

# KIC 004951599

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004951599-01	OBS	No	342.903154	282.373416	263.9	3.344	11.5	6.1	2.04	4845	3.18	2.16
004951599-02	OBS	No	497.128297	468.124568	259.5	3.042	12.4	5.0	2.04	4845	4.05	1.32
004951599-03	OBS	No	351.830027	225.006998	339.7	3.357	8.5	6.6	2.04	4845	3.66	2.09

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004951599-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_TER_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004951599-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004951599-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS

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

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

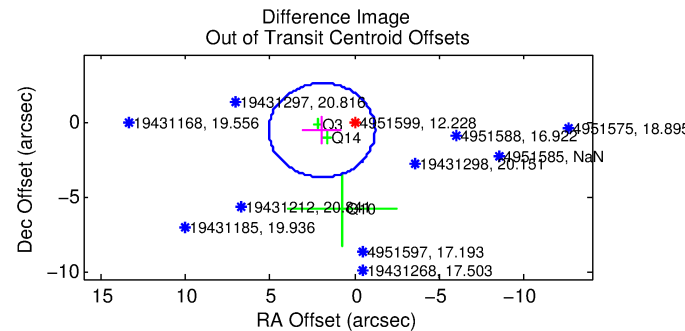
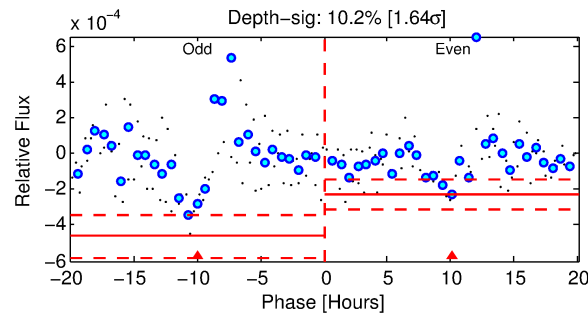
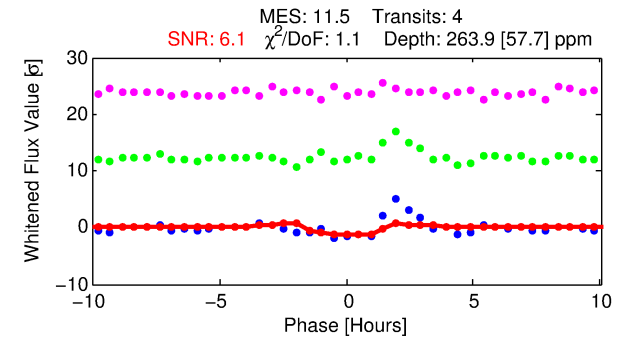
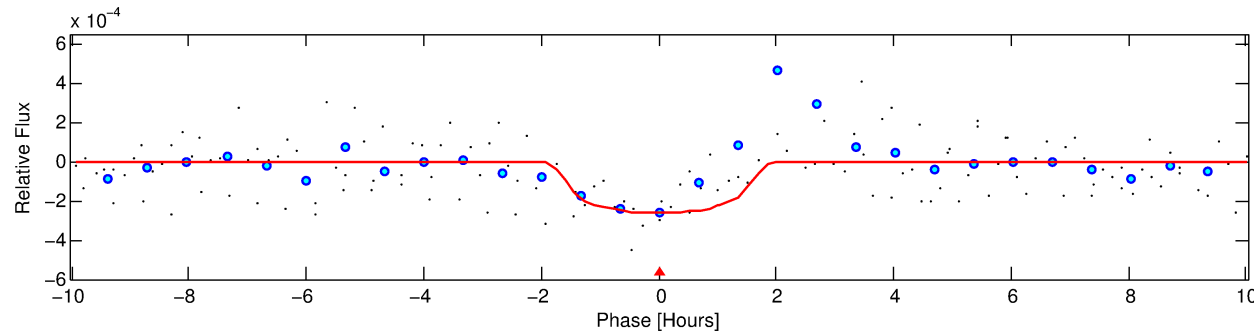
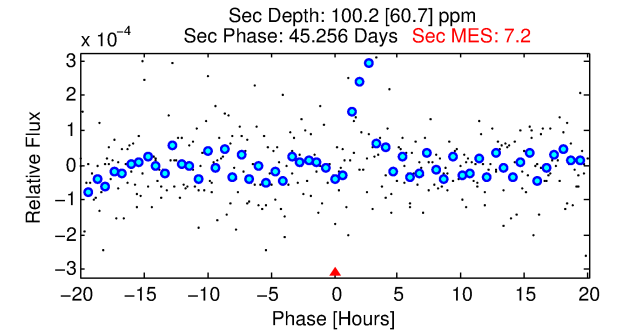
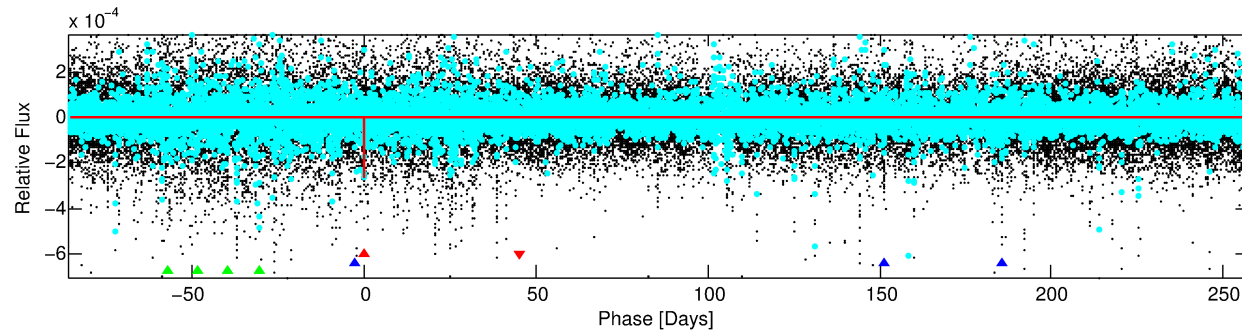
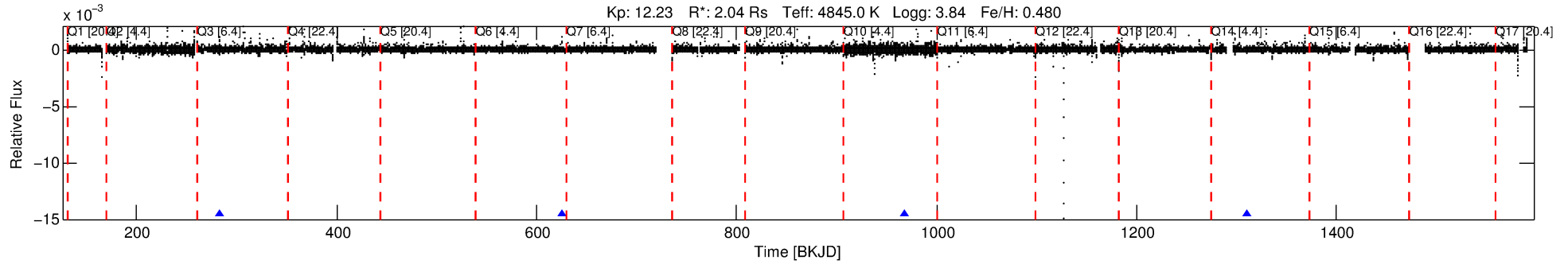
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004951599-01

No Significant Match Found

# DV One-Page Summary

KIC: 4951599 Candidate: 1 of 3 Period: 342.903 d



## DV Fit Results:

Period = 342.90315 [0.00470] d  
Epoch = 282.3734 [0.0086] BKJD  
Rp/R\* = 0.0143 [0.0324]  
a/R\* = 788.48 [5429.97]  
b = 0.12 [55.65]  
Seff = 2.16 [2.61]  
Teq = 309 [93] K  
Rp = 3.18 [7.48] Re  
a = 0.9755 [0.6853] AU  
Ag = 5178.45 [24476.08] [0.21 $\sigma$ ]  
Teffp = 4054 [4634] K [0.81 $\sigma$ ]

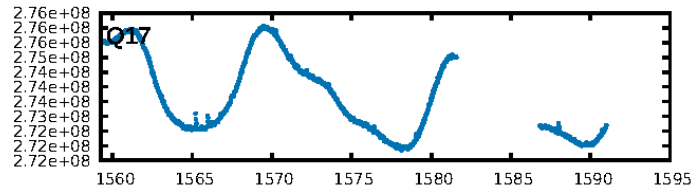
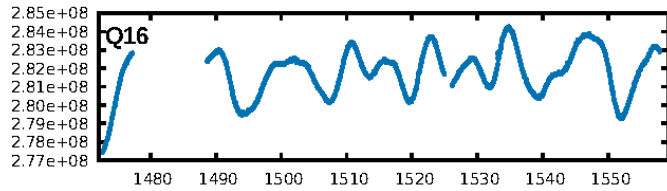
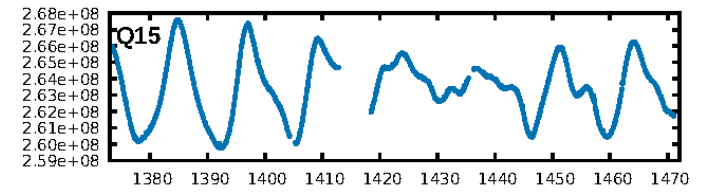
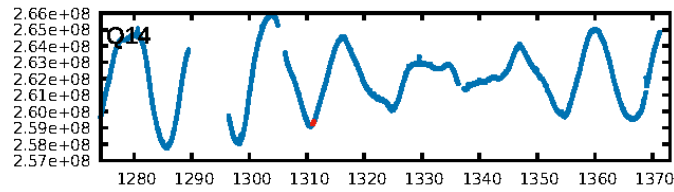
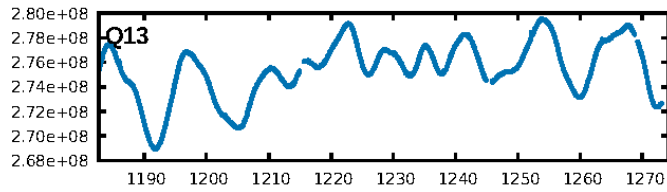
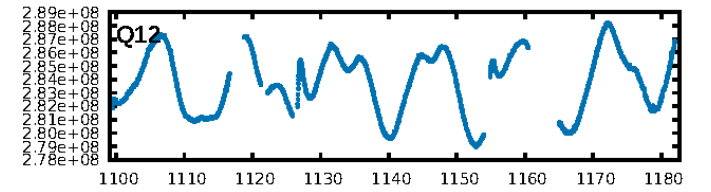
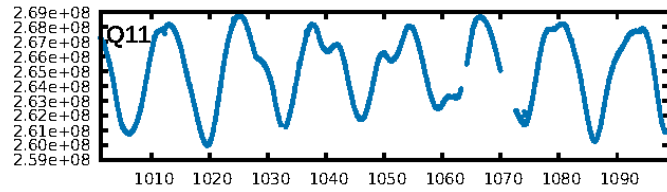
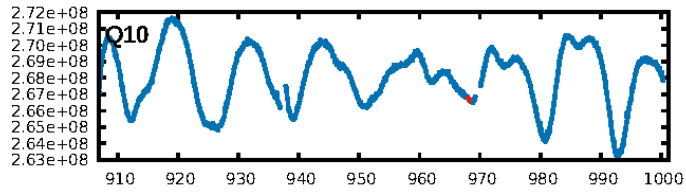
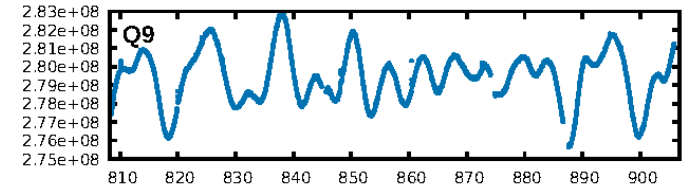
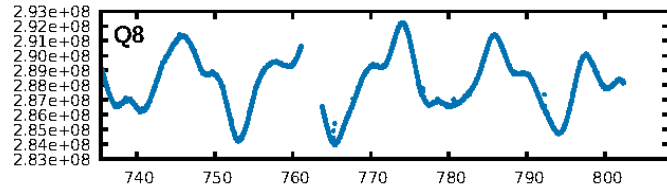
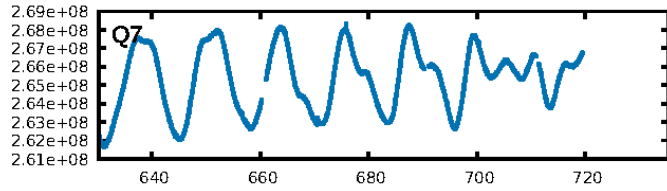
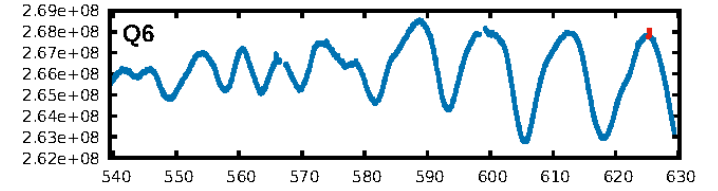
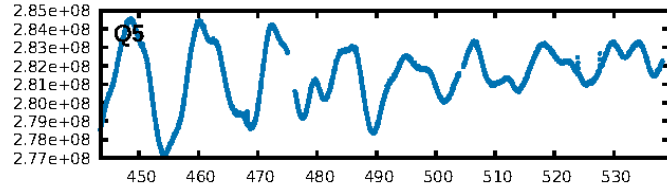
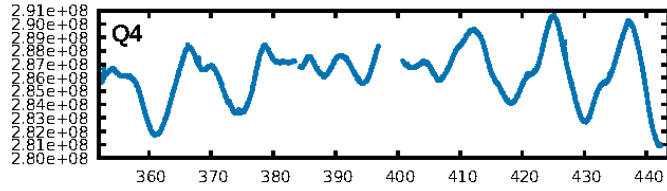
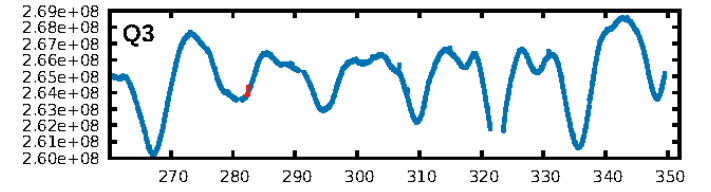
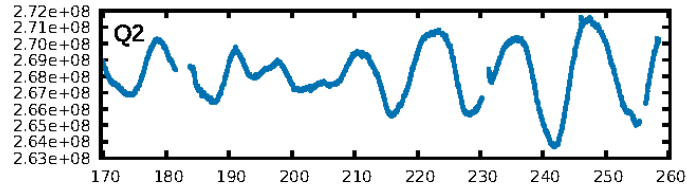
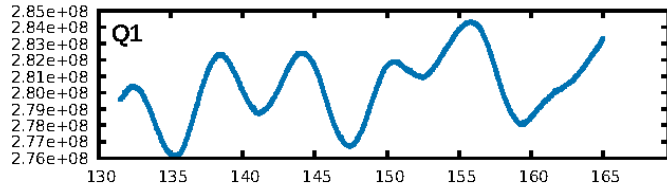
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [45.21 $\sigma$ ]  
ModelChiSquare2-sig: 1.1%  
ModelChiSquareGof-sig: 97.7%  
**Bootstrap-pfa: 6.95e-08**  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: -6.883  
Centroid-sig: 80.5%  
Centroid-so: 0.731 arcsec [0.44 $\sigma$ ]  
OotOffset-rm: 2.009 arcsec [1.92 $\sigma$ ]  
OotOffset-st: 2/1/0/0 [3]  
KicOffset-rm: 2.127 arcsec [2.03 $\sigma$ ]  
KicOffset-st: 2/1/0/0 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 1.00 [4/4]

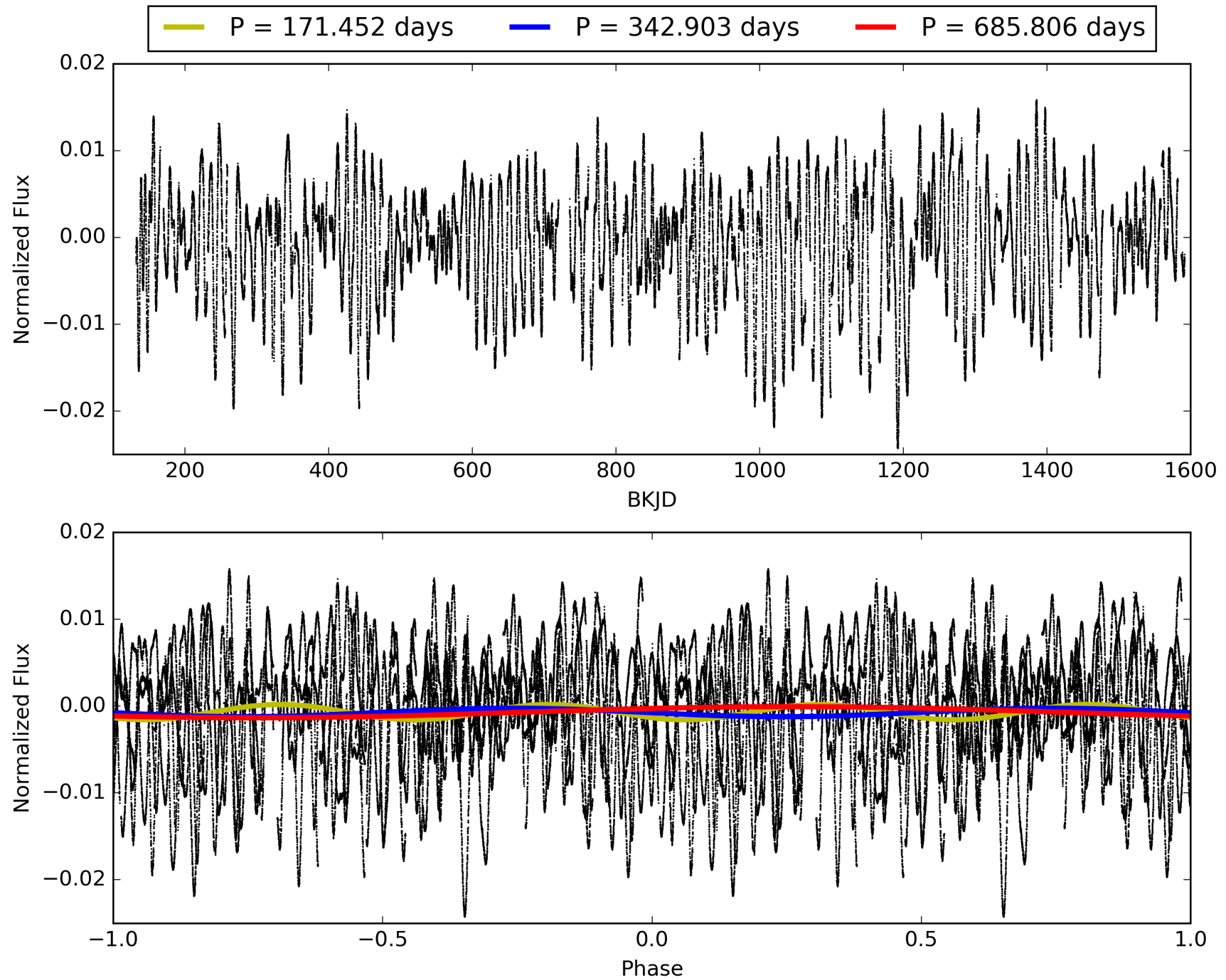
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This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 004951599-01, PDC Light Curves

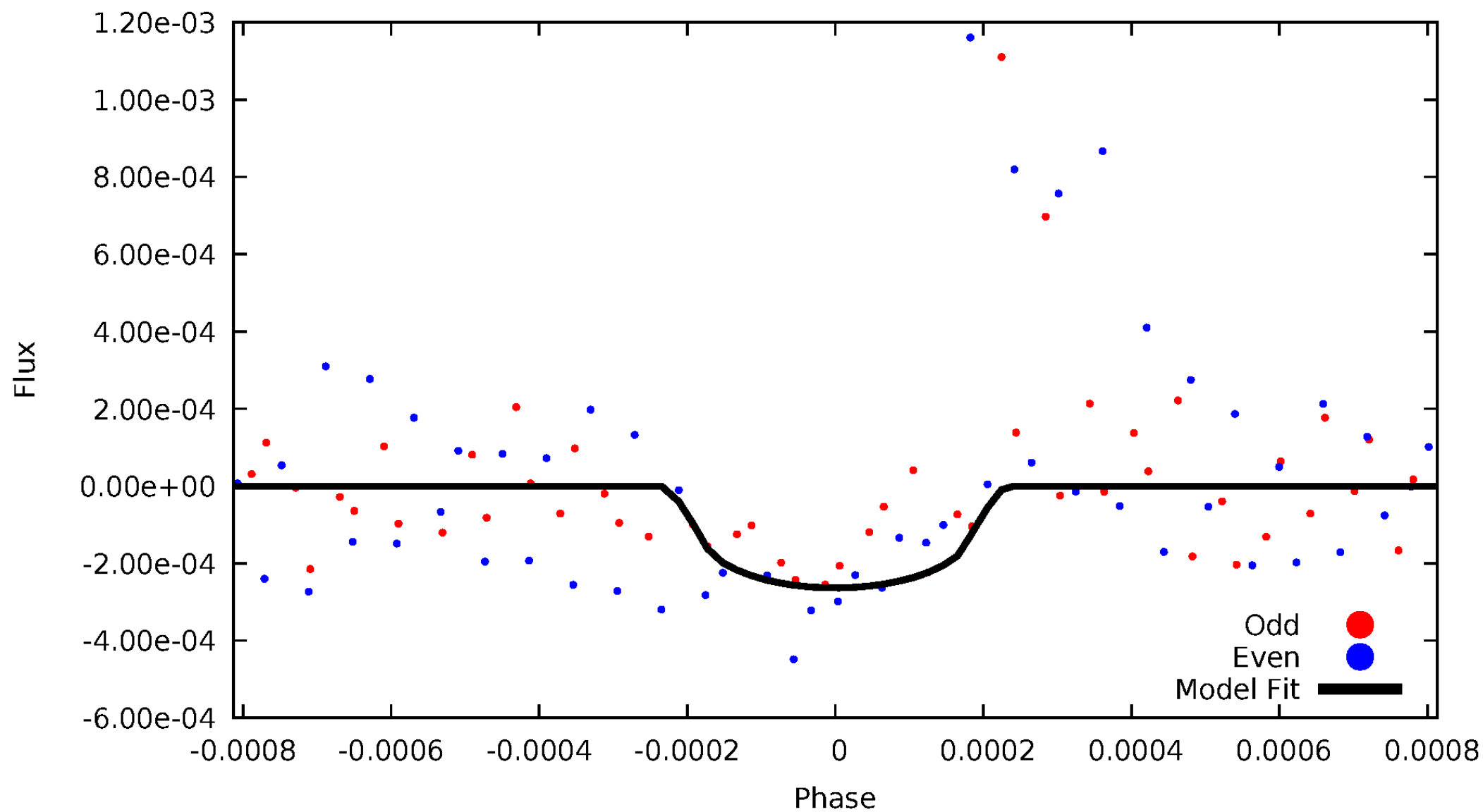


TCE 004951599-01



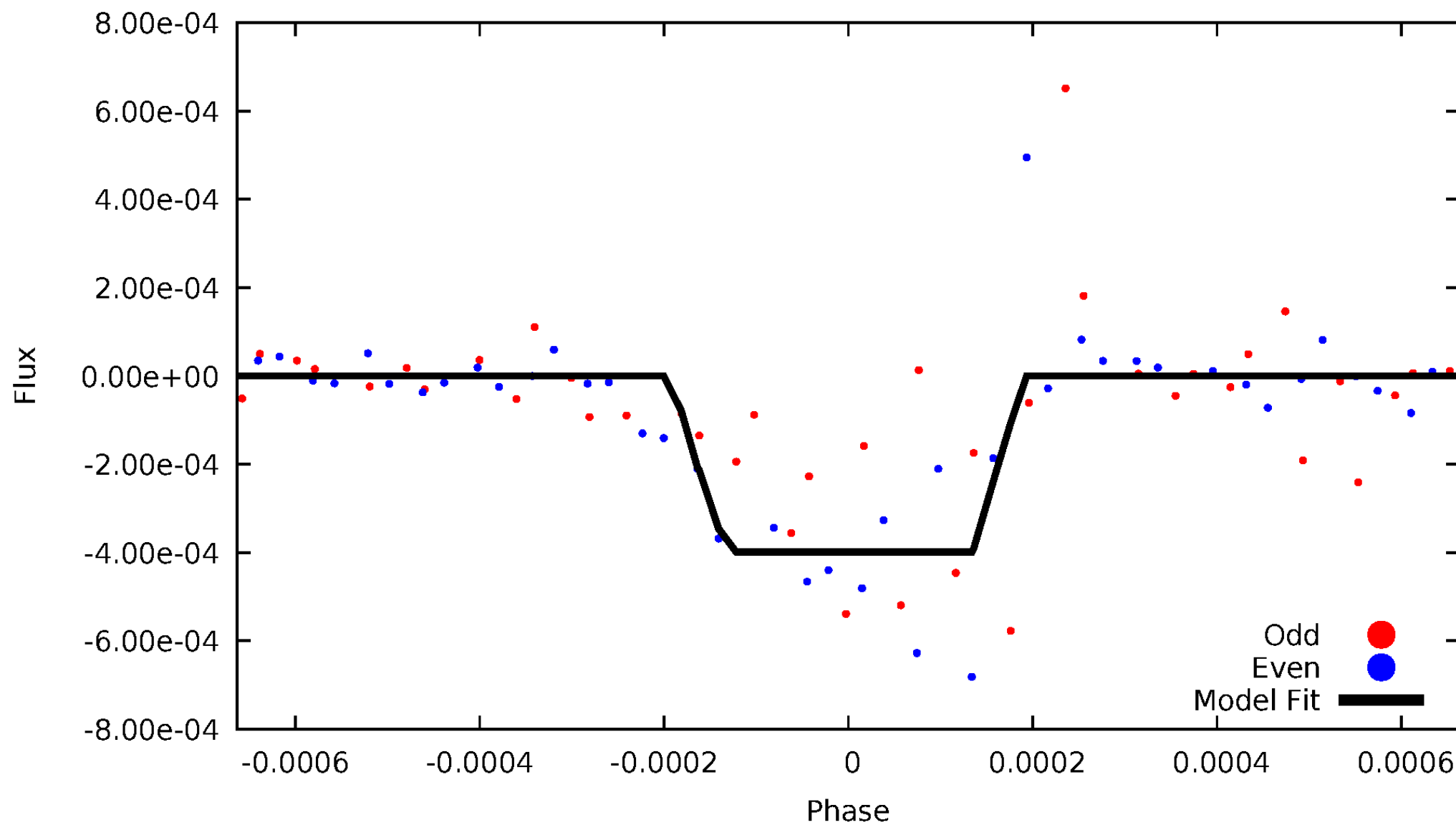
# DV Odd/Even

TCE 004951599-01

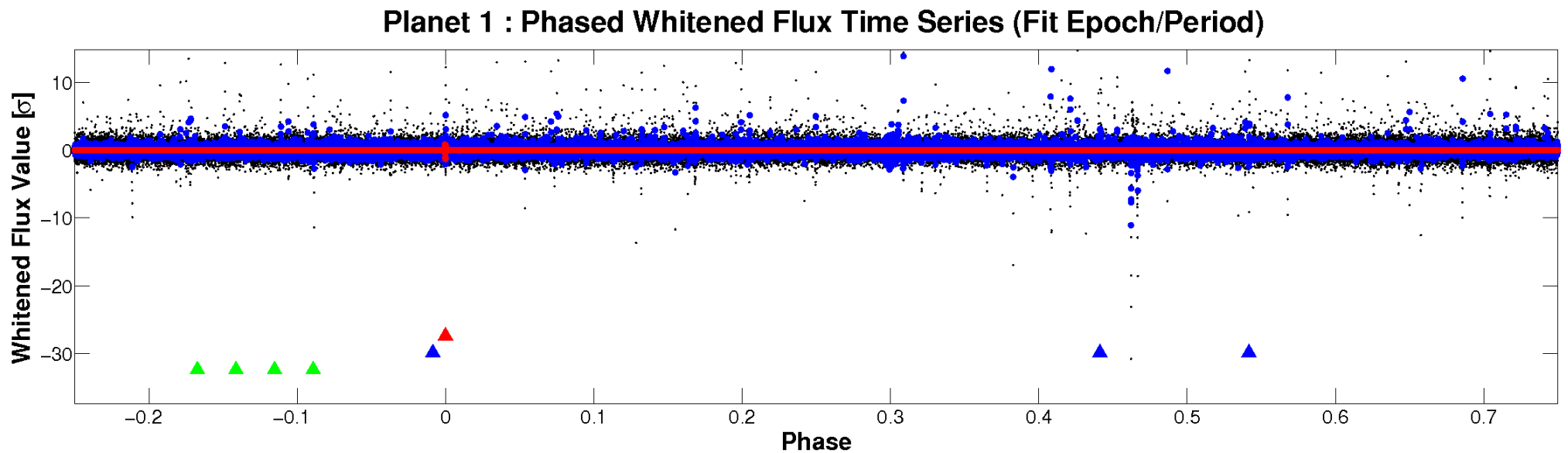
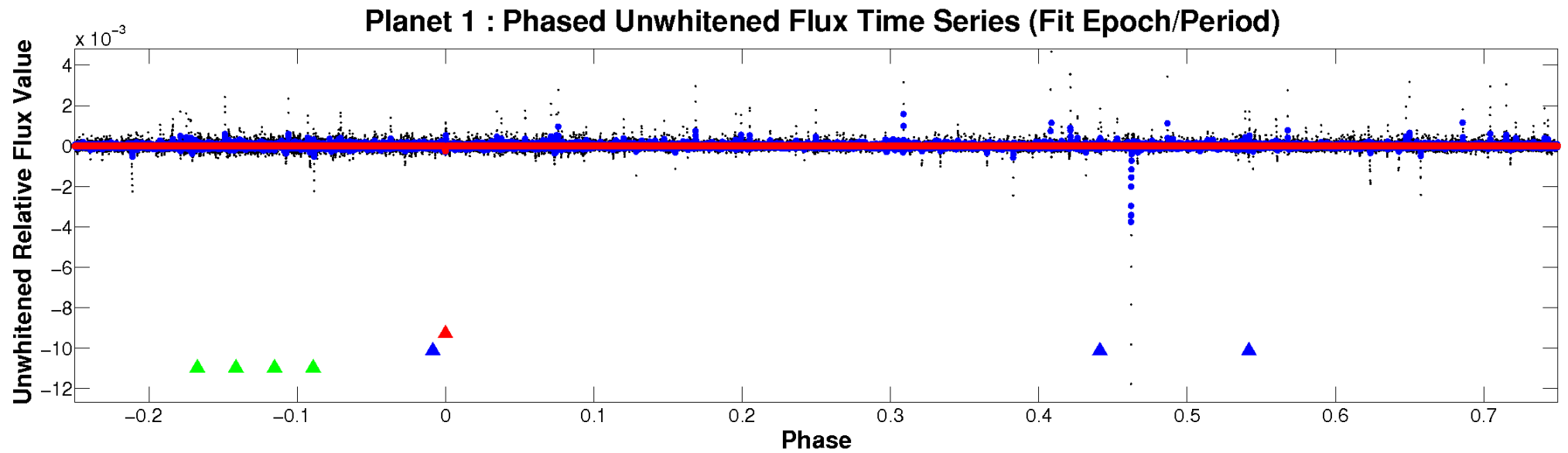


# ALT Odd/Even

TCE 004951599-01

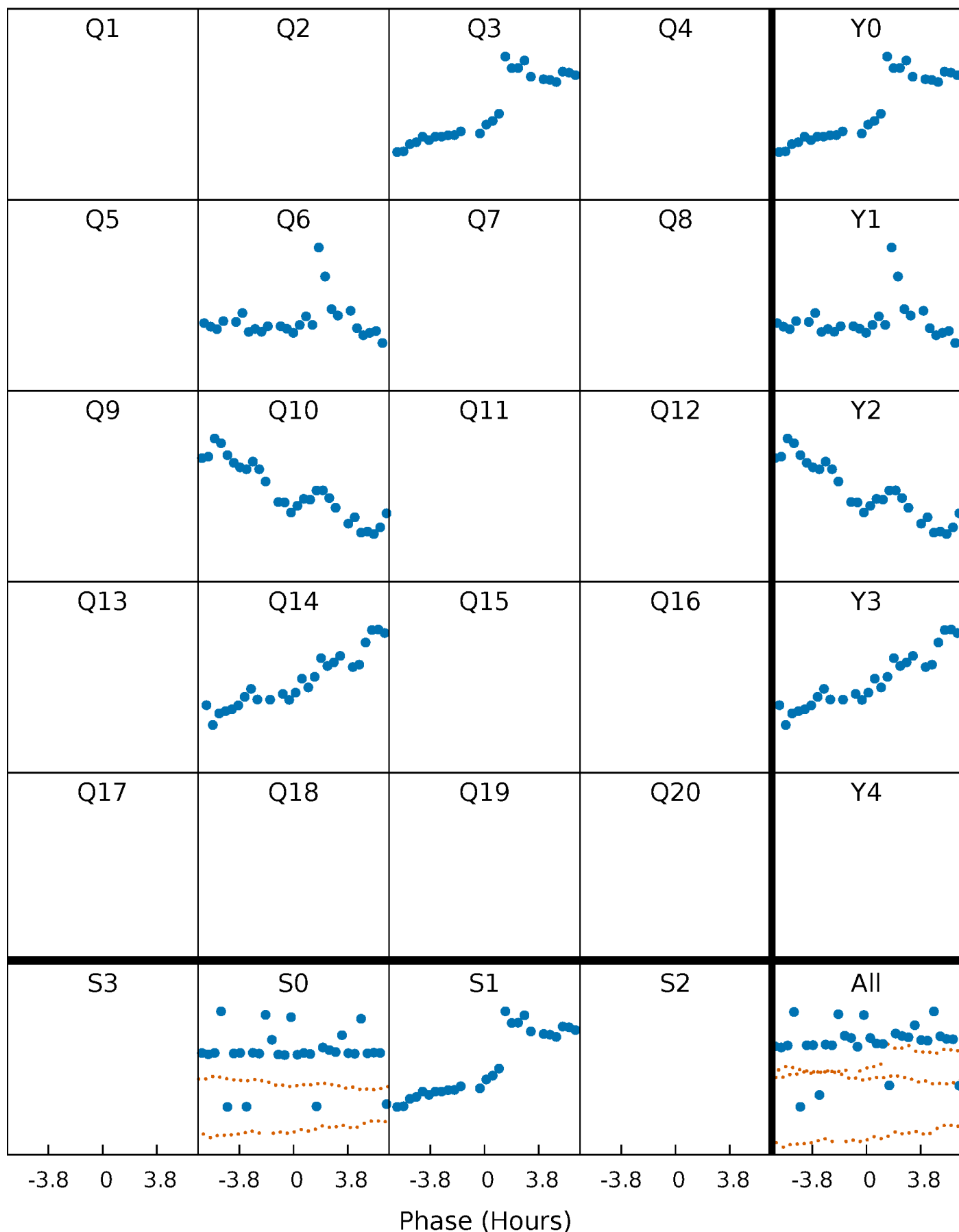


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

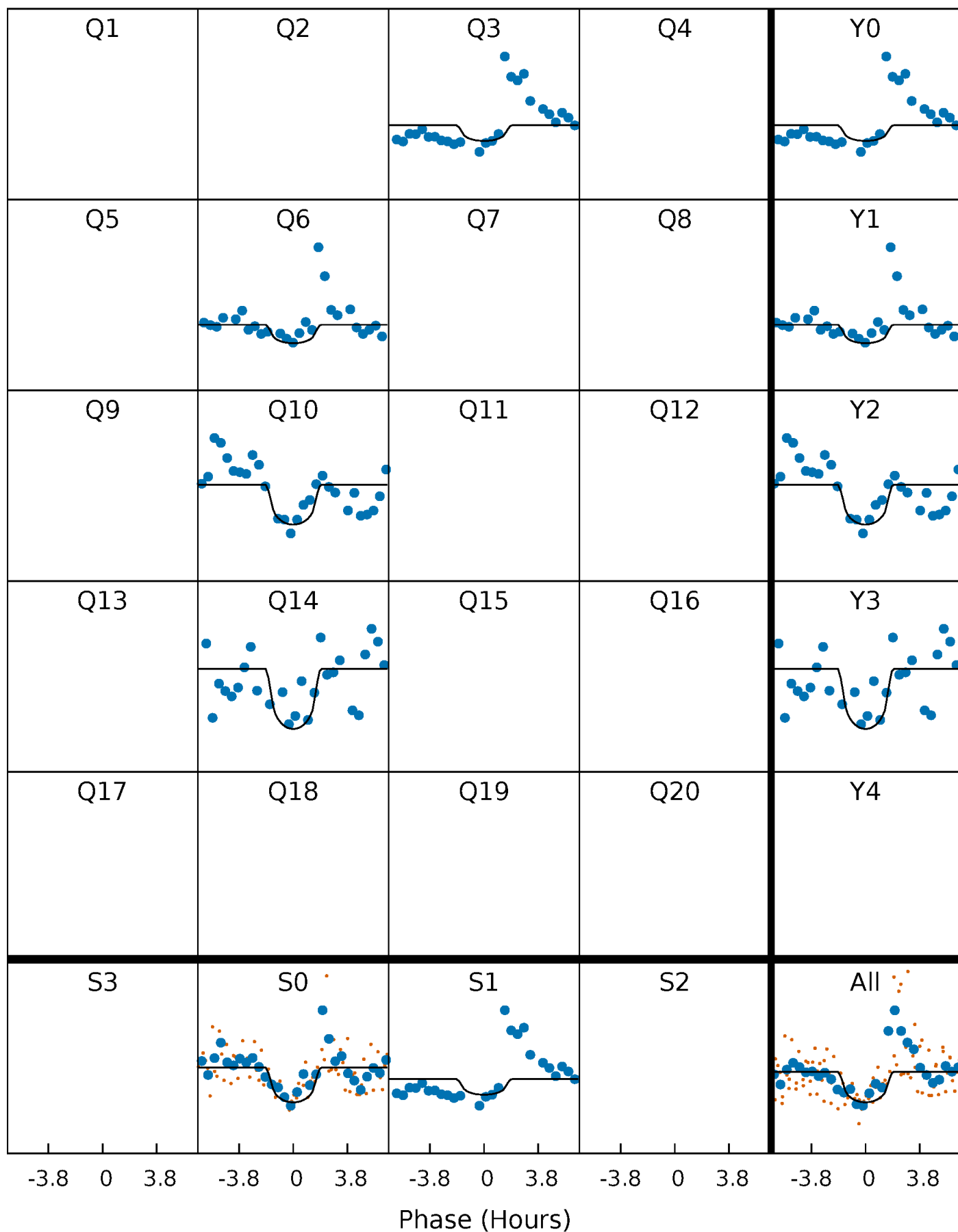
TCE 004951599-01 P=342.903154 Days  $T_0=282.373416$  (BKJD)





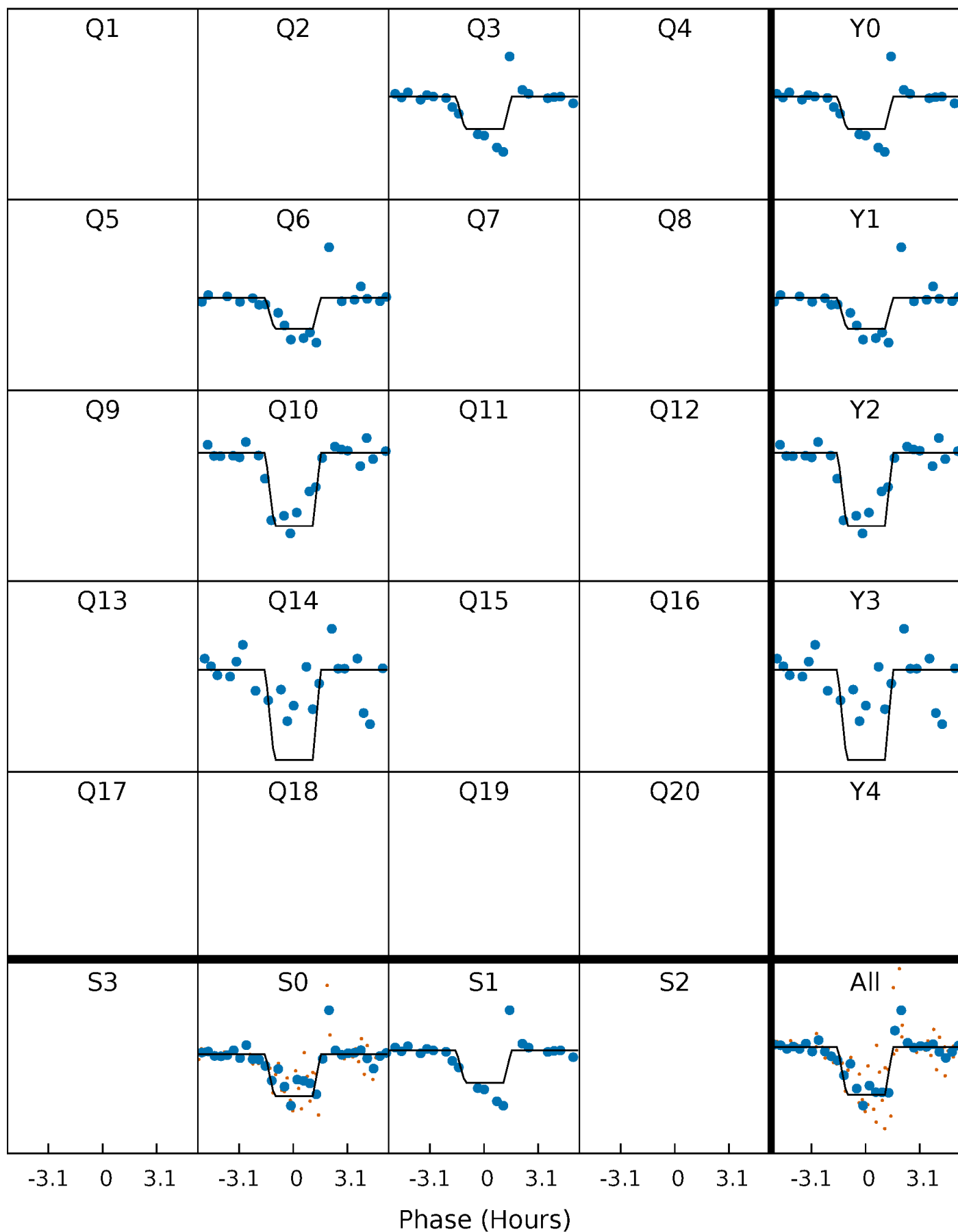
# DV Quarter-Phased Transit Curves

TCE 004951599-01 P=342.903154 Days  $T_0=282.373416$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

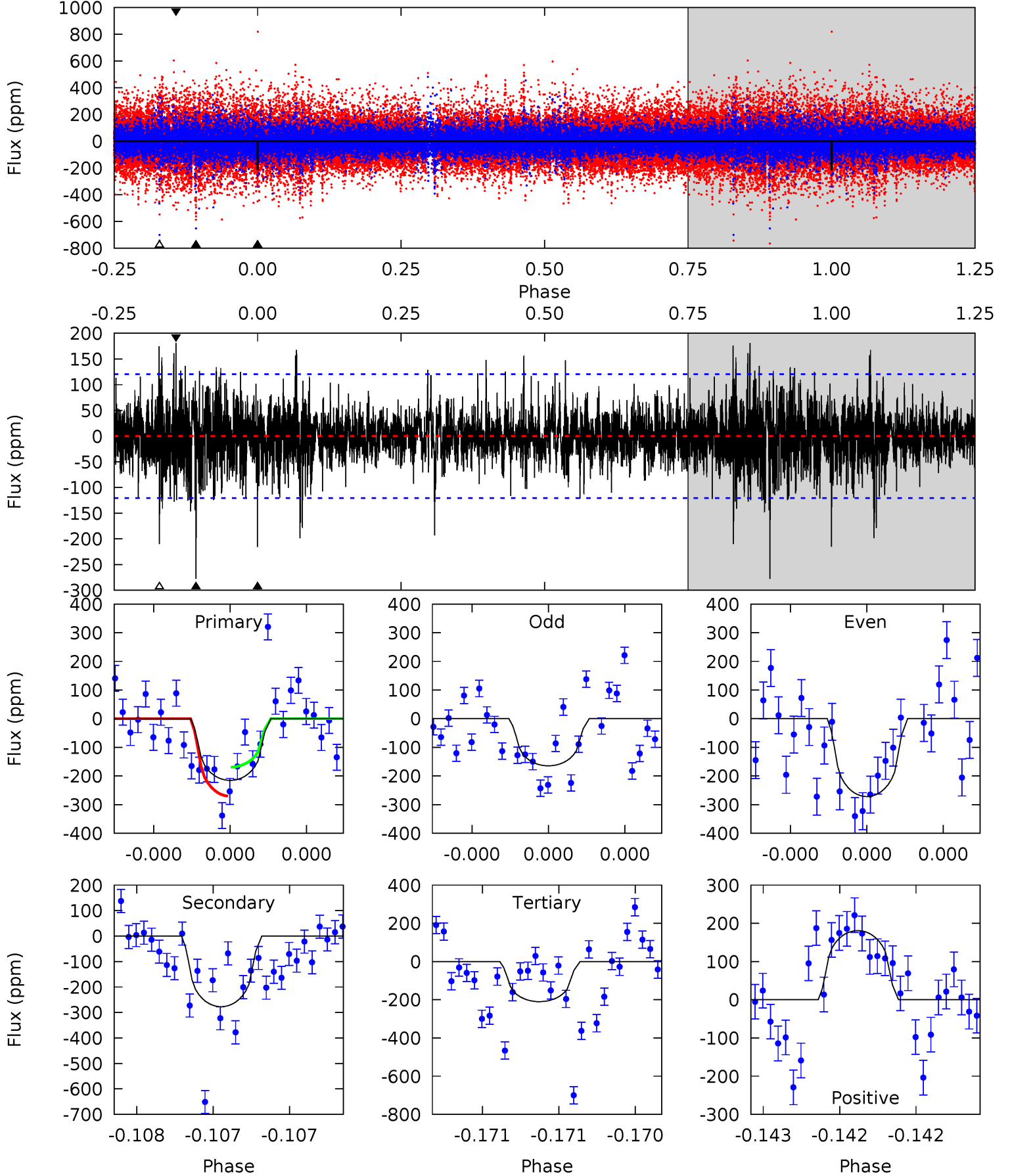
TCE 004951599-01 P=342.903182 Days  $T_0=282.369523$  (BKJD)



# DV Model-Shift Uniqueness Test

004951599-01, P = 342.903154 Days, E = 282.373416 Days

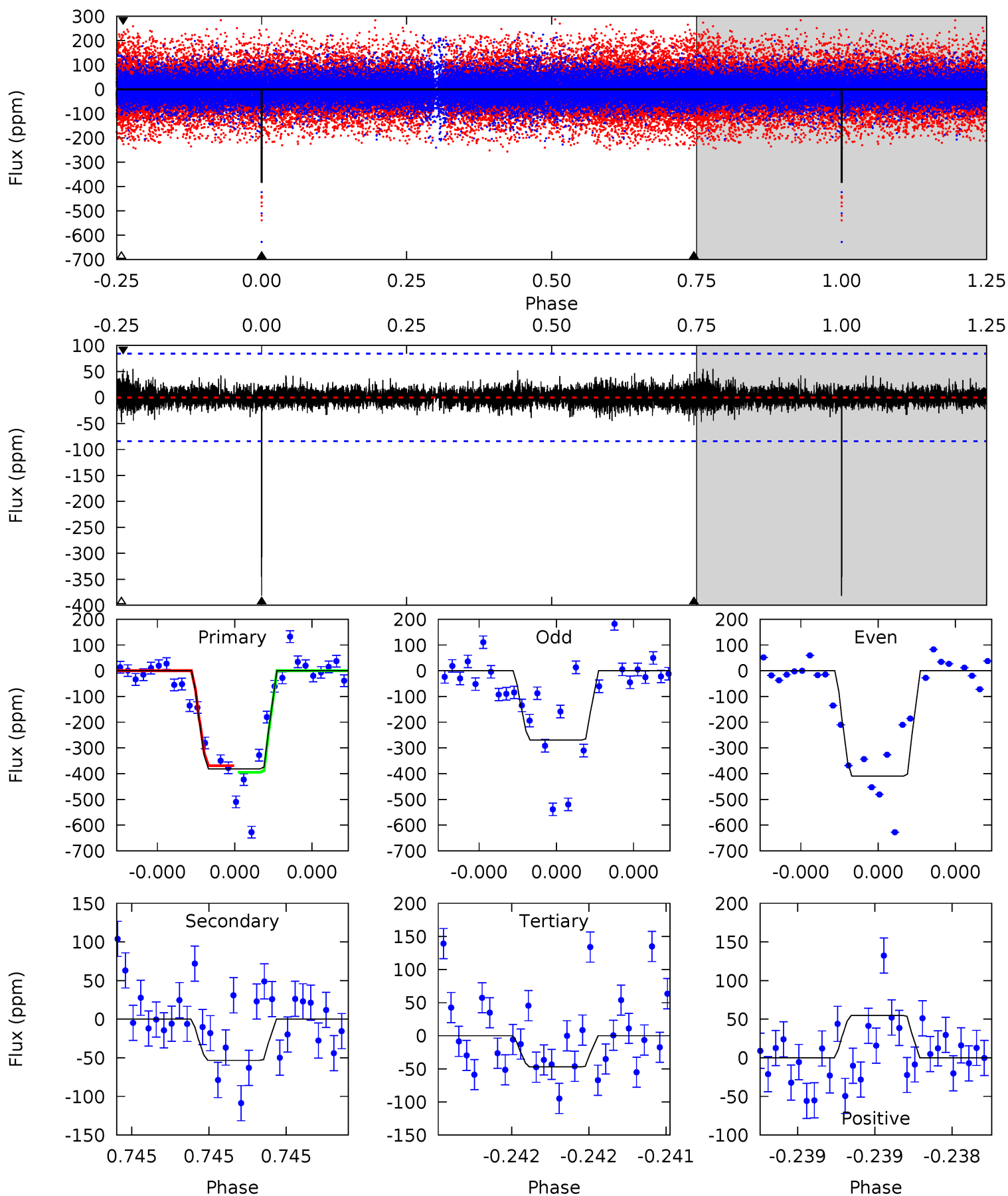
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.98	12.9	9.74	8.39	5.59	3.51	1.70	0.24	1.60	3.12	4.47	2.35	1.02	0.39	2.35



# Alt Model-Shift Uniqueness Test

004951599-01, P = 342.903182 Days, E = 282.369523 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
25.5	3.56	3.15	3.66	5.63	3.57	0.68	22.3	21.8	0.41	-0.10	5.08	0.94	0.13	0.87



### Stellar Parameters For KIC 004951599

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$4845^{+132}_{-120}$	$3.841^{+0.735}_{-0.315}$	$0.480^{+0.050}_{-0.250}$	$2.040^{+1.048}_{-1.281}$	$1.053^{+0.192}_{-0.235}$	$0.175^{+2.197}_{-0.112}$
	+3%/-2%	+19%/-8%	+10%/-52%	+51%/-63%	+18%/-22%	+1258%/-64%
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 004951599-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-277 \pm 22$	$5.62^{+6.78}_{-3.95}$	$424^{+62}_{-74}$	$3917^{+2276}_{-745}$	$4332^{+45273}_{-3383}$
Alt.	$-53 \pm 15$	$6.20^{+7.11}_{-4.16}$	$427^{+60}_{-79}$	$2967^{+1280}_{-455}$	$727^{+6196}_{-566}$

$T_{max}$  = 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

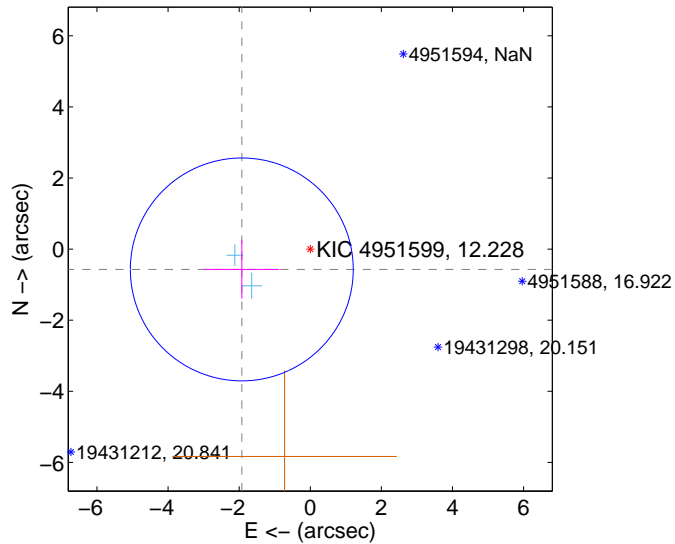
Supplemental centroid analysis for 004951599-01. Kepler magnitude: 12.23. Transit SNR 6.06

There are 2 quarters with good PRF difference image offsets

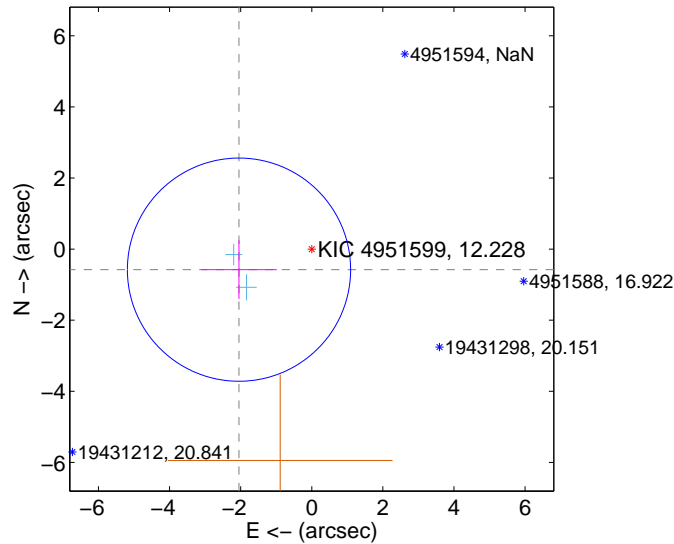
The direct PRF centroid is offset from the target star catalog position by about 0.19 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.009 \pm 1.045$	1.92	$1.926 \pm 1.062$	$-0.572 \pm 0.824$
PRF-fit source offset from KIC position	$2.127 \pm 1.047$	2.03	$2.047 \pm 1.062$	$-0.579 \pm 0.824$
photometric centroid source offset	$0.73 \pm 1.65$	0.44	$0.73 \pm 1.65$	$0.08 \pm 1.33$

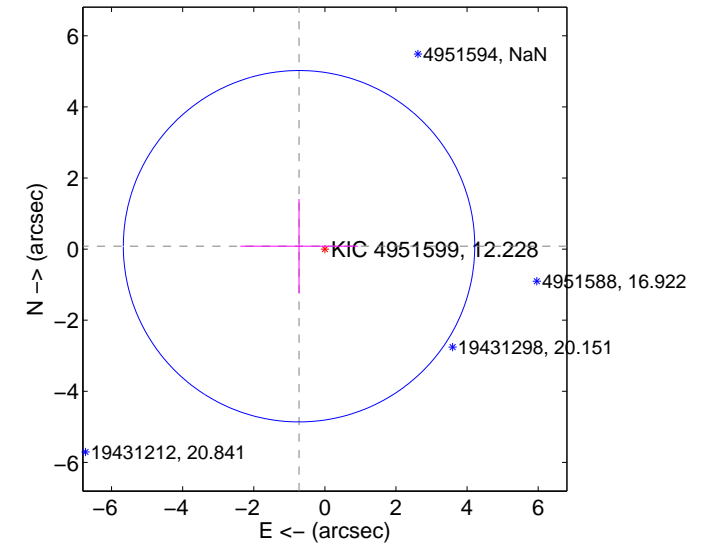
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

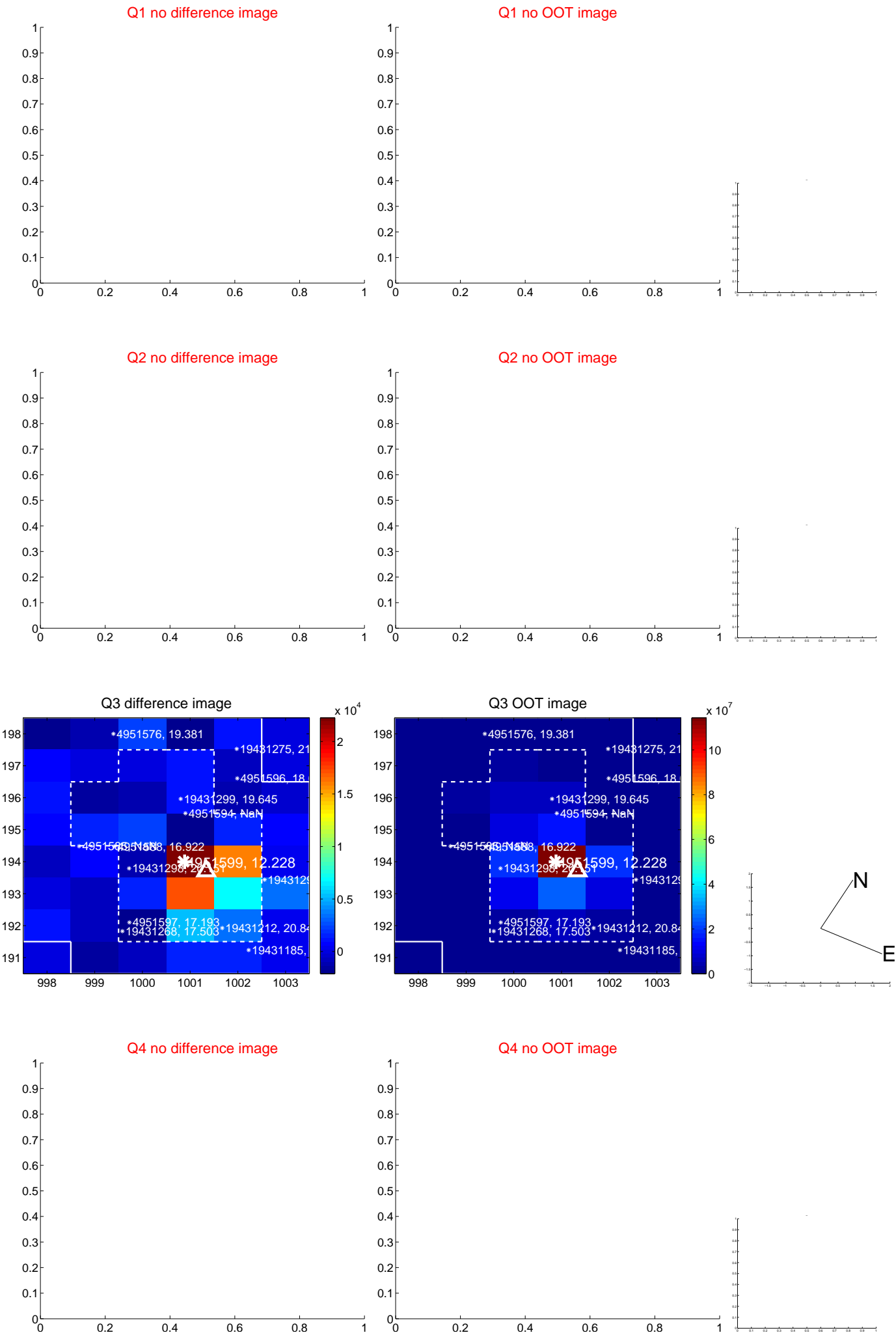


offset from photometric centroids

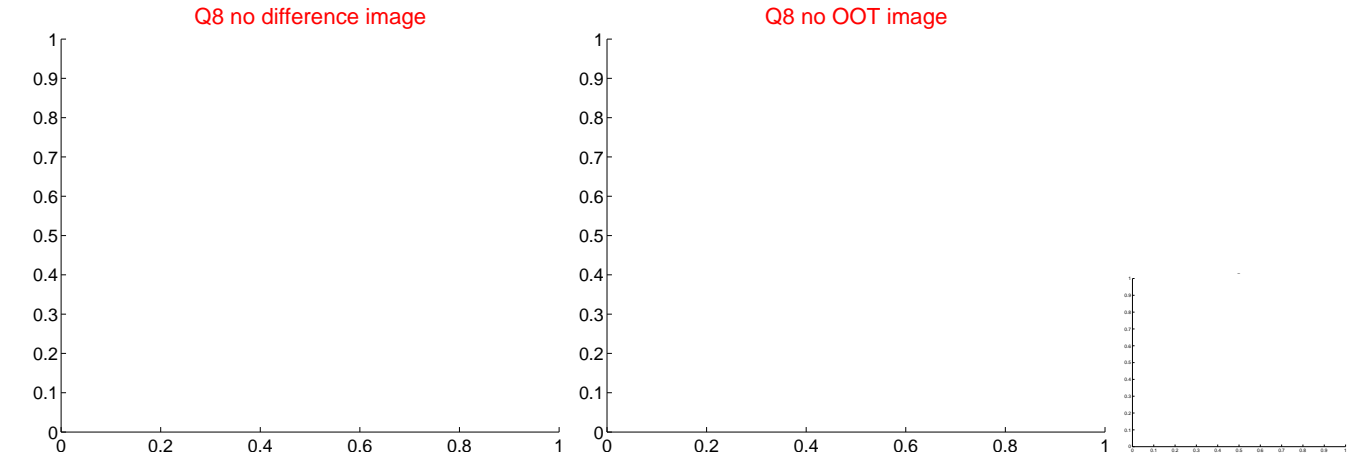
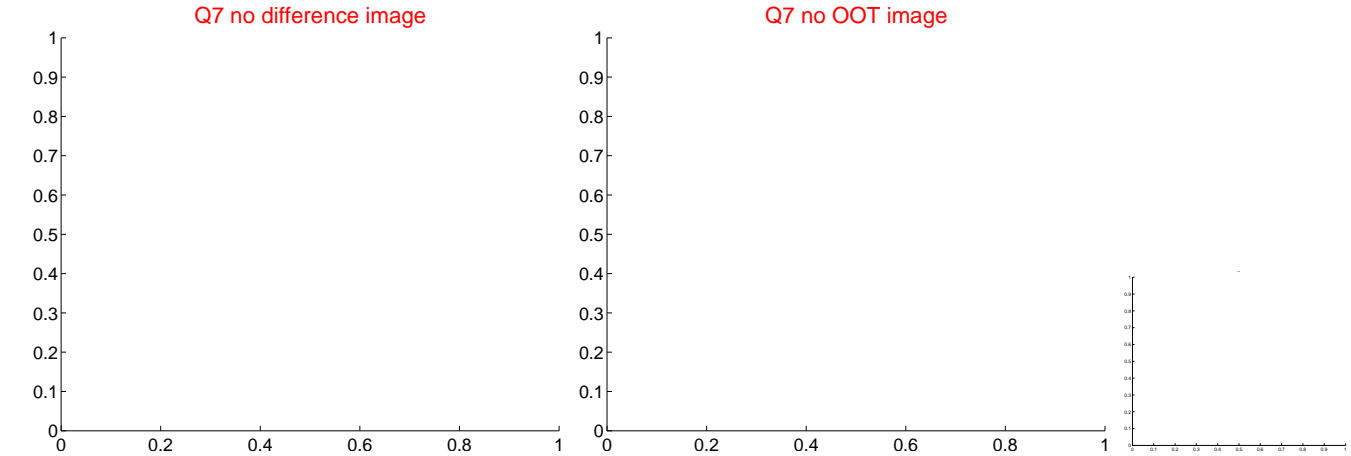
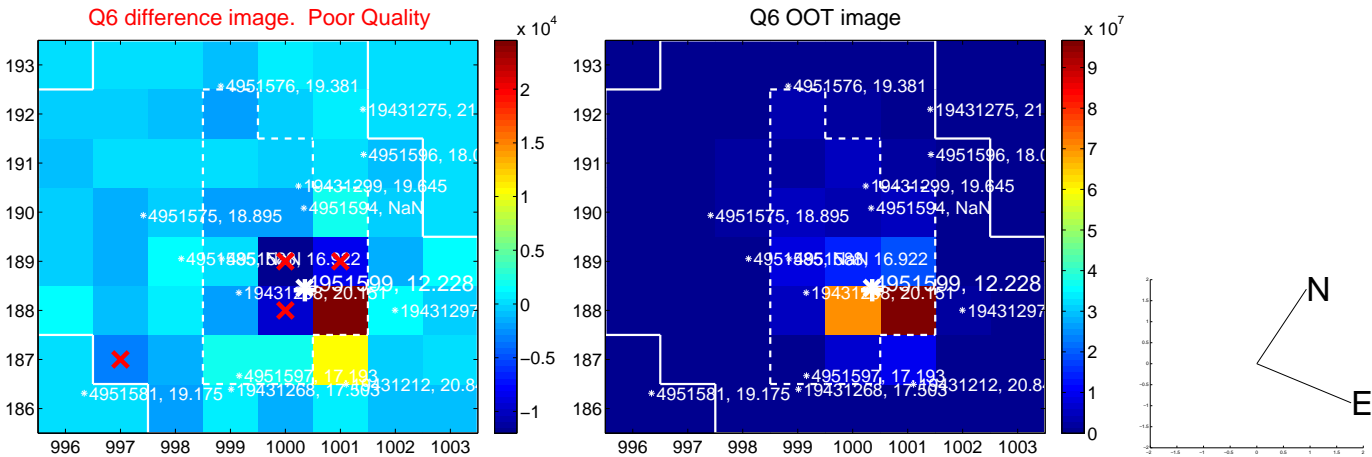
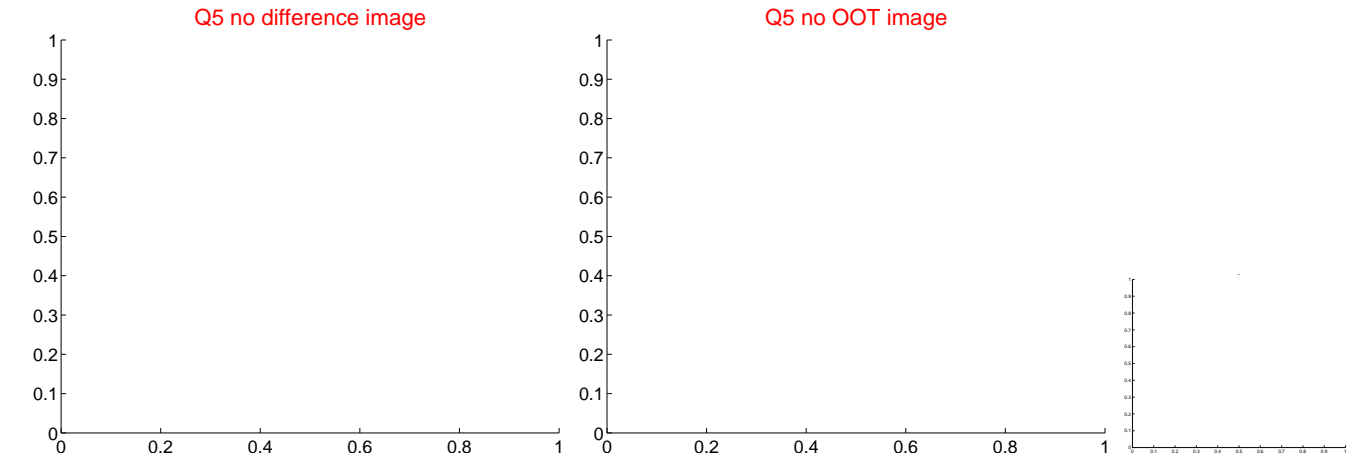


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

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



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





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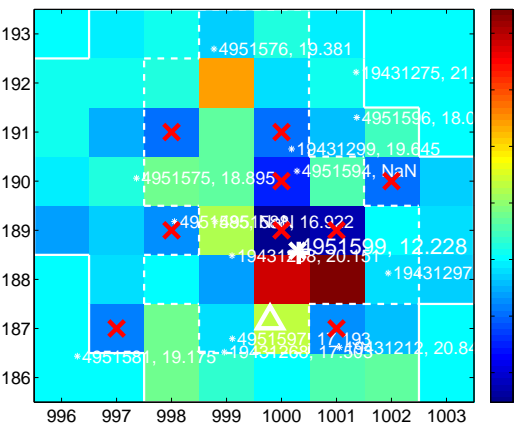
Q9 no difference image



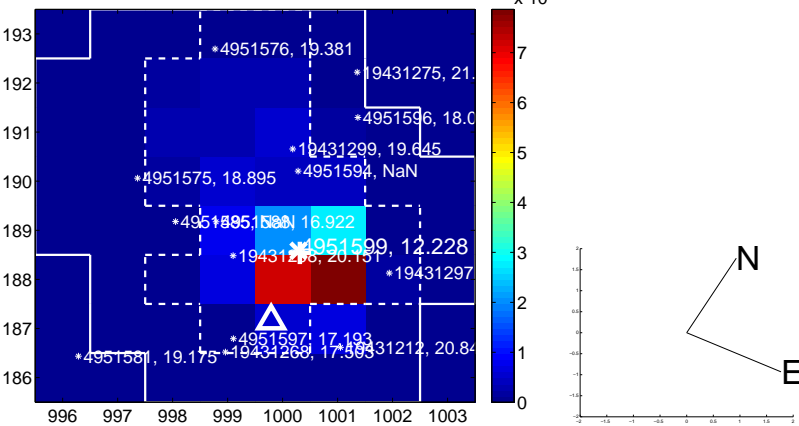
Q9 no OOT image



Q10 difference image. Poor Quality



Q10 OOT image



Q11 no difference image



Q11 no OOT image



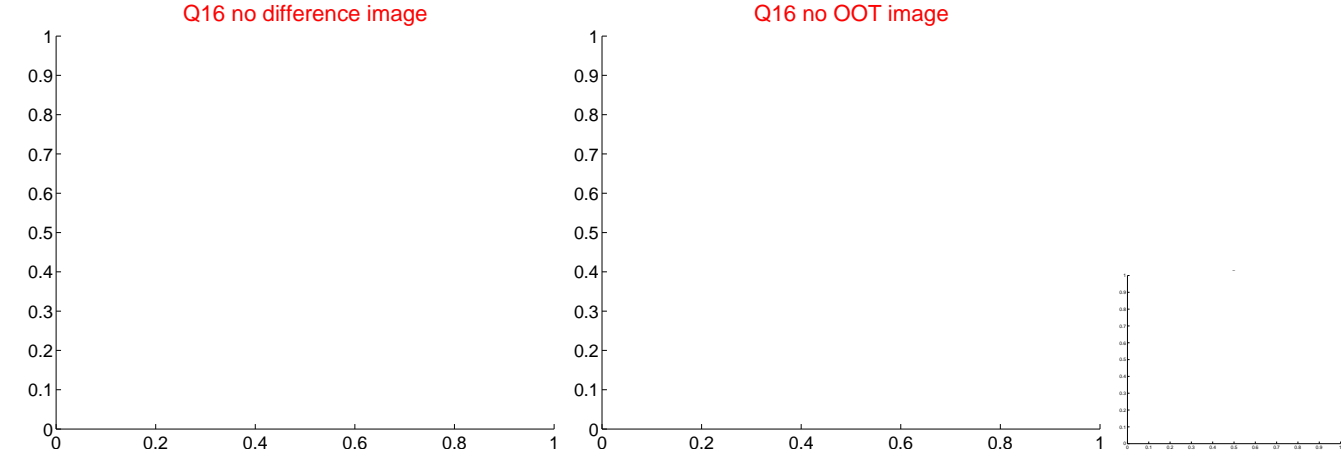
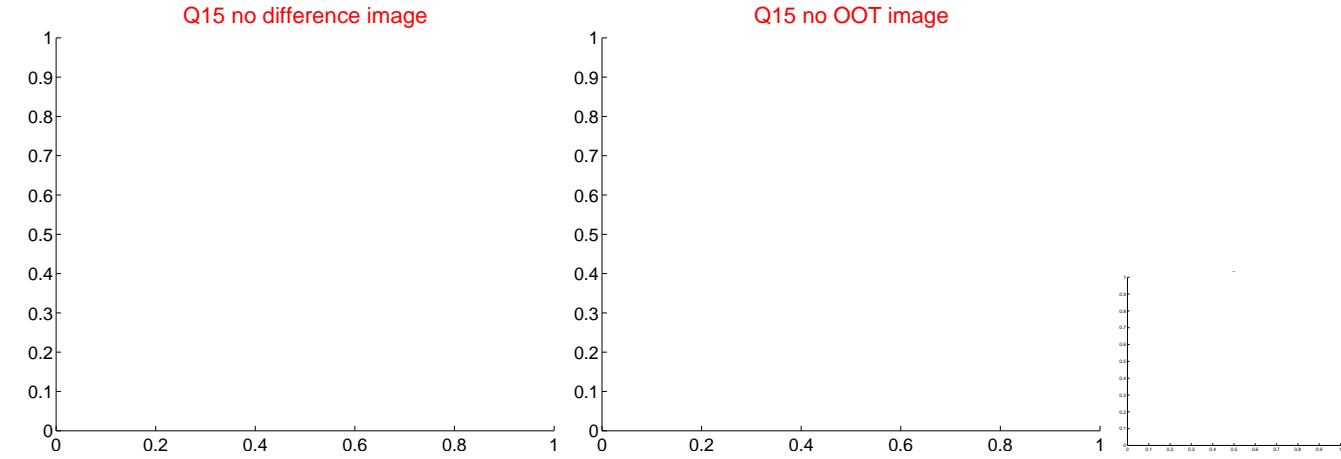
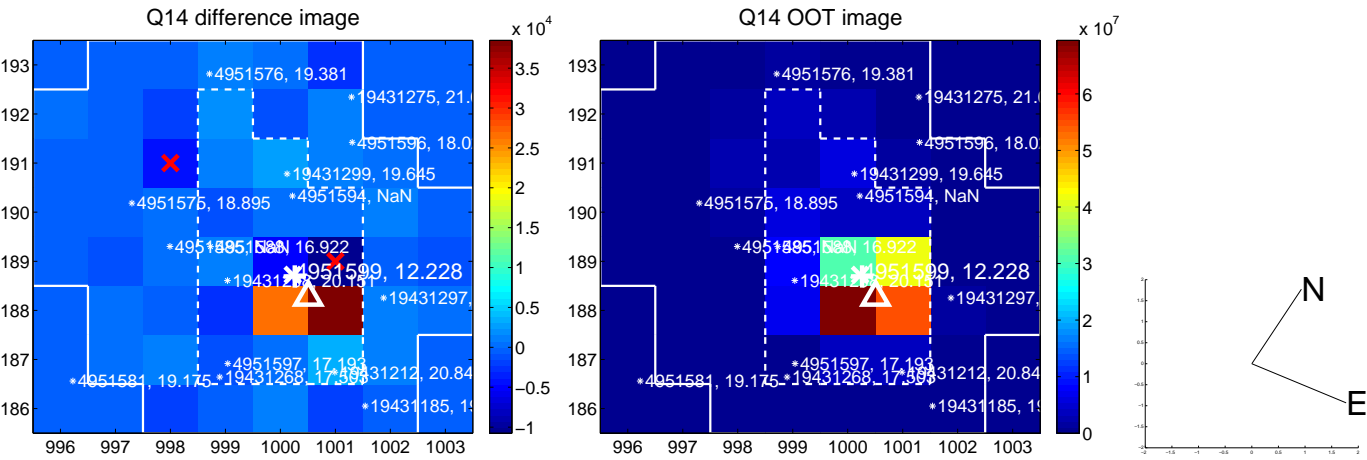
Q12 no difference image



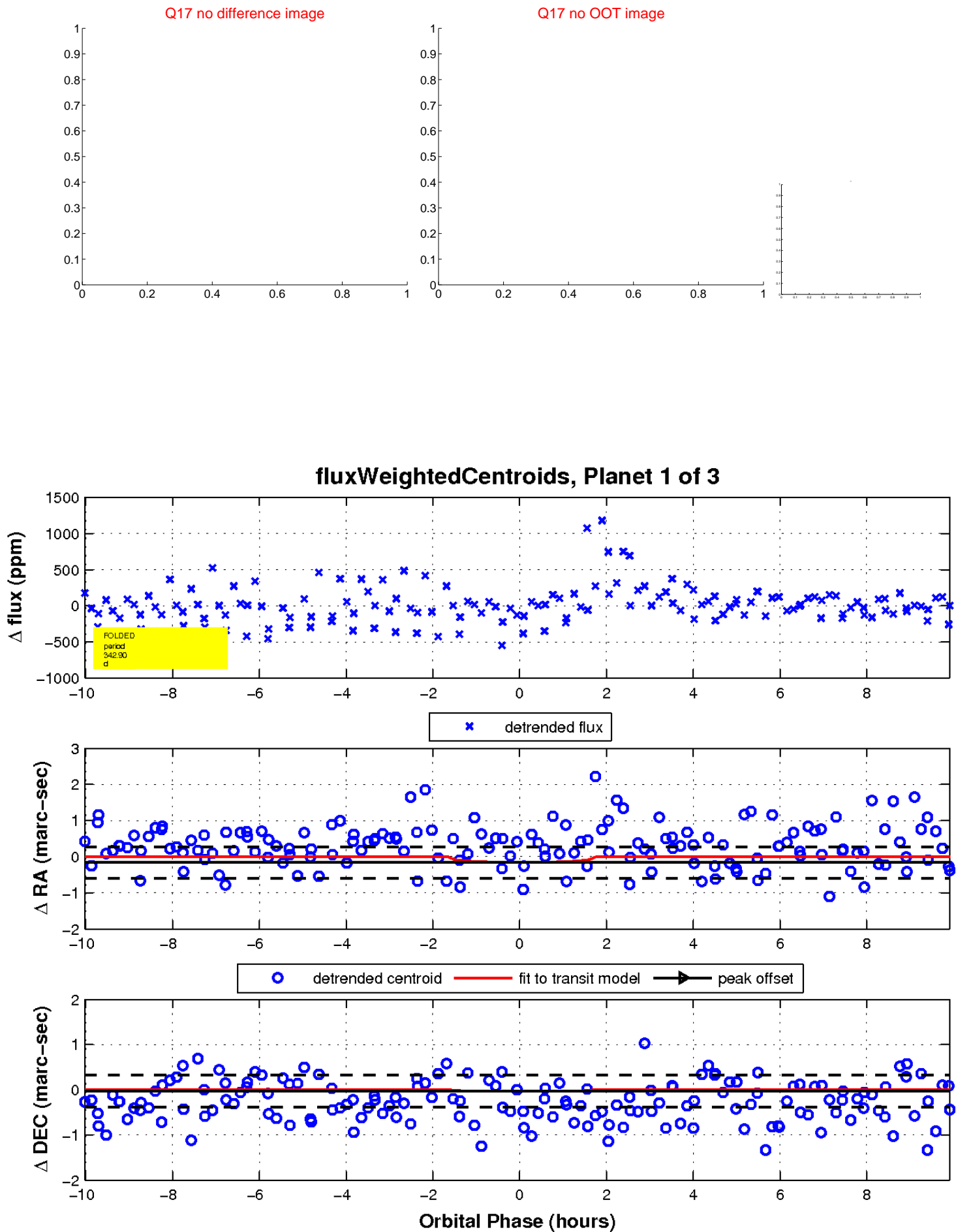
Q12 no OOT image



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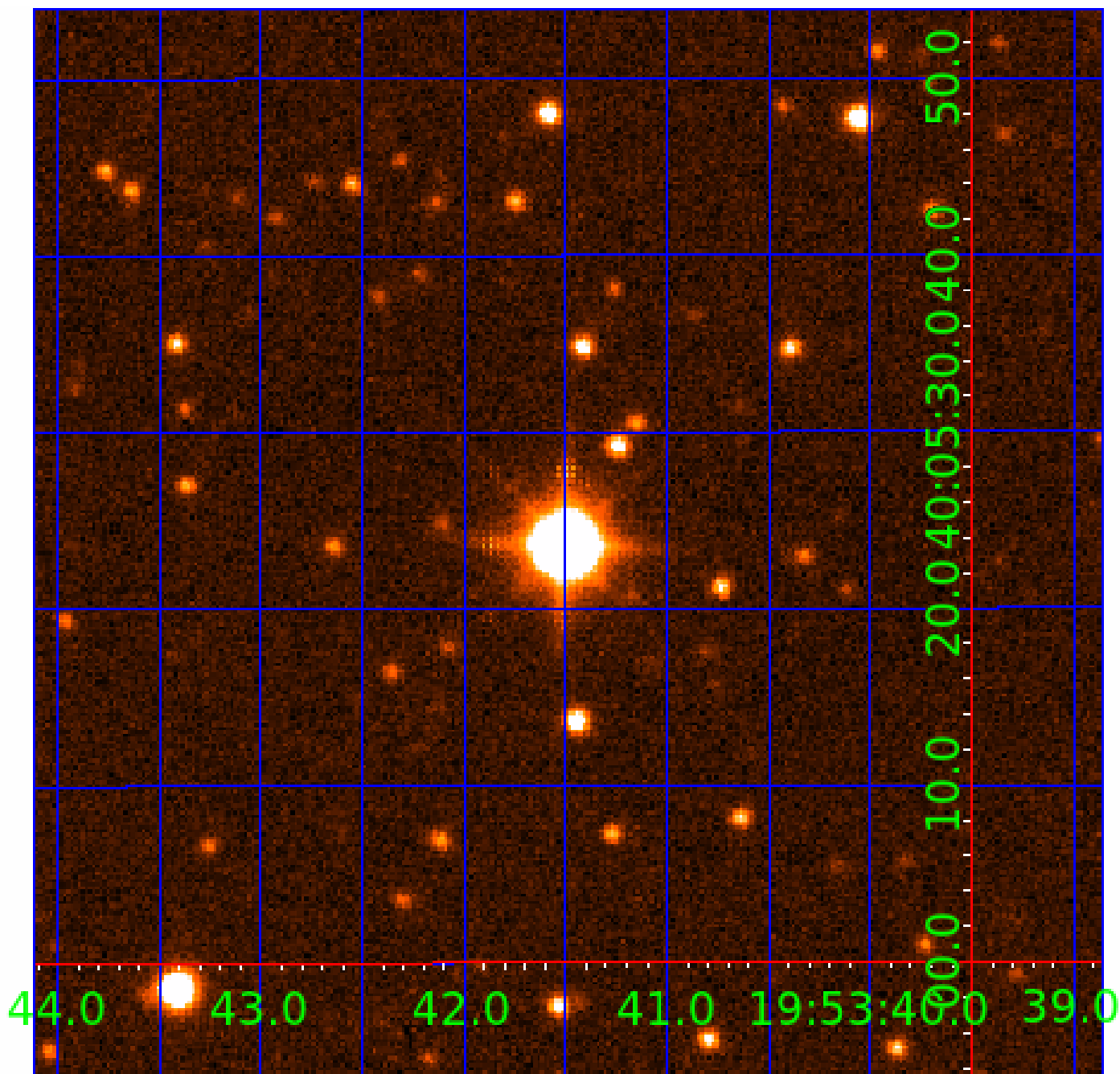


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UKIRT Image

Declination



# KIC 004951599

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004951599-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
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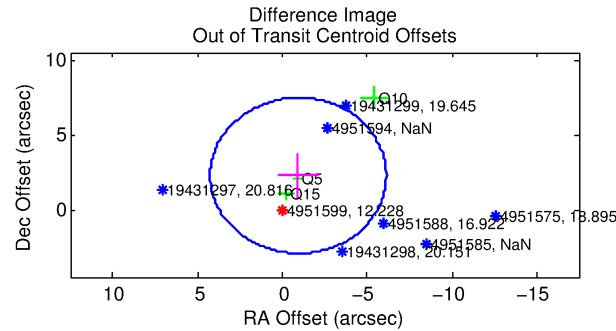
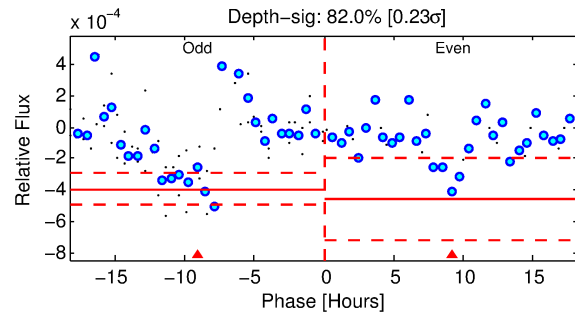
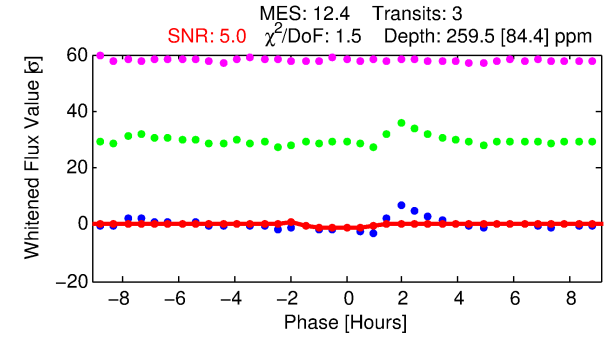
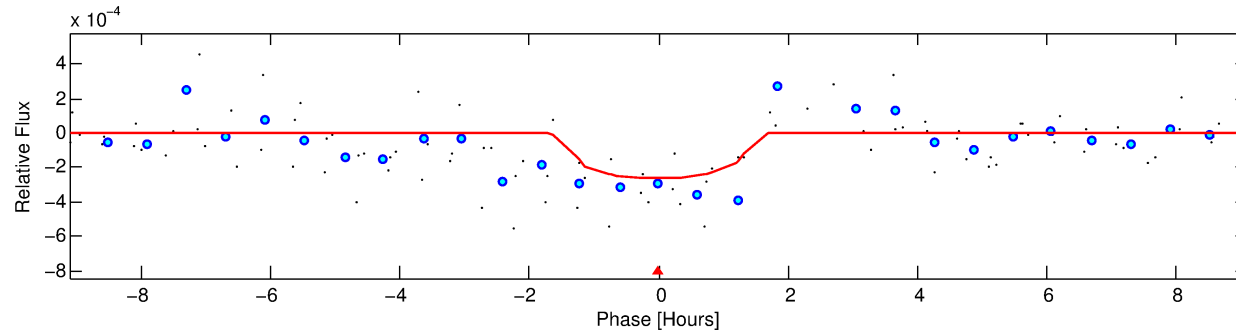
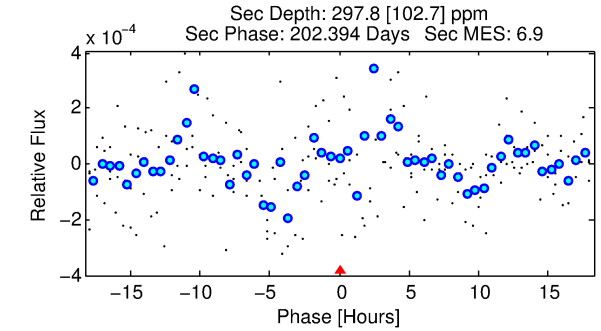
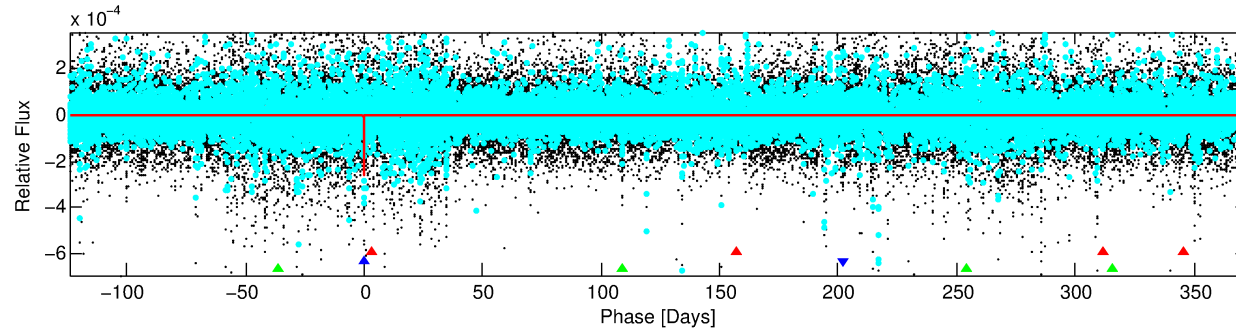
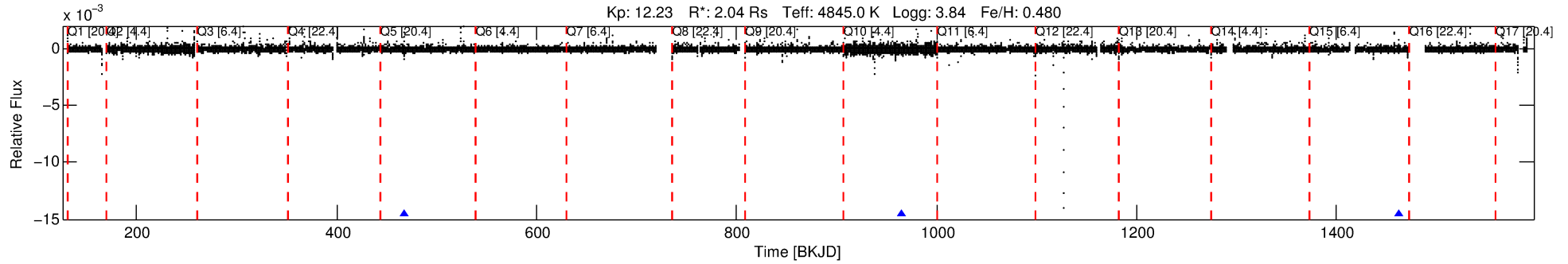
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 004951599-02

No Significant Match Found

# DV One-Page Summary

KIC: 4951599 Candidate: 2 of 3 Period: 497.128 d



## DV Fit Results:

Period = 497.12830 [0.00906] d  
Epoch = 468.1246 [0.0131] BKJD  
Rp/R\* = 0.0182 [0.0253]  
a/R\* = 592.79 [3059.17]  
b = 0.90 [1.10]  
Seff = 1.32 [1.59]  
Teq = 273 [83] K  
Rp = 4.05 [6.18] Re  
a = 1.2496 [0.8778] AU  
Ag = 15575.03 [47486.23] [0.33  $\sigma$ ]  
Teffp = 4717 [3306] K [1.34  $\sigma$ ]

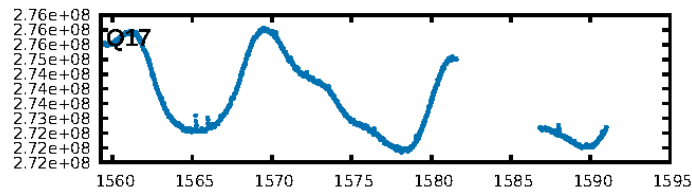
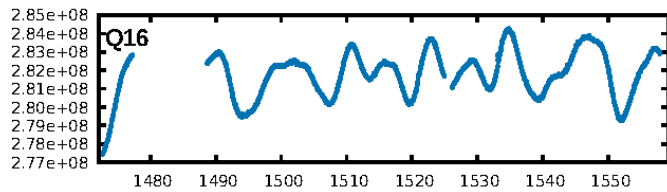
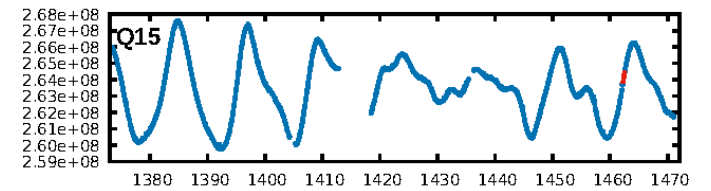
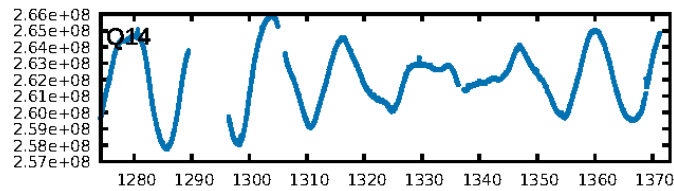
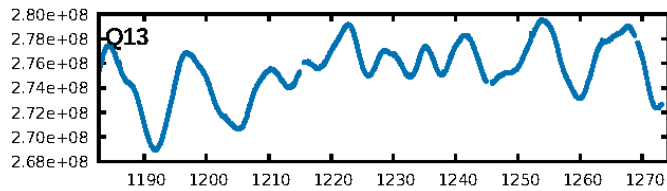
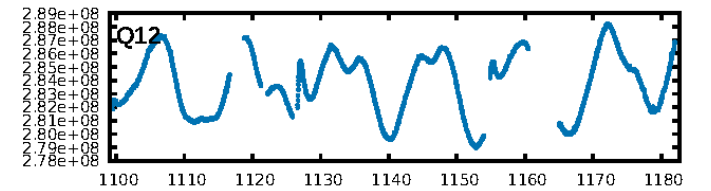
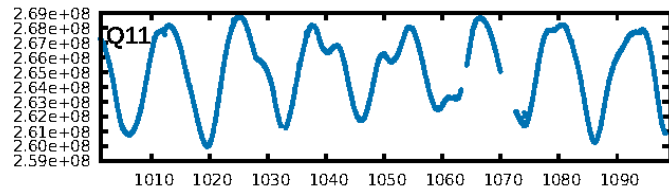
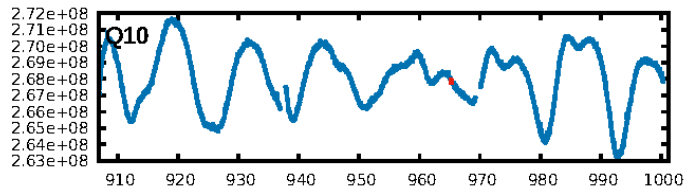
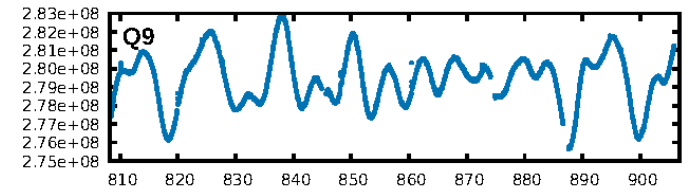
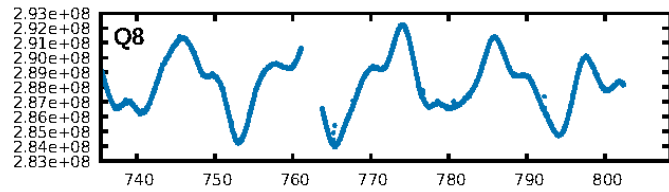
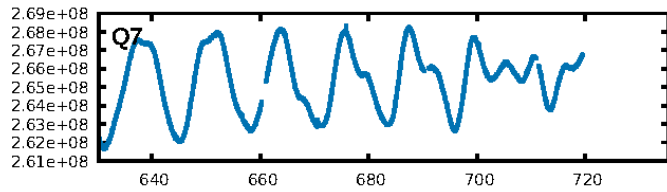
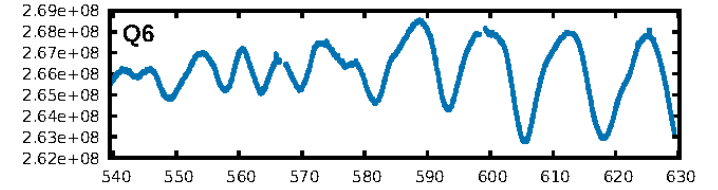
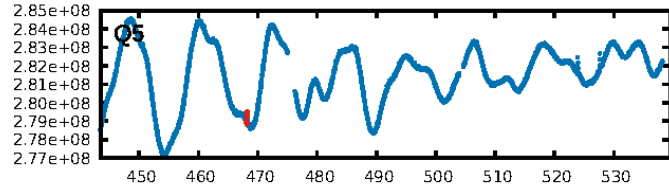
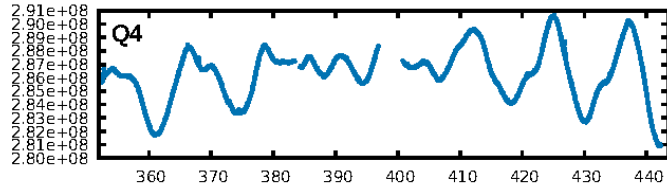
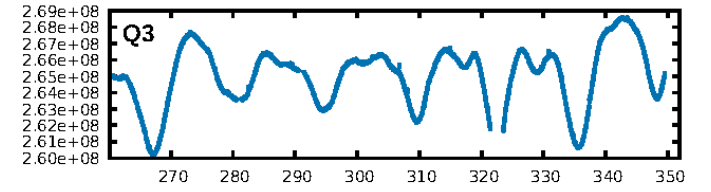
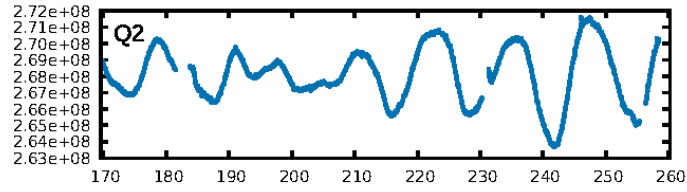
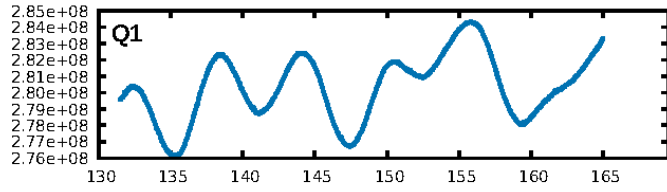
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [769.71  $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 2.3%  
ModelChiSquareGof-sig: 77.1%  
**Bootstrap-pfa: 4.55e-08**  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 61.59  
Centroid-sig: 41.7%  
Centroid-so: 1.177 arcsec [0.74  $\sigma$ ]  
OotOffset-rm: 2.458 arcsec [1.42  $\sigma$ ]  
OotOffset-st: 1/1/0/1 [3]  
KicOffset-rm: 2.398 arcsec [1.30  $\sigma$ ]  
KicOffset-st: 1/1/0/1 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 1.00 [3/3]

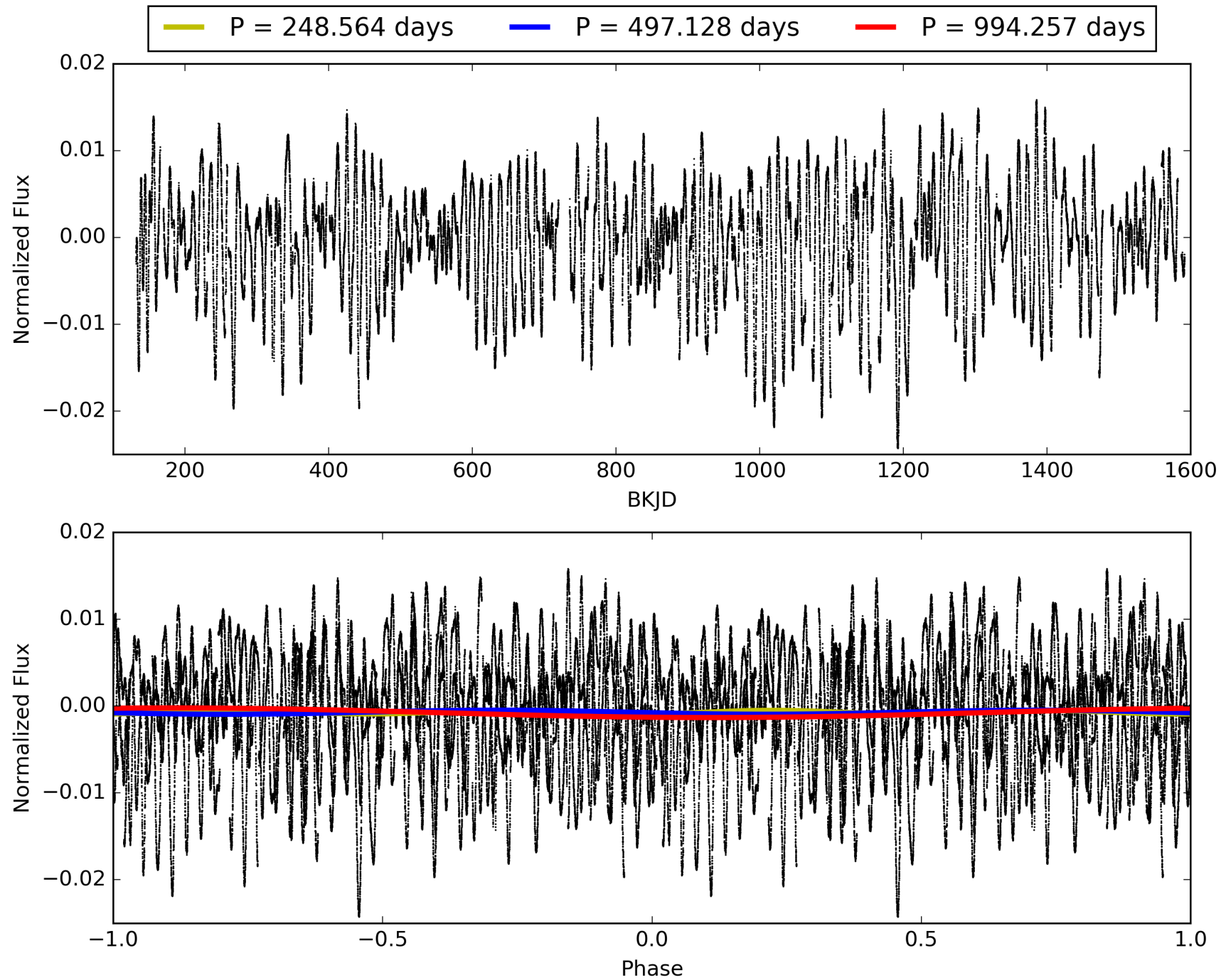
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 10:33:53 Z

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

# TCE 004951599-02, PDC Light Curves



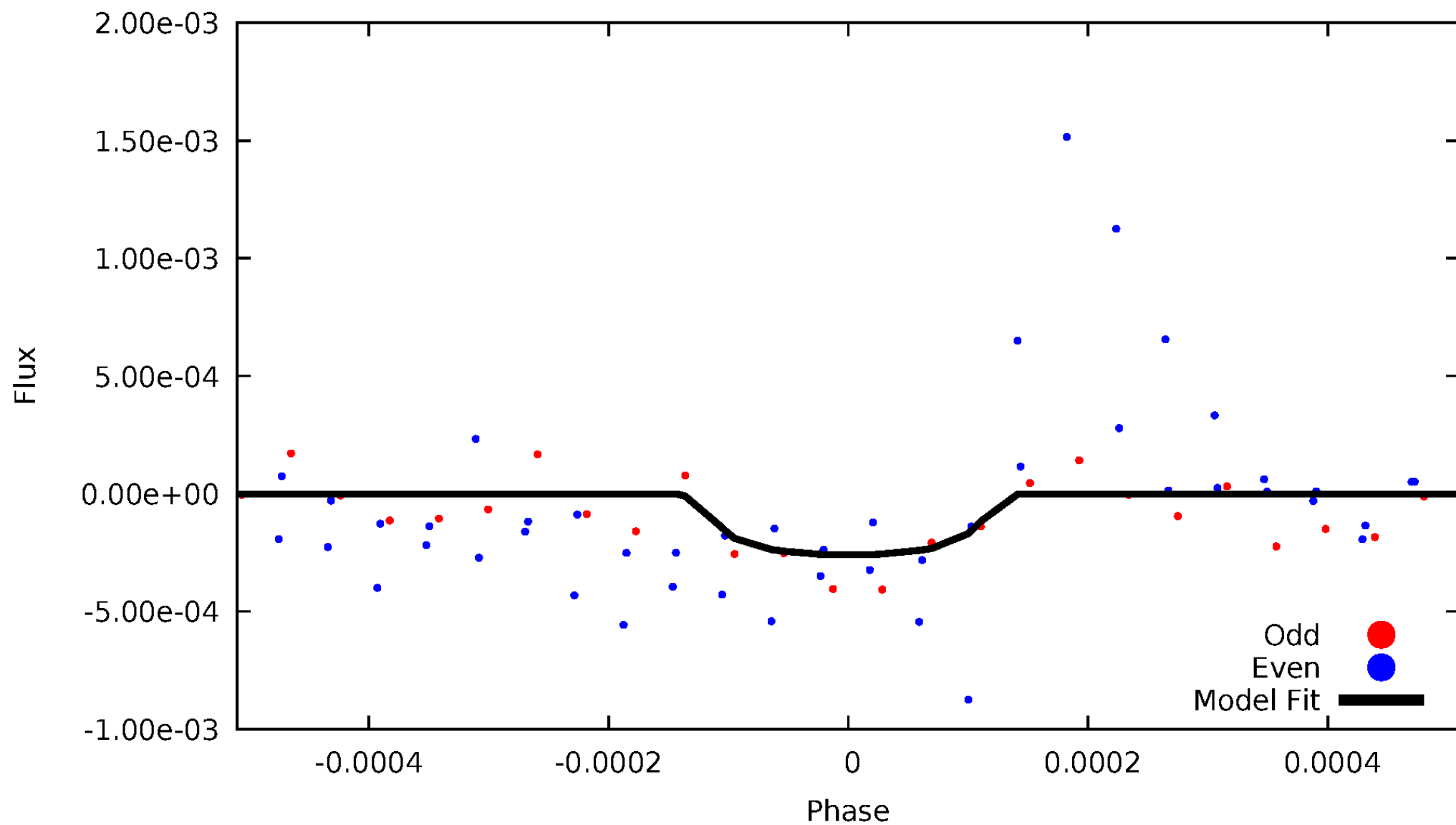
TCE 004951599-02





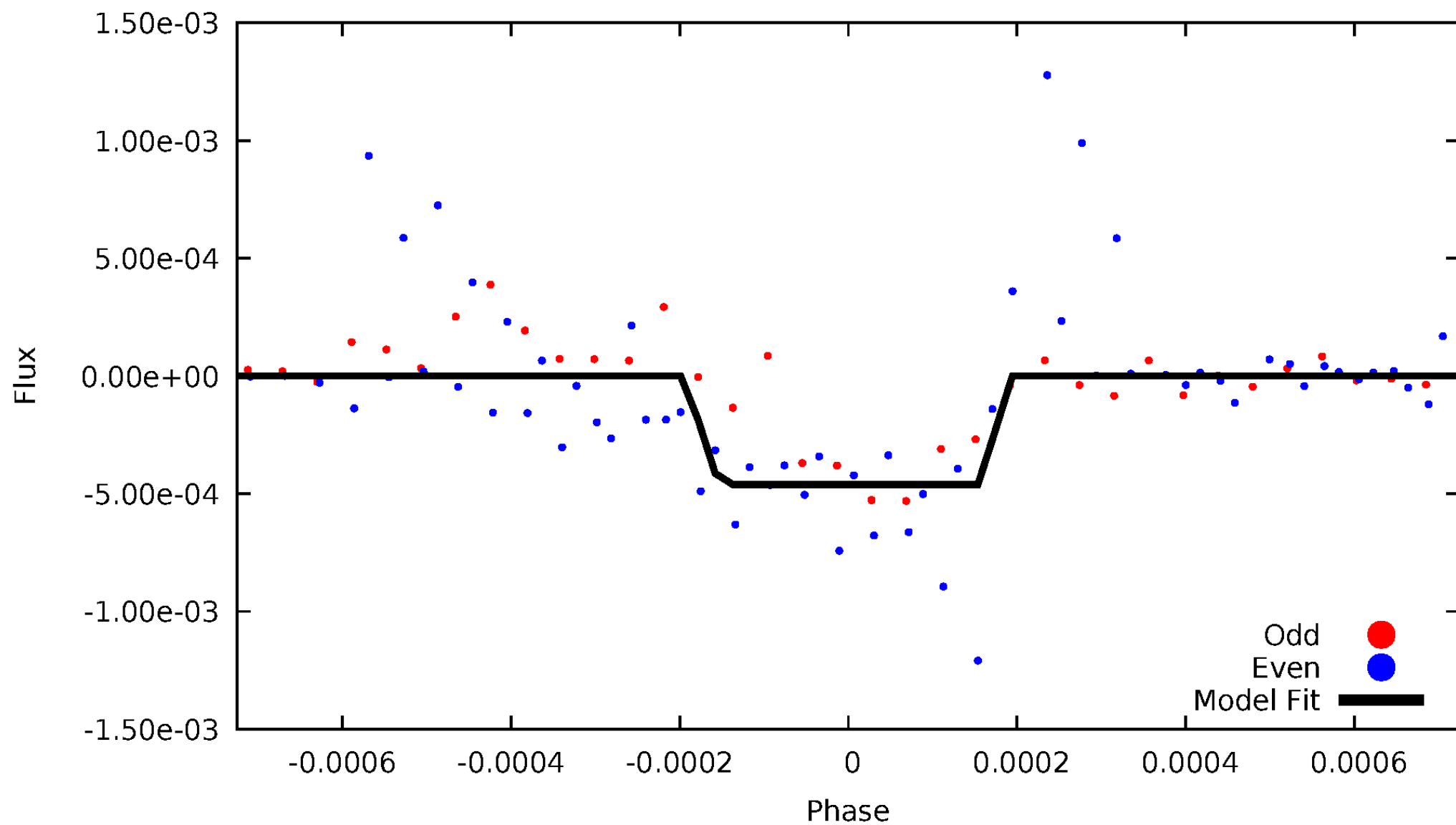
# DV Odd/Even

TCE 004951599-02



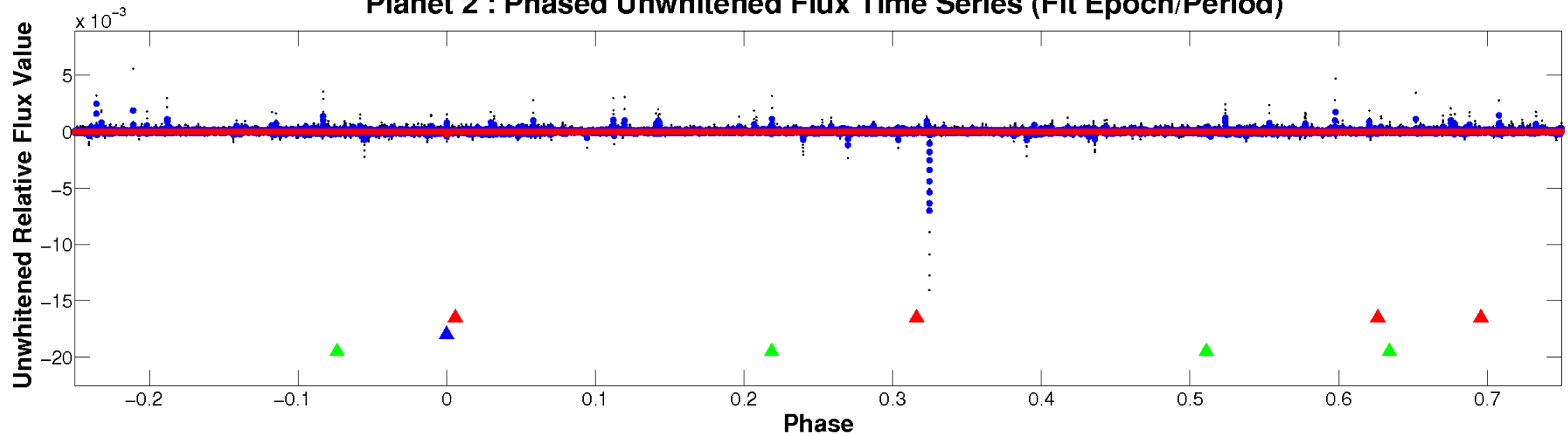
# ALT Odd/Even

TCE 004951599-02

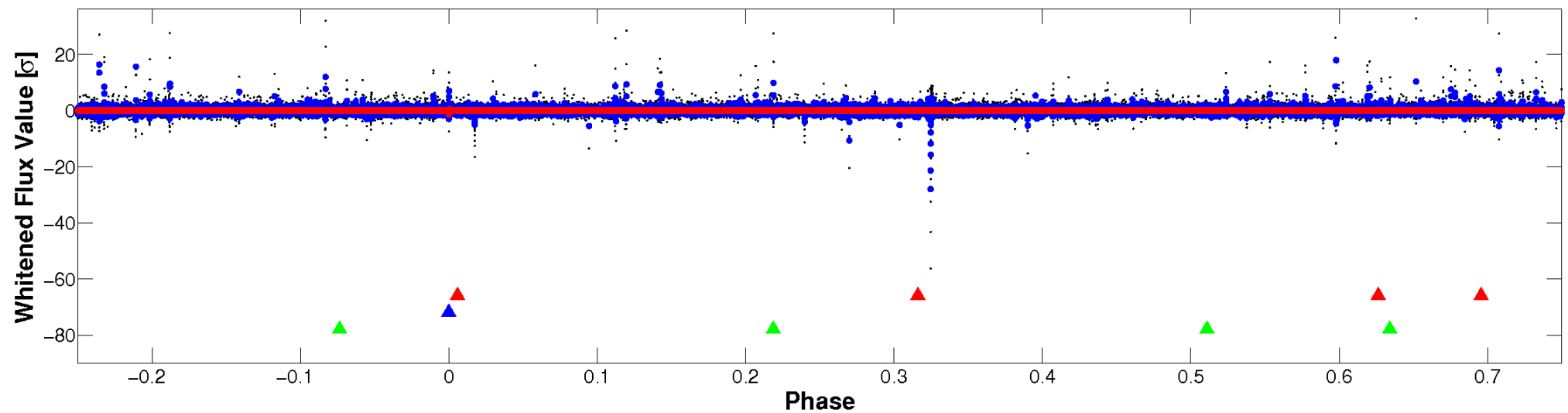


# Non-Whitened Vs. Whitened Light Curve

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

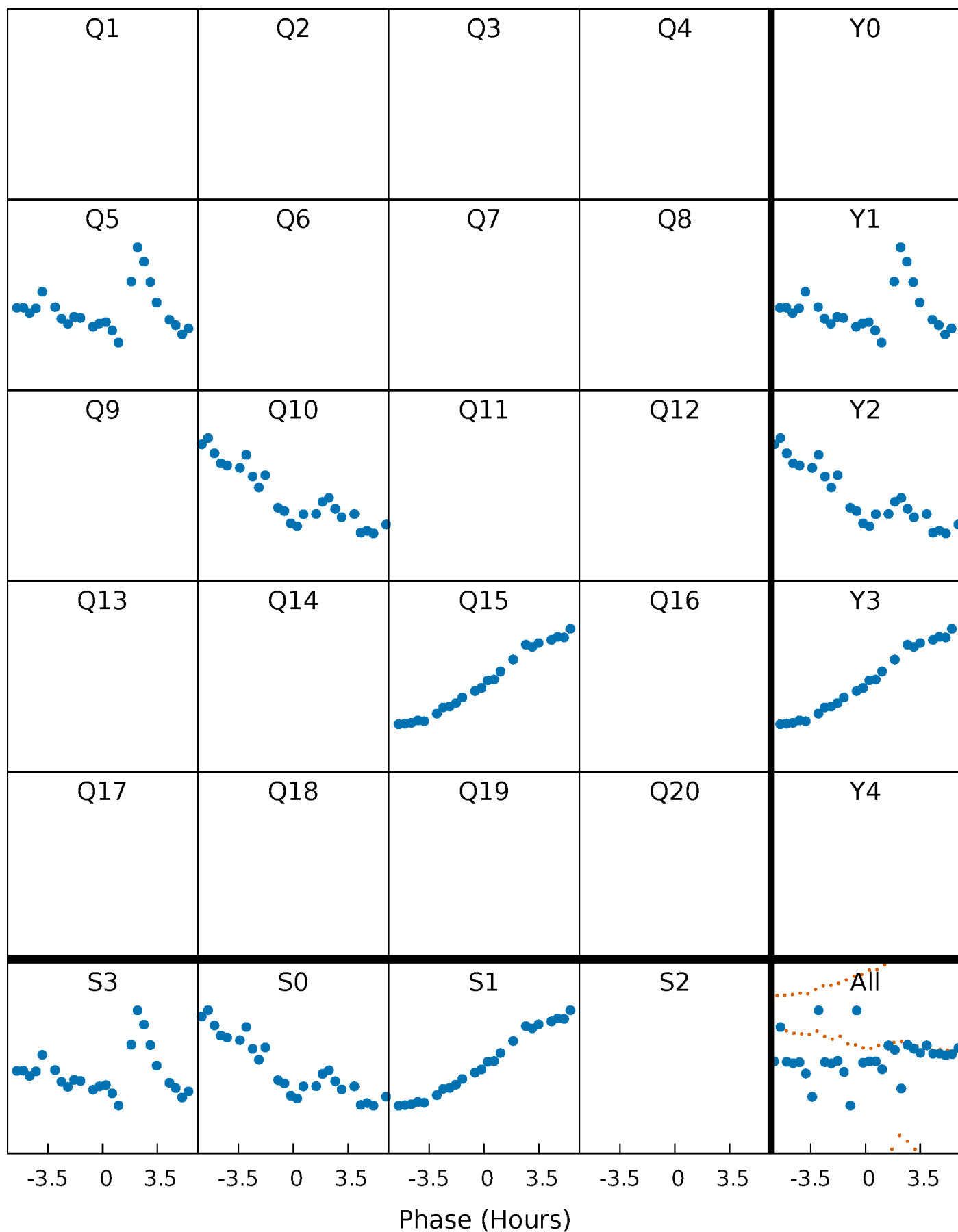


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



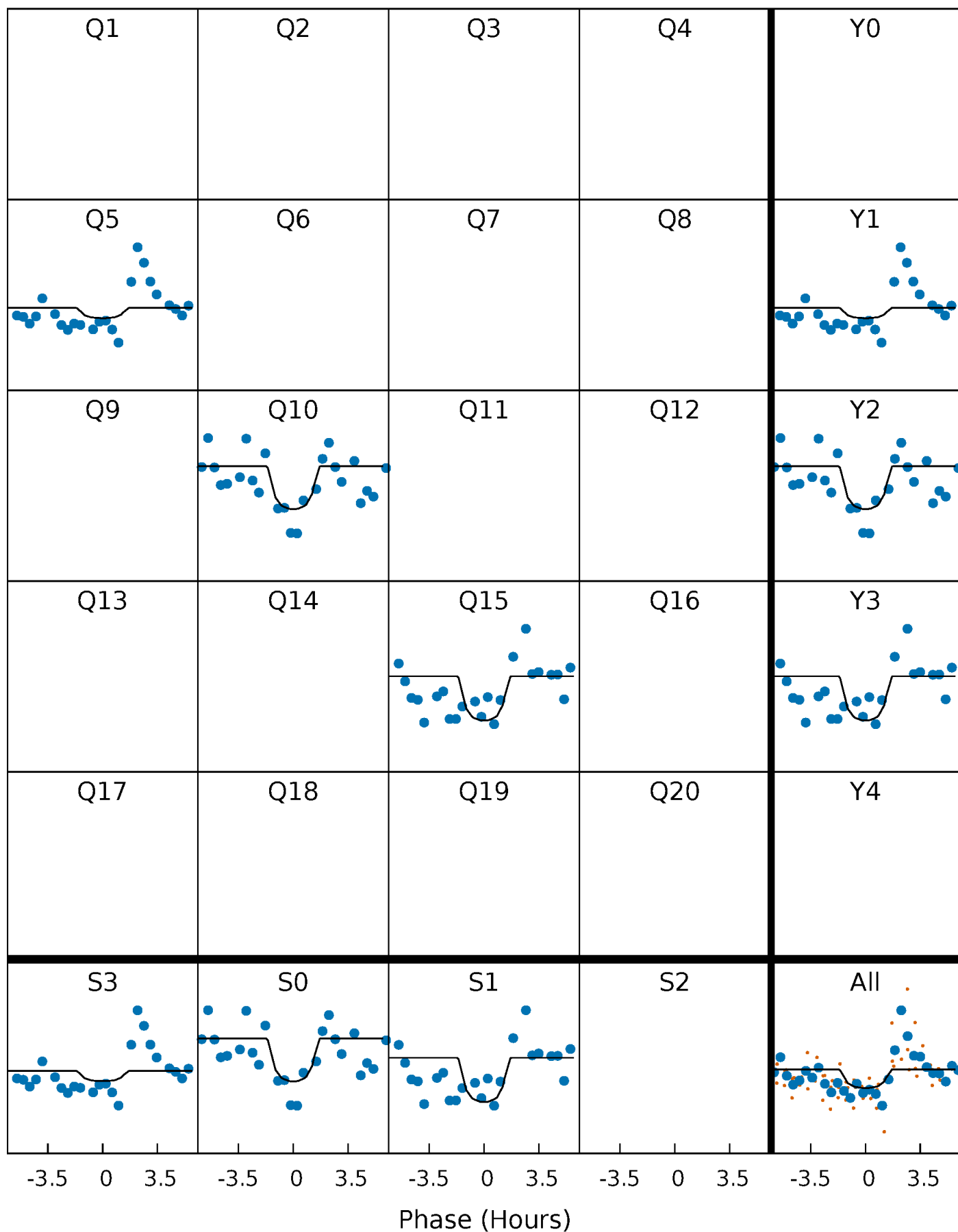
# PDC Quarter-Phased Transit Curves

TCE 004951599-02 P=497.128297 Days  $T_0=468.124568$  (BKJD)



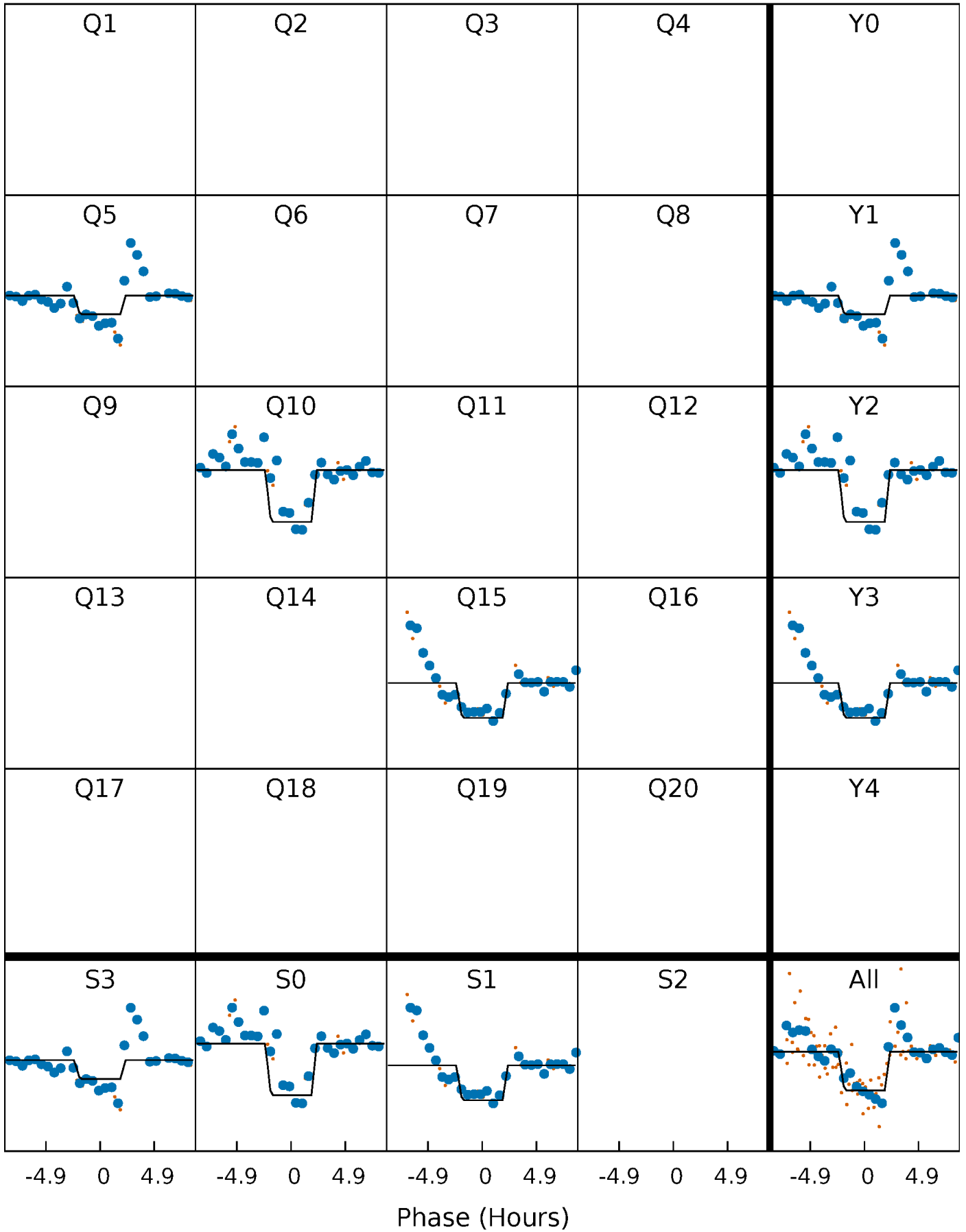
# DV Quarter-Phased Transit Curves

TCE 004951599-02     $P=497.128297$  Days     $T_0=468.124568$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

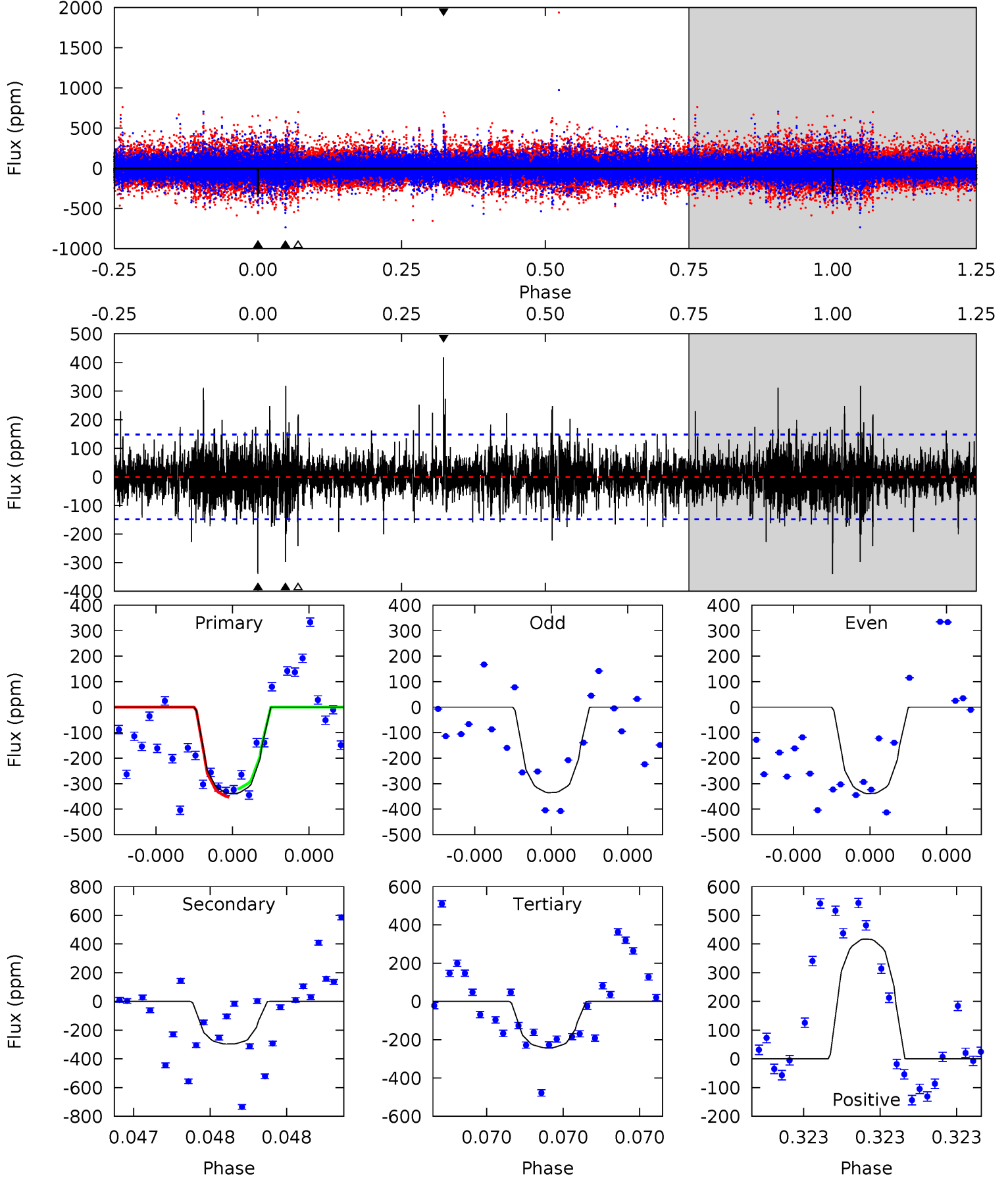
TCE 004951599-02     $P=497.134892$  Days     $T_0=468.097932$  (BKJD)



# DV Model-Shift Uniqueness Test

004951599-02, P = 497.128297 Days, E = 468.124568 Days

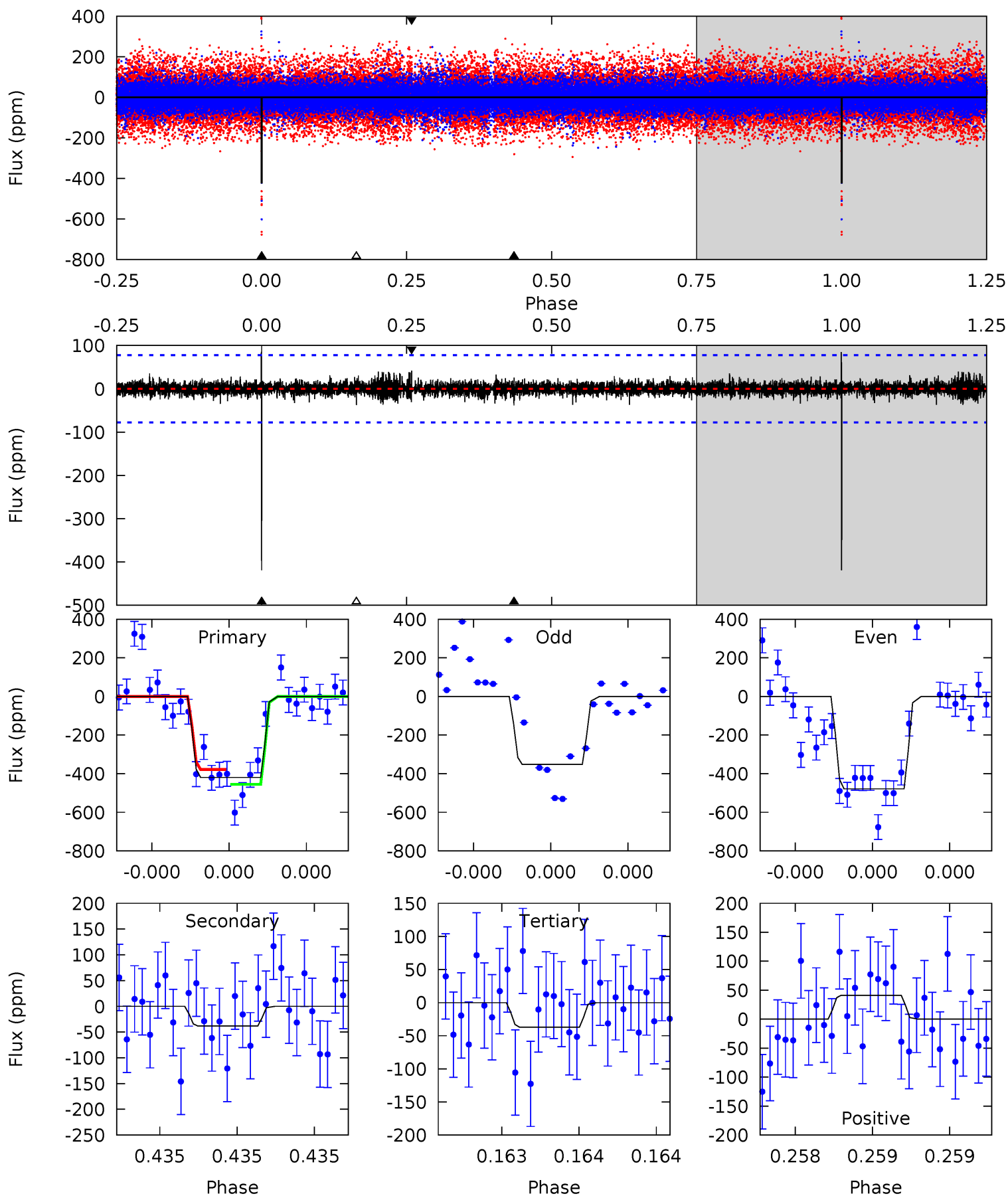
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
13.0	11.4	9.26	16.0	5.67	3.63	1.74	3.70	-3.03	2.11	-4.62	0.06	1.10	0.55	0.63



# Alt Model-Shift Uniqueness Test

004951599-02, P = 497.134892 Days, E = 468.097932 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
30.3	2.76	2.67	2.99	5.63	3.56	0.56	27.7	27.3	0.09	-0.24	4.52	1.23	0.17	0





### Stellar Parameters For KIC 004951599

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$4845^{+132}_{-120}$	$3.841^{+0.735}_{-0.315}$	$0.480^{+0.050}_{-0.250}$	$2.040^{+1.048}_{-1.281}$	$1.053^{+0.192}_{-0.235}$	$0.175^{+2.197}_{-0.112}$
	+3%/-2%	+19%/-8%	+10%/-52%	+51%/-63%	+18%/-22%	+1258%/-64%
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 004951599-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-297 \pm 26$	$5.02^{+6.06}_{-3.37}$	$380^{+54}_{-65}$	$4158^{+2670}_{-793}$	$10173^{+80546}_{-8129}$
Alt.	$-38 \pm 14$	$5.47^{+5.85}_{-3.64}$	$380^{+50}_{-69}$	$2918^{+1183}_{-447}$	$1080^{+7463}_{-864}$

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

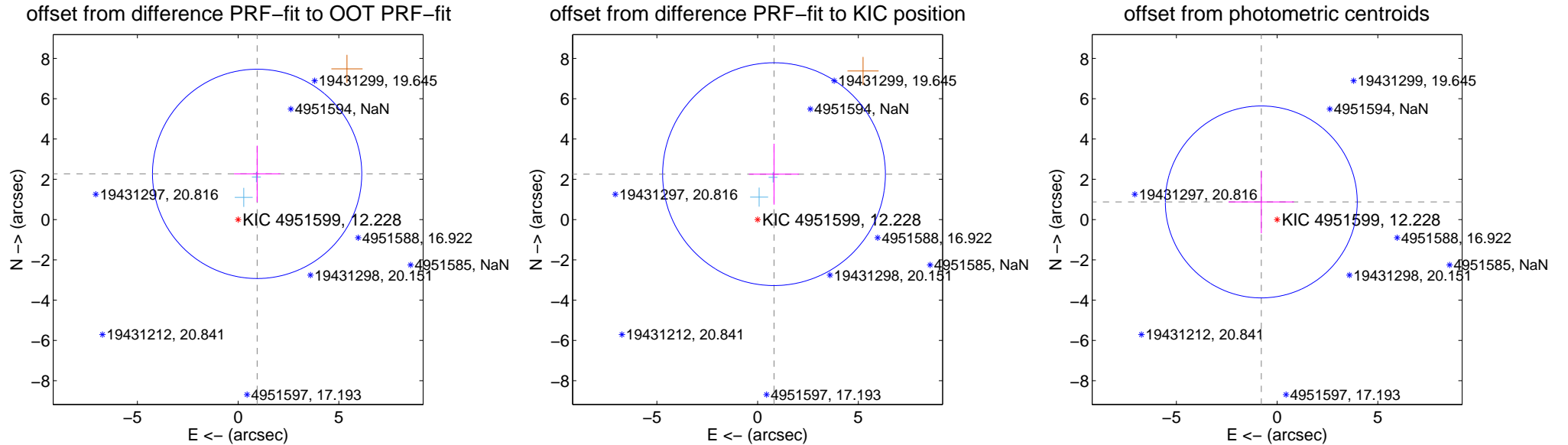
## DV Centroid Data

Supplemental centroid analysis for 004951599-02. Kepler magnitude: 12.23. Transit SNR 4.97

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	$2.458 \pm 1.732$	1.42	$-0.944 \pm 1.146$	$2.270 \pm 1.401$
PRF-fit source offset from KIC position	$2.398 \pm 1.844$	1.30	$-0.814 \pm 1.241$	$2.255 \pm 1.513$
photometric centroid source offset	$1.18 \pm 1.59$	0.74	$0.79 \pm 1.63$	$0.88 \pm 1.55$

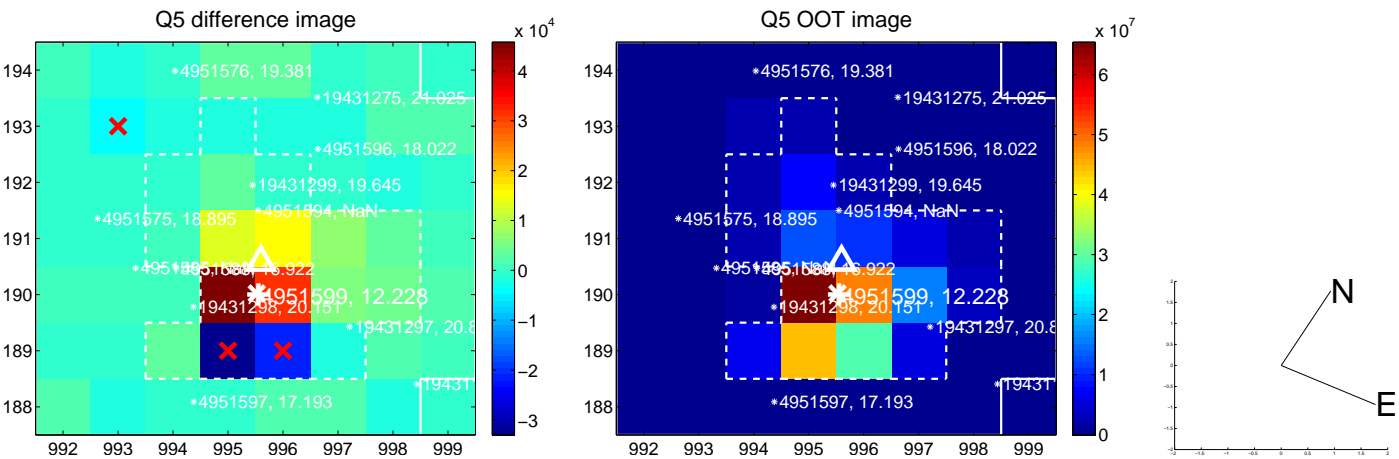


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

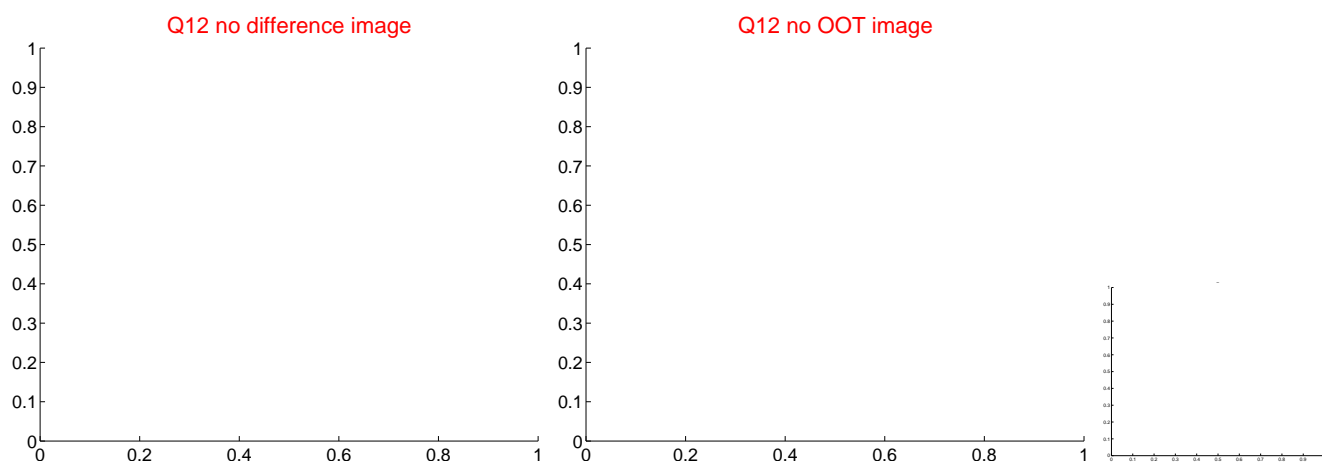
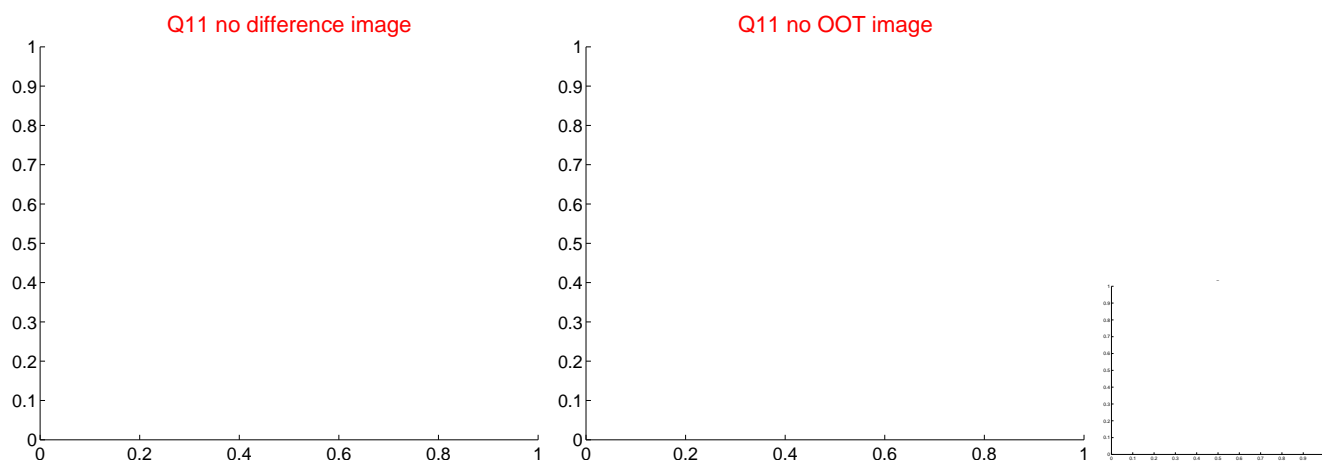
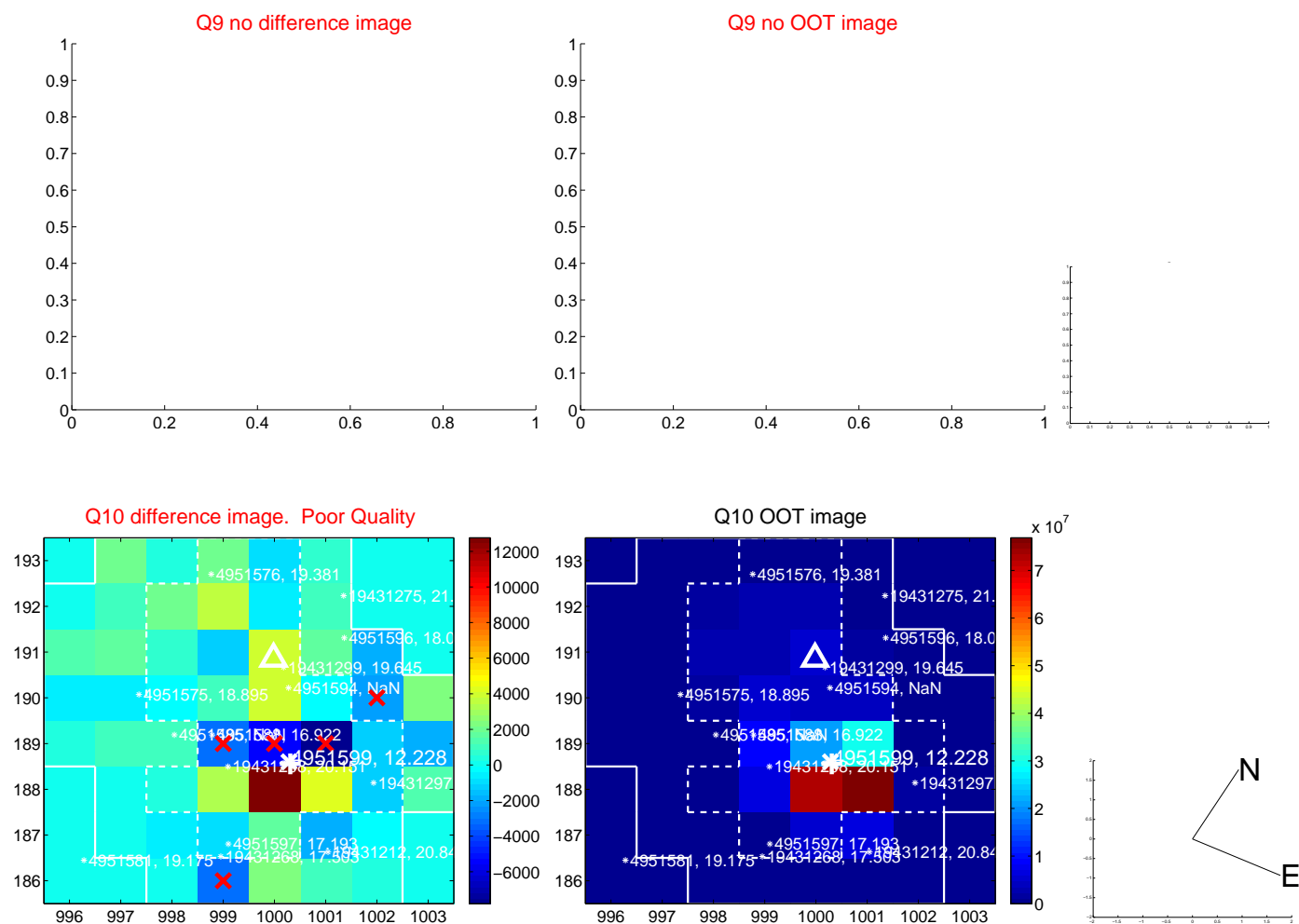
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



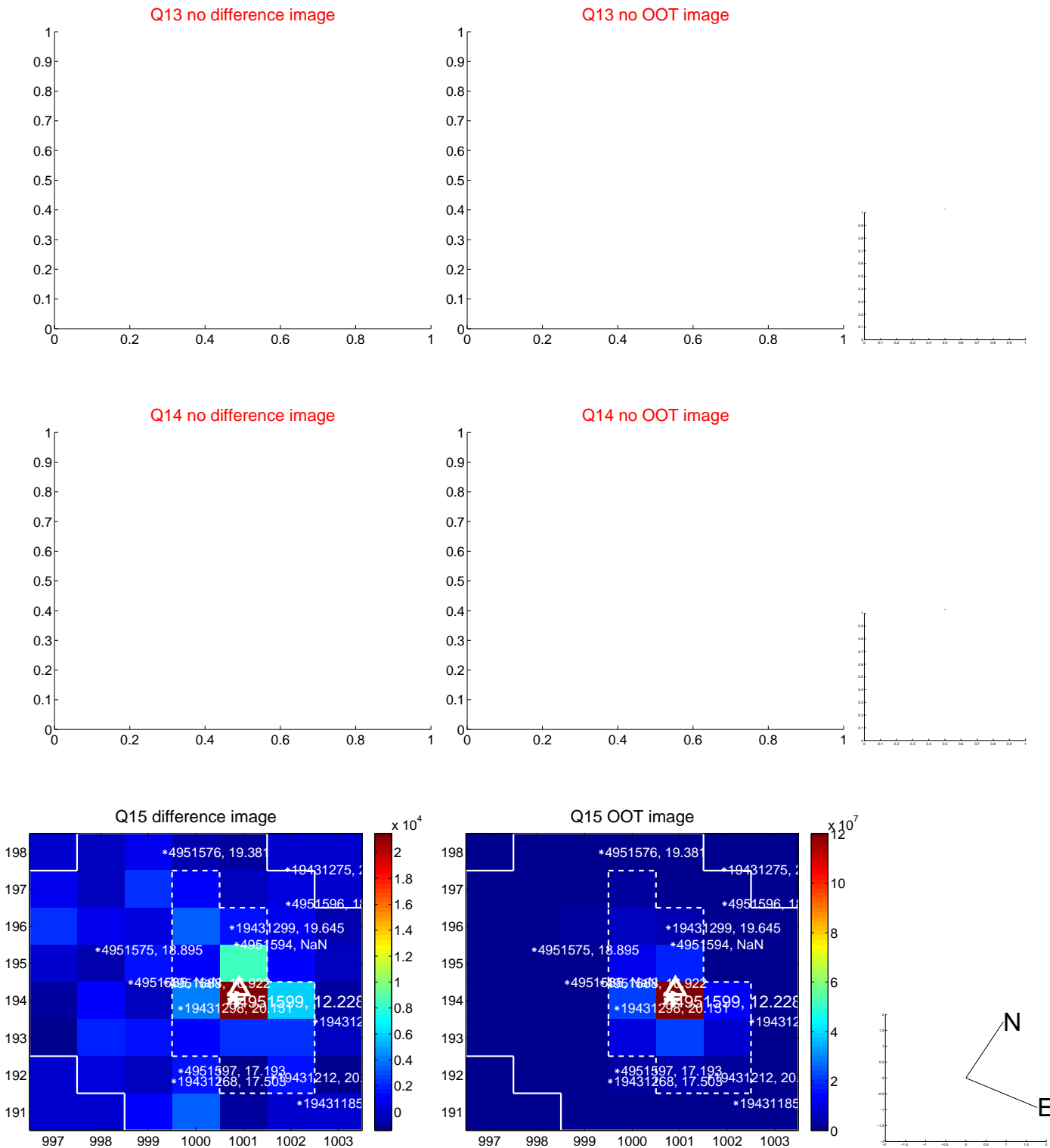
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



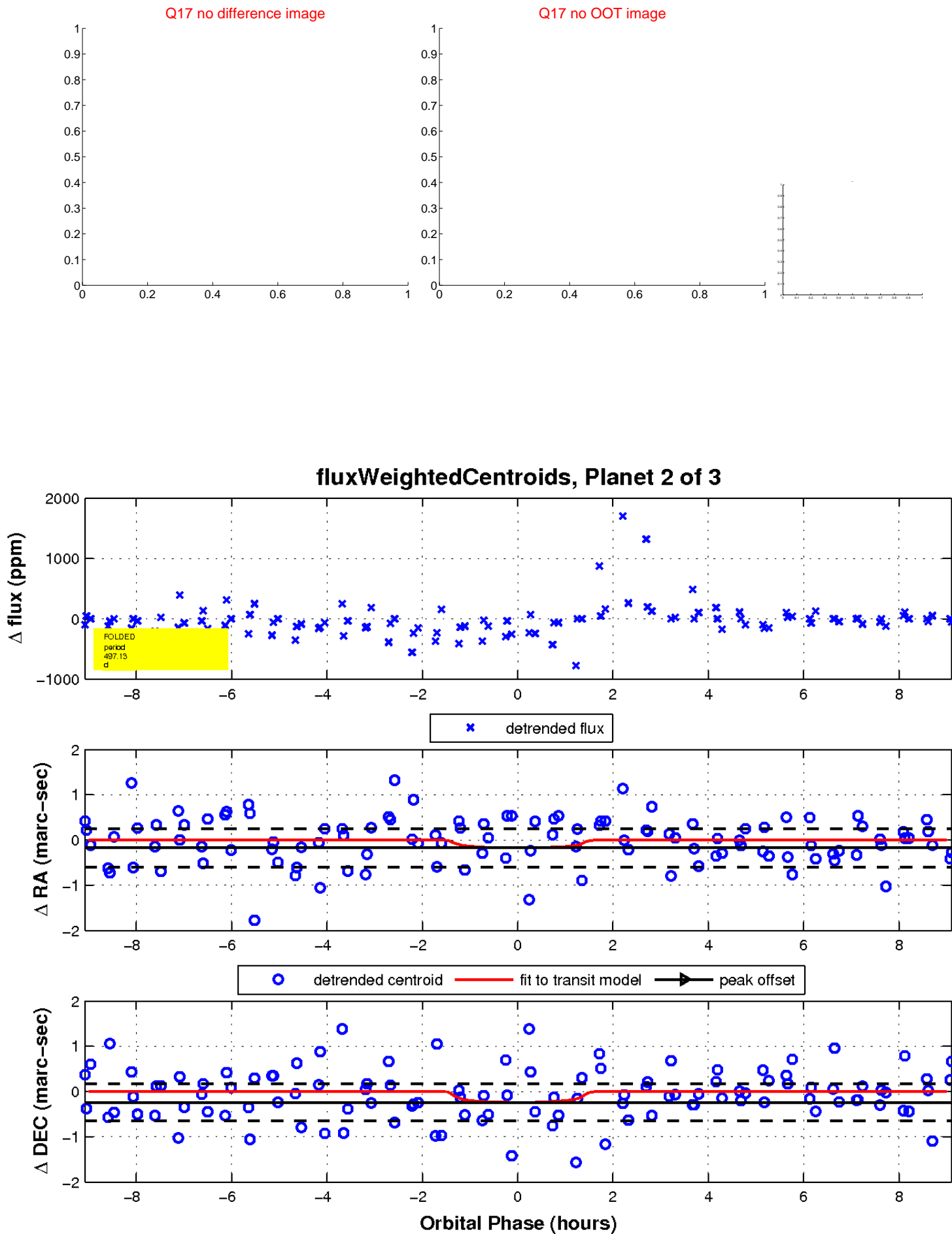
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



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

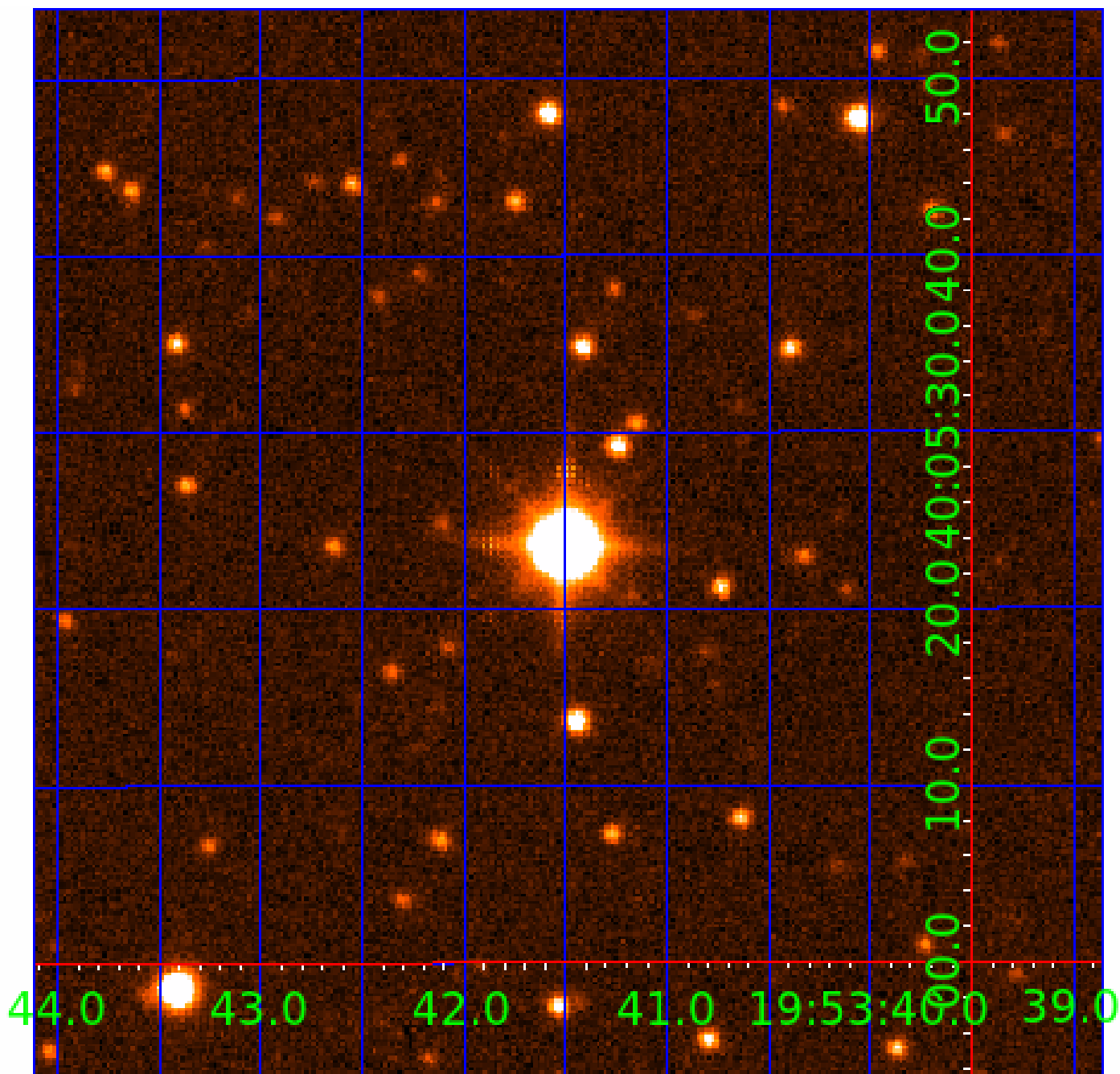


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 004951599

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004951599-01	OBS	No	342.903154	282.373416	263.9	3.344	11.5	6.1	2.04	4845	3.18	2.16
004951599-02	OBS	No	497.128297	468.124568	259.5	3.042	12.4	5.0	2.04	4845	4.05	1.32
004951599-03	OBS	No	351.830027	225.006998	339.7	3.357	8.5	6.6	2.04	4845	3.66	2.09

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004951599-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_TER_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004951599-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004951599-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS

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

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

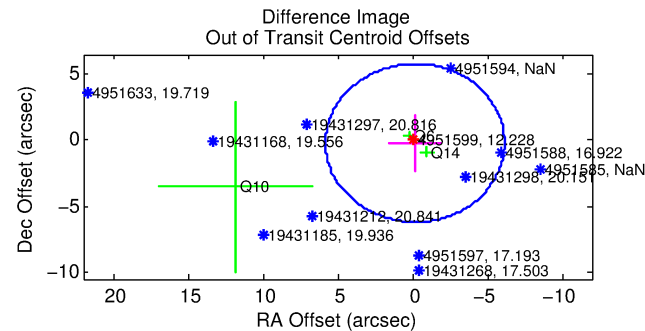
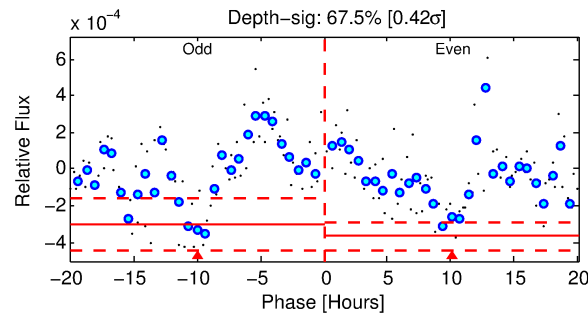
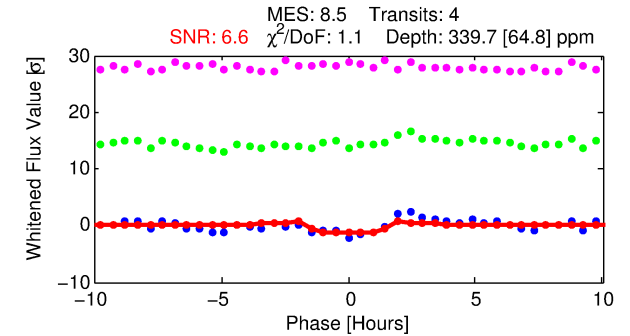
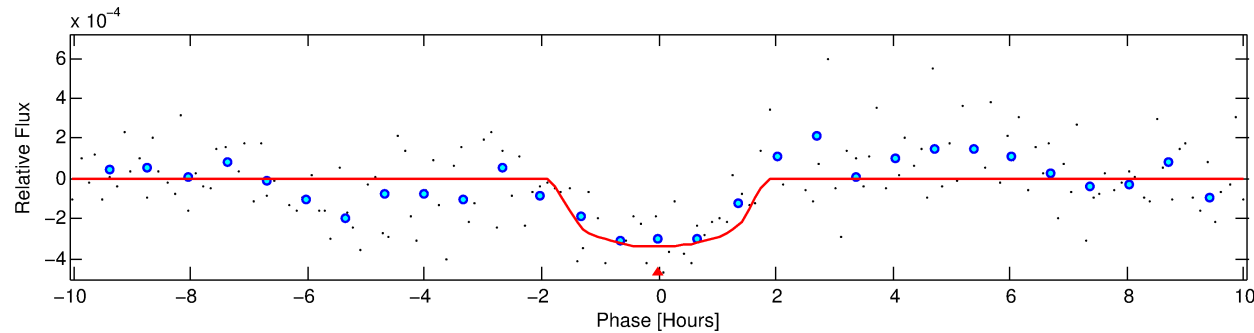
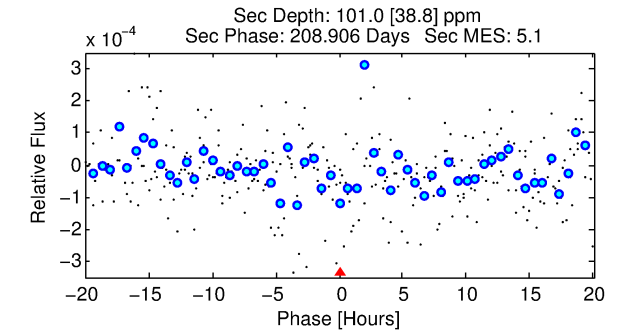
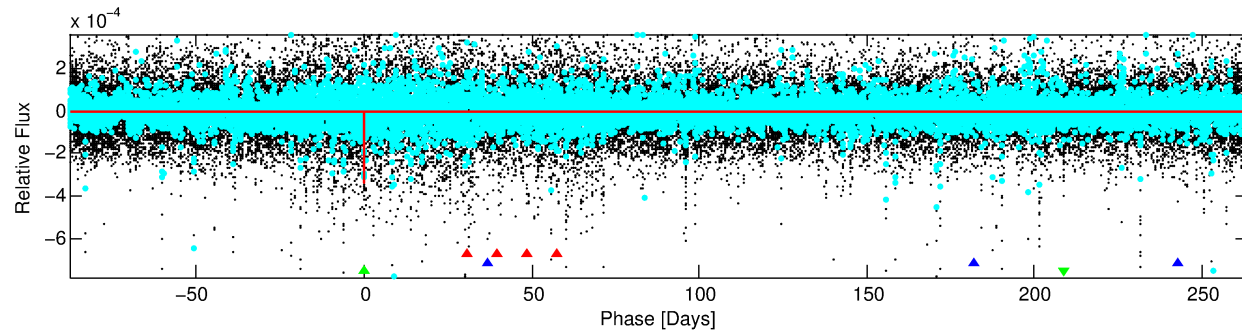
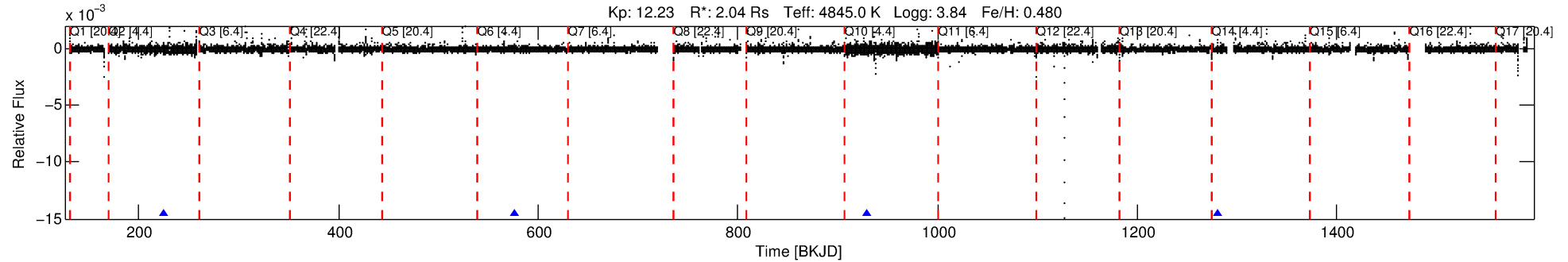
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 004951599-03

No Significant Match Found

# DV One-Page Summary

KIC: 4951599 Candidate: 3 of 3 Period: 351.830 d



## DV Fit Results:

Period = 351.83003 [0.00344] d  
Epoch = 225.0070 [0.0072] BKJD  
Rp/R\* = 0.0164 [0.0308]  
a/R\* = 776.77 [4437.38]  
b = 0.30 [17.52]  
Seff = 2.09 [2.52]  
Teq = 306 [93] K  
Rp = 3.66 [7.23] Re  
a = 0.9924 [0.6971] AU  
Ag = 4086.59 [16162.42] [0.25 $\sigma$ ]  
Teff = 3788 [3570] K [0.98 $\sigma$ ]

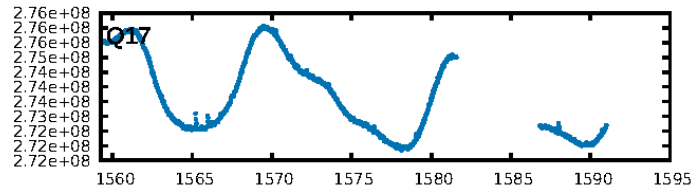
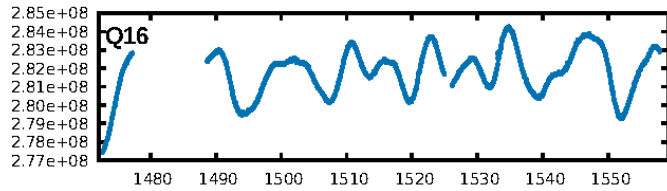
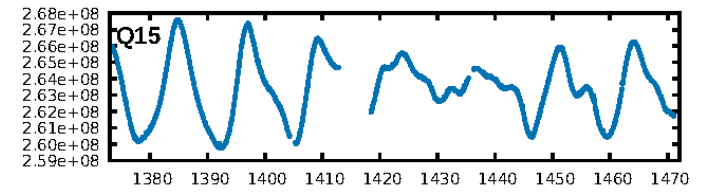
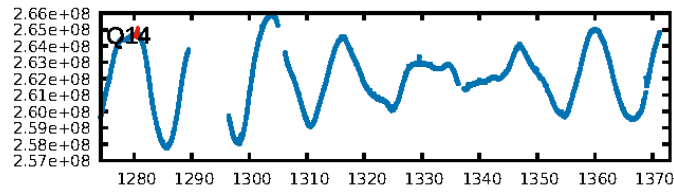
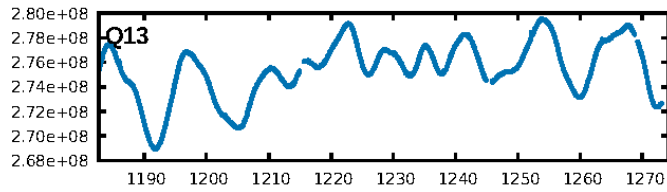
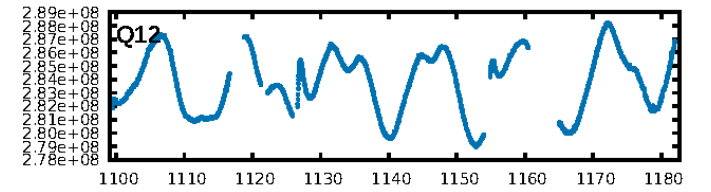
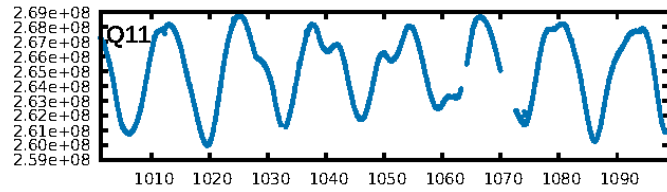
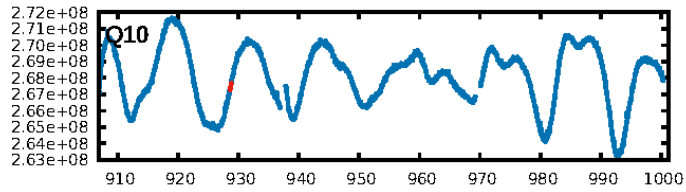
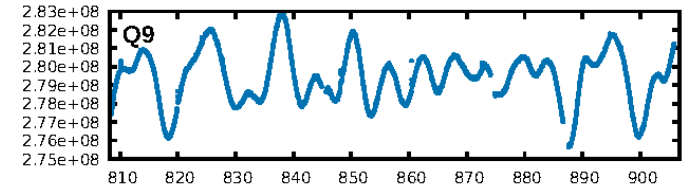
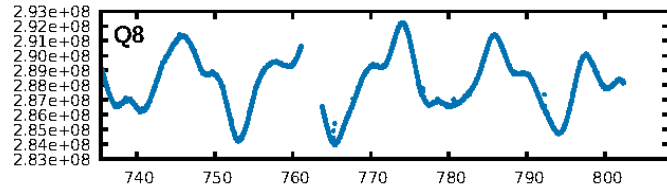
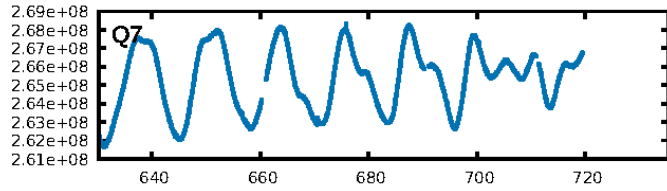
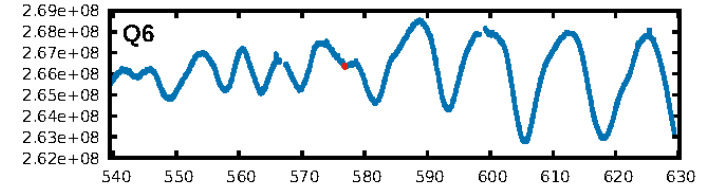
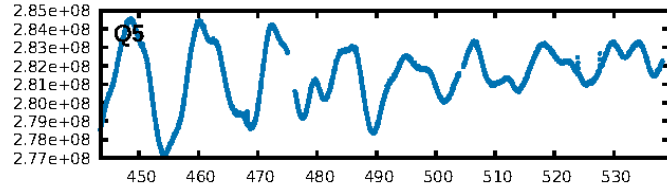
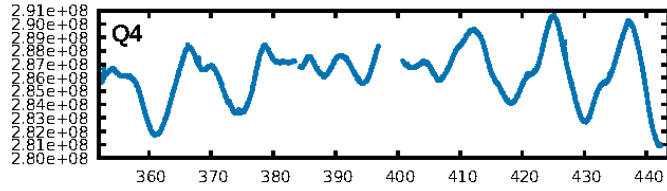
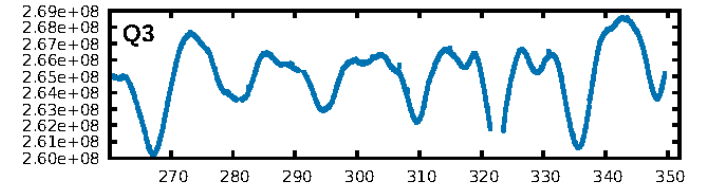
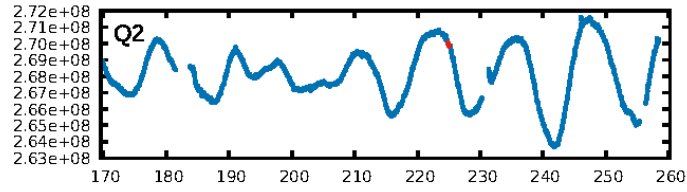
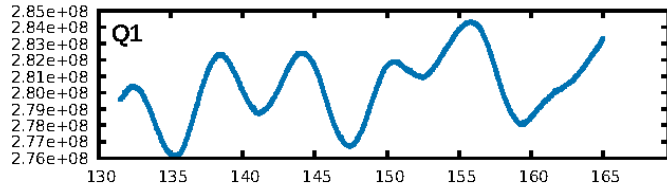
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [45.21 $\sigma$ ]  
LongPeriod-sig: 100.0% [769.71 $\sigma$ ]  
ModelChiSquare2-sig: 22.2%  
ModelChiSquareGof-sig: 77.3%  
**Bootstrap-pfa: 4.72e-06**  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: -2.513  
Centroid-sig: 8.7%  
Centroid-so: 1.596 arcsec [1.37 $\sigma$ ]  
OotOffset-rm: 0.267 arcsec [0.13 $\sigma$ ]  
KicOffset-rm: 0.268 arcsec [0.12 $\sigma$ ]  
OotOffset-st: 3/0/0/0 [3]  
KicOffset-st: 3/0/0/0 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 1.00 [4/4]

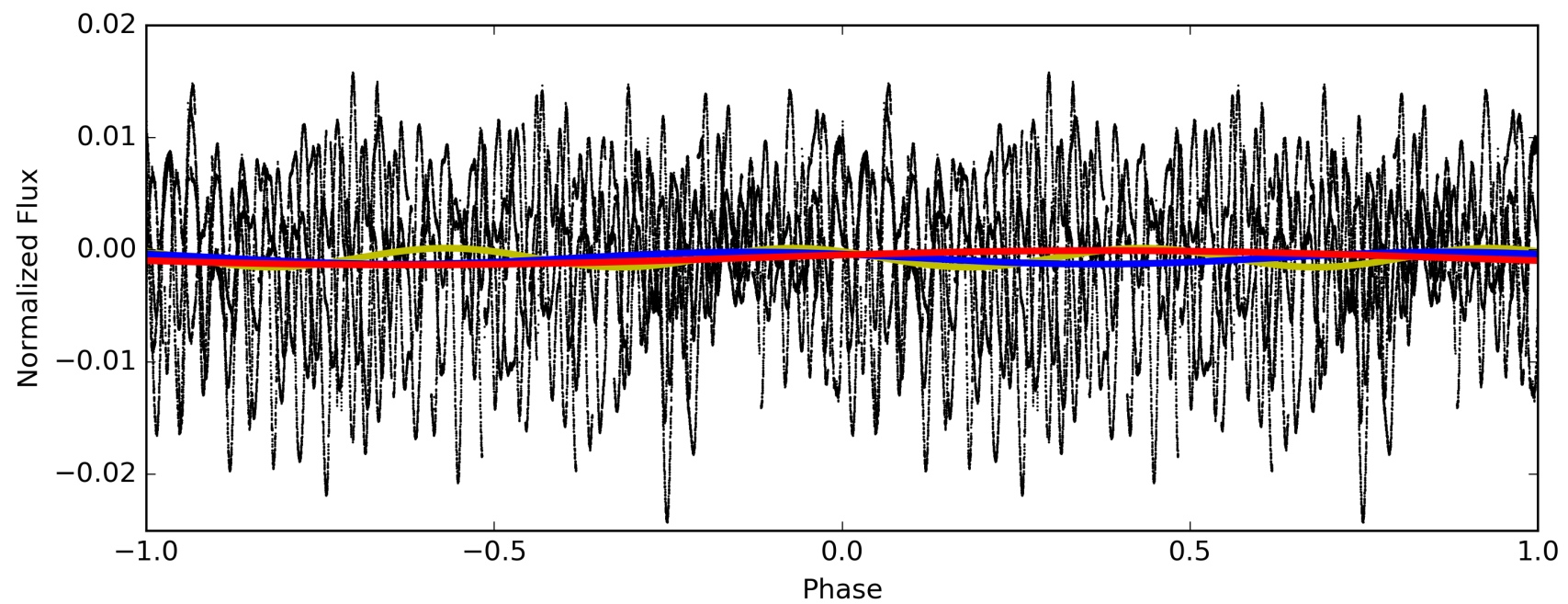
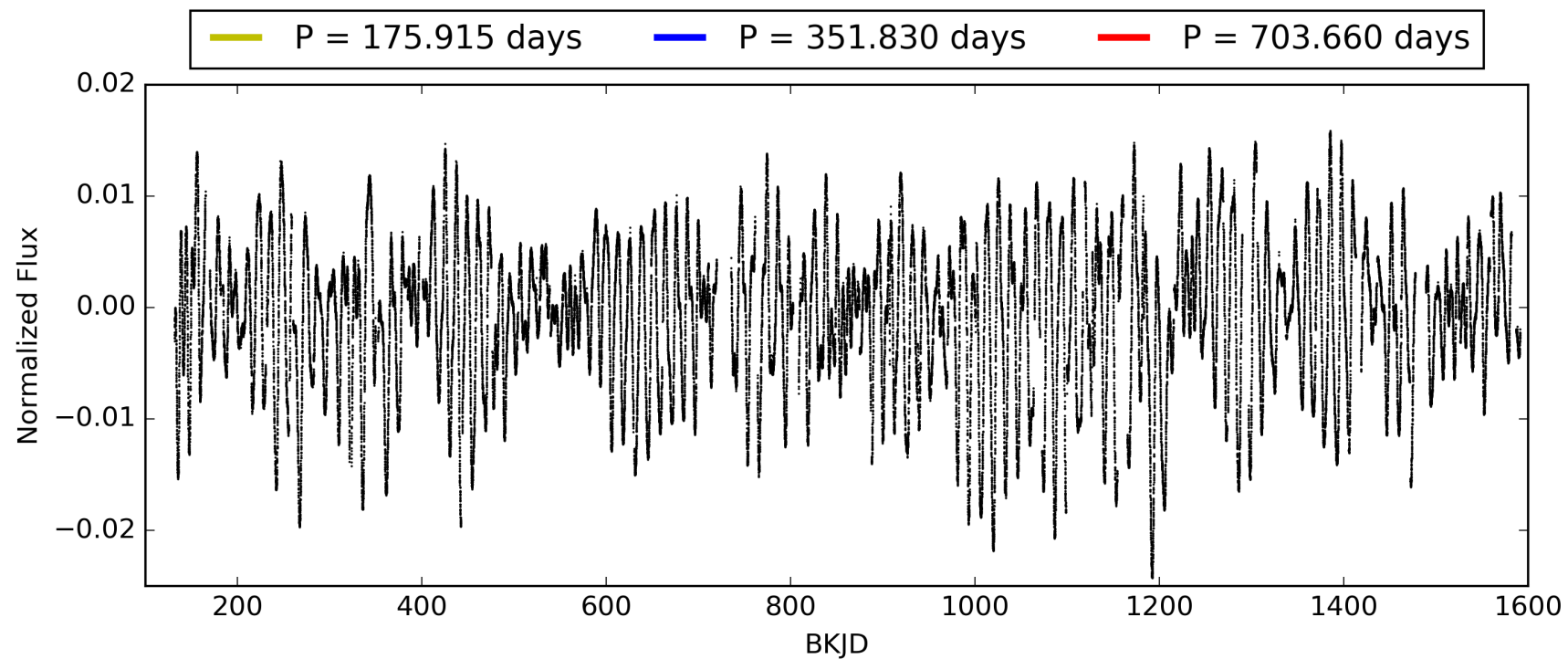
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 10:34:09 Z

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

# TCE 004951599-03, PDC Light Curves

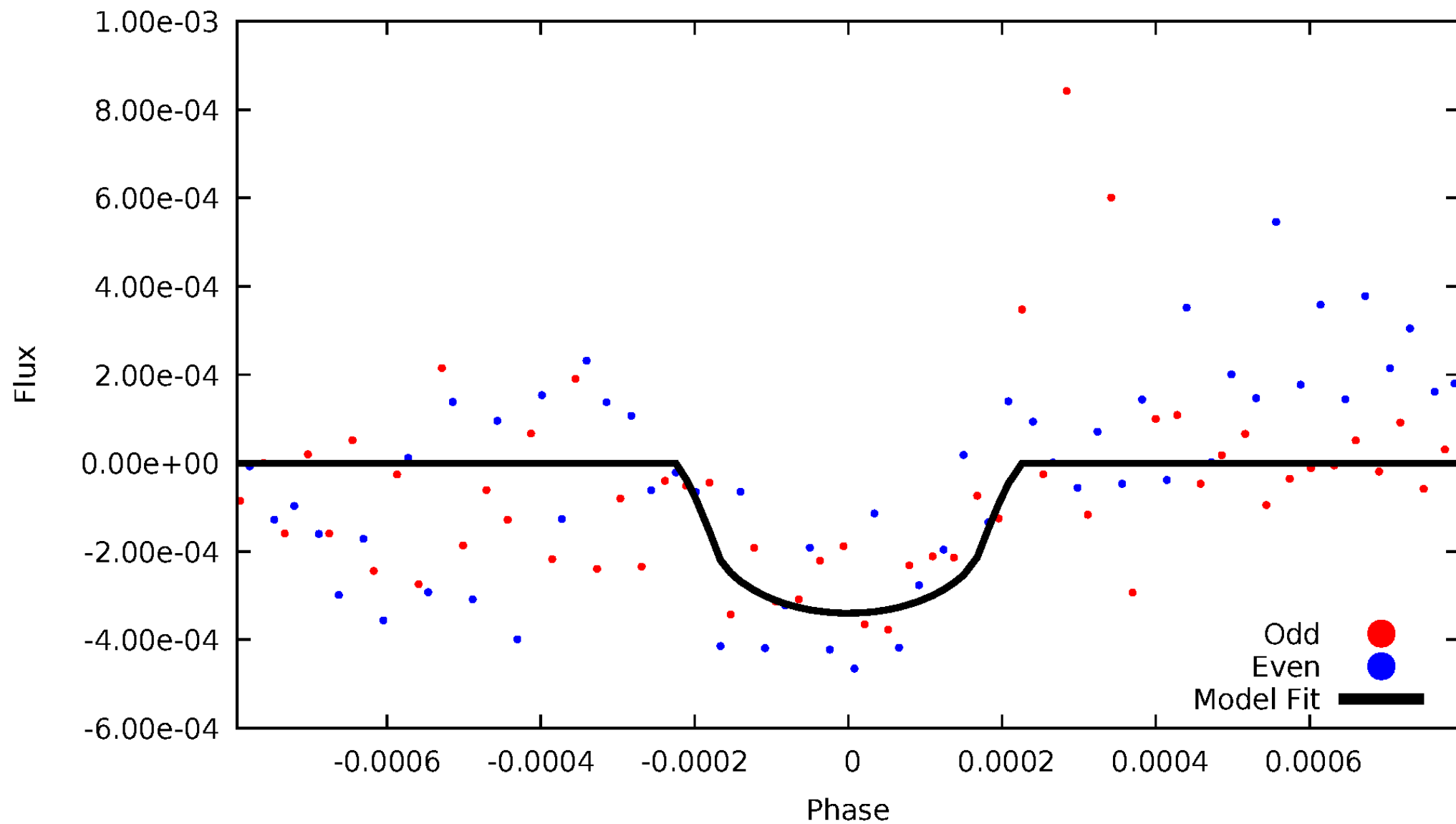


TCE 004951599-03



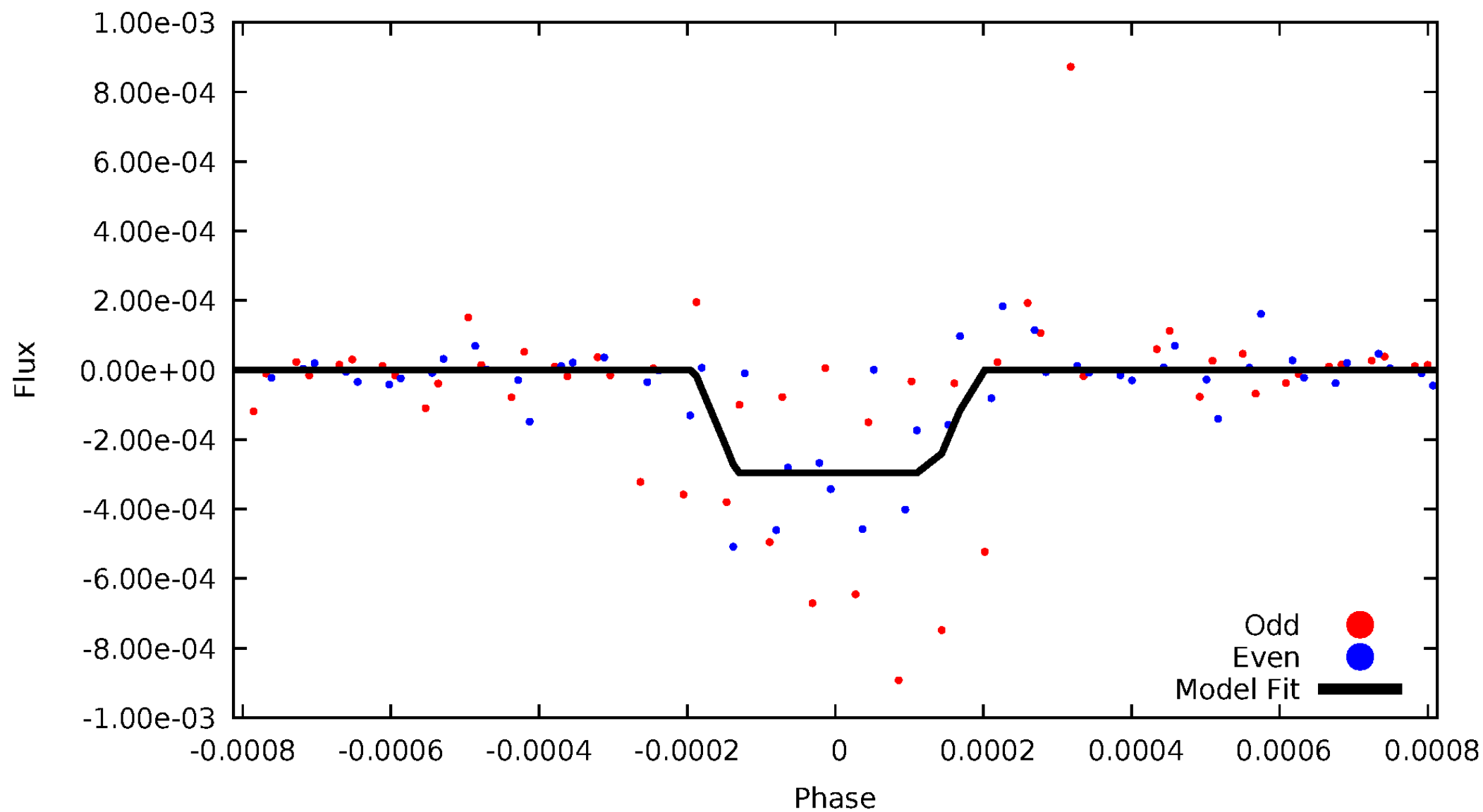
# DV Odd/Even

TCE 004951599-03



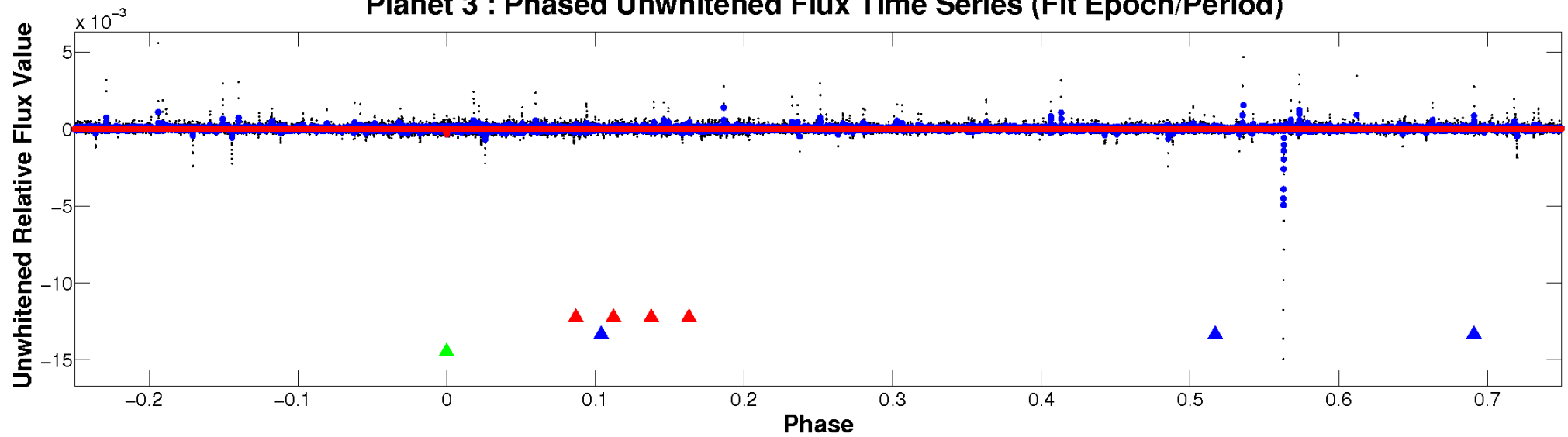
# ALT Odd/Even

TCE 004951599-03

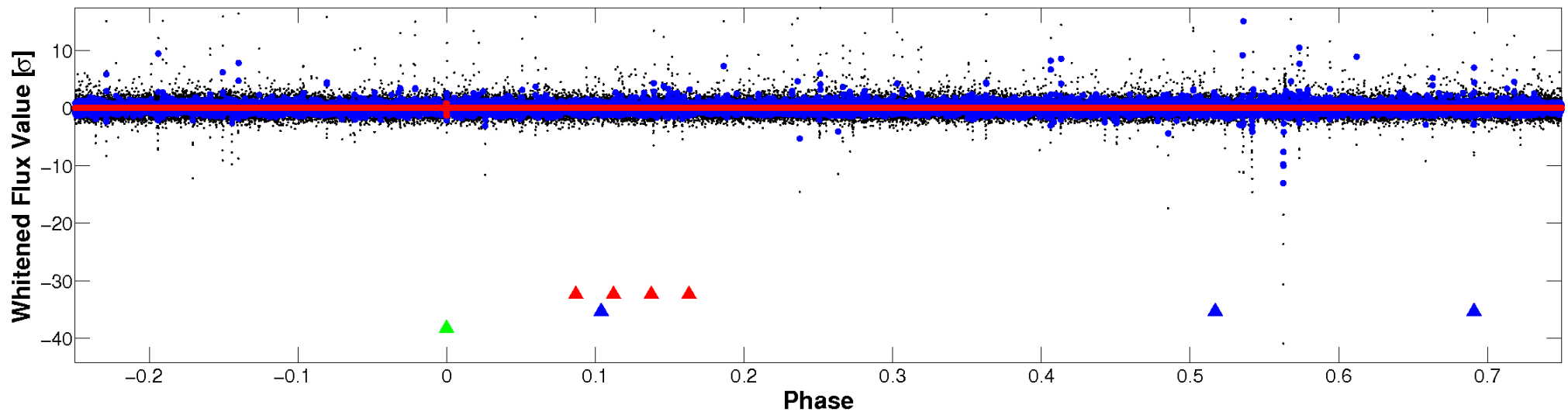


# Non-Whitened Vs. Whitened Light Curve

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

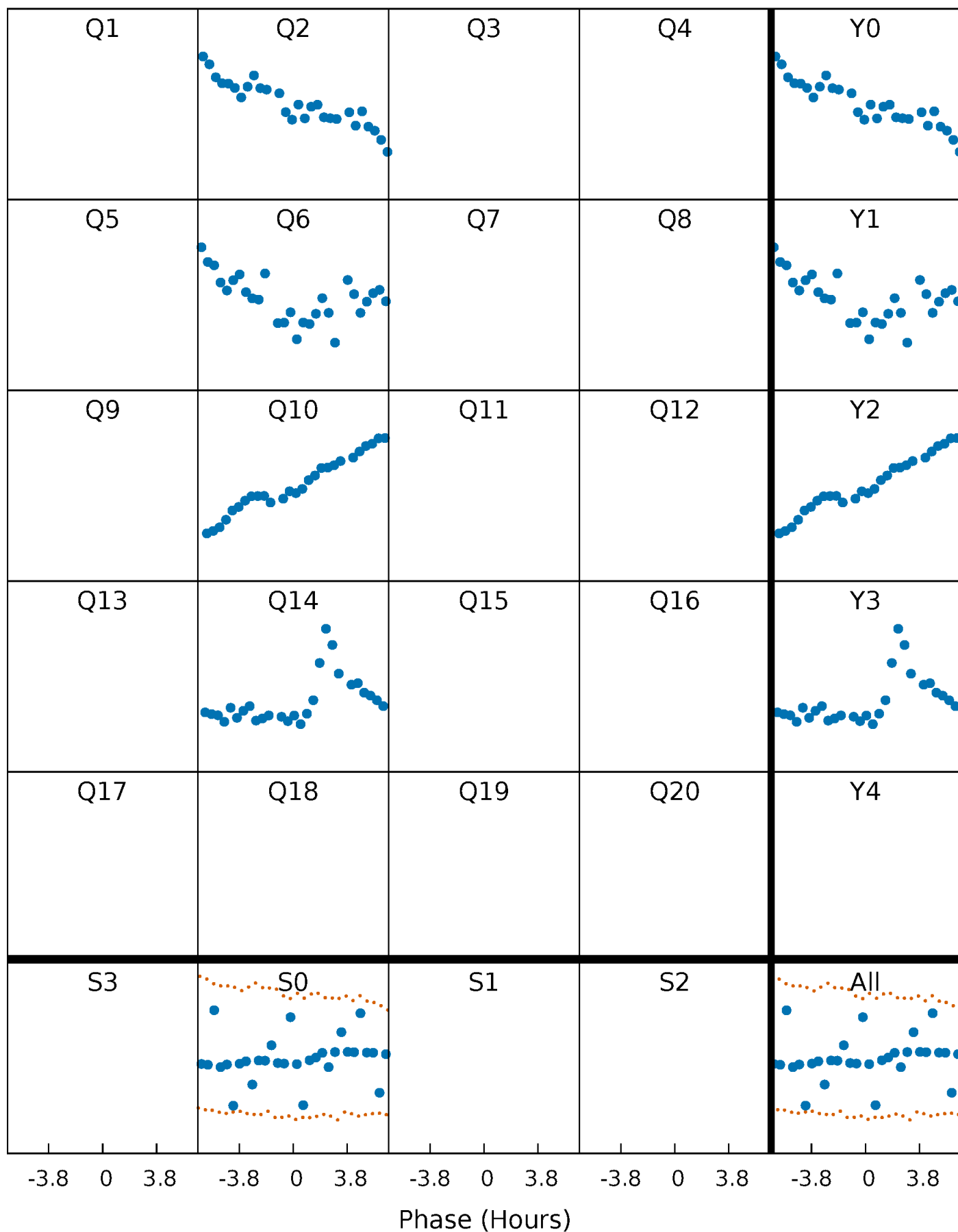


## Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

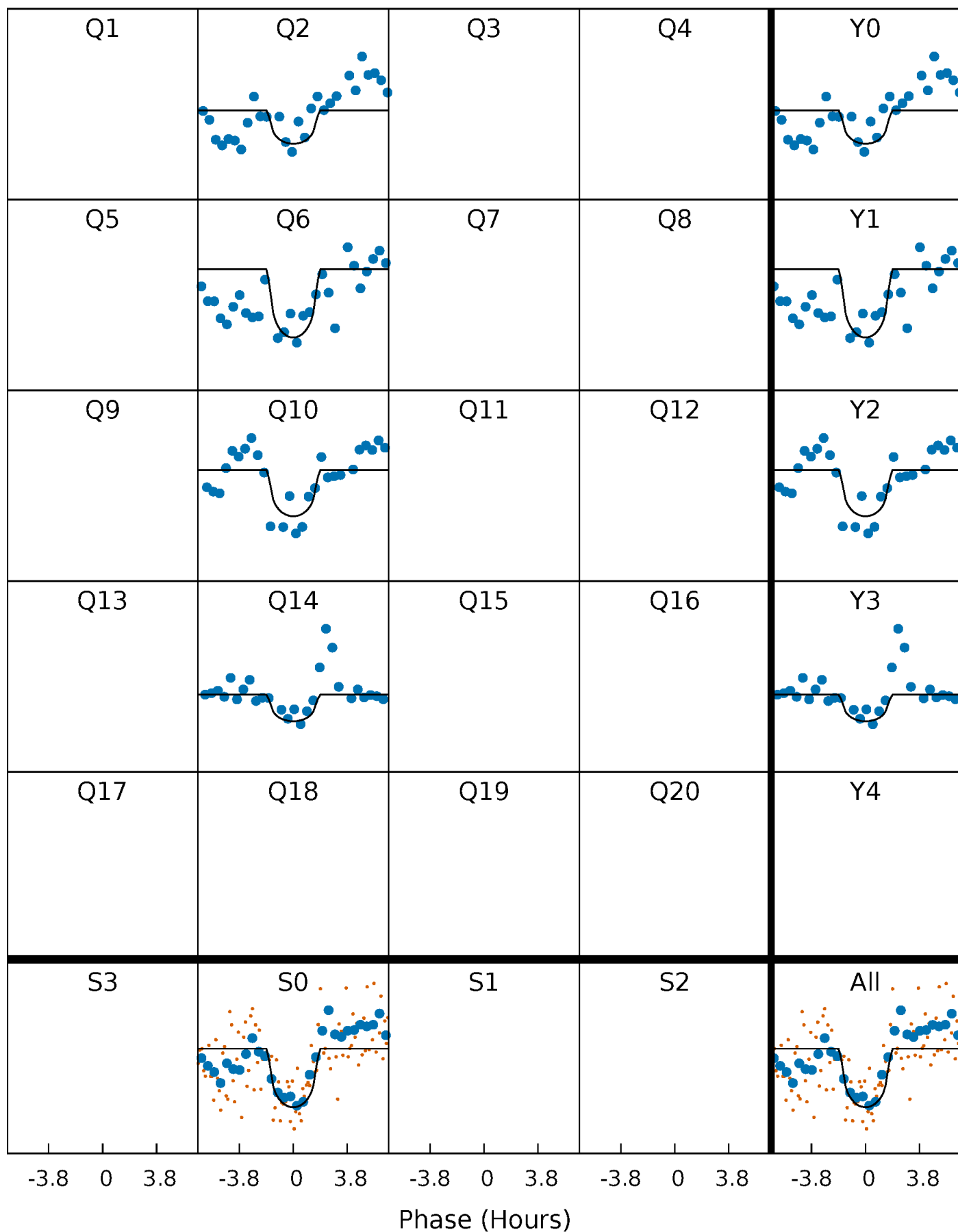
TCE 004951599-03 P=351.830027 Days  $T_0=225.006998$  (BKJD)





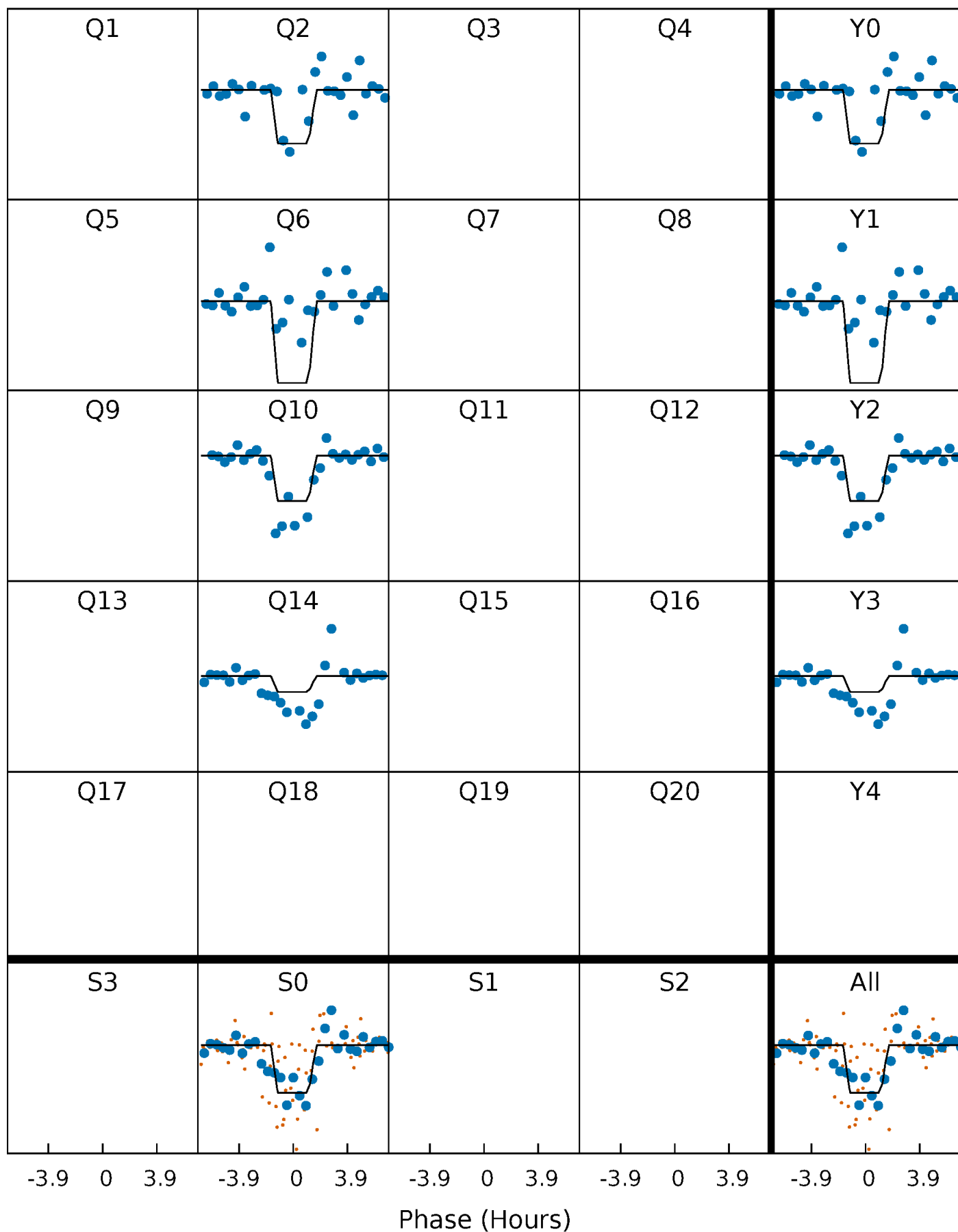
# DV Quarter-Phased Transit Curves

TCE 004951599-03 P=351.830027 Days  $T_0=225.006998$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

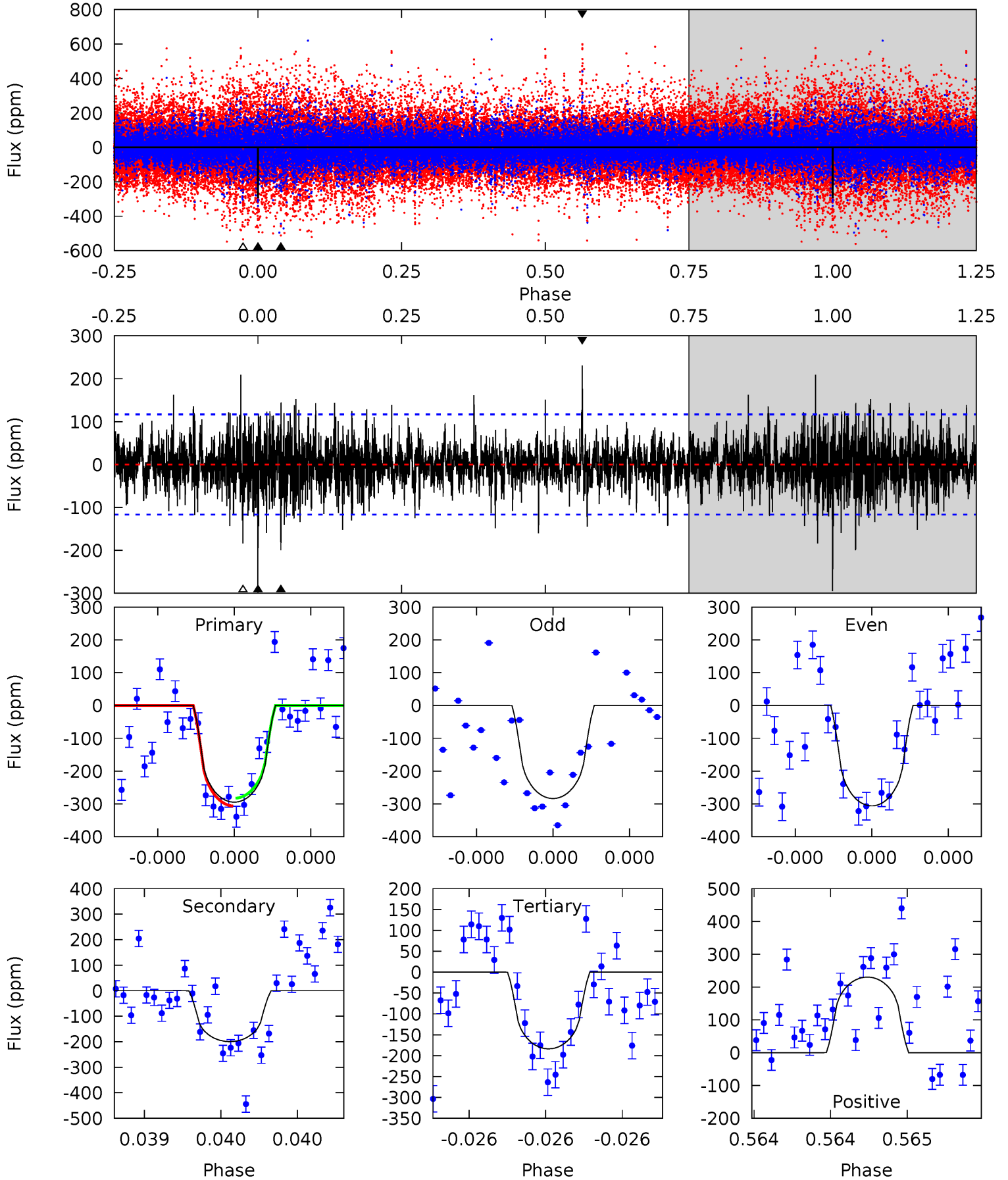
TCE 004951599-03 P=351.828184 Days  $T_0=225.000627$  (BKJD)



# DV Model-Shift Uniqueness Test

004951599-03, P = 351.830027 Days, E = 225.006998 Days

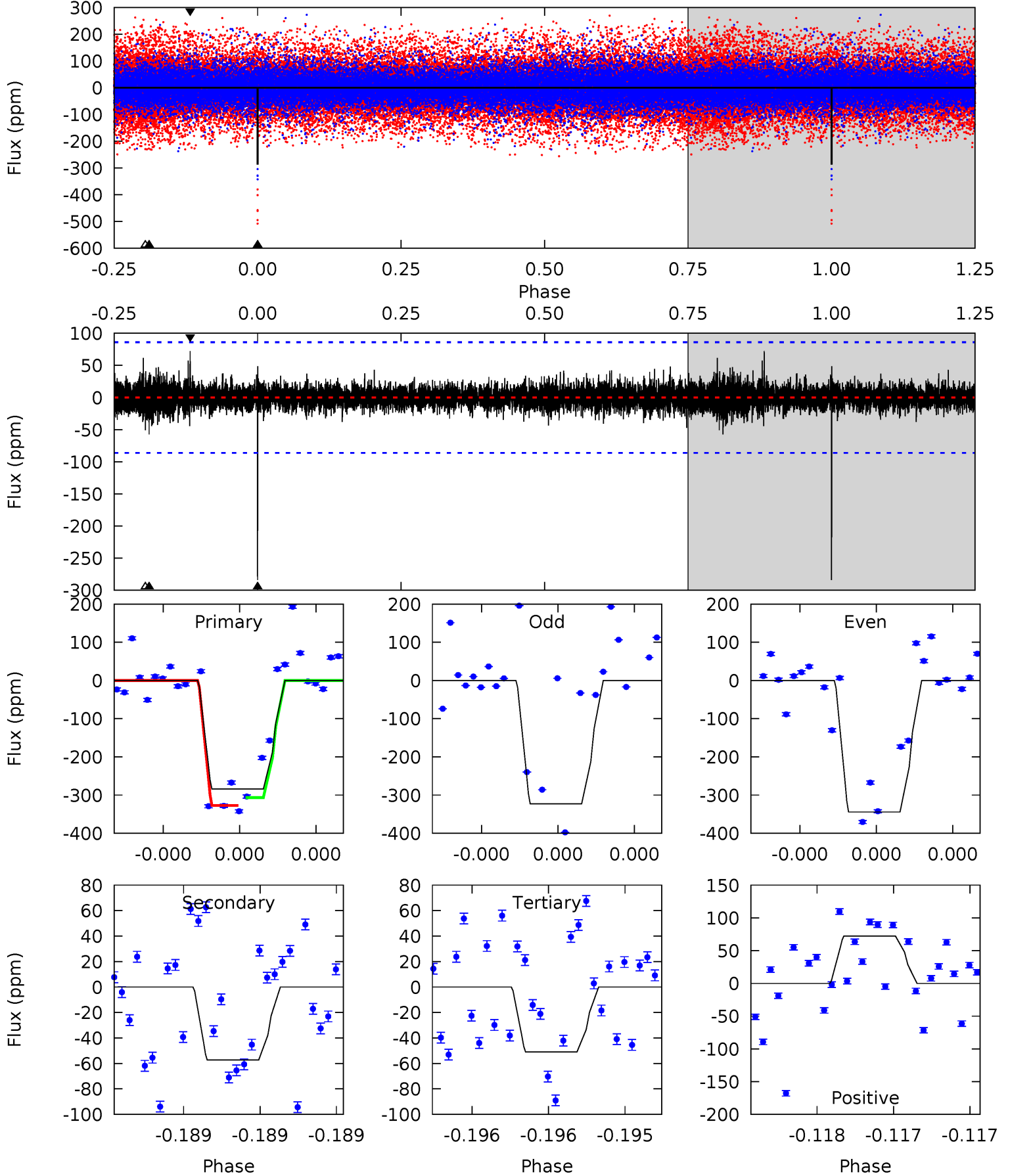
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
14.2	9.58	8.82	11.1	5.60	3.53	1.80	5.34	3.10	0.76	-1.48	0.51	1.04	0.44	0.58



# Alt Model-Shift Uniqueness Test

004951599-03, P = 351.828184 Days, E = 225.000627 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
18.6	3.74	3.33	4.73	5.63	3.57	0.69	15.2	13.8	0.42	-0.98	0.78	1.18	0.20	0.67



### Stellar Parameters For KIC 004951599

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$4845^{+132}_{-120}$	$3.841^{+0.735}_{-0.315}$	$0.480^{+0.050}_{-0.250}$	$2.040^{+1.048}_{-1.281}$	$1.053^{+0.192}_{-0.235}$	$0.175^{+2.197}_{-0.112}$
	+3%/-2%	+19%/-8%	+10%/-52%	+51%/-63%	+18%/-22%	+1258%/-64%
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 004951599-03 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-200 \pm 21$	$5.71^{+6.68}_{-3.90}$	$425^{+61}_{-77}$	$3731^{+2090}_{-714}$	$3482^{+27430}_{-2777}$
Alt.	$-57 \pm 15$	$5.63^{+6.18}_{-3.77}$	$419^{+65}_{-73}$	$3056^{+1211}_{-476}$	$888^{+8448}_{-683}$

$T_{max}$  = 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

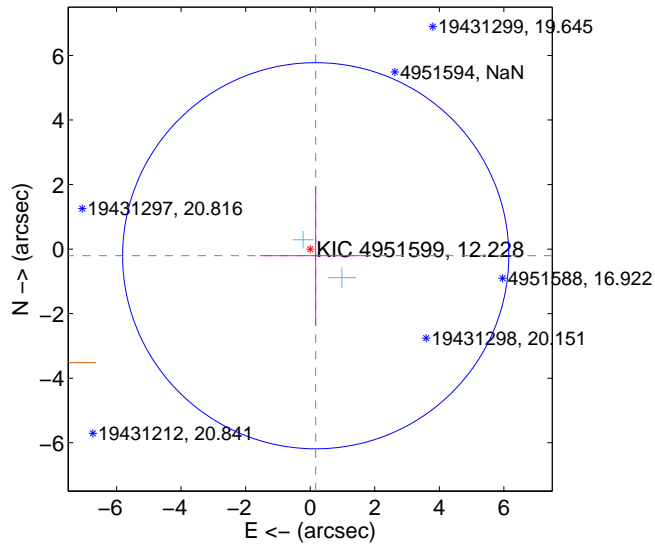
Supplemental centroid analysis for 004951599-03. Kepler magnitude: 12.23. Transit SNR 6.56

There are 2 quarters with good PRF difference image offsets

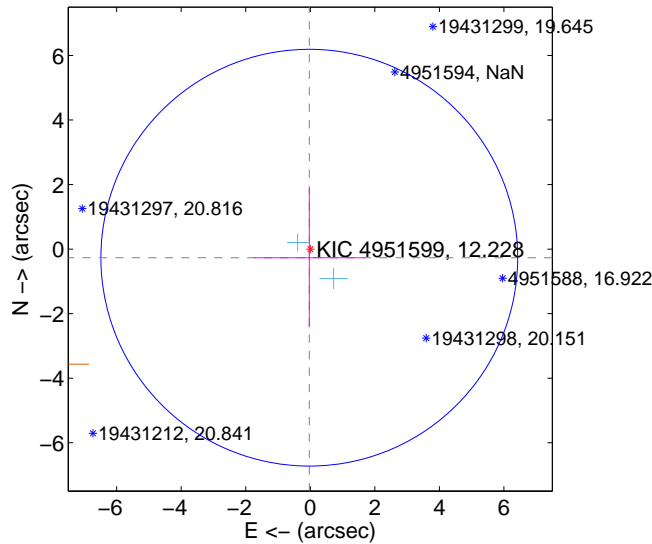
The direct PRF centroid is offset from the target star catalog position by about 0.26 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.267 \pm 1.994$	0.13	$-0.169 \pm 1.725$	$-0.206 \pm 2.157$
PRF-fit source offset from KIC position	$0.268 \pm 2.152$	0.12	$0.031 \pm 1.725$	$-0.266 \pm 2.157$
photometric centroid source offset	$1.60 \pm 1.17$	1.37	$1.46 \pm 1.20$	$-0.65 \pm 1.02$

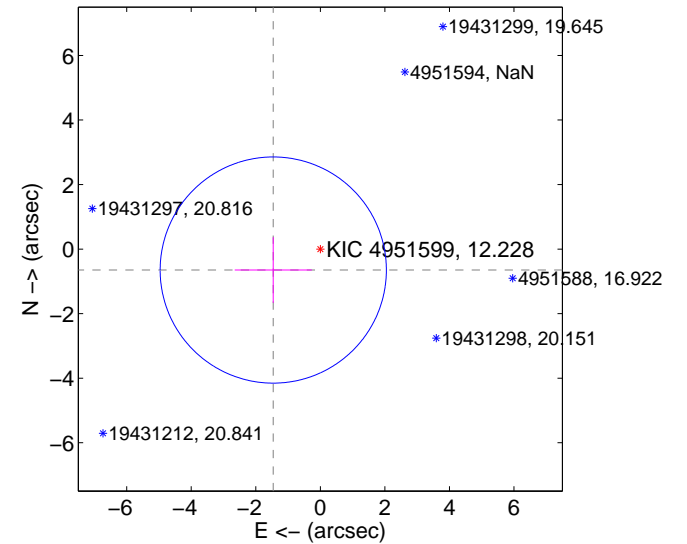
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

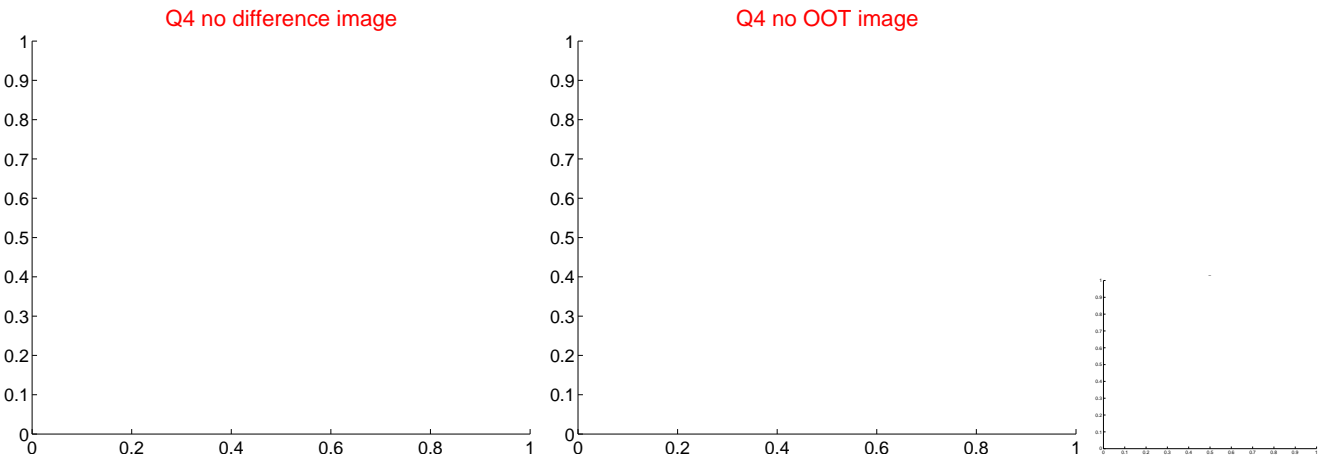
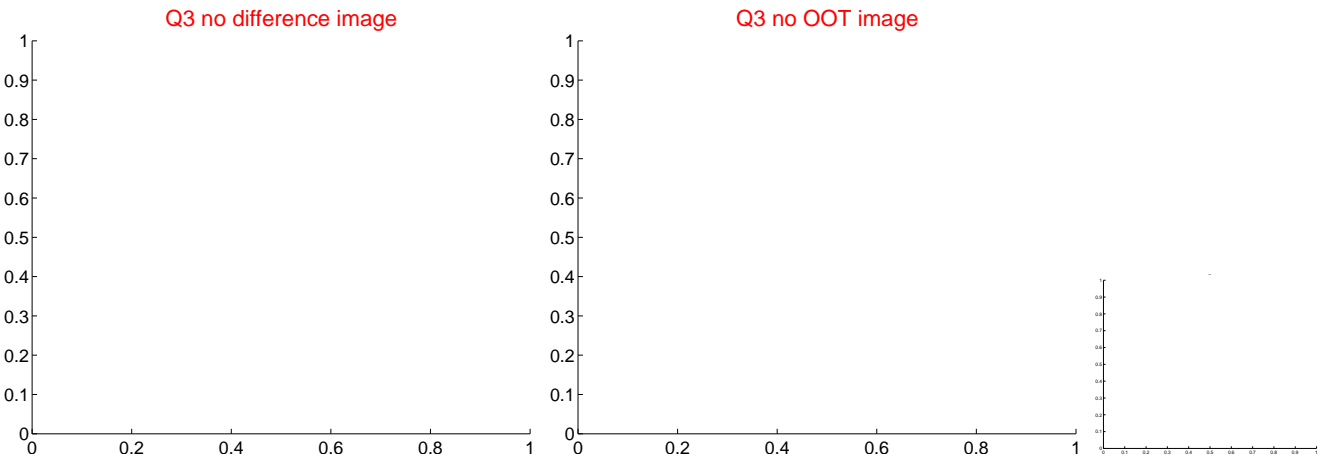
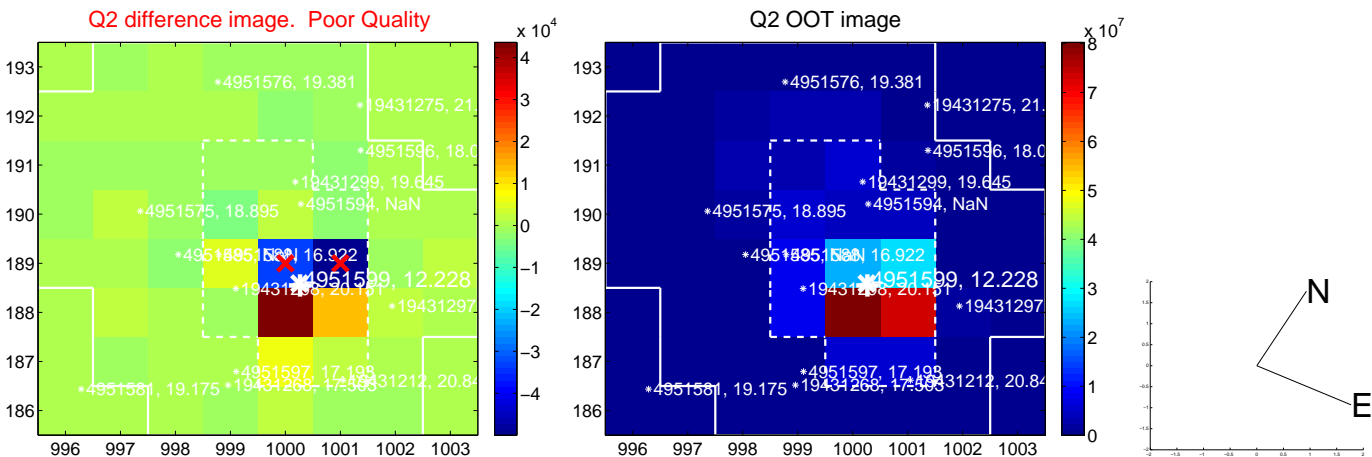
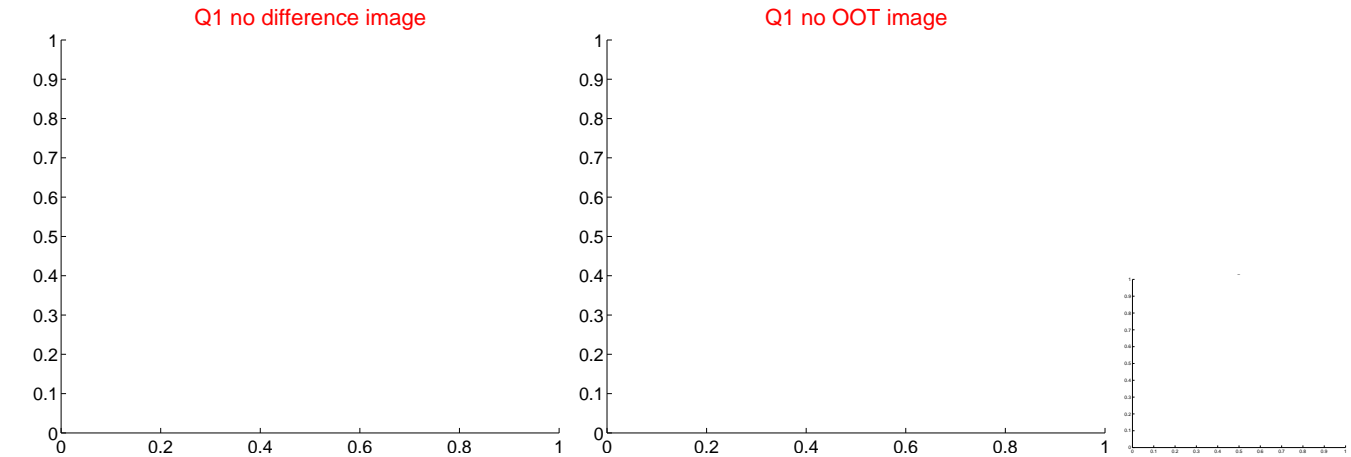


offset from photometric centroids



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

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



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

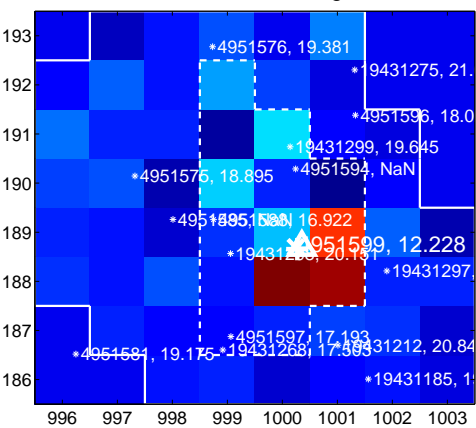
Q5 no difference image



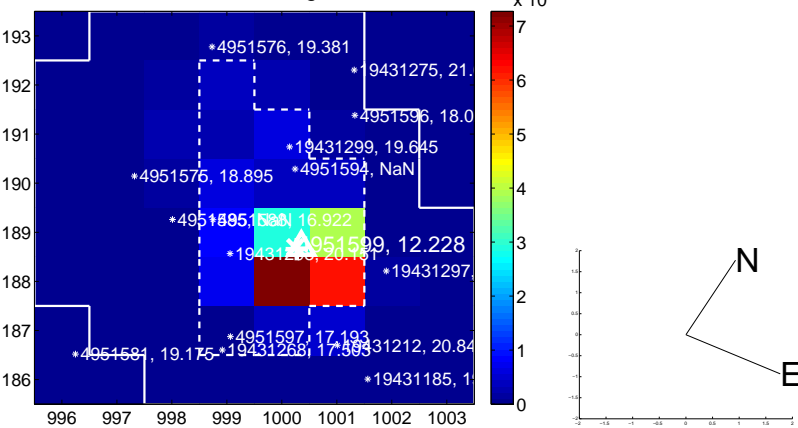
Q5 no OOT image



Q6 difference image



Q6 OOT image



Q7 no difference image



Q7 no OOT image



Q8 no difference image



Q8 no OOT image





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

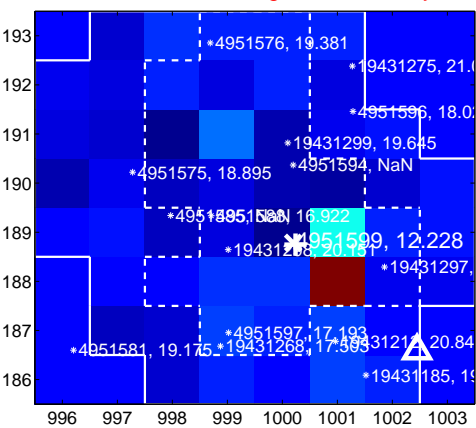
Q9 no difference image



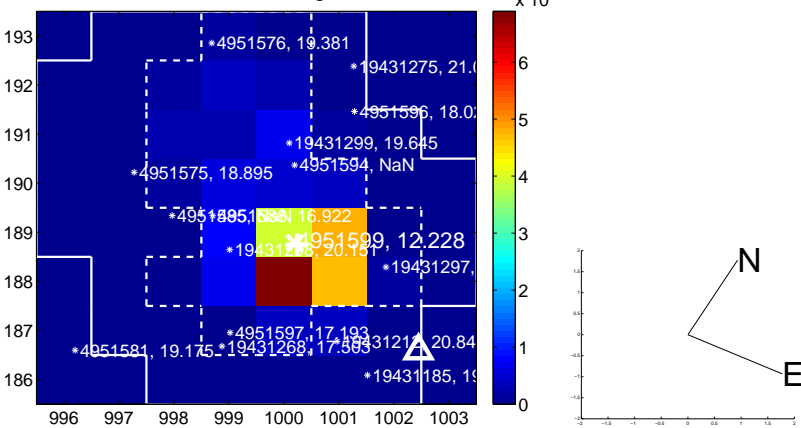
Q9 no OOT image



Q10 difference image. Poor Quality



Q10 OOT image



Q11 no difference image



Q11 no OOT image



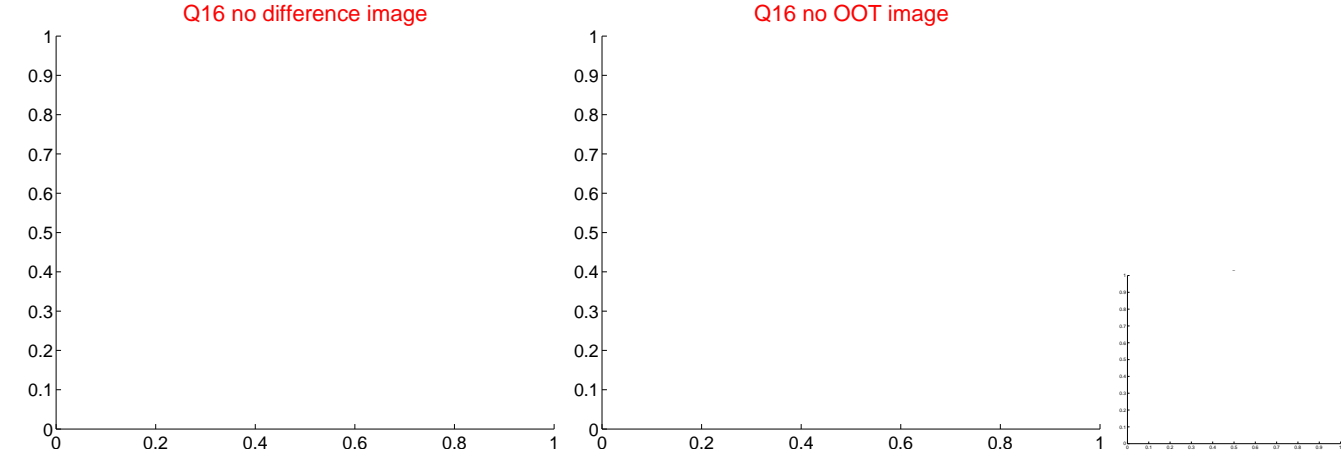
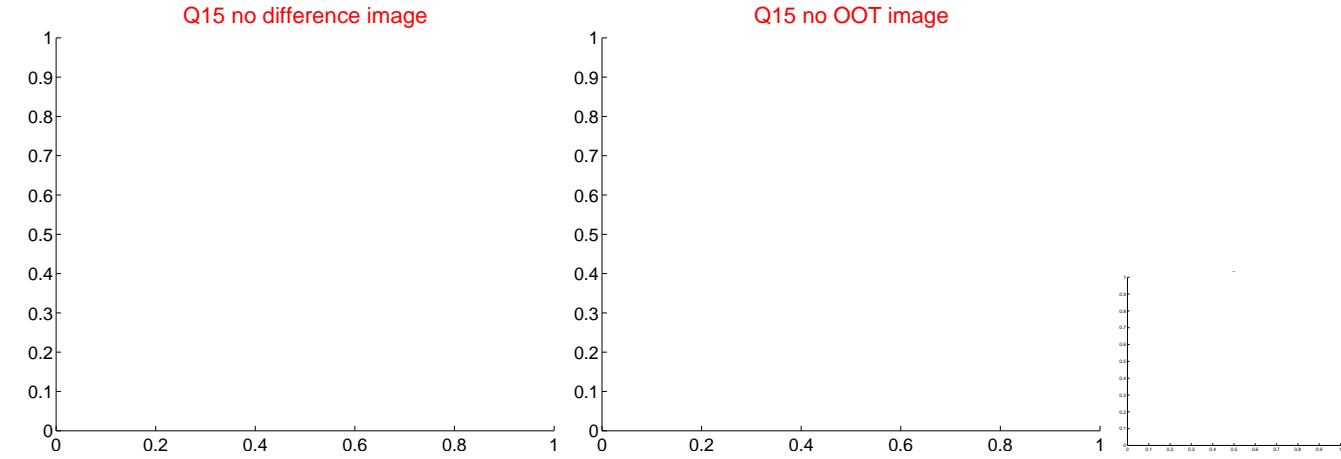
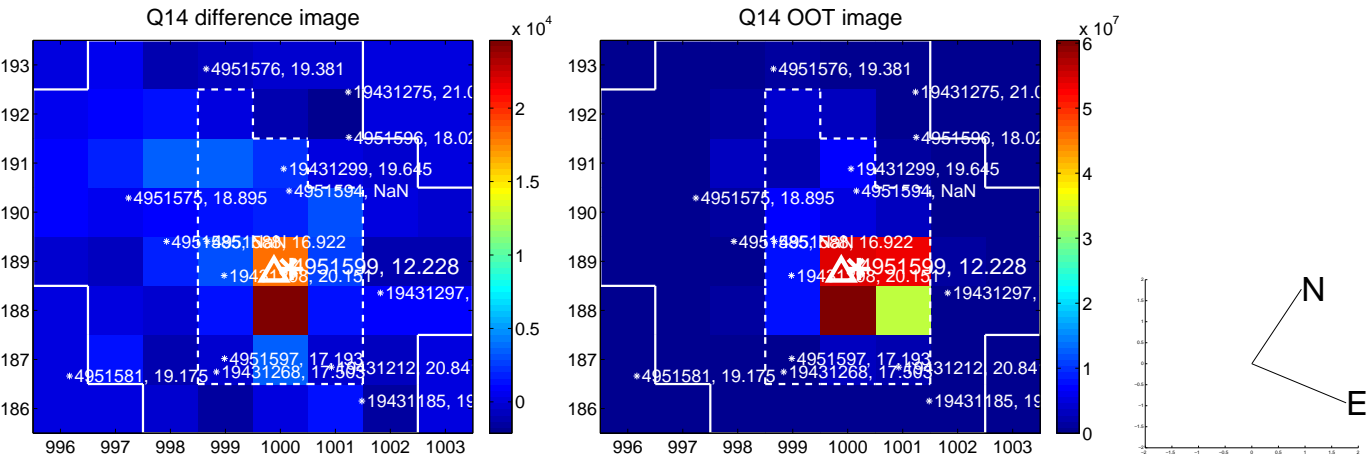
Q12 no difference image



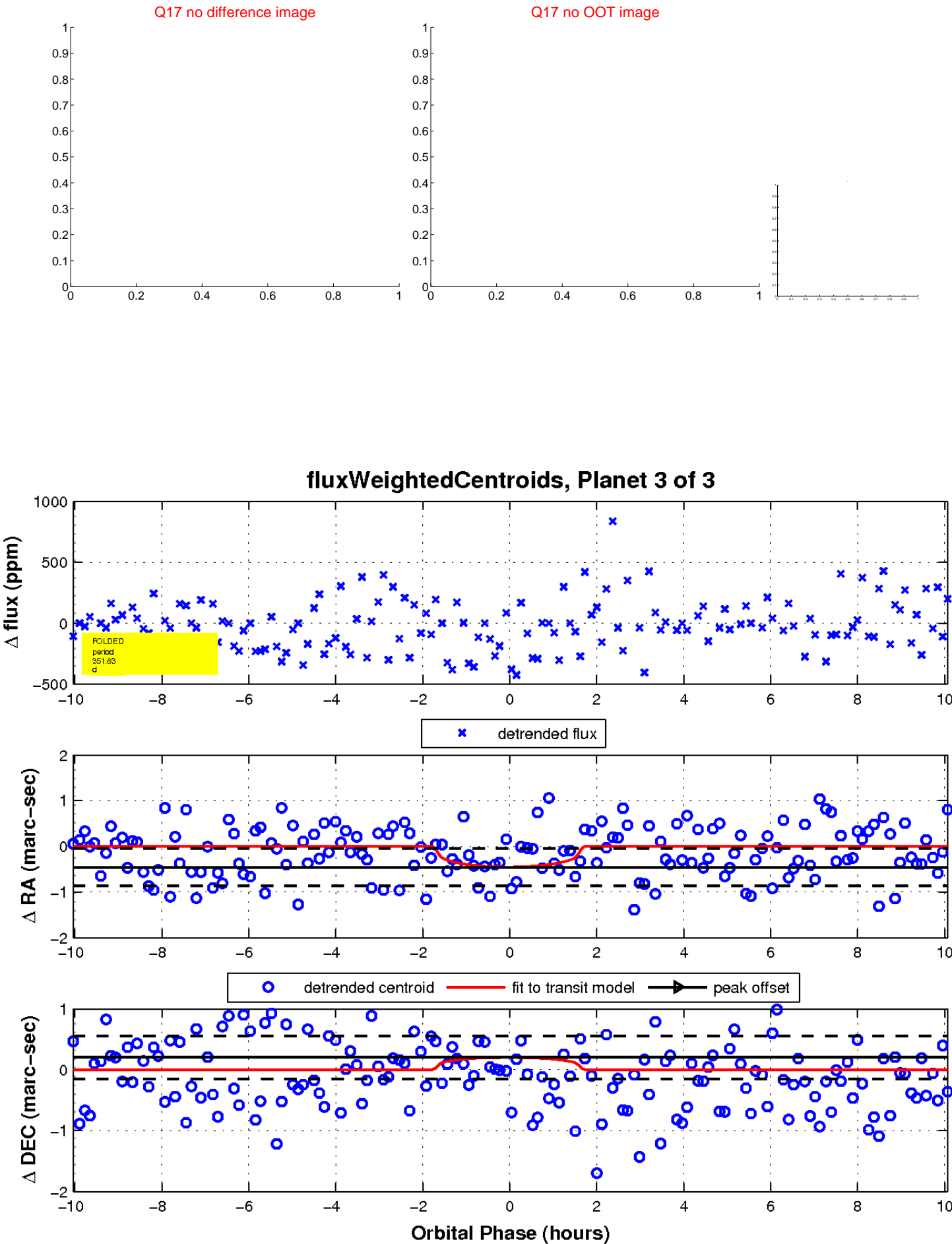
Q12 no OOT image



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



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



UKIRT Image

Declination

