

# KIC 003953212

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
003953212-01	OBS	No	440.198398	304.810275	456.6	7.457	7.4	7.9	1.12	6067	2.93	1.25
003953212-02	OBS	No	493.106222	511.391564	489.0	7.048	7.5	8.0	1.12	6067	2.71	1.07

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003953212-01	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_MARSHALL—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
003953212-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS

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

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

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

## Ephemeris Match Information For 003953212-01

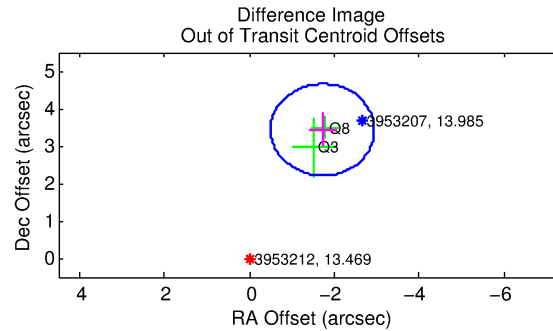
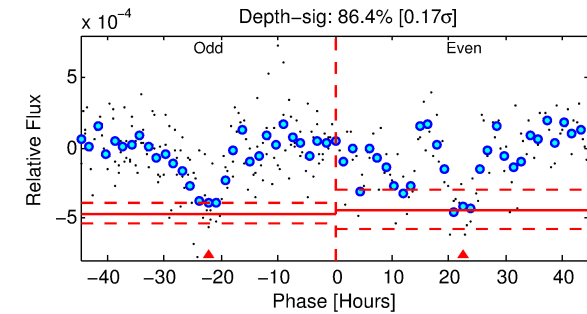
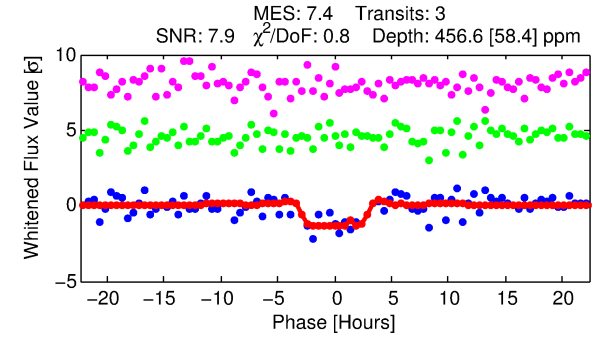
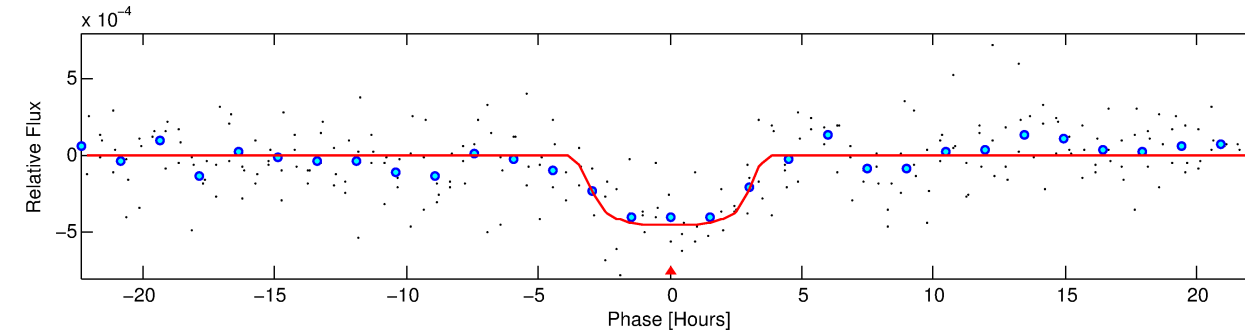
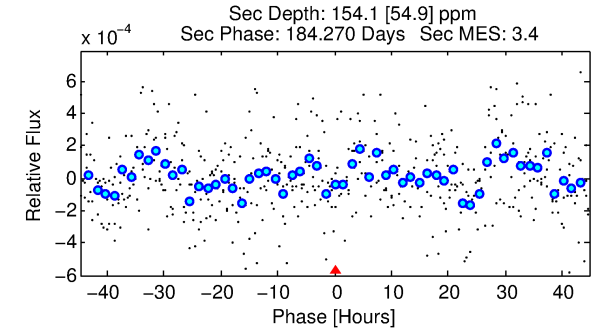
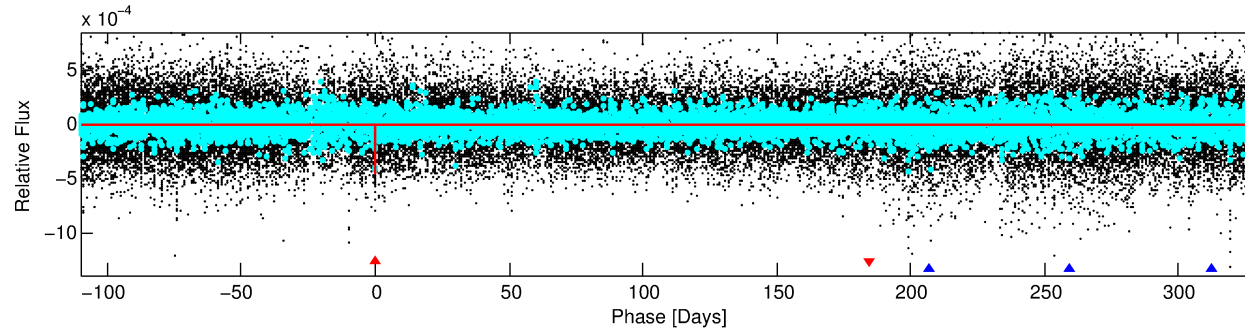
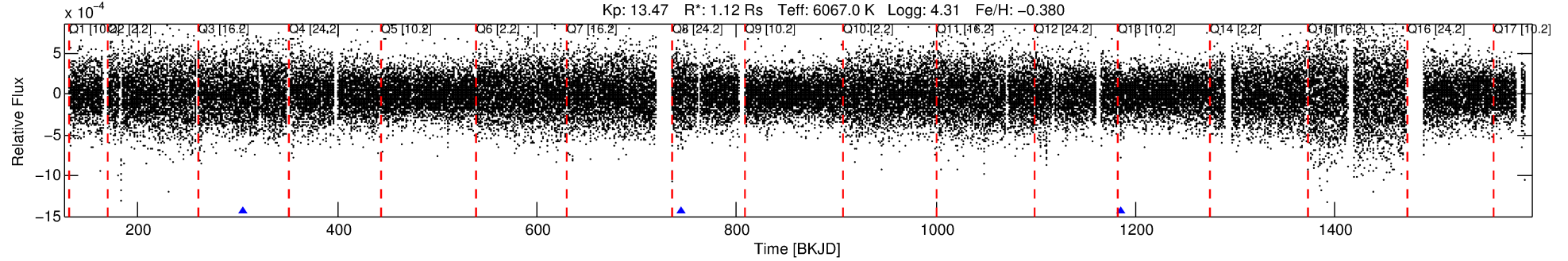
No Significant Match Found

# DV One-Page Summary

KIC: 3953212 Candidate: 1 of 2 Period: 440.198 d

KOI: K05026 Corr: No Ephemeris Match

Kp: 13.47 R\*: 1.12 Rs Teff: 6067.0 K Logg: 4.31 Fe/H: -0.380



## DV Fit Results:

Period = 440.19840 [0.00912] d  
Epoch = 304.8103 [0.0146] BKJD  
Rp/R\* = 0.0240 [0.0023]  
a/R\* = 183.17 [58.86]  
b = 0.94 [0.04]  
Seff = 1.24 [0.44]  
Teq = 269 [24] K  
Rp = 2.93 [0.88] Re  
a = 1.1021 [0.2589] AU  
Ag = 12018.51 [6323.51] [1.90σ]  
Teffp = 4360 [461] K [8.86σ]

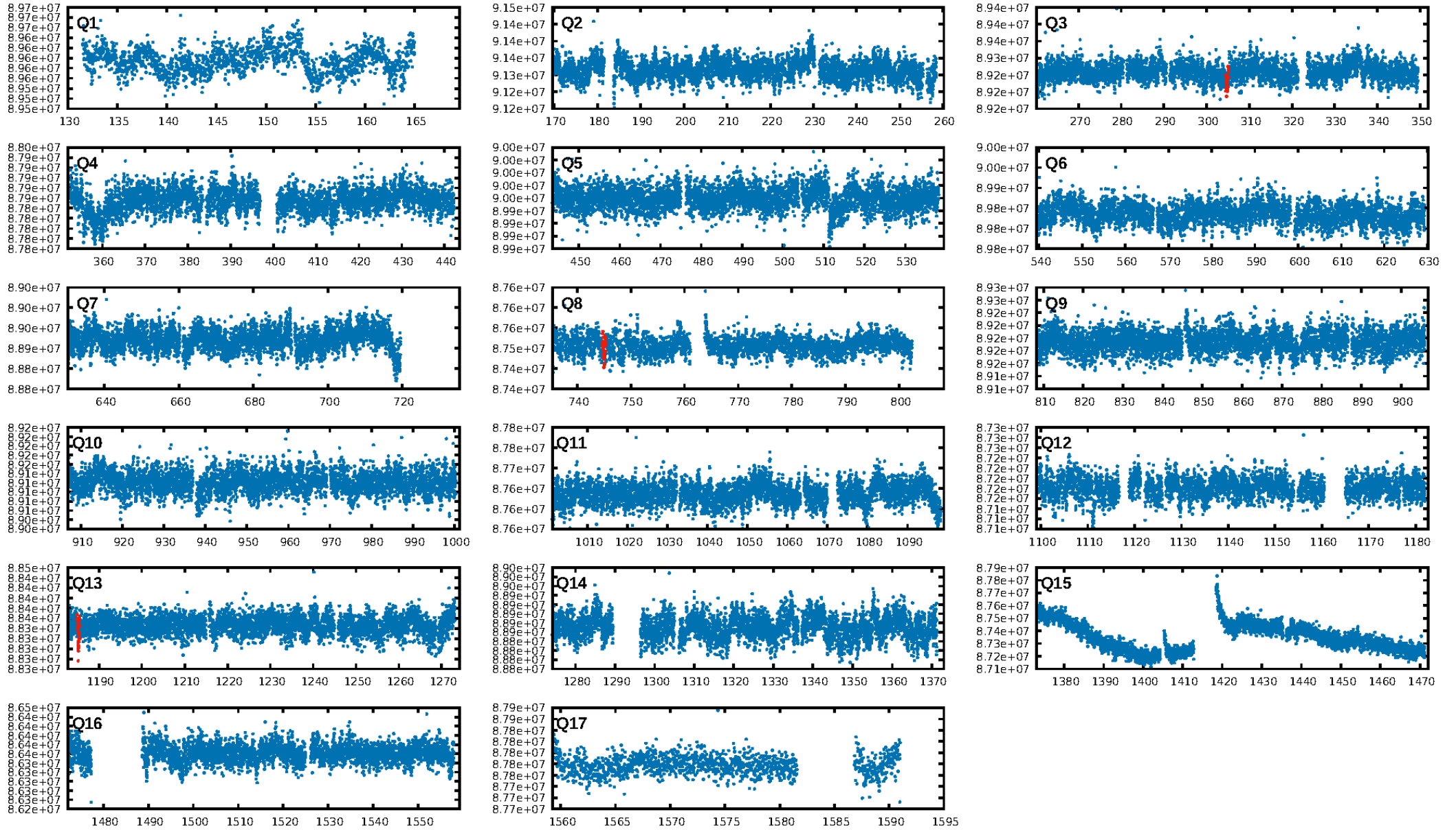
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [123.76σ]  
ModelChiSquare2-sig: 76.5%  
ModelChiSquareGof-sig: 99.7%  
**Bootstrap-pfa: 5.69e-10**  
RollingBand-fgt: 1.00 [3/3]  
**GhostDiagnostic-chr: 0.2156**  
Centroid-sig: 0.4%  
Centroid-so: 3.099 arcsec [2.20σ]  
**OotOffset-rm: 3.841 arcsec [9.42σ]**  
**KicOffset-rm: 4.456 arcsec [11.01σ]**  
OotOffset-st: 0/1/1/0 [2]  
KicOffset-st: 0/1/1/0 [2]  
DiffImageQuality-fgm: 1.00 [2/2]  
DiffImageOverlap-fno: 1.00 [2/2]

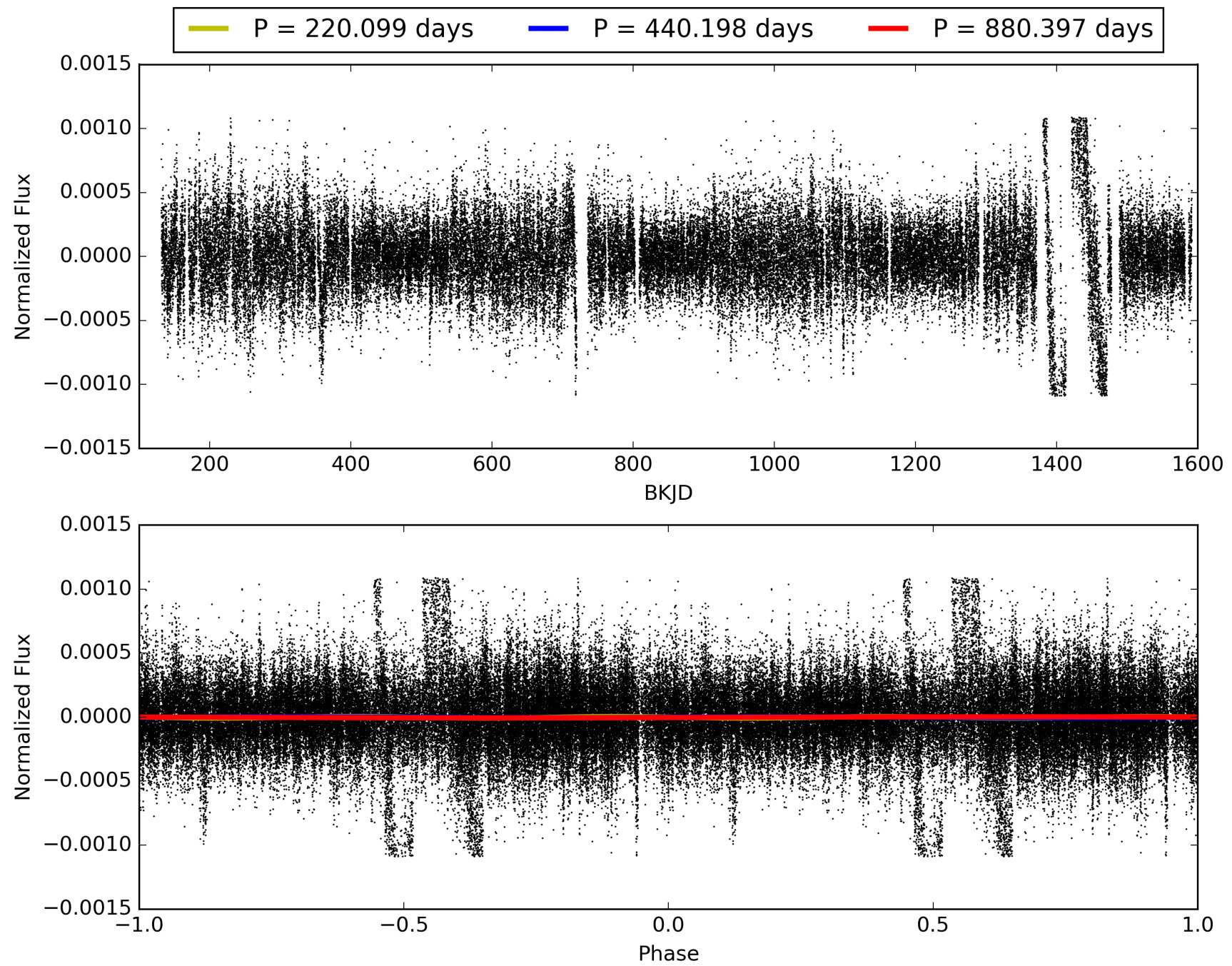
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 23:15:48 Z

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

# TCE 003953212-01, PDC Light Curves

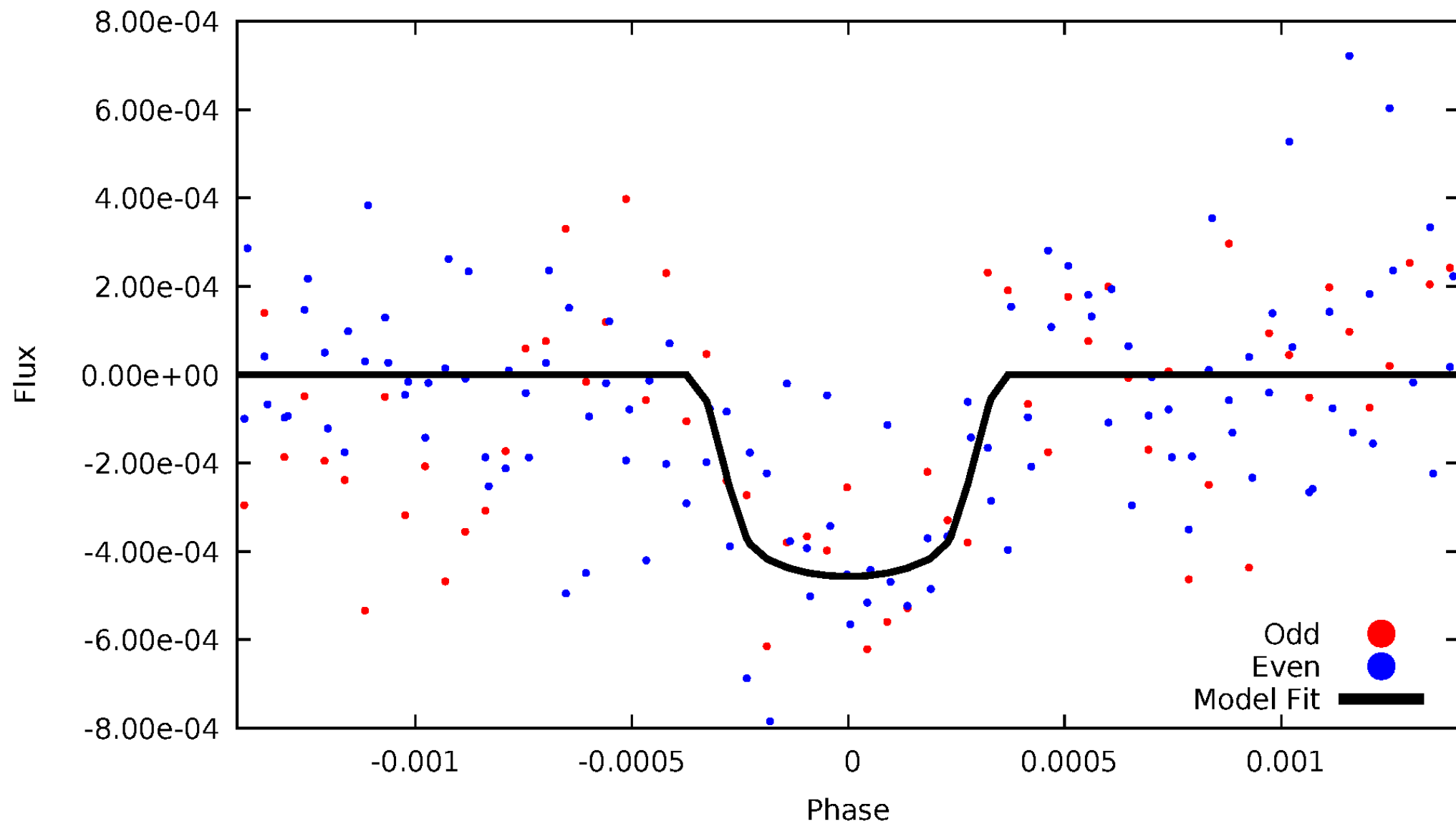


TCE 003953212-01



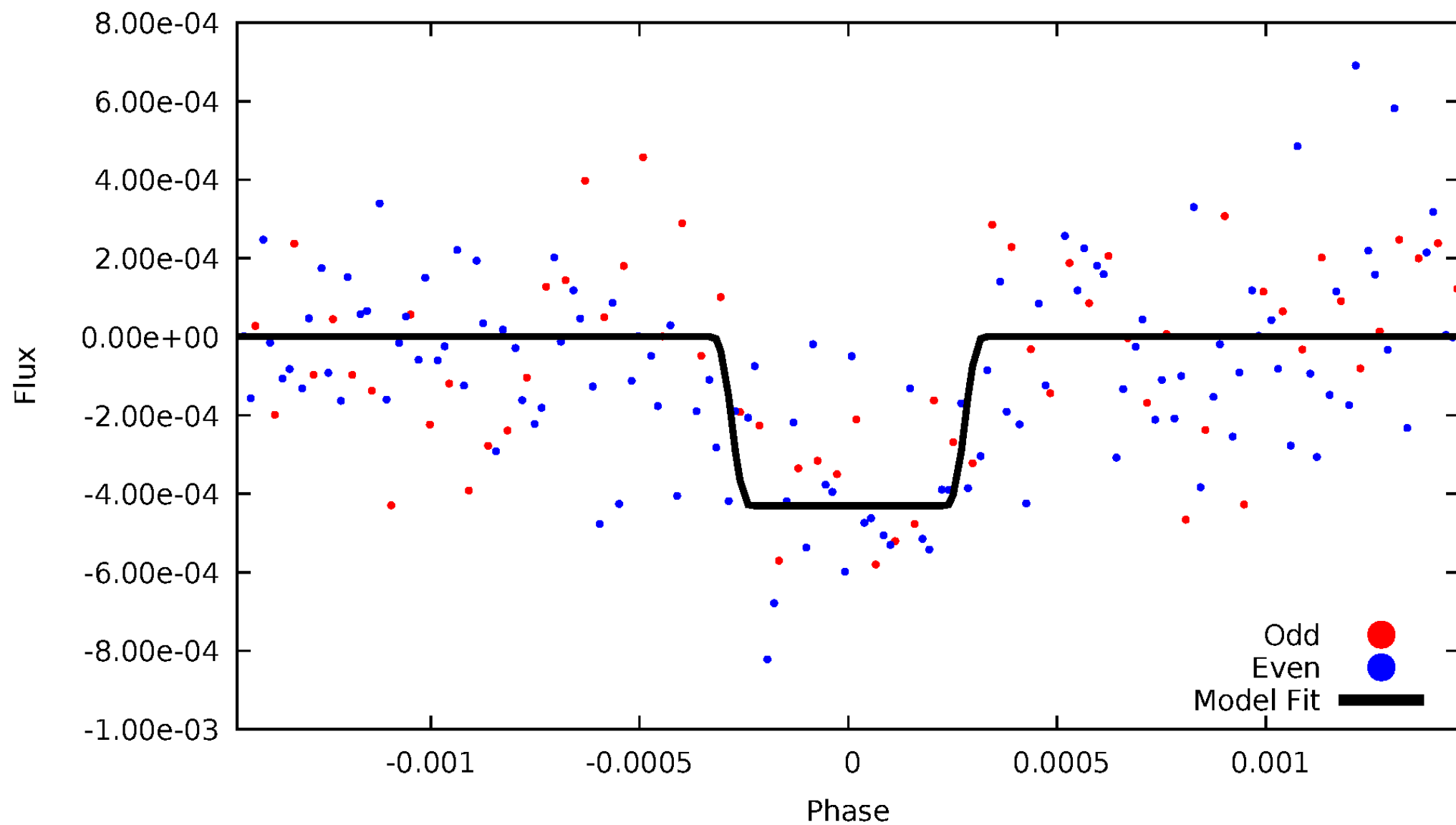
# DV Odd/Even

TCE 003953212-01

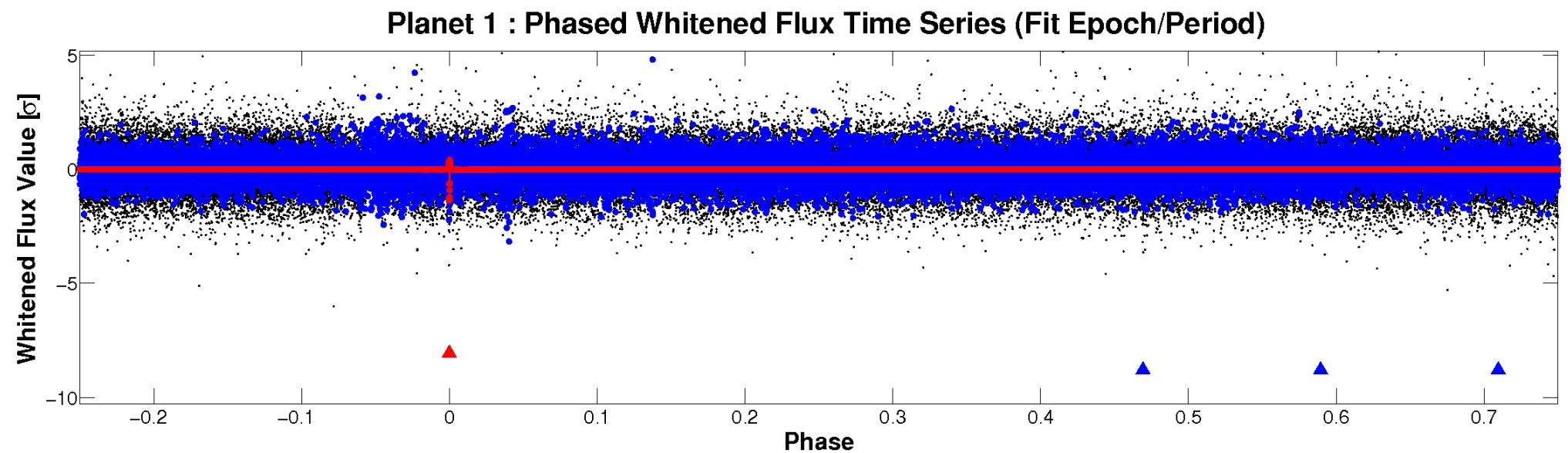
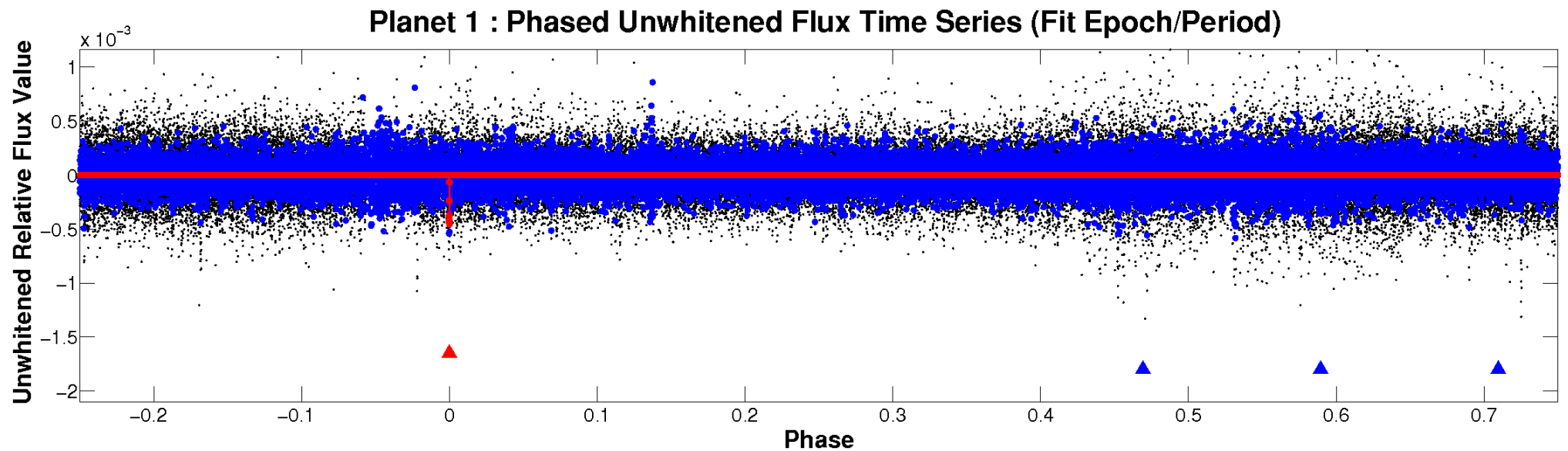


# ALT Odd/Even

TCE 003953212-01



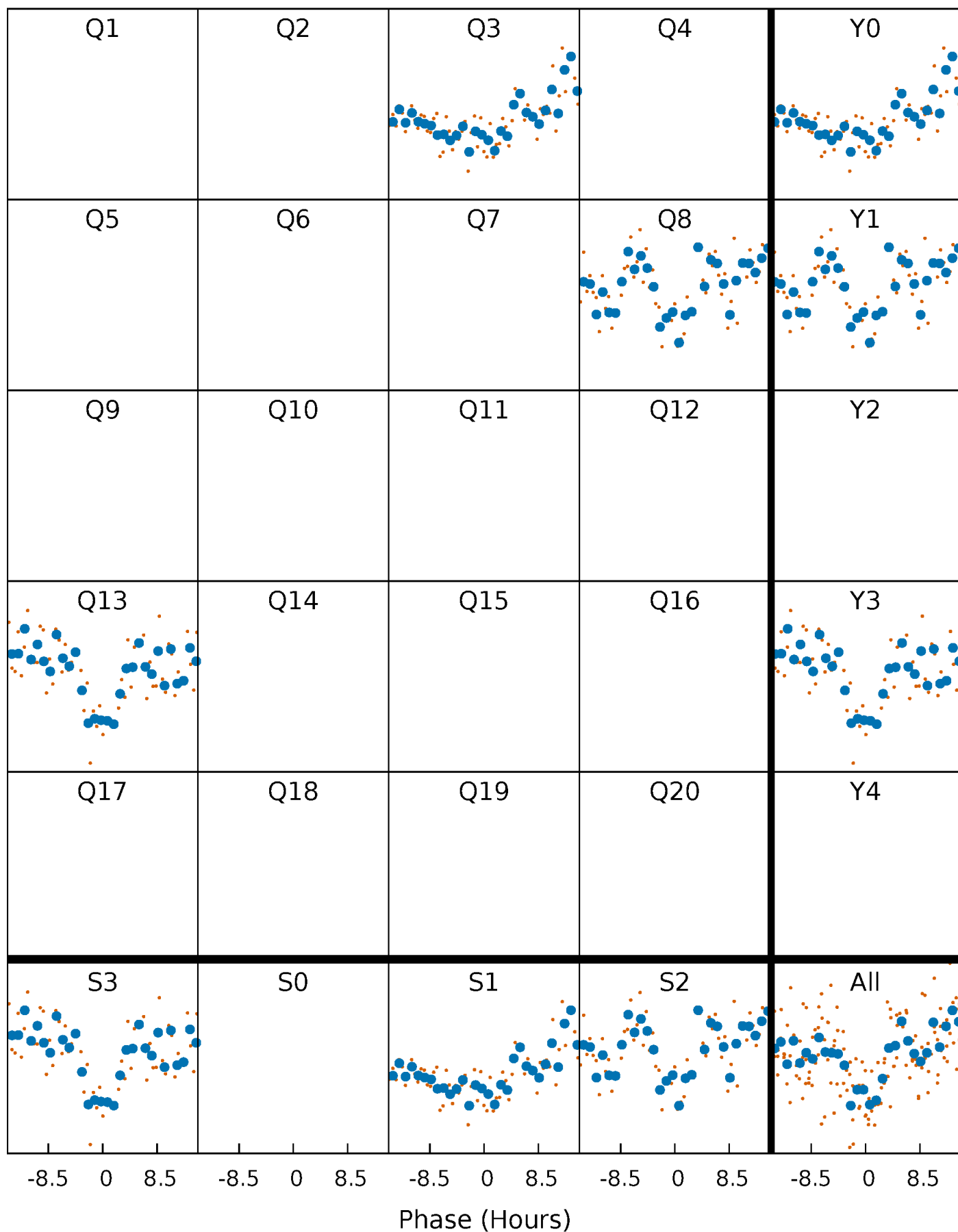
# Non-Whitened Vs. Whitened Light Curve





# PDC Quarter-Phased Transit Curves

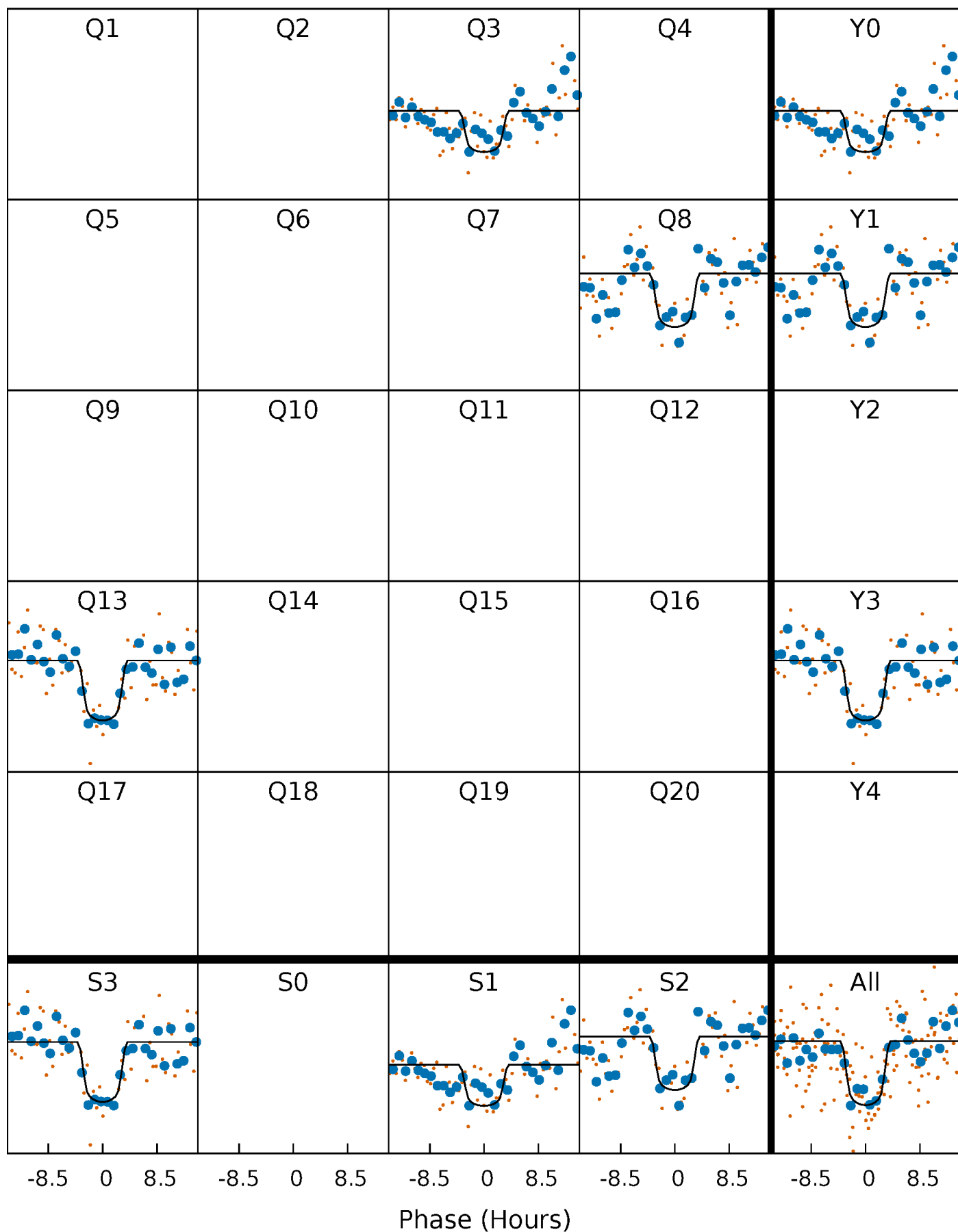
TCE 003953212-01 P=440.198398 Days  $T_0=304.810275$  (BKJD)





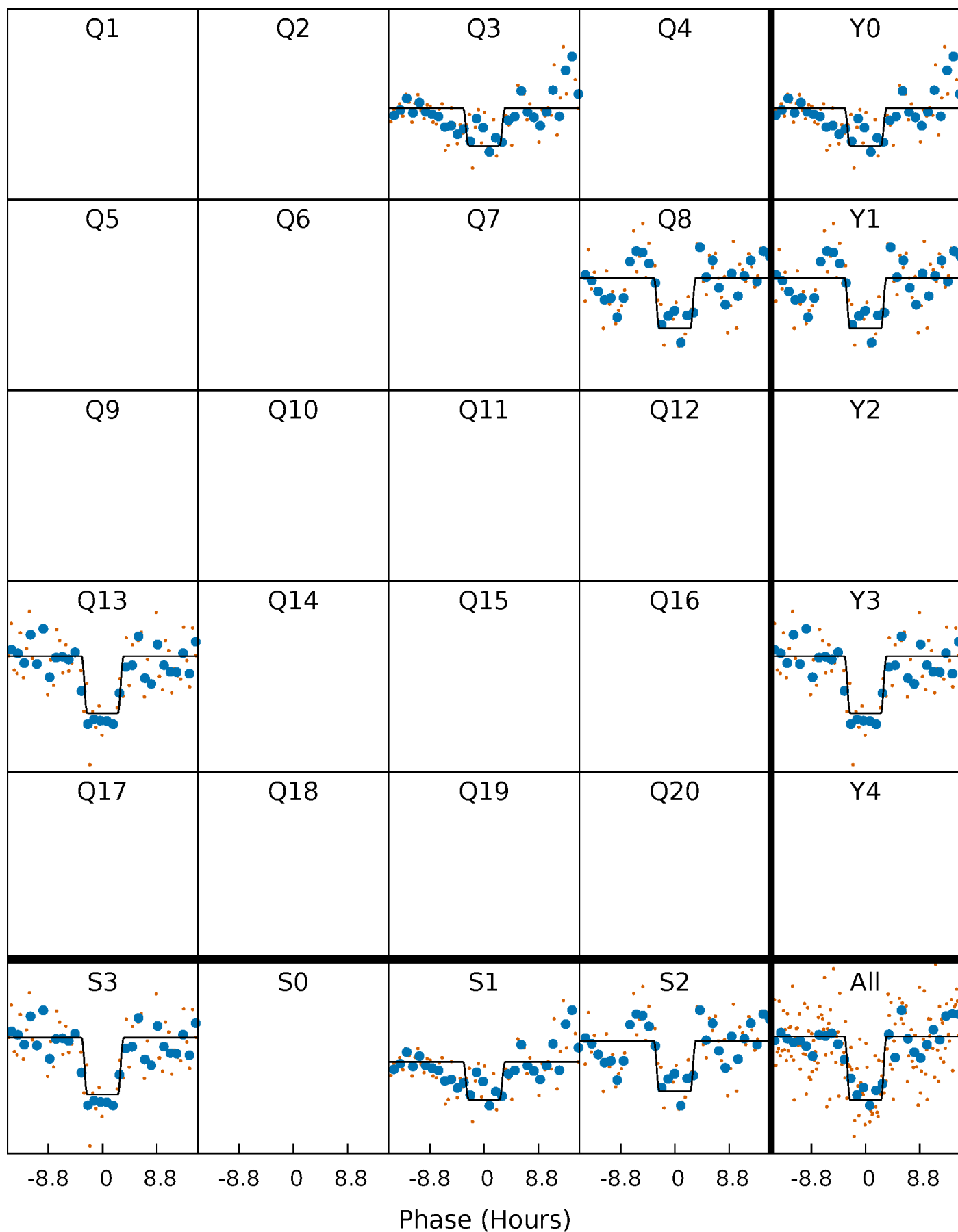
# DV Quarter-Phased Transit Curves

TCE 003953212-01 P=440.198398 Days  $T_0=304.810275$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

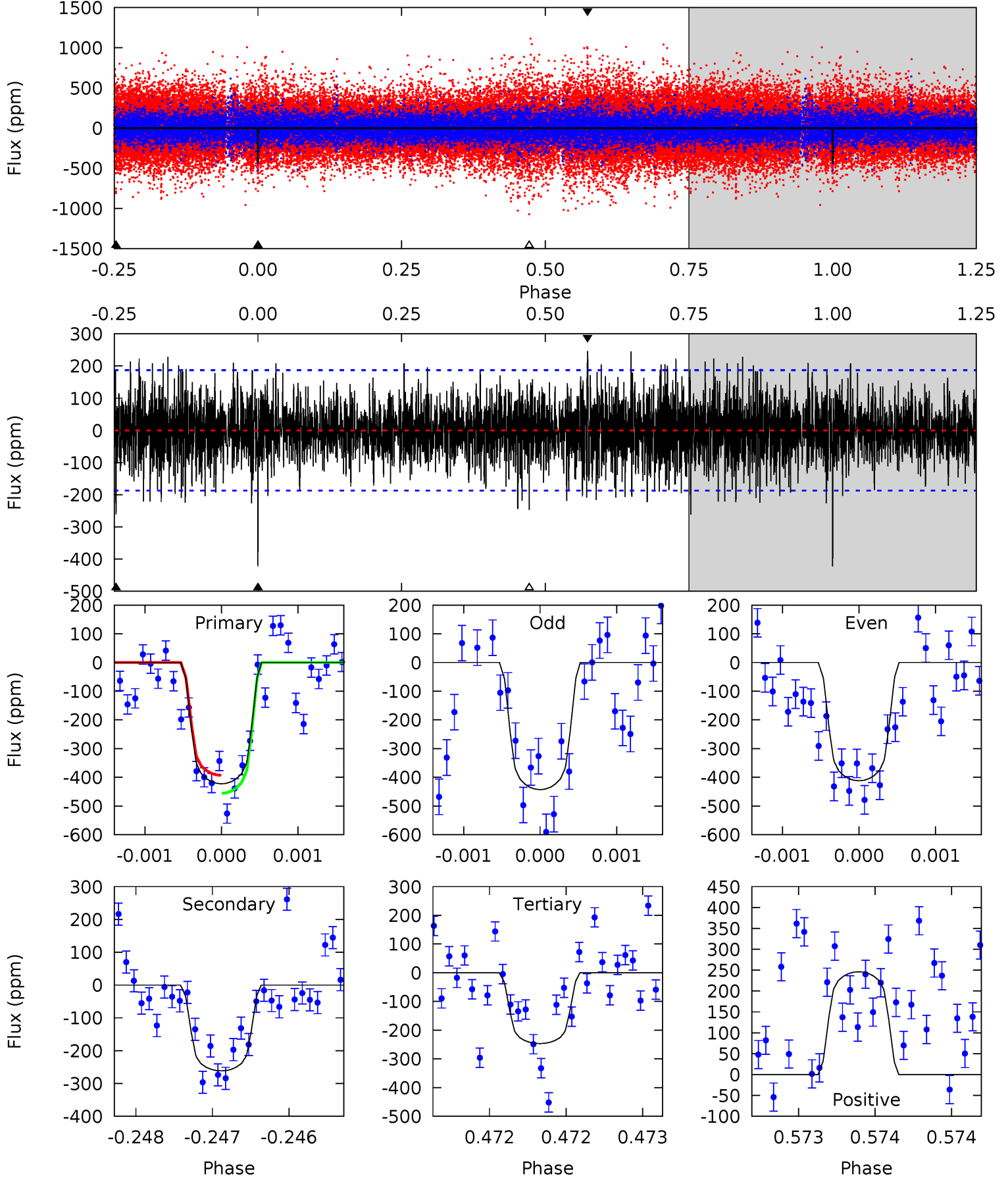
TCE 003953212-01 P=440.213805 Days  $T_0=304.785109$  (BKJD)



# DV Model-Shift Uniqueness Test

003953212-01, P = 440.198398 Days, E = 304.810275 Days

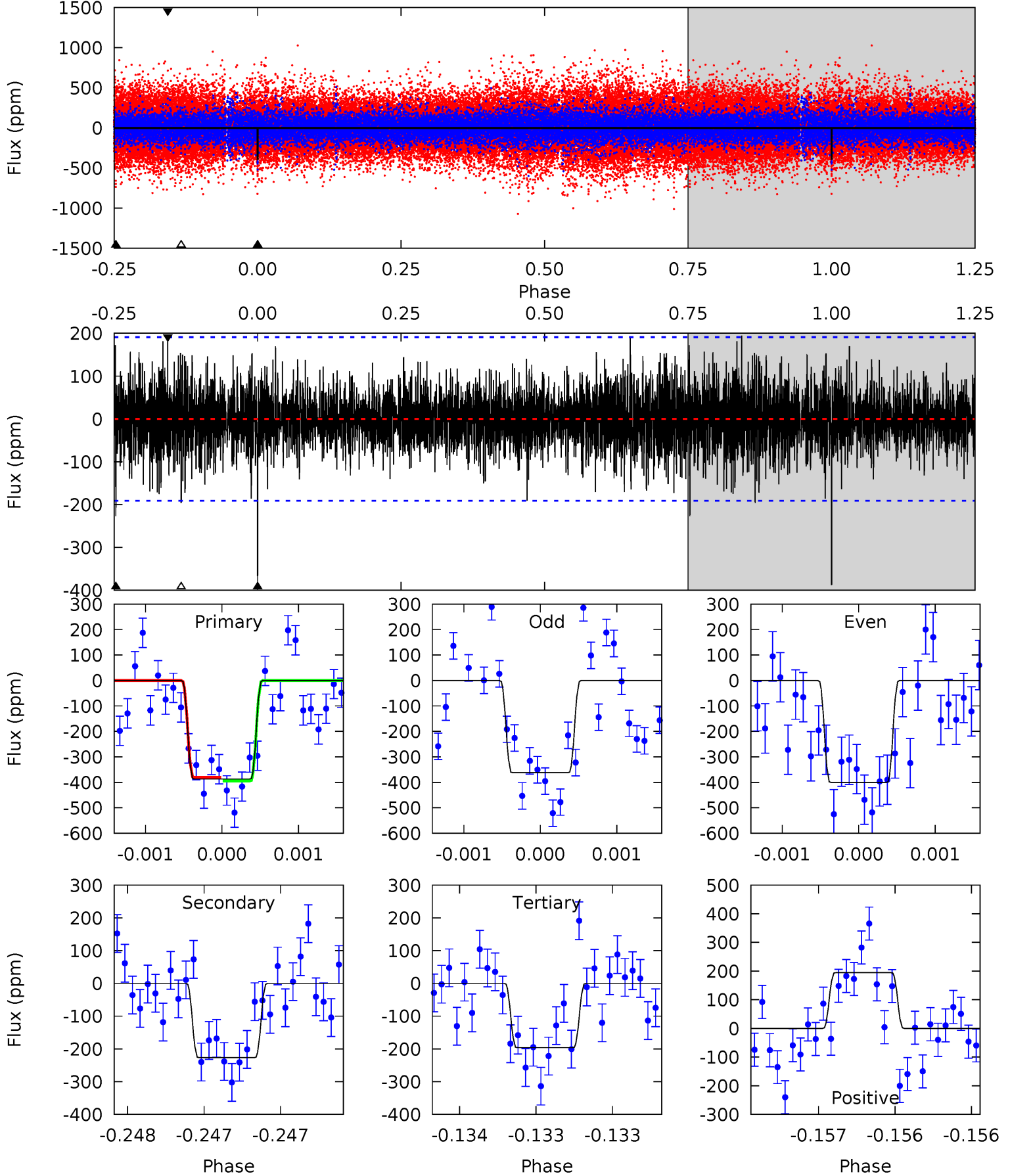
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.5	7.71	7.27	7.25	5.51	3.39	2.05	5.18	5.20	0.44	0.45	0.43	0.96	0.37	0.93



# Alt Model-Shift Uniqueness Test

003953212-01, P = 440.213805 Days, E = 304.785109 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
11.2	6.57	5.69	5.64	5.53	3.42	1.50	5.54	5.59	0.88	0.93	0.53	1.08	0.33	0.21



### Stellar Parameters For KIC 003953212

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6067^{+164}_{-182}$	$4.307^{+0.180}_{-0.180}$	$-0.380^{+0.300}_{-0.300}$	$1.116^{+0.318}_{-0.238}$	$0.922^{+0.130}_{-0.095}$	$0.934^{+0.863}_{-0.448}$
	+3%/-3%	+4%/-4%	+79%/-79%	+28%/-21%	+14%/-10%	+92%/-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 003953212-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-262 \pm 34$	$2.94^{+0.53}_{-0.48}$	$376^{+29}_{-27}$	$5047^{+321}_{-294}$	$20165^{+9210}_{-5891}$
Alt.	$-227 \pm 34$	$2.52^{+0.51}_{-0.41}$	$376^{+29}_{-26}$	$5194^{+376}_{-302}$	$23394^{+10513}_{-7138}$

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

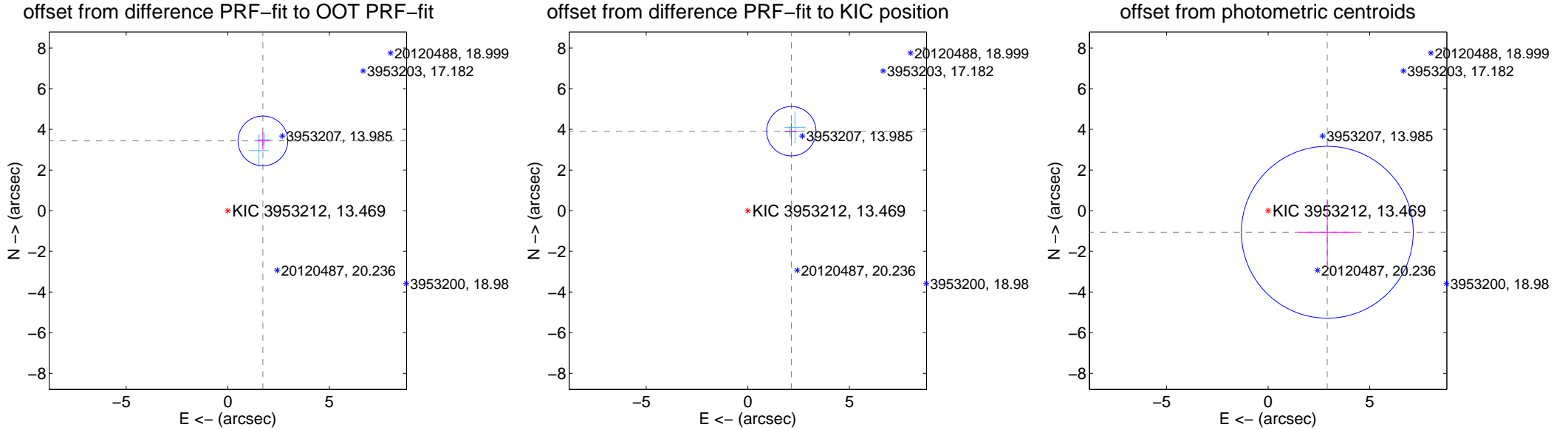
## DV Centroid Data

Supplemental centroid analysis for 003953212-01. Kepler magnitude: 13.47. Transit SNR 7.94

There are 2 quarters with good PRF difference image offsets

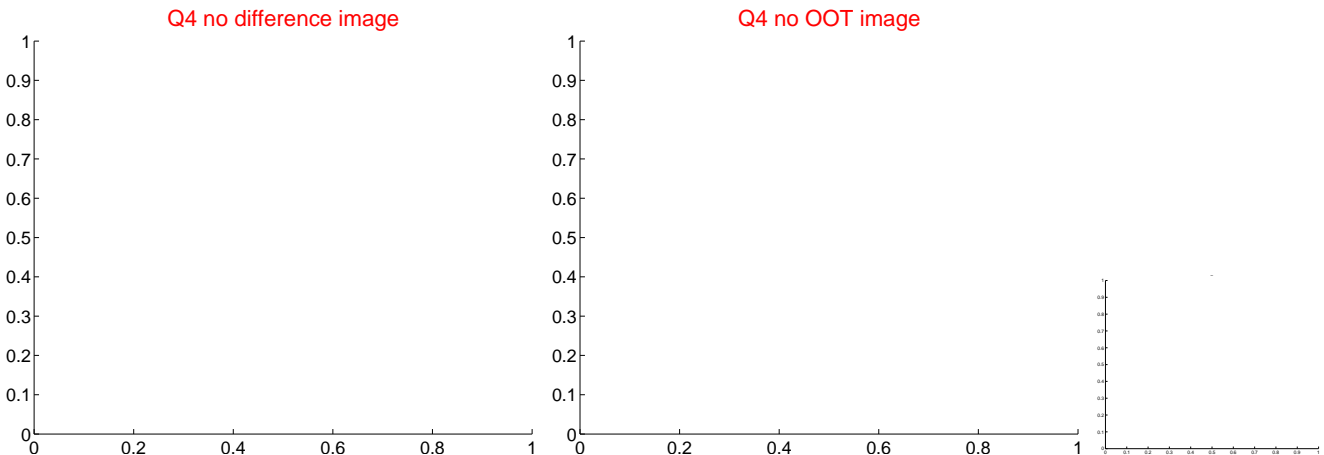
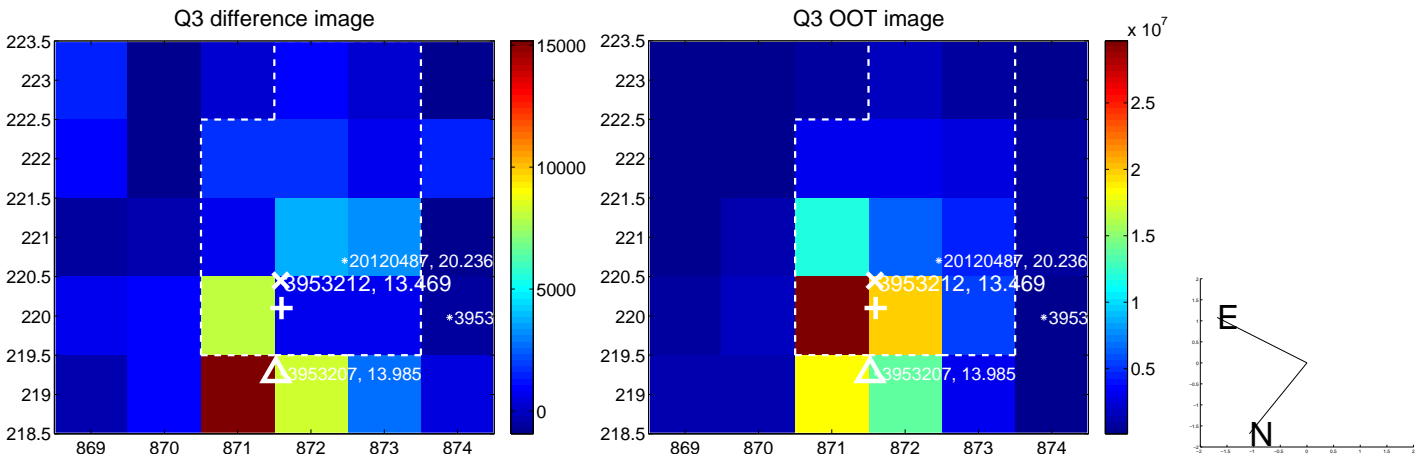
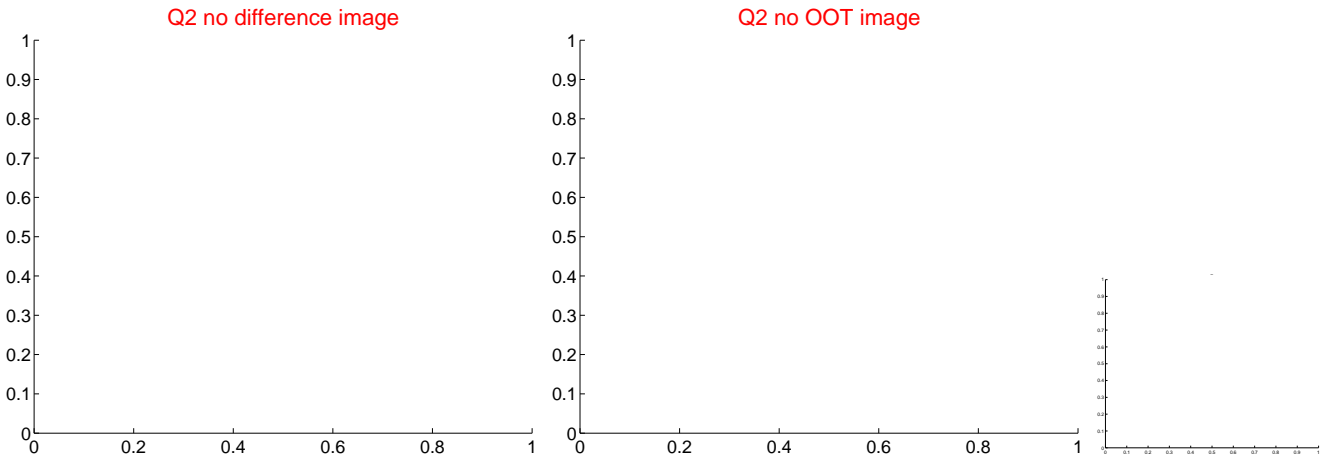
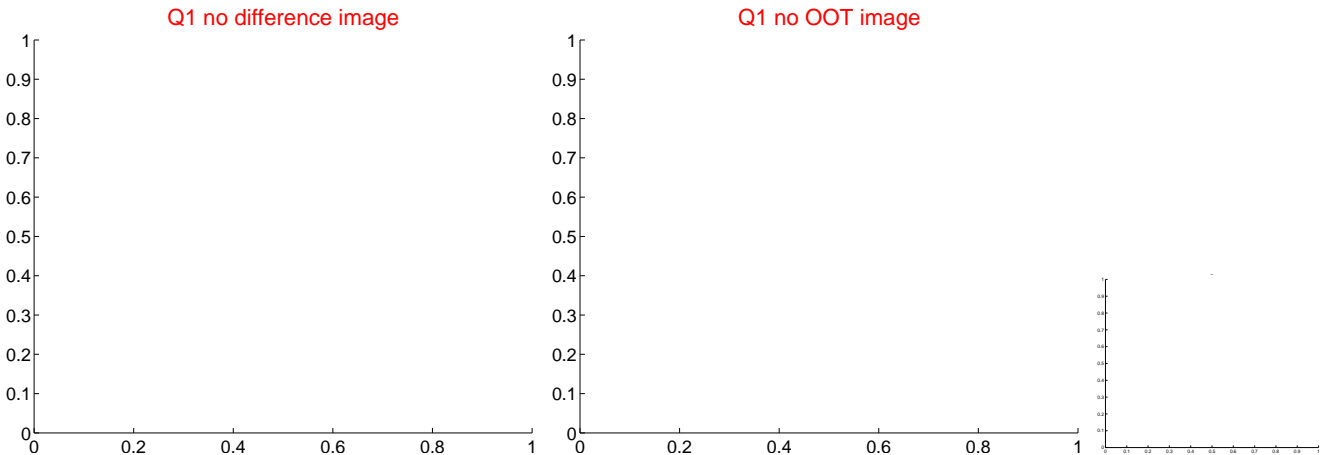
The direct PRF centroid is offset from the target star catalog position by about 0.48 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$3.841 \pm 0.408$	9.42	$-1.725 \pm 0.308$	$3.432 \pm 0.429$
PRF-fit source offset from KIC position	$4.456 \pm 0.405$	11.01	$-2.139 \pm 0.308$	$3.909 \pm 0.429$
photometric centroid source offset	$3.10 \pm 1.41$	2.20	$-2.91 \pm 1.38$	$-1.06 \pm 1.61$



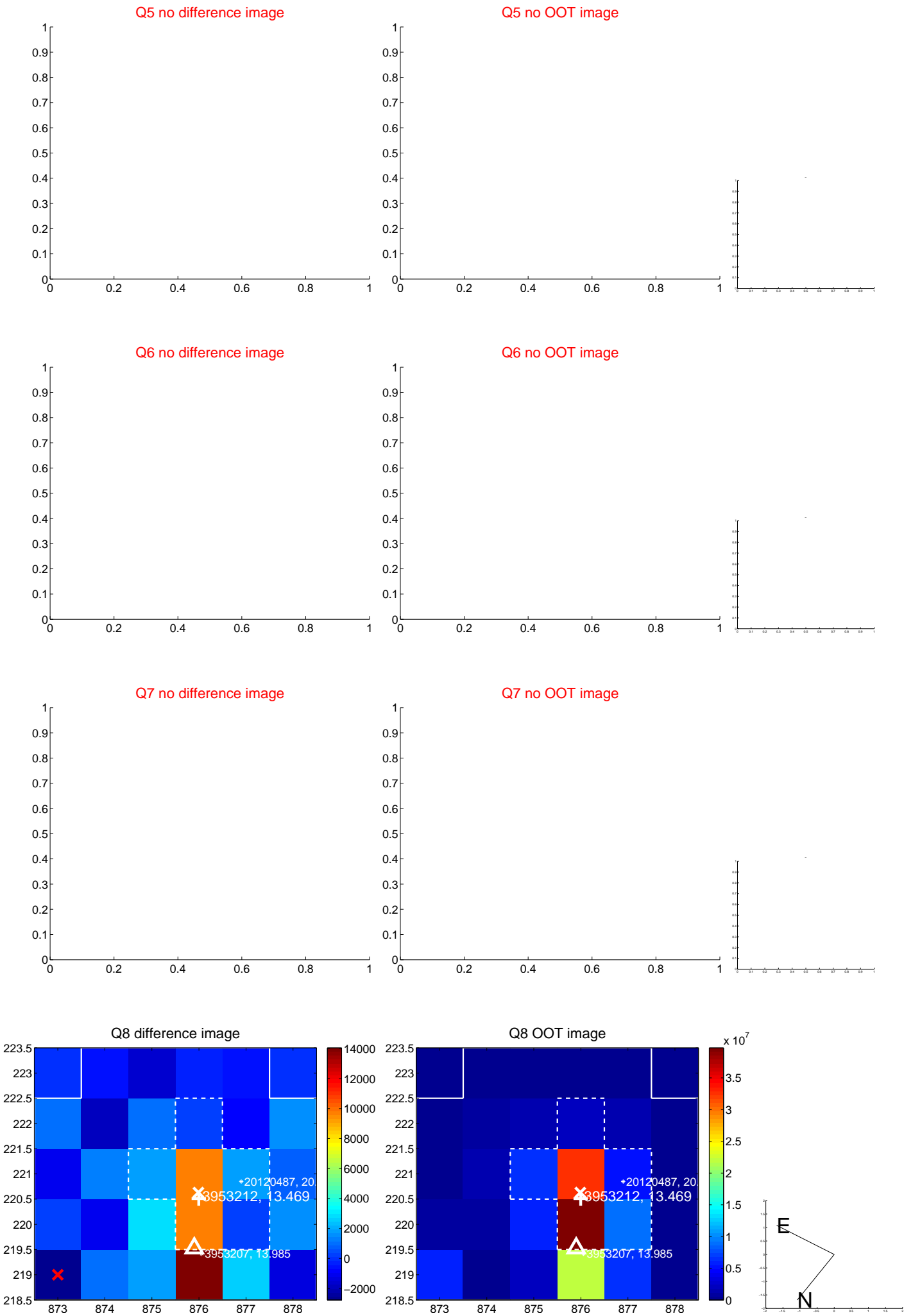
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

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





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



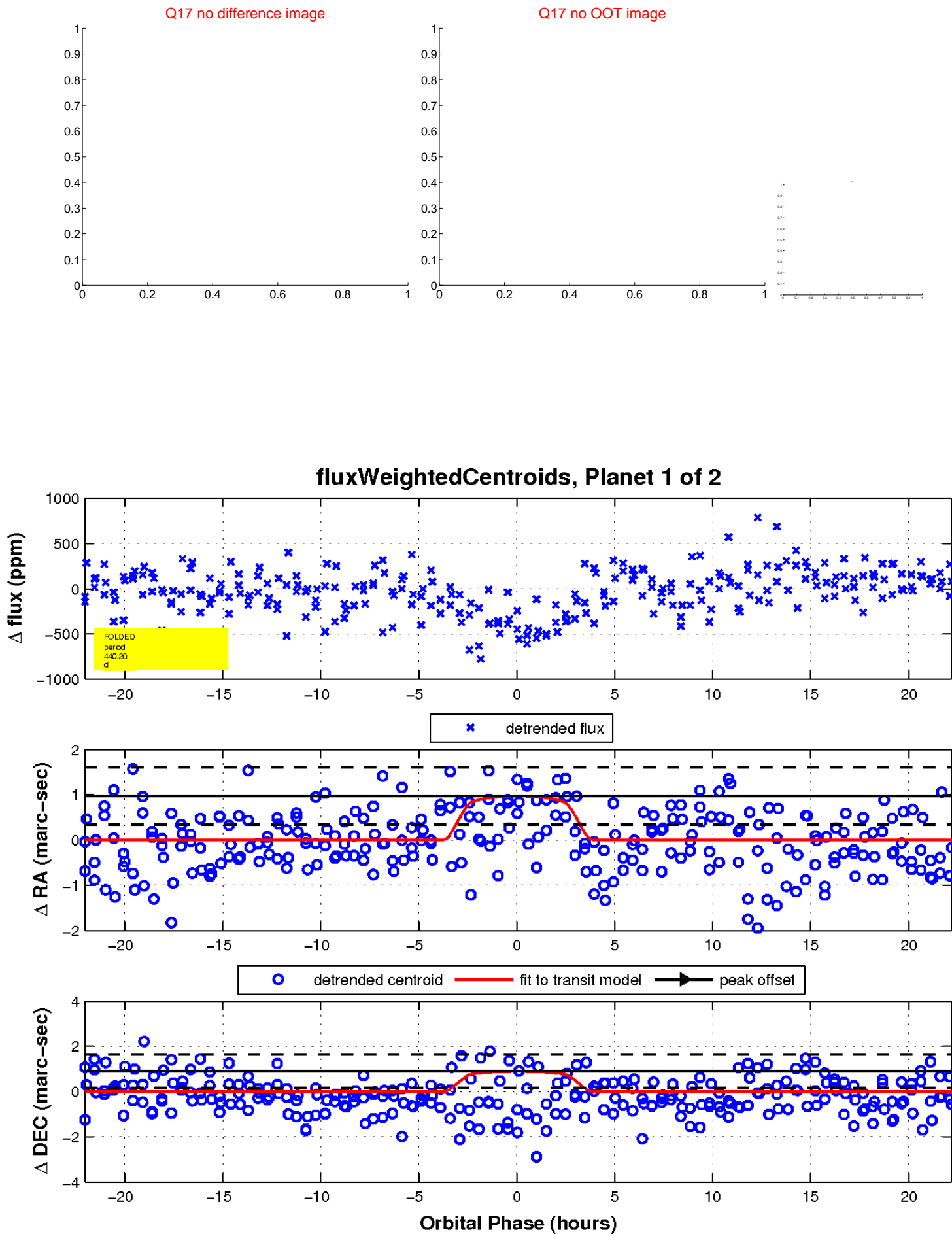
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

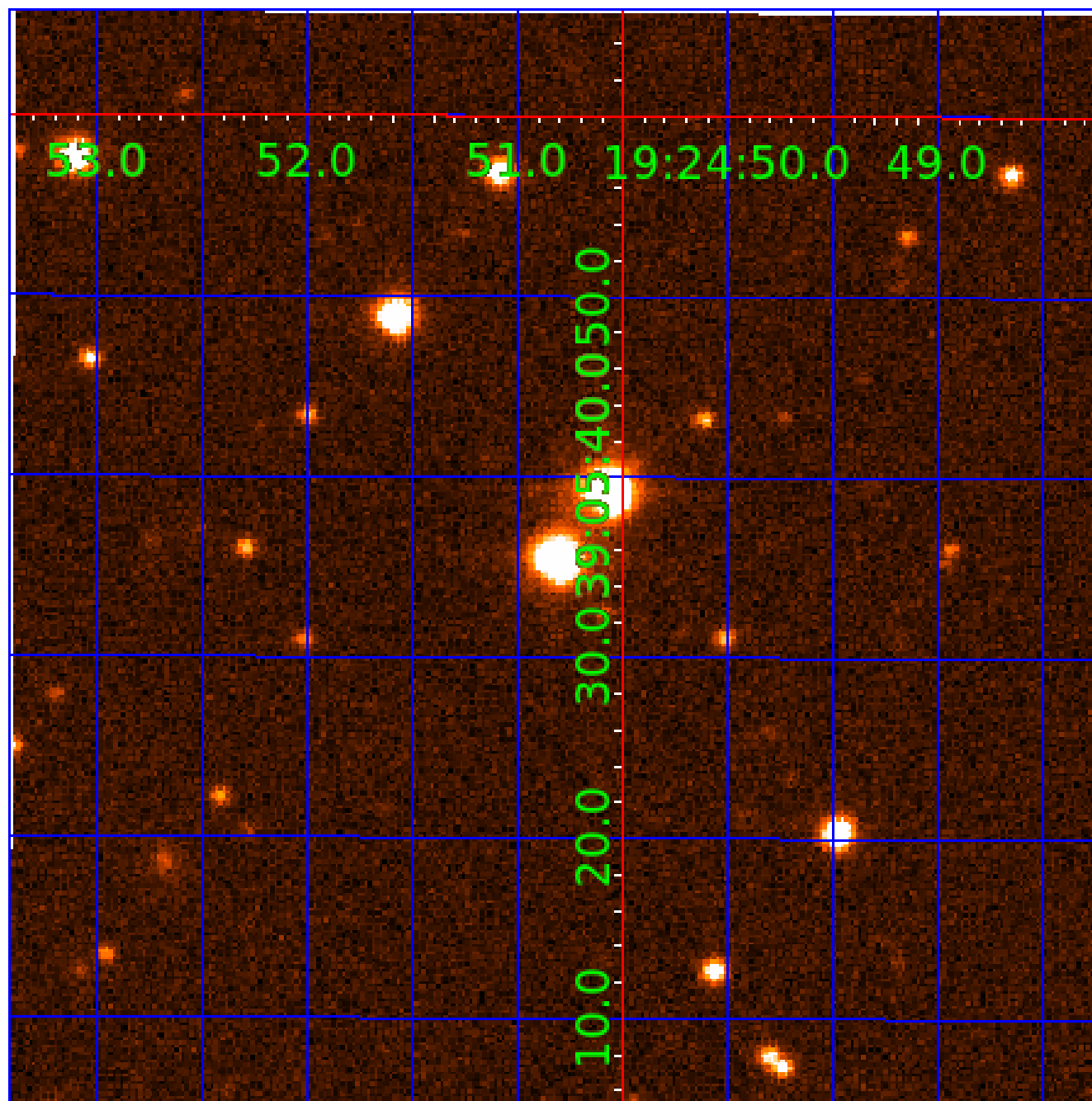


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 003953212

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
003953212-01	OBS	No	440.198398	304.810275	456.6	7.457	7.4	7.9	1.12	6067	2.93	1.25
003953212-02	OBS	No	493.106222	511.391564	489.0	7.048	7.5	8.0	1.12	6067	2.71	1.07

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003953212-01	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_MARSHALL—MOD_NONUNIQU_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
003953212-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—ALL_TRANS_CHASES—MOD_NONUNIQU_ALT—MOD_TER_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS

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

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

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

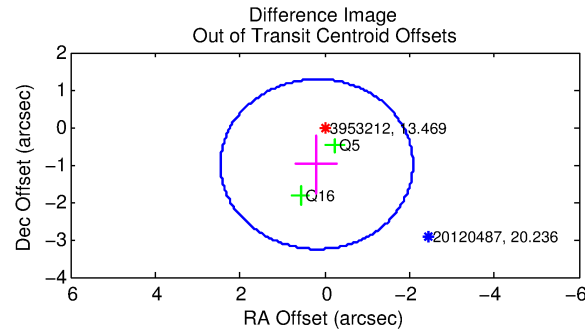
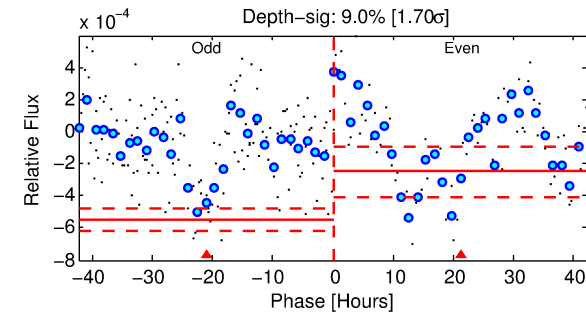
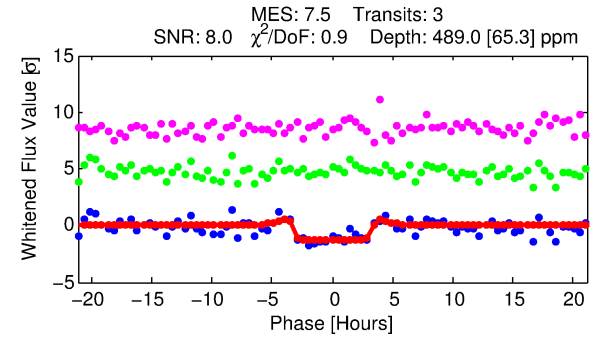
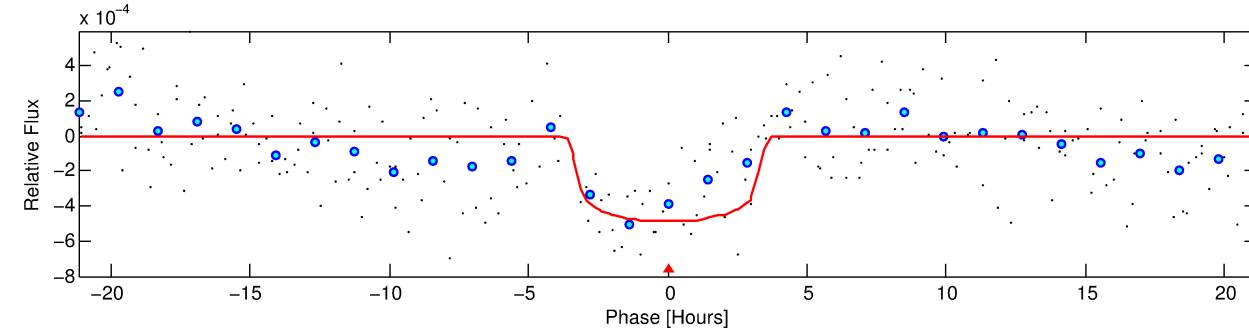
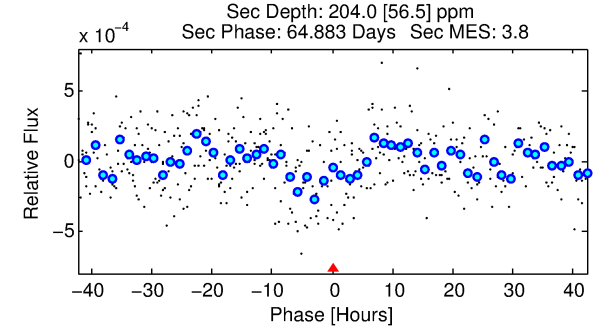
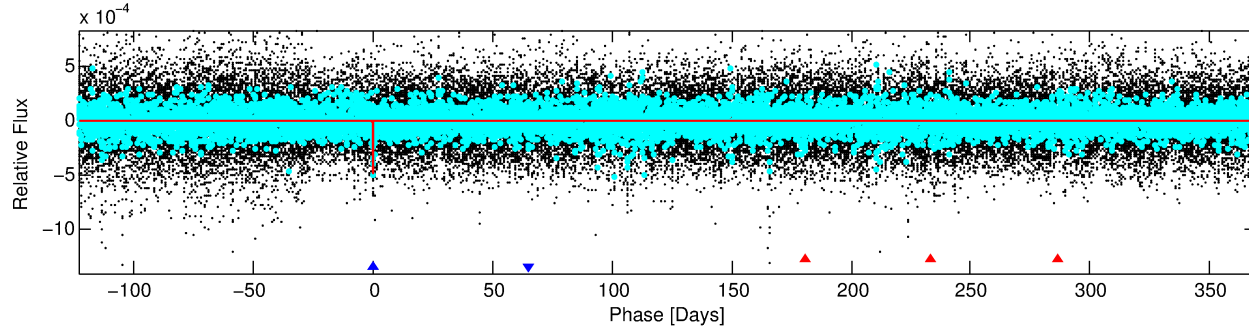
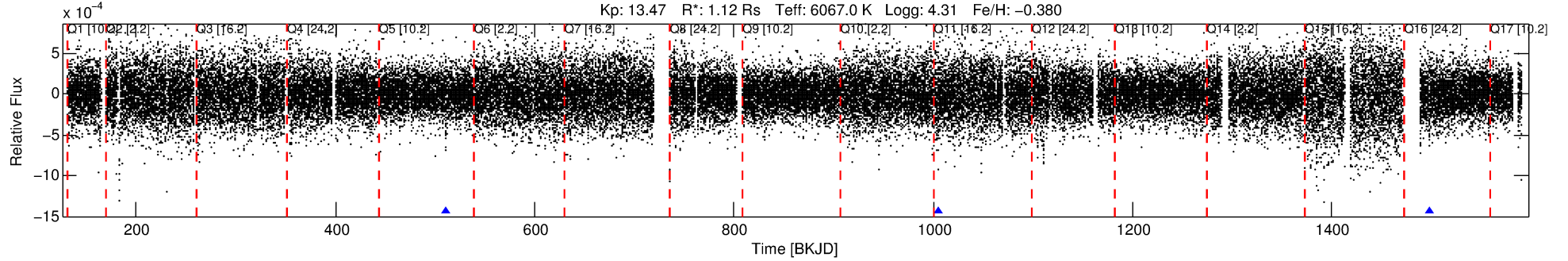
## Ephemeris Match Information For 003953212-02

No Significant Match Found

# DV One-Page Summary

KIC: 3953212 Candidate: 2 of 2 Period: 493.106 d  
KOI: K05026 Corr: No Ephemeris Match

Kp: 13.47 R\*: 1.12 Rs Teff: 6067.0 K Logg: 4.31 Fe/H: -0.380



## DV Fit Results:

Period = 493.10622 [0.00775] d  
Epoch = 511.3916 [0.0119] BKJD  
Rp/R\* = 0.0223 [0.0079]  
a/R\* = 351.17 [616.07]  
b = 0.78 [0.87]  
Seff = 1.07 [0.38]  
Teq = 259 [23] K  
Rp = 2.71 [1.23] Re  
a = 1.1888 [0.2792] AU  
Ag = 21590.43 [17959.45] [1.20σ]  
Teffp = 4860 [936] K [4.91σ]

## DV Diagnostic Results:

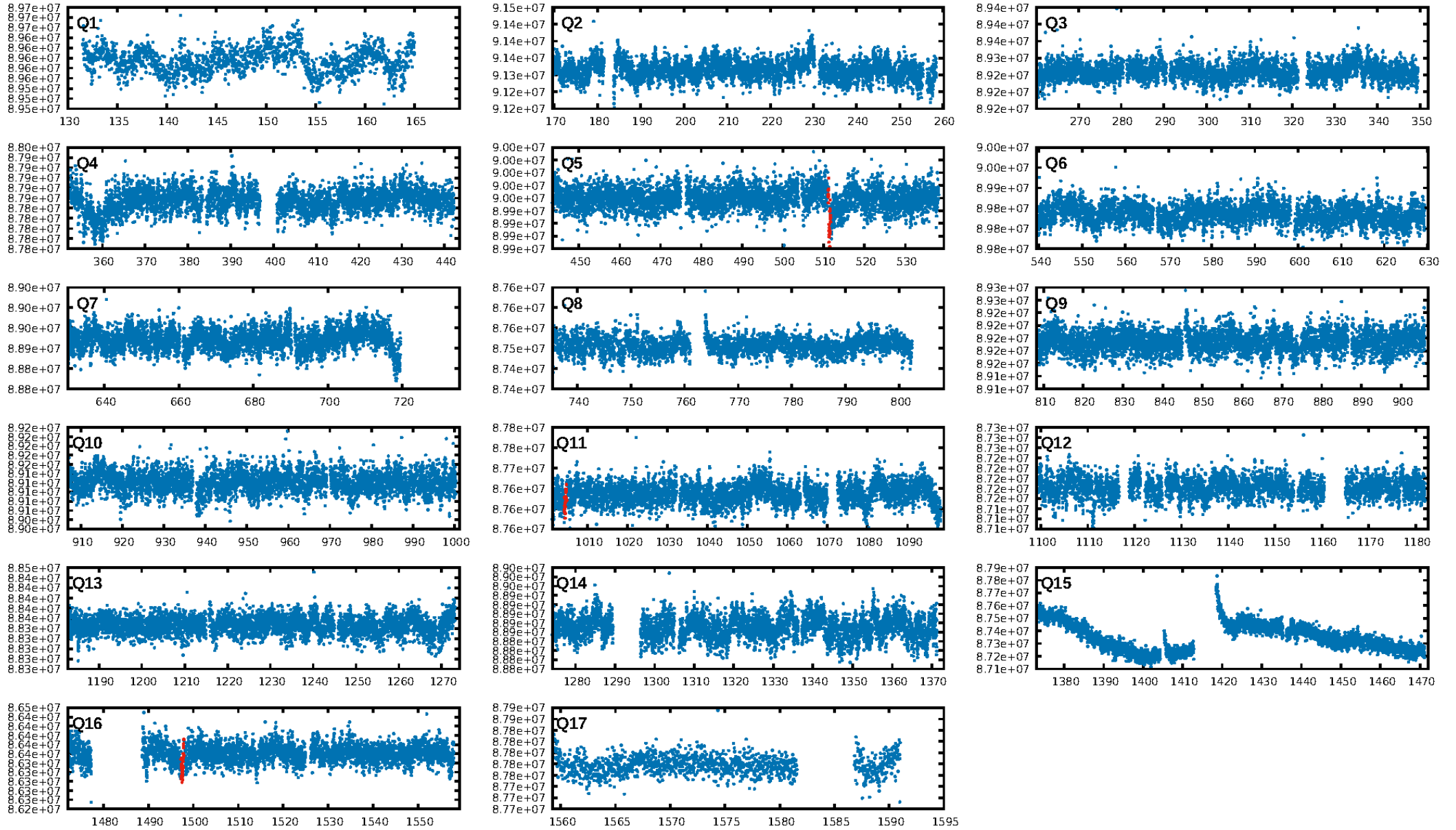
ShortPeriod-sig: 100.0% [123.76σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 12.9%  
ModelChiSquareGof-sig: 99.6%  
**Bootstrap-pfa: 4.14e-10**  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -52.8  
Centroid-sig: 1.5%  
Centroid-so: 3.243 arcsec [2.64σ]  
OotOffset-rm: 1.006 arcsec [1.33σ]  
OotOffset-st: 0/0/1/1 [2]  
KicOffset-rm: 0.683 arcsec [0.51σ]  
KicOffset-st: 0/0/1/1 [2]  
DiffImageQuality-fgm: 1.00 [2/2]  
DiffImageOverlap-fno: 1.00 [2/2]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 23:16:01 Z

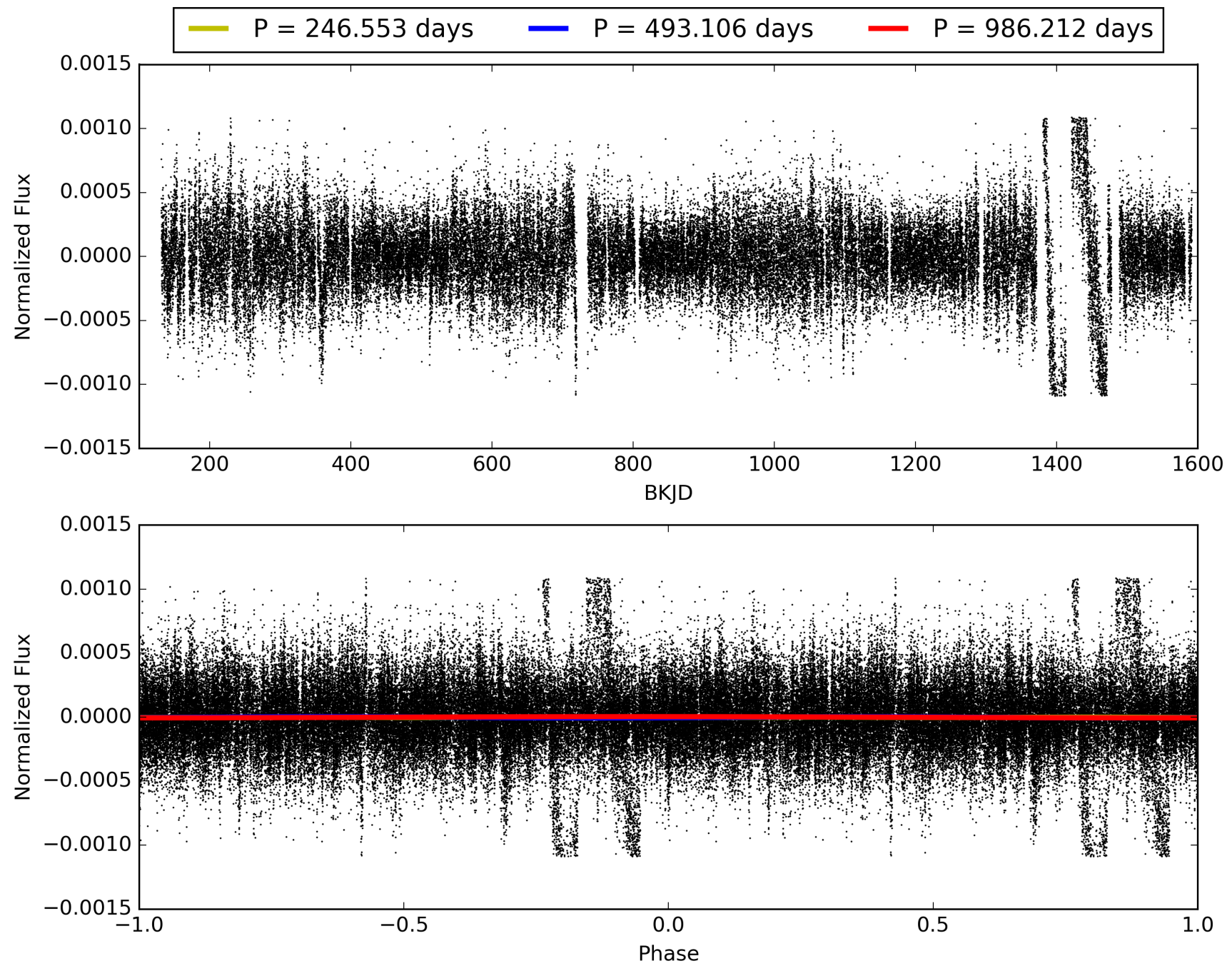
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 003953212-02, PDC Light Curves

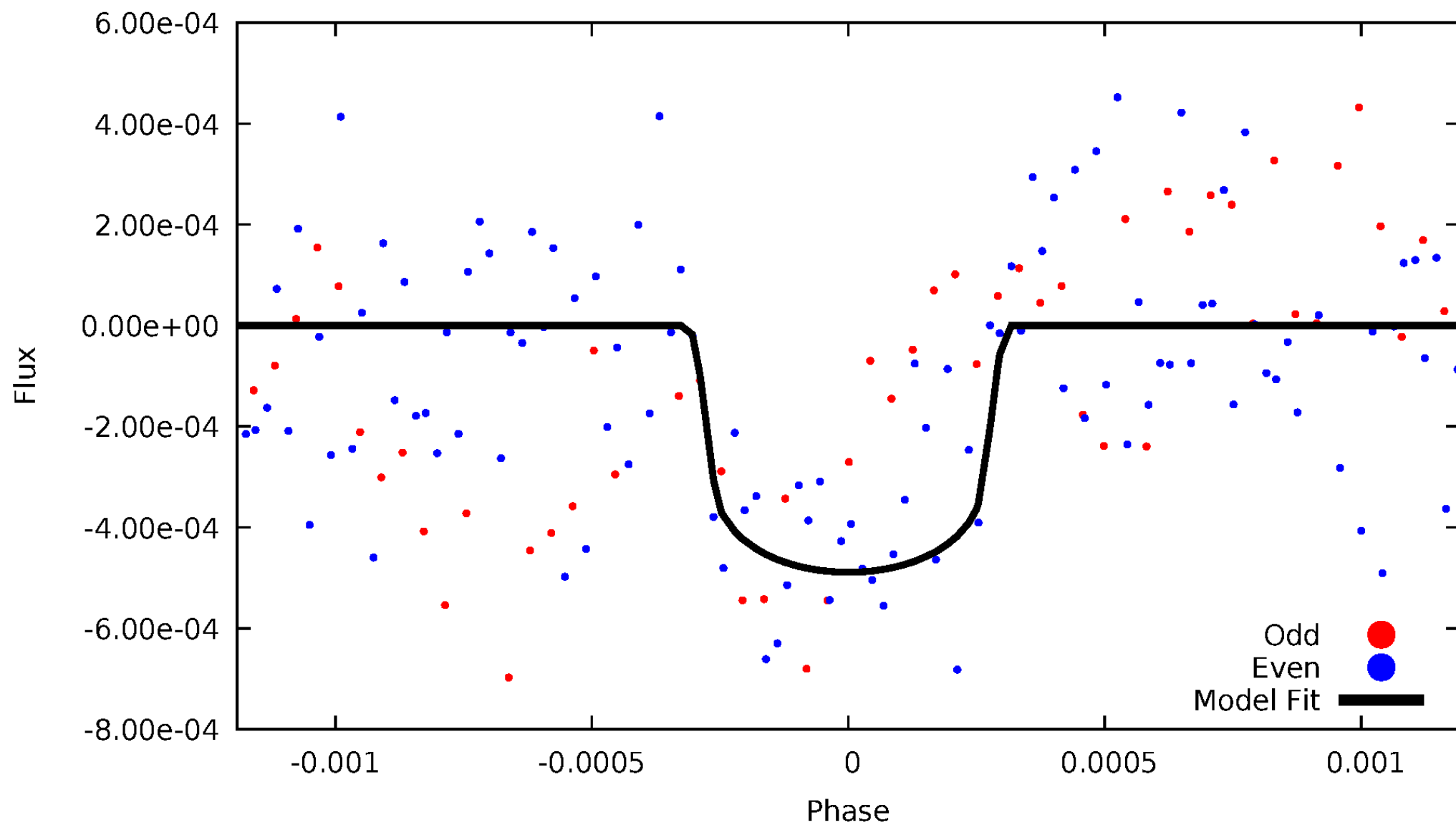


TCE 003953212-02



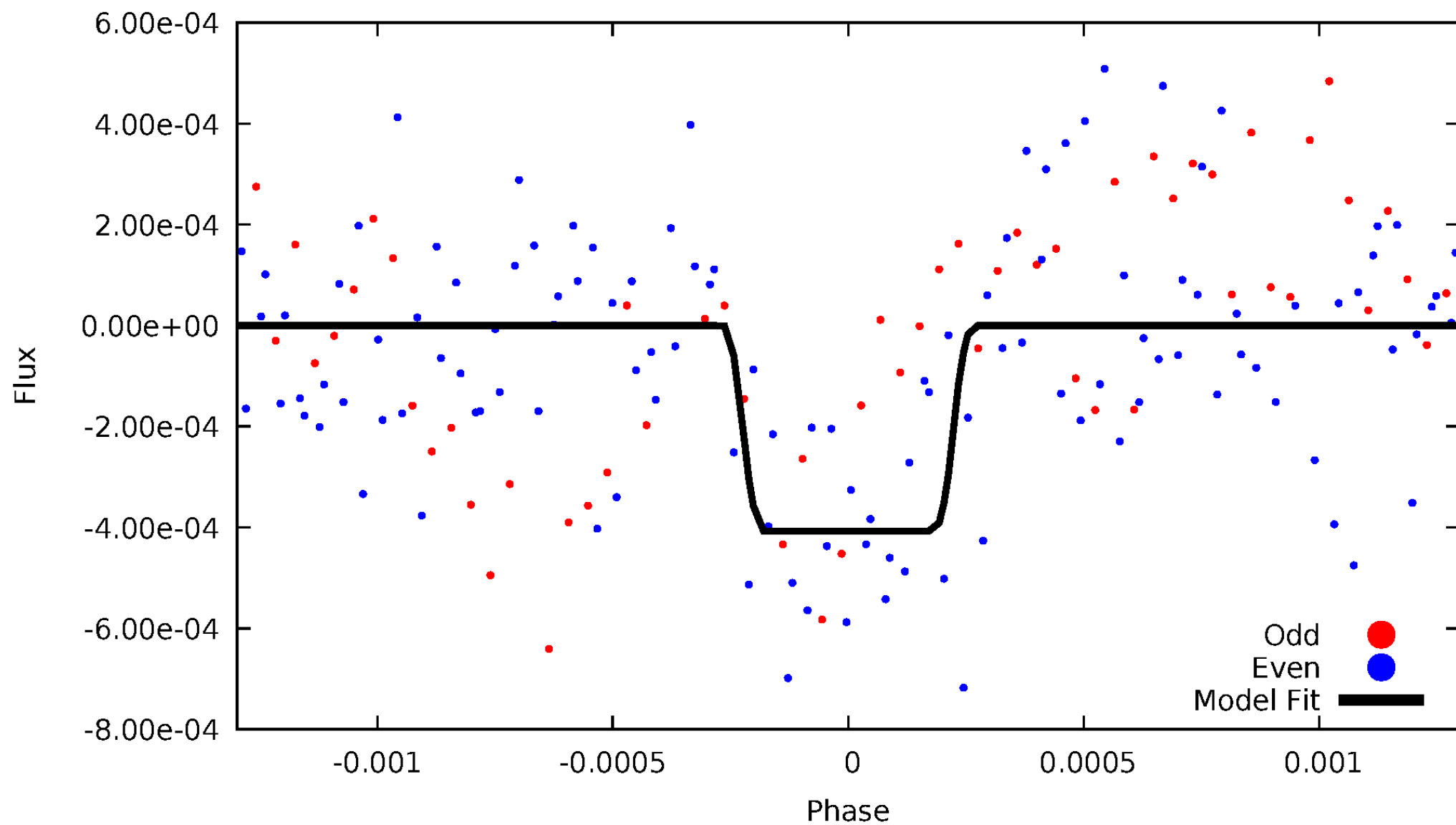
# DV Odd/Even

TCE 003953212-02



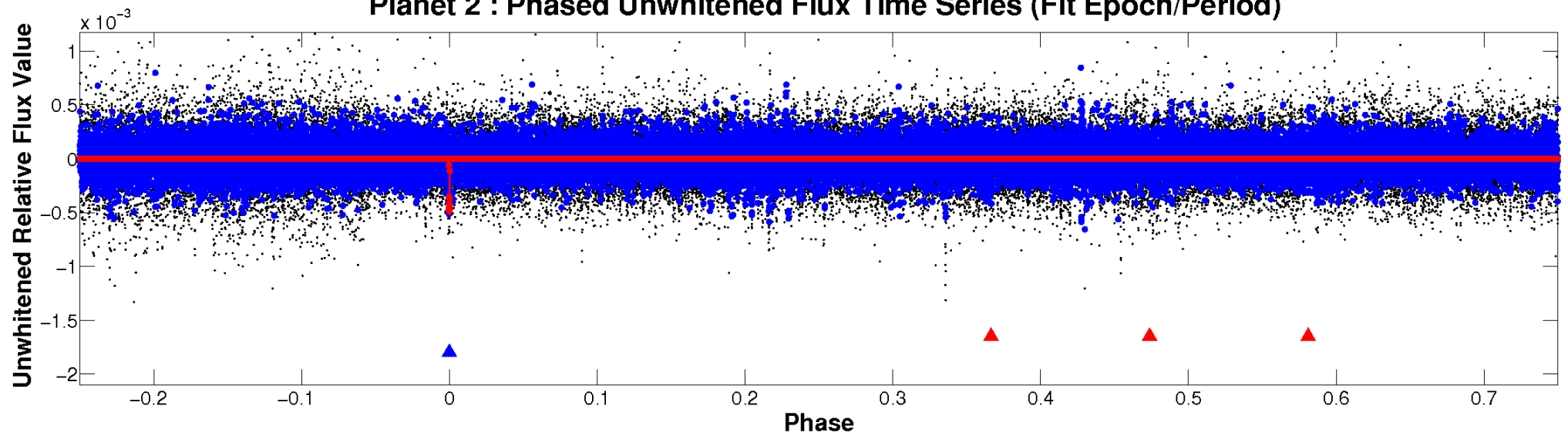
# ALT Odd/Even

TCE 003953212-02

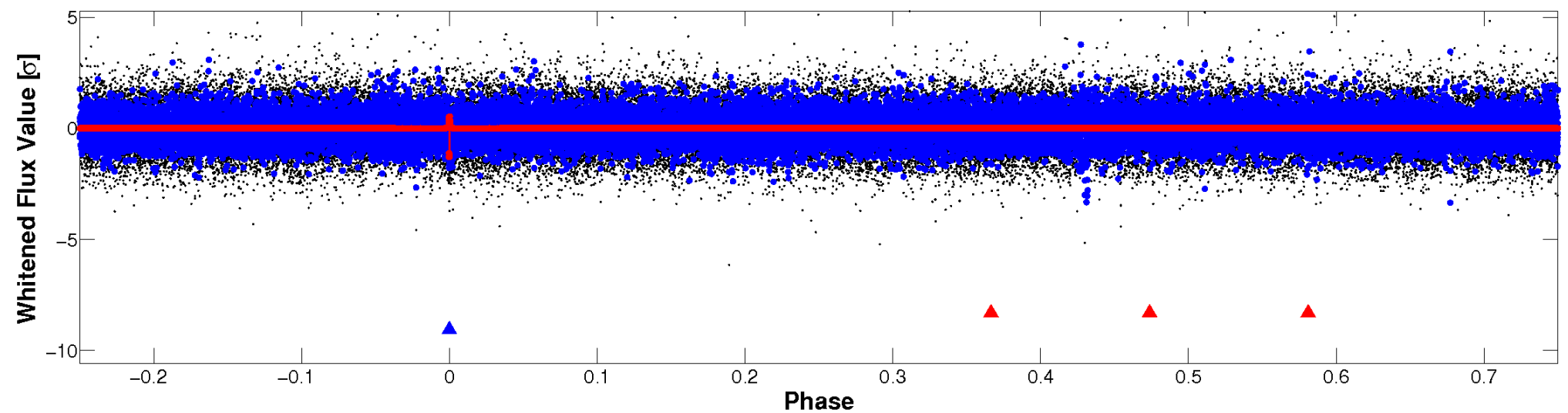


# Non-Whitened Vs. Whitened Light Curve

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

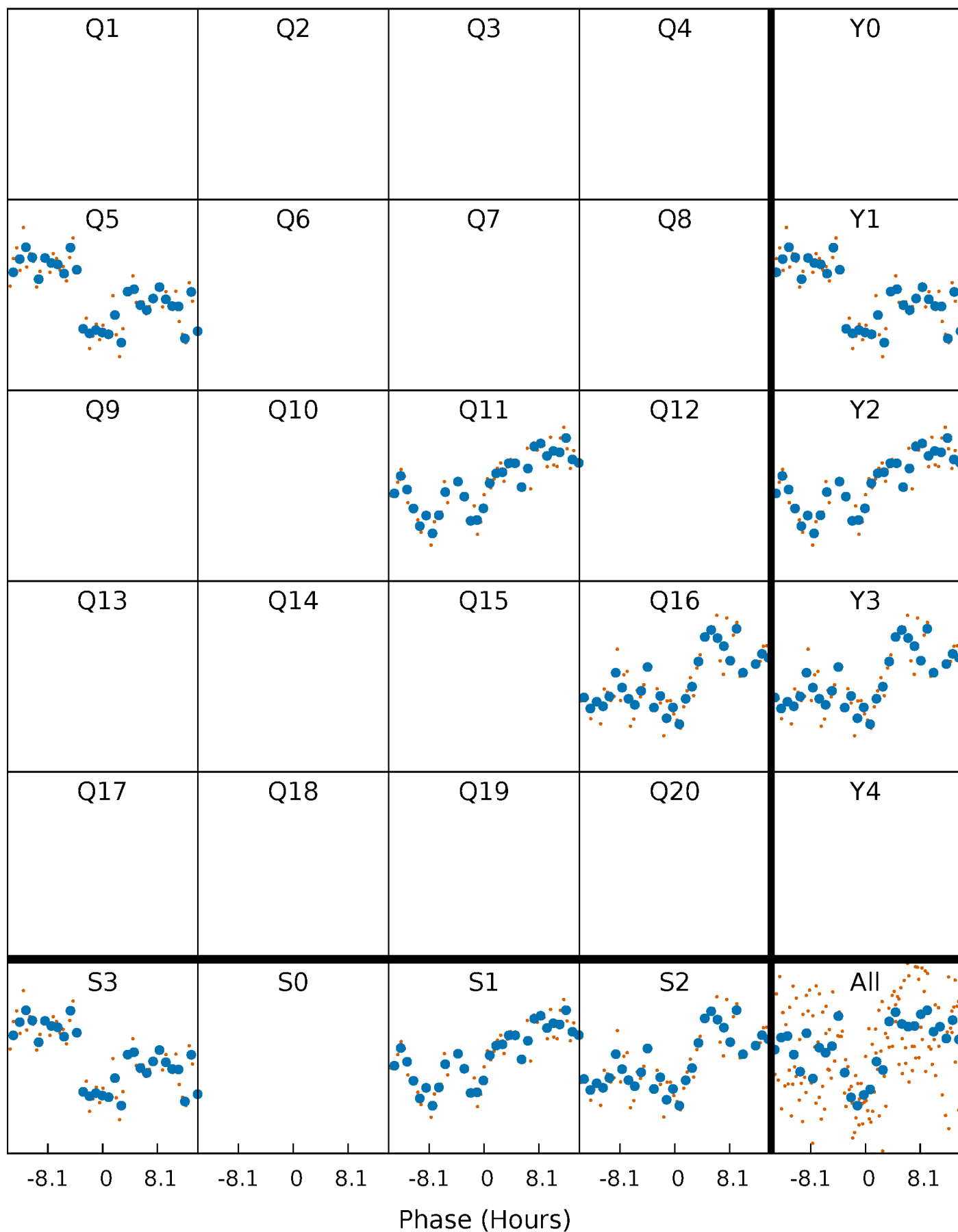


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



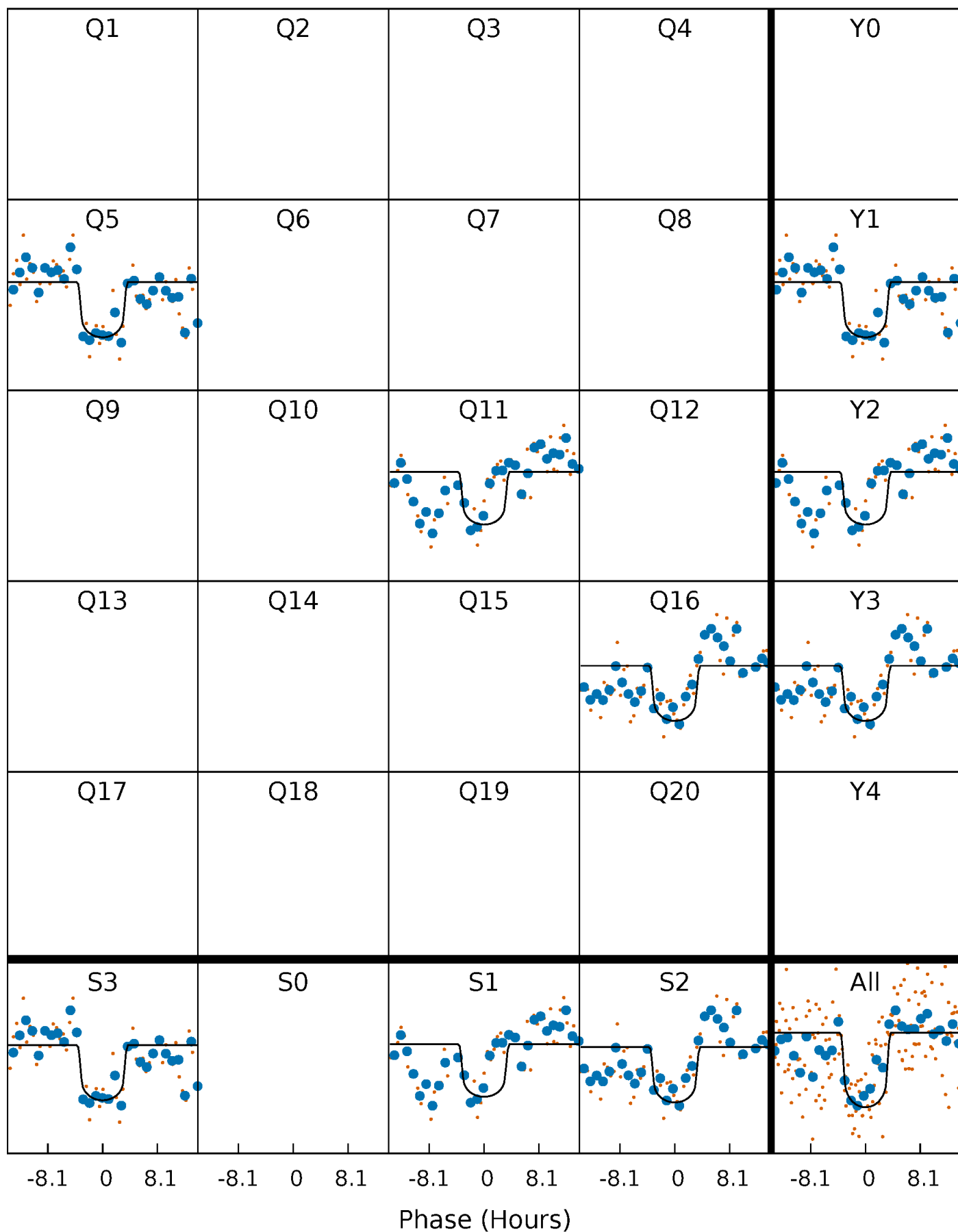
# PDC Quarter-Phased Transit Curves

TCE 003953212-02     $P=493.106222$  Days     $T_0=511.391564$  (BKJD)



# DV Quarter-Phased Transit Curves

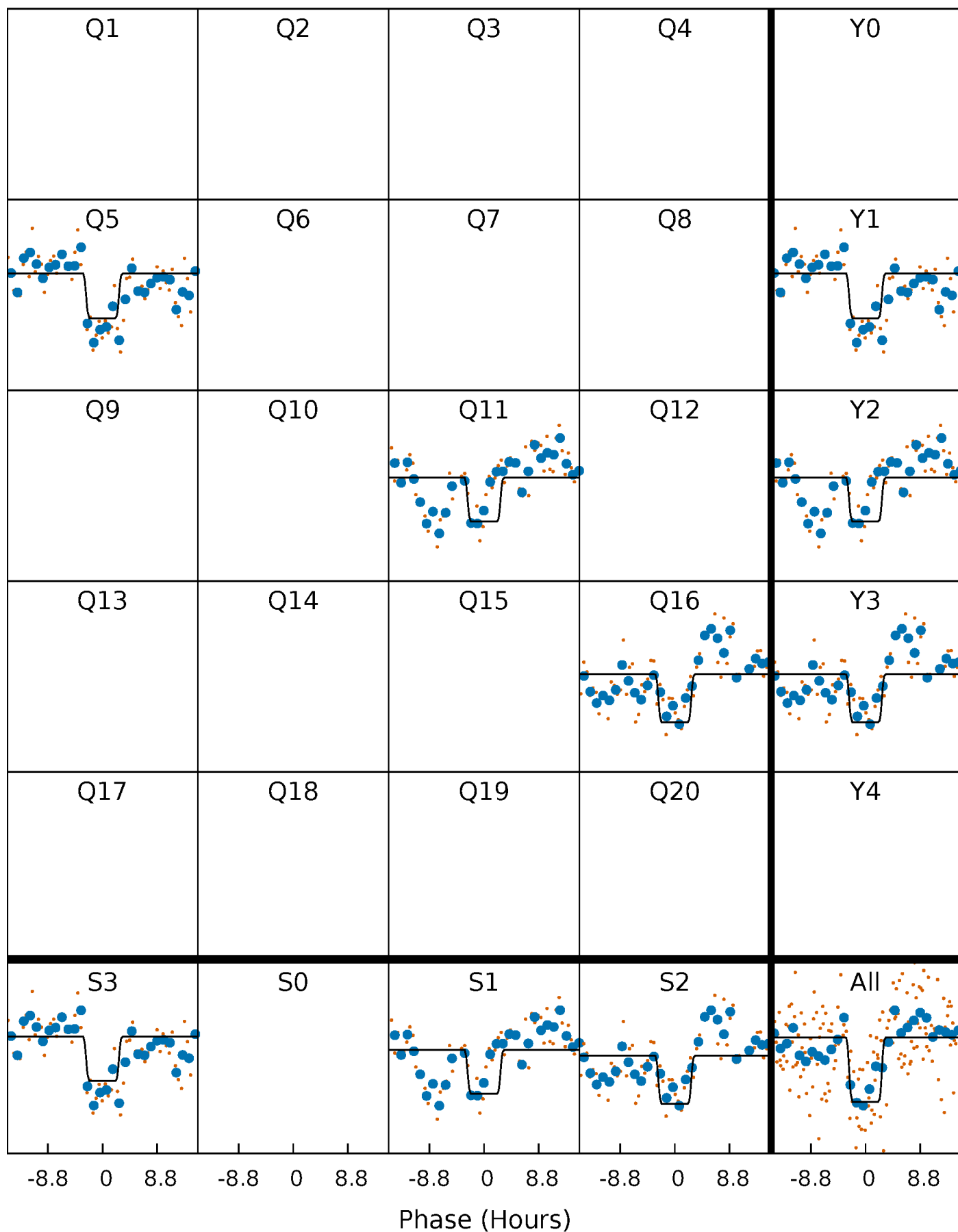
TCE 003953212-02 P=493.106222 Days  $T_0=511.391564$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

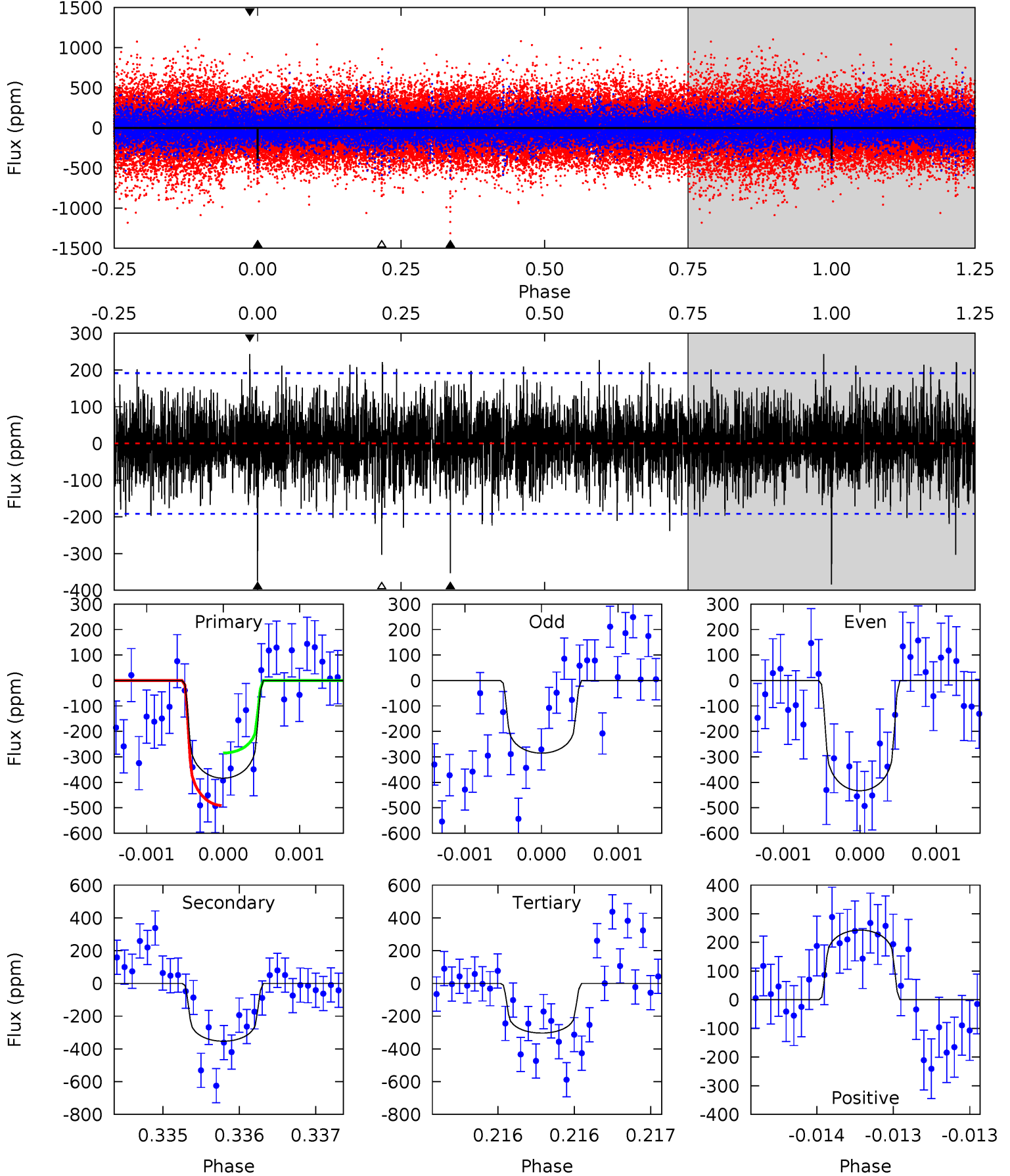
TCE 003953212-02 P=493.109481 Days  $T_0=511.375564$  (BKJD)



# DV Model-Shift Uniqueness Test

003953212-02, P = 493.106222 Days, E = 18.285342 Days

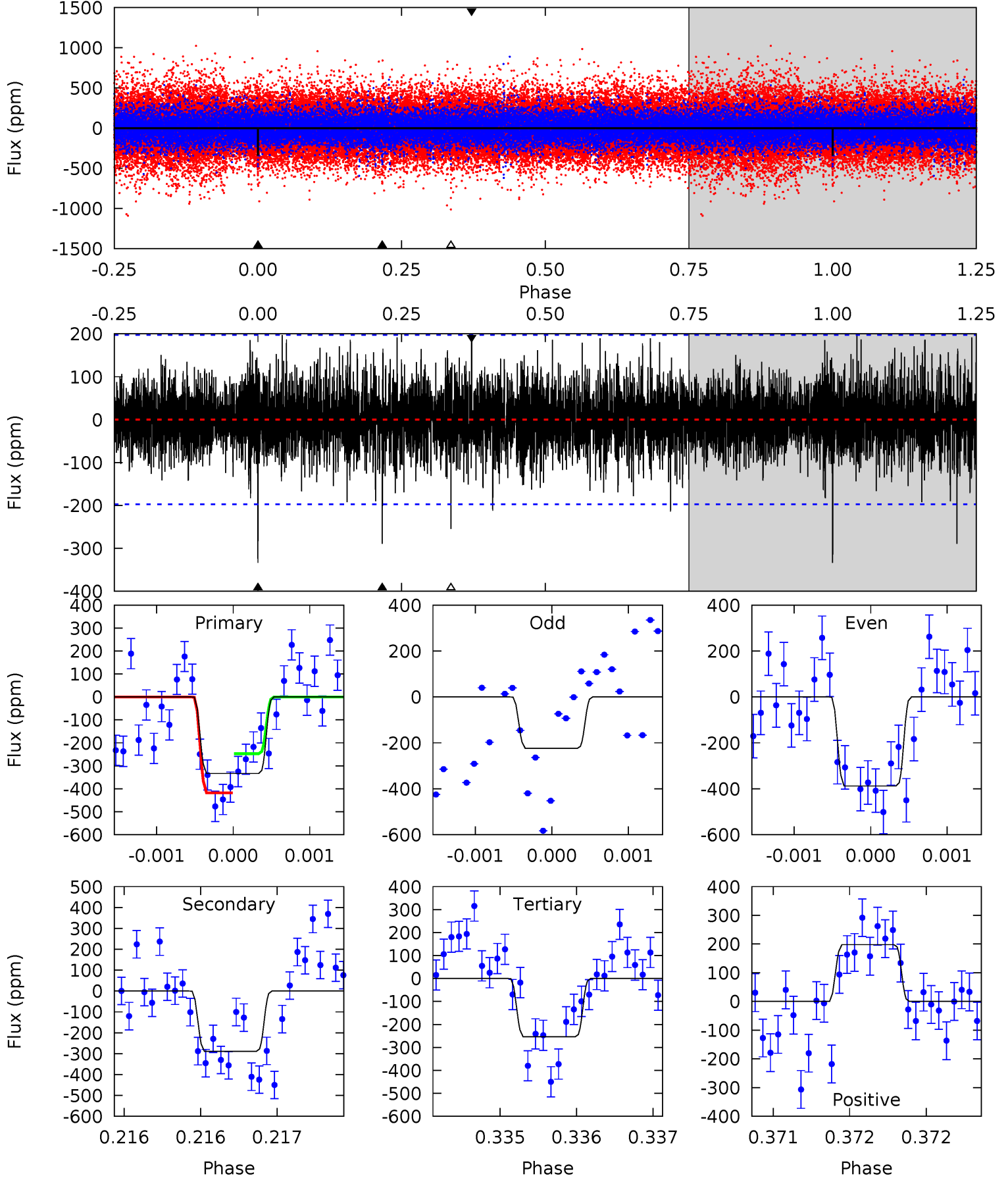
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.1	10.2	8.78	7.04	5.54	3.43	1.92	2.32	4.06	1.44	3.18	2.06	1.02	0.39	2.97



# Alt Model-Shift Uniqueness Test

003953212-02, P = 493.109481 Days, E = 18.266083 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
9.41	8.15	7.18	5.59	5.57	3.47	1.57	2.24	3.82	0.98	2.56	2.24	1.21	0.37	2.40



### Stellar Parameters For KIC 003953212

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6067^{+164}_{-182}$	$4.307^{+0.180}_{-0.180}$	$-0.380^{+0.300}_{-0.300}$	$1.116^{+0.318}_{-0.238}$	$0.922^{+0.130}_{-0.095}$	$0.934^{+0.863}_{-0.448}$
	+3%/-3%	+4%/-4%	+79%/-79%	+28%/-21%	+14%/-10%	+92%/-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 003953212-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-353 \pm 35$	$2.75^{+1.06}_{-1.03}$	$361^{+28}_{-24}$	$5559^{+1353}_{-690}$	$36876^{+56602}_{-17768}$
Alt.	$-289 \pm 35$	$2.39^{+1.09}_{-0.92}$	$362^{+26}_{-24}$	$5612^{+1695}_{-807}$	$38968^{+70681}_{-20839}$

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

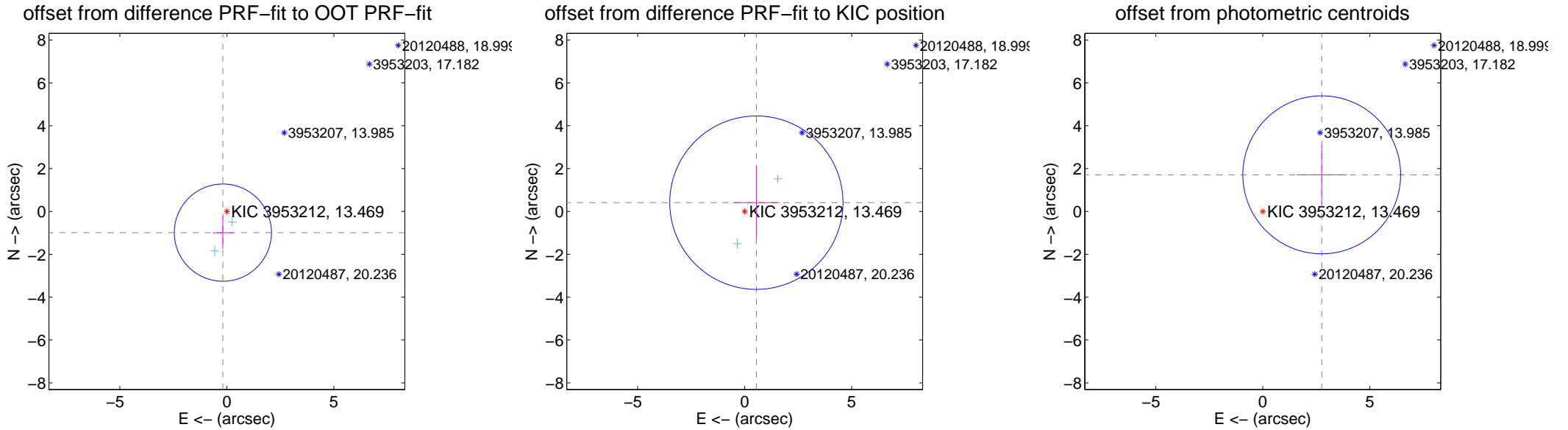
## DV Centroid Data

Supplemental centroid analysis for 003953212-02. Kepler magnitude: 13.47. Transit SNR 7.96

There are 2 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.41 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.006 \pm 0.756$	1.33	$0.185 \pm 0.478$	$-0.989 \pm 0.764$
PRF-fit source offset from KIC position	$0.683 \pm 1.349$	0.51	$-0.547 \pm 1.102$	$0.410 \pm 1.702$
photometric centroid source offset	$3.24 \pm 1.23$	2.64	$-2.76 \pm 1.16$	$1.71 \pm 1.38$

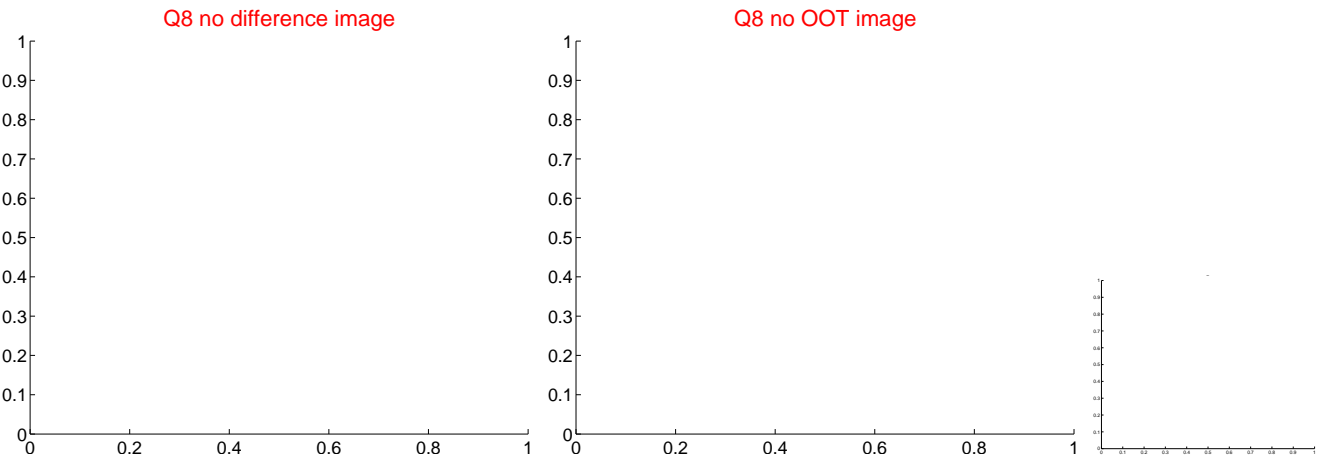
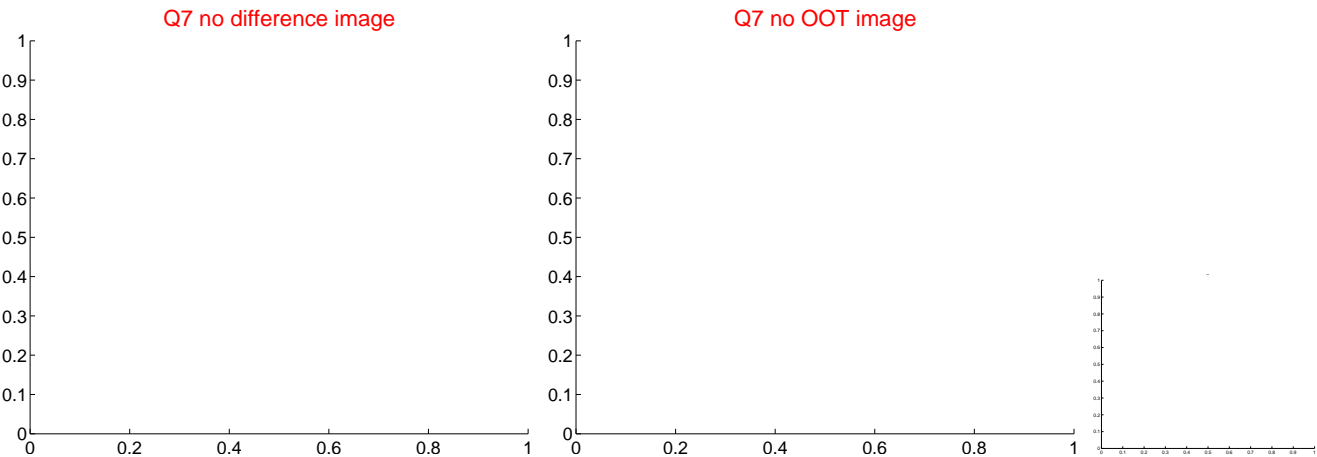
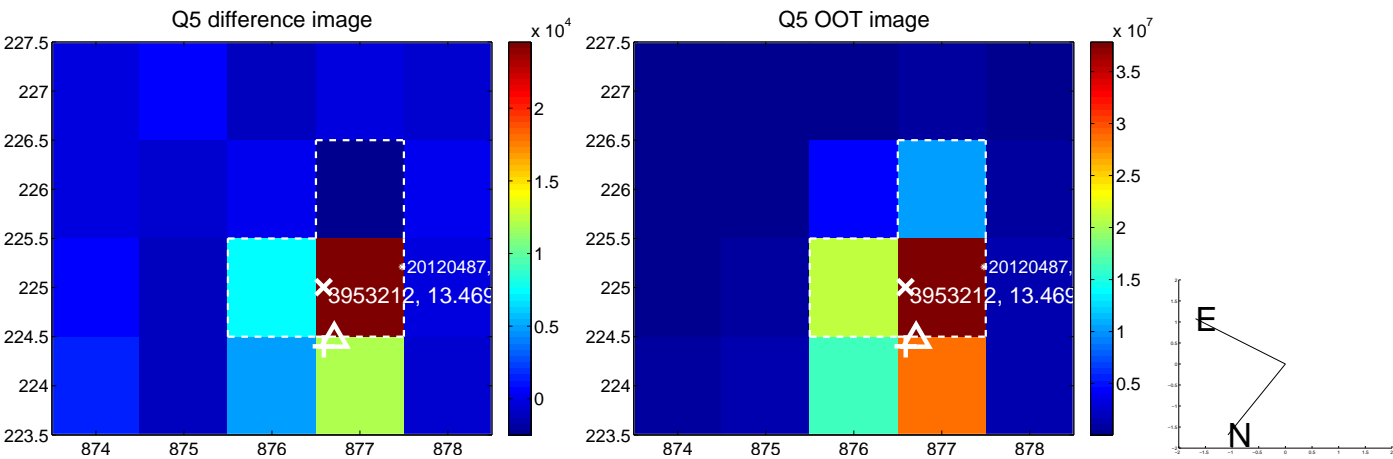


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

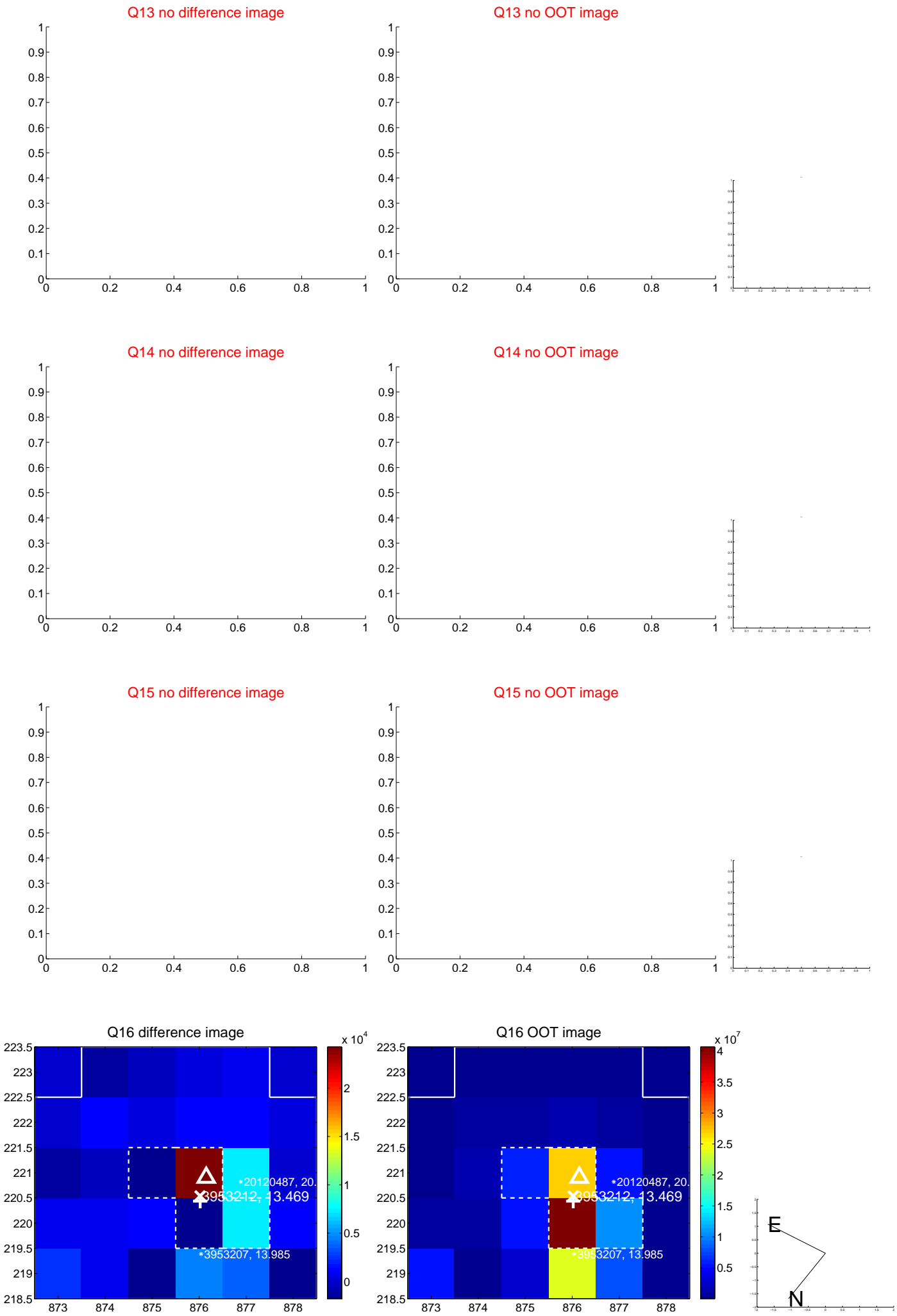




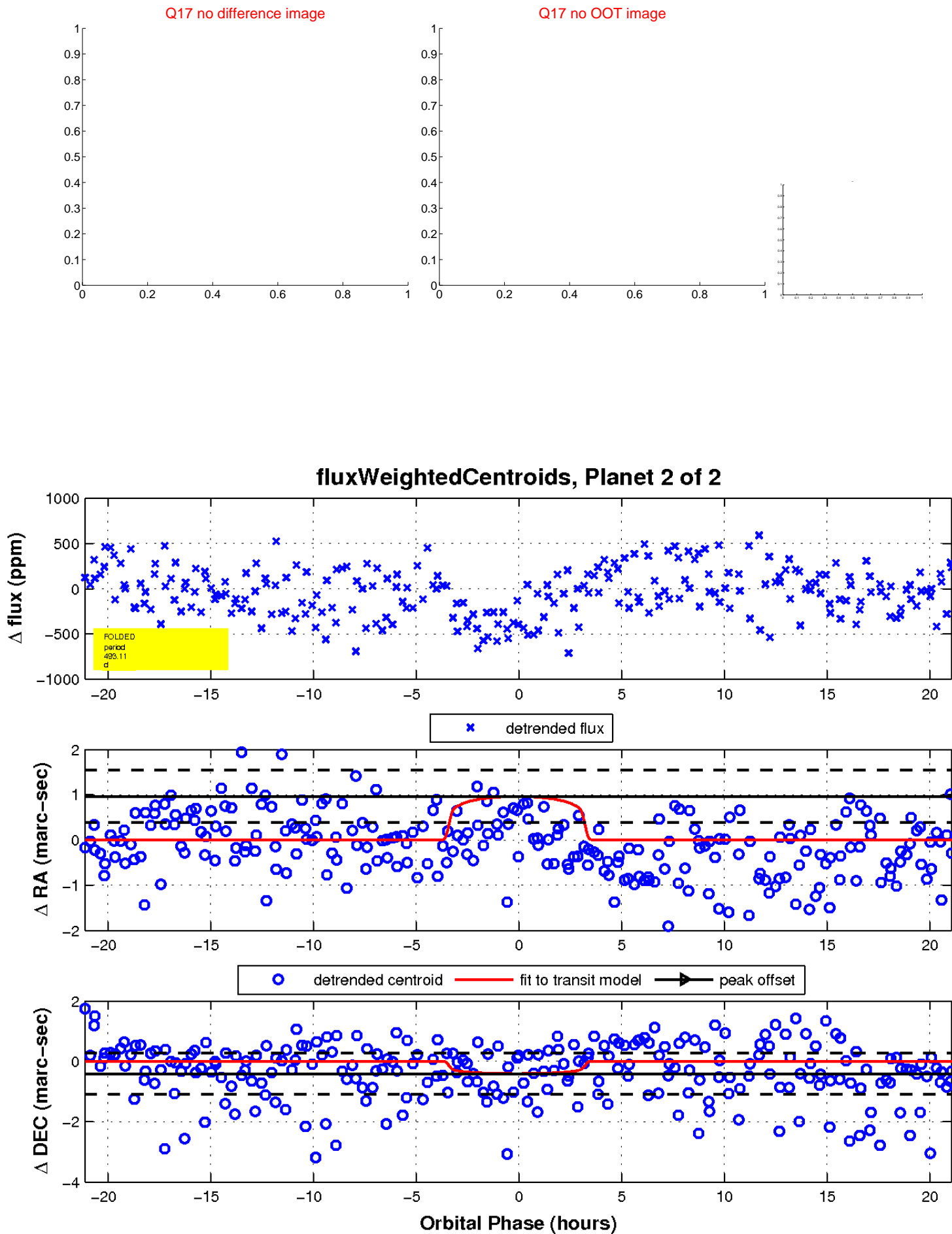
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UKIRT Image

Declination

