

# KIC 009353182

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009353182-01	OBS	7164.01	10.476258	136.528301	120530.4	7.769	12819.5	10393.4	1.54	6109	54.21	319.22
009353182-02	OBS	No	10.476257	131.530032	10203.6	7.002	1221.8	1041.6	1.54	6109	17.16	319.22

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009353182-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE
009353182-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE

**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.

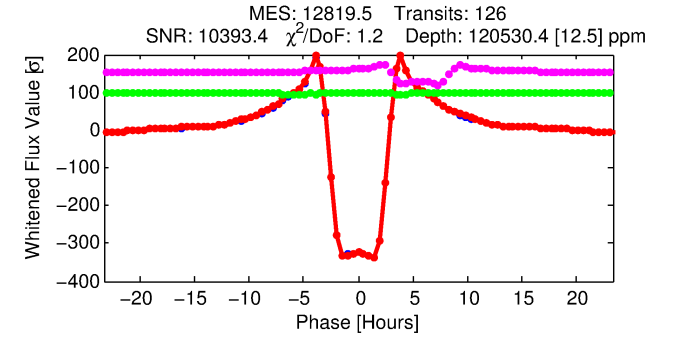
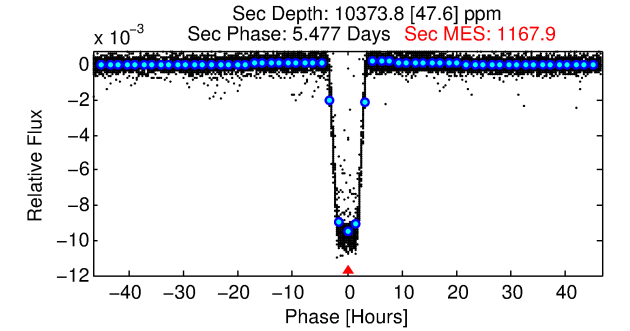
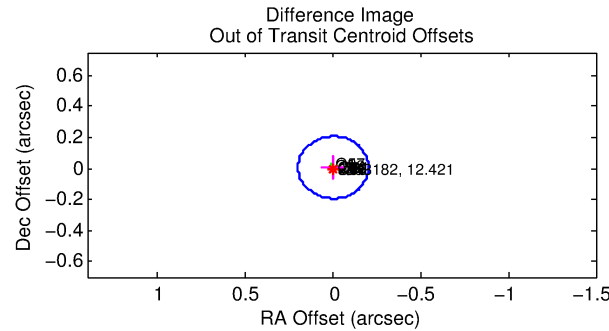
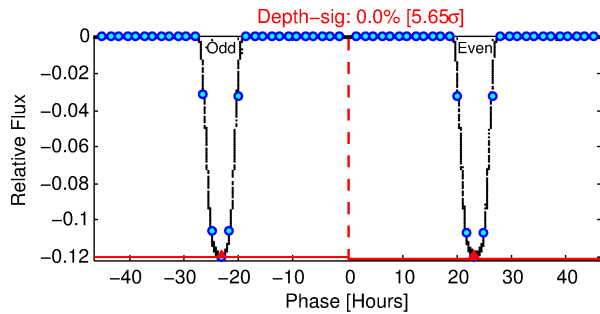
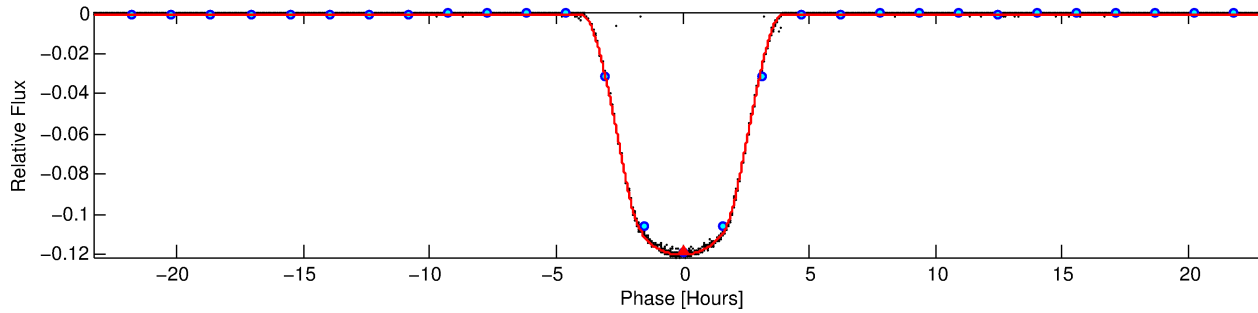
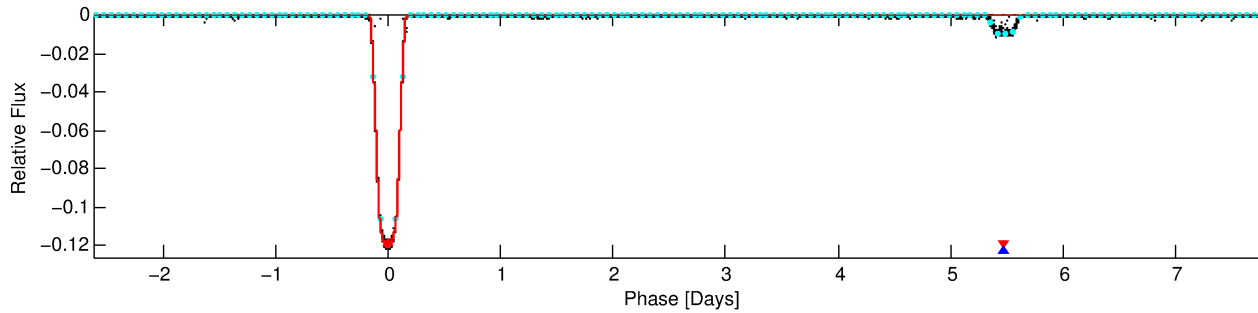
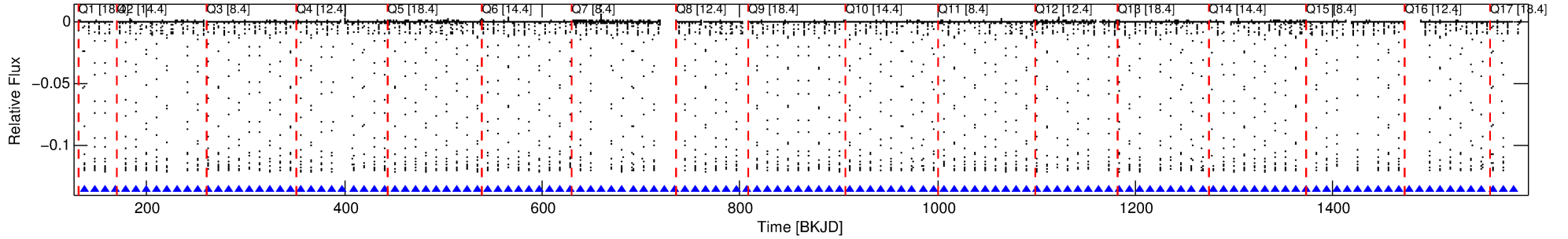
## Ephemeris Match Information For 009353182-01

No Significant Match Found

# DV One-Page Summary

KIC: 9353182 Candidate: 1 of 2 Period: 10.476 d  
KOI: K07164.01 Corr: 1.000

Kp: 12.42 R\*: 1.54 Rs Teff: 6109.0 K Logg: 4.10 Fe/H: -0.140



## DV Fit Results:

Period = 10.47626 [0.00000] d  
Epoch = 136.5283 [0.0000] BKJD  
Rp/R\* = 0.3235 [0.0000]  
a/R\* = 13.25 [0.00]  
b = 0.32 [0.00]  
Seff = 319.22 [131.47]  
Teq = 1078 [111] K  
Rp = 54.21 [14.61] Re  
a = 0.0960 [0.0241] AU  
Ag = 17.91 [7.05] [2.40σ]  
Teffp = 3428 [104] K [15.42σ]

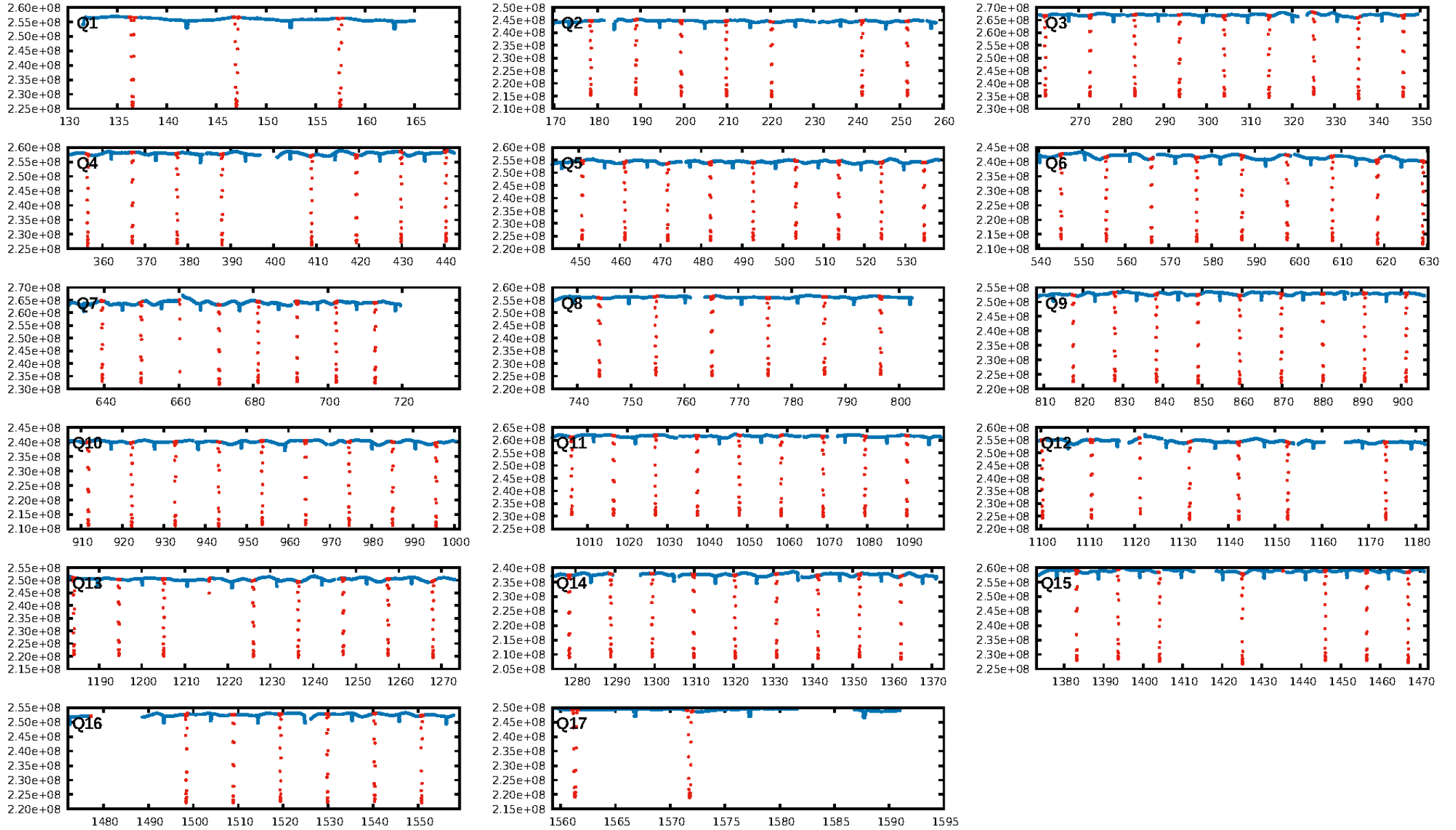
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 96.4%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [121/121]  
GhostDiagnostic-chr: 4.165  
Centroid-sig: N/A  
Centroid-so: 0.030 arcsec [93.42σ]  
OotOffset-rm: 0.007 arcsec [0.11σ]  
KicOffset-rm: 0.116 arcsec [1.72σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 1.00 [17/17]

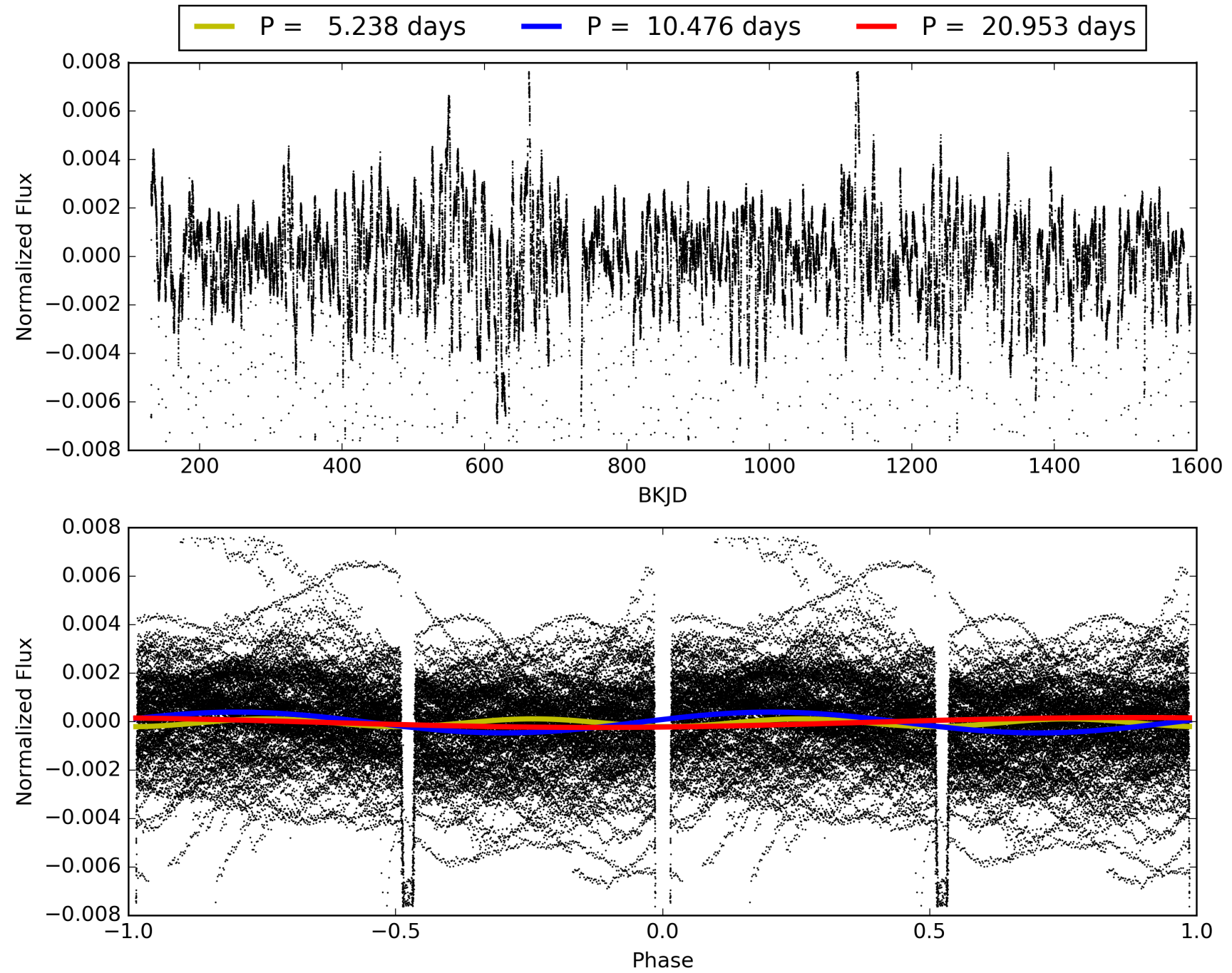
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 03-Feb-2016 06:41:50 Z

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

# TCE 009353182-01, PDC Light Curves

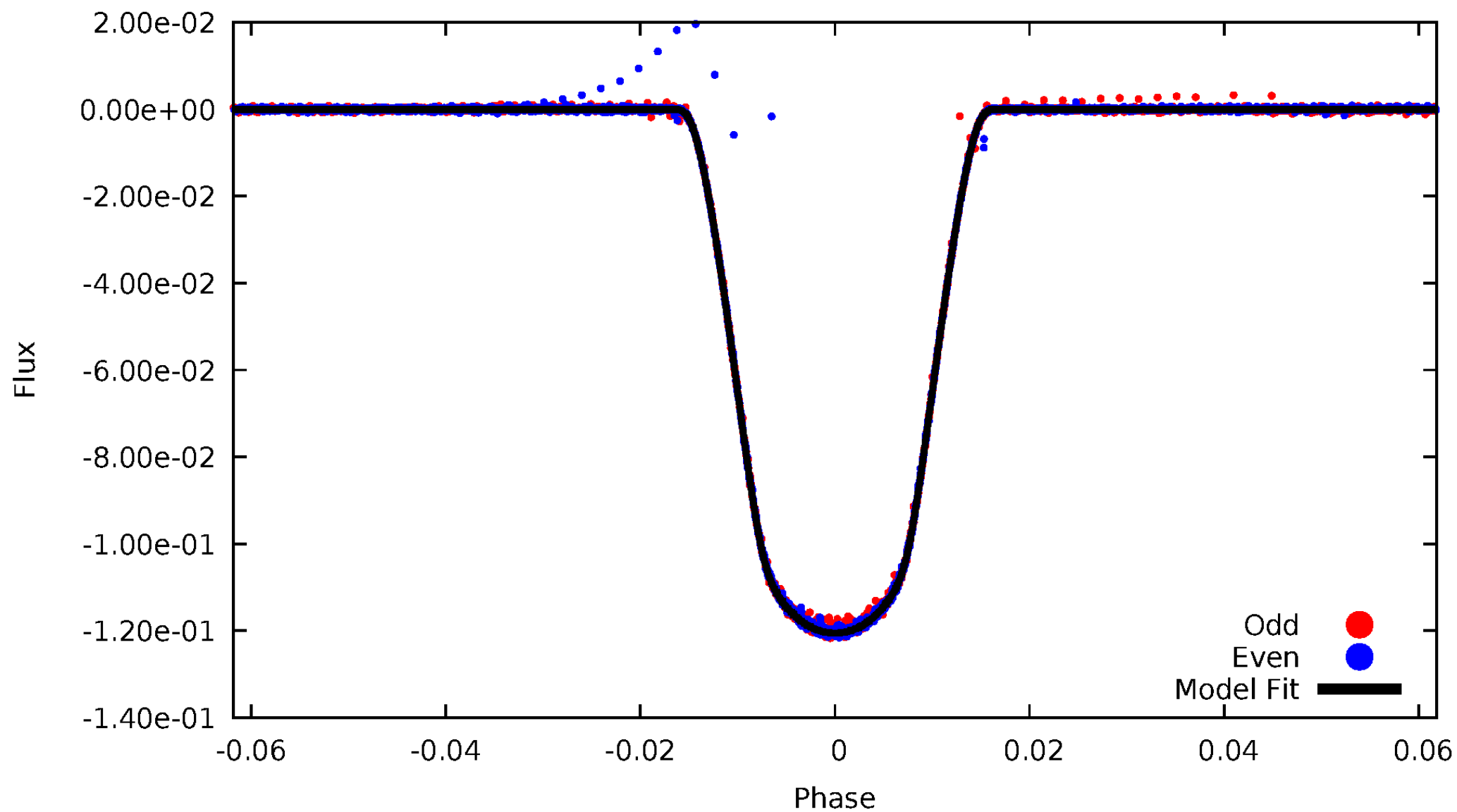


TCE 009353182-01



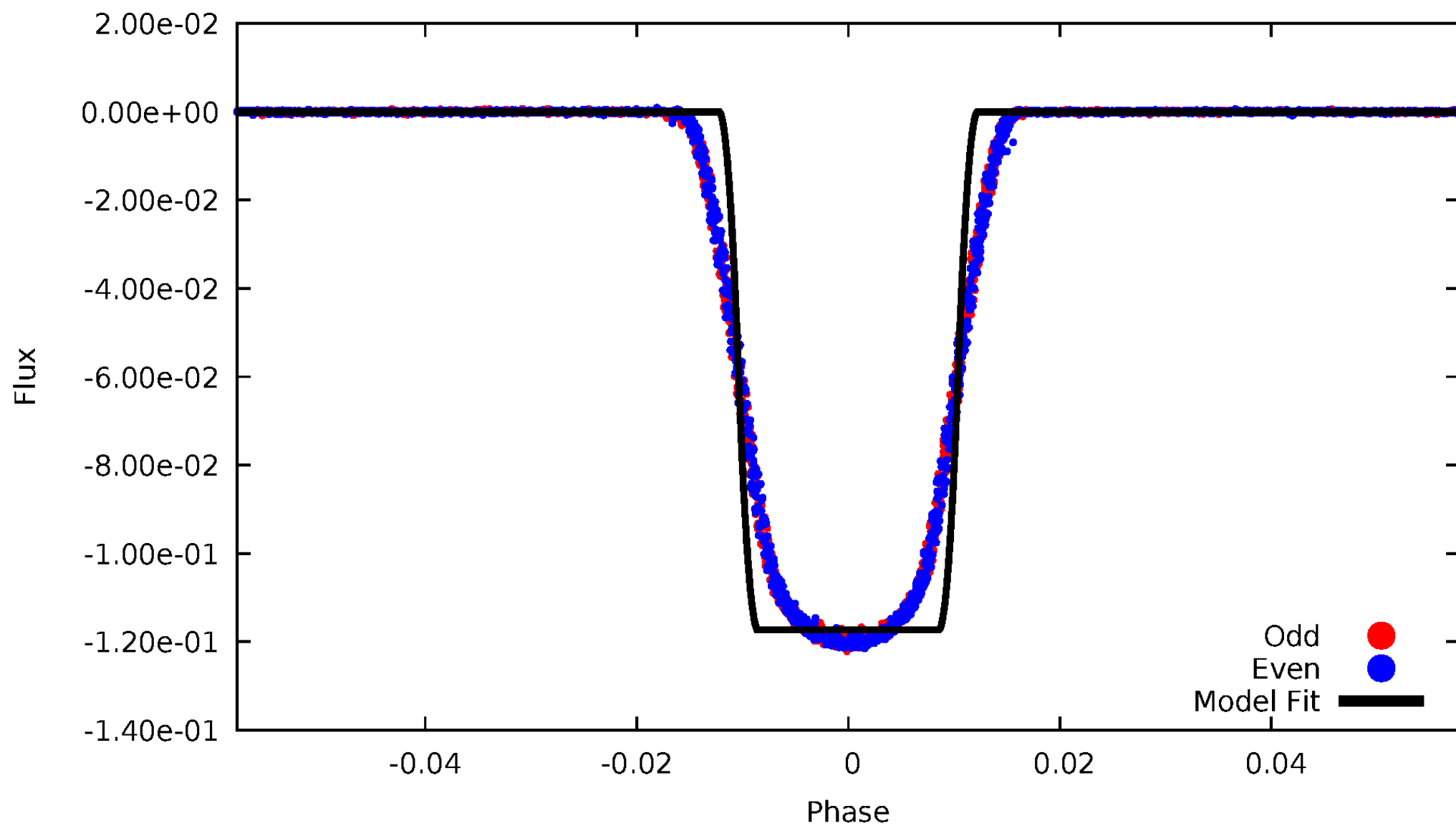
# DV Odd/Even

TCE 009353182-01



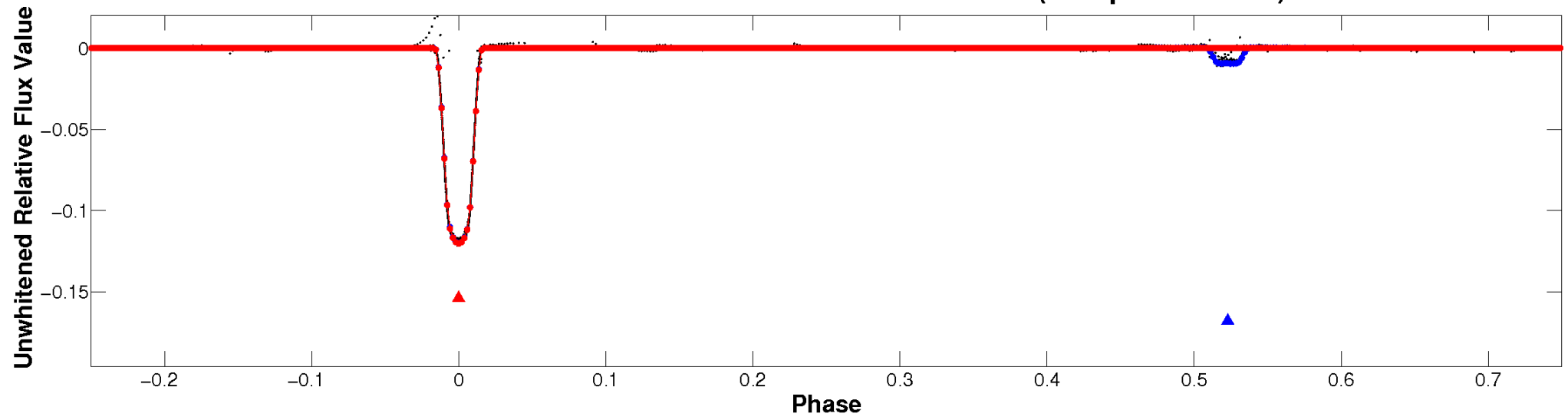
# ALT Odd/Even

TCE 009353182-01

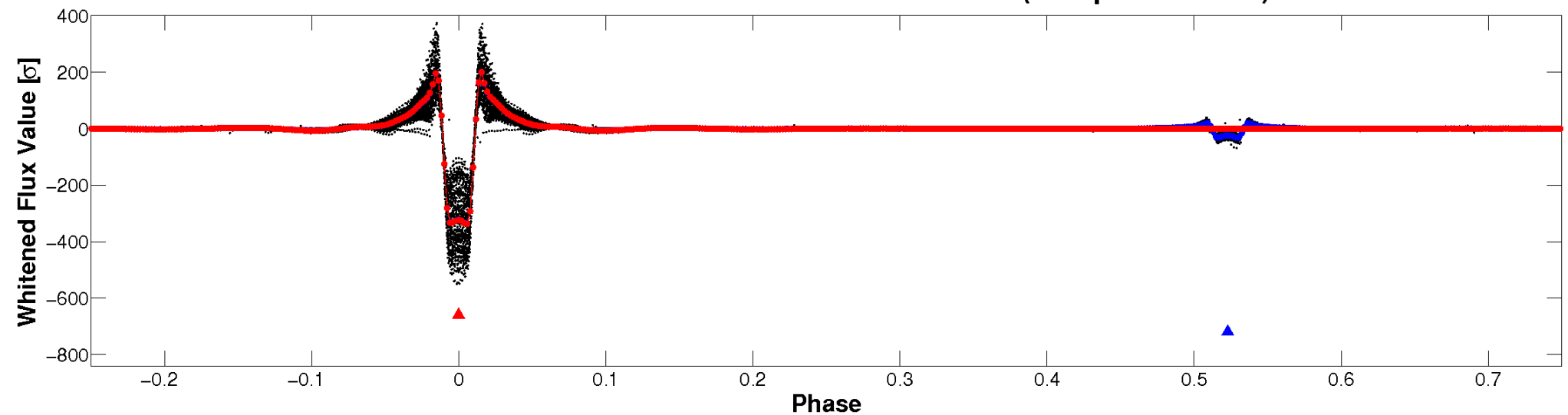


# Non-Whitened Vs. Whitened Light Curve

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

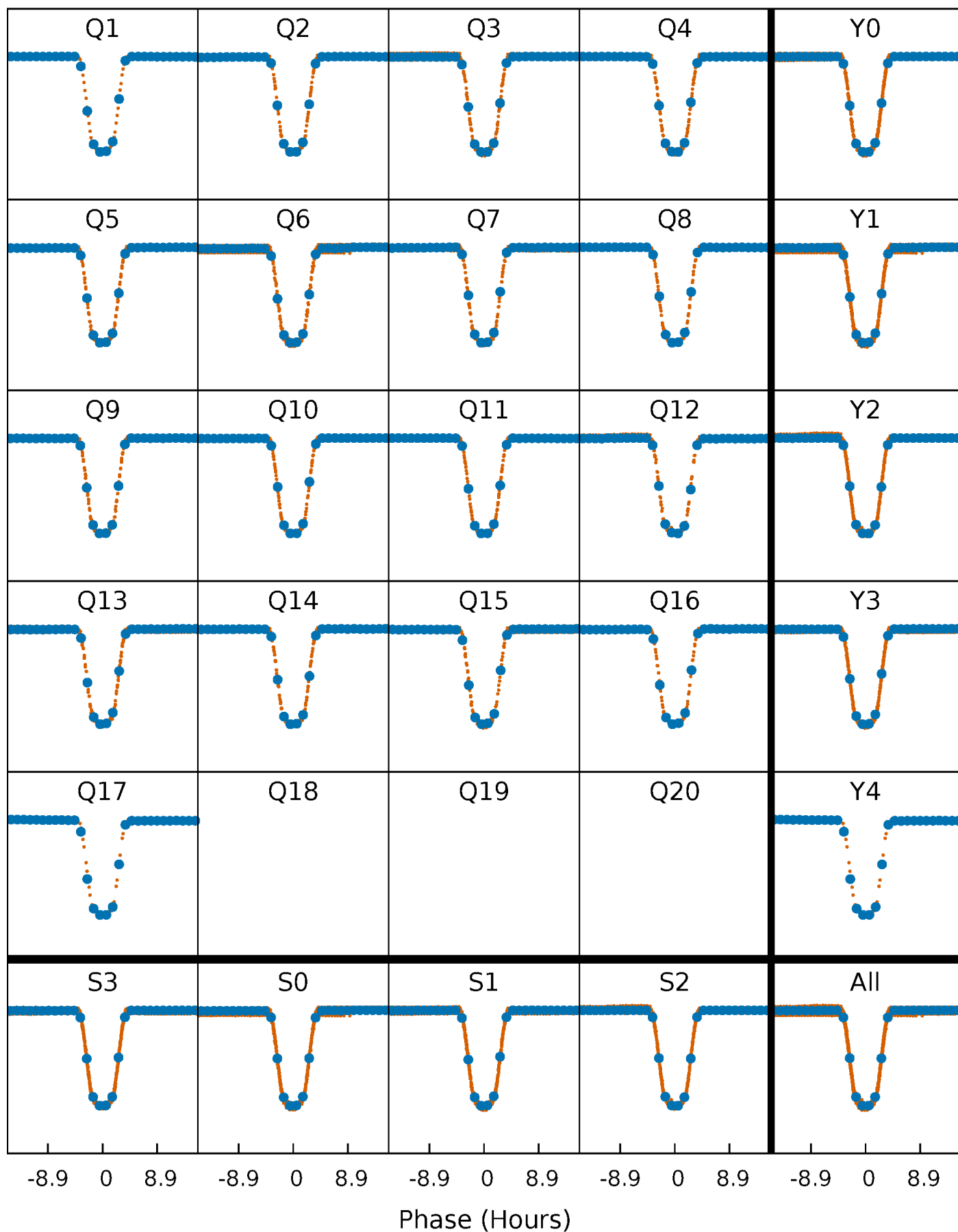


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

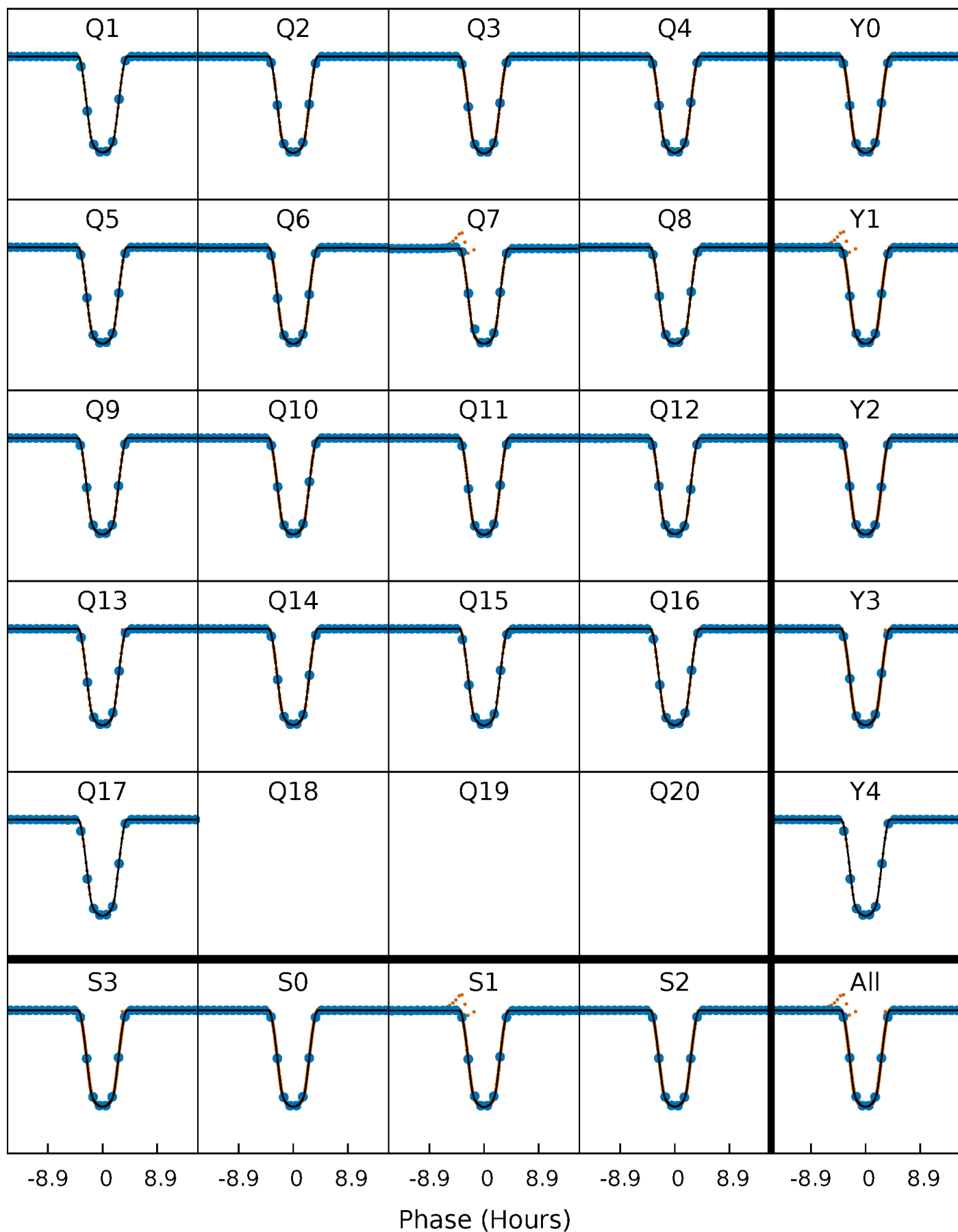
TCE 009353182-01 P= 10.476258 Days  $T_0=136.528301$  (BKJD)





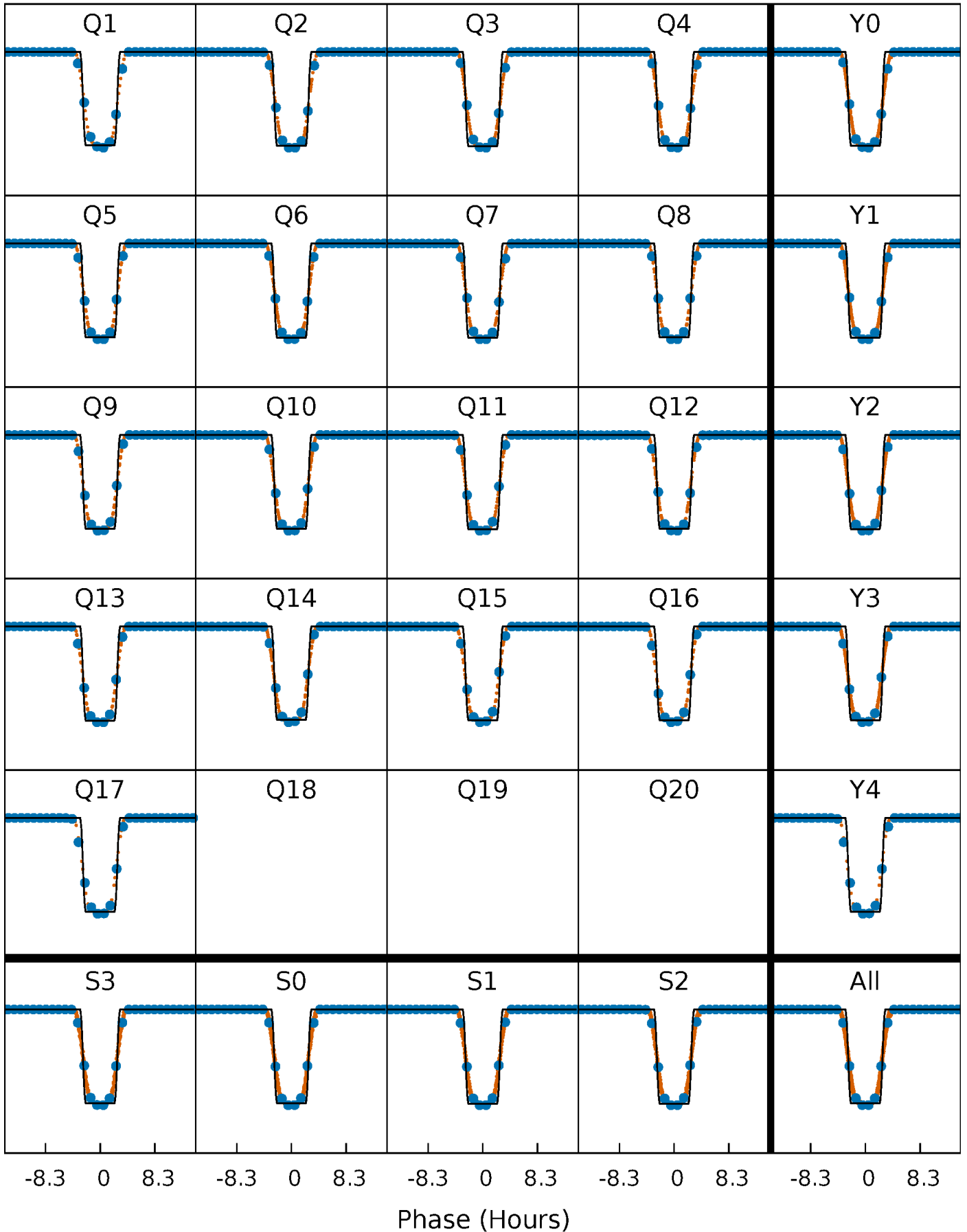
# DV Quarter-Phased Transit Curves

TCE 009353182-01 P= 10.476258 Days  $T_0=136.528301$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

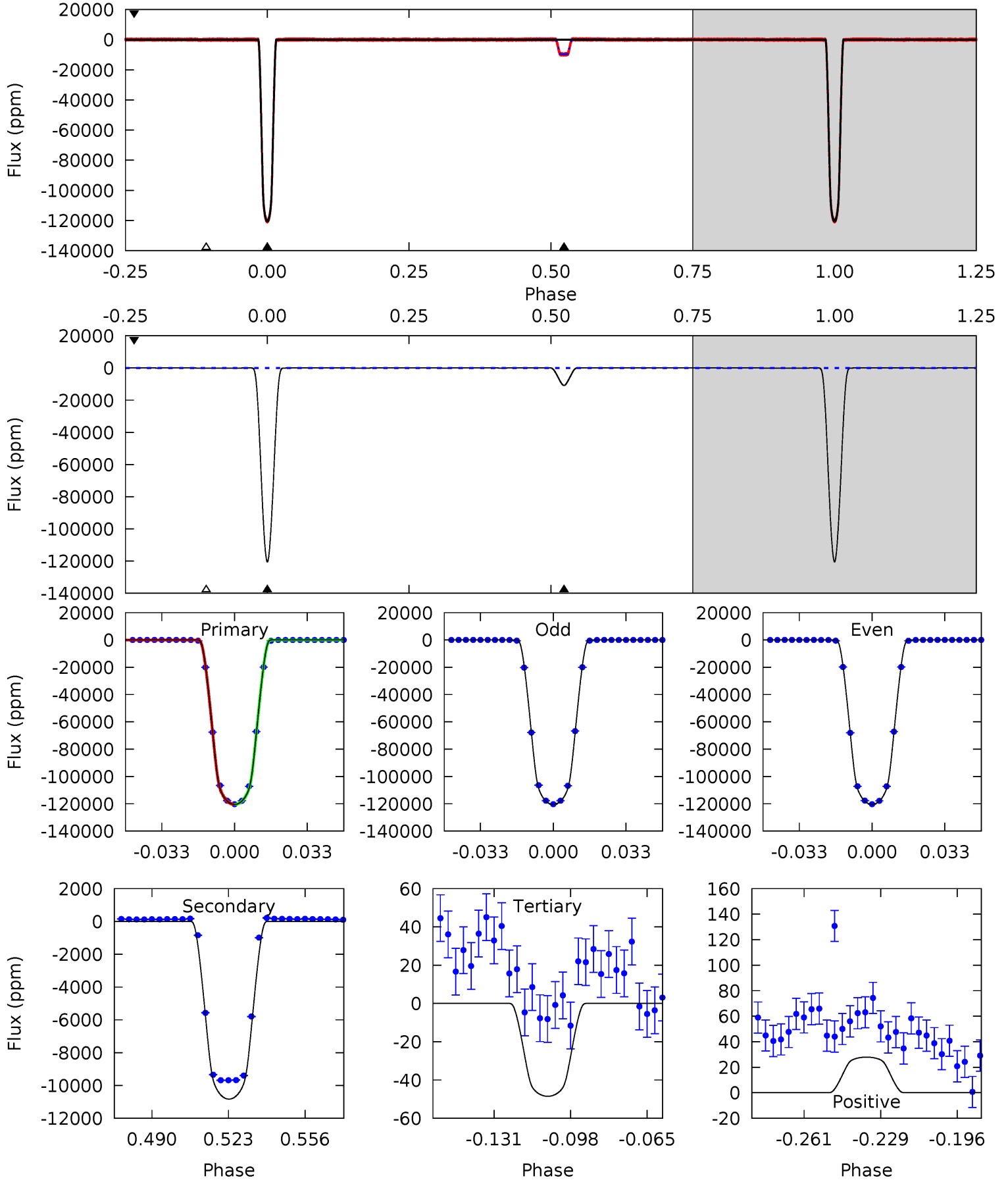
TCE 009353182-01 P= 10.476330 Days  $T_0=136.523434$  (BKJD)



# DV Model-Shift Uniqueness Test

009353182-01, P = 10.476258 Days, E = 126.052043 Days

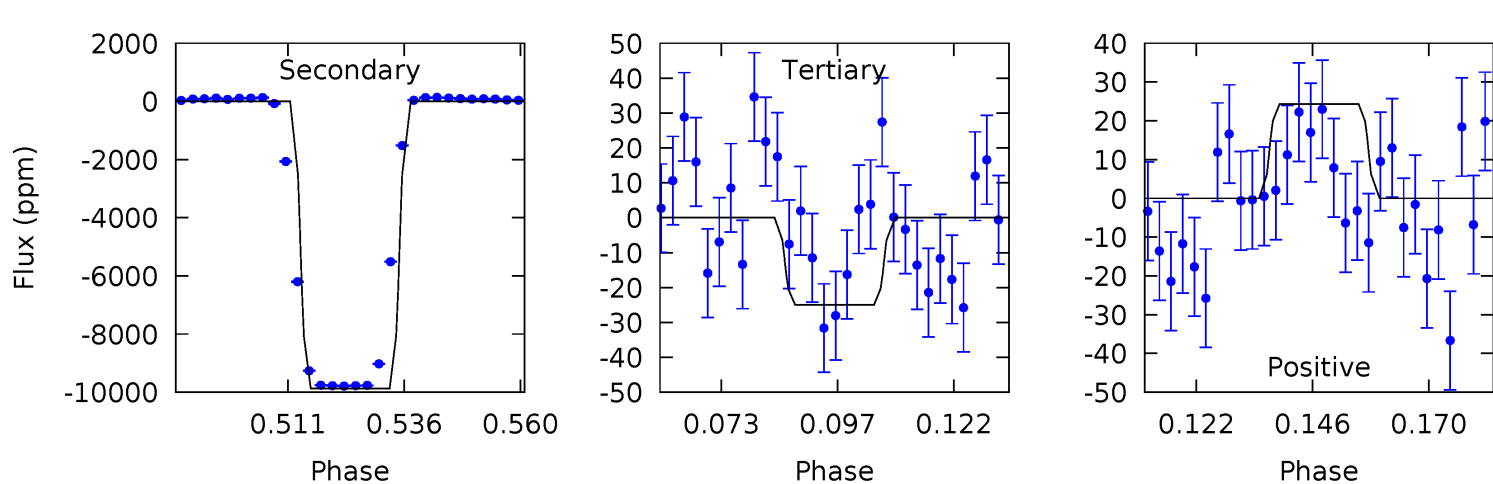
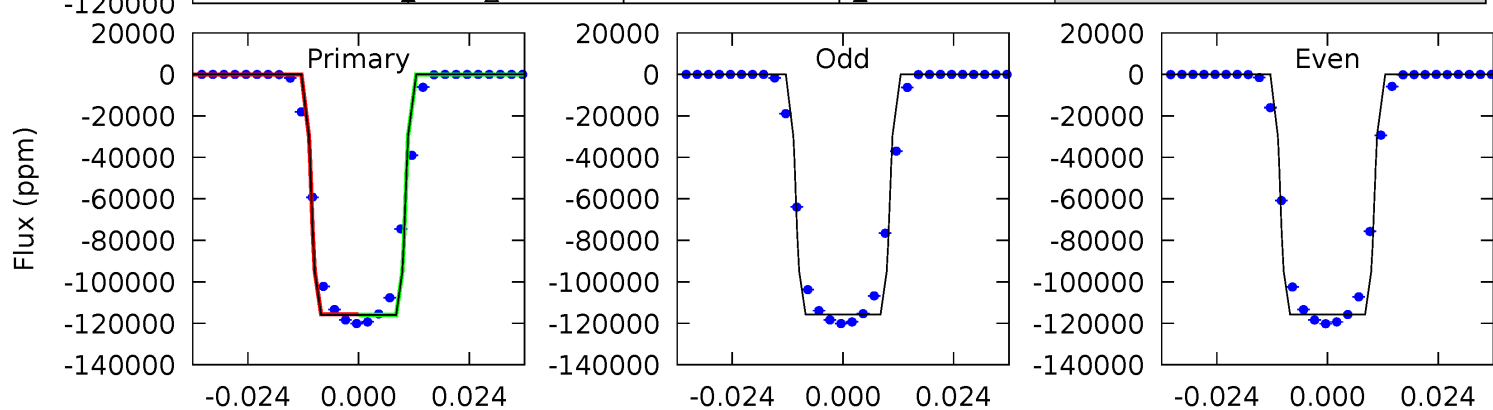
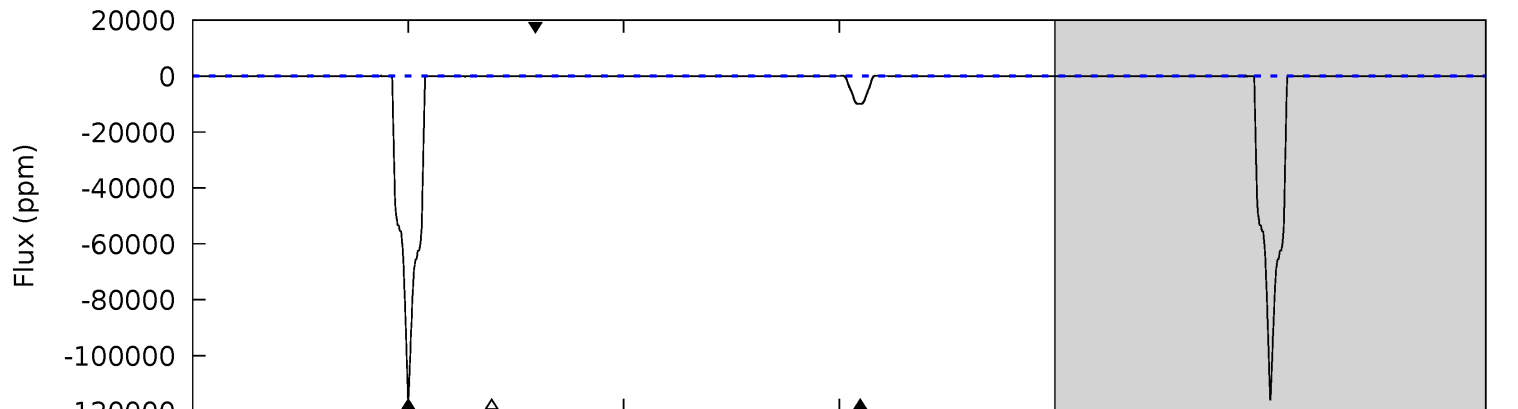
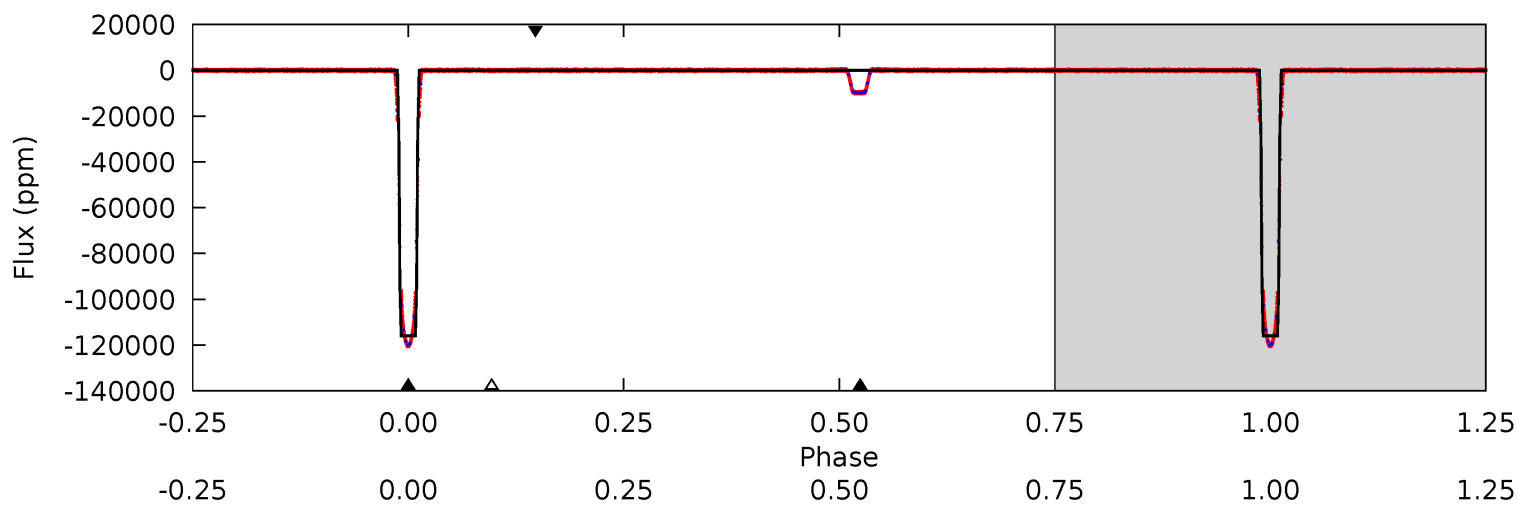
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
24460	2199	9.84	5.67	4.79	2.14	6.97	24450	24454	2189	2193	4.14	0.98	0.00	4.60



# Alt Model-Shift Uniqueness Test

009353182-01, P = 10.476330 Days, E = 126.047104 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
17368	1479	3.74	3.65	4.85	2.25	2.43	17365	17365	1475	1475	4.24	1.00	0.00	3.59



### Stellar Parameters For KIC 009353182

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6109^{+167}_{-186}$	$4.097^{+0.228}_{-0.123}$	$-0.140^{+0.300}_{-0.300}$	$1.536^{+0.339}_{-0.414}$	$1.076^{+0.175}_{-0.143}$	$0.418^{+0.570}_{-0.156}$
	+3%/-3%	+6%/-3%	+214%/-214%	+22%/-27%	+16%/-13%	+136%/-37%
Source	PHO1	FLK73	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 009353182-01 / KOI 7164.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-10830 \pm 5$	$53.74^{+7.27}_{-7.61}$	$1493^{+93}_{-118}$	$3830^{+74}_{-77}$	$19^{+6}_{-4}$
Alt.	$-9872 \pm 7$	$57.04^{+6.46}_{-8.15}$	$1485^{+99}_{-104}$	$3699^{+66}_{-72}$	$16^{+5}_{-3}$

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

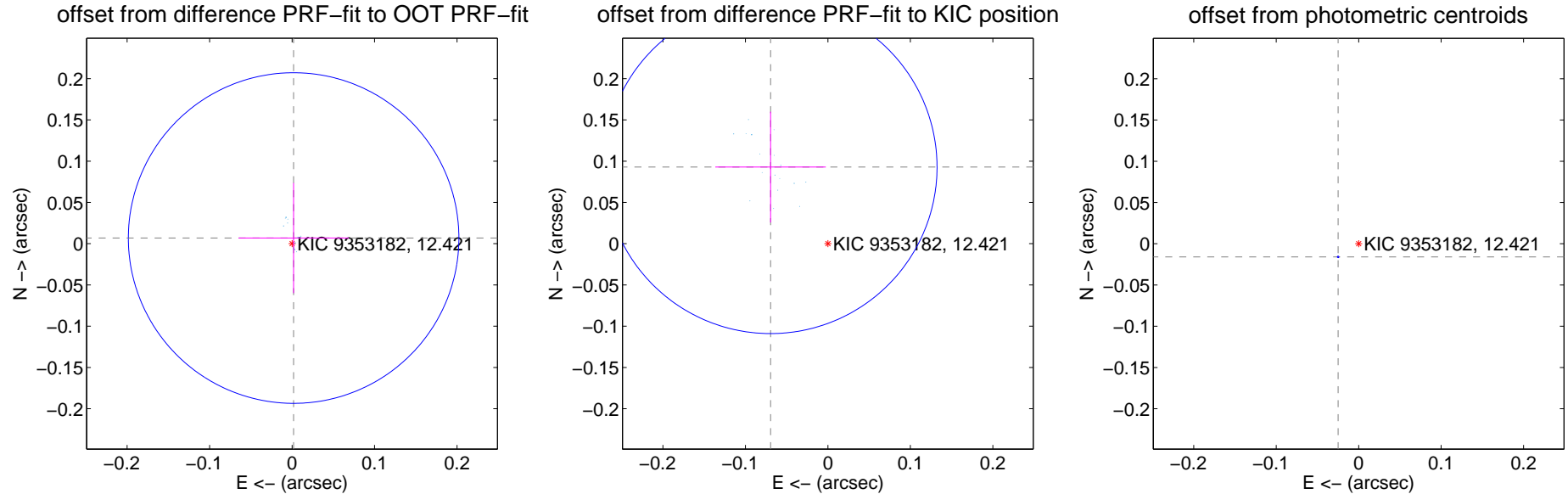
## DV Centroid Data

Supplemental centroid analysis for 009353182-01. Kepler magnitude: 12.42. Transit SNR 10393.43

There are 17 quarters with good PRF difference image offsets

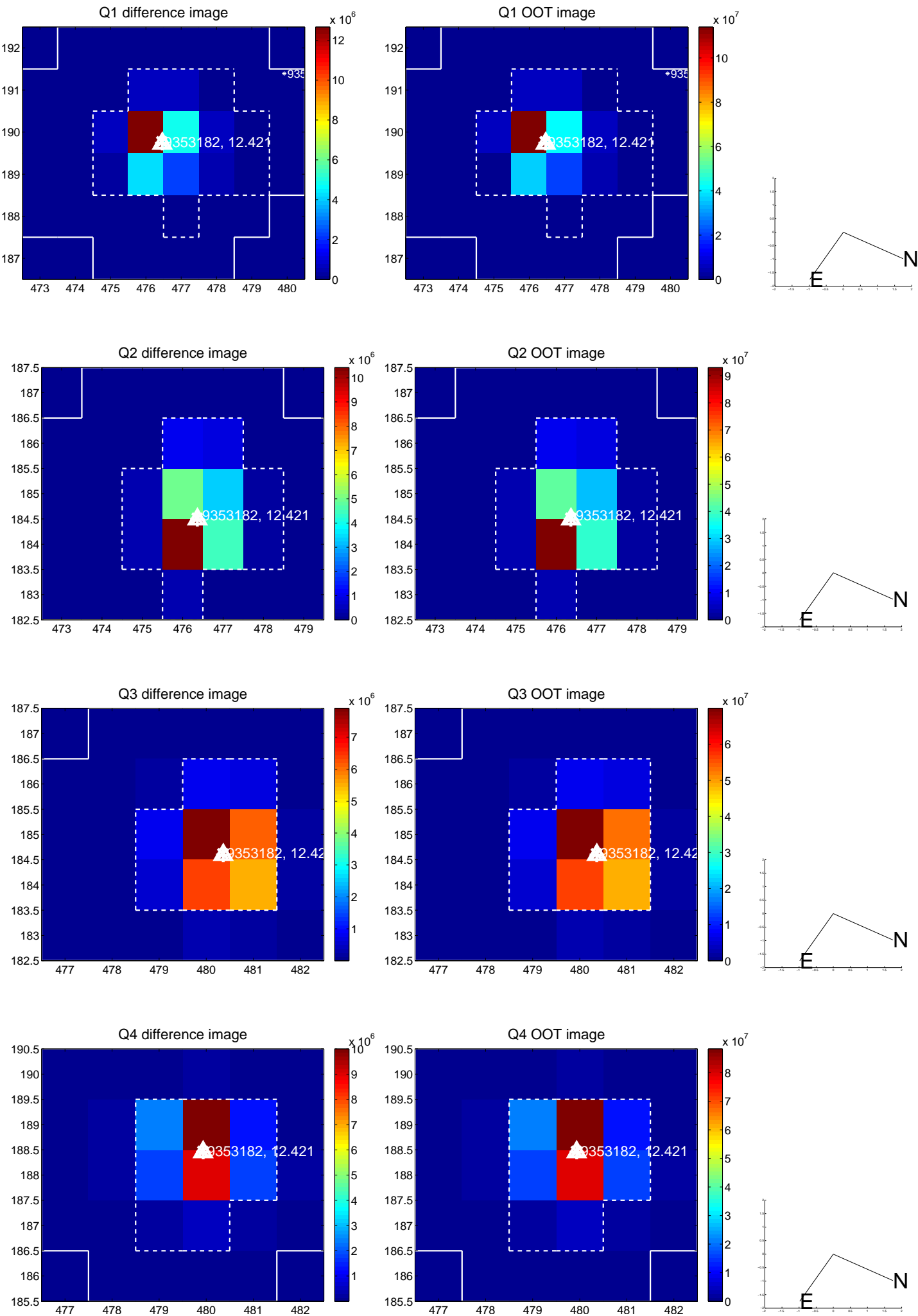
The direct PRF centroid is offset from the target star catalog position by about 0.13 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.007 \pm 0.067$	0.11	$-0.002 \pm 0.067$	$0.007 \pm 0.067$
PRF-fit source offset from KIC position	$0.116 \pm 0.067$	1.72	$0.069 \pm 0.067$	$0.093 \pm 0.067$
photometric centroid source offset	$0.03 \pm 0.00$	93.42	$0.02 \pm 0.00$	$-0.02 \pm 0.00$

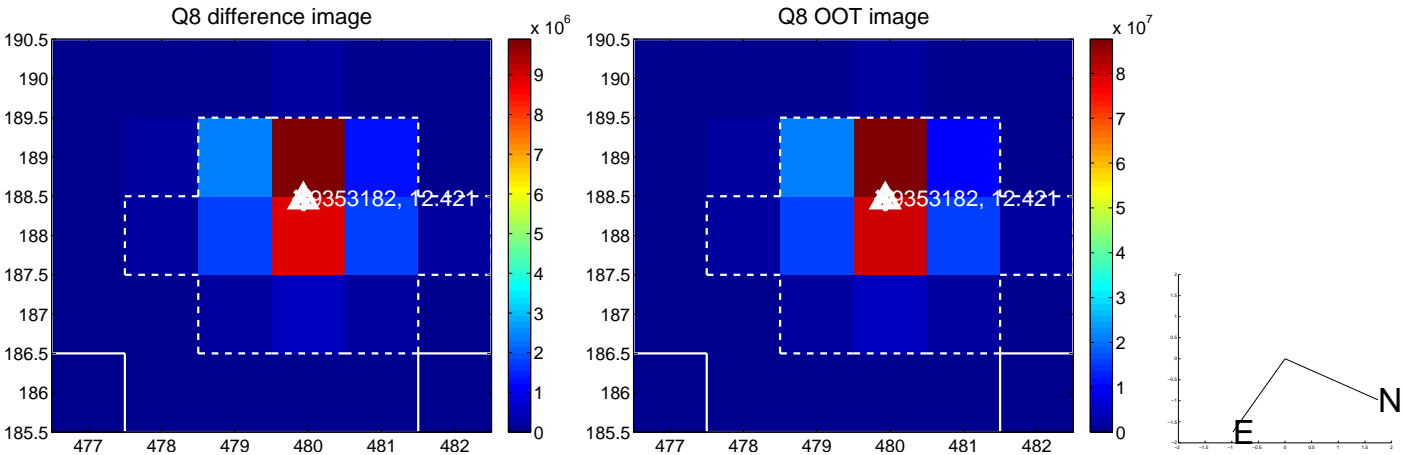
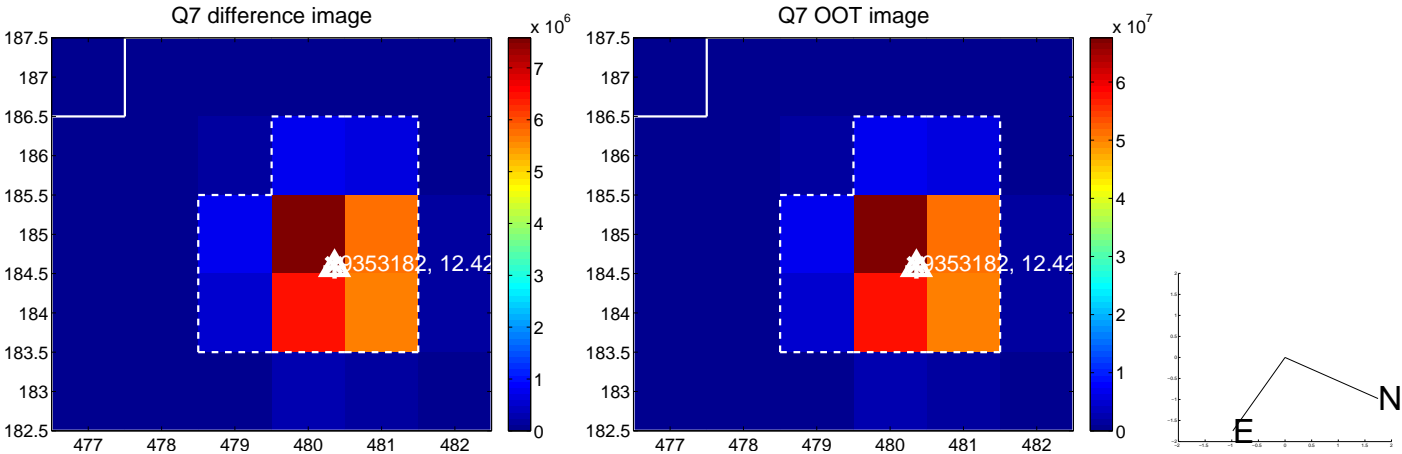
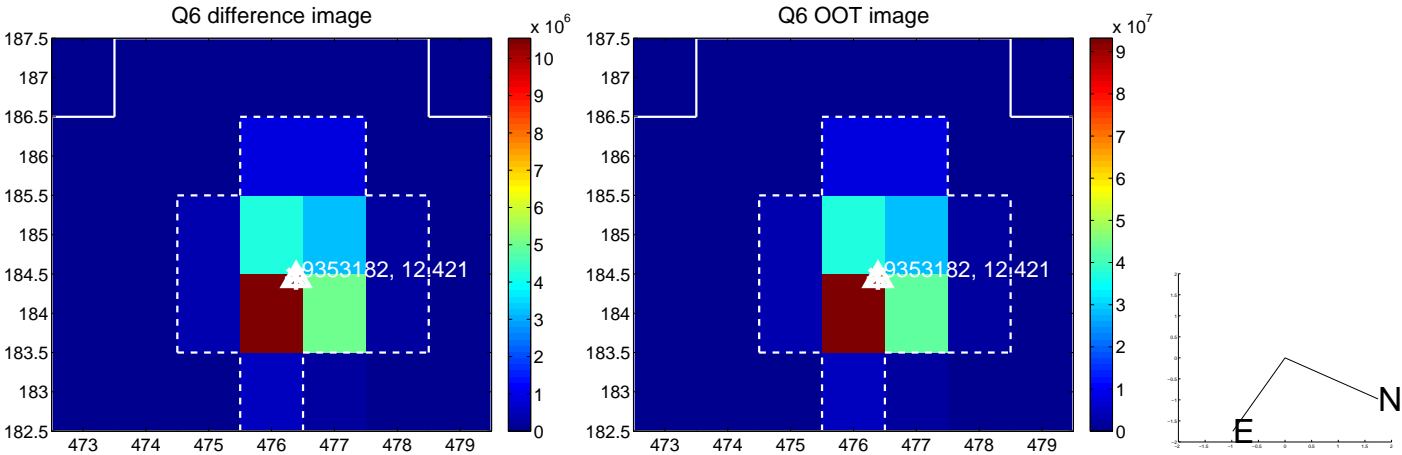
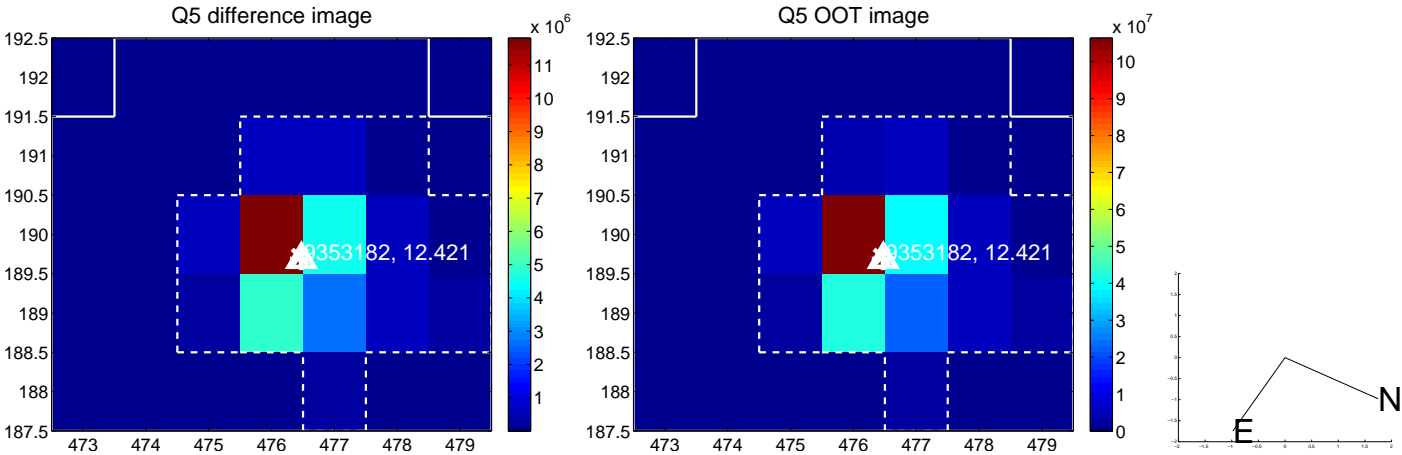


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

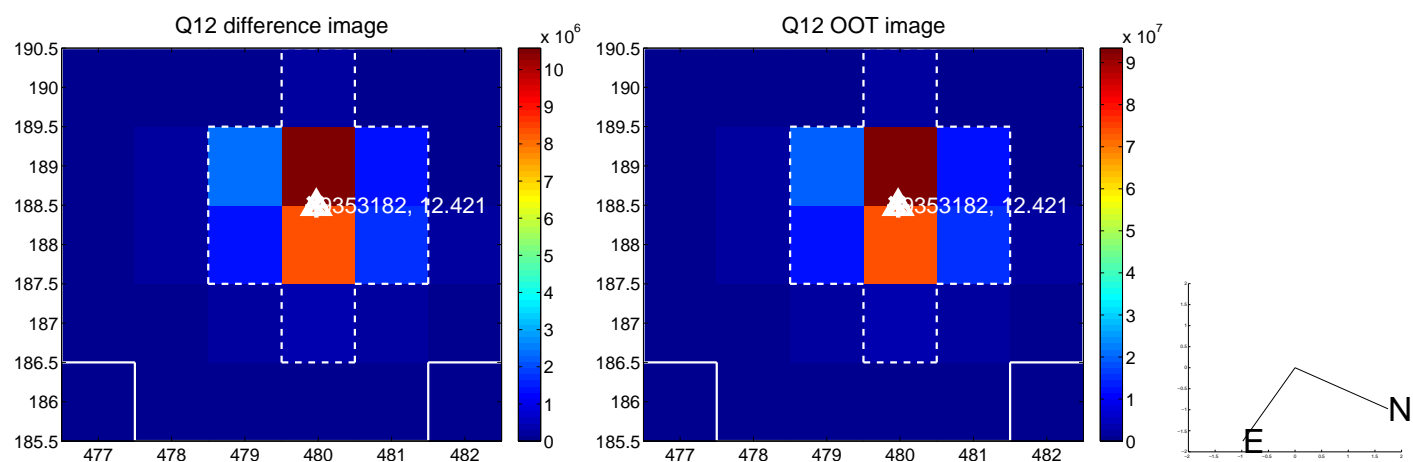
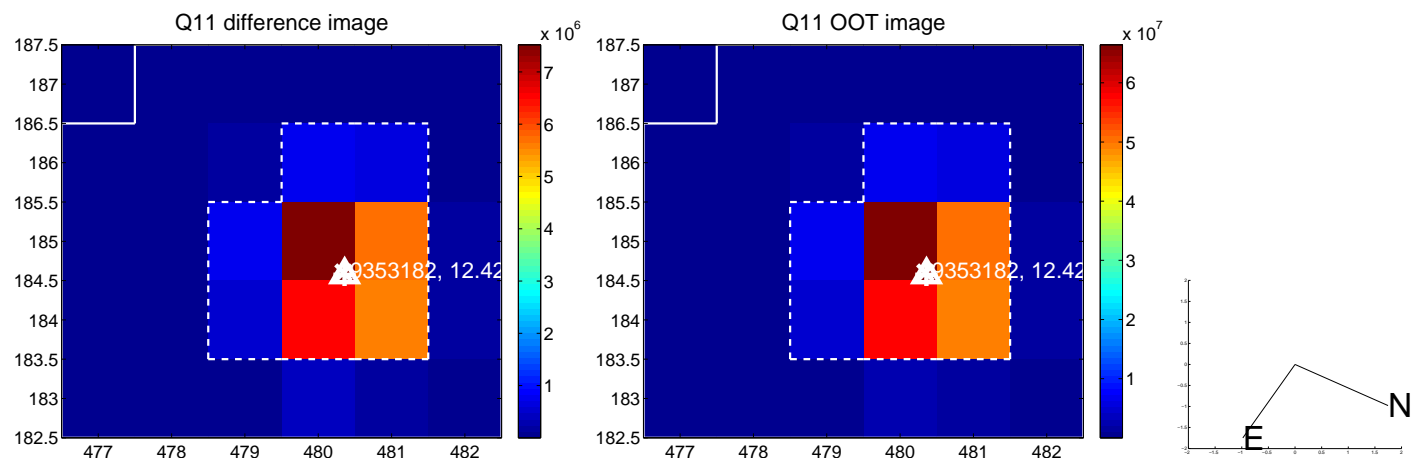
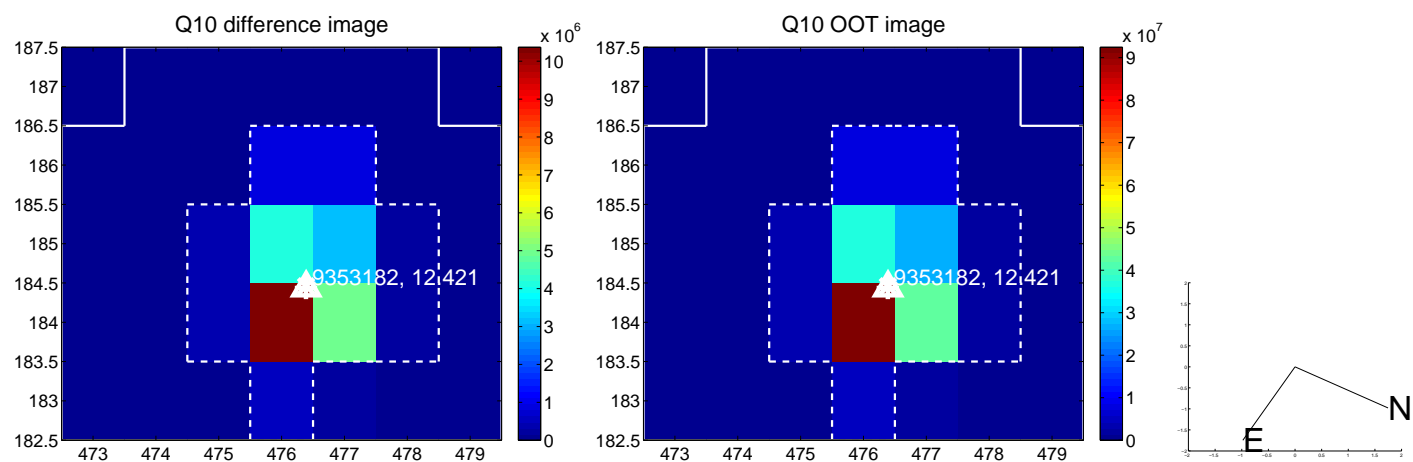
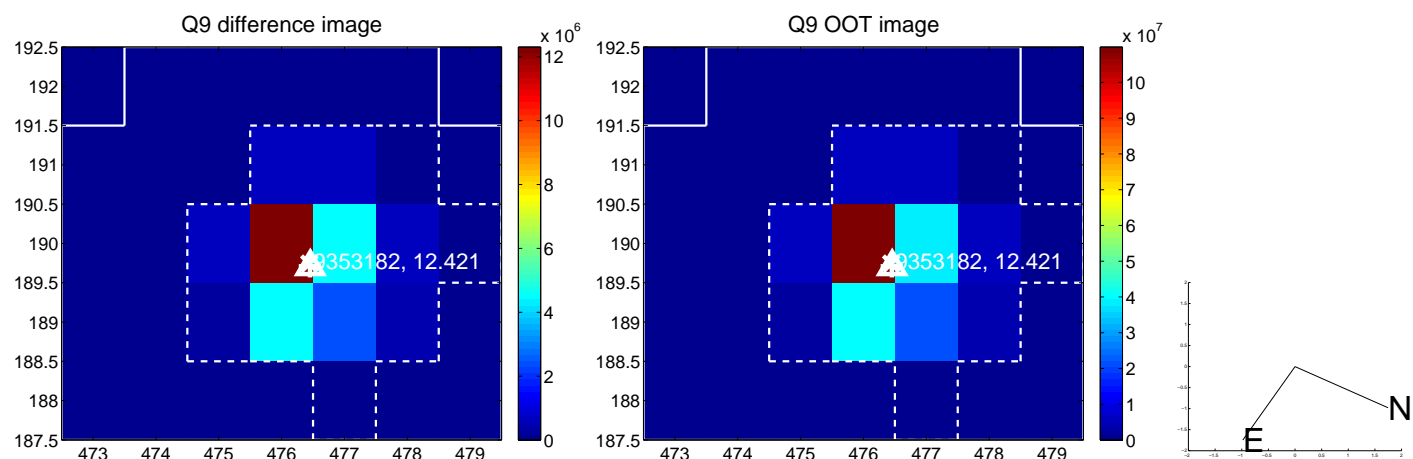


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

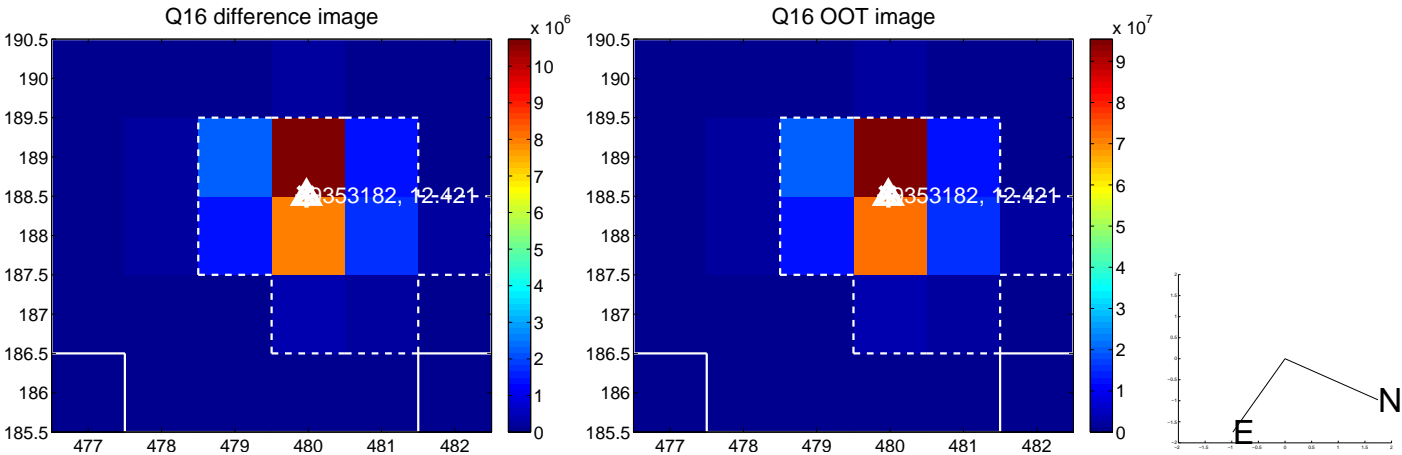
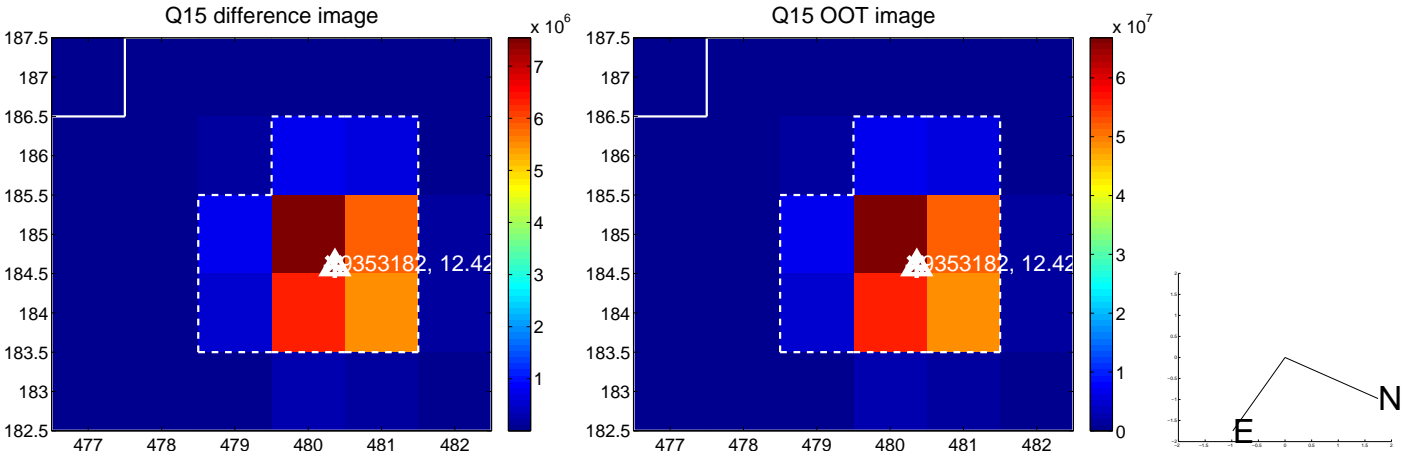
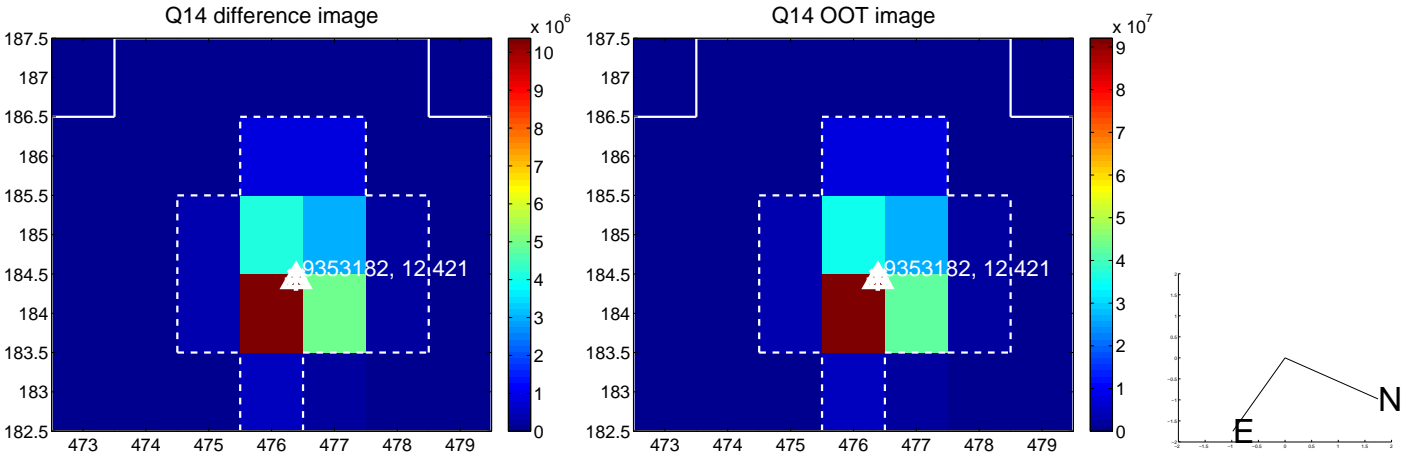
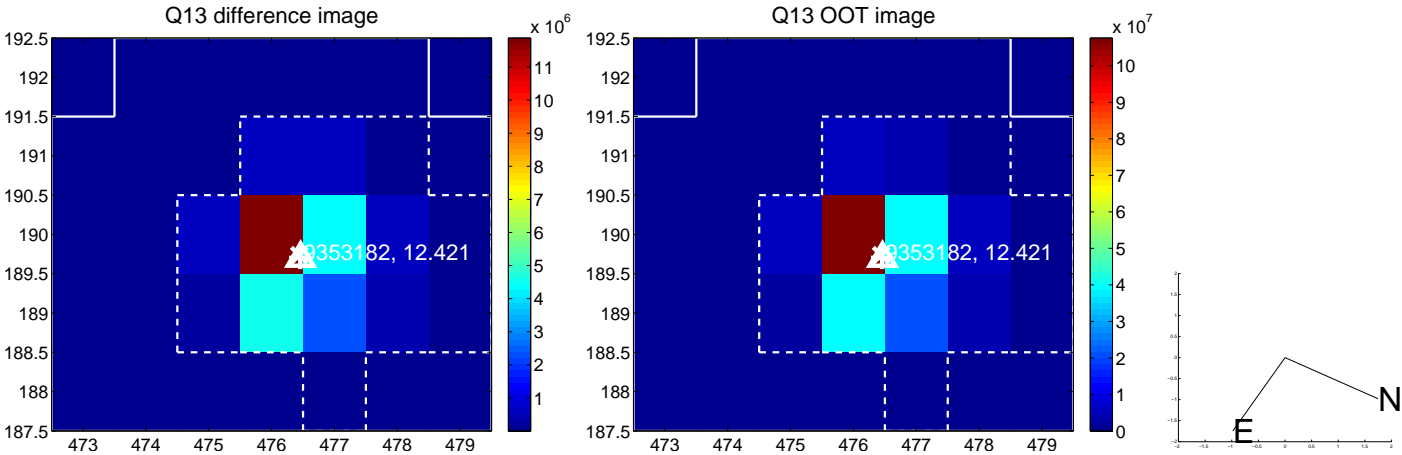




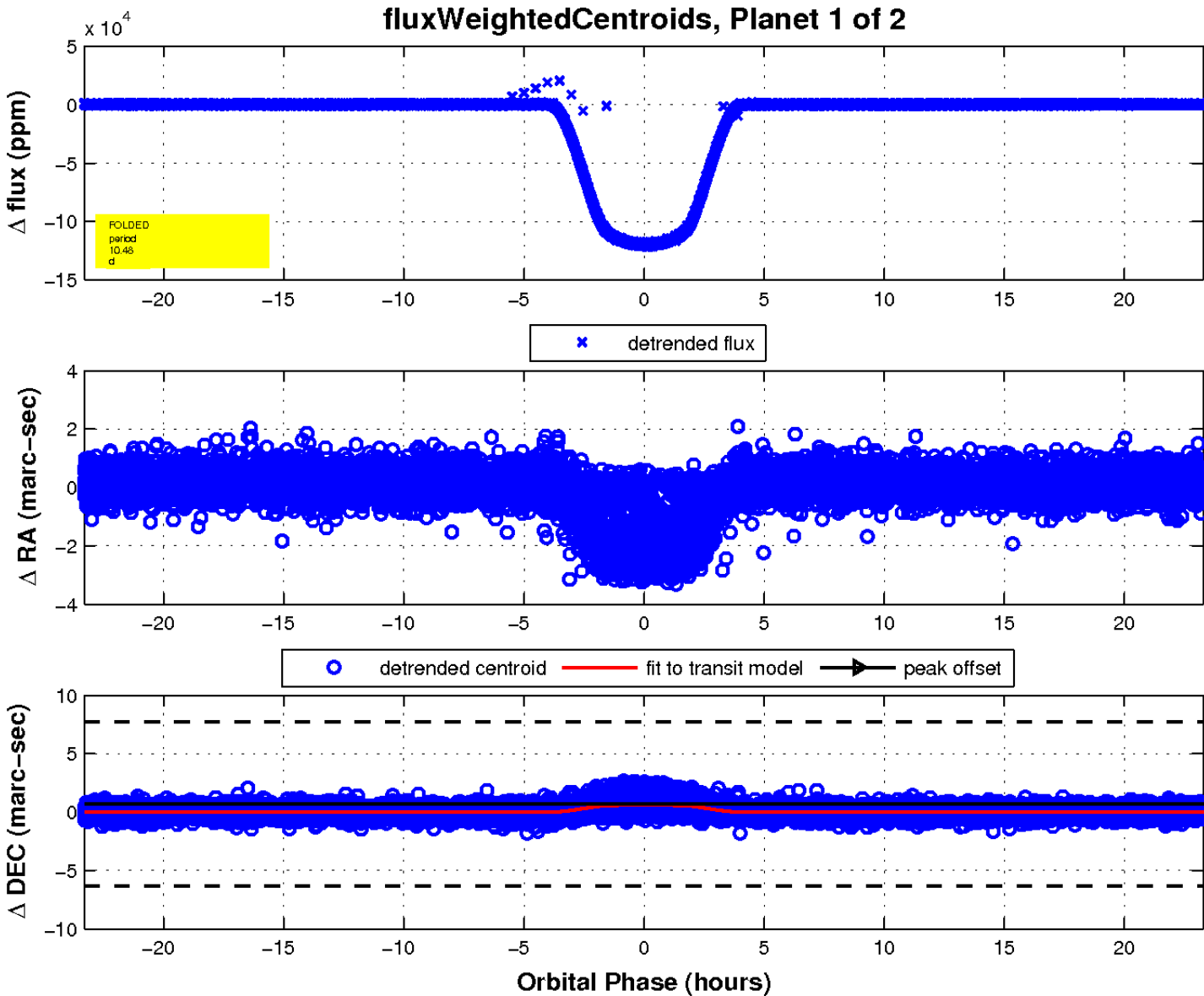
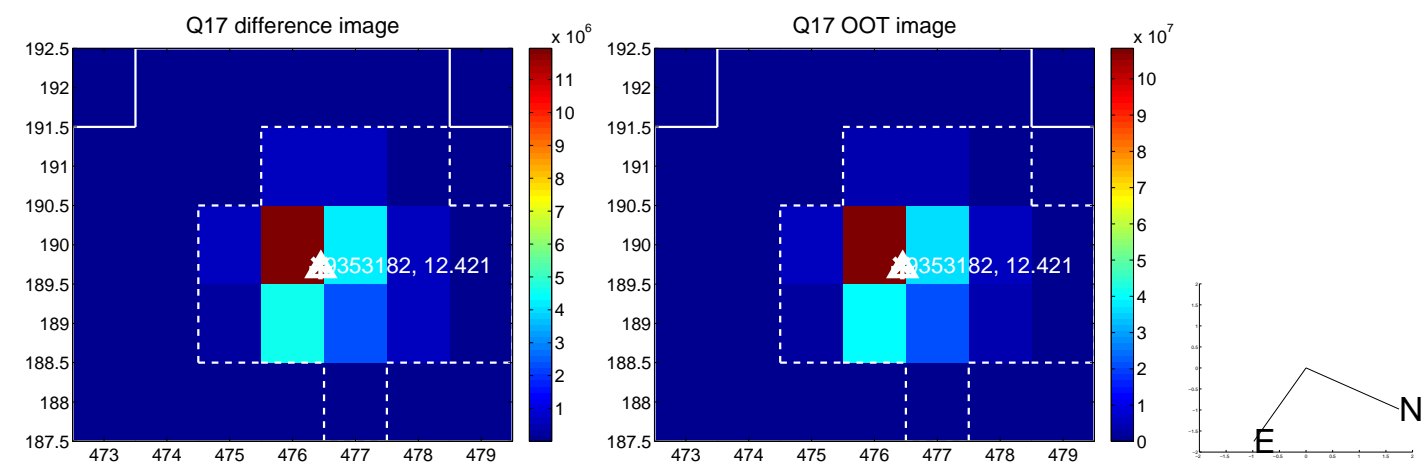
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

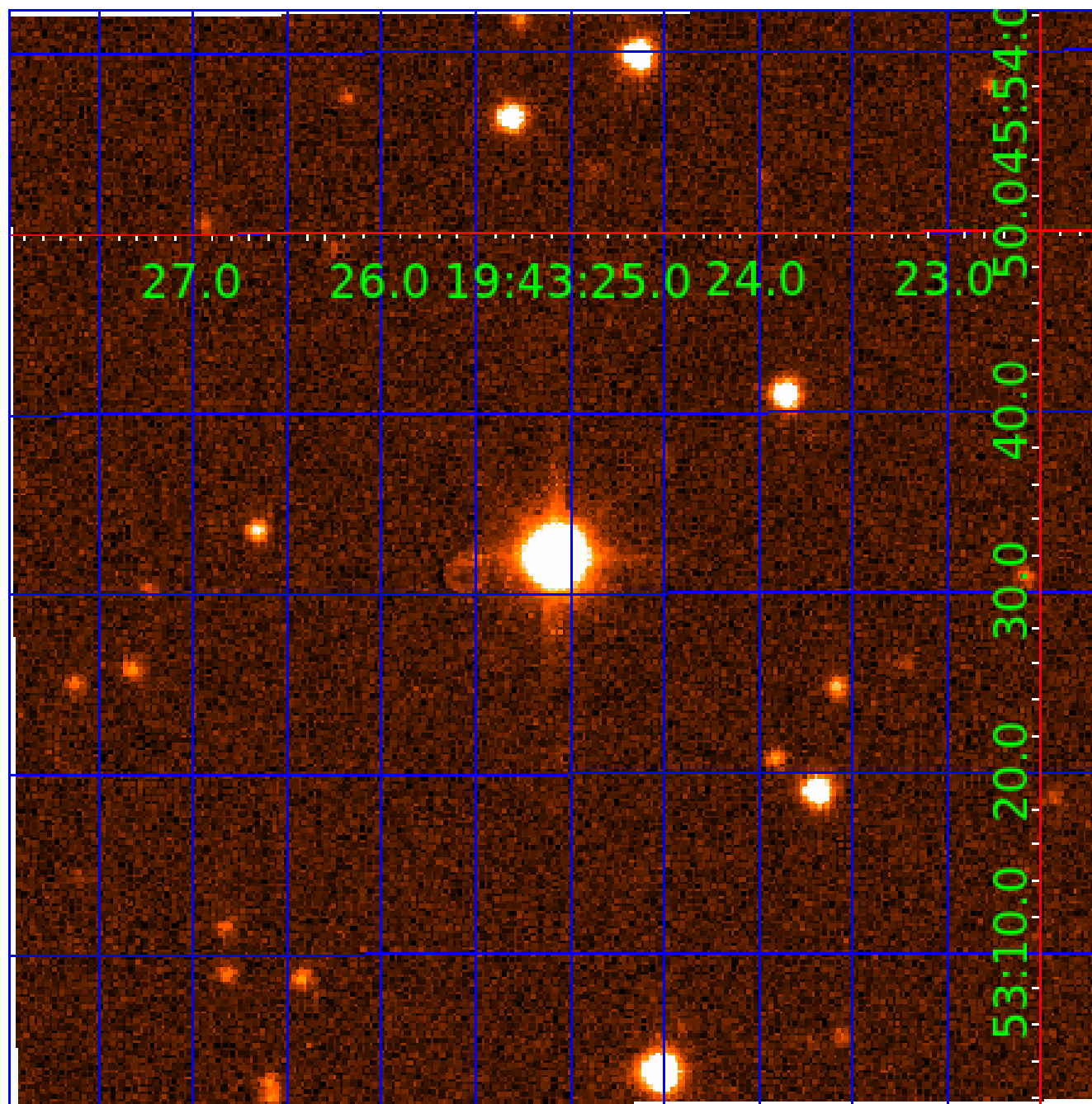


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 009353182

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009353182-01	OBS	7164.01	10.476258	136.528301	120530.4	7.769	12819.5	10393.4	1.54	6109	54.21	319.22
009353182-02	OBS	No	10.476257	131.530032	10203.6	7.002	1221.8	1041.6	1.54	6109	17.16	319.22

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009353182-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE
009353182-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE

**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.

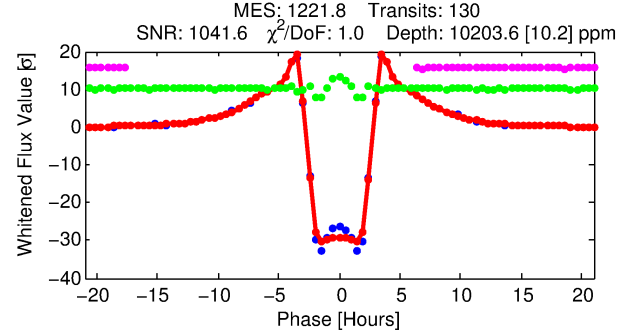
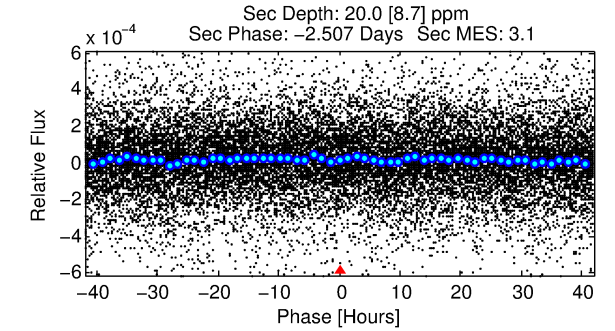
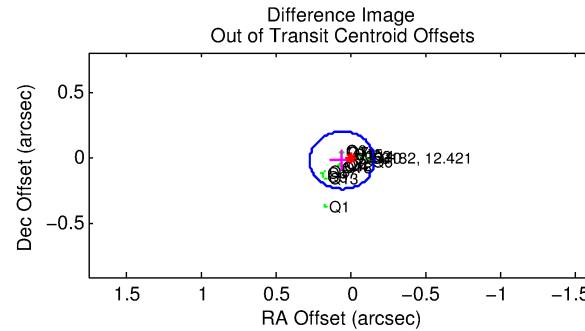
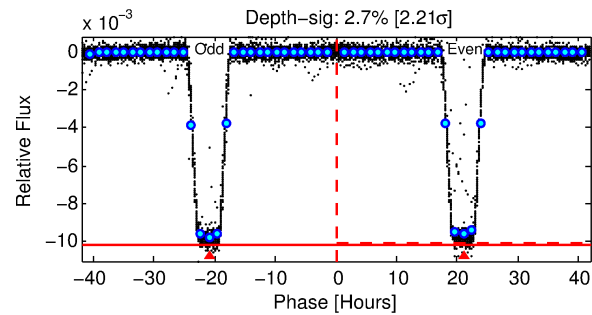
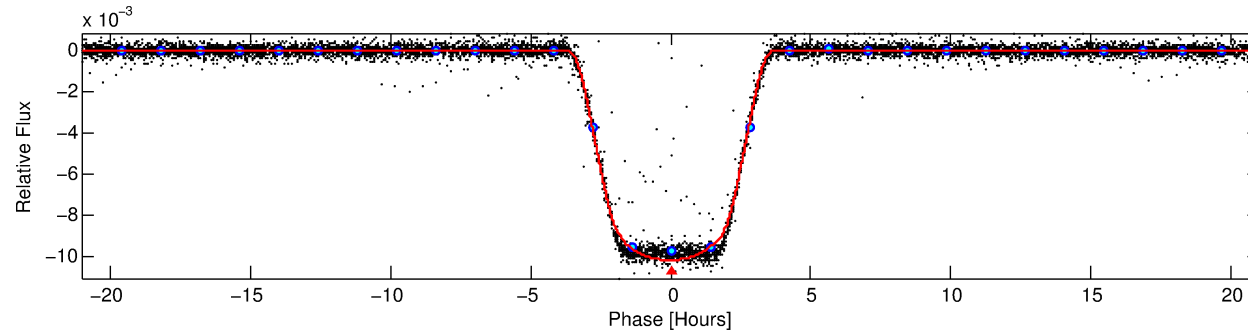
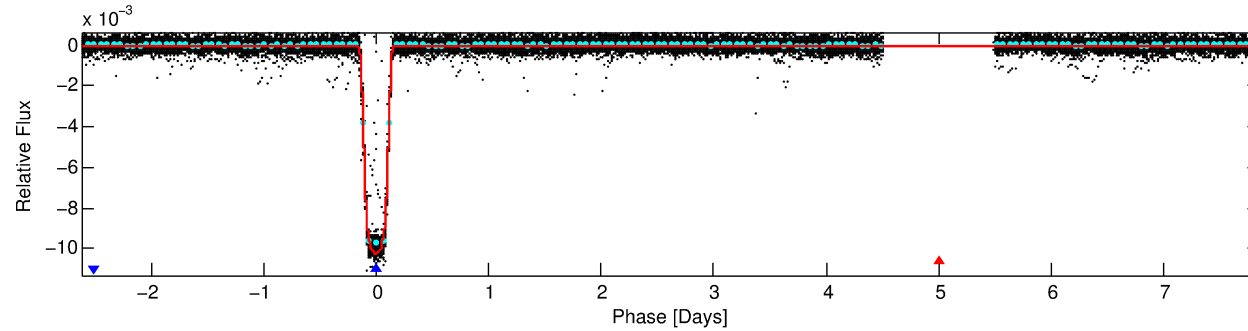
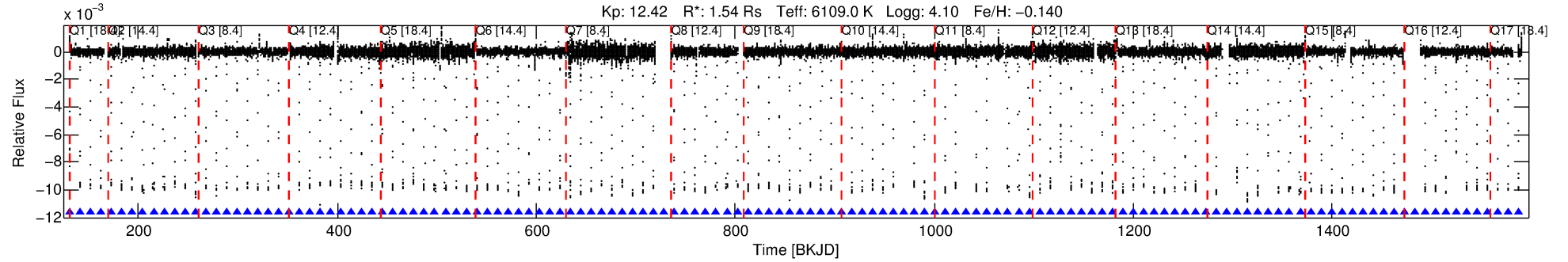
## Ephemeris Match Information For 009353182-02

No Significant Match Found

# DV One-Page Summary

KIC: 9353182 Candidate: 2 of 2 Period: 10.476 d

KOI: K07164 Corr: No Ephemeris Match



## DV Fit Results:

Period = 10.47626 [0.00000] d  
Epoch = 131.5300 [0.0001] BKJD  
Rp/R\* = 0.1024 [0.0001]  
a/R\* = 8.81 [0.01]  
b = 0.79 [0.00]  
Seff = 319.22 [131.47]  
Teq = 1078 [111] K  
Rp = 17.16 [4.63] Re  
a = 0.0960 [0.0241] AU  
Ag = 0.34 [0.20] [-3.24 $\sigma$ ]  
Teffp = 1276 [145] K [1.09 $\sigma$ ]

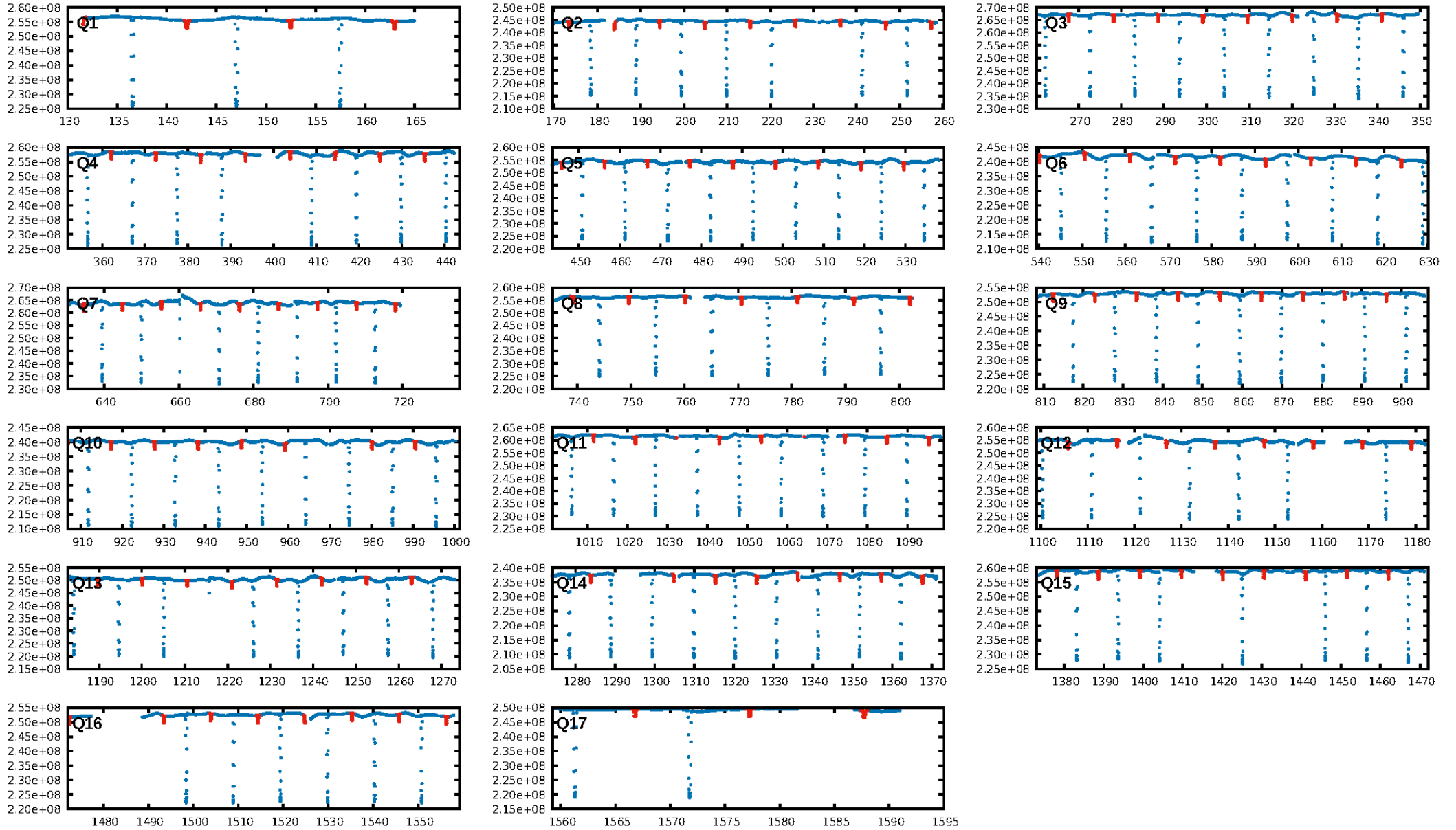
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00 $\sigma$ ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 32.6%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [123/123]  
GhostDiagnostic-chr: 3.36  
Centroid-sig: N/A  
Centroid-so: 0.100 arcsec [31.33 $\sigma$ ]  
OotOffset-rm: 0.057 arcsec [0.79 $\sigma$ ]  
KicOffset-rm: 0.139 arcsec [1.95 $\sigma$ ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 1.00 [17/17]

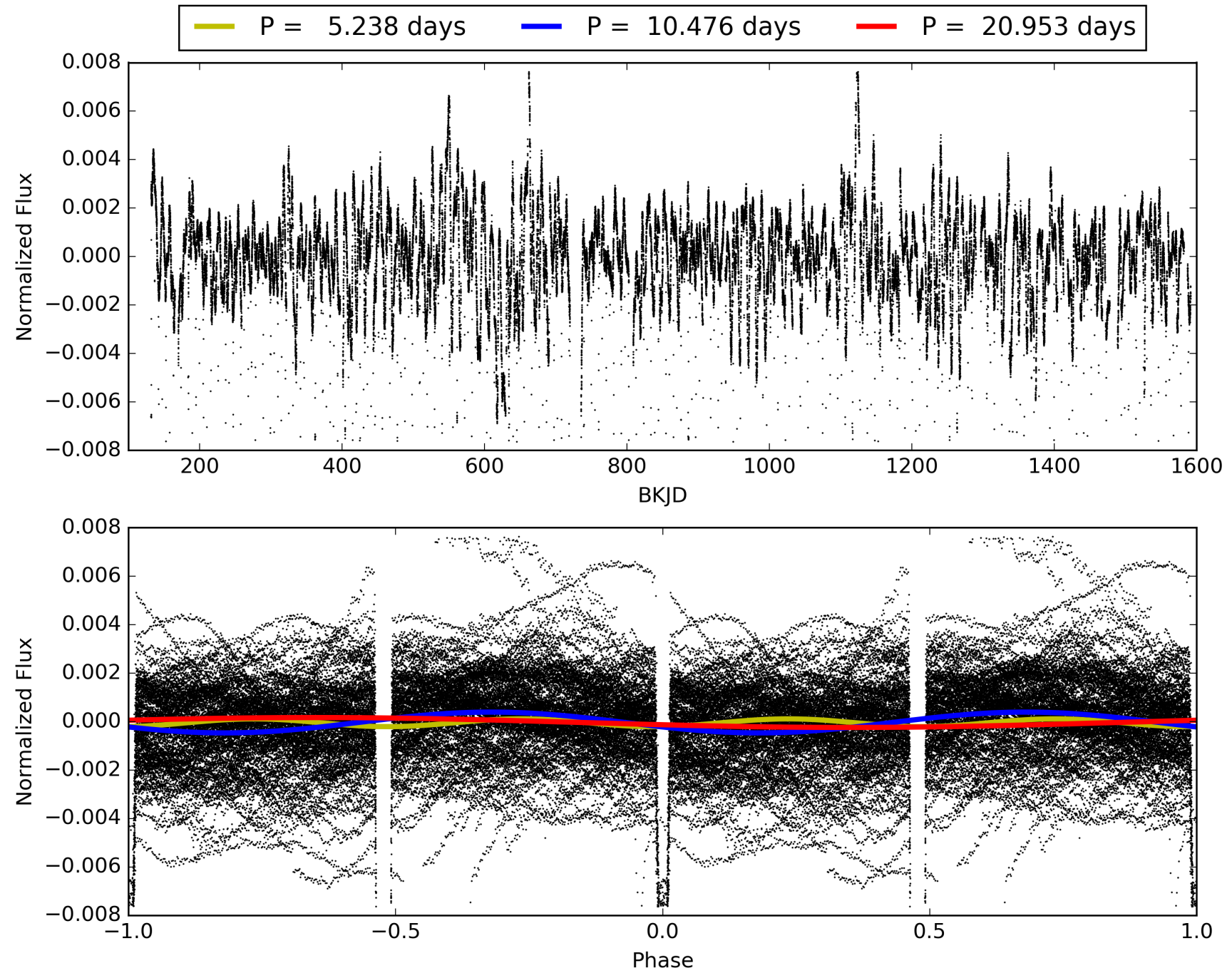
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 03-Feb-2016 06:41:55 Z

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

# TCE 009353182-02, PDC Light Curves



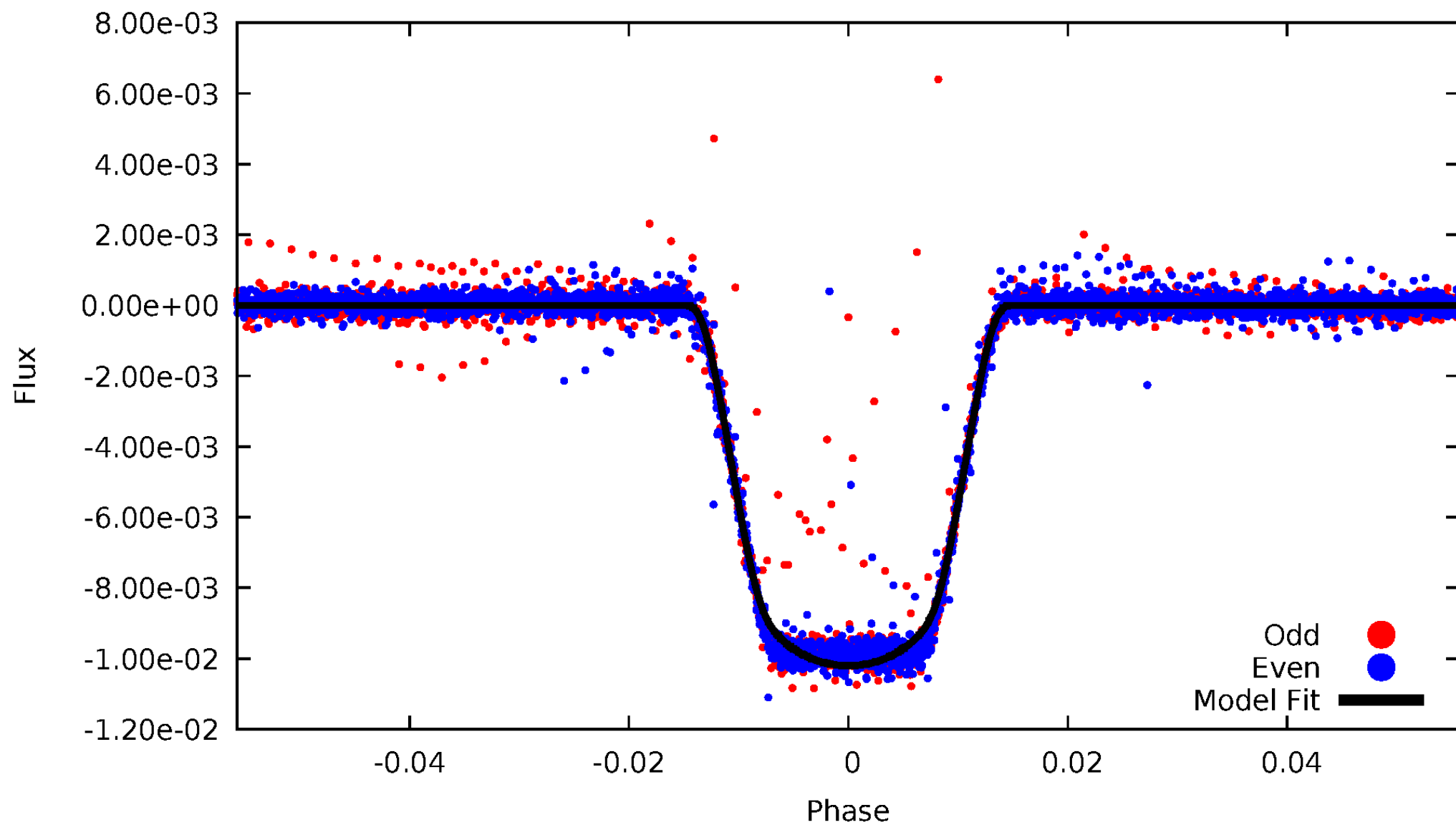
TCE 009353182-02





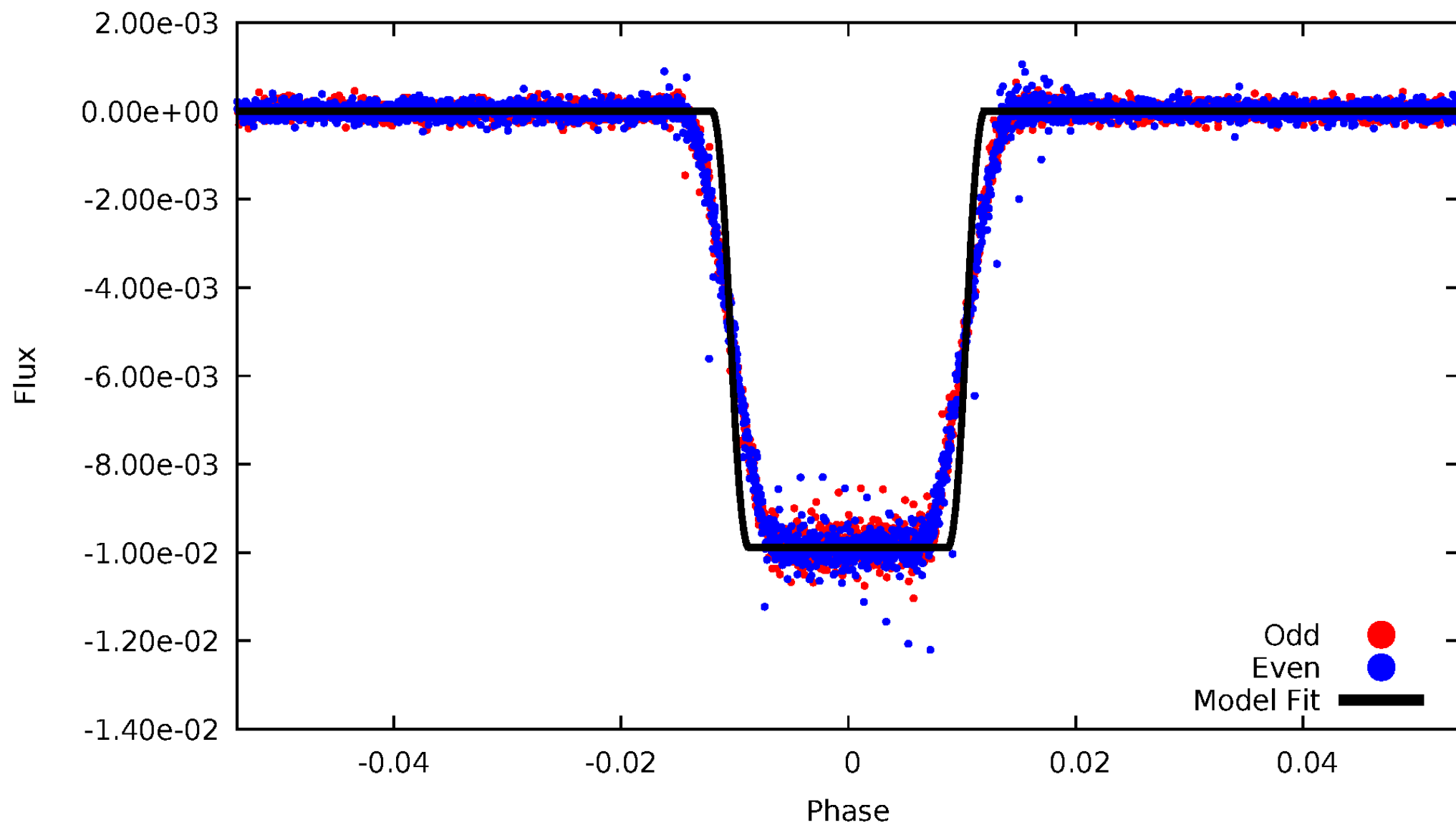
# DV Odd/Even

TCE 009353182-02



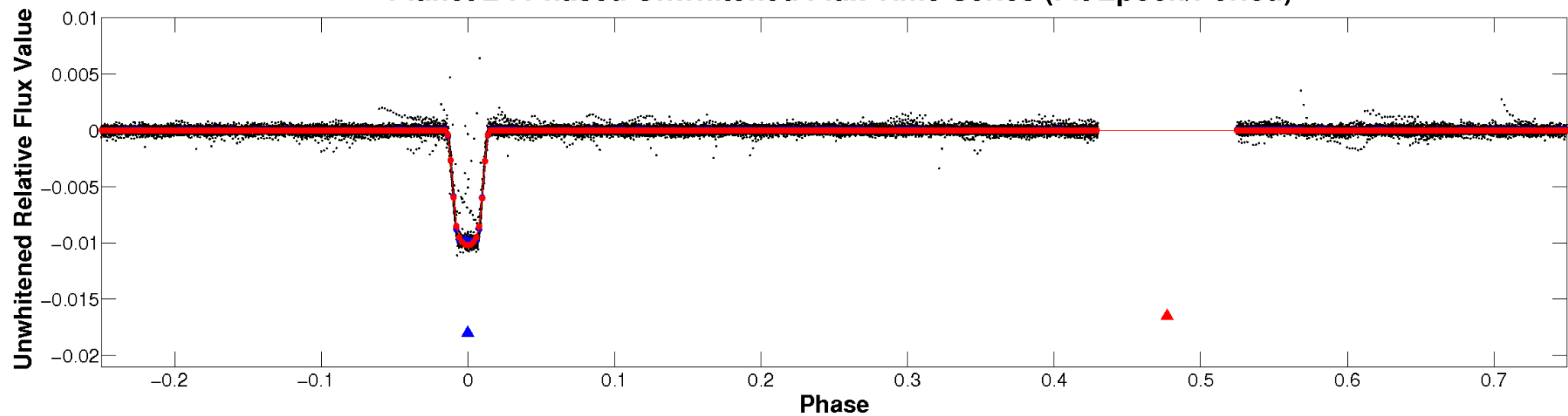
# ALT Odd/Even

TCE 009353182-02

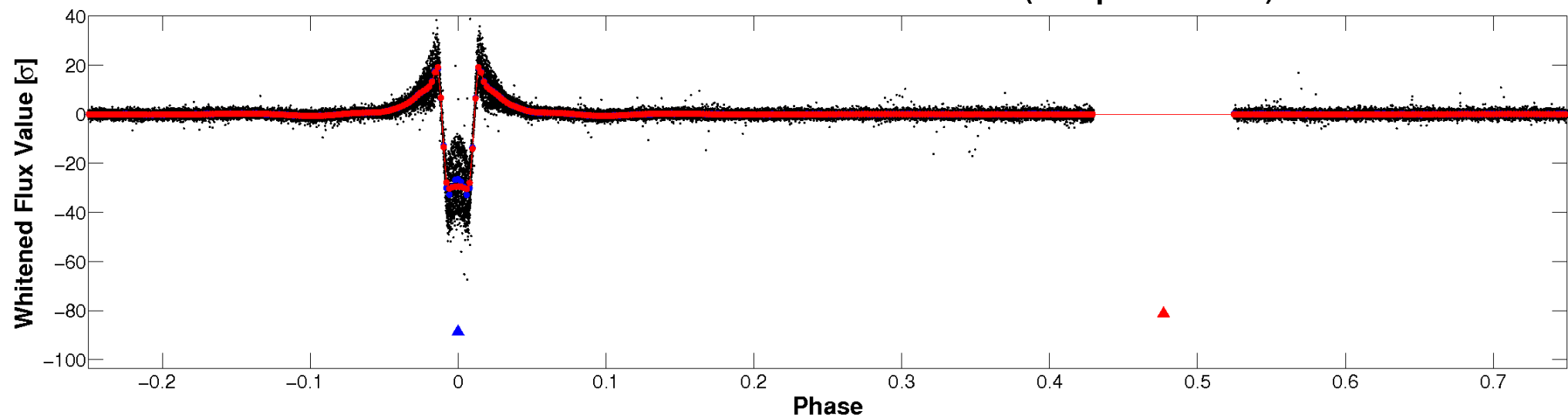


# Non-Whitened Vs. Whitened Light Curve

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

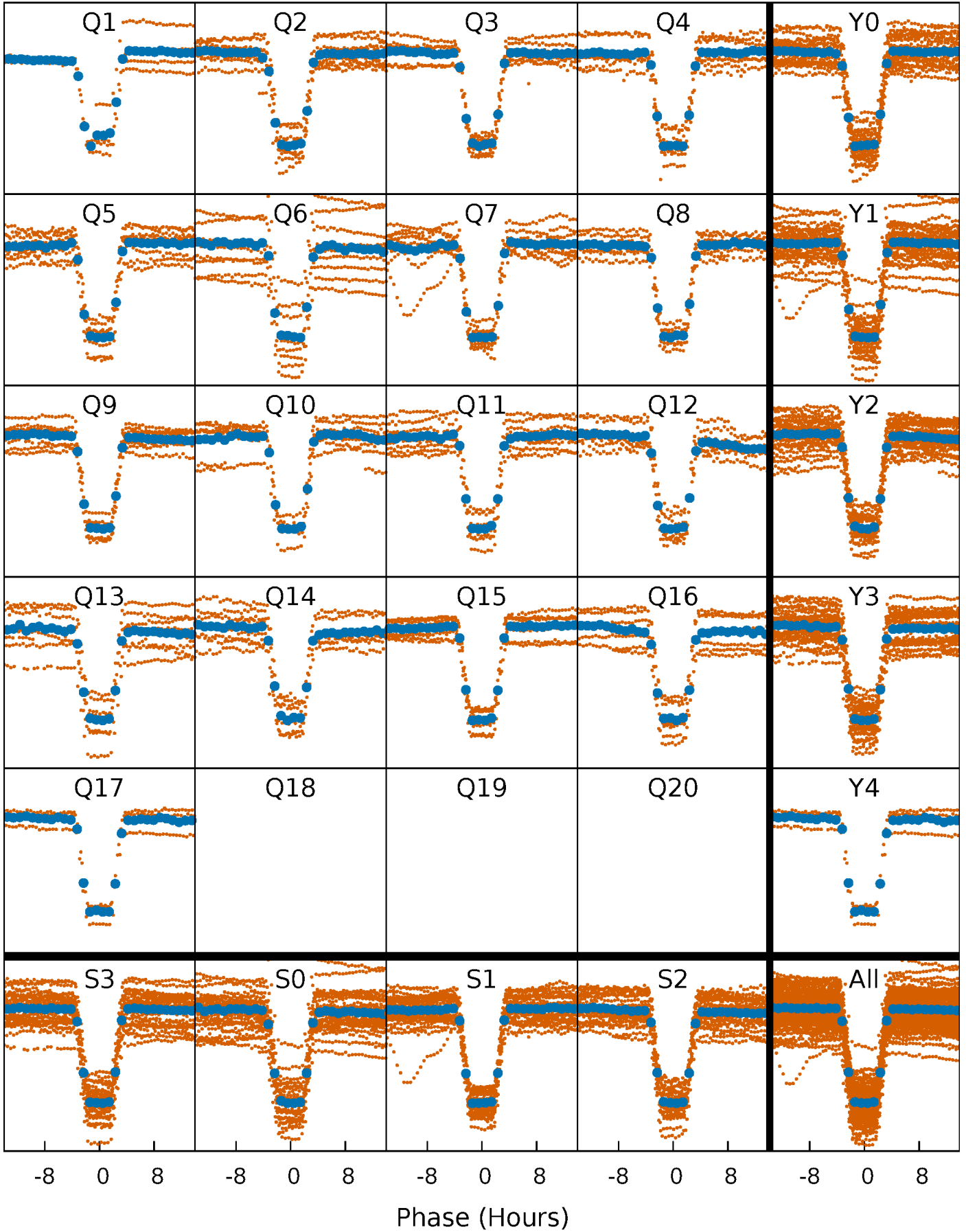


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



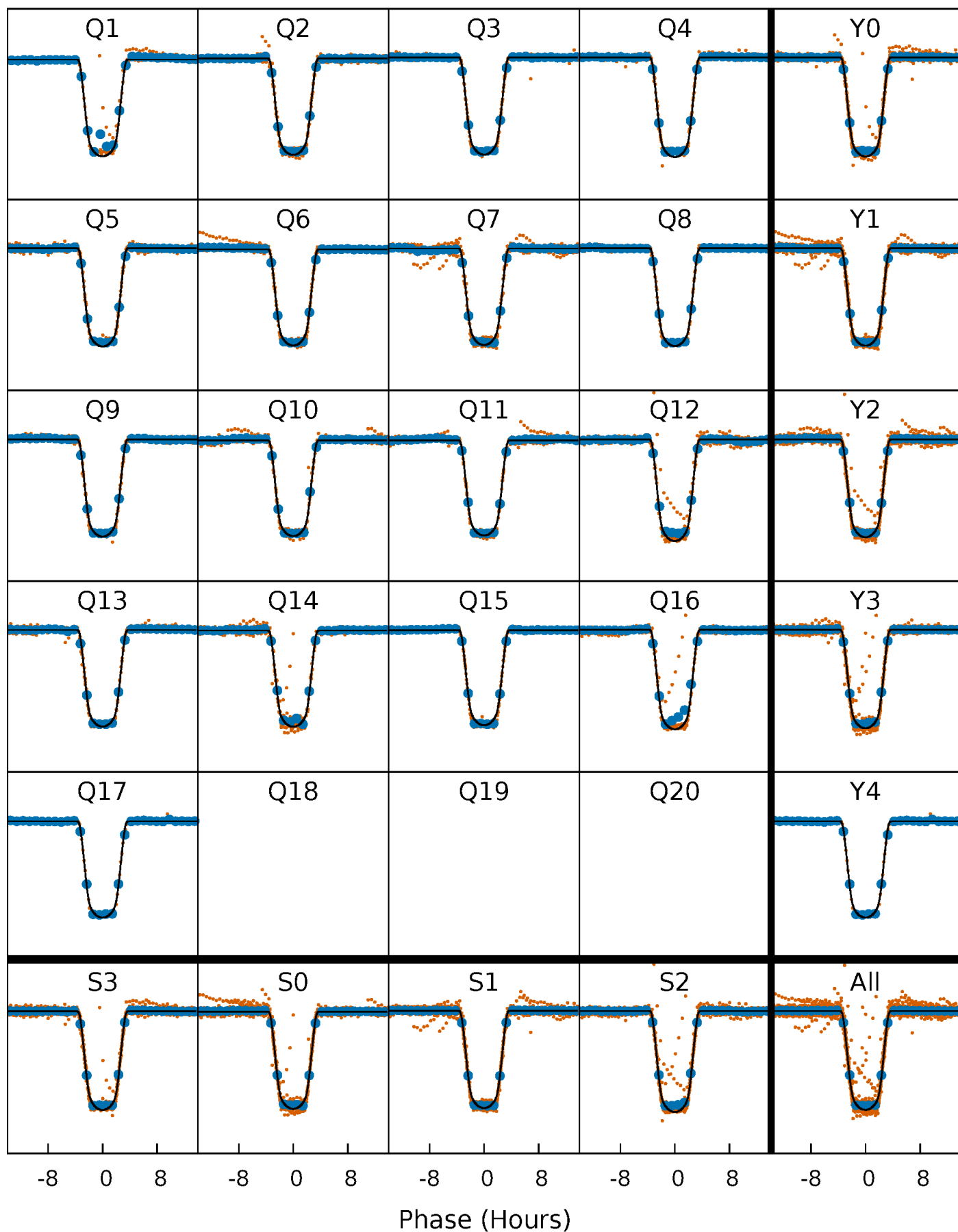
# PDC Quarter-Phased Transit Curves

TCE 009353182-02   P= 10.476257 Days    $T_0=131.530032$  (BKJD)



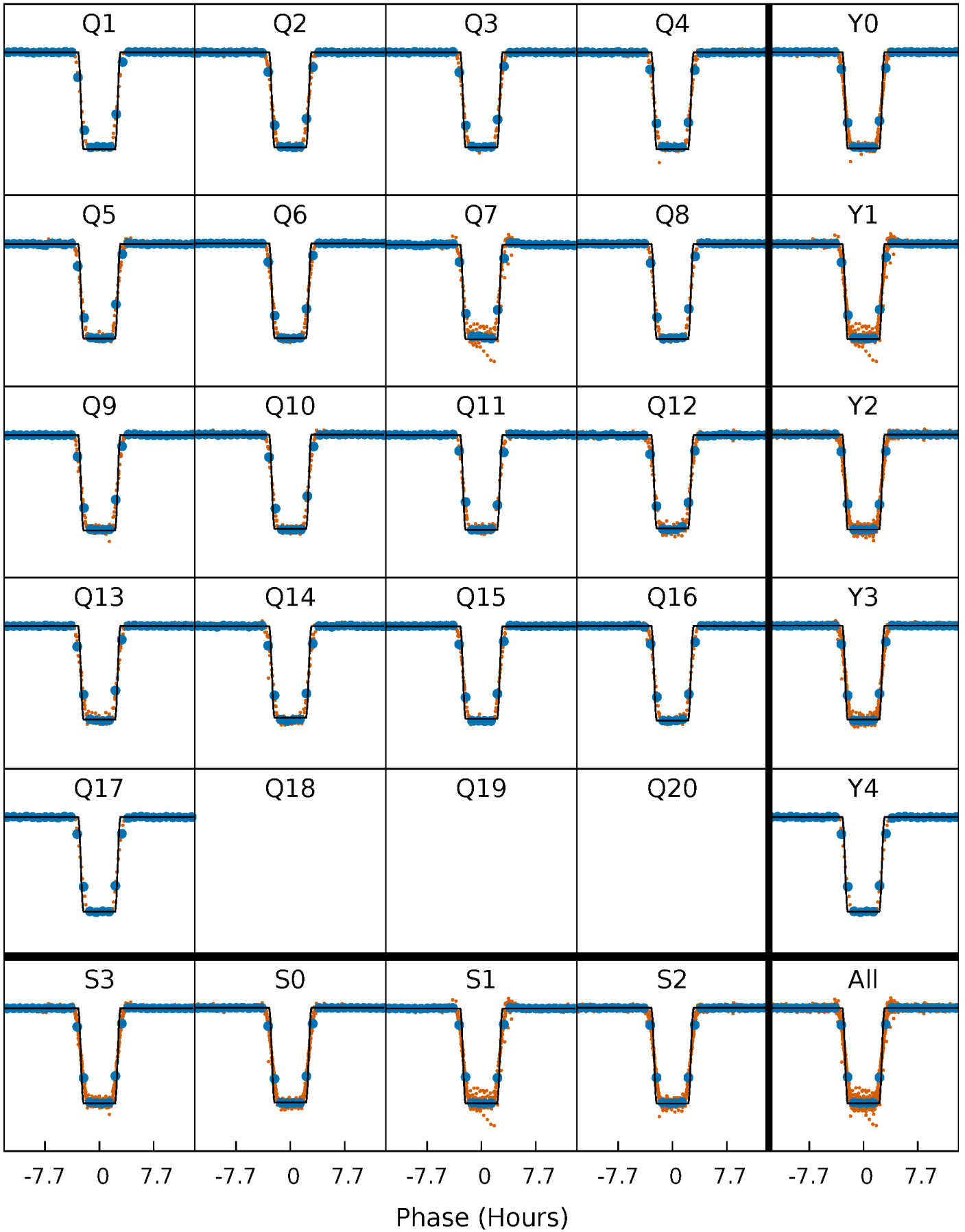
# DV Quarter-Phased Transit Curves

TCE 009353182-02     $P = 10.476257$  Days     $T_0 = 131.530032$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

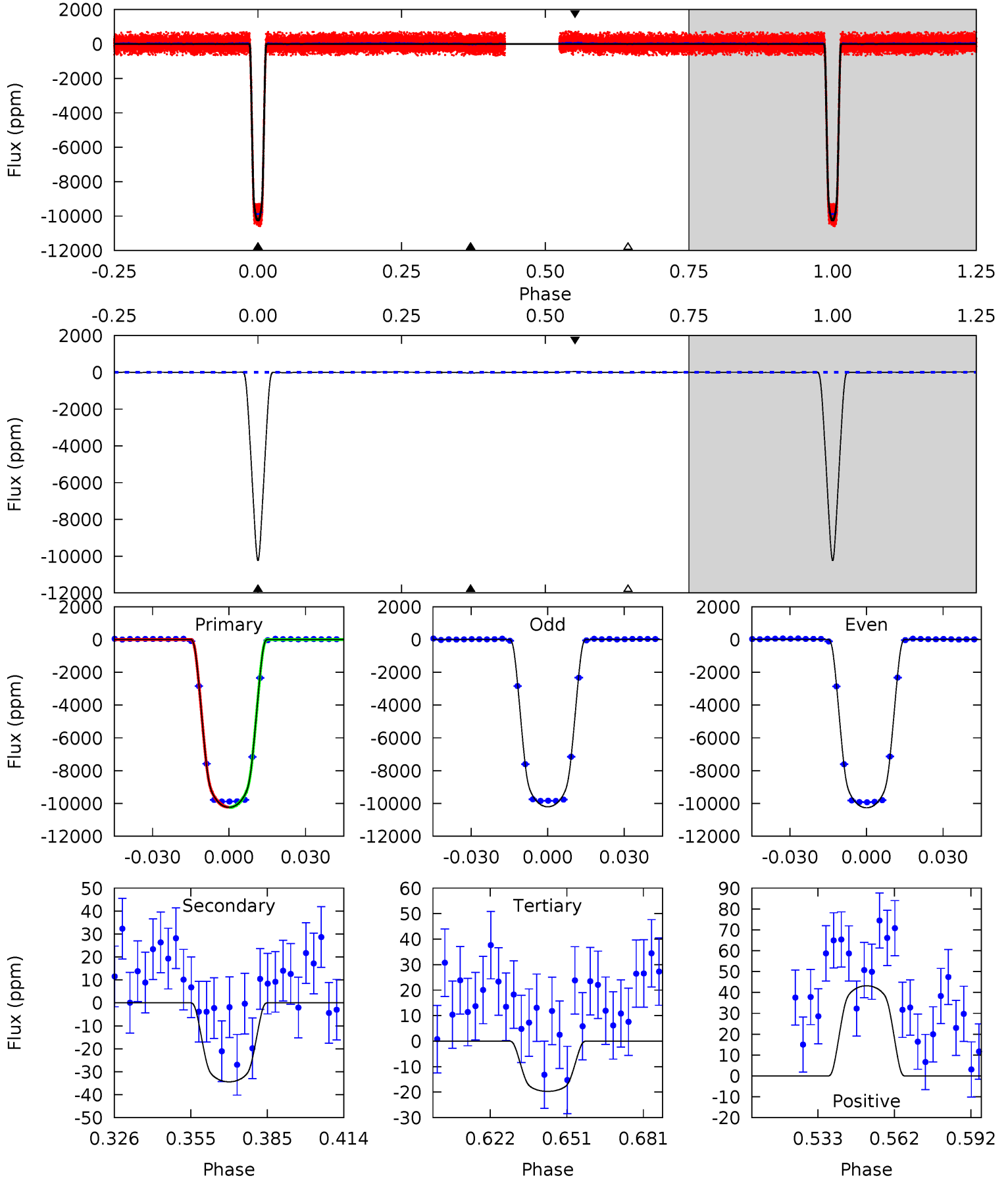
TCE 009353182-02 P= 10.476247 Days  $T_0=131.530749$  (BKJD)



# DV Model-Shift Uniqueness Test

009353182-02, P = 10.476257 Days, E = 121.053775 Days

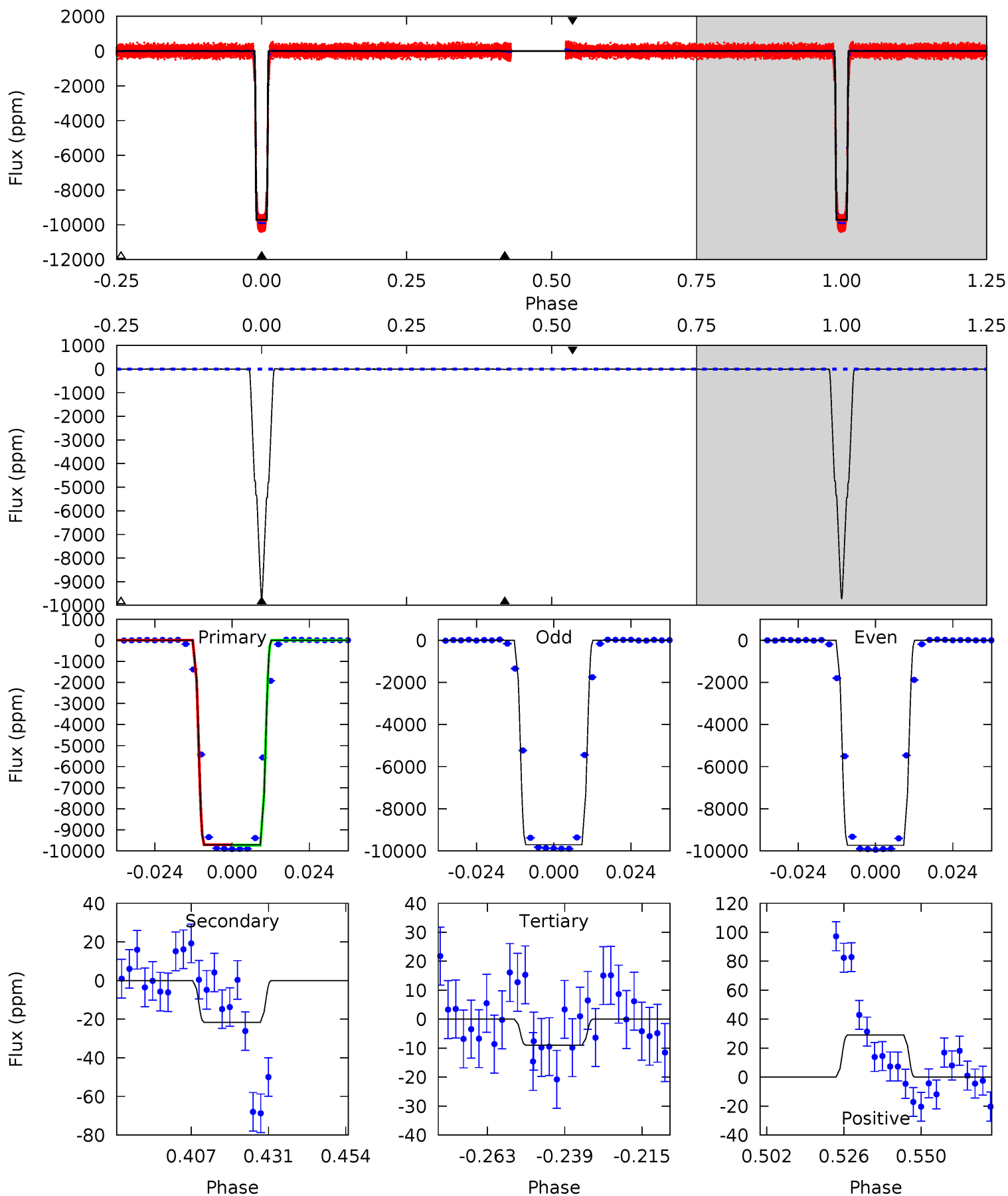
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
2387	8.02	4.60	10.1	4.81	2.18	2.79	2383	2377	3.42	-2.05	6.97	0.98	0.00	2.07



# Alt Model-Shift Uniqueness Test

009353182-02, P = 10.476247 Days, E = 121.054502 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
2648	5.90	2.45	7.95	4.86	2.26	0.97	2645	2640	3.45	-2.04	3.70	1.00	0.00	2.63





### Stellar Parameters For KIC 009353182

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6109^{+167}_{-186}$	$4.097^{+0.228}_{-0.123}$	$-0.140^{+0.300}_{-0.300}$	$1.536^{+0.339}_{-0.414}$	$1.076^{+0.175}_{-0.143}$	$0.418^{+0.570}_{-0.156}$
	+3%/-3%	+6%/-3%	+214%/-214%	+22%/-27%	+16%/-13%	+136%/-37%
Source	PHO1	FLK73	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 009353182-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-34 \pm 4$	$17.08^{+2.20}_{-2.34}$	$1492^{+95}_{-115}$	$2187^{+85}_{-104}$	$0.612^{+0.220}_{-0.139}$
Alt.	$-22 \pm 4$	$16.62^{+2.05}_{-2.34}$	$1496^{+97}_{-109}$	$1946^{+142}_{-494}$	$0.398^{+0.135}_{-0.095}$

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

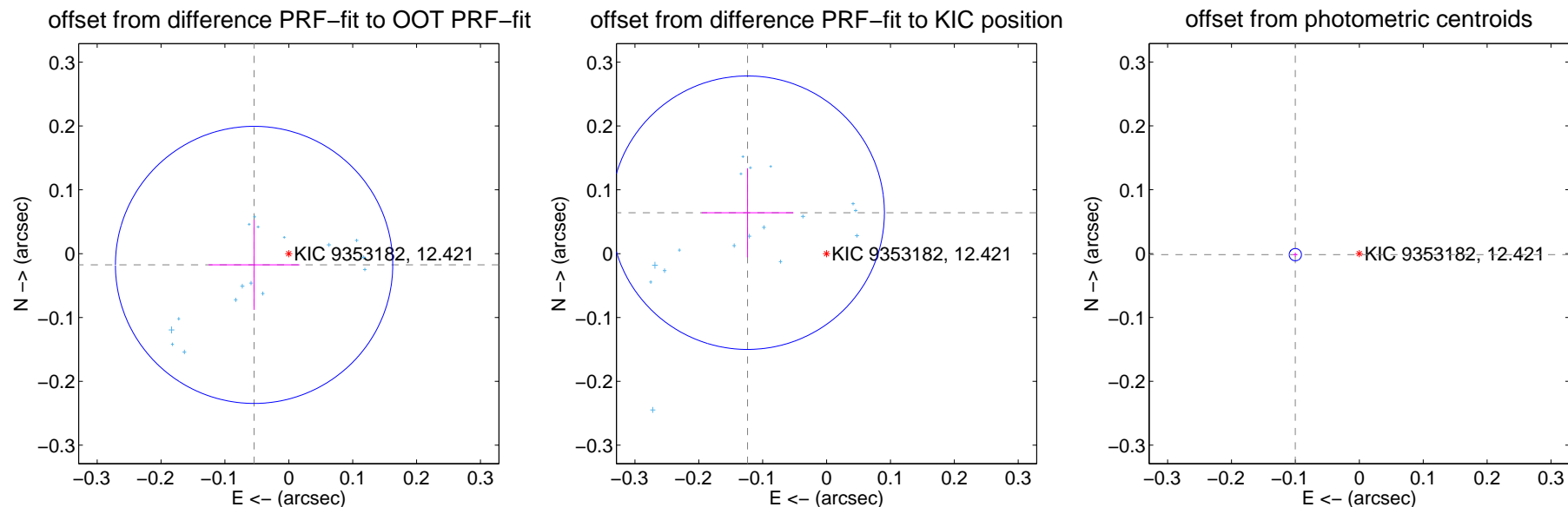
## DV Centroid Data

Supplemental centroid analysis for 009353182-02. Kepler magnitude: 12.42. Transit SNR 1041.63

There are 17 quarters with good PRF difference image offsets

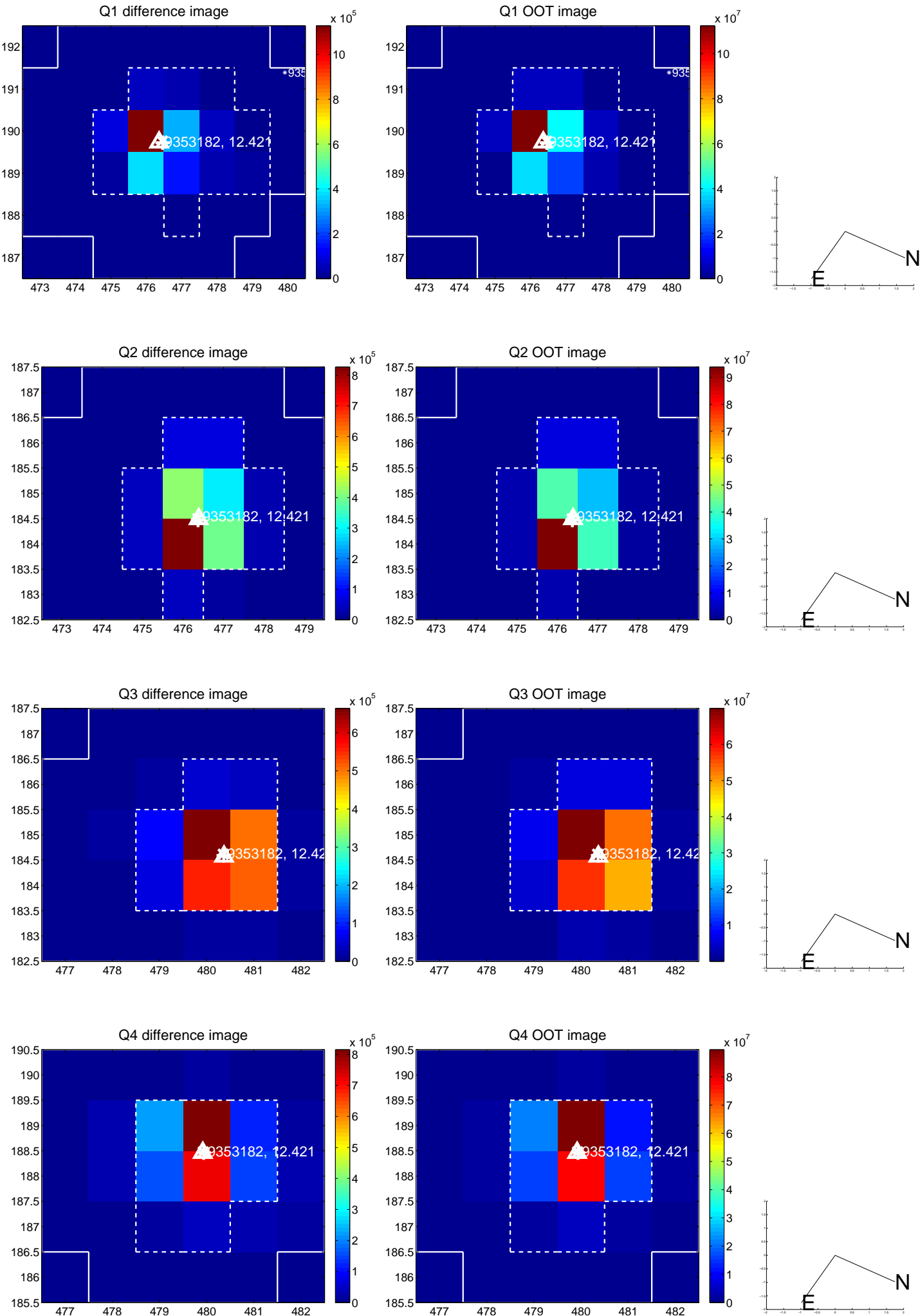
The direct PRF centroid is offset from the target star catalog position by about 0.13 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.057 \pm 0.072$	0.79	$0.054 \pm 0.071$	$-0.018 \pm 0.071$
PRF-fit source offset from KIC position	$0.139 \pm 0.071$	1.95	$0.124 \pm 0.072$	$0.064 \pm 0.070$
photometric centroid source offset	$0.10 \pm 0.00$	31.33	$0.10 \pm 0.00$	$-0.00 \pm 0.00$

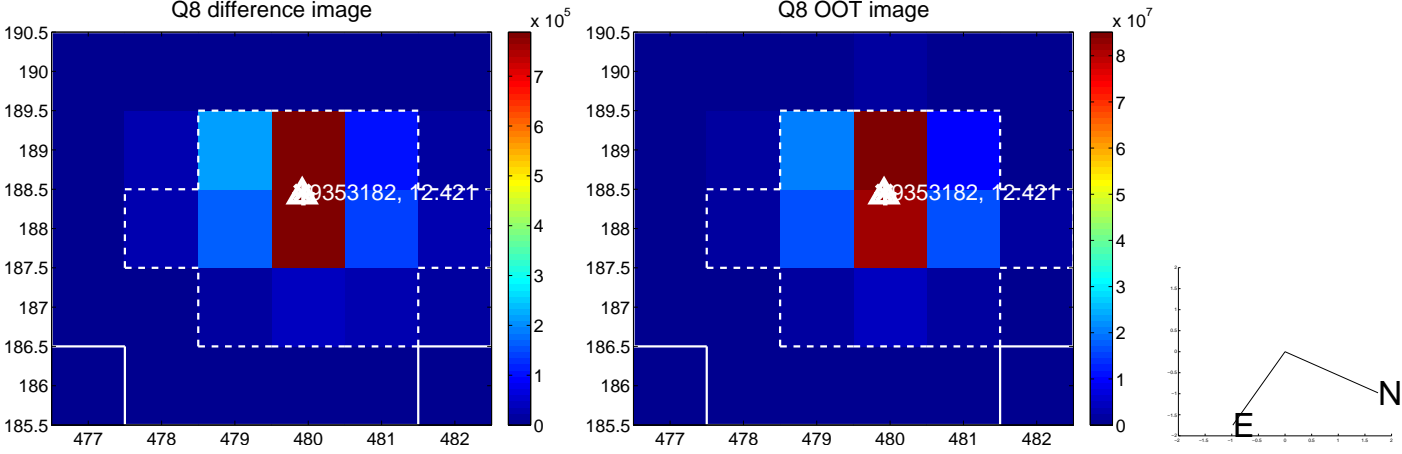
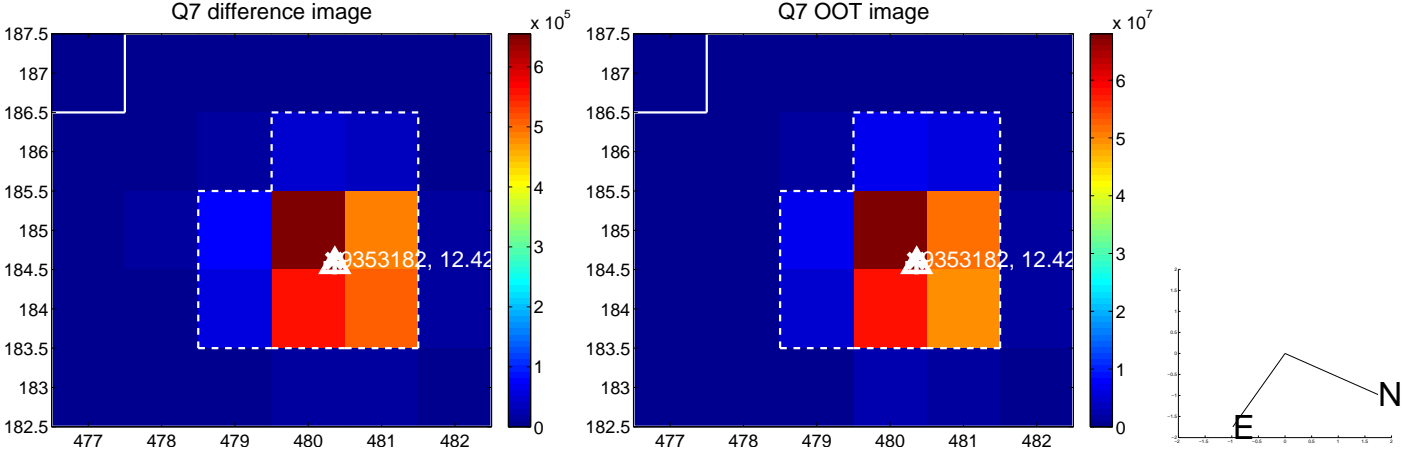
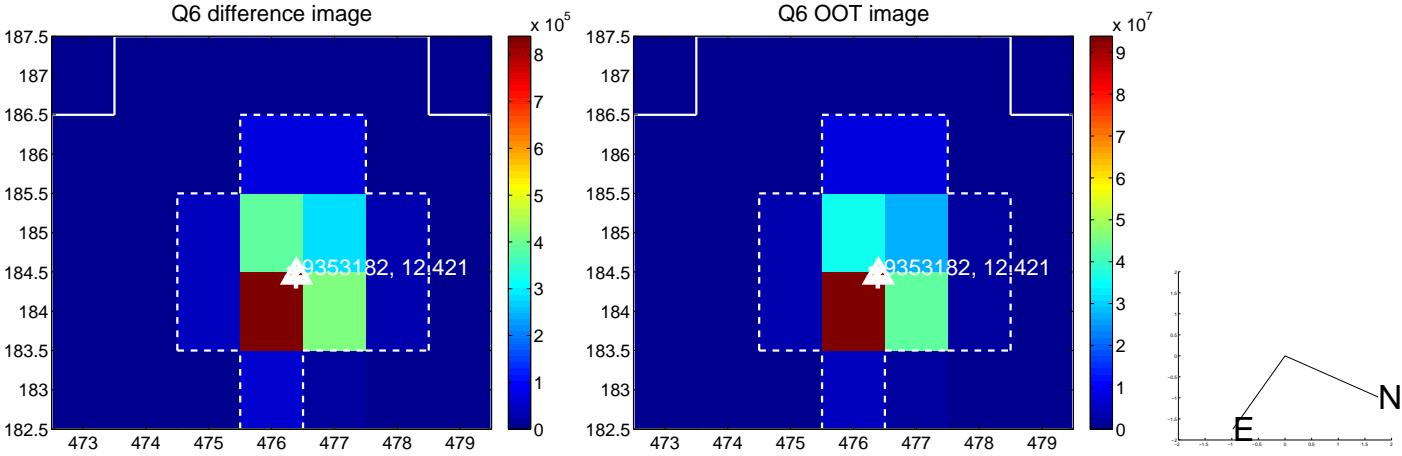
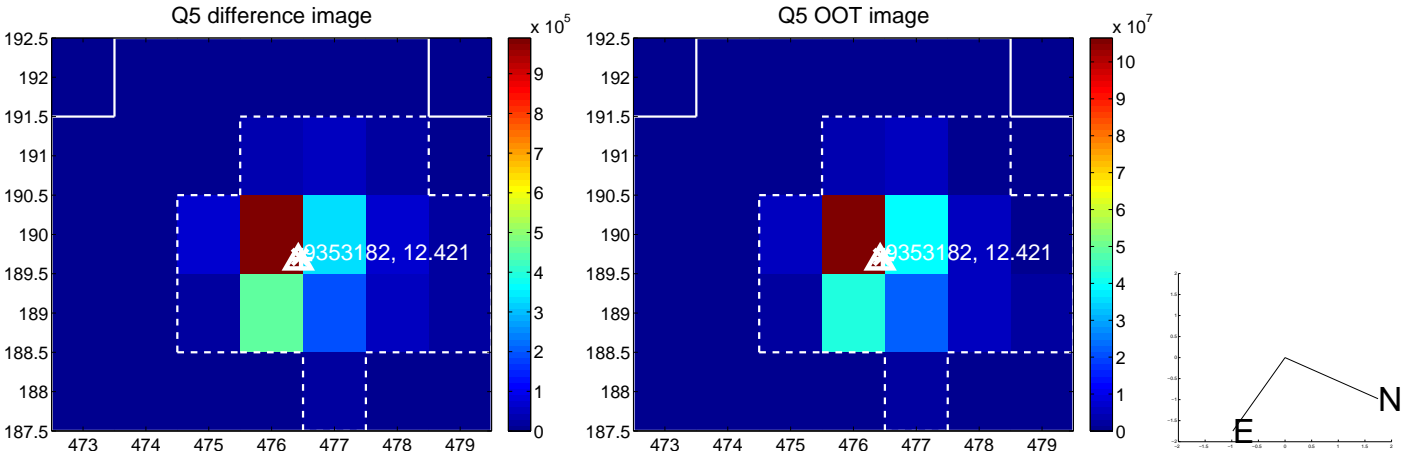


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

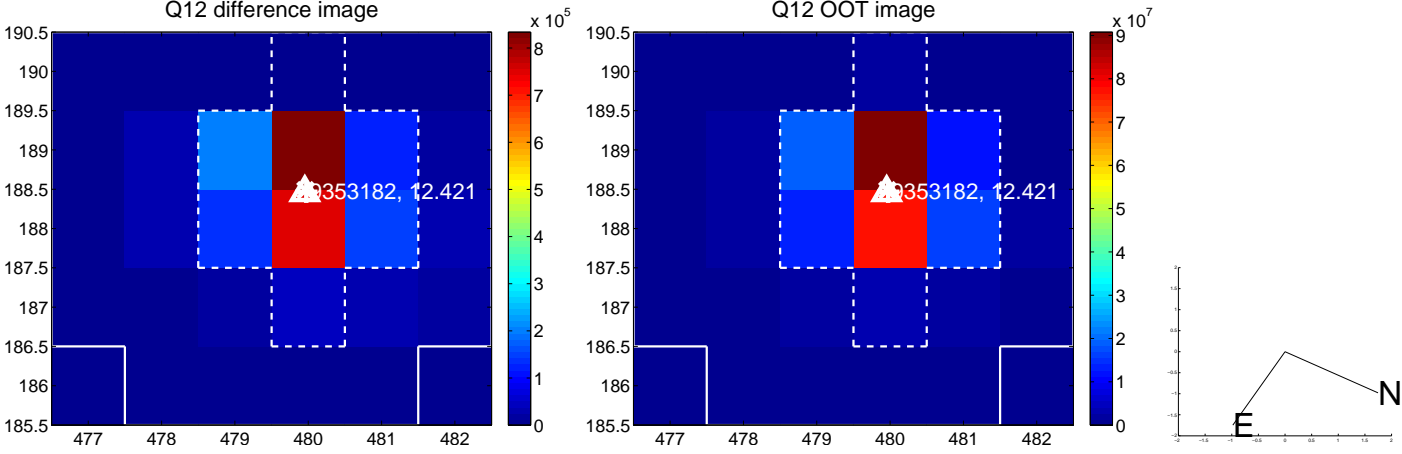
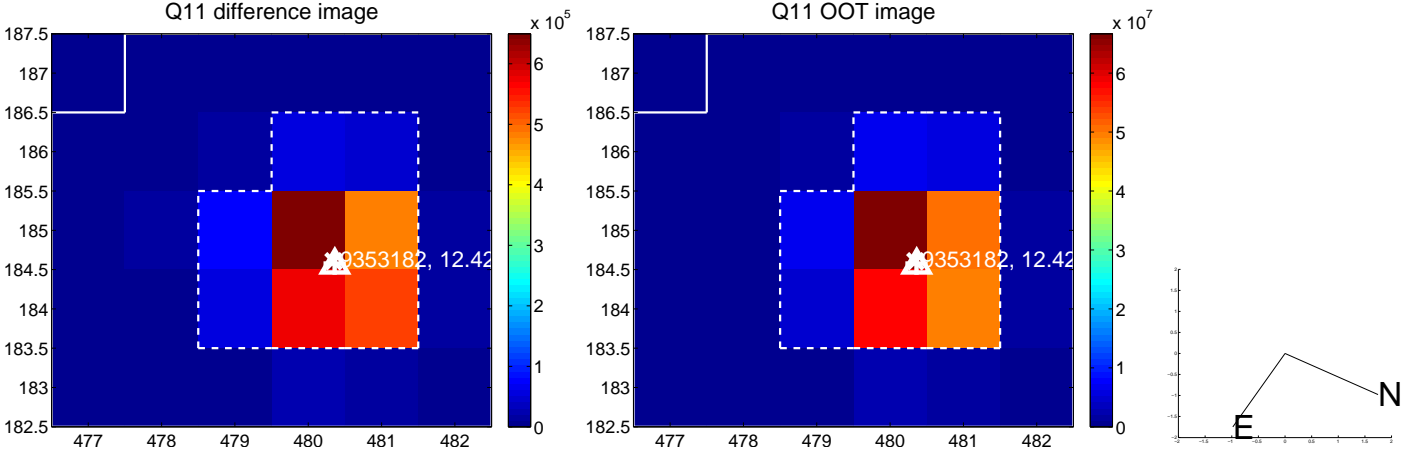
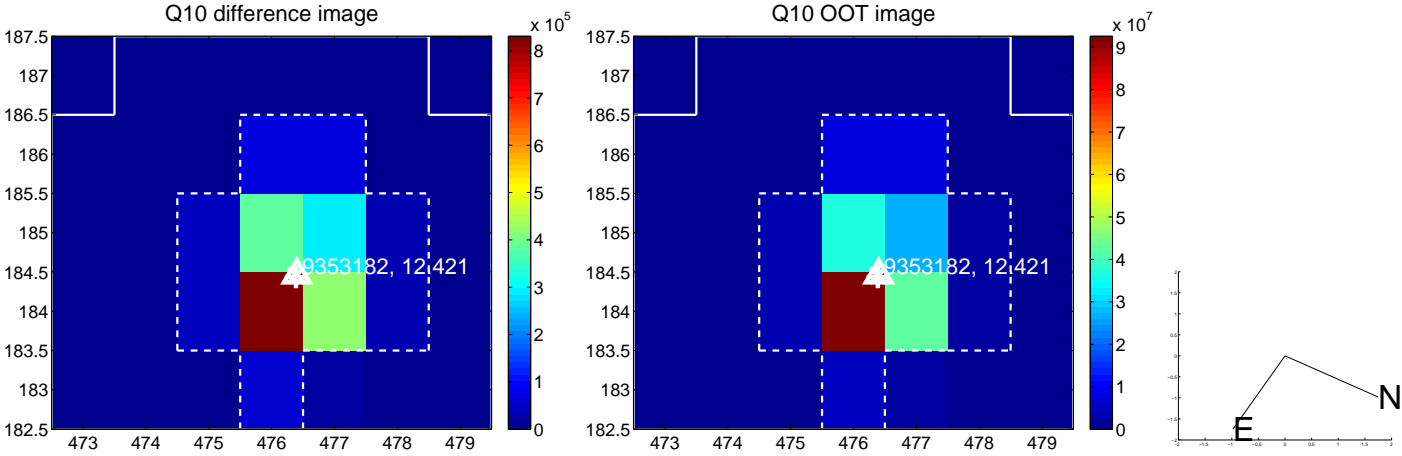
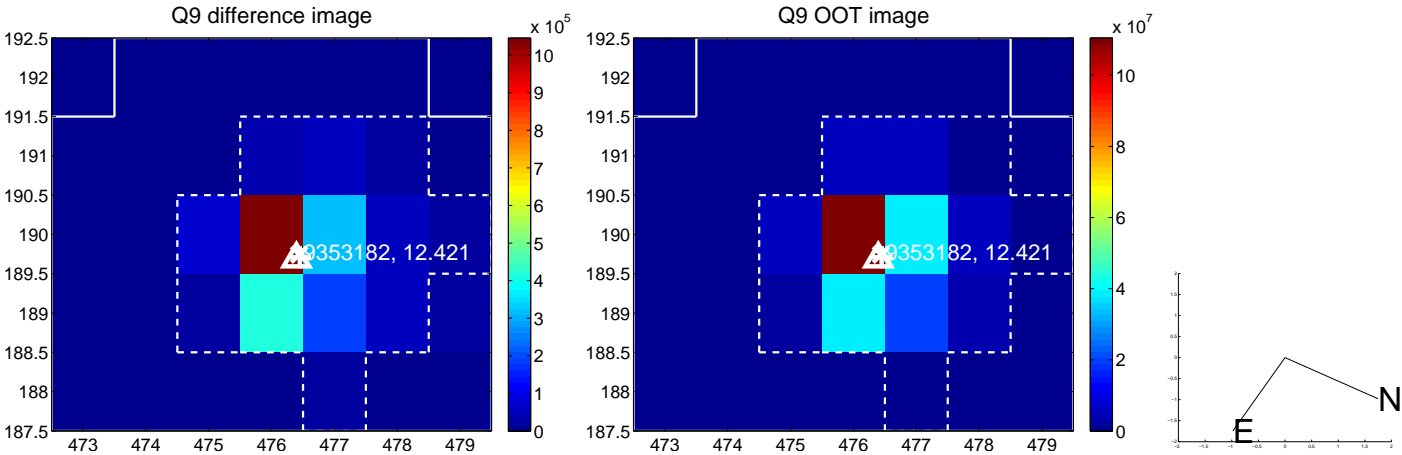
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



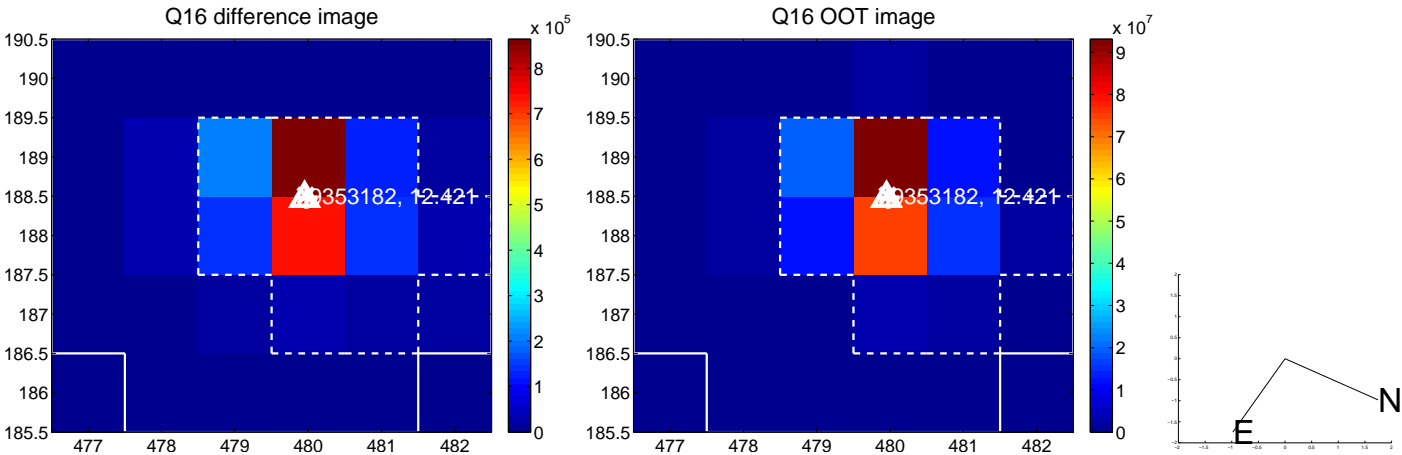
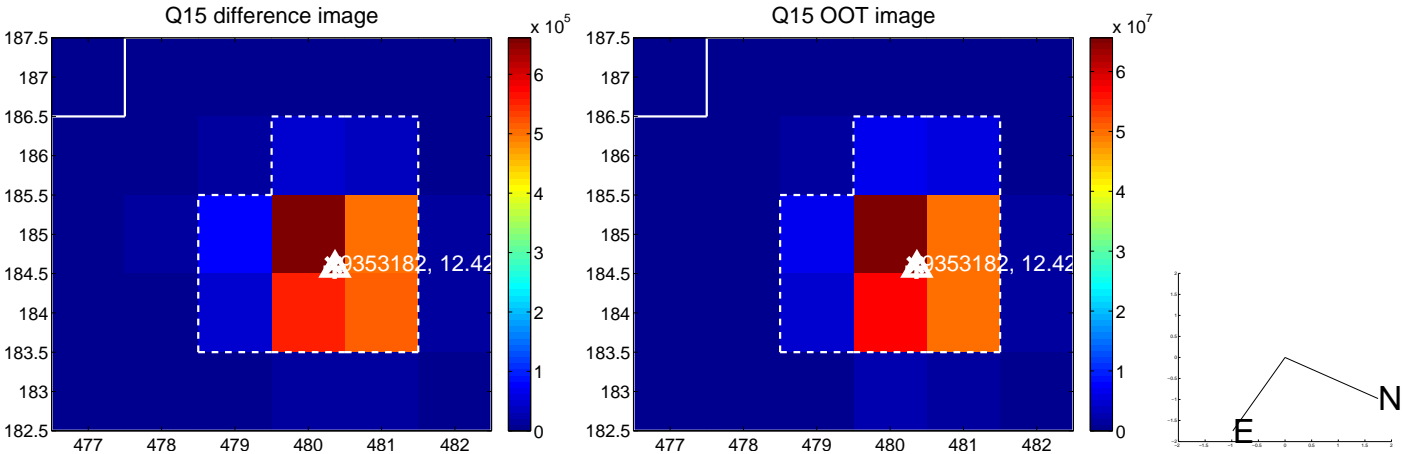
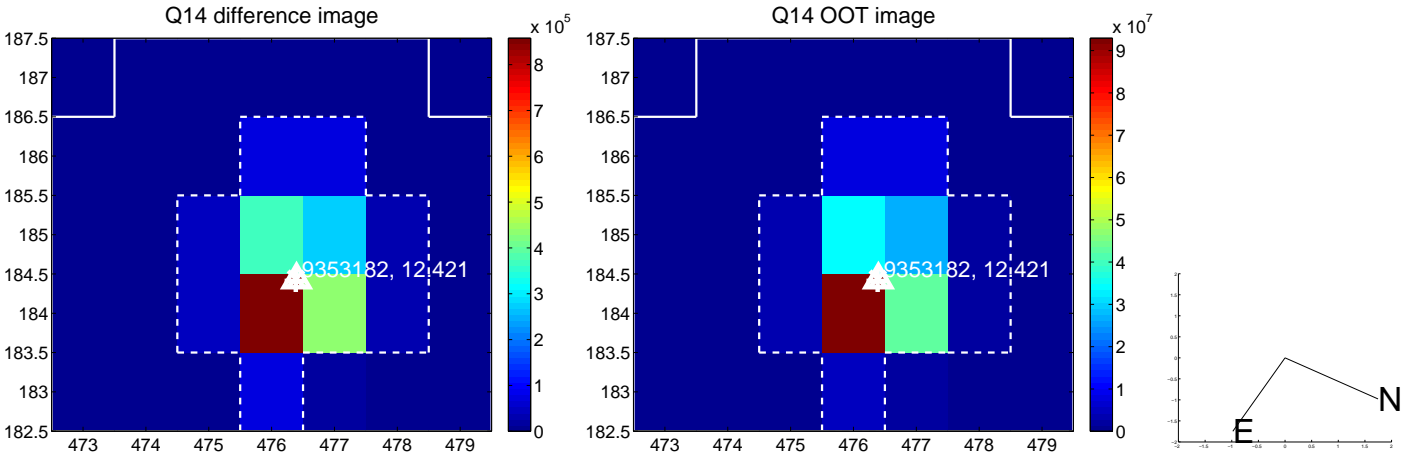
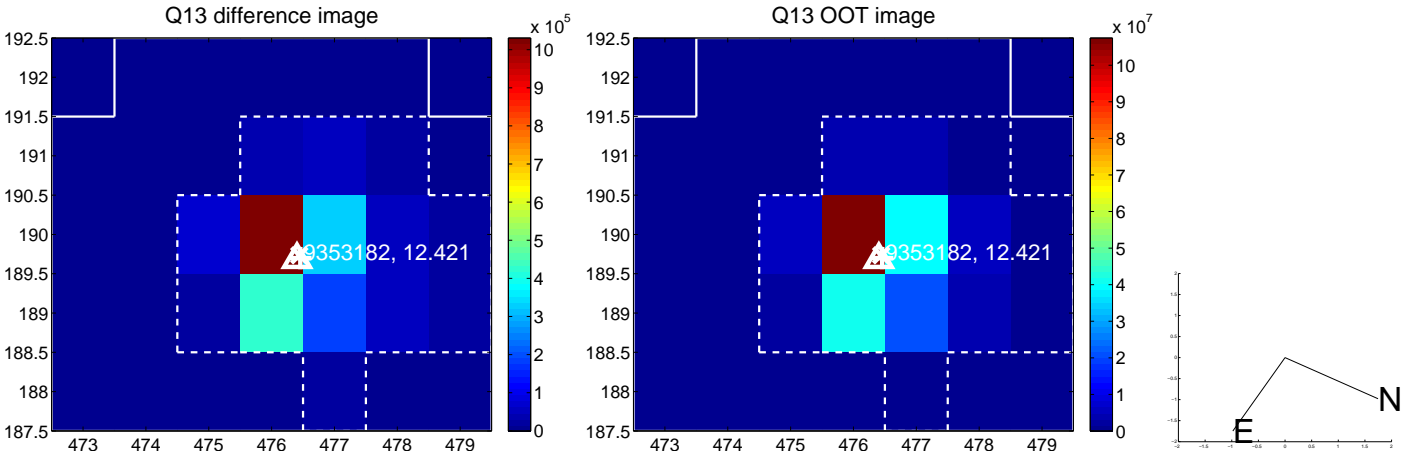
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



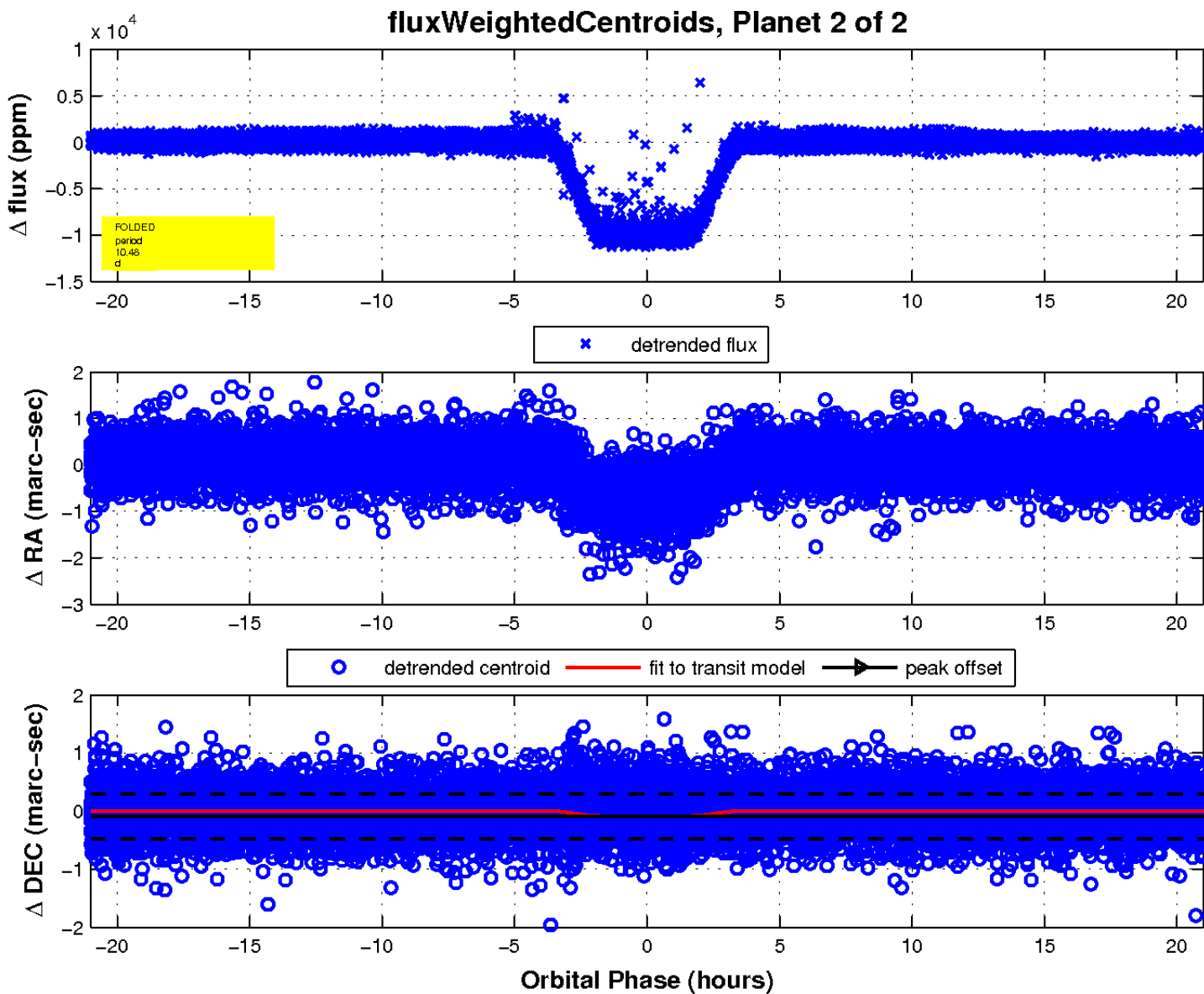
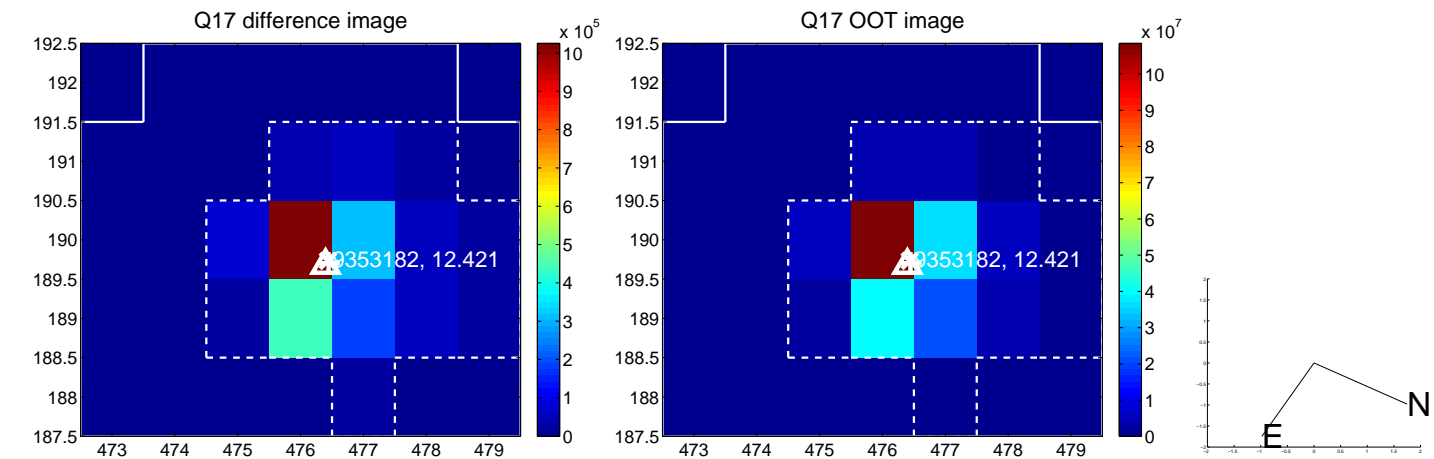
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

