

# KIC 010796473

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010796473-01	OBS	No	0.969920	132.162822	44.9	1.914	8.5	8.3	1.05	6228	0.83	3765.51
010796473-02	OBS	No	0.969906	131.701417	53.7	1.547	8.4	9.0	1.05	6228	0.92	3765.59

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010796473-01	OBS	FP	0.00	1	0	1	1	LPP_DV—MOD_NONUNIQ_ALT—CENT_RESOLVED_OFFSET—EPHEM_MATCH
010796473-02	OBS	FP	0.00	1	0	1	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_RESOLVED_OFFSET

**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.

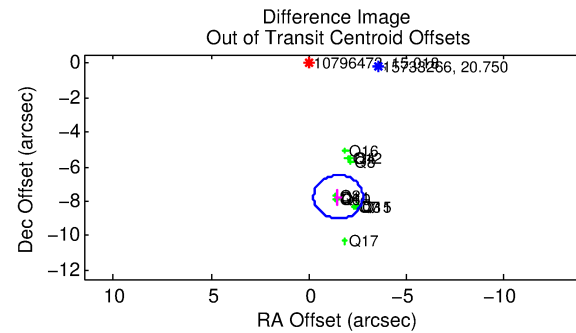
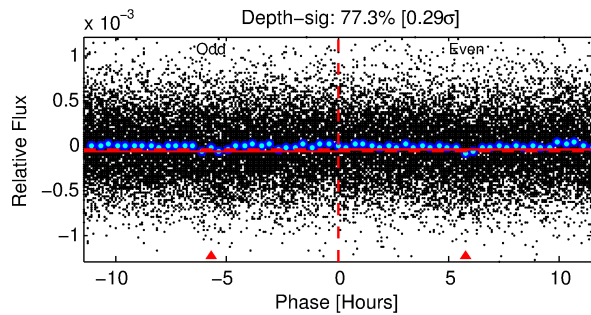
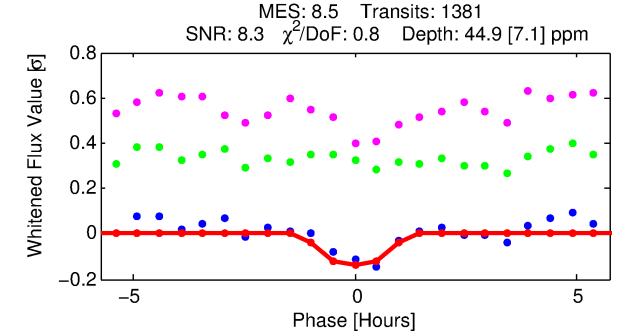
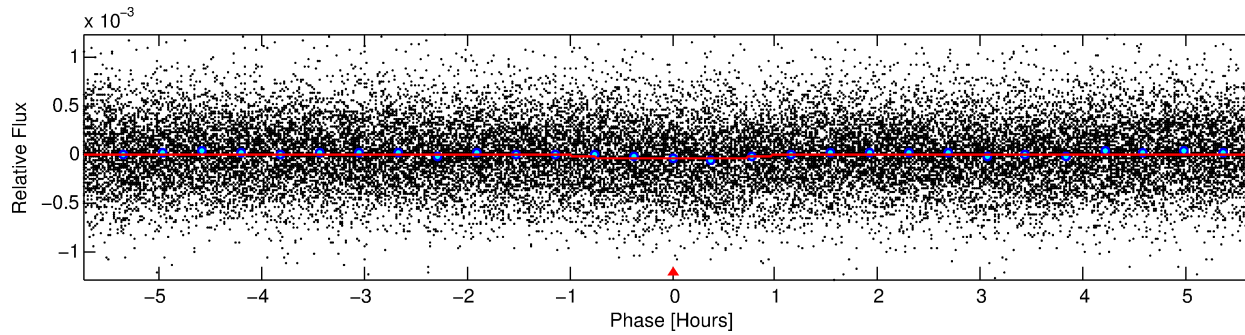
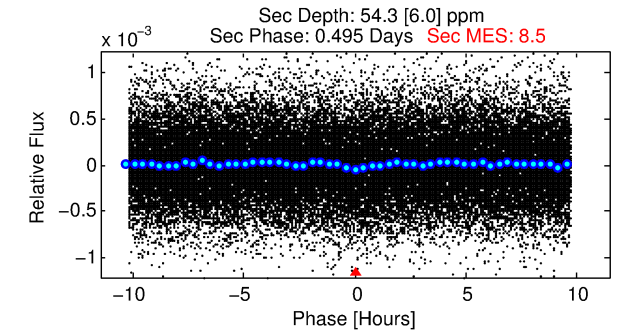
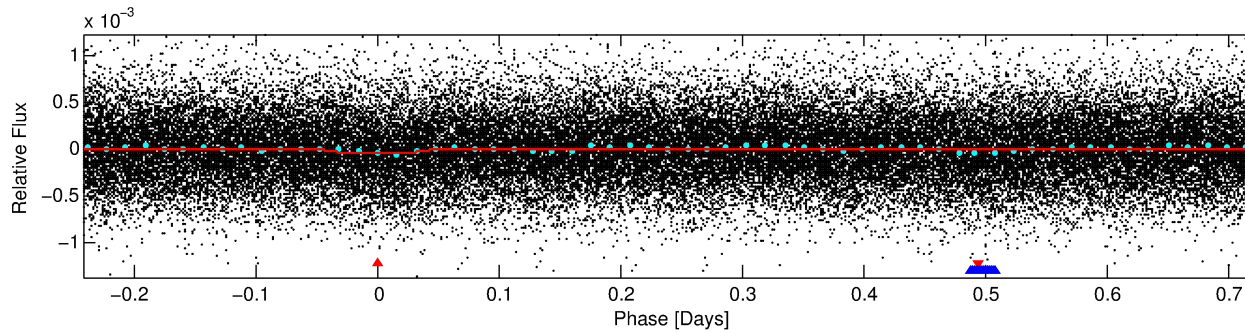
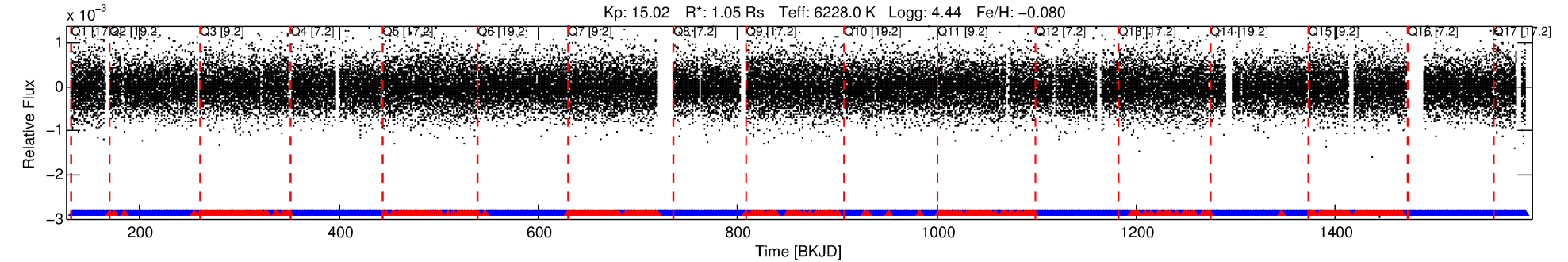
## Ephemeris Match Information For 010796473-01

TCE (1)	KIC	Parent (2)	Parent KIC	$P_1:P_2$	Dist ( $''$ )	$\Delta$ Row	$\Delta$ Col	$m_2$	$m_1$	$D_2/D_1$	Mechanism	Flag	$\sigma_P$	$\sigma_T$
010796473-01	10796473	010796477-pri	10796477	2:1	22.6	6	1	14.11	15.02	8306.70	Direct-PRF	0	2.92	0.10

**Notes:**  $P_1:P_2$  is the period ratio. Dist is the distance in arcseconds.  $\Delta$ Row and  $\Delta$ Col are the number of pixels apart in row and column.  $m_2$  and  $m_1$  are the magnitudes of the parent and child.  $D_2/D_1$  is the parent's transit depth divided by the child's.  $\sigma_P$  and  $\sigma_T$  are the significance of the match in period and epoch. For a match to be considered significant  $\sigma_P < 5.0$  and  $\sigma_T < 5.0$ . Matches which have  $\sigma_P$  and  $\sigma_T$  very close to this cutoff should receive extra scrutiny, especially if the period ratio is very large.

# DV One-Page Summary

KIC: 10796473 Candidate: 1 of 2 Period: 0.970 d



## DV Fit Results:

Period = 0.96992 [0.00001] d  
Epoch = 132.1628 [0.0033] BKJD  
Rp/R\* = 0.0073 [0.0045]  
a/R\* = 1.94 [4.77]  
b = 0.91 [0.66]  
Seff = 3765.51 [1595.19]  
Teq = 1997 [212] K  
Rp = 0.83 [0.58] Re  
a = 0.0198 [0.0055] AU  
Ag = 16.99 [22.06] [0.72σ]  
Teffp = 6270 [1950] K [2.18σ]

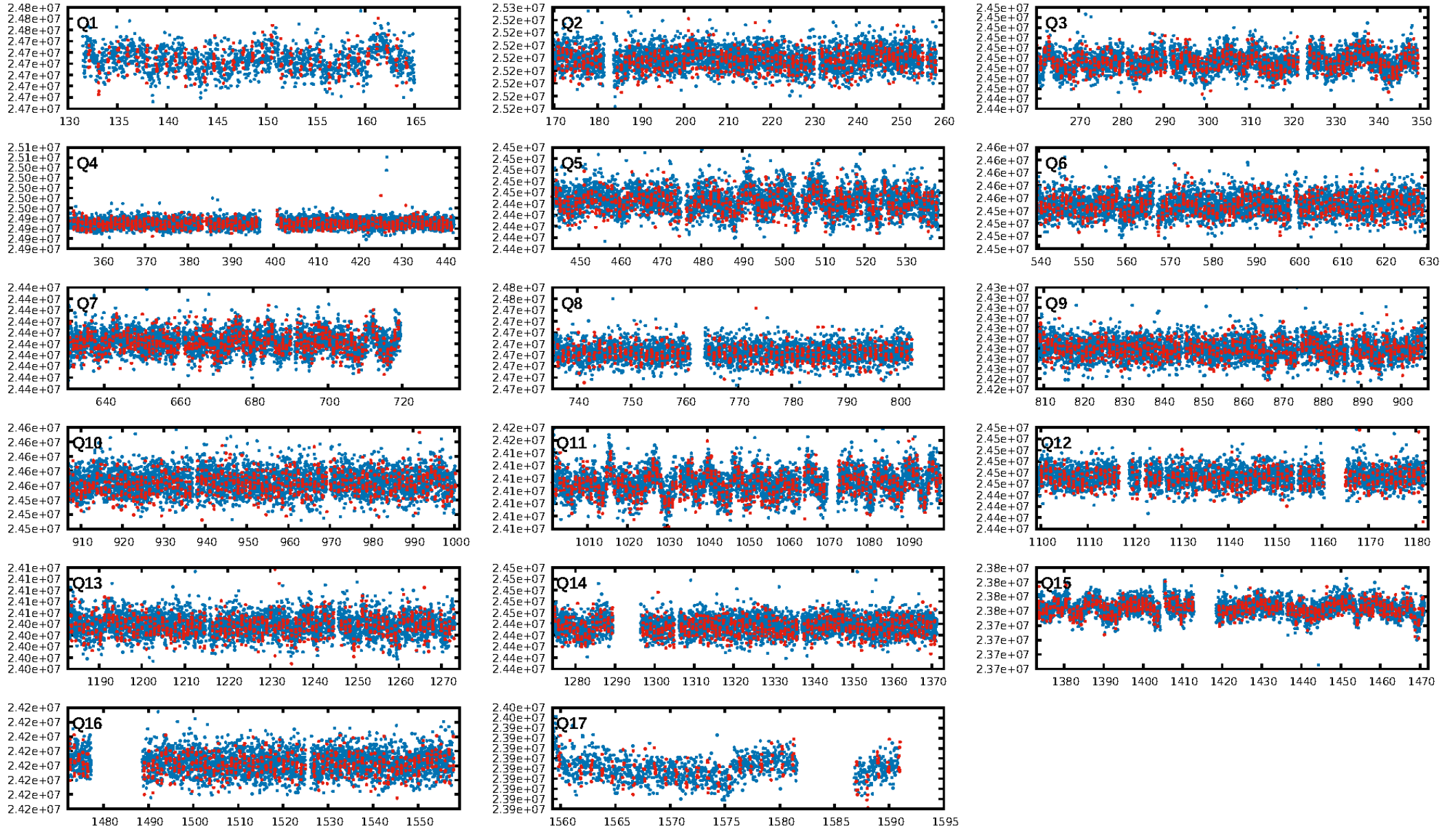
## DV Diagnostic Results:

**ShortPeriod-sig: 0.0% [0.00σ]**  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 9.77e-21  
**RollingBand-fgt: 0.72 [947/1319]**  
**GhostDiagnostic-chr: -0.4531**  
**Centroid-sig: 0.0%**  
Centroid-so: 11.174 arcsec [5.84σ]  
**OotOffset-rm: 7.899 arcsec [18.82σ]**  
**KicOffset-rm: 8.127 arcsec [19.92σ]**  
OotOffset-st: 4/4/4/1 [13]  
KicOffset-st: 4/4/4/1 [13]  
DiffImageQuality-fgm: 0.69 [9/13]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 11:47:23 Z

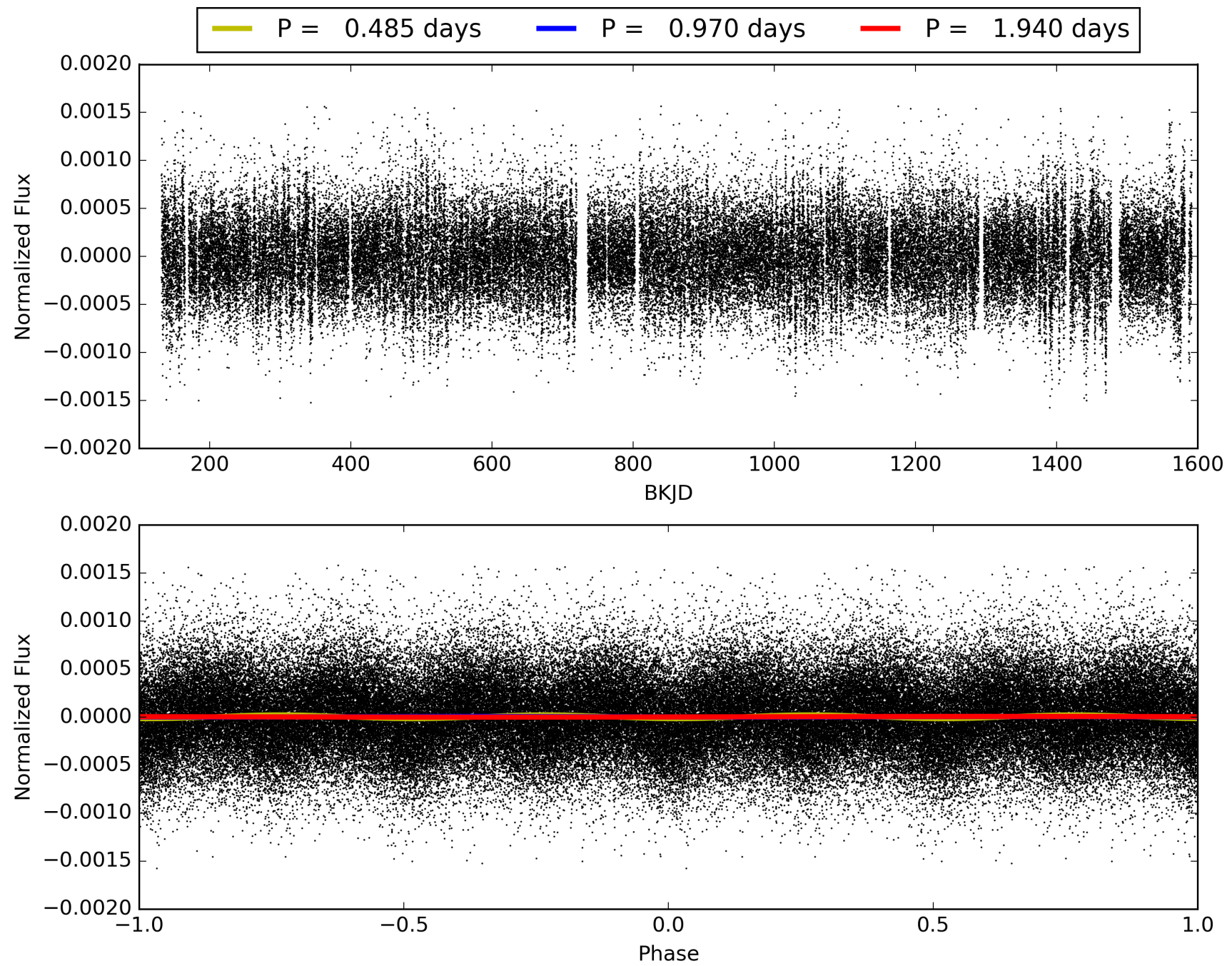
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 010796473-01, PDC Light Curves



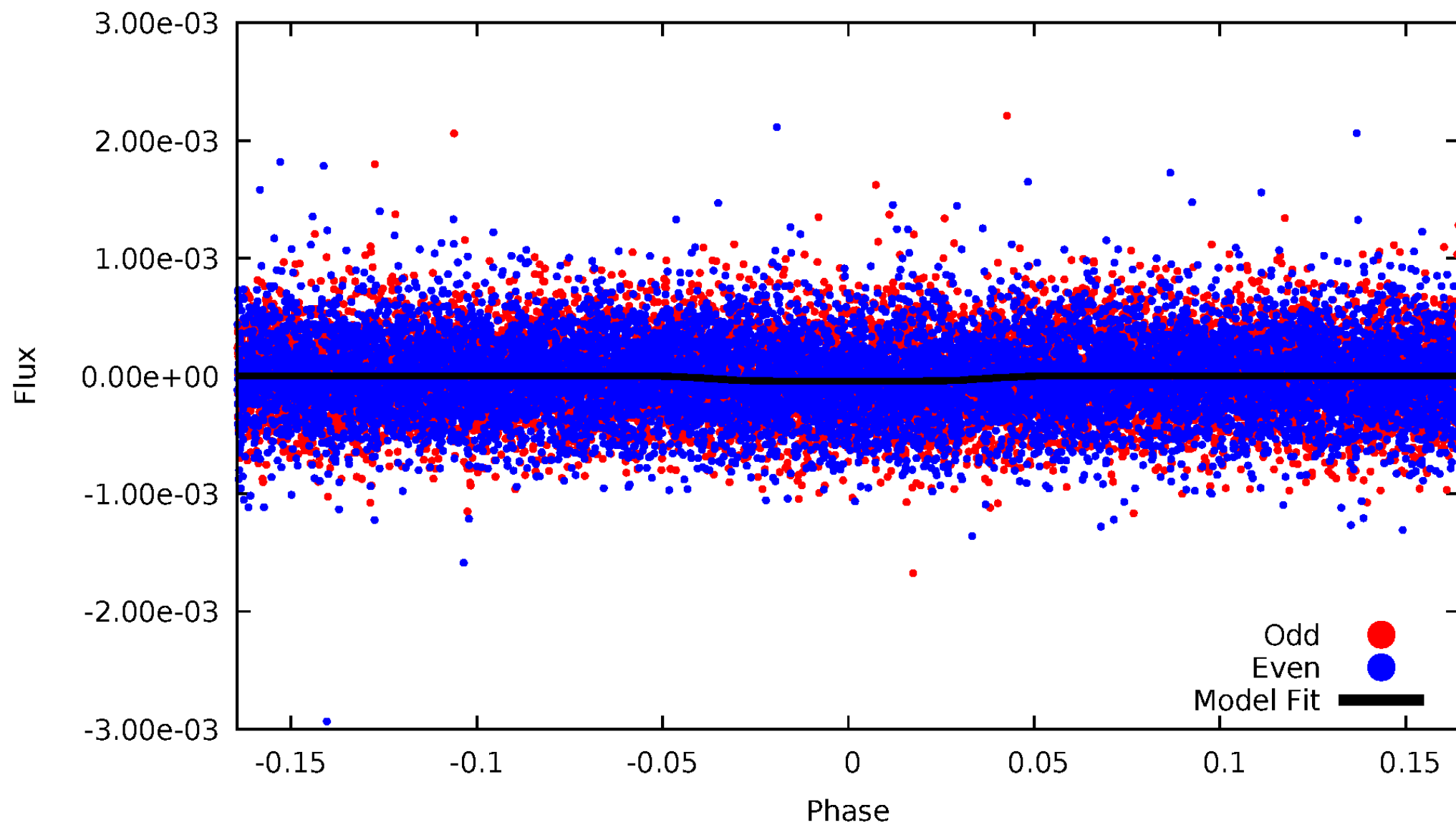


TCE 010796473-01



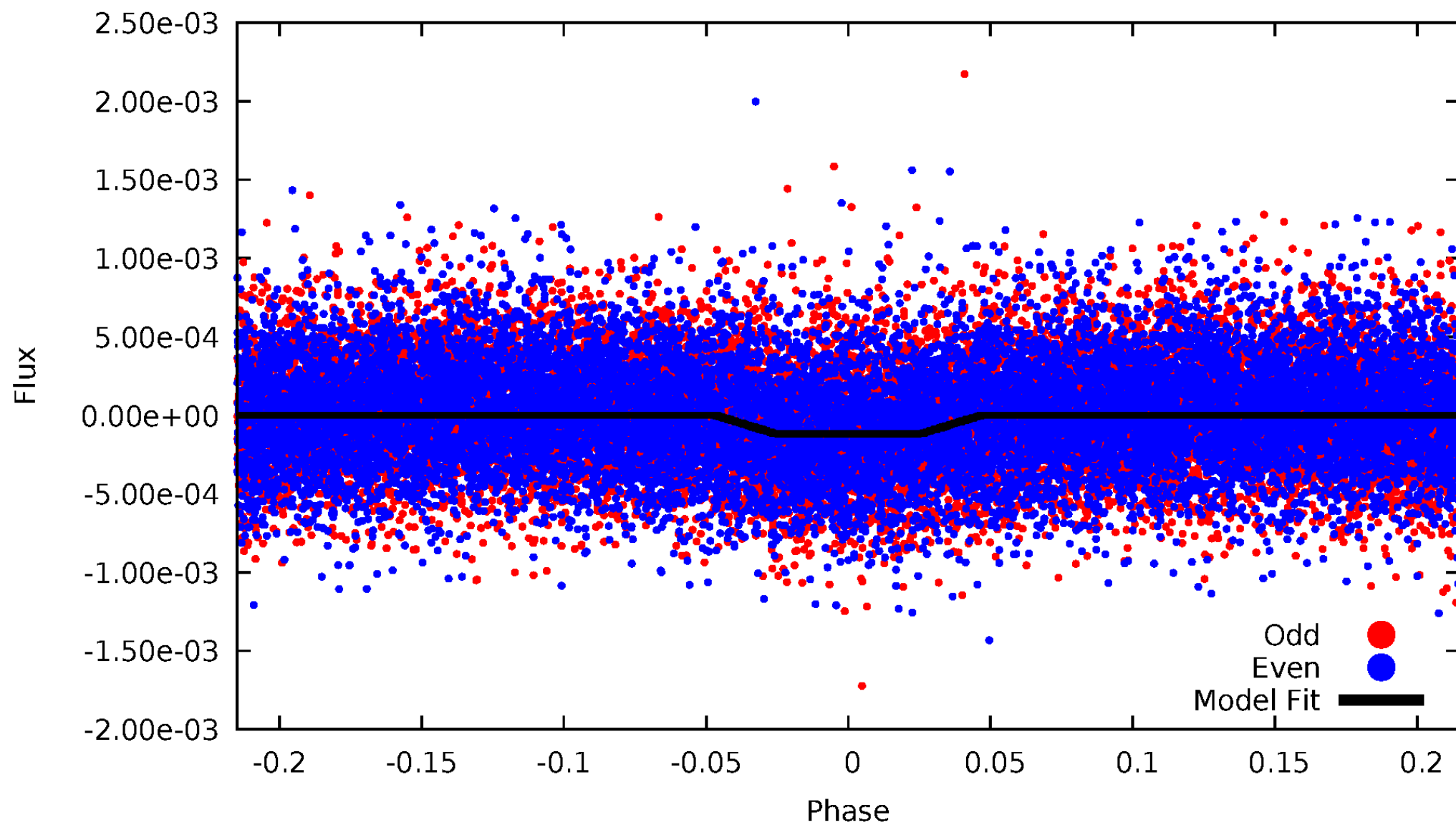
# DV Odd/Even

TCE 010796473-01



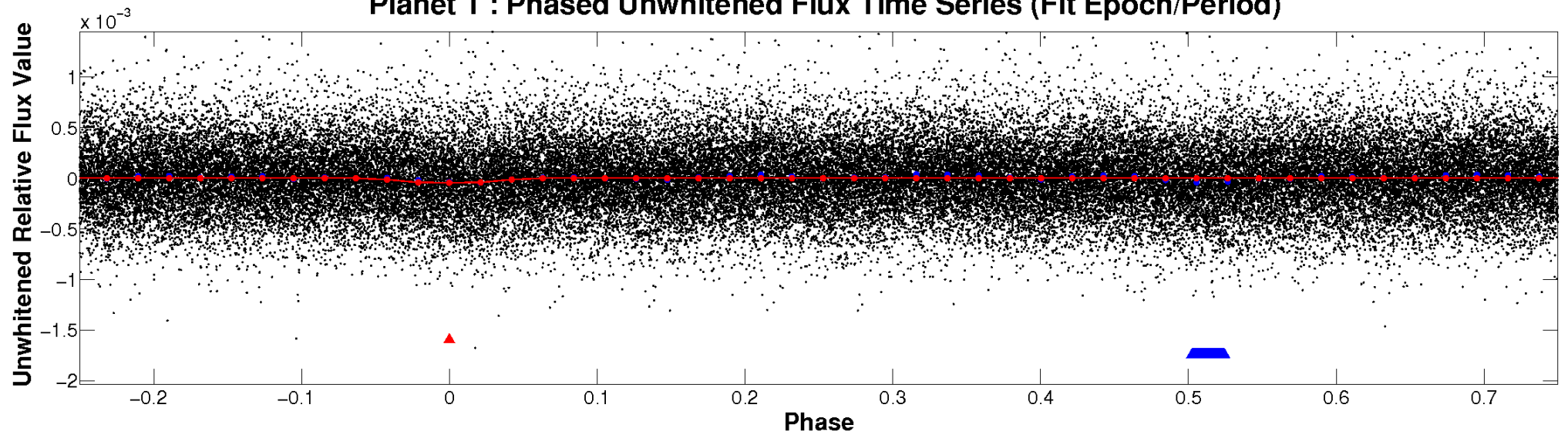
# ALT Odd/Even

TCE 010796473-01

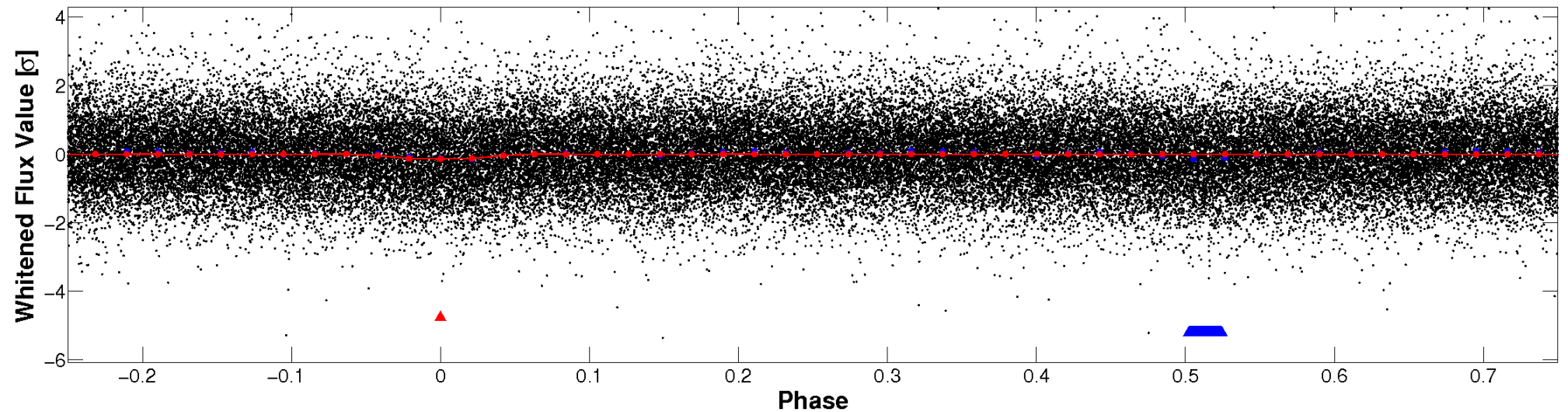


# Non-Whitened Vs. Whitened Light Curve

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



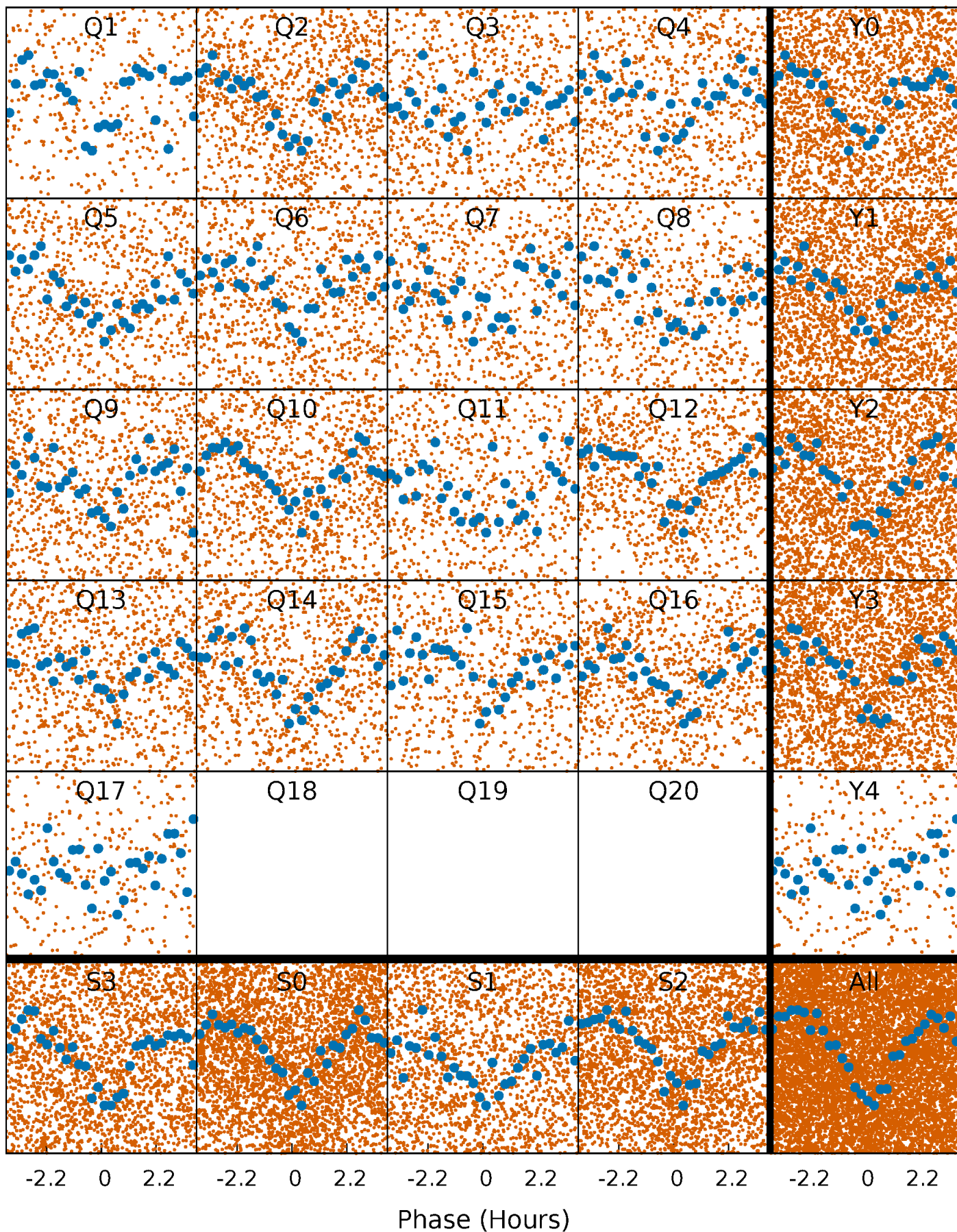
**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**





# PDC Quarter-Phased Transit Curves

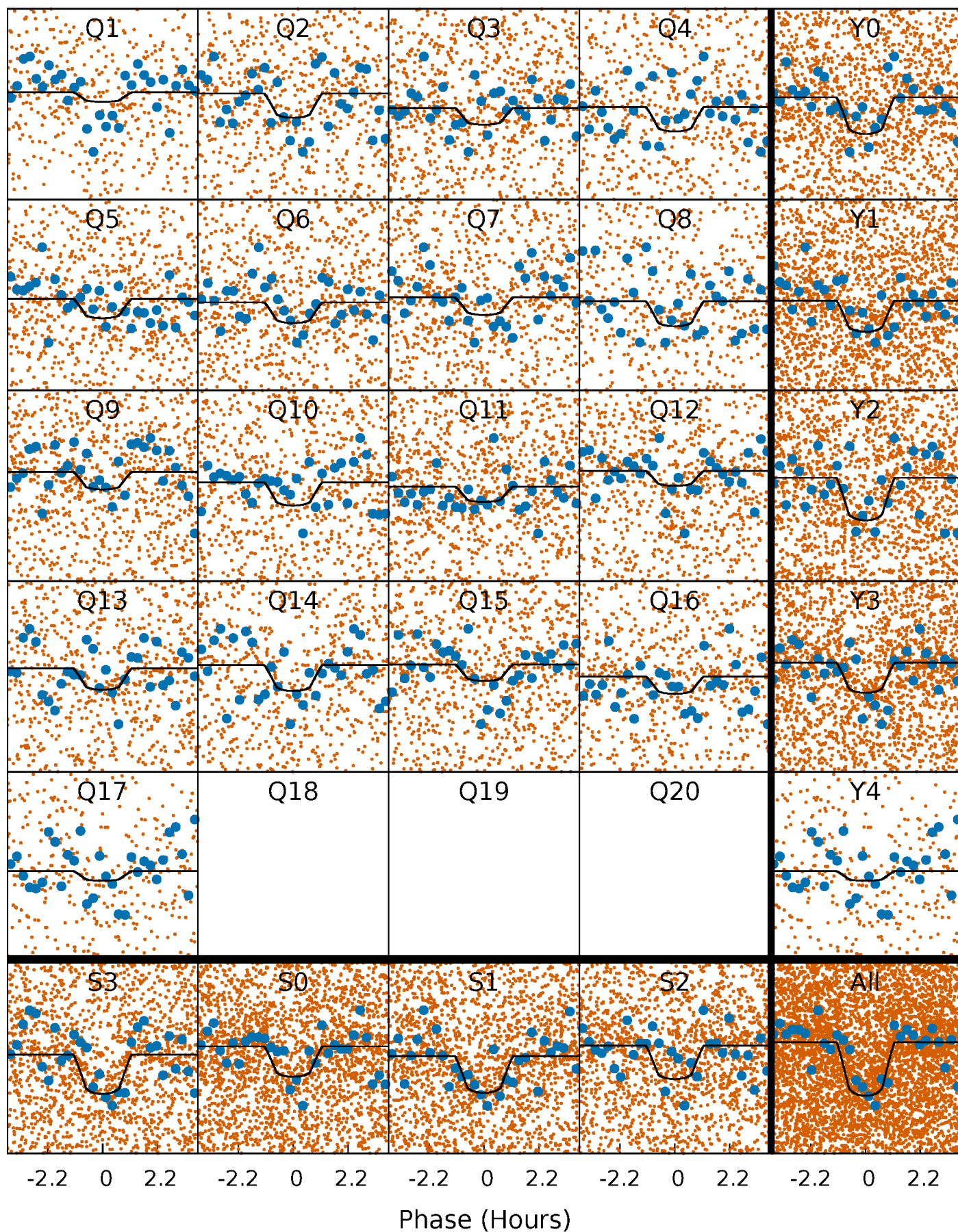
TCE 010796473-01 P= 0.969920 Days  $T_0=132.162822$  (BKJD)





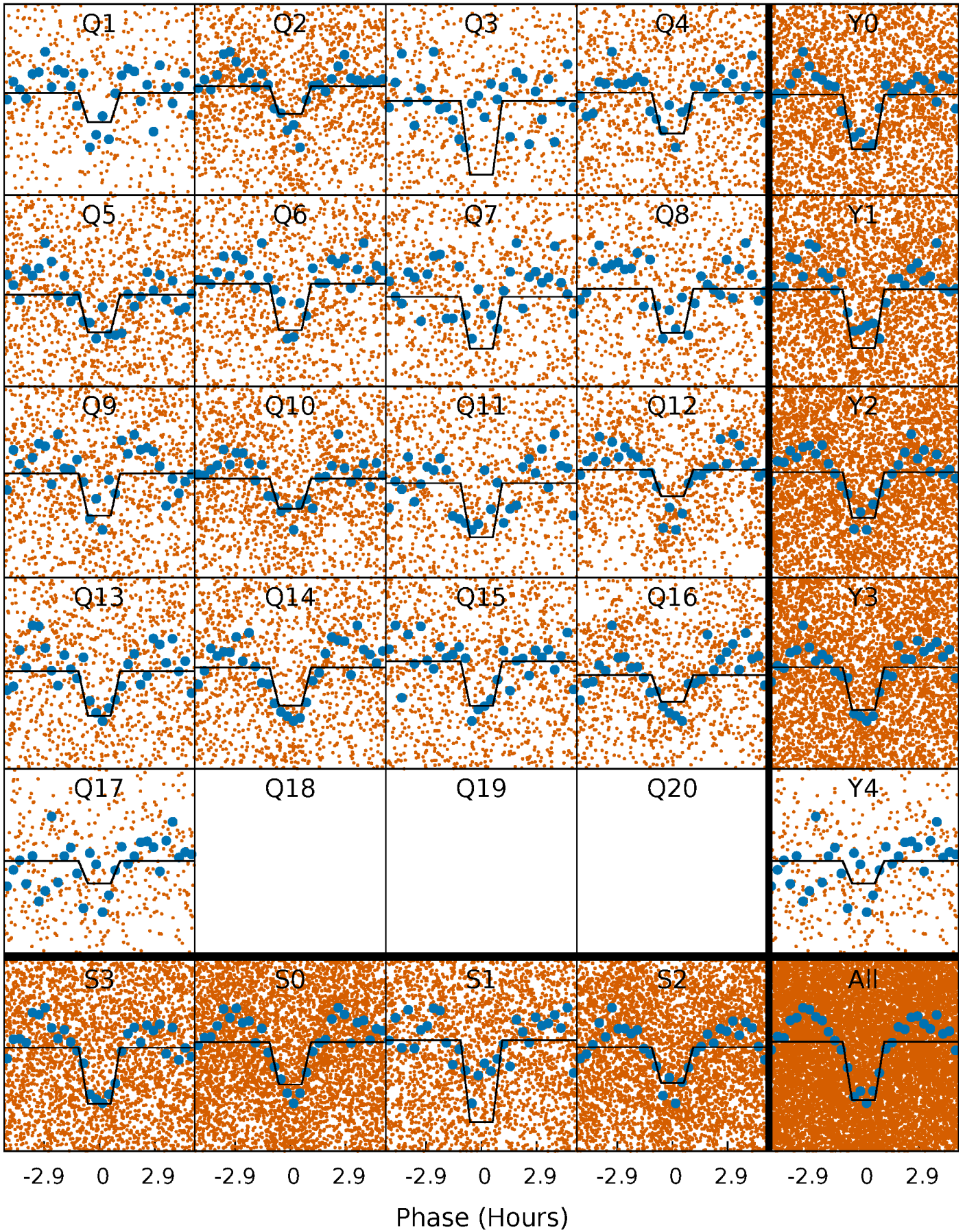
# DV Quarter-Phased Transit Curves

TCE 010796473-01 P= 0.969920 Days  $T_0=132.162822$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 010796473-01 P= 0.969934 Days  $T_0=132.160605$  (BKJD)

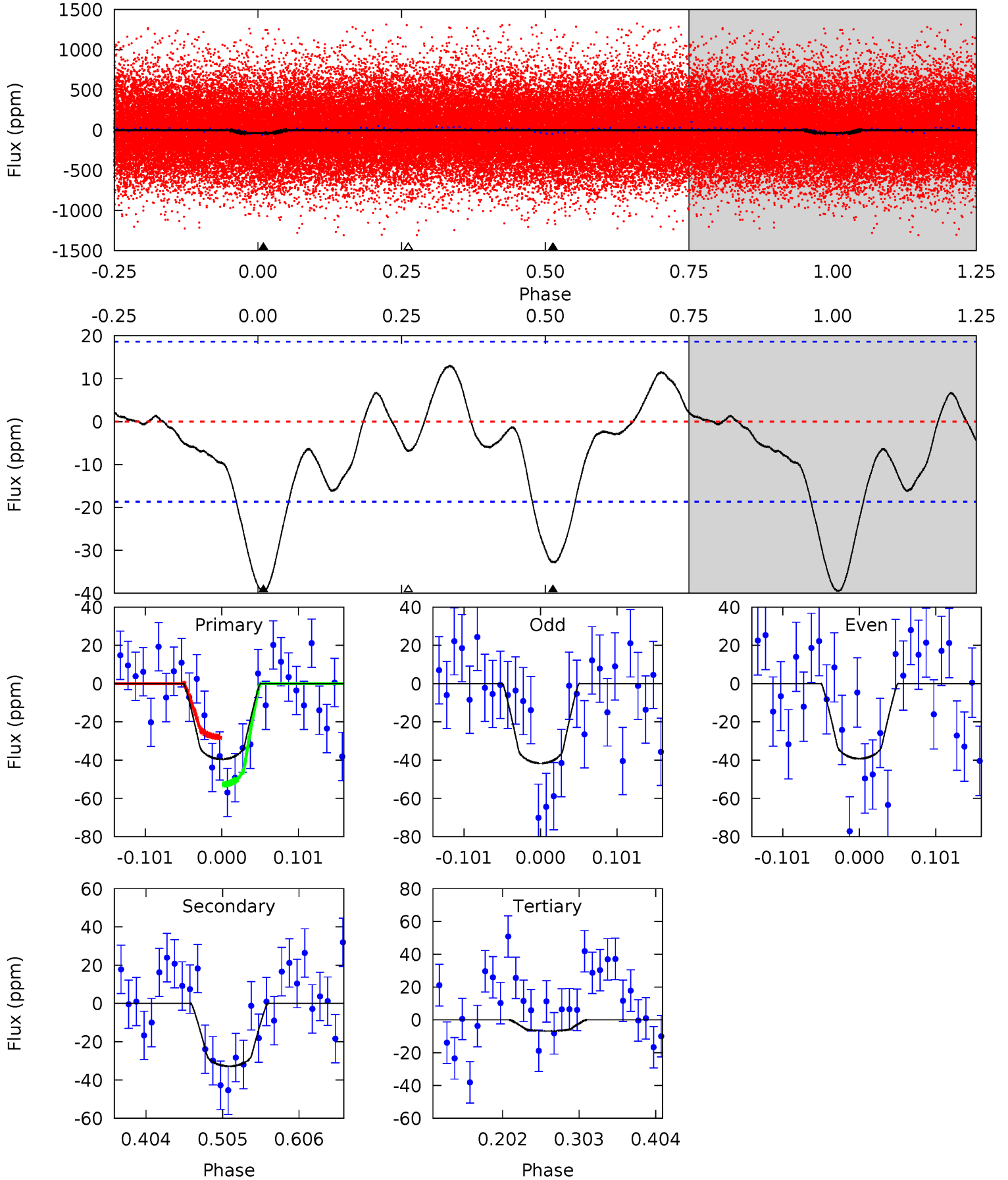




# DV Model-Shift Uniqueness Test

010796473-01, P = 0.969920 Days, E = 131.192902 Days

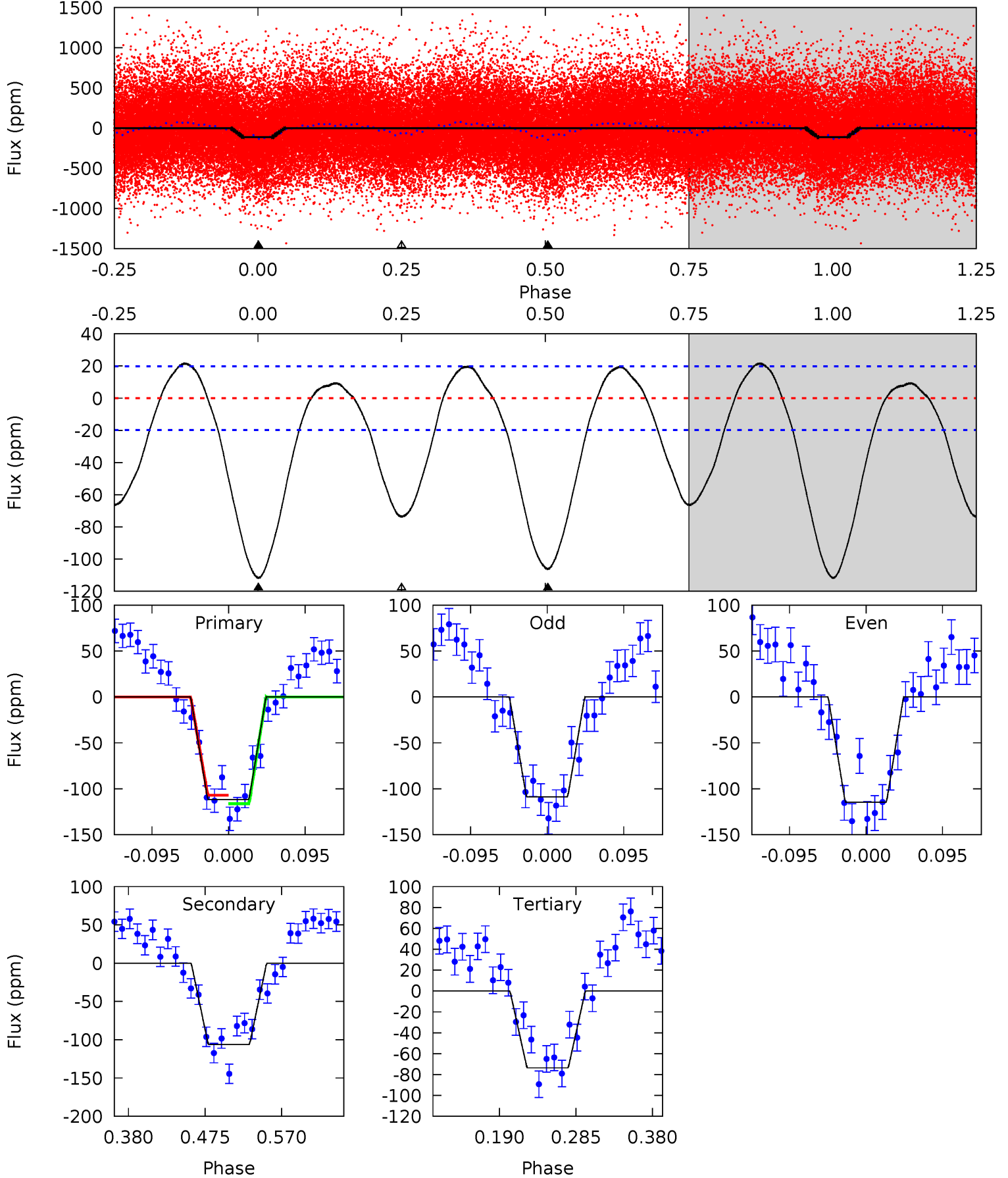
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.67	8.03	1.67	0	4.56	1.64	1.68	8.00	9.67	6.36	8.03	0.30	0.79	0.25	3.04



# Alt Model-Shift Uniqueness Test

010796473-01, P = 0.969934 Days, E = 131.190671 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
25.8	24.6	17.0	0	4.58	1.67	7.11	8.81	25.8	7.55	24.6	0.67	1.00	0.16	1.06





### Stellar Parameters For KIC 010796473

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6228^{+166}_{-222}$	$4.441^{+0.054}_{-0.216}$	$-0.080^{+0.250}_{-0.300}$	$1.049^{+0.349}_{-0.116}$	$1.107^{+0.153}_{-0.153}$	$1.351^{+0.387}_{-0.715}$
	+3%/-4%	+1%/-5%	+312%/-375%	+33%/-11%	+14%/-14%	+29%/-53%
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 010796473-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-33 \pm 4$	$0.93^{+0.53}_{-0.51}$	$2848^{+224}_{-150}$	$5287^{+3041}_{-890}$	$7.845^{+34.366}_{-4.558}$
Alt.	$-106 \pm 4$	$1.29^{+0.59}_{-0.53}$	$2840^{+223}_{-139}$	$6036^{+2061}_{-943}$	$13^{+25}_{-7}$

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

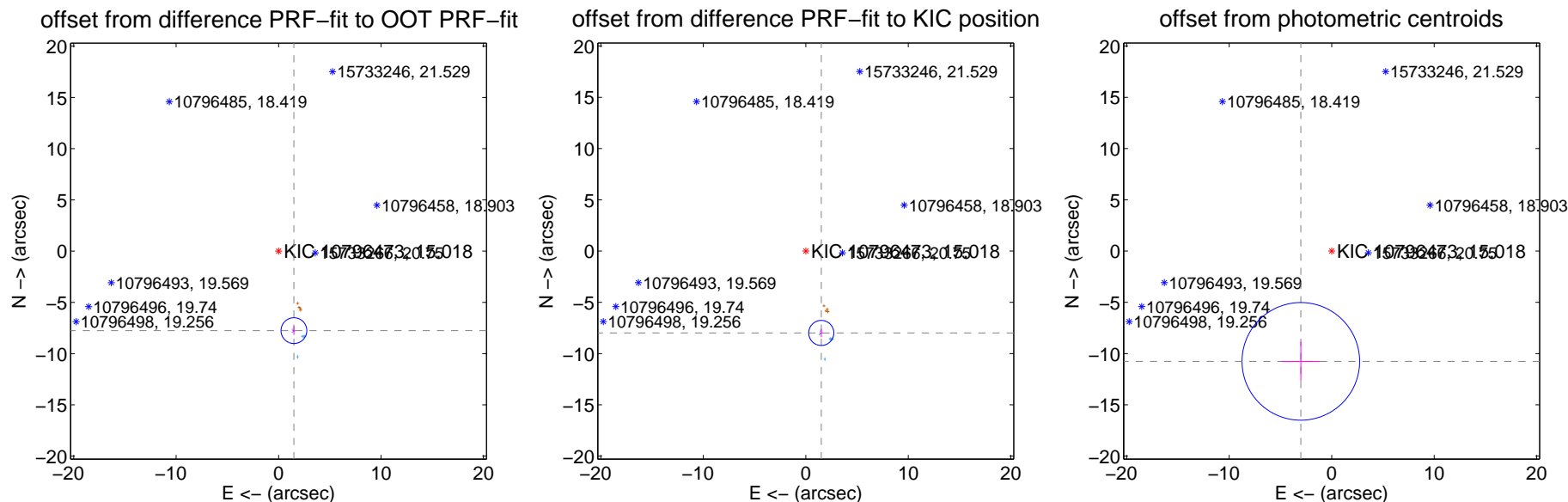
## DV Centroid Data

Supplemental centroid analysis for 010796473-01. Kepler magnitude: 15.02. Transit SNR 8.31

There are 9 quarters with good PRF difference image offsets

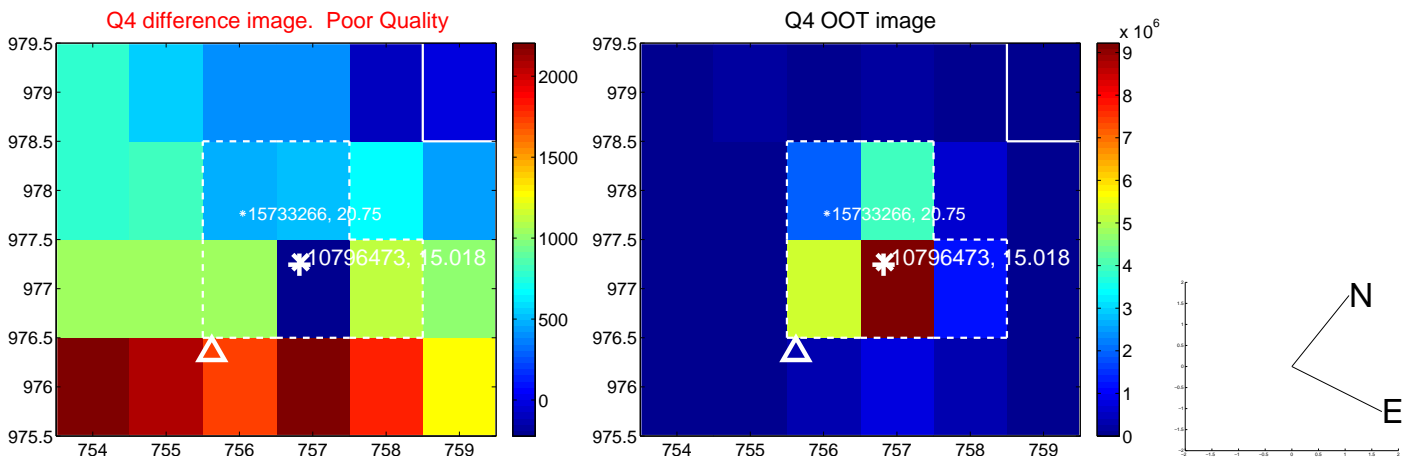
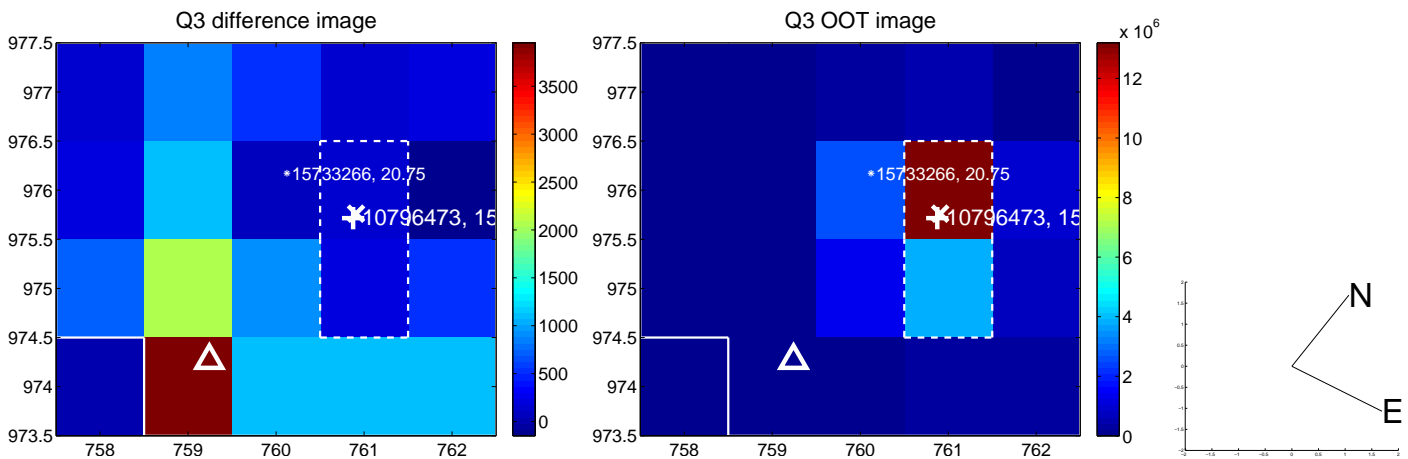
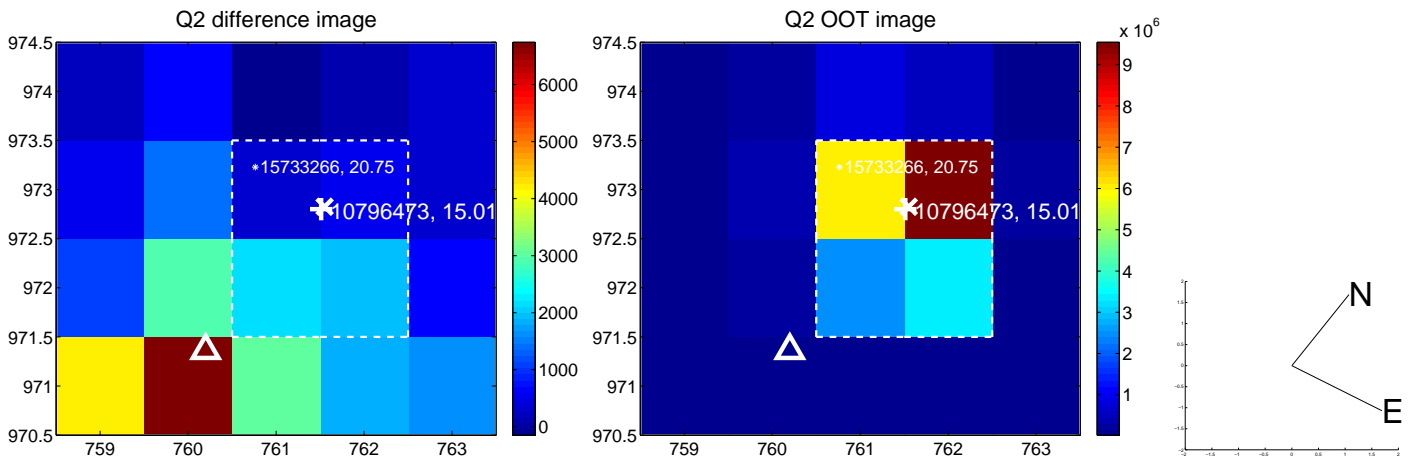
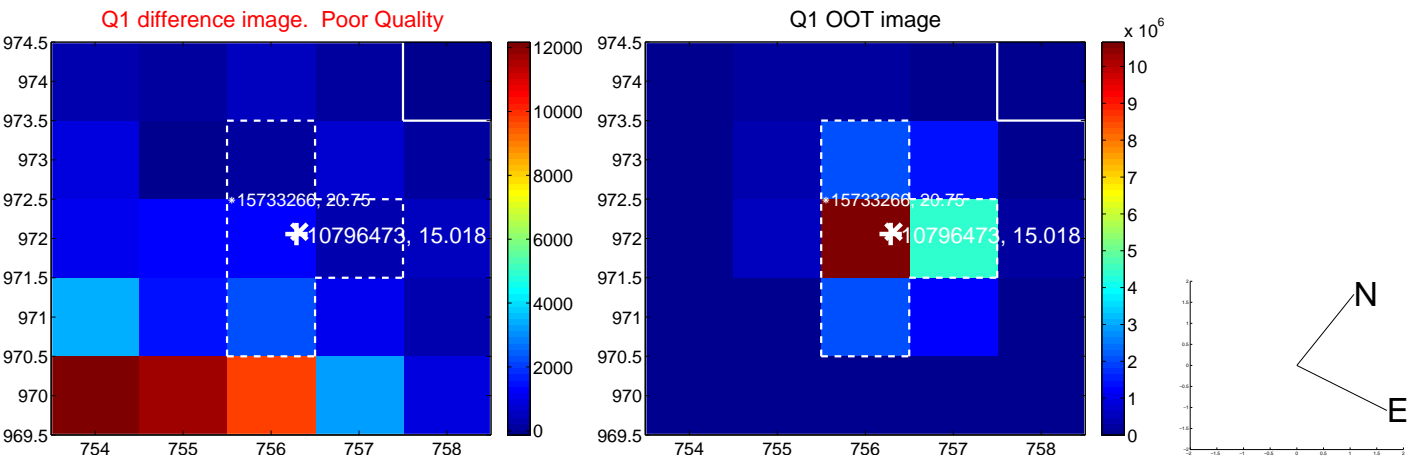
The direct PRF centroid is offset from the target star catalog position by about 0.22 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$7.899 \pm 0.420$	18.82	$-1.498 \pm 0.134$	$-7.756 \pm 0.427$
PRF-fit source offset from KIC position	$8.127 \pm 0.408$	19.92	$-1.511 \pm 0.143$	$-7.985 \pm 0.416$
photometric centroid source offset	$11.17 \pm 1.91$	5.84	$3.01 \pm 1.89$	$-10.76 \pm 1.91$

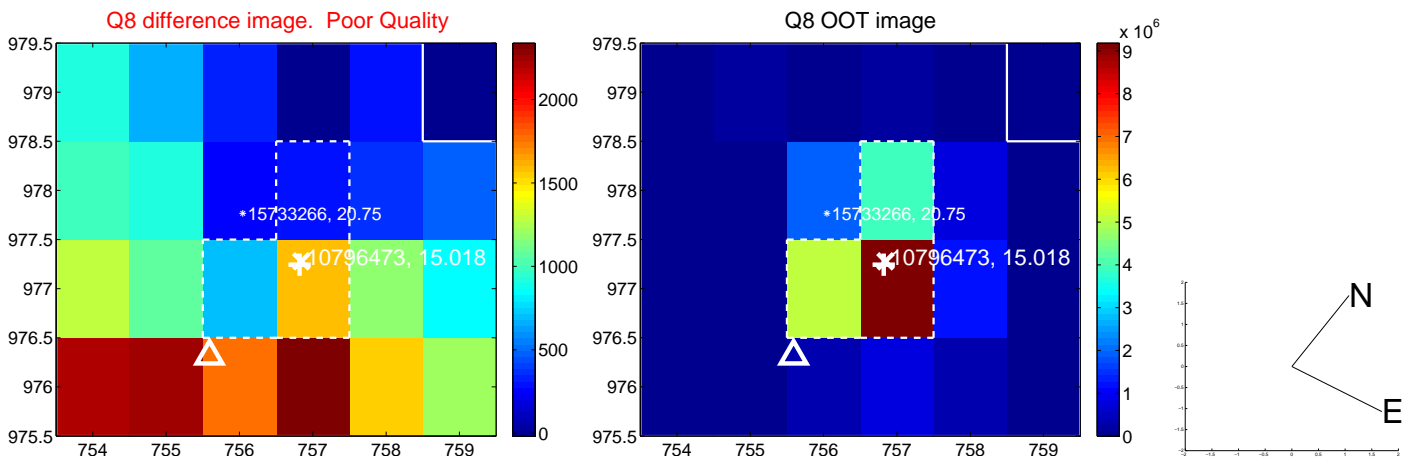
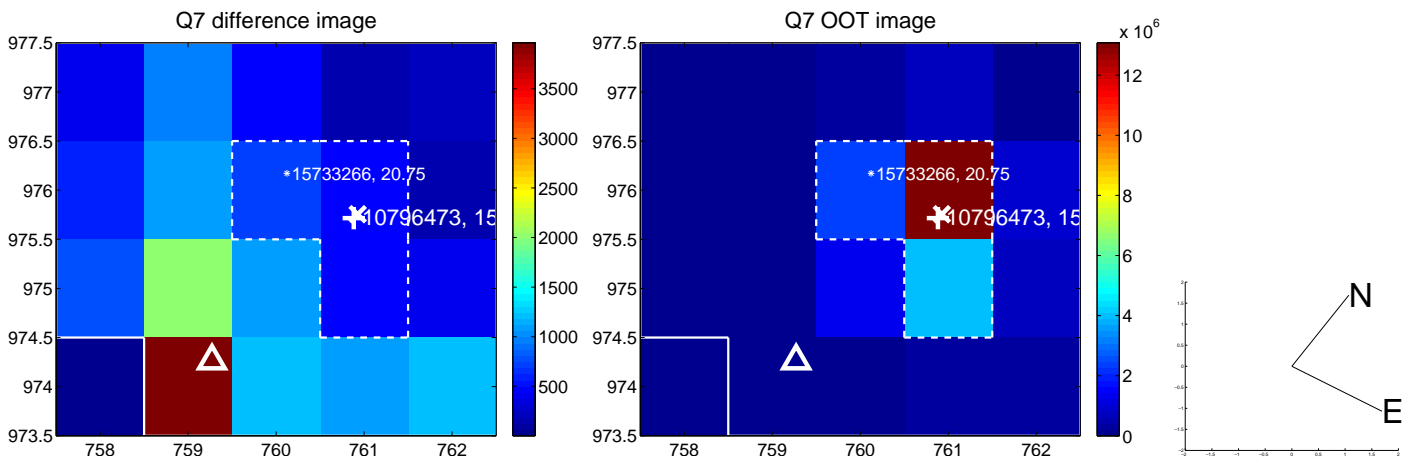
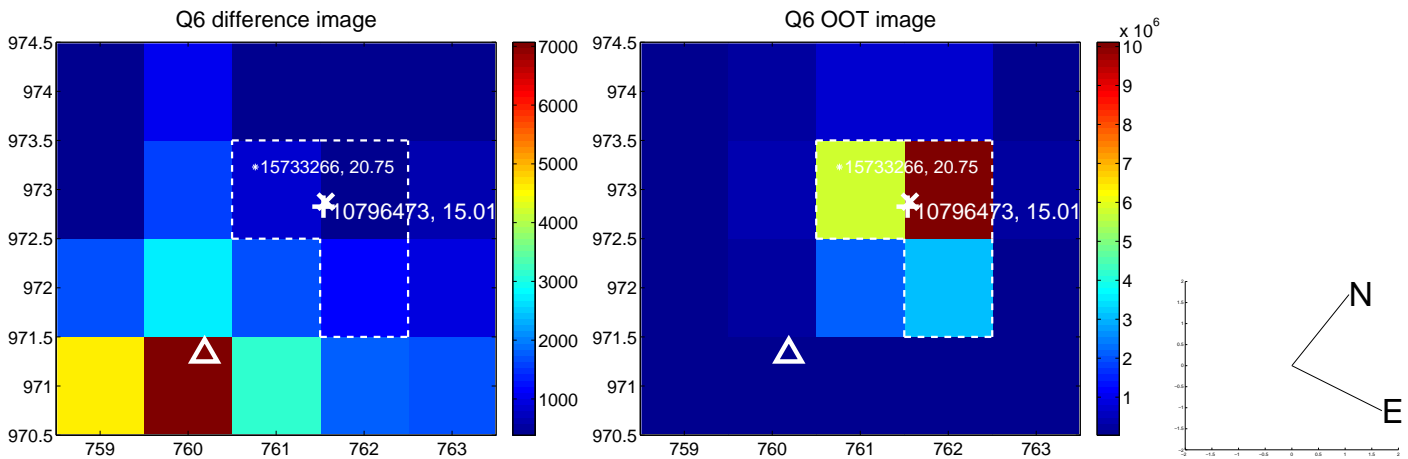
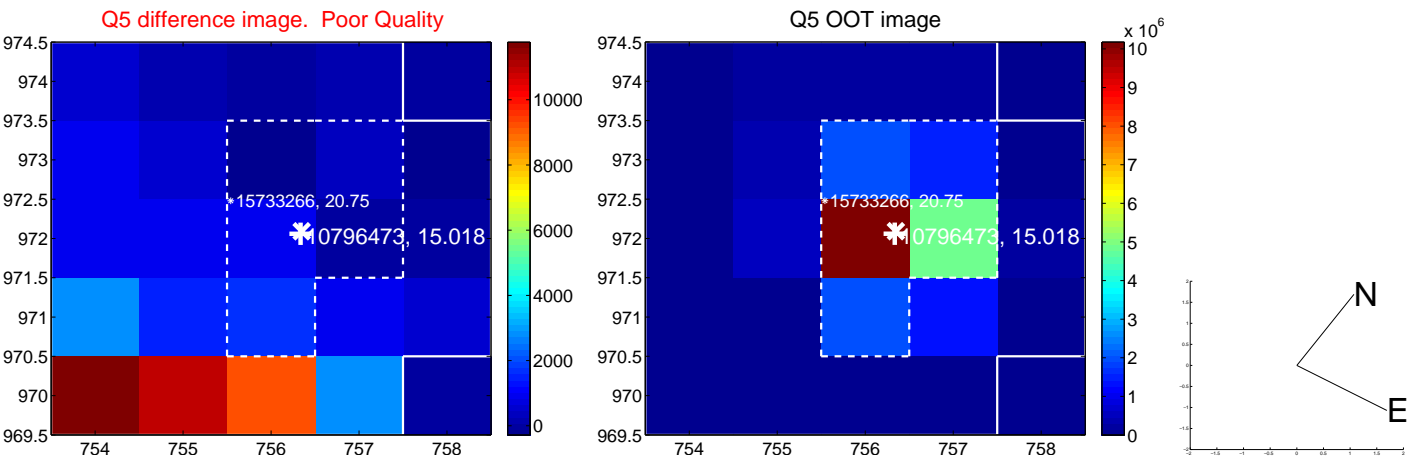


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

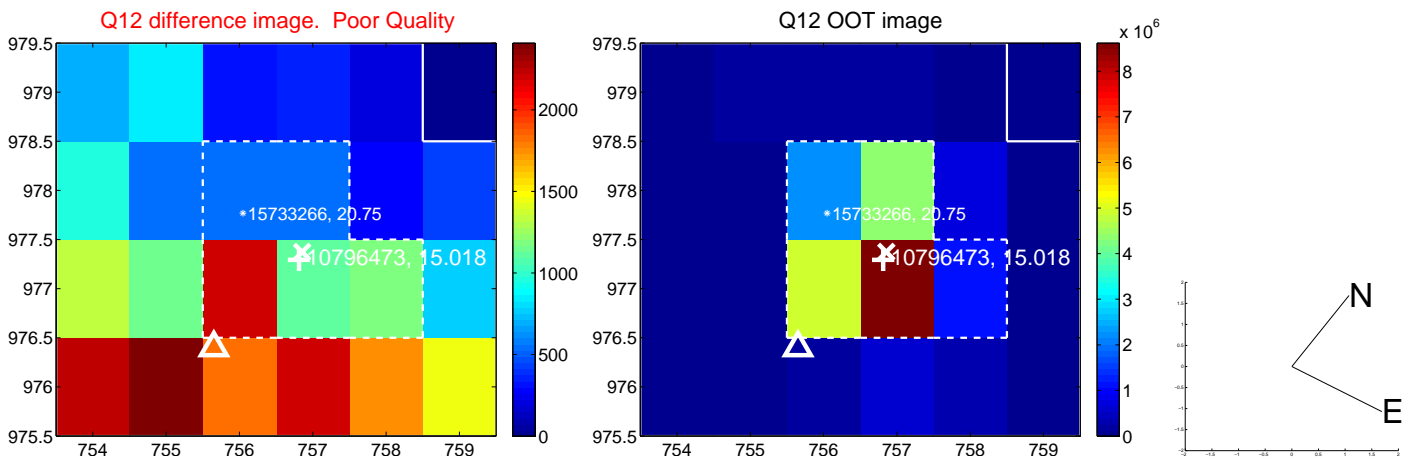
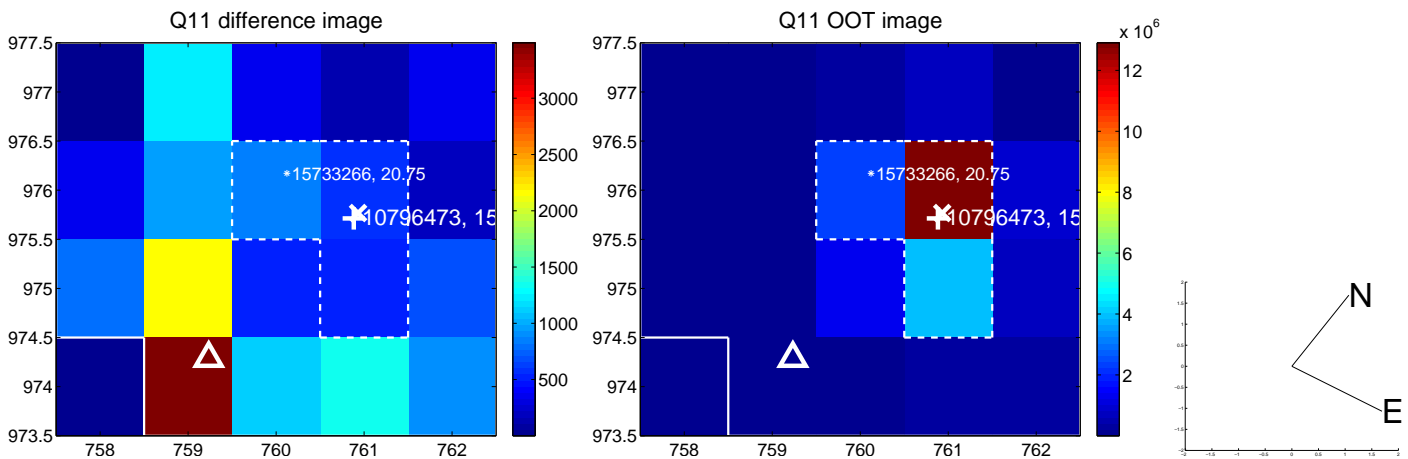
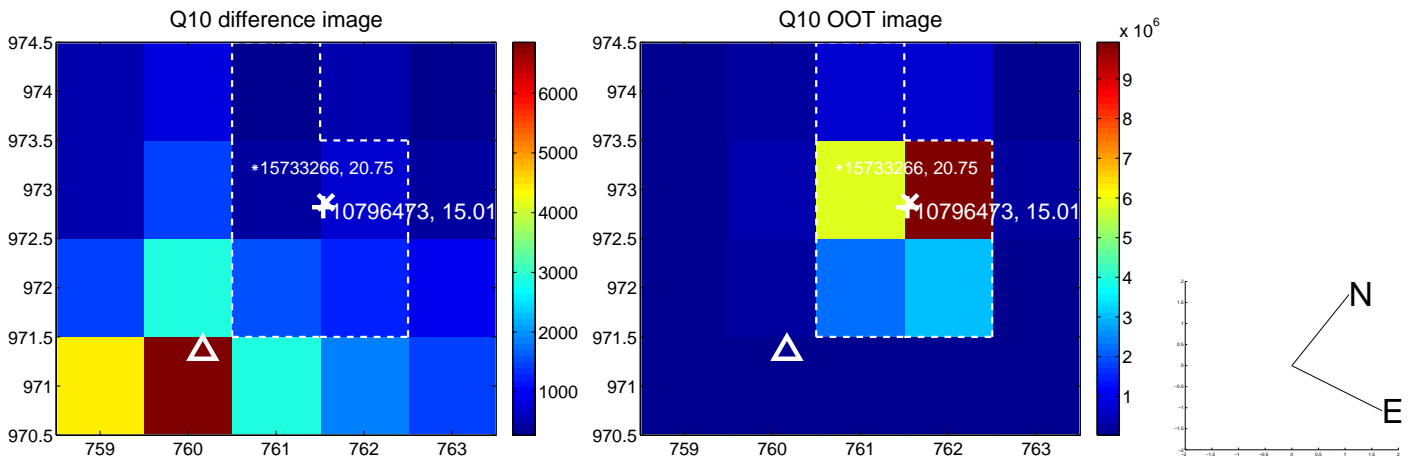
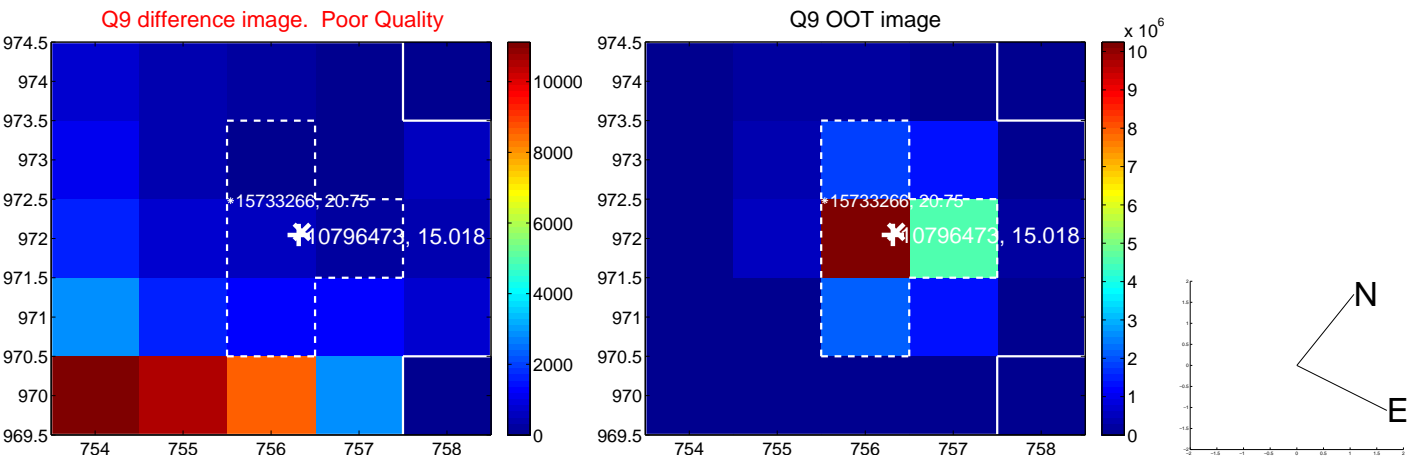


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

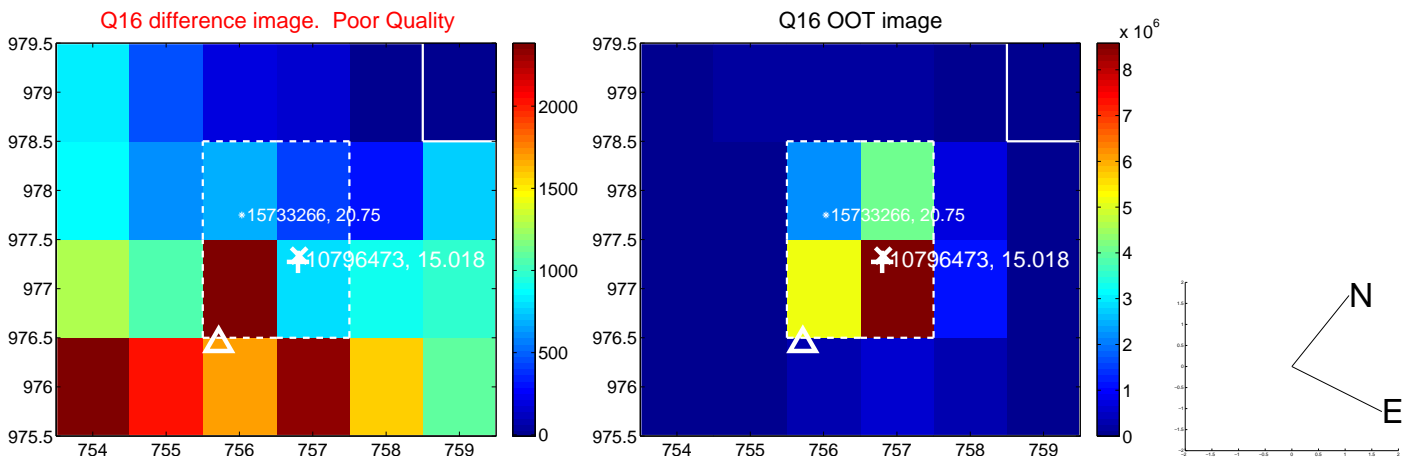
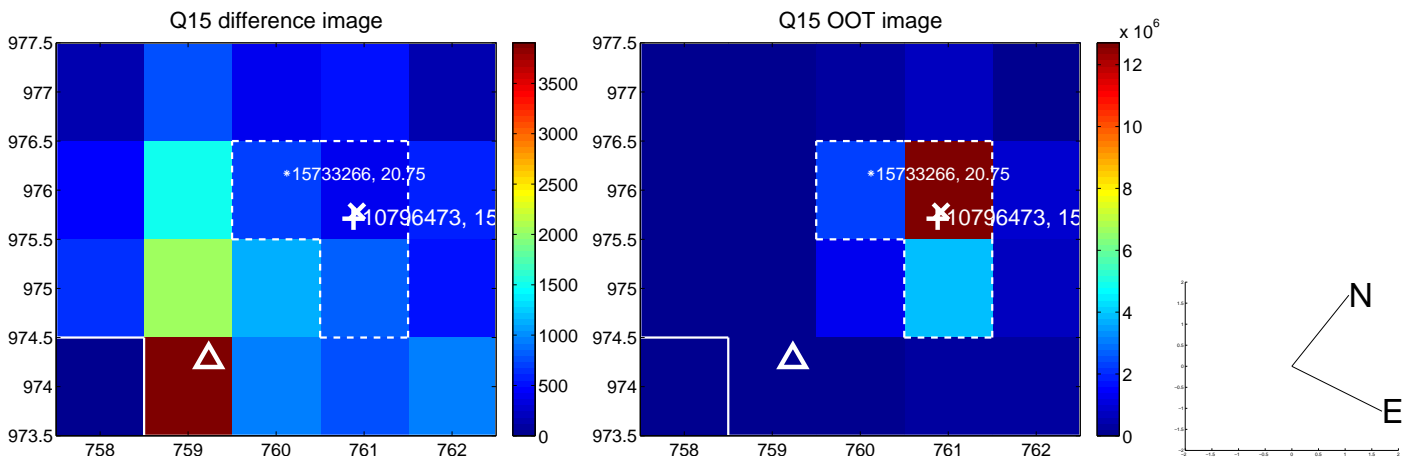
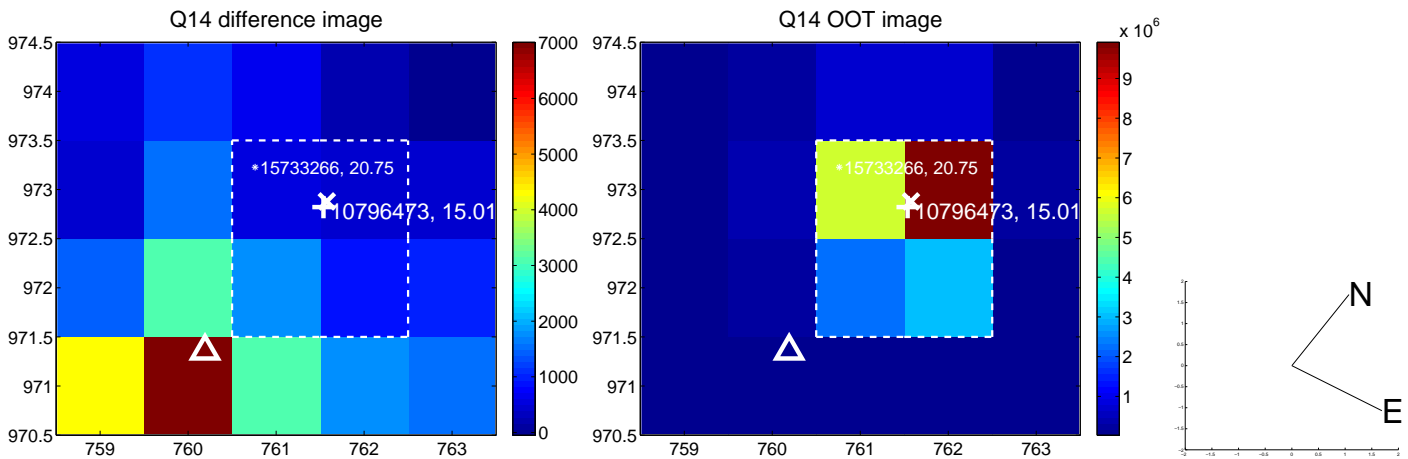
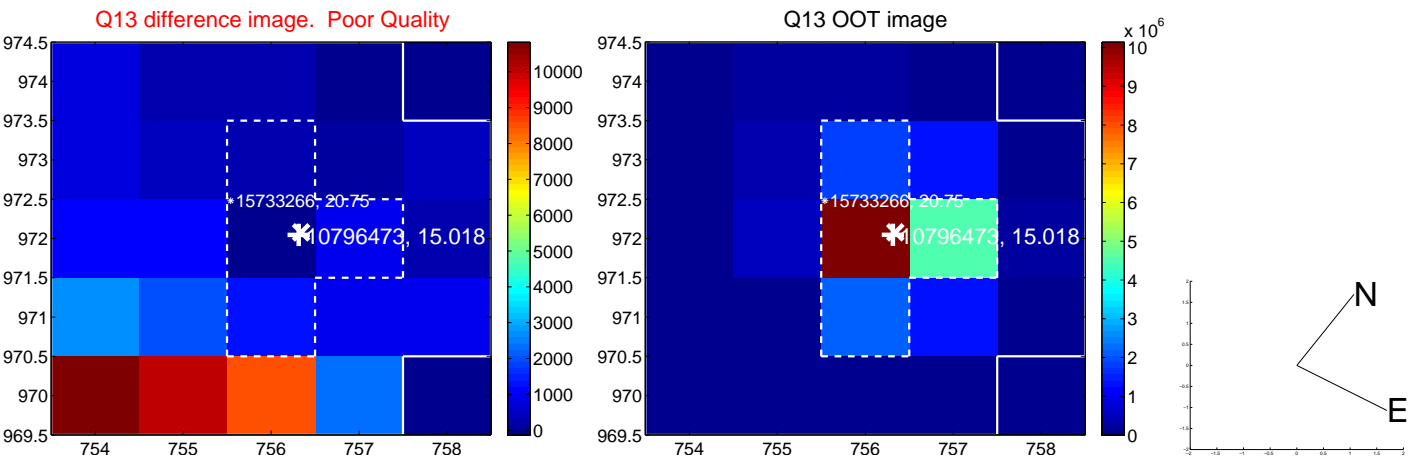




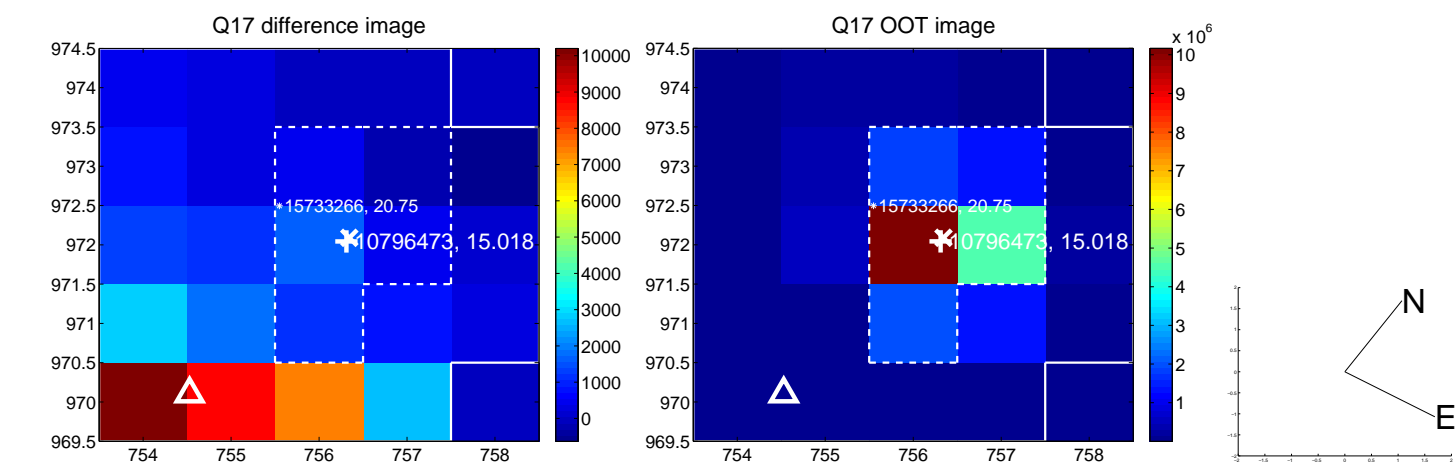
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



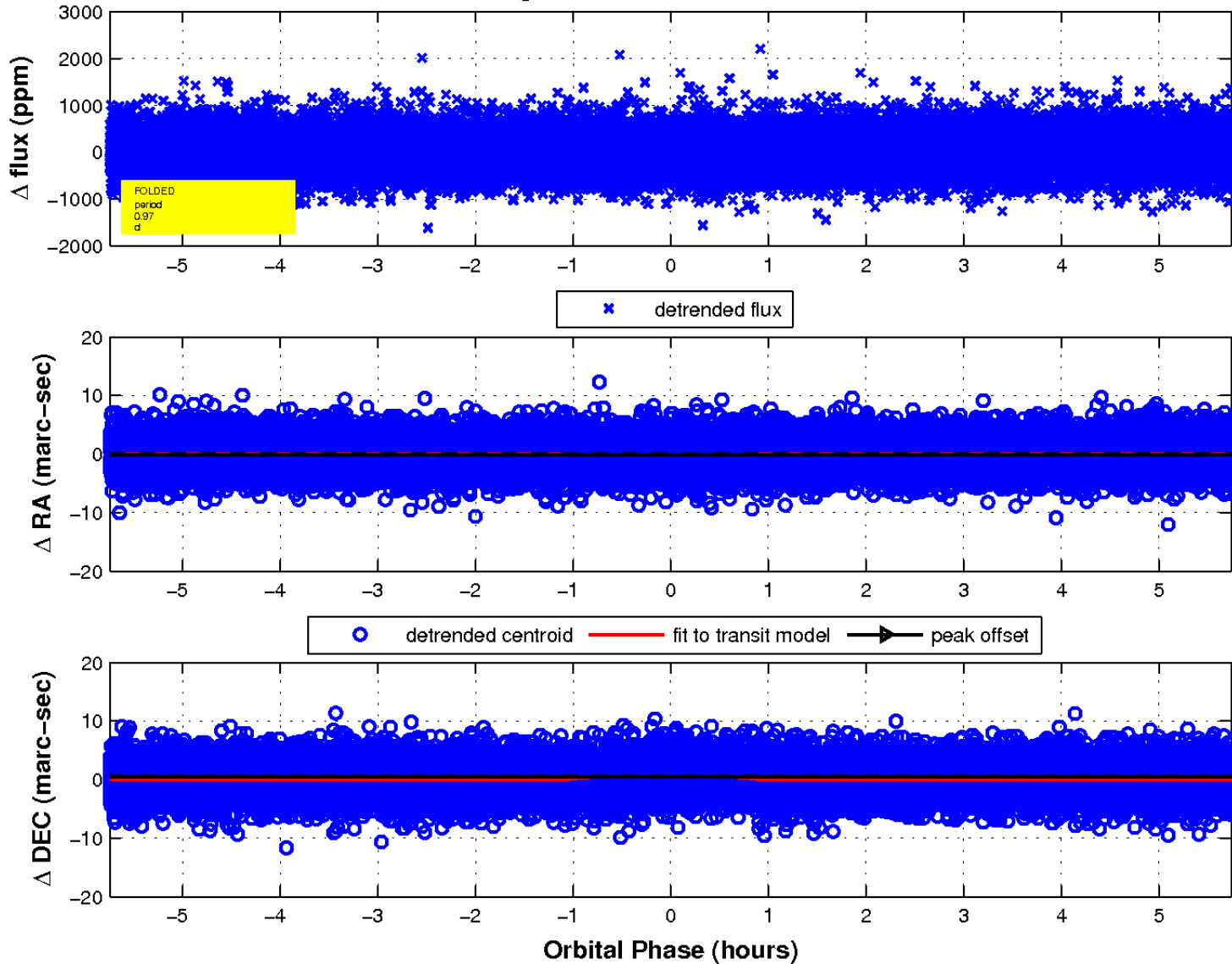
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

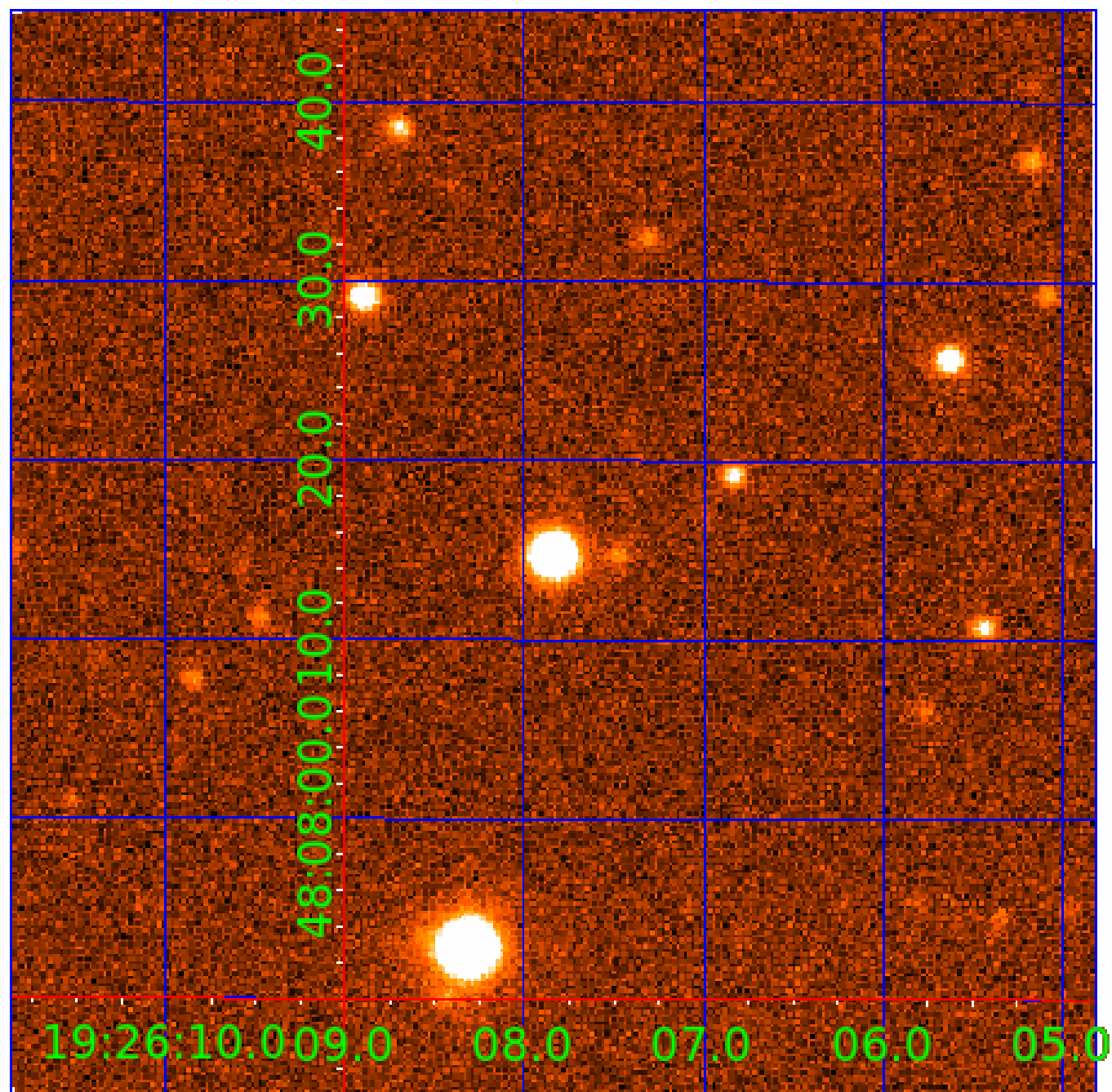


fluxWeightedCentroids, Planet 1 of 2



UKIRT Image

Declination





# KIC 010796473

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010796473-01	OBS	No	0.969920	132.162822	44.9	1.914	8.5	8.3	1.05	6228	0.83	3765.51
010796473-02	OBS	No	0.969906	131.701417	53.7	1.547	8.4	9.0	1.05	6228	0.92	3765.59

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010796473-01	OBS	FP	0.00	1	0	1	1	LPP_DV—MOD_NONUNIQ_ALT—CENT_RESOLVED_OFFSET—EPHEM_MATCH
010796473-02	OBS	FP	0.00	1	0	1	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_RESOLVED_OFFSET

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

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

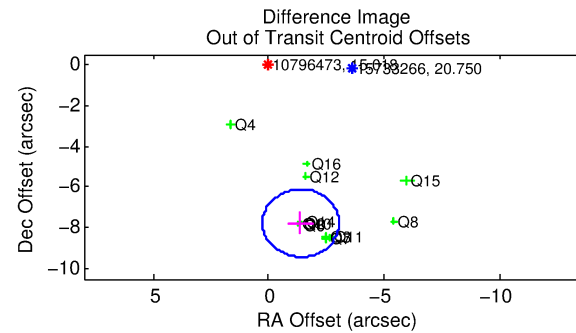
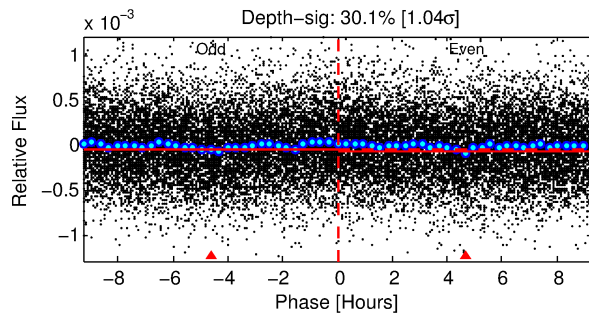
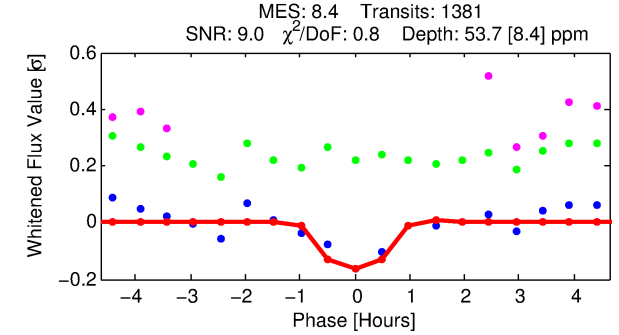
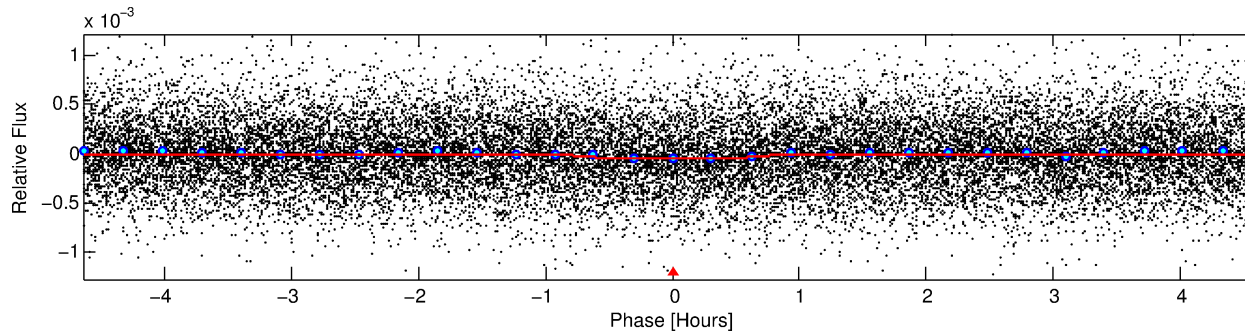
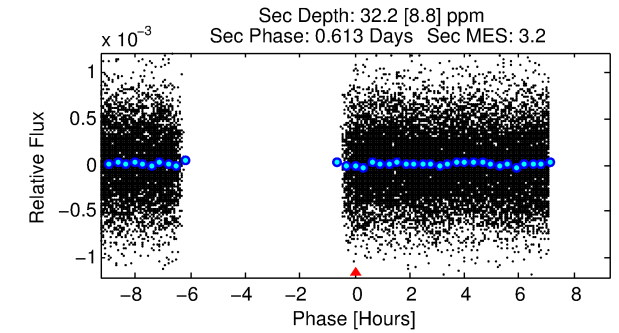
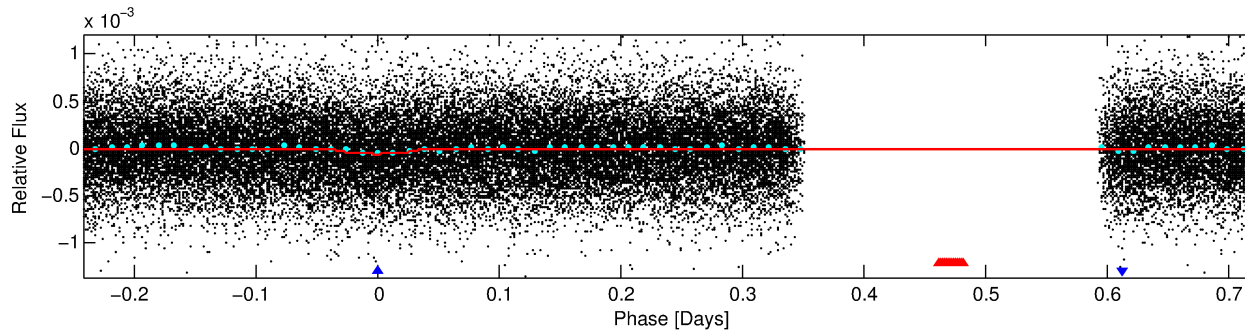
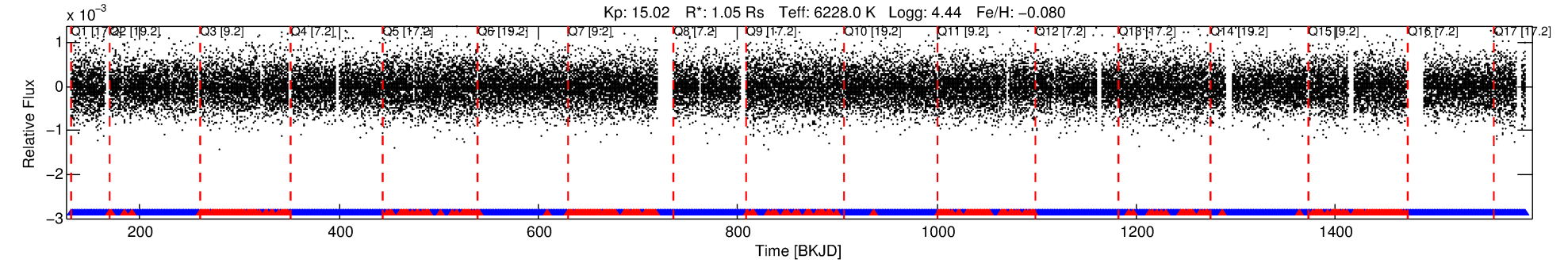
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010796473-02

No Significant Match Found

# DV One-Page Summary

KIC: 10796473 Candidate: 2 of 2 Period: 0.970 d



## DV Fit Results:

Period = 0.96991 [0.00001] d  
Epoch = 131.7014 [0.0026] BKJD  
Rp/R\* = 0.0080 [0.0052]  
a/R\* = 2.23 [6.35]  
b = 0.92 [0.64]  
Seff = 3765.59 [1595.22]  
Teff = 1997 [212] K  
Rp = 0.92 [0.67] Re  
a = 0.0198 [0.0055] AU  
Ag = 8.26 [11.47] [0.63σ]  
Teffp = 5235 [1752] K [1.83σ]

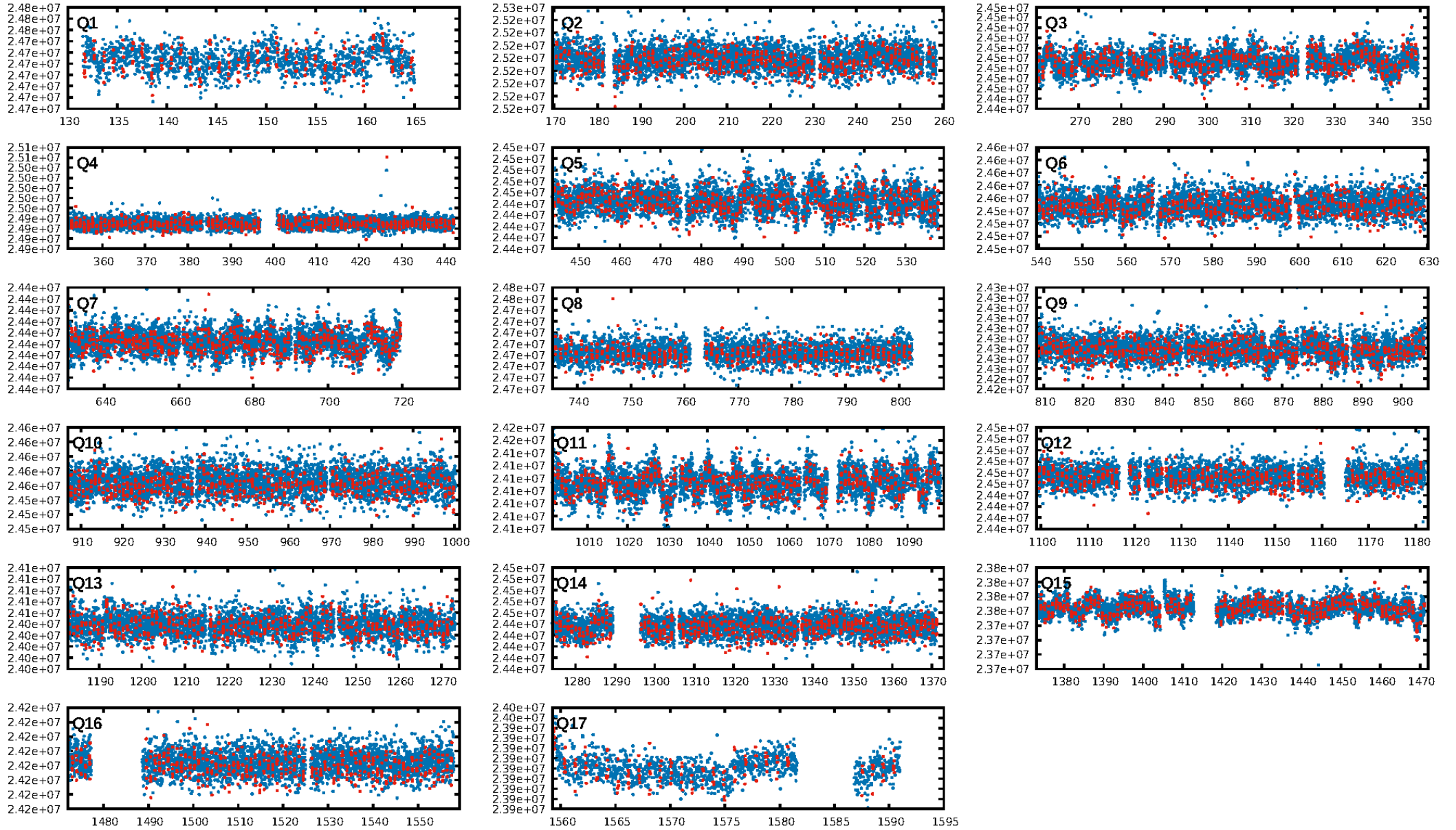
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 2.77e-20  
RollingBand-fgt: 0.74 [981/1319]  
GhostDiagnostic-chr: -0.3906  
Centroid-sig: 0.0%  
Centroid-so: 9.834 arcsec [5.52σ]  
OotOffset-rm: 7.888 arcsec [14.30σ]  
KicOffset-rm: 8.115 arcsec [14.37σ]  
OotOffset-st: 4/4/4/0 [12]  
KicOffset-st: 4/4/4/0 [12]  
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DiffImageOverlap-fno: 1.00 [17/17]

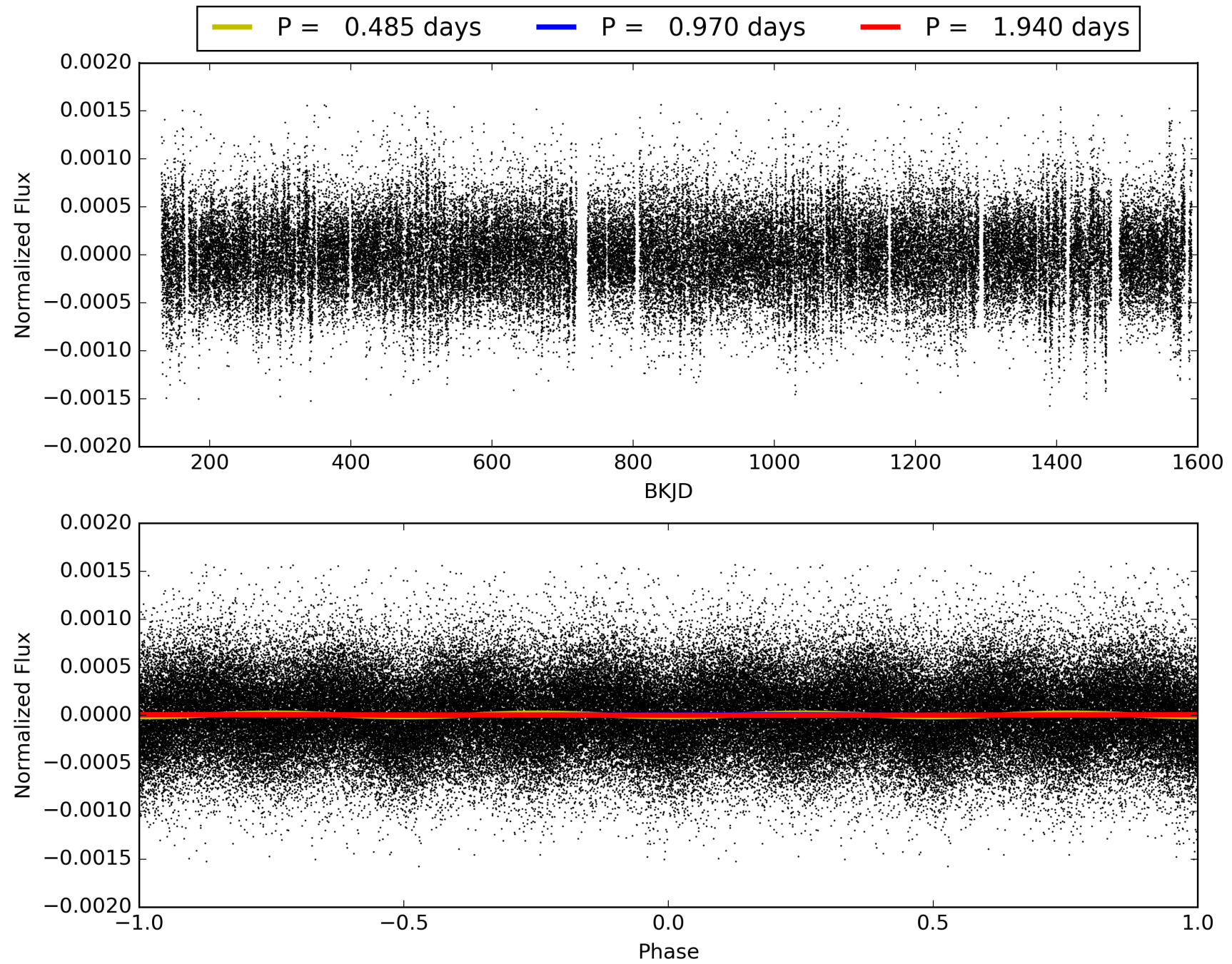
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This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 010796473-02, PDC Light Curves



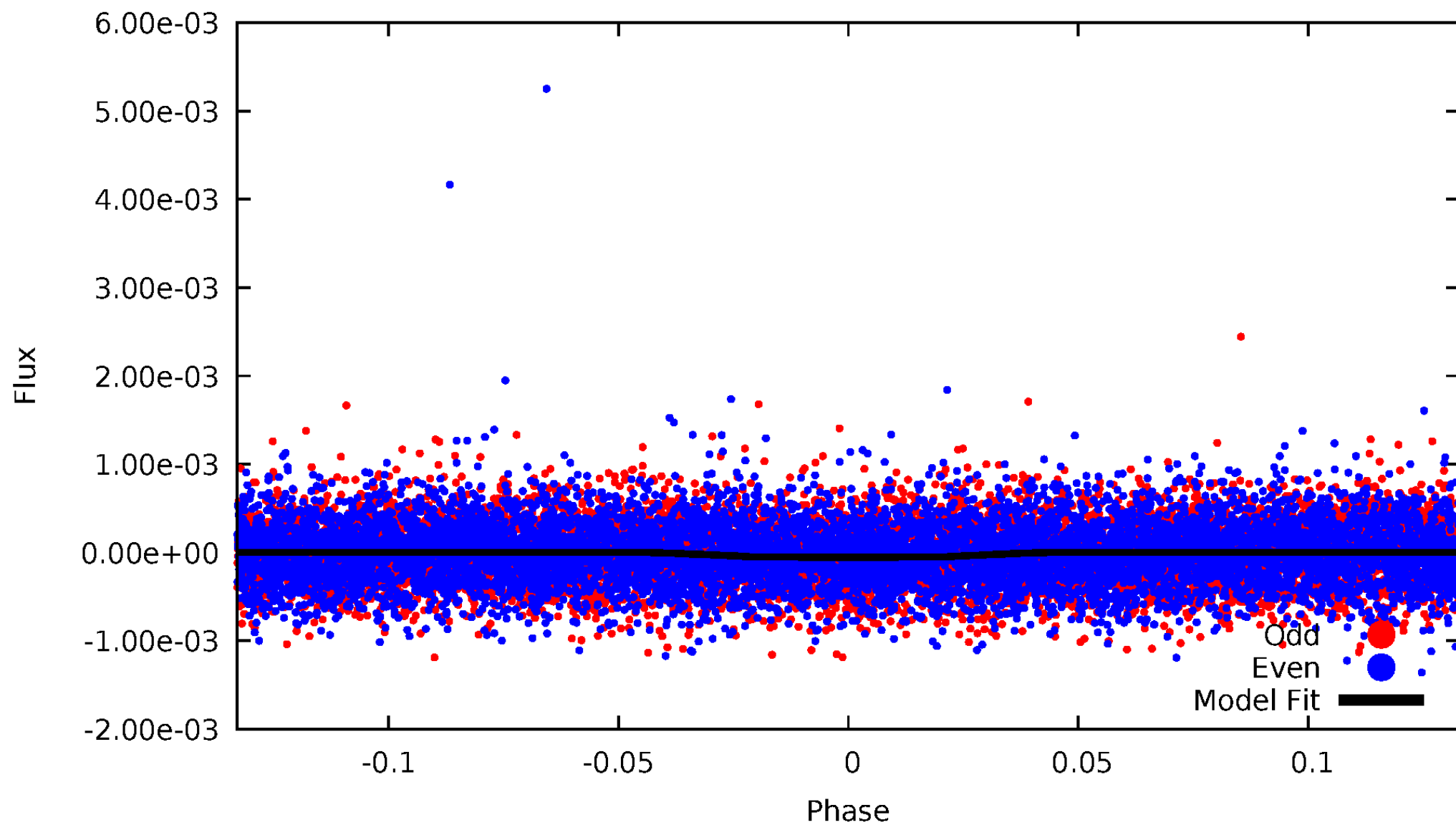
TCE 010796473-02





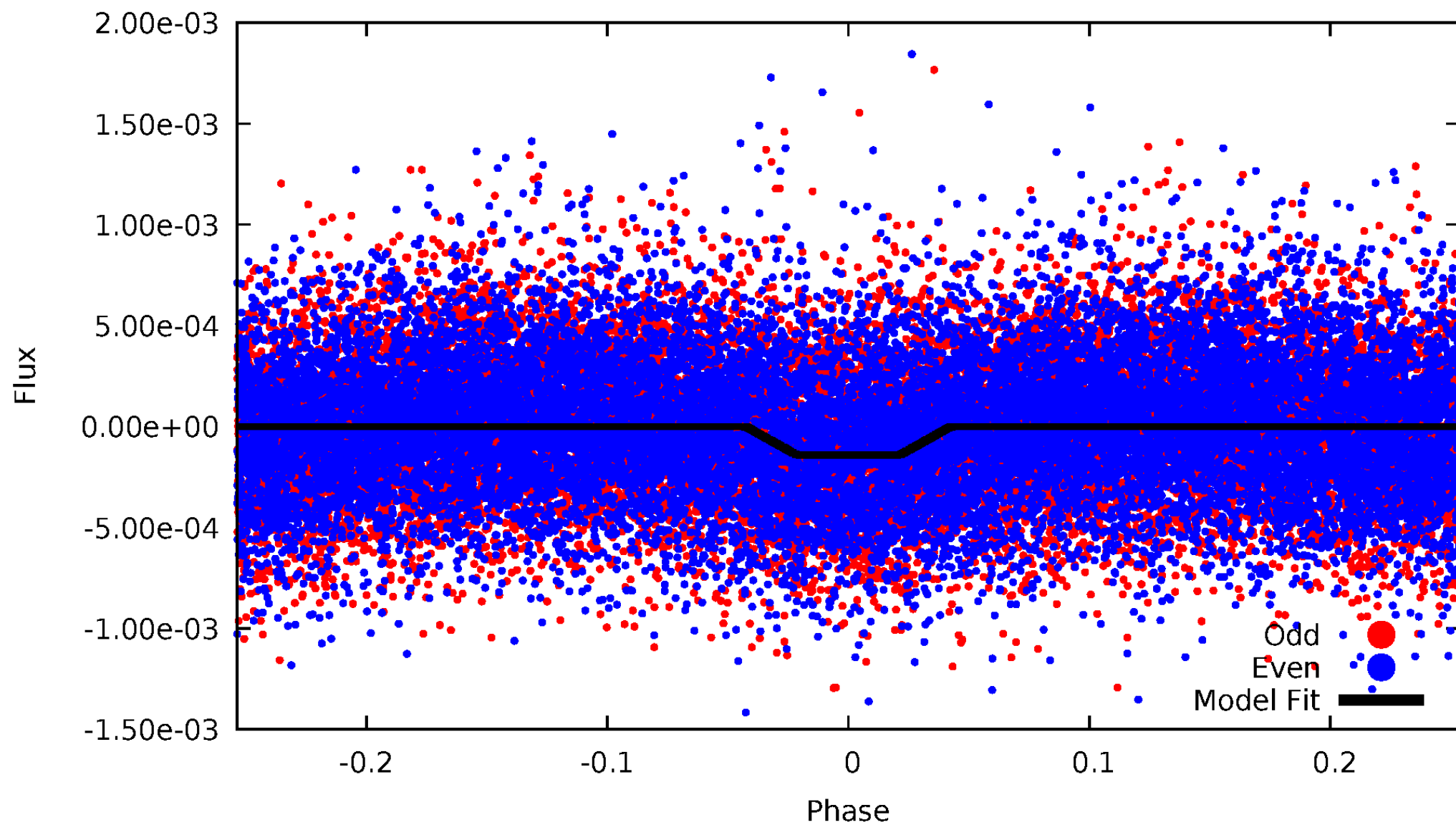
# DV Odd/Even

TCE 010796473-02



# ALT Odd/Even

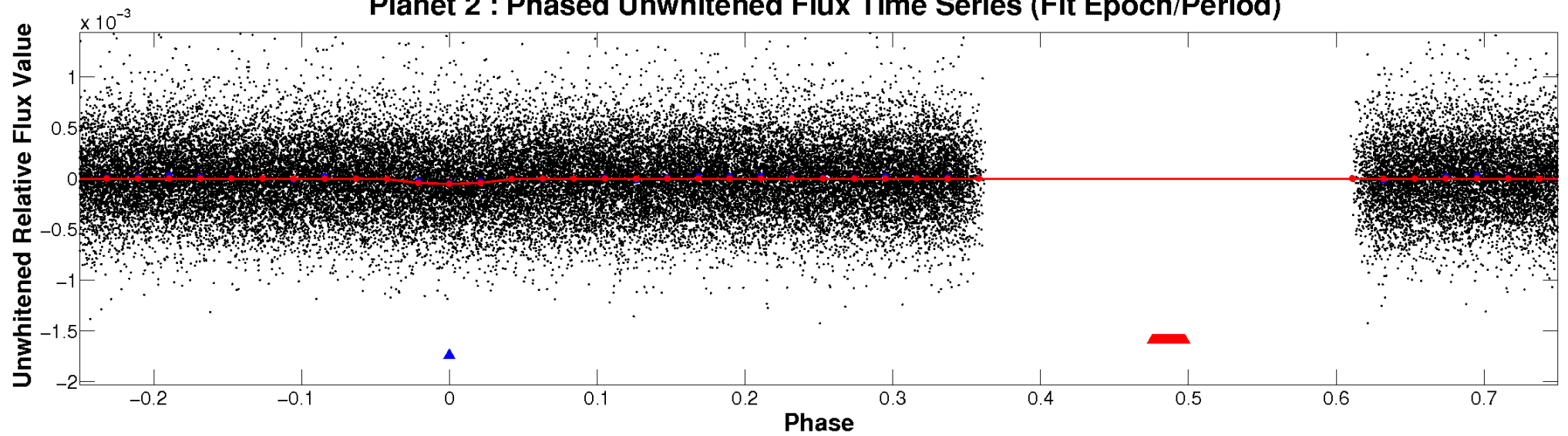
TCE 010796473-02



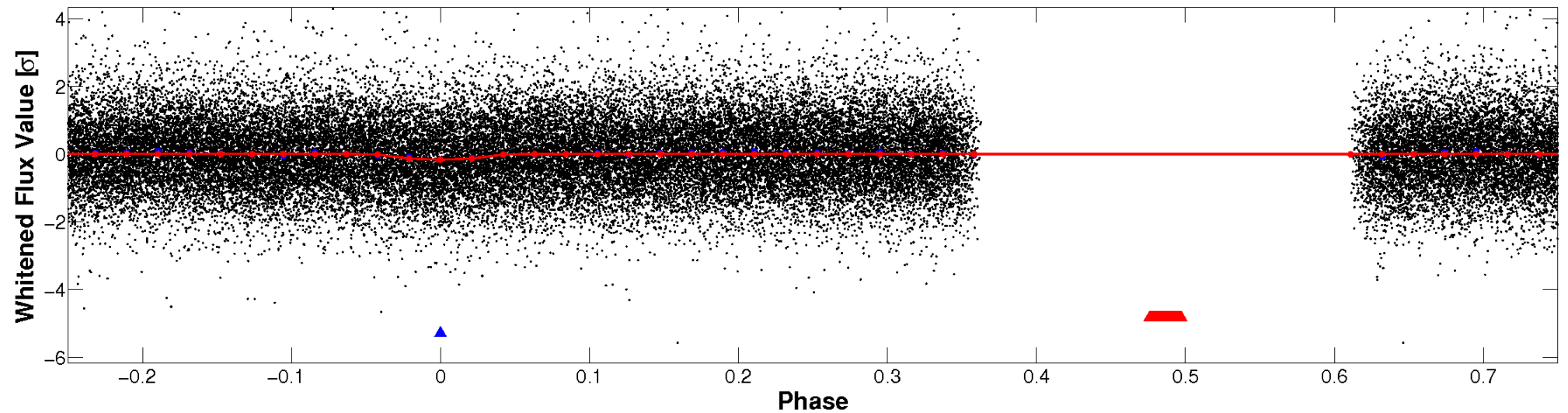


# Non-Whitened Vs. Whitened Light Curve

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

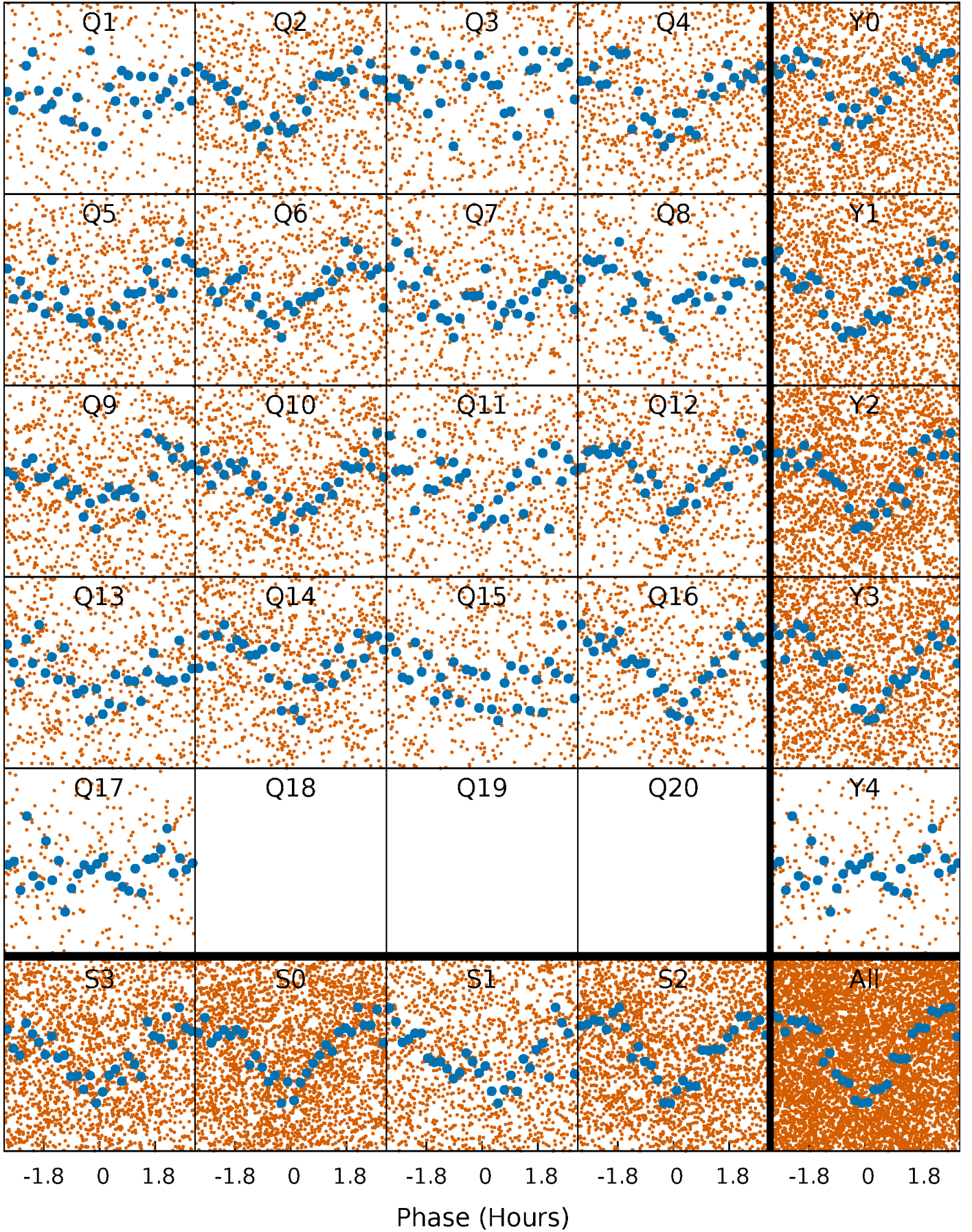


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



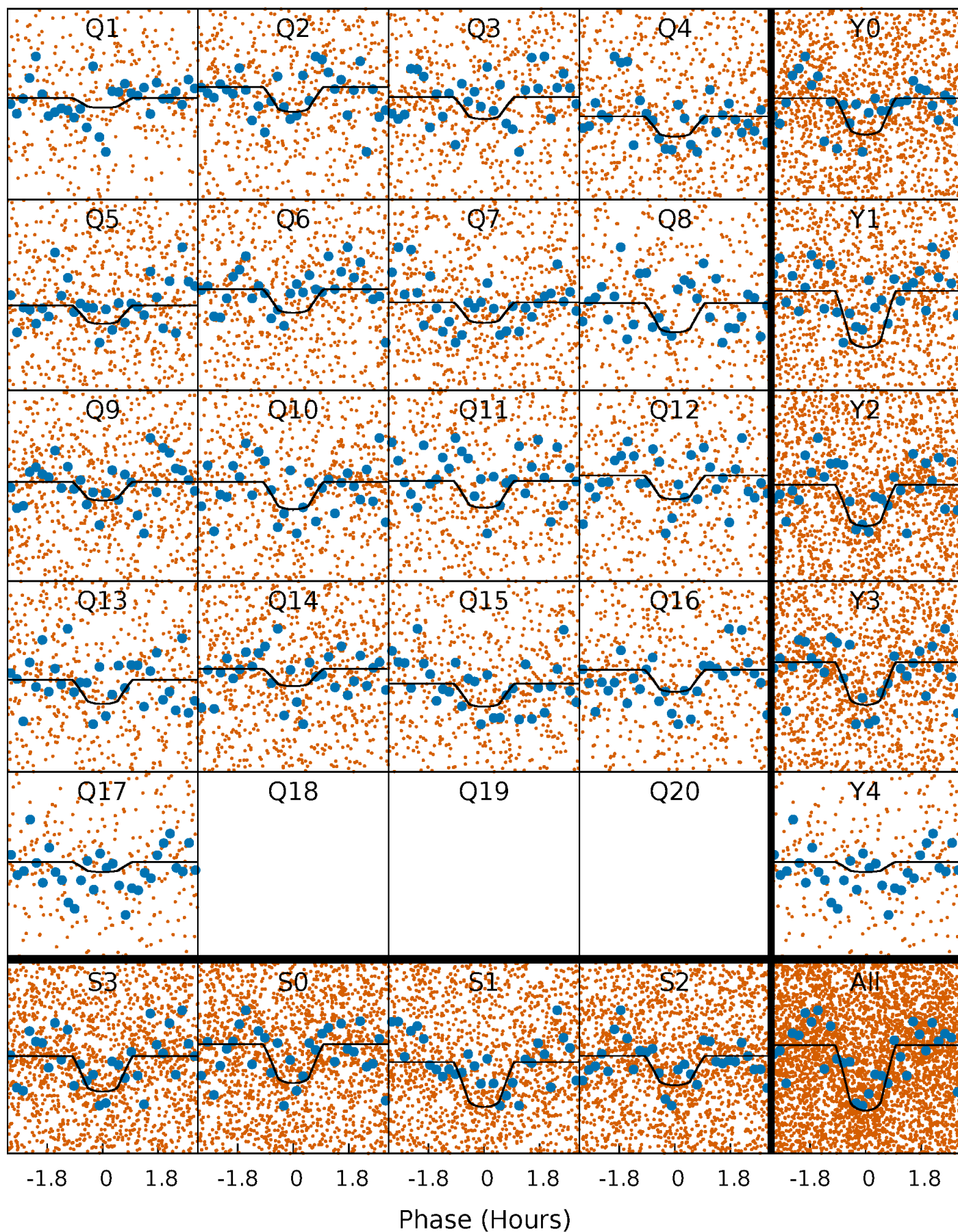
# PDC Quarter-Phased Transit Curves

TCE 010796473-02   P= 0.969906 Days    $T_0=131.701417$  (BKJD)



# DV Quarter-Phased Transit Curves

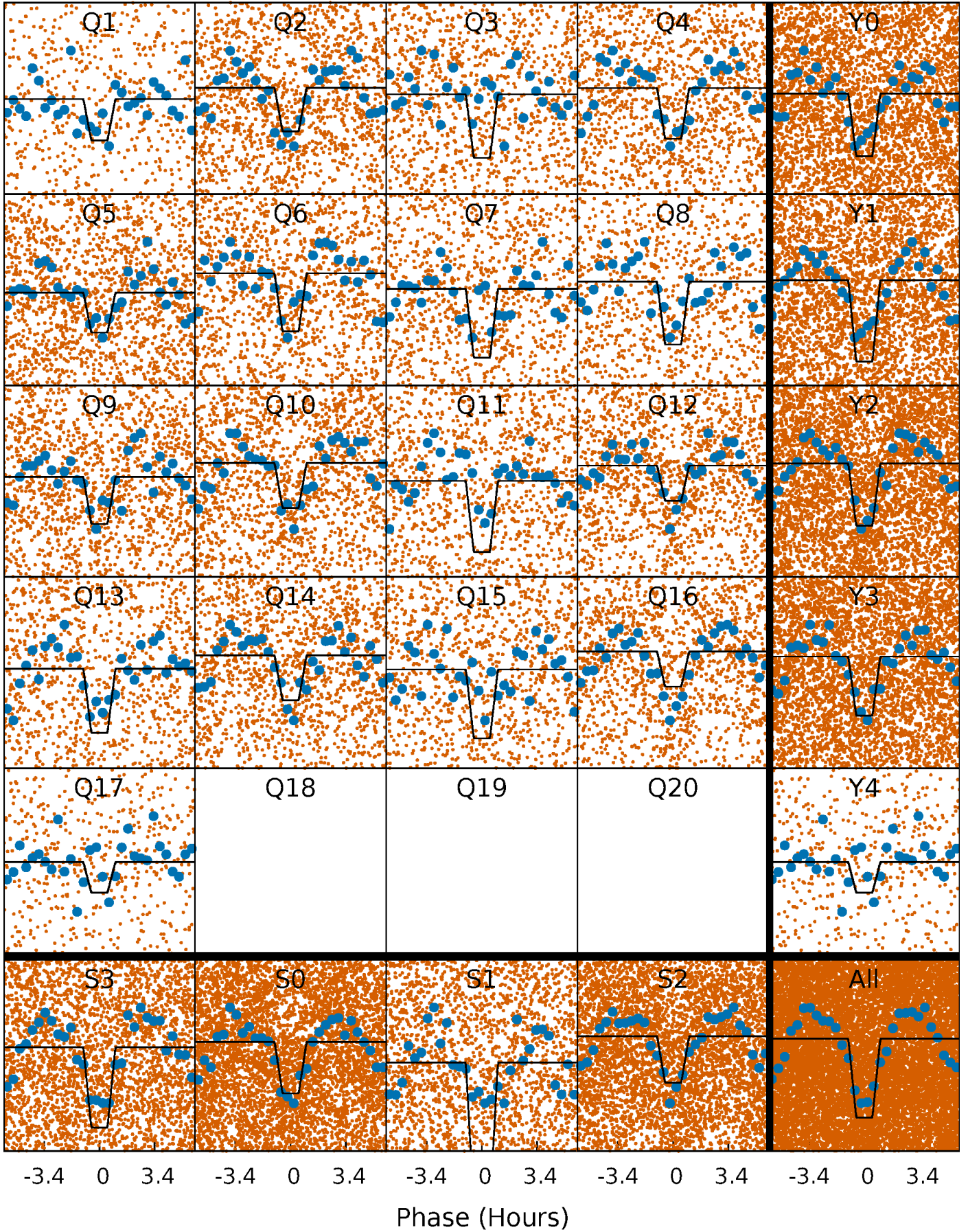
TCE 010796473-02   P= 0.969906 Days    $T_0=131.701417$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

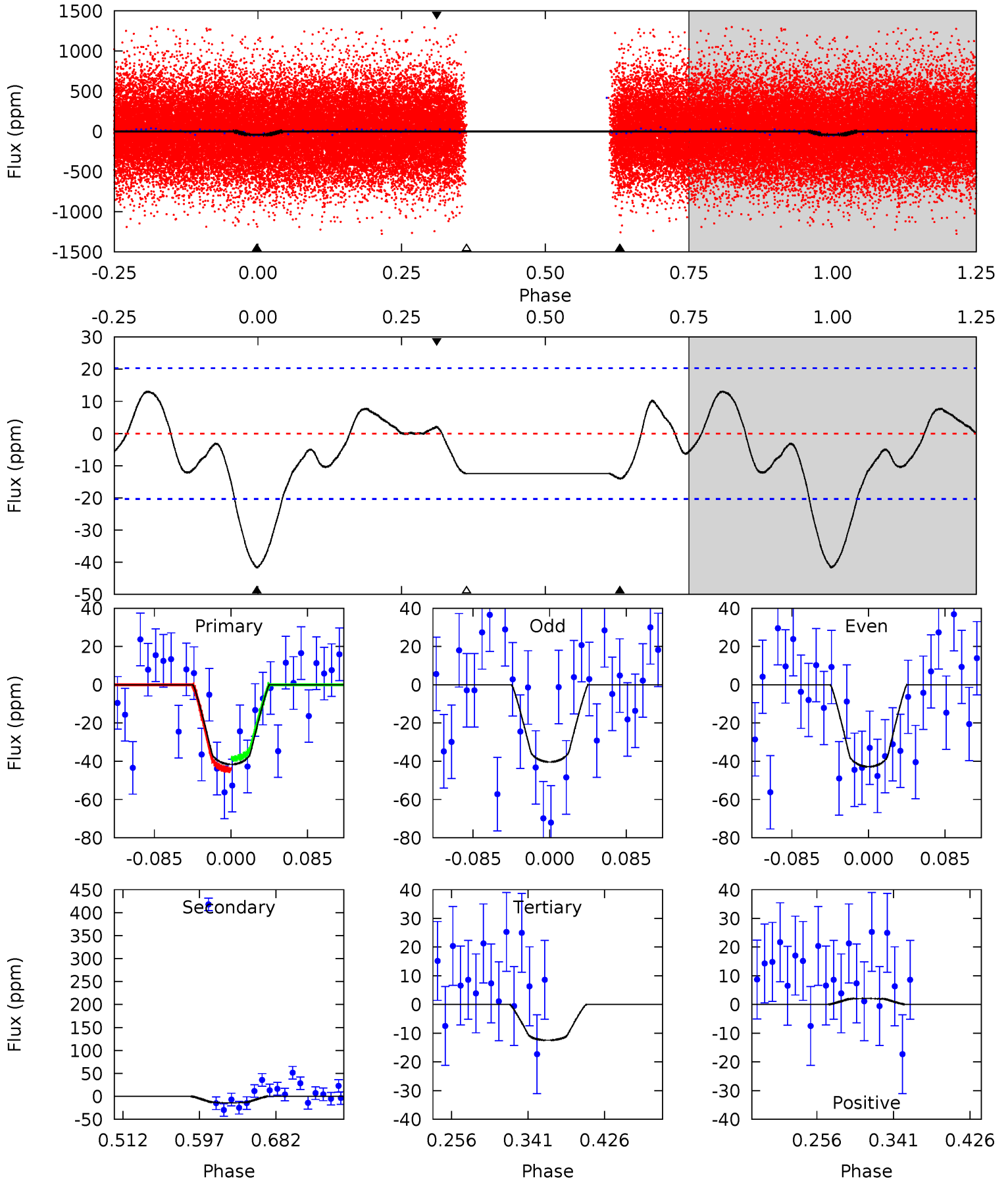
TCE 010796473-02   P= 0.969925 Days    $T_0=131.684596$  (BKJD)



# DV Model-Shift Uniqueness Test

010796473-02, P = 0.969906 Days, E = 130.731511 Days

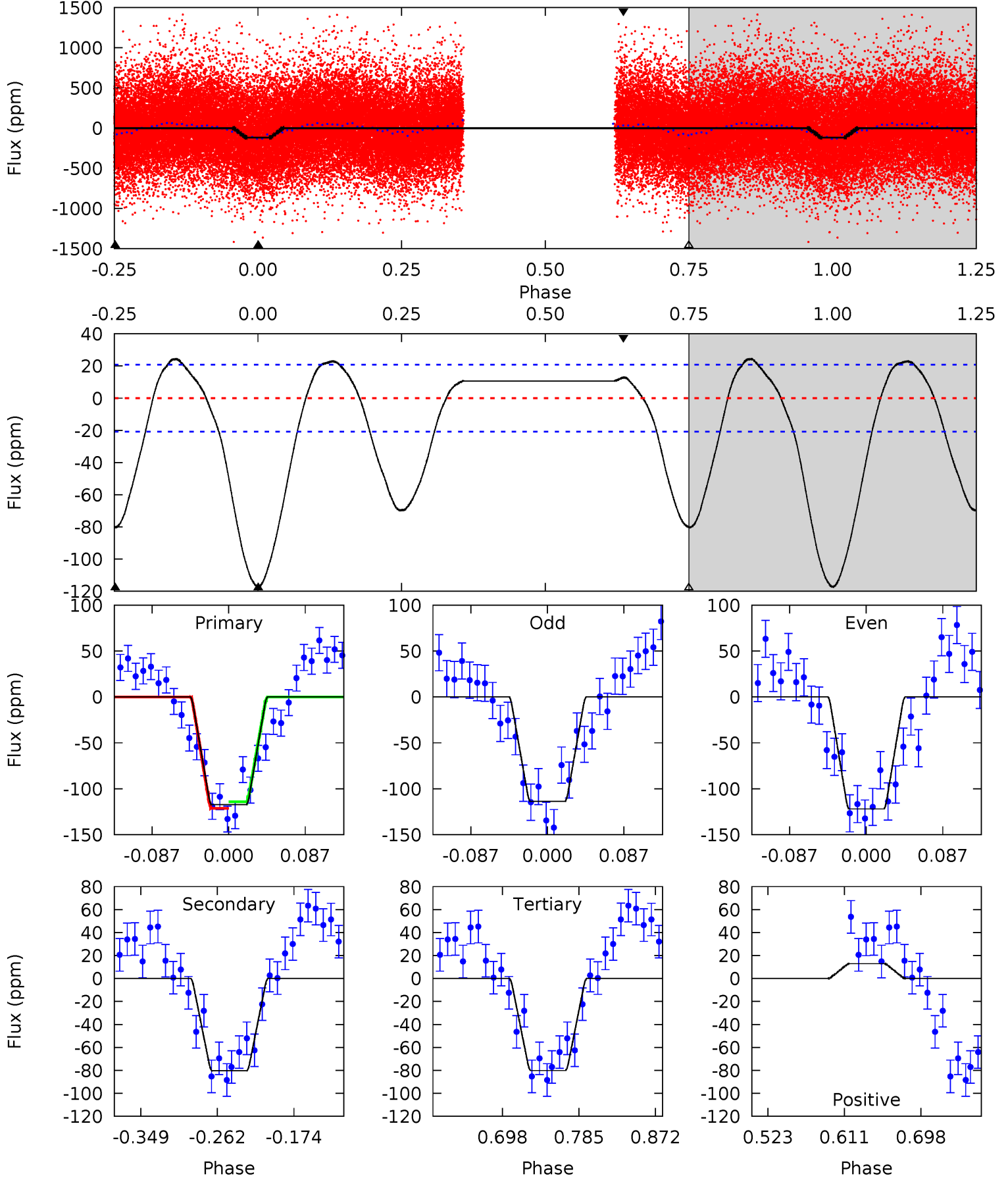
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.43	3.19	2.82	0.47	4.60	1.72	1.52	6.61	8.95	0.37	2.71	0.28	0.85	0.24	0.66



# Alt Model-Shift Uniqueness Test

010796473-02, P = 0.969925 Days, E = 130.714671 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
25.9	17.7	17.7	2.85	4.59	1.71	7.21	8.19	23.0	0.04	14.9	0.93	0.88	0.17	0.80





### Stellar Parameters For KIC 010796473

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6228^{+166}_{-222}$	$4.441^{+0.054}_{-0.216}$	$-0.080^{+0.250}_{-0.300}$	$1.049^{+0.349}_{-0.116}$	$1.107^{+0.153}_{-0.153}$	$1.351^{+0.387}_{-0.715}$
	+3%/-4%	+1%/-5%	+312%/-375%	+33%/-11%	+14%/-14%	+29%/-53%
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 010796473-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-14 \pm 4$	$1.04^{+0.64}_{-0.60}$	$2845^{+219}_{-134}$	$4165^{+2054}_{-803}$	$2.658^{+11.866}_{-1.762}$
Alt.	$-80 \pm 5$	$1.46^{+0.70}_{-0.60}$	$2853^{+219}_{-149}$	$5311^{+1559}_{-800}$	$7.881^{+14.967}_{-4.180}$

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

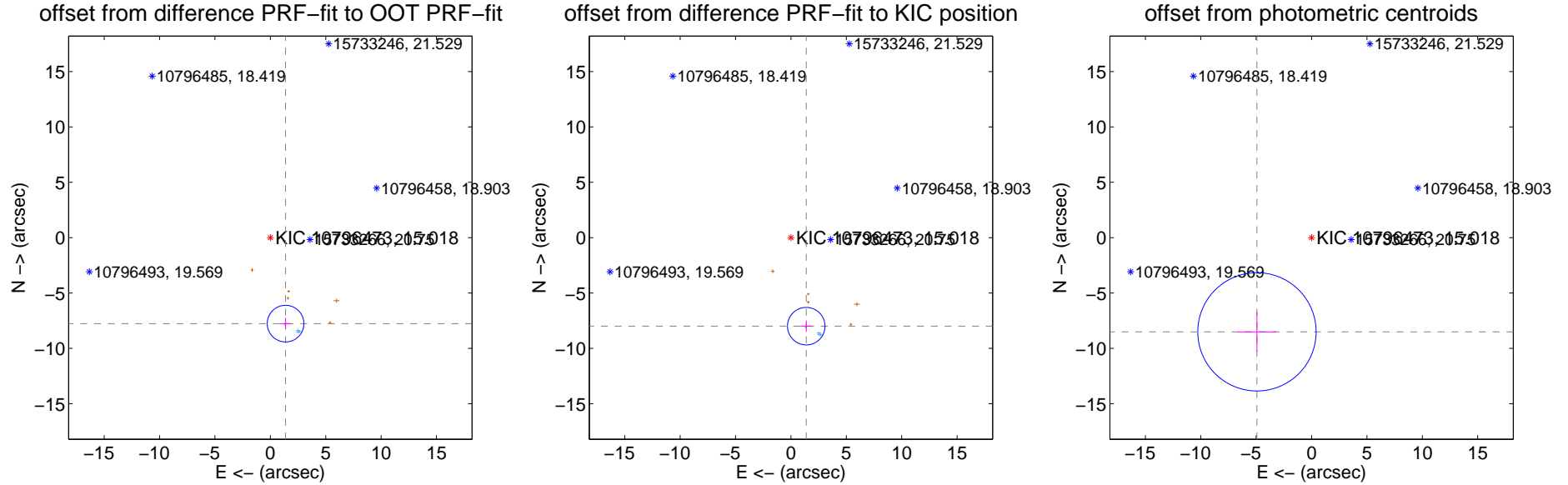
## DV Centroid Data

Supplemental centroid analysis for 010796473-02. Kepler magnitude: 15.02. Transit SNR 9.01

There are 7 quarters with good PRF difference image offsets

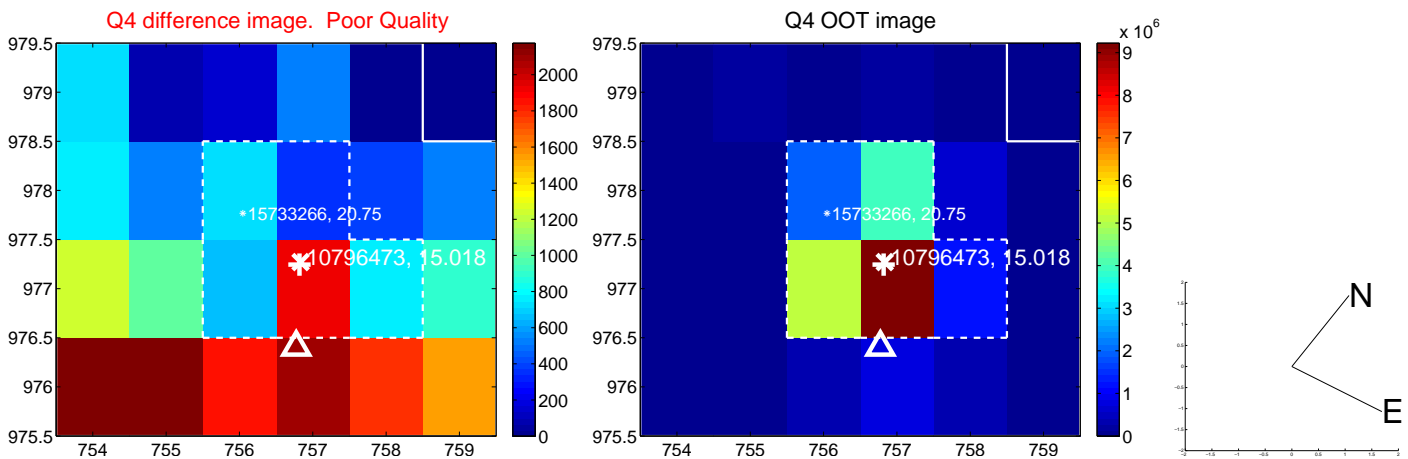
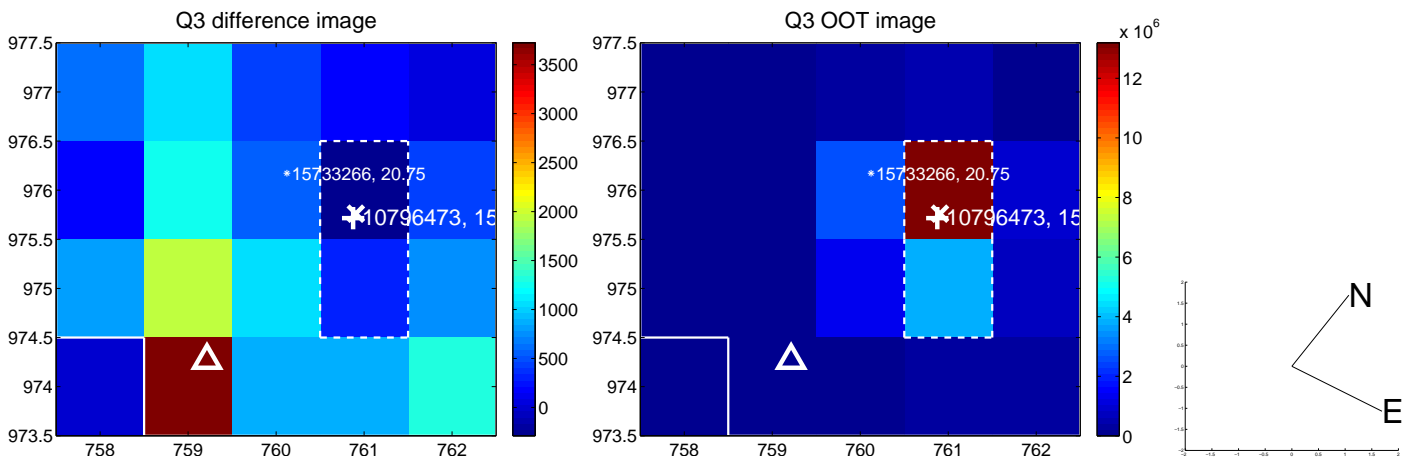
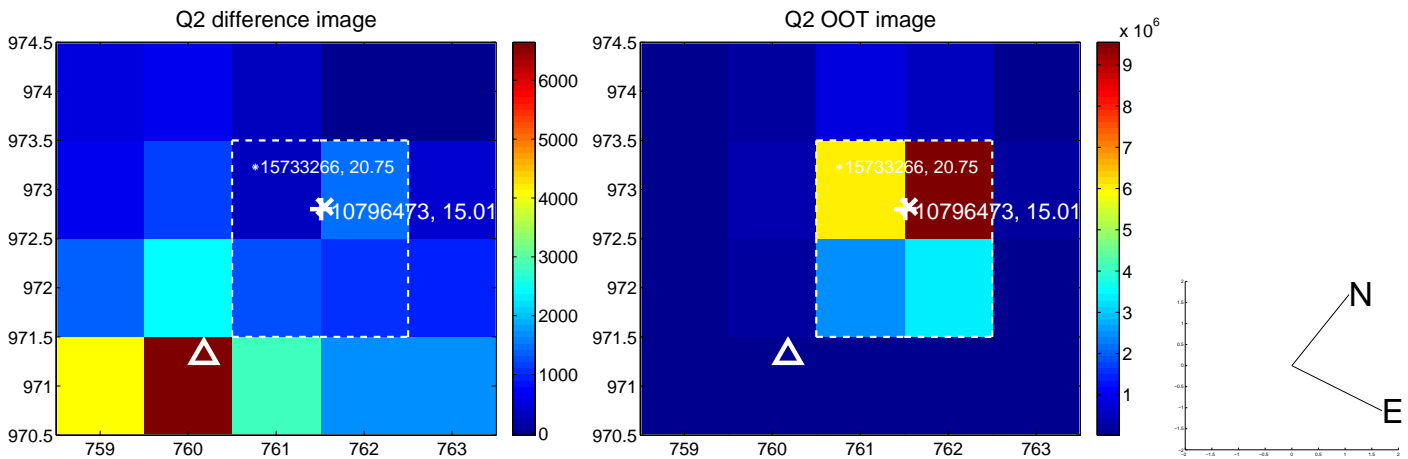
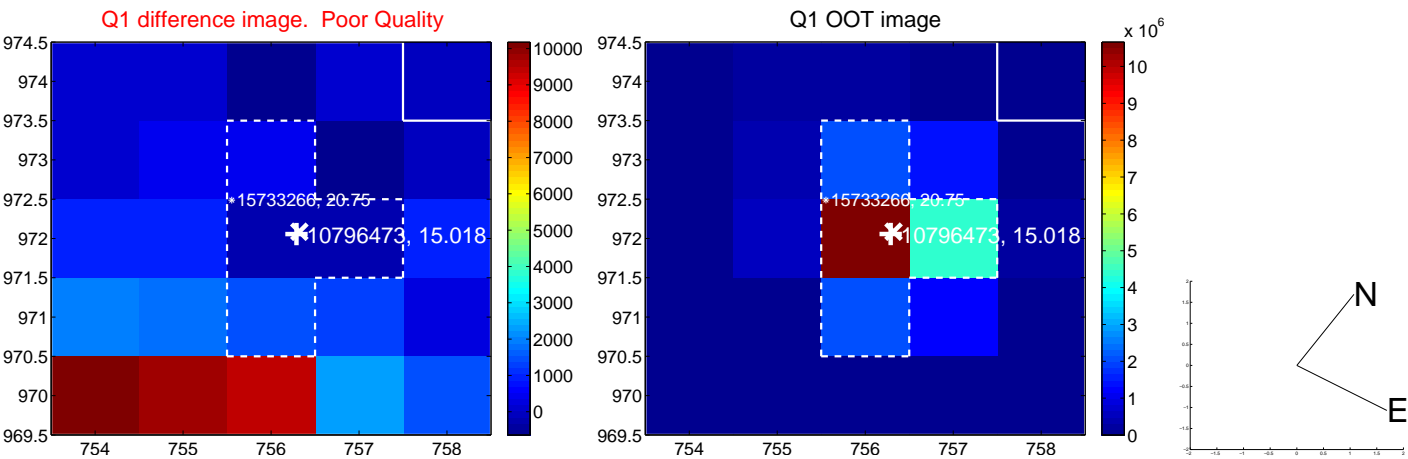
The direct PRF centroid is offset from the target star catalog position by about 0.26 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$7.888 \pm 0.552$	14.30	$-1.375 \pm 0.524$	$-7.767 \pm 0.527$
PRF-fit source offset from KIC position	$8.115 \pm 0.565$	14.37	$-1.382 \pm 0.528$	$-7.996 \pm 0.531$
photometric centroid source offset	$9.83 \pm 1.78$	5.52	$4.93 \pm 1.76$	$-8.51 \pm 1.79$

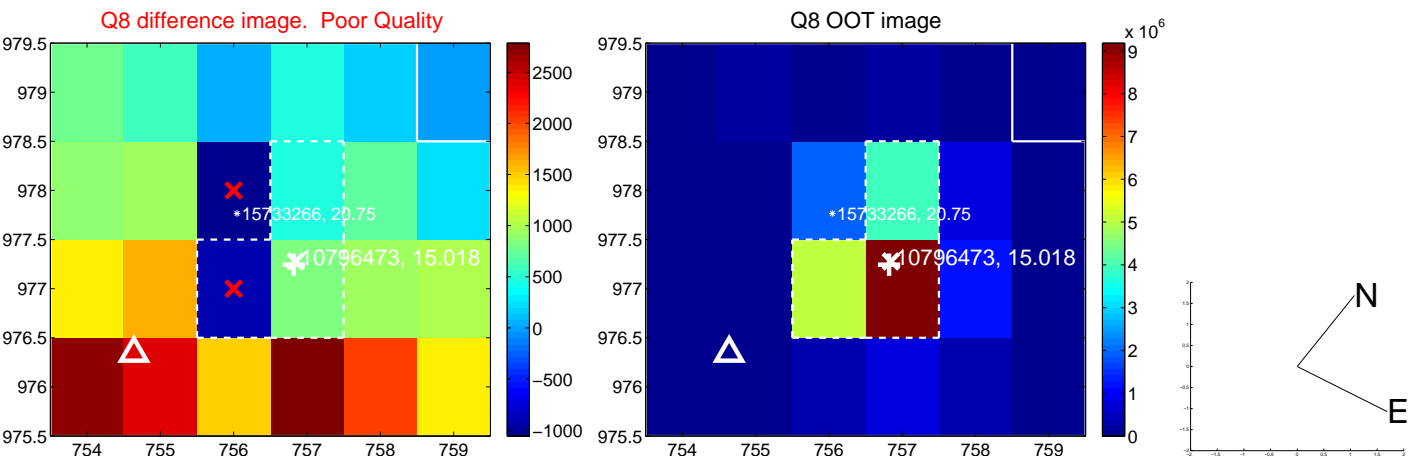
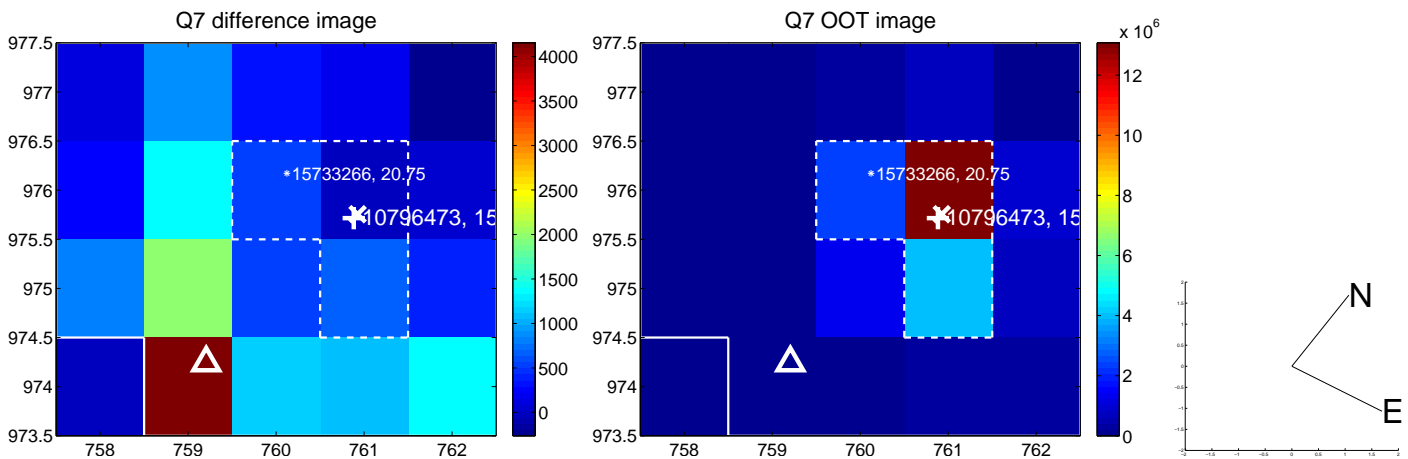
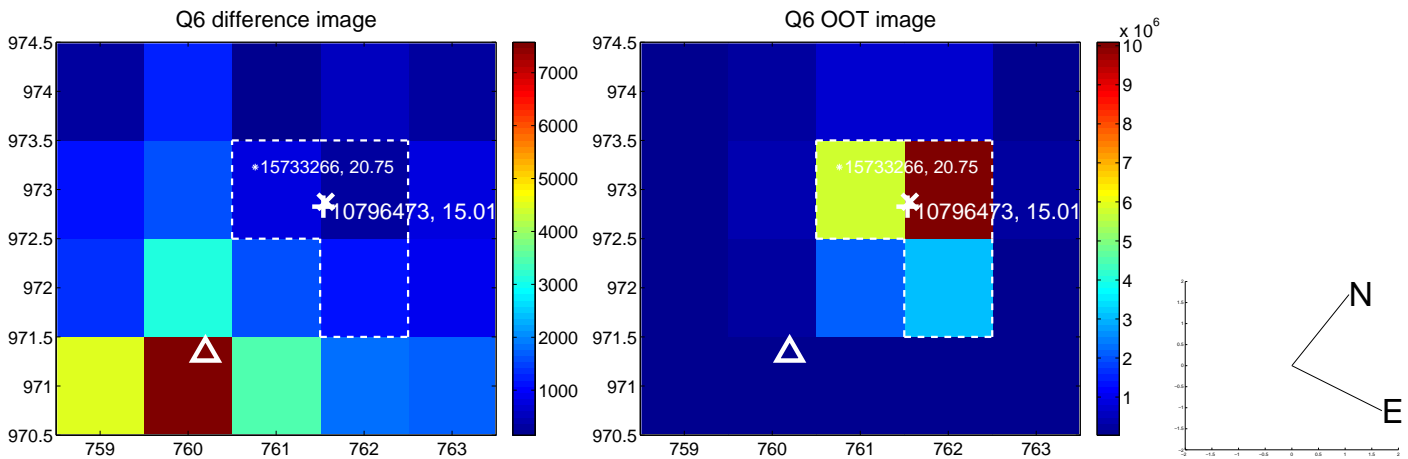
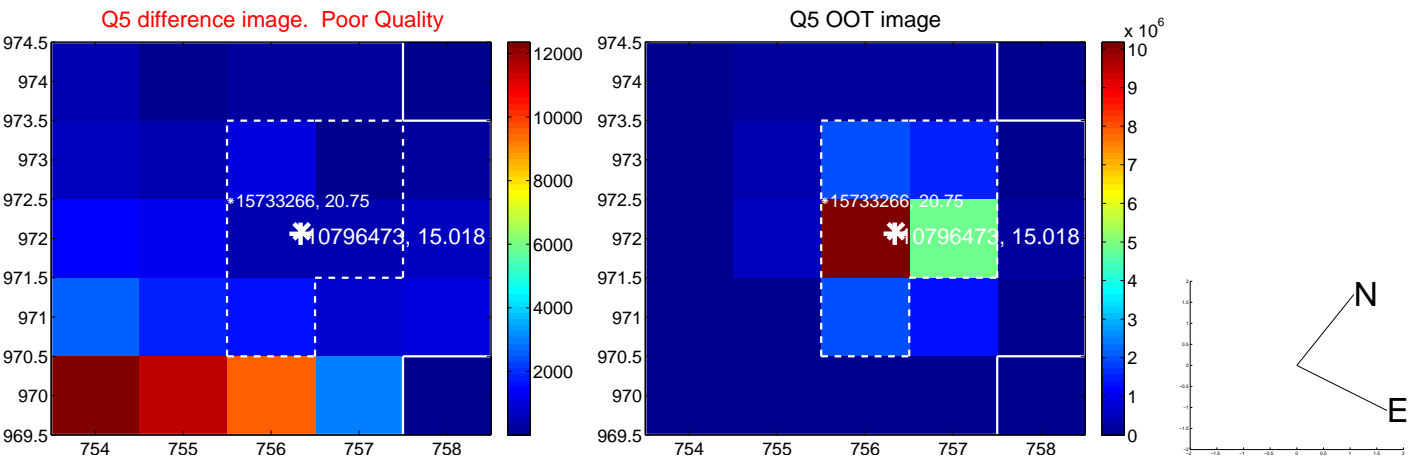


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

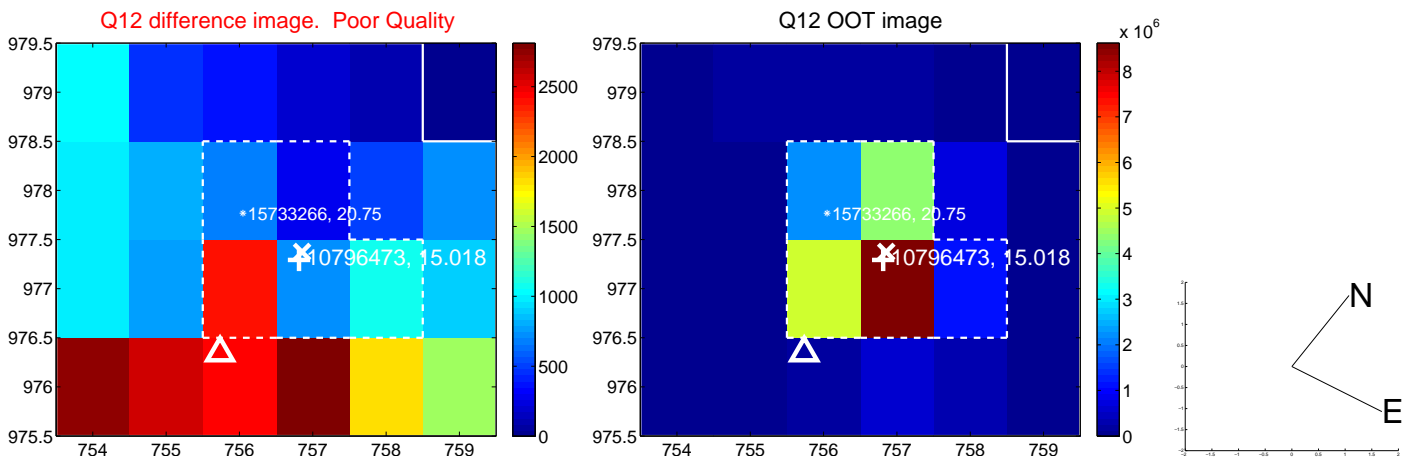
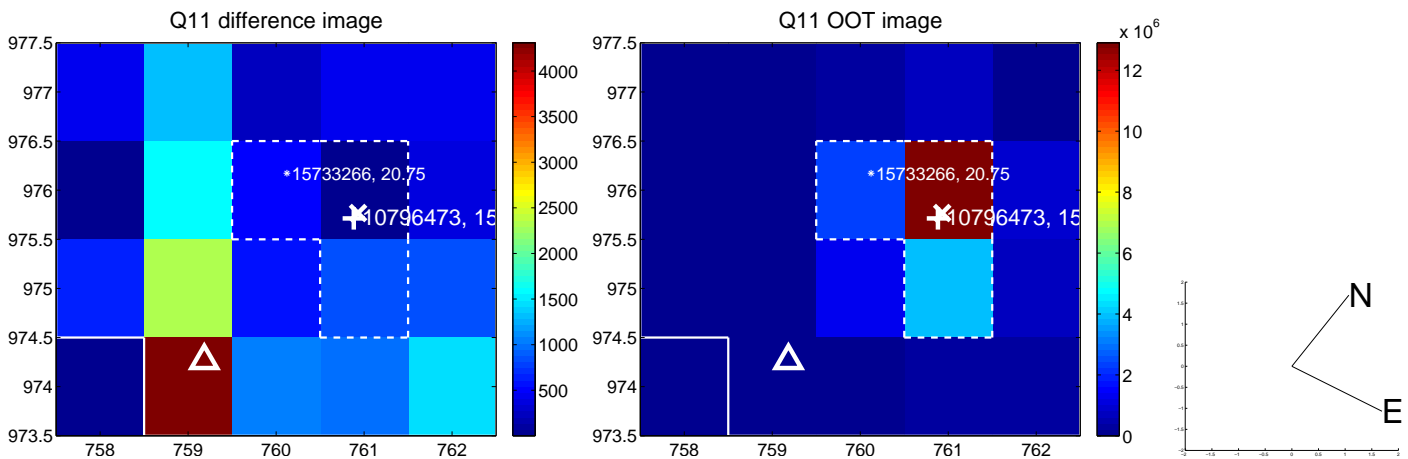
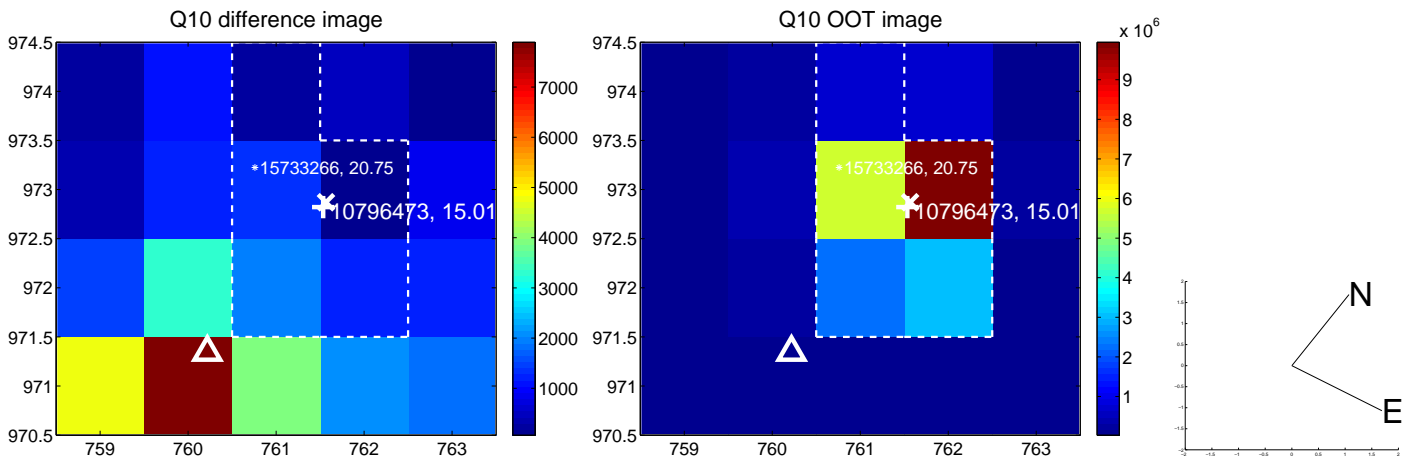
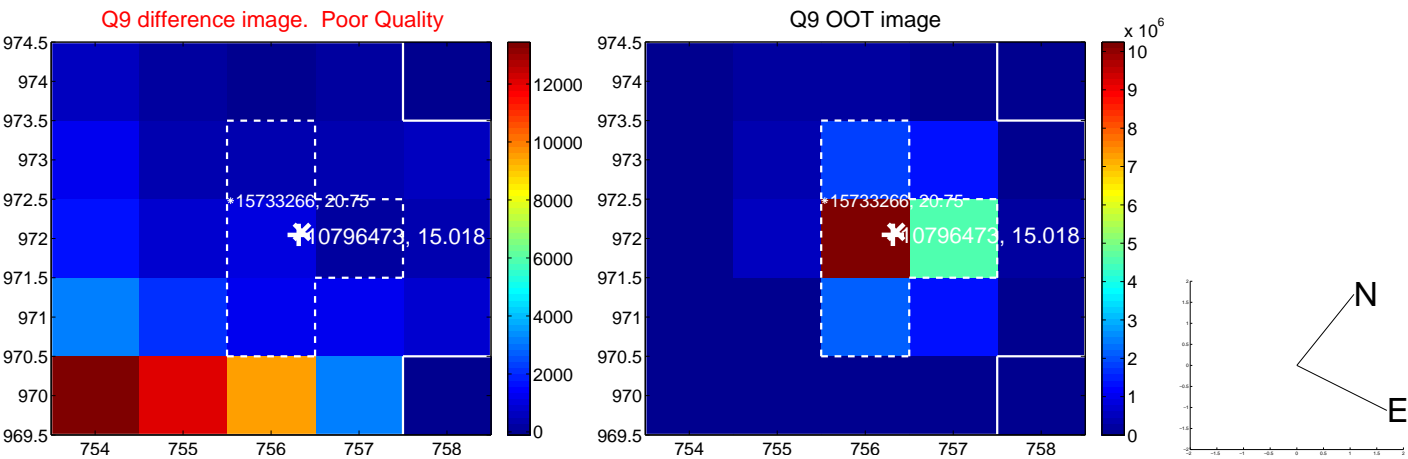
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



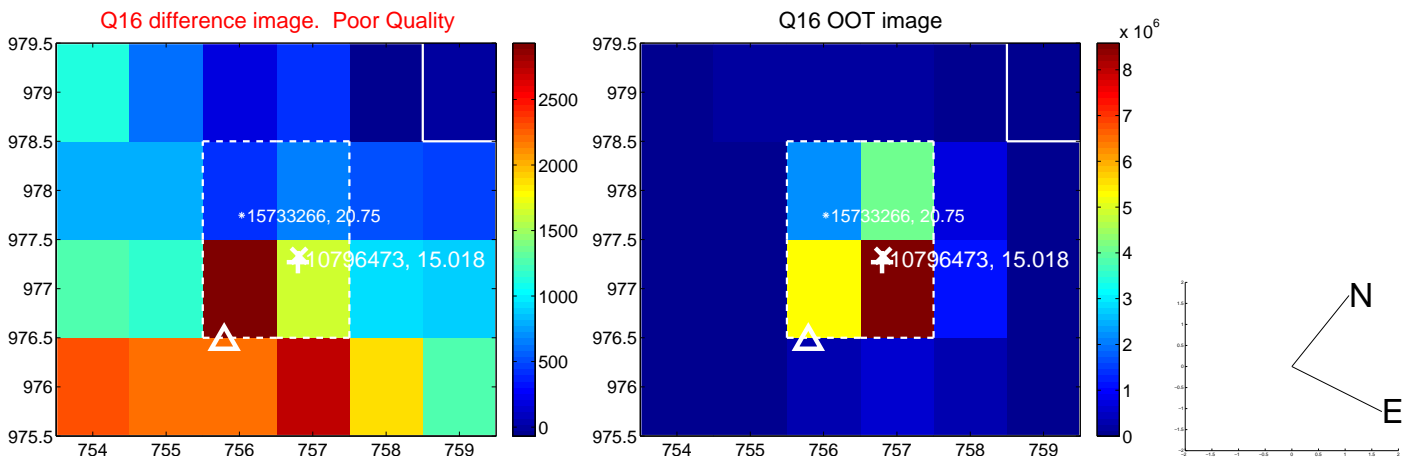
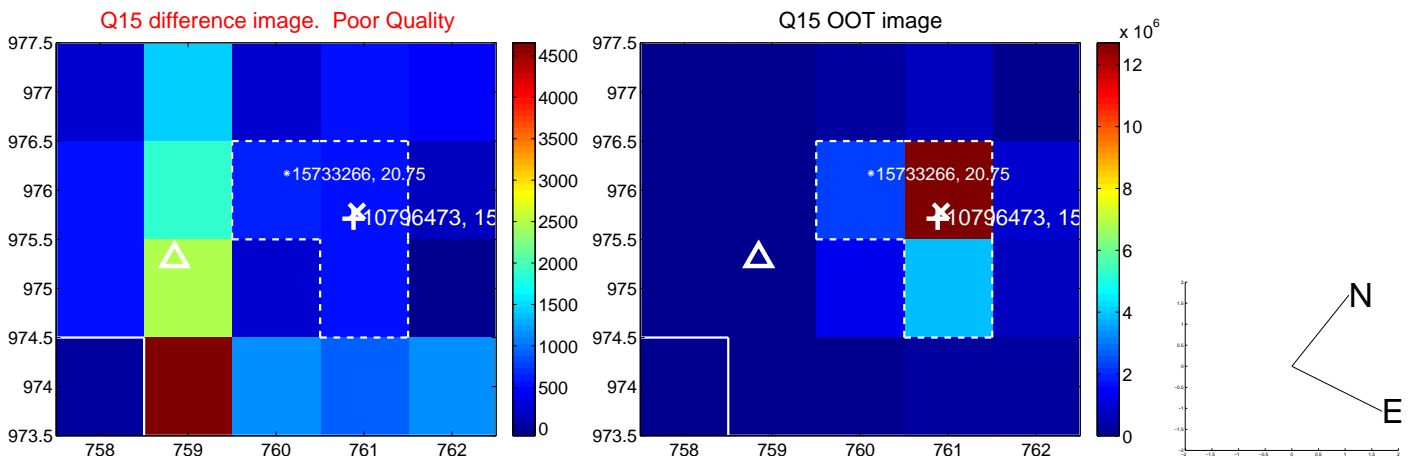
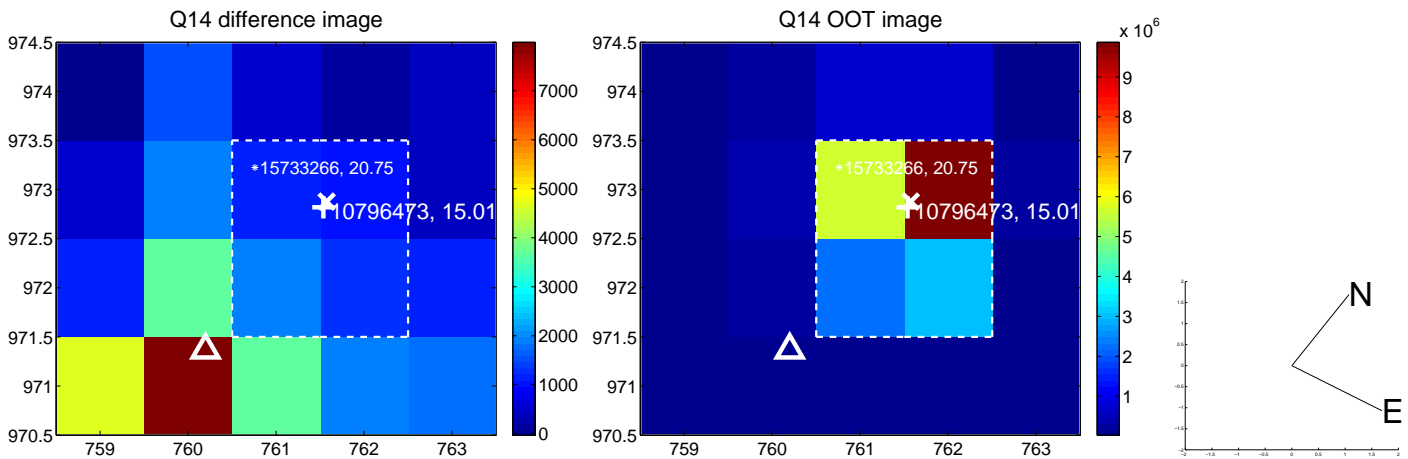
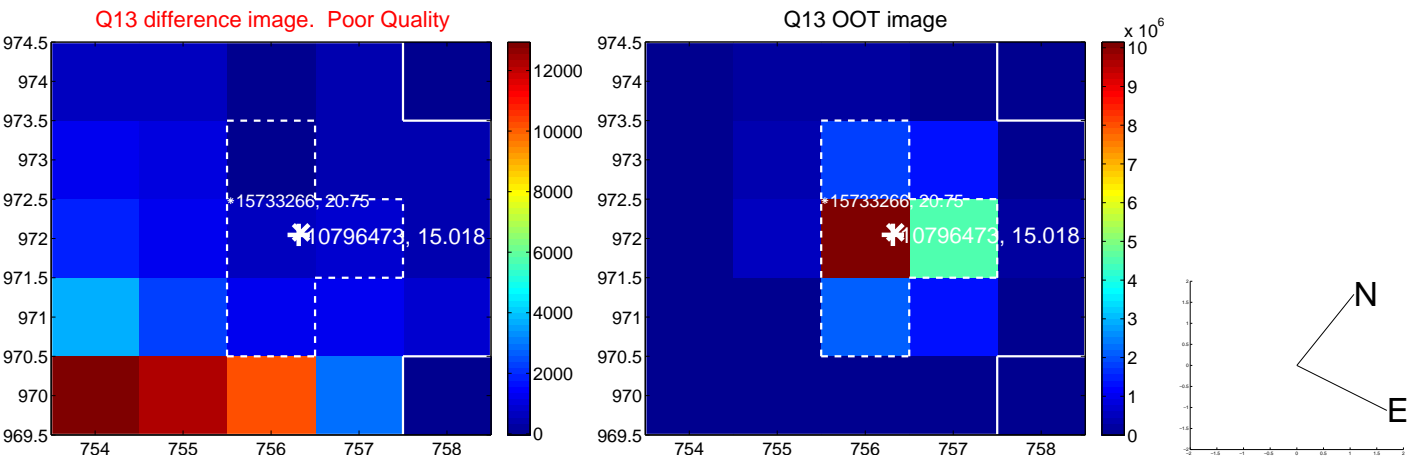
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

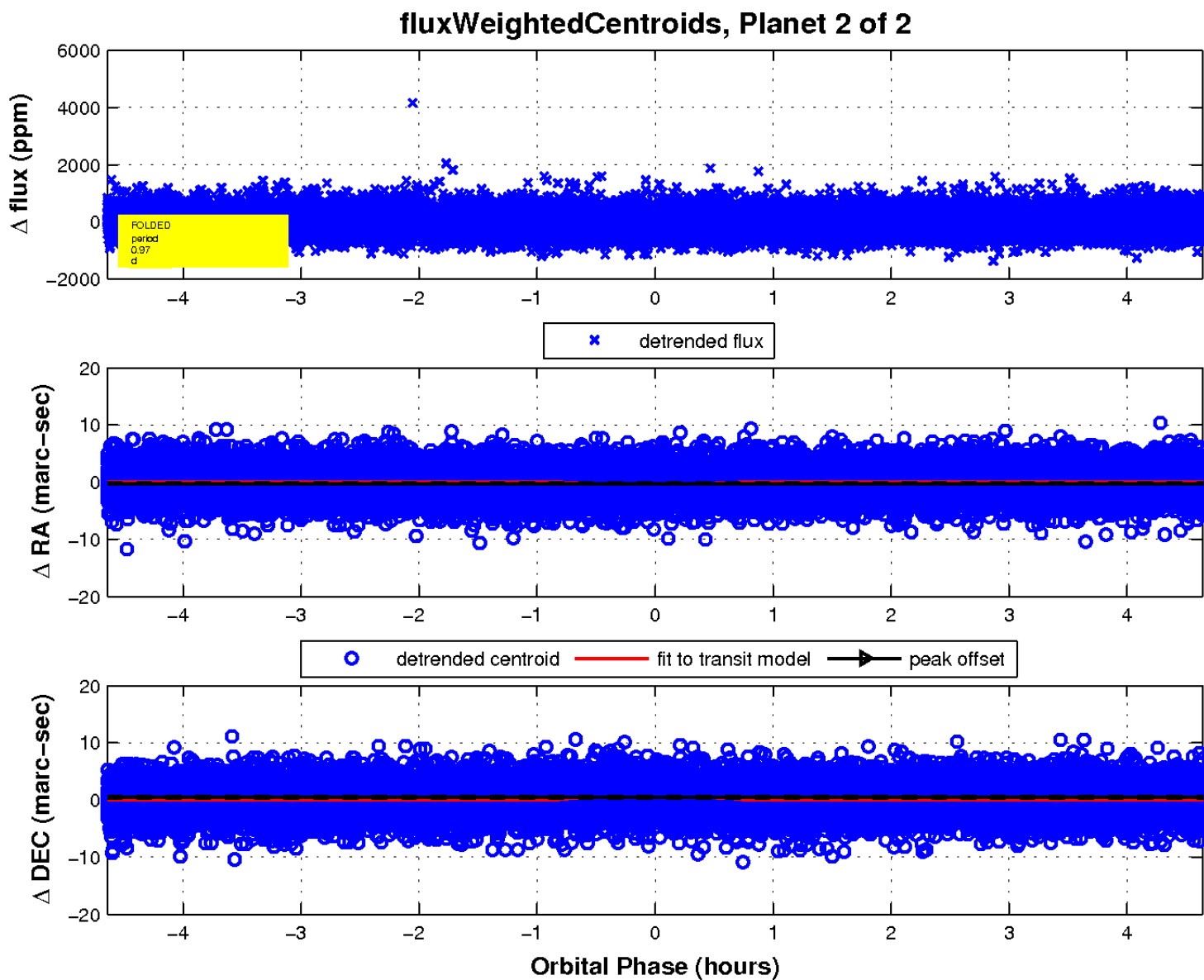
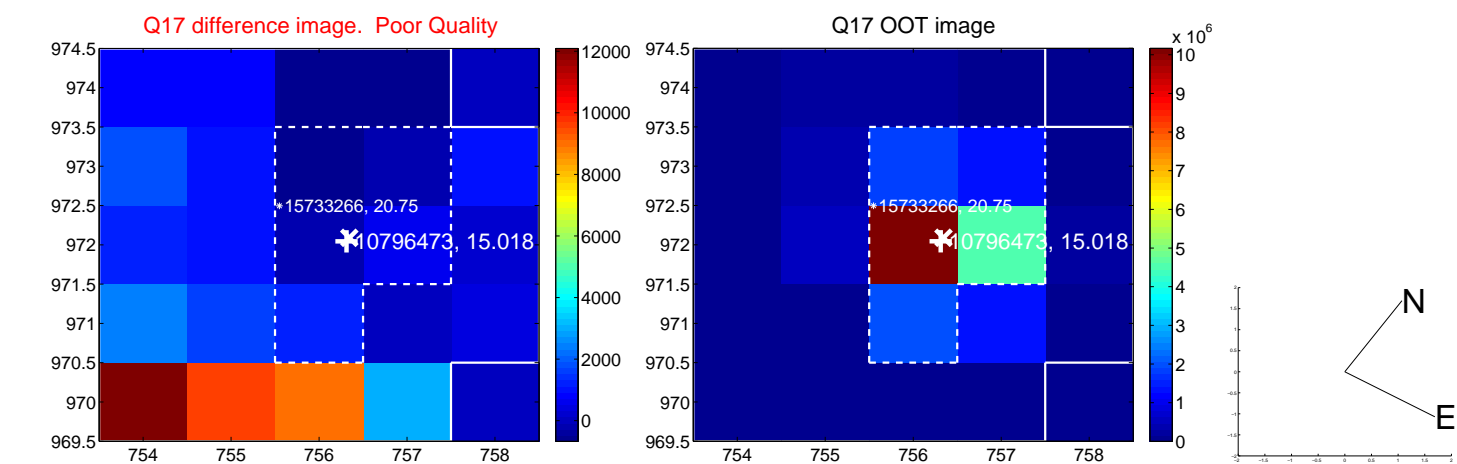


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





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



UKIRT Image

Declination

