

# KIC 004863614

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004863614-01	OBS	No	0.703847	131.586036	25.2	1.557	8.8	8.5	1.01	6046	0.56	4715.00
004863614-02	OBS	No	391.380986	148.096874	319.1	6.601	11.7	3.5	1.01	6046	1.91	1.03
004863614-03	OBS	No	373.261860	156.811508	178.0	3.067	10.8	1.8	1.01	6046	1.56	1.10
004863614-04	OBS	No	284.129997	157.131940	684.7	5.311	12.5	6.2	1.01	6046	2.85	1.58
004863614-05	OBS	No	0.703868	132.049544	34.9	1.809	7.9	10.9	1.01	6046	0.70	4714.82
004863614-06	OBS	No	151.197753	143.473671	554.2	9.456	10.3	4.9	1.01	6046	2.51	3.67

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004863614-01	OBS	FP	0.00	1	0	1	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—CENT_RESOLVED_OFFSET
004863614-02	OBS	FP	0.00	1	0	0	0	LPP_ALT—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004863614-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL_SKYE_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004863614-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV
004863614-05	OBS	FP	0.00	1	0	1	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_RESOLVED_OFFSET—HALO_GHOST
004863614-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

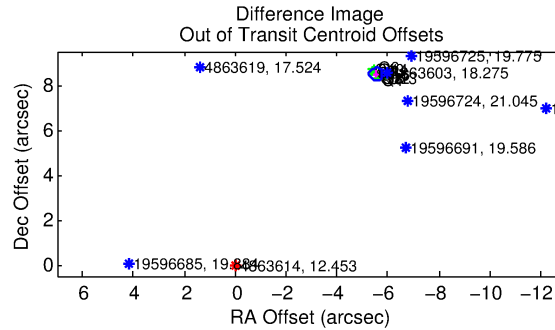
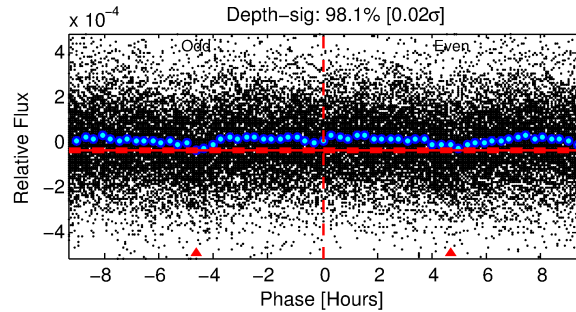
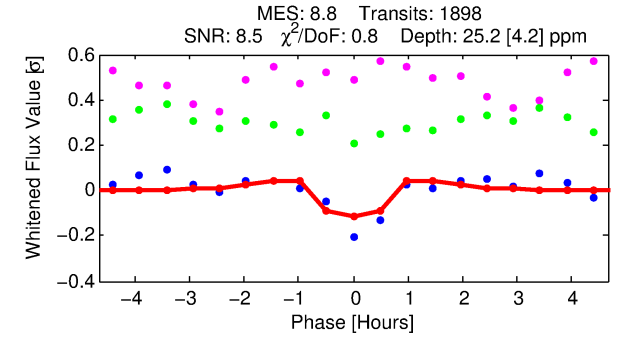
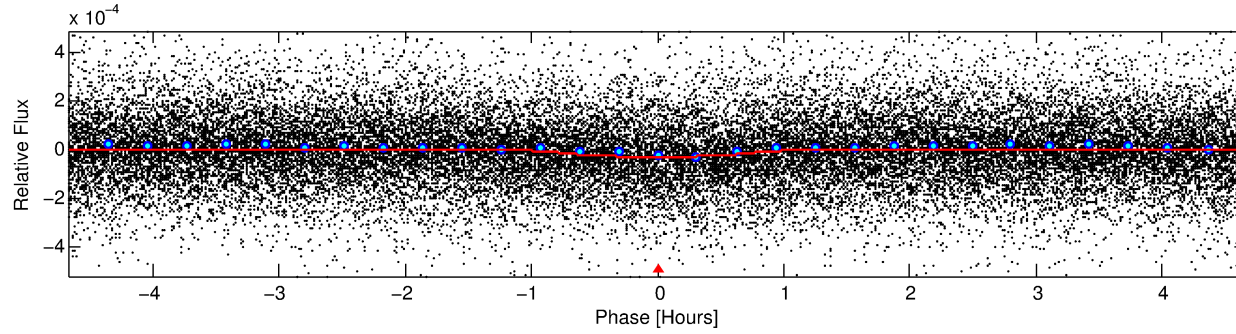
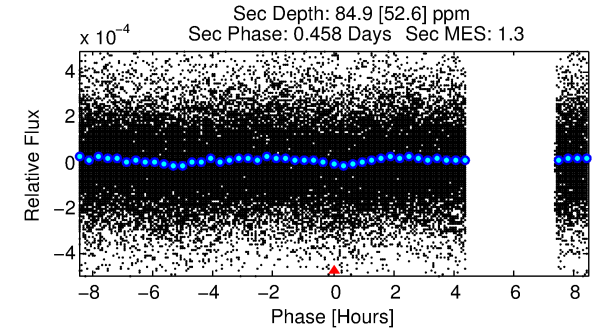
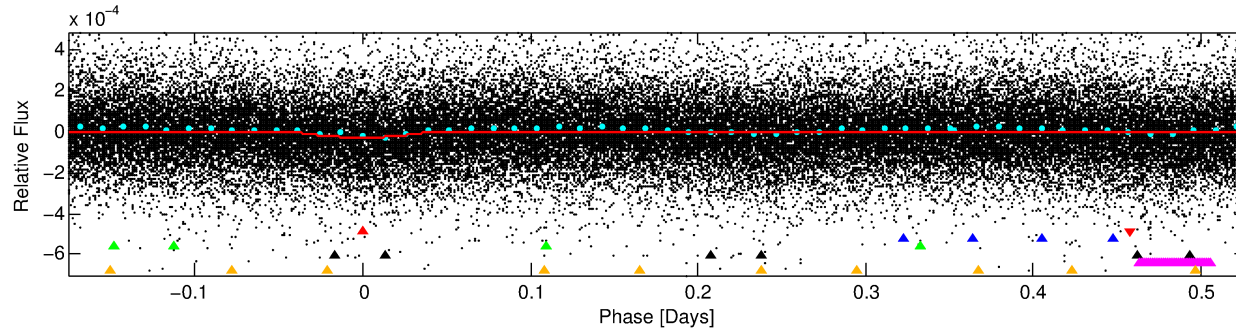
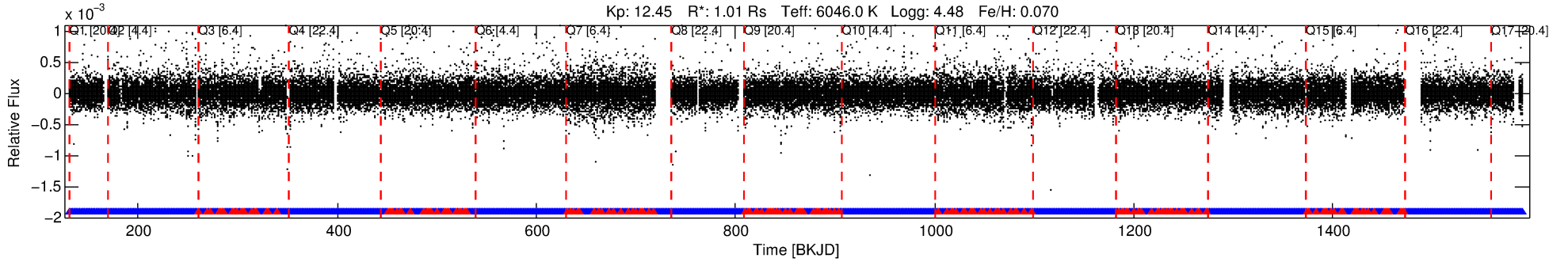
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004863614-01

No Significant Match Found

# DV One-Page Summary

KIC: 4863614 Candidate: 1 of 6 Period: 0.704 d



## DV Fit Results:

Period = 0.70385 [0.00001] d  
Epoch = 131.5860 [0.0019] BKJD  
Rp/R\* = 0.0051 [0.0011]  
a/R\* = 2.32 [1.90]  
b = 0.79 [0.49]  
Seff = 4715.00 [1666.51]  
Teq = 2113 [187] K  
Rp = 0.56 [0.19] Re  
a = 0.0160 [0.0036] AU  
Ag = 38.49 [32.02] [1.17σ]  
Teff = 8137 [1578] K [3.79σ]

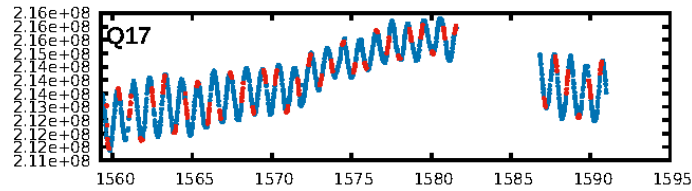
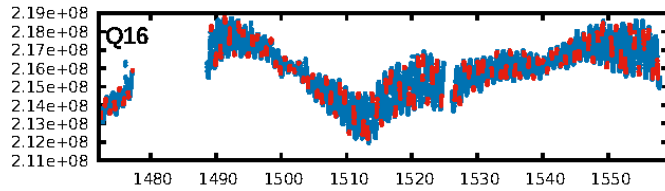
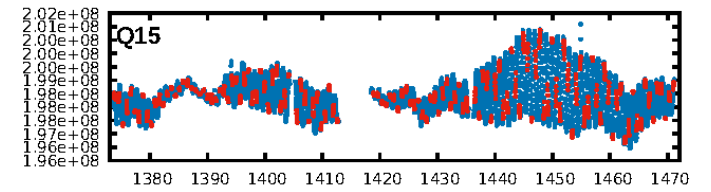
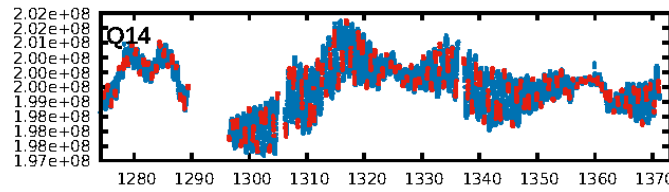
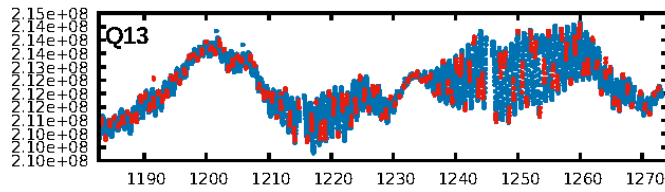
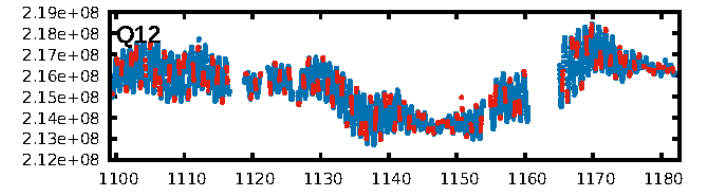
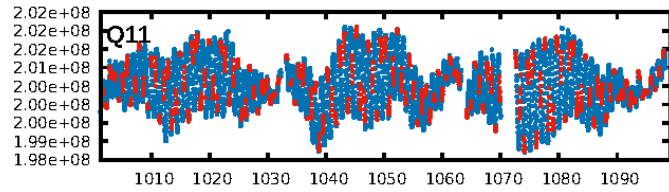
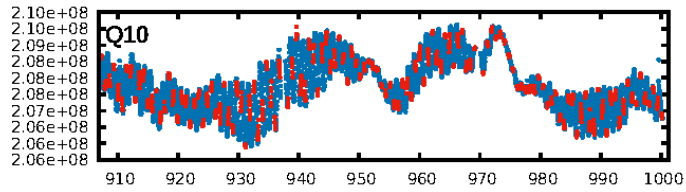
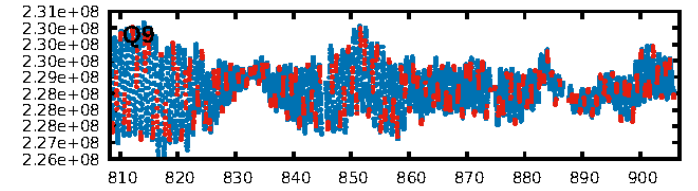
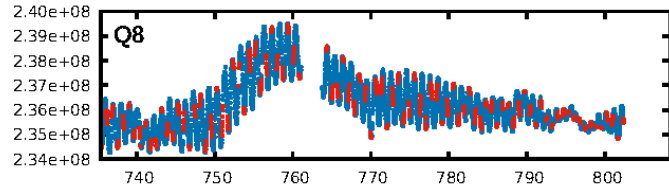
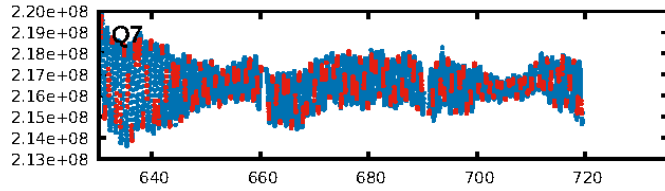
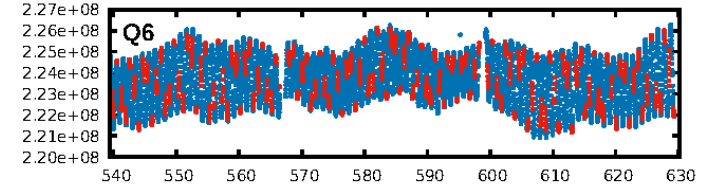
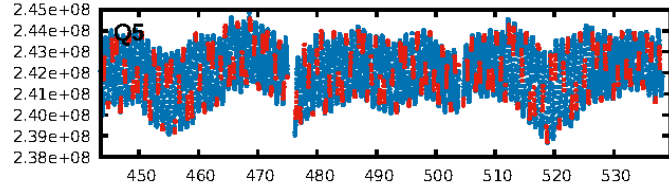
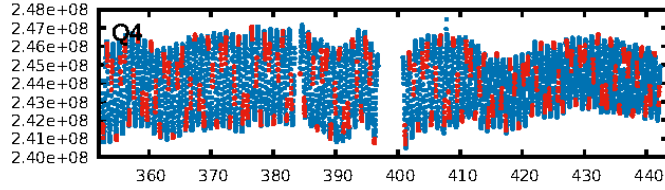
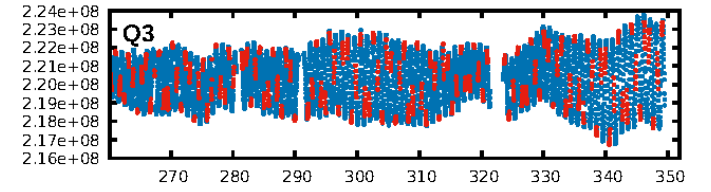
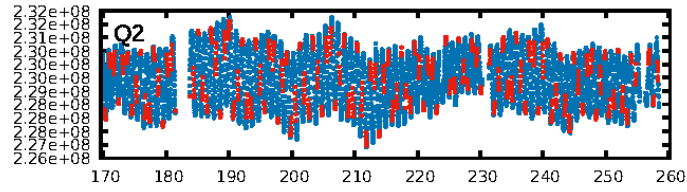
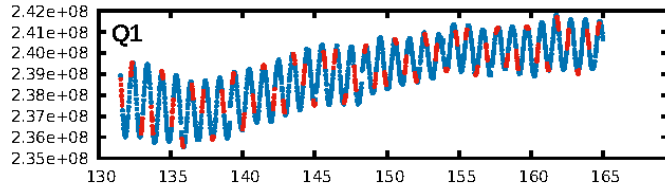
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 0.90 [1625/1812]  
GhostDiagnostic-chr: 0.5244  
Centroid-sig: 0.0%  
Centroid-so: 2.409 arcsec [2.67σ]  
OotOffset-rm: 10.123 arcsec [110.40σ]  
KicOffset-rm: 10.114 arcsec [116.95σ]  
OotOffset-st: 3/1/4/3 [11]  
KicOffset-st: 3/1/4/3 [11]  
DiffImageQuality-fgm: 0.91 [10/11]  
DiffImageOverlap-fno: 0.00 [0/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 17:12:37 Z

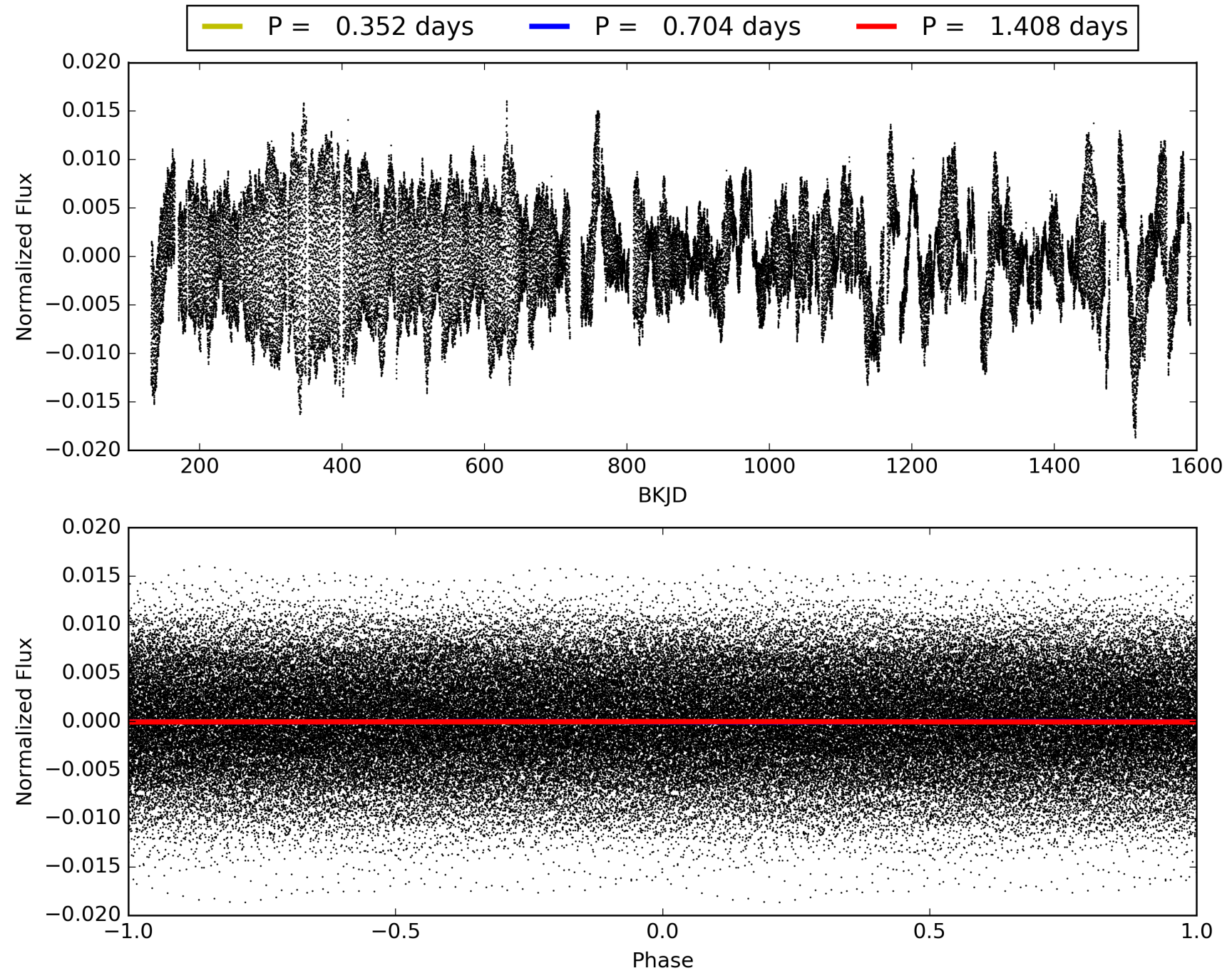
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 004863614-01, PDC Light Curves





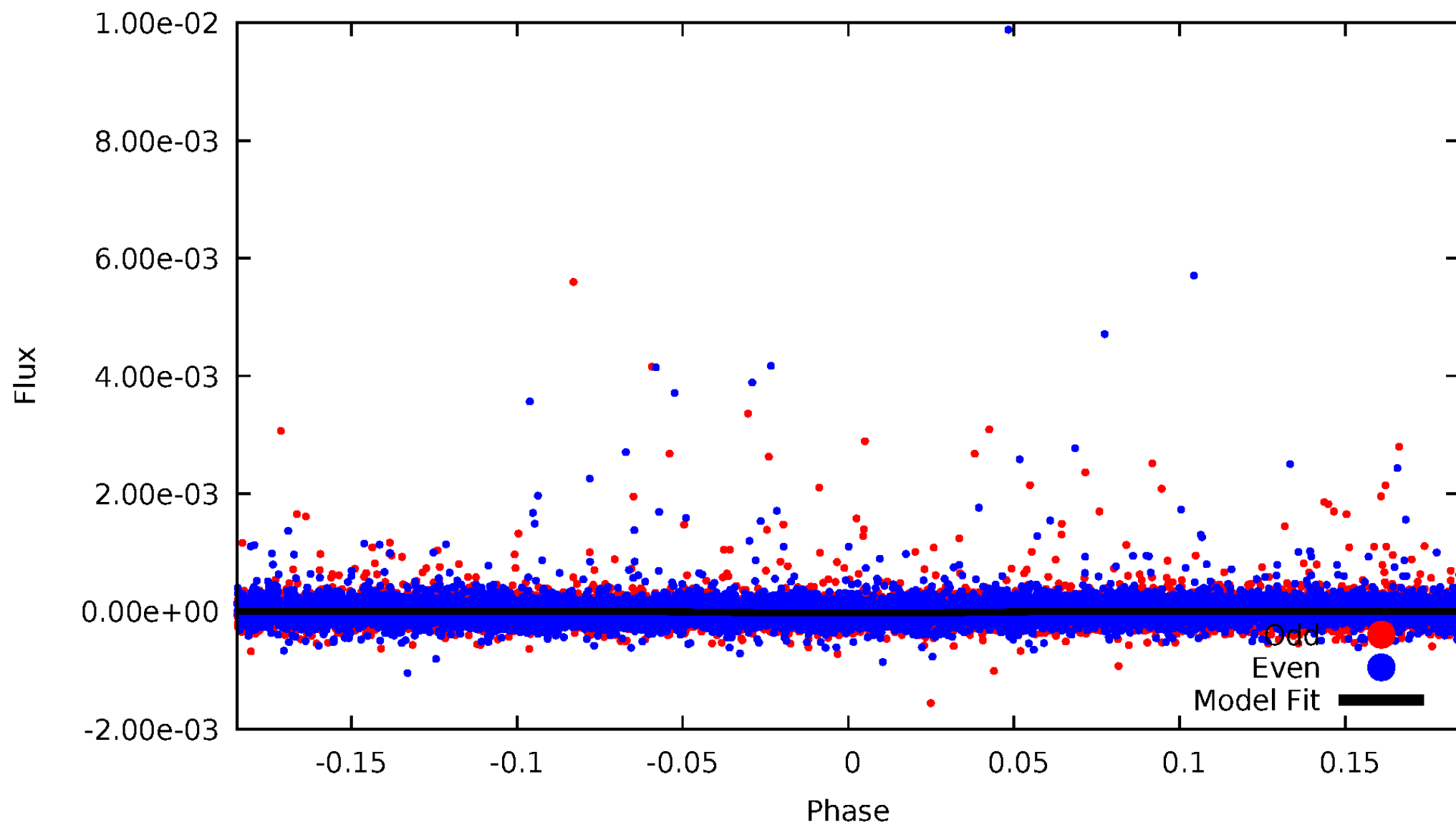
TCE 004863614-01





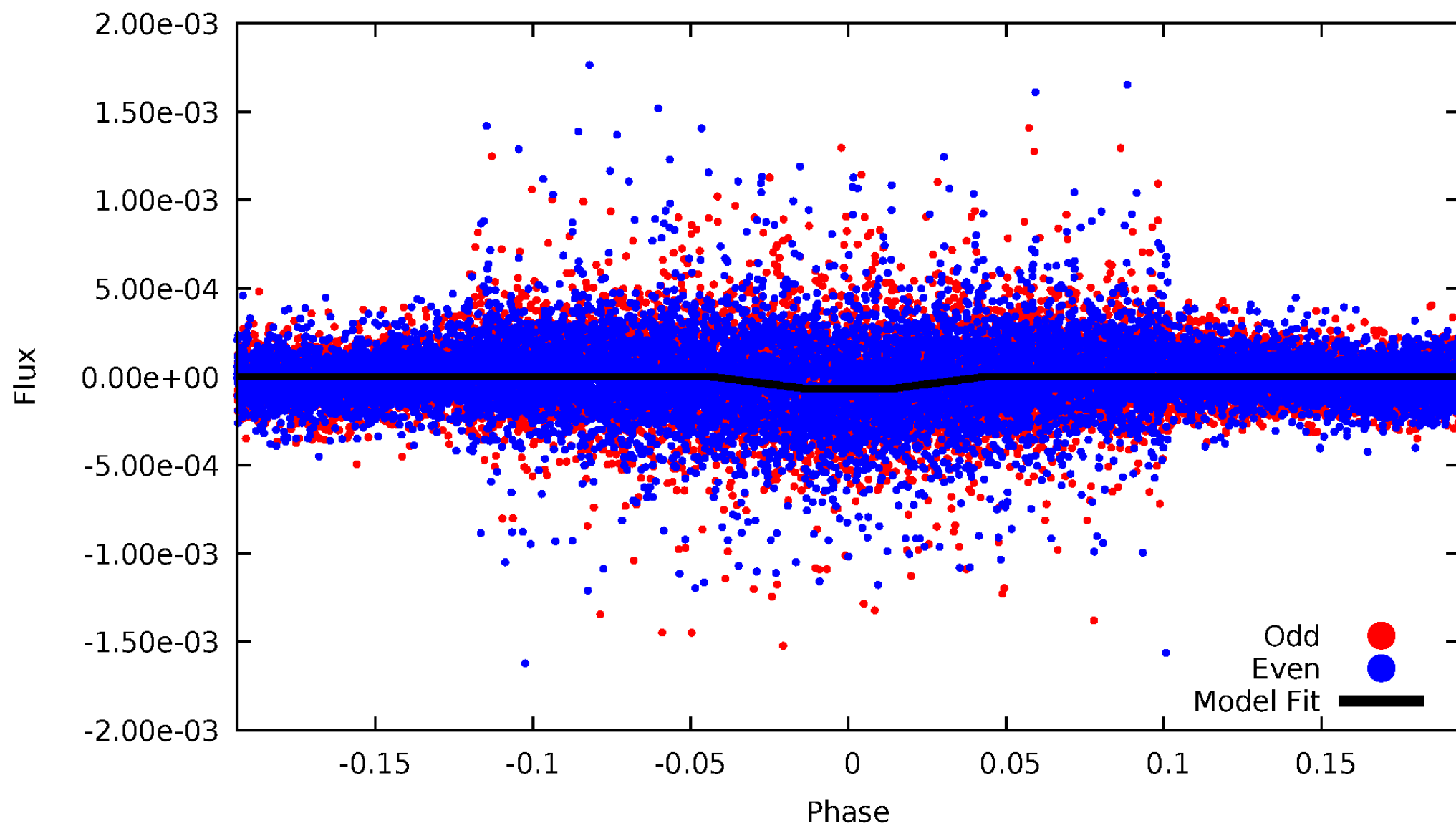
# DV Odd/Even

TCE 004863614-01



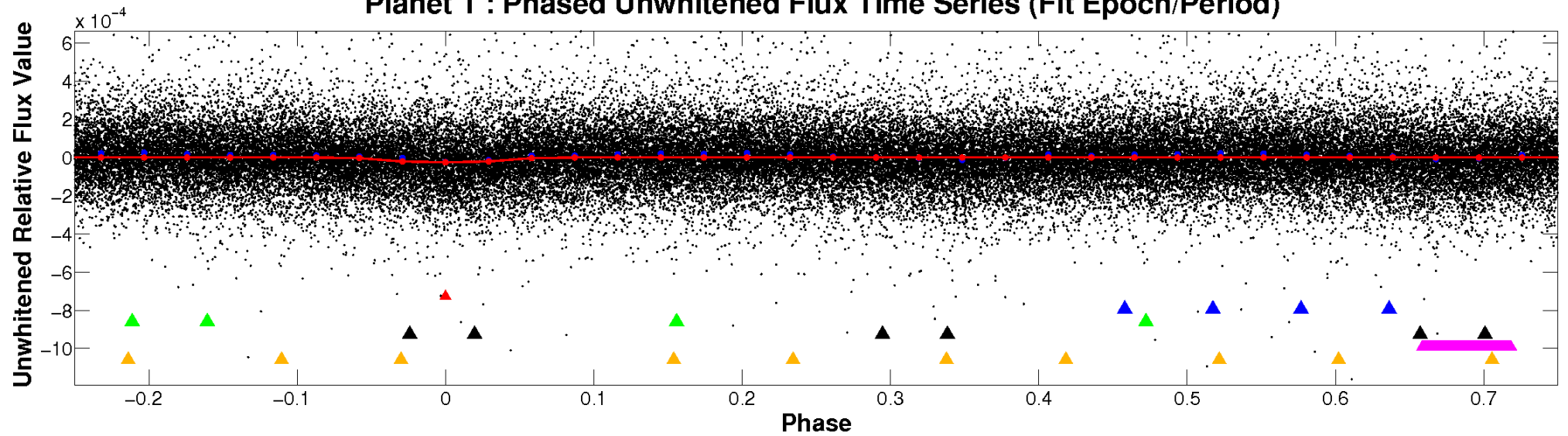
# ALT Odd/Even

TCE 004863614-01

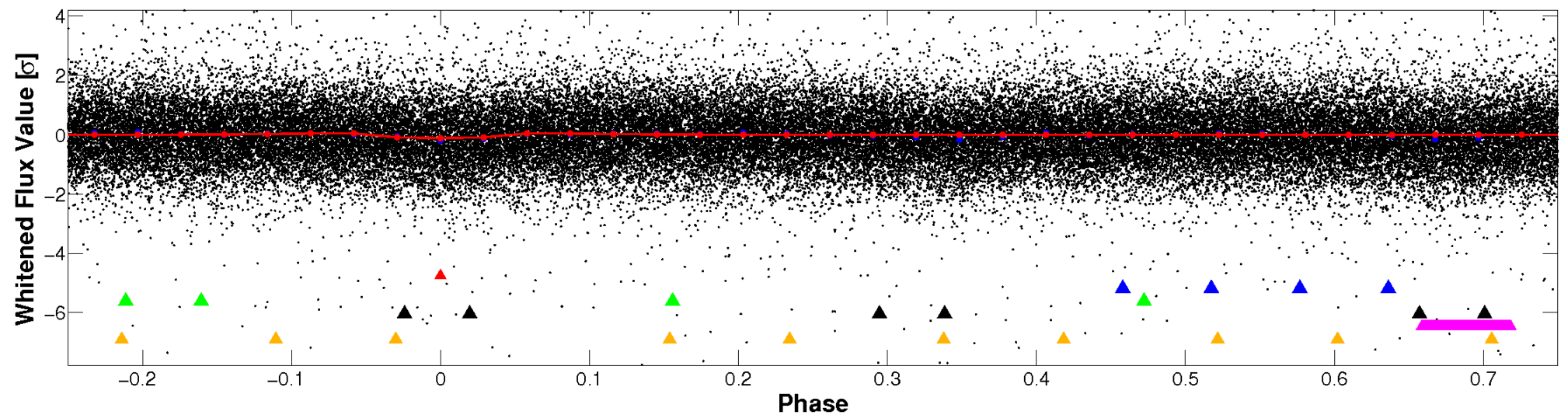


# Non-Whitened Vs. Whitened Light Curve

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



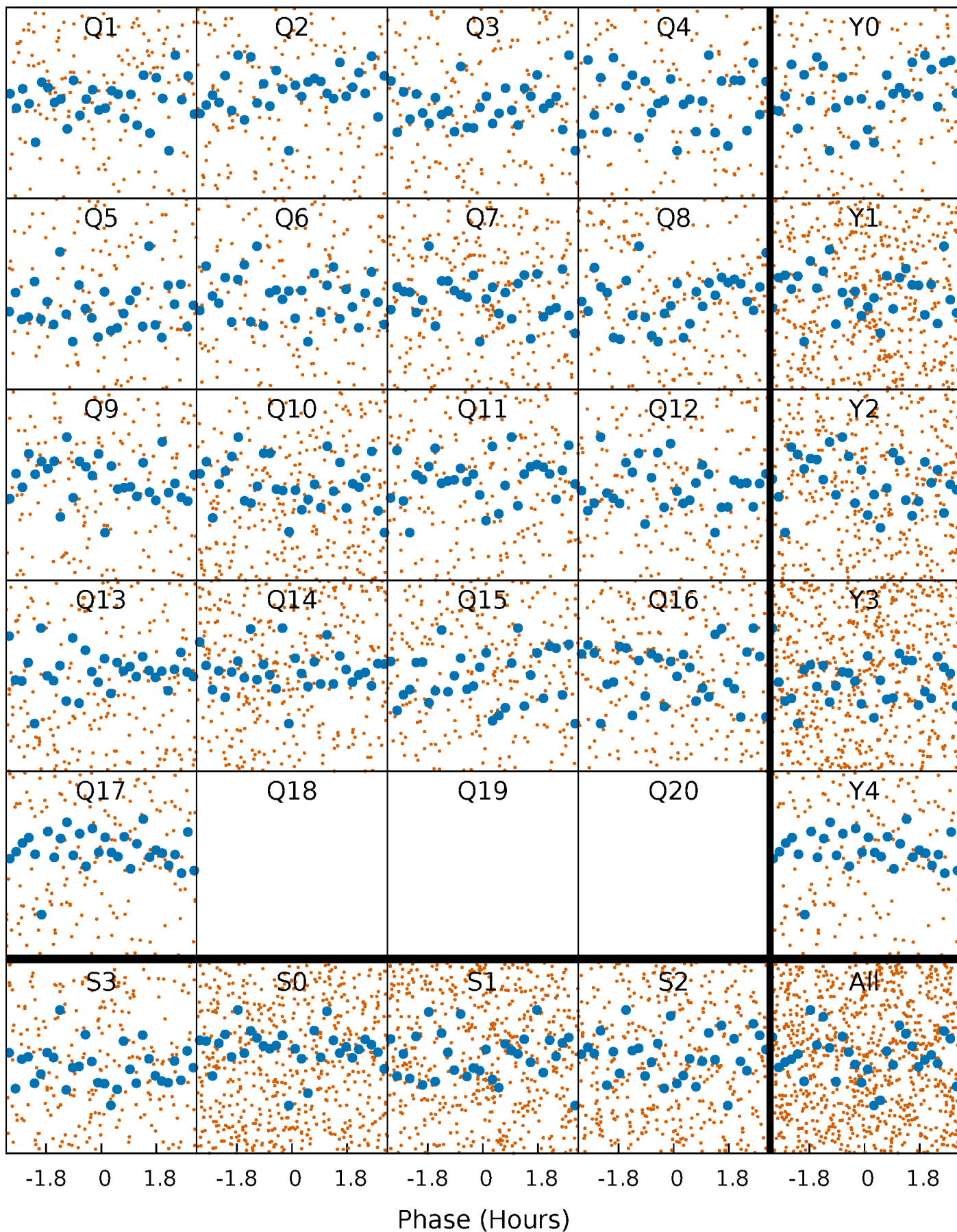
## Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)





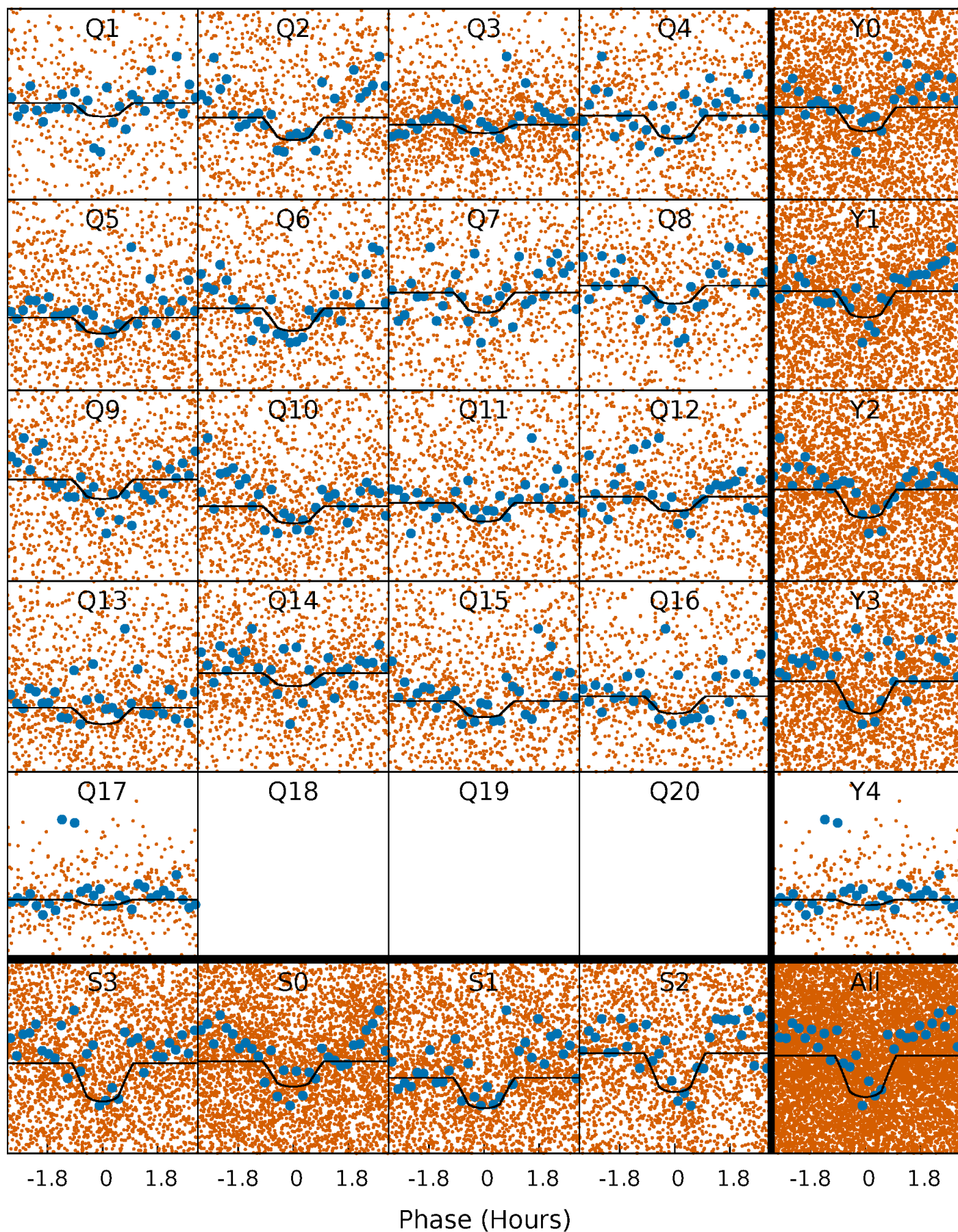
# PDC Quarter-Phased Transit Curves

TCE 004863614-01 P= 0.703847 Days  $T_0=131.586036$  (BKJD)



# DV Quarter-Phased Transit Curves

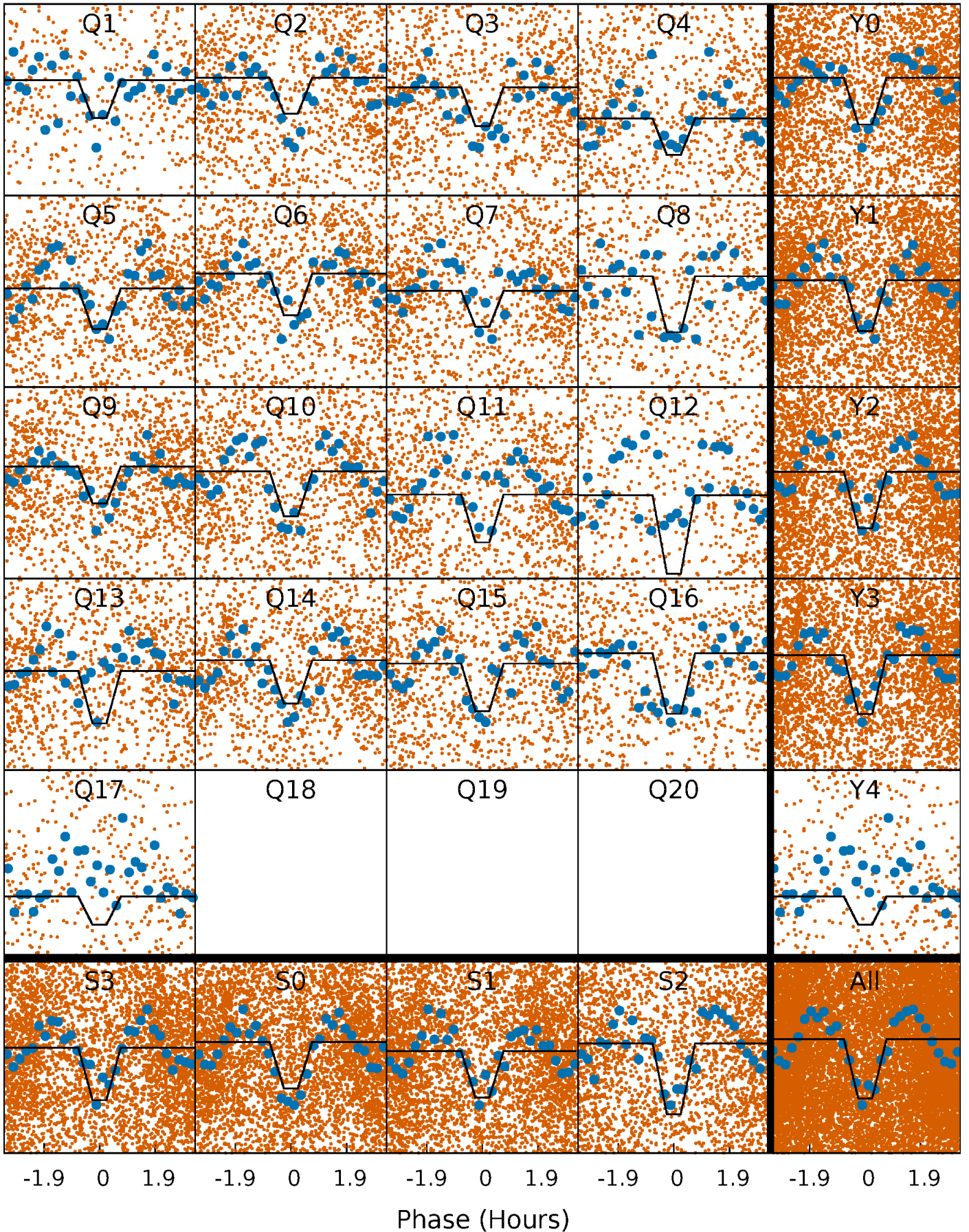
TCE 004863614-01 P= 0.703847 Days  $T_0=131.586036$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

TCE 004863614-01 P= 0.703859 Days  $T_0=131.580167$  (BKJD)

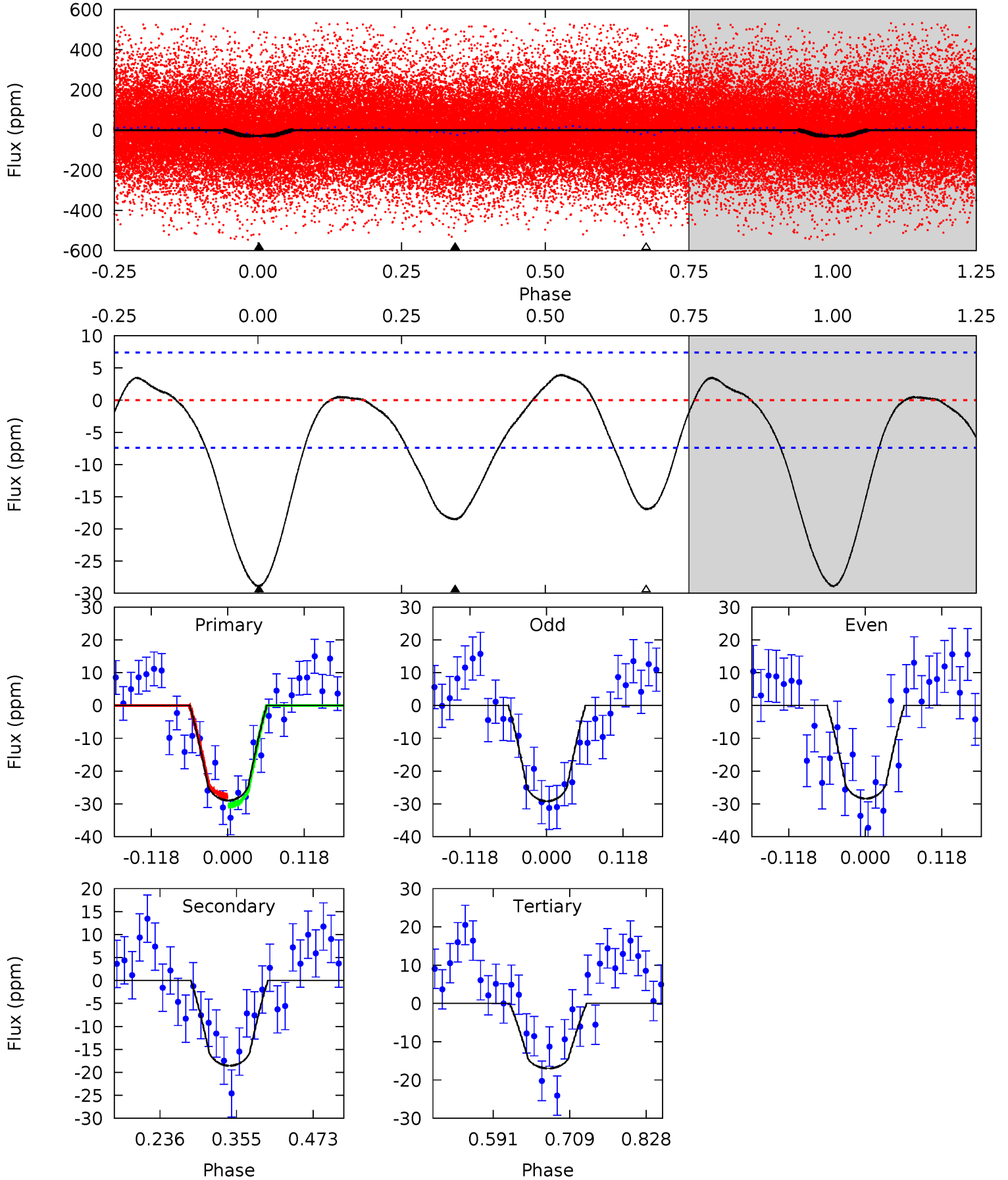




# DV Model-Shift Uniqueness Test

004863614-01, P = 0.703847 Days, E = 130.882189 Days

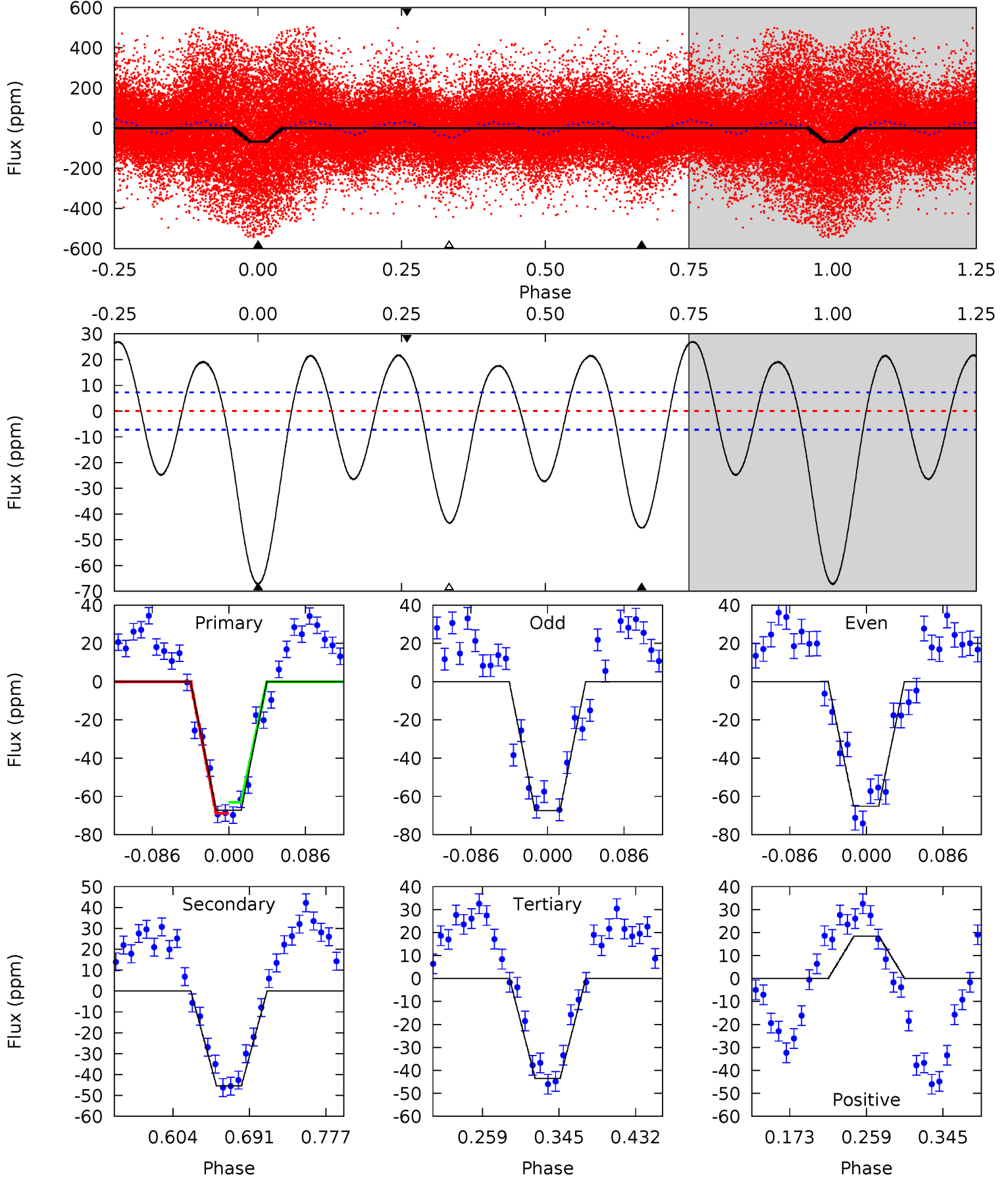
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
17.7	11.4	10.4	0	4.53	1.56	3.76	7.32	17.7	0.97	11.4	0.24	0.50	0.12	0.88



# Alt Model-Shift Uniqueness Test

004863614-01, P = 0.703859 Days, E = 131.580167 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
42.5	28.7	27.5	11.7	4.60	1.72	12.1	15.0	30.8	1.23	17.1	0.72	0.88	0.29	0



### Stellar Parameters For KIC 004863614

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6046^{+163}_{-199}$	$4.478^{+0.048}_{-0.180}$	$0.070^{+0.250}_{-0.350}$	$1.007^{+0.267}_{-0.114}$	$1.111^{+0.120}_{-0.160}$	$1.532^{+0.377}_{-0.742}$
	+3%/-3%	+1%/-4%	+357%/-500%	+27%/-11%	+11%/-14%	+25%/-48%
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 004863614-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-19 \pm 2$	$0.58^{+0.15}_{-0.15}$	$3010^{+213}_{-142}$	$5528^{+789}_{-541}$	$7.509^{+5.913}_{-2.745}$
Alt.	$-45 \pm 2$	$0.92^{+0.18}_{-0.15}$	$3020^{+173}_{-141}$	$5488^{+417}_{-375}$	$7.386^{+2.836}_{-2.123}$

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



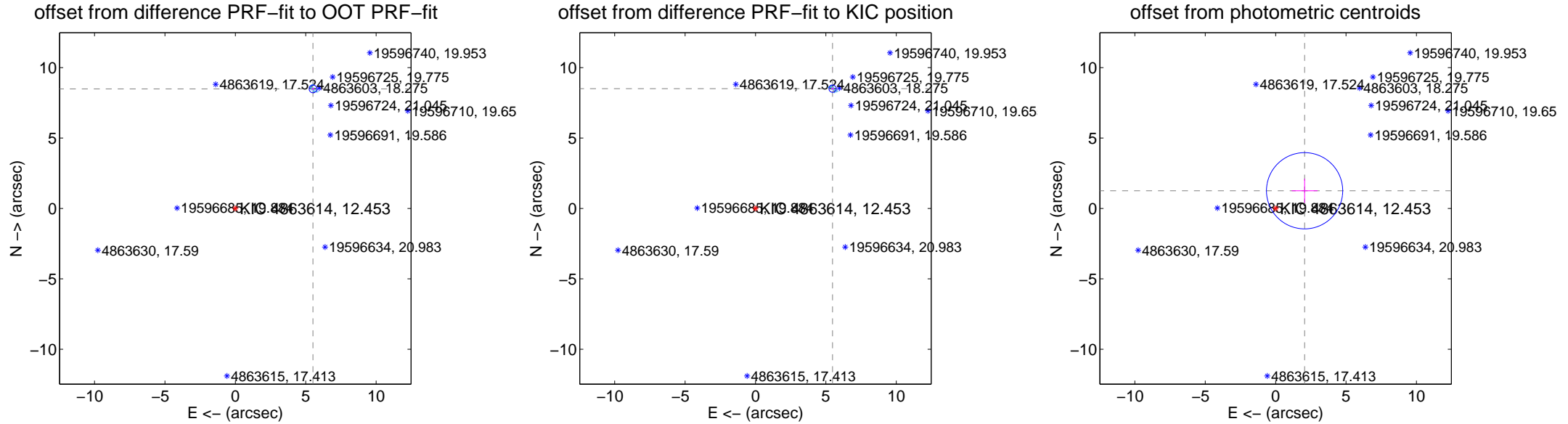
## DV Centroid Data

Supplemental centroid analysis for 004863614-01. Kepler magnitude: 12.45. Transit SNR 8.51

There are 10 quarters with good PRF difference image offsets

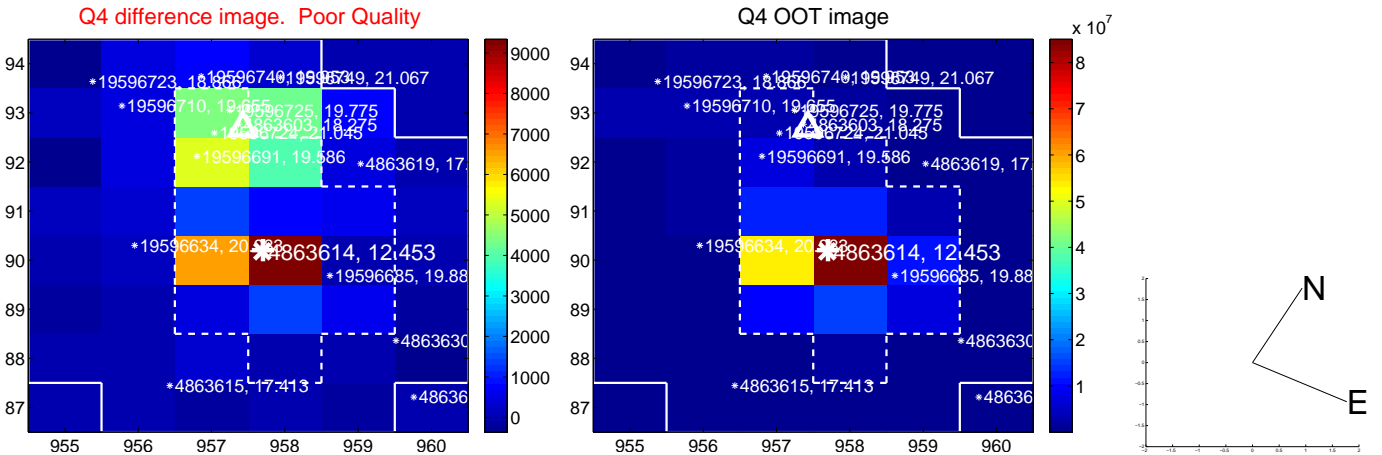
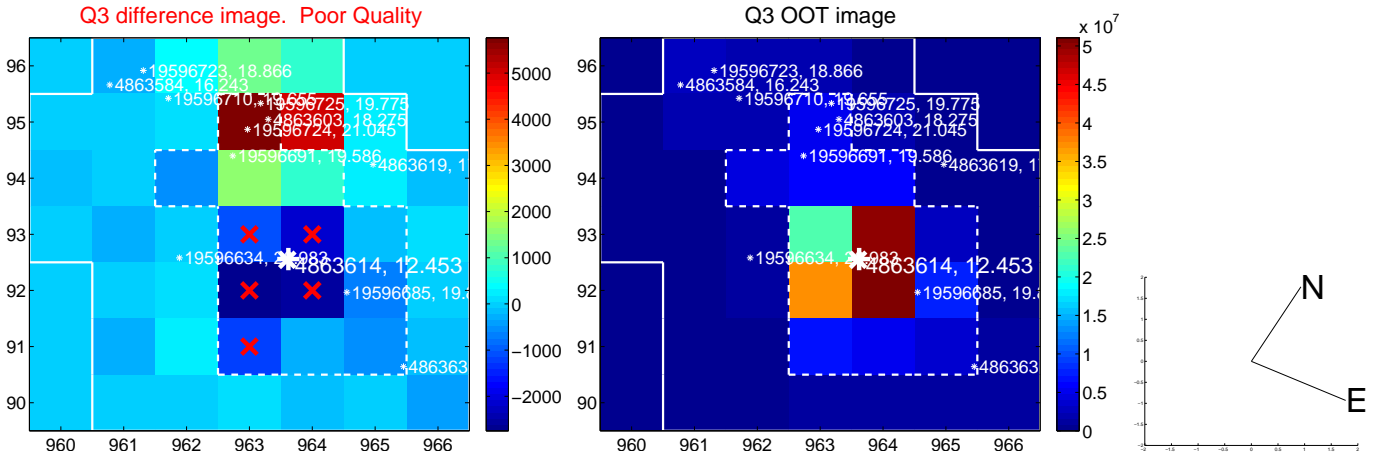
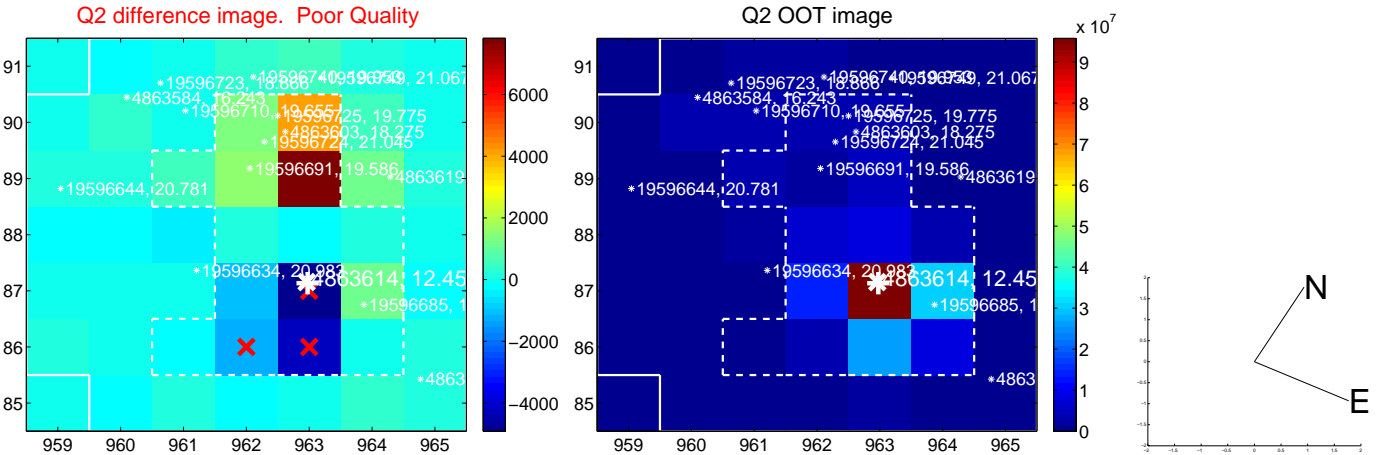
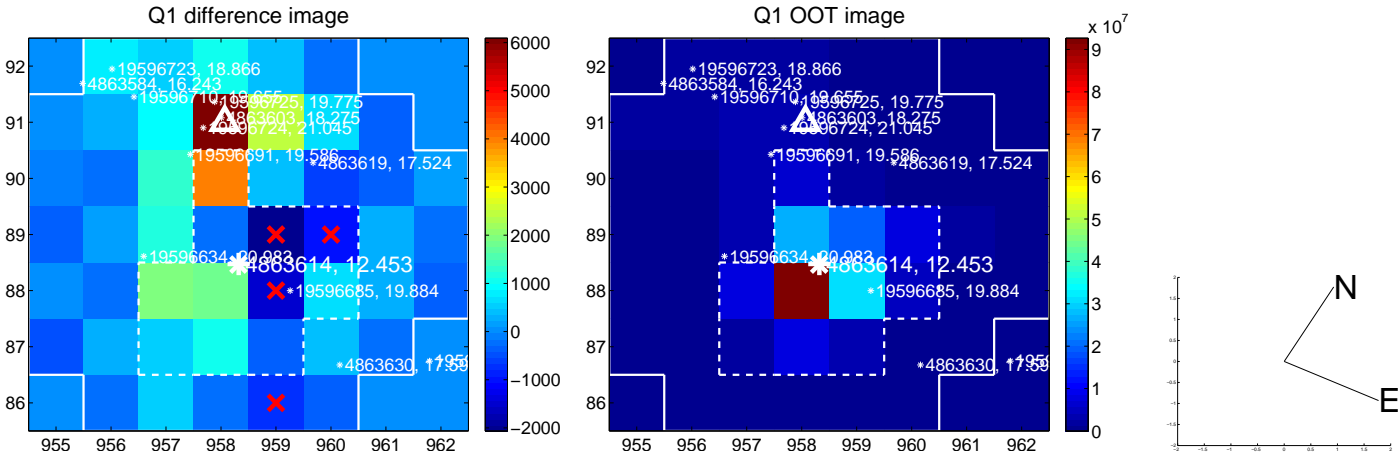
The direct PRF centroid is offset from the target star catalog position by about 0.11 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	10.123 $\pm$ 0.092	110.40	-5.515 $\pm$ 0.077	8.489 $\pm$ 0.097
PRF-fit source offset from KIC position	10.114 $\pm$ 0.086	116.95	-5.474 $\pm$ 0.083	8.505 $\pm$ 0.088
photometric centroid source offset	2.41 $\pm$ 0.90	2.67	-2.06 $\pm$ 0.92	1.26 $\pm$ 0.86

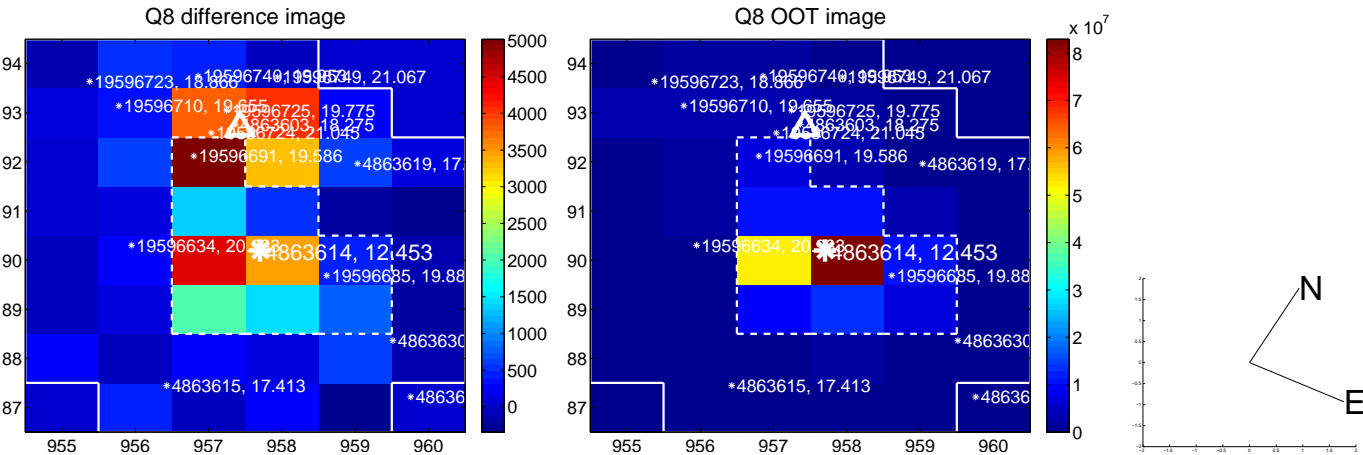
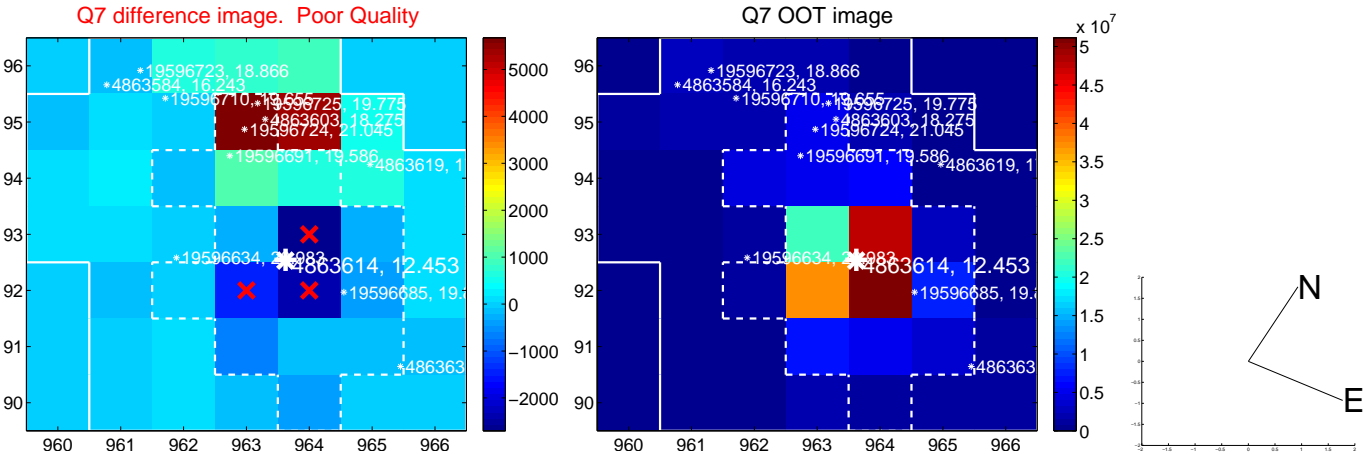
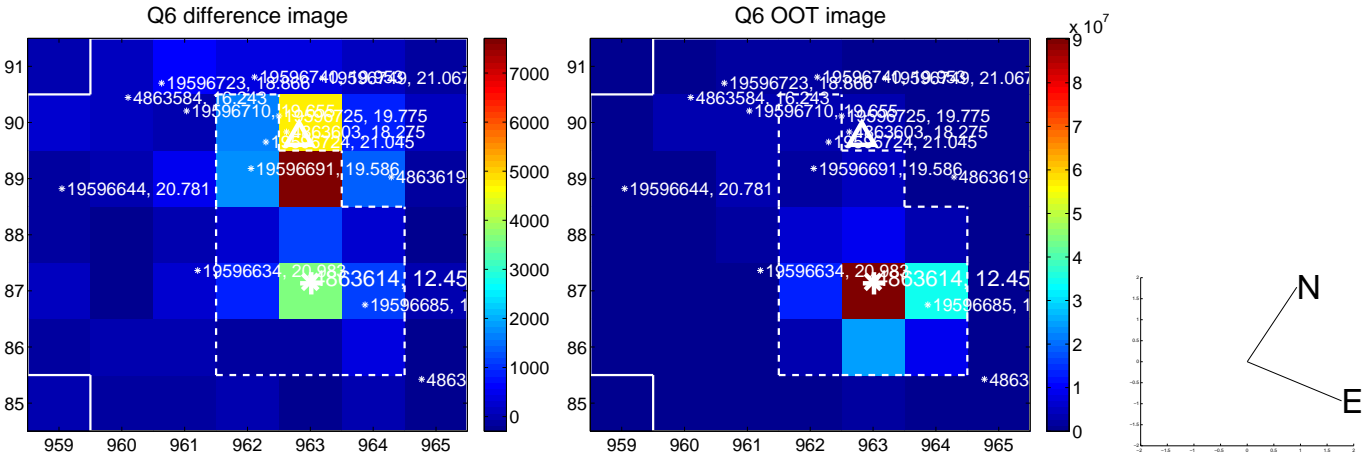
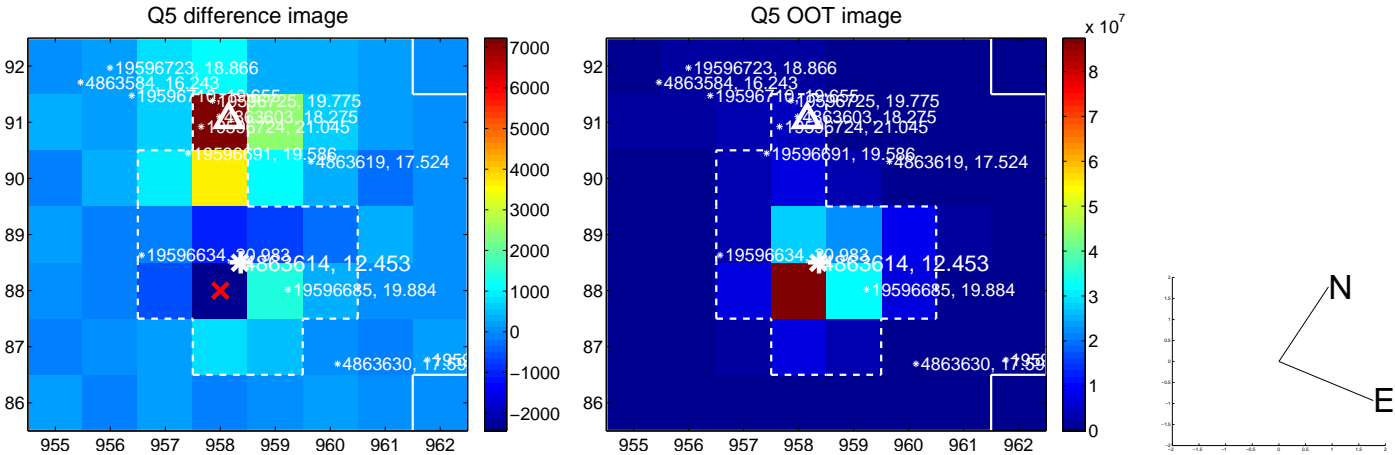


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

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

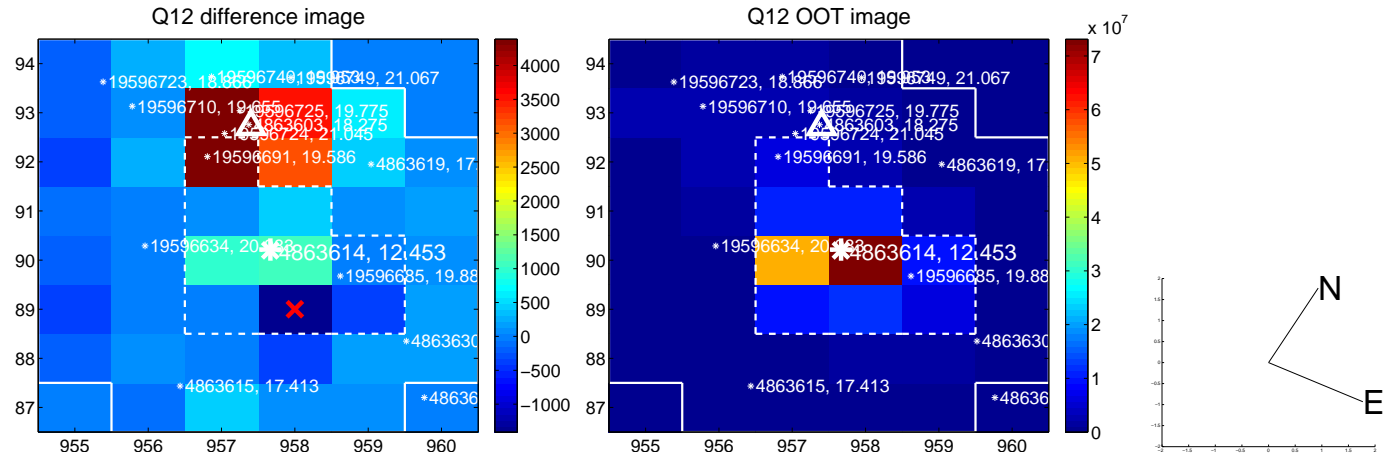
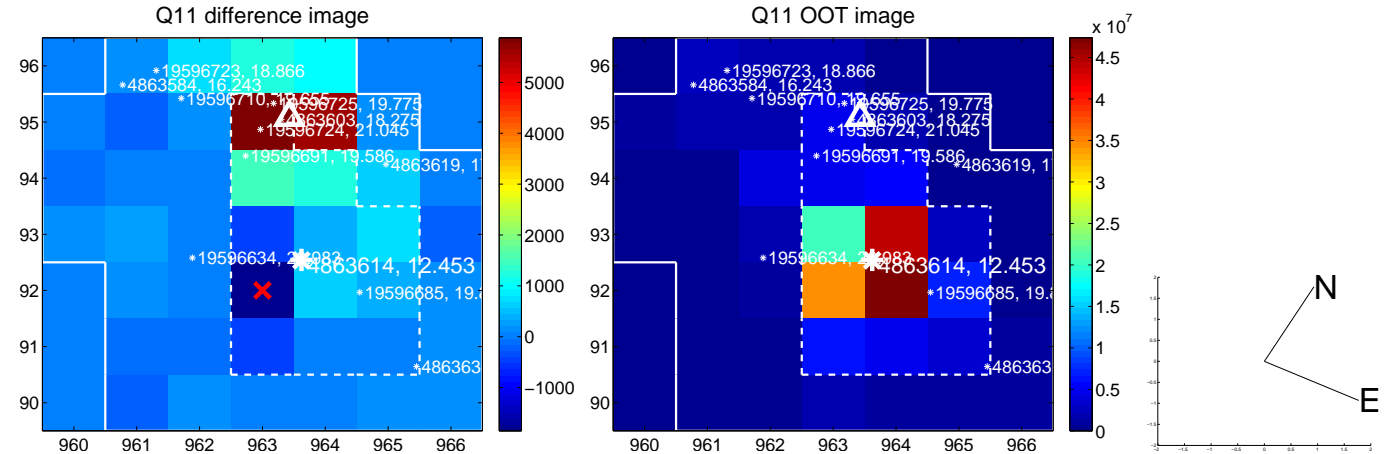
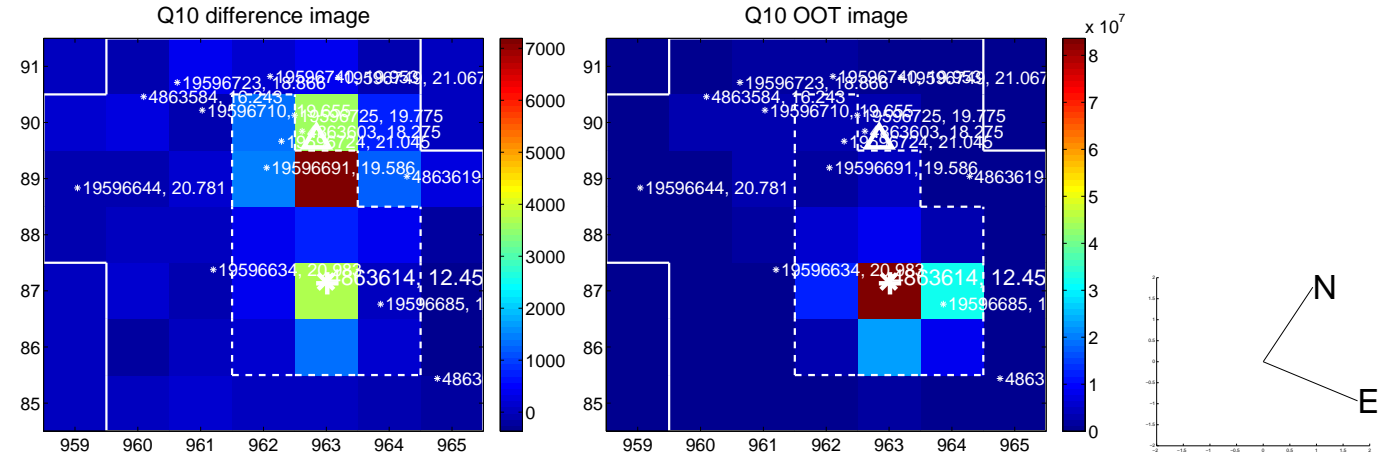
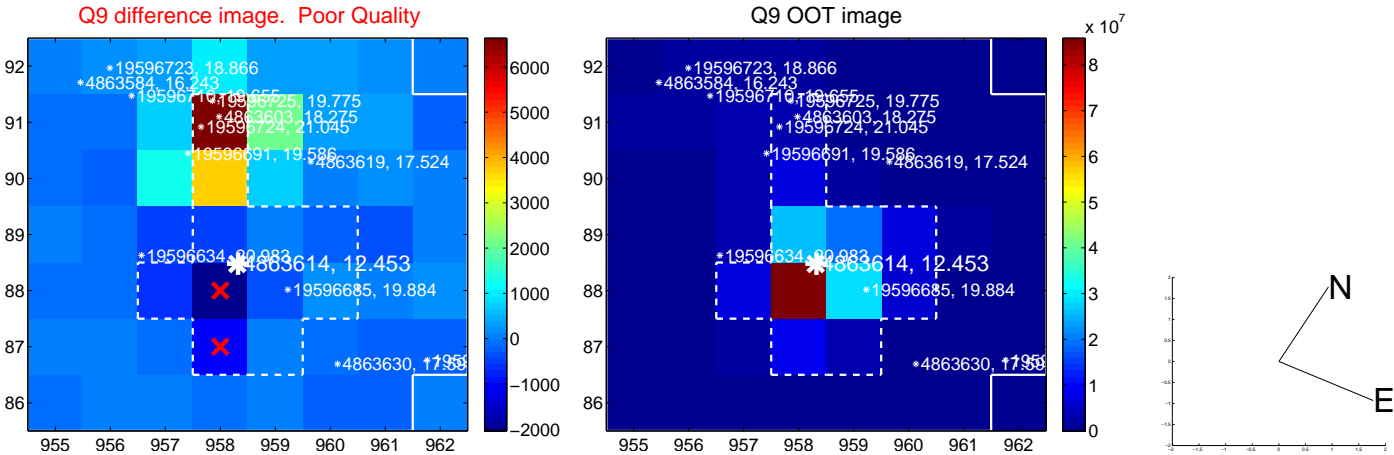


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

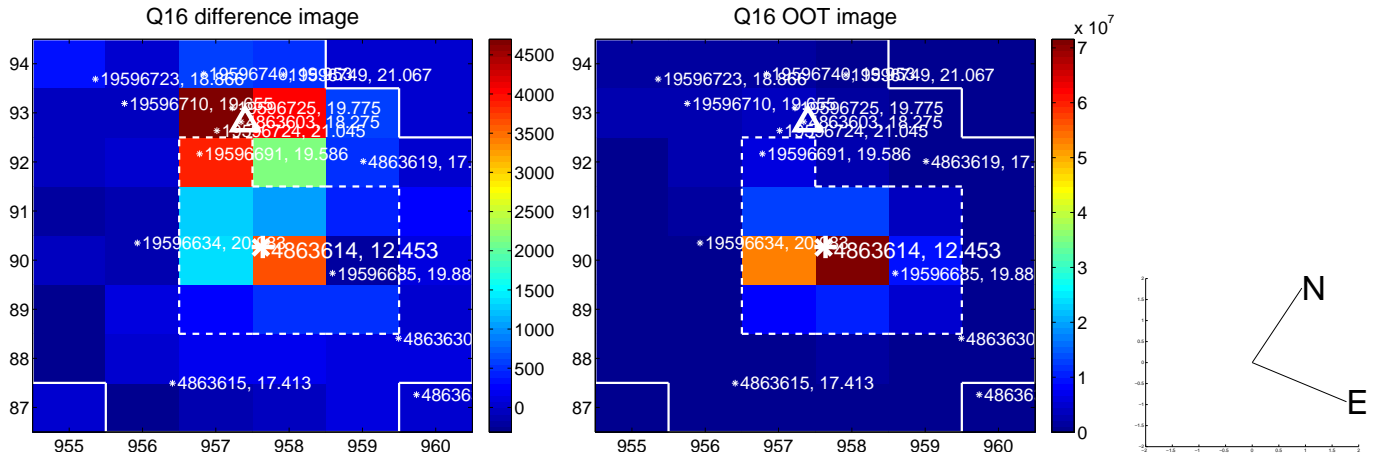
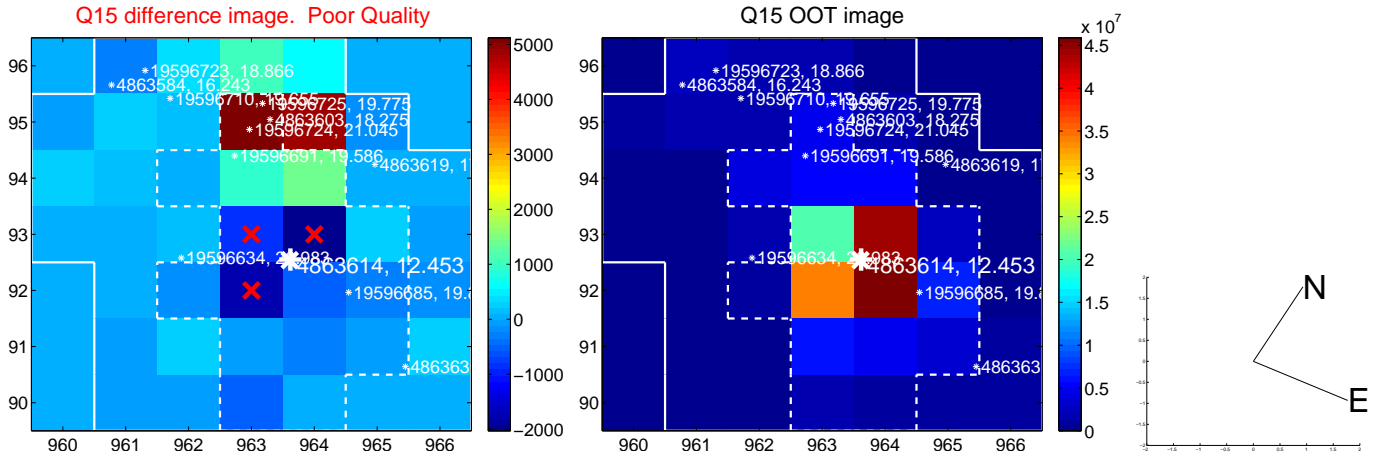
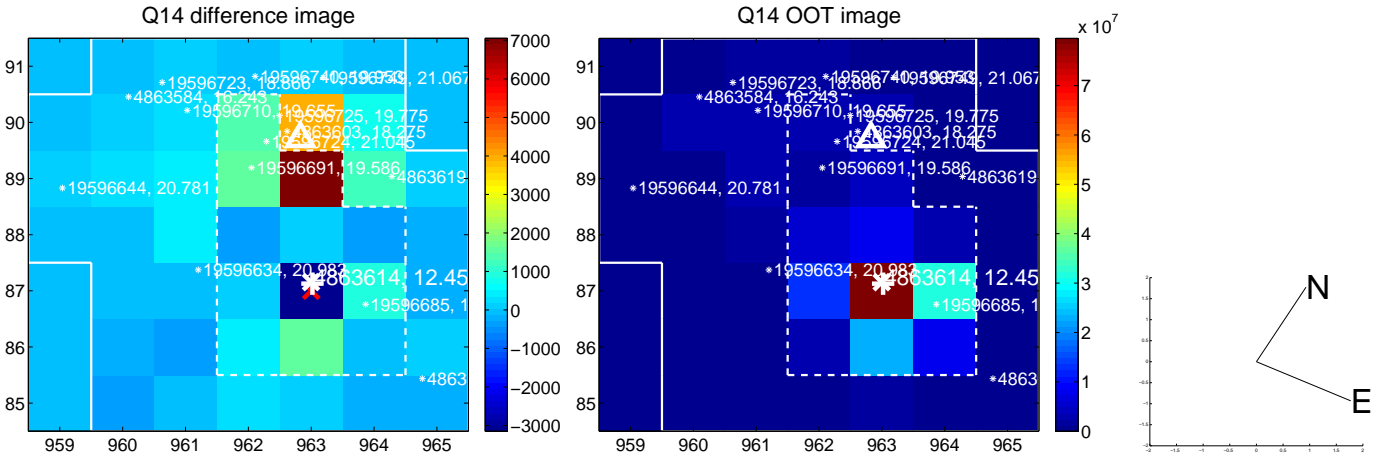
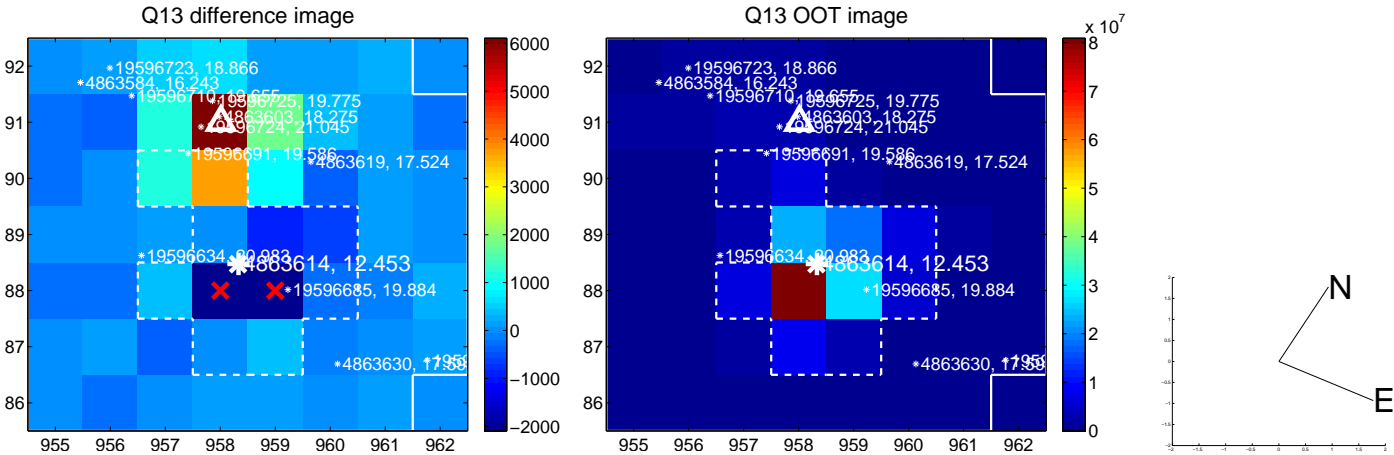




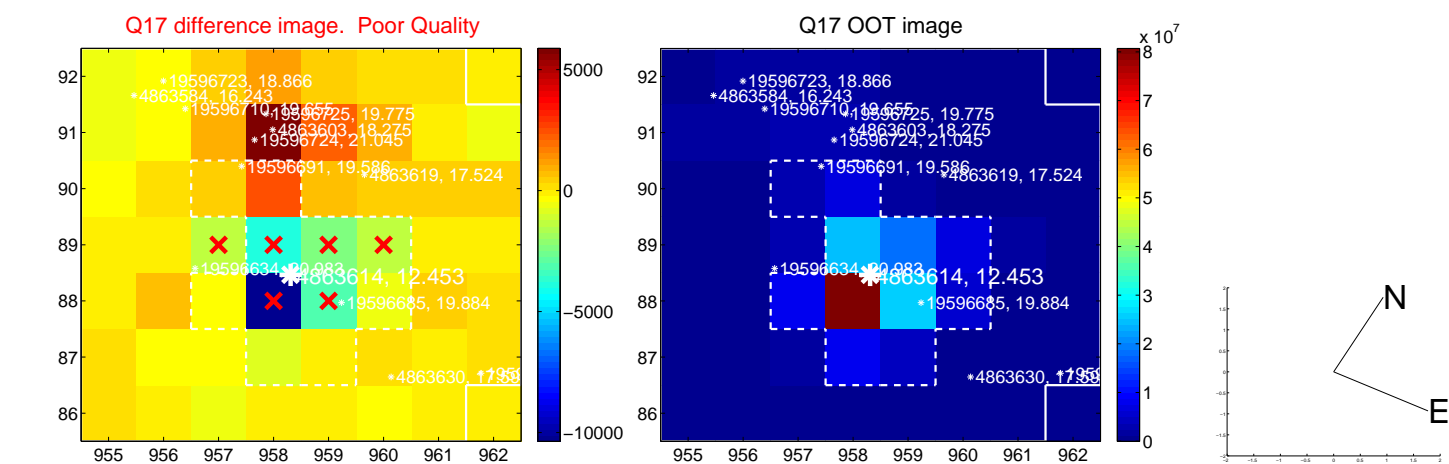
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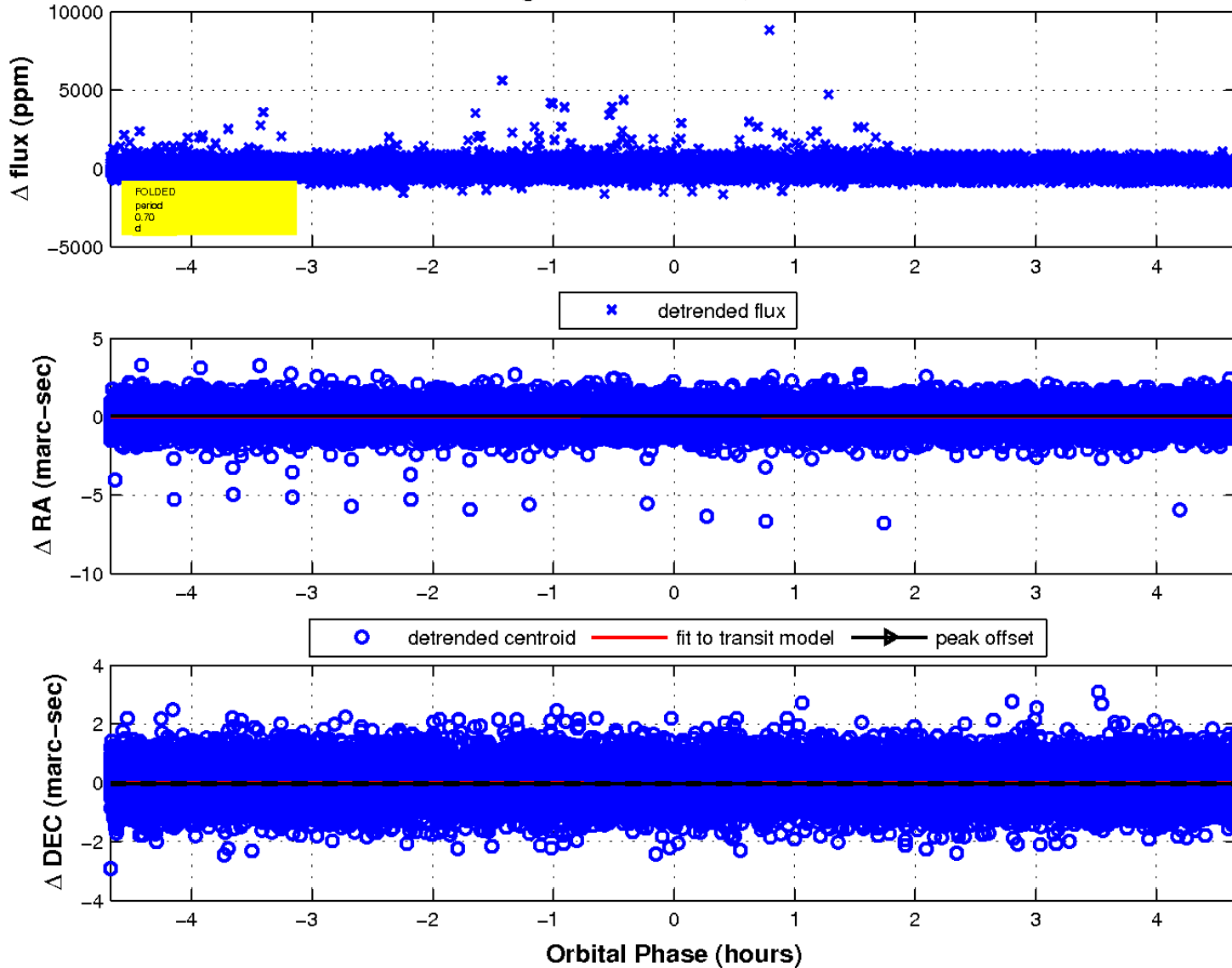
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



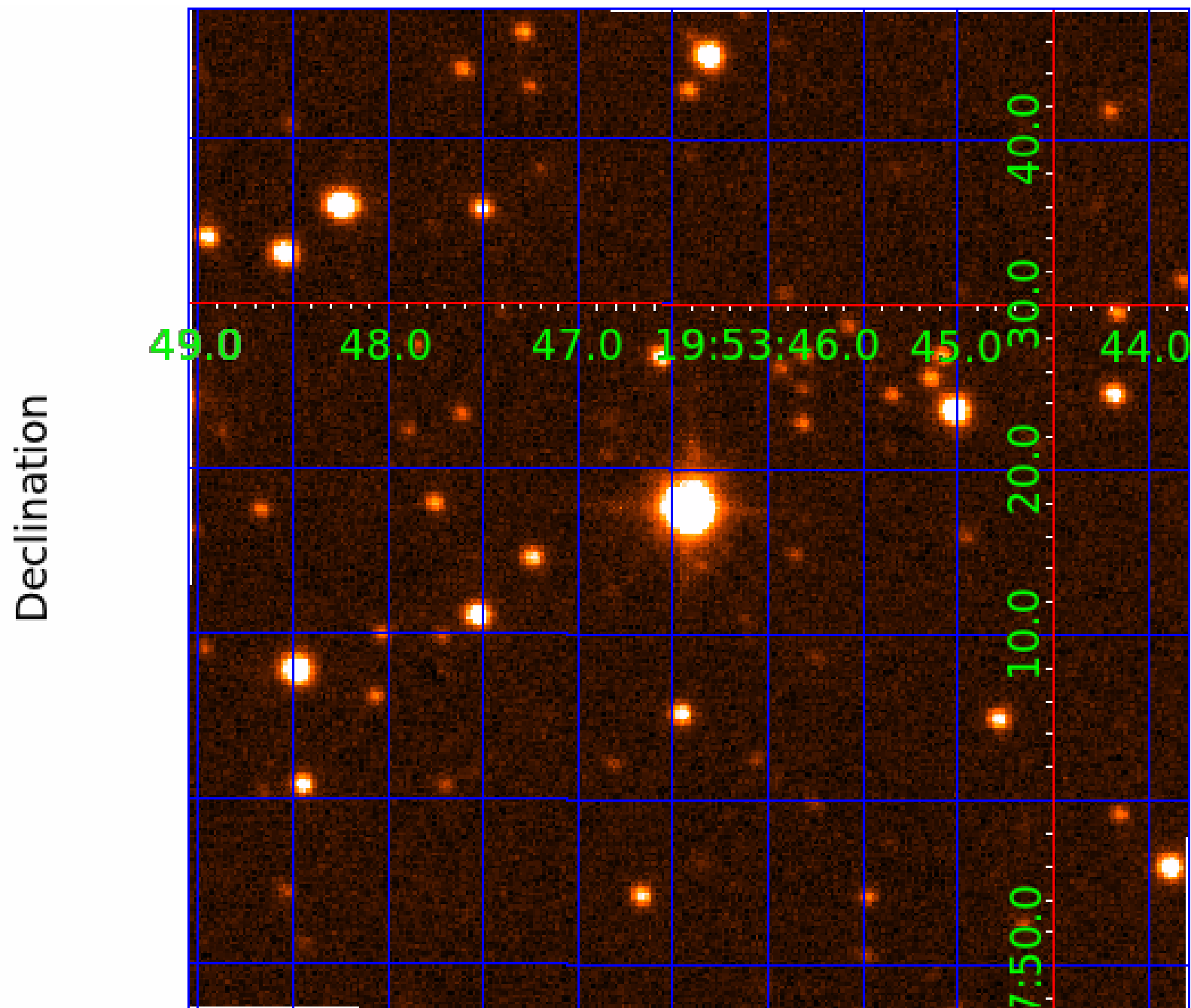
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



fluxWeightedCentroids, Planet 1 of 6



UKIRT Image



# KIC 004863614

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004863614-01	OBS	No	0.703847	131.586036	25.2	1.557	8.8	8.5	1.01	6046	0.56	4715.00
004863614-02	OBS	No	391.380986	148.096874	319.1	6.601	11.7	3.5	1.01	6046	1.91	1.03
004863614-03	OBS	No	373.261860	156.811508	178.0	3.067	10.8	1.8	1.01	6046	1.56	1.10
004863614-04	OBS	No	284.129997	157.131940	684.7	5.311	12.5	6.2	1.01	6046	2.85	1.58
004863614-05	OBS	No	0.703868	132.049544	34.9	1.809	7.9	10.9	1.01	6046	0.70	4714.82
004863614-06	OBS	No	151.197753	143.473671	554.2	9.456	10.3	4.9	1.01	6046	2.51	3.67

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004863614-01	OBS	FP	0.00	1	0	1	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—CENT_RESOLVED_OFFSET
004863614-02	OBS	FP	0.00	1	0	0	0	LPP_ALT—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004863614-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL_SKYE_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004863614-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV
004863614-05	OBS	FP	0.00	1	0	1	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_RESOLVED_OFFSET—HALO_GHOST
004863614-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

**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.

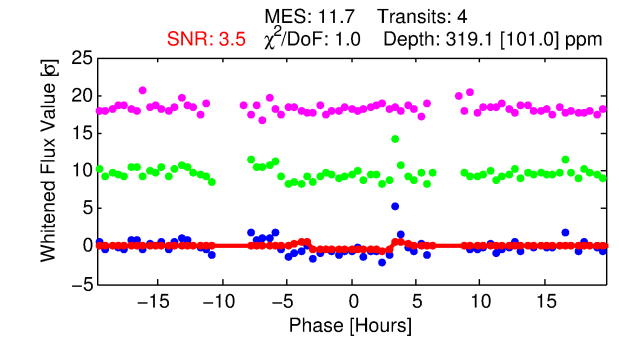
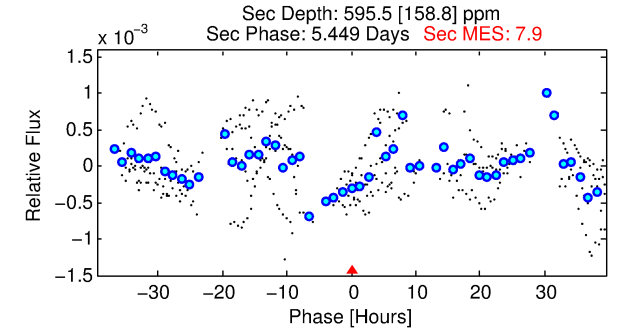
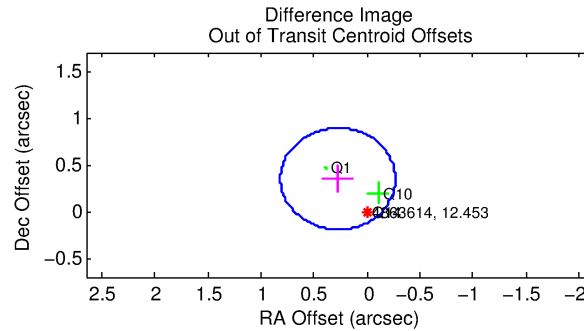
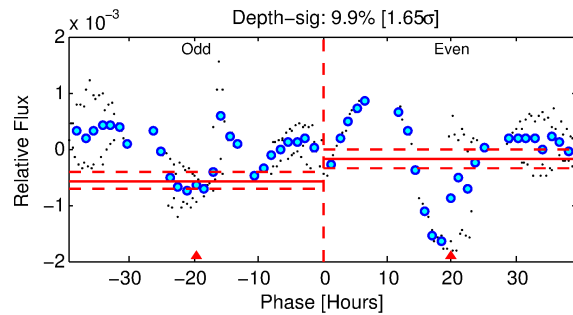
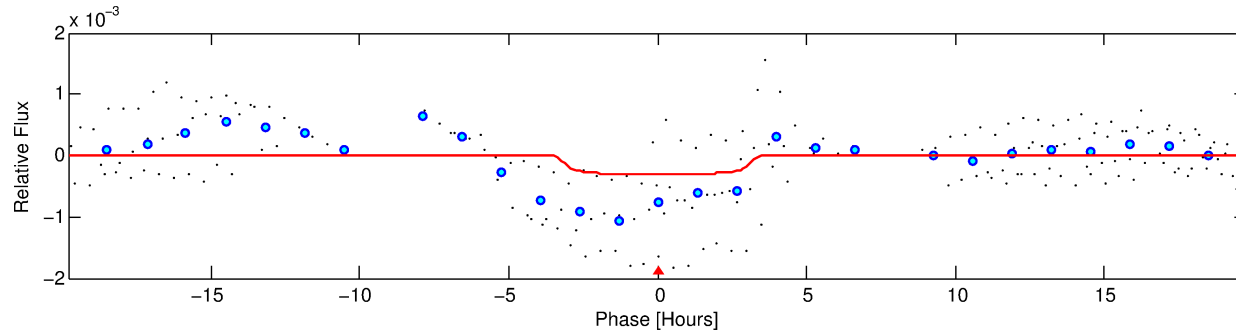
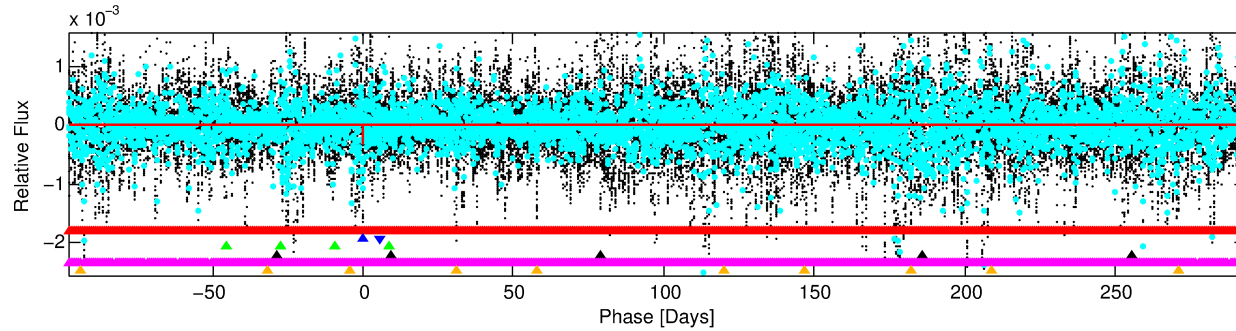
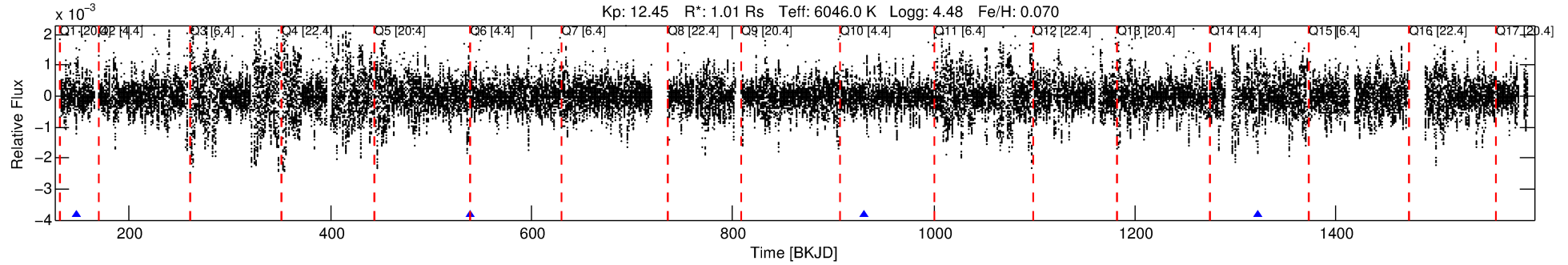
Ephemeris Match Information For 004863614-02

No Significant Match Found



# DV One-Page Summary

KIC: 4863614 Candidate: 2 of 6 Period: 391.381 d



## DV Fit Results:

Period = 391.38099 [0.00569] d  
Epoch = 148.0969 [0.0096] BKJD  
Rp/R\* = 0.0174 [0.0144]  
a/R\* = 340.95 [1261.71]  
b = 0.68 [2.88]  
Seff = 1.03 [0.36]  
Teq = 257 [23] K  
Rp = 1.91 [1.66] Re  
a = 1.0851 [0.2434] AU  
Ag = 105366.00 [180235.88] [0.58 $\sigma$ ]  
Teffp = 7158 [3013] K [2.29 $\sigma$ ]

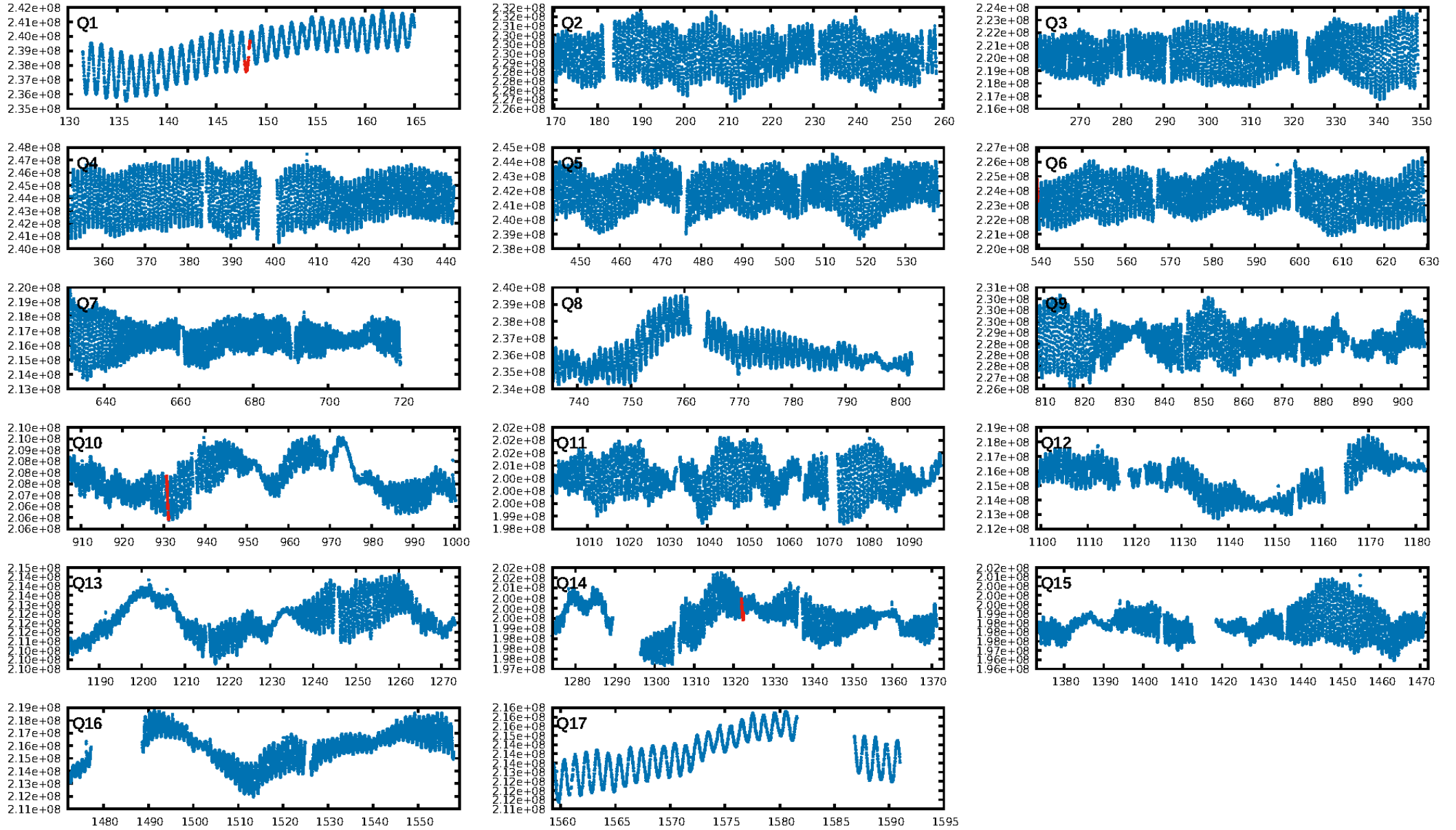
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [59.75 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.6%  
ModelChiSquareGof-sig: 99.2%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 6.021  
Centroid-sig: 36.6%  
Centroid-so: 0.862 arcsec [0.93 $\sigma$ ]  
OotOffset-rm: 0.444 arcsec [2.45 $\sigma$ ]  
KicOffset-rm: 0.486 arcsec [2.98 $\sigma$ ]  
OotOffset-st: 2/0/0/1 [3]  
KicOffset-st: 2/0/0/1 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 0.00 [0/3]

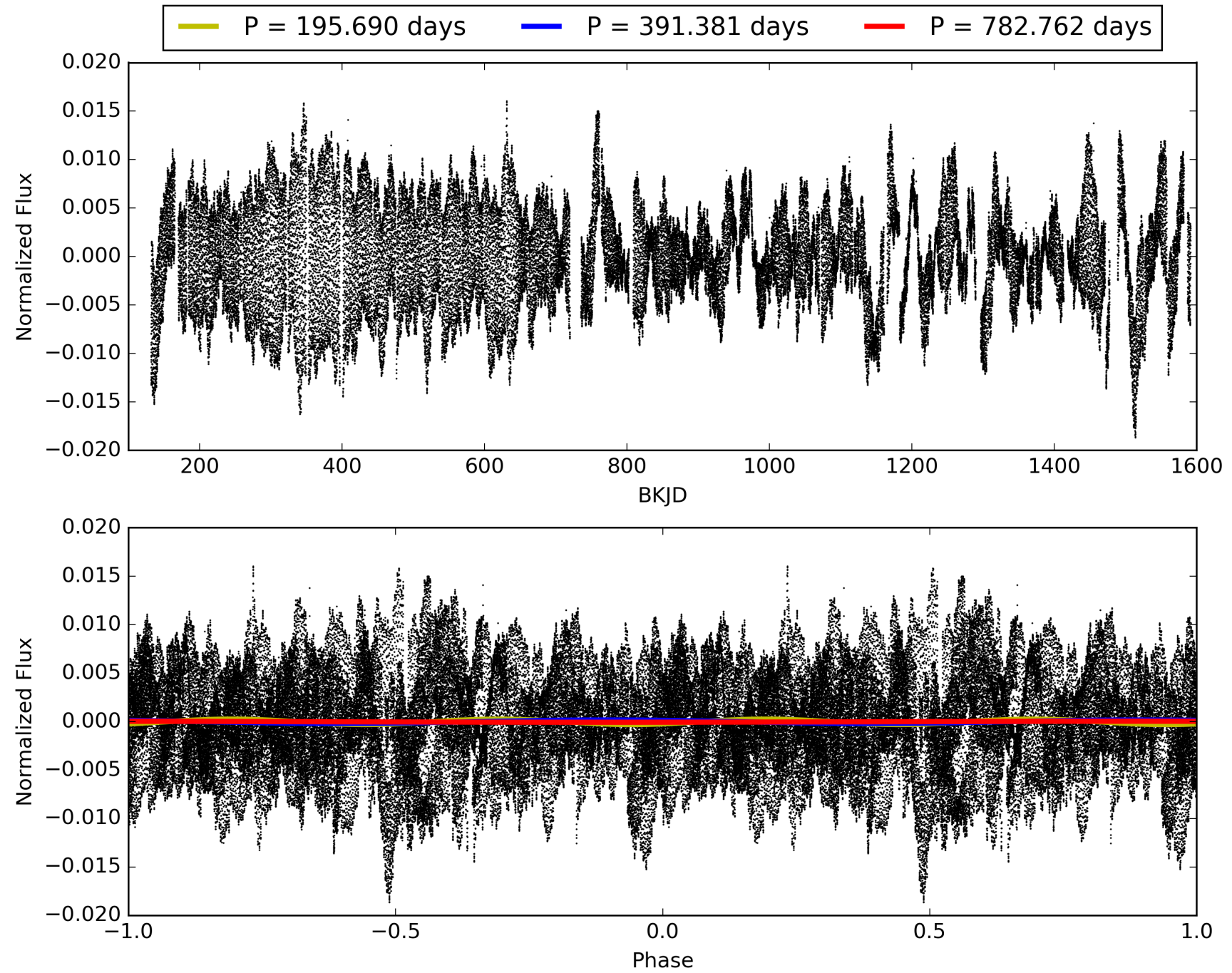
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 17:12:50 Z

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

# TCE 004863614-02, PDC Light Curves

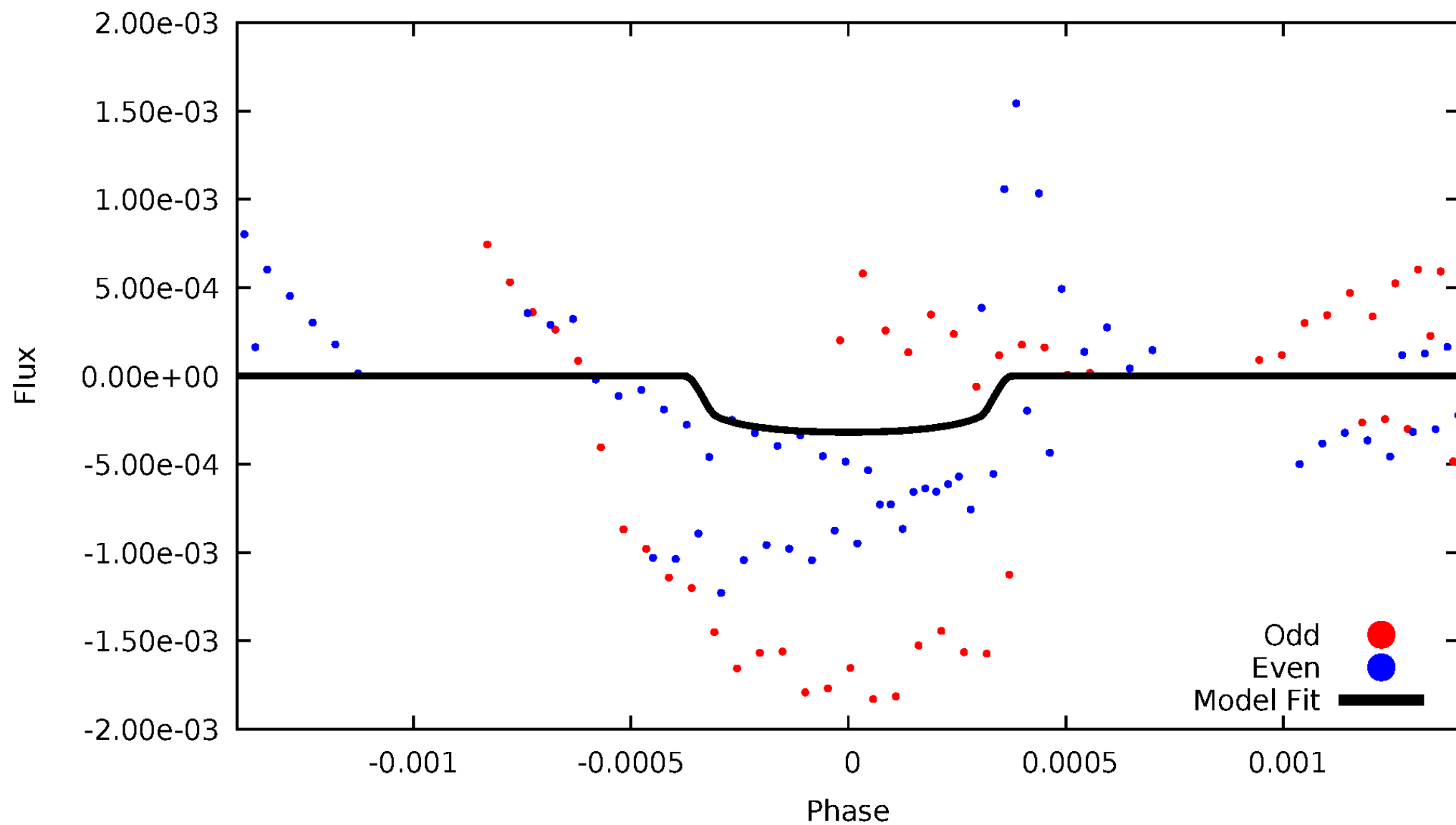


TCE 004863614-02



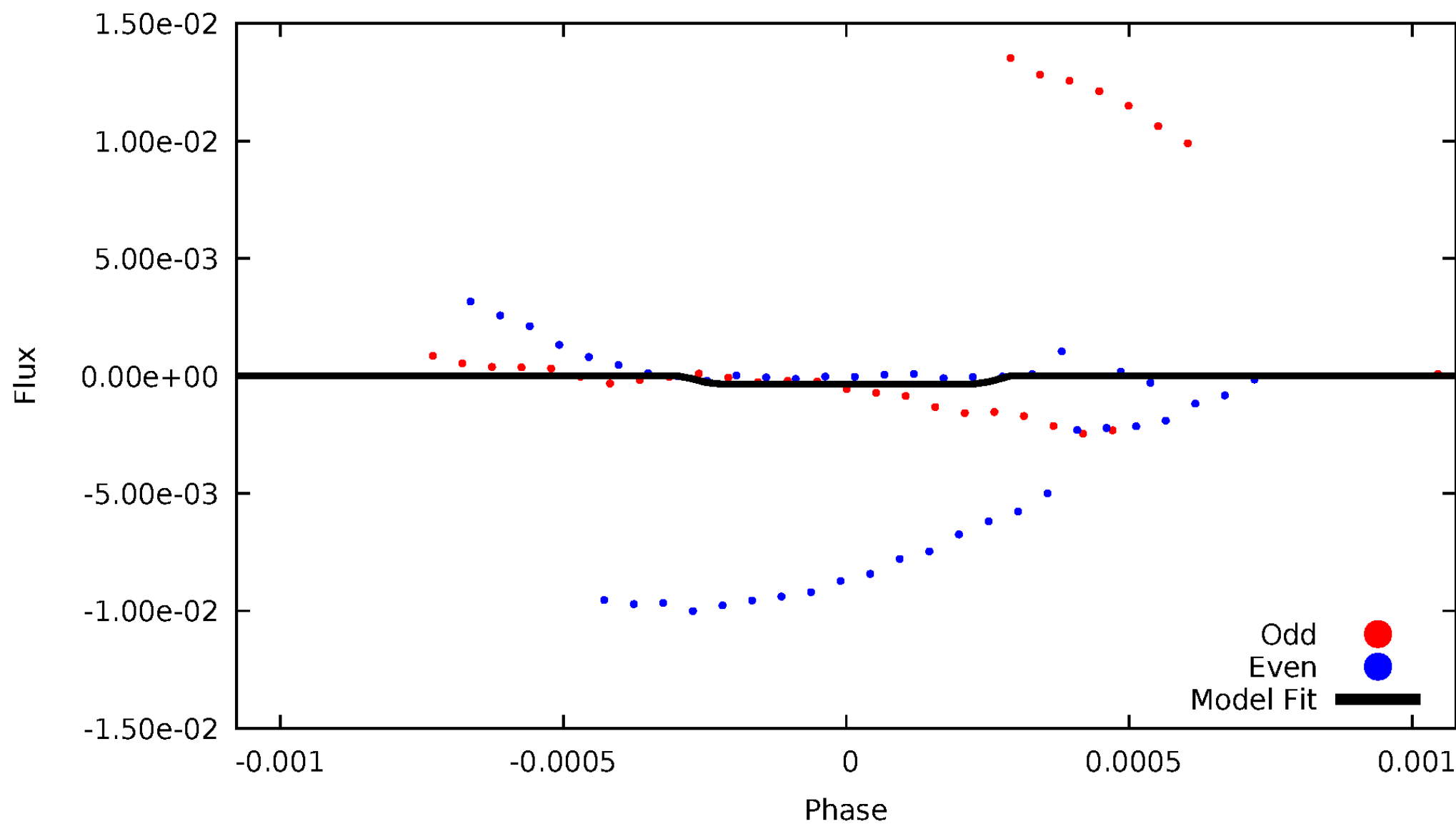
# DV Odd/Even

TCE 004863614-02



# ALT Odd/Even

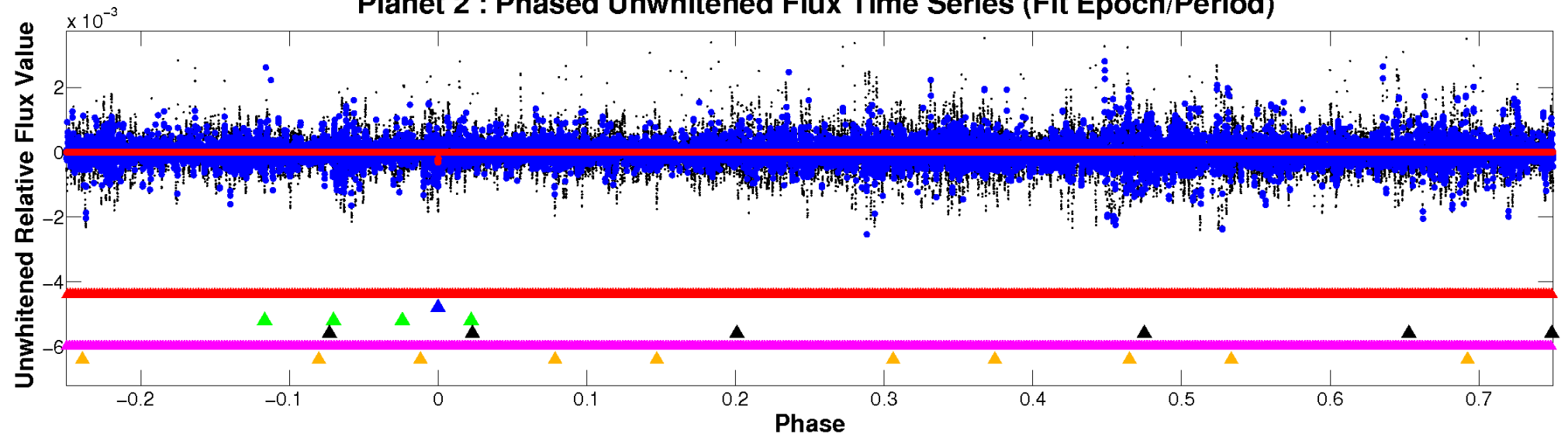
TCE 004863614-02



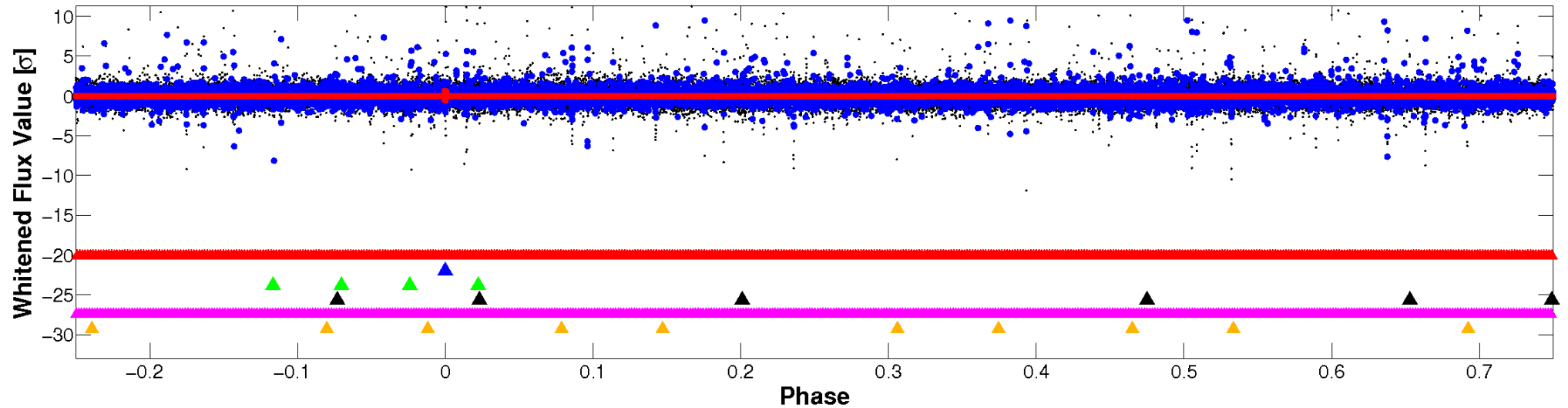


# Non-Whitened Vs. Whitened Light Curve

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

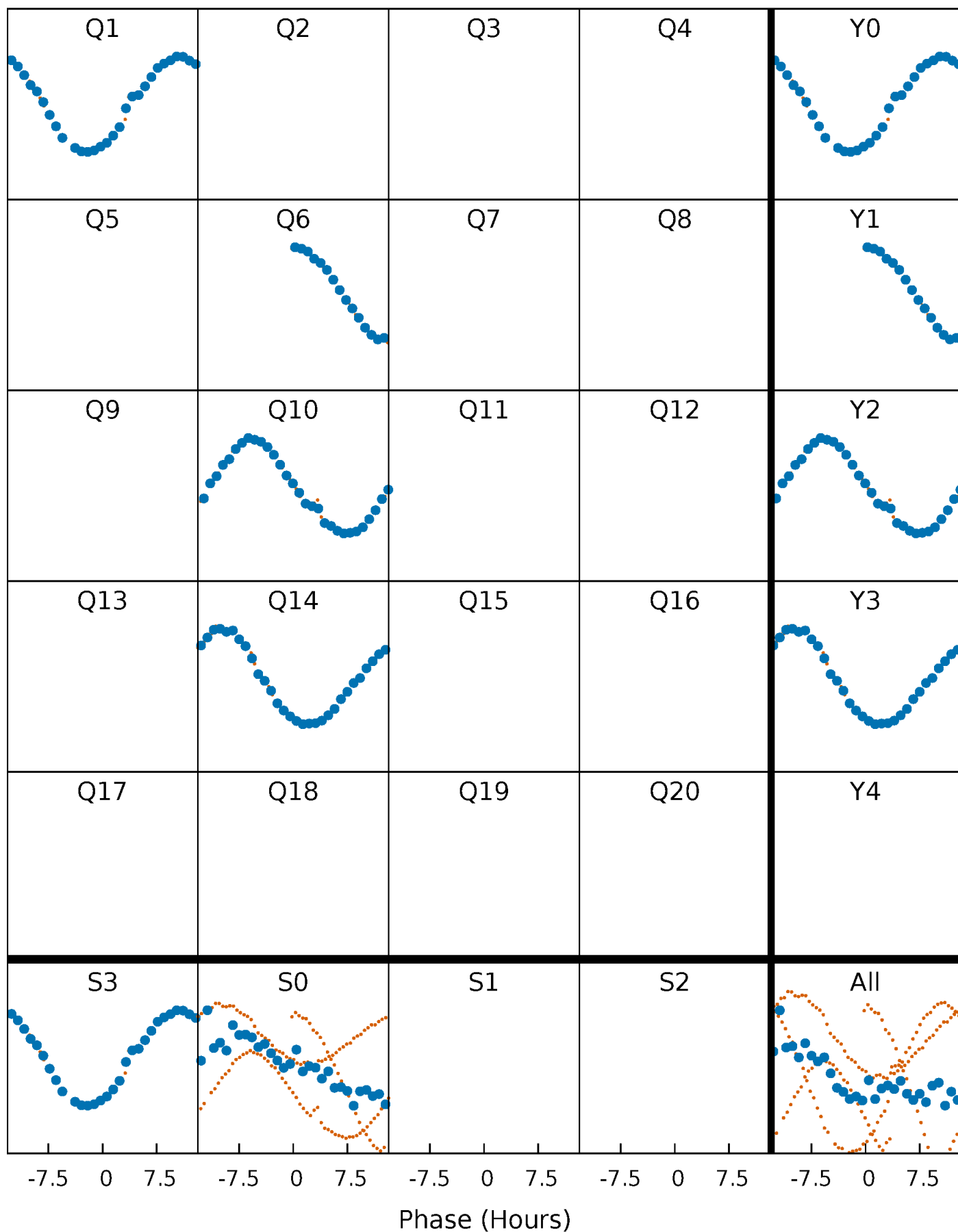


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



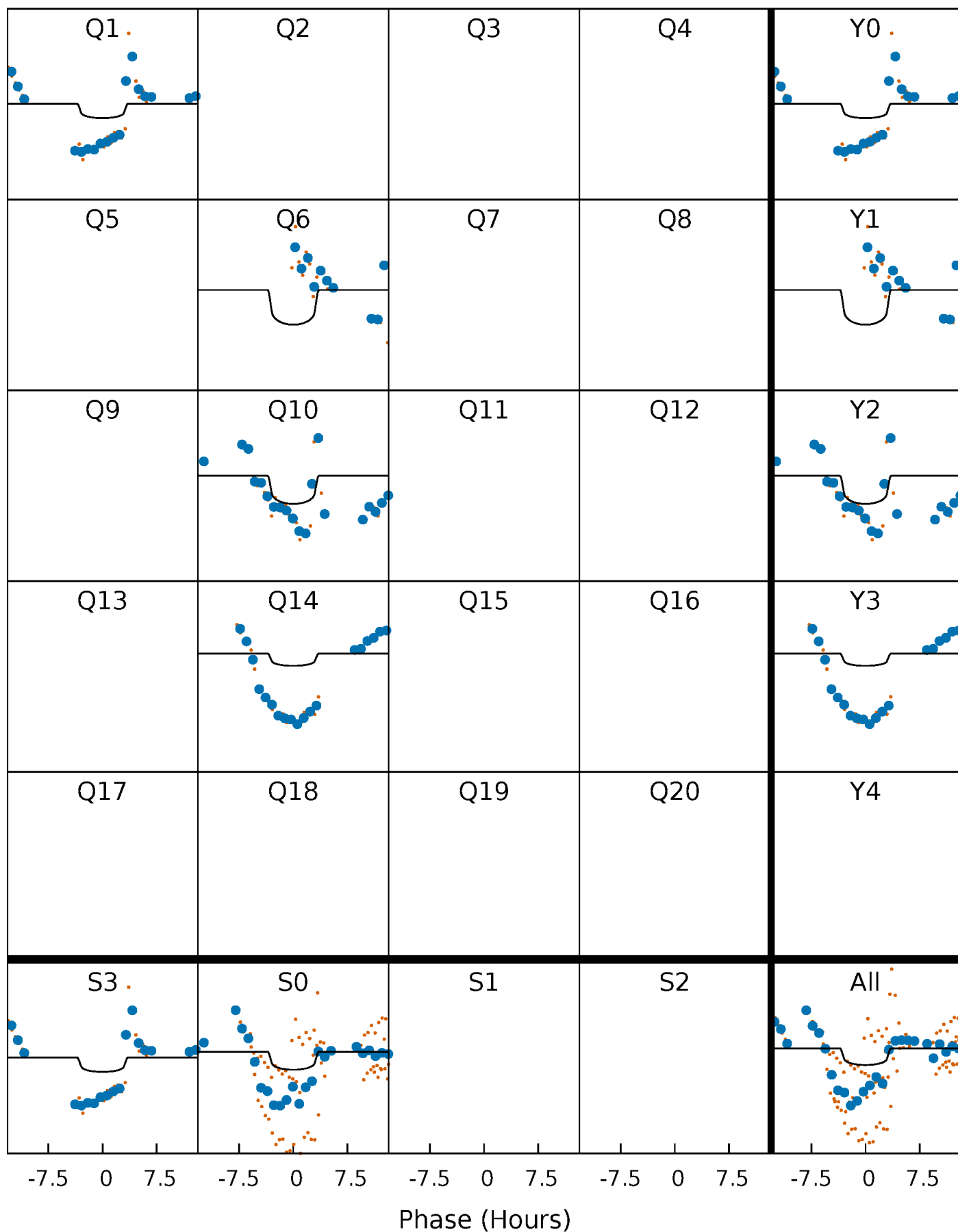
# PDC Quarter-Phased Transit Curves

TCE 004863614-02     $P=391.380986$  Days     $T_0=148.096874$  (BKJD)



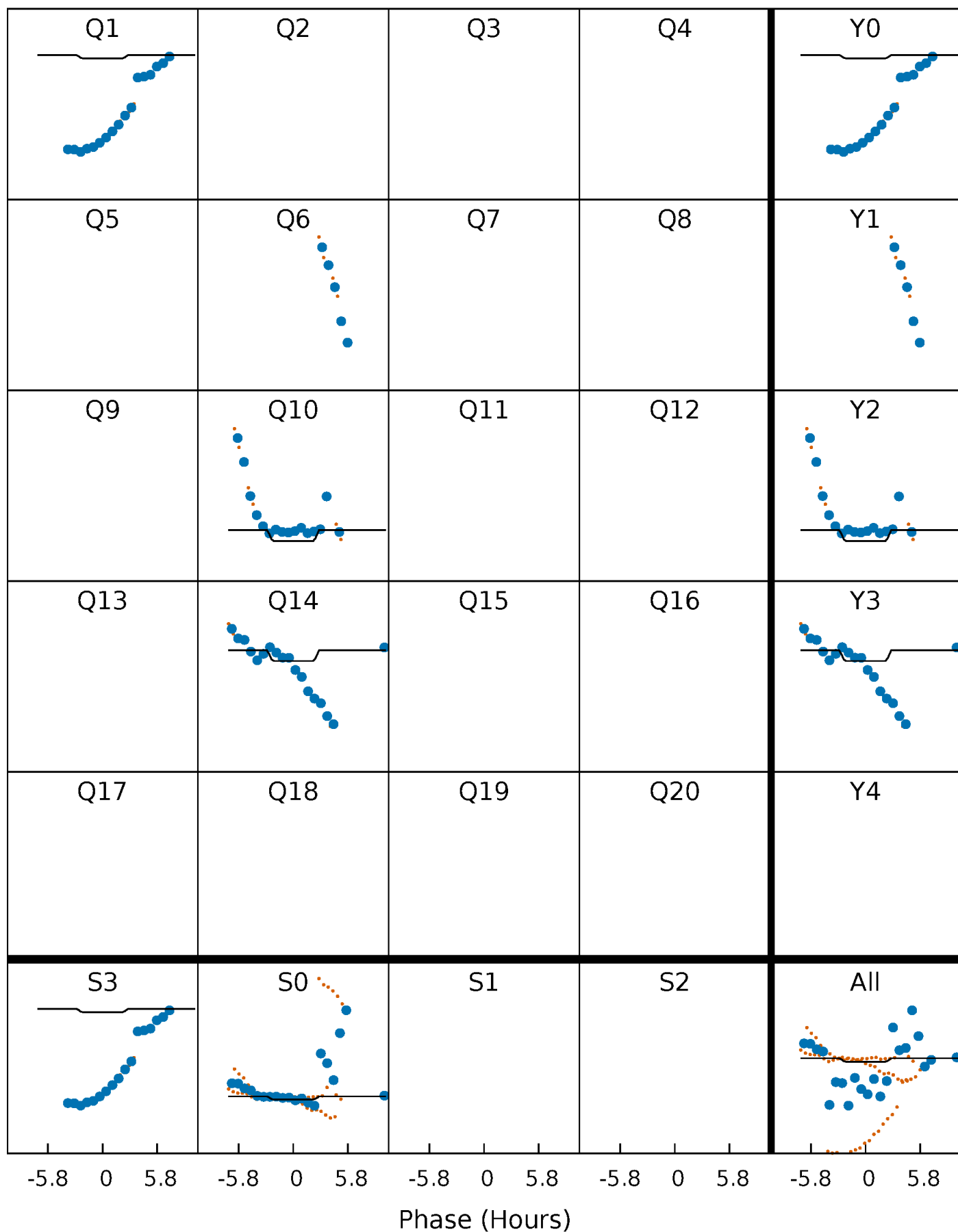
# DV Quarter-Phased Transit Curves

TCE 004863614-02 P=391.380986 Days  $T_0=148.096874$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

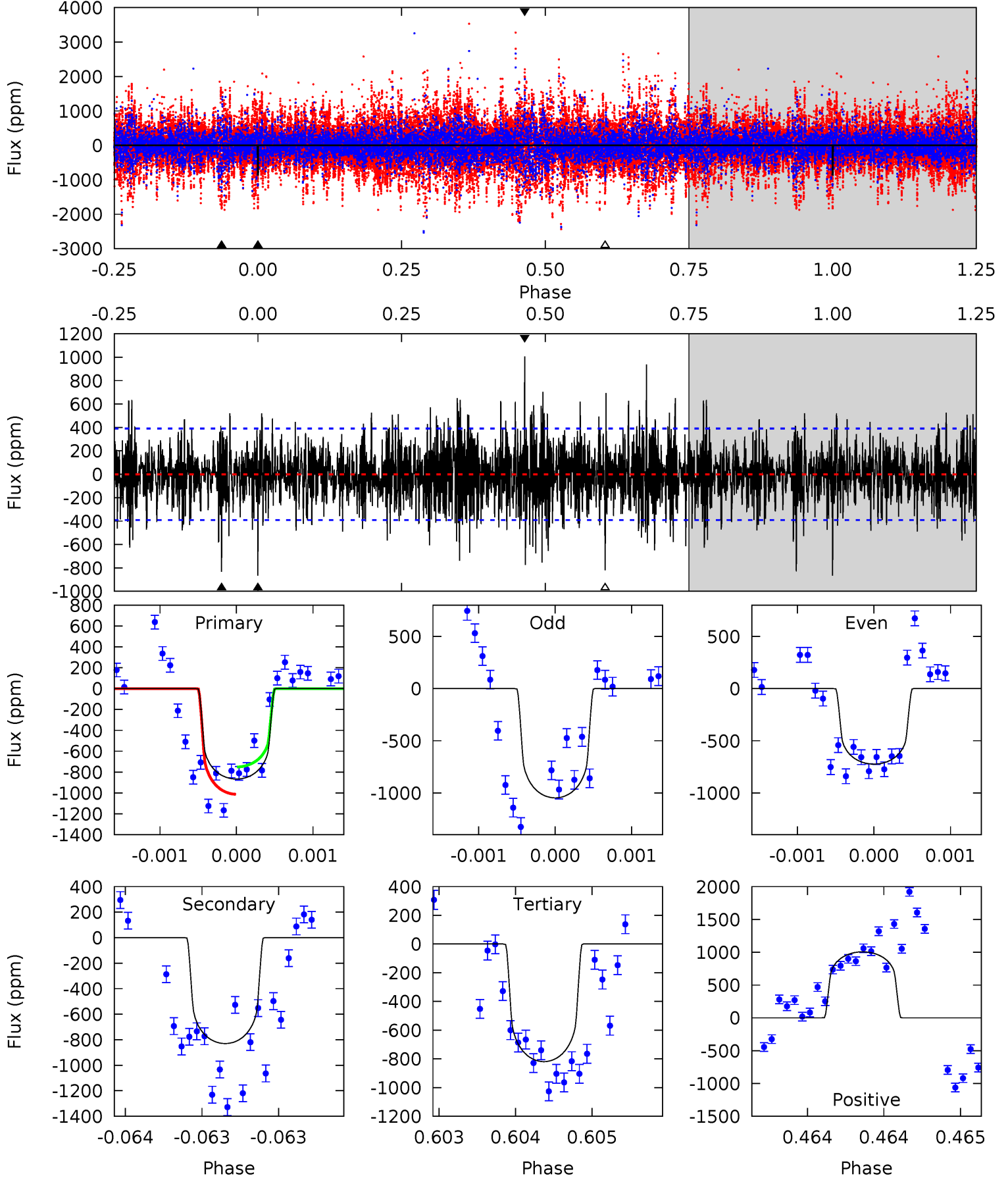
TCE 004863614-02 P=391.370786 Days  $T_0=148.088367$  (BKJD)



# DV Model-Shift Uniqueness Test

004863614-02, P = 391.380986 Days, E = 148.096874 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.2	11.7	11.5	14.2	5.50	3.37	2.97	0.67	-1.96	0.15	-2.48	2.20	1.03	0.54	1.83

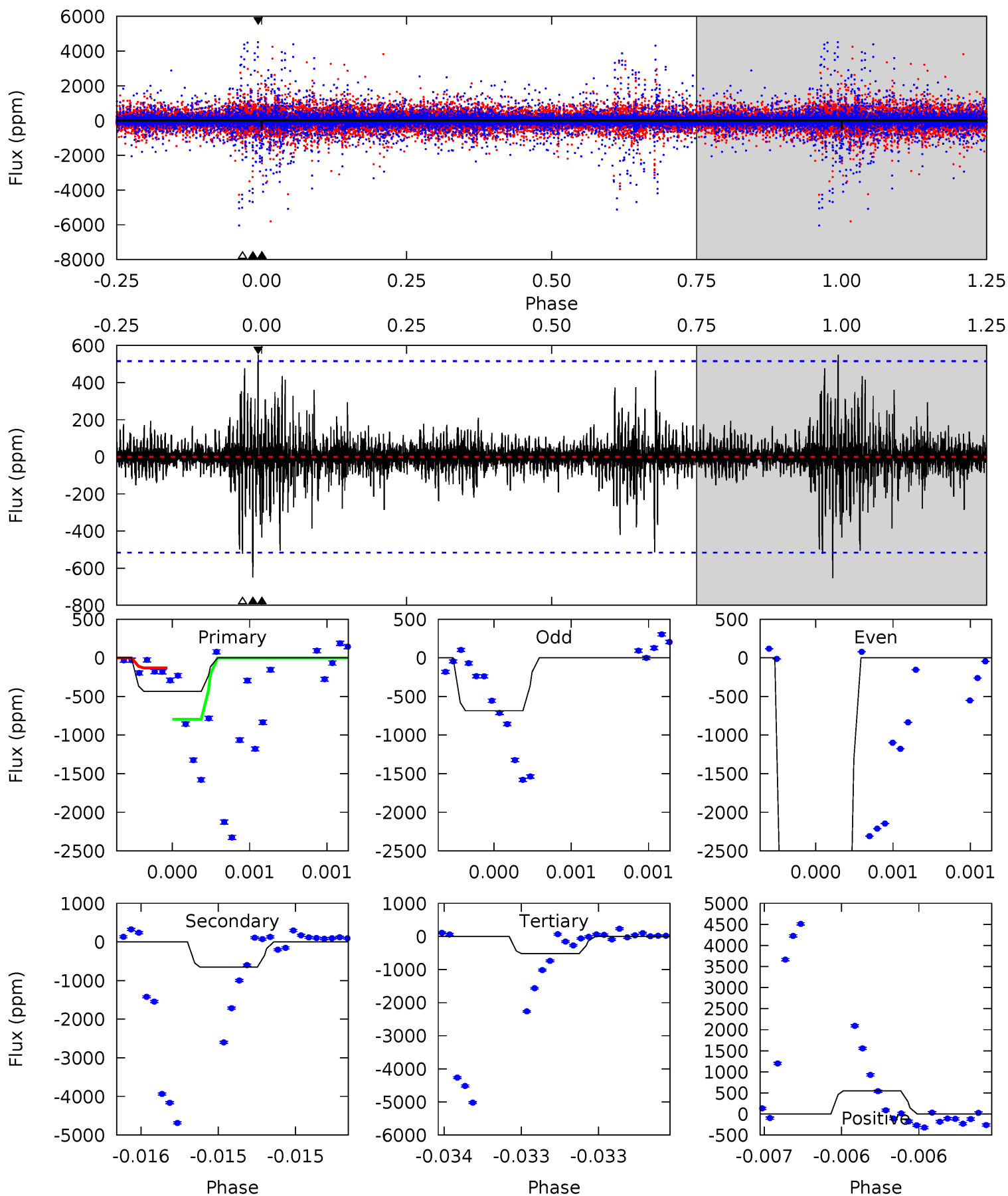




# Alt Model-Shift Uniqueness Test

004863614-02, P = 391.370786 Days, E = 148.088367 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
4.68	7.00	5.62	5.91	5.55	3.45	0.68	-0.94	-1.23	1.38	1.09	20.2	4.64	0.46	0



### Stellar Parameters For KIC 004863614

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6046^{+163}_{-199}$	$4.478^{+0.048}_{-0.180}$	$0.070^{+0.250}_{-0.350}$	$1.007^{+0.267}_{-0.114}$	$1.111^{+0.120}_{-0.160}$	$1.532^{+0.377}_{-0.742}$
	+3%/-3%	+1%/-4%	+357%/-500%	+27%/-11%	+11%/-14%	+25%/-48%
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 004863614-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-830 \pm 71$	$2.15^{+1.56}_{-1.26}$	$365^{+24}_{-15}$	$7495^{+7495}_{-1820}$	$108432^{+566584}_{-70491}$
Alt.	$-650 \pm 93$	$2.29^{+1.61}_{-1.33}$	$367^{+23}_{-17}$	$6872^{+5707}_{-1573}$	$78065^{+387405}_{-51126}$

$T_{\text{max}}$  = 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

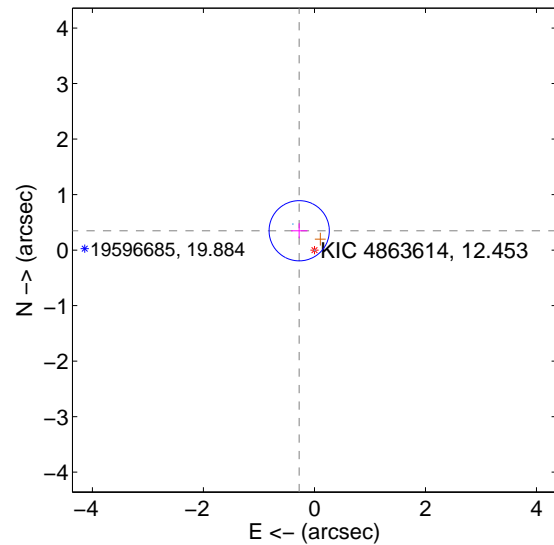
Supplemental centroid analysis for 004863614-02. Kepler magnitude: 12.45. Transit SNR 3.51

There are 2 quarters with good PRF difference image offsets

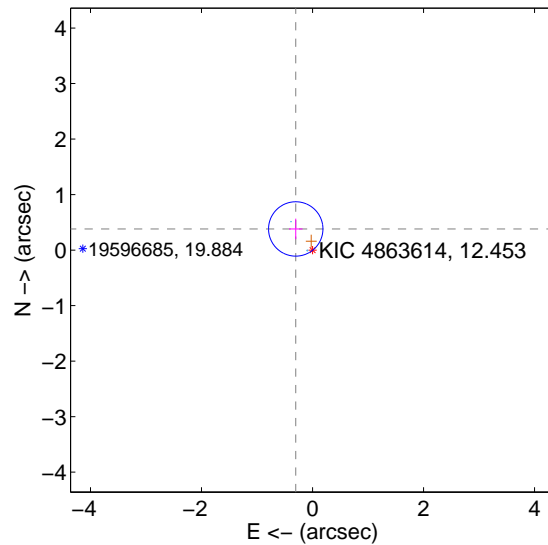
The direct PRF centroid is offset from the target star catalog position by about 0.10 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.444 \pm 0.181$	2.45	$0.275 \pm 0.147$	$0.349 \pm 0.134$
PRF-fit source offset from KIC position	$0.486 \pm 0.163$	2.98	$0.302 \pm 0.122$	$0.381 \pm 0.184$
photometric centroid source offset	$0.86 \pm 0.92$	0.93	$-0.59 \pm 0.95$	$0.63 \pm 0.90$

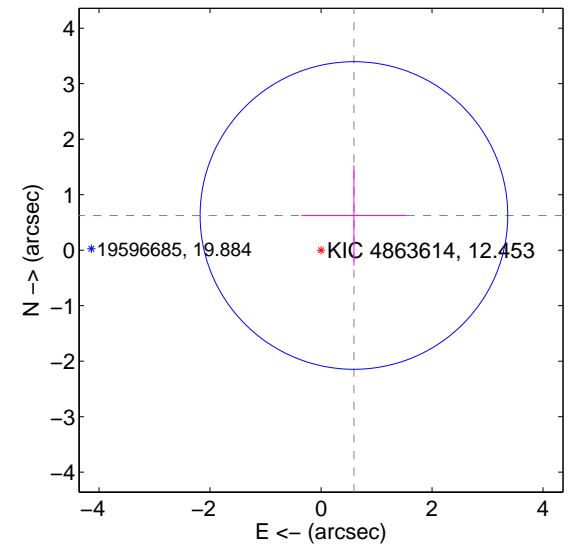
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

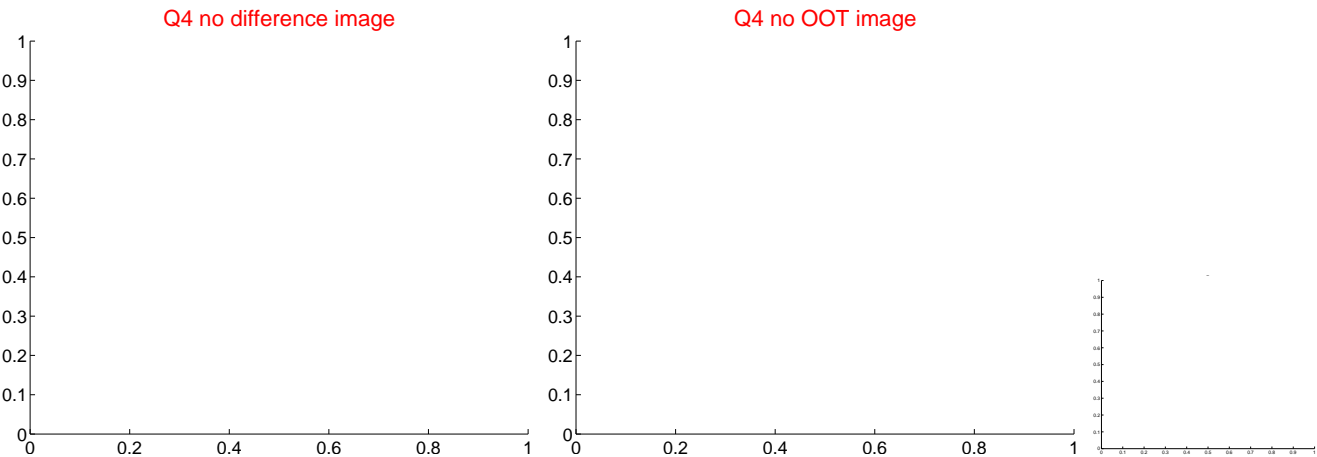
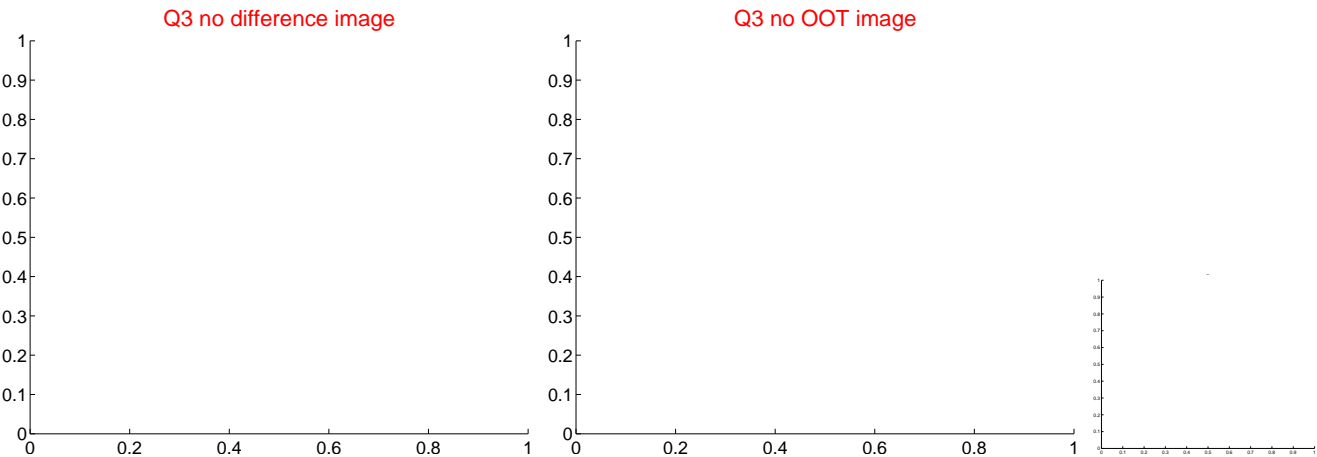
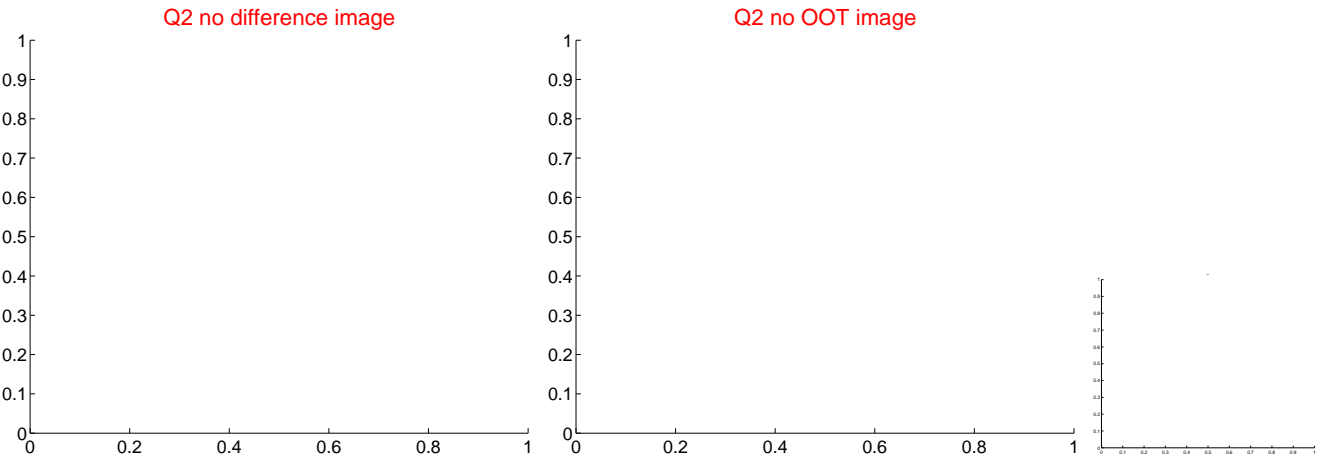
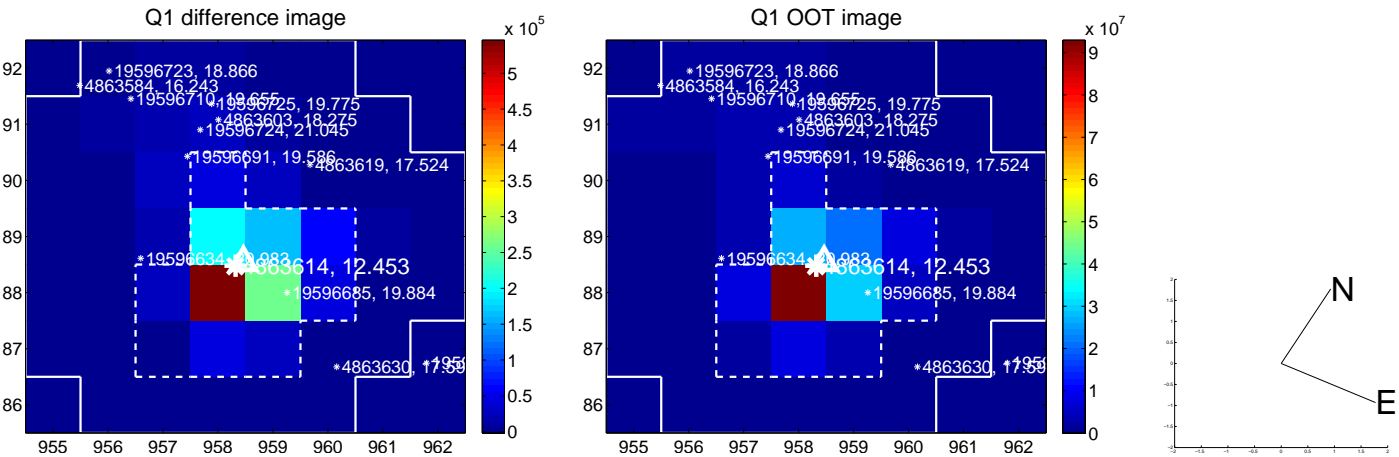


offset from photometric centroids



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.

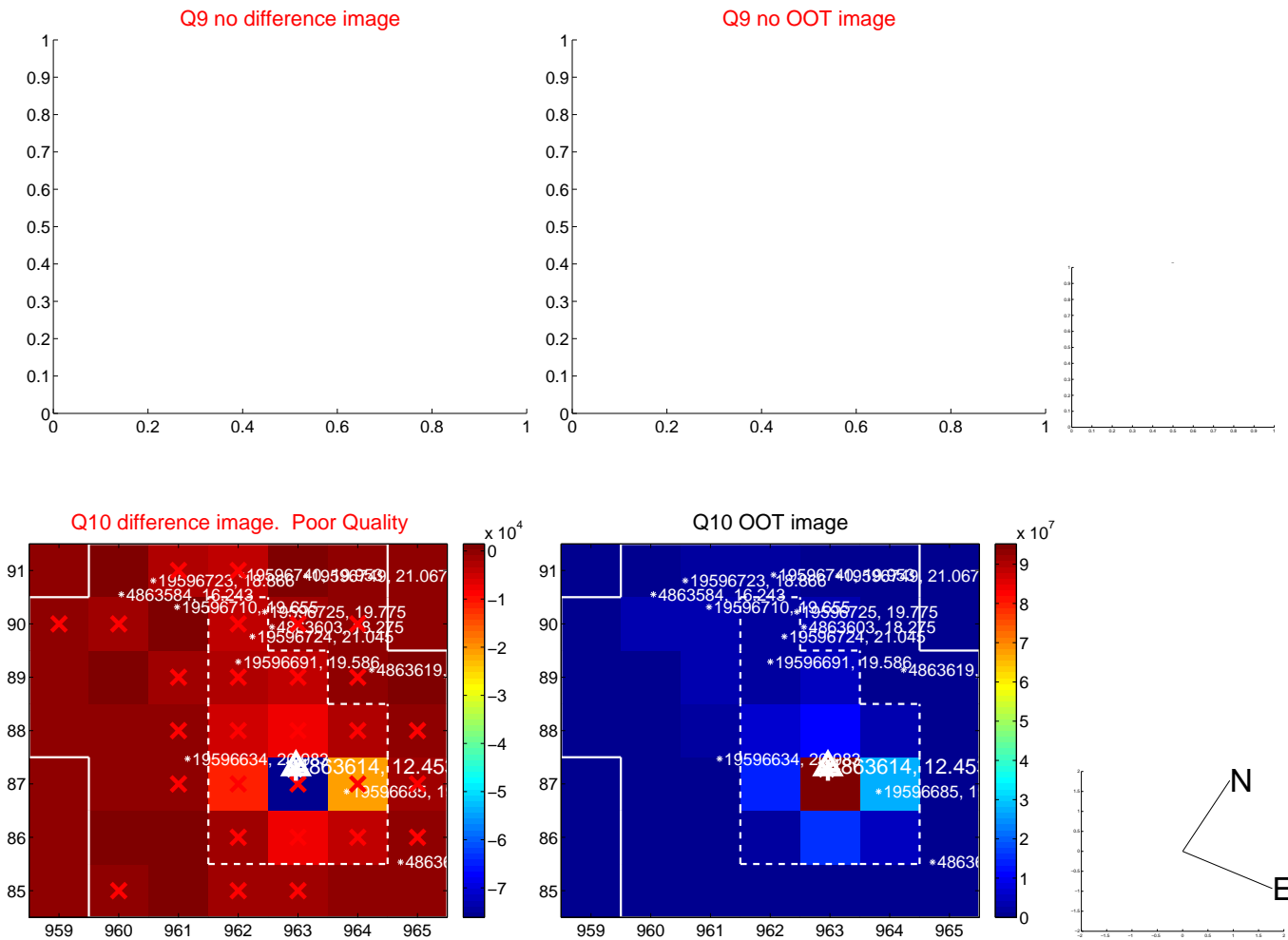


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

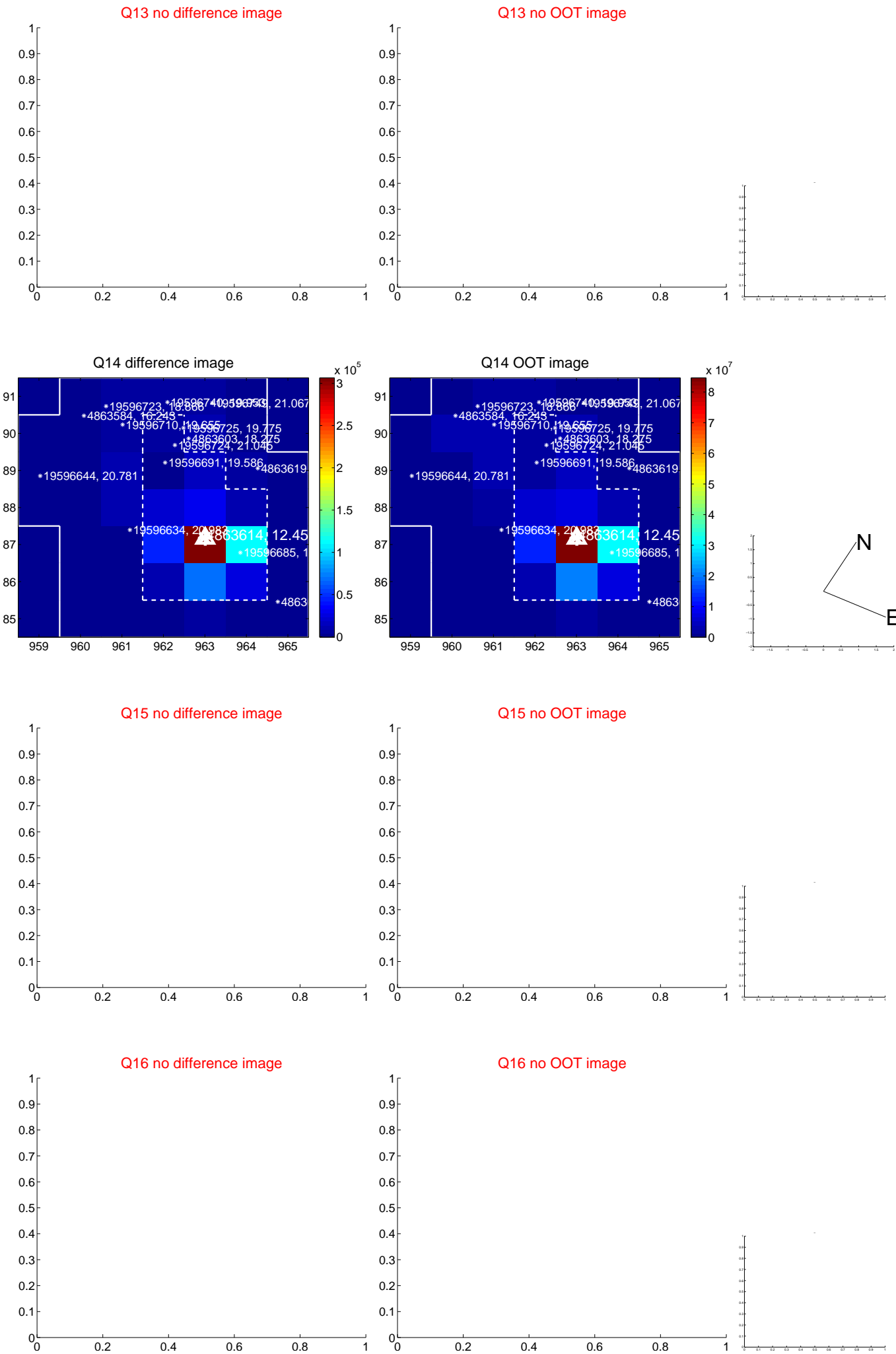




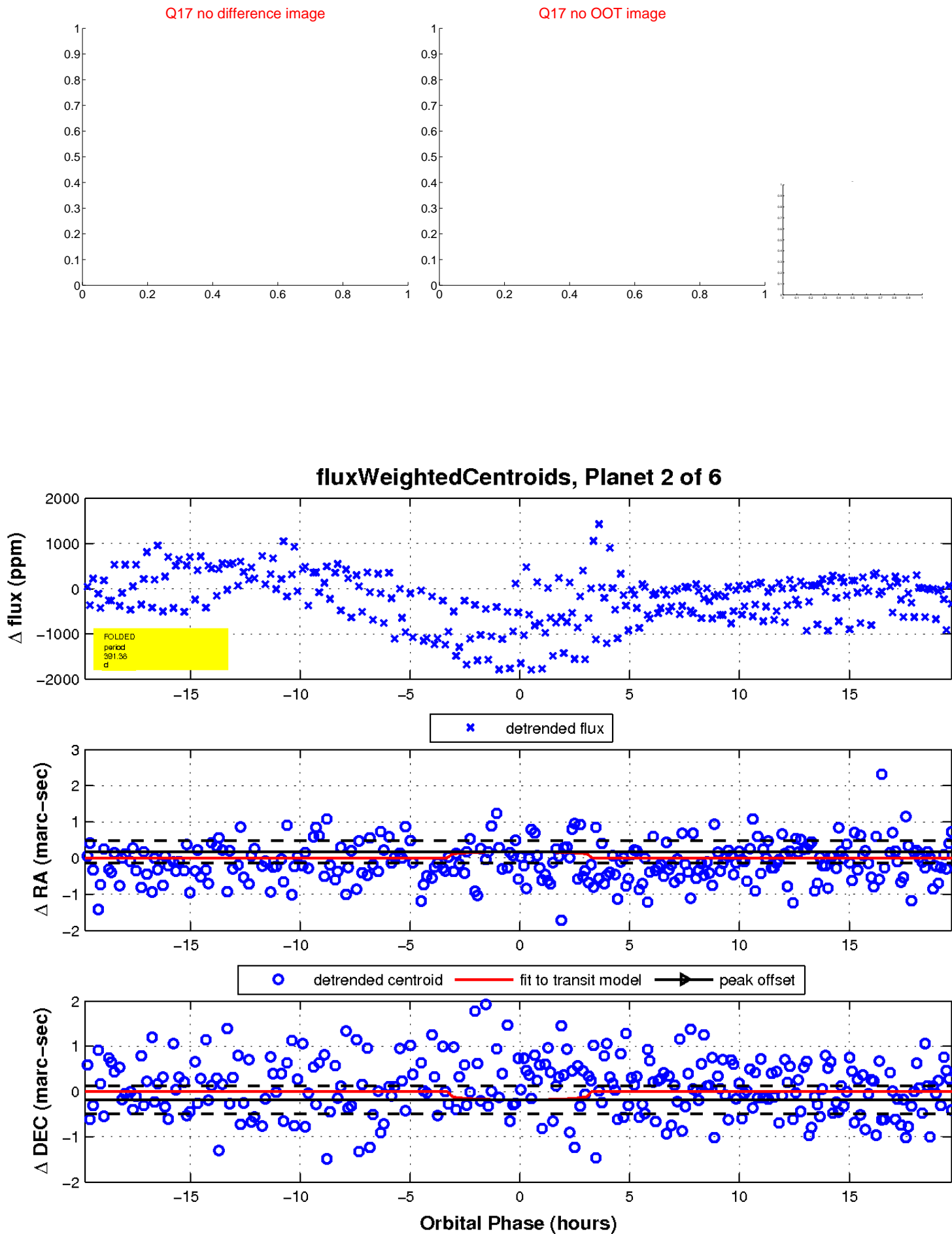
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



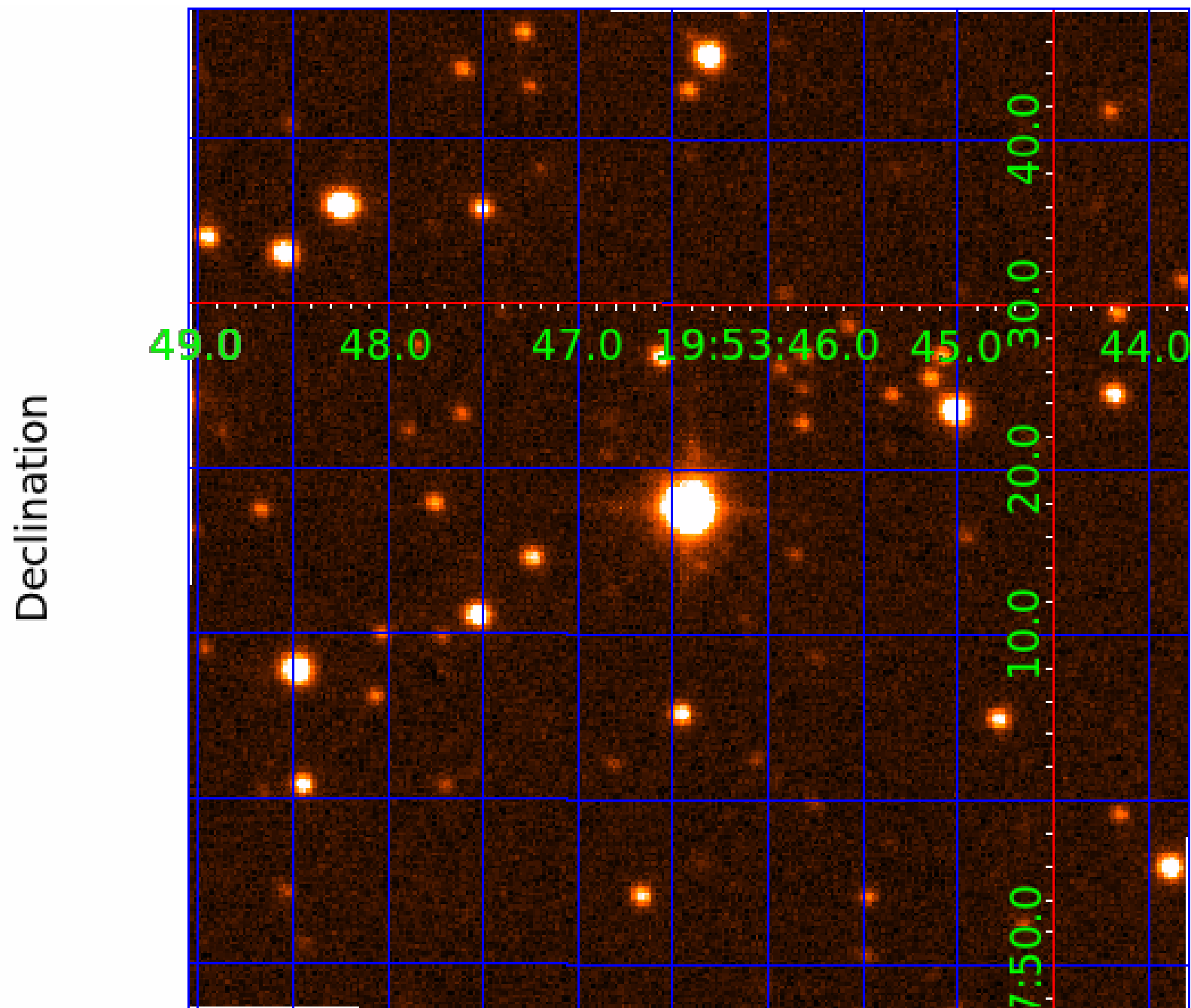
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.



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



UKIRT Image



# KIC 004863614

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004863614-01	OBS	No	0.703847	131.586036	25.2	1.557	8.8	8.5	1.01	6046	0.56	4715.00
004863614-02	OBS	No	391.380986	148.096874	319.1	6.601	11.7	3.5	1.01	6046	1.91	1.03
004863614-03	OBS	No	373.261860	156.811508	178.0	3.067	10.8	1.8	1.01	6046	1.56	1.10
004863614-04	OBS	No	284.129997	157.131940	684.7	5.311	12.5	6.2	1.01	6046	2.85	1.58
004863614-05	OBS	No	0.703868	132.049544	34.9	1.809	7.9	10.9	1.01	6046	0.70	4714.82
004863614-06	OBS	No	151.197753	143.473671	554.2	9.456	10.3	4.9	1.01	6046	2.51	3.67

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004863614-01	OBS	FP	0.00	1	0	1	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—CENT_RESOLVED_OFFSET
004863614-02	OBS	FP	0.00	1	0	0	0	LPP_ALT—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004863614-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL_SKYE_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004863614-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV
004863614-05	OBS	FP	0.00	1	0	1	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_RESOLVED_OFFSET—HALO_GHOST
004863614-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

**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.

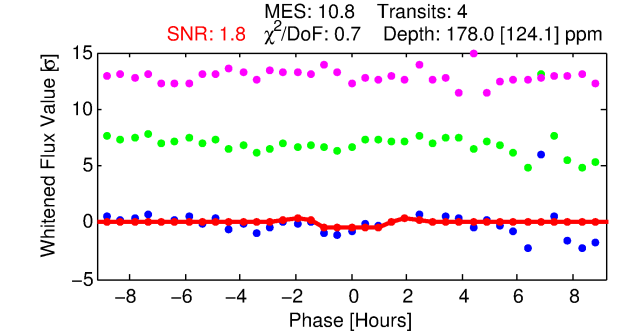
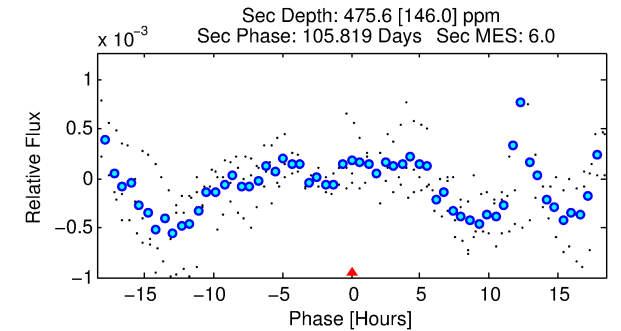
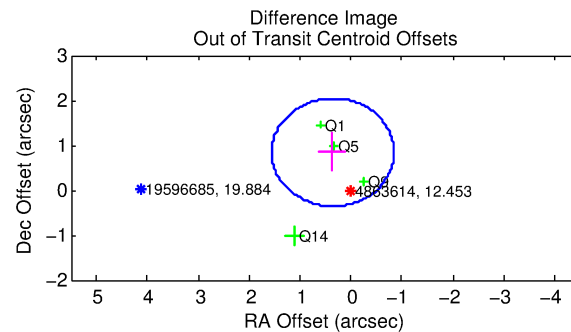
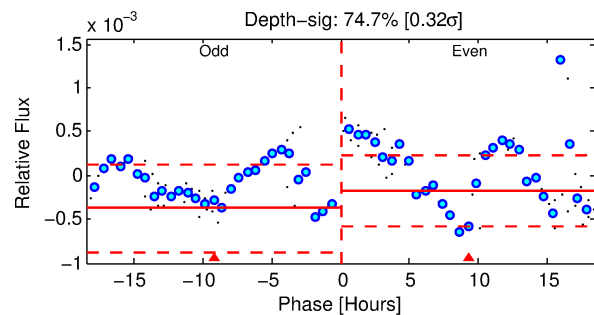
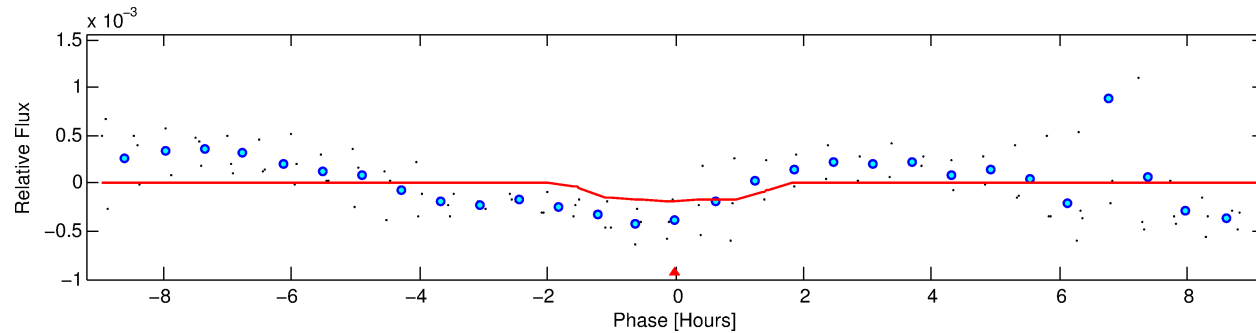
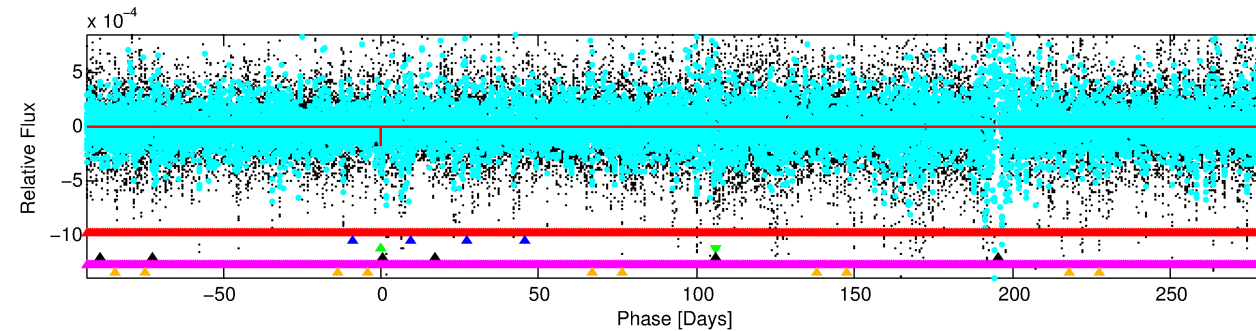
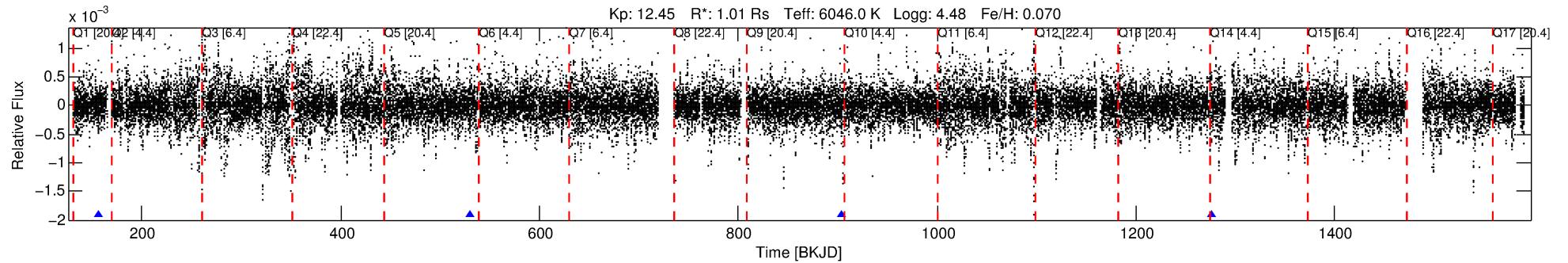
Ephemeris Match Information For 004863614-03

No Significant Match Found



# DV One-Page Summary

KIC: 4863614 Candidate: 3 of 6 Period: 373.262 d



## DV Fit Results:

Period = 373.26186 [0.01264] d  
Epoch = 156.8115 [0.0241] BKJD  
Rp/R\* = 0.0142 [0.0735]  
a/R\* = 467.47 [12239.07]  
b = 0.88 [6.77]  
Seff = 1.10 [0.39]  
Teff = 261 [23] K  
Rp = 1.56 [8.09] Re  
a = 1.0513 [0.2359] AU  
Ag = 118416.86 [1225507.75] [0.10σ]  
Teffp = 7487 [19363] K [0.37σ]

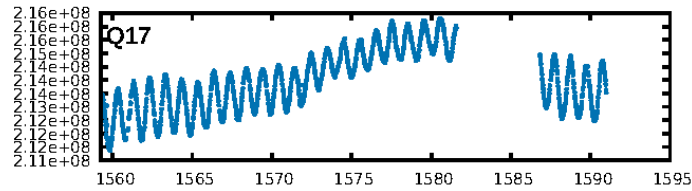
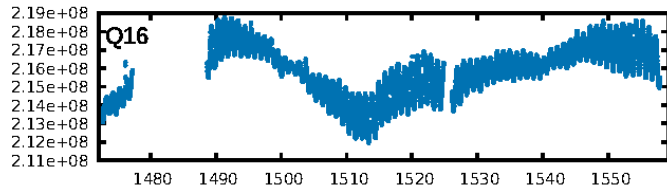
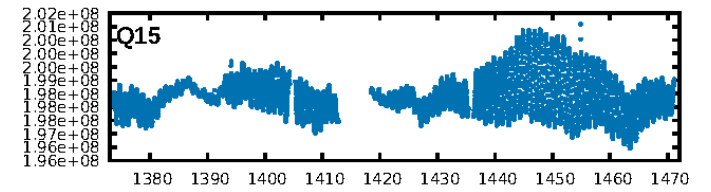
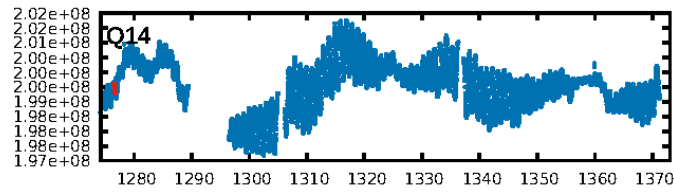
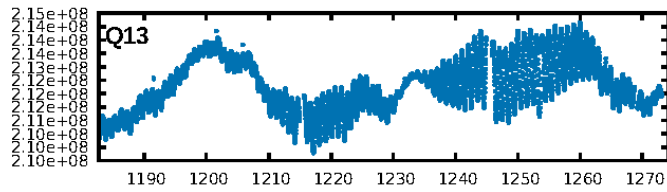
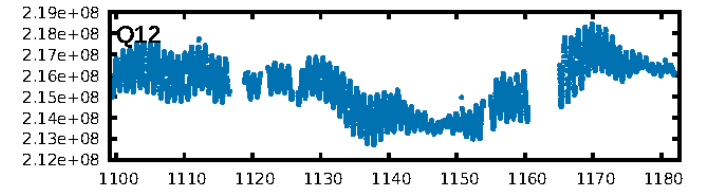
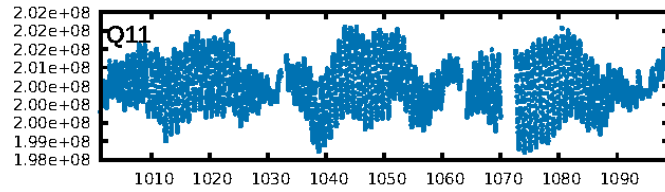
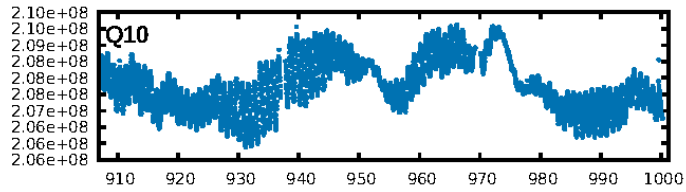
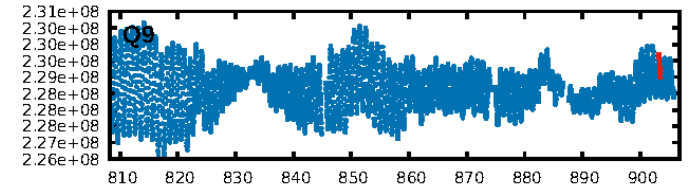
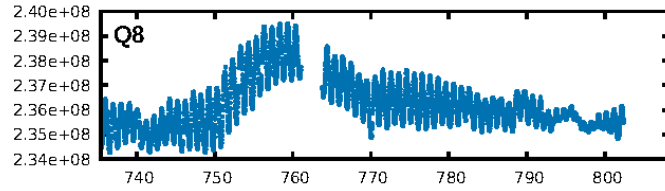
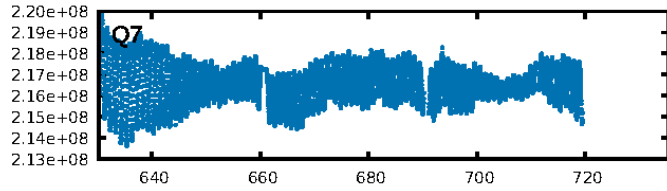
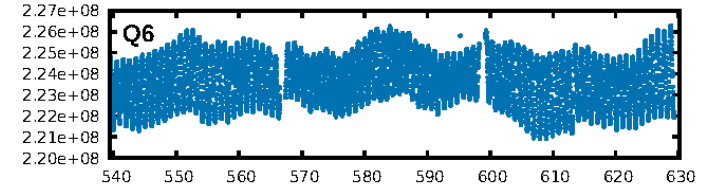
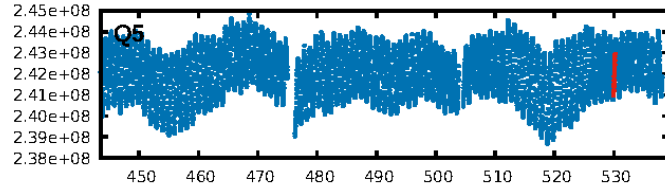
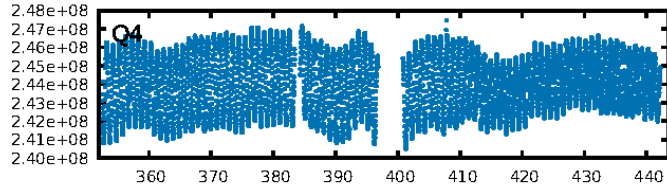
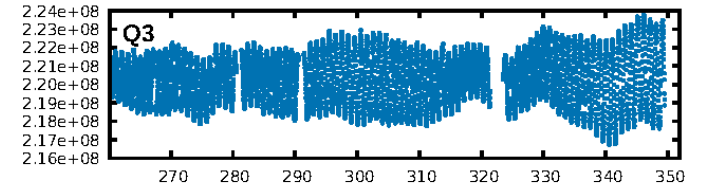
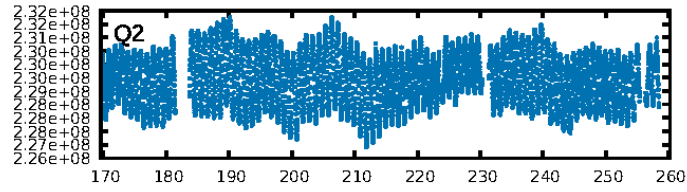
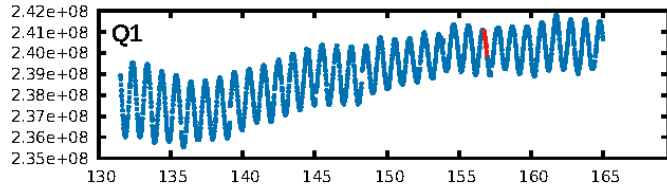
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [348.78σ]  
LongPeriod-sig: 100.0% [59.75σ]  
ModelChiSquare2-sig: 23.0%  
ModelChiSquareGof-sig: 99.7%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -0.4368  
Centroid-sig: 26.1%  
Centroid-so: 2.134 arcsec [1.02σ]  
OotOffset-rm: 0.912 arcsec [2.28σ]  
KicOffset-rm: 0.969 arcsec [2.37σ]  
OotOffset-st: 1/0/0/3 [4]  
KicOffset-st: 1/0/0/3 [4]  
DiffImageQuality-fgm: 0.25 [1/4]  
DiffImageOverlap-fno: 0.00 [0/4]

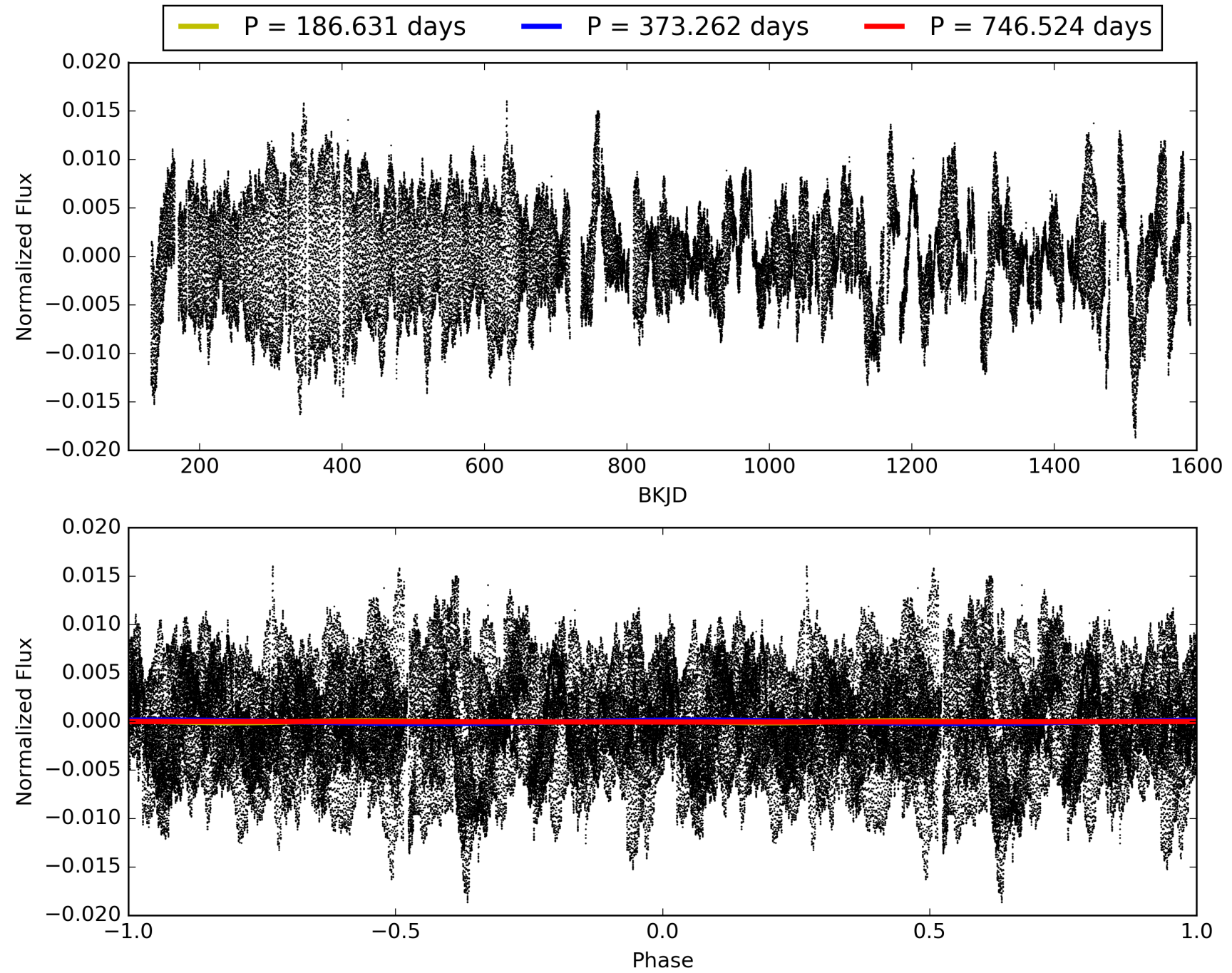
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 17:13:03 Z

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

# TCE 004863614-03, PDC Light Curves

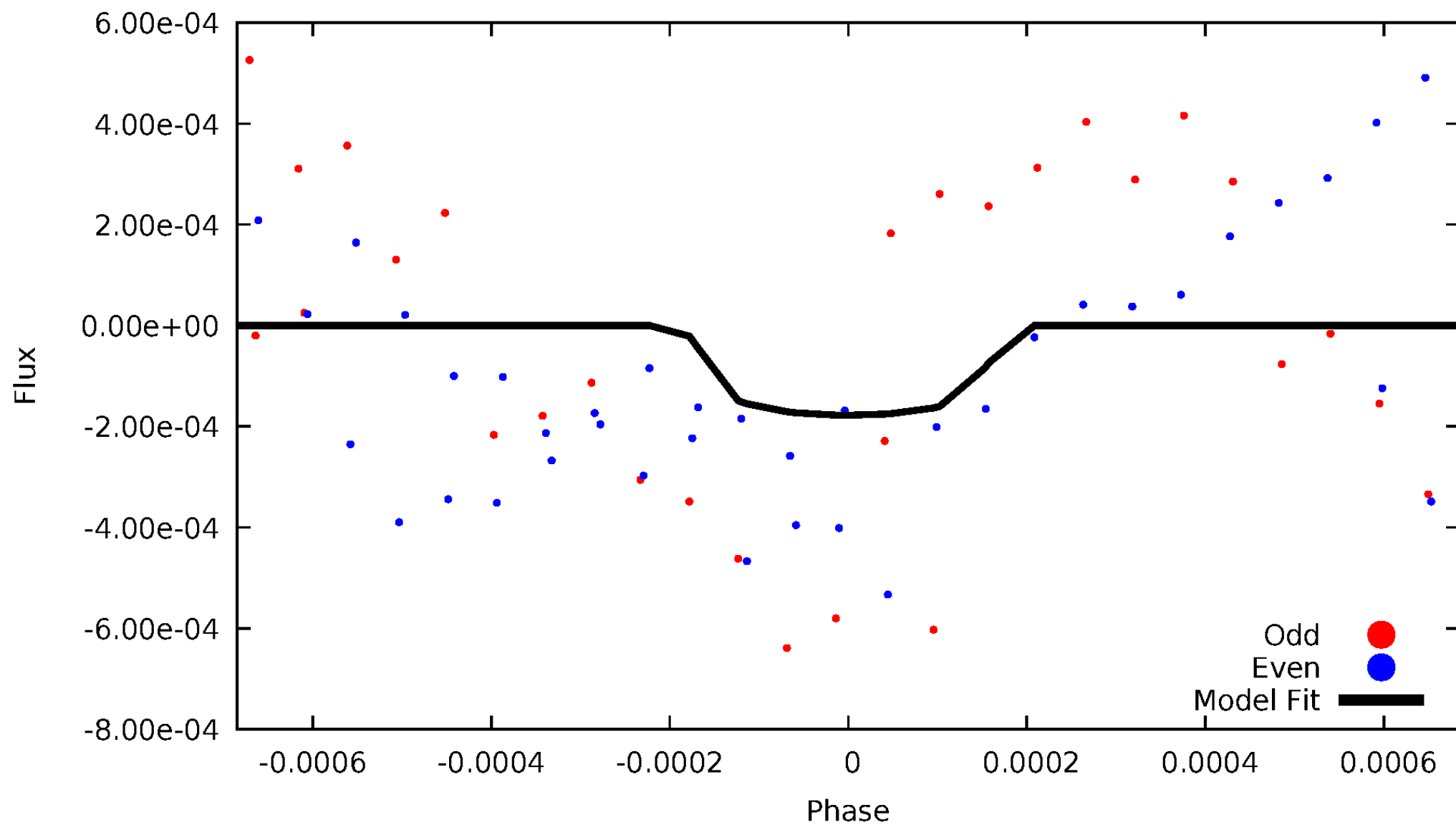


TCE 004863614-03



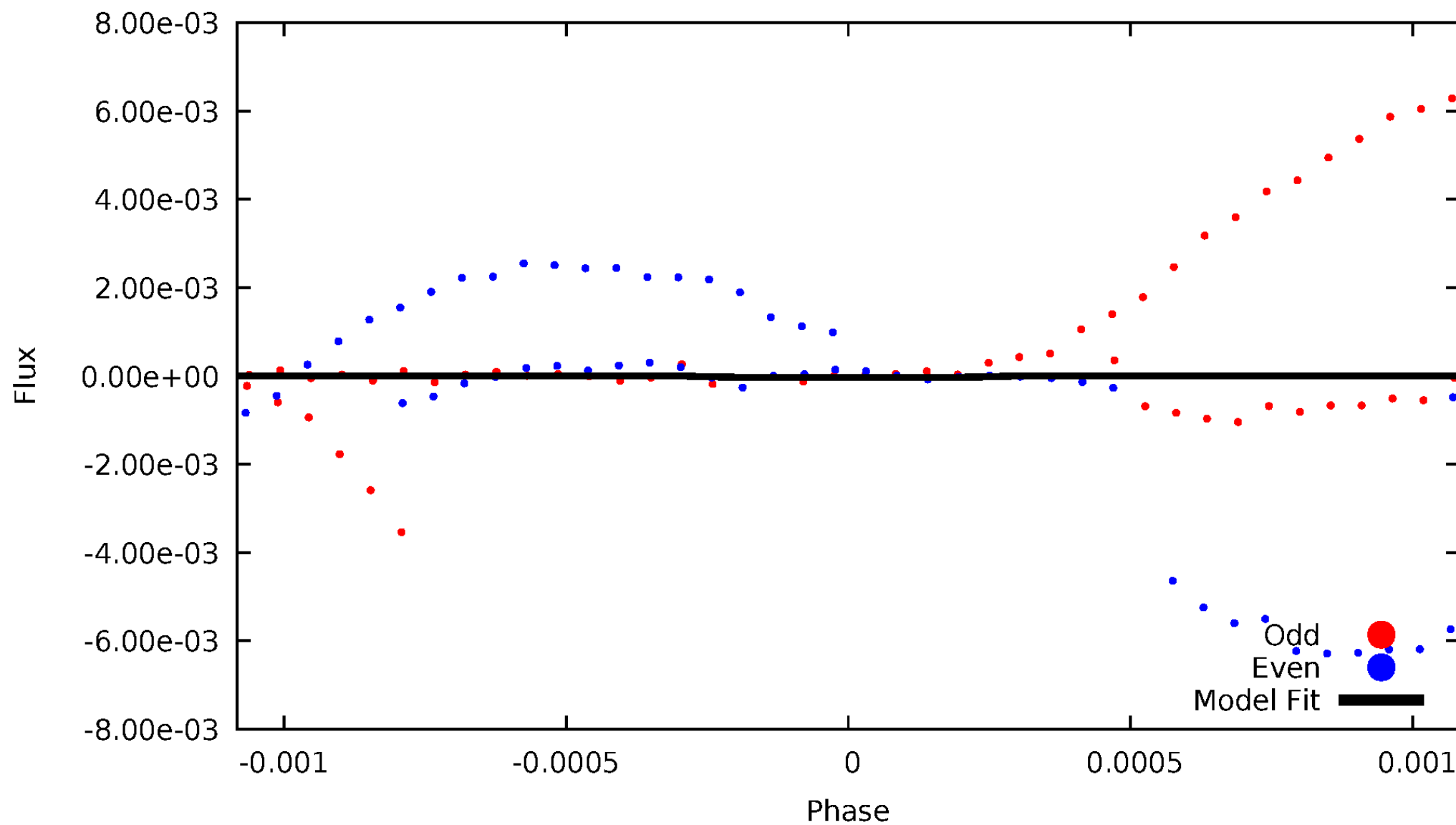
# DV Odd/Even

TCE 004863614-03



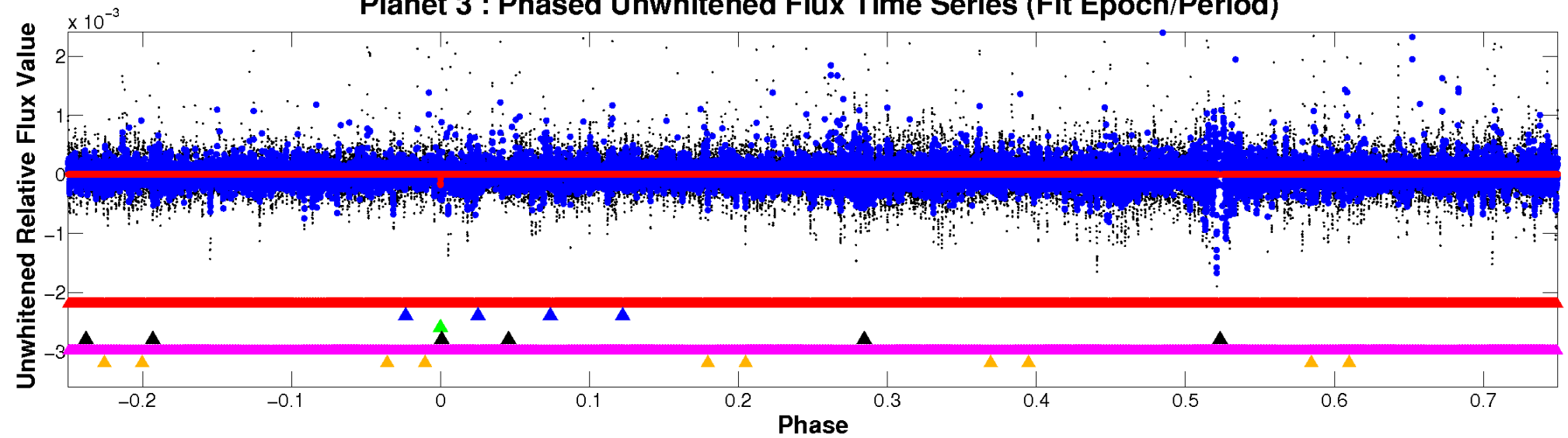
# ALT Odd/Even

TCE 004863614-03

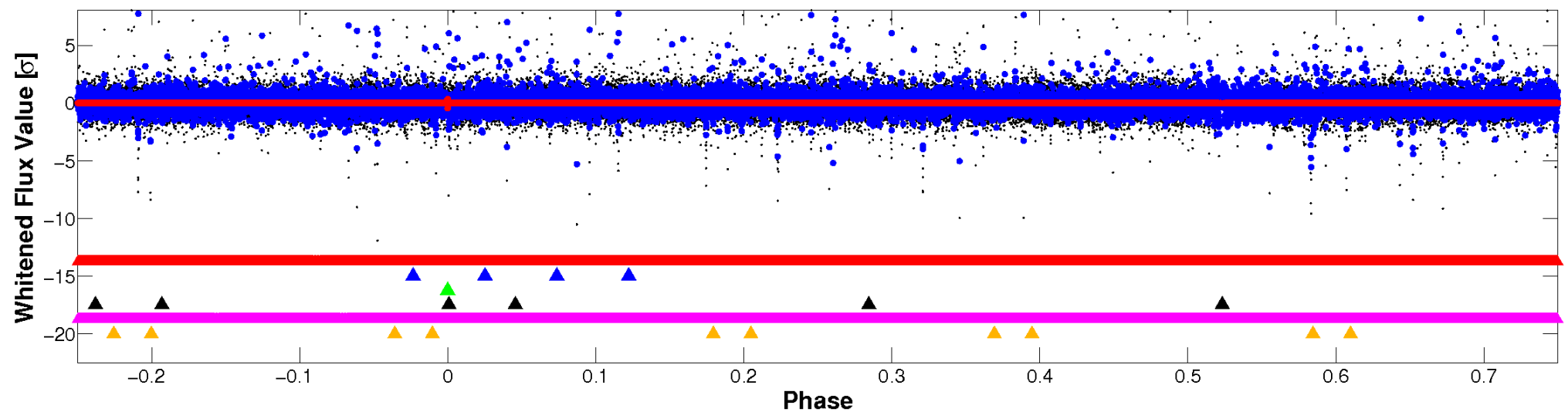


# Non-Whitened Vs. Whitened Light Curve

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



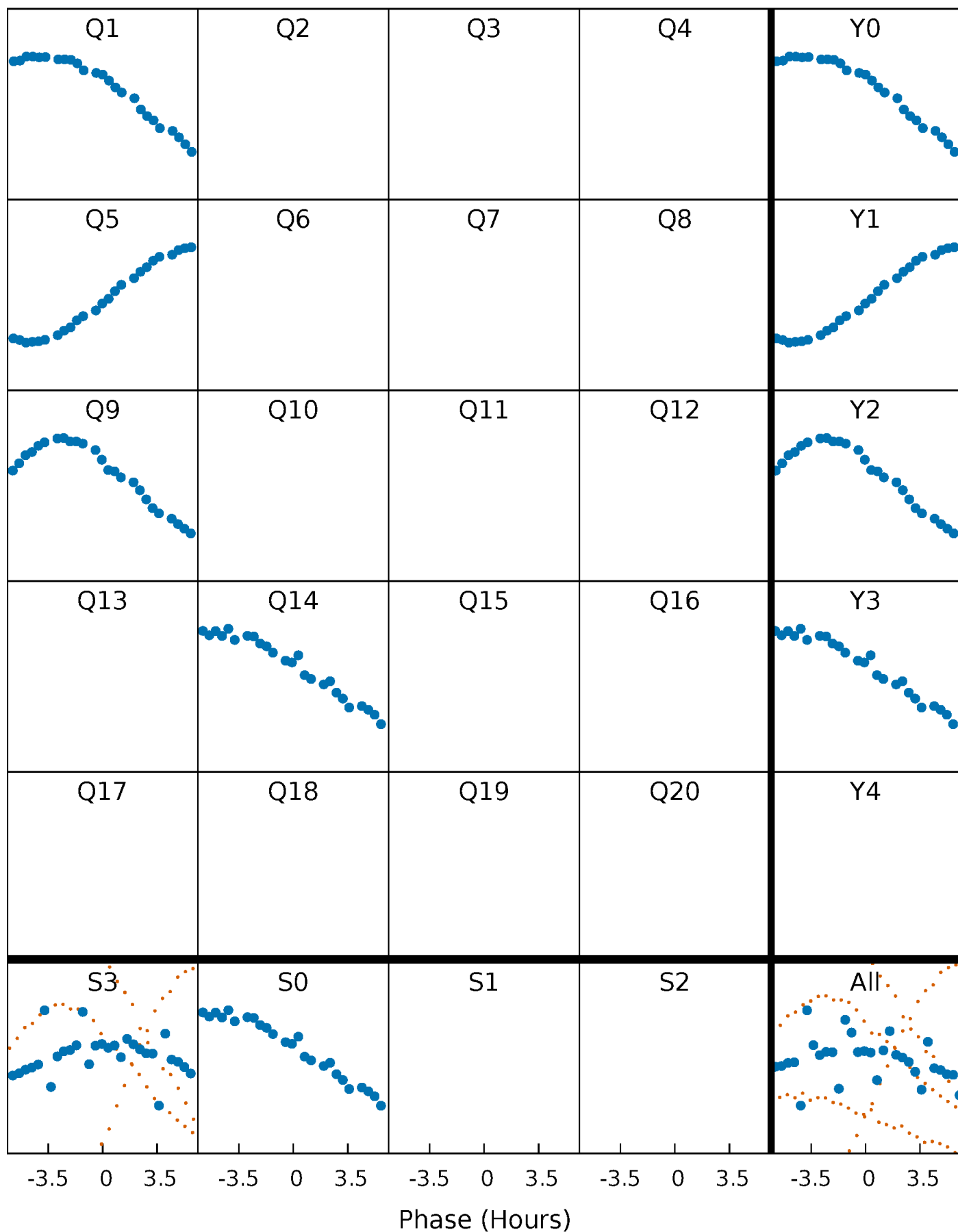
## Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)





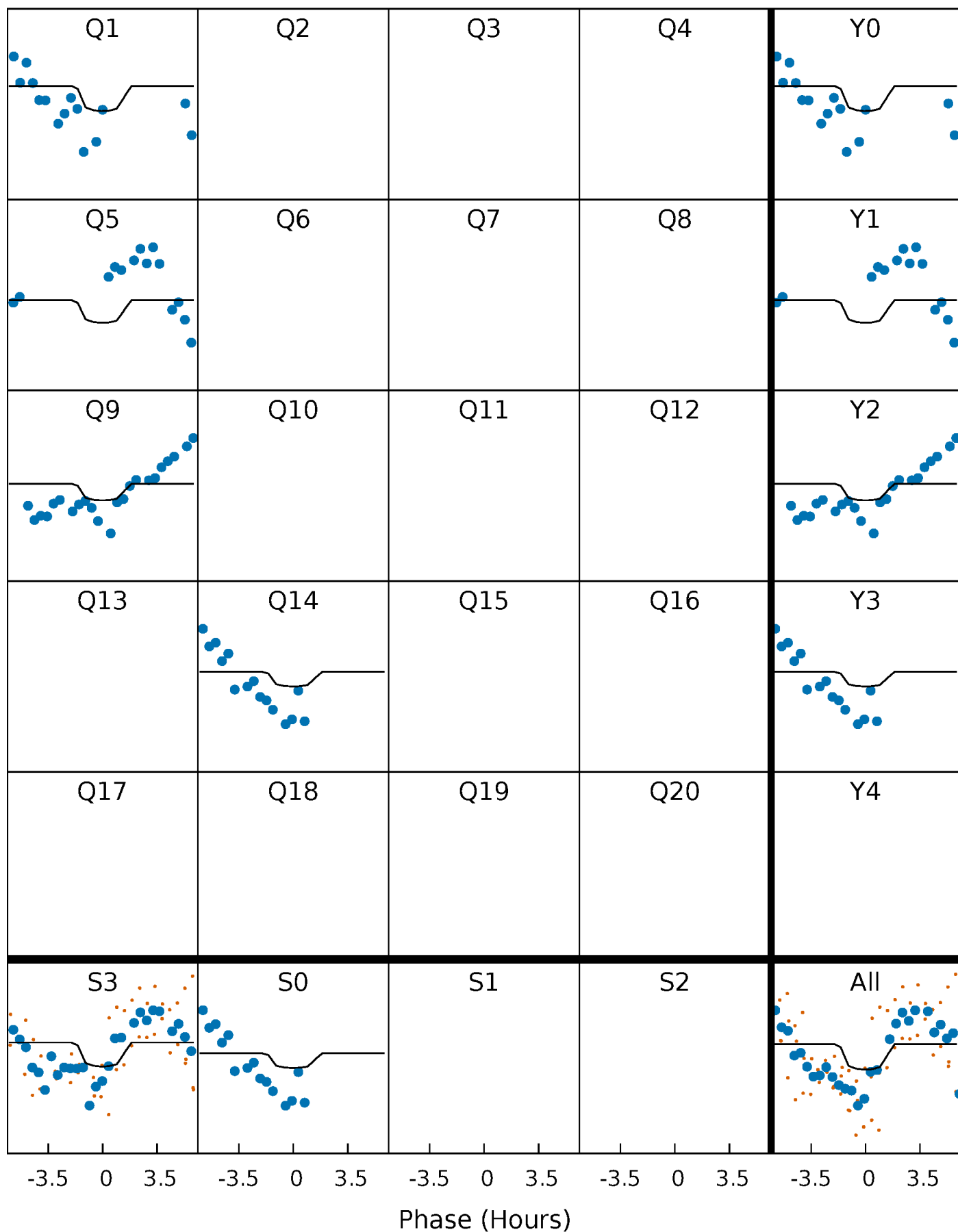
# PDC Quarter-Phased Transit Curves

TCE 004863614-03 P=373.261861 Days  $T_0=156.811508$  (BKJD)



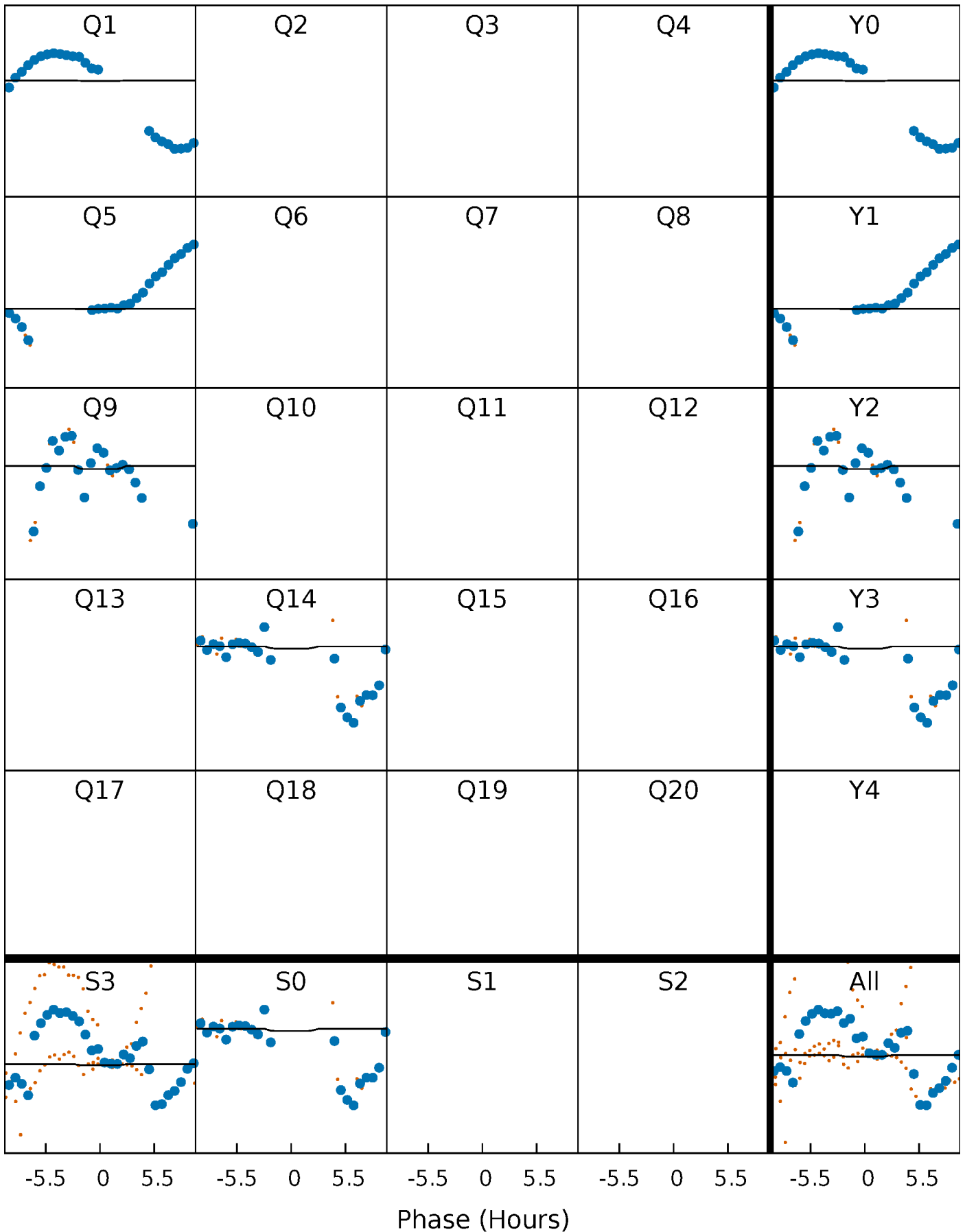
# DV Quarter-Phased Transit Curves

TCE 004863614-03 P=373.261861 Days  $T_0=156.811508$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

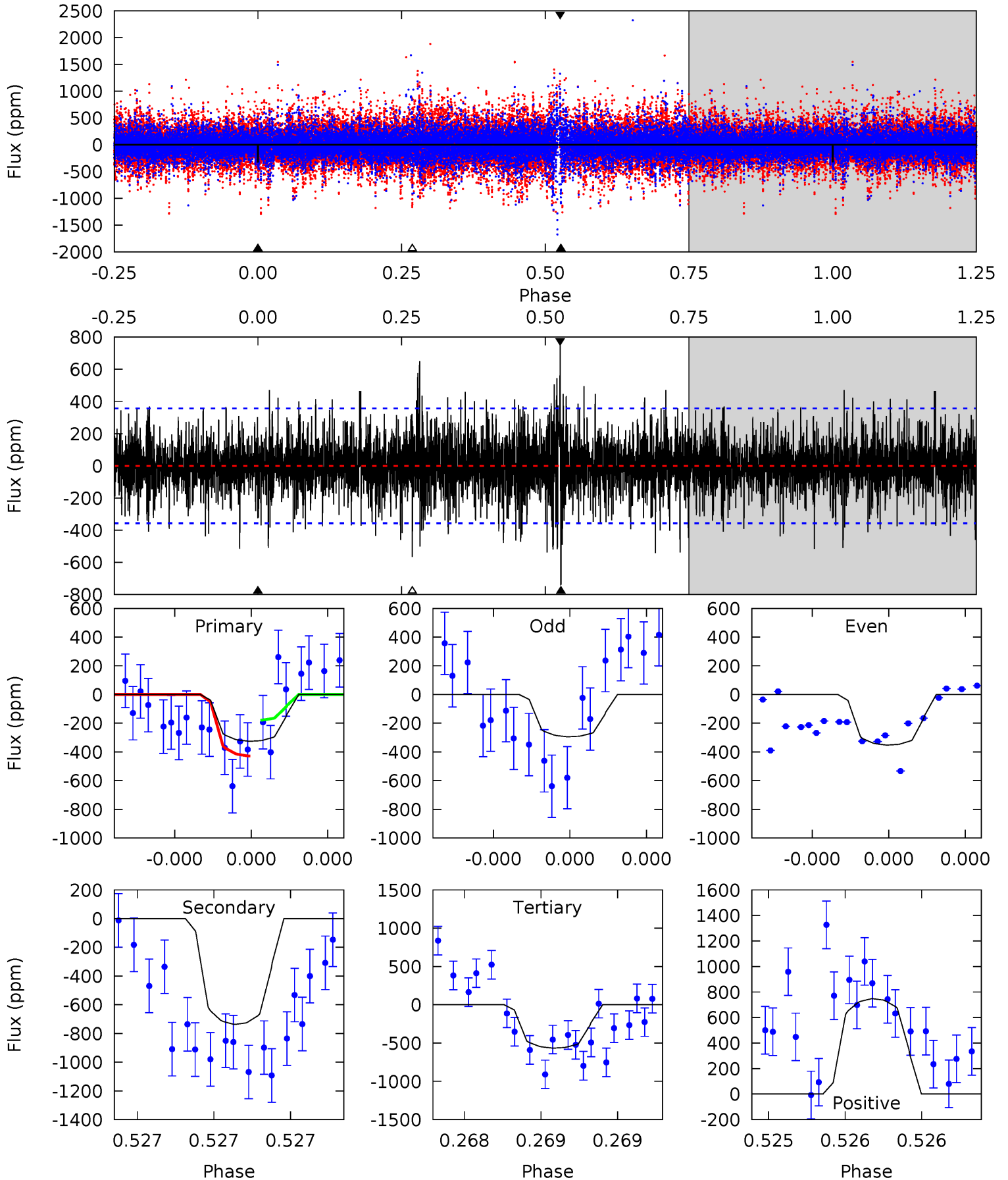
TCE 004863614-03     $P=373.300708$  Days     $T_0=156.820332$  (BKJD)



# DV Model-Shift Uniqueness Test

004863614-03, P = 373.261861 Days, E = 156.811508 Days

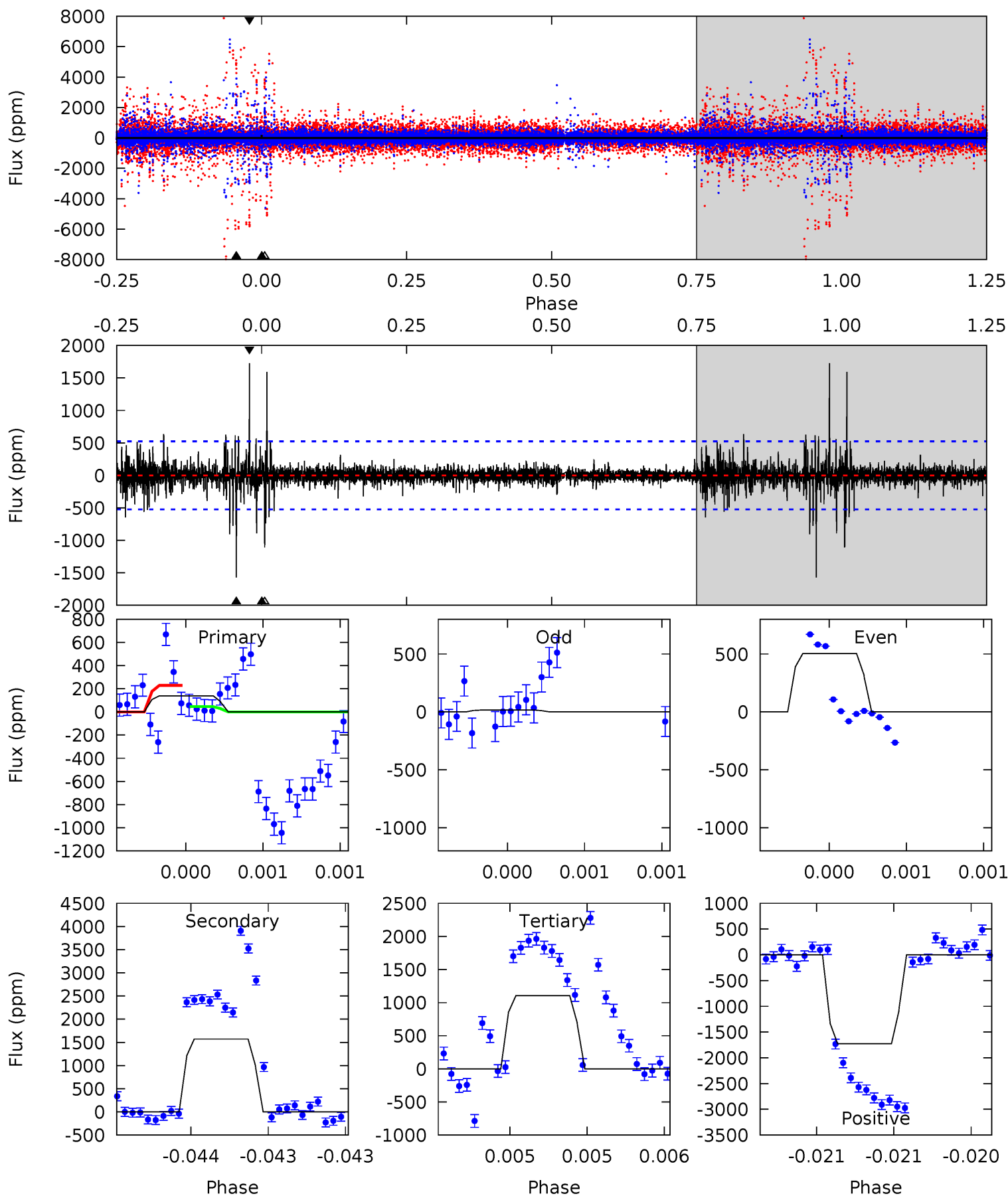
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.16	11.7	8.96	11.8	5.64	3.59	2.12	-3.79	-6.67	2.71	-0.17	0.43	0.70	0.50	1.93



# Alt Model-Shift Uniqueness Test

004863614-03, P = 373.300708 Days, E = 156.820332 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
1.48	16.7	11.8	18.4	5.56	3.46	1.15	-10.3	-16.9	4.96	-1.66	1.63	13.2	0.52	0.98



### Stellar Parameters For KIC 004863614

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6046^{+163}_{-199}$	$4.478^{+0.048}_{-0.180}$	$0.070^{+0.250}_{-0.350}$	$1.007^{+0.267}_{-0.114}$	$1.111^{+0.120}_{-0.160}$	$1.532^{+0.377}_{-0.742}$
	+3%/-3%	+1%/-4%	+357%/-500%	+27%/-11%	+11%/-14%	+25%/-48%
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 004863614-03 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-737 \pm 63$	$5.82^{+6.72}_{-3.92}$	$372^{+24}_{-17}$	$4540^{+3491}_{-1038}$	$12929^{+112874}_{-10131}$
Alt.	$-1572 \pm 94$	$5.94^{+6.12}_{-4.12}$	$372^{+27}_{-17}$	$5301^{+5573}_{-1267}$	$26531^{+249229}_{-20251}$

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

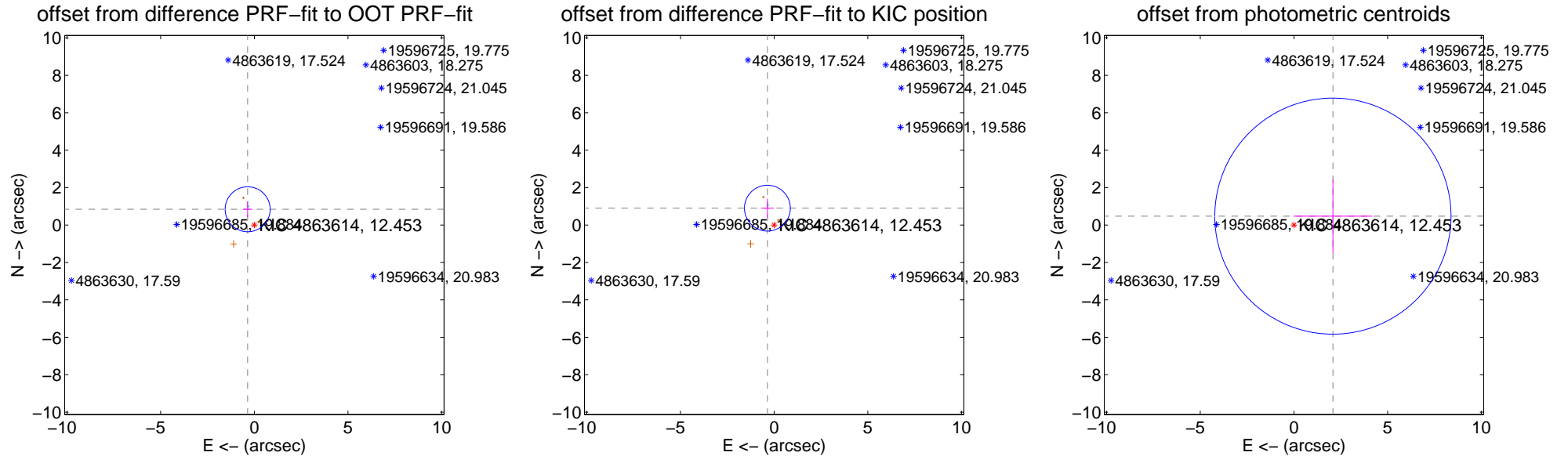
## DV Centroid Data

Supplemental centroid analysis for 004863614-03. Kepler magnitude: 12.45. Transit SNR 1.85

There are 1 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.15 arcsec

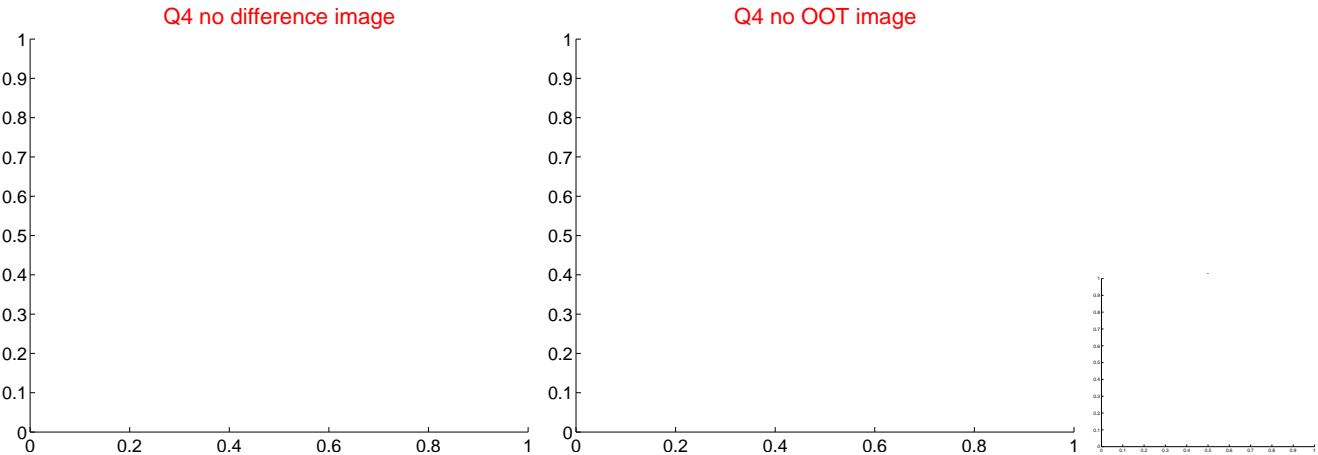
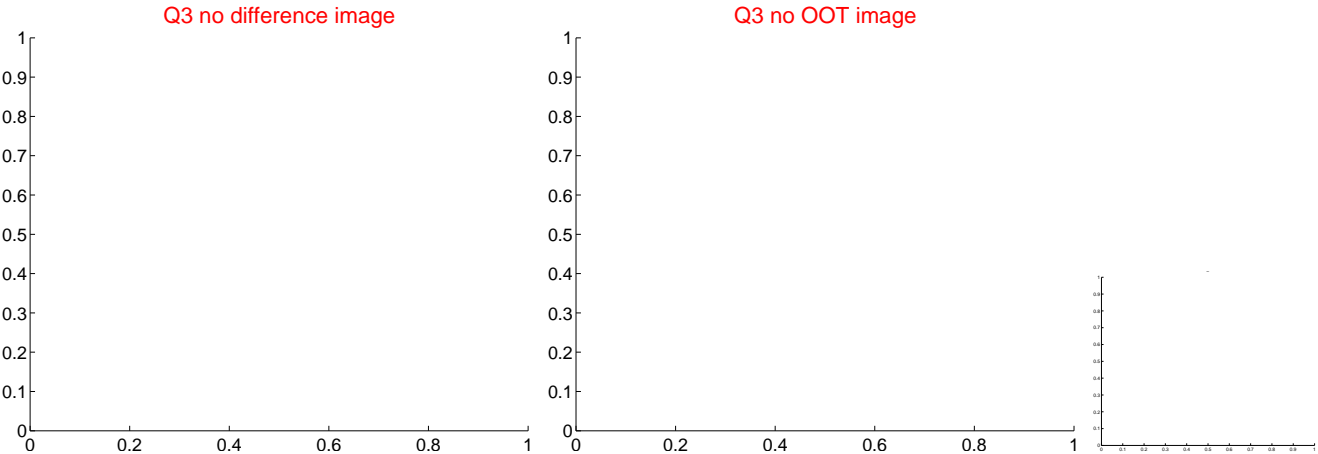
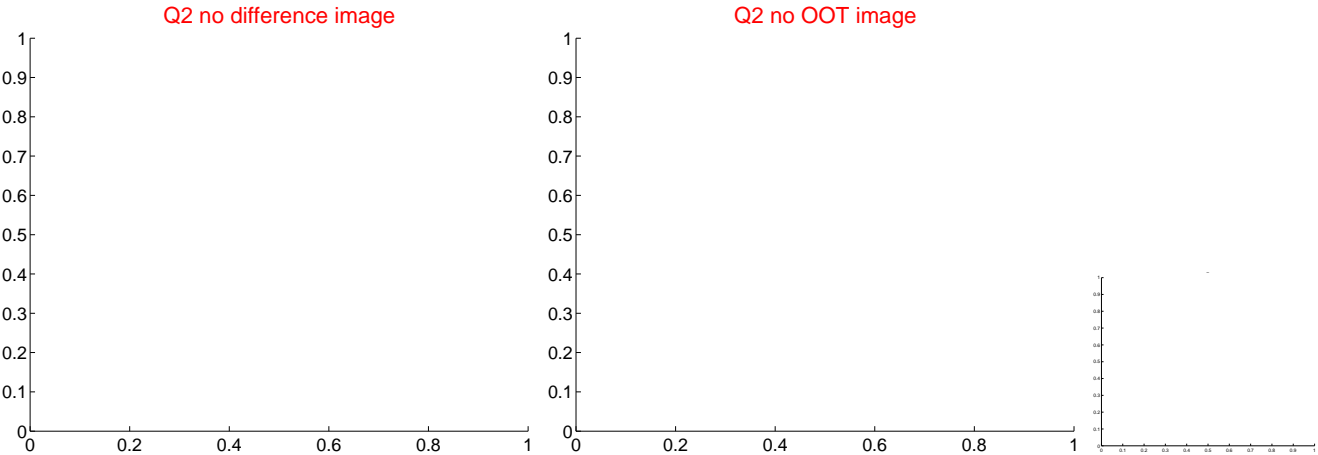
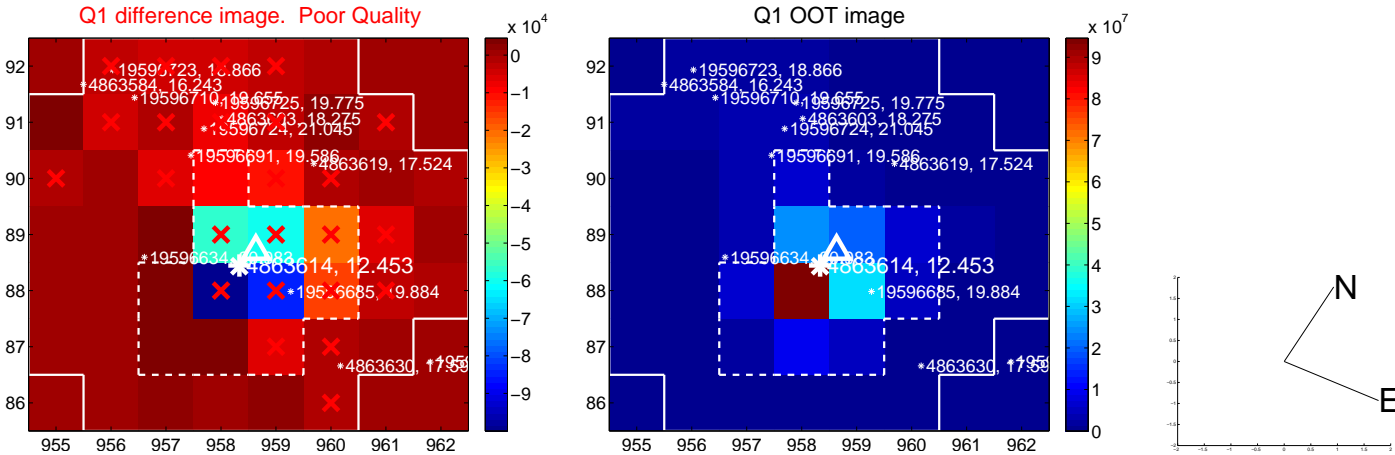
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.912 \pm 0.401$	2.28	$0.356 \pm 0.260$	$0.840 \pm 0.421$
PRF-fit source offset from KIC position	$0.969 \pm 0.408$	2.37	$0.359 \pm 0.345$	$0.900 \pm 0.510$
photometric centroid source offset	$2.13 \pm 2.10$	1.02	$-2.08 \pm 2.11$	$0.47 \pm 1.98$



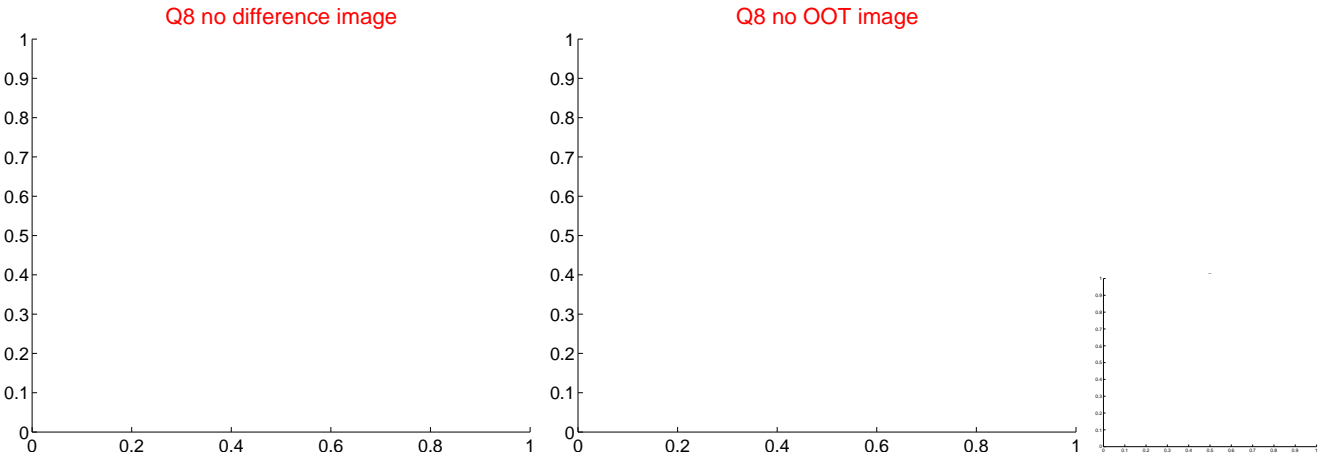
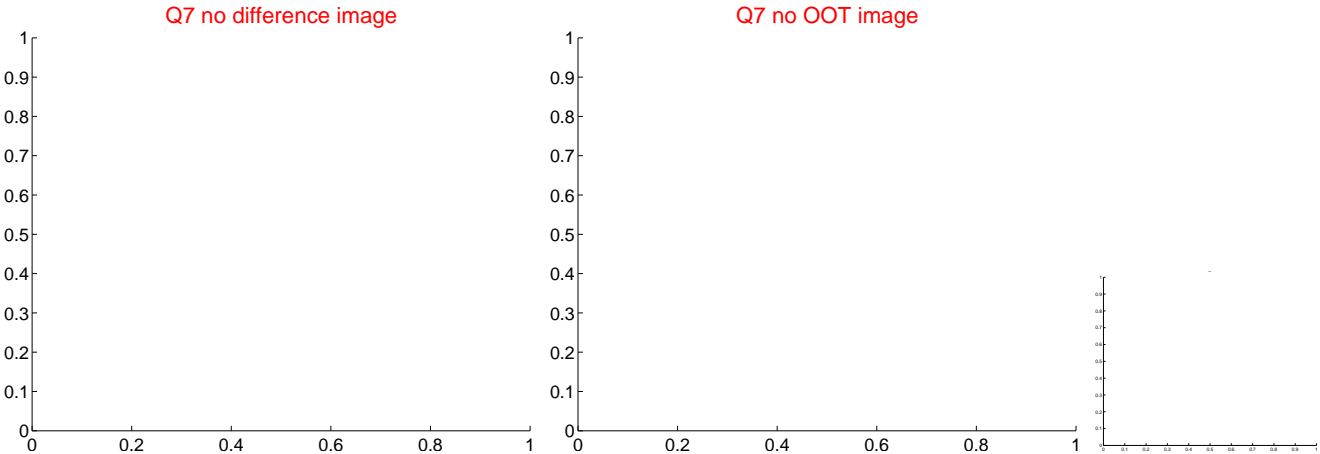
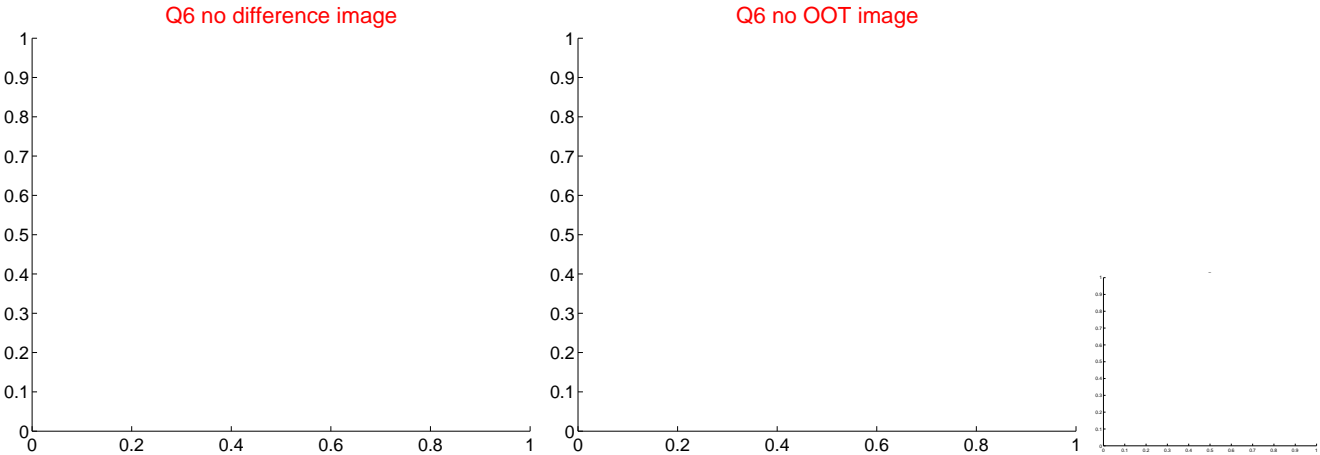
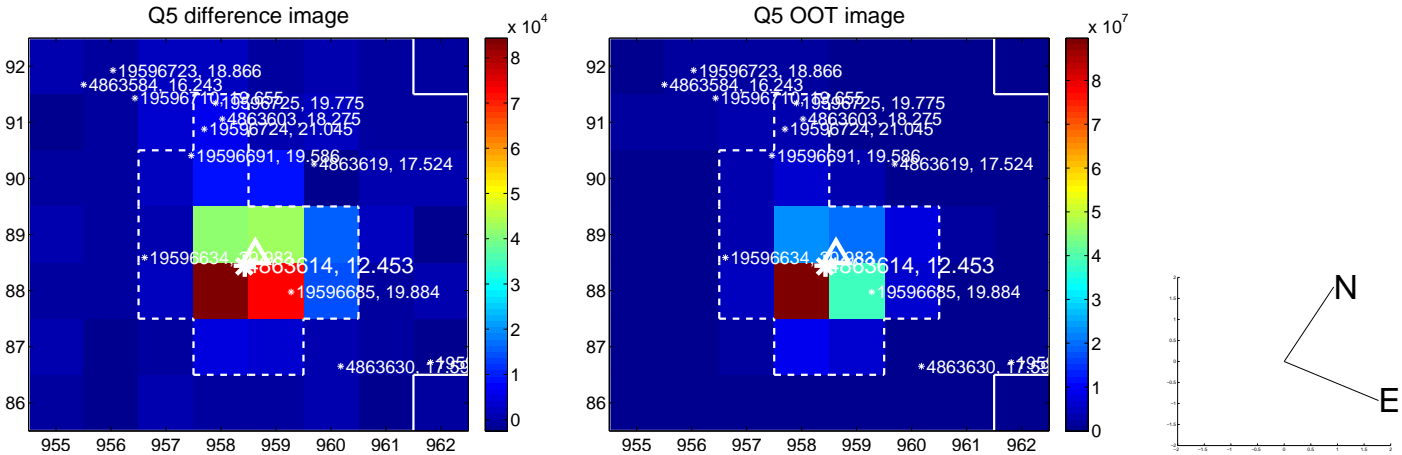
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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



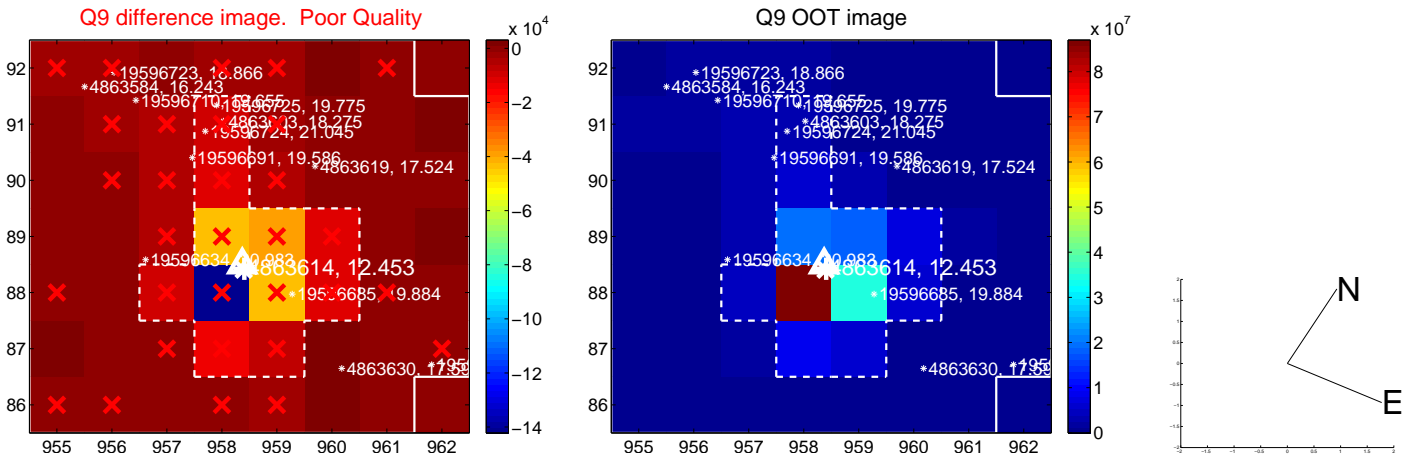
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



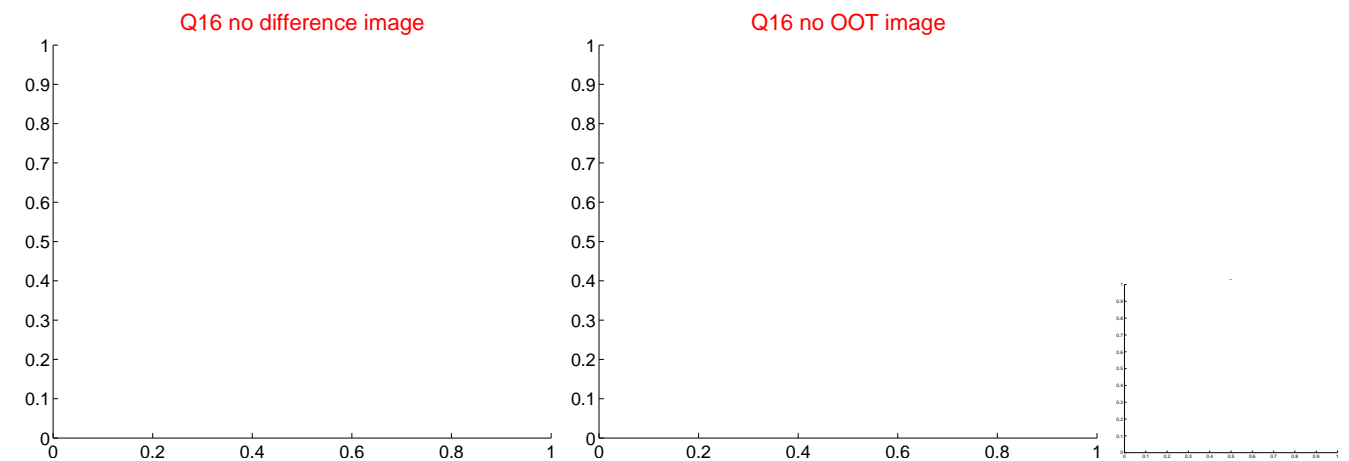
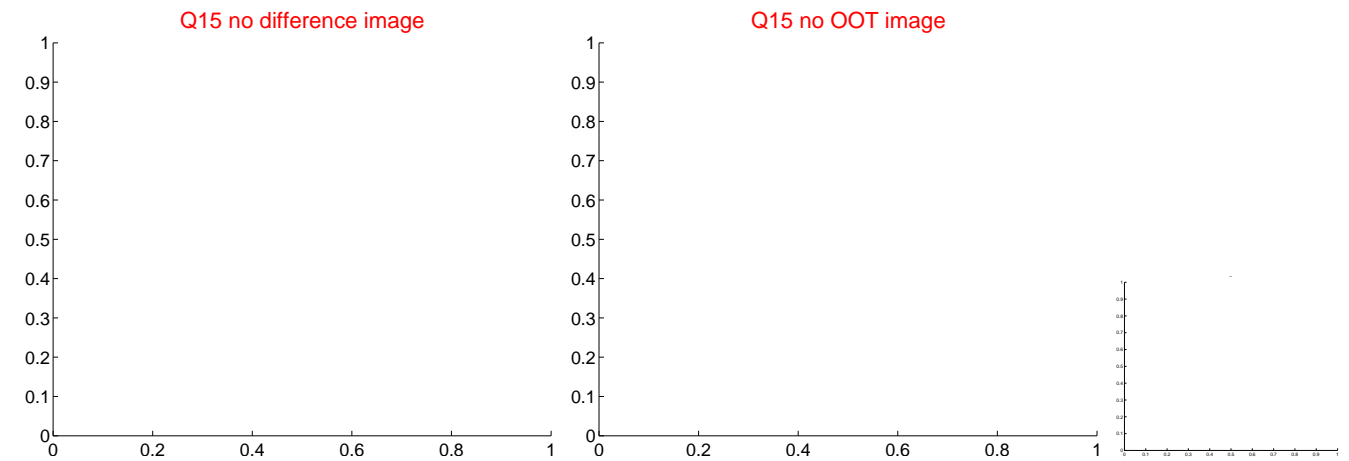
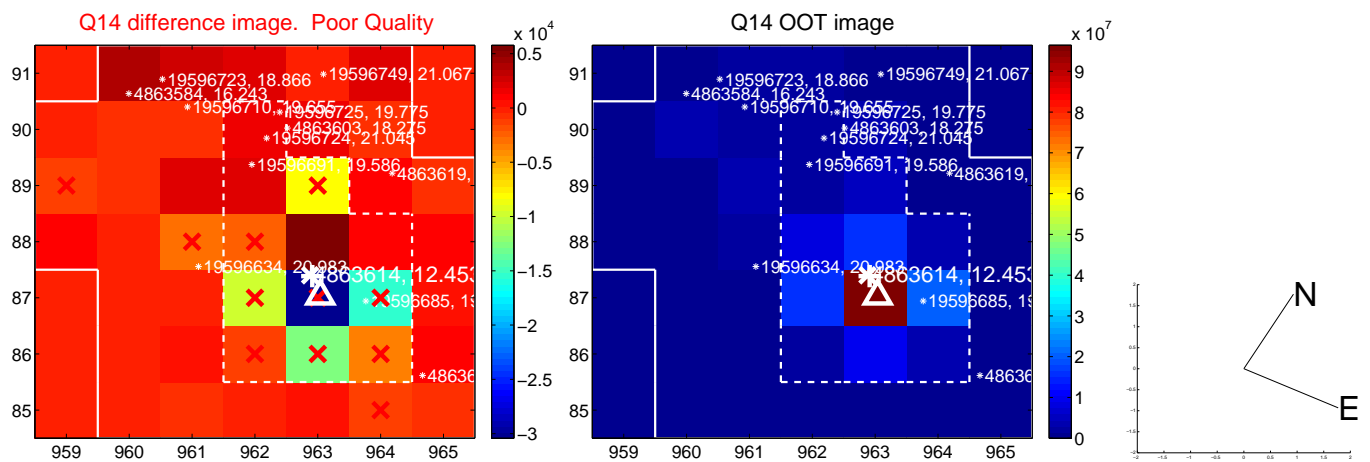
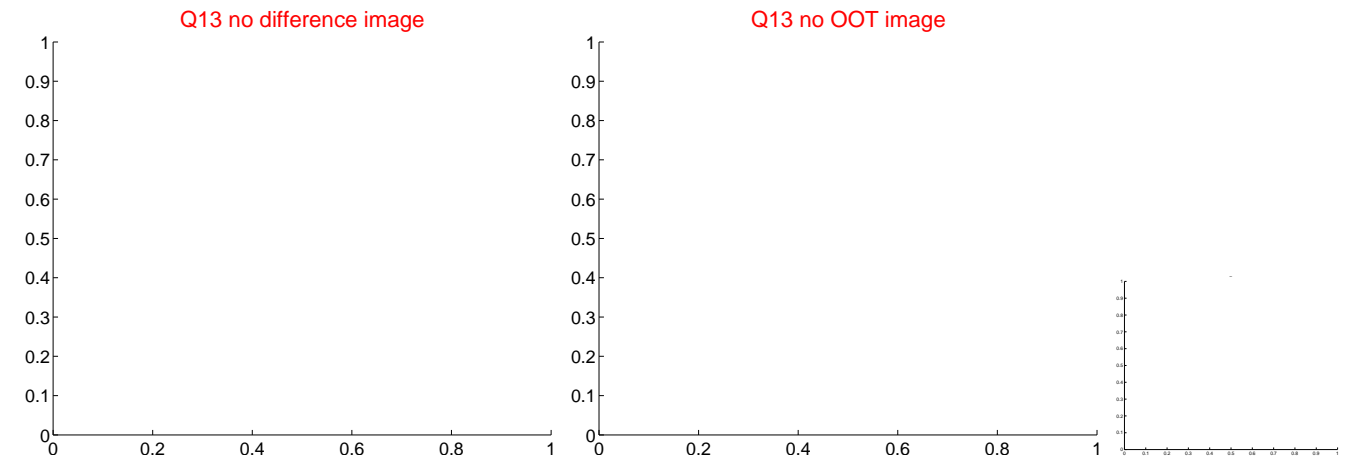
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



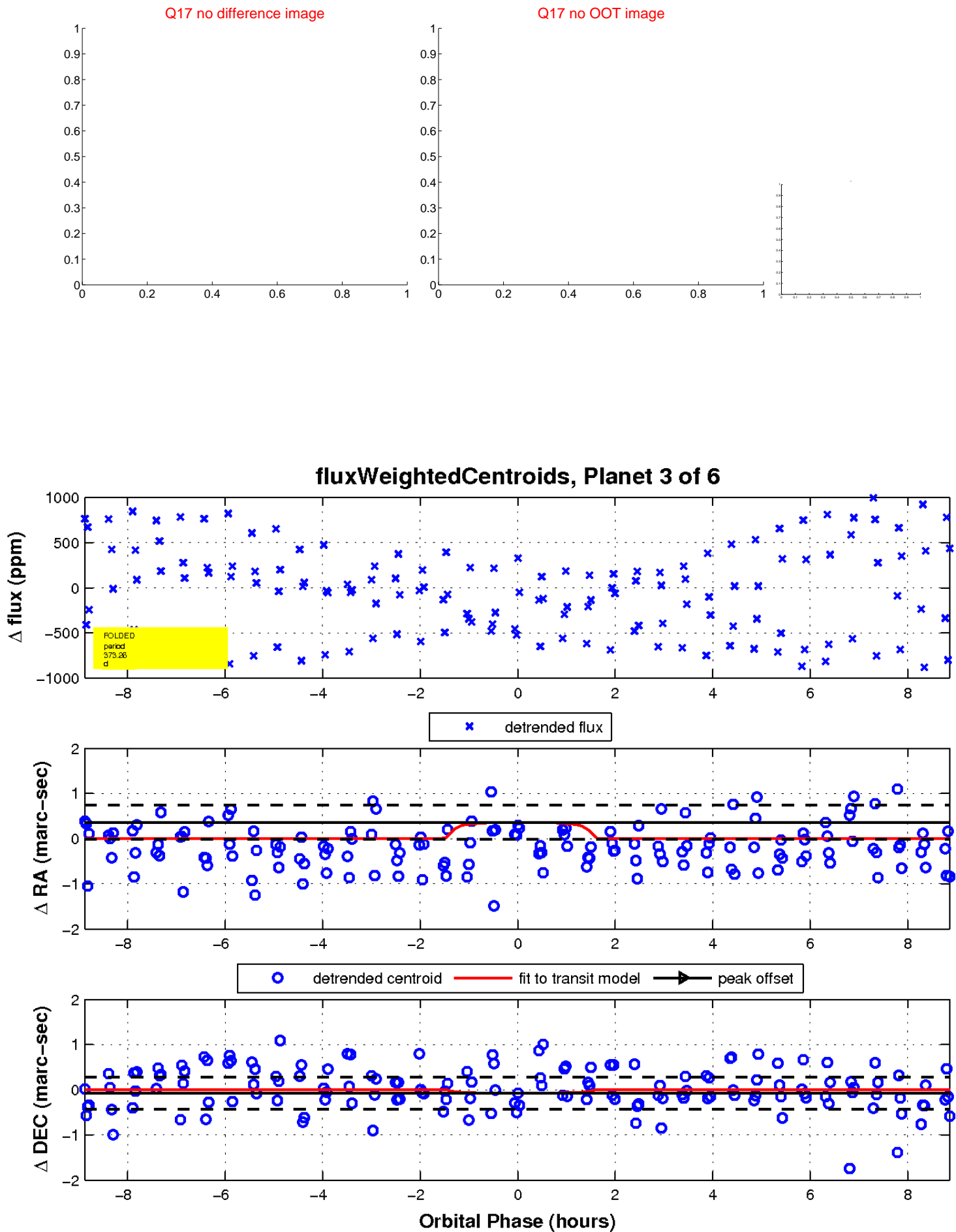
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



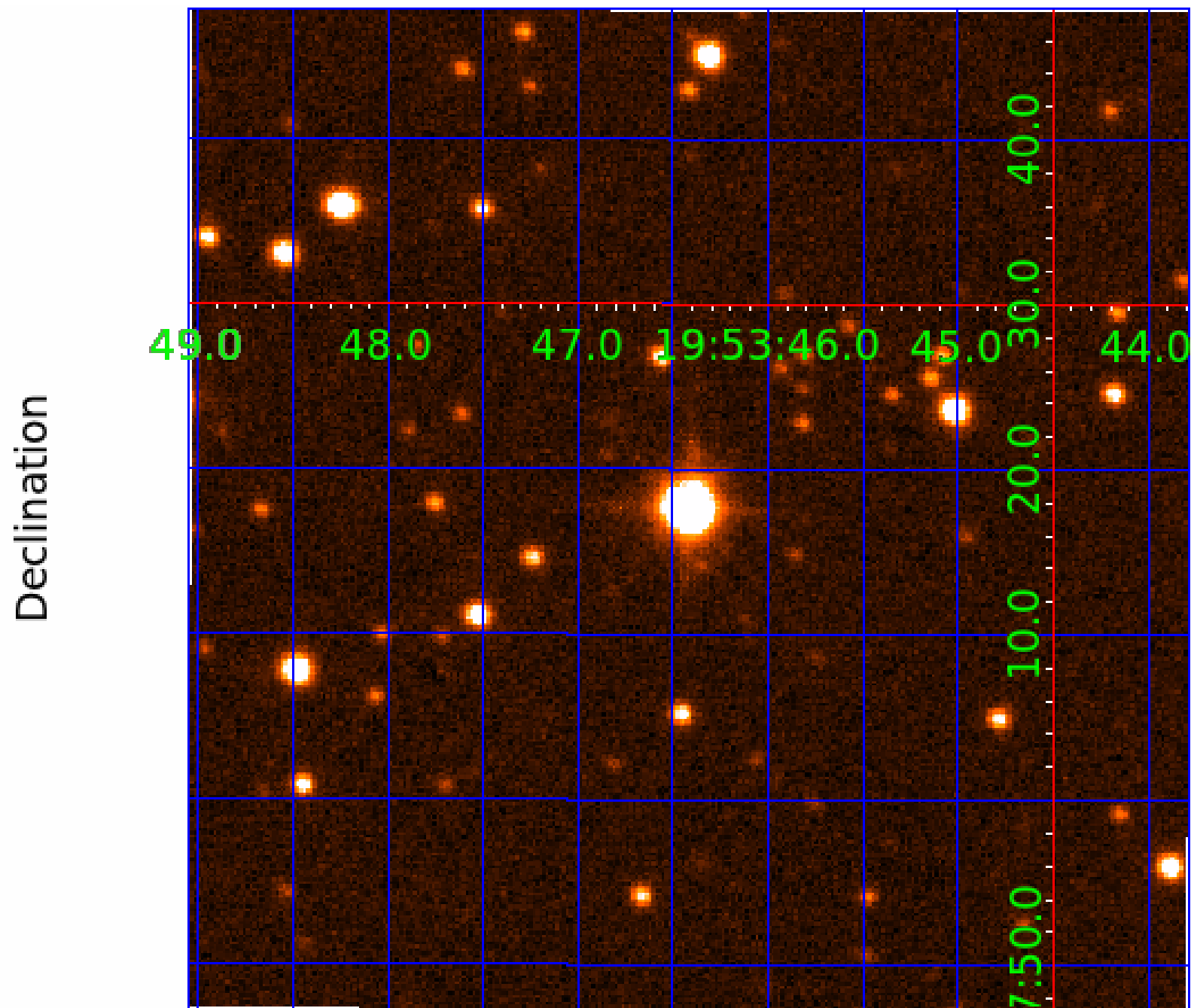
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image



# KIC 004863614

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004863614-01	OBS	No	0.703847	131.586036	25.2	1.557	8.8	8.5	1.01	6046	0.56	4715.00
004863614-02	OBS	No	391.380986	148.096874	319.1	6.601	11.7	3.5	1.01	6046	1.91	1.03
004863614-03	OBS	No	373.261860	156.811508	178.0	3.067	10.8	1.8	1.01	6046	1.56	1.10
004863614-04	OBS	No	284.129997	157.131940	684.7	5.311	12.5	6.2	1.01	6046	2.85	1.58
004863614-05	OBS	No	0.703868	132.049544	34.9	1.809	7.9	10.9	1.01	6046	0.70	4714.82
004863614-06	OBS	No	151.197753	143.473671	554.2	9.456	10.3	4.9	1.01	6046	2.51	3.67

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004863614-01	OBS	FP	0.00	1	0	1	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—CENT_RESOLVED_OFFSET
004863614-02	OBS	FP	0.00	1	0	0	0	LPP_ALT—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004863614-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL_SKYE_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004863614-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV
004863614-05	OBS	FP	0.00	1	0	1	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_RESOLVED_OFFSET—HALO_GHOST
004863614-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

**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.

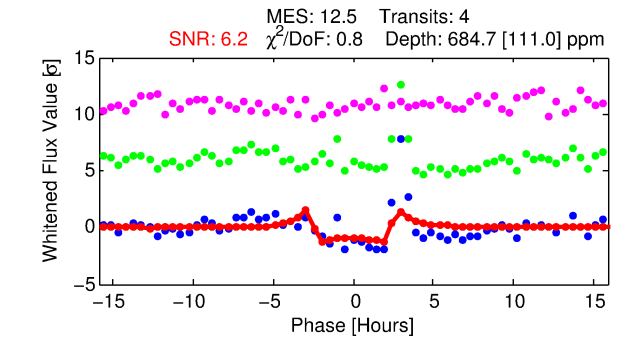
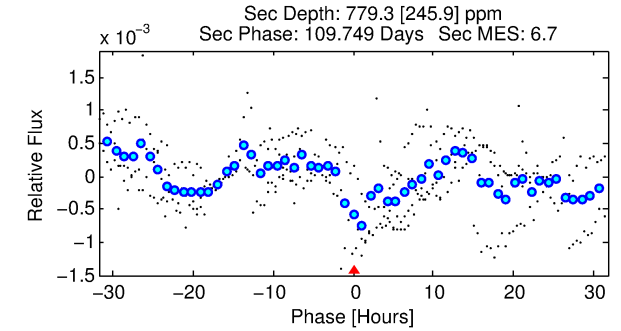
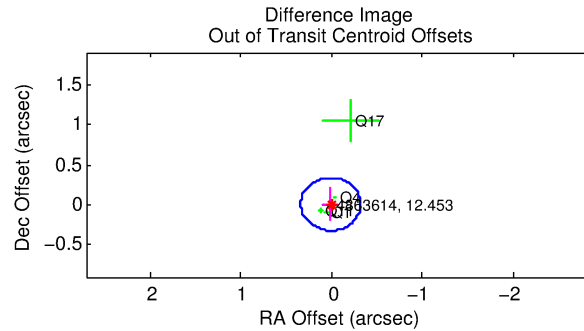
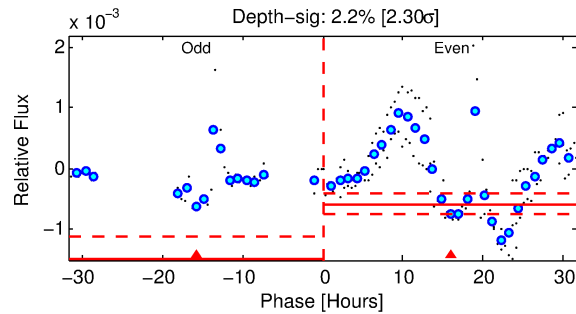
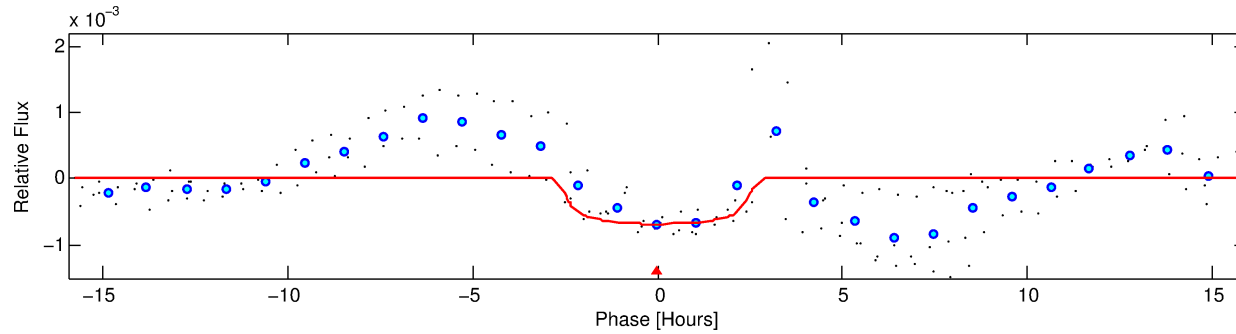
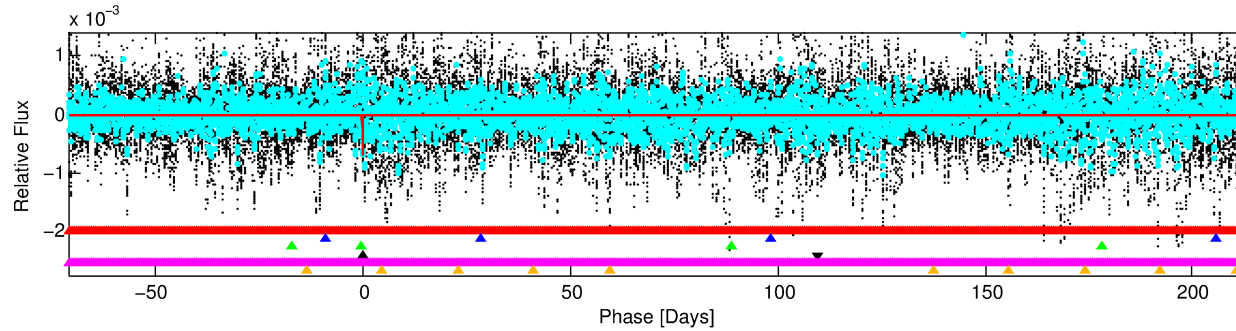
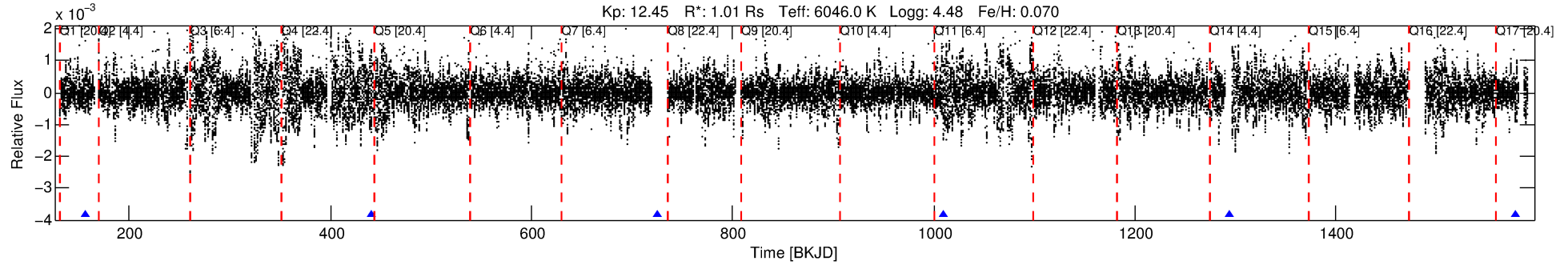
Ephemeris Match Information For 004863614-04

No Significant Match Found



# DV One-Page Summary

KIC: 4863614 Candidate: 4 of 6 Period: 284.130 d



## DV Fit Results:

Period = 284.13000 [0.00137] d  
Epoch = 157.1319 [0.0049] BKJD  
Rp/R\* = 0.0259 [0.0213]  
a/R\* = 290.85 [1147.44]  
b = 0.74 [2.44]  
Seff = 1.58 [0.56]  
Teq = 286 [25] K  
Rp = 2.85 [2.46] Re  
a = 0.8765 [0.1966] AU  
Ag = 40548.28 [69010.74] [0.59 $\sigma$ ]  
Teffp = 6273 [2627] K [2.28 $\sigma$ ]

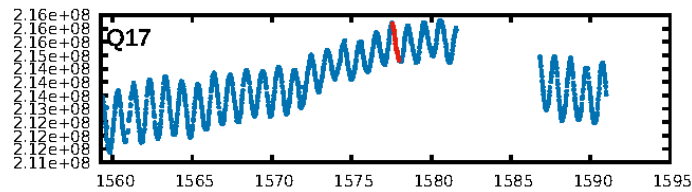
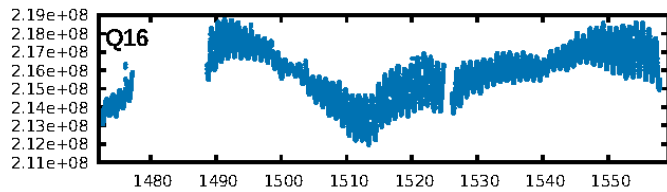
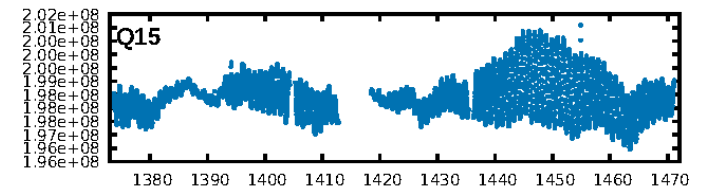
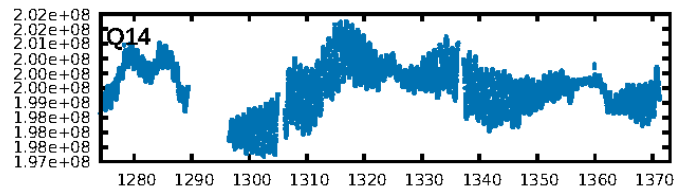
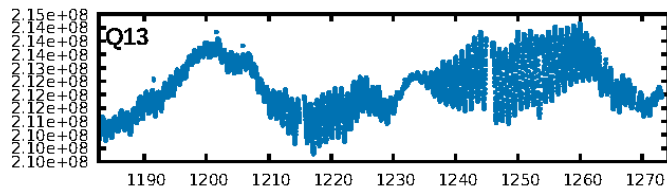
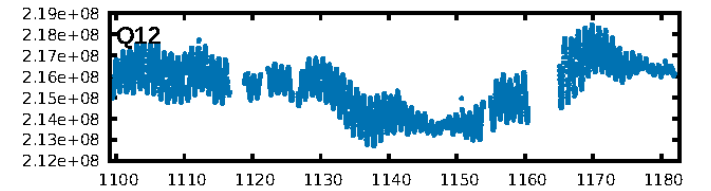
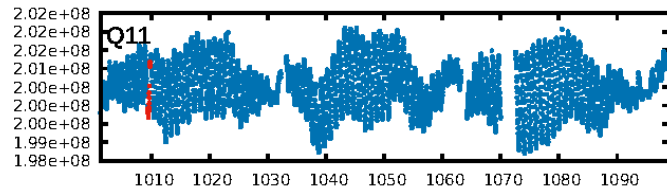
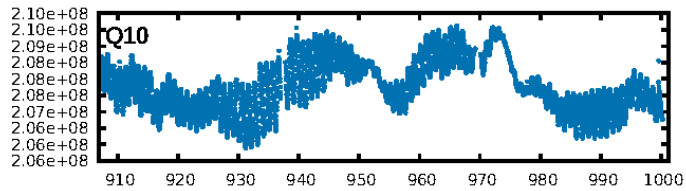
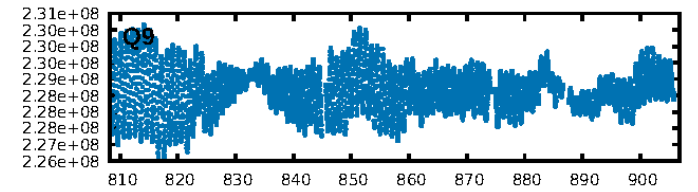
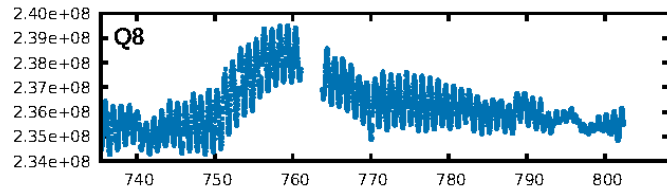
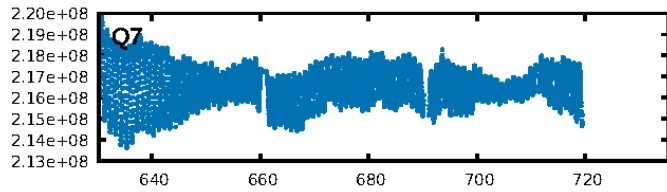
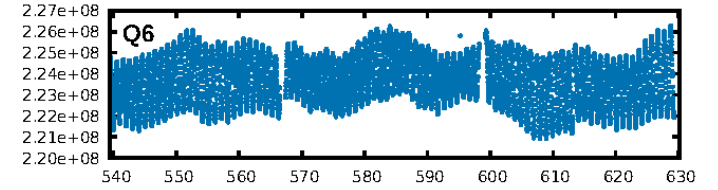
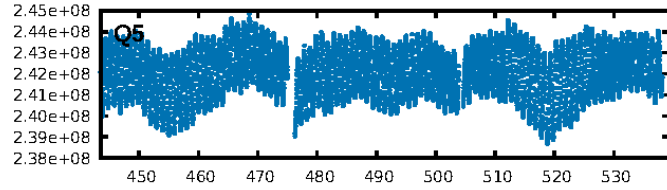
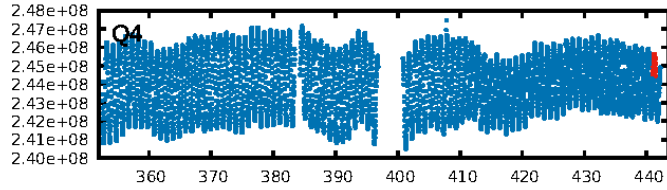
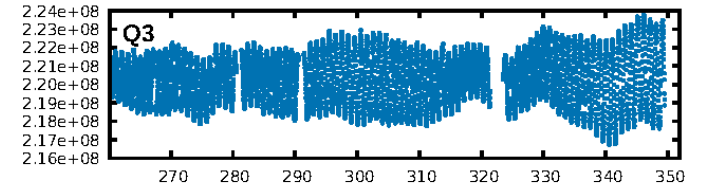
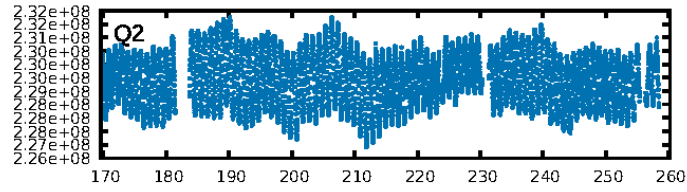
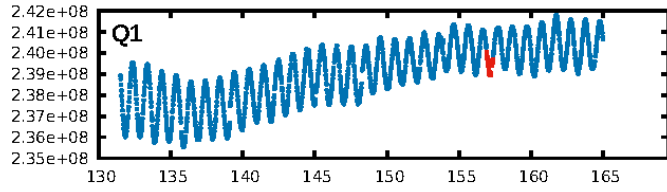
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [294.17 $\sigma$ ]  
LongPeriod-sig: 100.0% [348.78 $\sigma$ ]  
ModelChiSquare2-sig: 49.9%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [2/2]  
GhostDiagnostic-chr: 2.477  
Centroid-sig: 23.9%  
Centroid-so: 0.271 arcsec [0.72 $\sigma$ ]  
OotOffset-rm: 0.011 arcsec [0.10 $\sigma$ ]  
OotOffset-st: 0/1/1/2 [4]  
KicOffset-rm: 0.048 arcsec [0.21 $\sigma$ ]  
KicOffset-st: 0/1/1/2 [4]  
DiffImageQuality-fgm: 0.75 [3/4]  
DiffImageOverlap-fno: 0.00 [0/4]

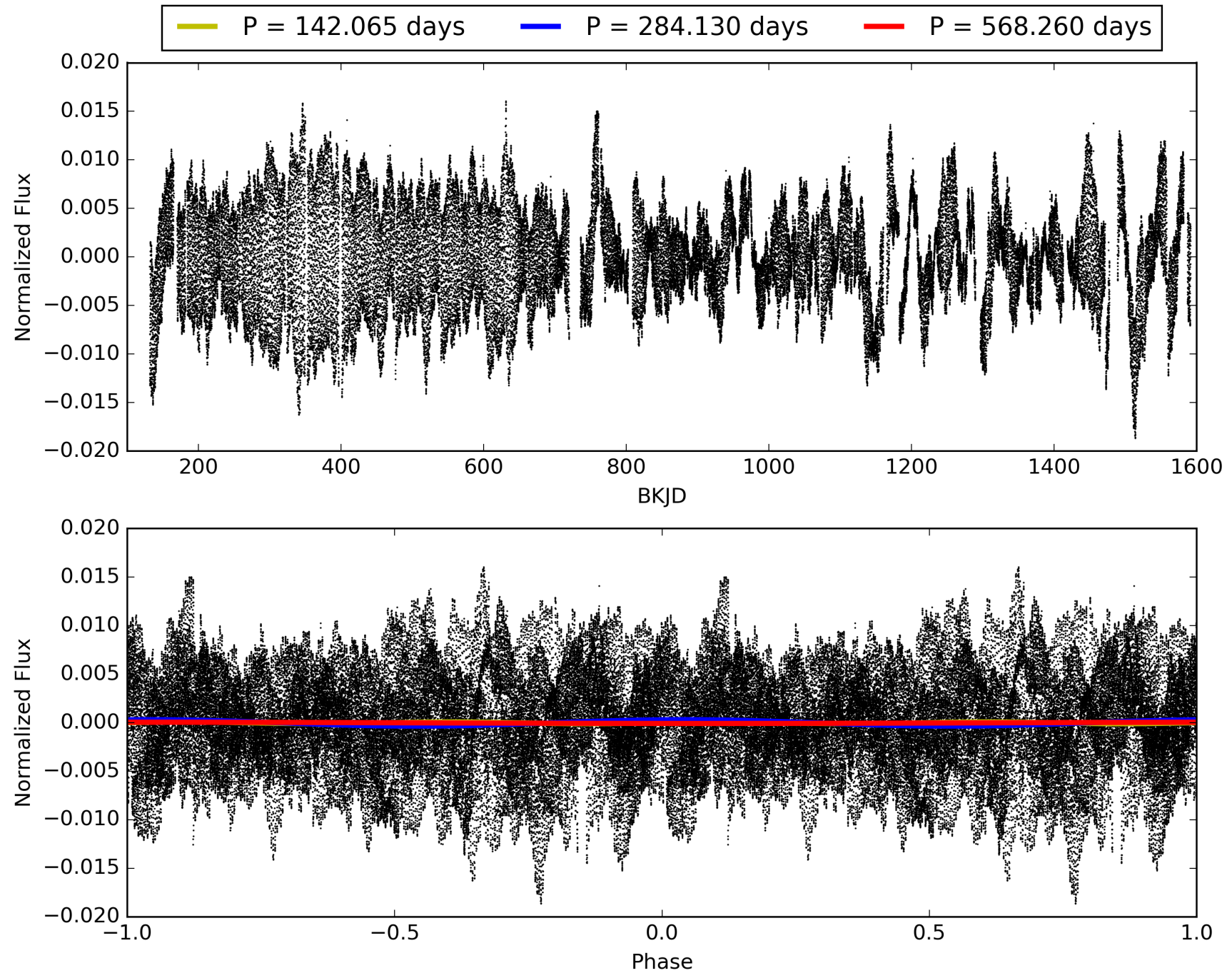
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 17:13:13 Z

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

# TCE 004863614-04, PDC Light Curves

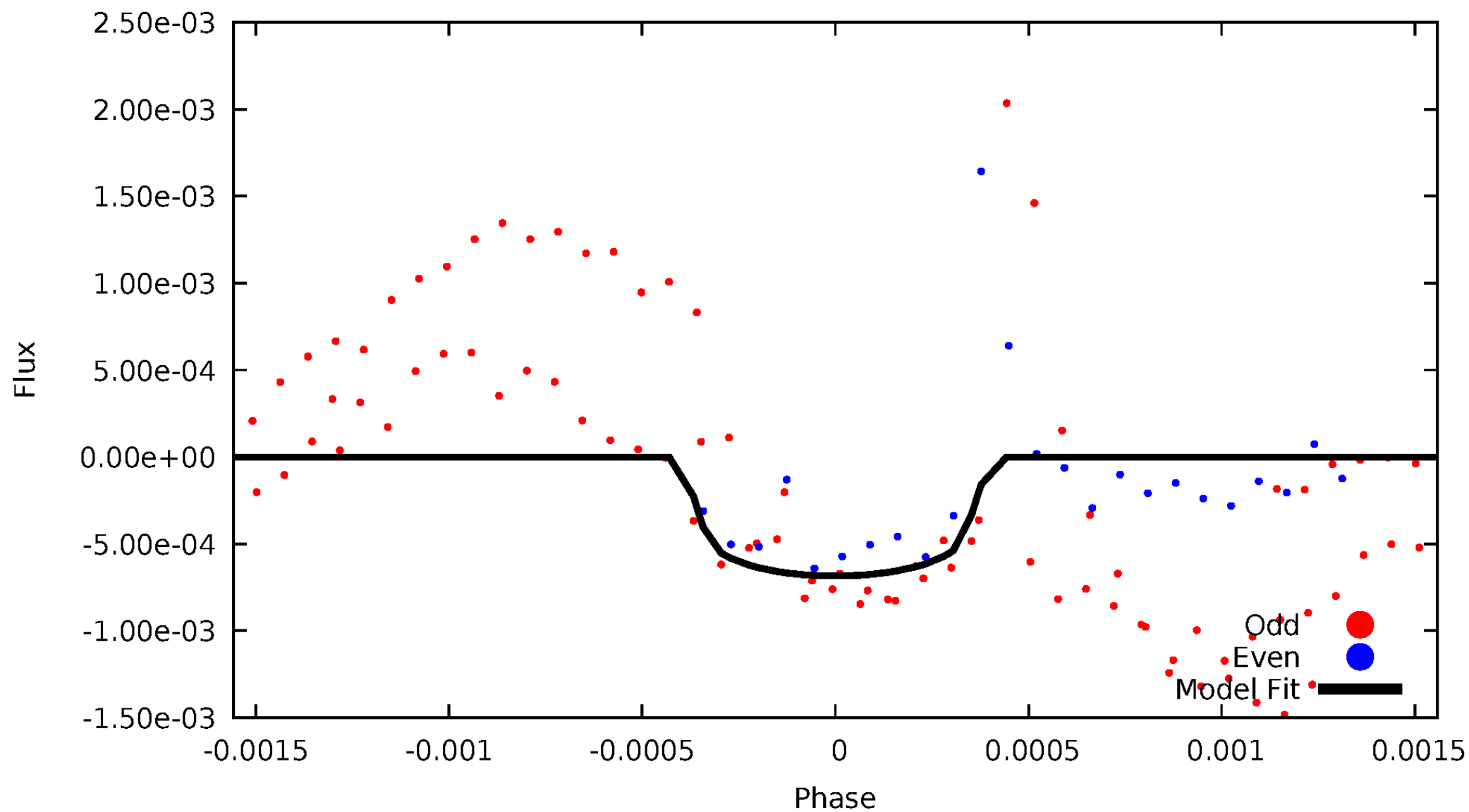


TCE 004863614-04



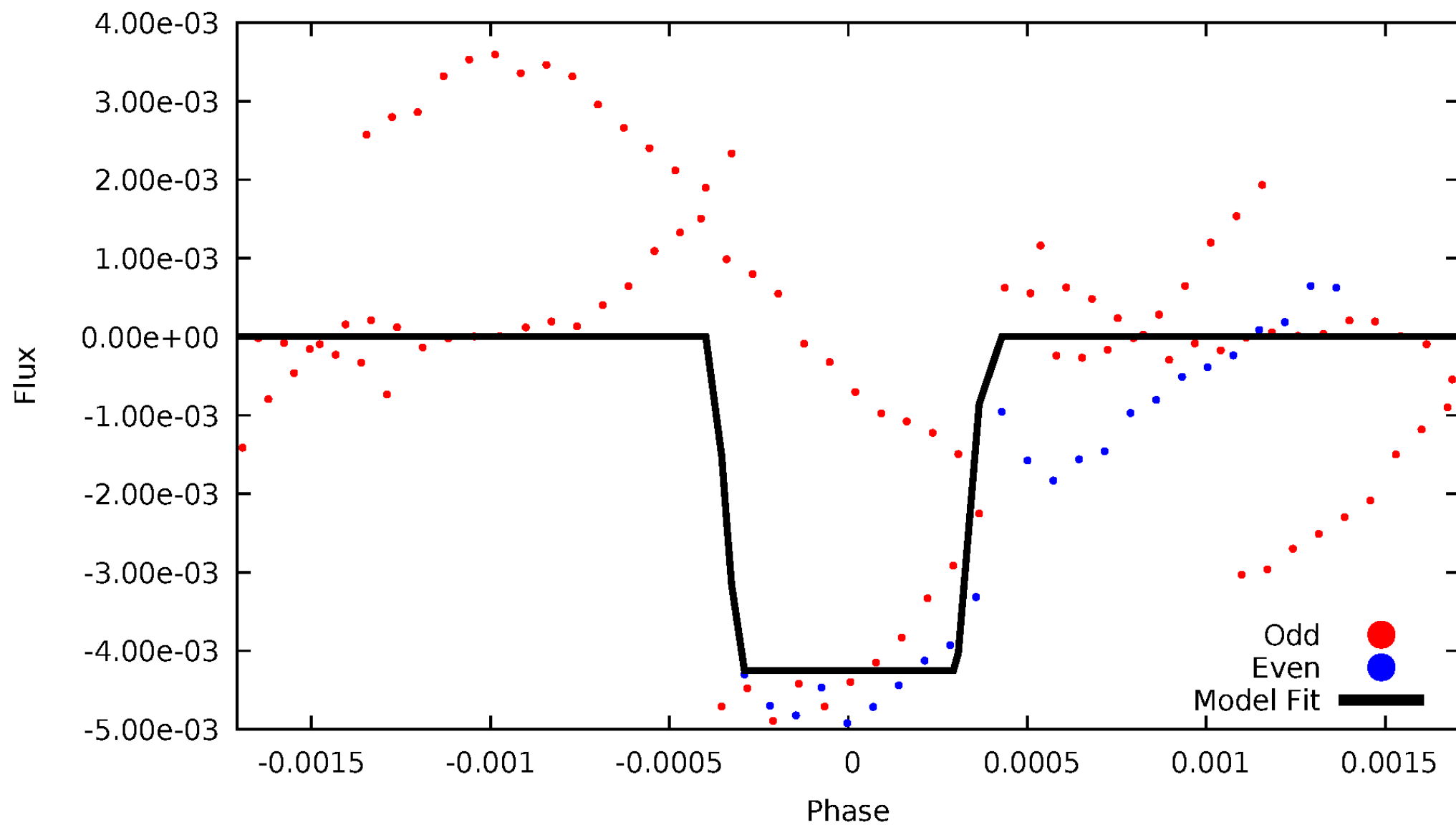
# DV Odd/Even

TCE 004863614-04



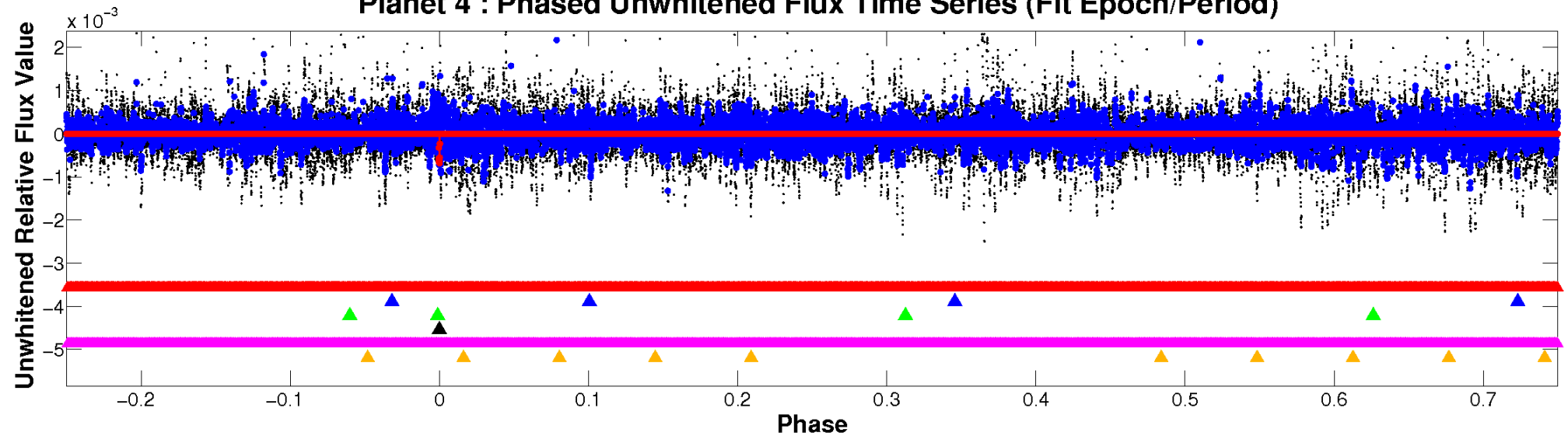
# ALT Odd/Even

TCE 004863614-04

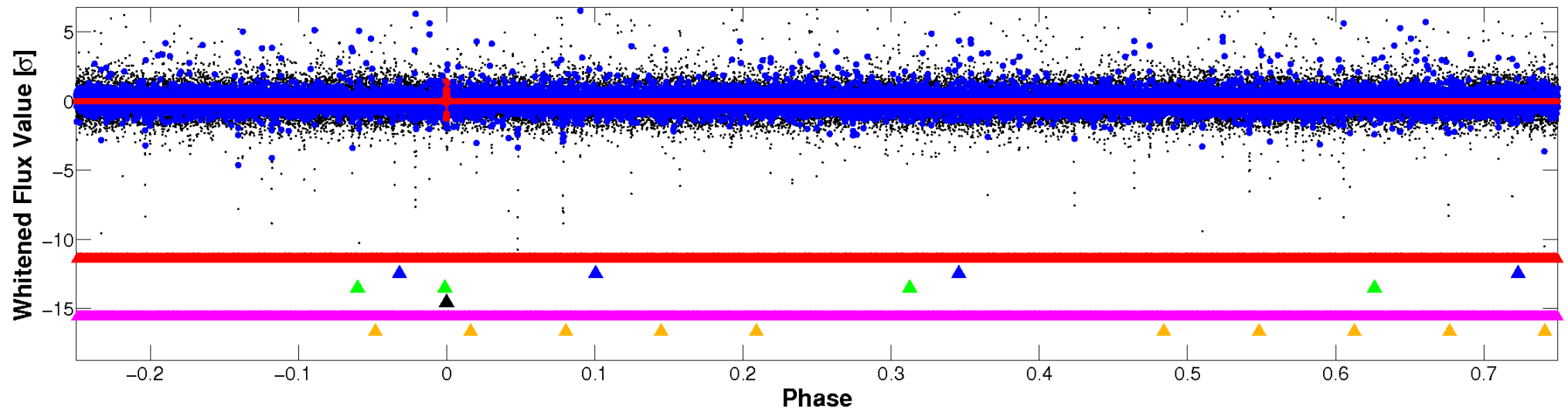


# Non-Whitened Vs. Whitened Light Curve

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

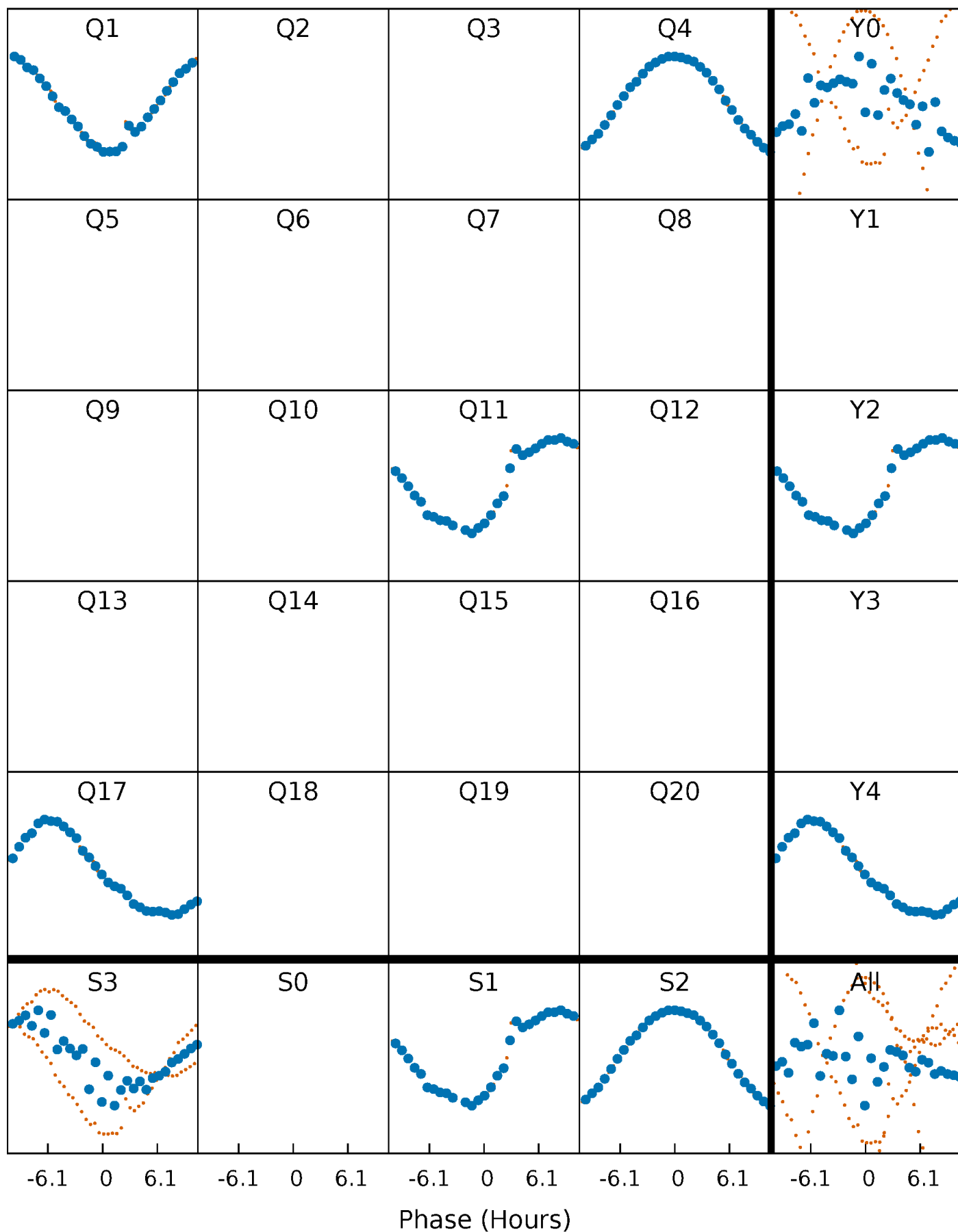


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

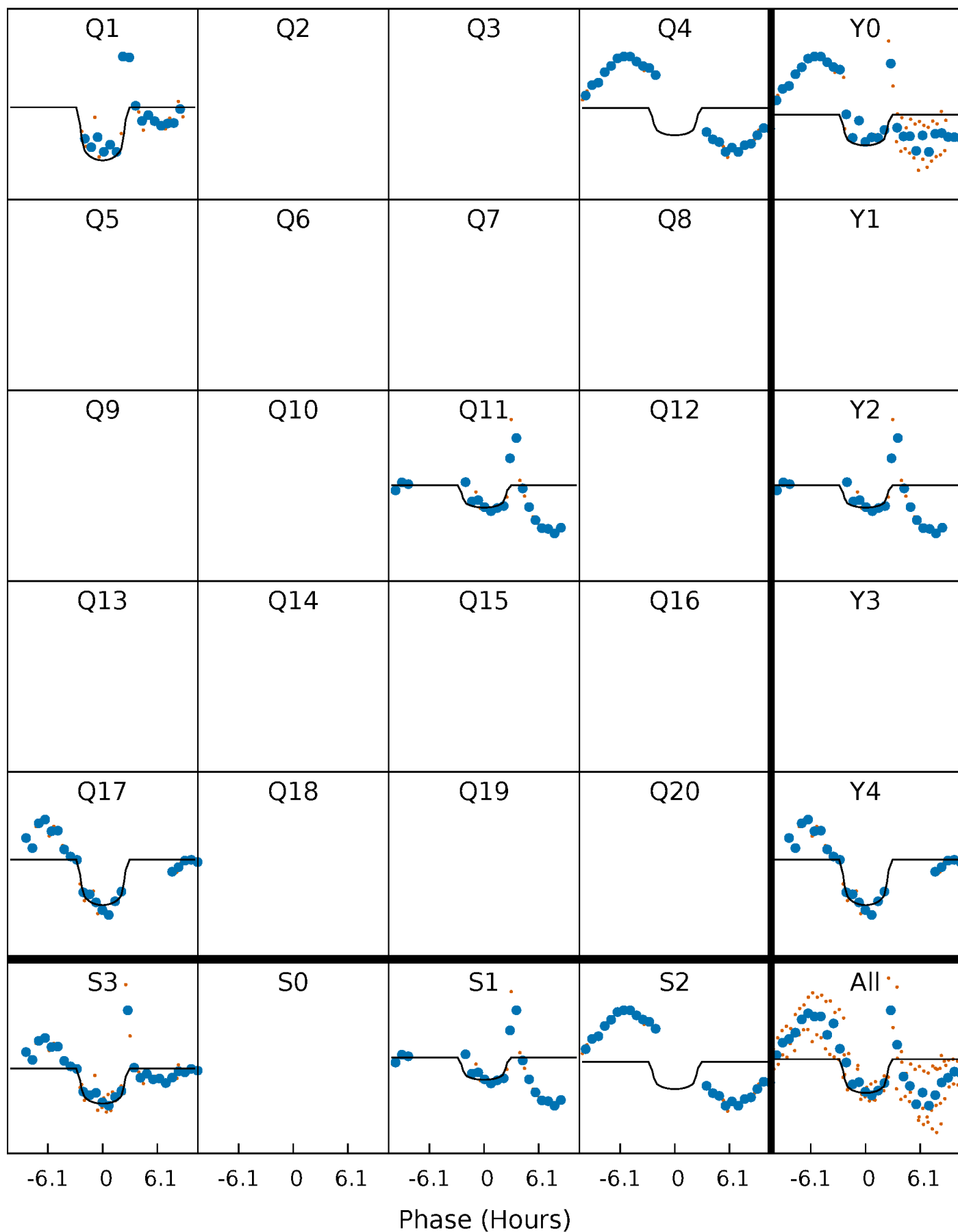
TCE 004863614-04 P=284.129997 Days  $T_0=157.131940$  (BKJD)





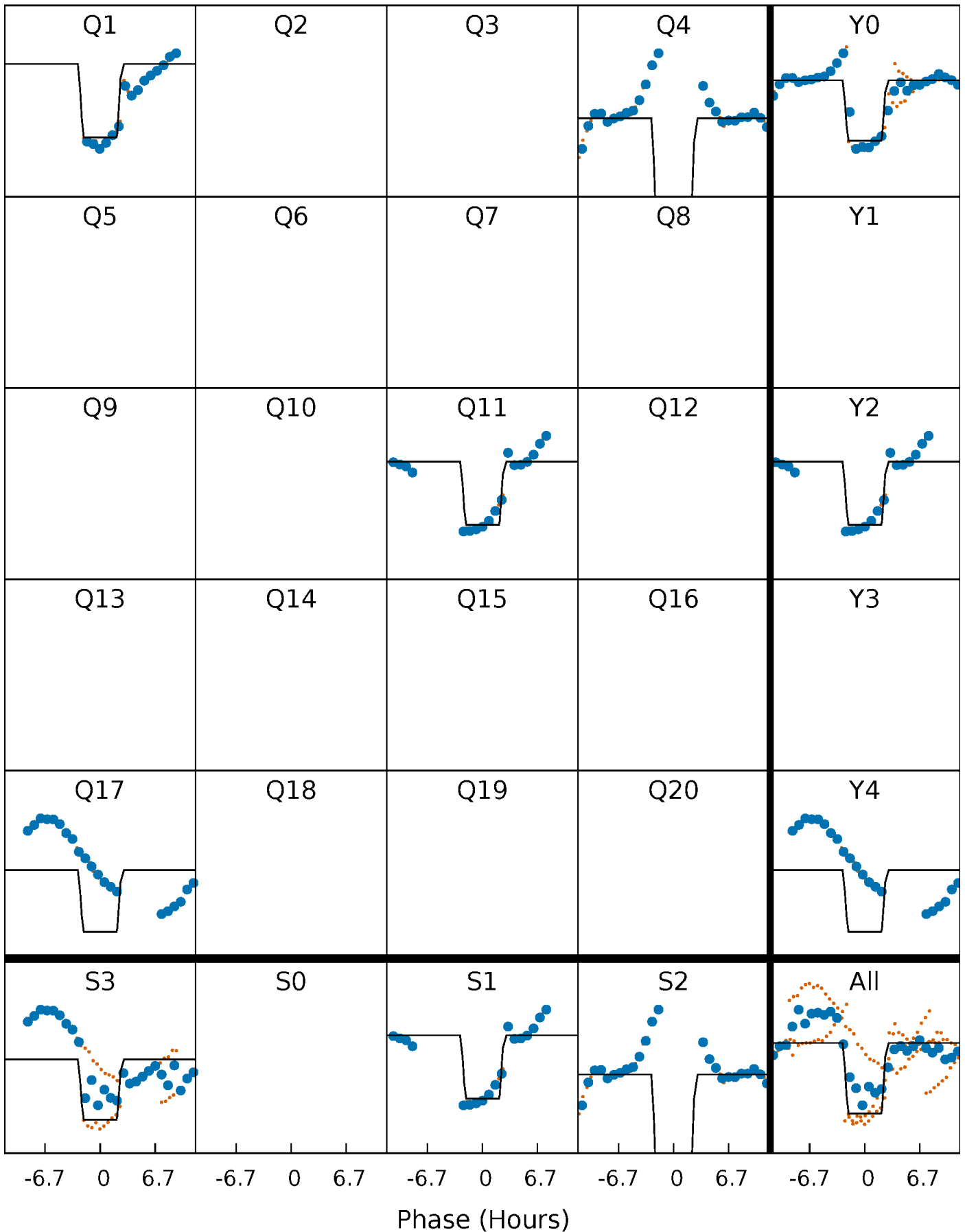
# DV Quarter-Phased Transit Curves

TCE 004863614-04 P=284.129997 Days  $T_0=157.131940$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

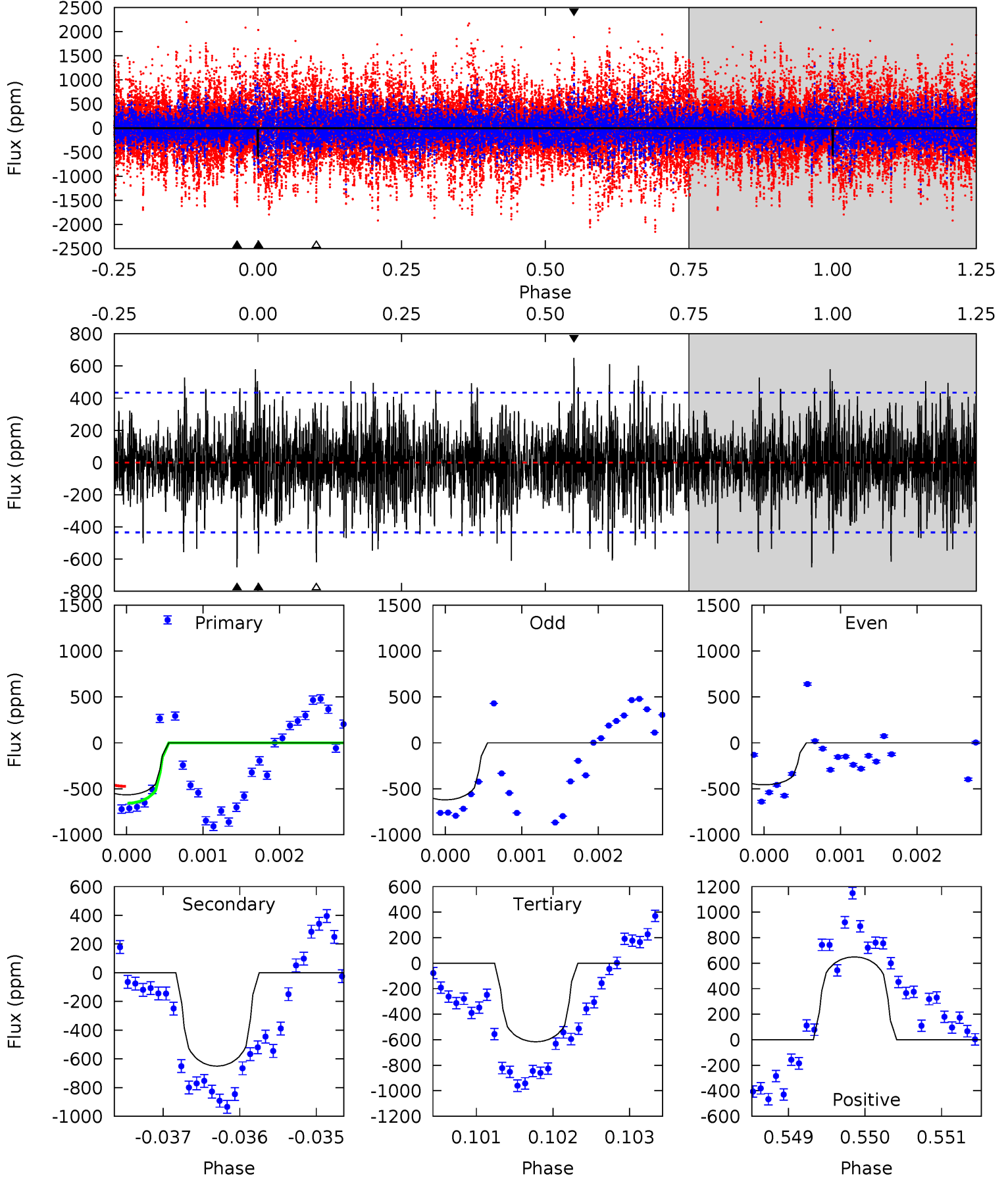
TCE 004863614-04 P=284.135463 Days  $T_0=157.117320$  (BKJD)



# DV Model-Shift Uniqueness Test

004863614-04, P = 284.129997 Days, E = 157.131940 Days

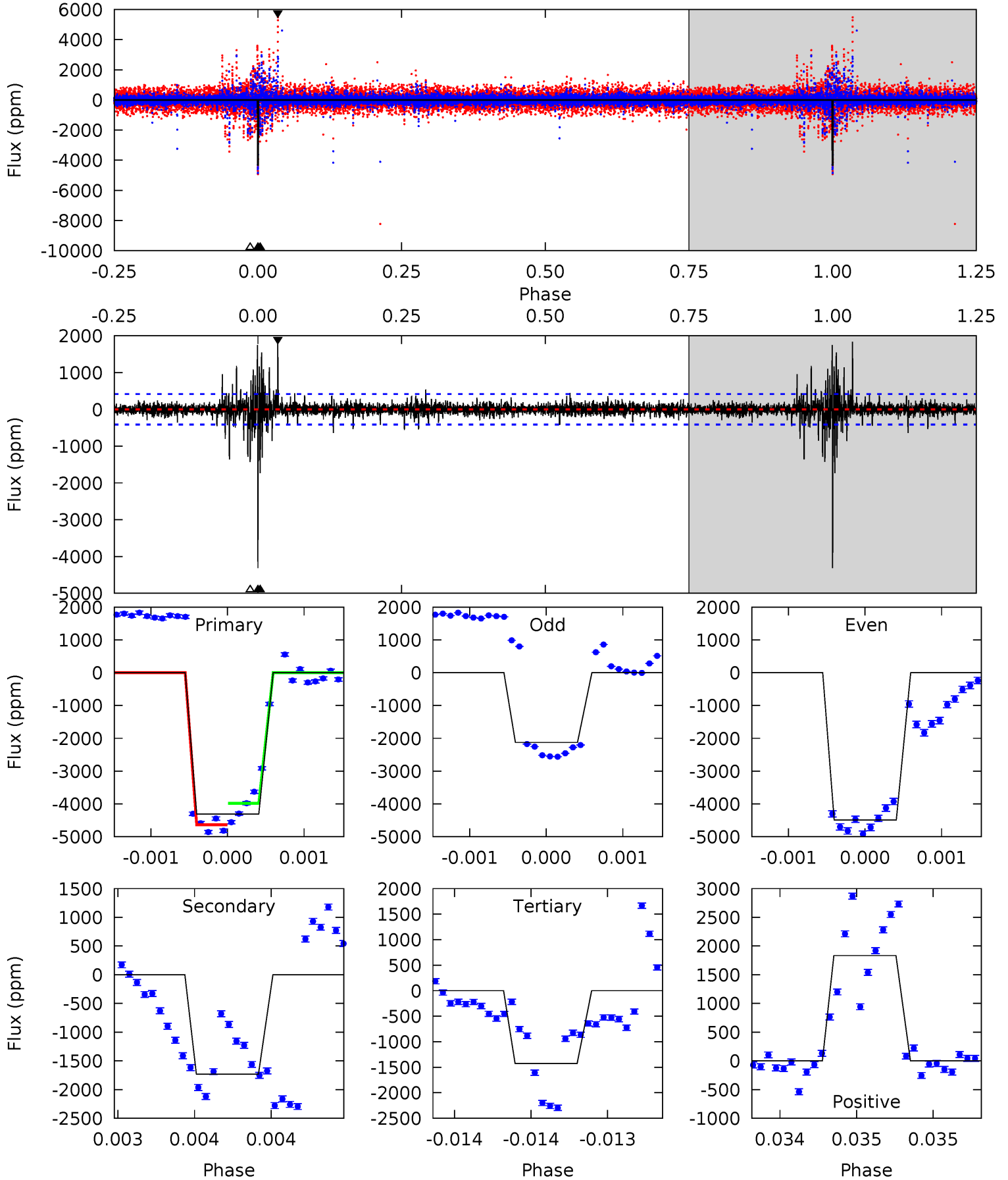
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.16	8.22	7.79	8.20	5.49	3.35	2.17	-0.63	-1.05	0.43	0.02	0.97	1.02	0.50	1.17



# Alt Model-Shift Uniqueness Test

004863614-04, P = 284.135463 Days, E = 157.117320 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
57.2	23.0	18.9	24.3	5.51	3.38	1.86	38.3	32.9	4.06	-1.35	11.7	0.72	0.30	4.36



### Stellar Parameters For KIC 004863614

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6046^{+163}_{-199}$	$4.478^{+0.048}_{-0.180}$	$0.070^{+0.250}_{-0.350}$	$1.007^{+0.267}_{-0.114}$	$1.111^{+0.120}_{-0.160}$	$1.532^{+0.377}_{-0.742}$
	+3%/-3%	+1%/-4%	+357%/-500%	+27%/-11%	+11%/-14%	+25%/-48%
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 004863614-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-650 \pm 79$	$3.43^{+2.14}_{-1.96}$	$406^{+29}_{-18}$	$5598^{+3226}_{-1067}$	$22452^{+97824}_{-13822}$
Alt.	$-1731 \pm 75$	$7.60^{+2.78}_{-2.62}$	$409^{+28}_{-19}$	$4913^{+972}_{-543}$	$12738^{+14822}_{-6021}$

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

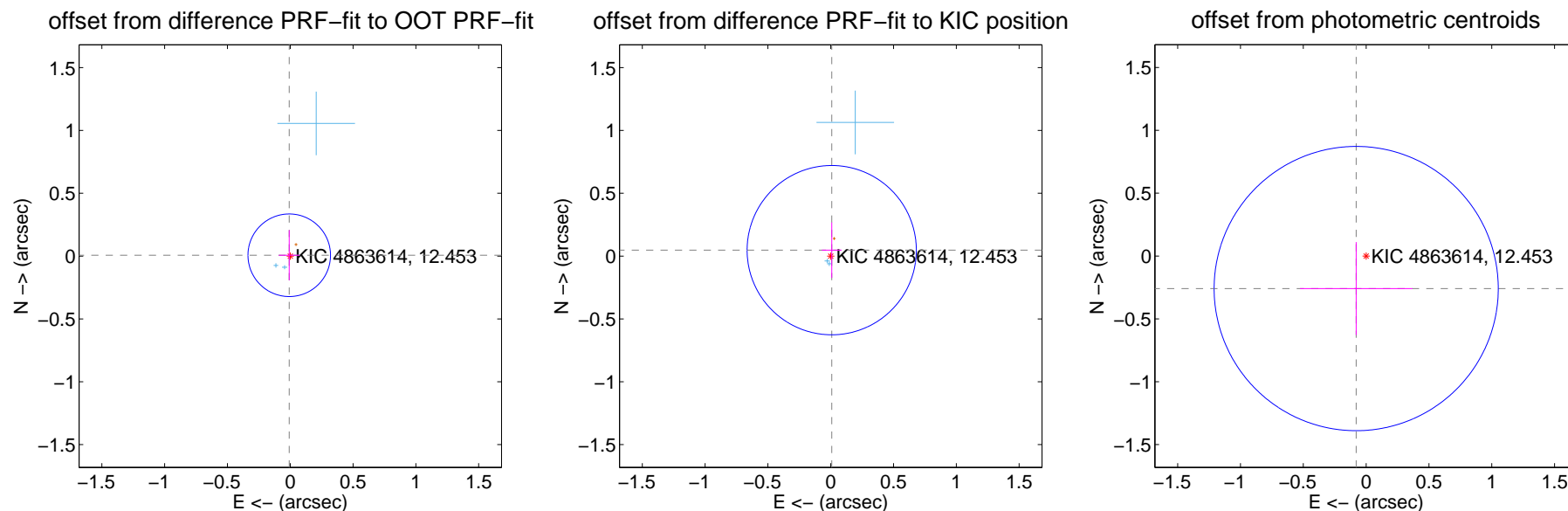
## DV Centroid Data

Supplemental centroid analysis for 004863614-04. Kepler magnitude: 12.45. Transit SNR 6.22

There are 3 quarters with good PRF difference image offsets

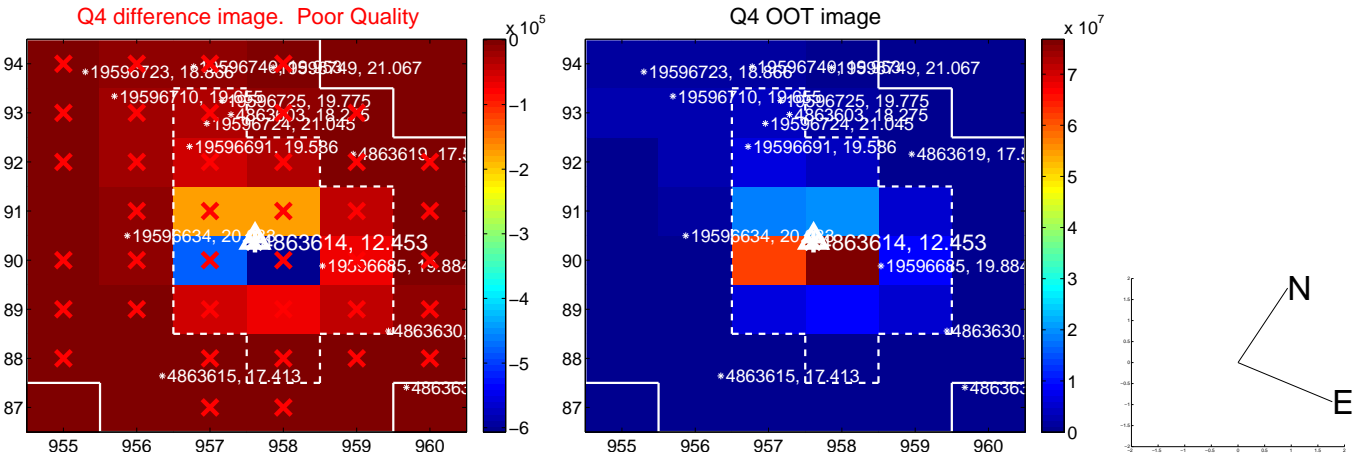
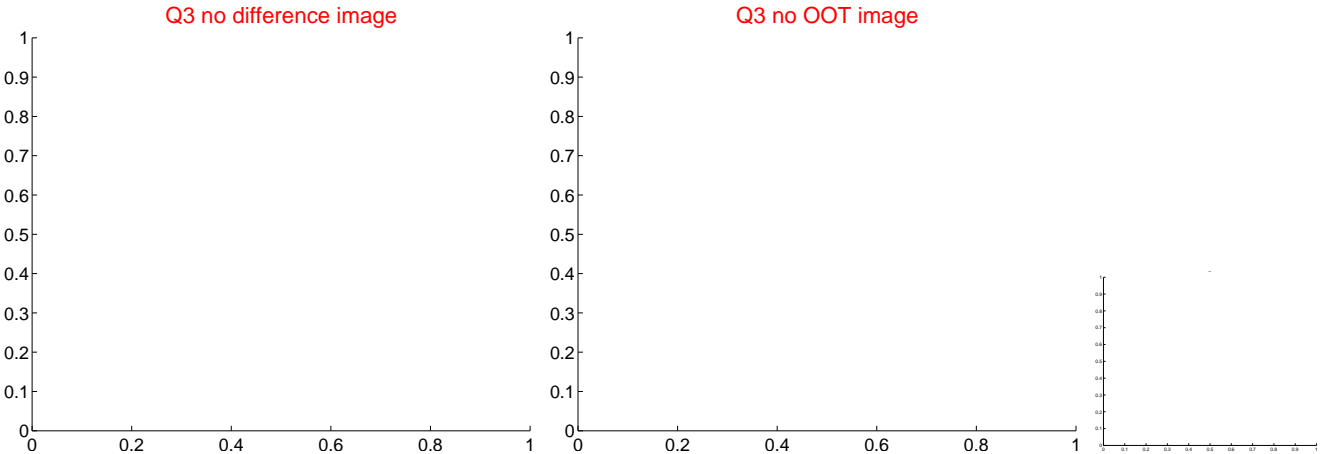
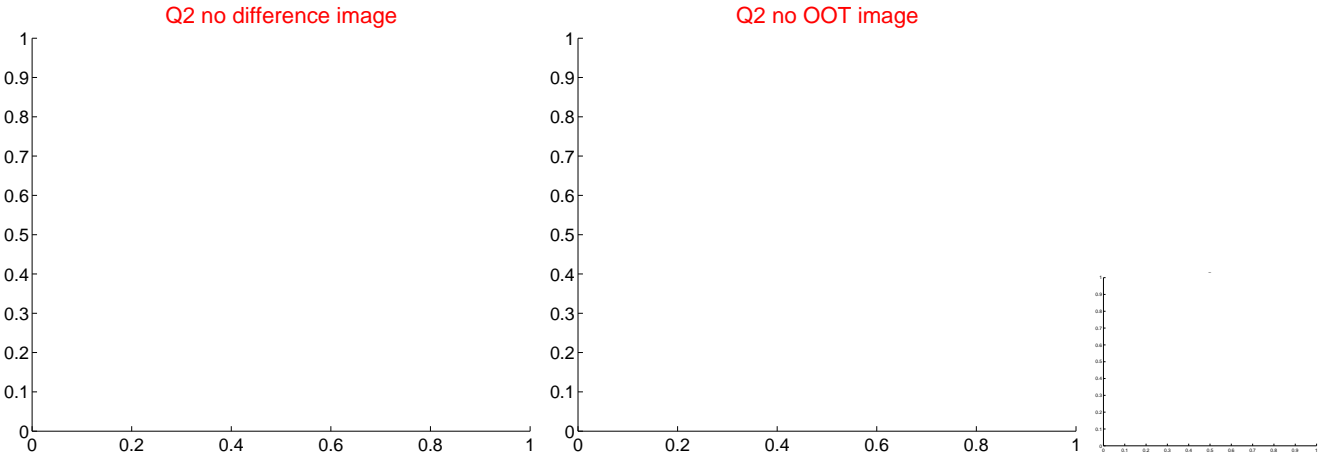
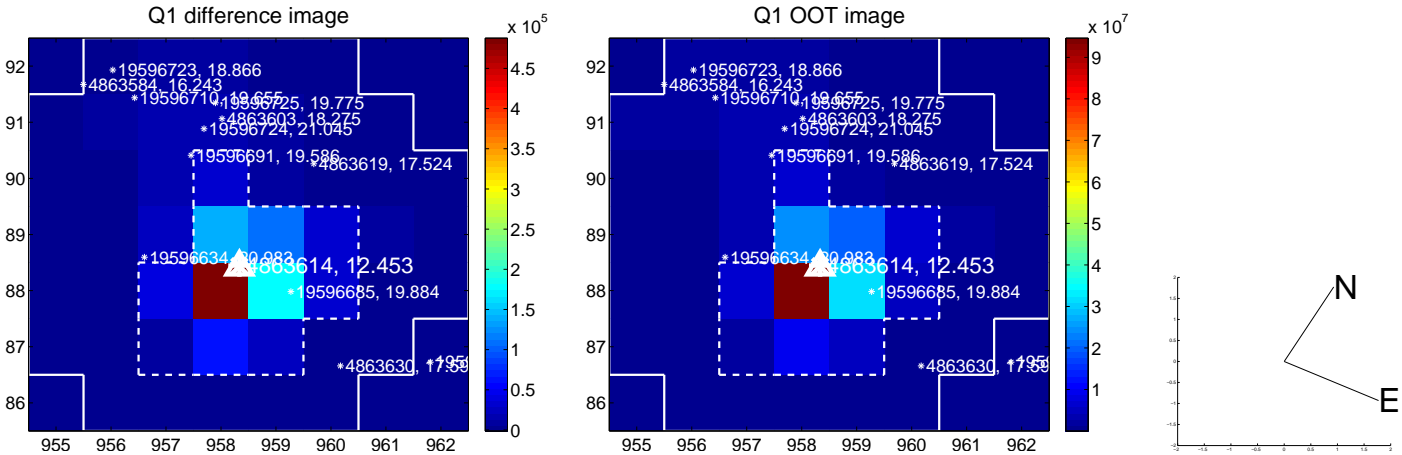
The direct PRF centroid is offset from the target star catalog position by about 0.01 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.011 \pm 0.110$	0.10	$0.008 \pm 0.083$	$0.007 \pm 0.200$
PRF-fit source offset from KIC position	$0.048 \pm 0.225$	0.21	$-0.008 \pm 0.079$	$0.047 \pm 0.221$
photometric centroid source offset	$0.27 \pm 0.38$	0.72	$0.08 \pm 0.45$	$-0.26 \pm 0.37$



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.

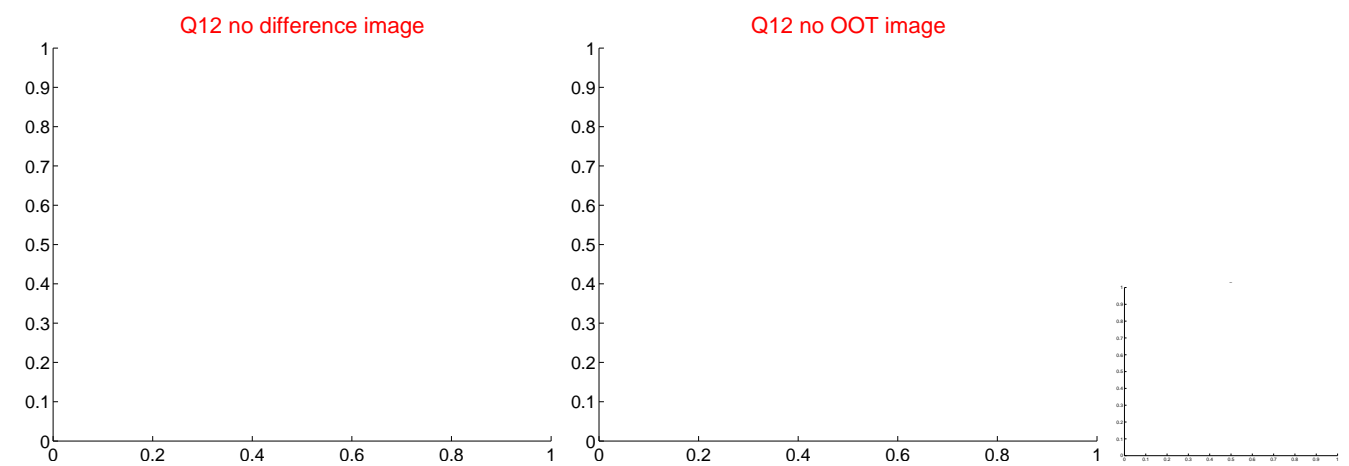
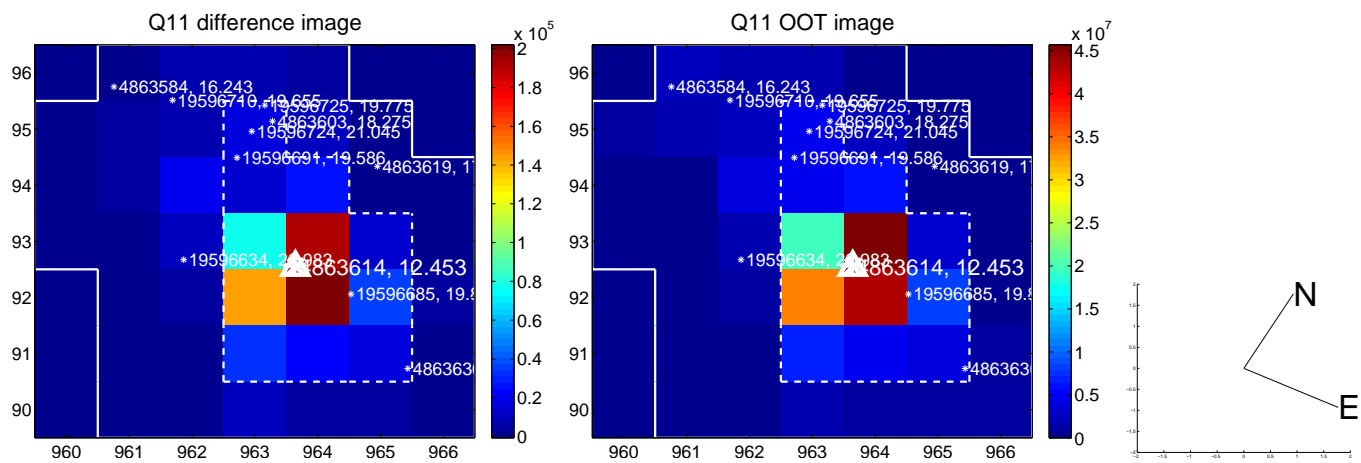
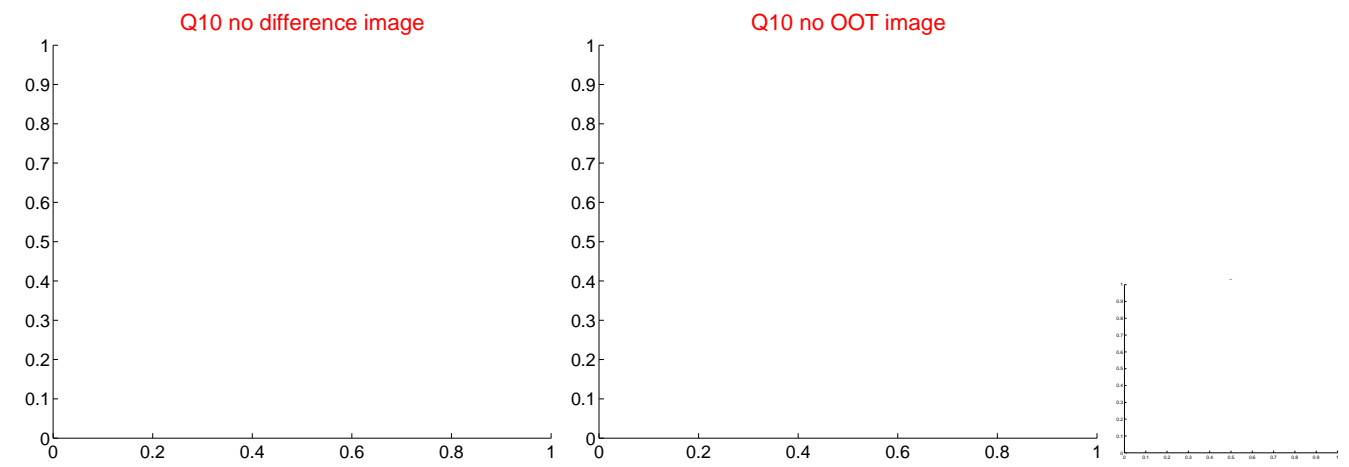
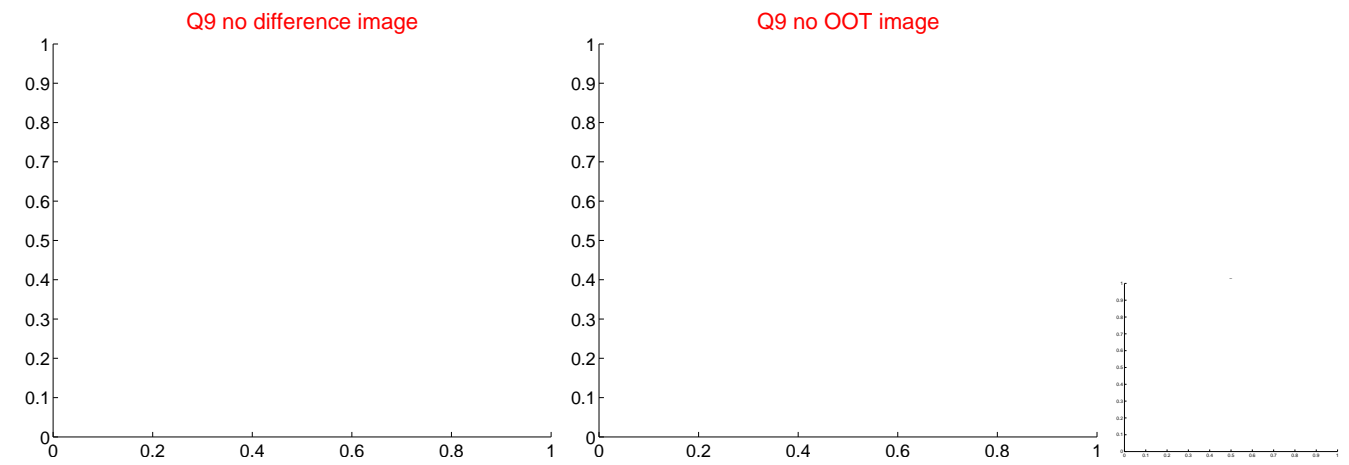




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



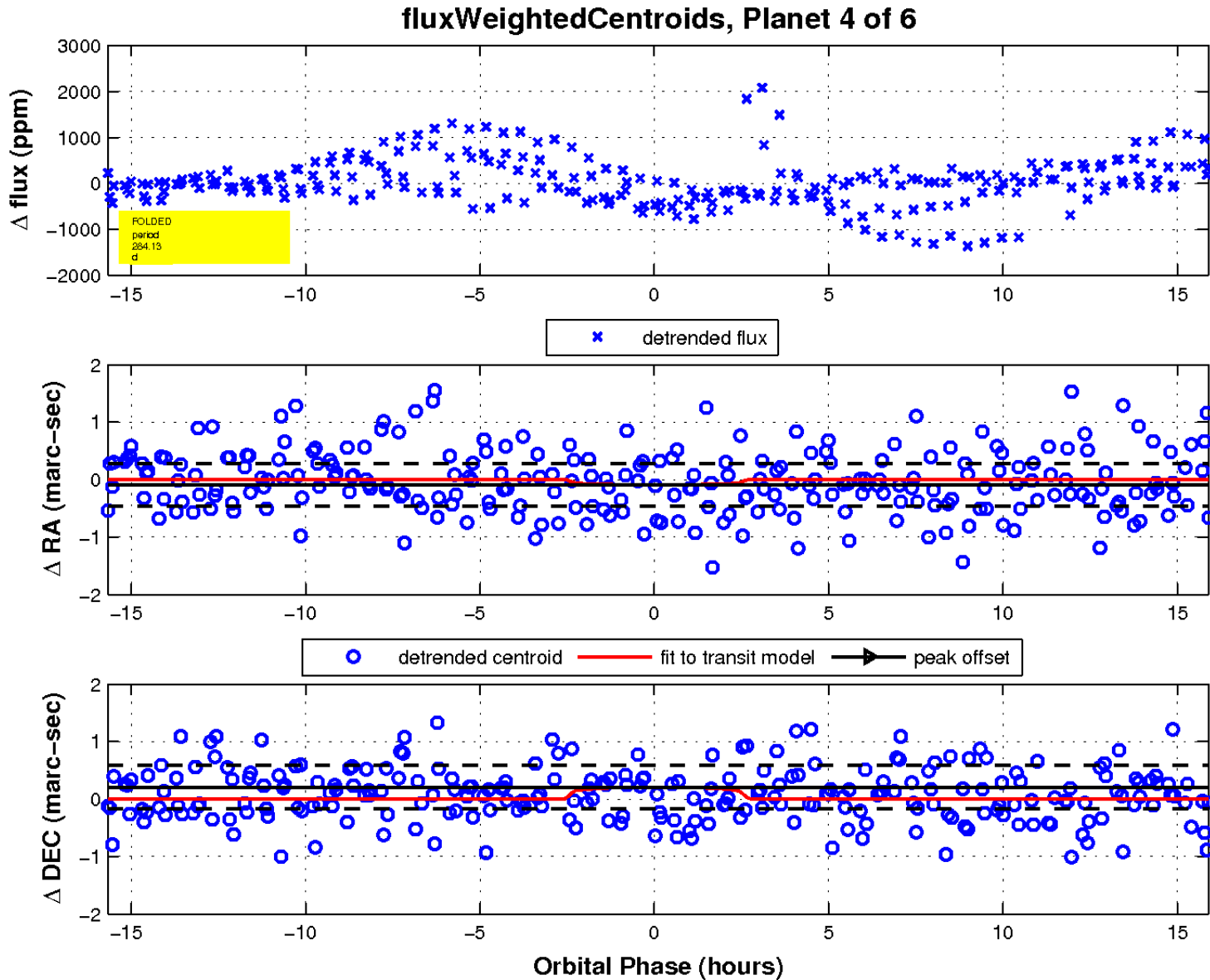
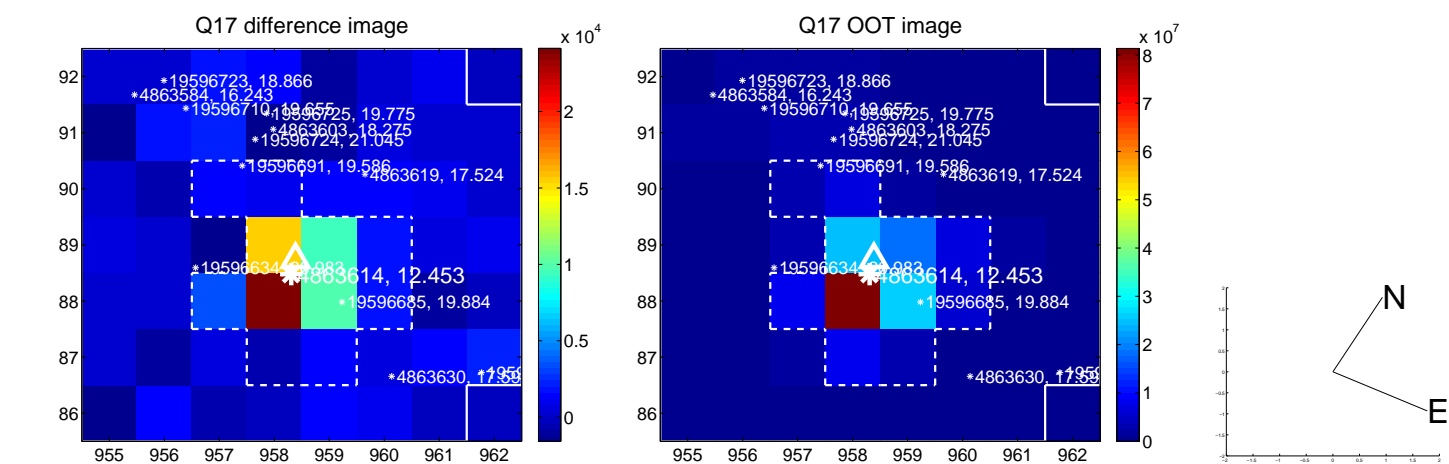
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



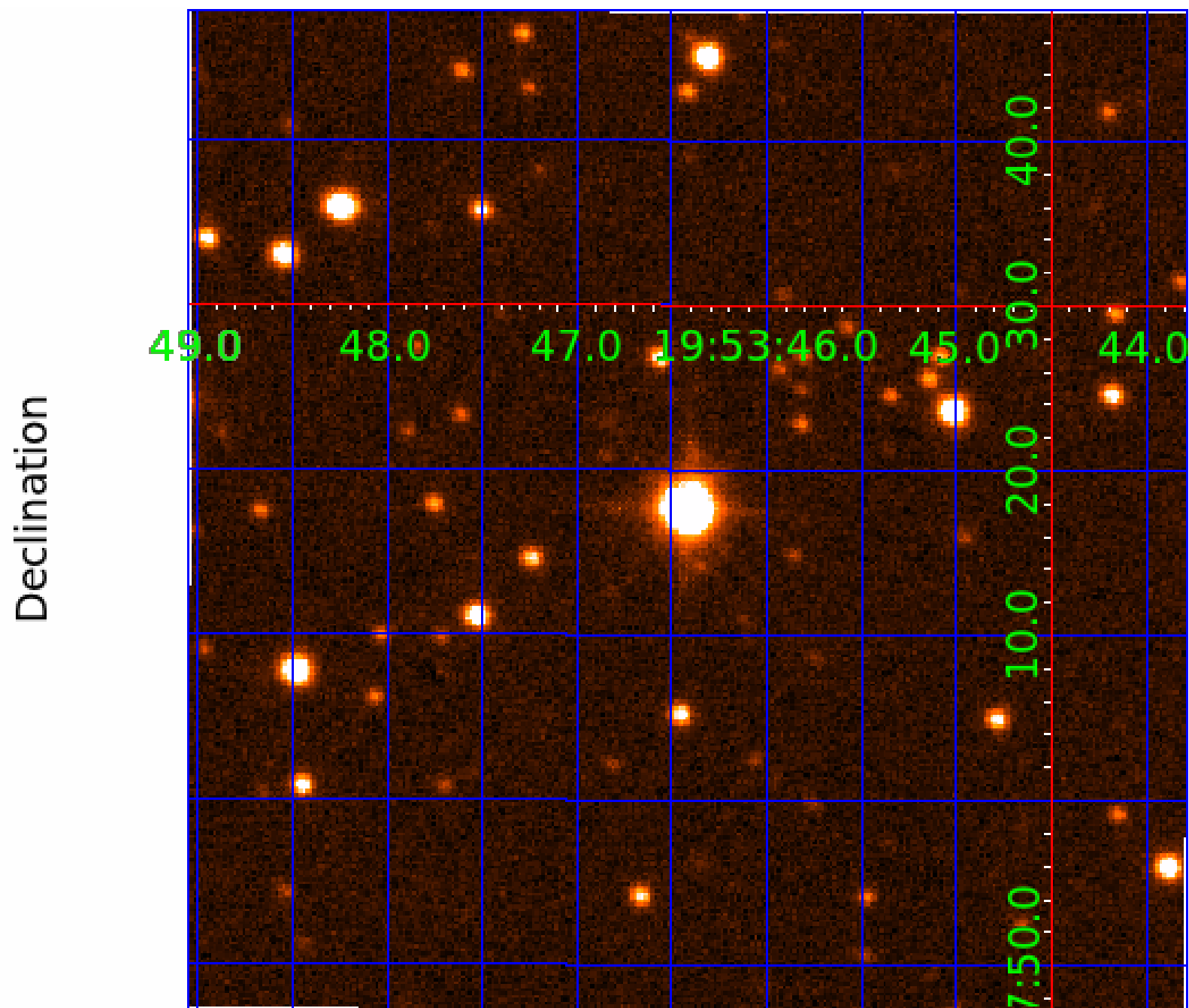
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image



# KIC 004863614

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004863614-01	OBS	No	0.703847	131.586036	25.2	1.557	8.8	8.5	1.01	6046	0.56	4715.00
004863614-02	OBS	No	391.380986	148.096874	319.1	6.601	11.7	3.5	1.01	6046	1.91	1.03
004863614-03	OBS	No	373.261860	156.811508	178.0	3.067	10.8	1.8	1.01	6046	1.56	1.10
004863614-04	OBS	No	284.129997	157.131940	684.7	5.311	12.5	6.2	1.01	6046	2.85	1.58
004863614-05	OBS	No	0.703868	132.049544	34.9	1.809	7.9	10.9	1.01	6046	0.70	4714.82
004863614-06	OBS	No	151.197753	143.473671	554.2	9.456	10.3	4.9	1.01	6046	2.51	3.67

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004863614-01	OBS	FP	0.00	1	0	1	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—CENT_RESOLVED_OFFSET
004863614-02	OBS	FP	0.00	1	0	0	0	LPP_ALT—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004863614-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL_SKYE_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004863614-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV
004863614-05	OBS	FP	0.00	1	0	1	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_RESOLVED_OFFSET—HALO_GHOST
004863614-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

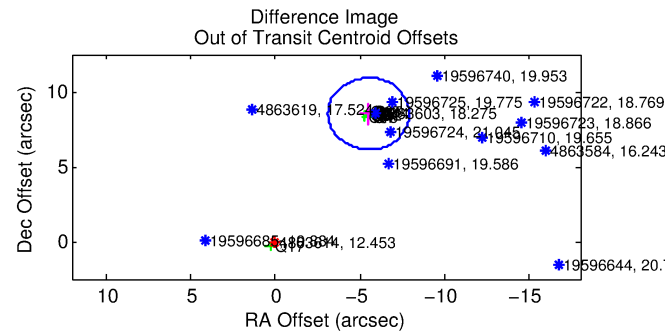
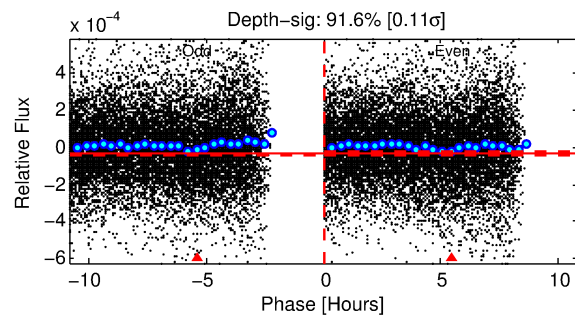
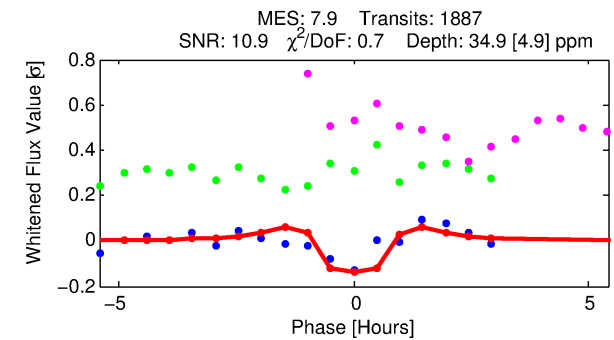
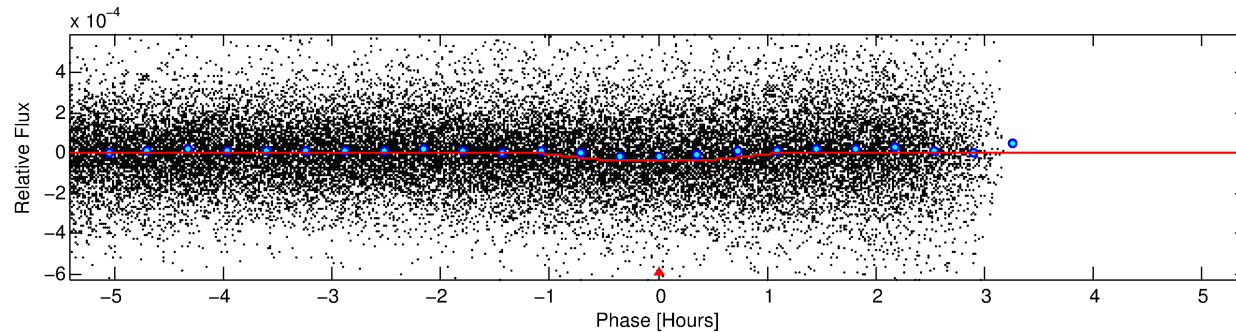
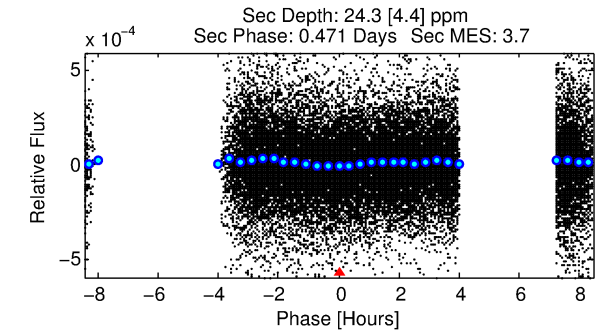
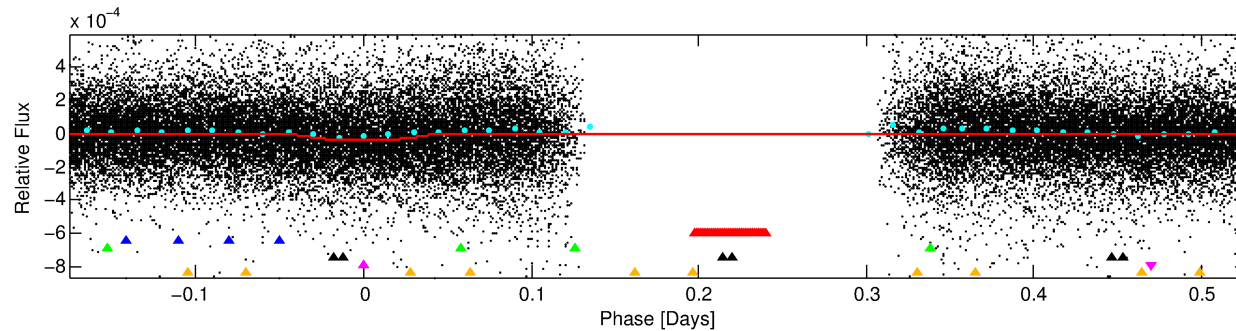
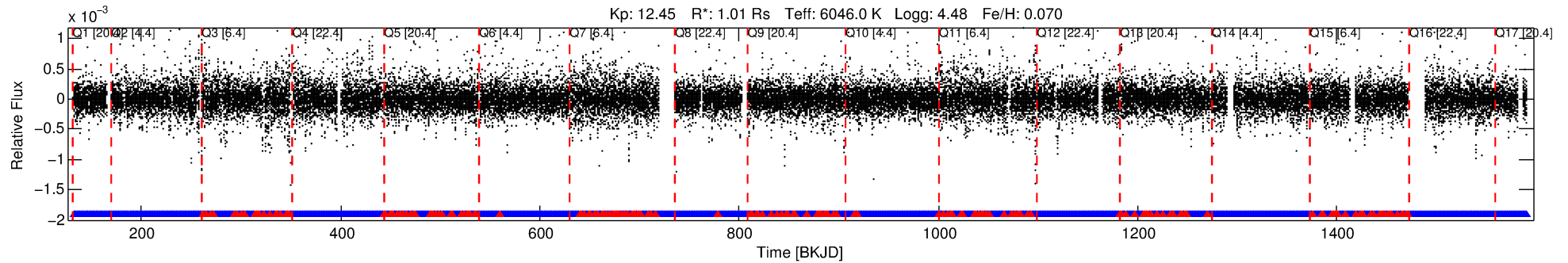
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004863614-05

No Significant Match Found

# DV One-Page Summary

KIC: 4863614 Candidate: 5 of 6 Period: 0.704 d



## DV Fit Results:

Period = 0.70387 [0.00001] d  
Epoch = 132.0495 [0.0015] BKJD  
Rp/R\* = 0.0064 [0.0022]  
a/R\* = 1.63 [1.73]  
b = 0.90 [0.36]  
Seff = 4714.82 [1666.45]  
Teq = 2113 [187] K  
Rp = 0.71 [0.30] Re  
a = 0.0160 [0.0036] AU  
Ag = 6.92 [5.33] [1.11σ]  
Teffp = 5298 [940] K [3.32σ]

## DV Diagnostic Results:

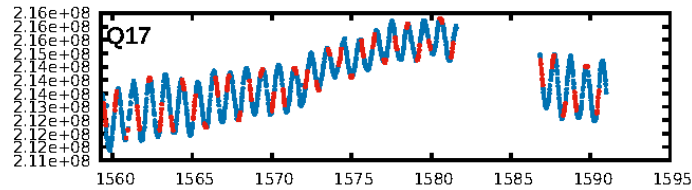
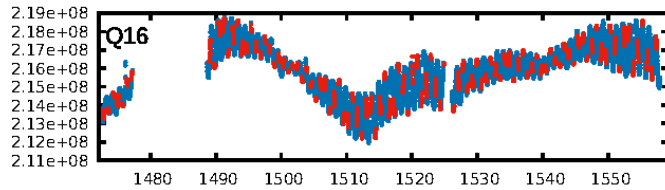
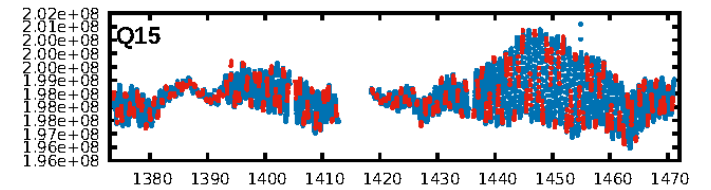
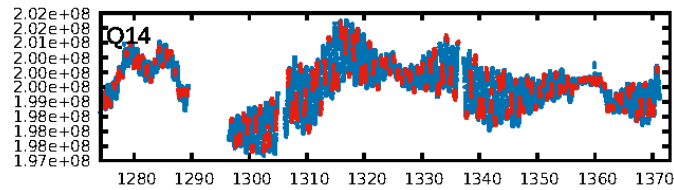
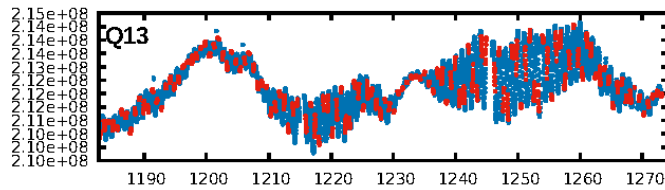
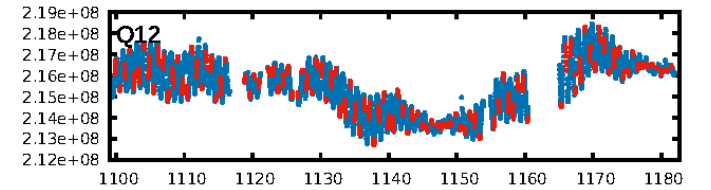
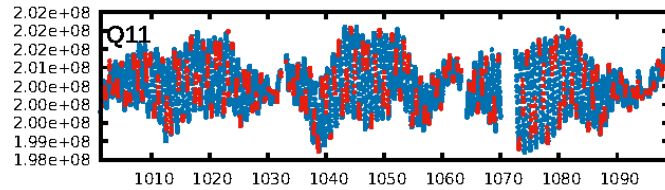
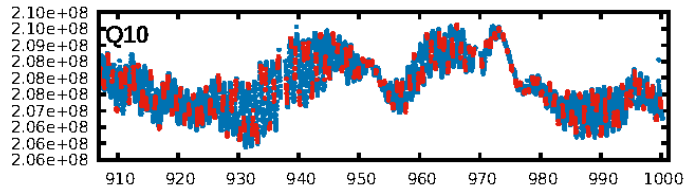
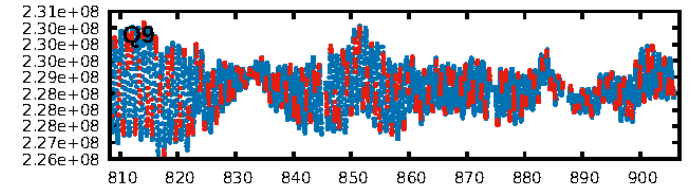
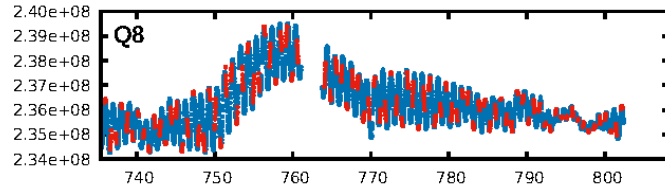
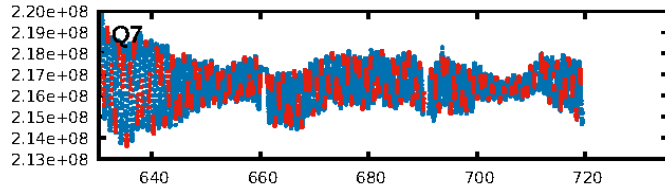
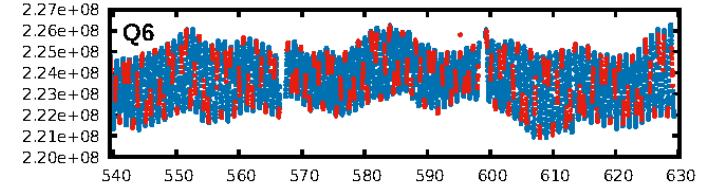
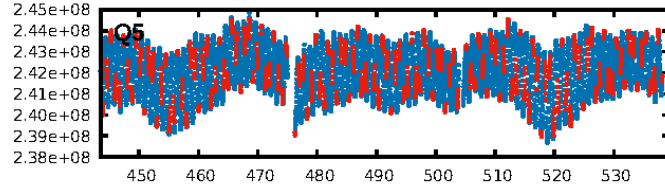
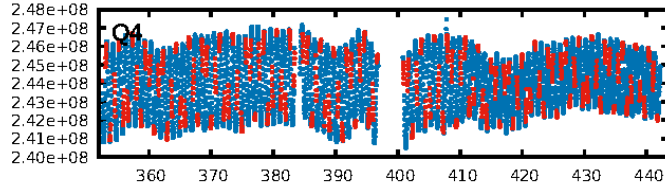
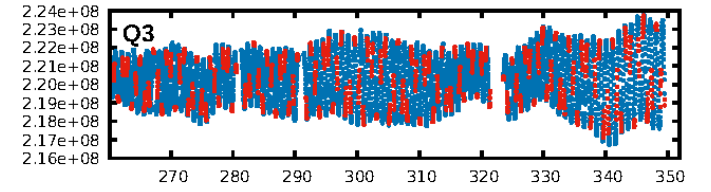
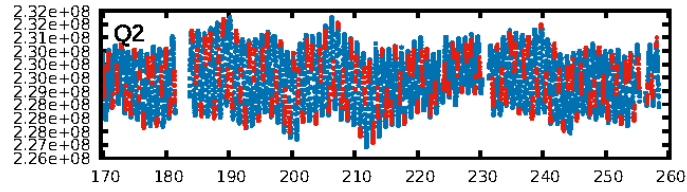
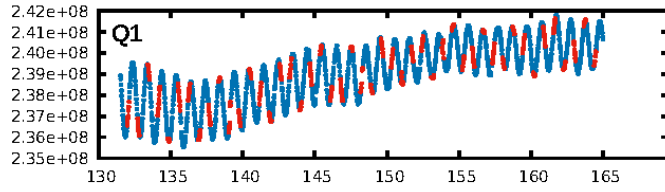
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LongPeriod-sig: 100.0% [375.17σ]  
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ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 0.90 [1618/1807]  
GhostDiagnostic-chr: 0.1879  
Centroid-sig: 94.3%  
Centroid-so: 0.108 arcsec [0.18σ]  
OotOffset-rm: 10.152 arcsec [12.72σ]  
KicOffset-rm: 10.134 arcsec [13.00σ]  
OotOffset-st: 4/1/3/5 [13]  
KicOffset-st: 4/1/3/5 [13]  
DiffImageQuality-fgm: 1.00 [13/13]  
DiffImageOverlap-fno: 0.00 [0/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 17:13:20 Z

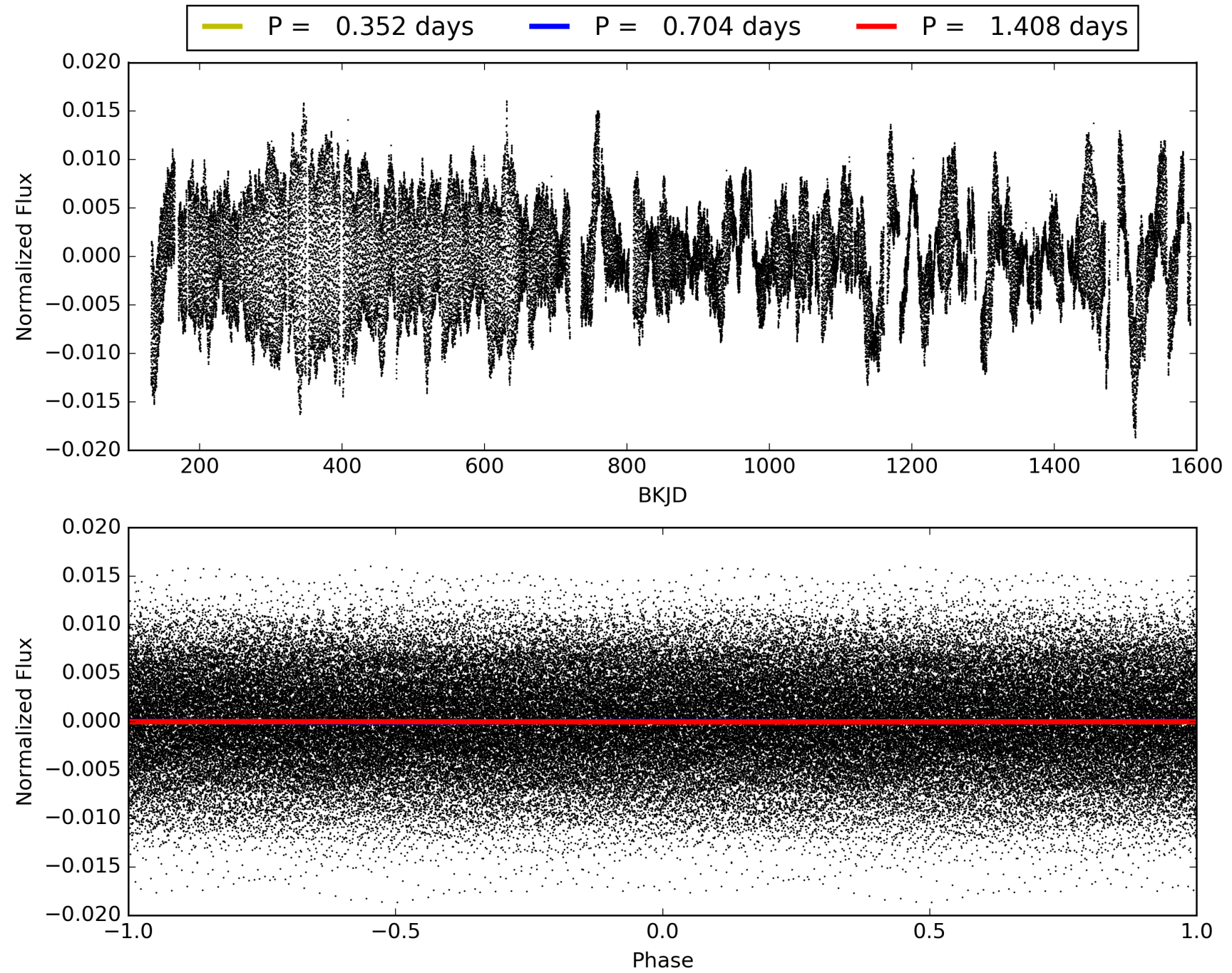
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 004863614-05, PDC Light Curves

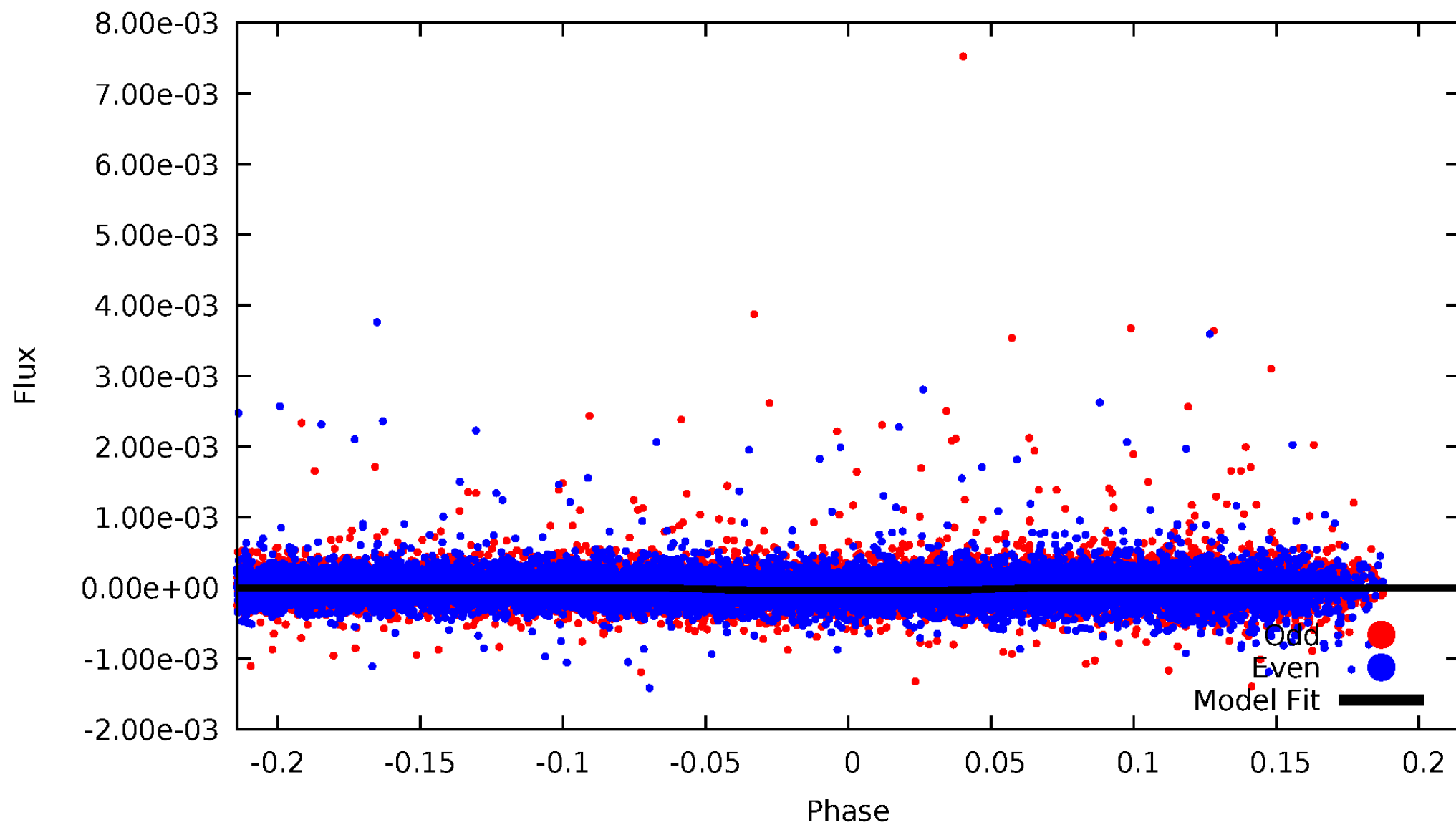


TCE 004863614-05



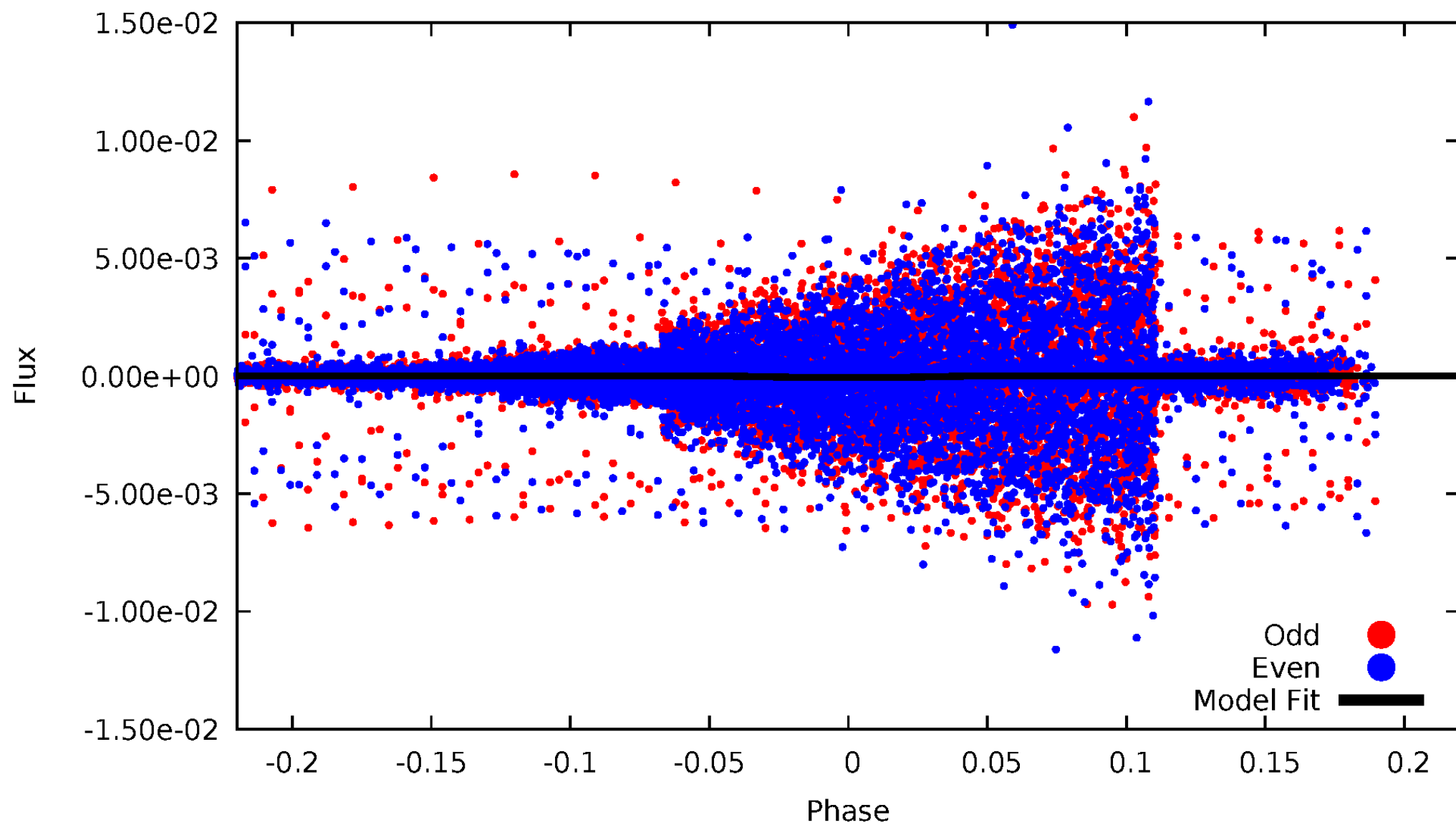
# DV Odd/Even

TCE 004863614-05



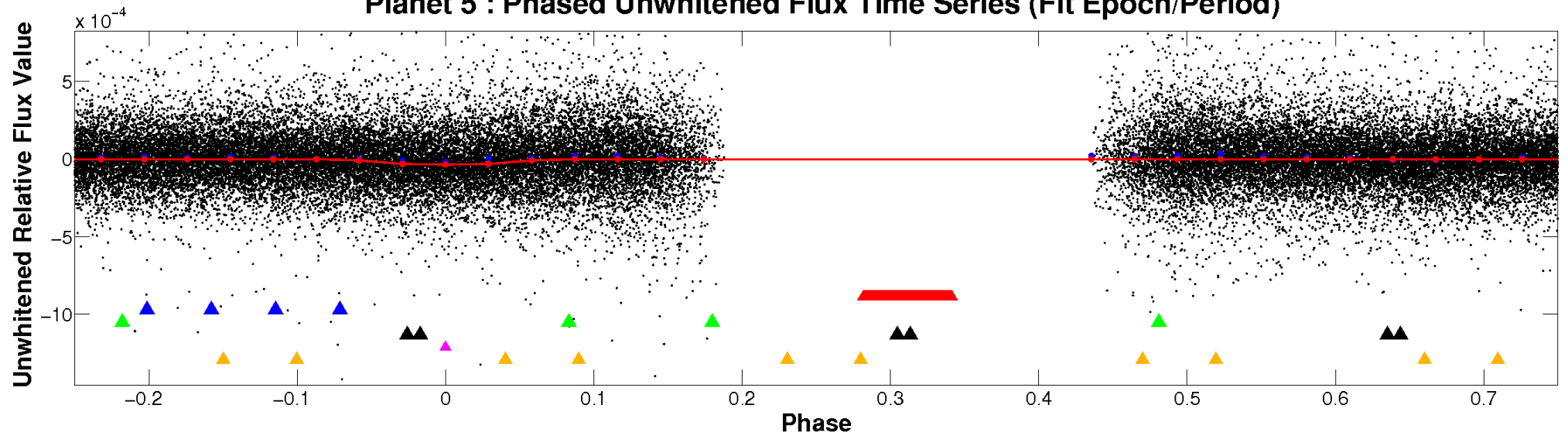
# ALT Odd/Even

TCE 004863614-05

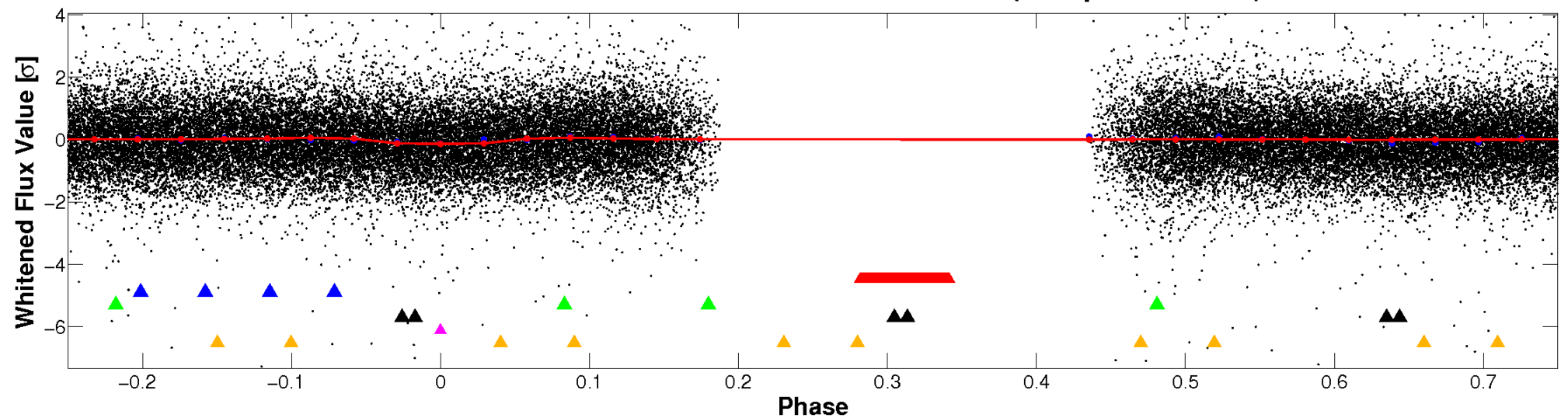


# Non-Whitened Vs. Whitened Light Curve

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



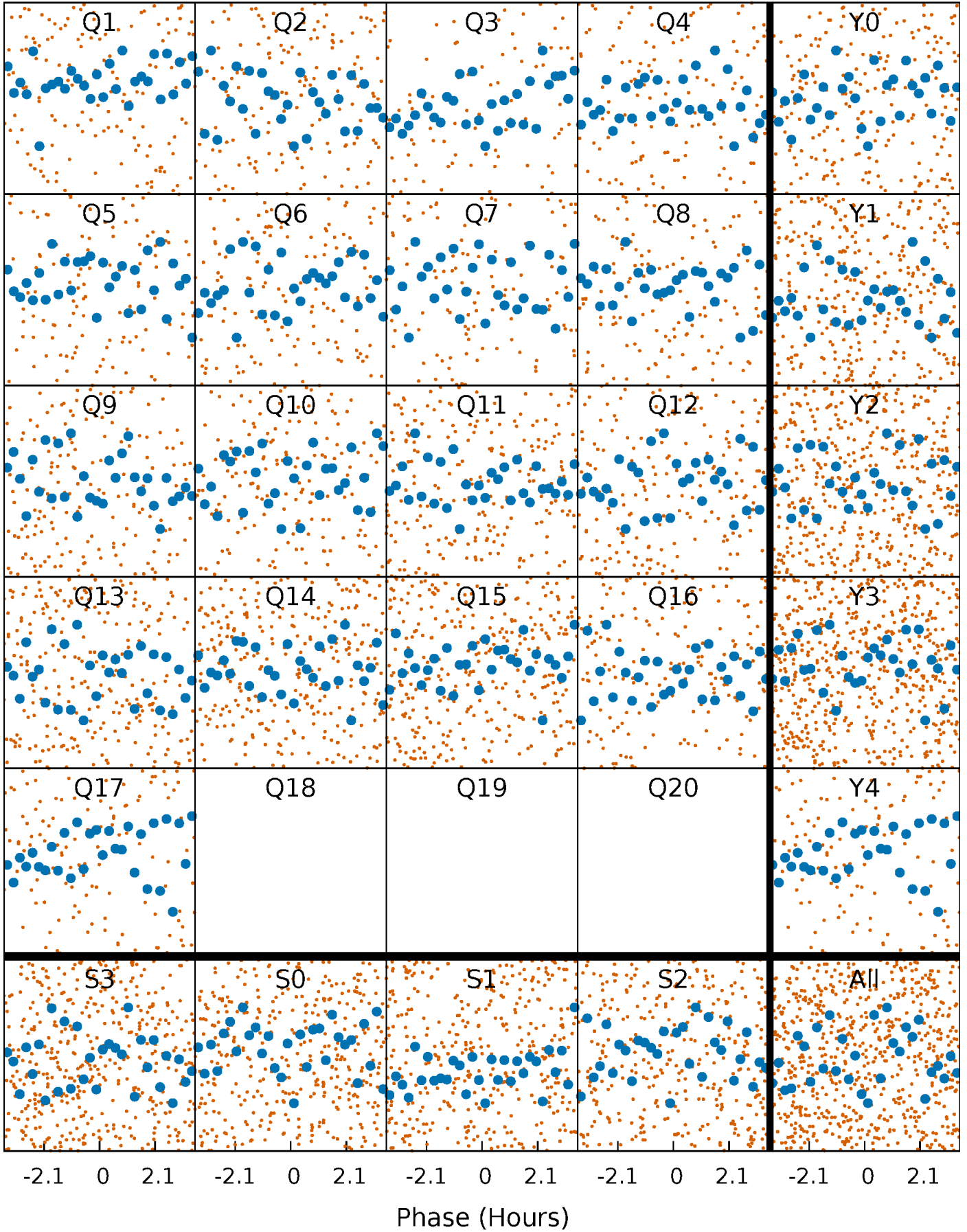
## Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)





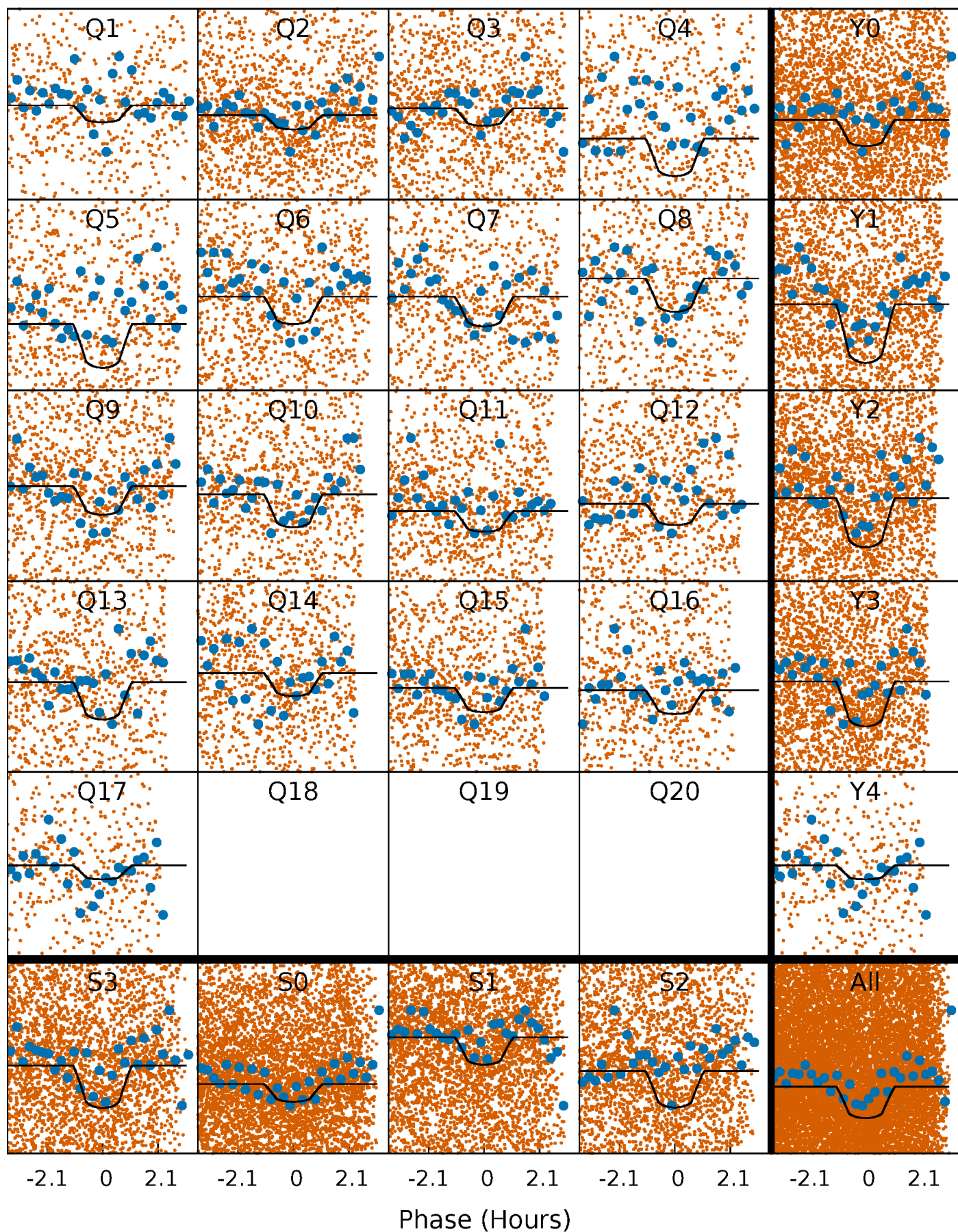
# PDC Quarter-Phased Transit Curves

TCE 004863614-05   P= 0.703868 Days    $T_0=132.049544$  (BKJD)



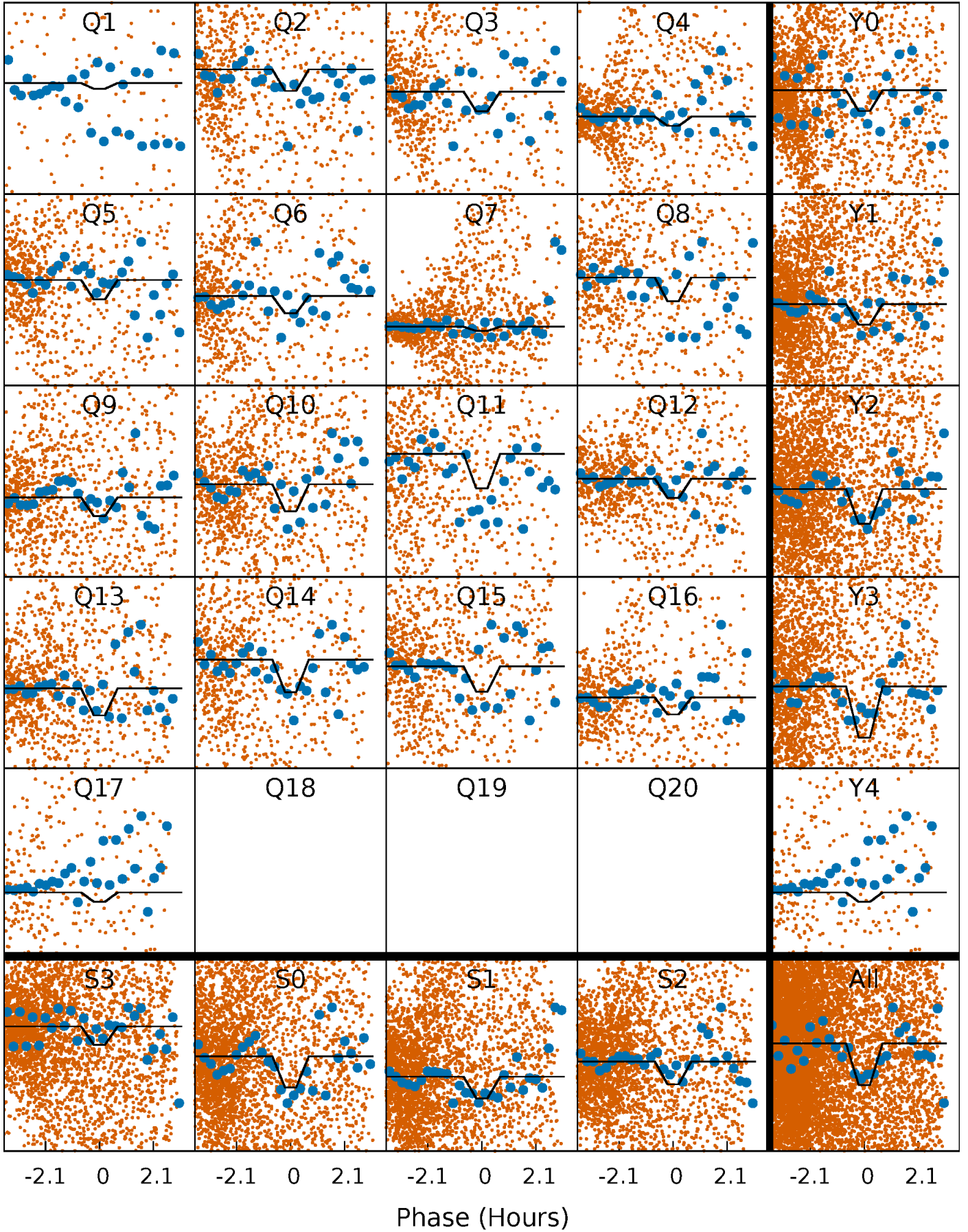
# DV Quarter-Phased Transit Curves

TCE 004863614-05   P= 0.703868 Days    $T_0=132.049544$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 004863614-05   P= 0.703857 Days    $T_0=132.048444$  (BKJD)

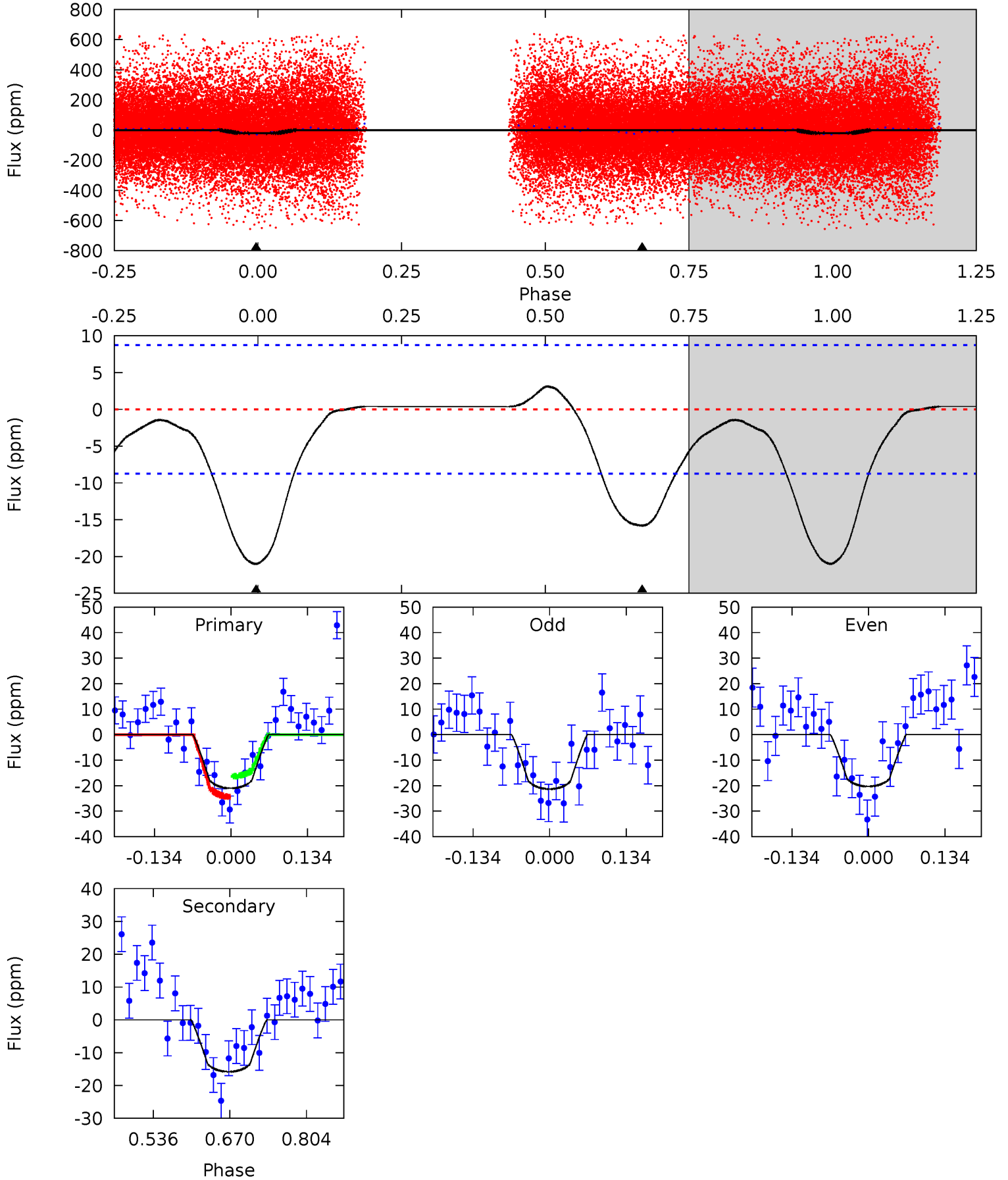




# DV Model-Shift Uniqueness Test

004863614-05, P = 0.703868 Days, E = 131.345676 Days

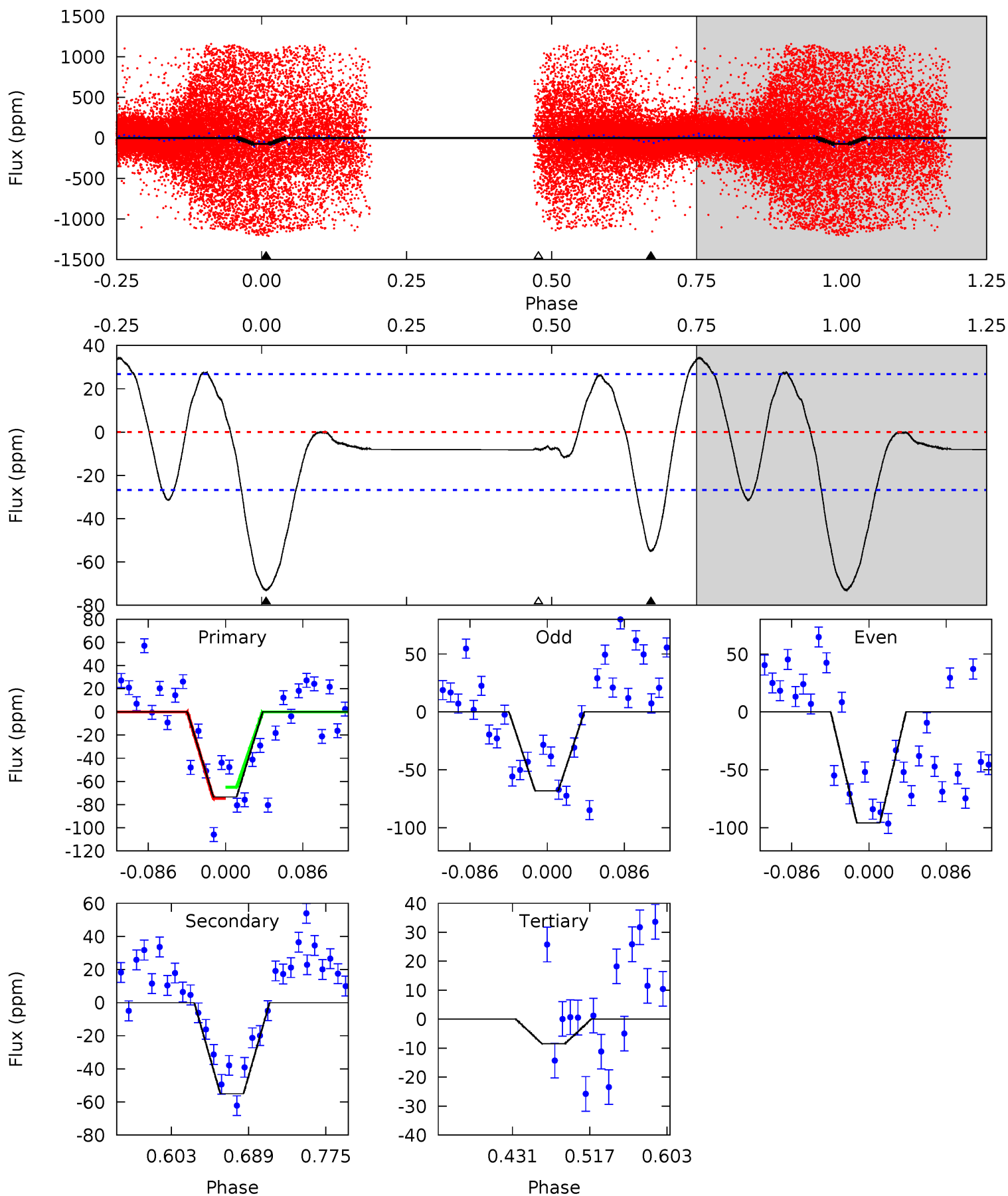
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.8	8.15	0	0	4.50	1.50	0.98	10.8	10.8	8.15	8.15	0.27	0.47	0.13	2.02



# Alt Model-Shift Uniqueness Test

004863614-05, P = 0.703857 Days, E = 131.344587 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.6	9.44	1.45	0	4.60	1.72	3.20	11.2	12.6	7.99	9.44	2.39	1.23	0.32	0



### Stellar Parameters For KIC 004863614

	$T_{\text{eff}} (K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6046^{+163}_{-199}$	$4.478^{+0.048}_{-0.180}$	$0.070^{+0.250}_{-0.350}$	$1.007^{+0.267}_{-0.114}$	$1.111^{+0.120}_{-0.160}$	$1.532^{+0.377}_{-0.742}$
	+3%/-3%	+1%/-4%	+357%/-500%	+27%/-11%	+11%/-14%	+25%/-48%
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 004863614-05 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-16 \pm 2$	$0.73^{+0.27}_{-0.25}$	$3016^{+202}_{-138}$	$4785^{+1094}_{-550}$	$4.049^{+5.280}_{-1.827}$
Alt.	$-55 \pm 6$	$0.99^{+0.28}_{-0.26}$	$3009^{+179}_{-139}$	$5537^{+932}_{-593}$	$7.775^{+6.536}_{-3.106}$

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

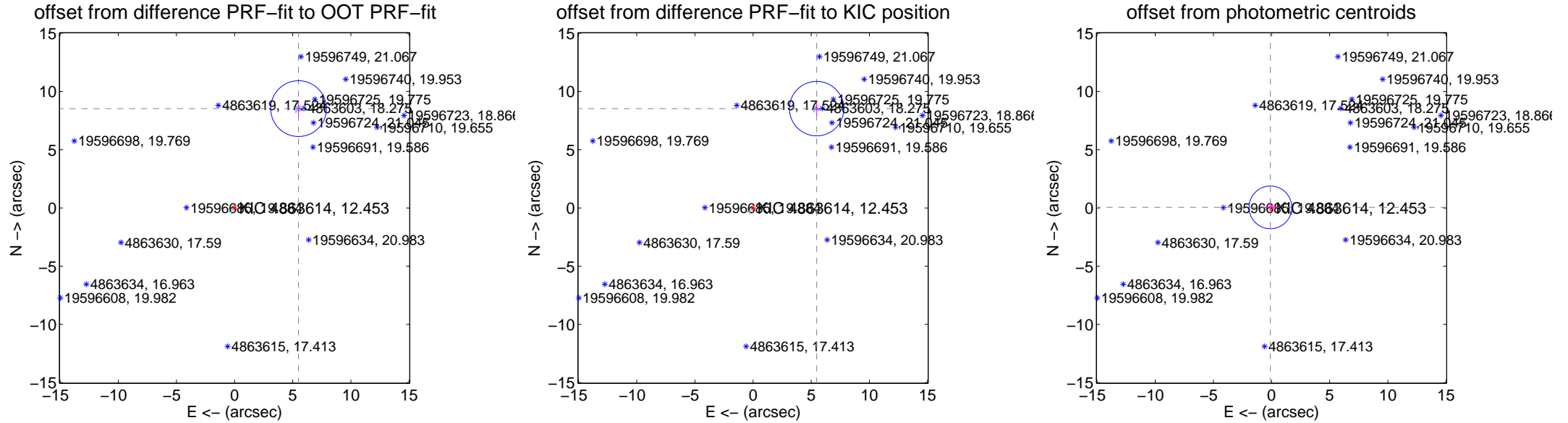
## DV Centroid Data

Supplemental centroid analysis for 004863614-05. Kepler magnitude: 12.45. Transit SNR 10.90

There are 13 quarters with good PRF difference image offsets

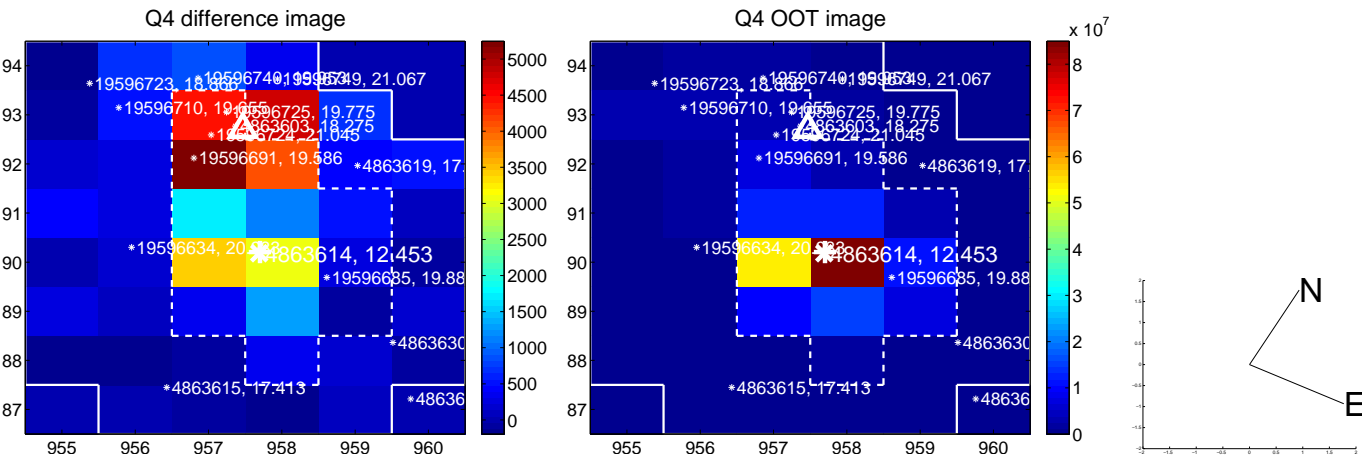
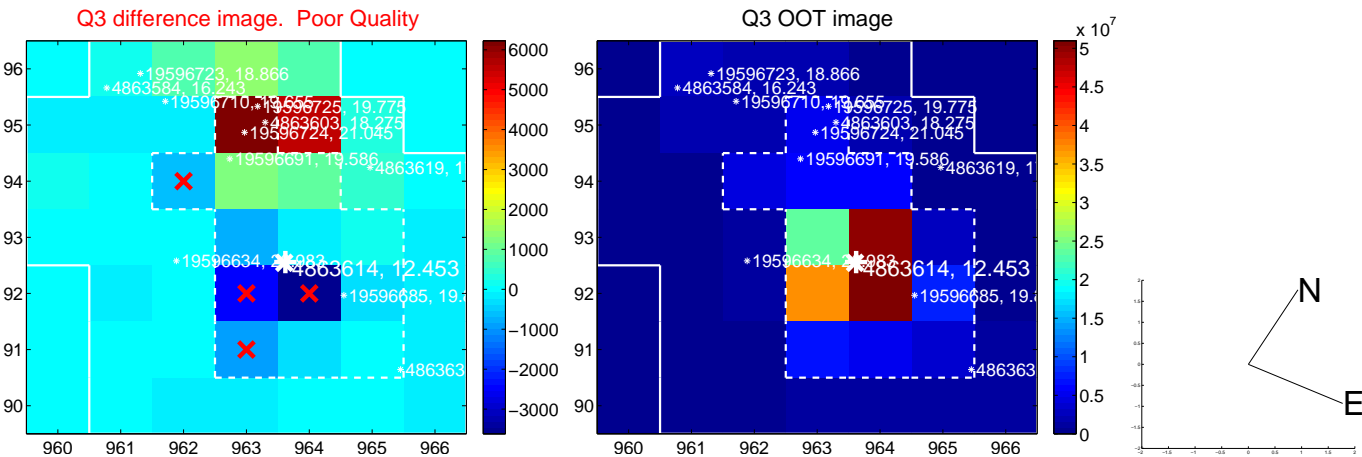
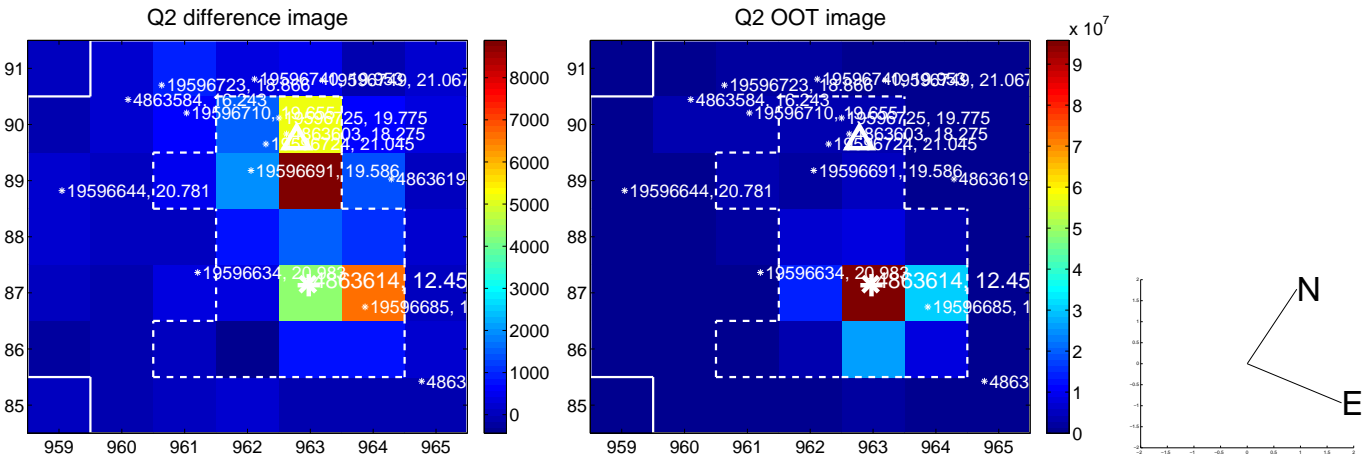
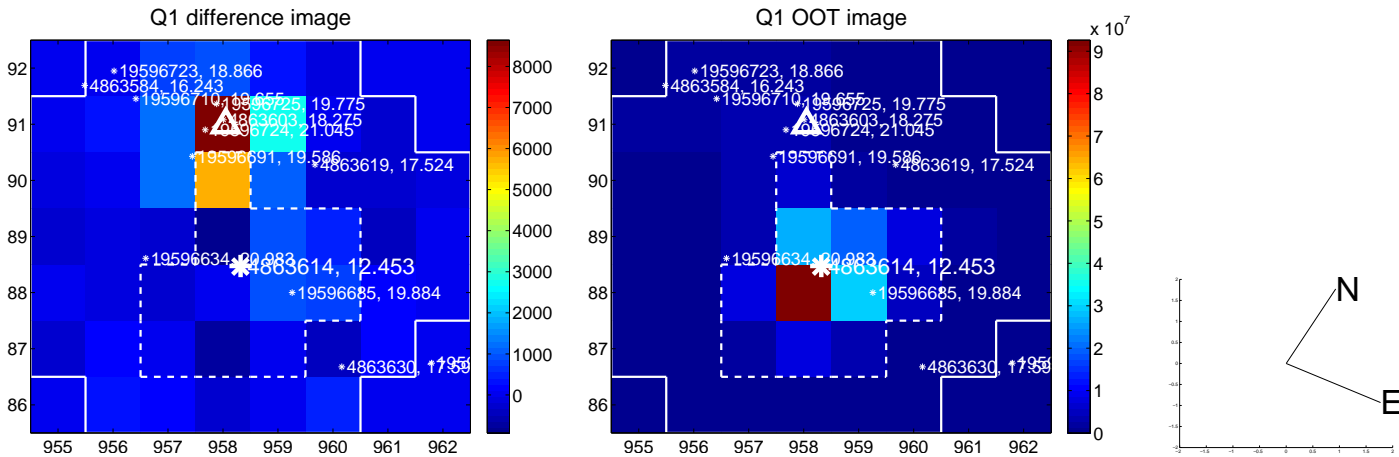
The direct PRF centroid is offset from the target star catalog position by about 0.02 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	10.152 $\pm$ 0.798	12.72	-5.500 $\pm$ 0.442	8.533 $\pm$ 0.669
PRF-fit source offset from KIC position	10.134 $\pm$ 0.780	13.00	-5.467 $\pm$ 0.427	8.533 $\pm$ 0.656
photometric centroid source offset	0.11 $\pm$ 0.61	0.18	0.10 $\pm$ 0.62	0.05 $\pm$ 0.58

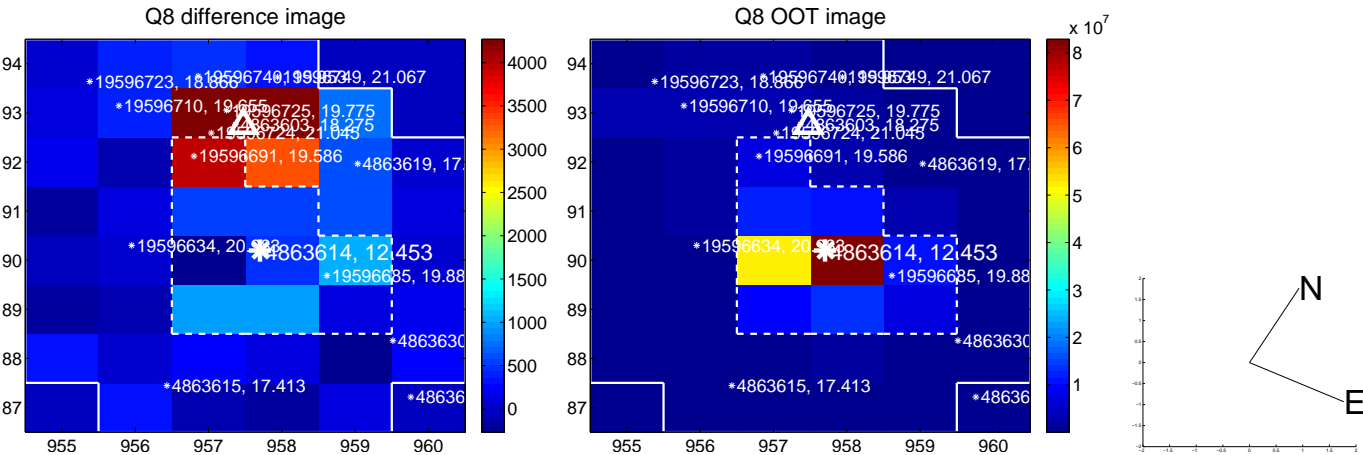
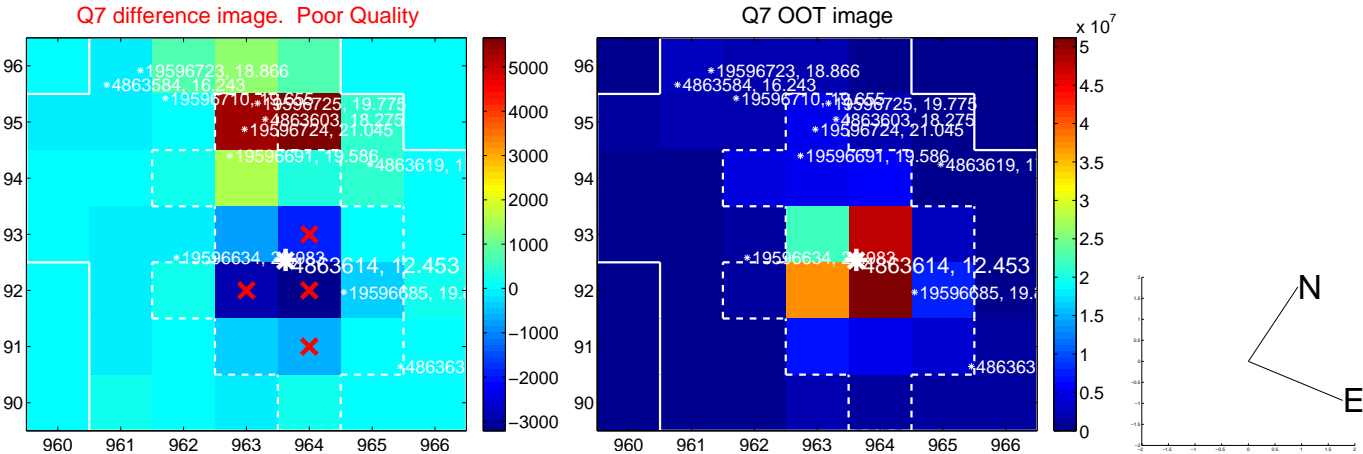
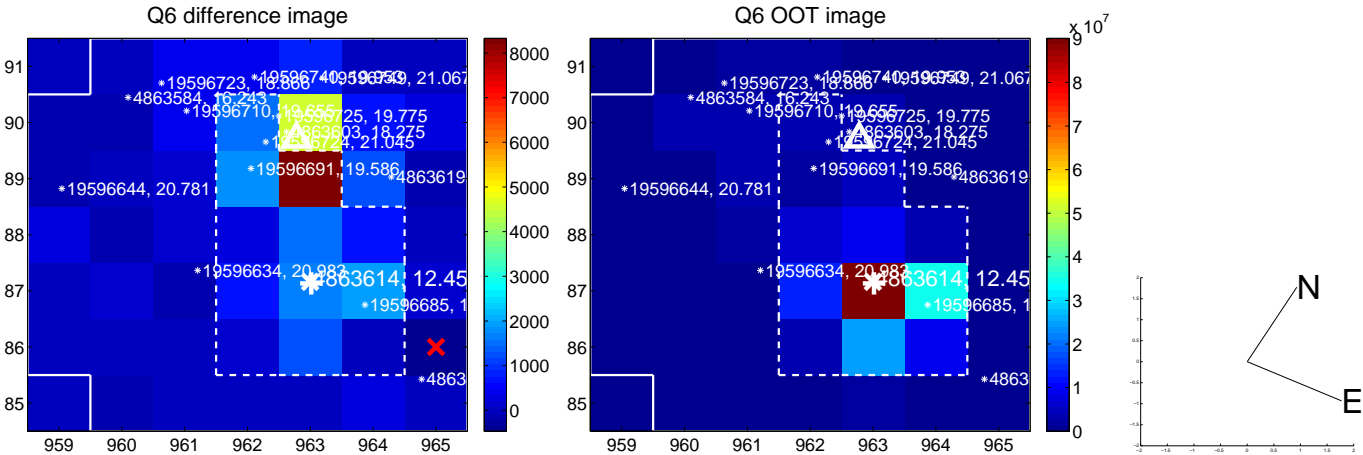
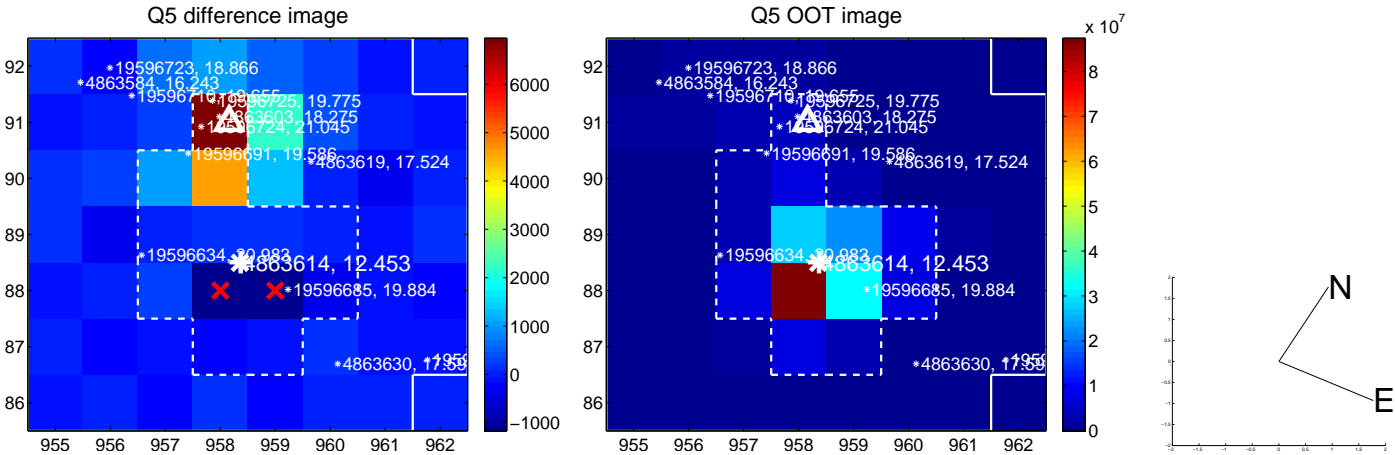


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

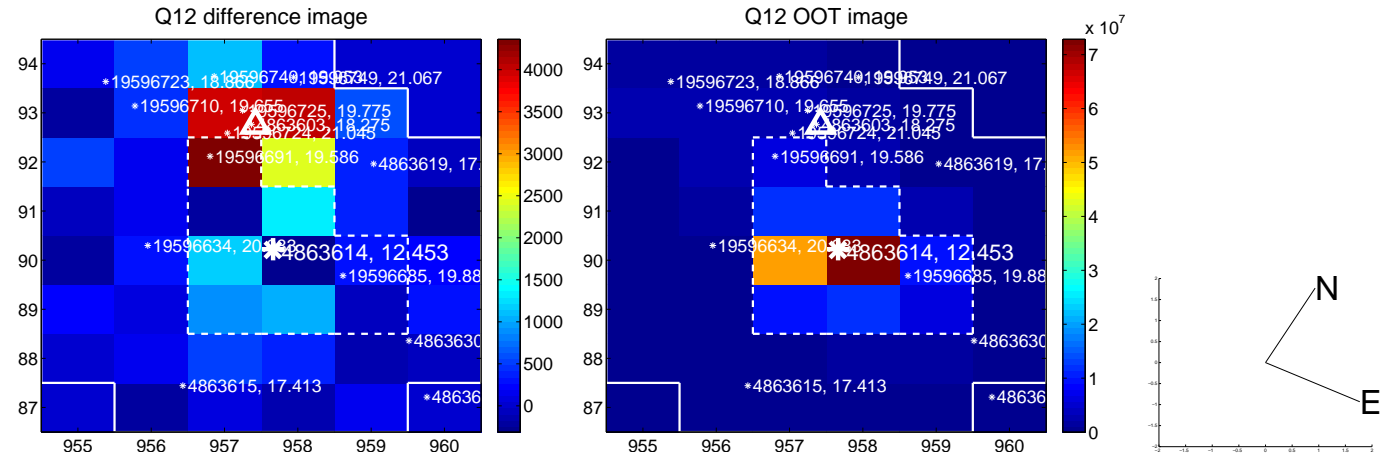
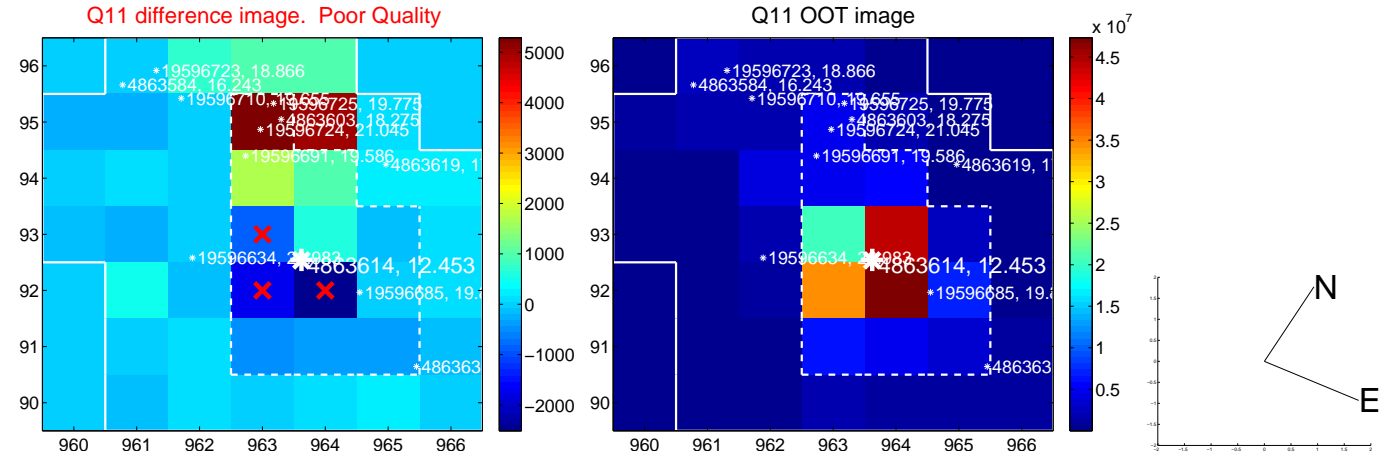
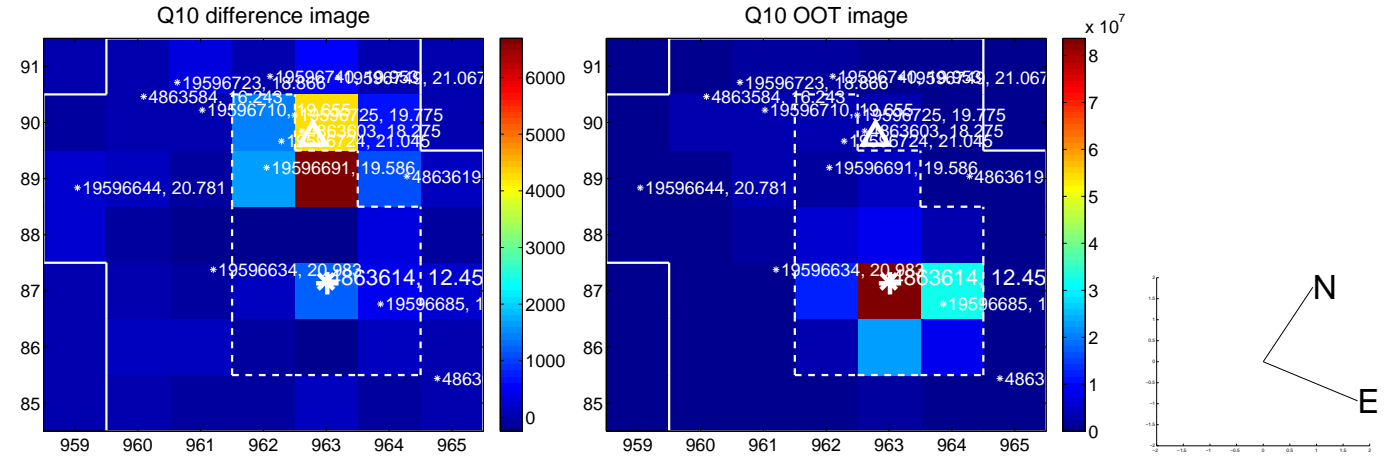
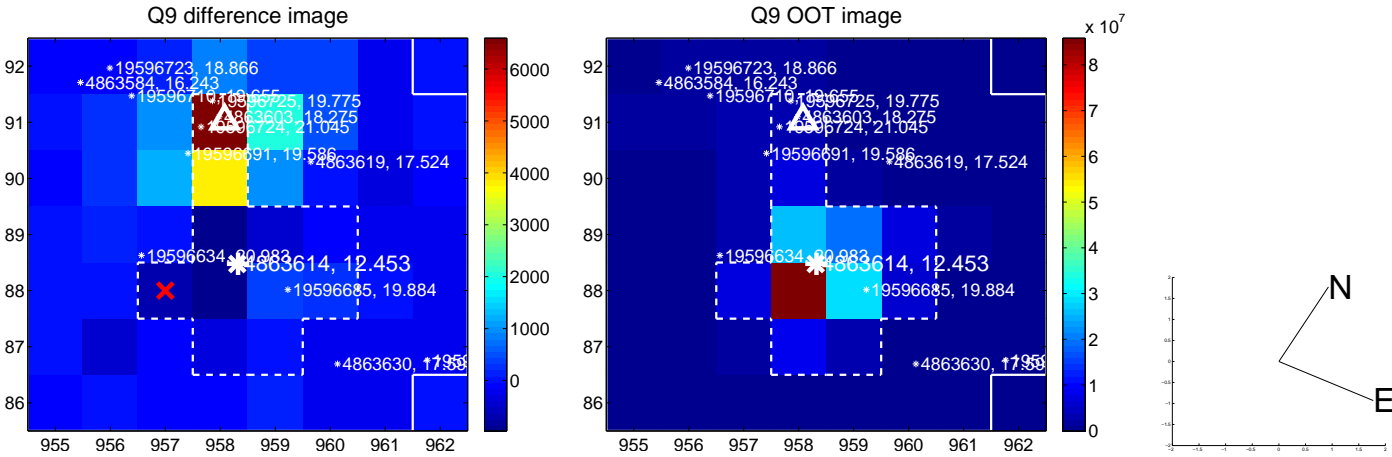
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.



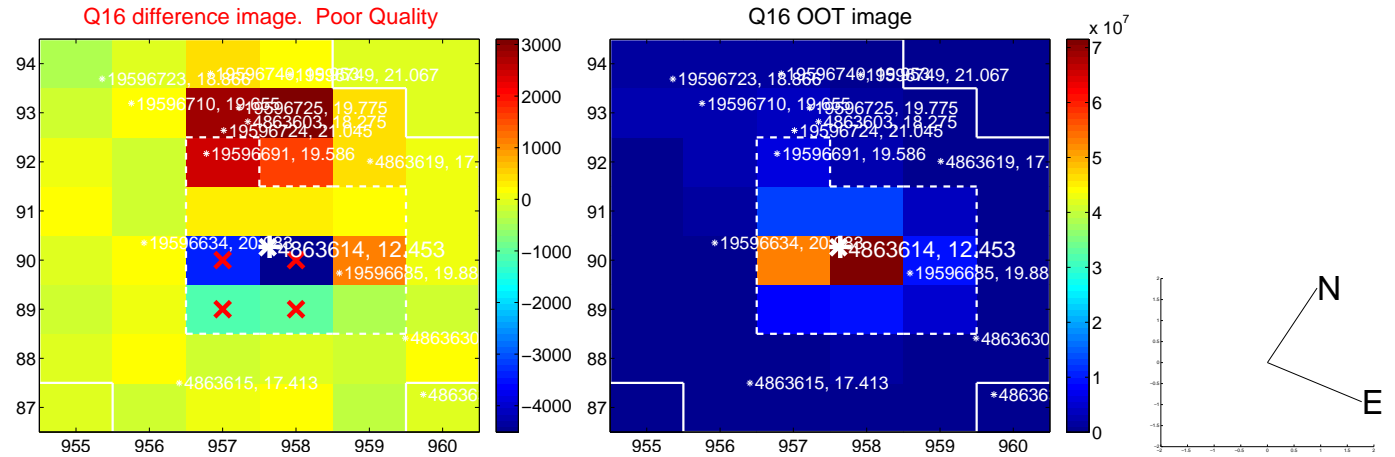
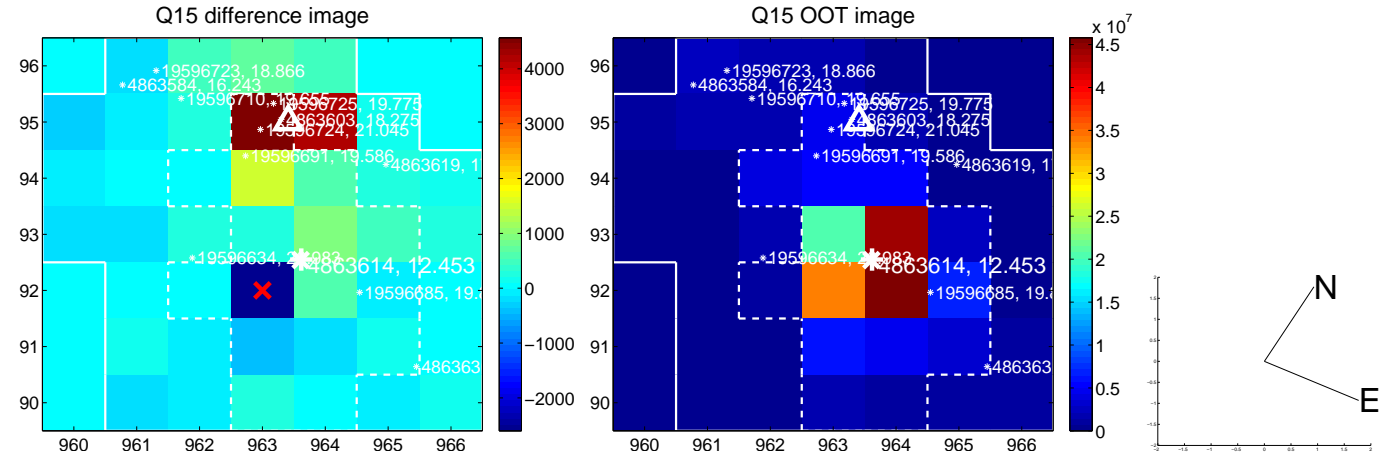
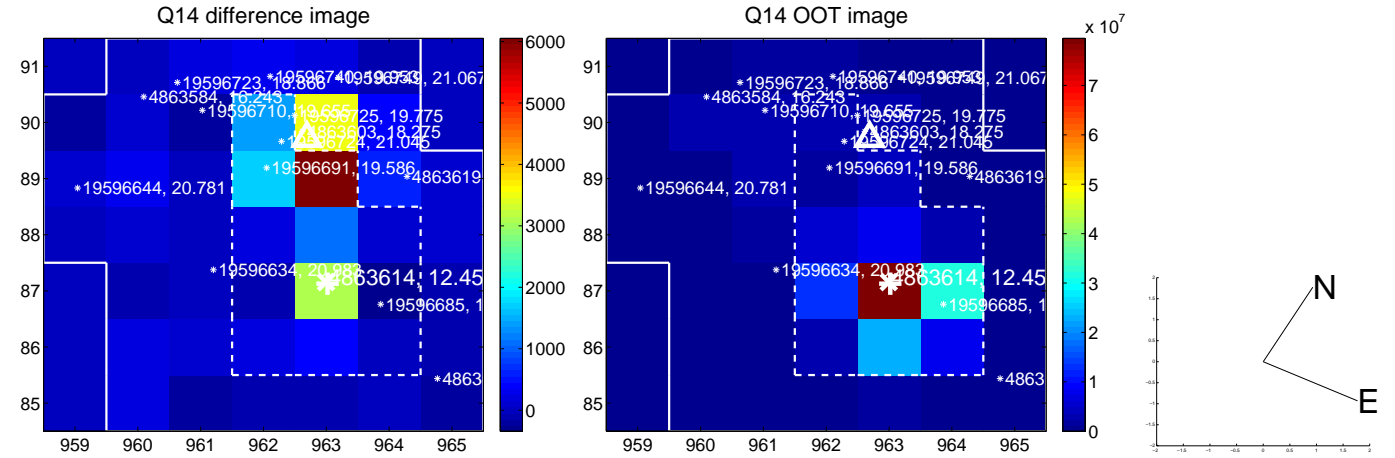
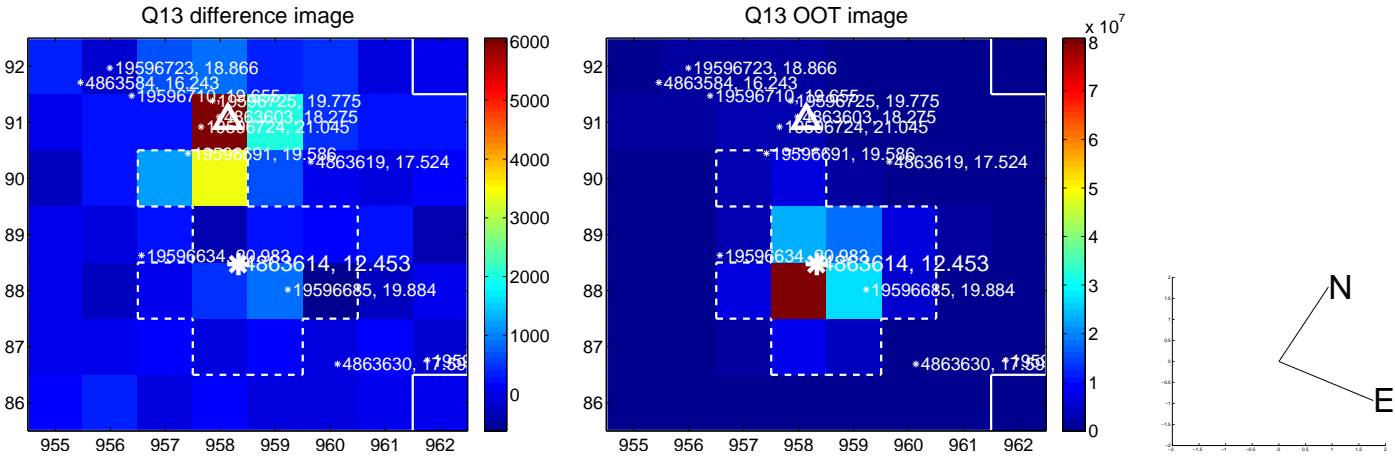
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.



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

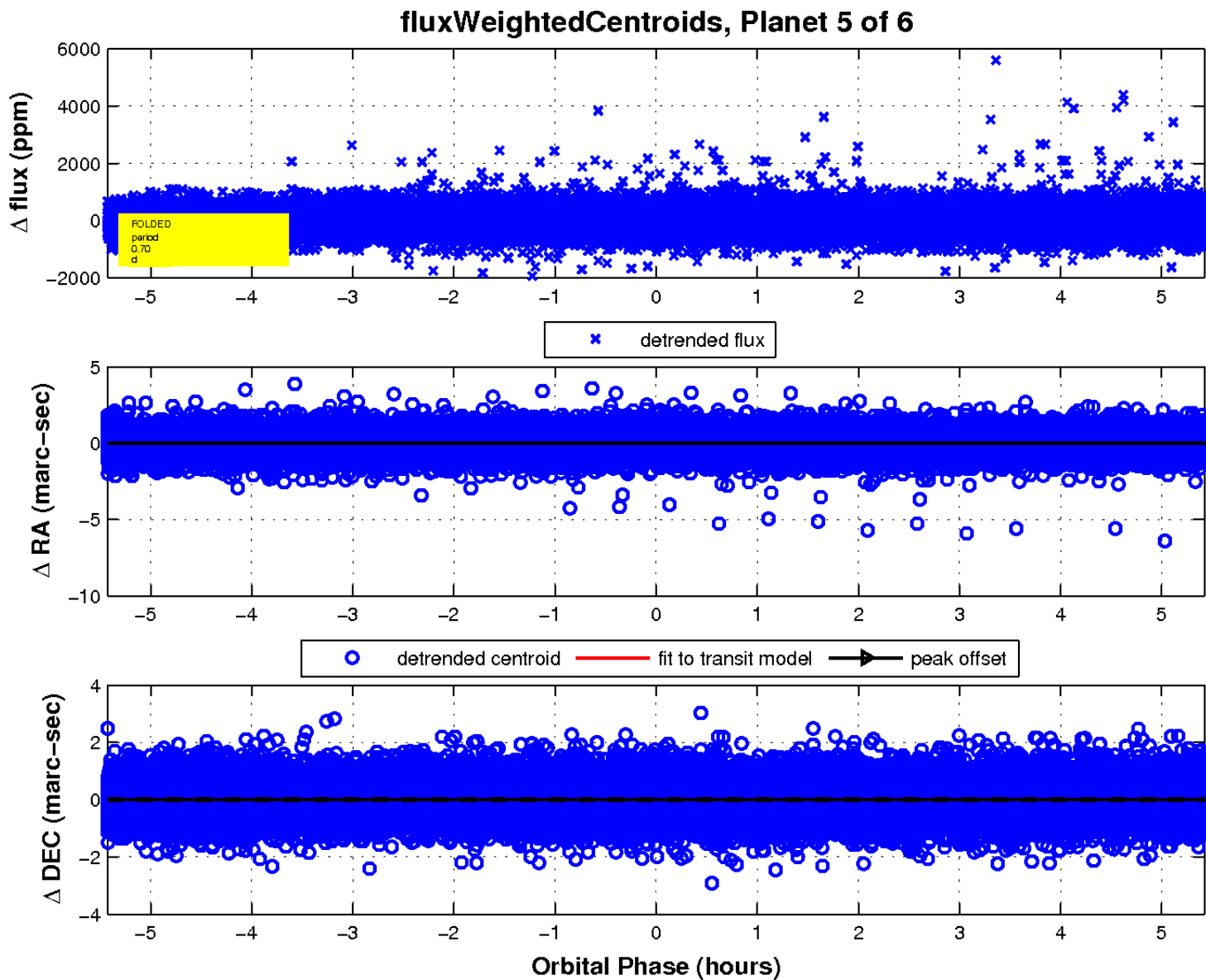
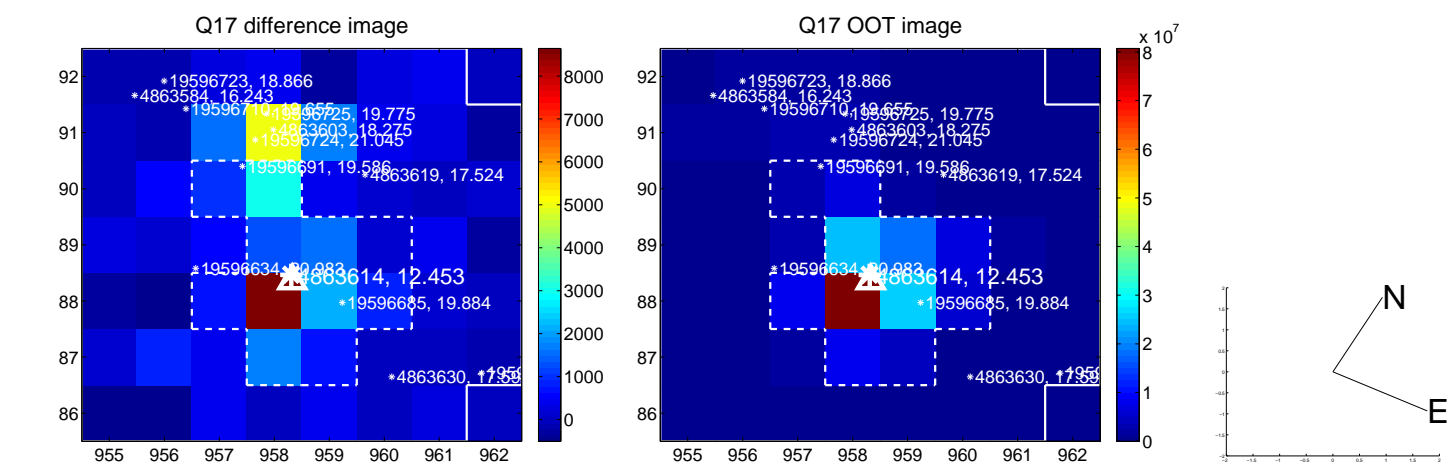


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

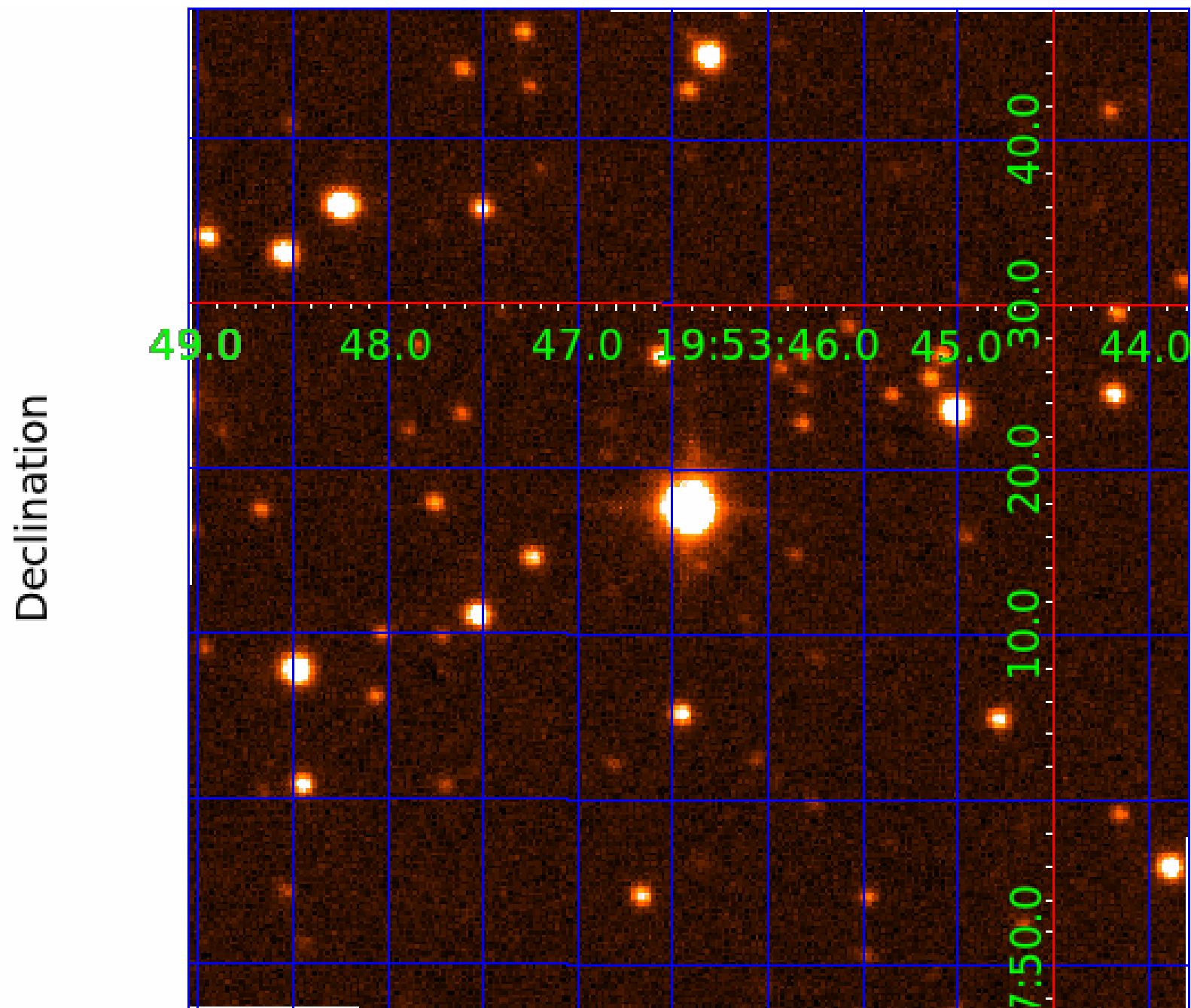




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image



# KIC 004863614

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004863614-01	OBS	No	0.703847	131.586036	25.2	1.557	8.8	8.5	1.01	6046	0.56	4715.00
004863614-02	OBS	No	391.380986	148.096874	319.1	6.601	11.7	3.5	1.01	6046	1.91	1.03
004863614-03	OBS	No	373.261860	156.811508	178.0	3.067	10.8	1.8	1.01	6046	1.56	1.10
004863614-04	OBS	No	284.129997	157.131940	684.7	5.311	12.5	6.2	1.01	6046	2.85	1.58
004863614-05	OBS	No	0.703868	132.049544	34.9	1.809	7.9	10.9	1.01	6046	0.70	4714.82
004863614-06	OBS	No	151.197753	143.473671	554.2	9.456	10.3	4.9	1.01	6046	2.51	3.67

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004863614-01	OBS	FP	0.00	1	0	1	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—CENT_RESOLVED_OFFSET
004863614-02	OBS	FP	0.00	1	0	0	0	LPP_ALT—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004863614-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL_SKYE_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004863614-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV
004863614-05	OBS	FP	0.00	1	0	1	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_RESOLVED_OFFSET—HALO_GHOST
004863614-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

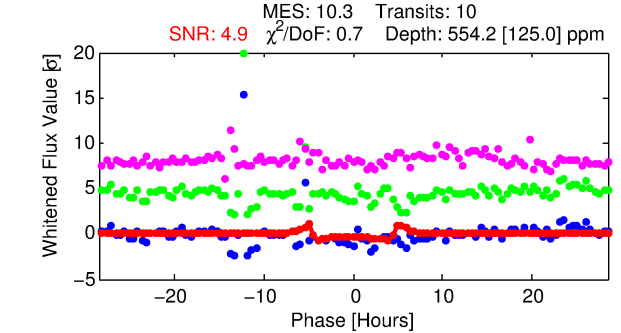
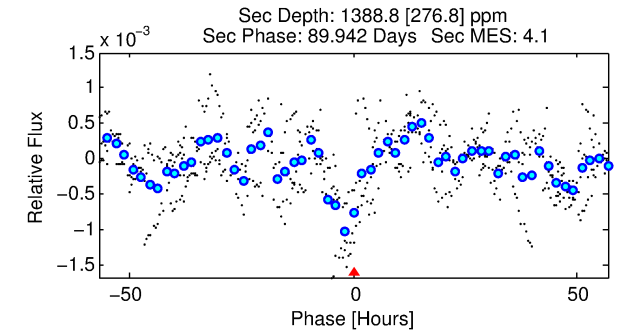
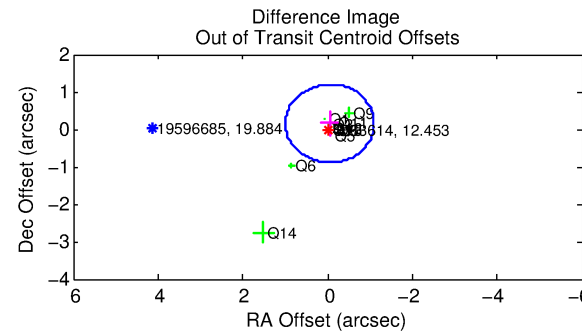
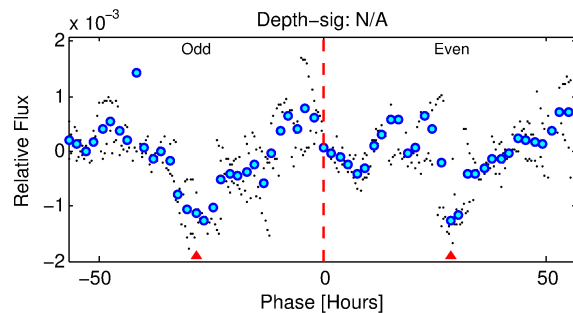
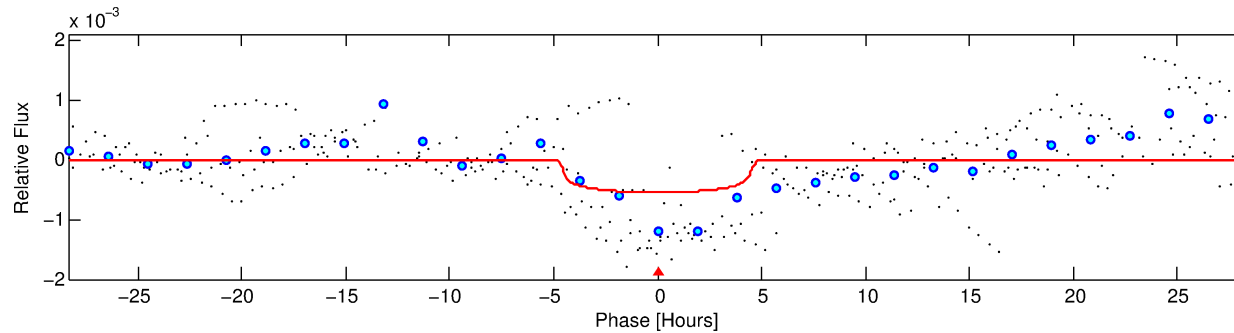
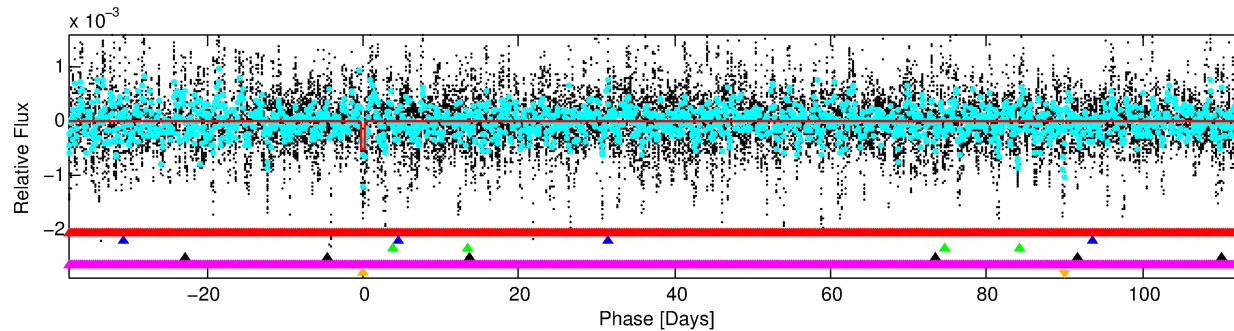
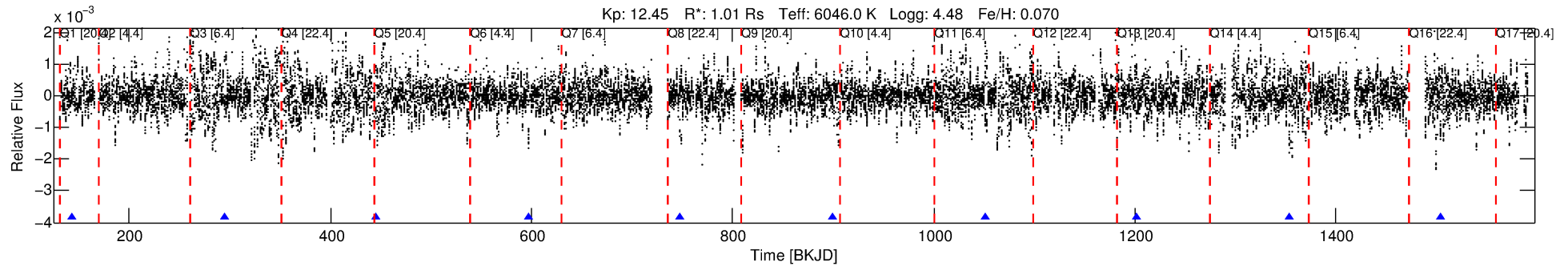
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004863614-06

No Significant Match Found

# DV One-Page Summary

KIC: 4863614 Candidate: 6 of 6 Period: 151.198 d



## DV Fit Results:

Period = 151.19775 [0.00183] d  
Epoch = 143.4737 [0.0108] BKJD  
Rp/R\* = 0.0228 [0.0071]  
a/R\* = 95.05 [118.81]  
b = 0.66 [1.06]  
Seff = 3.66 [1.30]  
Teq = 353 [31] K  
Rp = 2.51 [1.03] Re  
a = 0.5755 [0.1291] AU  
Ag = 40248.70 [29510.98] [1.36σ]  
Teff = 7726 [1292] K [5.71σ]

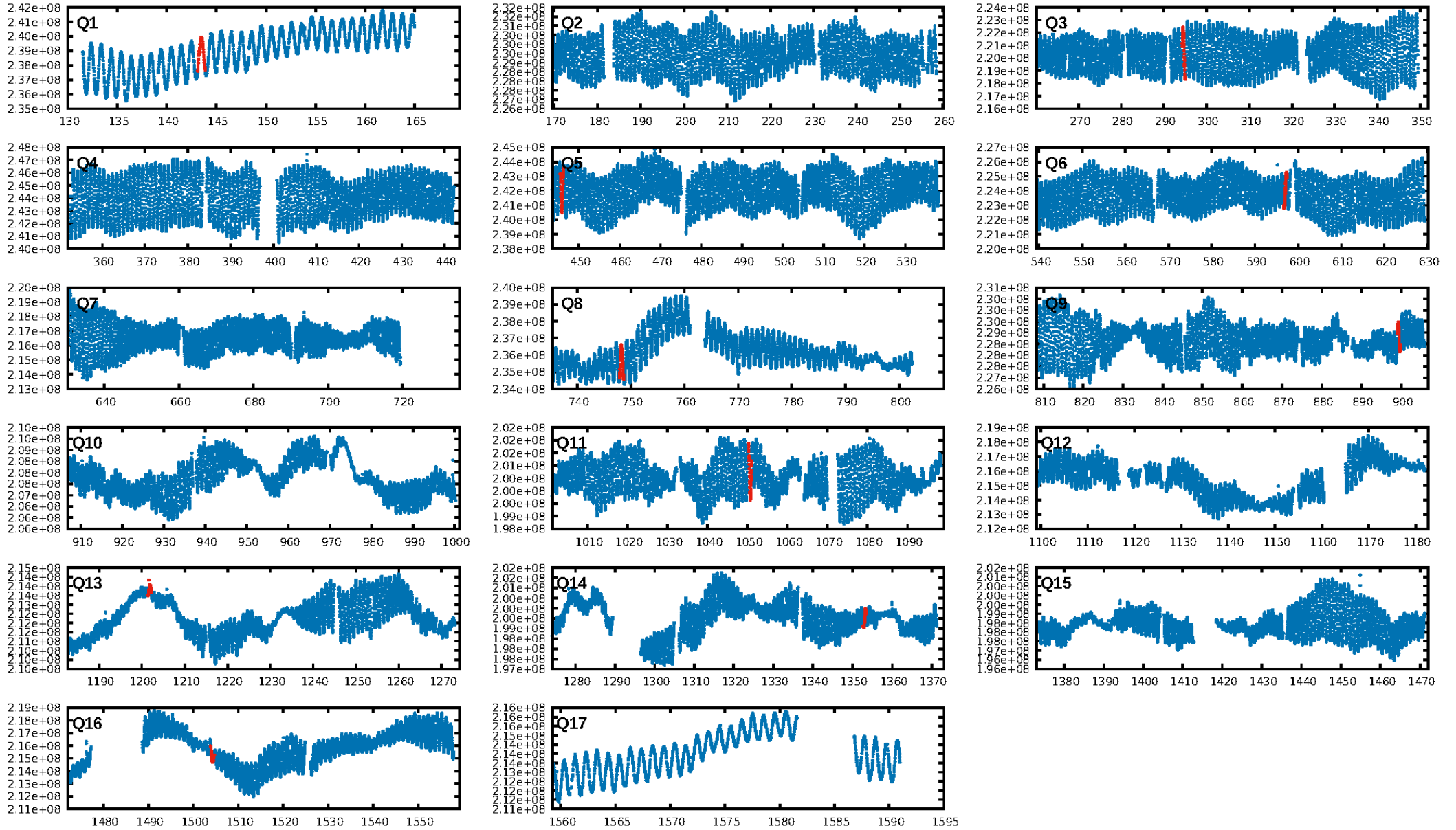
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [375.17σ]  
LongPeriod-sig: 100.0% [294.17σ]  
ModelChiSquare2-sig: 2.9%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [9/9]  
**GhostDiagnostic-chr: 1.331**  
Centroid-sig: 2.1%  
Centroid-so: 0.368 arcsec [1.31σ]  
OotOffset-rm: 0.162 arcsec [0.46σ]  
OotOffset-st: 2/2/2/4 [10]  
KicOffset-rm: 0.211 arcsec [0.65σ]  
KicOffset-st: 2/2/2/4 [10]  
DiffImageQuality-fgm: 0.30 [3/10]  
DiffImageOverlap-fno: 0.00 [0/10]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 17:13:28 Z

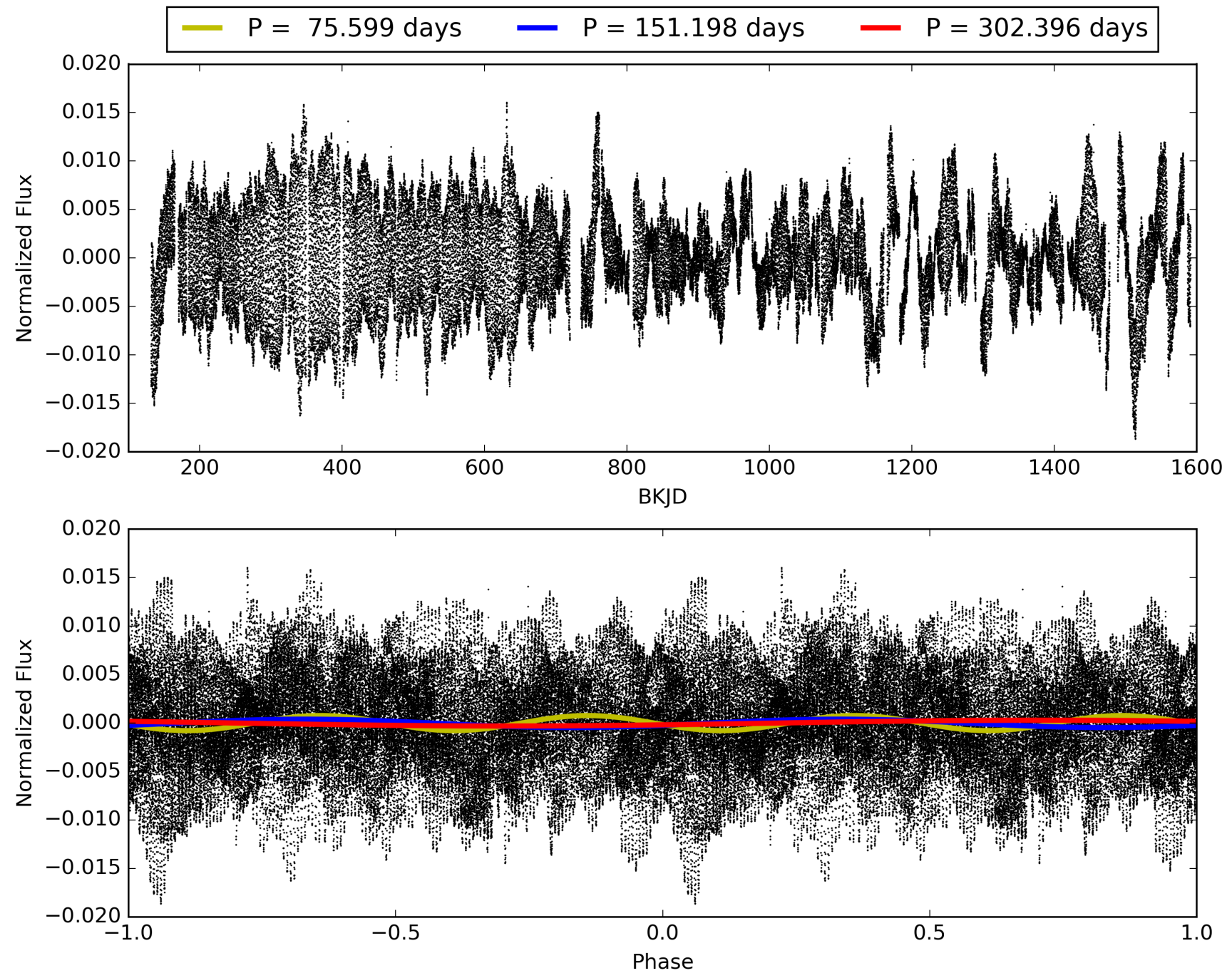
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 004863614-06, PDC Light Curves



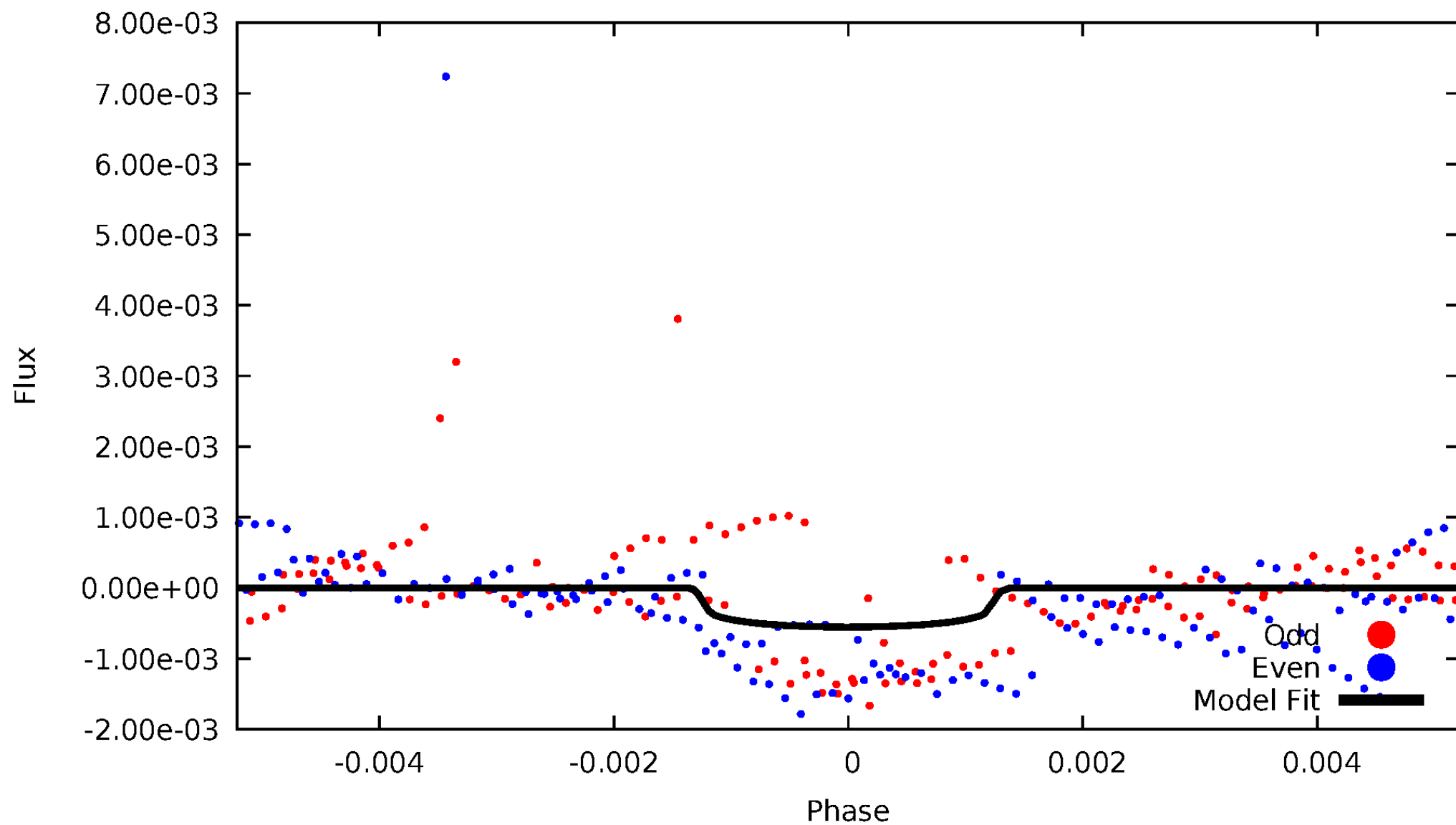


TCE 004863614-06



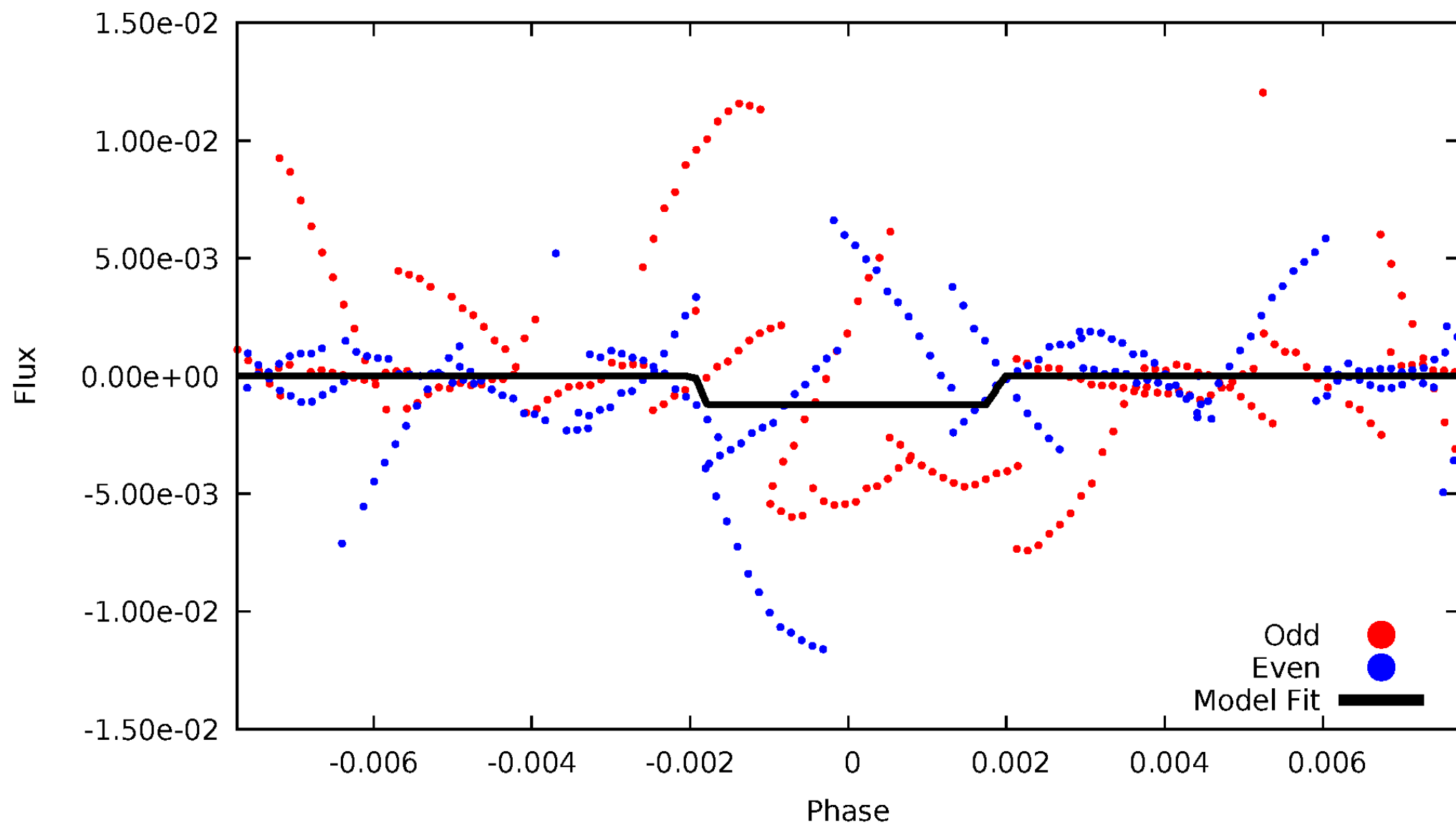
# DV Odd/Even

TCE 004863614-06



# ALT Odd/Even

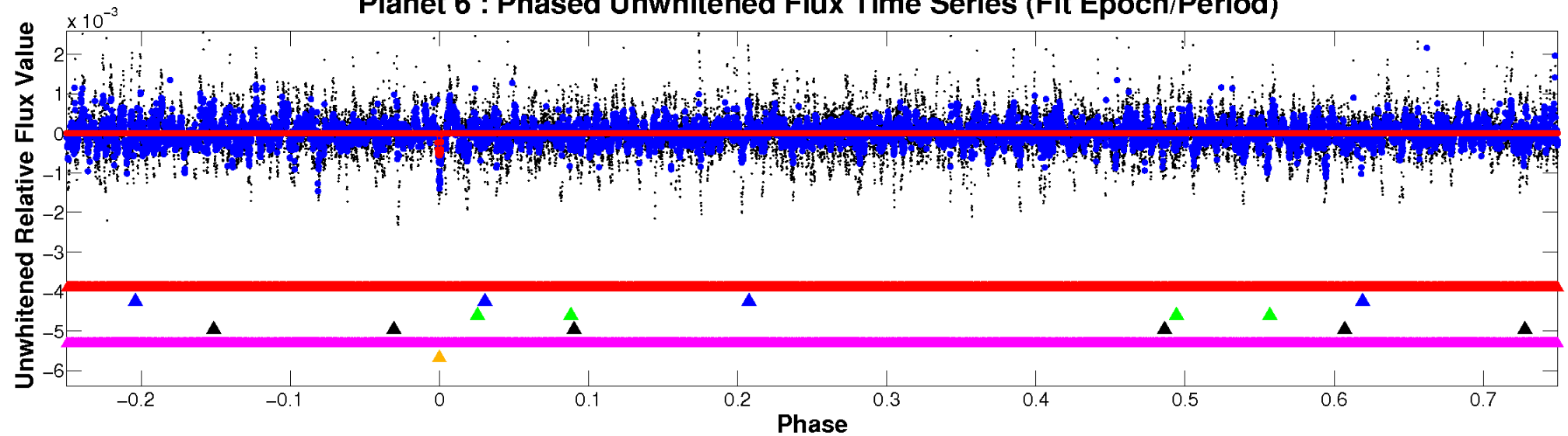
TCE 004863614-06



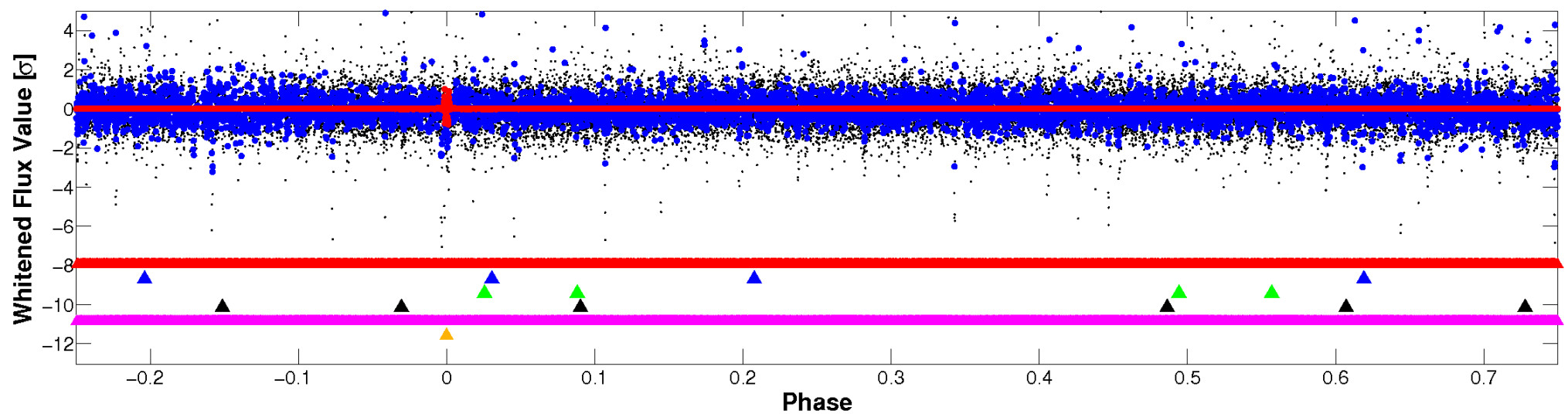


# Non-Whitened Vs. Whitened Light Curve

## Planet 6 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

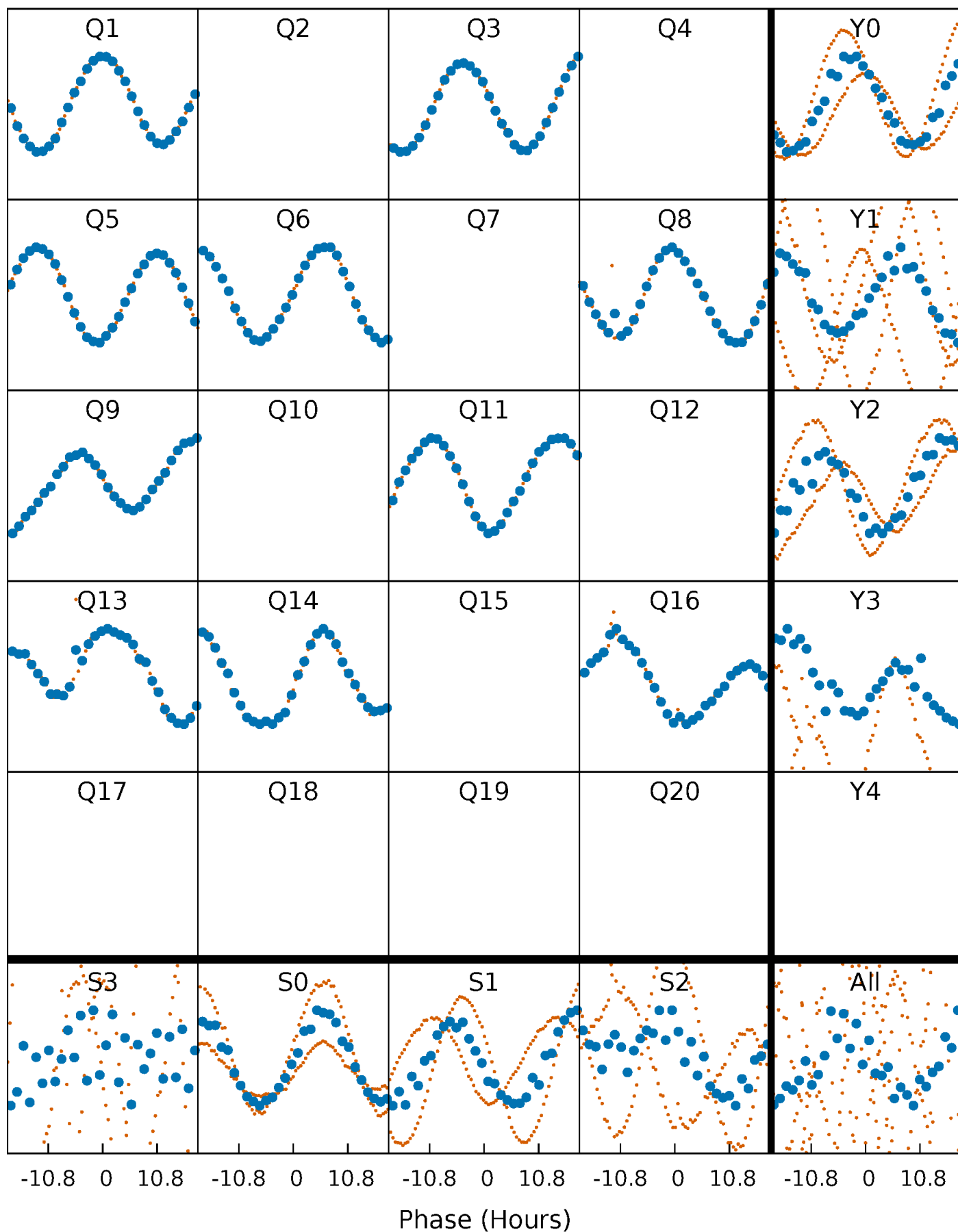


## Planet 6 : Phased Whitened Flux Time Series (Fit Epoch/Period)



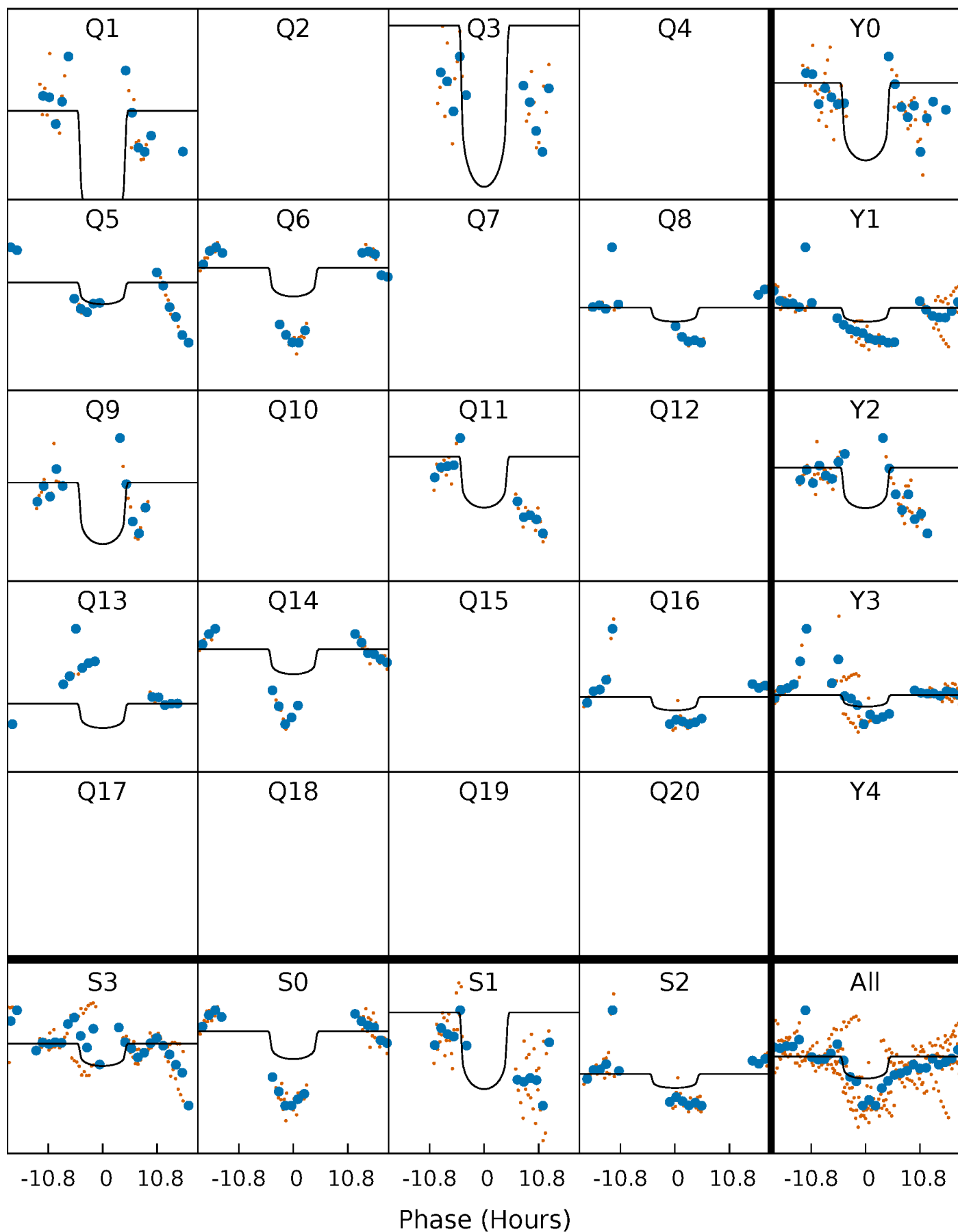
# PDC Quarter-Phased Transit Curves

TCE 004863614-06 P=151.197753 Days  $T_0=143.473671$  (BKJD)



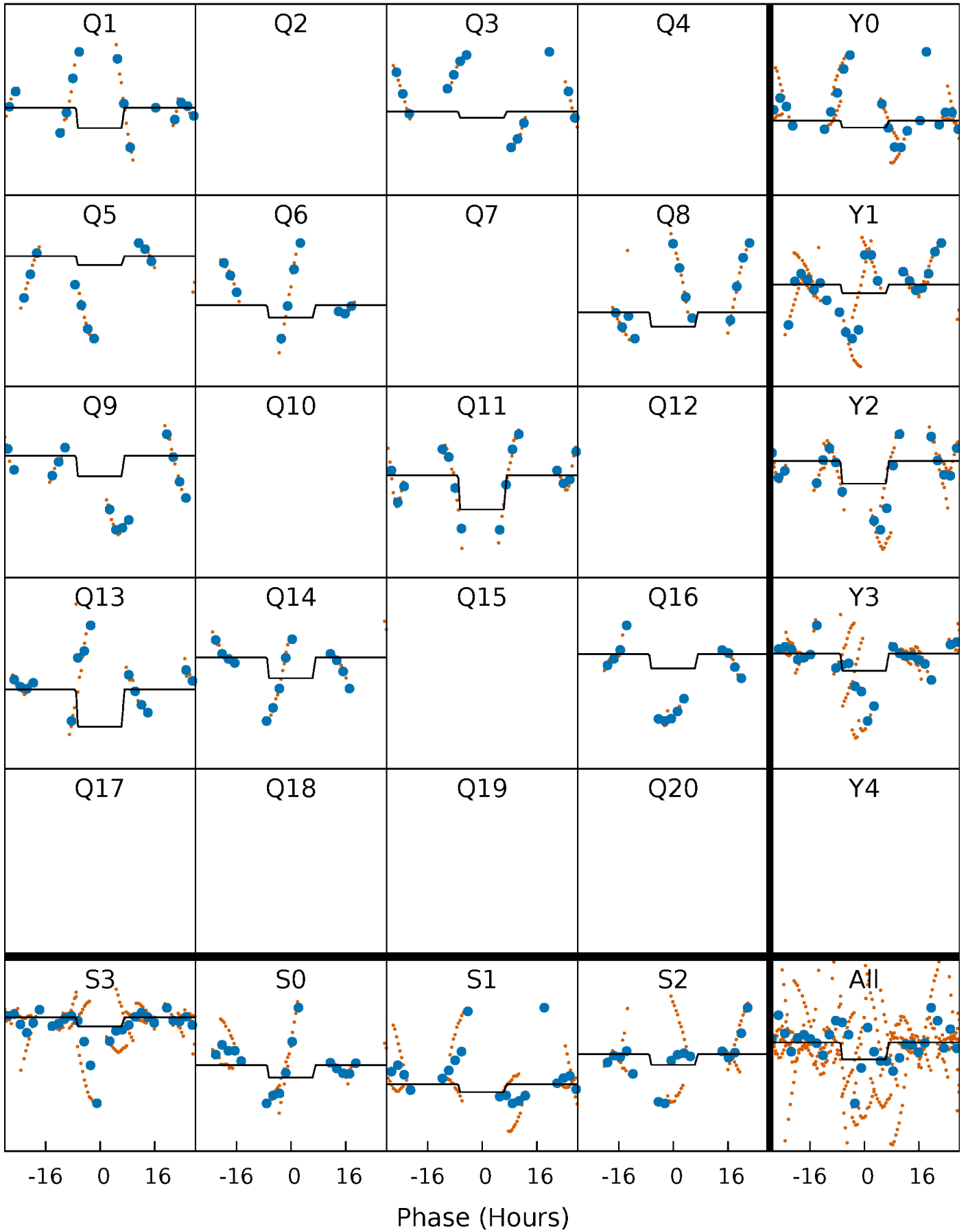
# DV Quarter-Phased Transit Curves

TCE 004863614-06 P=151.197753 Days  $T_0=143.473671$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

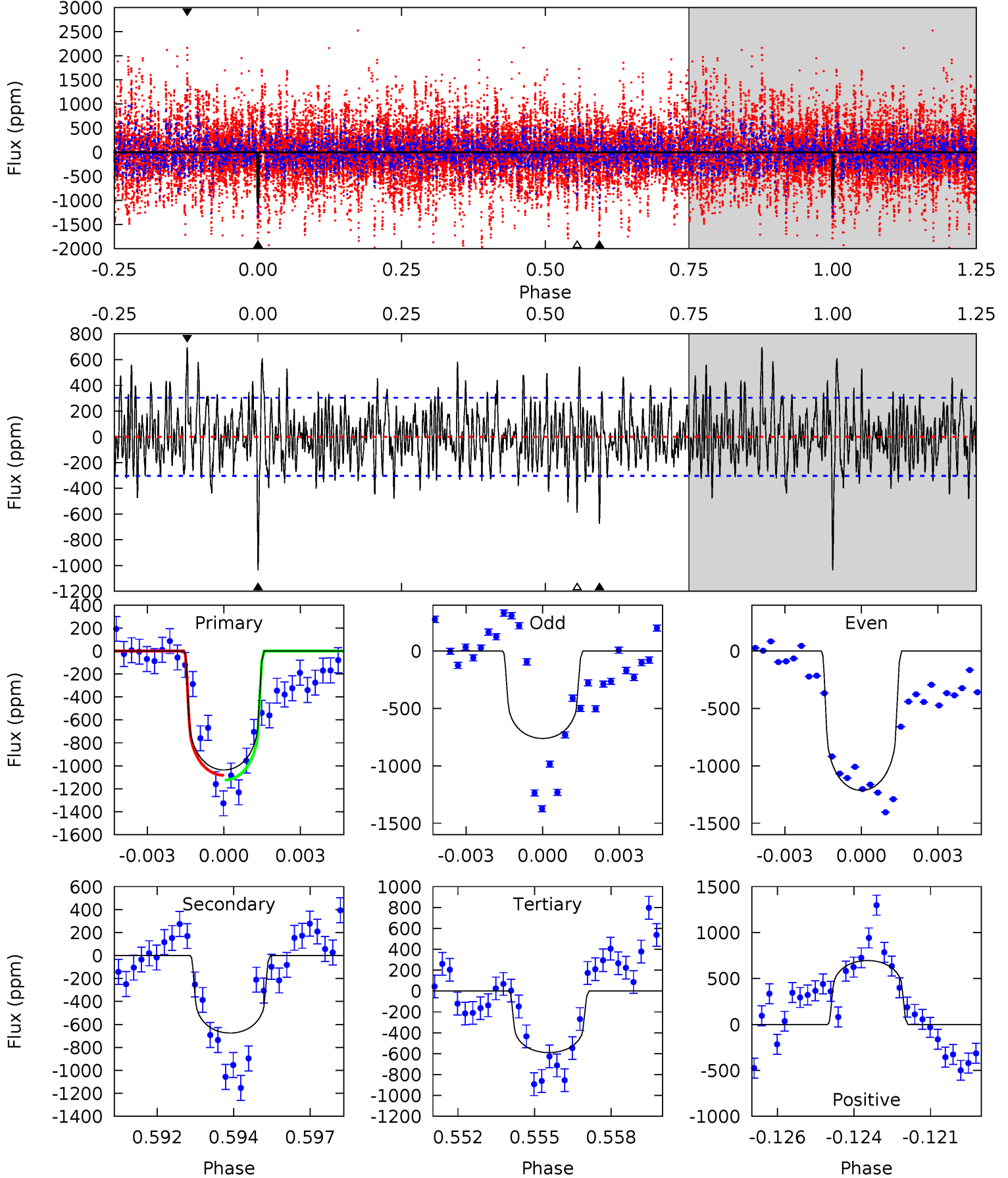
TCE 004863614-06 P=151.208344 Days  $T_0=143.471156$  (BKJD)



# DV Model-Shift Uniqueness Test

004863614-06, P = 151.197753 Days, E = 143.473671 Days

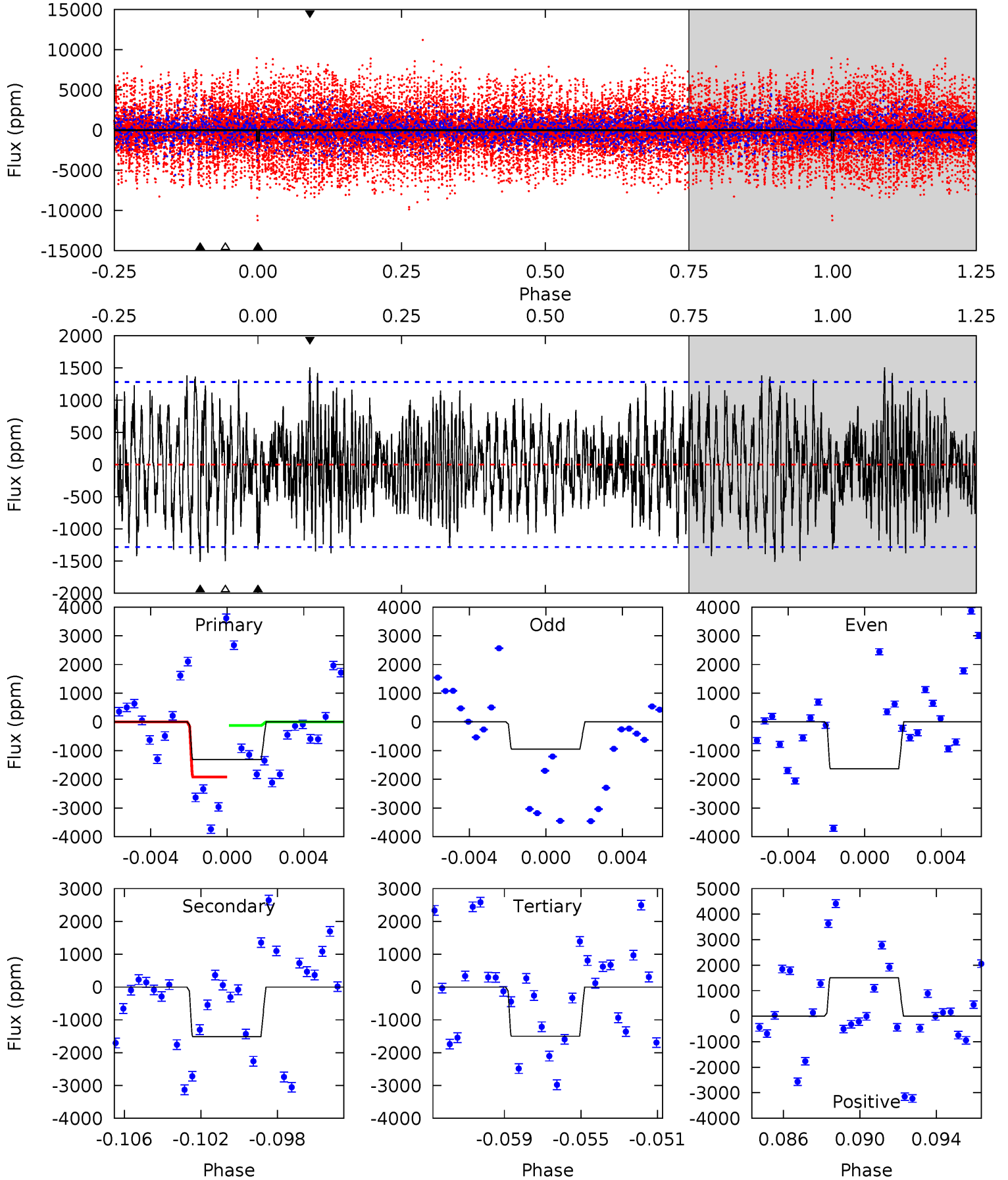
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
18.0	11.7	10.3	12.1	5.28	3.01	3.25	7.75	5.93	1.48	-0.35	3.90	0.66	0.40	0.37



# Alt Model-Shift Uniqueness Test

004863614-06, P = 151.208344 Days, E = 143.471156 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.33	6.13	6.08	6.11	5.20	2.88	2.03	-0.74	-0.78	0.05	0.02	1.37	0.53	0.50	3.62



### Stellar Parameters For KIC 004863614

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6046^{+163}_{-199}$	$4.478^{+0.048}_{-0.180}$	$0.070^{+0.250}_{-0.350}$	$1.007^{+0.267}_{-0.114}$	$1.111^{+0.120}_{-0.160}$	$1.532^{+0.377}_{-0.742}$
	+3%/-3%	+1%/-4%	+357%/-500%	+27%/-11%	+11%/-14%	+25%/-48%
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 004863614-06 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-675 \pm 58$	$2.50^{+0.92}_{-0.81}$	$504^{+30}_{-25}$	$6560^{+1600}_{-896}$	$18607^{+22523}_{-8296}$
Alt.	$-1511 \pm 246$	$4.01^{+0.93}_{-0.86}$	$501^{+32}_{-23}$	$6325^{+902}_{-641}$	$16571^{+10719}_{-6153}$

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

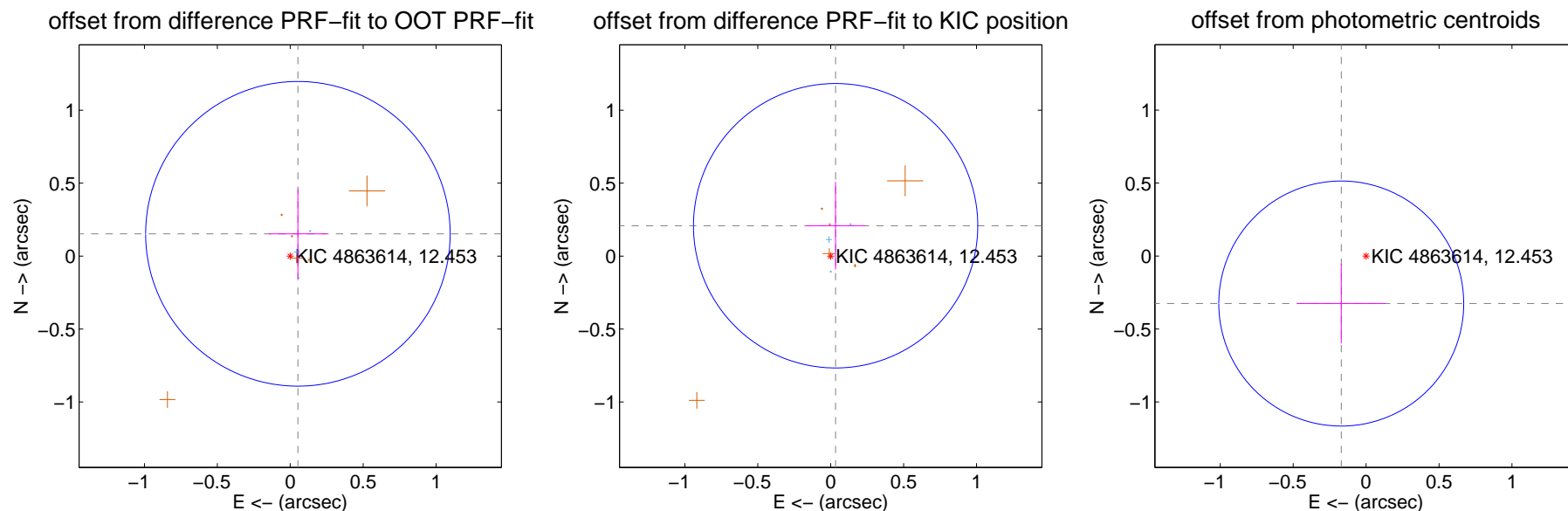
## DV Centroid Data

Supplemental centroid analysis for 004863614-06. Kepler magnitude: 12.45. Transit SNR 4.93

There are 3 quarters with good PRF difference image offsets

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

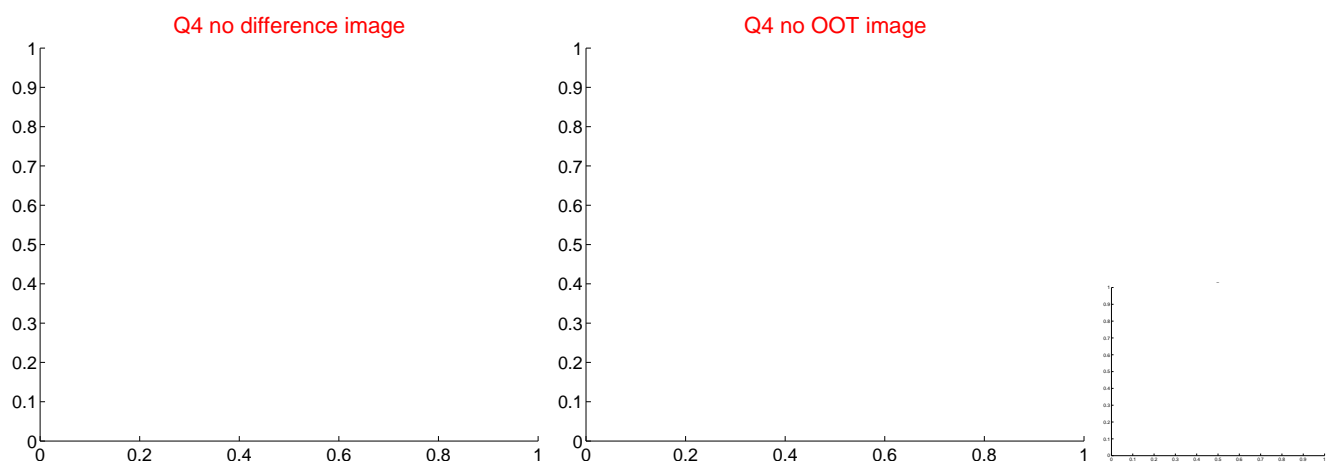
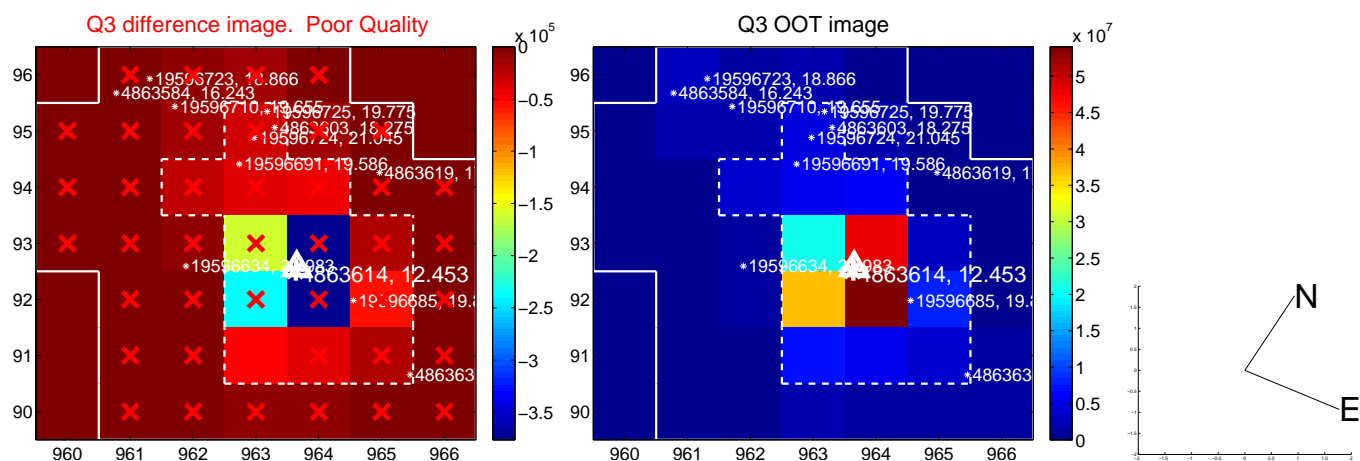
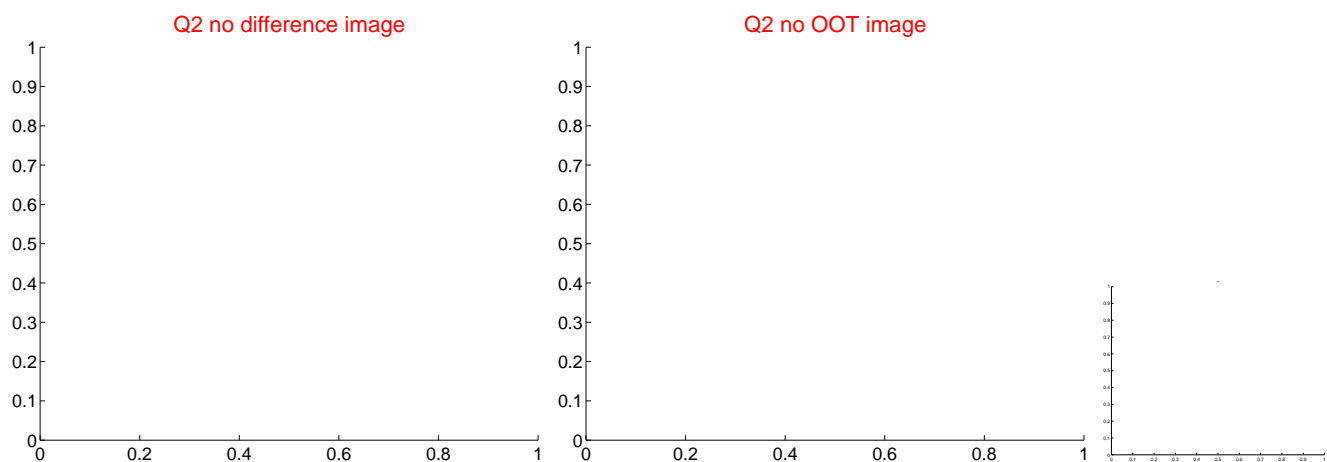
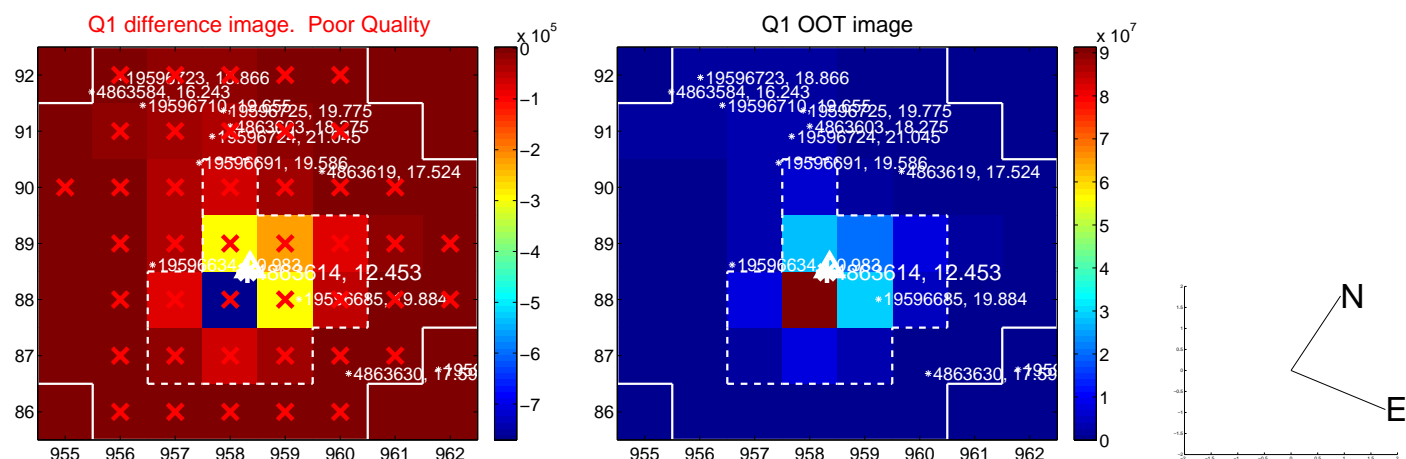
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.162 \pm 0.348$	0.46	$-0.052 \pm 0.200$	$0.153 \pm 0.306$
PRF-fit source offset from KIC position	$0.211 \pm 0.325$	0.65	$-0.034 \pm 0.201$	$0.208 \pm 0.301$
photometric centroid source offset	$0.37 \pm 0.28$	1.31	$0.17 \pm 0.30$	$-0.33 \pm 0.27$



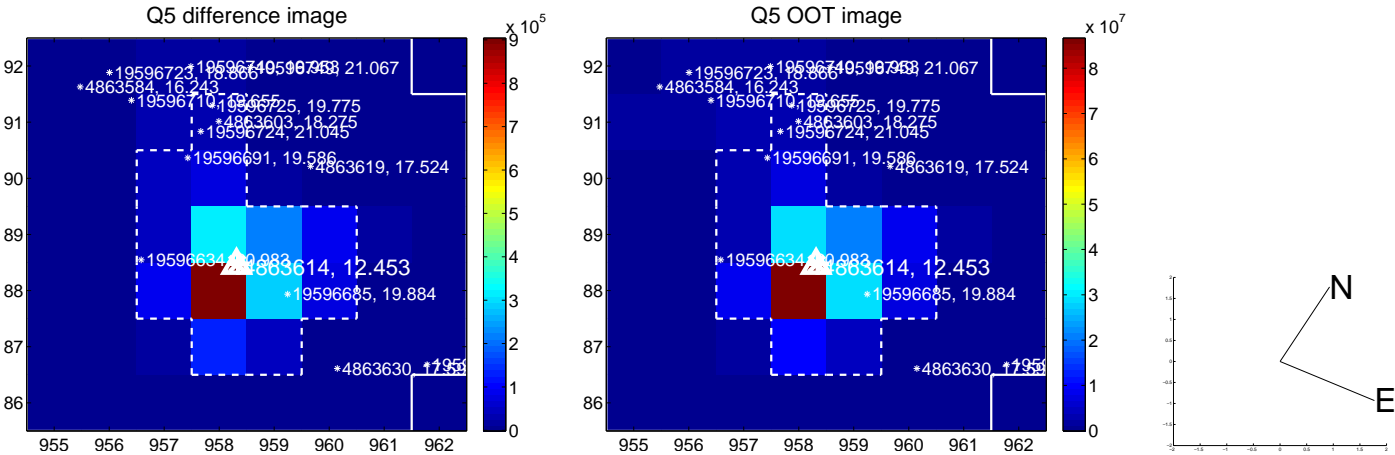
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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



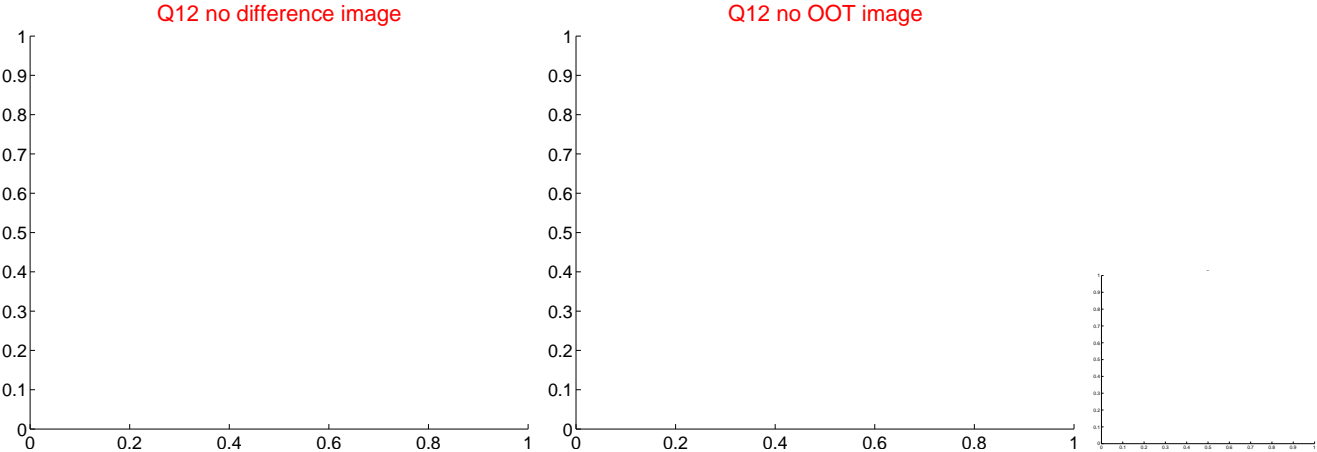
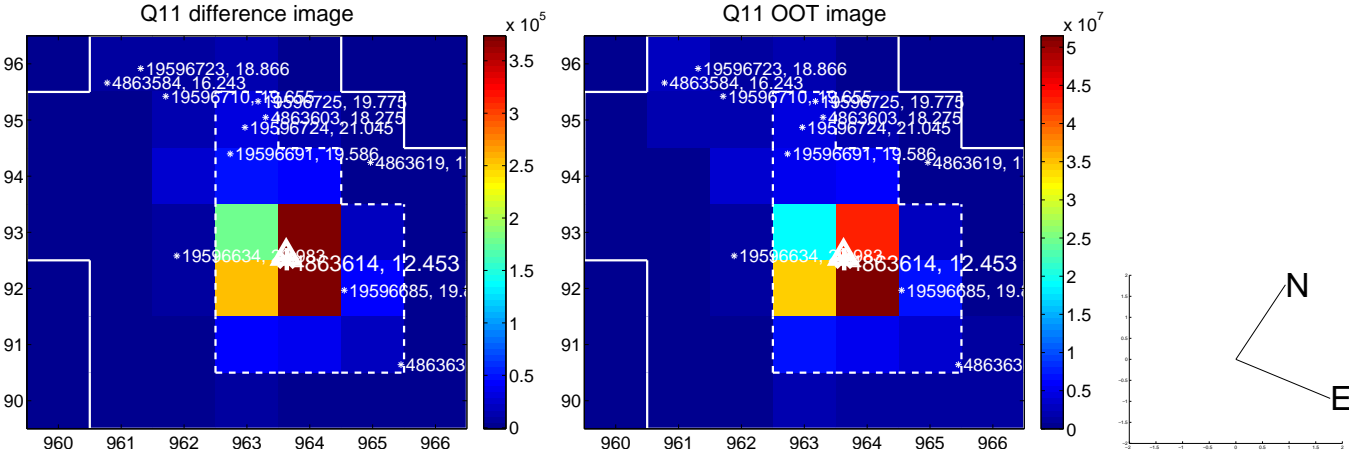
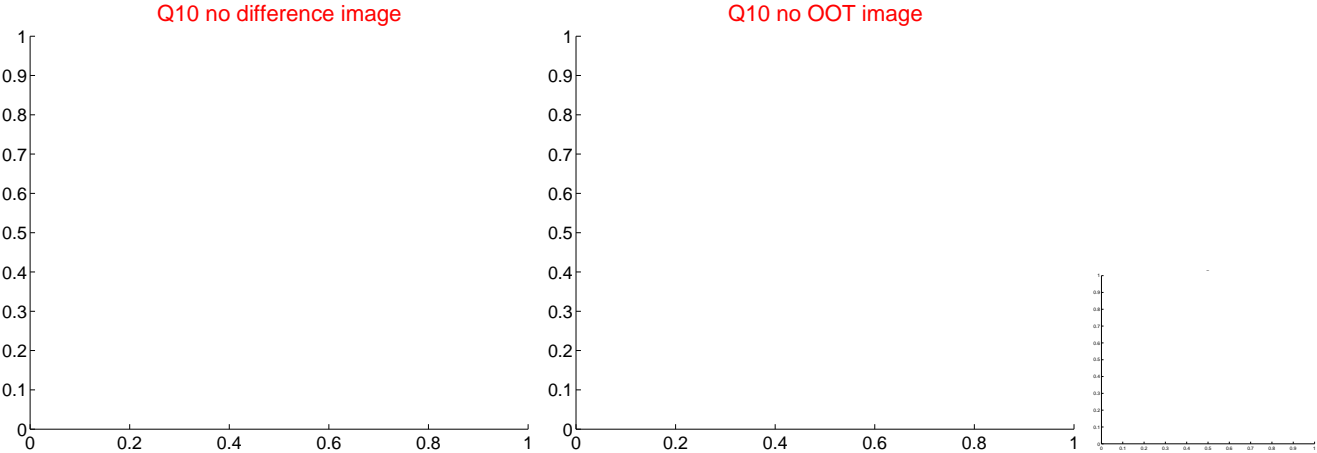
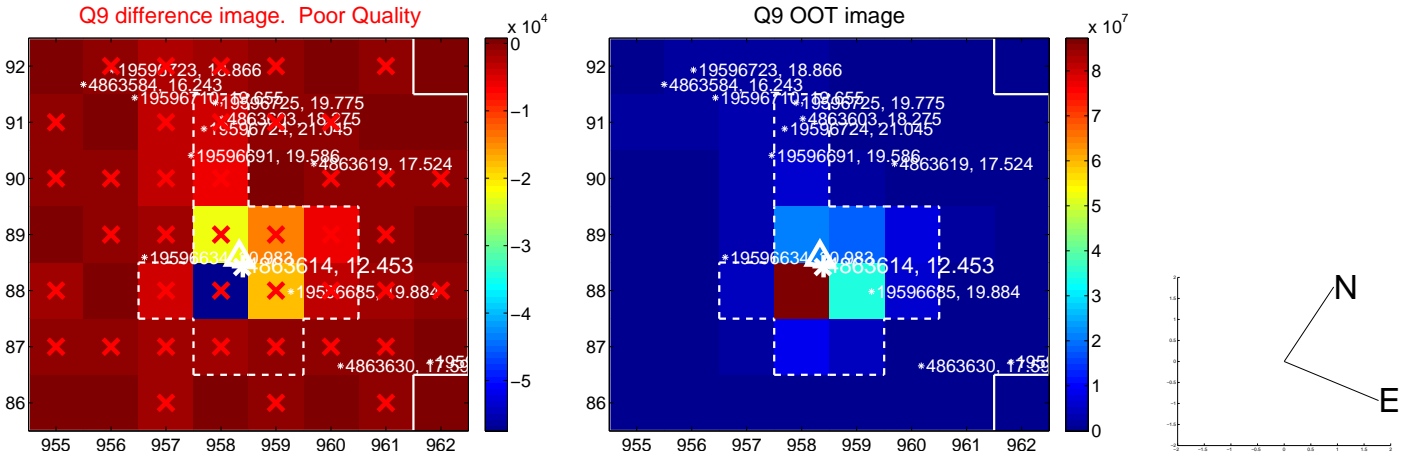
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



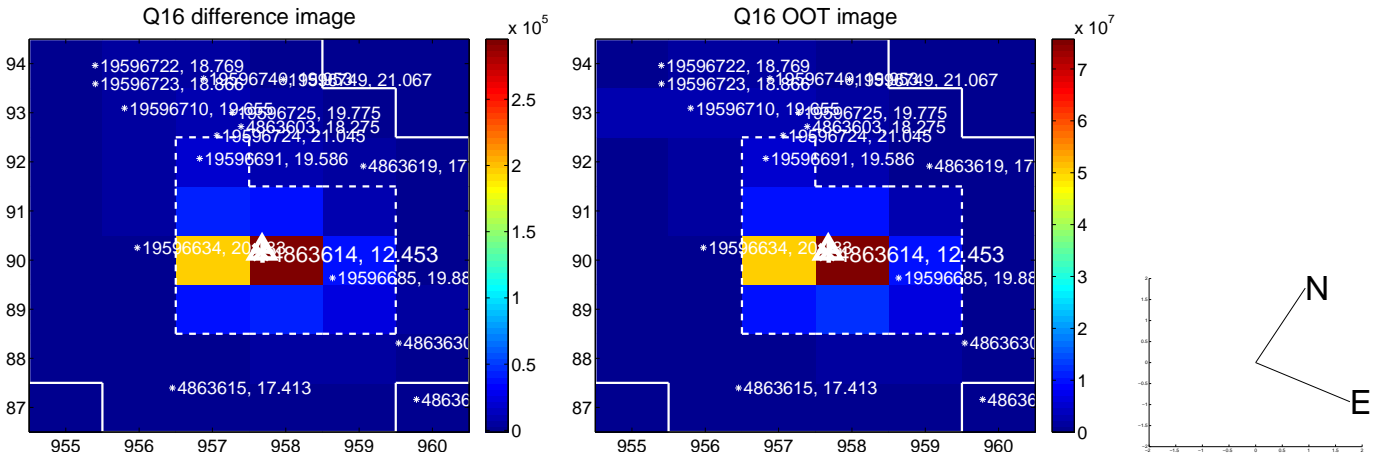
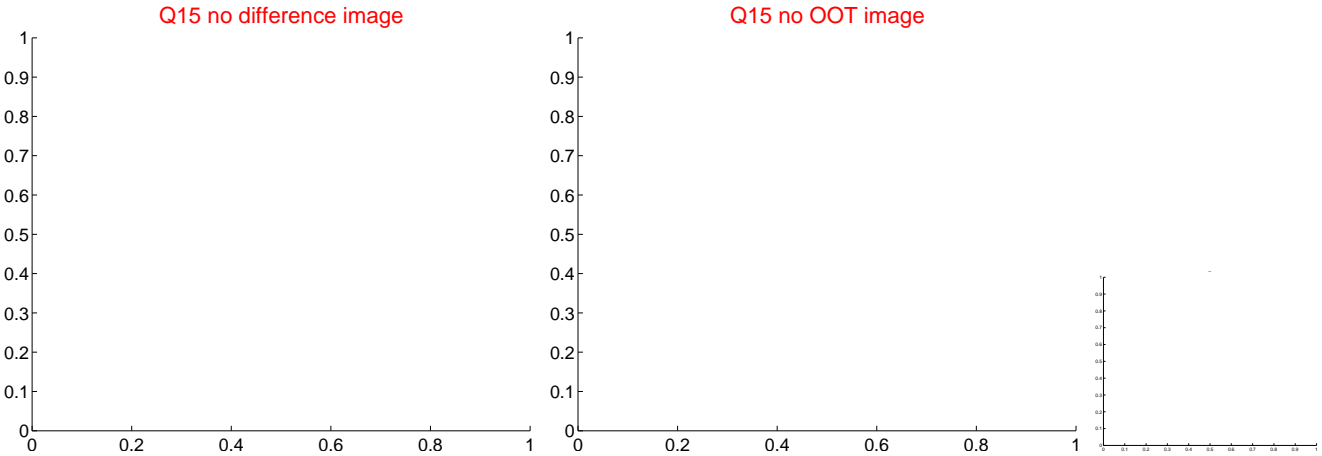
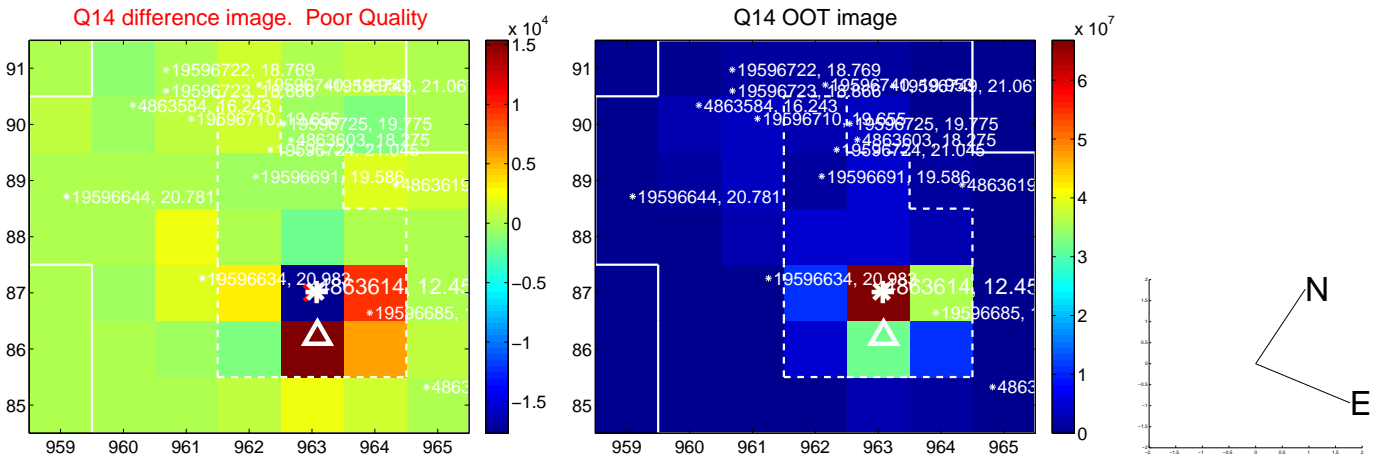
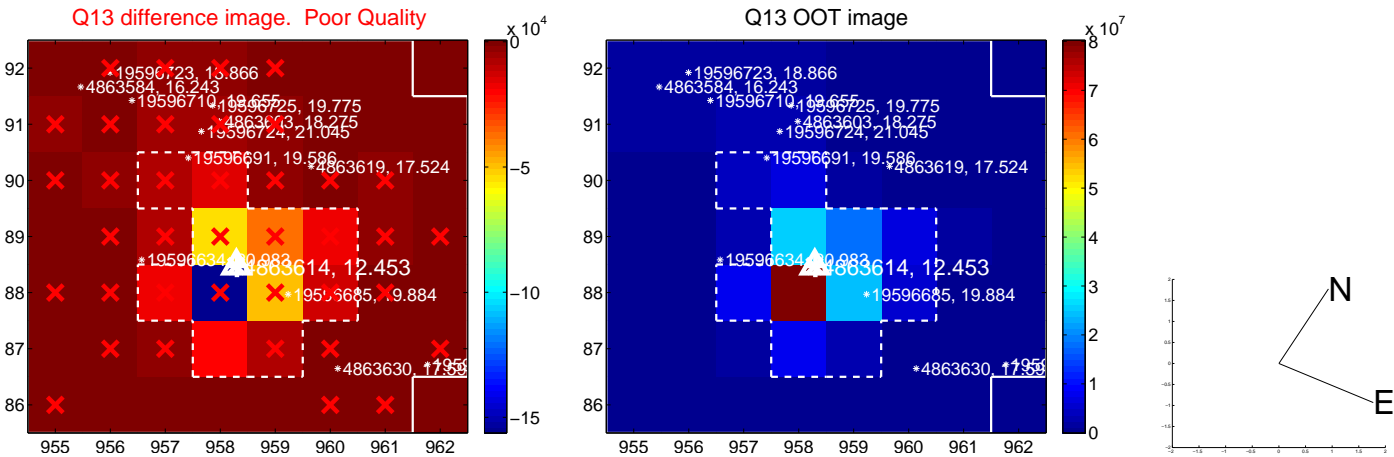
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



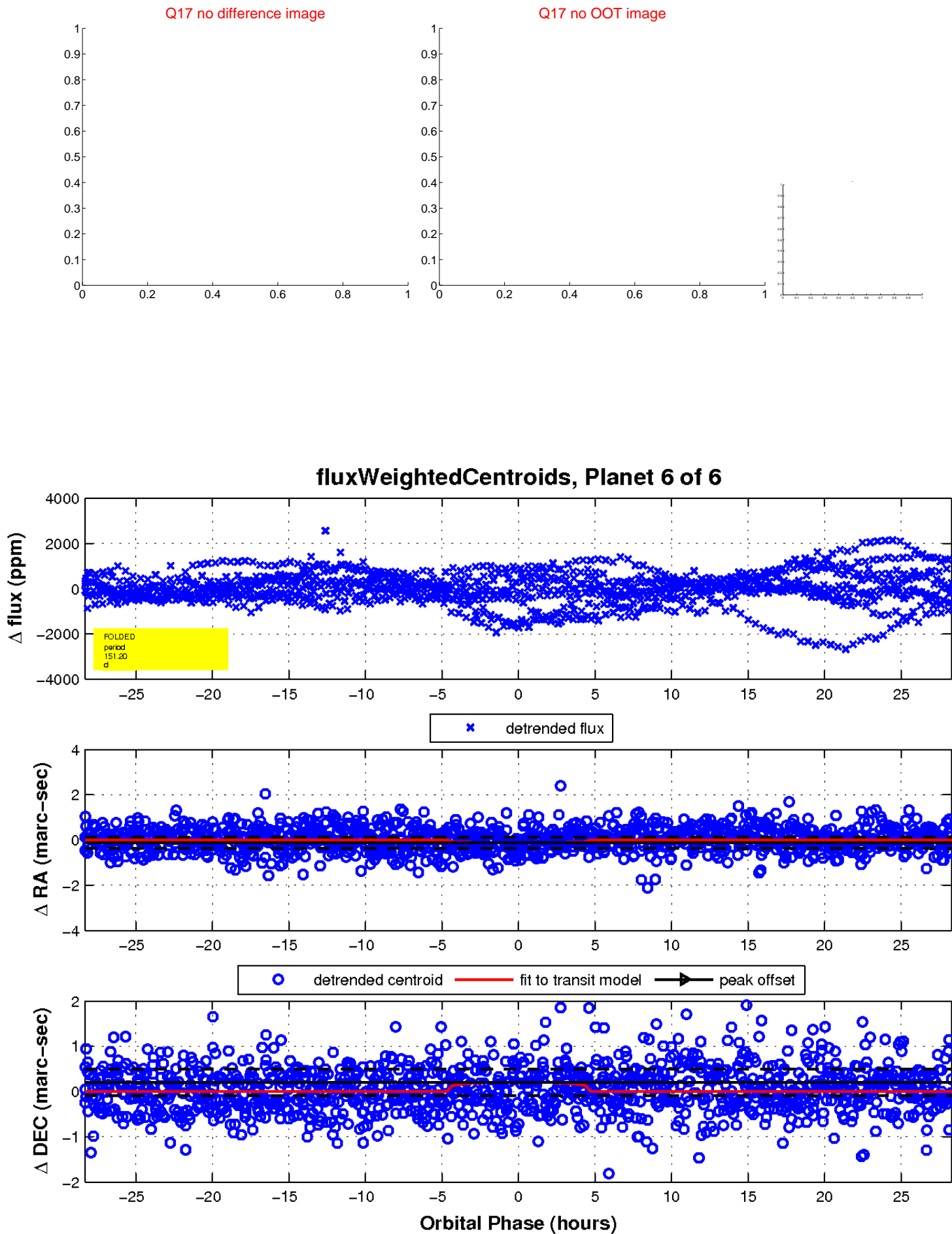
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

