

# KIC 008378922

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008378922-01	OBS	7028.01	43.262904	150.388198	366177.4	6.000	12874.6	-1.0	0.92	5623	50.03	15.40
008378922-02	OBS	No	43.263288	168.760159	235519.1	18.765	10162.6	5554.1	0.92	5623	54.85	15.40
008378922-03	OBS	No	234.587411	324.318660	11851.4	5.000	90.8	-1.0	0.92	5623	9.91	1.62
008378922-05	OBS	No	236.190747	321.110456	10715.2	29.319	40.6	87.5	0.92	5623	17.06	1.60
008378922-06	OBS	No	408.204114	316.068405	337.6	11.370	11.4	4.0	0.92	5623	1.83	0.77
008378922-07	OBS	No	404.679845	329.185253	725.8	15.000	11.8	-1.0	0.92	5623	2.45	0.78

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008378922-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_ALT—MOD_ODDEVEN_ALT—HAS_SEC_TCE—CENT_NOFITS
008378922-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE
008378922-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_NOFITS
008378922-05	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
008378922-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
008378922-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—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.

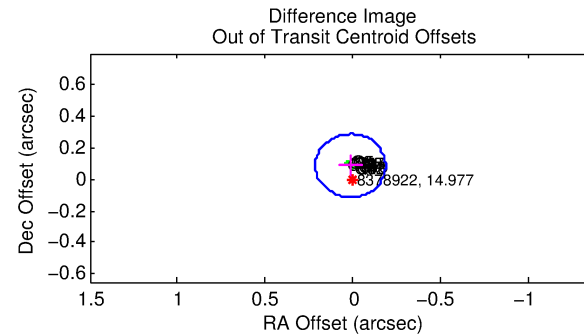
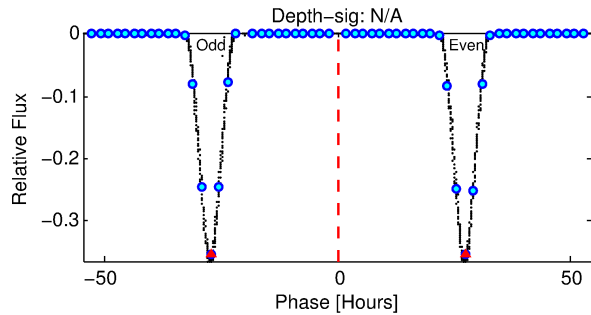
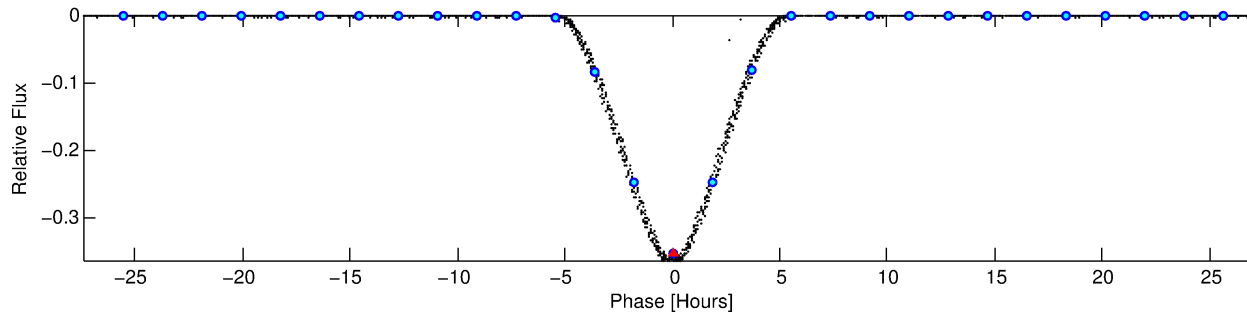
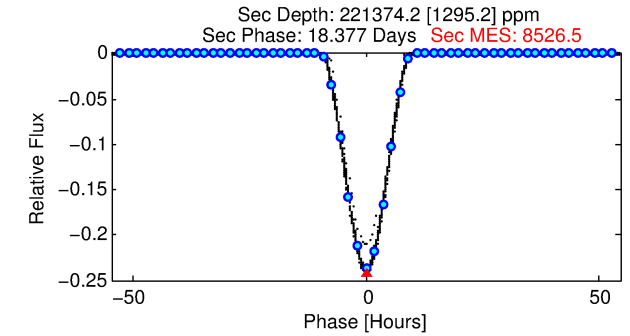
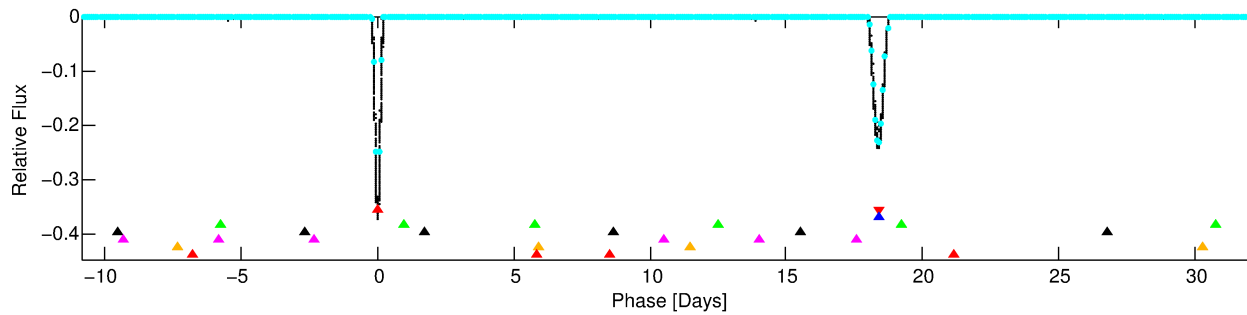
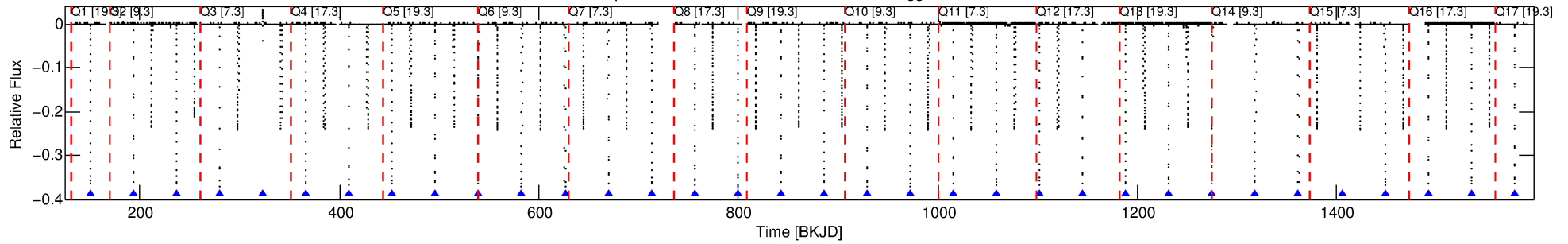
## Ephemeris Match Information For 008378922-01

No Significant Match Found

# DV One-Page Summary

KIC: 8378922 Candidate: 1 of 7 Period: 43.263 d  
KOI: K07028.01 Corr: 0.769

Kp: 14.98 R\*: 0.92 Rs Teff: 5623.0 K Logg: 4.40 Fe/H: -0.420



## TPS TCE Results:

Period = 43.26290 d  
Epoch = 150.3882 BKJD

DV fit results are unavailable

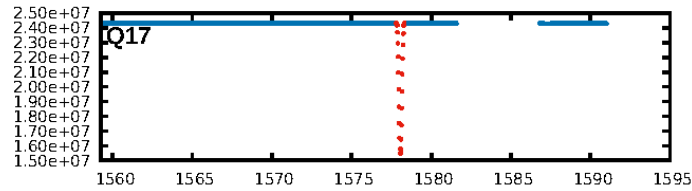
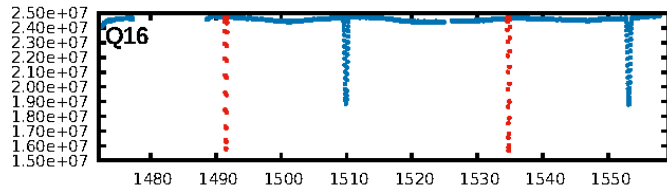
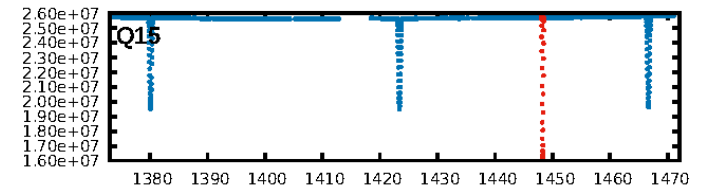
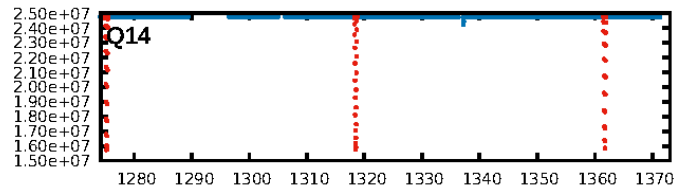
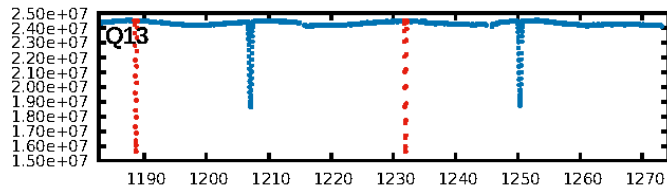
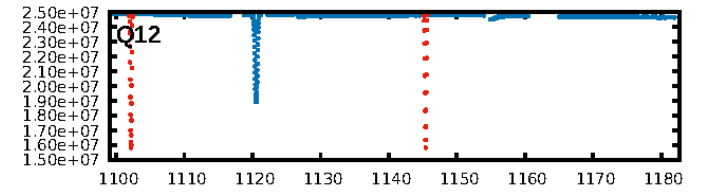
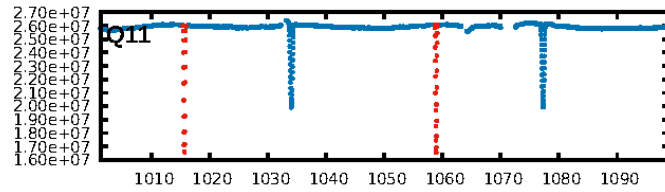
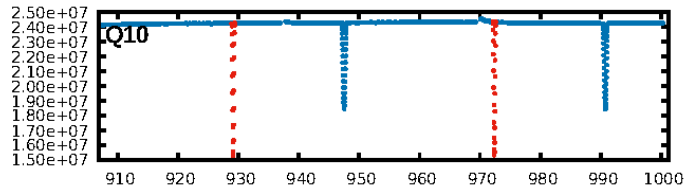
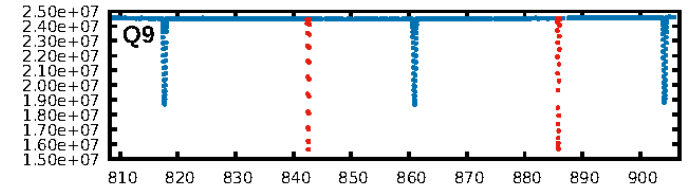
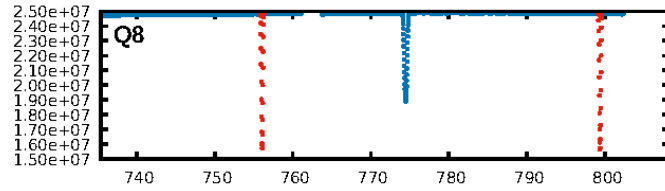
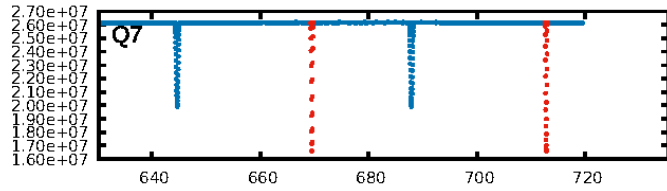
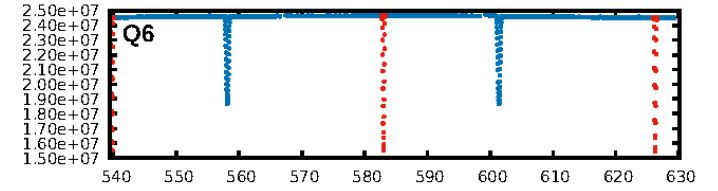
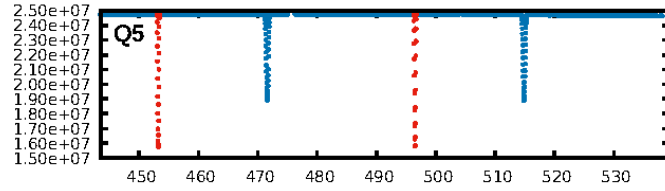
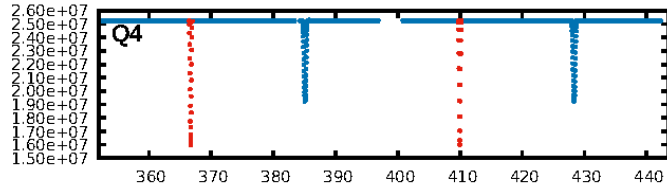
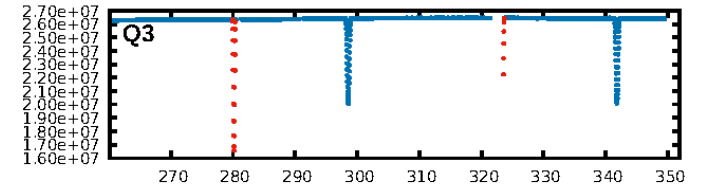
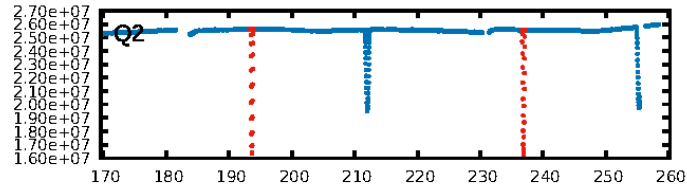
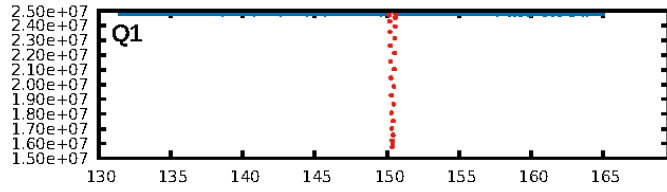
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [31/31]  
GhostDiagnostic-chr: 4.466  
Centroid-sig: 0.0%  
Centroid-so: 0.173 arcsec [216.75σ]  
OotOffset-rm: 0.090 arcsec [1.34σ]  
KicOffset-rm: 0.092 arcsec [1.36σ]  
OotOffset-st: 4/3/4/5 [16]  
KicOffset-st: 4/3/4/5 [16]  
DiffImageQuality-fgm: 1.00 [16/16]  
DiffImageOverlap-fno: 1.00 [16/16]

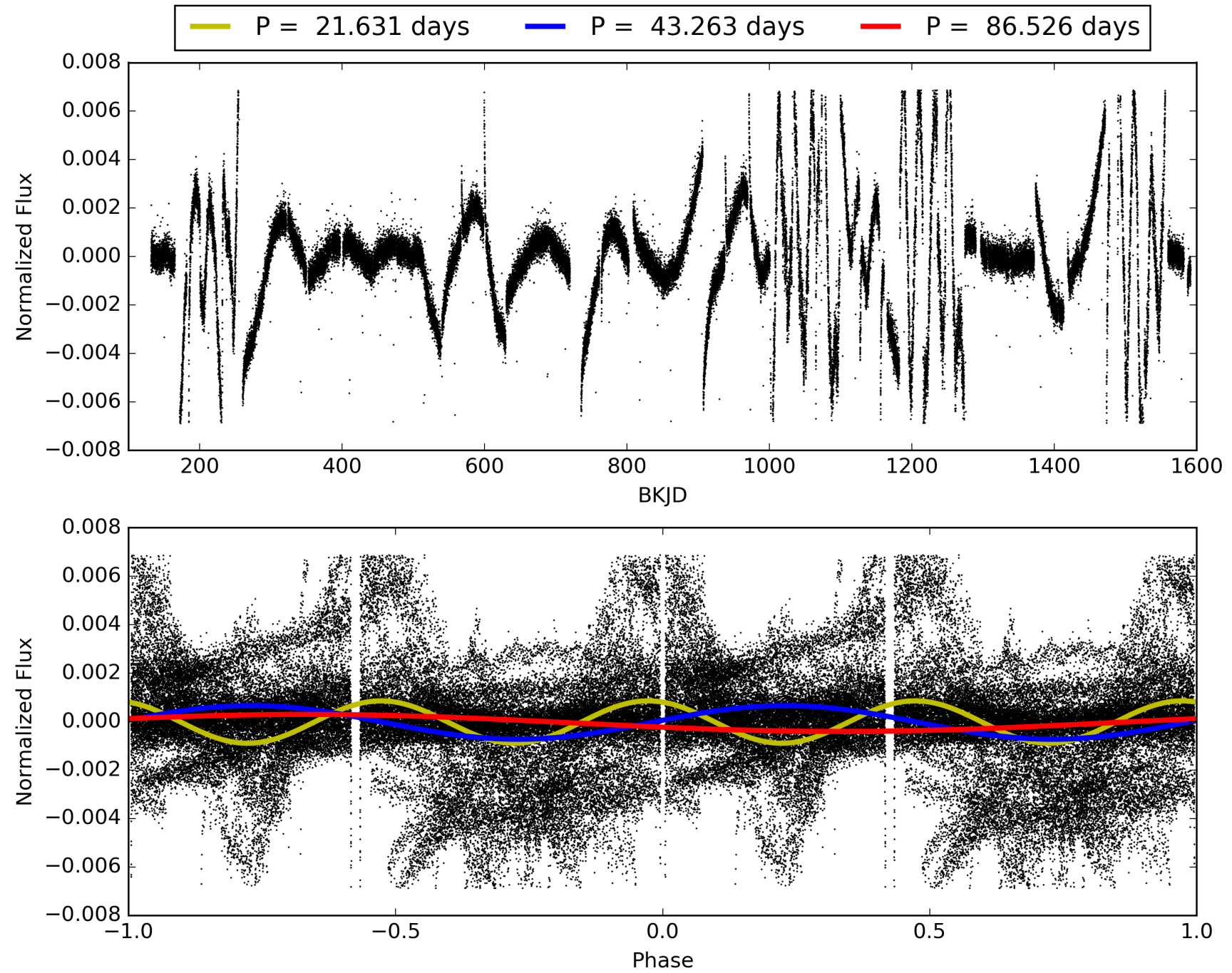
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 23:31:39 Z

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

# TCE 008378922-01, PDC Light Curves



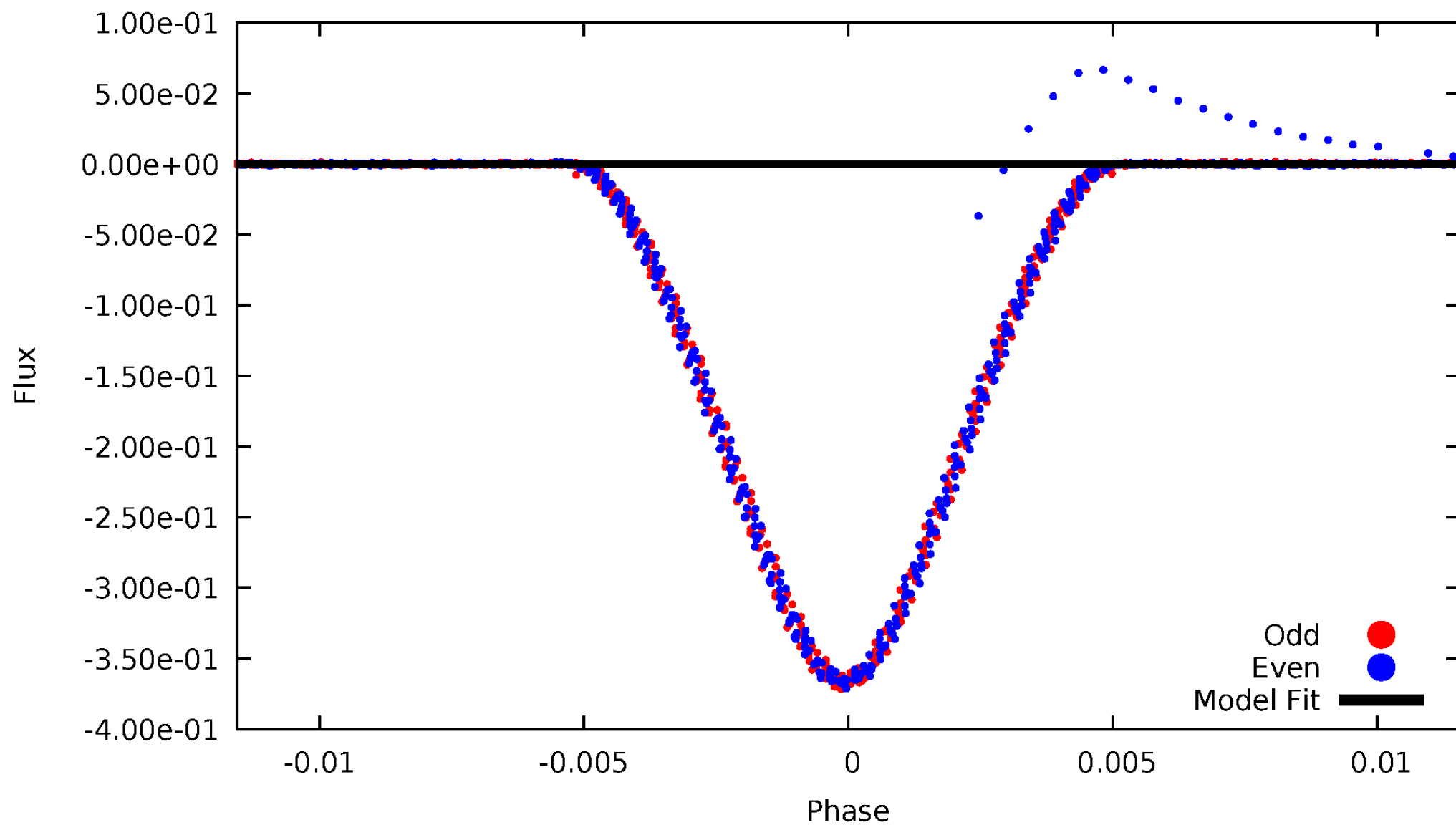
TCE 008378922-01





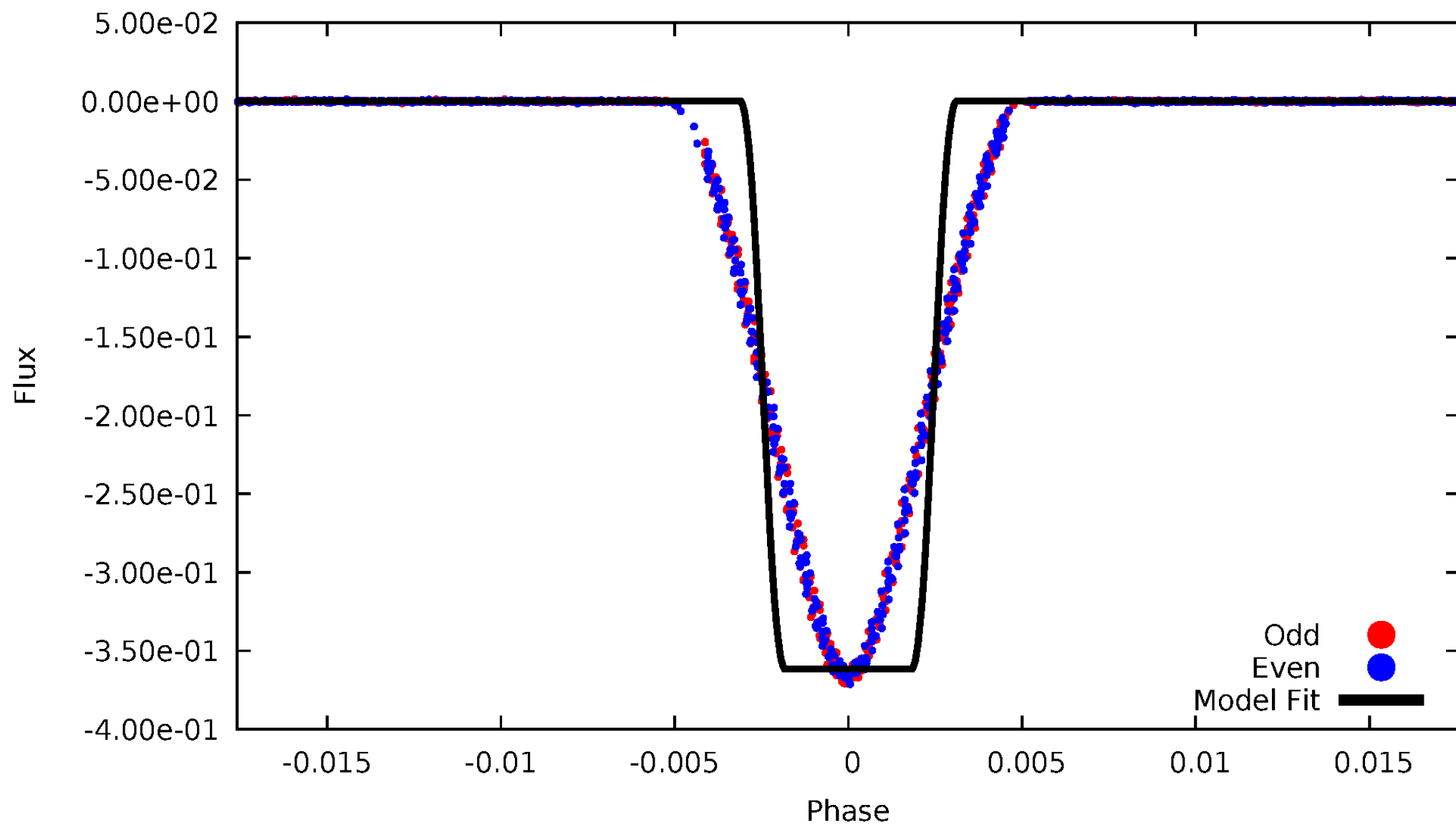
# DV Odd/Even

TCE 008378922-01



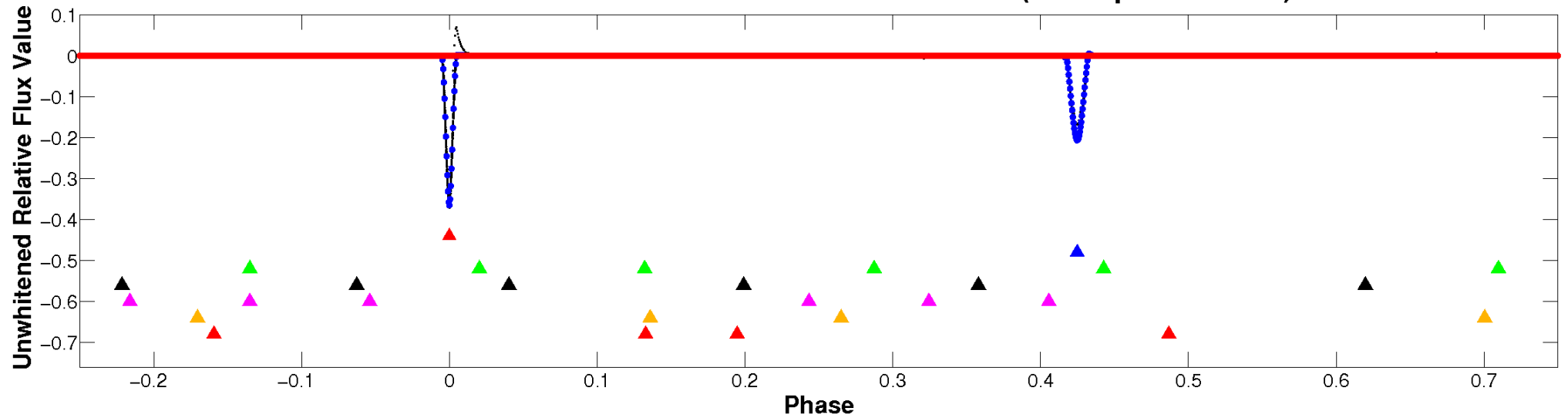
# ALT Odd/Even

TCE 008378922-01



# Non-Whitened Vs. Whitened Light Curve

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

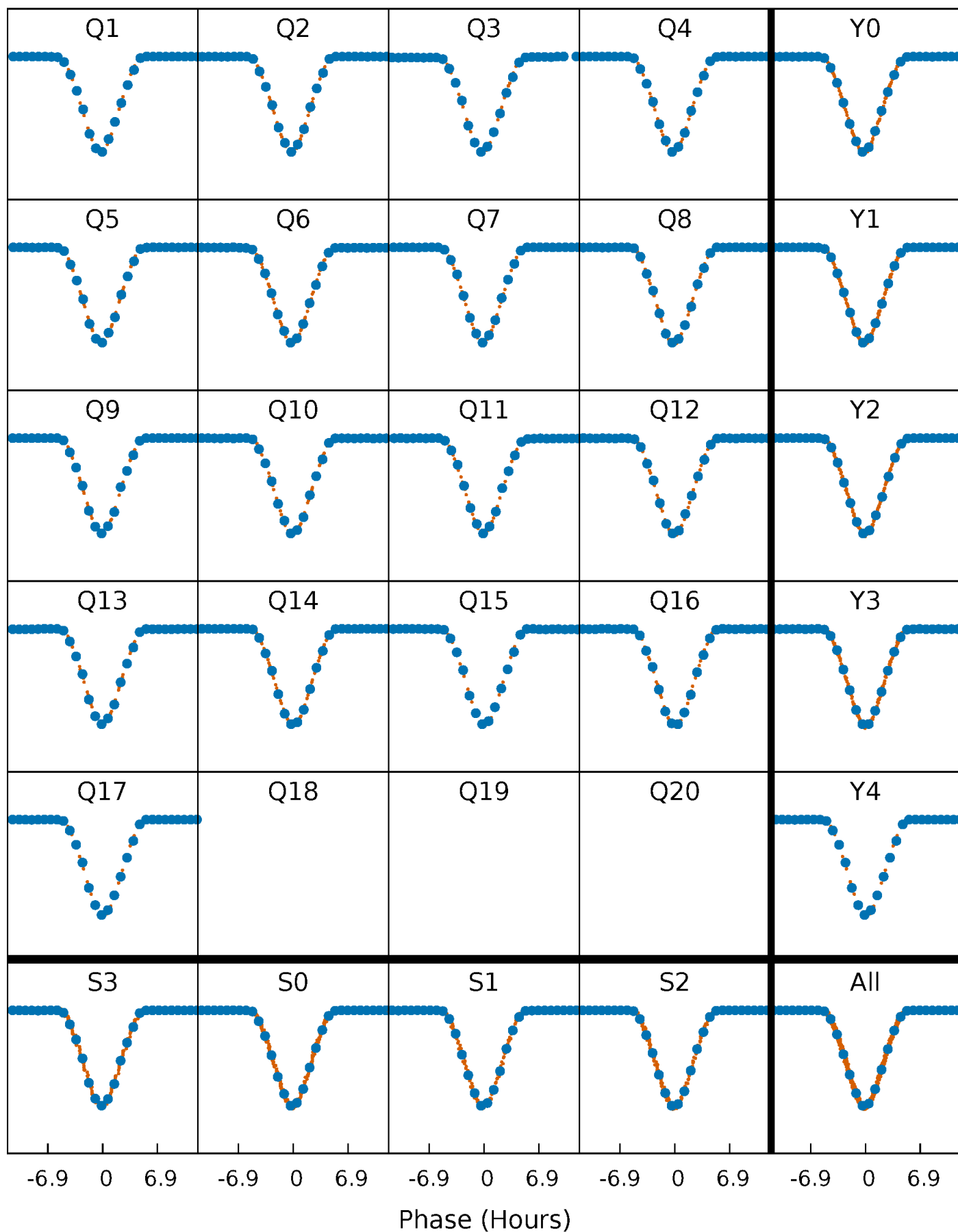


**Planet 1 : Phased Whitened Flux Time Series (TPS Epoch/Period)**



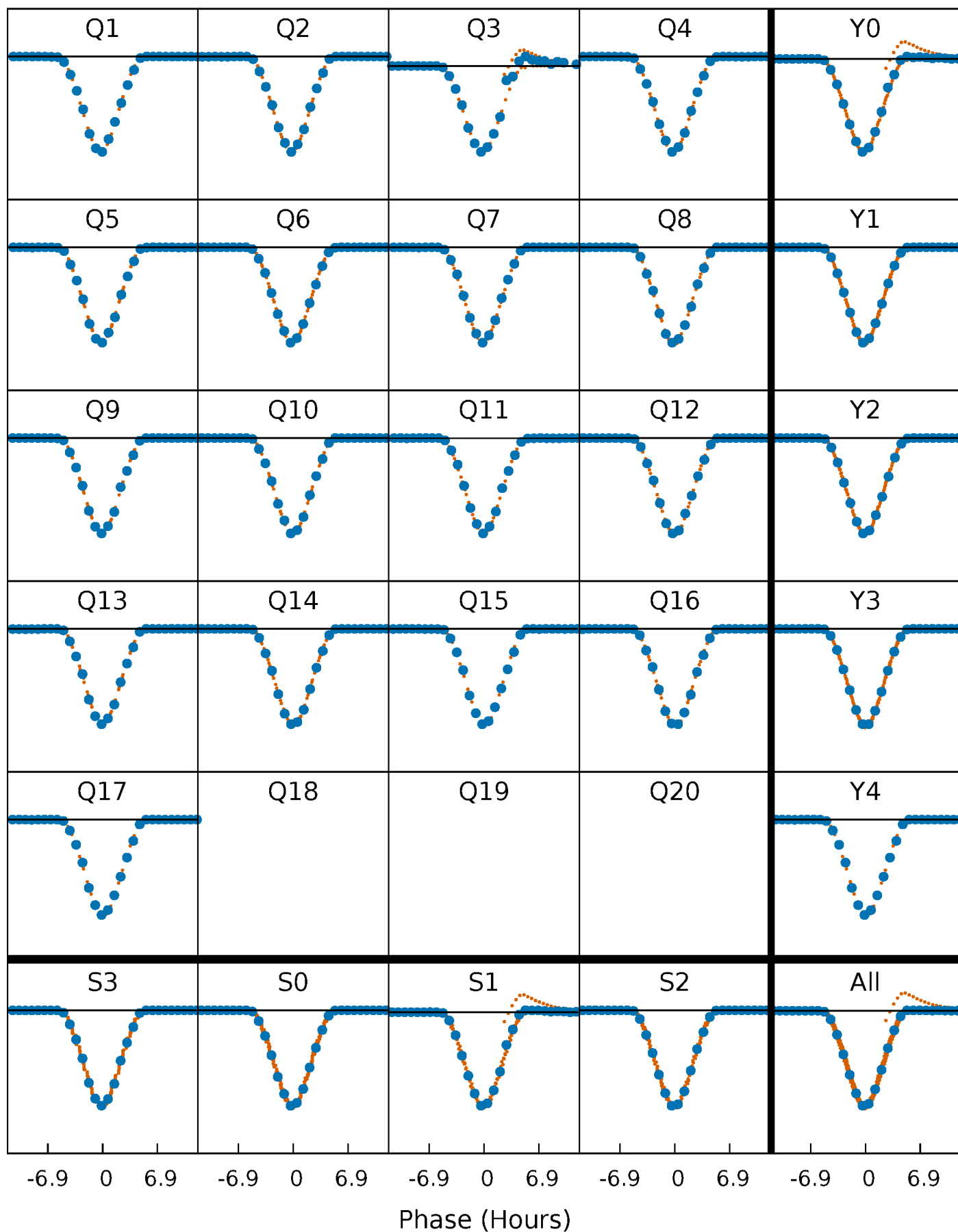
# PDC Quarter-Phased Transit Curves

TCE 008378922-01 P= 43.262904 Days  $T_0=150.388198$  (BKJD)



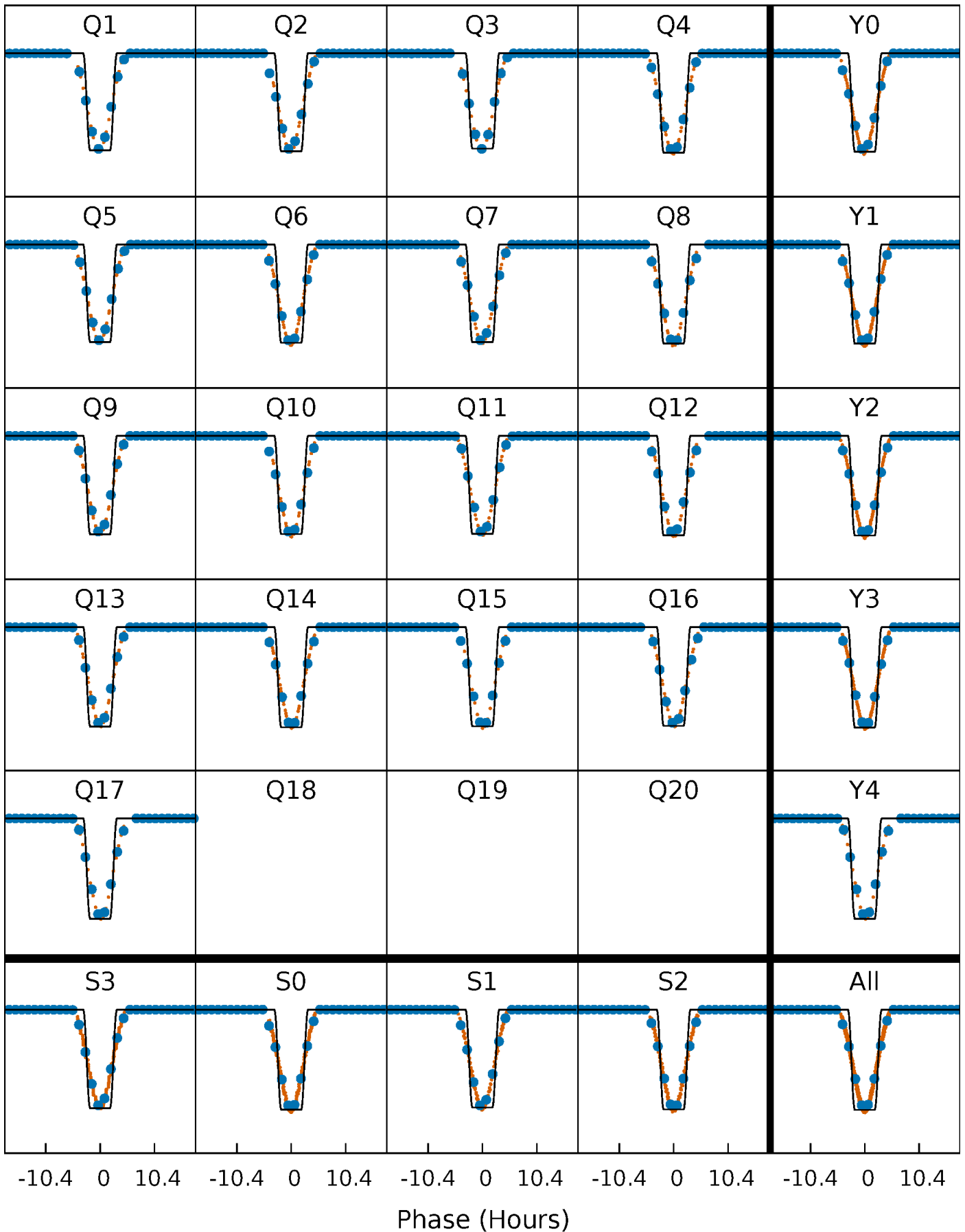
# DV Quarter-Phased Transit Curves

TCE 008378922-01 P= 43.262904 Days  $T_0=150.388198$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 008378922-01 P= 43.262904 Days  $T_0=150.384677$  (BKJD)

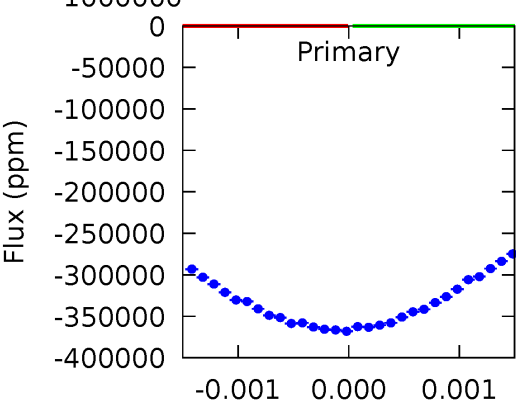
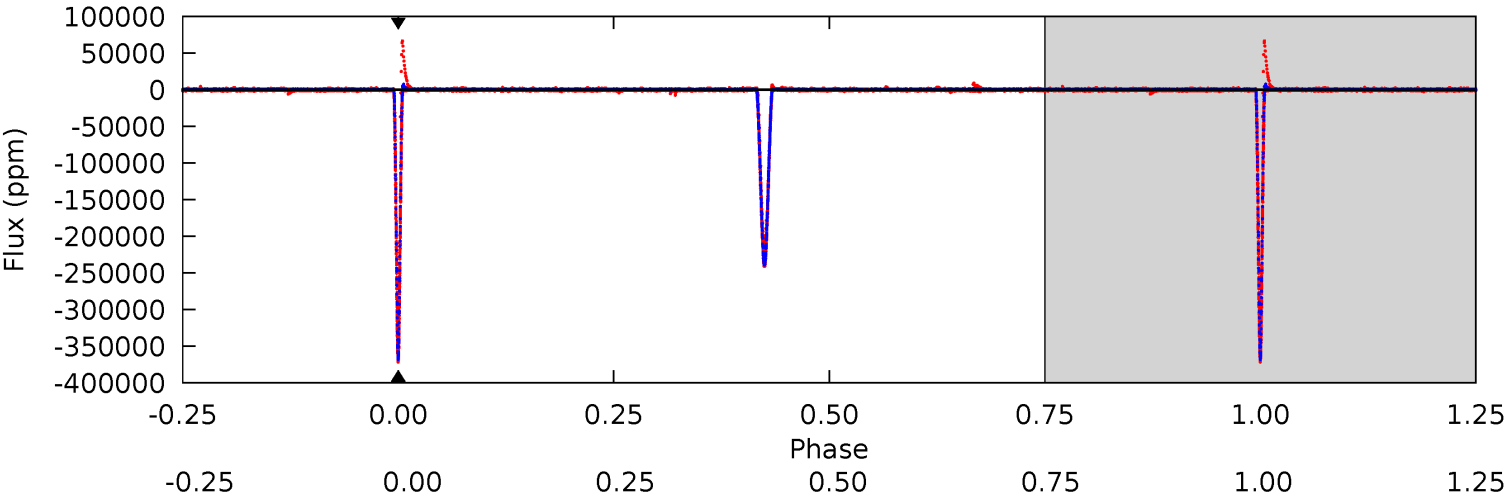




# DV Model-Shift Uniqueness Test

008378922-01, P = 43.262904 Days, E = 107.125294 Days

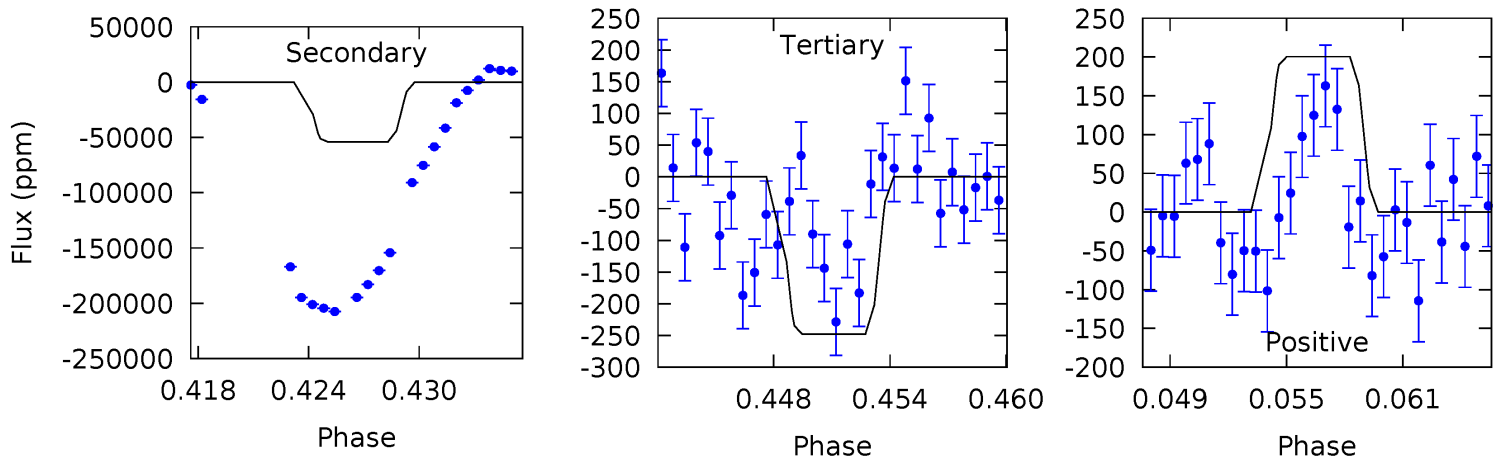
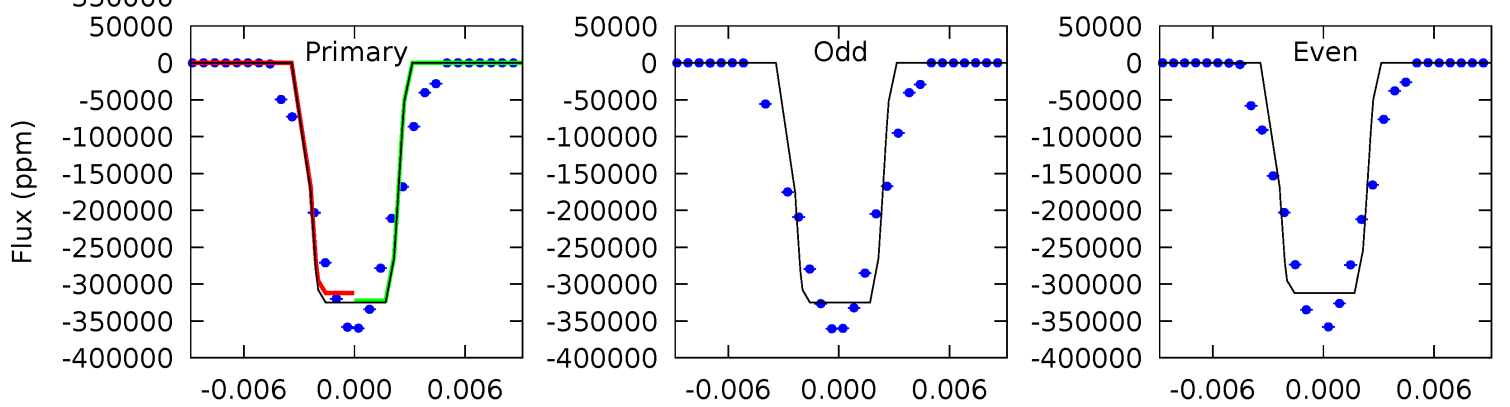
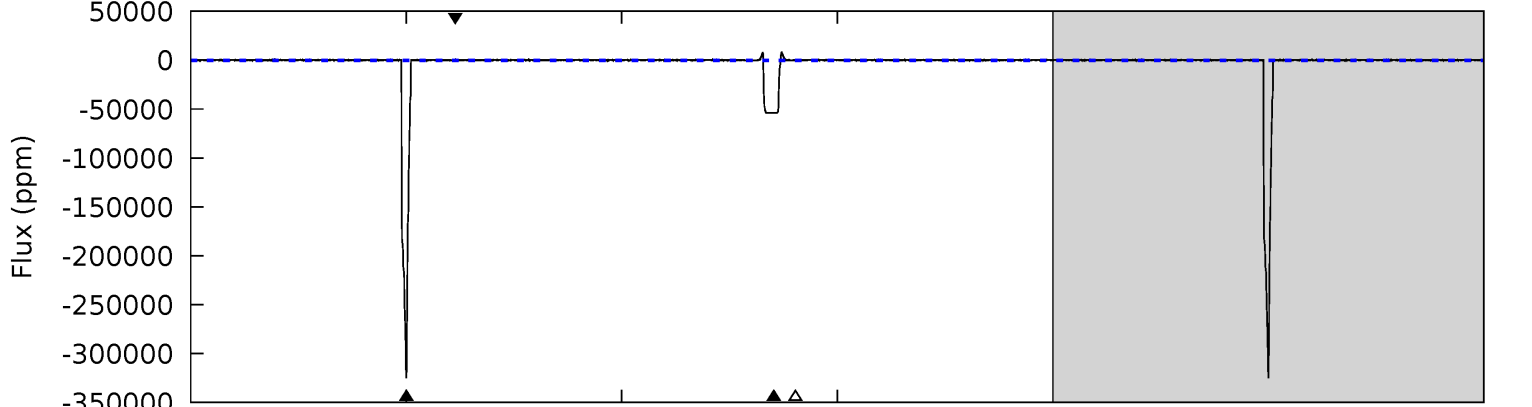
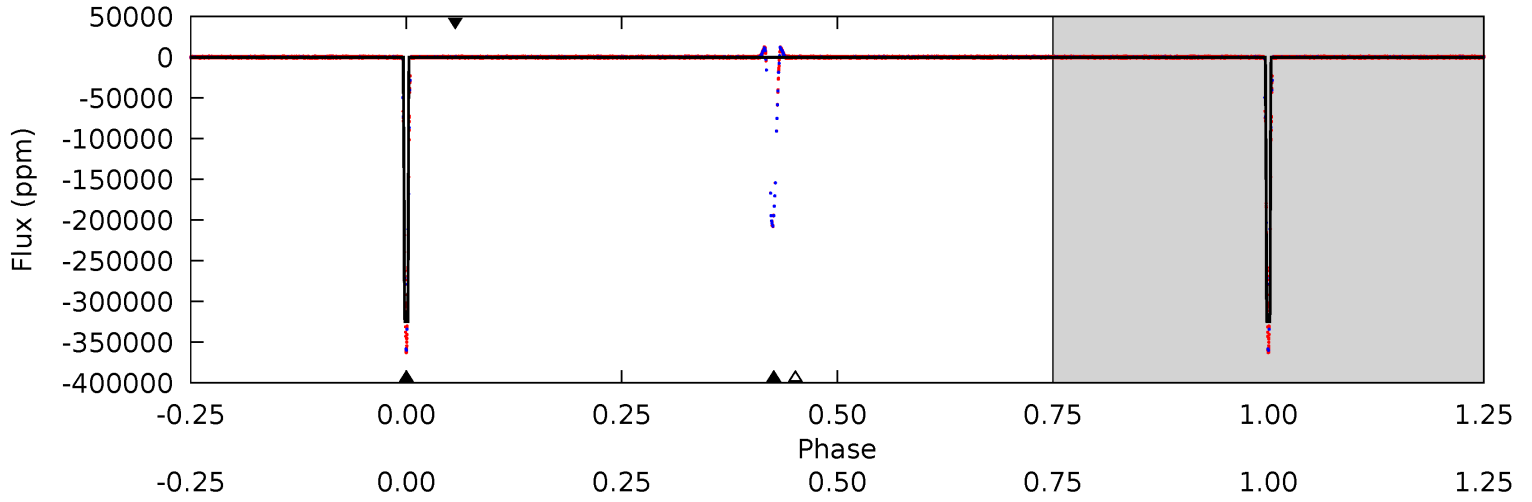
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



# Alt Model-Shift Uniqueness Test

008378922-01, P = 43.262904 Days, E = 107.121773 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
5055	840.8	3.86	3.12	5.12	2.74	15.5	5051	5052	837.0	837.7	73.6	1.01	0.02	0



### Stellar Parameters For KIC 008378922

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5623^{+169}_{-169}$	$4.400^{+0.167}_{-0.204}$	$-0.420^{+0.350}_{-0.250}$	$0.917^{+0.242}_{-0.161}$	$0.770^{+0.124}_{-0.053}$	$1.408^{+1.082}_{-0.699}$
	+3%/-3%	+4%/-5%	+83%/-60%	+26%/-18%	+16%/-7%	+77%/-50%
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 008378922-01 / KOI 7028.01

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$0 \pm 1000000$	$51.02^{+13.85}_{-10.62}$	$710^{+54}_{-44}$	$2887^{+1946}_{-7445}$	$55^{+1212}_{-1000}$
Alt.	$-54045 \pm 64$	$61.07^{+13.85}_{-12.04}$	$710^{+59}_{-47}$	$3893^{+282}_{-213}$	$423^{+223}_{-144}$

$T_{max}$  = 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

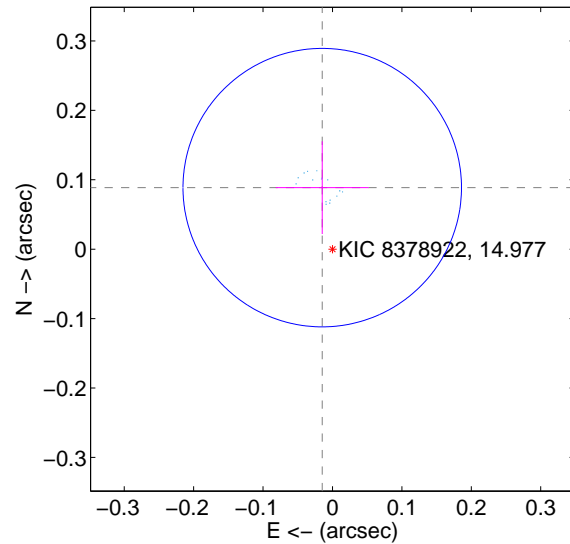
Supplemental centroid analysis for 008378922-01. Kepler magnitude: 14.98. Transit SNR -1.00

There are 16 quarters with good PRF difference image offsets

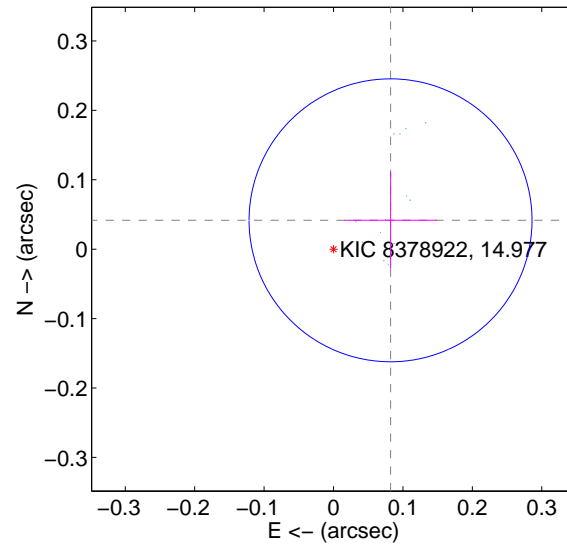
The direct PRF centroid is offset from the target star catalog position by about 0.14 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.090 \pm 0.067$	1.34	$0.015 \pm 0.067$	$0.089 \pm 0.067$
PRF-fit source offset from KIC position	$0.092 \pm 0.068$	1.36	$-0.082 \pm 0.067$	$0.042 \pm 0.069$
photometric centroid source offset	$0.17 \pm 0.00$	216.75	$-0.07 \pm 0.00$	$0.16 \pm 0.00$

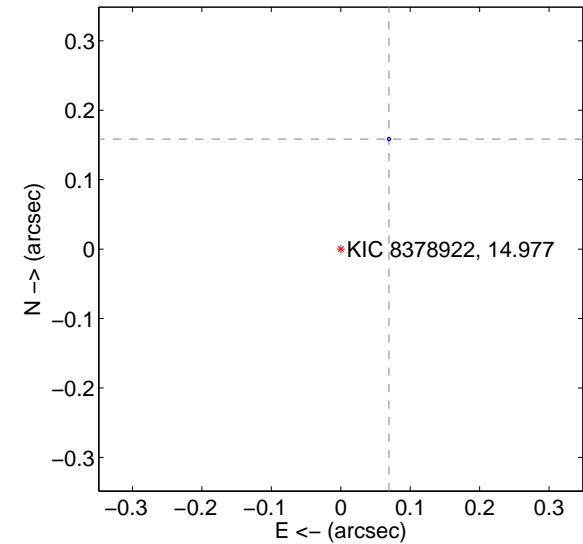
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

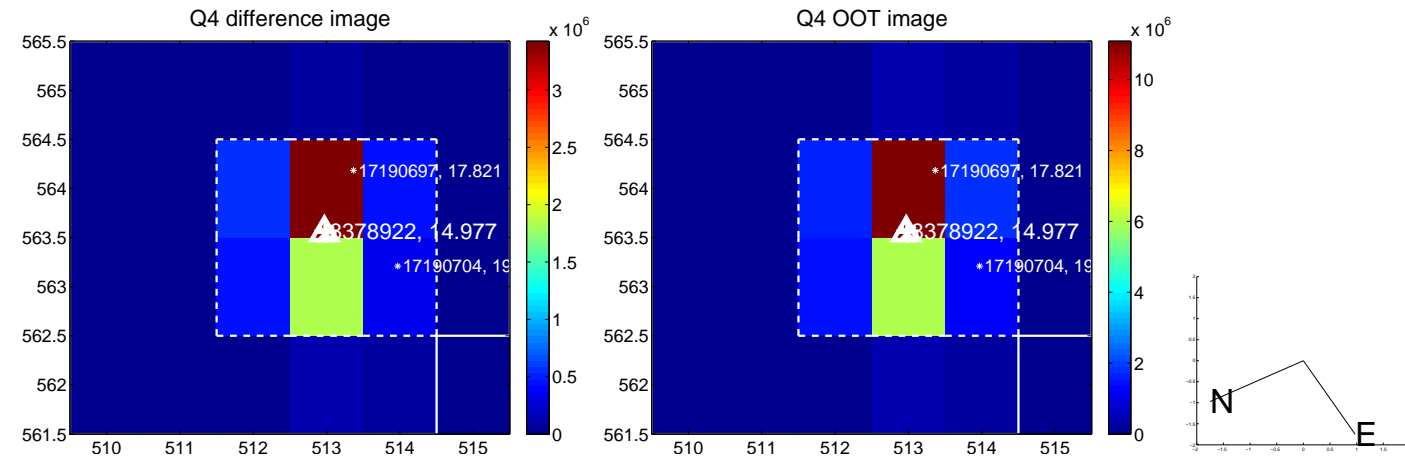
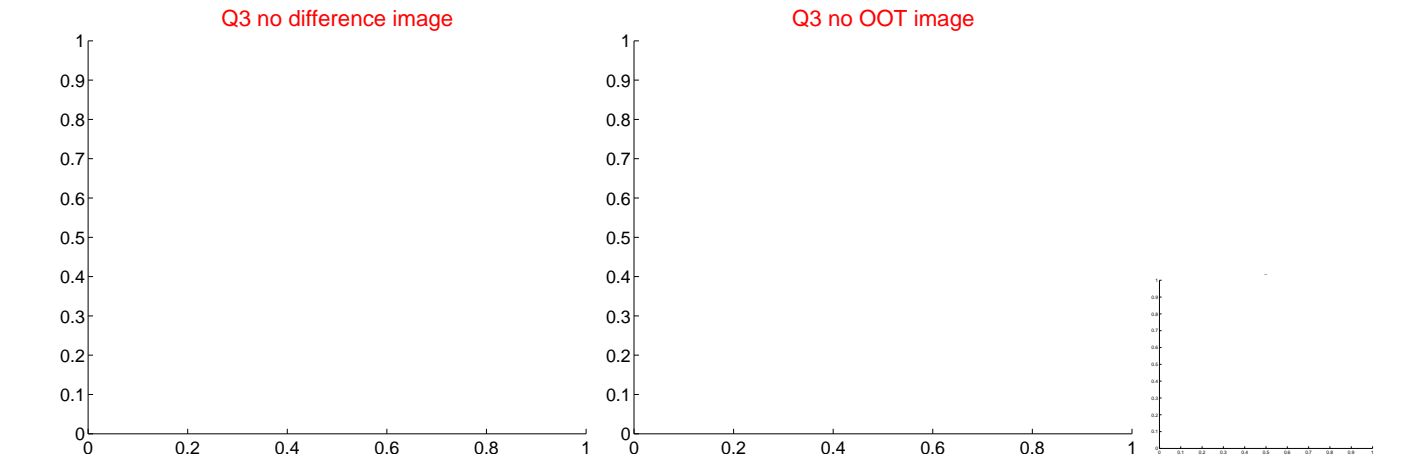
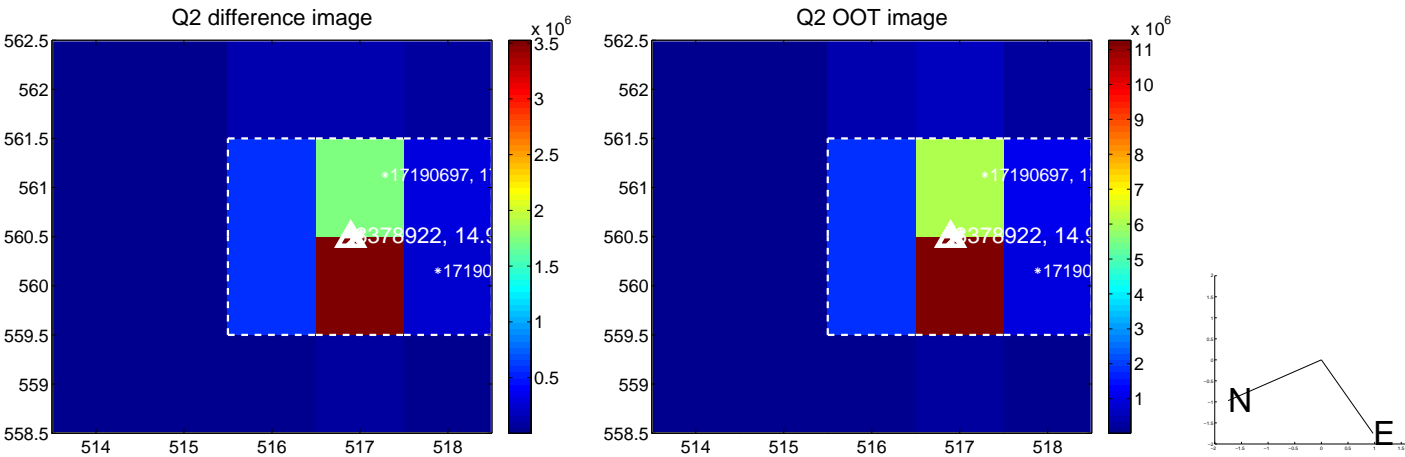
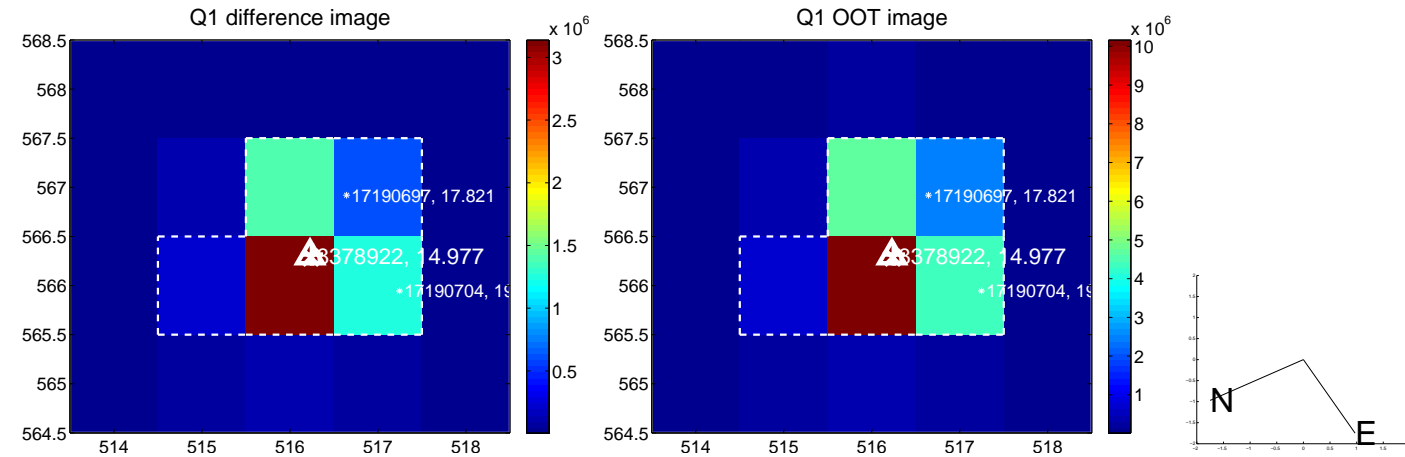


offset from photometric centroids

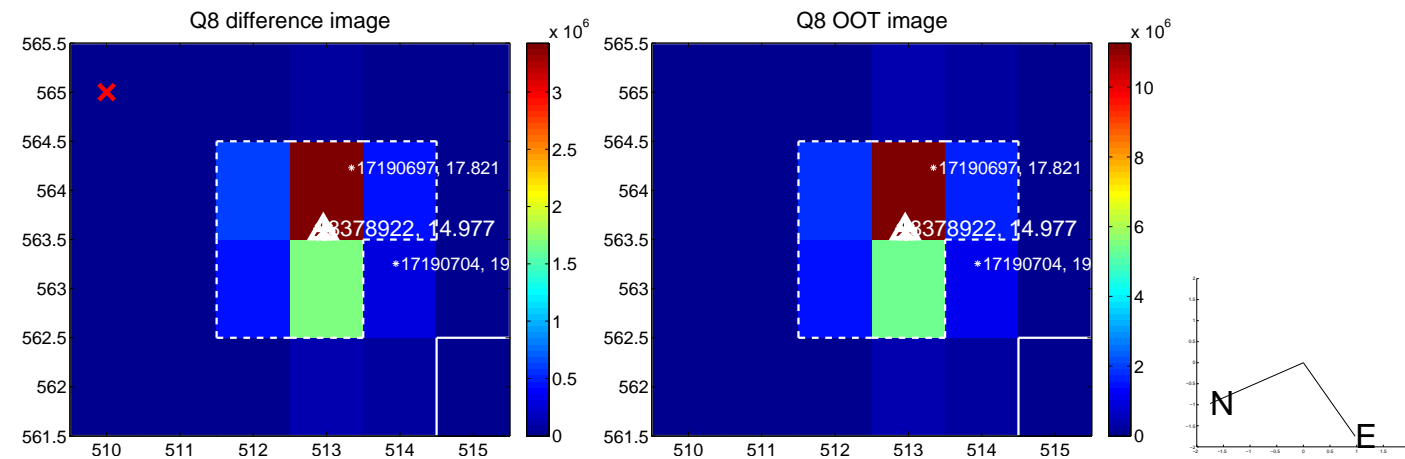
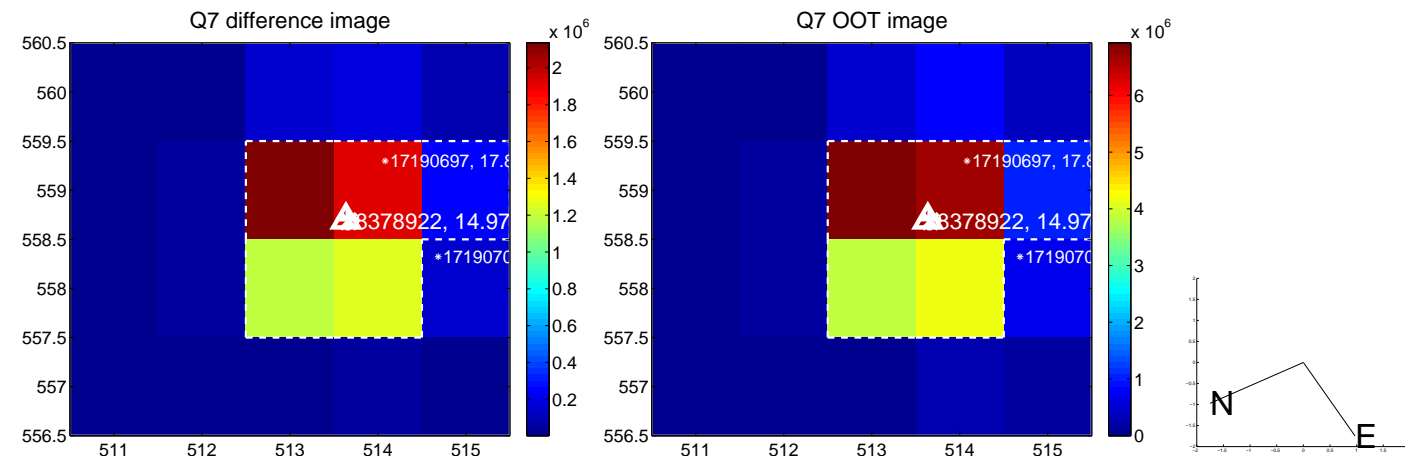
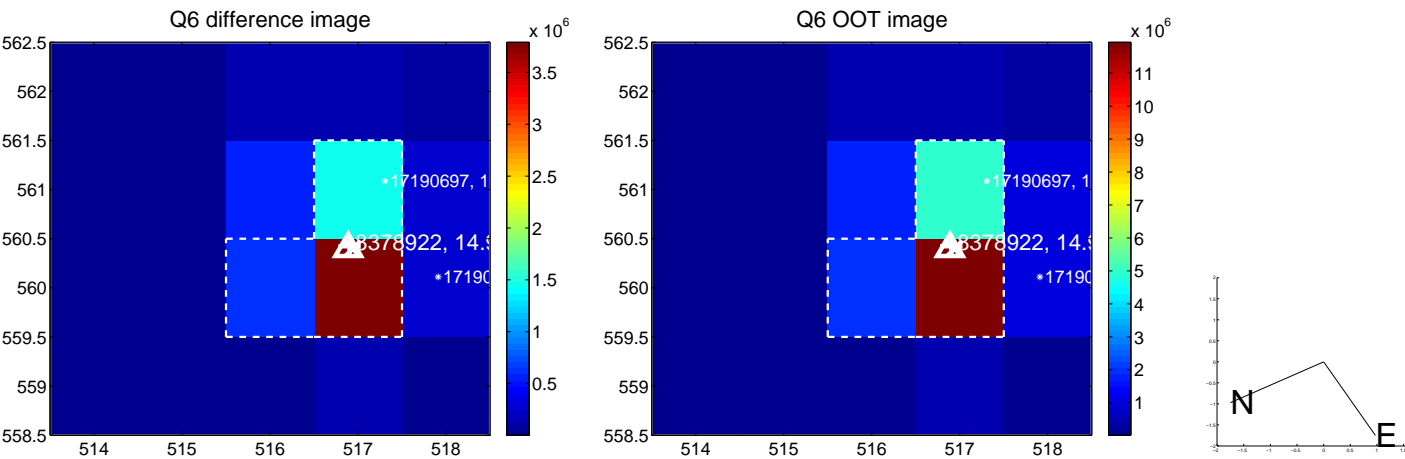
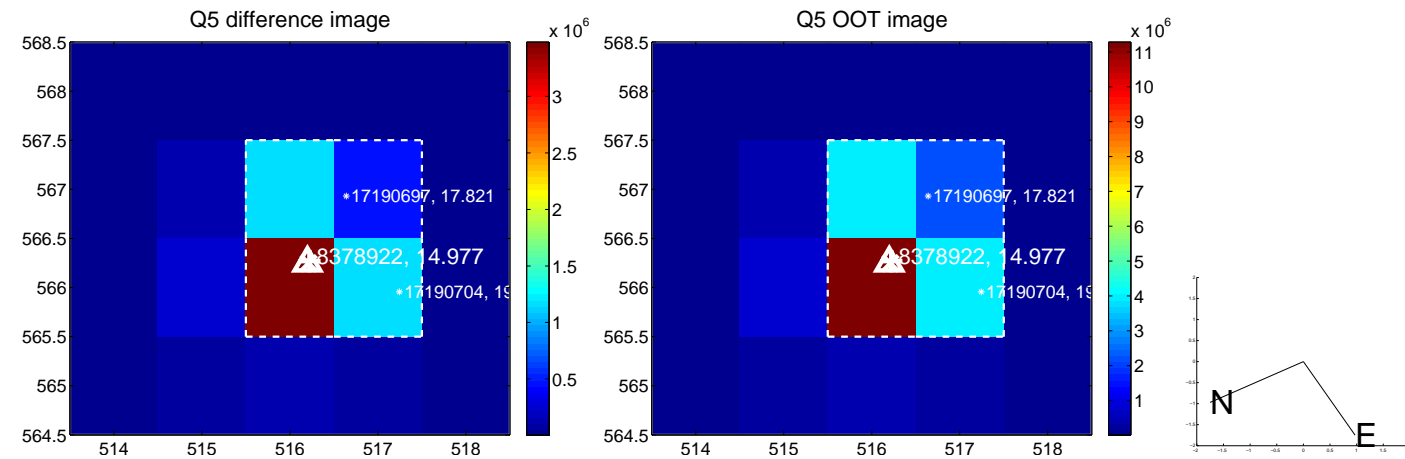


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

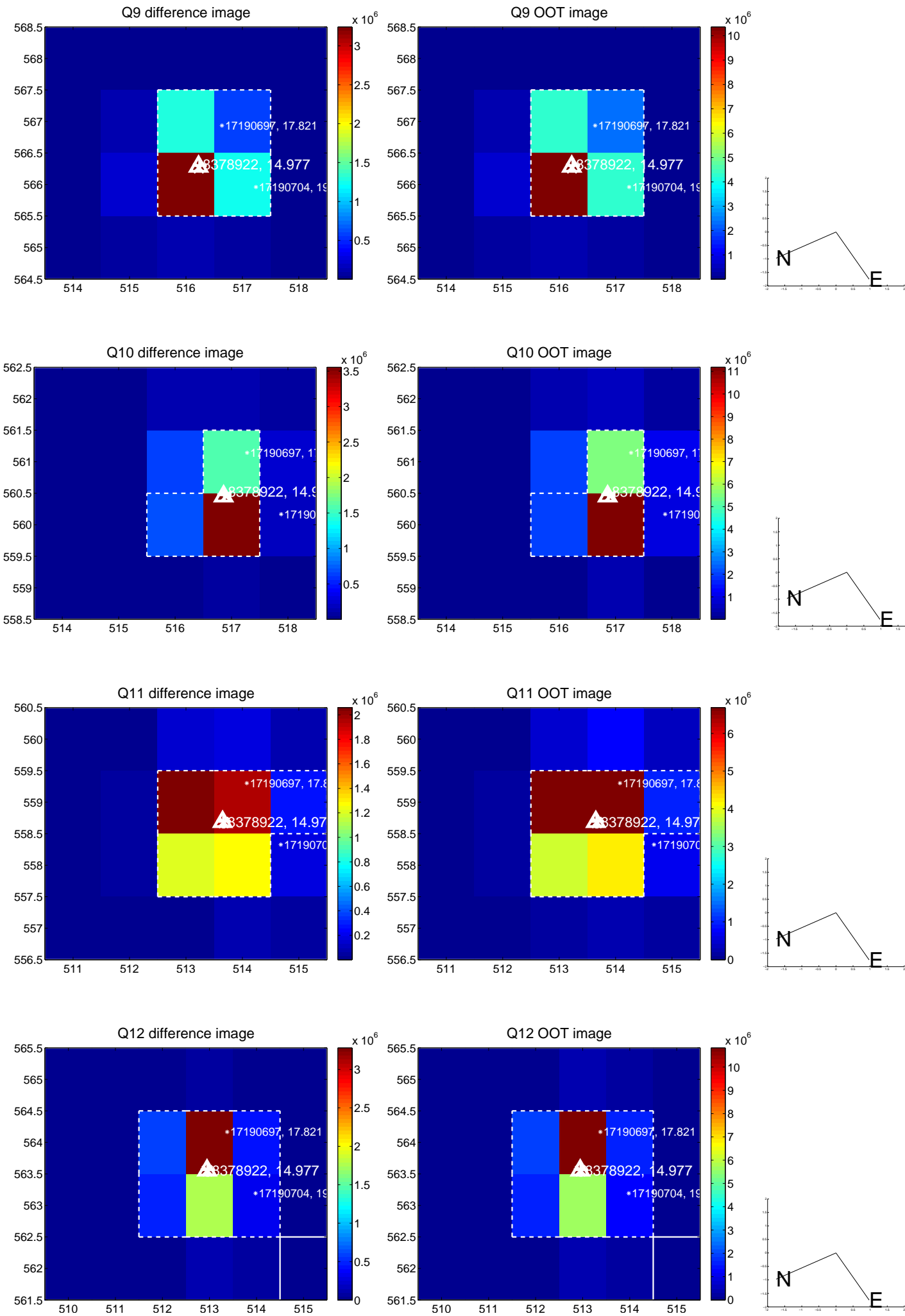


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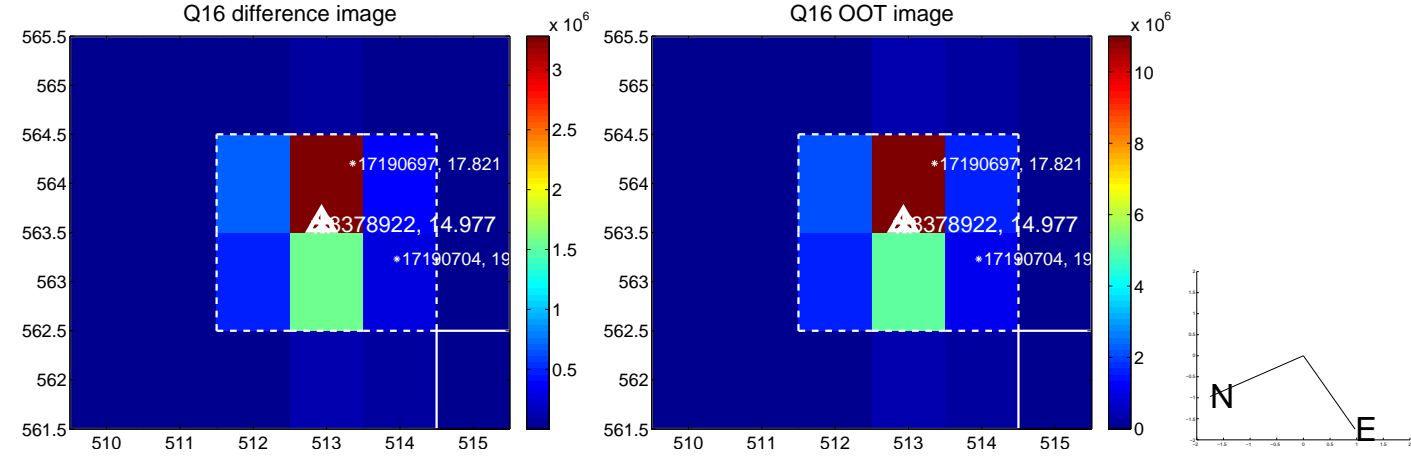
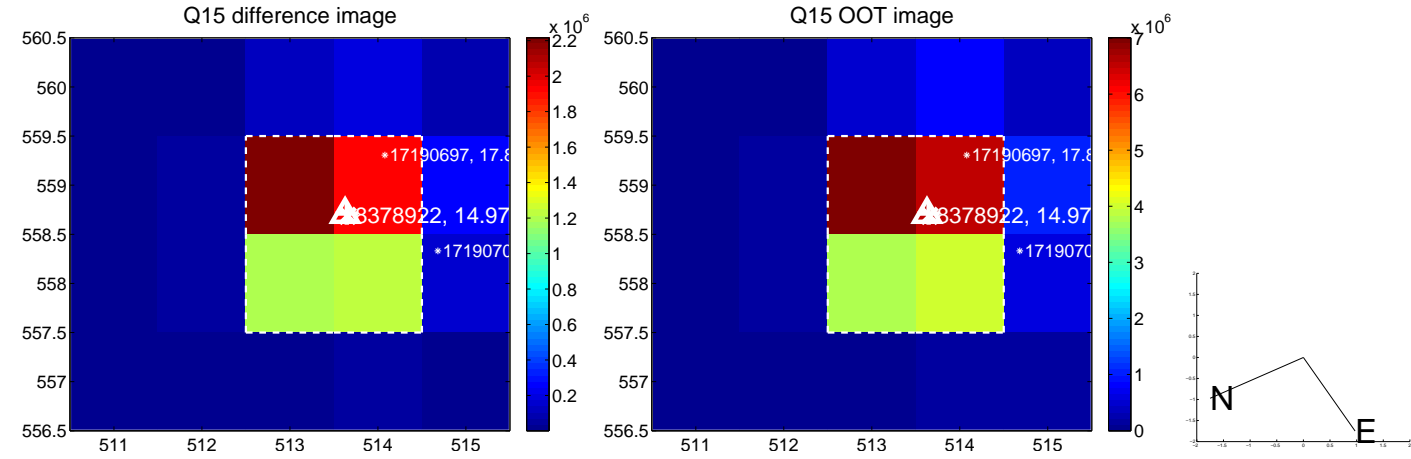
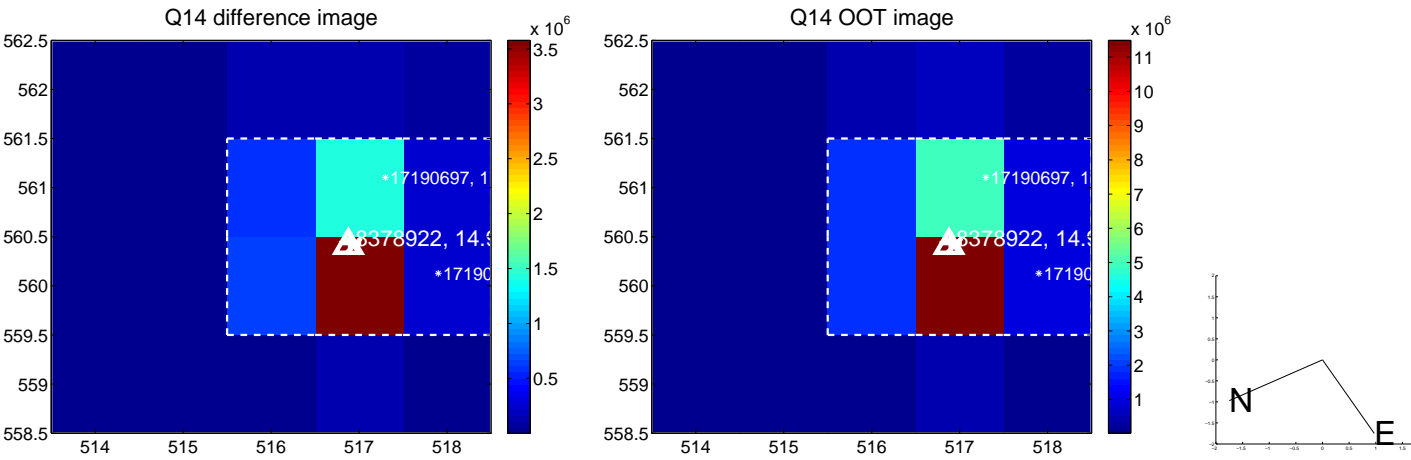
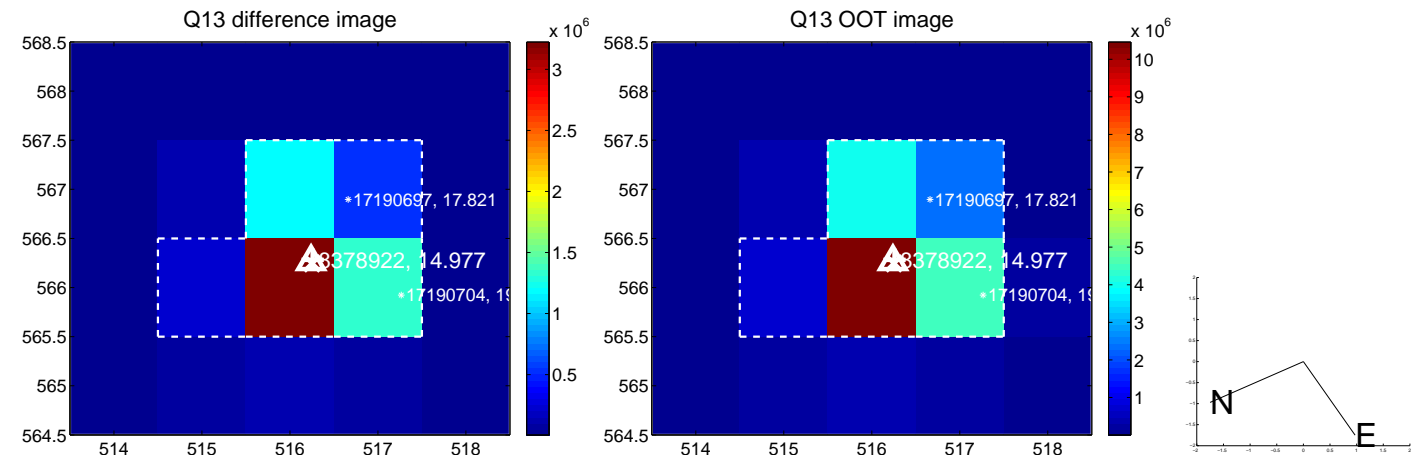




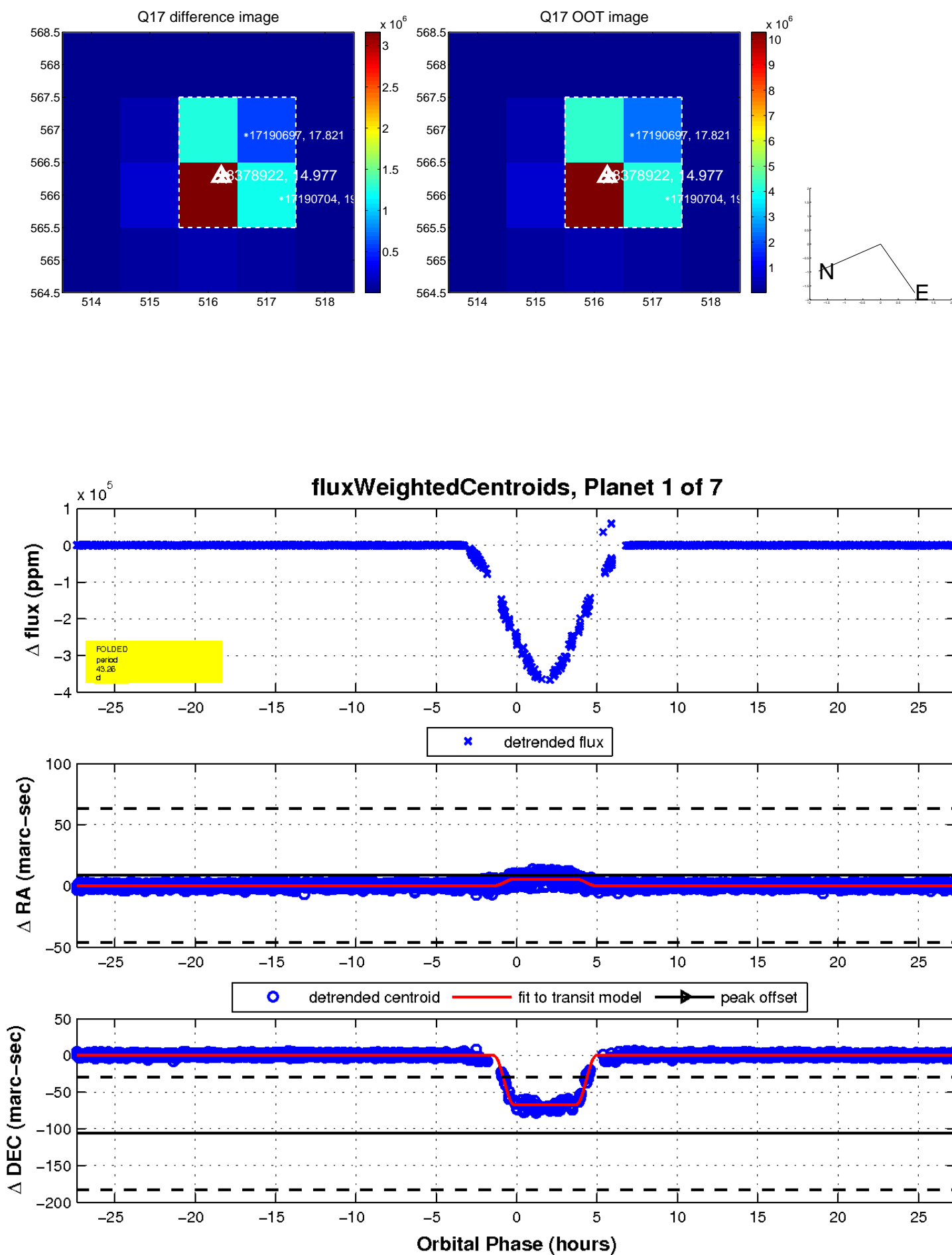
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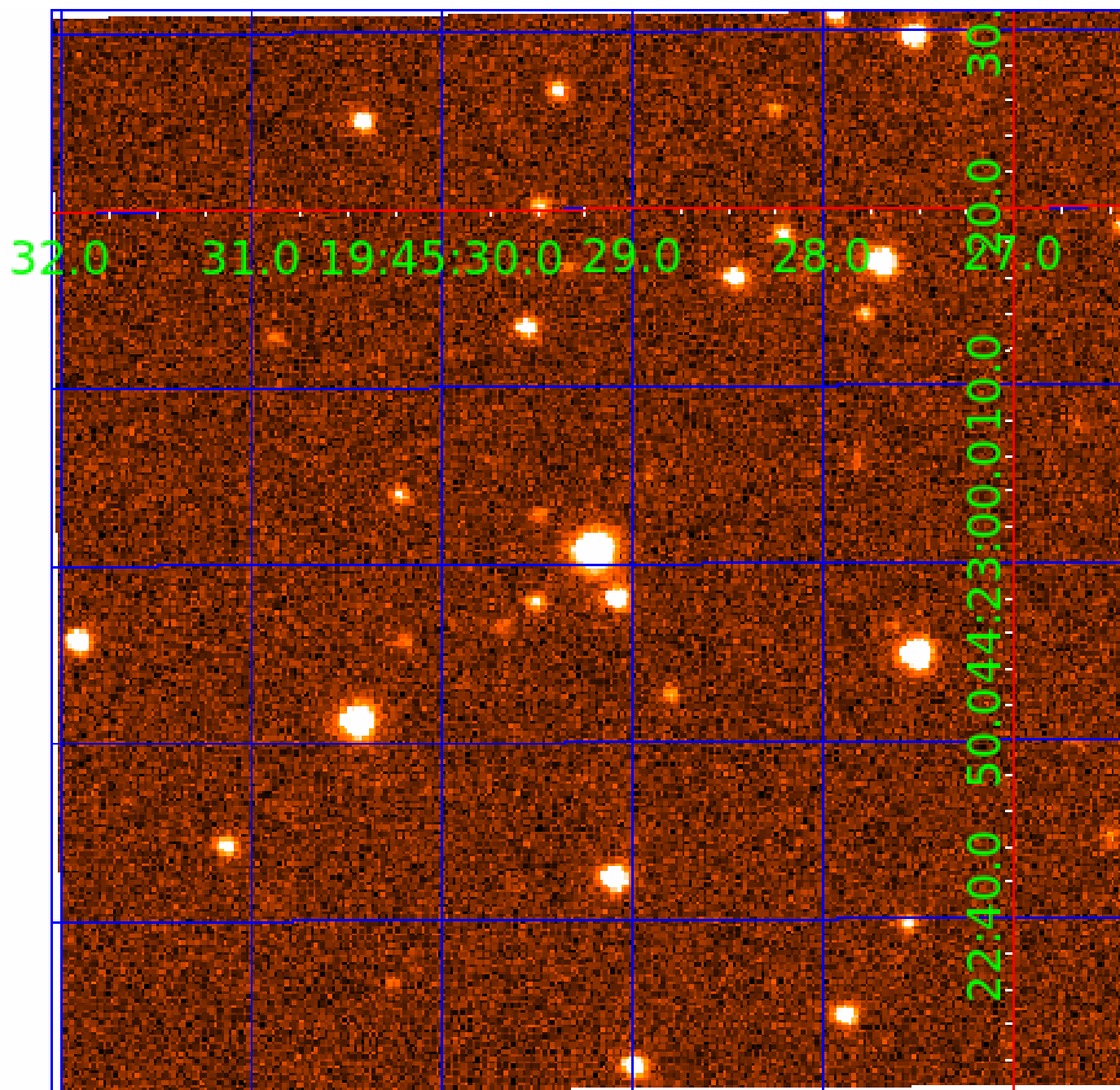


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 008378922

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008378922-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_ALT—MOD_ODDEVEN_ALT—HAS_SEC_TCE—CENT_NOFITS
008378922-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE
008378922-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_NOFITS
008378922-05	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
008378922-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
008378922-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—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 008378922-02

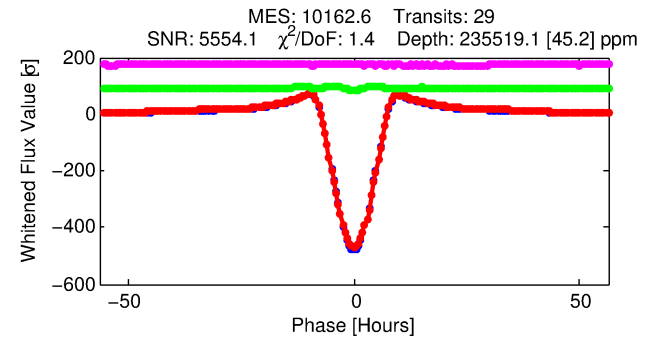
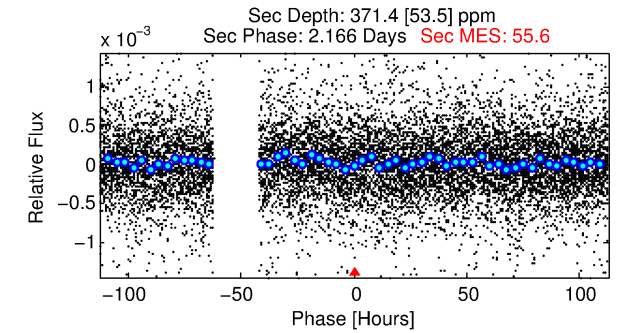
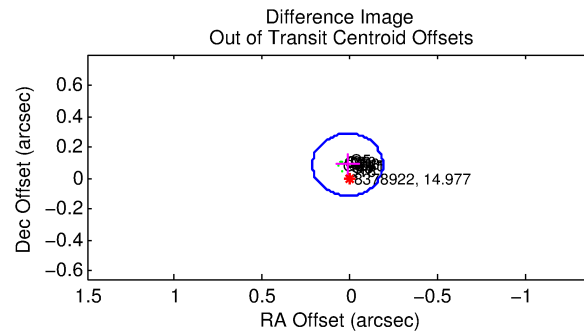
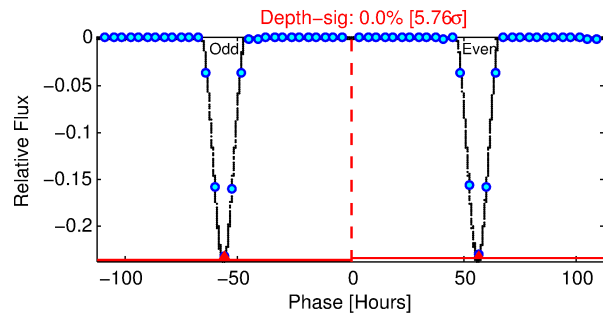
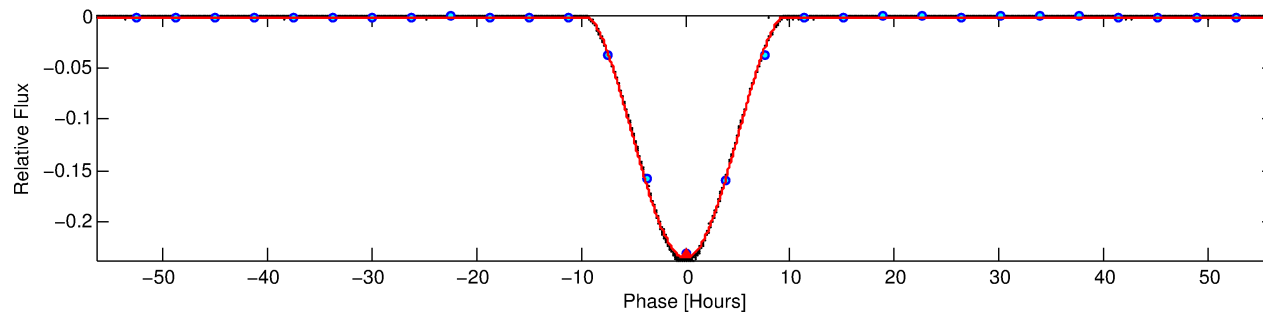
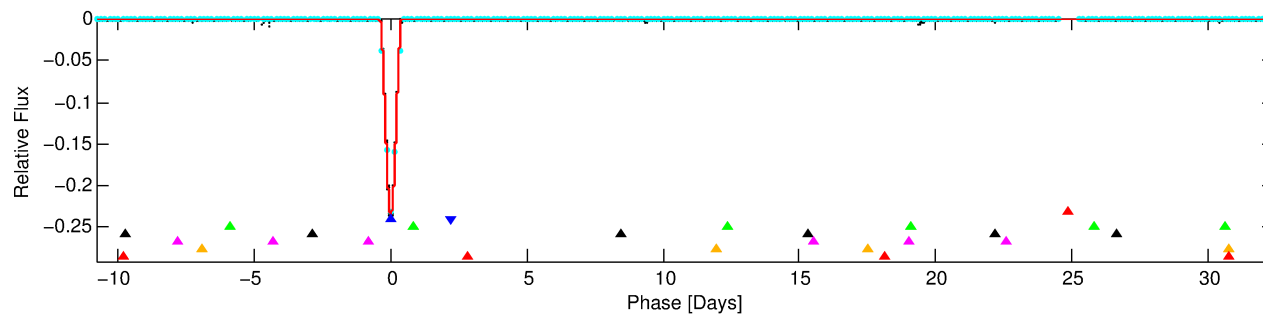
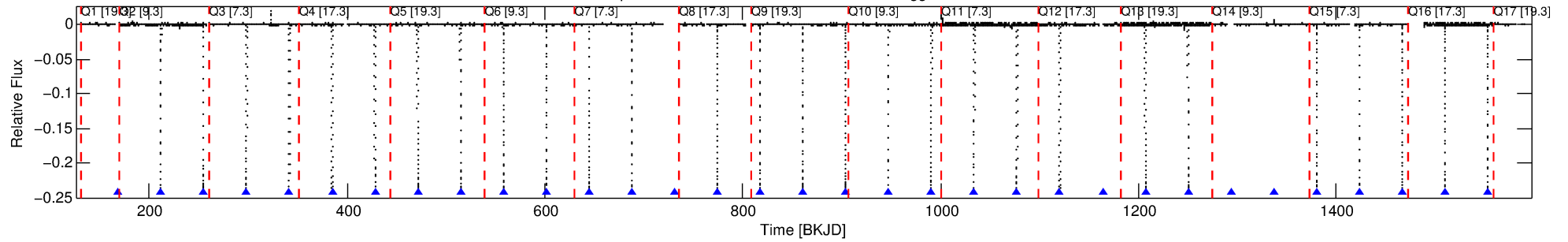
No Significant Match Found

# DV One-Page Summary

KIC: 8378922 Candidate: 2 of 7 Period: 43.263 d

KOI: K07028 Corr: No Ephemeris Match

Kp: 14.98 R\*: 0.92 Rs Teff: 5623.0 K Logg: 4.40 Fe/H: -0.420



## DV Fit Results:

Period = 43.26329 [0.00000] d  
Epoch = 168.7602 [0.0001] BKJD  
Rp/R\* = 0.5481 [0.0085]  
a/R\* = 24.26 [0.04]  
b = 0.71 [0.01]  
Seff = 15.40 [5.83]  
Teq = 505 [48] K  
Rp = 54.85 [14.50] Re  
a = 0.2212 [0.0521] AU  
Ag = 3.32 [1.29] [1.80σ]  
Teffp = 1054 [50] K [7.93σ]

## DV Diagnostic Results:

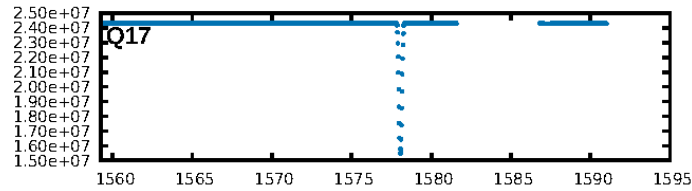
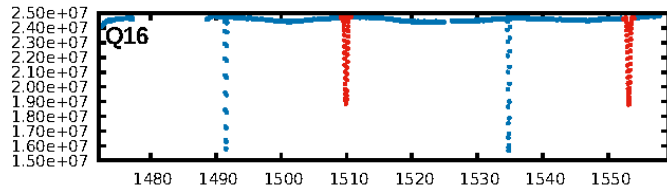
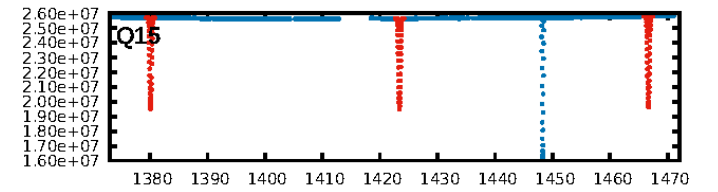
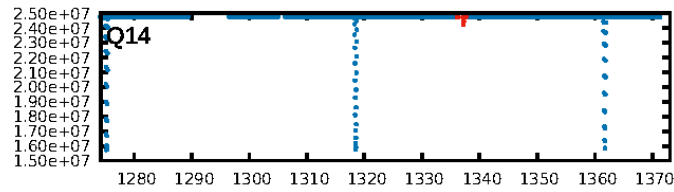
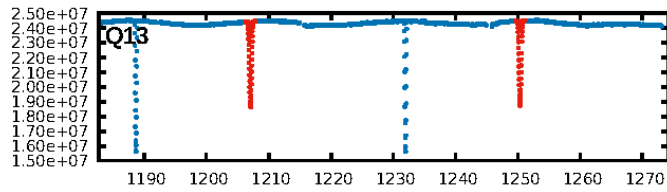
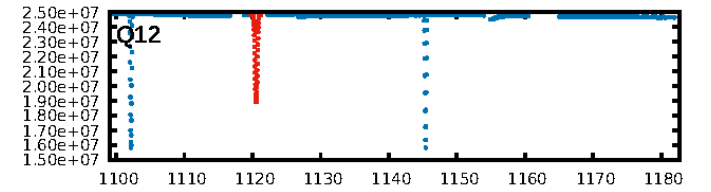
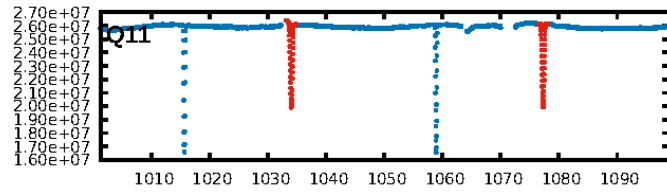
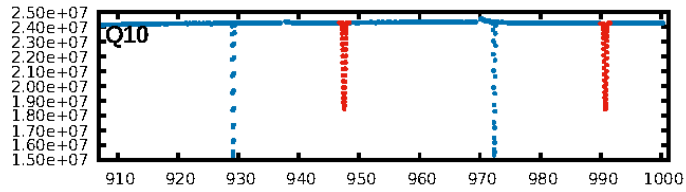
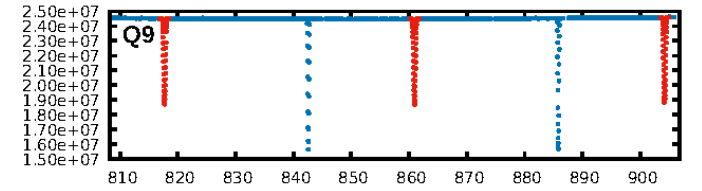
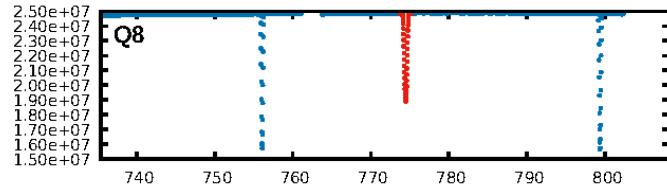
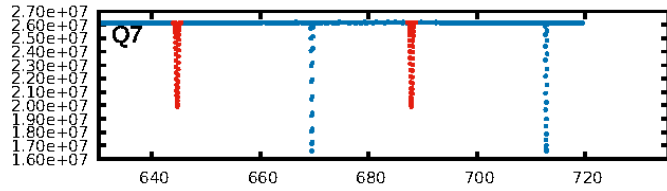
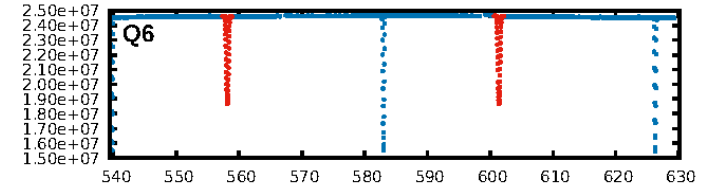
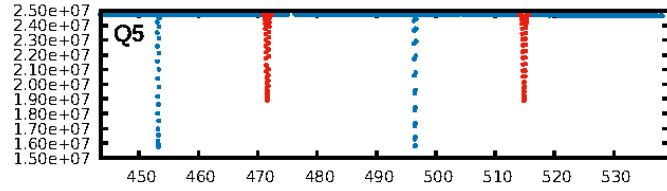
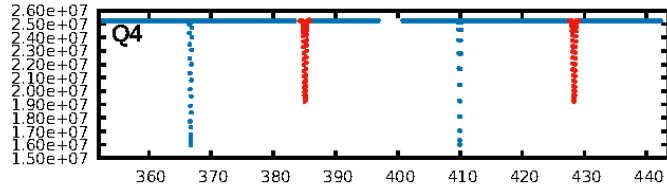
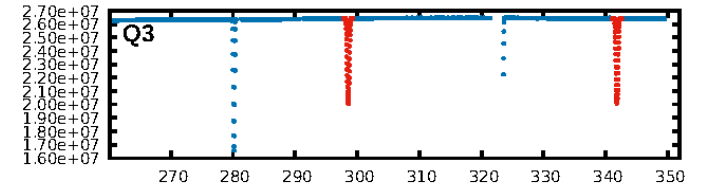
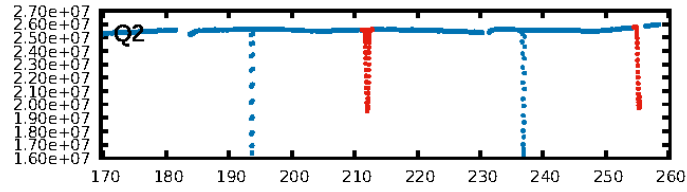
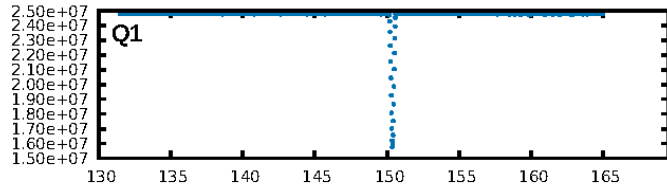
ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: 100.0% [236.45σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 0.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [29/29]  
GhostDiagnostic-chr: 5.086  
Centroid-sig: 0.0%  
Centroid-so: 0.155 arcsec [149.46σ]  
OotOffset-rm: 0.089 arcsec [1.33σ]  
KicOffset-rm: 0.092 arcsec [1.36σ]  
OotOffset-st: 3/4/3/3 [13]  
KicOffset-st: 3/4/3/3 [13]  
DiffImageQuality-fgm: 1.00 [13/13]  
DiffImageOverlap-fno: 0.92 [12/13]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 23:31:43 Z

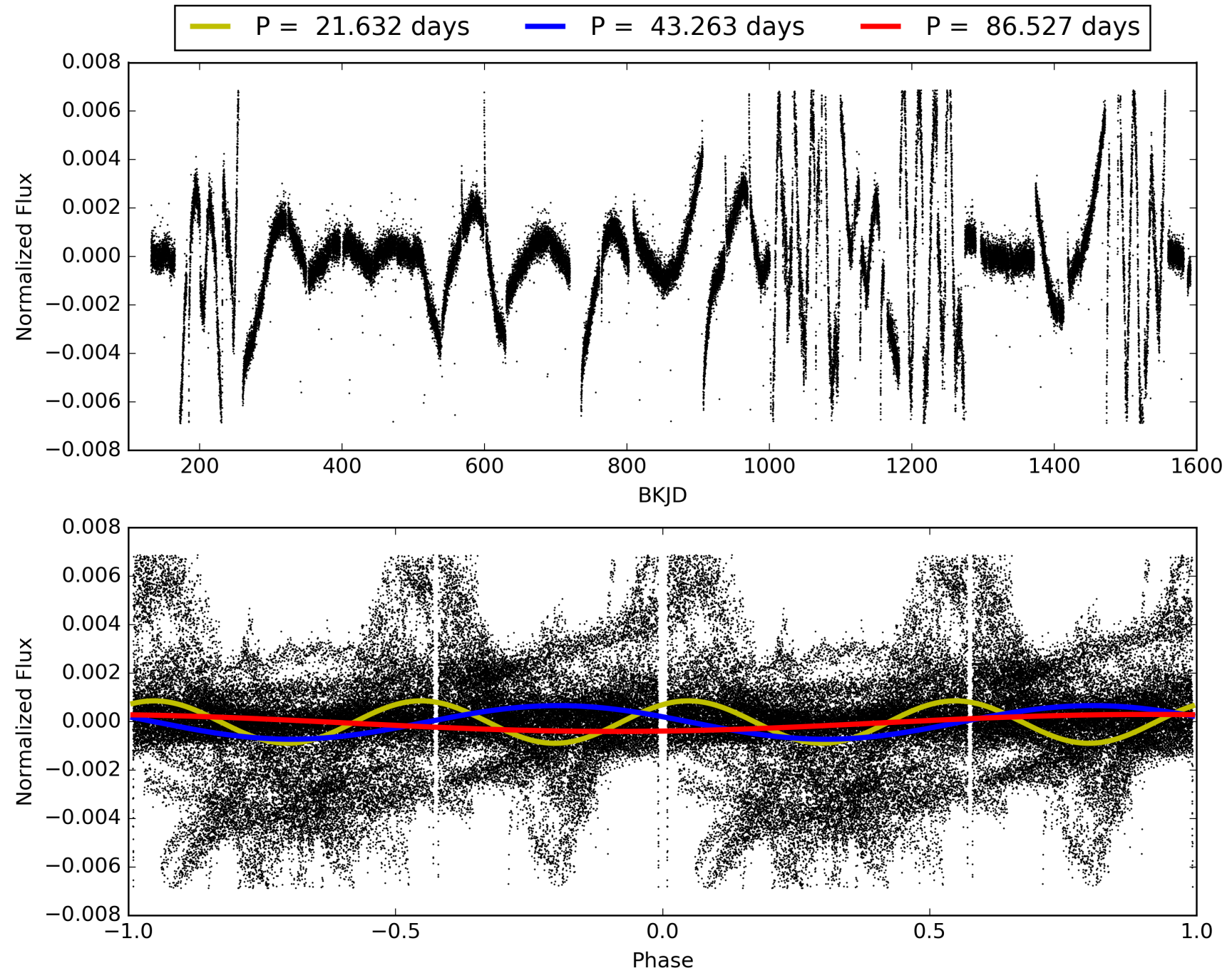
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 008378922-02, PDC Light Curves

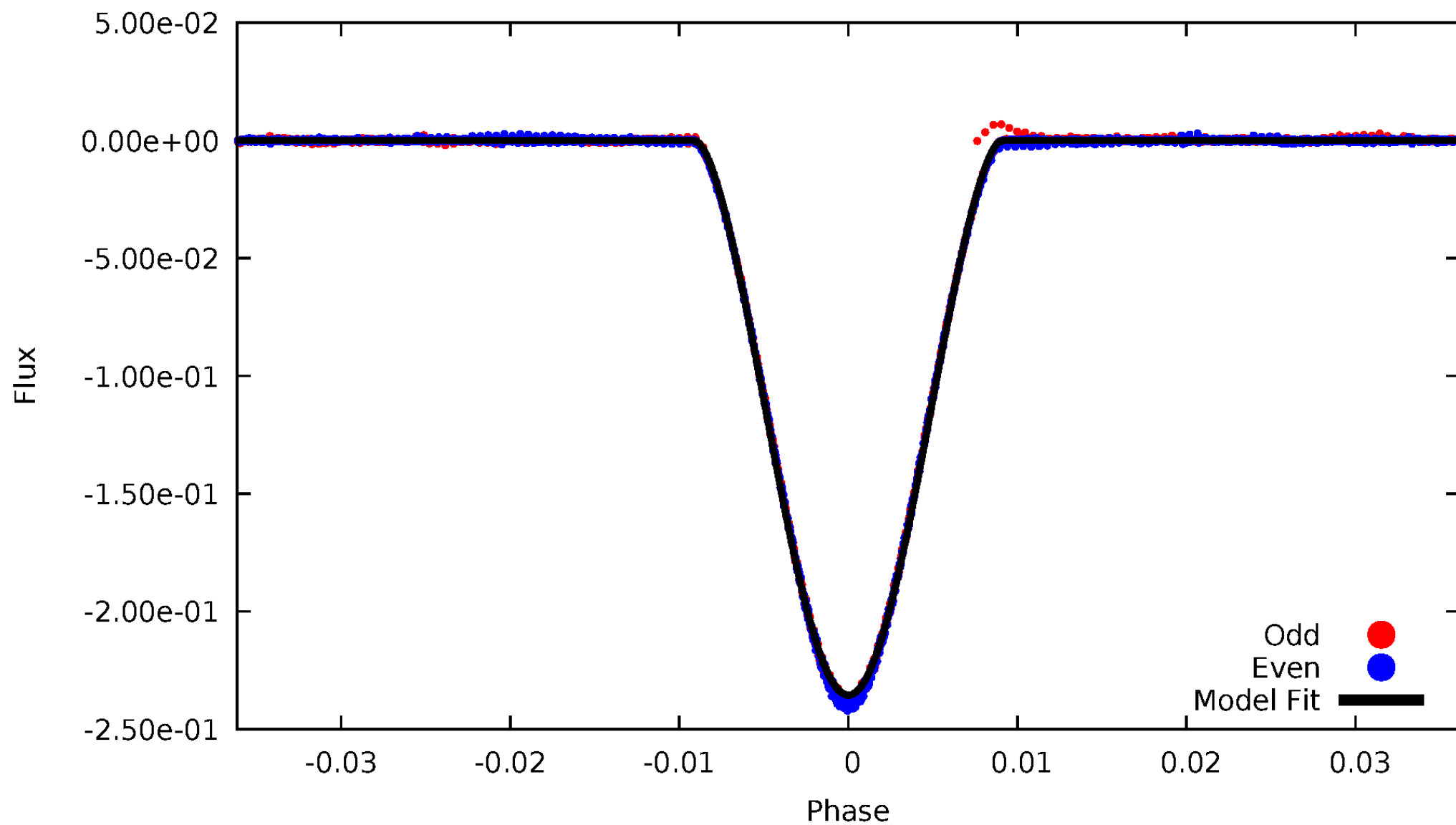


TCE 008378922-02



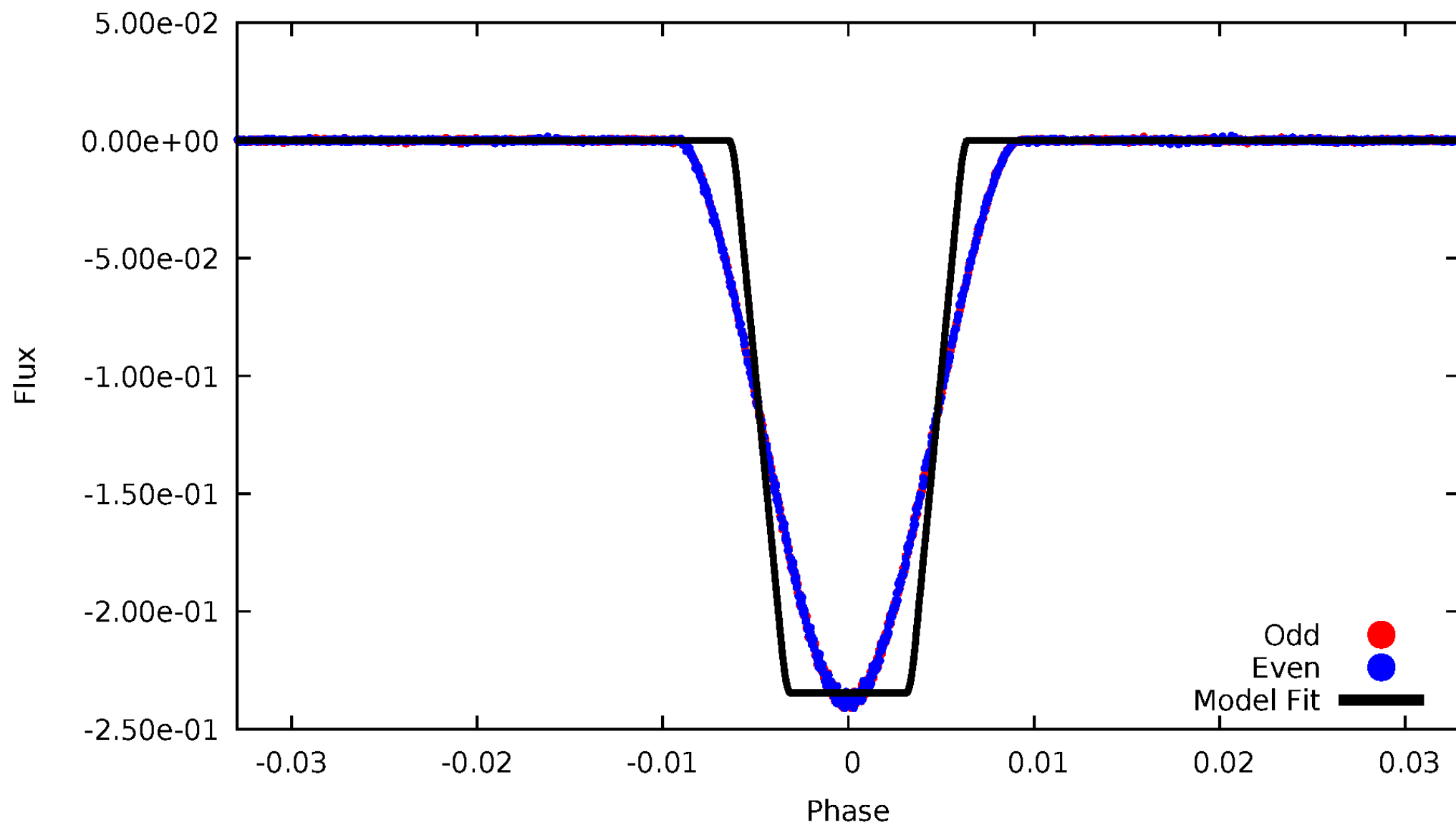
# DV Odd/Even

TCE 008378922-02



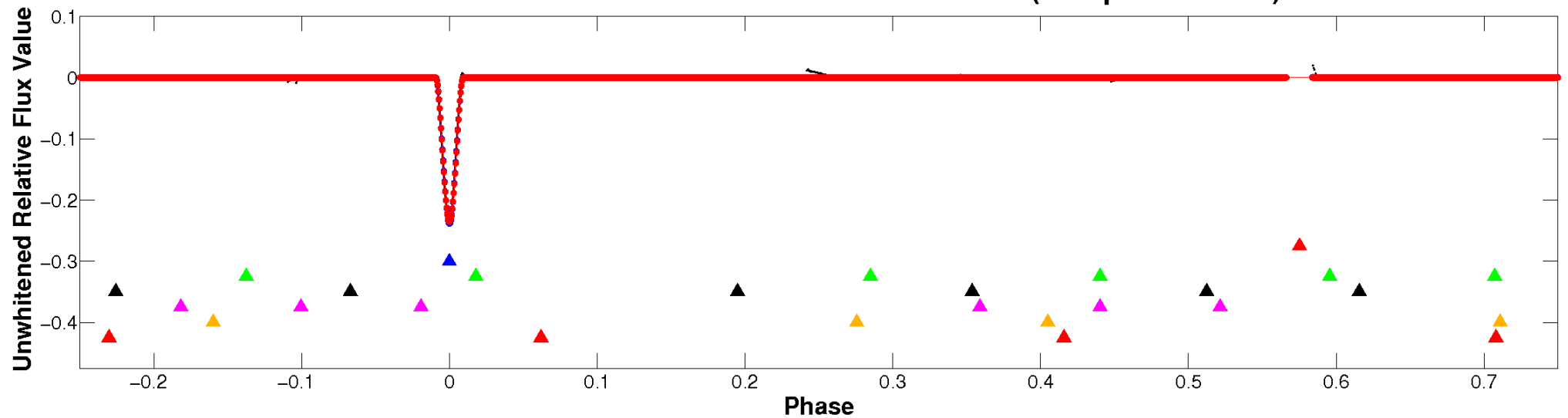
# ALT Odd/Even

TCE 008378922-02

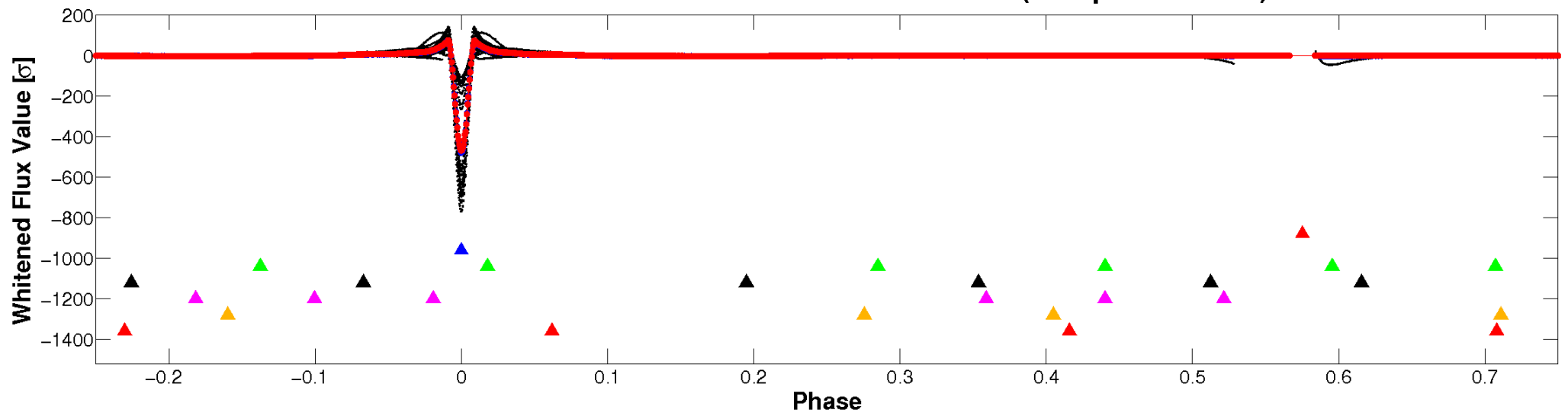


# Non-Whitened Vs. Whitened Light Curve

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

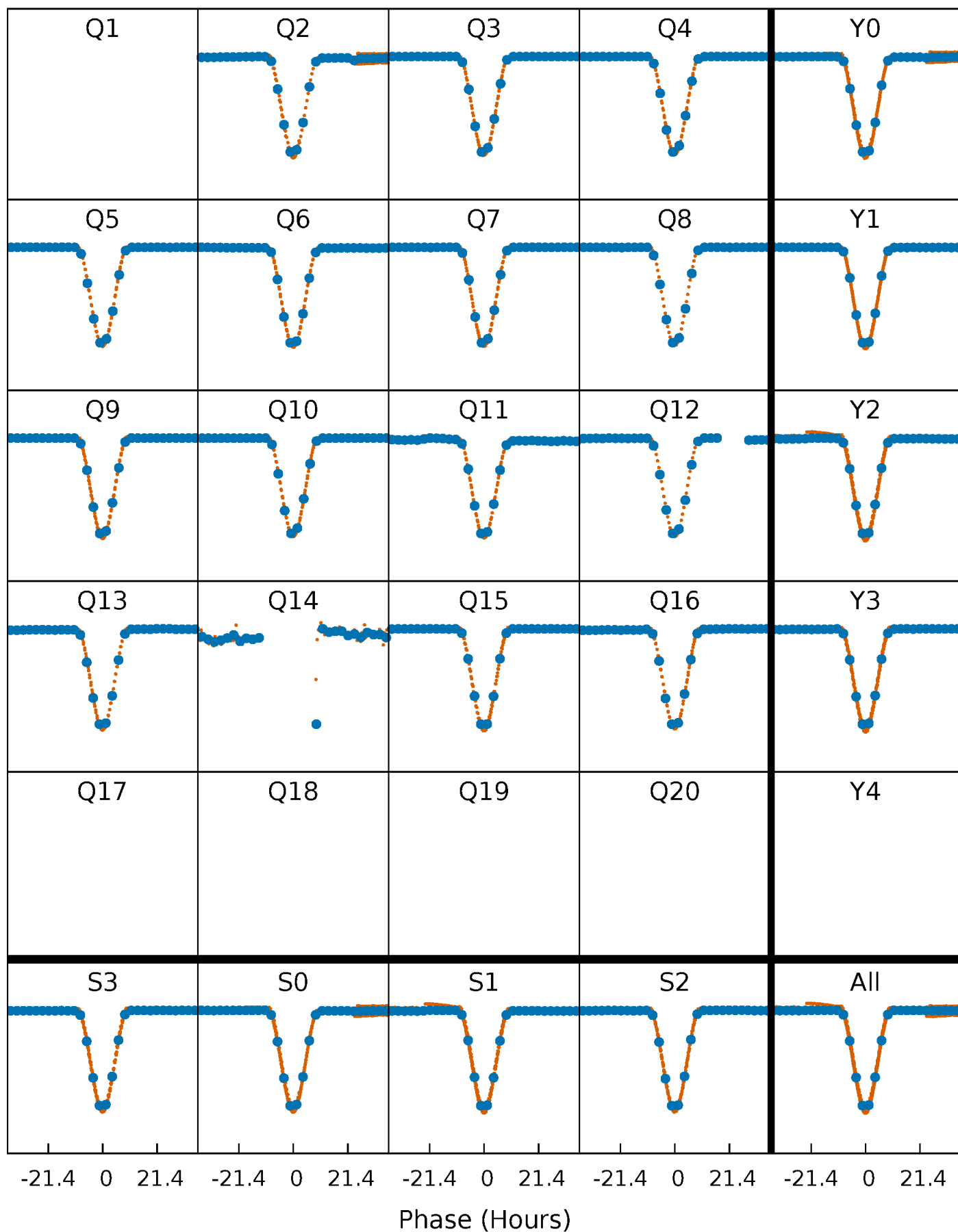


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

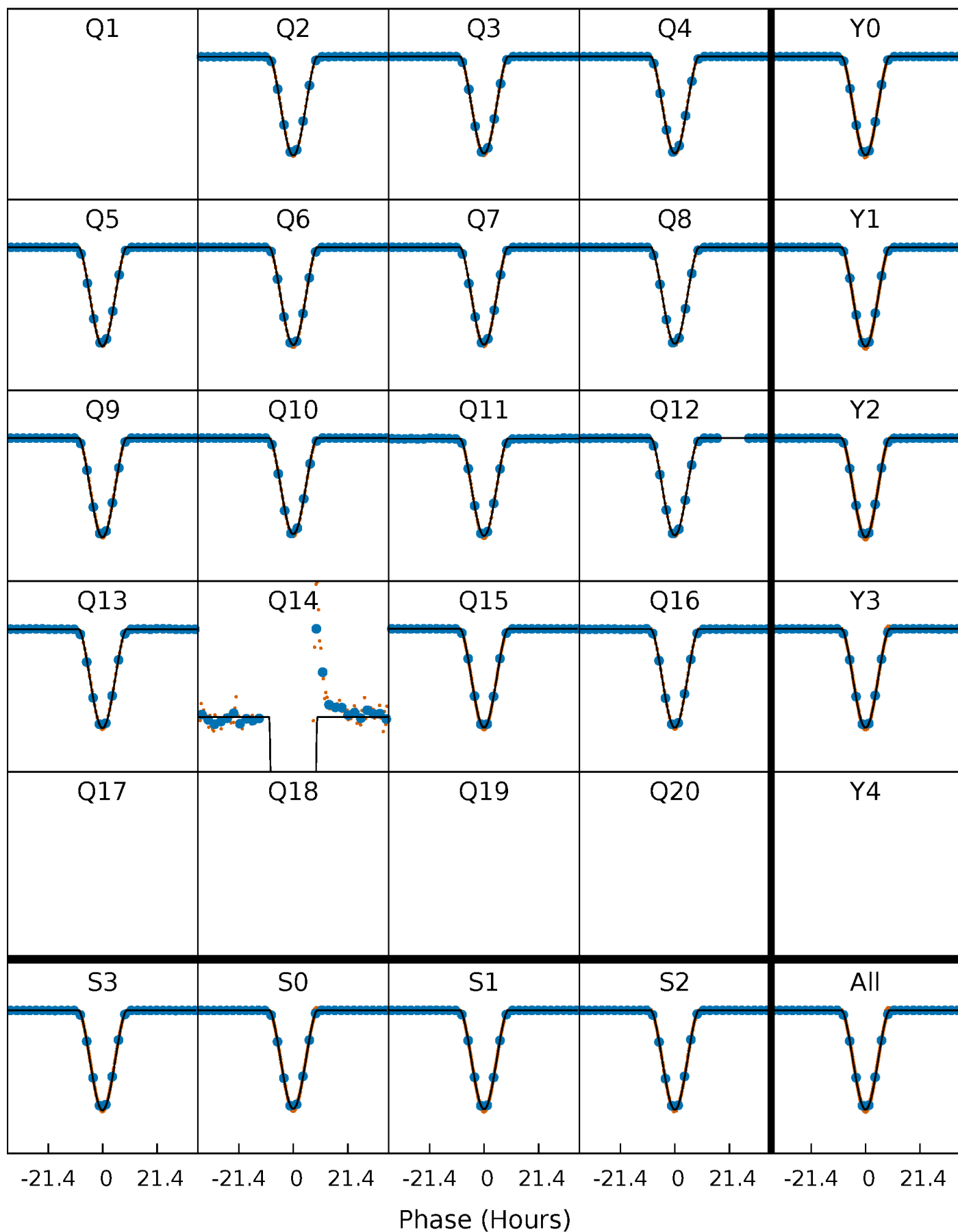
TCE 008378922-02 P= 43.263288 Days  $T_0=168.760159$  (BKJD)





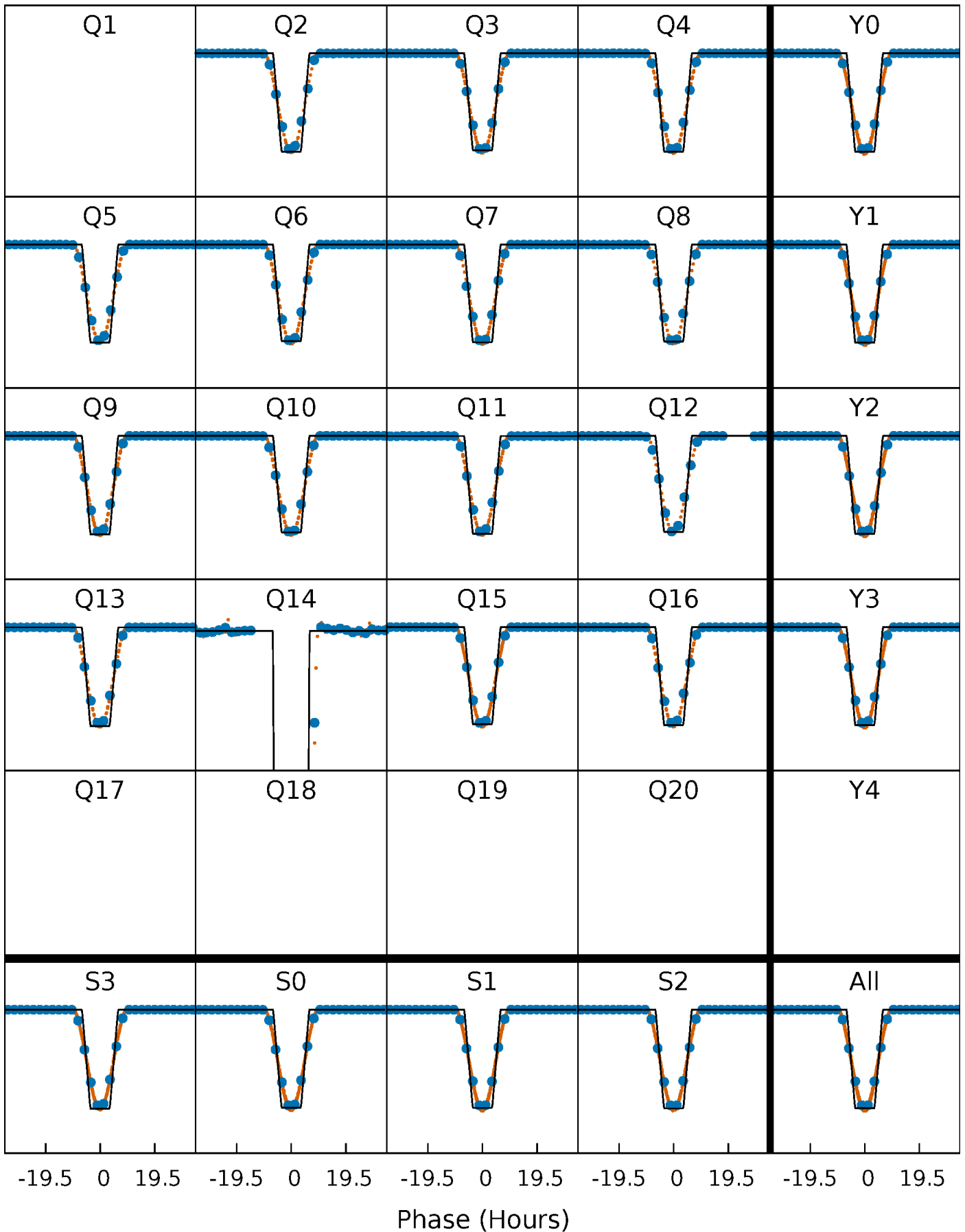
# DV Quarter-Phased Transit Curves

TCE 008378922-02 P= 43.263288 Days  $T_0=168.760159$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

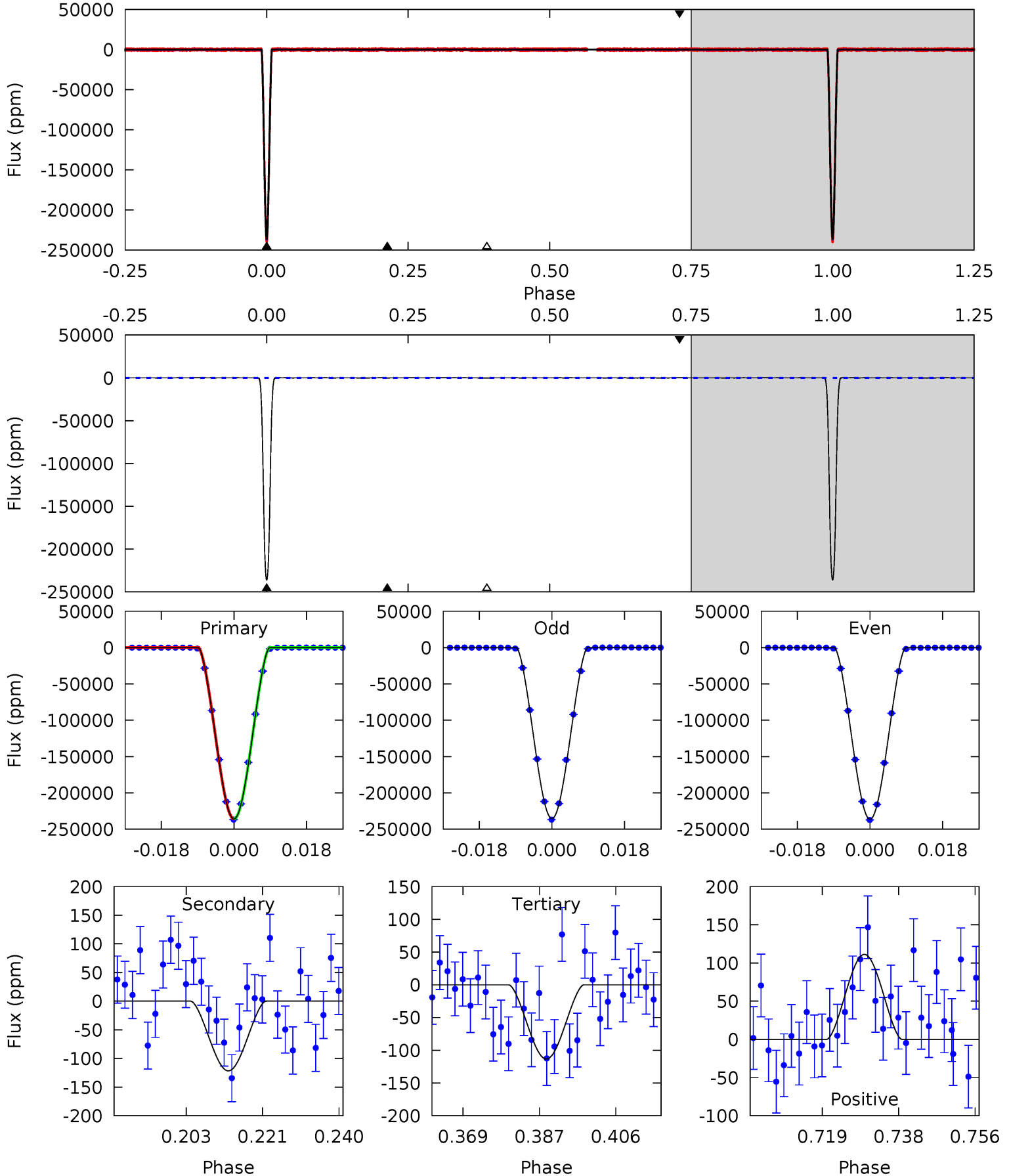
TCE 008378922-02   P= 43.263372 Days    $T_0=168.758896$  (BKJD)



# DV Model-Shift Uniqueness Test

008378922-02, P = 43.263288 Days, E = 125.496871 Days

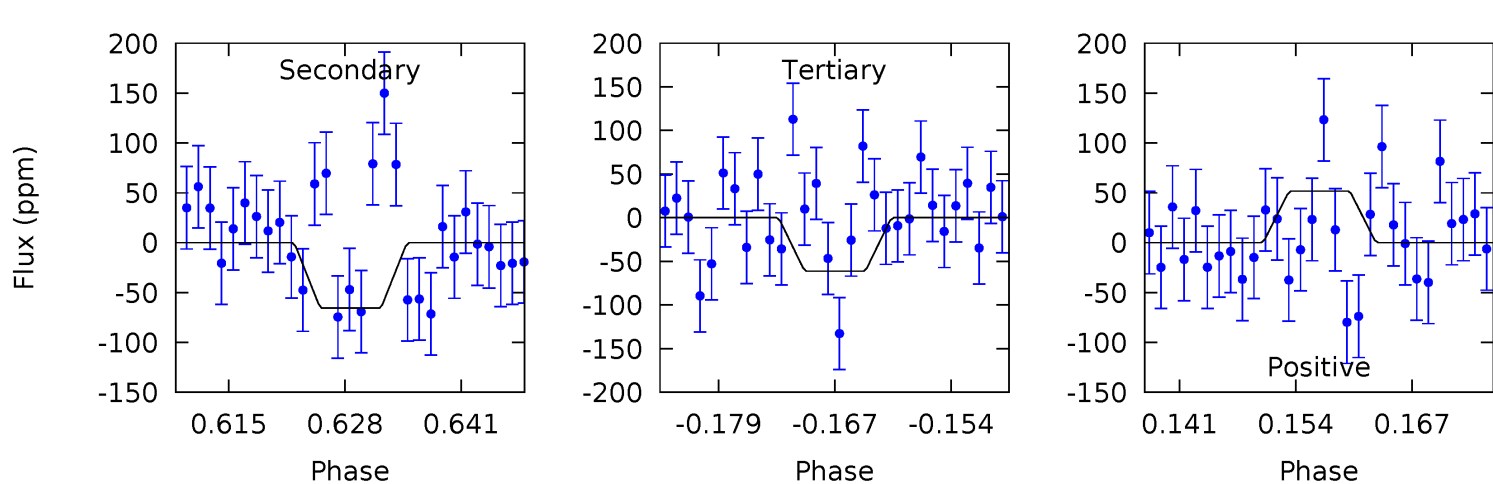
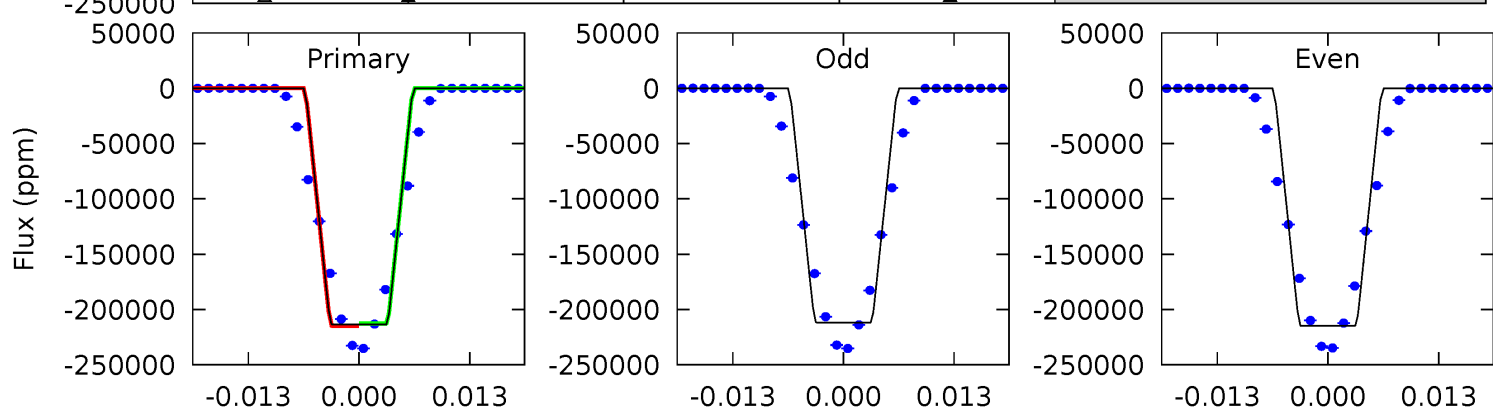
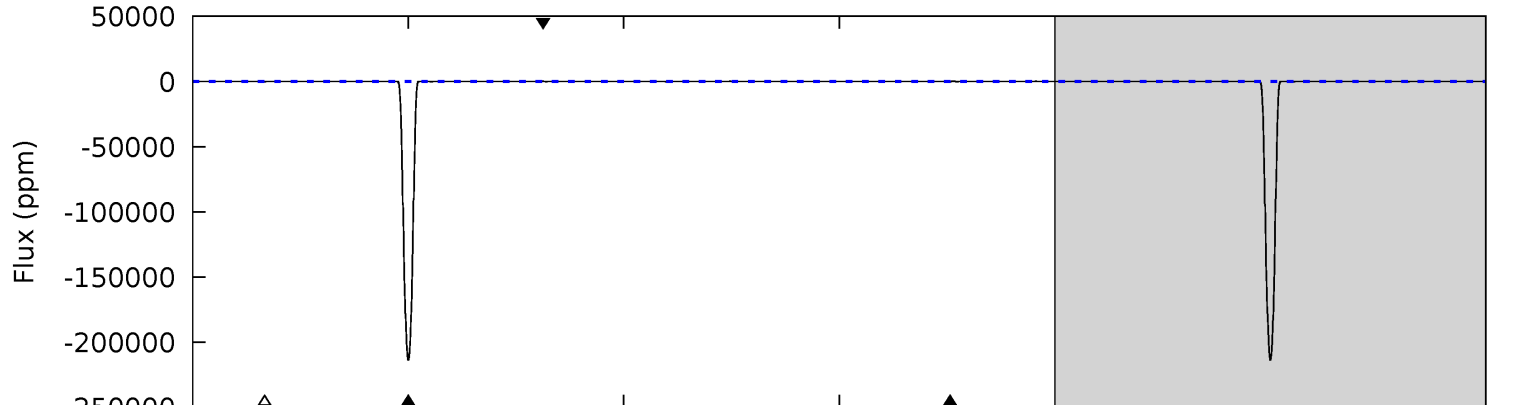
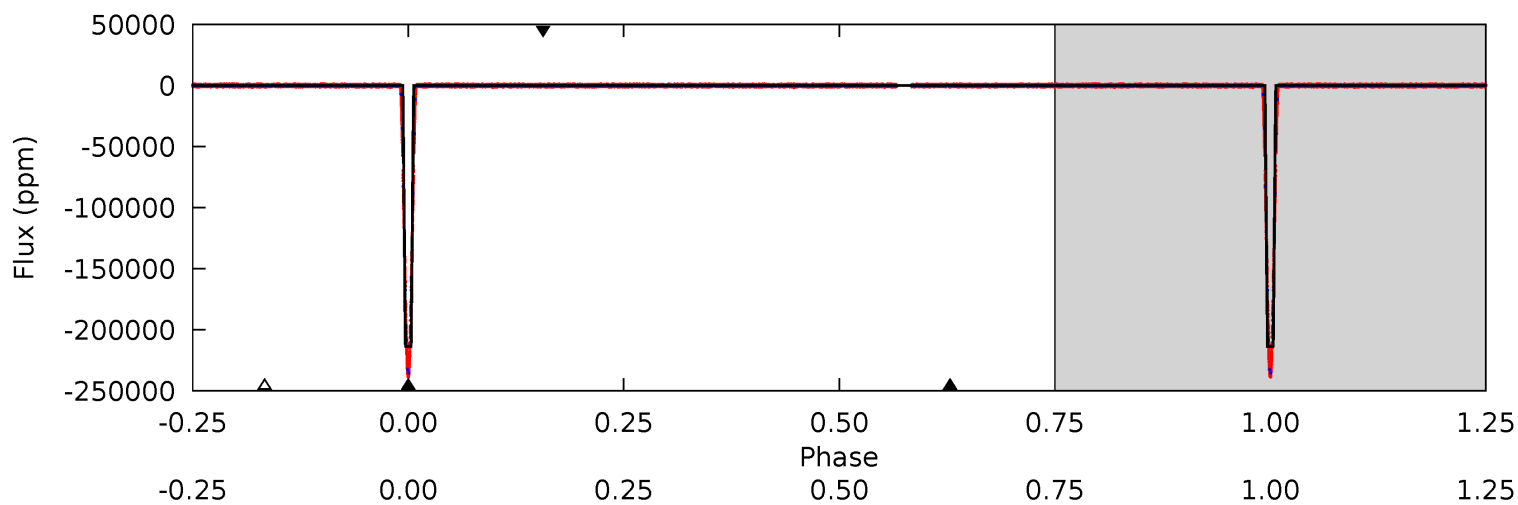
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
16223	8.36	7.79	7.65	4.91	2.36	3.06	16215	16215	0.57	0.71	31.4	0.96	0.00	1.65



# Alt Model-Shift Uniqueness Test

008378922-02, P = 43.263372 Days, E = 125.495524 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
12344	3.79	3.53	2.99	4.98	2.49	1.11	12341	12341	0.26	0.80	89.1	1.00	0.00	0



### Stellar Parameters For KIC 008378922

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$\rho_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5623^{+169}_{-169}$	$4.400^{+0.167}_{-0.204}$	$-0.420^{+0.350}_{-0.250}$	$0.917^{+0.242}_{-0.161}$	$0.770^{+0.124}_{-0.053}$	$1.408^{+1.082}_{-0.699}$
	+3%/-3%	+4%/-5%	+83%/-60%	+26%/-18%	+16%/-7%	+77%/-50%
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 008378922-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	-122±15	$55.26^{+8.16}_{-6.62}$	$706^{+55}_{-47}$	$1775^{+33}_{-38}$	$1.085^{+0.341}_{-0.270}$
Alt.	-66±17	$48.95^{+7.57}_{-5.22}$	$707^{+53}_{-42}$	$1677^{+71}_{-101}$	$0.711^{+0.319}_{-0.230}$

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

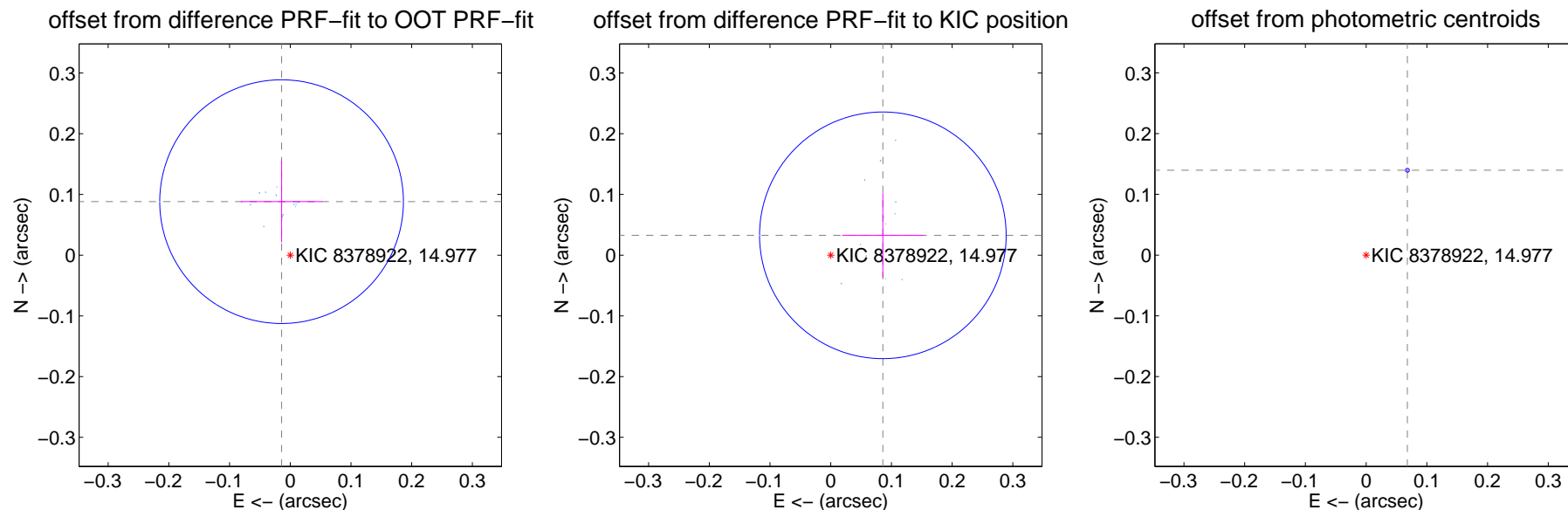
## DV Centroid Data

Supplemental centroid analysis for 008378922-02. Kepler magnitude: 14.98. Transit SNR 5554.11

There are 13 quarters with good PRF difference image offsets

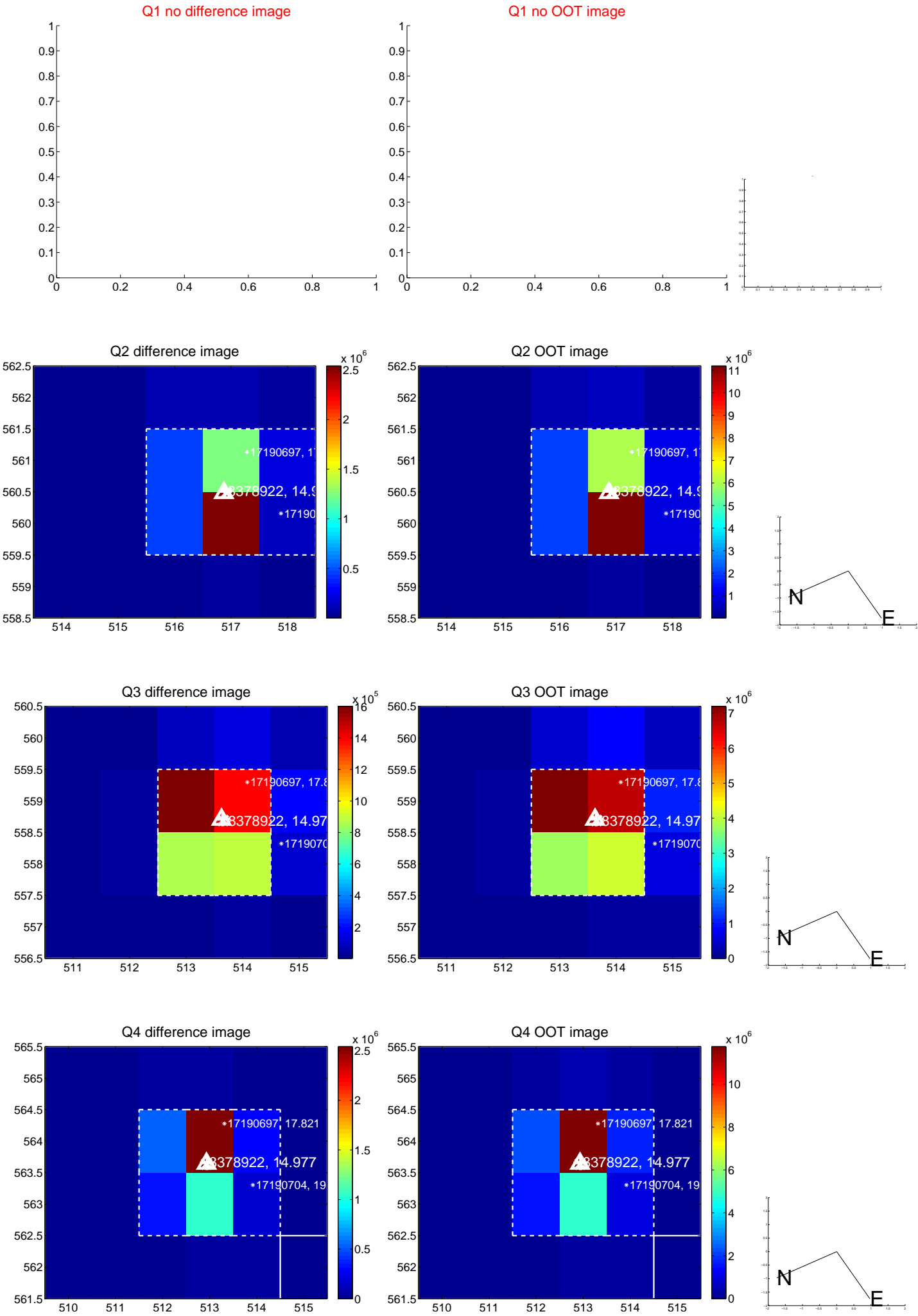
The direct PRF centroid is offset from the target star catalog position by about 0.11 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.089 \pm 0.067$	1.33	$0.014 \pm 0.067$	$0.088 \pm 0.067$
PRF-fit source offset from KIC position	$0.092 \pm 0.068$	1.36	$-0.086 \pm 0.067$	$0.033 \pm 0.069$
photometric centroid source offset	$0.16 \pm 0.00$	149.46	$-0.07 \pm 0.00$	$0.14 \pm 0.00$

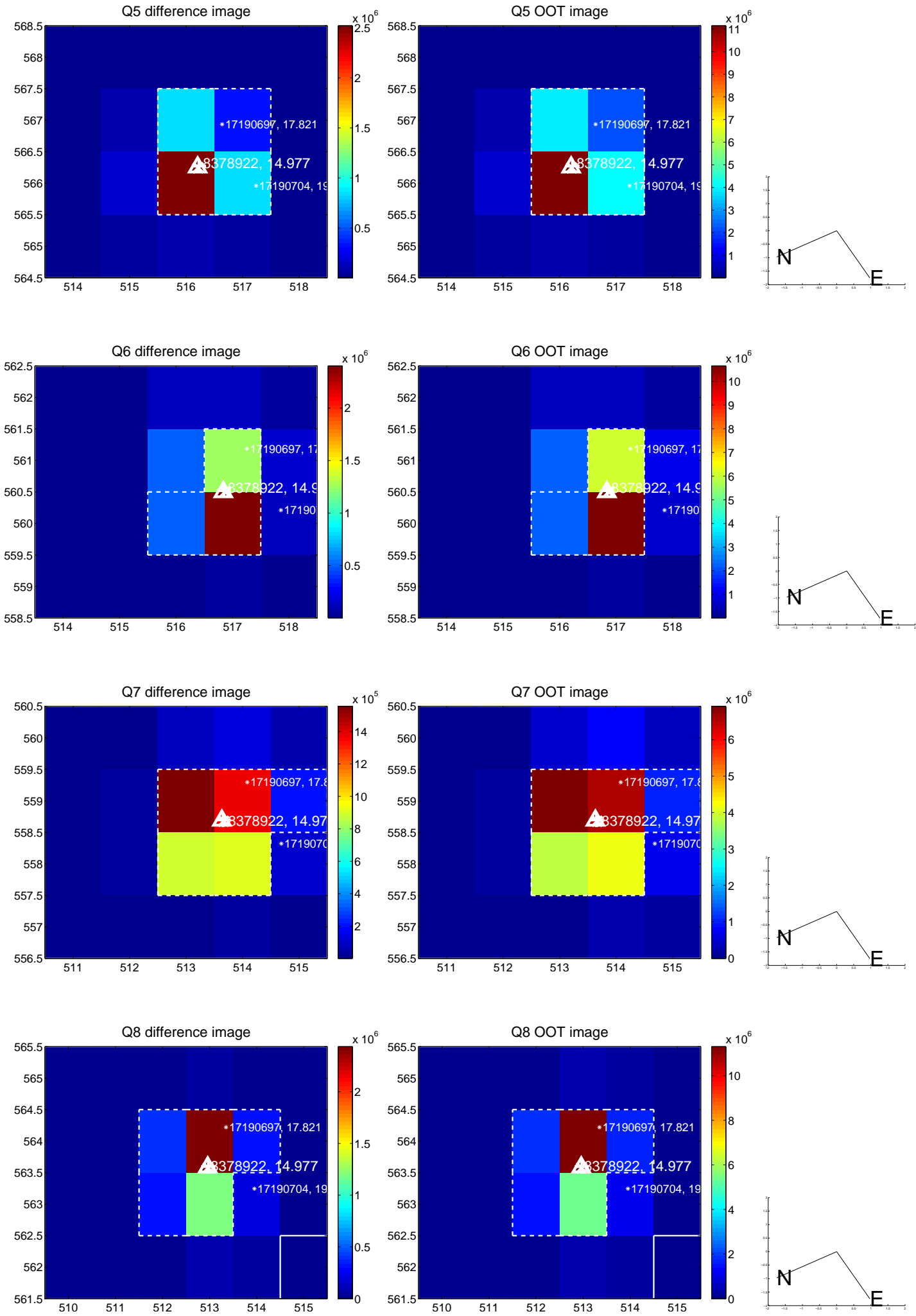


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

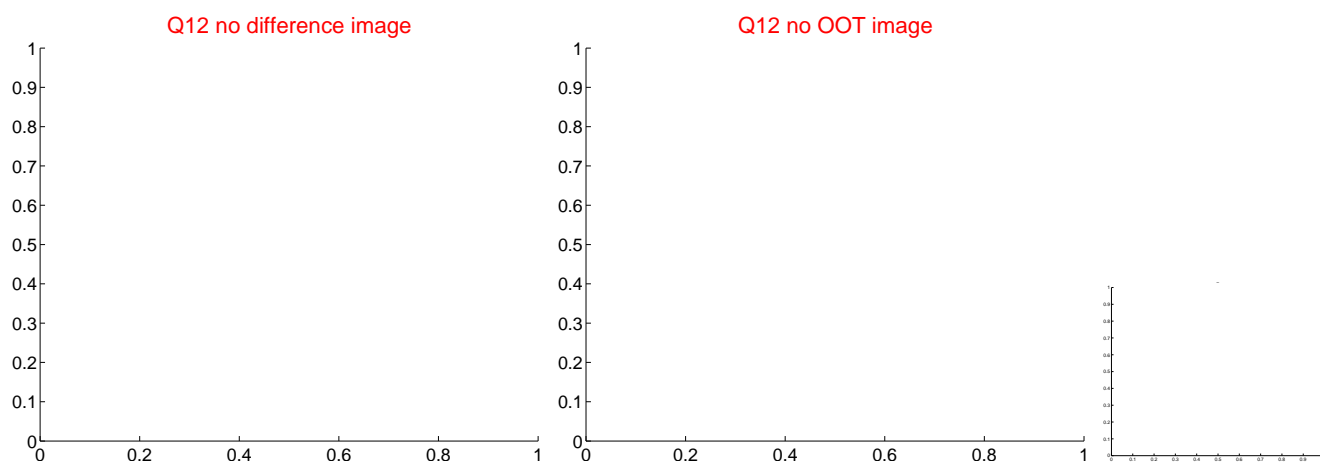
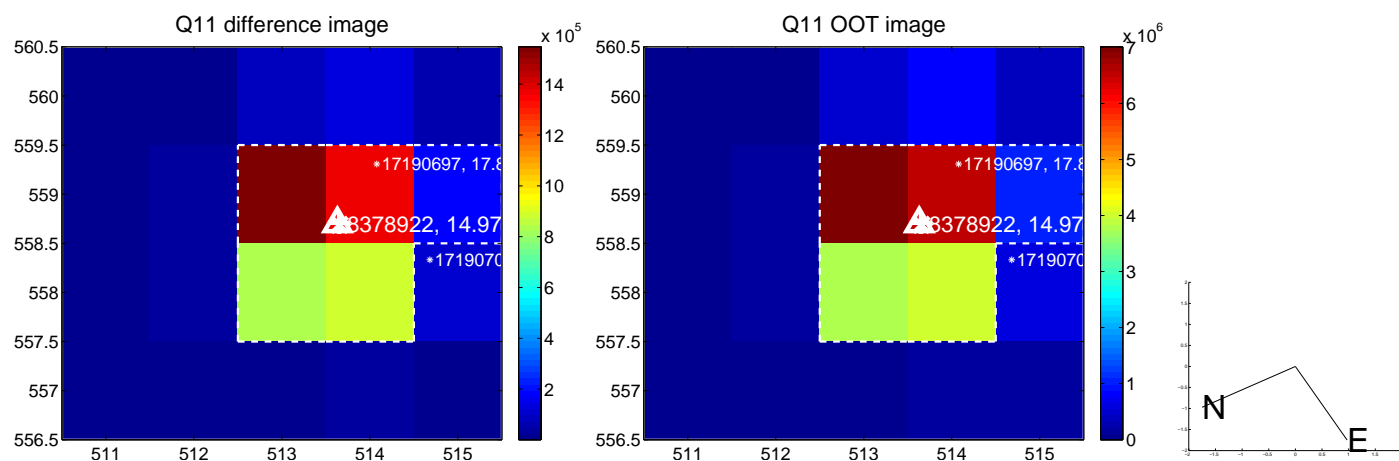
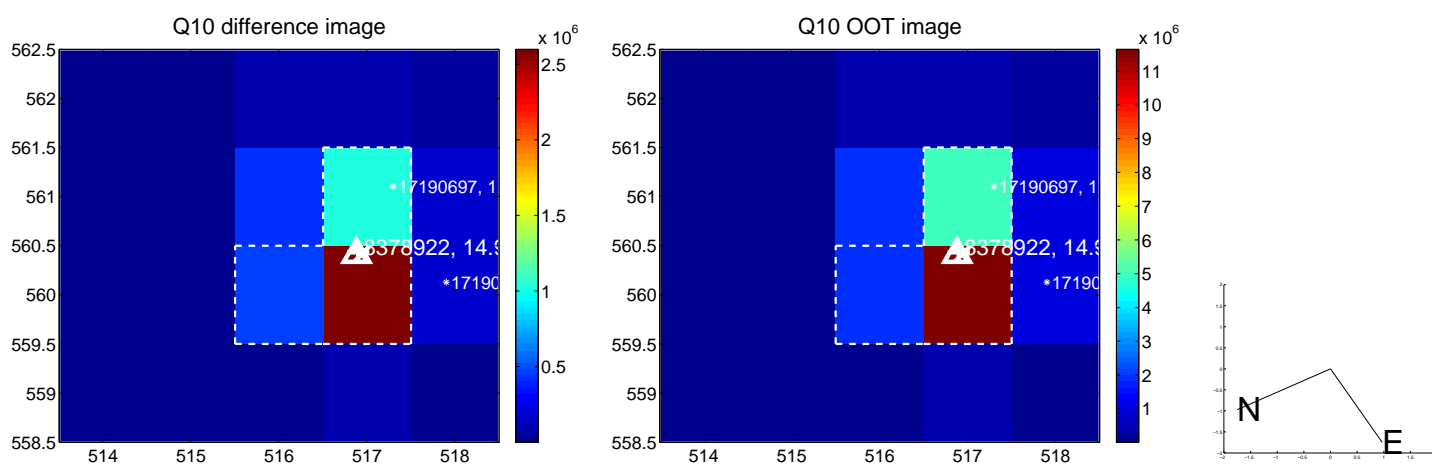
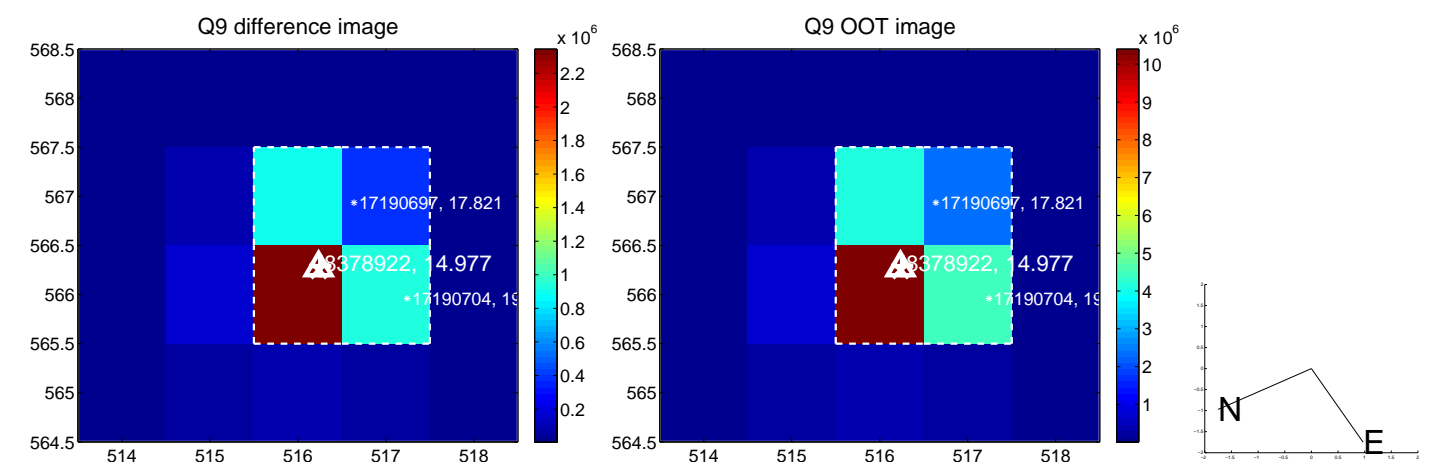


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

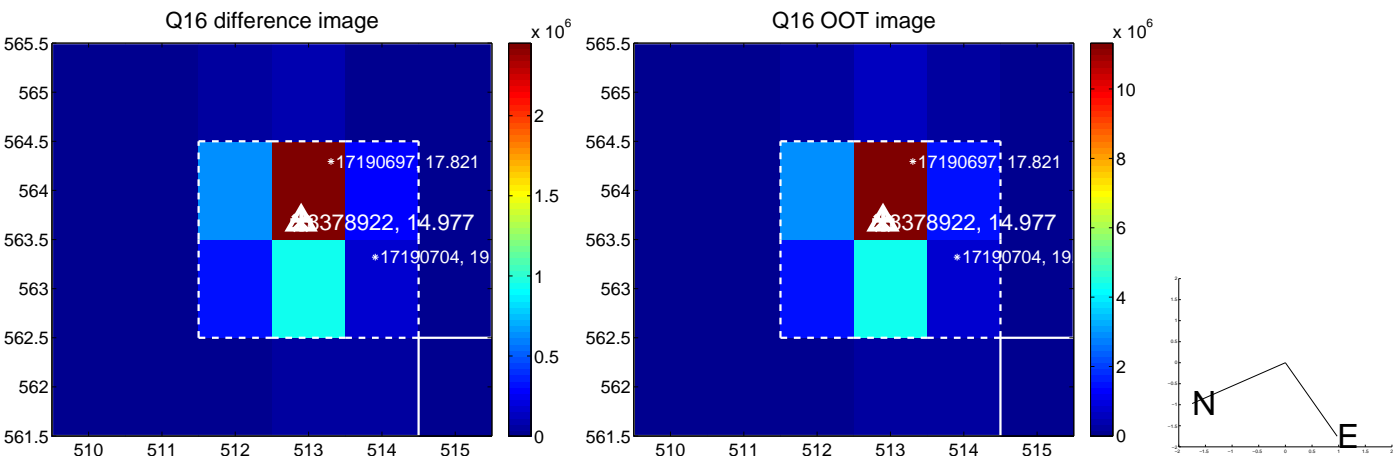
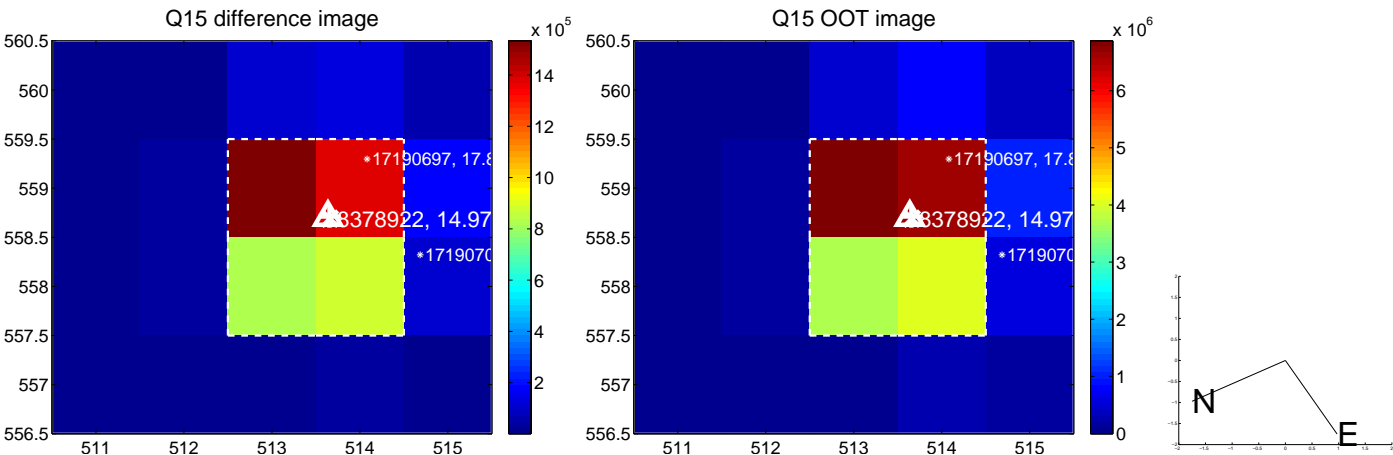
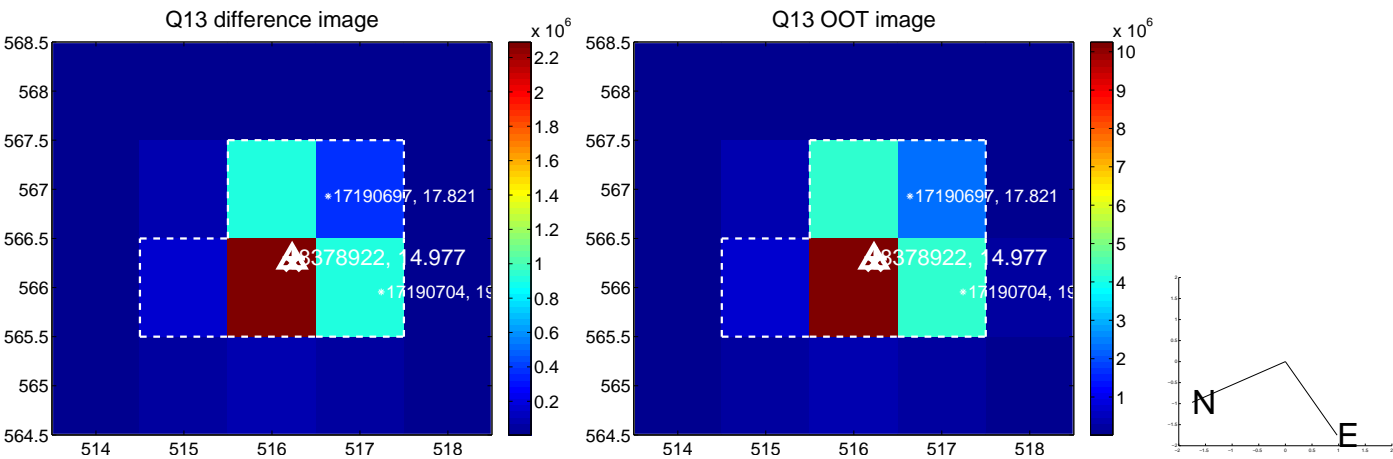




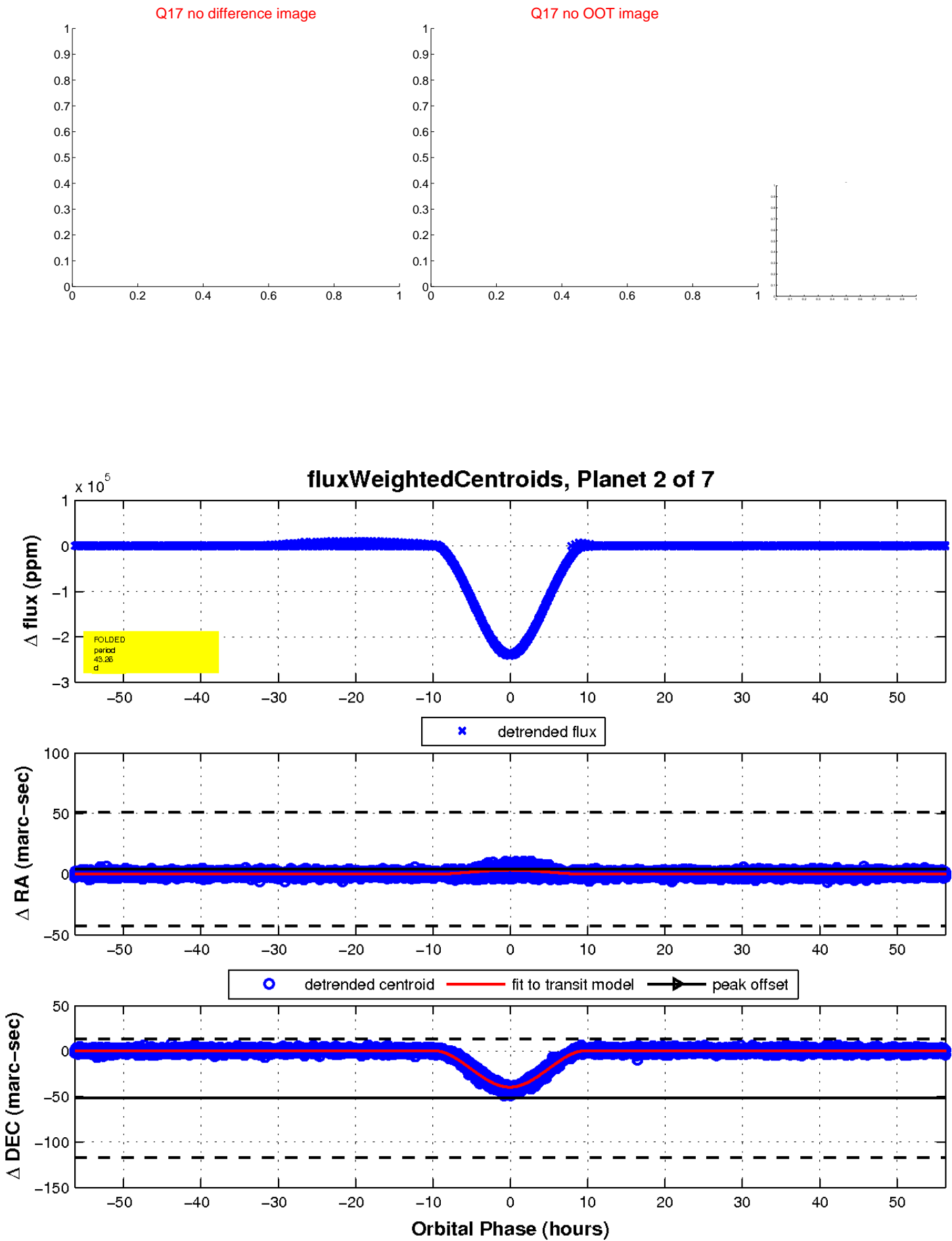
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

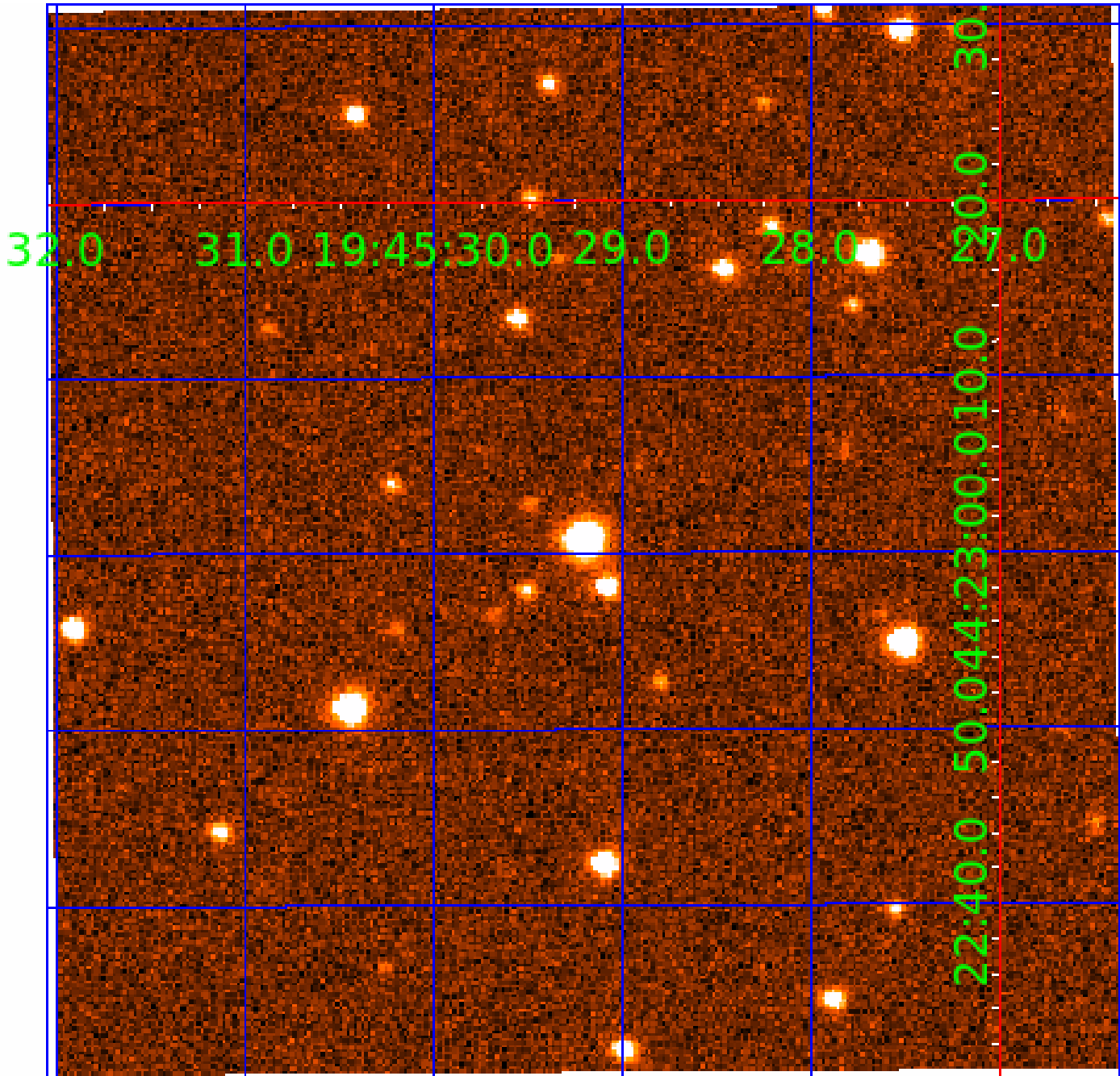


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 008378922

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008378922-01	OBS	7028.01	43.262904	150.388198	366177.4	6.000	12874.6	-1.0	0.92	5623	50.03	15.40
008378922-02	OBS	No	43.263288	168.760159	235519.1	18.765	10162.6	5554.1	0.92	5623	54.85	15.40
008378922-03	OBS	No	234.587411	324.318660	11851.4	5.000	90.8	-1.0	0.92	5623	9.91	1.62
008378922-05	OBS	No	236.190747	321.110456	10715.2	29.319	40.6	87.5	0.92	5623	17.06	1.60
008378922-06	OBS	No	408.204114	316.068405	337.6	11.370	11.4	4.0	0.92	5623	1.83	0.77
008378922-07	OBS	No	404.679845	329.185253	725.8	15.000	11.8	-1.0	0.92	5623	2.45	0.78

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008378922-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_ALT—MOD_ODDEVEN_ALT—HAS_SEC_TCE—CENT_NOFITS
008378922-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE
008378922-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_NOFITS
008378922-05	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
008378922-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
008378922-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—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.

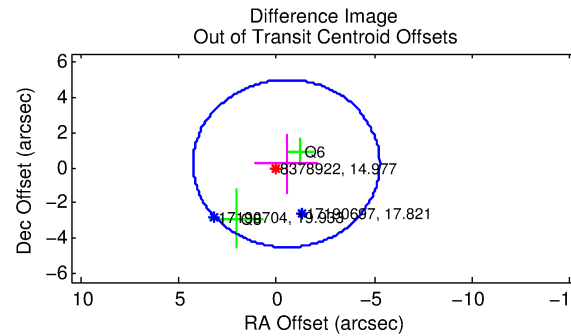
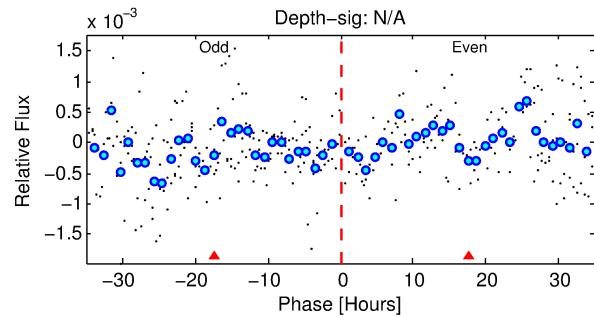
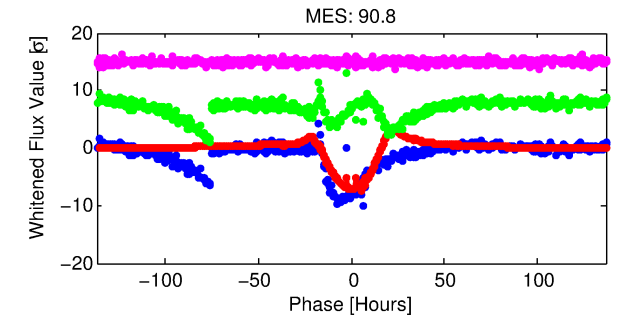
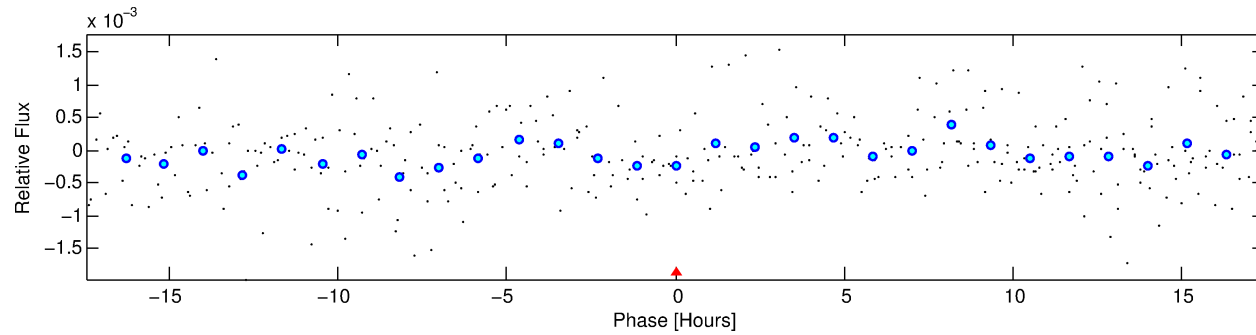
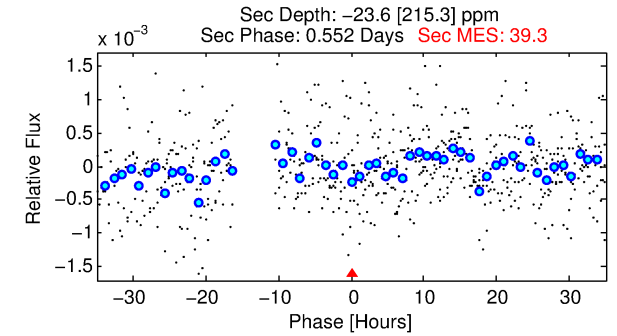
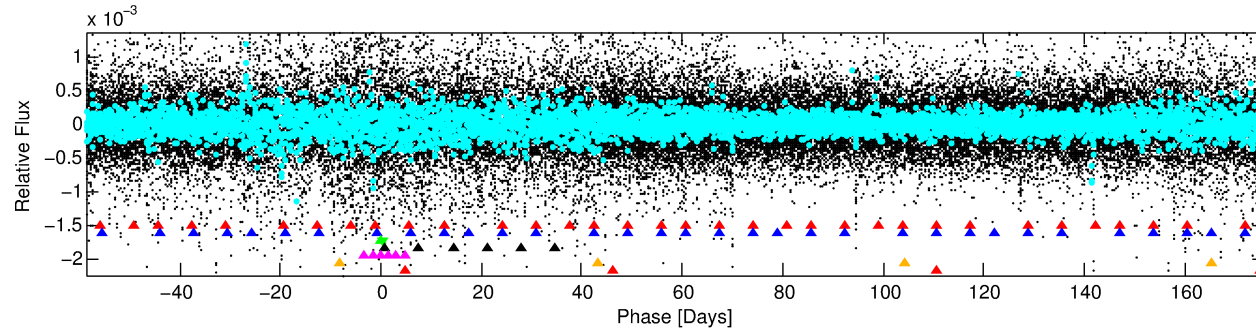
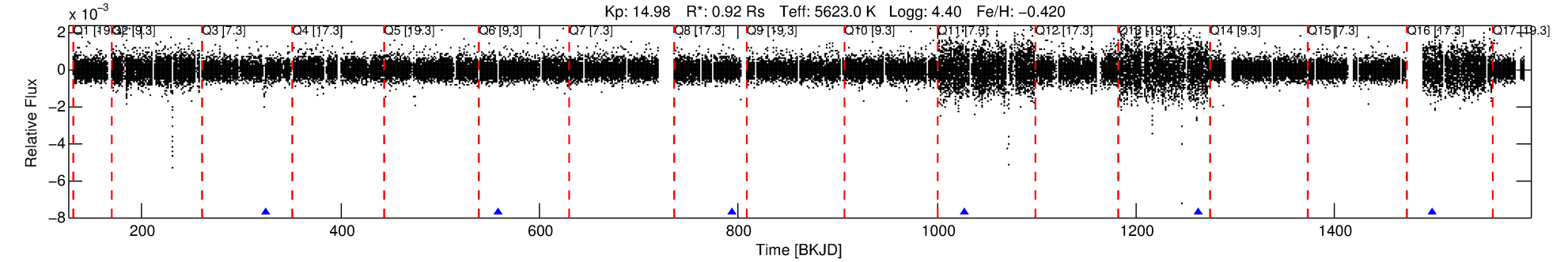
## Ephemeris Match Information For 008378922-03

No Significant Match Found

# DV One-Page Summary

KIC: 8378922 Candidate: 3 of 7 Period: 234.587 d  
KOI: K07028 Corr: No Ephemeris Match

Kp: 14.98 R\*: 0.92 Rs Teff: 5623.0 K Logg: 4.40 Fe/H: -0.420



## TPS TCE Results:

Period = 234.58741 d  
Epoch = 324.3187 BKJD

DV fit results are unavailable

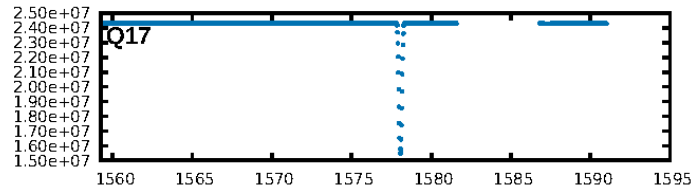
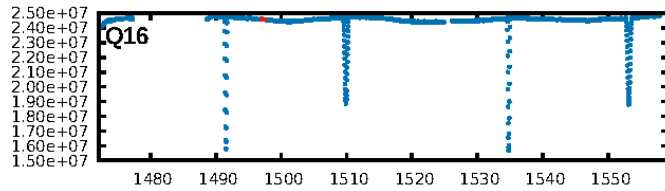
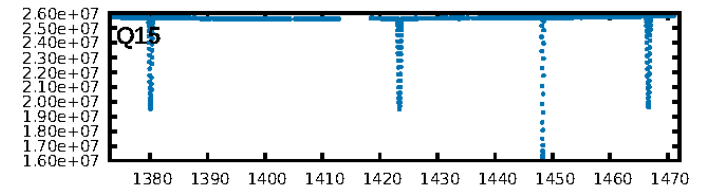
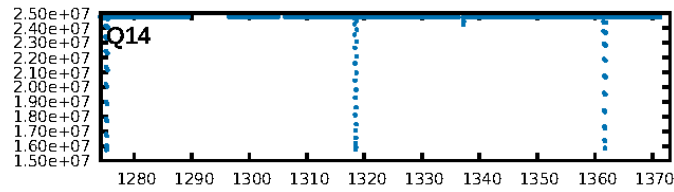
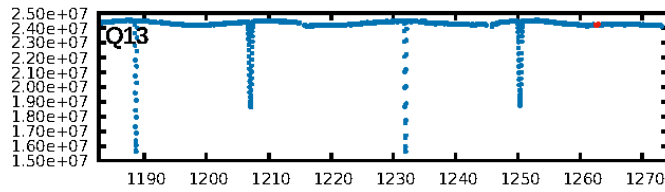
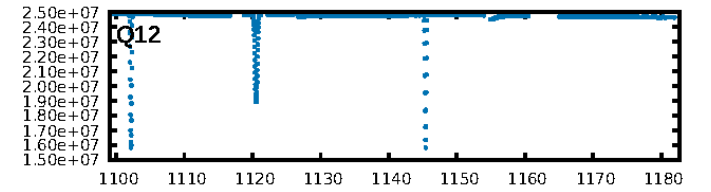
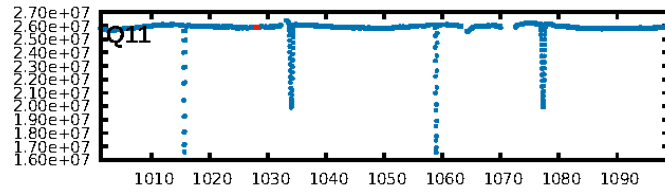
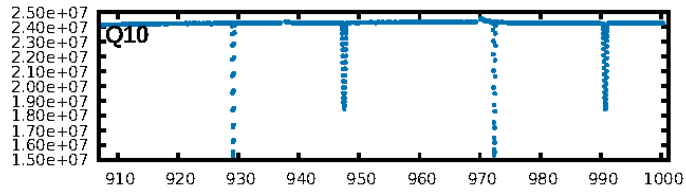
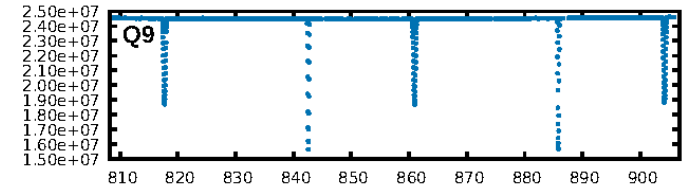
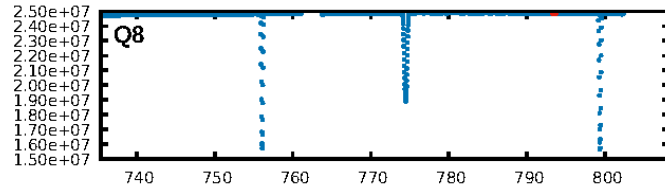
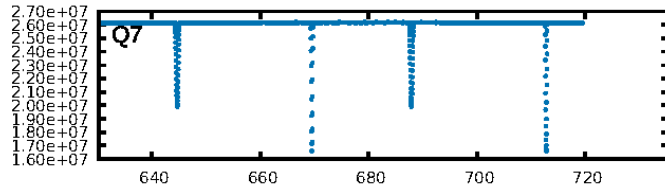
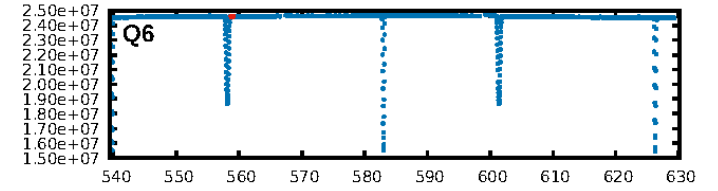
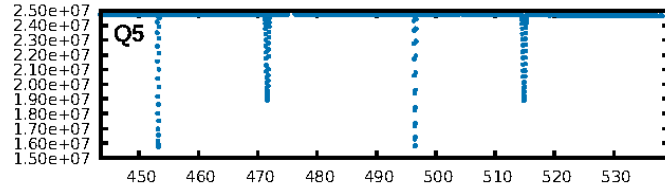
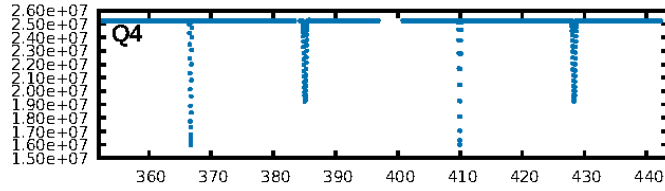
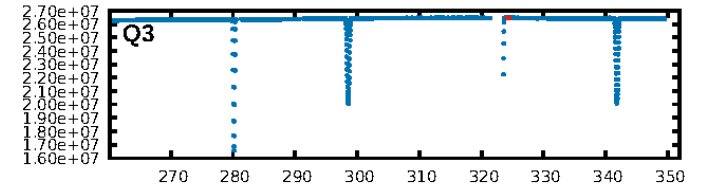
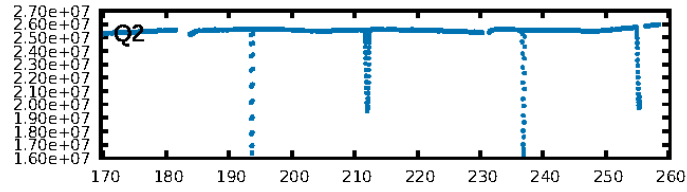
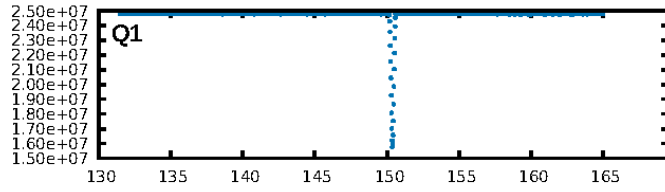
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [236.45σ]  
LongPeriod-sig: 80.4% [1.29σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: 1.405  
Centroid-sig: 7.8%  
Centroid-so: 5.649 arcsec [1.66σ]  
OotOffset-rm: 0.558 arcsec [0.35σ]  
KicOffset-rm: 0.668 arcsec [0.36σ]  
OotOffset-st: 1/0/1/0 [2]  
KicOffset-st: 1/0/1/0 [2]  
DiffImageQuality-fgm: 0.00 [0/2]  
DiffImageOverlap-fno: 0.60 [3/5]

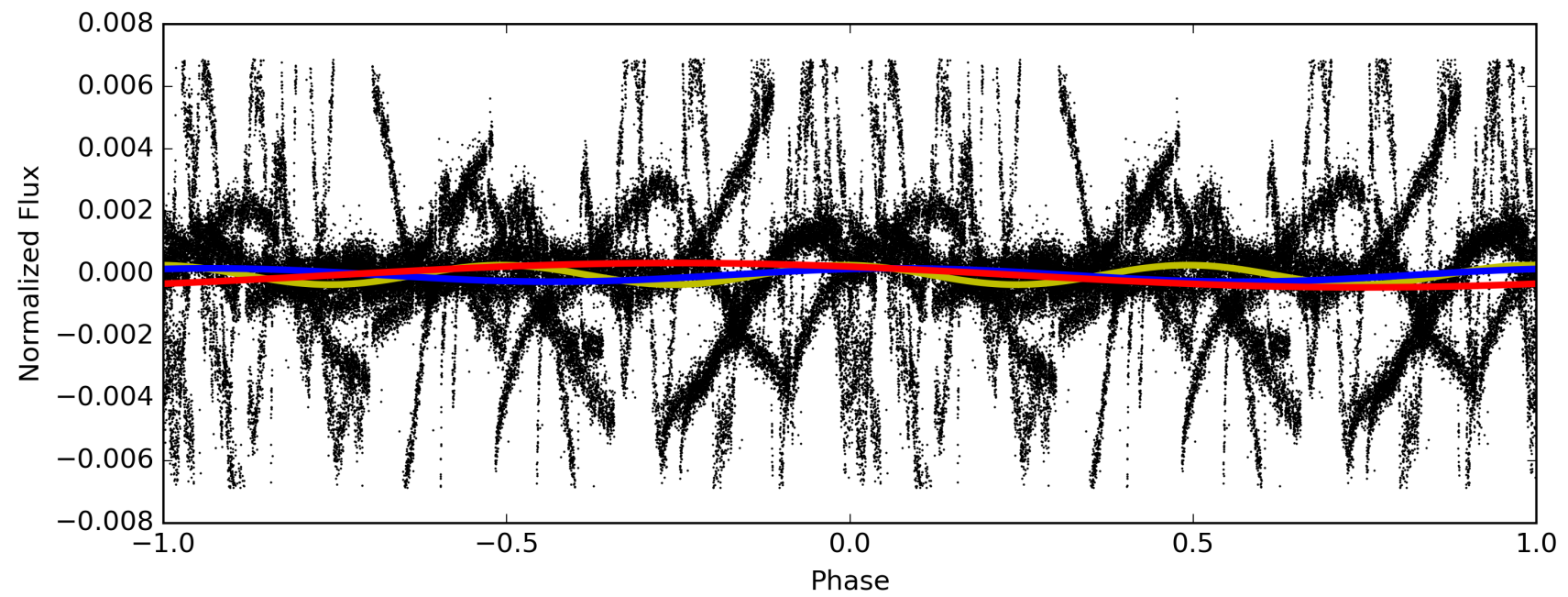
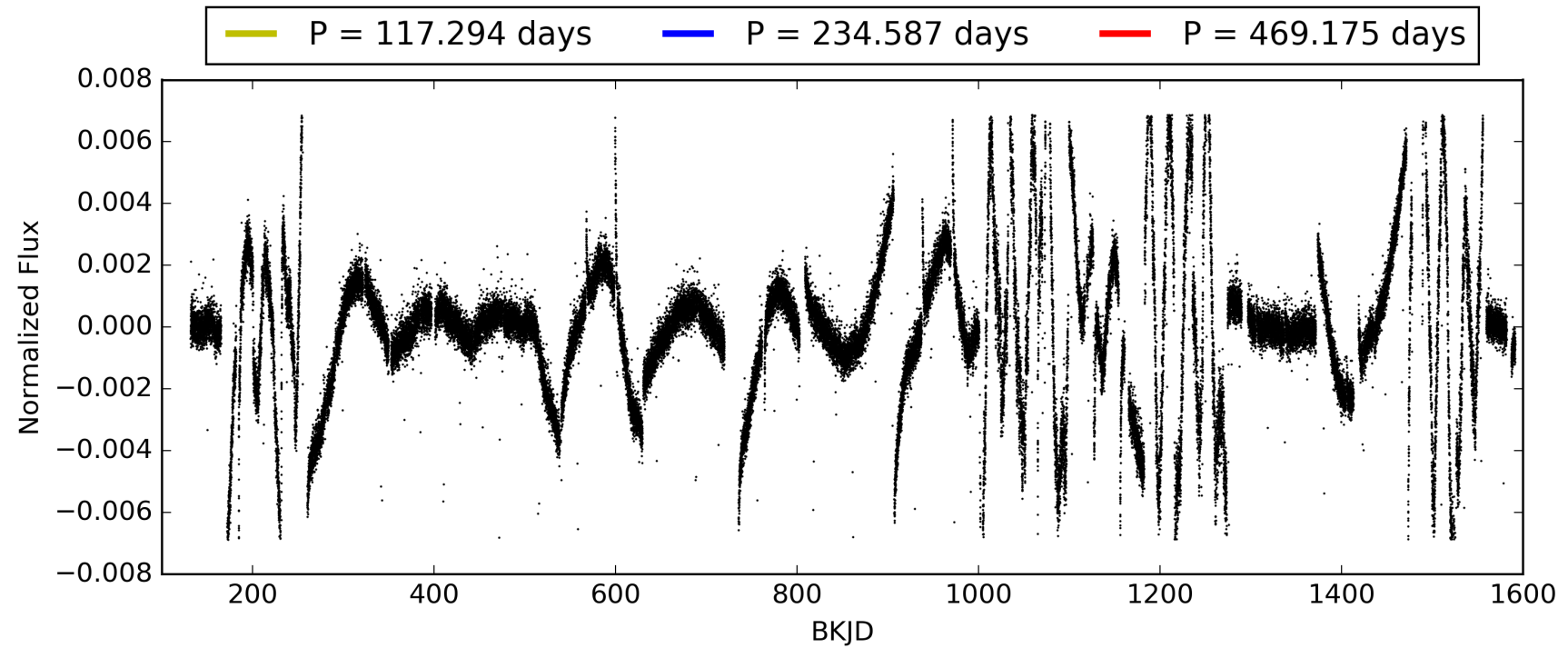
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 23:31:50 Z

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

# TCE 008378922-03, PDC Light Curves



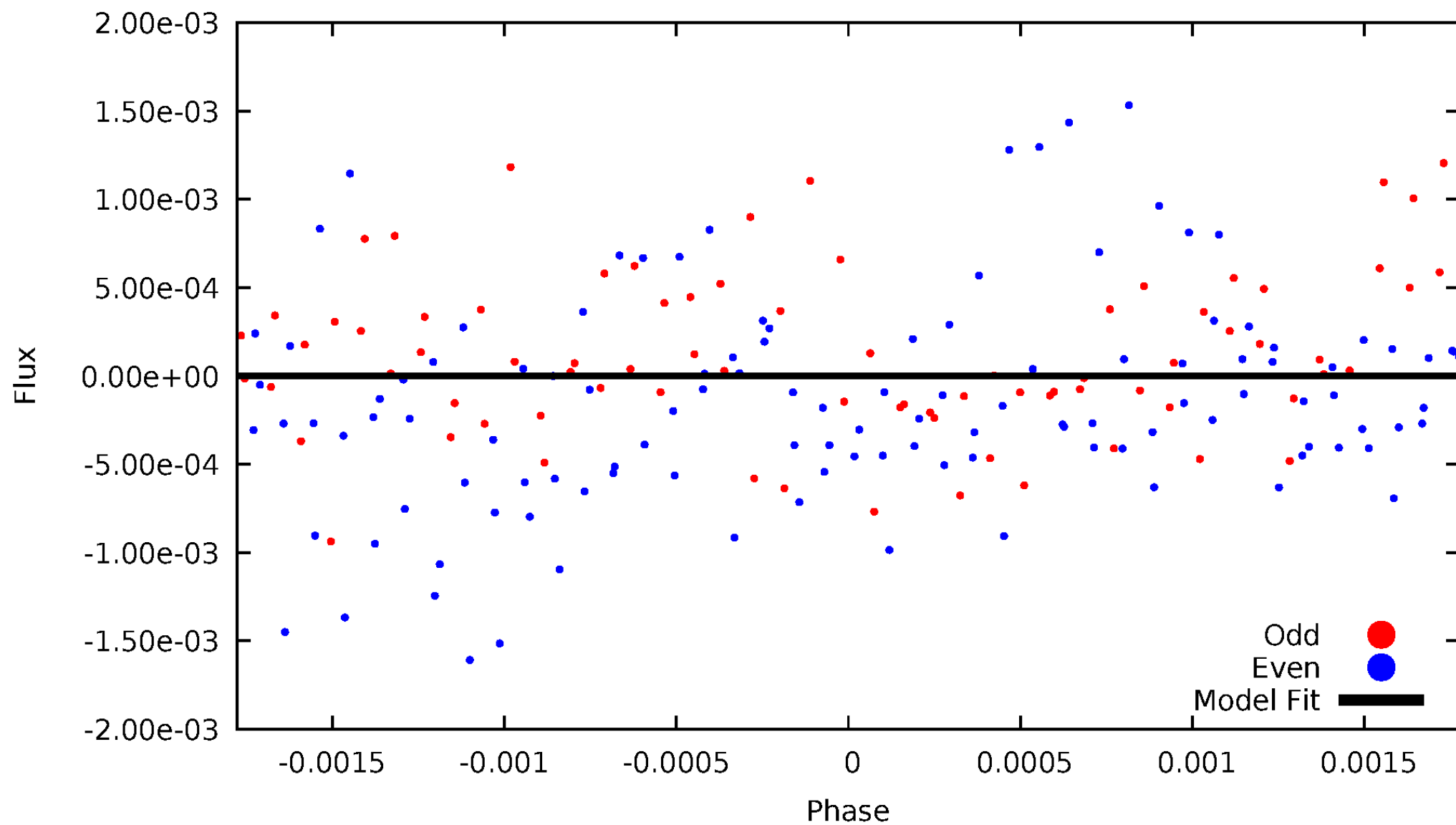
TCE 008378922-03





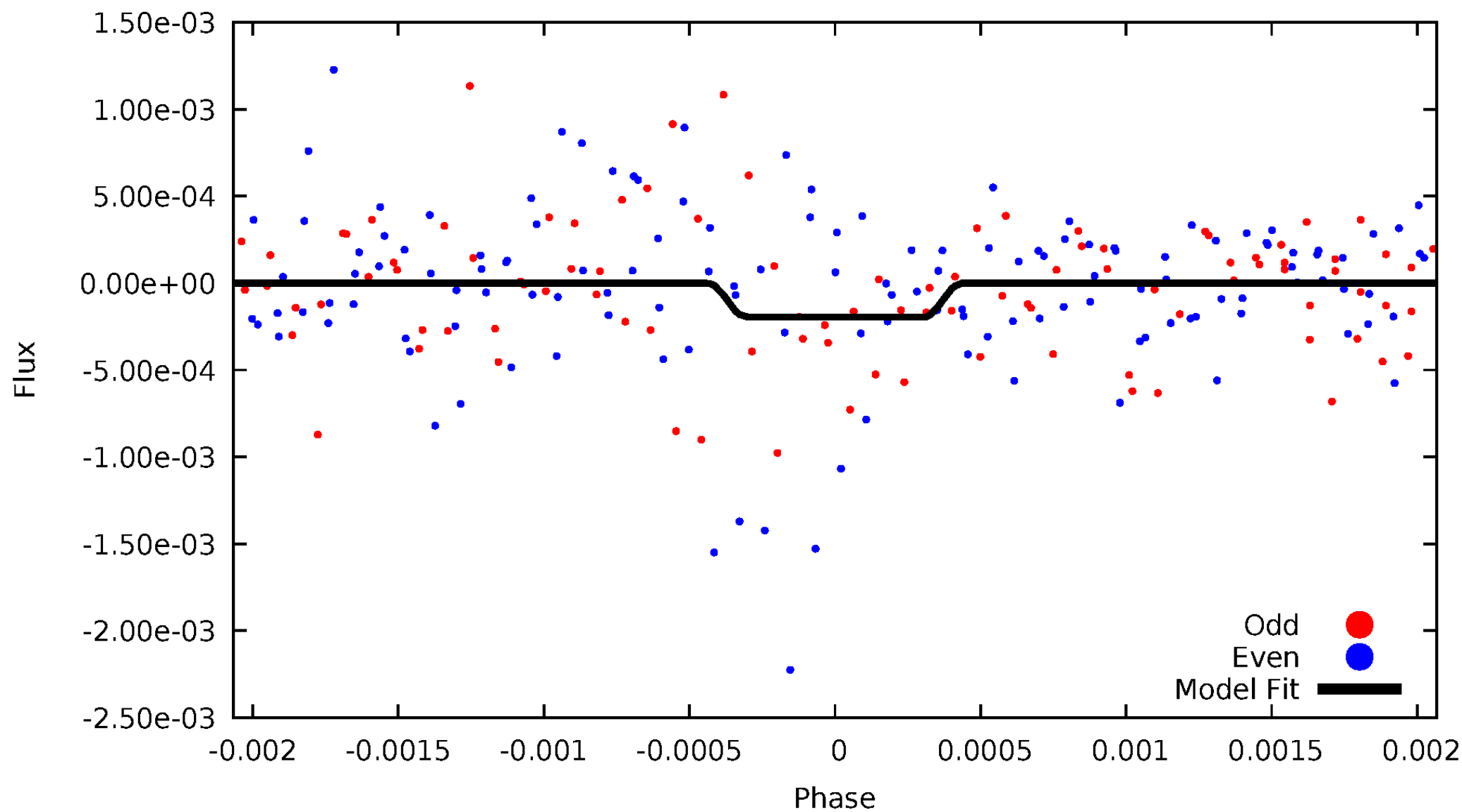
# DV Odd/Even

TCE 008378922-03

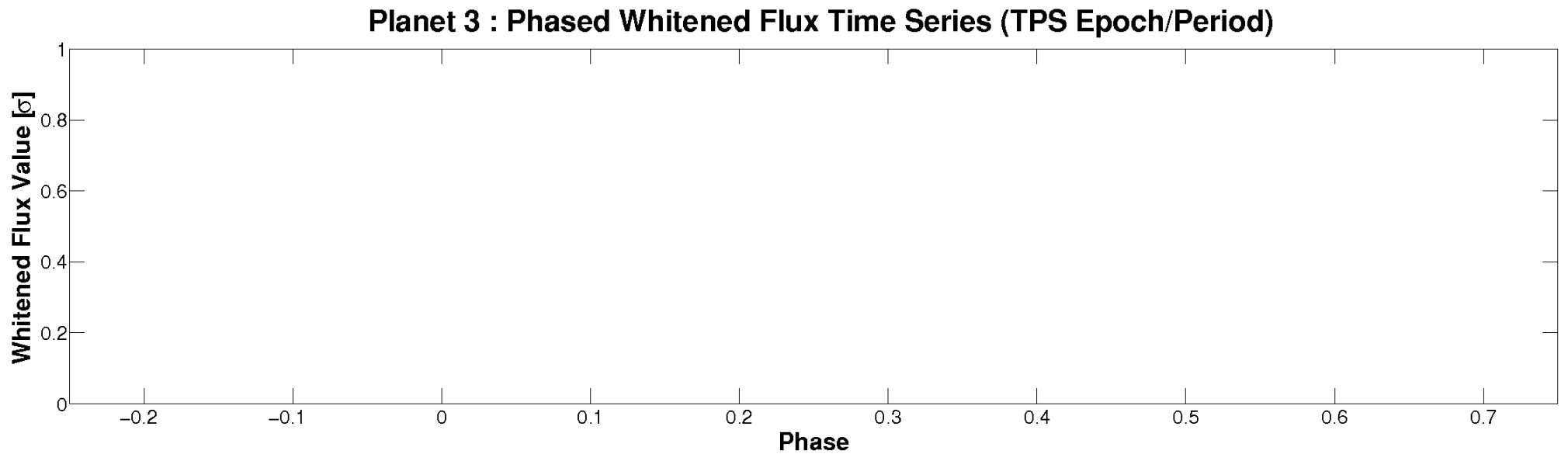
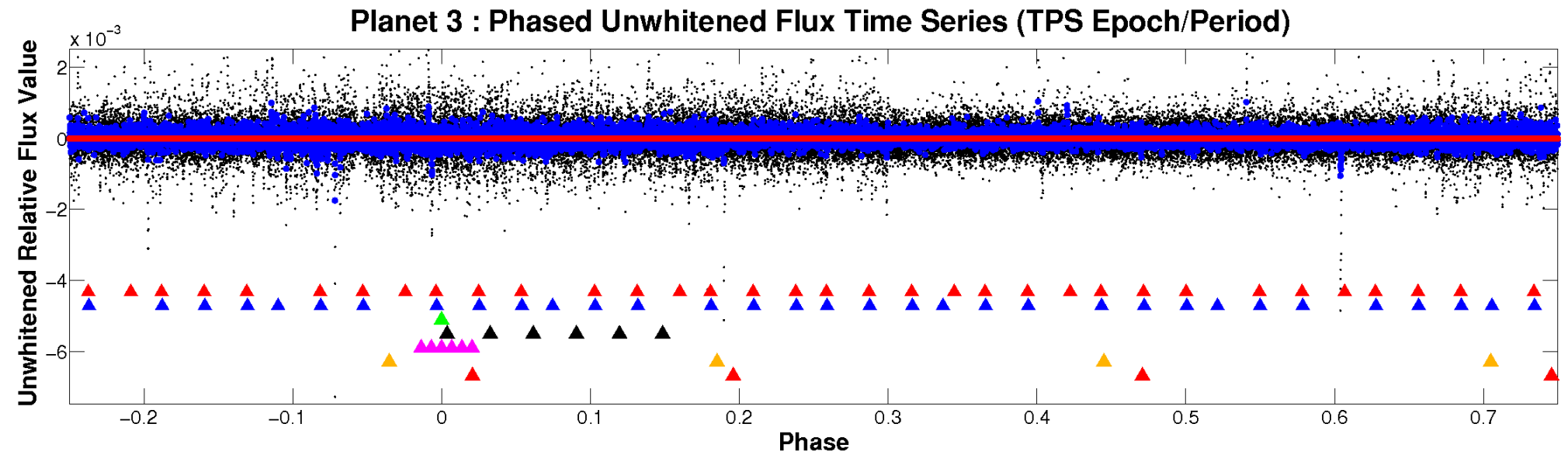


# ALT Odd/Even

TCE 008378922-03

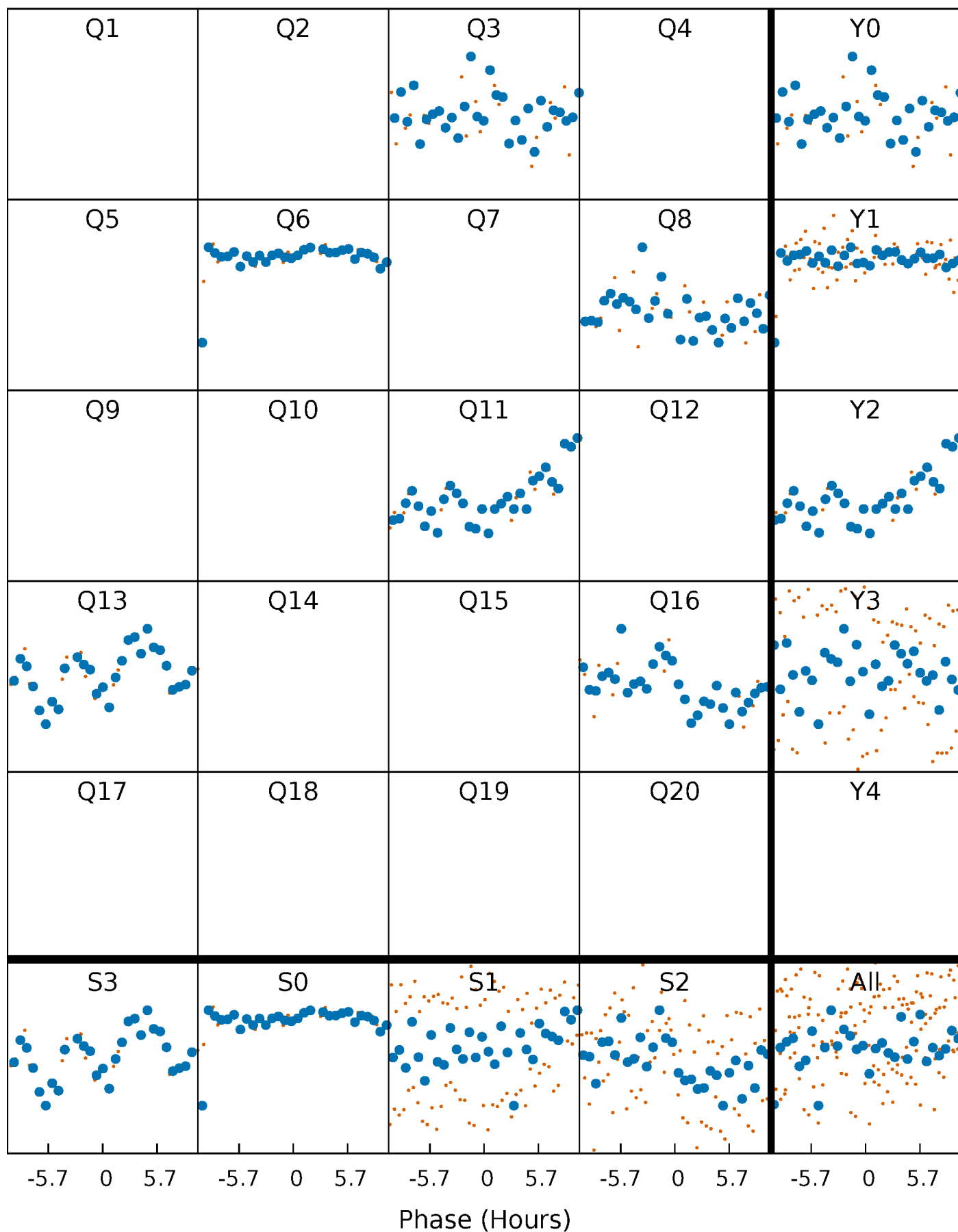


# Non-Whitened Vs. Whitened Light Curve



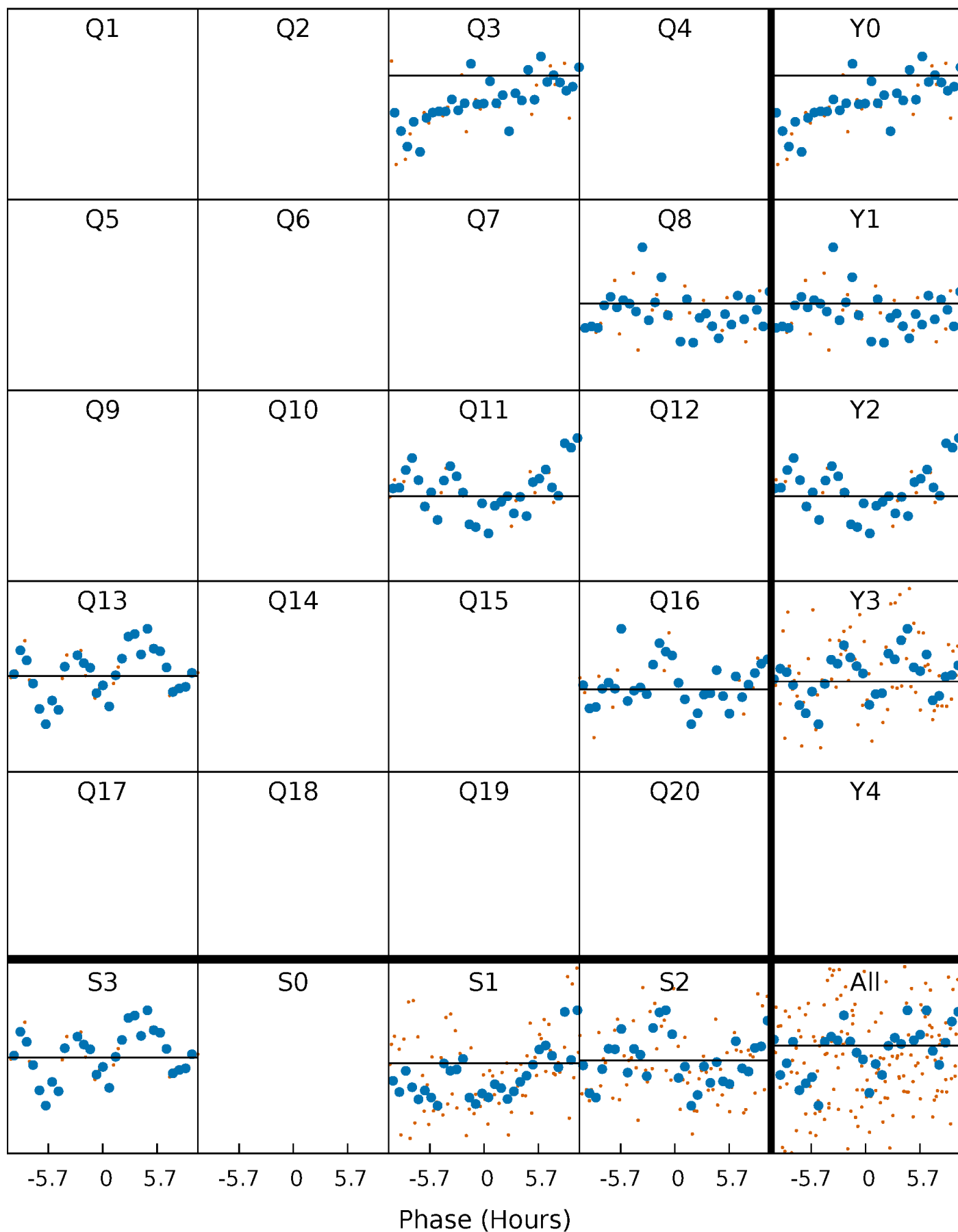
# PDC Quarter-Phased Transit Curves

TCE 008378922-03 P=234.587411 Days  $T_0=324.318660$  (BKJD)



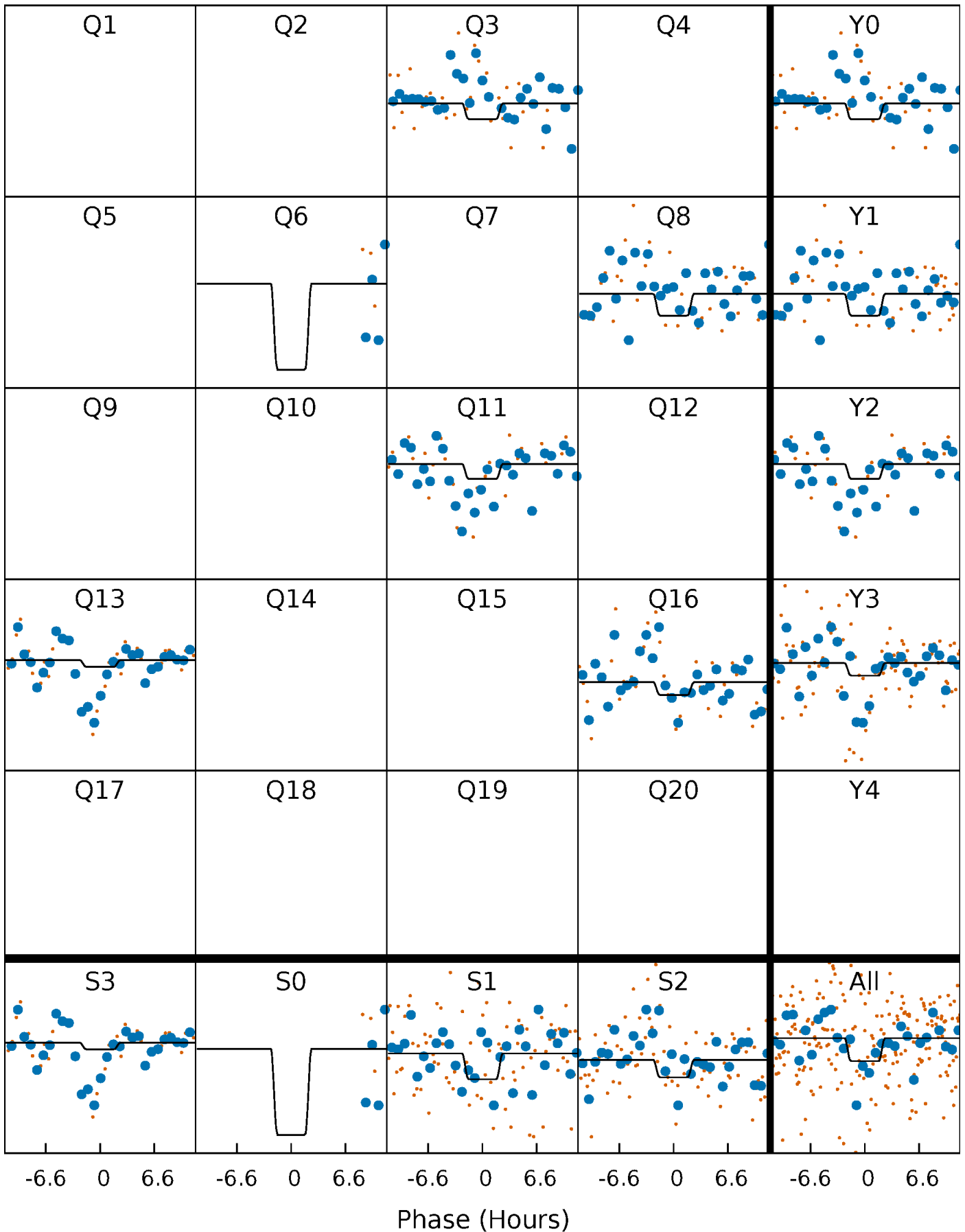
# DV Quarter-Phased Transit Curves

TCE 008378922-03     $P=234.587411$  Days     $T_0=324.318660$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

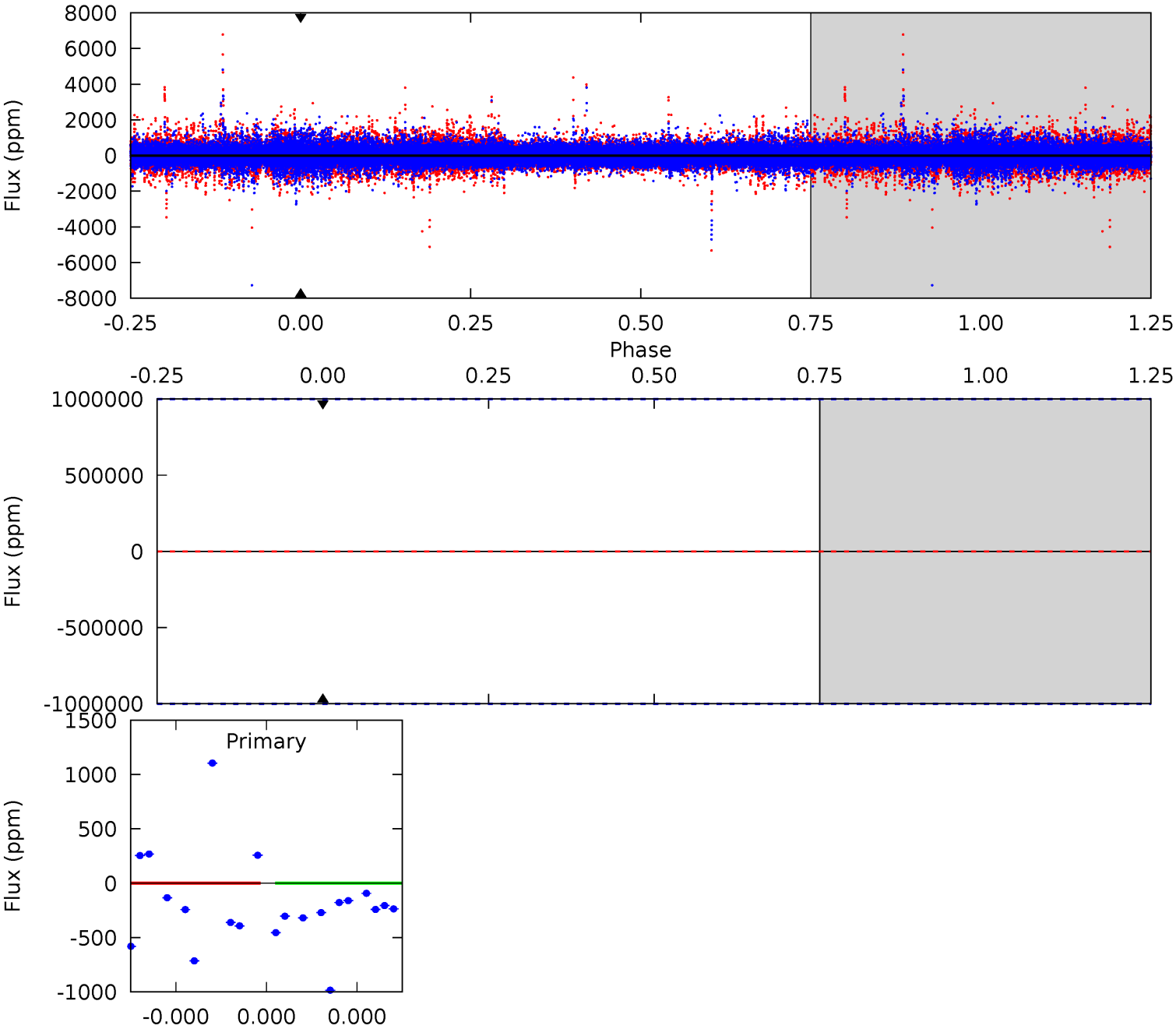
TCE 008378922-03     $P=234.587411$  Days     $T_0=324.382655$  (BKJD)



# DV Model-Shift Uniqueness Test

008378922-03, P = 234.587411 Days, E = 89.731249 Days

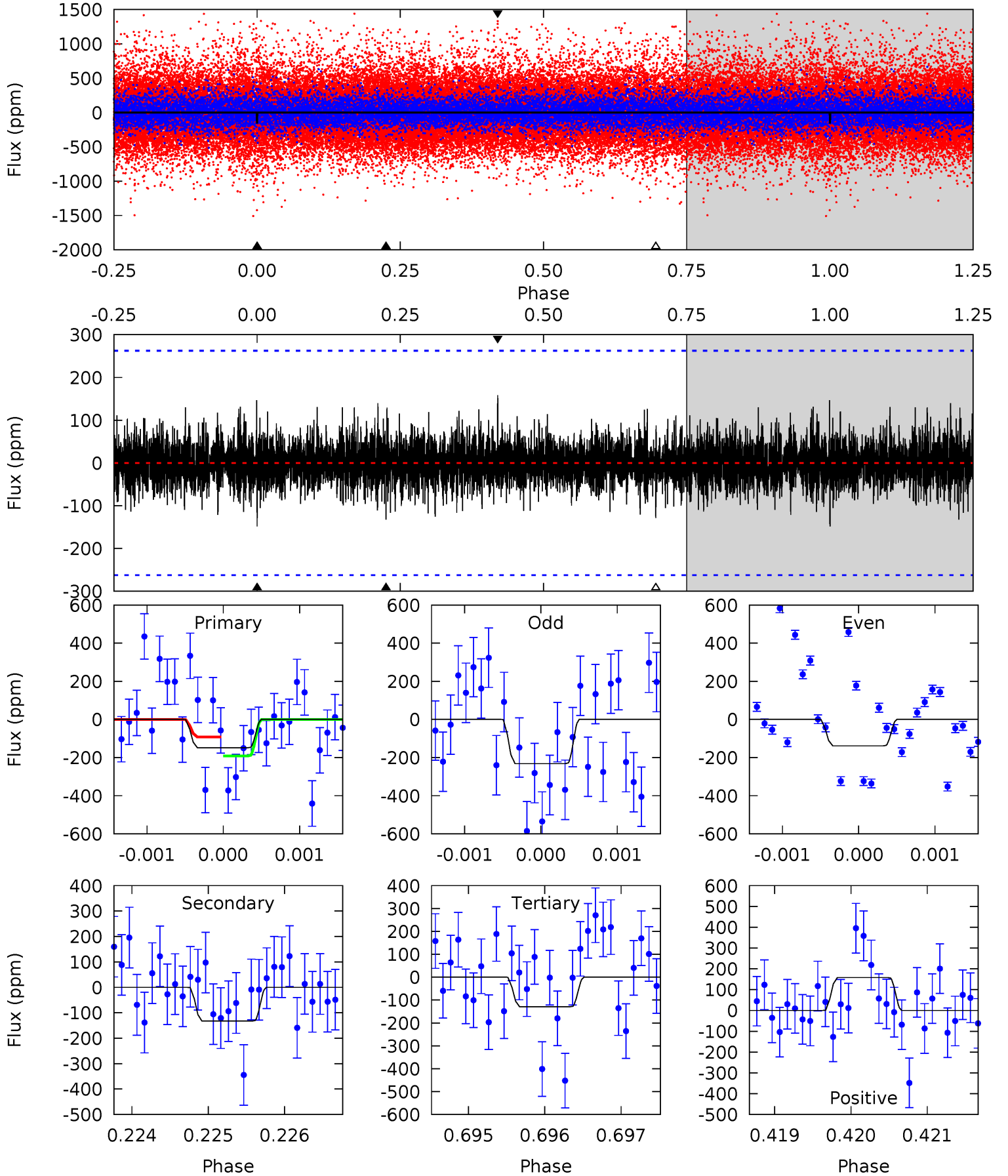
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



# Alt Model-Shift Uniqueness Test

008378922-03, P = 234.587411 Days, E = 89.795244 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
3.10	2.77	2.70	3.30	5.48	3.33	0.76	0.40	-0.21	0.07	-0.54	0.99	2.17	0.52	1.03





### Stellar Parameters For KIC 008378922

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5623^{+169}_{-169}$	$4.400^{+0.167}_{-0.204}$	$-0.420^{+0.350}_{-0.250}$	$0.917^{+0.242}_{-0.161}$	$0.770^{+0.124}_{-0.053}$	$1.408^{+1.082}_{-0.699}$
	+3%/-3%	+4%/-5%	+83%/-60%	+26%/-18%	+16%/-7%	+77%/-50%
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 008378922-03 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$0 \pm 1000000$	$12.24^{+10.19}_{-7.49}$	$404^{+34}_{-25}$	$4271^{+8423}_{-15371}$	$6510^{+339631}_{-238733}$
Alt.	$-133 \pm 48$	$7.48^{+8.00}_{-5.45}$	$404^{+30}_{-27}$	$2877^{+1631}_{-476}$	$601^{+8021}_{-472}$

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

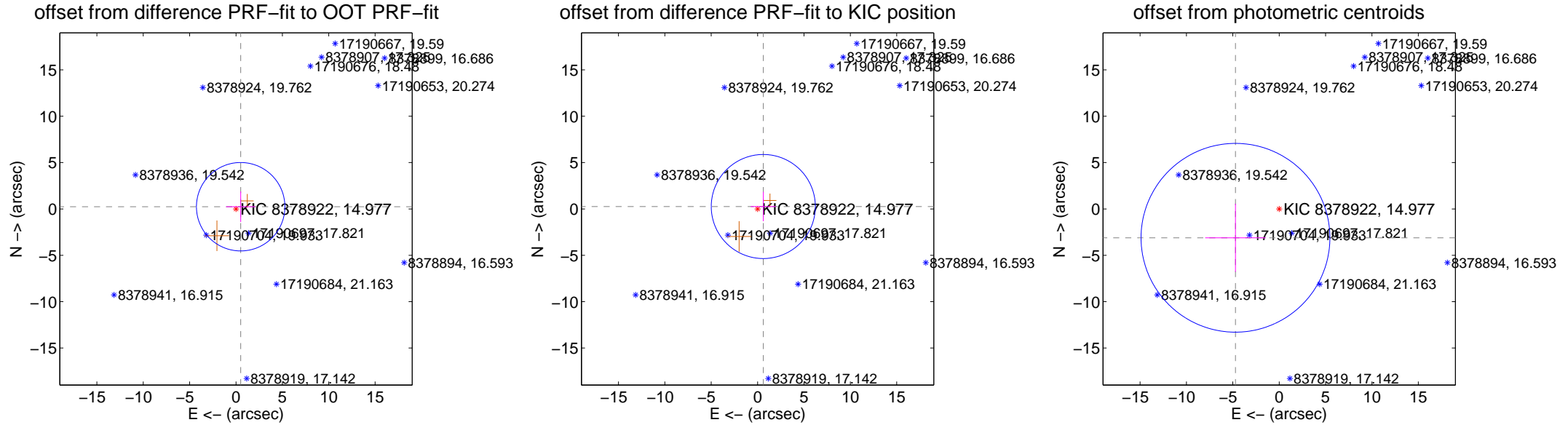
## DV Centroid Data

Supplemental centroid analysis for 008378922-03. Kepler magnitude: 14.98. Transit SNR -1.00

There are 0 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.10 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.558 \pm 1.590$	0.35	$-0.505 \pm 1.577$	$0.238 \pm 1.647$
PRF-fit source offset from KIC position	$0.668 \pm 1.871$	0.36	$-0.615 \pm 1.360$	$0.261 \pm 1.586$
photometric centroid source offset	$5.65 \pm 3.39$	1.66	$4.72 \pm 3.27$	$-3.11 \pm 3.67$



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.

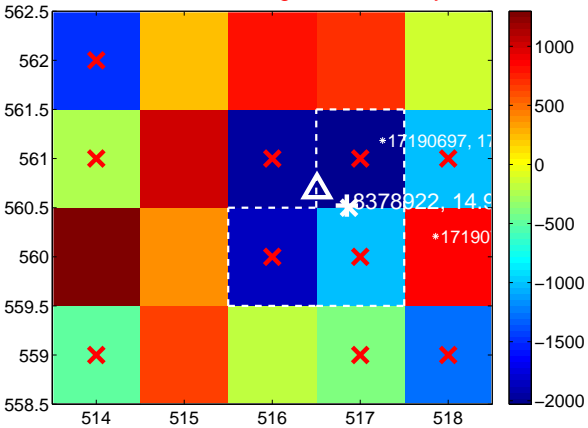
Q5 no difference image



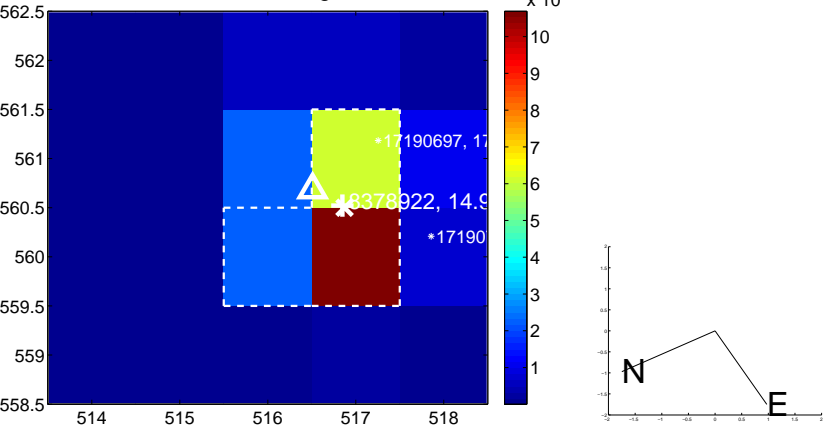
Q5 no OOT image



Q6 difference image. Poor Quality



Q6 OOT image



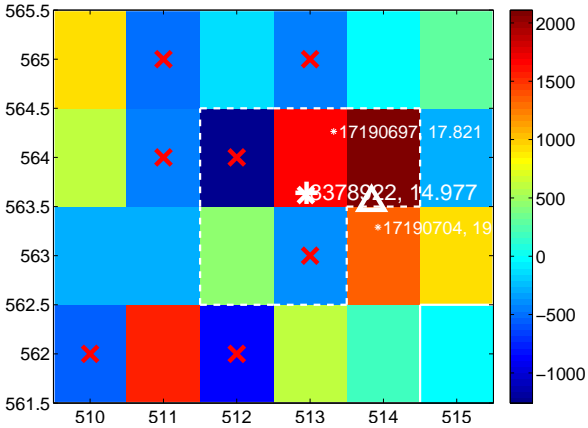
Q7 no difference image



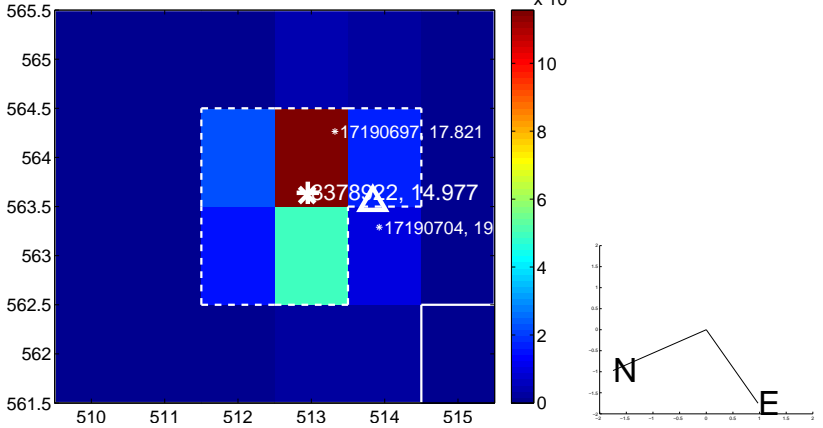
Q7 no OOT image



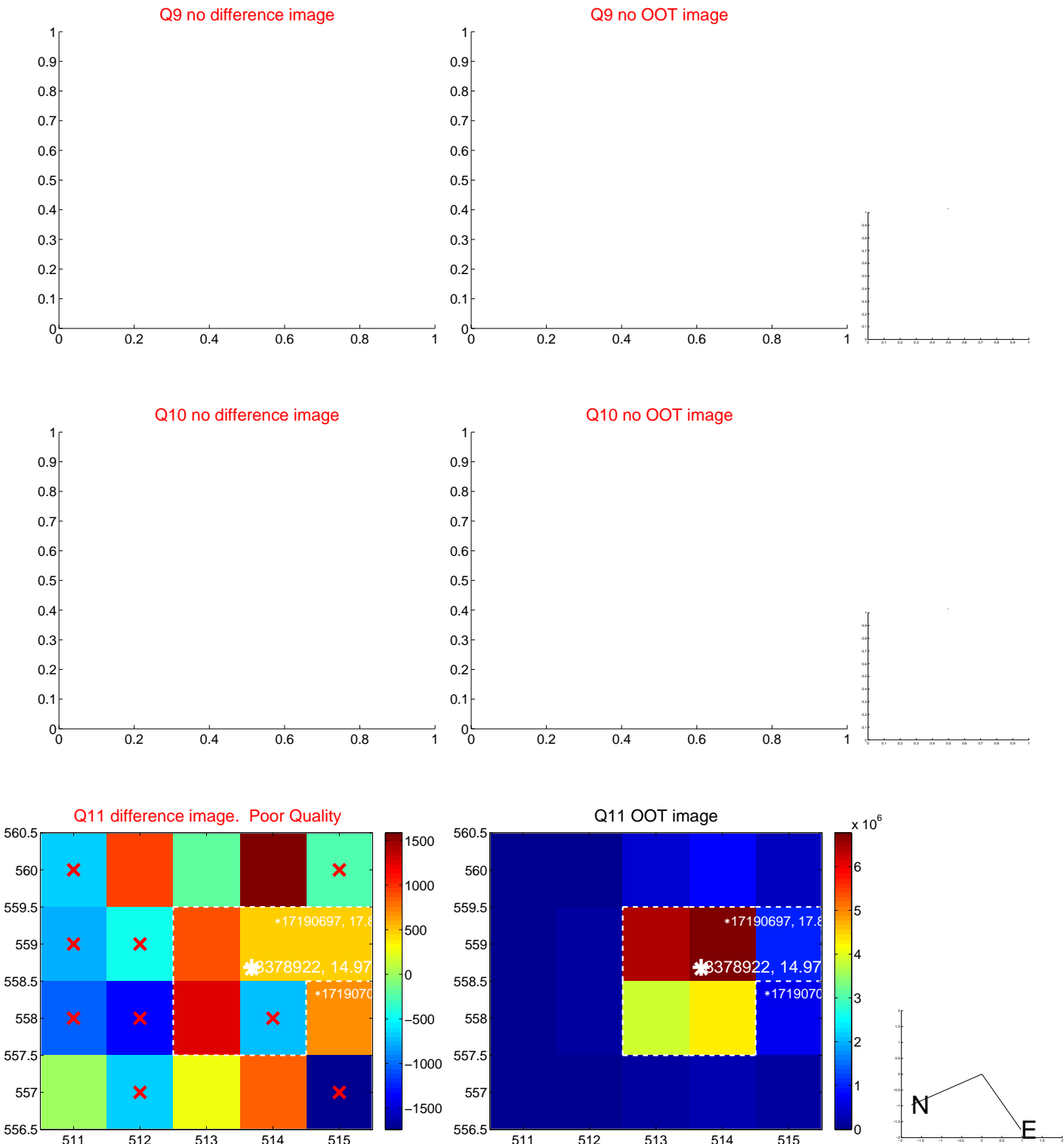
Q8 difference image. Poor Quality



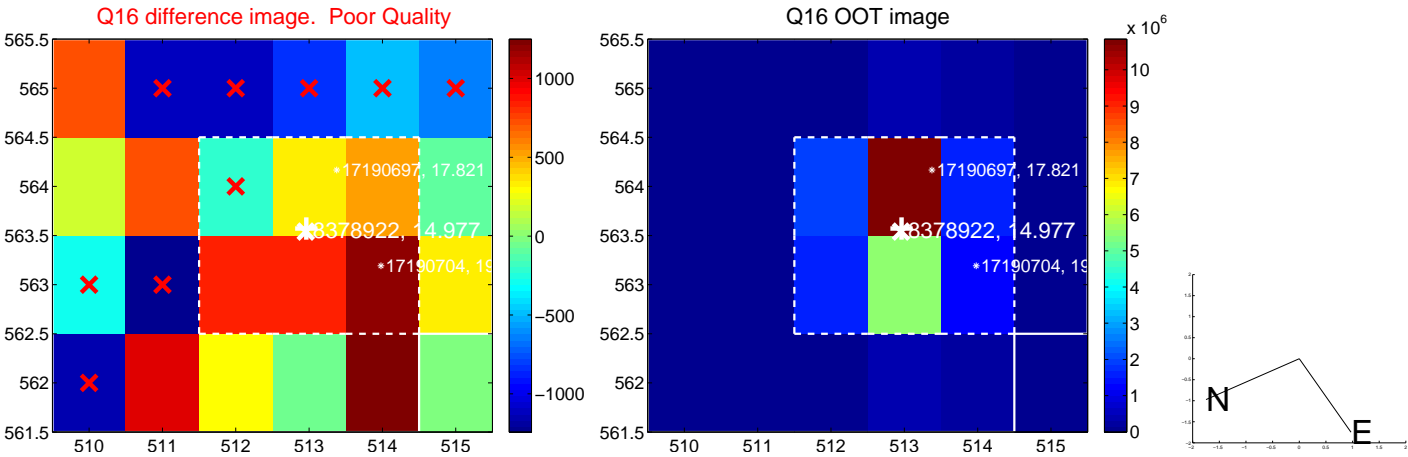
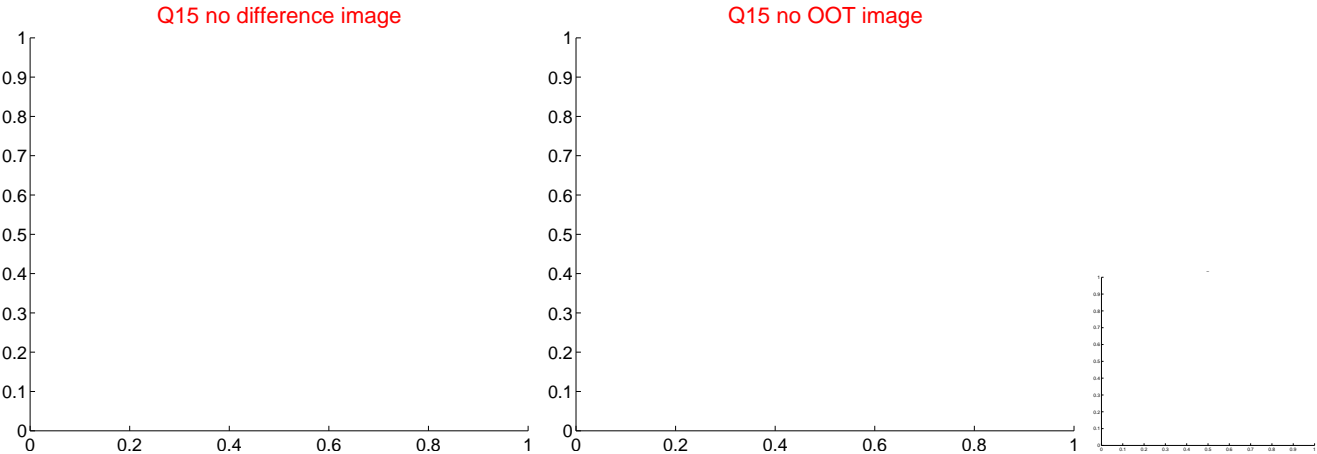
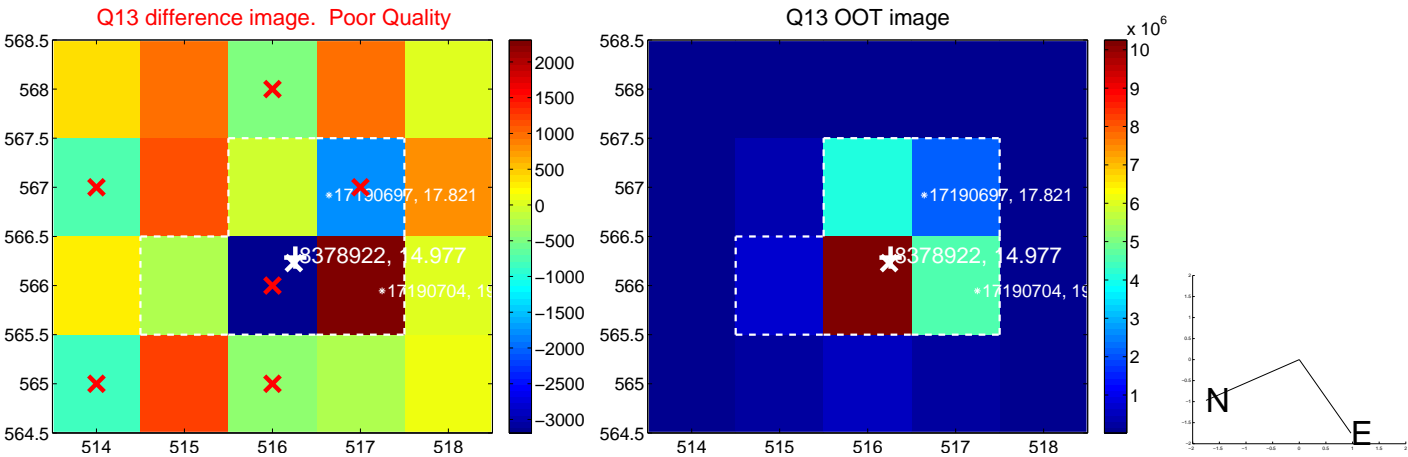
Q8 OOT image



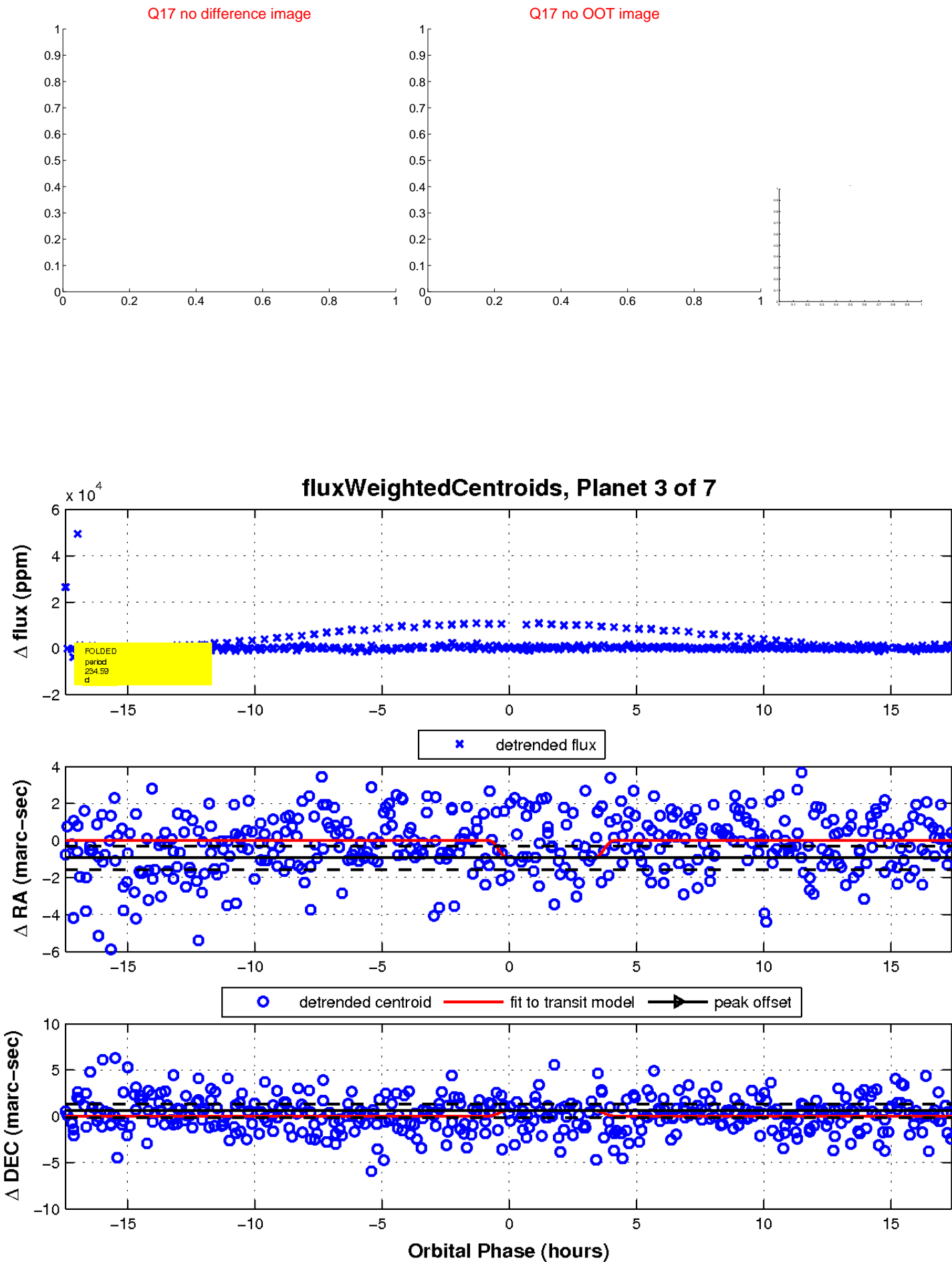
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



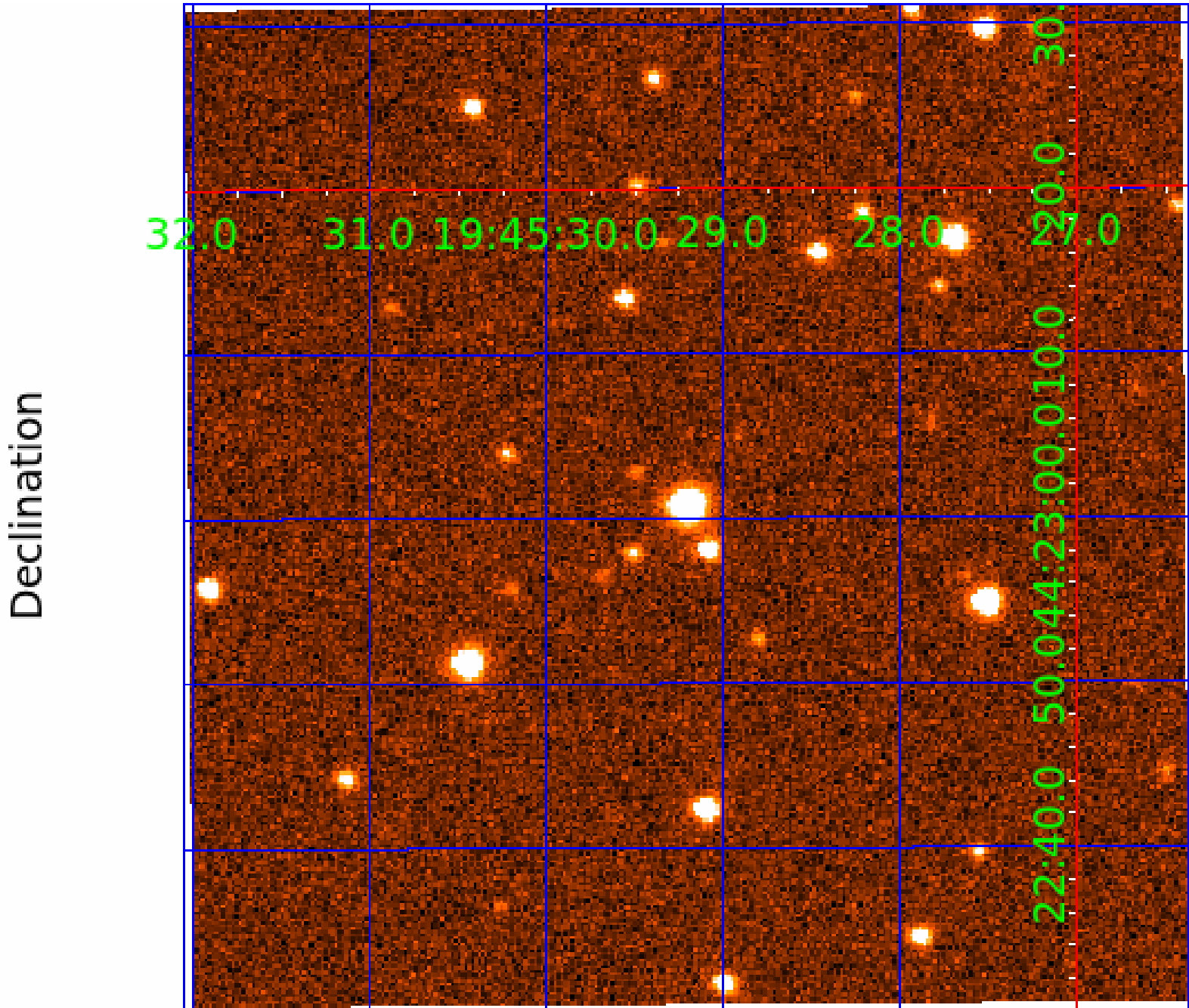
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image





# KIC 008378922

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008378922-01	OBS	7028.01	43.262904	150.388198	366177.4	6.000	12874.6	-1.0	0.92	5623	50.03	15.40
008378922-02	OBS	No	43.263288	168.760159	235519.1	18.765	10162.6	5554.1	0.92	5623	54.85	15.40
008378922-03	OBS	No	234.587411	324.318660	11851.4	5.000	90.8	-1.0	0.92	5623	9.91	1.62
008378922-05	OBS	No	236.190747	321.110456	10715.2	29.319	40.6	87.5	0.92	5623	17.06	1.60
008378922-06	OBS	No	408.204114	316.068405	337.6	11.370	11.4	4.0	0.92	5623	1.83	0.77
008378922-07	OBS	No	404.679845	329.185253	725.8	15.000	11.8	-1.0	0.92	5623	2.45	0.78

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008378922-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_ALT—MOD_ODDEVEN_ALT—HAS_SEC_TCE—CENT_NOFITS
008378922-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE
008378922-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_NOFITS
008378922-05	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
008378922-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
008378922-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—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.

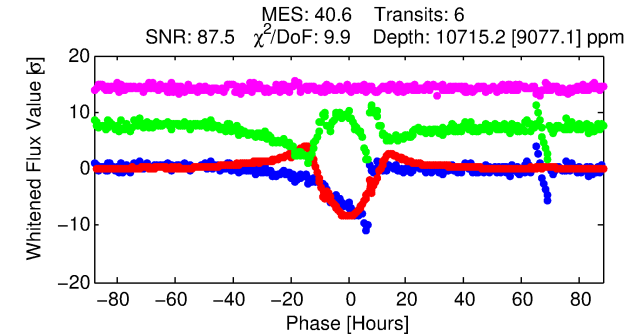
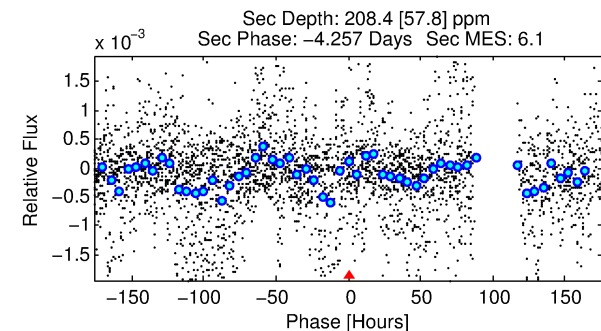
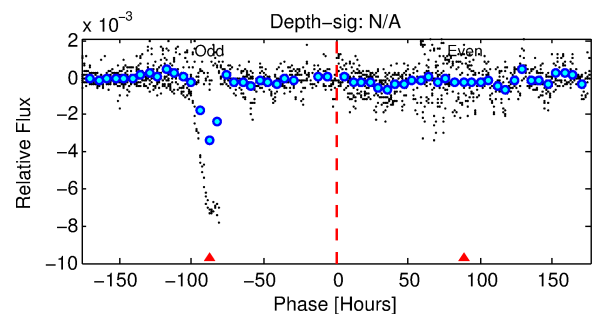
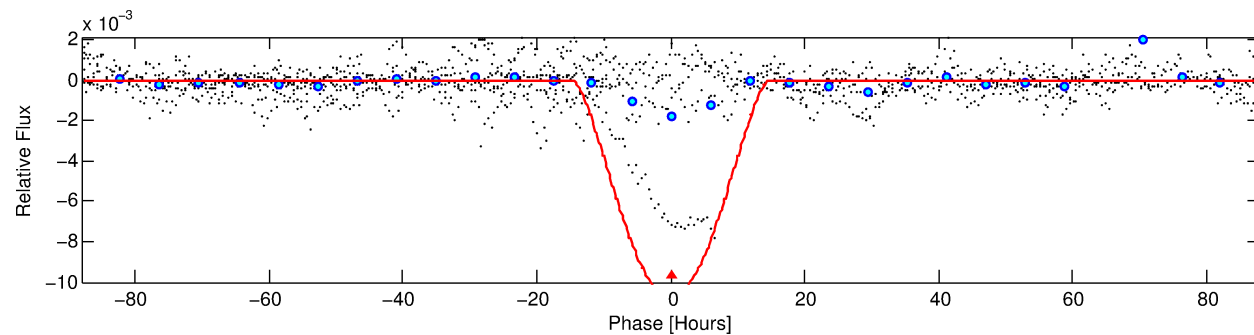
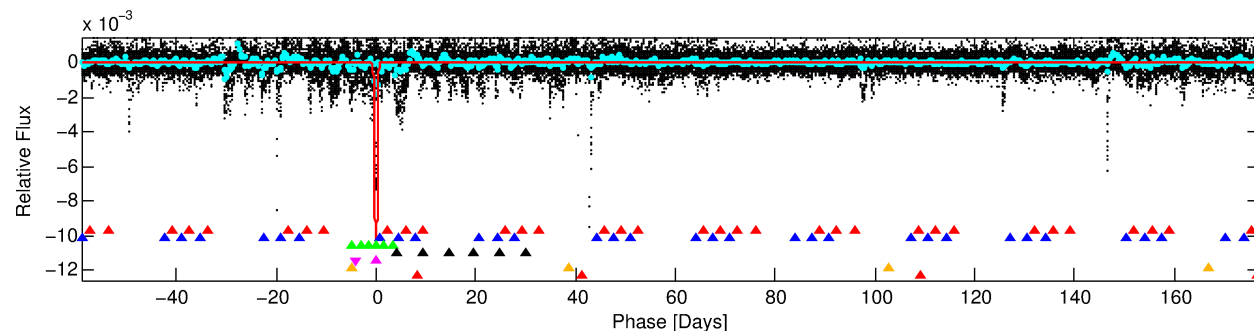
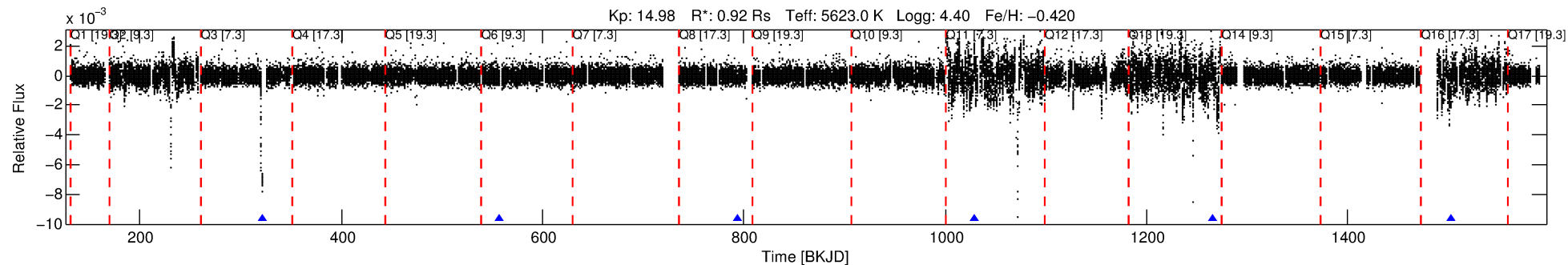
## Ephemeris Match Information For 008378922-05

No Significant Match Found

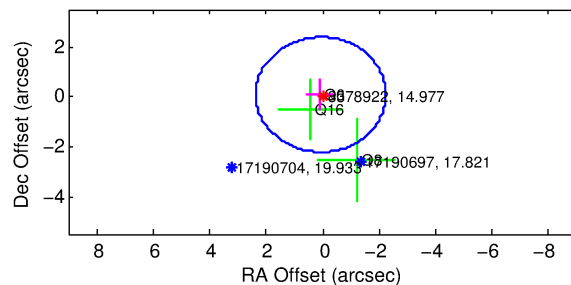
# DV One-Page Summary

KIC: 8378922 Candidate: 5 of 7 Period: 236.191 d  
KOI: K07028 Corr: No Ephemeris Match

Kp: 14.98 R\*: 0.92 Rs Teff: 5623.0 K Logg: 4.40 Fe/H: -0.420



Difference Image  
Out of Transit Centroid Offsets



DV Fit Results:

Period = 236.19075 [0.00549] d  
Epoch = 321.1105 [0.0110] BKJD  
Rp/R\* = 0.1705 [0.1727]  
a/R\* = 37.45 [5.14]  
b = 1.00 [0.33]  
Seff = 1.60 [0.61]  
Teq = 287 [27] K  
Rp = 17.06 [17.86] Re  
a = 0.6857 [0.1615] AU  
Ag = 185.25 [384.64] [0.48σ]  
Teffp = 1636 [838] K [1.61σ]

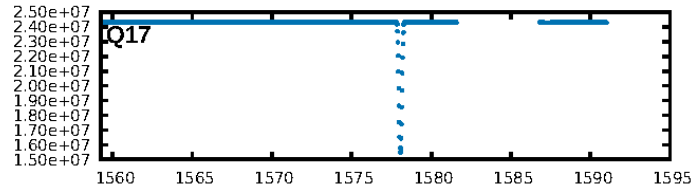
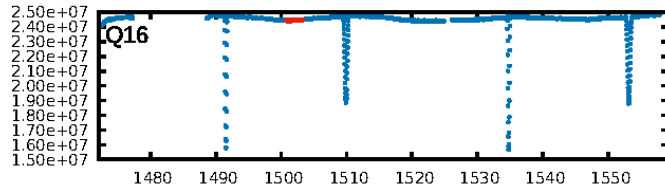
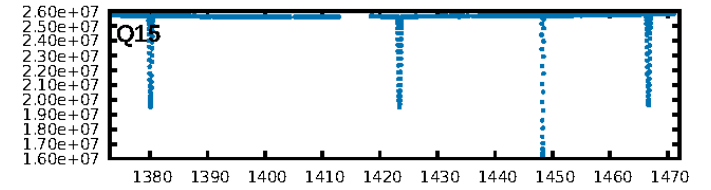
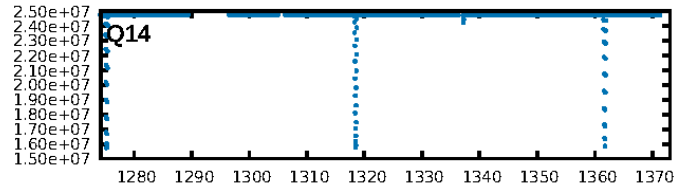
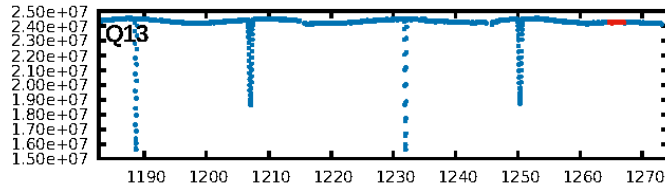
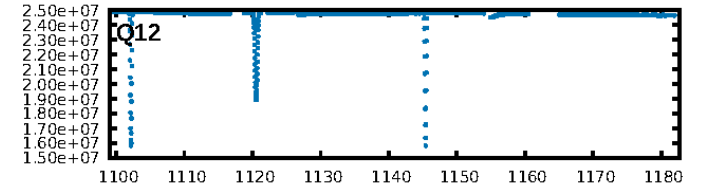
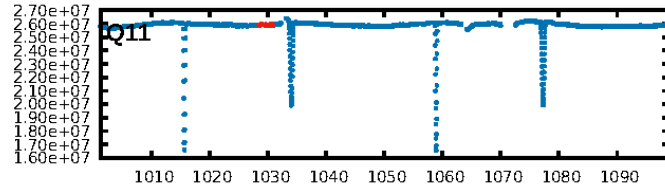
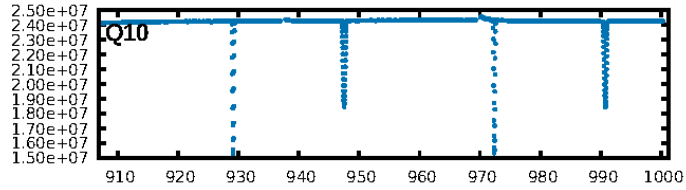
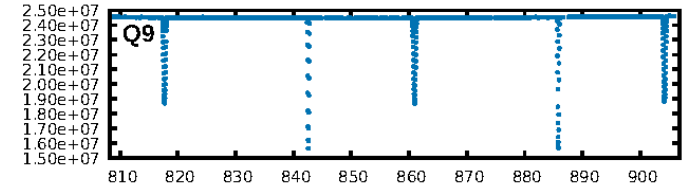
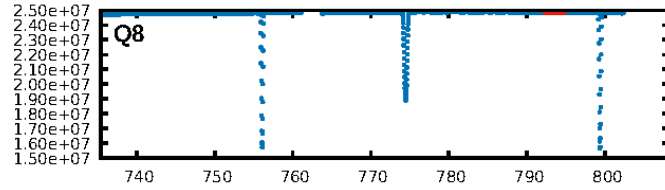
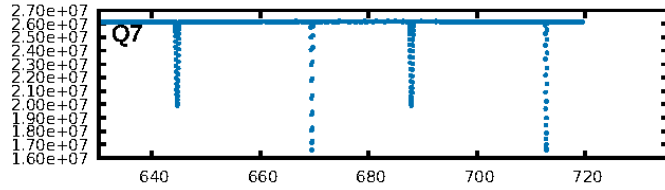
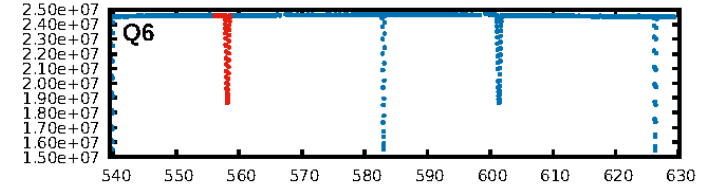
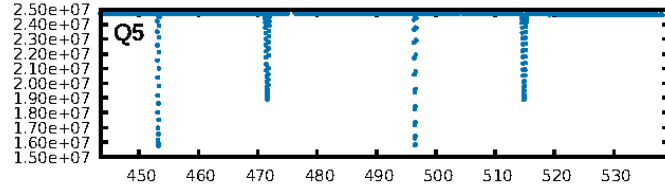
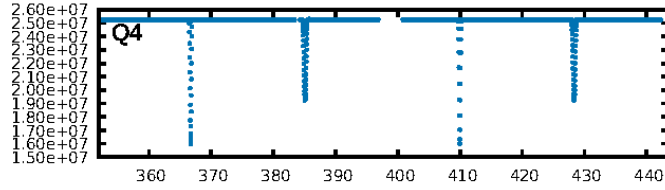
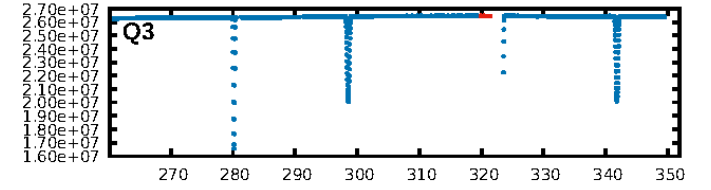
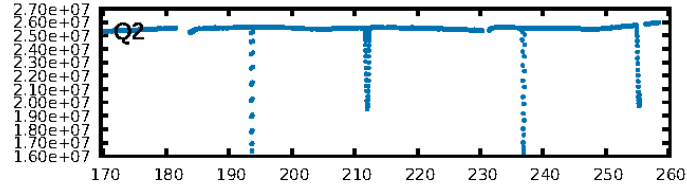
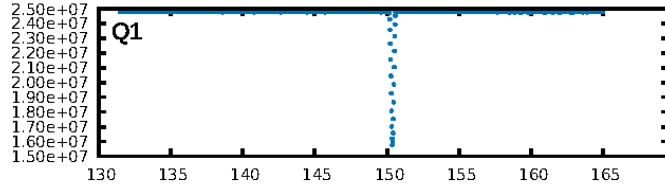
DV Diagnostic Results:

ShortPeriod-sig: 80.4% [1.29σ]  
LongPeriod-sig: 100.0% [4.07σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 0.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [6/6]  
GhostDiagnostic-chr: 2.242  
Centroid-sig: 87.7%  
Centroid-so: 0.070 arcsec [1.85σ]  
OotOffset-rm: 0.109 arcsec [0.14σ]  
OotOffset-st: 1/0/2/0 [3]  
KicOffset-rm: 0.133 arcsec [0.20σ]  
KicOffset-st: 1/0/2/0 [3]  
DiffImageQuality-fgm: 0.00 [0/3]  
DiffImageOverlap-fno: 0.33 [1/3]

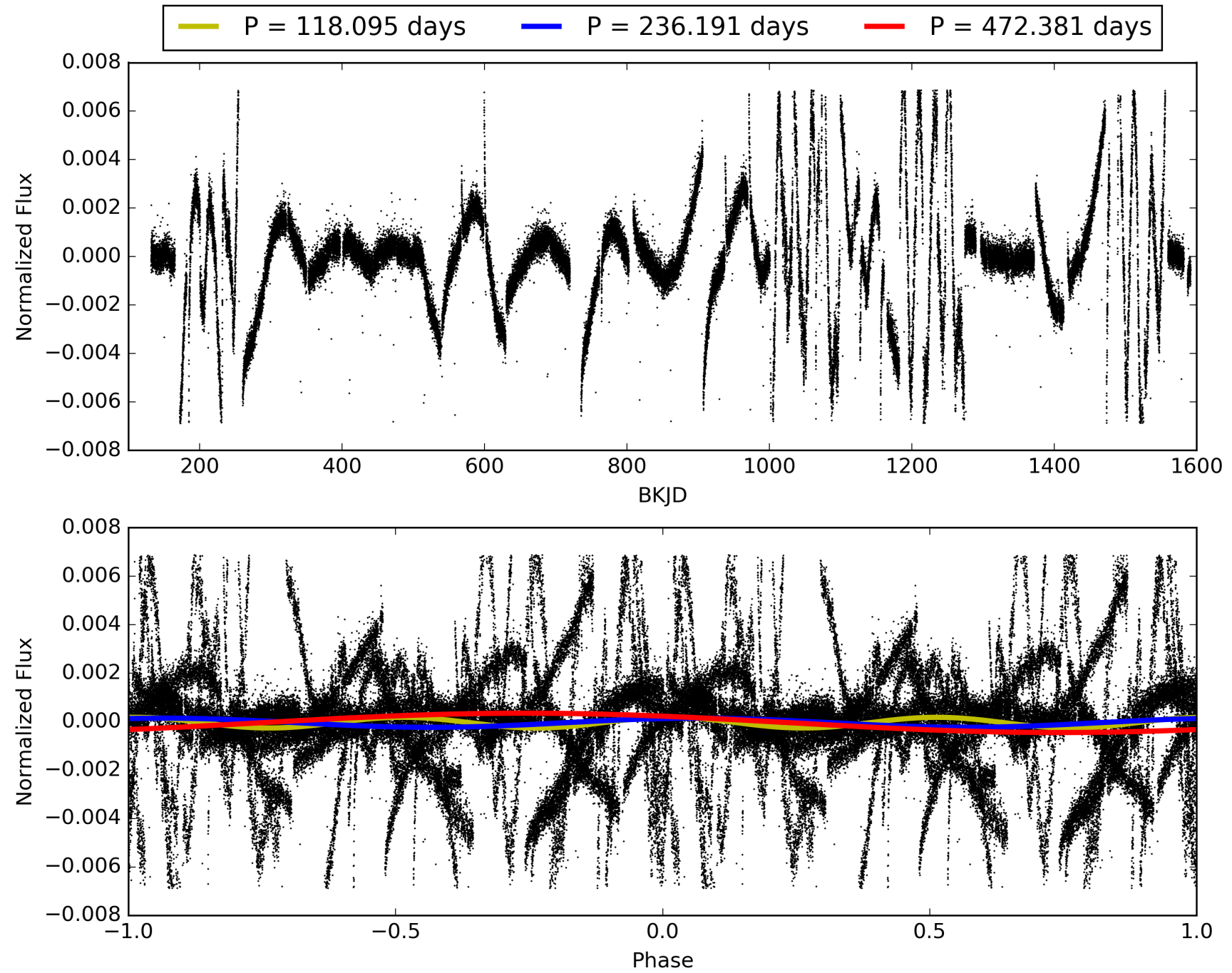
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 23:32:06 Z

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

# TCE 008378922-05, PDC Light Curves

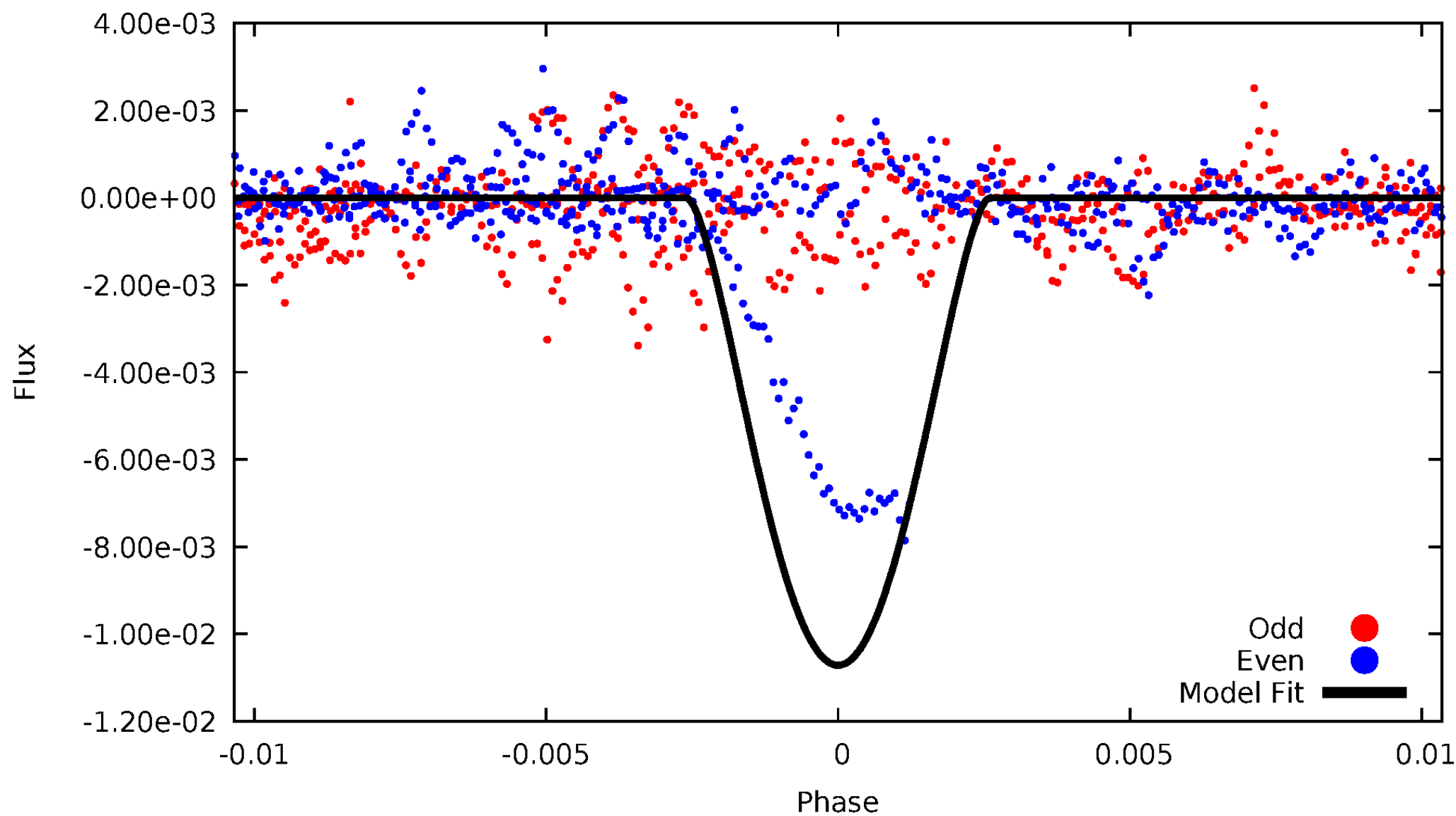


TCE 008378922-05



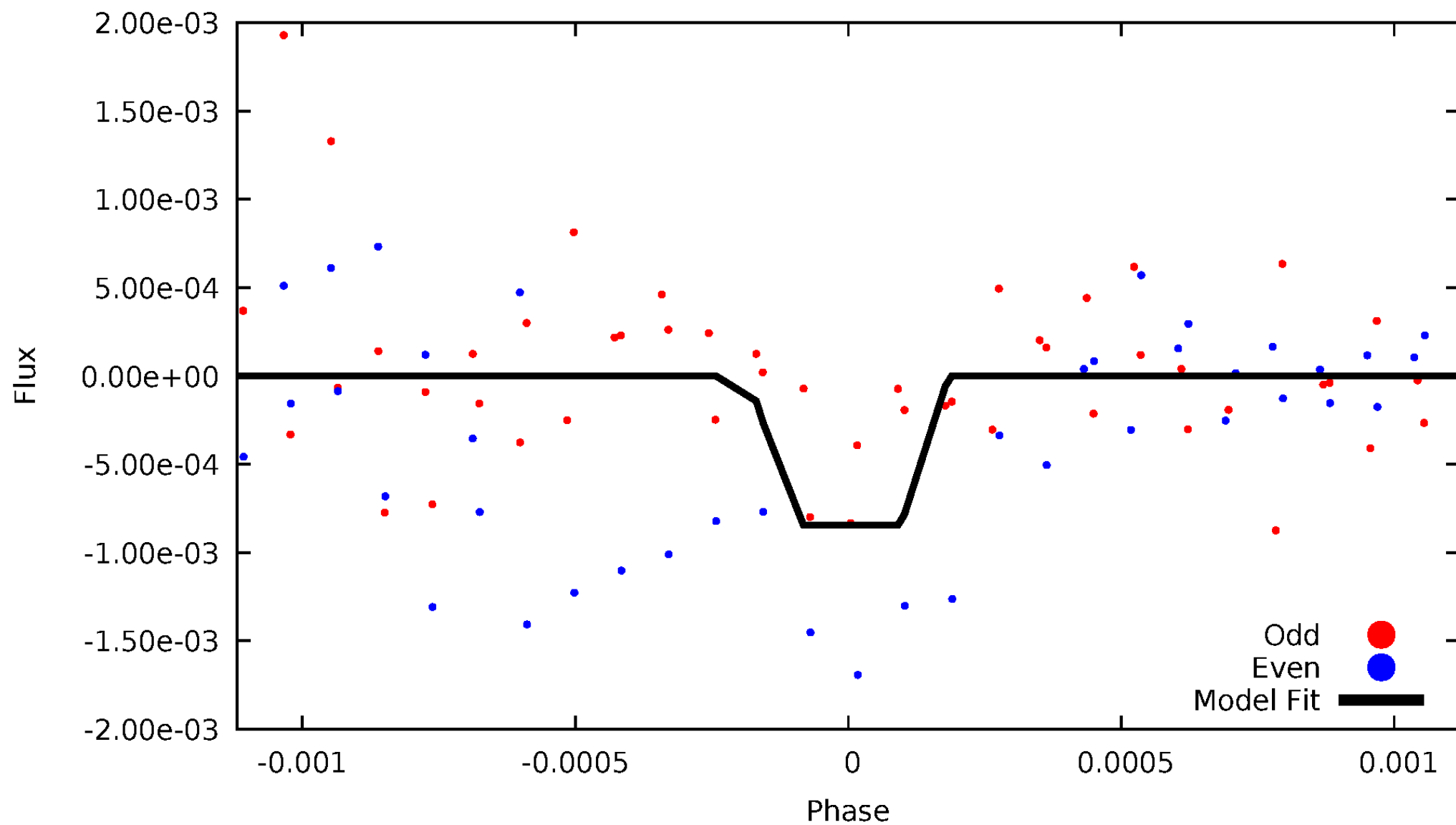
DV Odd/Even

TCE 008378922-05



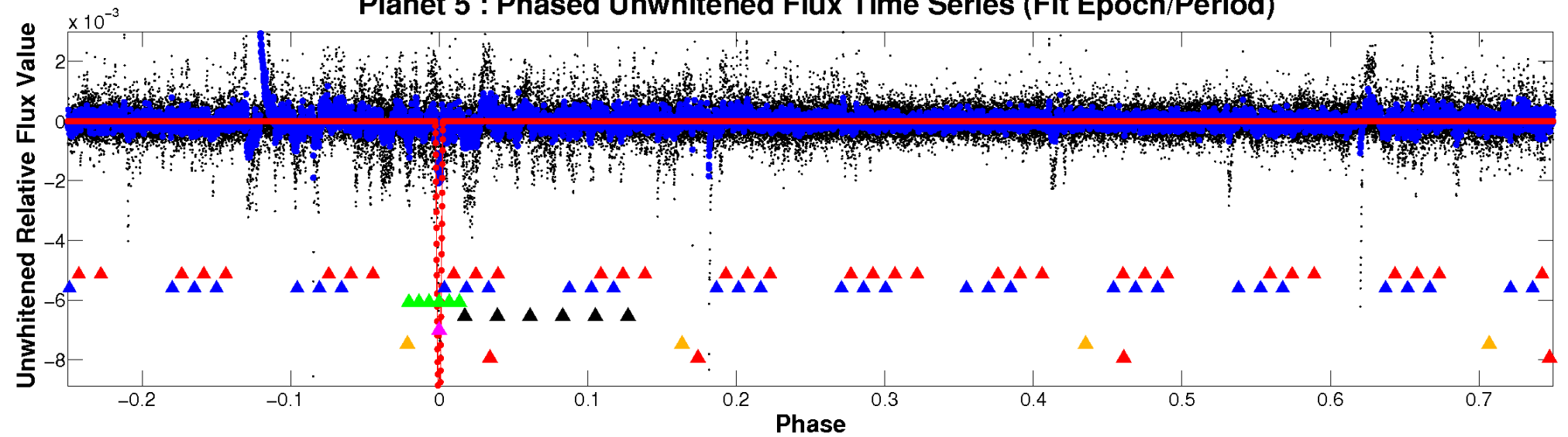
# ALT Odd/Even

TCE 008378922-05

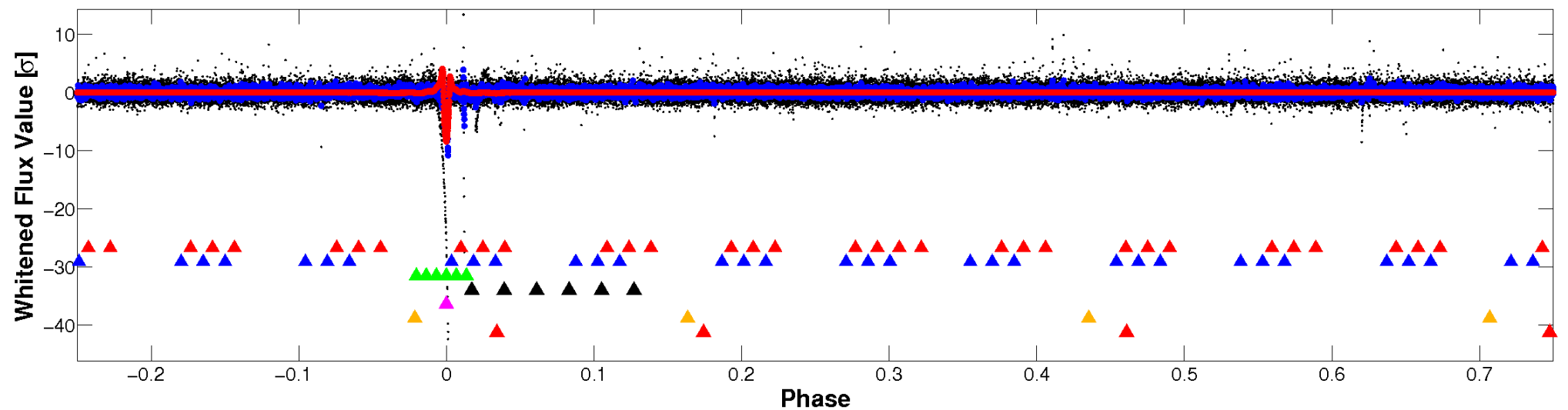


# Non-Whitened Vs. Whitened Light Curve

## 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

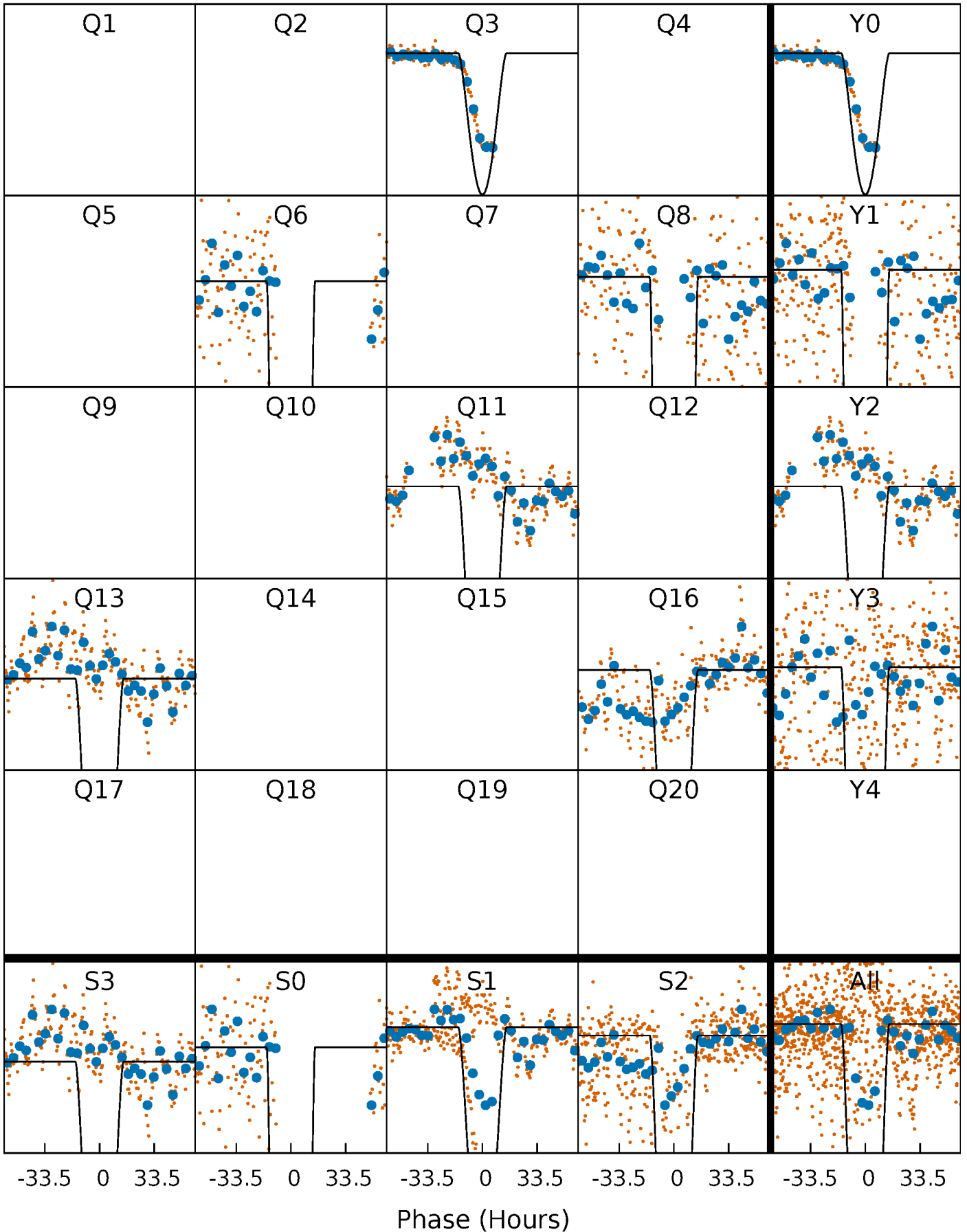
TCE 008378922-05     $P=236.190747$  Days     $T_0=321.110456$  (BKJD)





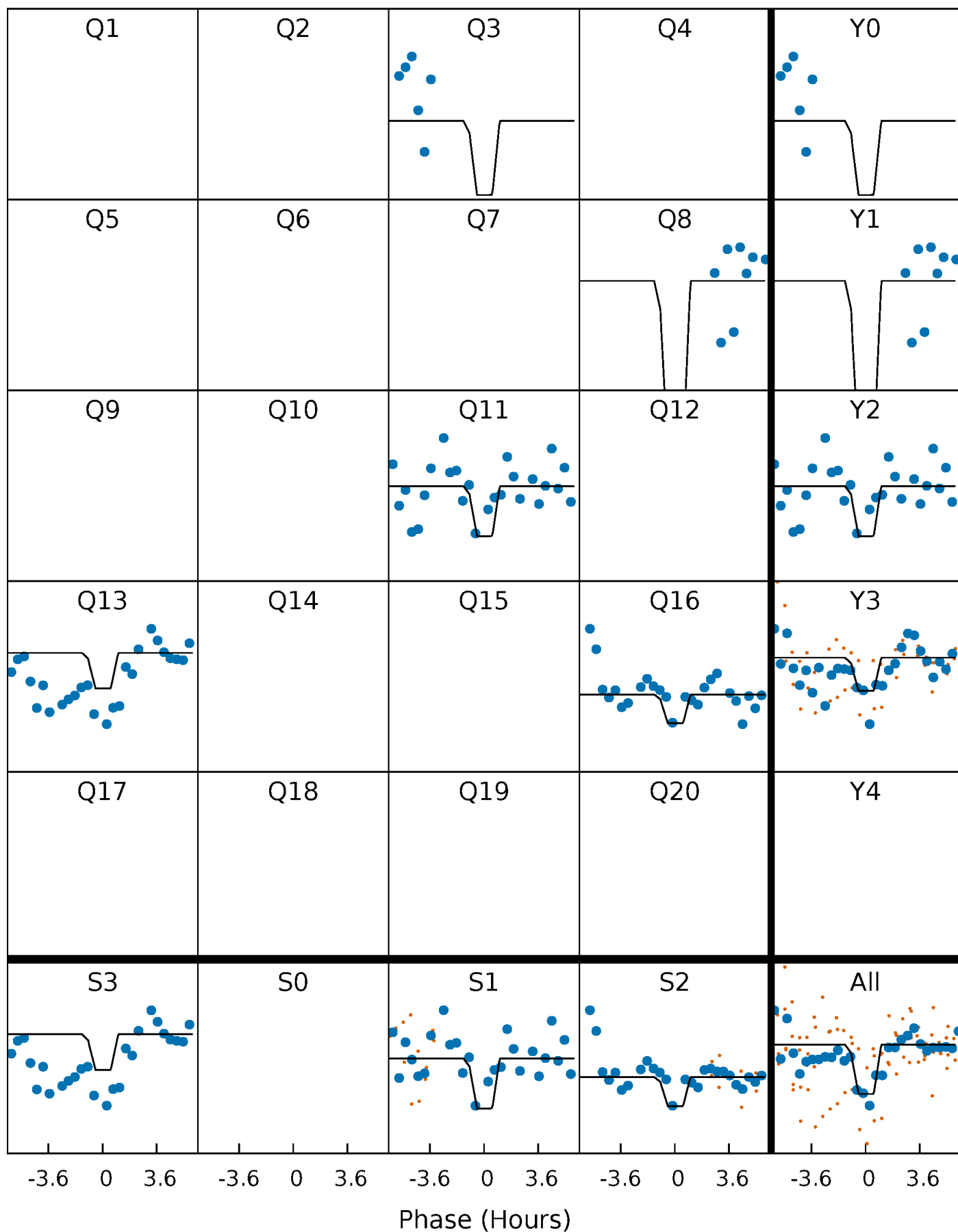
# DV Quarter-Phased Transit Curves

TCE 008378922-05     $P=236.190747$  Days     $T_0=321.110456$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

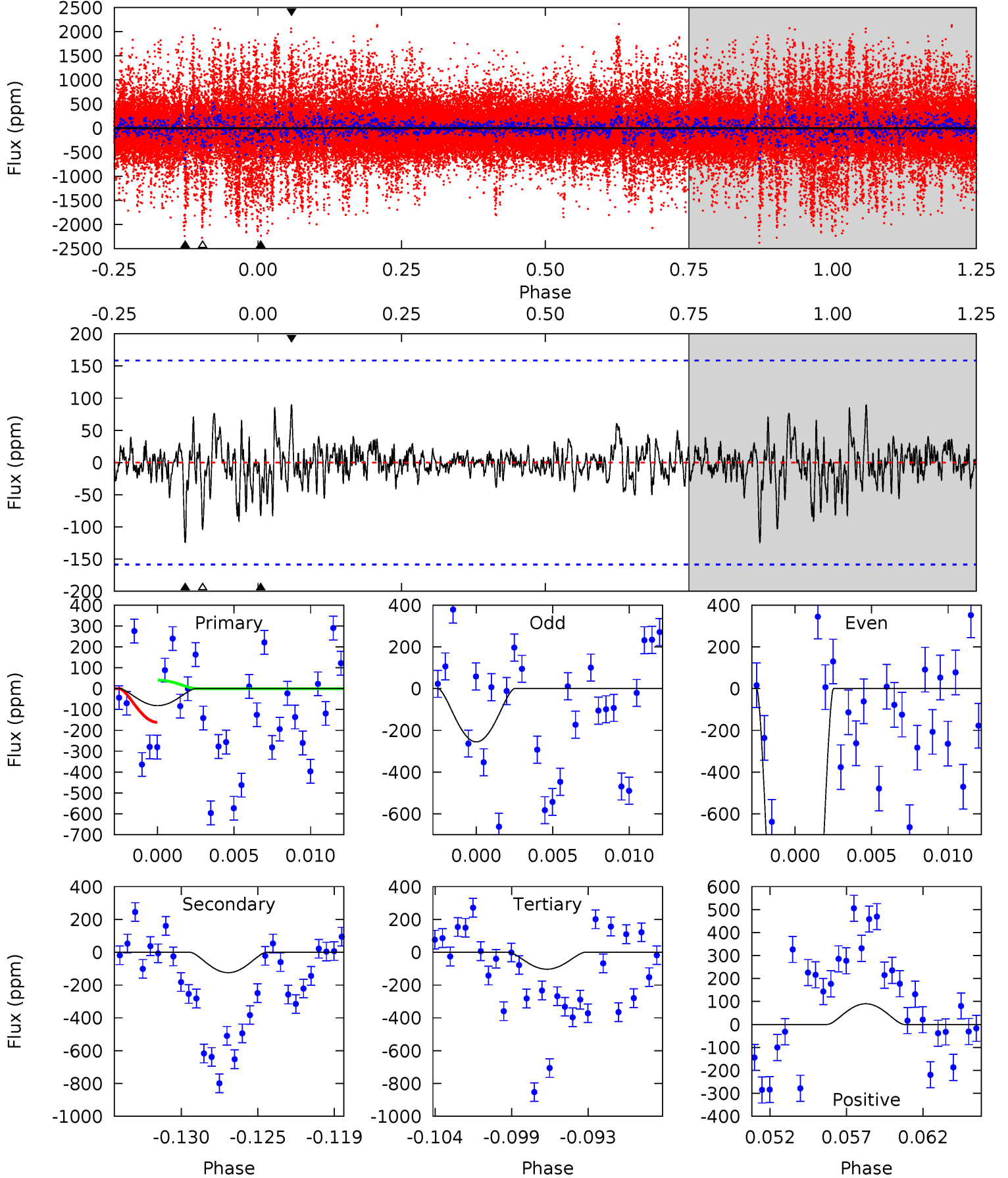
TCE 008378922-05     $P=236.089352$  Days     $T_0=321.542971$  (BKJD)



# DV Model-Shift Uniqueness Test

008378922-05, P = 236.190747 Days, E = 84.919709 Days

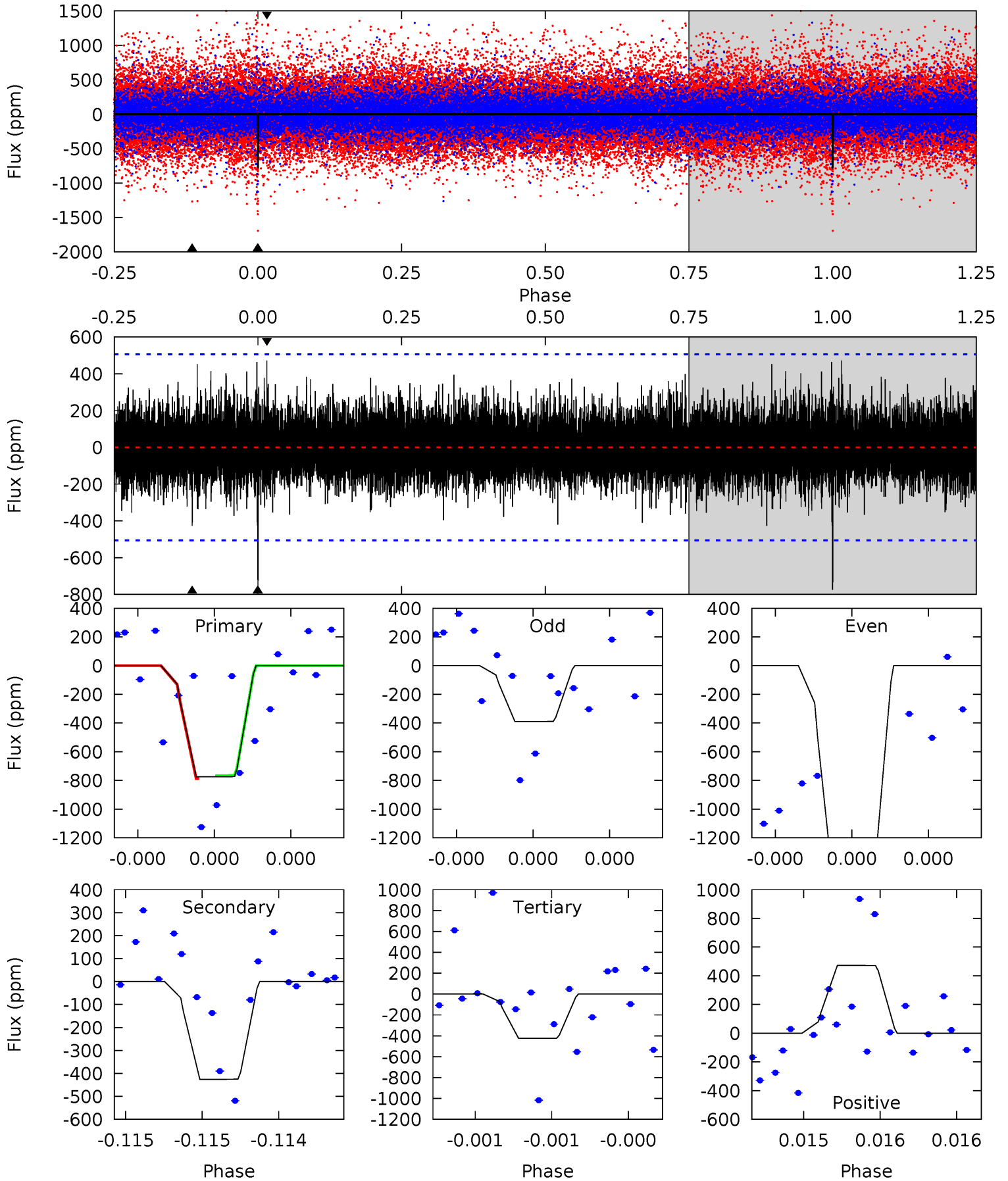
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
2.65	4.05	3.36	2.92	5.15	2.79	0.71	-0.71	-0.27	0.69	1.13	39.0	6.32	0.42	2.00



# Alt Model-Shift Uniqueness Test

008378922-05, P = 236.089352 Days, E = 85.453619 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
8.64	4.75	4.73	5.26	5.64	3.58	1.15	3.91	3.38	0.02	-0.51	6.08	1.69	0.38	0.11



### Stellar Parameters For KIC 008378922

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5623^{+169}_{-169}$	$4.400^{+0.167}_{-0.204}$	$-0.420^{+0.350}_{-0.250}$	$0.917^{+0.242}_{-0.161}$	$0.770^{+0.124}_{-0.053}$	$1.408^{+1.082}_{-0.699}$
	+3%/-3%	+4%/-5%	+83%/-60%	+26%/-18%	+16%/-7%	+77%/-50%
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 008378922-05 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-125 \pm 31$	$20.92^{+17.43}_{-12.81}$	$401^{+30}_{-24}$	$2229^{+599}_{-271}$	$75^{+400}_{-54}$
Alt.	$-426 \pm 90$	$12.86^{+13.55}_{-8.92}$	$403^{+30}_{-24}$	$2965^{+1423}_{-516}$	$665^{+6860}_{-512}$

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

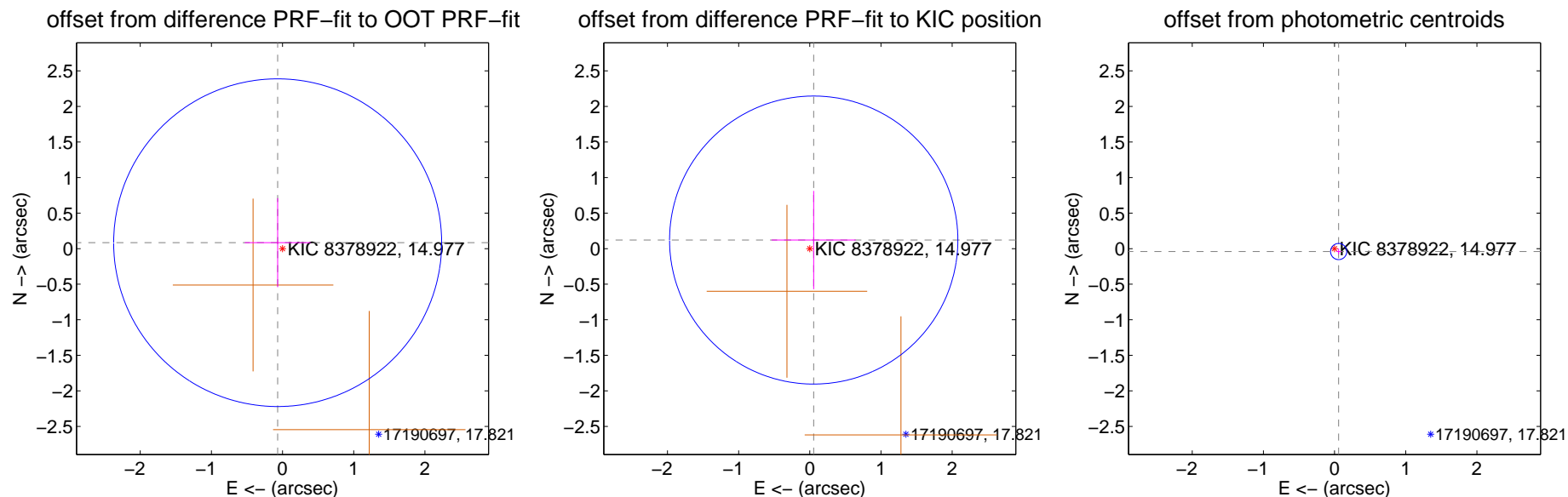
## DV Centroid Data

Supplemental centroid analysis for 008378922-05. Kepler magnitude: 14.98. Transit SNR 87.50

There are 0 quarters with good PRF difference image offsets

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

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.109 \pm 0.768$	0.14	$0.069 \pm 0.463$	$0.084 \pm 0.626$
PRF-fit source offset from KIC position	$0.133 \pm 0.675$	0.20	$-0.055 \pm 0.590$	$0.121 \pm 0.691$
photometric centroid source offset	$0.07 \pm 0.04$	1.85	$-0.06 \pm 0.04$	$-0.04 \pm 0.04$



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.

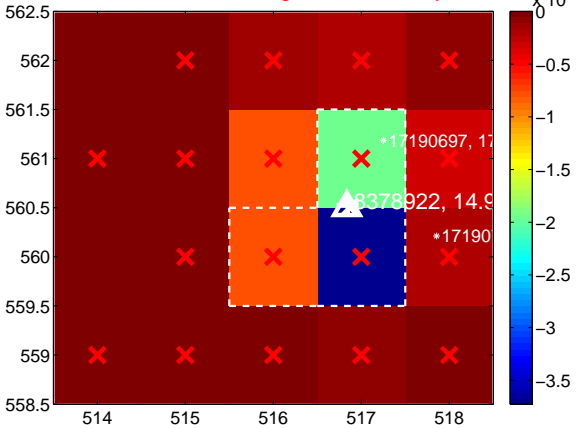
Q5 no difference image



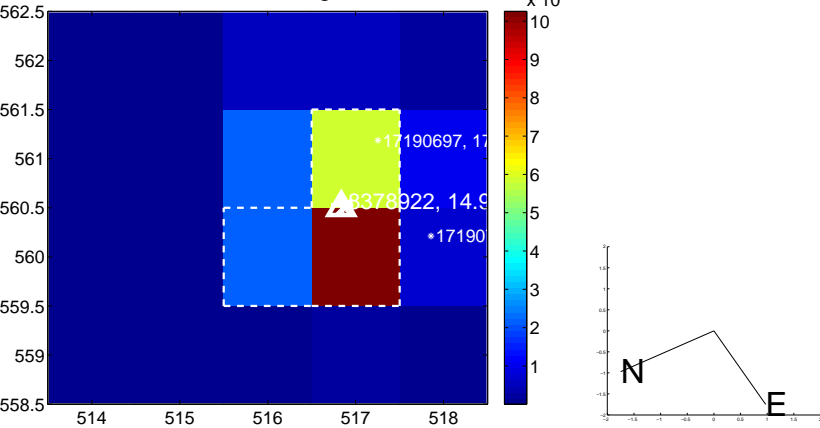
Q5 no OOT image



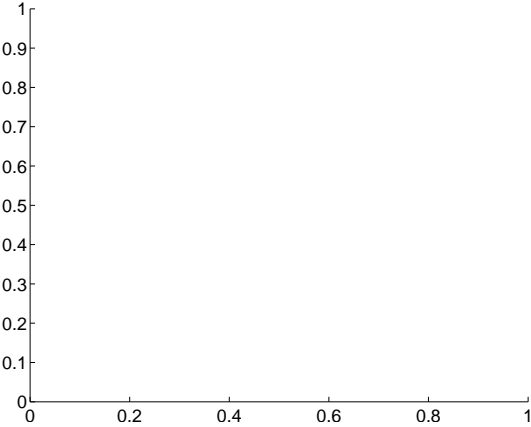
Q6 difference image. Poor Quality



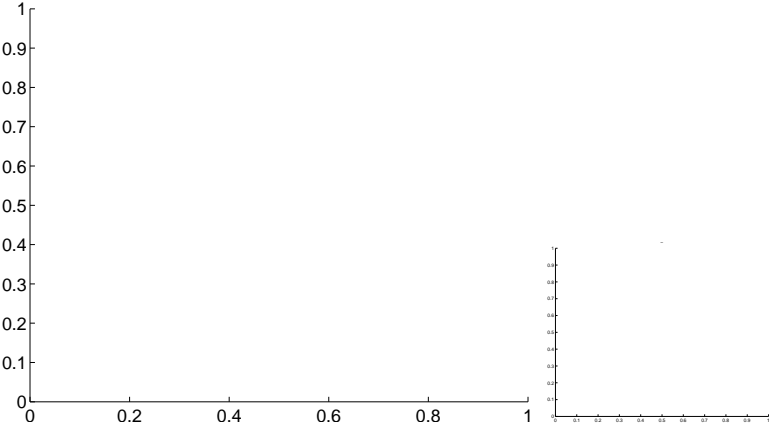
Q6 OOT image



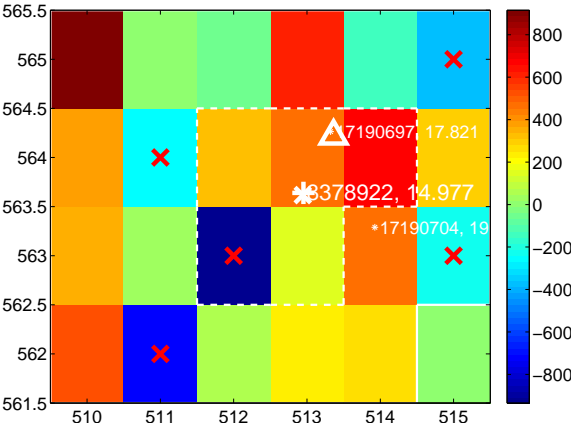
Q7 no difference image



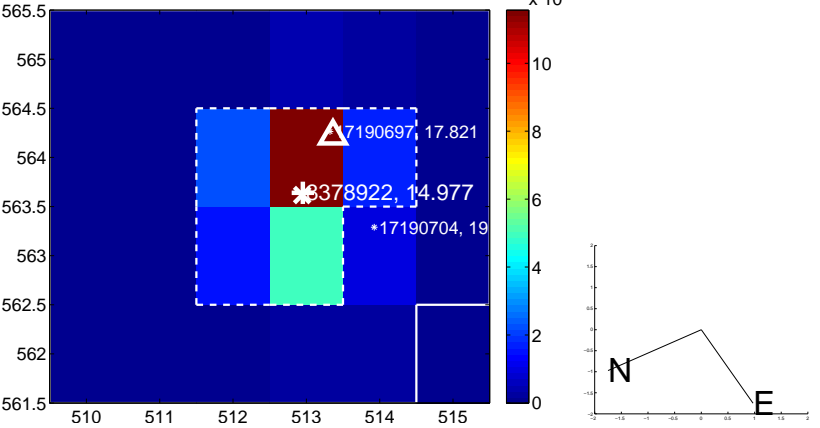
Q7 no OOT image



Q8 difference image. Poor Quality



Q8 OOT image

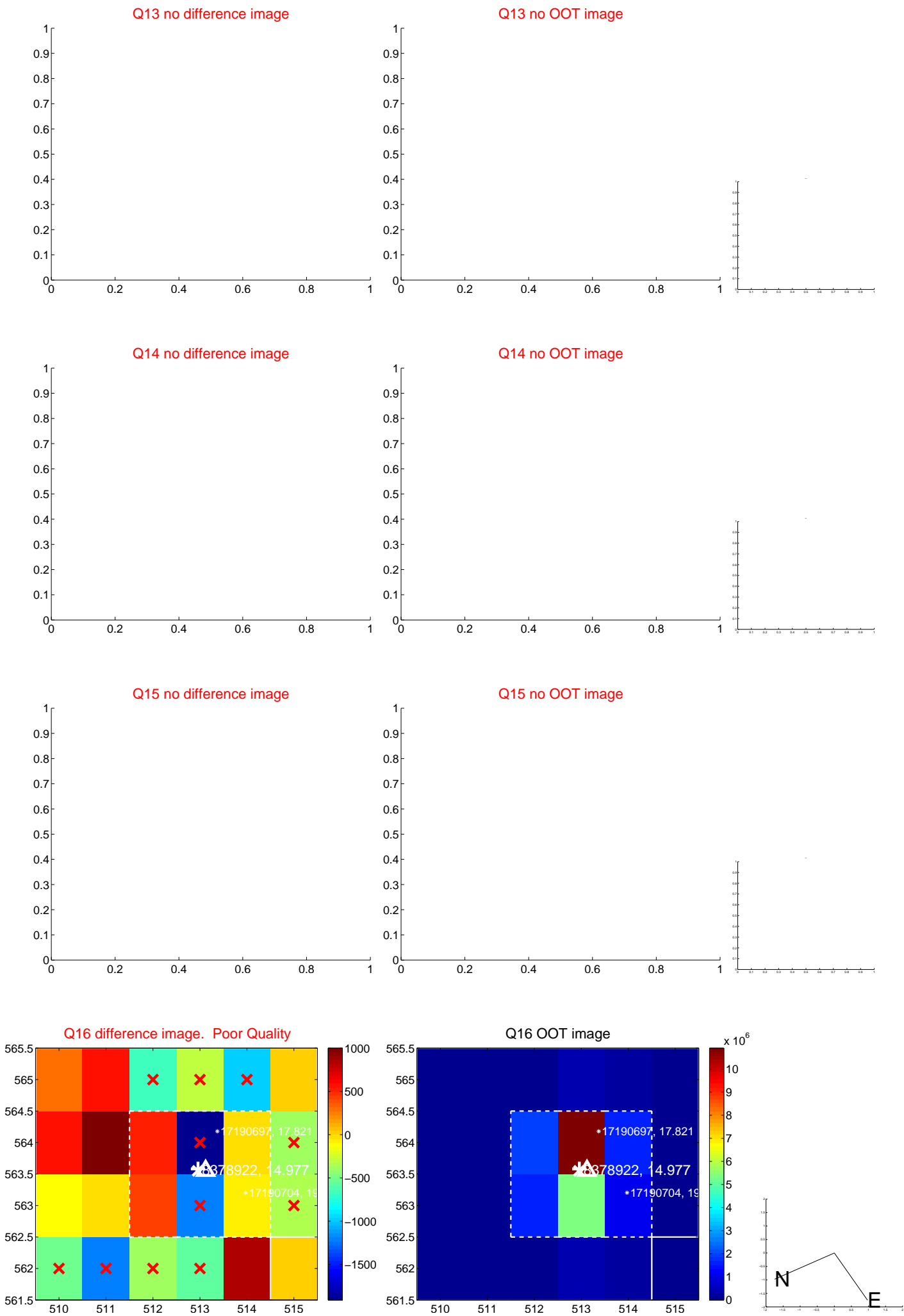




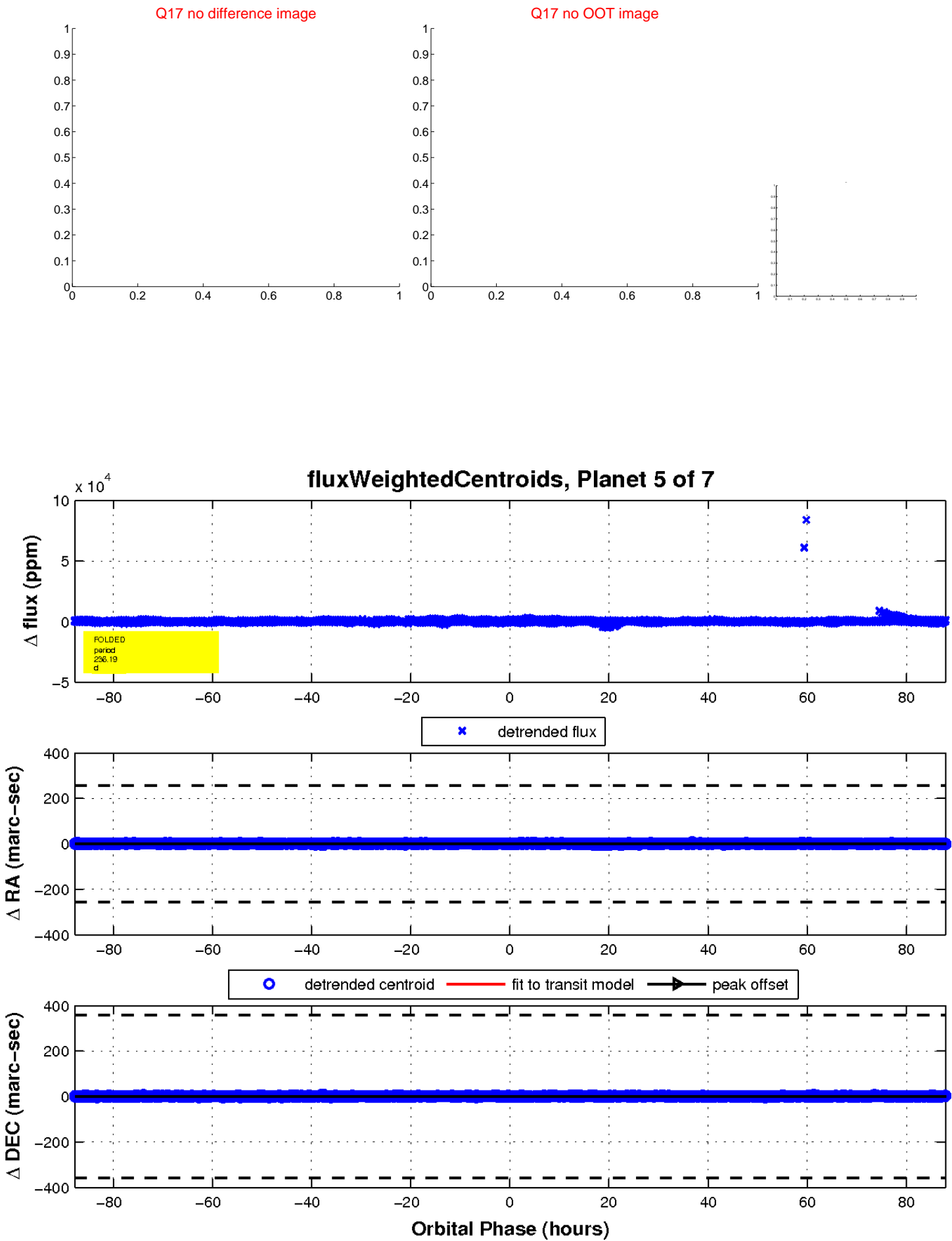
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

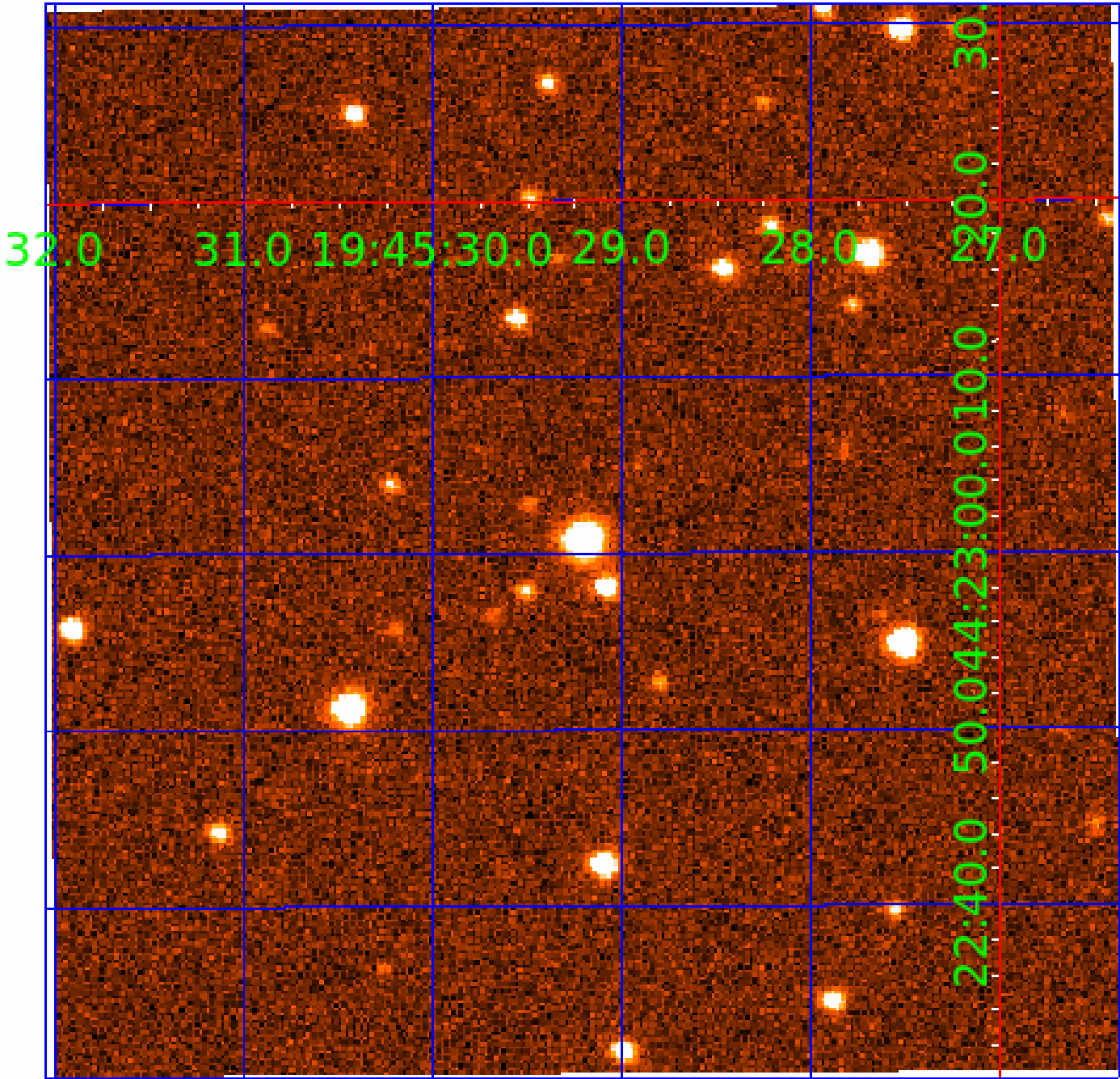


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 008378922

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008378922-01	OBS	7028.01	43.262904	150.388198	366177.4	6.000	12874.6	-1.0	0.92	5623	50.03	15.40
008378922-02	OBS	No	43.263288	168.760159	235519.1	18.765	10162.6	5554.1	0.92	5623	54.85	15.40
008378922-03	OBS	No	234.587411	324.318660	11851.4	5.000	90.8	-1.0	0.92	5623	9.91	1.62
008378922-05	OBS	No	236.190747	321.110456	10715.2	29.319	40.6	87.5	0.92	5623	17.06	1.60
008378922-06	OBS	No	408.204114	316.068405	337.6	11.370	11.4	4.0	0.92	5623	1.83	0.77
008378922-07	OBS	No	404.679845	329.185253	725.8	15.000	11.8	-1.0	0.92	5623	2.45	0.78

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008378922-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_ALT—MOD_ODDEVEN_ALT—HAS_SEC_TCE—CENT_NOFITS
008378922-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE
008378922-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_NOFITS
008378922-05	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
008378922-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
008378922-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—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.

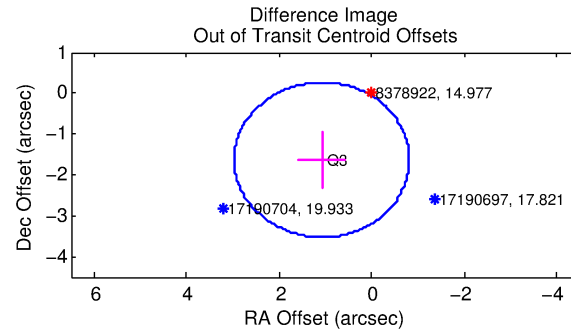
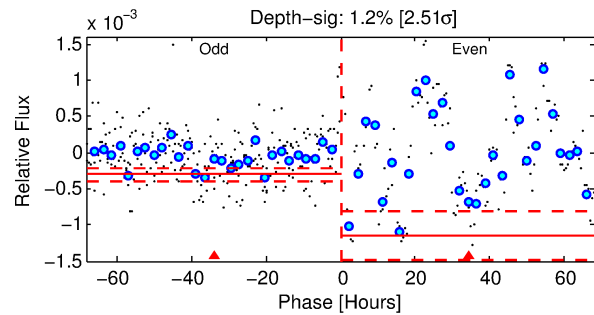
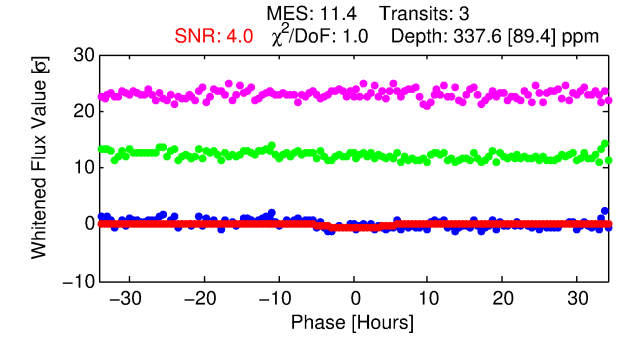
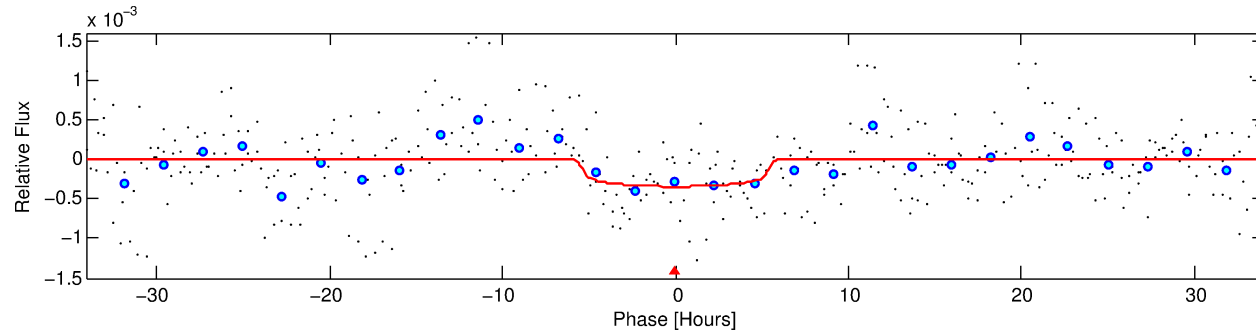
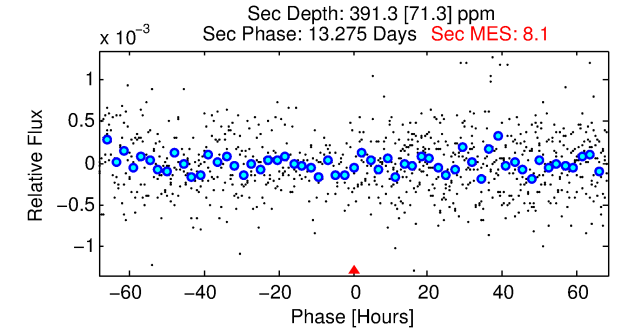
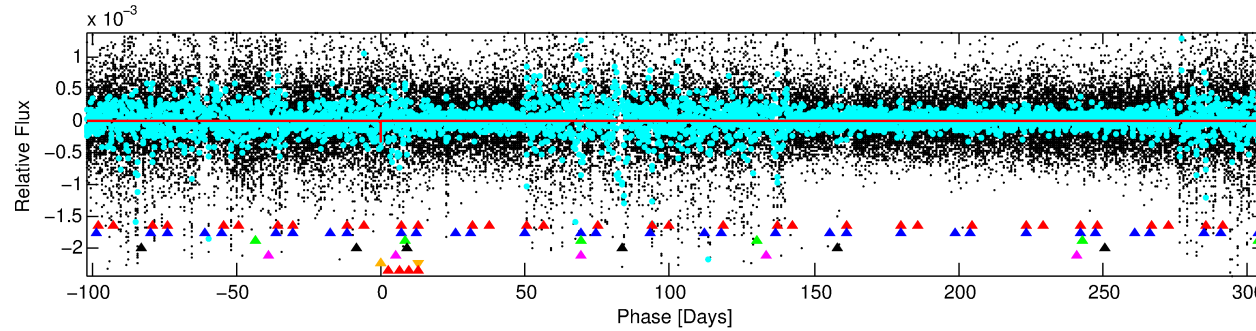
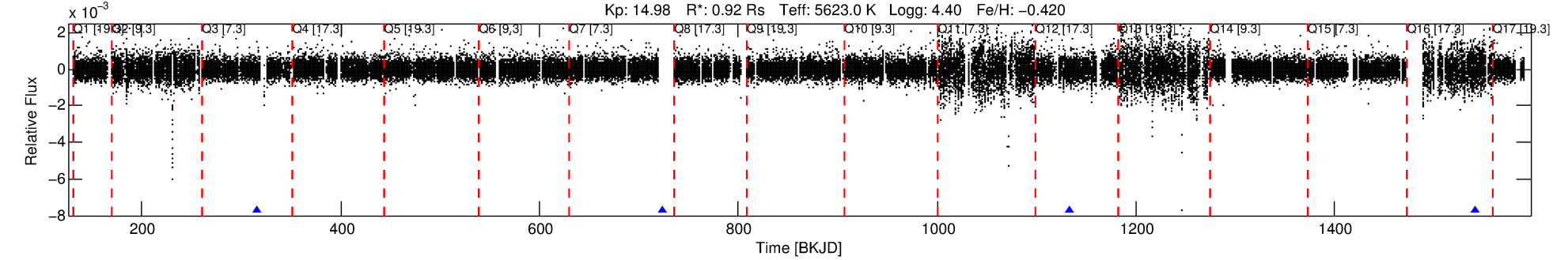
Ephemeris Match Information For 008378922-06

No Significant Match Found

# DV One-Page Summary

KIC: 8378922 Candidate: 6 of 7 Period: 408.204 d  
KOI: K07028 Corr: No Ephemeris Match

Kp: 14.98 R\*: 0.92 Rs Teff: 5623.0 K Logg: 4.40 Fe/H: -0.420



## DV Fit Results:

Period = 408.20411 [0.01517] d  
Epoch = 316.0684 [0.0241] BKJD  
Rp/R\* = 0.0183 [0.0110]  
a/R\* = 187.05 [494.88]  
b = 0.76 [1.51]  
Seff = 0.77 [0.29]  
Teq = 239 [23] K  
Rp = 1.83 [1.20] Re  
a = 0.9875 [0.2326] AU  
Ag = 62445.72 [79149.57] [0.79σ]  
Teffp = 5843 [1784] K [3.14σ]

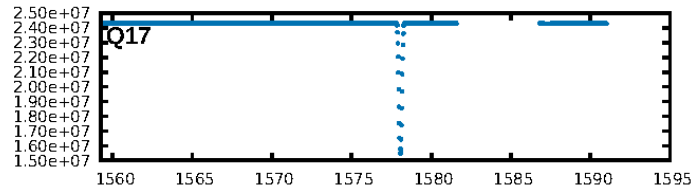
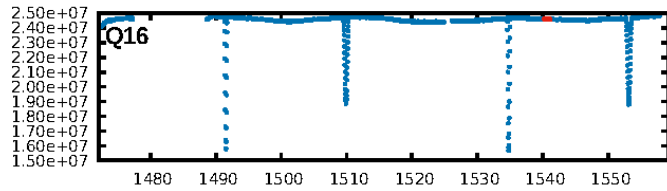
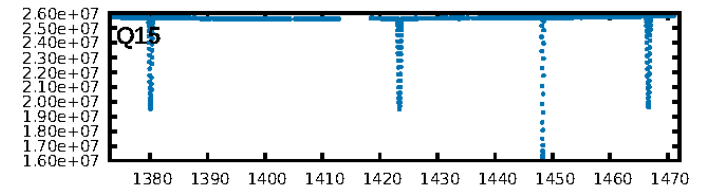
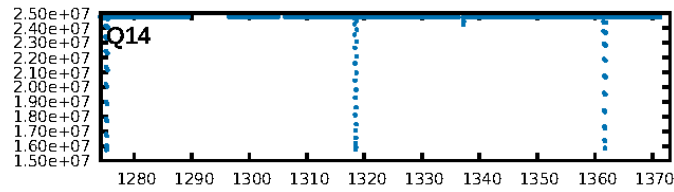
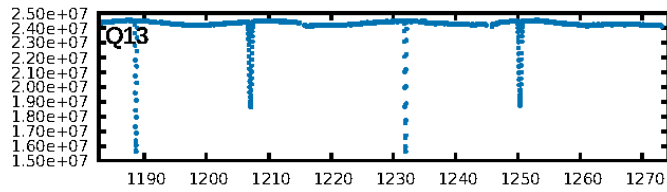
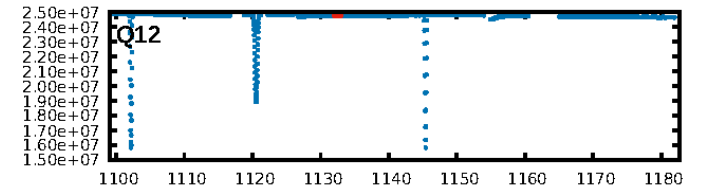
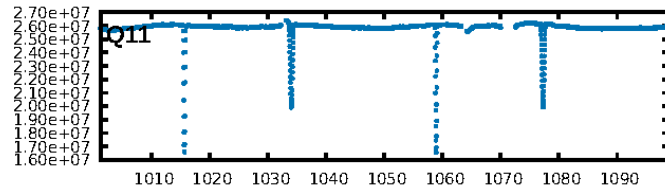
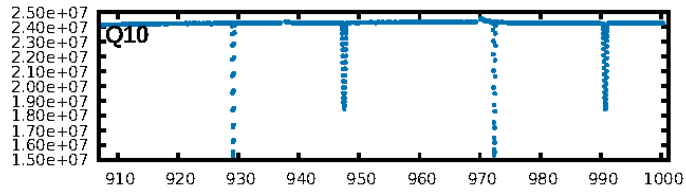
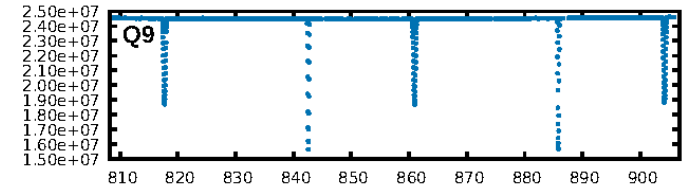
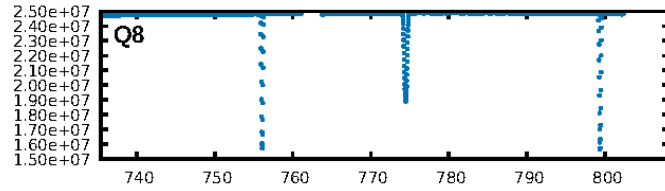
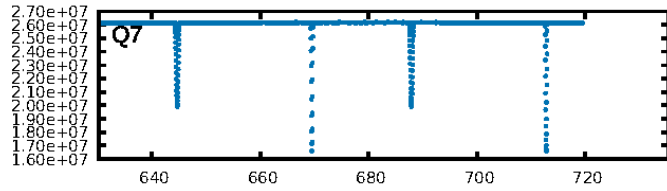
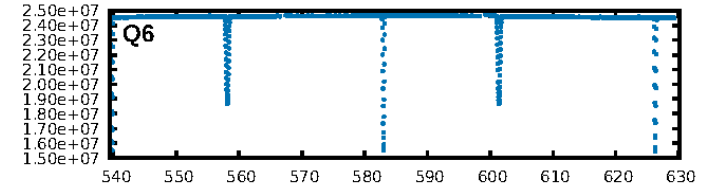
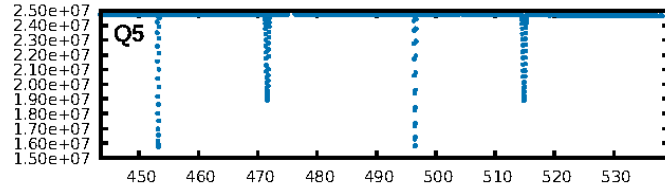
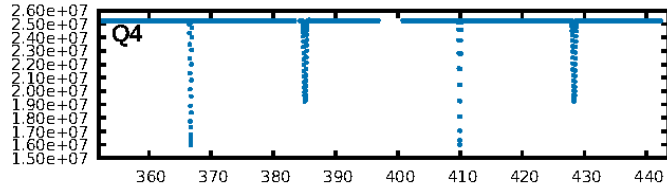
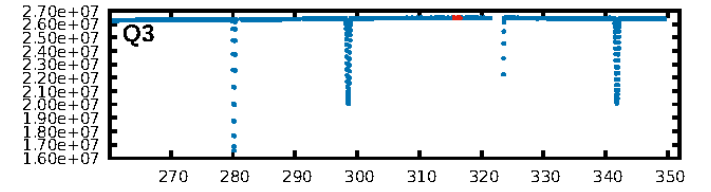
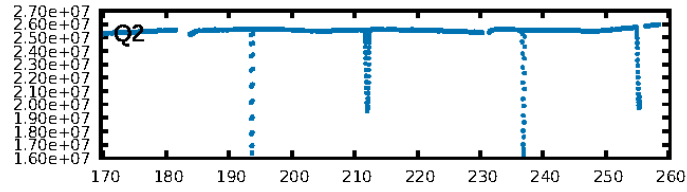
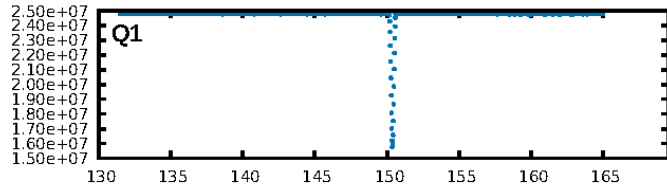
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [4.49σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 24.6%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 0.6022  
Centroid-sig: 6.3%  
Centroid-so: 3.260 arcsec [1.47σ]  
OotOffset-rm: 1.958 arcsec [3.10σ]  
KicOffset-rm: 1.917 arcsec [3.00σ]  
OotOffset-st: 0/1/0/0 [1]  
KicOffset-st: 0/1/0/0 [1]  
DiffImageQuality-fgm: 1.00 [1/1]  
DiffImageOverlap-fno: 1.00 [3/3]

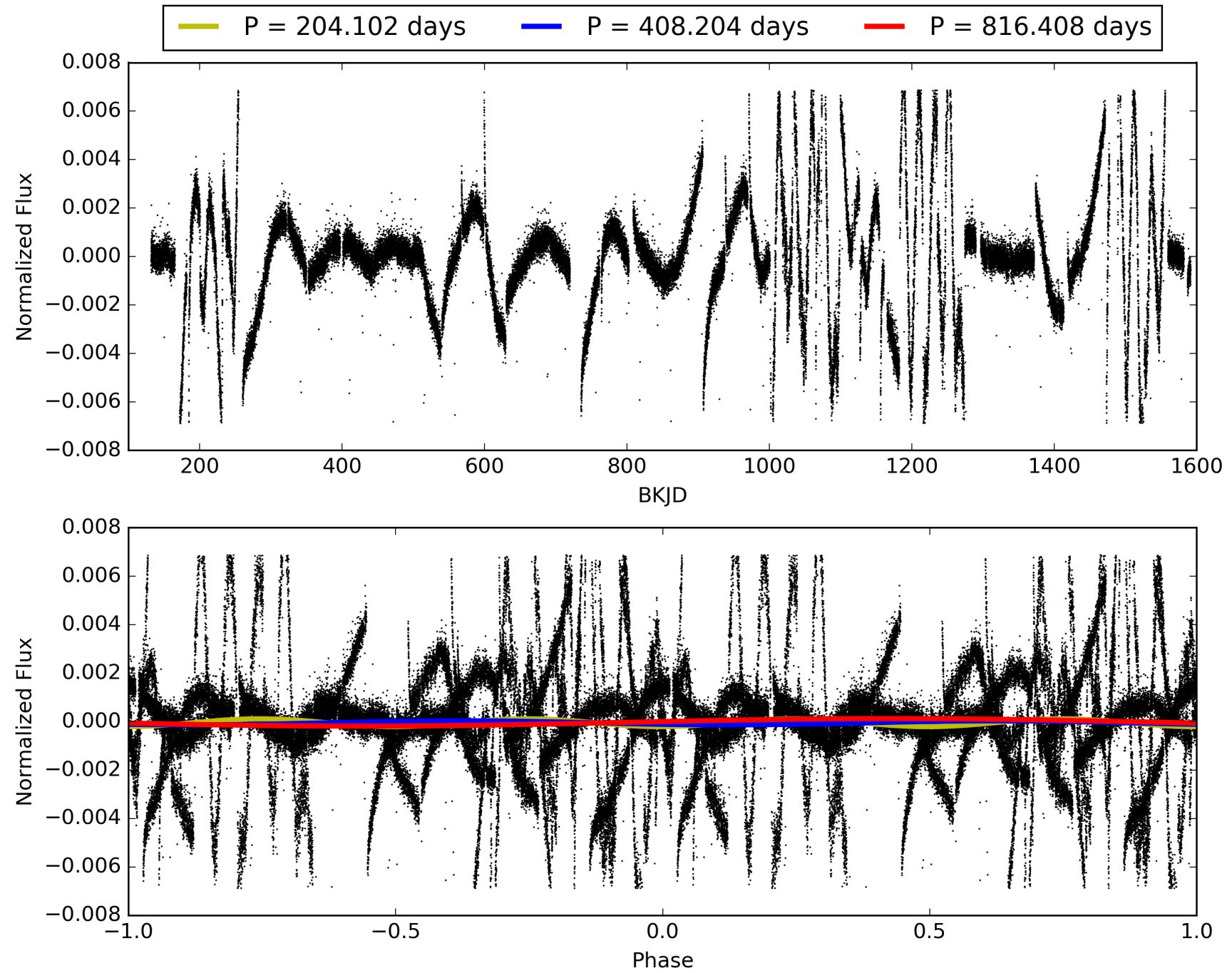
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 23:32:15 Z

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

# TCE 008378922-06, PDC Light Curves



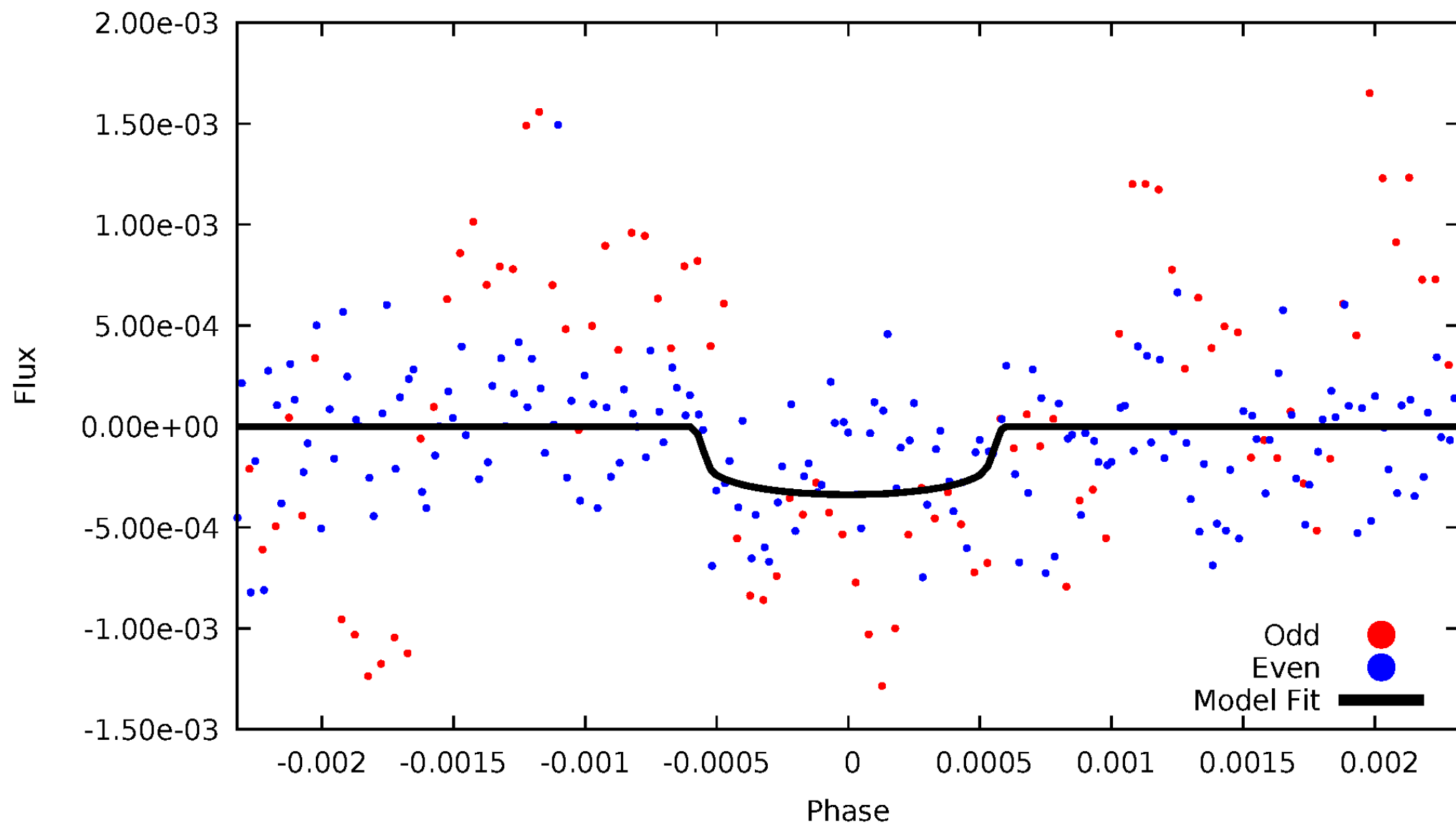
TCE 008378922-06





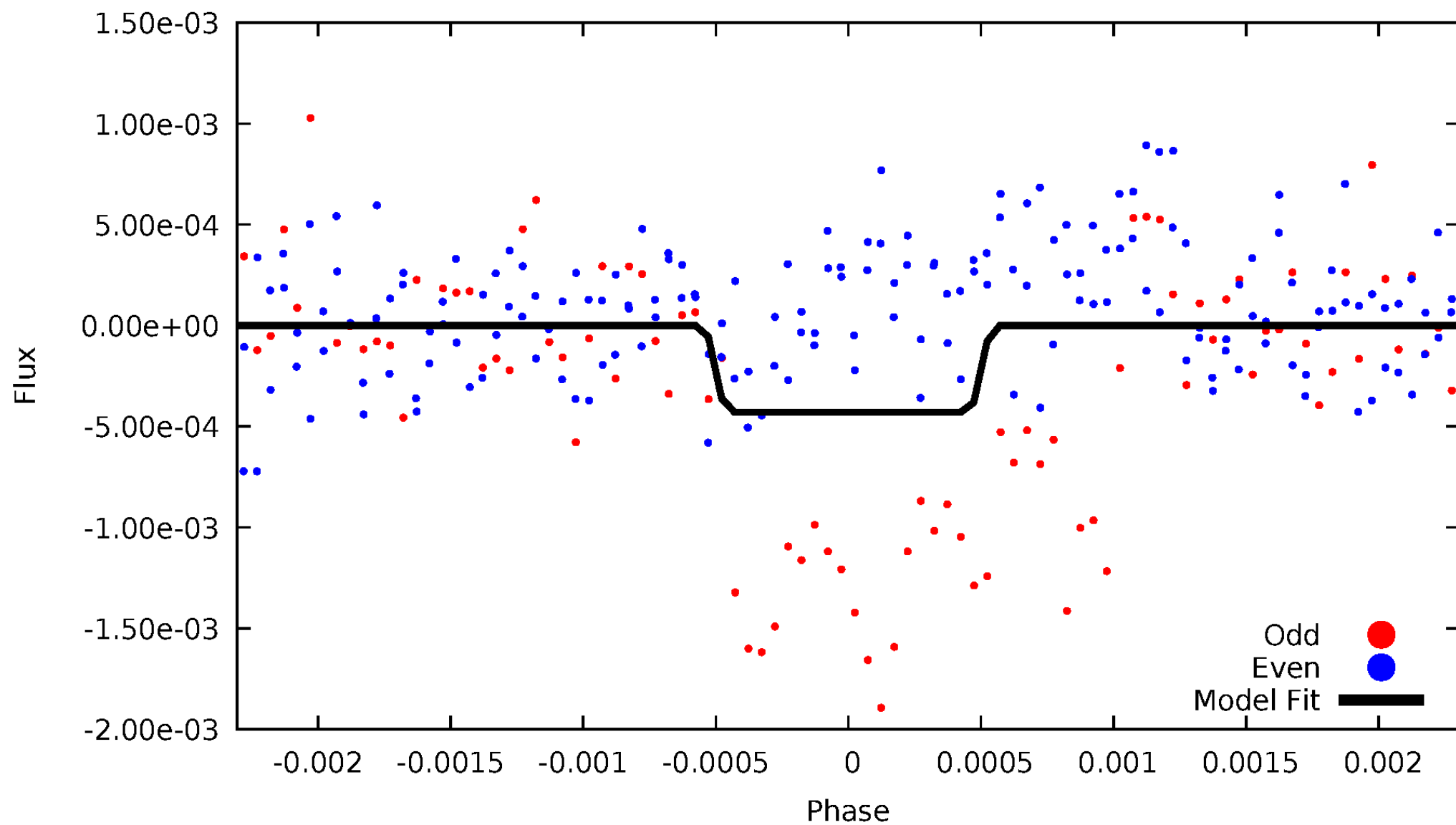
# DV Odd/Even

TCE 008378922-06



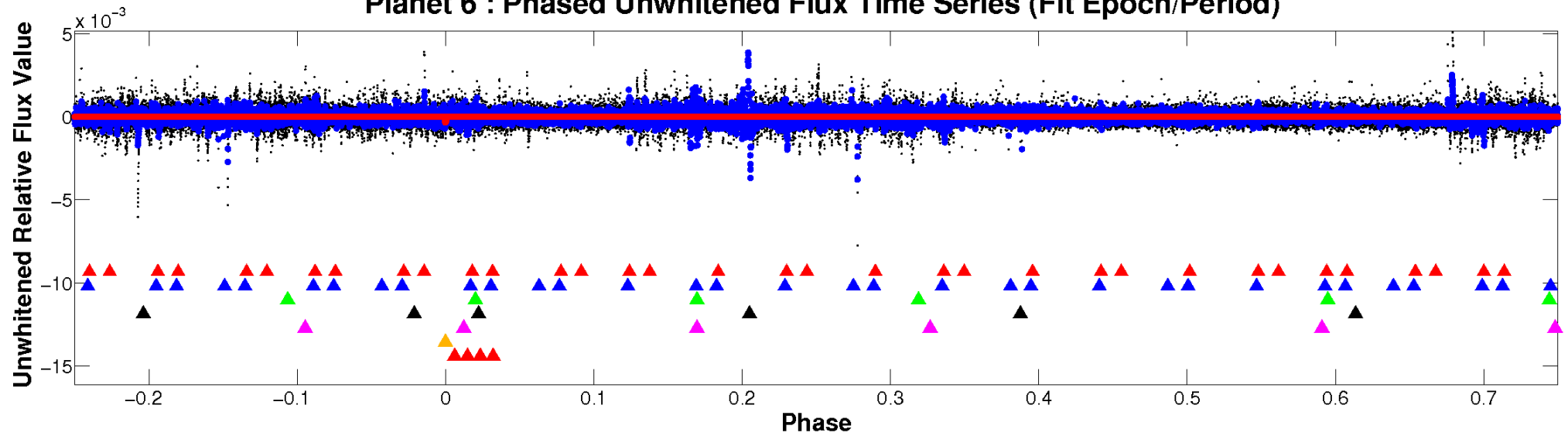
# ALT Odd/Even

TCE 008378922-06

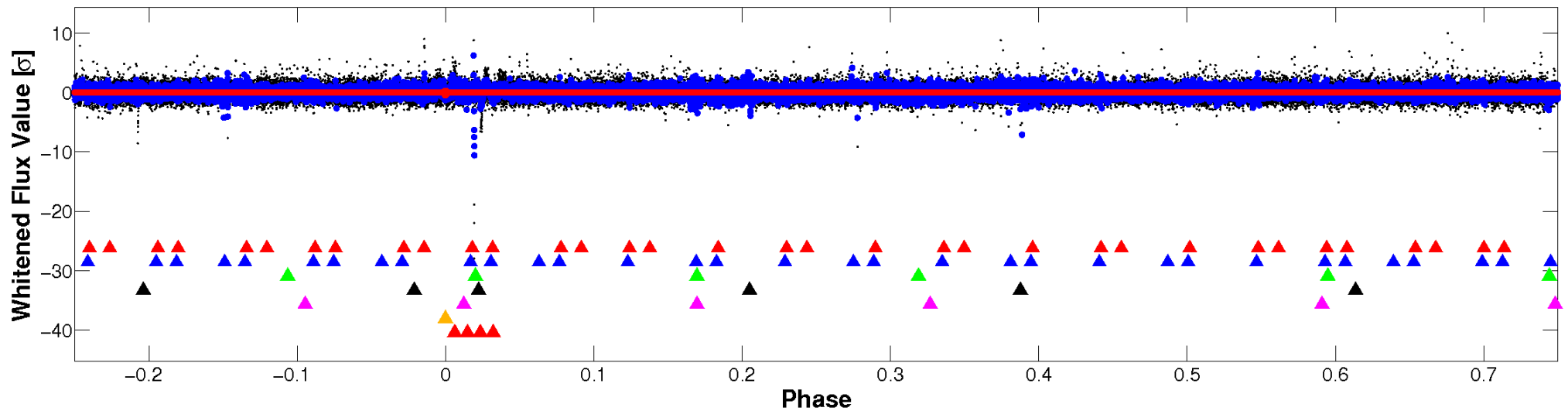


# Non-Whitened Vs. Whitened Light Curve

## Planet 6 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

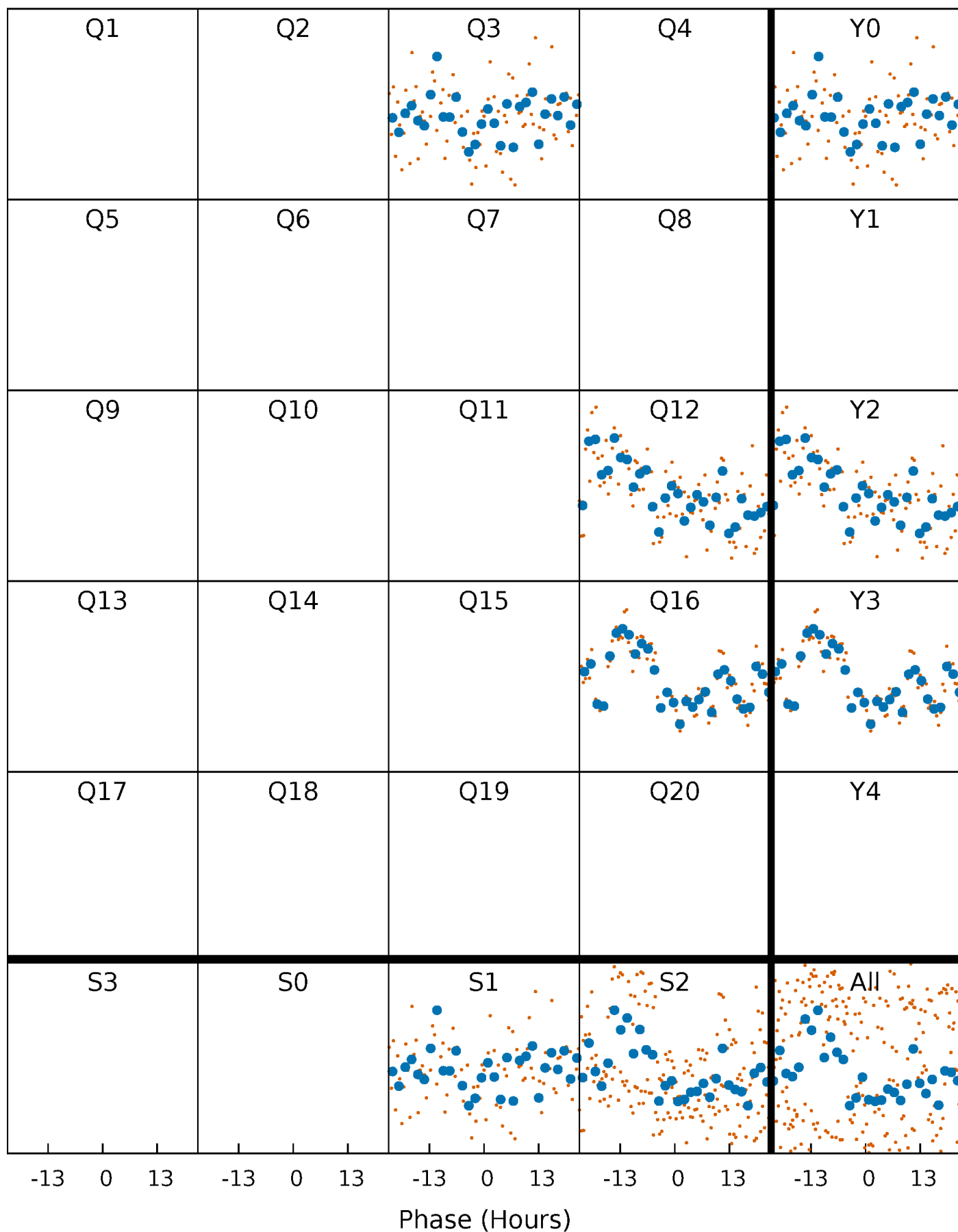


## Planet 6 : Phased Whitened Flux Time Series (Fit Epoch/Period)



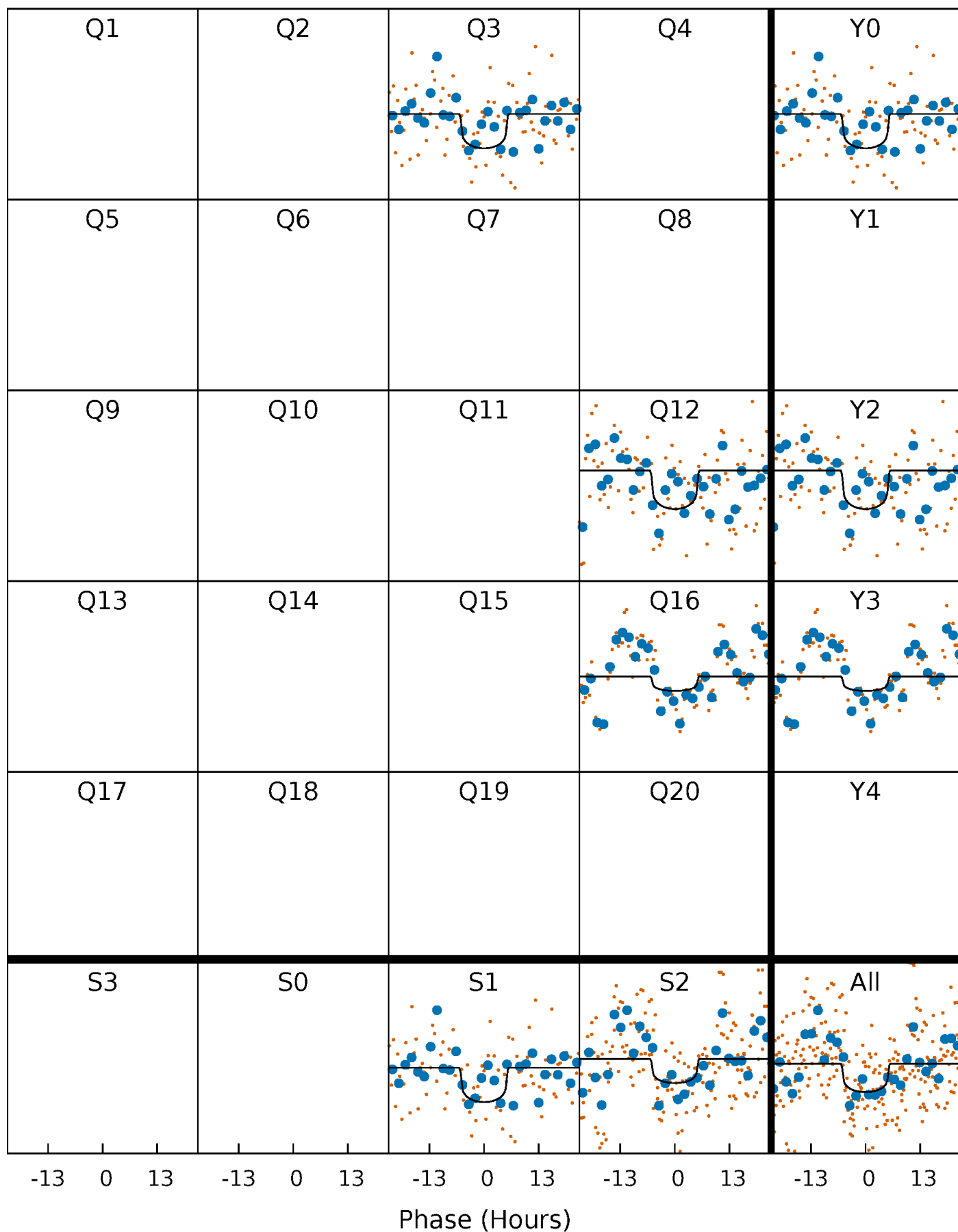
# PDC Quarter-Phased Transit Curves

TCE 008378922-06   P=408.204114 Days    $T_0=316.068405$  (BKJD)



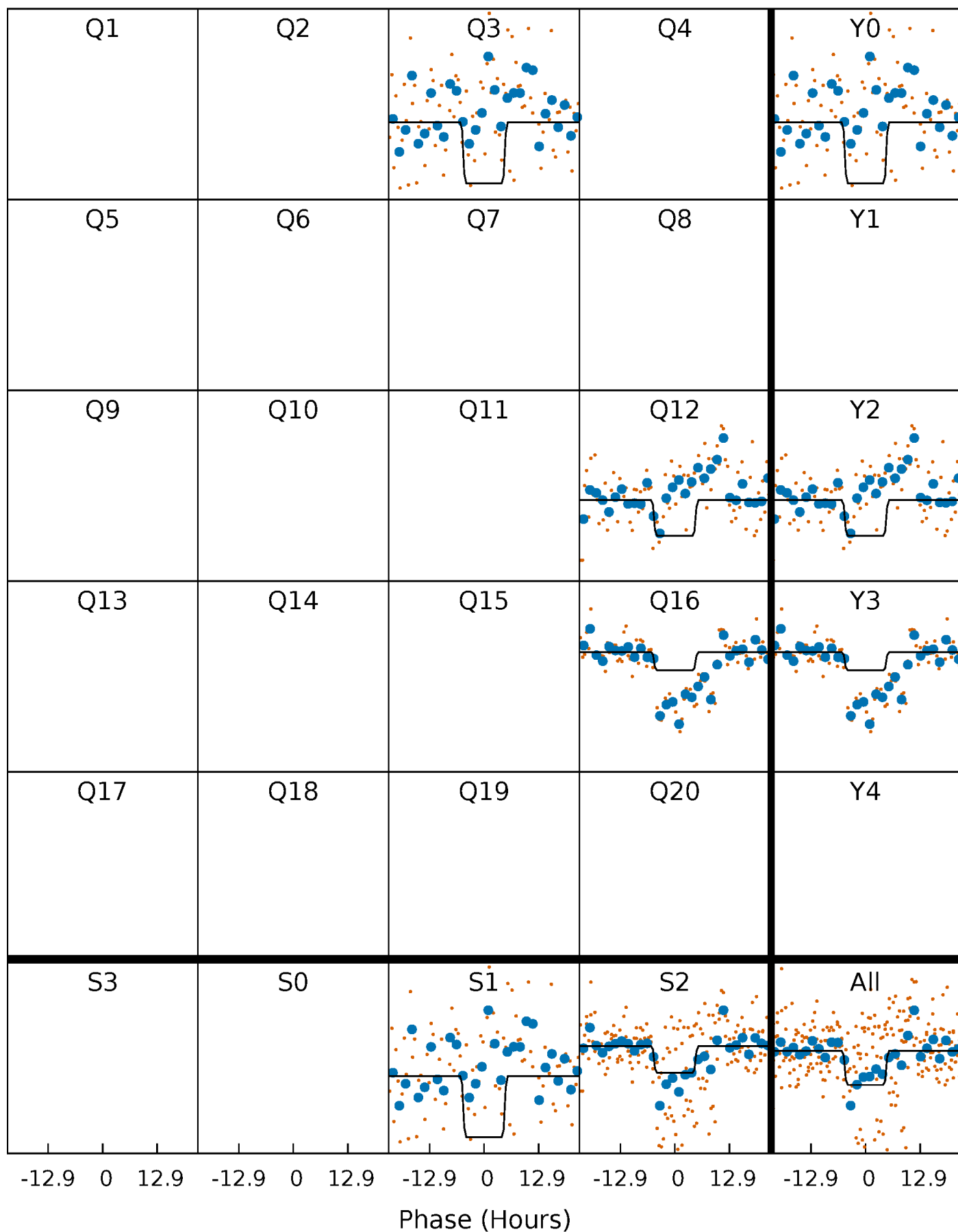
# DV Quarter-Phased Transit Curves

TCE 008378922-06 P=408.204114 Days  $T_0=316.068405$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

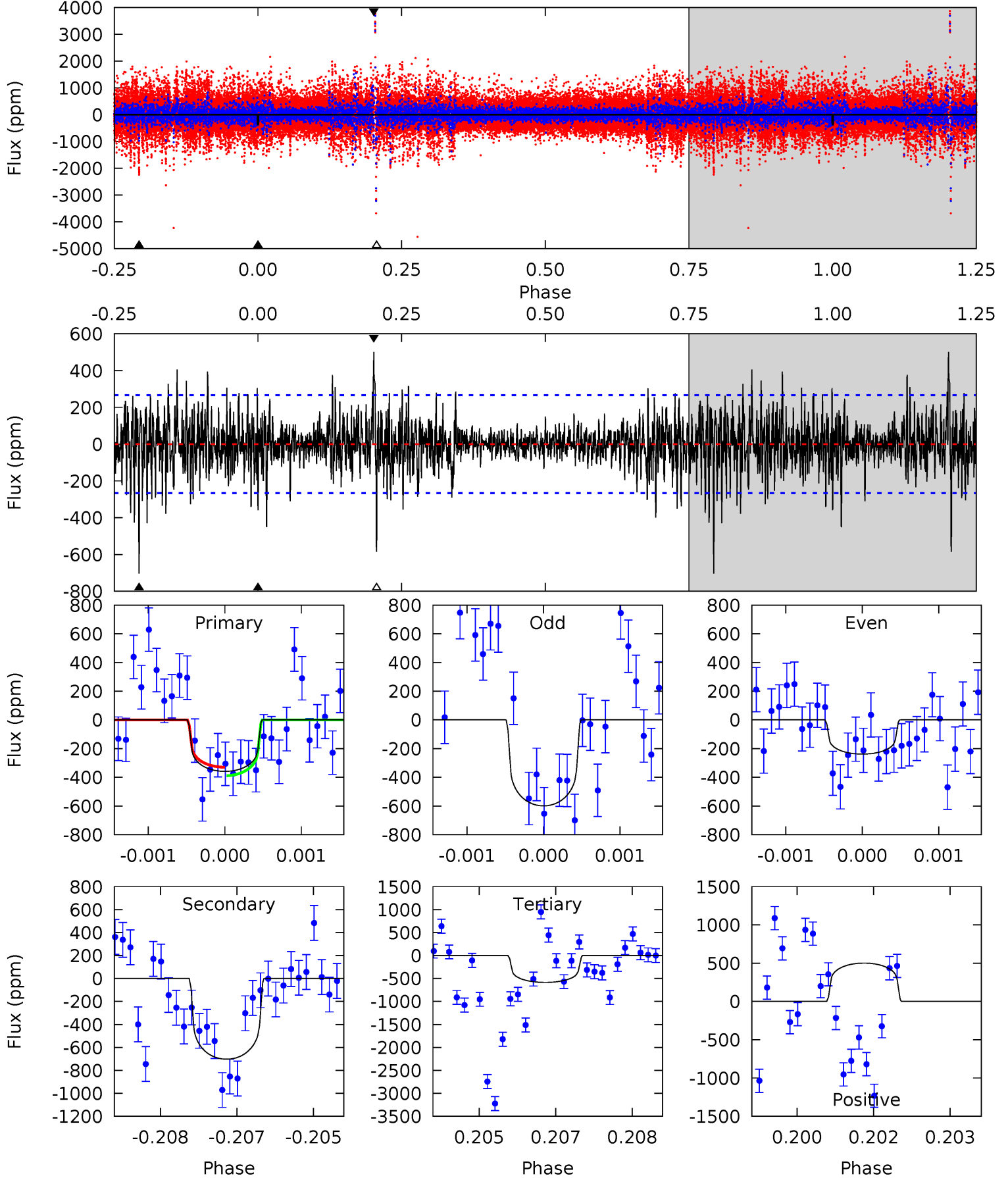
TCE 008378922-06 P=408.201228 Days  $T_0=316.078733$  (BKJD)



# DV Model-Shift Uniqueness Test

008378922-06, P = 408.204114 Days, E = 316.068405 Days

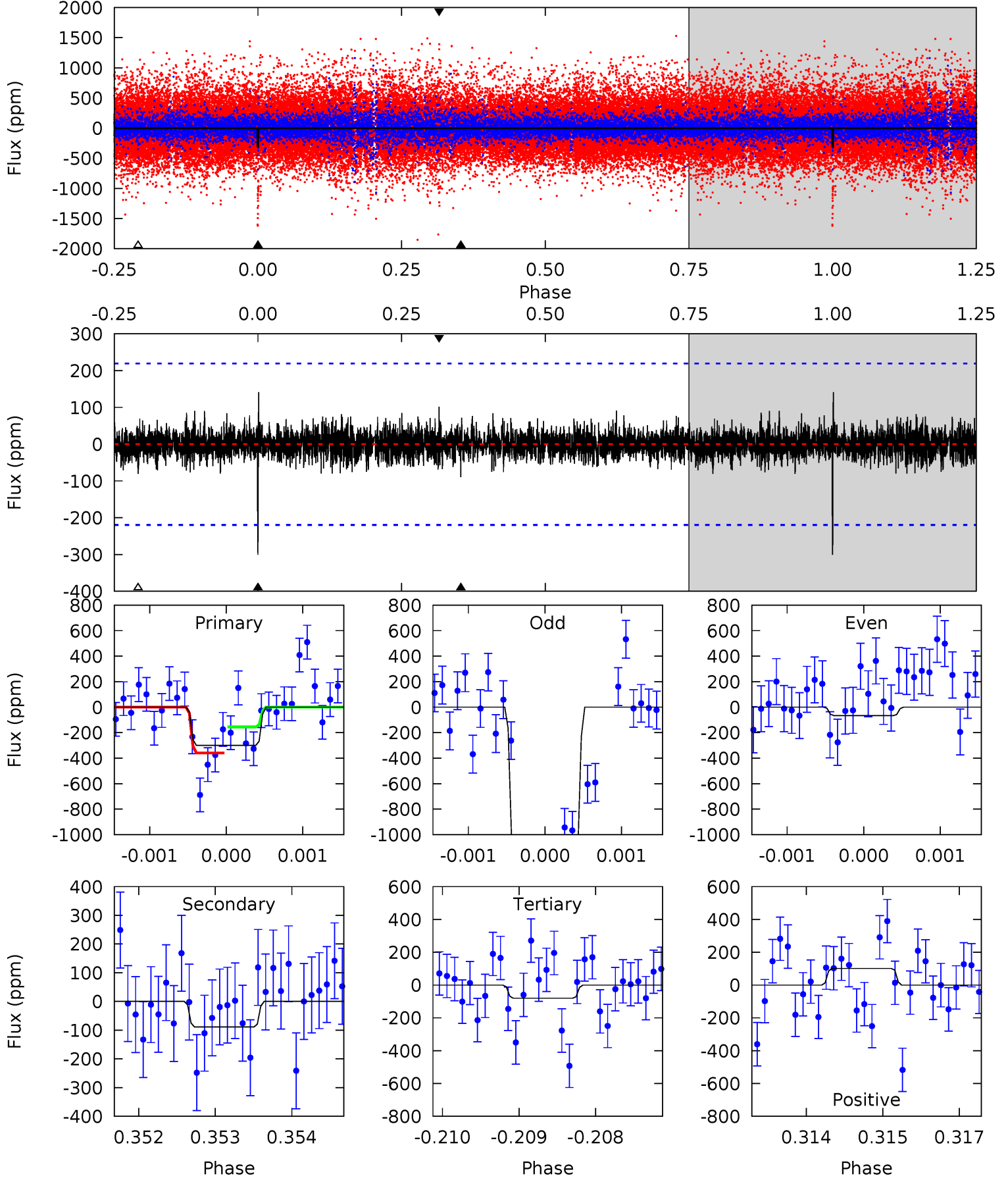
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.29	14.3	11.9	10.2	5.41	3.23	1.98	-4.61	-2.89	2.38	4.10	3.49	1.35	0.42	0.62



# Alt Model-Shift Uniqueness Test

008378922-06, P = 408.201228 Days, E = 316.078733 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
7.44	2.20	1.99	2.51	5.43	3.26	0.56	5.45	4.94	0.21	-0.30	14.5	-7.93	0.32	2.48





### Stellar Parameters For KIC 008378922

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5623^{+169}_{-169}$	$4.400^{+0.167}_{-0.204}$	$-0.420^{+0.350}_{-0.250}$	$0.917^{+0.242}_{-0.161}$	$0.770^{+0.124}_{-0.053}$	$1.408^{+1.082}_{-0.699}$
	+3%/-3%	+4%/-5%	+83%/-60%	+26%/-18%	+16%/-7%	+77%/-50%
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 008378922-06 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-703 \pm 49$	$1.95^{+1.12}_{-1.05}$	$335^{+27}_{-22}$	$6668^{+4316}_{-1326}$	$100092^{+391232}_{-58670}$
Alt.	$-89 \pm 40$	$2.12^{+1.27}_{-1.00}$	$336^{+25}_{-21}$	$3993^{+1288}_{-615}$	$9663^{+31112}_{-6380}$

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

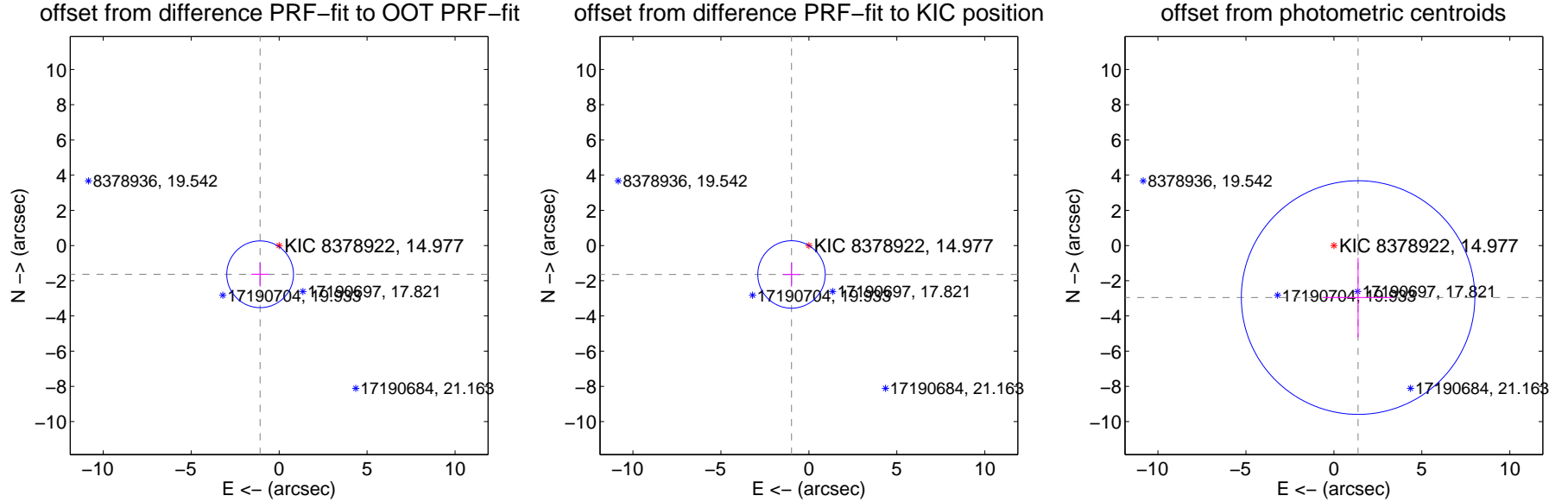
## DV Centroid Data

Supplemental centroid analysis for 008378922-06. Kepler magnitude: 14.98. Transit SNR 4.02

There are 1 quarters with good PRF difference image offsets

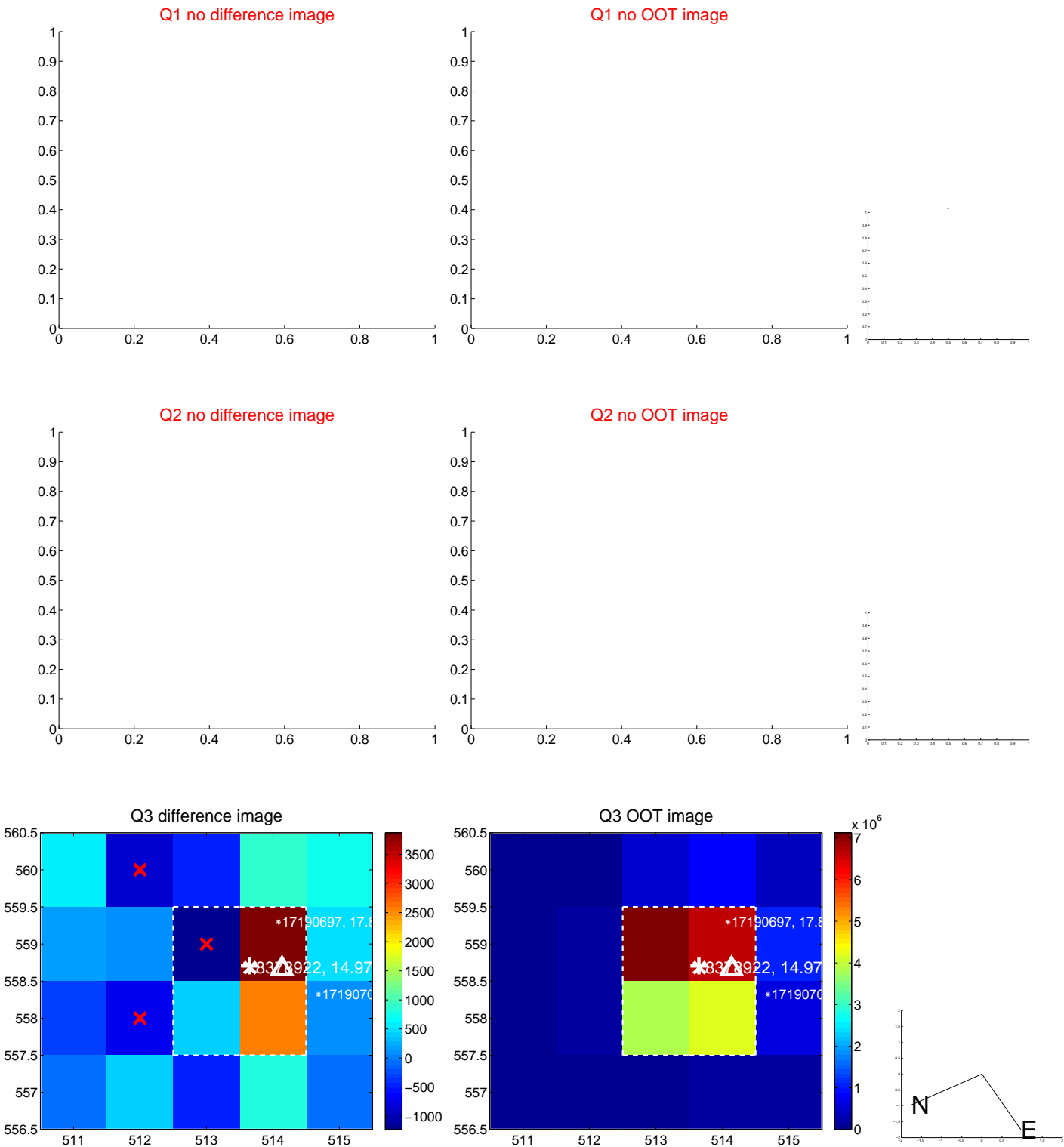
The direct PRF centroid is offset from the target star catalog position by about 0.09 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.958 \pm 0.632$	3.10	$1.080 \pm 0.500$	$-1.633 \pm 0.682$
PRF-fit source offset from KIC position	$1.917 \pm 0.639$	3.00	$0.987 \pm 0.500$	$-1.643 \pm 0.682$
photometric centroid source offset	$3.26 \pm 2.21$	1.47	$-1.38 \pm 1.99$	$-2.96 \pm 2.26$



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 are from the UKIRT catalog.

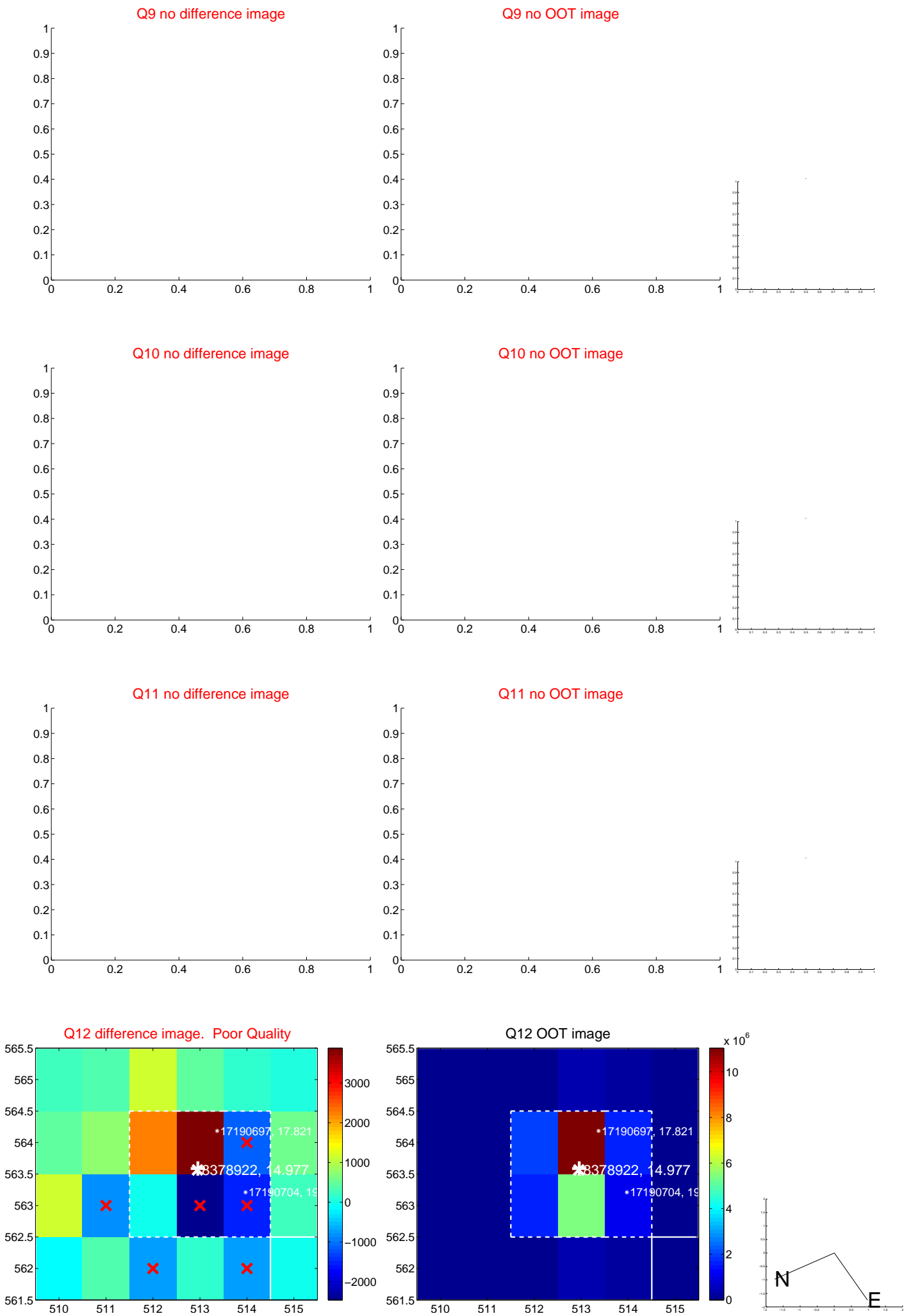
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



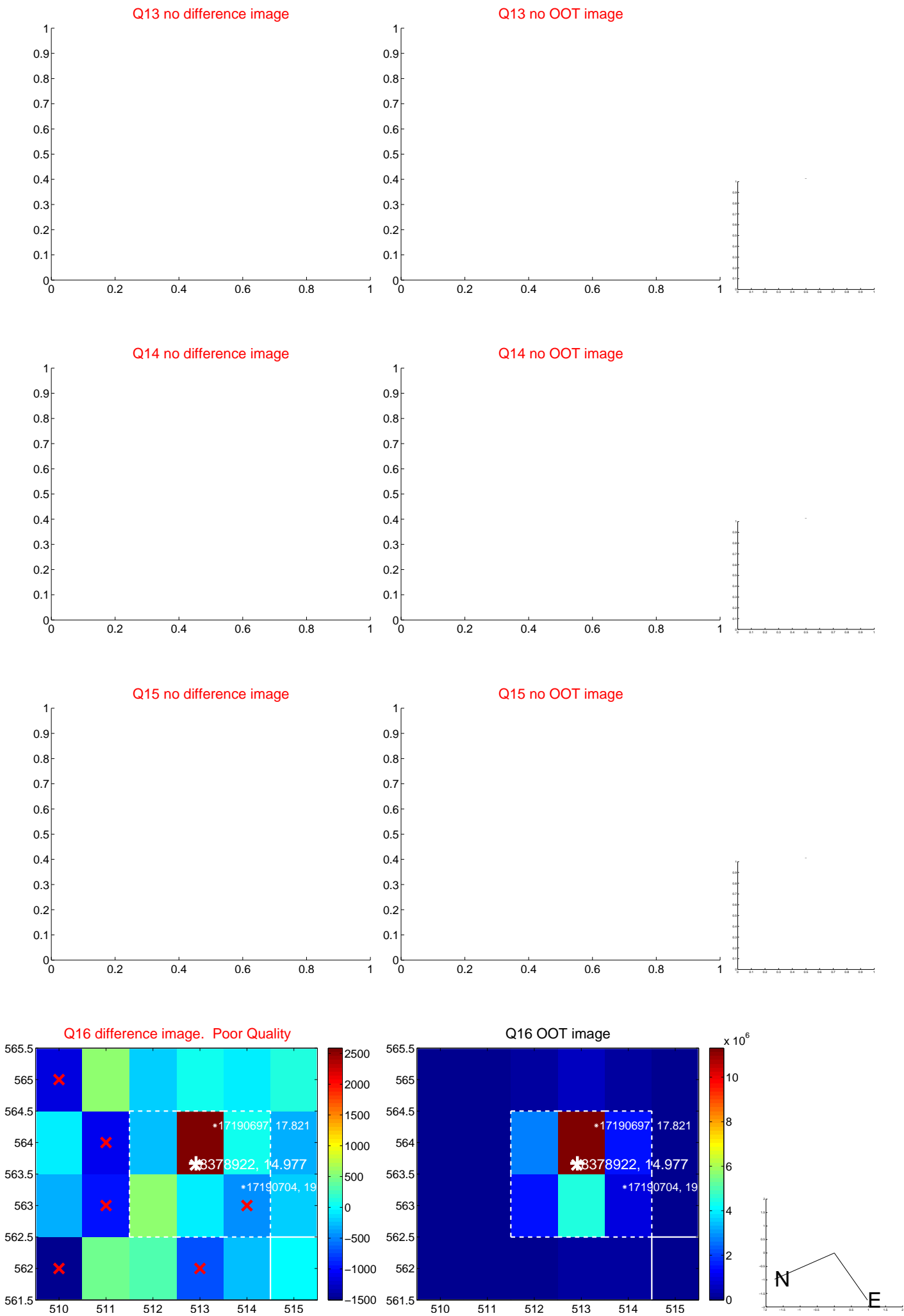
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



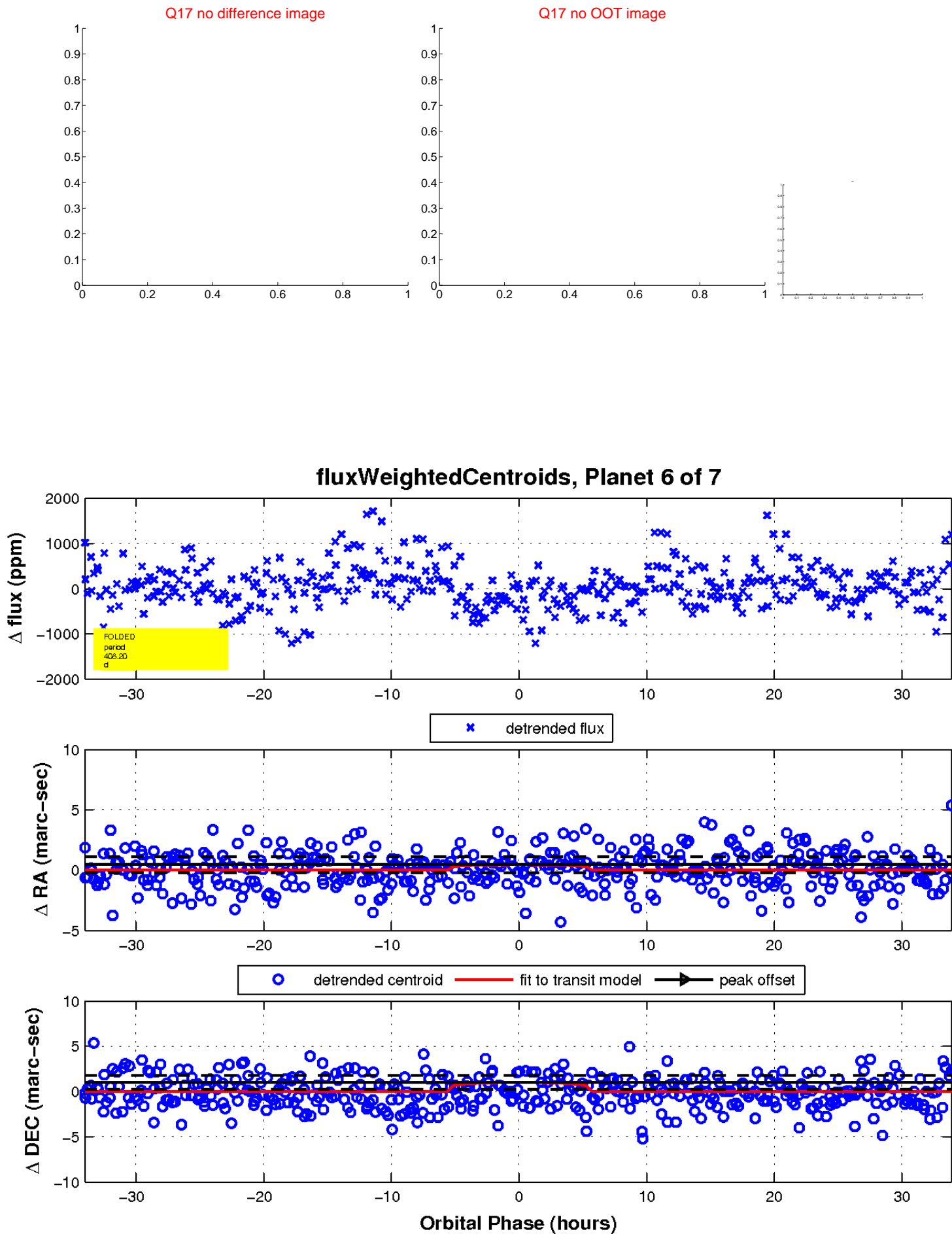
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



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

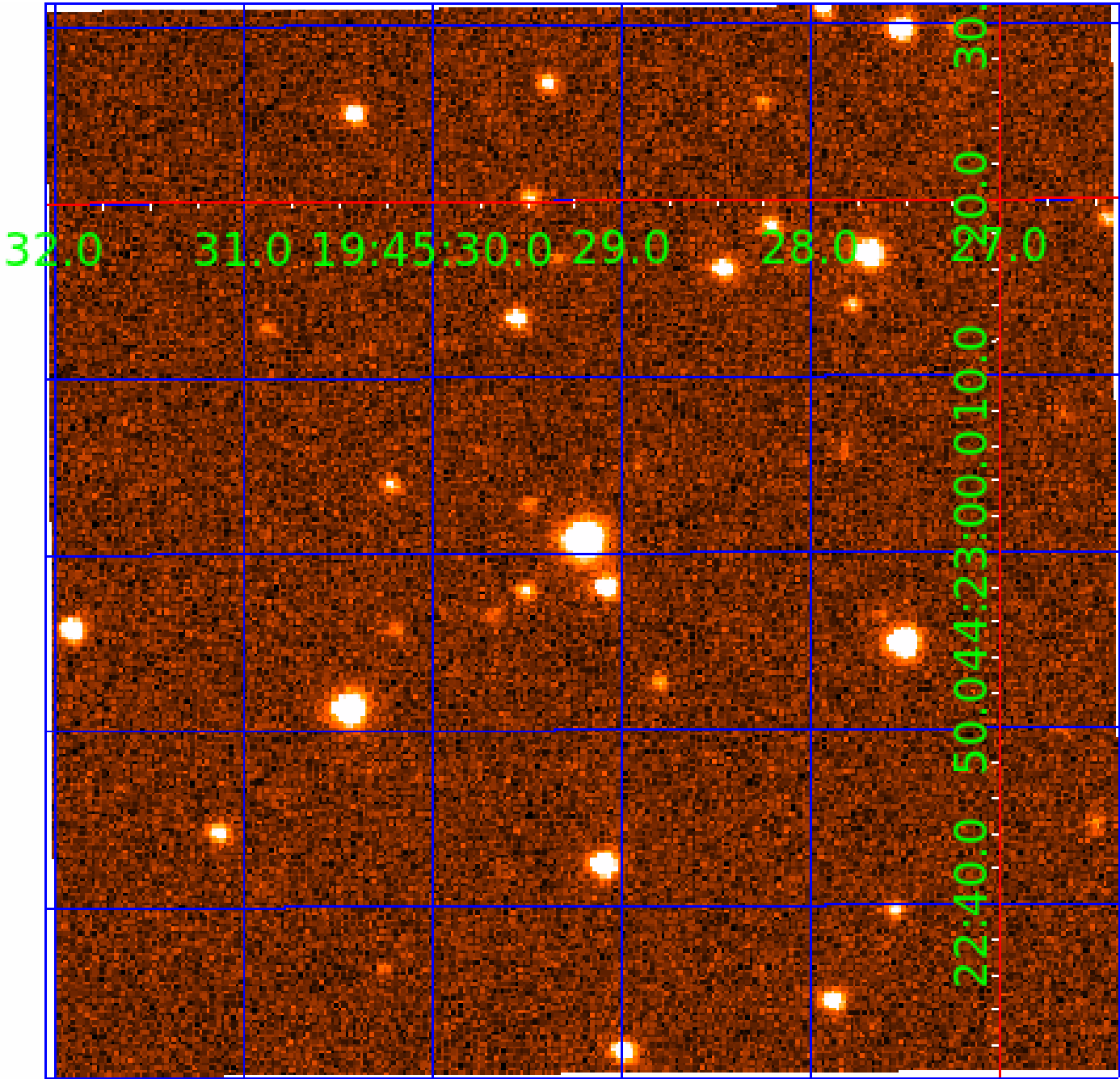


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 008378922

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008378922-01	OBS	7028.01	43.262904	150.388198	366177.4	6.000	12874.6	-1.0	0.92	5623	50.03	15.40
008378922-02	OBS	No	43.263288	168.760159	235519.1	18.765	10162.6	5554.1	0.92	5623	54.85	15.40
008378922-03	OBS	No	234.587411	324.318660	11851.4	5.000	90.8	-1.0	0.92	5623	9.91	1.62
008378922-05	OBS	No	236.190747	321.110456	10715.2	29.319	40.6	87.5	0.92	5623	17.06	1.60
008378922-06	OBS	No	408.204114	316.068405	337.6	11.370	11.4	4.0	0.92	5623	1.83	0.77
008378922-07	OBS	No	404.679845	329.185253	725.8	15.000	11.8	-1.0	0.92	5623	2.45	0.78

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008378922-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_ALT—MOD_ODDEVEN_ALT—HAS_SEC_TCE—CENT_NOFITS
008378922-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE
008378922-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_NOFITS
008378922-05	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
008378922-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
008378922-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—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 008378922-07

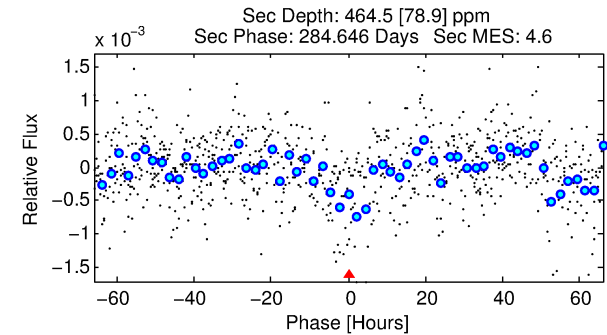
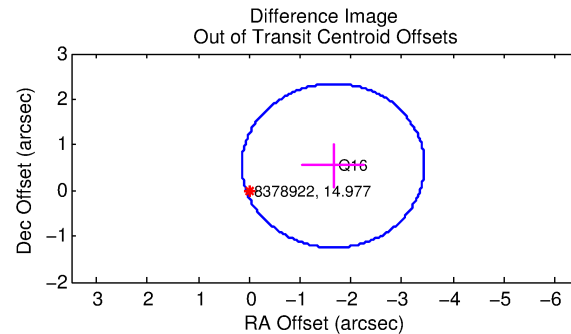
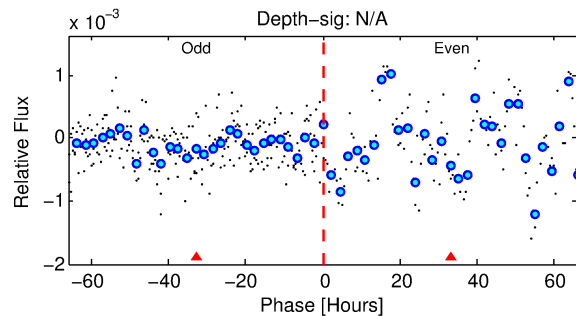
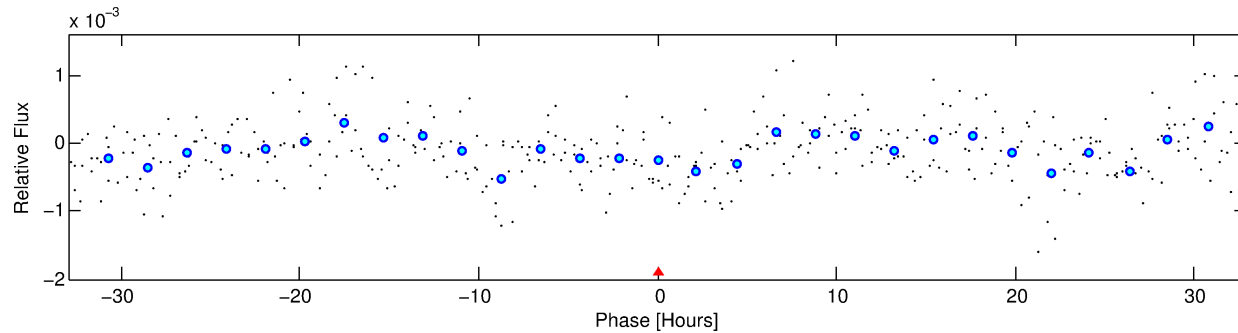
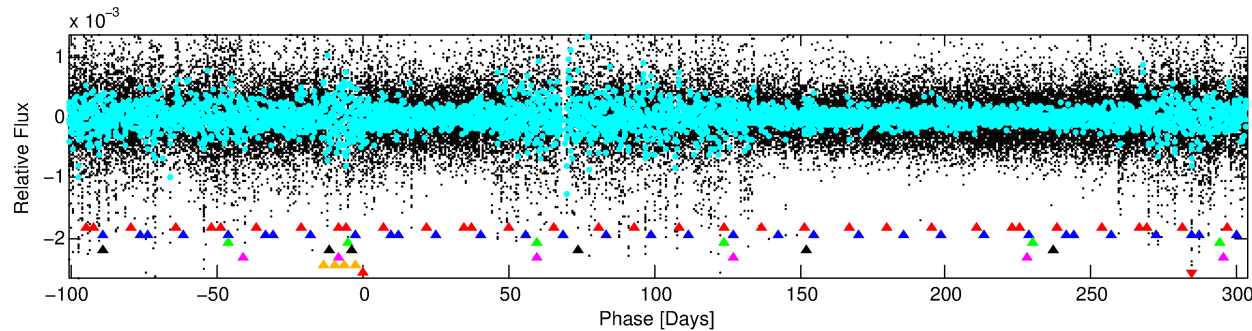
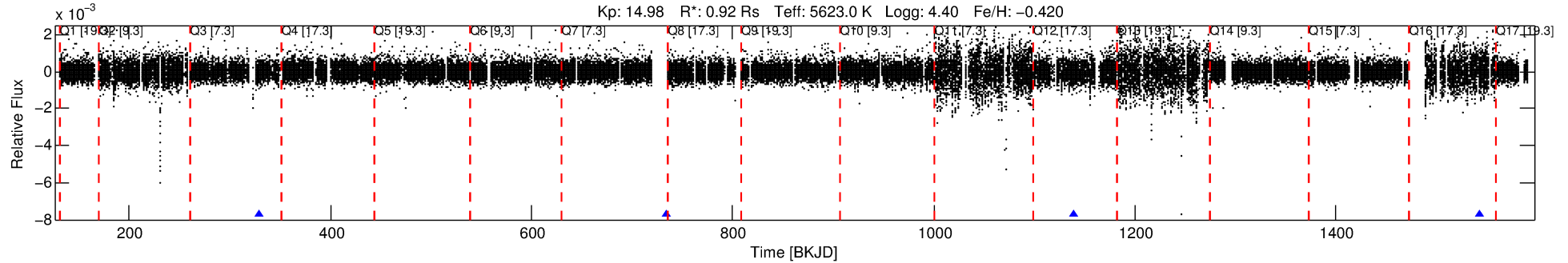
No Significant Match Found

# DV One-Page Summary

KIC: 8378922 Candidate: 7 of 7 Period: 404.680 d

KOI: K07028 Corr: No Ephemeris Match

Kp: 14.98 R\*: 0.92 Rs Teff: 5623.0 K Logg: 4.40 Fe/H: -0.420



## TPS TCE Results:

Period = 404.67984 d  
Epoch = 329.1853 BKJD

DV fit results are unavailable

## DV Diagnostic Results:

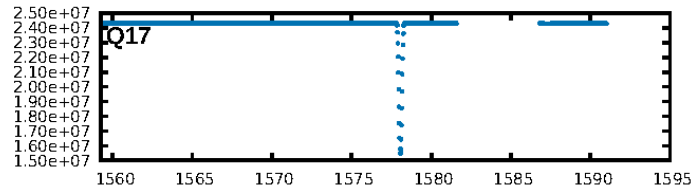
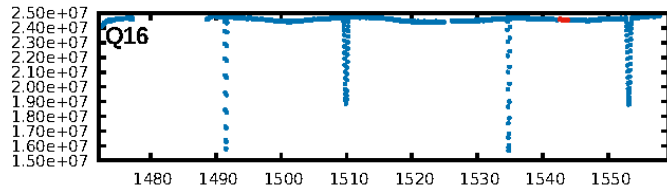
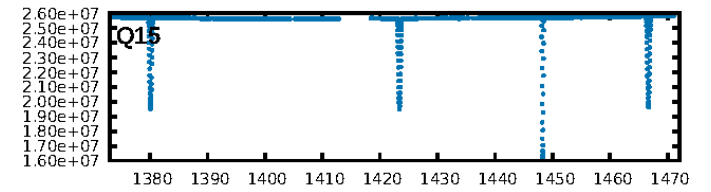
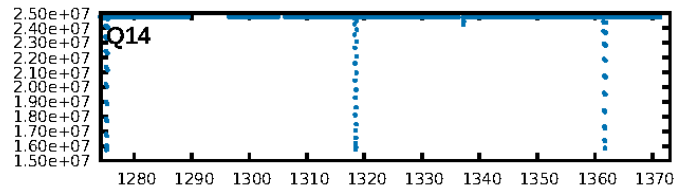
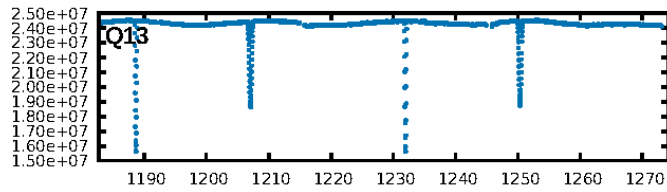
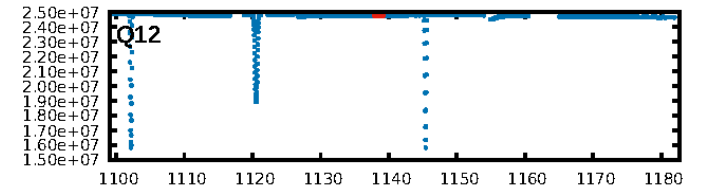
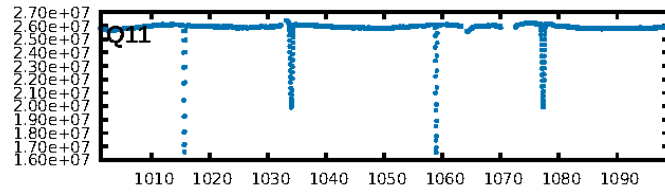
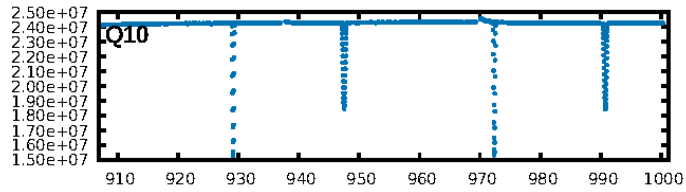
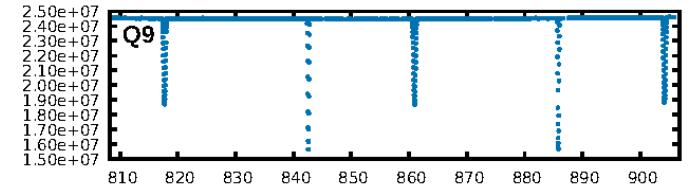
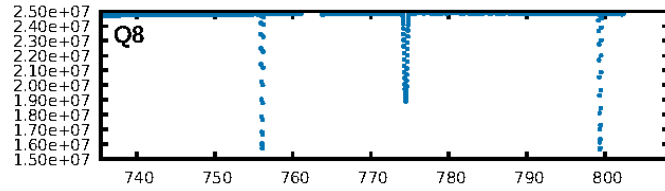
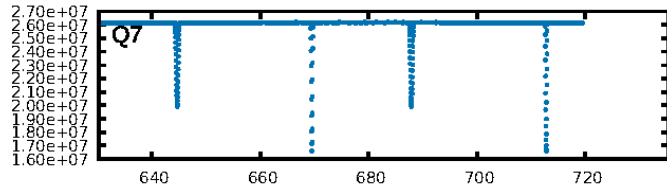
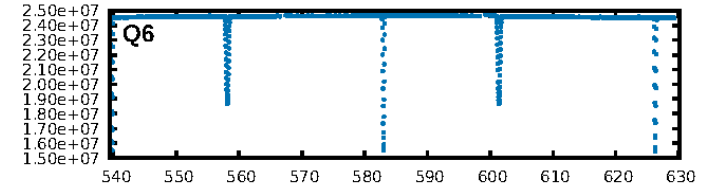
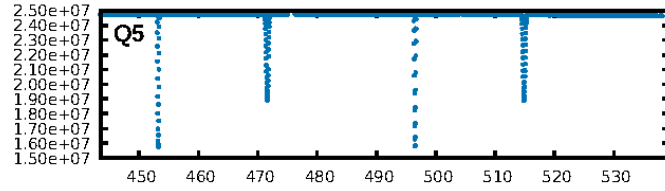
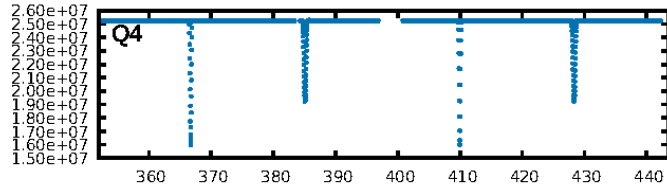
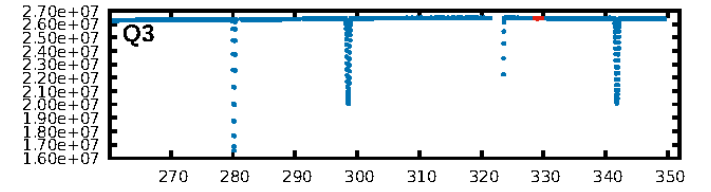
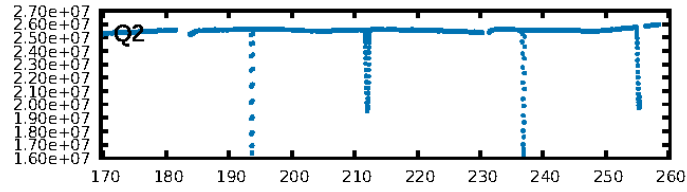
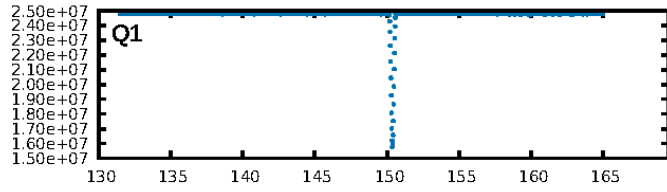
ShortPeriod-sig: 100.0% [225.47 $\sigma$ ]  
LongPeriod-sig: 100.0% [4.49 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -1.156

Centroid-sig: 34.3%  
Centroid-so: 1.479 arcsec [1.20 $\sigma$ ]  
OotOffset-rm: 1.739 arcsec [2.91 $\sigma$ ]  
OotOffset-st: 0/0/1/0 [1]  
KicOffset-st: 0/0/1/0 [1]  
DiffImageQuality-fgm: 1.00 [1/1]  
DiffImageOverlap-fno: 1.00 [3/3]

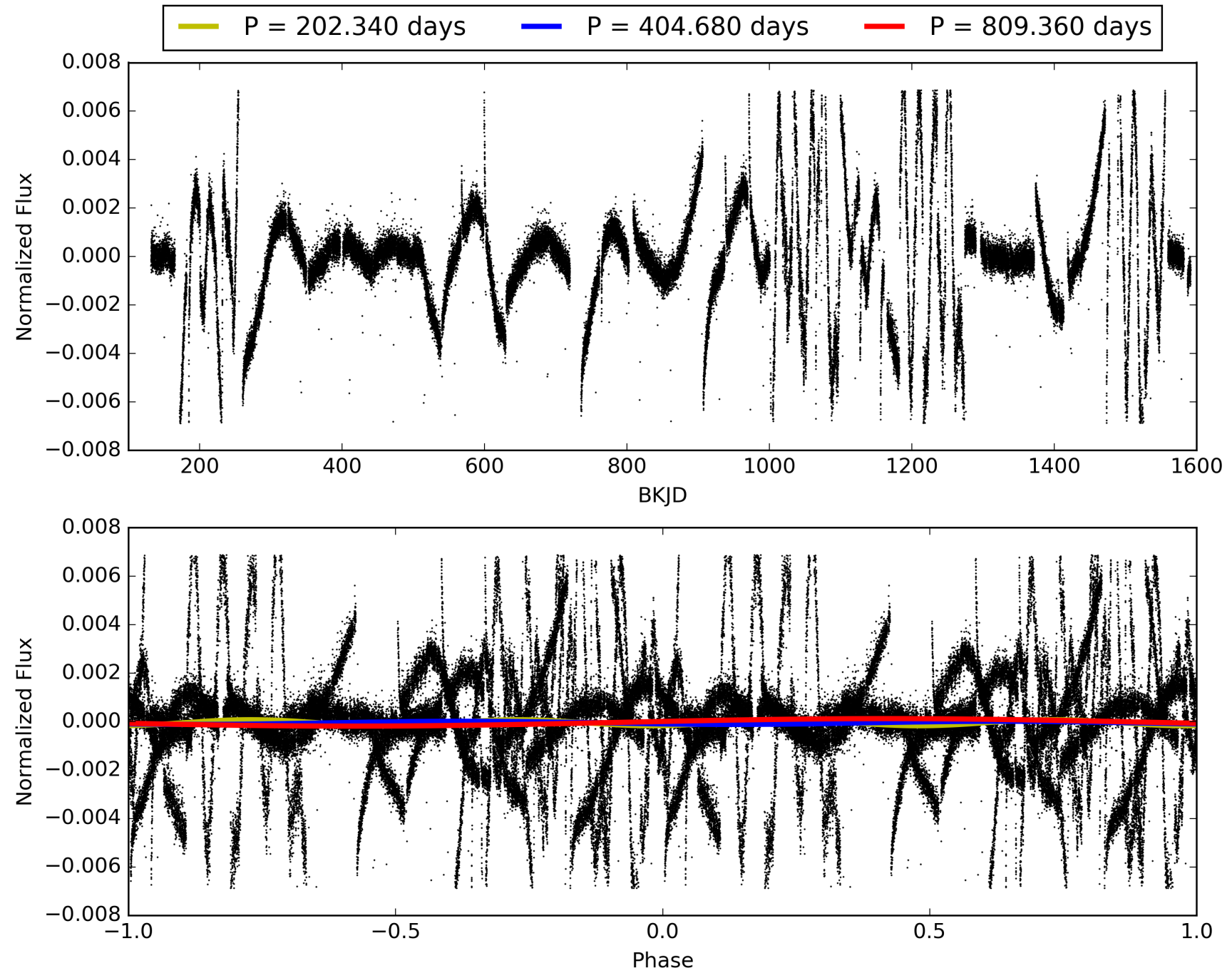
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 23:32:23 Z

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

# TCE 008378922-07, PDC Light Curves

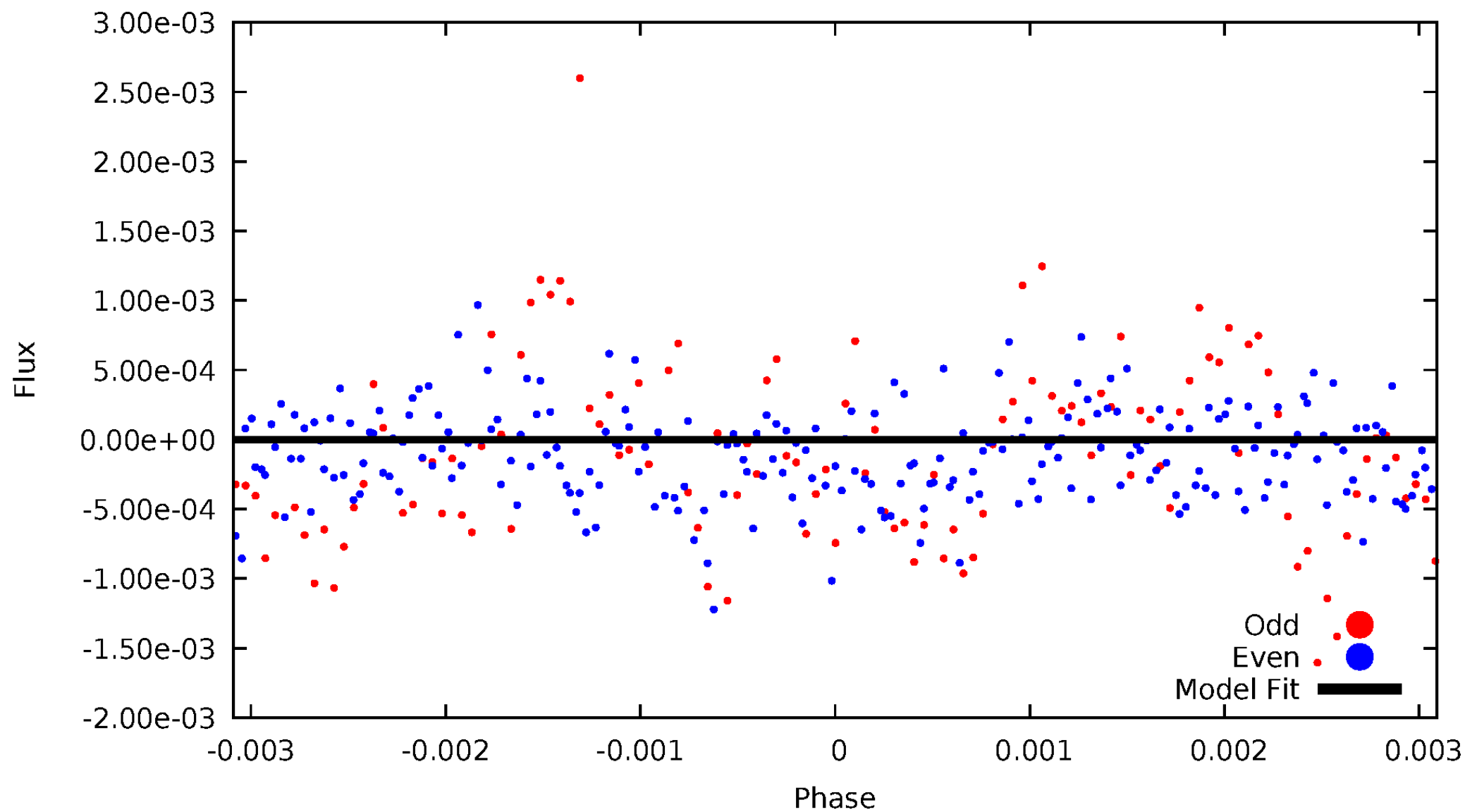


# TCE 008378922-07



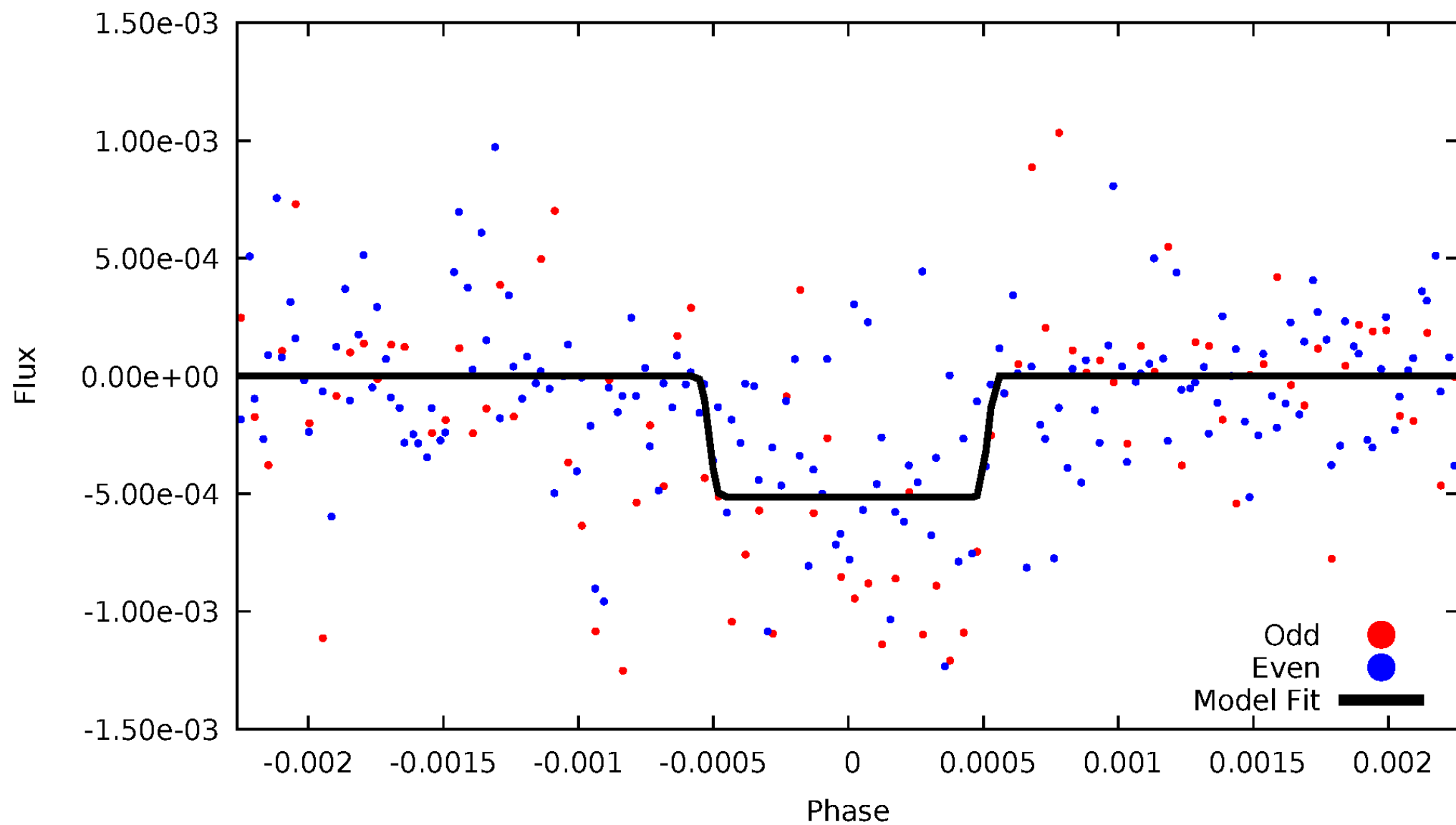
# DV Odd/Even

TCE 008378922-07

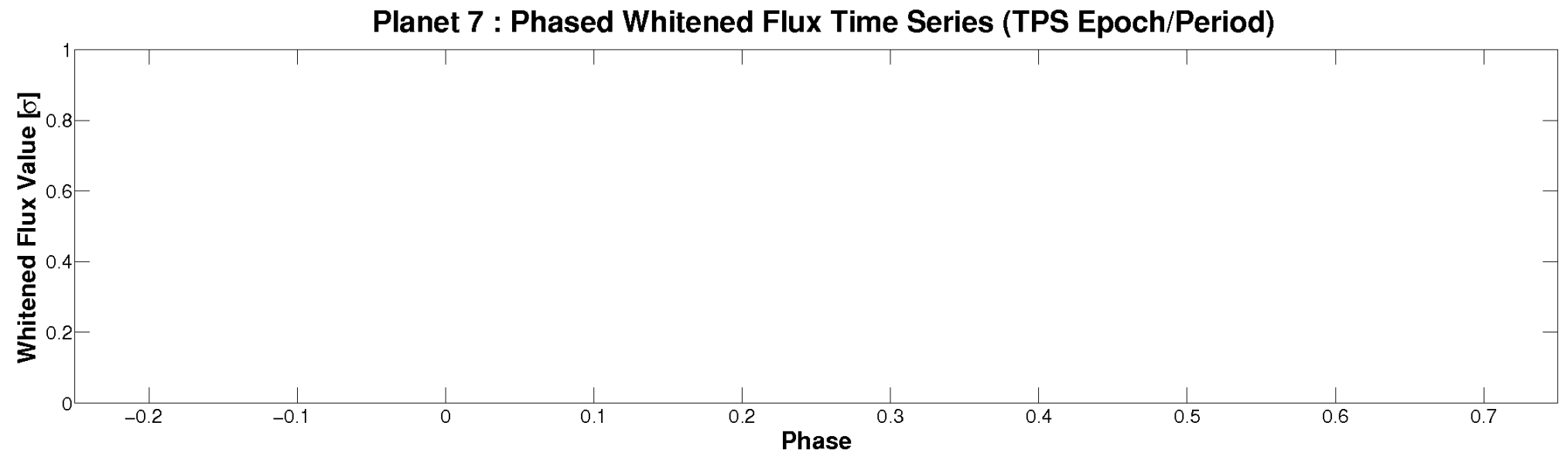
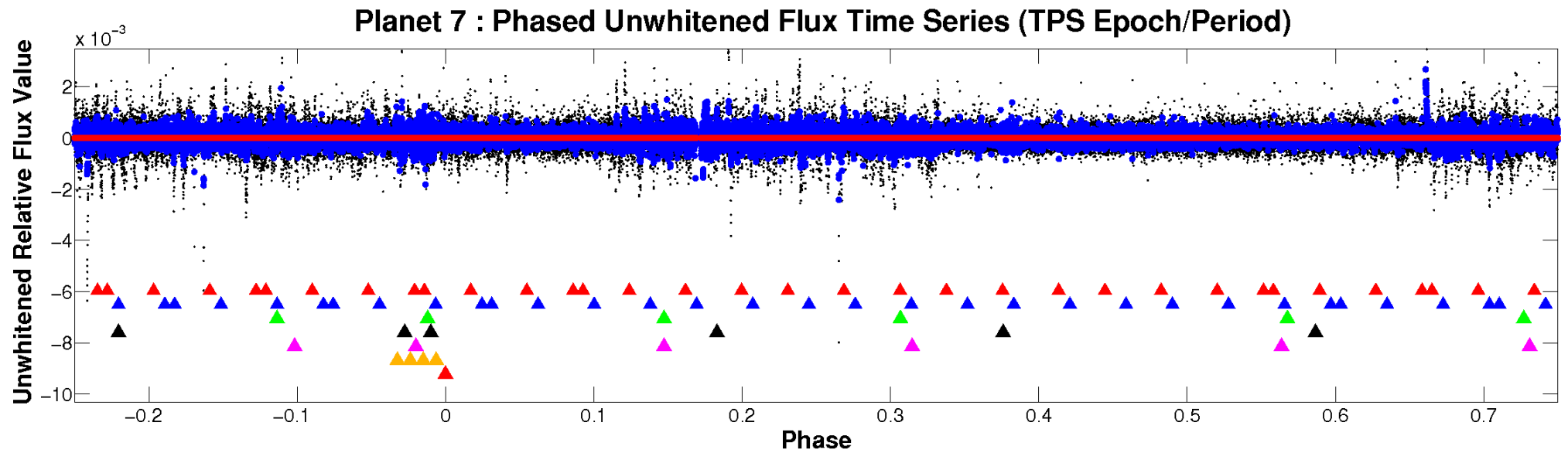


# ALT Odd/Even

TCE 008378922-07



# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

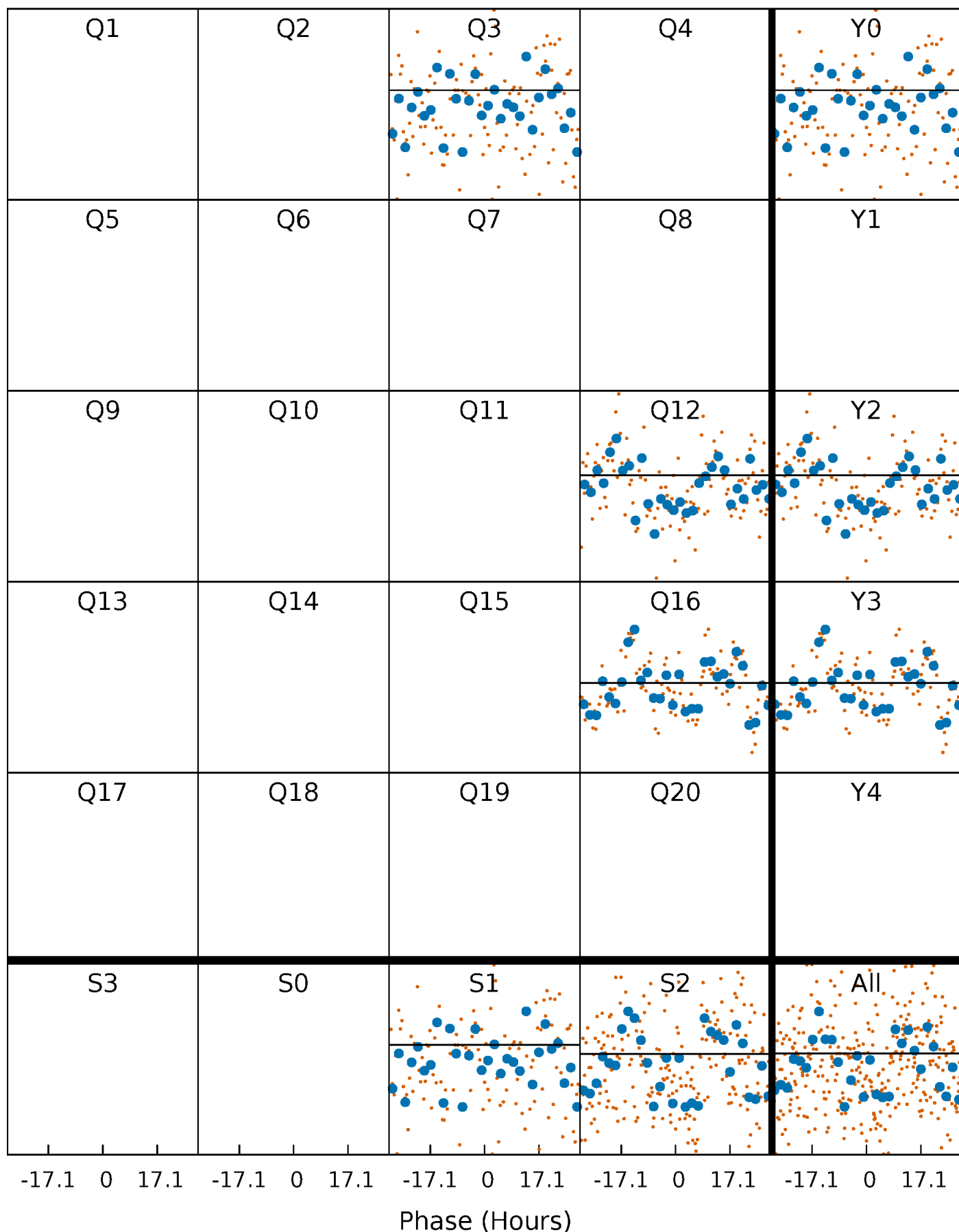
TCE 008378922-07     $P=404.679845$  Days     $T_0=329.185253$  (BKJD)





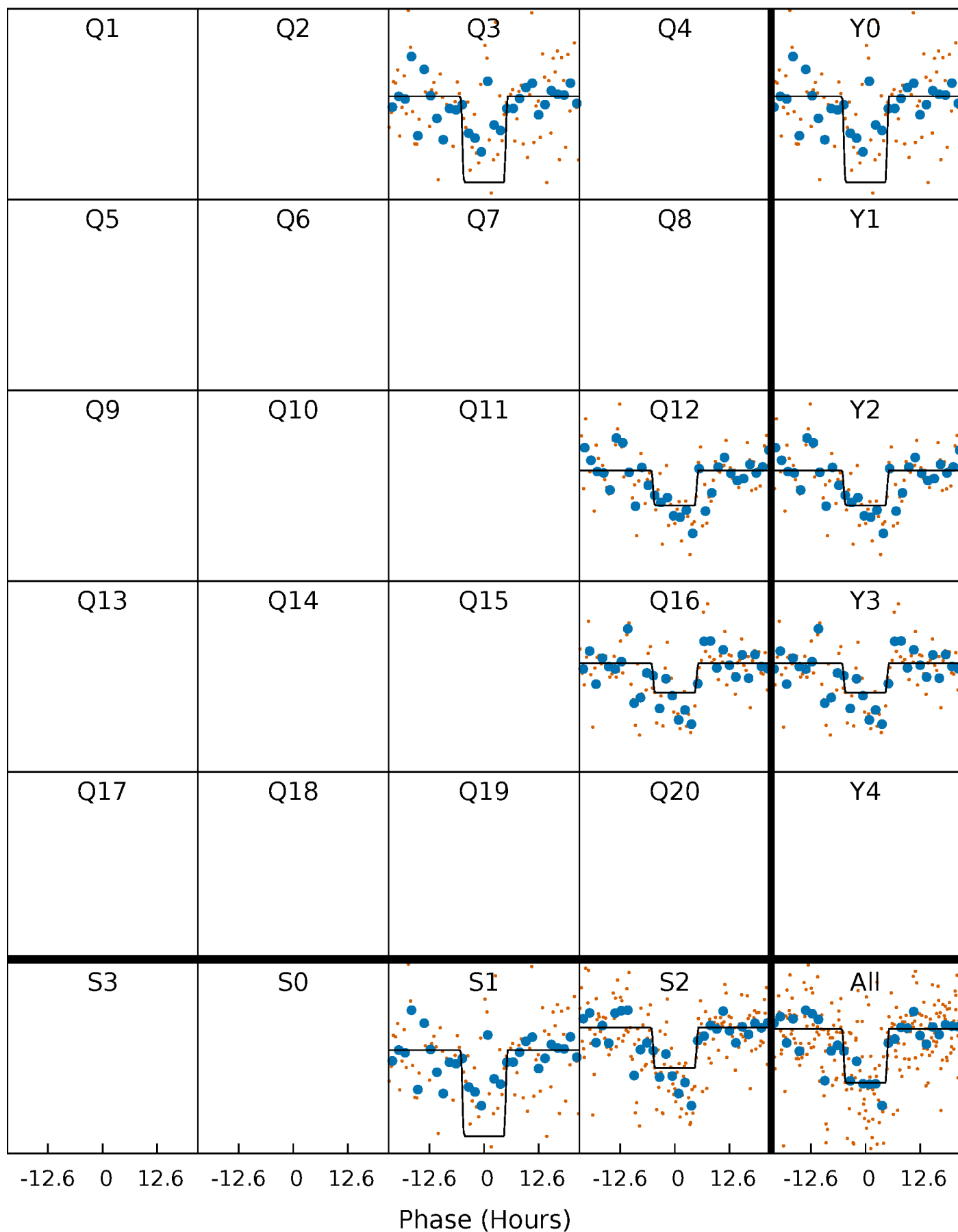
# DV Quarter-Phased Transit Curves

TCE 008378922-07     $P=404.679845$  Days     $T_0=329.185253$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

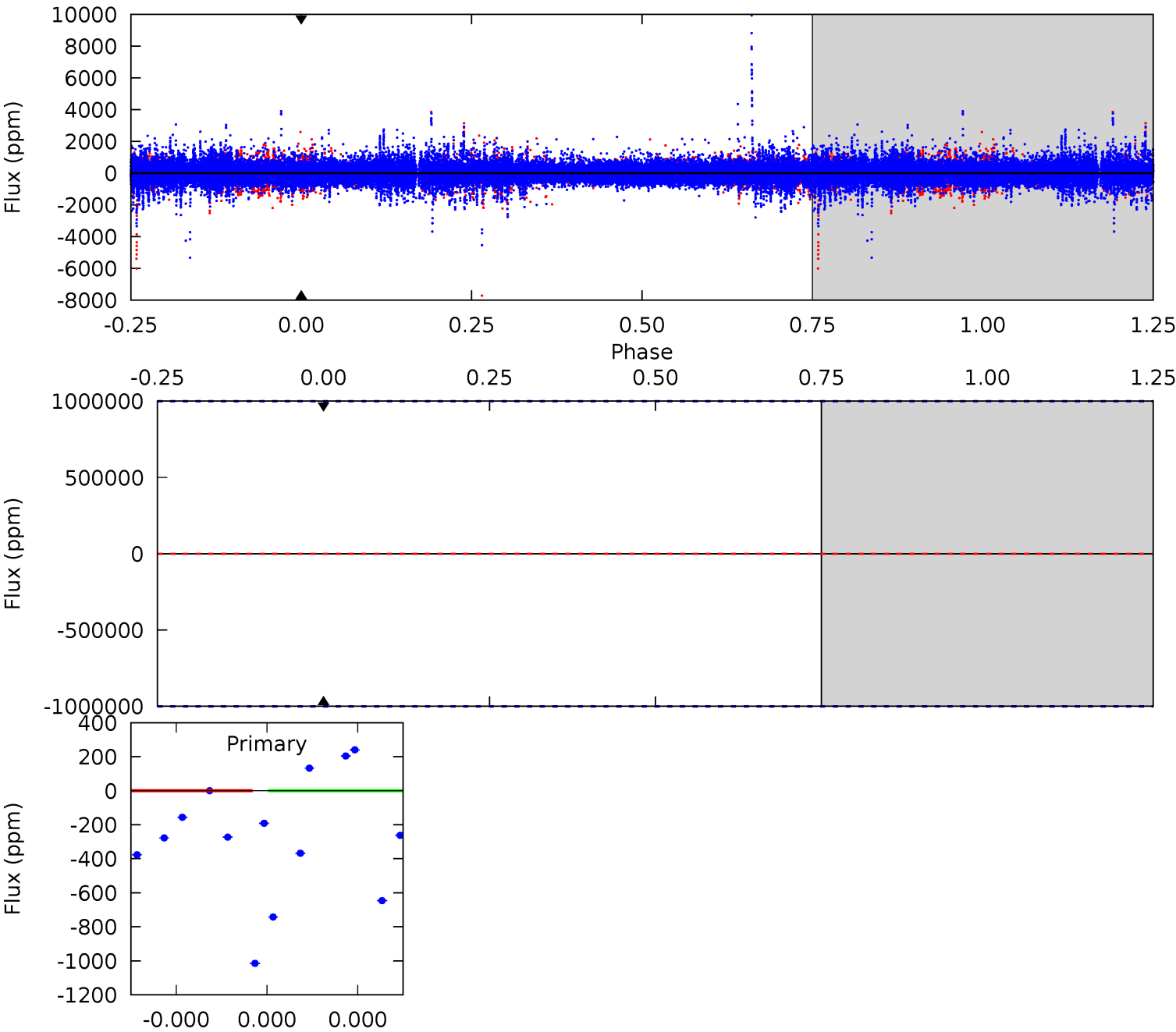
TCE 008378922-07     $P=404.679845$  Days     $T_0=329.299472$  (BKJD)



# DV Model-Shift Uniqueness Test

008378922-07, P = 404.679845 Days, E = 329.185253 Days

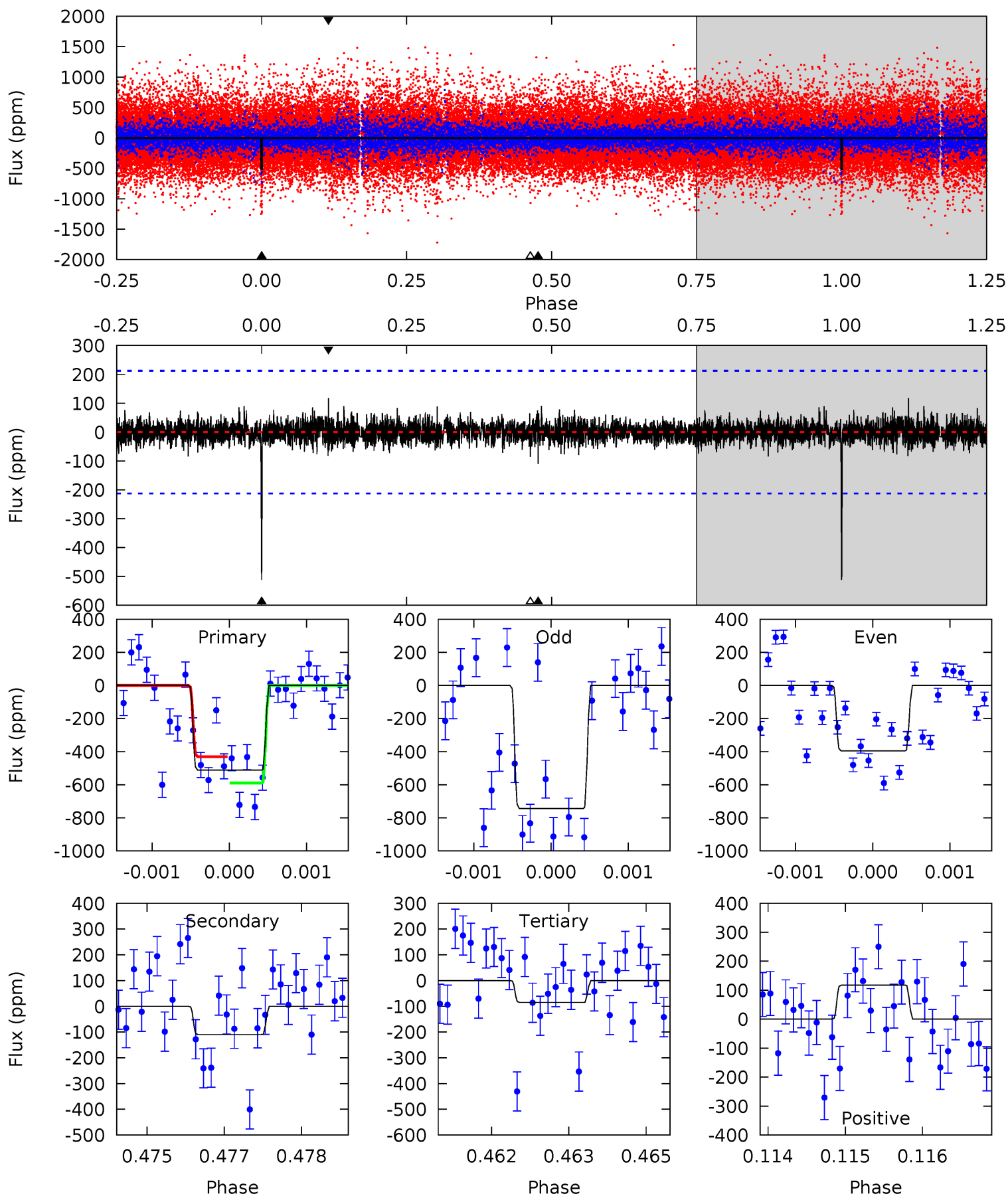
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



# Alt Model-Shift Uniqueness Test

008378922-07, P = 404.679845 Days, E = 329.299472 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
13.1	2.81	2.17	3.01	5.44	3.27	0.57	10.9	10.1	0.64	-0.20	4.37	0.83	0.19	2.03



### Stellar Parameters For KIC 008378922

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5623^{+169}_{-169}$	$4.400^{+0.167}_{-0.204}$	$-0.420^{+0.350}_{-0.250}$	$0.917^{+0.242}_{-0.161}$	$0.770^{+0.124}_{-0.053}$	$1.408^{+1.082}_{-0.699}$
	+3%/-3%	+4%/-5%	+83%/-60%	+26%/-18%	+16%/-7%	+77%/-50%
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 008378922-07 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$0 \pm 1000000$	$7.76^{+8.17}_{-5.41}$	$336^{+28}_{-21}$	$4217^{+18088}_{-20134}$	$13075^{+2263182}_{-1064148}$
Alt.	$-110 \pm 39$	$7.34^{+7.79}_{-5.13}$	$336^{+26}_{-23}$	$2833^{+1272}_{-476}$	$1091^{+9686}_{-863}$

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

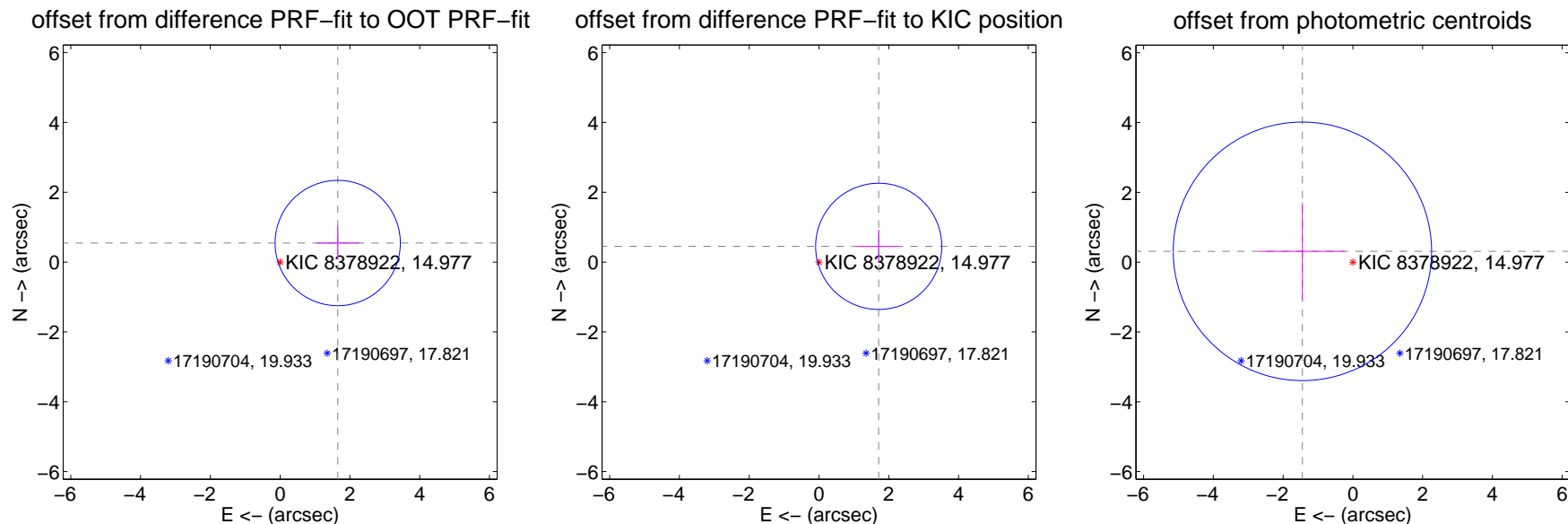
## DV Centroid Data

Supplemental centroid analysis for 008378922-07. Kepler magnitude: 14.98. Transit SNR -1.00

There are 1 quarters with good PRF difference image offsets

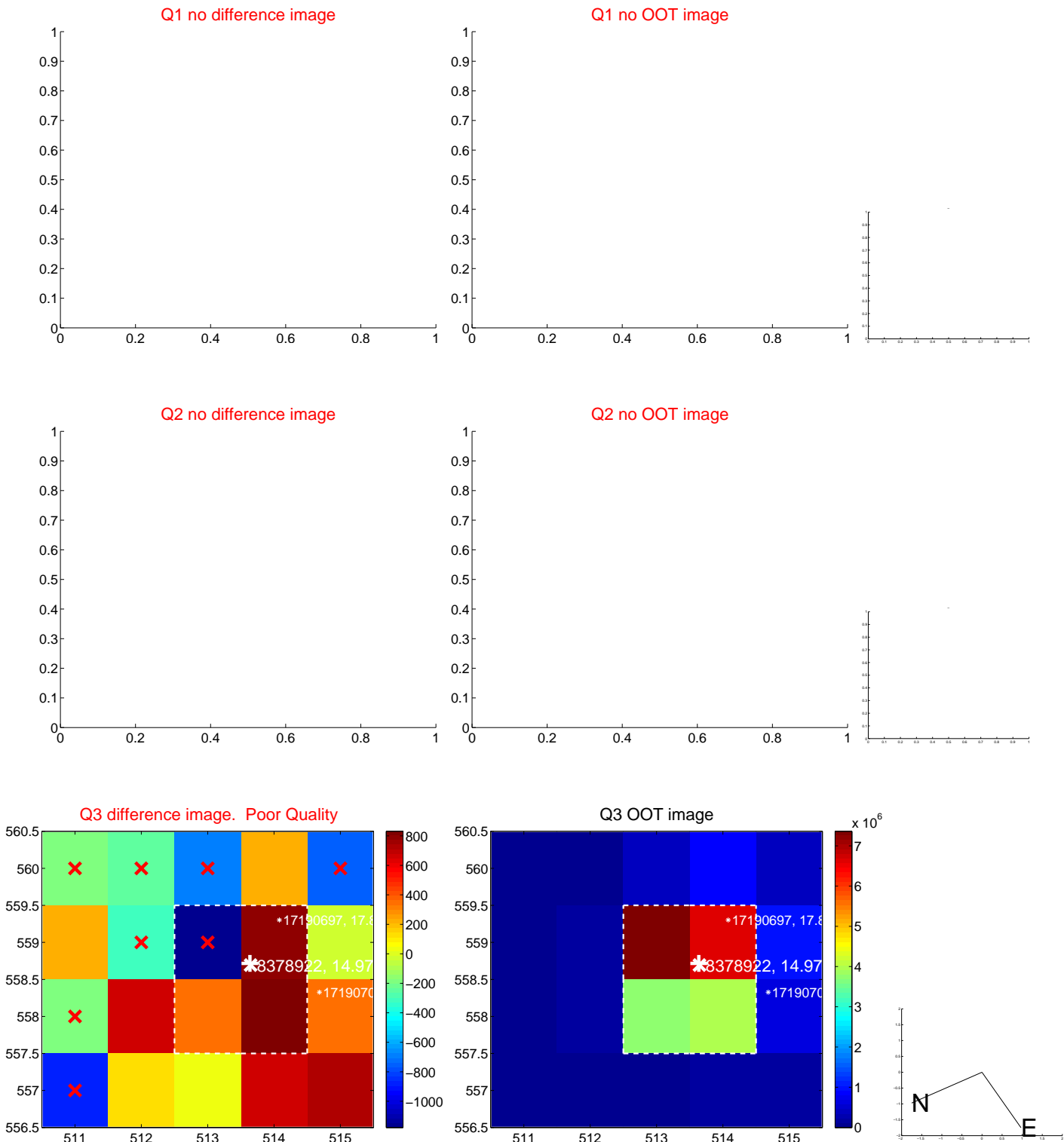
The direct PRF centroid is offset from the target star catalog position by about 0.11 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.739 \pm 0.598$	2.91	$-1.651 \pm 0.610$	$0.546 \pm 0.472$
PRF-fit source offset from KIC position	$1.770 \pm 0.602$	2.94	$-1.712 \pm 0.610$	$0.451 \pm 0.472$
photometric centroid source offset	$1.48 \pm 1.23$	1.20	$1.45 \pm 1.23$	$0.31 \pm 1.40$



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.

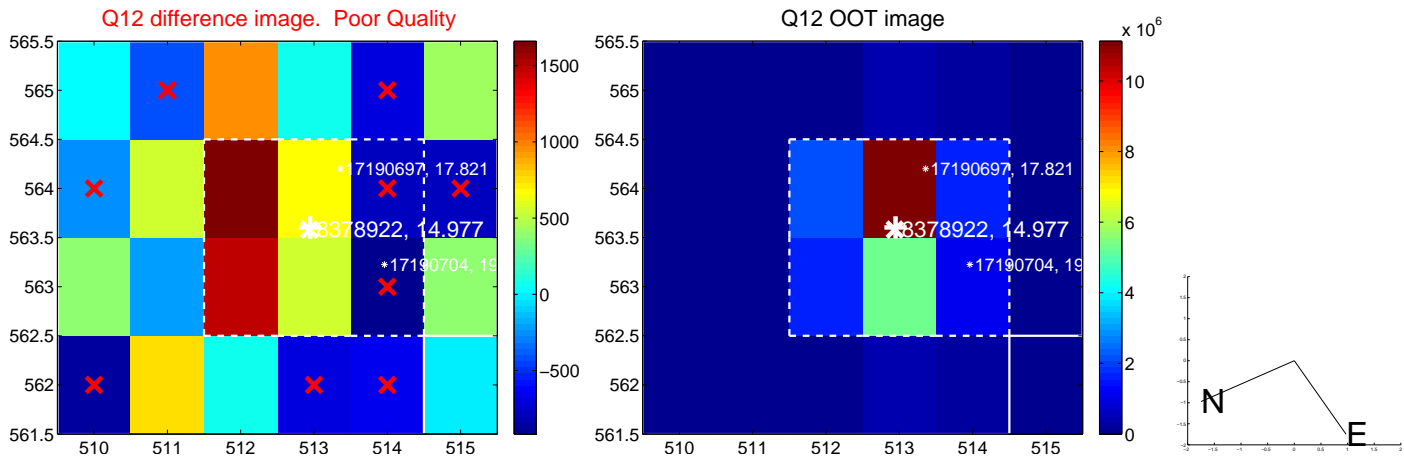
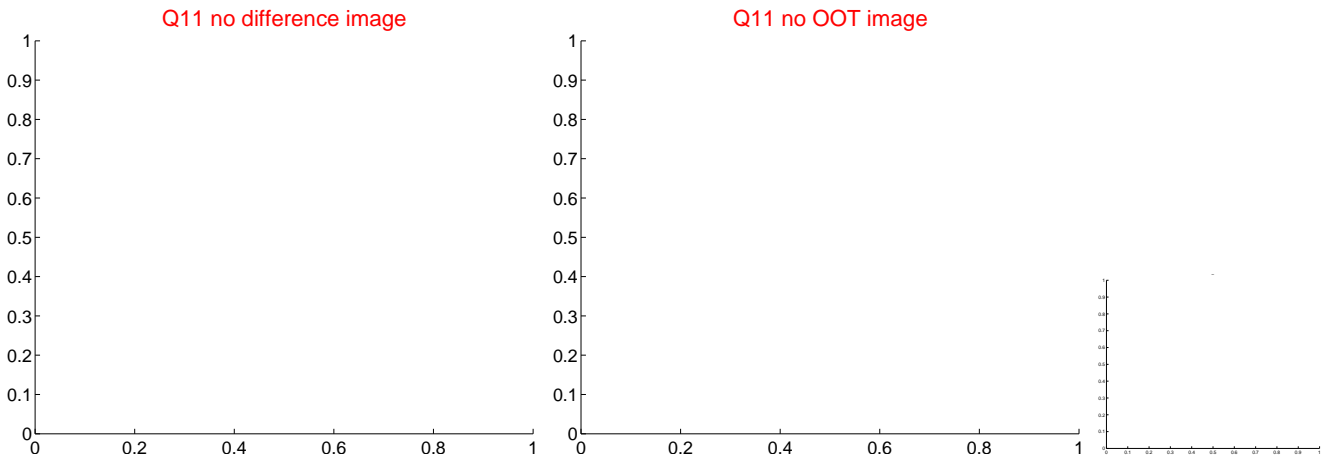
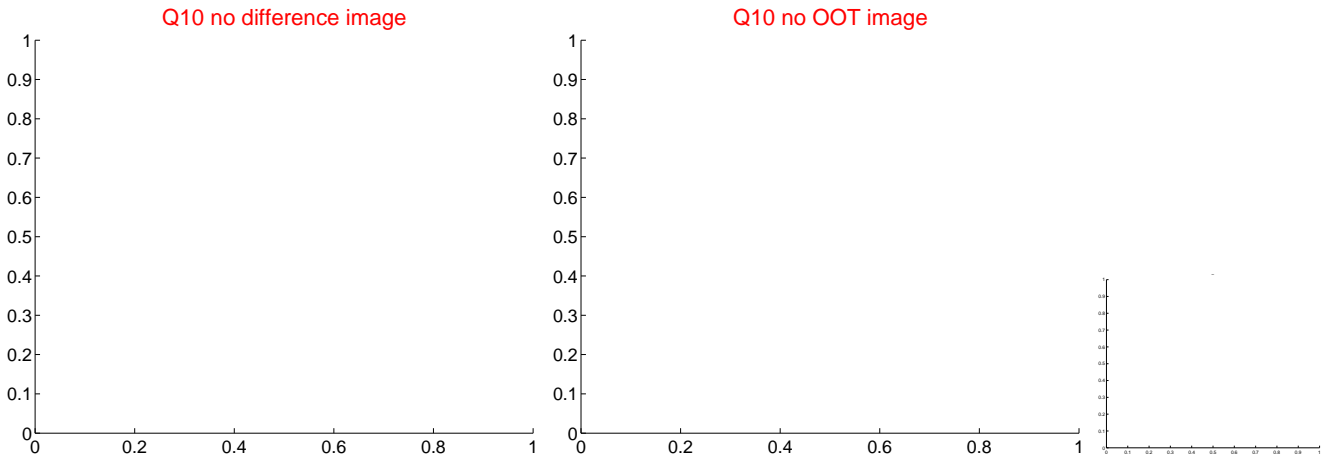
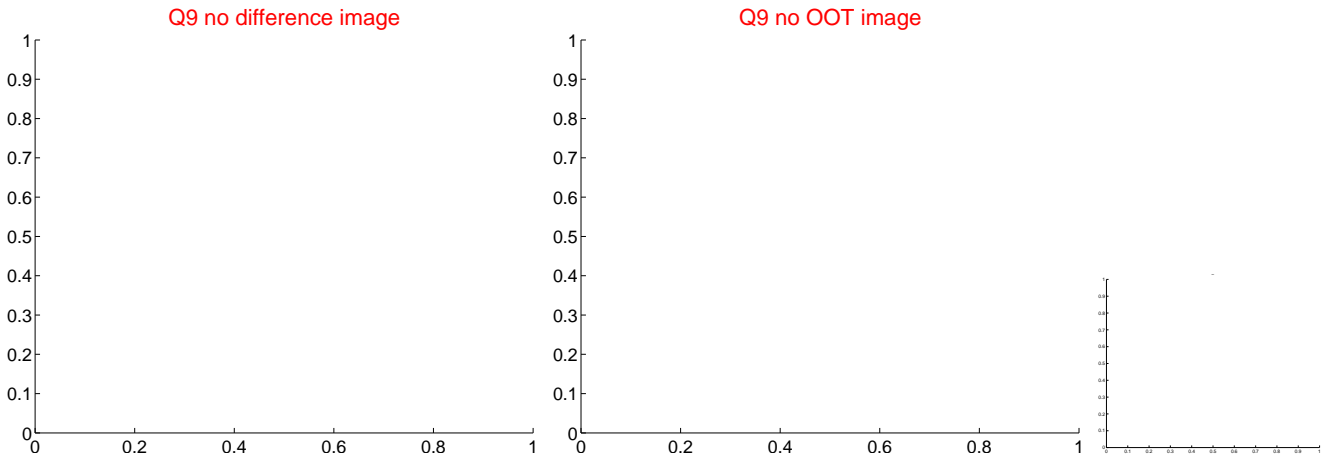


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

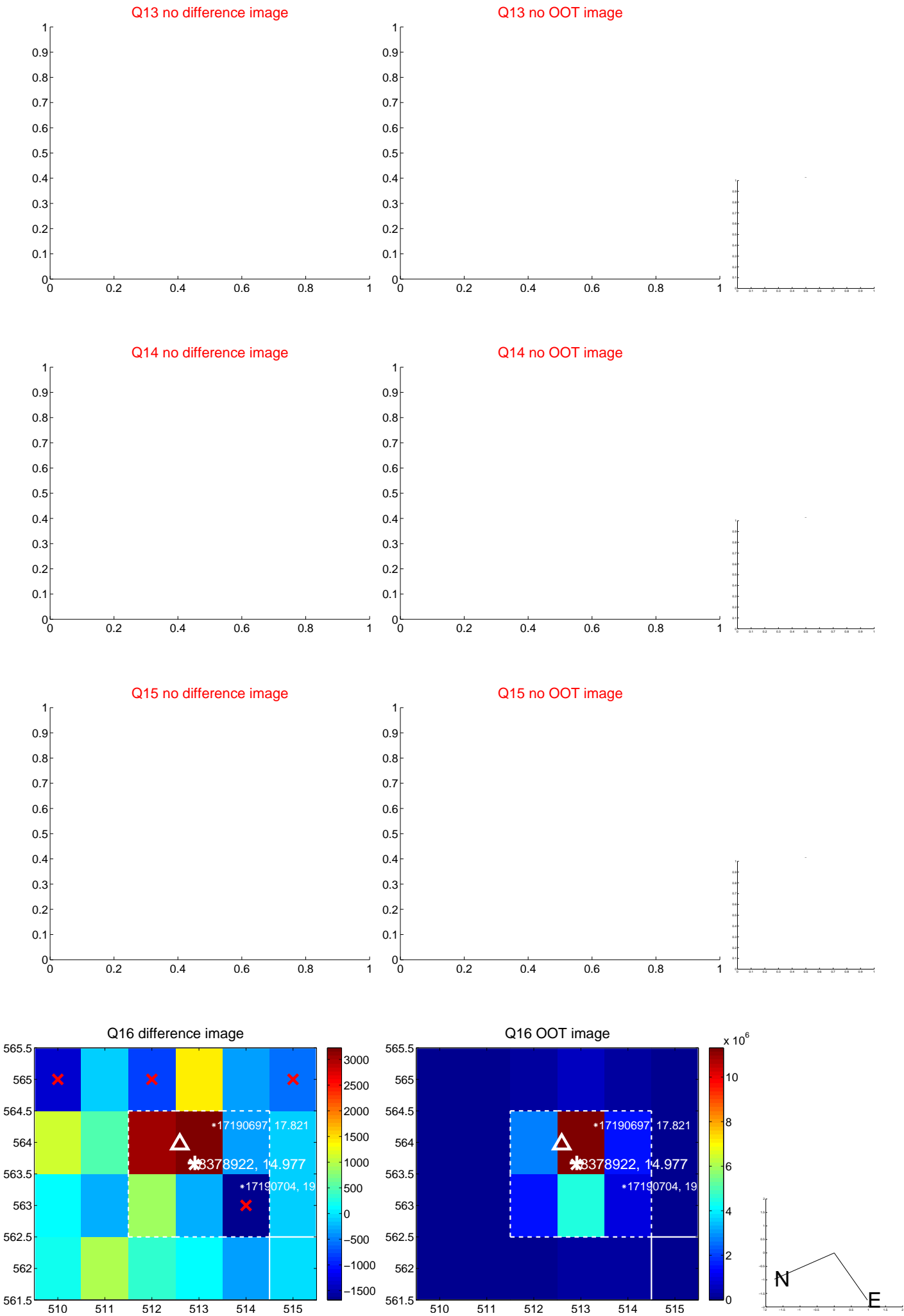




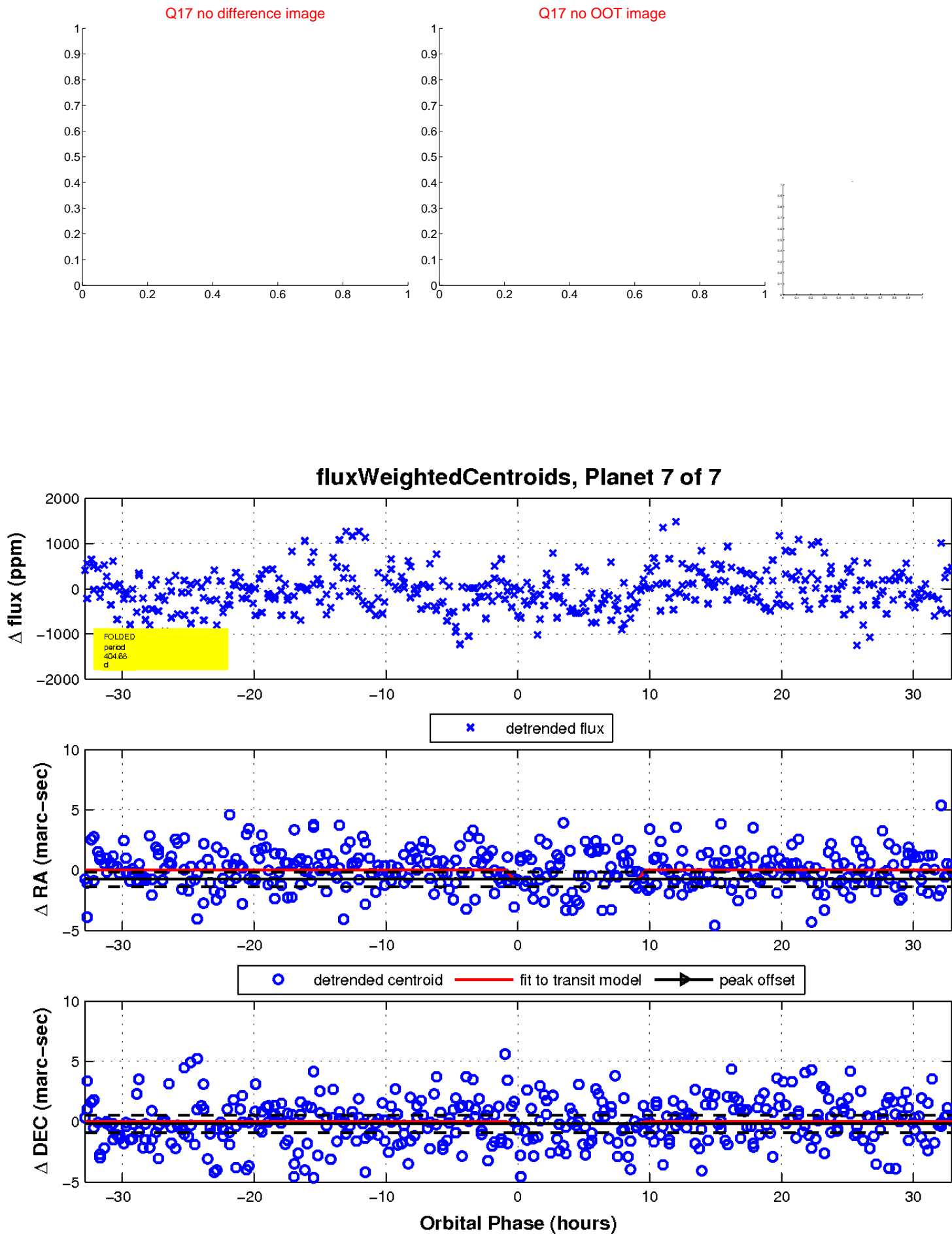
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



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

