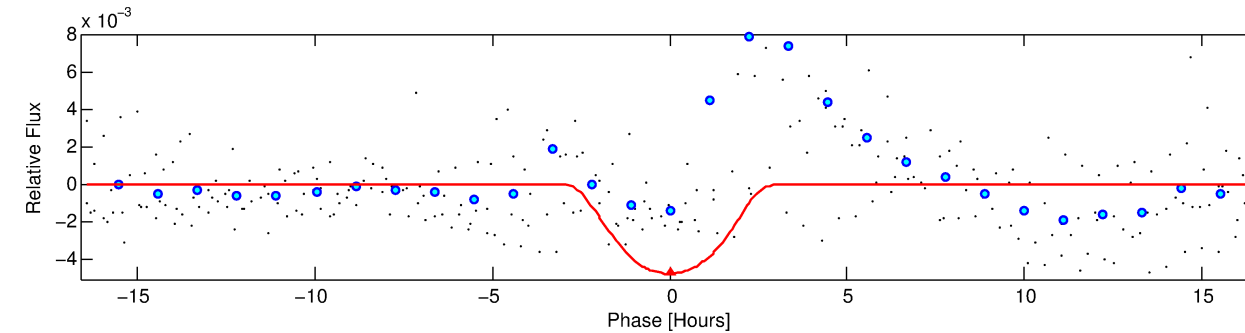
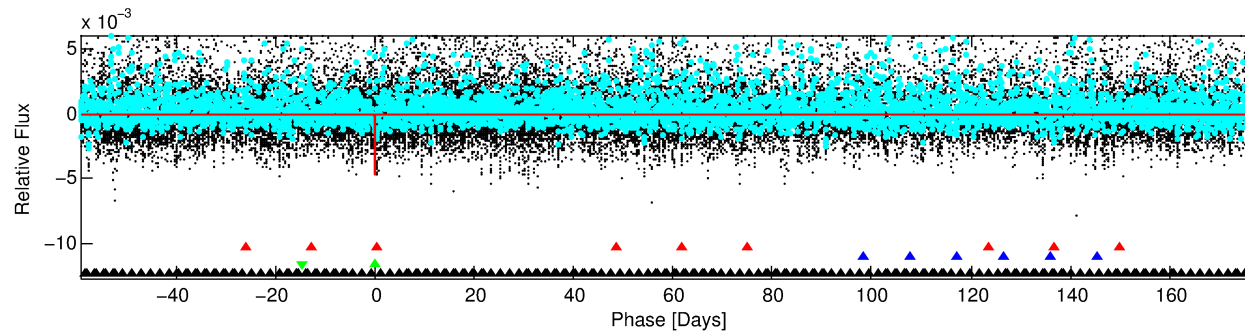
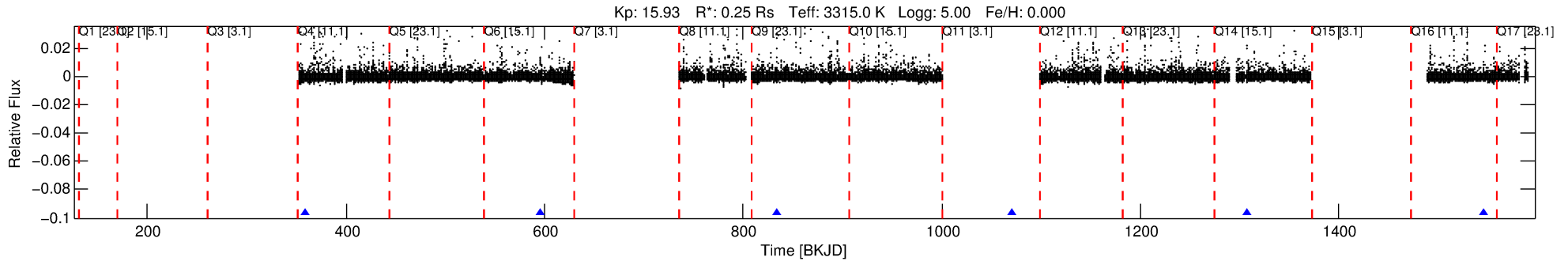
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009479539-03

No Significant Match Found

# DV One-Page Summary

KIC: 9479539 Candidate: 3 of 4 Period: 237.343 d



## DV Fit Results:

Period = 237.34341 [0.00299] d  
Epoch = 358.7378 [0.0089] BKJD  
Rp/R\* = 0.0793 [0.0172]  
a/R\* = 181.58 [31.47]  
b = 0.93 [0.05]  
Seff = 0.03 [0.00]  
Teq = 108 [3] K  
Rp = 2.18 [0.56] Re  
a = 0.4623 [0.0456] AU  
Ag = 32106.30 [22384.59] [1.43σ]  
Teffp = 2235 [385] K [5.52σ]

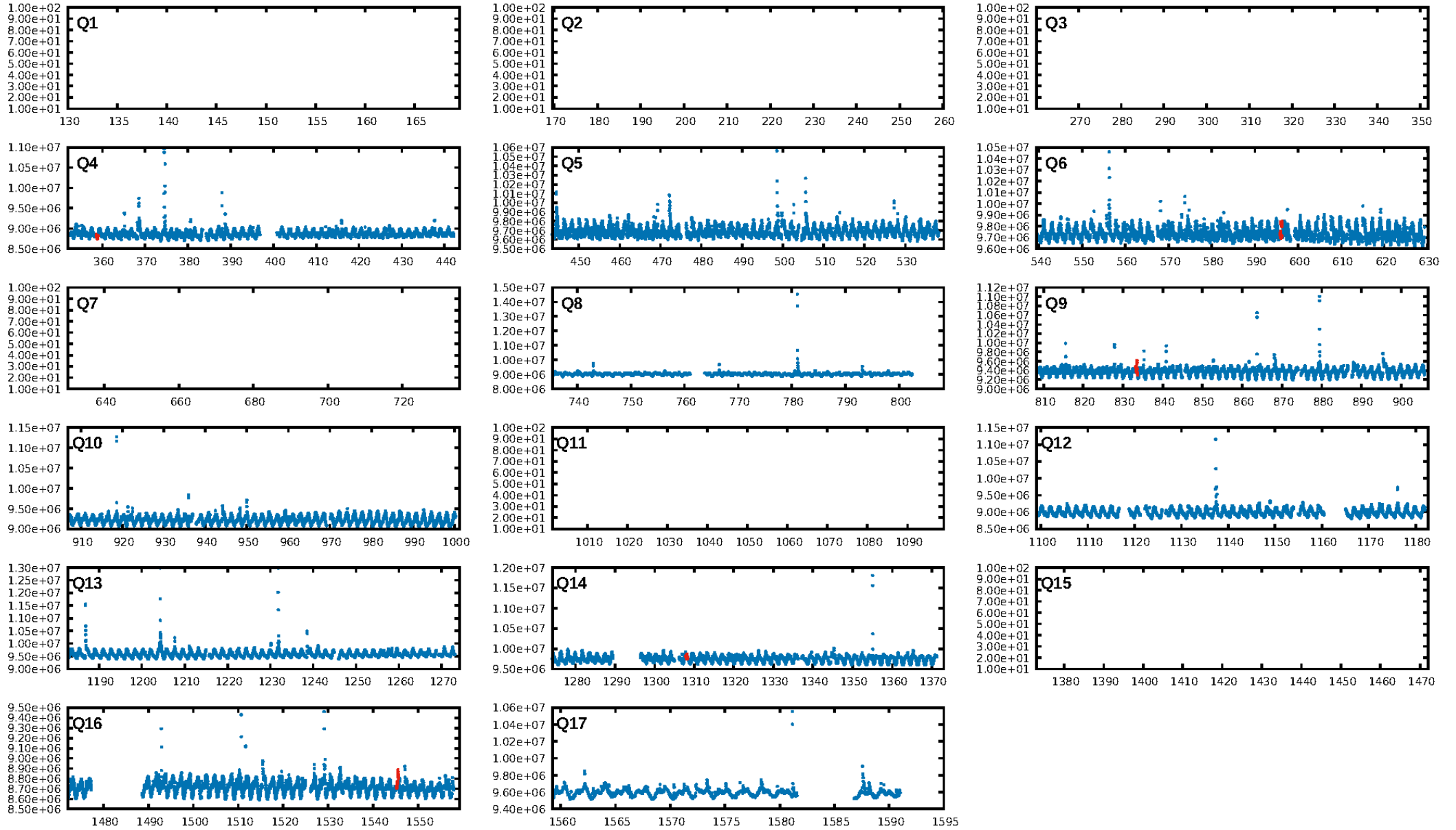
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [296.24σ]  
LongPeriod-sig: 100.0% [23.84σ]  
ModelChiSquare2-sig: 9.9%  
ModelChiSquareGof-sig: 99.8%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: 1.88  
Centroid-sig: 92.6%  
Centroid-so: 0.563 arcsec [1.18σ]  
OotOffset-rm: 0.114 arcsec [0.75σ]  
OotOffset-st: 2/0/2/1 [5]  
KicOffset-rm: 0.124 arcsec [0.88σ]  
KicOffset-st: 2/0/2/1 [5]  
DiffImageQuality-fgm: 0.60 [3/5]  
DiffImageOverlap-fno: 0.00 [0/5]

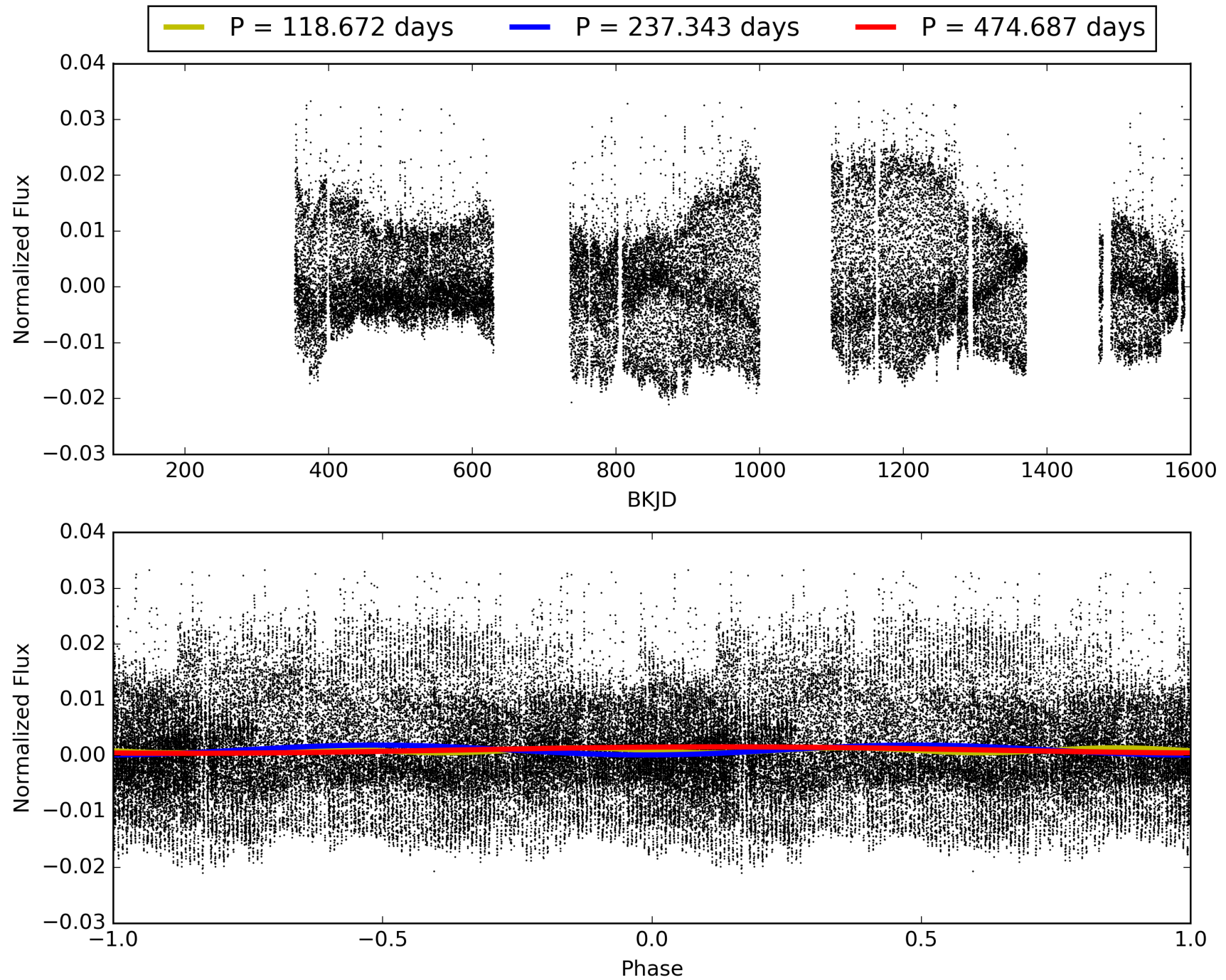
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 10:44:40 Z

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

# TCE 009479539-03, PDC Light Curves

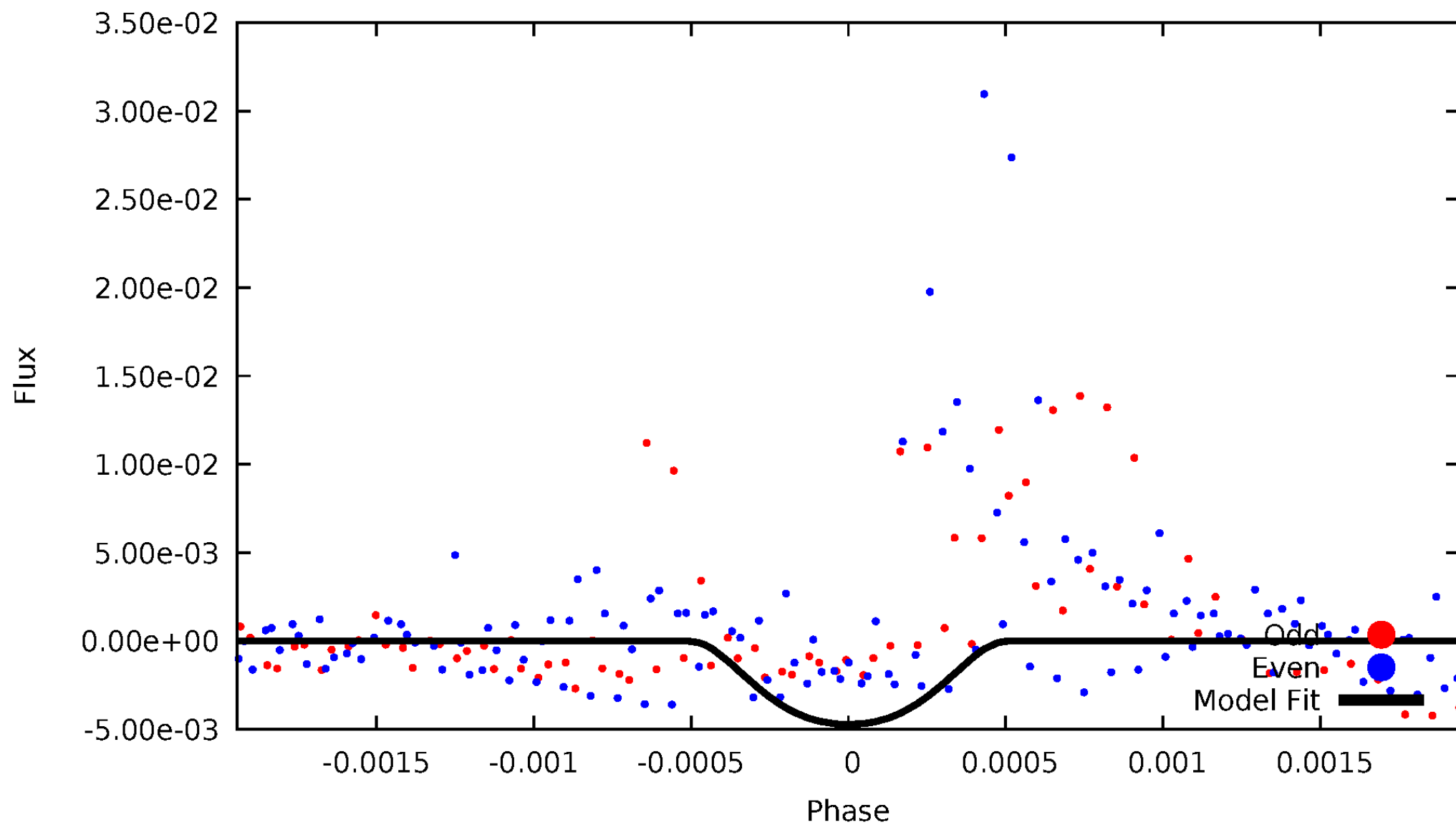


TCE 009479539-03



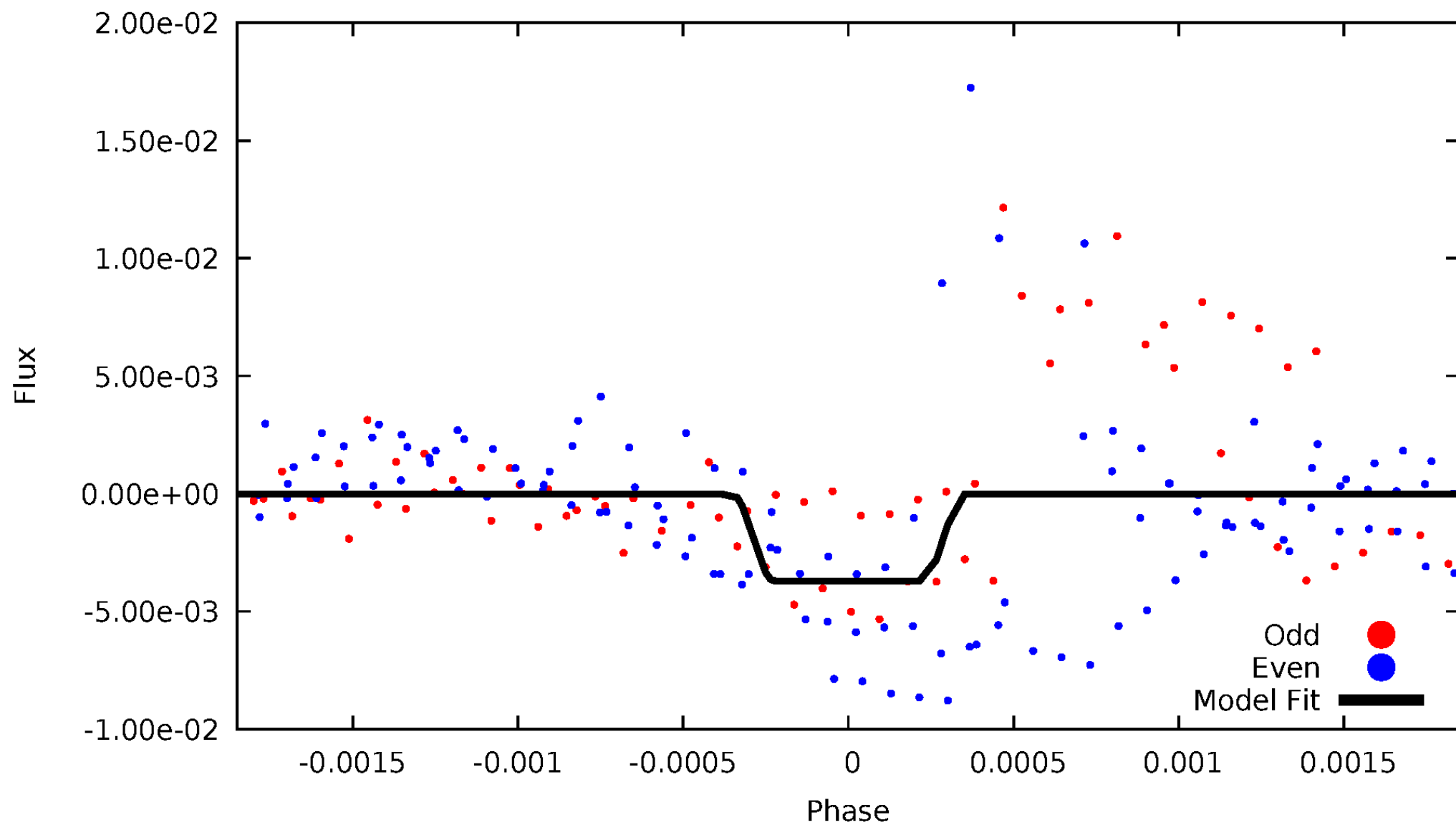
# DV Odd/Even

TCE 009479539-03



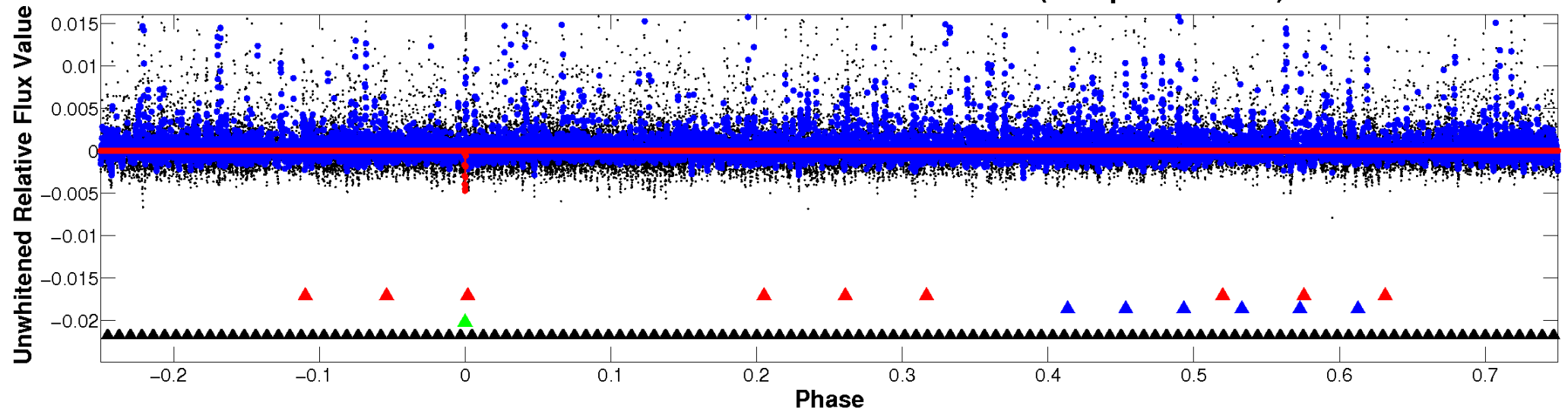
# ALT Odd/Even

TCE 009479539-03

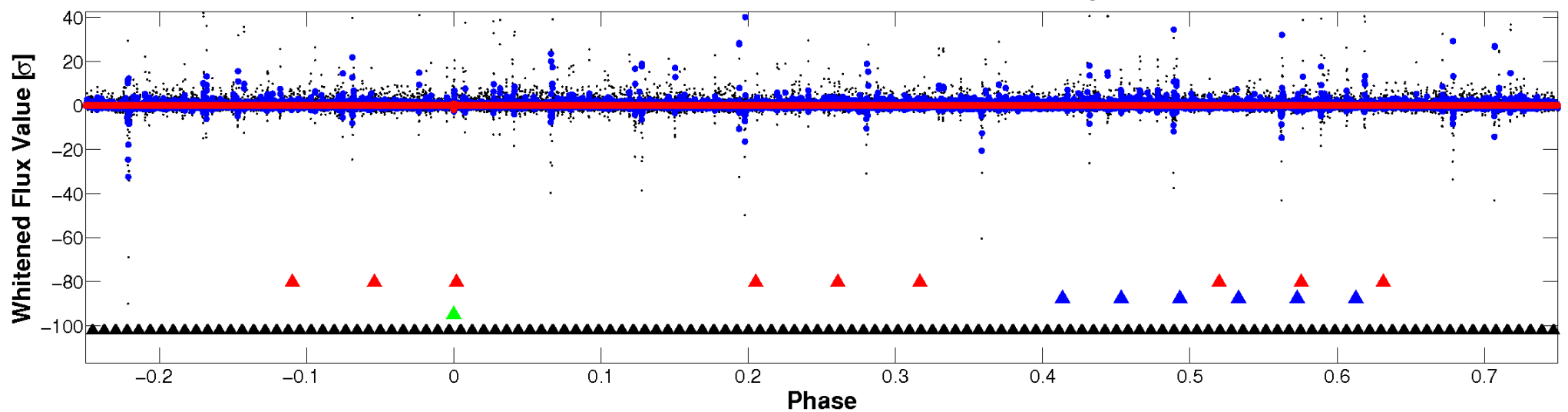


# Non-Whitened Vs. Whitened Light Curve

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

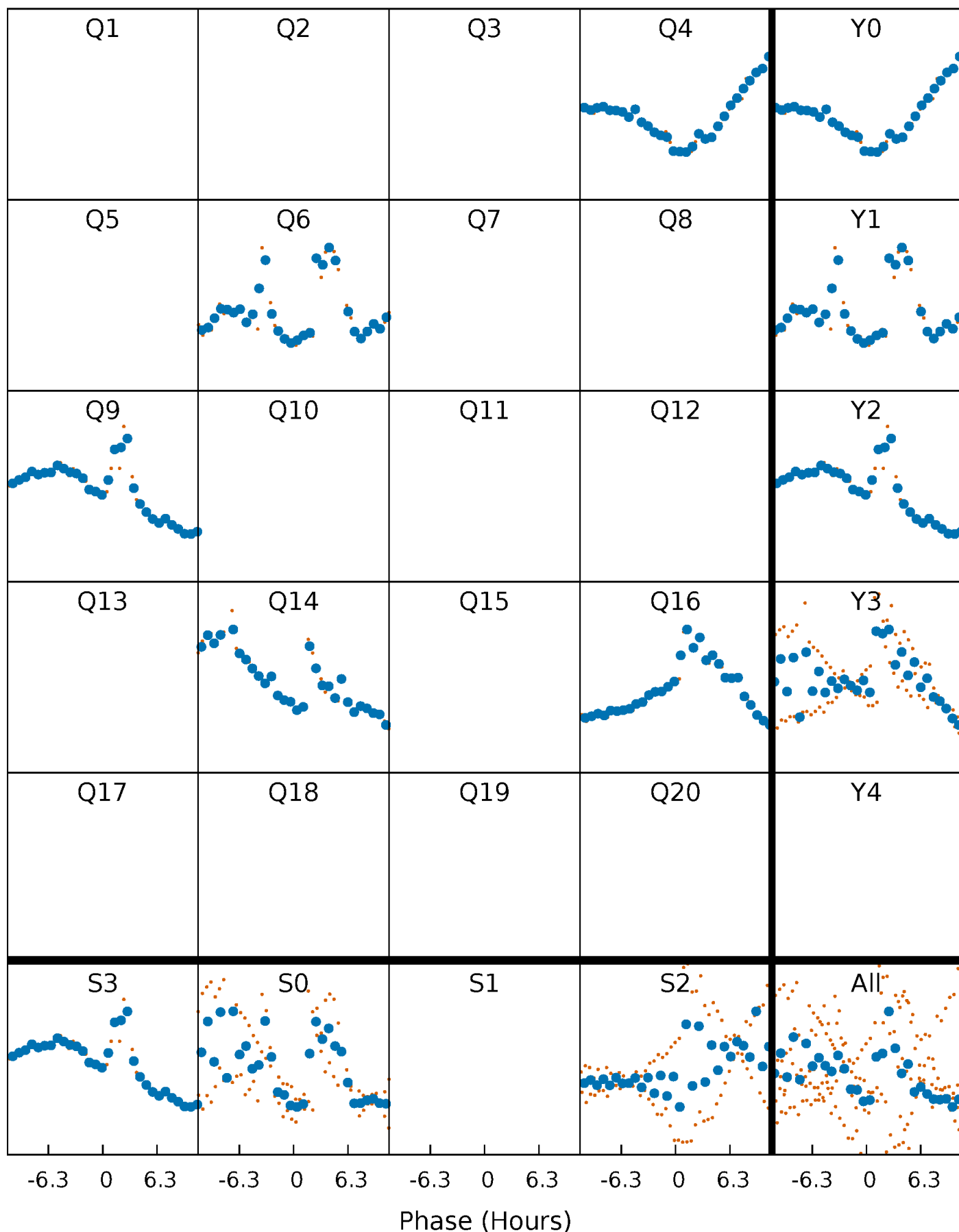


## Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

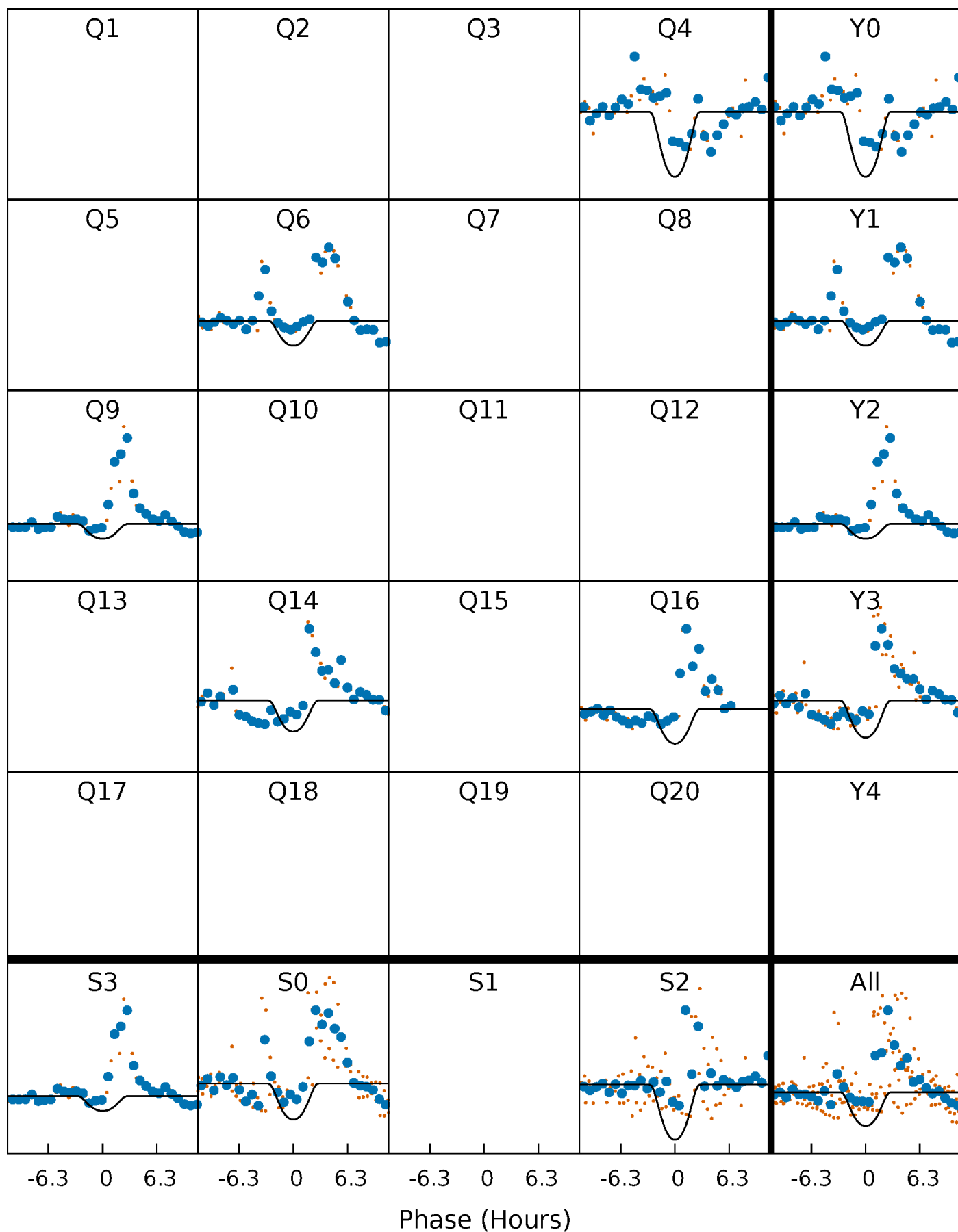
TCE 009479539-03 P=237.343409 Days  $T_0=358.737781$  (BKJD)





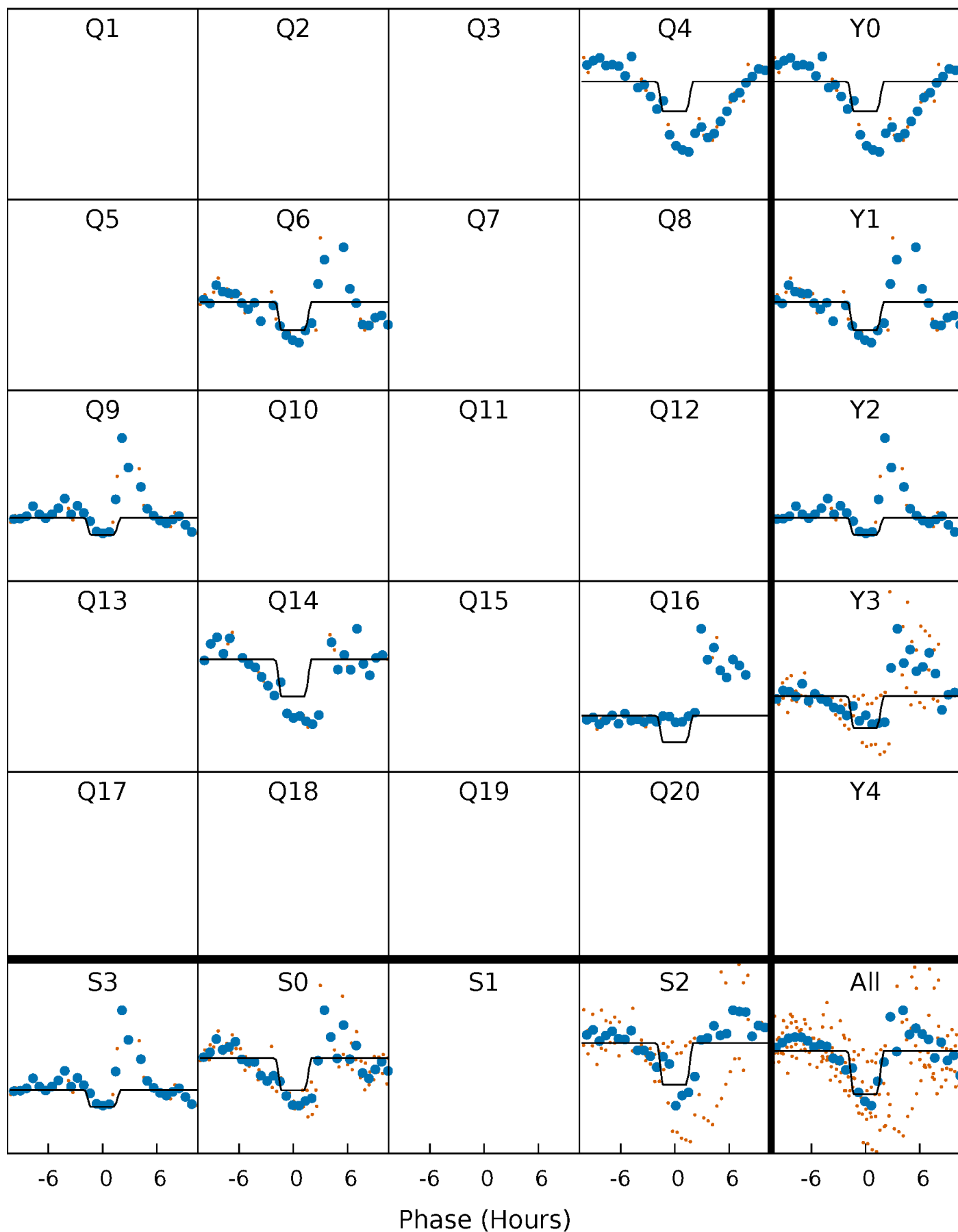
# DV Quarter-Phased Transit Curves

TCE 009479539-03 P=237.343409 Days  $T_0=358.737781$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

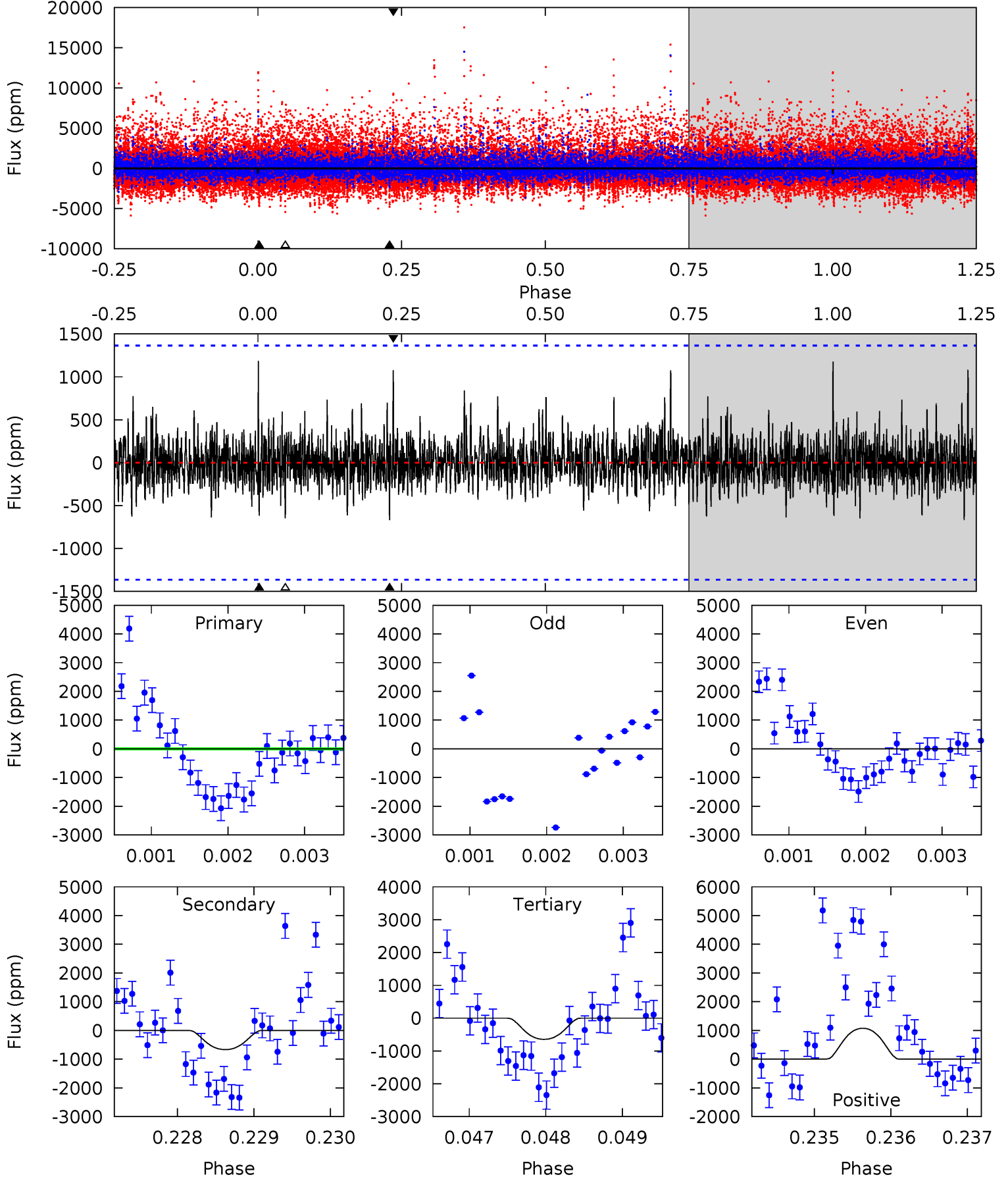
TCE 009479539-03 P=237.328156 Days  $T_0=358.741988$  (BKJD)



# DV Model-Shift Uniqueness Test

009479539-03, P = 237.343409 Days, E = 121.394372 Days

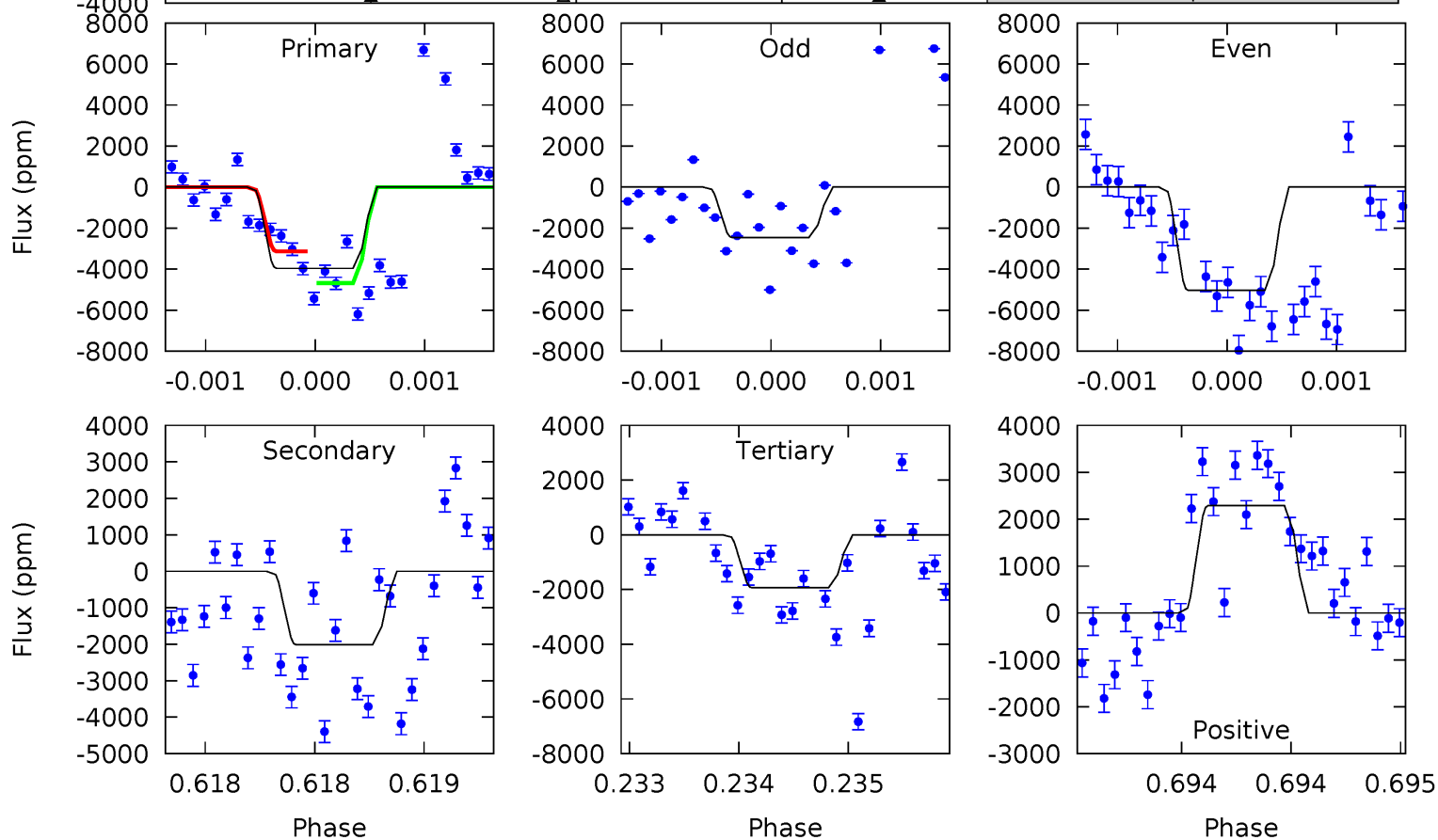
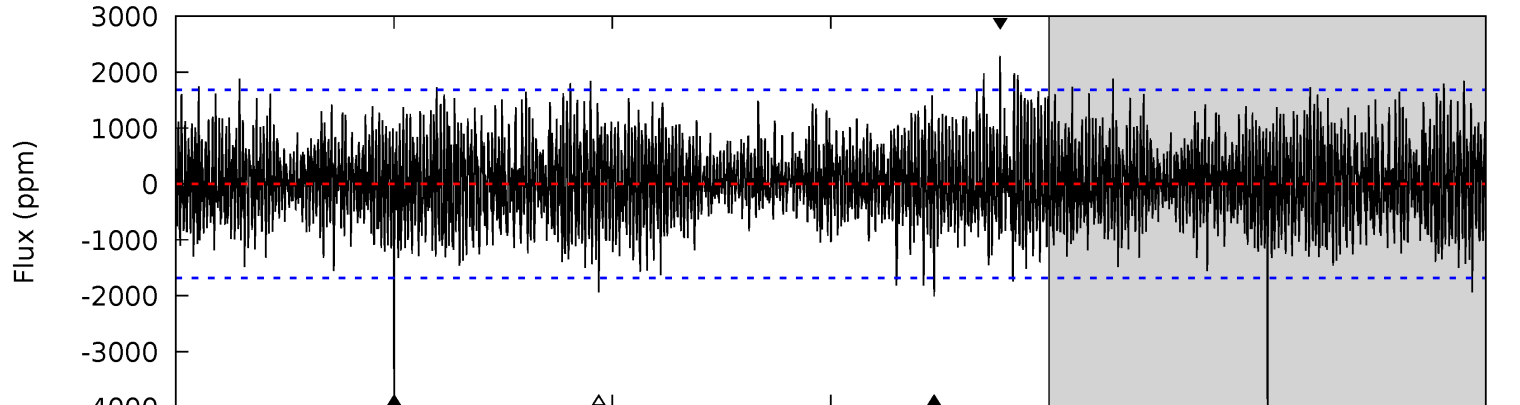
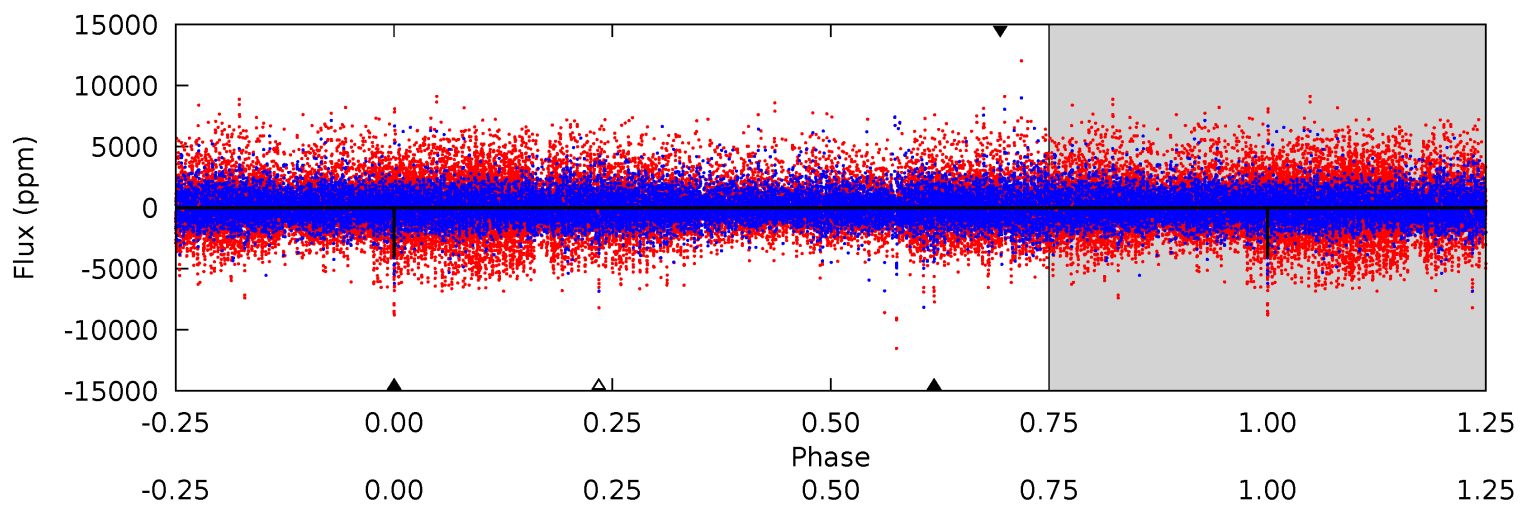
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
2.46	2.66	2.58	4.29	5.44	3.27	0.83	-0.12	-1.83	0.08	-1.63	0.37	-1.09	0.64	1.99



# Alt Model-Shift Uniqueness Test

009479539-03, P = 237.328156 Days, E = 121.413832 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
13.0	6.61	6.37	7.53	5.53	3.42	2.04	6.66	5.50	0.25	-0.91	4.00	0.85	0.37	2.57



### Stellar Parameters For KIC 009479539

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3315^{+43}_{-39}$	$5.004^{+0.044}_{-0.040}$	$0.000^{+0.100}_{-0.100}$	$0.252^{+0.035}_{-0.029}$	$0.233^{+0.043}_{-0.029}$	$20.580^{+5.047}_{-4.056}$
	+1%/-1%	+1%/-1%	+inf%/-inf%	+14%/-12%	+18%/-12%	+25%/-20%
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 009479539-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-667 \pm 251$	$2.17^{+0.51}_{-0.51}$	$151^{+4}_{-3}$	$2453^{+198}_{-164}$	$16861^{+13718}_{-8006}$
Alt.	$-2011 \pm 304$	$1.68^{+0.50}_{-0.46}$	$151^{+4}_{-3}$	$3036^{+313}_{-227}$	$83688^{+81118}_{-34968}$

$T_{\text{max}}$  = 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

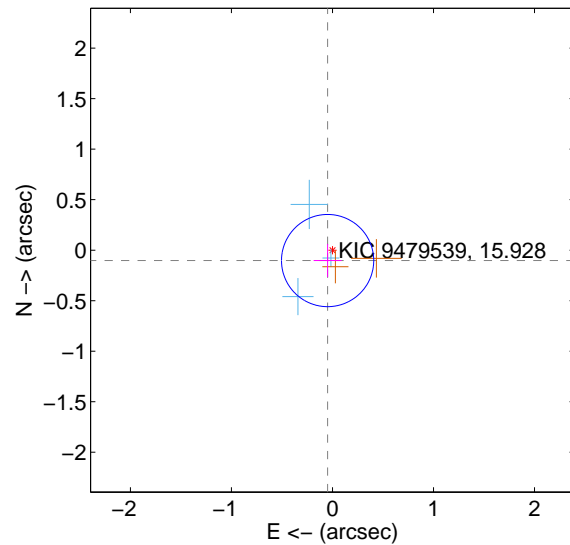
Supplemental centroid analysis for 009479539-03. Kepler magnitude: 15.93. Transit SNR 9.48

There are 3 quarters with good PRF difference image offsets

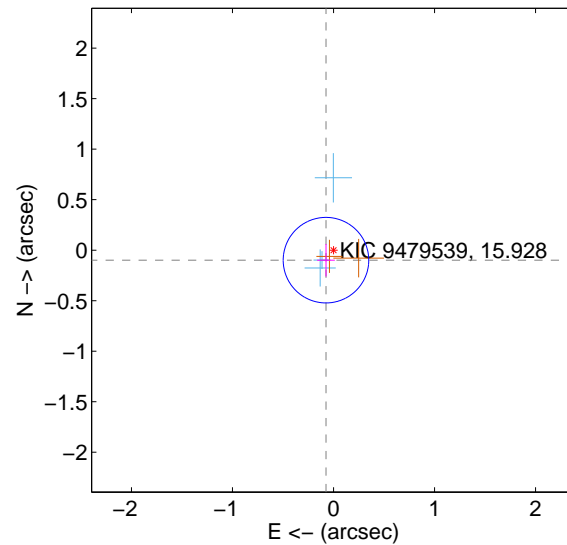
The direct PRF centroid is offset from the target star catalog position by about 0.12 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.114 \pm 0.152$	0.75	$0.048 \pm 0.138$	$-0.103 \pm 0.165$
PRF-fit source offset from KIC position	$0.124 \pm 0.141$	0.88	$0.075 \pm 0.088$	$-0.099 \pm 0.161$
photometric centroid source offset	$0.56 \pm 0.48$	1.18	$-0.21 \pm 0.34$	$0.52 \pm 0.50$

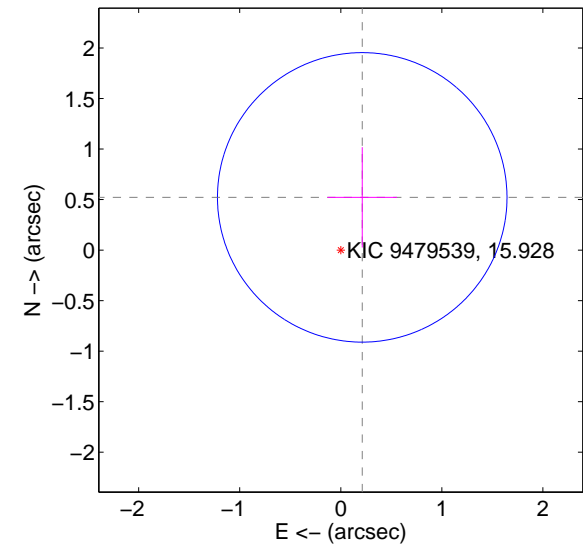
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

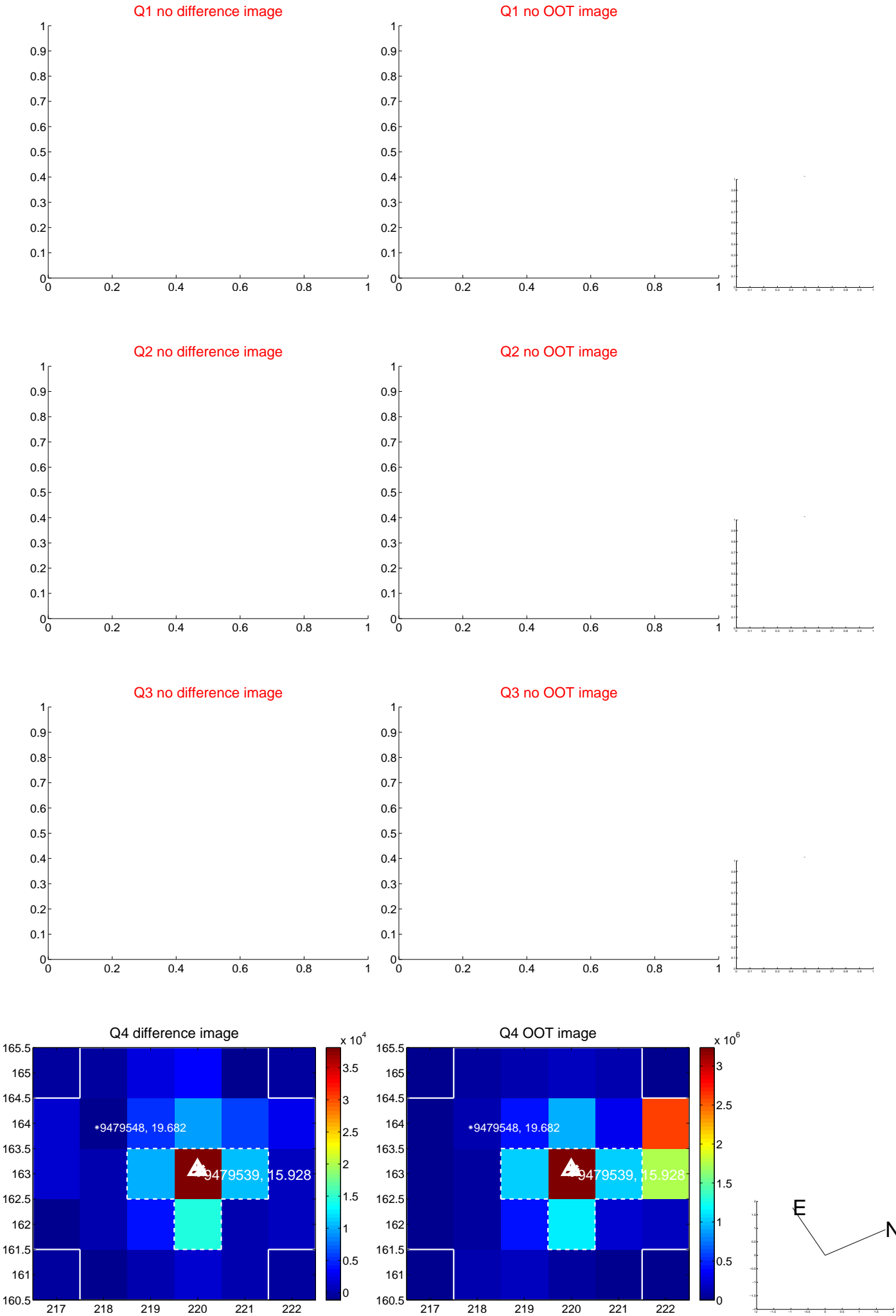


offset from photometric centroids



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.

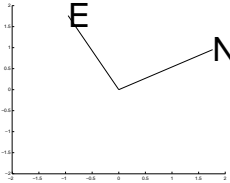
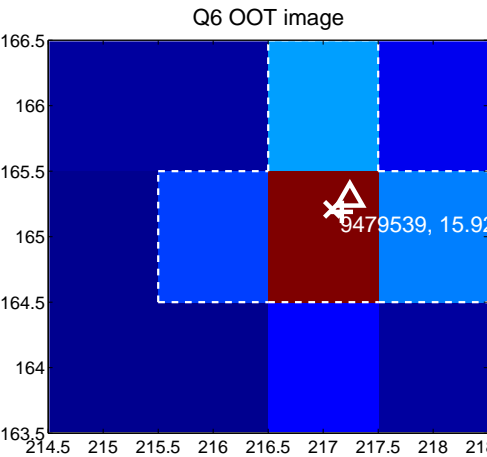
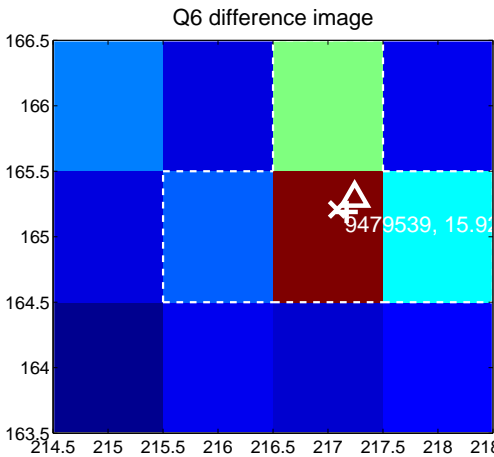


white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.

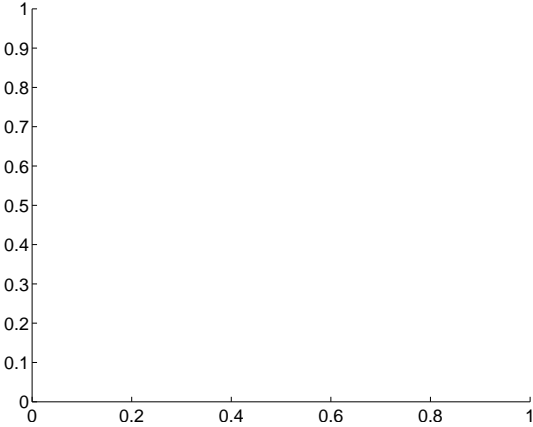
Q5 no difference image



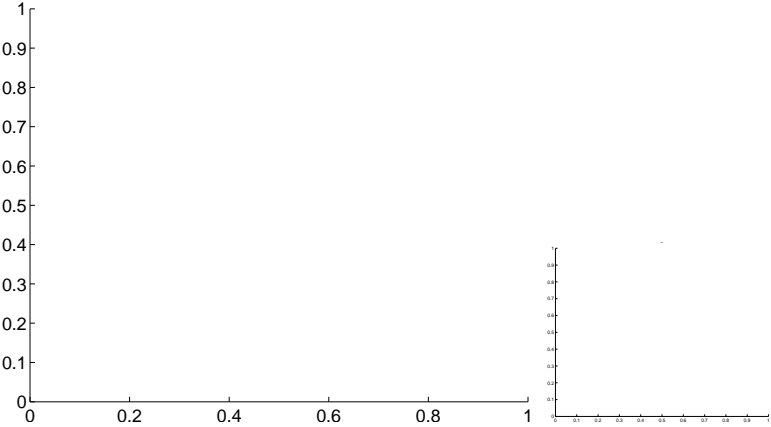
Q5 no OOT image



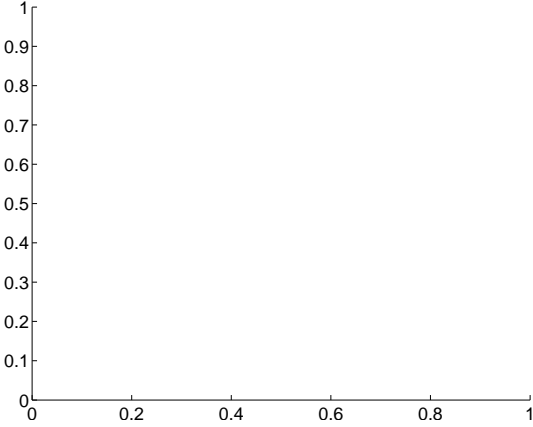
Q7 no difference image



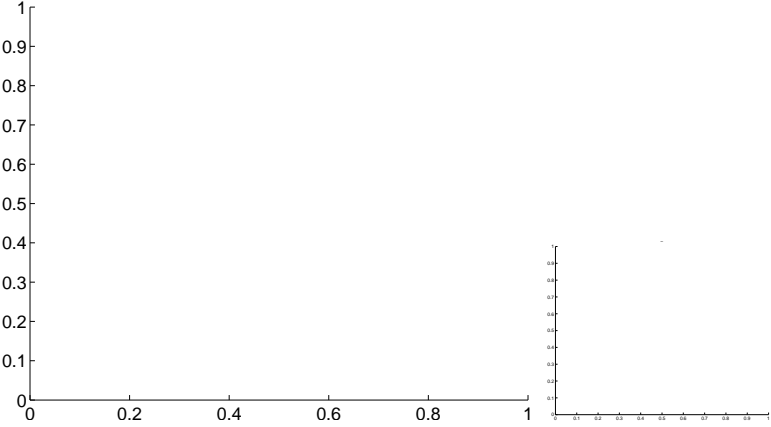
Q7 no OOT image



Q8 no difference image

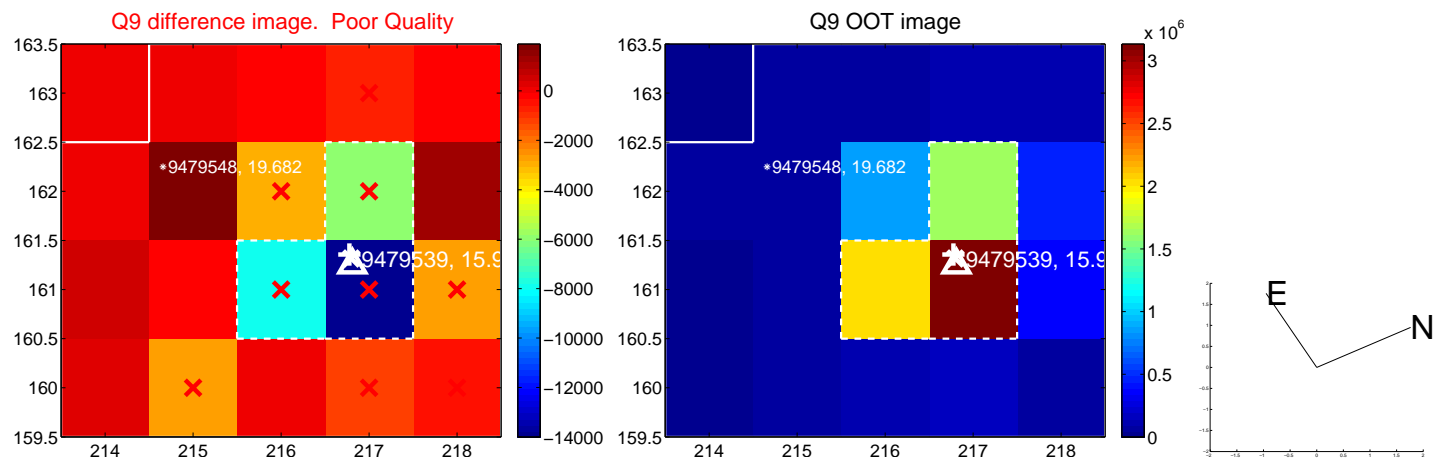


Q8 no OOT image

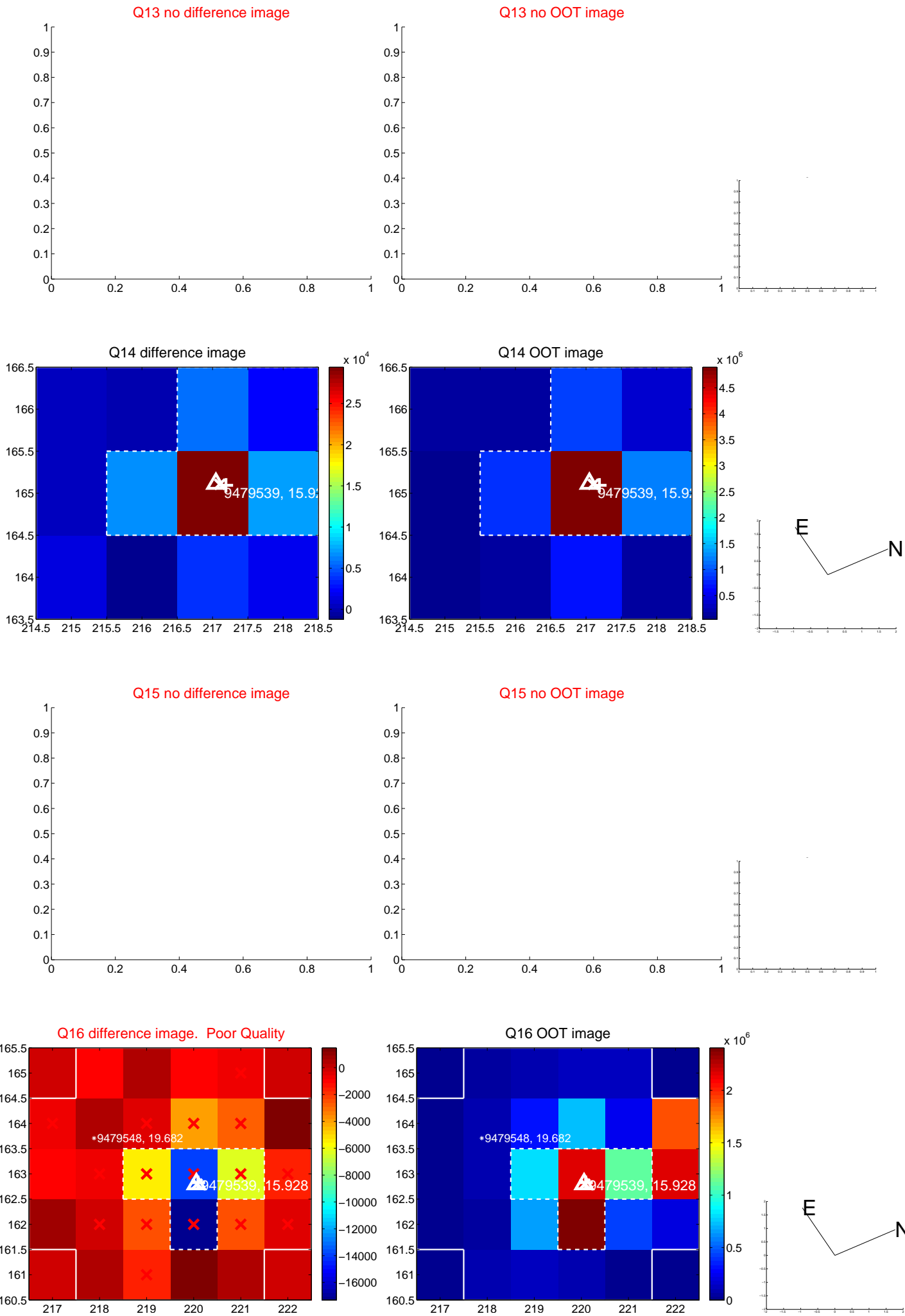




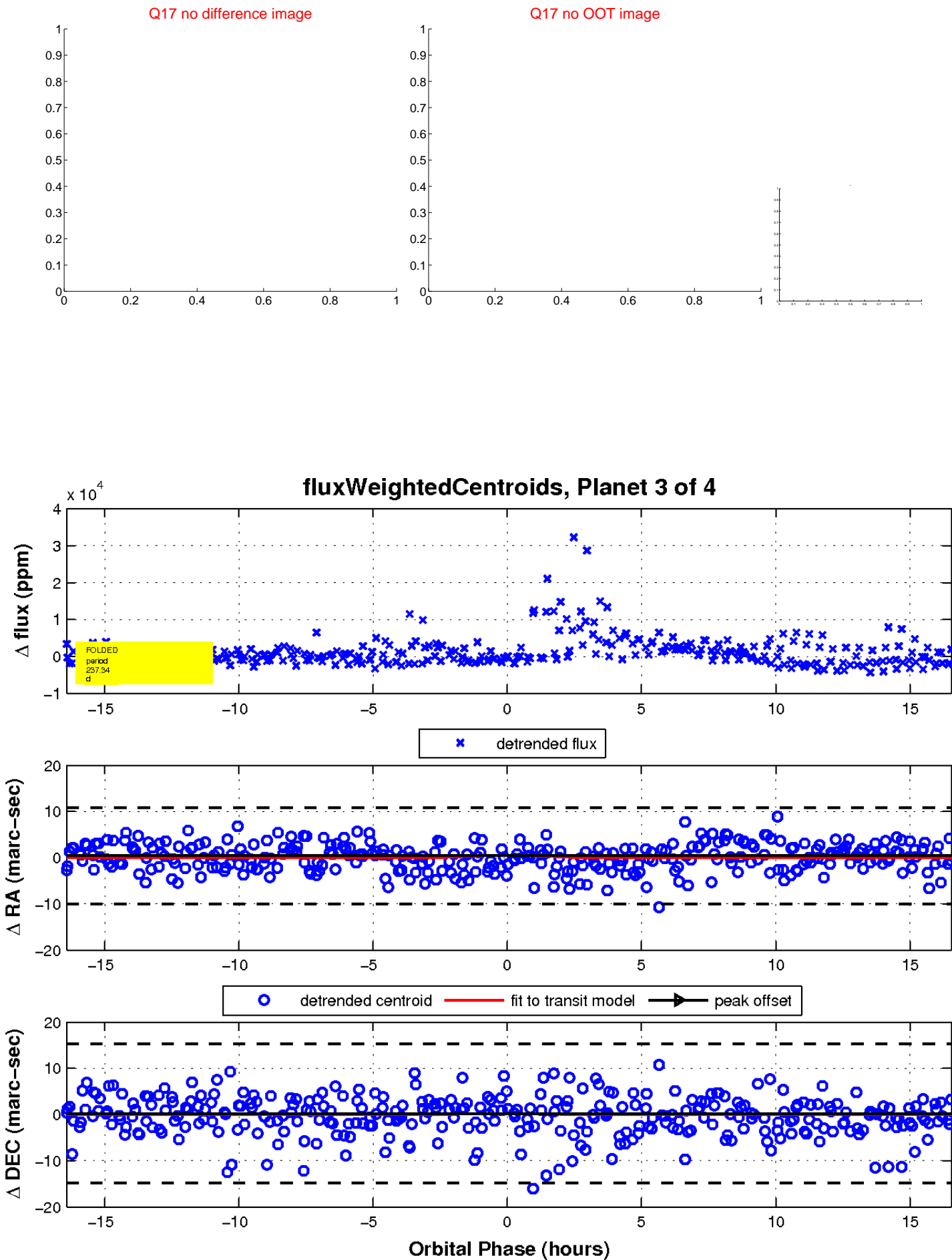
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.



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

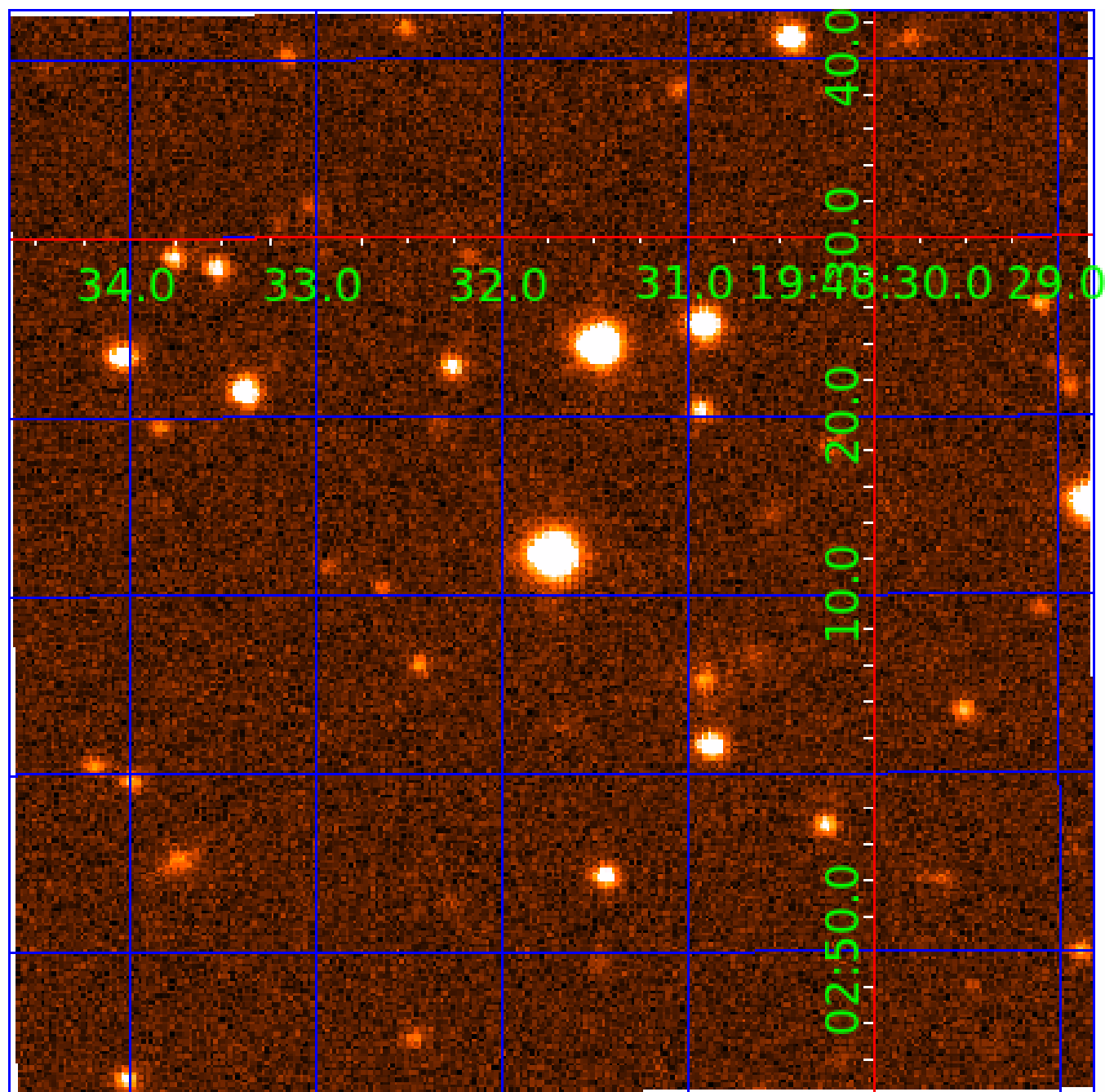


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 009479539

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009479539-01	OBS	No	162.639005	244.790255	5258.5	2.456	15.0	10.6	0.25	3315	1.81	0.05
009479539-02	OBS	No	246.799853	219.538476	3329.3	7.747	13.3	6.0	0.25	3315	1.43	0.03
009479539-03	OBS	No	237.343409	358.737781	4727.6	5.531	13.5	9.5	0.25	3315	2.18	0.03
009479539-04	OBS	No	1.853919	131.933167	10.4	17.403	12.4	0.3	0.25	3315	0.08	20.75

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009479539-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_ZUMA_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009479539-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—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
009479539-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT
009479539-04	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV

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

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

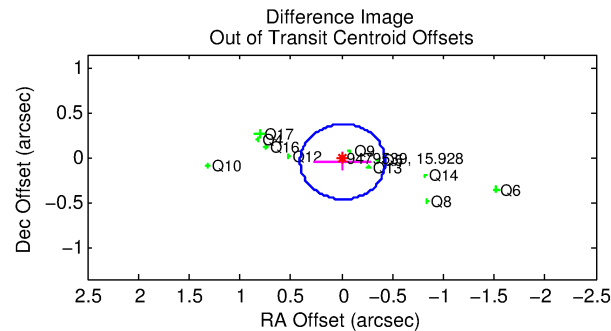
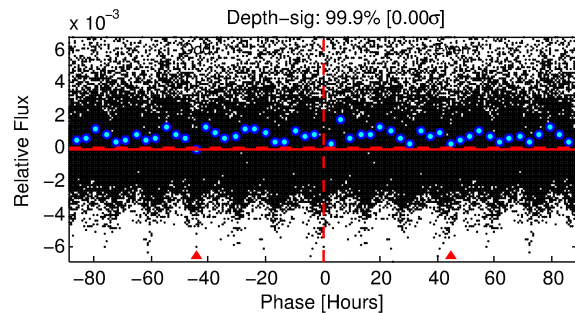
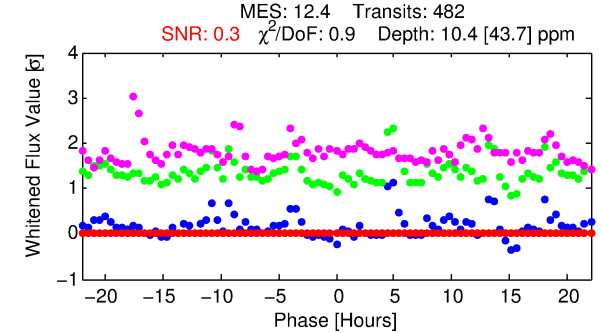
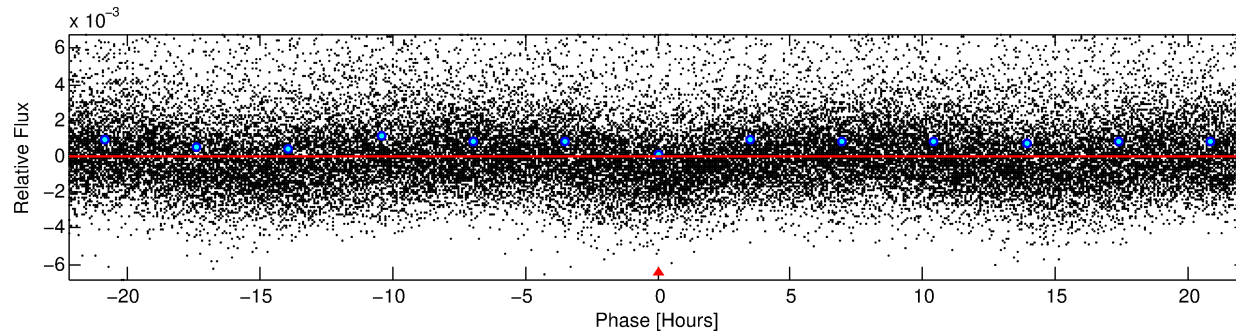
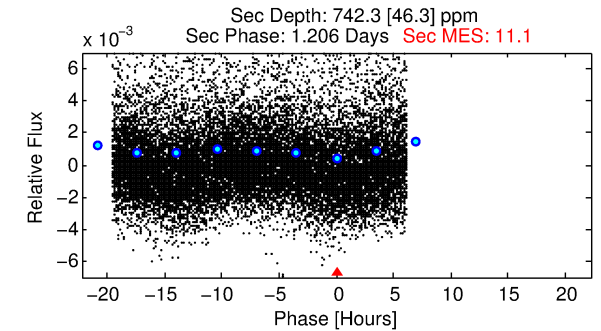
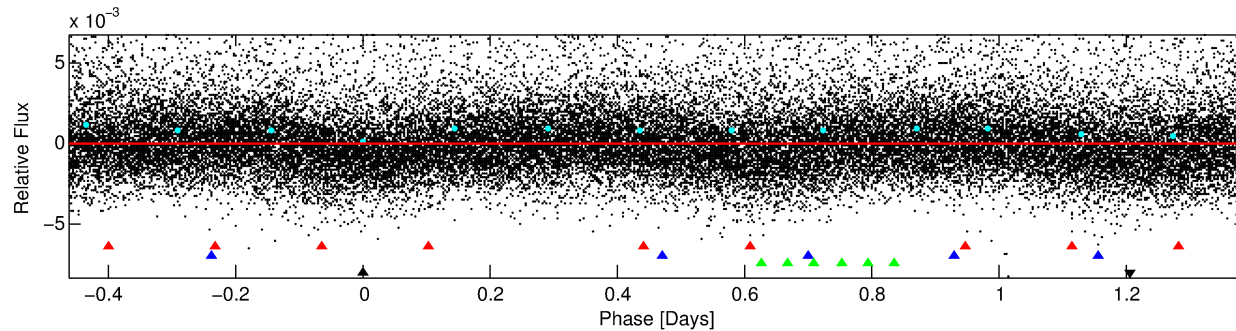
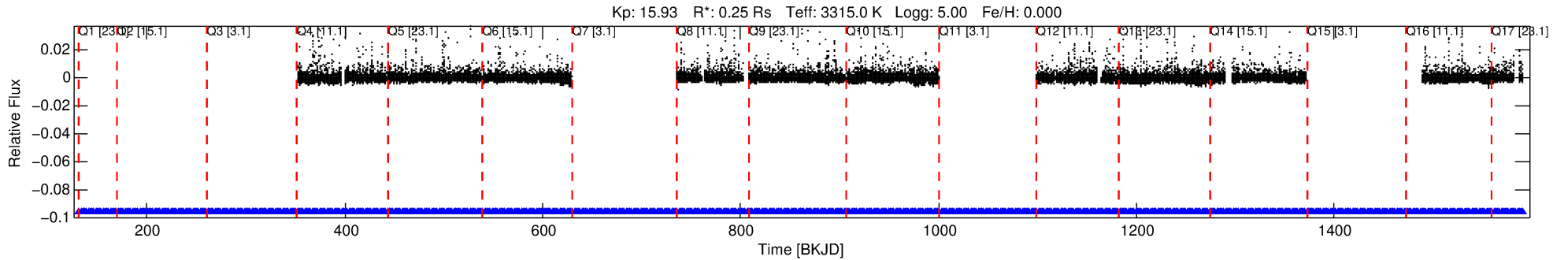
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 009479539-04

No Significant Match Found

# DV One-Page Summary

KIC: 9479539 Candidate: 4 of 4 Period: 1.854 d



## DV Fit Results:

Period = 1.85392 [0.00090] d  
Epoch = 131.9332 [0.2033] BKJD  
Rp/R\* = 0.0029 [0.1253]  
a/R\* = 1.06 [23.53]  
b = 0.04 [4290.73]  
Seff = 20.75 [2.61]  
Teq = 544 [17] K  
Rp = 0.08 [3.45] Re  
a = 0.0182 [0.0018] AU  
Ag = 21148.95 [1822433.11] [0.01σ]  
Teffp = 10147 [218593] K [0.04σ]

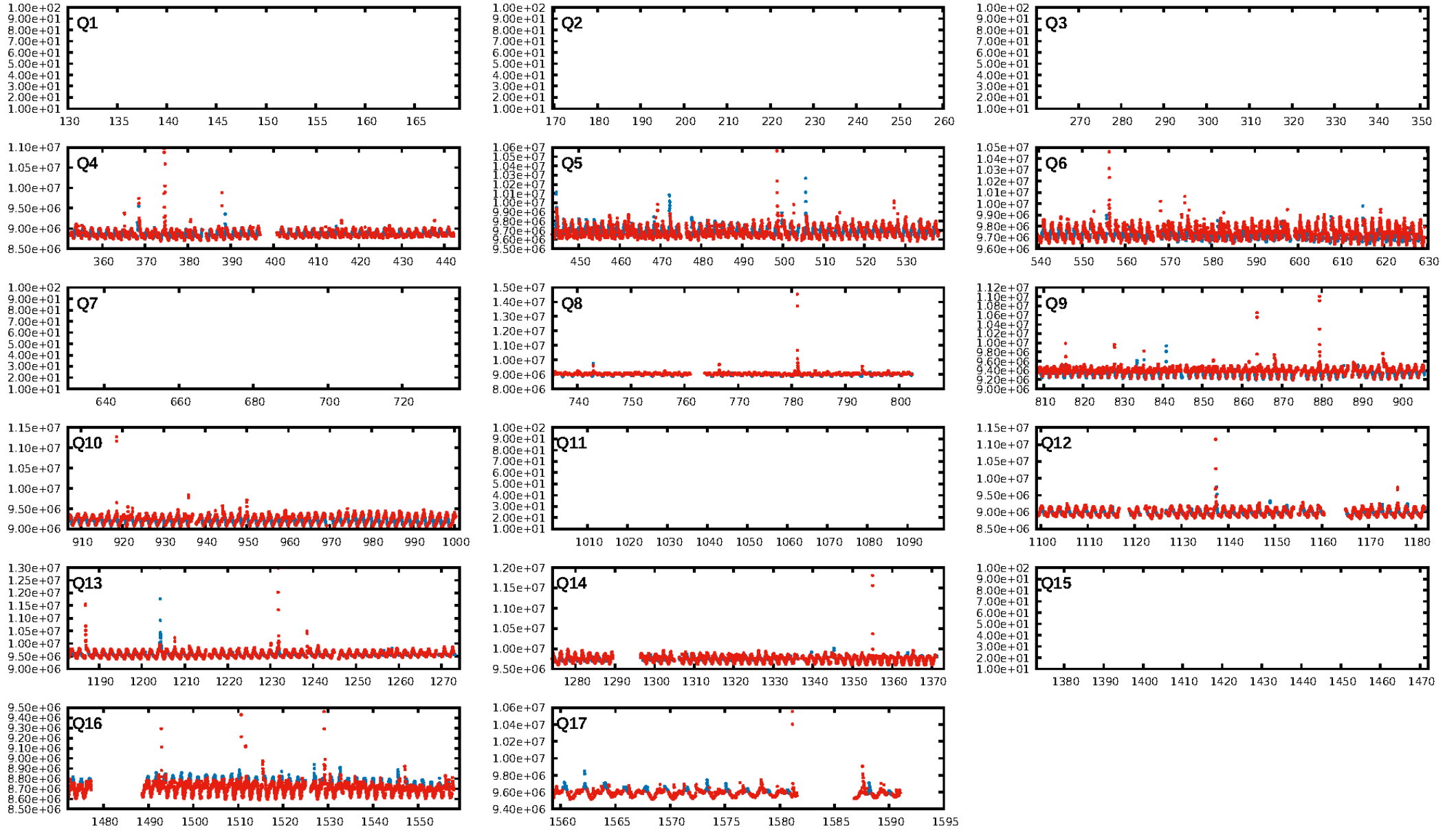
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [219.56σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [466/466]  
GhostDiagnostic-chr: -0.6062  
Centroid-sig: 0.7%  
Centroid-so: 19.974 arcsec [1.79σ]  
OotOffset-rm: 0.046 arcsec [0.33σ]  
KicOffset-rm: 0.048 arcsec [0.19σ]  
OotOffset-st: 3/0/4/4 [11]  
KicOffset-st: 3/0/4/4 [11]  
DiffImageQuality-fgm: 0.73 [8/11]  
DiffImageOverlap-fno: 1.00 [11/11]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 10:44:50 Z

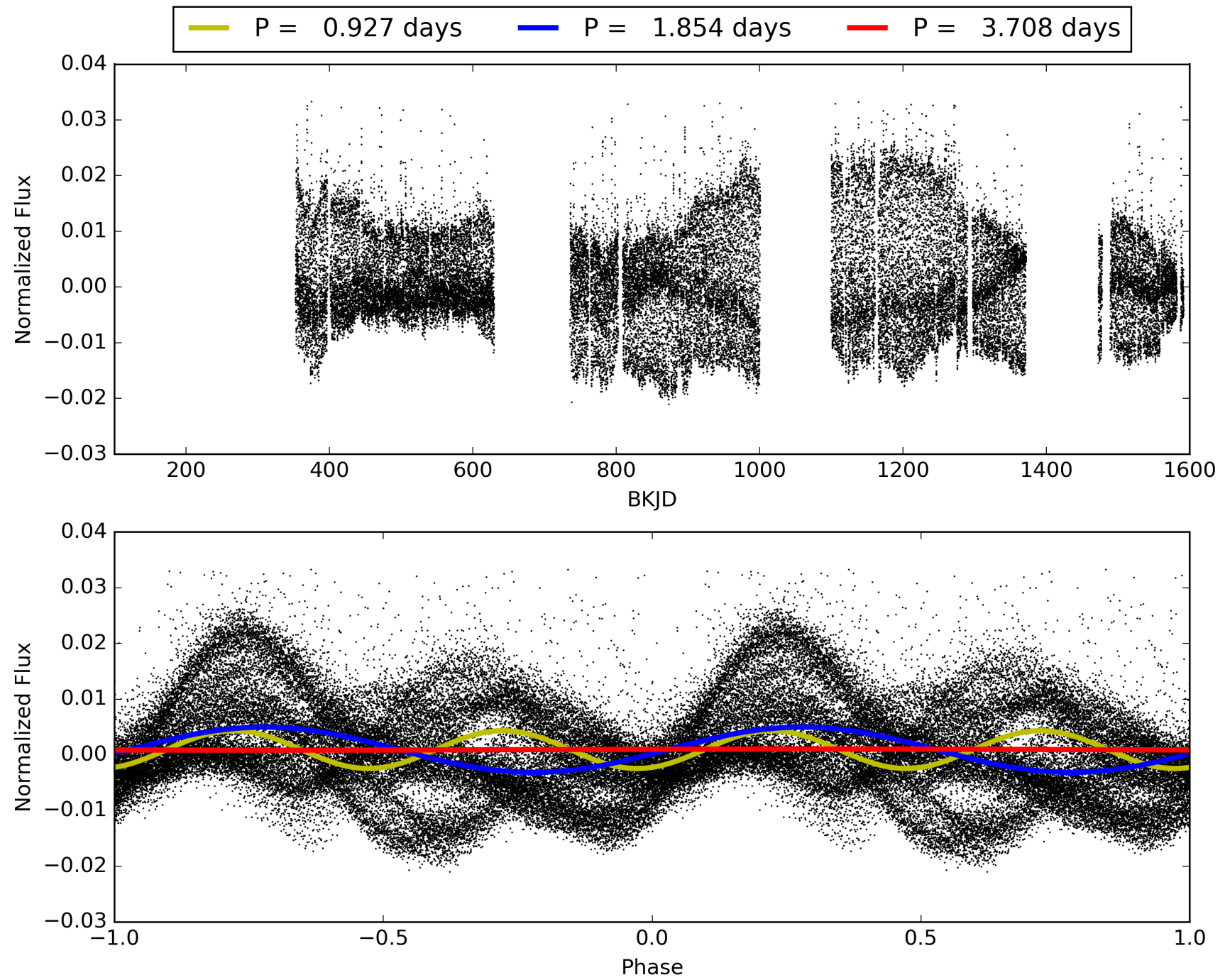
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 009479539-04, PDC Light Curves





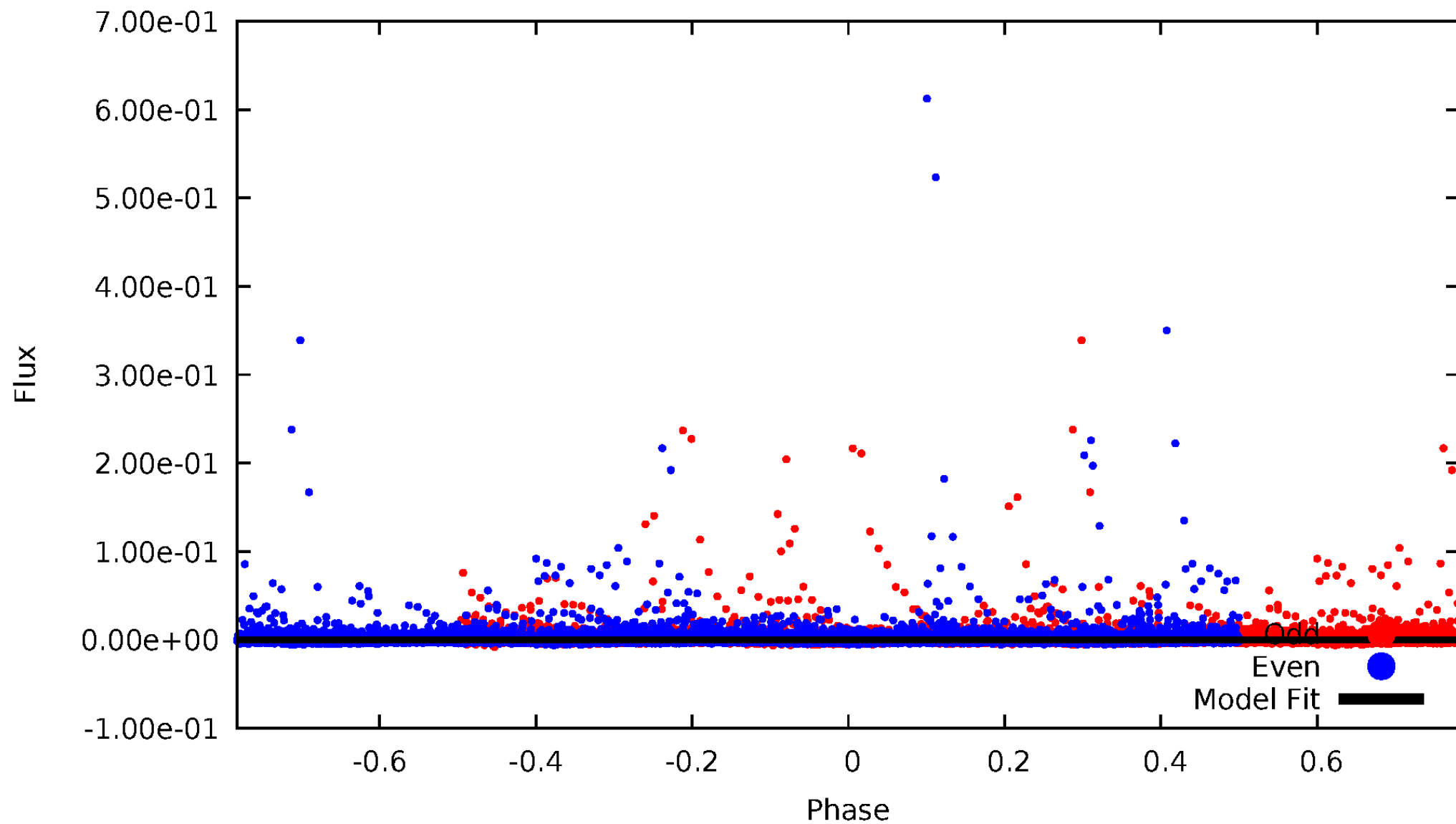
TCE 009479539-04





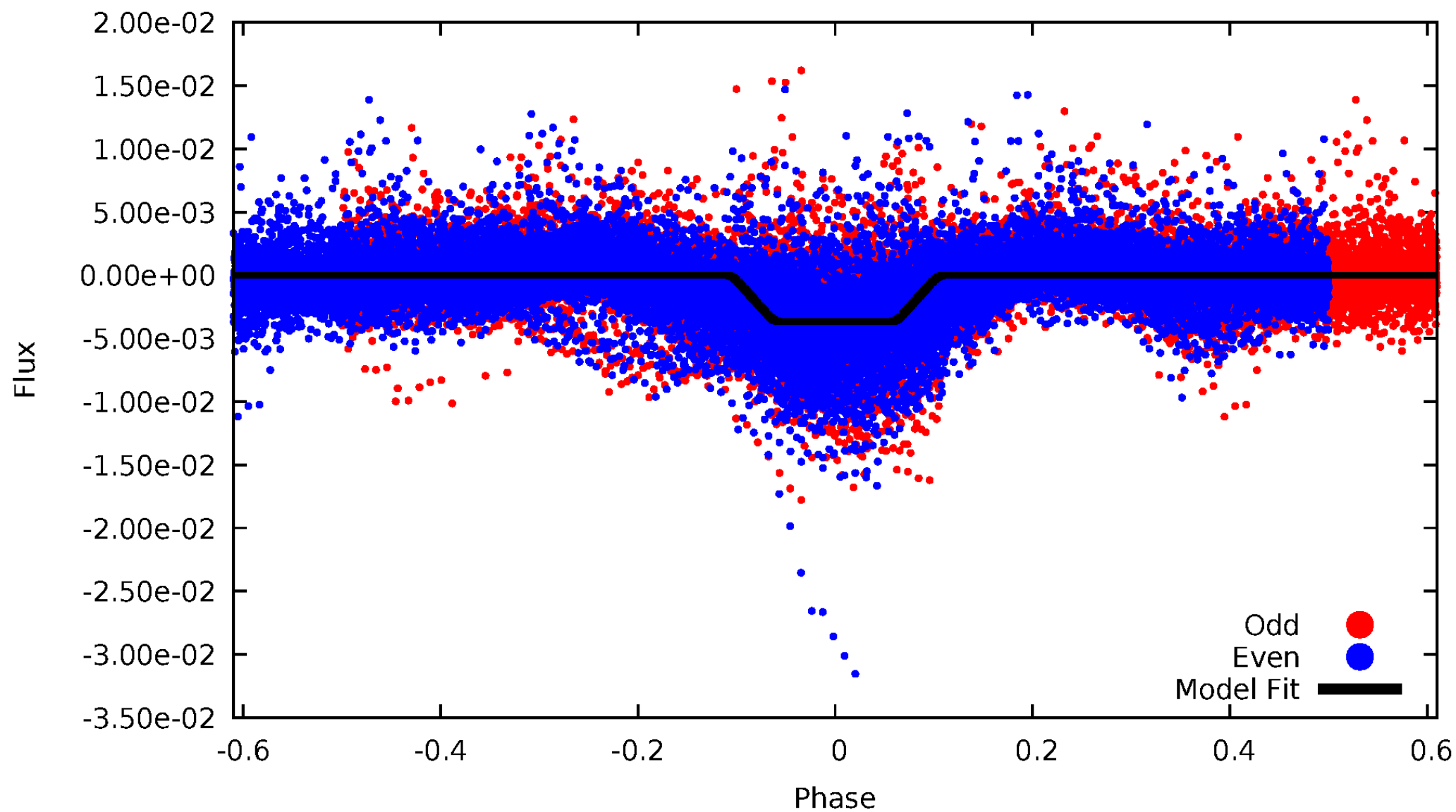
# DV Odd/Even

TCE 009479539-04



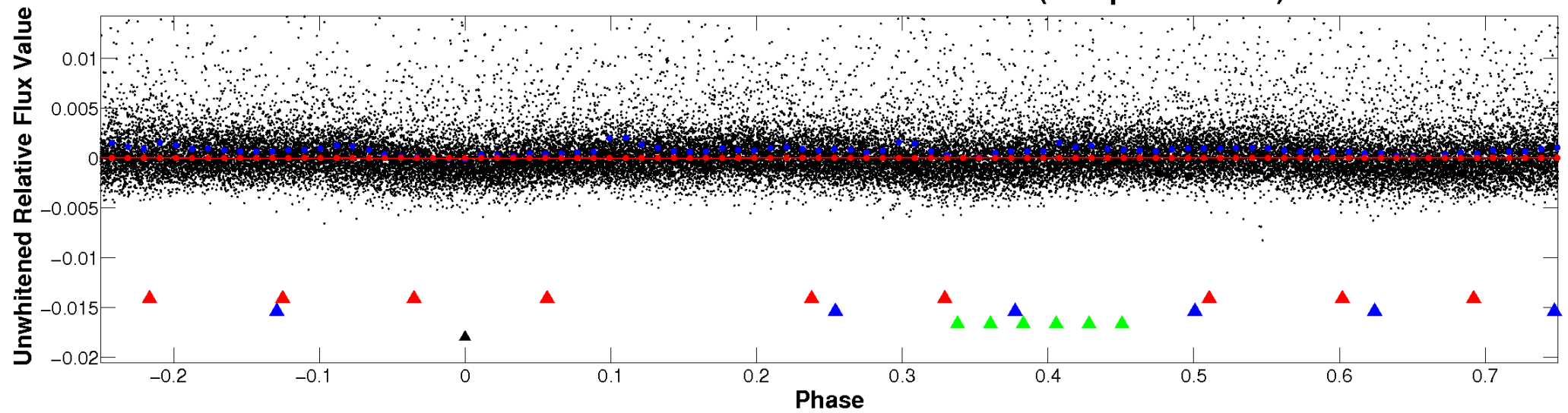
# ALT Odd/Even

TCE 009479539-04

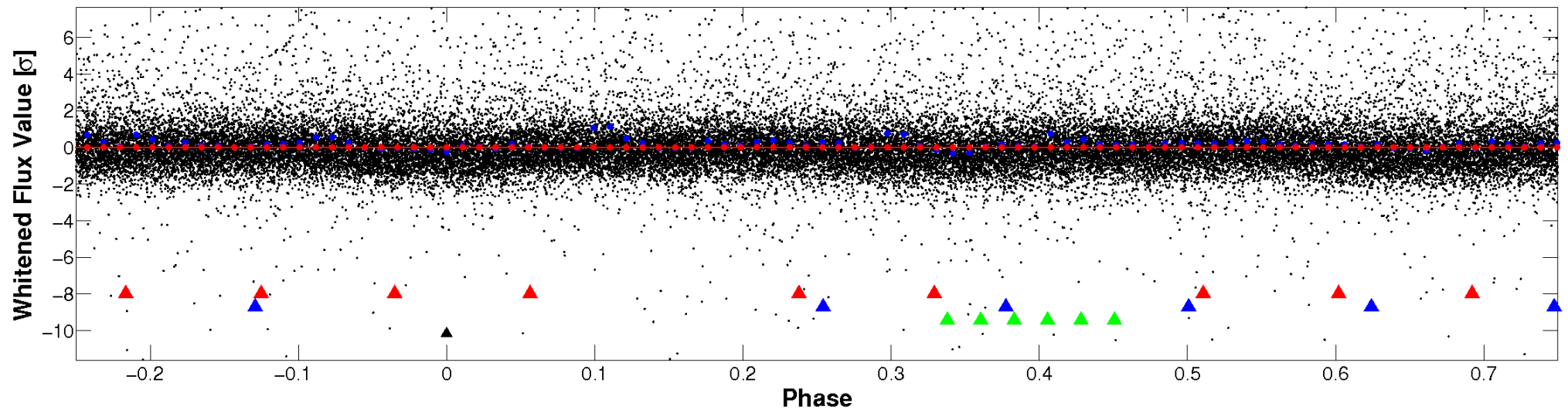


# Non-Whitened Vs. Whitened Light Curve

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

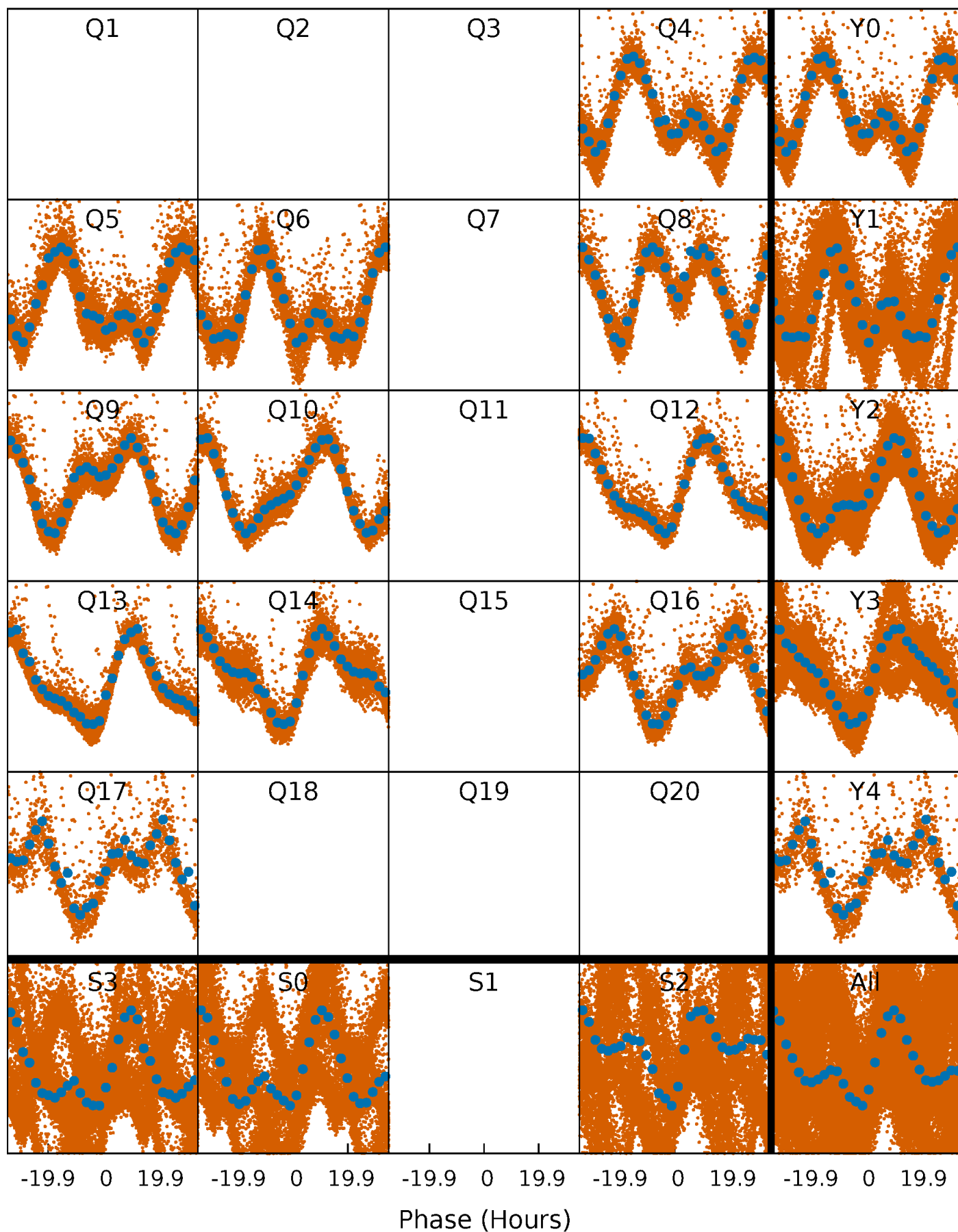


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



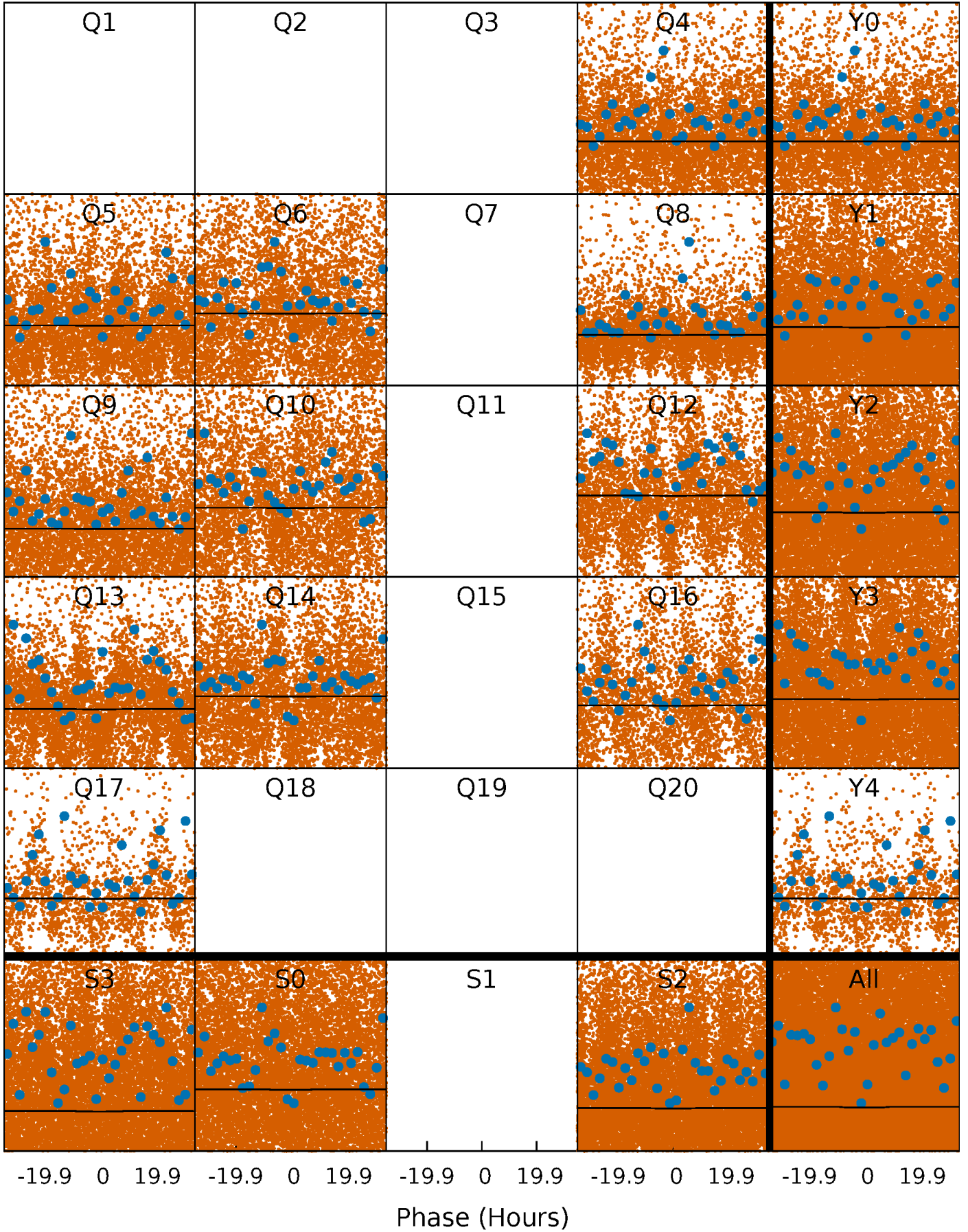
# PDC Quarter-Phased Transit Curves

TCE 009479539-04     $P = 1.853919$  Days     $T_0 = 131.933167$  (BKJD)



# DV Quarter-Phased Transit Curves

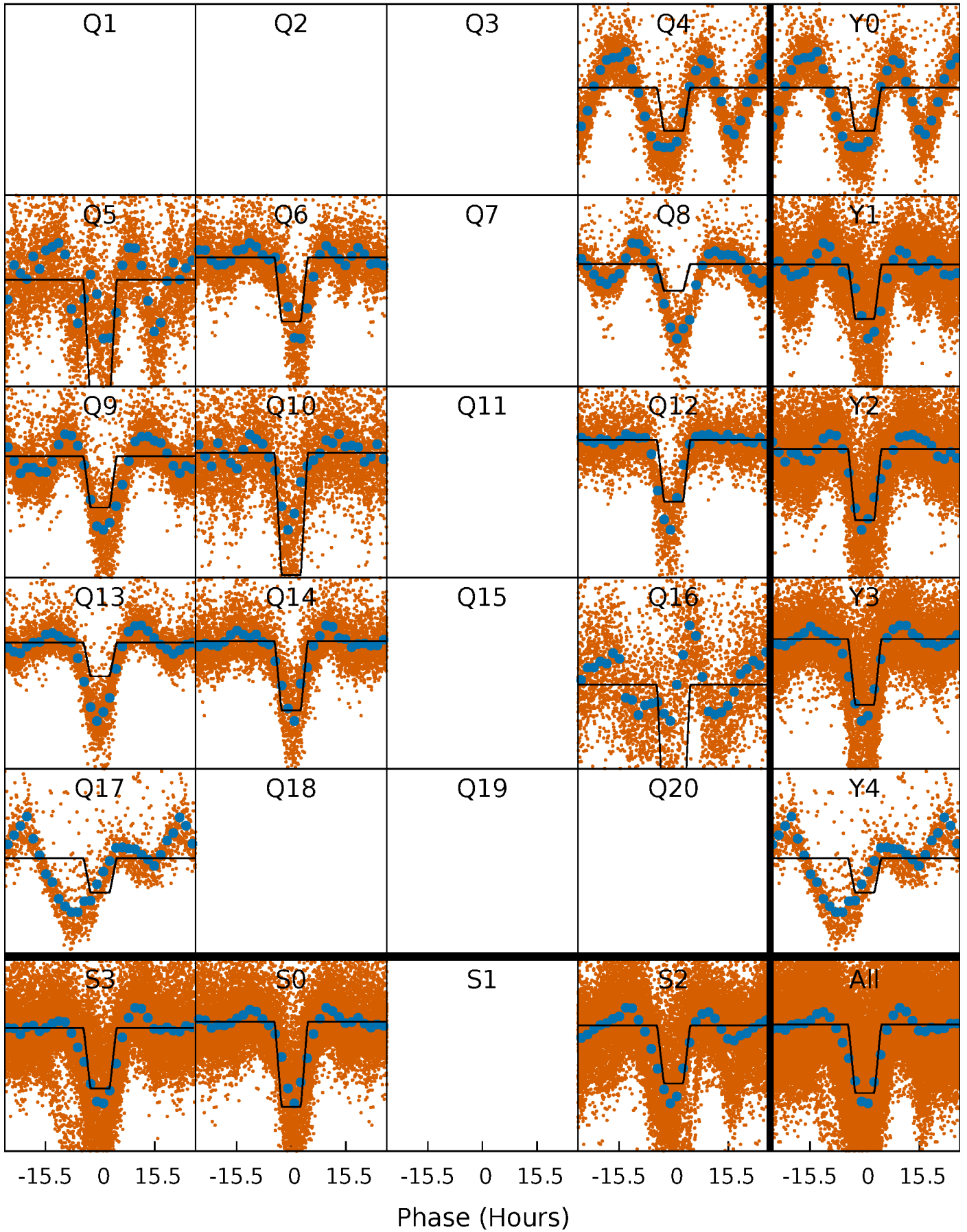
TCE 009479539-04    P= 1.853919 Days     $T_0=131.933167$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

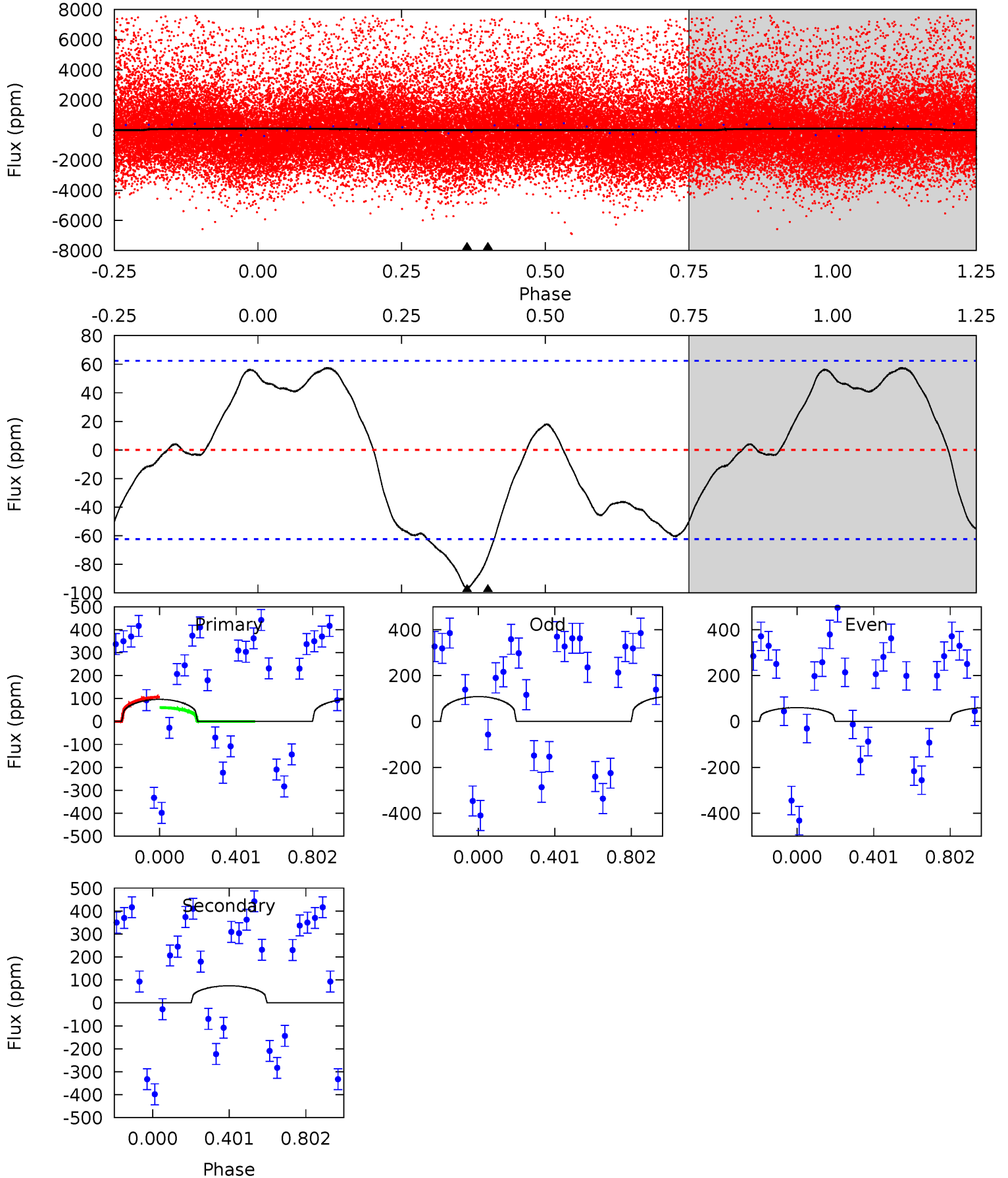
TCE 009479539-04   P= 1.853859 Days    $T_0=131.939221$  (BKJD)



# DV Model-Shift Uniqueness Test

009479539-04, P = 1.853919 Days, E = 131.933167 Days

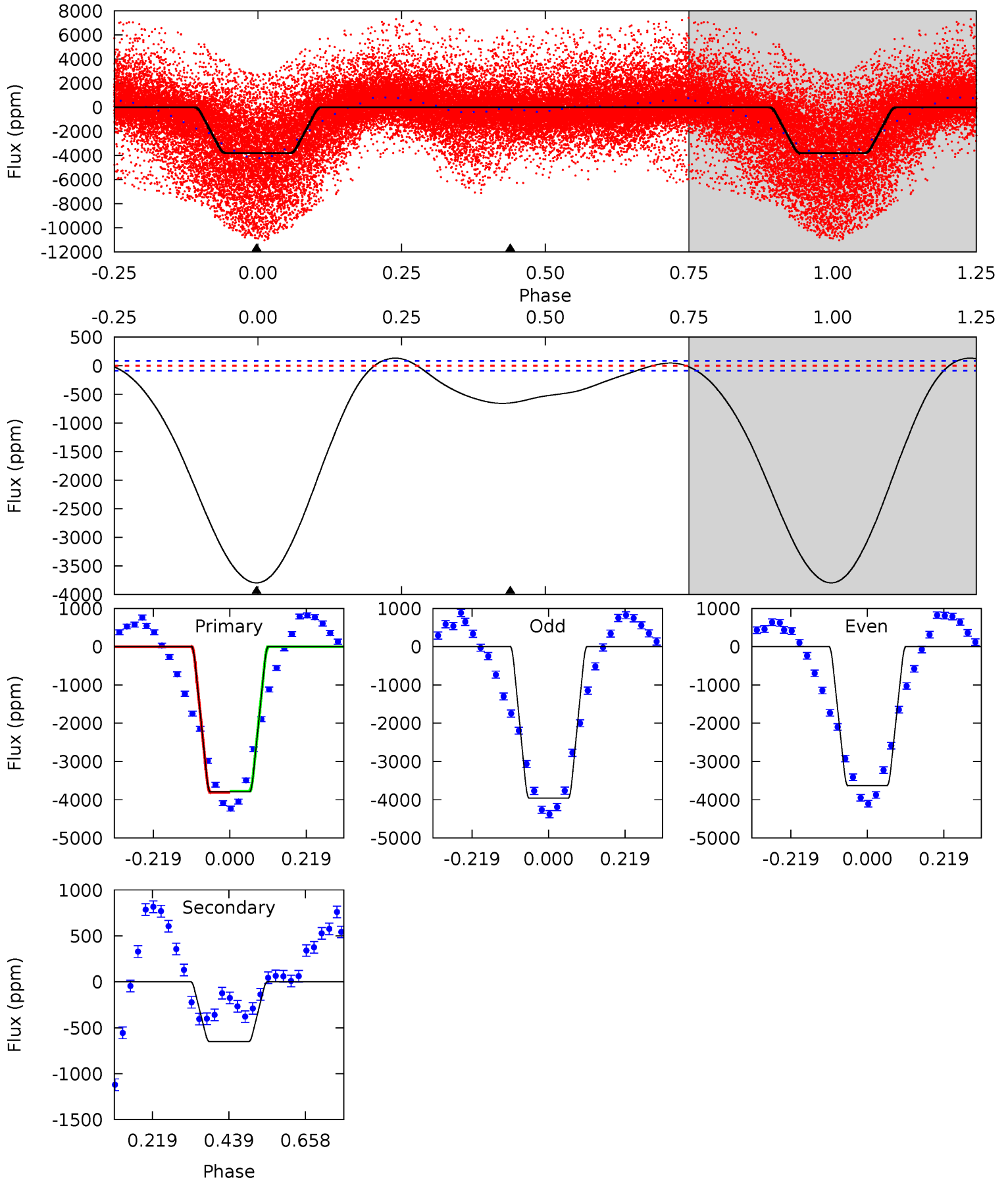
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.59	5.10	0	0	4.26	0.84	0.94	6.59	6.59	5.10	5.10	1.68	2.32	0.37	1.51



# Alt Model-Shift Uniqueness Test

009479539-04, P = 1.853859 Days, E = 131.939221 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
194.9	33.4	0	0	4.40	1.23	3.19	194.9	194.9	33.4	33.4	8.51	1.10	0.03	0.93





### Stellar Parameters For KIC 009479539

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3315^{+43}_{-39}$	$5.004^{+0.044}_{-0.040}$	$0.000^{+0.100}_{-0.100}$	$0.252^{+0.035}_{-0.029}$	$0.233^{+0.043}_{-0.029}$	$20.580^{+5.047}_{-4.056}$
	+1%/-1%	+1%/-1%	+inf%/-inf%	+14%/-12%	+18%/-12%	+25%/-20%
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 009479539-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-75 \pm 15$	$2.39^{+2.33}_{-1.68}$	$759^{+19}_{-17}$	$1875^{+572}_{-303}$	$2.475^{+23.709}_{-1.881}$
Alt.	$-650 \pm 19$	$3.10^{+2.79}_{-2.15}$	$761^{+18}_{-18}$	$2251^{+802}_{-305}$	$13^{+122}_{-9}$

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

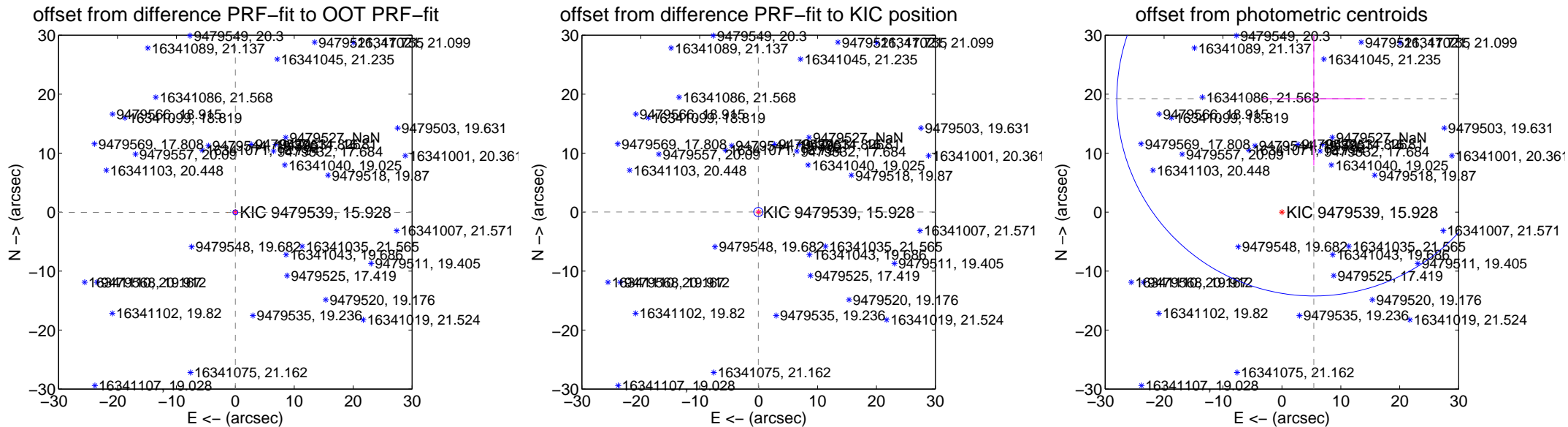
## DV Centroid Data

Supplemental centroid analysis for 009479539-04. Kepler magnitude: 15.93. Transit SNR 0.25

There are 8 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.17 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.046 \pm 0.139$	0.33	$-0.010 \pm 0.281$	$-0.045 \pm 0.096$
PRF-fit source offset from KIC position	$0.048 \pm 0.256$	0.19	$0.044 \pm 0.261$	$0.019 \pm 0.089$
photometric centroid source offset	$19.97 \pm 11.15$	1.79	$-5.42 \pm 8.73$	$19.22 \pm 11.32$



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.

Q1 no difference image



Q1 no OOT image



Q2 no difference image



Q2 no OOT image



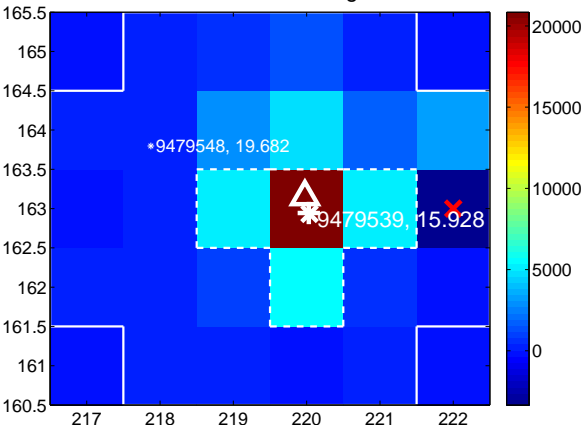
Q3 no difference image



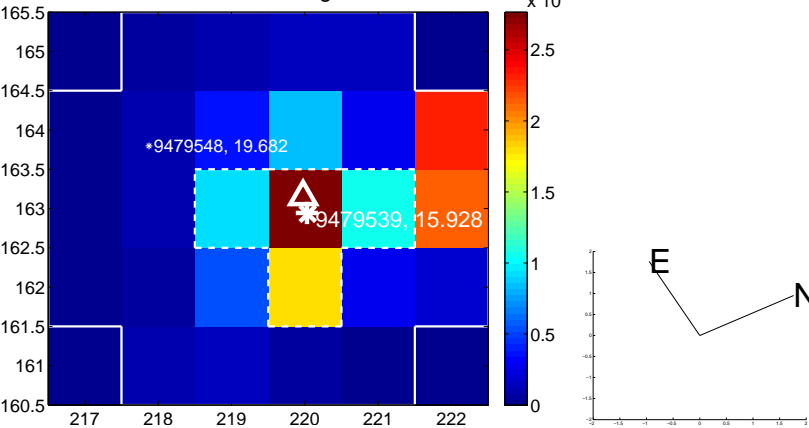
Q3 no OOT image



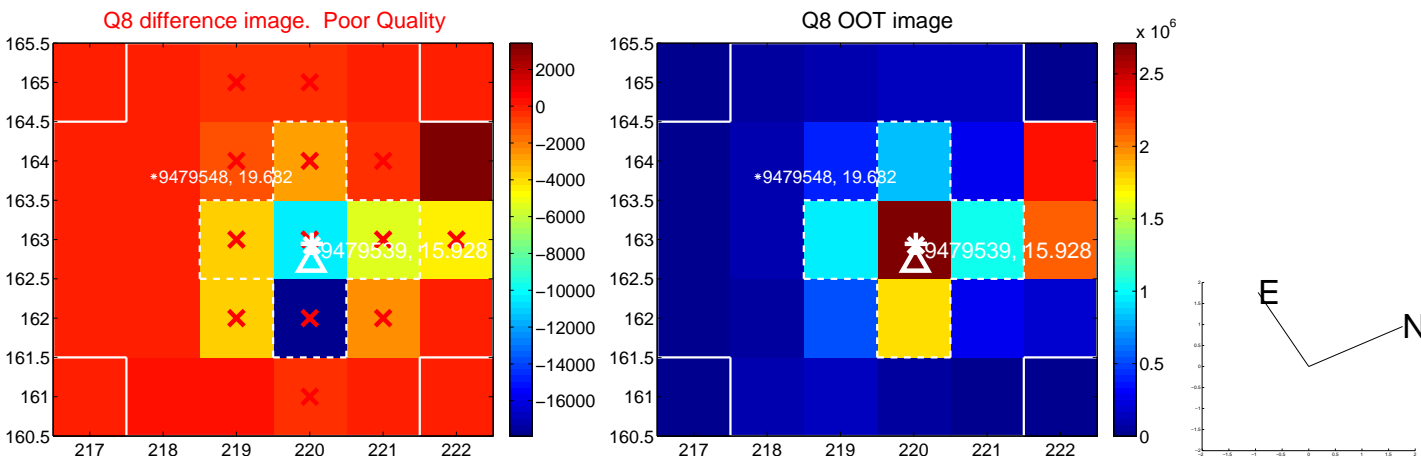
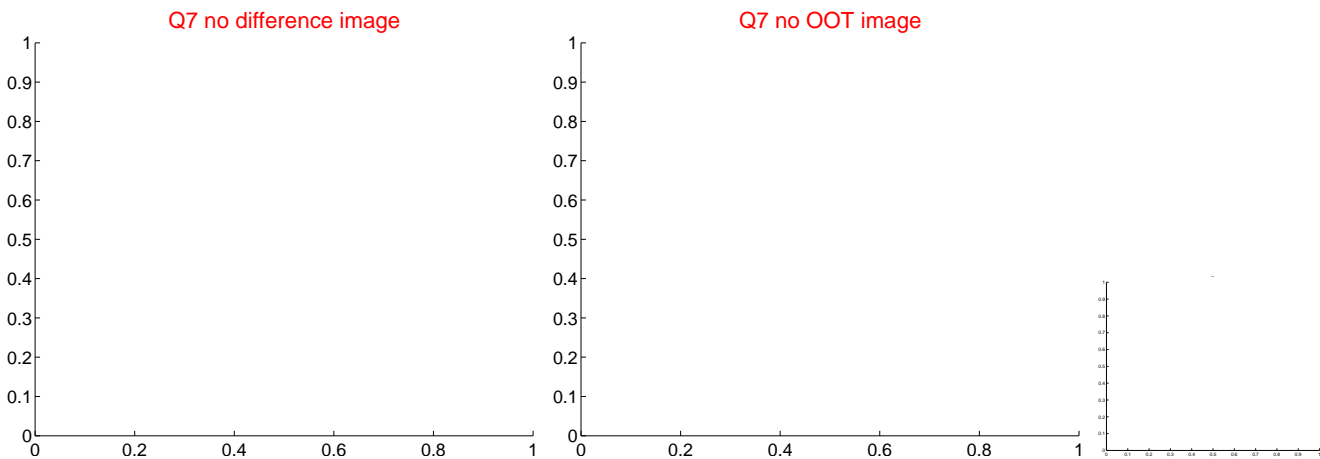
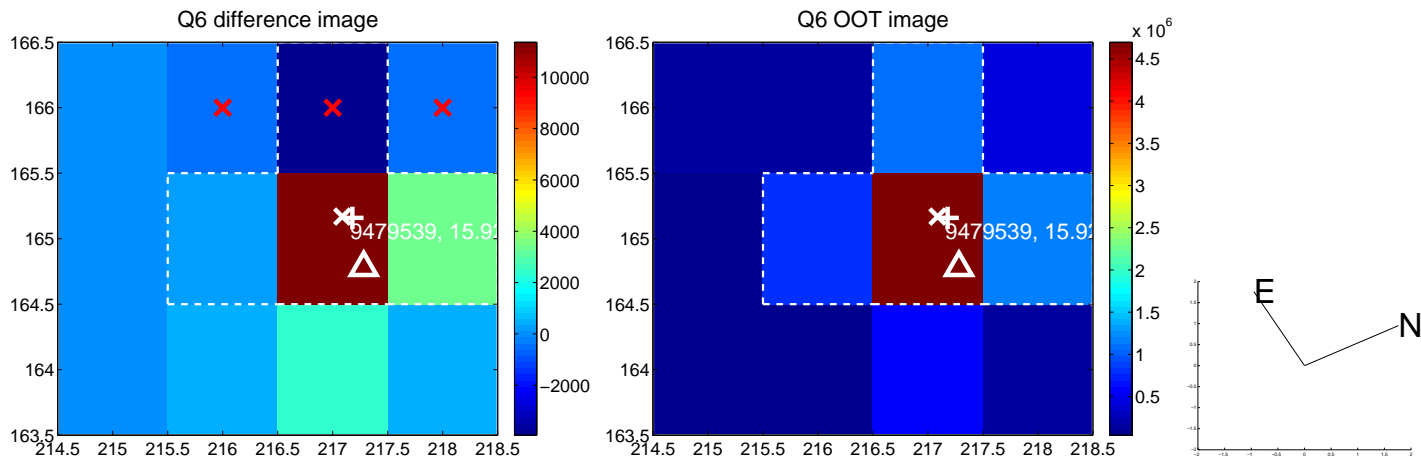
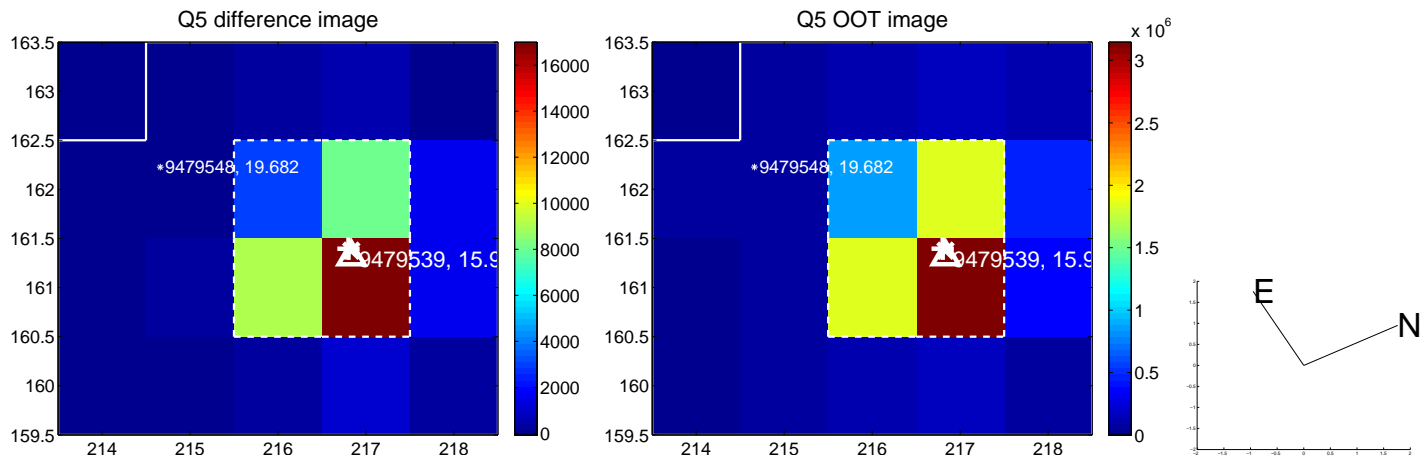
Q4 difference image



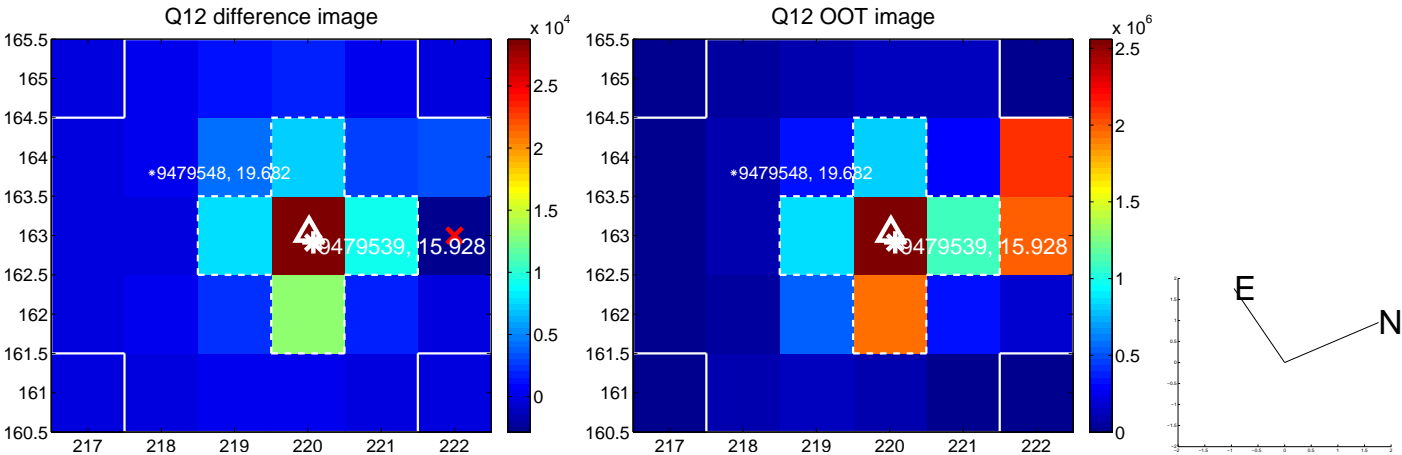
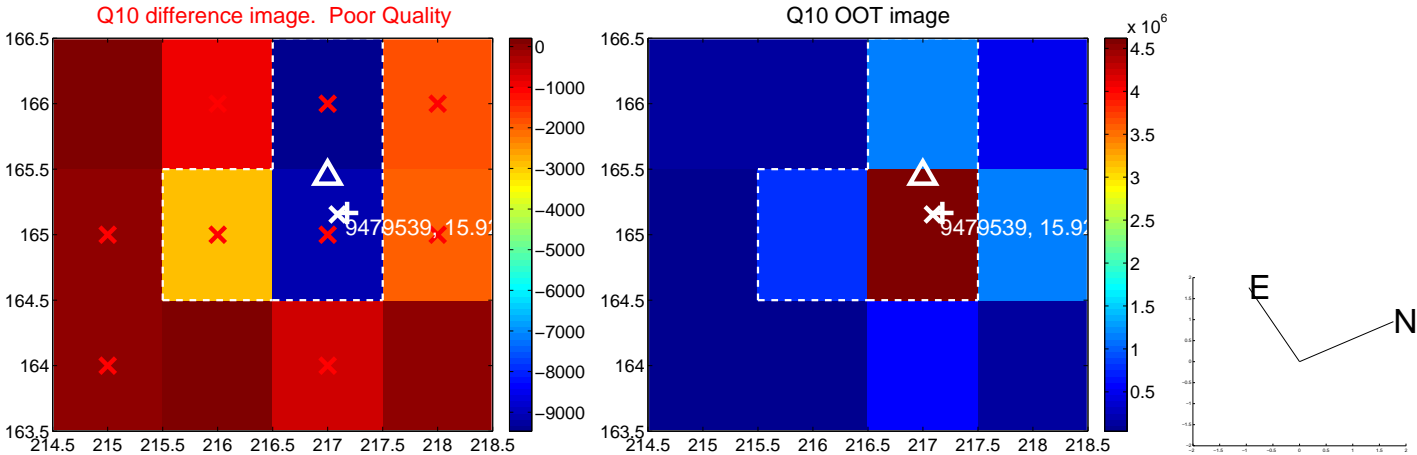
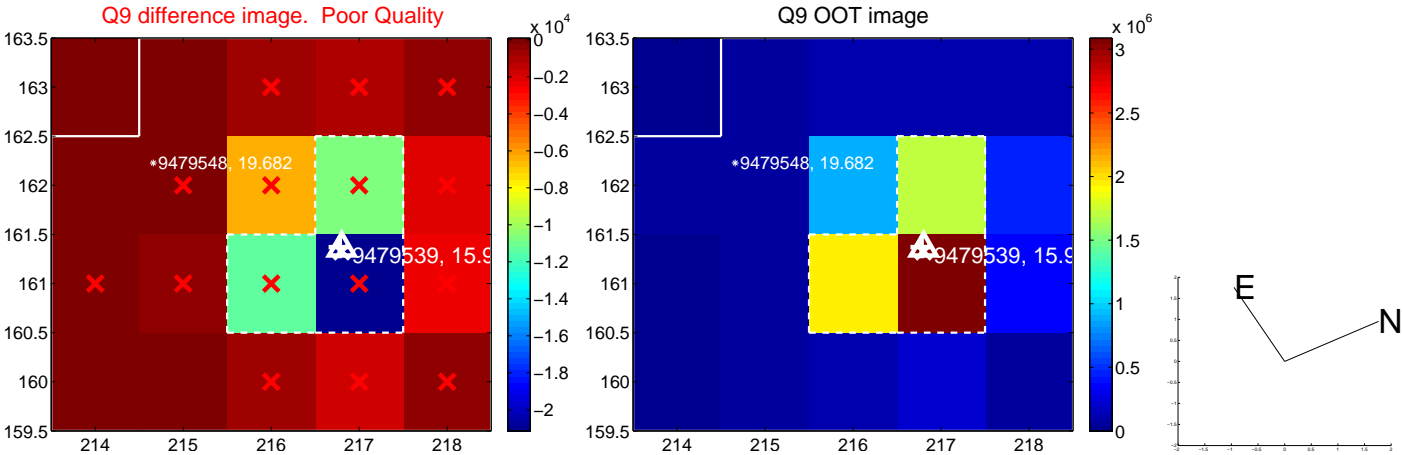
Q4 OOT image



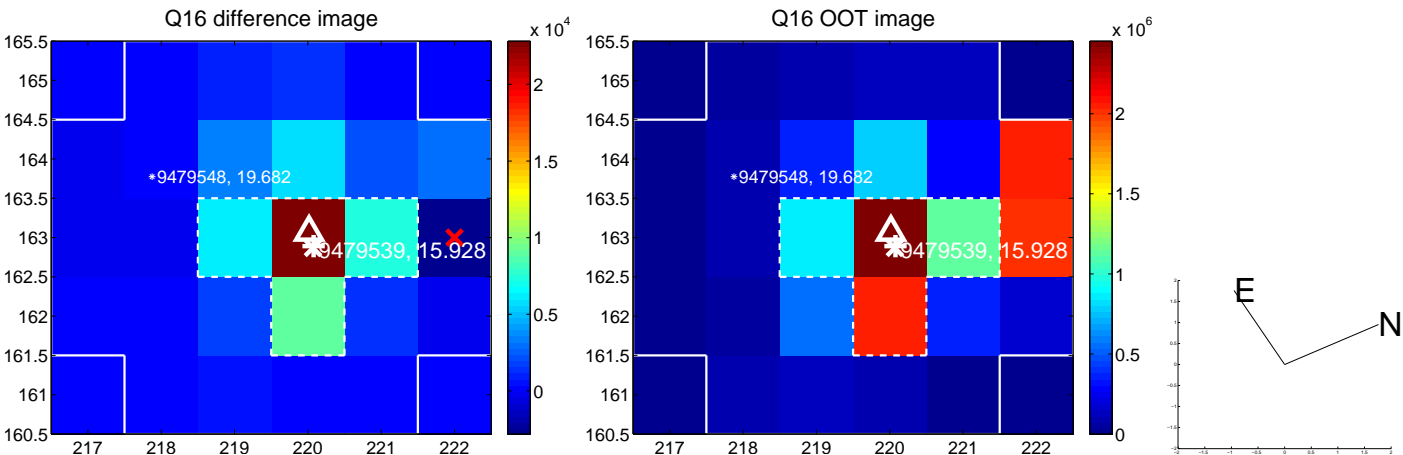
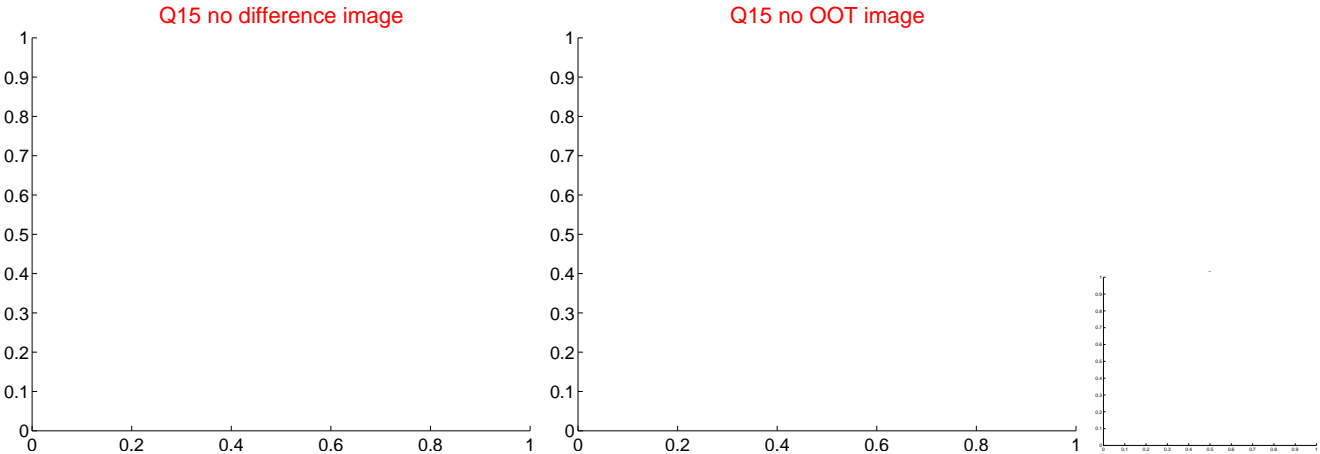
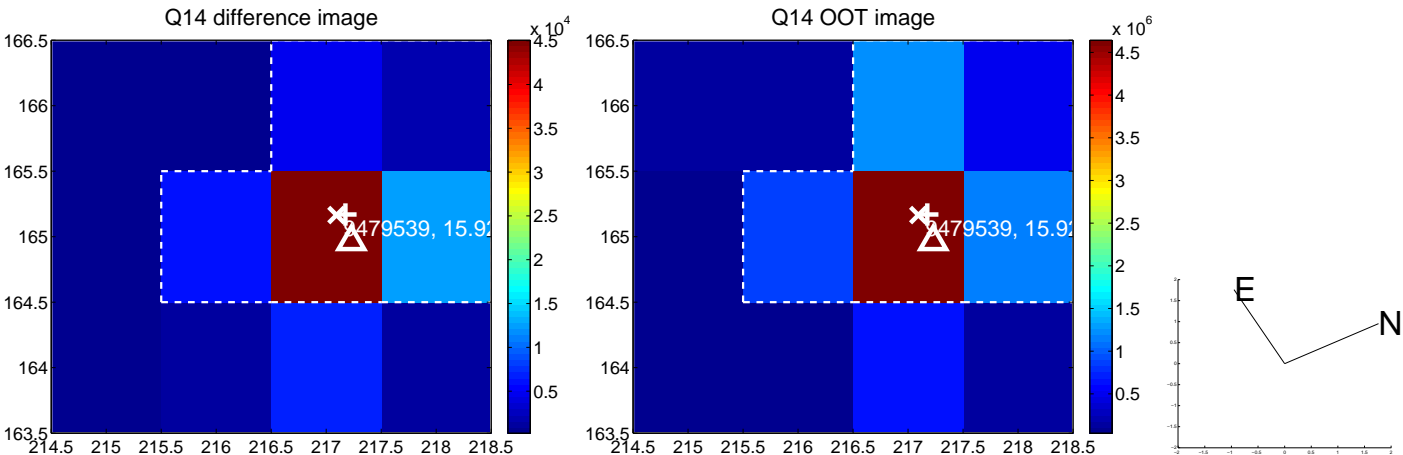
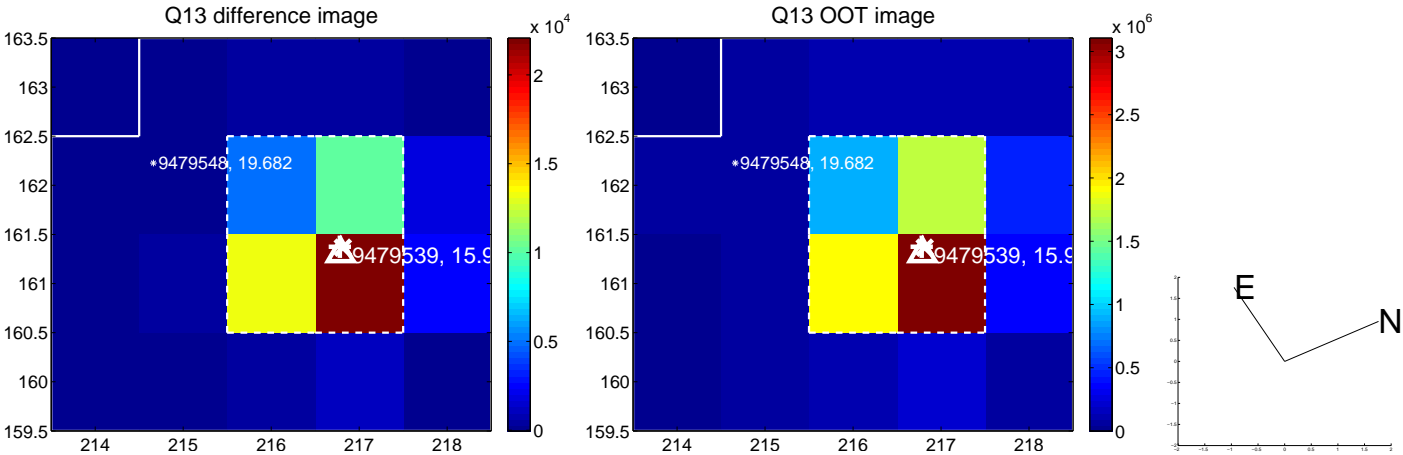
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



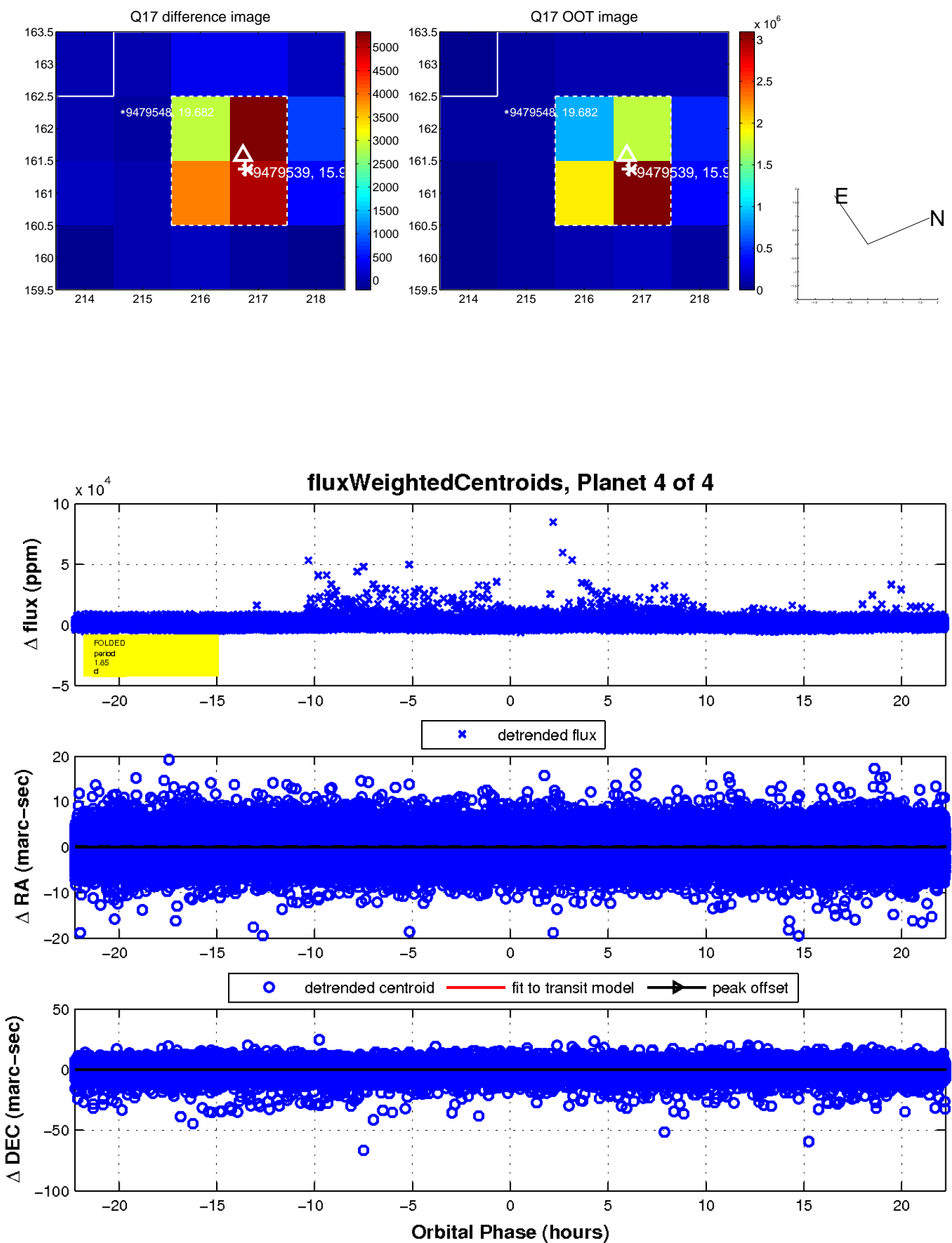
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



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



UKIRT Image

Declination

