

# KIC 005471770

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005471770-01	OBS	6012.01	12.425511	141.547073	96.0	27.913	13.4	17.7	1.36	6367	1.81	242.81
005471770-02	OBS	No	12.426938	133.887165	92.5	28.536	13.4	17.4	1.36	6367	1.83	242.77

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005471770-01	OBS	FP	0.00	1	0	1	1	LPP_DV—HALO_GHOST—EPHEM_MATCH
005471770-02	OBS	FP	0.00	1	0	1	1	LPP_DV—SAME_NTL_PERIOD—CENT_KIC_POS—HALO_GHOST—EPHEM_MATCH

**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.

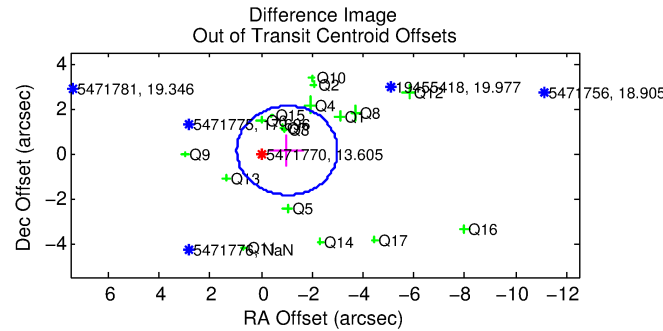
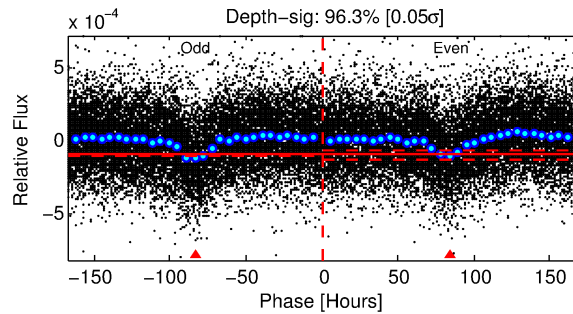
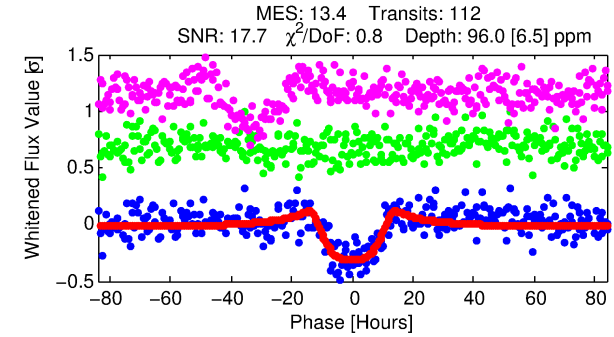
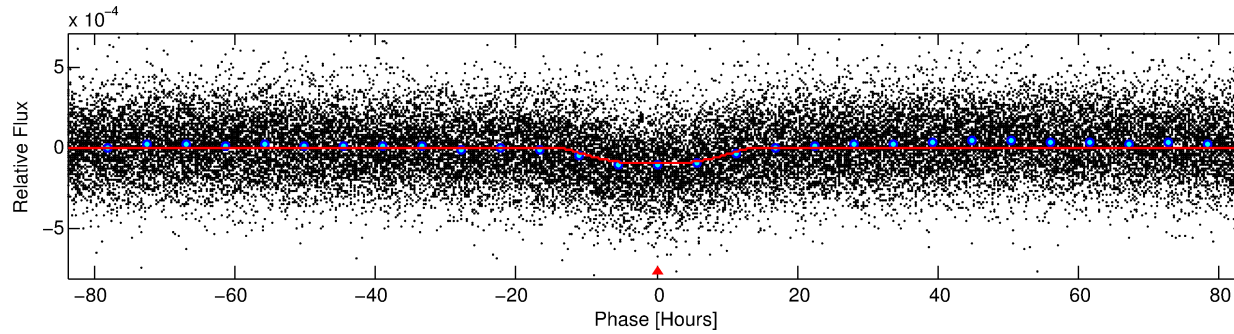
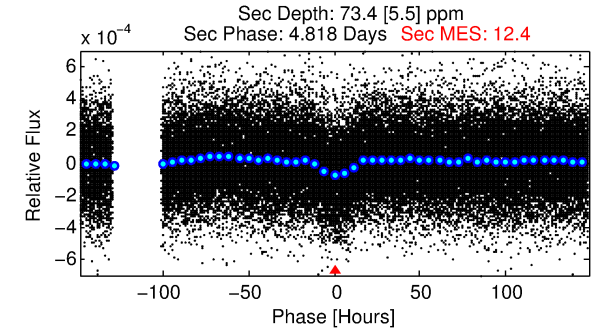
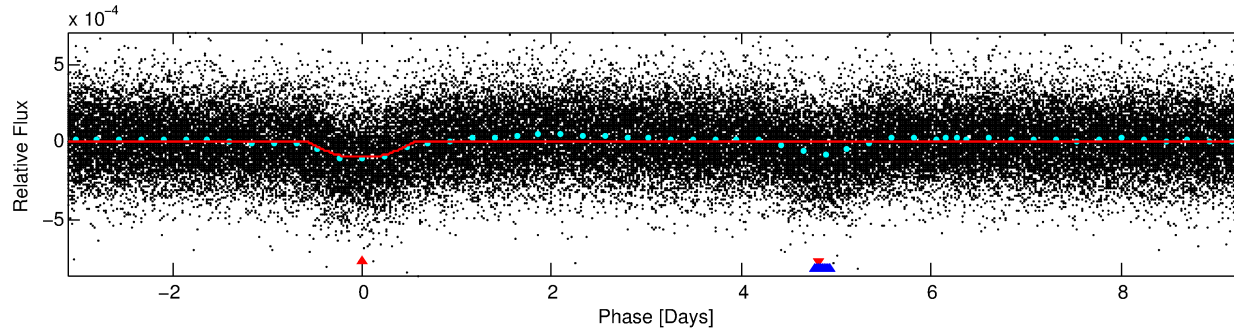
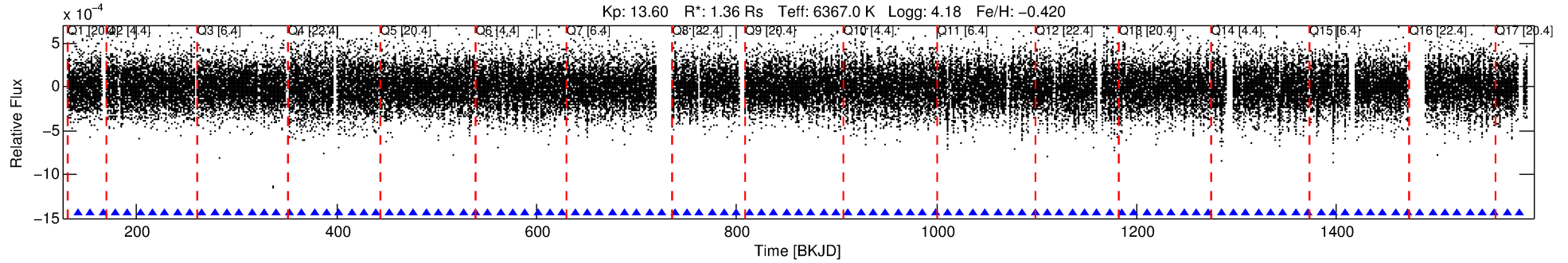
## Ephemeris Match Information For 005471770-01

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	$\sigma_P$	$\sigma_T$
005471770-01	5471770	V380-Cyg-pri	5385723	1:1	311.0	13	77	5.77	13.60	1509.70	Direct-PRF	0	0.60	0.14

**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: 5471770 Candidate: 1 of 2 Period: 12.426 d  
KOI: K06012.01 Corr: 0.987



## DV Fit Results:

Period = 12.42551 [0.00042] d  
Epoch = 141.5471 [0.0261] BKJD  
Rp/R\* = 0.0122 [0.0005]  
a/R\* = 1.26 [0.03]  
b = 0.99 [0.00]  
Seff = 242.81 [107.05]  
Teq = 1007 [111] K  
Rp = 1.81 [0.49] Re  
a = 0.1057 [0.0276] AU  
Ag = 137.47 [59.46] [2.29σ]  
**Teffp = 5329 [237] K [16.52σ]**

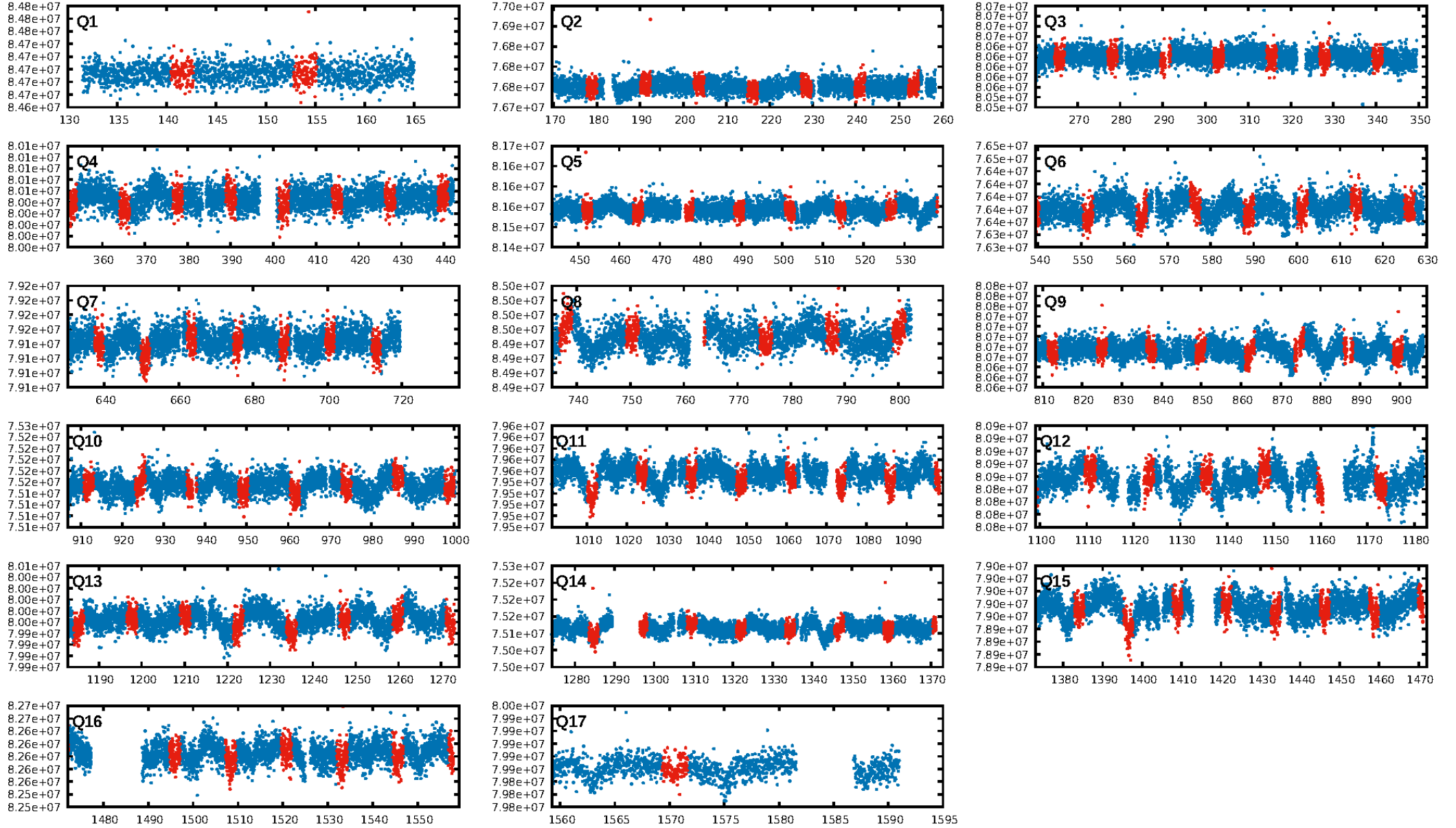
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
**LongPeriod-sig: 0.1% [0.00σ]**  
ModelChiSquare2-sig: 13.8%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 1.62e-45  
RollingBand-fgt: 1.00 [109/109]  
**GhostDiagnostic-chr: -0.0526**  
**Centroid-sig: 0.0%**  
Centroid-so: 1.207 arcsec [2.06σ]  
OotOffset-rm: 1.035 arcsec [1.57σ]  
KicOffset-rm: 1.178 arcsec [1.82σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.35 [6/17]  
DiffImageOverlap-fno: 1.00 [17/17]

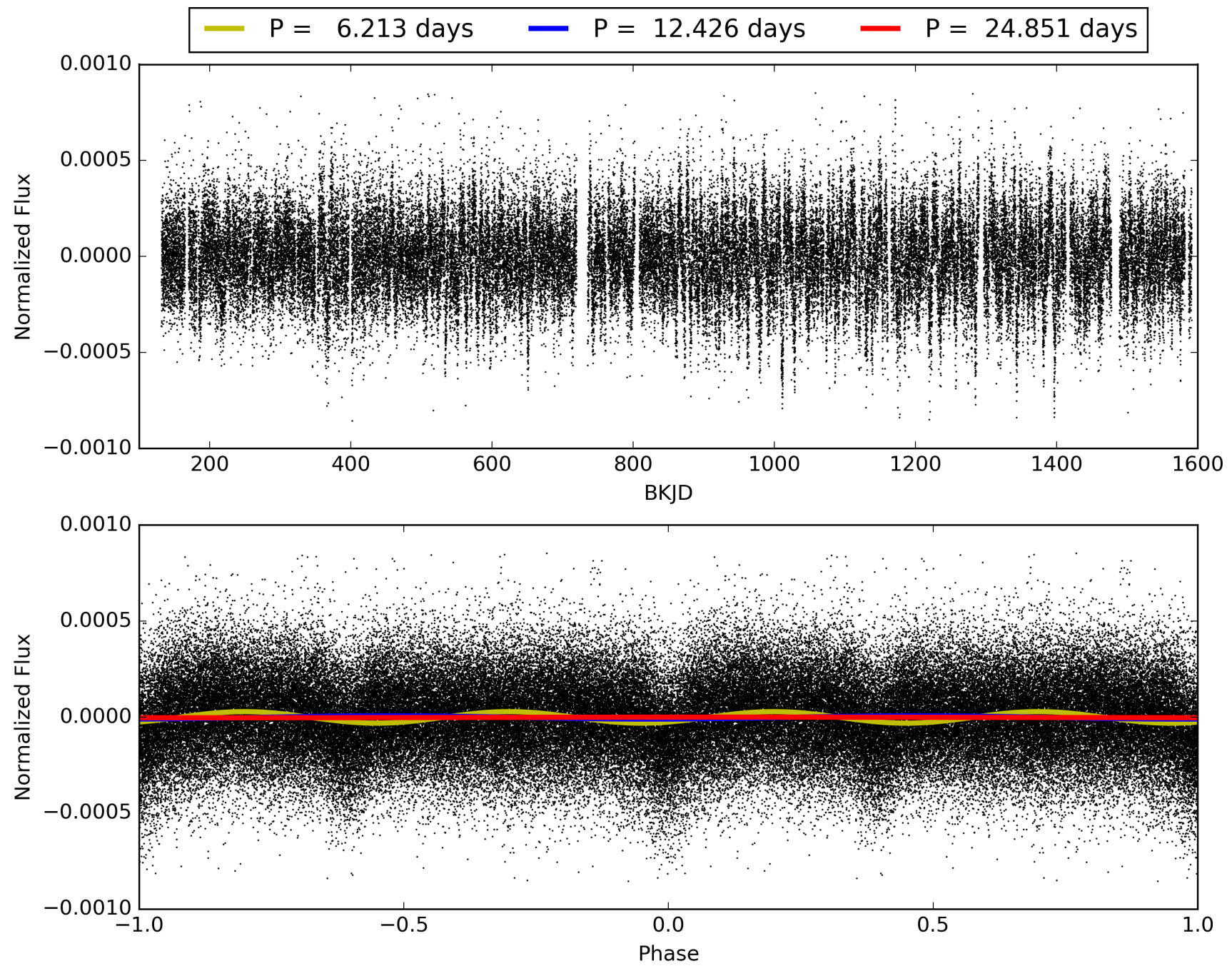
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 13:59:53 Z

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

# TCE 005471770-01, PDC Light Curves



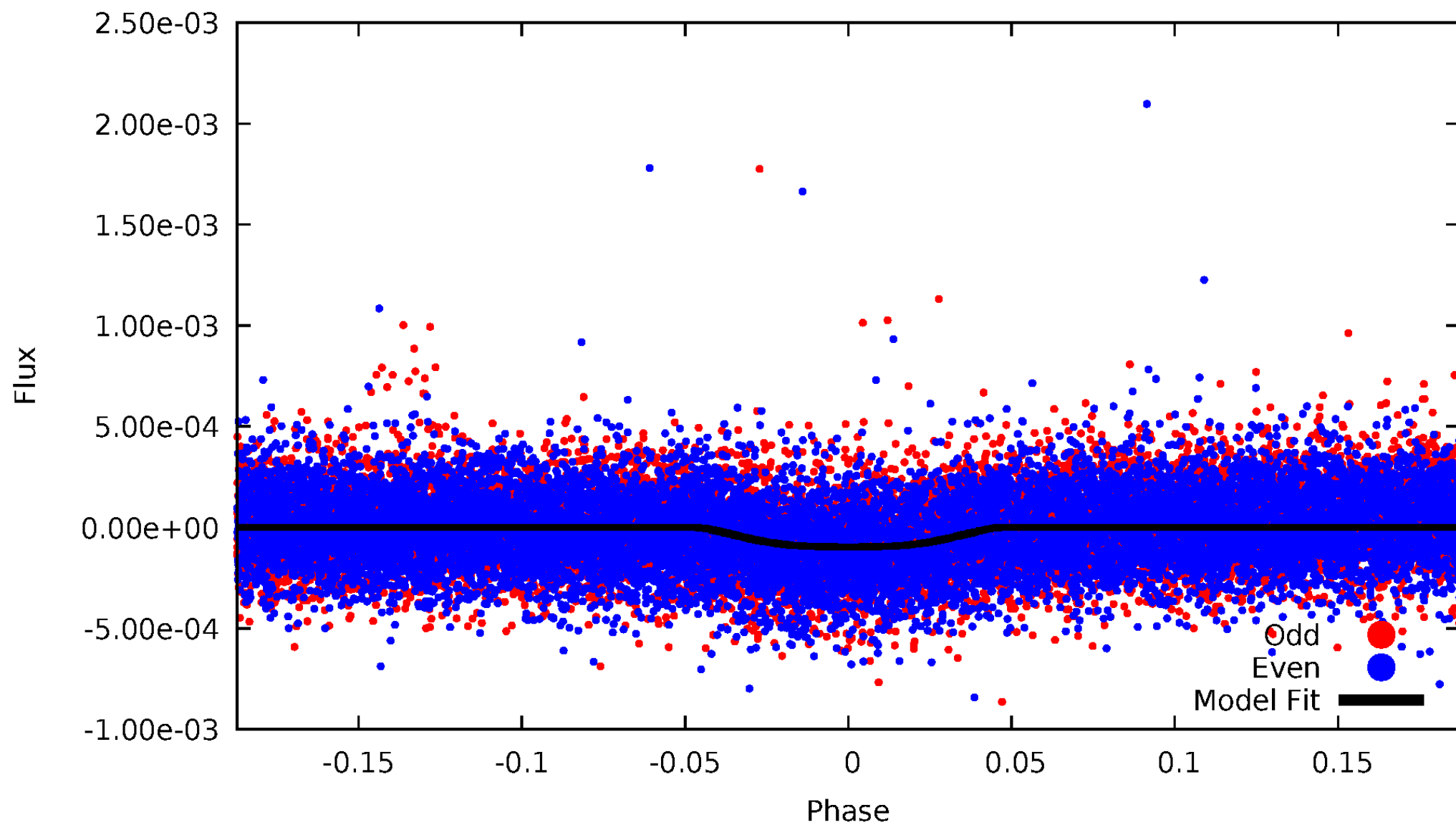
TCE 005471770-01





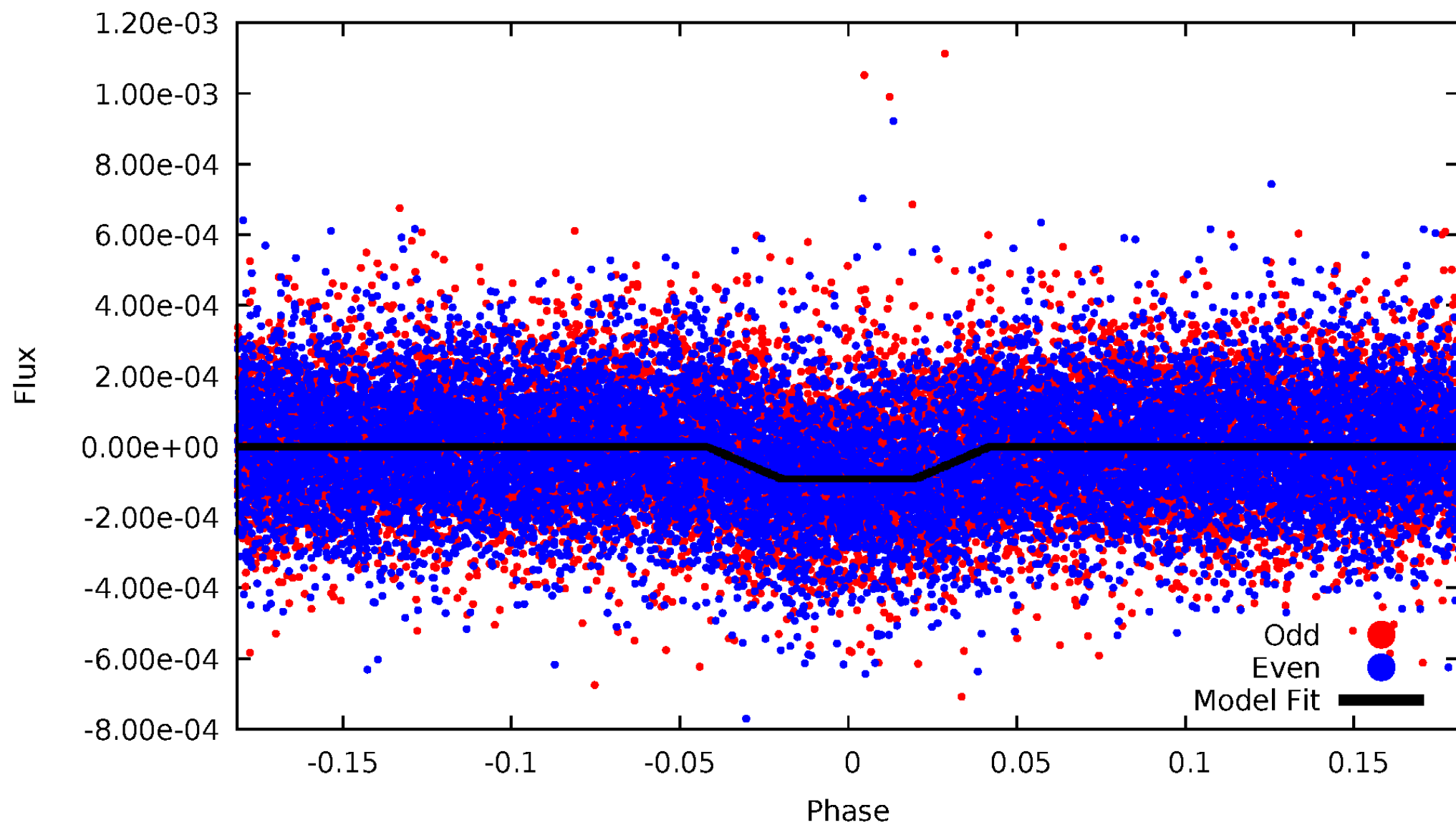
# DV Odd/Even

TCE 005471770-01



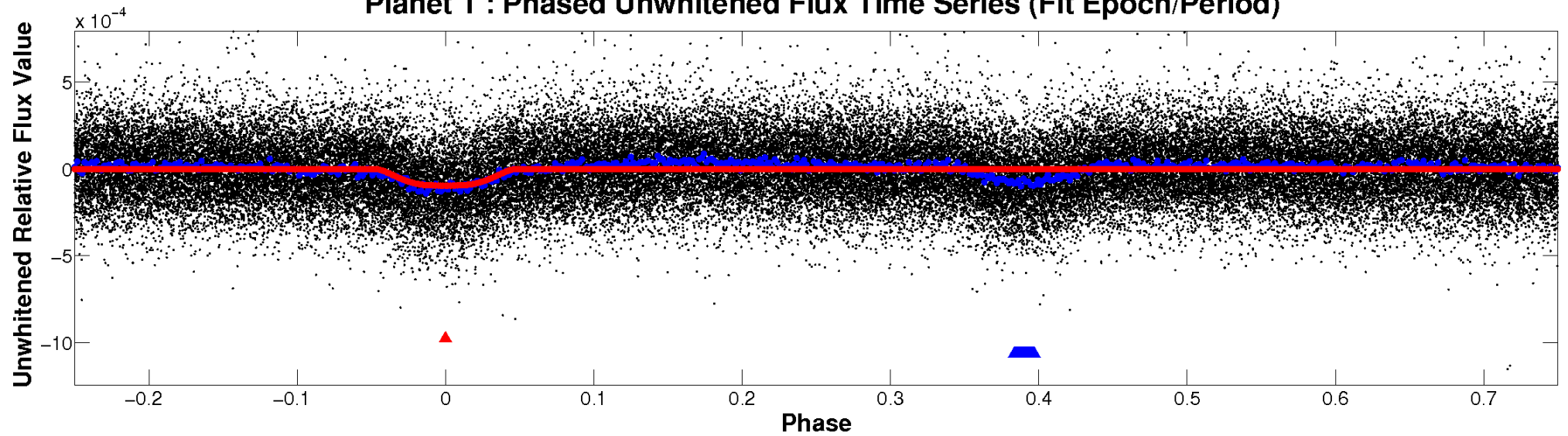
# ALT Odd/Even

TCE 005471770-01

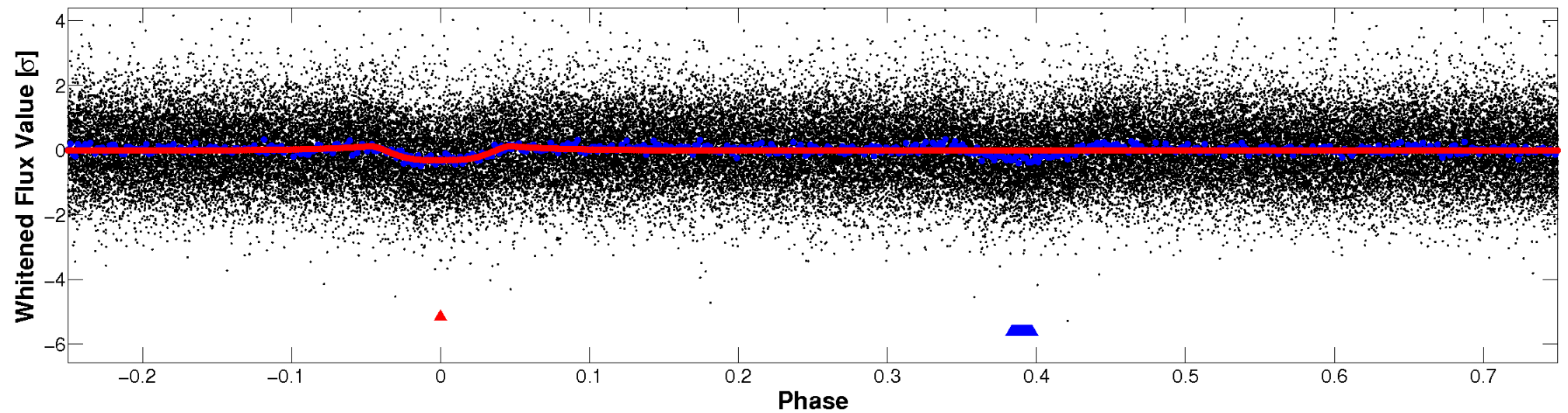


# Non-Whitened Vs. Whitened Light Curve

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

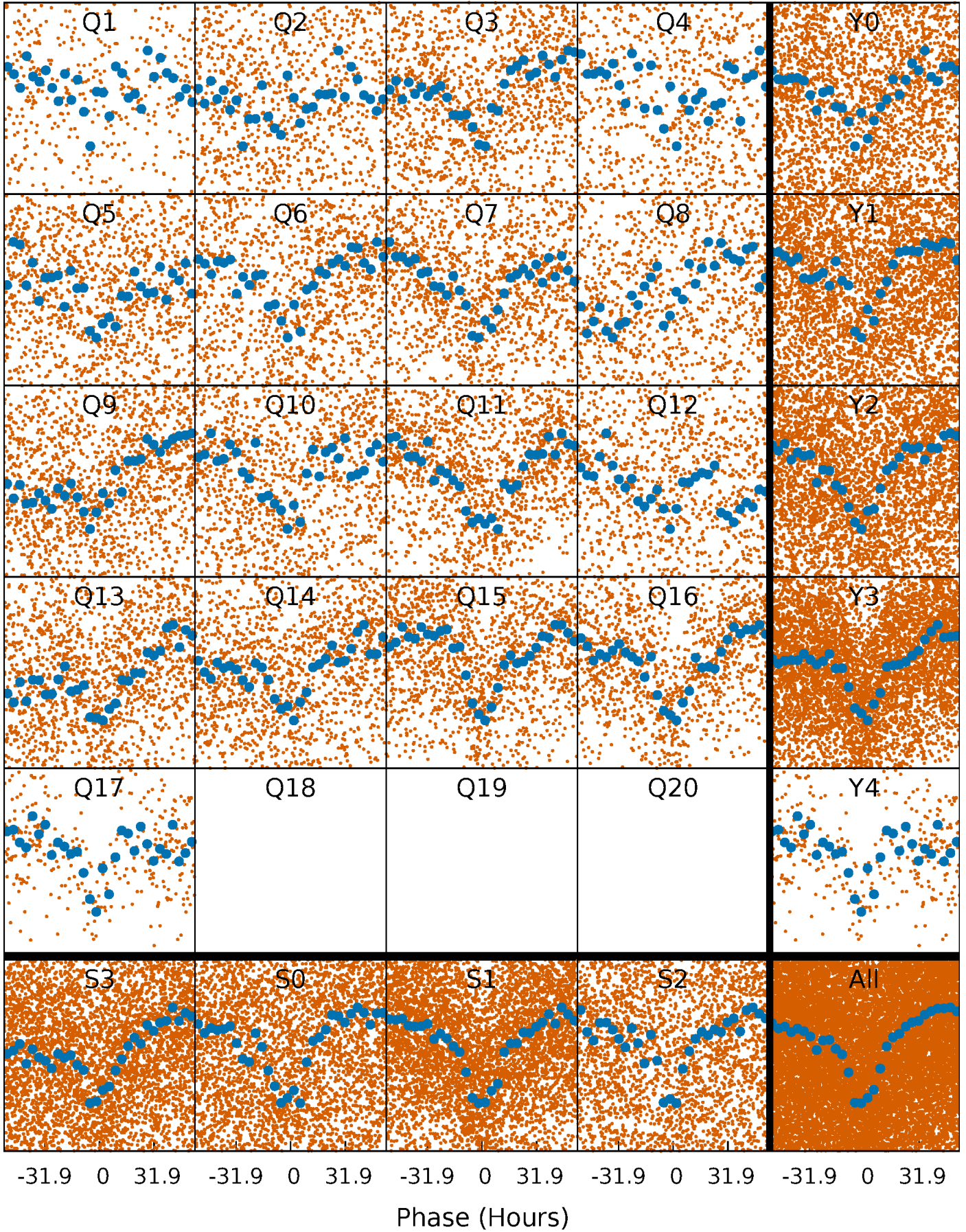


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

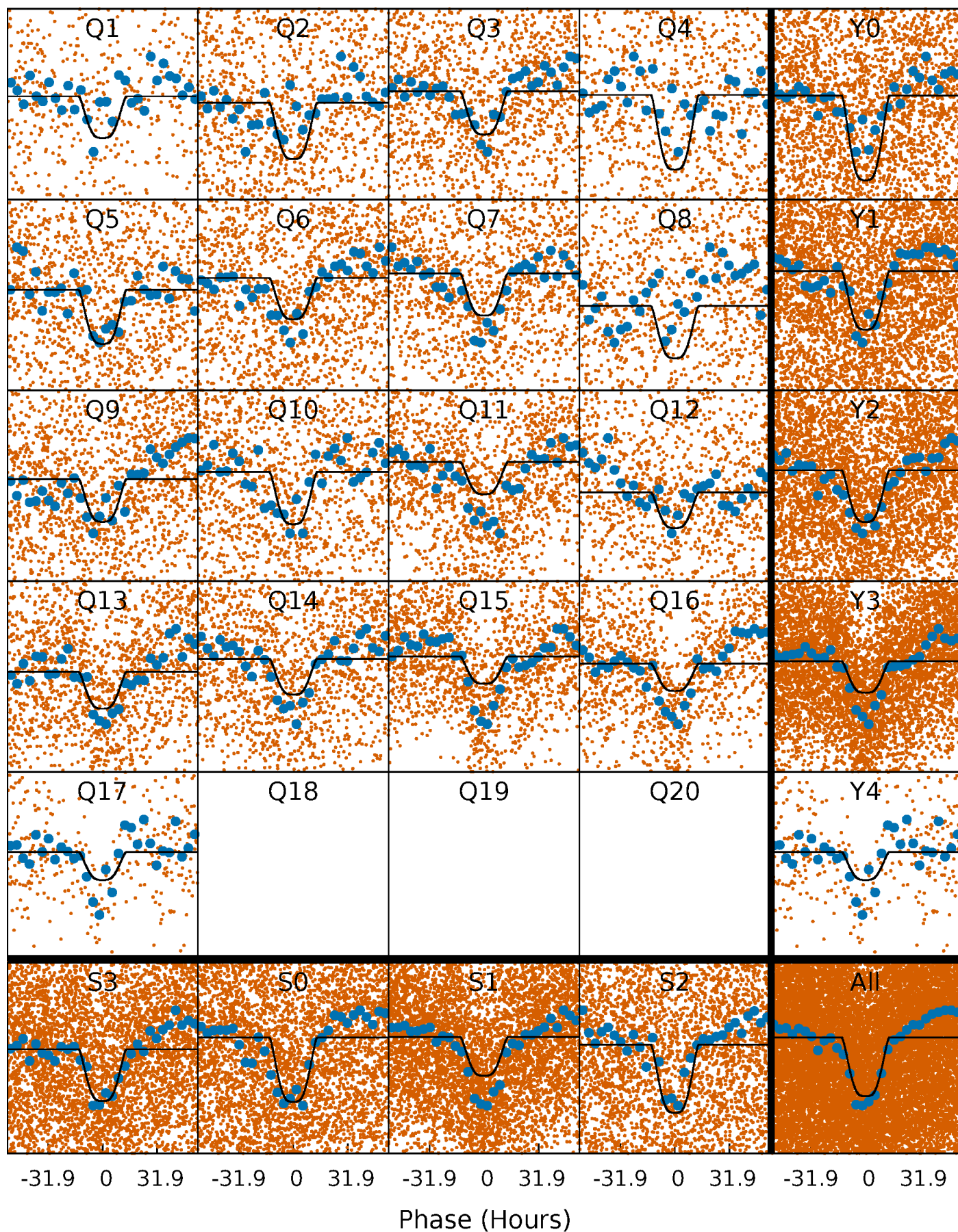
TCE 005471770-01 P= 12.425511 Days  $T_0=141.547073$  (BKJD)





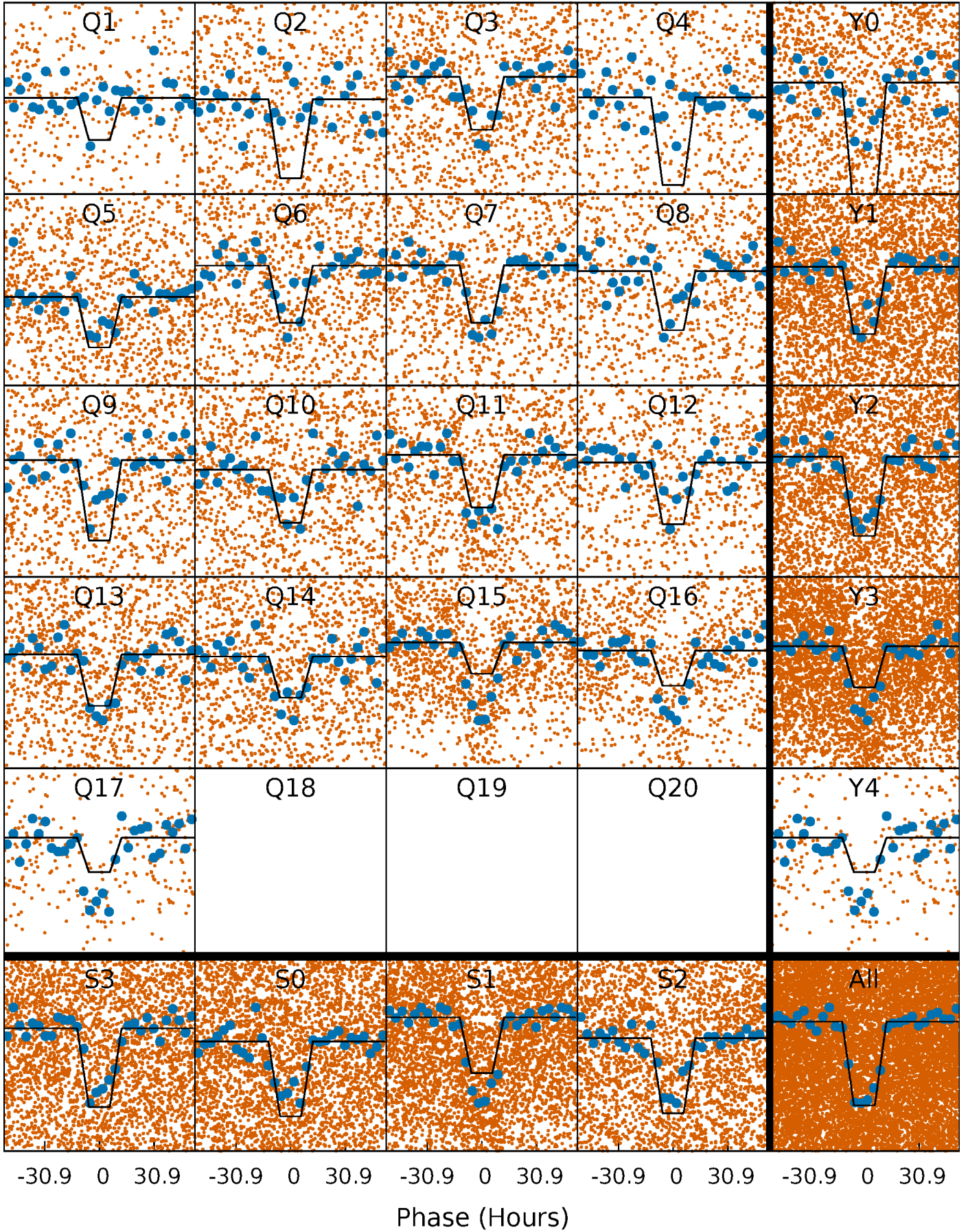
# DV Quarter-Phased Transit Curves

TCE 005471770-01 P= 12.425511 Days  $T_0=141.547073$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 005471770-01 P= 12.425672 Days  $T_0=141.535011$  (BKJD)

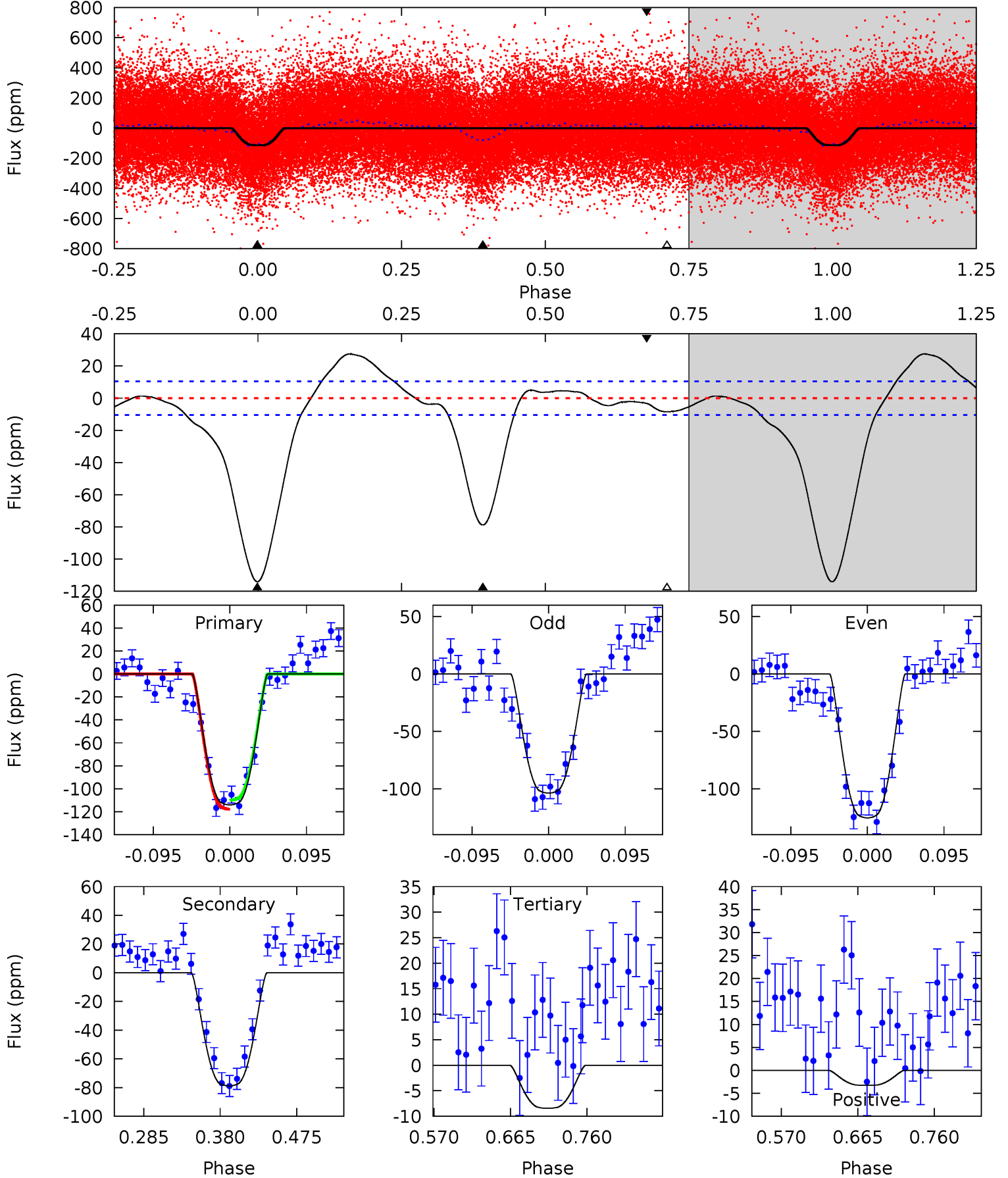




# DV Model-Shift Uniqueness Test

005471770-01, P = 12.425511 Days, E = 129.121562 Days

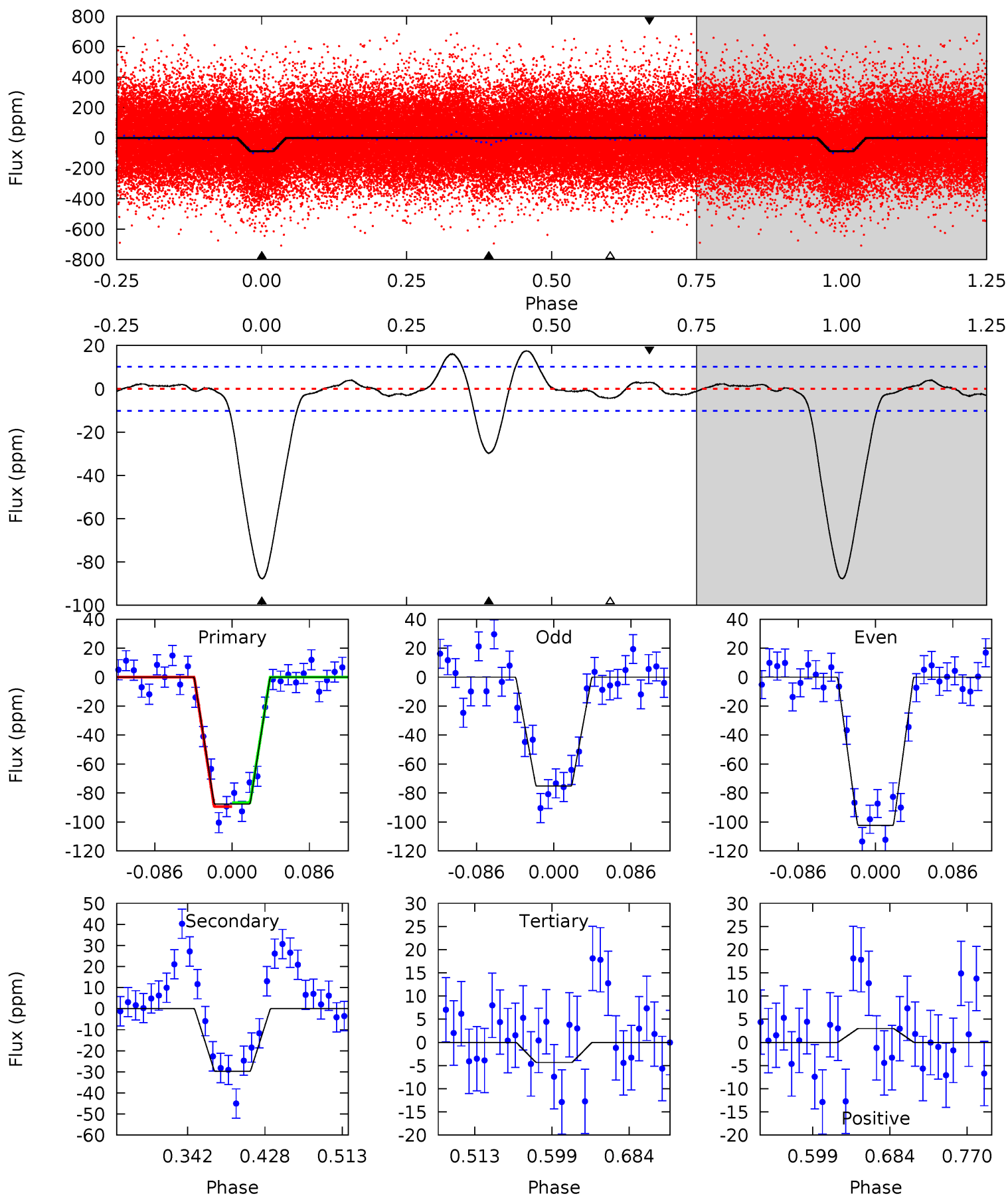
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
49.9	34.5	3.69	-1.43	4.58	1.67	4.60	46.2	51.3	30.8	35.9	4.74	1.10	0.19	1.70



# Alt Model-Shift Uniqueness Test

005471770-01, P = 12.425672 Days, E = 129.109339 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
39.4	13.4	1.95	1.34	4.60	1.72	1.06	37.5	38.1	11.4	12.0	6.12	1.01	0.17	0.61





### Stellar Parameters For KIC 005471770

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6367^{+177}_{-222}$	$4.181^{+0.246}_{-0.164}$	$-0.420^{+0.300}_{-0.300}$	$1.357^{+0.366}_{-0.366}$	$1.019^{+0.156}_{-0.128}$	$0.574^{+0.723}_{-0.281}$
	+3%/-3%	+6%/-4%	+71%/-71%	+27%/-27%	+15%/-13%	+126%/-49%
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 005471770-01 / KOI 6012.01

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-79 \pm 2$	$1.80^{+0.30}_{-0.28}$	$1398^{+104}_{-110}$	$5452^{+179}_{-200}$	$150^{+55}_{-36}$
Alt.	$-30 \pm 2$	$1.41^{+0.23}_{-0.22}$	$1399^{+99}_{-113}$	$4901^{+171}_{-193}$	$93^{+35}_{-24}$

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

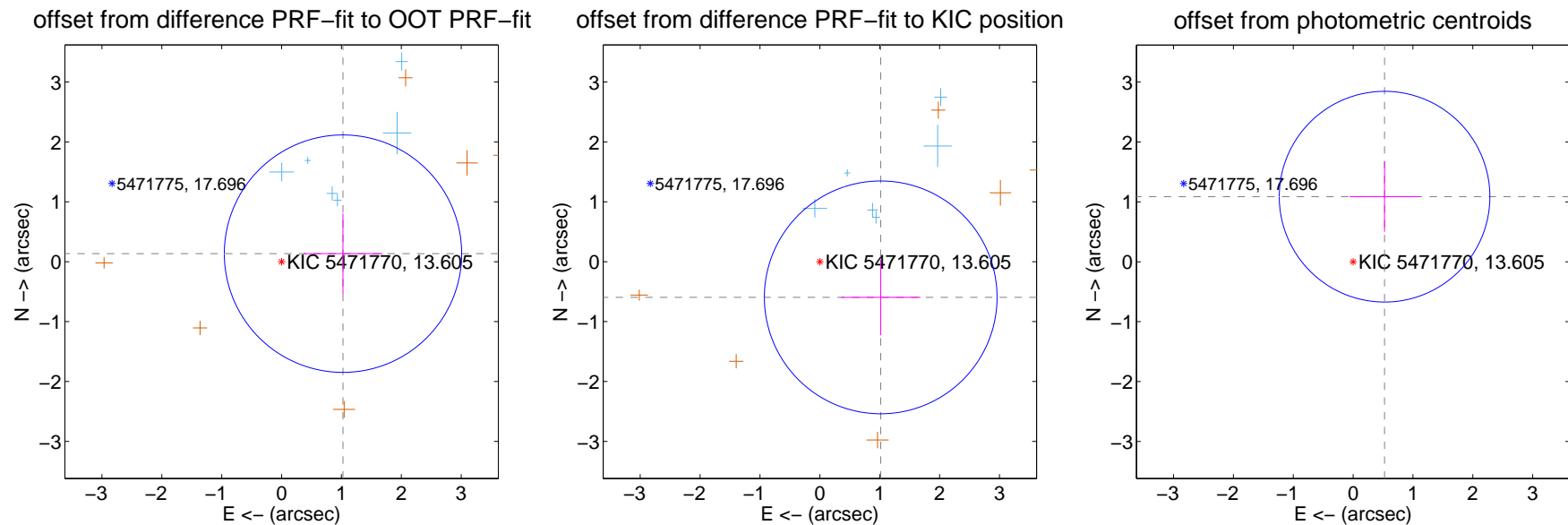
## DV Centroid Data

Supplemental centroid analysis for 005471770-01. Kepler magnitude: 13.61. Transit SNR 17.73

There are 6 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.52 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.035 \pm 0.661$	1.57	$-1.026 \pm 0.662$	$0.134 \pm 0.672$
PRF-fit source offset from KIC position	$1.178 \pm 0.648$	1.82	$-1.017 \pm 0.663$	$-0.596 \pm 0.633$
photometric centroid source offset	$1.21 \pm 0.59$	2.06	$-0.53 \pm 0.58$	$1.09 \pm 0.59$



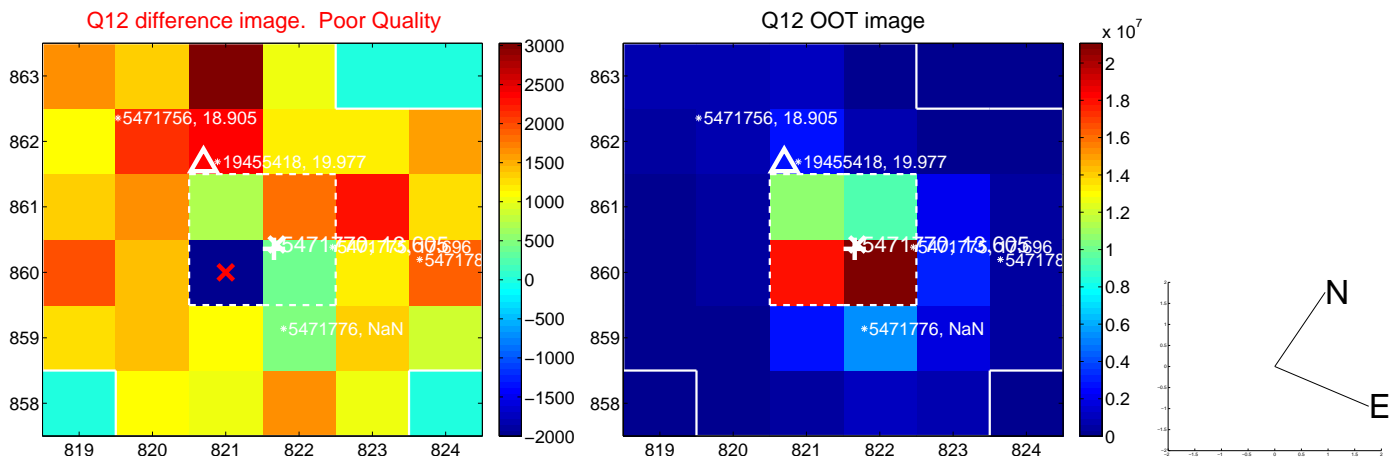
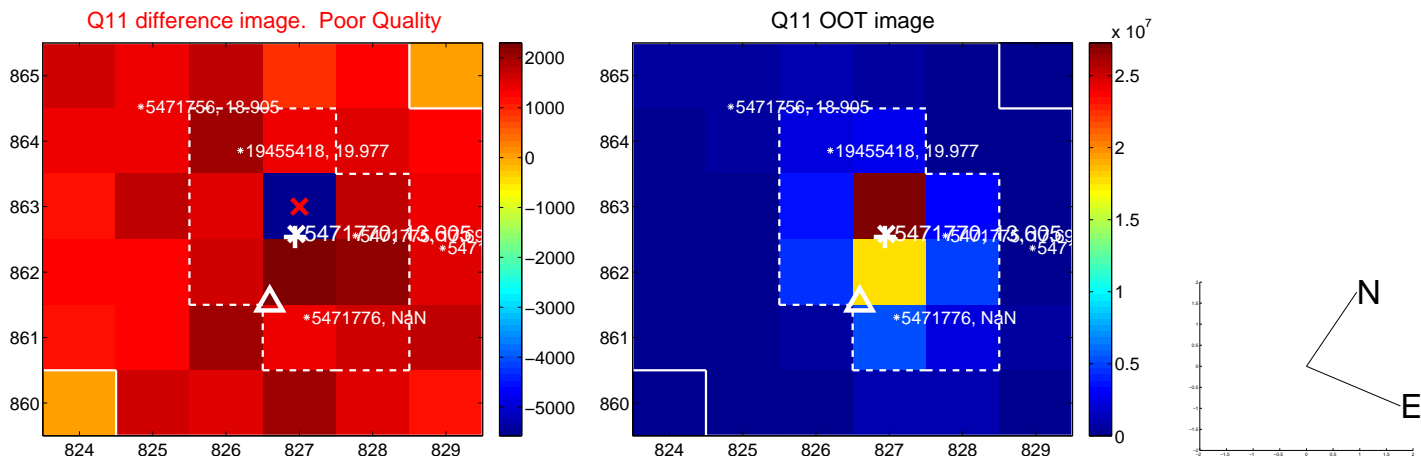
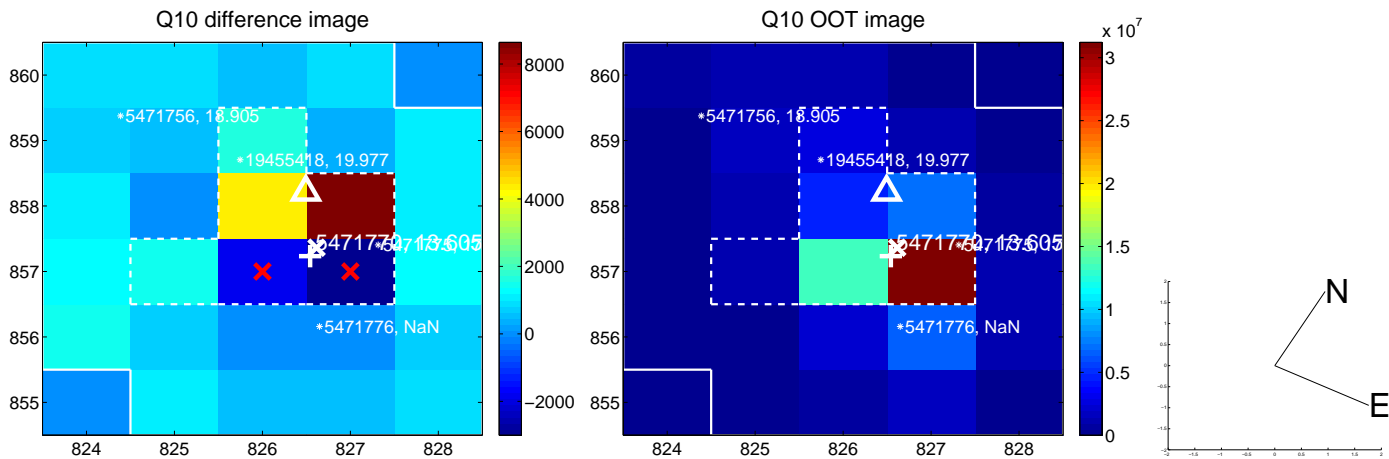
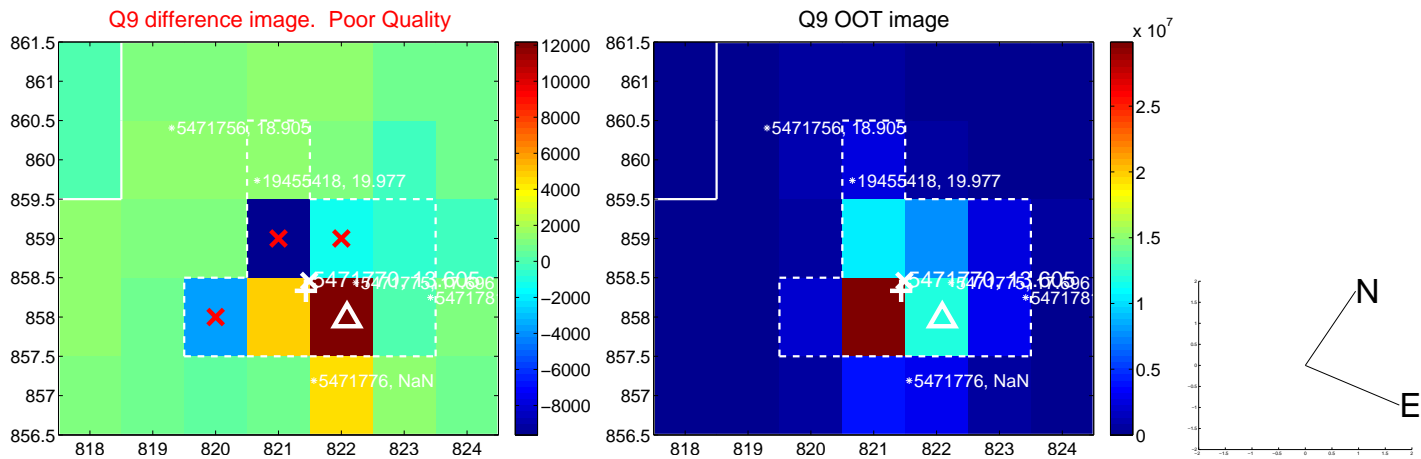
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



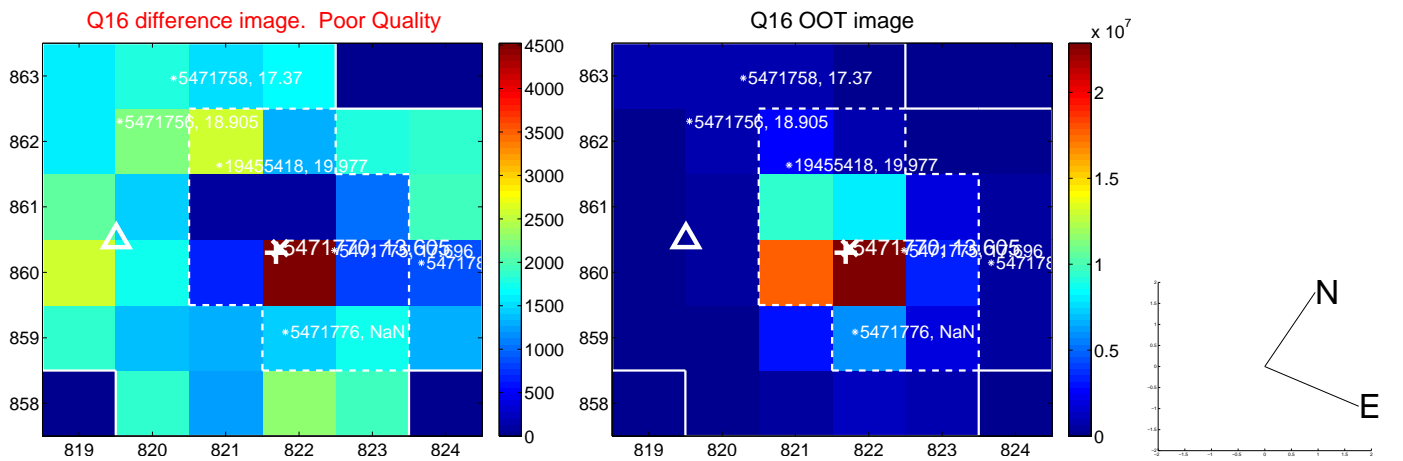
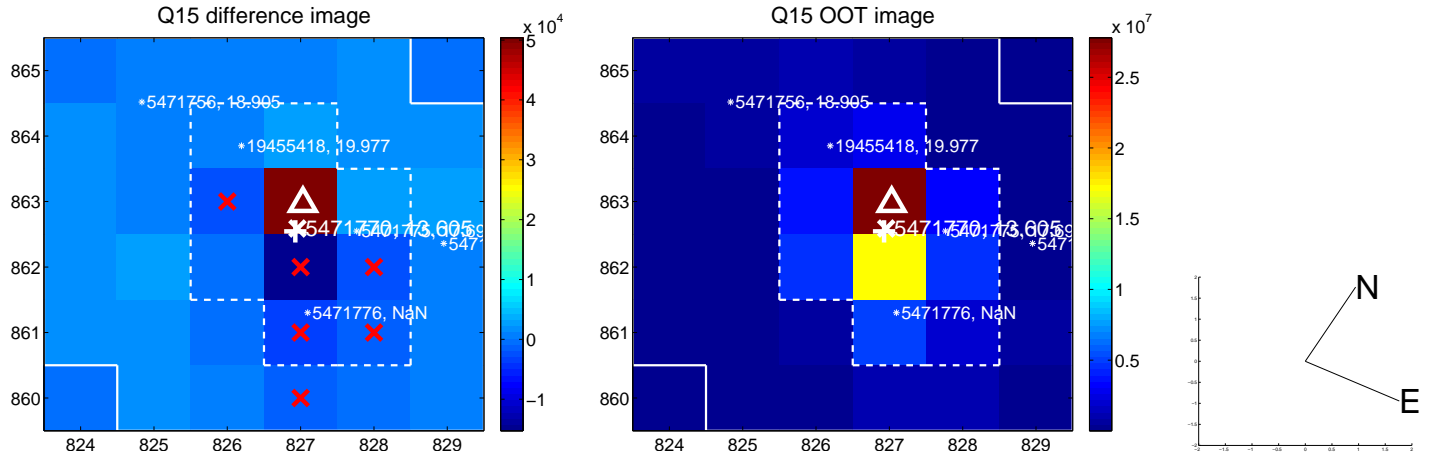
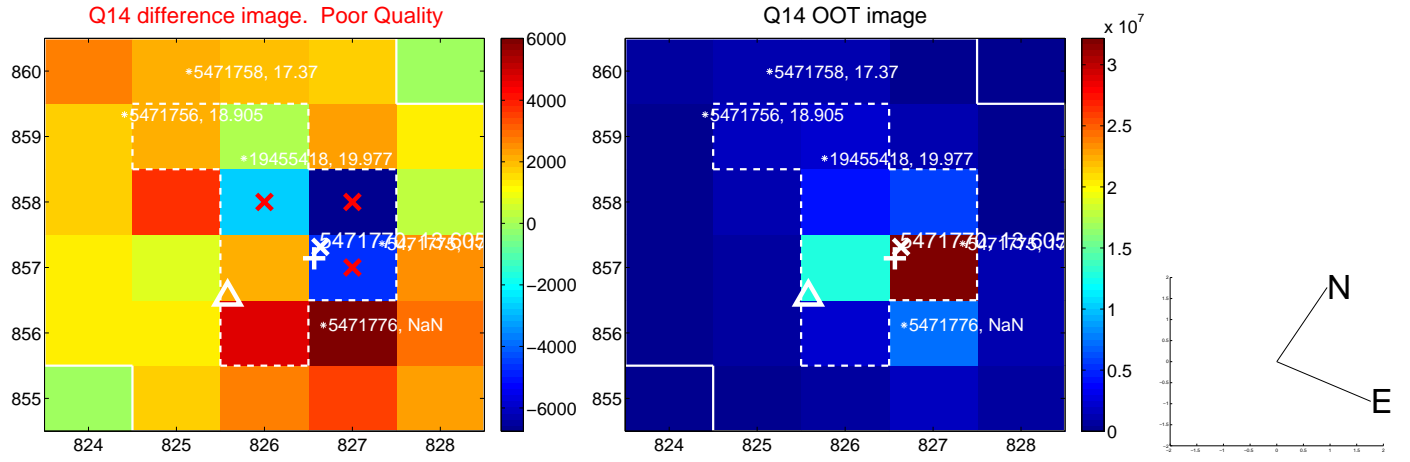
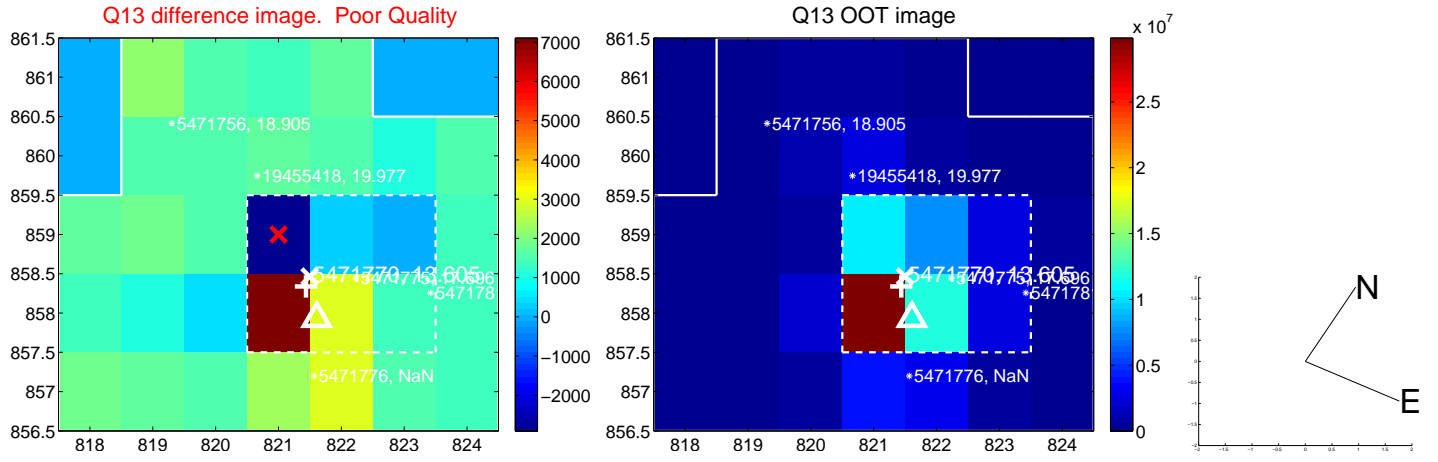




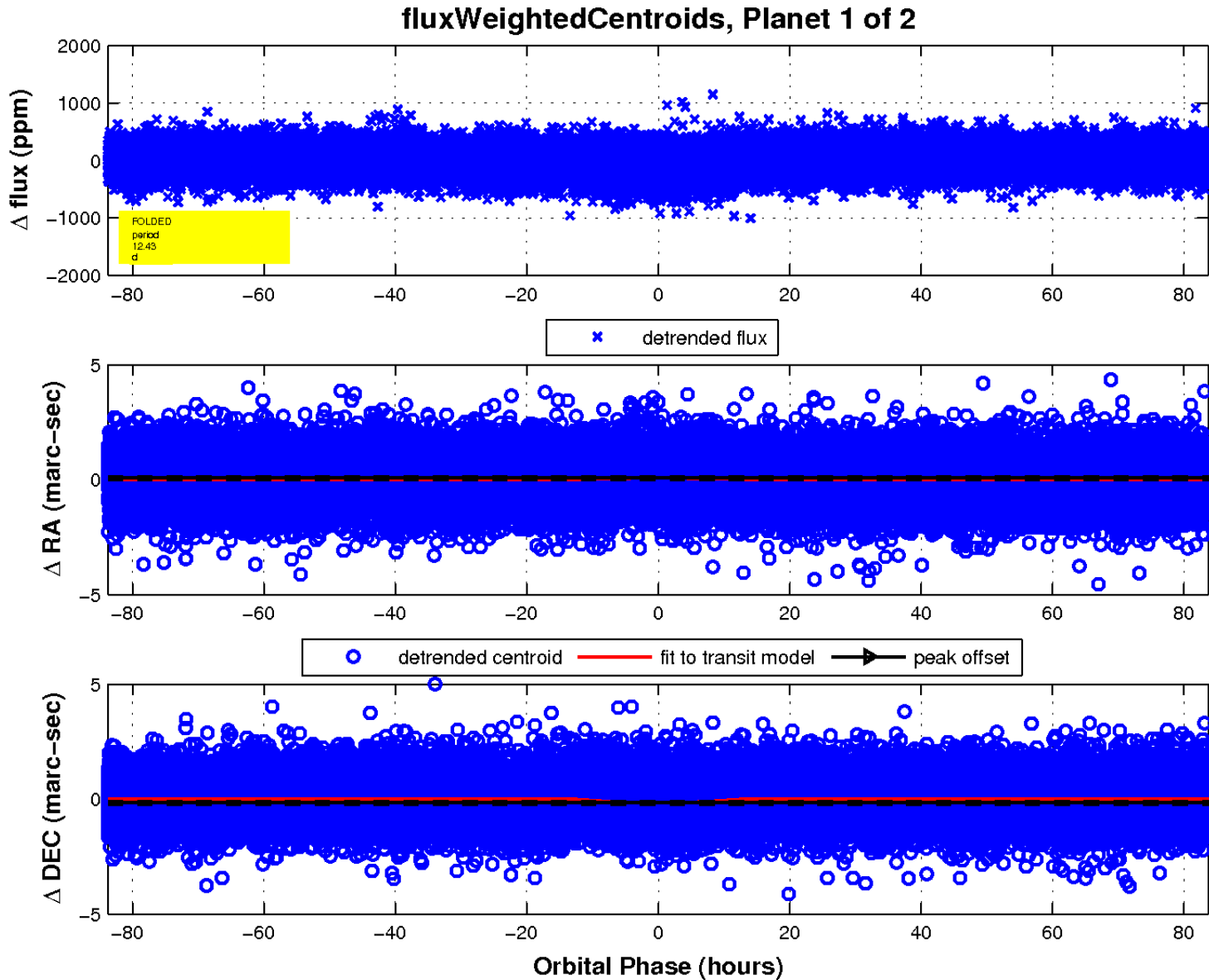
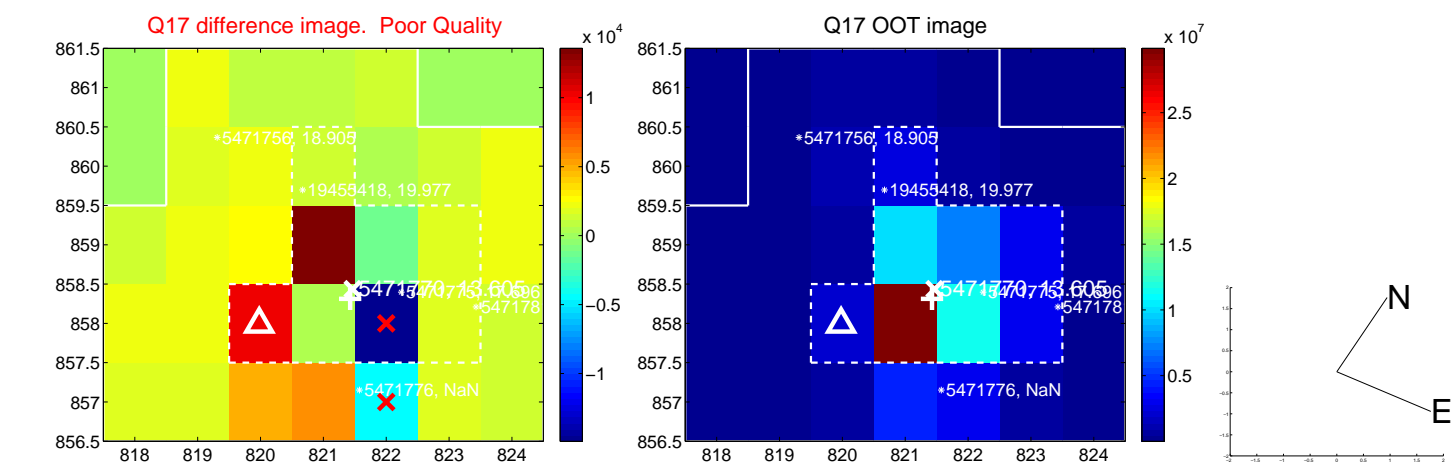
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

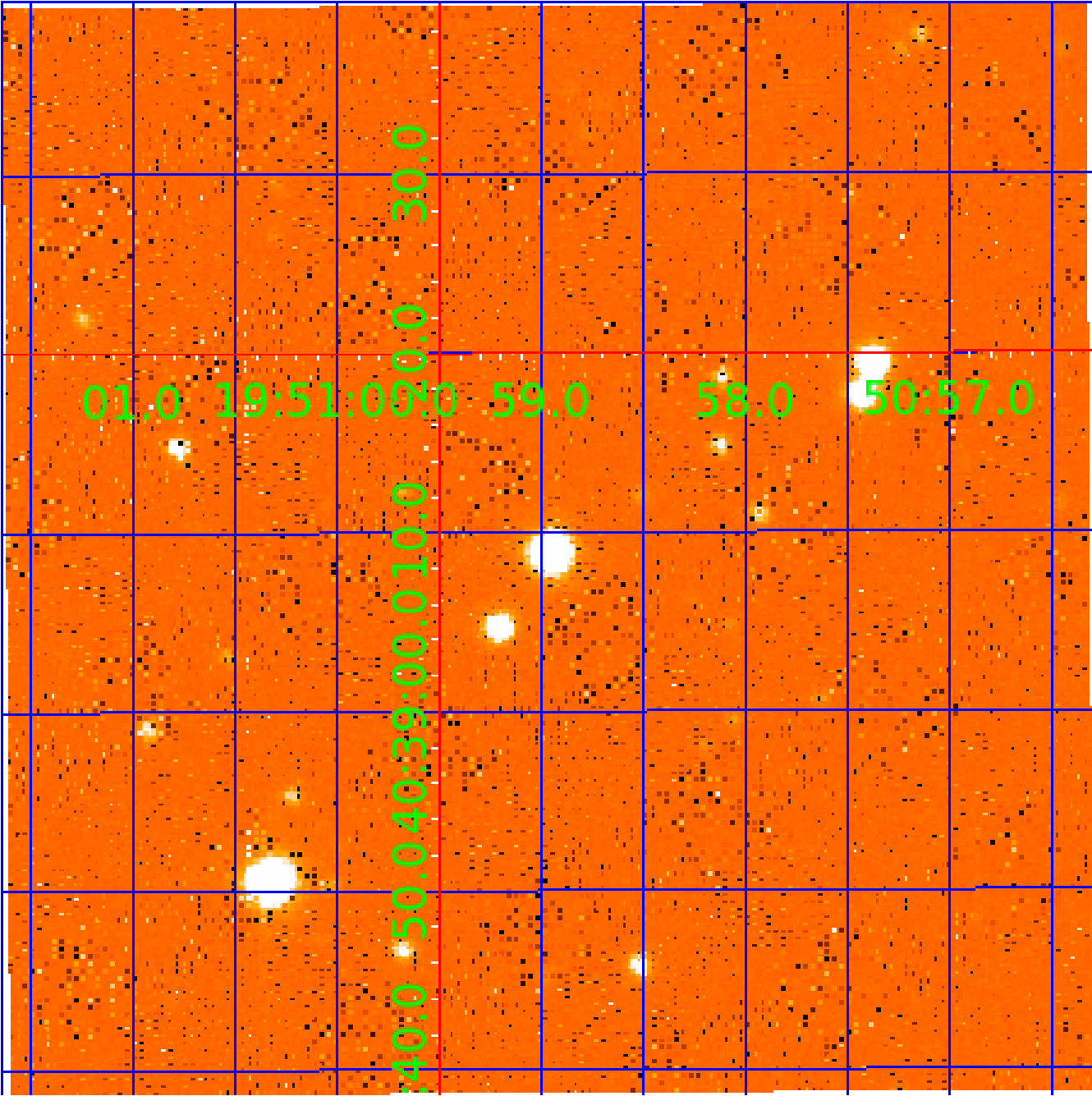


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 005471770

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005471770-01	OBS	6012.01	12.425511	141.547073	96.0	27.913	13.4	17.7	1.36	6367	1.81	242.81
005471770-02	OBS	No	12.426938	133.887165	92.5	28.536	13.4	17.4	1.36	6367	1.83	242.77

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005471770-01	OBS	FP	0.00	1	0	1	1	LPP_DV—HALO_GHOST—EPHEM_MATCH
005471770-02	OBS	FP	0.00	1	0	1	1	LPP_DV—SAME_NTL_PERIOD—CENT_KIC_POS—HALO_GHOST—EPHEM_MATCH

**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 005471770-02

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	$\sigma_P$	$\sigma_T$
005471770-02	5471770	V380-Cyg-sec	5385723	1:1	311.0	13	77	5.77	13.60	1402.60	Direct-PRF	0	4.17	1.75

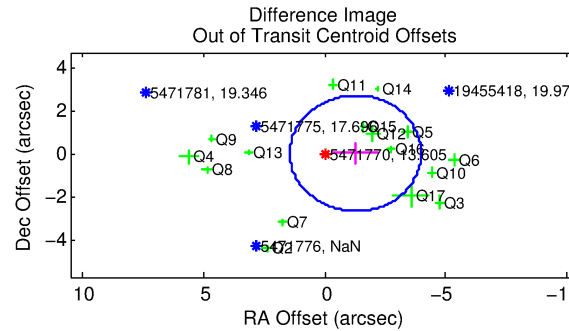
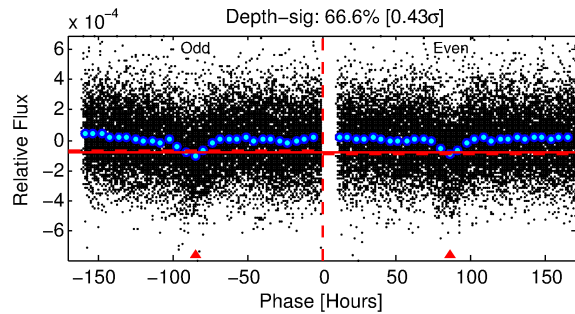
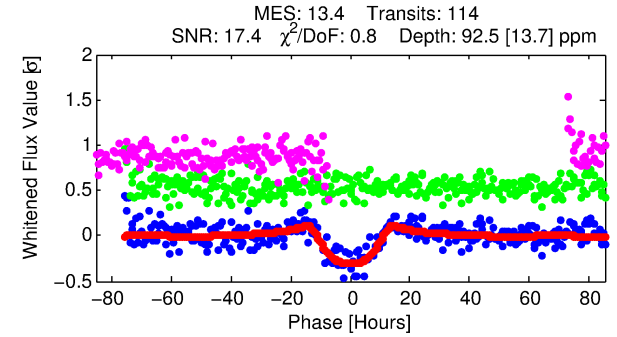
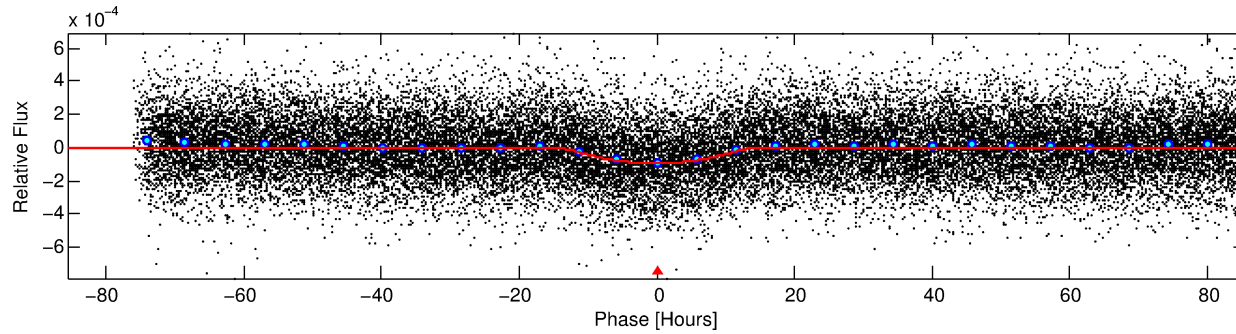
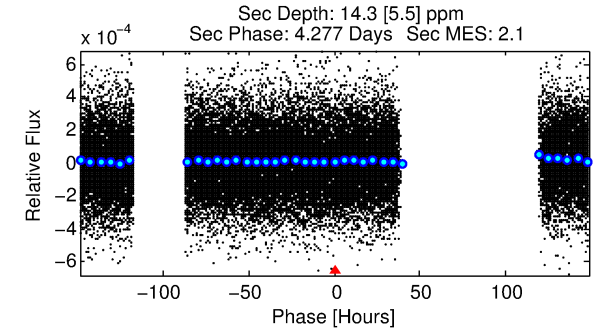
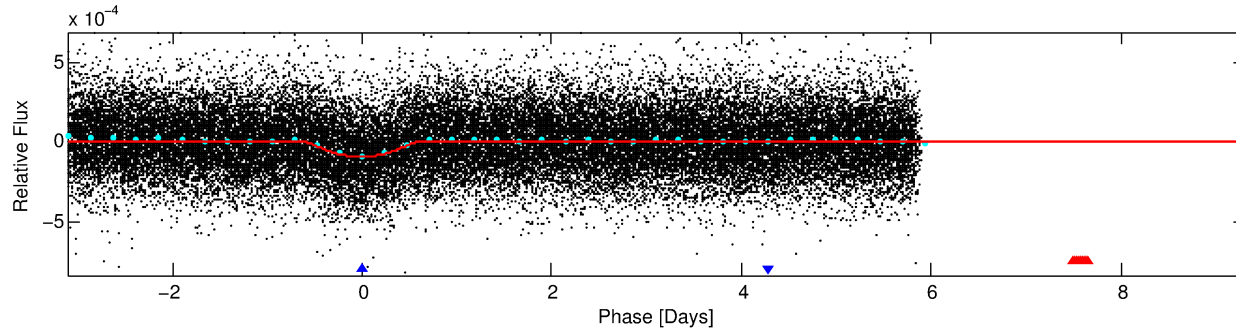
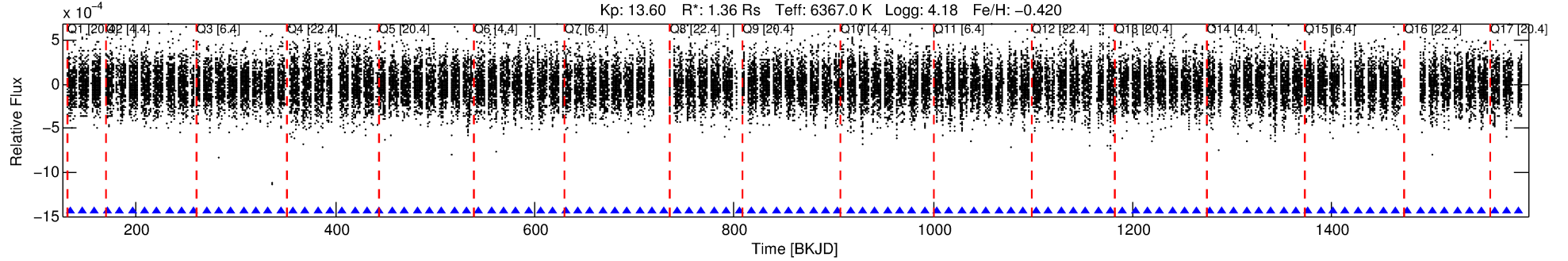
**Notes:**  $P_1:P_2$  is the period ratio. Dist is the distance in arcseconds.  $\Delta$ Row and  $\Delta$ Col are the number of pixels apart in row and column.  $m_2$  and  $m_1$  are the magnitudes of the parent and child.  $D_2/D_1$  is the parent's transit depth divided by the child's.  $\sigma_P$  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: 5471770 Candidate: 2 of 2 Period: 12.427 d

KOI: K06012 Corr: No Ephemeris Match

Kp: 13.60 R\*: 1.36 Rs Teff: 6367.0 K Logg: 4.18 Fe/H: -0.420



## DV Fit Results:

Period = 12.42694 [0.00043] d  
Epoch = 133.8872 [0.0269] BKJD  
Rp/R\* = 0.0123 [0.0014]  
a/R\* = 1.23 [0.04]  
b = 0.99 [0.00]  
Seff = 242.77 [107.04]  
Teq = 1007 [111] K  
Rp = 1.83 [0.54] Re  
a = 0.1057 [0.0276] AU  
Ag = 26.30 [16.14] [1.57σ]  
Teffp = 3524 [414] K [5.87σ]

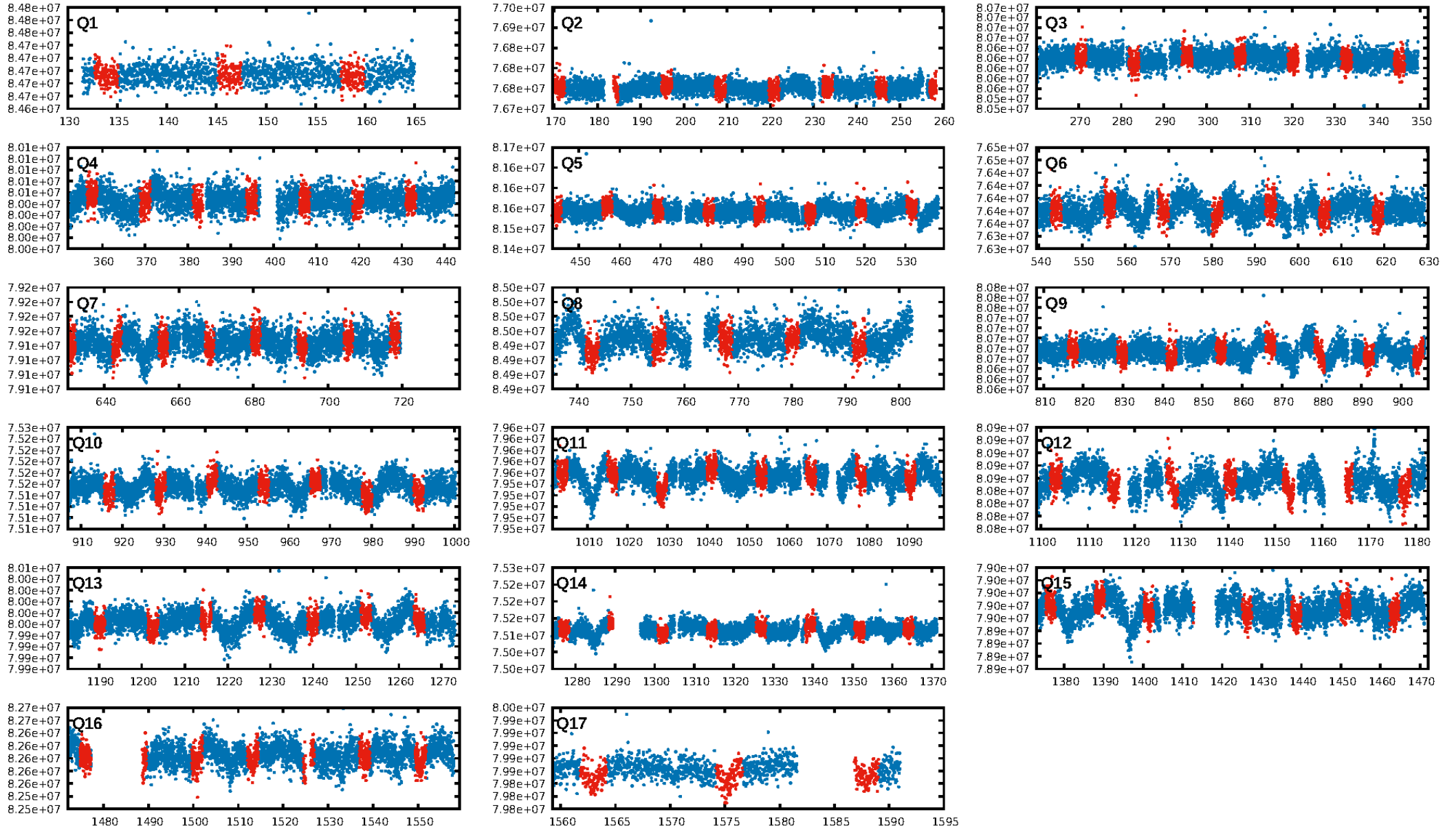
## DV Diagnostic Results:

ShortPeriod-sig: 0.1% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 89.3%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 6.03e-46  
RollingBand-fgt: 1.00 [108/108]  
GhostDiagnostic-chr: 0.1672  
Centroid-sig: 0.1%  
Centroid-so: 0.614 arcsec [1.00σ]  
OotOffset-rm: 1.271 arcsec [1.41σ]  
KicOffset-rm: 1.285 arcsec [1.57σ]  
OotOffset-st: 4/4/4/4 [16]  
KicOffset-st: 4/4/4/4 [16]  
DiffImageQuality-fgm: 0.25 [4/16]  
DiffImageOverlap-fno: 1.00 [17/17]

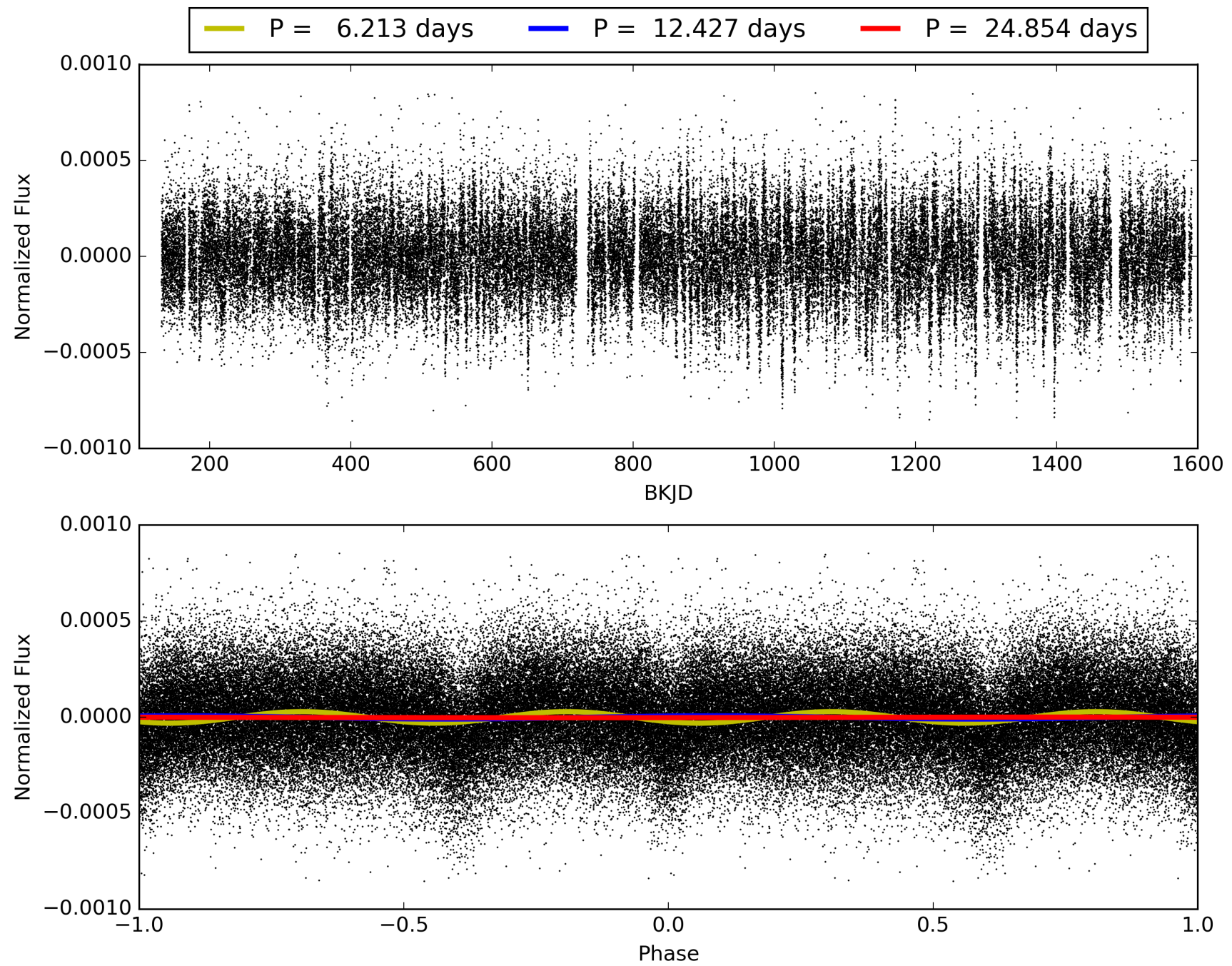
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 14:00:04 Z

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

# TCE 005471770-02, PDC Light Curves



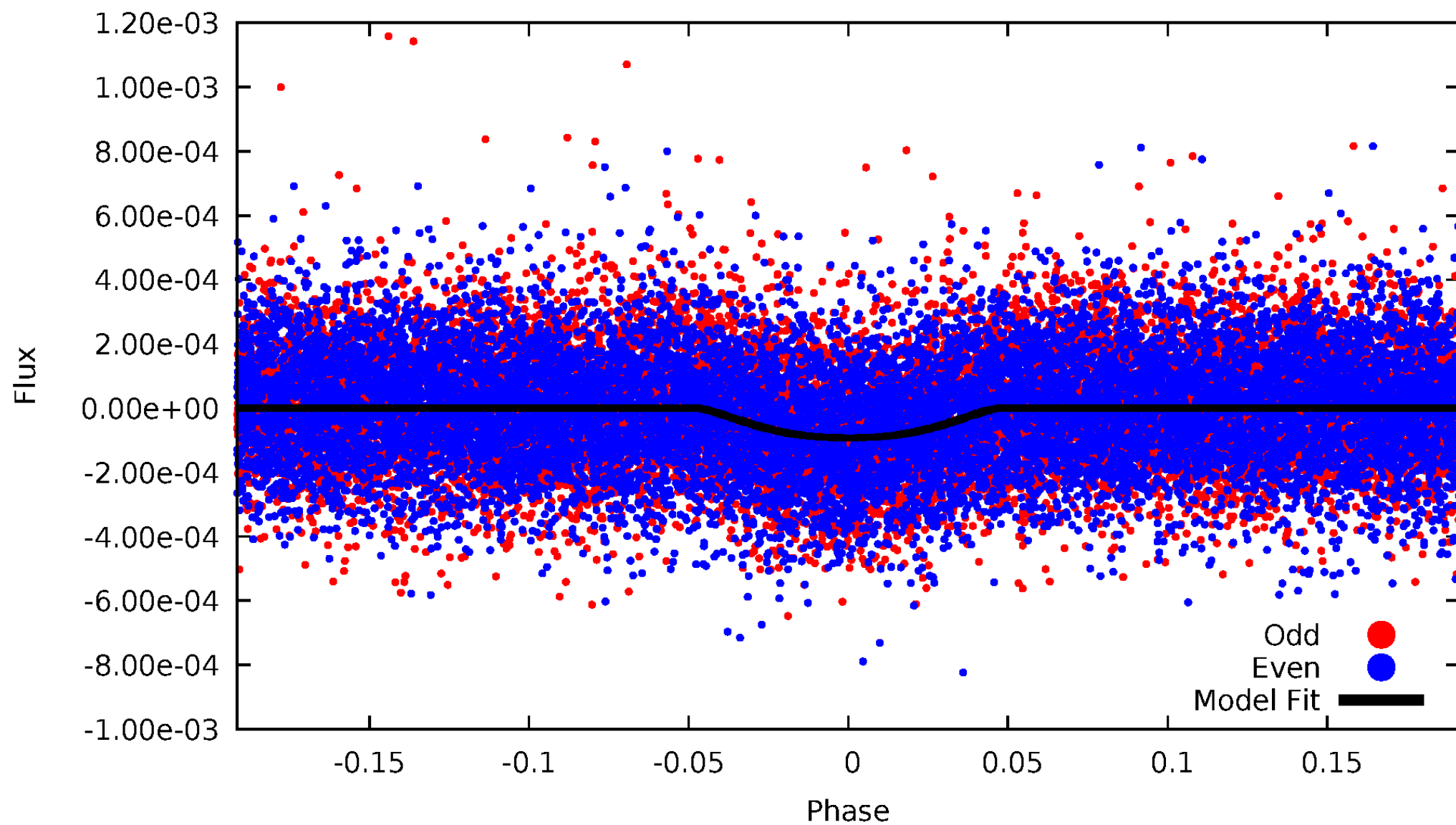
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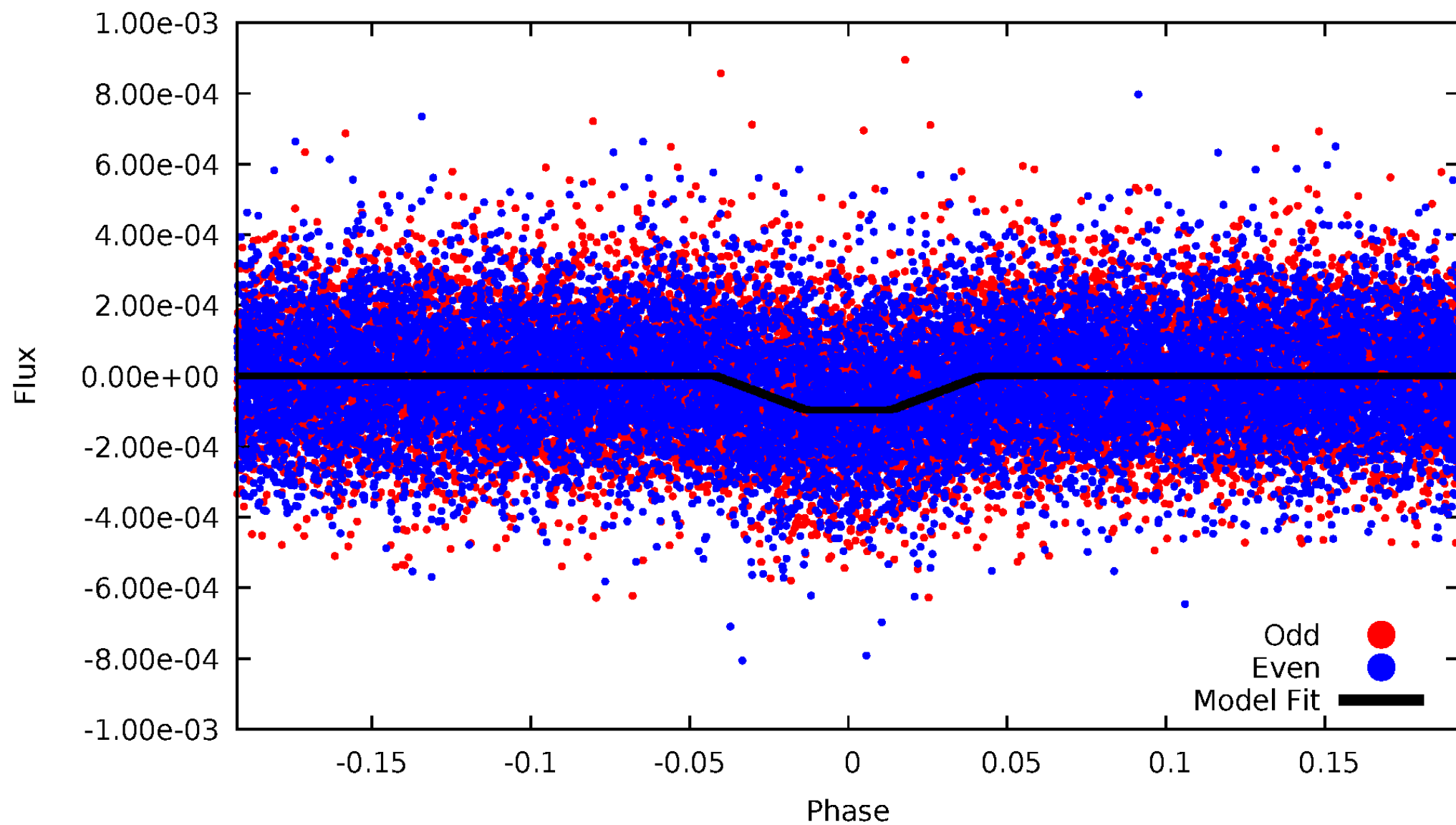
# DV Odd/Even

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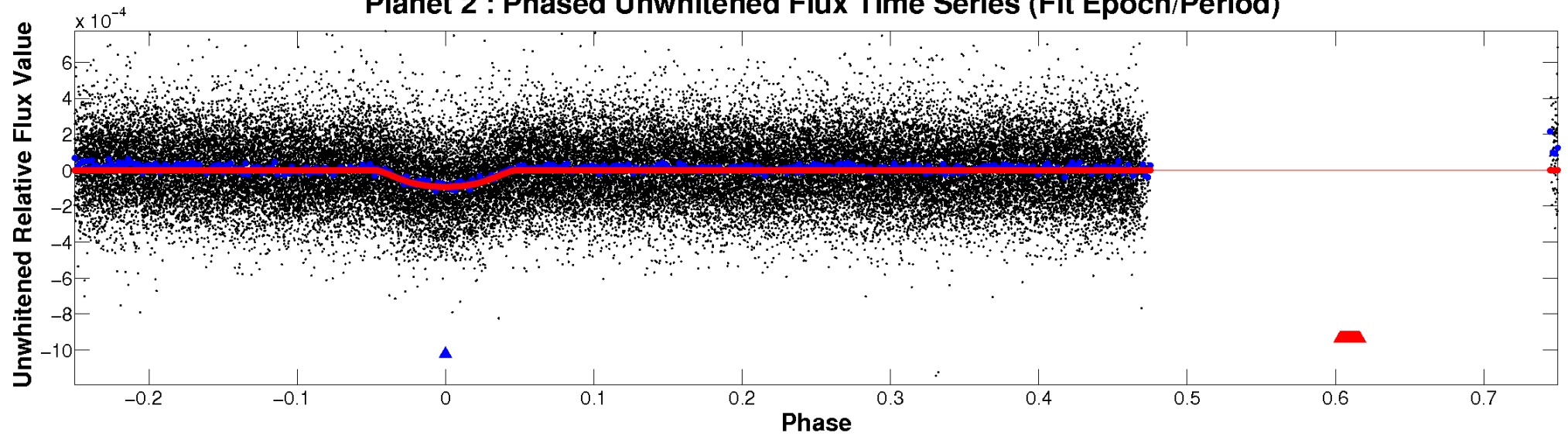
# ALT Odd/Even

TCE 005471770-02

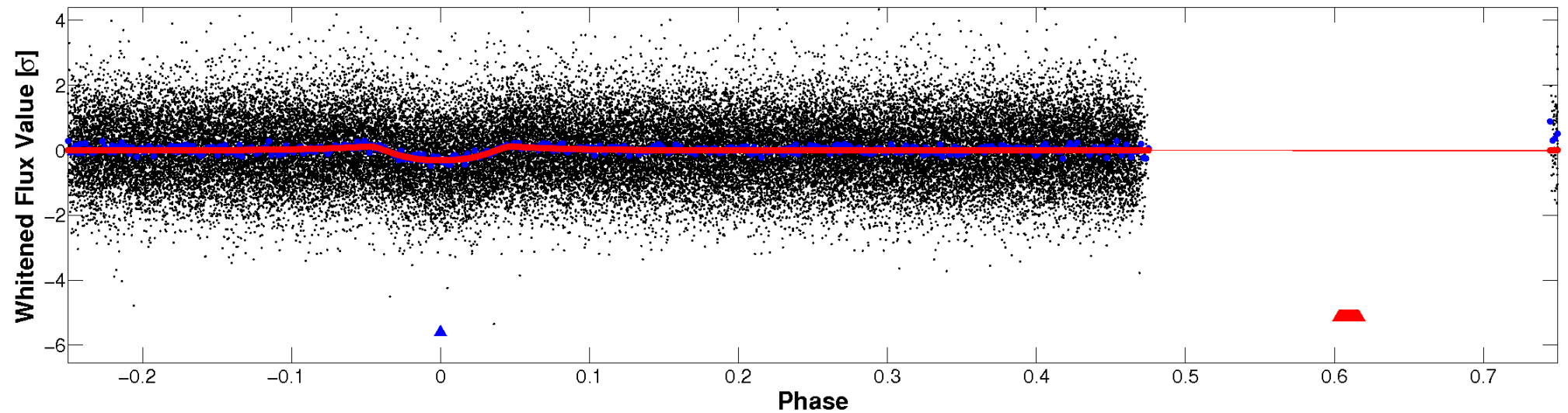


# Non-Whitened Vs. Whitened Light Curve

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

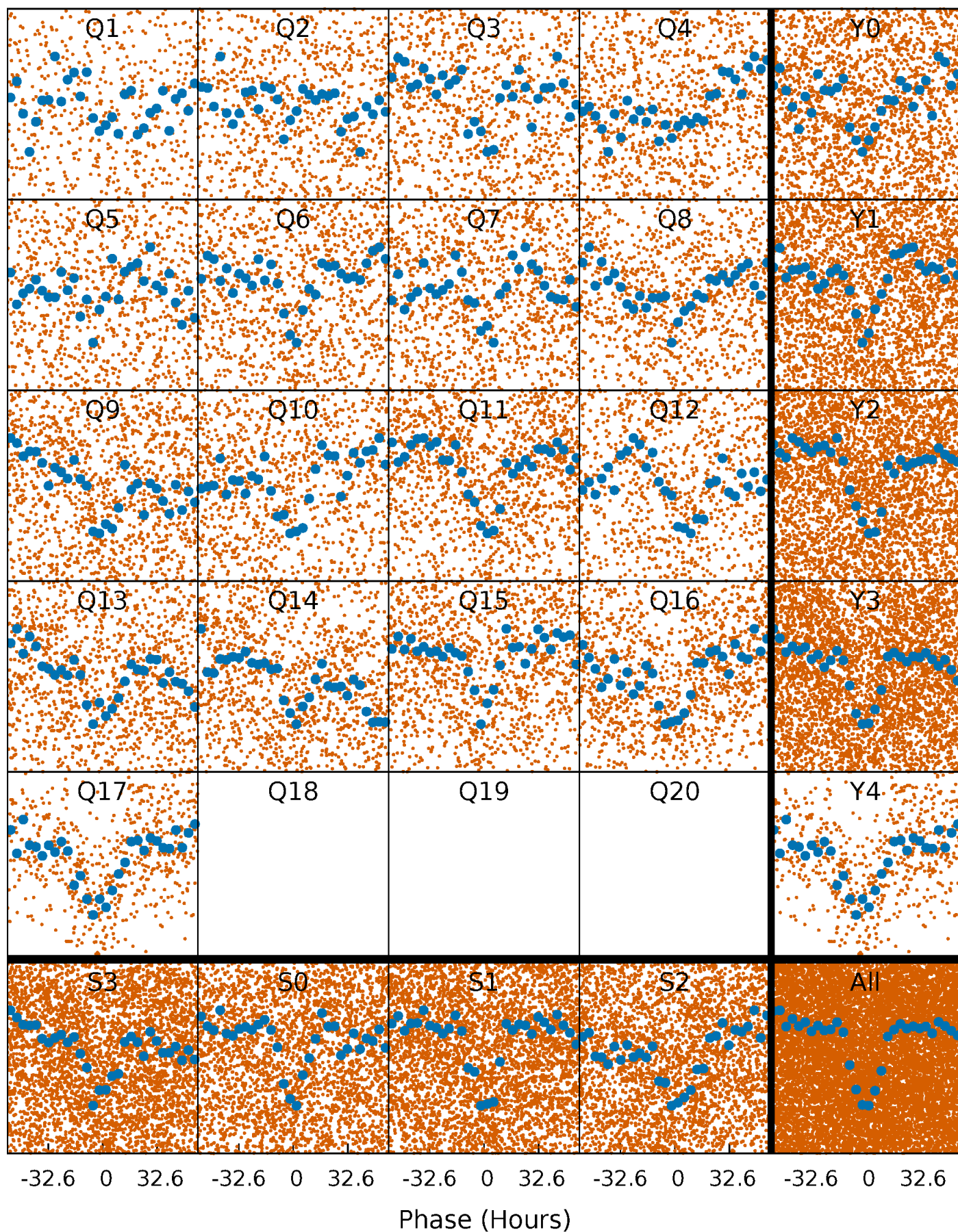


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

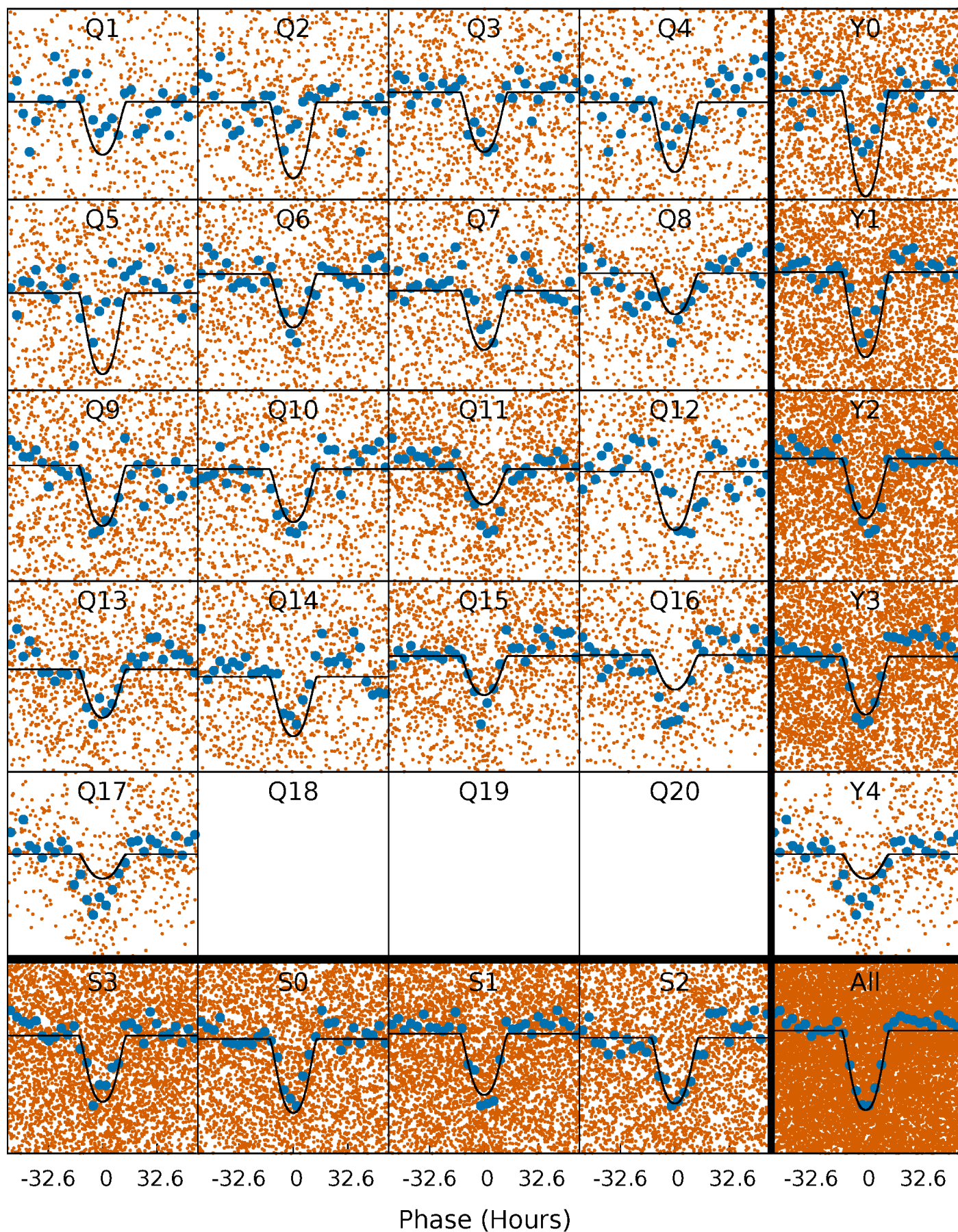
TCE 005471770-02 P= 12.426938 Days  $T_0=133.887165$  (BKJD)





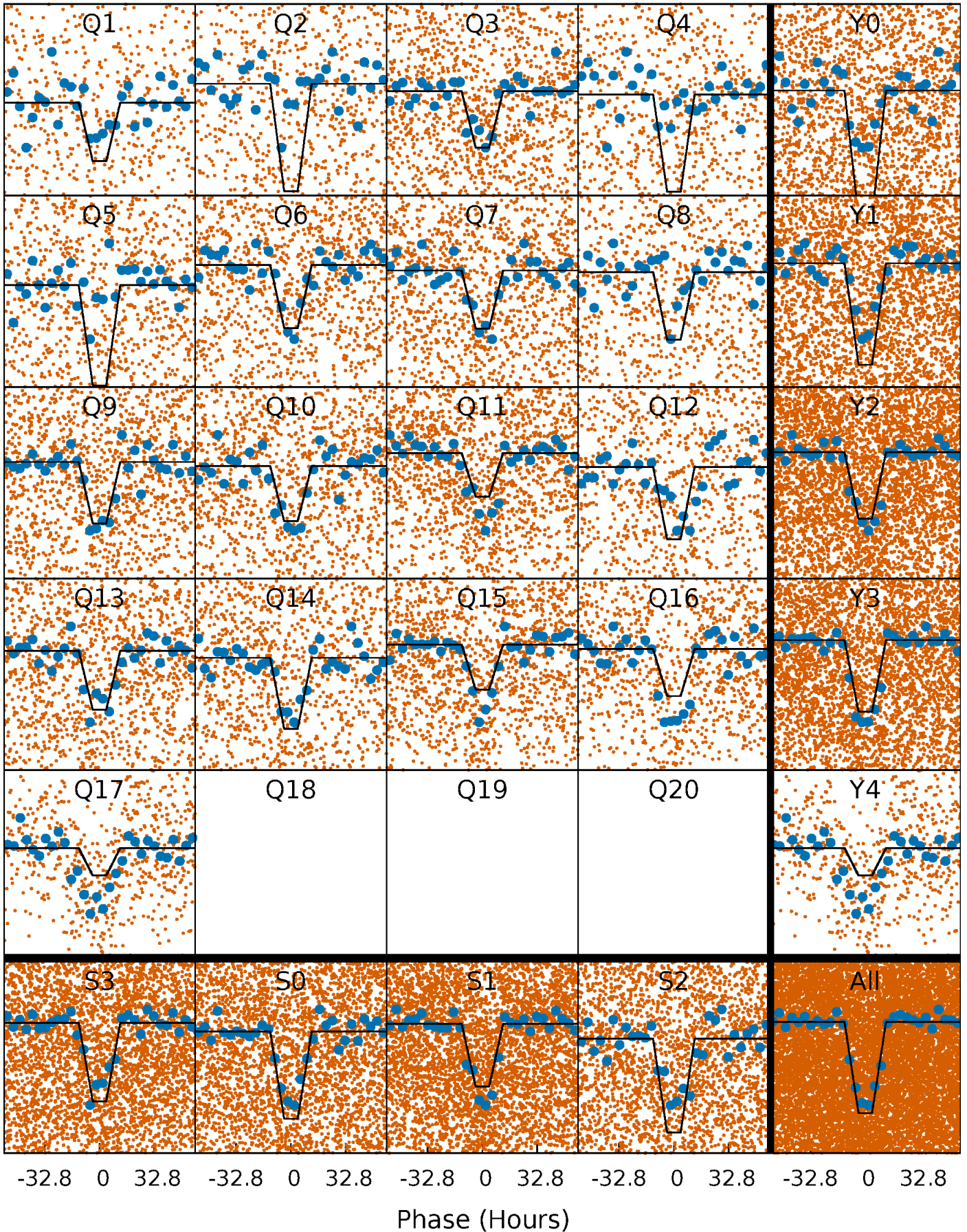
# DV Quarter-Phased Transit Curves

TCE 005471770-02 P= 12.426938 Days  $T_0=133.887165$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 005471770-02 P= 12.426732 Days  $T_0=133.896603$  (BKJD)

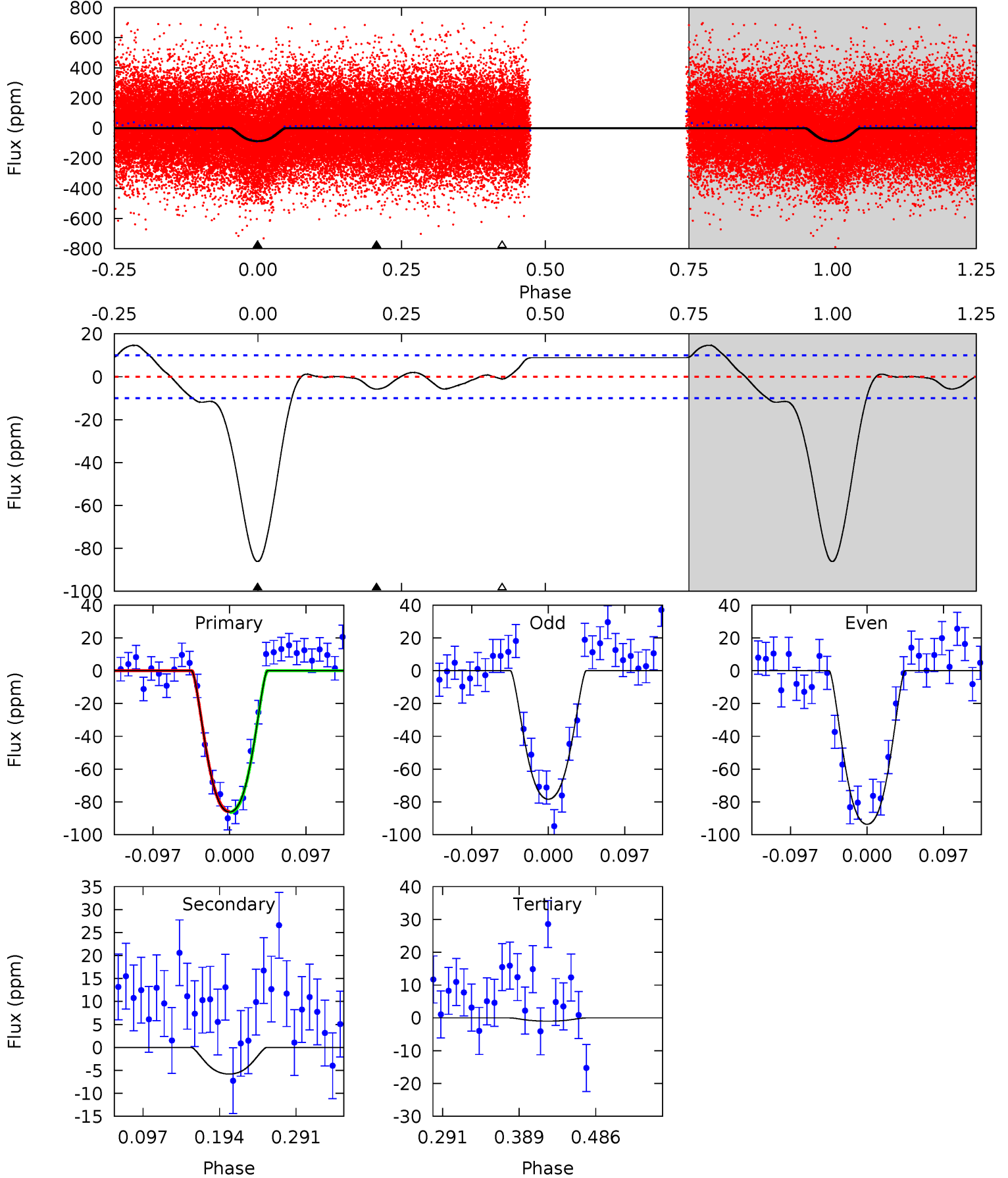




# DV Model-Shift Uniqueness Test

005471770-02,  $P = 12.426938$  Days,  $E = 121.460227$  Days

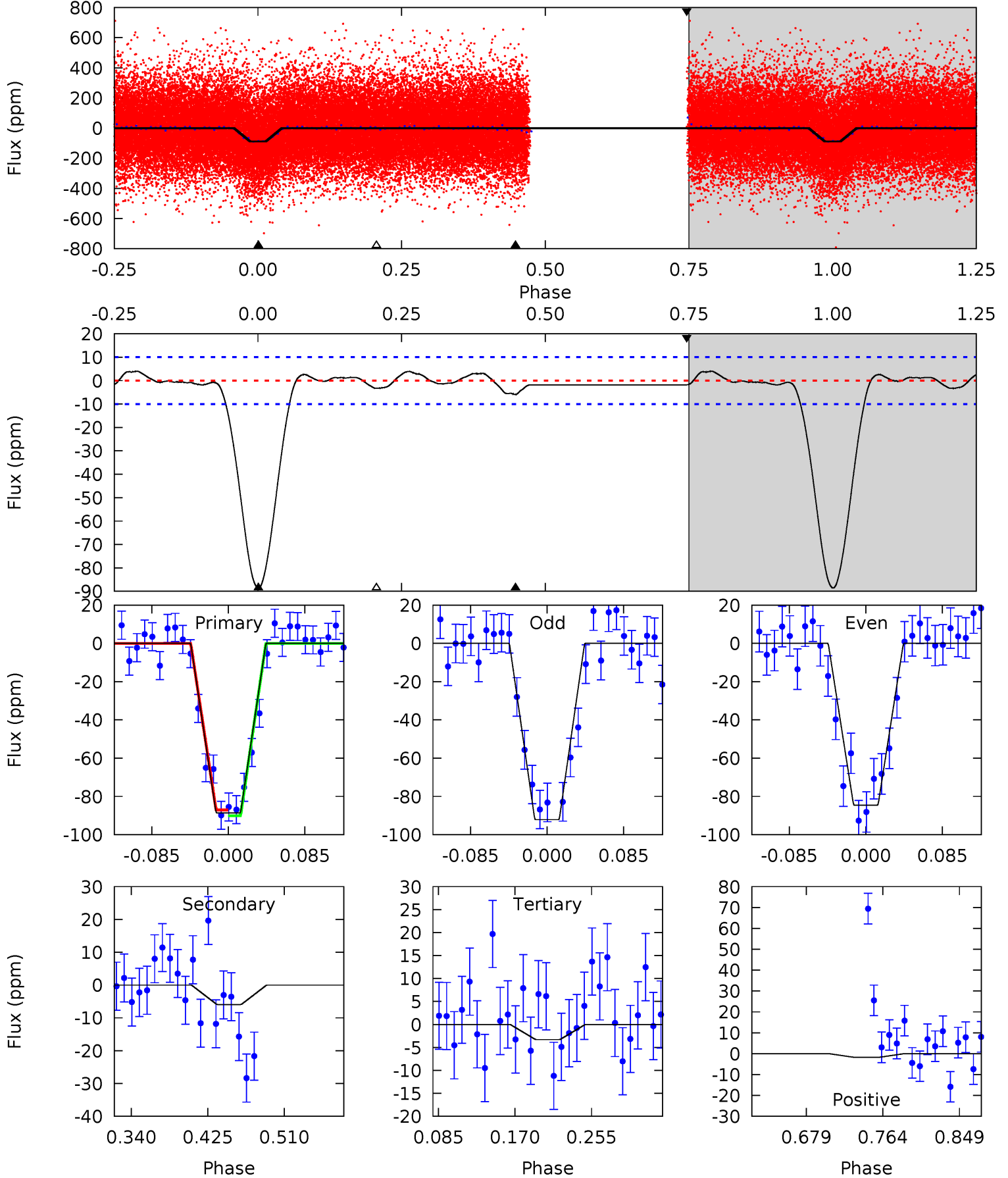
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
39.4	2.65	0.46	0	4.57	1.66	3.19	38.9	39.4	2.19	2.65	3.51	1.01	0.15	0.11



# Alt Model-Shift Uniqueness Test

005471770-02, P = 12.426732 Days, E = 121.469871 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
40.6	2.71	1.51	-0.81	4.60	1.72	0.85	39.1	41.4	1.20	3.52	1.73	1.05	0.04	0.69



### Stellar Parameters For KIC 005471770

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6367^{+177}_{-222}$	$4.181^{+0.246}_{-0.164}$	$-0.420^{+0.300}_{-0.300}$	$1.357^{+0.366}_{-0.366}$	$1.019^{+0.156}_{-0.128}$	$0.574^{+0.723}_{-0.281}$
	+3%/-3%	+6%/-4%	+71%/-71%	+27%/-27%	+15%/-13%	+126%/-49%
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 005471770-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-6 \pm 2$	$1.82^{+0.35}_{-0.33}$	$1392^{+108}_{-105}$	$3296^{+247}_{-258}$	$10^{+8}_{-4}$
Alt.	$-6 \pm 2$	$1.43^{+0.33}_{-0.29}$	$1401^{+108}_{-120}$	$3591^{+310}_{-289}$	$18^{+13}_{-8}$

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

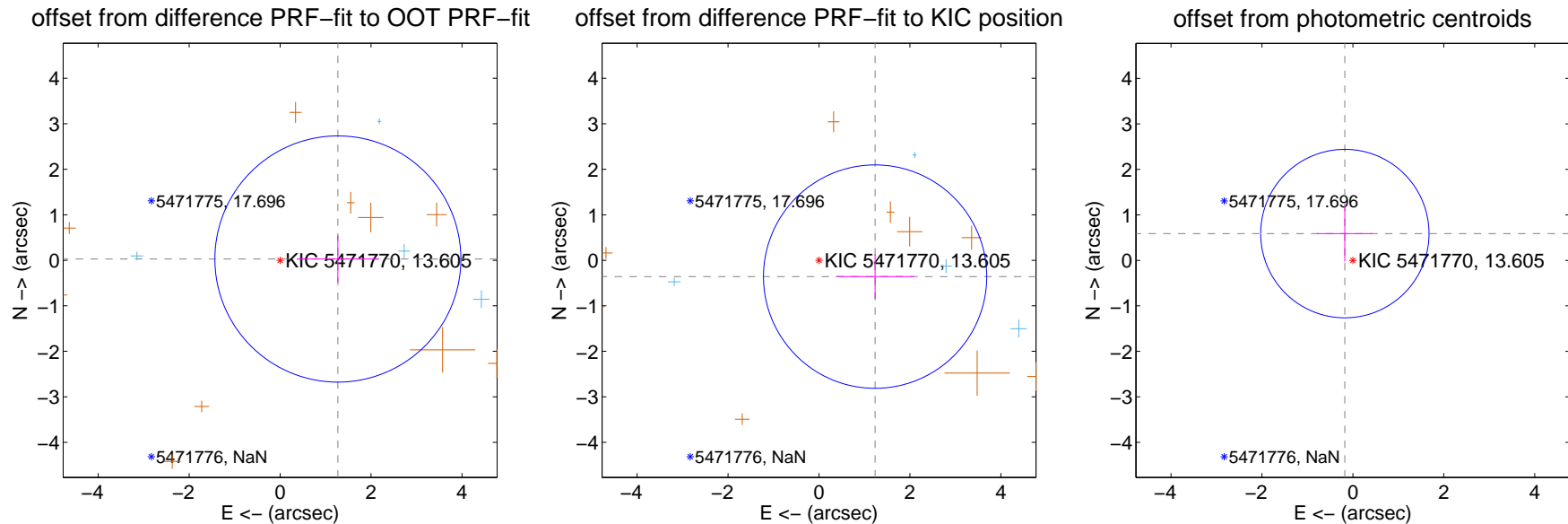
## DV Centroid Data

Supplemental centroid analysis for 005471770-02. Kepler magnitude: 13.61. Transit SNR 17.41

There are 4 quarters with good PRF difference image offsets

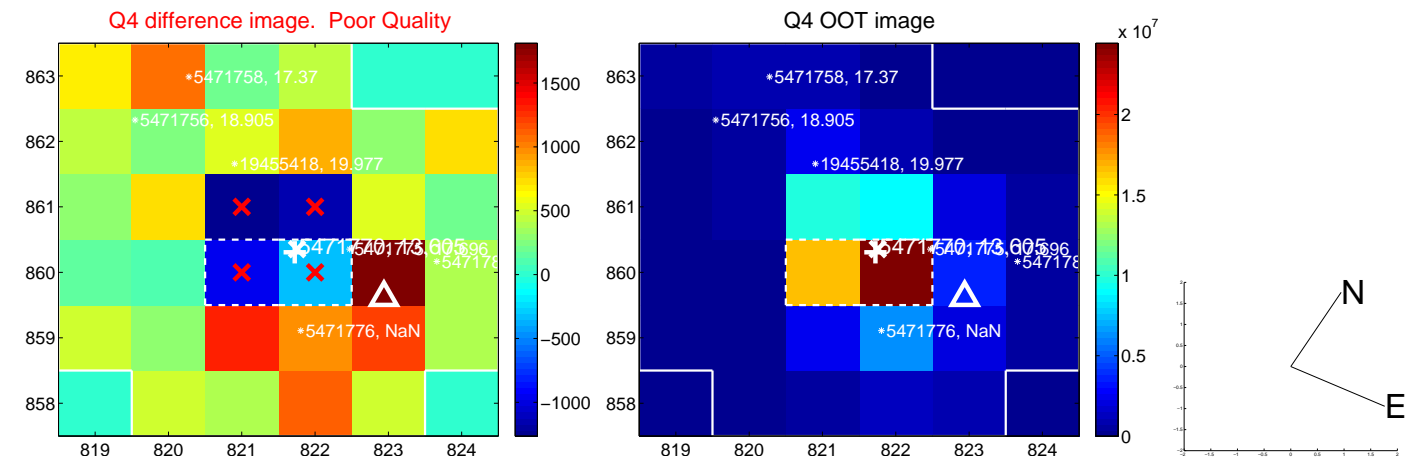
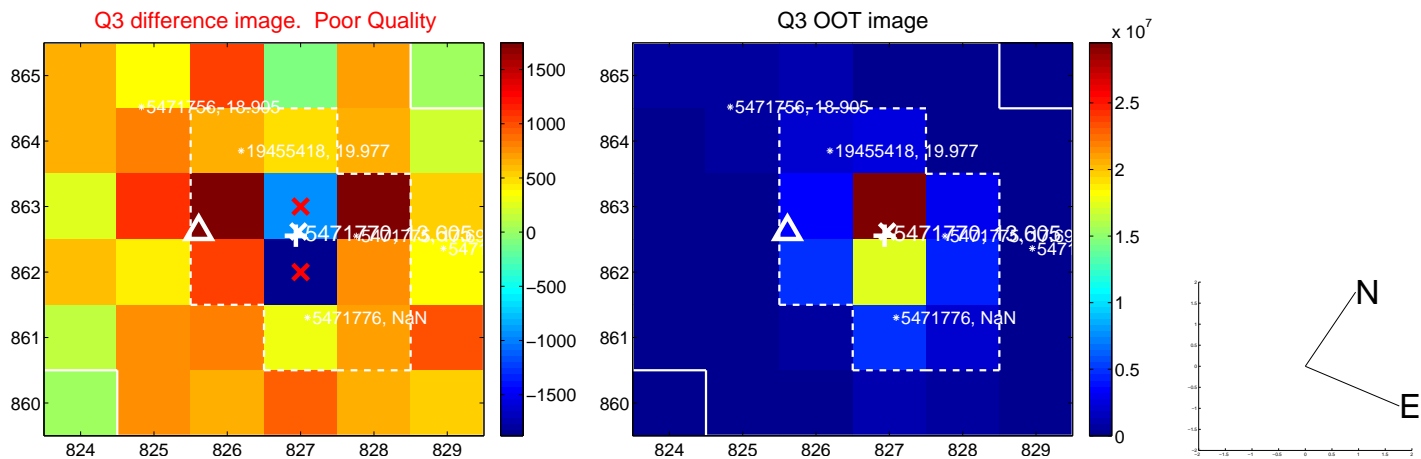
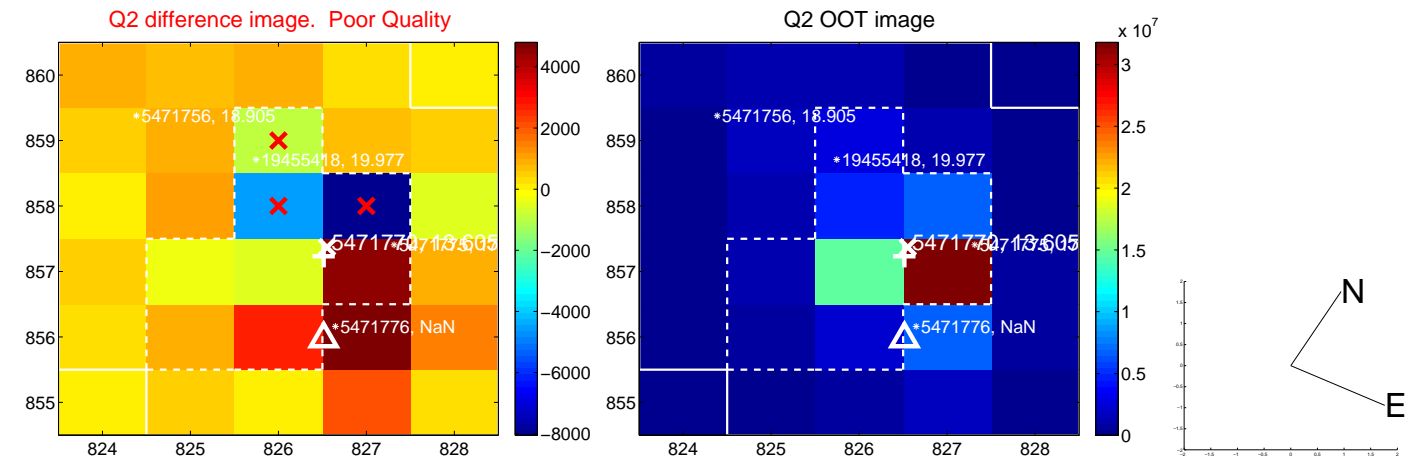
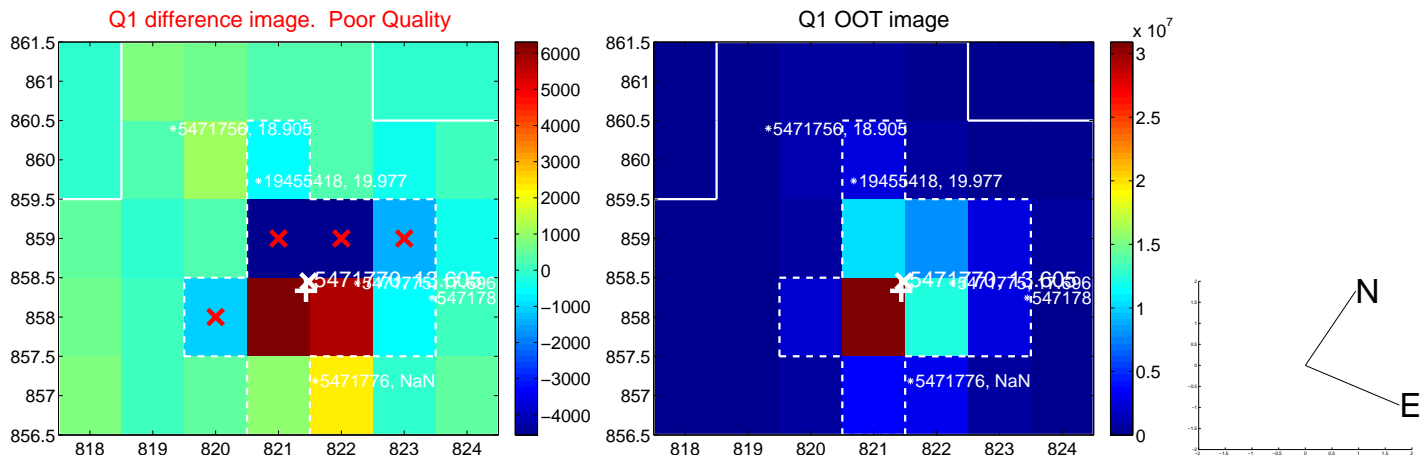
The direct PRF centroid is offset from the target star catalog position by about 0.52 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.271 \pm 0.902$	1.41	$-1.271 \pm 0.901$	$0.028 \pm 0.514$
PRF-fit source offset from KIC position	$1.285 \pm 0.818$	1.57	$-1.234 \pm 0.858$	$-0.359 \pm 0.494$
photometric centroid source offset	$0.61 \pm 0.62$	1.00	$0.18 \pm 0.61$	$0.59 \pm 0.62$

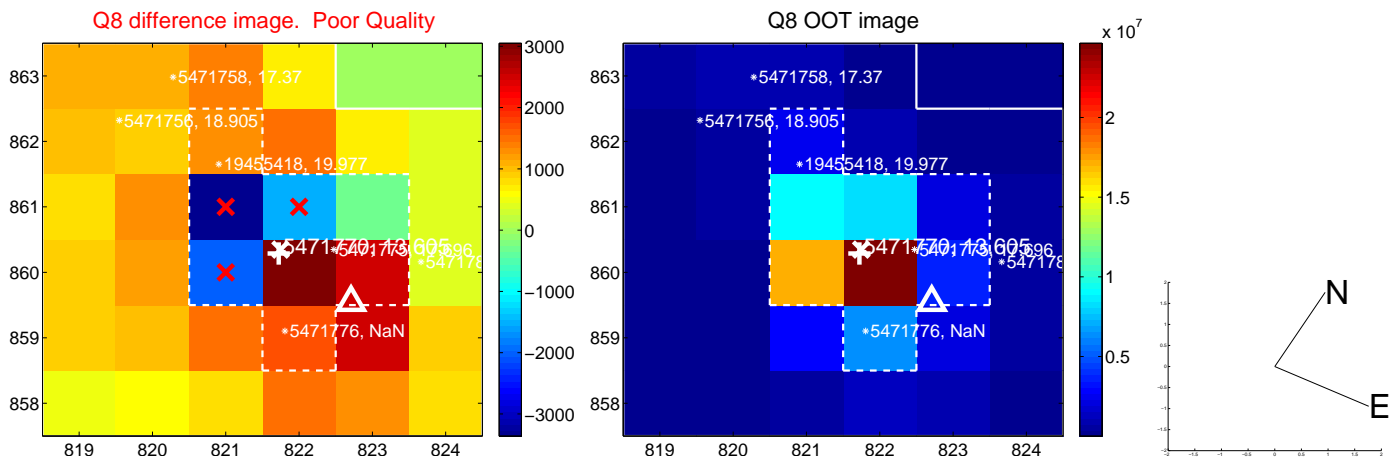
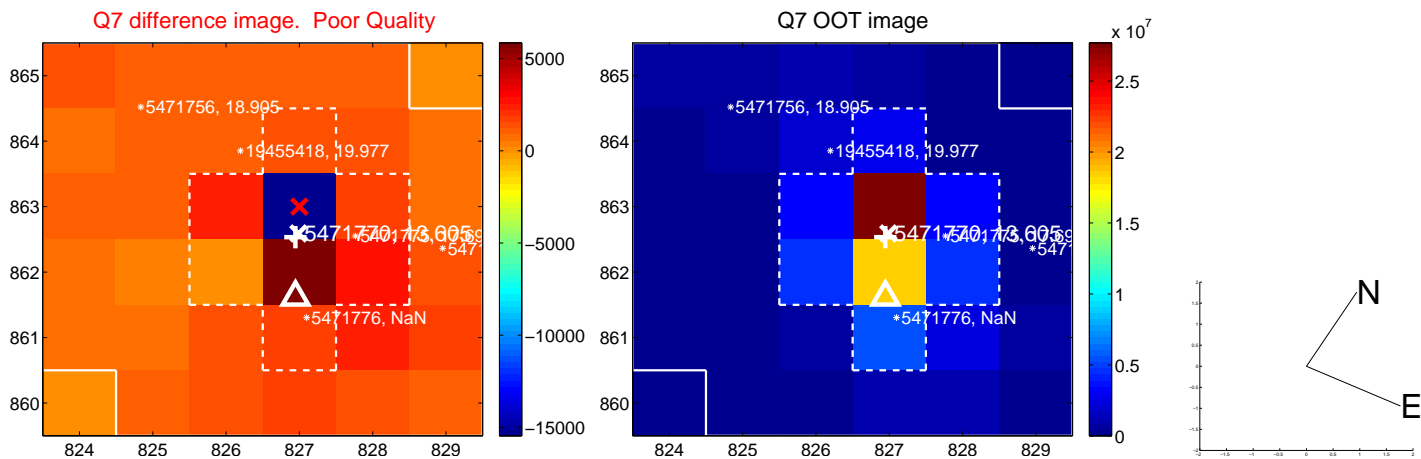
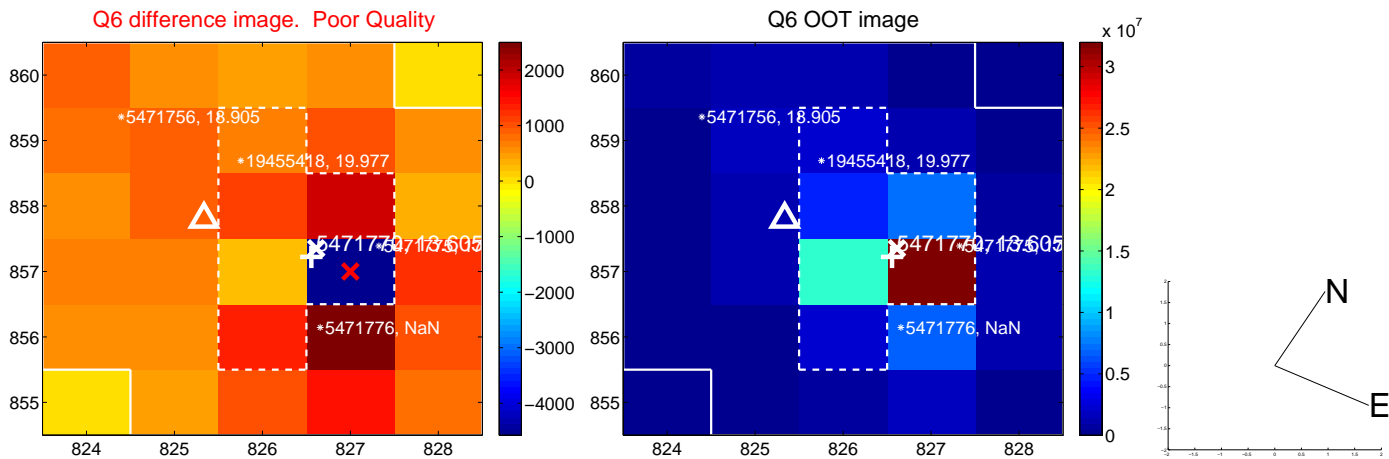
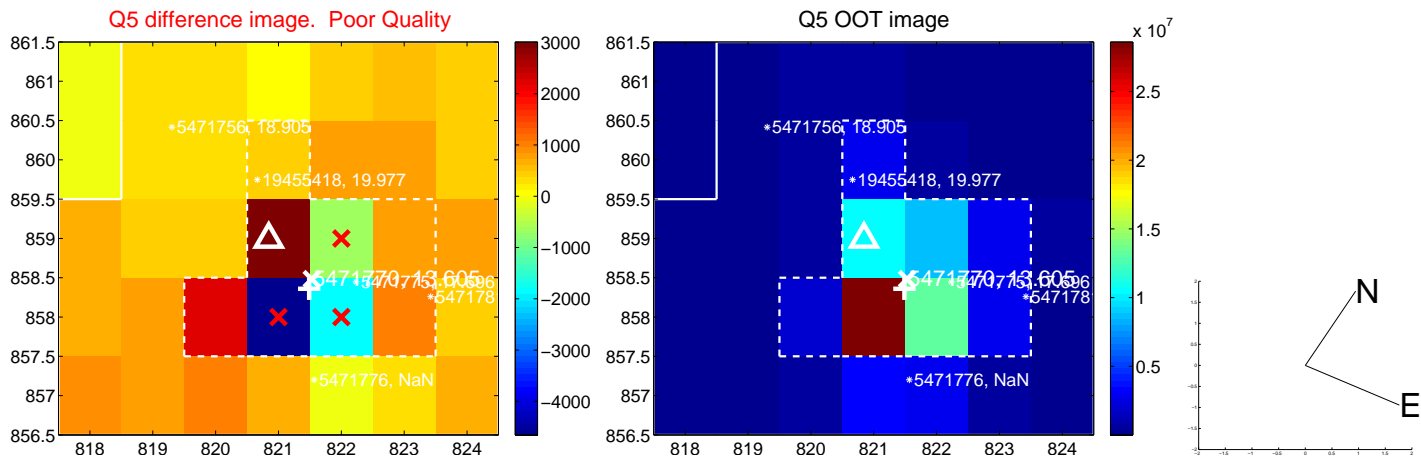


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

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

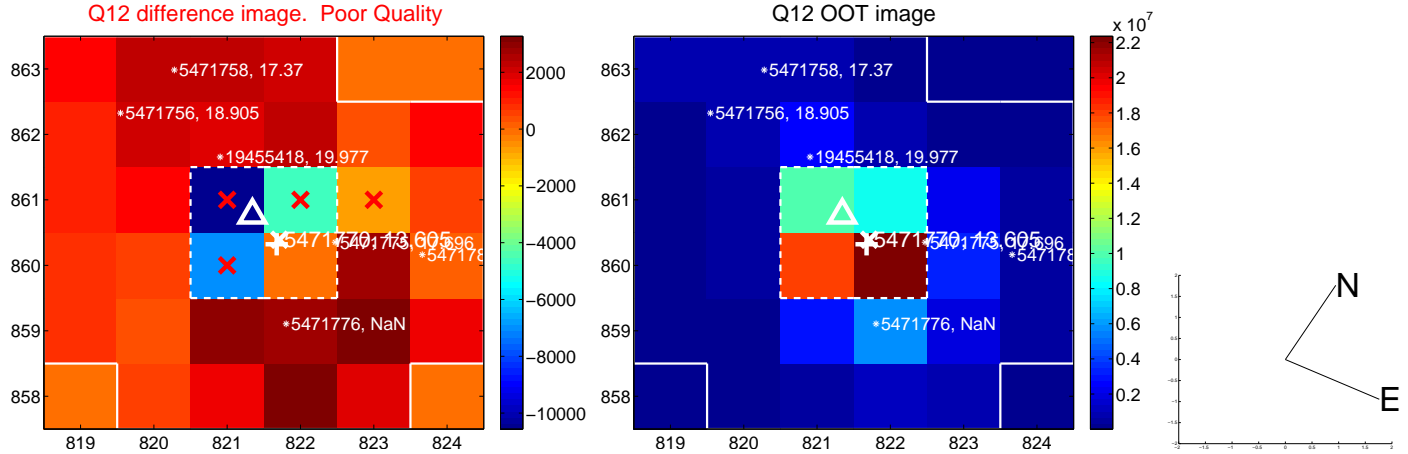
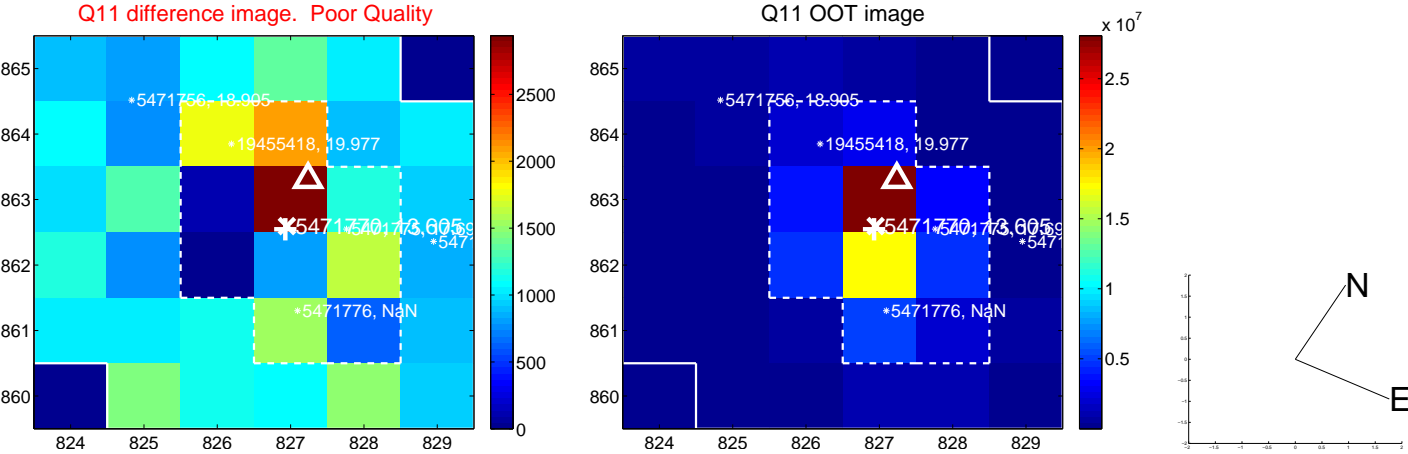
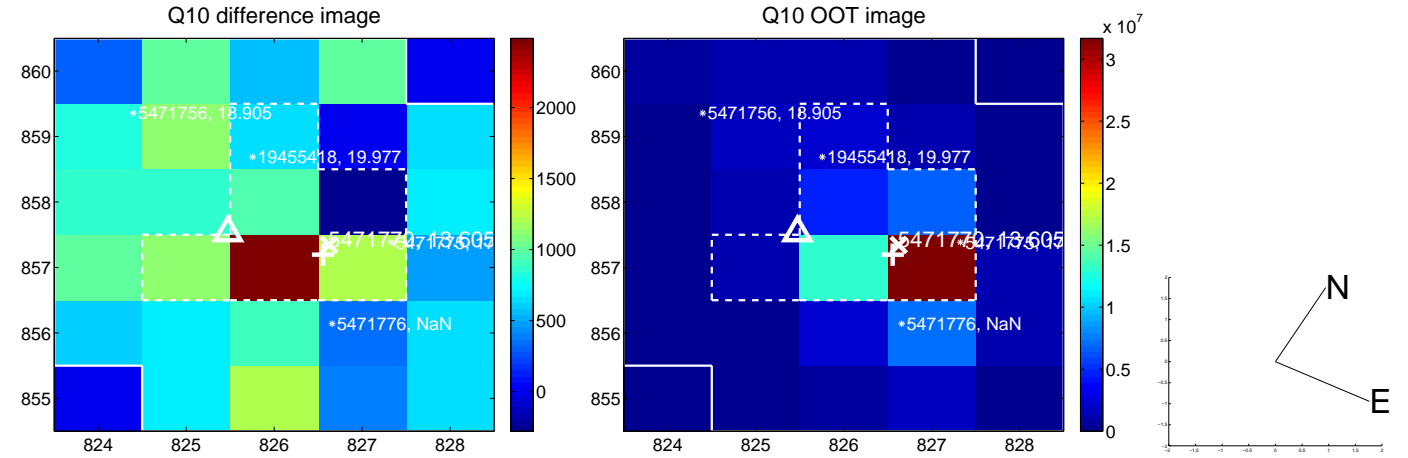
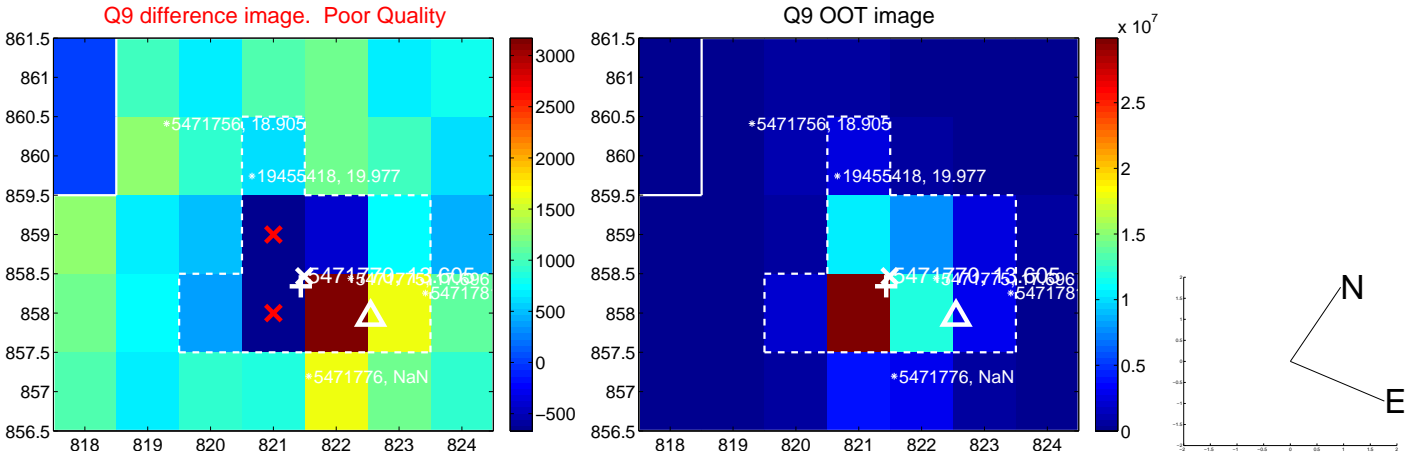


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

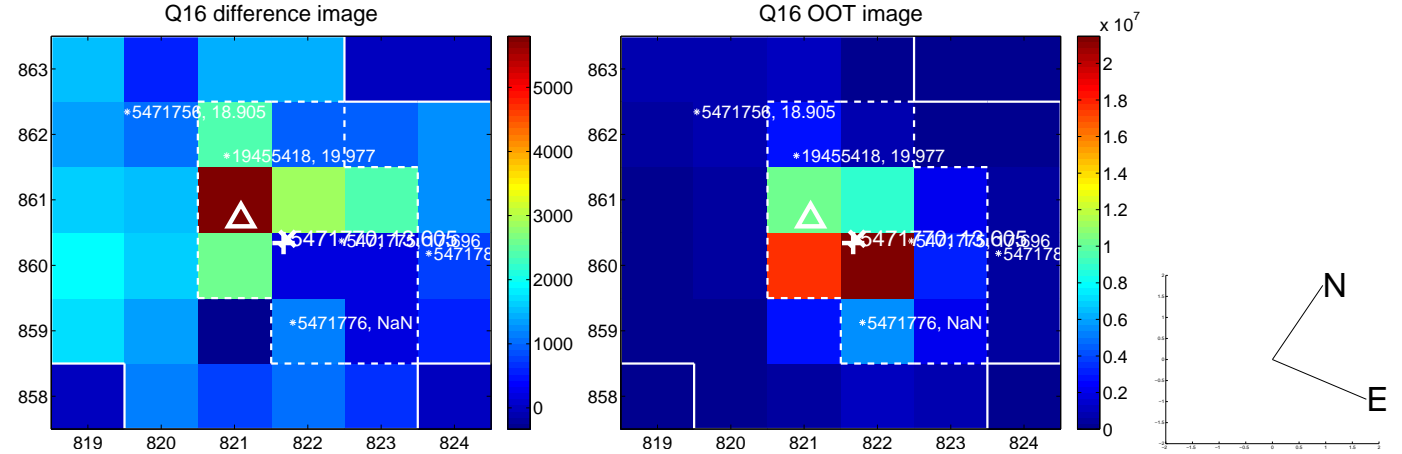
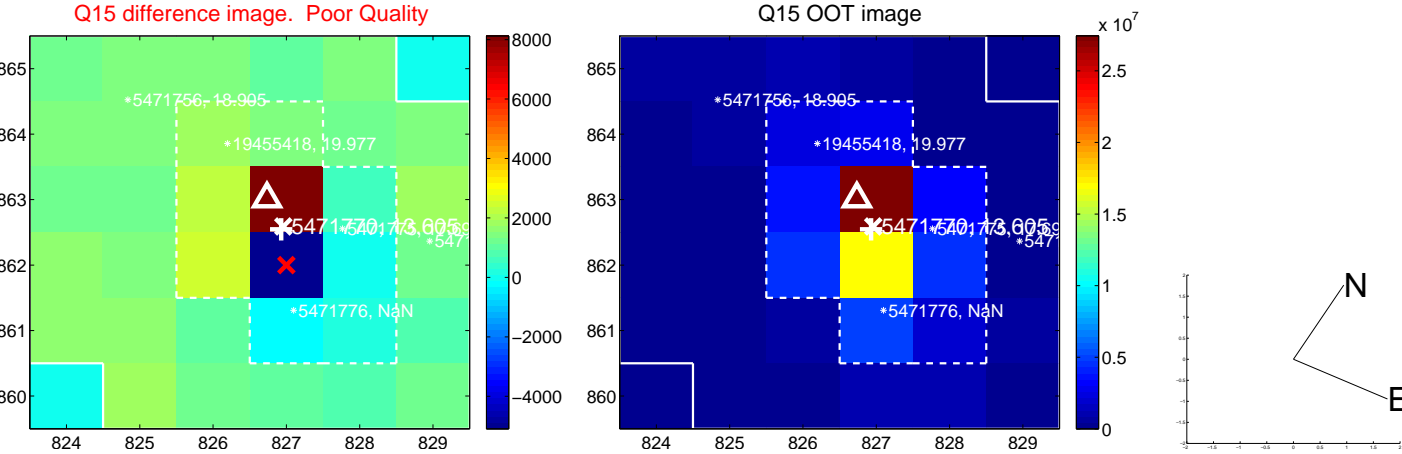
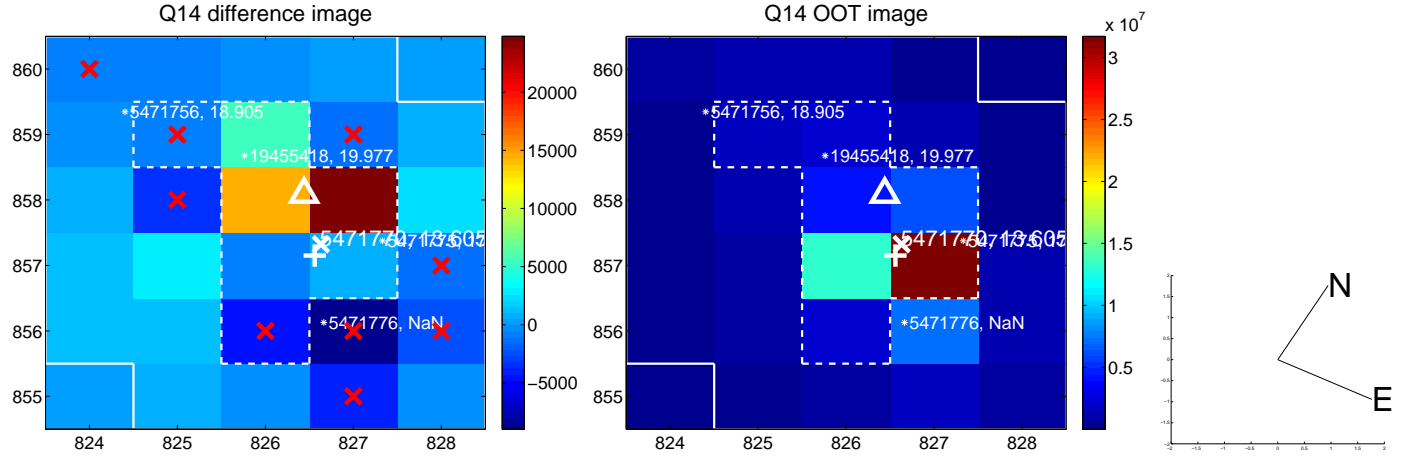
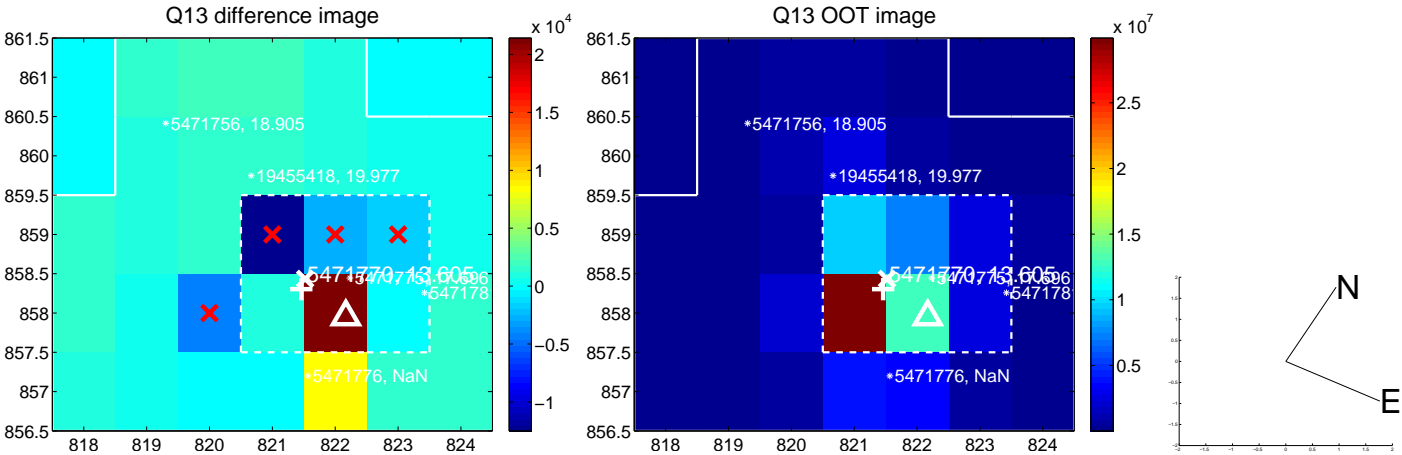




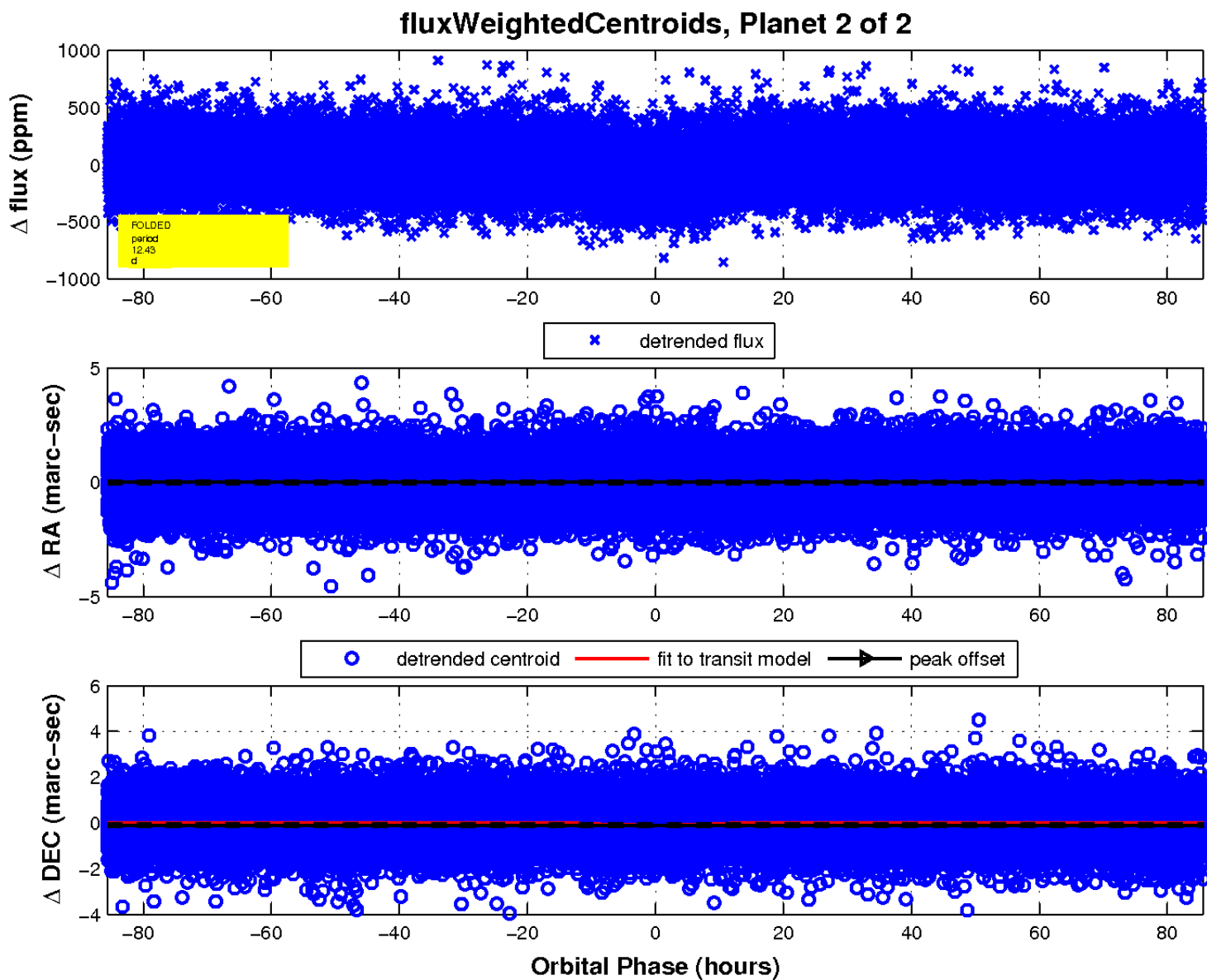
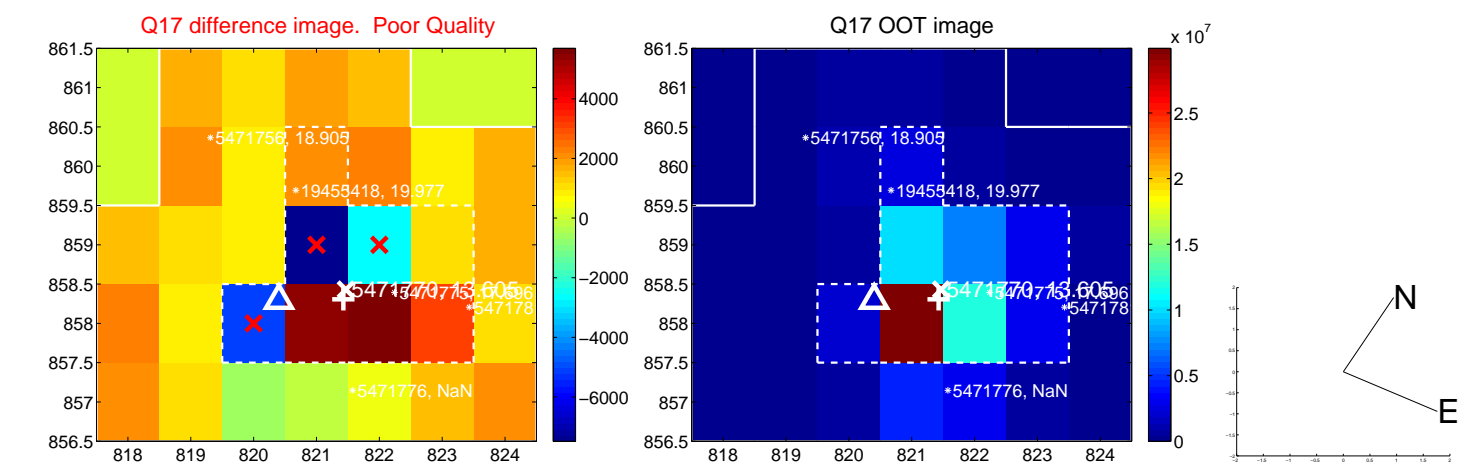
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white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination

