

# KIC 010252131

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010252131-01	OBS	No	320.393024	430.832020	92.6	3.021	12.1	2.8	1.69	6415	1.80	4.49
010252131-02	OBS	No	248.117987	267.358218	100.1	6.021	12.3	3.5	1.69	6415	1.98	6.31
010252131-03	OBS	No	311.907073	417.894039	287.9	5.160	12.6	6.4	1.69	6415	3.03	4.65
010252131-04	OBS	No	453.868158	361.835365	196.7	4.699	10.3	4.9	1.69	6415	2.62	2.82

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010252131-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE_ZUMA_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_SATURATED
010252131-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_SATURATED
010252131-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—INCONSISTENT_TRANS—CENT_SATURATED
010252131-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_SATURATED

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

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

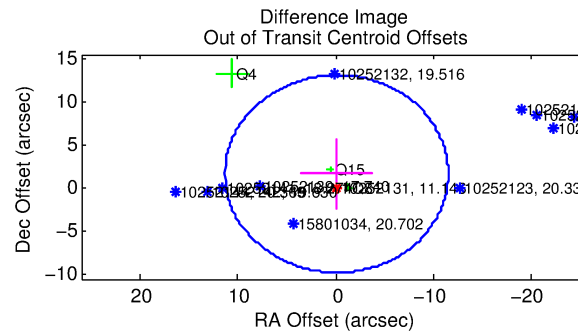
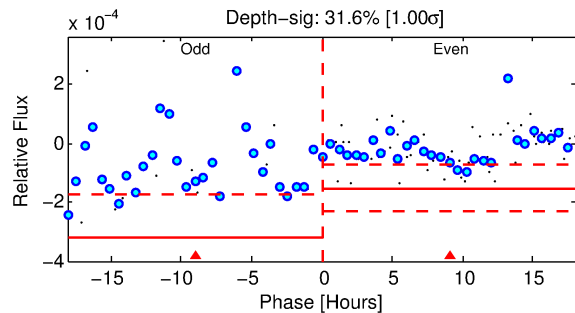
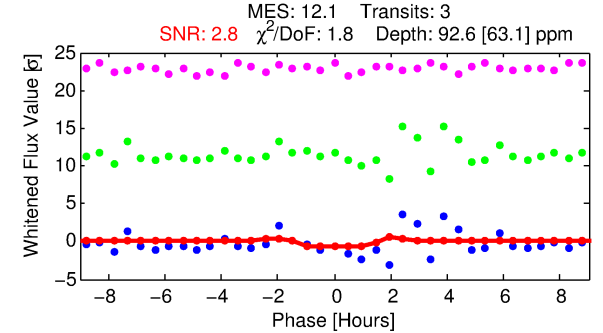
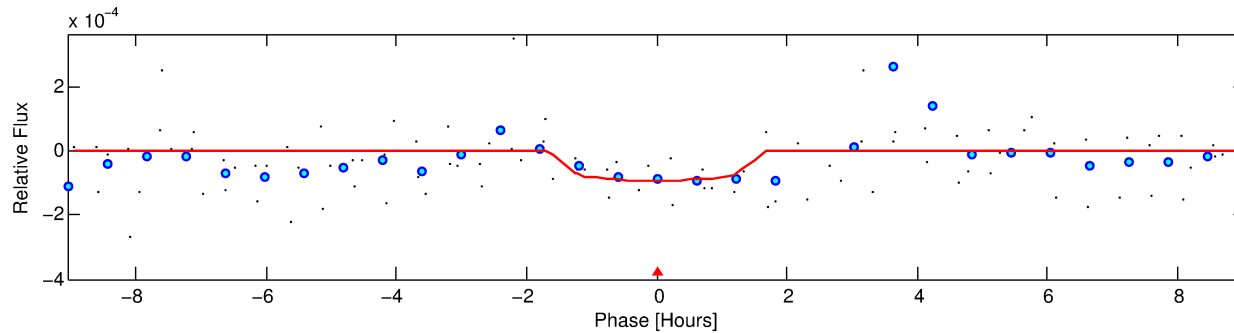
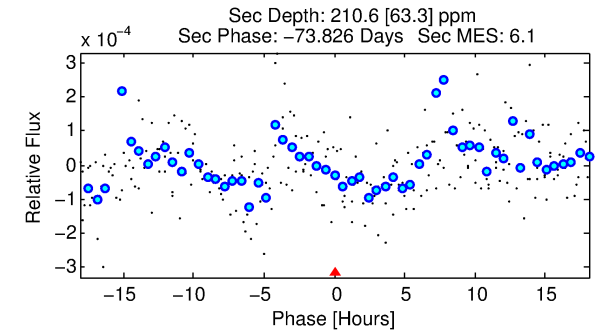
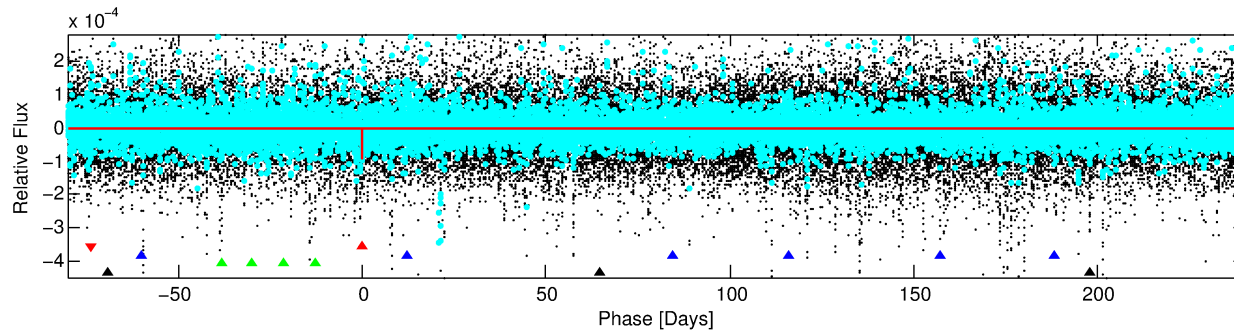
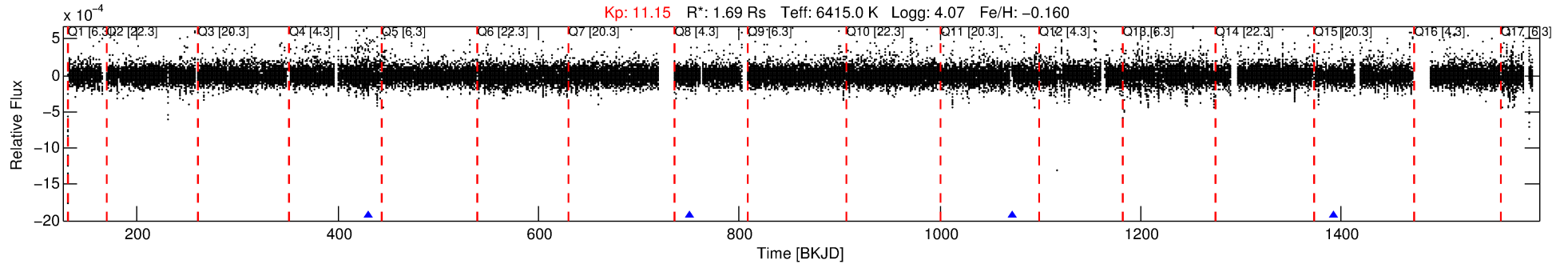
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010252131-01

No Significant Match Found

# DV One-Page Summary

KIC: 10252131 Candidate: 1 of 4 Period: 320.393 d



## DV Fit Results:

Period = 320.39302 [0.01254] d  
Epoch = 430.8320 [0.0230] BKJD  
Rp/R\* = 0.0098 [0.0189]  
a/R\* = 495.51 [4853.32]  
b = 0.80 [4.37]  
Seff = 4.49 [1.81]  
Teq = 371 [37] K  
Rp = 1.80 [3.52] Re  
a = 0.9827 [0.2428] AU  
Ag = 34492.18 [134676.44] [0.26σ]  
Teff = 7820 [7598] K [0.98σ]

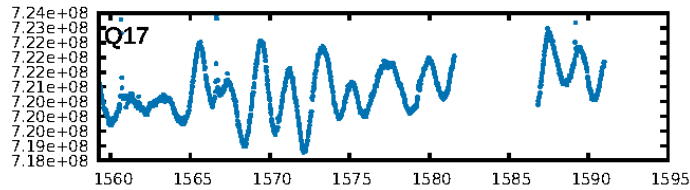
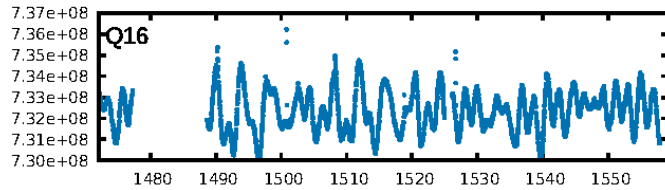
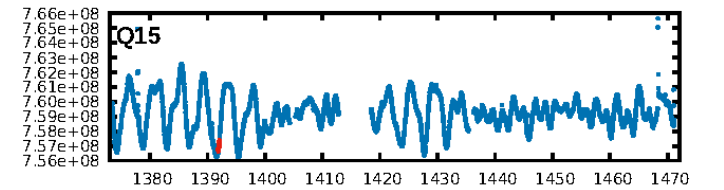
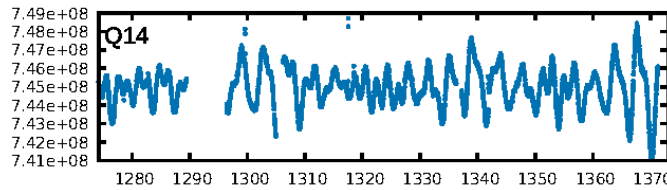
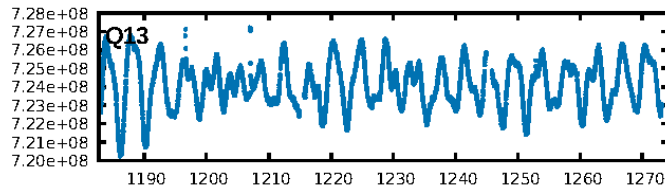
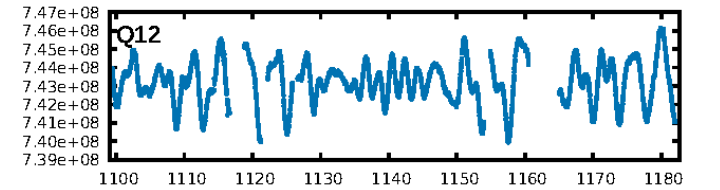
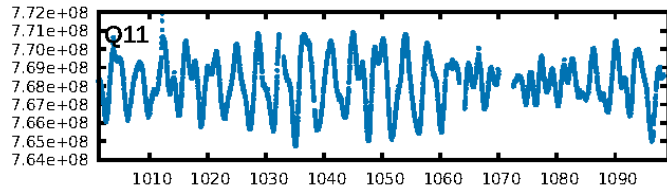
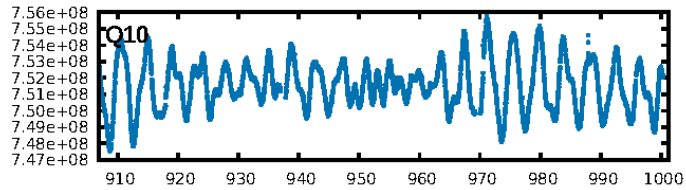
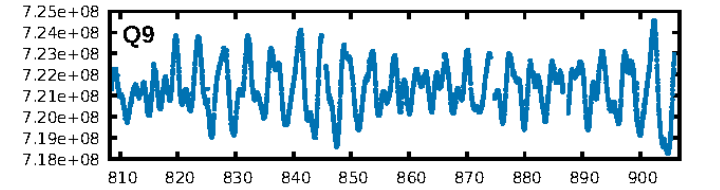
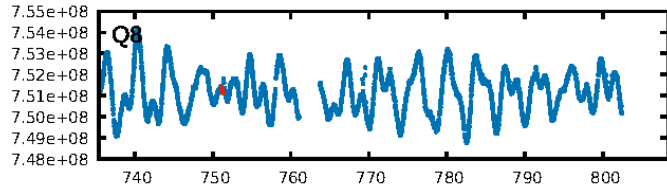
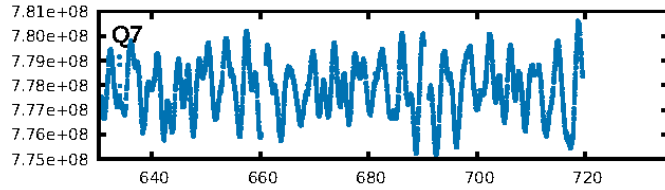
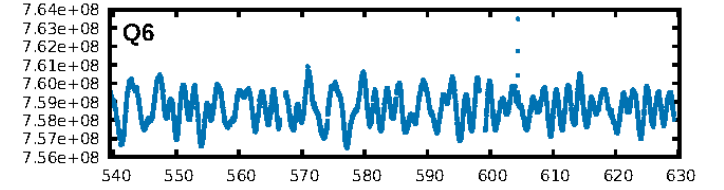
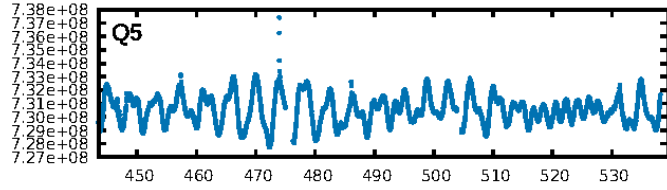
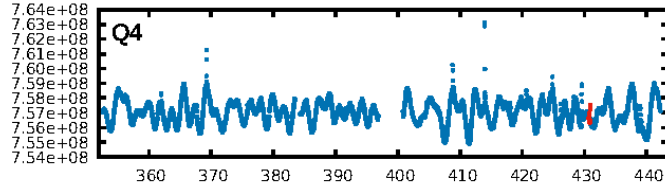
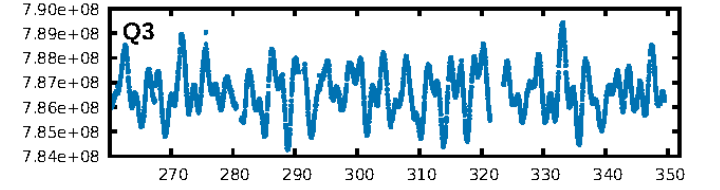
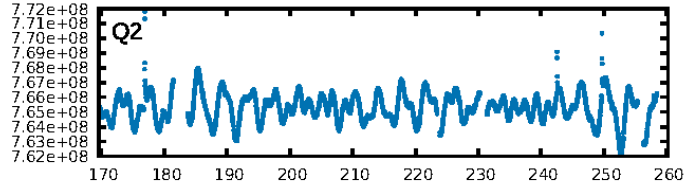
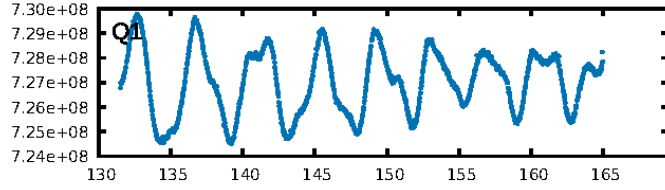
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [34.06σ]  
LongPeriod-sig: 100.0% [573.47σ]  
ModelChiSquare2-sig: 0.4%  
ModelChiSquareGof-sig: 55.7%  
**Bootstrap-pfa: 3.57e-11**  
RollingBand-fgt: 1.00 [3/3]  
**GhostDiagnostic-chr: 0.5622**  
Centroid-sig: 66.1%  
Centroid-so: 1.656 arcsec [0.53σ]  
OotOffset-rm: 1.665 arcsec [0.44σ]  
OotOffset-st: 0/1/2/0 [3]  
KicOffset-rm: 1.866 arcsec [0.58σ]  
KicOffset-st: 0/1/2/0 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 1.00 [3/3]

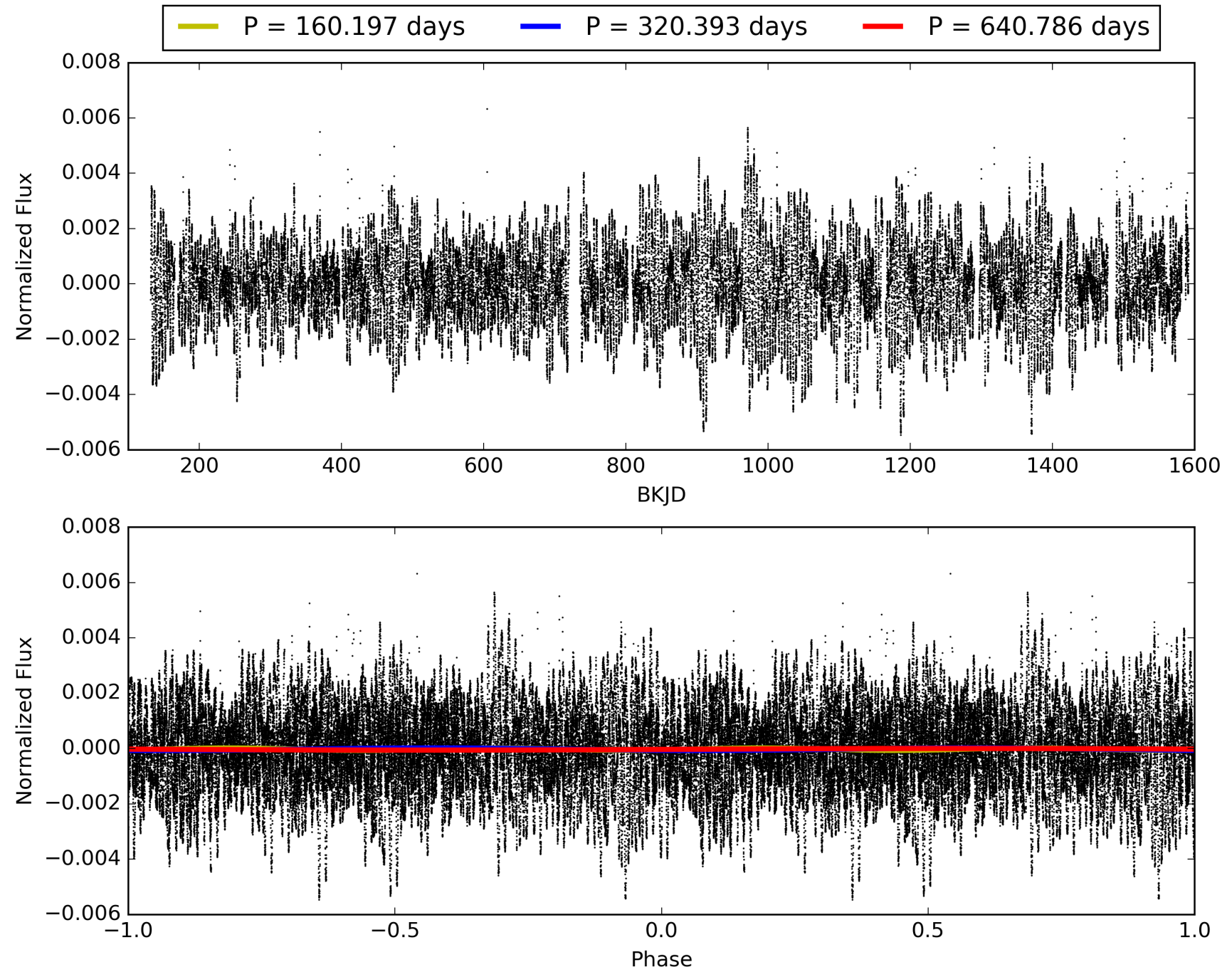
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 13:01:14 Z

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

# TCE 010252131-01, PDC Light Curves



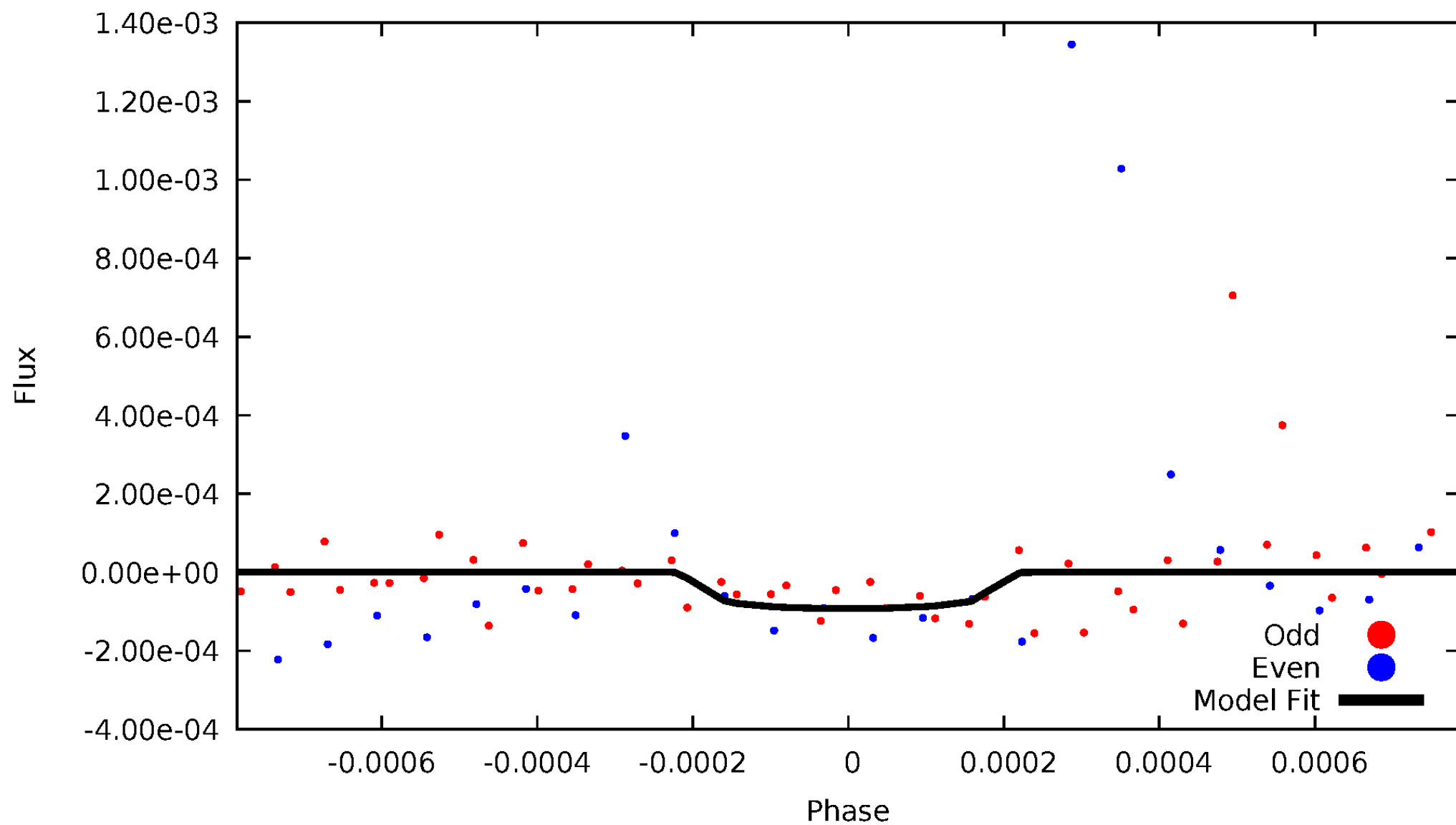
# TCE 010252131-01





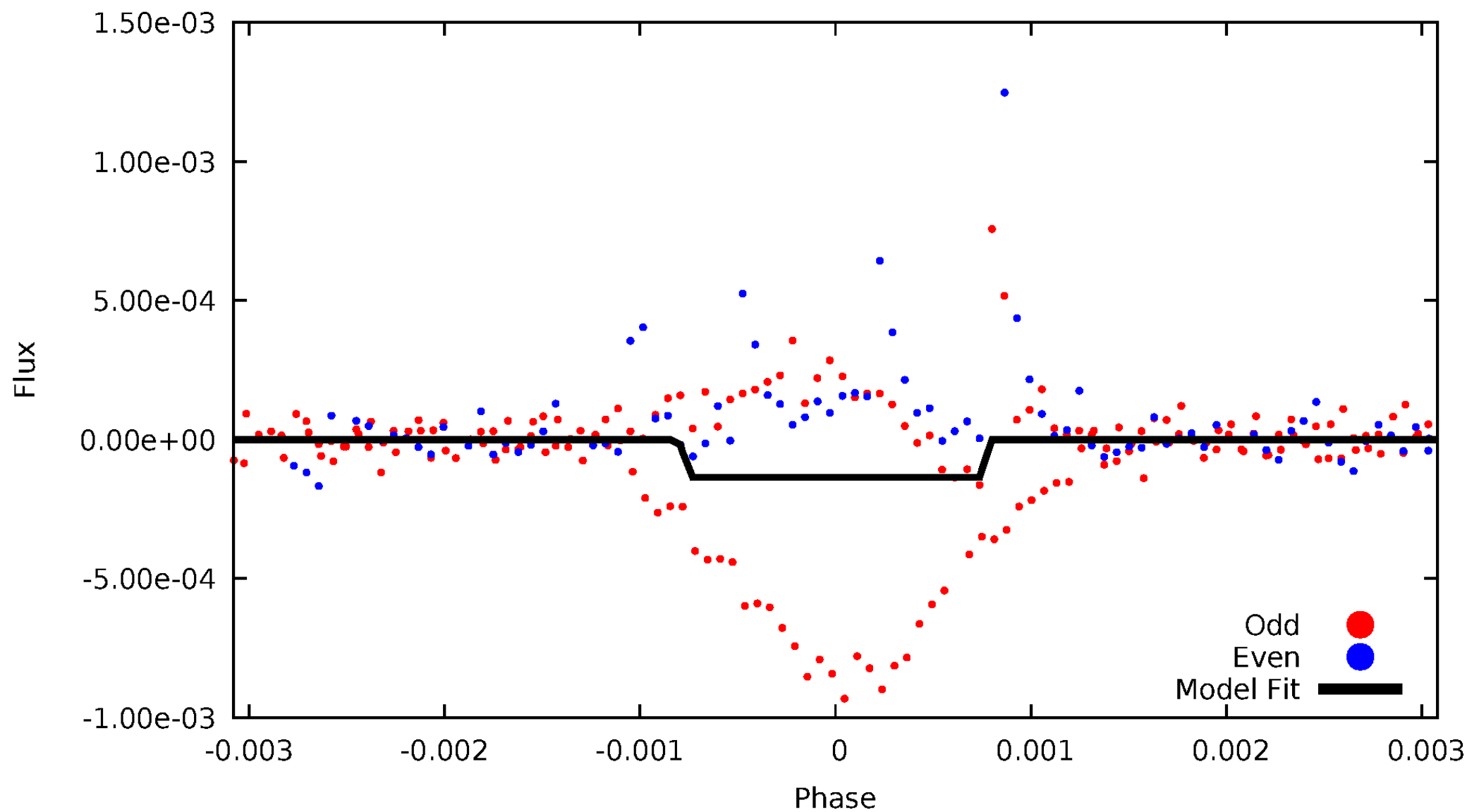
# DV Odd/Even

TCE 010252131-01

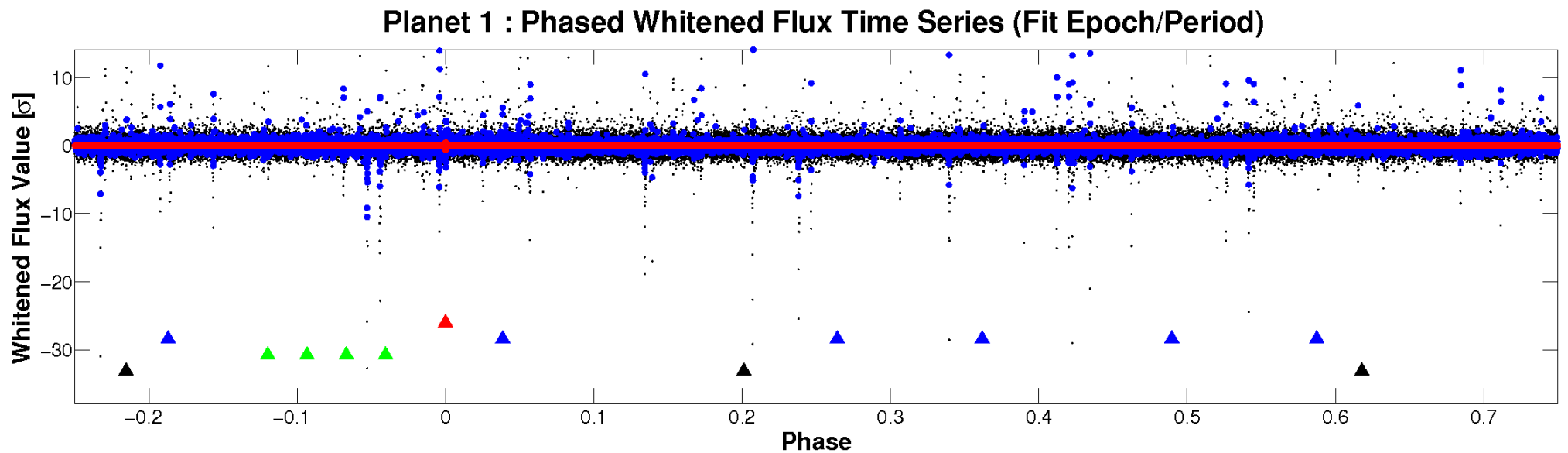
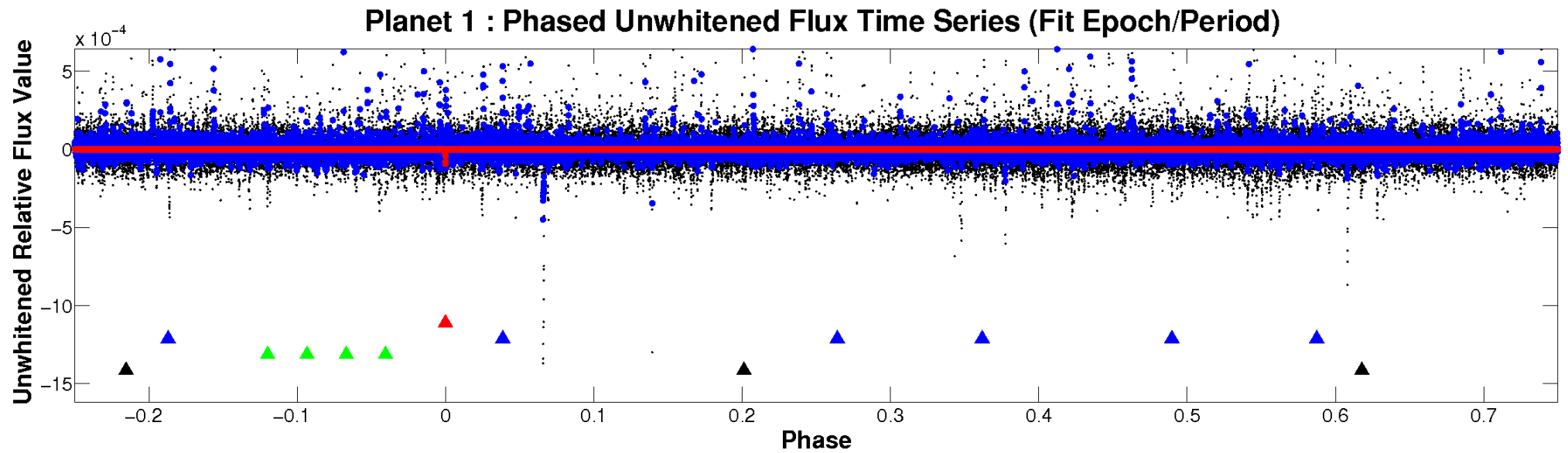


# ALT Odd/Even

TCE 010252131-01

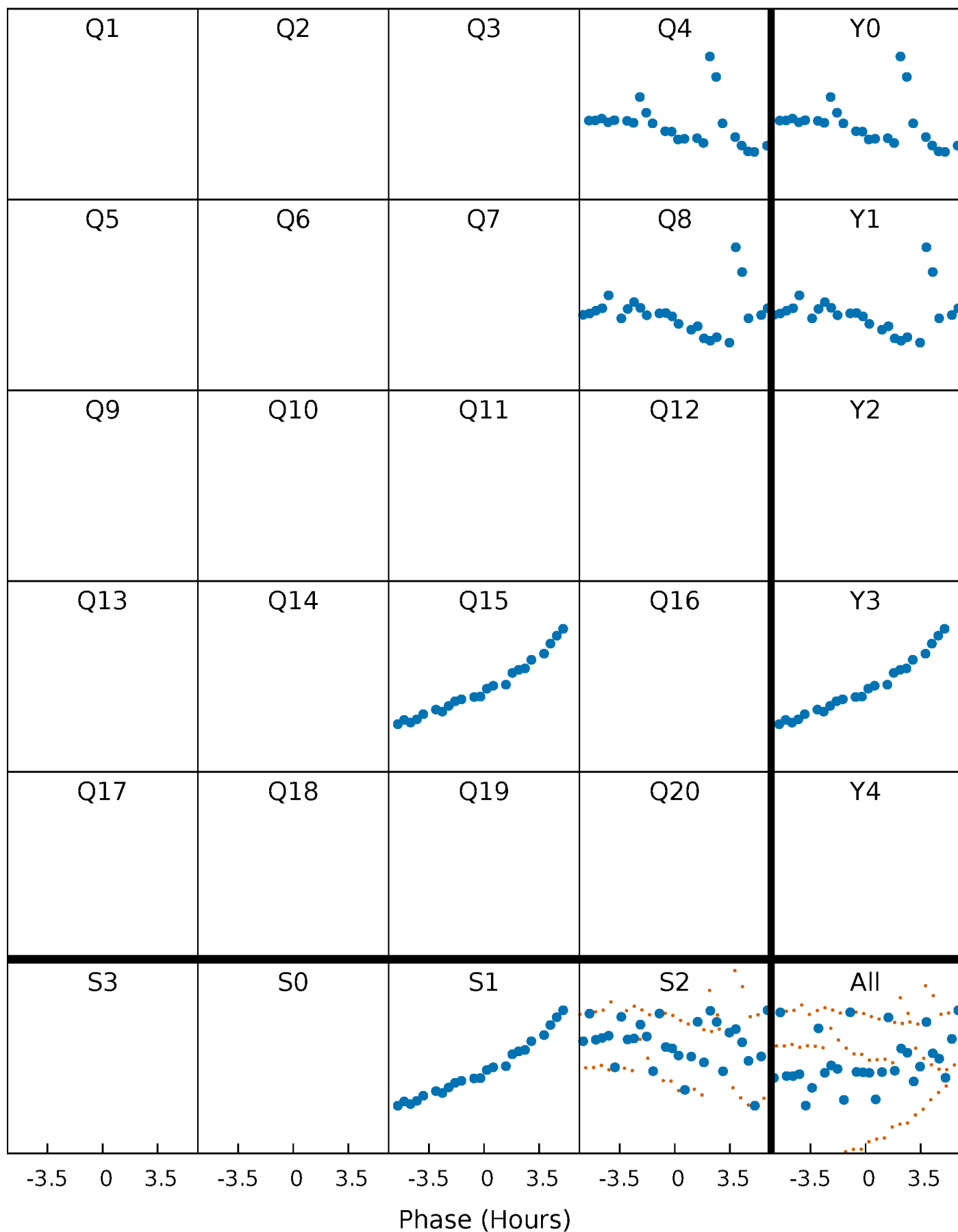


# Non-Whitened Vs. Whitened Light Curve



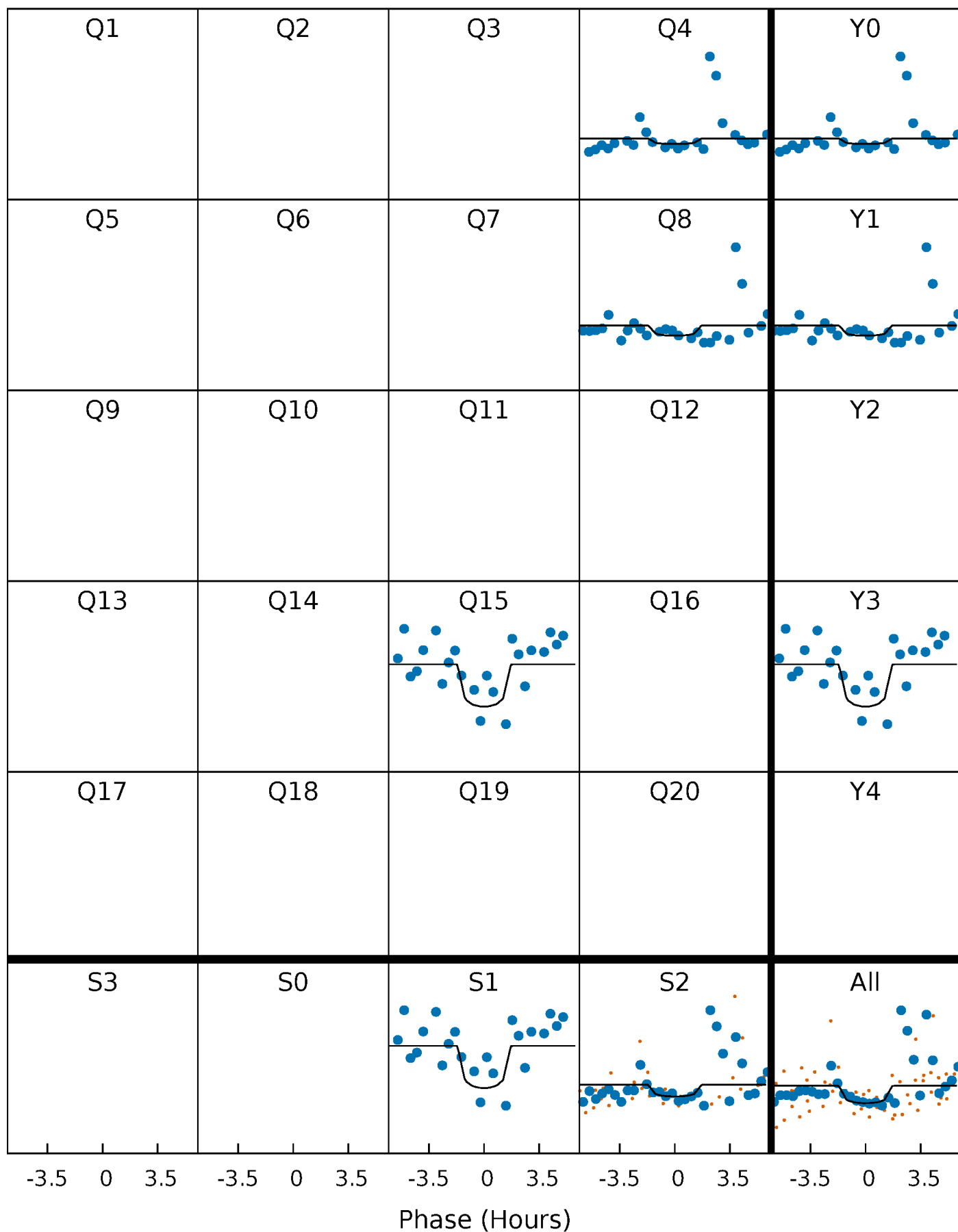
# PDC Quarter-Phased Transit Curves

TCE 010252131-01 P=320.393024 Days  $T_0=430.832020$  (BKJD)



# DV Quarter-Phased Transit Curves

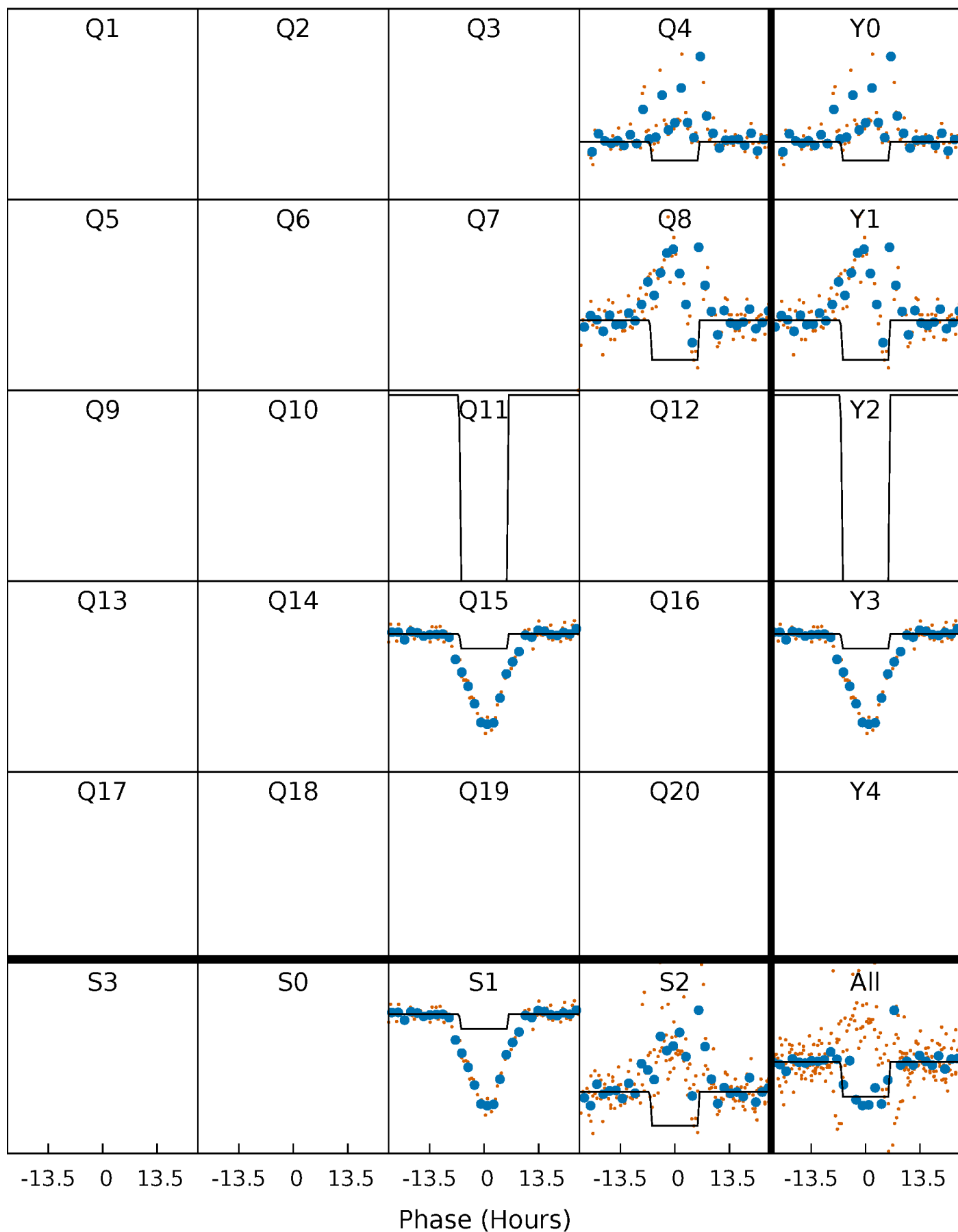
TCE 010252131-01     $P=320.393024$  Days     $T_0=430.832020$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

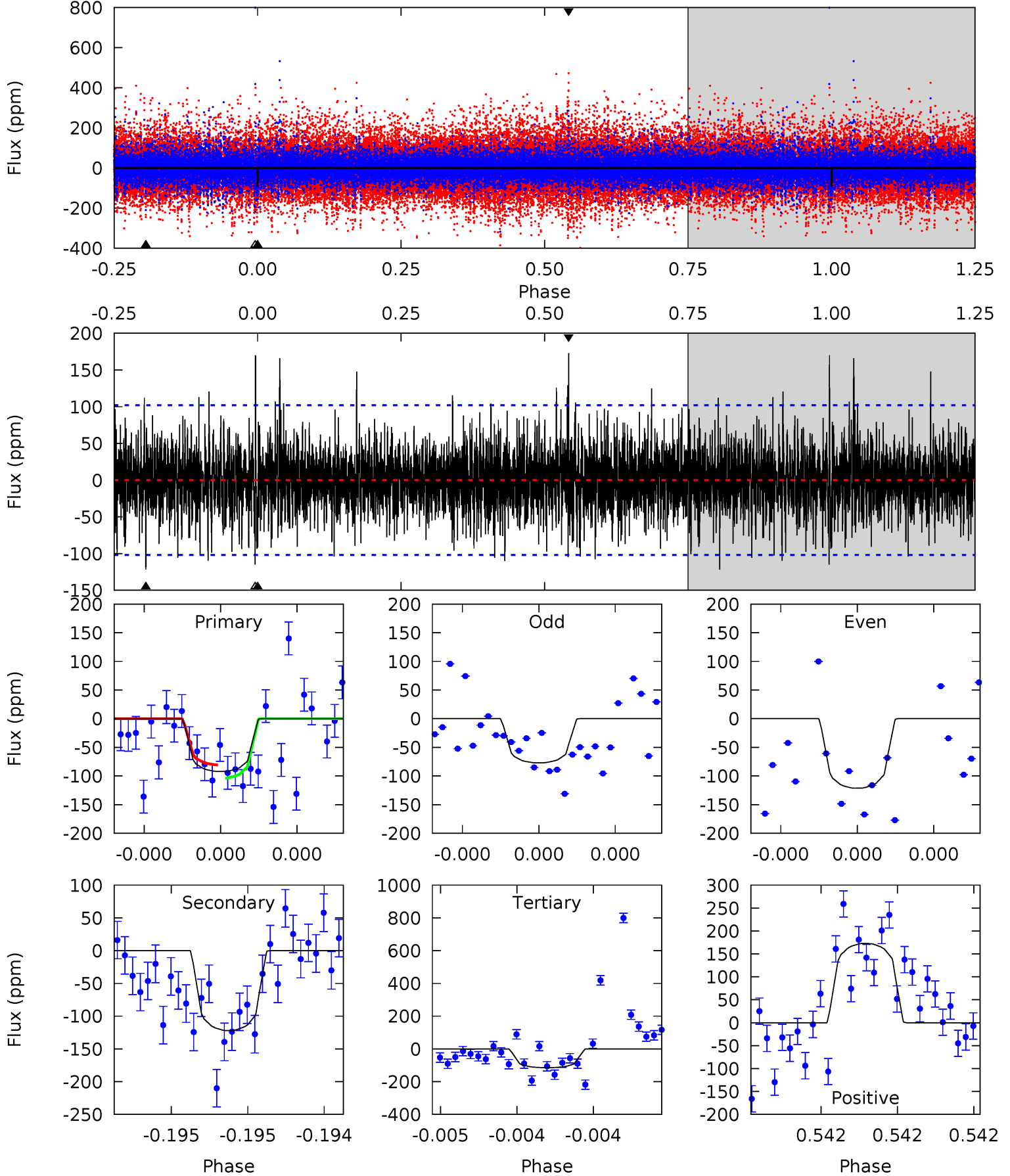
TCE 010252131-01 P=320.459521 Days  $T_0=430.667286$  (BKJD)



# DV Model-Shift Uniqueness Test

010252131-01, P = 320.393024 Days, E = 110.438996 Days

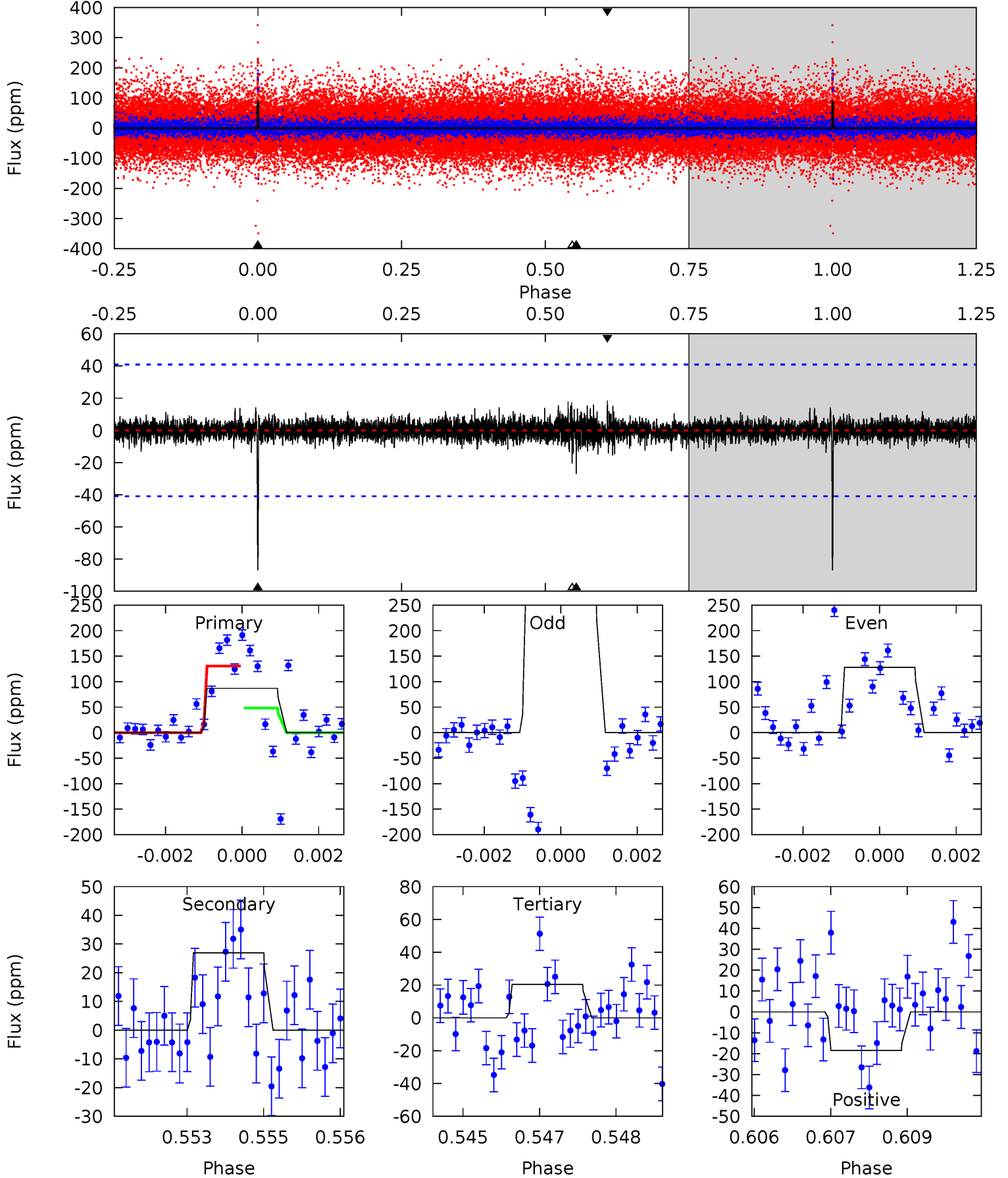
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.06	6.69	6.31	9.49	5.59	3.51	1.69	-1.25	-4.43	0.38	-2.80	0.97	1.18	0.59	0.64



# Alt Model-Shift Uniqueness Test

010252131-01, P = 320.459521 Days, E = 110.207765 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
11.4	3.53	2.69	2.43	5.37	3.16	0.47	8.70	8.96	0.84	1.10	11.0	-1.25	0.18	0



### Stellar Parameters For KIC 010252131

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6415^{+146}_{-162}$	$4.073^{+0.228}_{-0.123}$	$-0.160^{+0.250}_{-0.250}$	$1.690^{+0.362}_{-0.442}$	$1.234^{+0.188}_{-0.188}$	$0.360^{+0.460}_{-0.127}$
	+2%/-3%	+6%/-3%	+156%/-156%	+21%/-26%	+15%/-15%	+128%/-35%
Source	PHO1	FLK73	KIC0	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 010252131-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-122 \pm 18$	$3.06^{+2.88}_{-2.09}$	$512^{+33}_{-39}$	$5210^{+4381}_{-1192}$	$6961^{+61922}_{-5160}$
Alt.	$-27 \pm 8$	$3.15^{+3.11}_{-1.99}$	$514^{+31}_{-39}$	$3817^{+2023}_{-695}$	$1458^{+9942}_{-1085}$

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

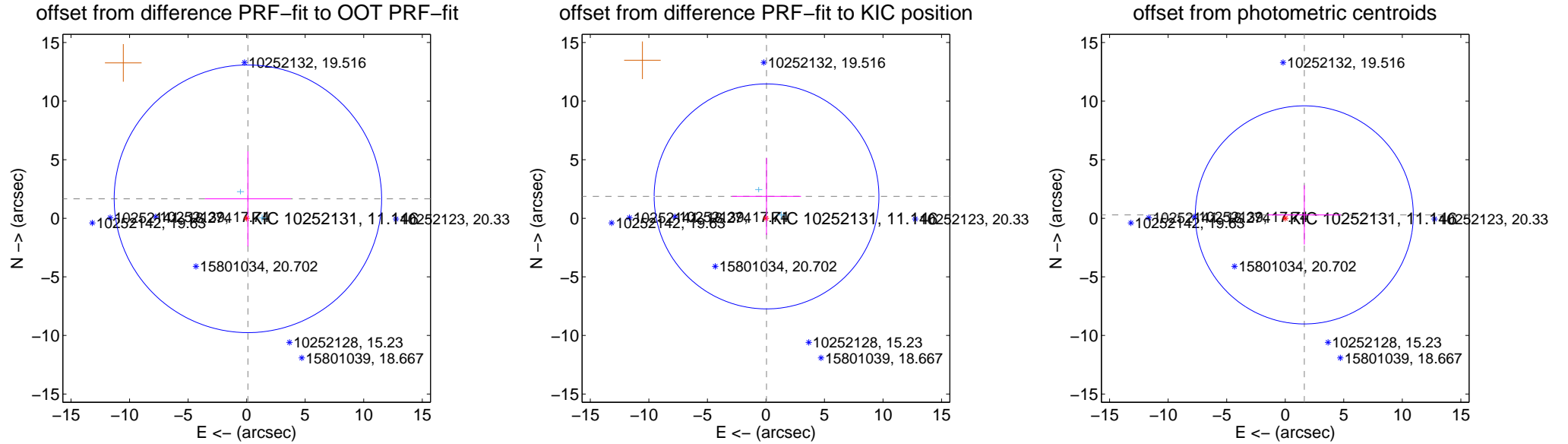
## DV Centroid Data

Supplemental centroid analysis for 010252131-01. **Kepler magnitude: 11.15.** Transit SNR 2.76

**There are 2 quarters with good PRF difference image offsets**

The direct PRF centroid is offset from the target star catalog position by about 0.20 arcsec

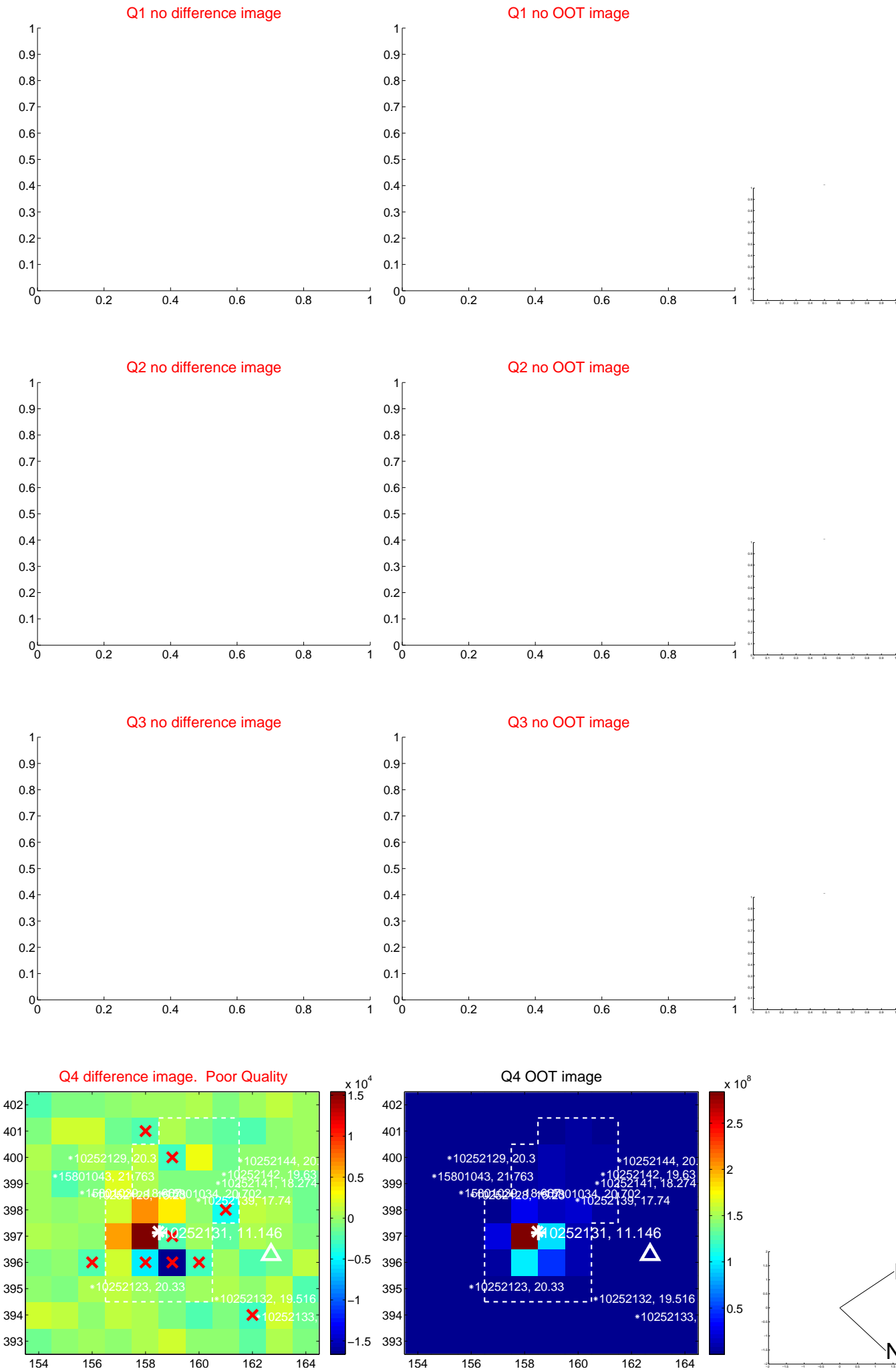
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.665 \pm 3.806$	0.44	$-0.107 \pm 3.671$	$1.661 \pm 4.051$
PRF-fit source offset from KIC position	$1.866 \pm 3.199$	0.58	$-0.051 \pm 2.949$	$1.865 \pm 3.282$
photometric centroid source offset	$1.66 \pm 3.10$	0.53	$-1.63 \pm 3.12$	$0.29 \pm 2.53$



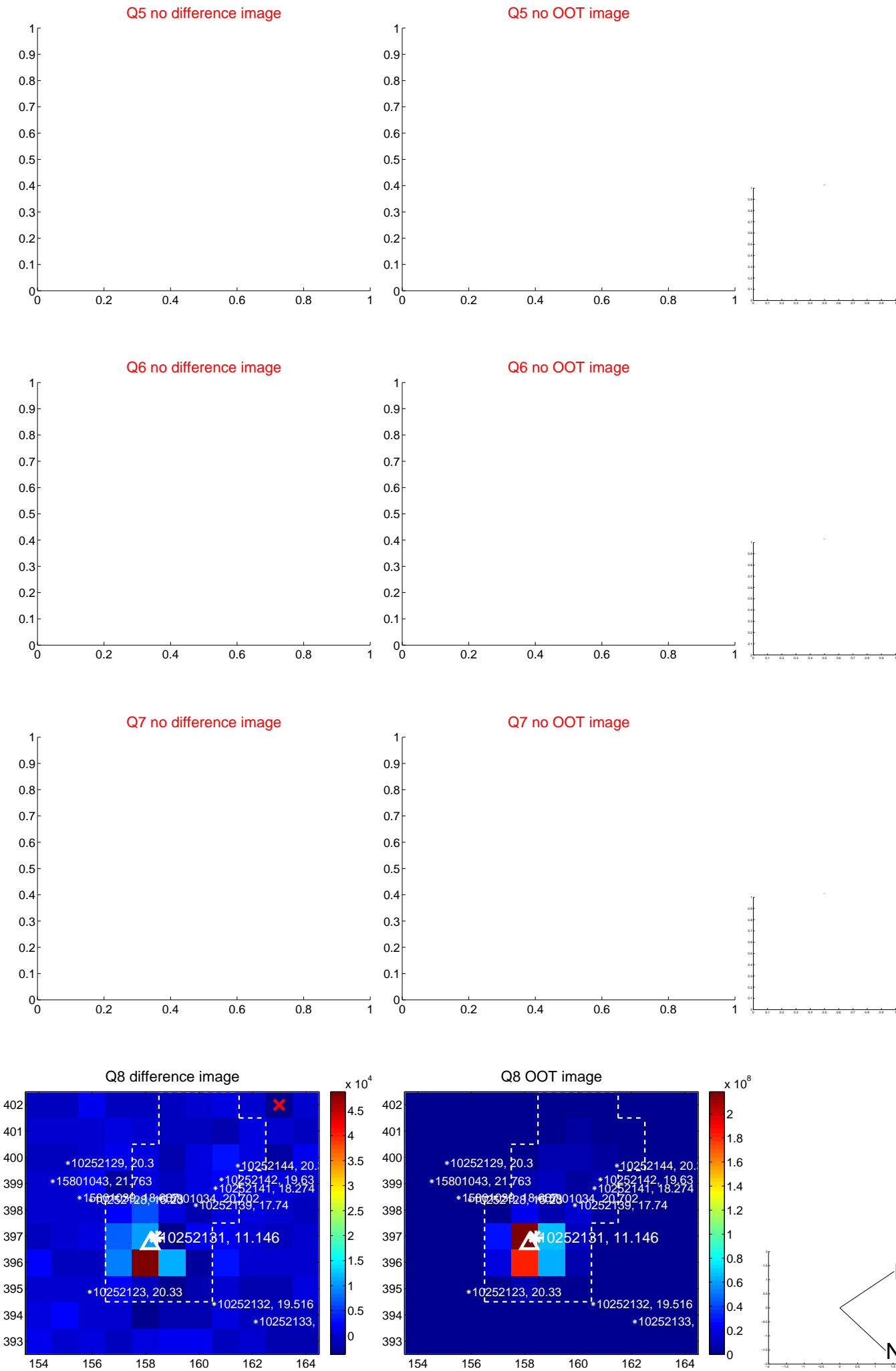
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



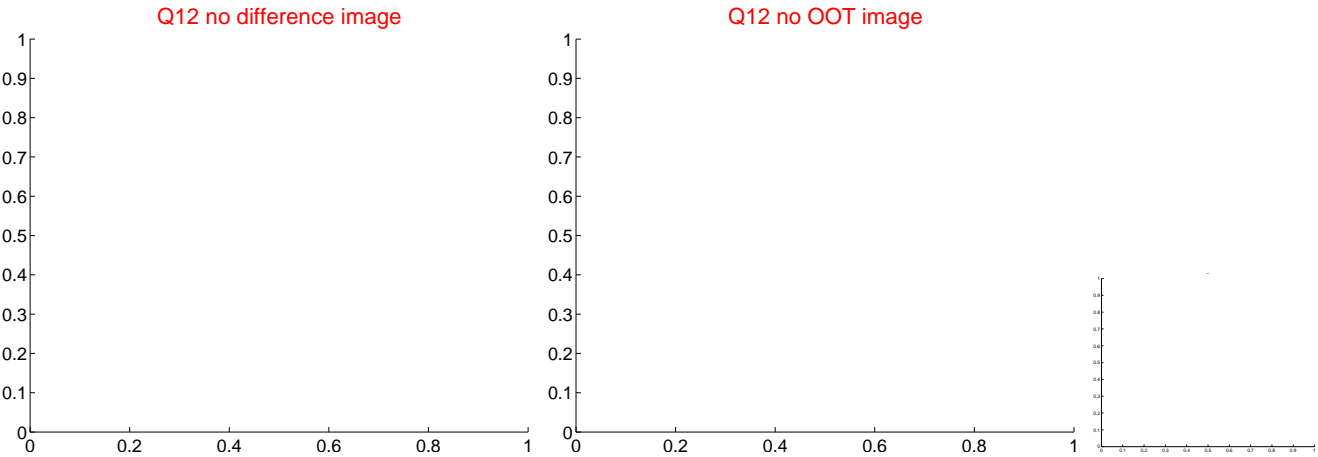
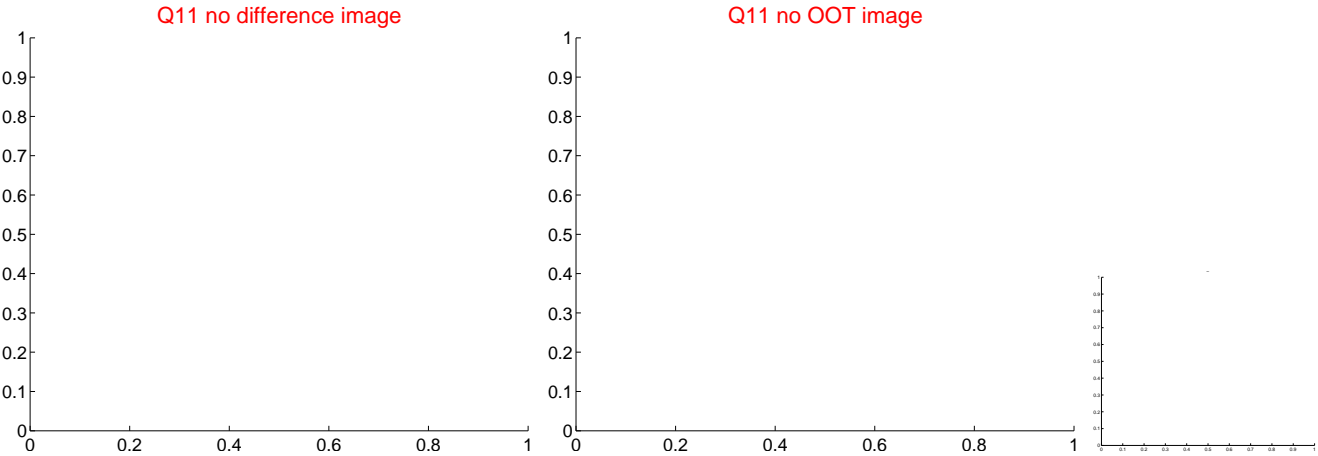
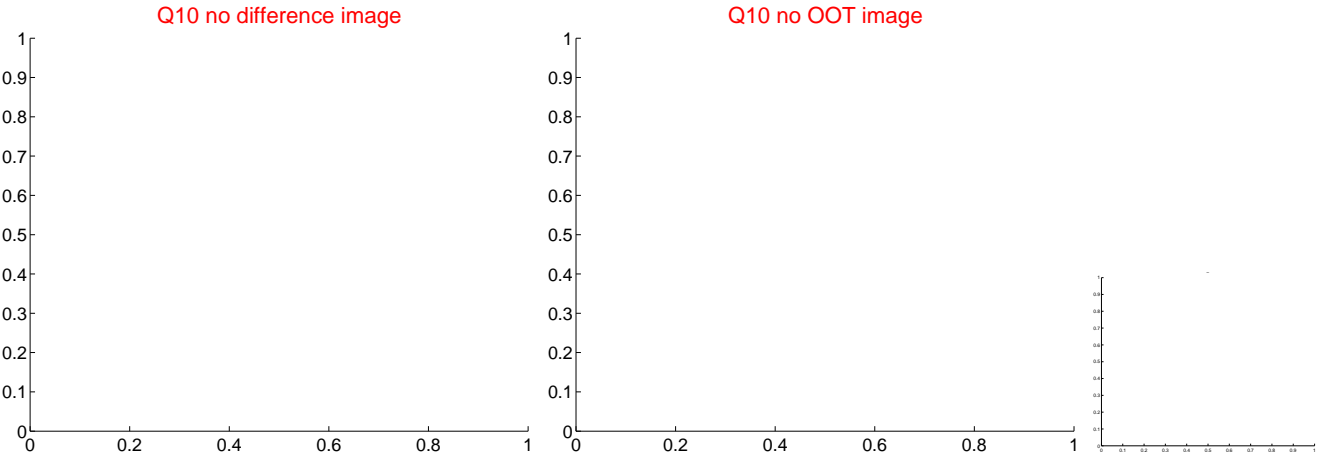
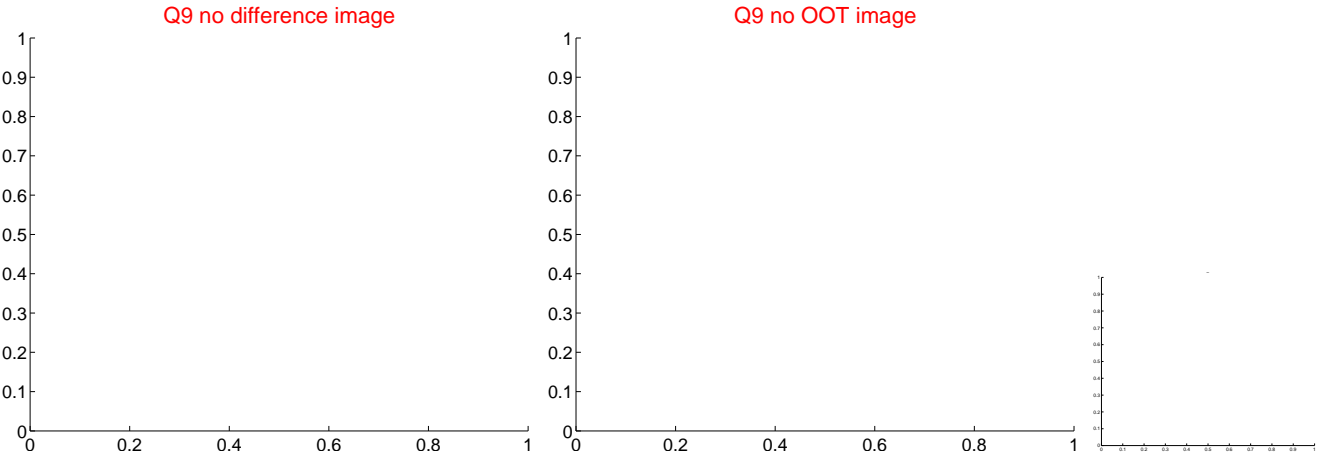
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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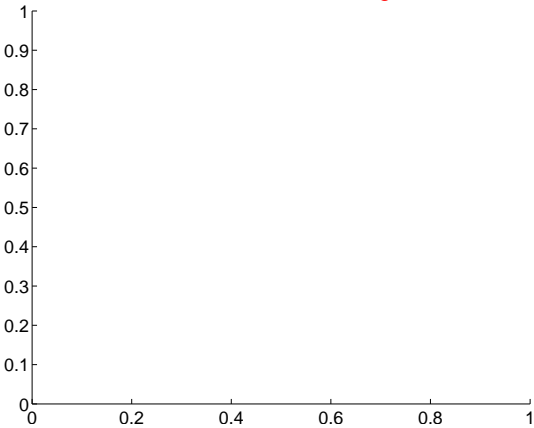


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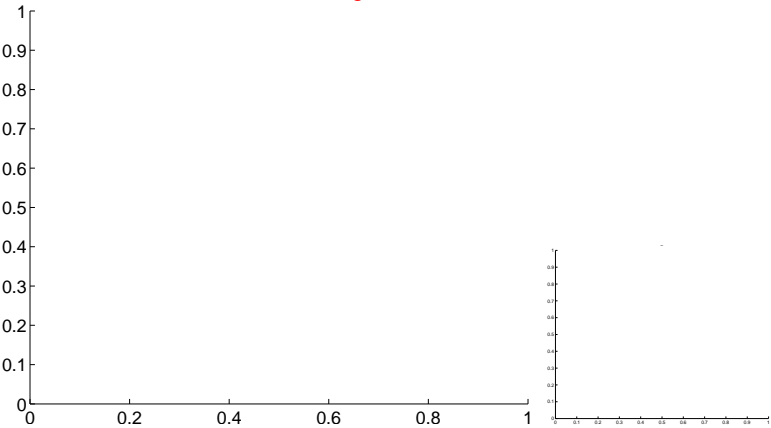


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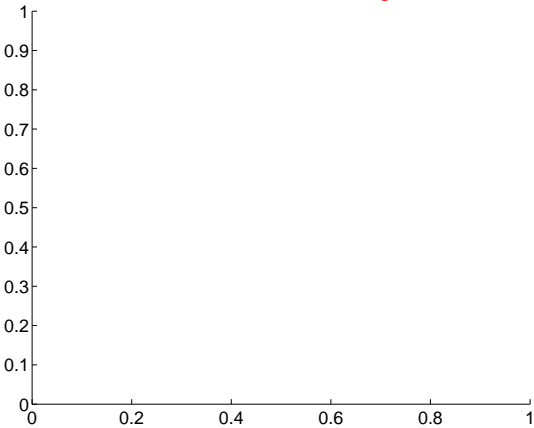
Q13 no difference image



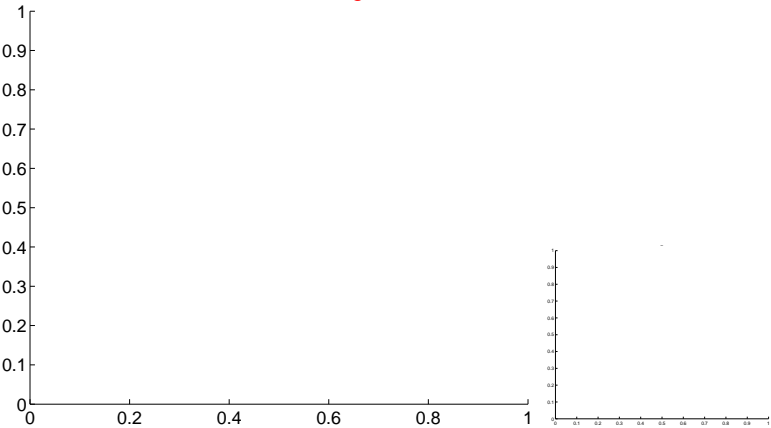
Q13 no OOT image



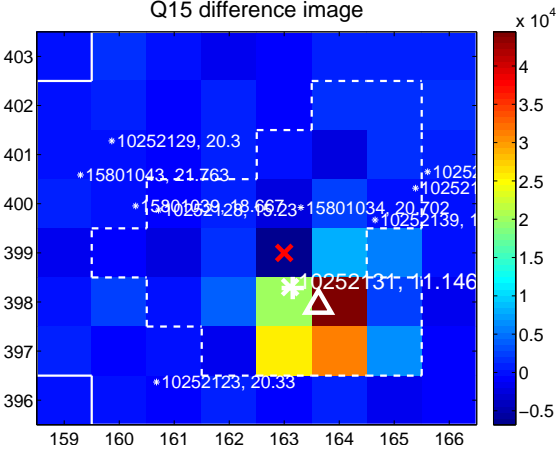
Q14 no difference image



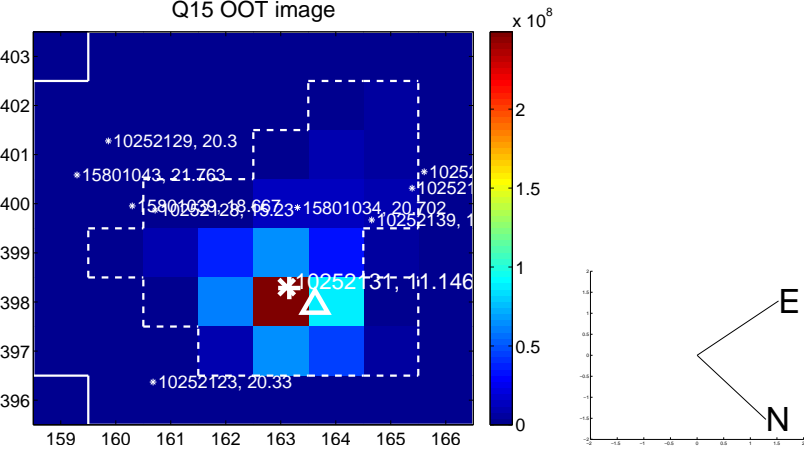
Q14 no OOT image



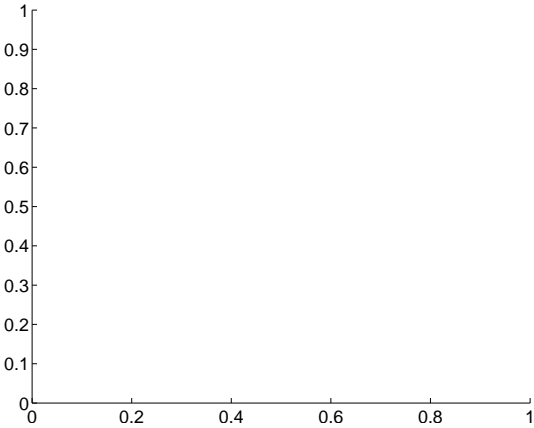
Q15 difference image



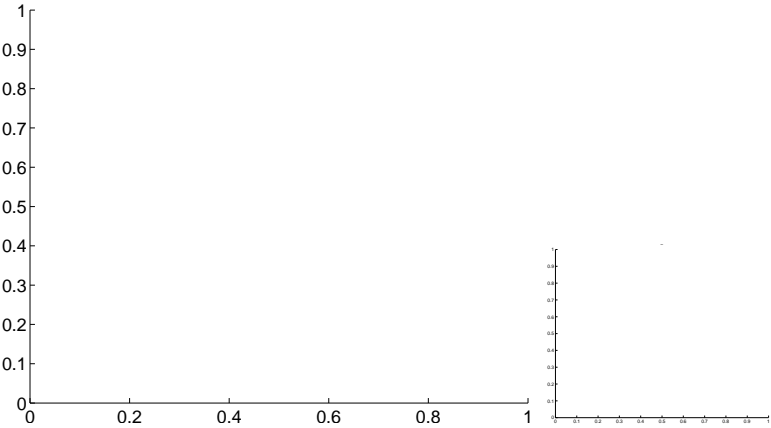
Q15 OOT image



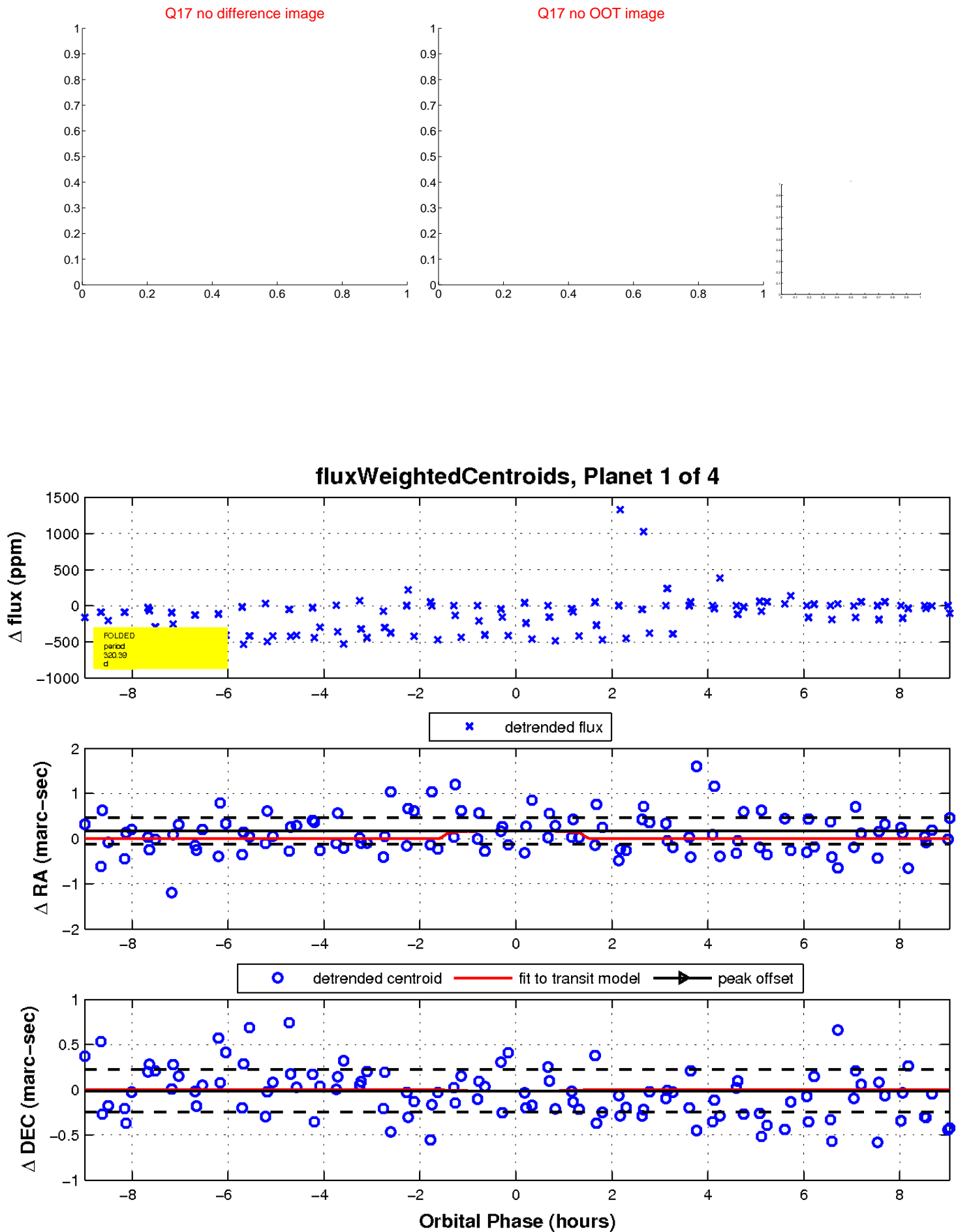
Q16 no difference image



Q16 no OOT image



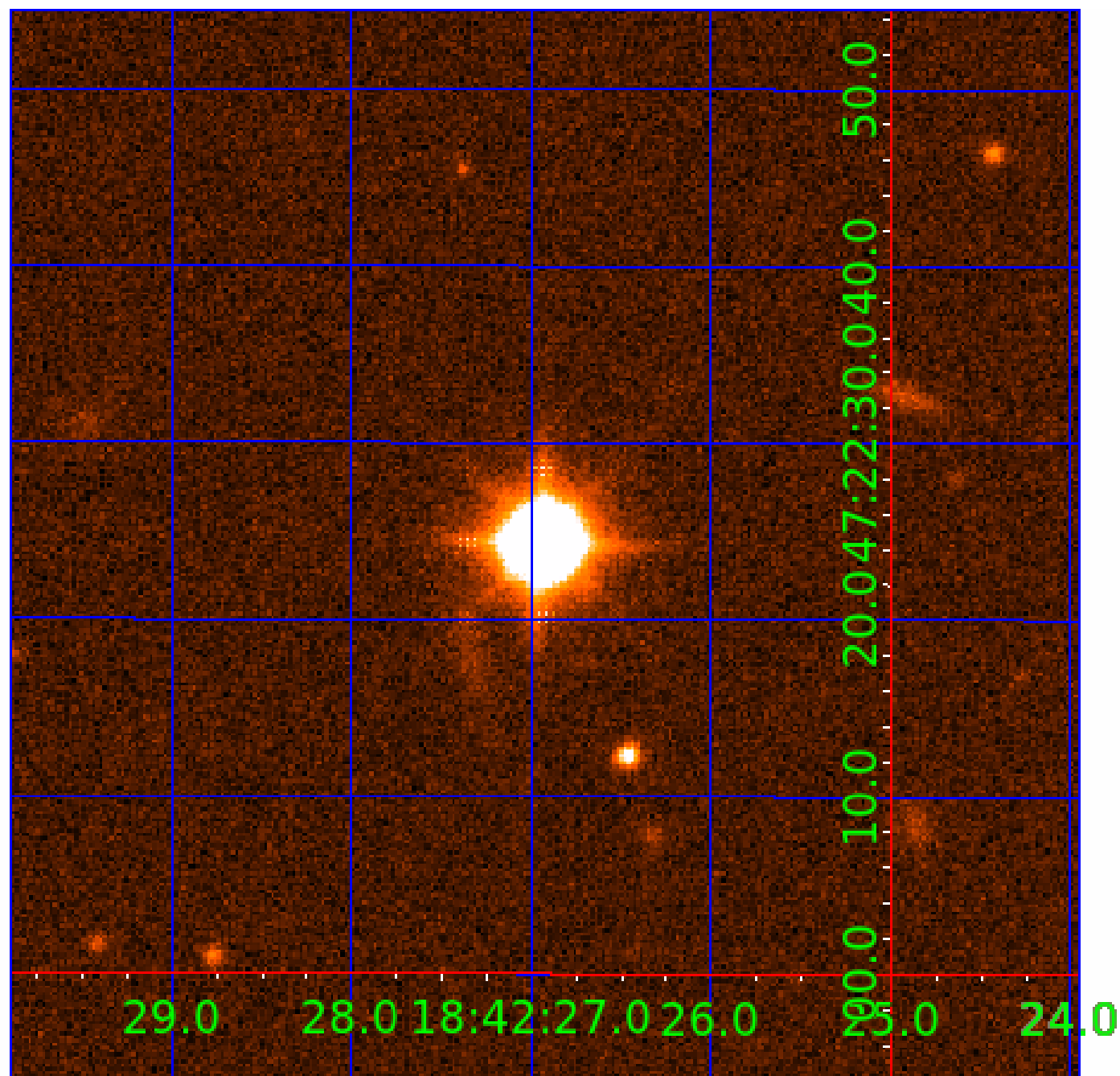
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image

Declination



# KIC 010252131

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

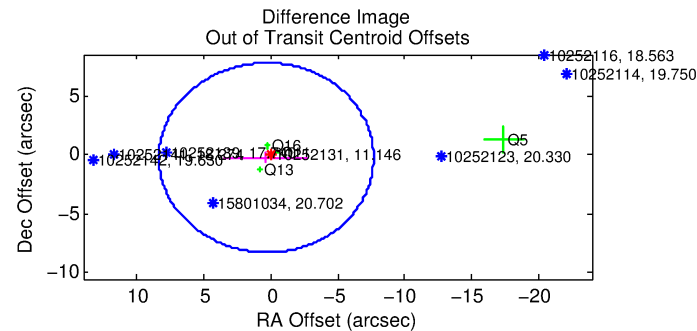
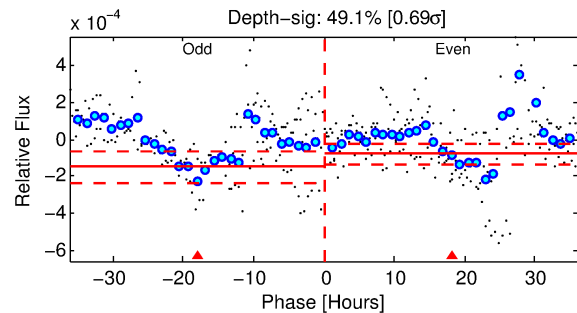
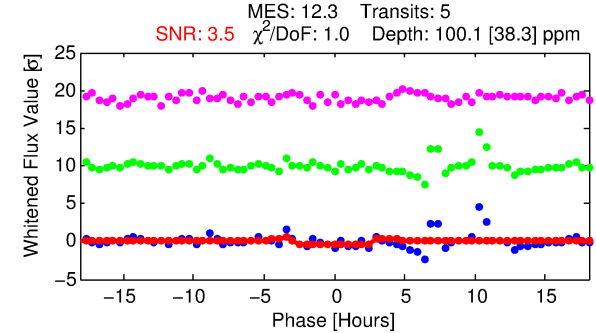
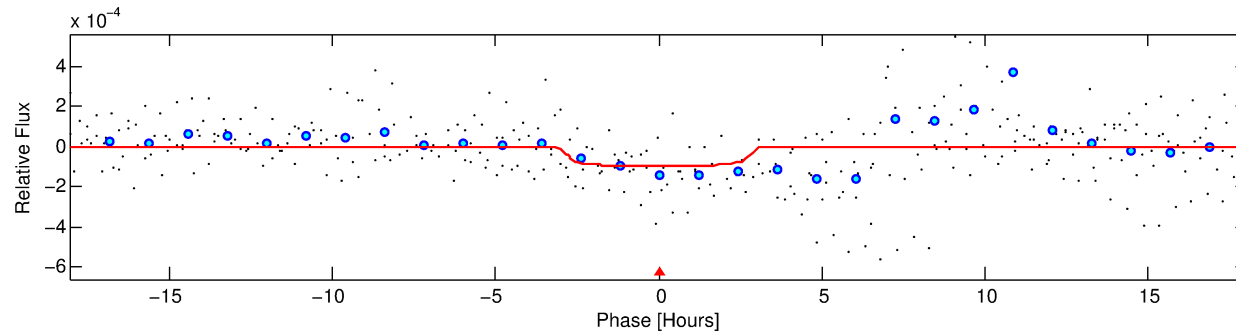
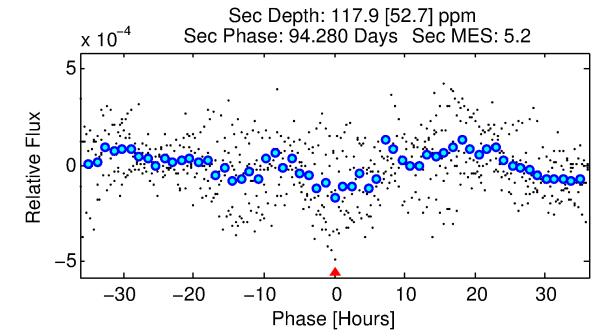
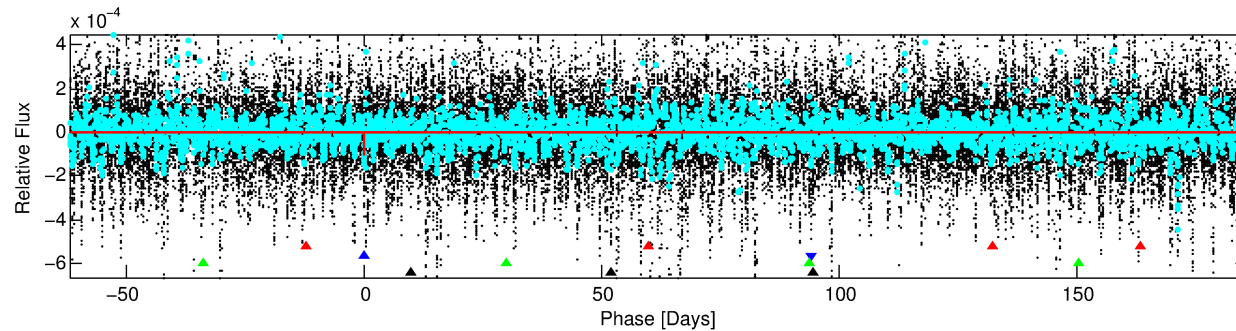
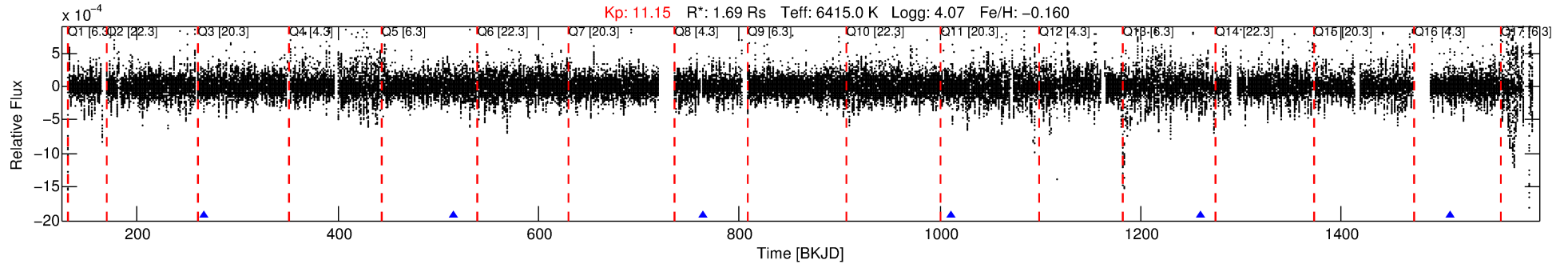
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010252131-02

No Significant Match Found

# DV One-Page Summary

KIC: 10252131 Candidate: 2 of 4 Period: 248.118 d



## DV Fit Results:

Period = 248.11799 [0.00521] d  
Epoch = 267.3582 [0.0188] BKJD  
Rp/R\* = 0.0107 [0.0049]  
a/R\* = 144.46 [303.74]  
b = 0.90 [0.45]  
Seff = 6.31 [2.55]  
Teq = 404 [41] K  
Rp = 1.98 [1.04] Re  
a = 0.8287 [0.2047] AU  
Ag = 11372.17 [12395.31] [0.92σ]  
Teff = 6453 [1649] K [3.67σ]

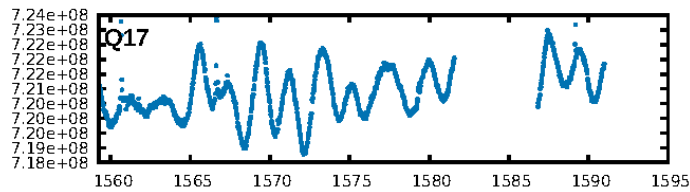
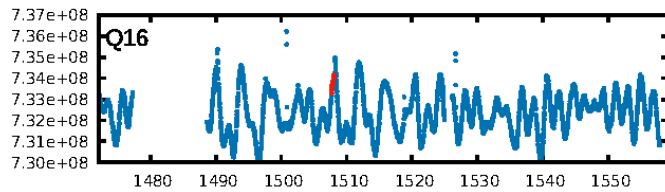
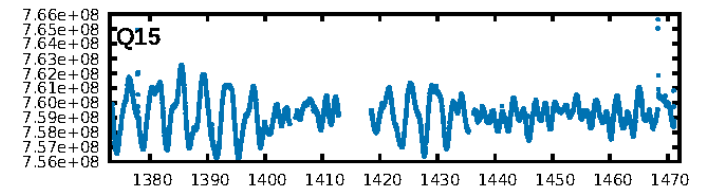
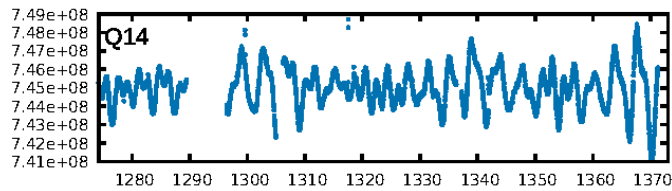
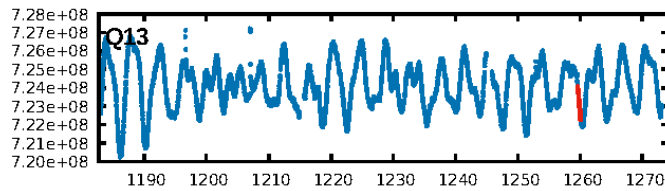
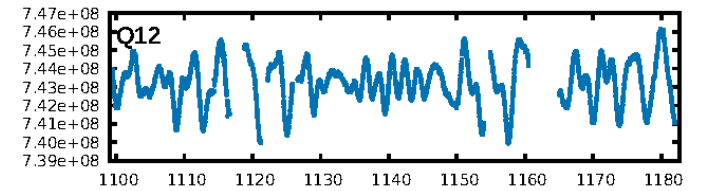
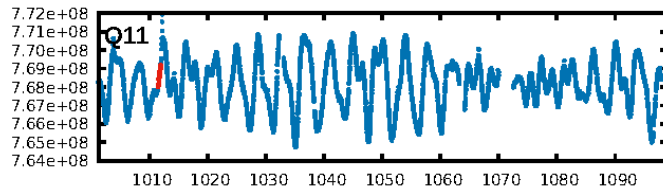
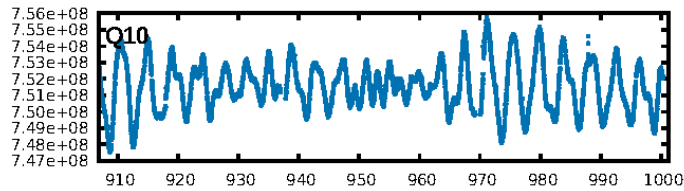
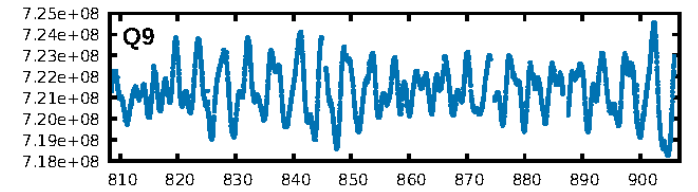
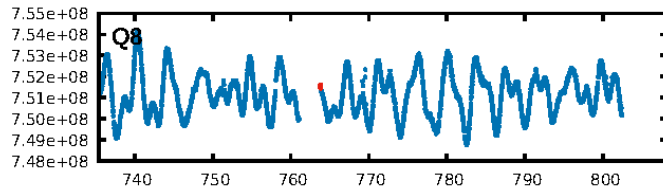
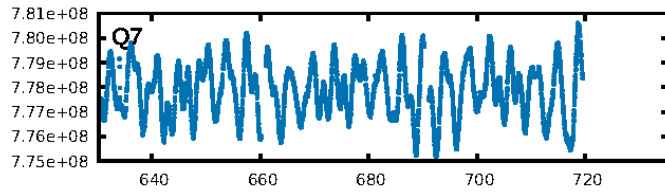
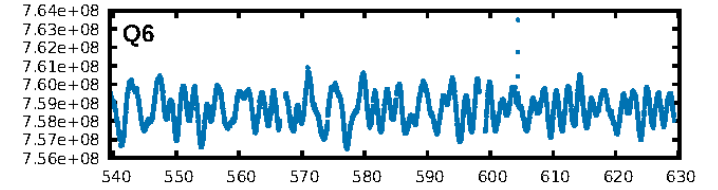
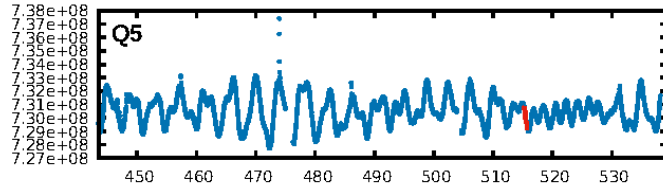
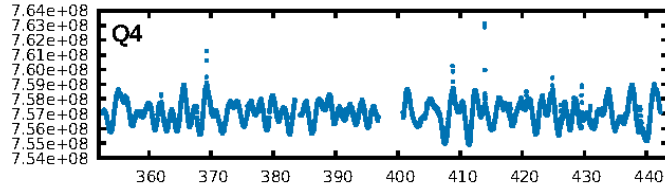
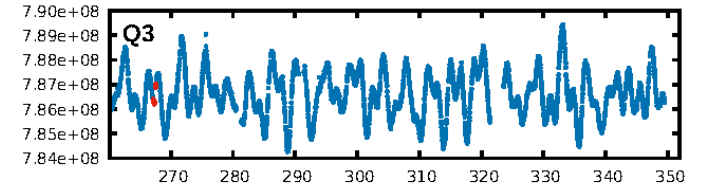
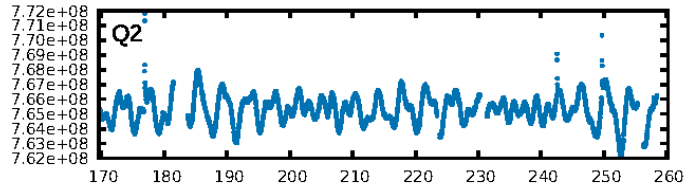
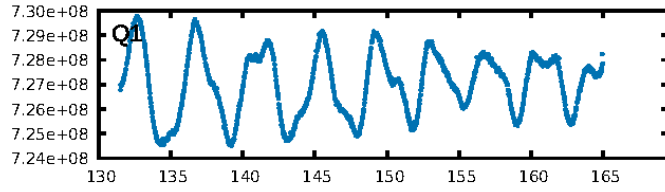
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [193.08σ]  
ModelChiSquare2-sig: 23.3%  
ModelChiSquareGof-sig: 99.9%  
Bootstrap-pfa: 2.25e-13  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: -1.795  
Centroid-sig: 33.1%  
Centroid-so: 1.959 arcsec [1.04σ]  
OotOffset-rm: 0.403 arcsec [0.15σ]  
OotOffset-st: 0/1/1/2 [4]  
KicOffset-rm: 0.365 arcsec [0.09σ]  
KicOffset-st: 0/1/1/2 [4]  
DiffImageQuality-fgm: 0.50 [2/4]  
DiffImageOverlap-fno: 1.00 [4/4]

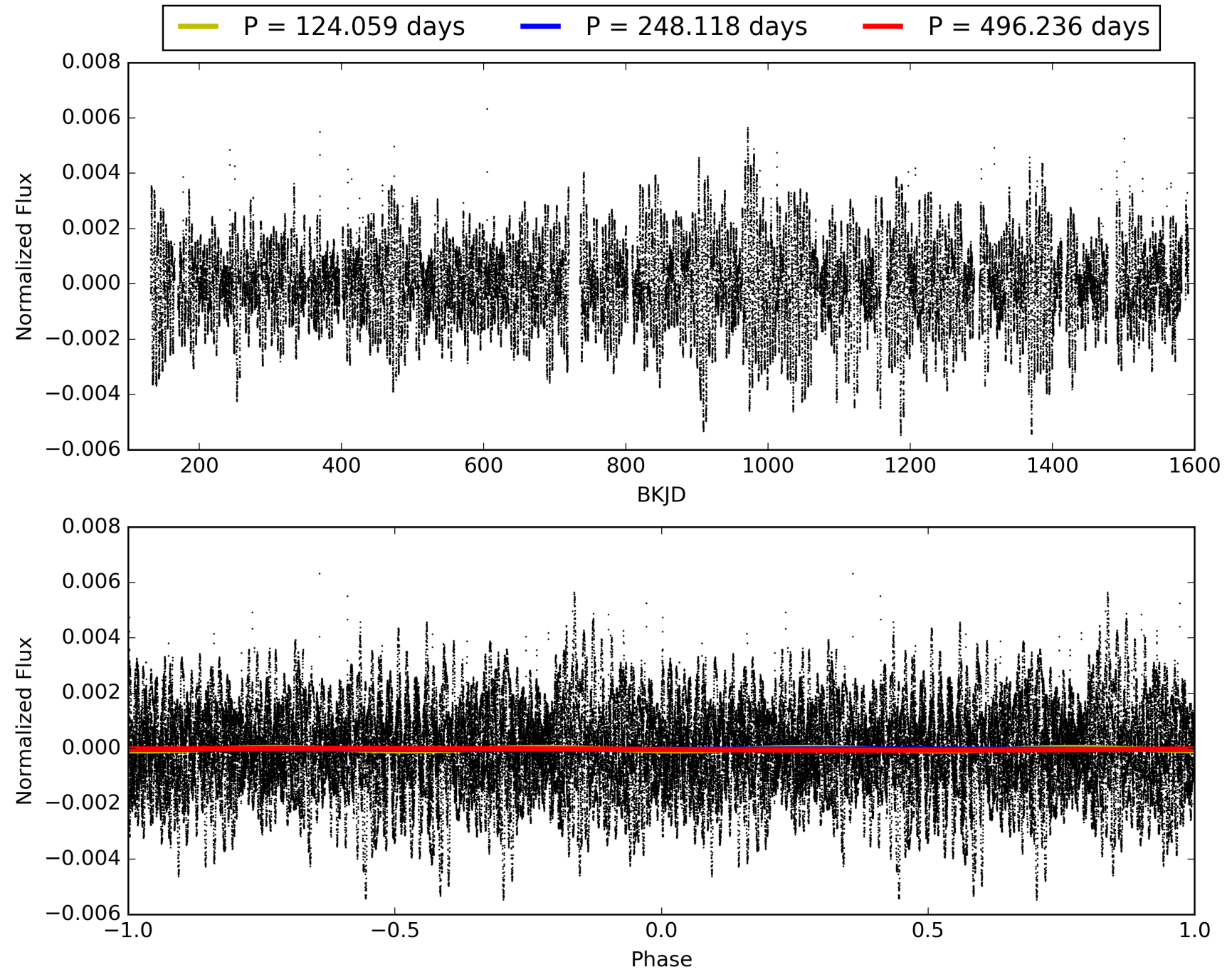
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 13:01:32 Z

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

# TCE 010252131-02, PDC Light Curves



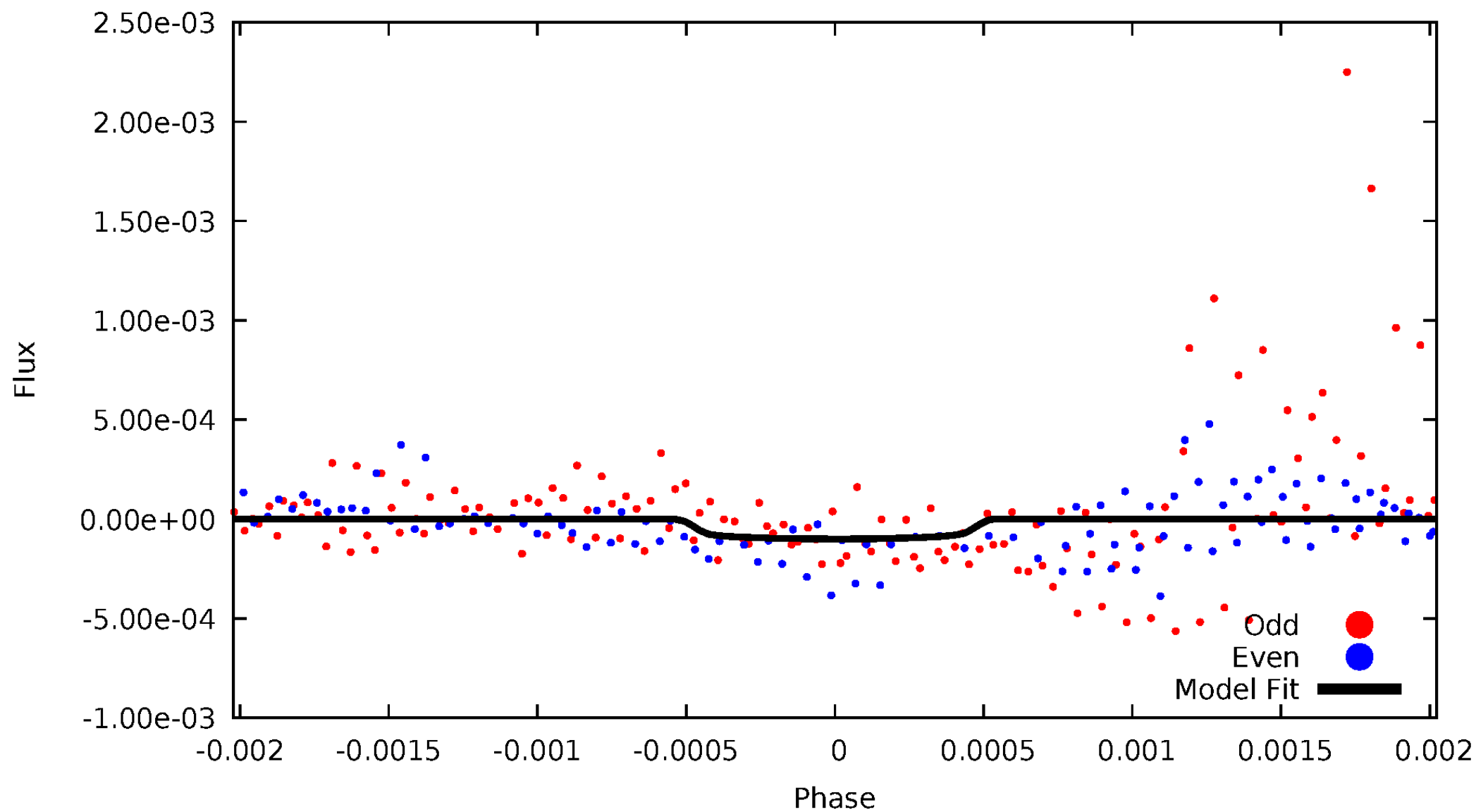
# TCE 010252131-02





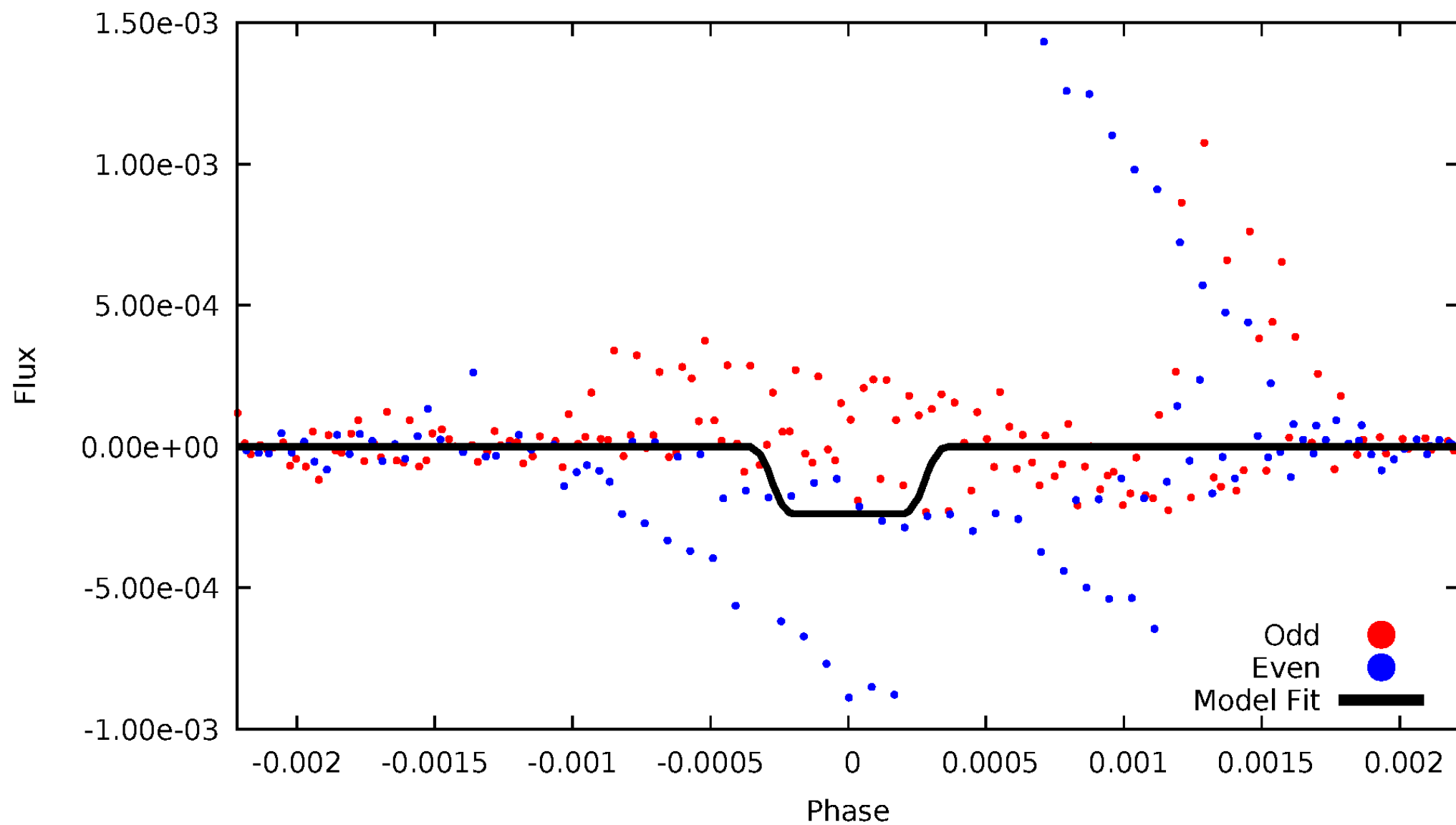
# DV Odd/Even

TCE 010252131-02



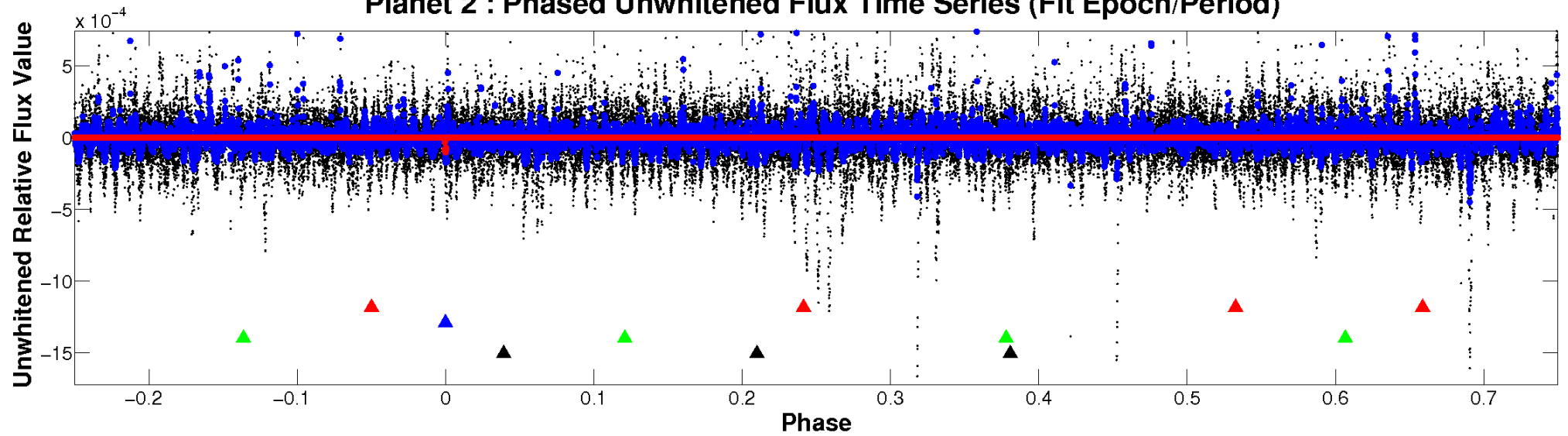
# ALT Odd/Even

TCE 010252131-02

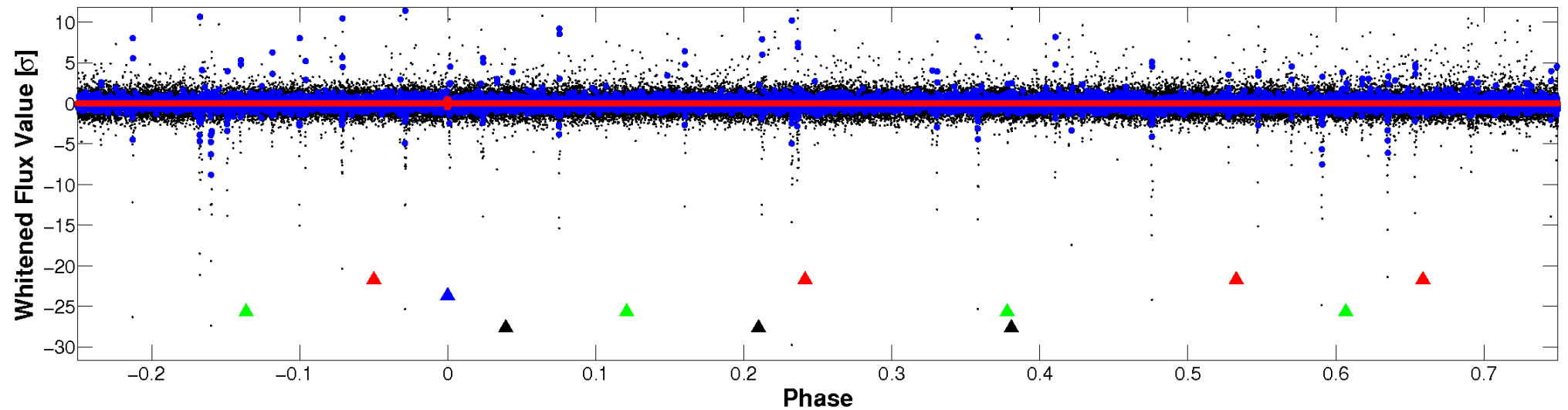


# Non-Whitened Vs. Whitened Light Curve

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

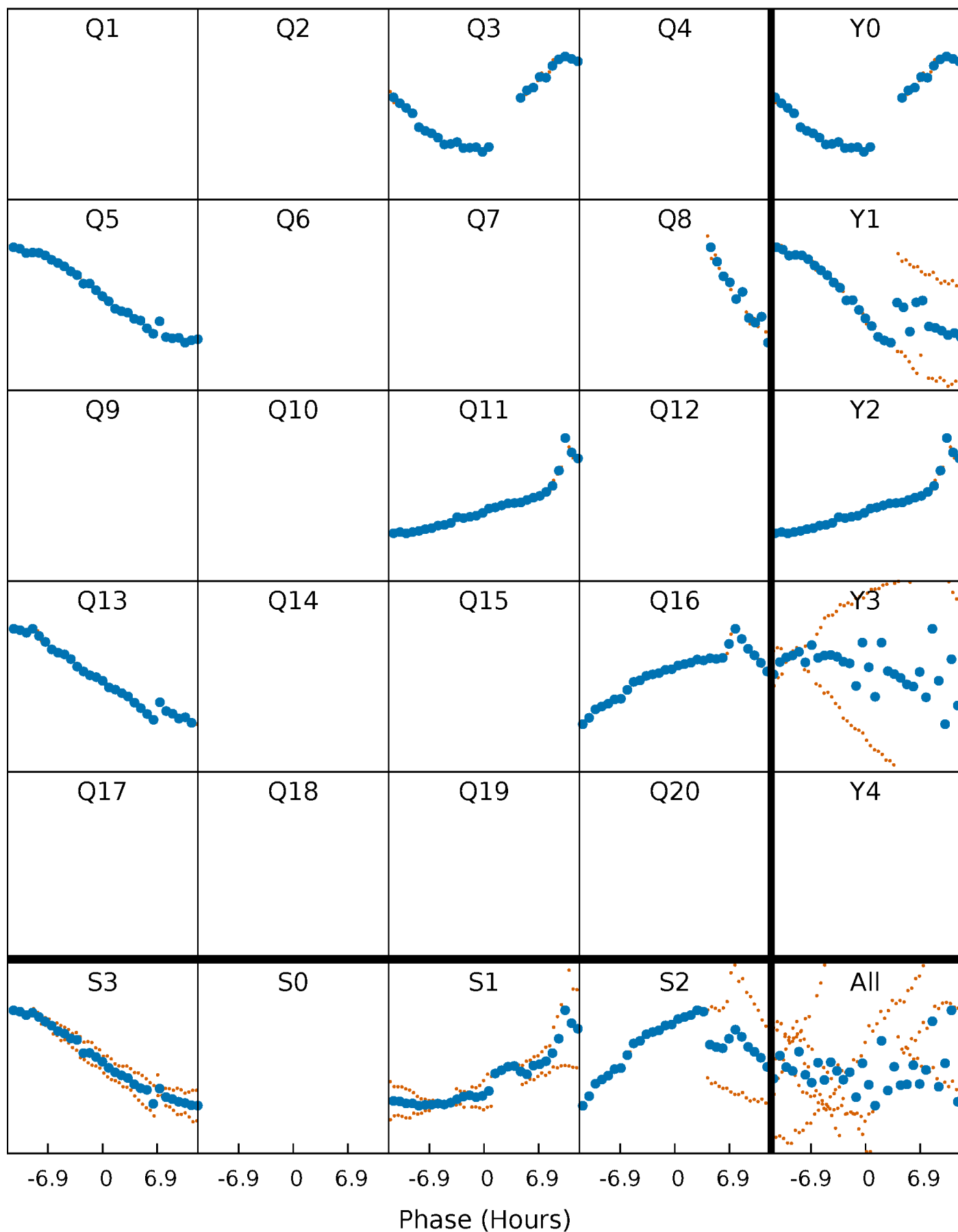


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



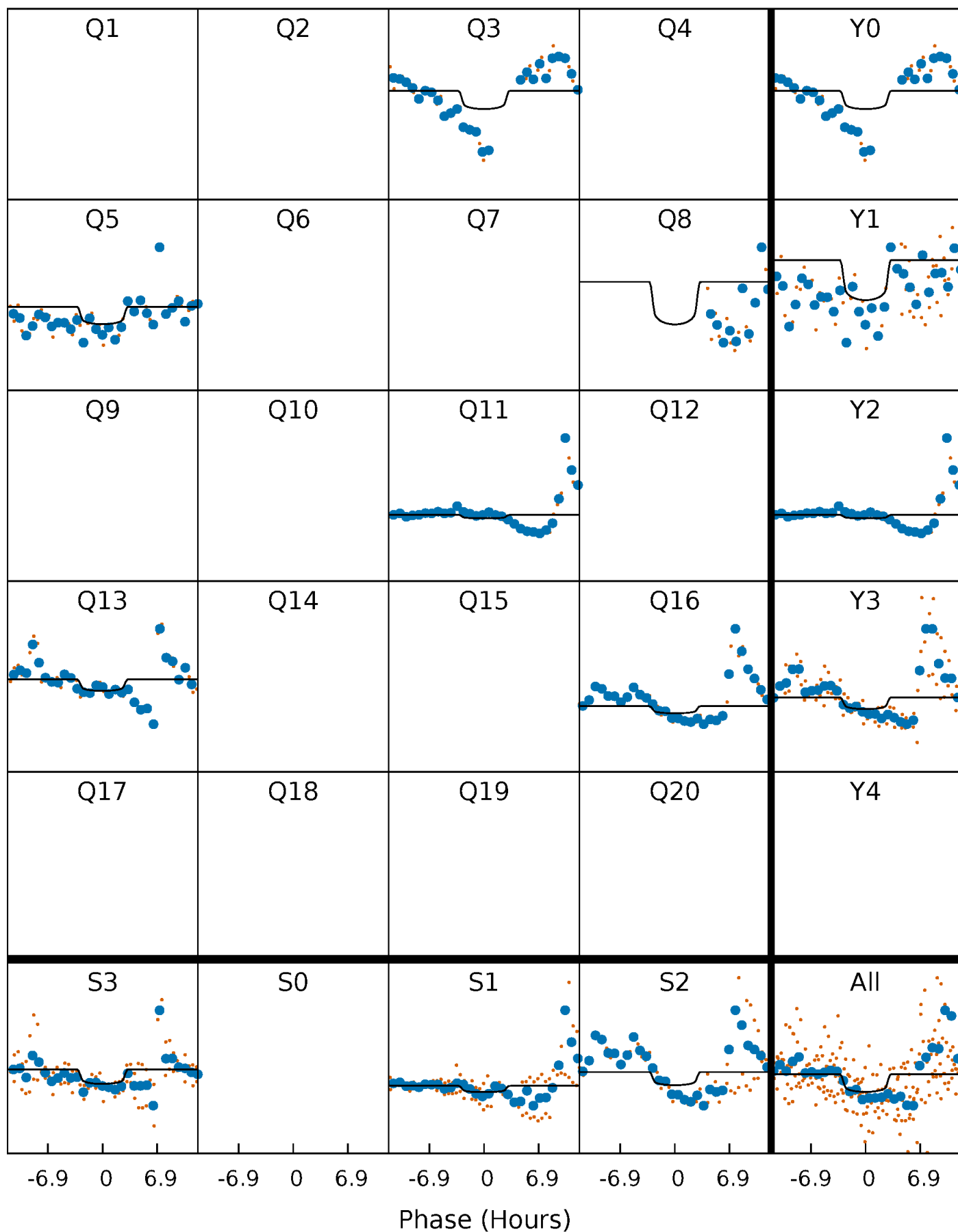
# PDC Quarter-Phased Transit Curves

TCE 010252131-02 P=248.117987 Days  $T_0=267.358218$  (BKJD)



# DV Quarter-Phased Transit Curves

TCE 010252131-02     $P=248.117987$  Days     $T_0=267.358218$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

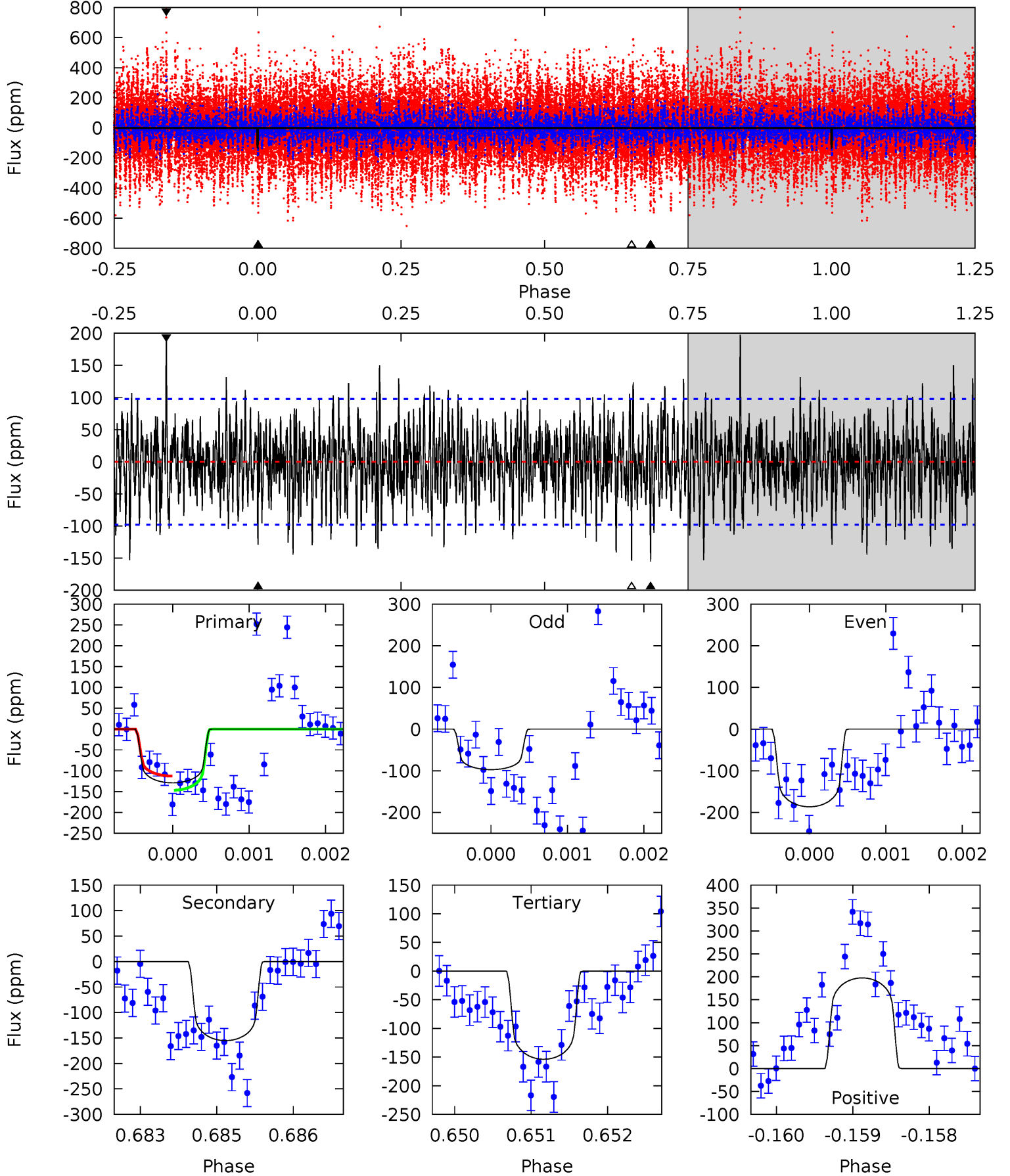
TCE 010252131-02     $P=248.117908$  Days     $T_0=267.354453$  (BKJD)



# DV Model-Shift Uniqueness Test

010252131-02, P = 248.117987 Days, E = 19.240231 Days

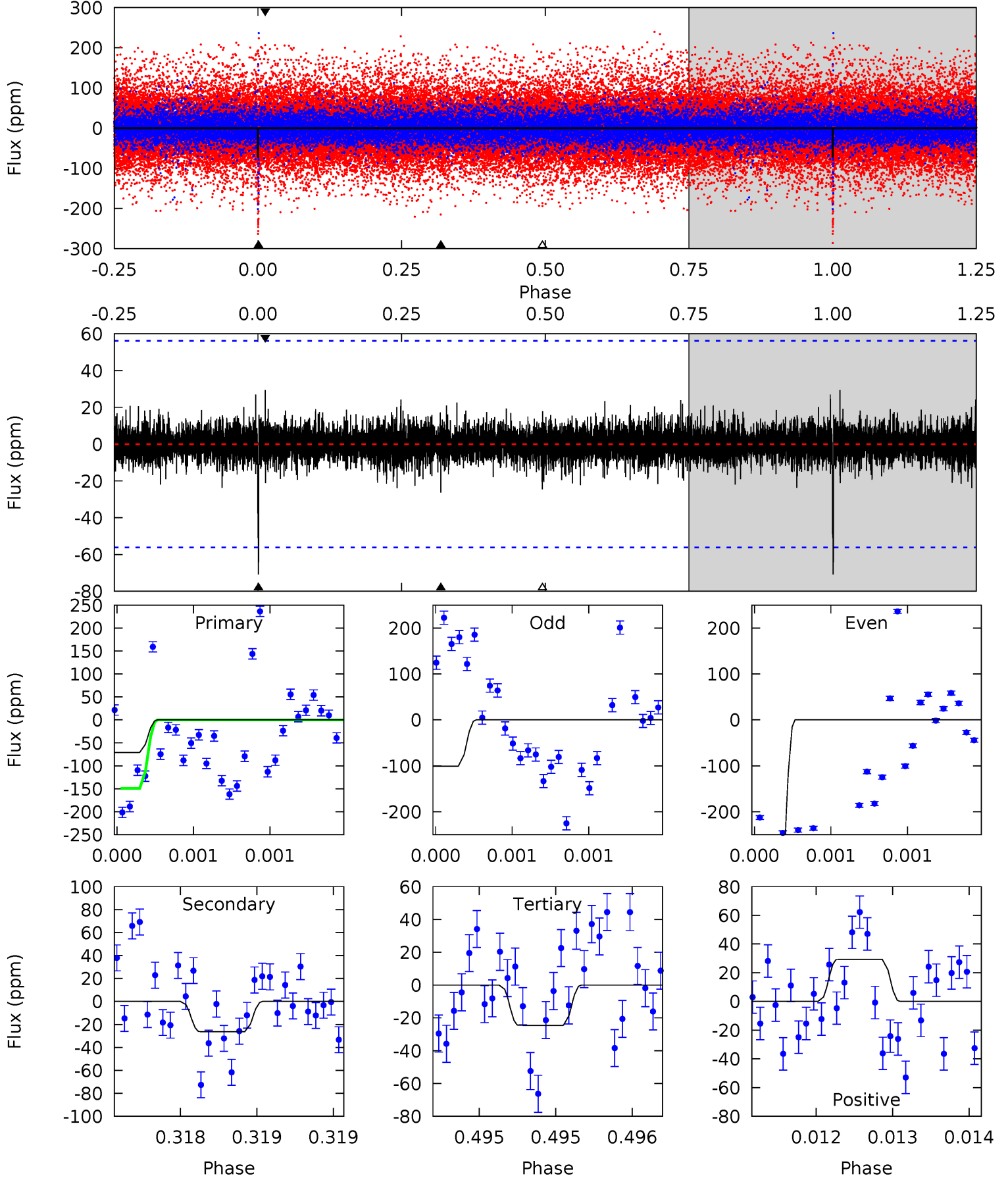
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.17	8.62	8.55	11.0	5.43	3.26	2.55	-1.38	-3.82	0.08	-2.36	2.34	0.98	0.56	0.95



# Alt Model-Shift Uniqueness Test

010252131-02, P = 248.117908 Days, E = 19.236545 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
6.95	2.59	2.41	2.88	5.52	3.40	0.59	4.54	4.07	0.18	-0.30	19.9	1.69	0.29	5.97





### Stellar Parameters For KIC 010252131

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6415^{+146}_{-162}$	$4.073^{+0.228}_{-0.123}$	$-0.160^{+0.250}_{-0.250}$	$1.690^{+0.362}_{-0.442}$	$1.234^{+0.188}_{-0.188}$	$0.360^{+0.460}_{-0.127}$
	+2%/-3%	+6%/-3%	+156%/-156%	+21%/-26%	+15%/-15%	+128%/-35%
Source	PHO1	FLK73	KIC0	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 010252131-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-155 \pm 18$	$1.92^{+0.93}_{-0.82}$	$560^{+33}_{-43}$	$6898^{+2932}_{-1184}$	$15852^{+34175}_{-8634}$
Alt.	$-26 \pm 10$	$2.71^{+1.02}_{-0.83}$	$556^{+37}_{-38}$	$3988^{+636}_{-421}$	$1337^{+1662}_{-718}$

$T_{max}$  = 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

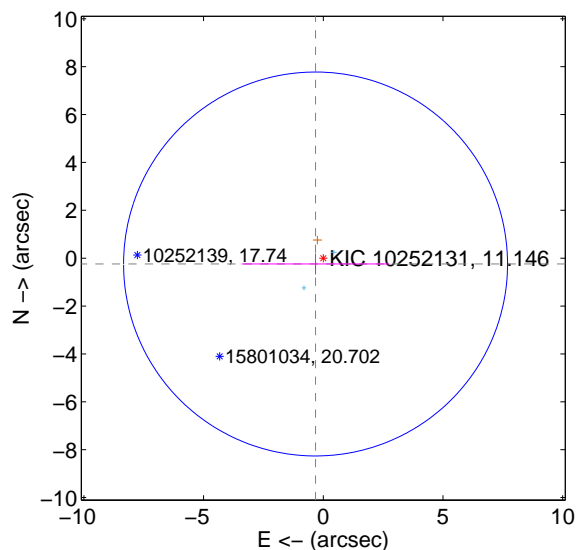
Supplemental centroid analysis for 010252131-02. **Kepler magnitude: 11.15.** Transit SNR 3.45

**There are 2 quarters with good PRF difference image offsets**

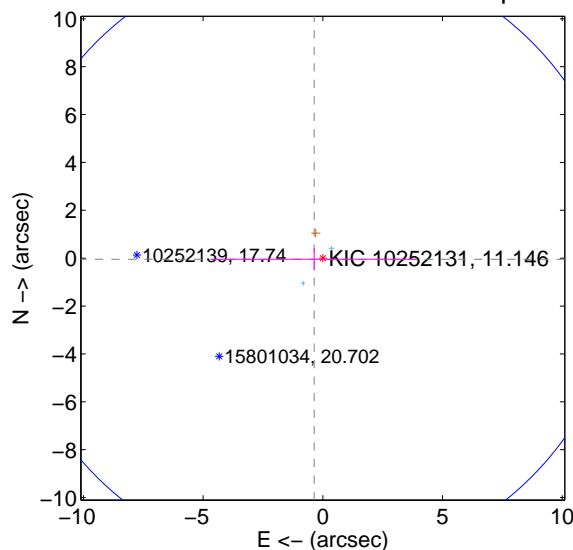
The direct PRF centroid is offset from the target star catalog position by about 0.29 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.403 \pm 2.673$	0.15	$0.322 \pm 3.077$	$-0.243 \pm 0.439$
PRF-fit source offset from KIC position	$0.365 \pm 4.283$	0.09	$0.362 \pm 4.294$	$-0.048 \pm 0.464$
photometric centroid source offset	$1.96 \pm 1.88$	1.04	$-1.89 \pm 1.90$	$0.52 \pm 1.60$

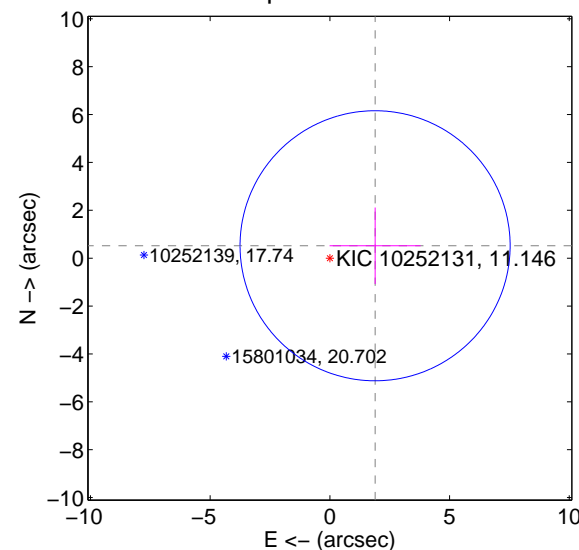
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

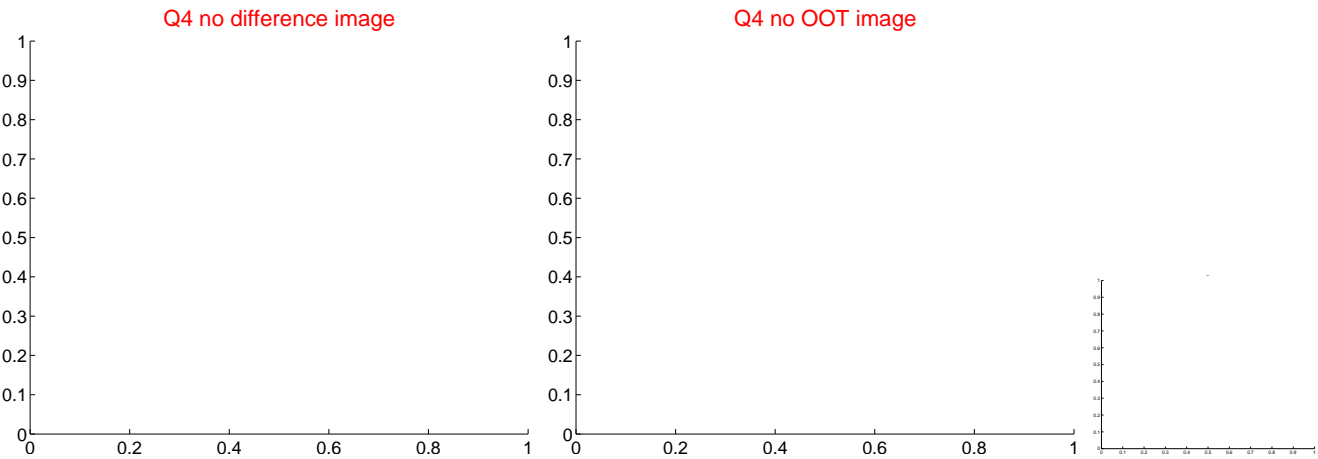
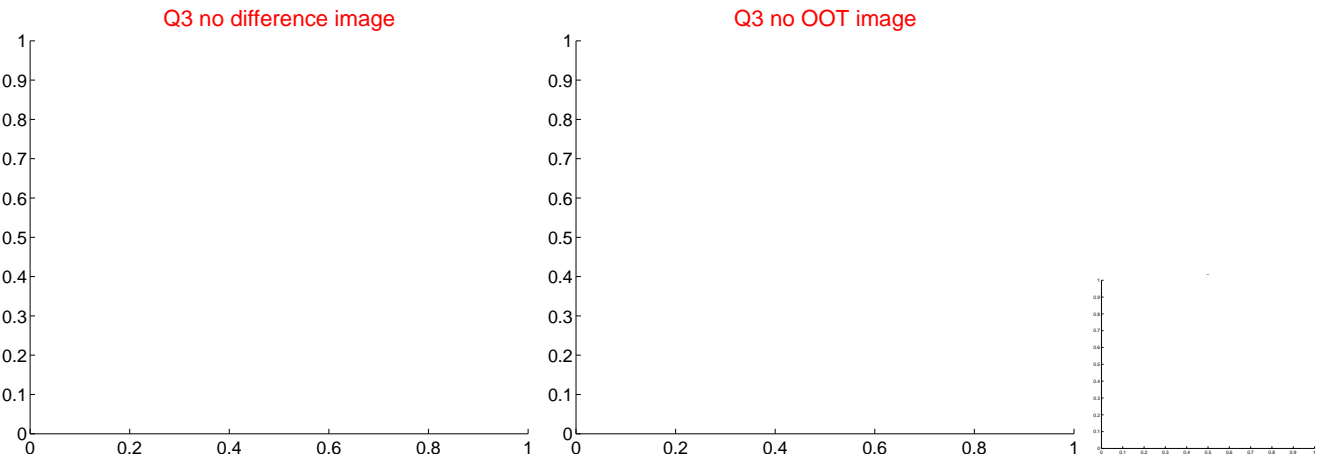
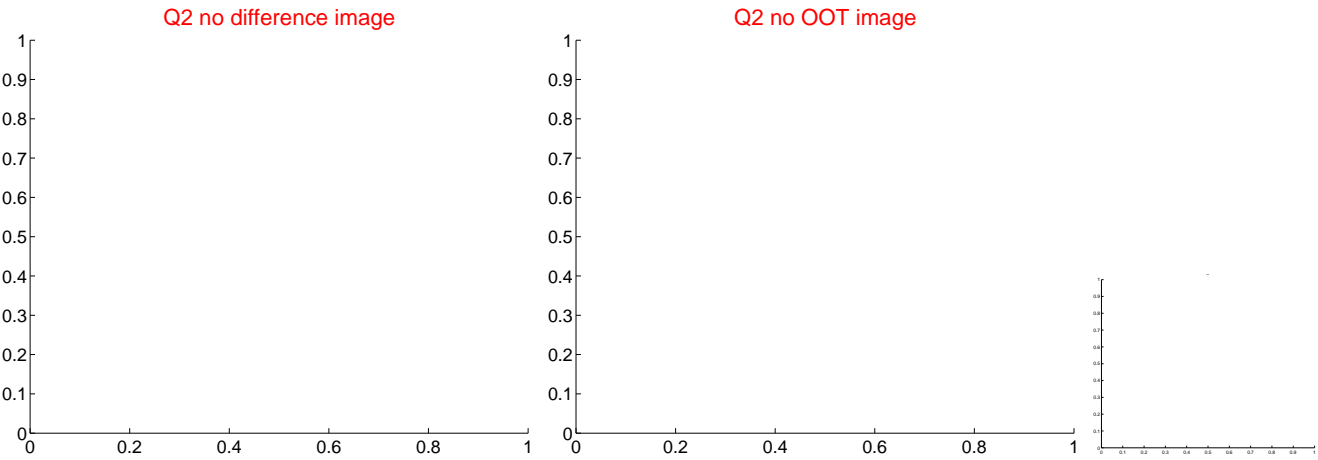
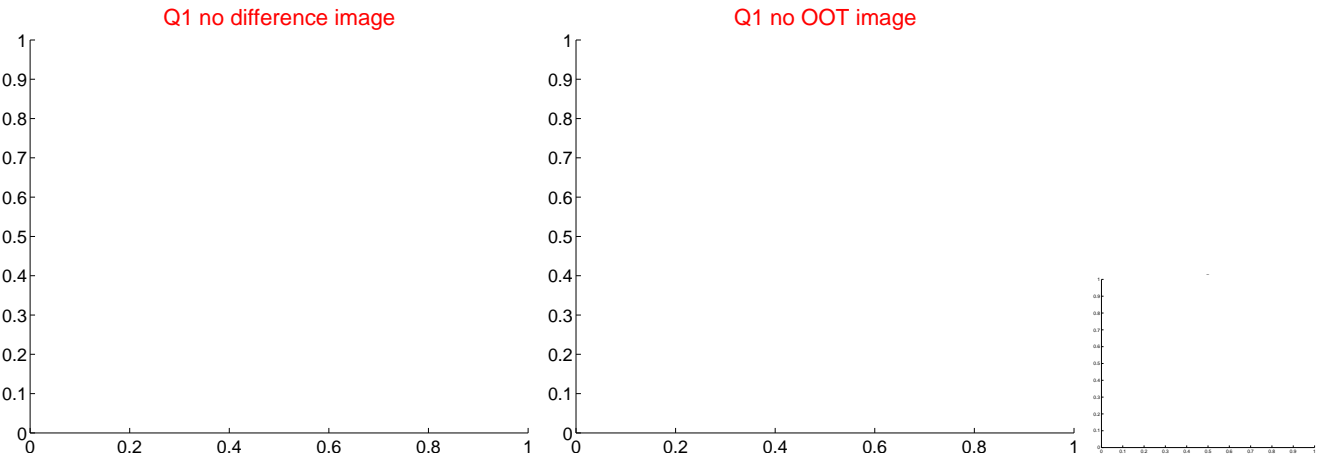


offset from photometric centroids



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

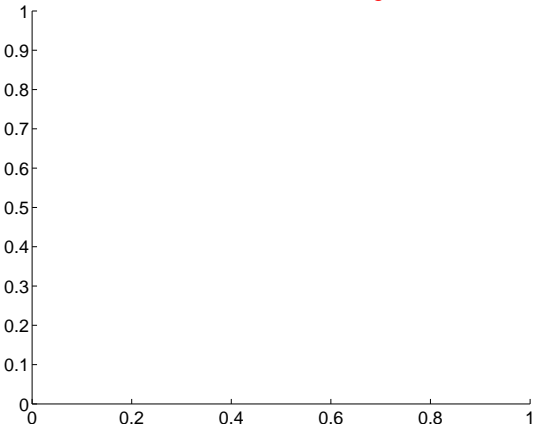
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



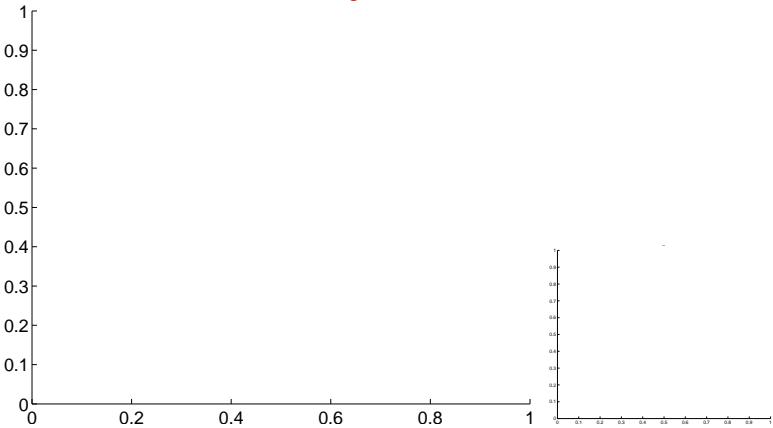


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

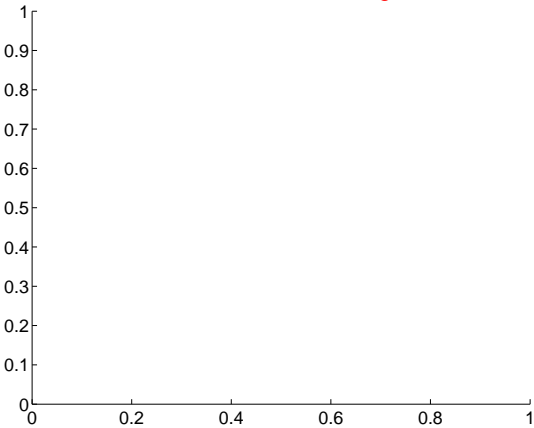
Q9 no difference image



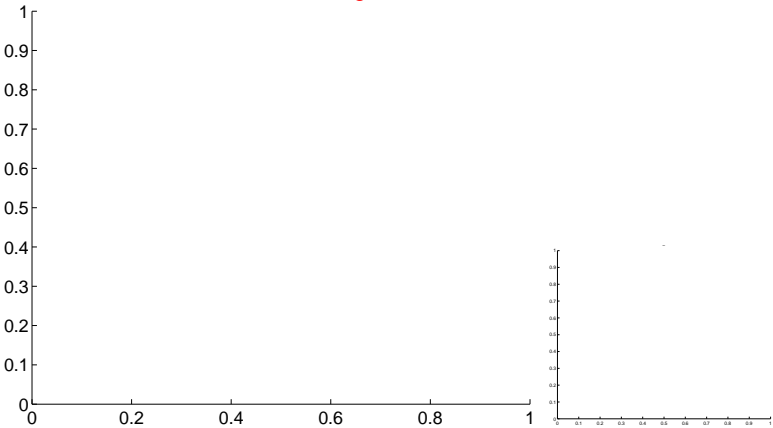
Q9 no OOT image



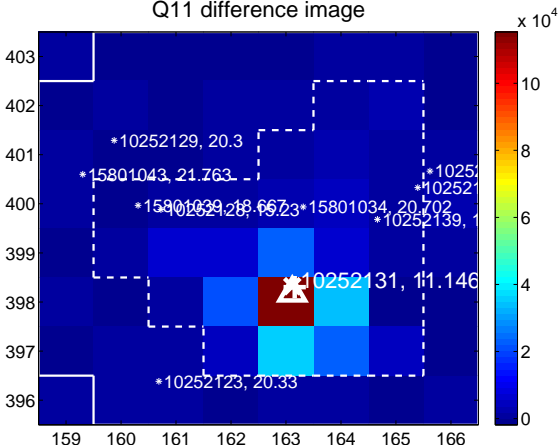
Q10 no difference image



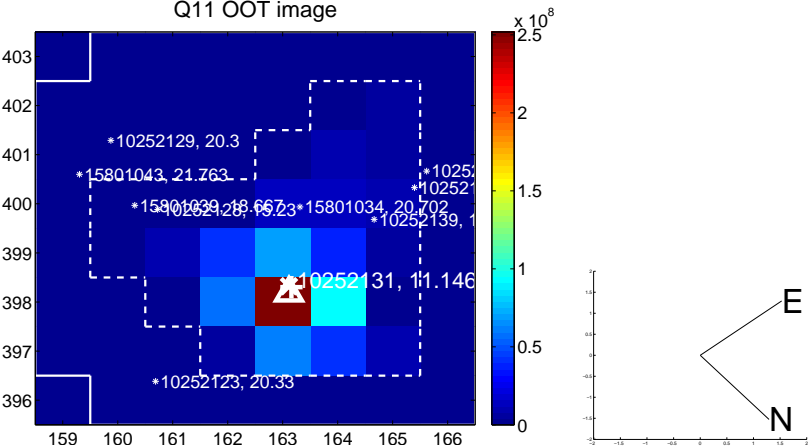
Q10 no OOT image



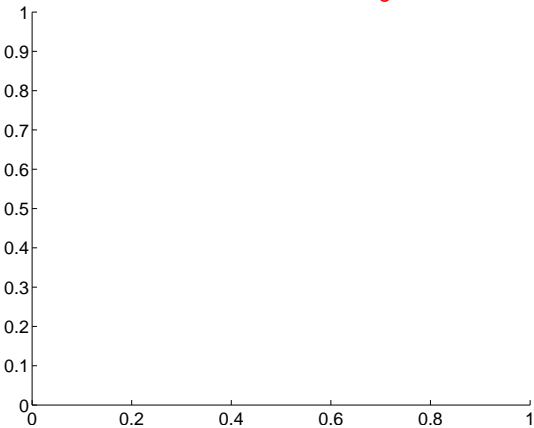
Q11 difference image



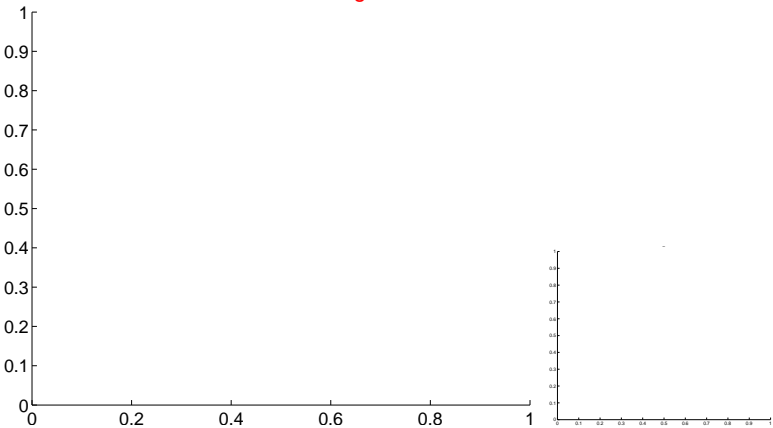
Q11 OOT image



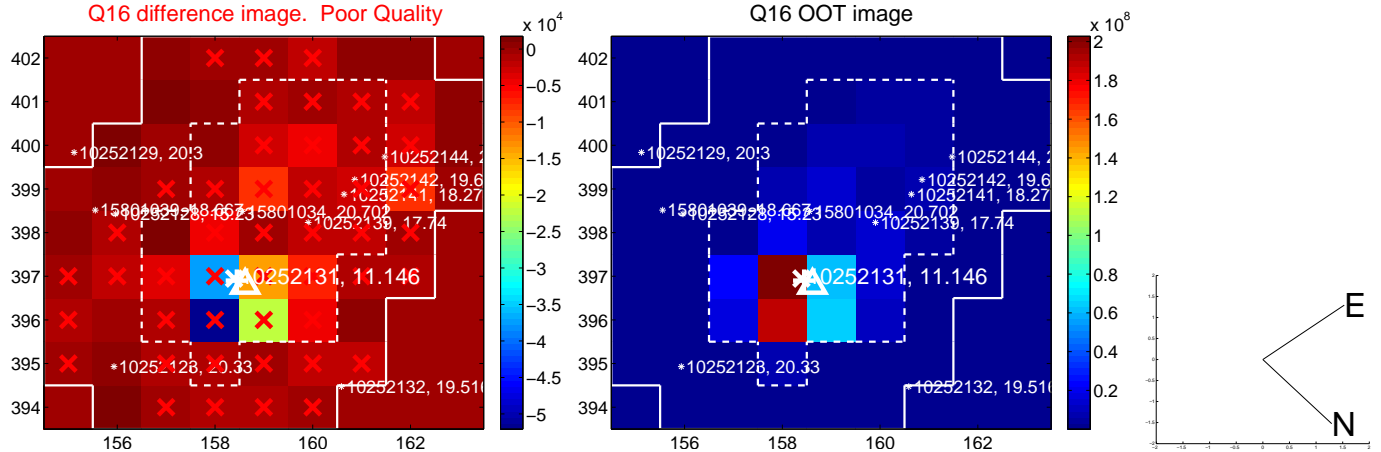
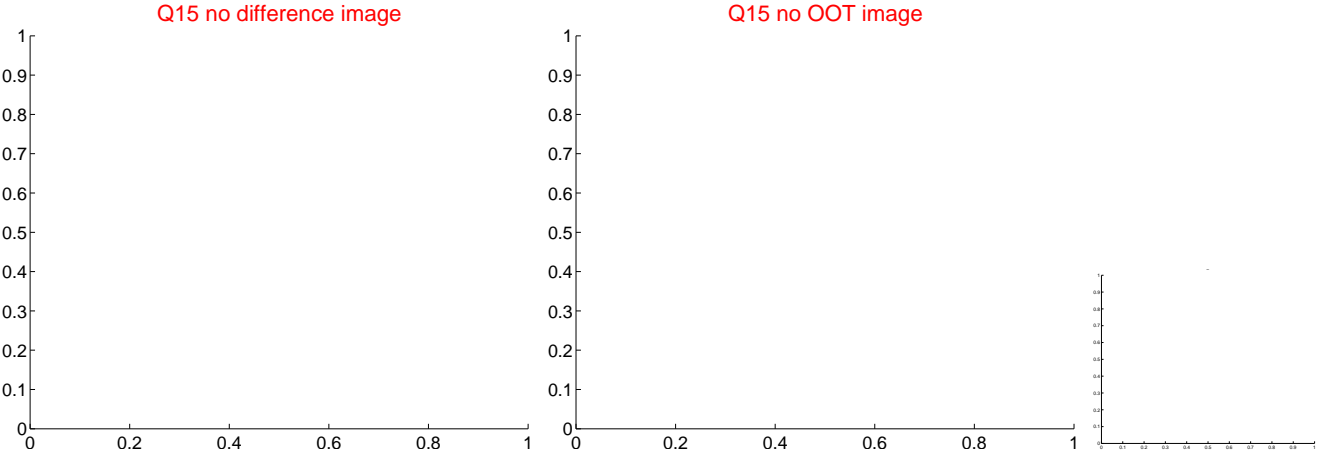
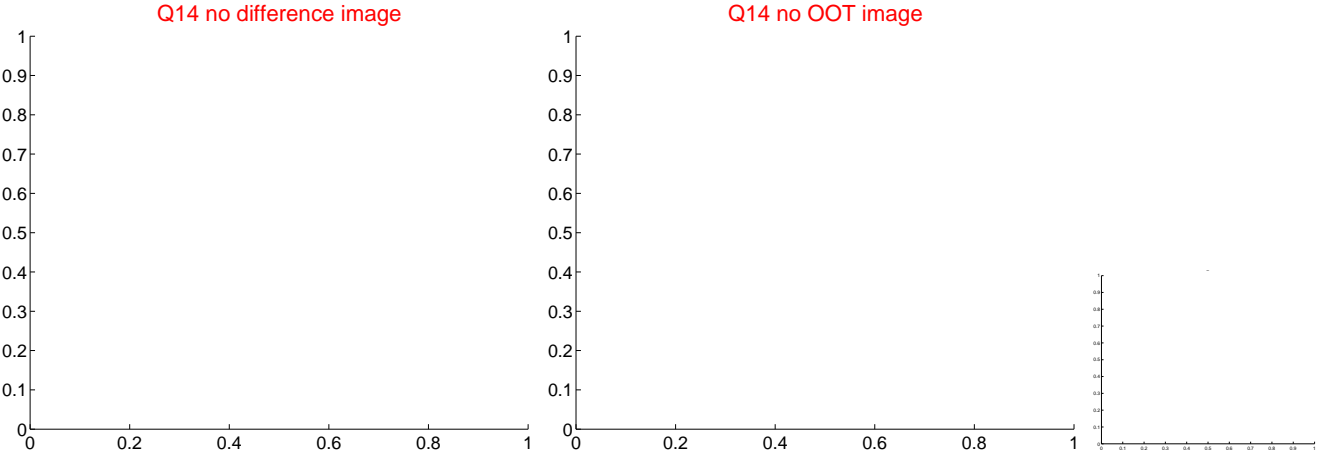
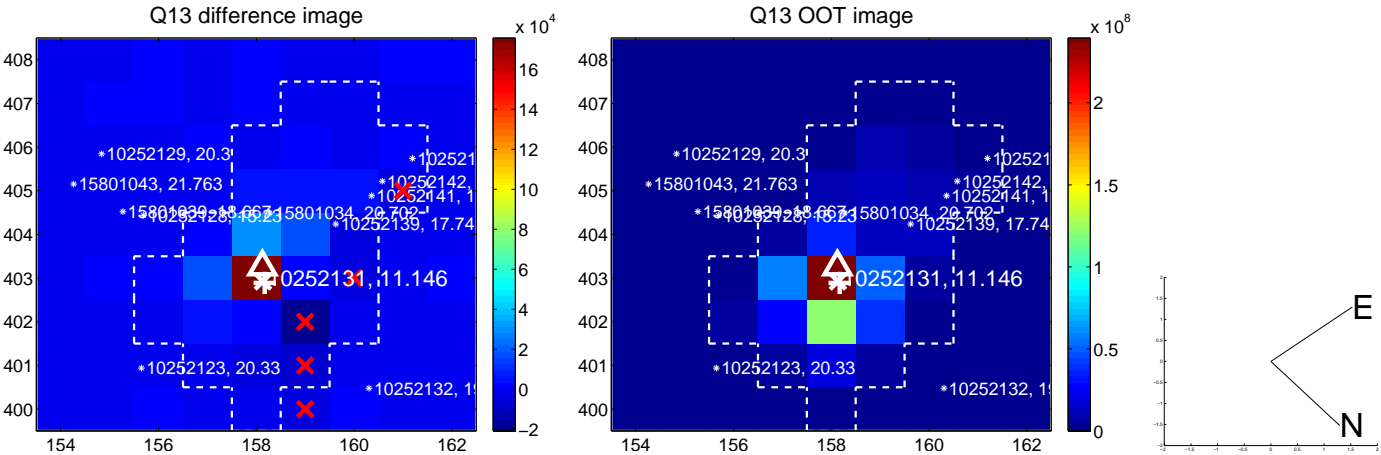
Q12 no difference image



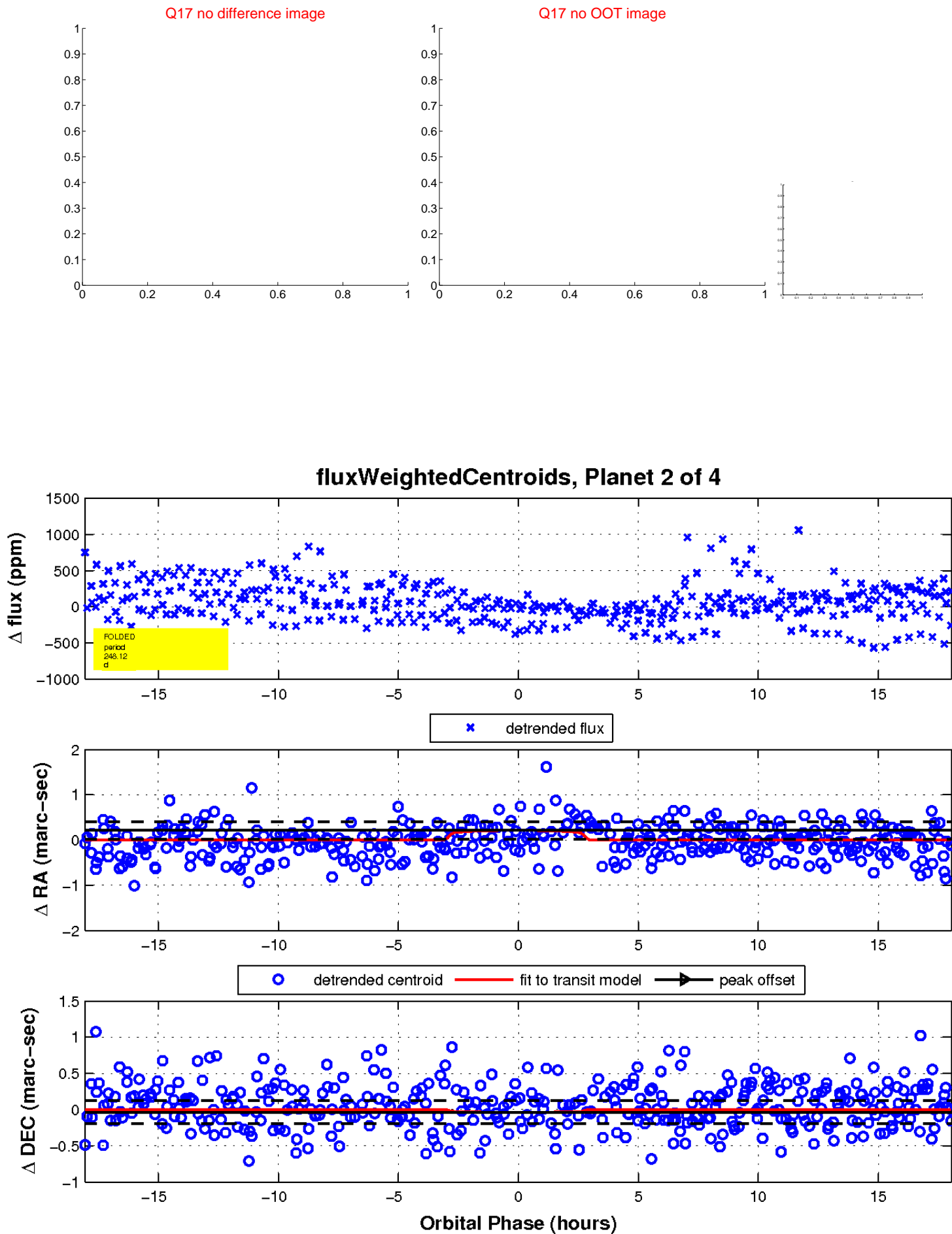
Q12 no OOT image



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

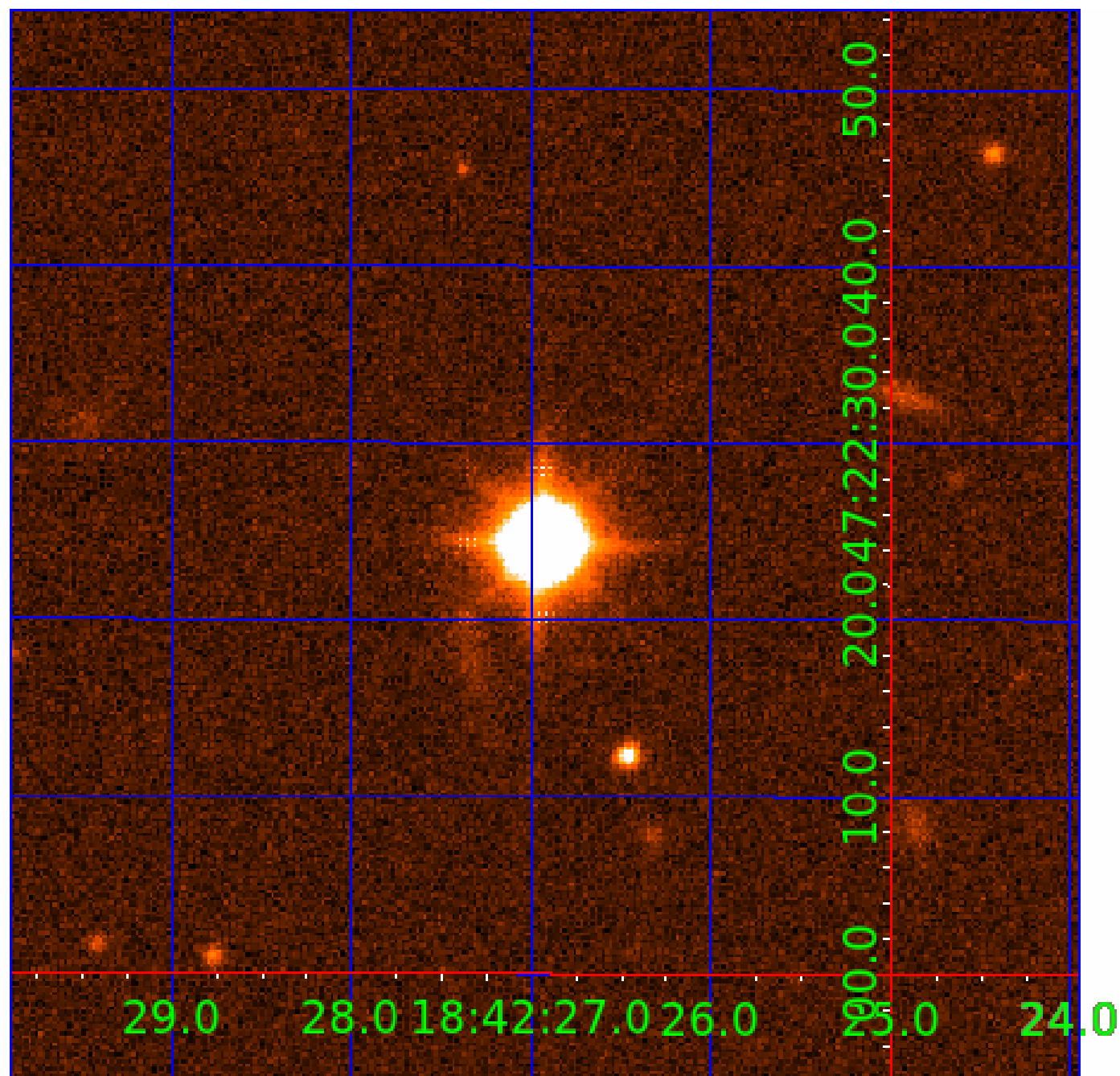


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 010252131

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010252131-01	OBS	No	320.393024	430.832020	92.6	3.021	12.1	2.8	1.69	6415	1.80	4.49
010252131-02	OBS	No	248.117987	267.358218	100.1	6.021	12.3	3.5	1.69	6415	1.98	6.31
010252131-03	OBS	No	311.907073	417.894039	287.9	5.160	12.6	6.4	1.69	6415	3.03	4.65
010252131-04	OBS	No	453.868158	361.835365	196.7	4.699	10.3	4.9	1.69	6415	2.62	2.82

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010252131-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE_ZUMA_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_SATURATED
010252131-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_SATURATED
010252131-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—INCONSISTENT_TRANS—CENT_SATURATED
010252131-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_SATURATED

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

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

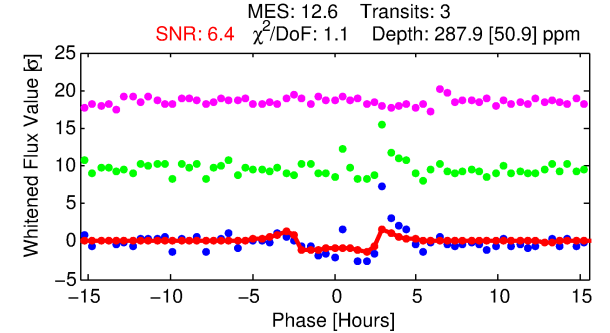
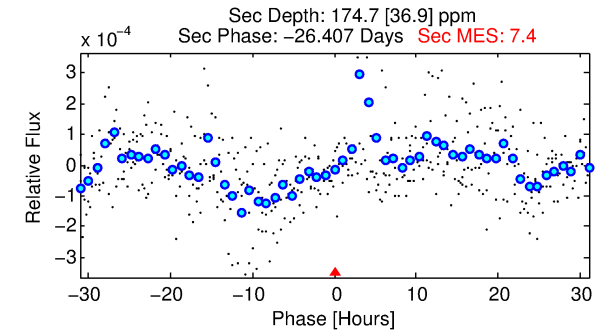
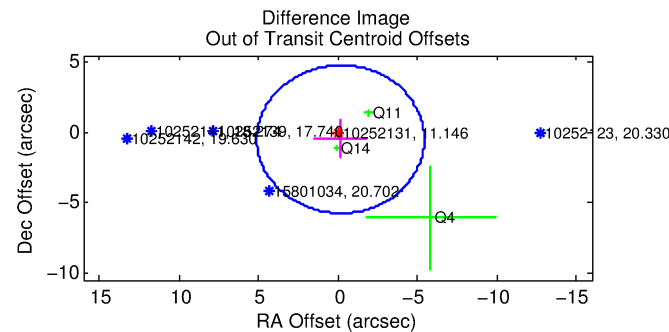
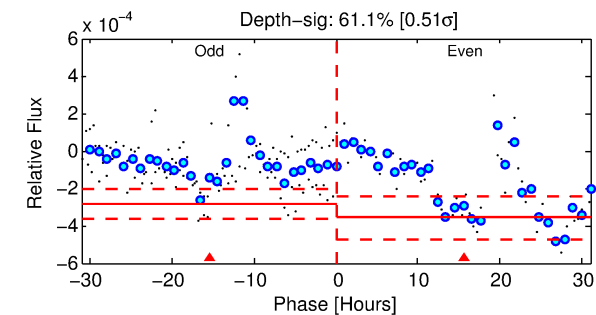
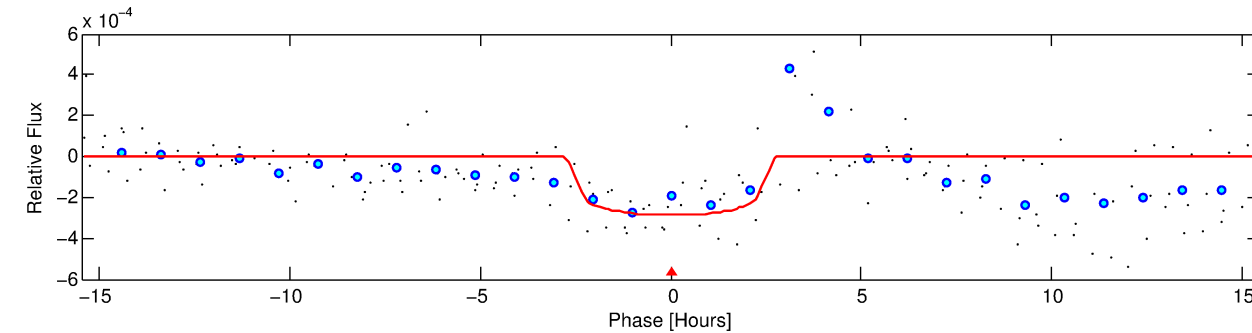
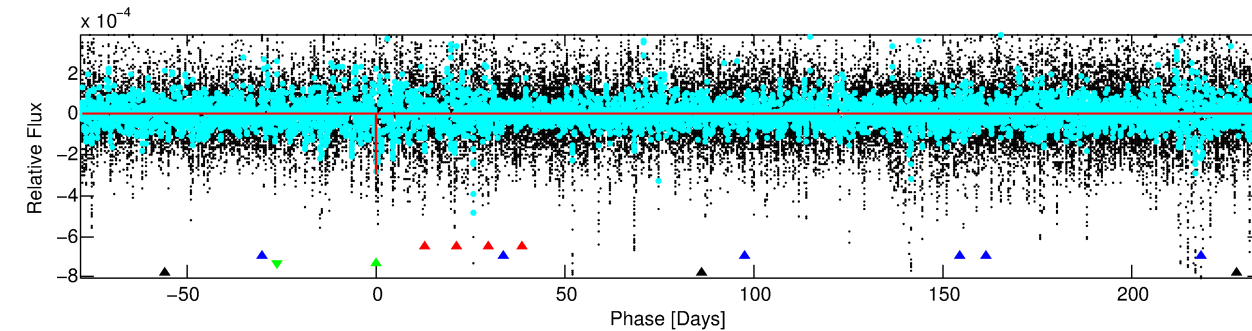
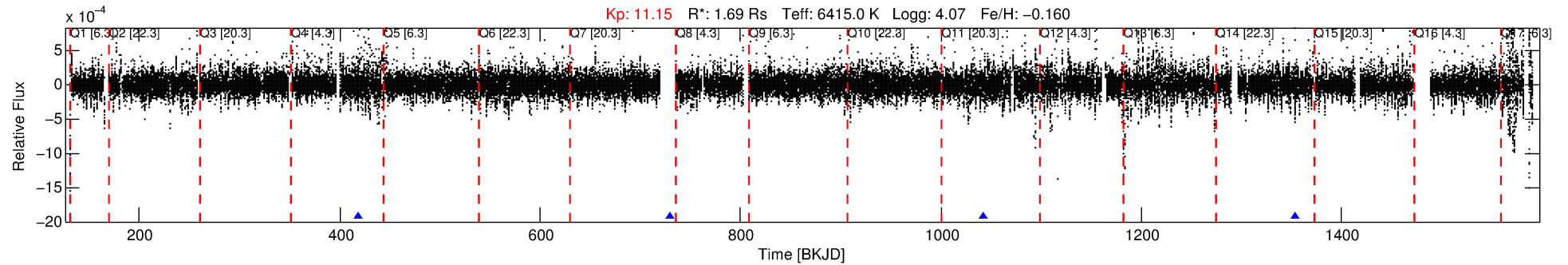
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010252131-03

No Significant Match Found

# DV One-Page Summary

KIC: 10252131 Candidate: 3 of 4 Period: 311.907 d



## DV Fit Results:

Period = 311.90707 [0.00385] d  
Epoch = 417.8940 [0.0078] BKJD  
Rp/R\* = 0.0164 [0.0125]  
a/R\* = 361.78 [1452.36]  
b = 0.65 [3.60]  
Seff = 4.65 [1.88]  
Teq = 374 [38] K  
Rp = 3.03 [2.44] Re  
a = 0.9652 [0.2384] AU  
Ag = 9743.16 [15472.69] [0.63 $\sigma$ ]  
Teff = 5752 [2218] K [2.42 $\sigma$ ]

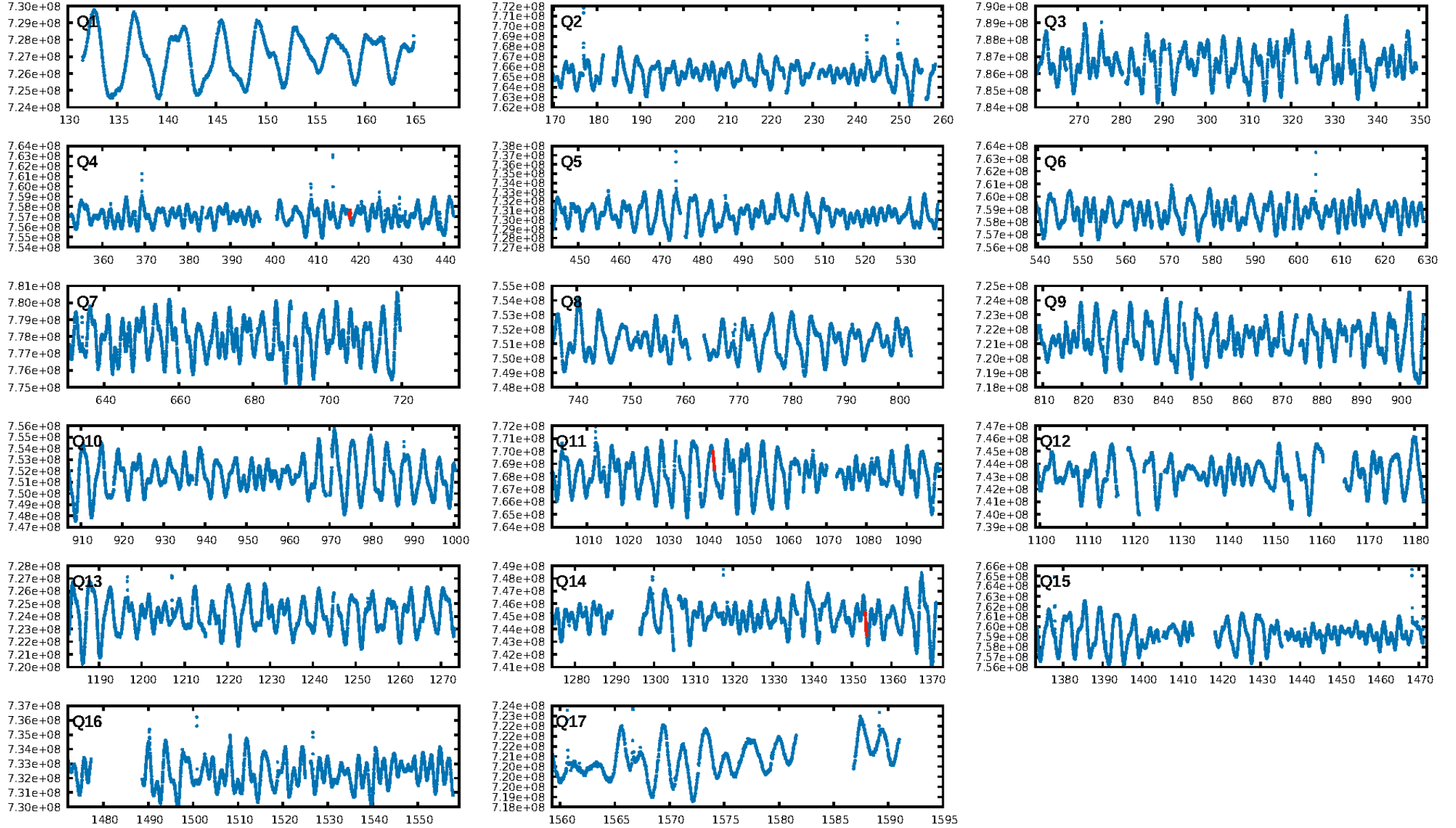
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [193.08 $\sigma$ ]  
LongPeriod-sig: 100.0% [34.06 $\sigma$ ]  
ModelChiSquare2-sig: 36.1%  
ModelChiSquareGof-sig: 84.3%  
Bootstrap-pfa: 8.23e-13  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 3.816  
Centroid-sig: 60.5%  
Centroid-so: 0.789 arcsec [0.93 $\sigma$ ]  
OotOffset-rm: 0.515 arcsec [0.29 $\sigma$ ]  
KicOffset-rm: 0.282 arcsec [0.16 $\sigma$ ]  
OotOffset-st: 1/1/1/0 [3]  
KicOffset-st: 1/1/1/0 [3]  
DiffImageQuality-fgm: 0.33 [1/3]  
DiffImageOverlap-fno: 1.00 [3/3]

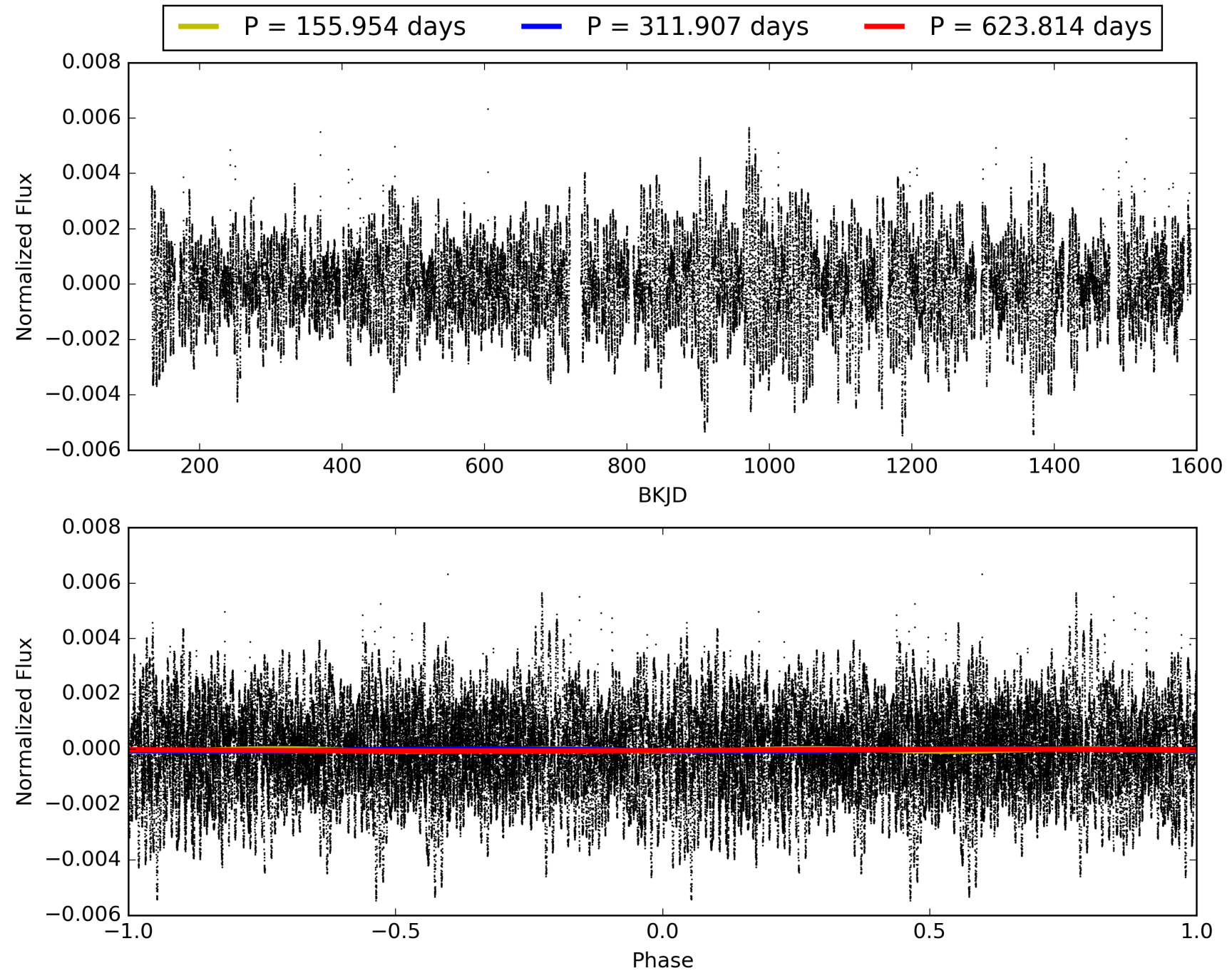
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 13:01:59 Z

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

# TCE 010252131-03, PDC Light Curves

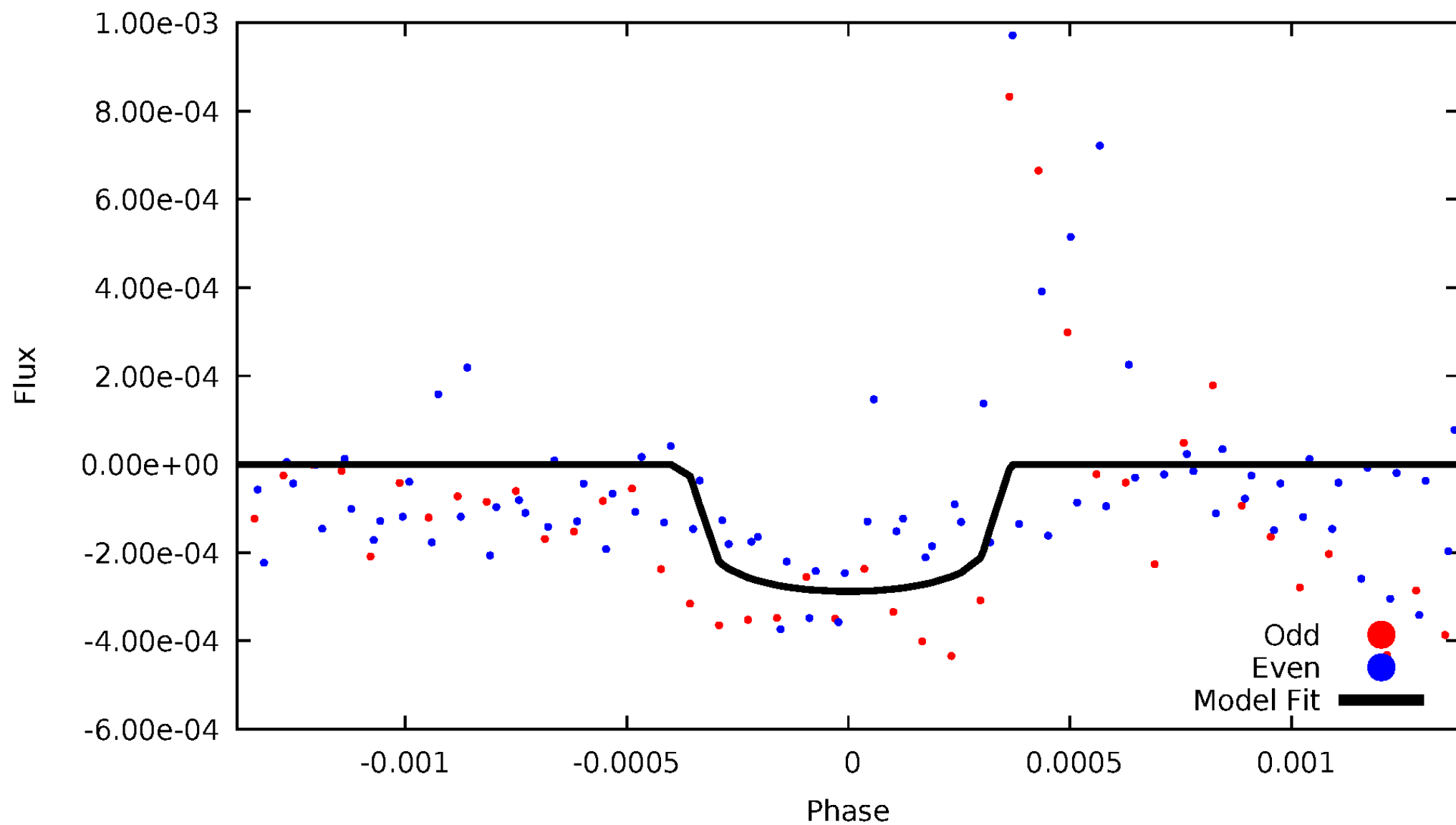


TCE 010252131-03



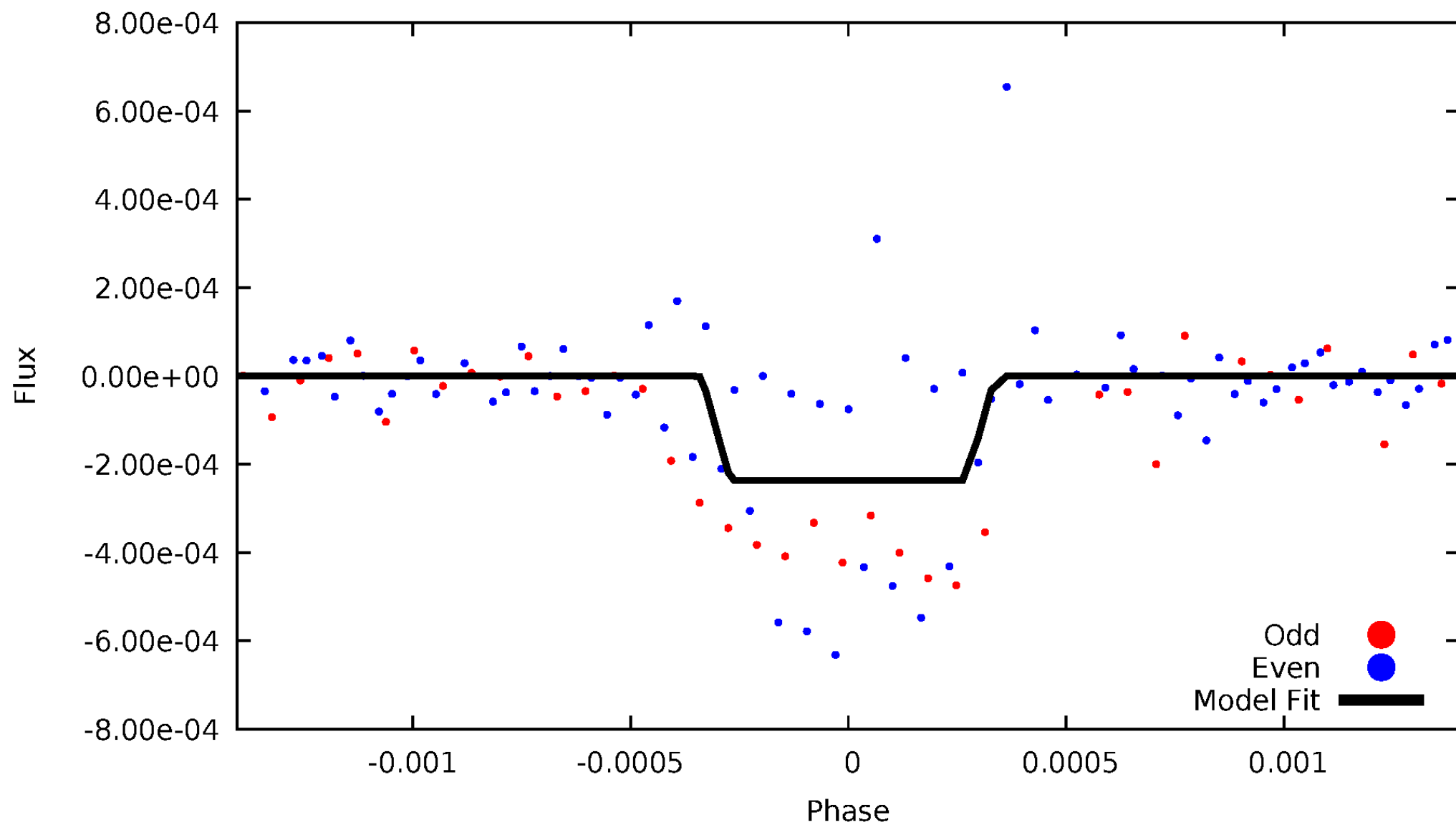
# DV Odd/Even

TCE 010252131-03

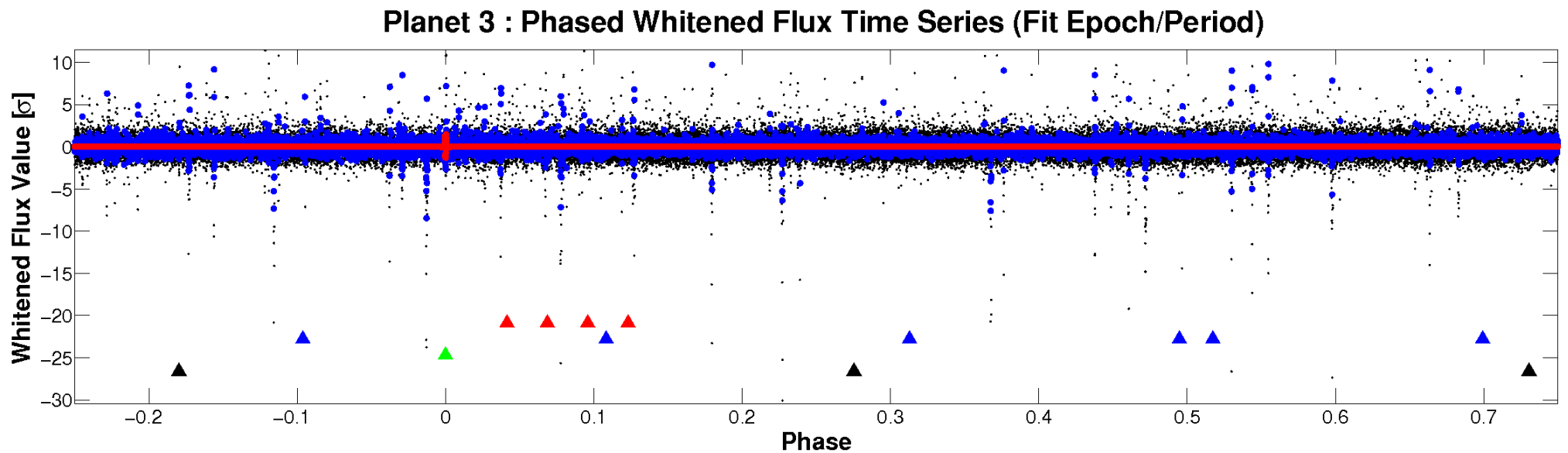
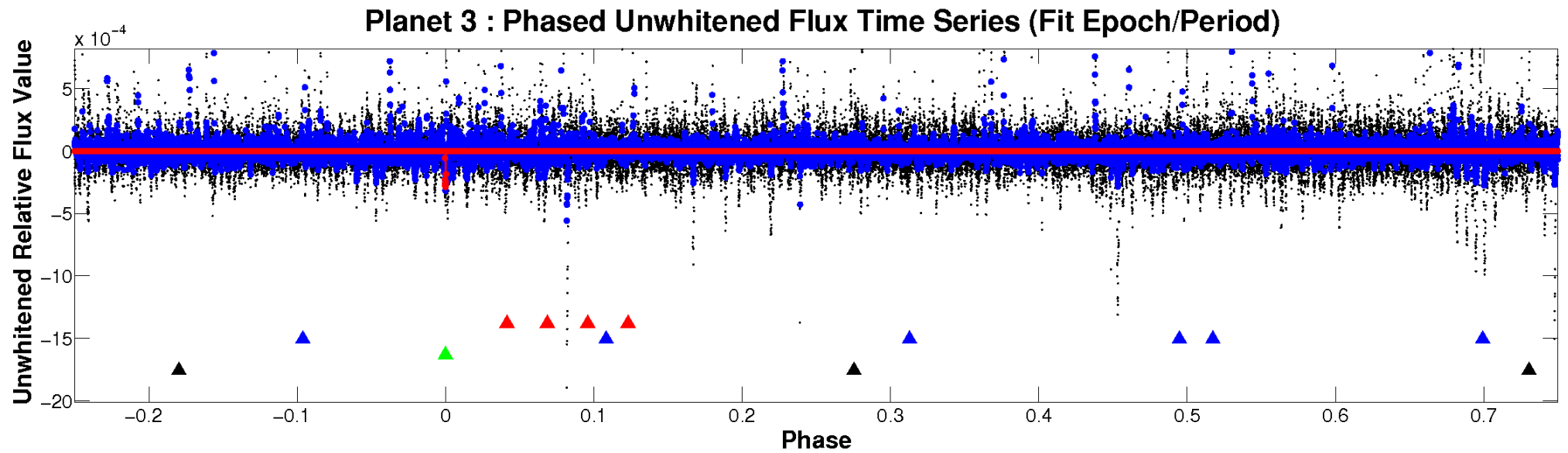


# ALT Odd/Even

TCE 010252131-03

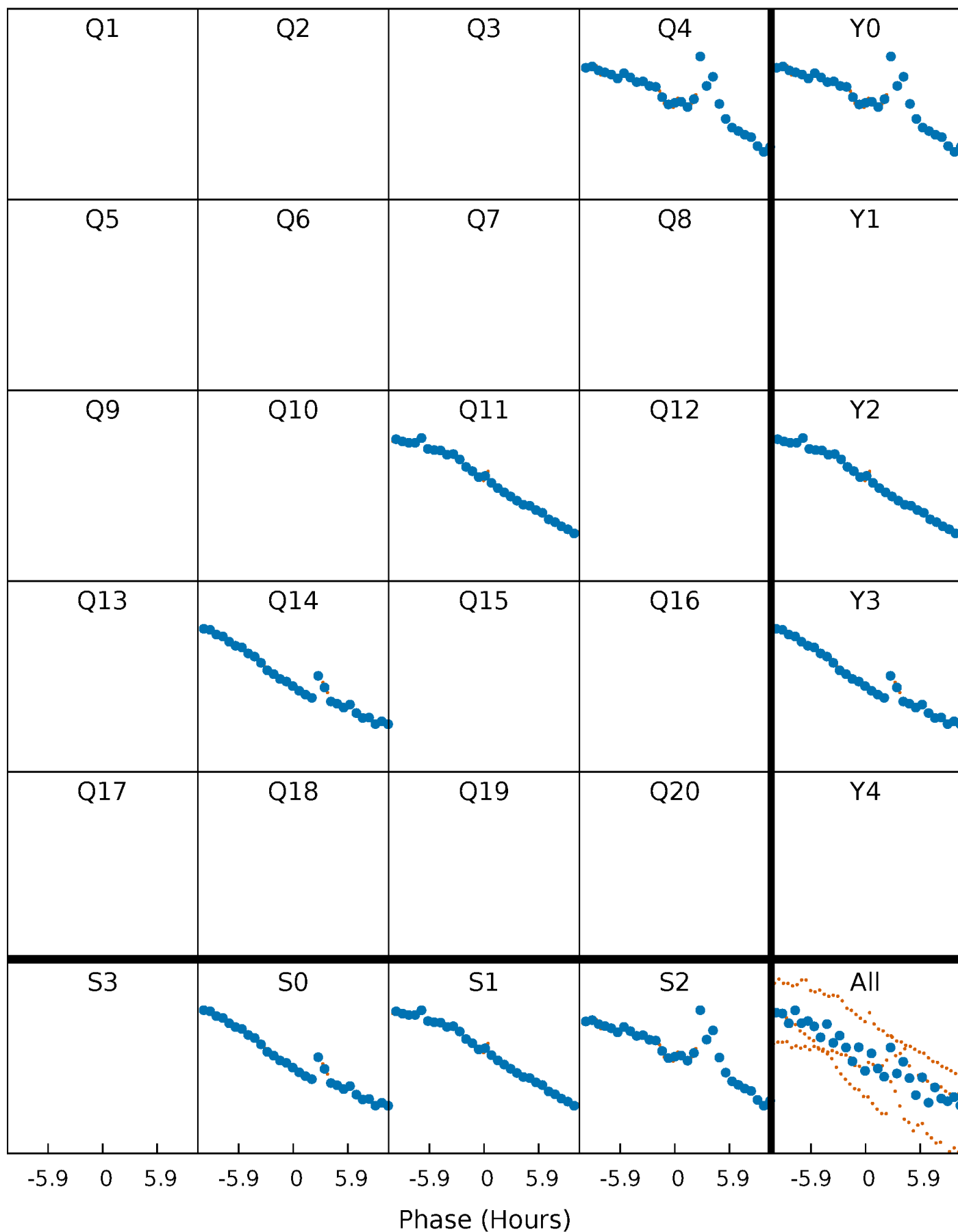


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

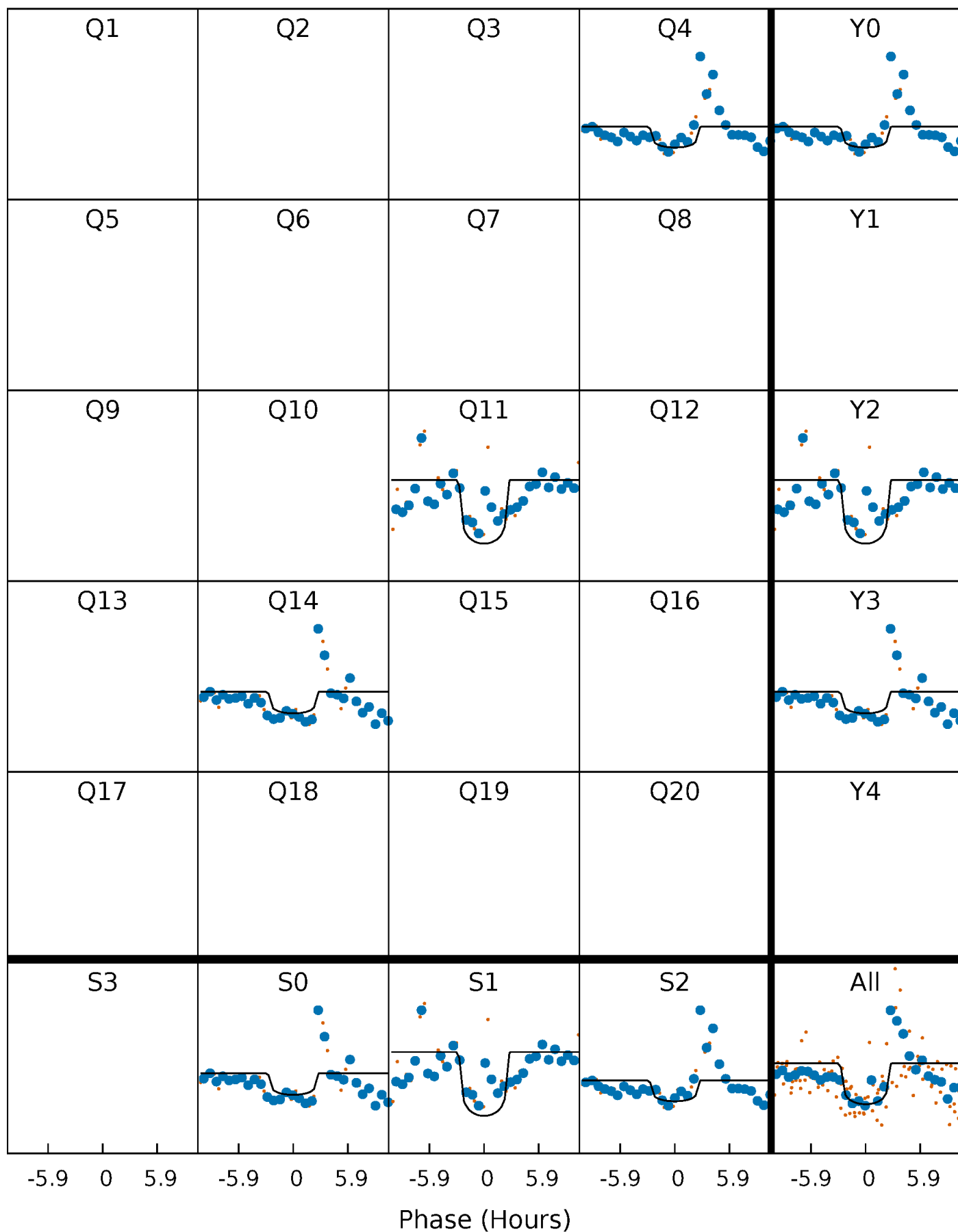
TCE 010252131-03     $P=311.907074$  Days     $T_0=417.894039$  (BKJD)





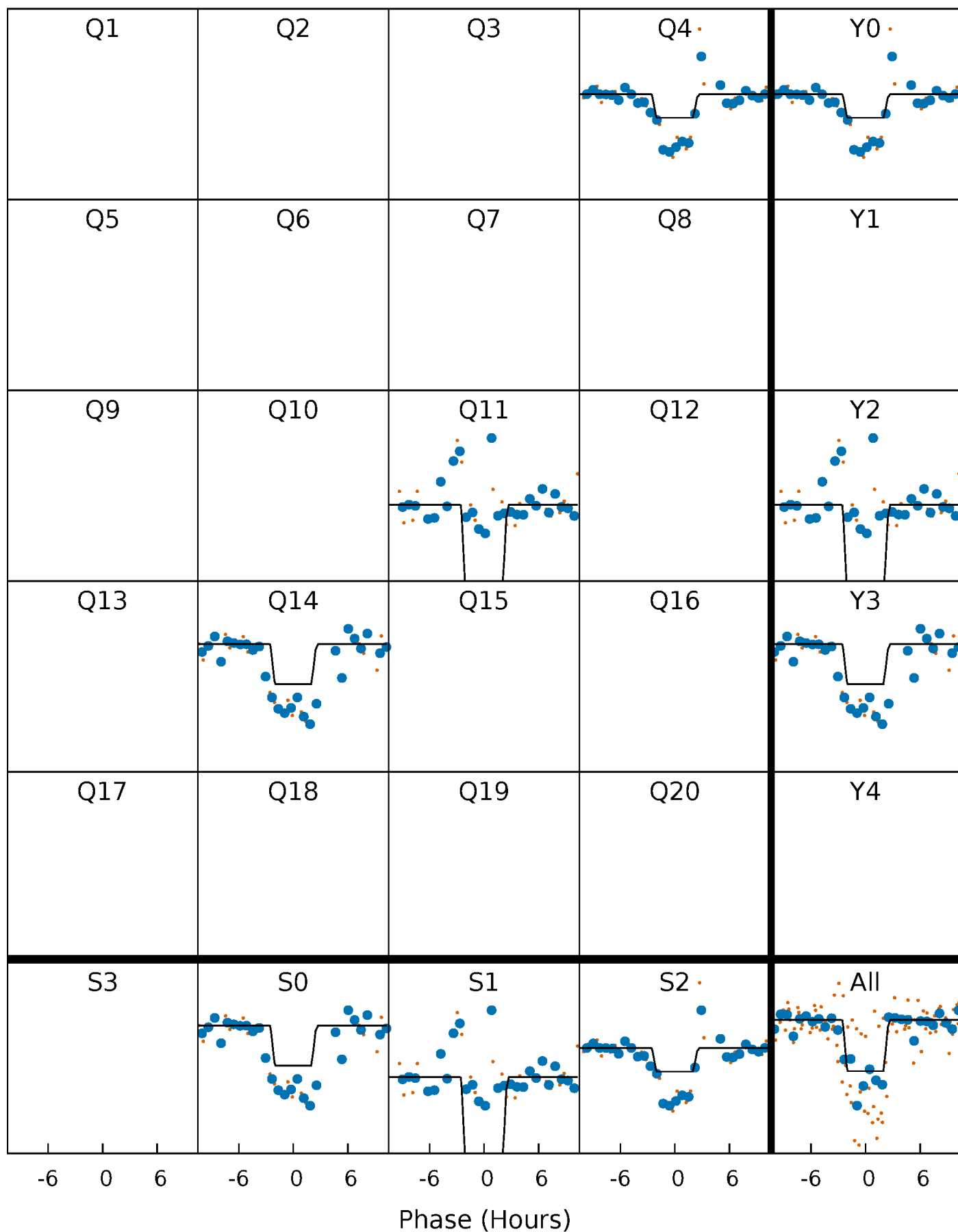
# DV Quarter-Phased Transit Curves

TCE 010252131-03 P=311.907074 Days  $T_0=417.894039$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

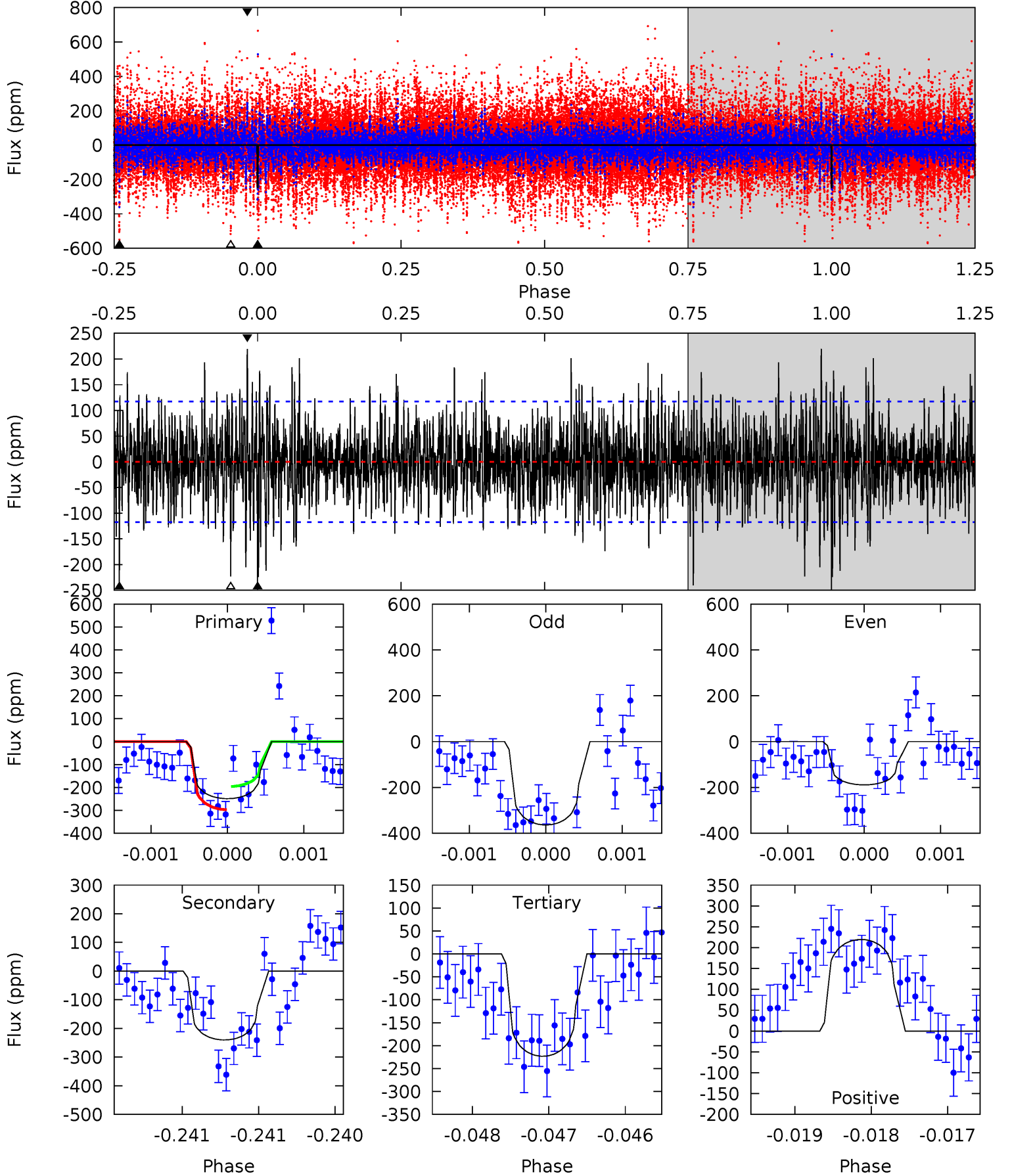
TCE 010252131-03 P=311.904671 Days  $T_0=417.896299$  (BKJD)



# DV Model-Shift Uniqueness Test

010252131-03, P = 311.907074 Days, E = 105.986965 Days

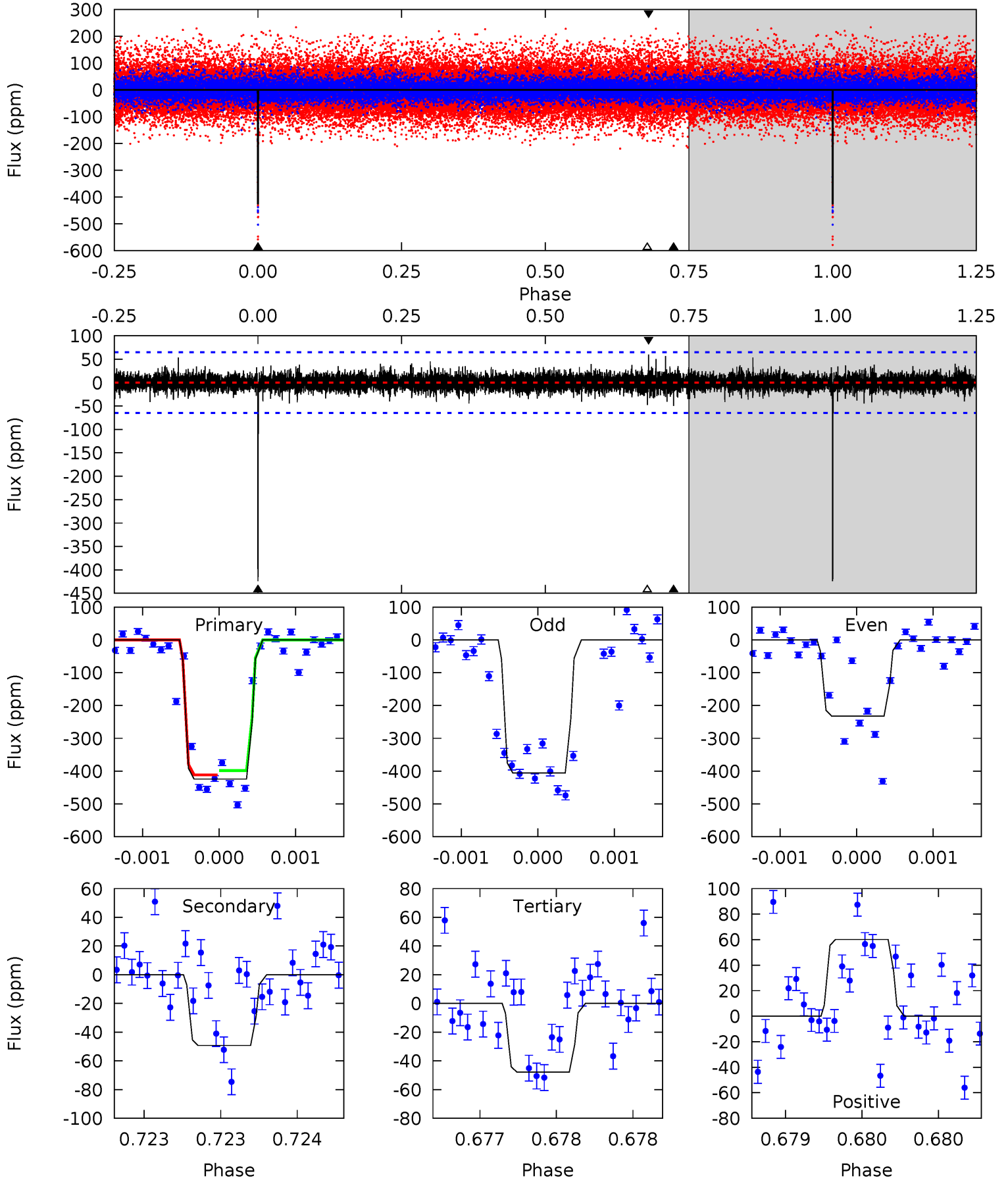
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.7	11.3	10.5	10.3	5.50	3.37	2.52	1.21	1.38	0.79	0.97	3.82	1.16	0.47	2.39



# Alt Model-Shift Uniqueness Test

010252131-03, P = 311.904671 Days, E = 105.991628 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
36.0	4.18	4.05	5.10	5.52	3.39	0.88	32.0	30.9	0.13	-0.92	8.35	0.71	0.12	0.56



### Stellar Parameters For KIC 010252131

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6415^{+146}_{-162}$	$4.073^{+0.228}_{-0.123}$	$-0.160^{+0.250}_{-0.250}$	$1.690^{+0.362}_{-0.442}$	$1.234^{+0.188}_{-0.188}$	$0.360^{+0.460}_{-0.127}$
	+2%/-3%	+6%/-3%	+156%/-156%	+21%/-26%	+15%/-15%	+128%/-35%
Source	PHO1	FLK73	KIC0	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 010252131-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-240 \pm 21$	$3.23^{+2.28}_{-1.92}$	$518^{+31}_{-37}$	$5920^{+3887}_{-1196}$	$11933^{+56342}_{-7981}$
Alt.	$-49 \pm 12$	$3.12^{+2.36}_{-1.84}$	$516^{+34}_{-37}$	$4291^{+1991}_{-750}$	$2603^{+13156}_{-1803}$

$T_{max}$  = 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

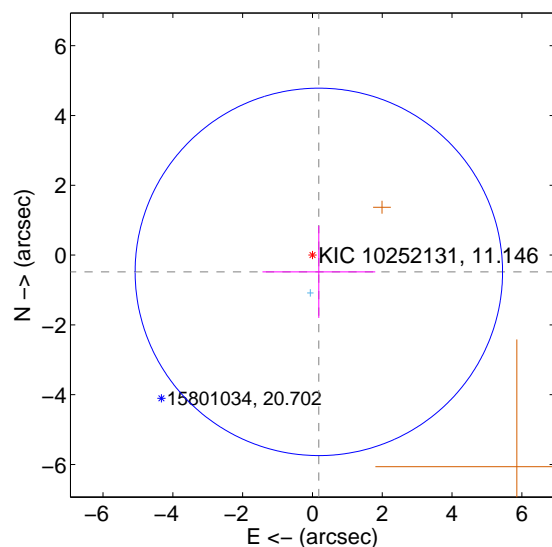
Supplemental centroid analysis for 010252131-03. **Kepler magnitude: 11.15.** Transit SNR 6.44

**There are 1 quarters with good PRF difference image offsets**

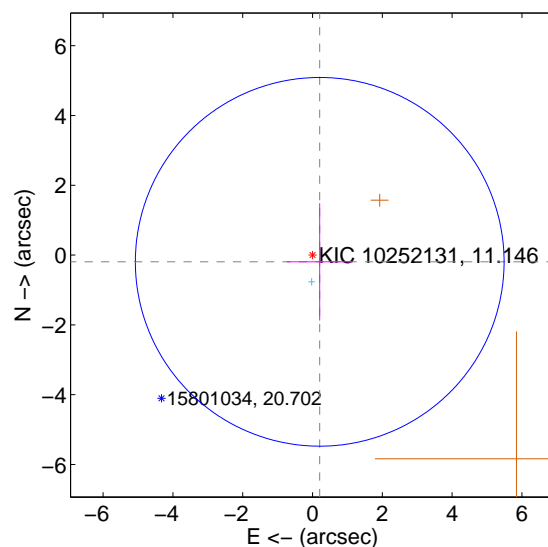
The direct PRF centroid is offset from the target star catalog position by about 0.32 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.515 \pm 1.755$	0.29	$-0.183 \pm 1.616$	$-0.481 \pm 1.320$
PRF-fit source offset from KIC position	$0.282 \pm 1.761$	0.16	$-0.206 \pm 0.951$	$-0.193 \pm 1.683$
photometric centroid source offset	$0.79 \pm 0.84$	0.93	$0.79 \pm 0.85$	$0.06 \pm 0.62$

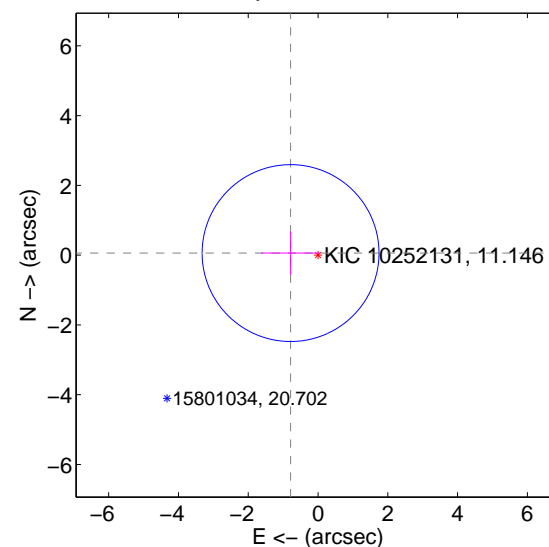
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



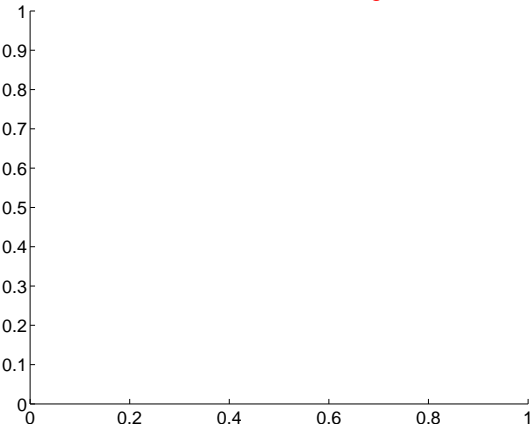
offset from photometric centroids



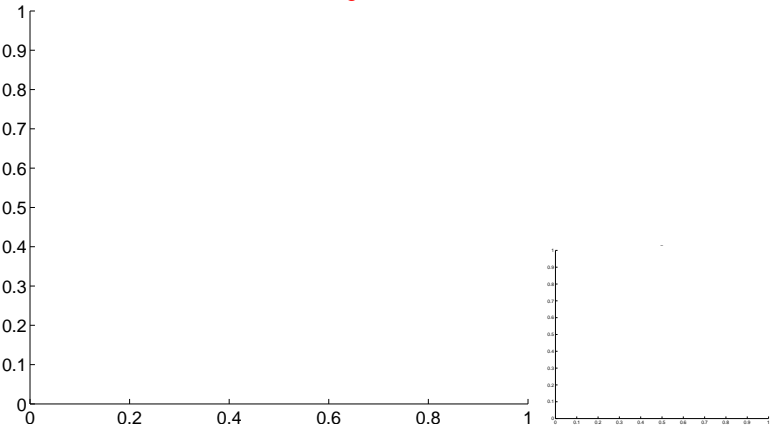
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

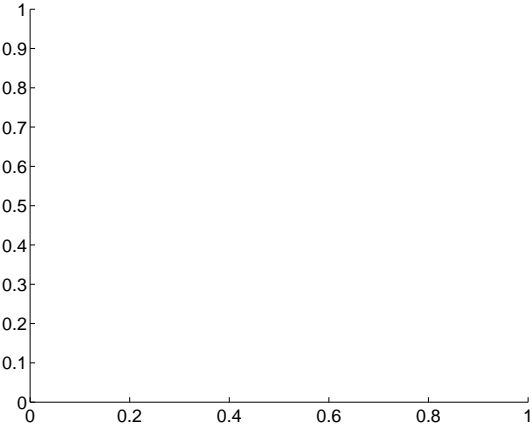
Q1 no difference image



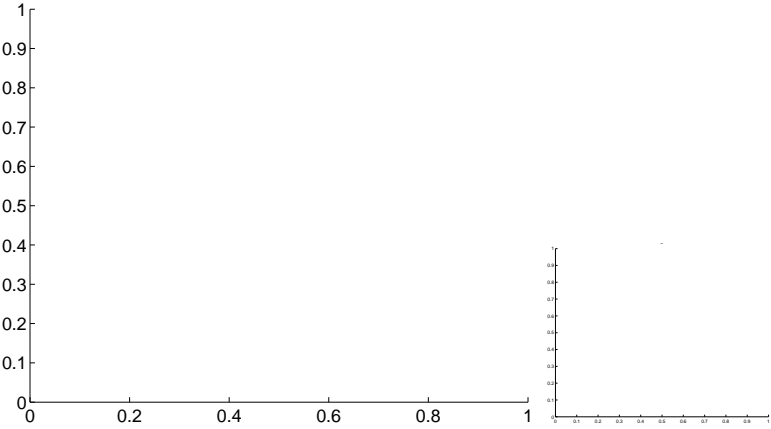
Q1 no OOT image



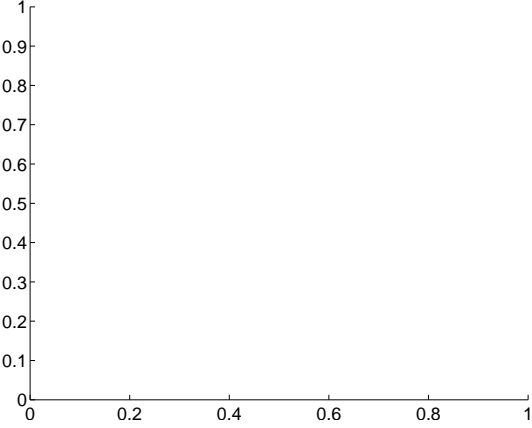
Q2 no difference image



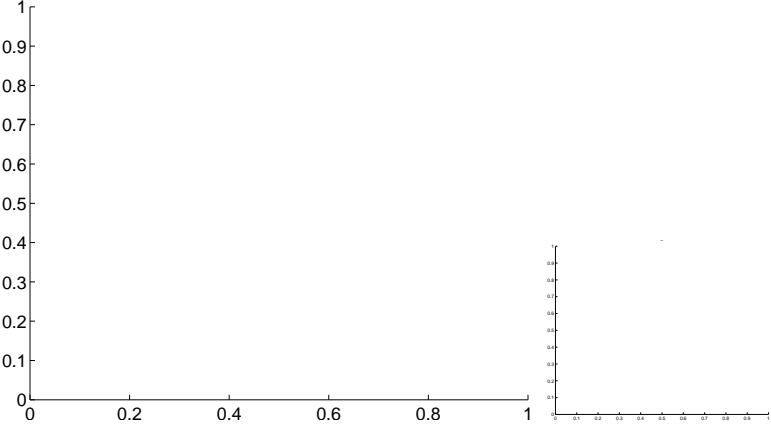
Q2 no OOT image



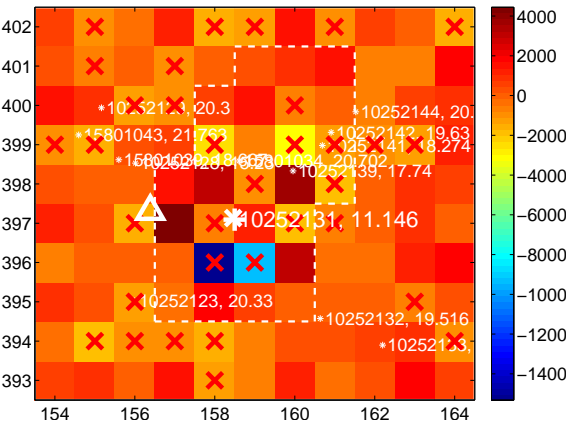
Q3 no difference image



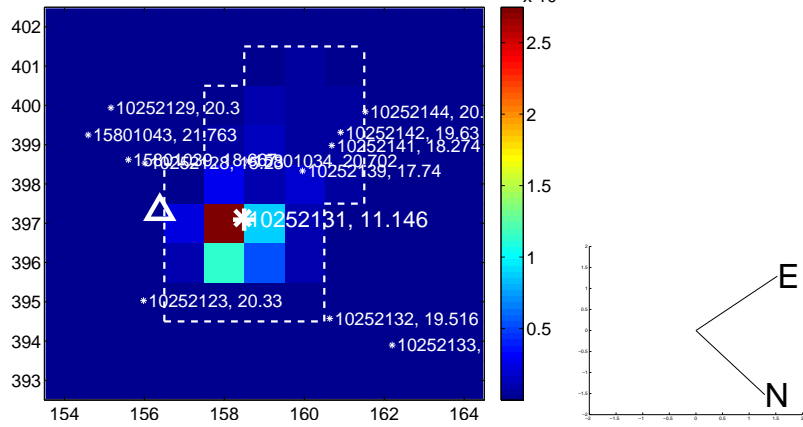
Q3 no OOT image



Q4 difference image. Poor Quality



Q4 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.

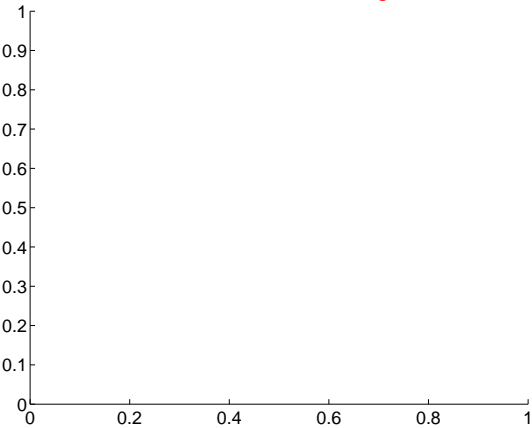
Q9 no difference image



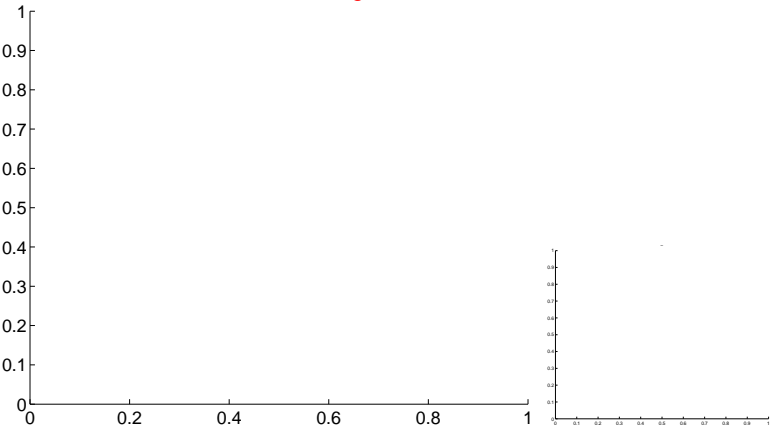
Q9 no OOT image



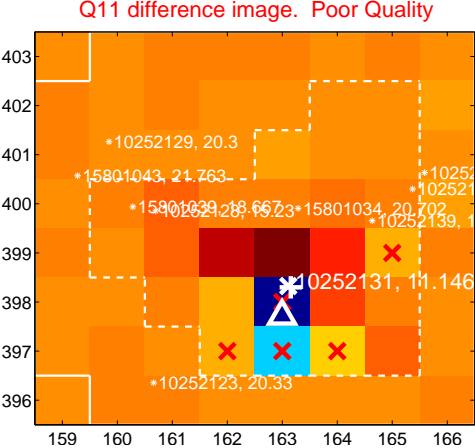
Q10 no difference image



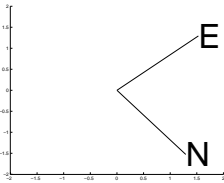
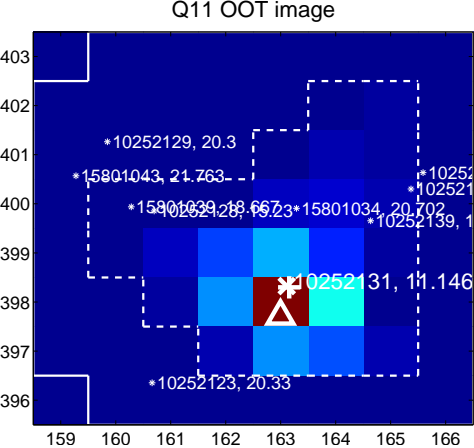
Q10 no OOT image



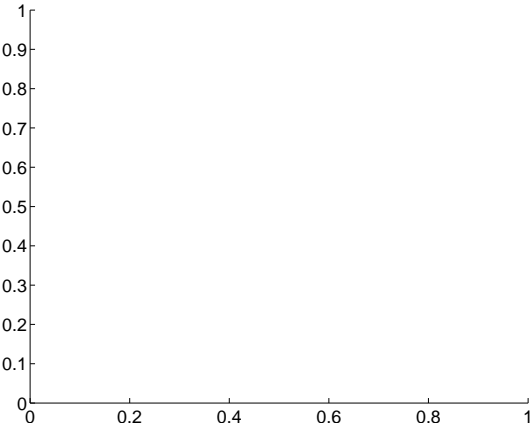
Q11 difference image. Poor Quality



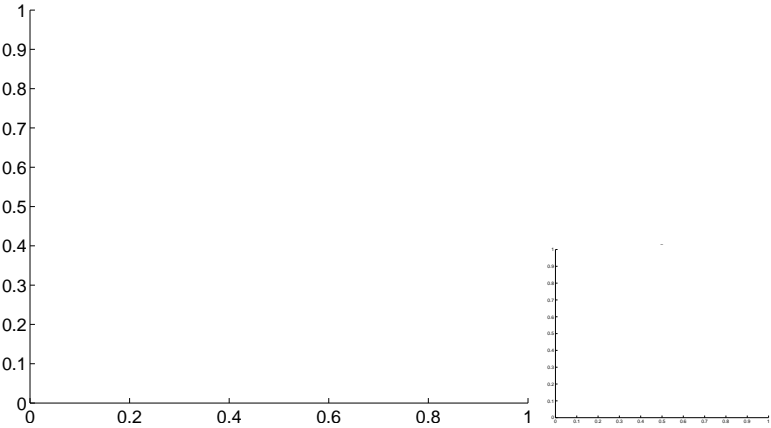
Q11 OOT image



Q12 no difference image

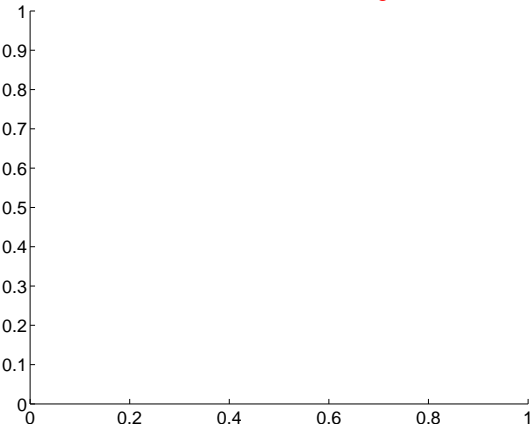


Q12 no OOT image

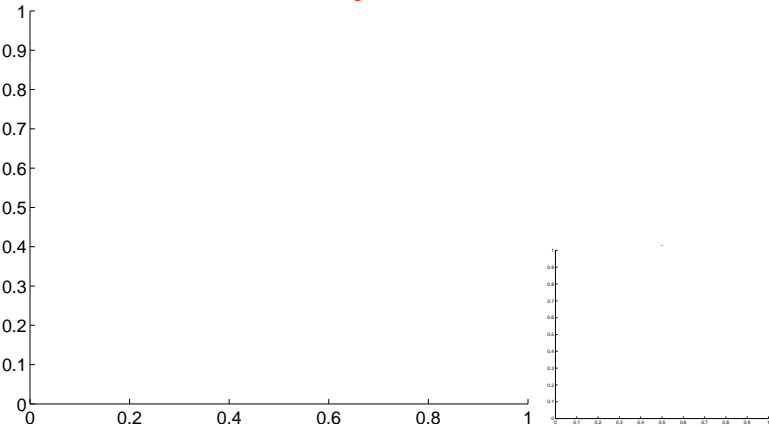


white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.

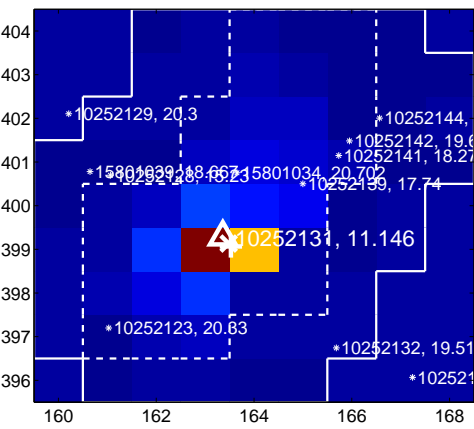
Q13 no difference image



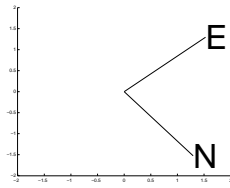
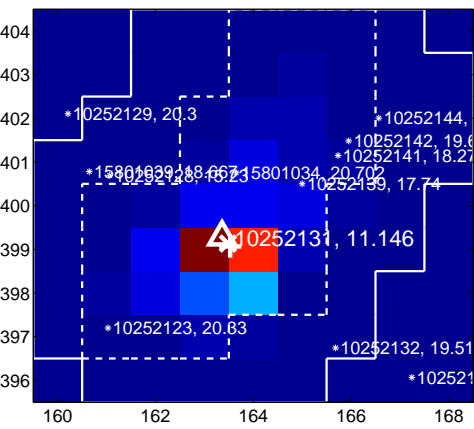
Q13 no OOT image



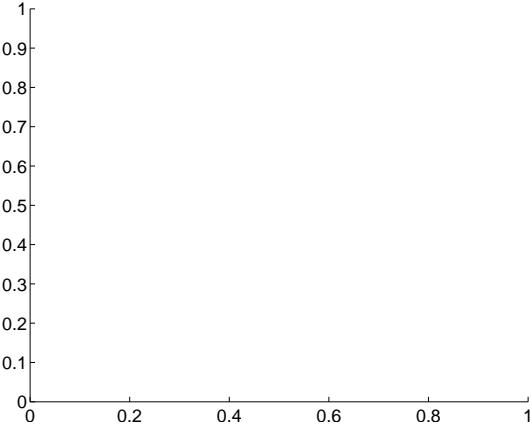
Q14 difference image



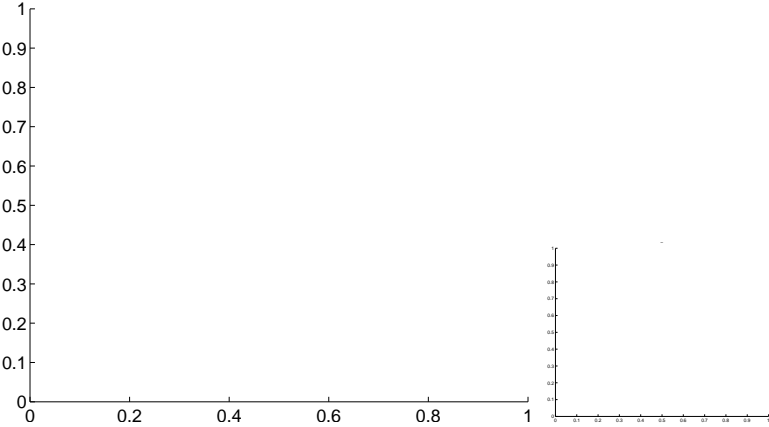
Q14 OOT image



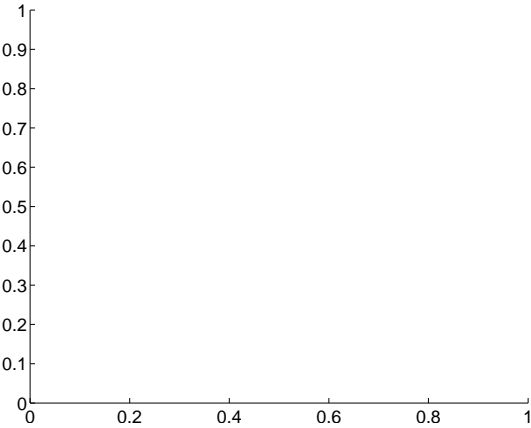
Q15 no difference image



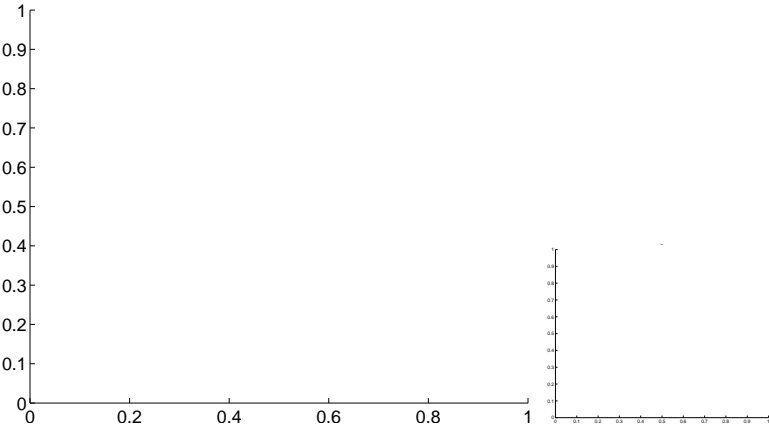
Q15 no OOT image



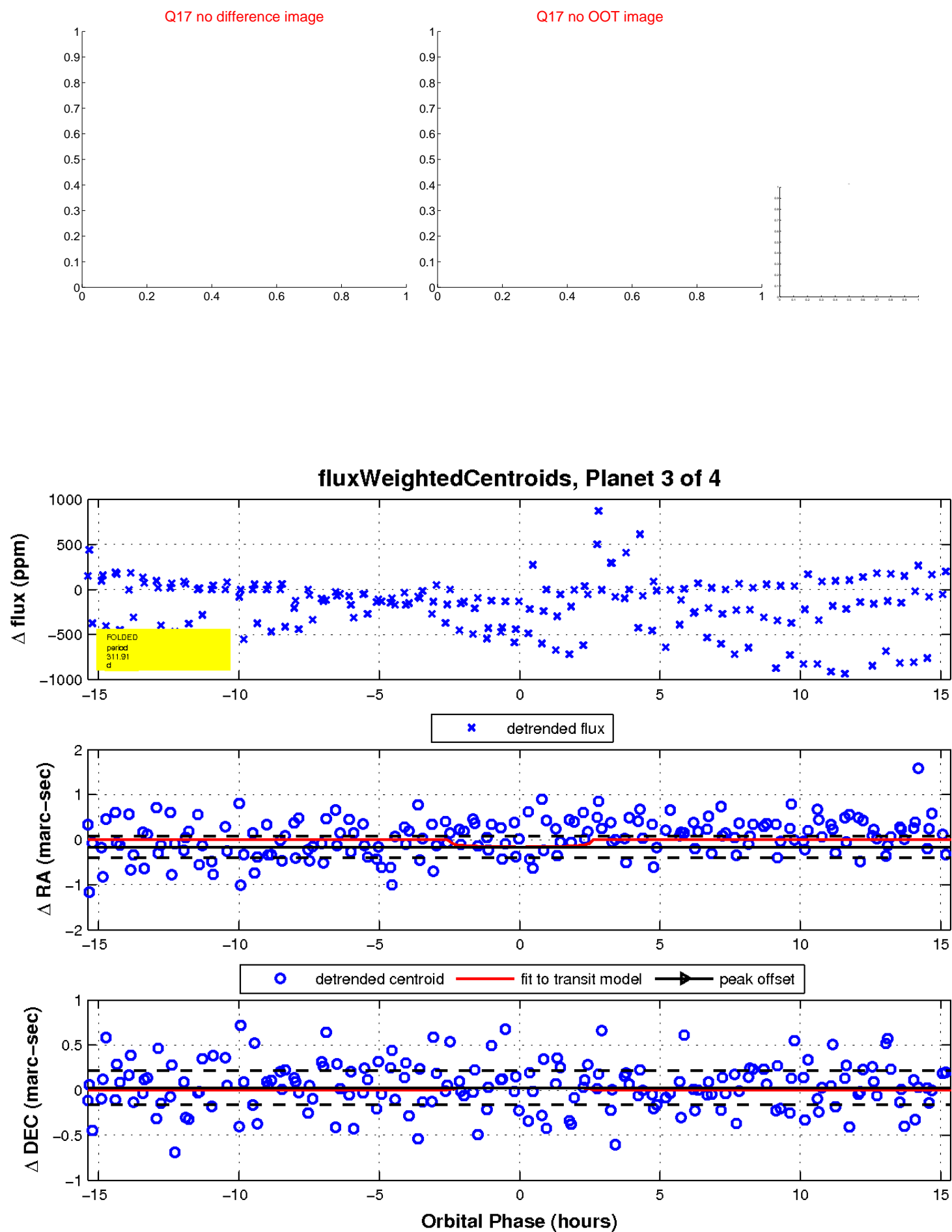
Q16 no difference image



Q16 no OOT image

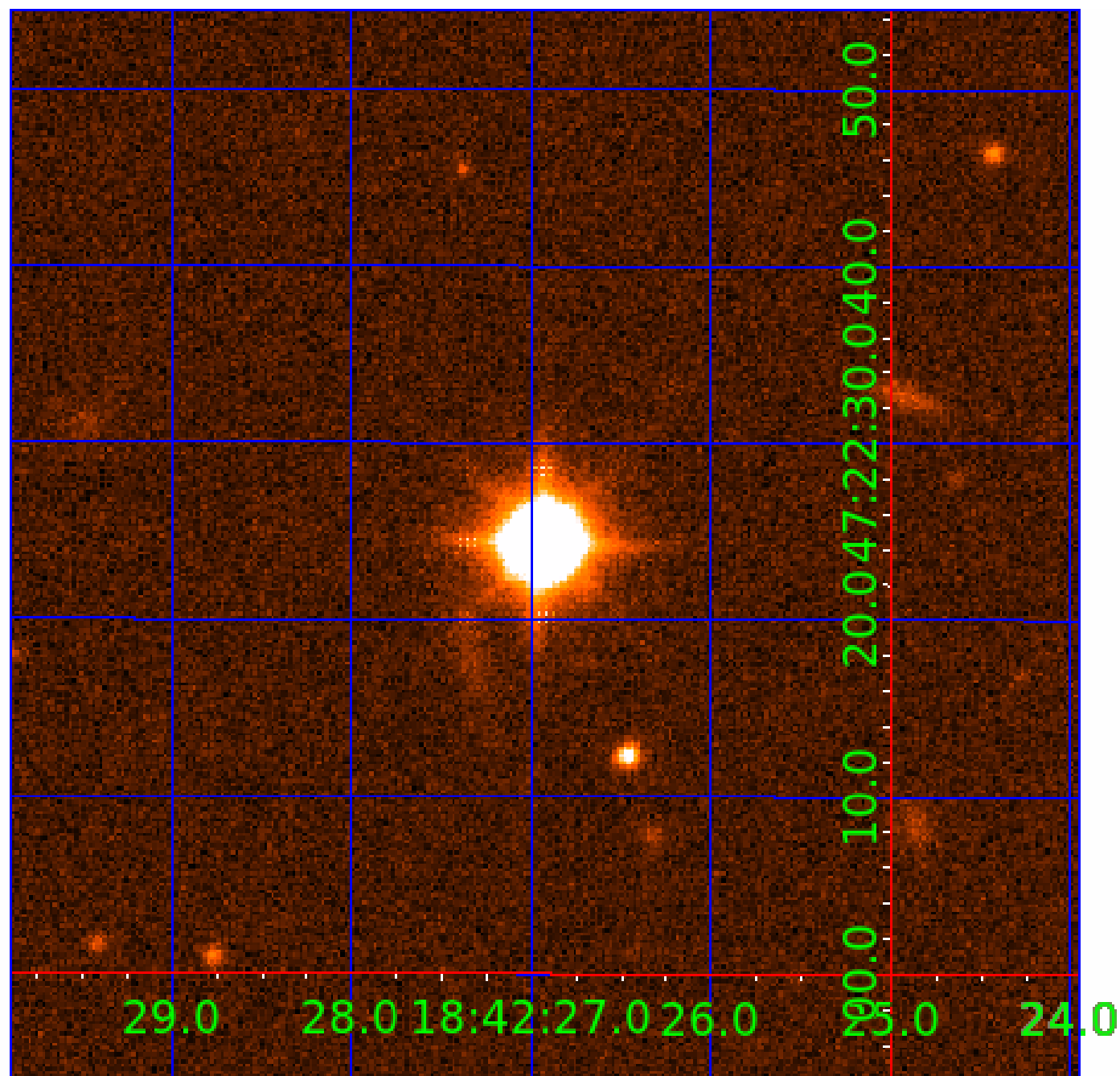


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 010252131

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010252131-01	OBS	No	320.393024	430.832020	92.6	3.021	12.1	2.8	1.69	6415	1.80	4.49
010252131-02	OBS	No	248.117987	267.358218	100.1	6.021	12.3	3.5	1.69	6415	1.98	6.31
010252131-03	OBS	No	311.907073	417.894039	287.9	5.160	12.6	6.4	1.69	6415	3.03	4.65
010252131-04	OBS	No	453.868158	361.835365	196.7	4.699	10.3	4.9	1.69	6415	2.62	2.82

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010252131-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE_ZUMA_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_SATURATED
010252131-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_SATURATED
010252131-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—INCONSISTENT_TRANS—CENT_SATURATED
010252131-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_SATURATED

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

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

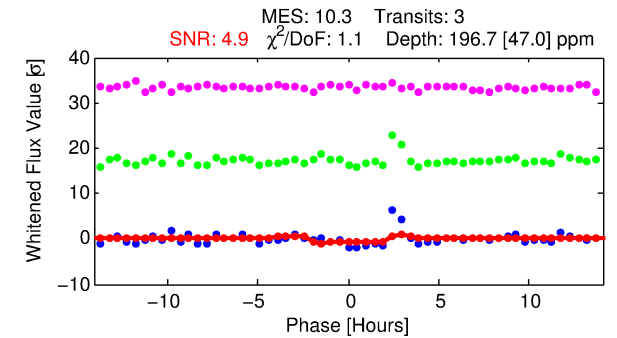
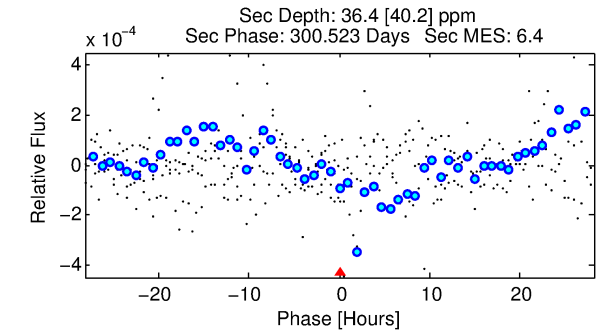
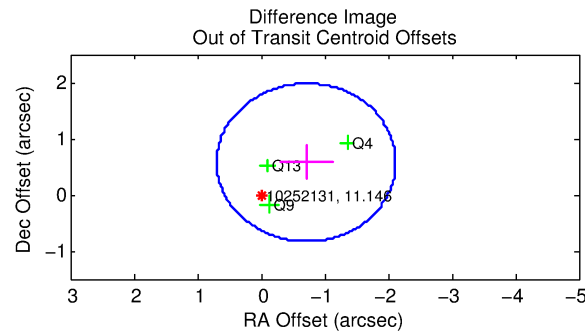
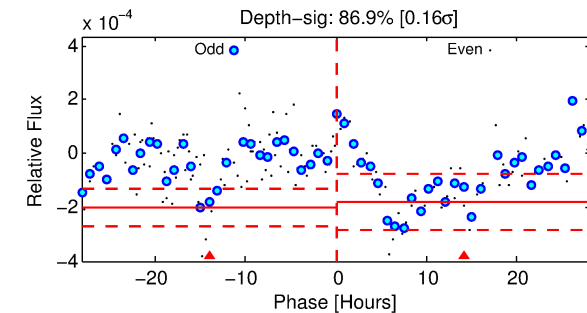
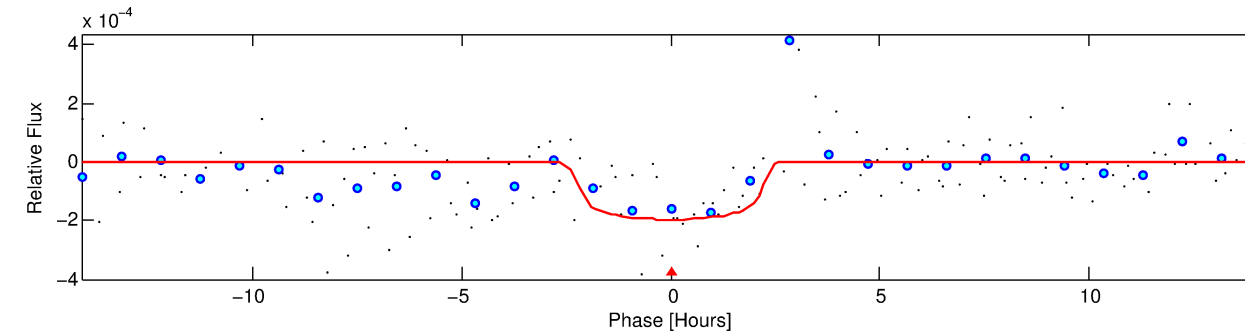
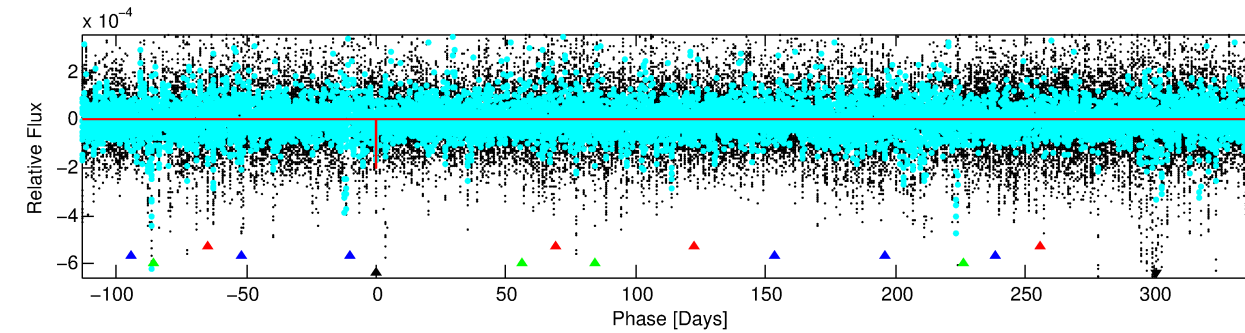
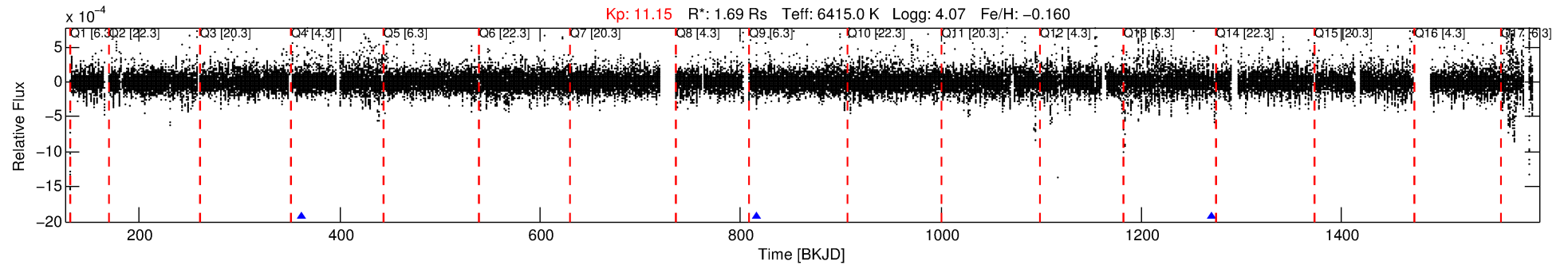
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010252131-04

No Significant Match Found

# DV One-Page Summary

KIC: 10252131 Candidate: 4 of 4 Period: 453.868 d



## DV Fit Results:

Period = 453.86816 [0.00727] d  
Epoch = 361.8354 [0.0112] BKJD  
Rp/R\* = 0.0142 [0.0119]  
a/R\* = 463.02 [2113.21]  
b = 0.80 [2.10]  
Seff = 2.82 [1.14]  
Teq = 330 [33] K  
Rp = 2.62 [2.30] Re  
a = 1.2395 [0.3062] AU  
Ag = 4500.87 [9207.75] [0.49 $\sigma$ ]  
Teffp = 4185 [2104] K [1.83 $\sigma$ ]

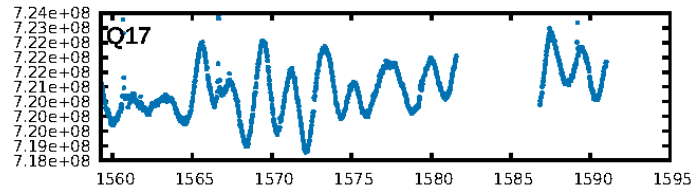
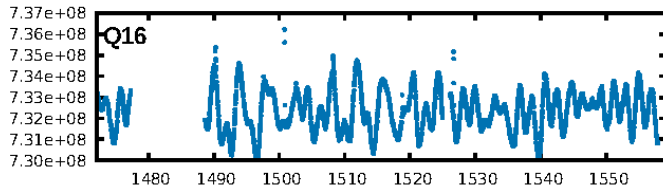
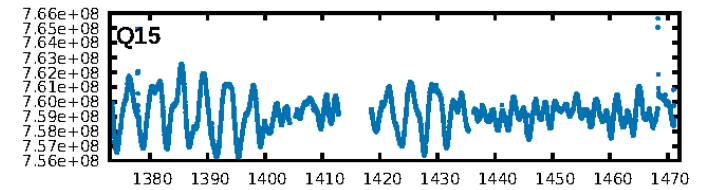
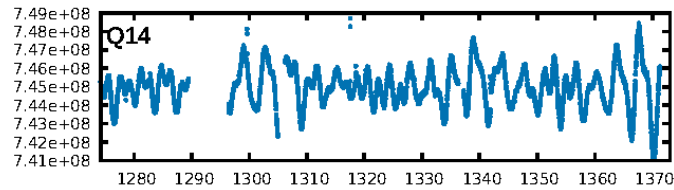
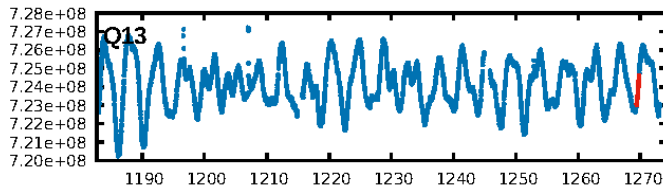
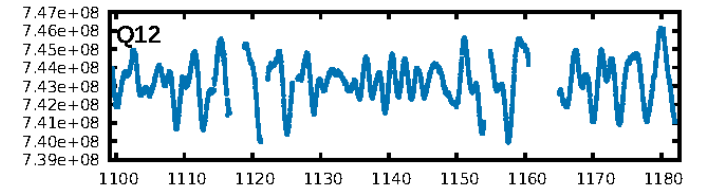
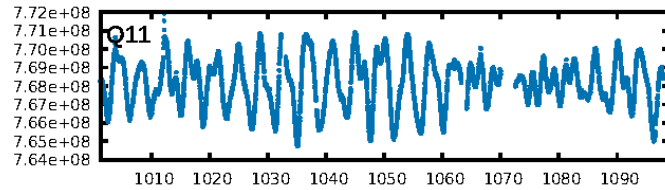
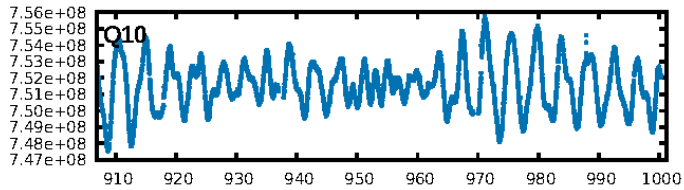
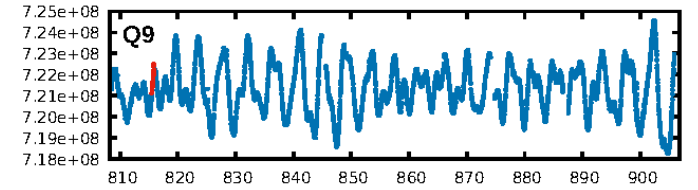
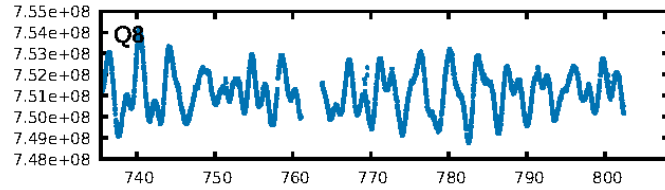
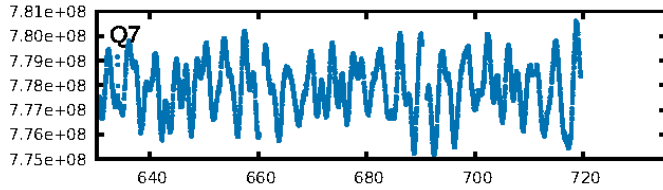
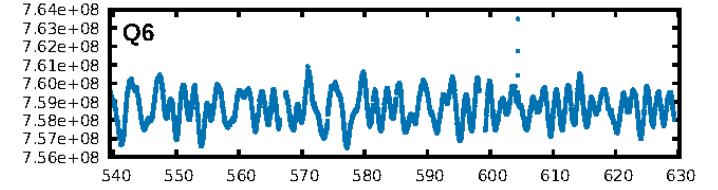
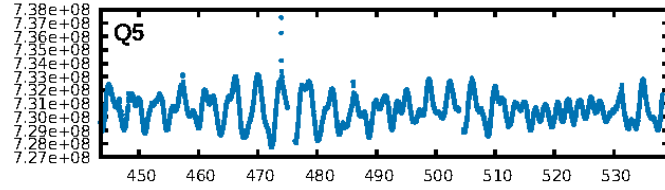
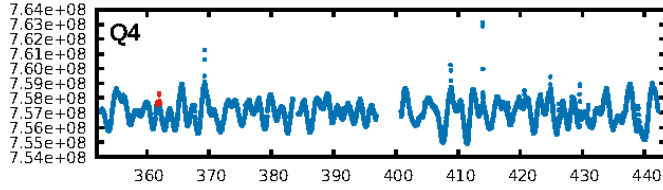
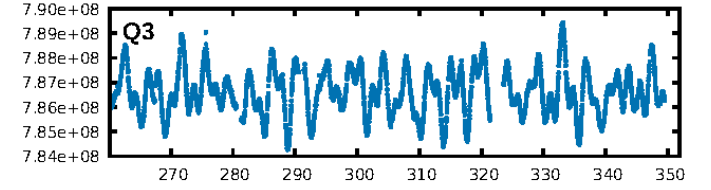
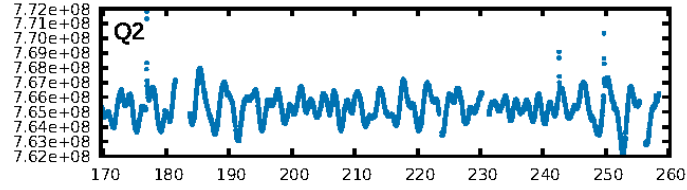
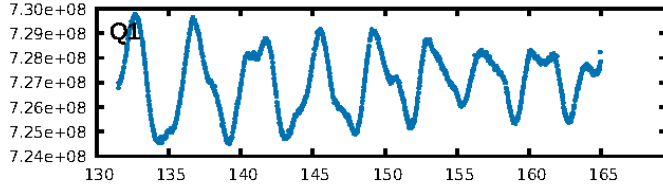
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [573.47 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 36.7%  
ModelChiSquareGof-sig: 51.4%  
**Bootstrap-pfa: 3.04e-09**  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -2.397  
**Centroid-sig: 0.1%**  
Centroid-so: 2.086 arcsec [2.05 $\sigma$ ]  
OotOffset-rm: 0.913 arcsec [1.95 $\sigma$ ]  
KicOffset-rm: 1.015 arcsec [2.39 $\sigma$ ]  
OotOffset-st: 0/0/1/2 [3]  
KicOffset-st: 0/0/1/2 [3]  
DiffImageQuality-fgm: 0.33 [1/3]  
DiffImageOverlap-fno: 1.00 [3/3]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 13:02:31 Z

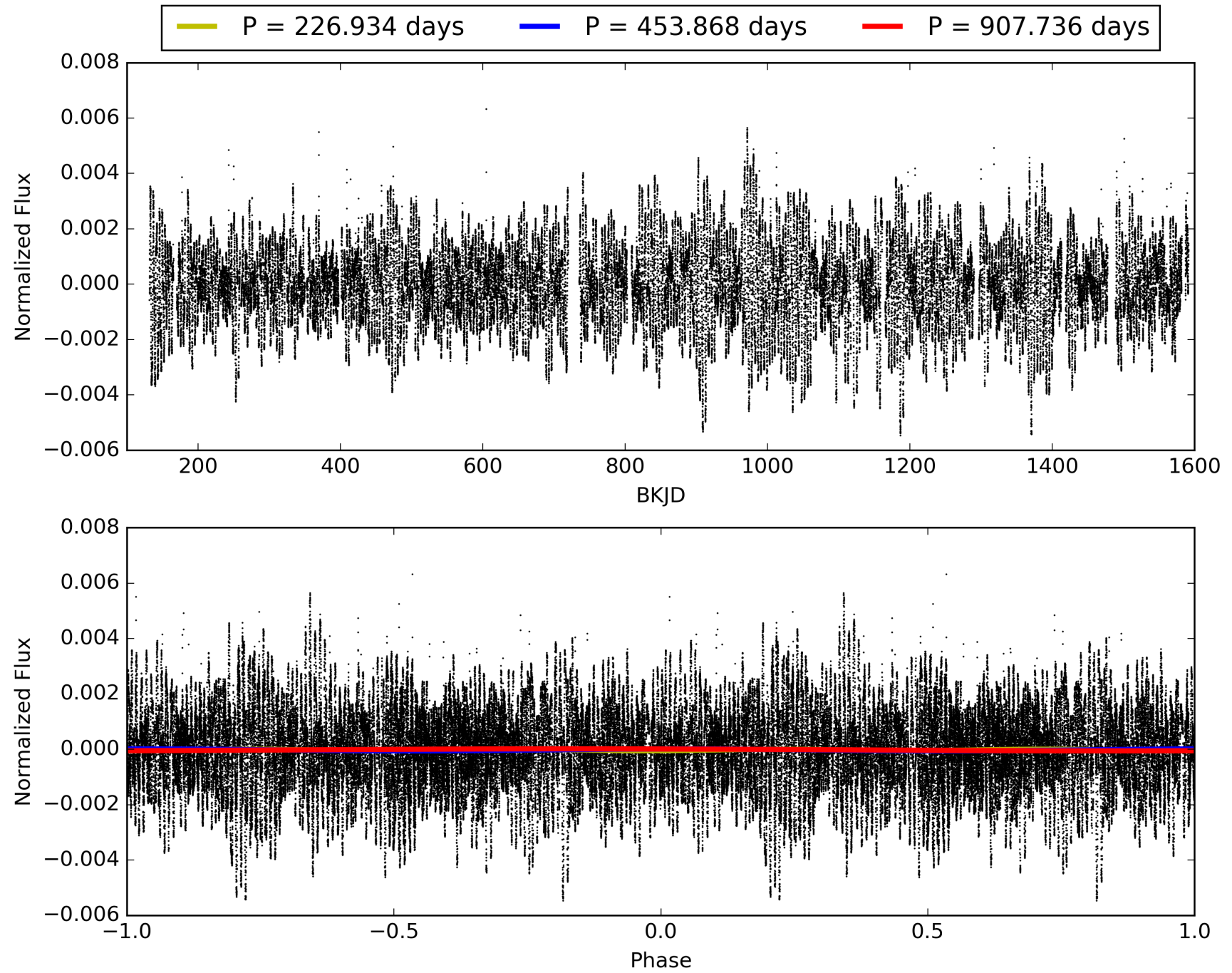
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 010252131-04, PDC Light Curves





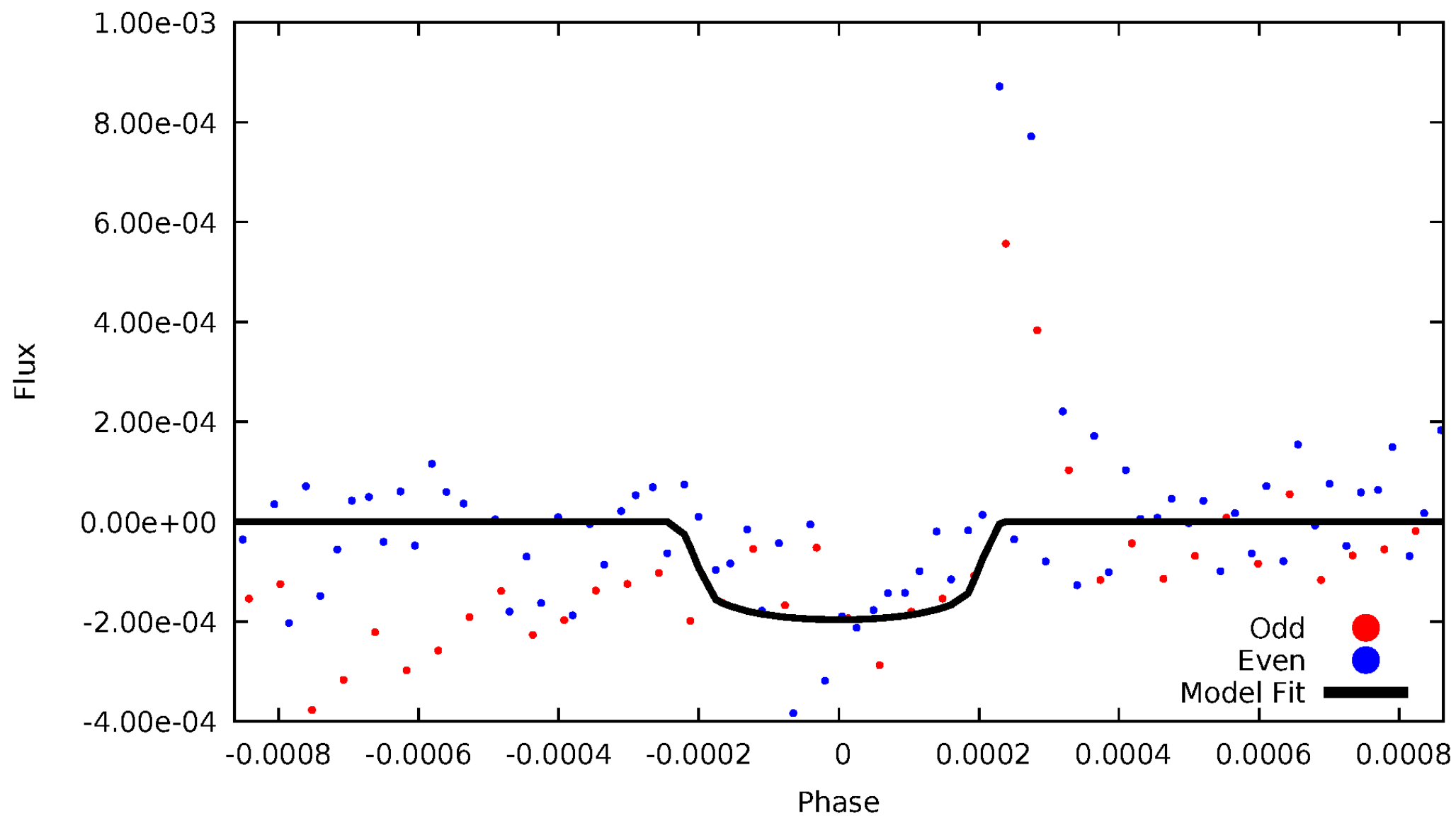
# TCE 010252131-04





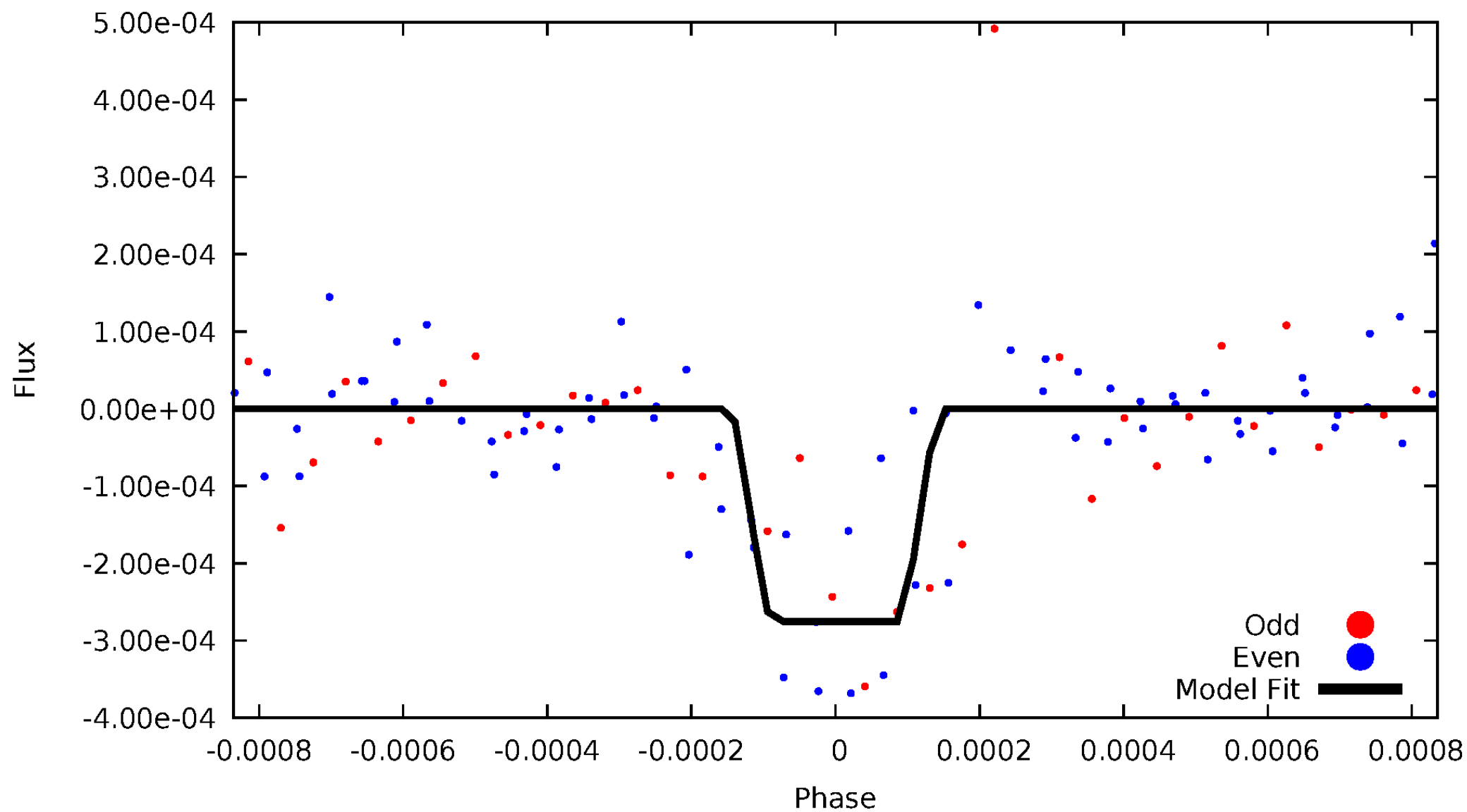
# DV Odd/Even

TCE 010252131-04



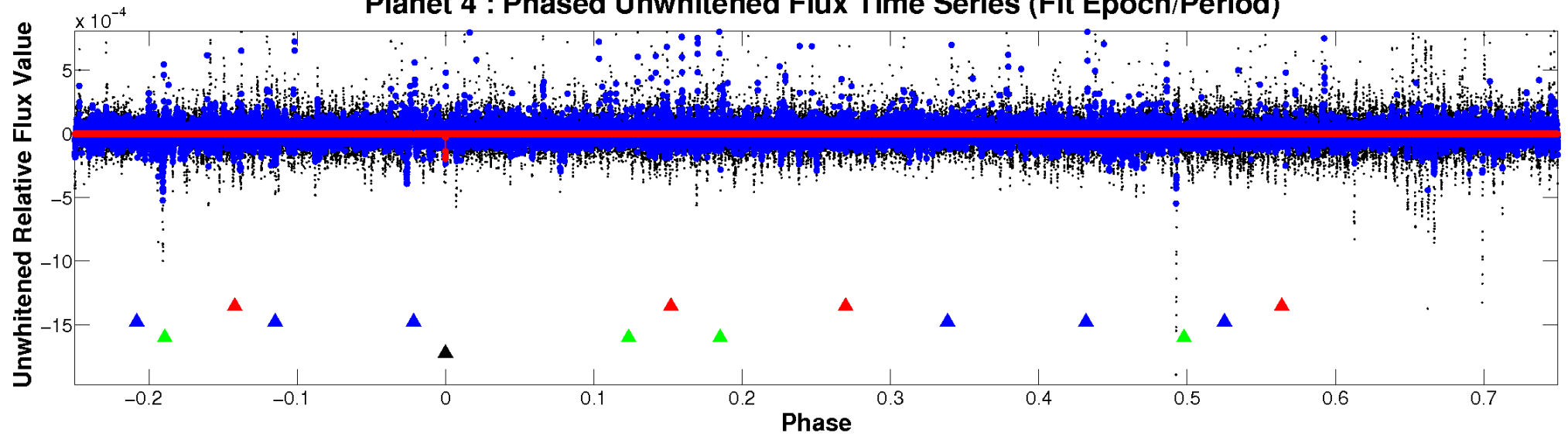
# ALT Odd/Even

TCE 010252131-04

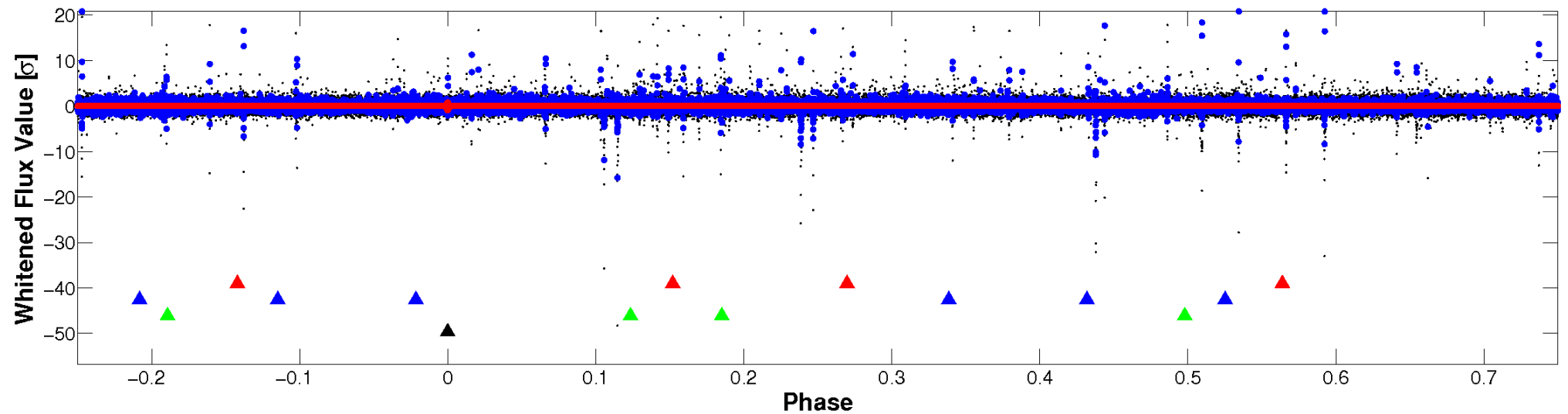


# Non-Whitened Vs. Whitened Light Curve

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

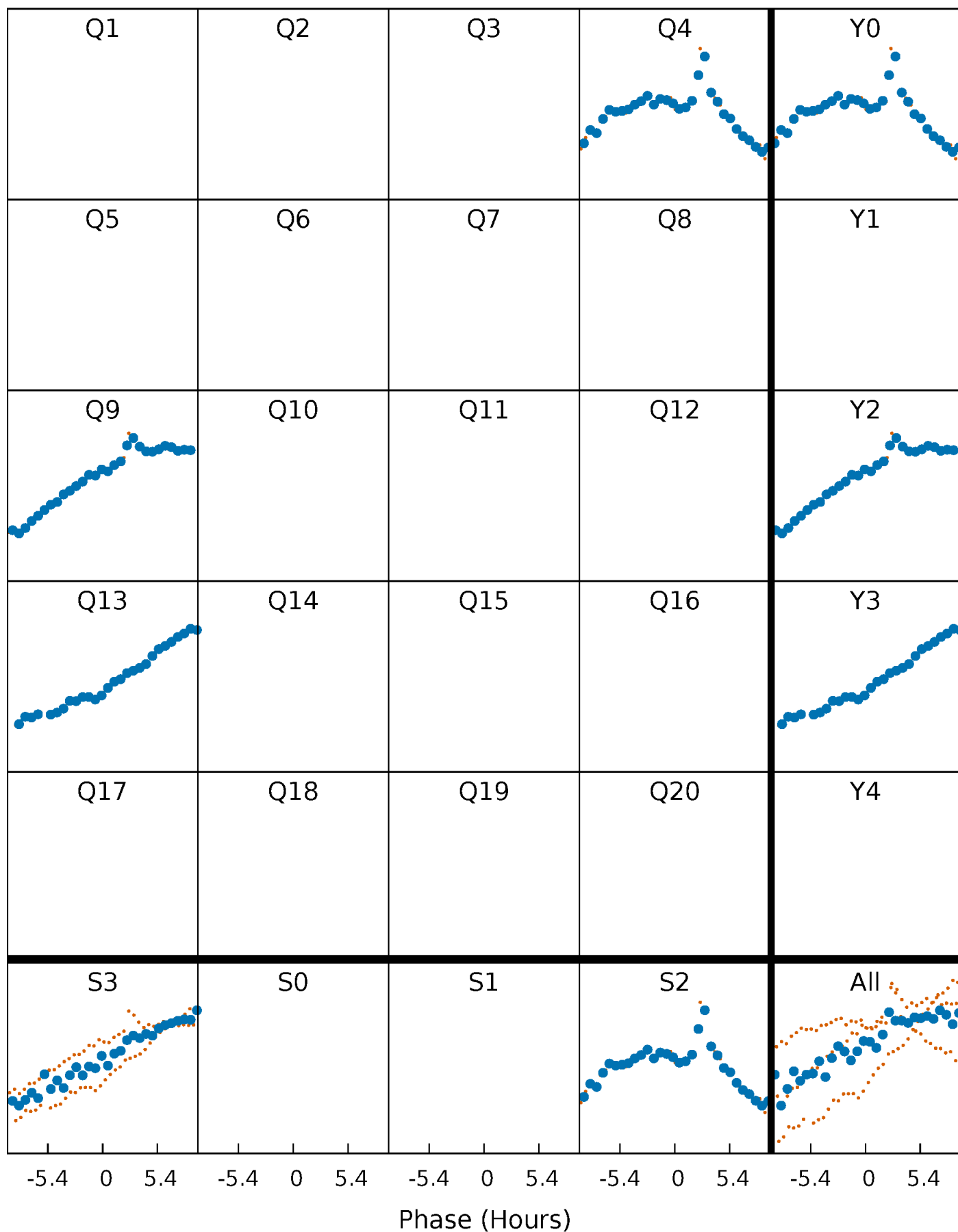


**Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



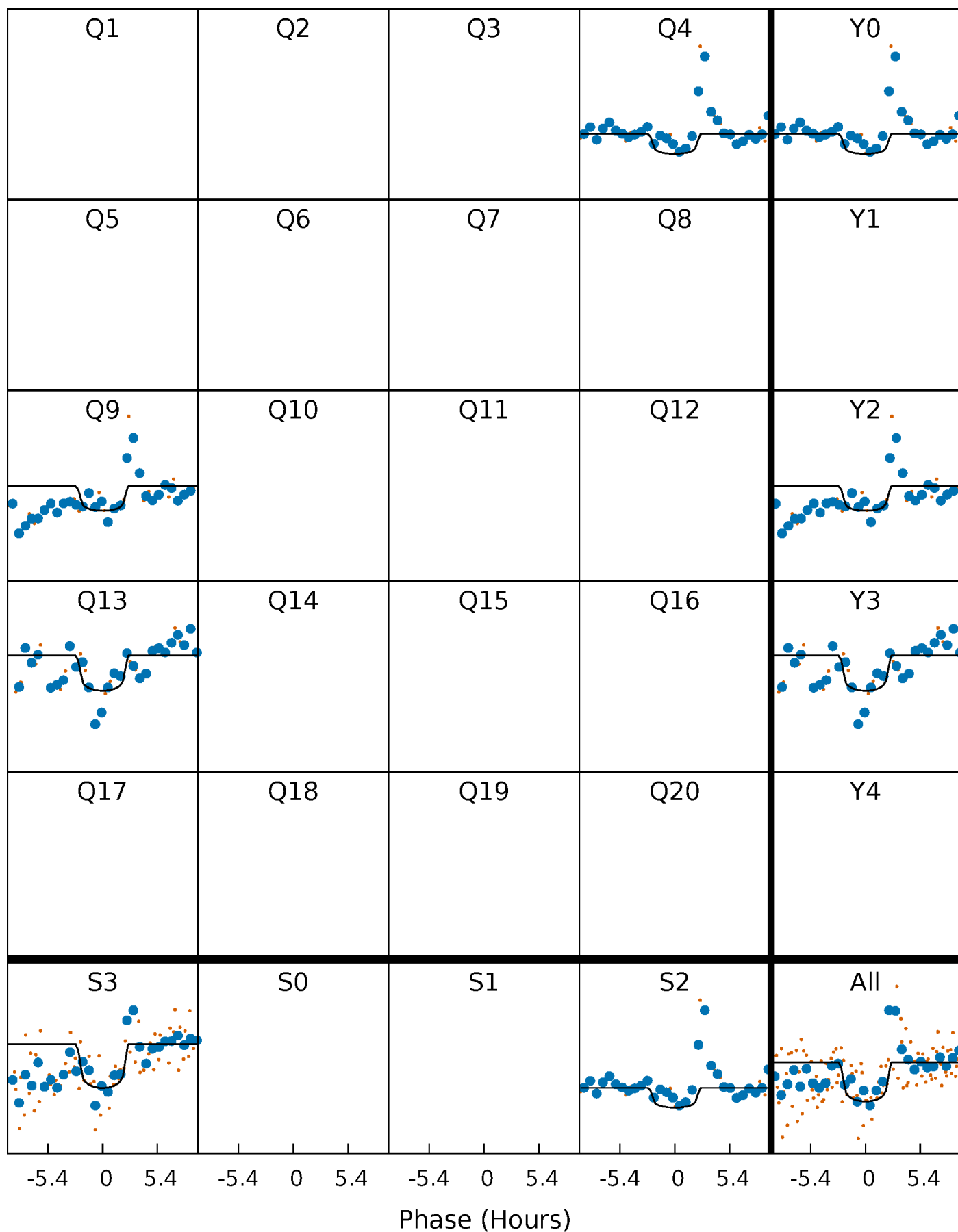
# PDC Quarter-Phased Transit Curves

TCE 010252131-04 P=453.868158 Days  $T_0=361.835365$  (BKJD)



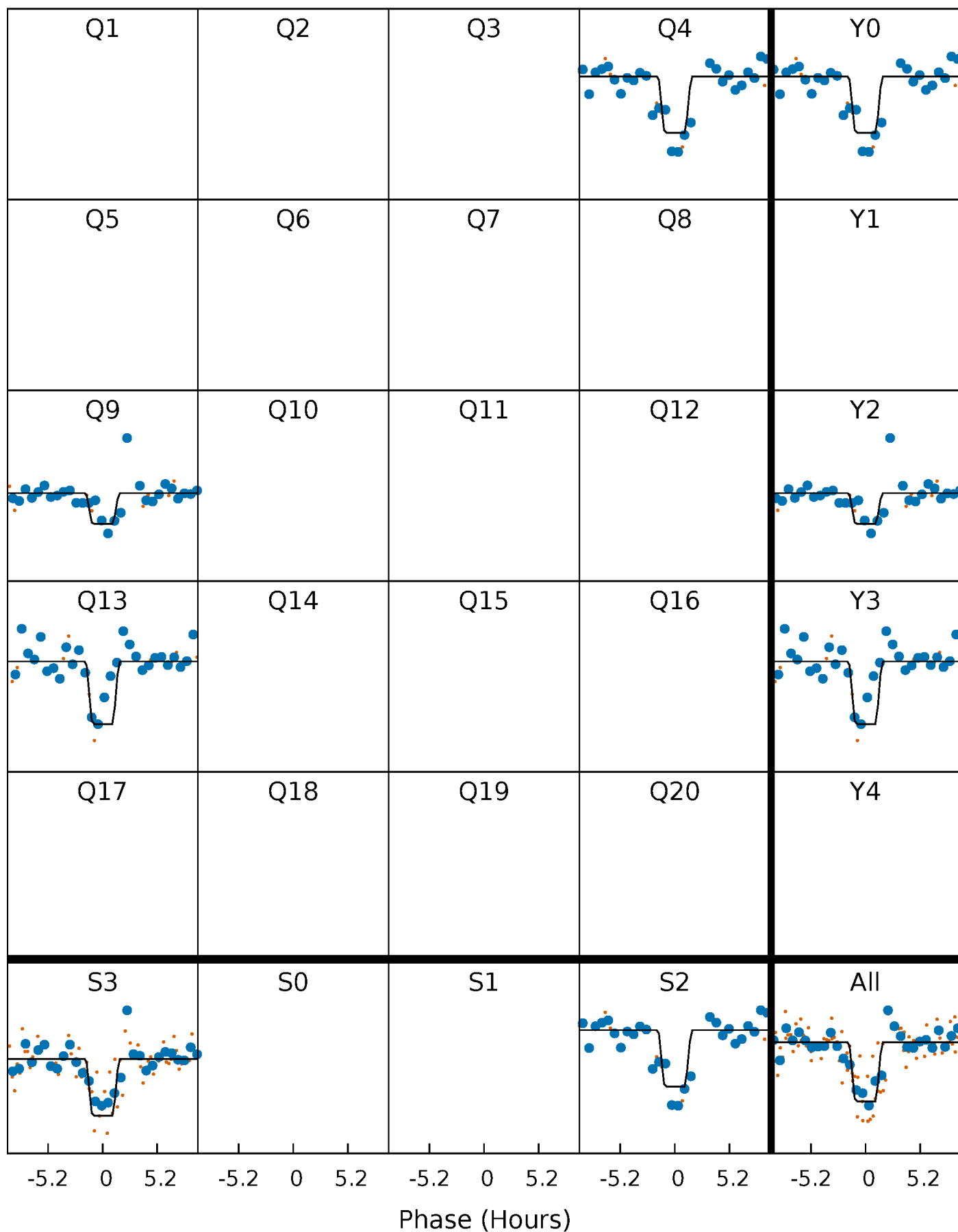
# DV Quarter-Phased Transit Curves

TCE 010252131-04     $P=453.868158$  Days     $T_0=361.835365$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

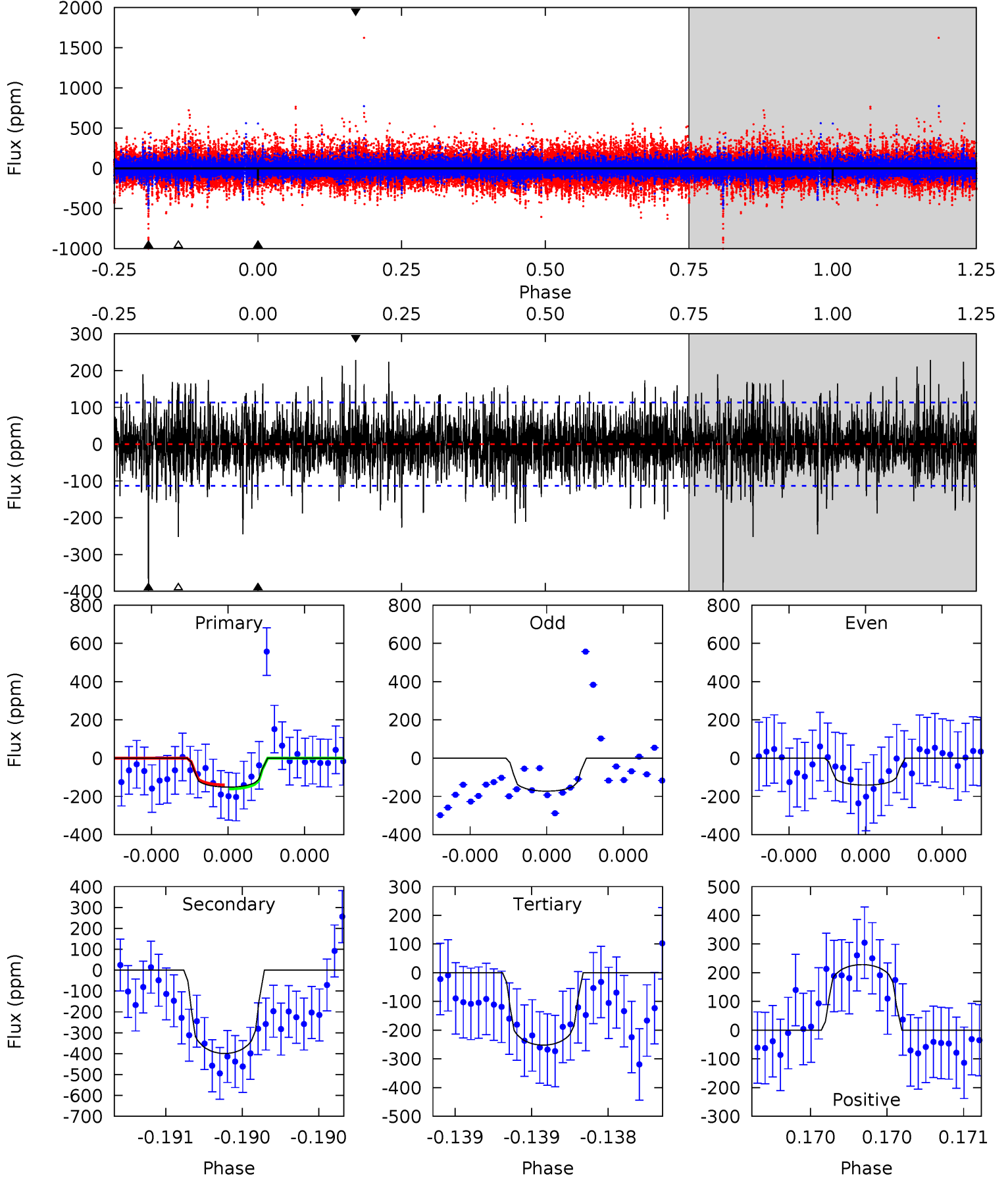
TCE 010252131-04     $P=453.863424$  Days     $T_0=361.848014$  (BKJD)



# DV Model-Shift Uniqueness Test

010252131-04, P = 453.868158 Days, E = 361.835365 Days

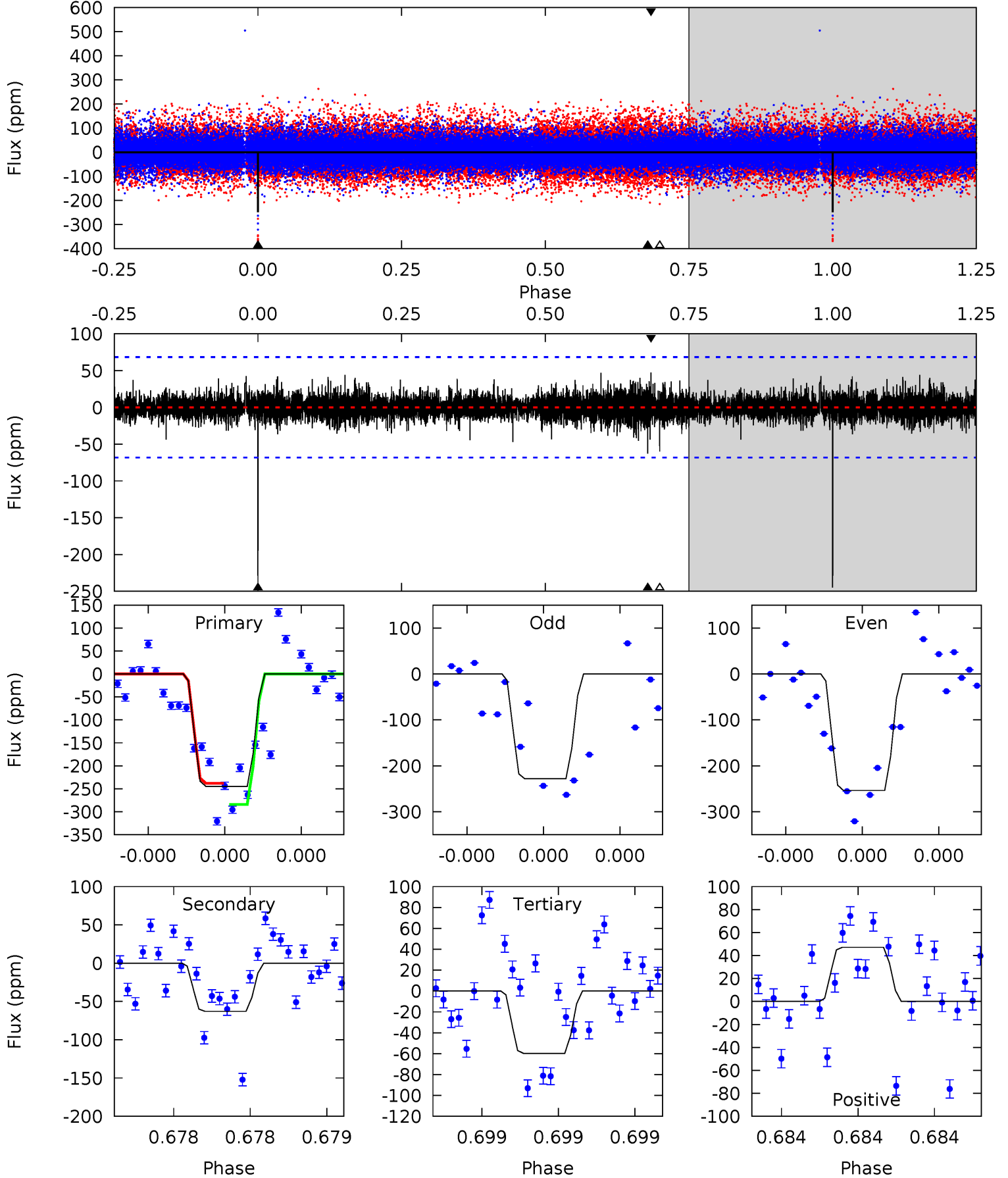
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.46	19.7	12.4	11.3	5.59	3.50	2.61	-4.96	-3.80	7.25	8.42	0.67	0.87	0.36	0.52



# Alt Model-Shift Uniqueness Test

010252131-04, P = 453.863424 Days, E = 361.848014 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
20.3	5.21	4.96	3.91	5.67	3.62	0.82	15.4	16.4	0.26	1.30	1.00	1.08	0.16	1.85





### Stellar Parameters For KIC 010252131

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6415^{+146}_{-162}$	$4.073^{+0.228}_{-0.123}$	$-0.160^{+0.250}_{-0.250}$	$1.690^{+0.362}_{-0.442}$	$1.234^{+0.188}_{-0.188}$	$0.360^{+0.460}_{-0.127}$
	+2%/-3%	+6%/-3%	+156%/-156%	+21%/-26%	+15%/-15%	+128%/-35%
Source	PHO1	FLK73	KIC0	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 010252131-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-399 \pm 20$	$2.95^{+2.13}_{-1.72}$	$457^{+29}_{-31}$	$7059^{+5888}_{-1563}$	$38126^{+192880}_{-24632}$
Alt.	$-63 \pm 12$	$3.17^{+2.02}_{-1.78}$	$456^{+28}_{-34}$	$4489^{+1997}_{-773}$	$5286^{+22374}_{-3378}$

$T_{\text{max}}$  = 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

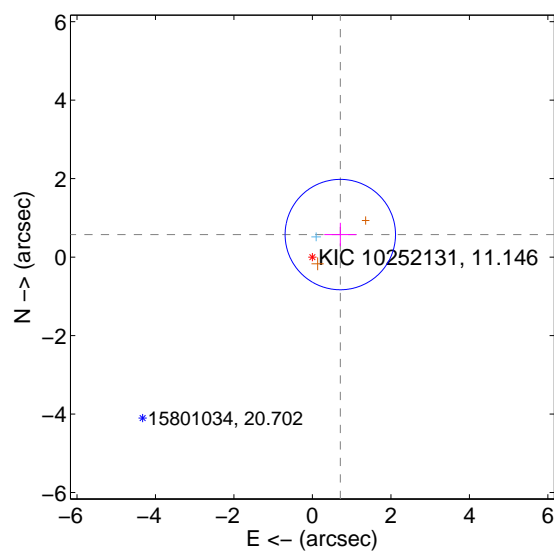
Supplemental centroid analysis for 010252131-04. **Kepler magnitude: 11.15.** Transit SNR 4.85

**There are 1 quarters with good PRF difference image offsets**

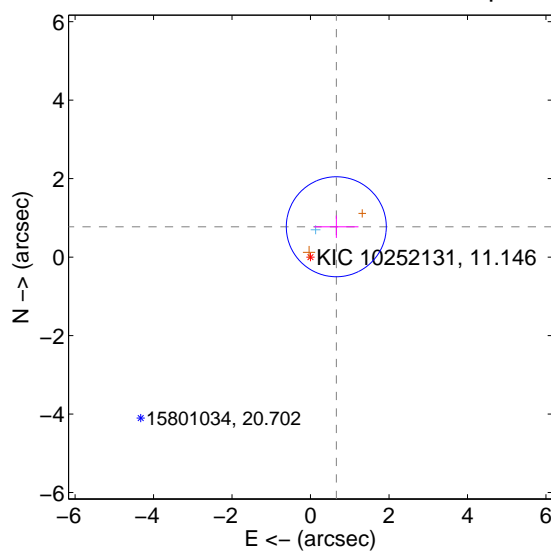
The direct PRF centroid is offset from the target star catalog position by about 0.18 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.913 \pm 0.469$	1.95	$-0.710 \pm 0.409$	$0.574 \pm 0.299$
PRF-fit source offset from KIC position	$1.015 \pm 0.425$	2.39	$-0.657 \pm 0.565$	$0.773 \pm 0.284$
photometric centroid source offset	$2.09 \pm 1.02$	2.05	$-0.39 \pm 1.37$	$2.05 \pm 1.00$

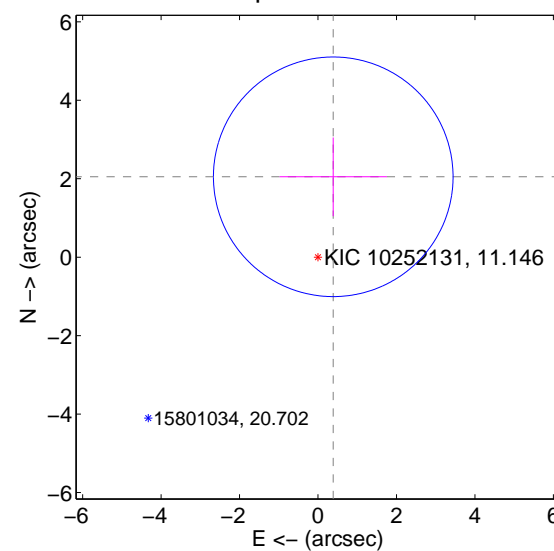
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

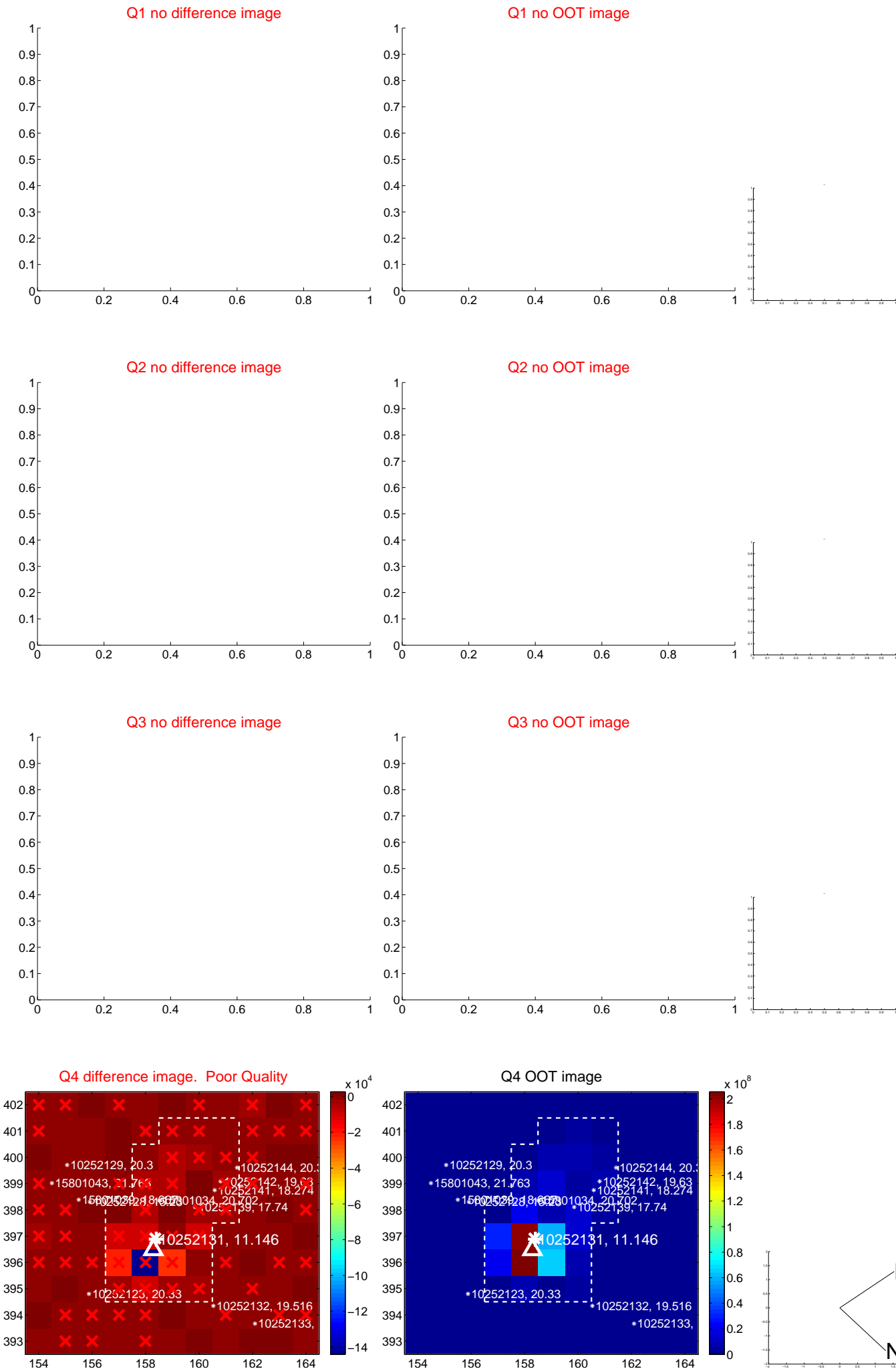


offset from photometric centroids

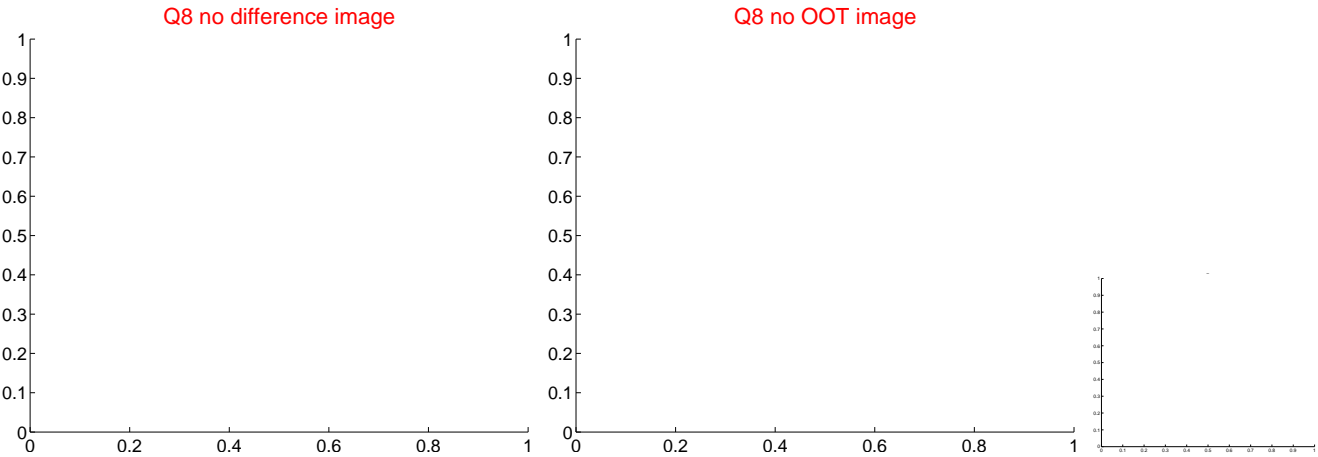
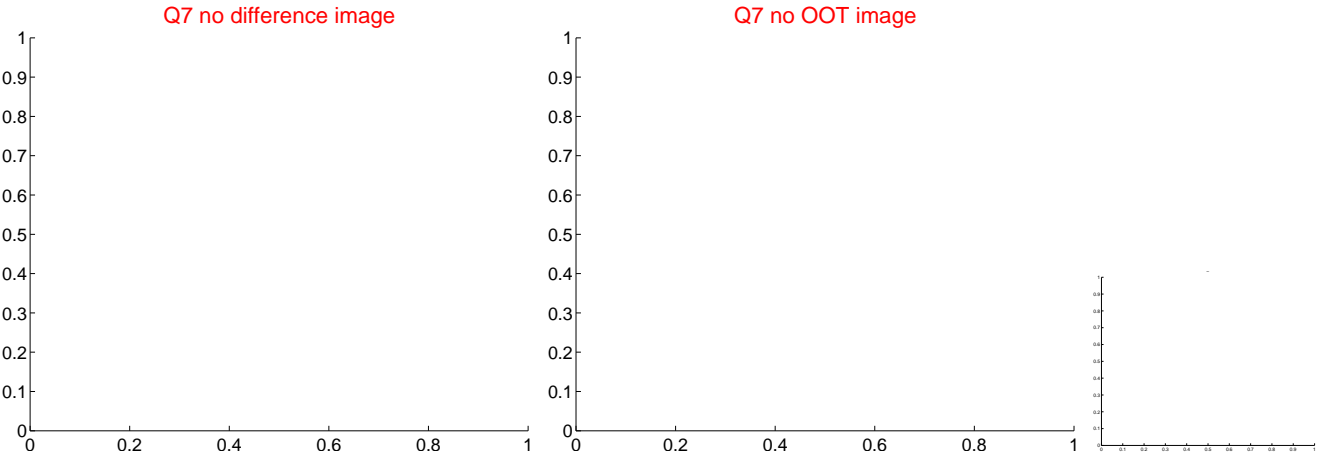
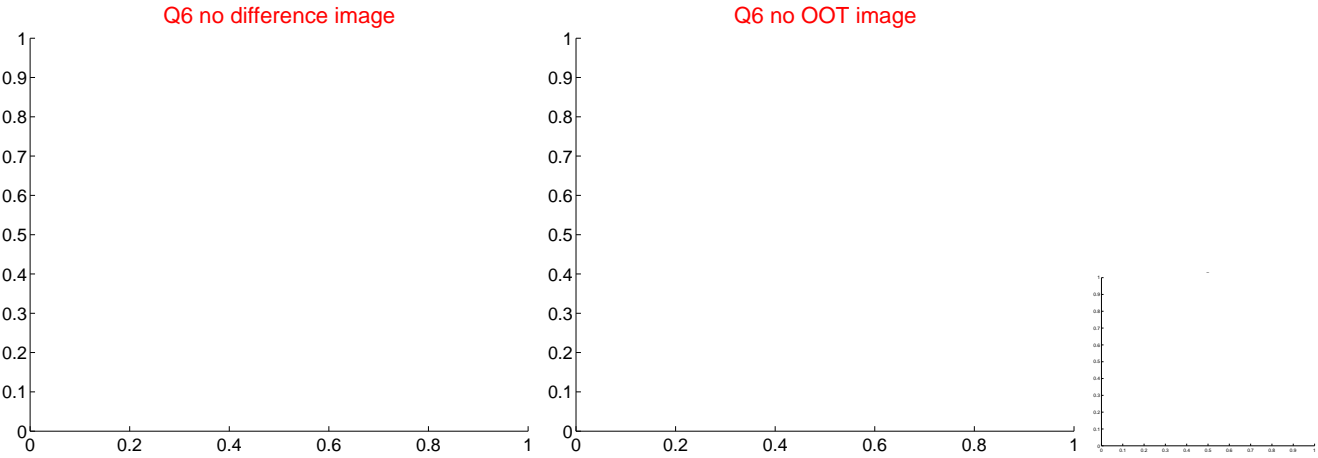
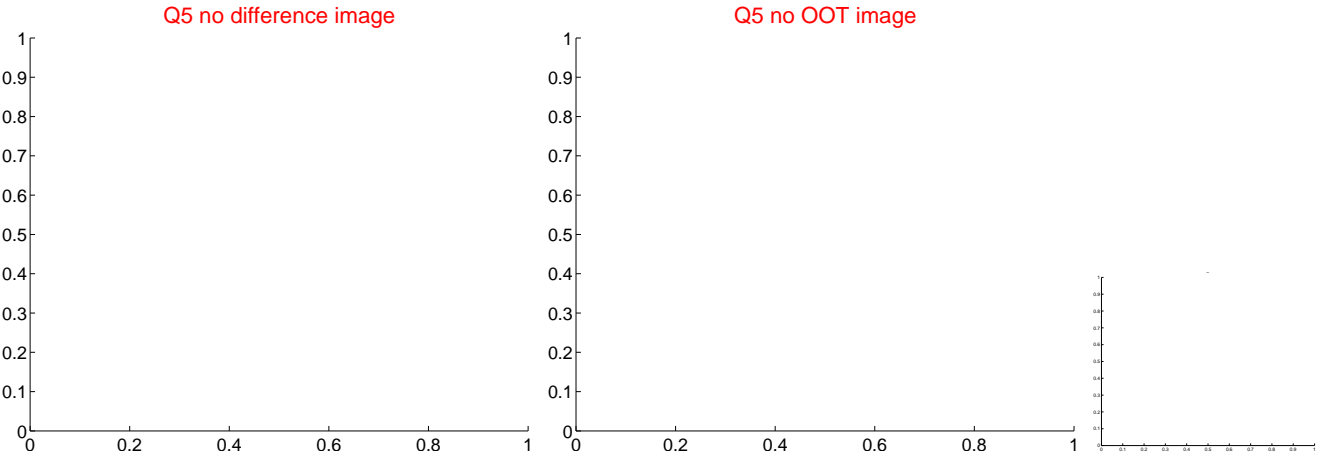


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

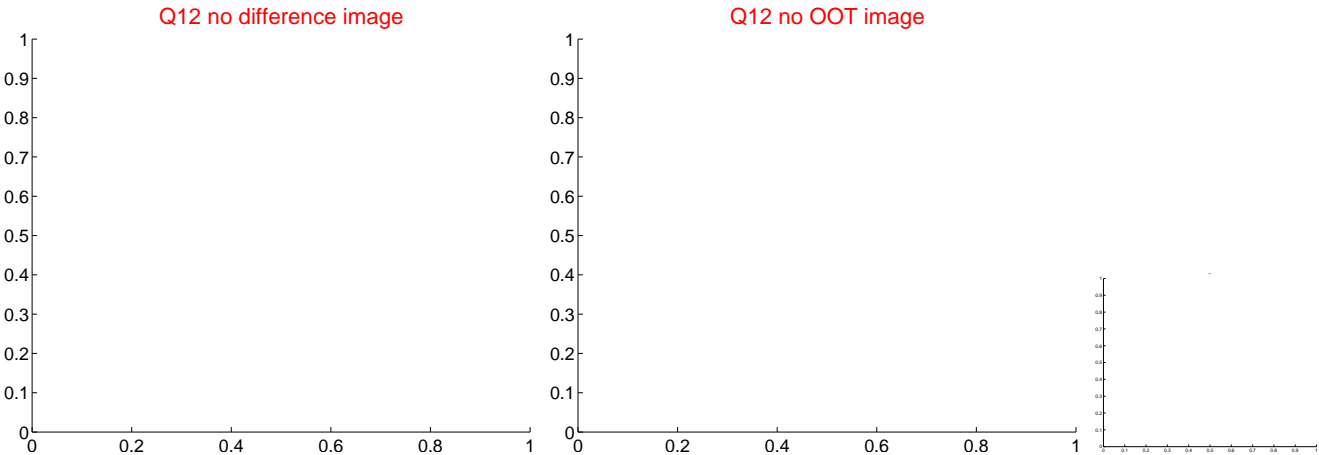
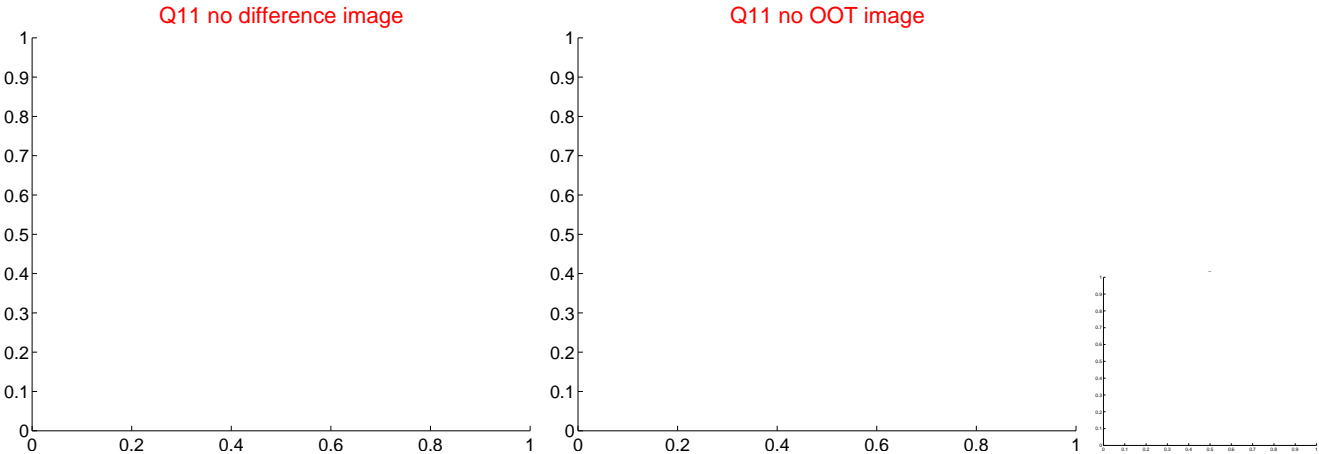
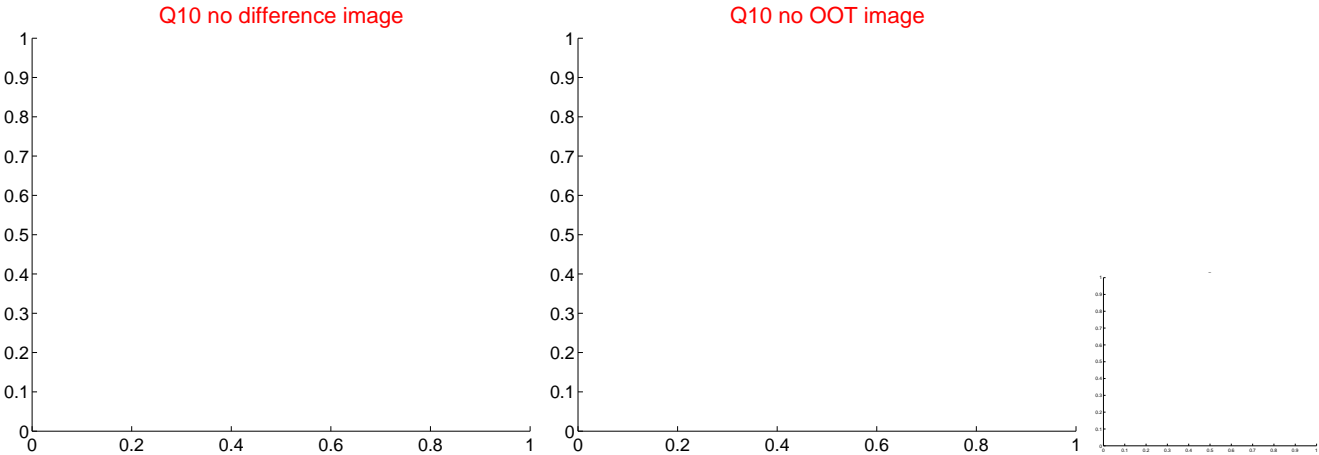
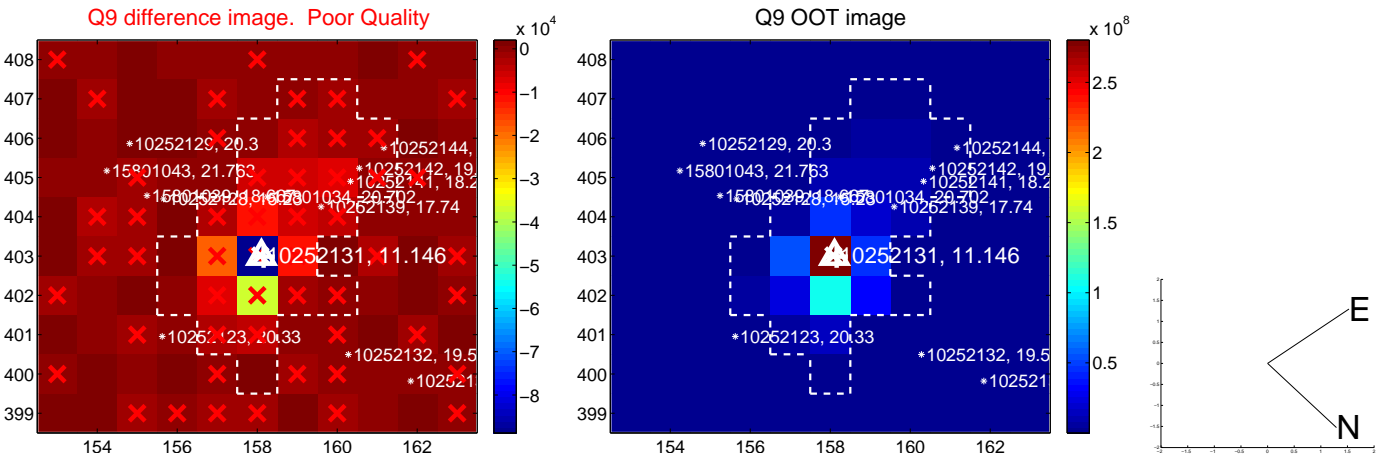
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



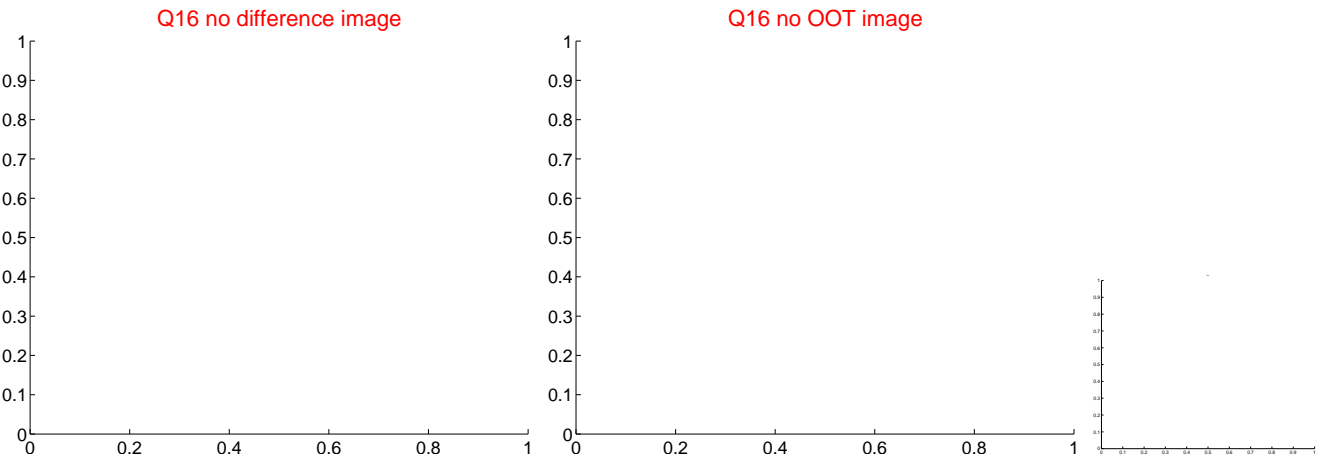
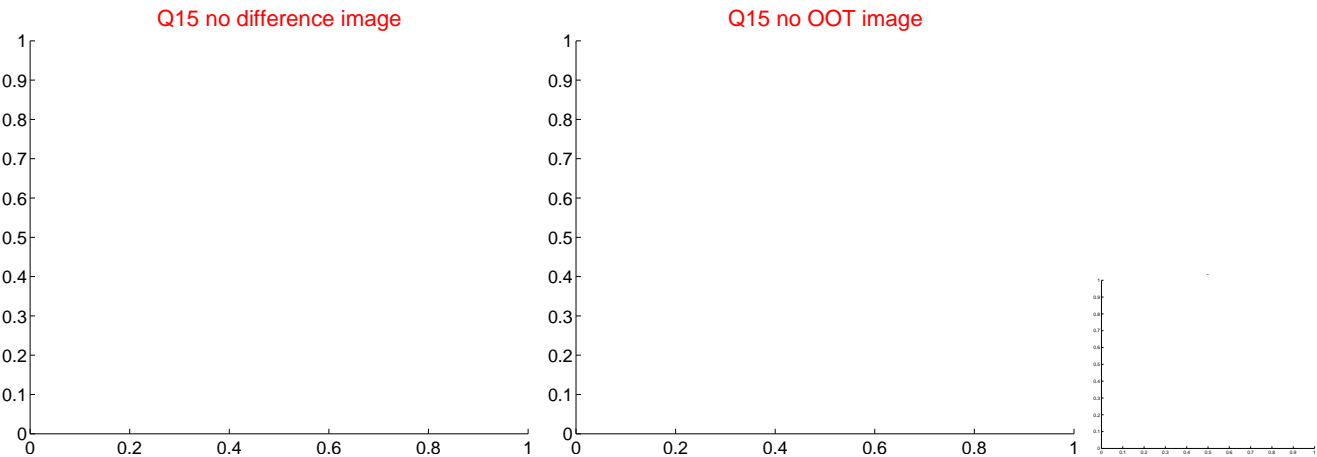
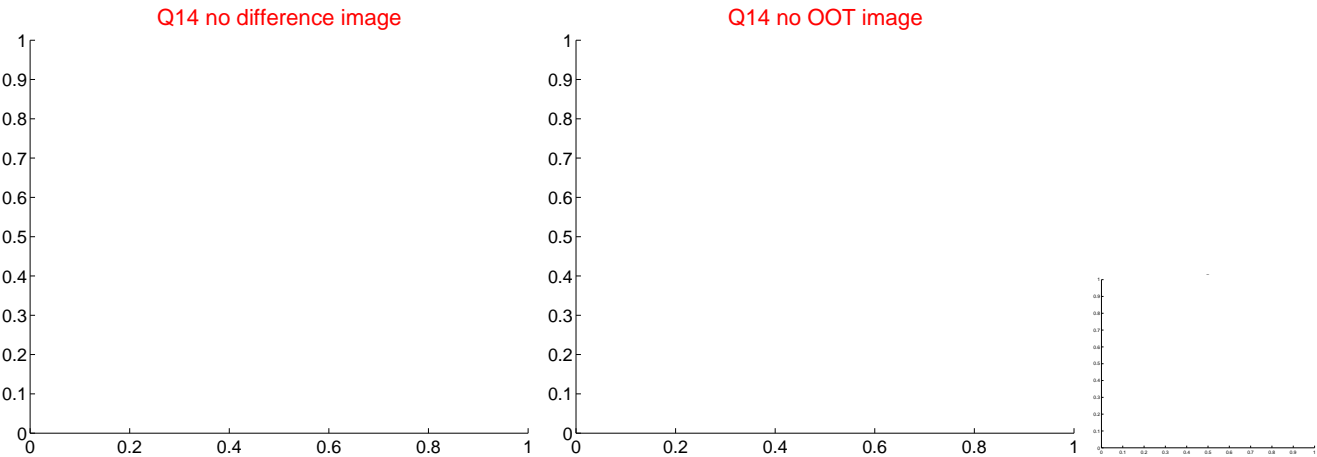
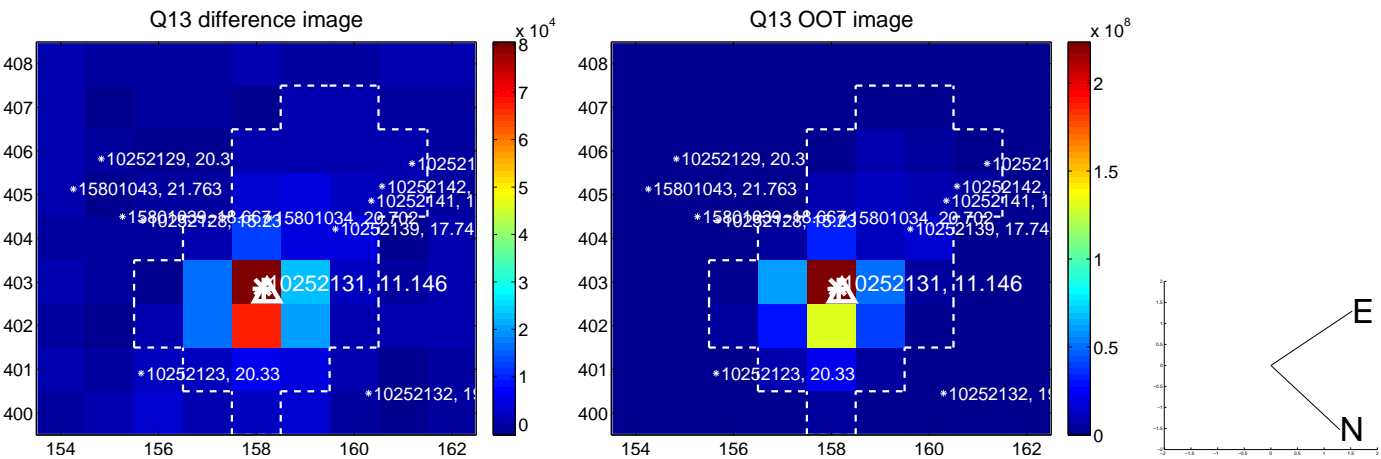
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



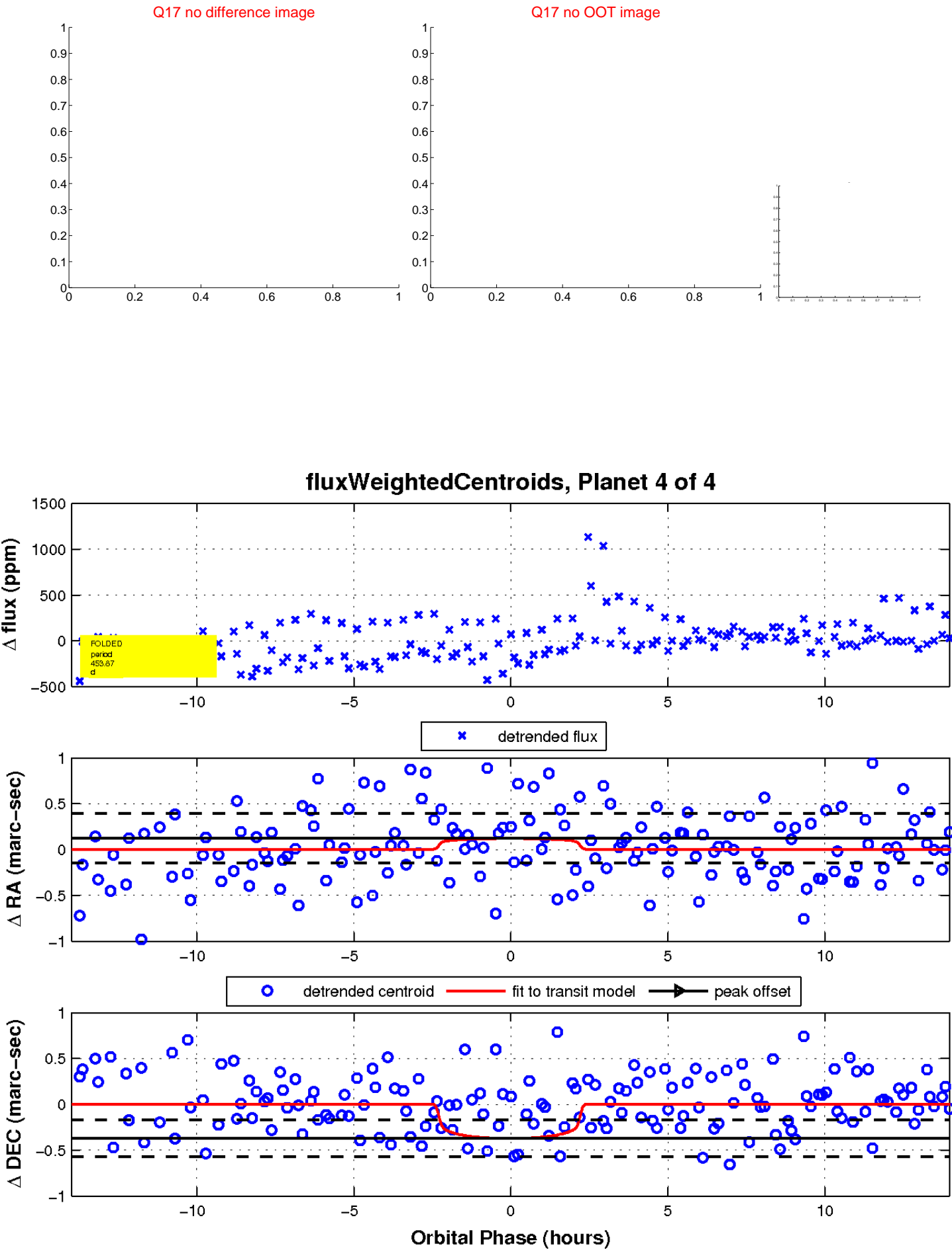
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

