

# KIC 007885309

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007885309-01	OBS	No	497.420836	217.225123	542.3	0.571	20.4	2.8	0.51	4679	1.27	0.11
007885309-02	OBS	No	473.217212	285.496718	1477.8	5.227	17.0	9.3	0.51	4679	1.98	0.12
007885309-03	OBS	No	423.140437	500.921247	945.0	8.649	18.5	5.0	0.51	4679	1.59	0.14
007885309-04	OBS	No	398.026126	415.335195	1460.2	8.793	17.3	7.2	0.51	4679	3.78	0.15

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007885309-01	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_MARSHALL_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—HALO_GHOST
007885309-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
007885309-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
007885309-04	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—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.

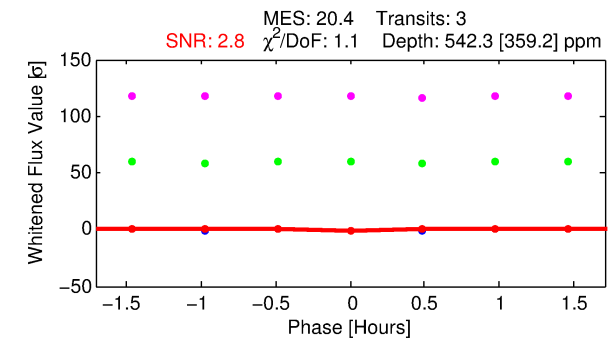
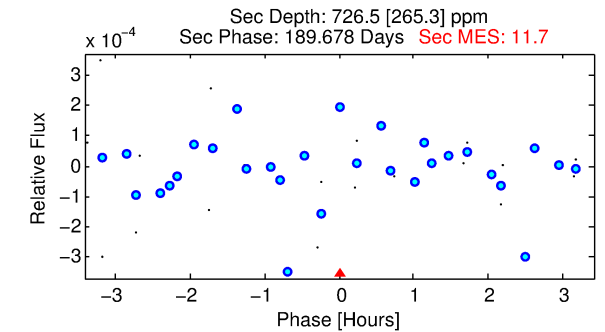
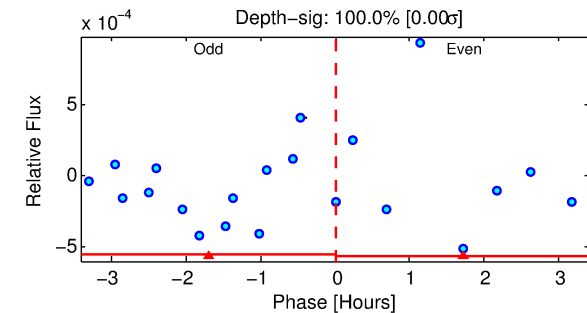
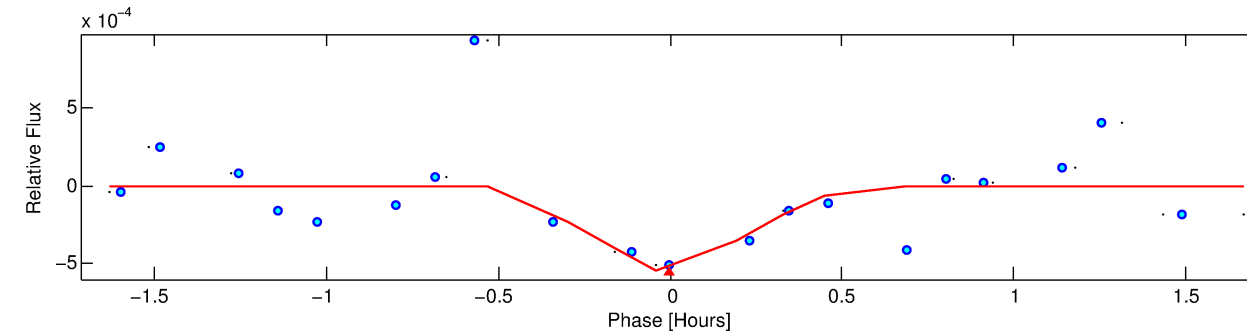
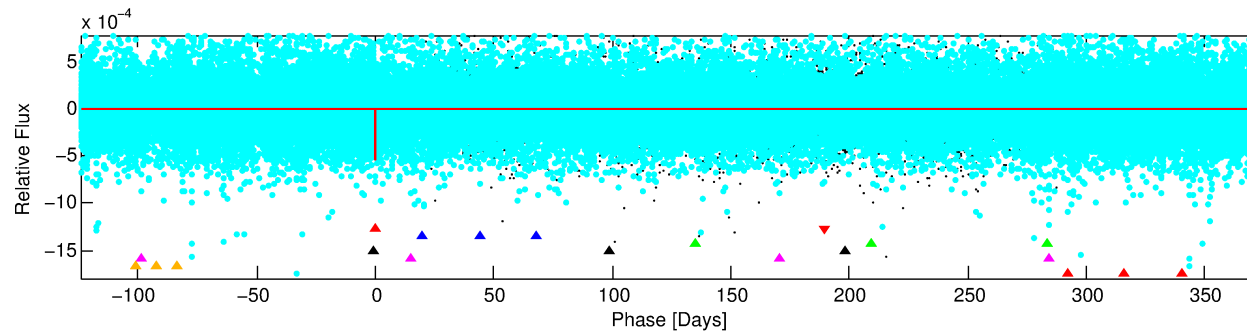
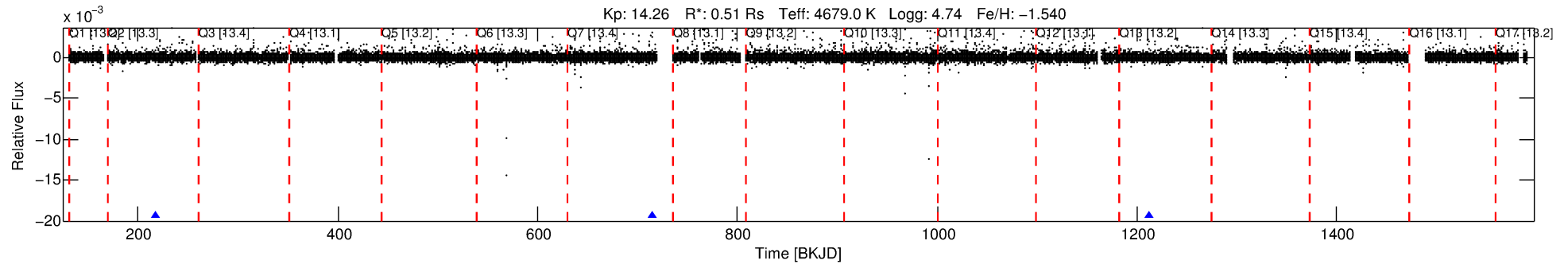
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 007885309-01

No Significant Match Found

# DV One-Page Summary

KIC: 7885309 Candidate: 1 of 7 Period: 497.421 d



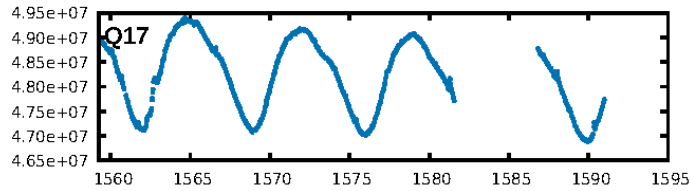
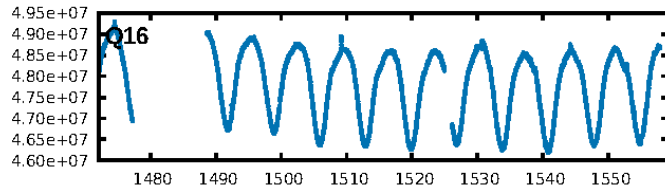
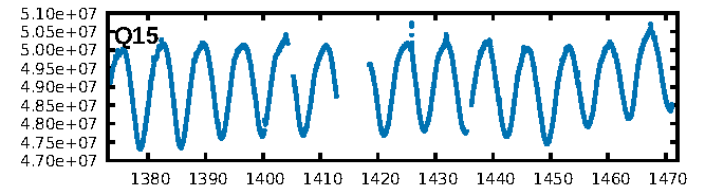
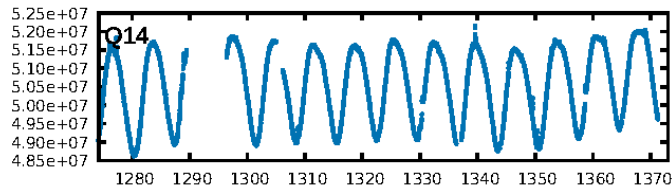
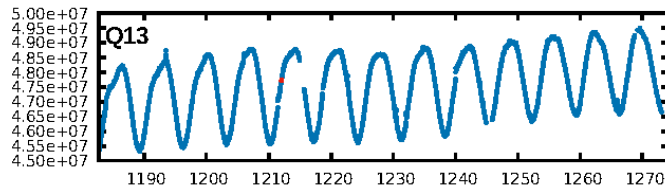
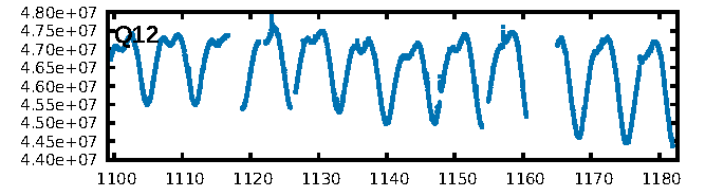
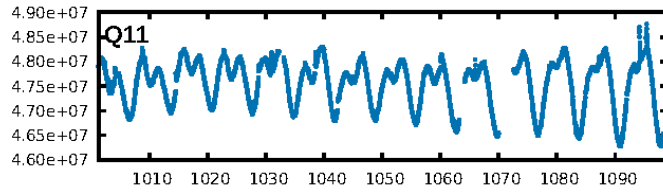
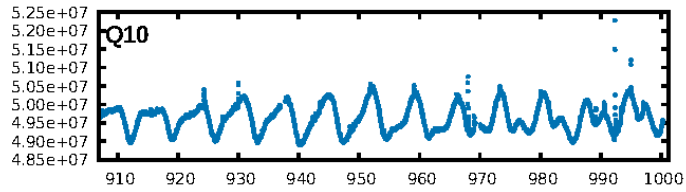
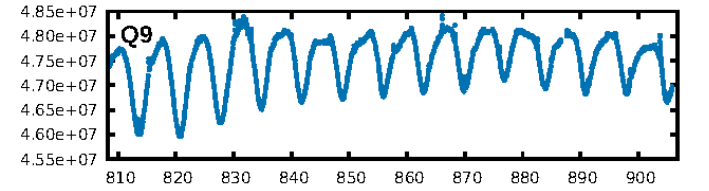
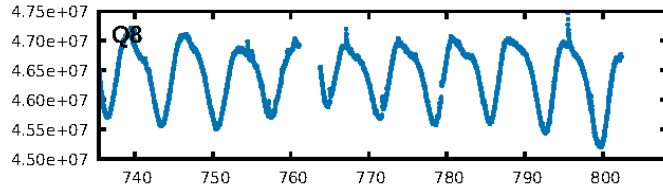
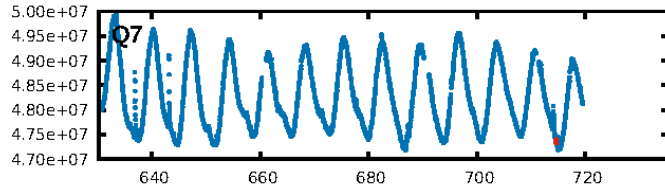
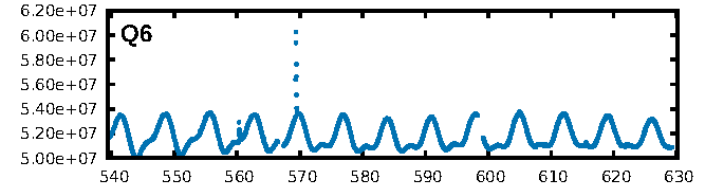
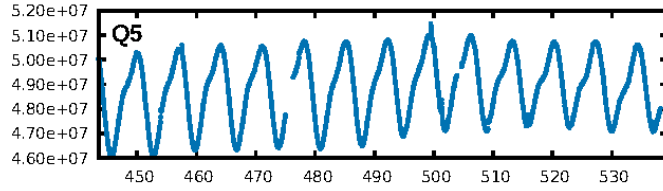
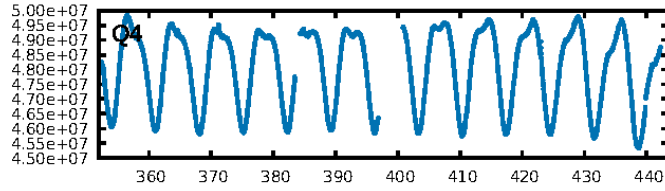
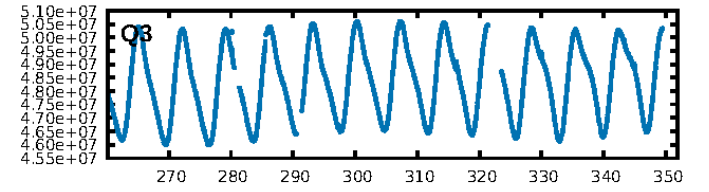
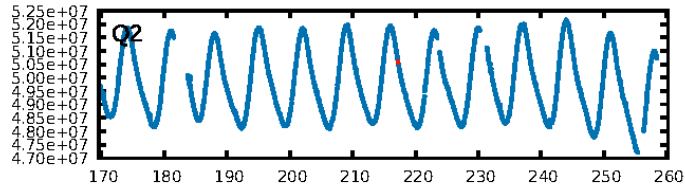
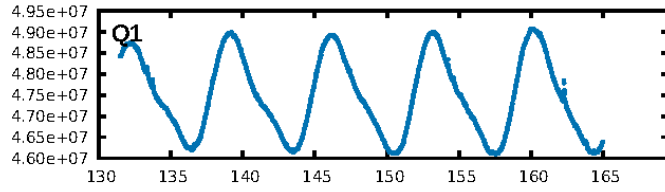
## DV Fit Results:

Period = 497.42084 [0.01023] d  
Epoch = 217.2251 [0.0155] BKJD  
Rp/R\* = 0.0228 [0.1413]  
a/R\* = 6031.68 [186849.07]  
b = 0.47 [49.10]  
Seff = 0.11 [0.02]  
Teq = 148 [6] K  
Rp = 1.27 [7.87] Re  
a = 0.9906 [0.0537] AU  
Ag = 244328.31 [3035251.96] [0.08σ]  
Teffp = 5091 [15813] K [0.31σ]

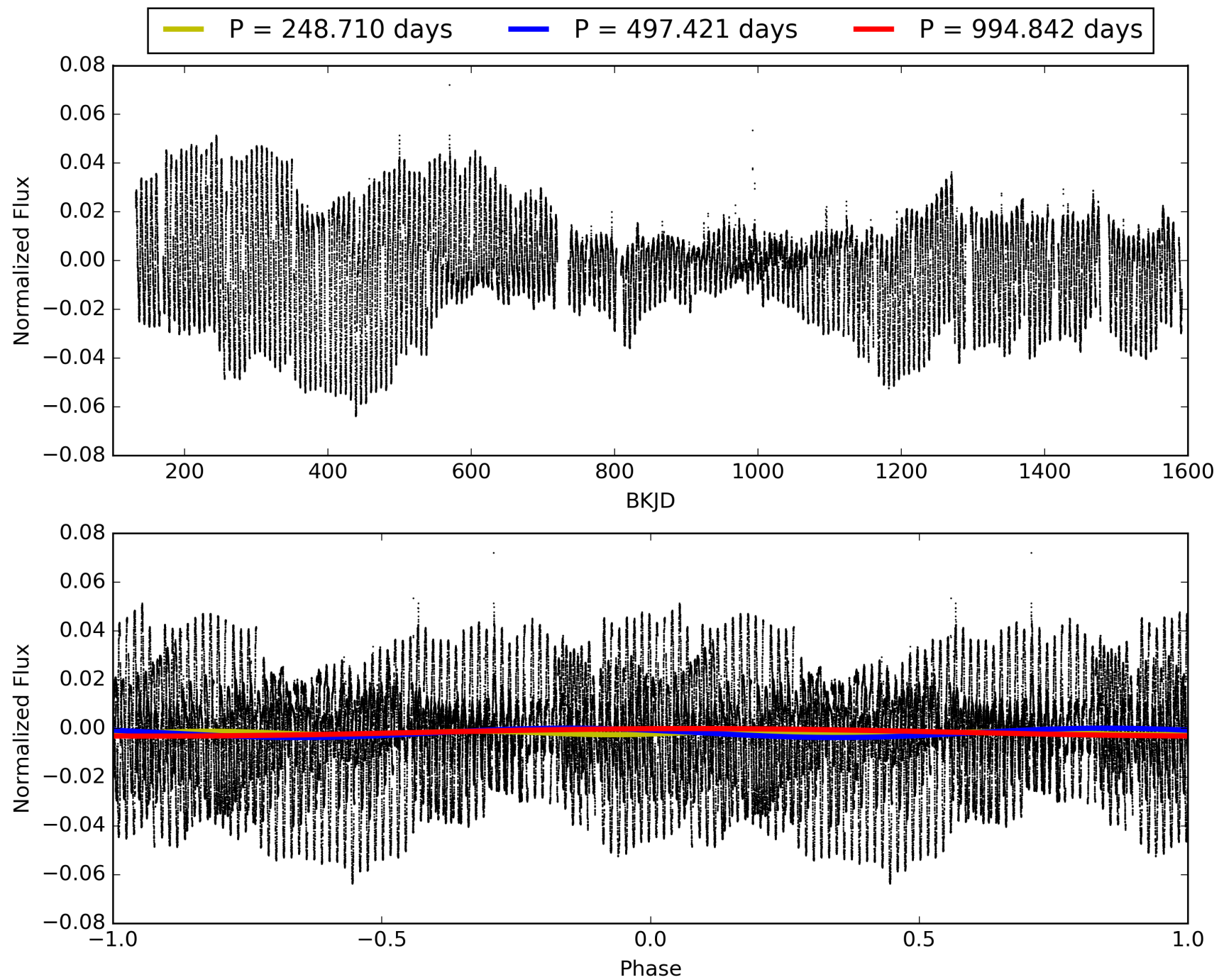
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [40.53σ]  
LongPeriod-sig: 100.0% [49.46σ]  
ModelChiSquare2-sig: 87.1%  
ModelChiSquareGof-sig: 98.9%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 0.06144  
Centroid-sig: N/A  
Centroid-so: 0.868 arcsec [0.20σ]  
OotOffset-rm: N/A  
KicOffset-rm: N/A  
OotOffset-st: 0/0/0 [0]  
KicOffset-st: 0/0/0 [0]  
DiffImageQuality-fgm: N/A  
DiffImageOverlap-fno: 1.00 [1/1]

# TCE 007885309-01, PDC Light Curves

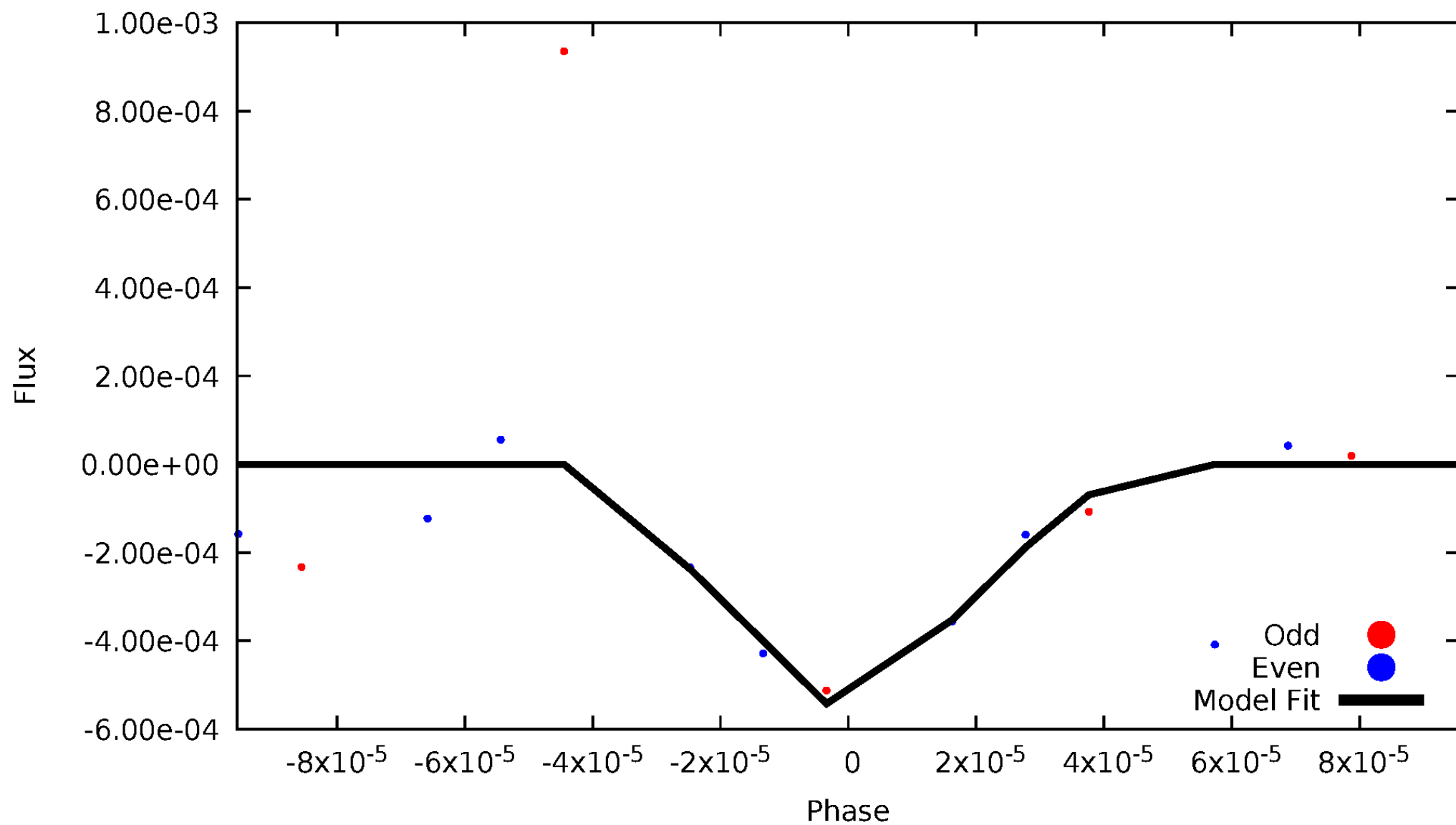


TCE 007885309-01



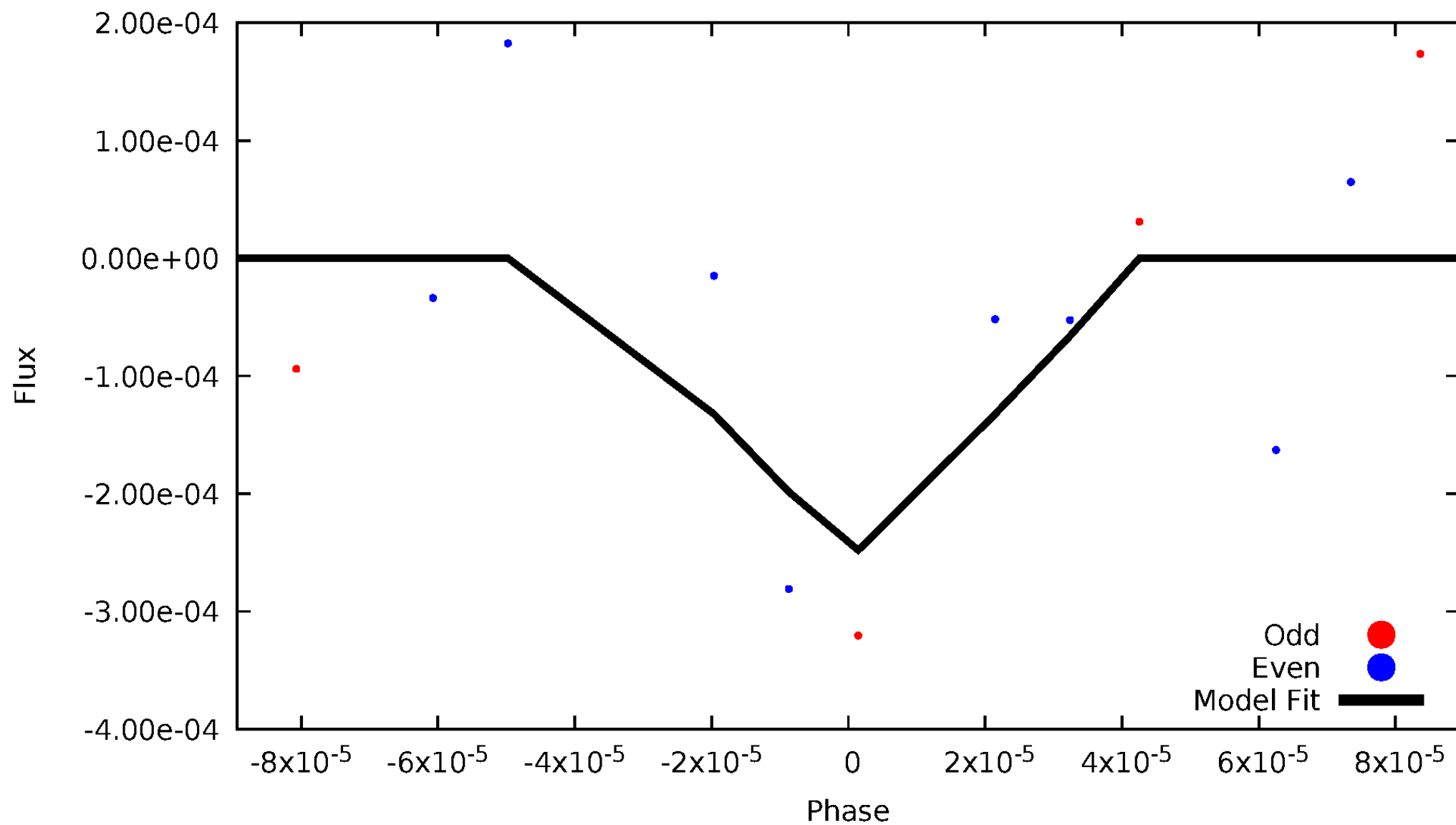
# DV Odd/Even

TCE 007885309-01



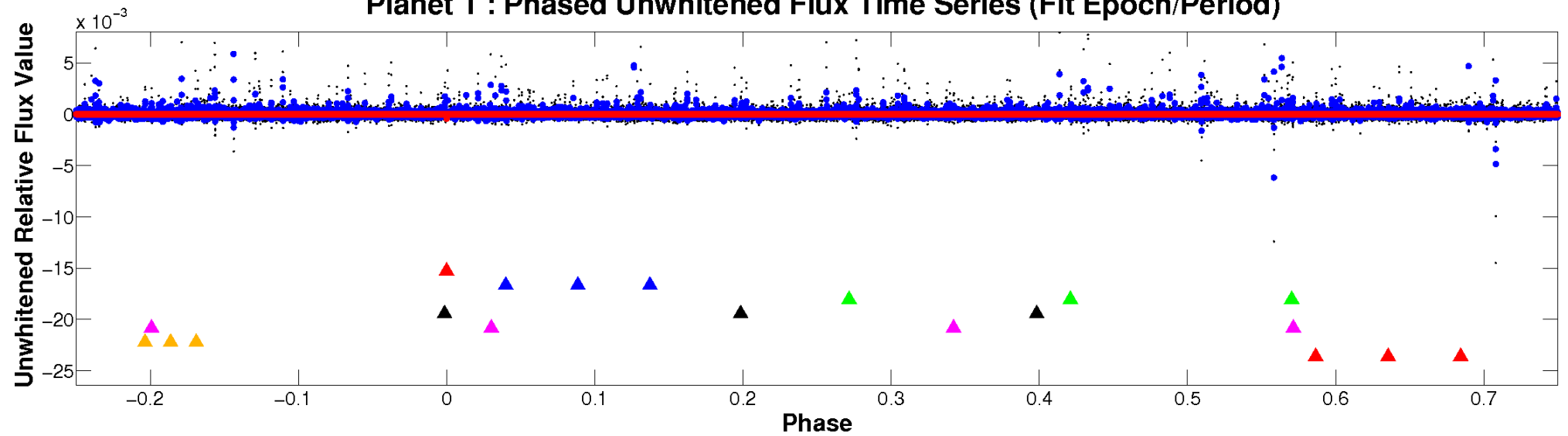
# ALT Odd/Even

TCE 007885309-01

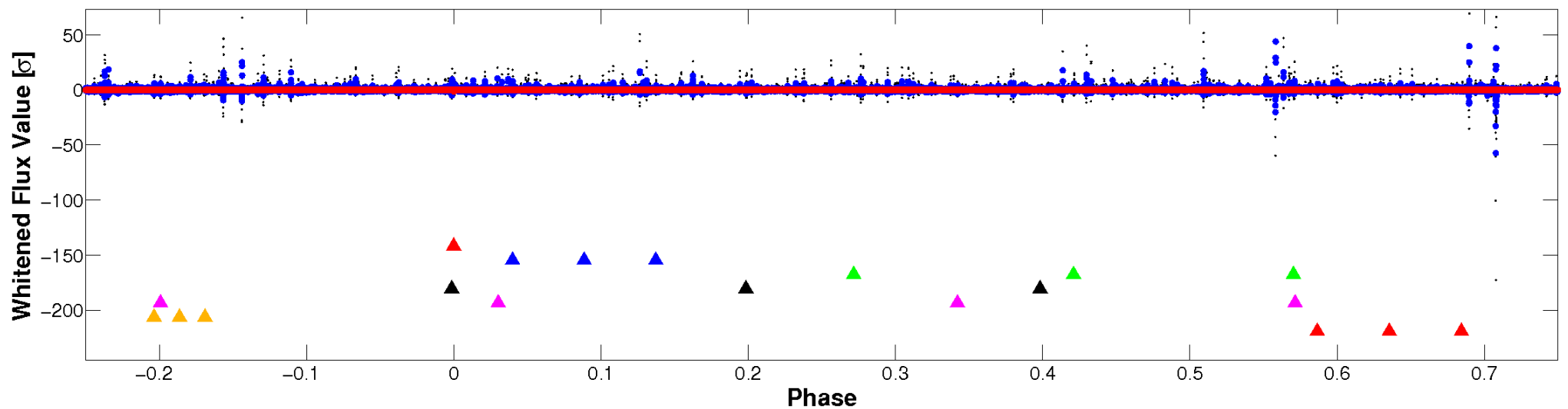


# Non-Whitened Vs. Whitened Light Curve

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

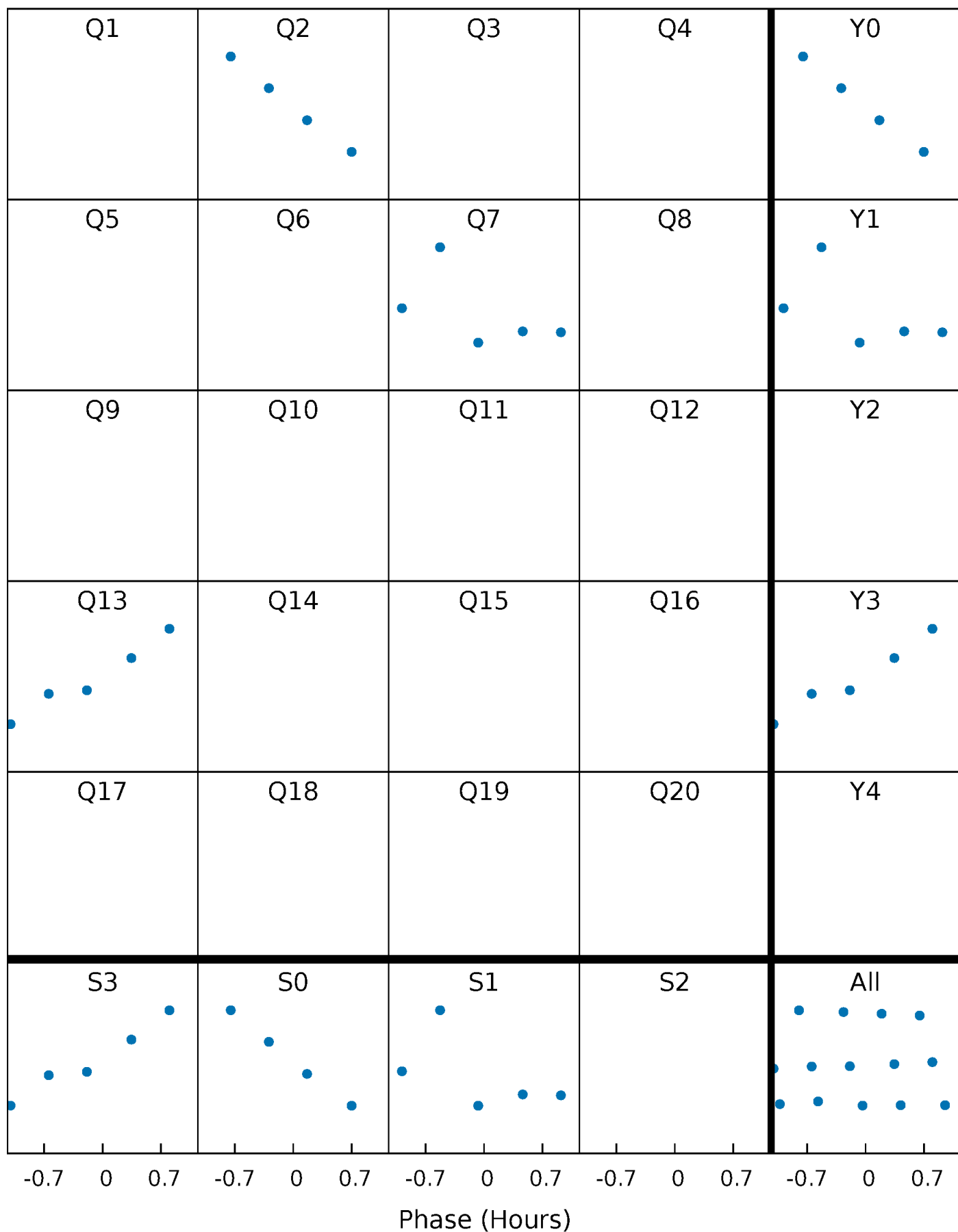


## Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

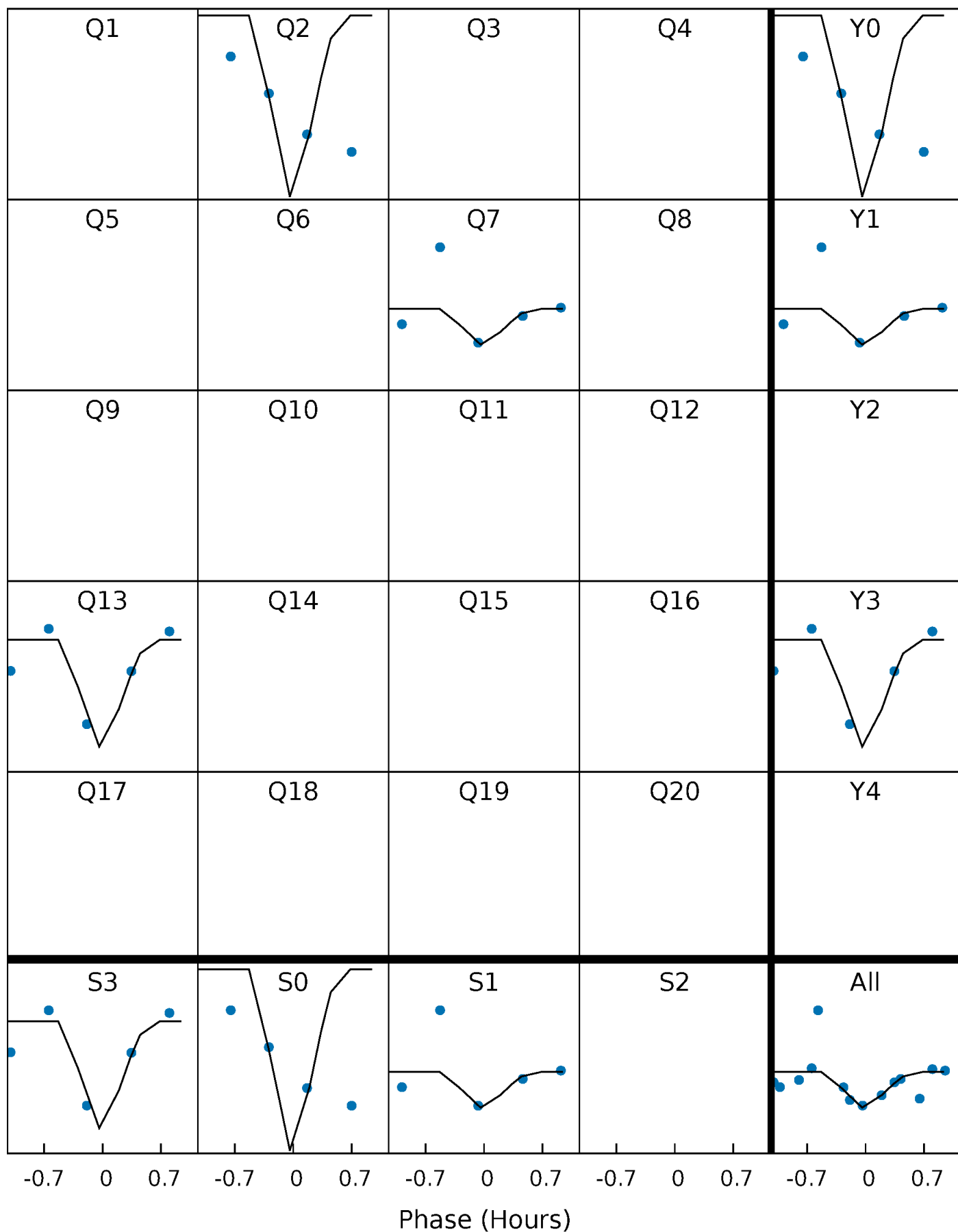
TCE 007885309-01 P=497.420836 Days  $T_0=217.225123$  (BKJD)





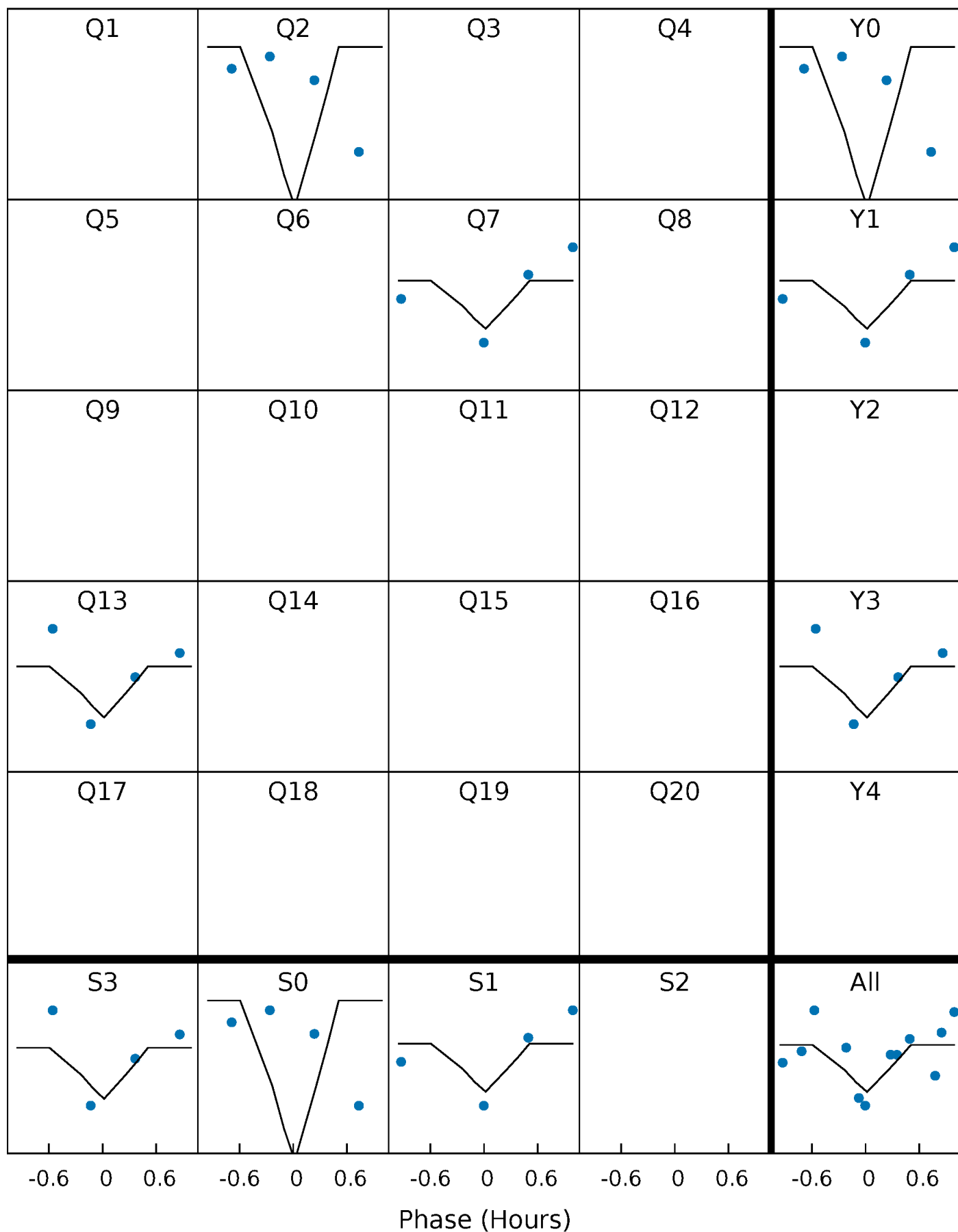
# DV Quarter-Phased Transit Curves

TCE 007885309-01 P=497.420836 Days  $T_0=217.225123$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

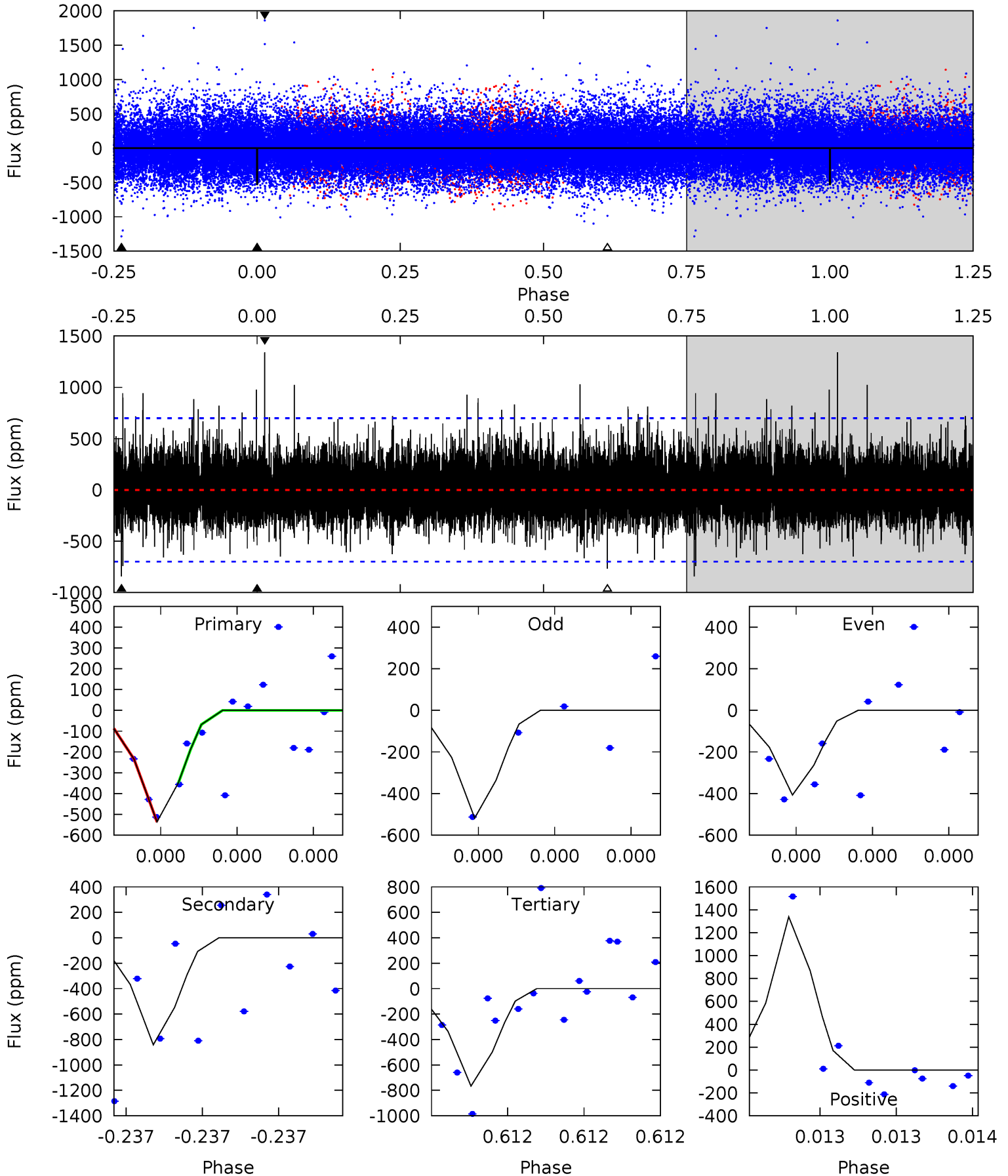
TCE 007885309-01 P=497.420962 Days  $T_0=217.222565$  (BKJD)



# DV Model-Shift Uniqueness Test

007885309-01, P = 497.420836 Days, E = 217.225123 Days

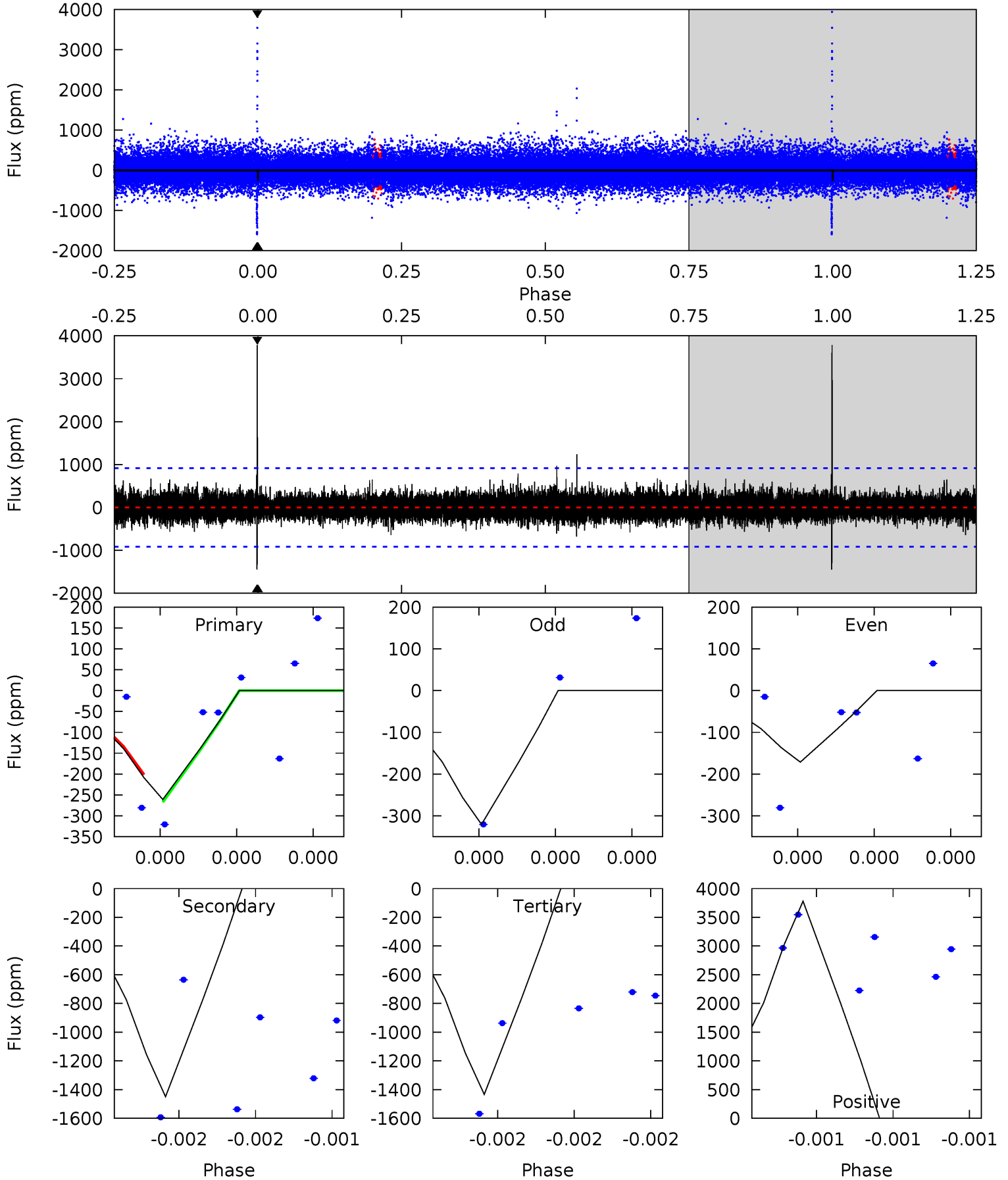
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
4.53	7.11	6.48	11.3	5.90	3.97	1.35	-1.94	-6.78	0.64	-4.21	0.38	0.99	0.61	0.68



# Alt Model-Shift Uniqueness Test

007885309-01, P = 497.420962 Days, E = 217.222565 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
1.71	9.50	9.39	24.8	5.99	4.10	0.96	-7.69	-23.1	0.10	-15.3	0.45	1.00	0.72	0.00



### Stellar Parameters For KIC 007885309

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4679^{+145}_{-162}$	$4.742^{+0.045}_{-0.024}$	$-1.540^{+0.300}_{-0.250}$	$0.510^{+0.027}_{-0.032}$	$0.523^{+0.034}_{-0.024}$	$5.559^{+1.090}_{-0.510}$
	+3%/-3%	+1%/-1%	+19%/-16%	+5%/-6%	+7%/-5%	+20%/-9%
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 007885309-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-841 \pm 118$	$6.07^{+5.84}_{-4.33}$	$206^{+7}_{-8}$	$3022^{+1504}_{-509}$	$12838^{+142187}_{-9541}$
Alt.	$-1450 \pm 153$	$5.57^{+5.83}_{-3.92}$	$206^{+8}_{-7}$	$3325^{+1826}_{-610}$	$25418^{+281079}_{-19299}$

$T_{\text{max}}$  = 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

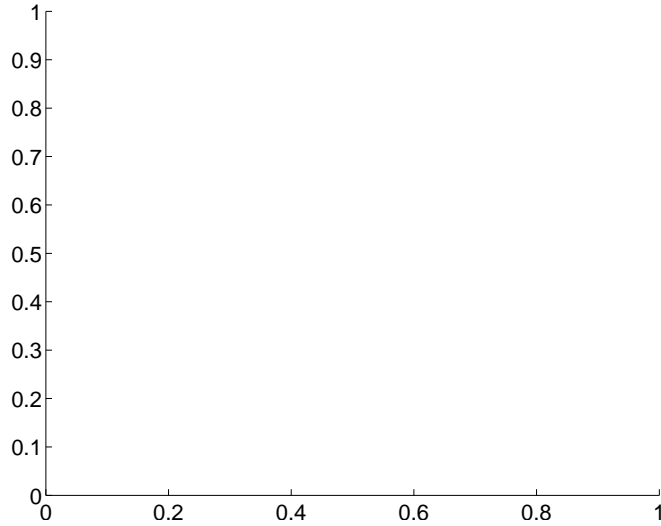
Supplemental centroid analysis for 007885309-01. Kepler magnitude: 14.26. Transit SNR 2.77

There are 0 quarters with good PRF difference image offsets

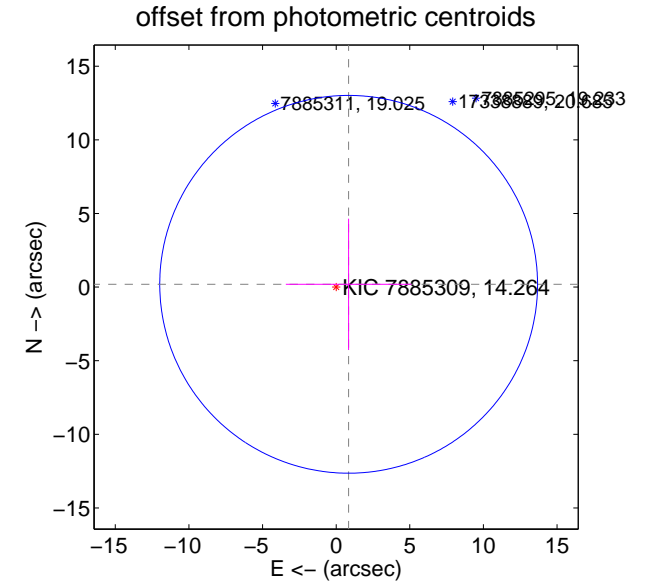
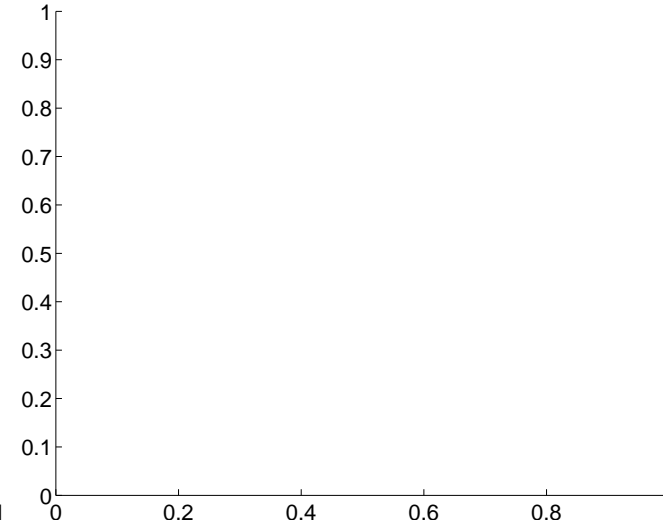
The direct PRF centroid is offset from the target star catalog position by about NaN arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	—	—	—	—
PRF-fit source offset from KIC position	—	—	—	—
photometric centroid source offset	$0.87 \pm 4.28$	0.20	$-0.85 \pm 4.27$	$0.19 \pm 4.46$

There is no PRF-fit offset from OOT-fit



There is no PRF-fit offset from KIC

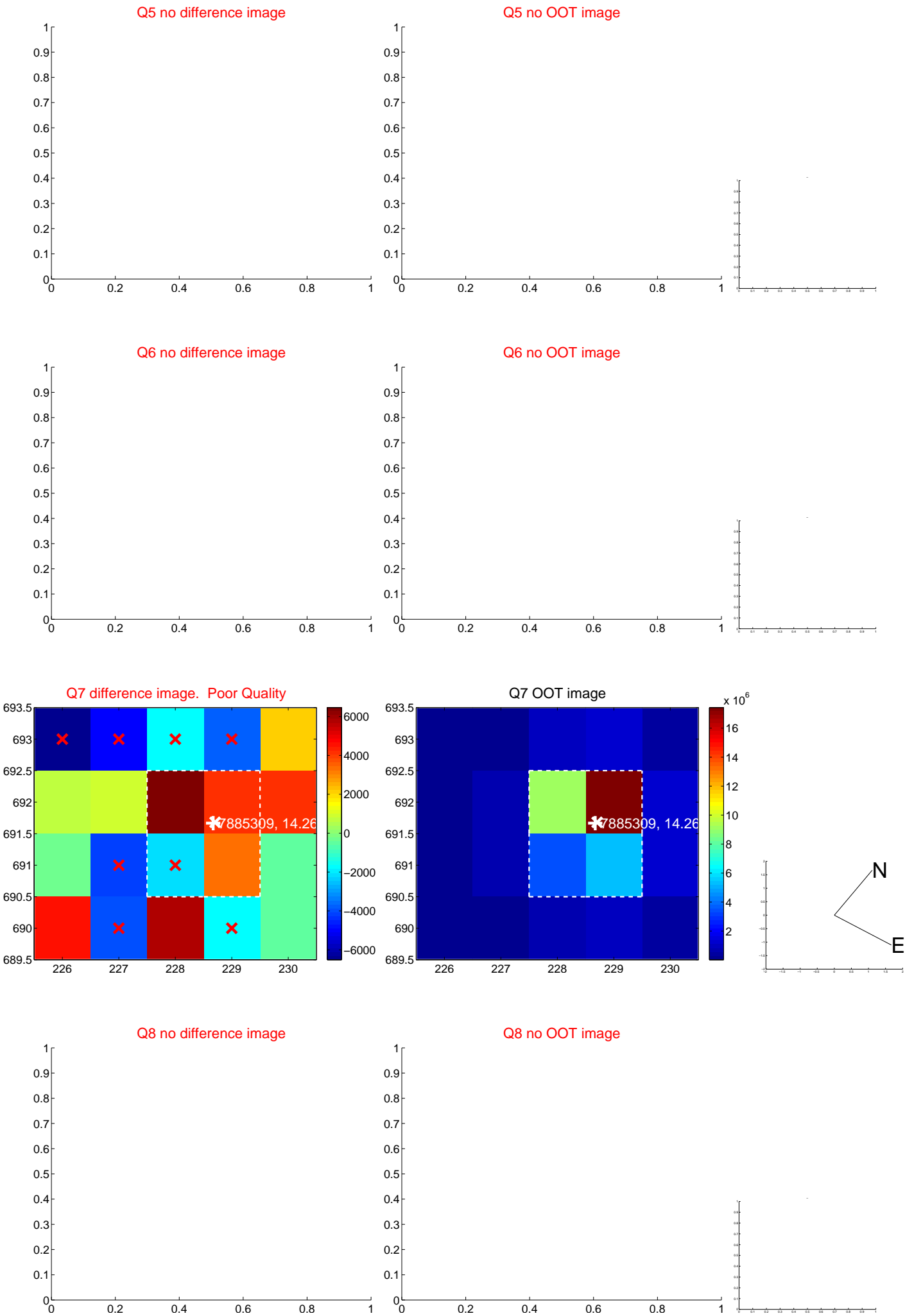


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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





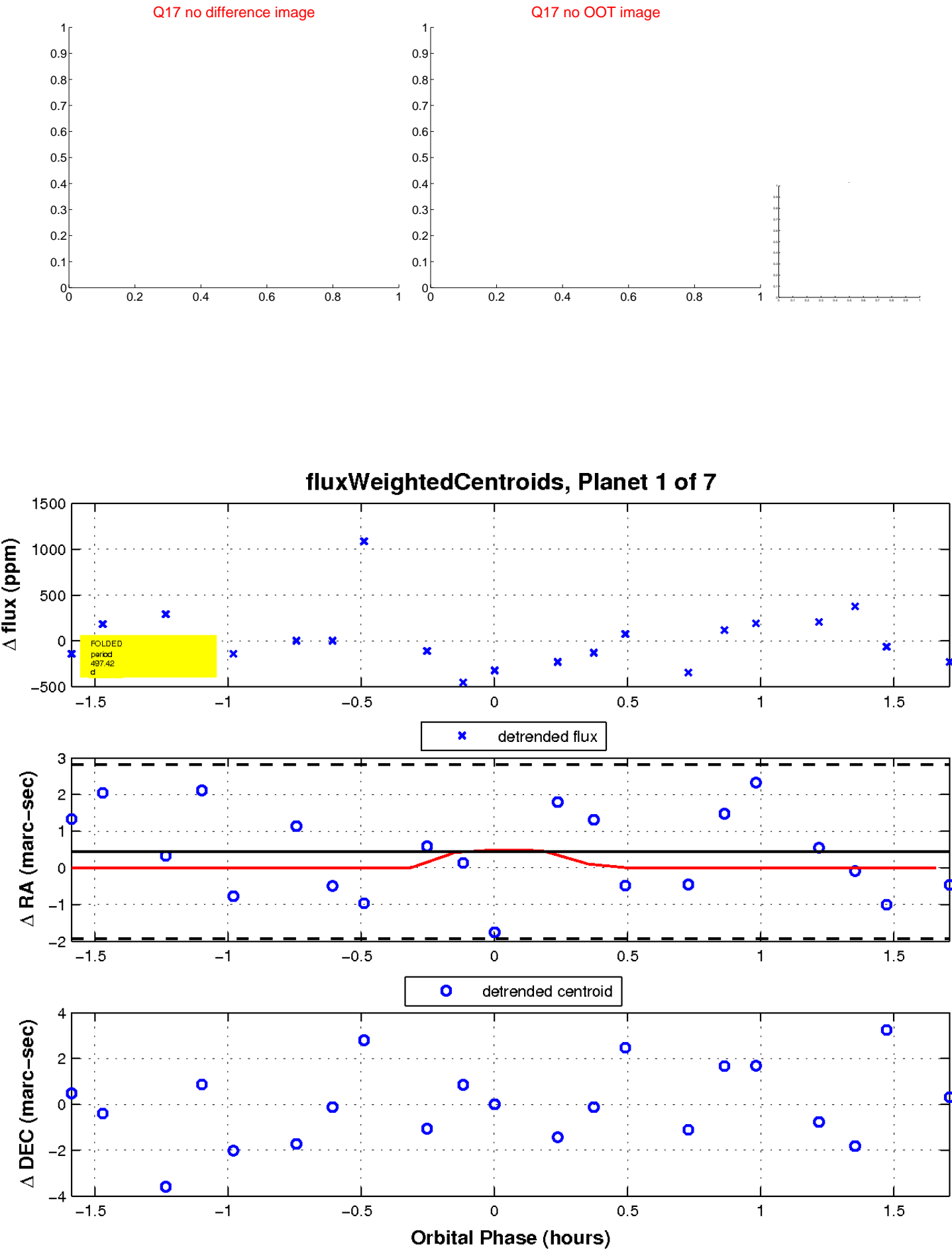
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

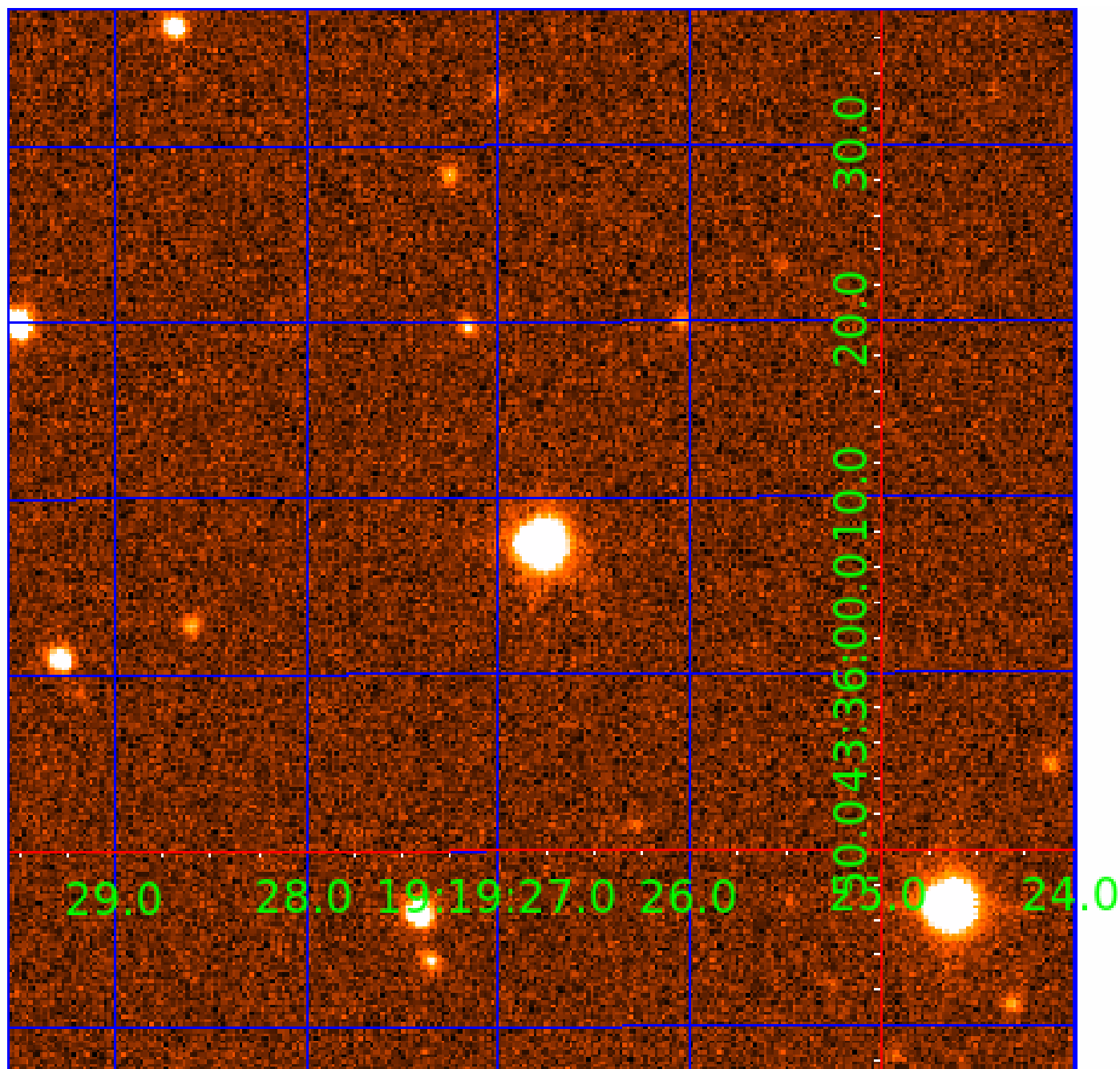


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 007885309

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007885309-01	OBS	No	497.420836	217.225123	542.3	0.571	20.4	2.8	0.51	4679	1.27	0.11
007885309-02	OBS	No	473.217212	285.496718	1477.8	5.227	17.0	9.3	0.51	4679	1.98	0.12
007885309-03	OBS	No	423.140437	500.921247	945.0	8.649	18.5	5.0	0.51	4679	1.59	0.14
007885309-04	OBS	No	398.026126	415.335195	1460.2	8.793	17.3	7.2	0.51	4679	3.78	0.15

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007885309-01	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_MARSHALL_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—HALO_GHOST
007885309-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
007885309-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
007885309-04	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—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.

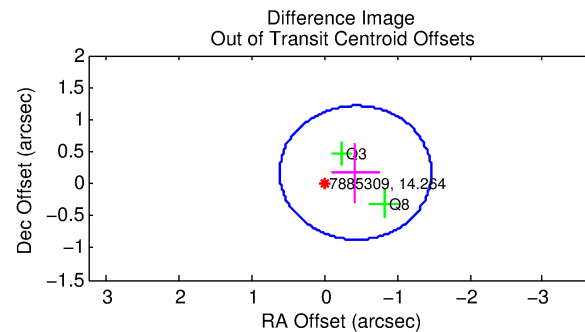
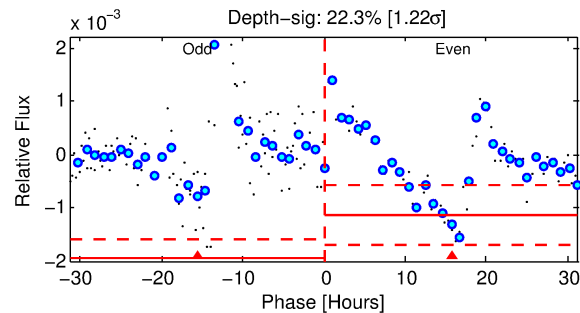
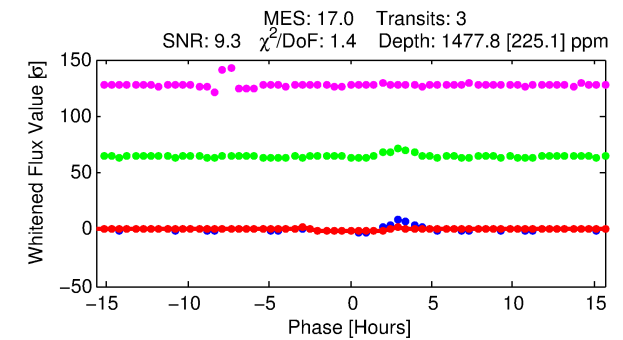
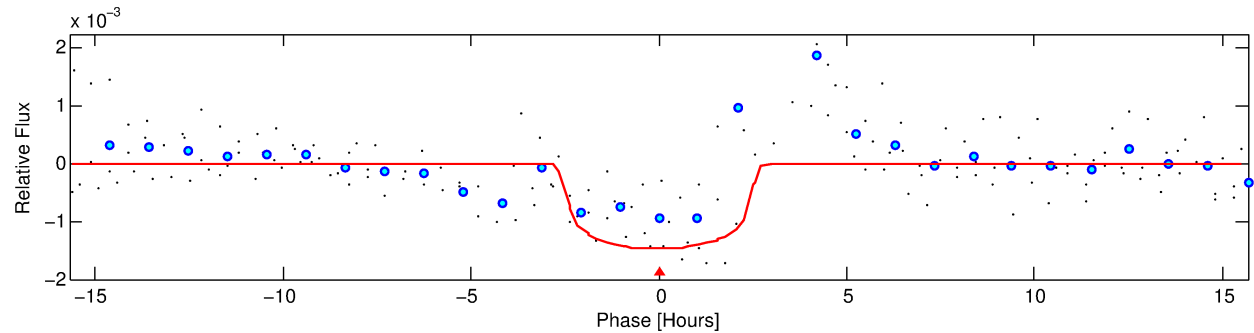
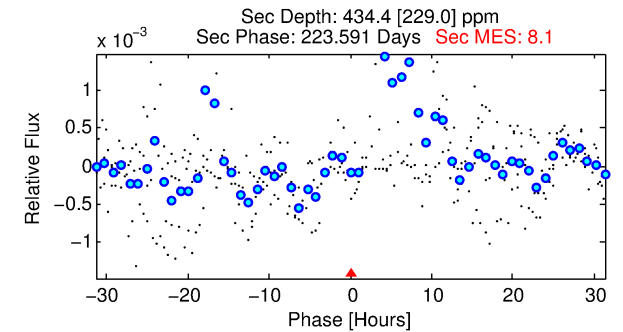
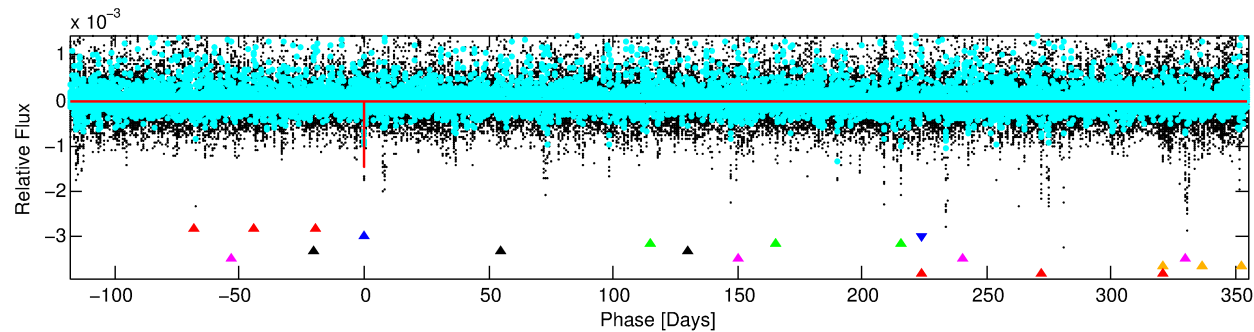
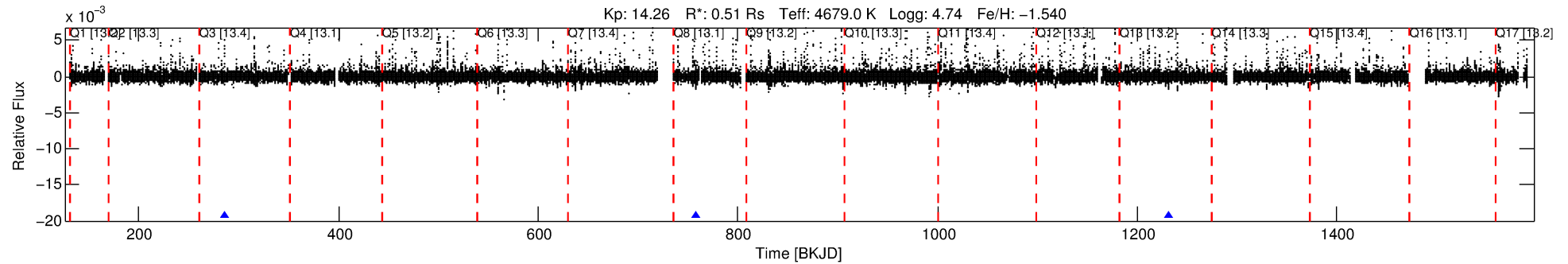
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 007885309-02

No Significant Match Found

# DV One-Page Summary

KIC: 7885309 Candidate: 2 of 7 Period: 473.217 d



## DV Fit Results:

Period = 473.21721 [0.00573] d  
Epoch = 285.4967 [0.0064] BKJD  
Rp/R\* = 0.0355 [0.0355]  
a/R\* = 662.06 [2879.50]  
b = 0.39 [9.36]  
Seff = 0.12 [0.02]  
Teq = 151 [6] K  
Rp = 1.98 [1.98] Re  
a = 0.9582 [0.0520] AU  
Ag = 56141.58 [116039.09] [0.48 $\sigma$ ]  
Teffp = 3584 [1855] K [1.85 $\sigma$ ]

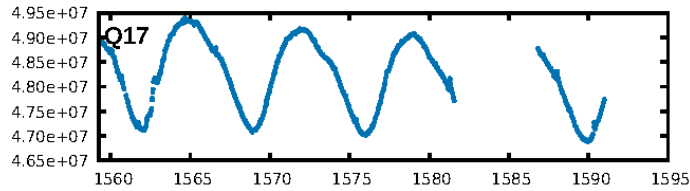
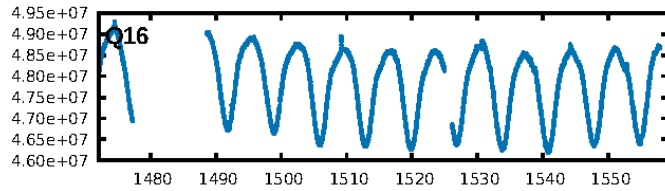
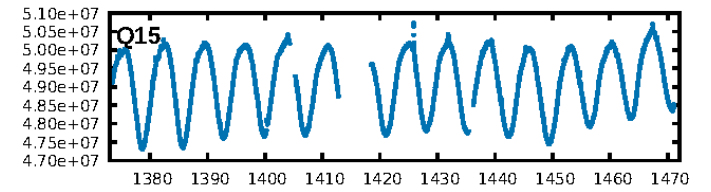
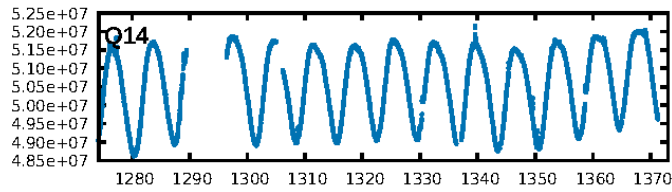
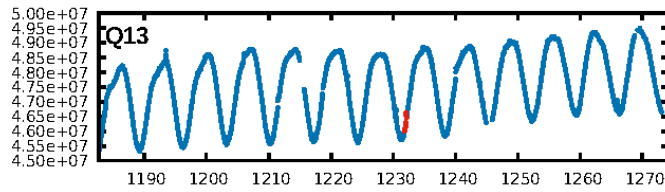
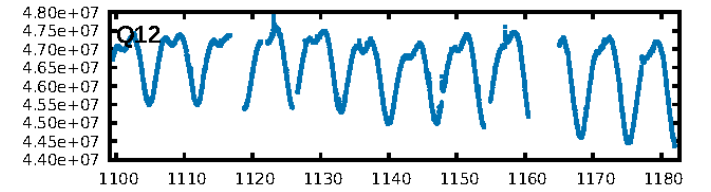
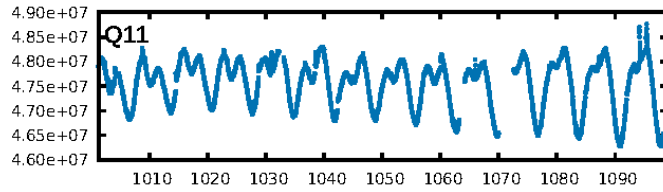
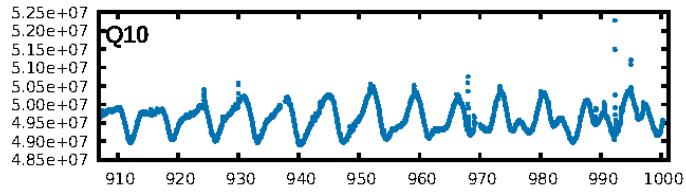
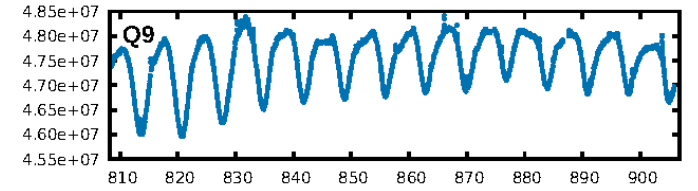
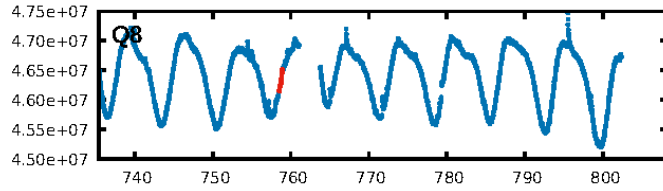
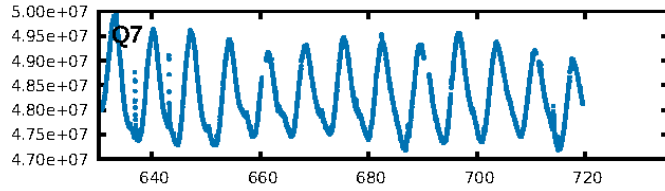
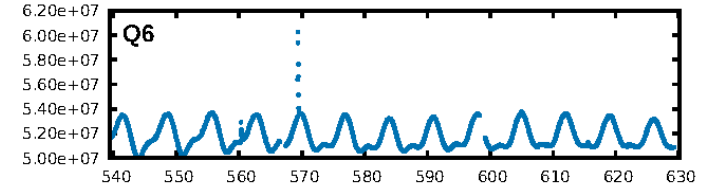
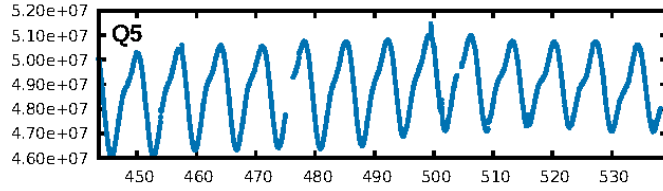
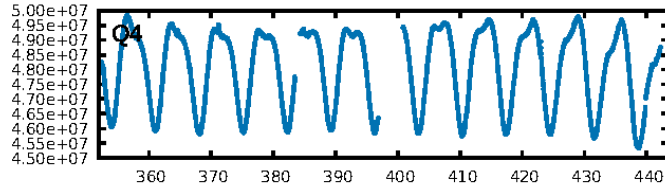
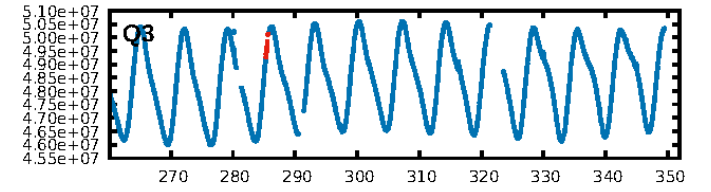
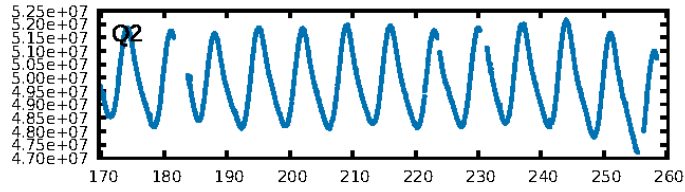
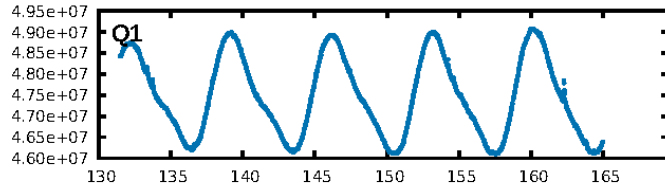
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [118.93 $\sigma$ ]  
LongPeriod-sig: 100.0% [51.49 $\sigma$ ]  
ModelChiSquare2-sig: 8.7%  
ModelChiSquareGof-sig: 75.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 1.961  
Centroid-sig: N/A  
Centroid-so: 0.671 arcsec [1.27 $\sigma$ ]  
OotOffset-rm: 0.461 arcsec [1.33 $\sigma$ ]  
OotOffset-st: 0/1/1/0 [2]  
KicOffset-rm: 0.492 arcsec [1.60 $\sigma$ ]  
KicOffset-st: 0/1/1/0 [2]  
DiffImageQuality-fgm: 0.50 [1/2]  
DiffImageOverlap-fno: 1.00 [2/2]

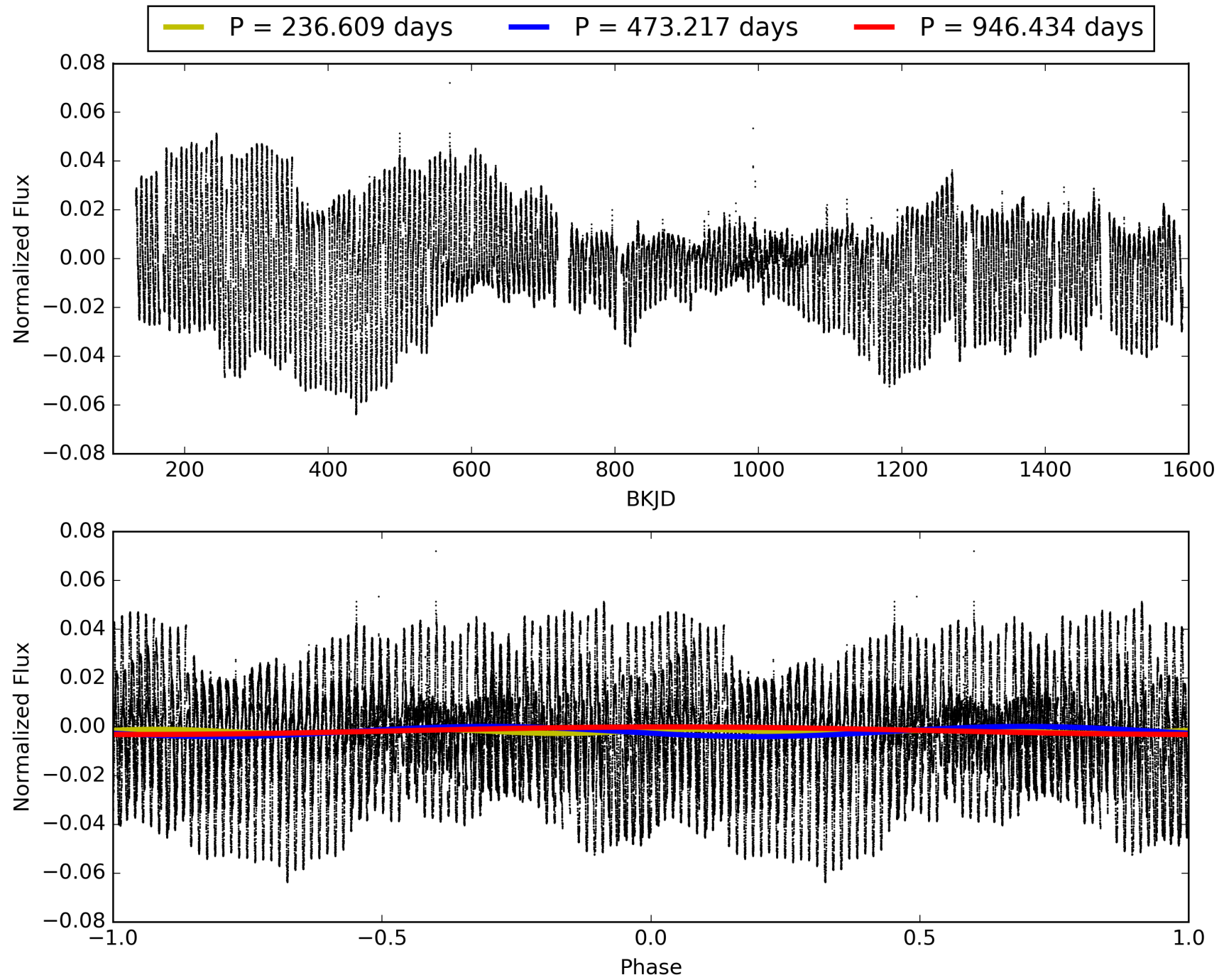
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 22:06:39 Z

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

# TCE 007885309-02, PDC Light Curves



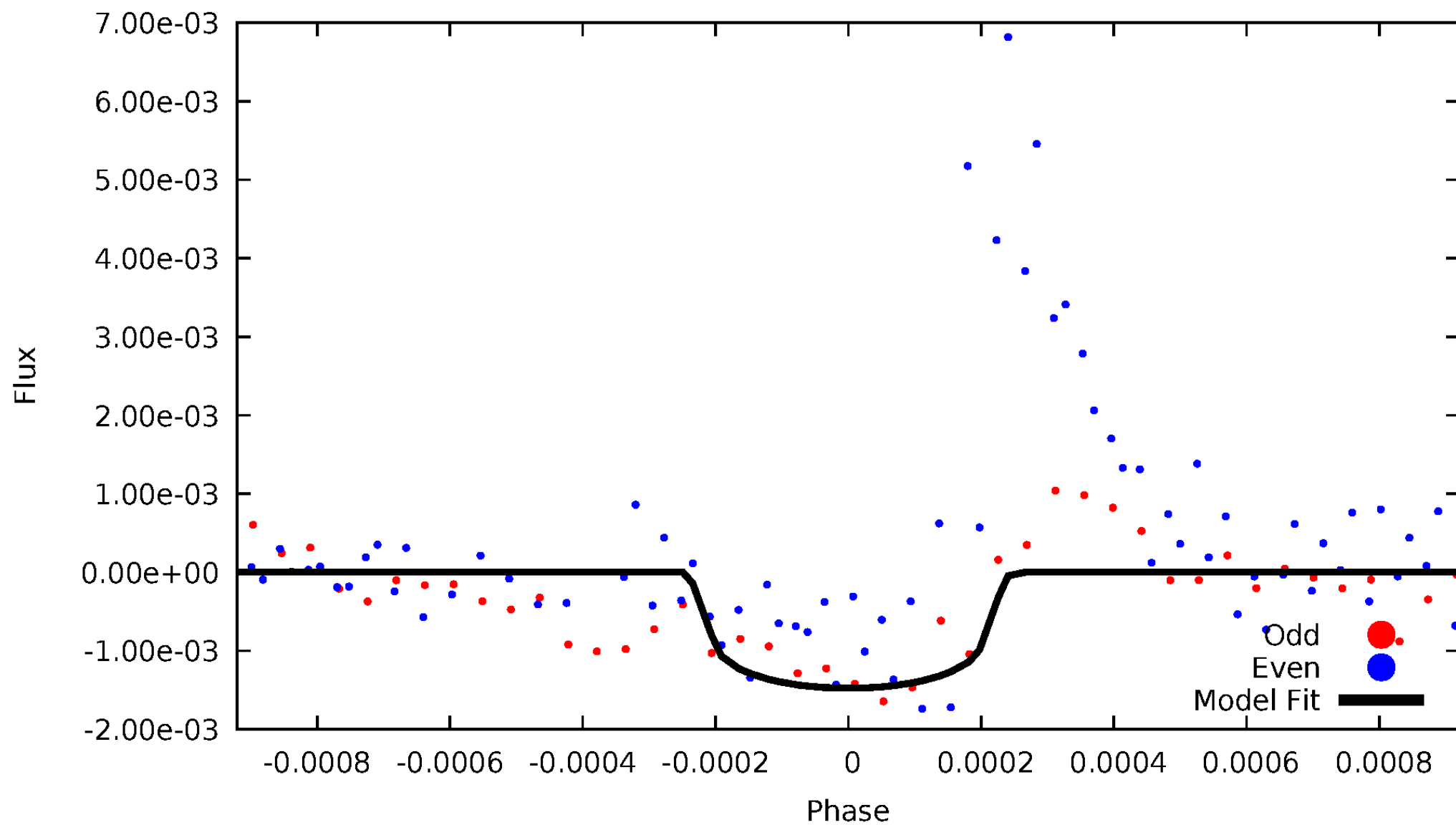
TCE 007885309-02





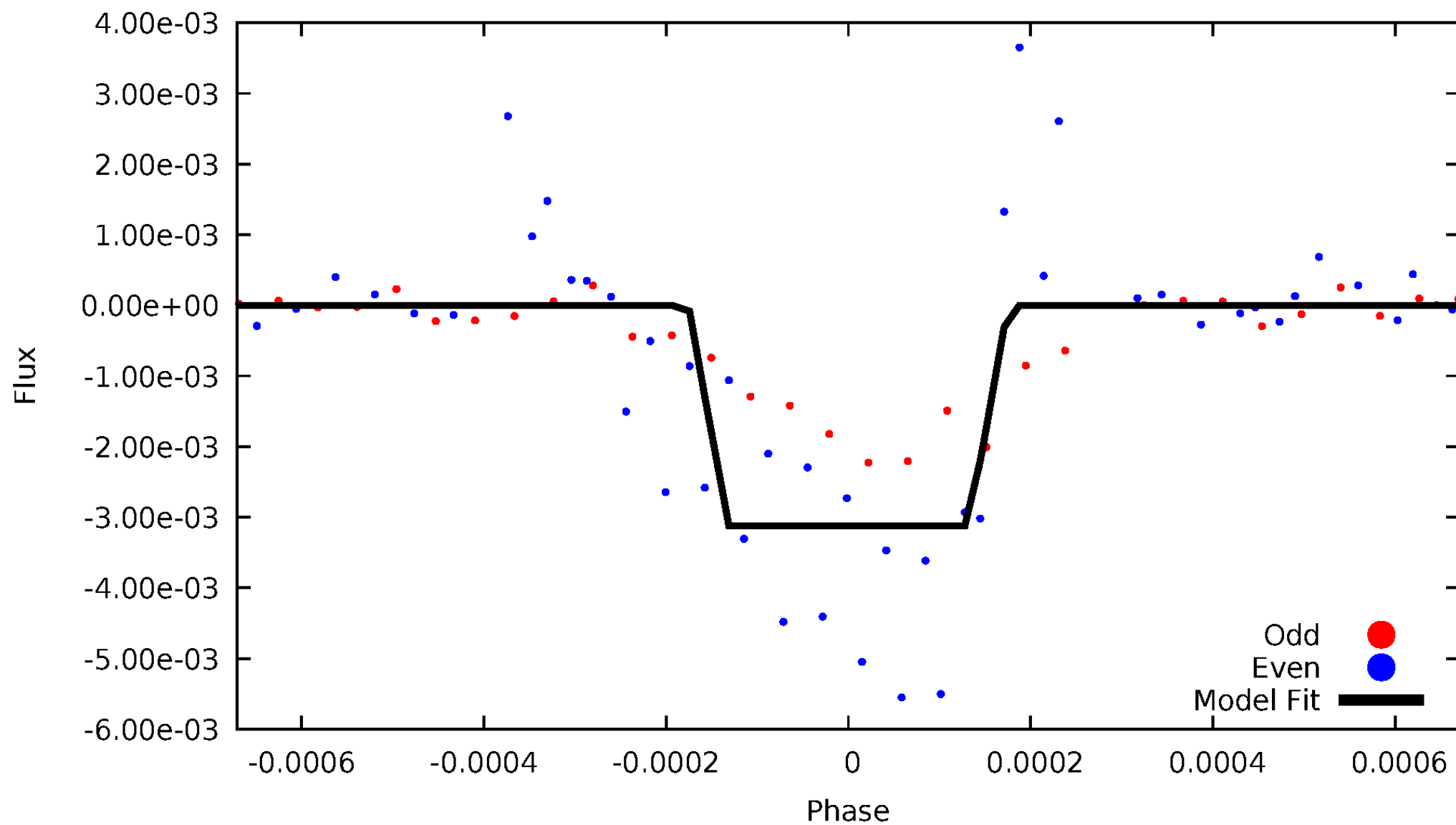
# DV Odd/Even

TCE 007885309-02



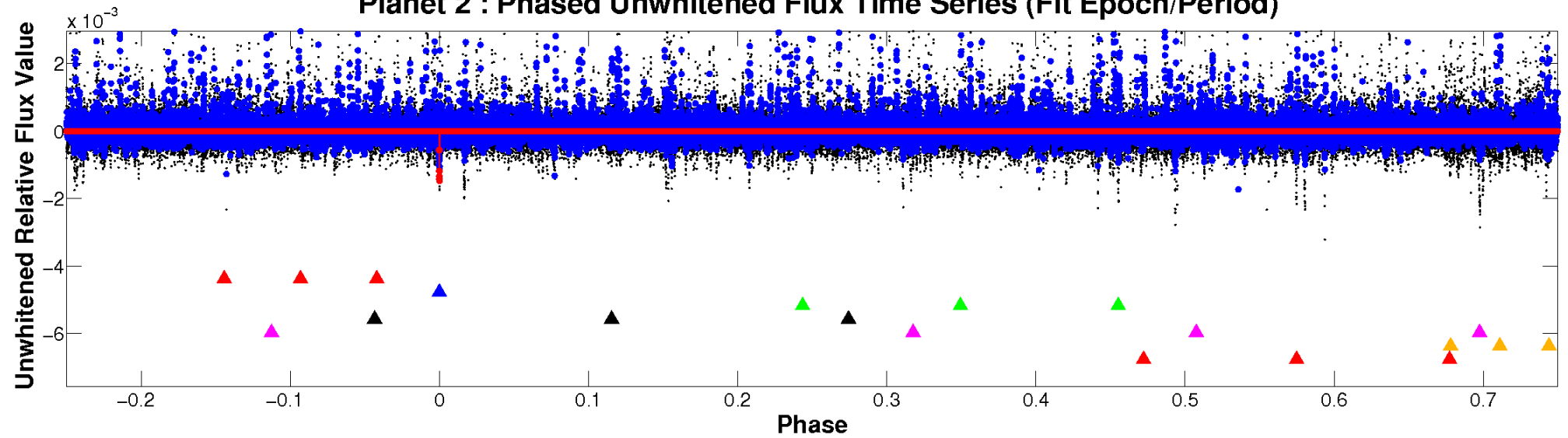
# ALT Odd/Even

TCE 007885309-02

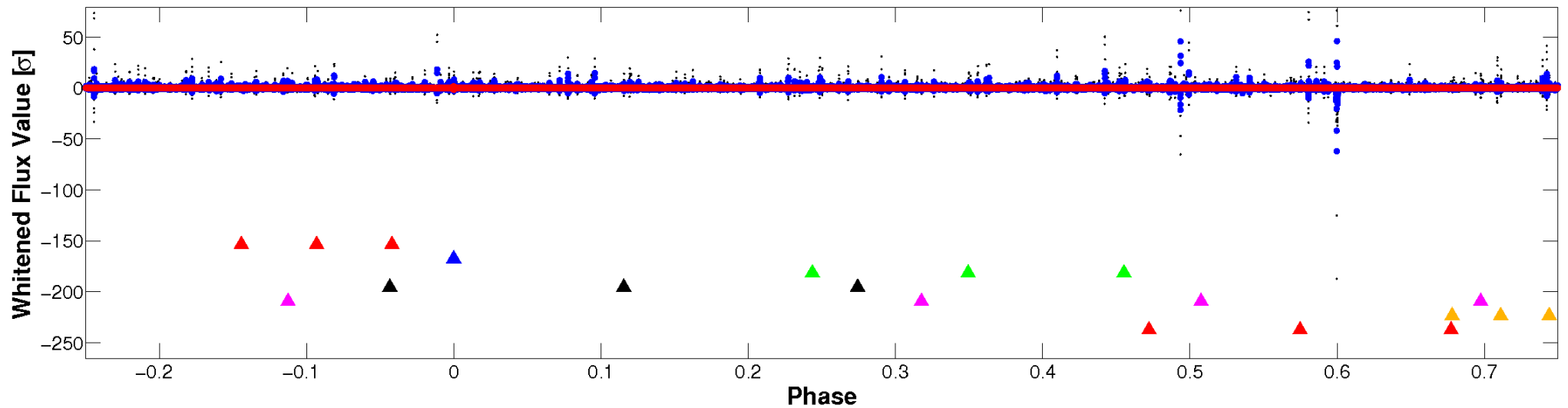


# Non-Whitened Vs. Whitened Light Curve

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

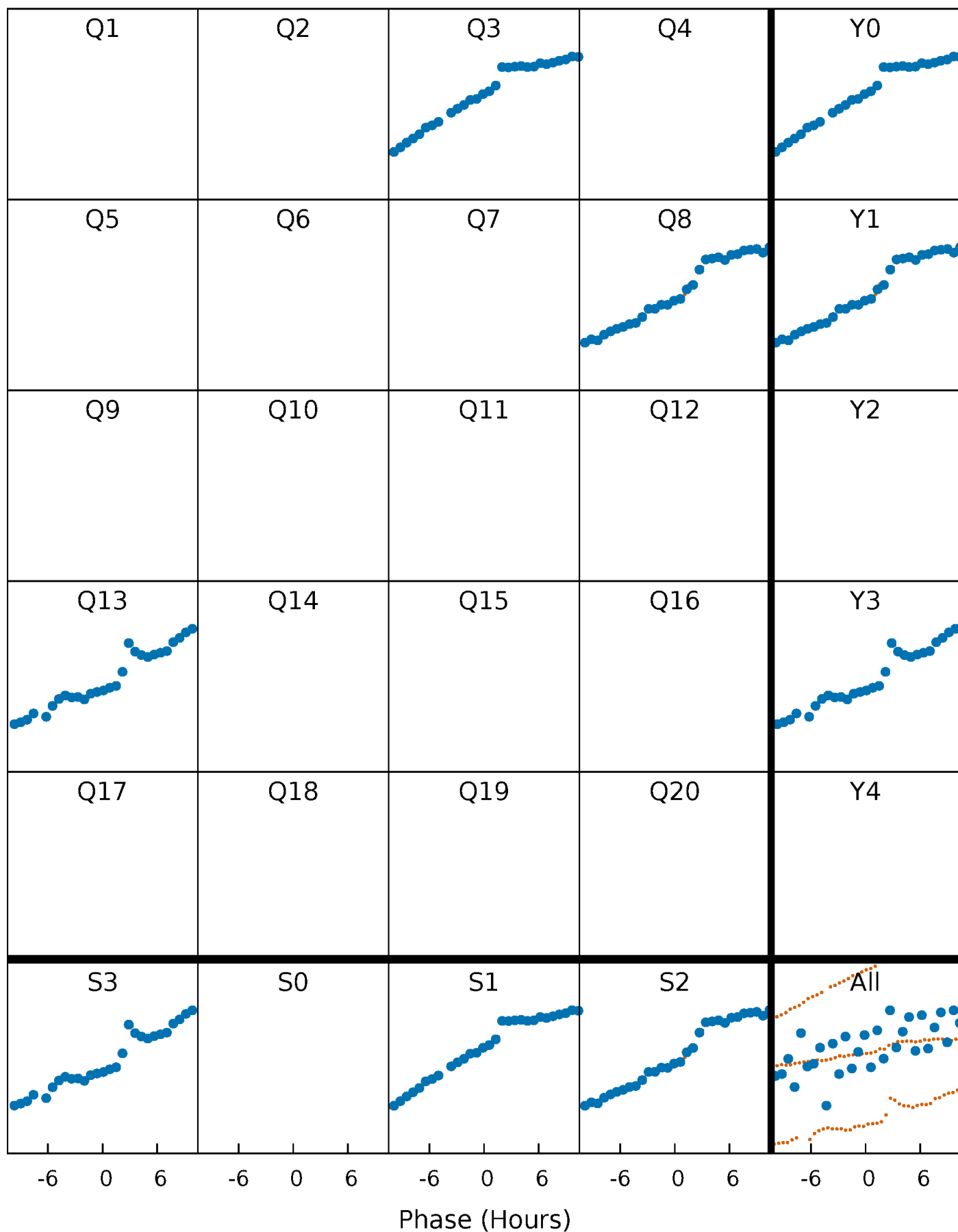


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



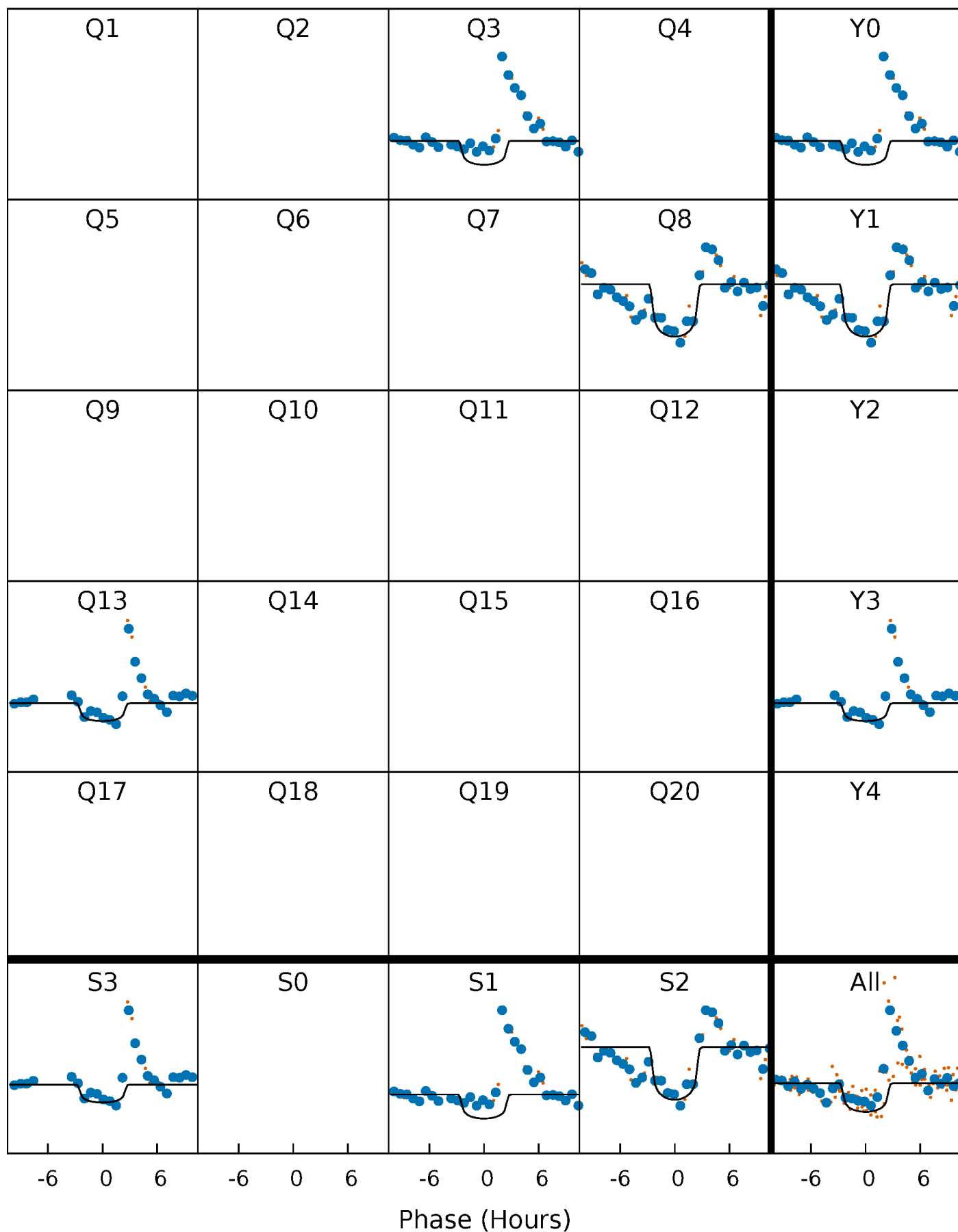
# PDC Quarter-Phased Transit Curves

TCE 007885309-02 P=473.217212 Days  $T_0=285.496718$  (BKJD)



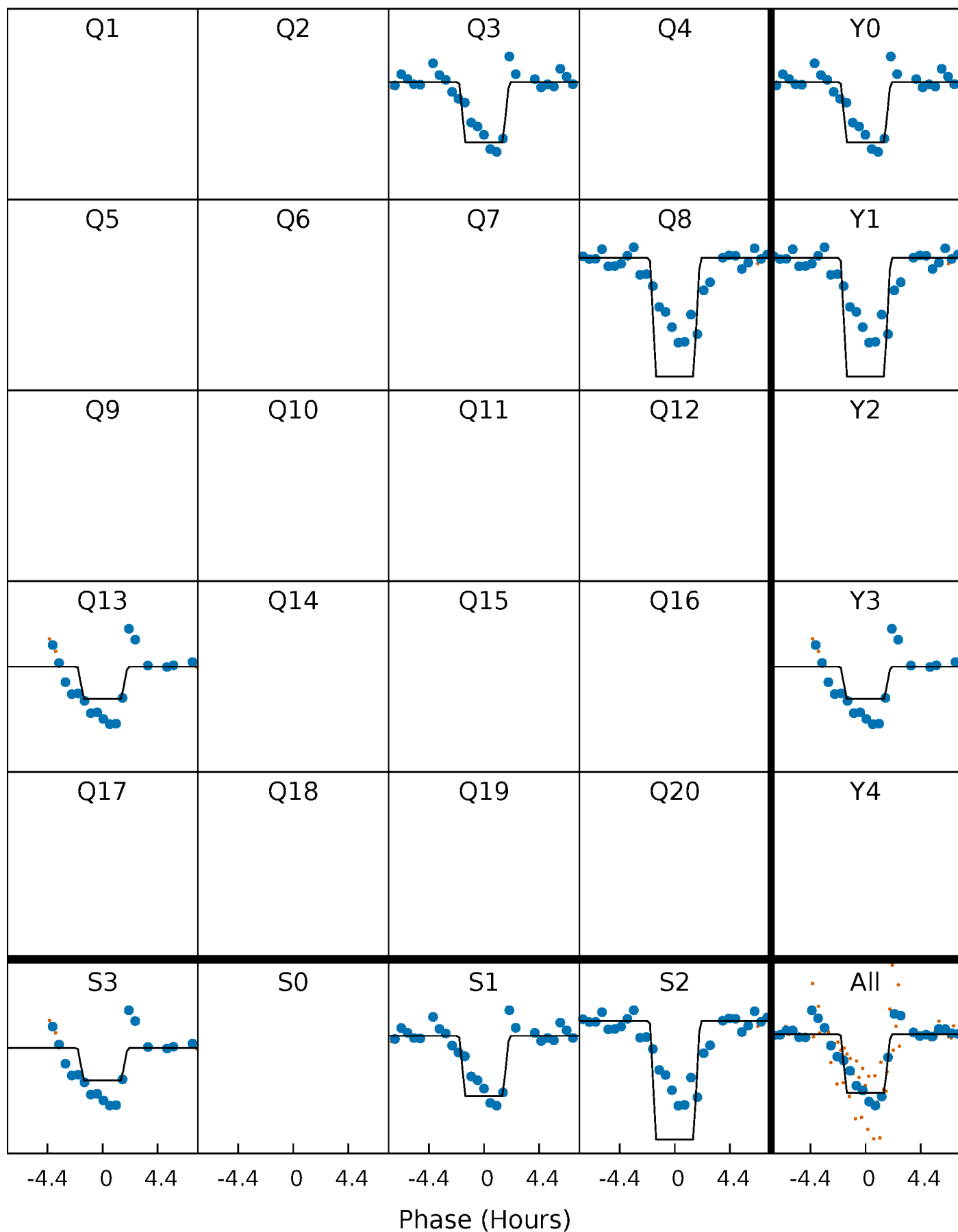
# DV Quarter-Phased Transit Curves

TCE 007885309-02     $P=473.217212$  Days     $T_0=285.496718$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

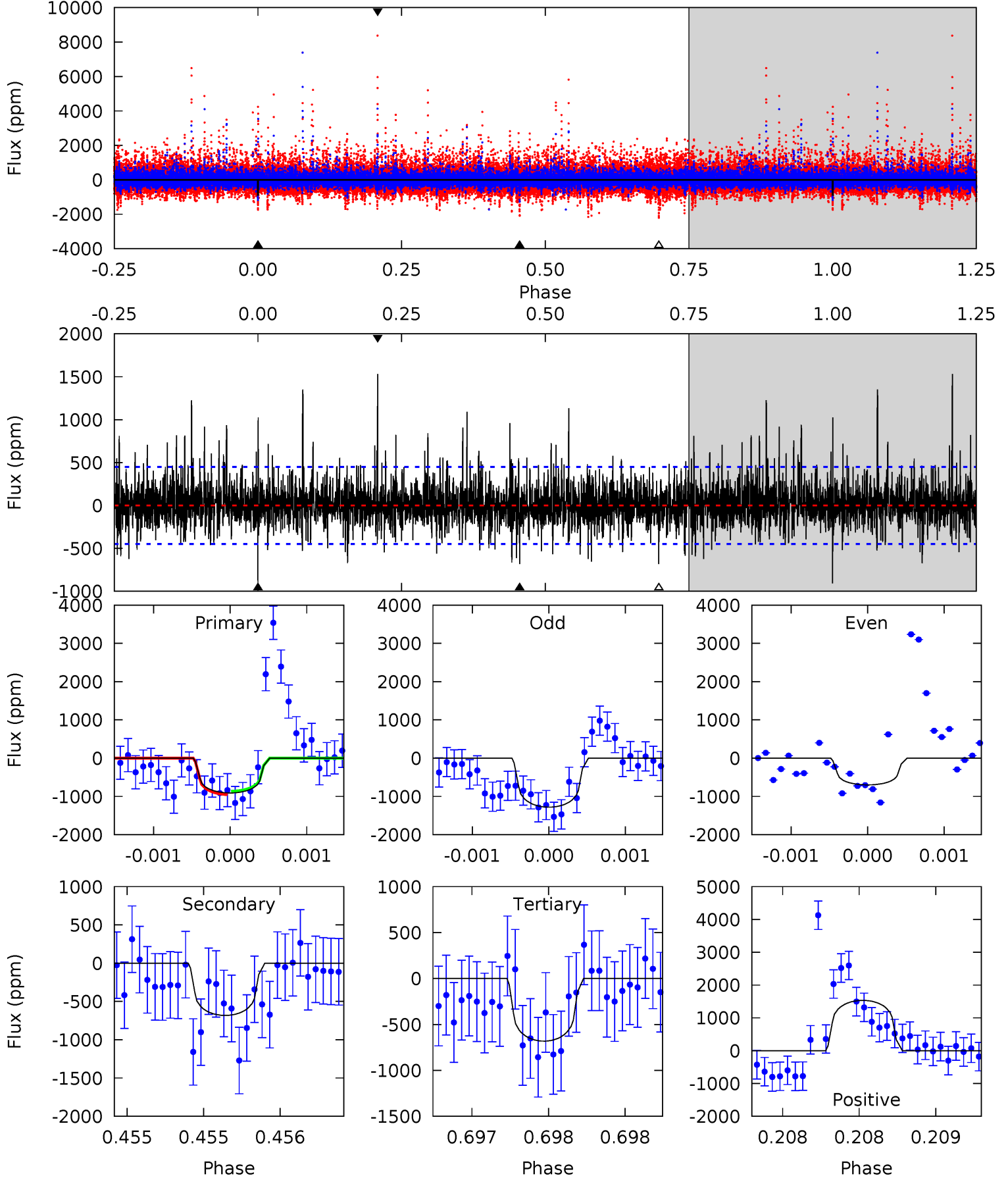
TCE 007885309-02 P=473.227627 Days  $T_0=285.500924$  (BKJD)



# DV Model-Shift Uniqueness Test

007885309-02, P = 473.217212 Days, E = 285.496718 Days

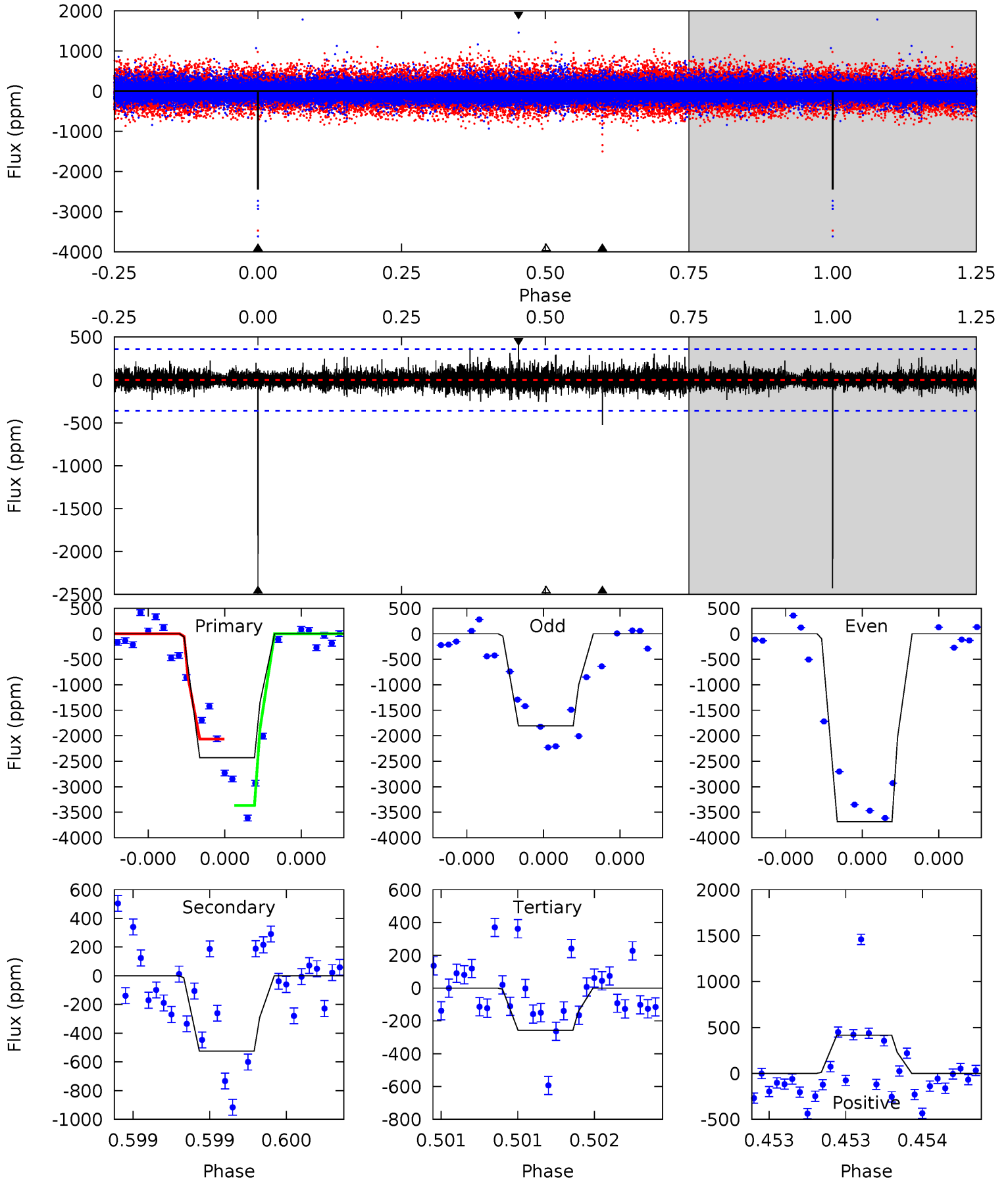
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.2	8.44	8.43	19.0	5.57	3.47	2.34	2.81	-7.72	0.01	-10.5	2.23	0.61	0.63	0.55



# Alt Model-Shift Uniqueness Test

007885309-02, P = 473.227627 Days, E = 285.500924 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
38.3	8.26	4.06	6.56	5.65	3.59	0.86	34.2	31.7	4.20	1.70	16.9	1.18	0.15	9.65





### Stellar Parameters For KIC 007885309

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4679^{+145}_{-162}$	$4.742^{+0.045}_{-0.024}$	$-1.540^{+0.300}_{-0.250}$	$0.510^{+0.027}_{-0.032}$	$0.523^{+0.034}_{-0.024}$	$5.559^{+1.090}_{-0.510}$
	+3%/-3%	+1%/-1%	+19%/-16%	+5%/-6%	+7%/-5%	+20%/-9%
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 007885309-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-682 \pm 81$	$2.30^{+1.84}_{-1.44}$	$209^{+7}_{-8}$	$3908^{+1945}_{-676}$	$63726^{+387384}_{-43845}$
Alt.	$-524 \pm 63$	$3.13^{+1.94}_{-1.68}$	$209^{+8}_{-8}$	$3390^{+1029}_{-452}$	$27221^{+99775}_{-16896}$

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

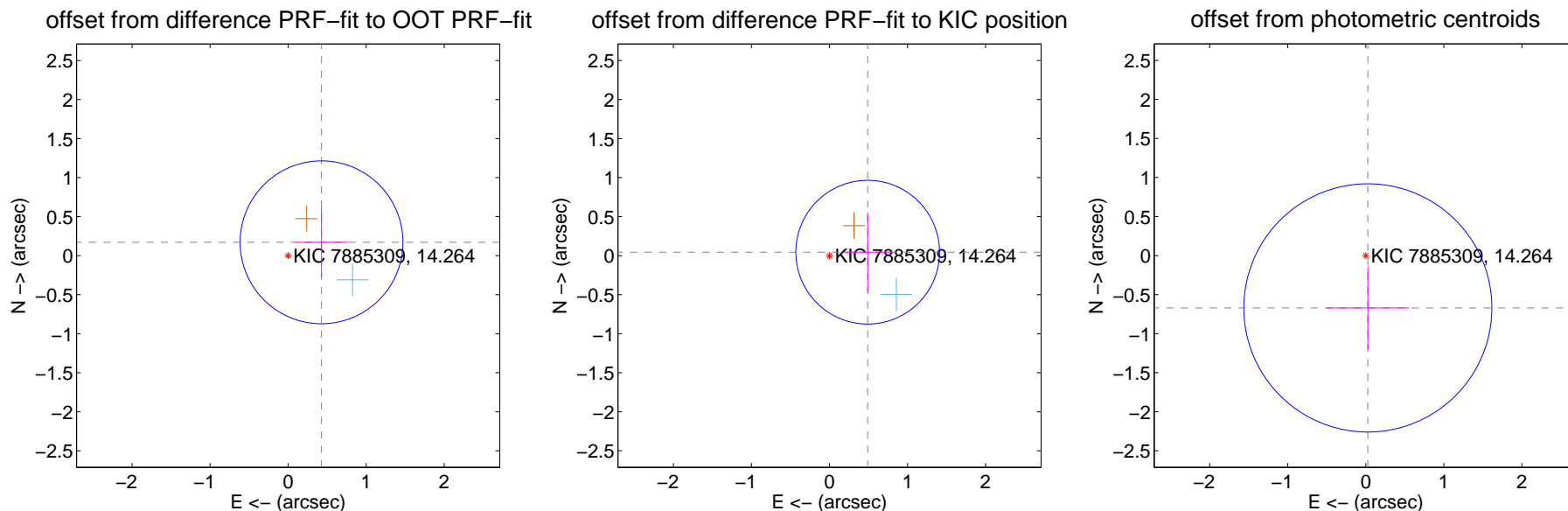
## DV Centroid Data

Supplemental centroid analysis for 007885309-02. Kepler magnitude: 14.26. Transit SNR 9.33

There are 1 quarters with good PRF difference image offsets

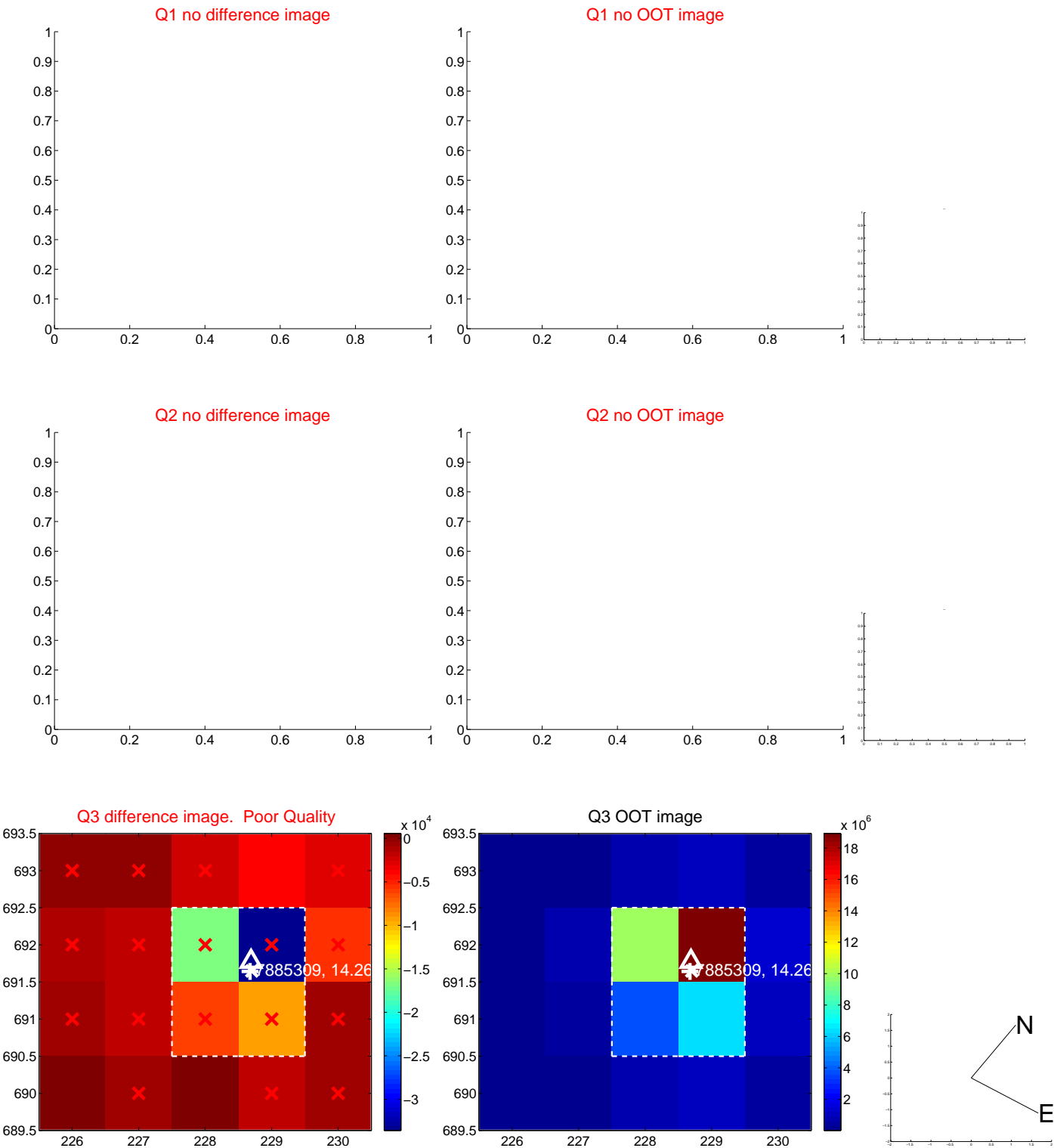
The direct PRF centroid is offset from the target star catalog position by about 0.19 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.461 \pm 0.348$	1.33	$-0.428 \pm 0.328$	$0.171 \pm 0.451$
PRF-fit source offset from KIC position	$0.492 \pm 0.307$	1.60	$-0.490 \pm 0.305$	$0.045 \pm 0.506$
photometric centroid source offset	$0.67 \pm 0.53$	1.27	$-0.03 \pm 0.53$	$-0.67 \pm 0.53$

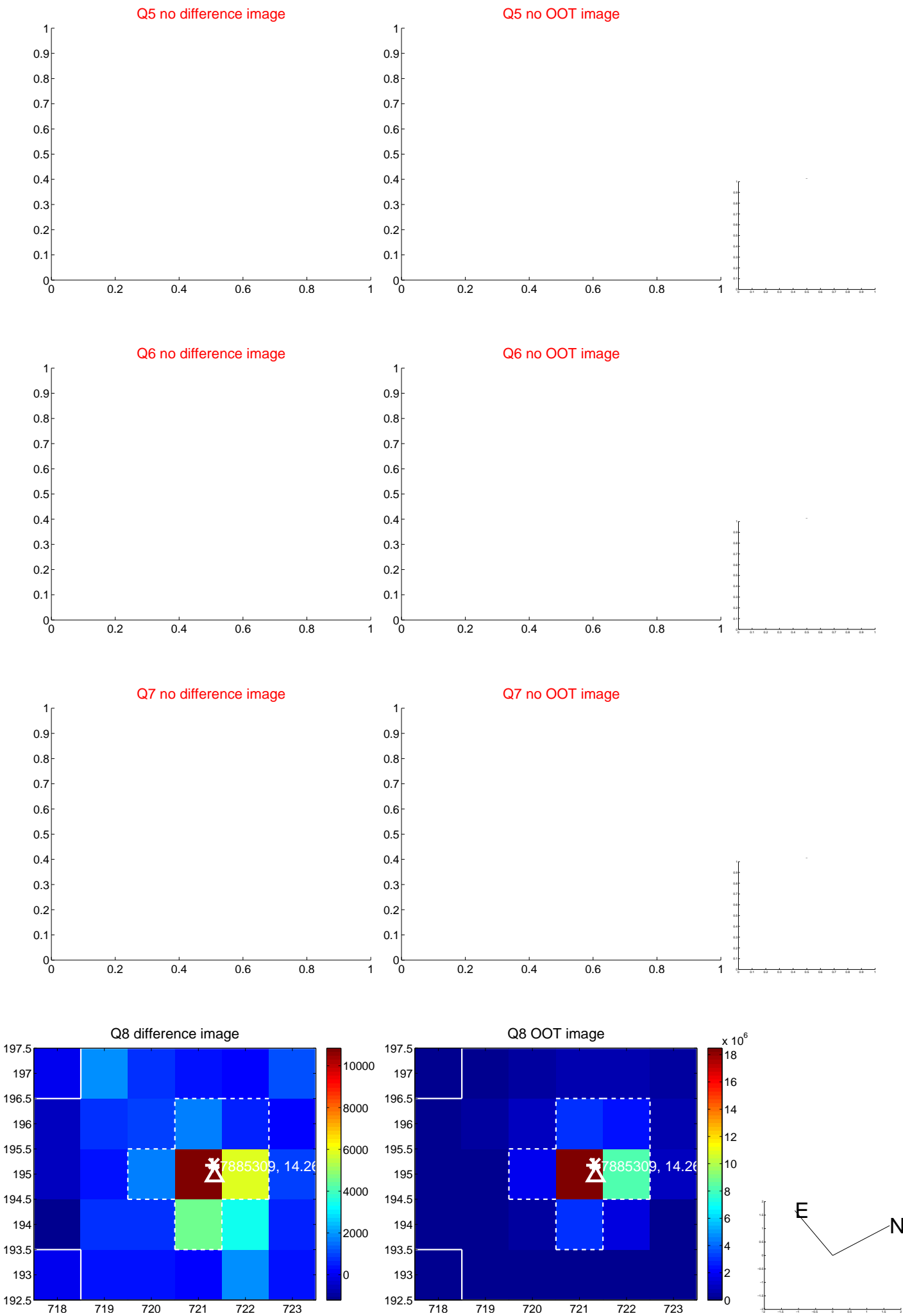


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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



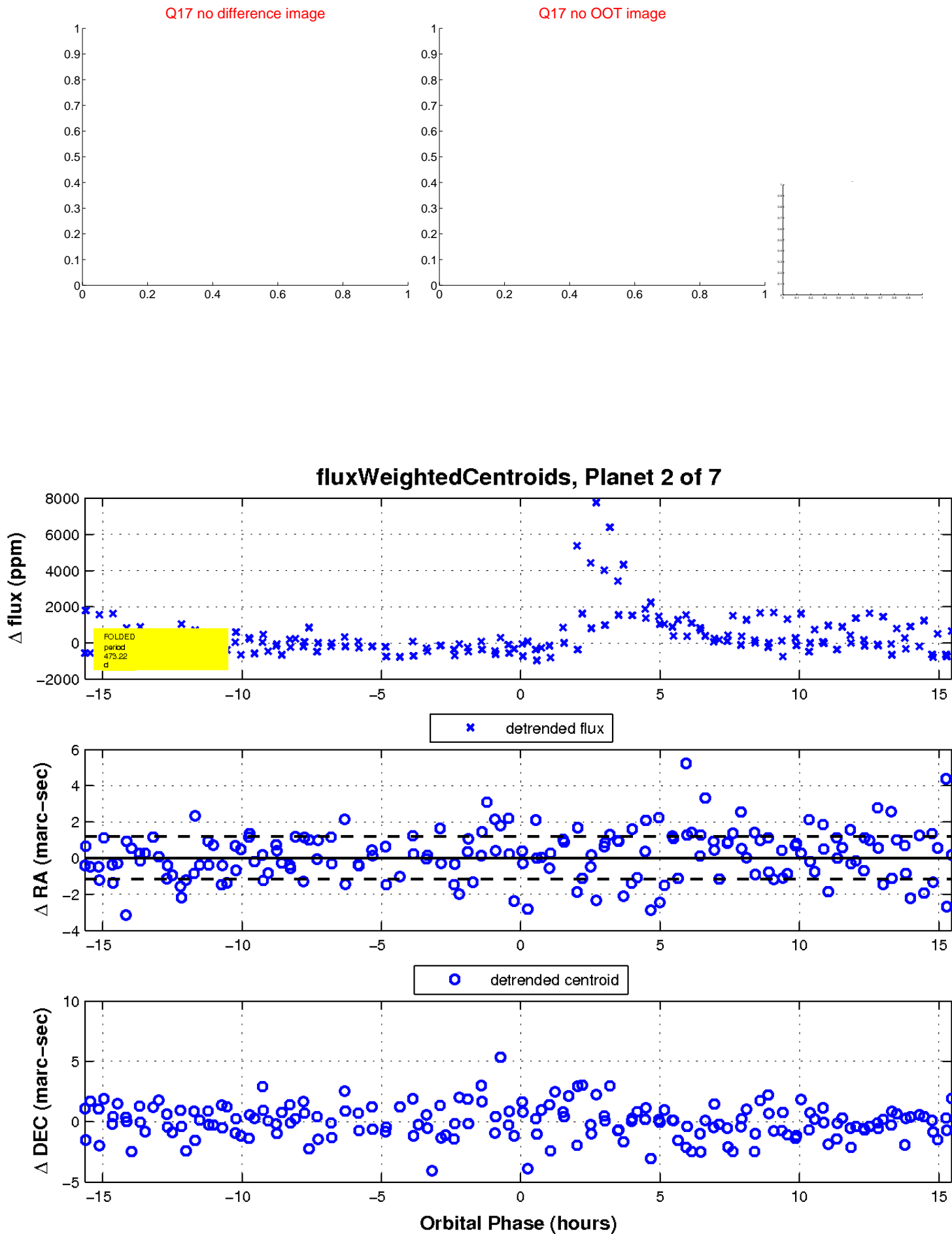
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

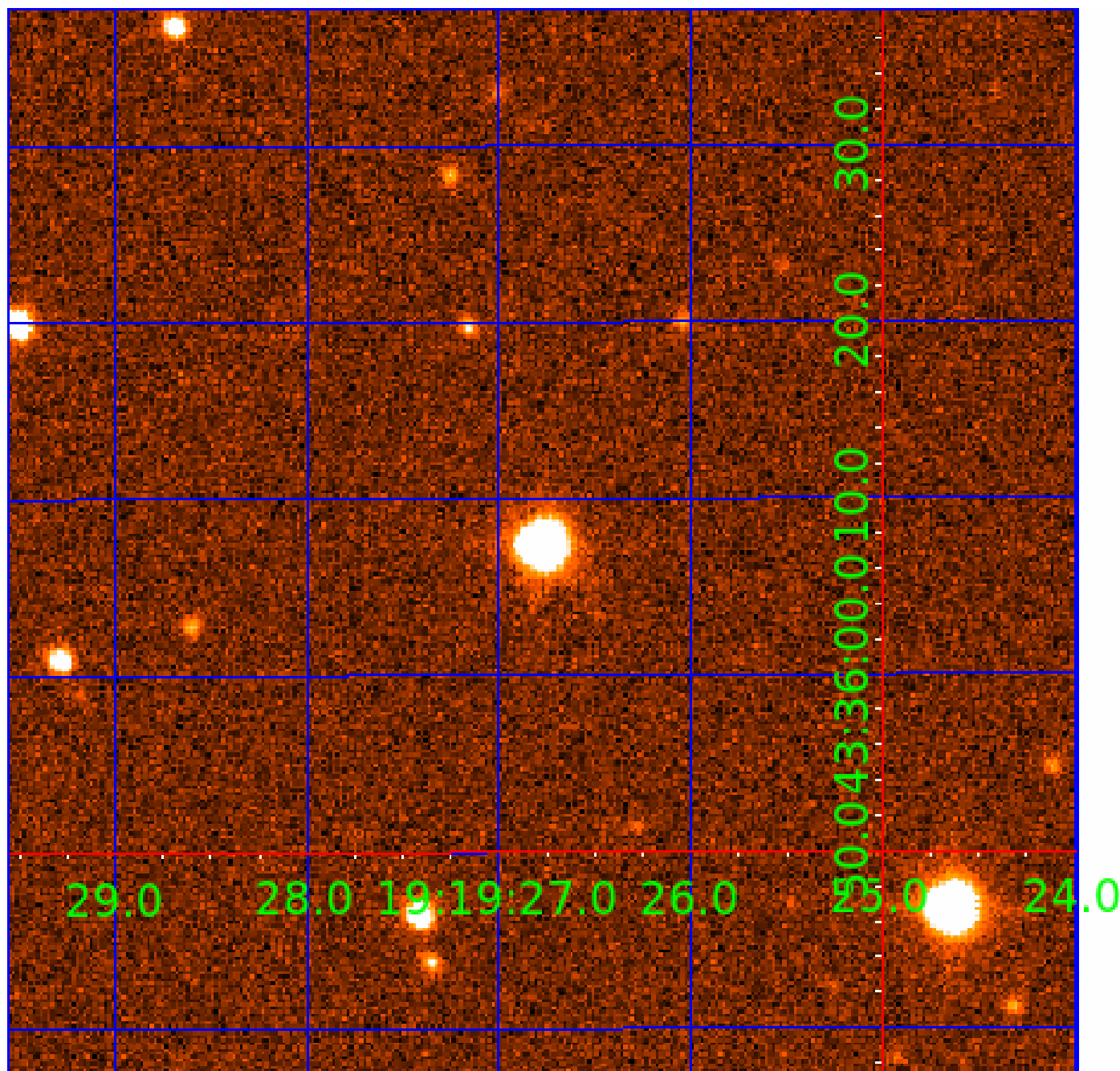


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 007885309

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007885309-01	OBS	No	497.420836	217.225123	542.3	0.571	20.4	2.8	0.51	4679	1.27	0.11
007885309-02	OBS	No	473.217212	285.496718	1477.8	5.227	17.0	9.3	0.51	4679	1.98	0.12
007885309-03	OBS	No	423.140437	500.921247	945.0	8.649	18.5	5.0	0.51	4679	1.59	0.14
007885309-04	OBS	No	398.026126	415.335195	1460.2	8.793	17.3	7.2	0.51	4679	3.78	0.15

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007885309-01	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_MARSHALL_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—HALO_GHOST
007885309-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
007885309-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
007885309-04	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—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.

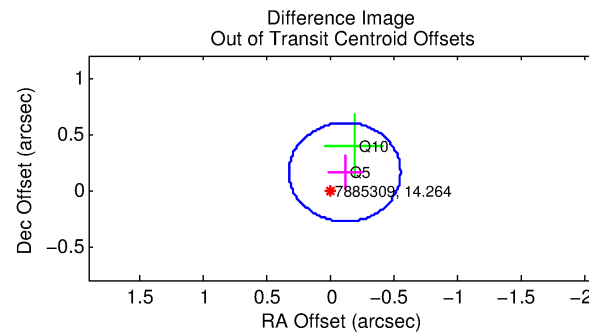
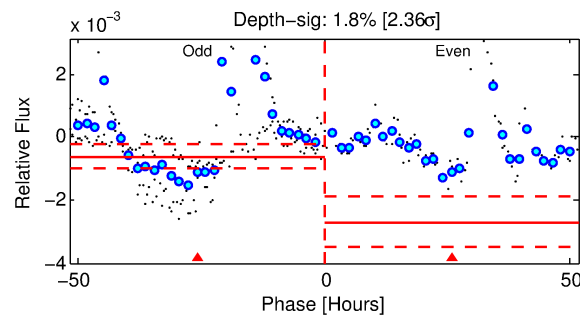
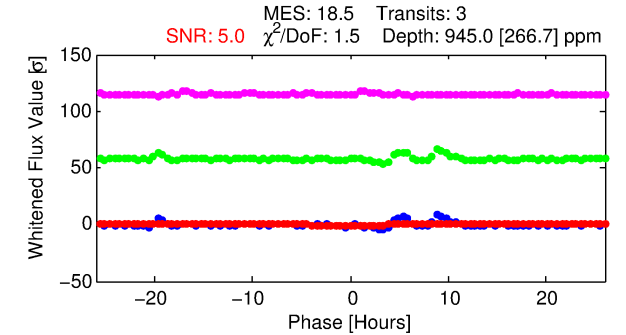
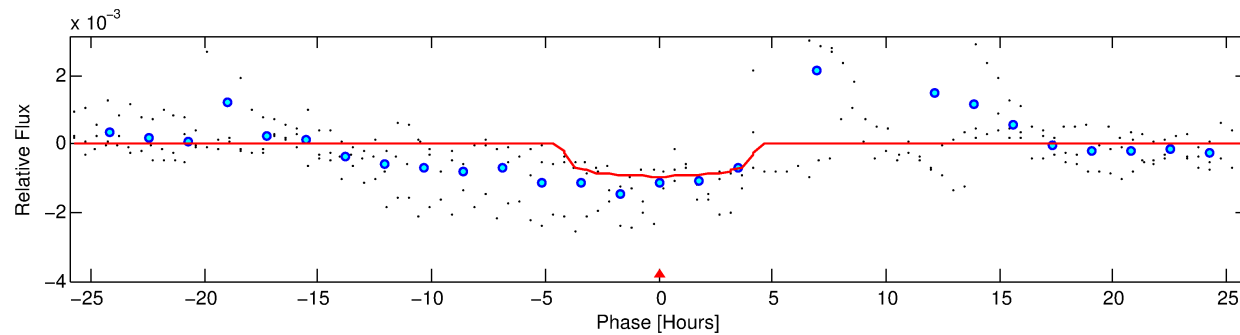
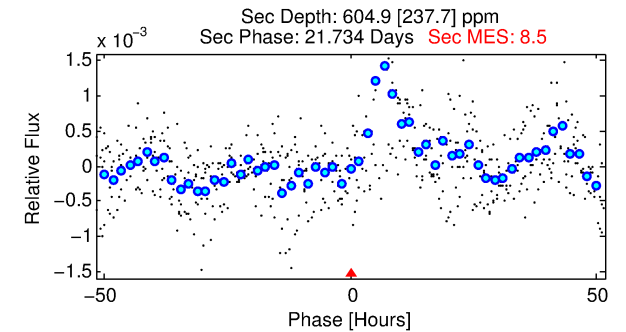
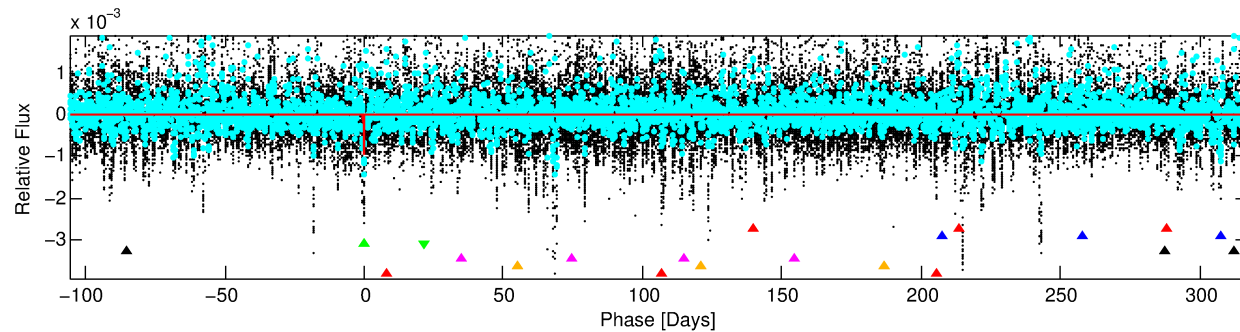
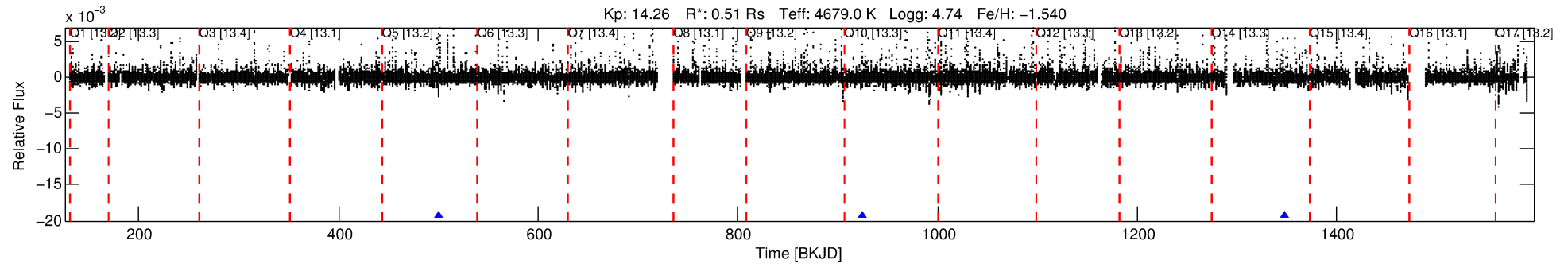
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 007885309-03

No Significant Match Found

# DV One-Page Summary

KIC: 7885309 Candidate: 3 of 7 Period: 423.140 d



## DV Fit Results:

Period = 423.14044 [0.00845] d  
Epoch = 500.9212 [0.0116] BKJD  
Rp/R\* = 0.0286 [0.2646]  
a/R\* = 345.23 [14187.11]  
b = 0.45 [72.72]  
Seff = 0.14 [0.02]  
Teq = 156 [6] K  
Rp = 1.59 [14.73] Re  
a = 0.8893 [0.0482] AU  
Ag = 103947.25 [1924238.52] [0.05]  
Teffp = 4340 [20084] K [0.21 $\sigma$ ]

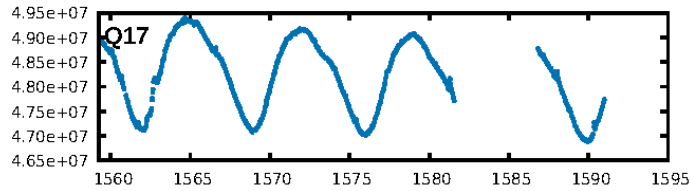
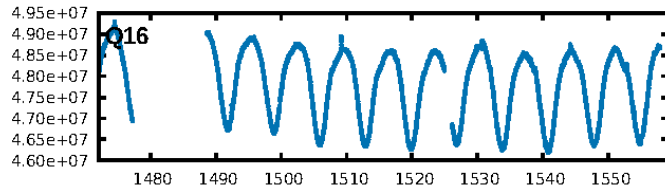
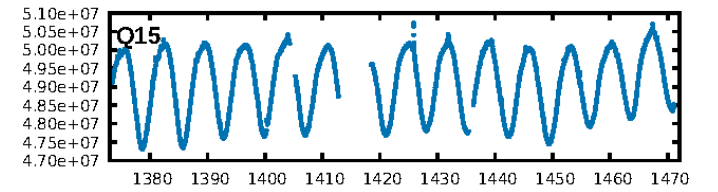
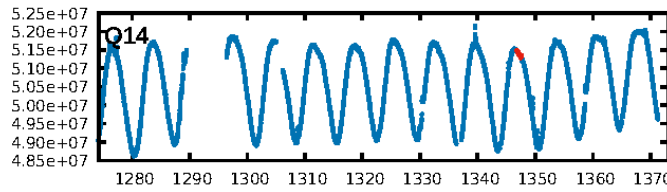
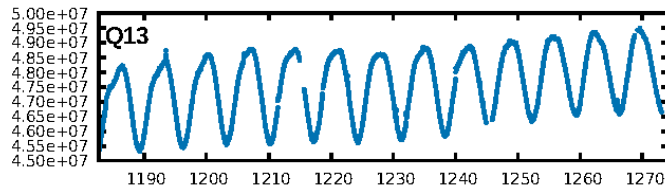
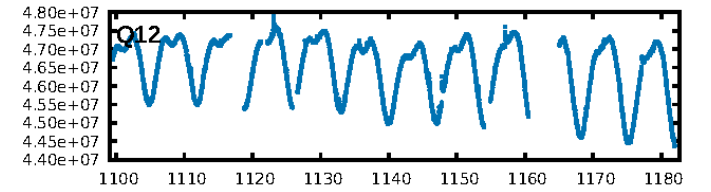
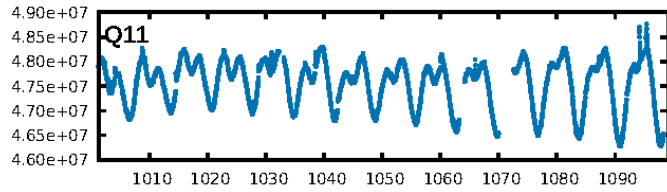
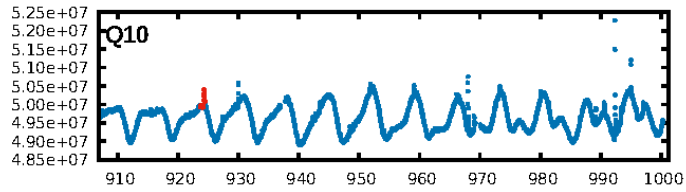
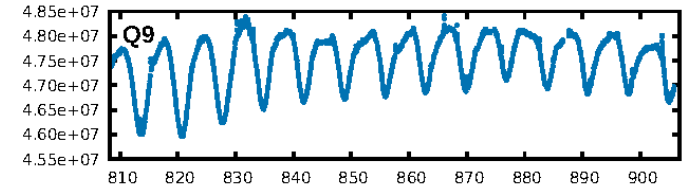
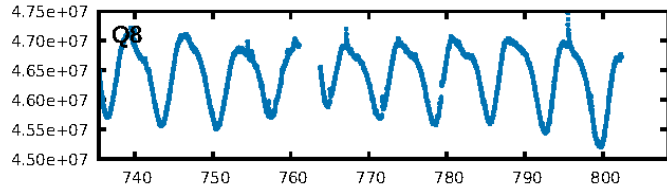
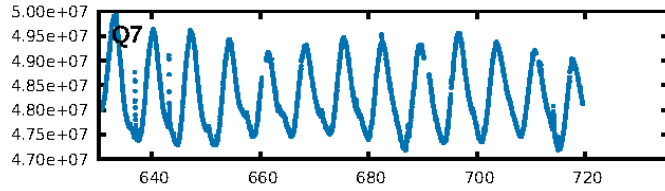
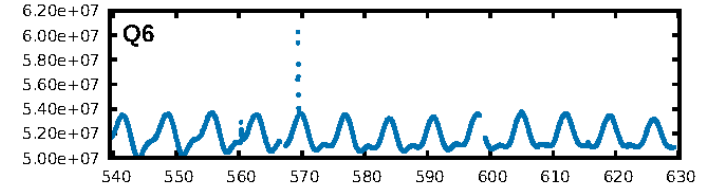
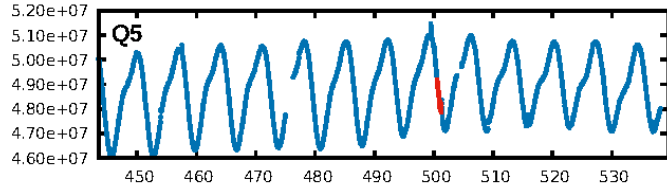
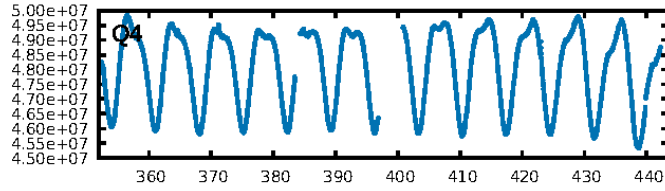
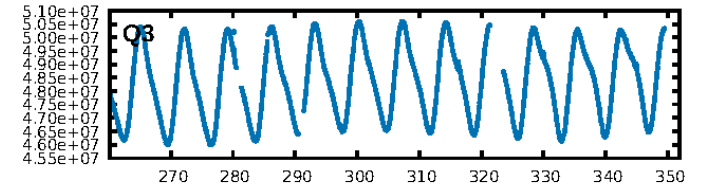
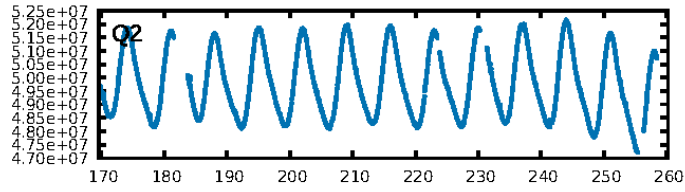
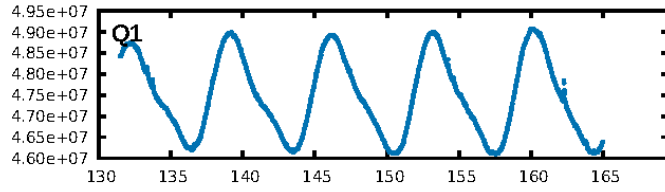
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [48.87 $\sigma$ ]  
LongPeriod-sig: 100.0% [118.93 $\sigma$ ]  
ModelChiSquare2-sig: 0.7%  
ModelChiSquareGof-sig: 74.4%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -4.504  
Centroid-sig: N/A  
Centroid-so: 0.940 arcsec [1.57 $\sigma$ ]  
OotOffset-rm: 0.198 arcsec [1.35 $\sigma$ ]  
OotOffset-st: 1/0/0/1 [2]  
KicOffset-rm: 0.189 arcsec [1.42 $\sigma$ ]  
KicOffset-st: 1/0/0/1 [2]  
DiffImageQuality-fgm: 1.00 [2/2]  
DiffImageOverlap-fno: 1.00 [3/3]

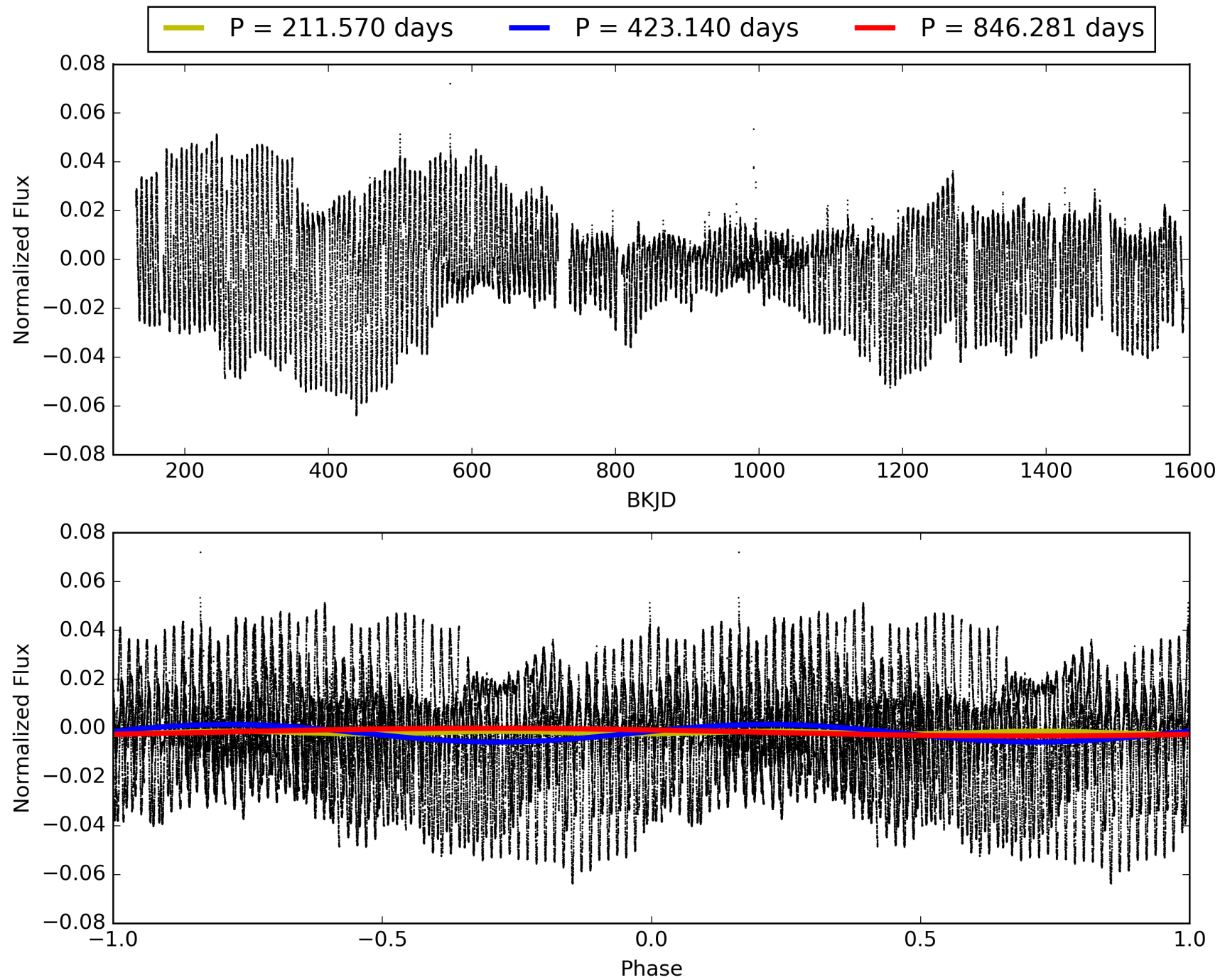
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 22:06:50 Z

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

# TCE 007885309-03, PDC Light Curves

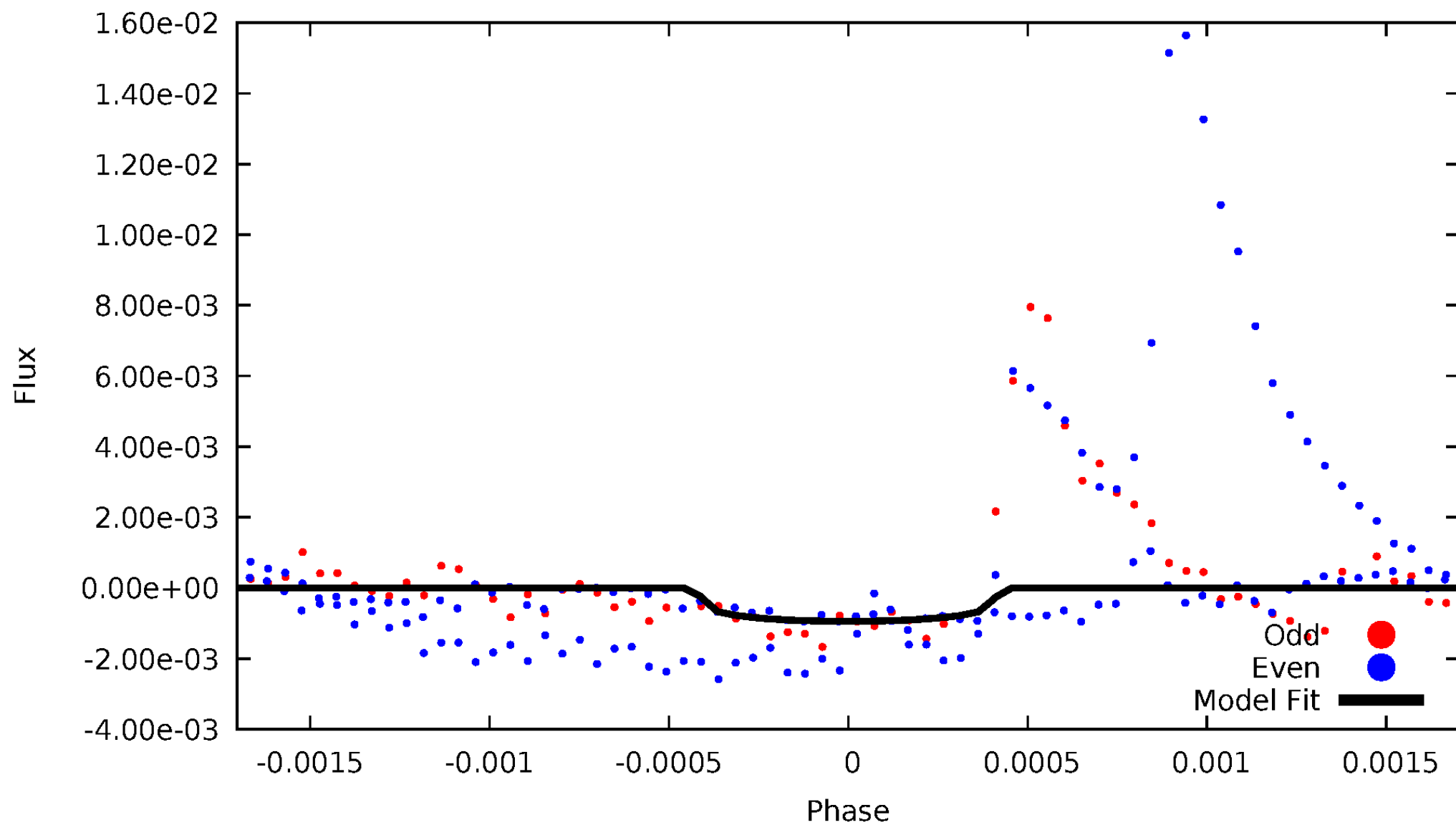


TCE 007885309-03



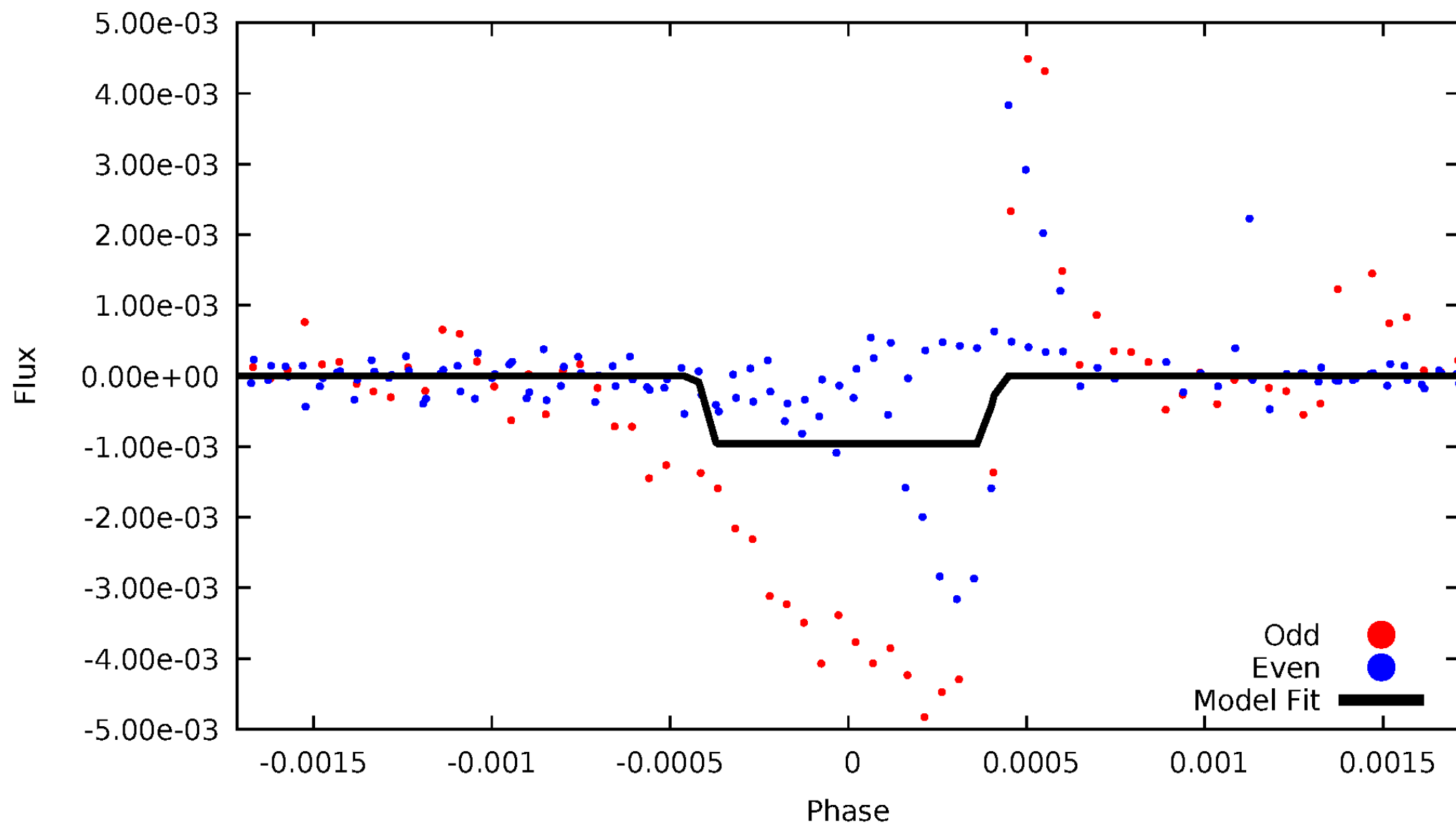
# DV Odd/Even

TCE 007885309-03



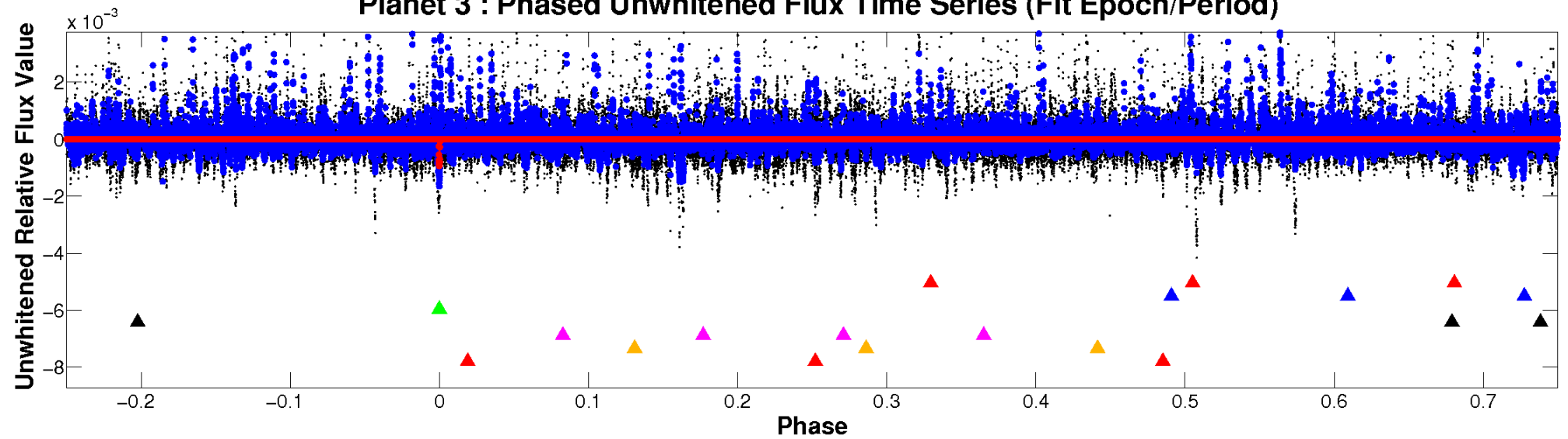
# ALT Odd/Even

TCE 007885309-03

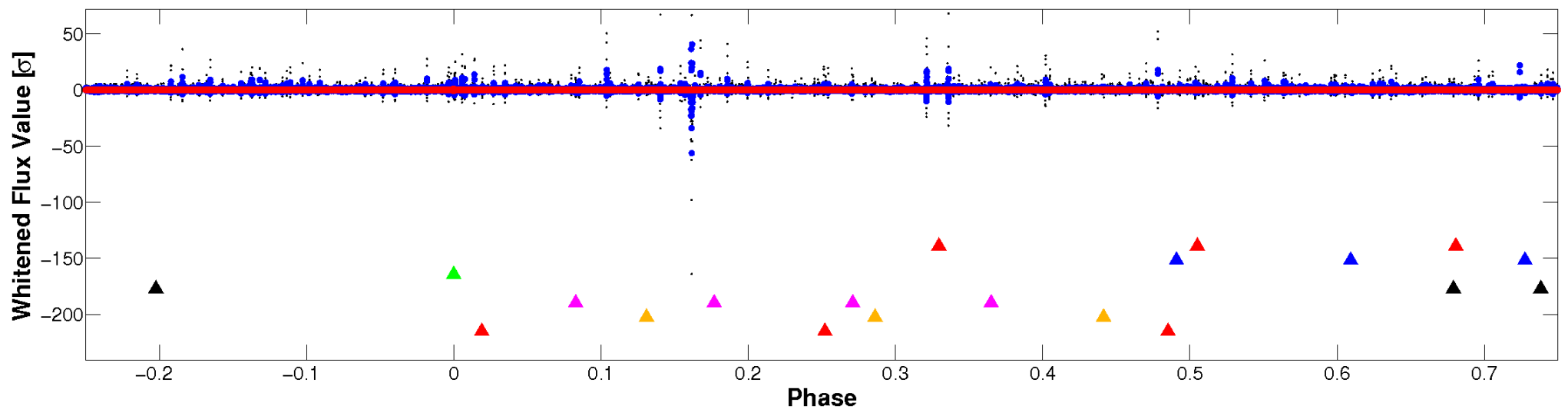


# Non-Whitened Vs. Whitened Light Curve

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

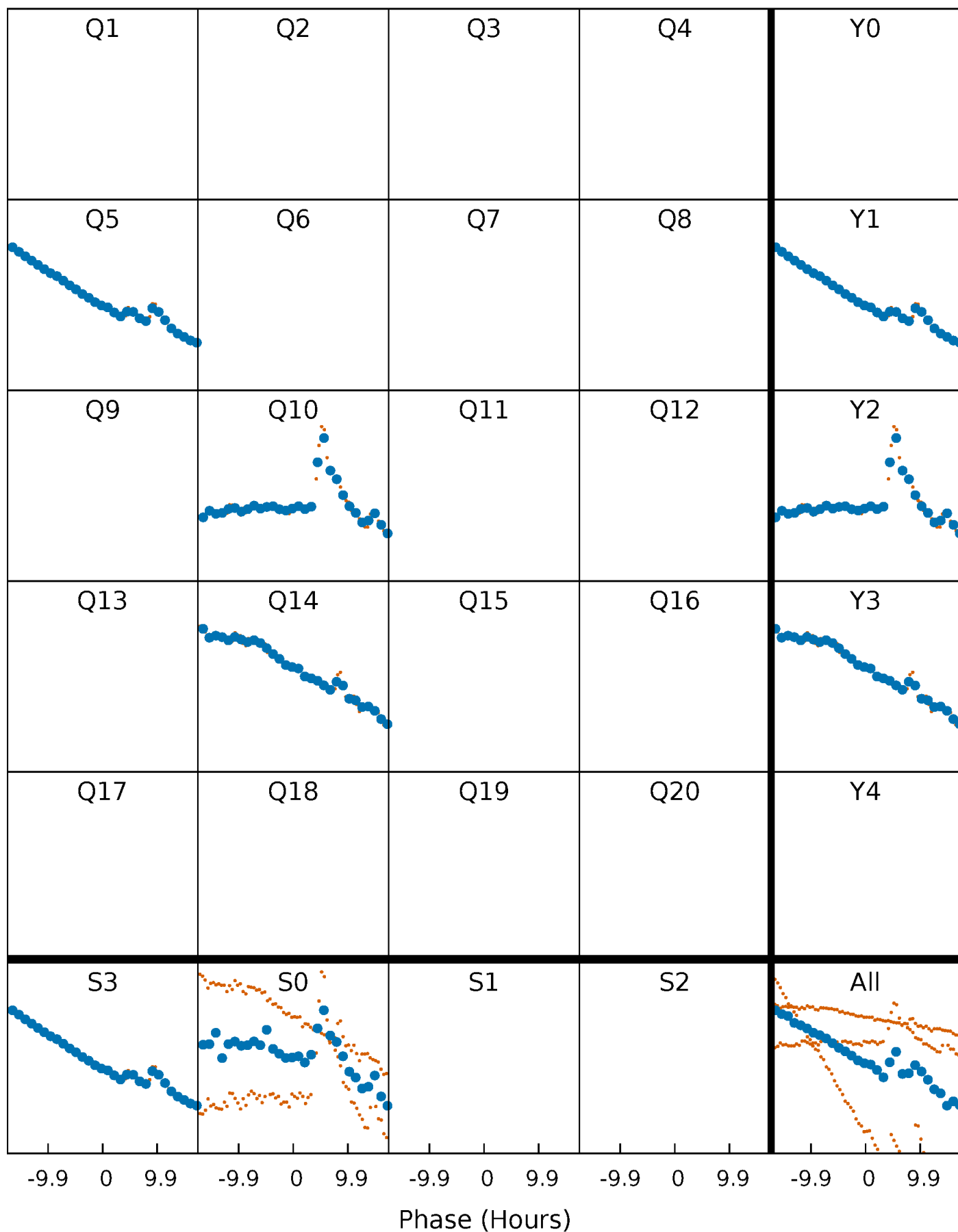


**Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

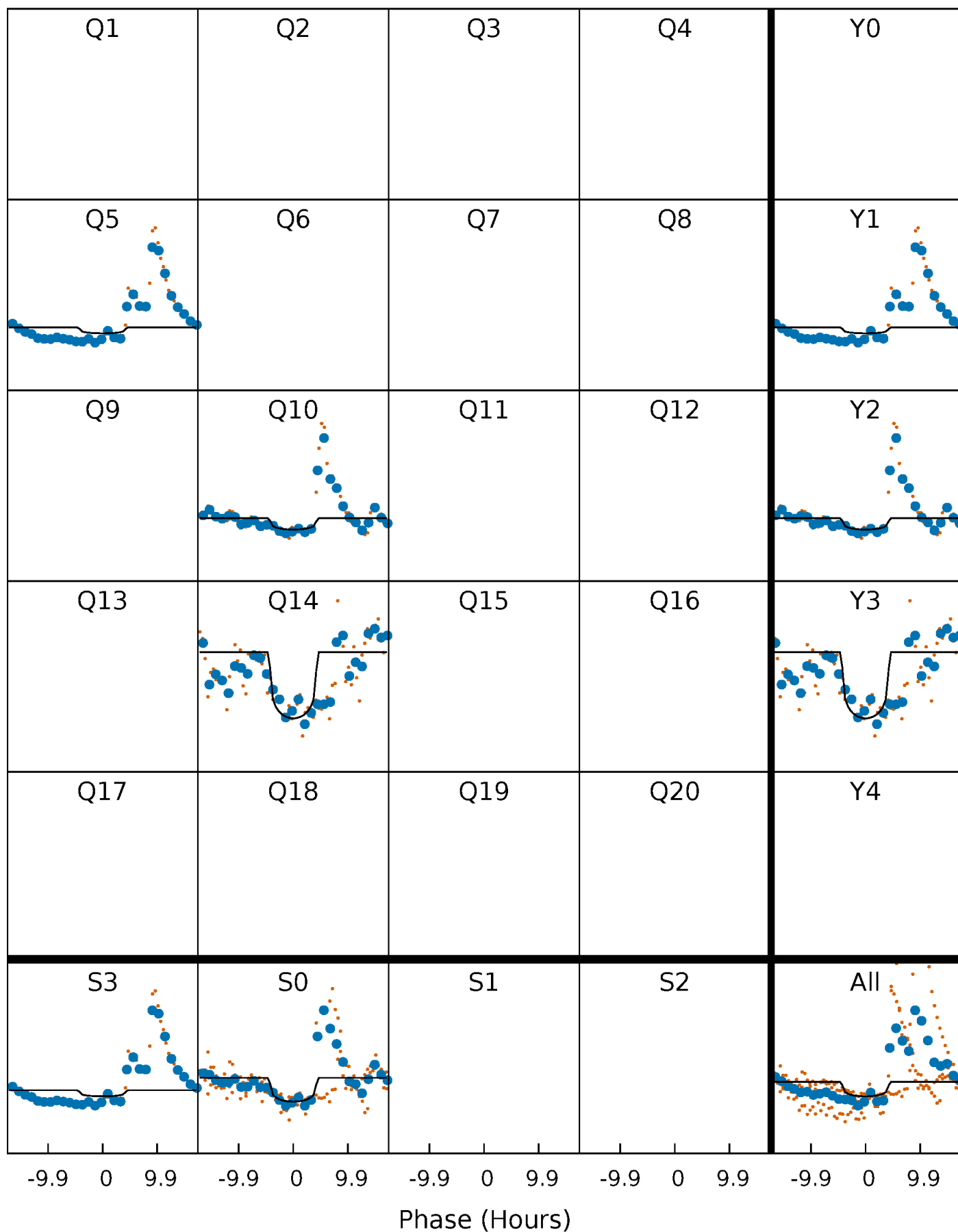
TCE 007885309-03 P=423.140437 Days  $T_0=500.921247$  (BKJD)





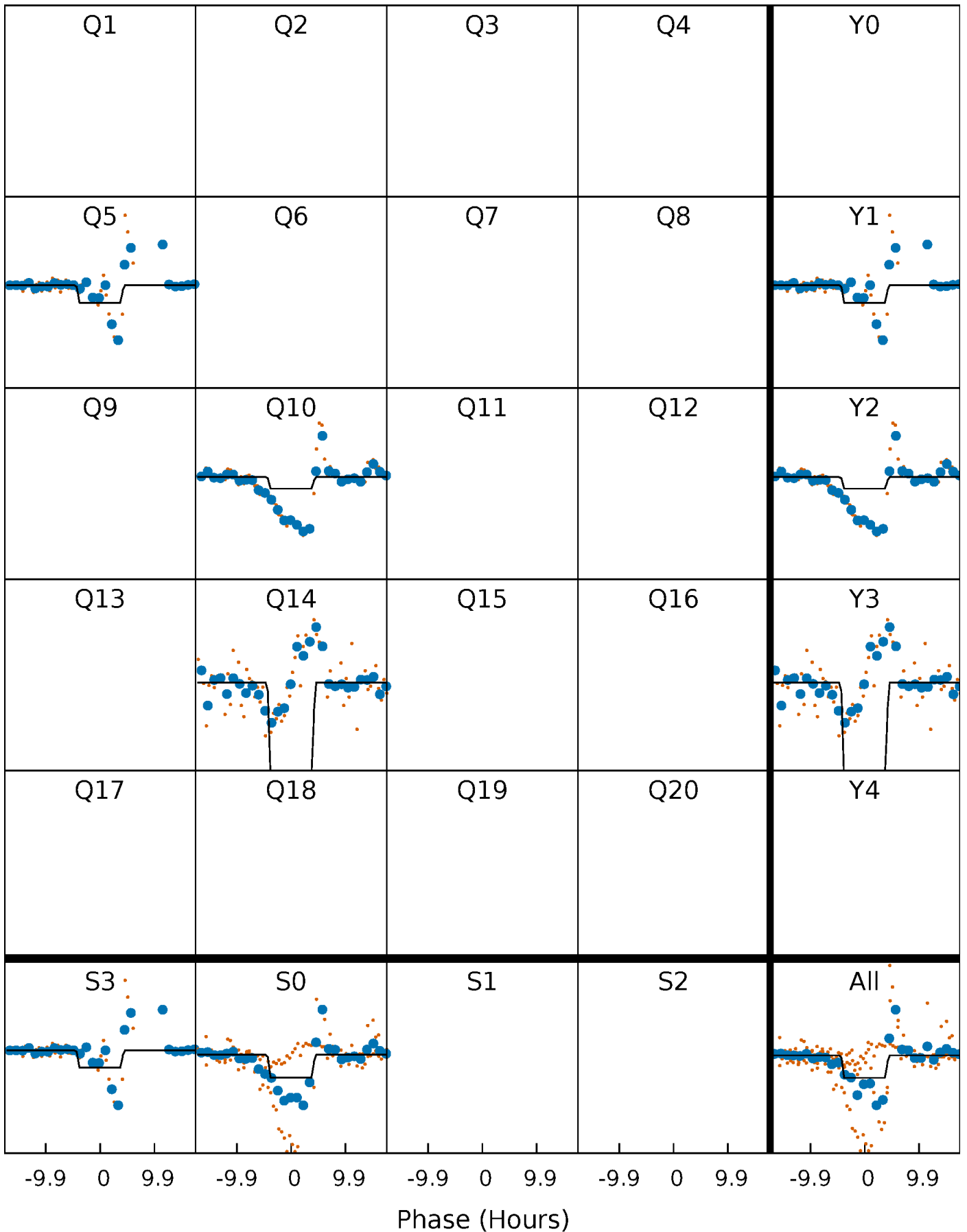
# DV Quarter-Phased Transit Curves

TCE 007885309-03     $P=423.140437$  Days     $T_0=500.921247$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

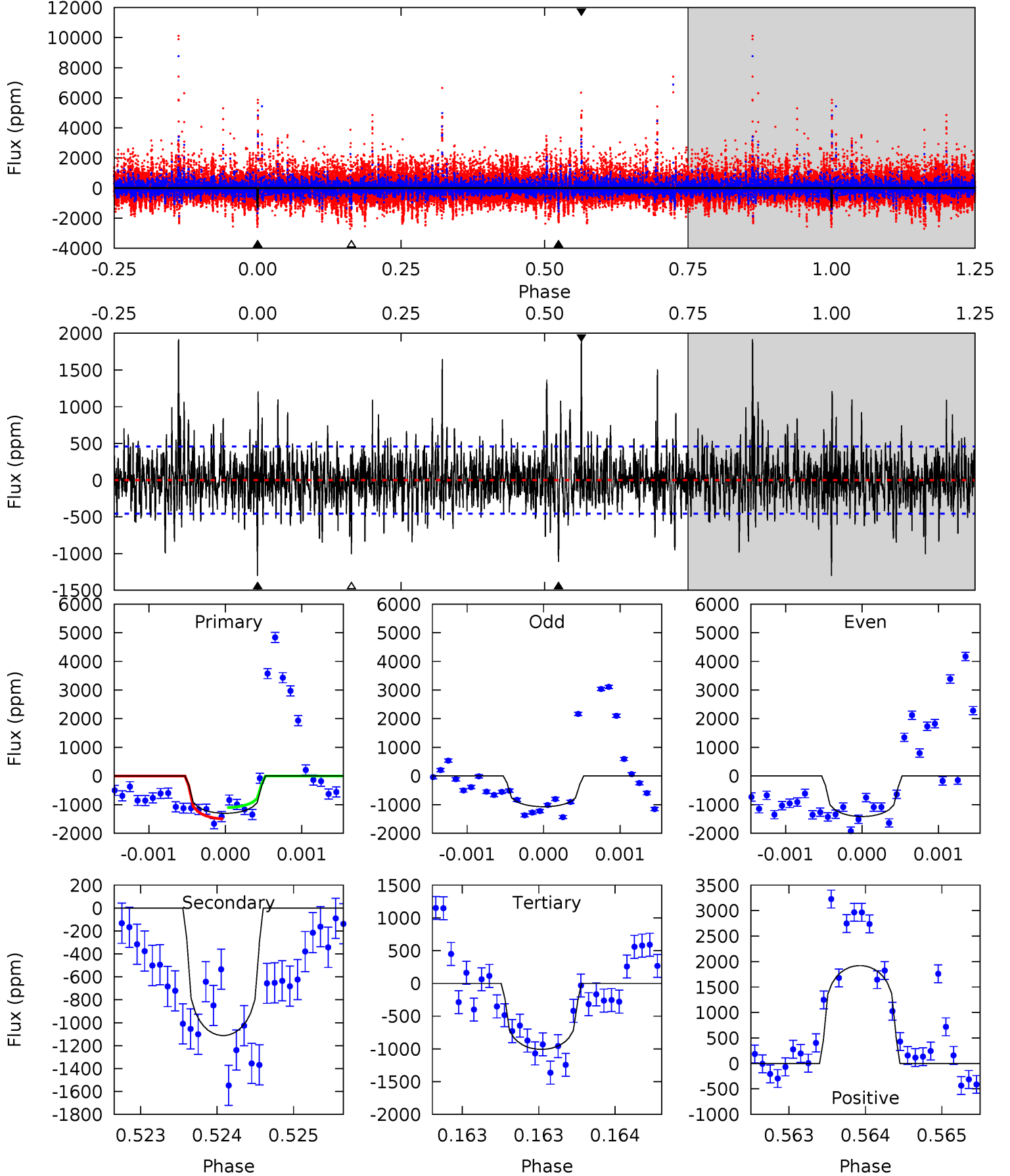
TCE 007885309-03     $P=423.138161$  Days     $T_0=500.925135$  (BKJD)



# DV Model-Shift Uniqueness Test

007885309-03, P = 423.140437 Days, E = 77.780810 Days

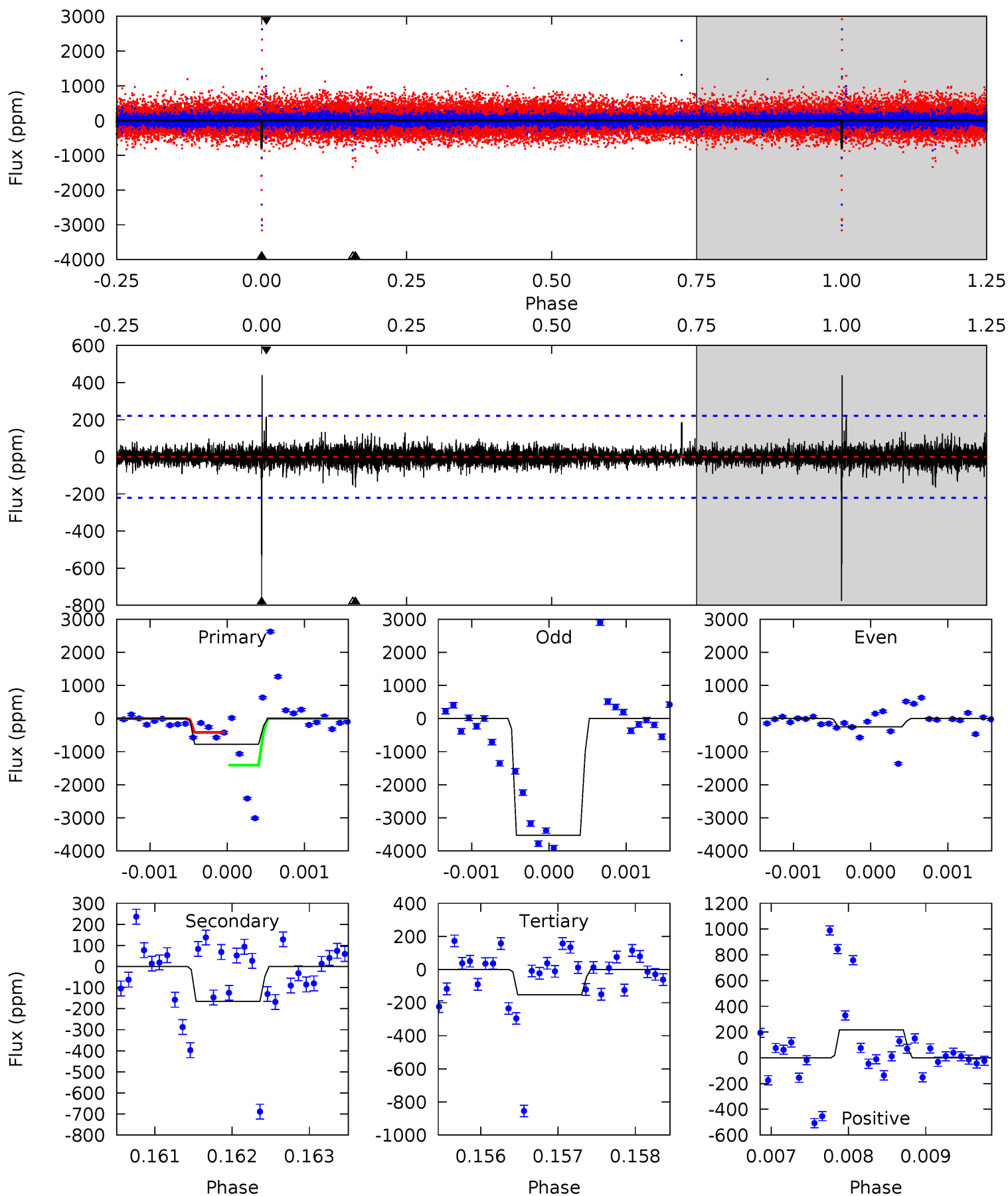
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
15.6	13.3	12.1	23.0	5.48	3.33	3.38	3.55	-7.40	1.25	-9.69	1.24	1.21	0.60	2.36



# Alt Model-Shift Uniqueness Test

007885309-03, P = 423.138161 Days, E = 77.786974 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
19.3	4.09	3.79	5.40	5.48	3.33	0.65	15.5	13.9	0.30	-1.30	42.0	1.47	0.36	11.9



### Stellar Parameters For KIC 007885309

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4679^{+145}_{-162}$	$4.742^{+0.045}_{-0.024}$	$-1.540^{+0.300}_{-0.250}$	$0.510^{+0.027}_{-0.032}$	$0.523^{+0.034}_{-0.024}$	$5.559^{+1.090}_{-0.510}$
	+3%/-3%	+1%/-1%	+19%/-16%	+5%/-6%	+7%/-5%	+20%/-9%
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 007885309-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-1112 \pm 83$	$10.36^{+11.39}_{-7.07}$	$217^{+8}_{-8}$	$2691^{+1077}_{-439}$	$4575^{+38390}_{-3538}$
Alt.	$-165 \pm 40$	$10.40^{+12.26}_{-7.22}$	$217^{+7}_{-9}$	$2142^{+695}_{-321}$	$657^{+6224}_{-526}$

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

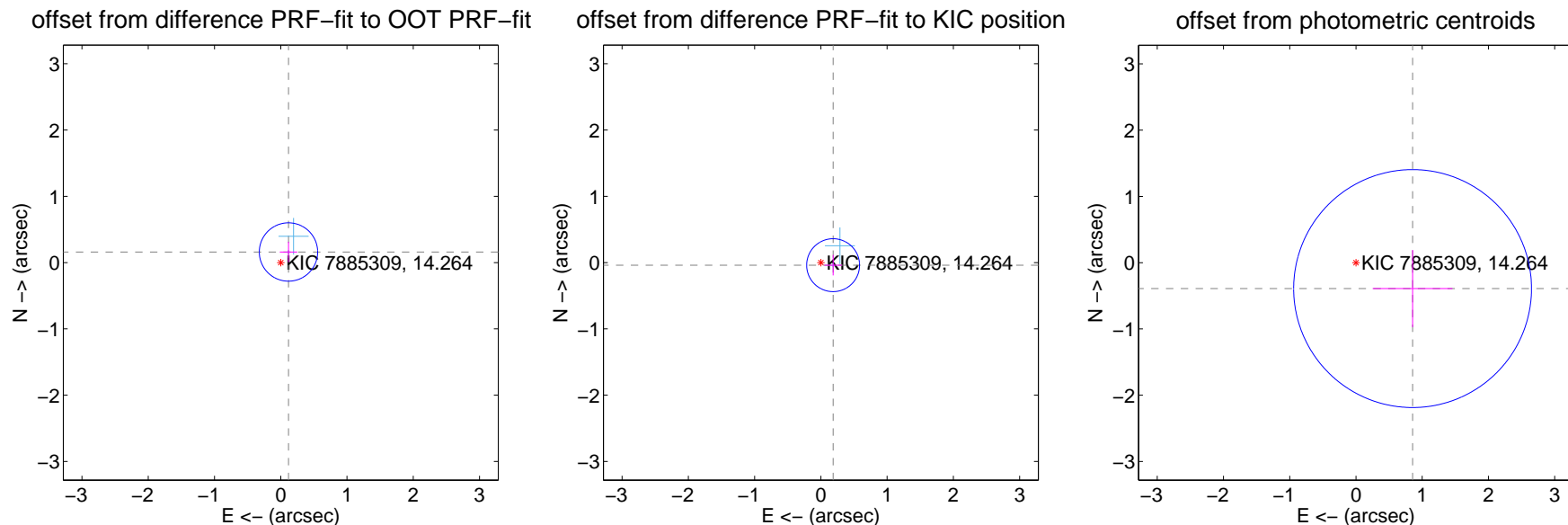
## DV Centroid Data

Supplemental centroid analysis for 007885309-03. Kepler magnitude: 14.26. Transit SNR 5.01

There are 2 quarters with good PRF difference image offsets

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

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.198 \pm 0.147$	1.35	$-0.117 \pm 0.132$	$0.160 \pm 0.154$
PRF-fit source offset from KIC position	$0.189 \pm 0.133$	1.42	$-0.185 \pm 0.132$	$-0.039 \pm 0.154$
photometric centroid source offset	$0.94 \pm 0.60$	1.57	$-0.85 \pm 0.60$	$-0.39 \pm 0.58$

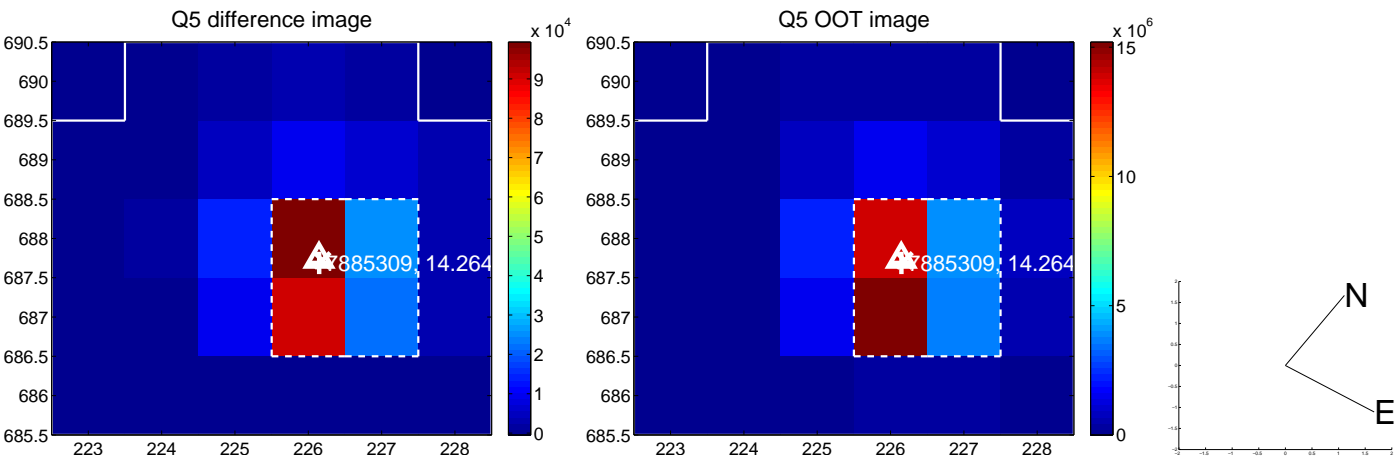


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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



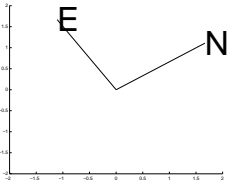
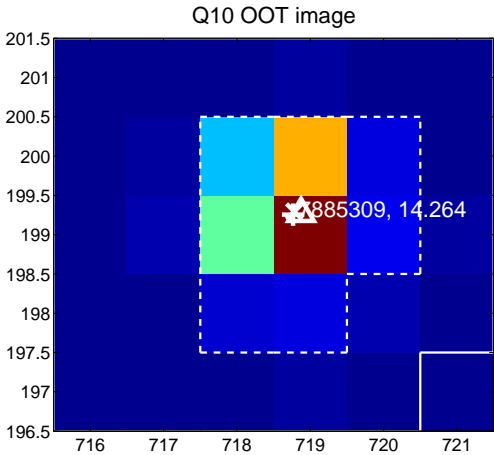
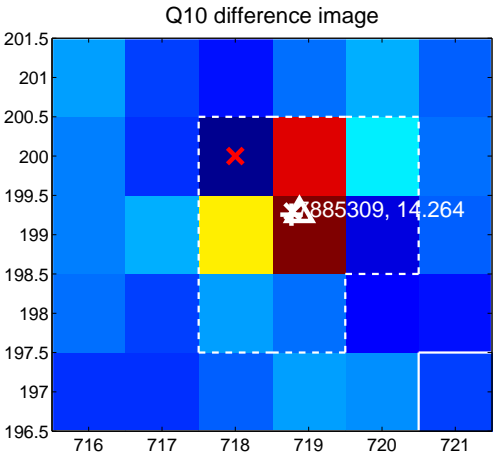


white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.

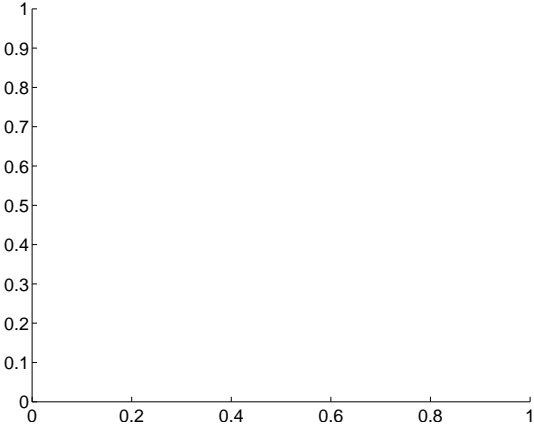
Q9 no difference image



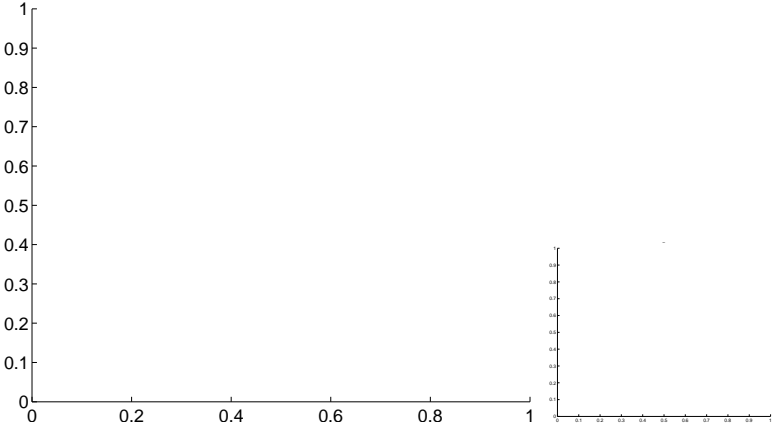
Q9 no OOT image



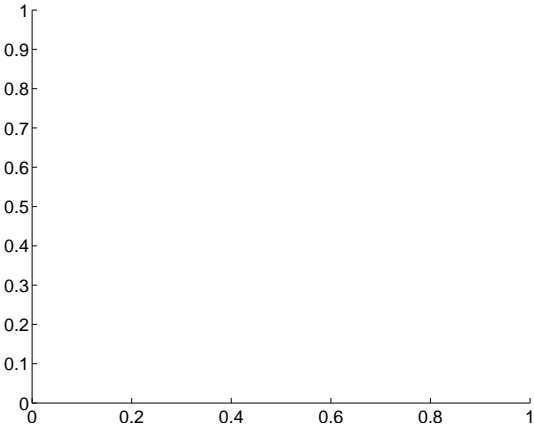
Q11 no difference image



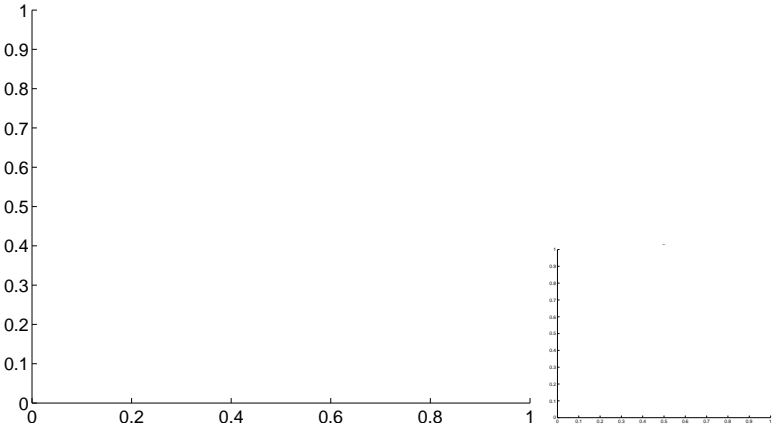
Q11 no OOT image



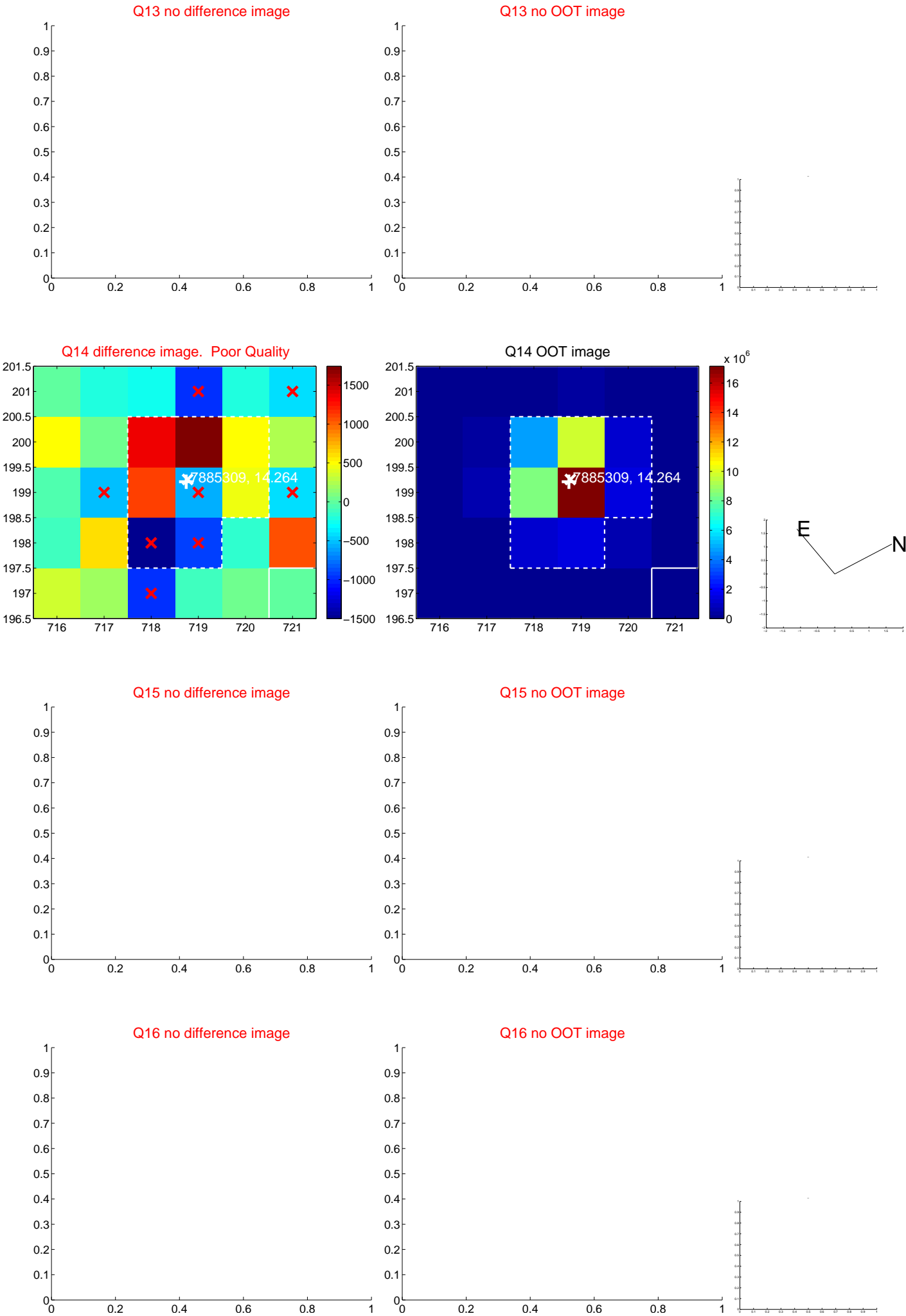
Q12 no difference image



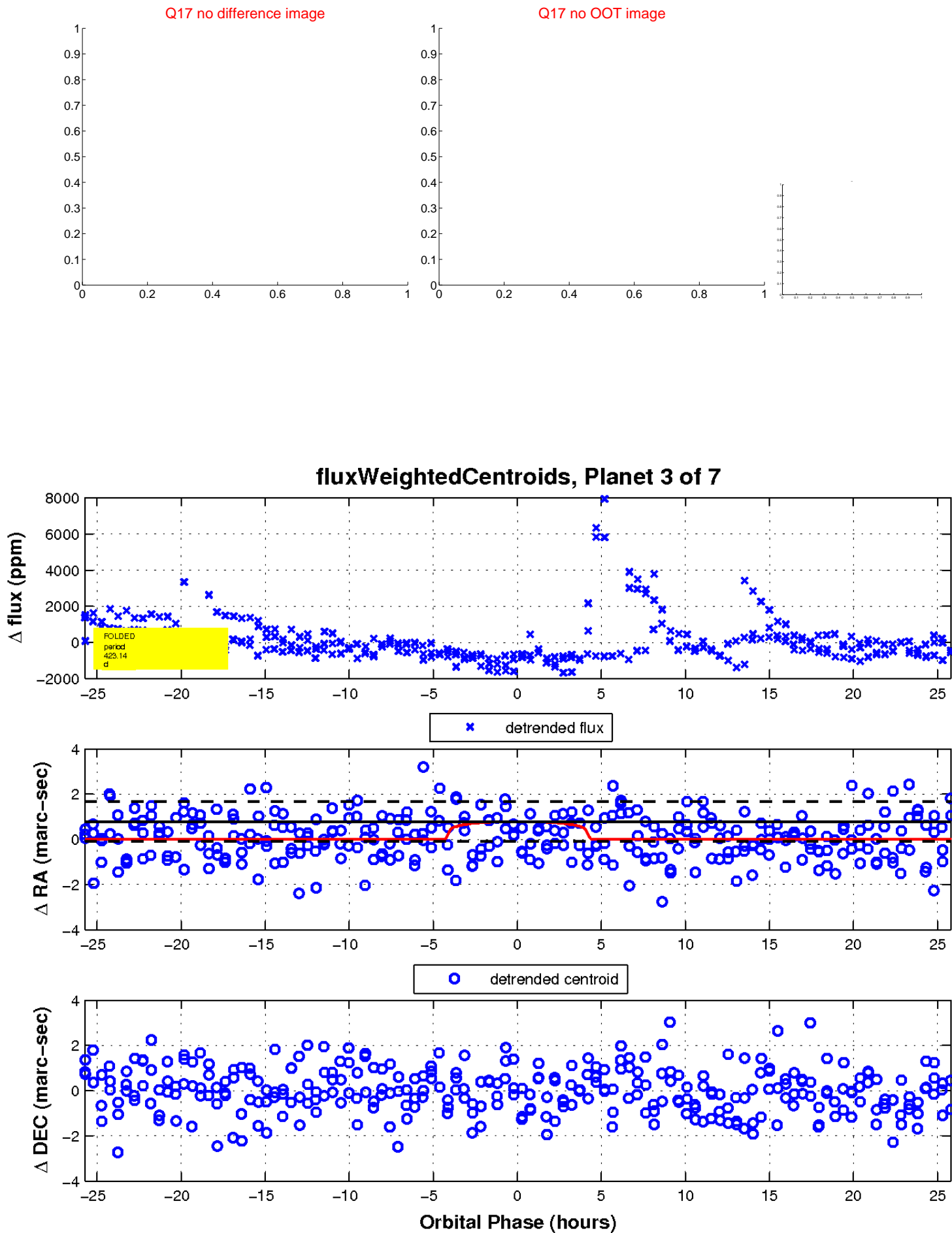
Q12 no OOT image



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

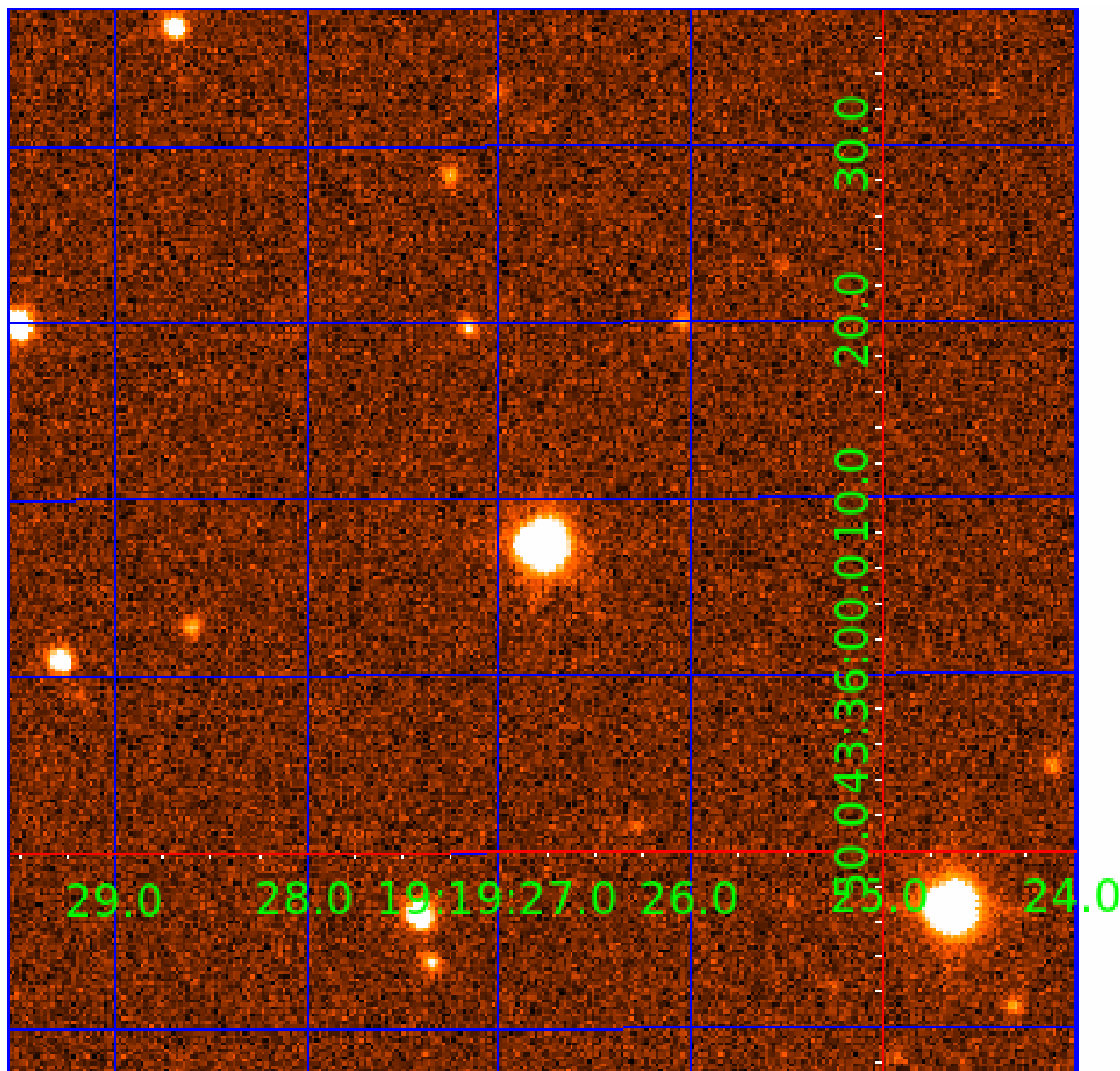


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 007885309

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007885309-01	OBS	No	497.420836	217.225123	542.3	0.571	20.4	2.8	0.51	4679	1.27	0.11
007885309-02	OBS	No	473.217212	285.496718	1477.8	5.227	17.0	9.3	0.51	4679	1.98	0.12
007885309-03	OBS	No	423.140437	500.921247	945.0	8.649	18.5	5.0	0.51	4679	1.59	0.14
007885309-04	OBS	No	398.026126	415.335195	1460.2	8.793	17.3	7.2	0.51	4679	3.78	0.15

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007885309-01	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_MARSHALL_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—HALO_GHOST
007885309-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
007885309-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
007885309-04	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—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.

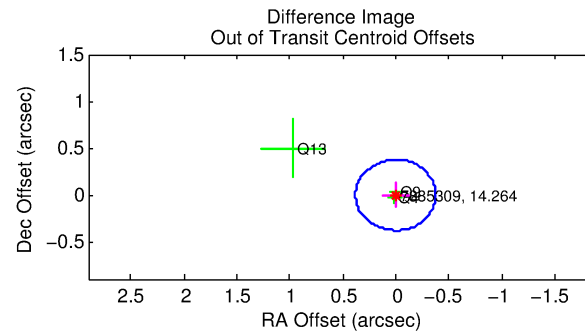
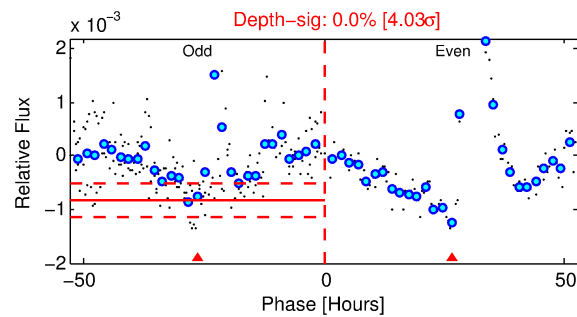
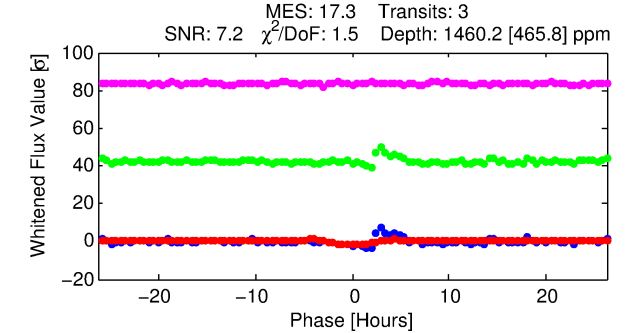
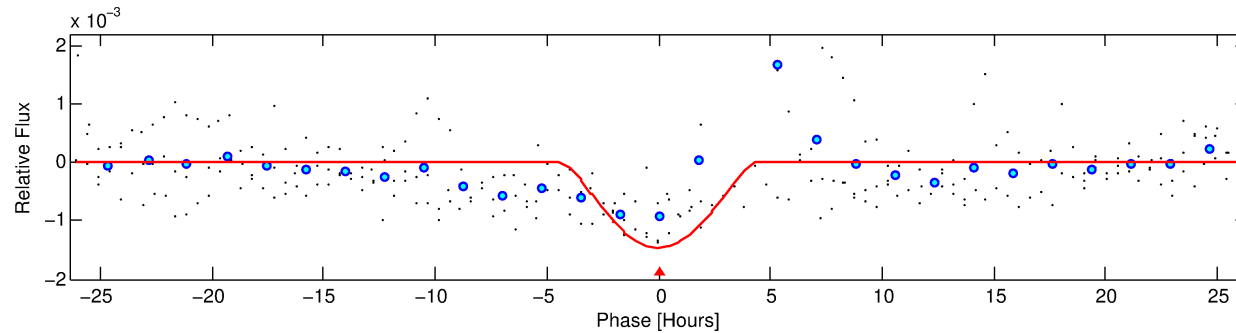
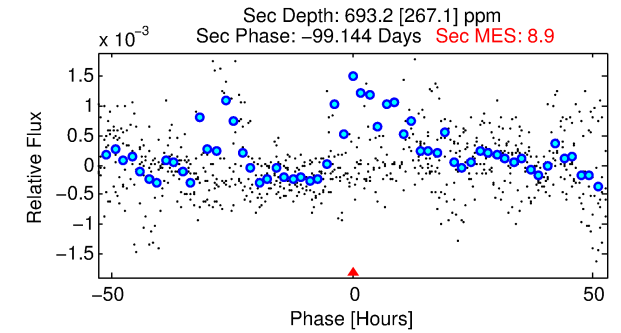
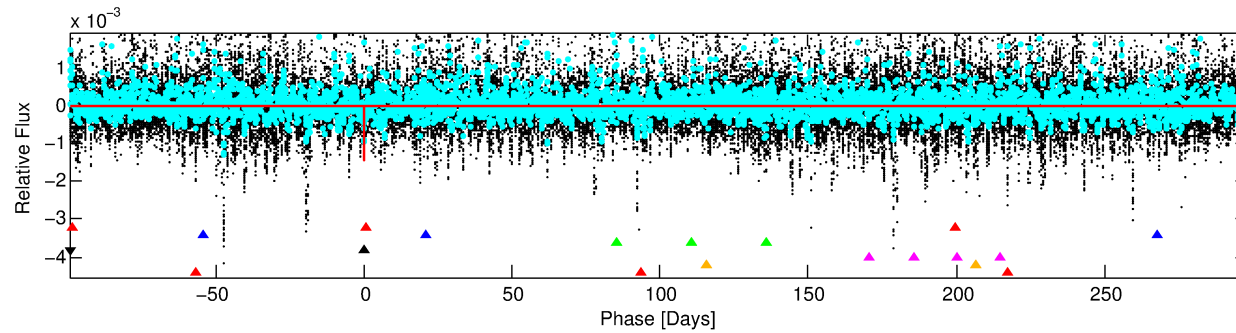
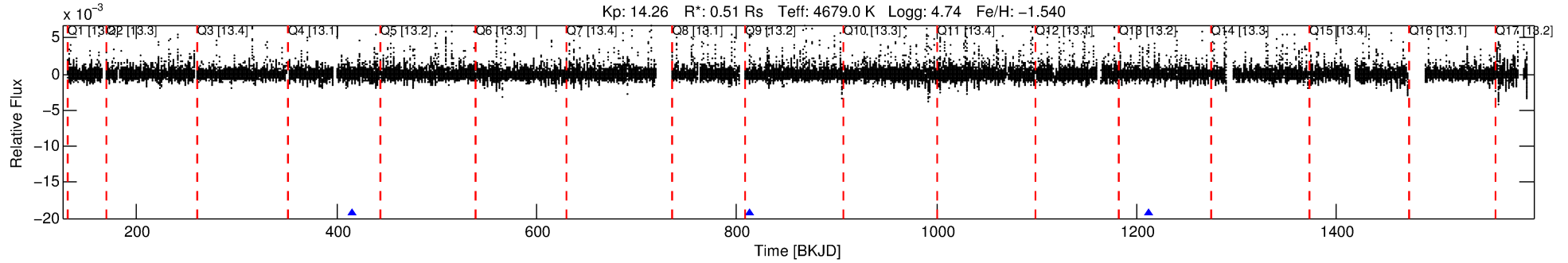
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 007885309-04

No Significant Match Found

# DV One-Page Summary

KIC: 7885309 Candidate: 4 of 7 Period: 398.026 d



## DV Fit Results:

Period = 398.02613 [0.01527] d  
Epoch = 415.3352 [0.0194] BKJD  
Rp/R\* = 0.0679 [0.2078]  
a/R\* = 129.68 [88.08]  
b = 1.00 [0.28]  
Seff = 0.15 [0.02]  
Teq = 160 [6] K  
Rp = 3.78 [11.57] Re  
a = 0.8538 [0.0463] AU  
Ag = 19468.95 [119415.79] [0.16 $\sigma$ ]  
Teffp = 2914 [4469] K [0.62 $\sigma$ ]

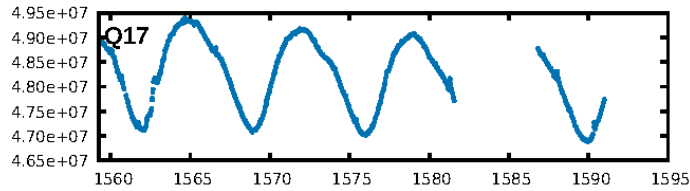
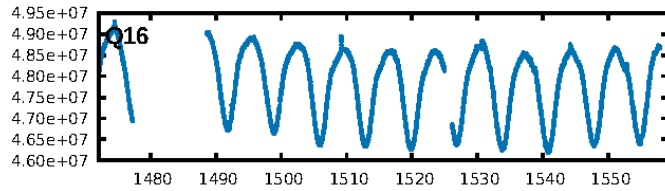
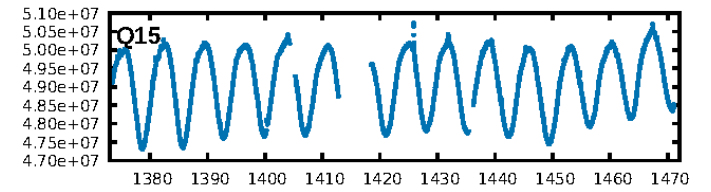
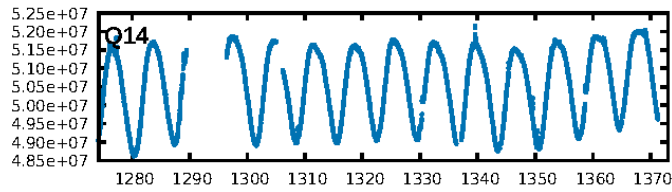
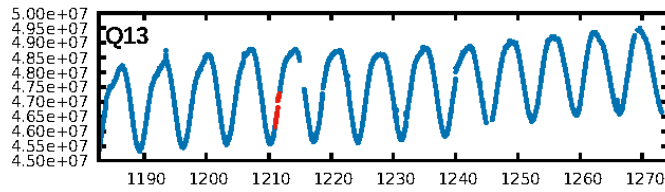
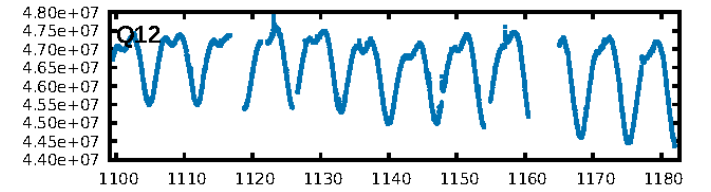
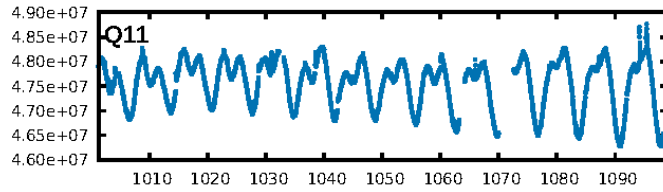
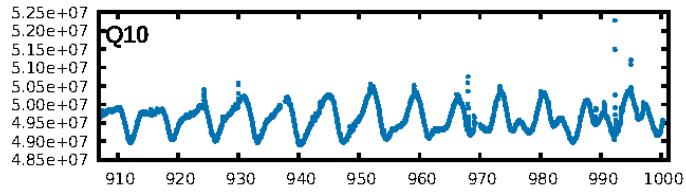
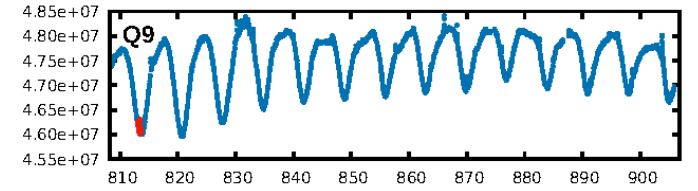
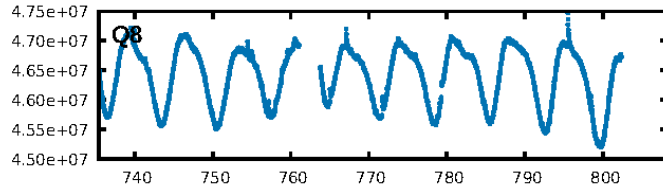
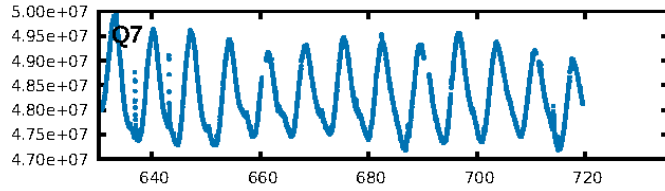
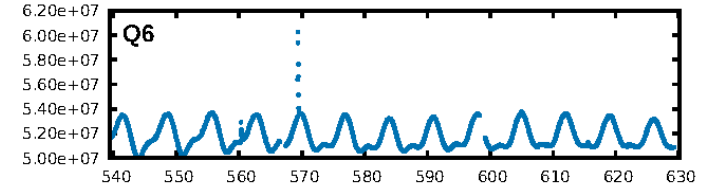
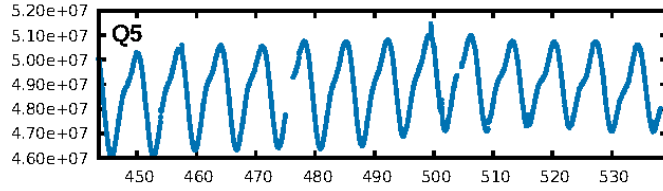
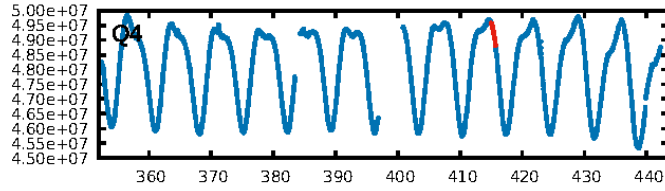
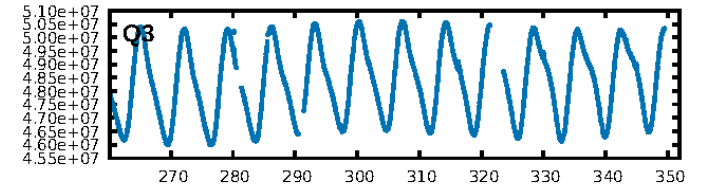
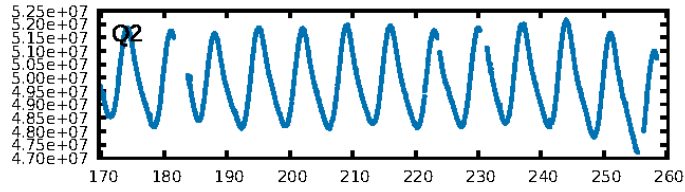
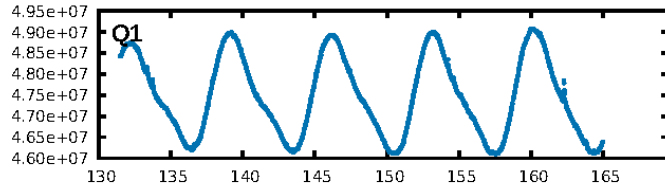
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [37.11 $\sigma$ ]  
LongPeriod-sig: 100.0% [48.87 $\sigma$ ]  
ModelChiSquare2-sig: 1.2%  
ModelChiSquareGof-sig: 74.5%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 1.623  
Centroid-sig: N/A  
Centroid-so: 0.235 arcsec [0.46 $\sigma$ ]  
OotOffset-rm: 0.004 arcsec [0.03 $\sigma$ ]  
OotOffset-st: 0/0/1/2 [3]  
KicOffset-rm: 0.211 arcsec [1.29 $\sigma$ ]  
KicOffset-st: 0/0/1/2 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 0.67 [2/3]

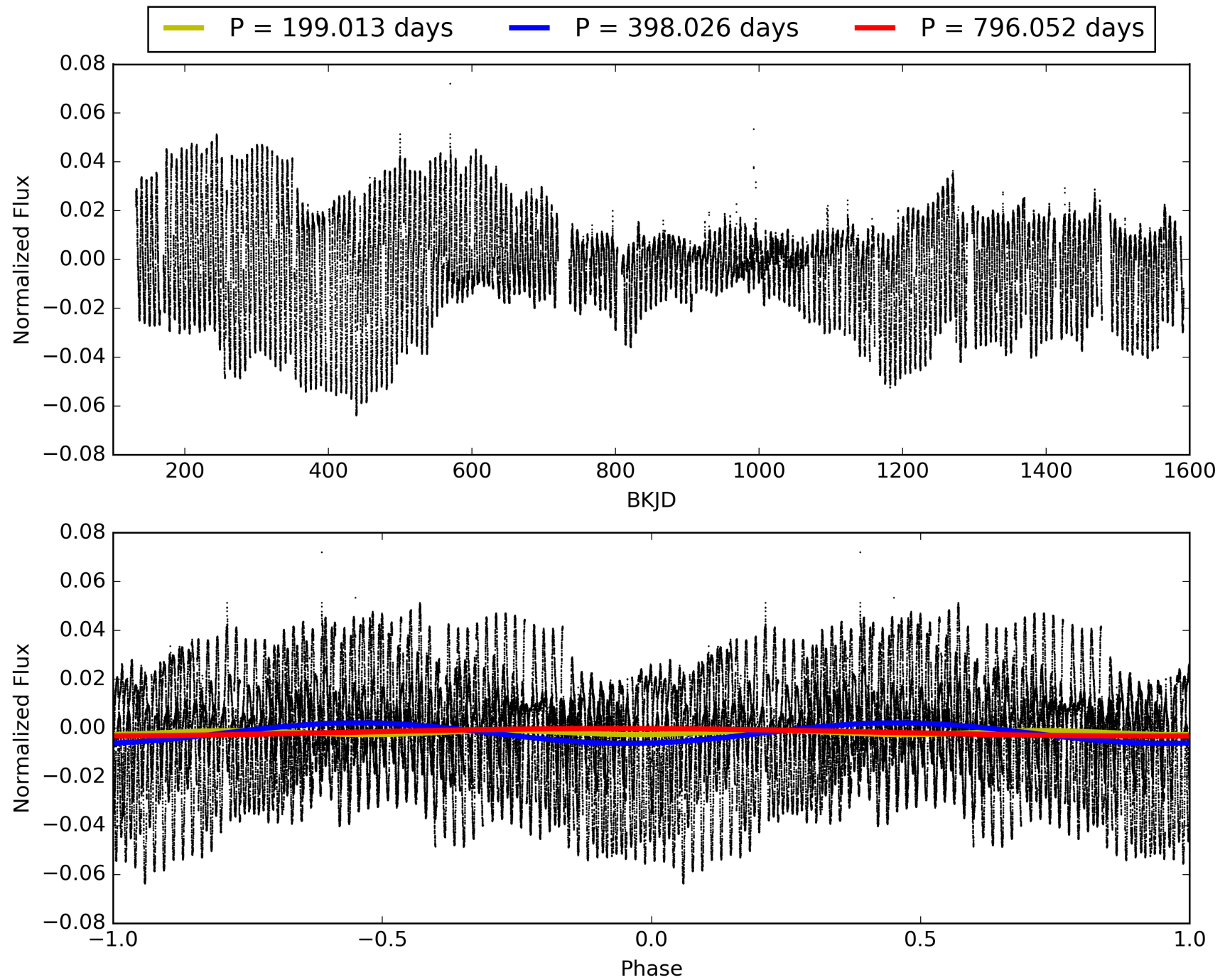
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 22:07:00 Z

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

# TCE 007885309-04, PDC Light Curves



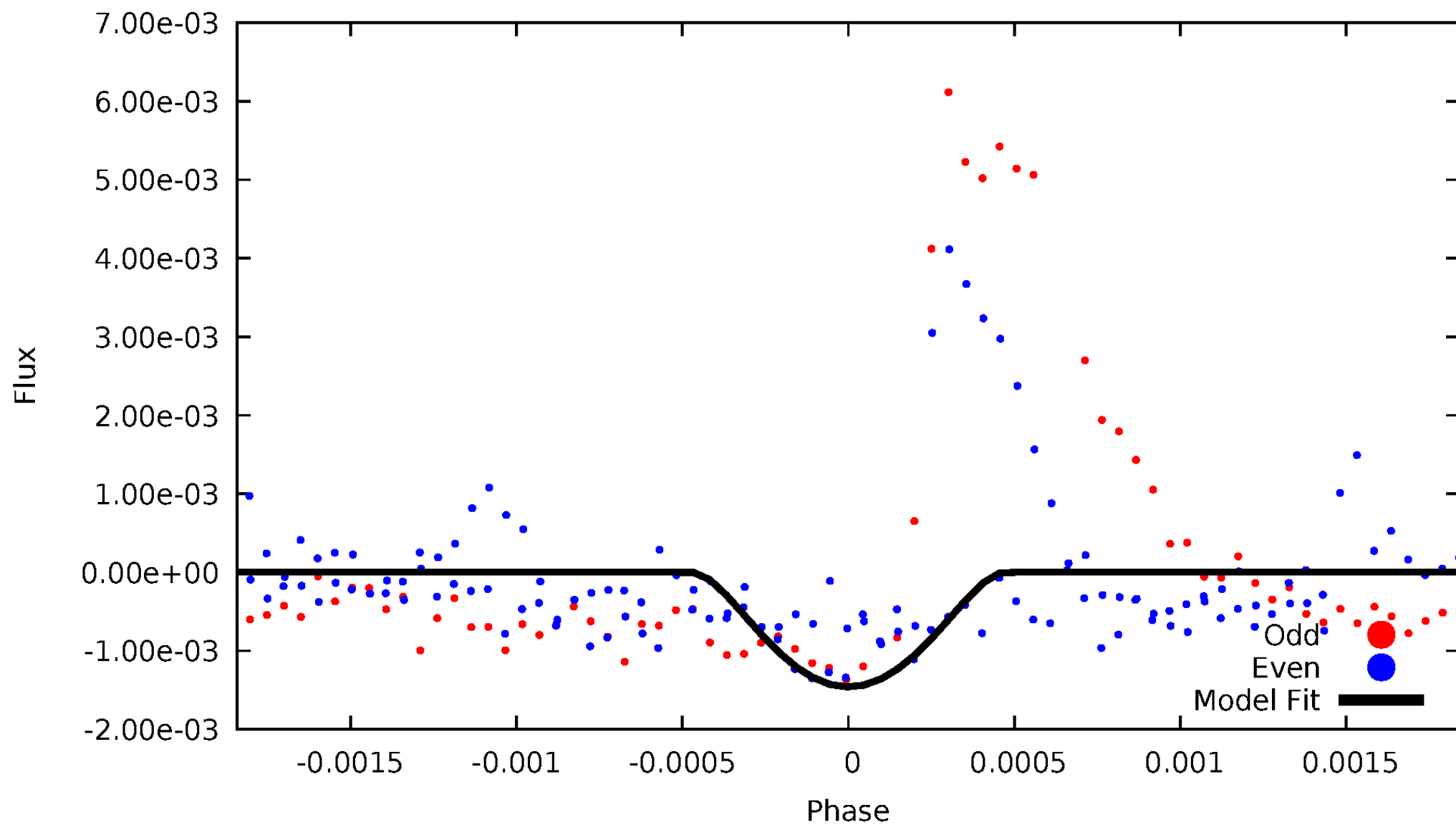
TCE 007885309-04





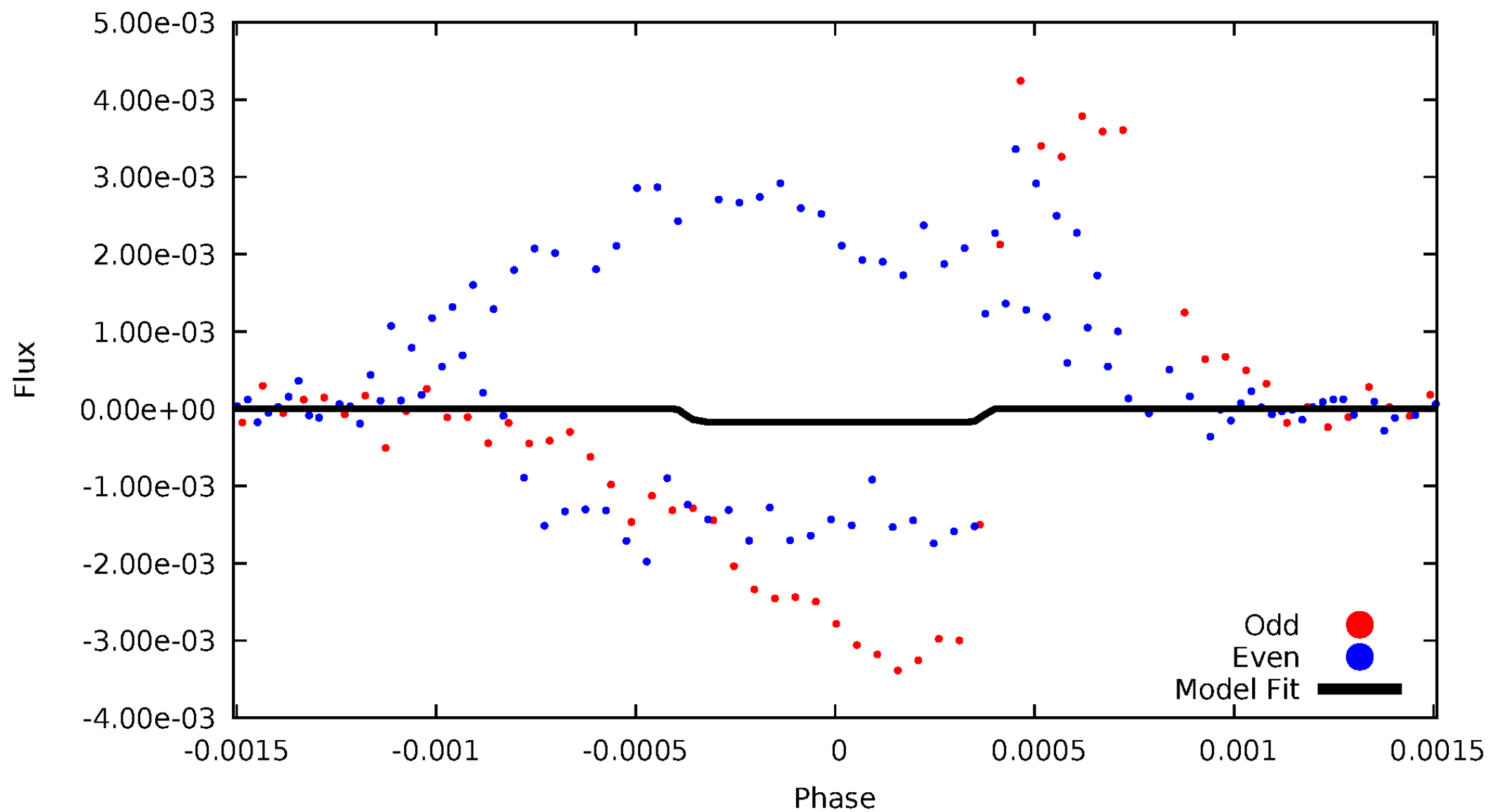
# DV Odd/Even

TCE 007885309-04



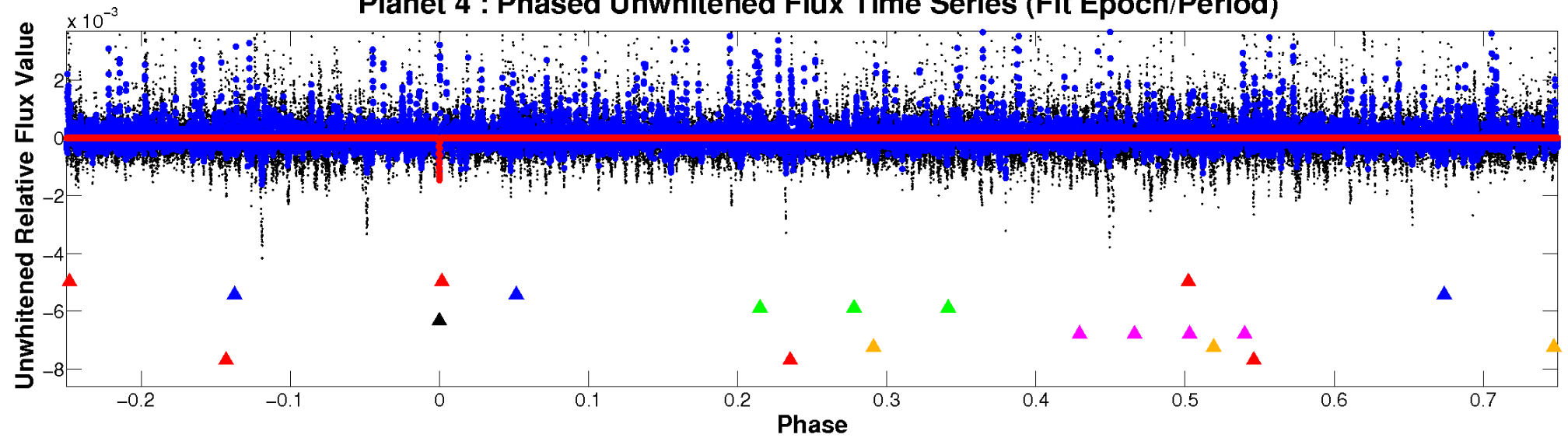
# ALT Odd/Even

TCE 007885309-04

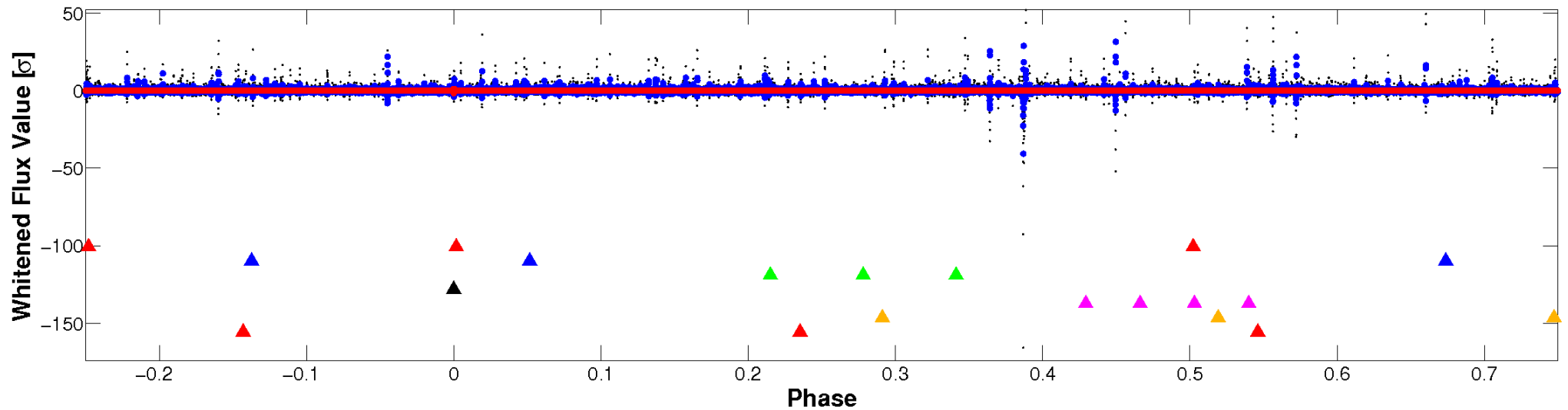


# Non-Whitened Vs. Whitened Light Curve

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

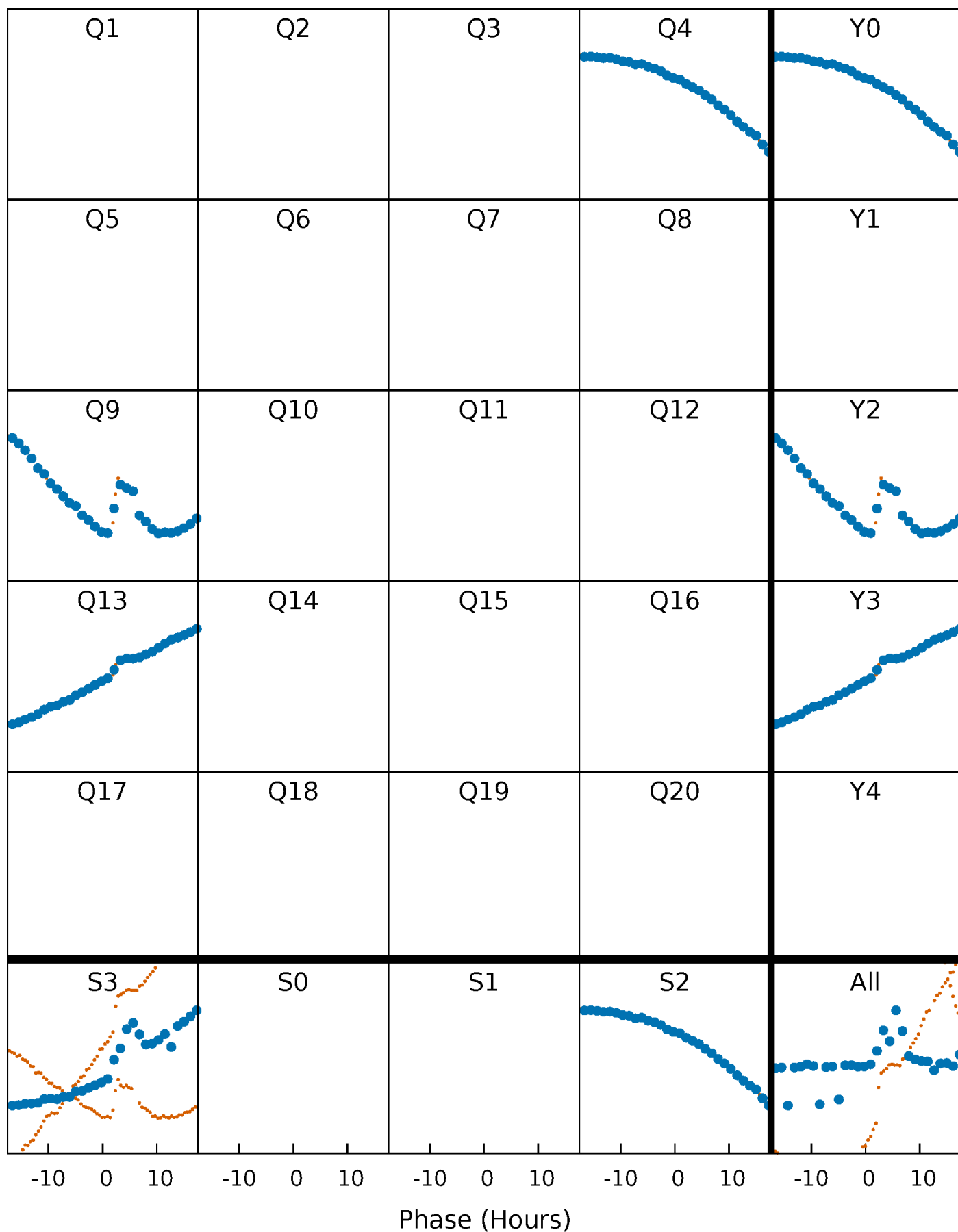


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



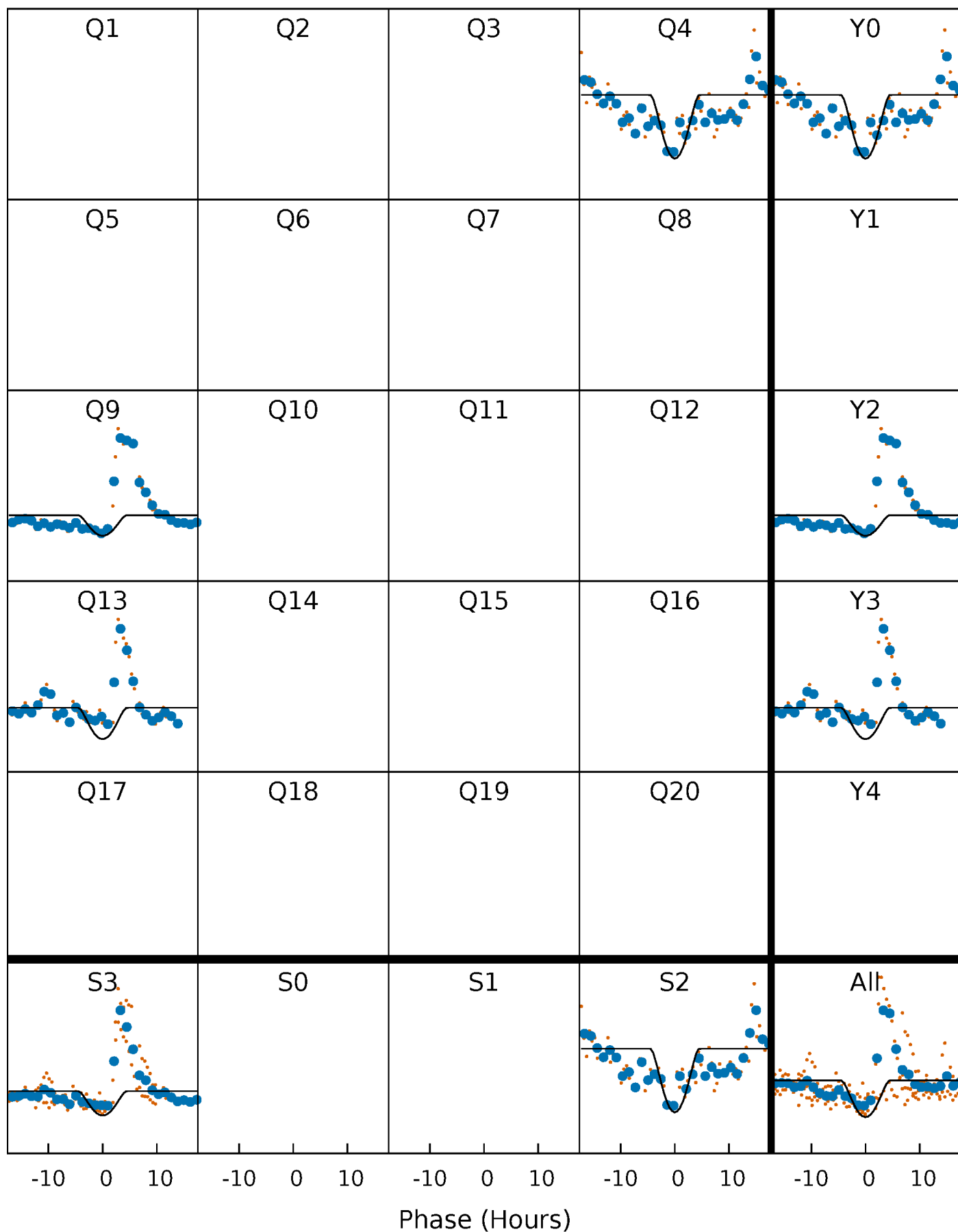
# PDC Quarter-Phased Transit Curves

TCE 007885309-04     $P=398.026126$  Days     $T_0=415.335195$  (BKJD)



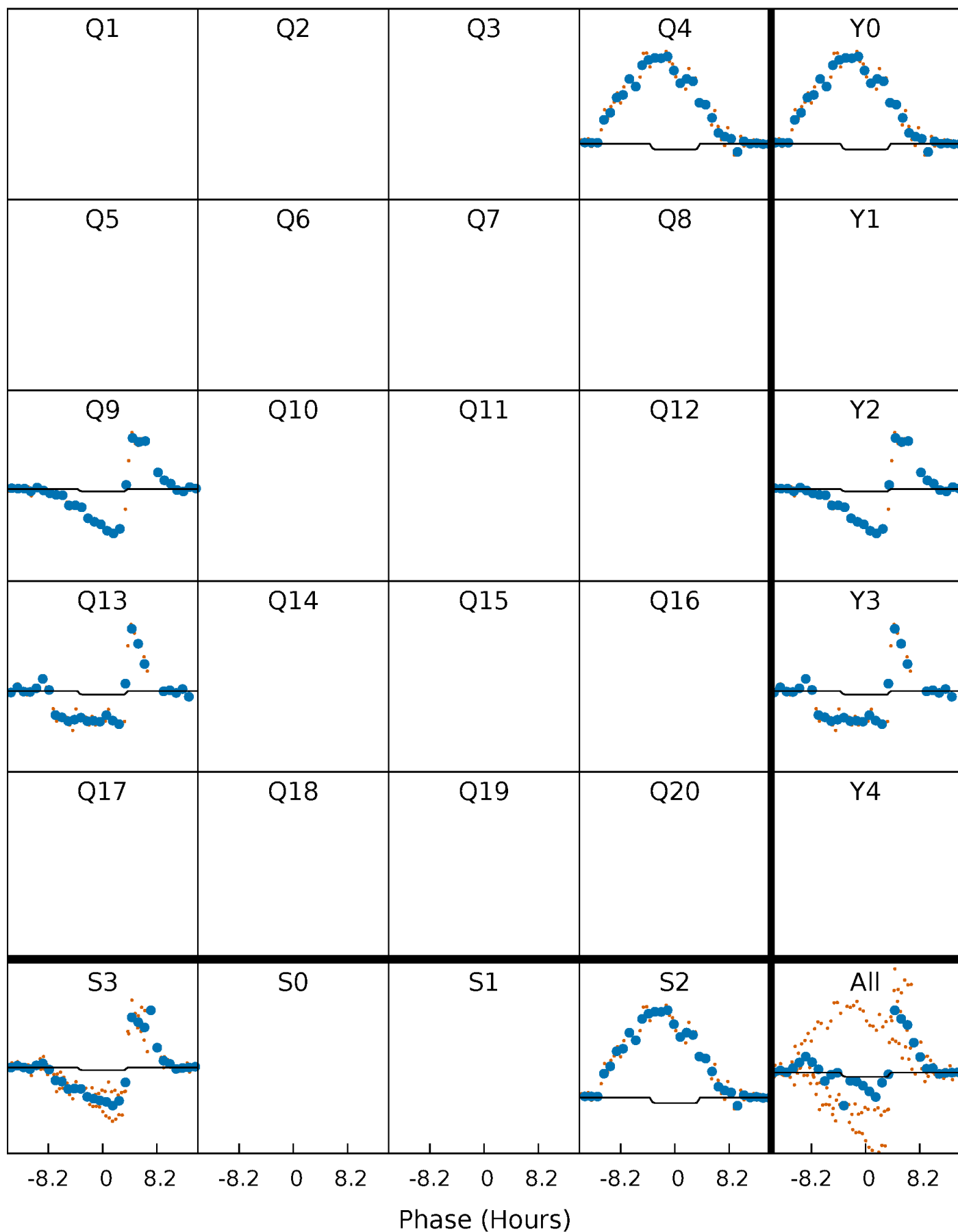
# DV Quarter-Phased Transit Curves

TCE 007885309-04     $P=398.026126$  Days     $T_0=415.335195$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

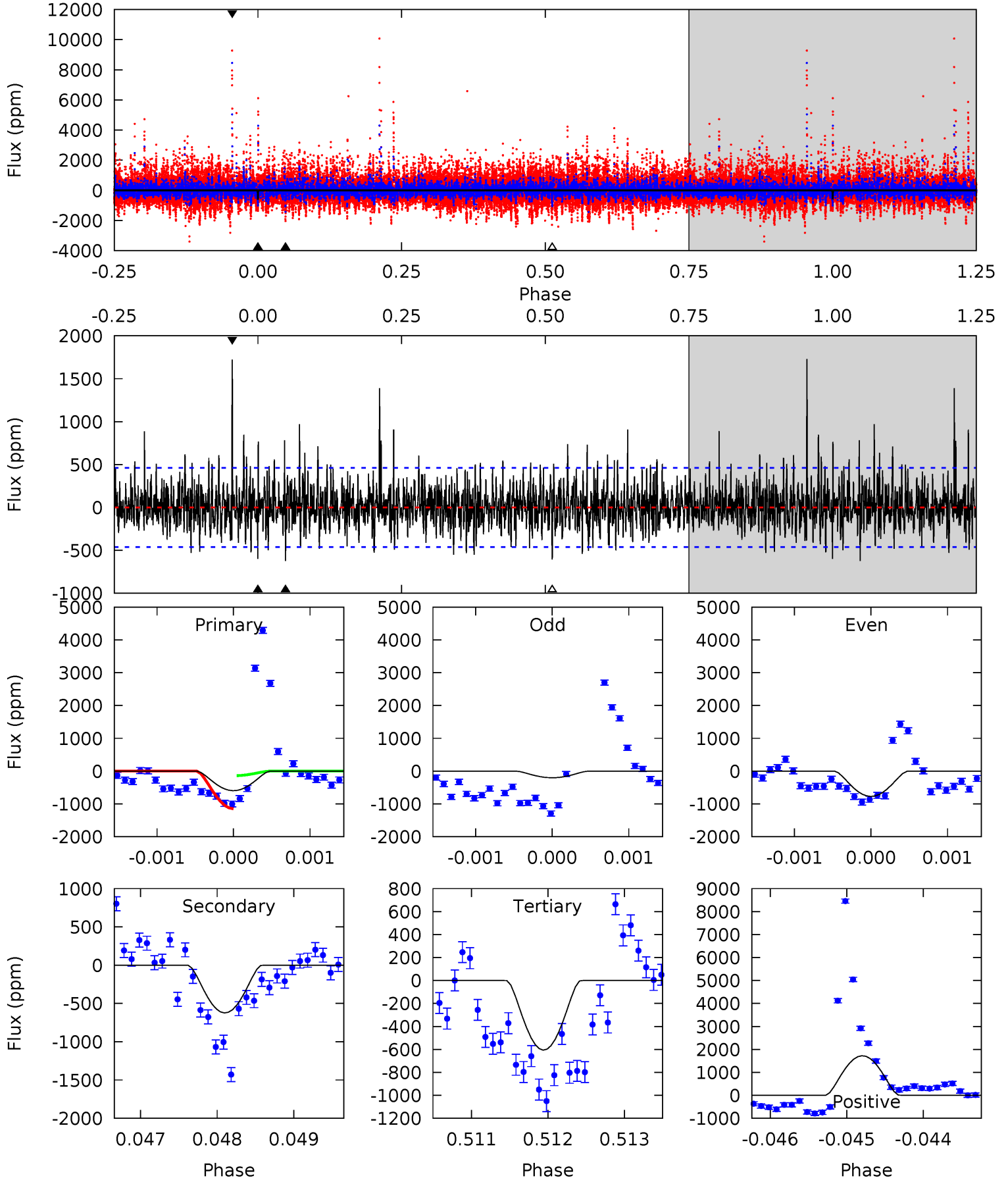
TCE 007885309-04     $P=398.032126$  Days     $T_0=415.264186$  (BKJD)



# DV Model-Shift Uniqueness Test

007885309-04, P = 398.026126 Days, E = 17.309069 Days

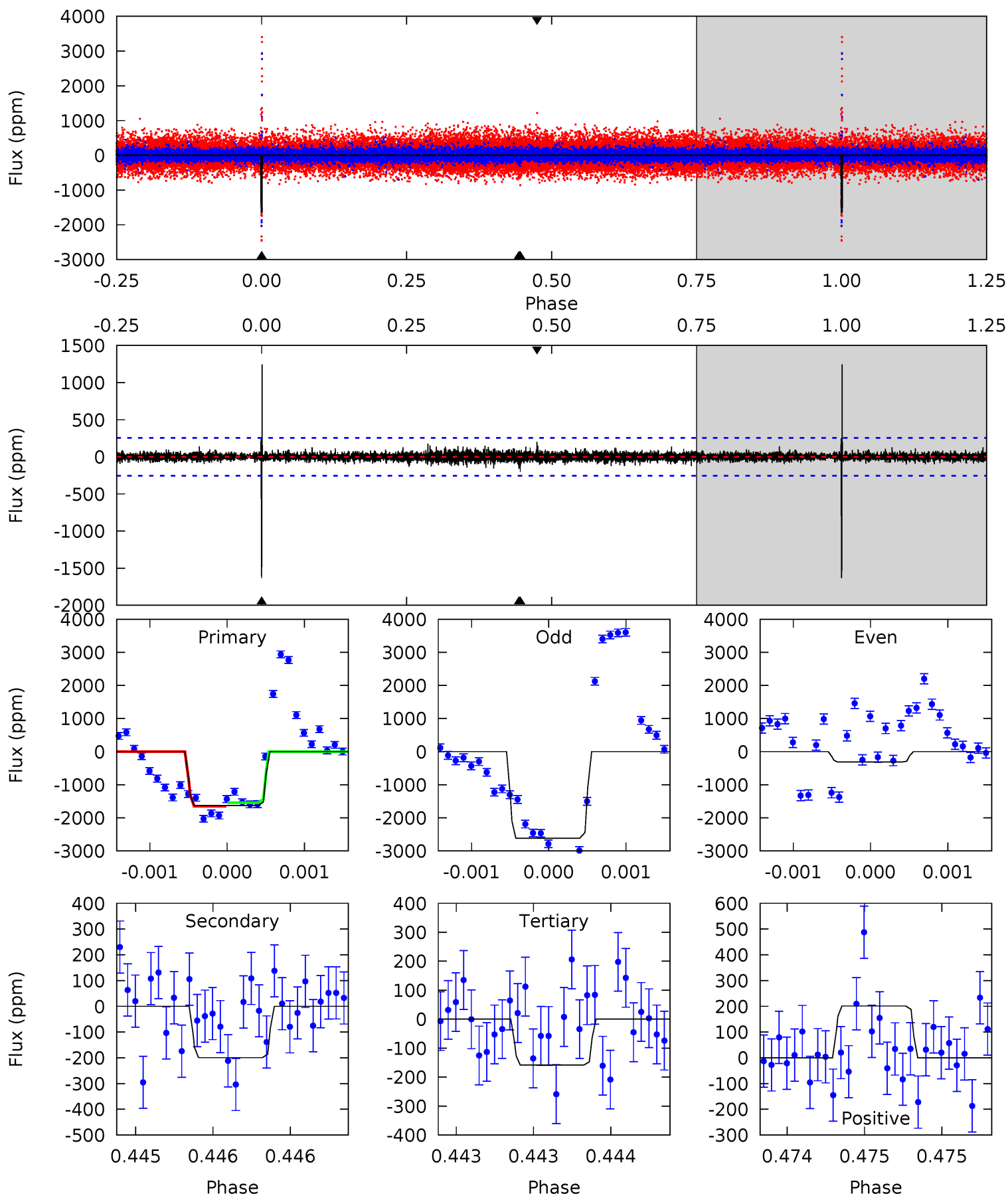
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.06	7.37	7.16	20.3	5.46	3.30	2.29	-0.10	-13.3	0.21	-13.0	2.74	2.46	0.73	5.87



# Alt Model-Shift Uniqueness Test

007885309-04, P = 398.032126 Days, E = 17.232060 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
35.3	4.31	3.42	4.35	5.50	3.37	0.72	31.9	30.9	0.90	-0.04	32.7	0.40	0.43	1.08





### Stellar Parameters For KIC 007885309

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4679^{+145}_{-162}$	$4.742^{+0.045}_{-0.024}$	$-1.540^{+0.300}_{-0.250}$	$0.510^{+0.027}_{-0.032}$	$0.523^{+0.034}_{-0.024}$	$5.559^{+1.090}_{-0.510}$
	+3%/-3%	+1%/-1%	+19%/-16%	+5%/-6%	+7%/-5%	+20%/-9%
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 007885309-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-624 \pm 85$	$9.18^{+10.16}_{-5.66}$	$222^{+8}_{-8}$	$2566^{+819}_{-394}$	$2868^{+18375}_{-2209}$
Alt.	$-199 \pm 46$	$8.09^{+8.74}_{-5.65}$	$222^{+7}_{-8}$	$2316^{+822}_{-349}$	$1188^{+11366}_{-922}$

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

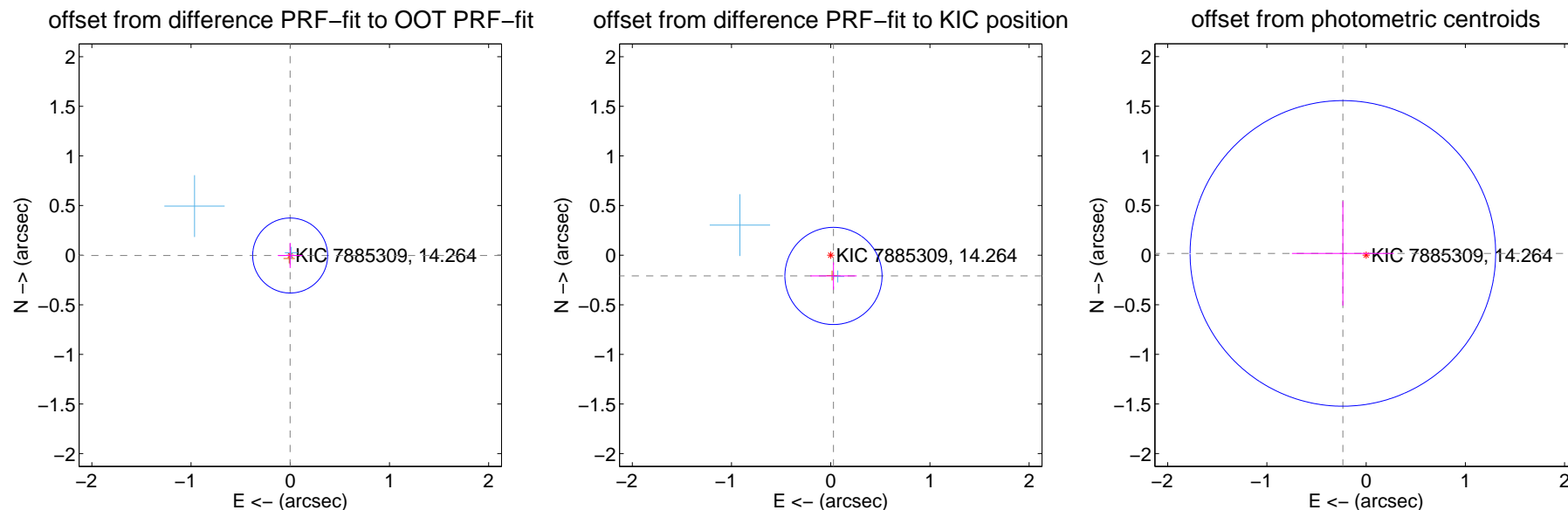
## DV Centroid Data

Supplemental centroid analysis for 007885309-04. Kepler magnitude: 14.26. Transit SNR 7.20

There are 2 quarters with good PRF difference image offsets

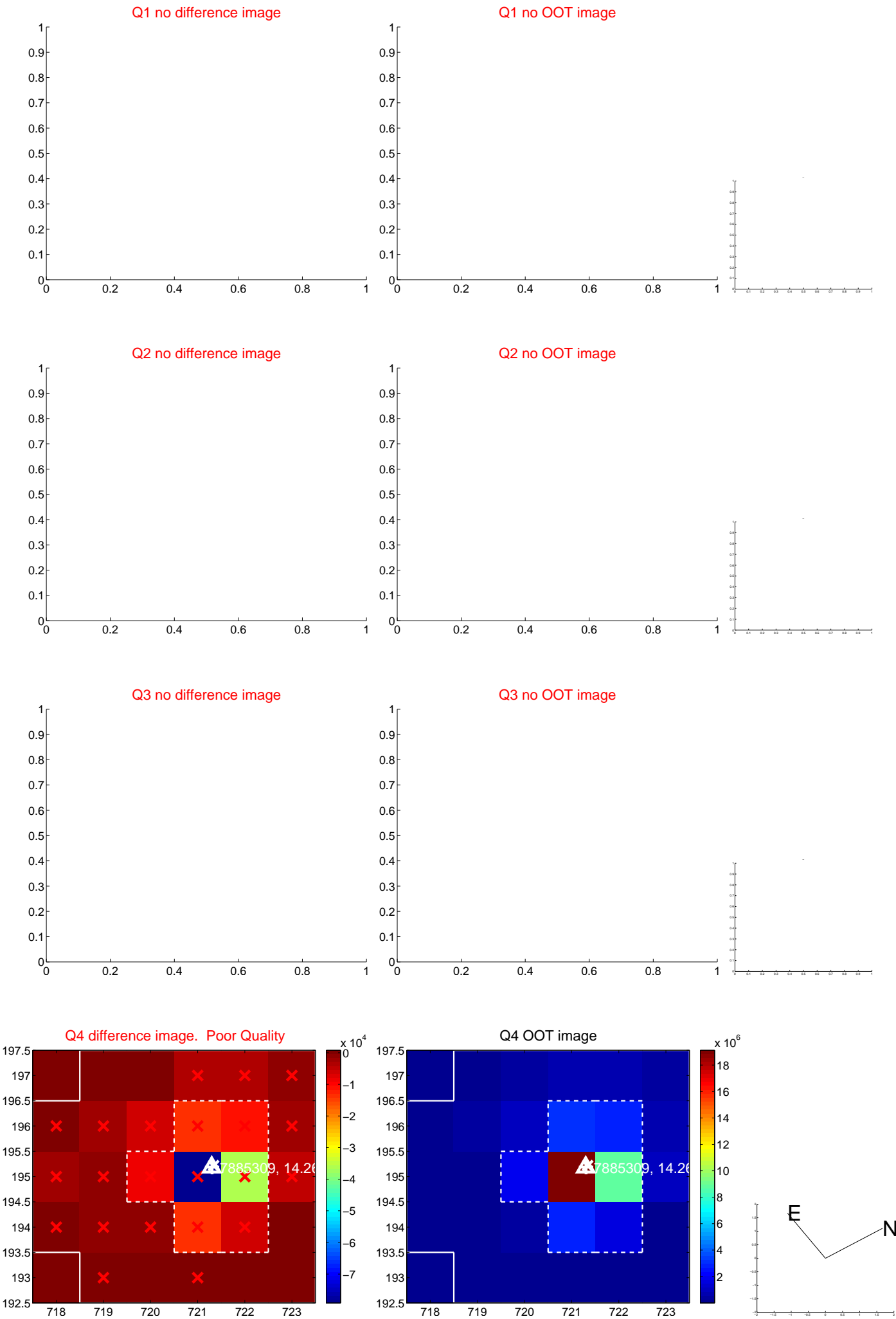
The direct PRF centroid is offset from the target star catalog position by about 0.20 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.004 \pm 0.126$	0.03	$0.001 \pm 0.125$	$-0.004 \pm 0.126$
PRF-fit source offset from KIC position	$0.211 \pm 0.163$	1.29	$-0.028 \pm 0.234$	$-0.210 \pm 0.138$
photometric centroid source offset	$0.24 \pm 0.51$	0.46	$0.23 \pm 0.51$	$0.02 \pm 0.53$



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.

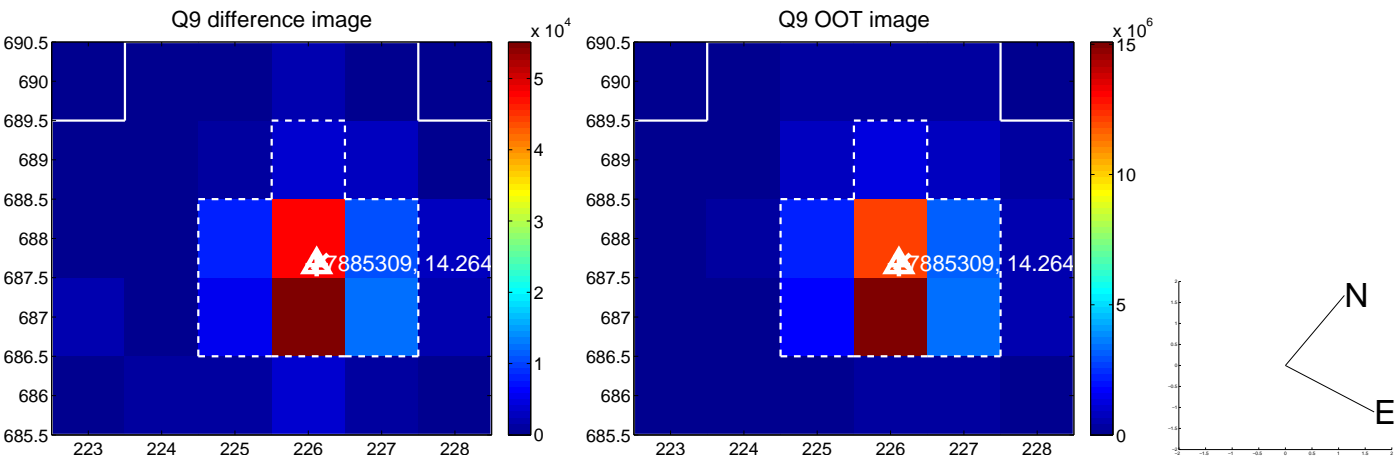
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



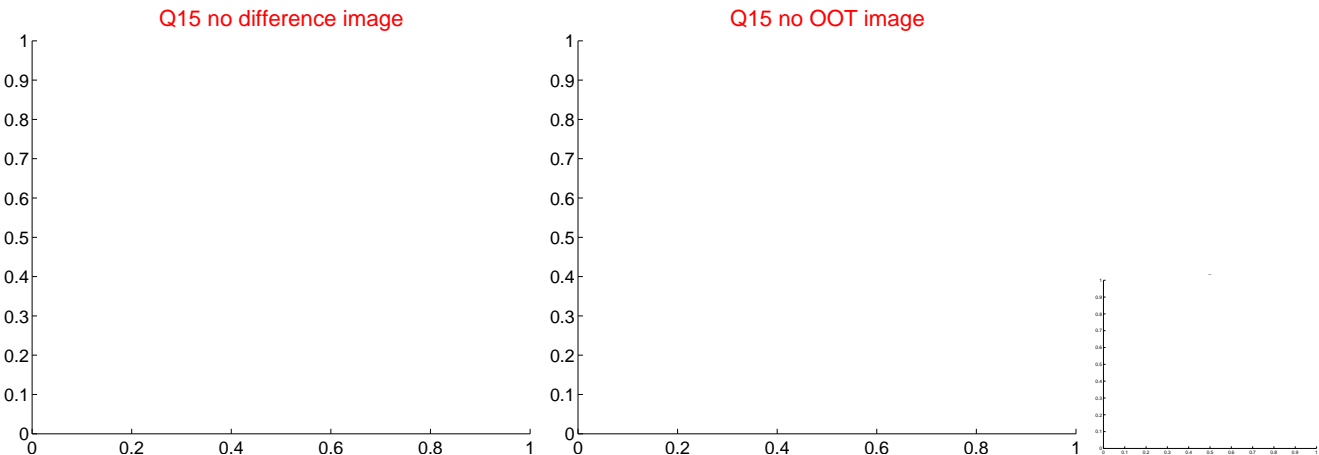
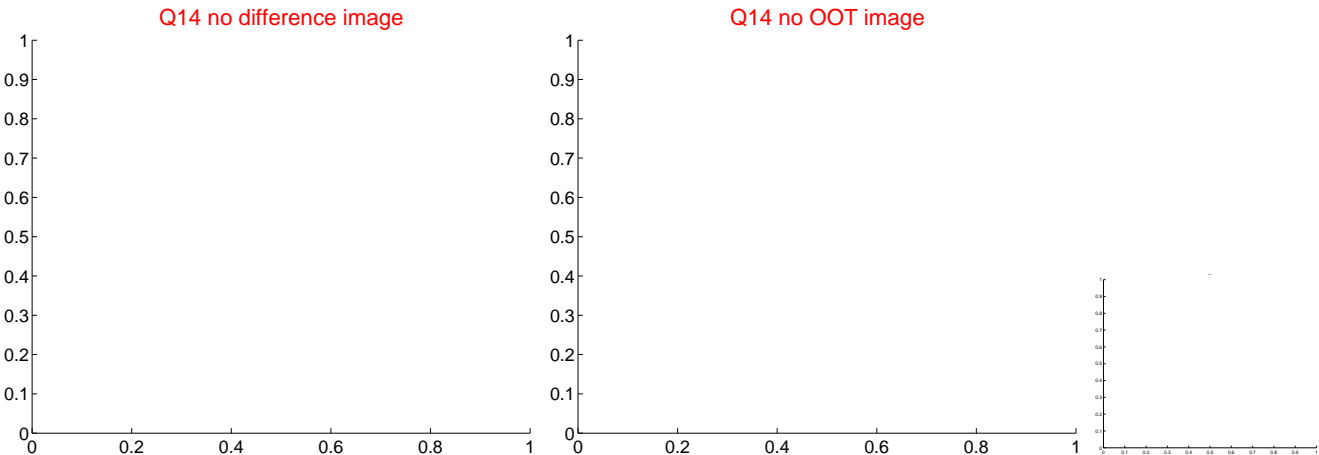
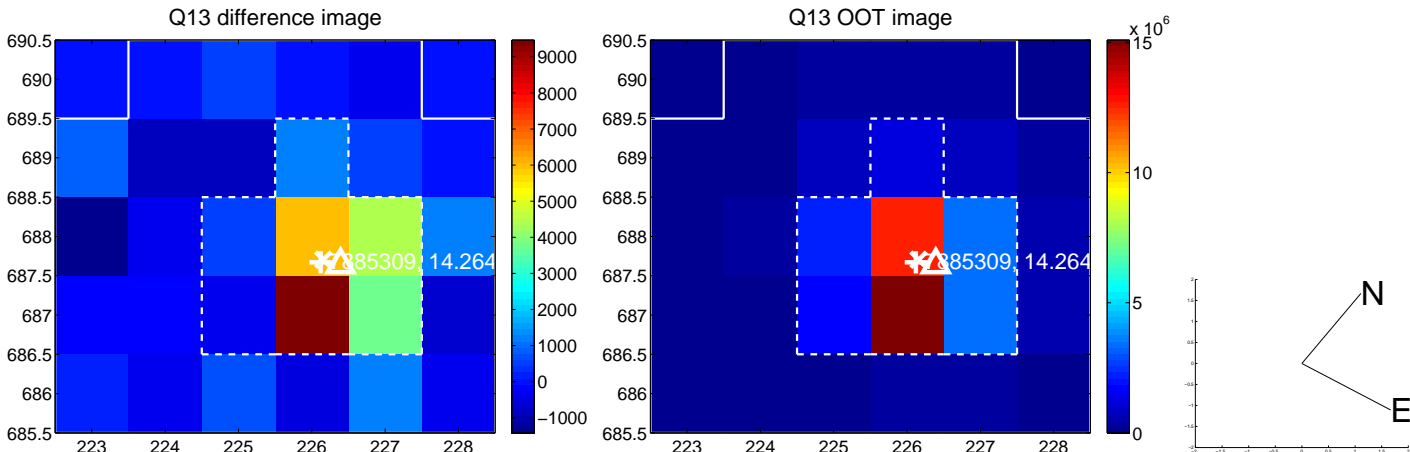
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



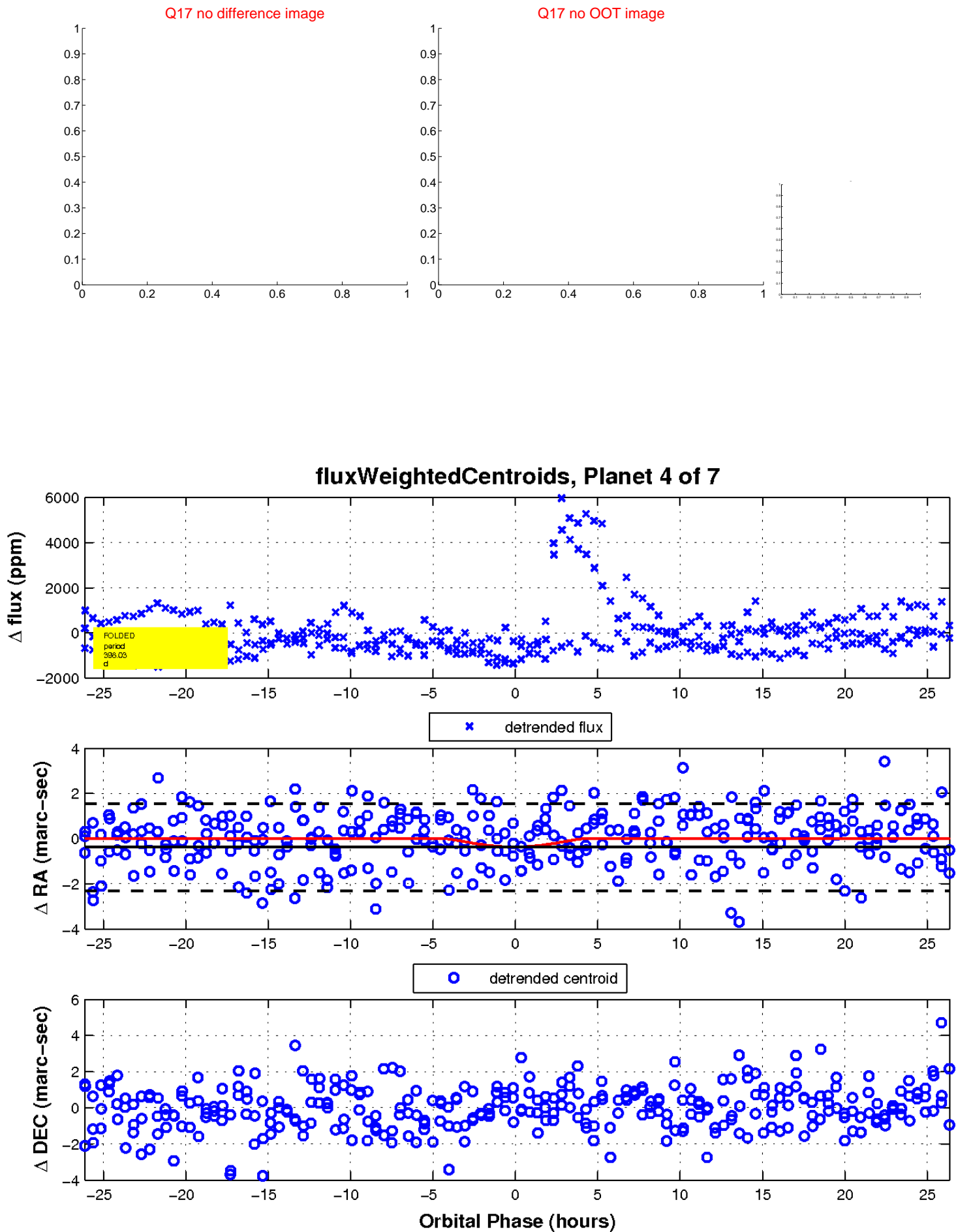
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

