

# KIC 009772849

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009772849-02	OBS	No	442.025565	247.147747	665.8	15.562	15.7	7.1	0.70	5593	2.26	0.42
009772849-03	OBS	No	435.086675	305.330819	634.6	7.244	12.5	6.3	0.70	5593	1.83	0.43
009772849-04	OBS	No	575.579420	198.696126	710.7	4.204	11.3	7.5	0.70	5593	2.31	0.29
009772849-05	OBS	No	487.717346	588.752969	413.9	17.908	16.1	3.7	0.70	5593	1.42	0.37
009772849-06	OBS	No	402.255062	250.866823	510.9	5.000	11.2	-1.0	0.70	5593	1.57	0.47

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009772849-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009772849-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009772849-04	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL—ALL_TRANS_CHASES—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
009772849-05	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL_SKYE_ZUMA—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
009772849-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—ALL_TRANS_CHASES—CENT_NOFITS

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

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

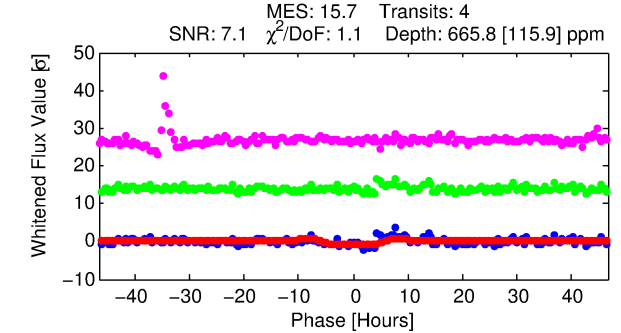
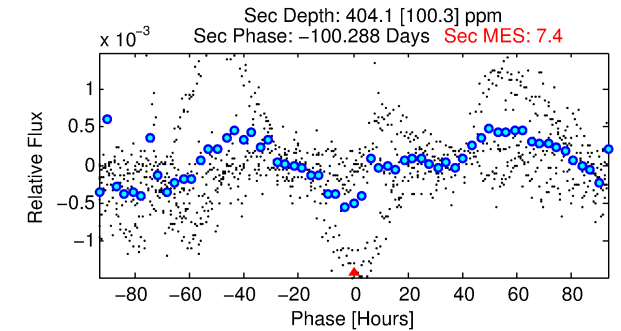
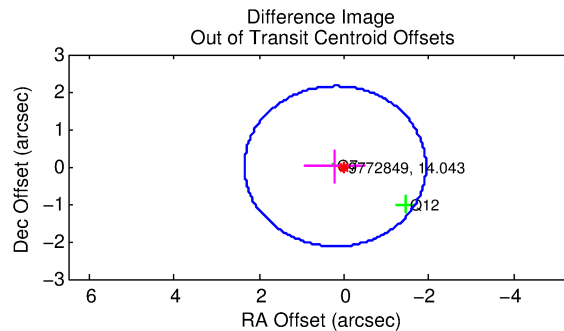
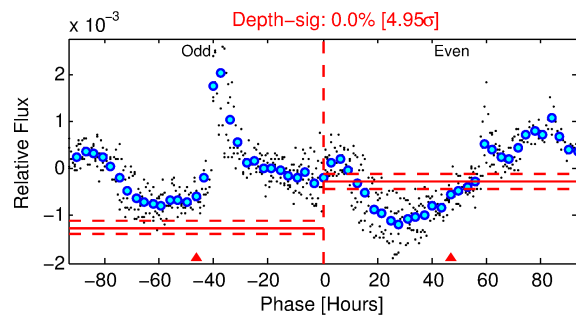
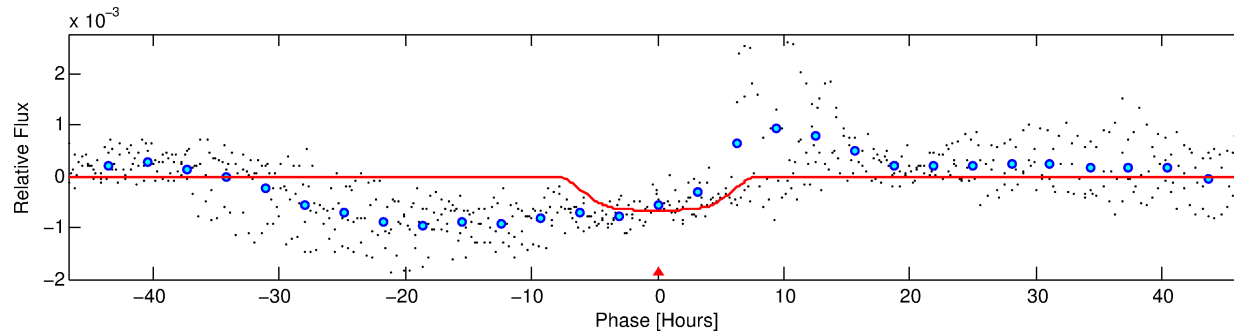
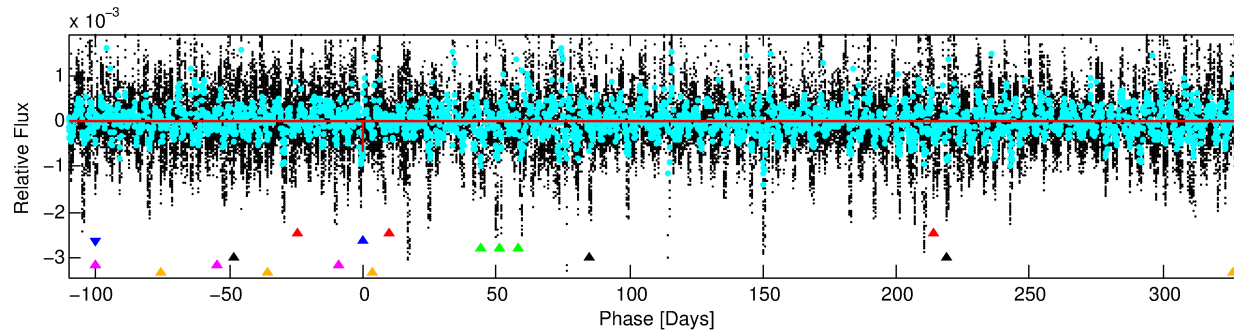
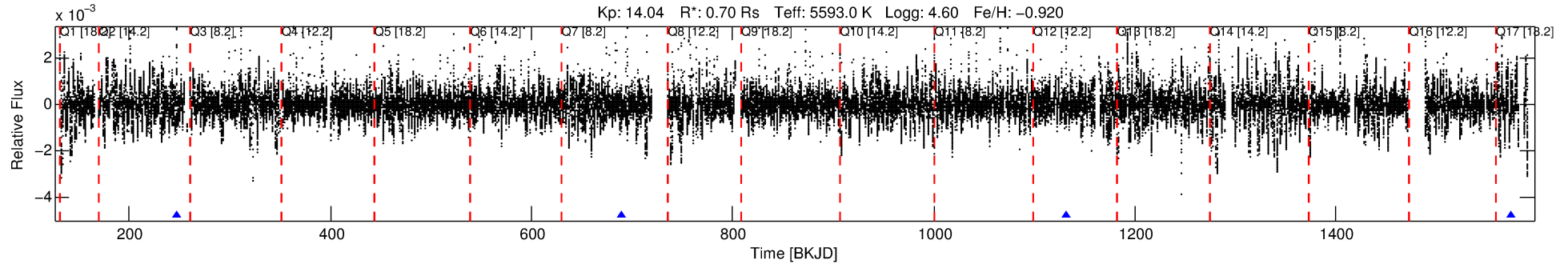
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 009772849-02

No Significant Match Found

# DV One-Page Summary

KIC: 9772849 Candidate: 2 of 6 Period: 442.026 d



## DV Fit Results:

Period = 442.02556 [0.01308] d  
Epoch = 247.1477 [0.0242] BKJD  
Rp/R\* = 0.0297 [0.0029]  
a/R\* = 85.64 [12.82]  
b = 0.95 [0.02]  
Seff = 0.42 [0.07]  
Teq = 205 [9] K  
Rp = 2.26 [0.34] Re  
a = 1.0081 [0.0955] AU  
Ag = 44173.46 [15151.91] [2.92 $\sigma$ ]  
Teff = 4599 [388] K [11.32 $\sigma$ ]

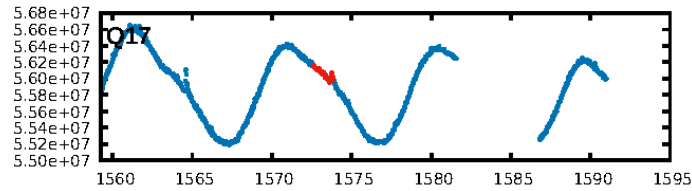
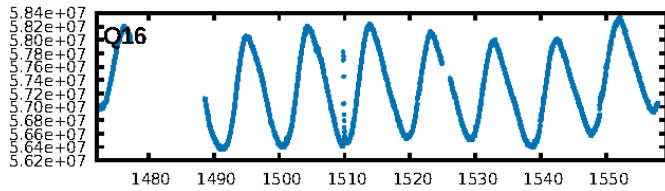
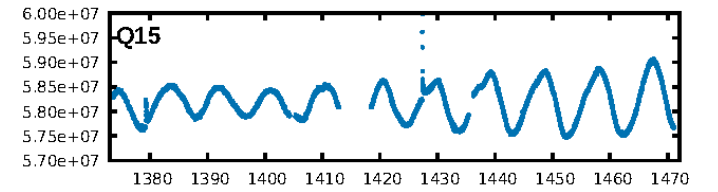
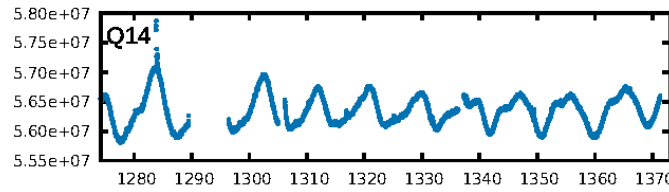
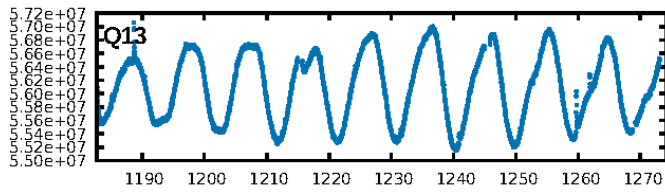
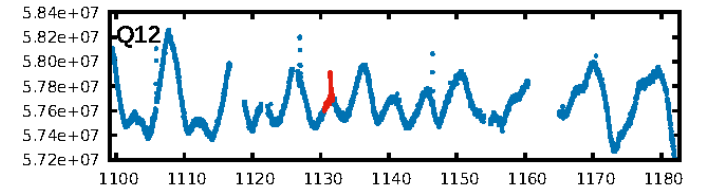
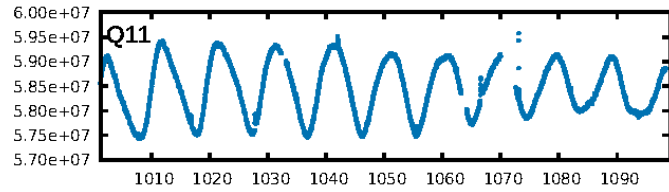
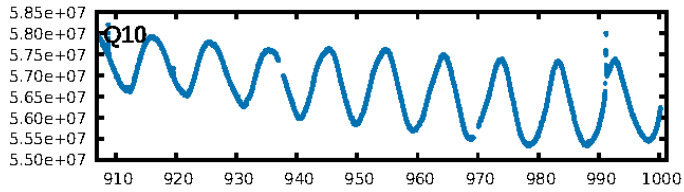
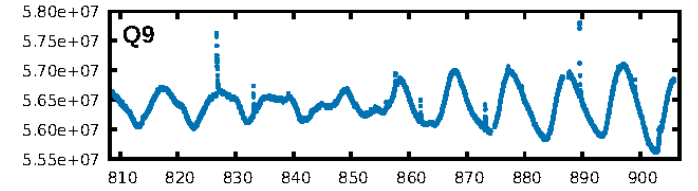
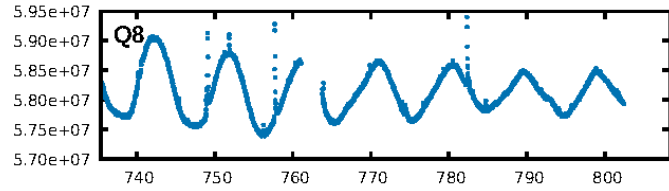
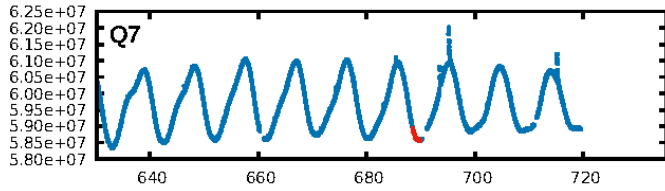
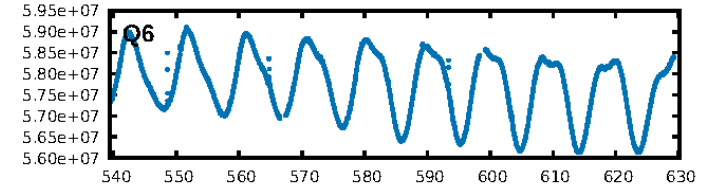
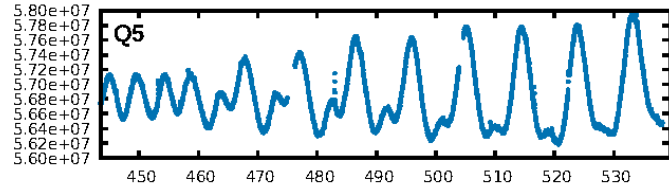
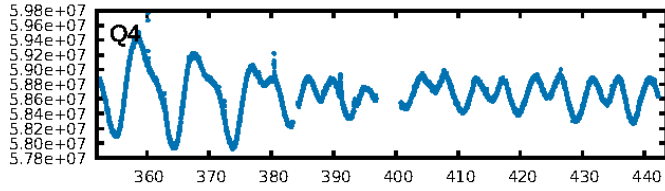
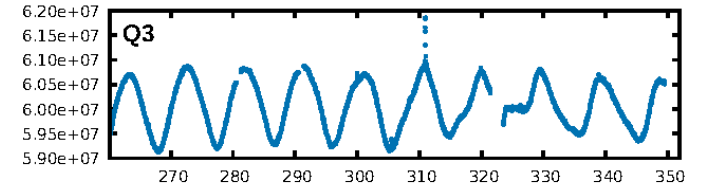
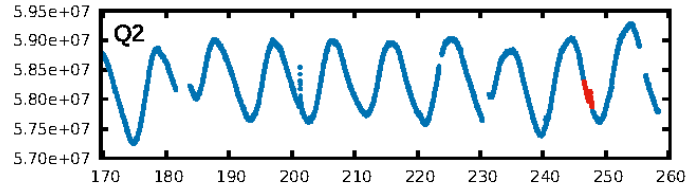
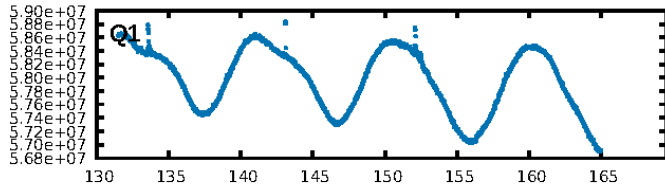
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [9.70 $\sigma$ ]  
LongPeriod-sig: 100.0% [46.22 $\sigma$ ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 98.4%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 1.437  
Centroid-sig: 2.7%  
Centroid-so: 1.043 arcsec [1.52 $\sigma$ ]  
OotOffset-rm: 0.203 arcsec [0.28 $\sigma$ ]  
OotOffset-st: 0/1/1/0 [2]  
KicOffset-rm: 0.205 arcsec [0.27 $\sigma$ ]  
KicOffset-st: 0/1/1/0 [2]  
DiffImageQuality-fgm: 0.50 [1/2]  
DiffImageOverlap-fno: 1.00 [3/3]

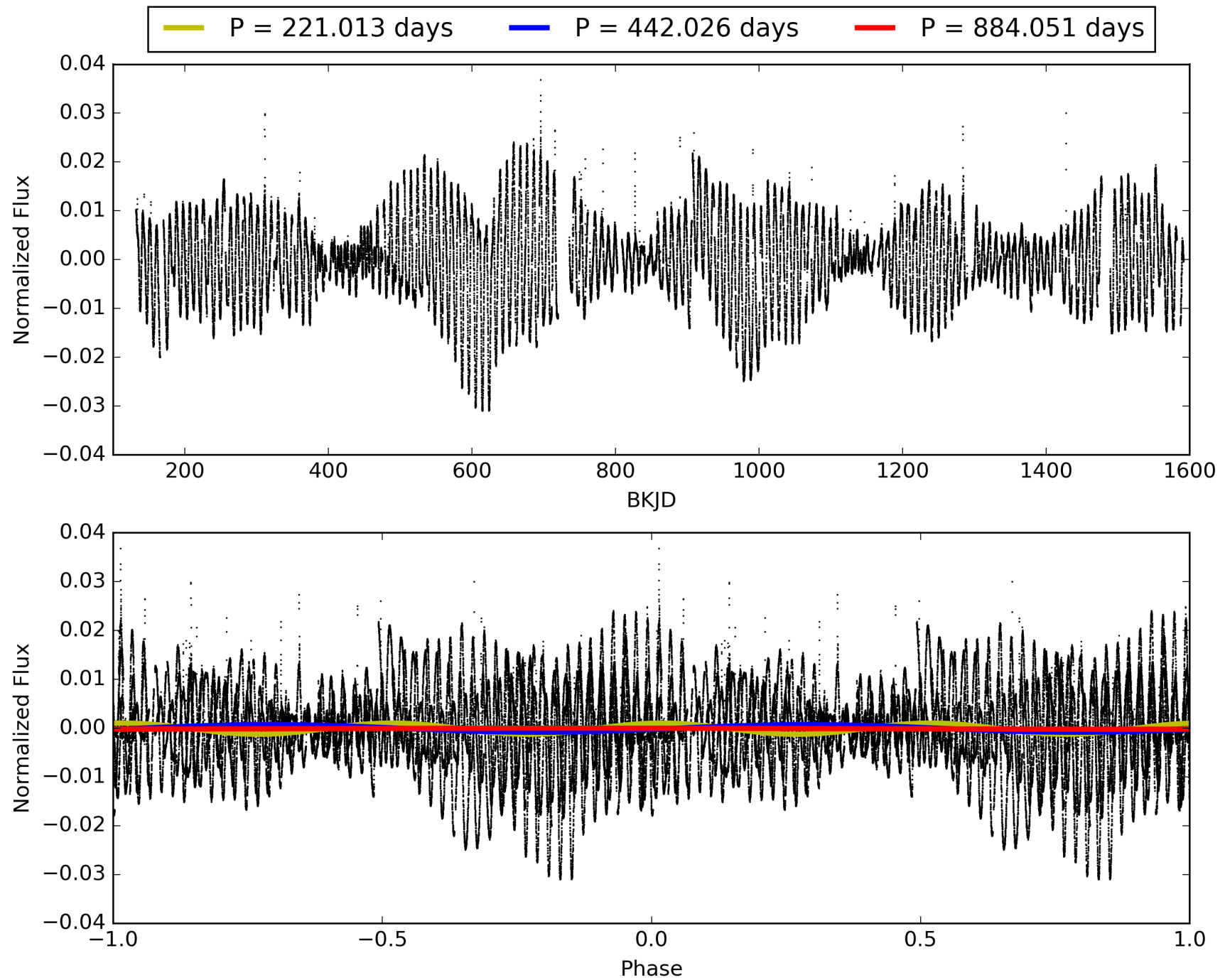
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 22:03:31 Z

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

# TCE 009772849-02, PDC Light Curves



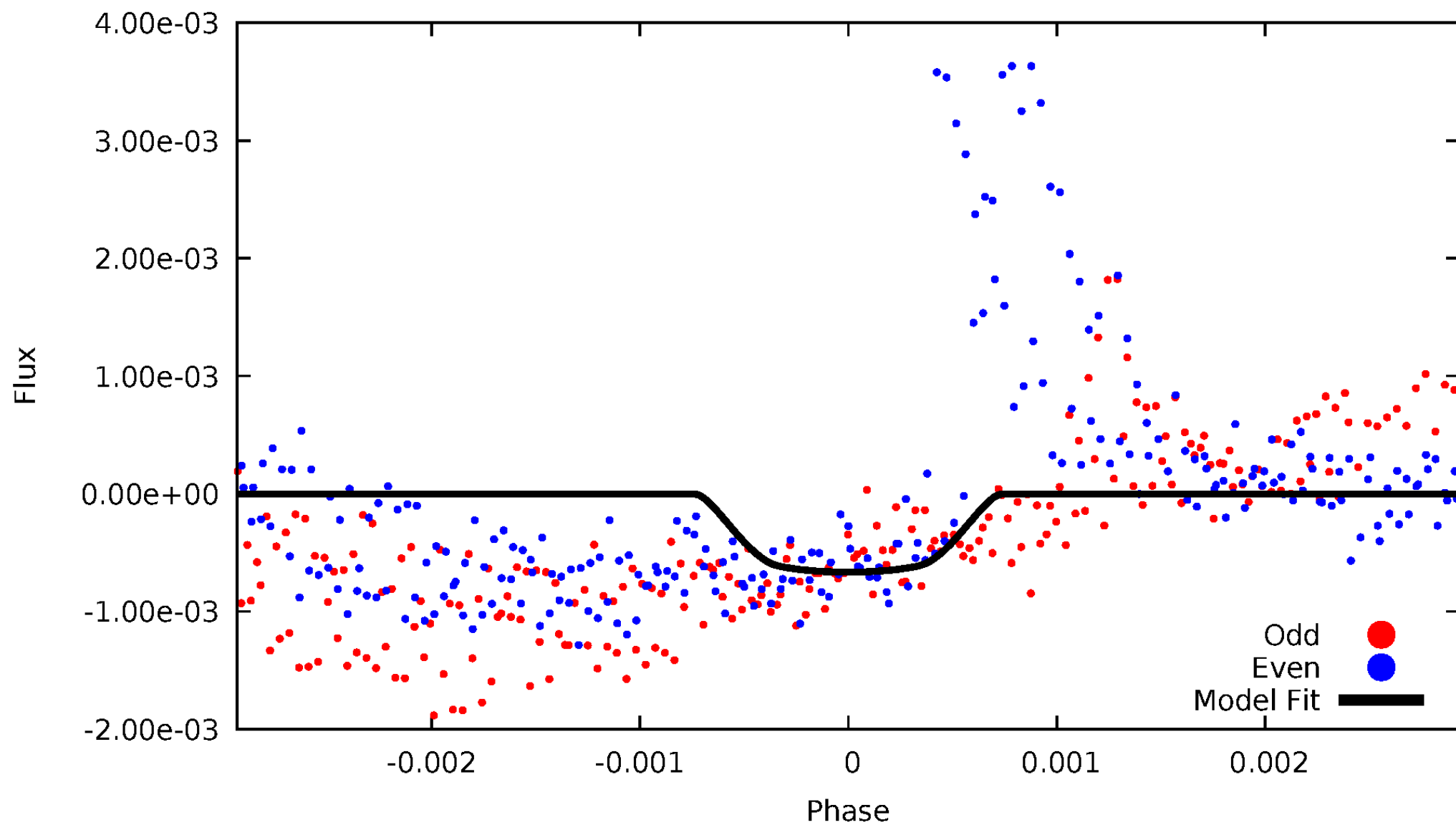
TCE 009772849-02





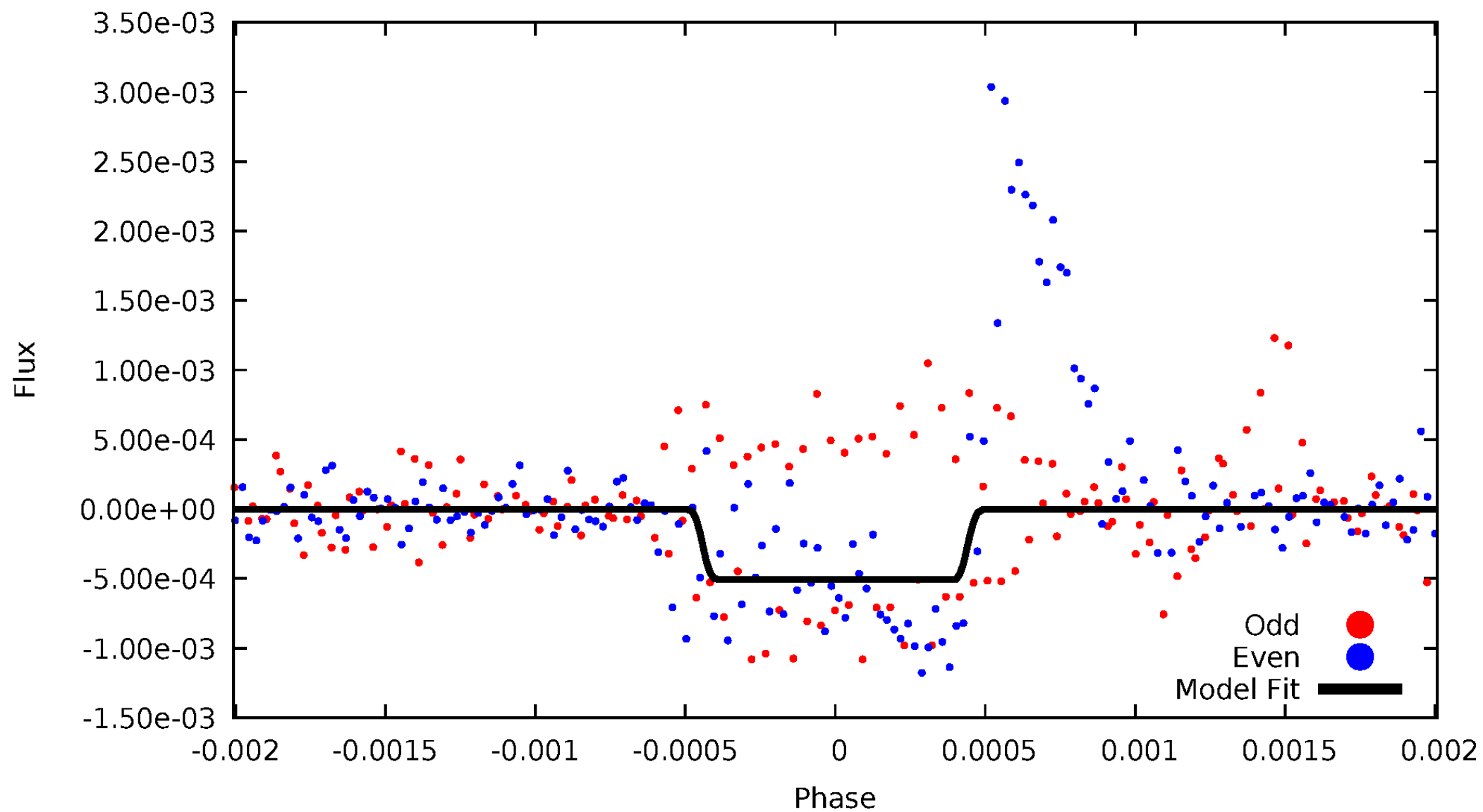
# DV Odd/Even

TCE 009772849-02



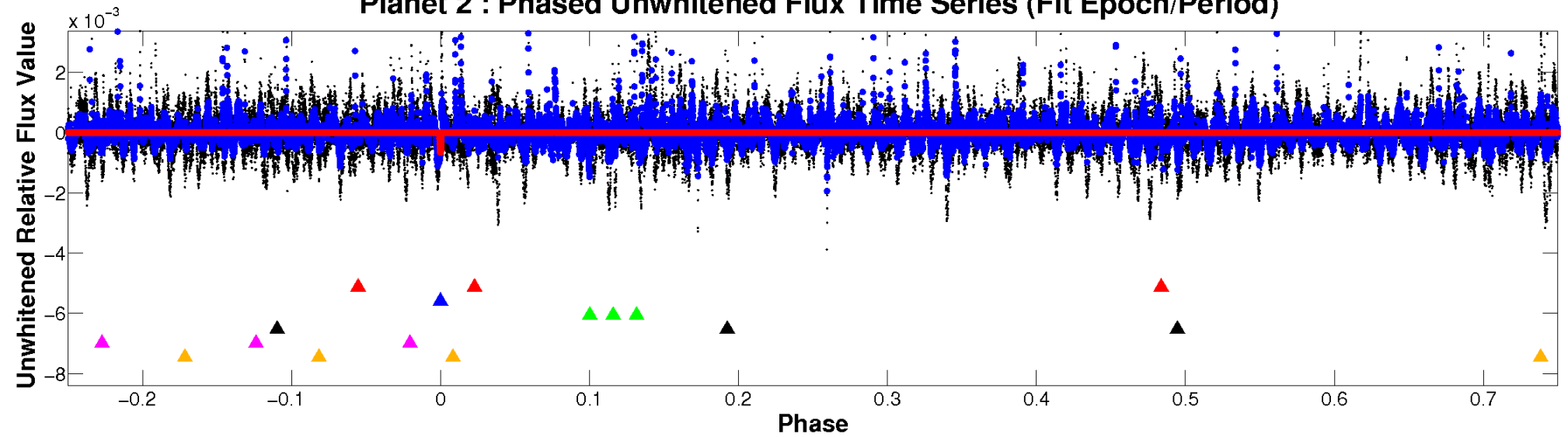
# ALT Odd/Even

TCE 009772849-02

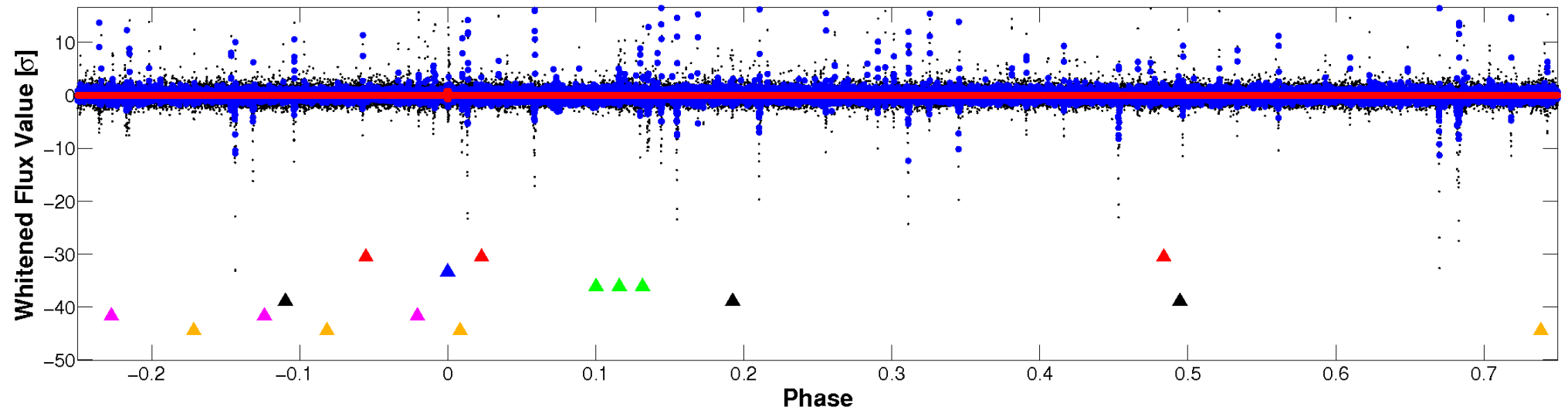


# Non-Whitened Vs. Whitened Light Curve

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

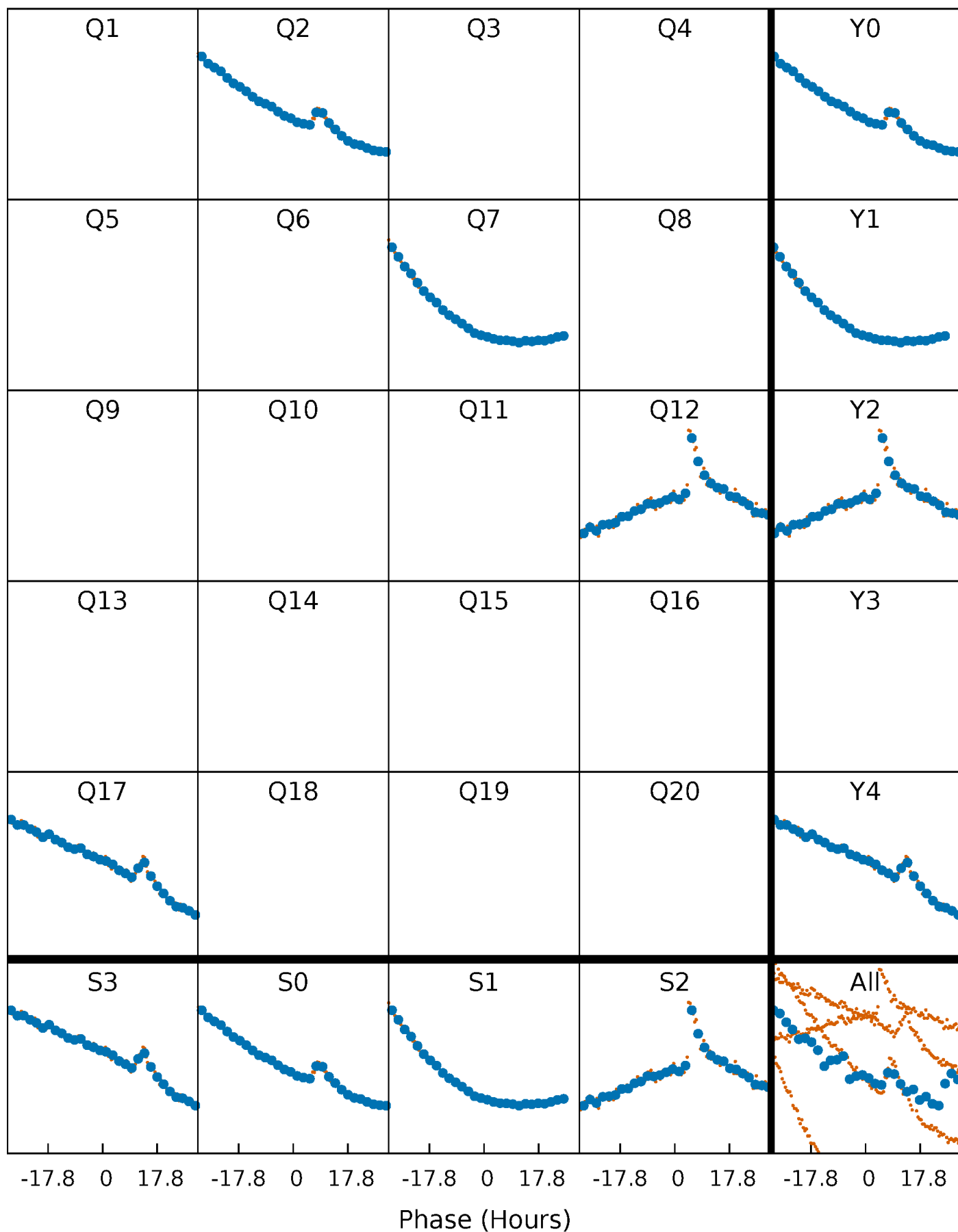


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



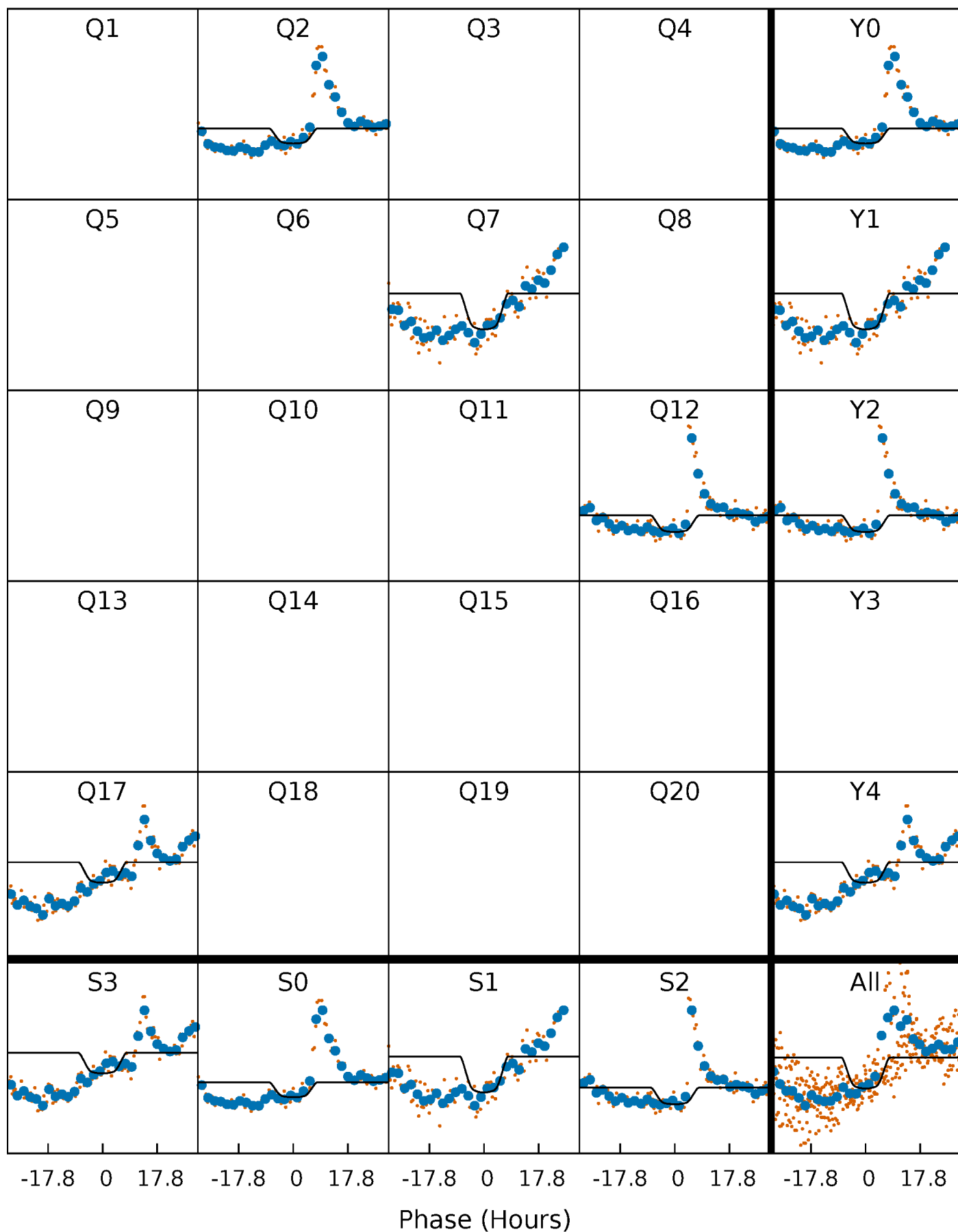
# PDC Quarter-Phased Transit Curves

TCE 009772849-02     $P=442.025565$  Days     $T_0=247.147747$  (BKJD)



# DV Quarter-Phased Transit Curves

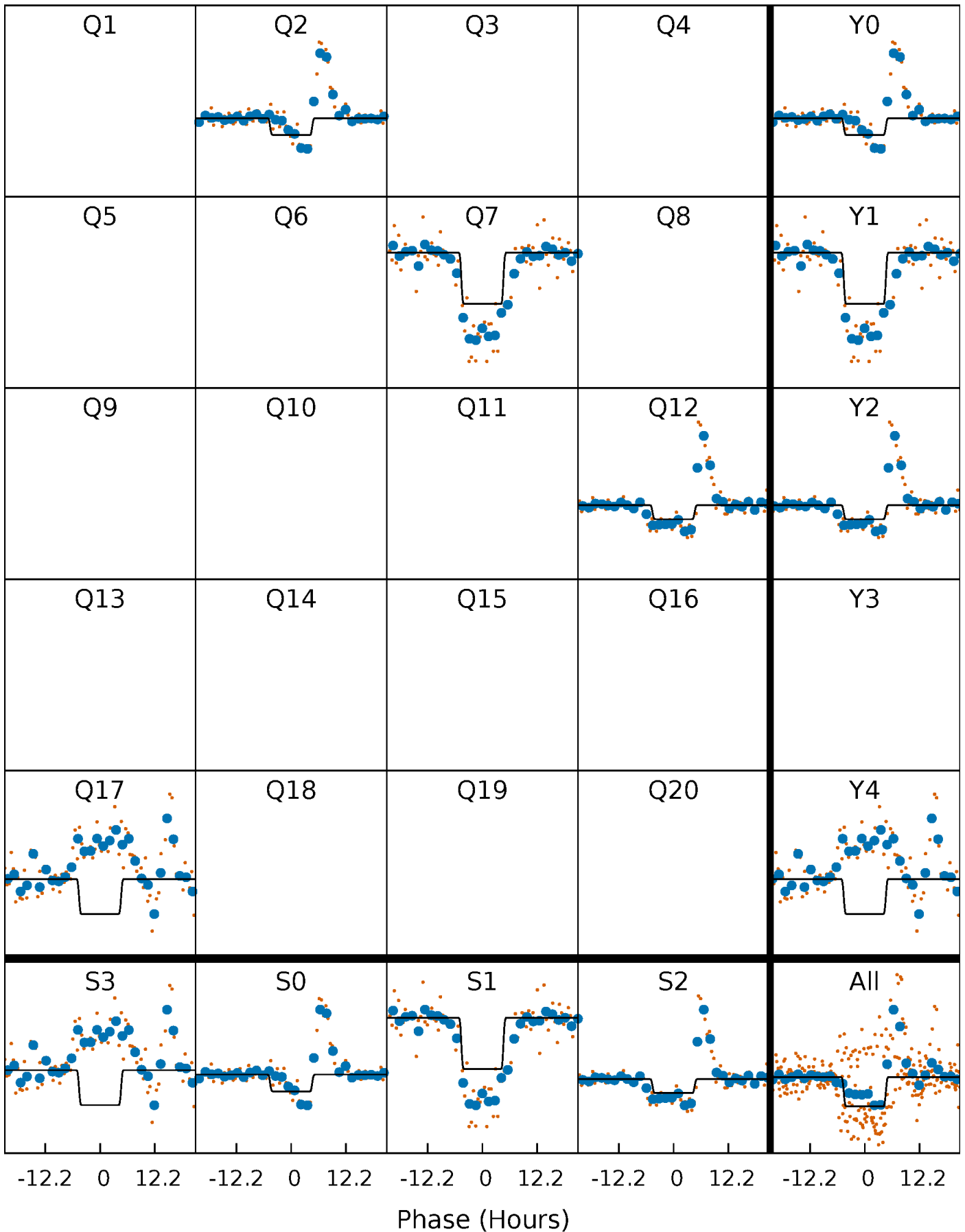
TCE 009772849-02     $P=442.025565$  Days     $T_0=247.147747$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

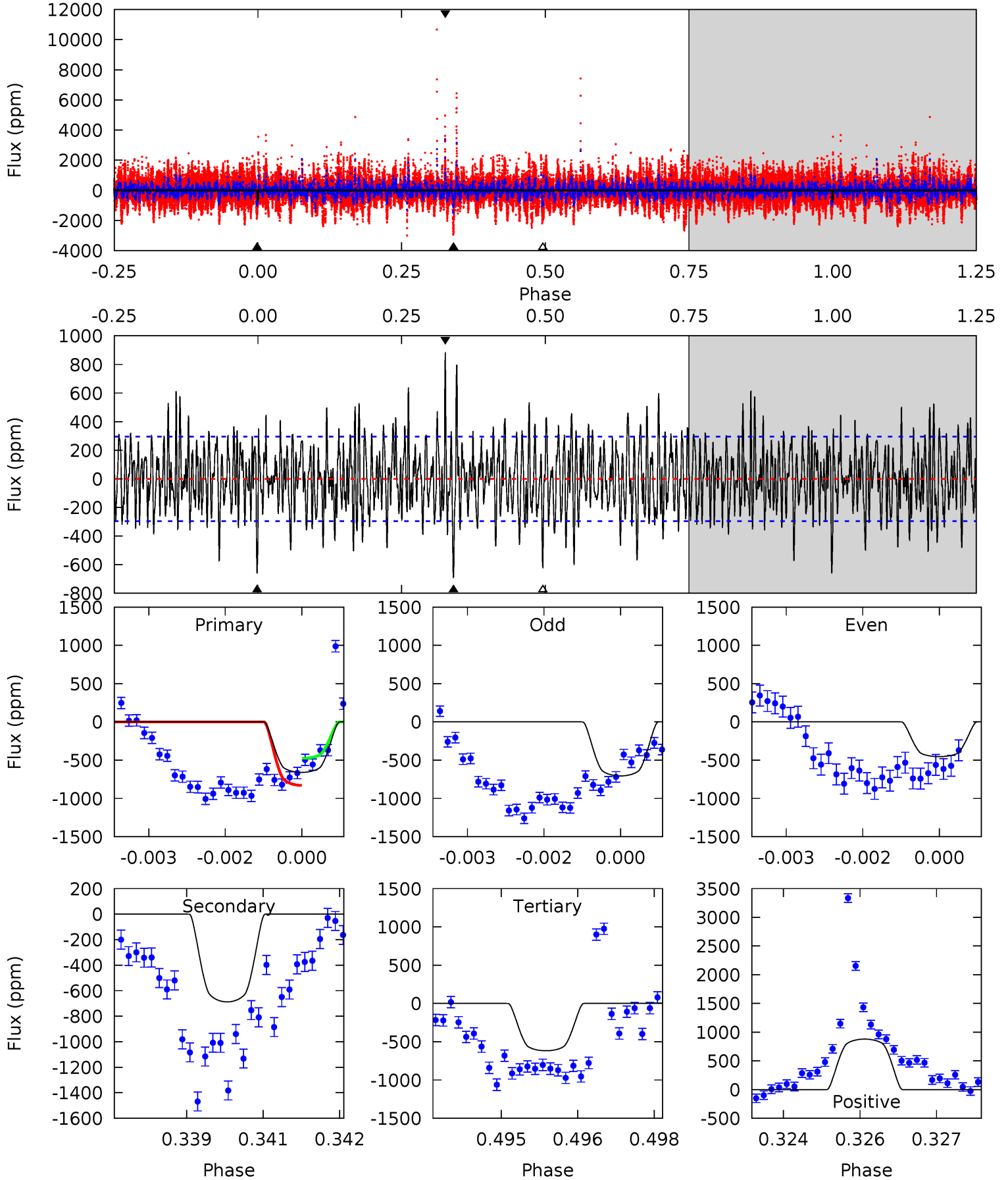
TCE 009772849-02 P=441.971092 Days  $T_0=247.214745$  (BKJD)



# DV Model-Shift Uniqueness Test

009772849-02, P = 442.025565 Days, E = 247.147747 Days

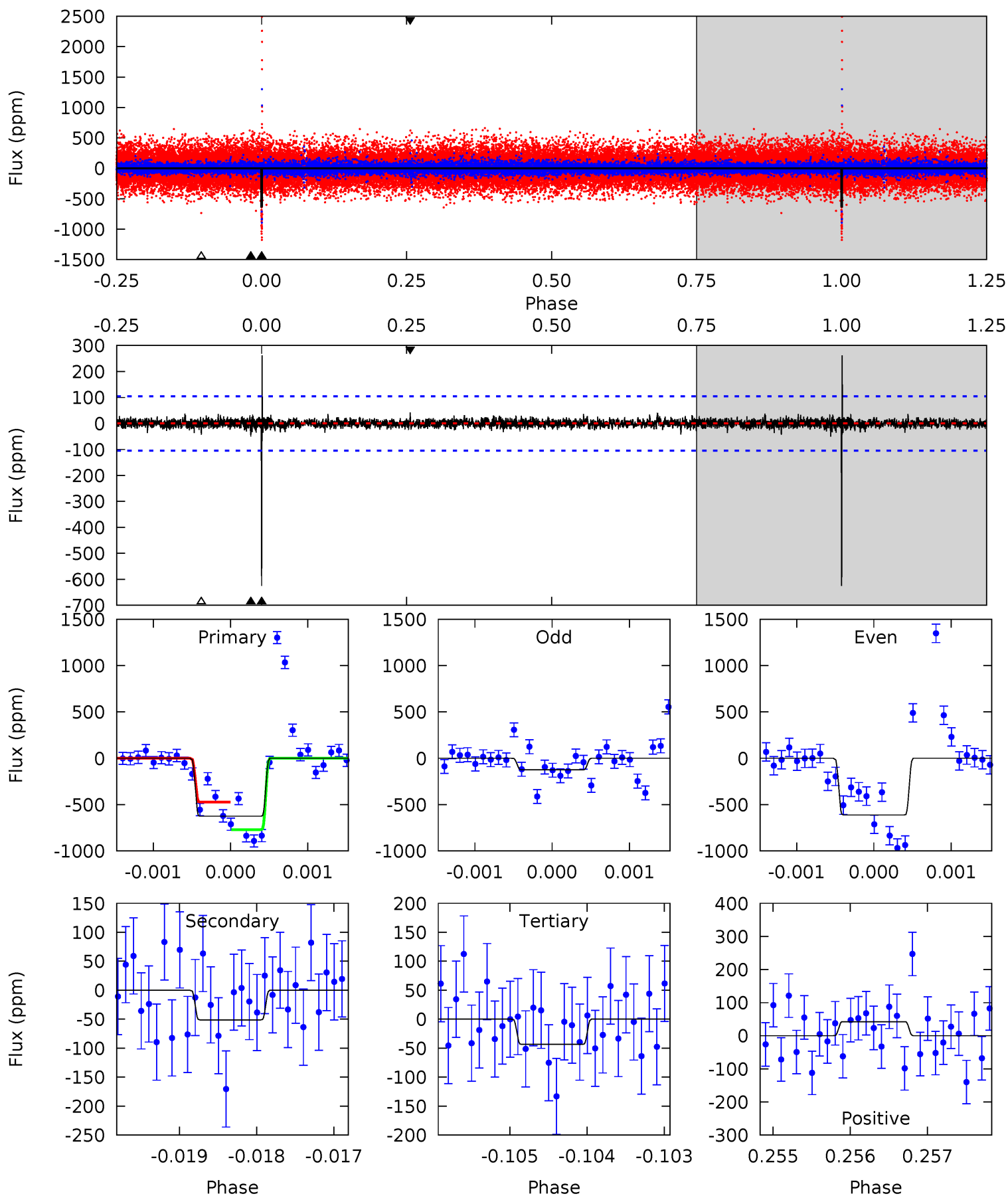
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.0	12.5	11.3	16.0	5.38	3.17	3.70	0.76	-4.00	1.27	-3.50	1.85	0.85	0.56	3.24



# Alt Model-Shift Uniqueness Test

009772849-02, P = 441.971092 Days, E = 247.214745 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
32.6	2.66	2.26	2.22	5.46	3.30	0.48	30.3	30.4	0.40	0.45	13.5	0.61	0.30	7.67



### Stellar Parameters For KIC 009772849

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5593^{+166}_{-166}$	$4.596^{+0.065}_{-0.071}$	$-0.920^{+0.350}_{-0.300}$	$0.697^{+0.081}_{-0.054}$	$0.698^{+0.069}_{-0.035}$	$2.905^{+0.750}_{-0.712}$
	+3%/-3%	+1%/-2%	+38%/-33%	+12%/-8%	+10%/-5%	+26%/-25%
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 009772849-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-688 \pm 55$	$2.27^{+0.27}_{-0.26}$	$287^{+11}_{-11}$	$5286^{+306}_{-254}$	$75638^{+21253}_{-15345}$
Alt.	$-51 \pm 19$	$1.72^{+0.26}_{-0.25}$	$286^{+12}_{-11}$	$3587^{+283}_{-278}$	$9862^{+5113}_{-3972}$

$T_{\text{max}}$  = 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

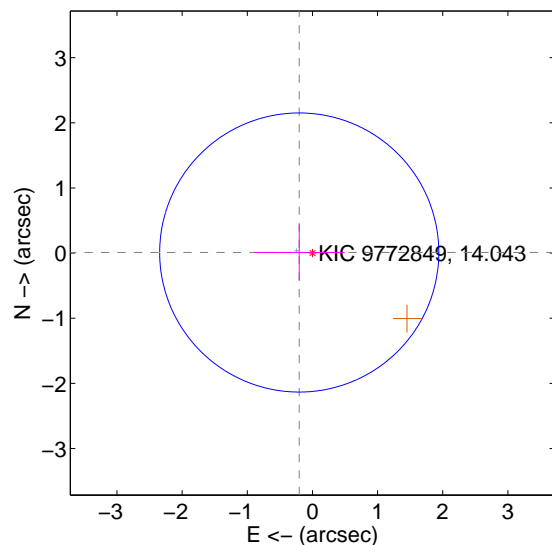
Supplemental centroid analysis for 009772849-02. Kepler magnitude: 14.04. Transit SNR 7.10

There are 1 quarters with good PRF difference image offsets

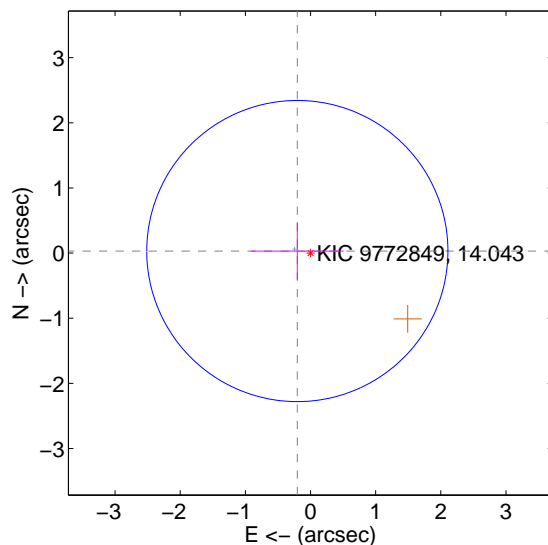
The direct PRF centroid is offset from the target star catalog position by about 0.04 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.203 \pm 0.714$	0.28	$0.203 \pm 0.695$	$0.009 \pm 0.431$
PRF-fit source offset from KIC position	$0.205 \pm 0.770$	0.27	$0.202 \pm 0.712$	$0.031 \pm 0.441$
photometric centroid source offset	$1.04 \pm 0.68$	1.52	$0.26 \pm 0.63$	$-1.01 \pm 0.69$

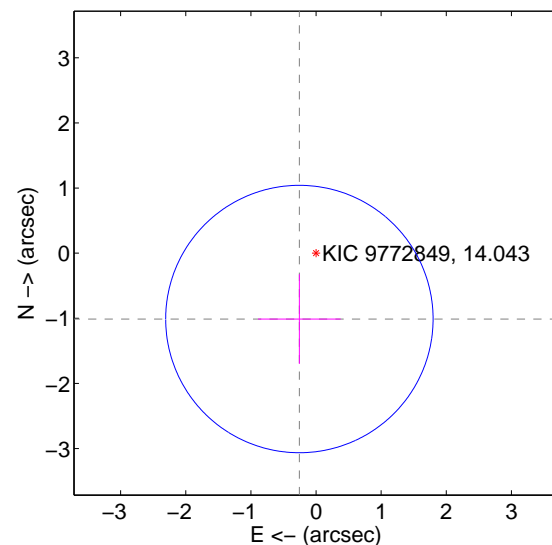
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



offset from photometric centroids



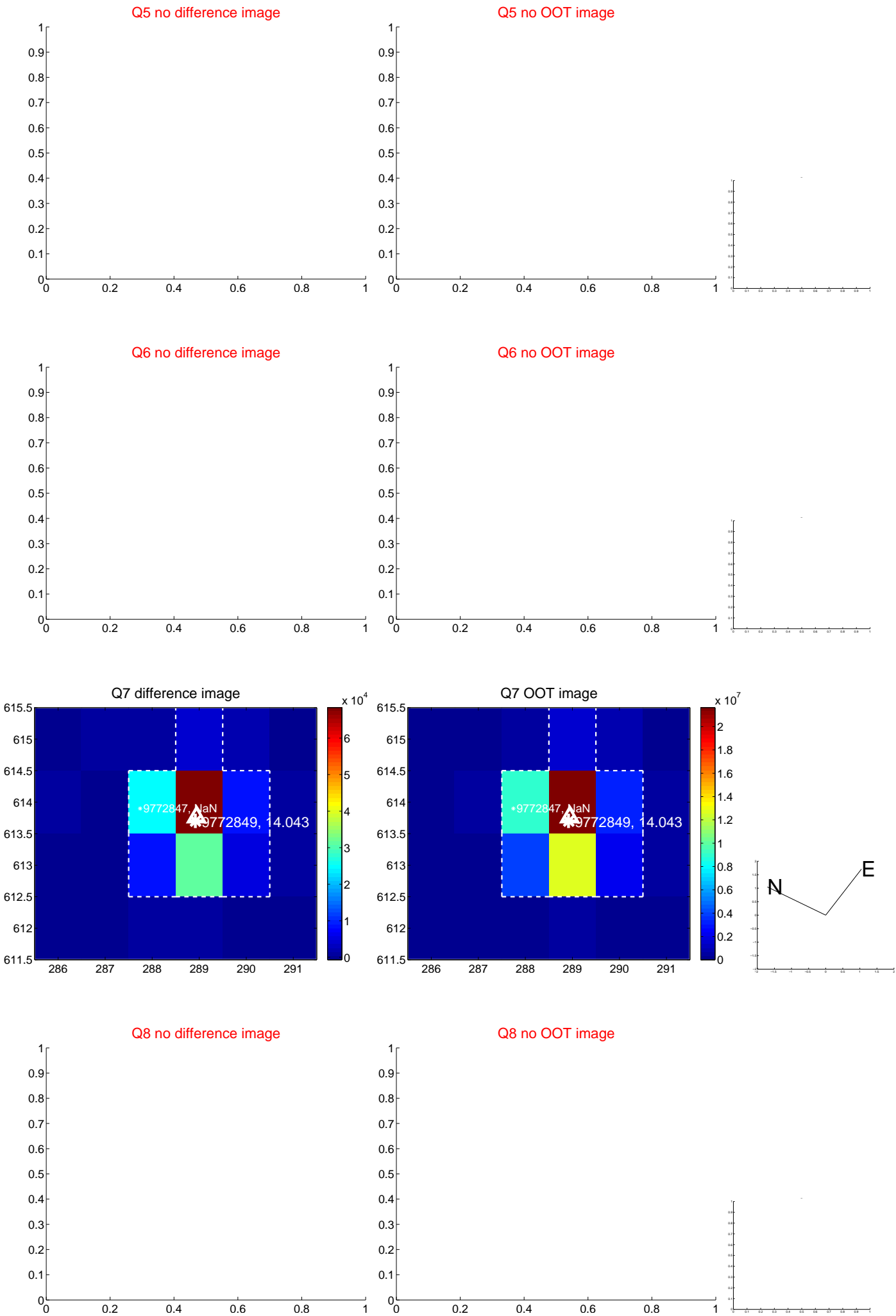
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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



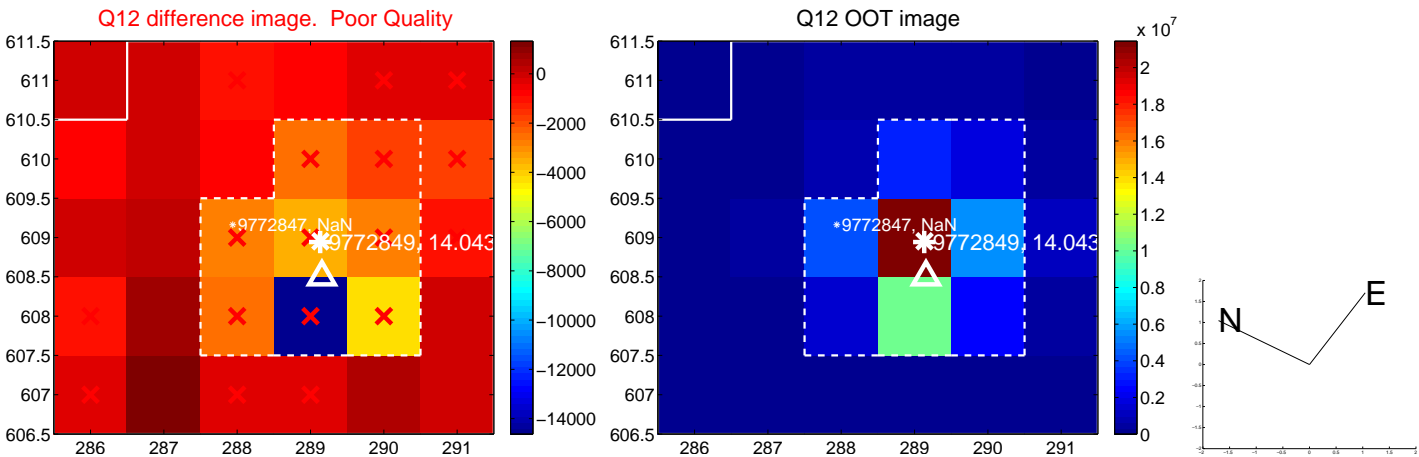
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



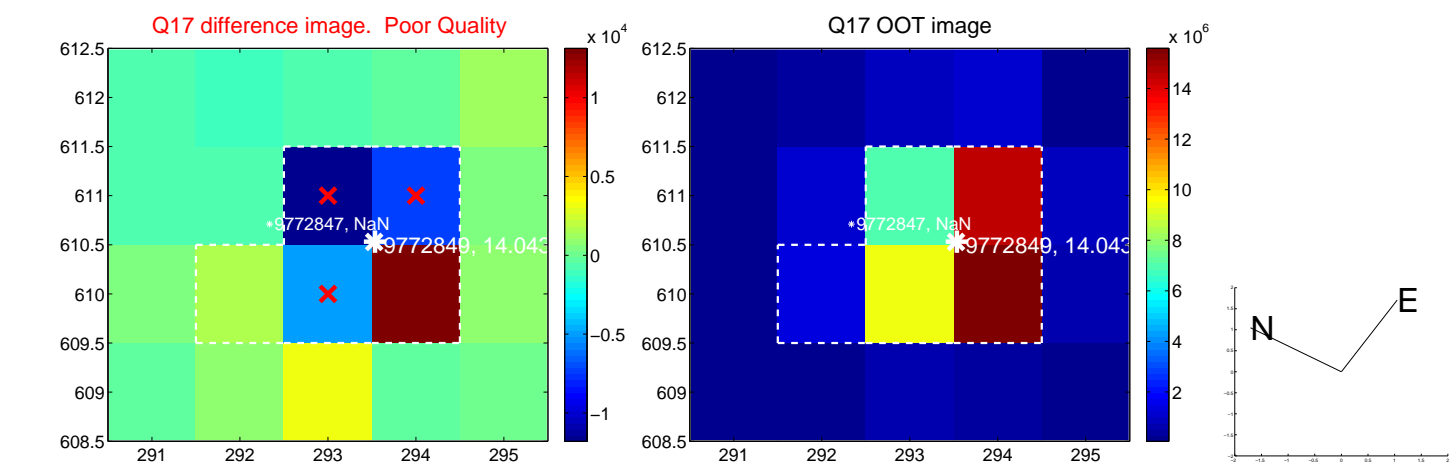
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.



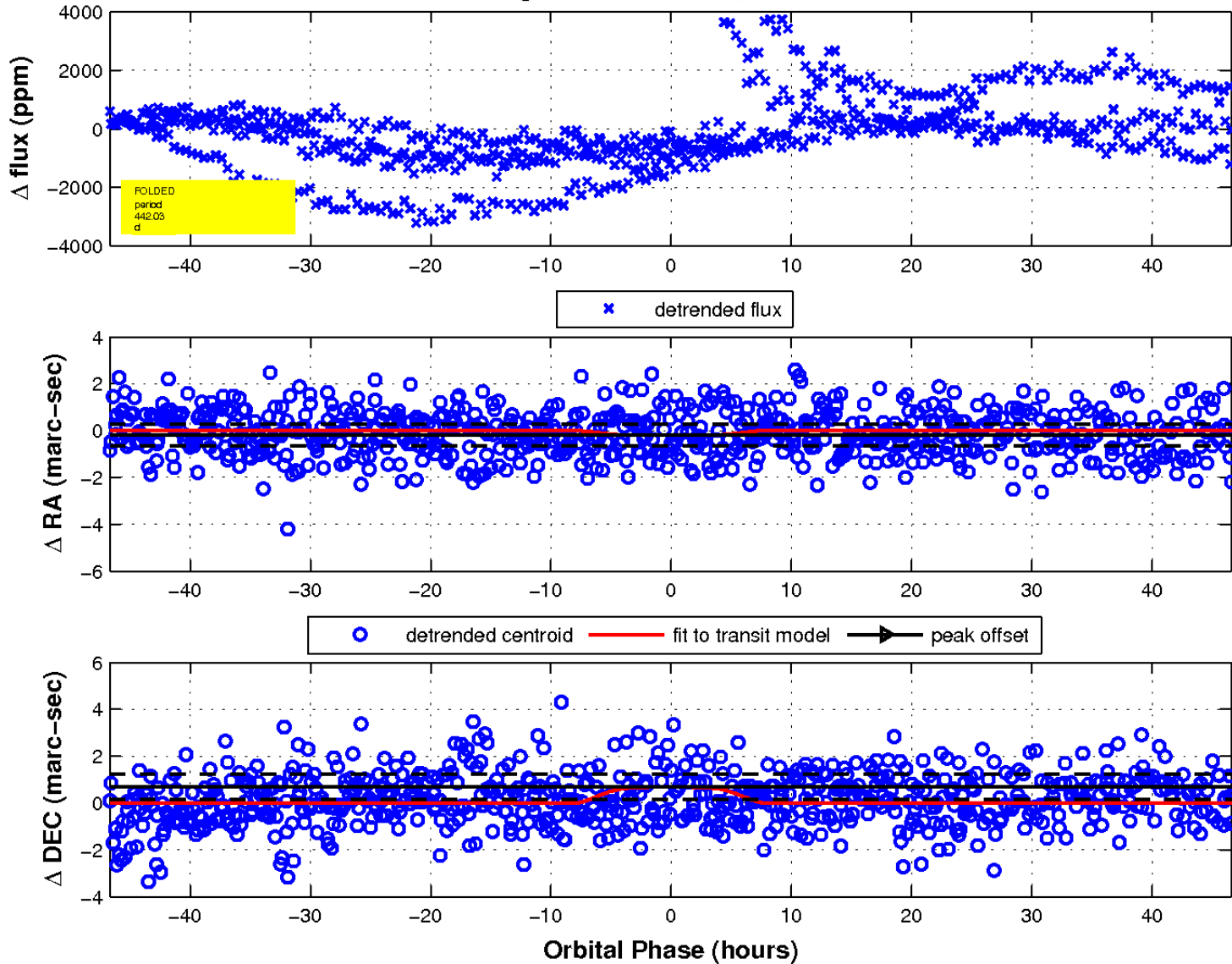
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



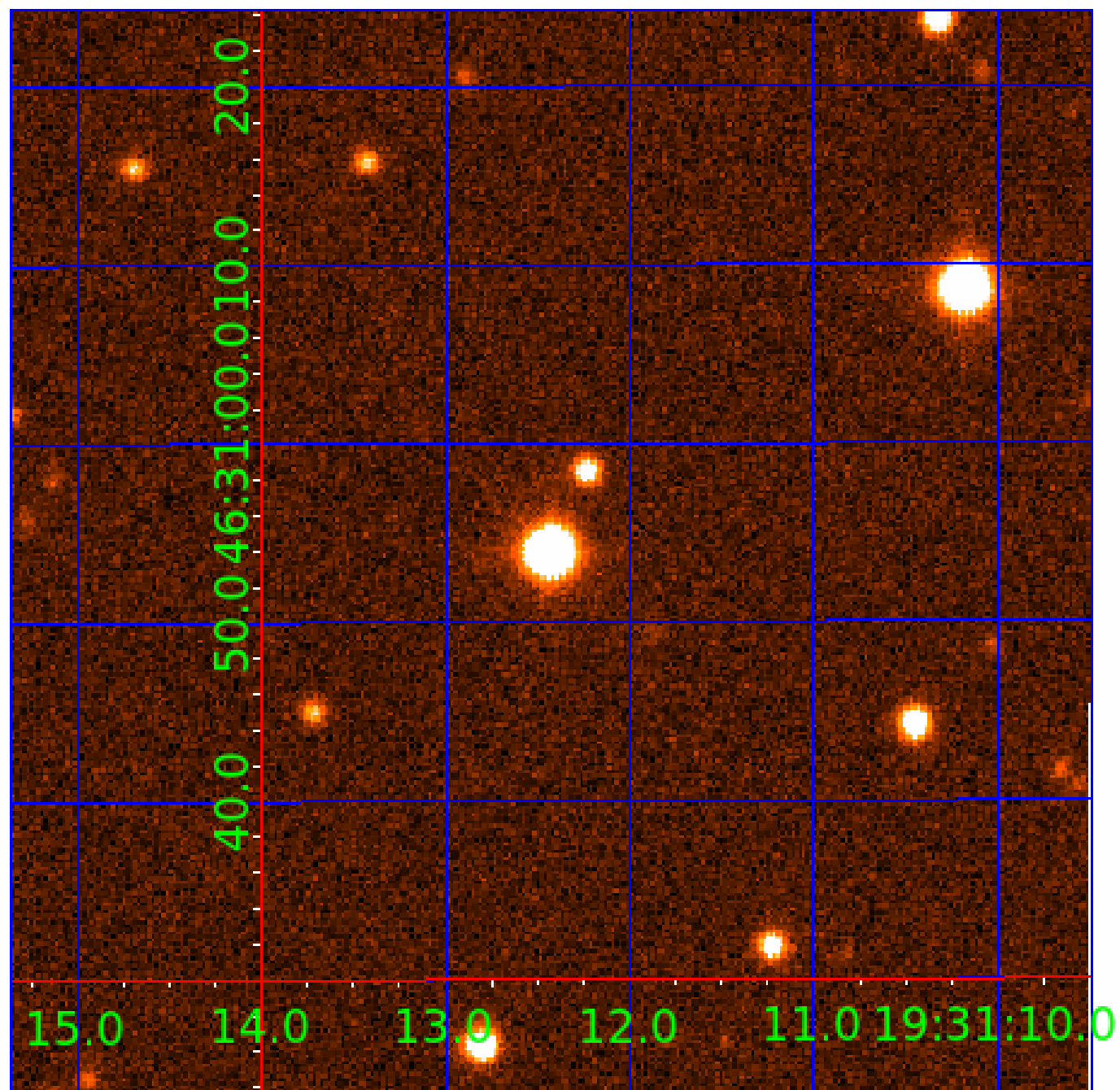
fluxWeightedCentroids, Planet 2 of 6





UKIRT Image

Declination



# KIC 009772849

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
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## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009772849-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009772849-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009772849-04	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL—ALL_TRANS_CHASES—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
009772849-05	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL_SKYE_ZUMA—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
009772849-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—ALL_TRANS_CHASES—CENT_NOFITS

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

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

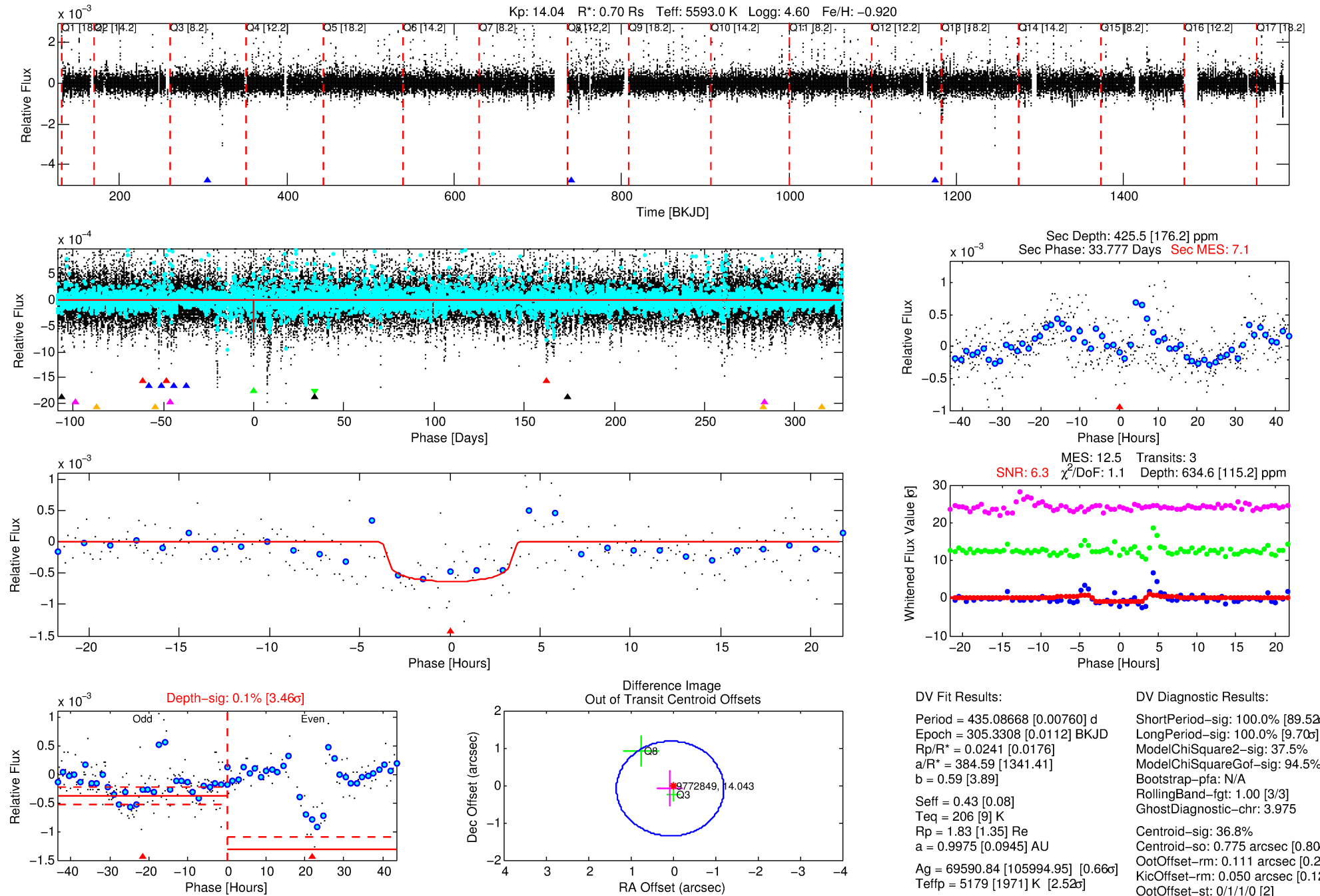
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009772849-03

No Significant Match Found

# DV One-Page Summary

KIC: 9772849 Candidate: 3 of 6 Period: 435.087 d



## DV Fit Results:

Period = 435.08668 [0.00760] d  
Epoch = 305.3308 [0.0112] BKJD  
Rp/R\* = 0.0241 [0.0176]  
a/R\* = 384.59 [1341.41]  
b = 0.59 [3.89]  
Seff = 0.43 [0.08]  
Teq = 206 [9] K  
Rp = 1.83 [1.35] Re  
a = 0.9975 [0.0945] AU  
Ag = 69590.84 [105994.95] [0.66 $\sigma$ ]  
Teffp = 5179 [1971] K [2.52 $\sigma$ ]

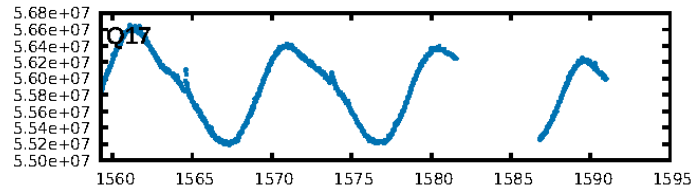
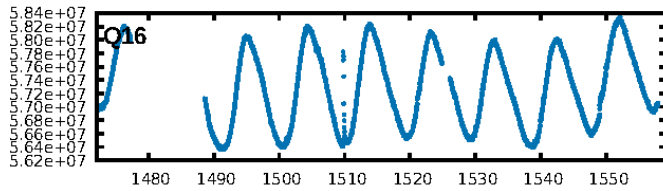
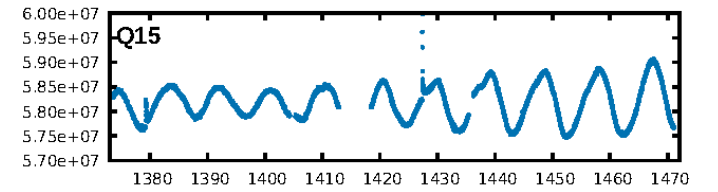
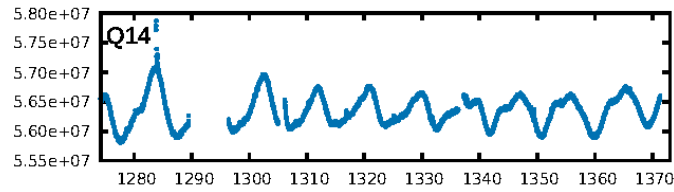
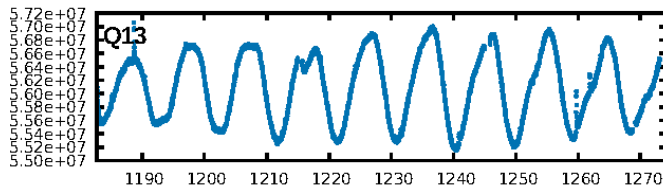
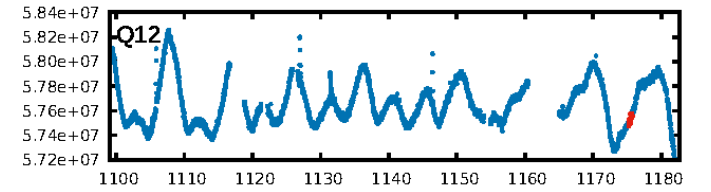
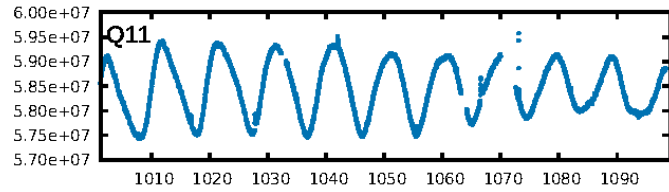
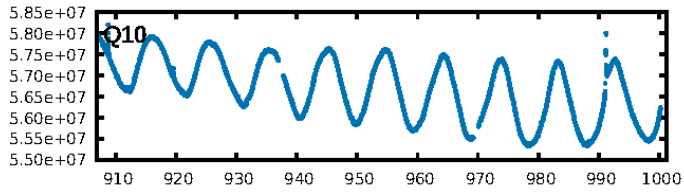
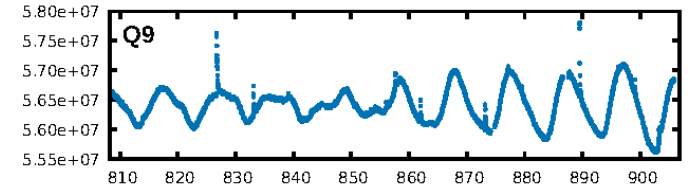
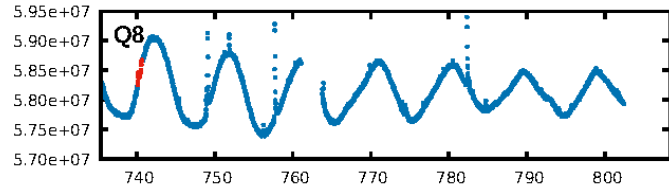
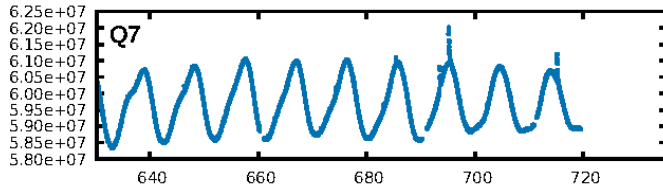
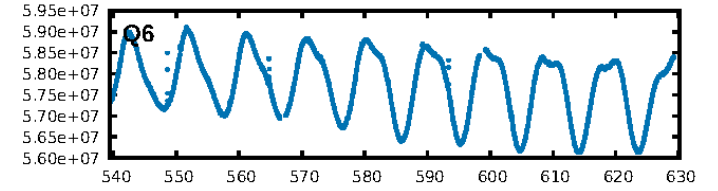
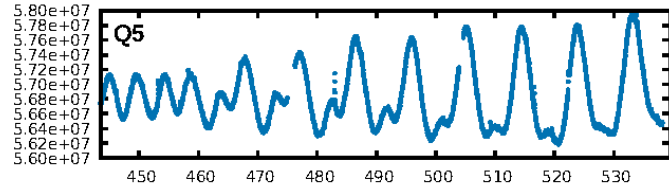
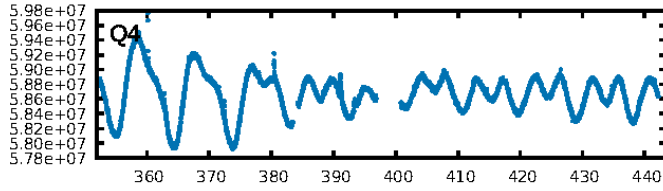
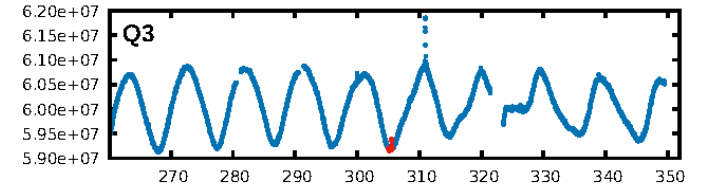
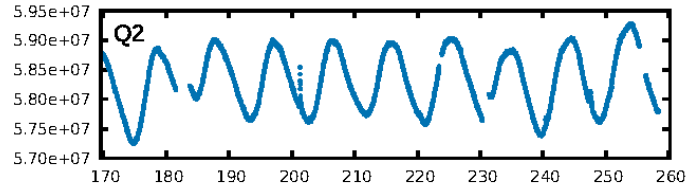
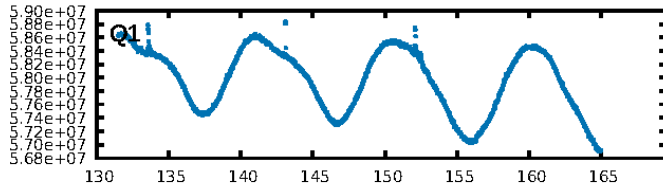
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [89.52 $\sigma$ ]  
LongPeriod-sig: 100.0% [9.70 $\sigma$ ]  
ModelChiSquare2-sig: 37.5%  
ModelChiSquareGof-sig: 94.5%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 3.975  
Centroid-sig: 36.8%  
Centroid-so: 0.775 arcsec [0.80 $\sigma$ ]  
OotOffset-rm: 0.111 arcsec [0.26 $\sigma$ ]  
OotOffset-st: 0/1/1/0 [2]  
KicOffset-rm: 0.050 arcsec [0.12 $\sigma$ ]  
KicOffset-st: 0/1/1/0 [2]  
DiffImageQuality-fgm: 1.00 [2/2]  
DiffImageOverlap-fno: 1.00 [3/3]

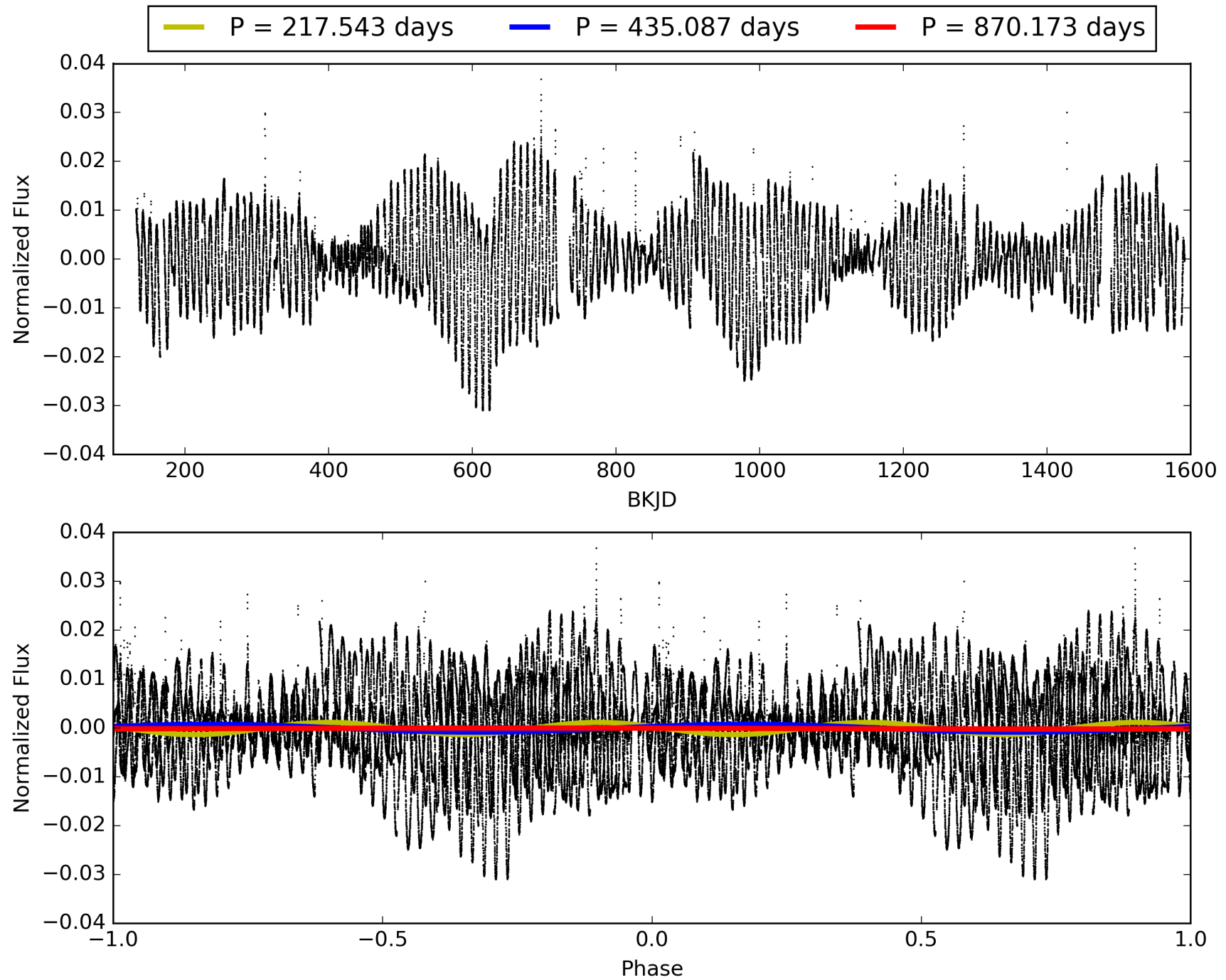
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 22:03:42 Z

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

# TCE 009772849-03, PDC Light Curves



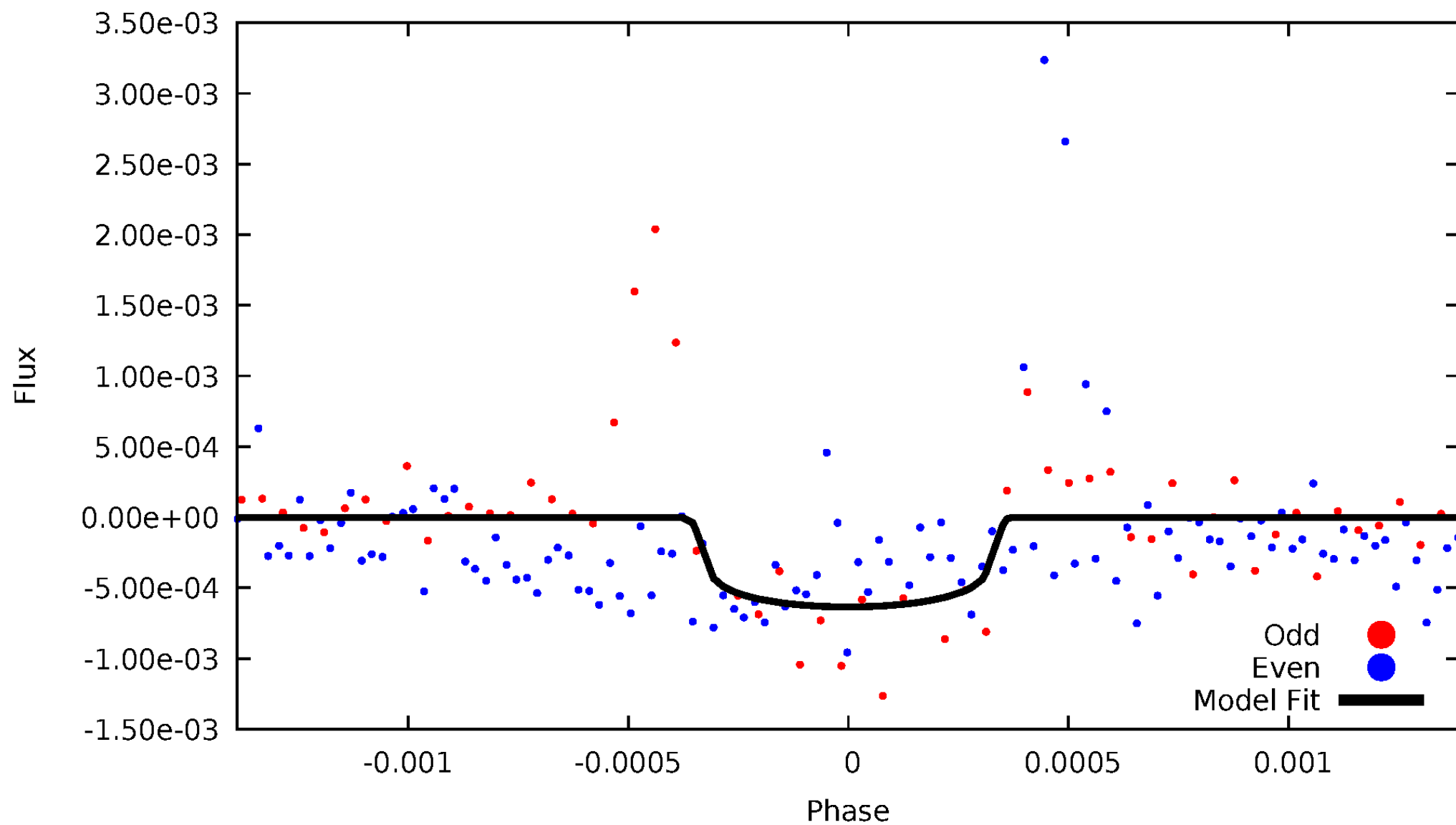
TCE 009772849-03





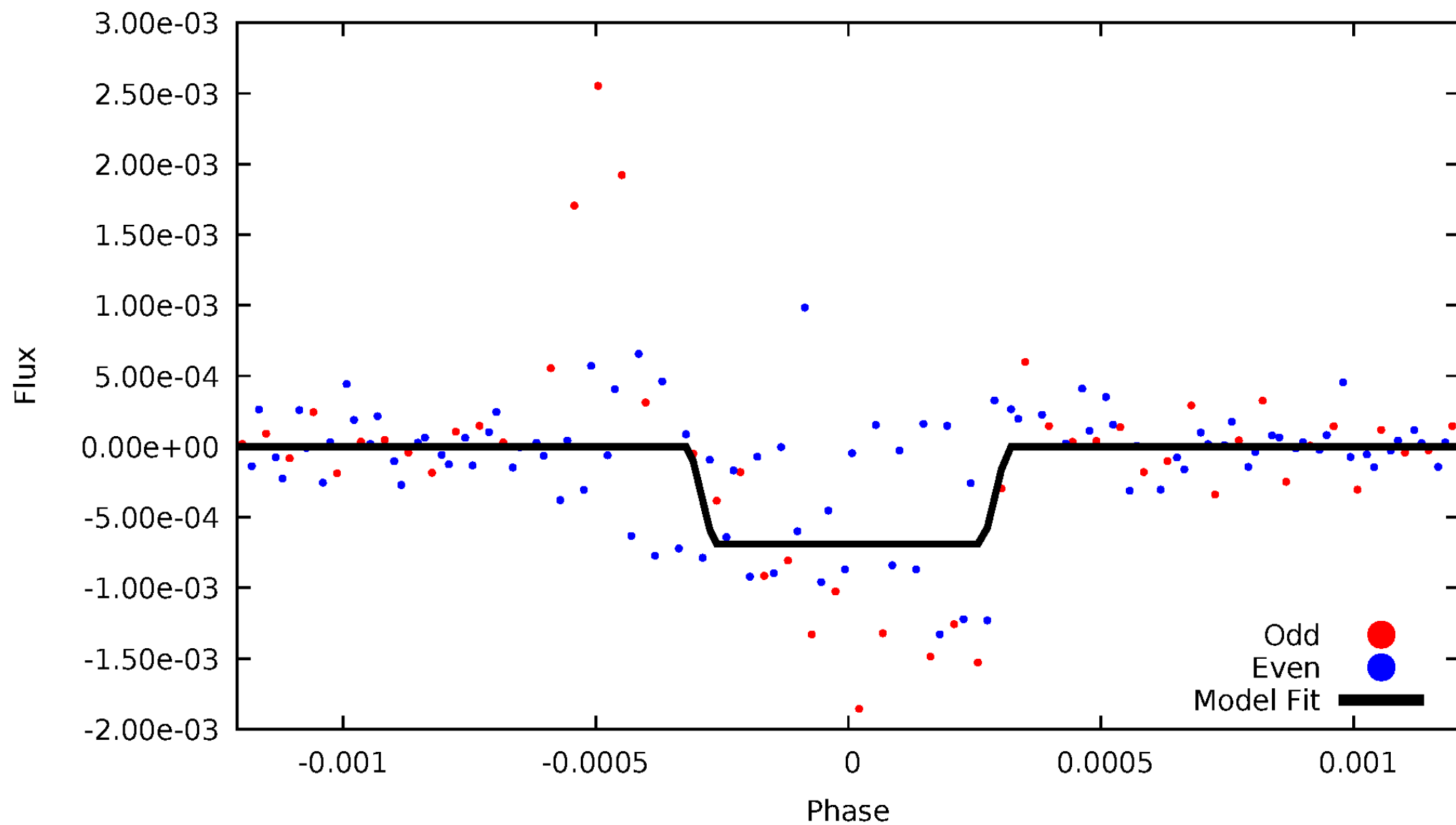
# DV Odd/Even

TCE 009772849-03



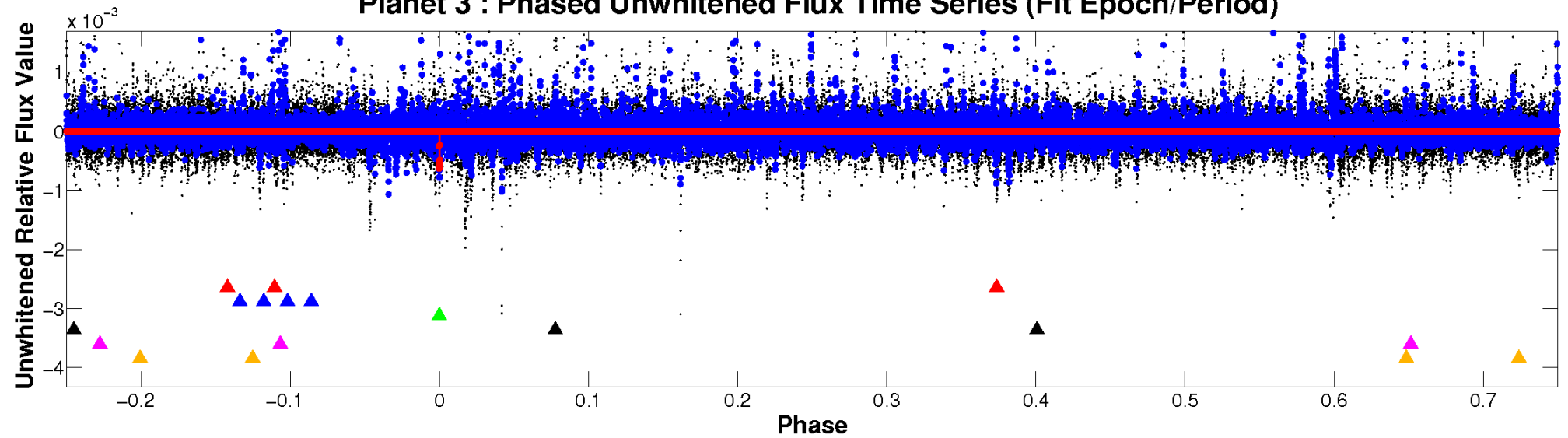
# ALT Odd/Even

TCE 009772849-03

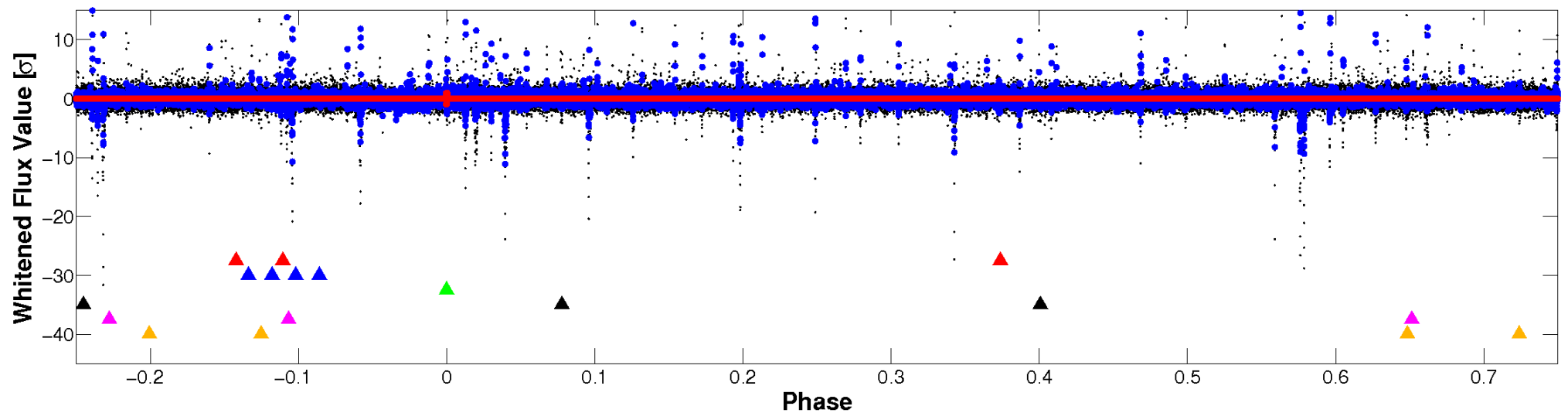


# Non-Whitened Vs. Whitened Light Curve

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

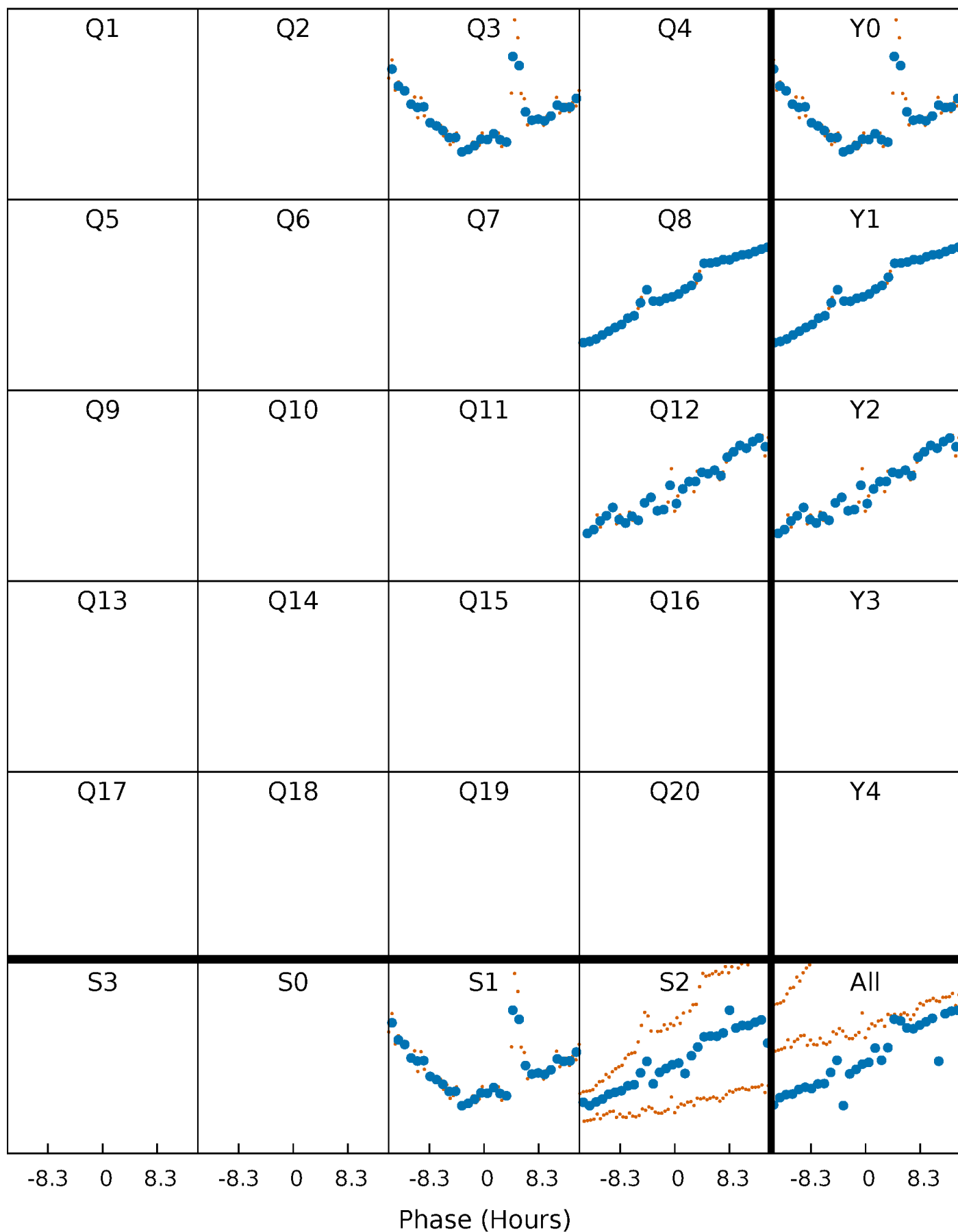


Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



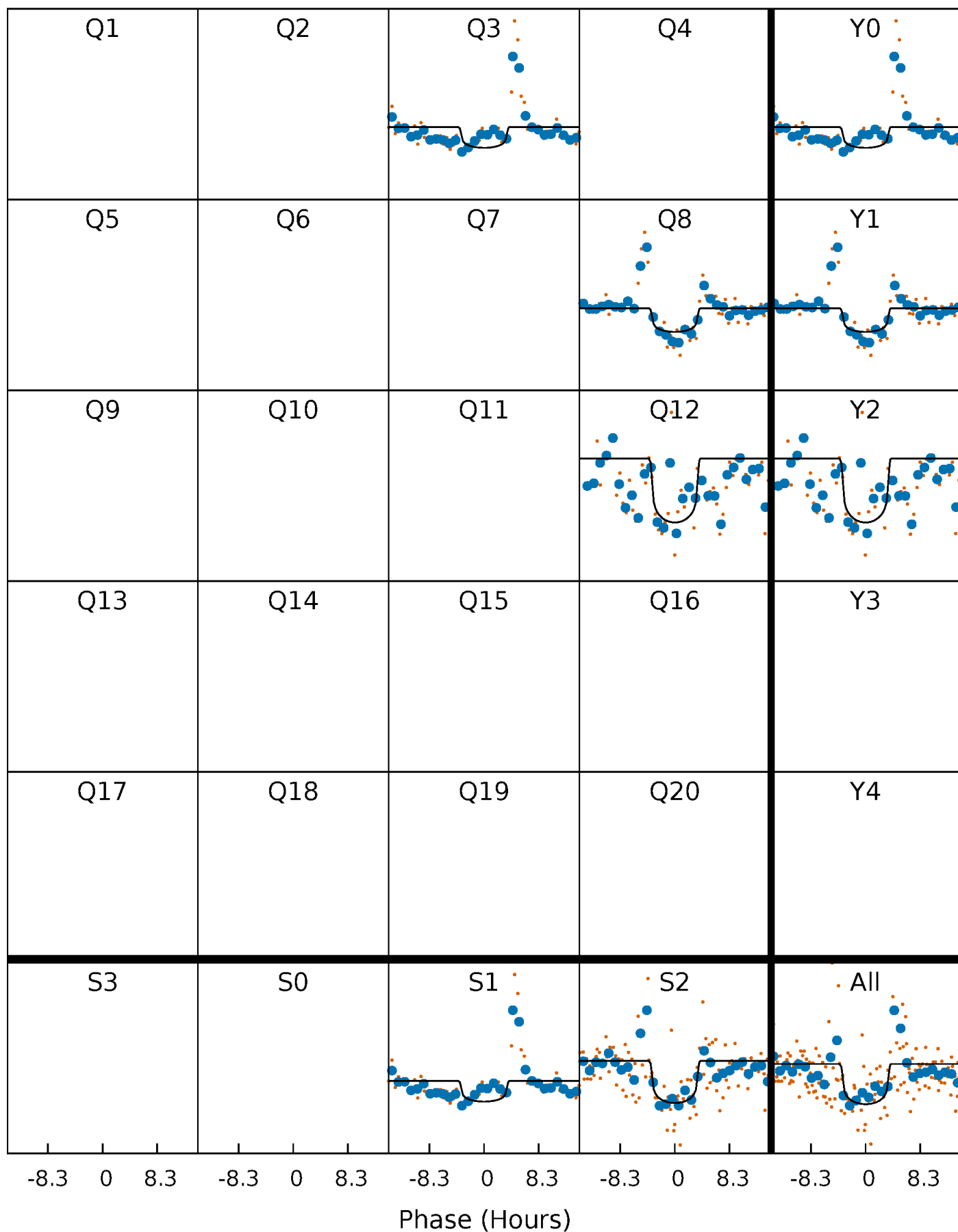
# PDC Quarter-Phased Transit Curves

TCE 009772849-03 P=435.086675 Days  $T_0=305.330819$  (BKJD)



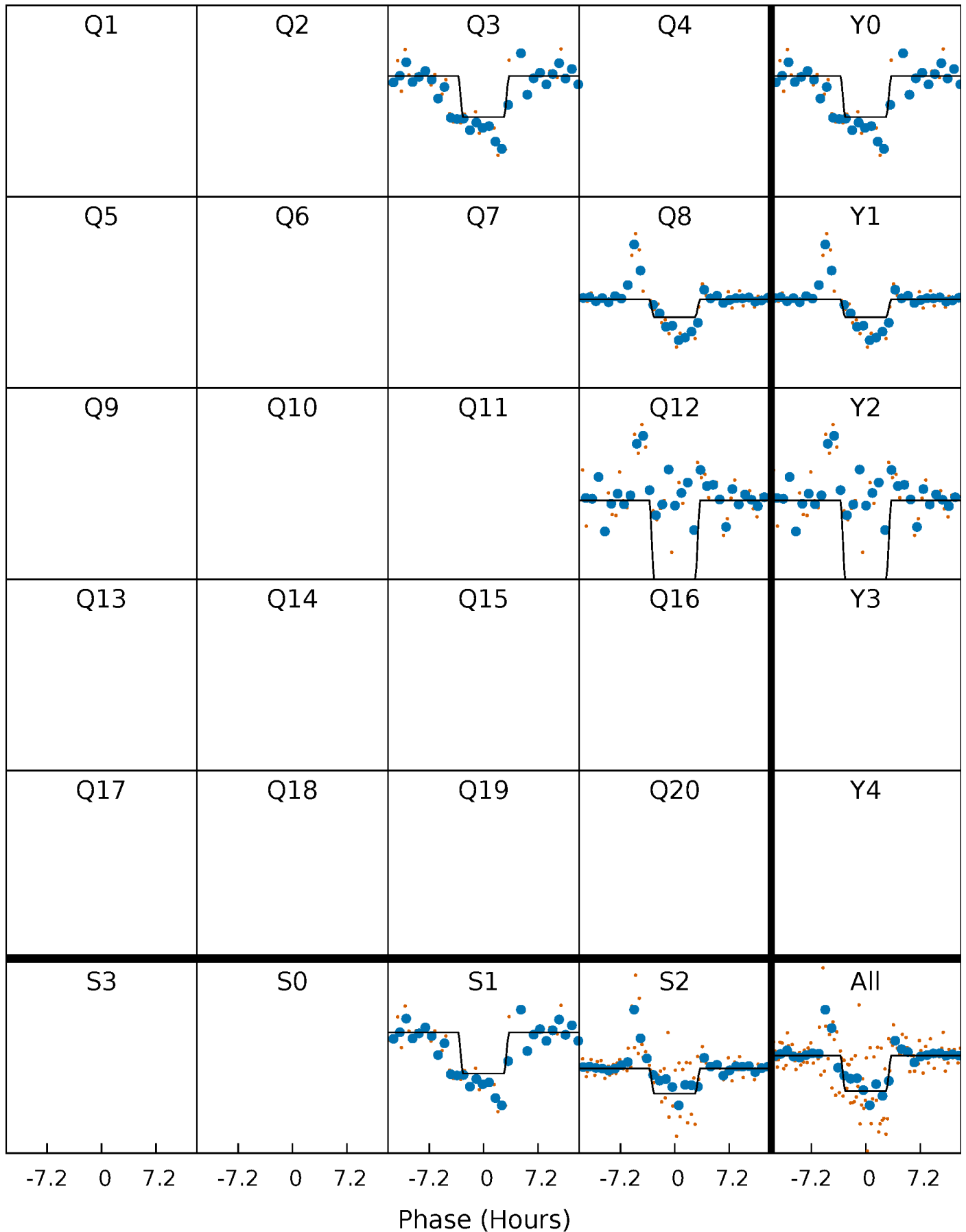
# DV Quarter-Phased Transit Curves

TCE 009772849-03     $P=435.086675$  Days     $T_0=305.330819$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

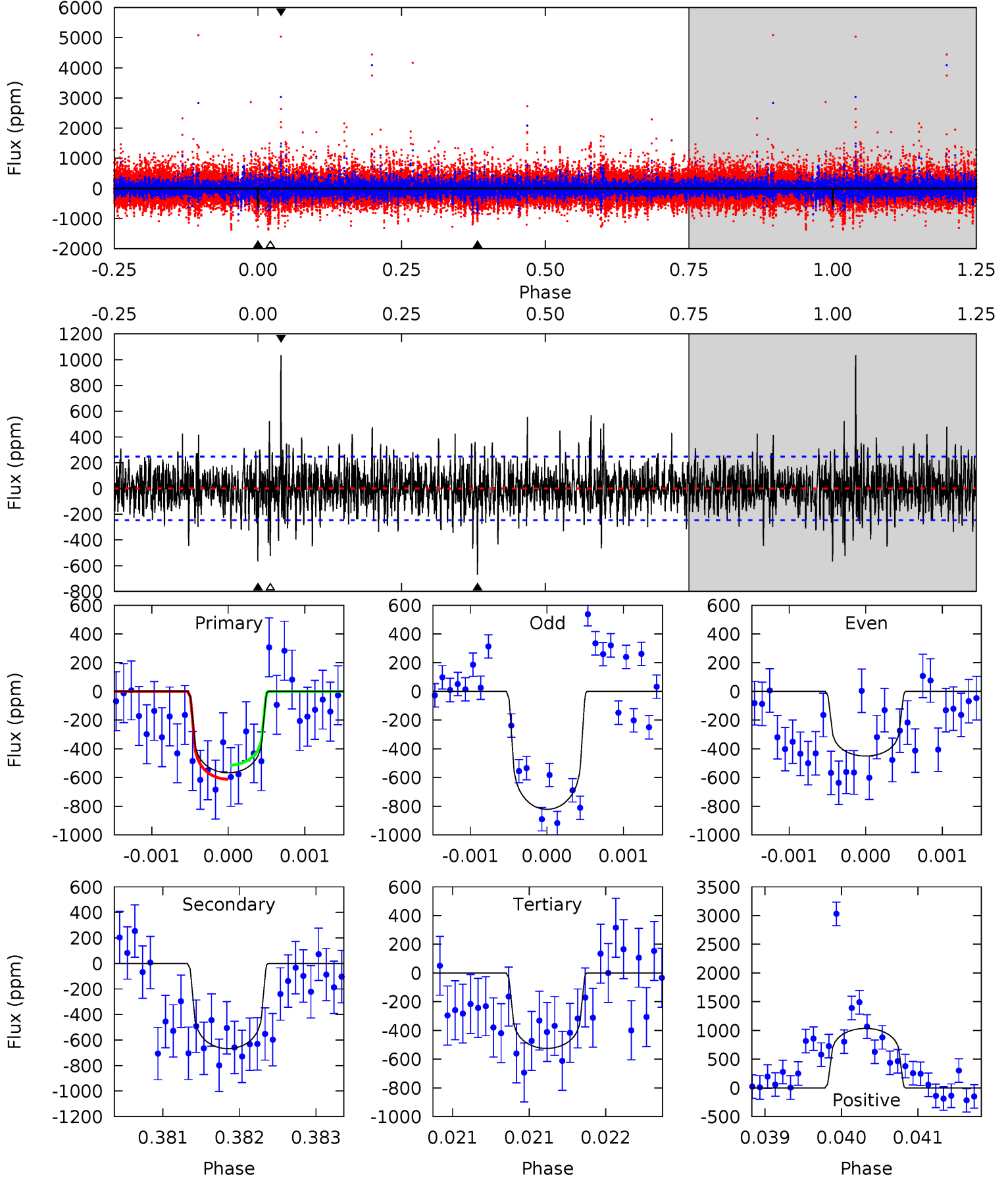
TCE 009772849-03     $P=435.078171$  Days     $T_0=305.363983$  (BKJD)



# DV Model-Shift Uniqueness Test

009772849-03, P = 435.086675 Days, E = 305.330819 Days

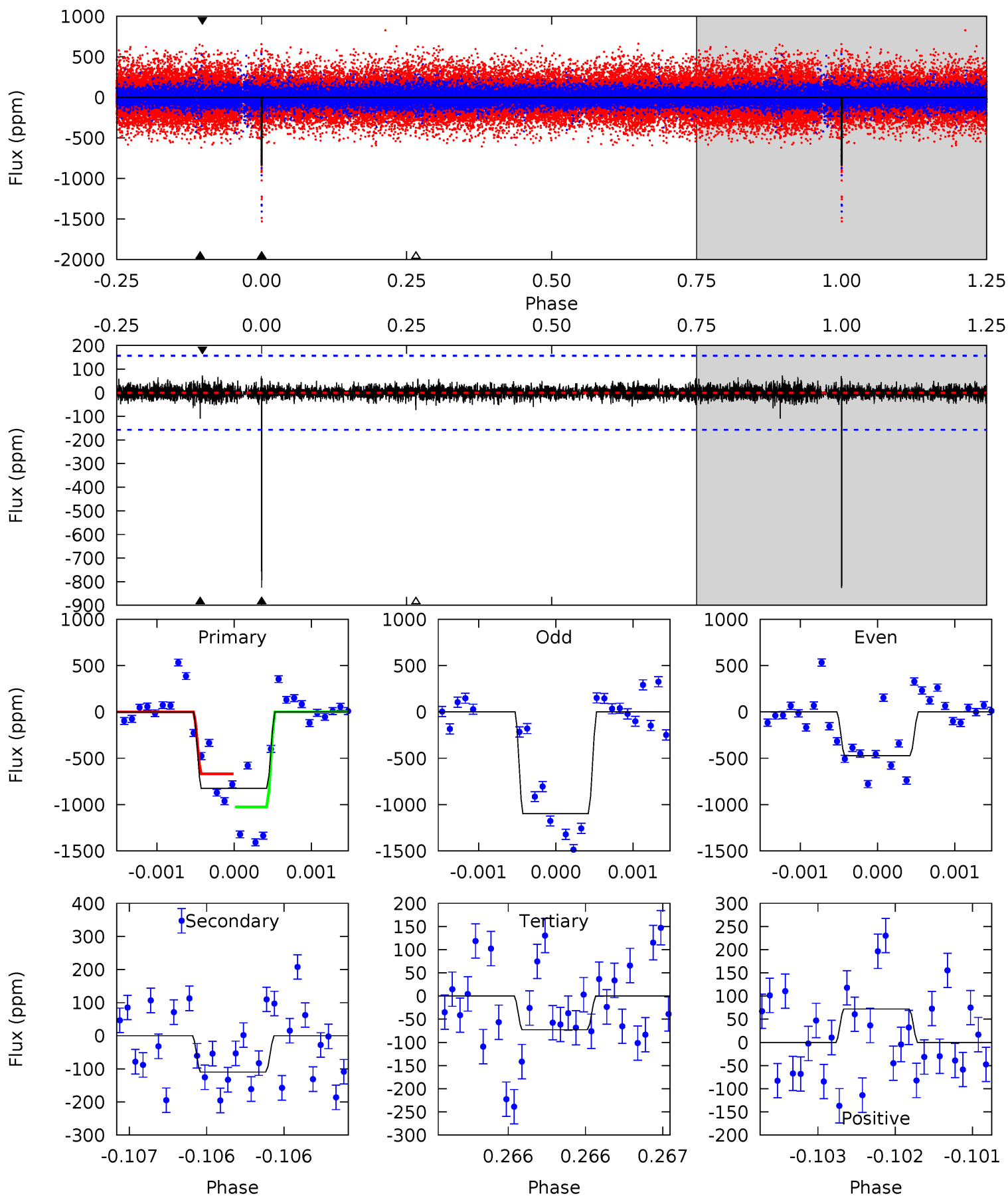
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.7	14.9	11.7	23.1	5.51	3.38	2.72	0.94	-10.4	3.18	-8.19	2.11	1.13	0.61	1.08



# Alt Model-Shift Uniqueness Test

009772849-03, P = 435.078171 Days, E = 305.363983 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
29.2	3.88	2.57	2.54	5.54	3.43	0.51	26.6	26.7	1.31	1.34	11.1	0.70	0.08	6.19





### Stellar Parameters For KIC 009772849

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5593^{+166}_{-166}$	$4.596^{+0.065}_{-0.071}$	$-0.920^{+0.350}_{-0.300}$	$0.697^{+0.081}_{-0.054}$	$0.698^{+0.069}_{-0.035}$	$2.905^{+0.750}_{-0.712}$
	+3%/-3%	+1%/-2%	+38%/-33%	+12%/-8%	+10%/-5%	+26%/-25%
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 009772849-03 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-668 \pm 45$	$1.93^{+1.35}_{-1.11}$	$288^{+12}_{-10}$	$5651^{+3702}_{-1138}$	$99393^{+447469}_{-64838}$
Alt.	$-110 \pm 28$	$2.16^{+1.37}_{-1.19}$	$289^{+11}_{-11}$	$3772^{+1356}_{-529}$	$12640^{+50694}_{-7744}$

$T_{max}$  = 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

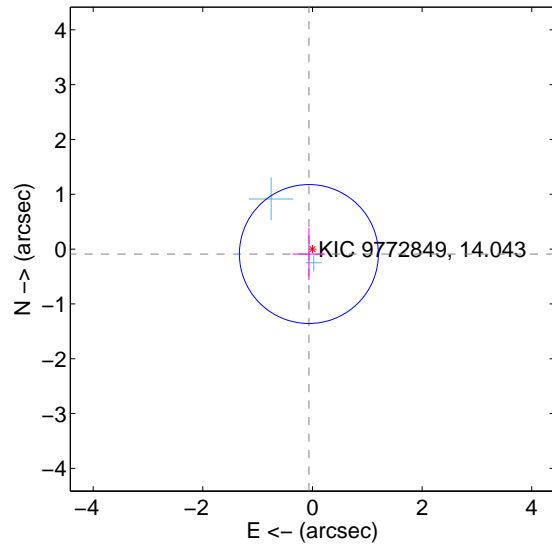
Supplemental centroid analysis for 009772849-03. Kepler magnitude: 14.04. Transit SNR 6.28

There are 2 quarters with good PRF difference image offsets

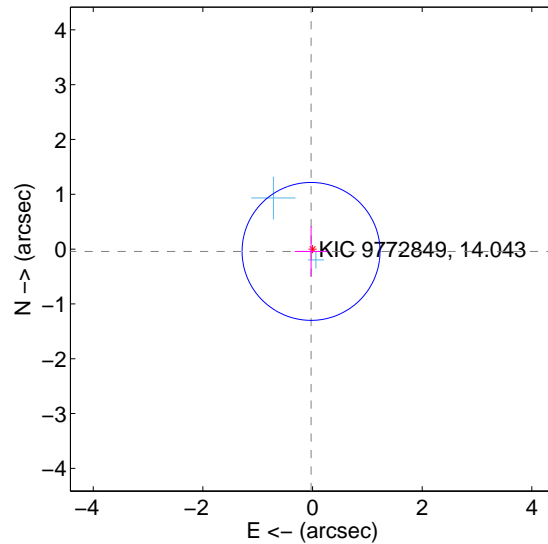
The direct PRF centroid is offset from the target star catalog position by about 0.04 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.111 \pm 0.422$	0.26	$0.065 \pm 0.298$	$-0.090 \pm 0.474$
PRF-fit source offset from KIC position	$0.050 \pm 0.419$	0.12	$0.027 \pm 0.297$	$-0.042 \pm 0.460$
photometric centroid source offset	$0.77 \pm 0.97$	0.80	$-0.47 \pm 0.95$	$0.61 \pm 0.98$

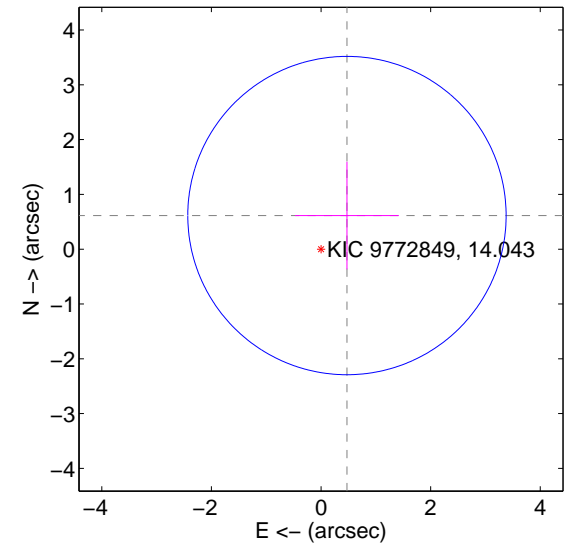
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

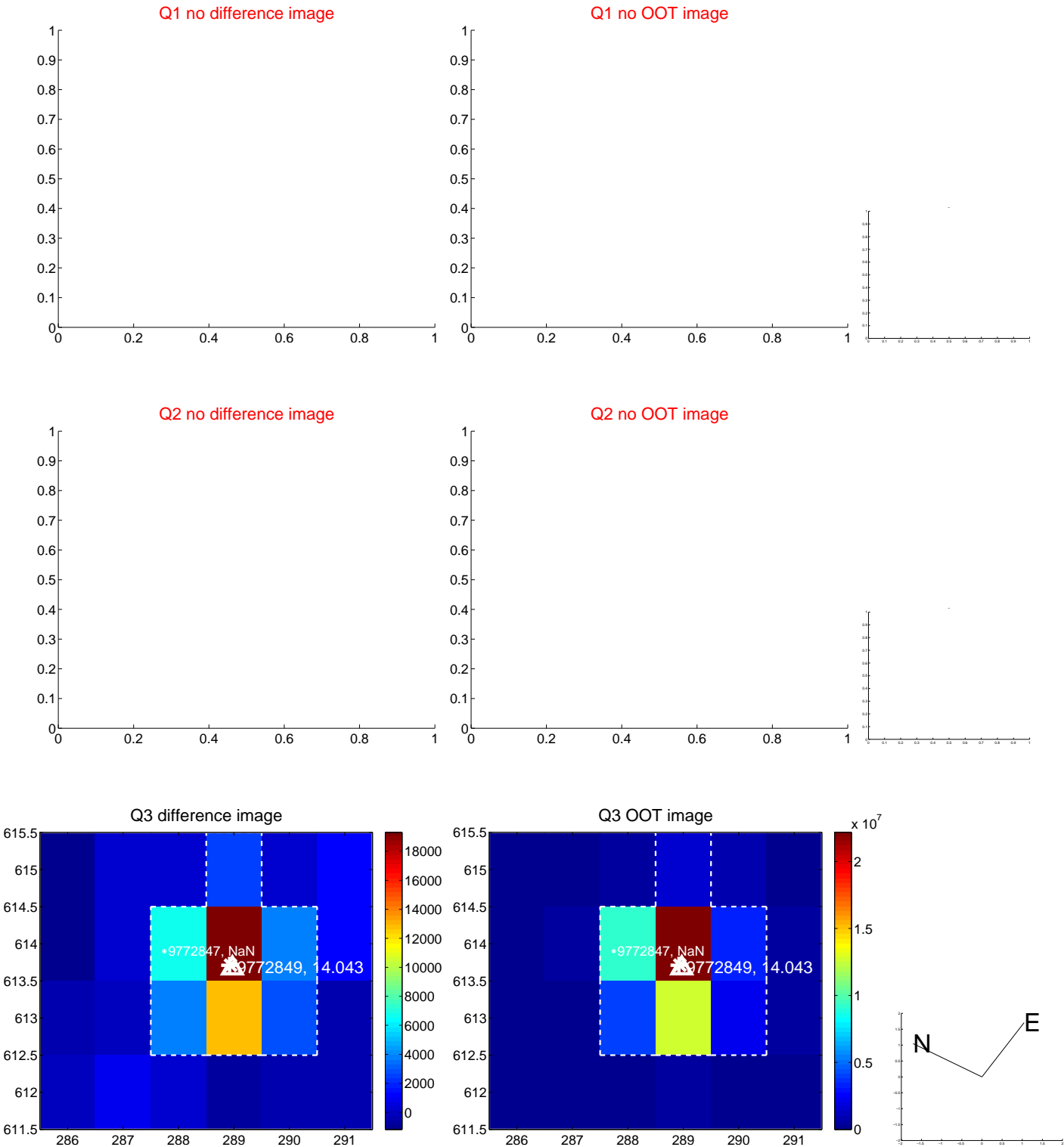


offset from photometric centroids

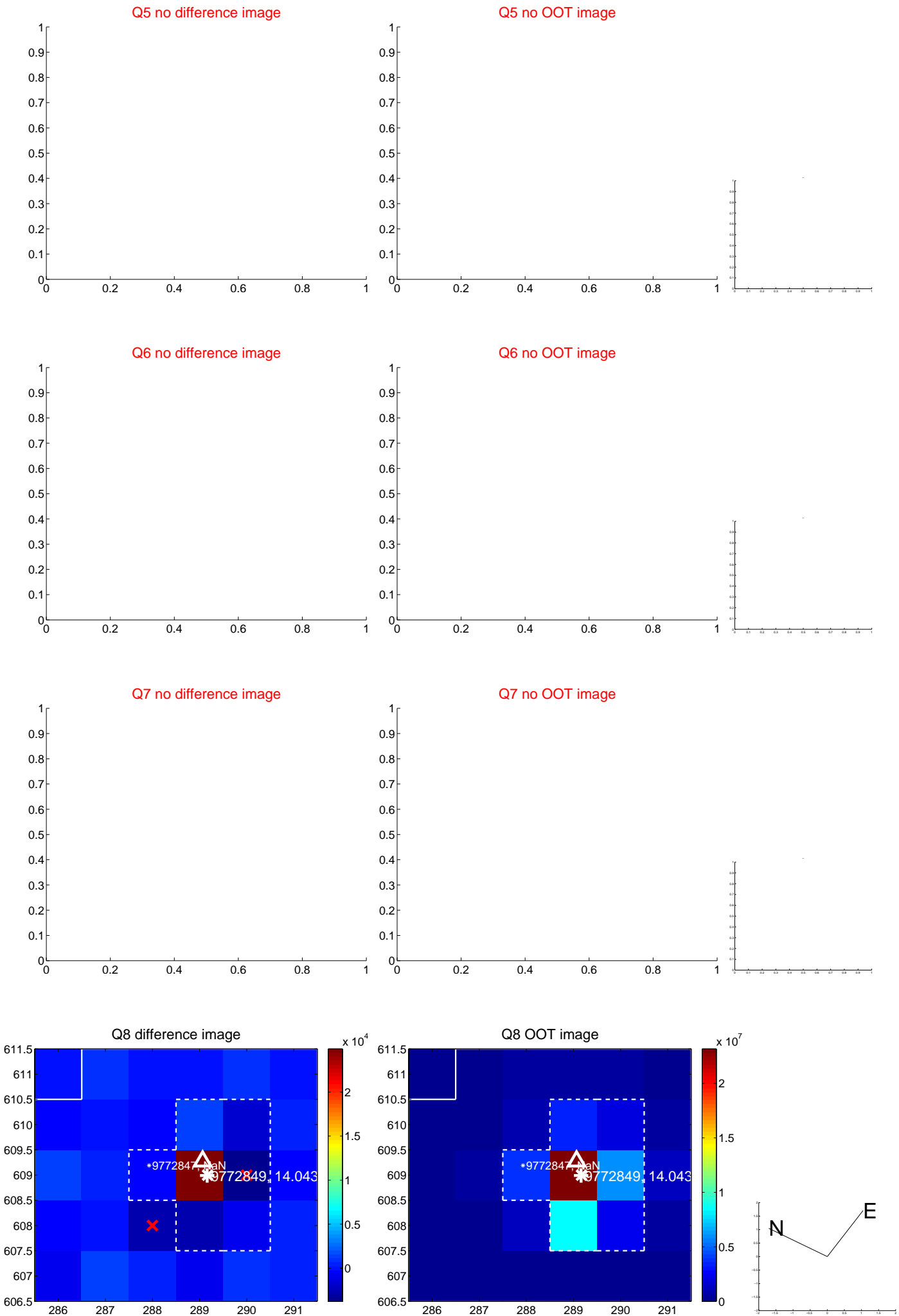


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

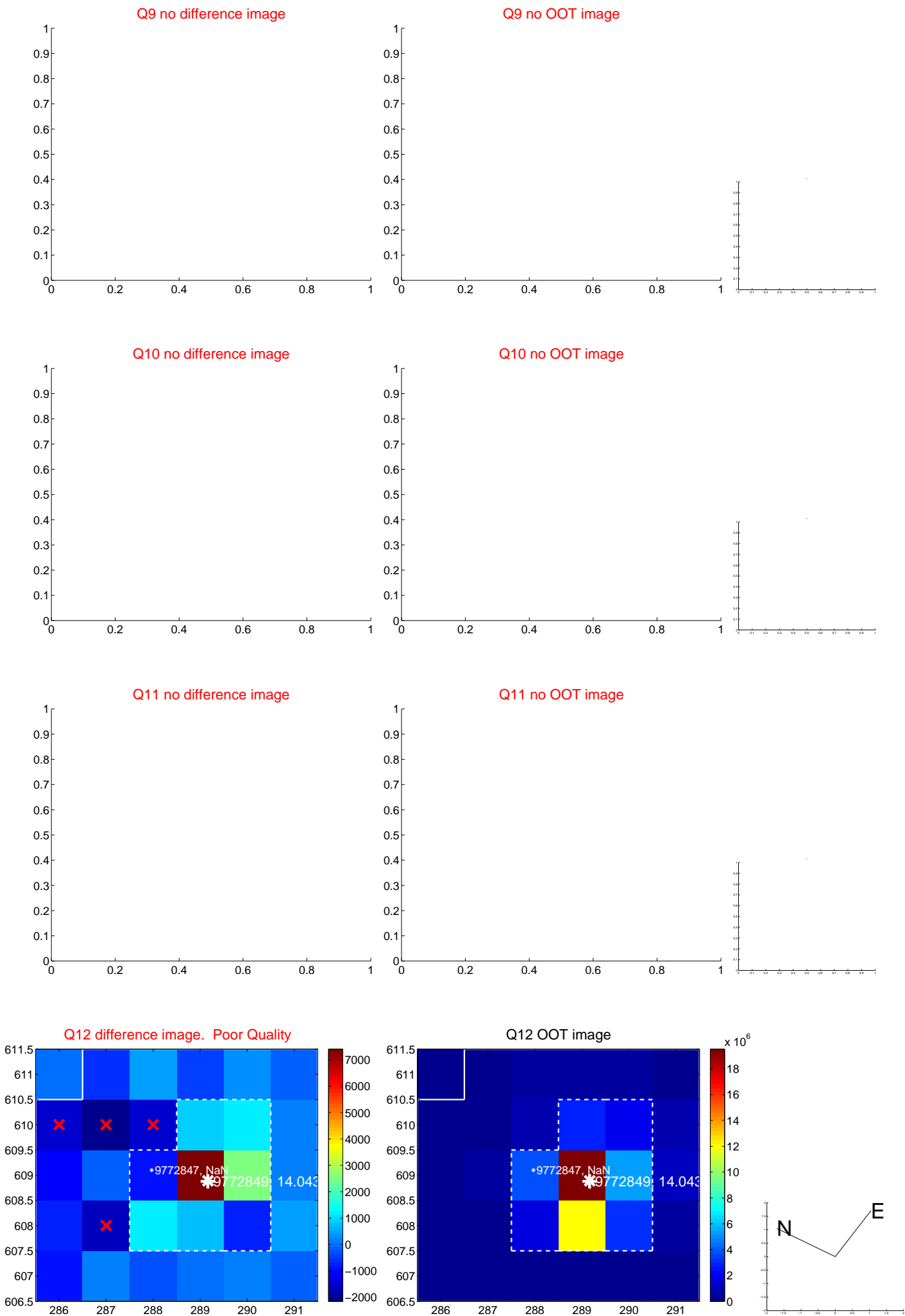
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



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



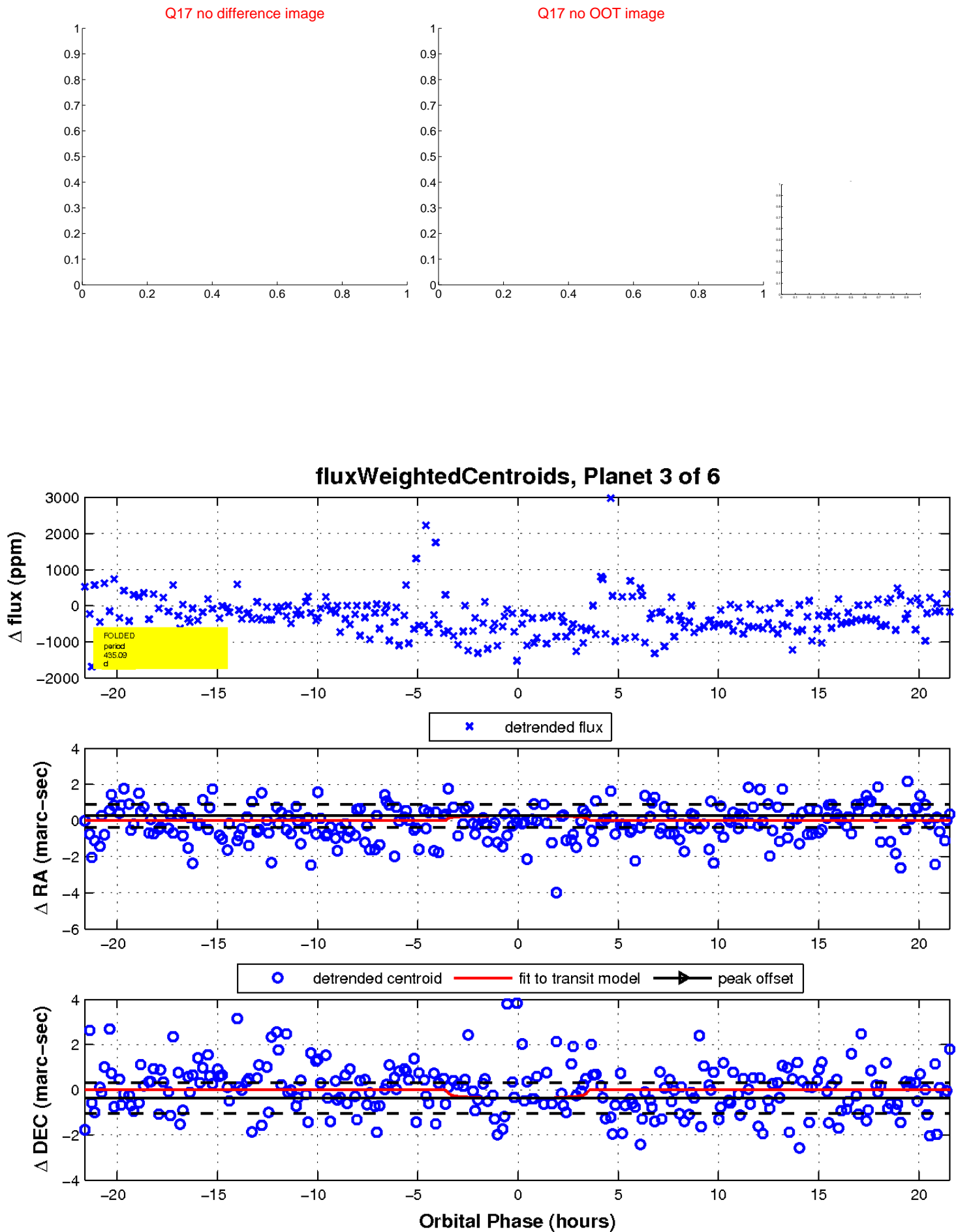
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

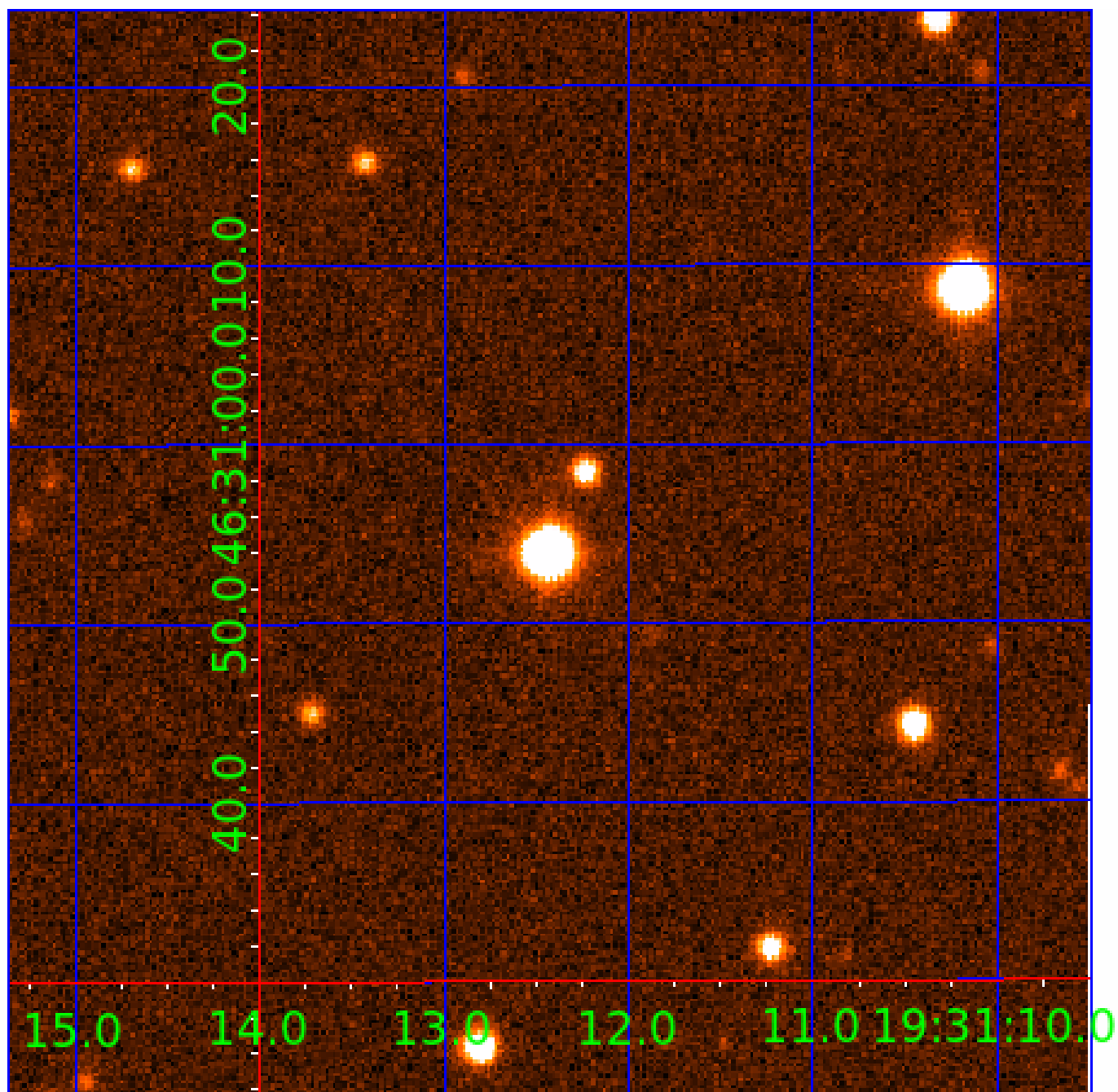


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 009772849

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009772849-02	OBS	No	442.025565	247.147747	665.8	15.562	15.7	7.1	0.70	5593	2.26	0.42
009772849-03	OBS	No	435.086675	305.330819	634.6	7.244	12.5	6.3	0.70	5593	1.83	0.43
009772849-04	OBS	No	575.579420	198.696126	710.7	4.204	11.3	7.5	0.70	5593	2.31	0.29
009772849-05	OBS	No	487.717346	588.752969	413.9	17.908	16.1	3.7	0.70	5593	1.42	0.37
009772849-06	OBS	No	402.255062	250.866823	510.9	5.000	11.2	-1.0	0.70	5593	1.57	0.47

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009772849-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009772849-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009772849-04	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL—ALL_TRANS_CHASES—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
009772849-05	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL_SKYE_ZUMA—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
009772849-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—ALL_TRANS_CHASES—CENT_NOFITS

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

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

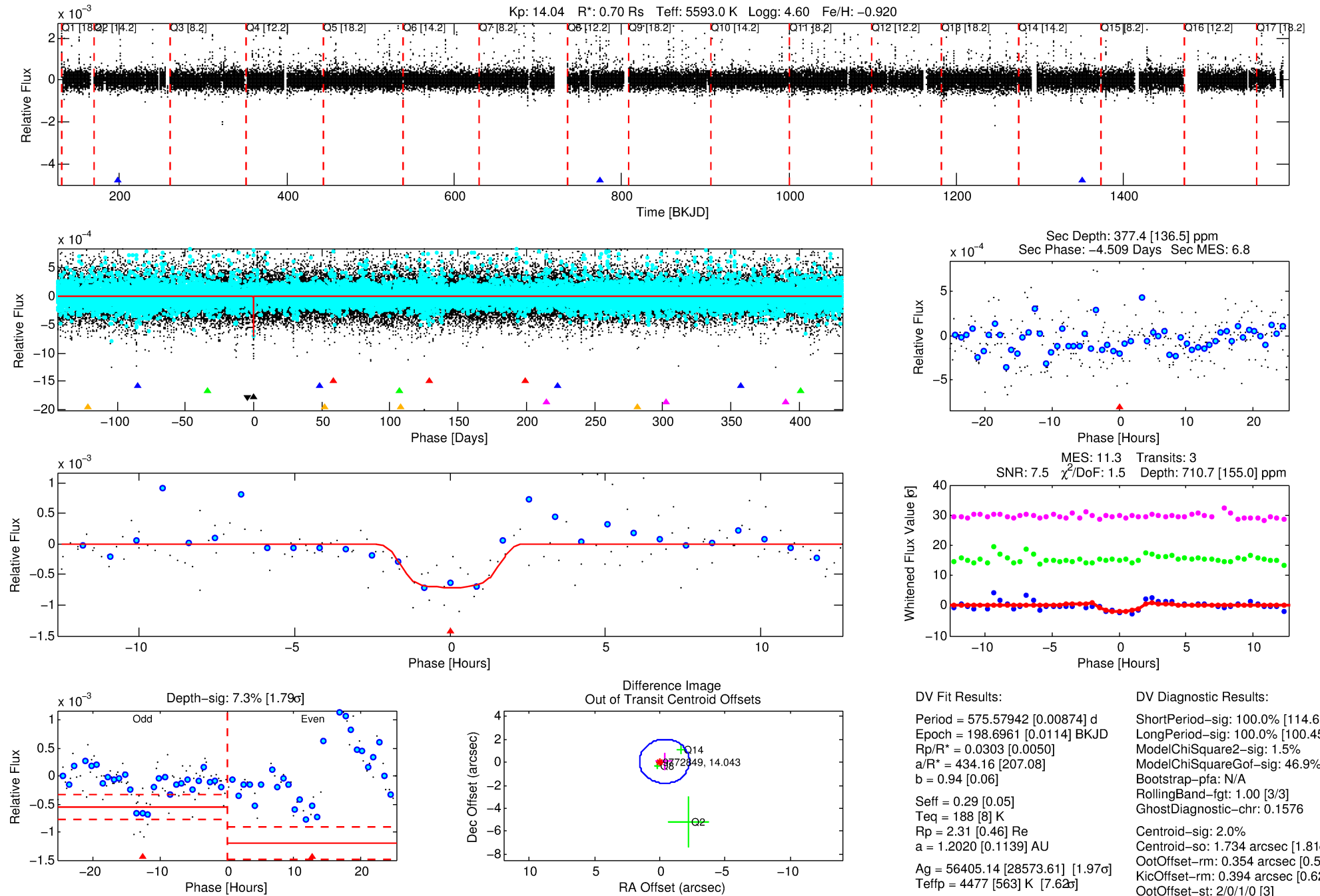
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 009772849-04

No Significant Match Found

# DV One-Page Summary

KIC: 9772849 Candidate: 4 of 6 Period: 575.579 d



## DV Fit Results:

Period = 575.57942 [0.00874] d  
Epoch = 198.6961 [0.0114] BKJD  
Rp/R\* = 0.0303 [0.0050]  
a/R\* = 434.16 [207.08]  
b = 0.94 [0.06]  
Seff = 0.29 [0.05]  
Teq = 188 [8] K  
Rp = 2.31 [0.46] Re  
a = 1.2020 [0.1139] AU  
Ag = 56405.14 [28573.61] [1.97σ]  
Teffp = 4477 [563] K [7.62σ]

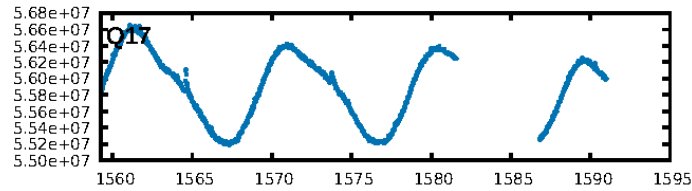
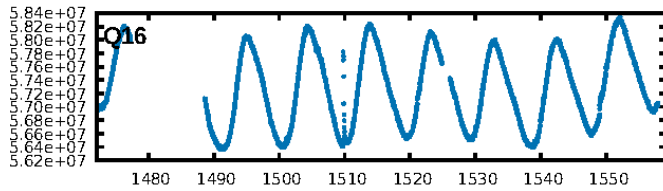
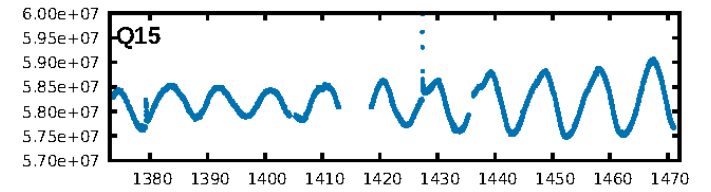
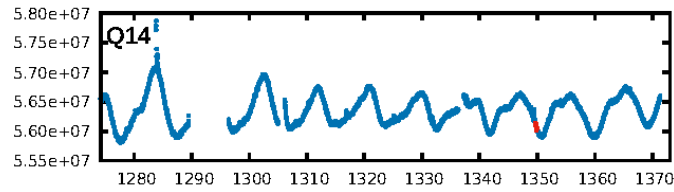
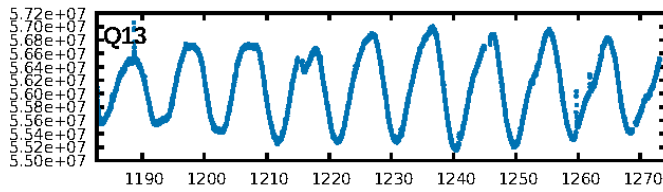
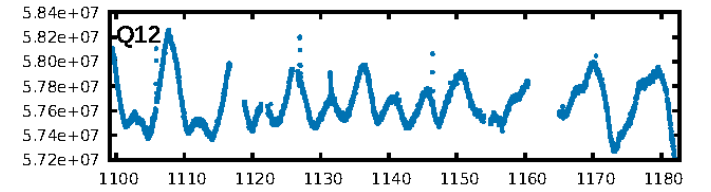
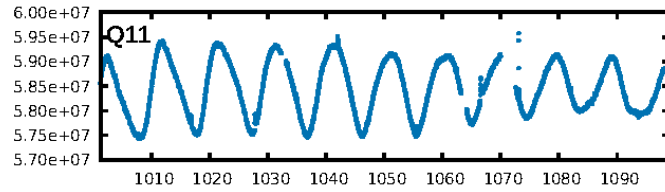
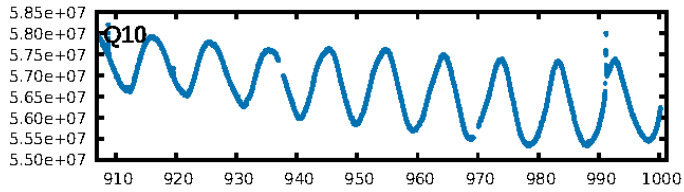
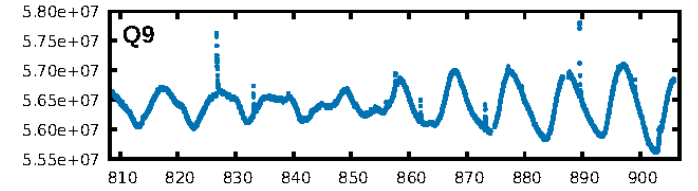
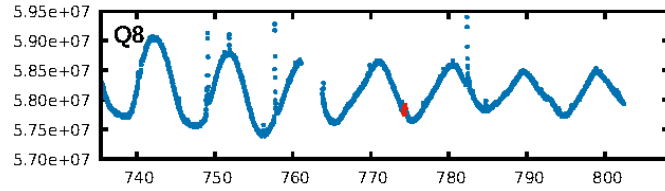
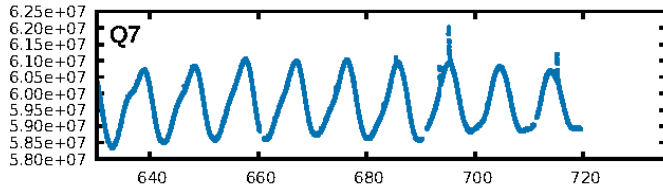
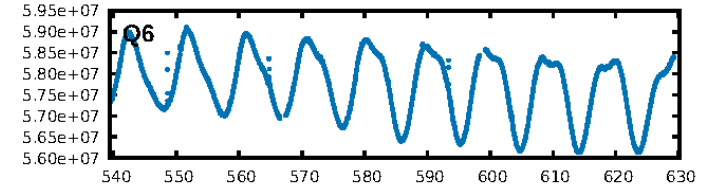
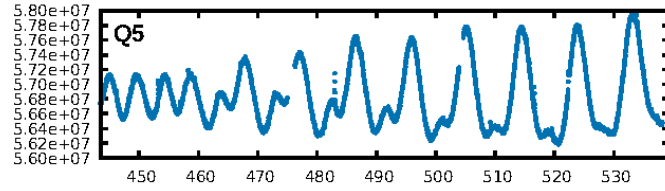
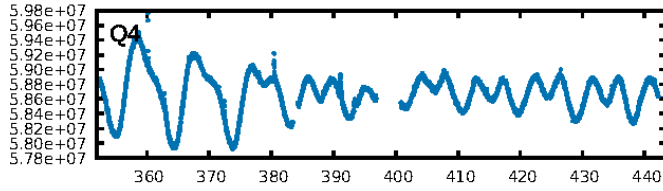
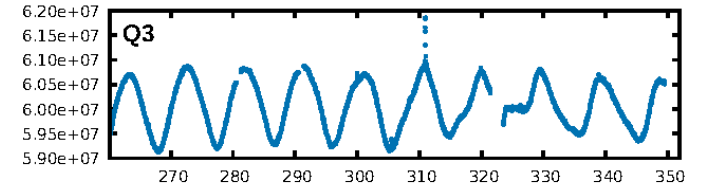
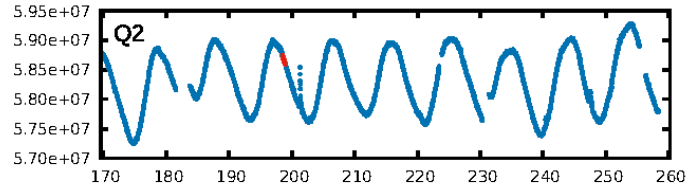
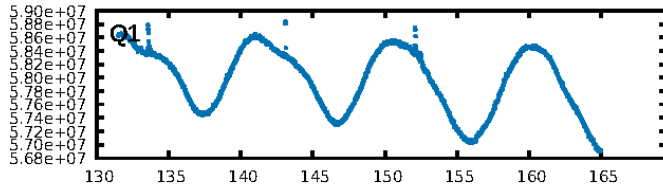
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [114.63σ]  
LongPeriod-sig: 100.0% [100.45σ]  
ModelChiSquare2-sig: 1.5%  
ModelChiSquareGof-sig: 46.9%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 0.1576  
Centroid-sig: 2.0%  
Centroid-so: 1.734 arcsec [1.81σ]  
OotOffset-rm: 0.354 arcsec [0.55σ]  
KicOffset-rm: 0.394 arcsec [0.62σ]  
OotOffset-st: 2/0/1/0 [3]  
KicOffset-st: 2/0/1/0 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 1.00 [3/3]

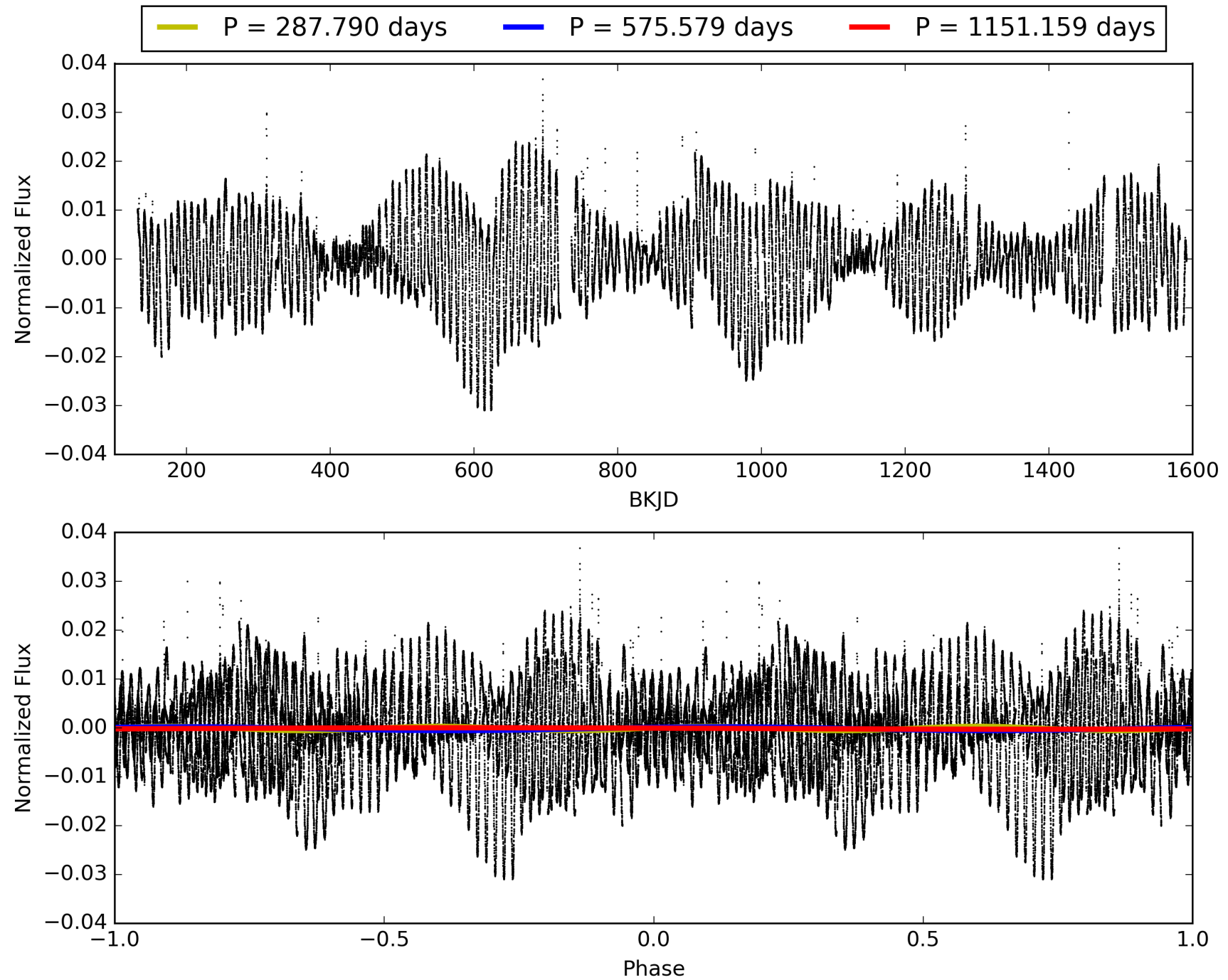
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 22:04:01 Z

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

# TCE 009772849-04, PDC Light Curves

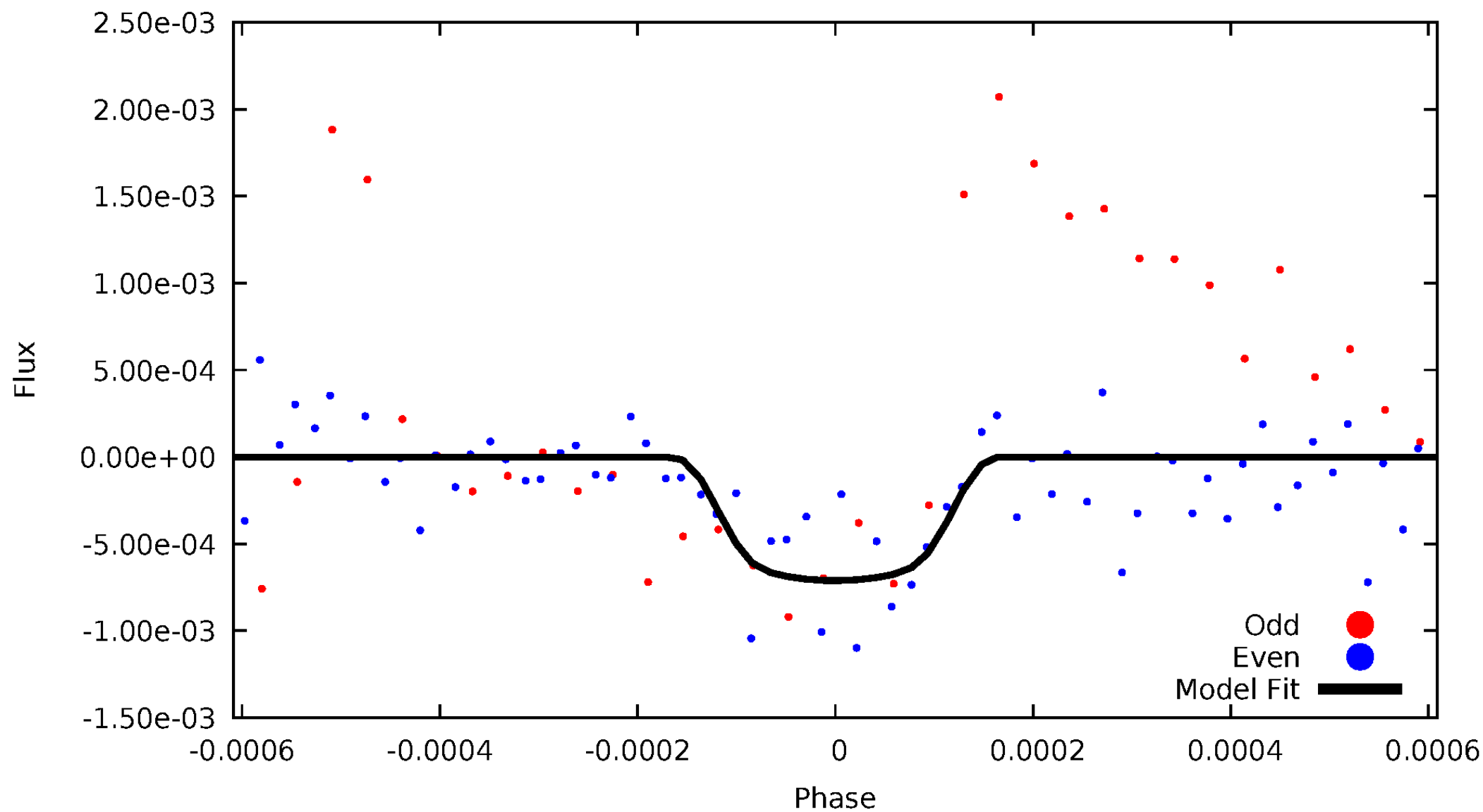


TCE 009772849-04



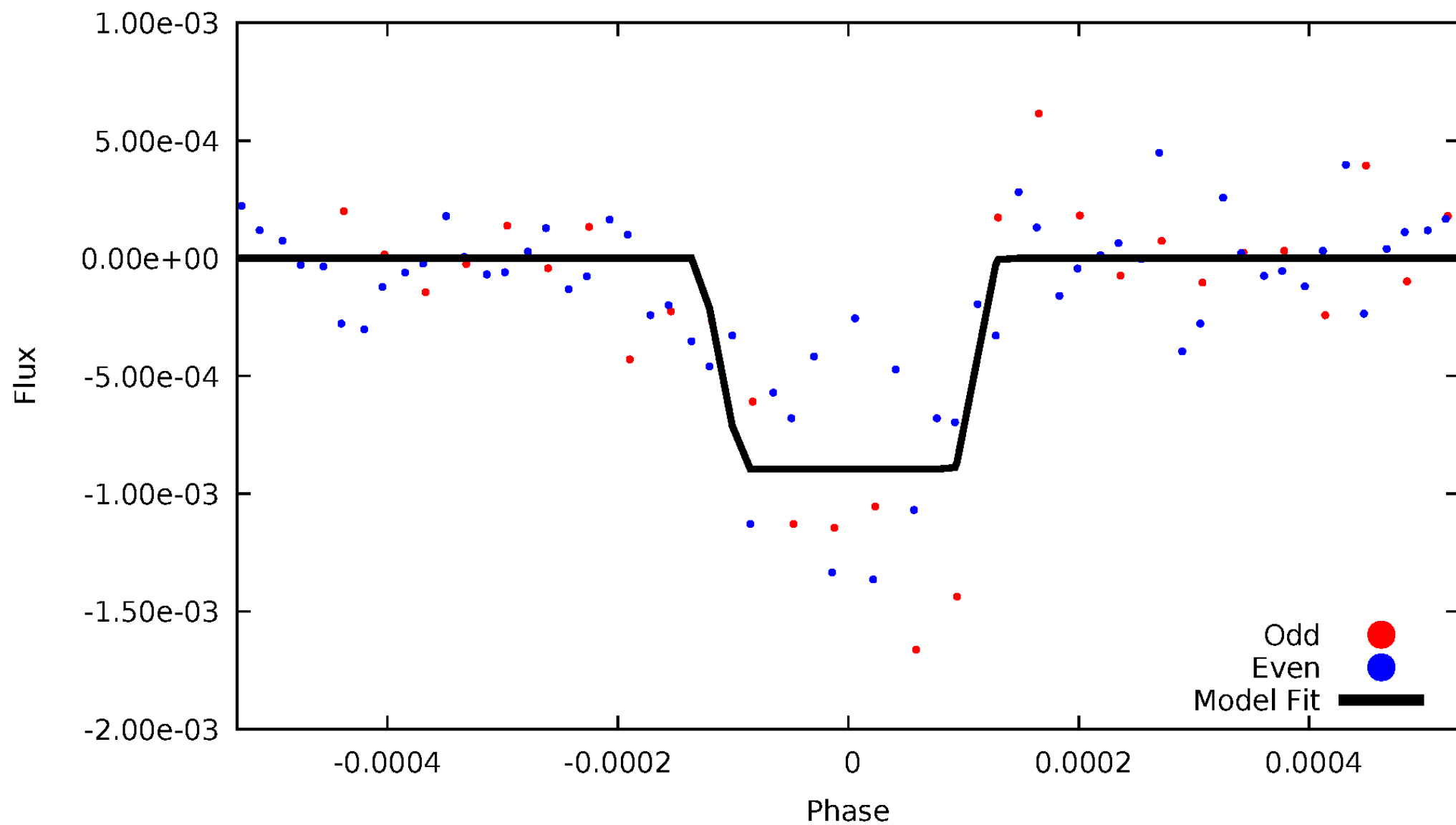
# DV Odd/Even

TCE 009772849-04



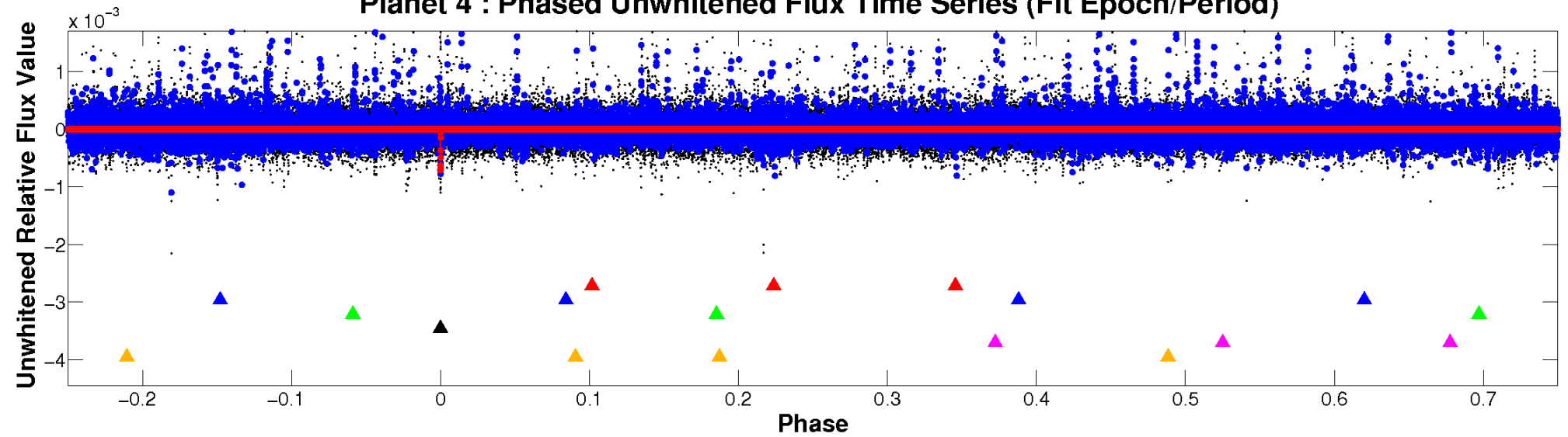
# ALT Odd/Even

TCE 009772849-04

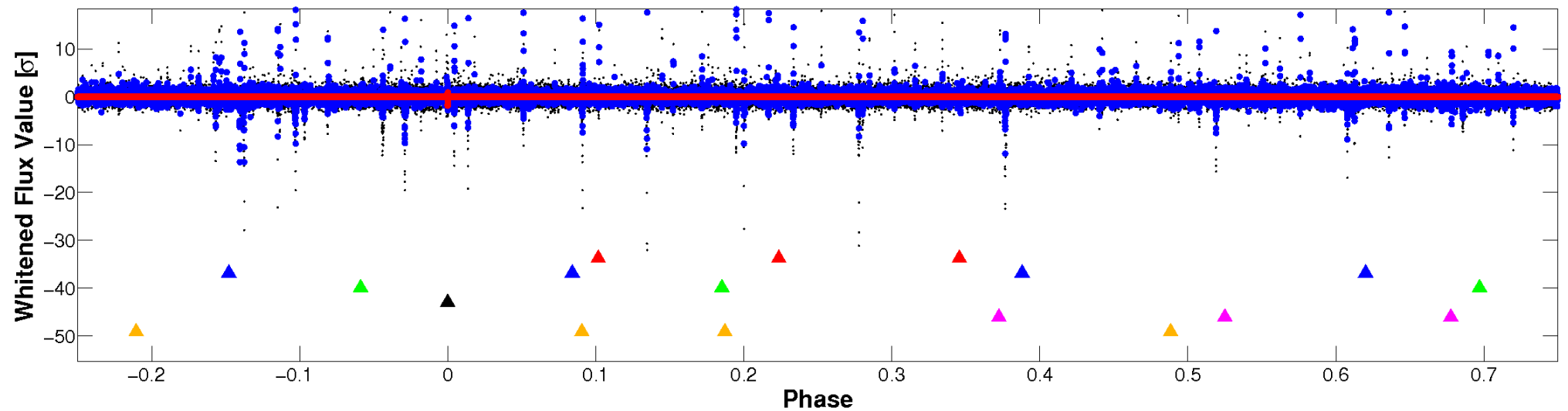


# Non-Whitened Vs. Whitened Light Curve

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

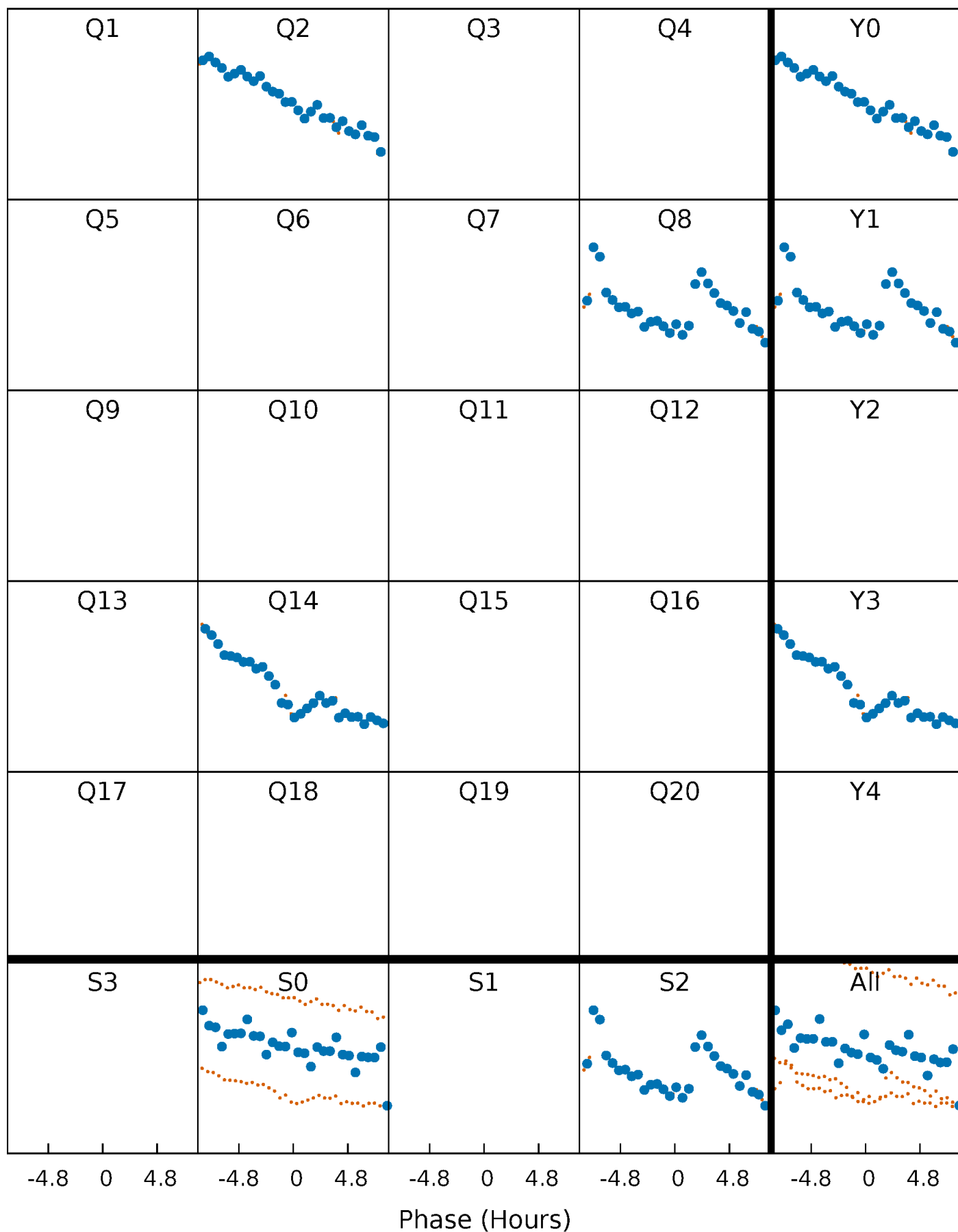


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

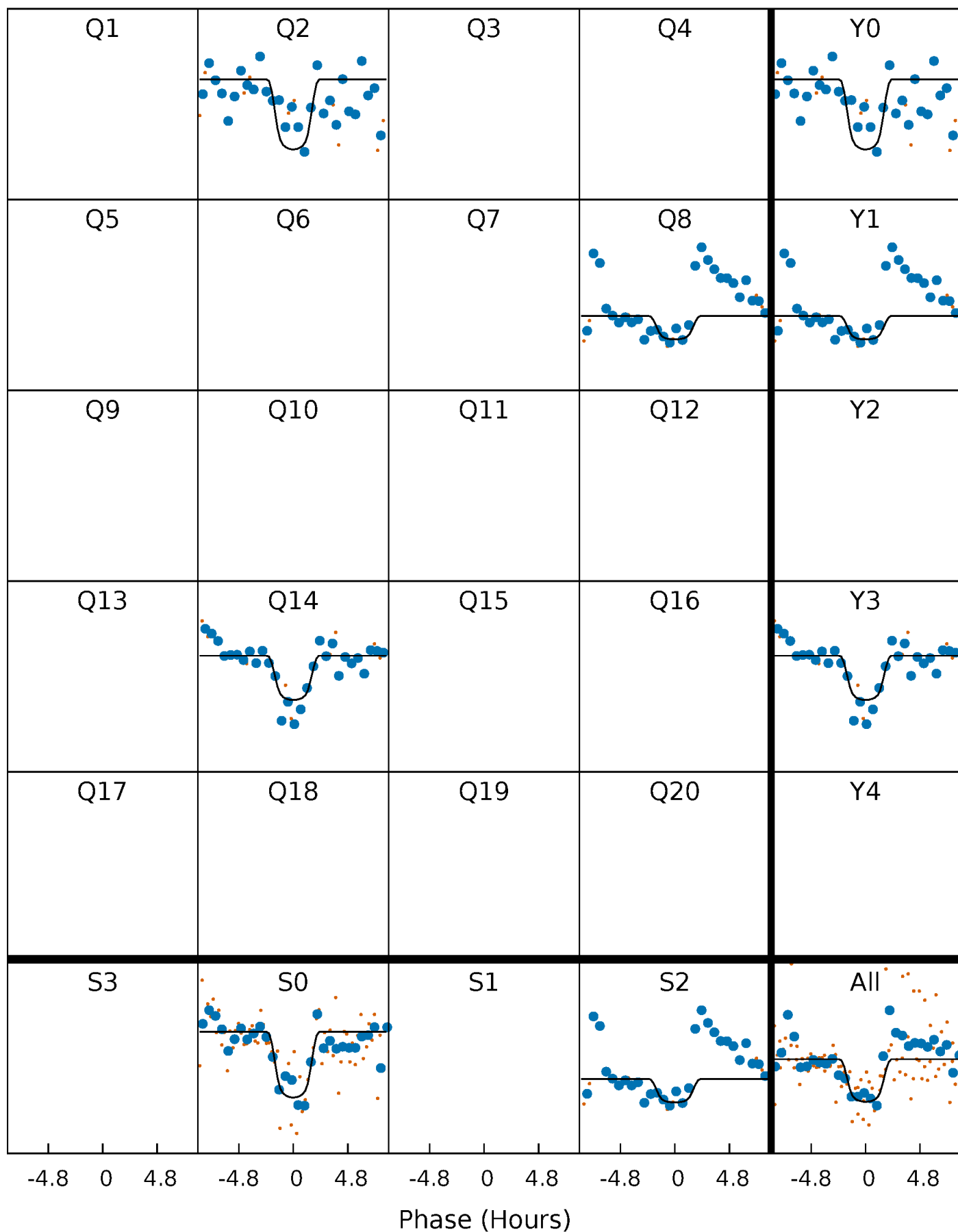
TCE 009772849-04 P=575.579420 Days  $T_0=198.696126$  (BKJD)





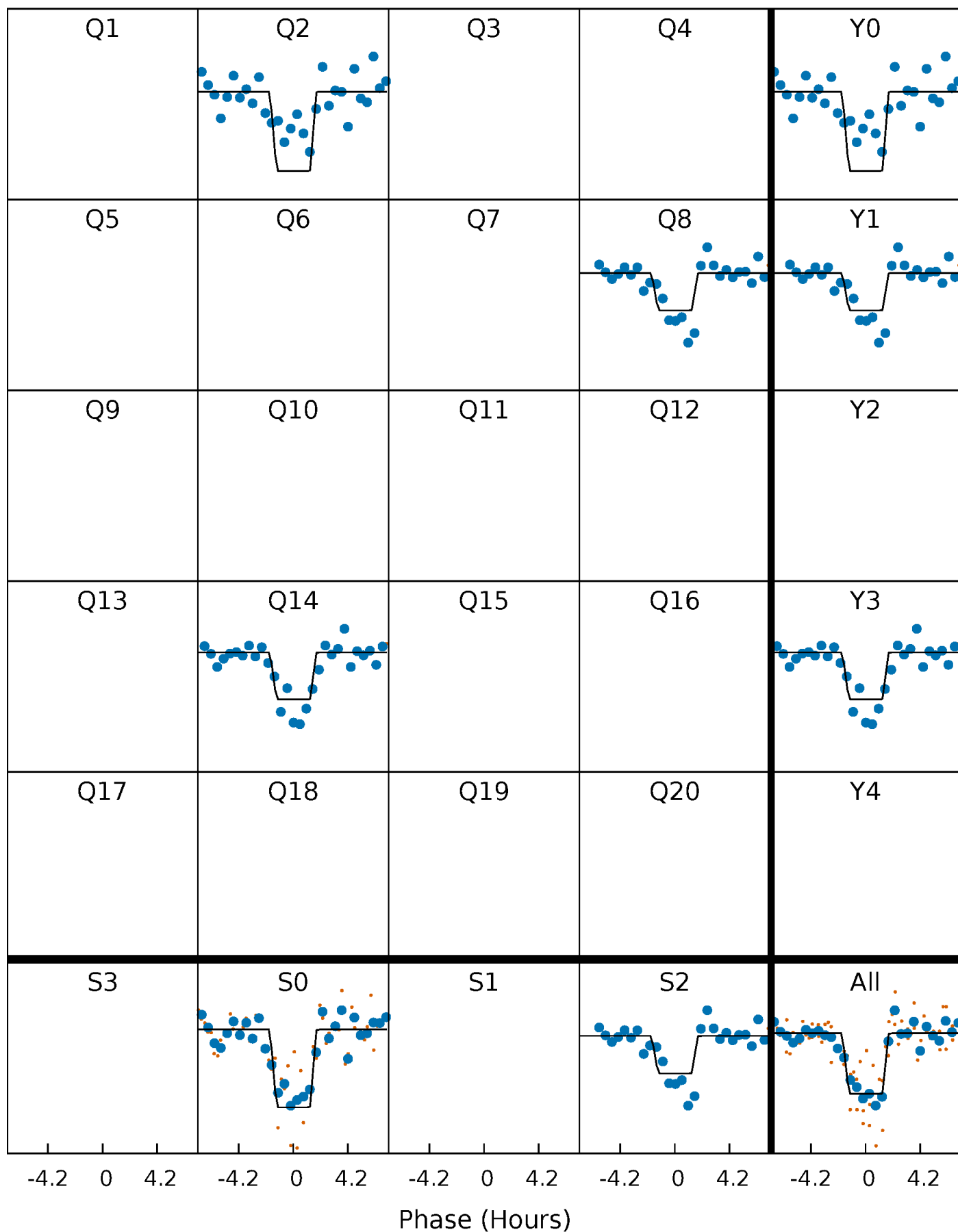
# DV Quarter-Phased Transit Curves

TCE 009772849-04     $P=575.579420$  Days     $T_0=198.696126$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

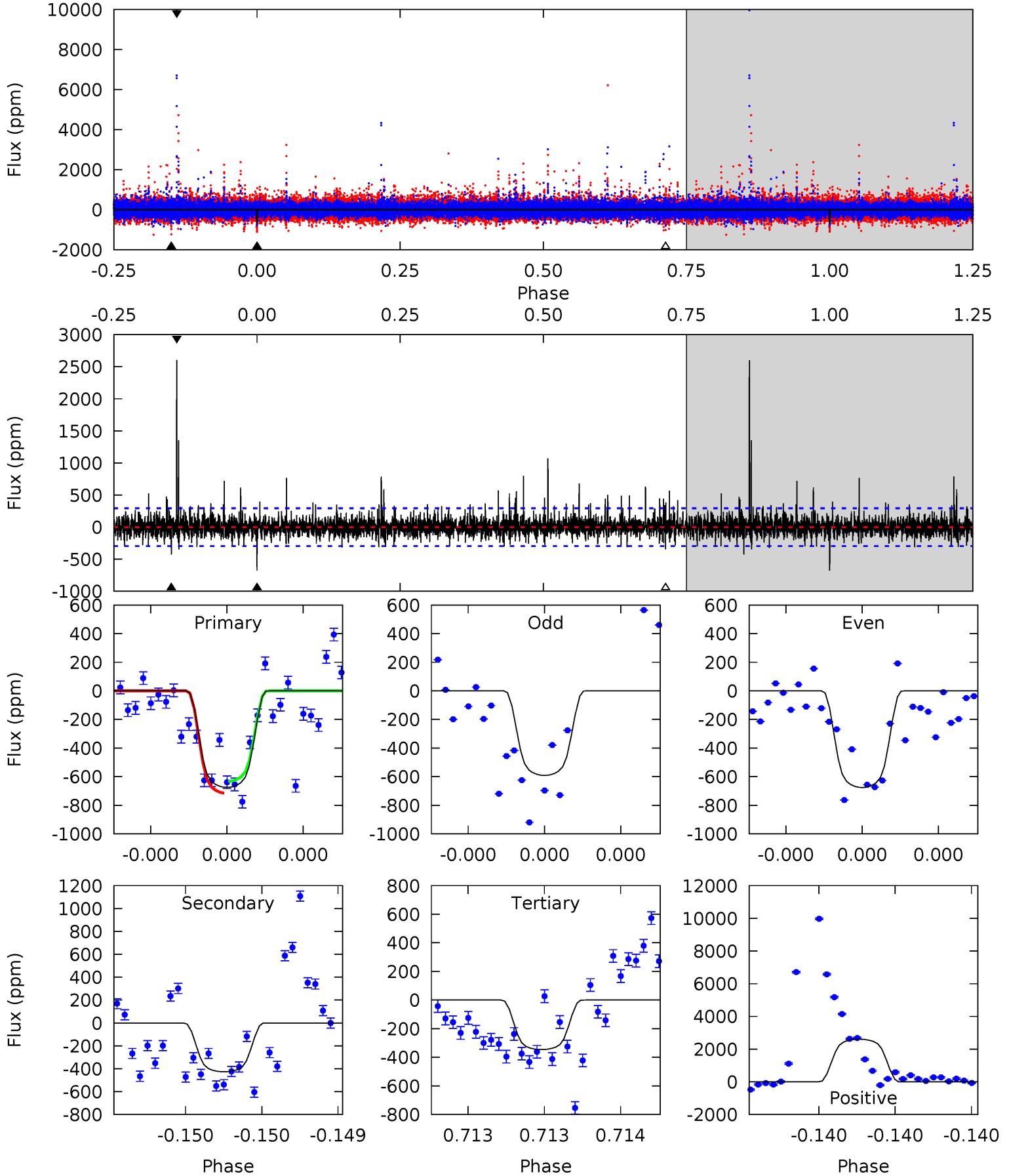
TCE 009772849-04 P=575.579329 Days  $T_0=198.696333$  (BKJD)



# DV Model-Shift Uniqueness Test

009772849-04, P = 575.579420 Days, E = 198.696126 Days

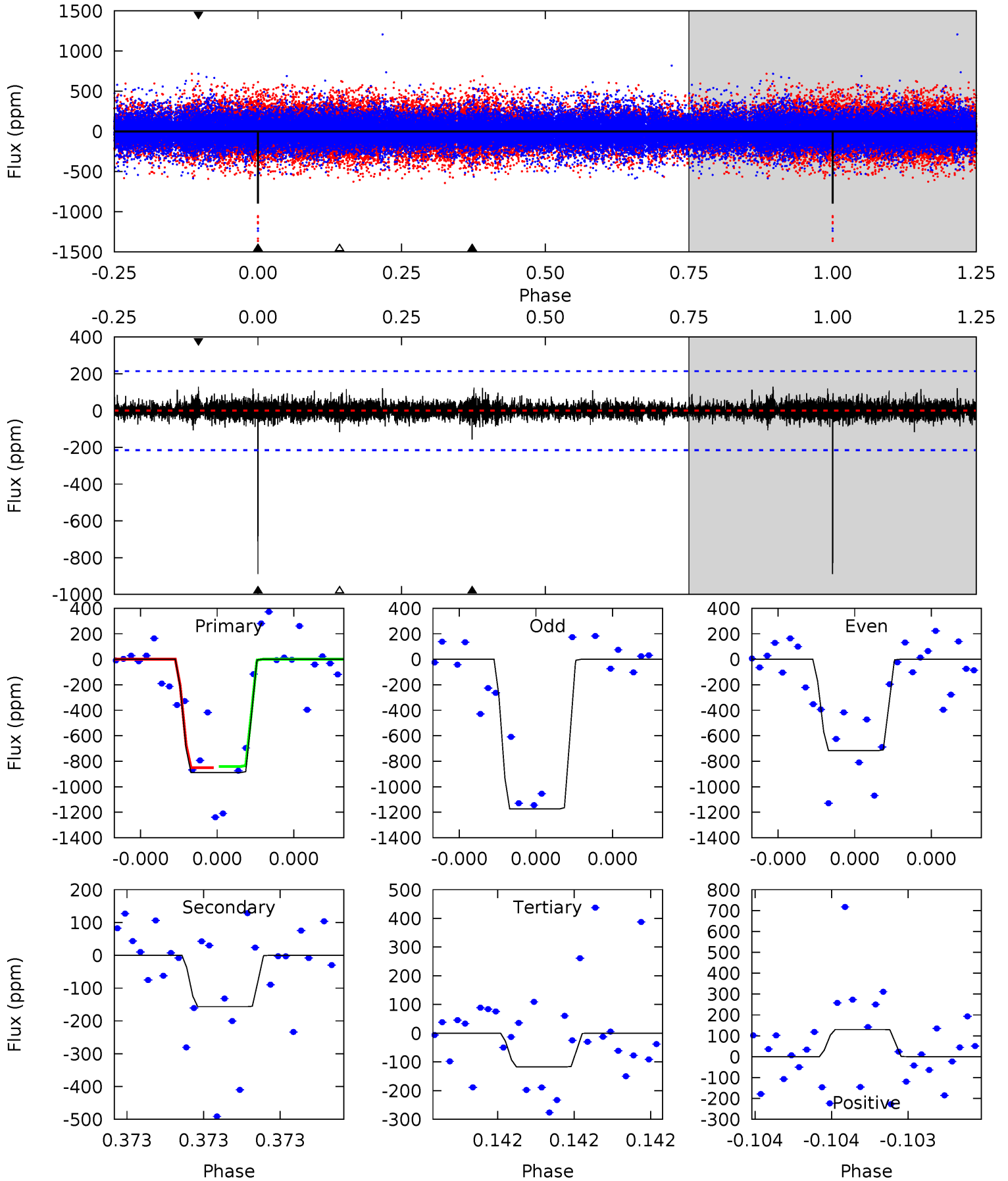
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.9	8.18	6.64	49.9	5.65	3.60	2.07	6.30	-37.0	1.54	-41.7	0.35	1.09	0.79	0.78



# Alt Model-Shift Uniqueness Test

009772849-04, P = 575.579329 Days, E = 198.696333 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
23.5	4.15	3.10	3.44	5.69	3.66	0.60	20.4	20.1	1.05	0.71	6.15	0.85	0.13	0.13



### Stellar Parameters For KIC 009772849

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5593^{+166}_{-166}$	$4.596^{+0.065}_{-0.071}$	$-0.920^{+0.350}_{-0.300}$	$0.697^{+0.081}_{-0.054}$	$0.698^{+0.069}_{-0.035}$	$2.905^{+0.750}_{-0.712}$
	+3%/-3%	+1%/-2%	+38%/-33%	+12%/-8%	+10%/-5%	+26%/-25%
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 009772849-04 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-427 \pm 52$	$2.30^{+0.40}_{-0.39}$	$263^{+10}_{-10}$	$4747^{+392}_{-336}$	$63975^{+29124}_{-18649}$
Alt.	$-157 \pm 38$	$2.29^{+0.43}_{-0.40}$	$263^{+11}_{-9}$	$3927^{+341}_{-284}$	$23239^{+13385}_{-7911}$

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

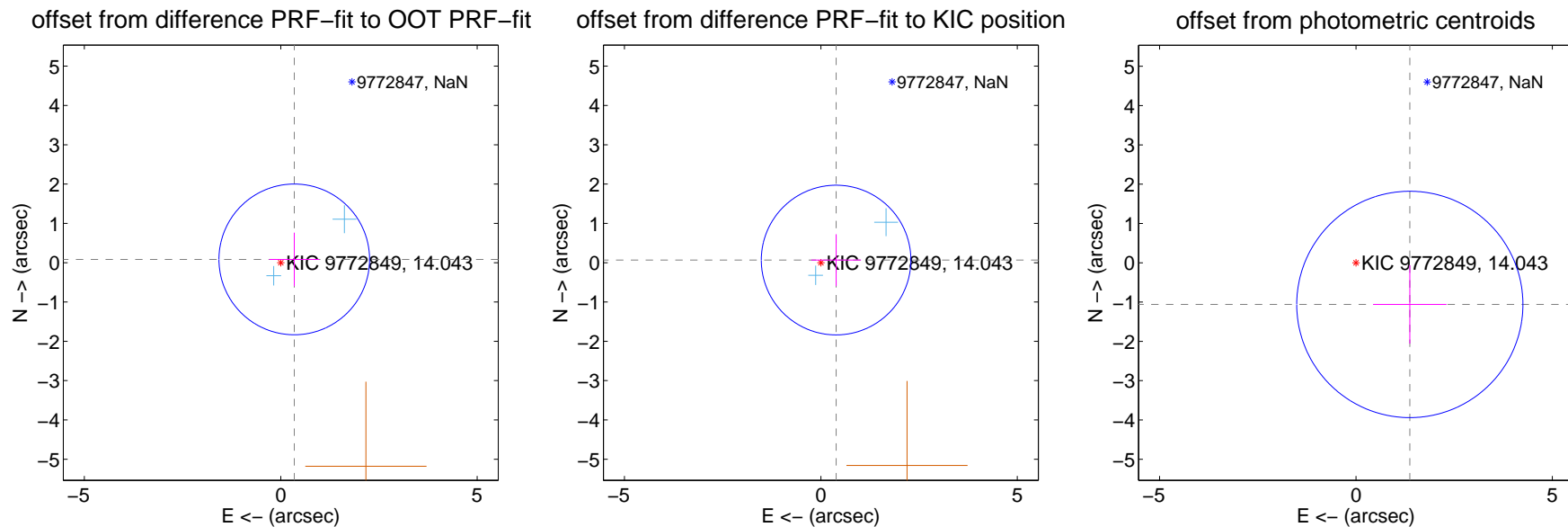
## DV Centroid Data

Supplemental centroid analysis for 009772849-04. Kepler magnitude: 14.04. Transit SNR 7.55

There are 2 quarters with good PRF difference image offsets

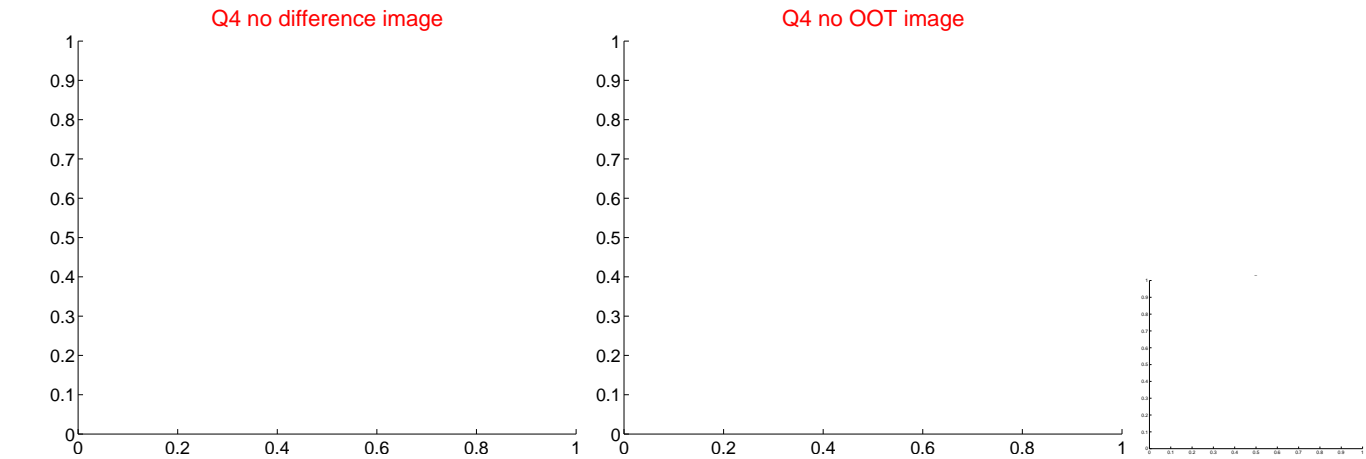
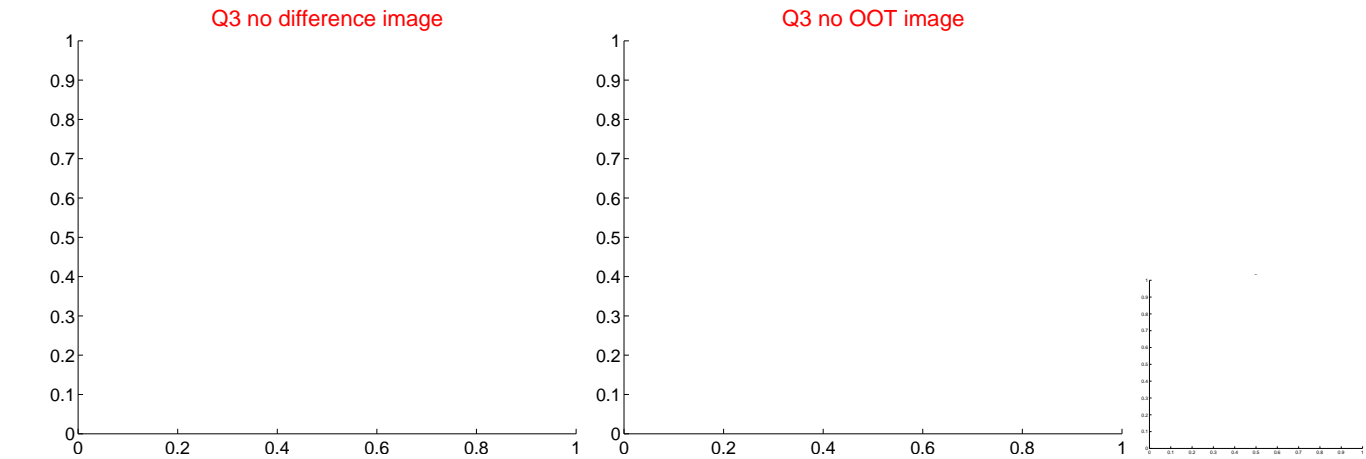
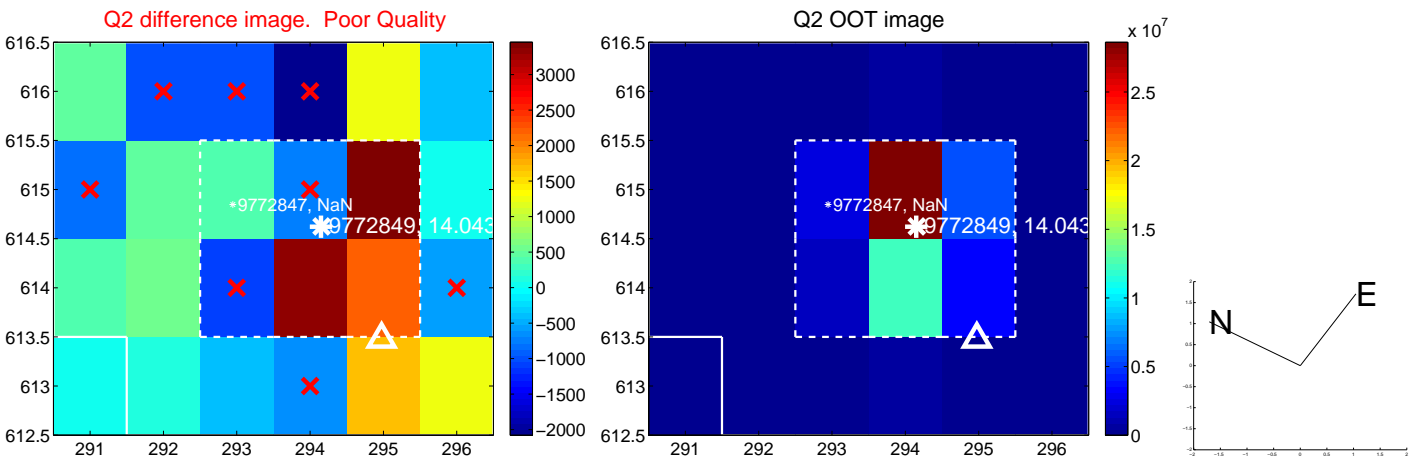
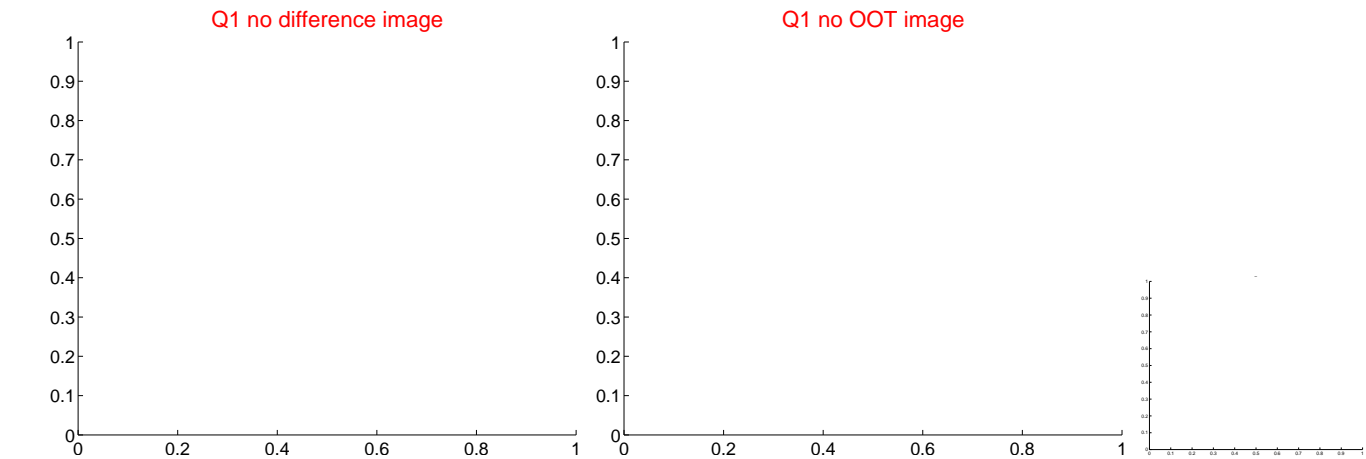
The direct PRF centroid is offset from the target star catalog position by about 0.09 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.354 \pm 0.639$	0.55	$-0.344 \pm 0.637$	$0.084 \pm 0.681$
PRF-fit source offset from KIC position	$0.394 \pm 0.635$	0.62	$-0.388 \pm 0.634$	$0.067 \pm 0.657$
photometric centroid source offset	$1.73 \pm 0.96$	1.81	$-1.37 \pm 0.94$	$-1.06 \pm 1.00$

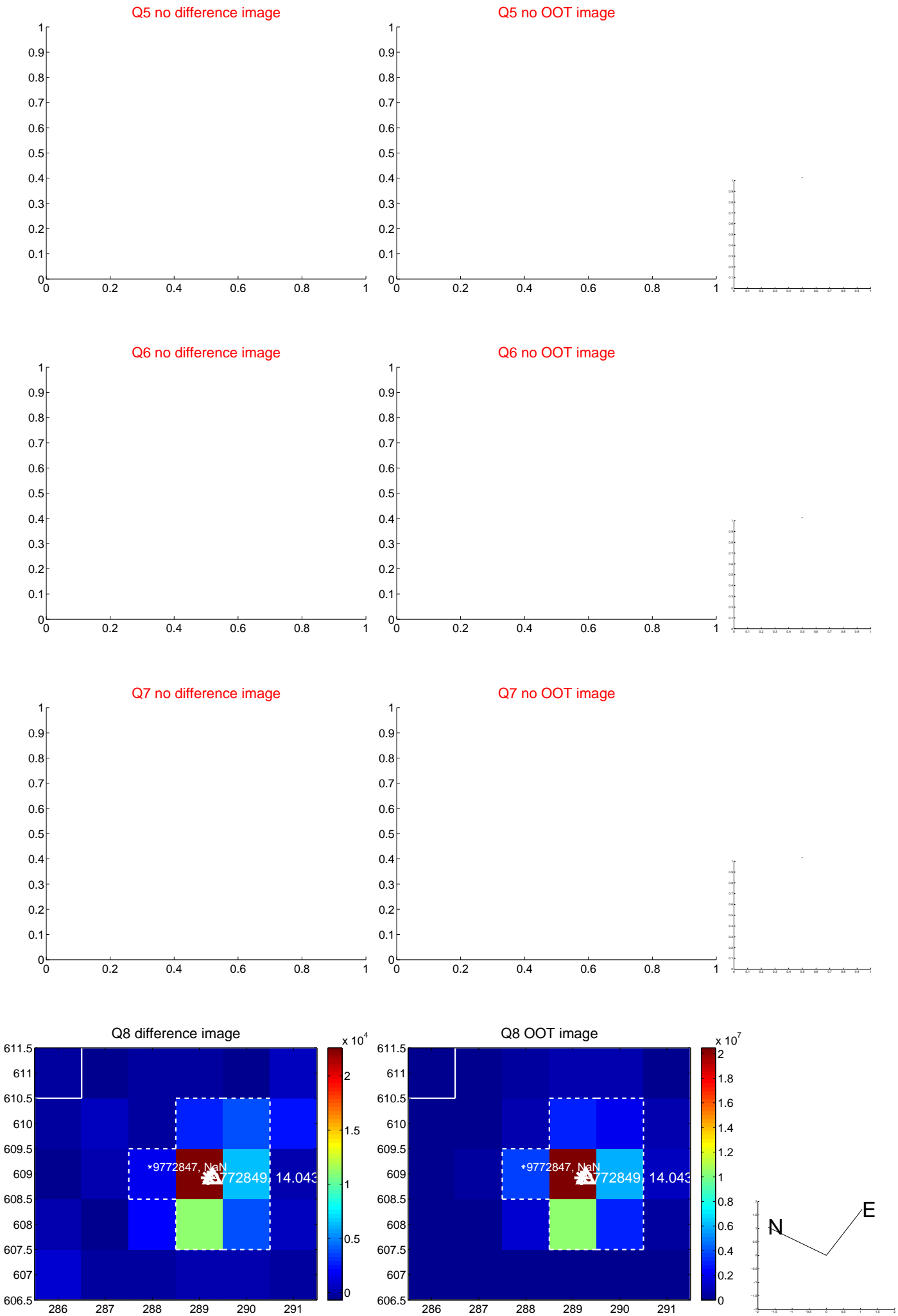


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

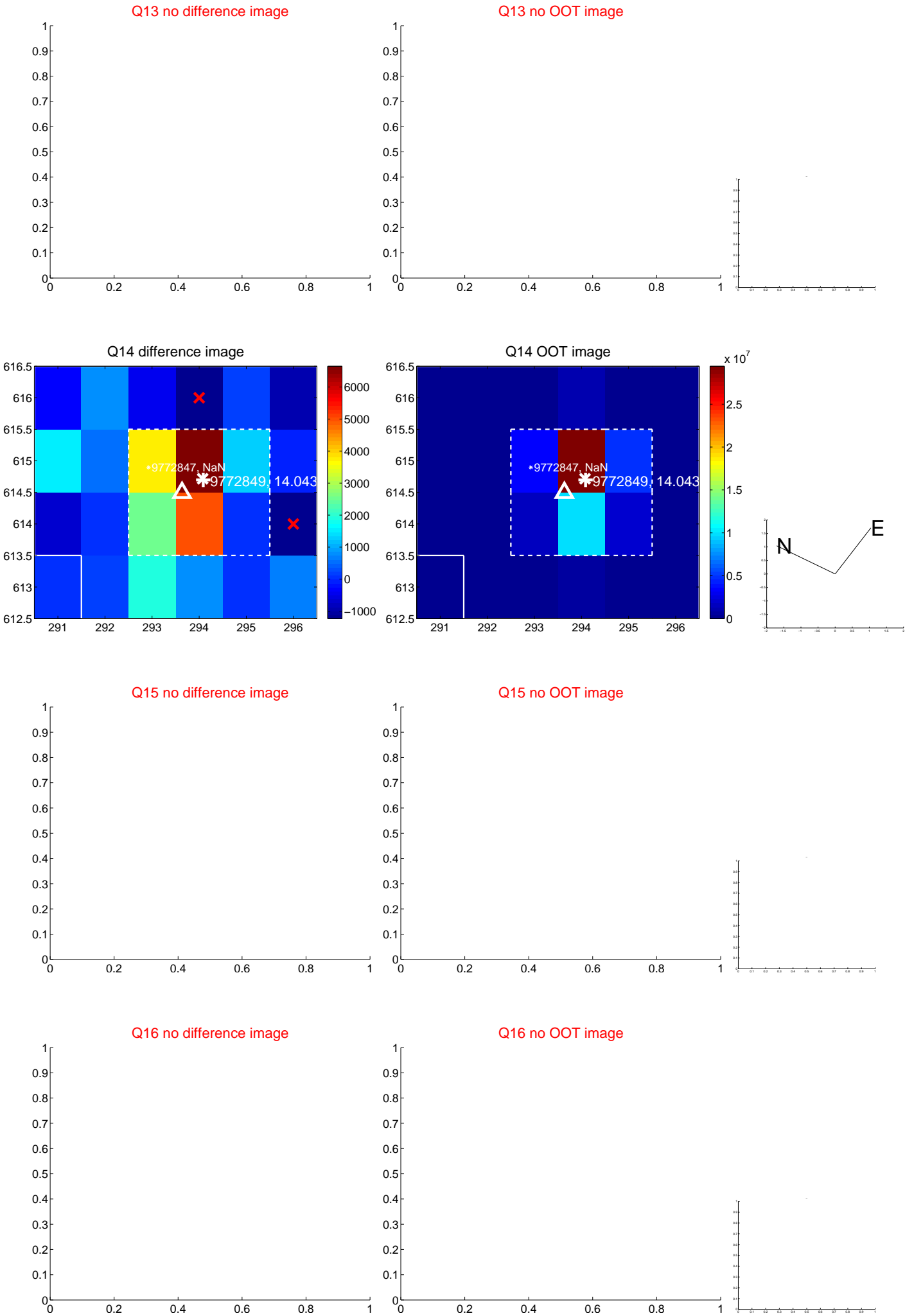




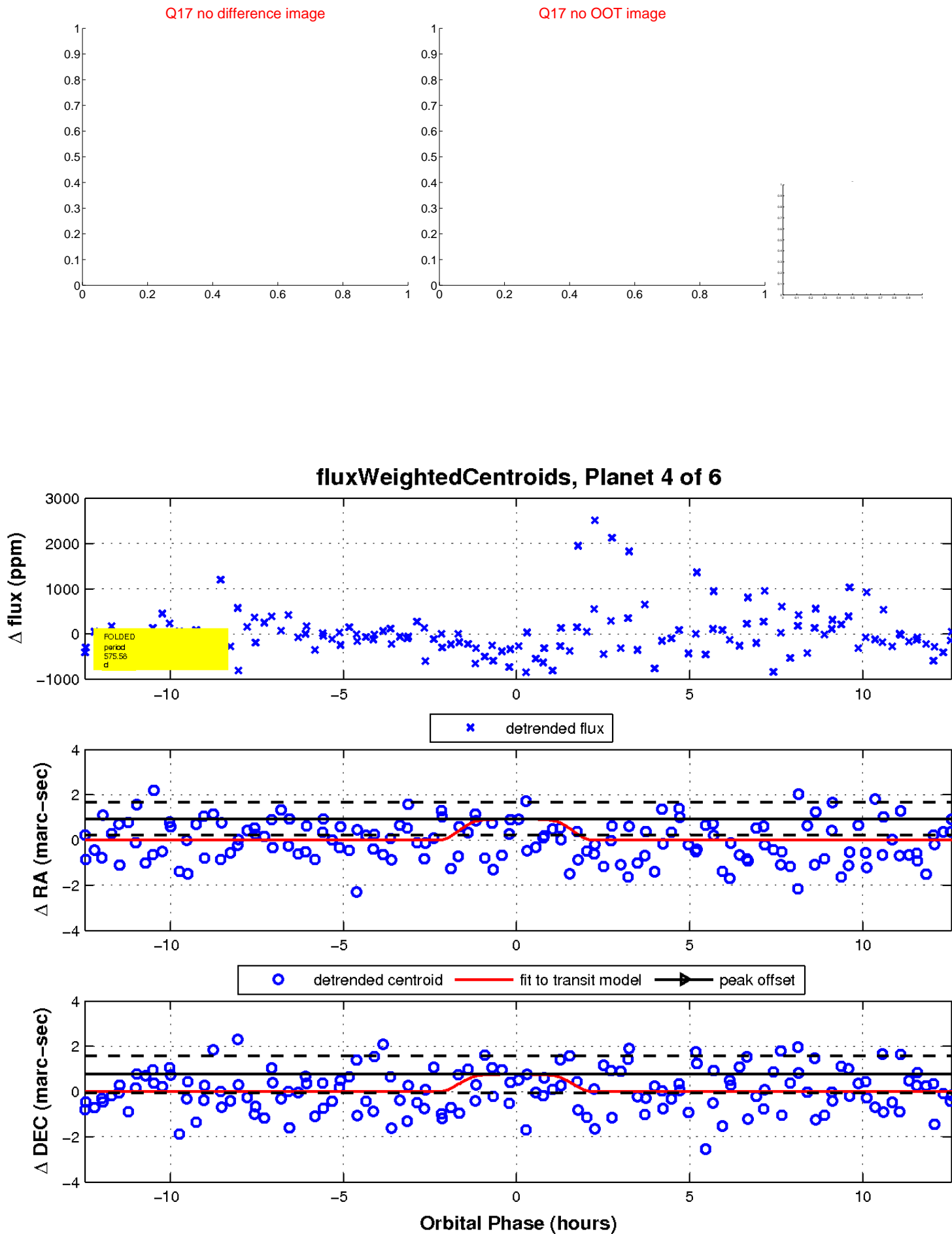
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

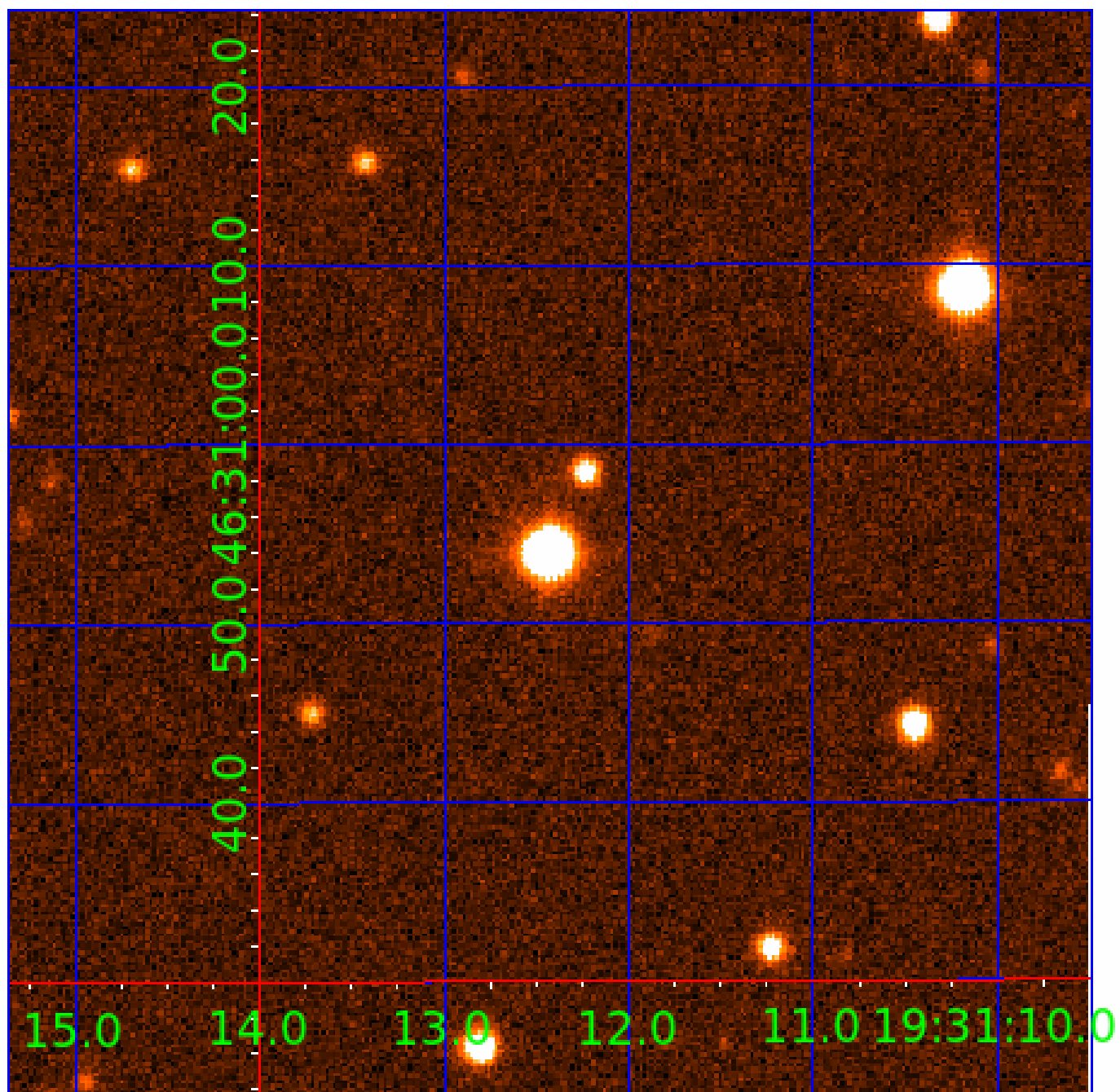


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 009772849

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009772849-02	OBS	No	442.025565	247.147747	665.8	15.562	15.7	7.1	0.70	5593	2.26	0.42
009772849-03	OBS	No	435.086675	305.330819	634.6	7.244	12.5	6.3	0.70	5593	1.83	0.43
009772849-04	OBS	No	575.579420	198.696126	710.7	4.204	11.3	7.5	0.70	5593	2.31	0.29
009772849-05	OBS	No	487.717346	588.752969	413.9	17.908	16.1	3.7	0.70	5593	1.42	0.37
009772849-06	OBS	No	402.255062	250.866823	510.9	5.000	11.2	-1.0	0.70	5593	1.57	0.47

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009772849-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009772849-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009772849-04	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL—ALL_TRANS_CHASES—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
009772849-05	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL_SKYE_ZUMA—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
009772849-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—ALL_TRANS_CHASES—CENT_NOFITS

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

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

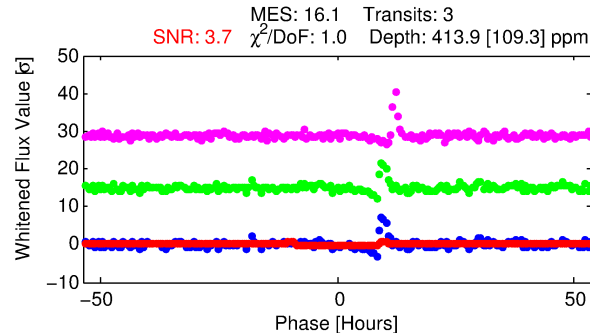
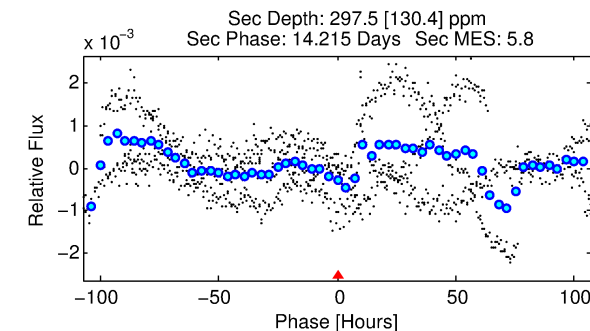
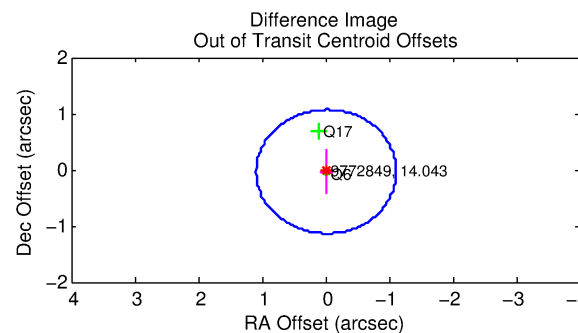
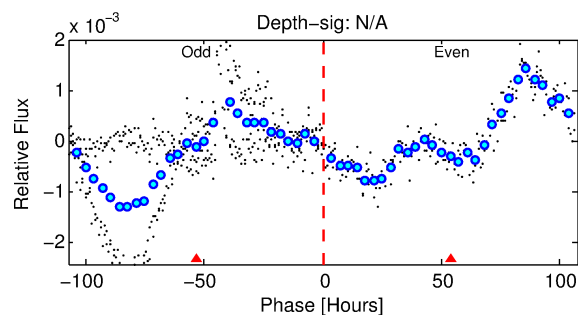
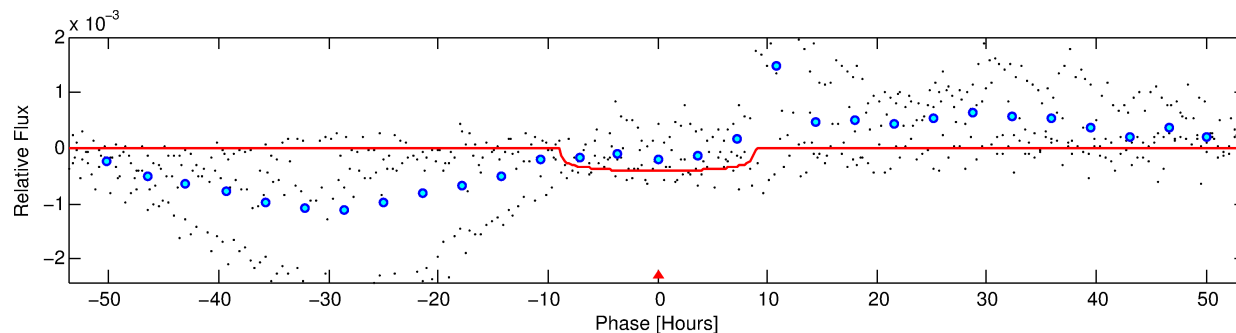
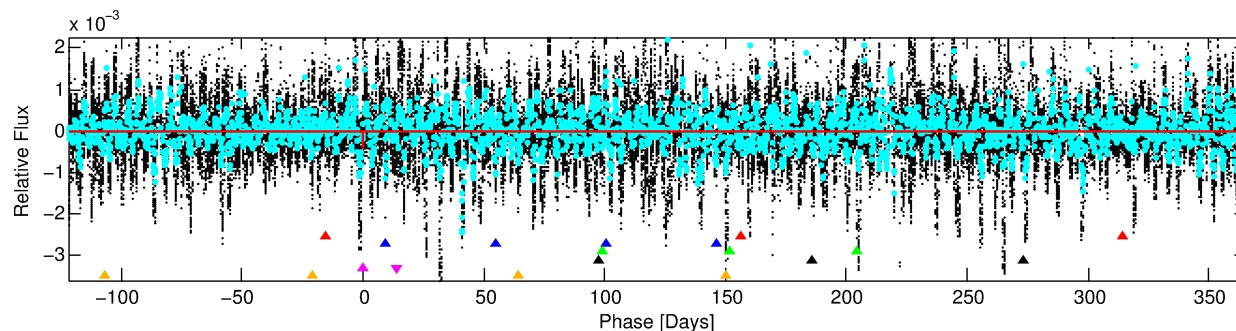
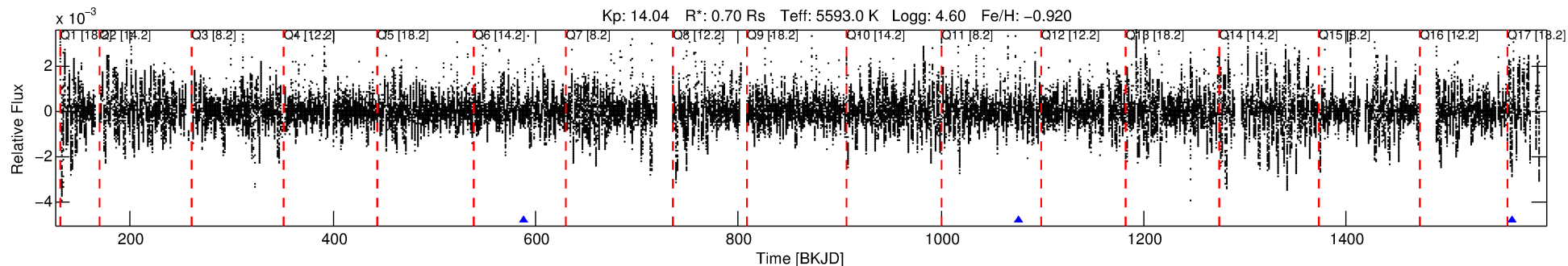
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 009772849-05

No Significant Match Found

# DV One-Page Summary

KIC: 9772849 Candidate: 5 of 6 Period: 487.717 d



## DV Fit Results:

Period = 487.71735 [0.01119] d  
Epoch = 588.7530 [0.0140] BKJD  
Rp/R\* = 0.0186 [0.0233]  
a/R\* = 210.65 [1276.51]  
b = 0.11 [53.74]  
Seff = 0.37 [0.07]  
Teq = 199 [9] K  
Rp = 1.42 [1.78] Re  
a = 1.0764 [0.1020] AU  
Ag = 94567.39 [240528.88] [0.39σ]  
Teffp = 5383 [3422] K [1.52σ]

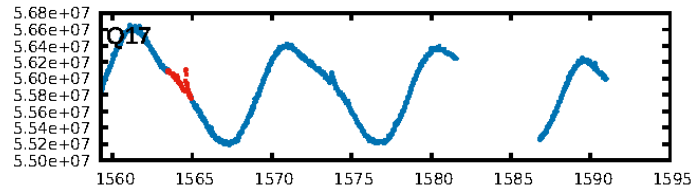
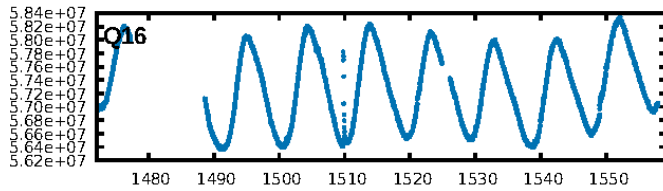
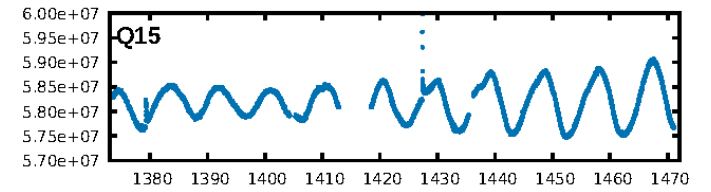
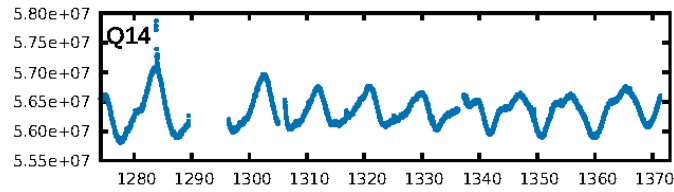
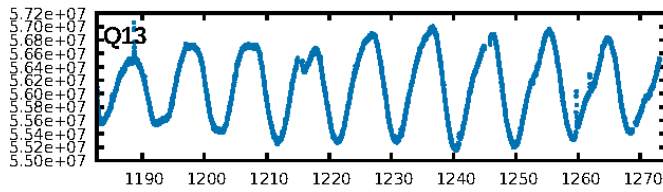
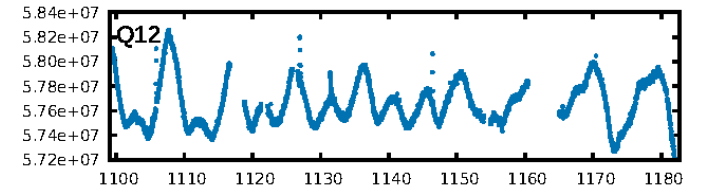
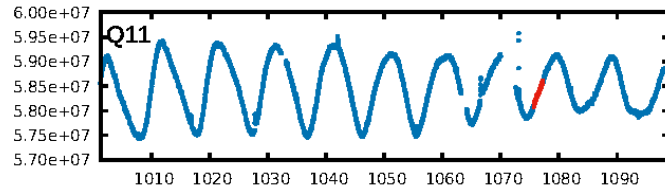
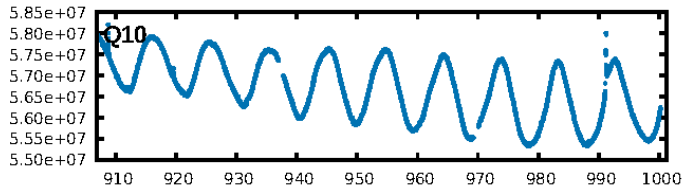
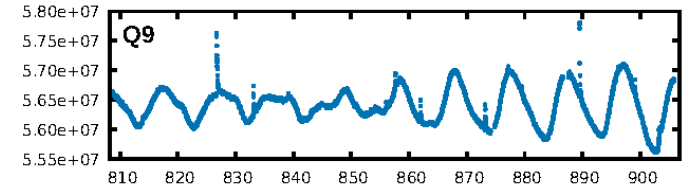
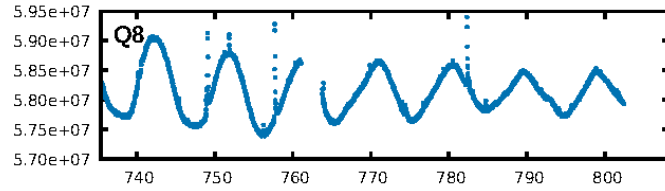
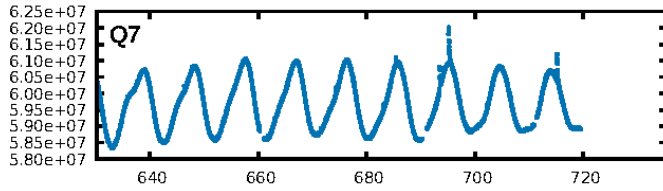
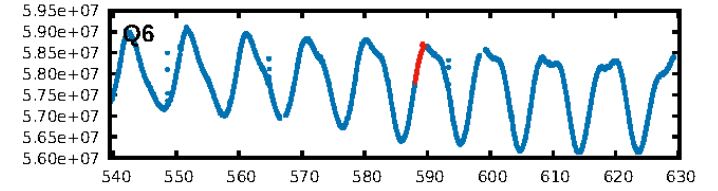
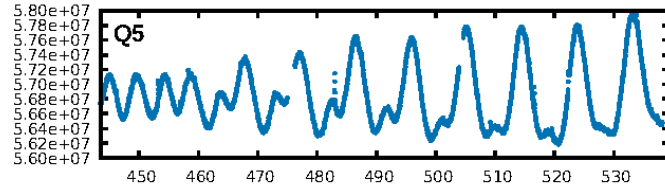
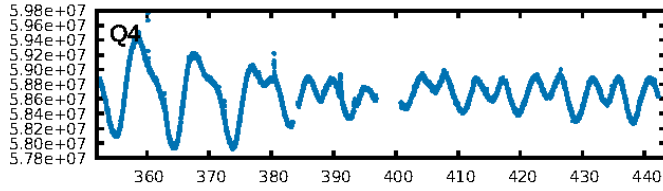
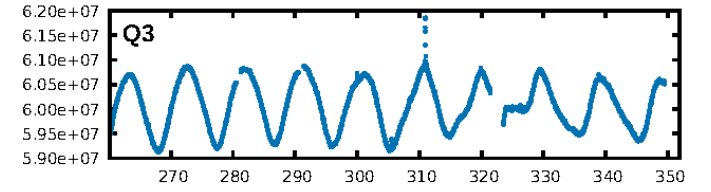
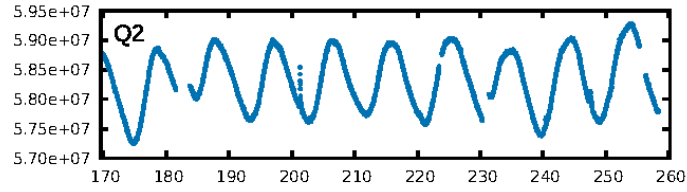
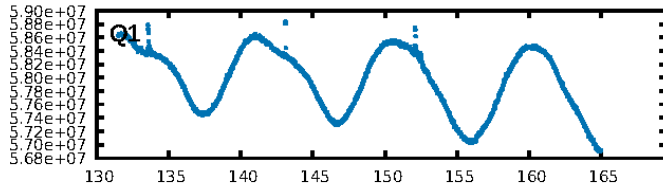
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [46.22σ]  
LongPeriod-sig: 100.0% [114.63σ]  
ModelChiSquare2-sig: 0.2%  
ModelChiSquareGof-sig: 95.7%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [2/2]  
GhostDiagnostic-chr: -0.06016  
Centroid-sig: 90.7%  
Centroid-so: 0.261 arcsec [0.24σ]  
OotOffset-rm: 0.037 arcsec [0.10σ]  
OotOffset-st: 1/0/0/1 [2]  
KicOffset-rm: 0.120 arcsec [0.29σ]  
KicOffset-st: 1/0/0/1 [2]  
DiffImageQuality-fgm: 0.00 [0/2]  
DiffImageOverlap-fno: 1.00 [3/3]

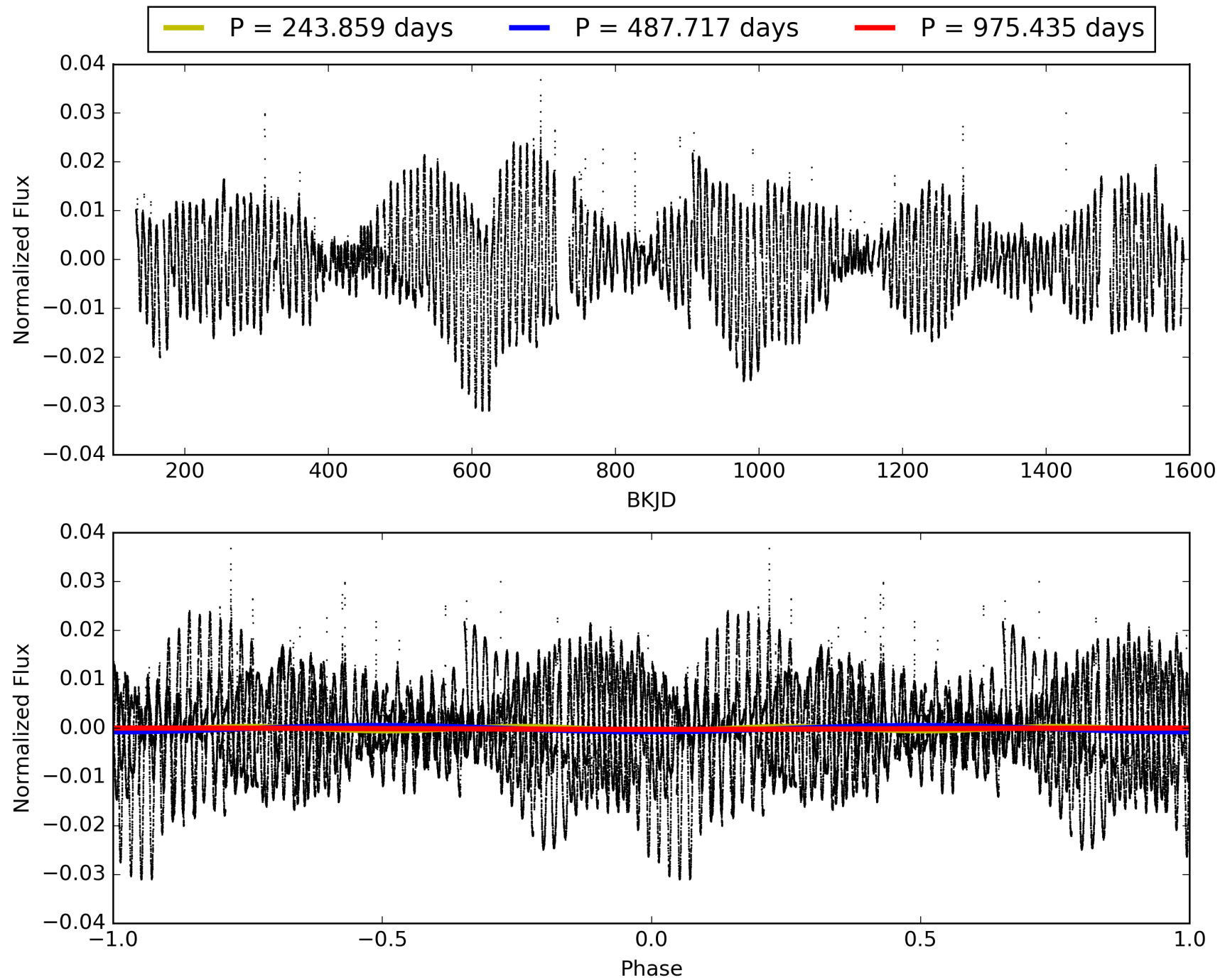
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 22:04:11 Z

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

# TCE 009772849-05, PDC Light Curves



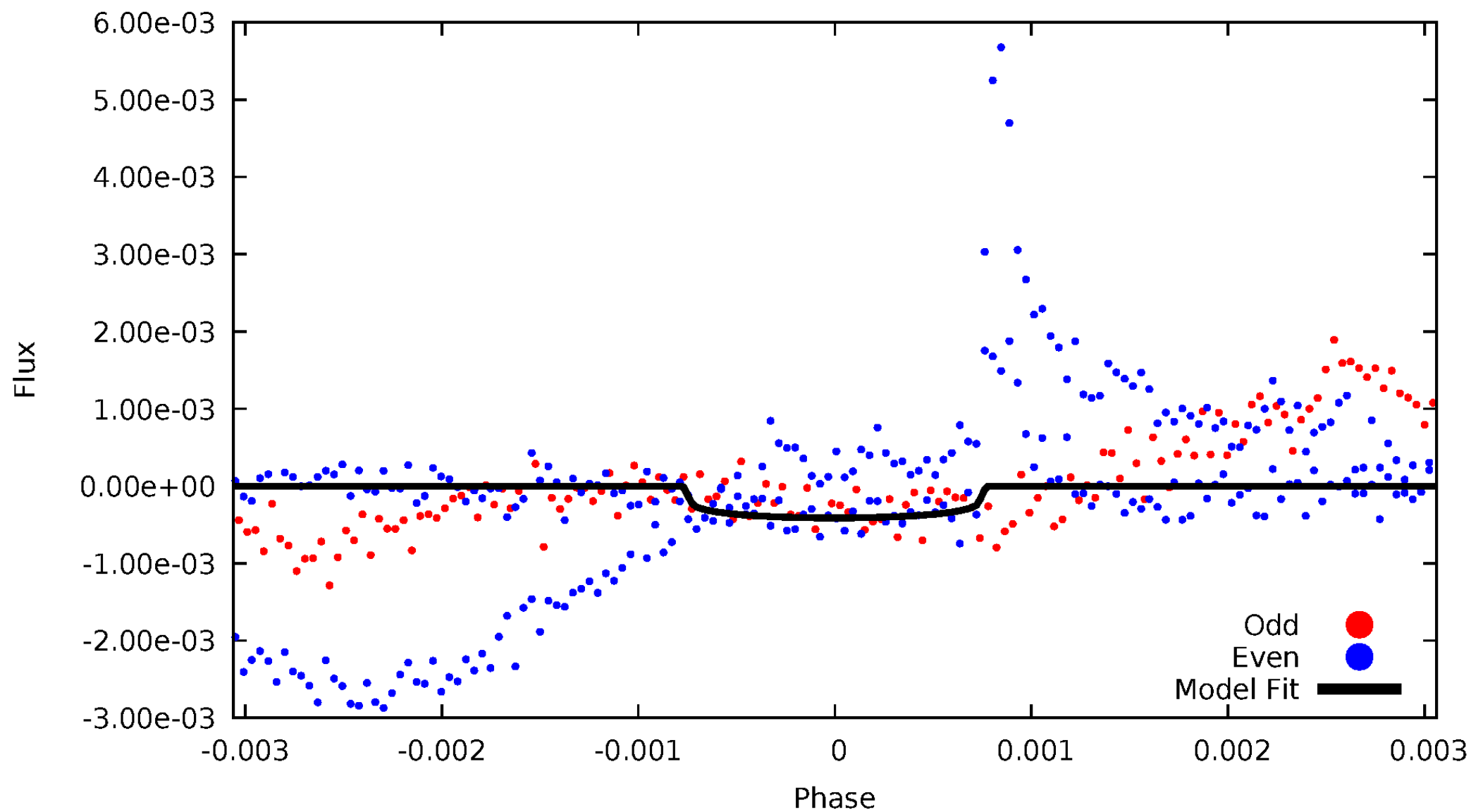
TCE 009772849-05





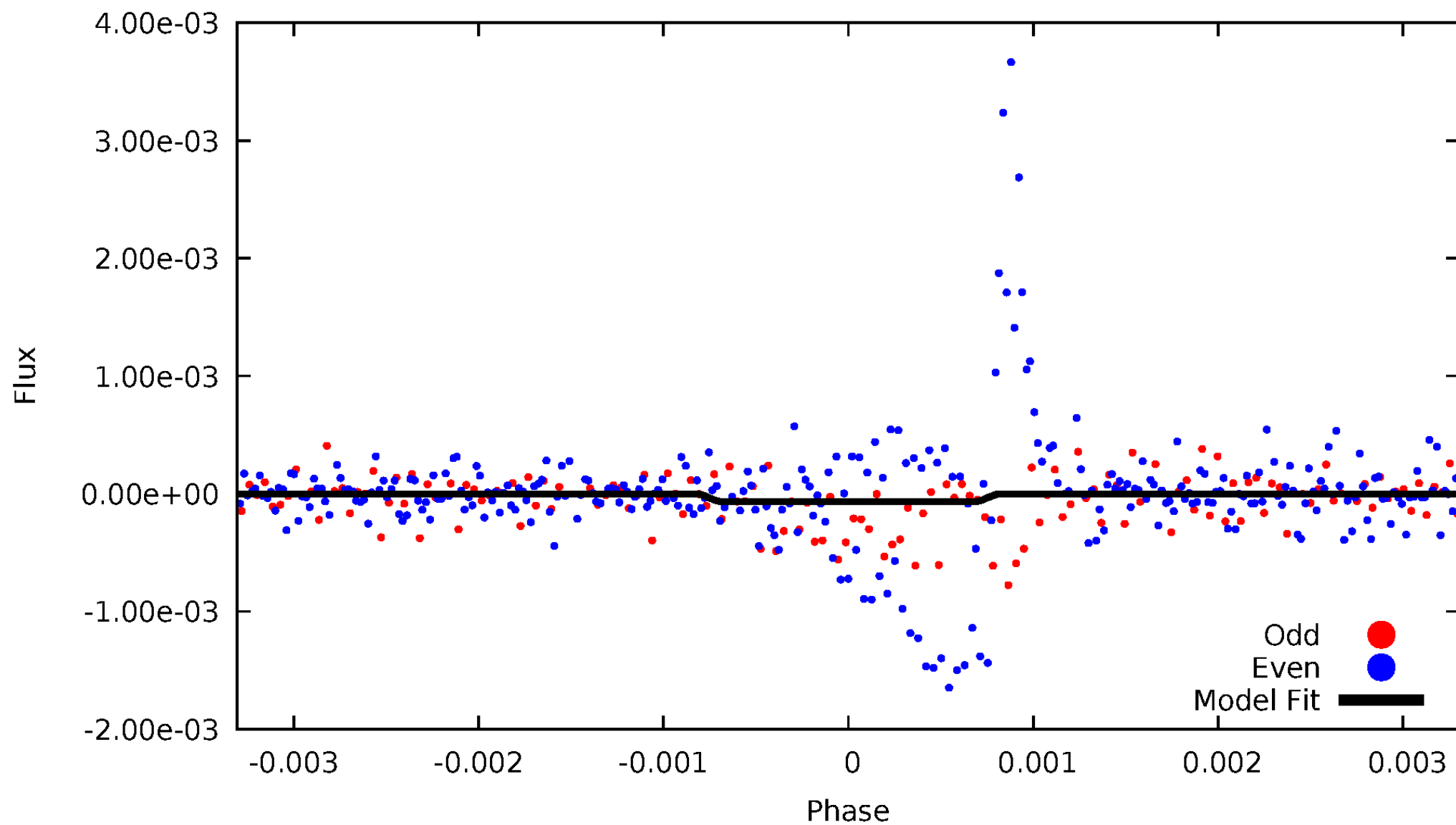
# DV Odd/Even

TCE 009772849-05



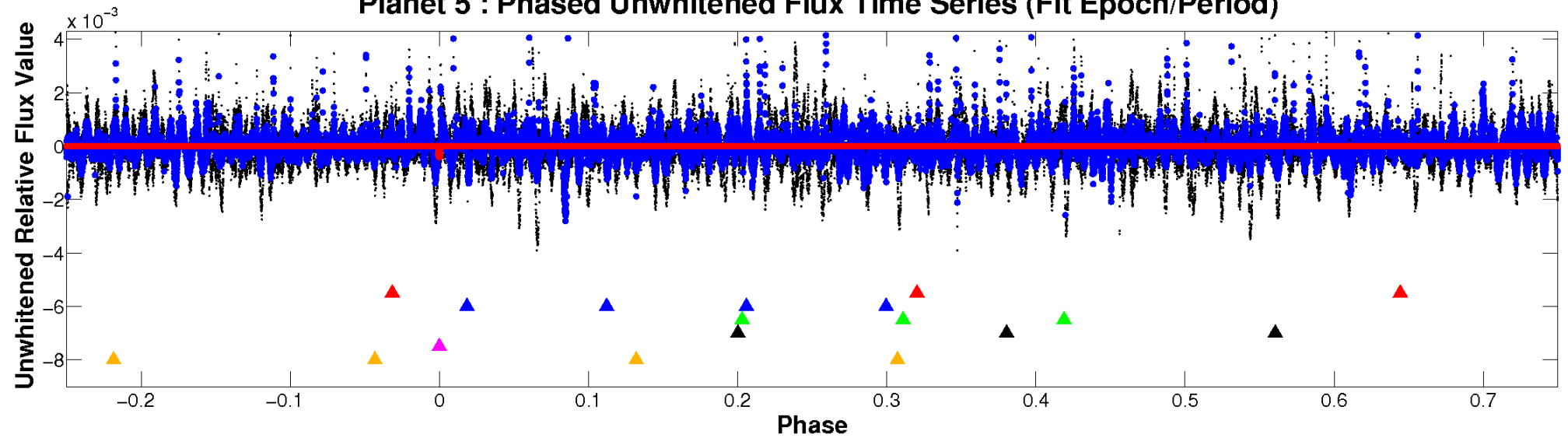
# ALT Odd/Even

TCE 009772849-05

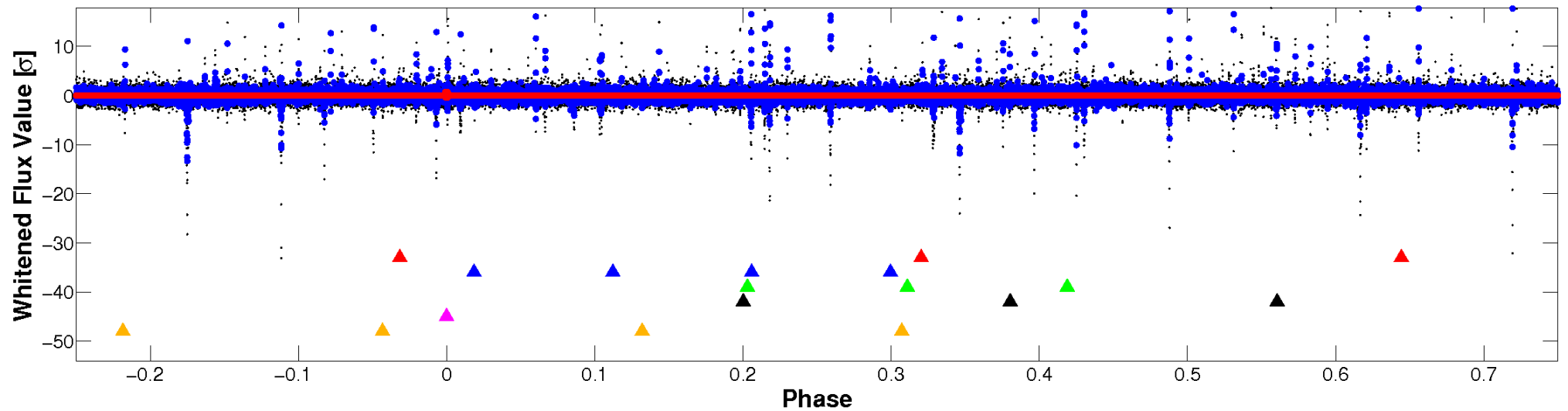


# Non-Whitened Vs. Whitened Light Curve

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

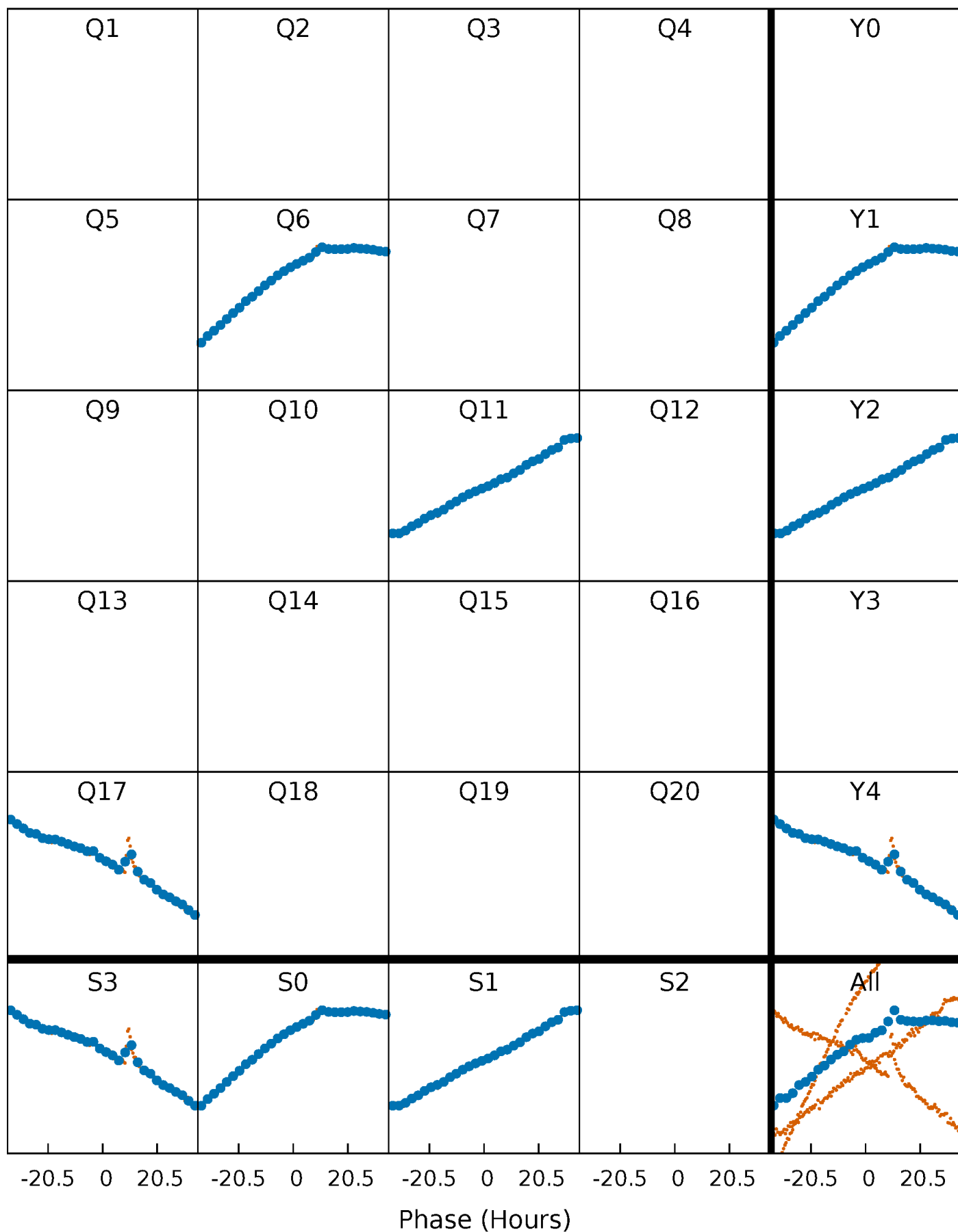


Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)



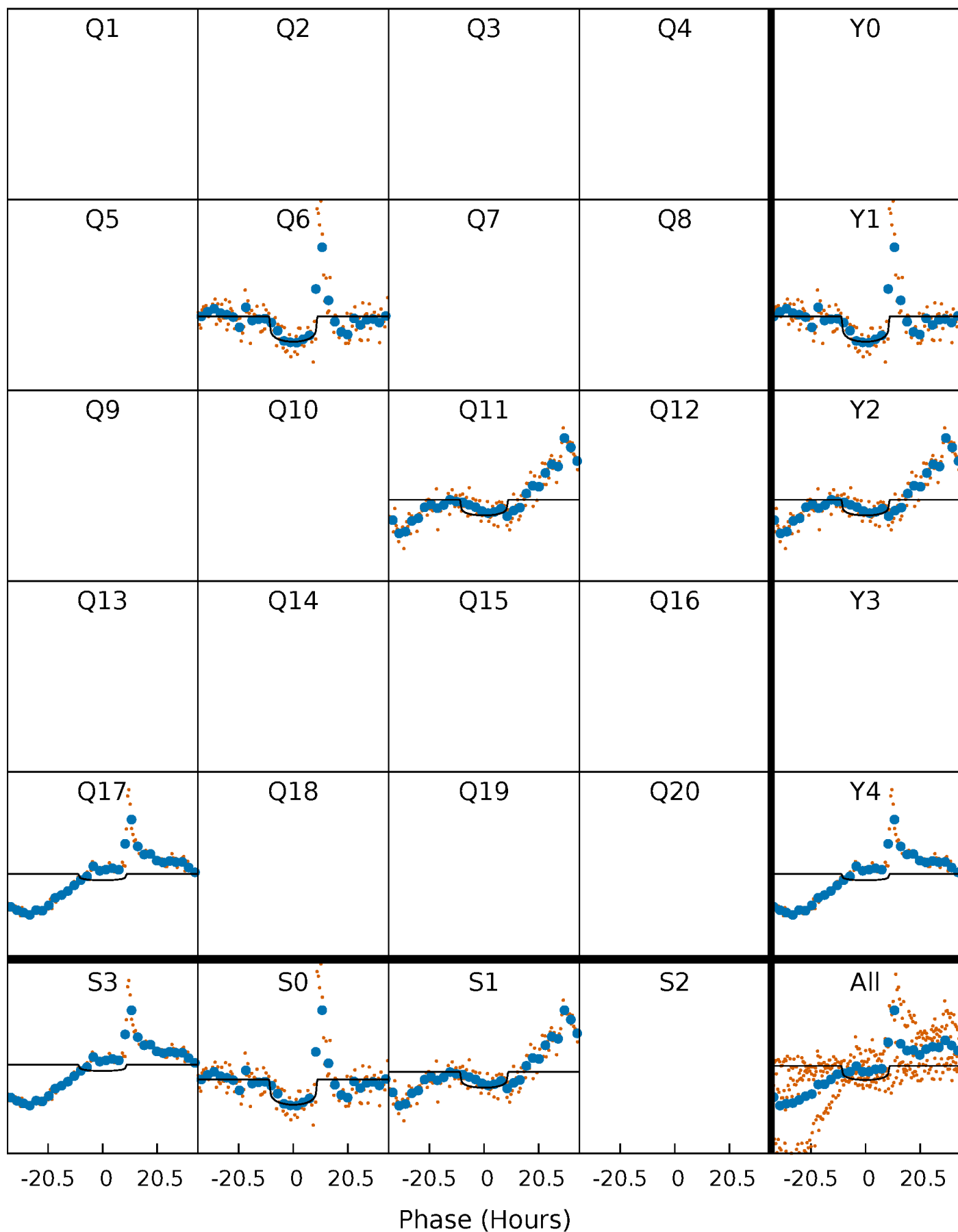
# PDC Quarter-Phased Transit Curves

TCE 009772849-05     $P=487.717346$  Days     $T_0=588.752969$  (BKJD)



# DV Quarter-Phased Transit Curves

TCE 009772849-05     $P=487.717346$  Days     $T_0=588.752969$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

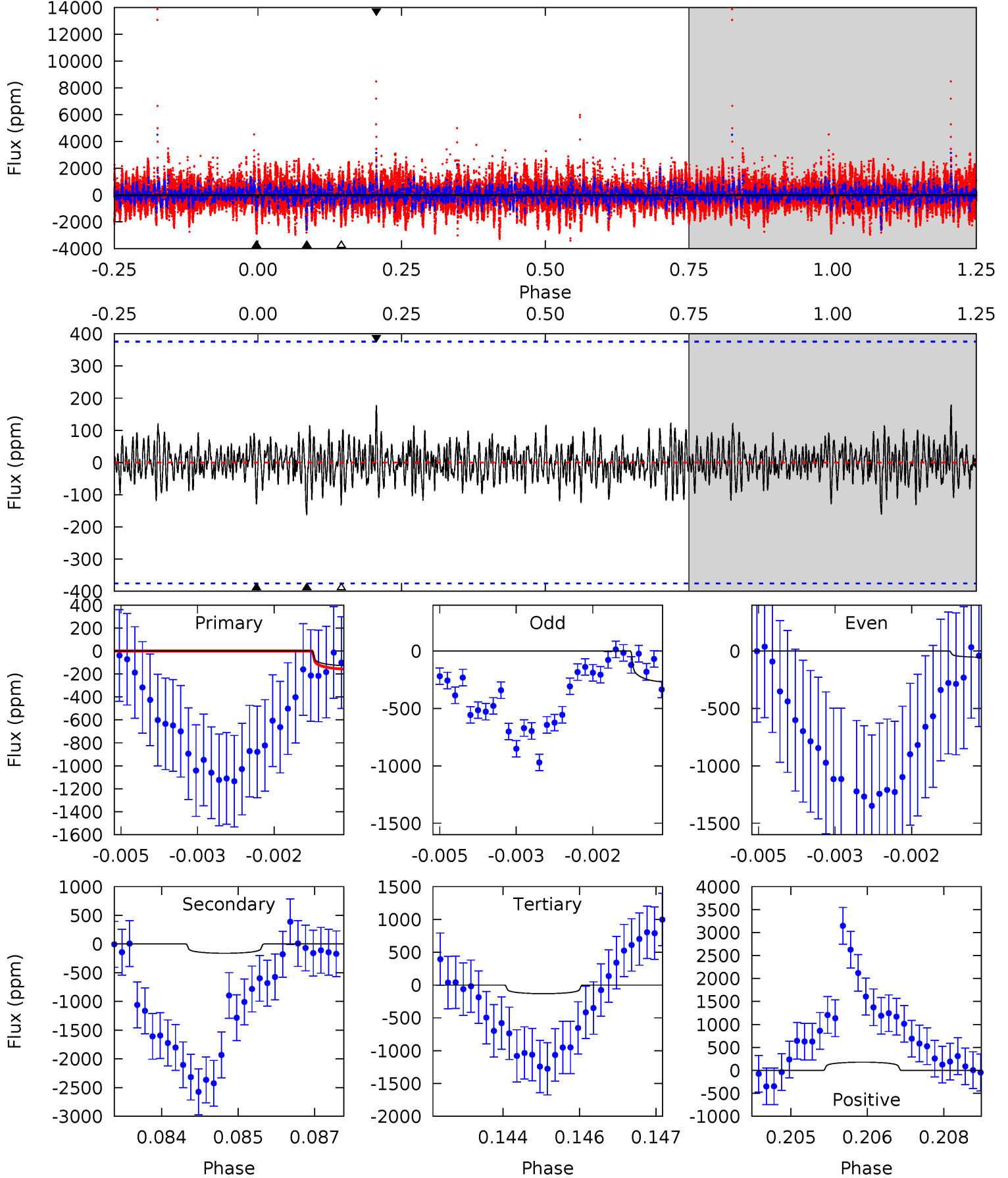
TCE 009772849-05     $P=487.721832$  Days     $T_0=588.727152$  (BKJD)



# DV Model-Shift Uniqueness Test

009772849-05, P = 487.717346 Days, E = 101.035623 Days

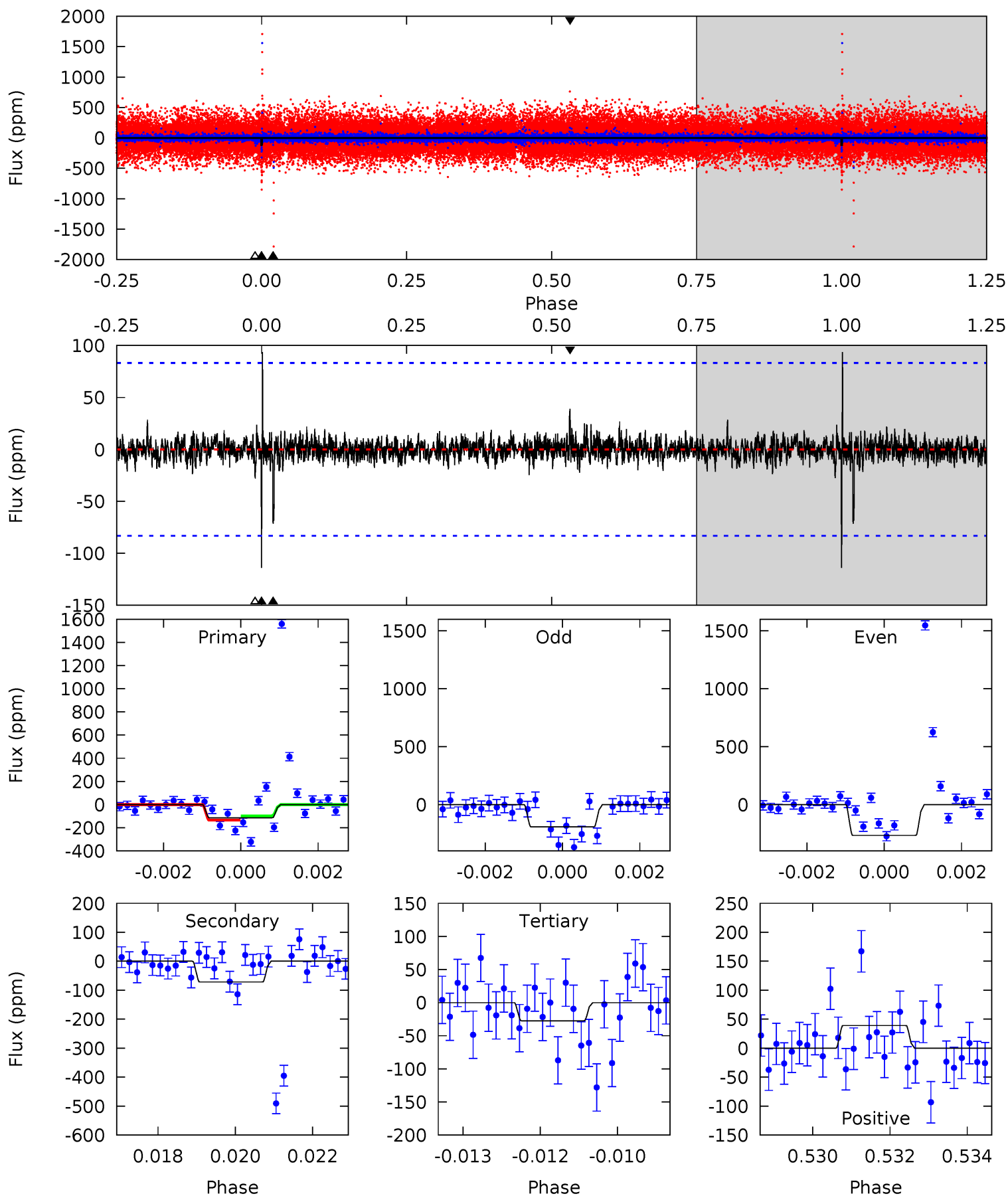
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
1.82	2.30	1.87	2.54	5.37	3.17	0.63	-0.05	-0.72	0.43	-0.24	1.20	0.48	0.53	0.43



# Alt Model-Shift Uniqueness Test

009772849-05, P = 487.721832 Days, E = 101.005320 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
7.35	4.61	1.76	2.52	5.36	3.15	0.44	5.59	4.83	2.84	2.09	2.23	1.22	0.45	1.20





### Stellar Parameters For KIC 009772849

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5593^{+166}_{-166}$	$4.596^{+0.065}_{-0.071}$	$-0.920^{+0.350}_{-0.300}$	$0.697^{+0.081}_{-0.054}$	$0.698^{+0.069}_{-0.035}$	$2.905^{+0.750}_{-0.712}$
	+3%/-3%	+1%/-2%	+38%/-33%	+12%/-8%	+10%/-5%	+26%/-25%
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 009772849-05 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-161 \pm 70$	$1.99^{+1.56}_{-1.28}$	$278^{+11}_{-10}$	$4096^{+2420}_{-754}$	$23226^{+182321}_{-16372}$
Alt.	$-71 \pm 16$	$1.54^{+1.31}_{-1.05}$	$278^{+11}_{-11}$	$3917^{+2487}_{-719}$	$18966^{+165407}_{-13724}$

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

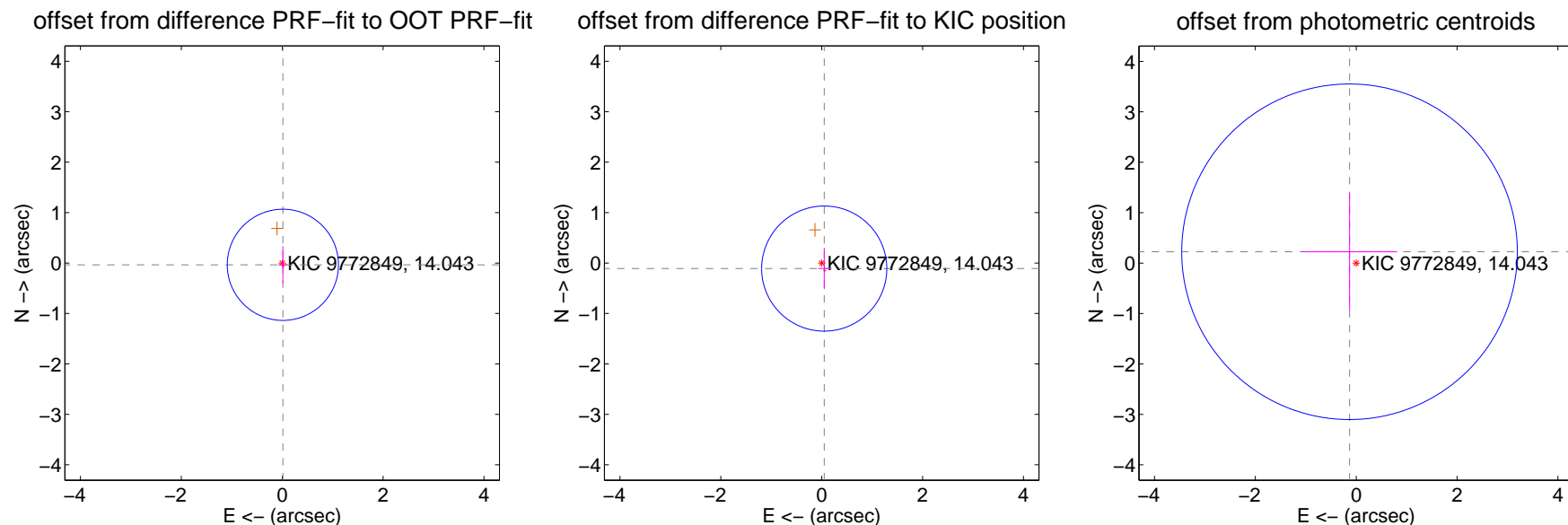
## DV Centroid Data

Supplemental centroid analysis for 009772849-05. Kepler magnitude: 14.04. Transit SNR 3.72

There are 0 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.04 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.037 \pm 0.367$	0.10	$-0.012 \pm 0.089$	$-0.035 \pm 0.369$
PRF-fit source offset from KIC position	$0.120 \pm 0.414$	0.29	$-0.050 \pm 0.118$	$-0.110 \pm 0.409$
photometric centroid source offset	$0.26 \pm 1.11$	0.24	$0.13 \pm 0.95$	$0.23 \pm 1.16$

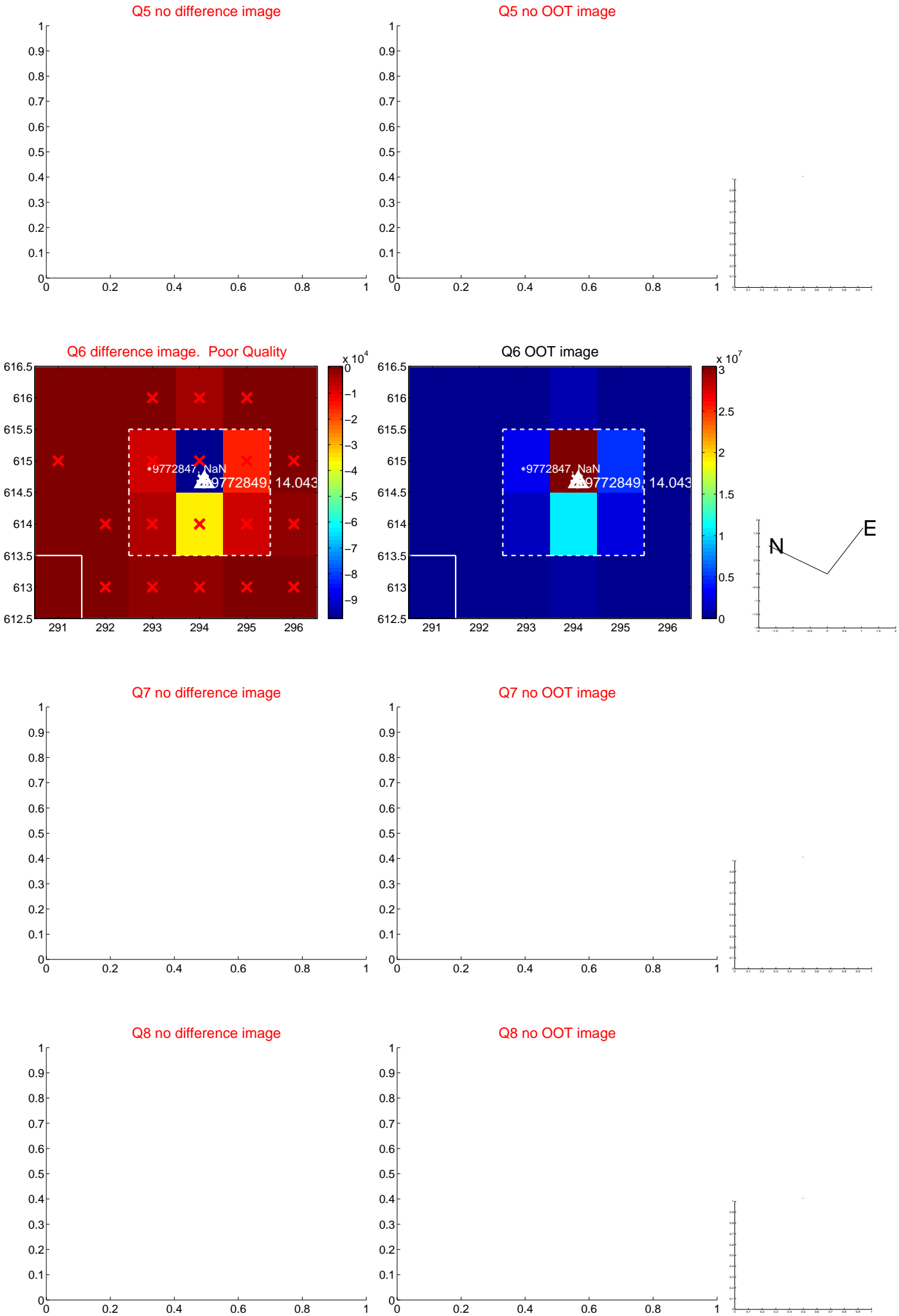


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

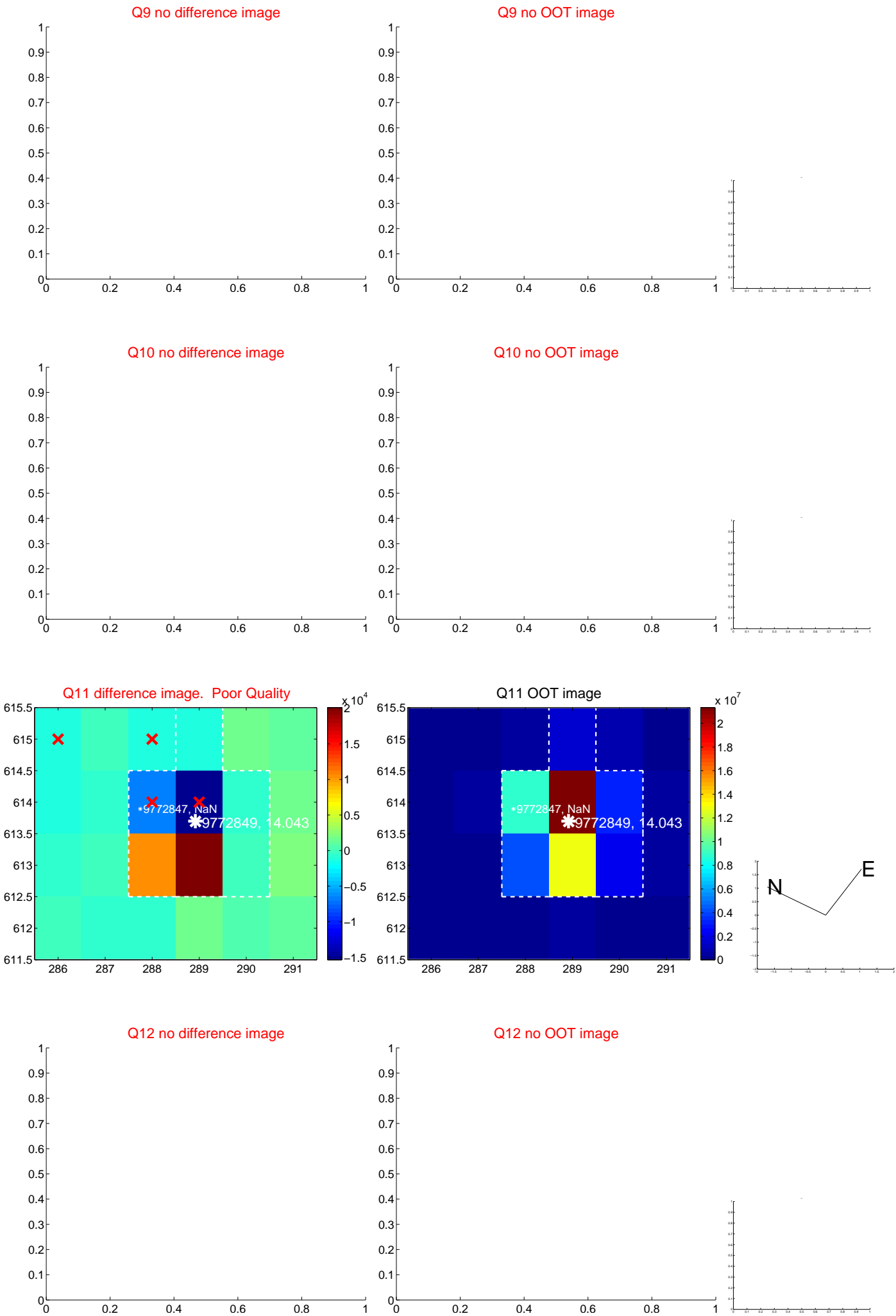
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



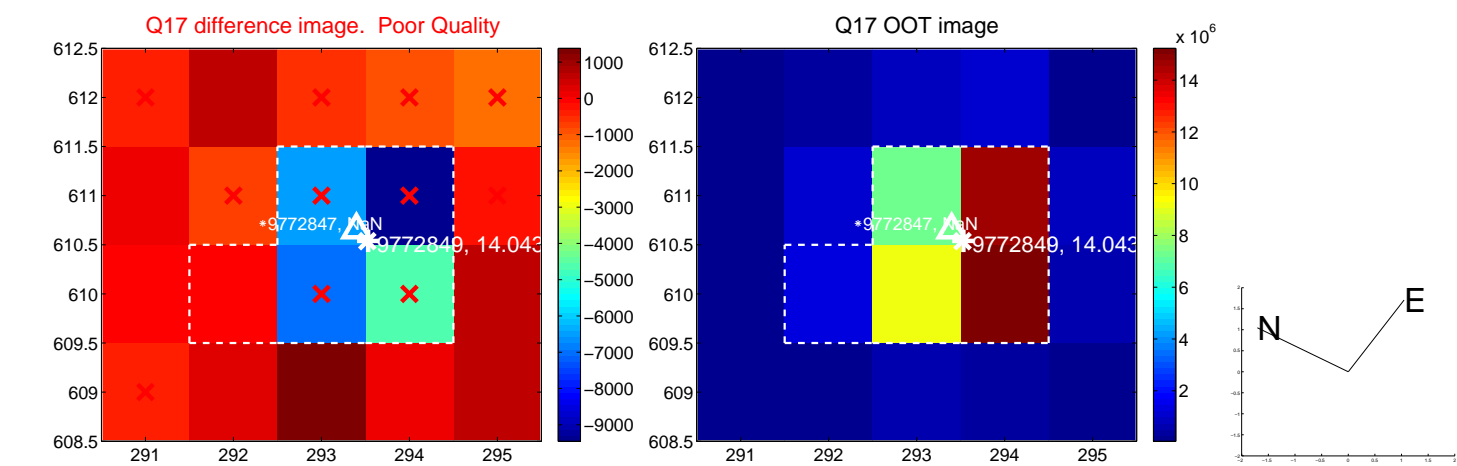
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



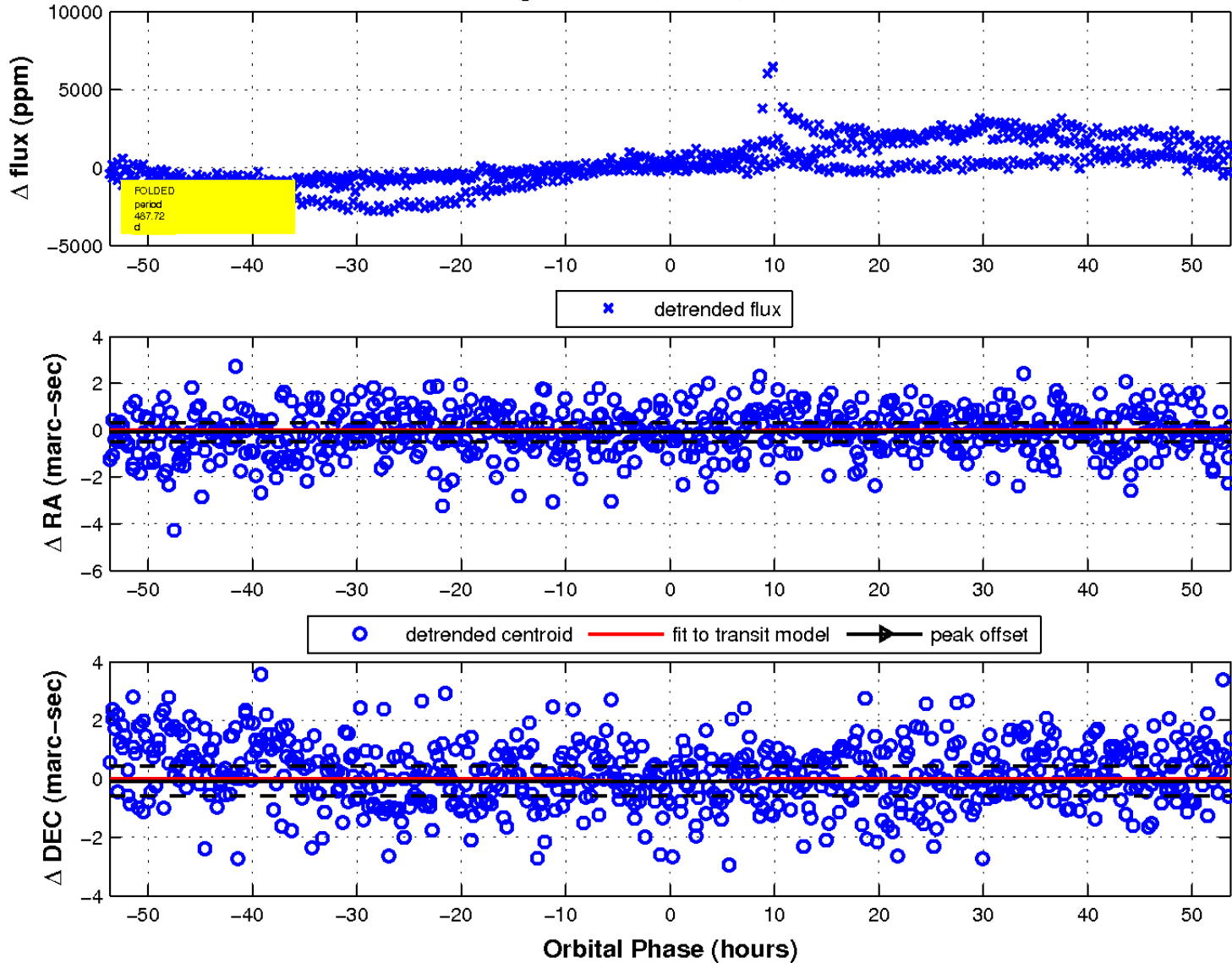
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

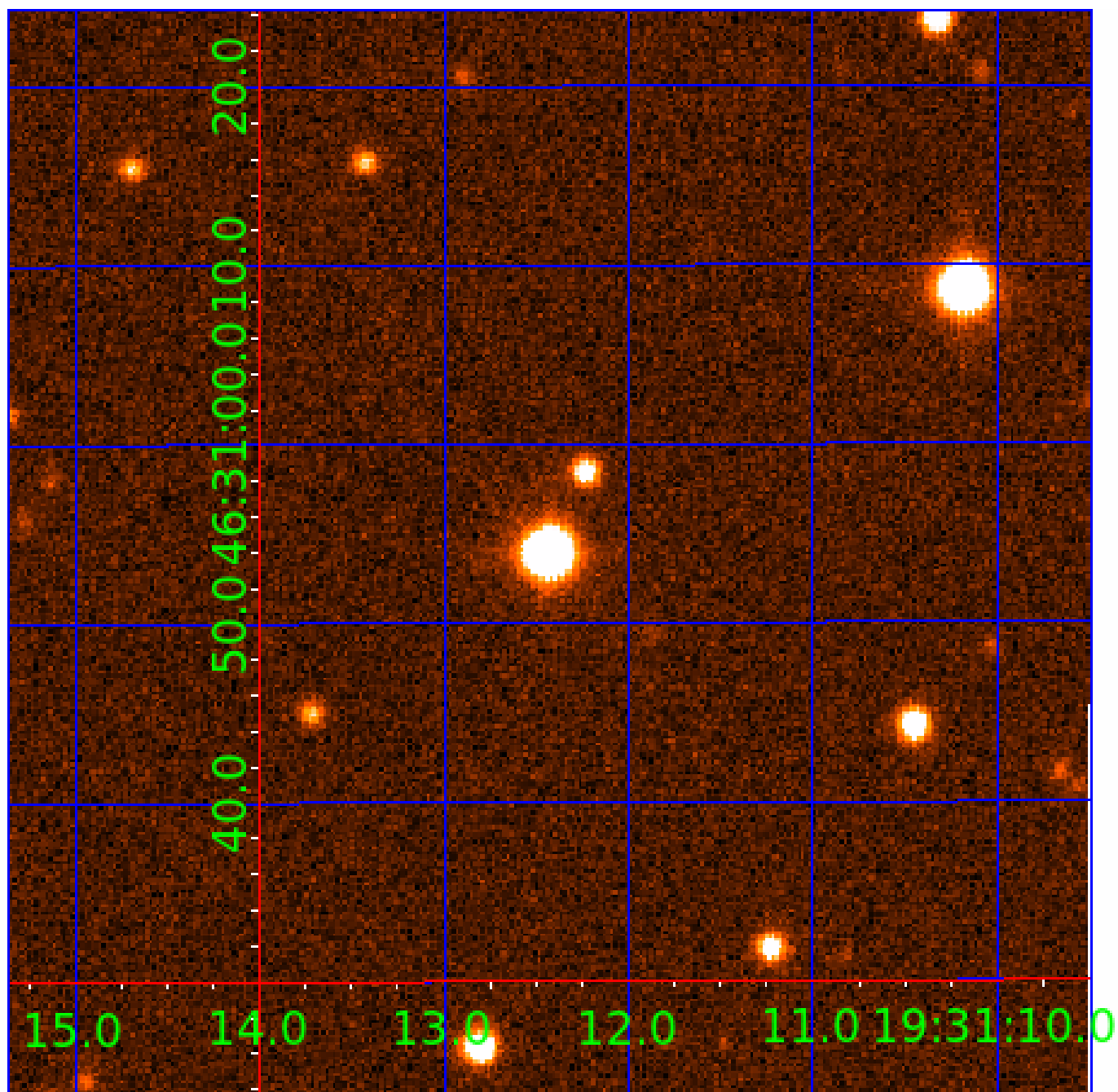


fluxWeightedCentroids, Planet 5 of 6



UKIRT Image

Declination





# KIC 009772849

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009772849-02	OBS	No	442.025565	247.147747	665.8	15.562	15.7	7.1	0.70	5593	2.26	0.42
009772849-03	OBS	No	435.086675	305.330819	634.6	7.244	12.5	6.3	0.70	5593	1.83	0.43
009772849-04	OBS	No	575.579420	198.696126	710.7	4.204	11.3	7.5	0.70	5593	2.31	0.29
009772849-05	OBS	No	487.717346	588.752969	413.9	17.908	16.1	3.7	0.70	5593	1.42	0.37
009772849-06	OBS	No	402.255062	250.866823	510.9	5.000	11.2	-1.0	0.70	5593	1.57	0.47

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009772849-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009772849-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009772849-04	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL—ALL_TRANS_CHASES—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
009772849-05	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL_SKYE_ZUMA—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
009772849-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—ALL_TRANS_CHASES—CENT_NOFITS

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

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

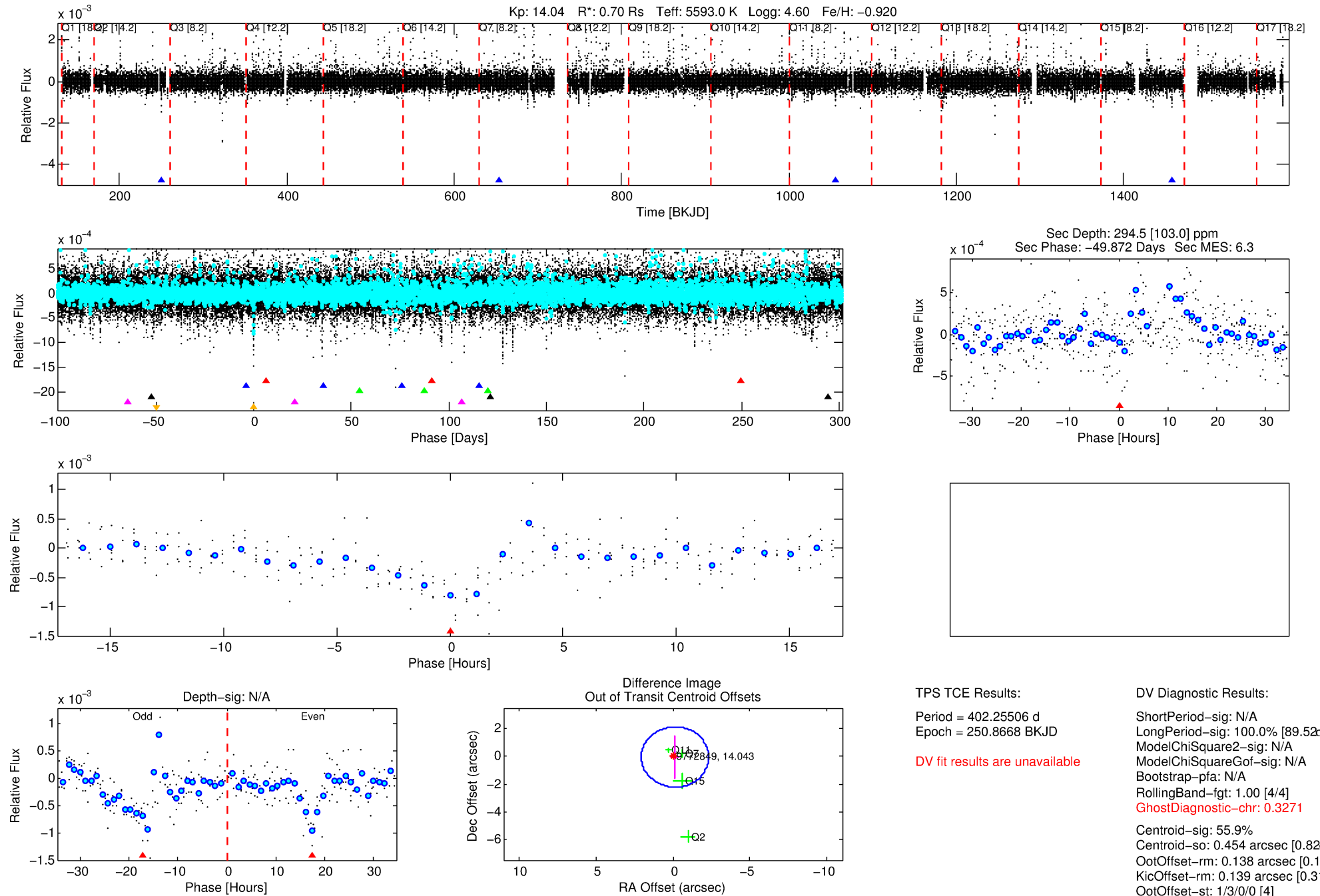
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 009772849-06

No Significant Match Found

# DV One-Page Summary

KIC: 9772849 Candidate: 6 of 6 Period: 402.255 d



## TPS TCE Results:

Period = 402.25506 d  
Epoch = 250.8668 BKJD

DV fit results are unavailable

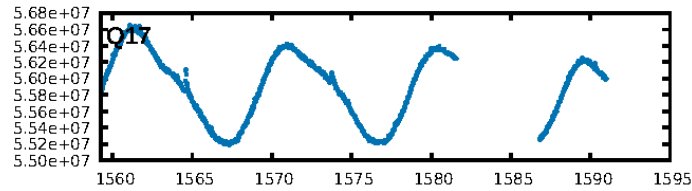
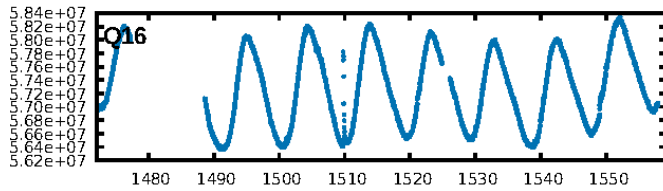
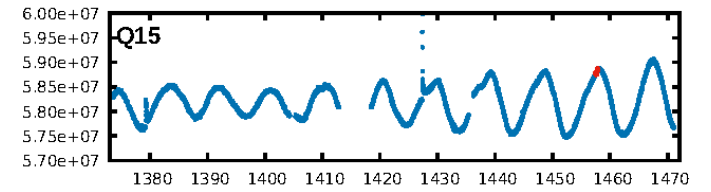
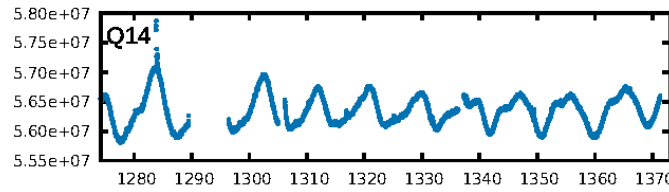
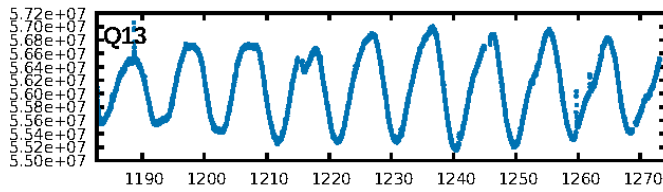
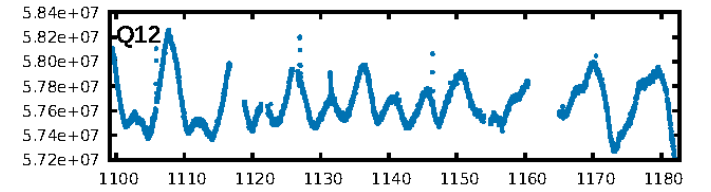
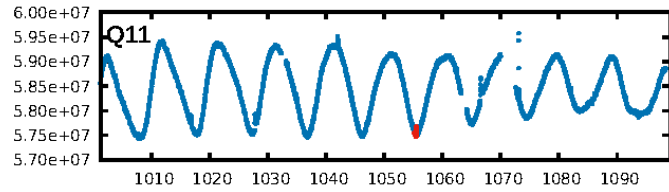
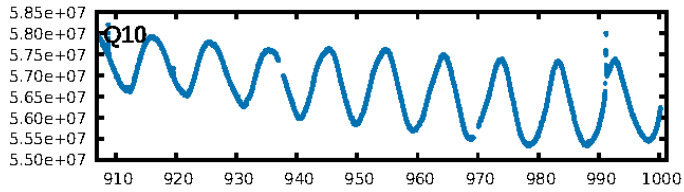
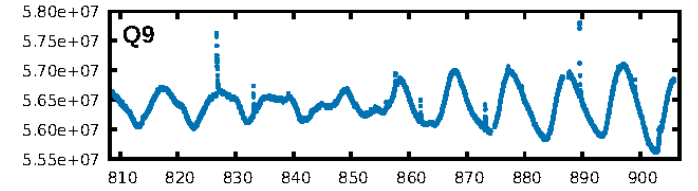
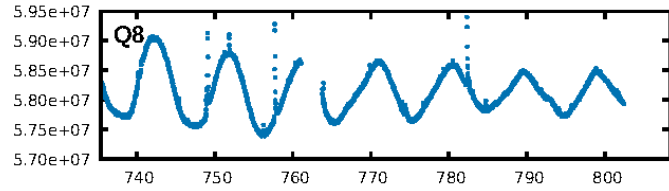
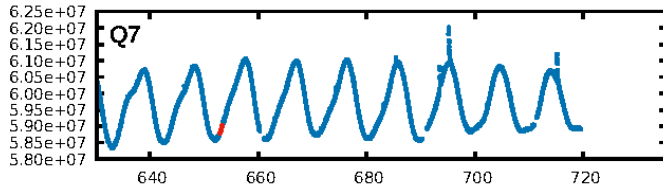
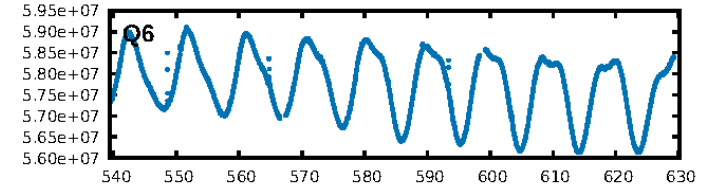
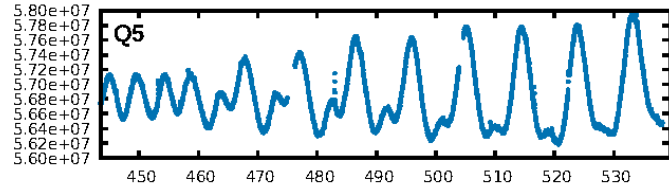
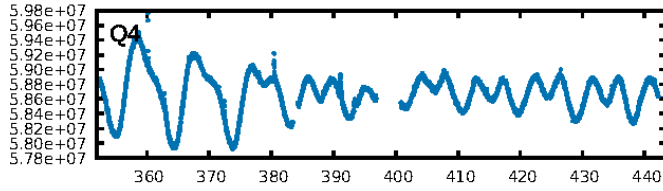
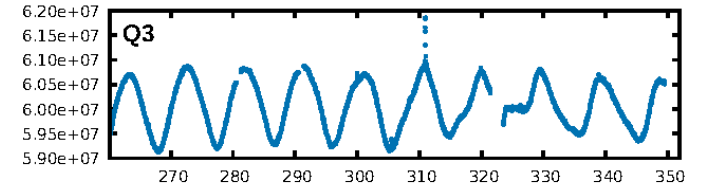
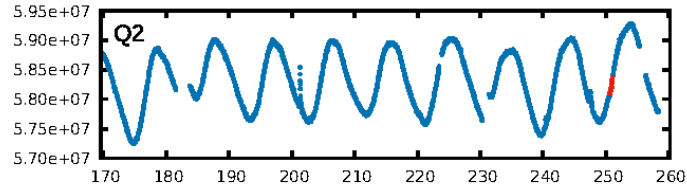
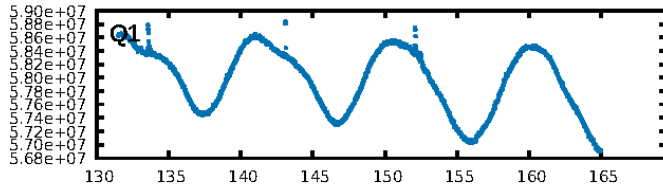
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [89.52σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: 0.3271  
Centroid-sig: 55.9%  
Centroid-so: 0.454 arcsec [0.82σ]  
OotOffset-rm: 0.138 arcsec [0.19σ]  
KicOffset-rm: 0.139 arcsec [0.31σ]  
OotOffset-st: 1/3/0/0 [4]  
KicOffset-st: 1/3/0/0 [4]  
DiffImageQuality-fgm: 0.75 [3/4]  
DiffImageOverlap-fno: 1.00 [4/4]

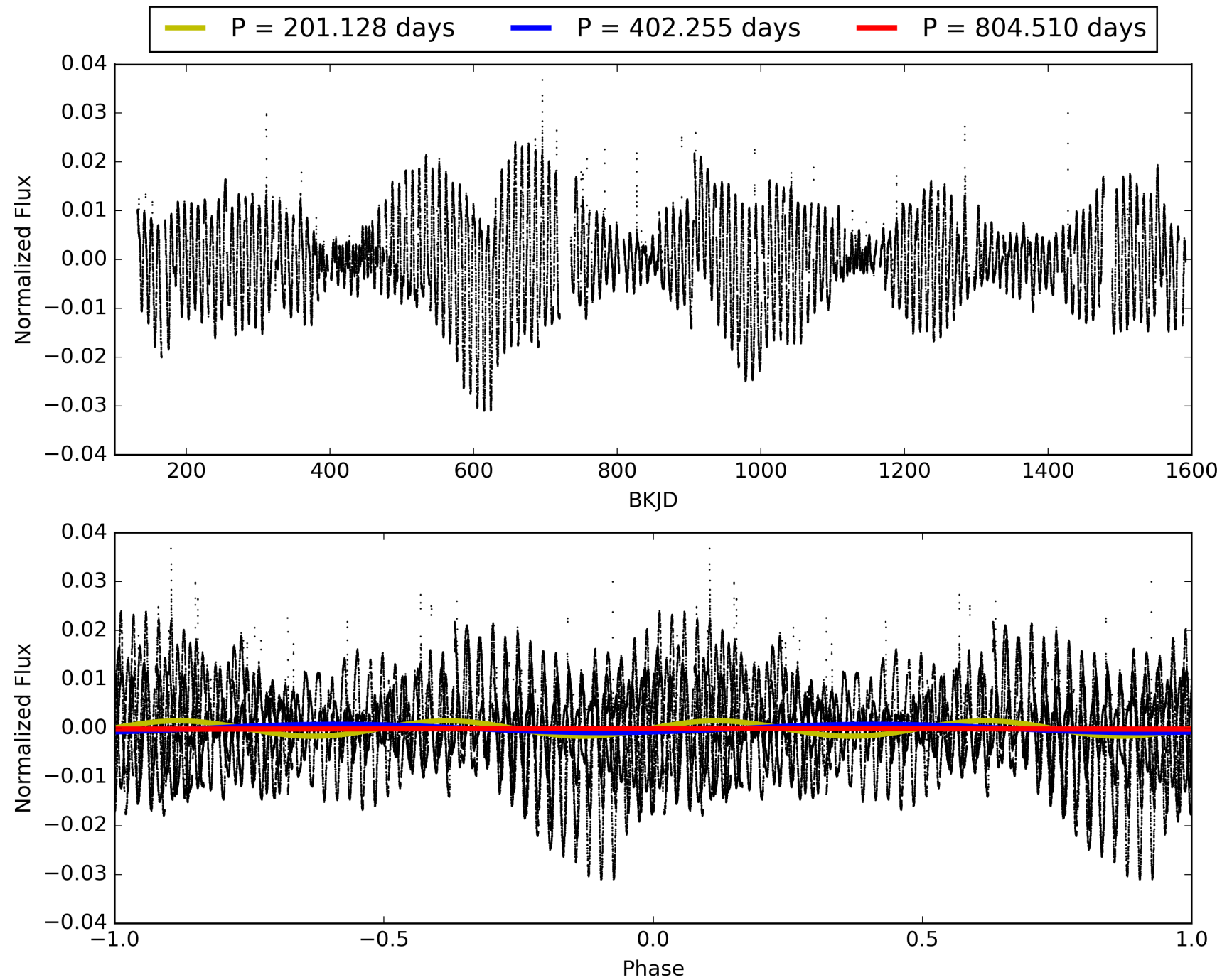
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 22:04:24 Z

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

# TCE 009772849-06, PDC Light Curves

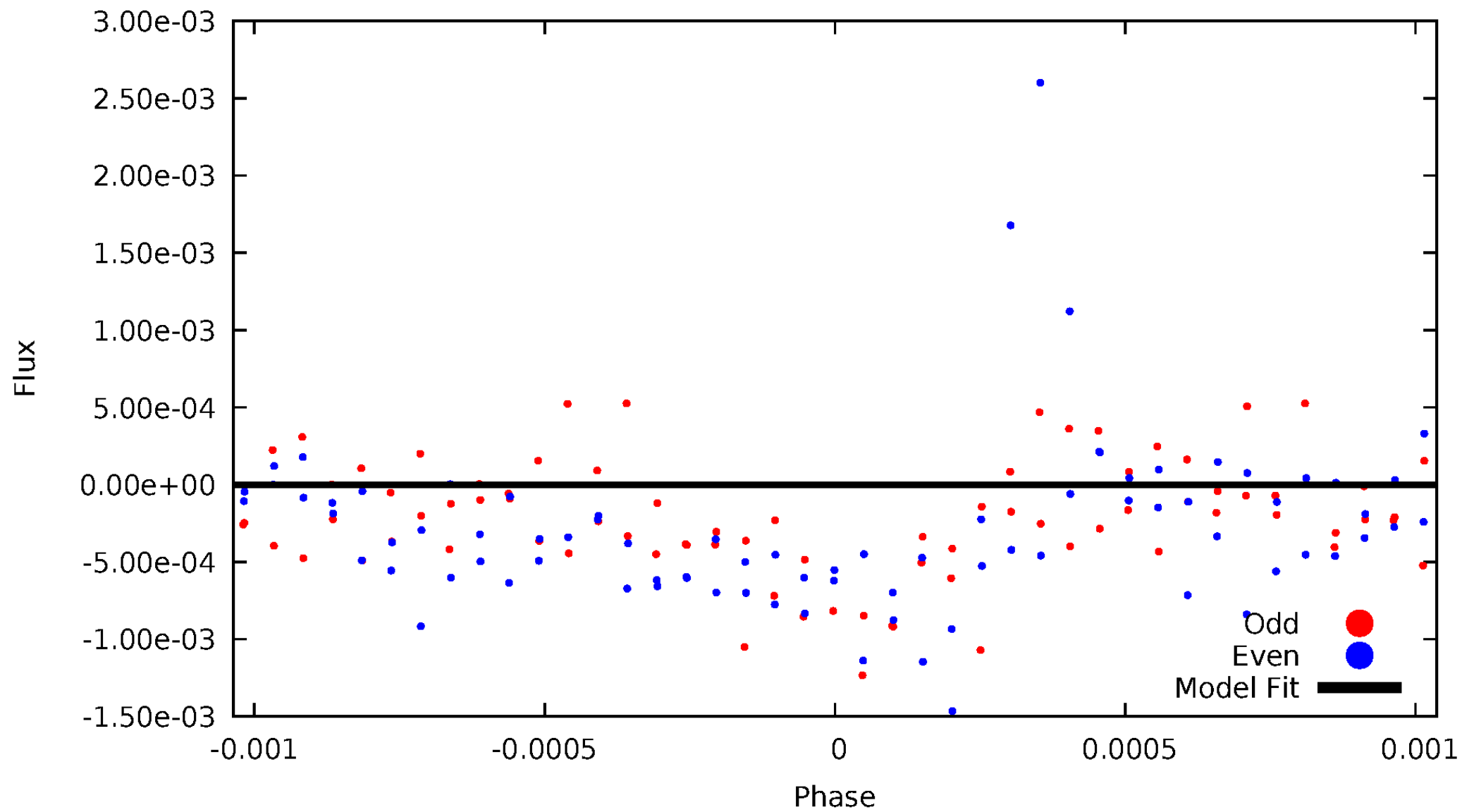


TCE 009772849-06



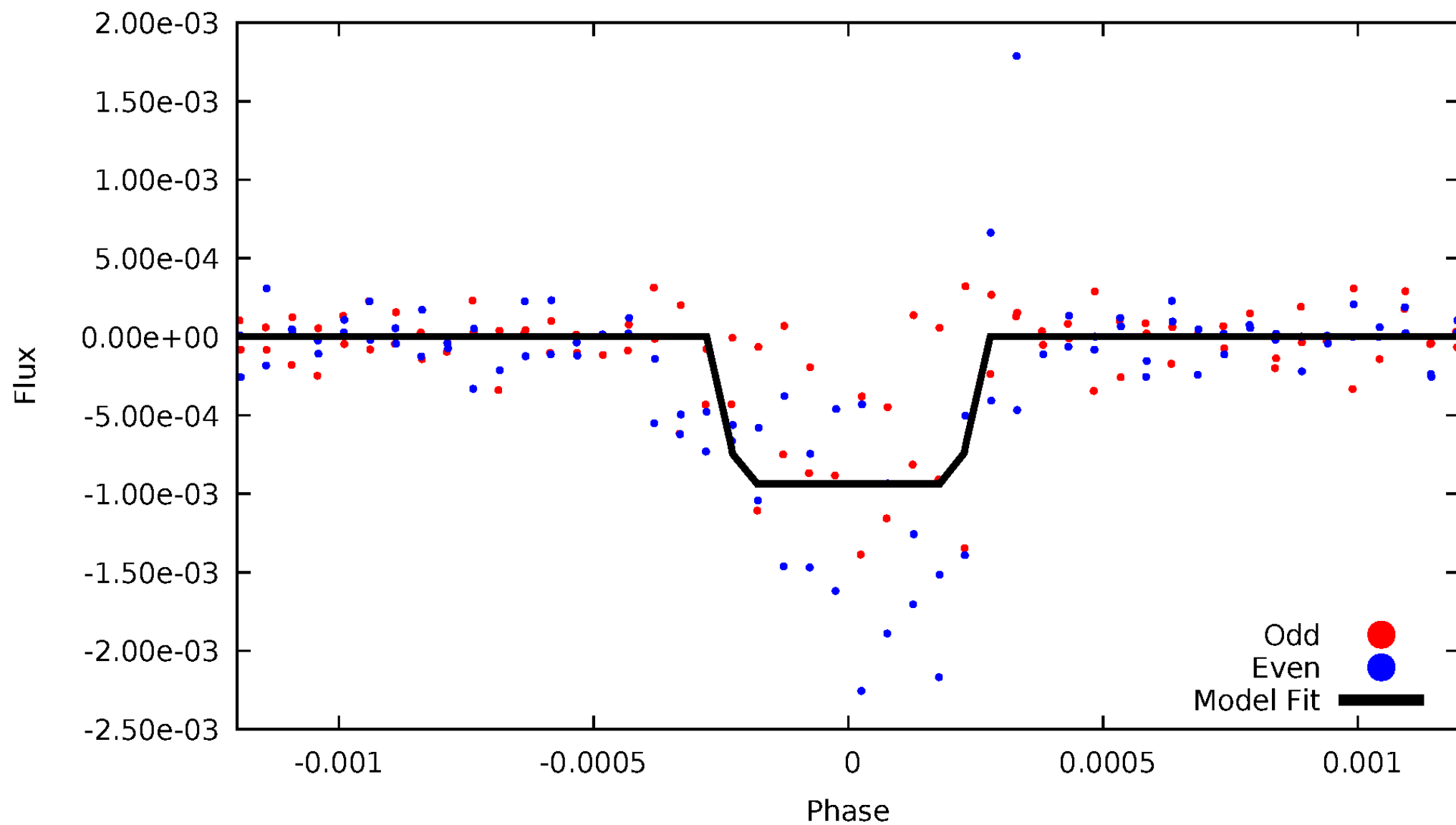
# DV Odd/Even

TCE 009772849-06



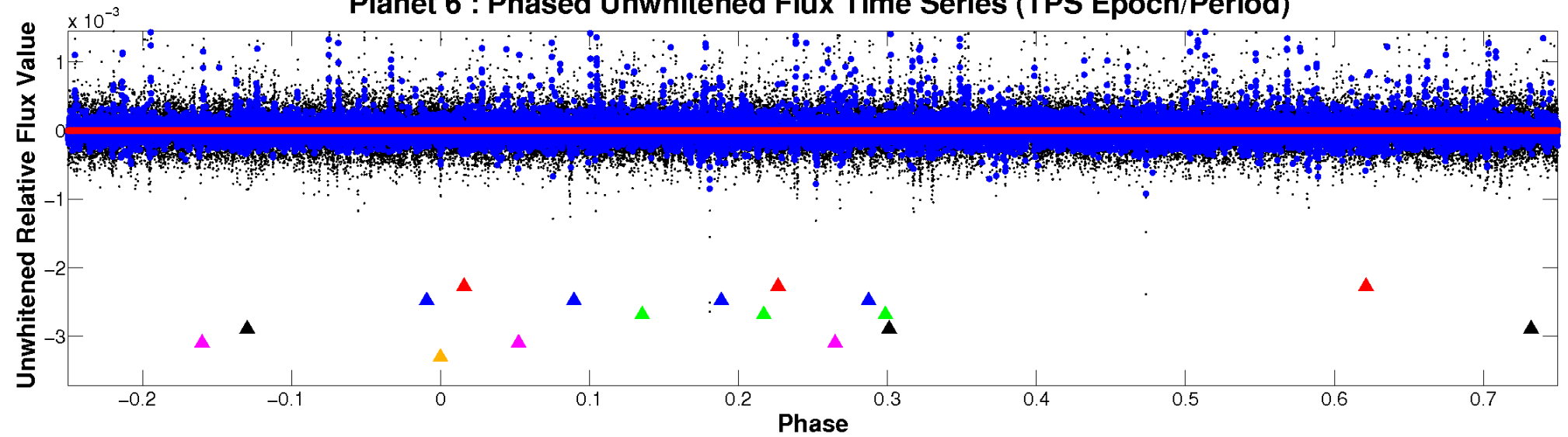
# ALT Odd/Even

TCE 009772849-06



# Non-Whitened Vs. Whitened Light Curve

**Planet 6 : Phased Unwhitened Flux Time Series (TPS Epoch/Period)**

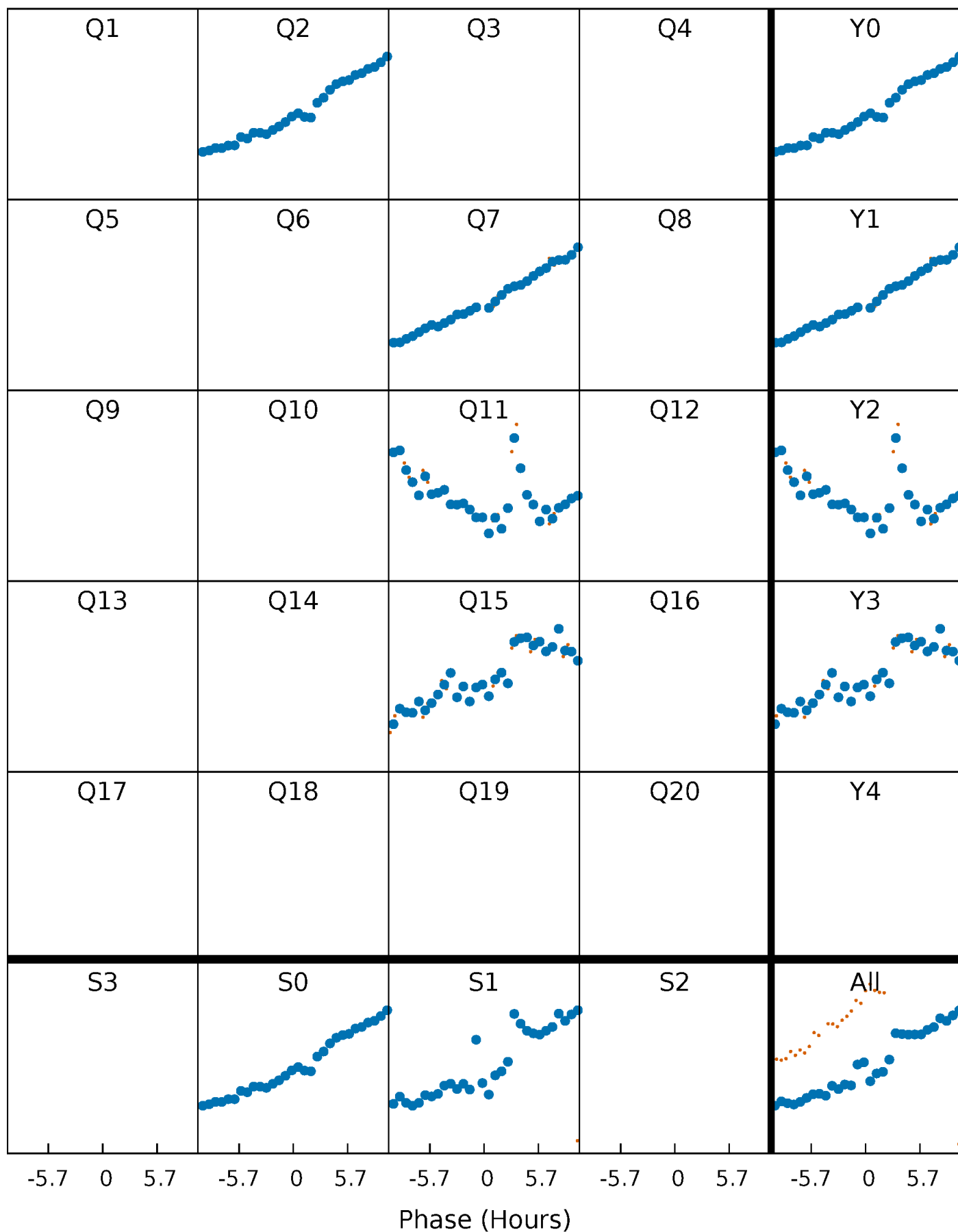


**Planet 6 : Phased Whitened Flux Time Series (TPS Epoch/Period)**



# PDC Quarter-Phased Transit Curves

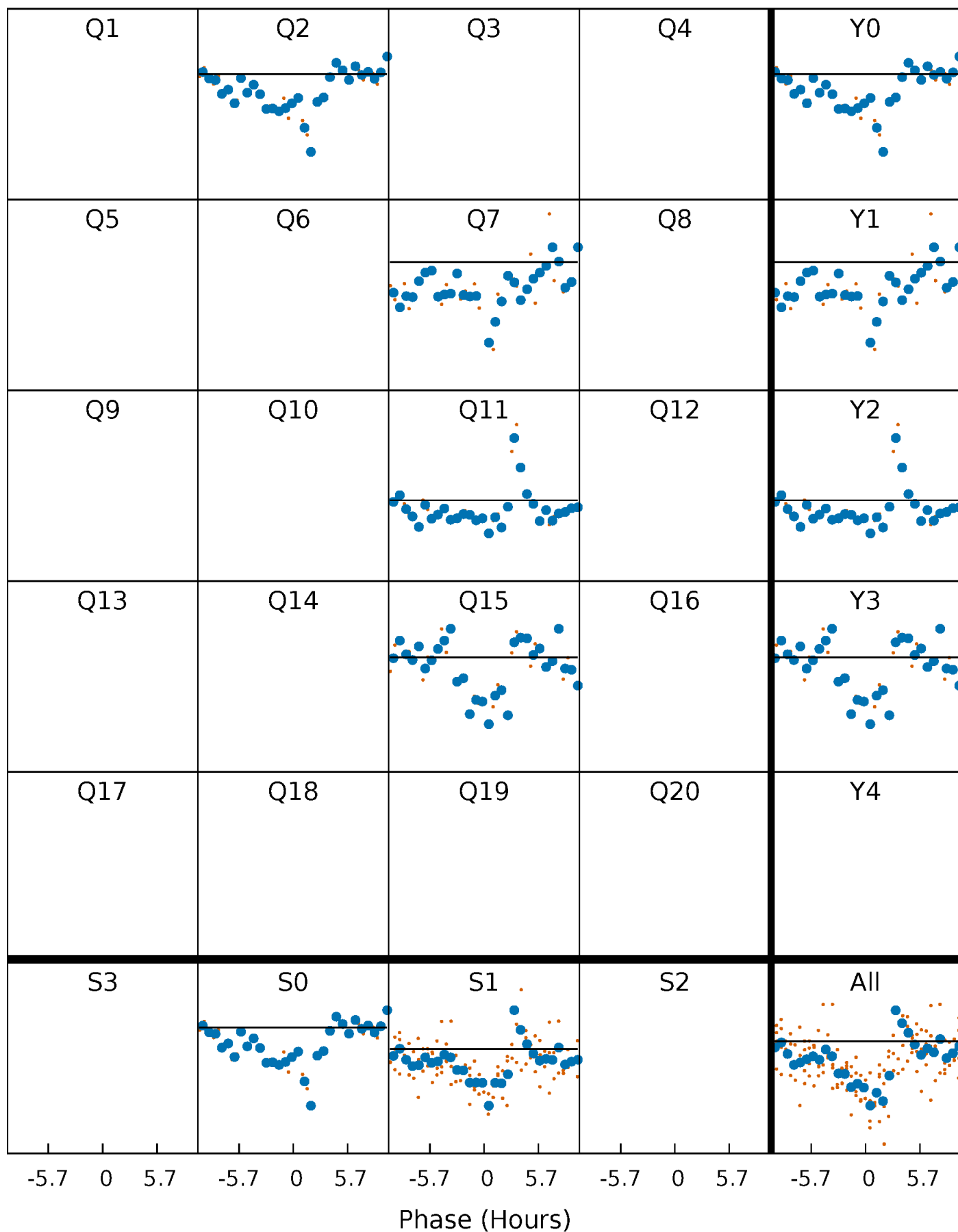
TCE 009772849-06 P=402.255062 Days  $T_0=250.866823$  (BKJD)





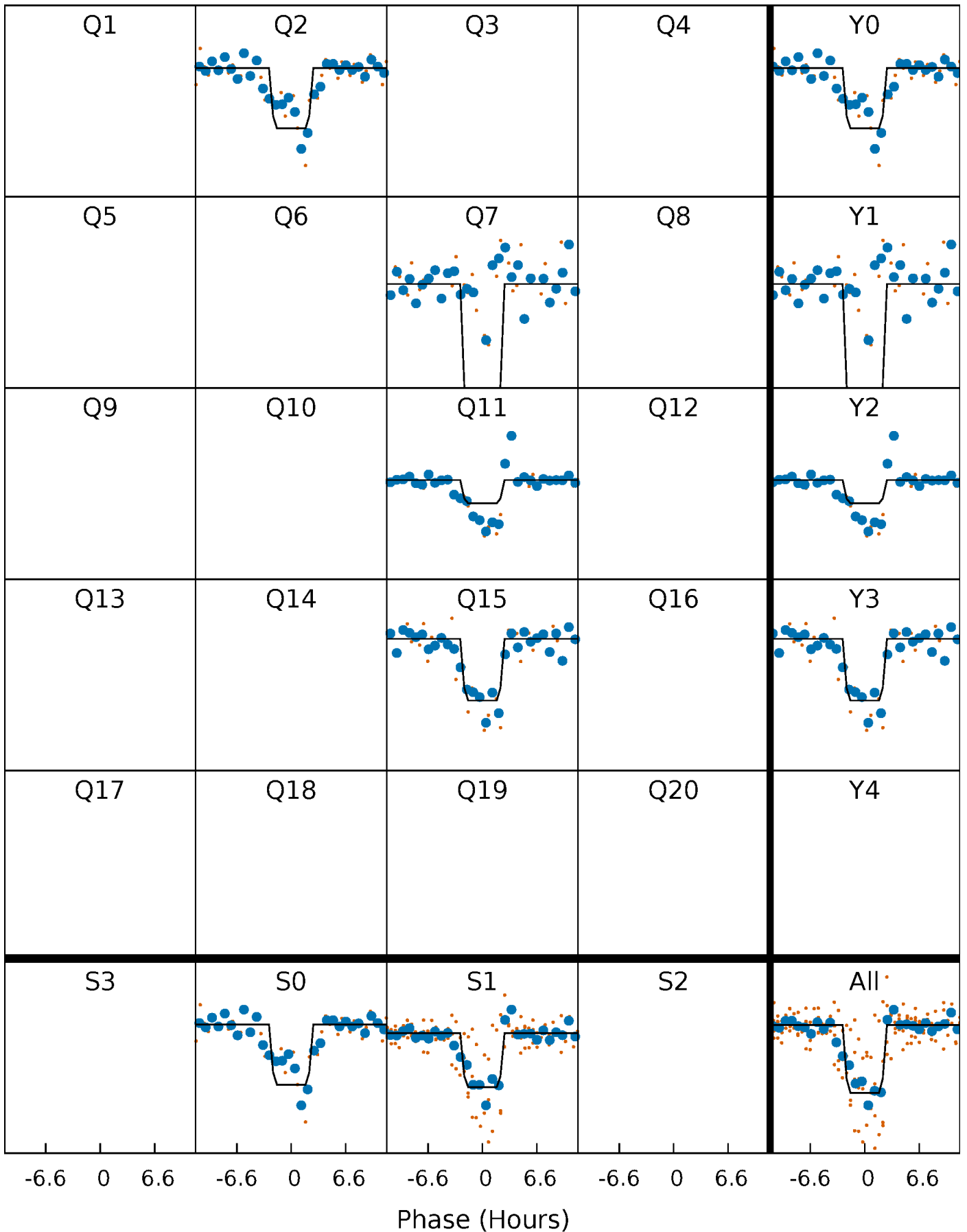
# DV Quarter-Phased Transit Curves

TCE 009772849-06     $P=402.255062$  Days     $T_0=250.866823$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

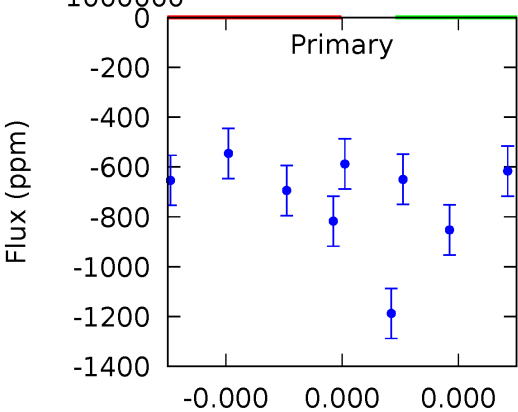
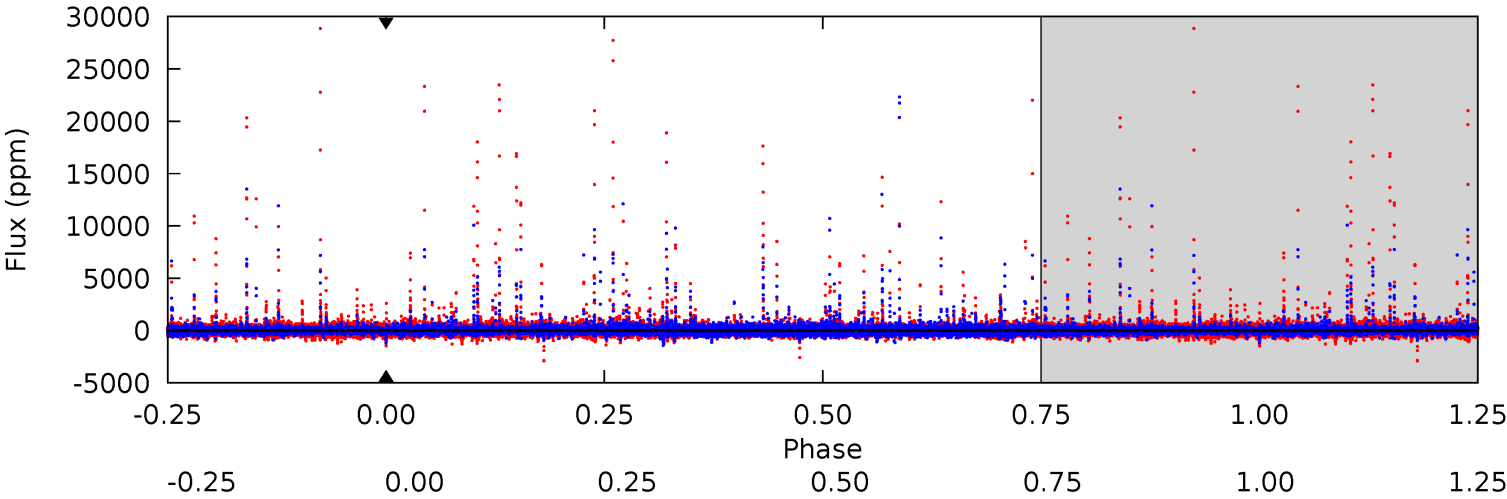
TCE 009772849-06 P=402.255062 Days  $T_0=250.876082$  (BKJD)



# DV Model-Shift Uniqueness Test

009772849-06, P = 402.255062 Days, E = 250.866823 Days

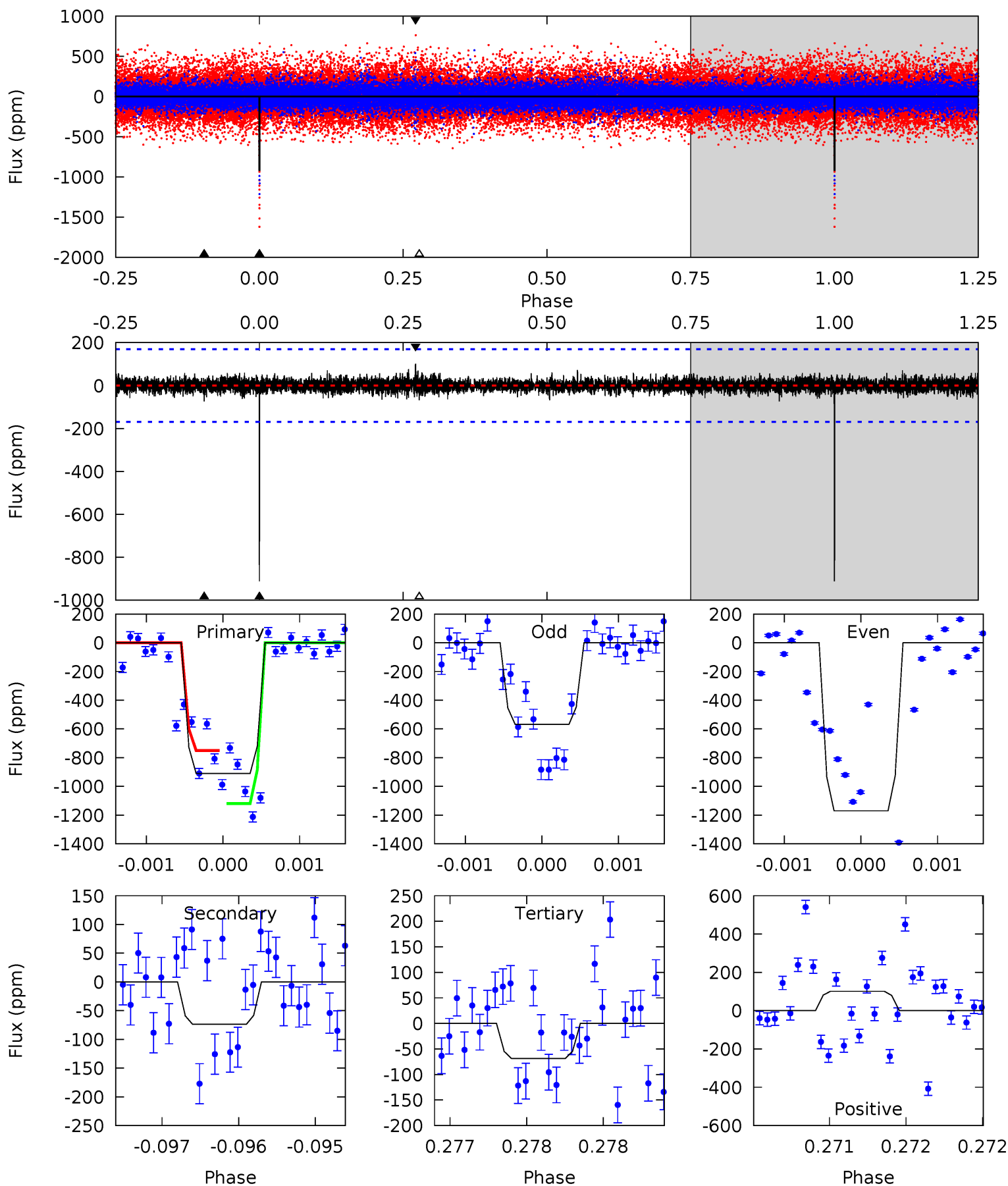
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



# Alt Model-Shift Uniqueness Test

009772849-06, P = 402.255062 Days, E = 250.876082 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
30.0	2.42	2.25	3.33	5.57	3.48	0.53	27.7	26.7	0.17	-0.90	11.2	0.98	0.10	5.73



### Stellar Parameters For KIC 009772849

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5593^{+166}_{-166}$	$4.596^{+0.065}_{-0.071}$	$-0.920^{+0.350}_{-0.300}$	$0.697^{+0.081}_{-0.054}$	$0.698^{+0.069}_{-0.035}$	$2.905^{+0.750}_{-0.712}$
	+3%/-3%	+1%/-2%	+38%/-33%	+12%/-8%	+10%/-5%	+26%/-25%
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 009772849-06 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$0 \pm 1000000$	$5.64^{+6.01}_{-4.05}$	$296^{+12}_{-10}$	$4502^{+15404}_{-22686}$	$27397^{+2766284}_{-2446525}$
Alt.	$-74 \pm 30$	$5.86^{+6.49}_{-3.82}$	$295^{+12}_{-11}$	$2632^{+1003}_{-438}$	$946^{+7906}_{-742}$

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

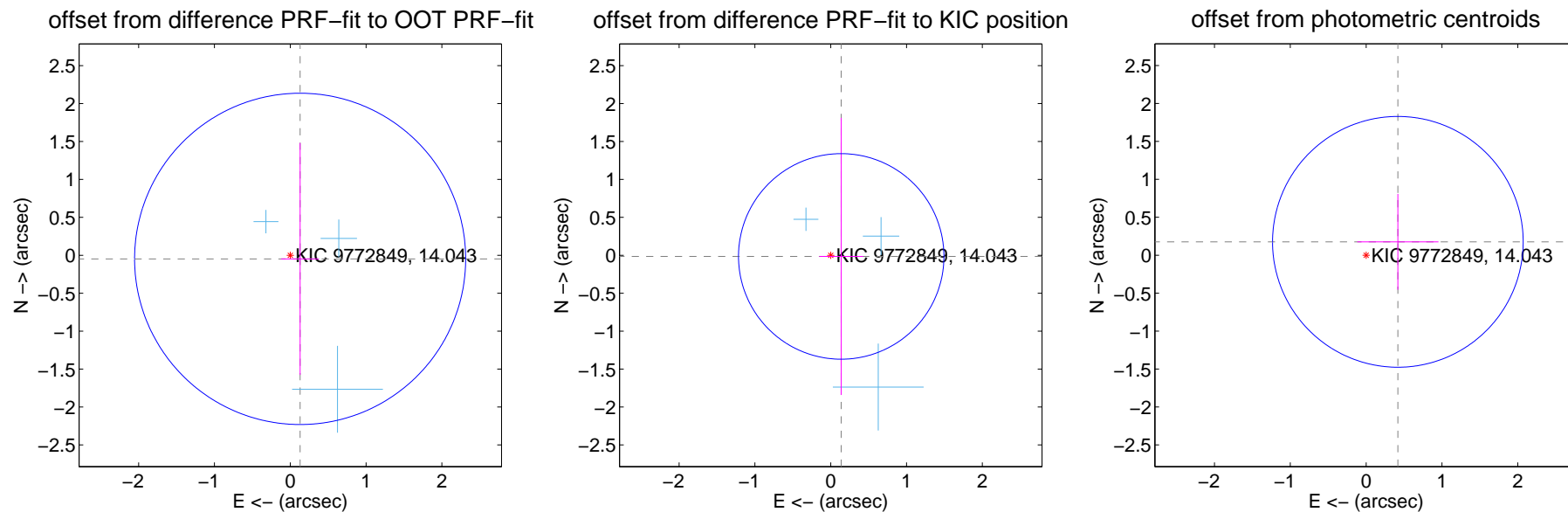
## DV Centroid Data

Supplemental centroid analysis for 009772849-06. Kepler magnitude: 14.04. Transit SNR -1.00

There are 3 quarters with good PRF difference image offsets

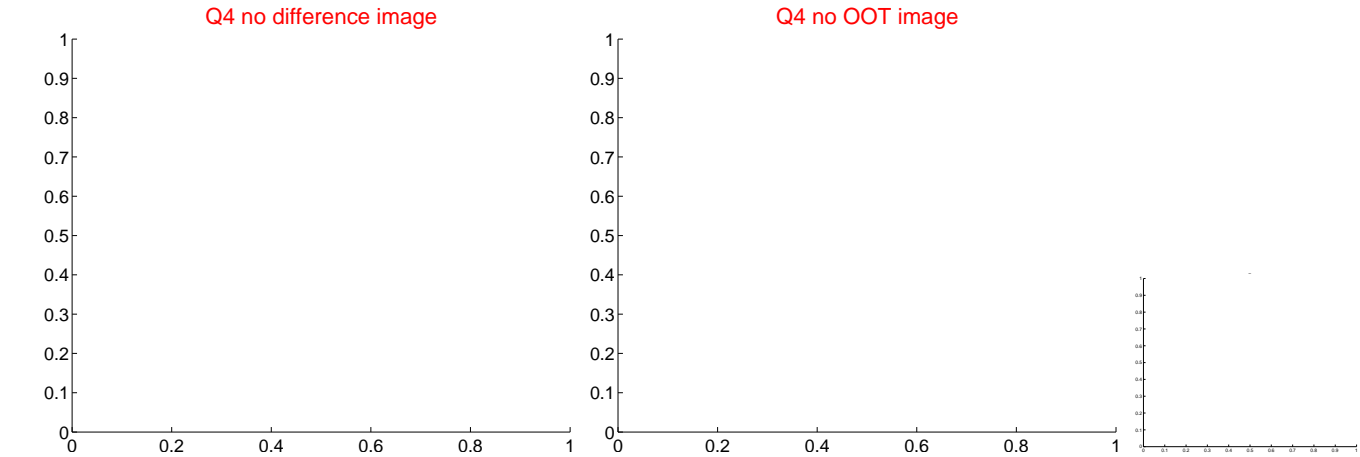
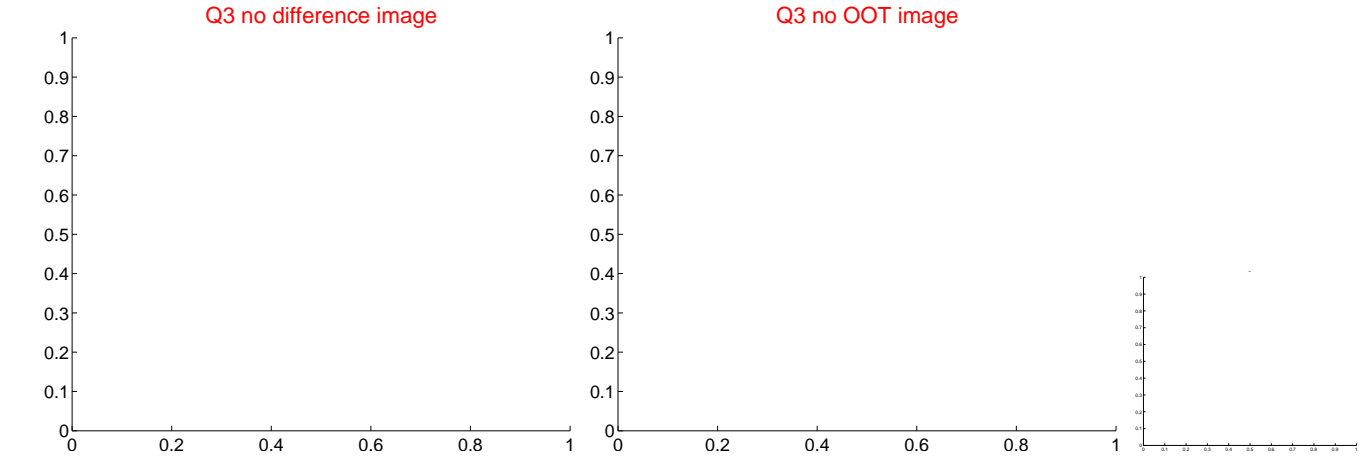
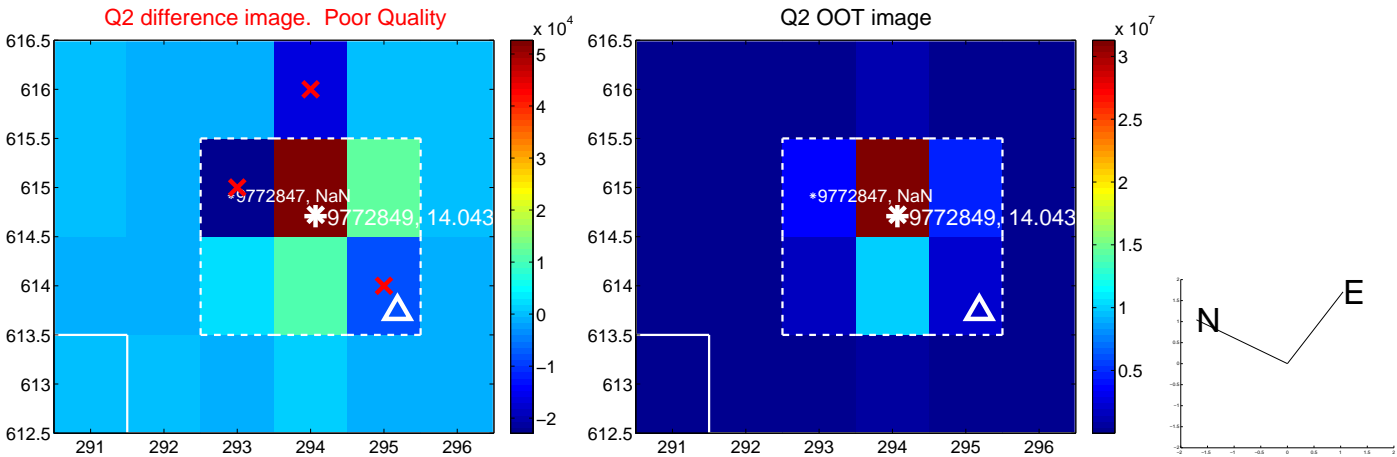
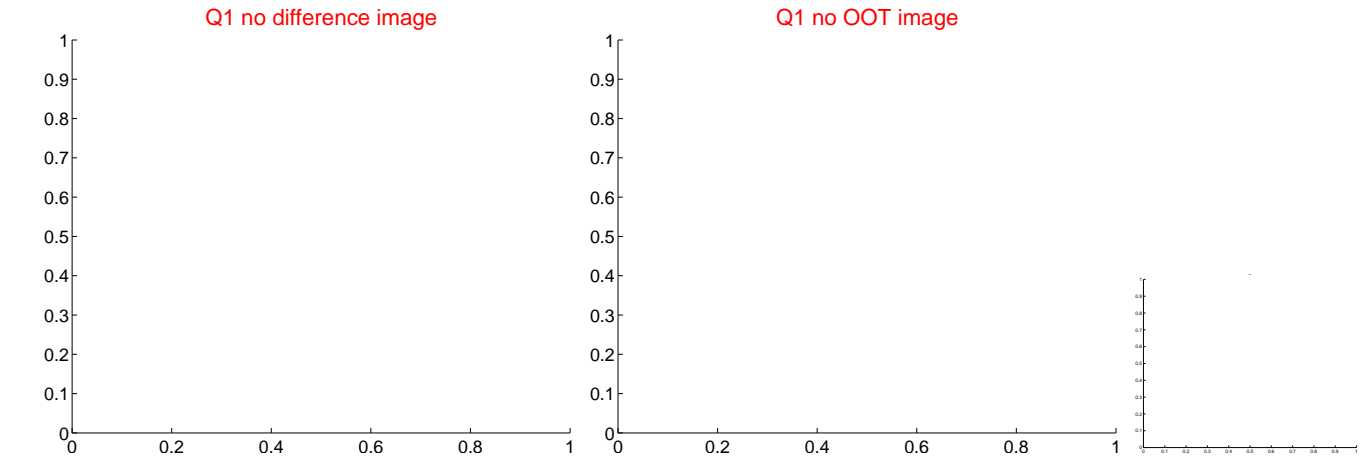
The direct PRF centroid is offset from the target star catalog position by about 0.03 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.138 \pm 0.728$	0.19	$-0.130 \pm 0.250$	$-0.048 \pm 1.527$
PRF-fit source offset from KIC position	$0.139 \pm 0.452$	0.31	$-0.138 \pm 0.288$	$-0.015 \pm 1.826$
photometric centroid source offset	$0.45 \pm 0.55$	0.82	$-0.42 \pm 0.54$	$0.18 \pm 0.63$

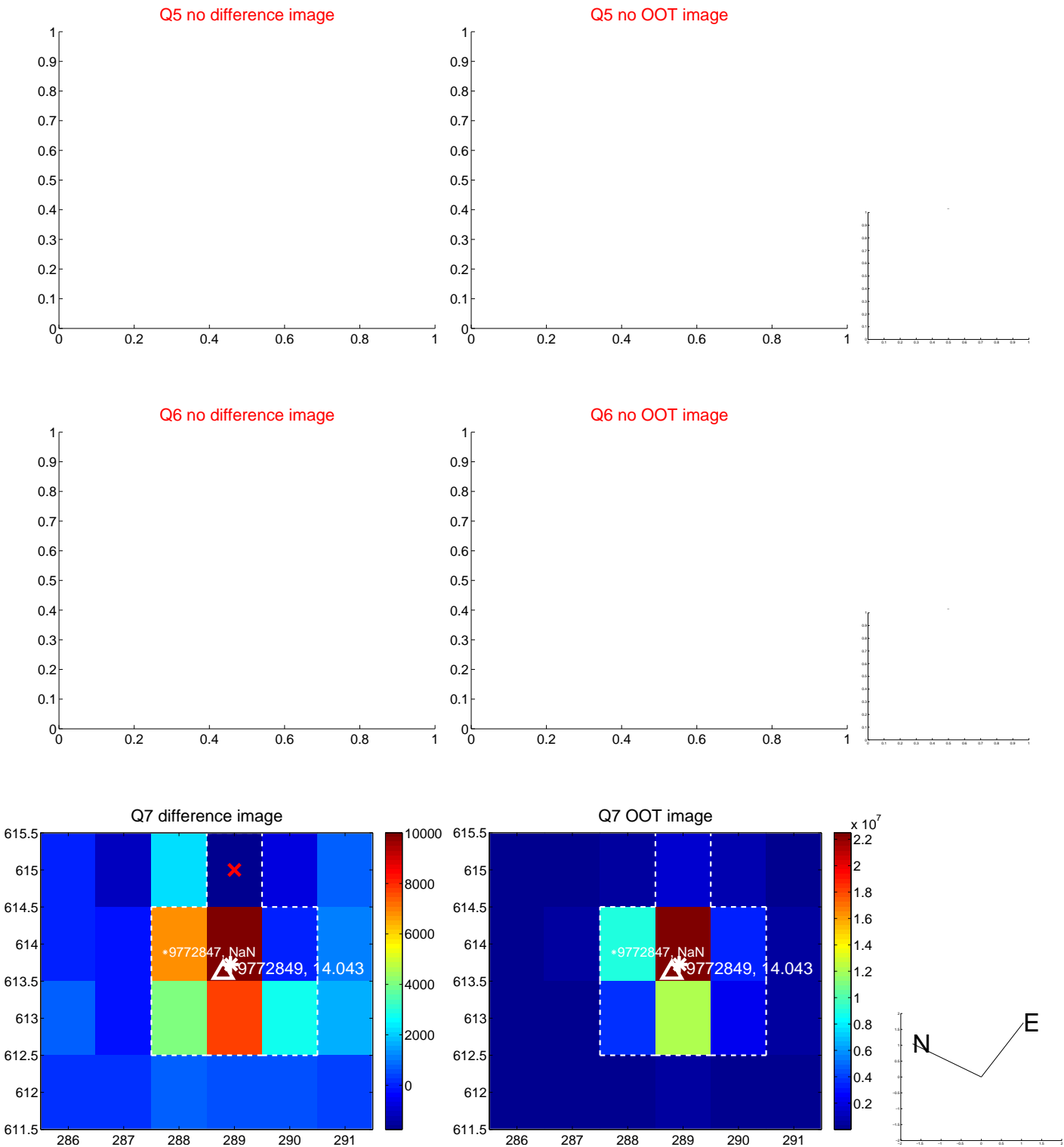


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

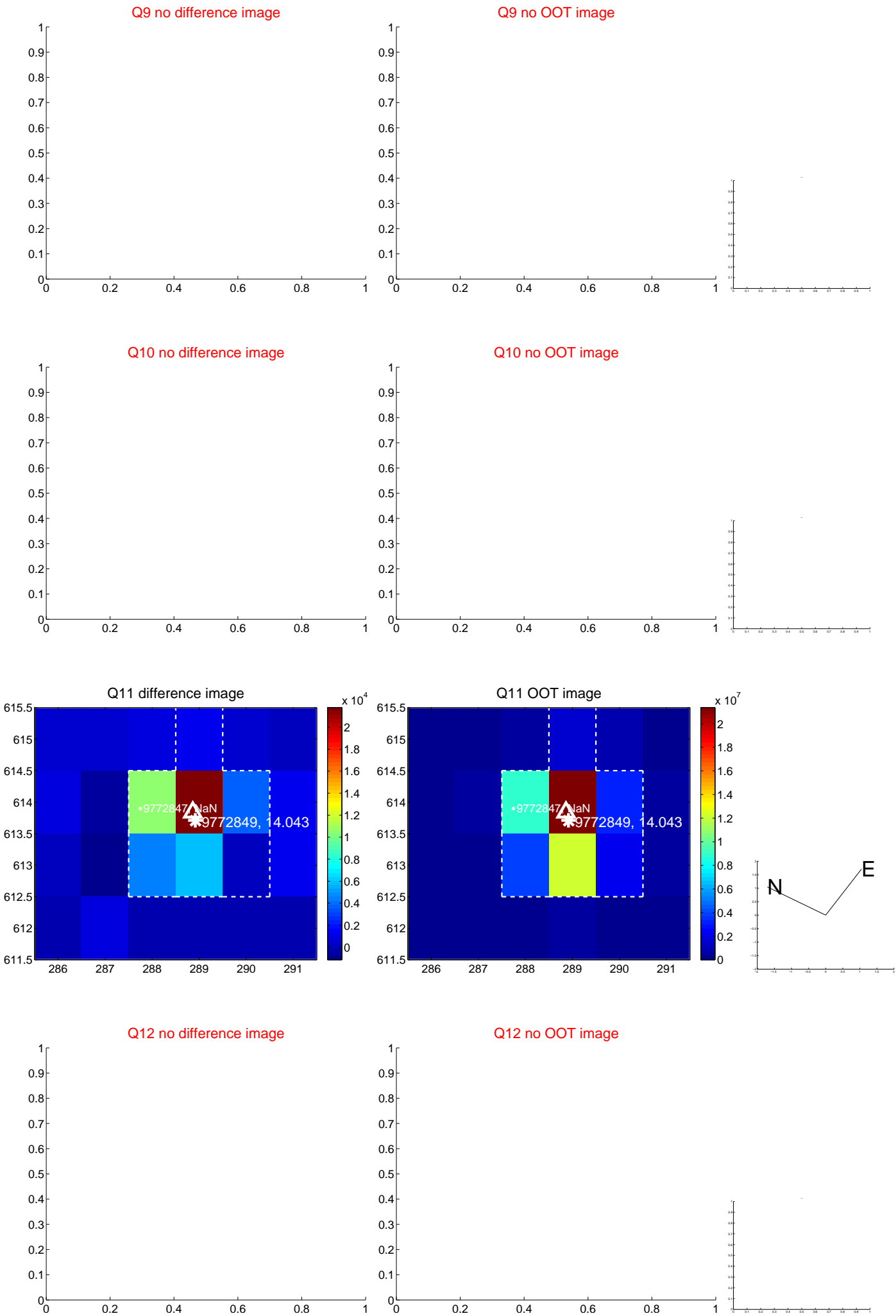


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

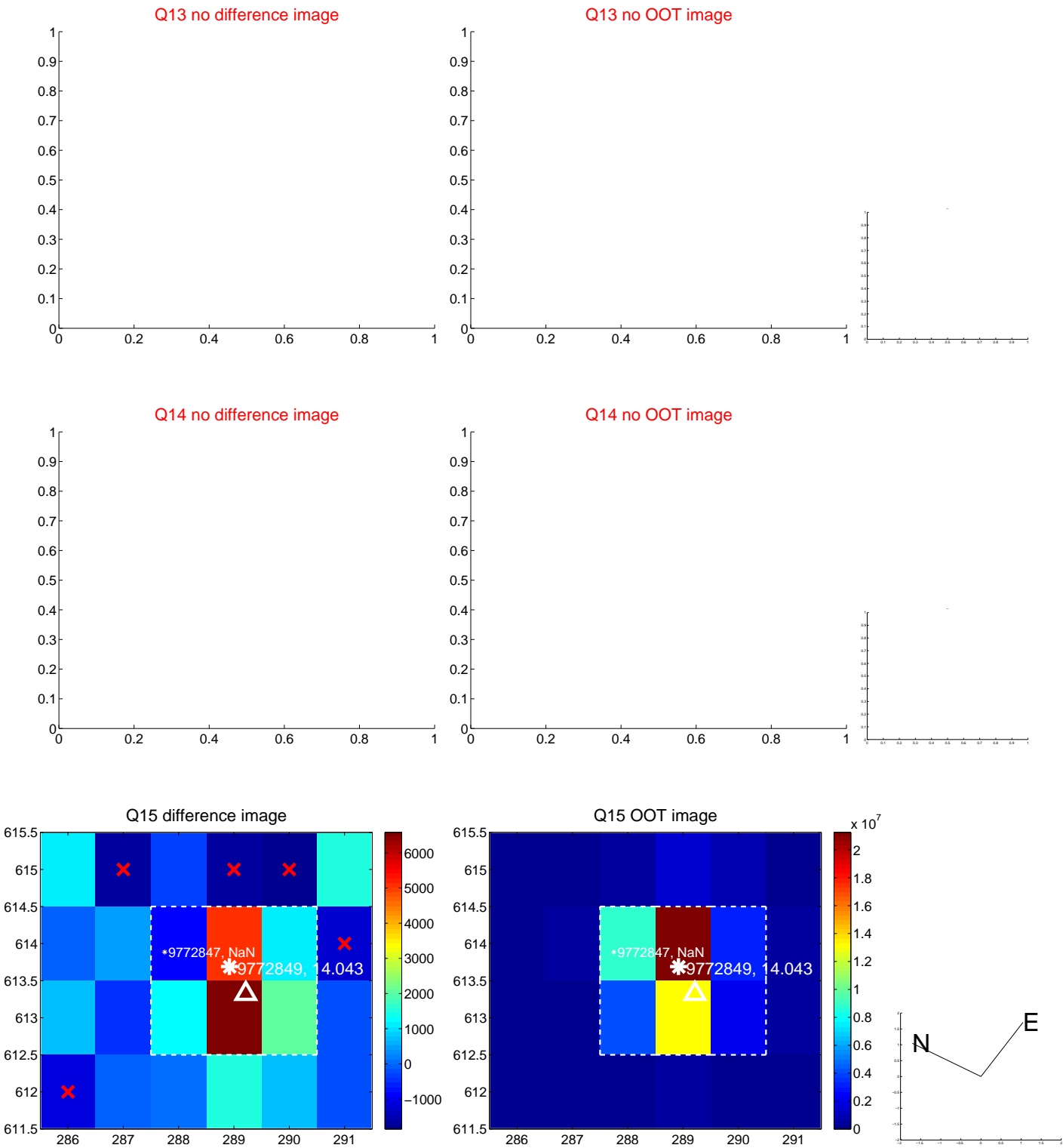




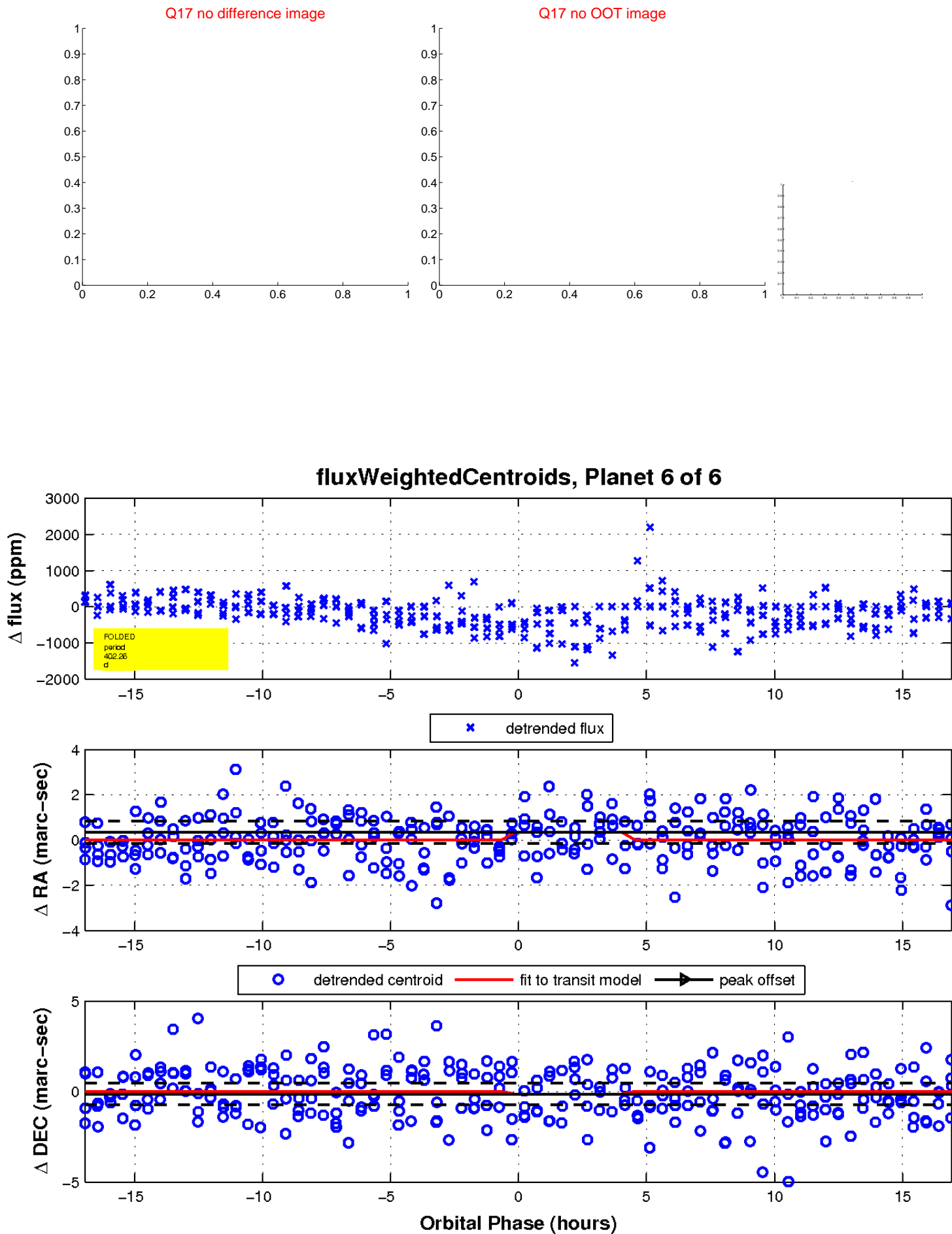
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



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

