

## KIC 008052016

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008052016-01	OBS	No	2.605256	133.117659	31.9	19.238	9.6	7.3	1.99	6212	1.16	3524.60
008052016-02	OBS	No	67.763122	134.382802	184.4	6.496	25.0	11.1	1.99	6212	3.03	45.73
008052016-03	OBS	No	26.742080	135.727966	190.8	10.952	18.8	12.1	1.99	6212	2.99	158.00
008052016-04	OBS	No	33.184196	158.831256	176.4	4.858	16.2	7.2	1.99	6212	2.96	118.49
008052016-05	OBS	No	37.315026	162.366643	172.7	3.991	13.1	7.8	1.99	6212	2.88	101.33
008052016-06	OBS	No	37.038602	156.474640	246.9	4.412	12.2	11.5	1.99	6212	3.45	102.34
008052016-07	OBS	No	39.906683	164.120100	244.5	4.294	9.9	10.4	1.99	6212	3.45	92.65
008052016-08	OBS	No	23.077641	133.725683	160.9	6.368	9.5	9.1	1.99	6212	2.90	192.30
008052016-09	OBS	No	28.929926	143.231572	102.0	5.045	8.8	5.4	1.99	6212	2.28	142.27

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008052016-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV
008052016-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
008052016-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—HALO_GHOST
008052016-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
008052016-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
008052016-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT
008052016-07	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—HALO_GHOST
008052016-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
008052016-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

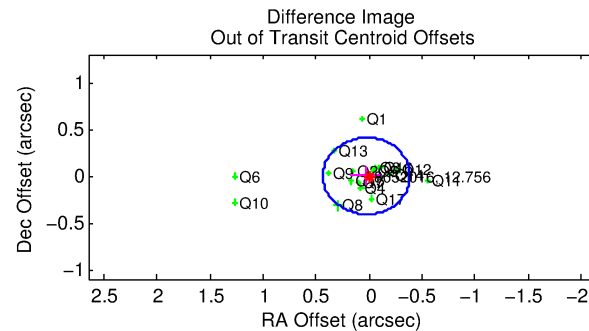
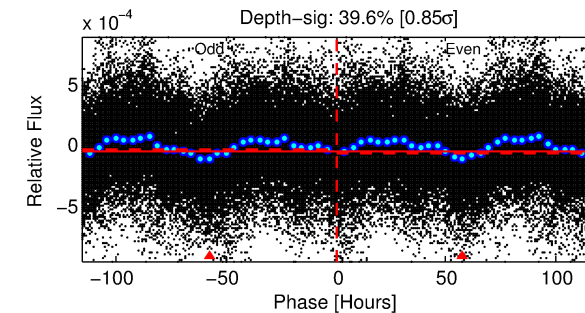
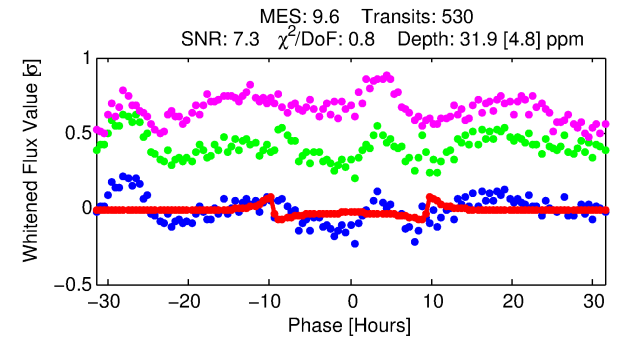
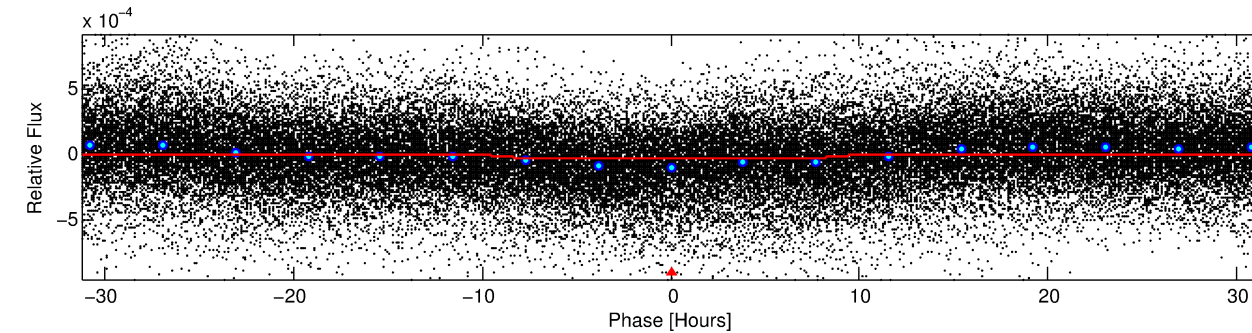
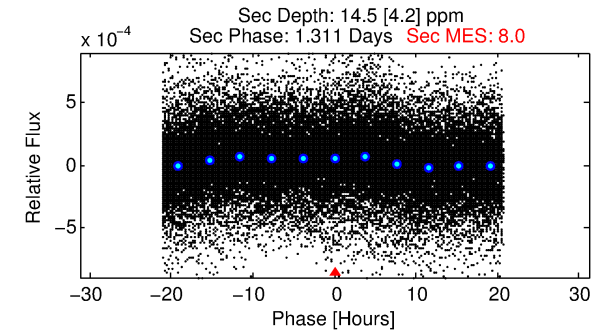
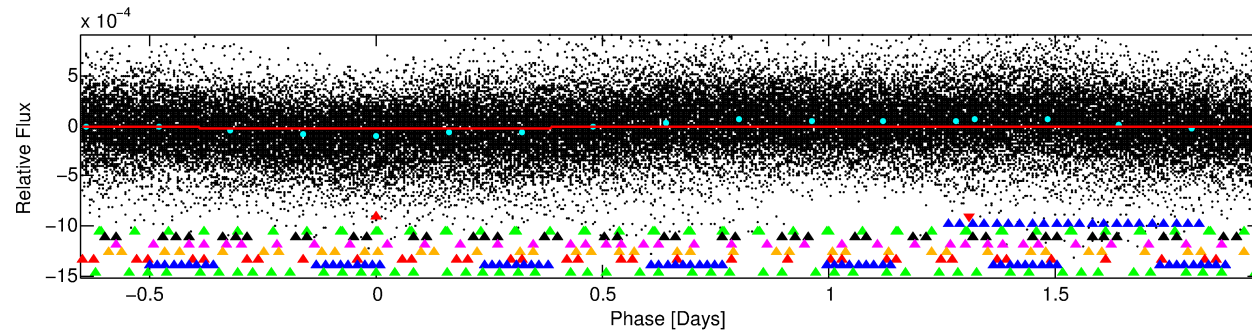
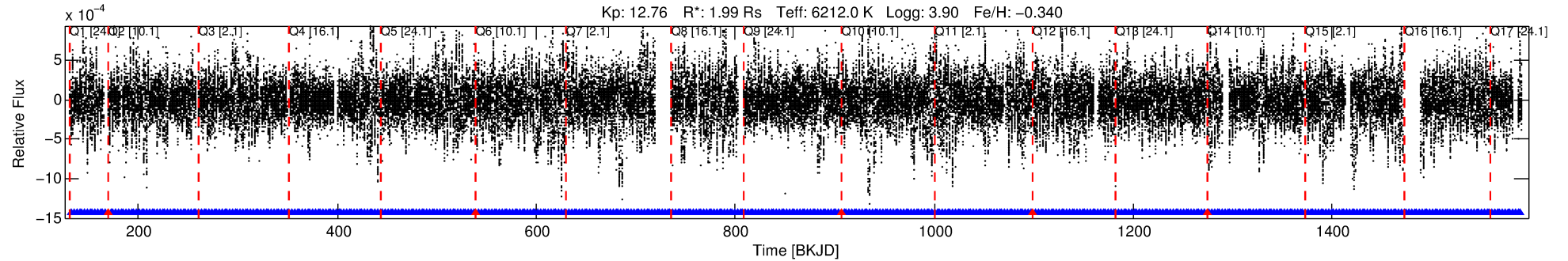
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 008052016-01

No Significant Match Found

# DV One-Page Summary

KIC: 8052016 Candidate: 1 of 9 Period: 2.605 d



## DV Fit Results:

Period = 2.60526 [0.00002] d  
Epoch = 133.1177 [0.0050] BKJD  
Rp/R\* = 0.0053 [0.0020]  
a/R\* = 1.17 [0.64]  
b = 0.53 [2.85]  
Seff = 3524.60 [1826.36]  
Teq = 1965 [255] K  
Rp = 1.16 [0.58] Re  
a = 0.0387 [0.0121] AU  
Ag = 8.84 [8.50] [0.92 $\sigma$ ]  
Teffp = 5238 [1081] K [2.95 $\sigma$ ]

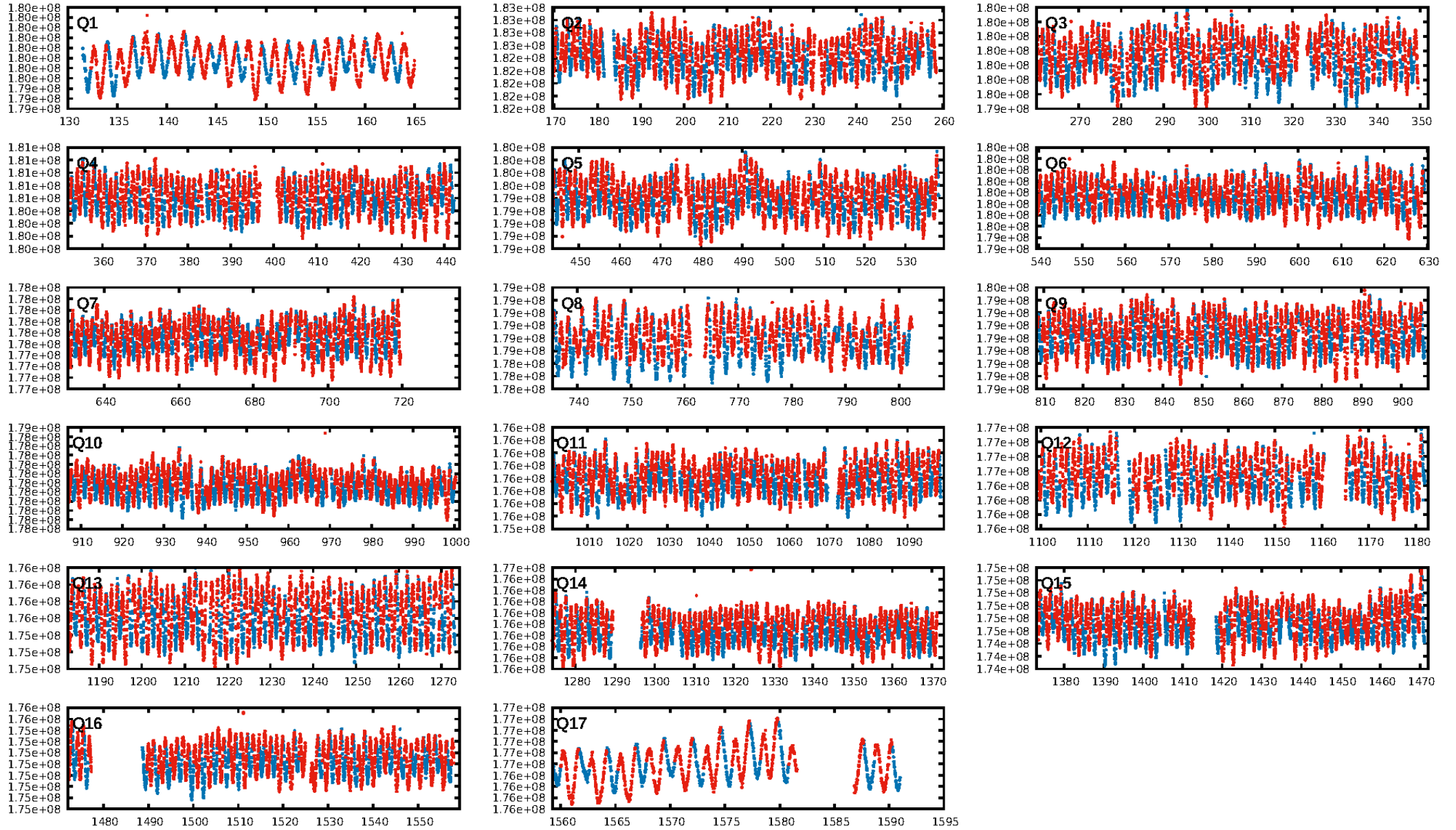
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [24.25 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 8.65e-15  
RollingBand-fgt: 0.99 [501/506]  
GhostDiagnostic-chr: 1.68  
**Centroid-sig: 0.0%**  
**Centroid-so: 1.461 arcsec [3.17 $\sigma$ ]**  
OotOffset-rm: 0.025 arcsec [0.19 $\sigma$ ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-rm: 0.082 arcsec [0.98 $\sigma$ ]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 23:13:22 Z

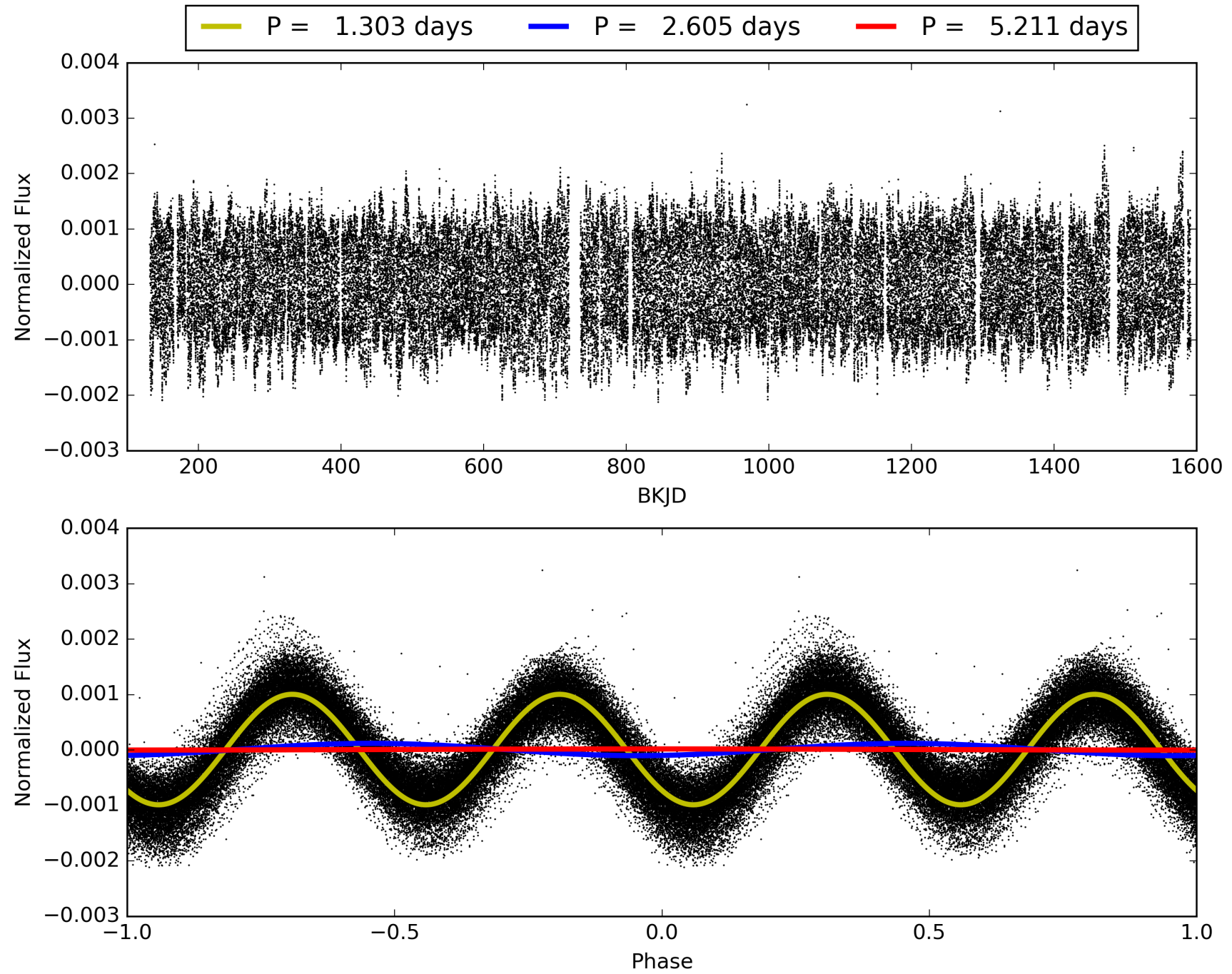
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 008052016-01, PDC Light Curves





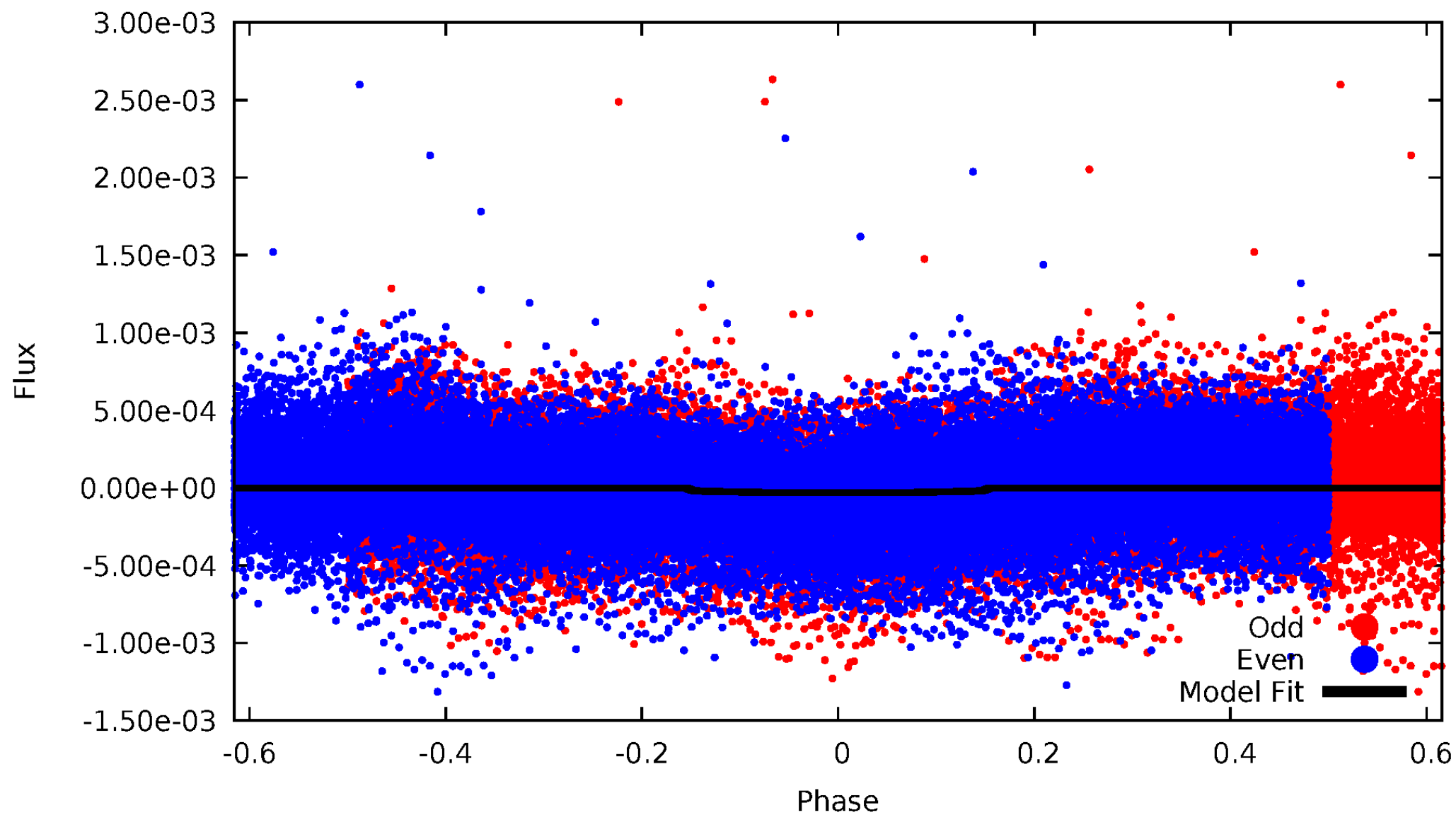
TCE 008052016-01





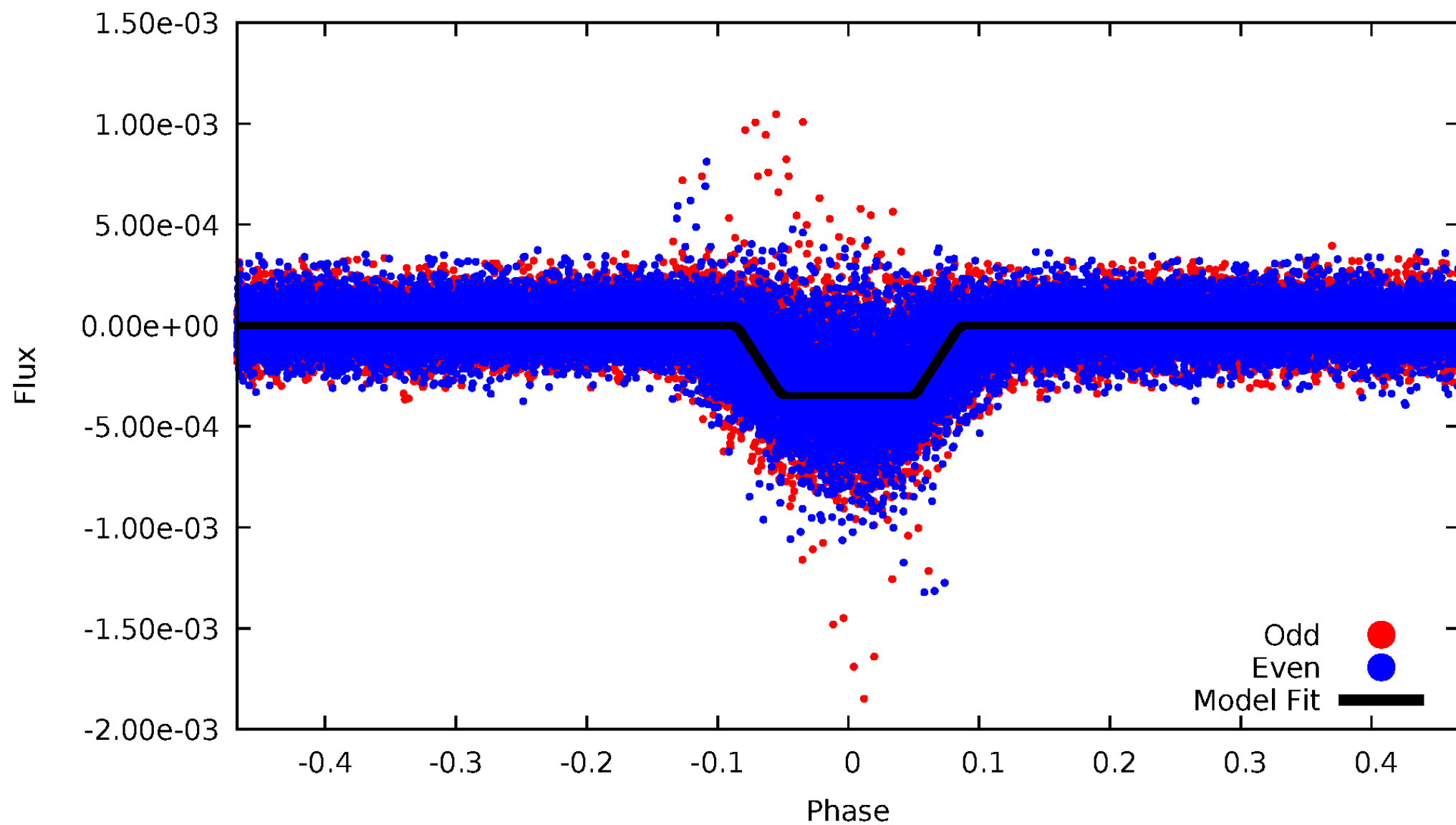
# DV Odd/Even

TCE 008052016-01



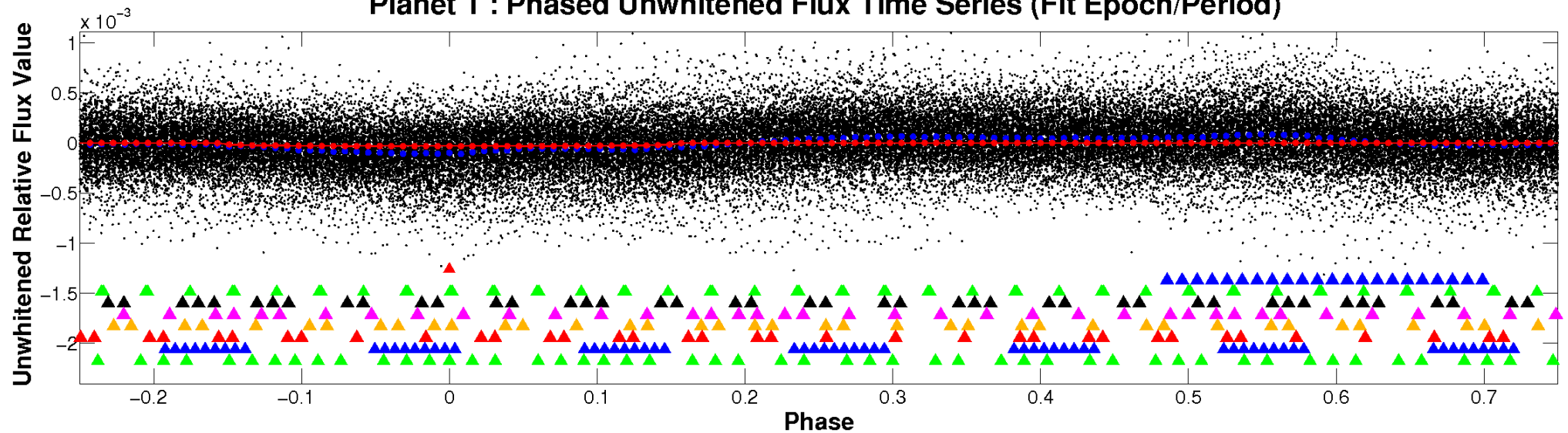
# ALT Odd/Even

TCE 008052016-01

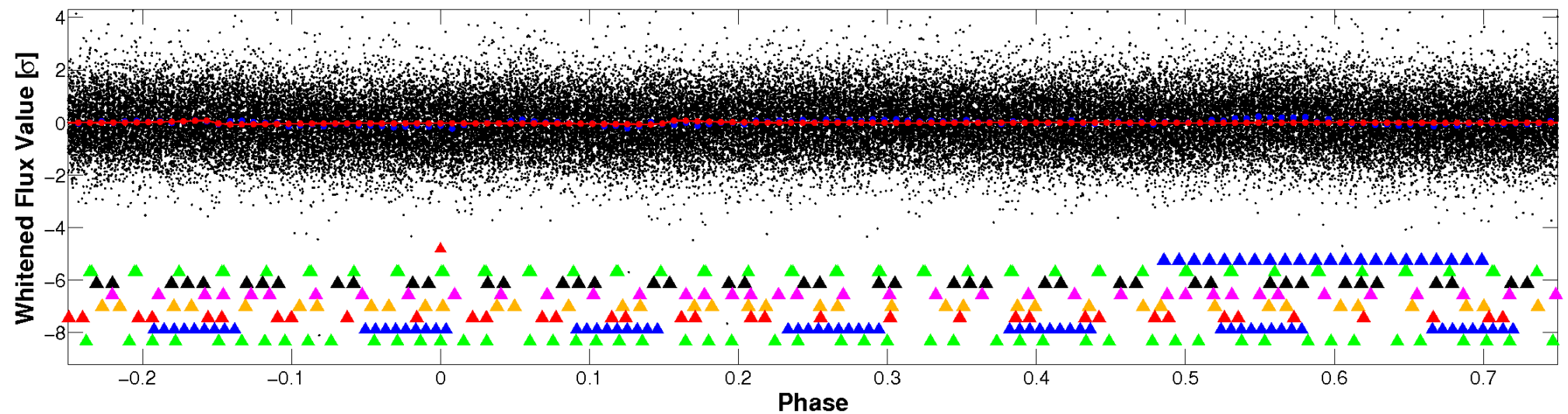


# Non-Whitened Vs. Whitened Light Curve

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



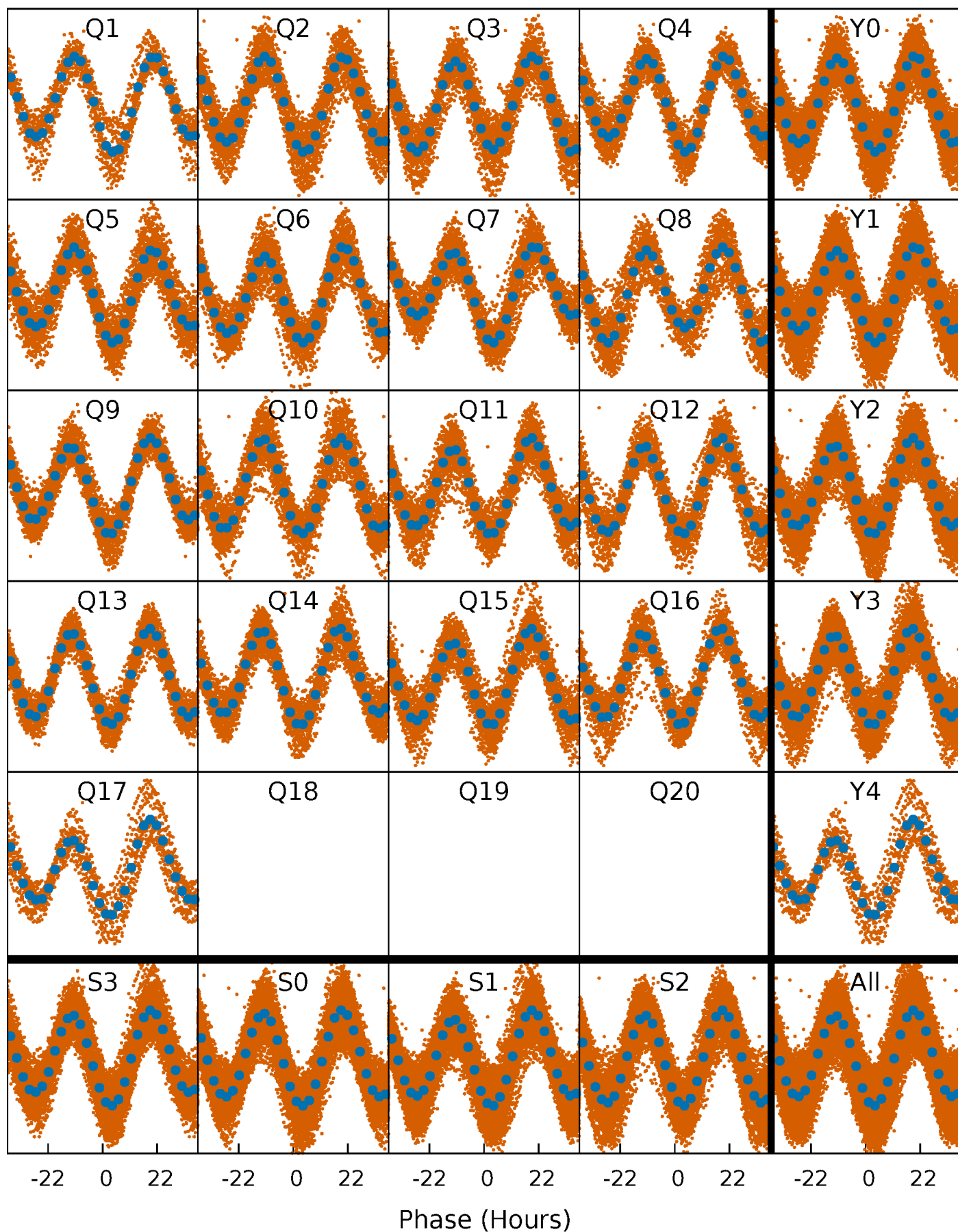
Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)





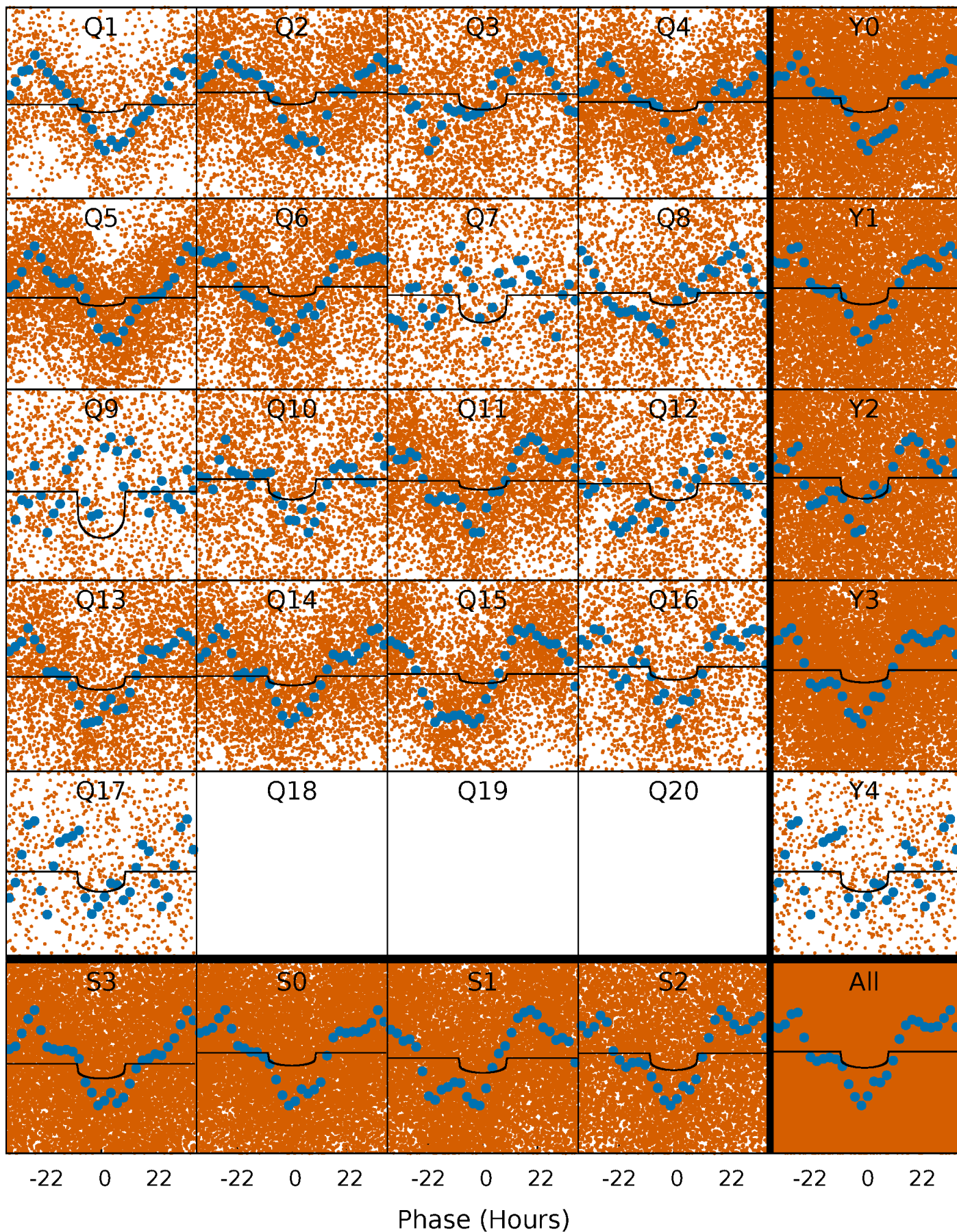
# PDC Quarter-Phased Transit Curves

TCE 008052016-01 P= 2.605256 Days  $T_0=133.117659$  (BKJD)



# DV Quarter-Phased Transit Curves

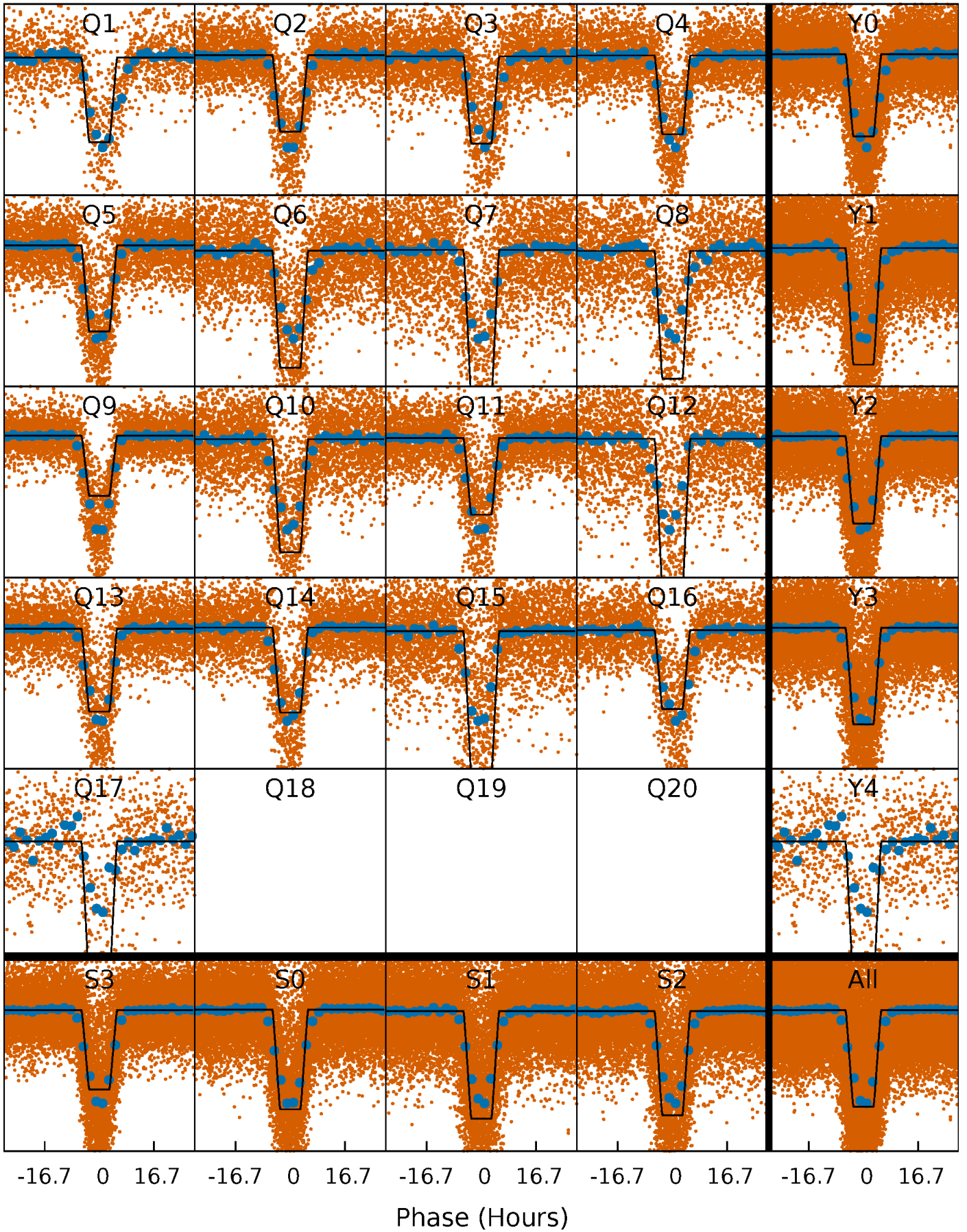
TCE 008052016-01 P= 2.605256 Days  $T_0=133.117659$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

TCE 008052016-01 P= 2.605087 Days  $T_0=133.113898$  (BKJD)

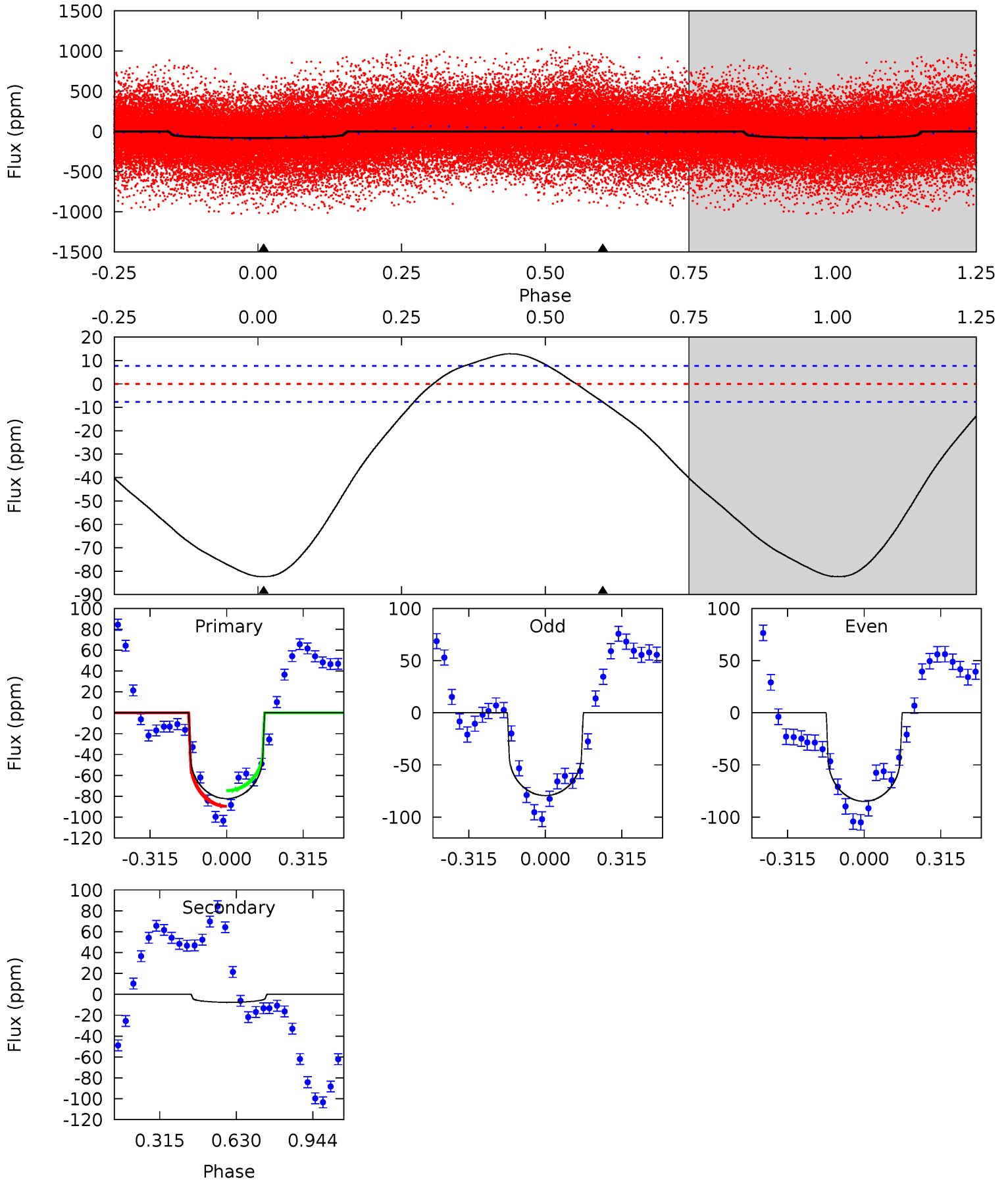




# DV Model-Shift Uniqueness Test

008052016-01, P = 2.605256 Days, E = 130.512403 Days

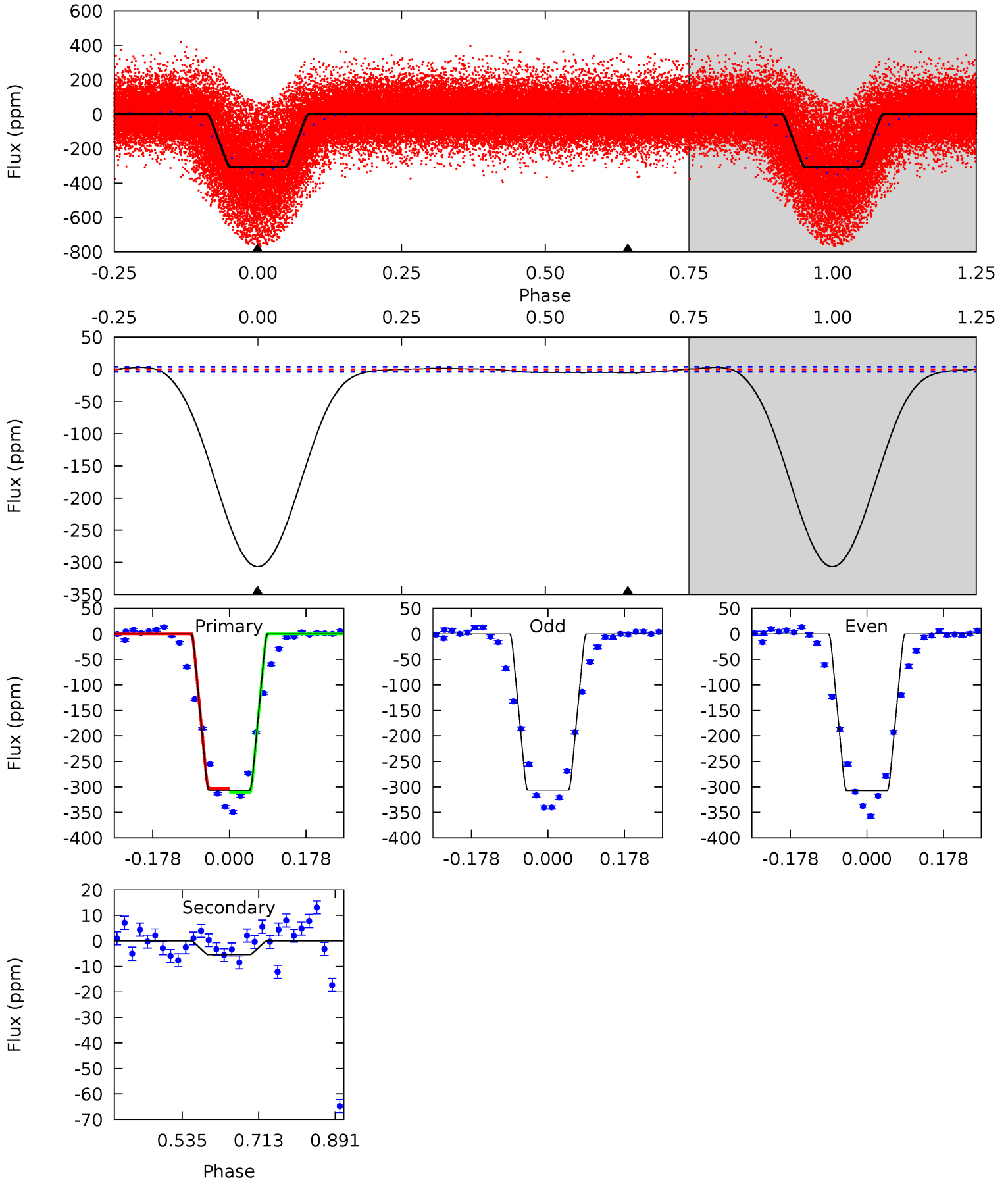
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
46.1	4.30	0	0	4.32	1.01	3.29	46.1	46.1	4.30	4.30	1.54	1.67	0.14	4.27



# Alt Model-Shift Uniqueness Test

008052016-01, P = 2.605087 Days, E = 130.508811 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
352.6	6.18	0	0	4.44	1.35	2.15	352.6	352.6	6.18	6.18	0.62	0.99	0.01	4.19



### Stellar Parameters For KIC 008052016

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6212^{+171}_{-171}$	$3.897^{+0.300}_{-0.100}$	$-0.340^{+0.350}_{-0.300}$	$1.989^{+0.418}_{-0.628}$	$1.138^{+0.225}_{-0.184}$	$0.204^{+0.380}_{-0.074}$
	+3%/-3%	+8%/-3%	+103%/-88%	+21%/-32%	+20%/-16%	+187%/-36%
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 008052016-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-8 \pm 2$	$1.10^{+0.47}_{-0.42}$	$2695^{+163}_{-231}$	$4557^{+1072}_{-588}$	$5.072^{+8.861}_{-2.509}$
Alt.	$-5 \pm 1$	$3.88^{+0.75}_{-0.73}$	$2686^{+168}_{-218}$	$-1895^{+4471}_{-654}$	$0.293^{+0.162}_{-0.087}$

$T_{\text{max}}$  = 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

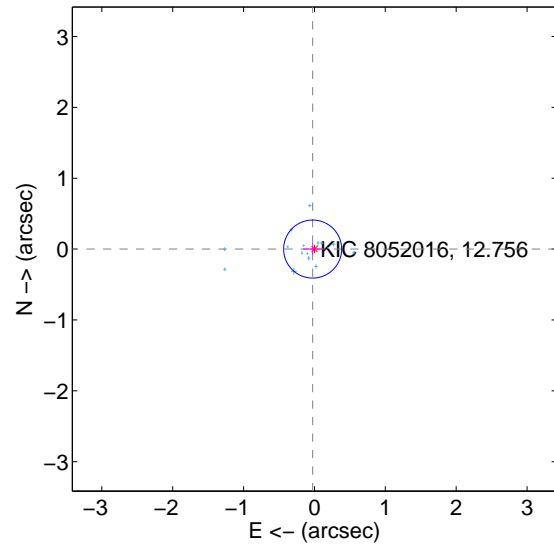
Supplemental centroid analysis for 008052016-01. Kepler magnitude: 12.76. Transit SNR 7.28

There are 17 quarters with good PRF difference image offsets

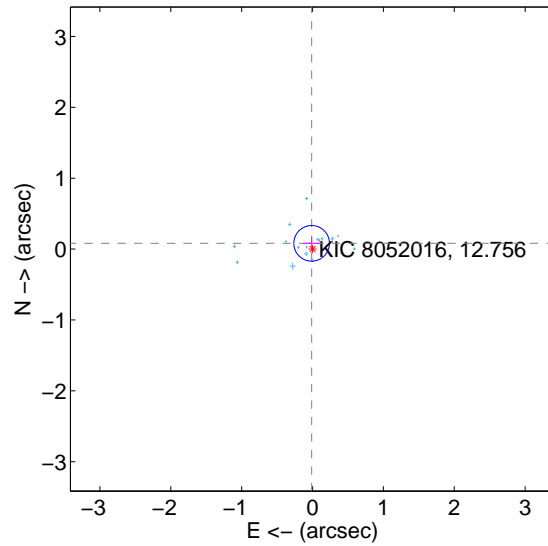
The direct PRF centroid is offset from the target star catalog position by about 0.09 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.025 \pm 0.136$	0.19	$0.025 \pm 0.137$	$0.000 \pm 0.083$
PRF-fit source offset from KIC position	$0.082 \pm 0.084$	0.98	$0.013 \pm 0.120$	$0.081 \pm 0.085$
photometric centroid source offset	$1.46 \pm 0.46$	3.17	$-0.61 \pm 0.51$	$1.33 \pm 0.45$

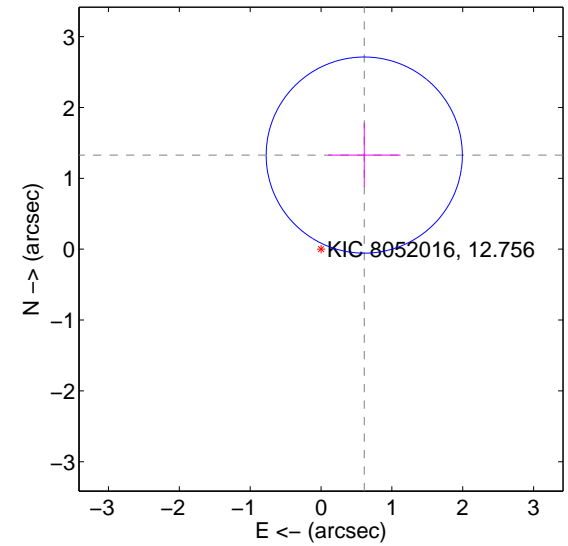
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

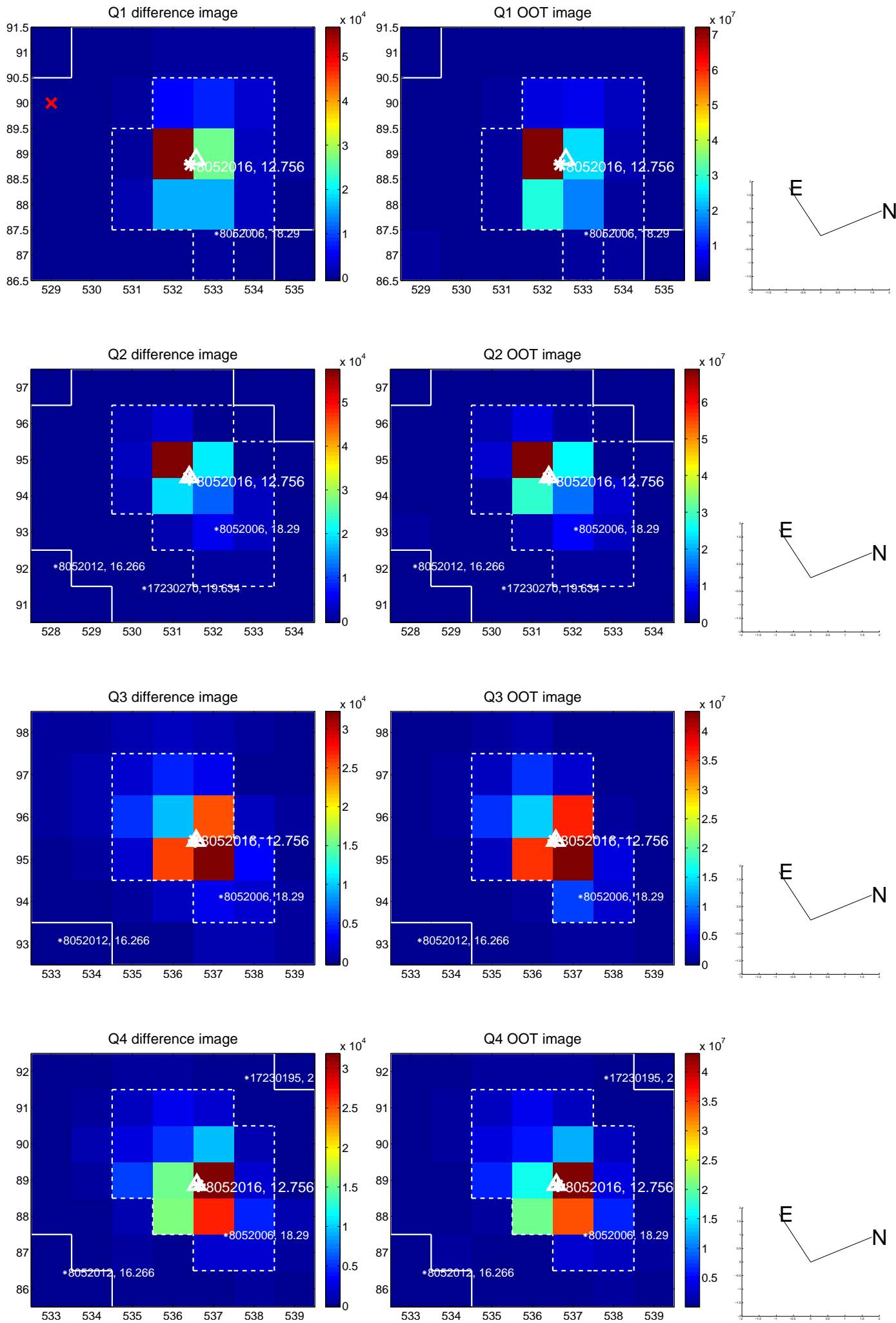


offset from photometric centroids

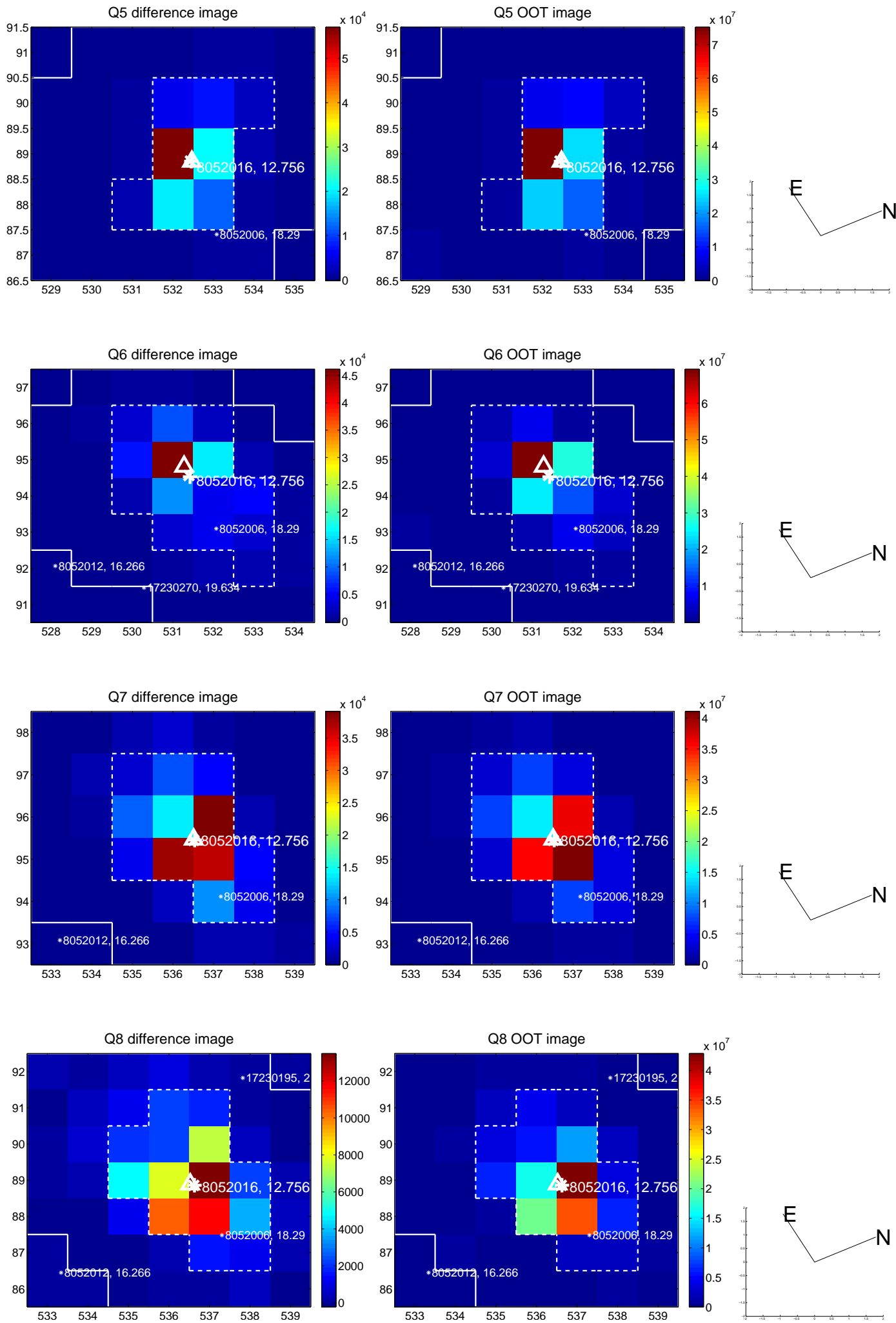


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

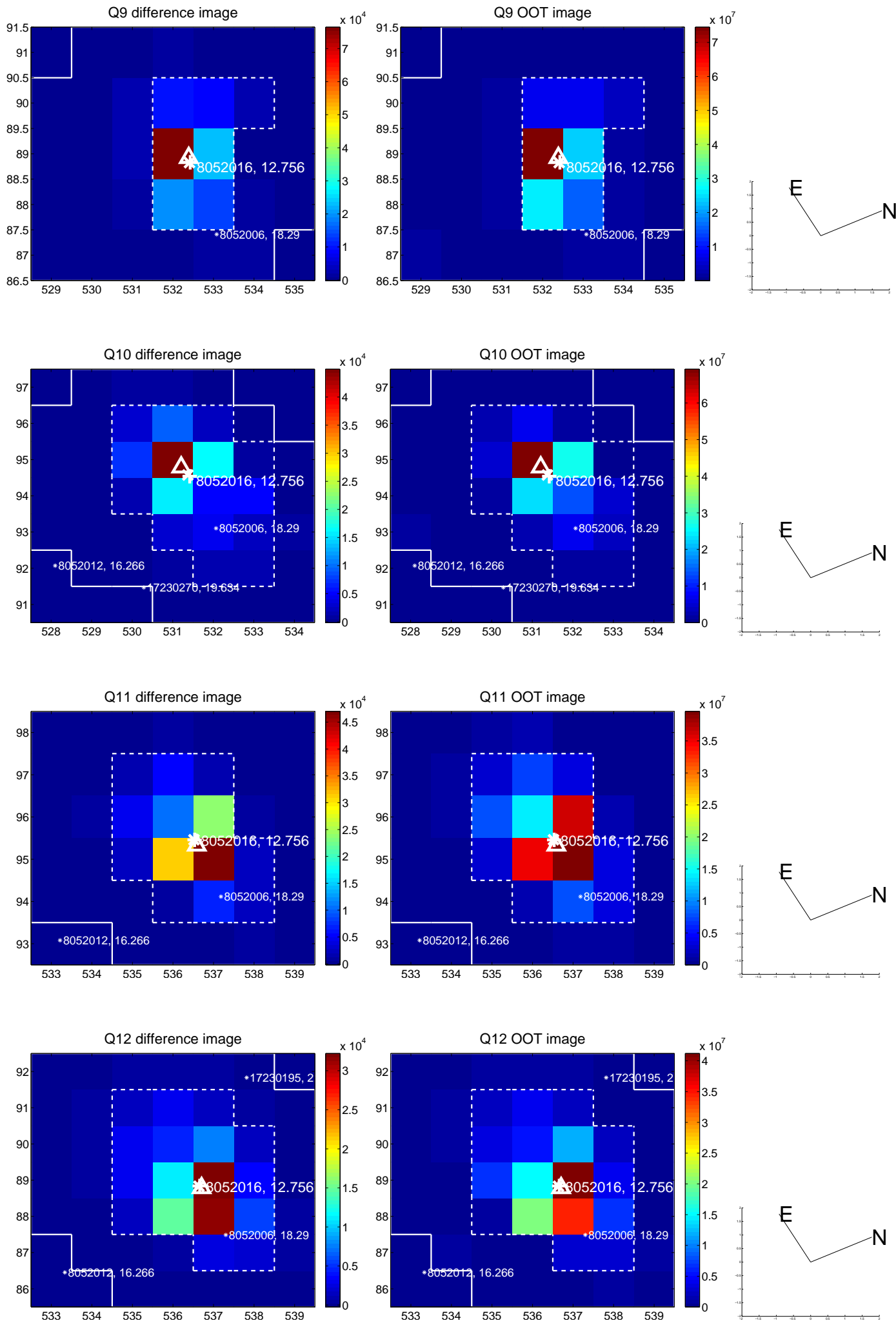


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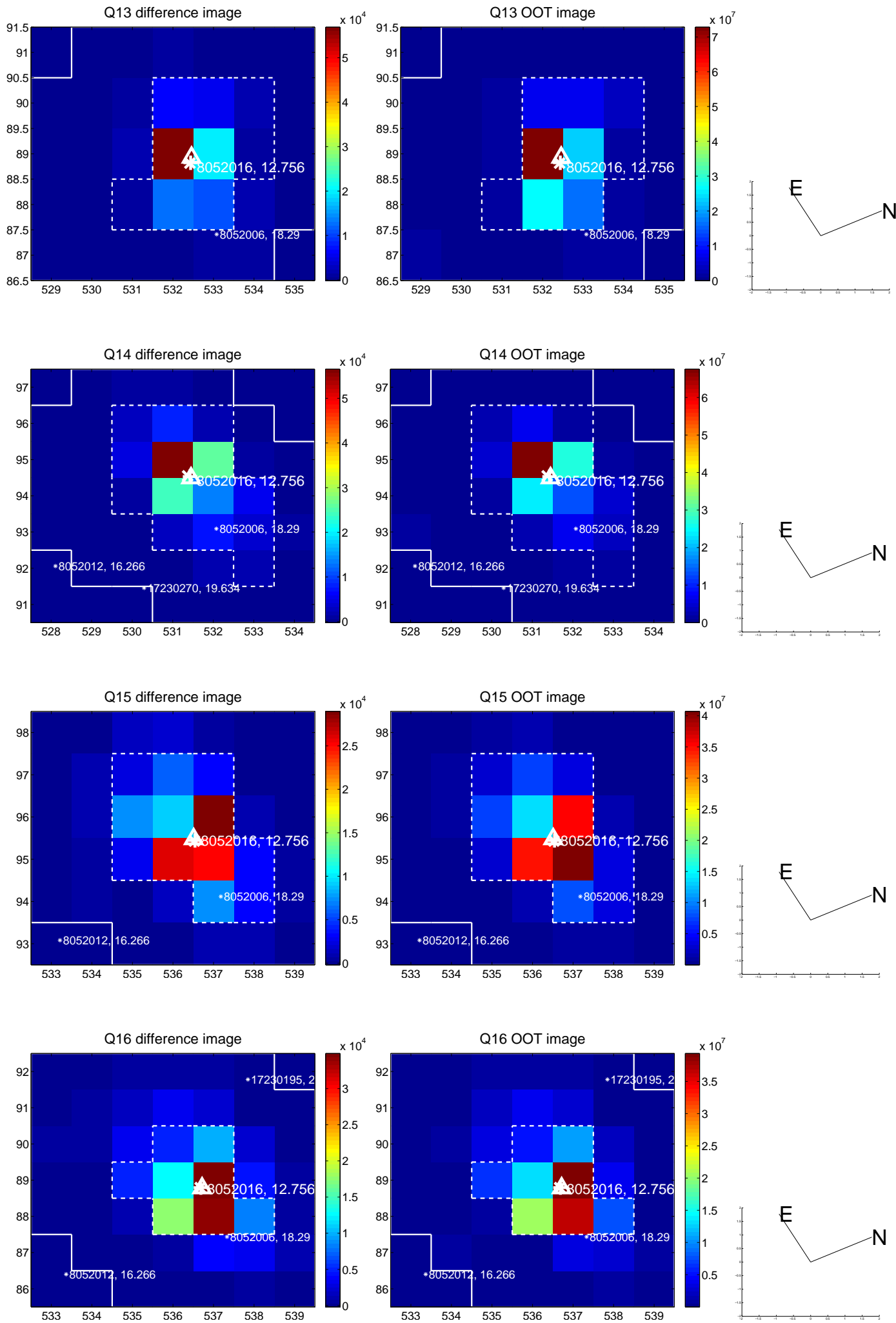




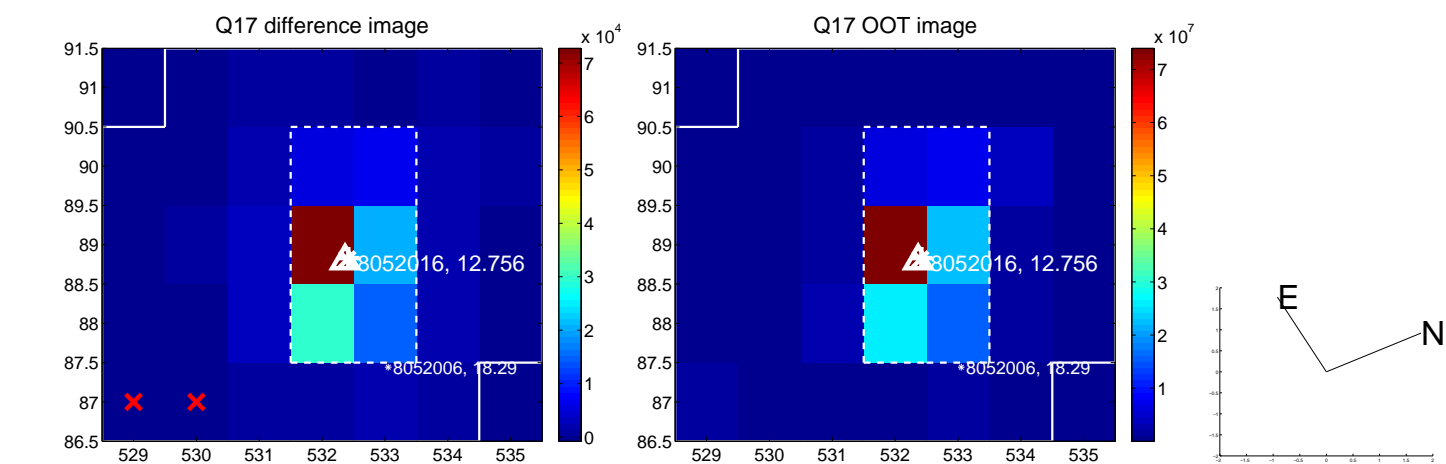
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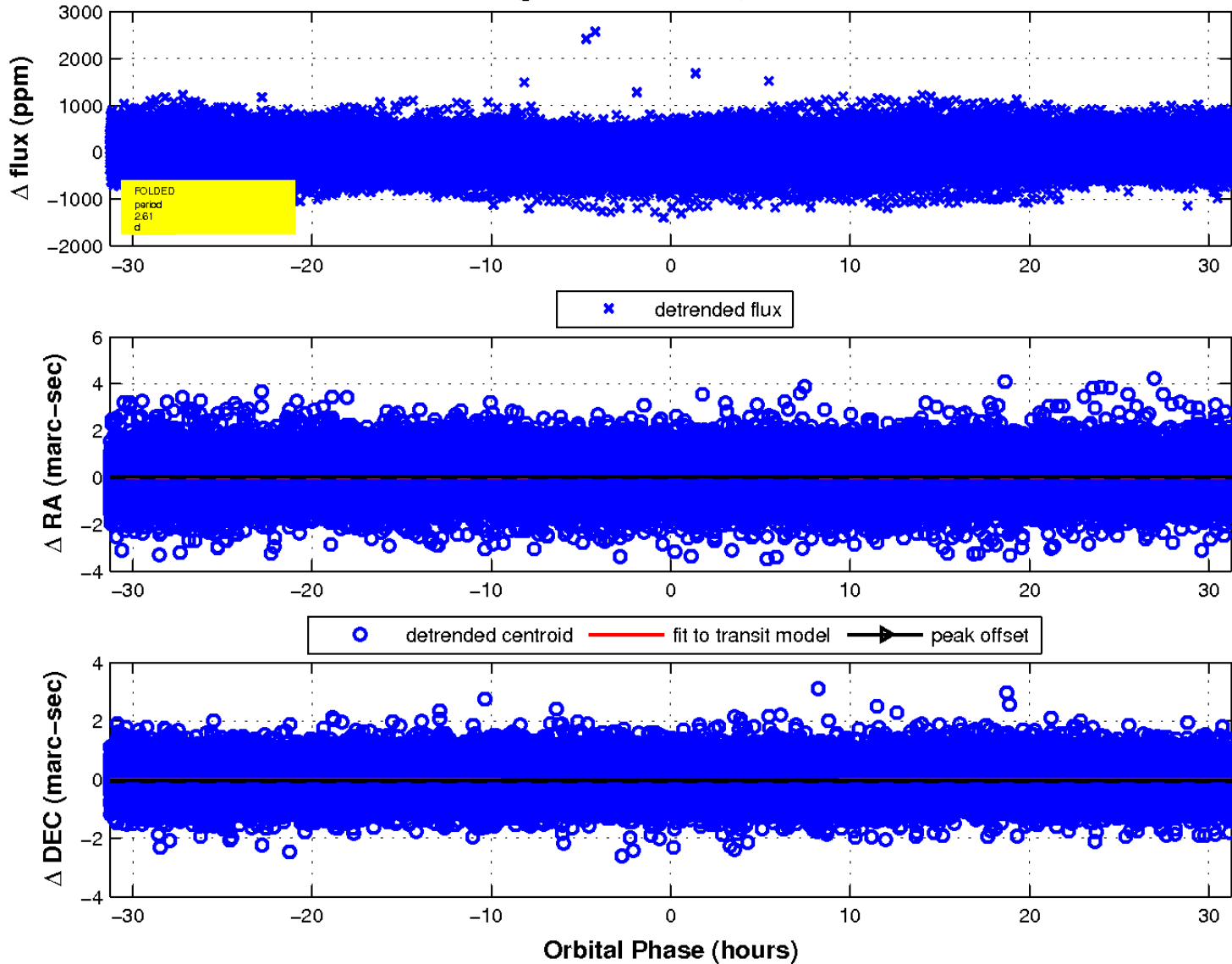
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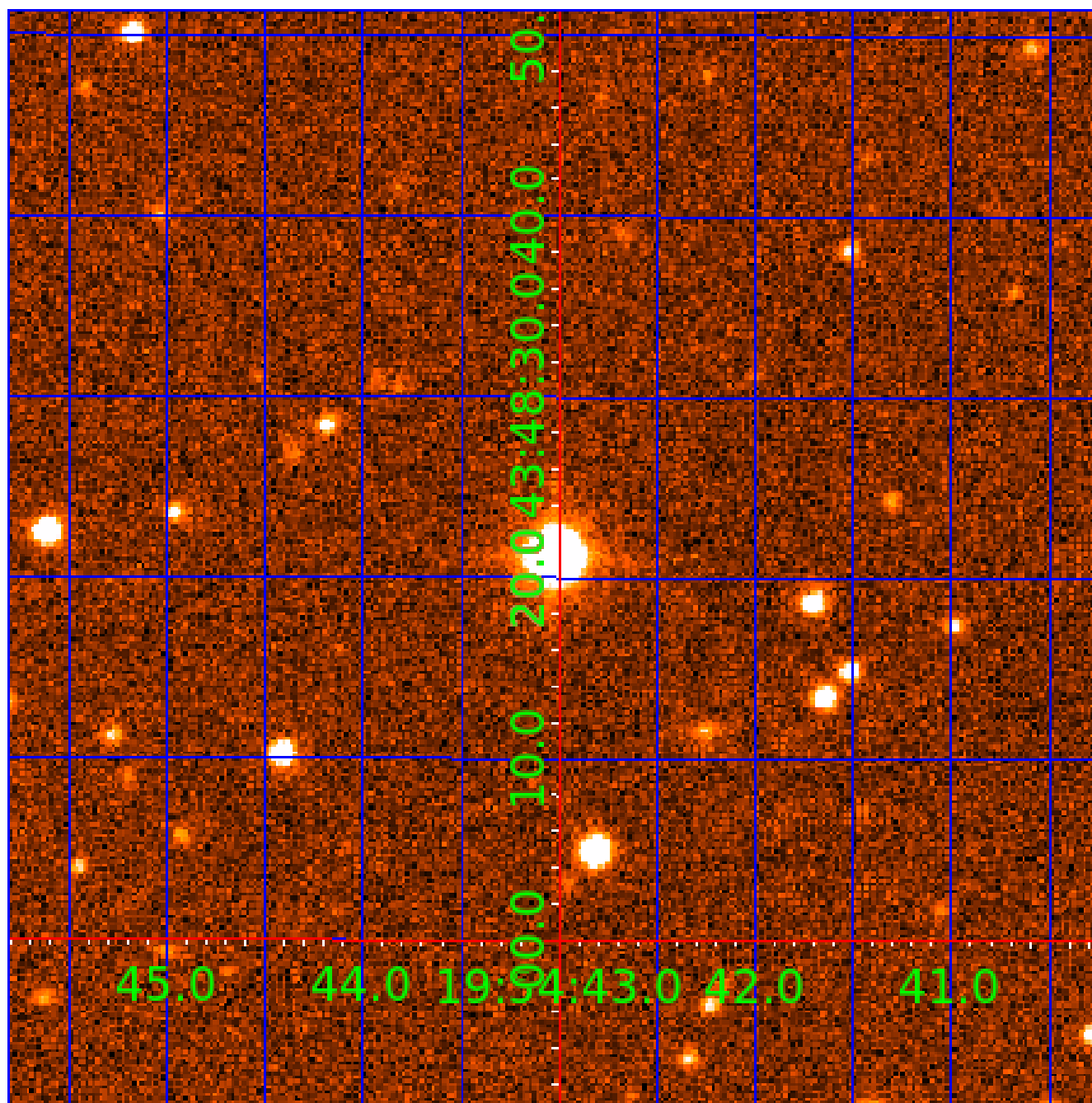


fluxWeightedCentroids, Planet 1 of 9



UKIRT Image

Declination



## KIC 008052016

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
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## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
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008052016-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
008052016-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—HALO_GHOST
008052016-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
008052016-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
008052016-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT
008052016-07	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—HALO_GHOST
008052016-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
008052016-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

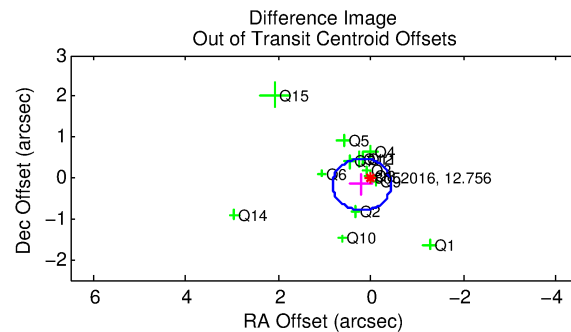
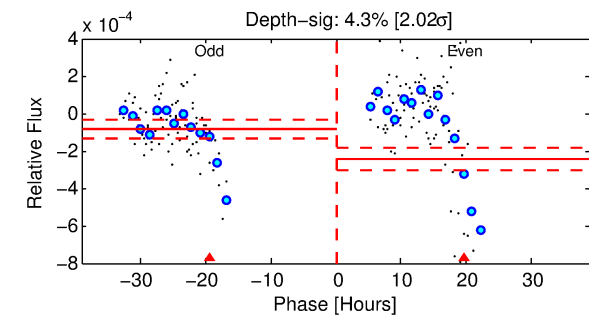
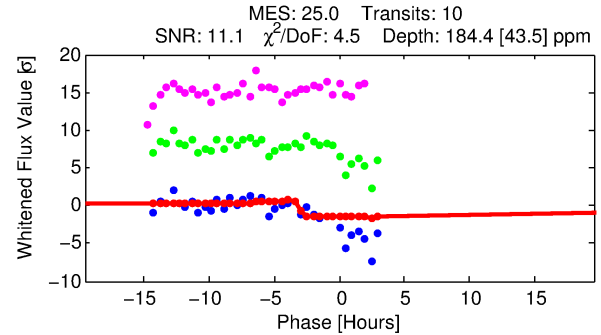
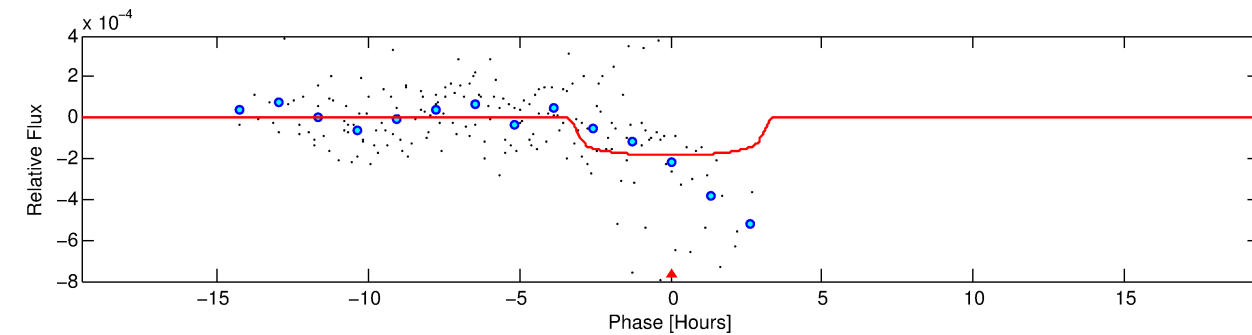
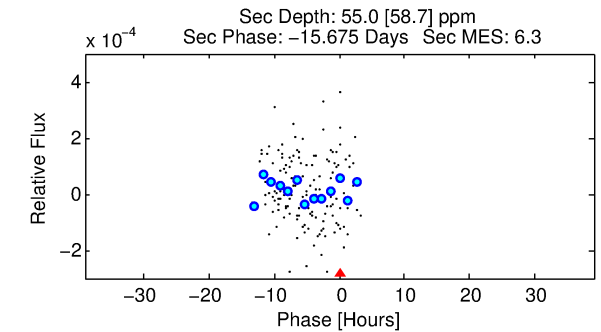
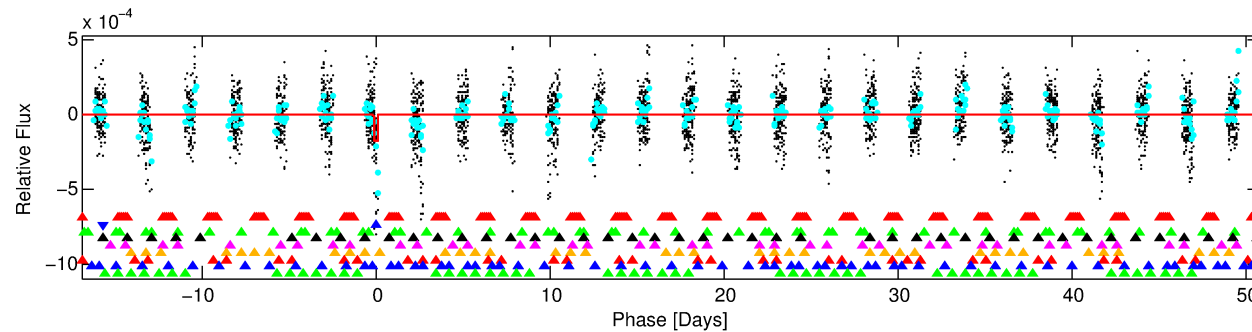
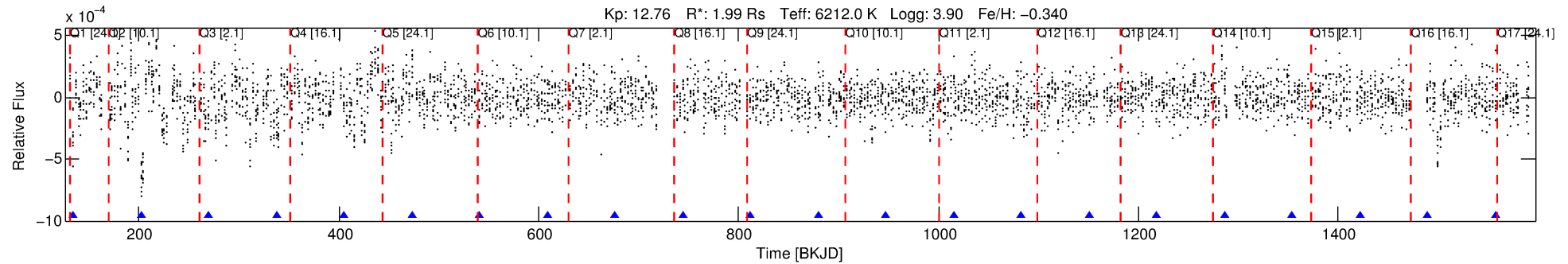
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 008052016-02

No Significant Match Found

# DV One-Page Summary

KIC: 8052016 Candidate: 2 of 9 Period: 67.763 d



## DV Fit Results:

Period = 67.76312 [0.00493] d  
Epoch = 134.3828 [0.0438] BKJD  
Rp/R\* = 0.0139 [0.0105]  
a/R\* = 46.37 [185.99]  
b = 0.83 [1.56]  
Seff = 45.74 [23.70]  
Teq = 663 [86] K  
Rp = 3.03 [2.47] Re  
a = 0.3397 [0.1060] AU  
Ag = 381.20 [729.10] [0.52 $\sigma$ ]  
Teffp = 4530 [2093] K [1.85 $\sigma$ ]

## DV Diagnostic Results:

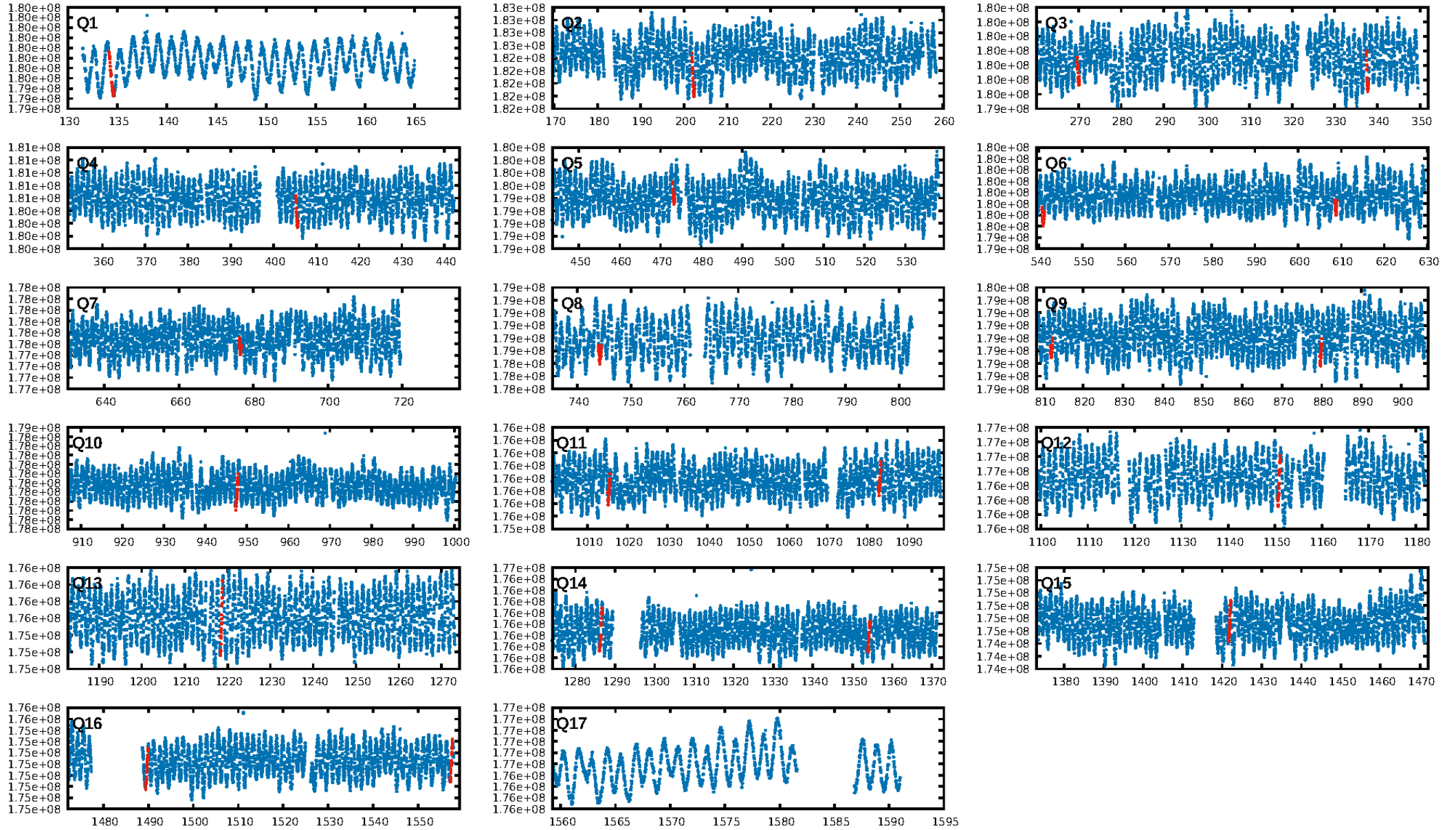
ShortPeriod-sig: 100.0% [85.86 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 0.0%  
Bootstrap-pfa: 1.58e-71  
RollingBand-fgt: 1.00 [9/9]  
GhostDiagnostic-chr: 0.9938  
Centroid-sig: 34.6%  
Centroid-so: 0.416 arcsec [0.70 $\sigma$ ]  
OotOffset-rm: 0.258 arcsec [1.22 $\sigma$ ]  
OotOffset-st: 4/4/3/3 [14]  
KicOffset-rm: 0.205 arcsec [0.95 $\sigma$ ]  
KicOffset-st: 4/4/3/3 [14]  
DiffImageQuality-fgm: 0.93 [13/14]  
DiffImageOverlap-fno: 0.73 [11/15]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 23:13:33 Z

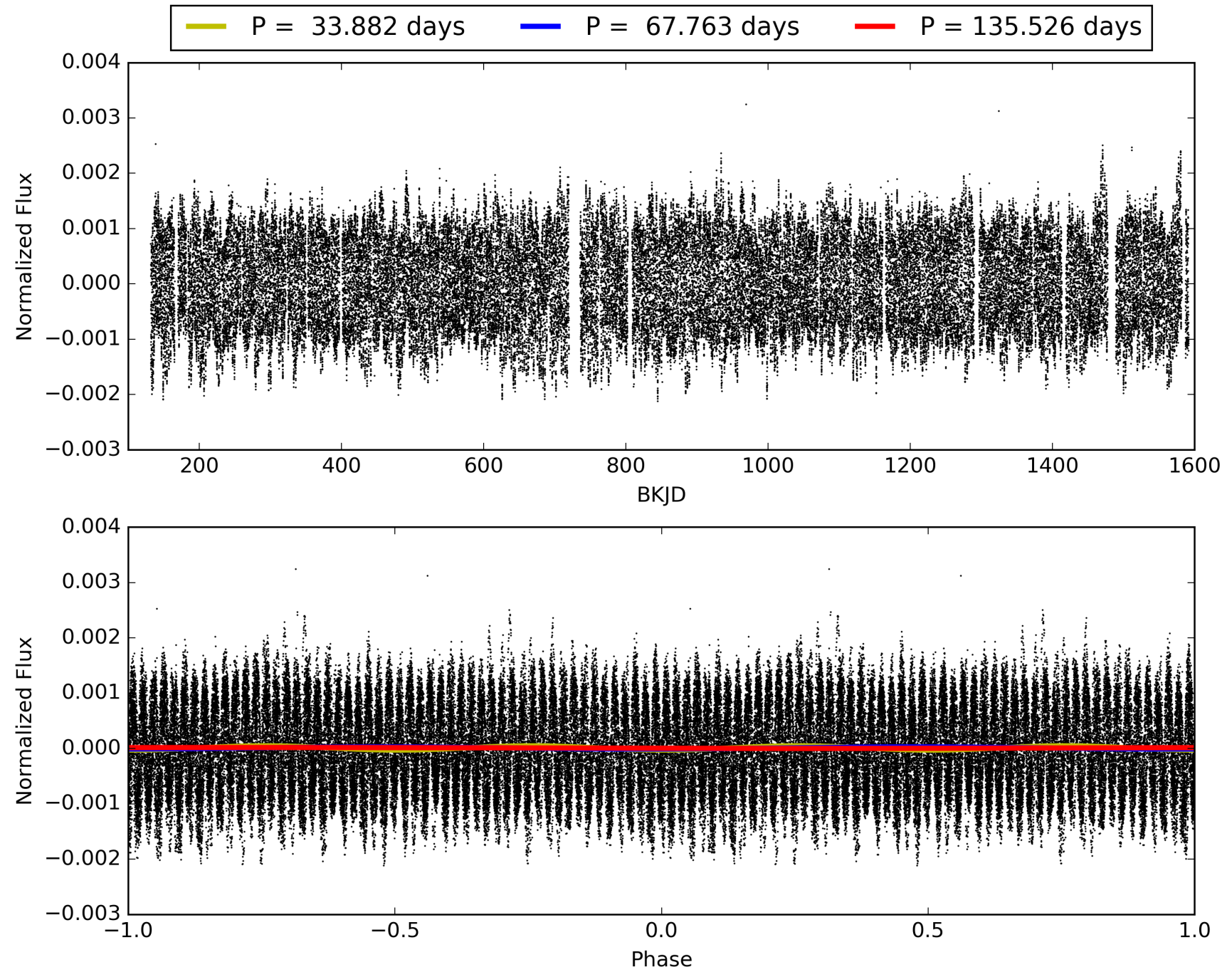
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 008052016-02, PDC Light Curves

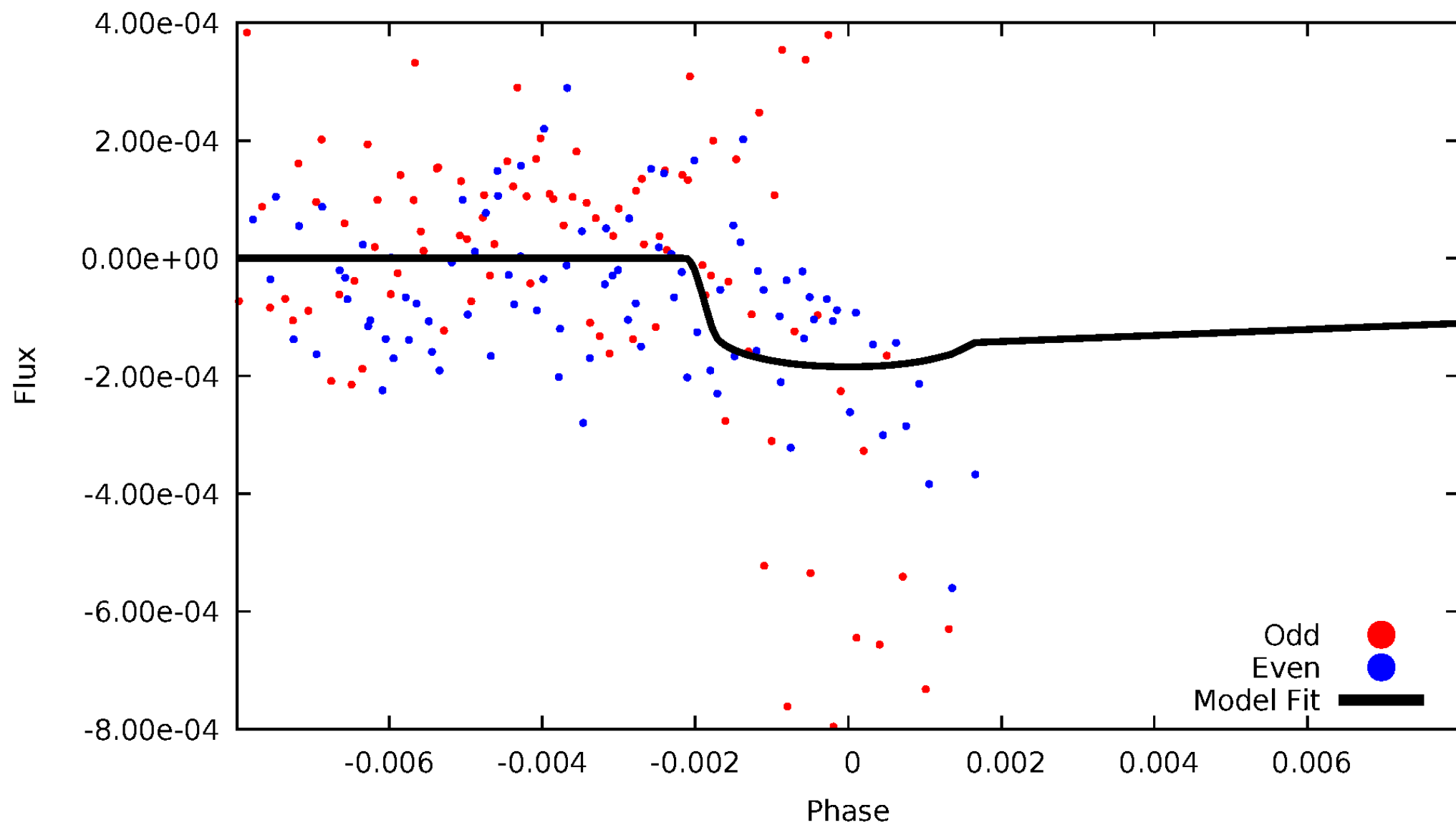


# TCE 008052016-02



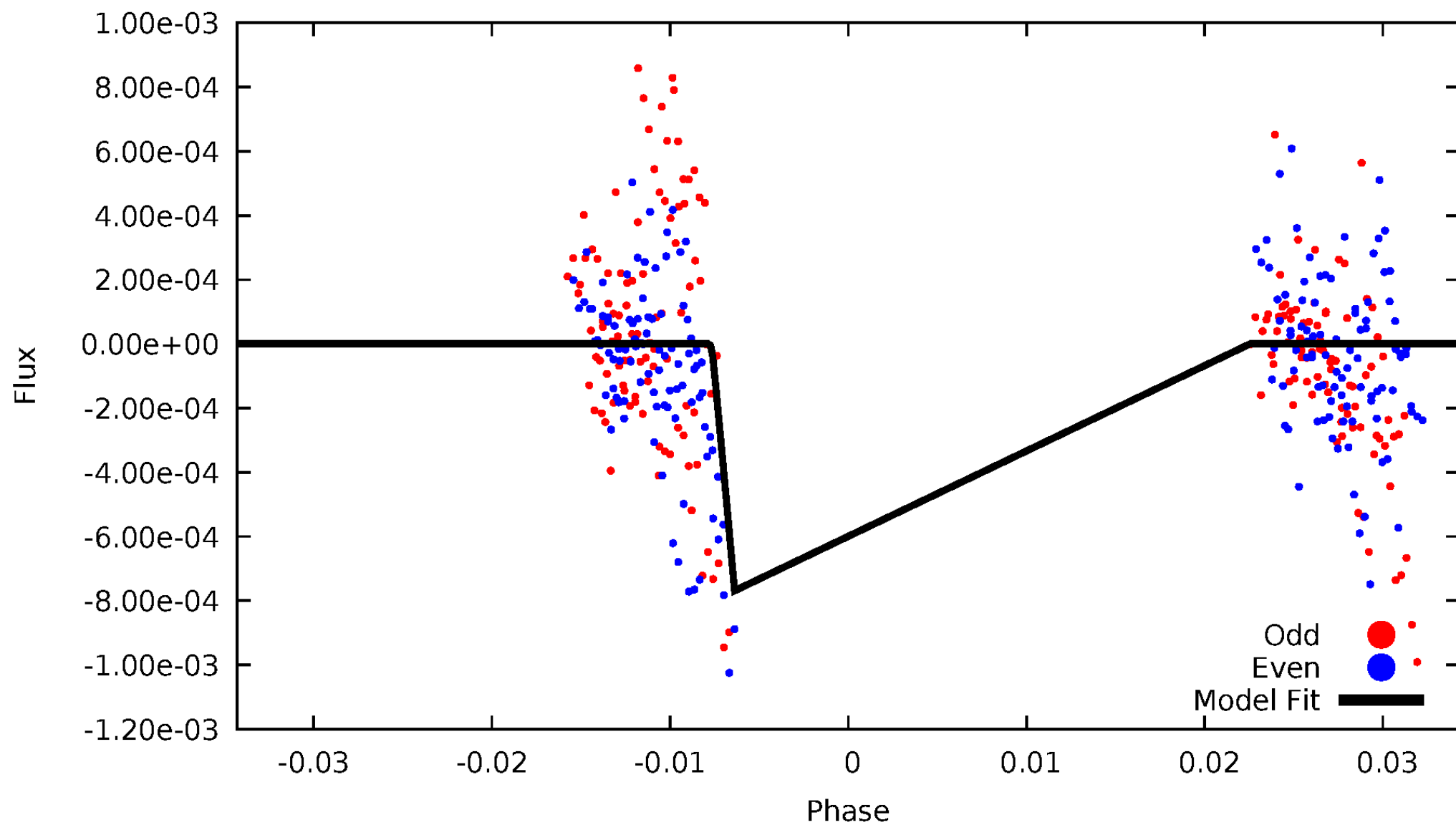
# DV Odd/Even

TCE 008052016-02



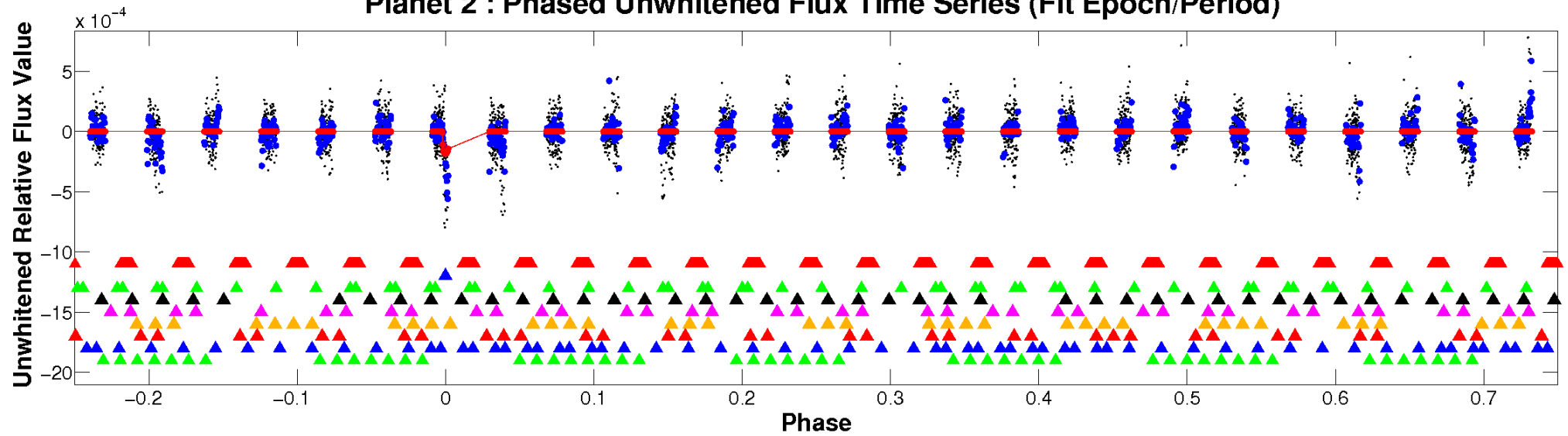
# ALT Odd/Even

TCE 008052016-02

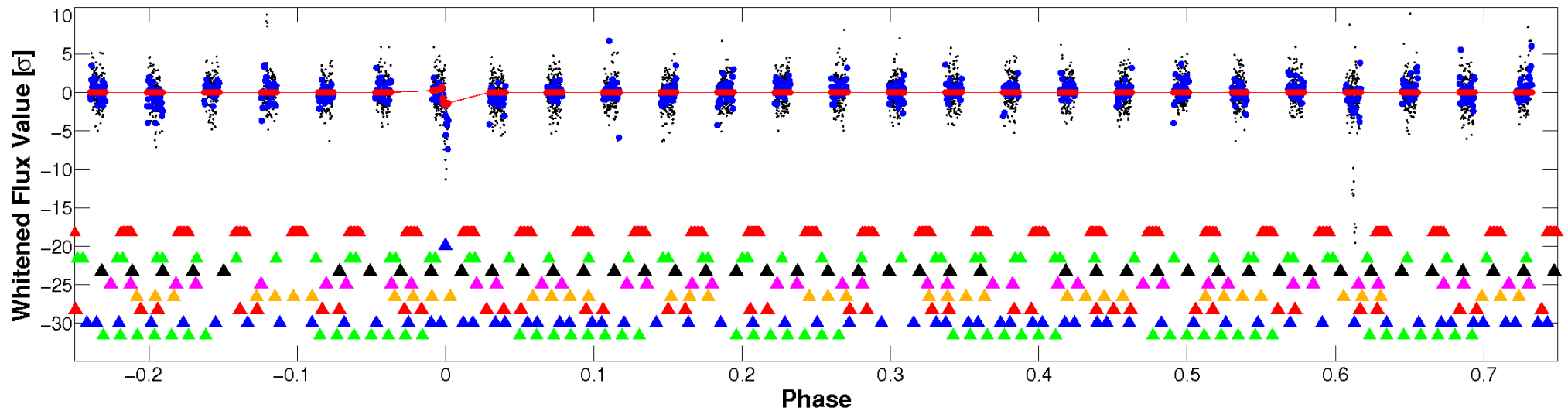


# Non-Whitened Vs. Whitened Light Curve

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

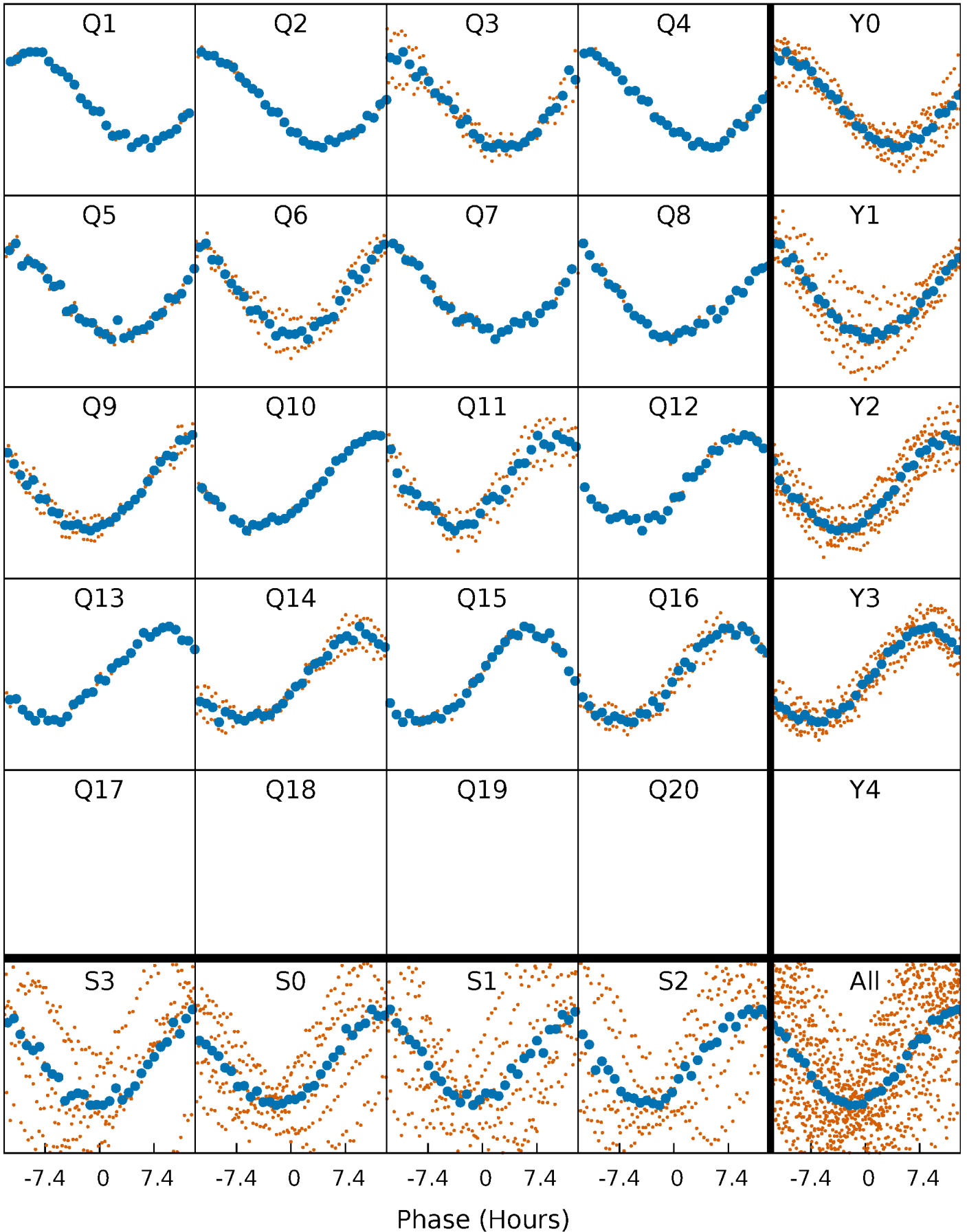


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

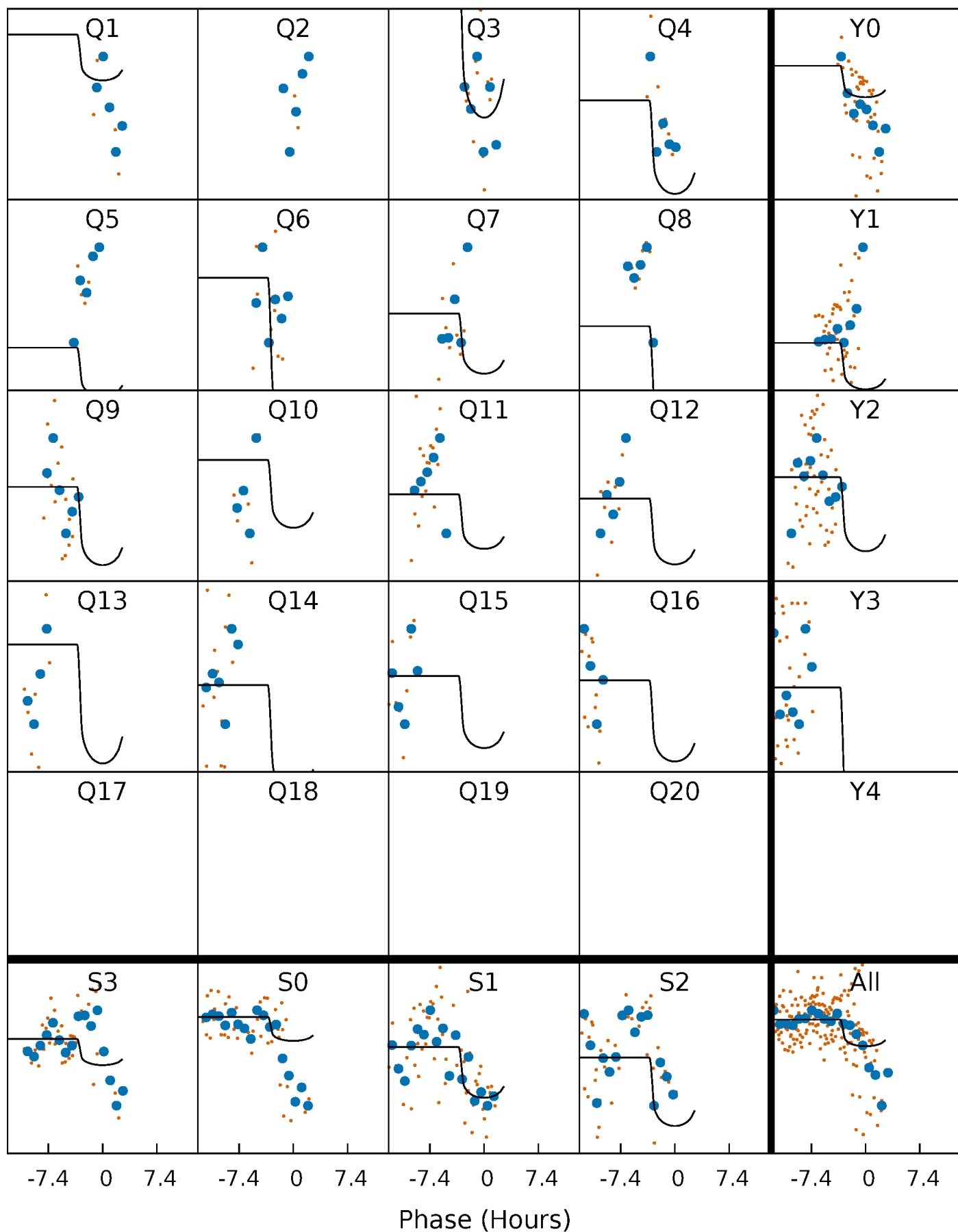
TCE 008052016-02 P= 67.763122 Days  $T_0=134.382802$  (BKJD)





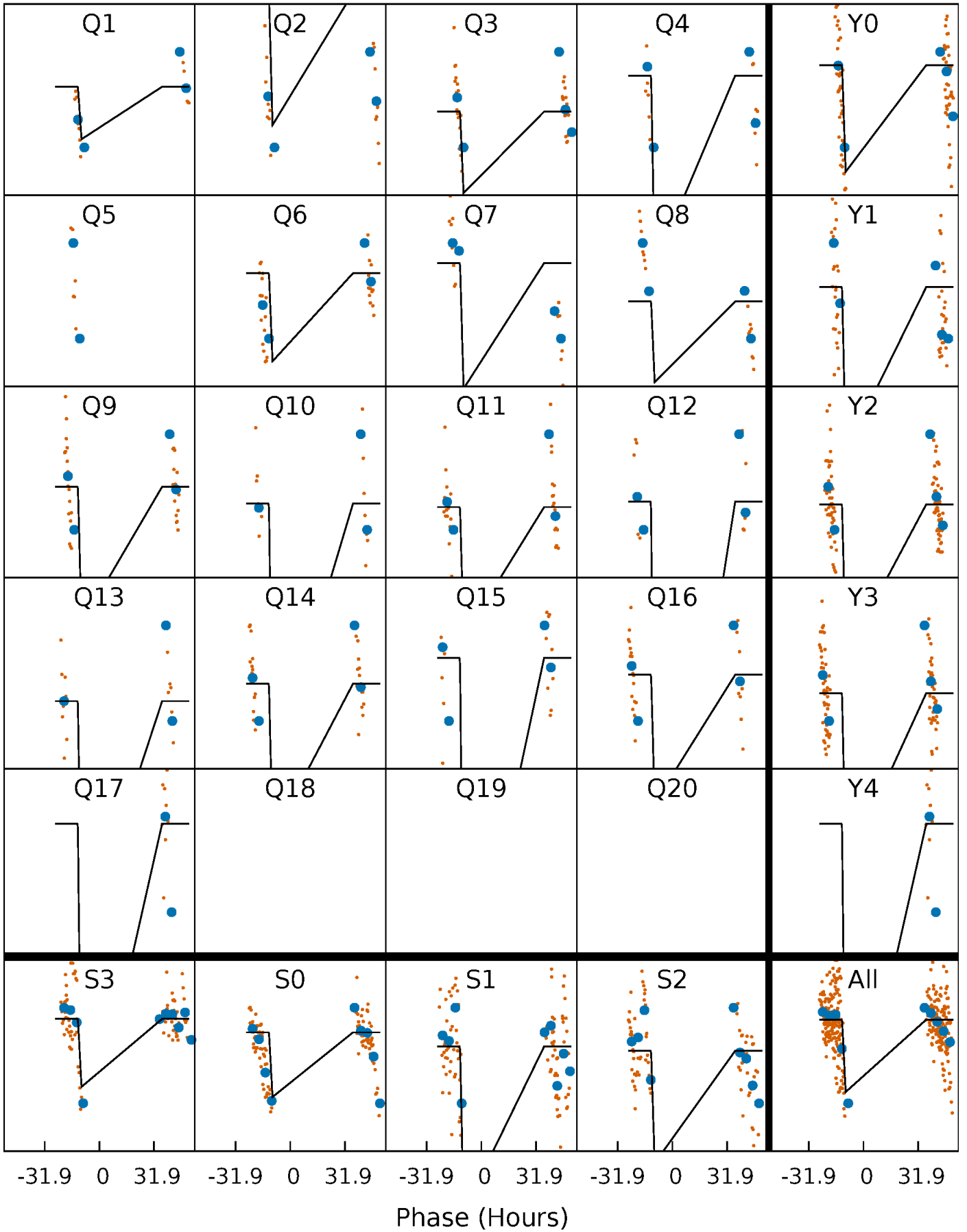
# DV Quarter-Phased Transit Curves

TCE 008052016-02 P= 67.763122 Days  $T_0=134.382802$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

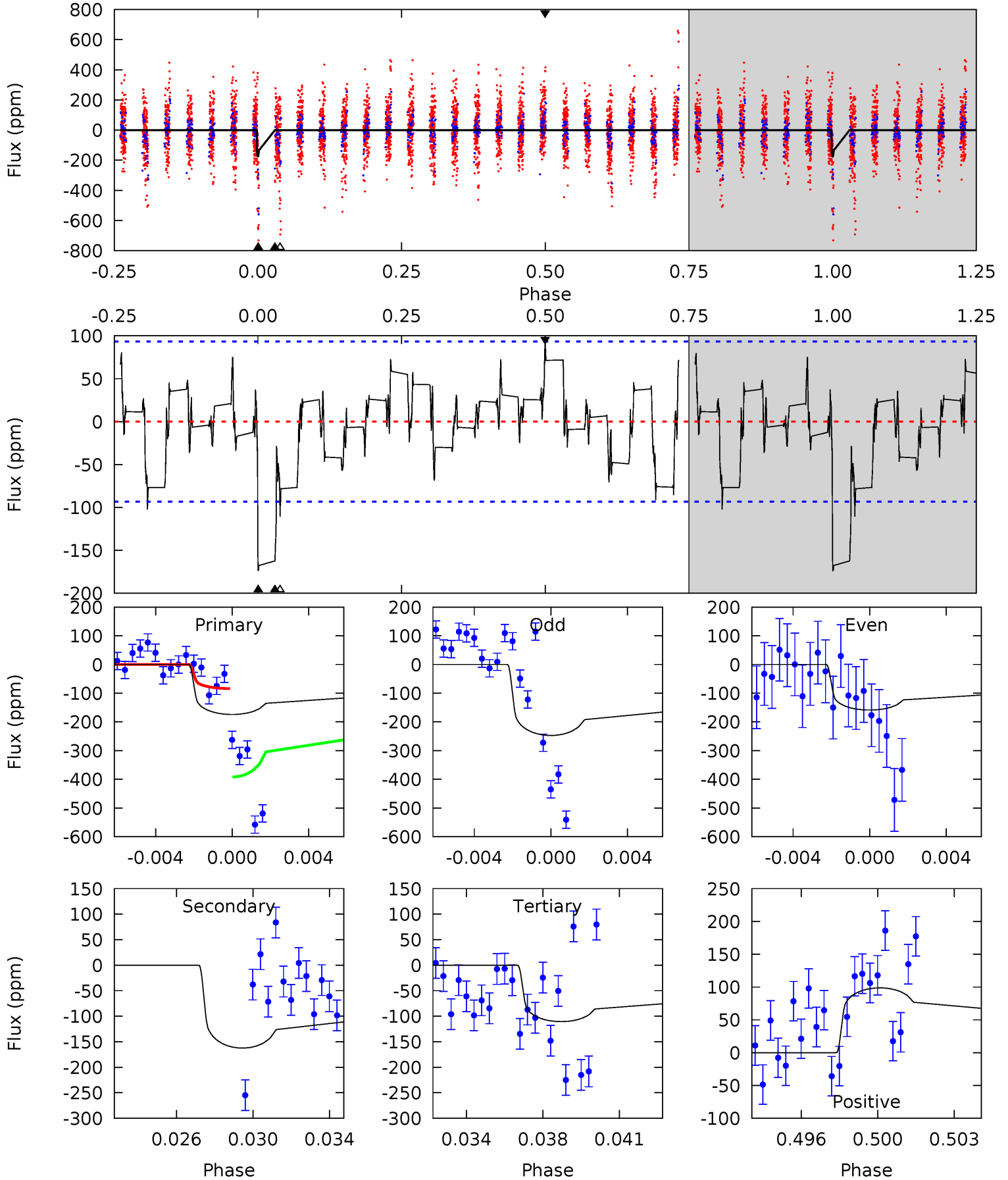
TCE 008052016-02 P= 67.759704 Days  $T_0=134.927734$  (BKJD)



# DV Model-Shift Uniqueness Test

008052016-02, P = 67.763122 Days, E = 66.619680 Days

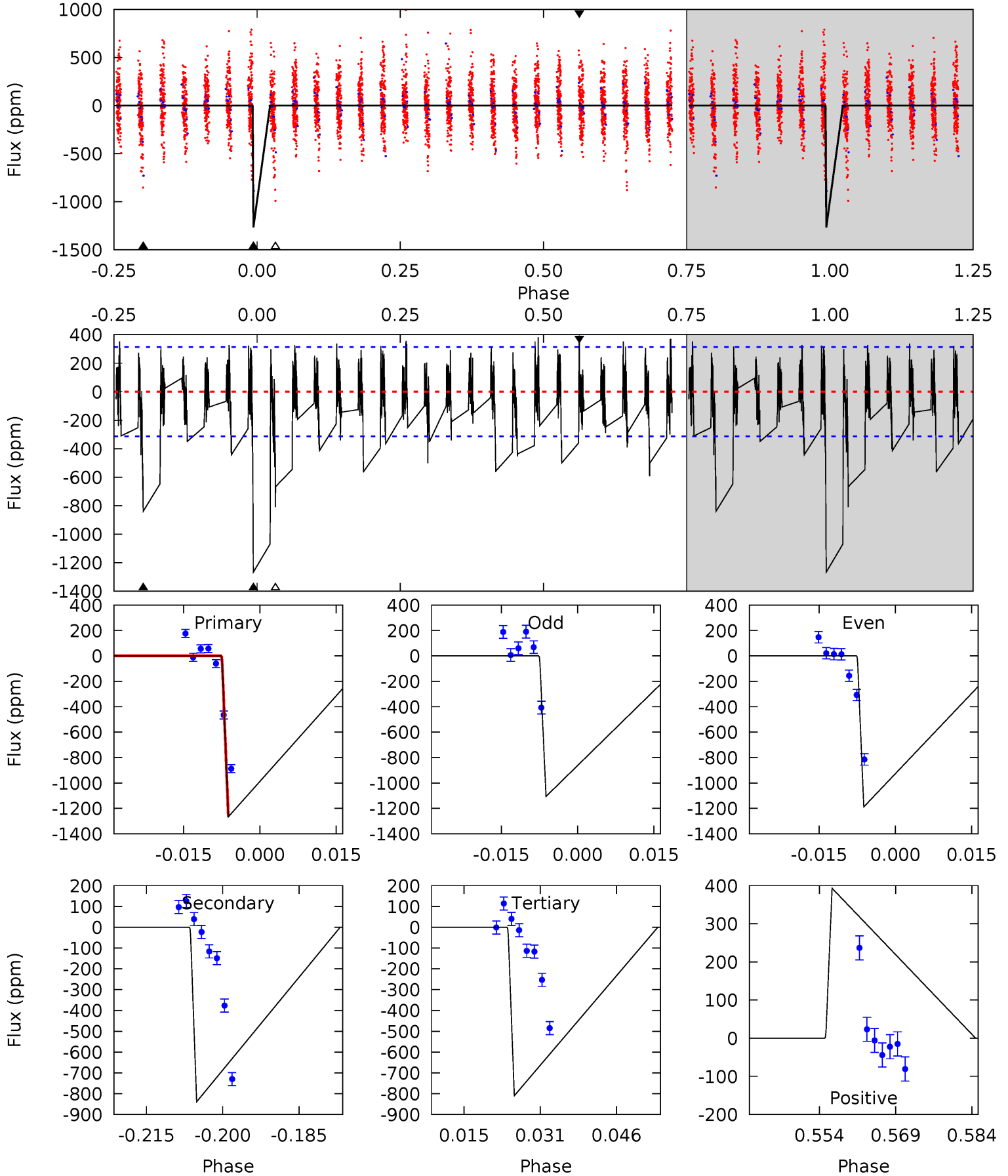
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.73	9.07	6.18	5.51	5.21	2.90	1.81	3.55	4.22	2.89	3.56	2.50	1.43	0.36	7.57



# Alt Model-Shift Uniqueness Test

008052016-02, P = 67.759704 Days, E = 67.168030 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
20.0	13.2	12.8	6.20	4.94	2.42	2.32	7.20	13.8	0.46	7.04	0.64	0	0.24	0



### Stellar Parameters For KIC 008052016

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6212^{+171}_{-171}$	$3.897^{+0.300}_{-0.100}$	$-0.340^{+0.350}_{-0.300}$	$1.989^{+0.418}_{-0.628}$	$1.138^{+0.225}_{-0.184}$	$0.204^{+0.380}_{-0.074}$
	+3%/-3%	+8%/-3%	+103%/-88%	+21%/-32%	+20%/-16%	+187%/-36%
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 008052016-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-162 \pm 18$	$2.91^{+2.18}_{-1.70}$	$907^{+61}_{-80}$	$5864^{+3643}_{-1187}$	$1248^{+5784}_{-831}$
Alt.	$-839 \pm 63$	$10.80^{+3.08}_{-2.69}$	$904^{+62}_{-77}$	$4734^{+502}_{-373}$	$459^{+361}_{-177}$

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

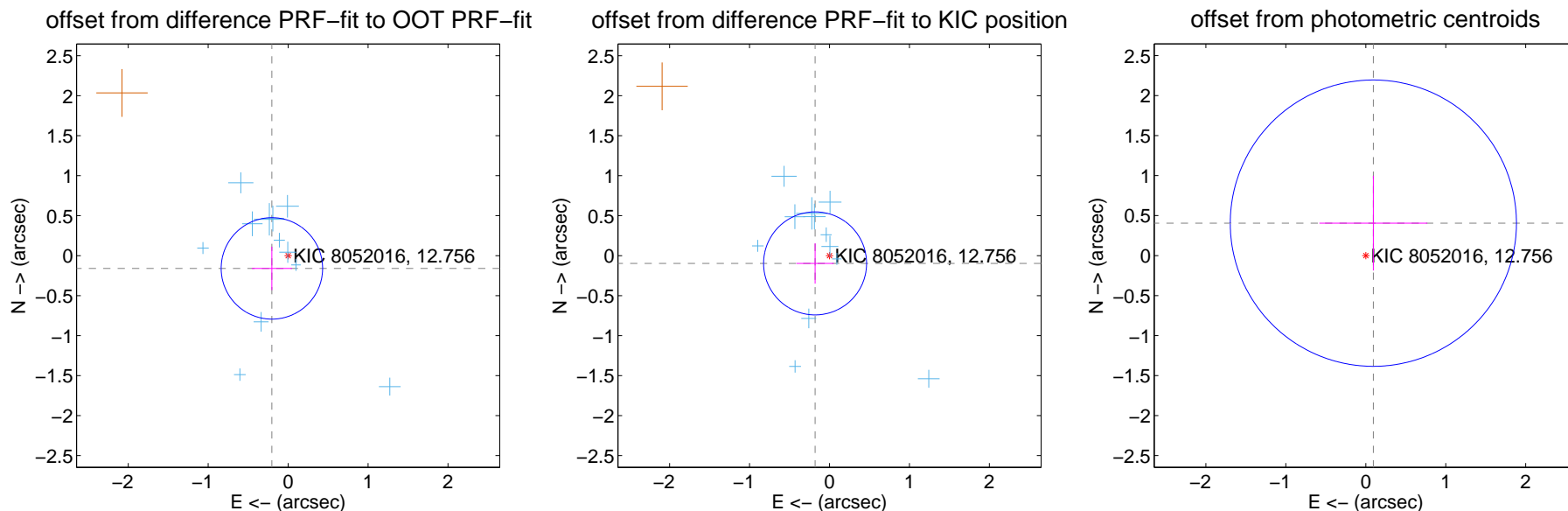
## DV Centroid Data

Supplemental centroid analysis for 008052016-02. Kepler magnitude: 12.76. Transit SNR 11.14

There are 13 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.08 arcsec

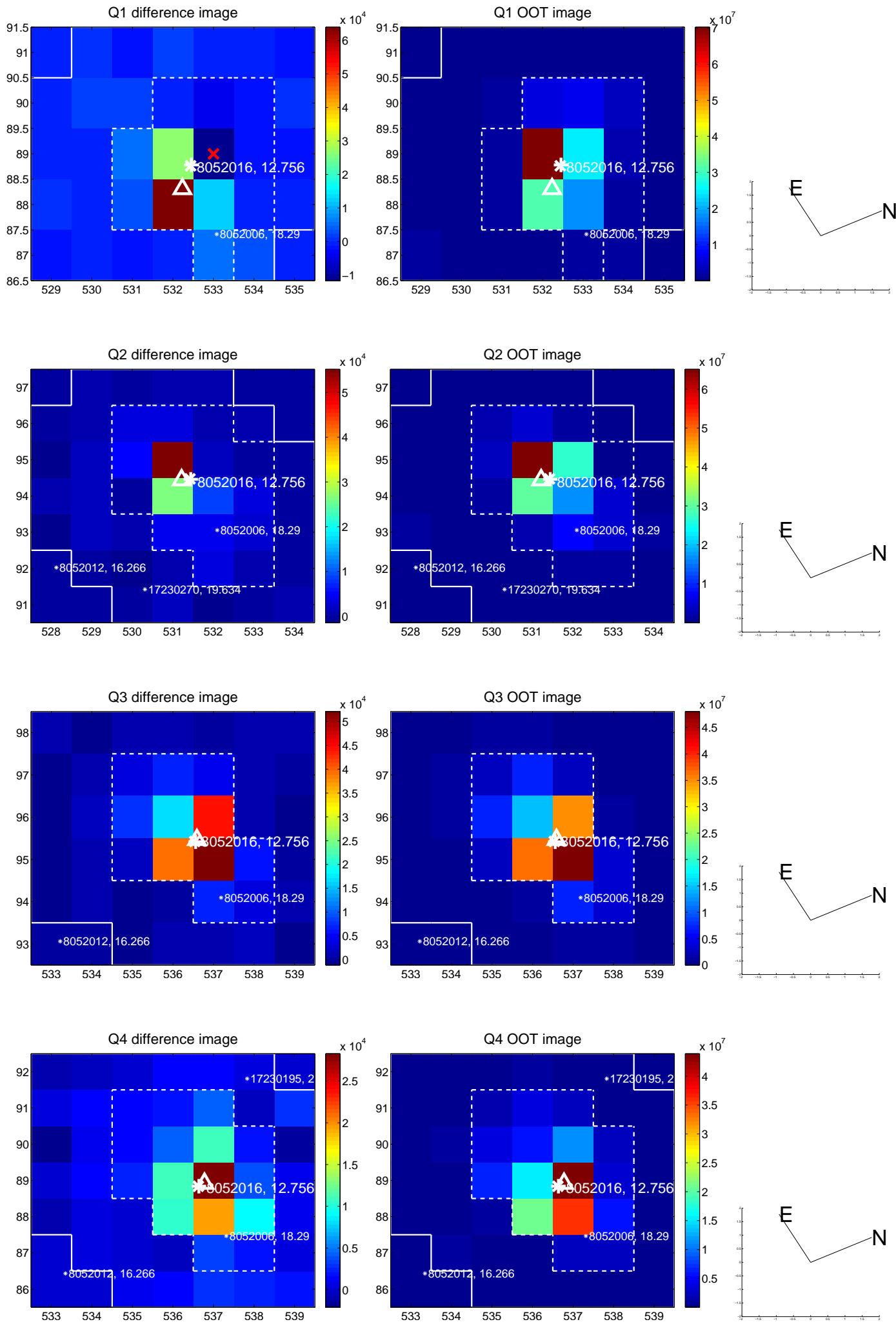
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.258 \pm 0.212$	1.22	$0.203 \pm 0.252$	$-0.159 \pm 0.271$
PRF-fit source offset from KIC position	$0.205 \pm 0.215$	0.95	$0.180 \pm 0.234$	$-0.097 \pm 0.253$
photometric centroid source offset	$0.42 \pm 0.60$	0.70	$-0.09 \pm 0.68$	$0.41 \pm 0.59$



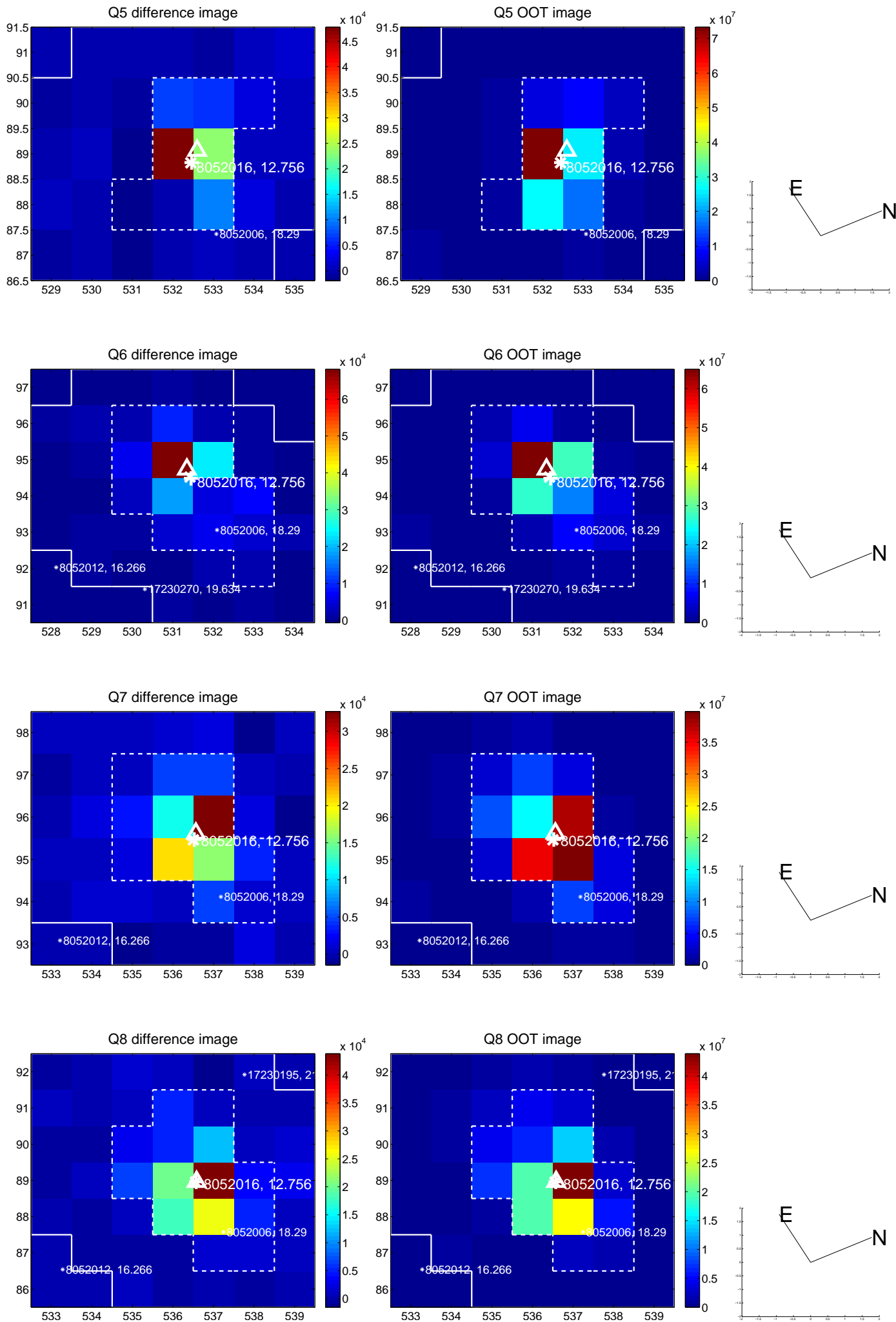
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



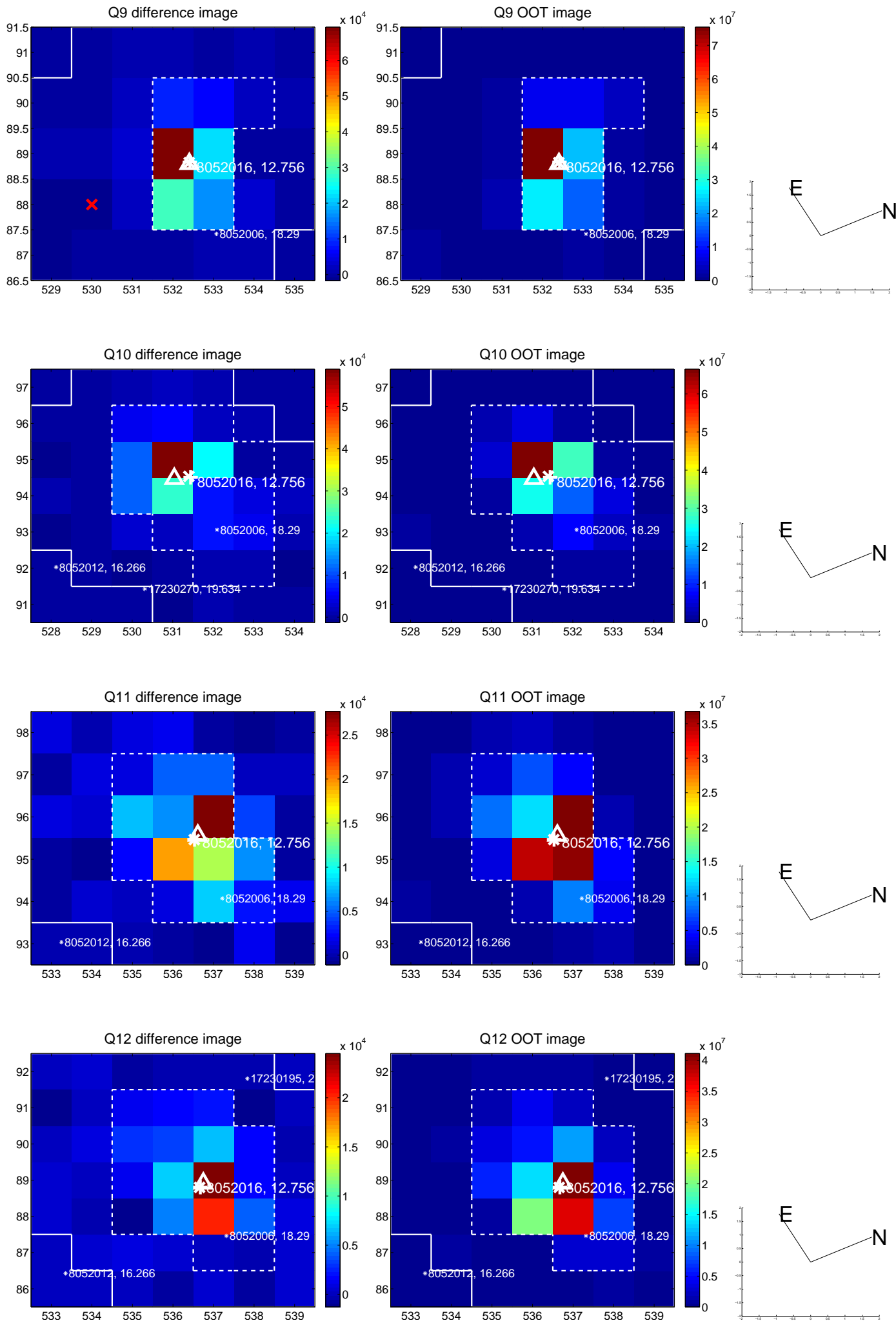
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



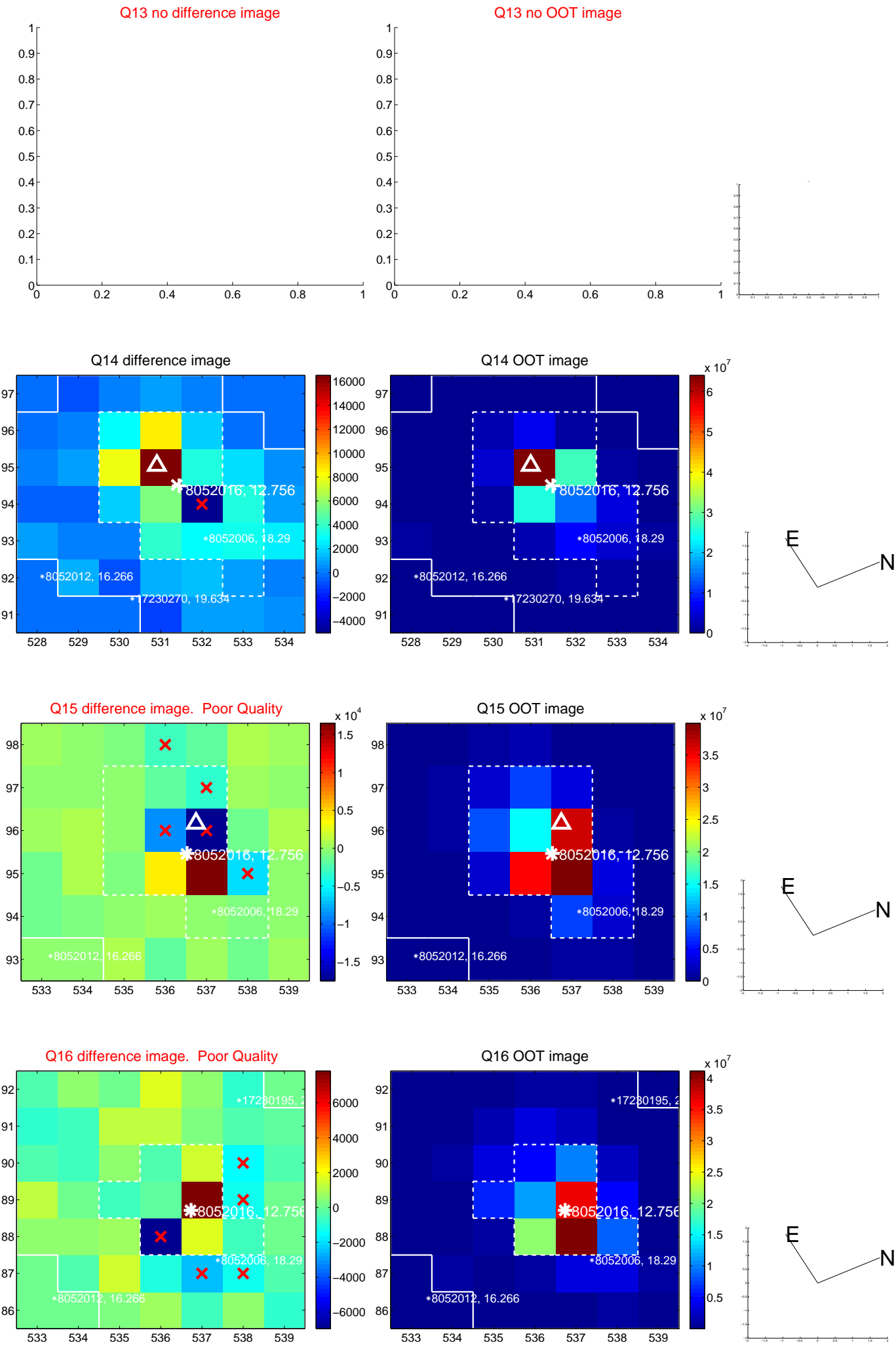
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



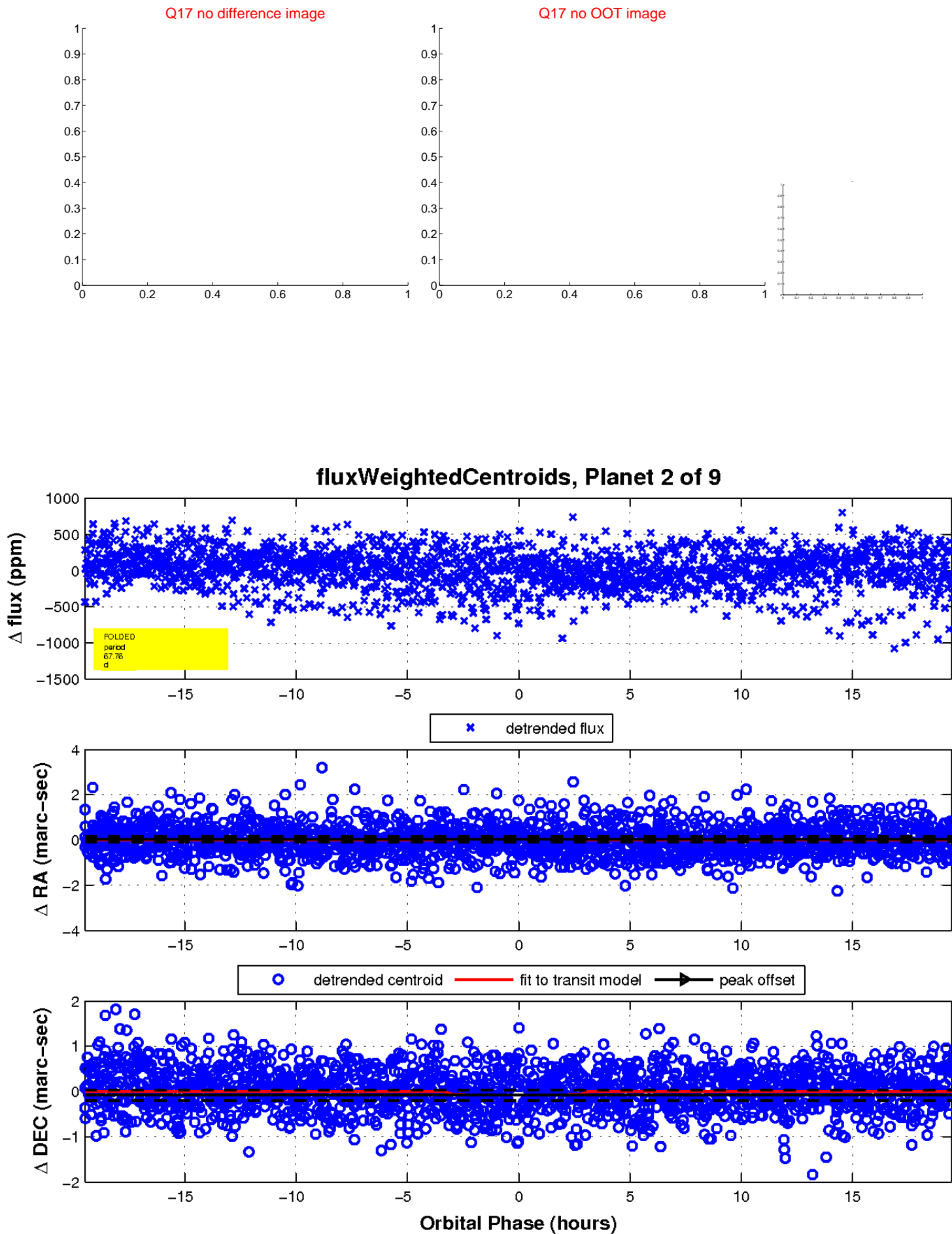
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



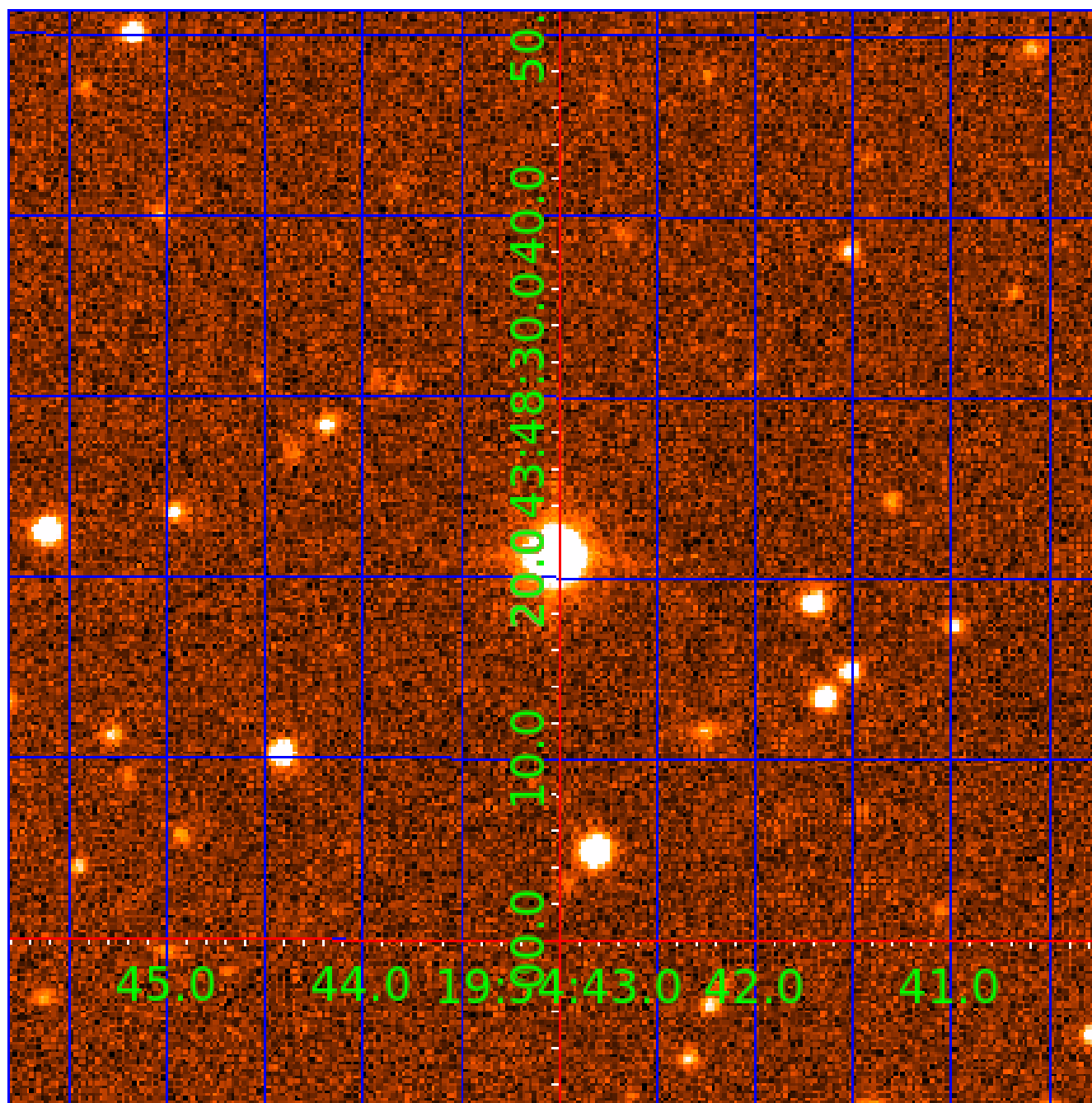
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image

Declination



# KIC 008052016

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008052016-01	OBS	No	2.605256	133.117659	31.9	19.238	9.6	7.3	1.99	6212	1.16	3524.60
008052016-02	OBS	No	67.763122	134.382802	184.4	6.496	25.0	11.1	1.99	6212	3.03	45.73
008052016-03	OBS	No	26.742080	135.727966	190.8	10.952	18.8	12.1	1.99	6212	2.99	158.00
008052016-04	OBS	No	33.184196	158.831256	176.4	4.858	16.2	7.2	1.99	6212	2.96	118.49
008052016-05	OBS	No	37.315026	162.366643	172.7	3.991	13.1	7.8	1.99	6212	2.88	101.33
008052016-06	OBS	No	37.038602	156.474640	246.9	4.412	12.2	11.5	1.99	6212	3.45	102.34
008052016-07	OBS	No	39.906683	164.120100	244.5	4.294	9.9	10.4	1.99	6212	3.45	92.65
008052016-08	OBS	No	23.077641	133.725683	160.9	6.368	9.5	9.1	1.99	6212	2.90	192.30
008052016-09	OBS	No	28.929926	143.231572	102.0	5.045	8.8	5.4	1.99	6212	2.28	142.27

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008052016-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV
008052016-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
008052016-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—HALO_GHOST
008052016-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
008052016-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
008052016-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT
008052016-07	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—HALO_GHOST
008052016-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
008052016-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

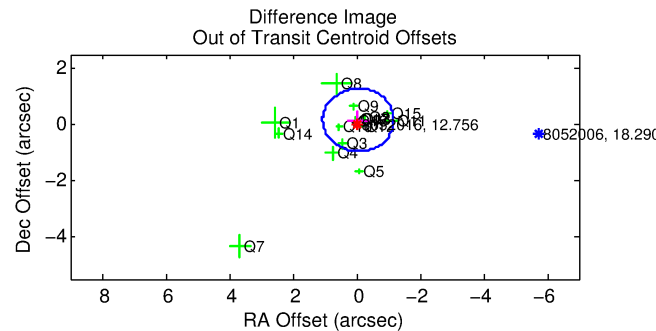
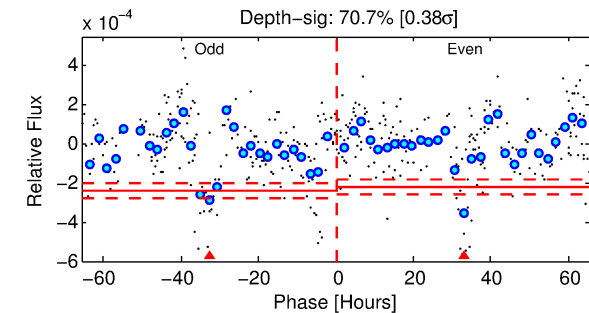
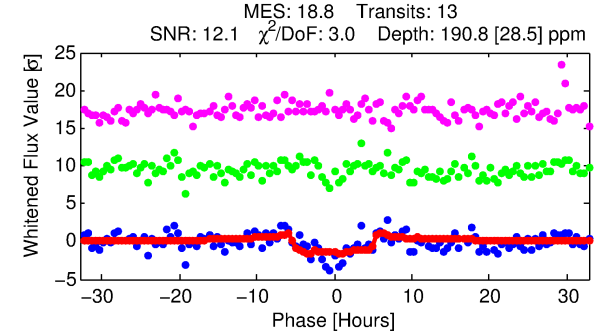
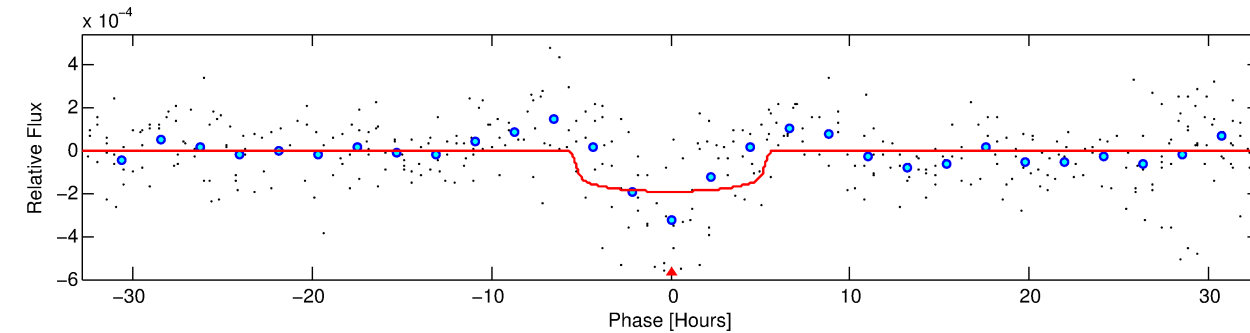
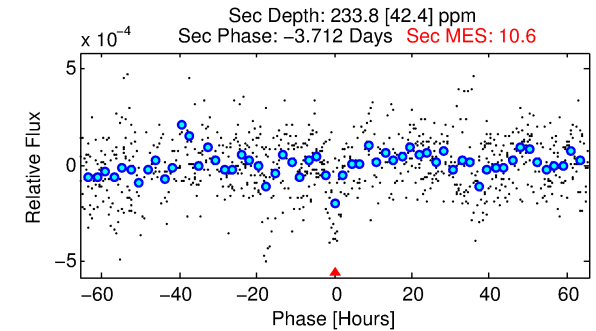
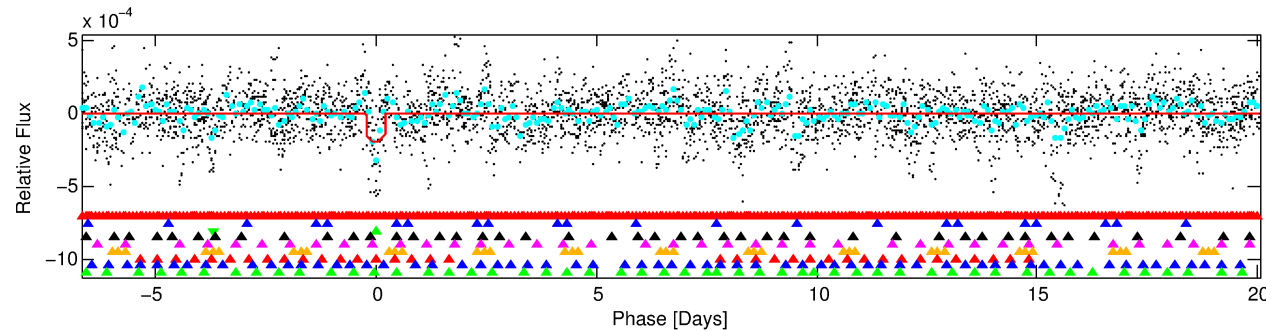
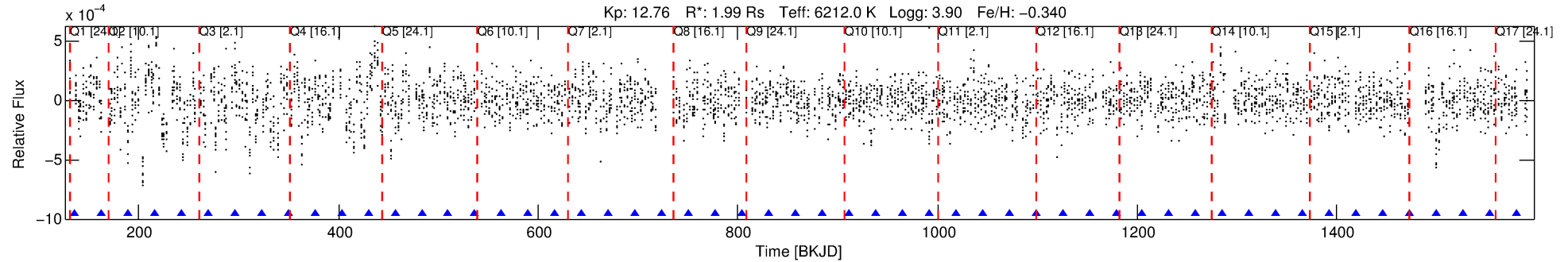
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 008052016-03

No Significant Match Found

# DV One-Page Summary

KIC: 8052016 Candidate: 3 of 9 Period: 26.742 d



## DV Fit Results:

Period = 26.74208 [0.00053] d  
Epoch = 135.7280 [0.0154] BKJD  
Rp/R\* = 0.0138 [0.0047]  
a/R\* = 12.52 [21.47]  
b = 0.76 [0.96]  
Seff = 158.00 [81.87]  
Teq = 904 [117] K  
Rp = 2.99 [1.39] Re  
a = 0.1828 [0.0570] AU  
Ag = 479.75 [417.57] [1.15sigma]  
Teffp = 6542 [1172] K [4.79sigma]

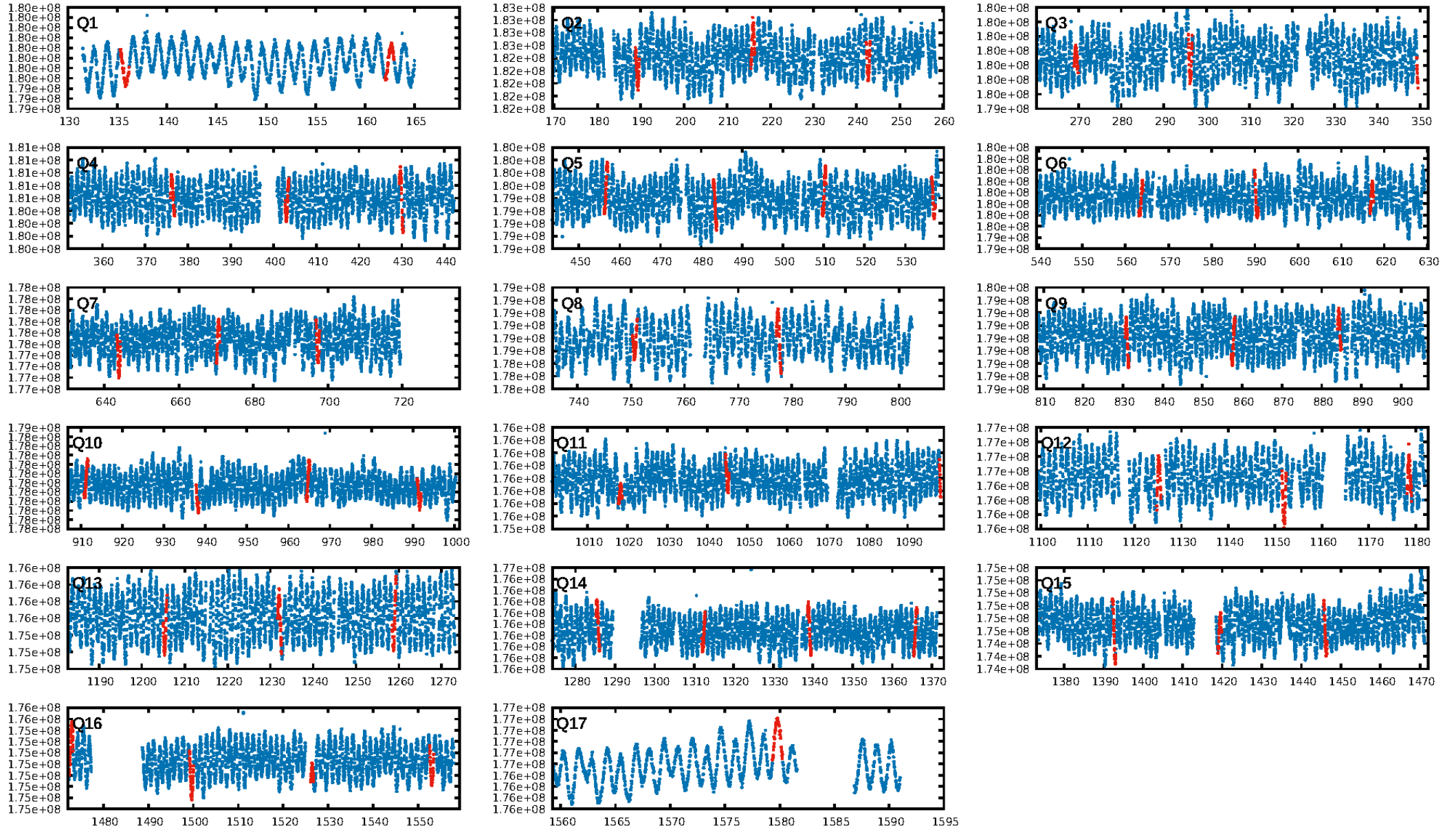
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [6.94sigma]  
LongPeriod-sig: 100.0% [4.35sigma]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 1.51e-22  
RollingBand-fgt: 1.00 [13/13]  
GhostDiagnostic-chr: -0.222  
Centroid-sig: 74.4%  
Centroid-so: 0.103 arcsec [0.30sigma]  
OotOffset-rm: 0.169 arcsec [0.45sigma]  
OotOffset-st: 3/4/4/5 [16]  
KicOffset-rm: 0.242 arcsec [0.71sigma]  
KicOffset-st: 3/4/4/5 [16]  
DiffImageQuality-fgm: 0.56 [9/16]  
DiffImageOverlap-fno: 0.12 [2/17]

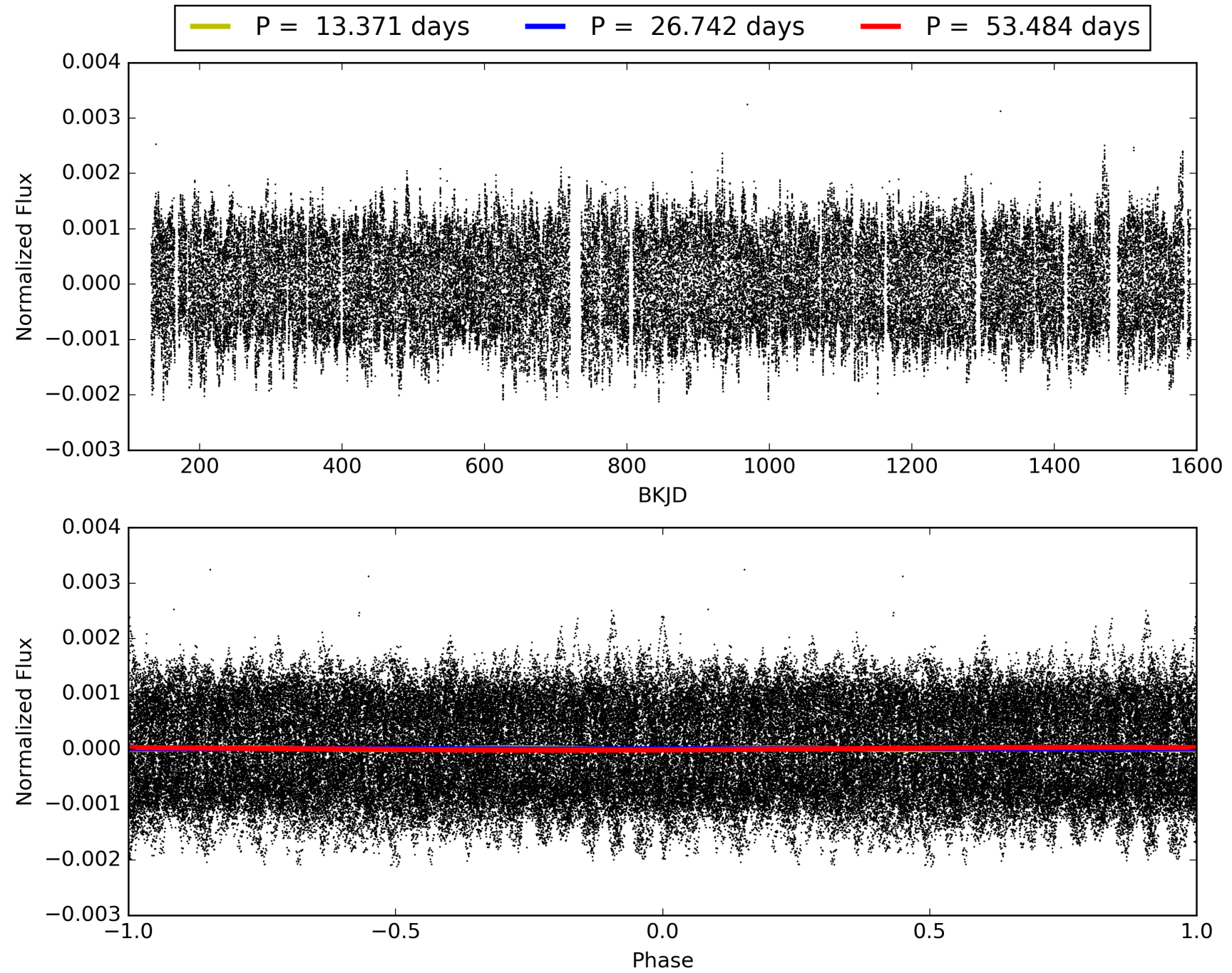
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 23:13:36 Z

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

# TCE 008052016-03, PDC Light Curves



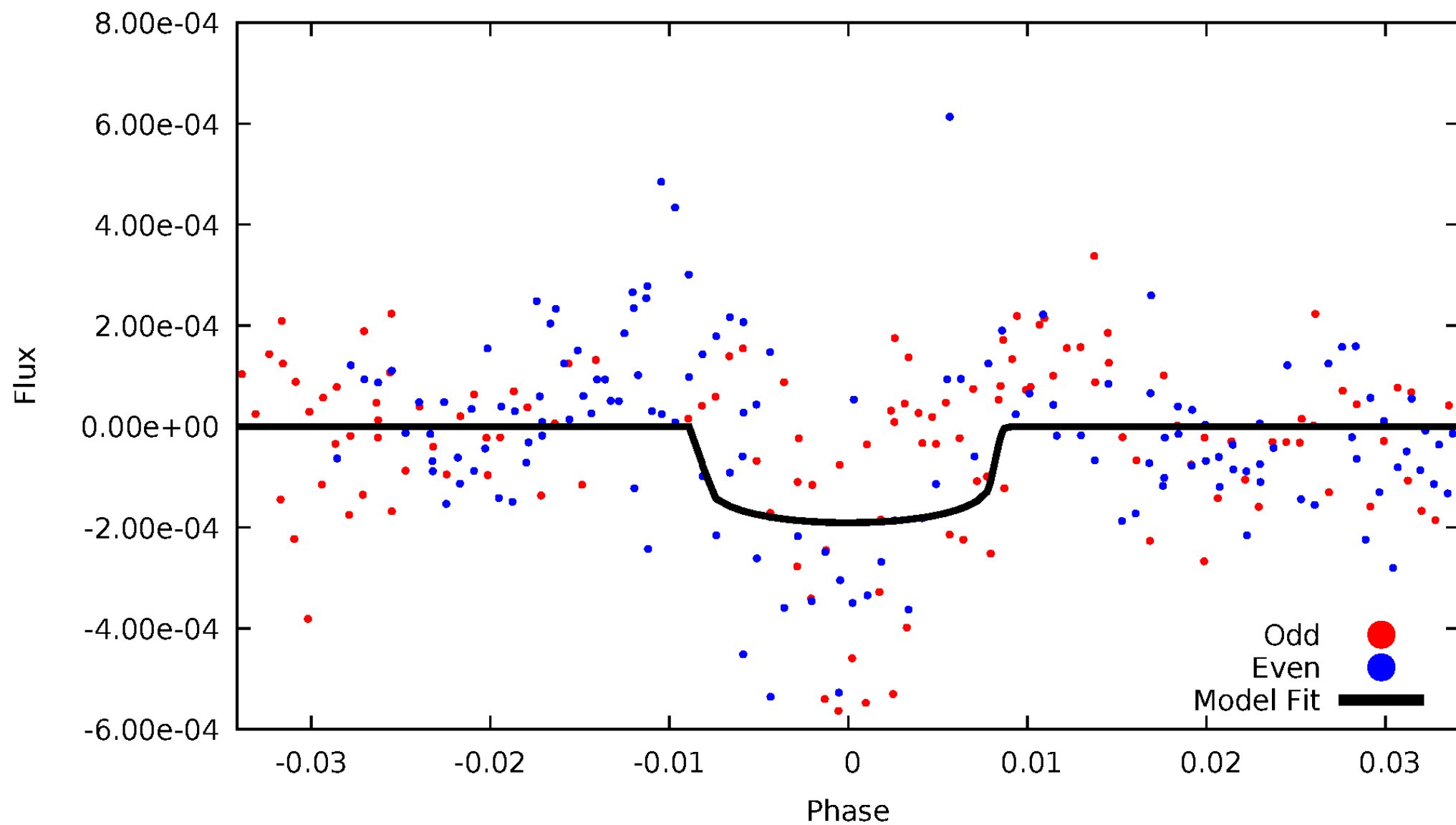
TCE 008052016-03





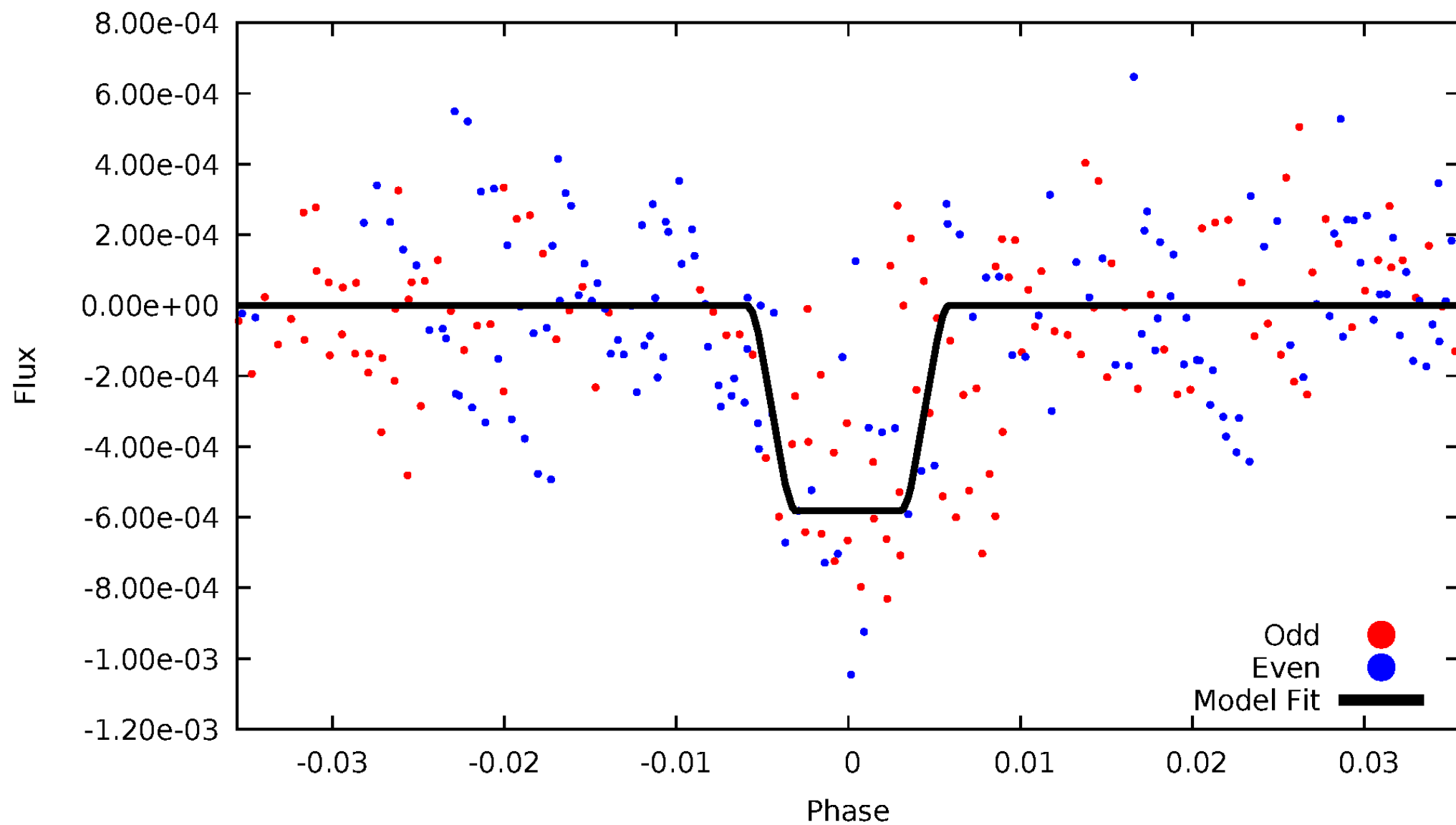
# DV Odd/Even

TCE 008052016-03



# ALT Odd/Even

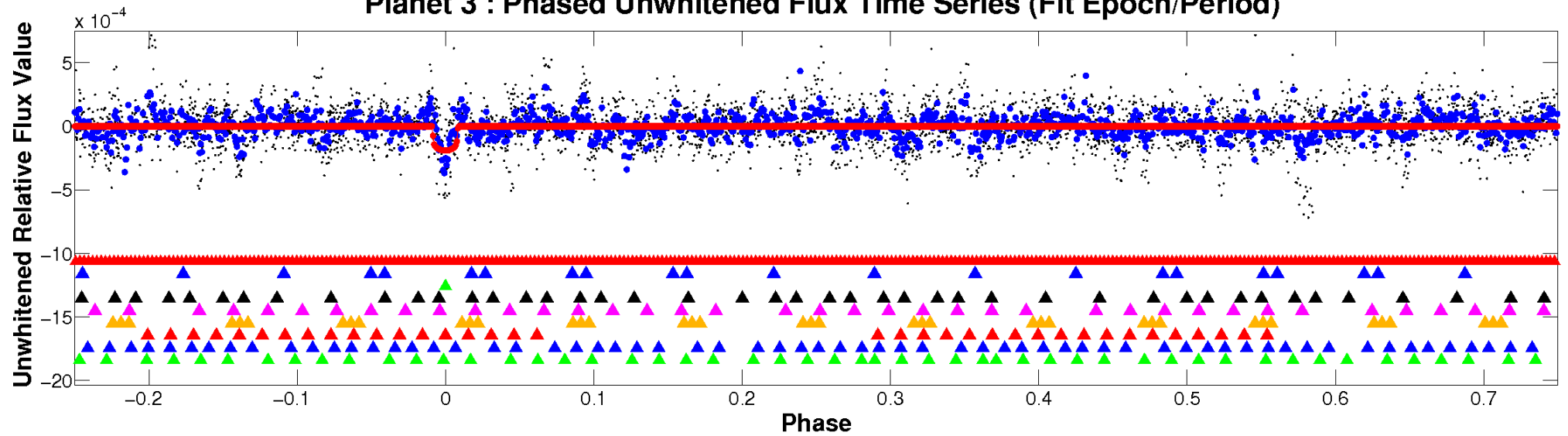
TCE 008052016-03



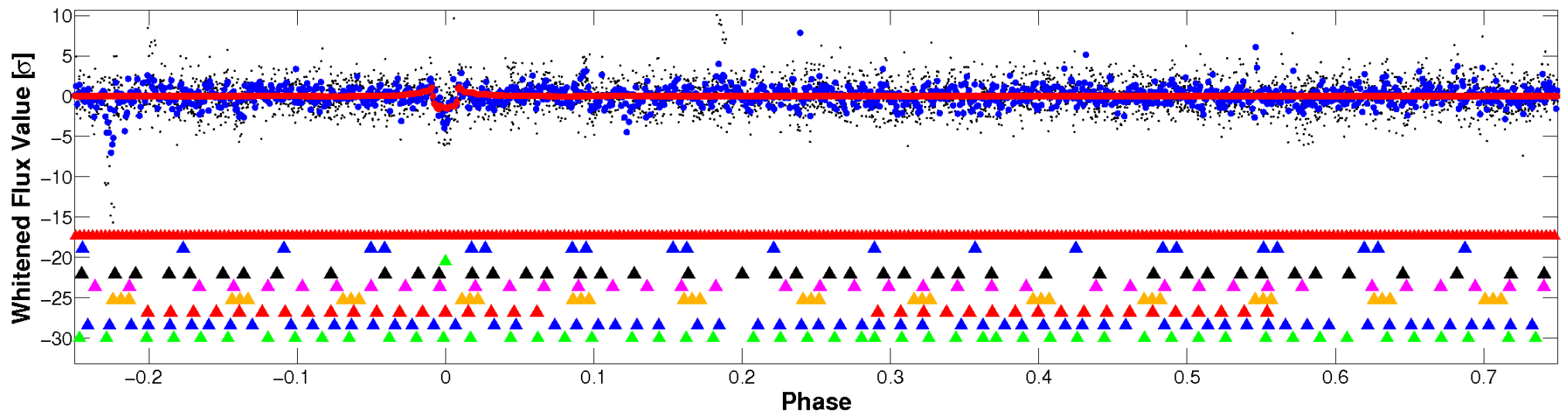


# Non-Whitened Vs. Whitened Light Curve

## Planet 3 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

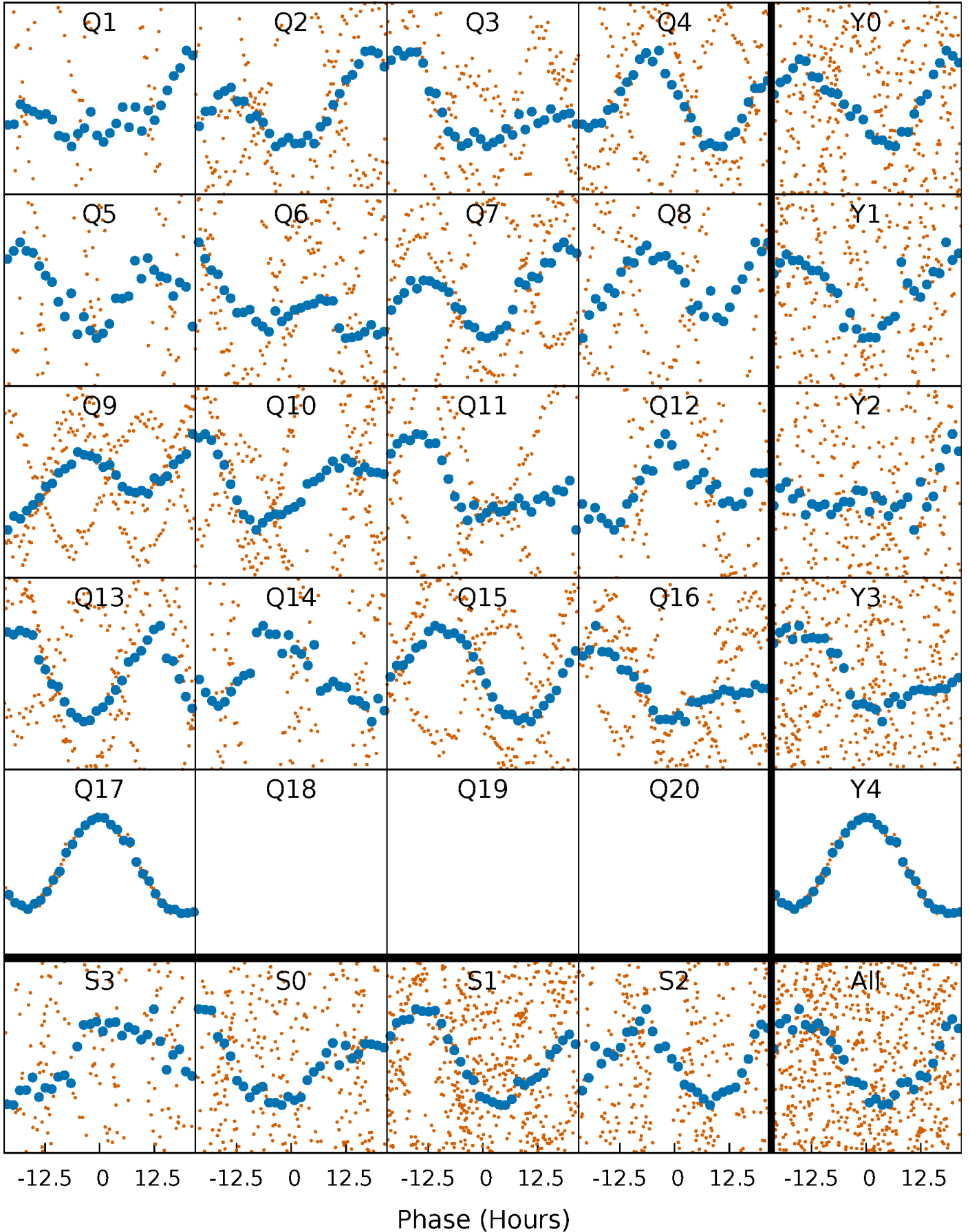


## Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



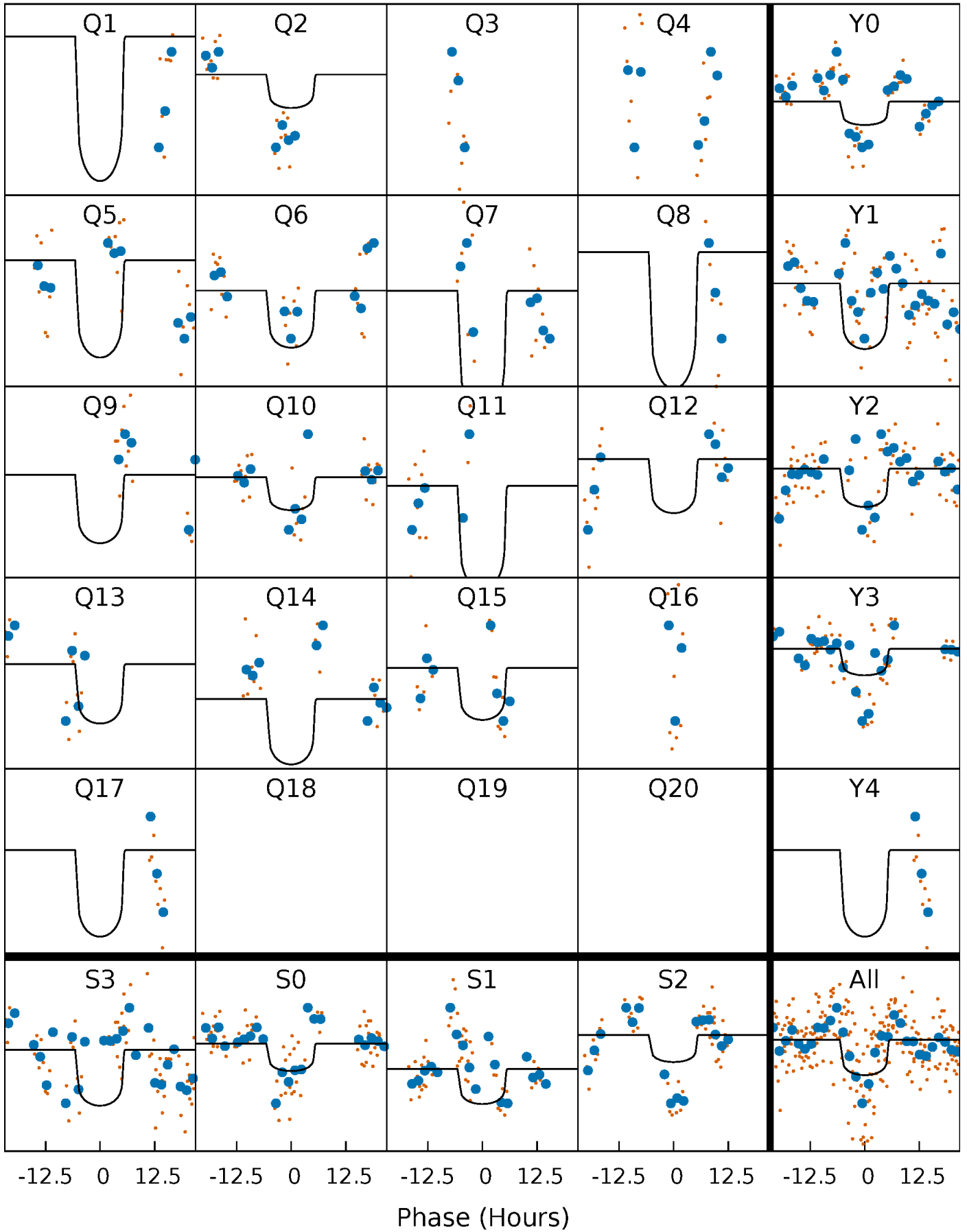
# PDC Quarter-Phased Transit Curves

TCE 008052016-03 P= 26.742080 Days  $T_0=135.727966$  (BKJD)



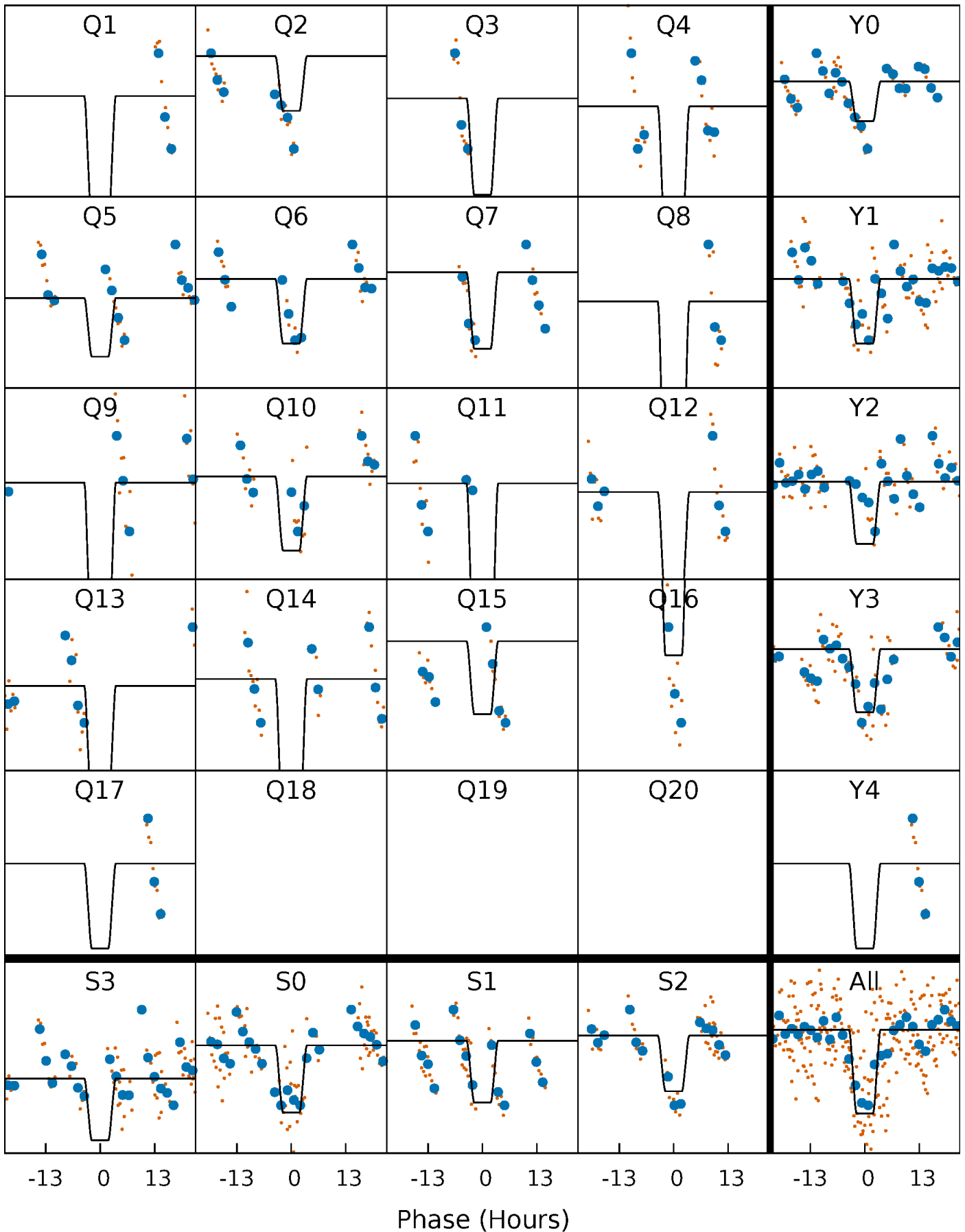
# DV Quarter-Phased Transit Curves

TCE 008052016-03   P= 26.742080 Days    $T_0=135.727966$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

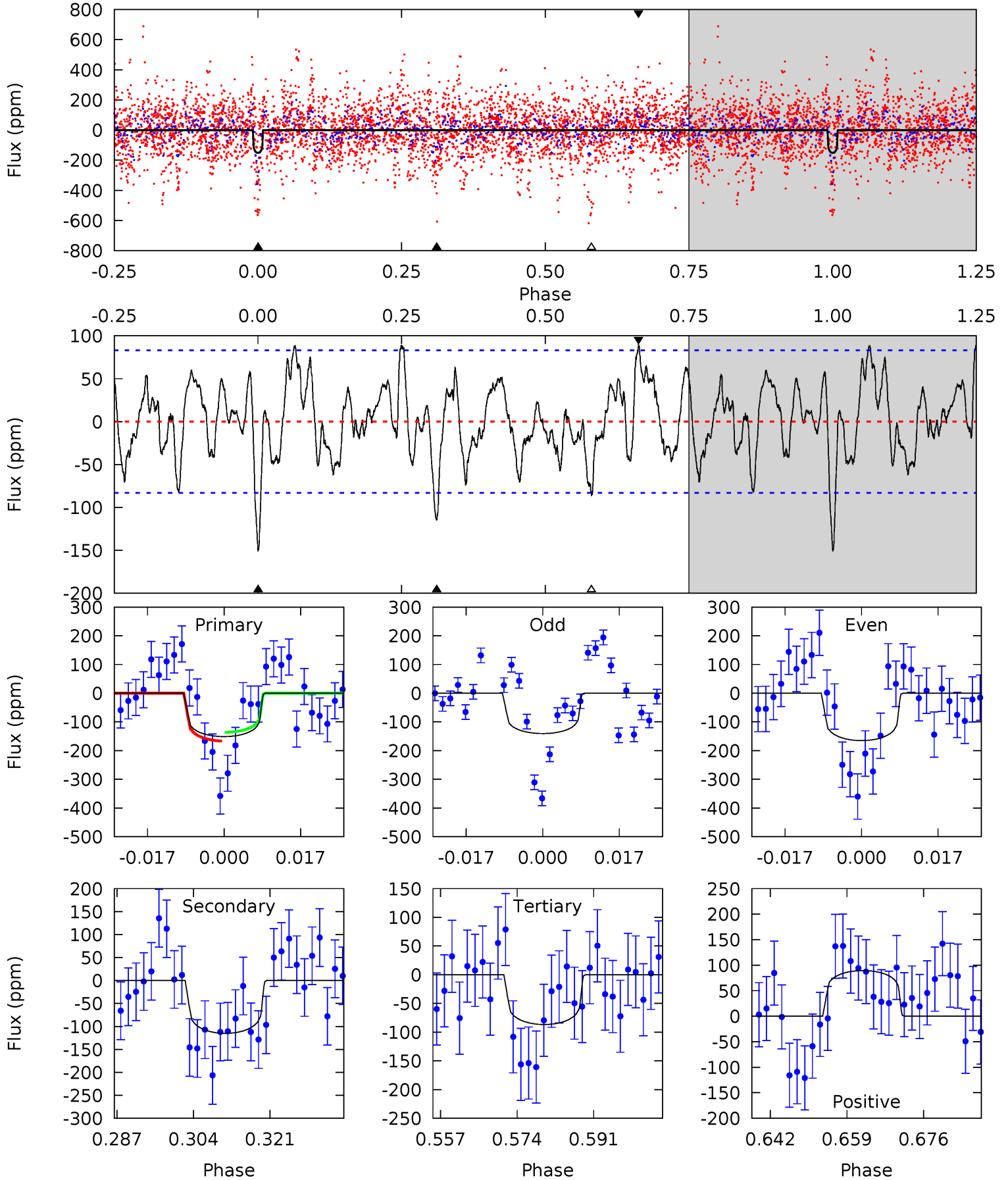
TCE 008052016-03 P= 26.742582 Days  $T_0=135.708773$  (BKJD)



# DV Model-Shift Uniqueness Test

008052016-03, P = 26.742080 Days, E = 108.985886 Days

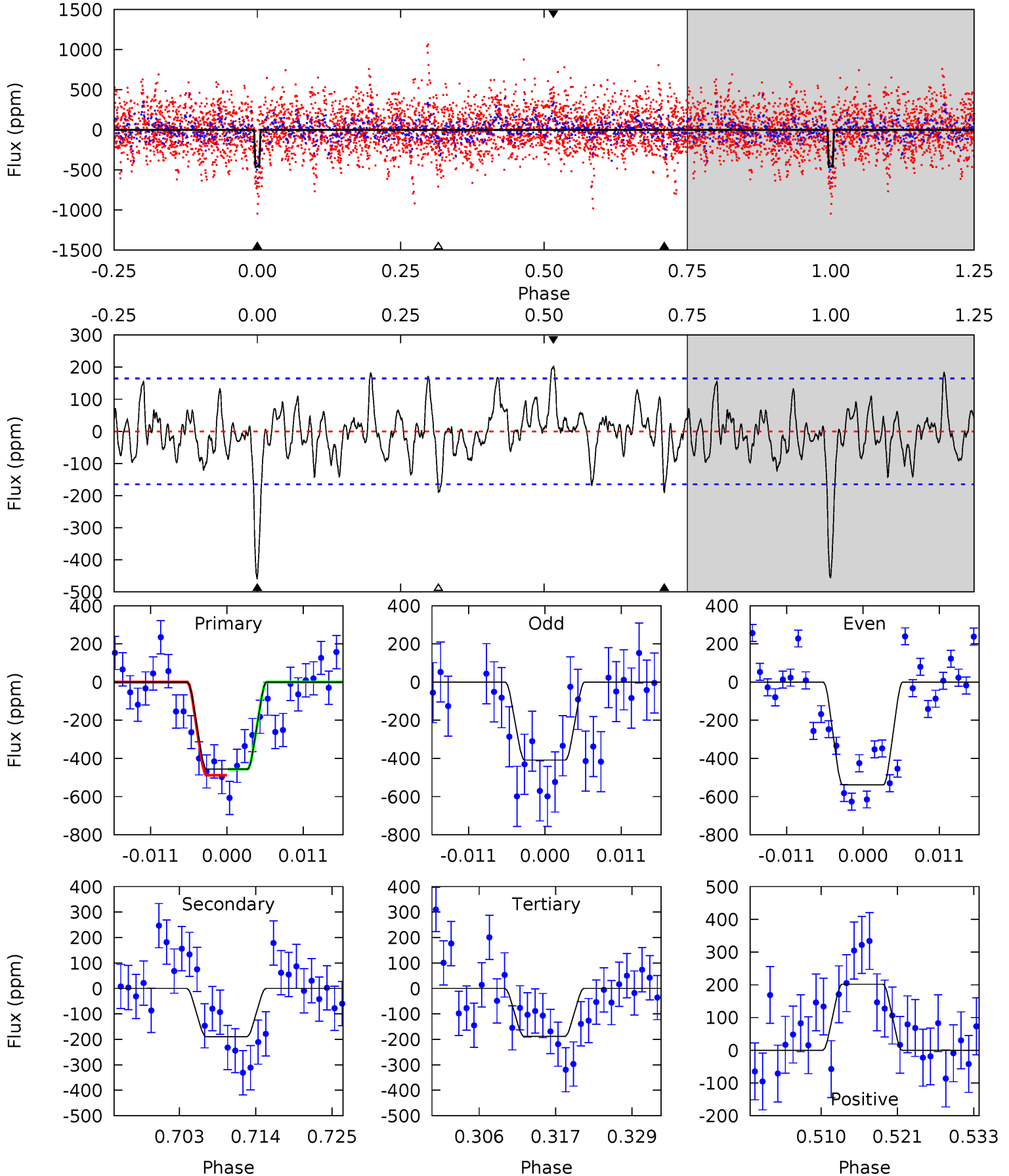
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.97	6.82	5.14	5.31	4.92	2.39	2.18	3.83	3.66	1.68	1.52	0.72	1.22	0.37	0.90



# Alt Model-Shift Uniqueness Test

008052016-03, P = 26.742582 Days, E = 108.966191 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
13.9	5.75	5.72	6.13	5.00	2.53	1.93	8.15	7.74	0.03	-0.38	1.96	0.93	0.31	0.46



### Stellar Parameters For KIC 008052016

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6212^{+171}_{-171}$	$3.897^{+0.300}_{-0.100}$	$-0.340^{+0.350}_{-0.300}$	$1.989^{+0.418}_{-0.628}$	$1.138^{+0.225}_{-0.184}$	$0.204^{+0.380}_{-0.074}$
	+3%/-3%	+8%/-3%	+103%/-88%	+21%/-32%	+20%/-16%	+187%/-36%
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 008052016-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-115 \pm 17$	$2.77^{+1.20}_{-1.01}$	$1233^{+80}_{-103}$	$5510^{+1372}_{-716}$	$273^{+439}_{-141}$
Alt.	$-189 \pm 33$	$4.98^{+1.25}_{-1.28}$	$1243^{+73}_{-105}$	$4855^{+523}_{-408}$	$143^{+121}_{-55}$

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



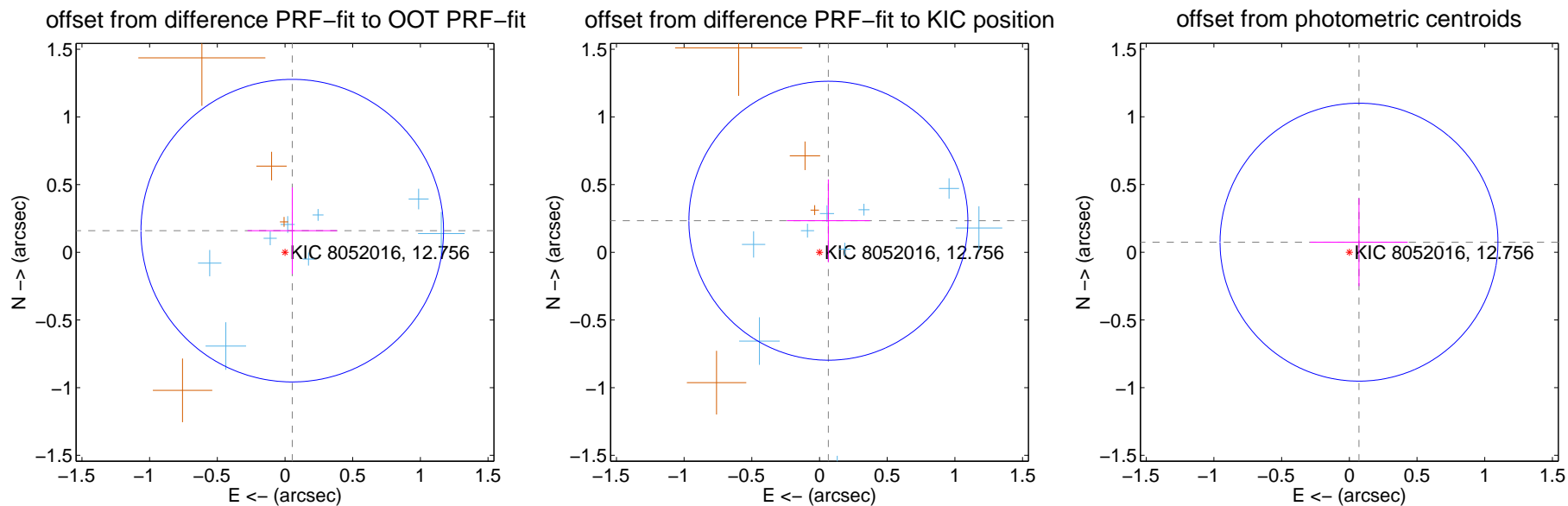
## DV Centroid Data

Supplemental centroid analysis for 008052016-03. Kepler magnitude: 12.76. Transit SNR 12.08

There are 9 quarters with good PRF difference image offsets

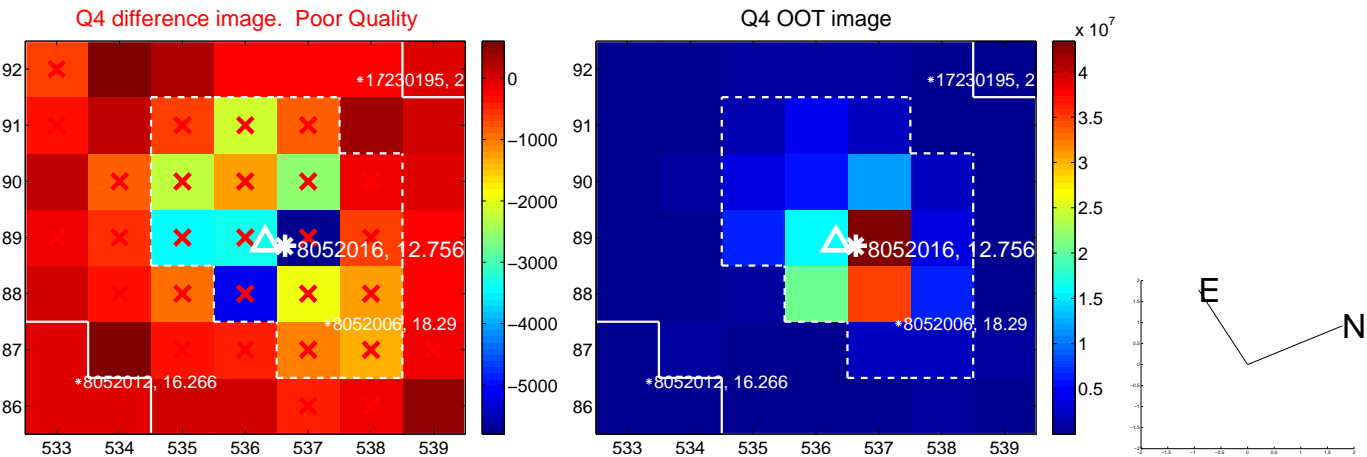
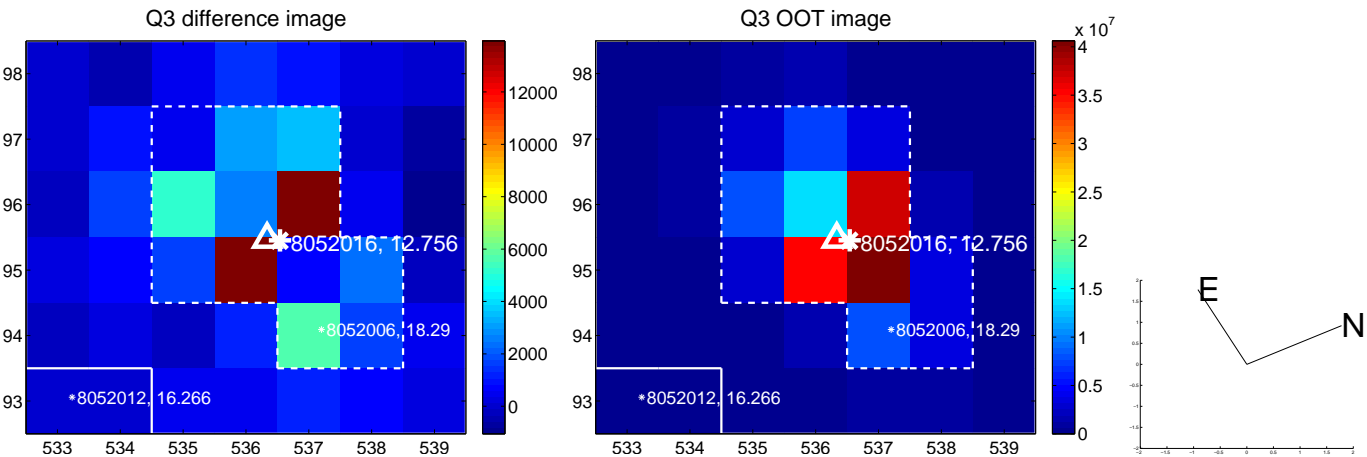
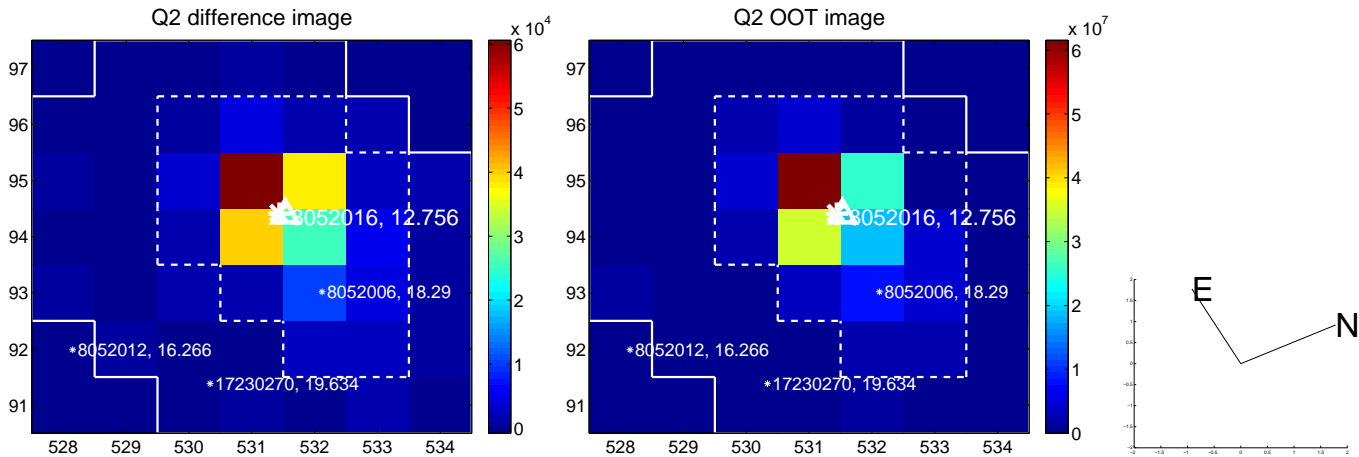
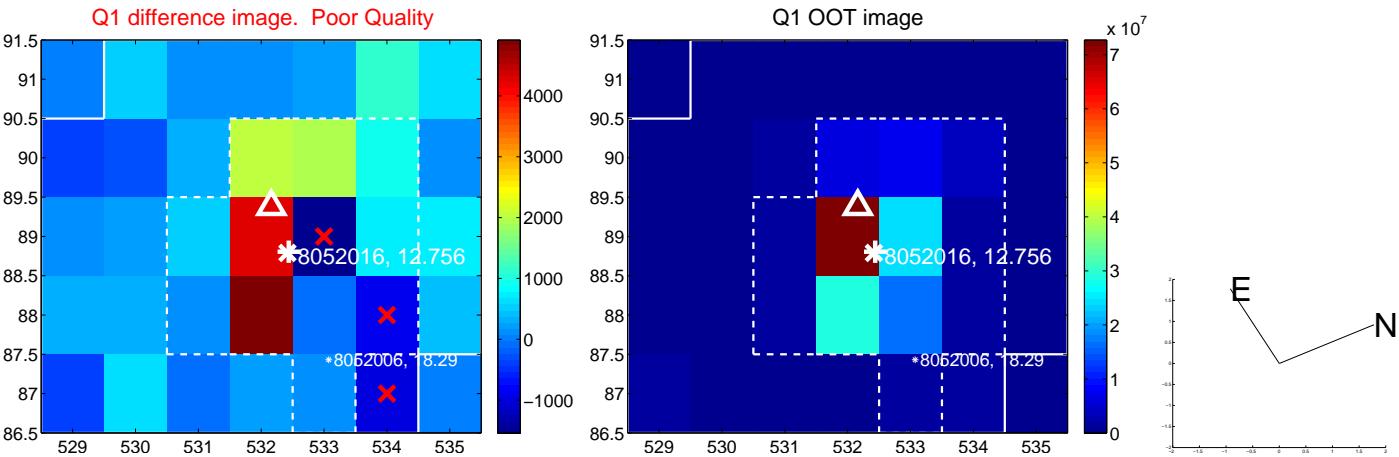
The direct PRF centroid is offset from the target star catalog position by about 0.09 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.169 \pm 0.373$	0.45	$-0.053 \pm 0.330$	$0.160 \pm 0.320$
PRF-fit source offset from KIC position	$0.242 \pm 0.343$	0.71	$-0.066 \pm 0.307$	$0.233 \pm 0.306$
photometric centroid source offset	$0.10 \pm 0.34$	0.30	$-0.07 \pm 0.36$	$0.07 \pm 0.32$

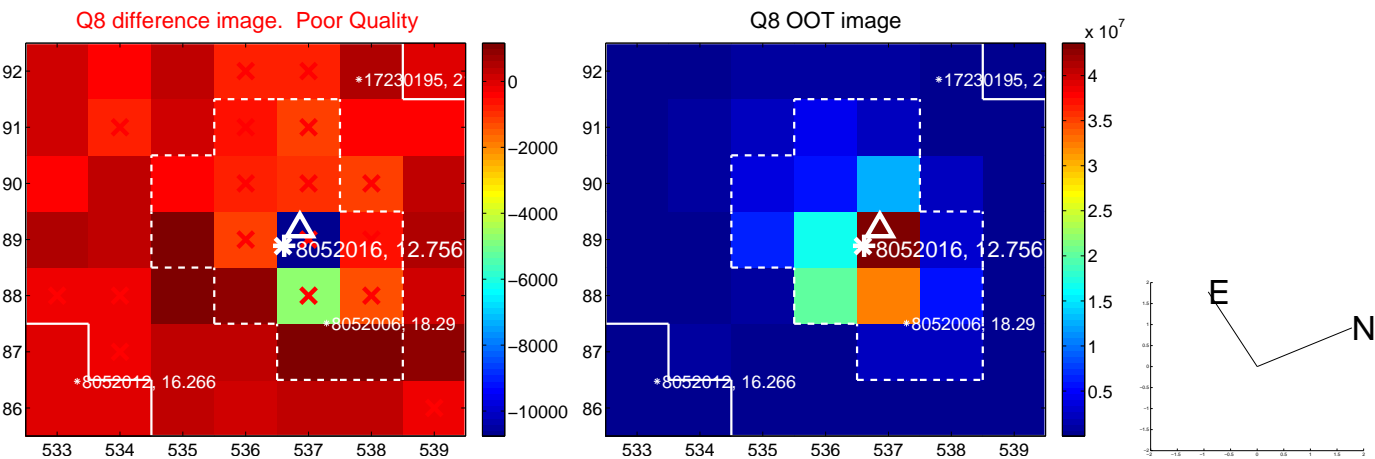
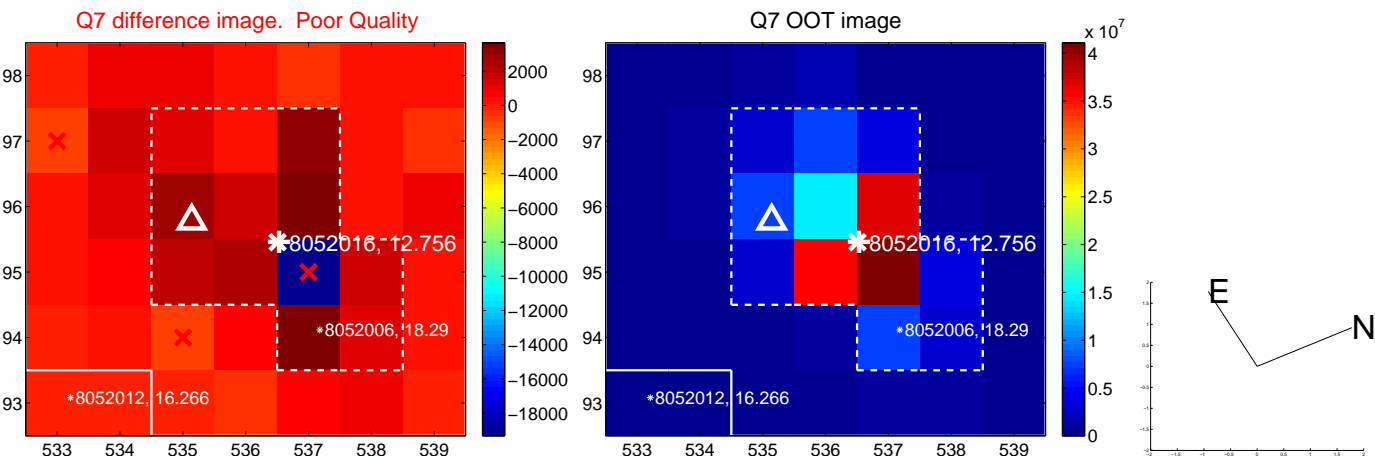
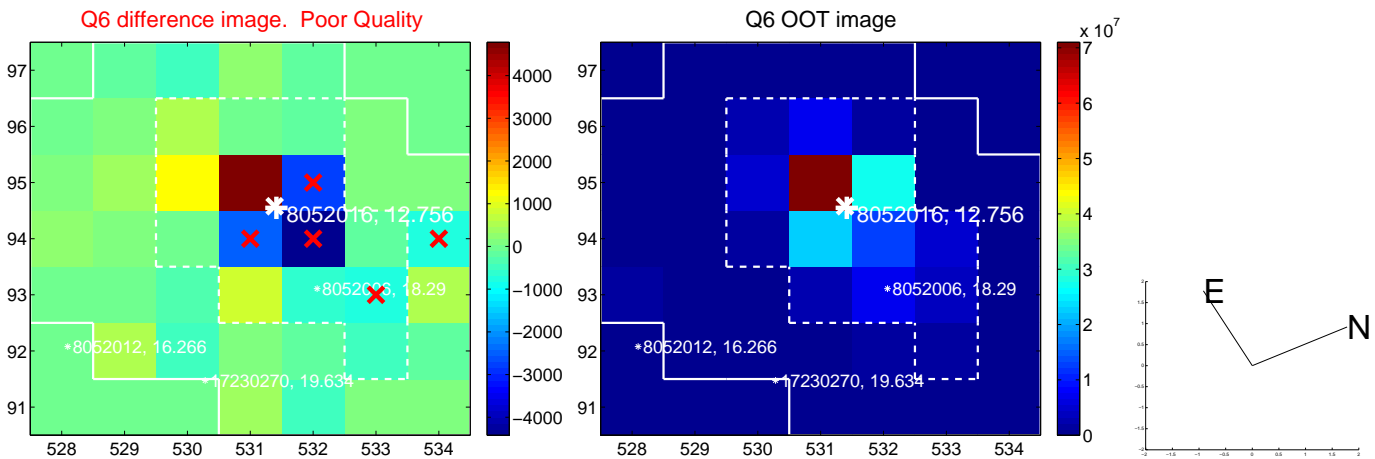
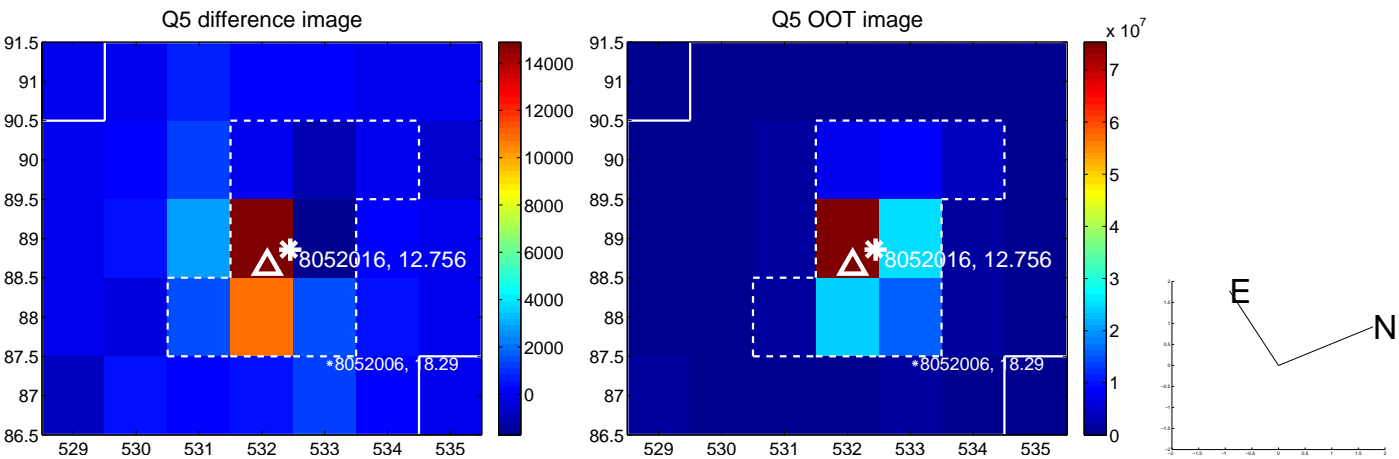


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

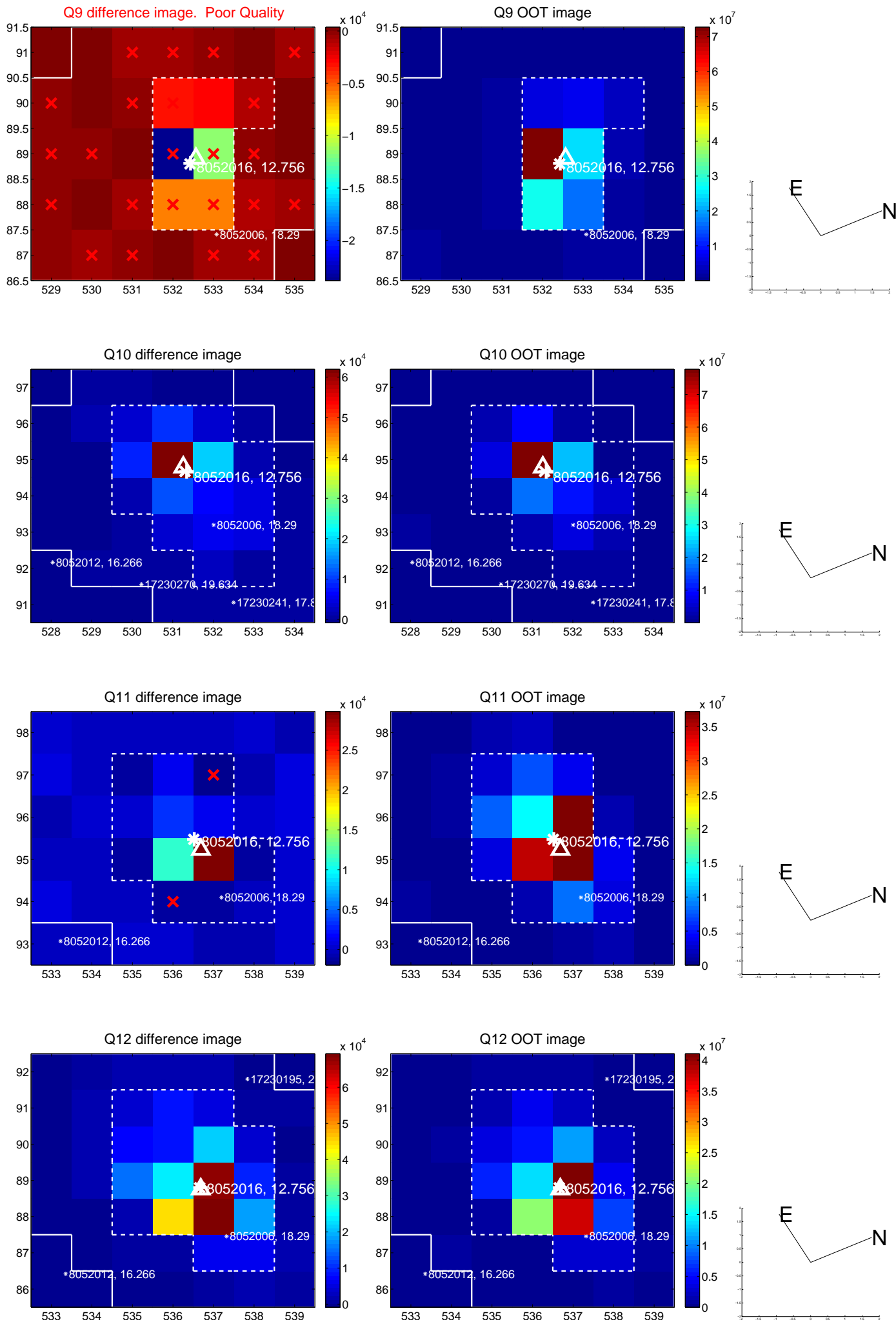
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



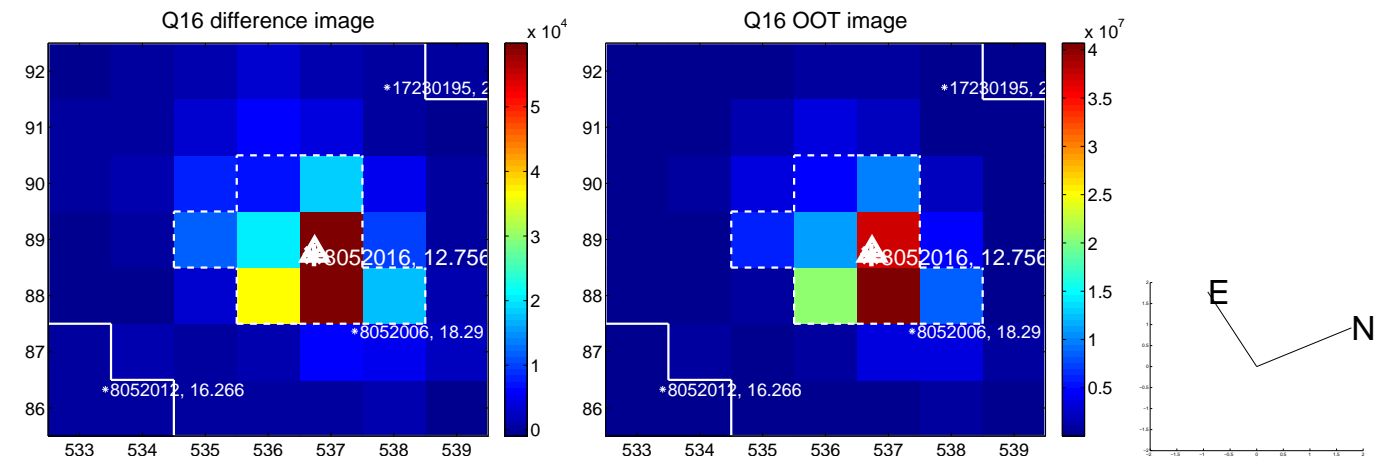
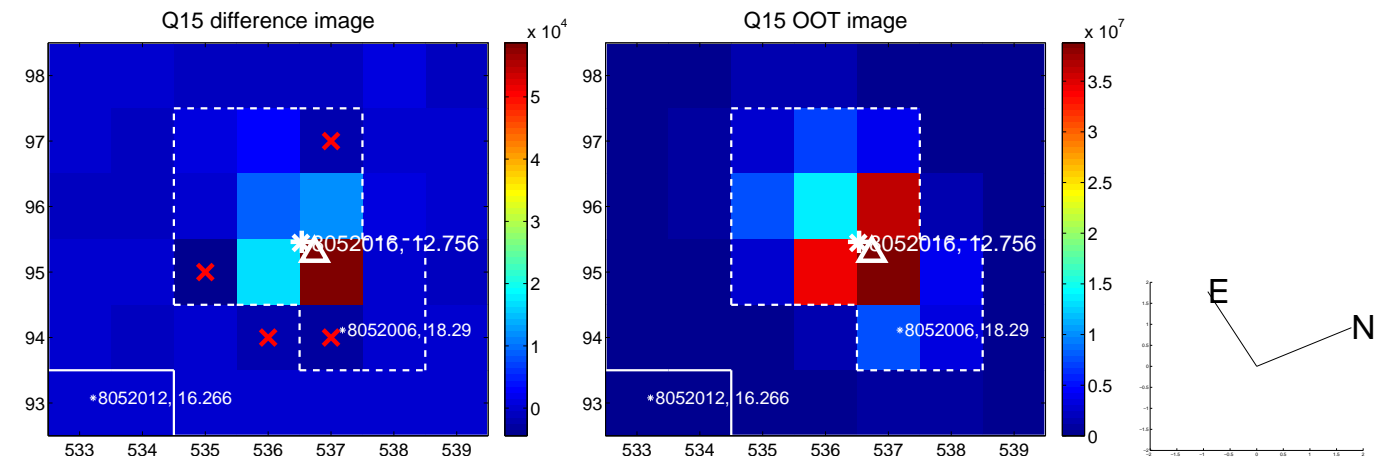
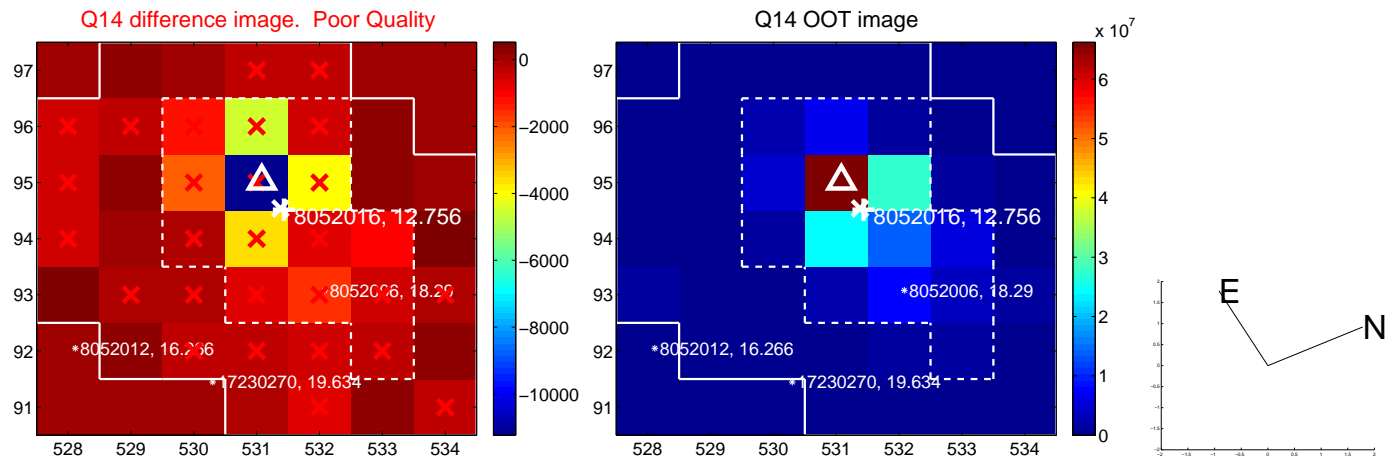
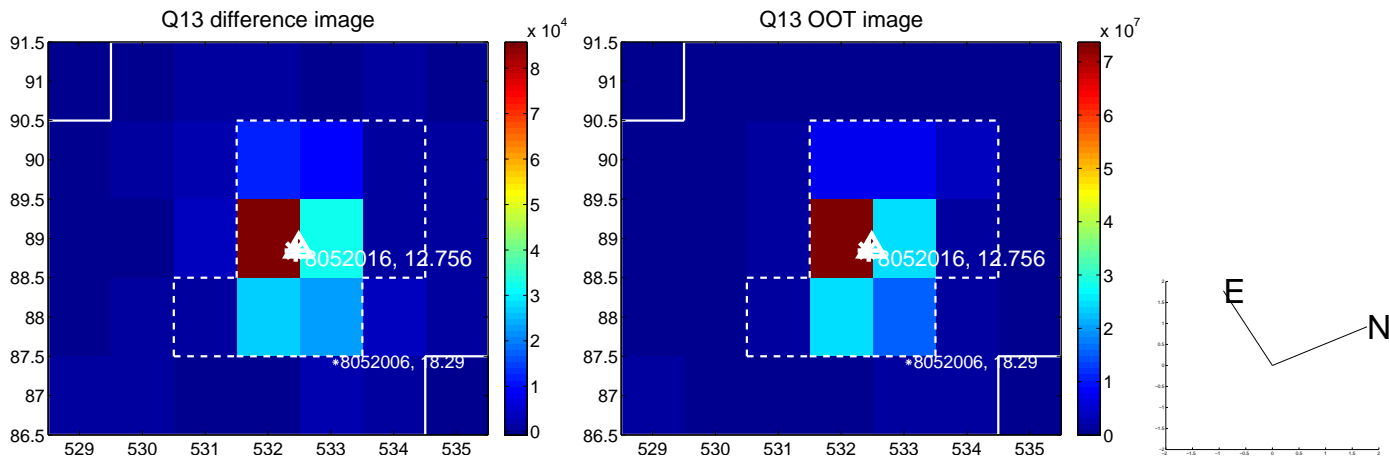
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



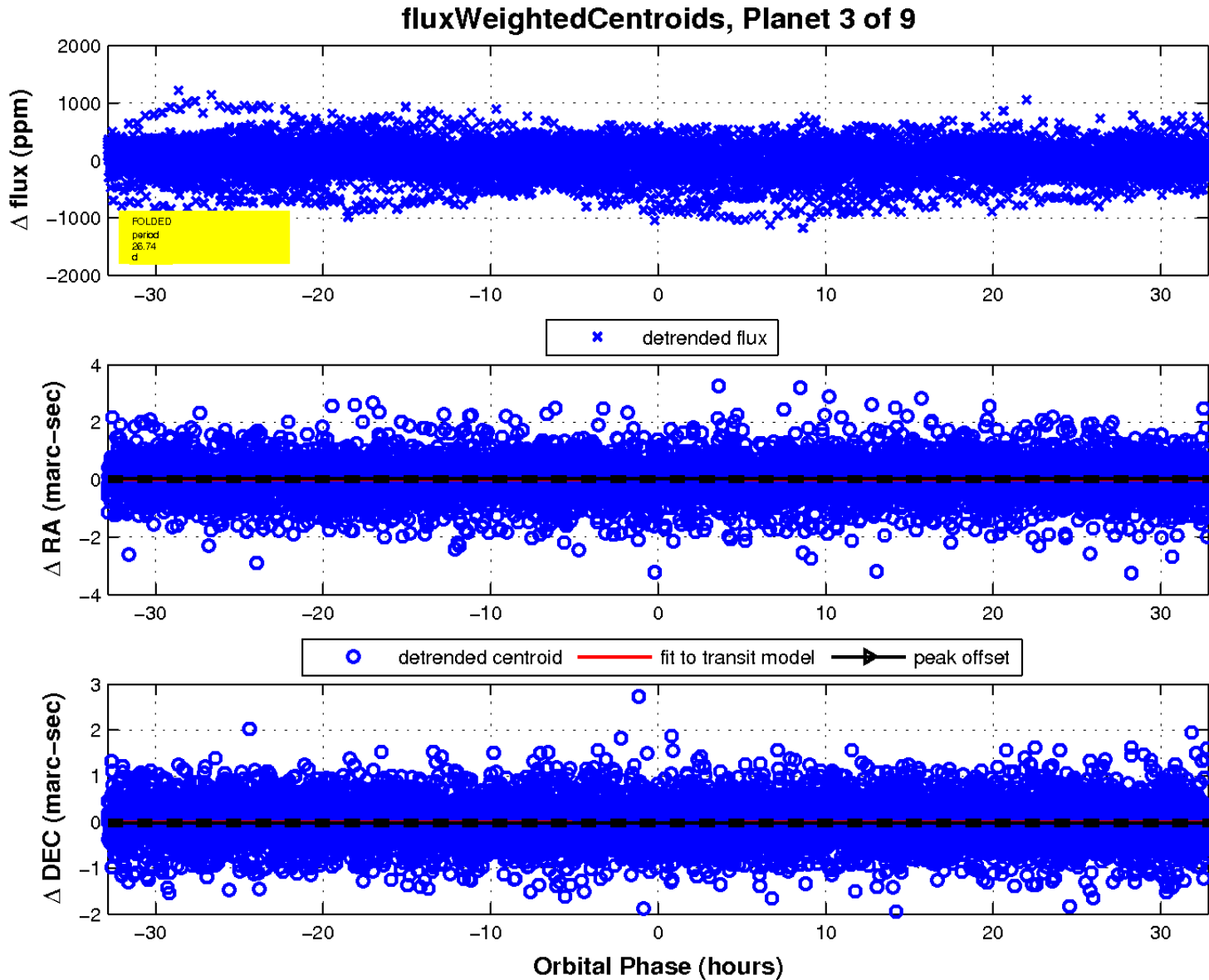
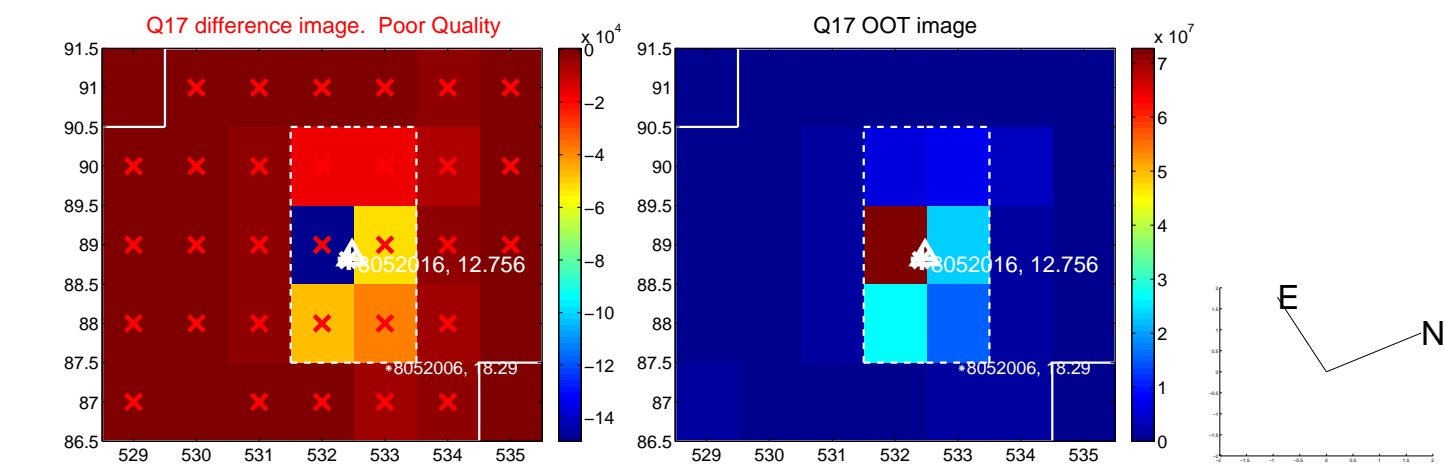
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

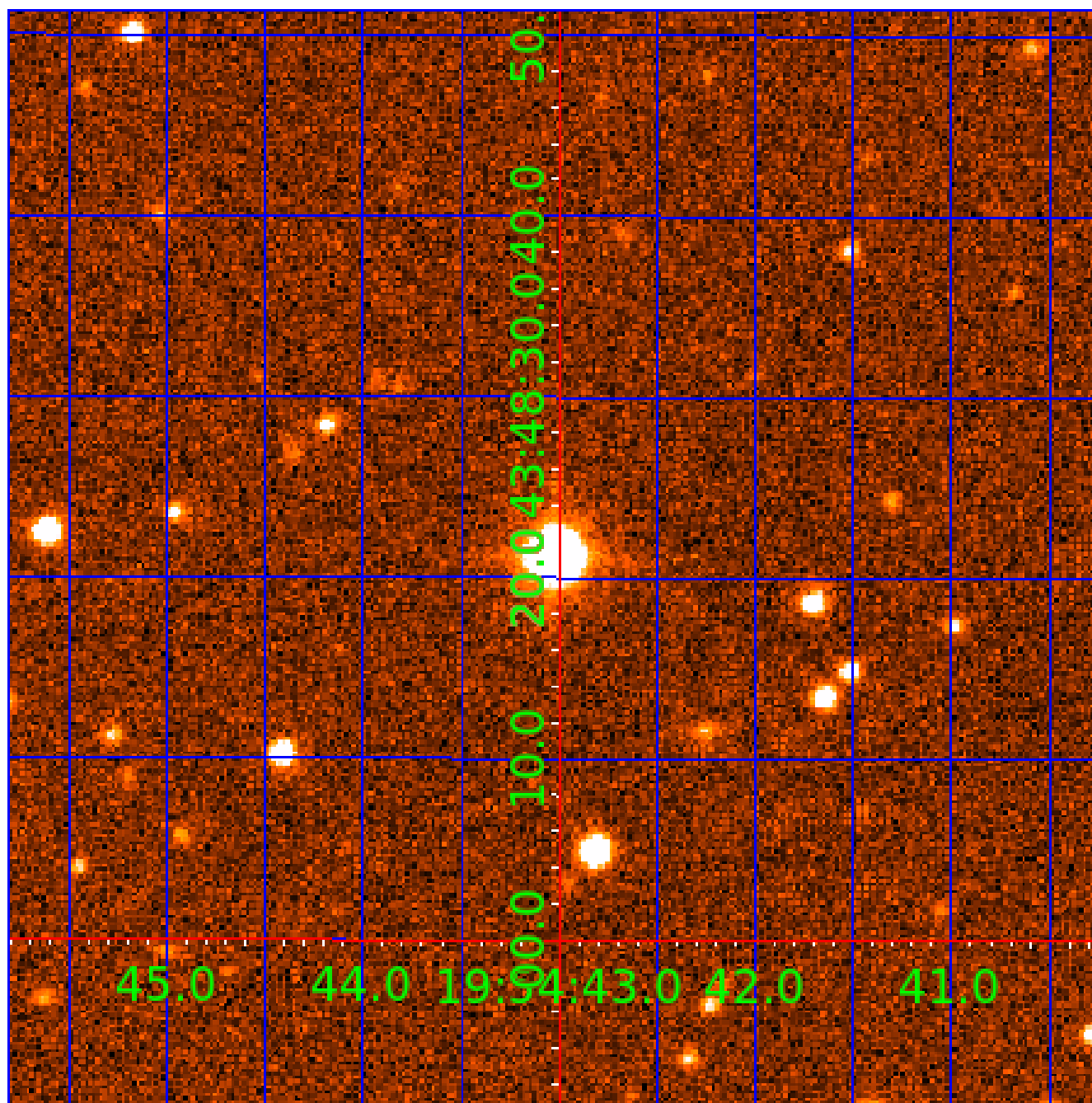


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





## KIC 008052016

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008052016-01	OBS	No	2.605256	133.117659	31.9	19.238	9.6	7.3	1.99	6212	1.16	3524.60
008052016-02	OBS	No	67.763122	134.382802	184.4	6.496	25.0	11.1	1.99	6212	3.03	45.73
008052016-03	OBS	No	26.742080	135.727966	190.8	10.952	18.8	12.1	1.99	6212	2.99	158.00
008052016-04	OBS	No	33.184196	158.831256	176.4	4.858	16.2	7.2	1.99	6212	2.96	118.49
008052016-05	OBS	No	37.315026	162.366643	172.7	3.991	13.1	7.8	1.99	6212	2.88	101.33
008052016-06	OBS	No	37.038602	156.474640	246.9	4.412	12.2	11.5	1.99	6212	3.45	102.34
008052016-07	OBS	No	39.906683	164.120100	244.5	4.294	9.9	10.4	1.99	6212	3.45	92.65
008052016-08	OBS	No	23.077641	133.725683	160.9	6.368	9.5	9.1	1.99	6212	2.90	192.30
008052016-09	OBS	No	28.929926	143.231572	102.0	5.045	8.8	5.4	1.99	6212	2.28	142.27

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008052016-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV
008052016-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
008052016-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—HALO_GHOST
008052016-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
008052016-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
008052016-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT
008052016-07	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—HALO_GHOST
008052016-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
008052016-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

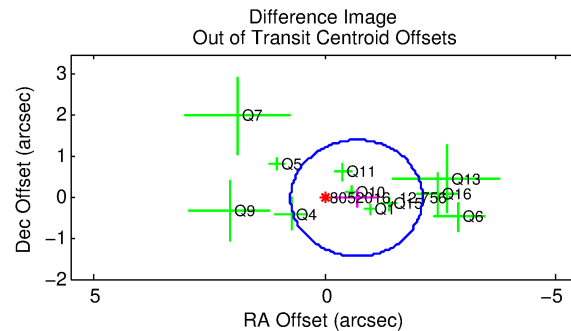
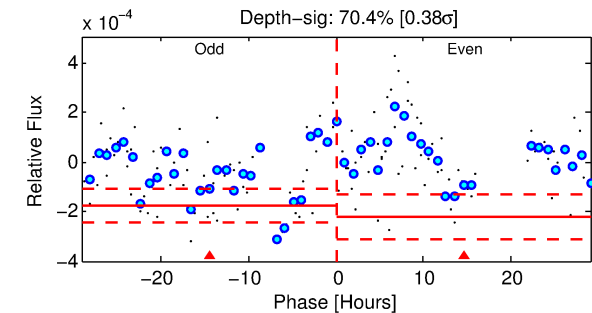
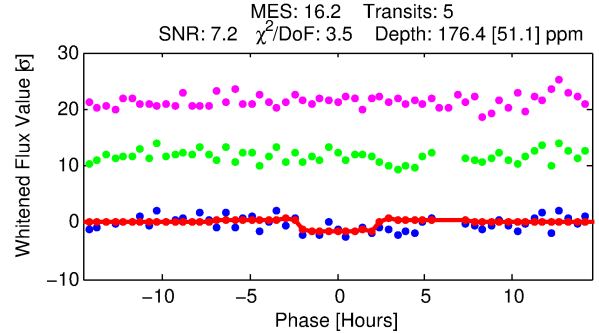
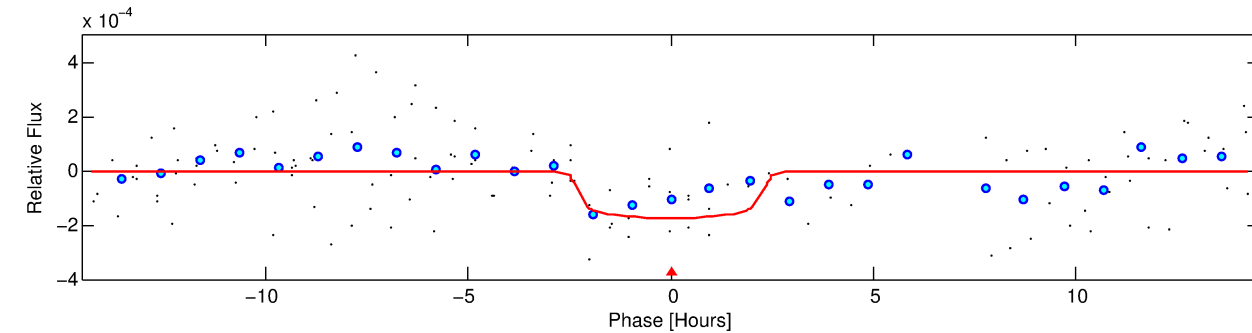
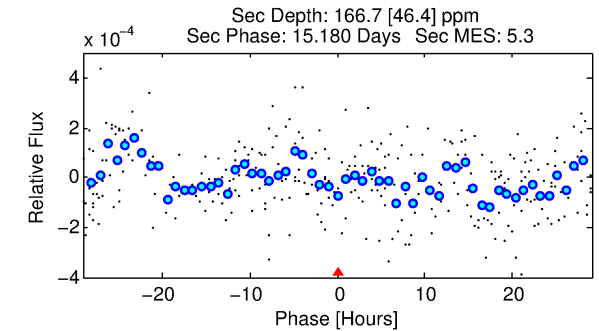
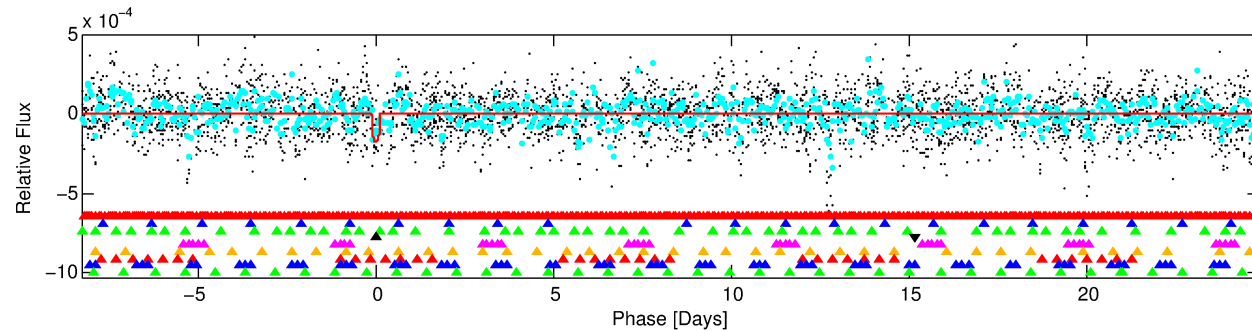
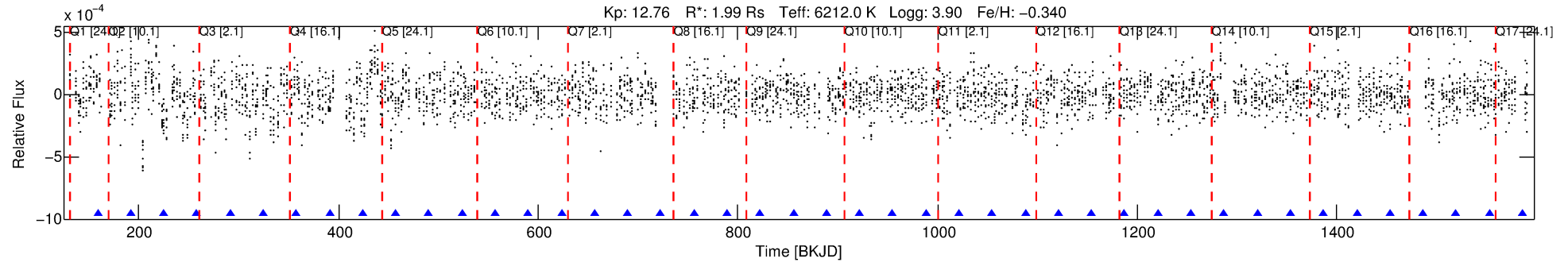
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 008052016-04

No Significant Match Found

# DV One-Page Summary

KIC: 8052016 Candidate: 4 of 9 Period: 33.184 d



## DV Fit Results:

Period = 33.18420 [0.00140] d  
Epoch = 158.8313 [0.0358] BKJD  
Rp/R\* = 0.0136 [0.0220]  
a/R\* = 30.57 [264.89]  
b = 0.83 [3.35]  
Seff = 118.49 [61.40]  
Teq = 841 [109] K  
Rp = 2.96 [4.88] Re  
a = 0.2111 [0.0658] AU  
Ag = 467.49 [1537.58] [0.30 $\sigma$ ]  
Teffp = 6048 [4917] K [1.06 $\sigma$ ]

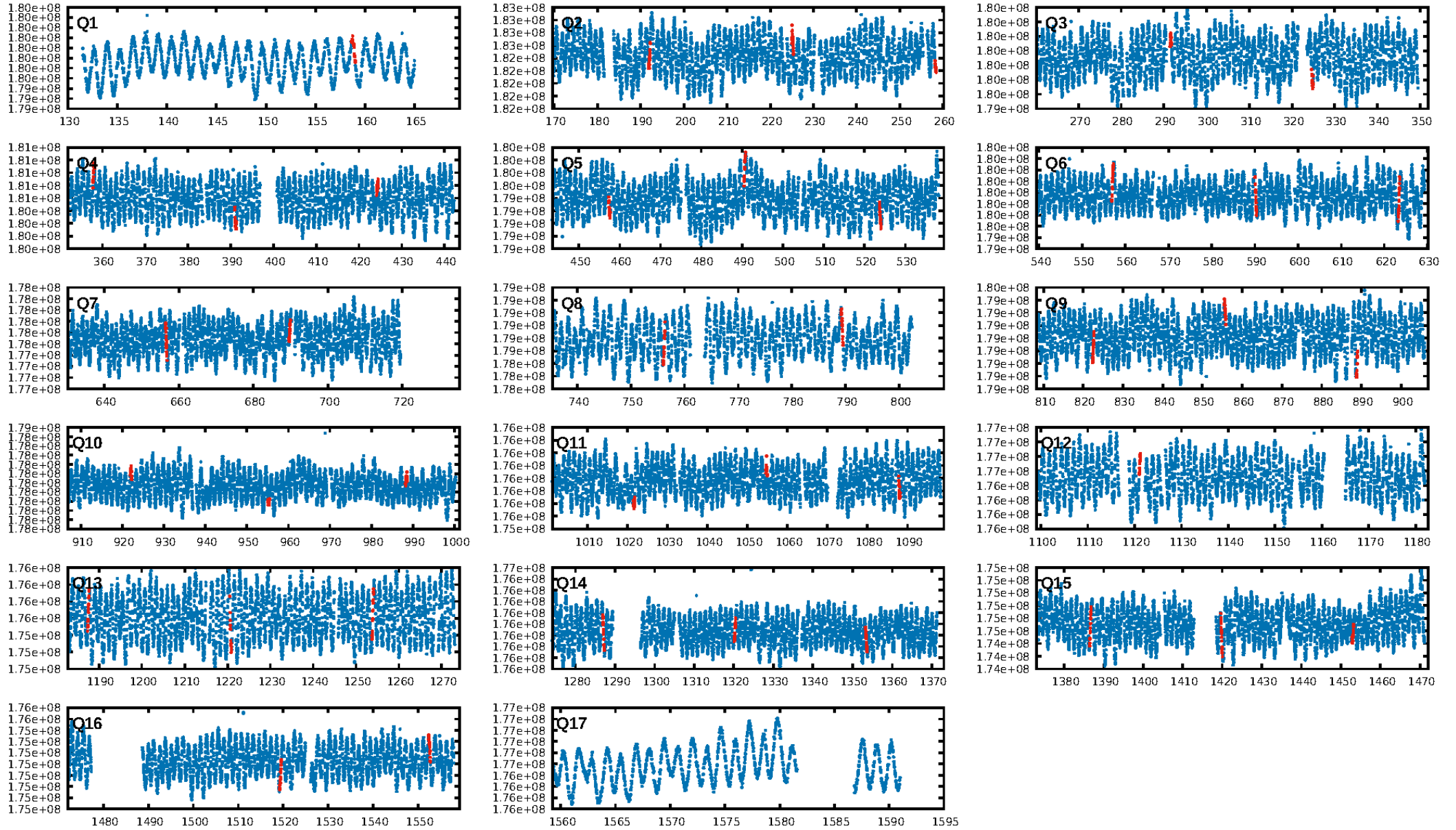
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [14.58 $\sigma$ ]  
LongPeriod-sig: 100.0% [14.10 $\sigma$ ]  
ModelChiSquare2-sig: 12.0%  
ModelChiSquareGof-sig: 58.0%  
Bootstrap-pfa: 1.43e-136  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: 9.45  
Centroid-sig: 55.3%  
Centroid-so: 0.316 arcsec [0.60 $\sigma$ ]  
OotOffset-rm: 0.691 arcsec [1.46 $\sigma$ ]  
KicOffset-rm: 0.788 arcsec [1.50 $\sigma$ ]  
OotOffset-st: 2/3/2/4 [11]  
KicOffset-st: 2/3/2/4 [11]  
DiffImageQuality-fgm: 0.45 [5/11]  
DiffImageOverlap-fno: 0.50 [7/14]

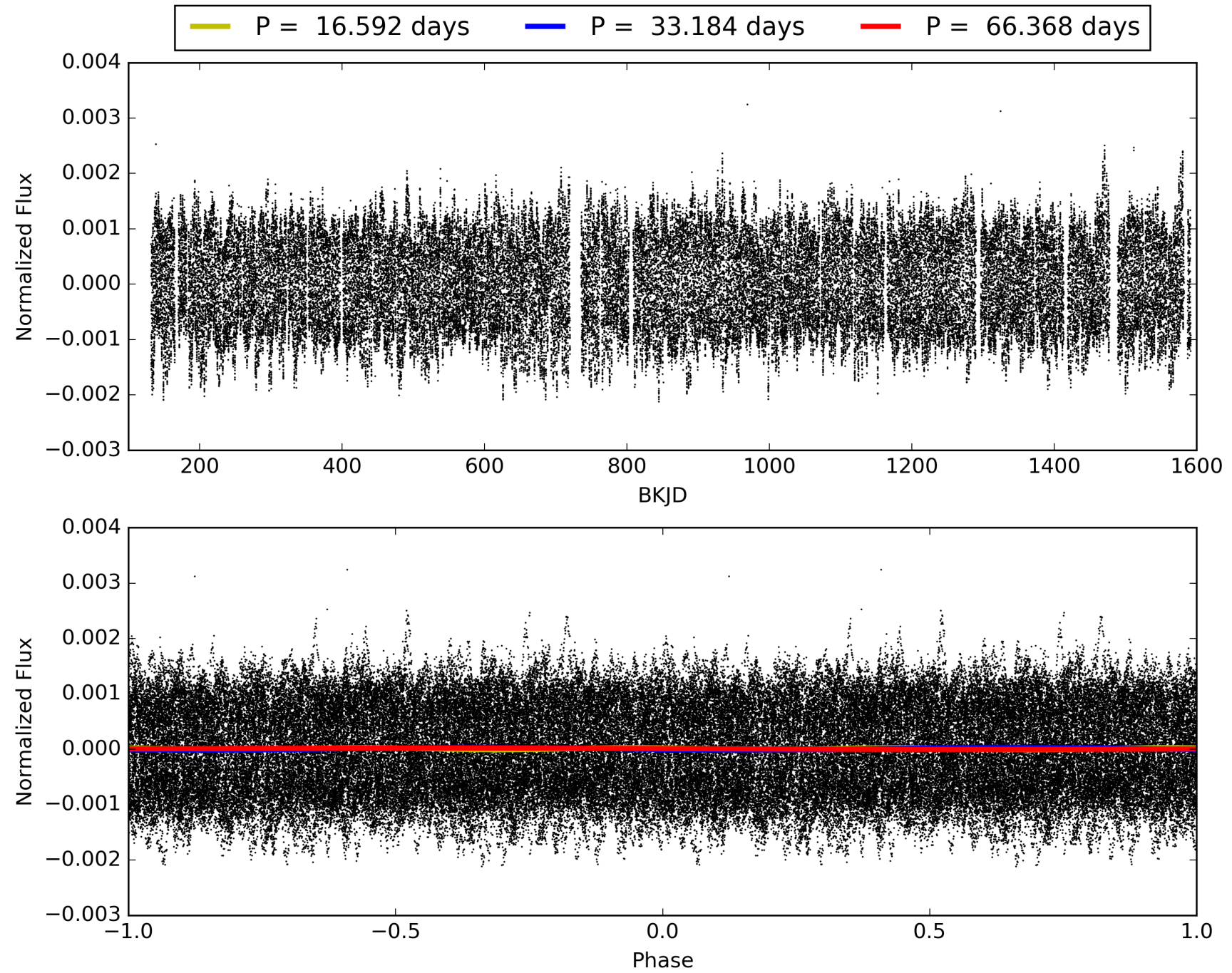
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 23:13:39 Z

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

# TCE 008052016-04, PDC Light Curves

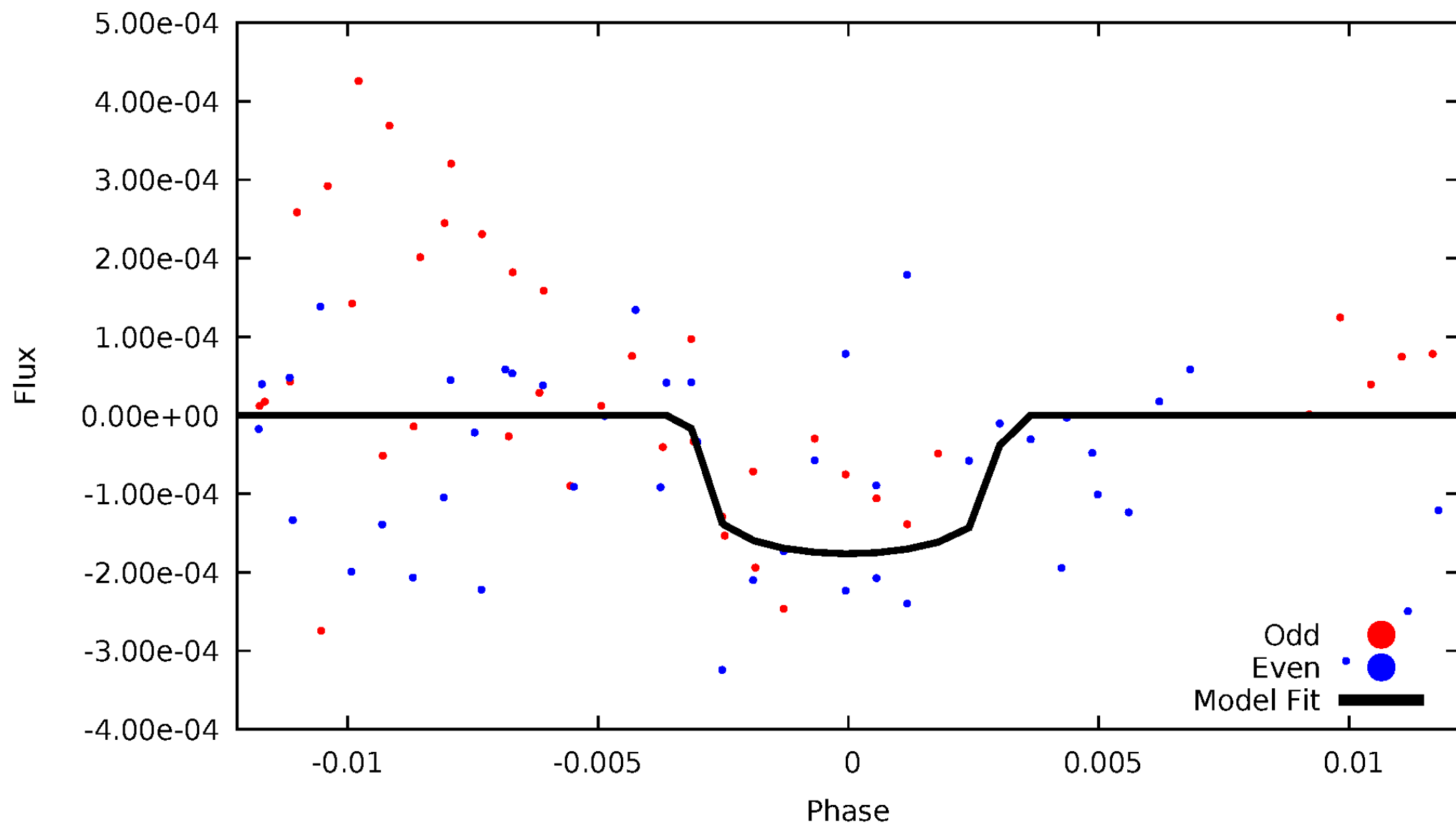


TCE 008052016-04



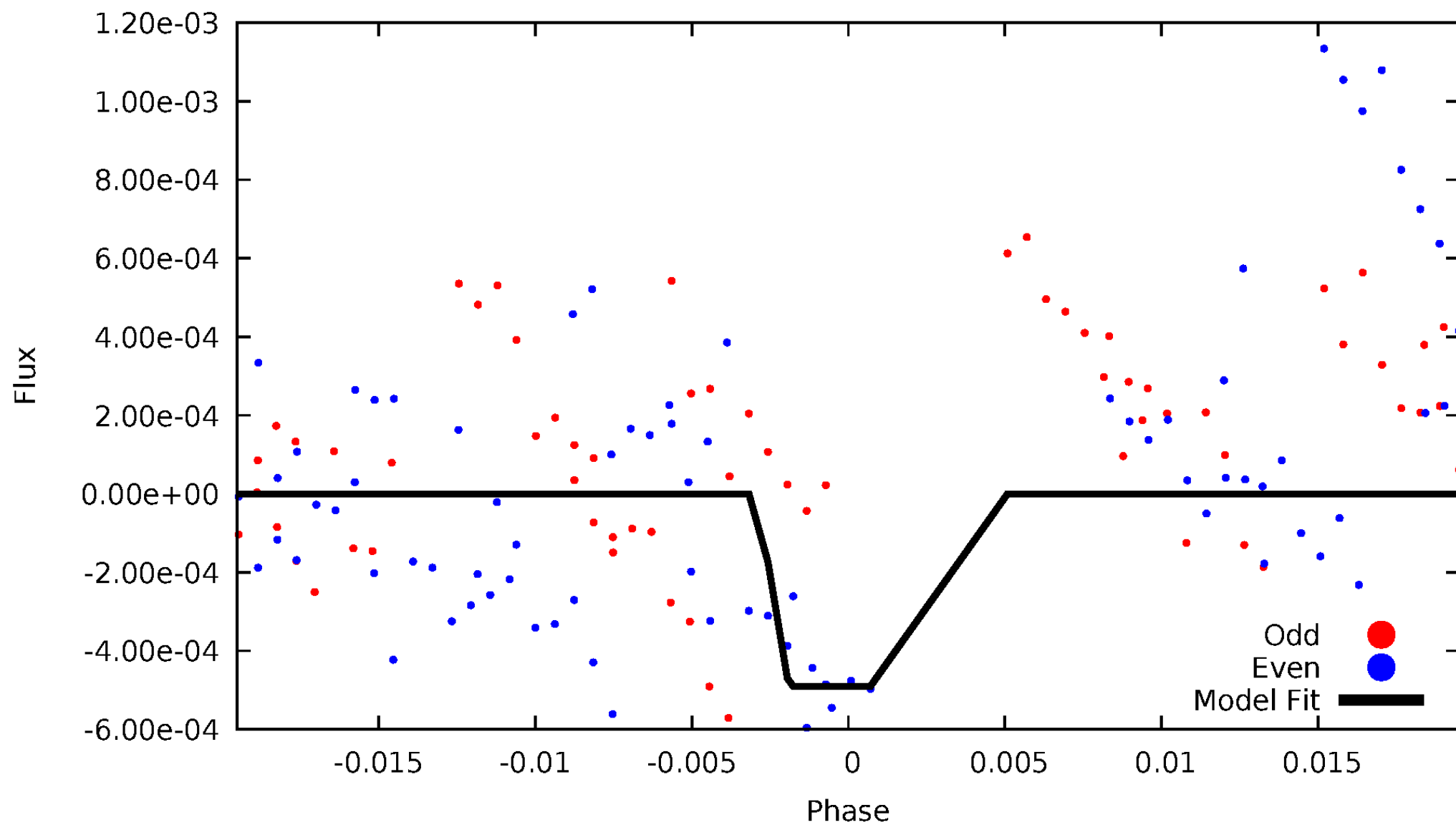
# DV Odd/Even

TCE 008052016-04



# ALT Odd/Even

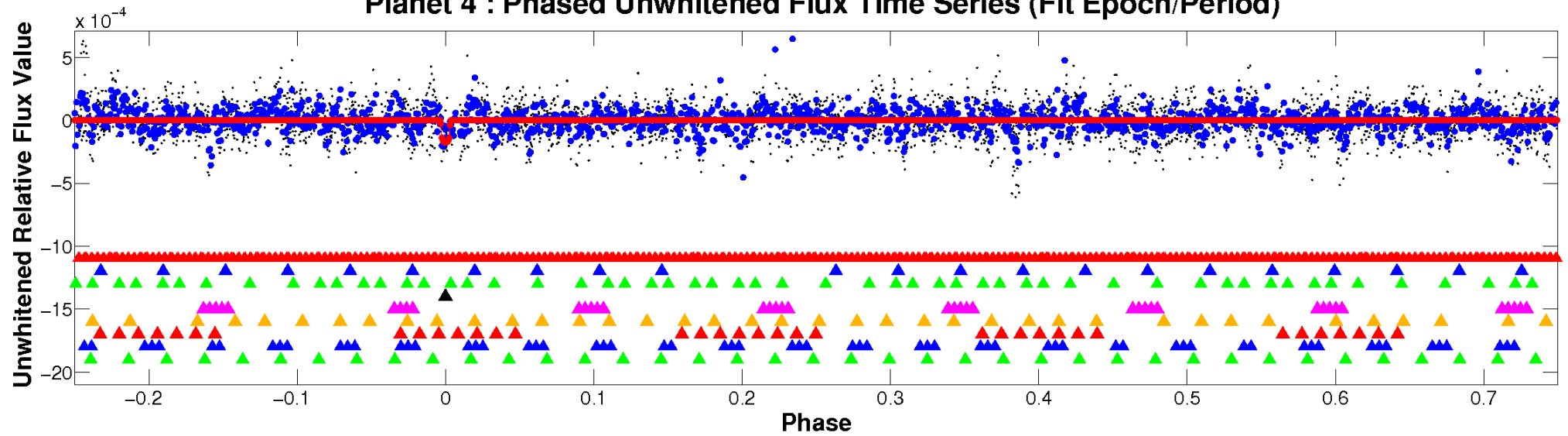
TCE 008052016-04



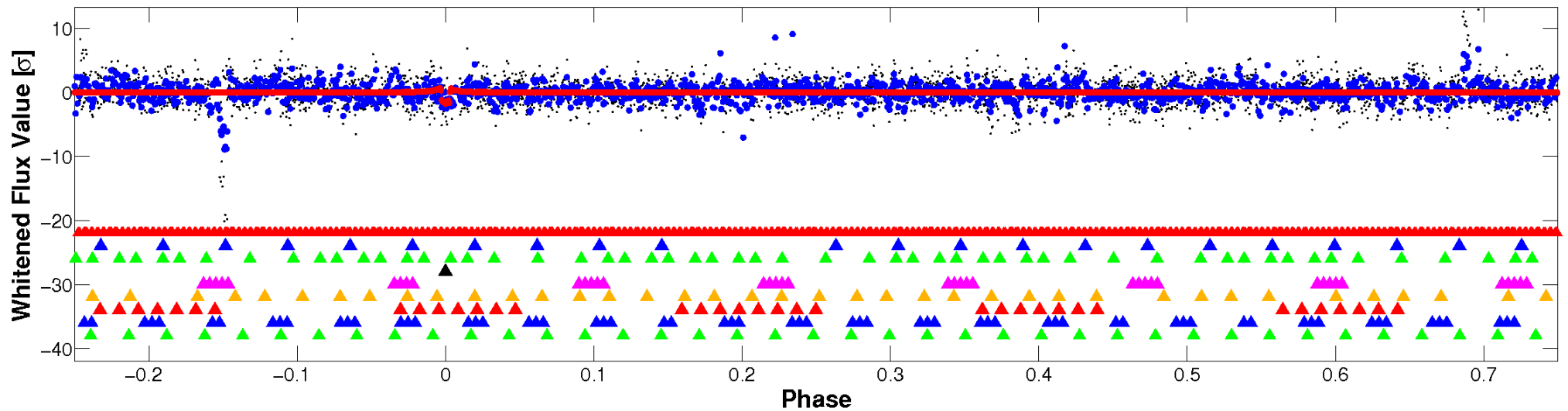


# Non-Whitened Vs. Whitened Light Curve

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



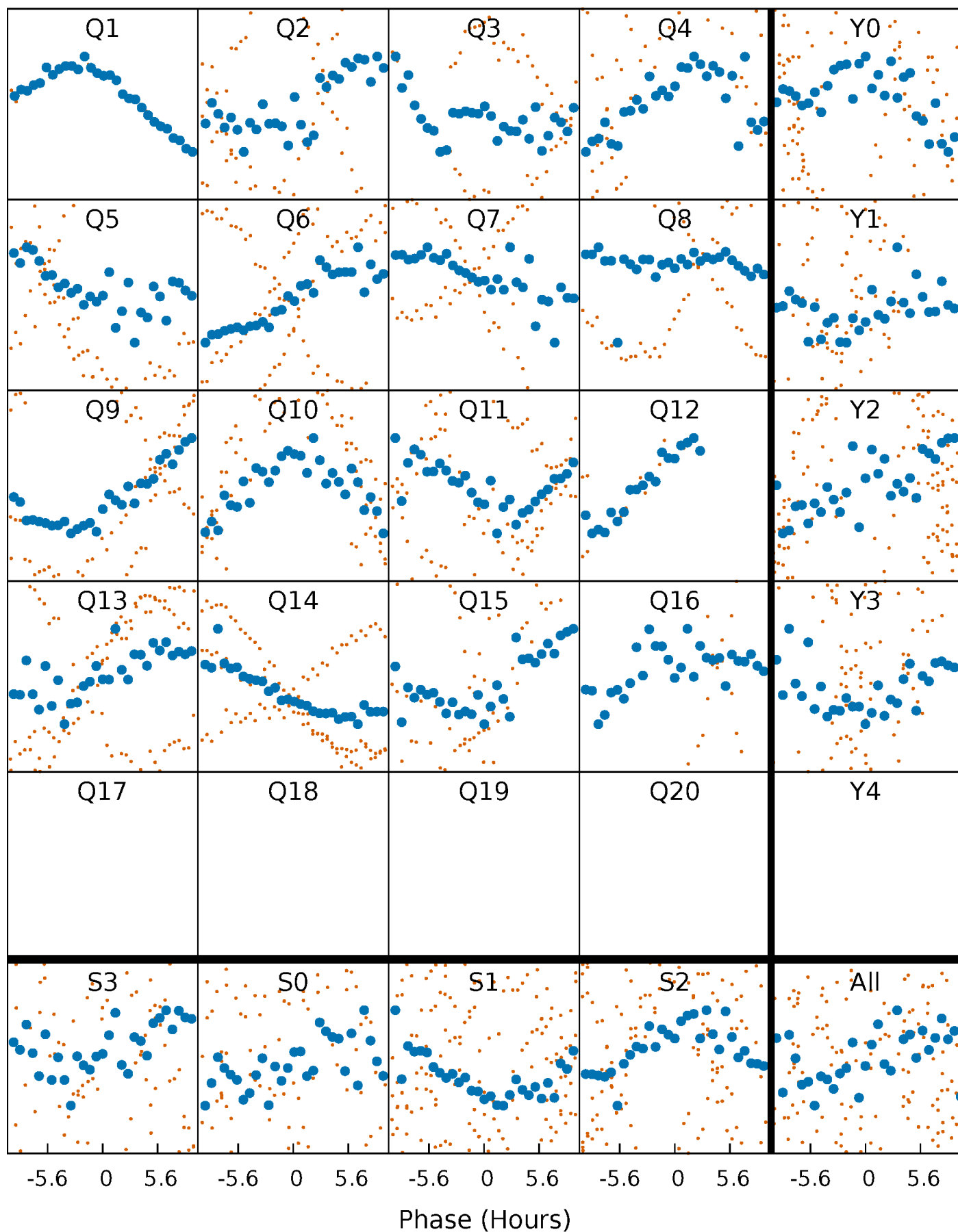
## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)





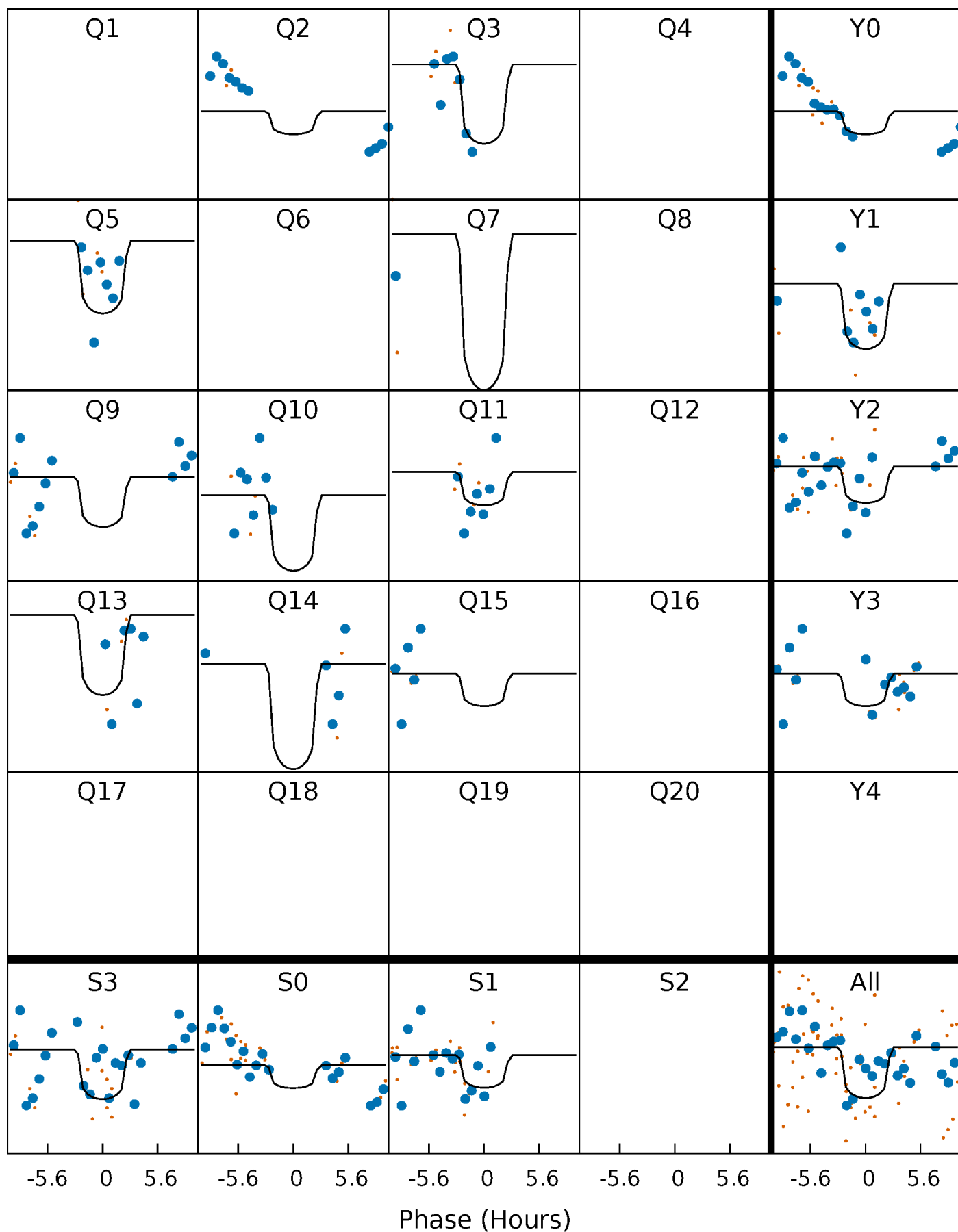
# PDC Quarter-Phased Transit Curves

TCE 008052016-04 P= 33.184196 Days  $T_0=158.831256$  (BKJD)



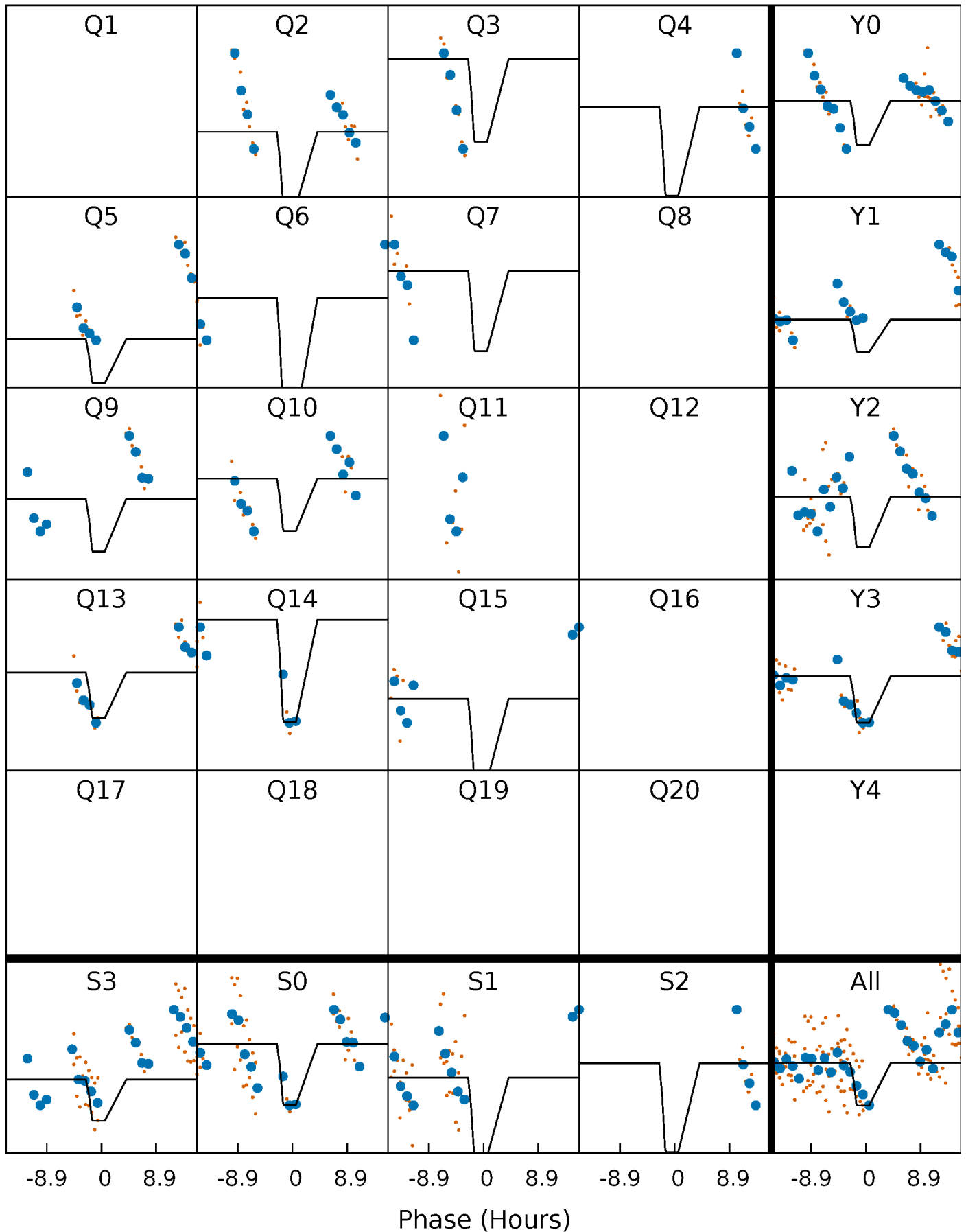
# DV Quarter-Phased Transit Curves

TCE 008052016-04 P= 33.184196 Days  $T_0=158.831256$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

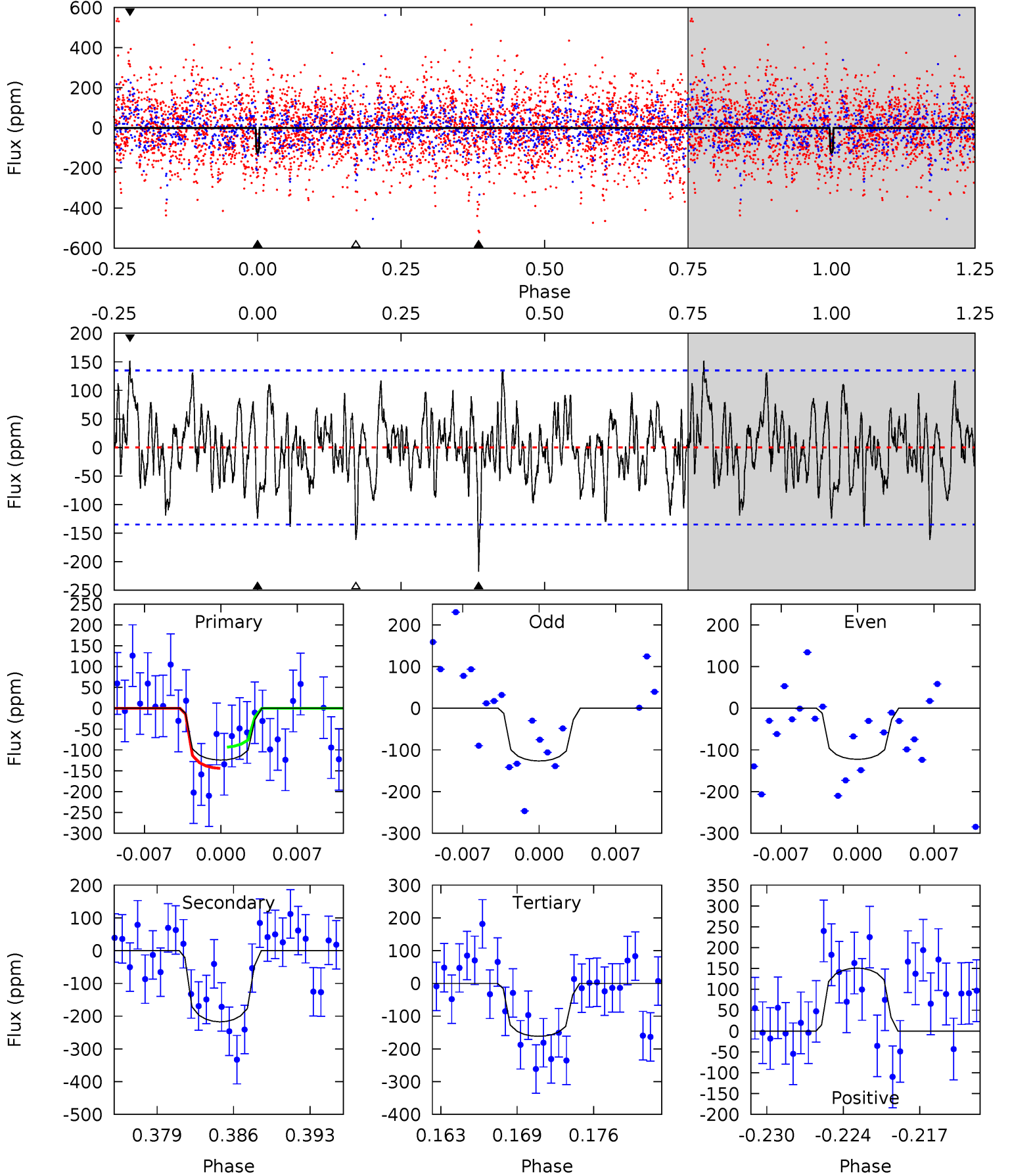
TCE 008052016-04 P= 33.188638 Days  $T_0=158.874531$  (BKJD)



# DV Model-Shift Uniqueness Test

008052016-04, P = 33.184196 Days, E = 125.647060 Days

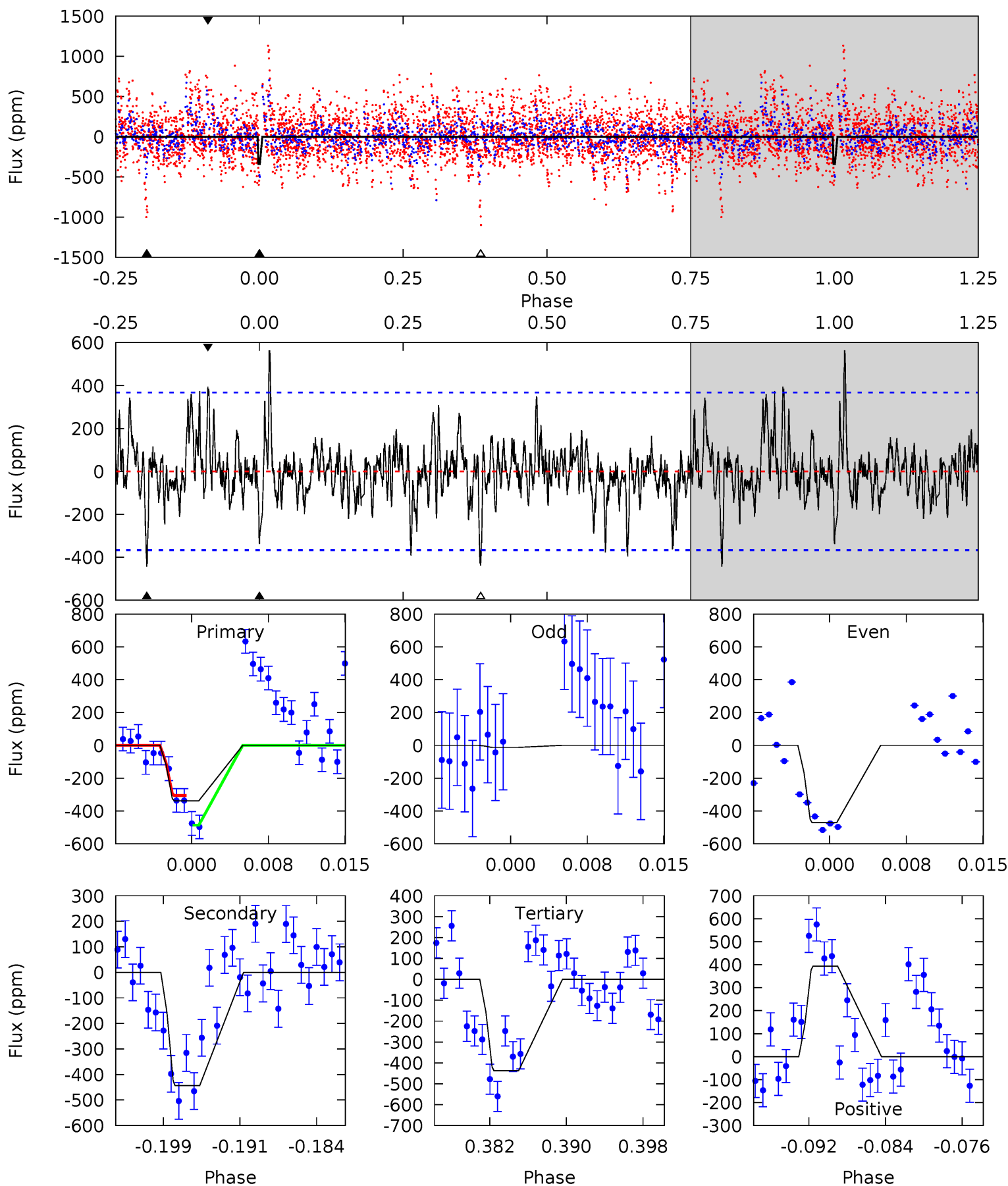
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
4.71	8.23	6.12	5.71	5.10	2.71	1.79	-1.41	-1.01	2.11	2.52	0.08	1.15	0.41	0.94



# Alt Model-Shift Uniqueness Test

008052016-04, P = 33.188638 Days, E = 125.685893 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
4.67	6.13	6.05	5.44	5.08	2.67	1.54	-1.38	-0.77	0.08	0.69	2.72	0.71	0.56	0.93



### Stellar Parameters For KIC 008052016

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6212^{+171}_{-171}$	$3.897^{+0.300}_{-0.100}$	$-0.340^{+0.350}_{-0.300}$	$1.989^{+0.418}_{-0.628}$	$1.138^{+0.225}_{-0.184}$	$0.204^{+0.380}_{-0.074}$
	+3%/-3%	+8%/-3%	+103%/-88%	+21%/-32%	+20%/-16%	+187%/-36%
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 008052016-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-218 \pm 26$	$4.27^{+3.78}_{-2.94}$	$1144^{+70}_{-90}$	$5211^{+4761}_{-1119}$	$303^{+2720}_{-221}$
Alt.	$-443 \pm 72$	$5.49^{+4.09}_{-3.32}$	$1149^{+78}_{-93}$	$5547^{+3855}_{-1171}$	$380^{+1954}_{-261}$

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

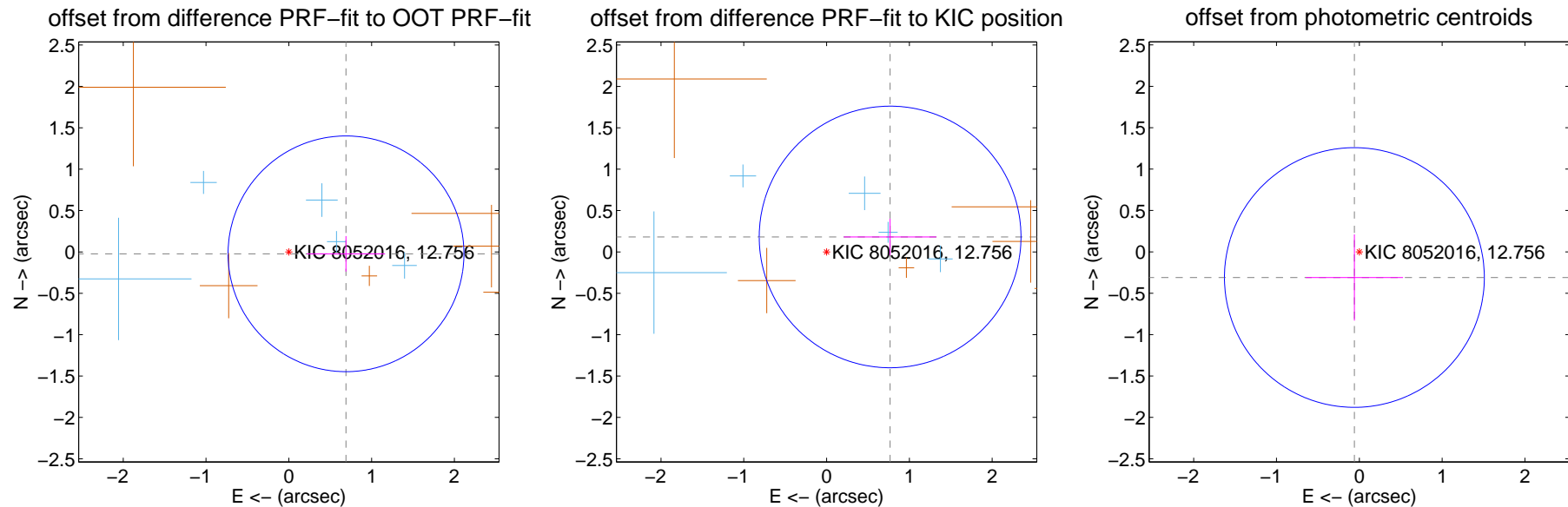
## DV Centroid Data

Supplemental centroid analysis for 008052016-04. Kepler magnitude: 12.76. Transit SNR 7.23

There are 5 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.06 arcsec

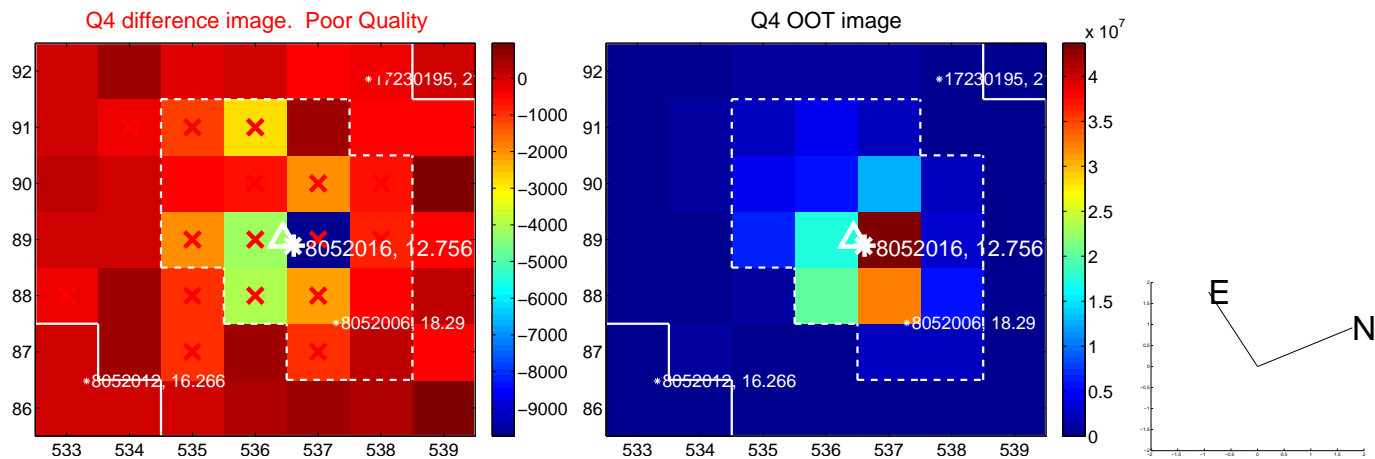
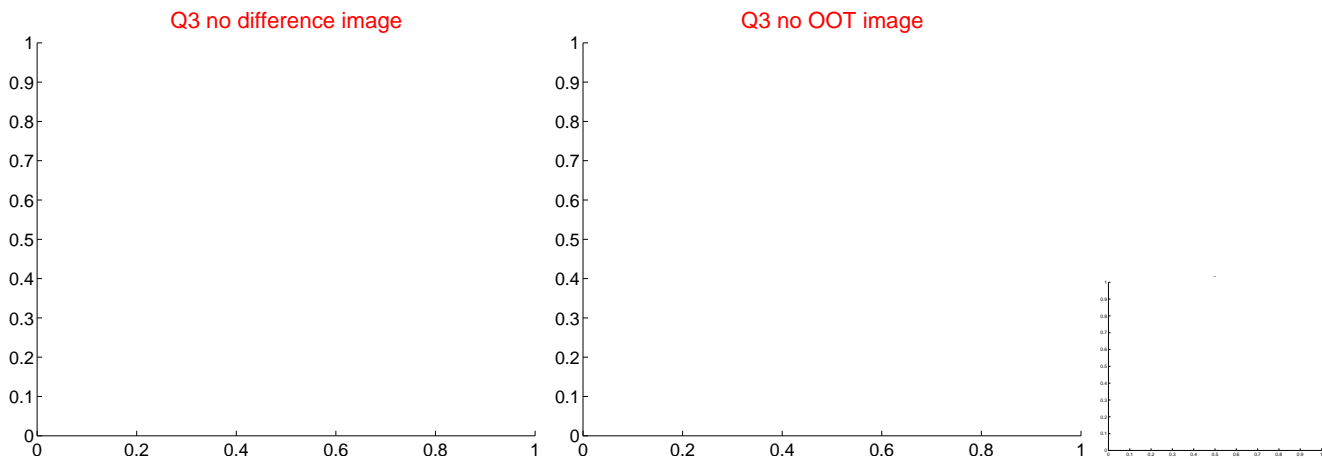
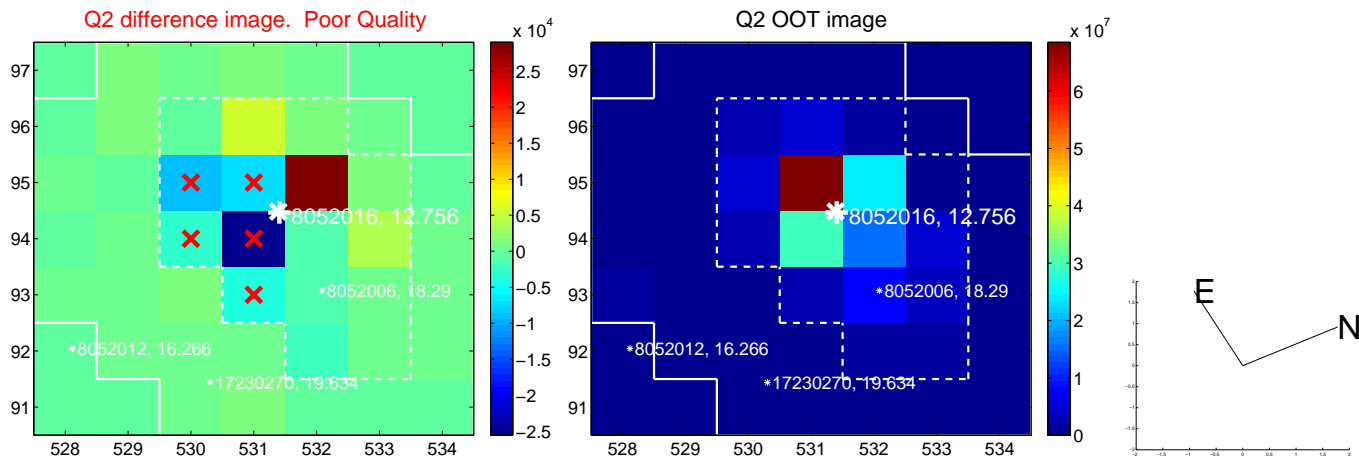
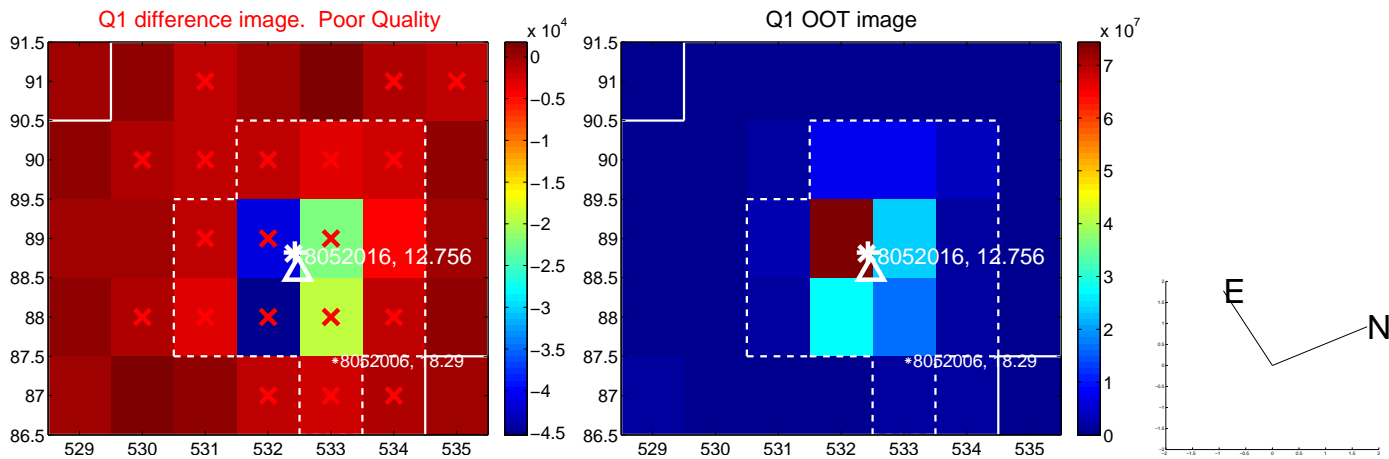
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.691 \pm 0.475$	1.46	$-0.691 \pm 0.472$	$-0.023 \pm 0.214$
PRF-fit source offset from KIC position	$0.788 \pm 0.527$	1.50	$-0.767 \pm 0.559$	$0.181 \pm 0.221$
photometric centroid source offset	$0.32 \pm 0.52$	0.60	$0.06 \pm 0.59$	$-0.31 \pm 0.52$



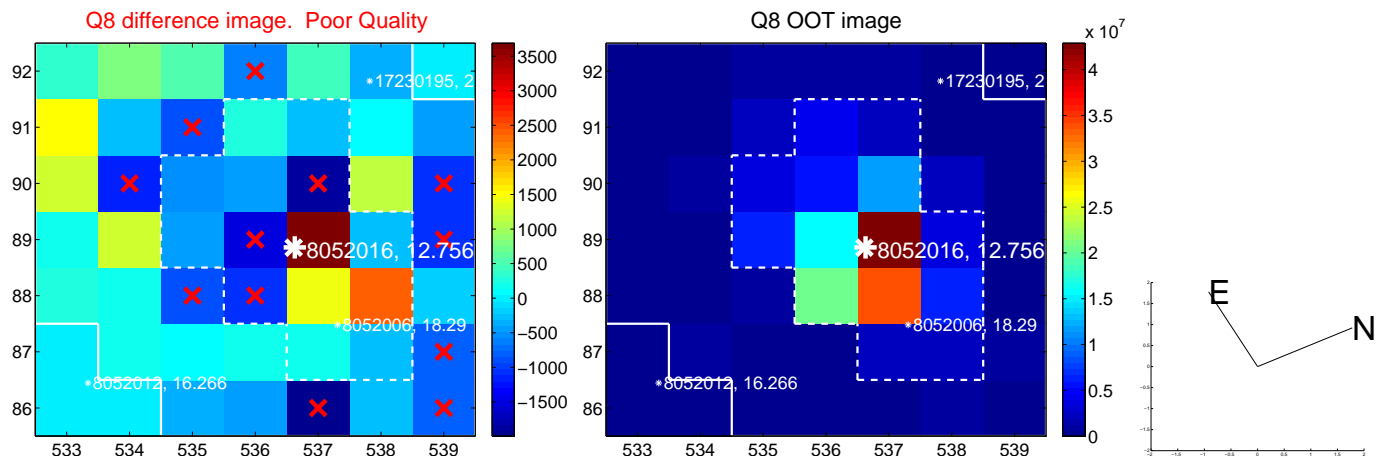
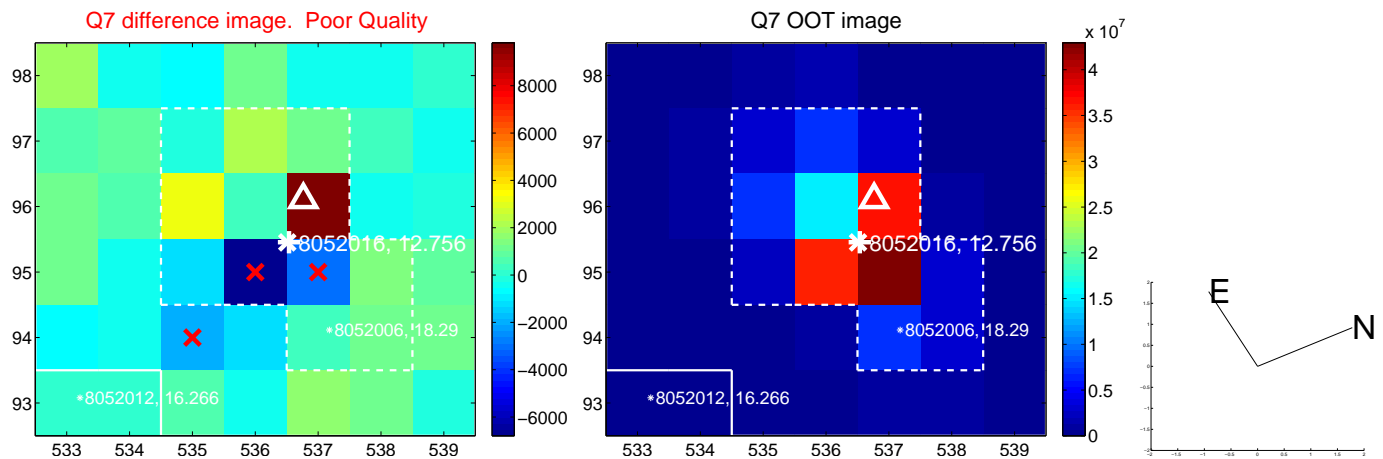
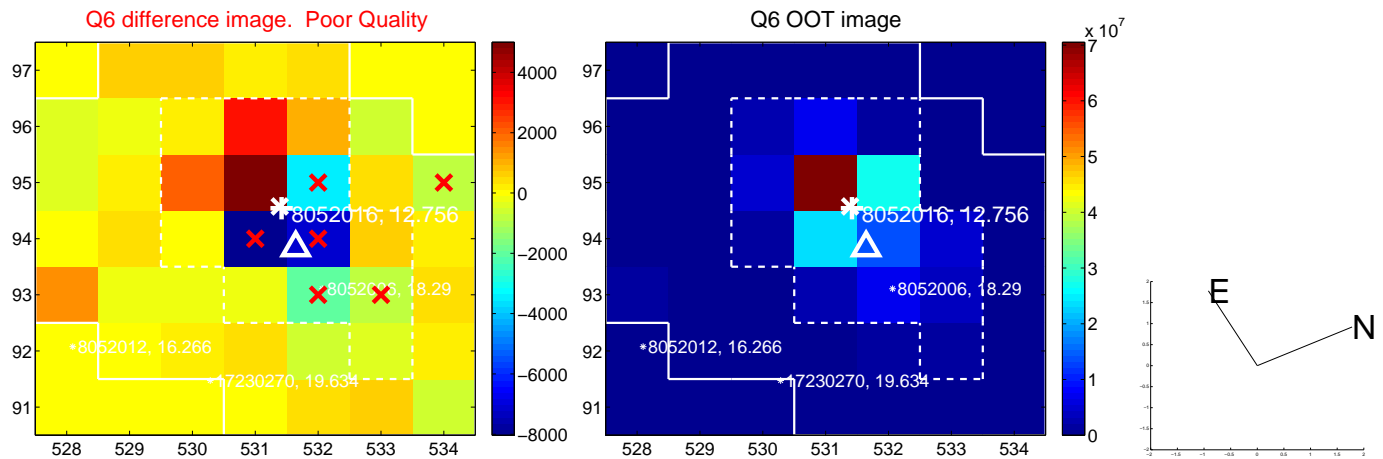
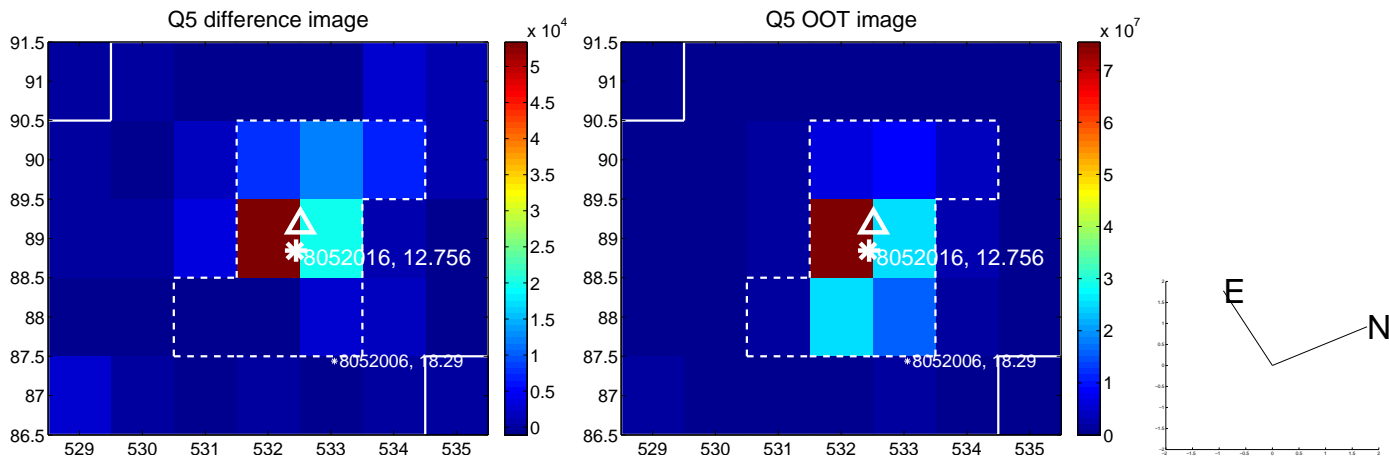
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



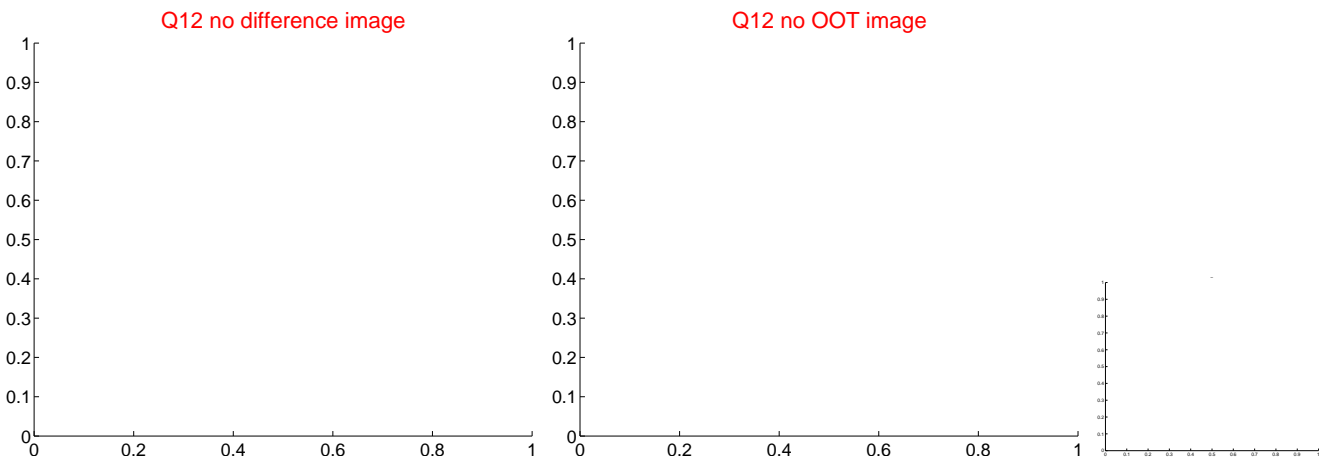
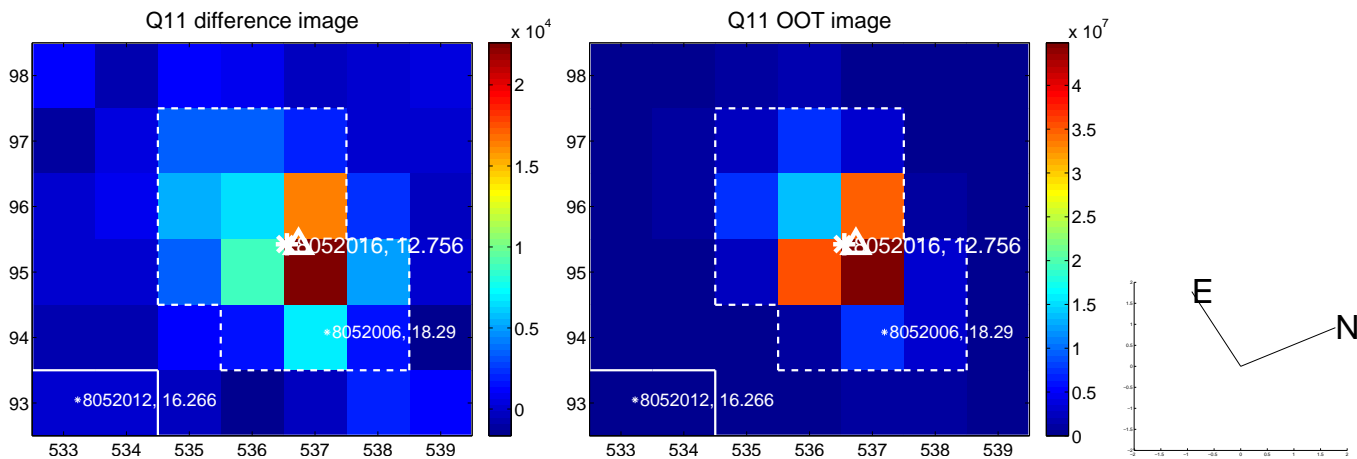
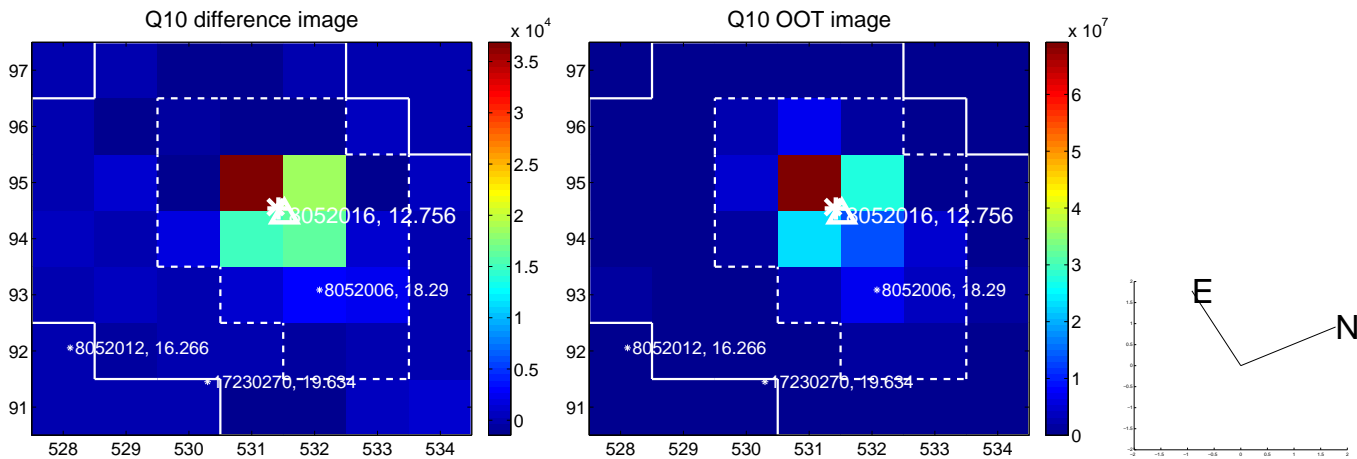
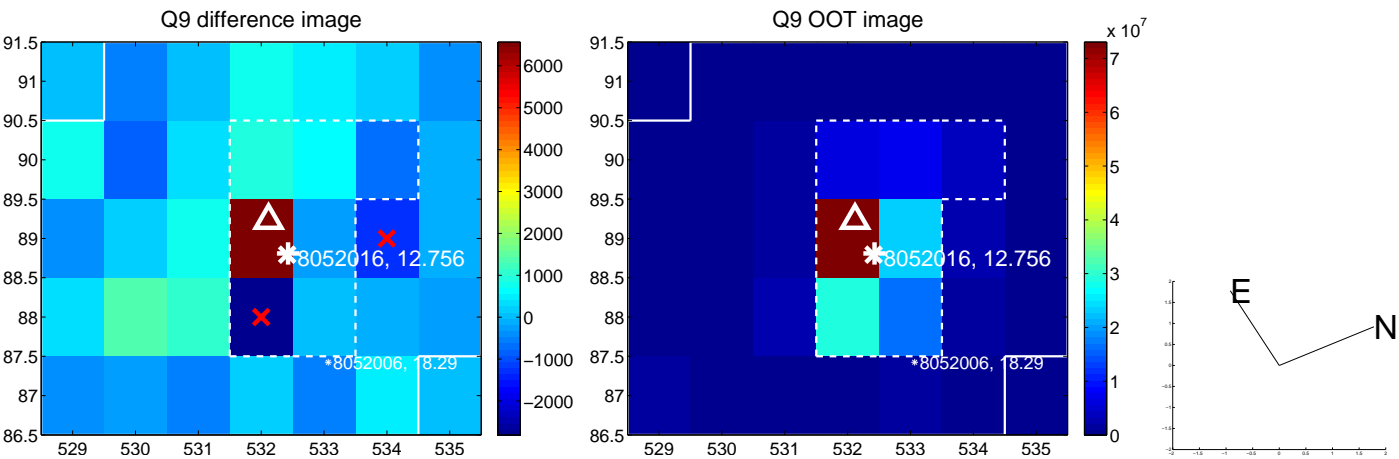
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



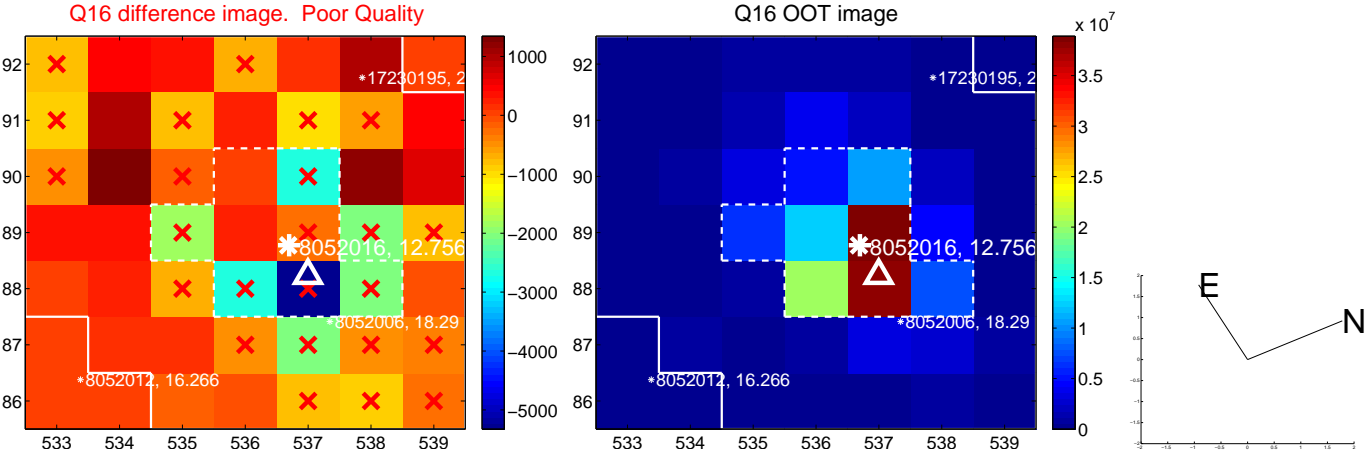
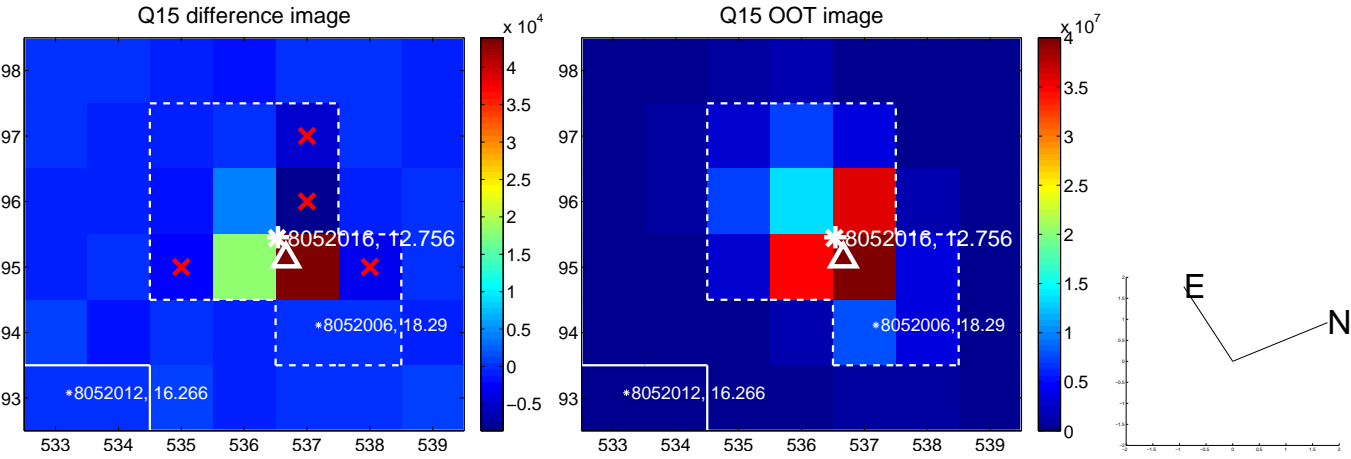
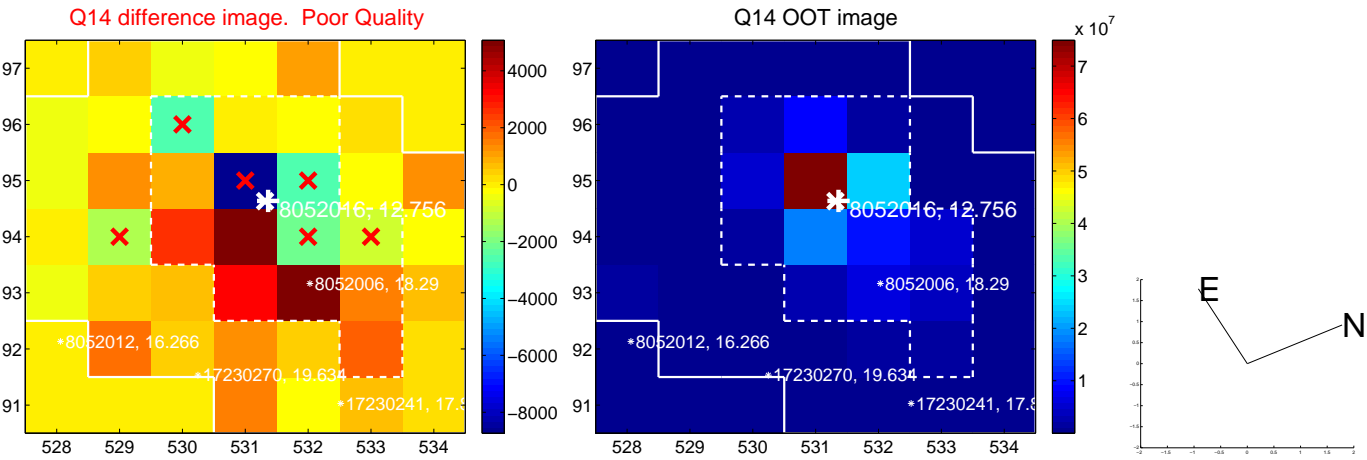
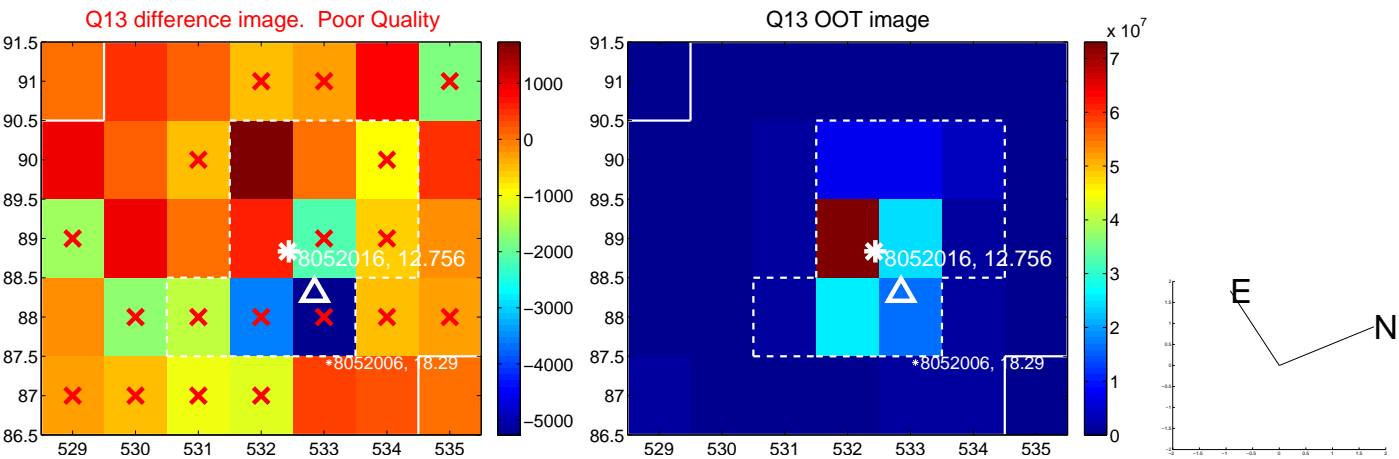
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



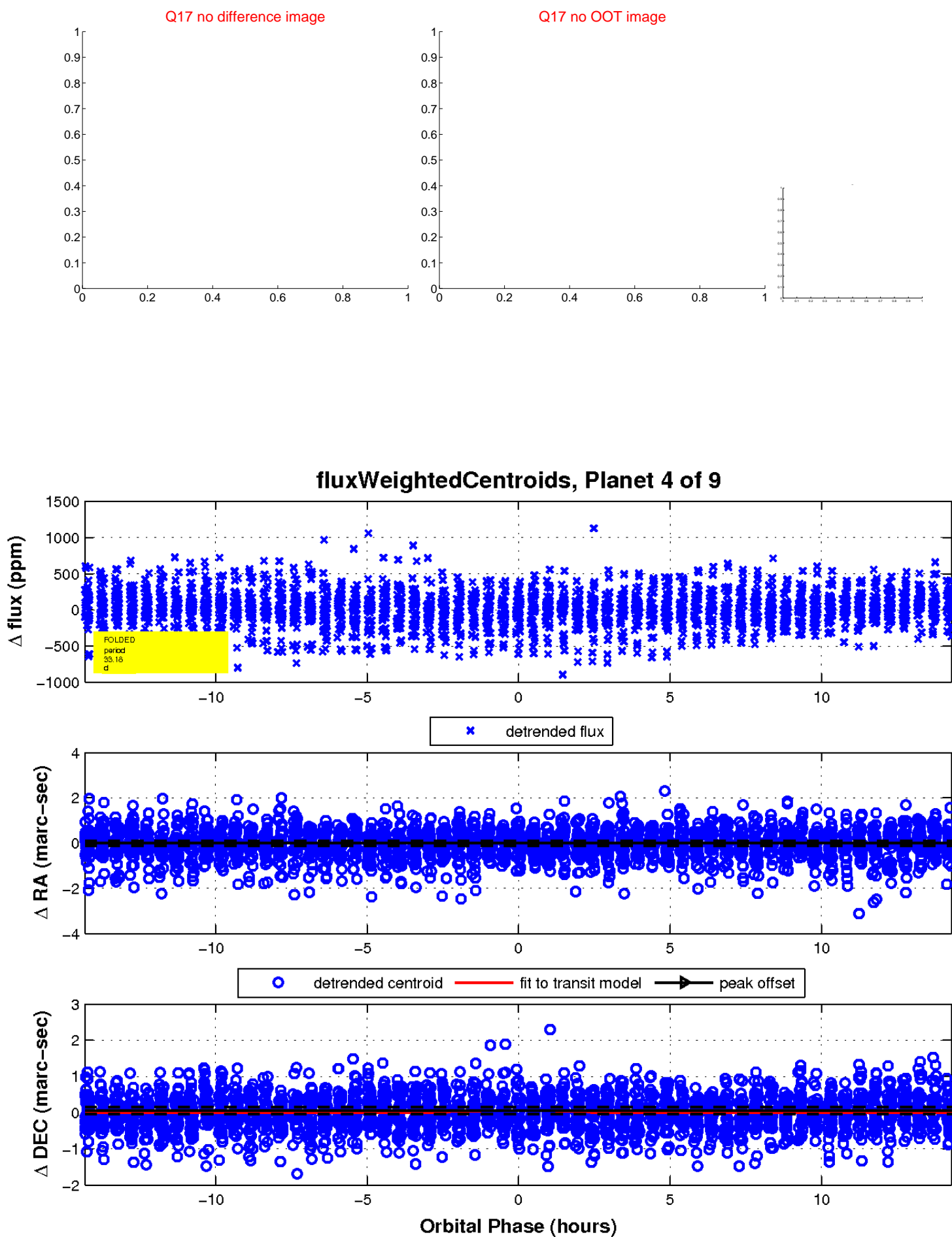
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

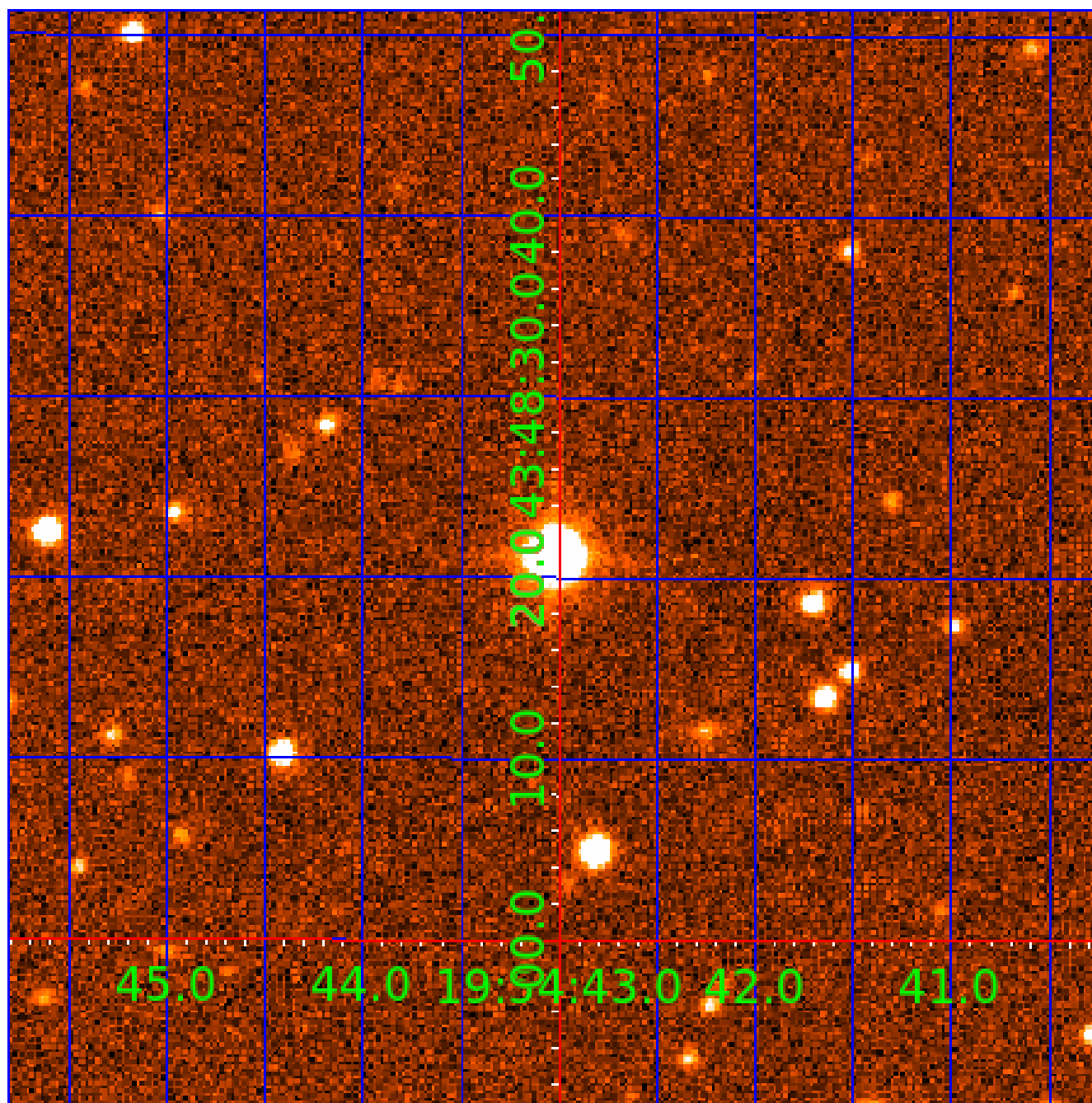


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 008052016

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008052016-01	OBS	No	2.605256	133.117659	31.9	19.238	9.6	7.3	1.99	6212	1.16	3524.60
008052016-02	OBS	No	67.763122	134.382802	184.4	6.496	25.0	11.1	1.99	6212	3.03	45.73
008052016-03	OBS	No	26.742080	135.727966	190.8	10.952	18.8	12.1	1.99	6212	2.99	158.00
008052016-04	OBS	No	33.184196	158.831256	176.4	4.858	16.2	7.2	1.99	6212	2.96	118.49
008052016-05	OBS	No	37.315026	162.366643	172.7	3.991	13.1	7.8	1.99	6212	2.88	101.33
008052016-06	OBS	No	37.038602	156.474640	246.9	4.412	12.2	11.5	1.99	6212	3.45	102.34
008052016-07	OBS	No	39.906683	164.120100	244.5	4.294	9.9	10.4	1.99	6212	3.45	92.65
008052016-08	OBS	No	23.077641	133.725683	160.9	6.368	9.5	9.1	1.99	6212	2.90	192.30
008052016-09	OBS	No	28.929926	143.231572	102.0	5.045	8.8	5.4	1.99	6212	2.28	142.27

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008052016-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV
008052016-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
008052016-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—HALO_GHOST
008052016-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
008052016-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
008052016-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT
008052016-07	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—HALO_GHOST
008052016-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
008052016-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

**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.

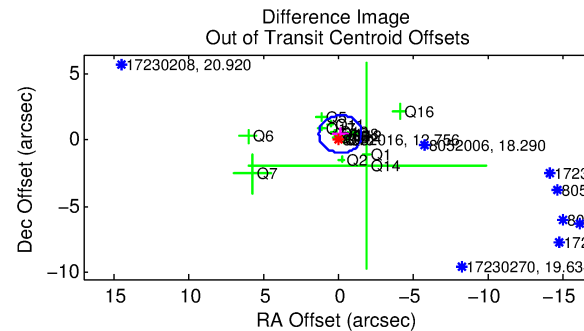
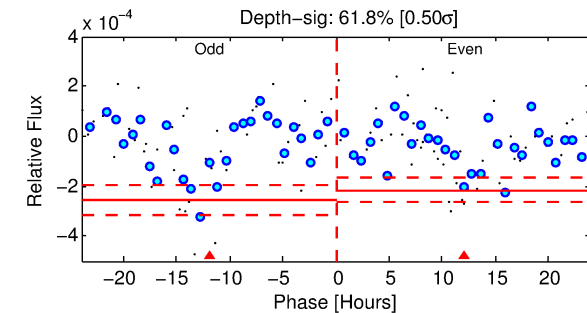
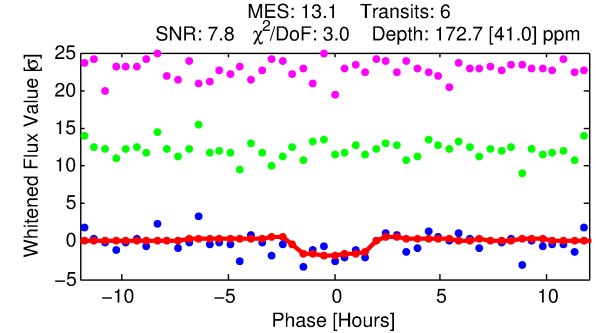
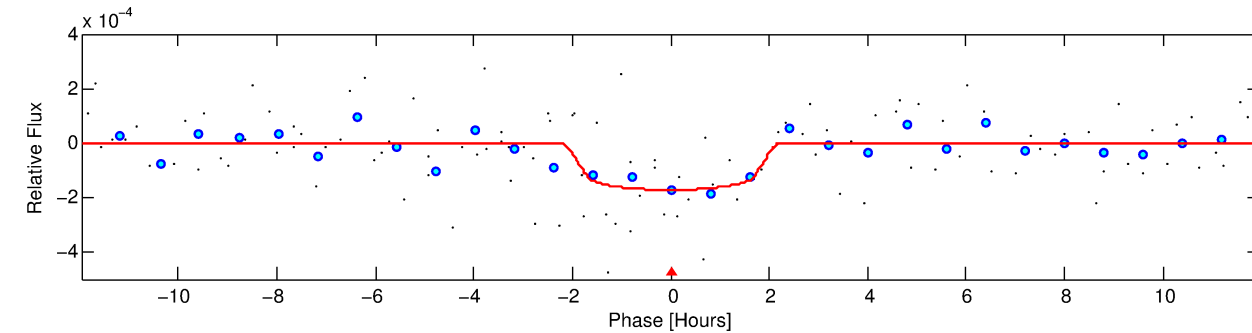
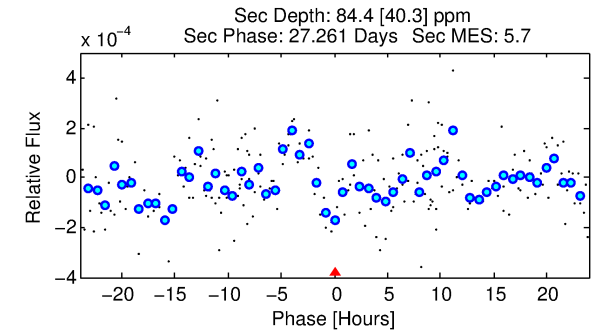
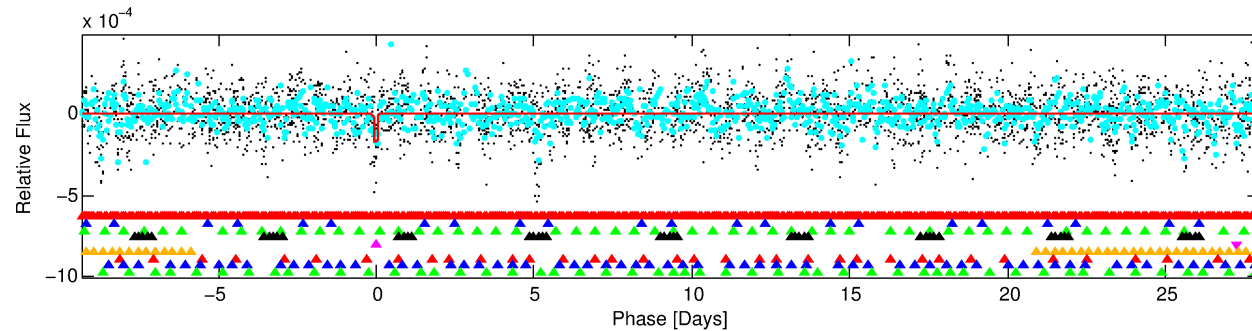
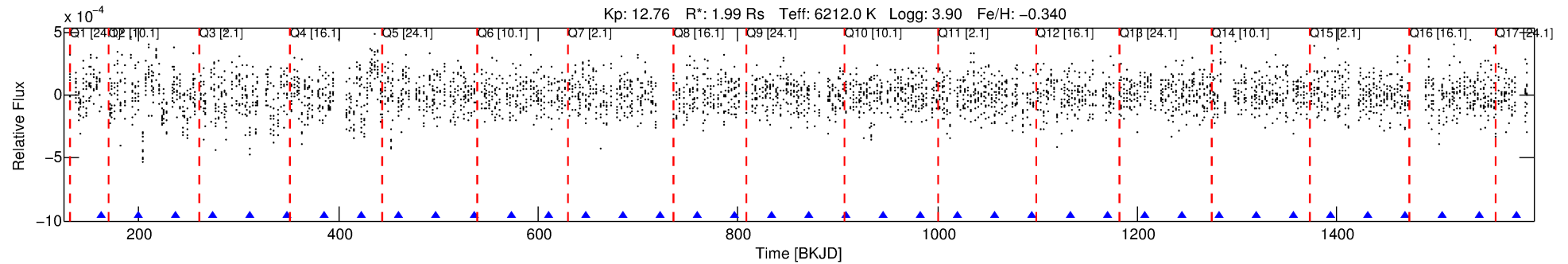
Ephemeris Match Information For 008052016-05

No Significant Match Found



# DV One-Page Summary

KIC: 8052016 Candidate: 5 of 9 Period: 37.315 d



## DV Fit Results:

Period = 37.31503 [0.00059] d  
Epoch = 162.3666 [0.0118] BKJD  
Rp/R\* = 0.0133 [0.0204]  
a/R\* = 45.45 [370.86]  
b = 0.79 [3.95]  
Seff = 101.33 [52.51]  
Teff = 809 [105] K  
Rp = 2.88 [4.51] Re  
a = 0.2282 [0.0712] AU  
Ag = 292.18 [920.47] [0.32σ]  
Teffp = 5171 [4023] K [1.08σ]

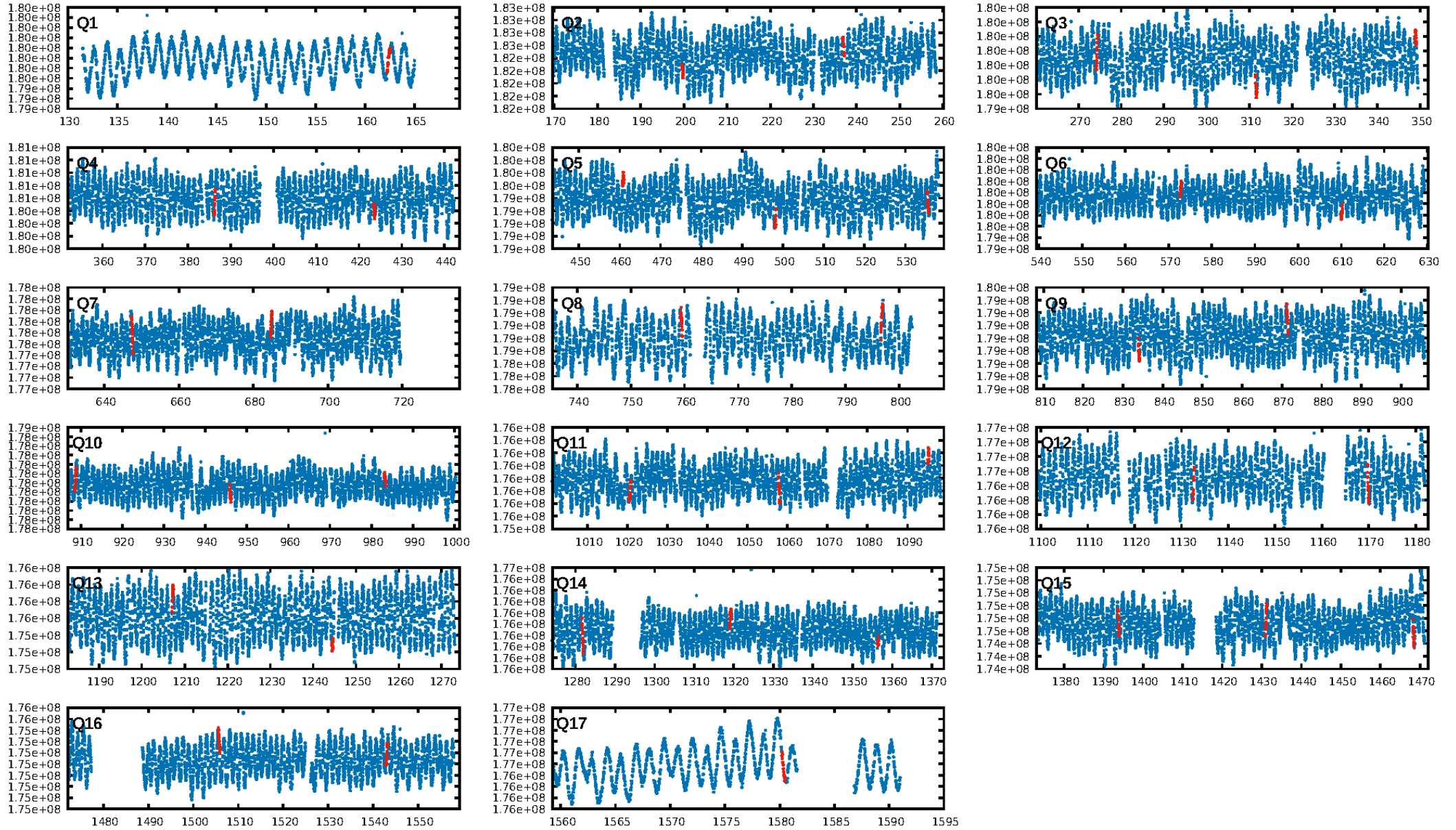
## DV Diagnostic Results:

ShortPeriod-sig: 73.5% [1.12σ]  
LongPeriod-sig: 100.0% [10.61σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 31.1%  
Bootstrap-pfa: 7.34e-12  
RollingBand-fgt: 1.00 [6/6]  
GhostDiagnostic-chr: -0.4875  
Centroid-sig: 66.7%  
Centroid-so: 0.324 arcsec [0.53σ]  
OotOffset-rm: 0.487 arcsec [1.02σ]  
KicOffset-rm: 0.567 arcsec [1.19σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.47 [8/17]  
DiffImageOverlap-fno: 0.71 [12/17]

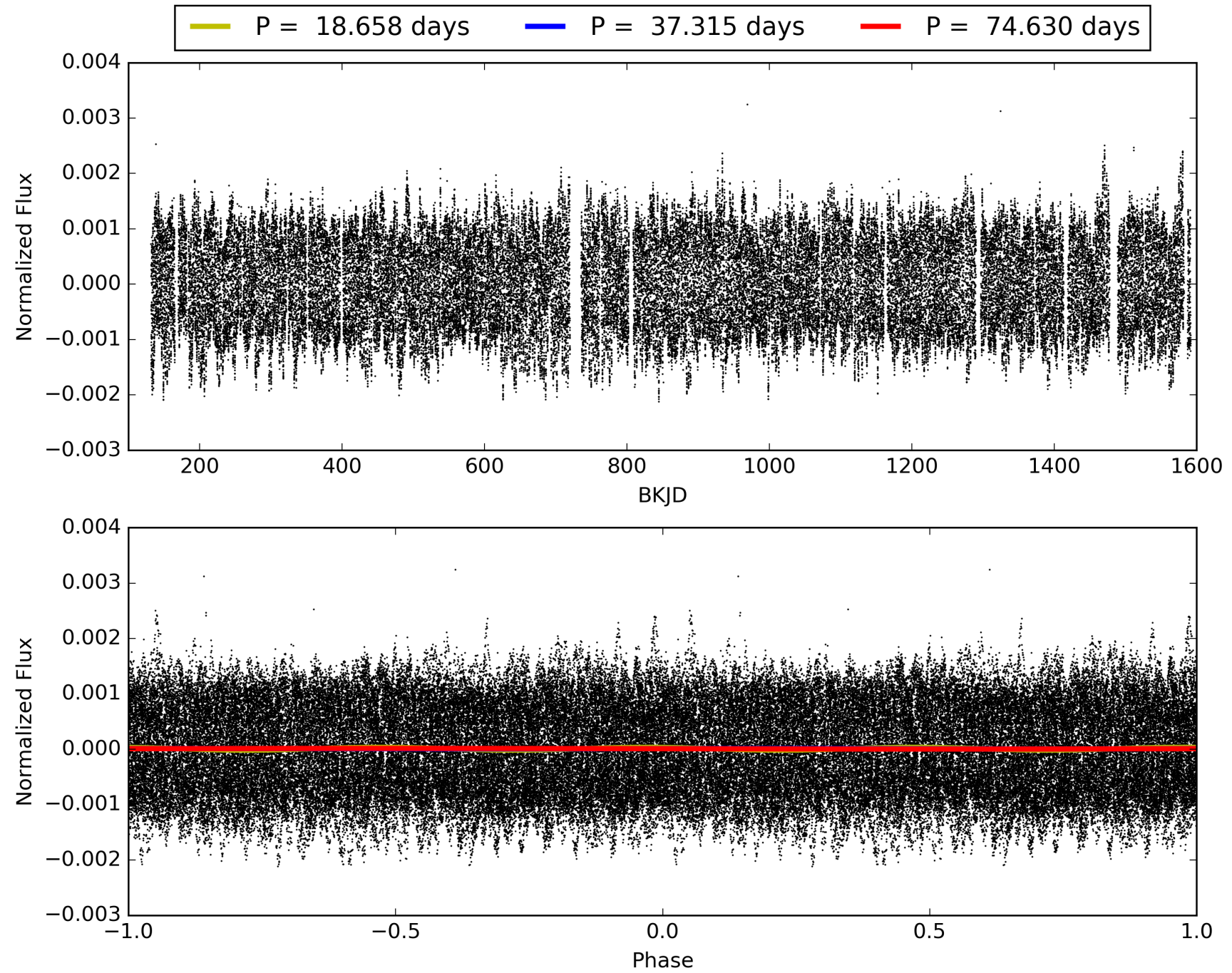
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 23:13:42 Z

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

# TCE 008052016-05, PDC Light Curves

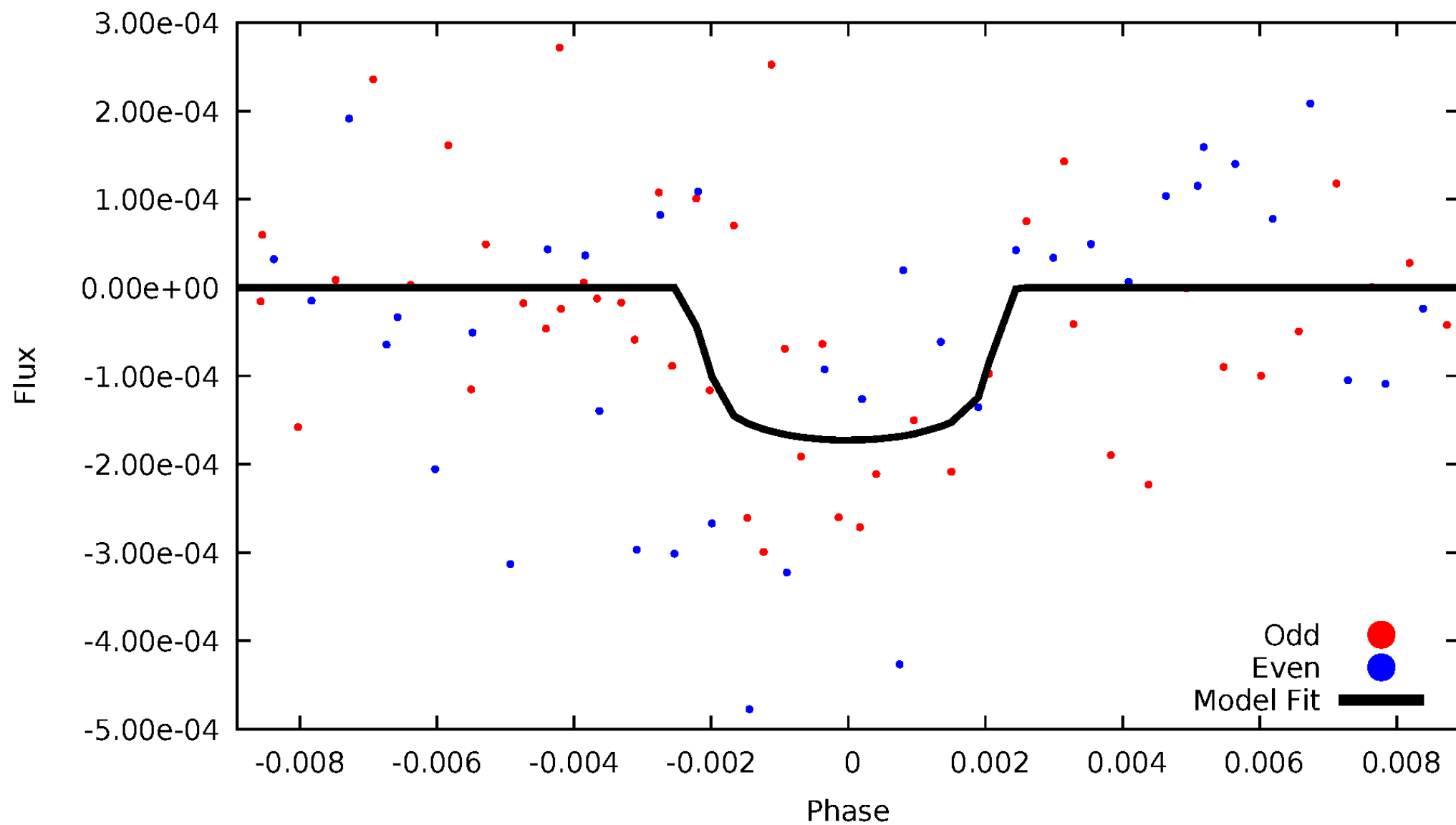


TCE 008052016-05



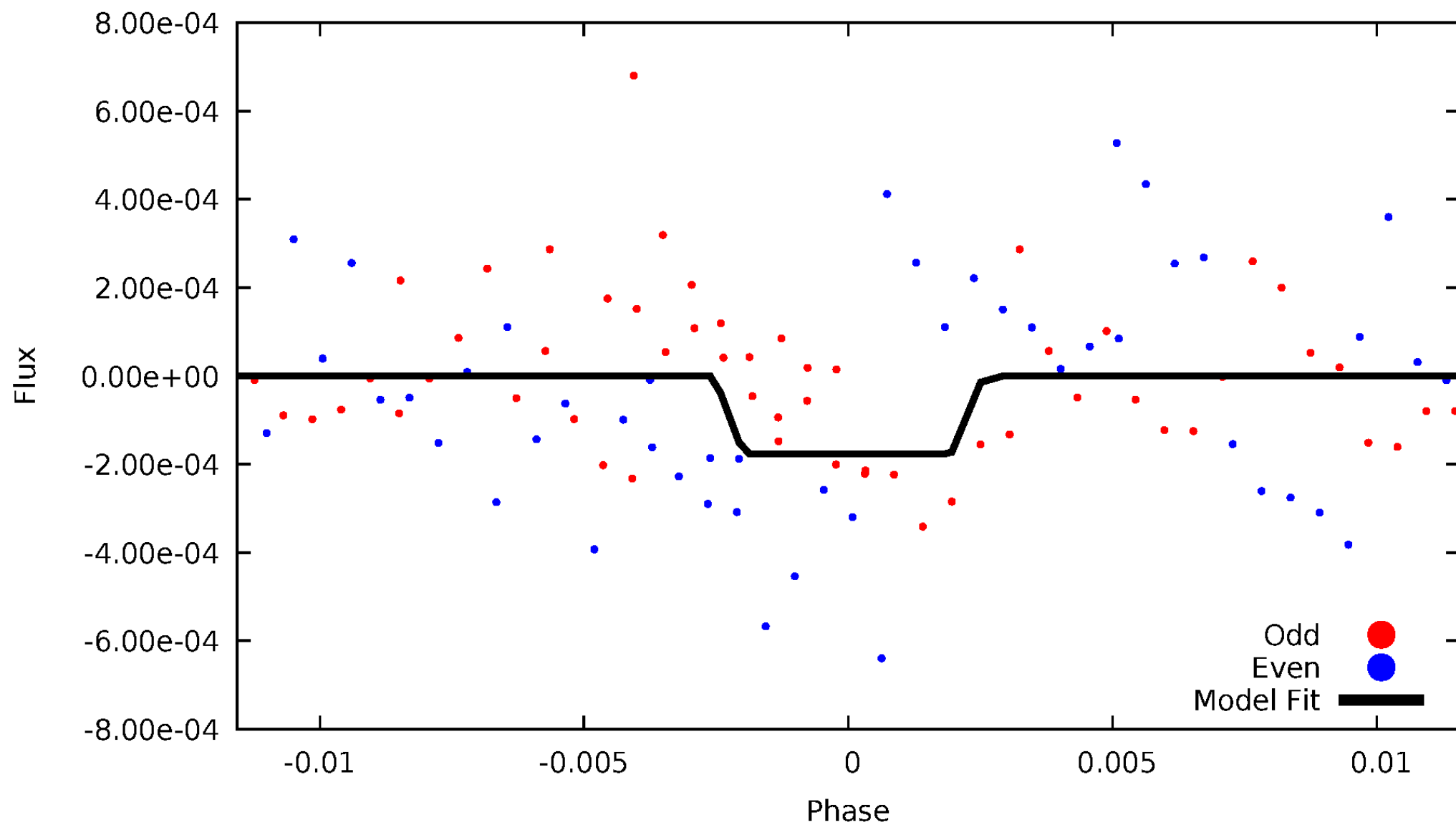
# DV Odd/Even

TCE 008052016-05



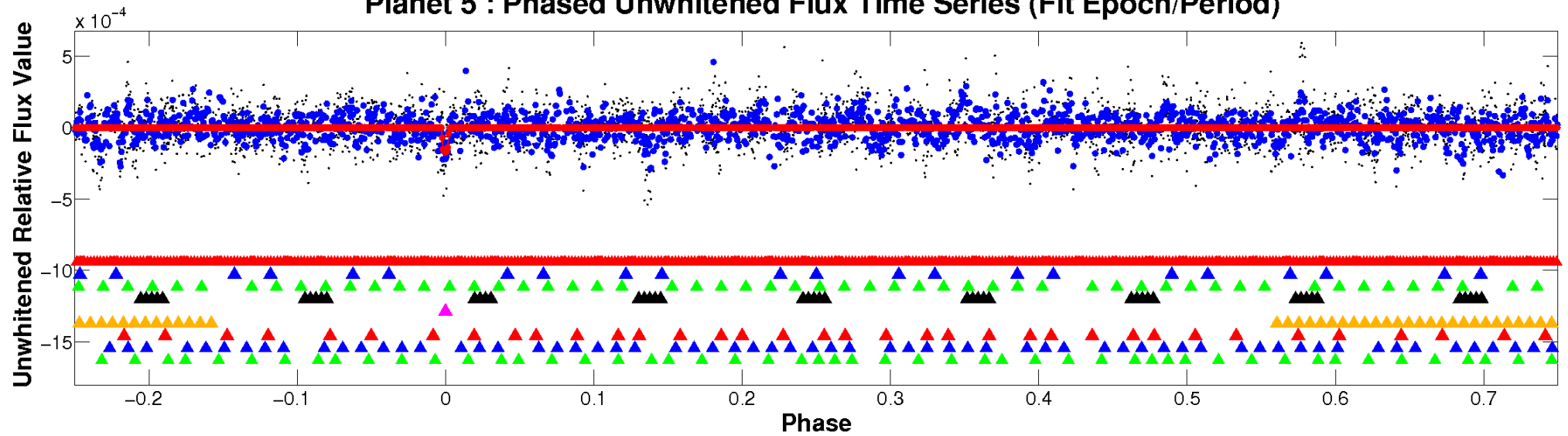
# ALT Odd/Even

TCE 008052016-05

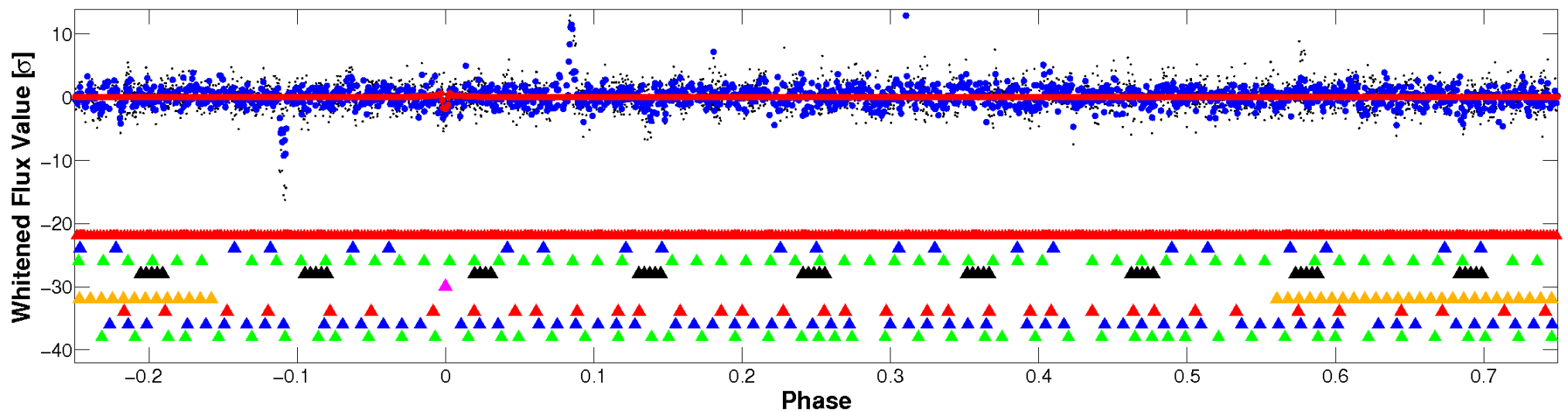


# Non-Whitened Vs. Whitened Light Curve

## Planet 5 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)



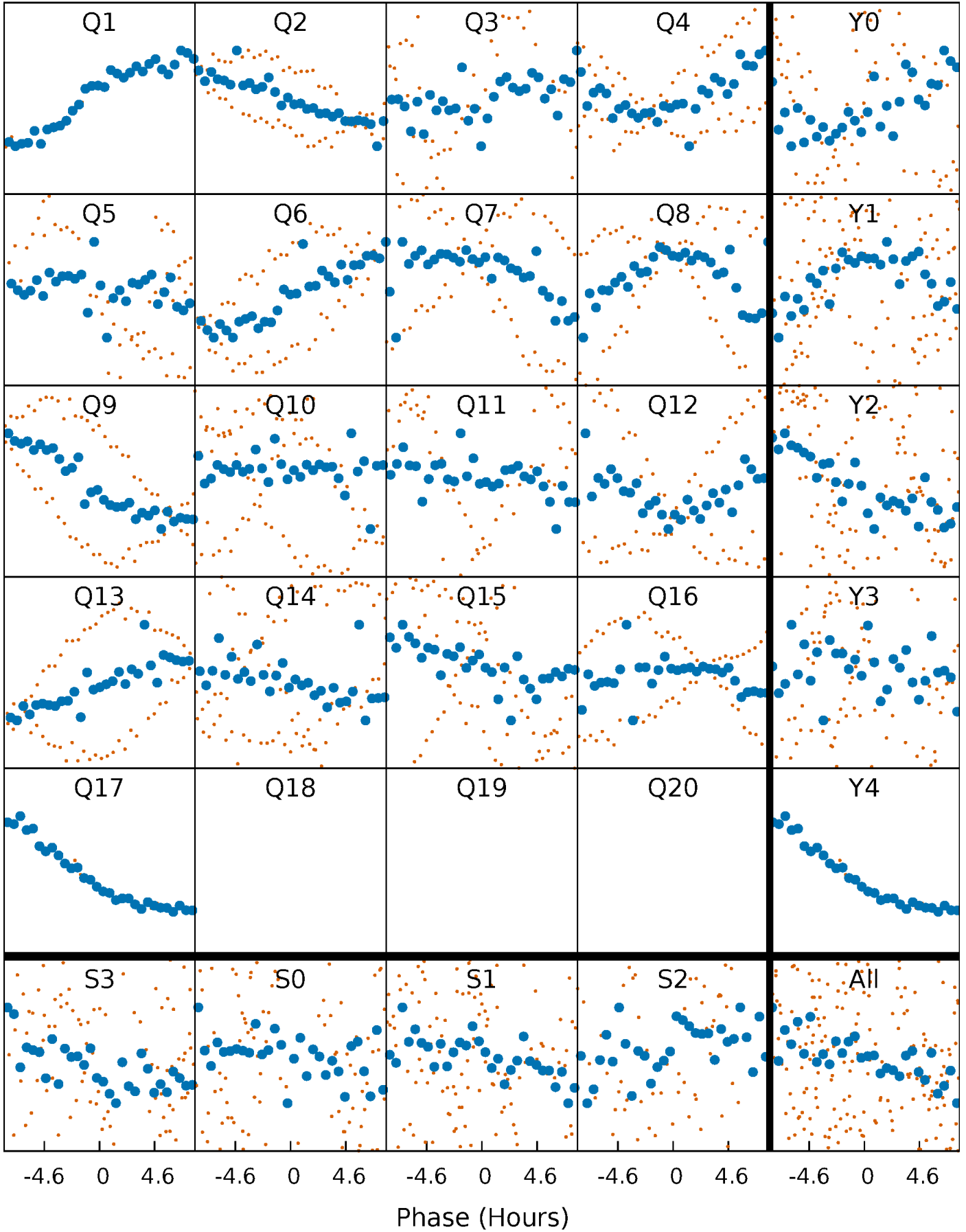
## Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)





# PDC Quarter-Phased Transit Curves

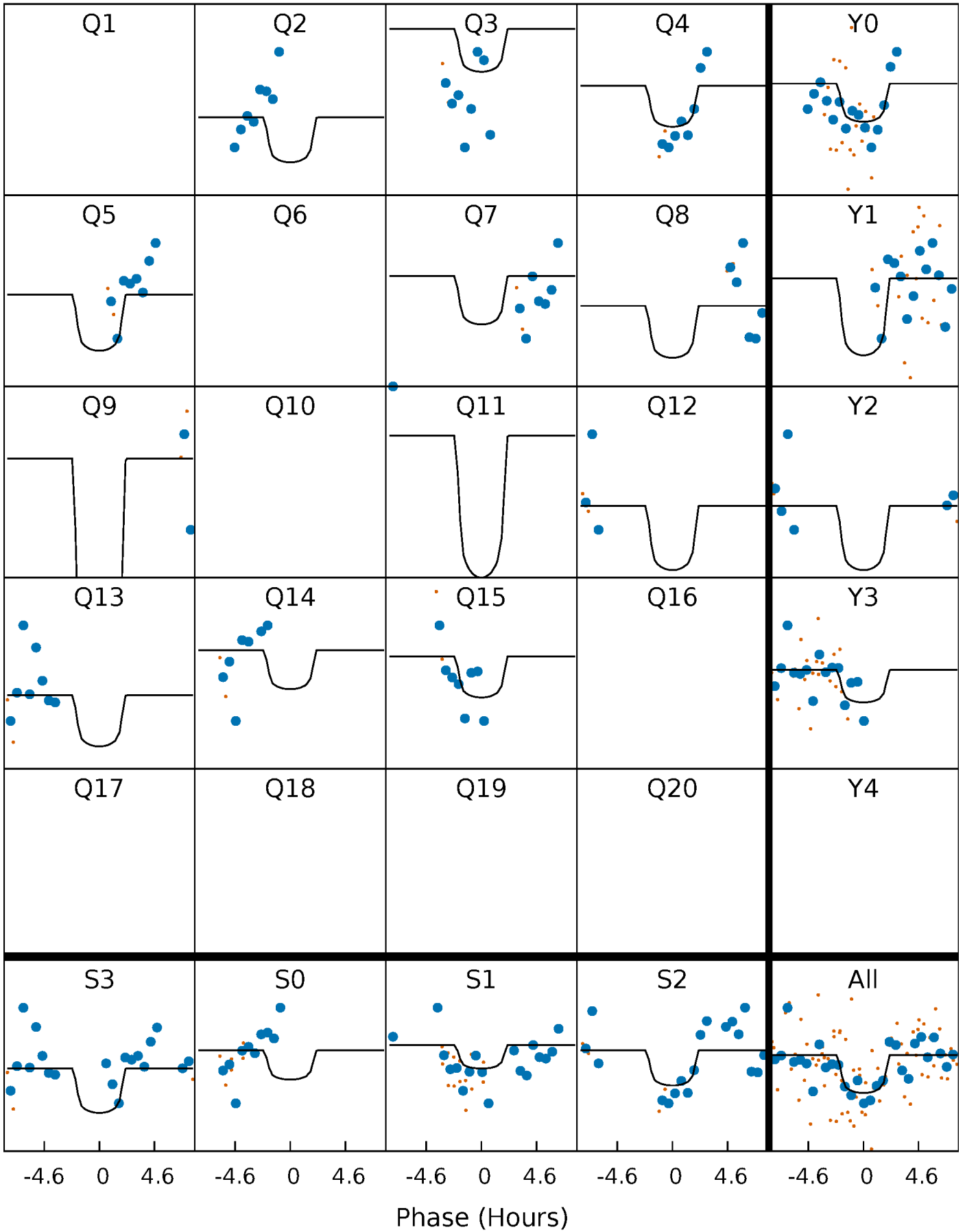
TCE 008052016-05   P= 37.315026 Days    $T_0=162.366643$  (BKJD)





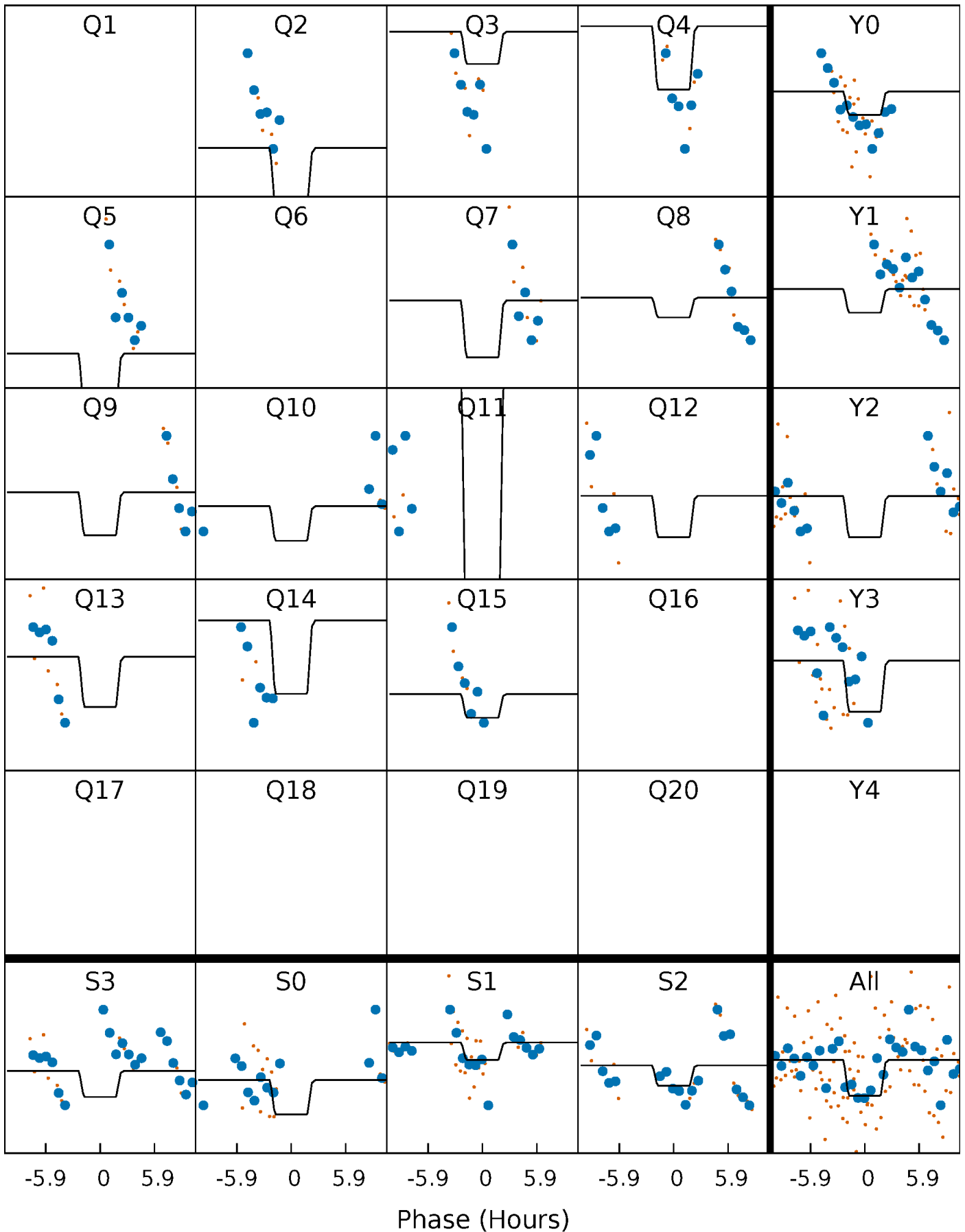
# DV Quarter-Phased Transit Curves

TCE 008052016-05   P= 37.315026 Days    $T_0=162.366643$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

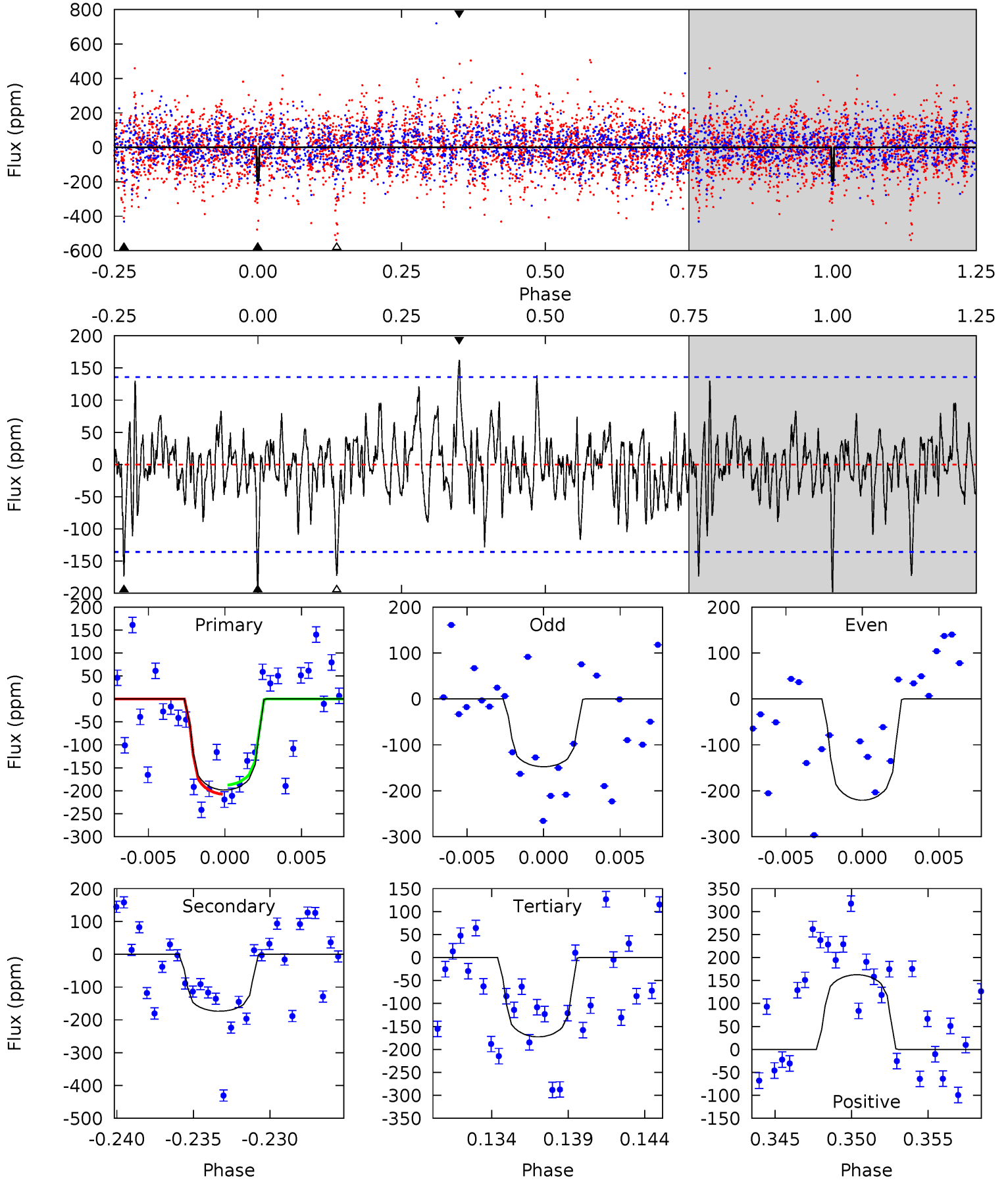
TCE 008052016-05 P= 37.314697 Days  $T_0=162.372449$  (BKJD)



# DV Model-Shift Uniqueness Test

008052016-05, P = 37.315026 Days, E = 125.051617 Days

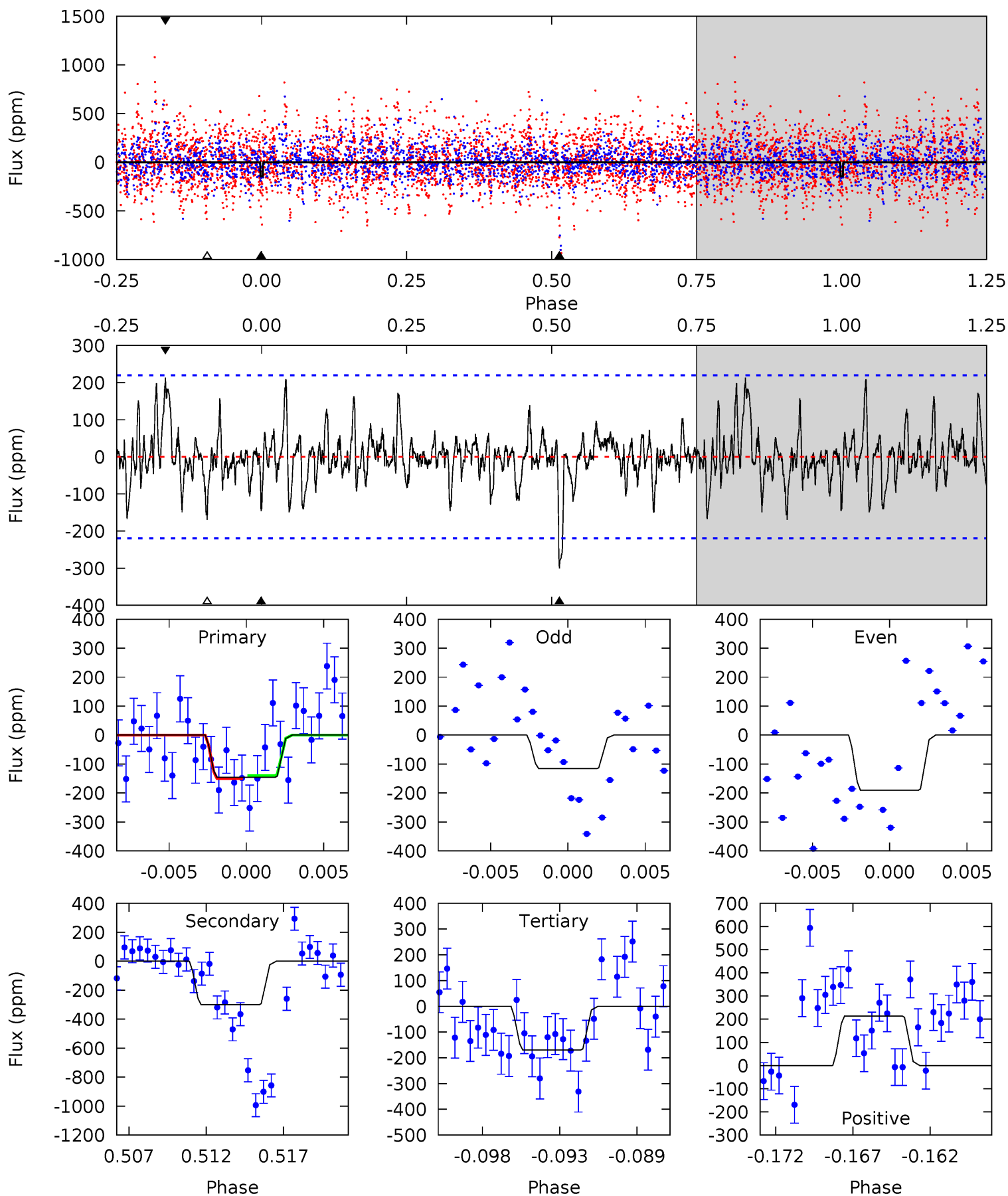
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.54	6.60	6.56	6.17	5.17	2.82	1.64	0.98	1.37	0.04	0.43	1.41	0.66	0.45	0.39



# Alt Model-Shift Uniqueness Test

008052016-05, P = 37.314697 Days, E = 125.057752 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
3.42	7.06	3.99	5.00	5.16	2.81	1.35	-0.56	-1.58	3.07	2.06	0.86	0.81	0.41	0.12



### Stellar Parameters For KIC 008052016

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6212^{+171}_{-171}$	$3.897^{+0.300}_{-0.100}$	$-0.340^{+0.350}_{-0.300}$	$1.989^{+0.418}_{-0.628}$	$1.138^{+0.225}_{-0.184}$	$0.204^{+0.380}_{-0.074}$
	+3%/-3%	+8%/-3%	+103%/-88%	+21%/-32%	+20%/-16%	+187%/-36%
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 008052016-05 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-174 \pm 26$	$4.00^{+3.68}_{-2.66}$	$1109^{+70}_{-92}$	$5173^{+4254}_{-1184}$	$313^{+2501}_{-230}$
Alt.	$-301 \pm 43$	$4.04^{+3.81}_{-2.62}$	$1110^{+68}_{-96}$	$5784^{+5239}_{-1386}$	$522^{+3753}_{-383}$

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

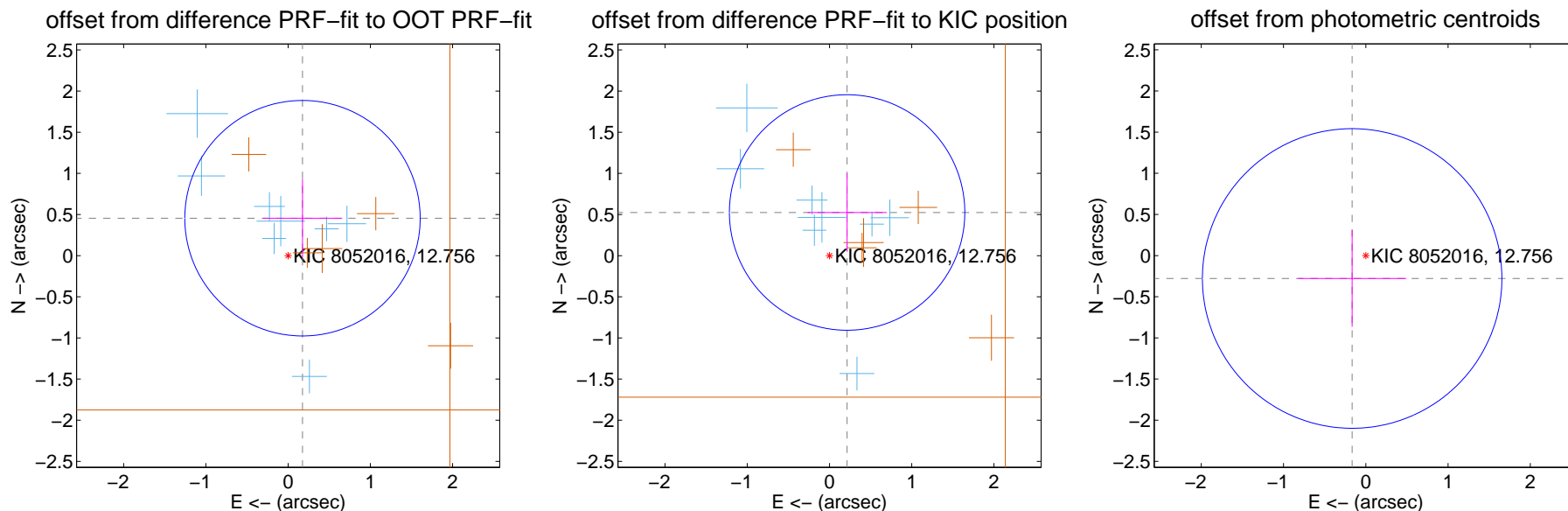
## DV Centroid Data

Supplemental centroid analysis for 008052016-05. Kepler magnitude: 12.76. Transit SNR 7.80

There are 8 quarters with good PRF difference image offsets

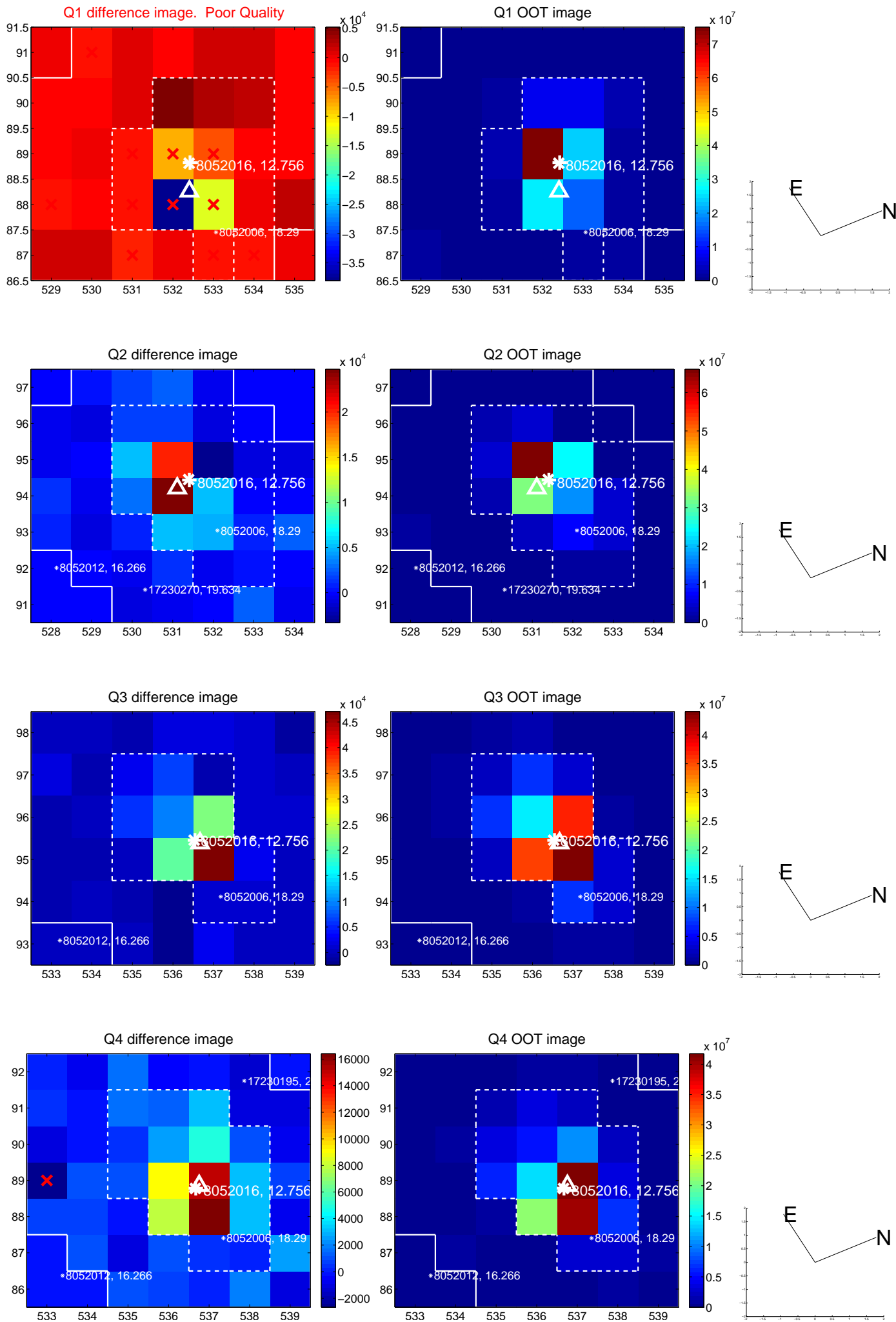
The direct PRF centroid is offset from the target star catalog position by about 0.09 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.487 \pm 0.477$	1.02	$-0.175 \pm 0.482$	$0.455 \pm 0.476$
PRF-fit source offset from KIC position	$0.567 \pm 0.477$	1.19	$-0.214 \pm 0.482$	$0.525 \pm 0.476$
photometric centroid source offset	$0.32 \pm 0.61$	0.53	$0.17 \pm 0.66$	$-0.28 \pm 0.59$



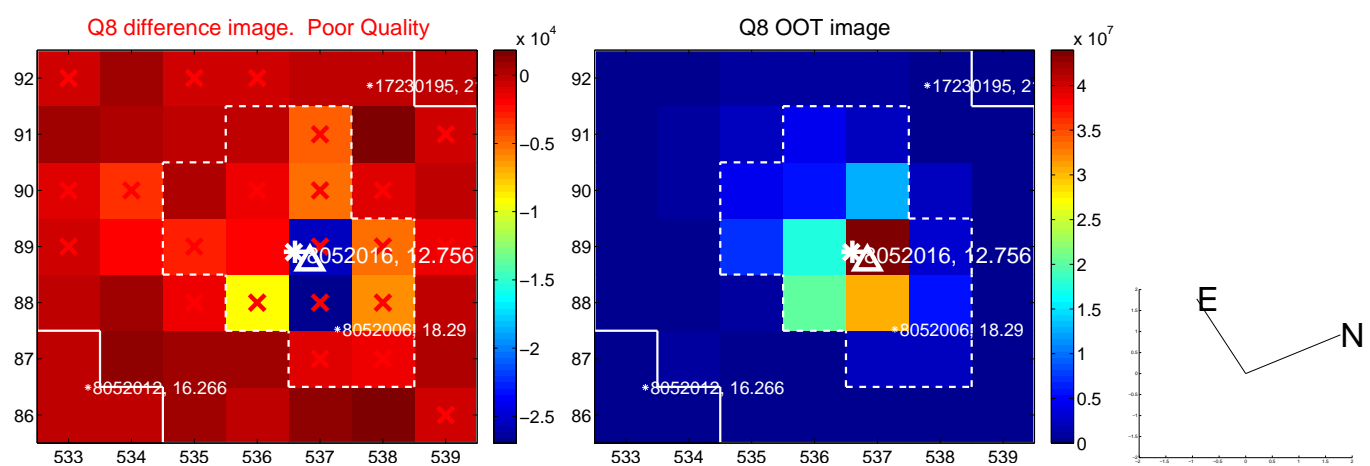
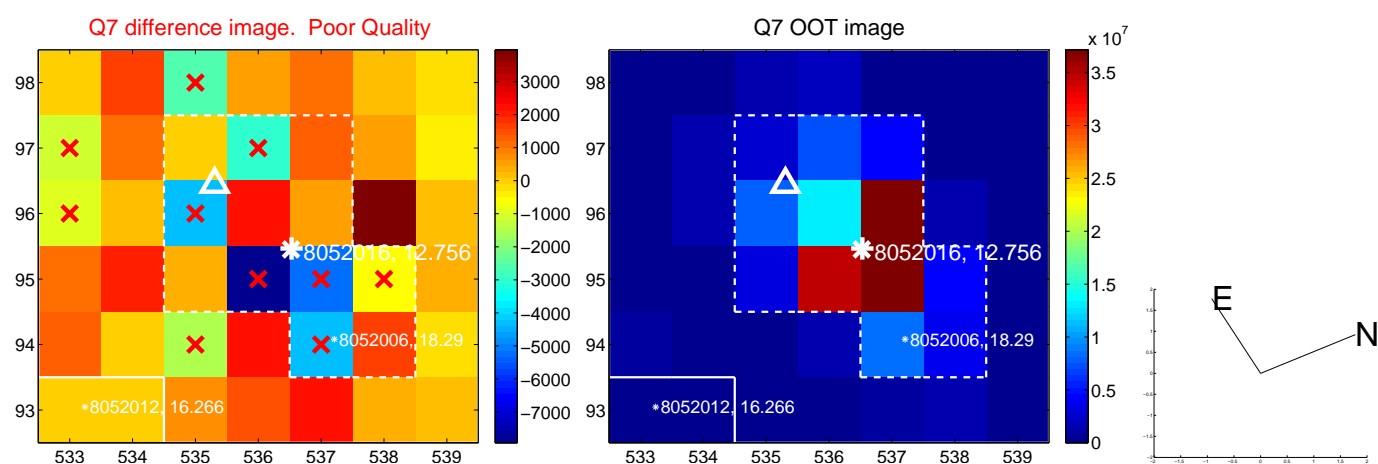
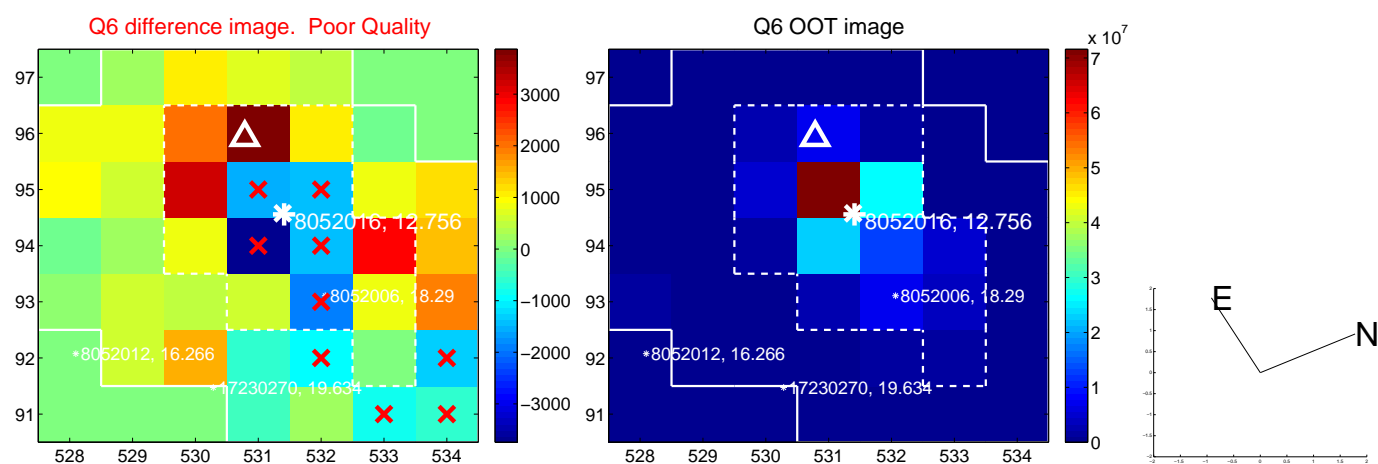
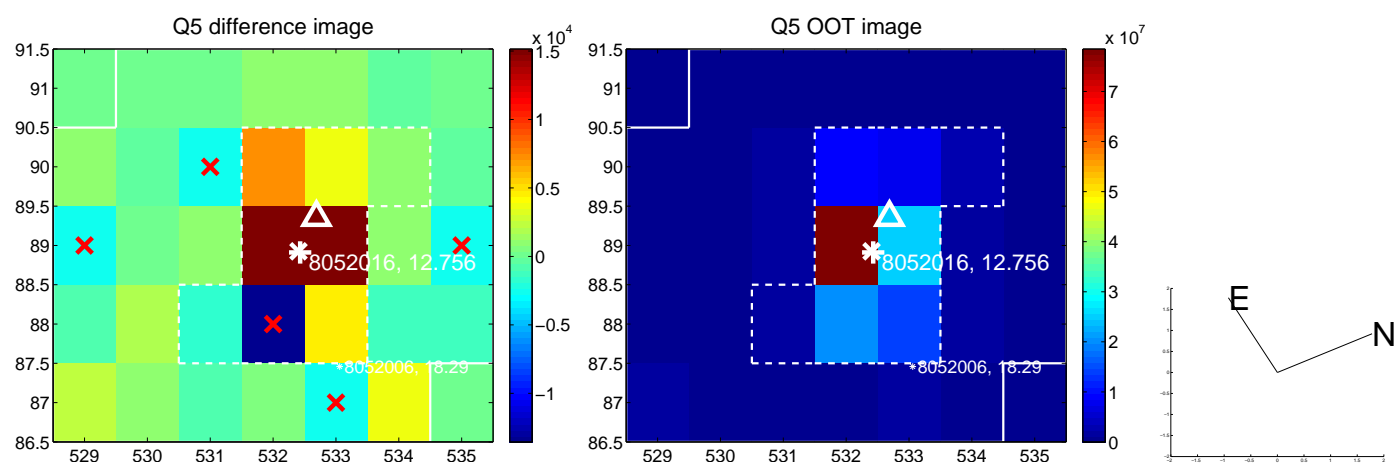
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

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

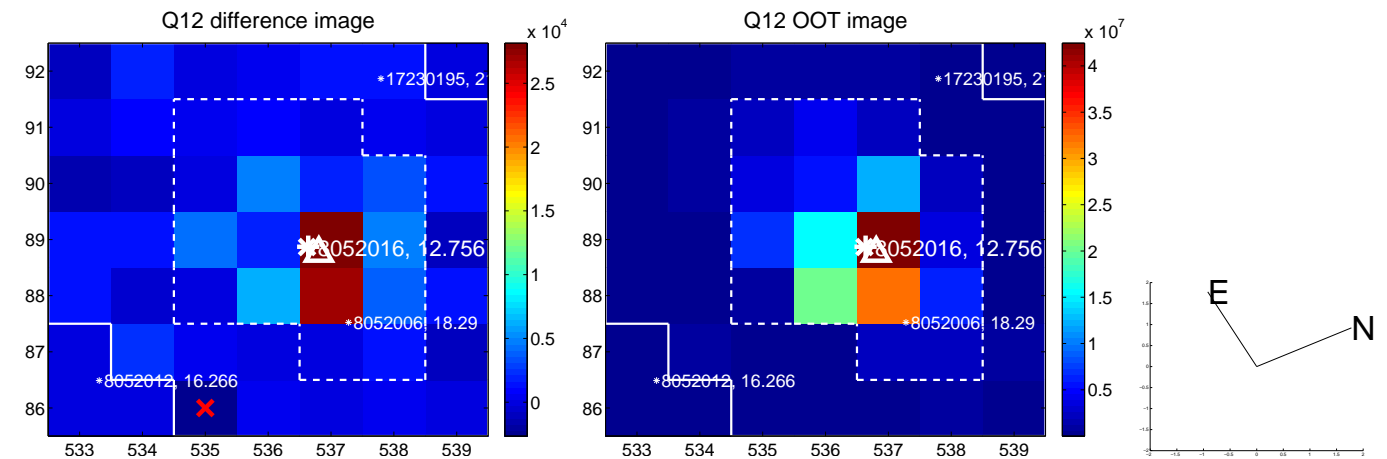
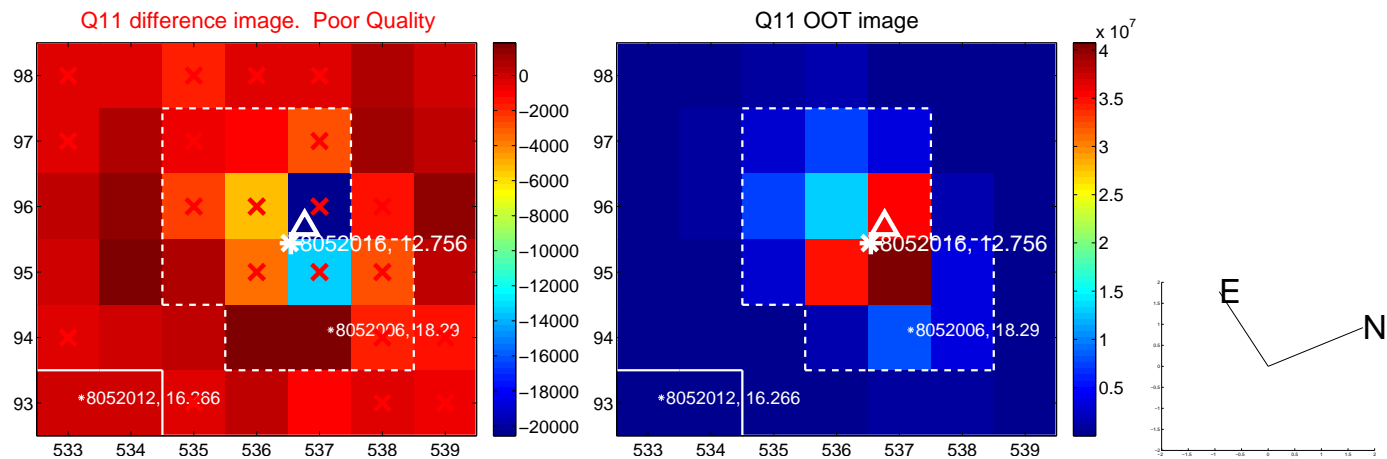
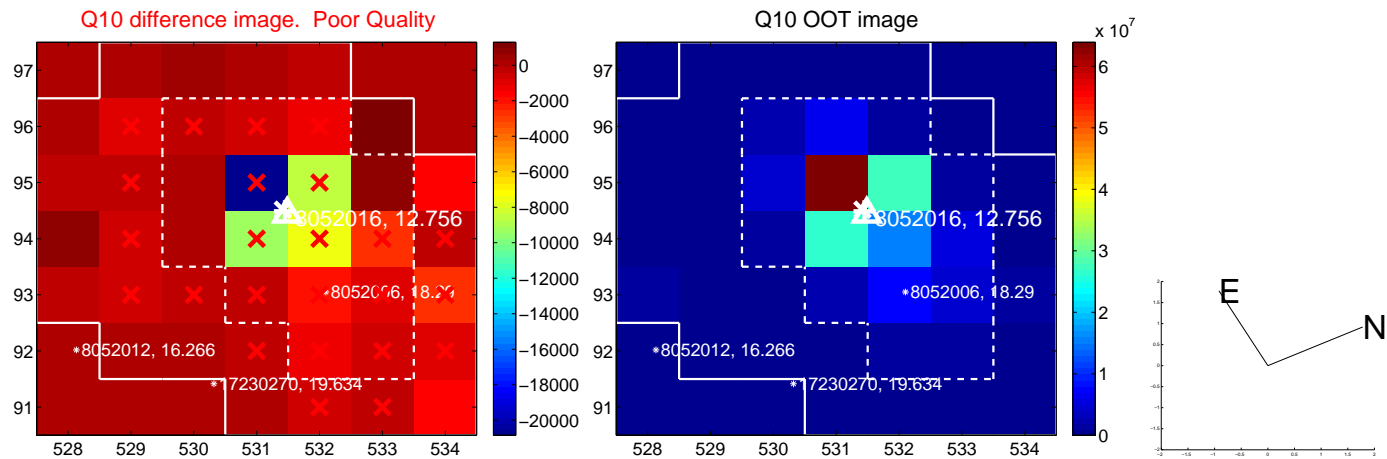
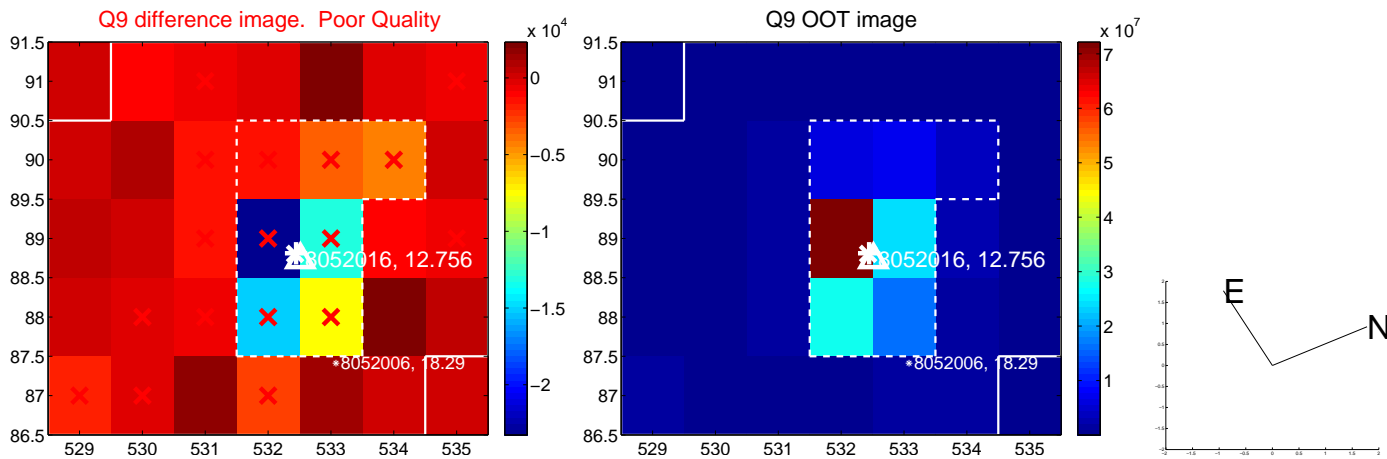




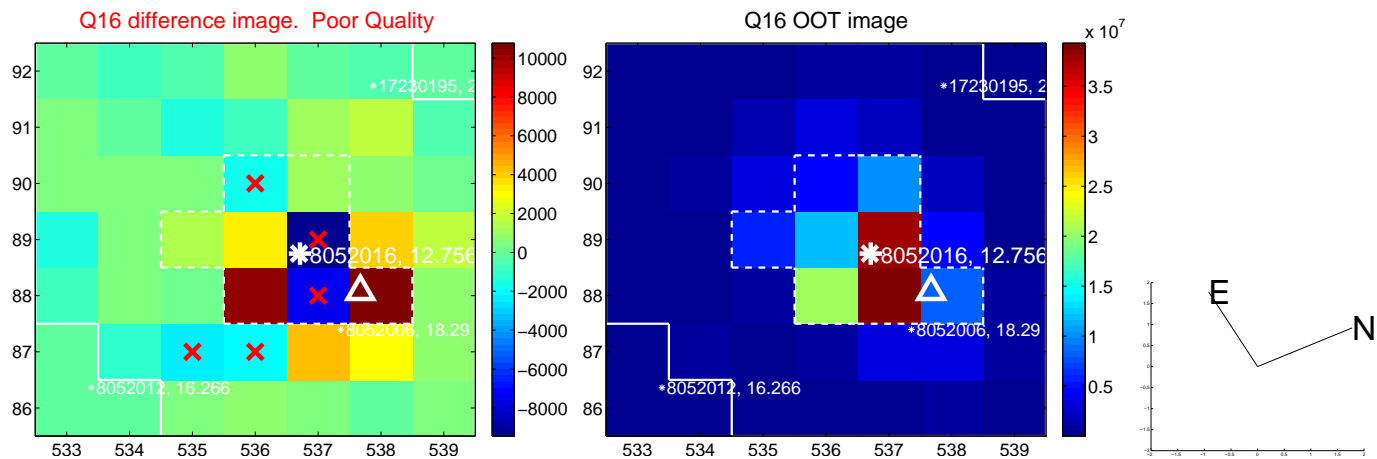
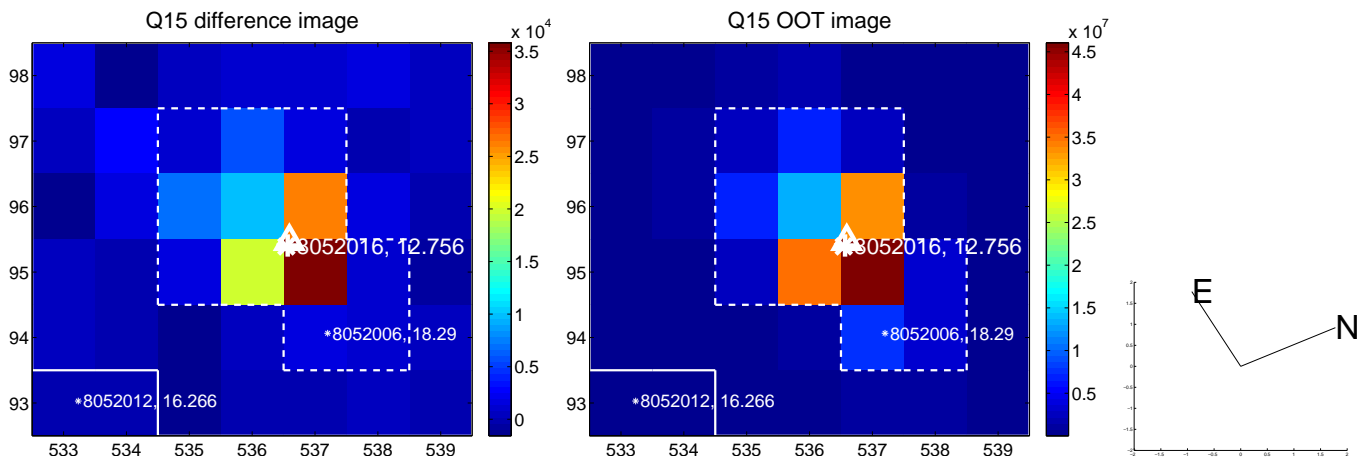
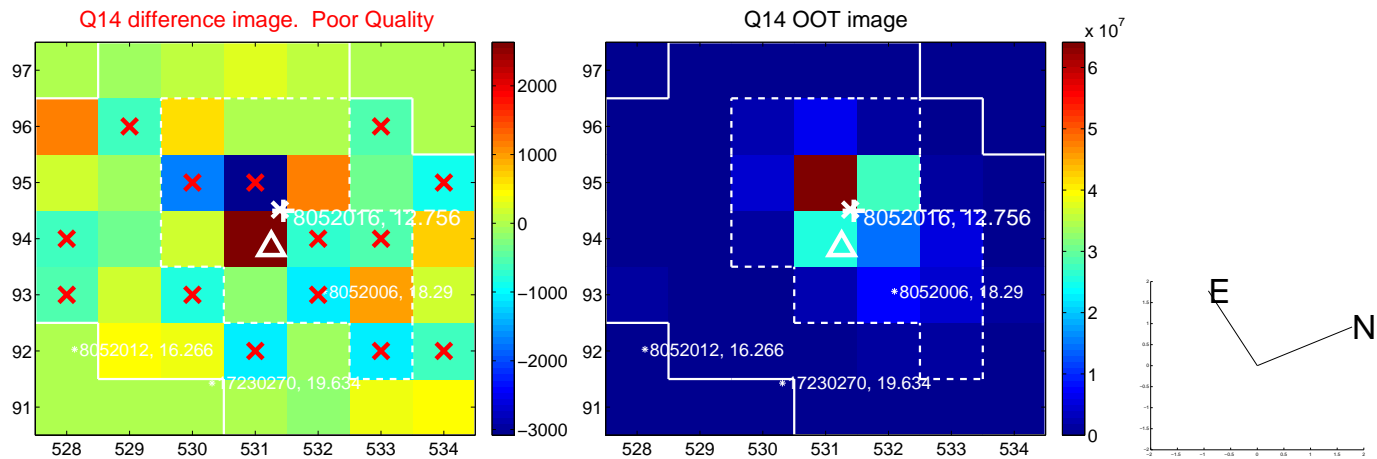
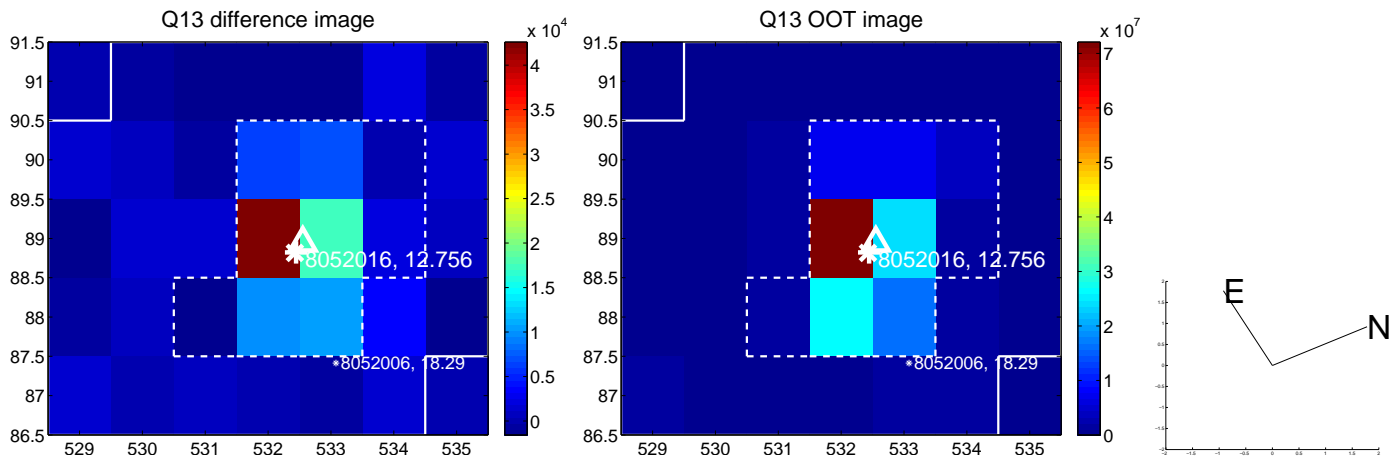
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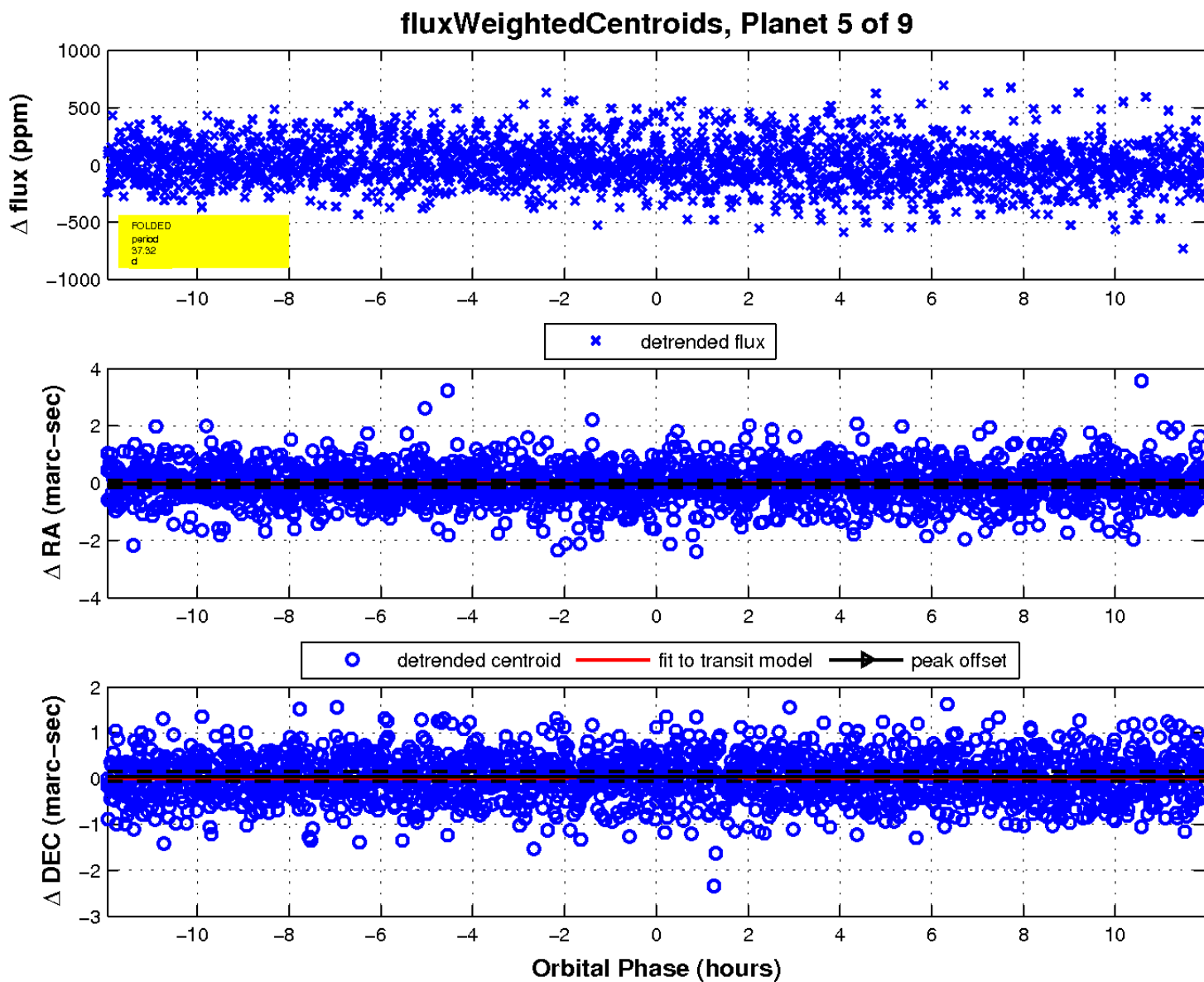
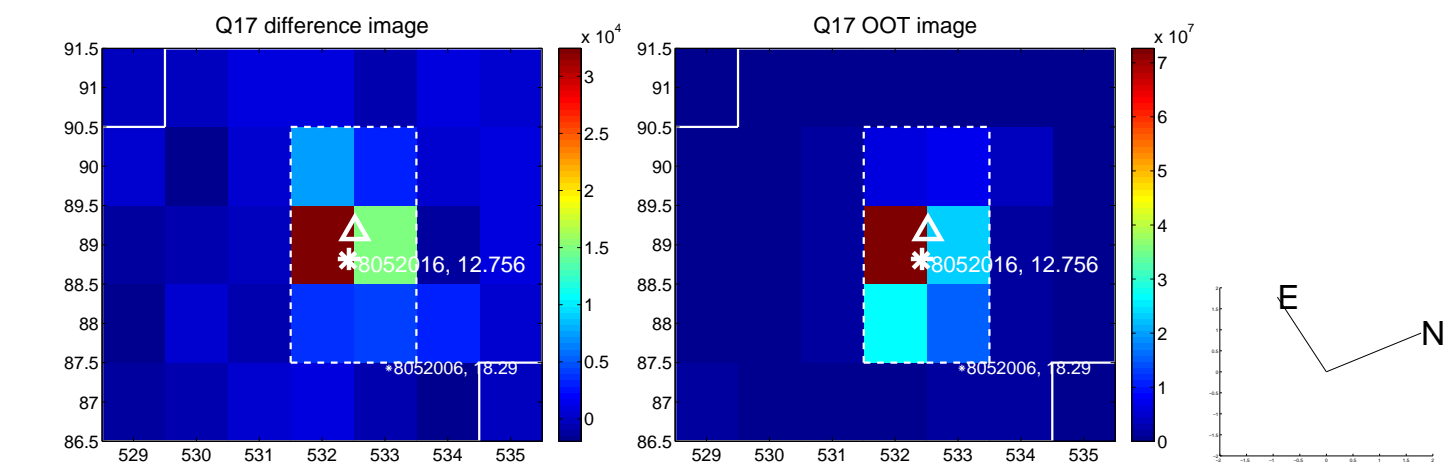
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

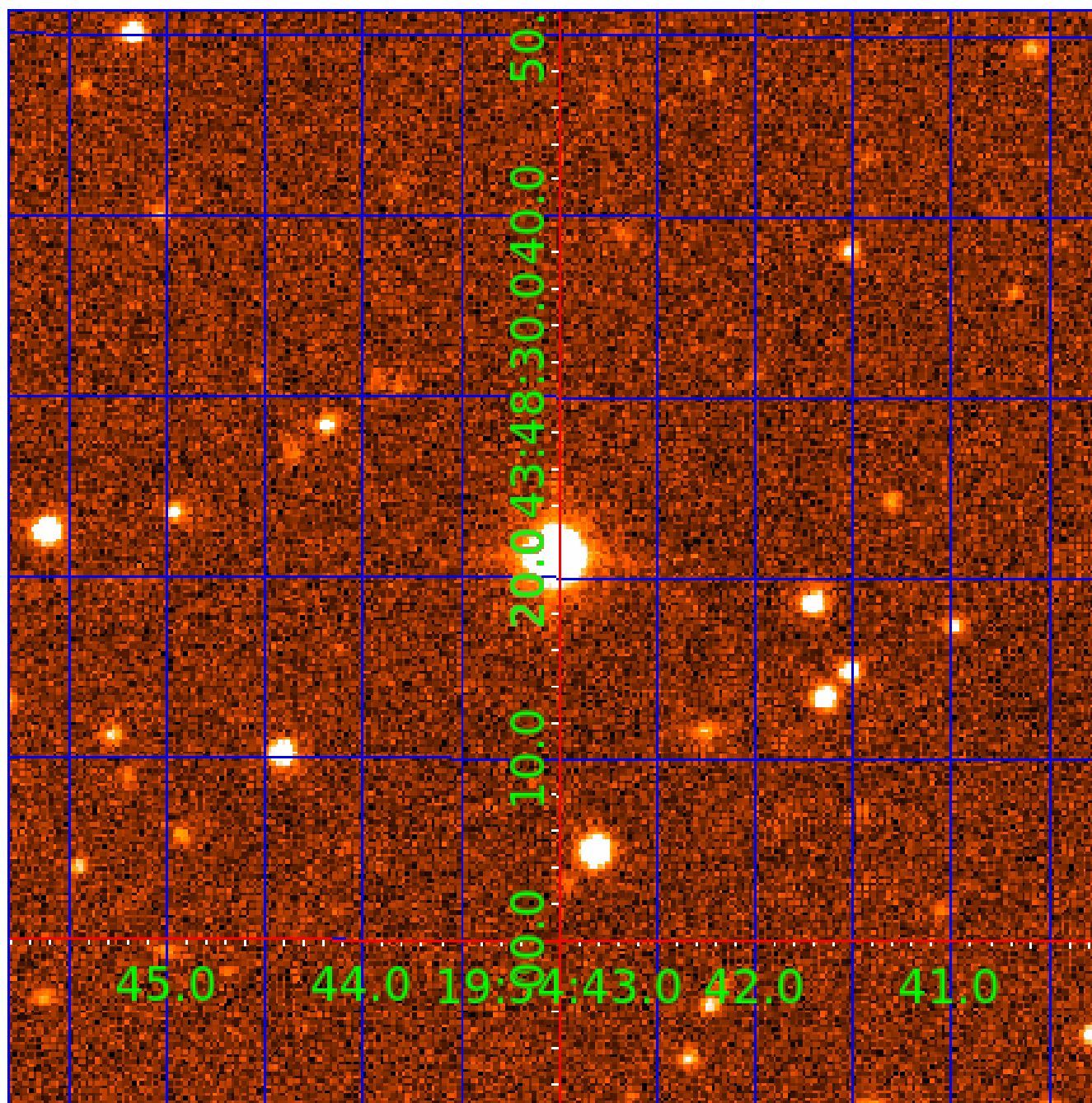


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\Delta$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



## KIC 008052016

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
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008052016-02	OBS	No	67.763122	134.382802	184.4	6.496	25.0	11.1	1.99	6212	3.03	45.73
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008052016-07	OBS	No	39.906683	164.120100	244.5	4.294	9.9	10.4	1.99	6212	3.45	92.65
008052016-08	OBS	No	23.077641	133.725683	160.9	6.368	9.5	9.1	1.99	6212	2.90	192.30
008052016-09	OBS	No	28.929926	143.231572	102.0	5.045	8.8	5.4	1.99	6212	2.28	142.27

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008052016-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV
008052016-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
008052016-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—HALO_GHOST
008052016-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
008052016-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
008052016-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT
008052016-07	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—HALO_GHOST
008052016-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
008052016-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

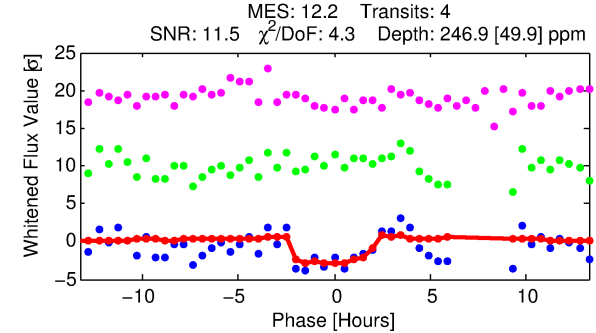
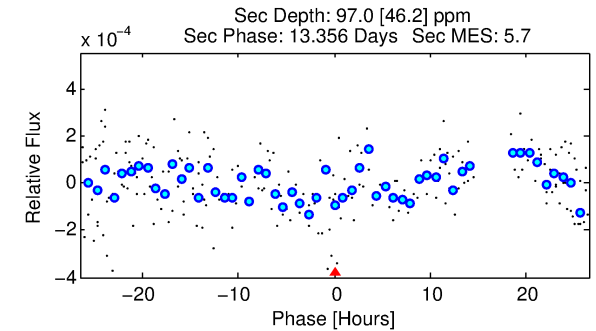
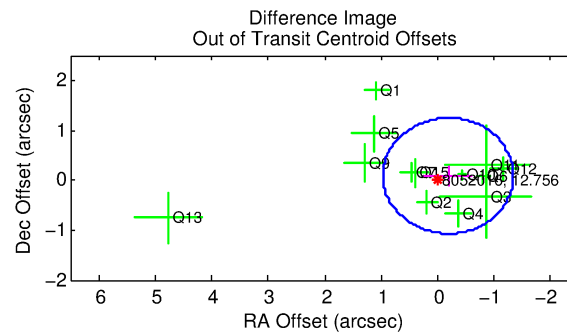
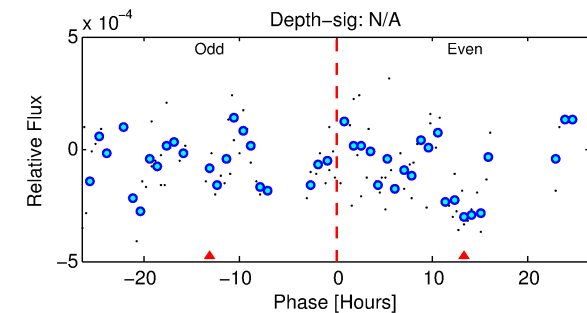
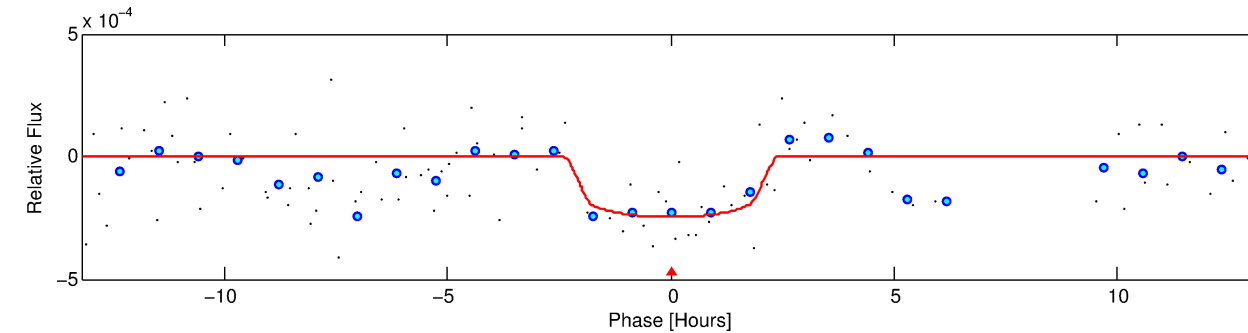
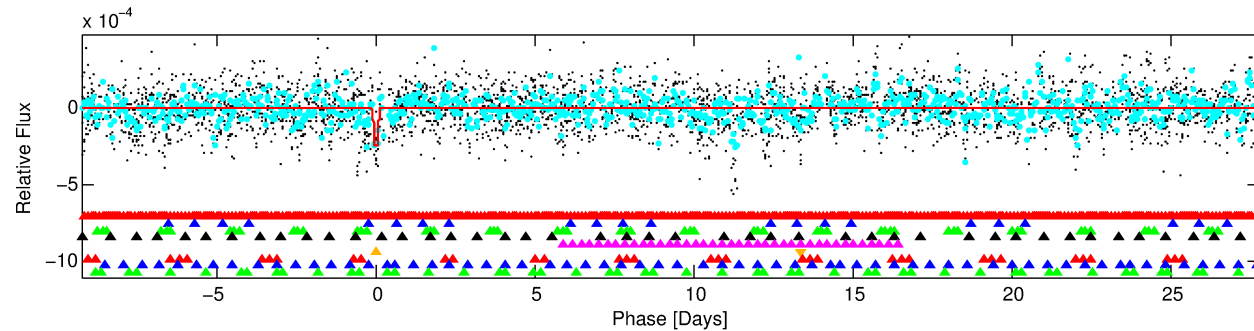
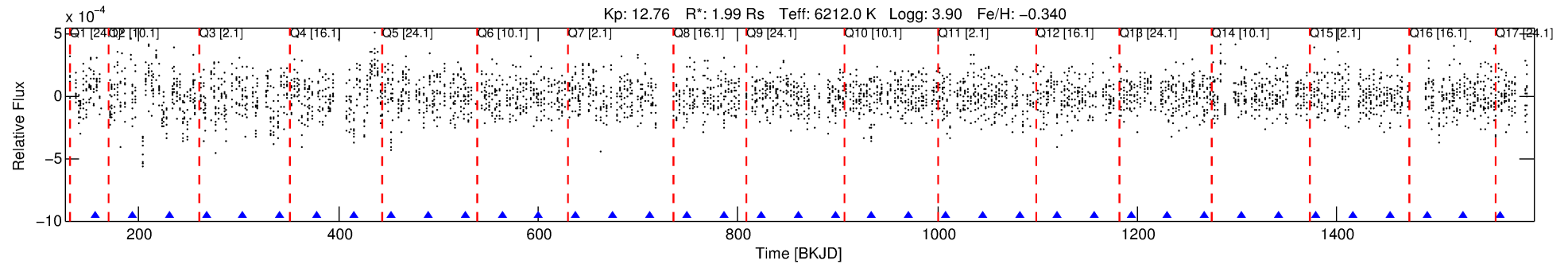
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 008052016-06

No Significant Match Found

# DV One-Page Summary

KIC: 8052016 Candidate: 6 of 9 Period: 37.039 d



## DV Fit Results:

Period = 37.03860 [0.00119] d  
Epoch = 156.4746 [0.0265] BKJD  
Rp/R\* = 0.0159 [0.0158]  
a/R\* = 40.57 [213.26]  
b = 0.80 [2.44]  
Seff = 102.34 [53.03]  
Teq = 811 [105] K  
Rp = 3.45 [3.59] Re  
a = 0.2271 [0.0708] AU  
Ag = 231.41 [486.96] [0.47σ]  
Teffp = 4891 [2501] K [1.63σ]

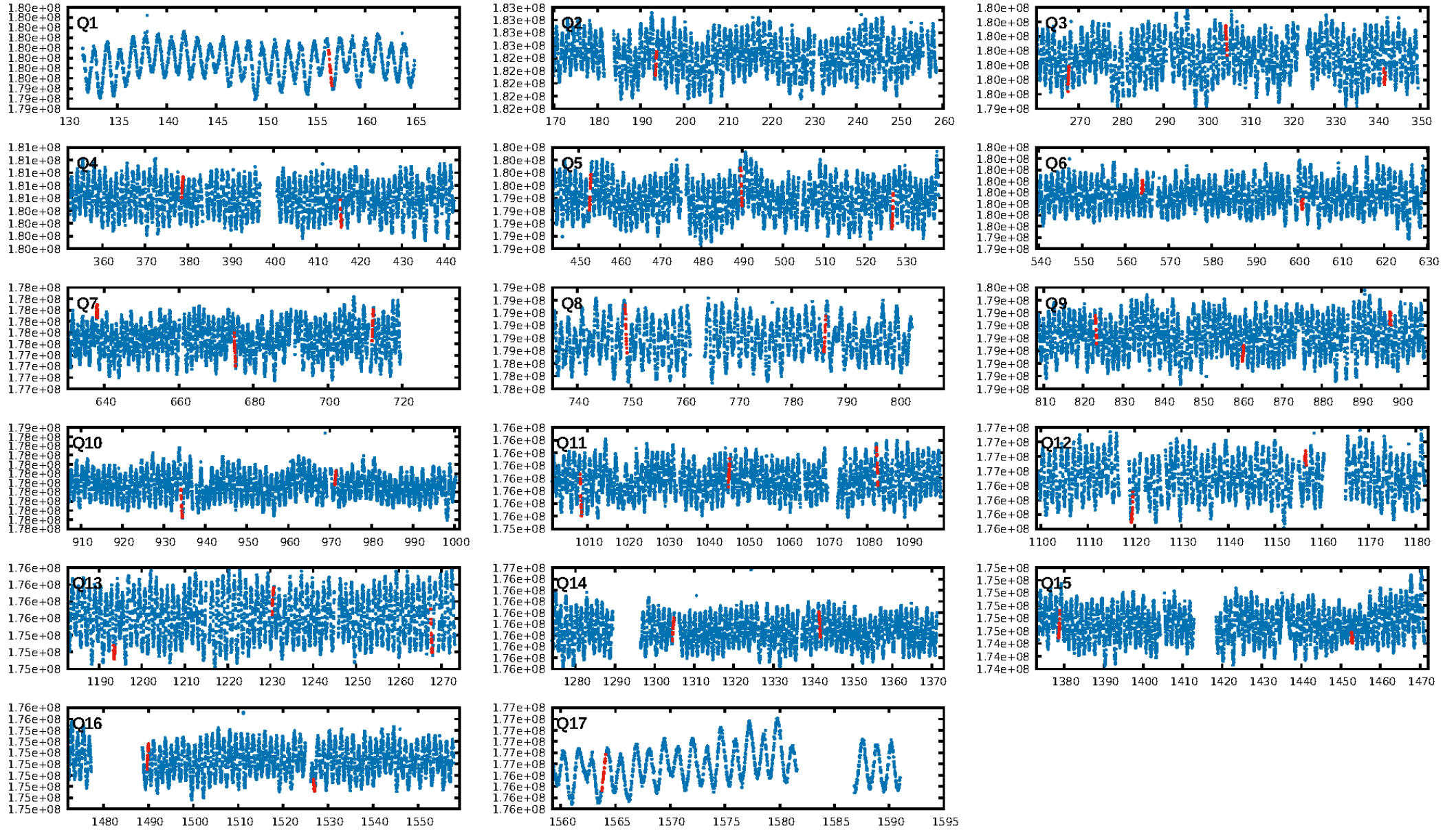
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [14.10σ]  
LongPeriod-sig: 73.5% [1.12σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 28.3%  
Bootstrap-pfa: 1.34e-10  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: -1.116  
Centroid-sig: 30.7%  
Centroid-so: 0.296 arcsec [0.72σ]  
OotOffset-rm: 0.203 arcsec [0.53σ]  
OotOffset-st: 3/4/2/4 [13]  
KicOffset-rm: 0.315 arcsec [0.82σ]  
KicOffset-st: 3/4/2/4 [13]  
DiffImageQuality-fgm: 0.69 [9/13]  
DiffImageOverlap-fno: 0.31 [5/16]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 23:13:45 Z

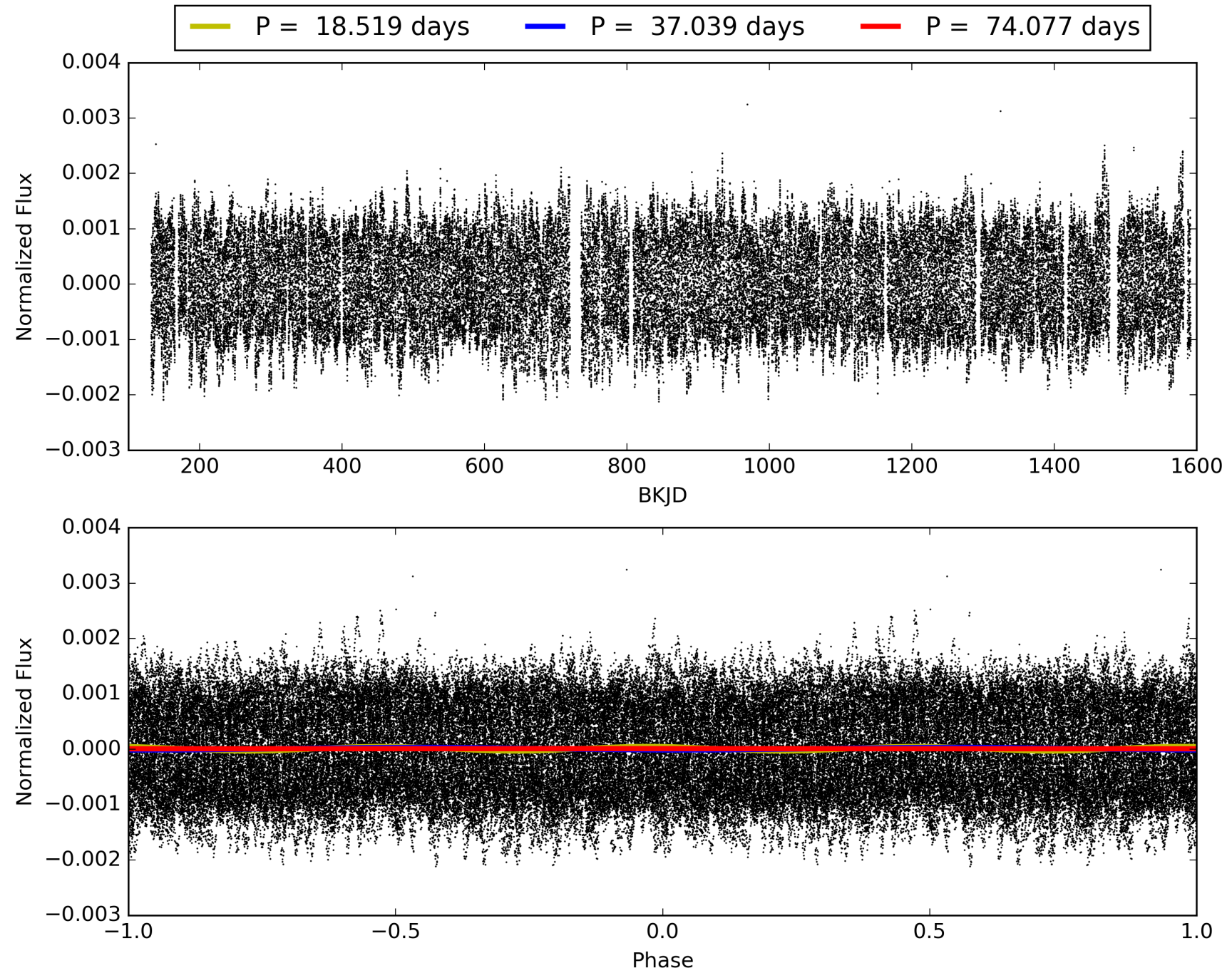
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 008052016-06, PDC Light Curves



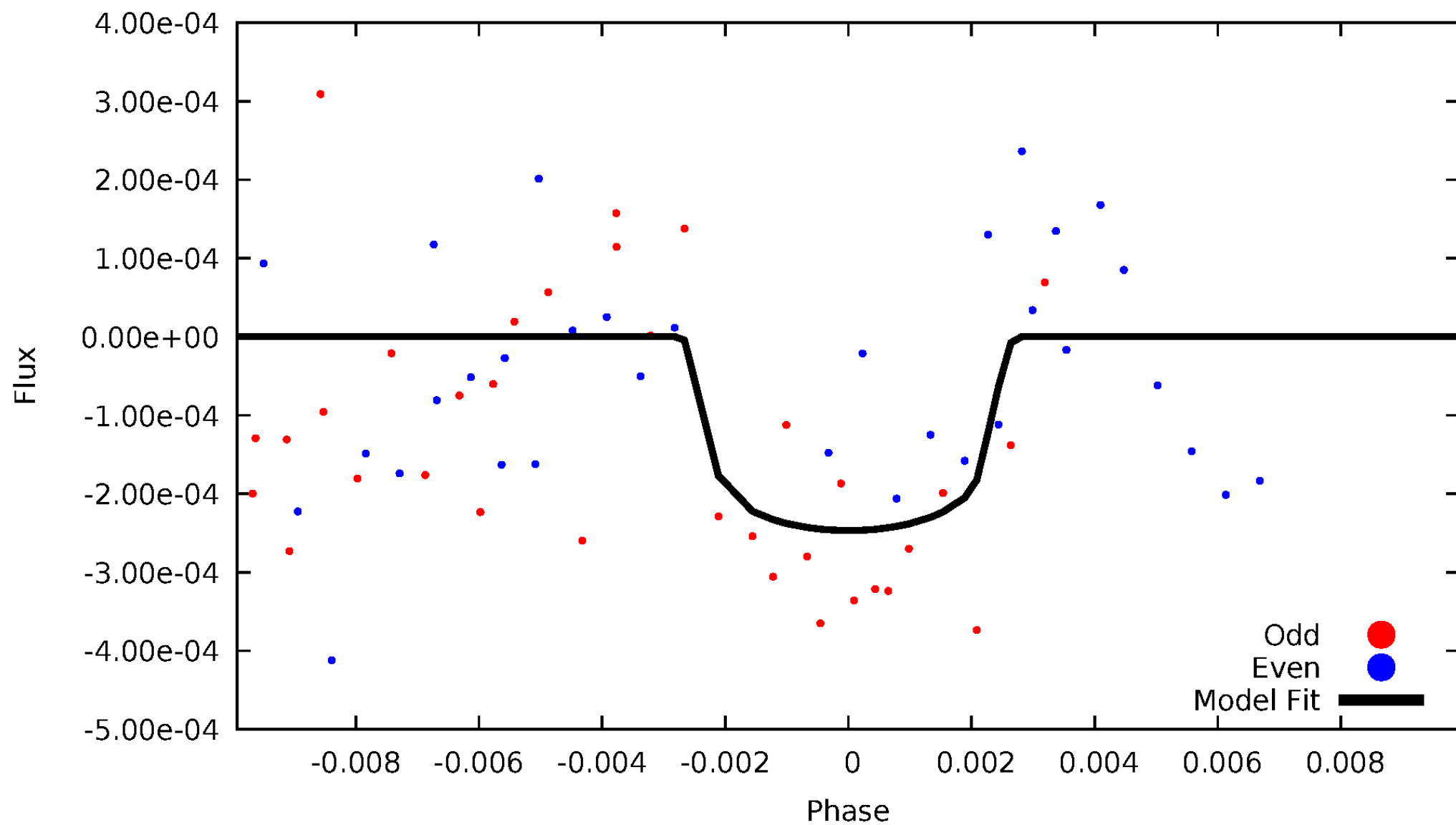


TCE 008052016-06



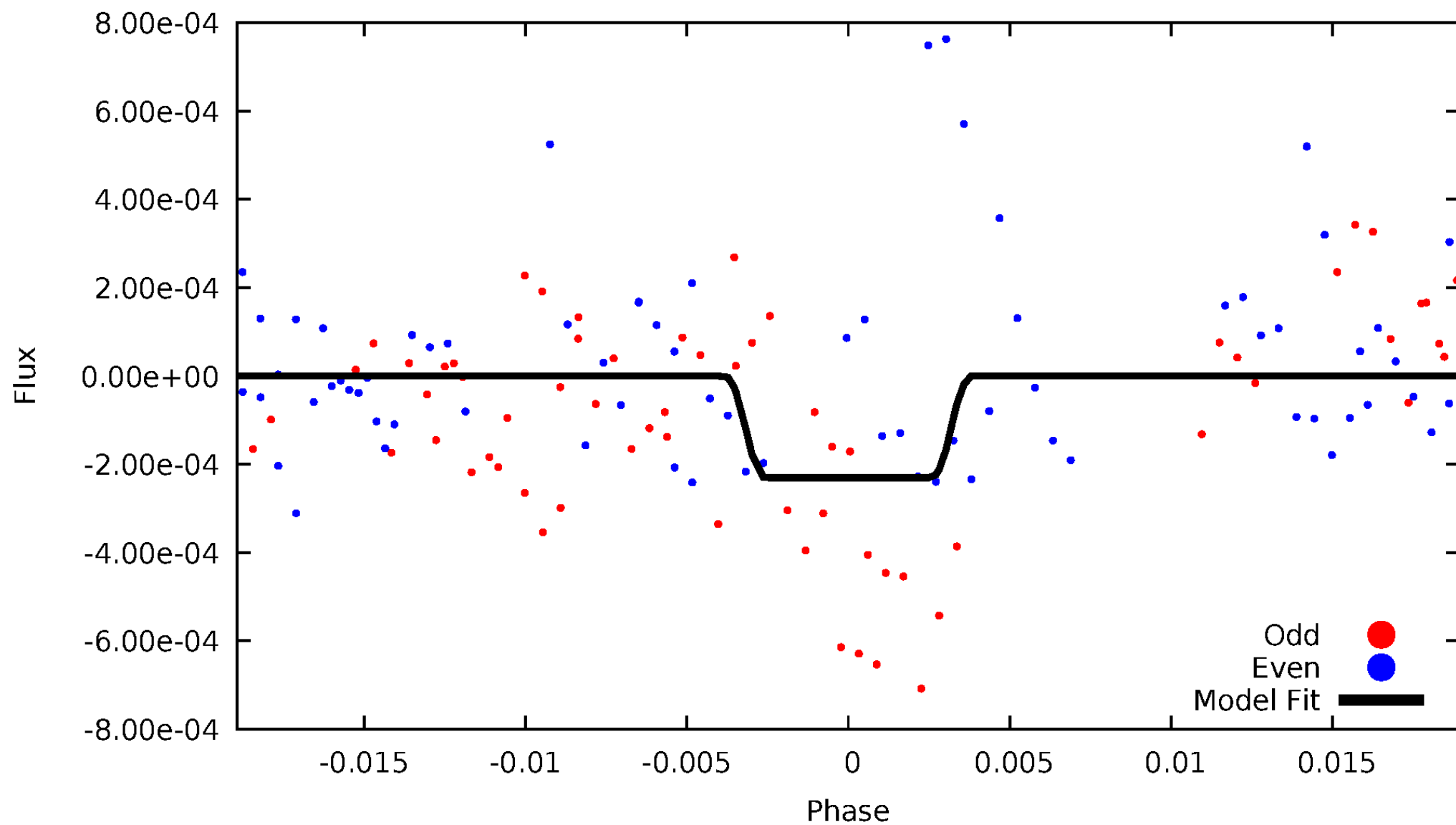
# DV Odd/Even

TCE 008052016-06



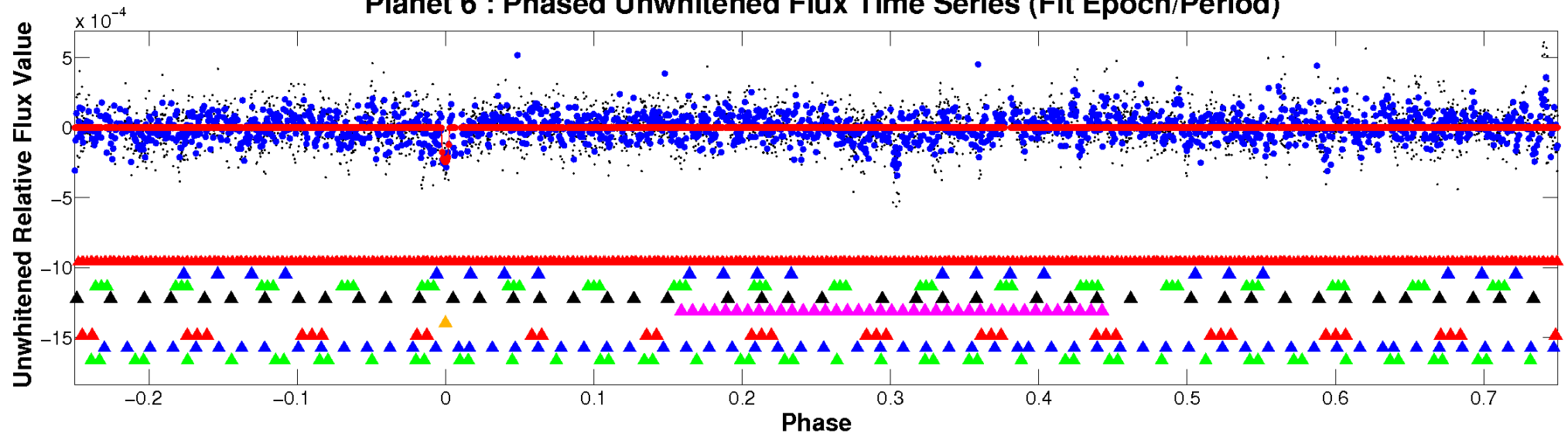
# ALT Odd/Even

TCE 008052016-06

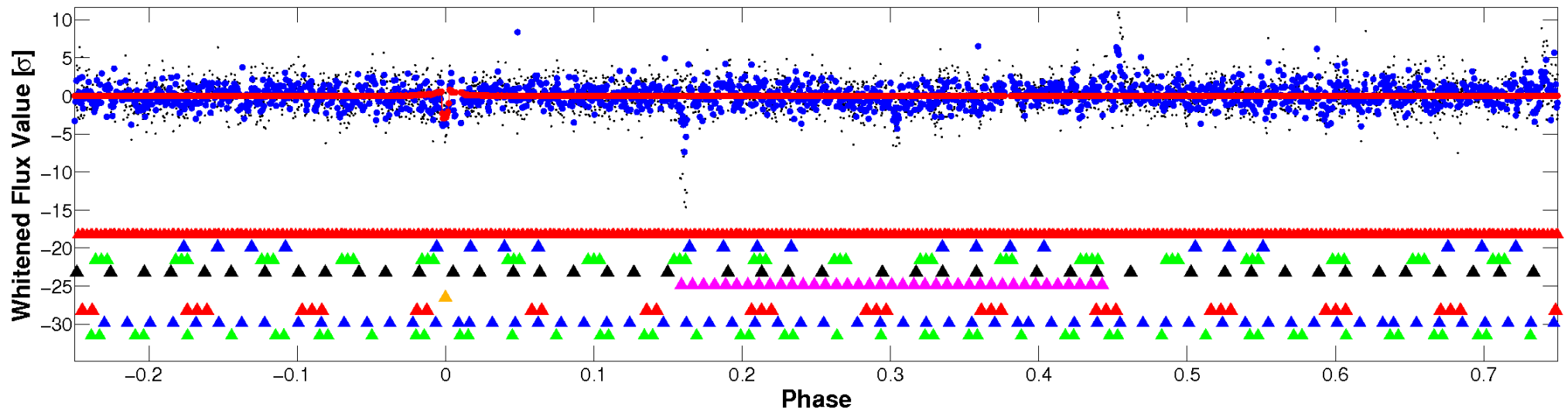


# Non-Whitened Vs. Whitened Light Curve

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

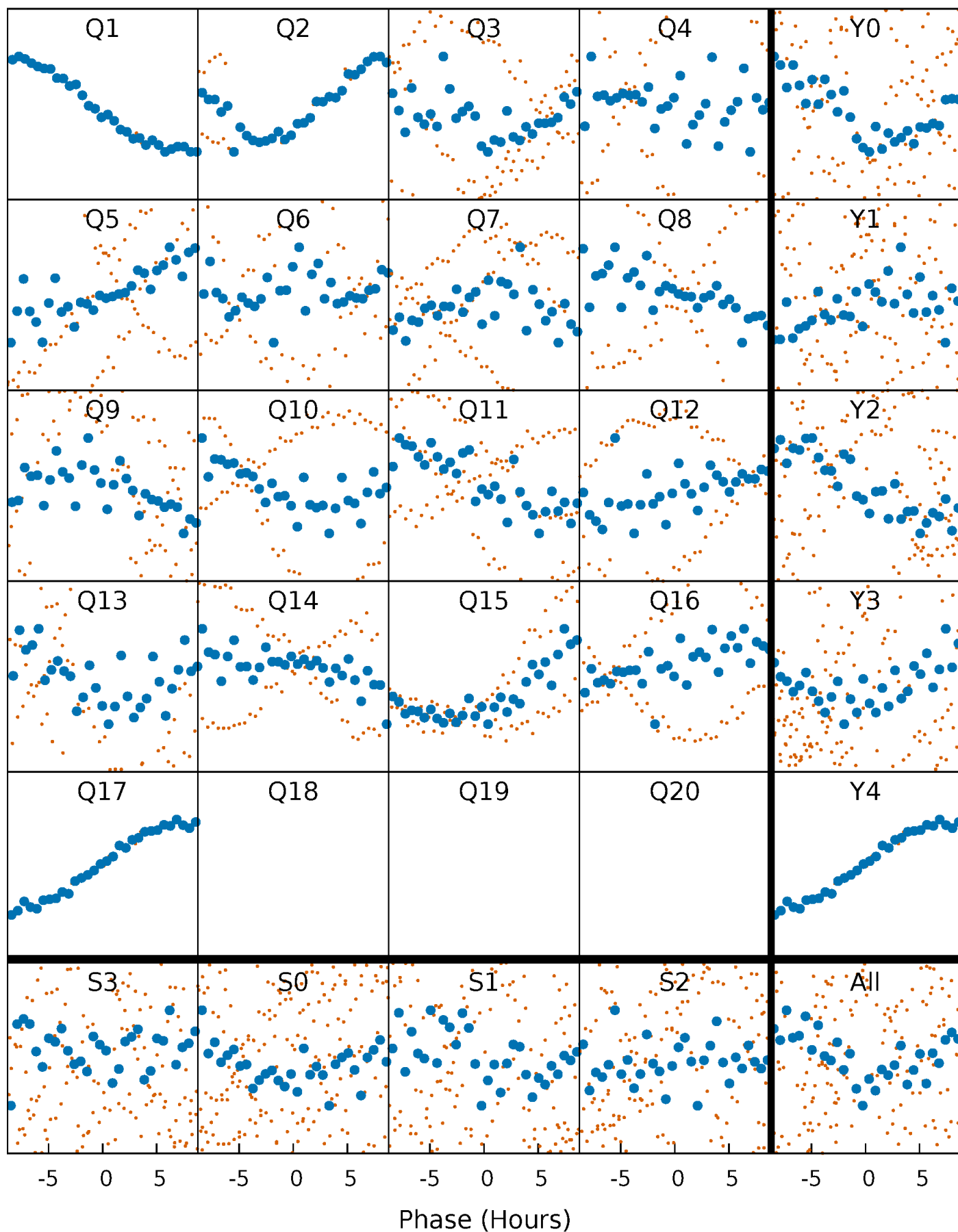


## Planet 6 : Phased Whitened Flux Time Series (Fit Epoch/Period)



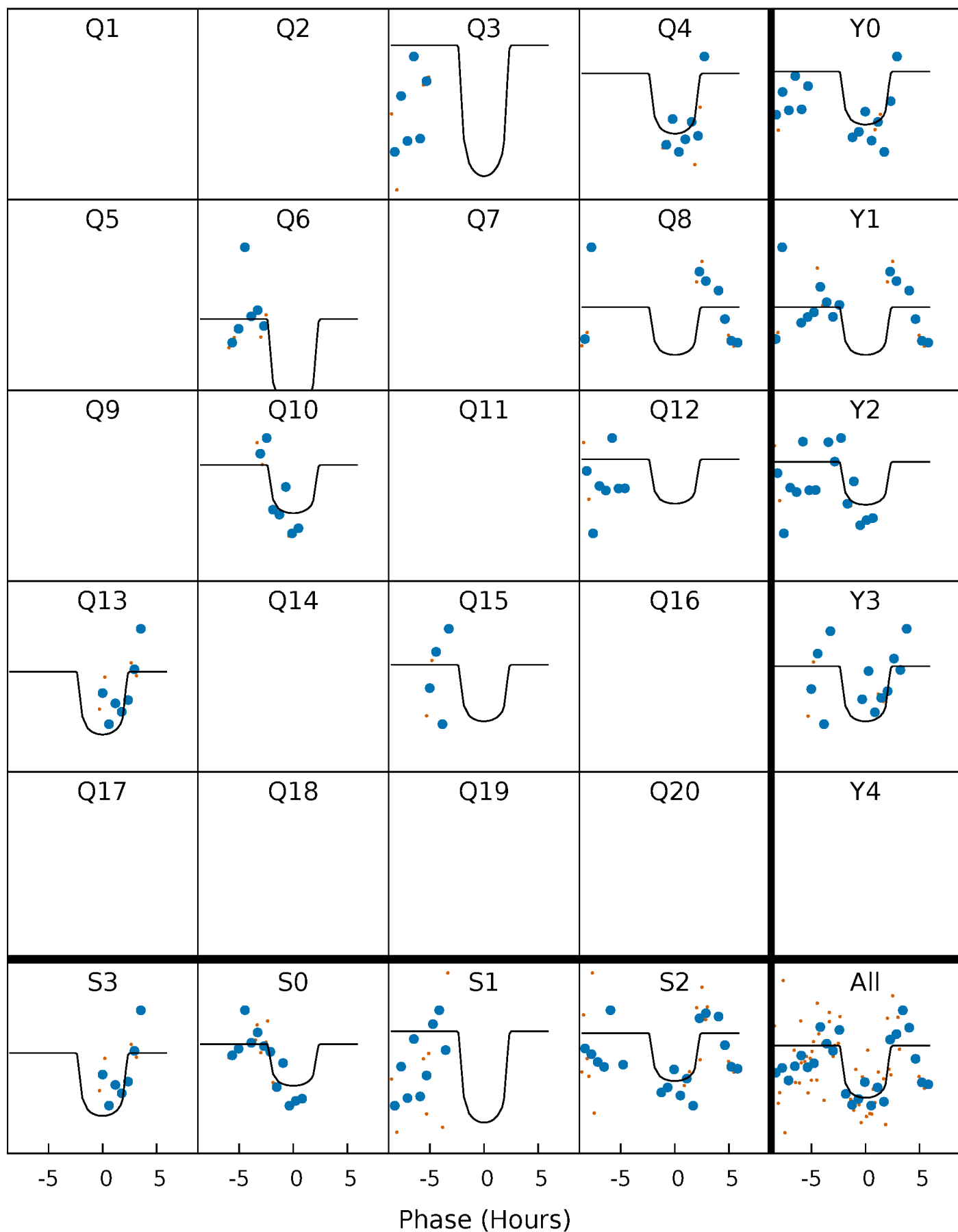
# PDC Quarter-Phased Transit Curves

TCE 008052016-06 P= 37.038602 Days  $T_0=156.474640$  (BKJD)



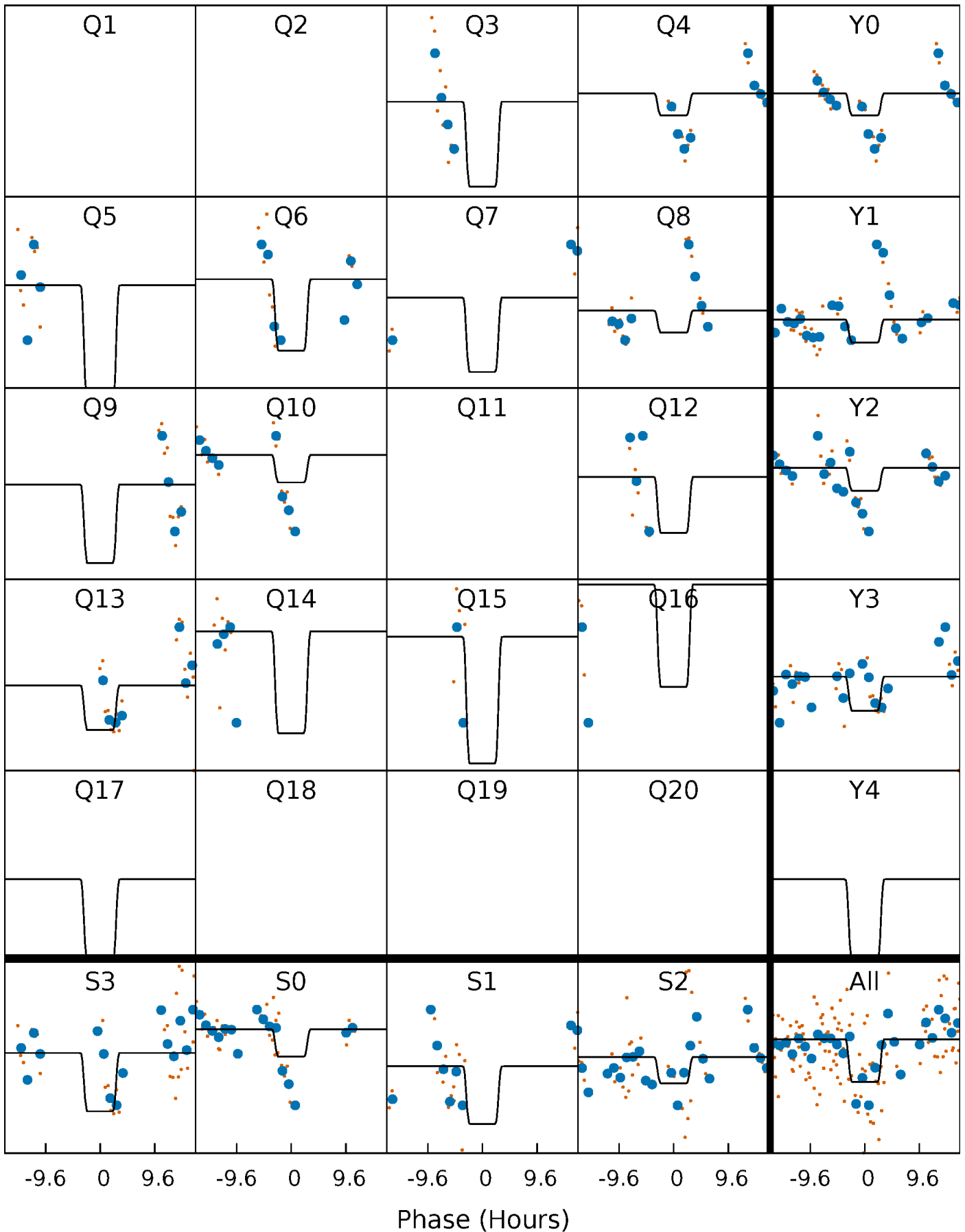
# DV Quarter-Phased Transit Curves

TCE 008052016-06 P= 37.038602 Days  $T_0=156.474640$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

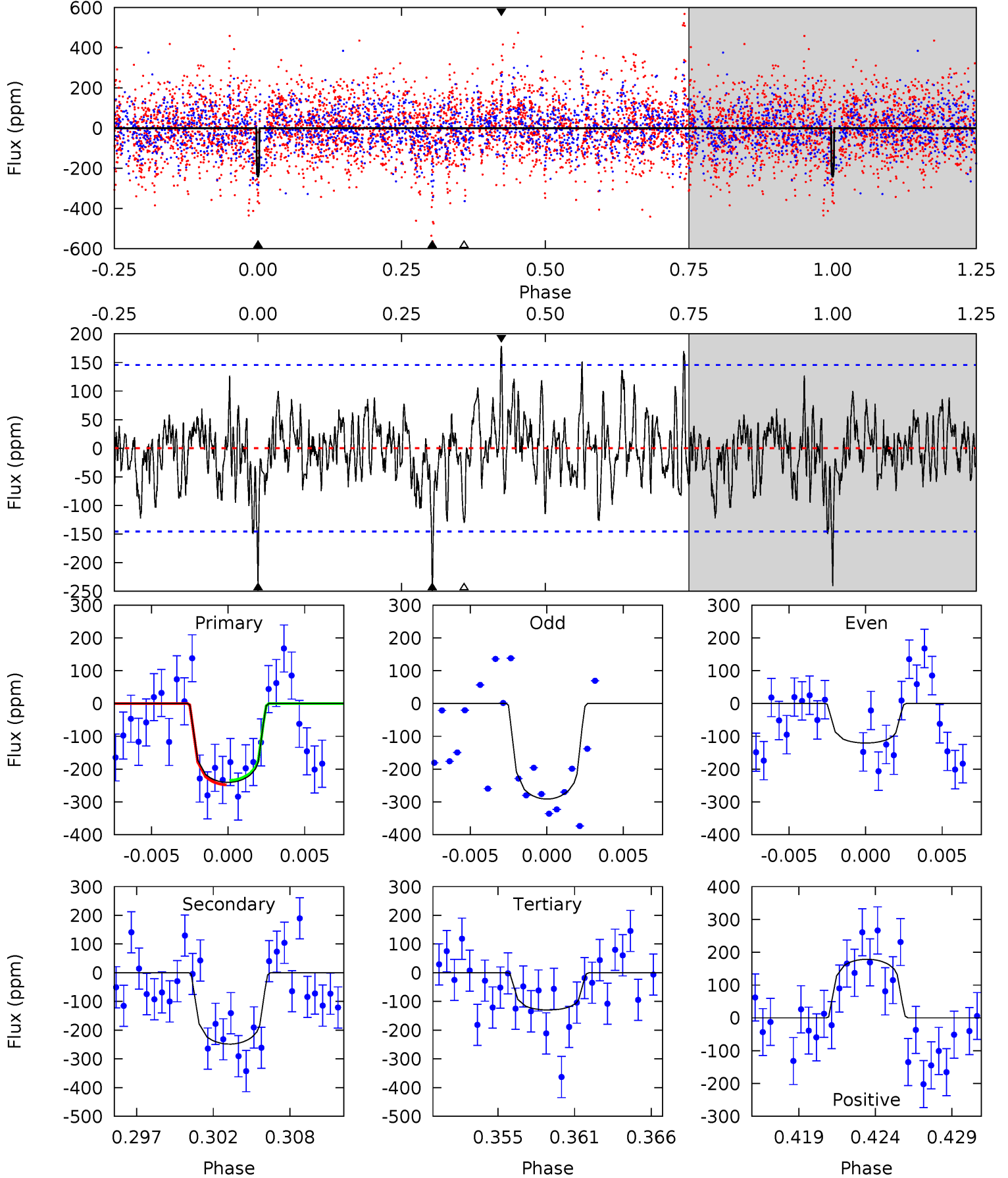
TCE 008052016-06 P= 37.038447 Days  $T_0=156.469382$  (BKJD)



# DV Model-Shift Uniqueness Test

008052016-06, P = 37.038602 Days, E = 119.436038 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
8.50	8.79	4.59	6.32	5.15	2.79	1.72	3.92	2.19	4.20	2.47	2.88	0.83	0.42	0.23

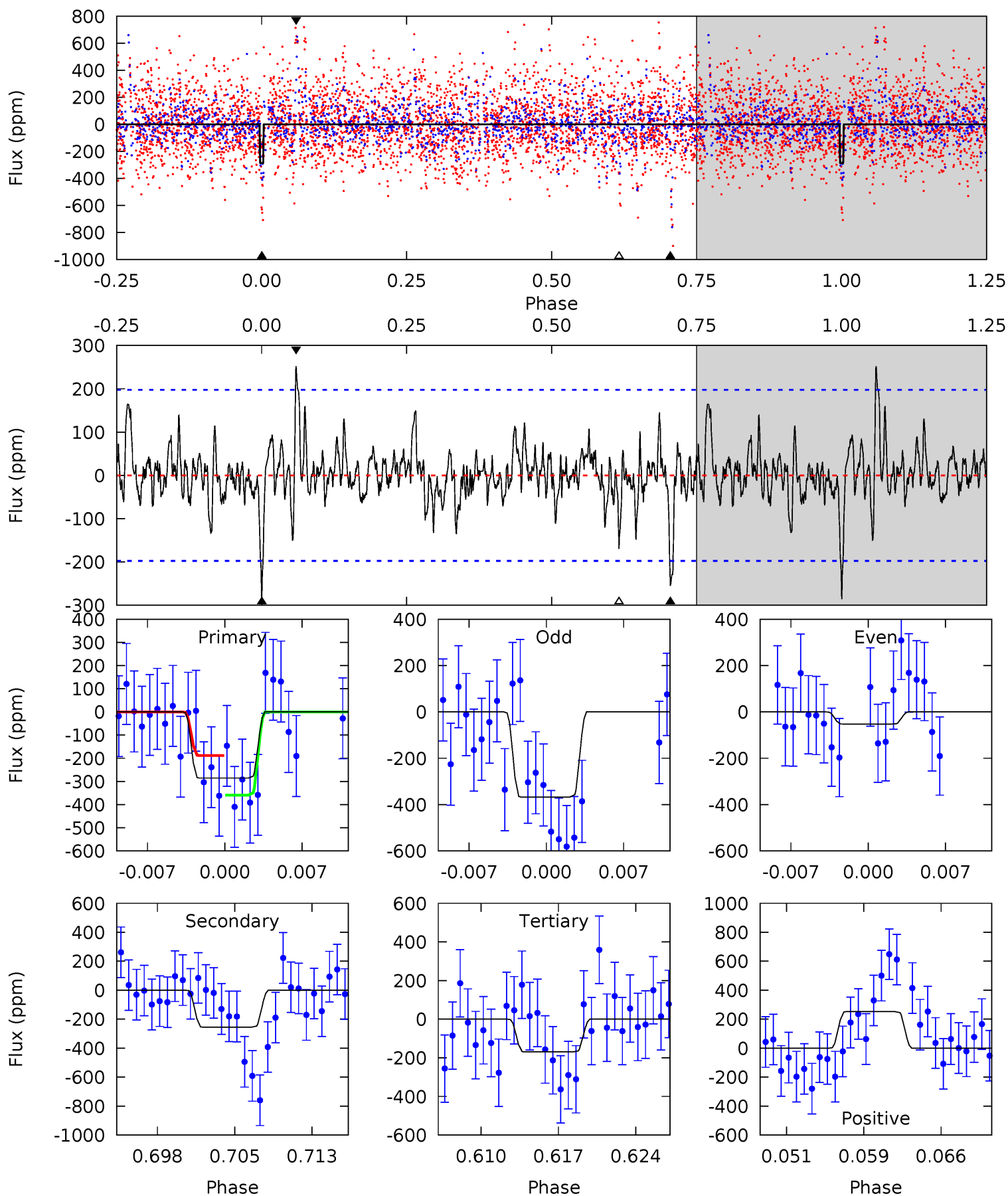




# Alt Model-Shift Uniqueness Test

008052016-06, P = 37.038447 Days, E = 119.430935 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
7.36	6.56	4.36	6.49	5.09	2.68	1.27	3.00	0.86	2.20	0.07	4.13	0.16	0.47	2.20



### Stellar Parameters For KIC 008052016

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6212^{+171}_{-171}$	$3.897^{+0.300}_{-0.100}$	$-0.340^{+0.350}_{-0.300}$	$1.989^{+0.418}_{-0.628}$	$1.138^{+0.225}_{-0.184}$	$0.204^{+0.380}_{-0.074}$
	+3%/-3%	+8%/-3%	+103%/-88%	+21%/-32%	+20%/-16%	+187%/-36%
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 008052016-06 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-248 \pm 28$	$4.10^{+3.04}_{-2.47}$	$1113^{+67}_{-93}$	$5576^{+3725}_{-1142}$	$438^{+2267}_{-302}$
Alt.	$-255 \pm 39$	$3.66^{+2.93}_{-2.24}$	$1109^{+68}_{-90}$	$5806^{+4819}_{-1214}$	$560^{+2941}_{-395}$

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

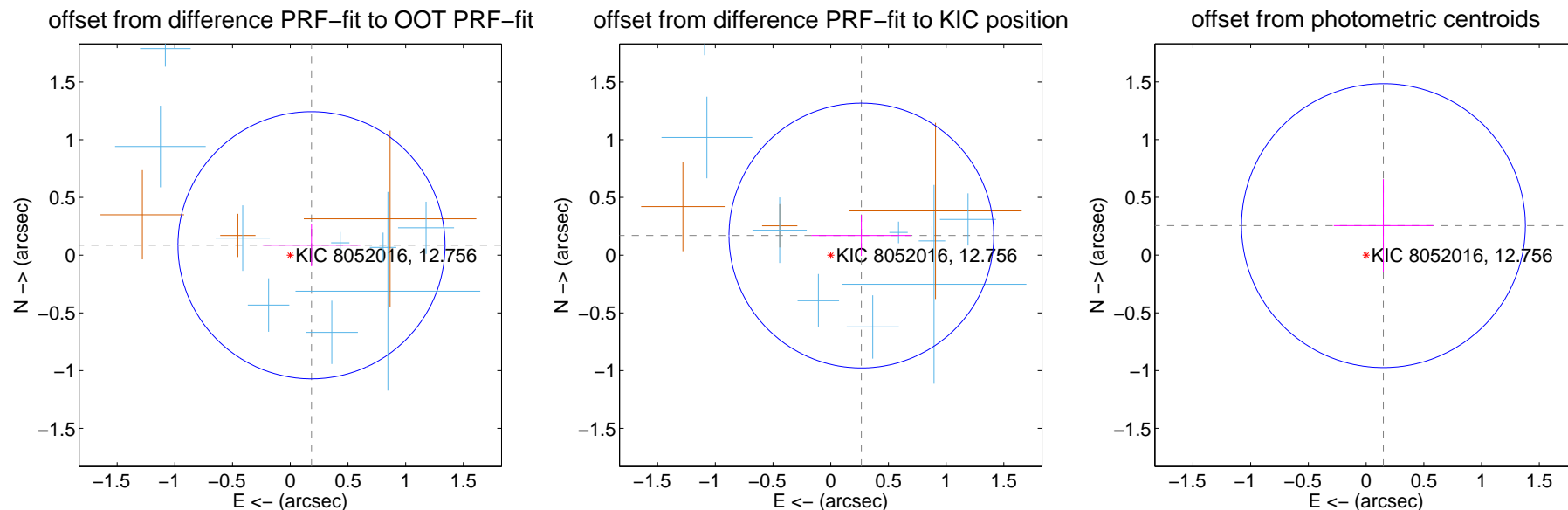
## DV Centroid Data

Supplemental centroid analysis for 008052016-06. Kepler magnitude: 12.76. Transit SNR 11.46

There are 9 quarters with good PRF difference image offsets

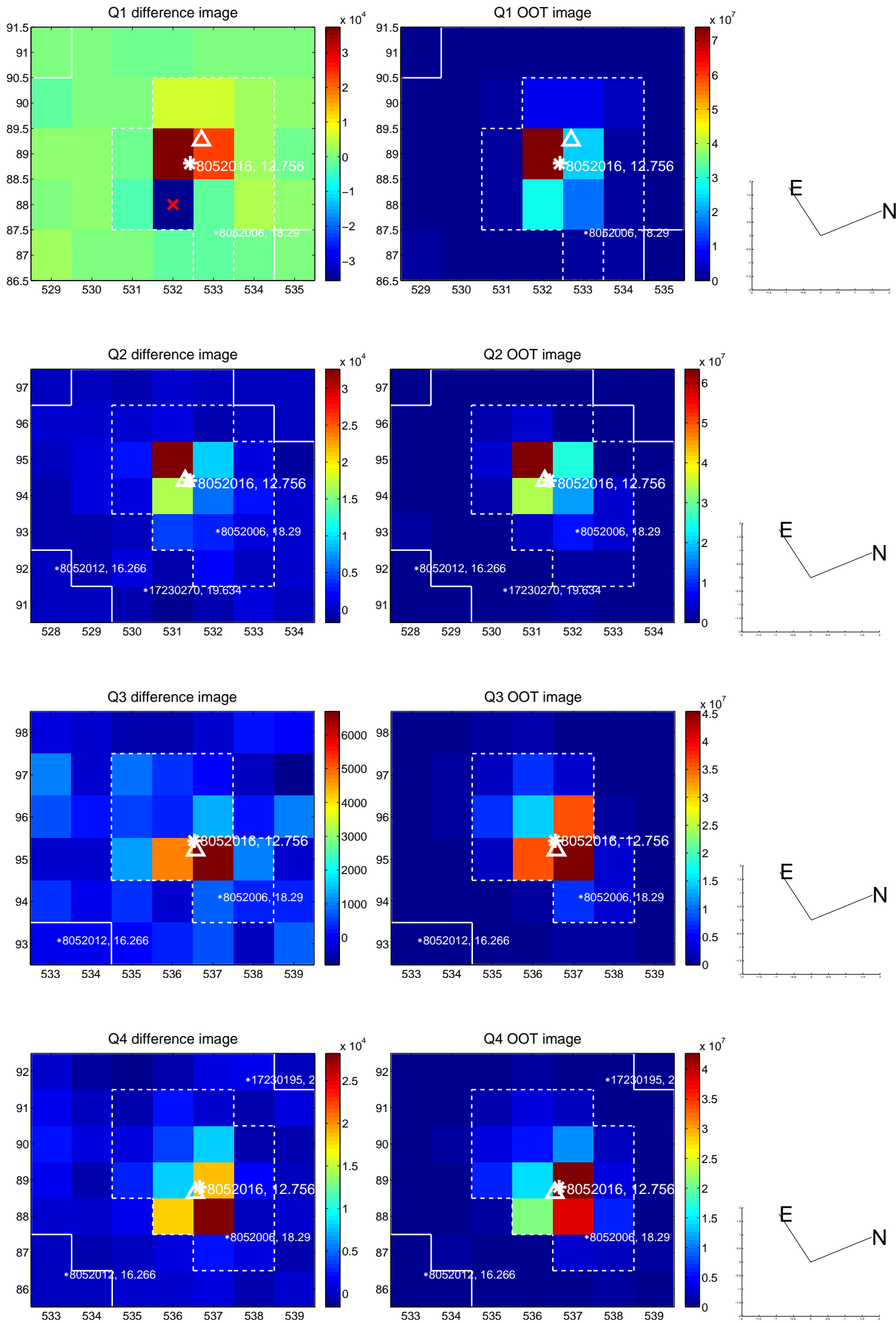
The direct PRF centroid is offset from the target star catalog position by about 0.08 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.203 \pm 0.386$	0.53	$-0.184 \pm 0.423$	$0.086 \pm 0.183$
PRF-fit source offset from KIC position	$0.315 \pm 0.382$	0.82	$-0.266 \pm 0.432$	$0.170 \pm 0.177$
photometric centroid source offset	$0.30 \pm 0.41$	0.72	$-0.15 \pm 0.43$	$0.26 \pm 0.40$

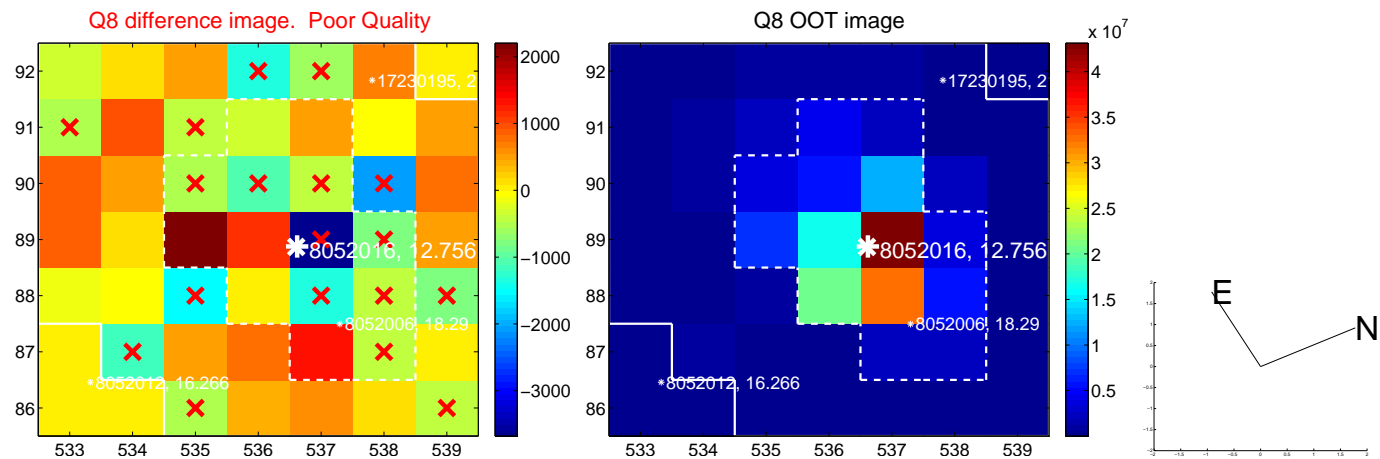
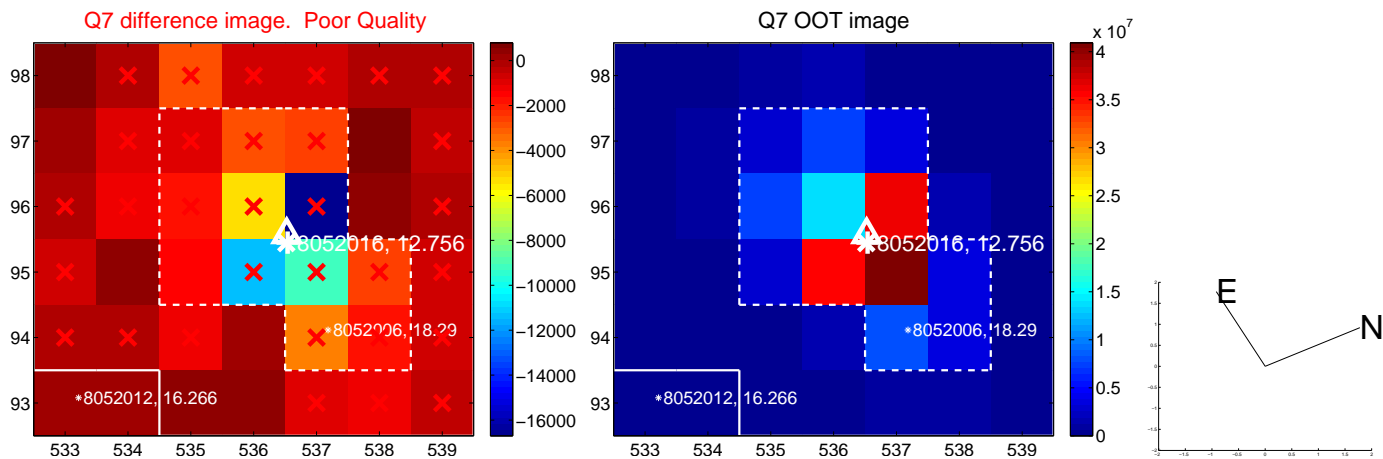
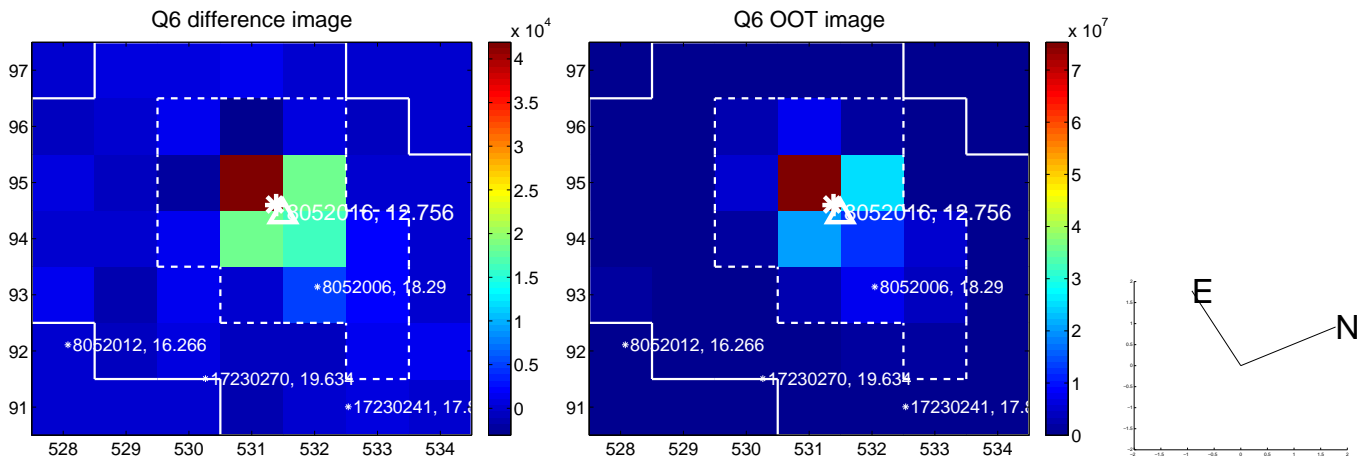
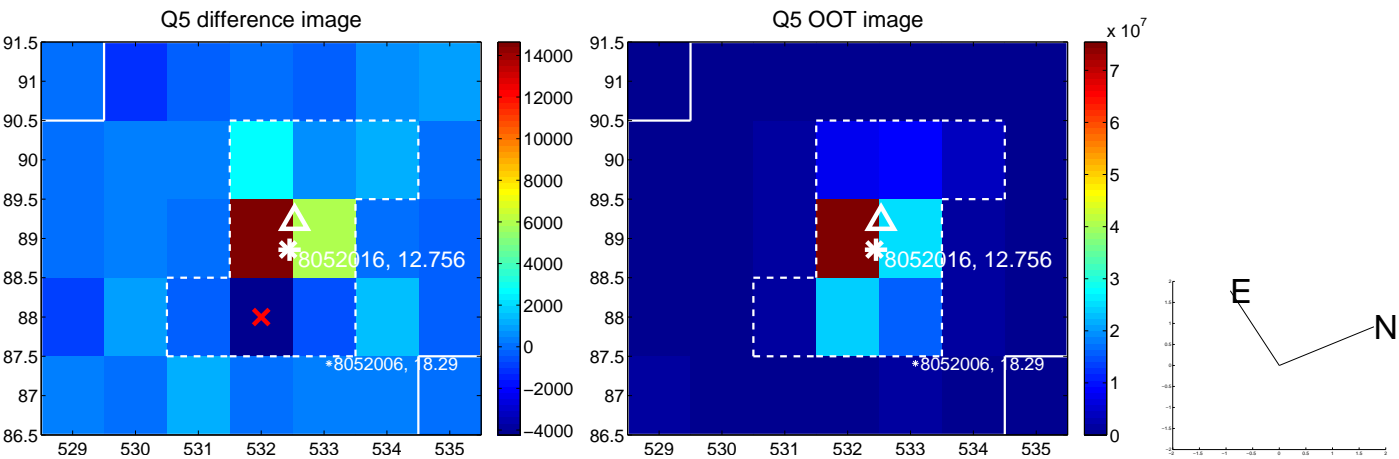


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

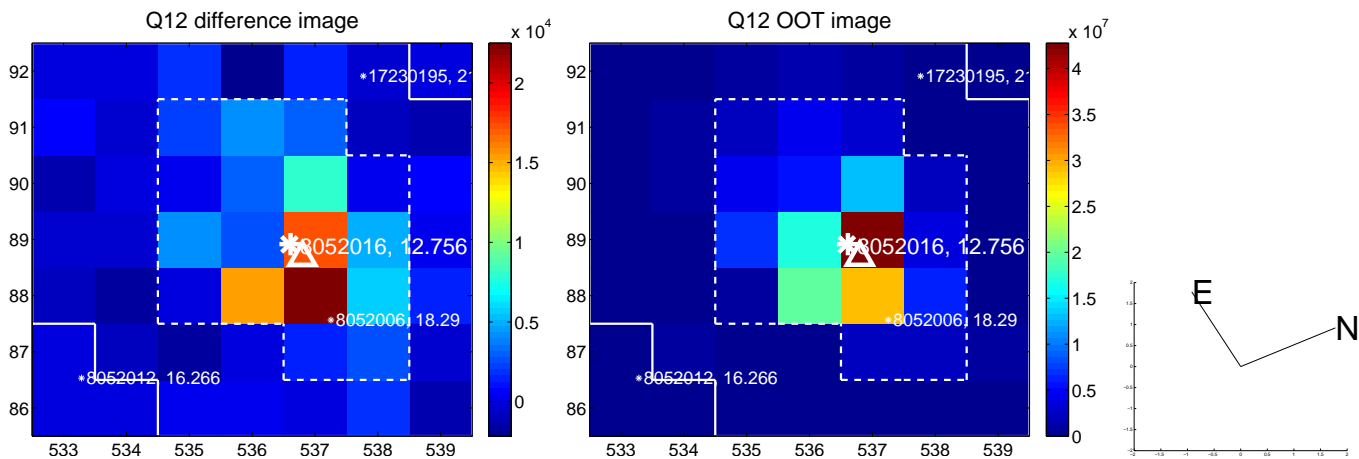
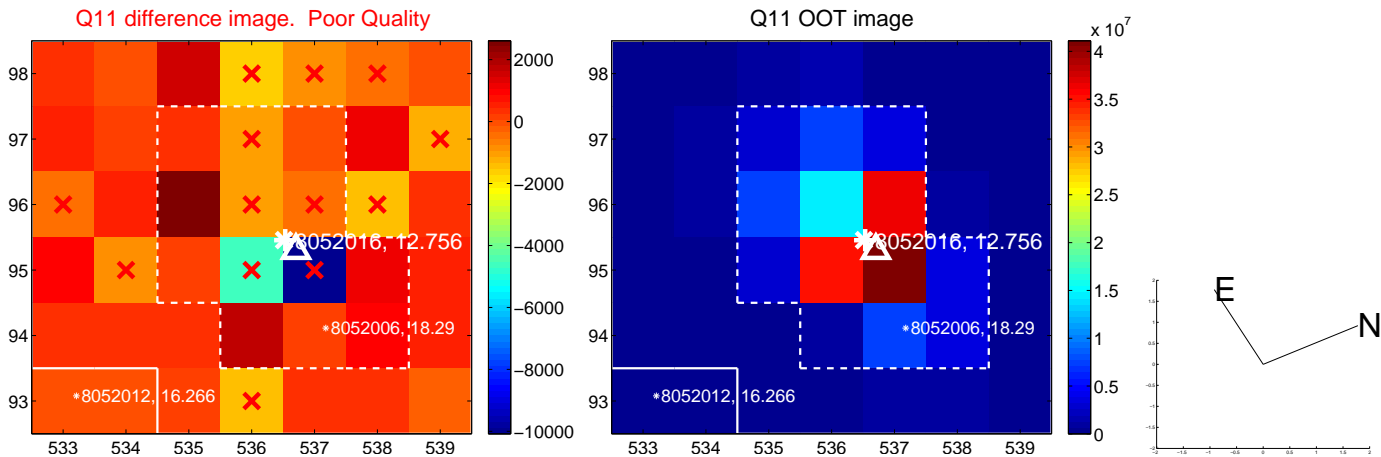
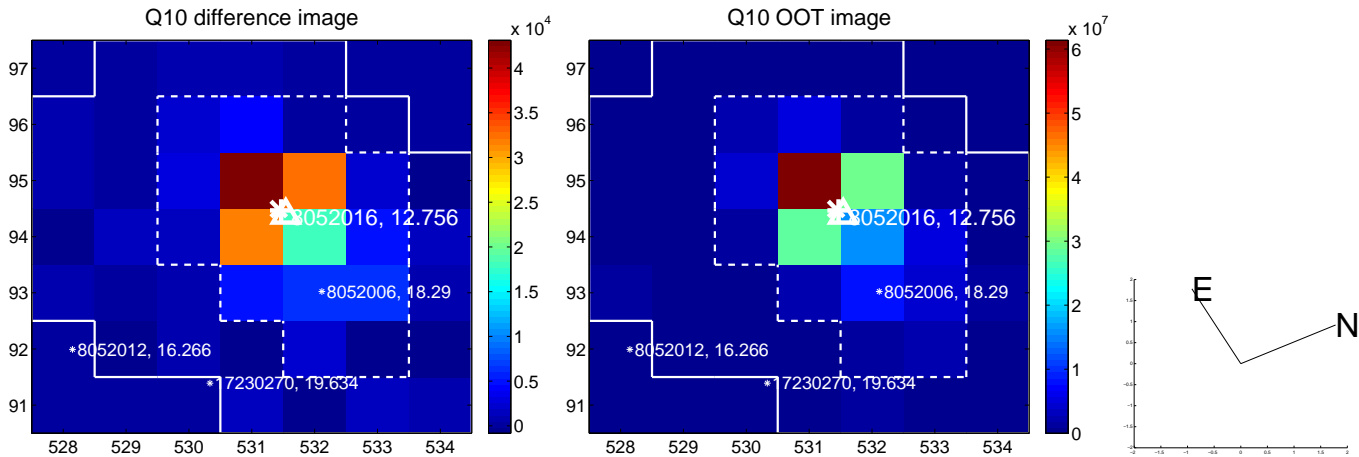
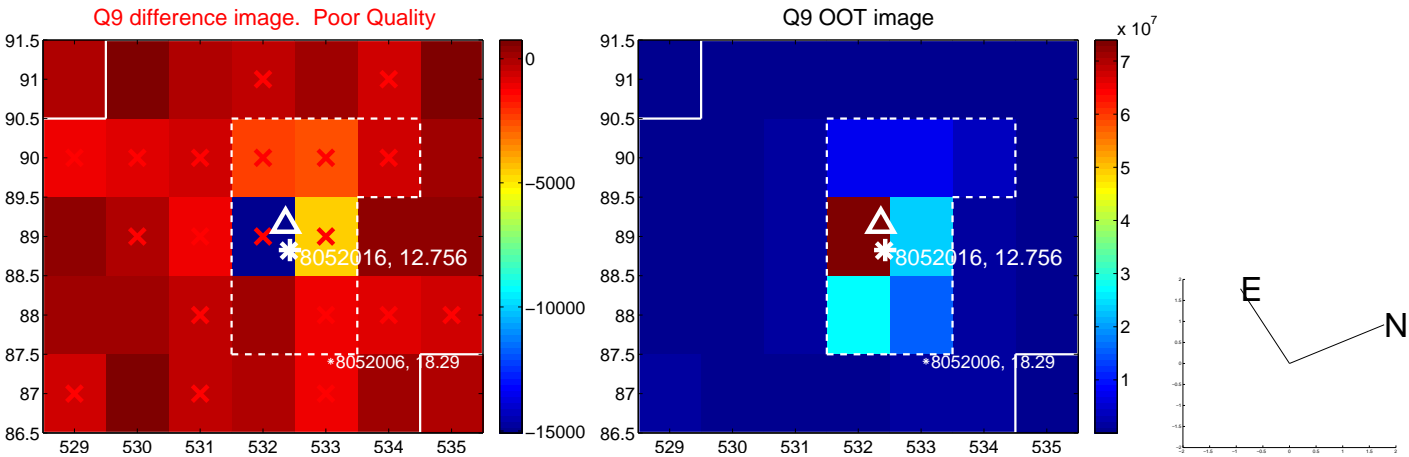
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



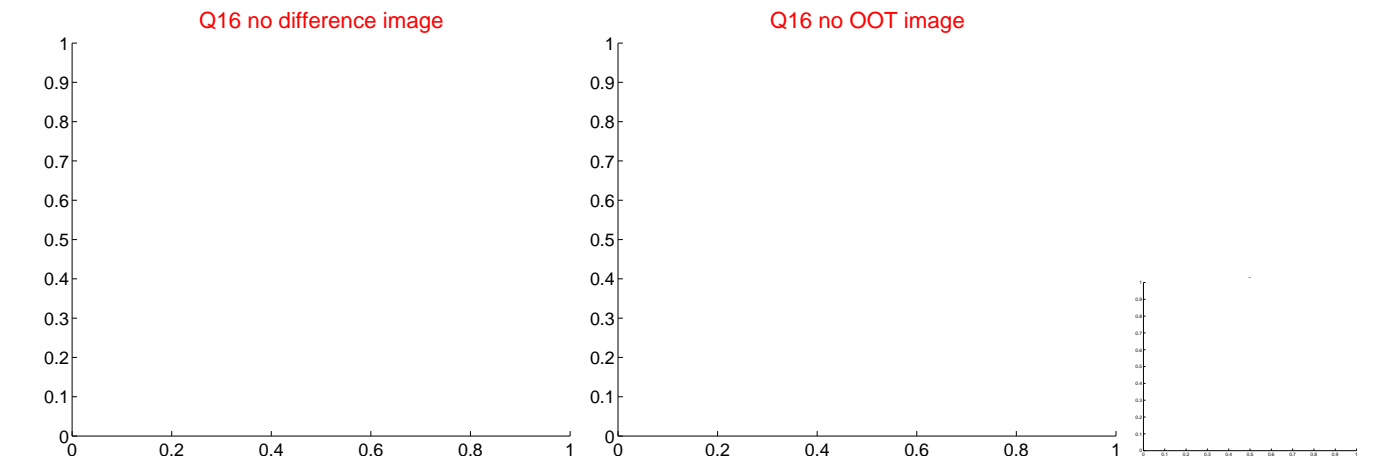
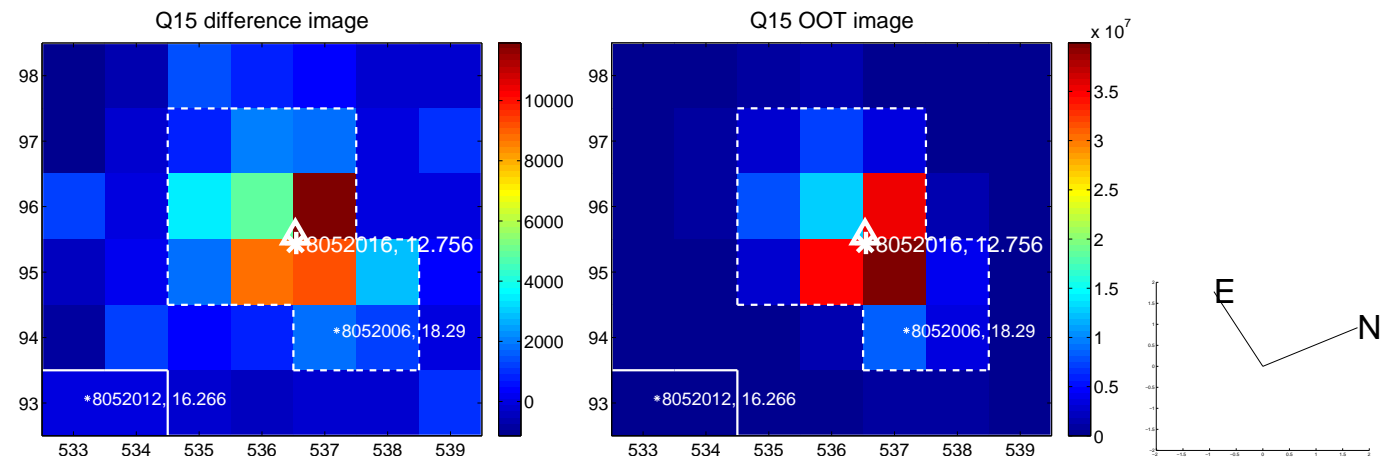
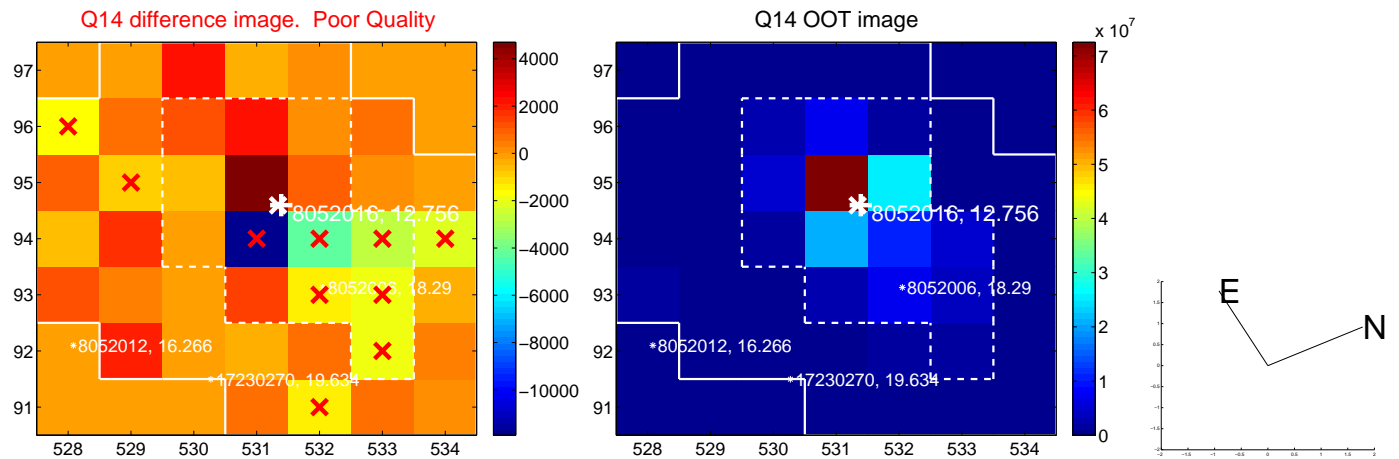
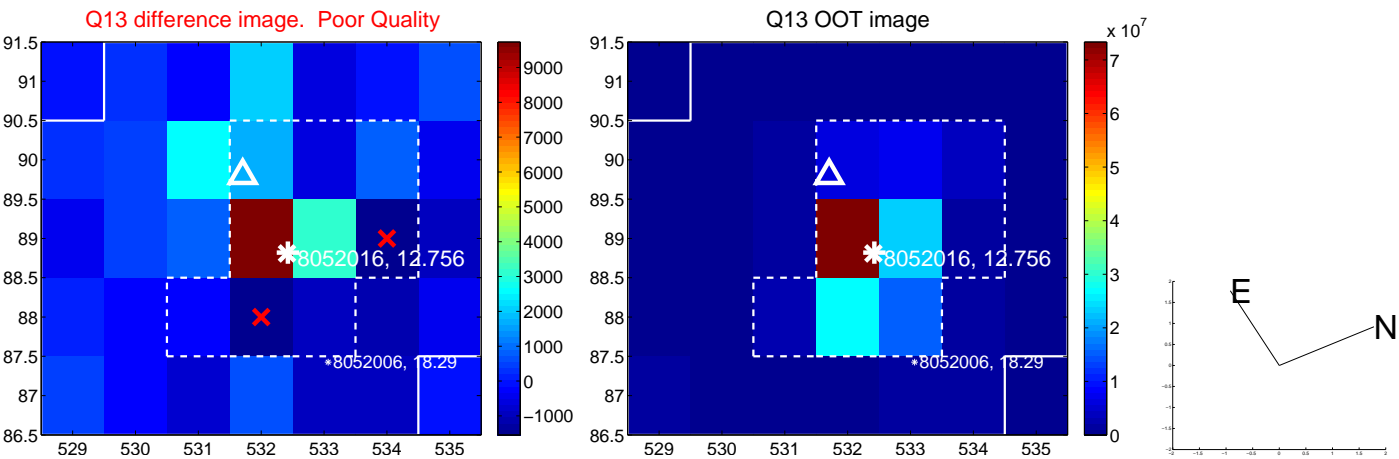
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



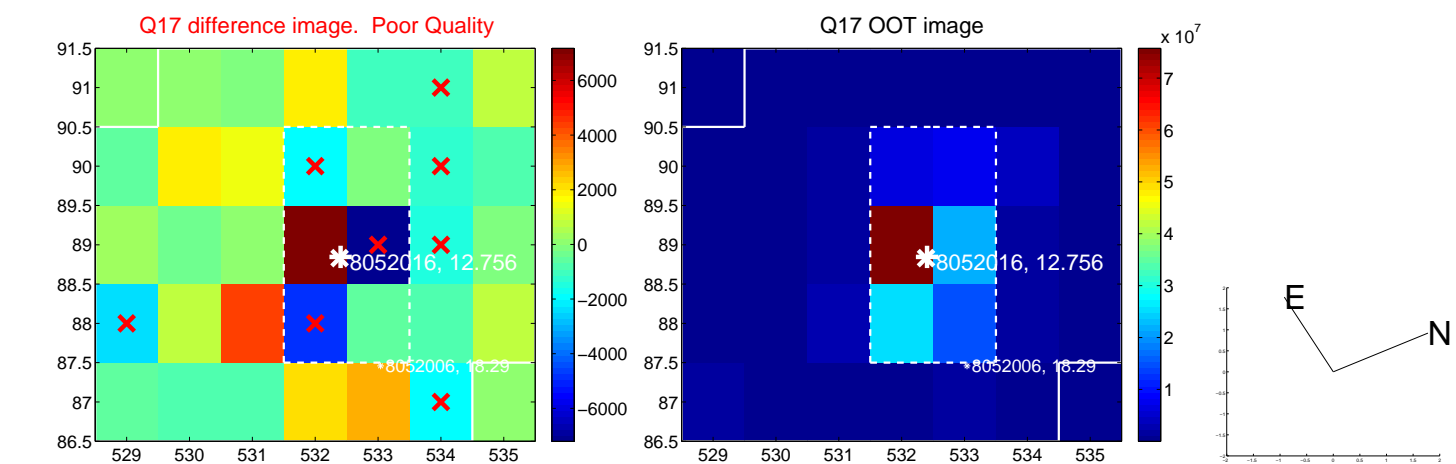
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



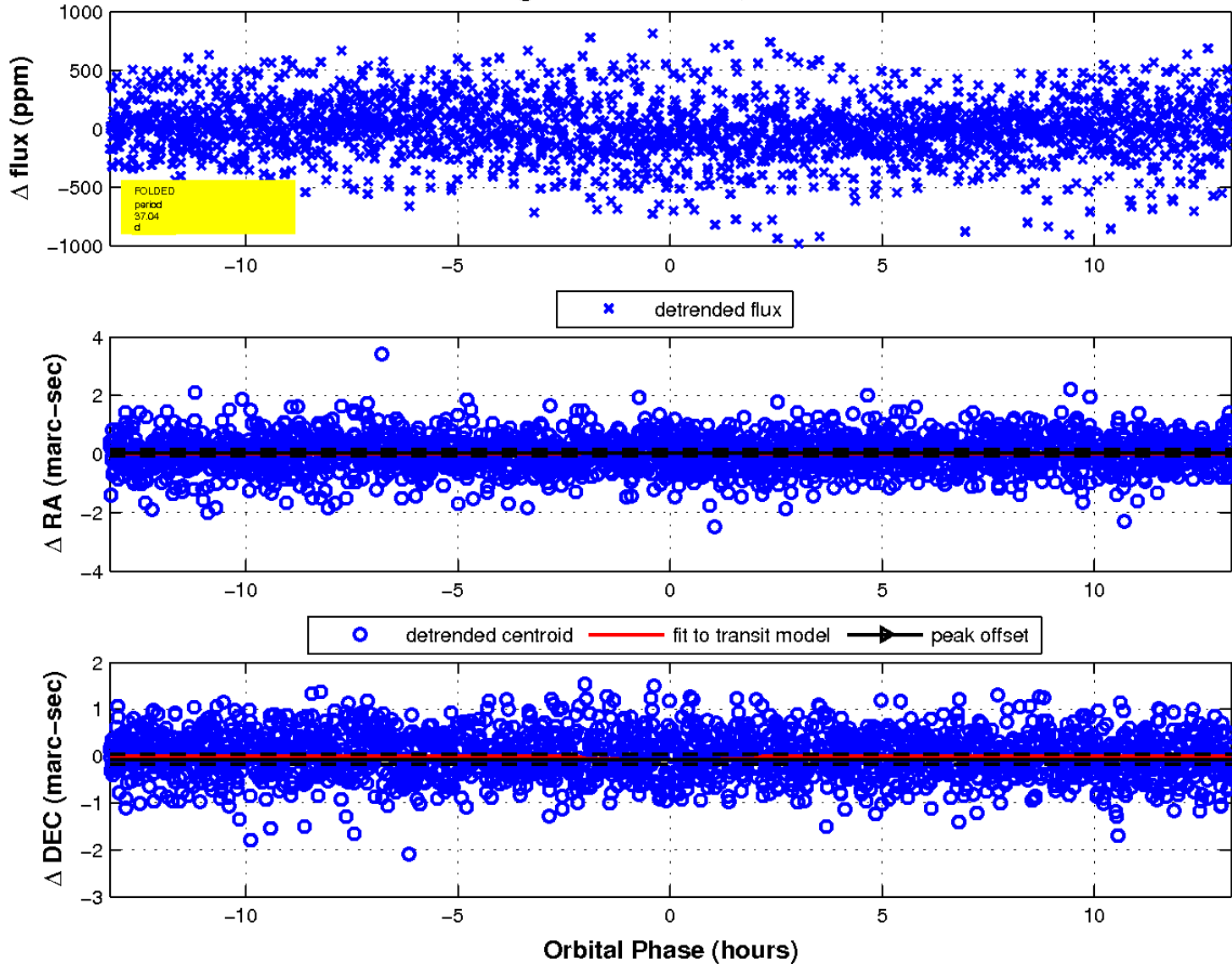
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



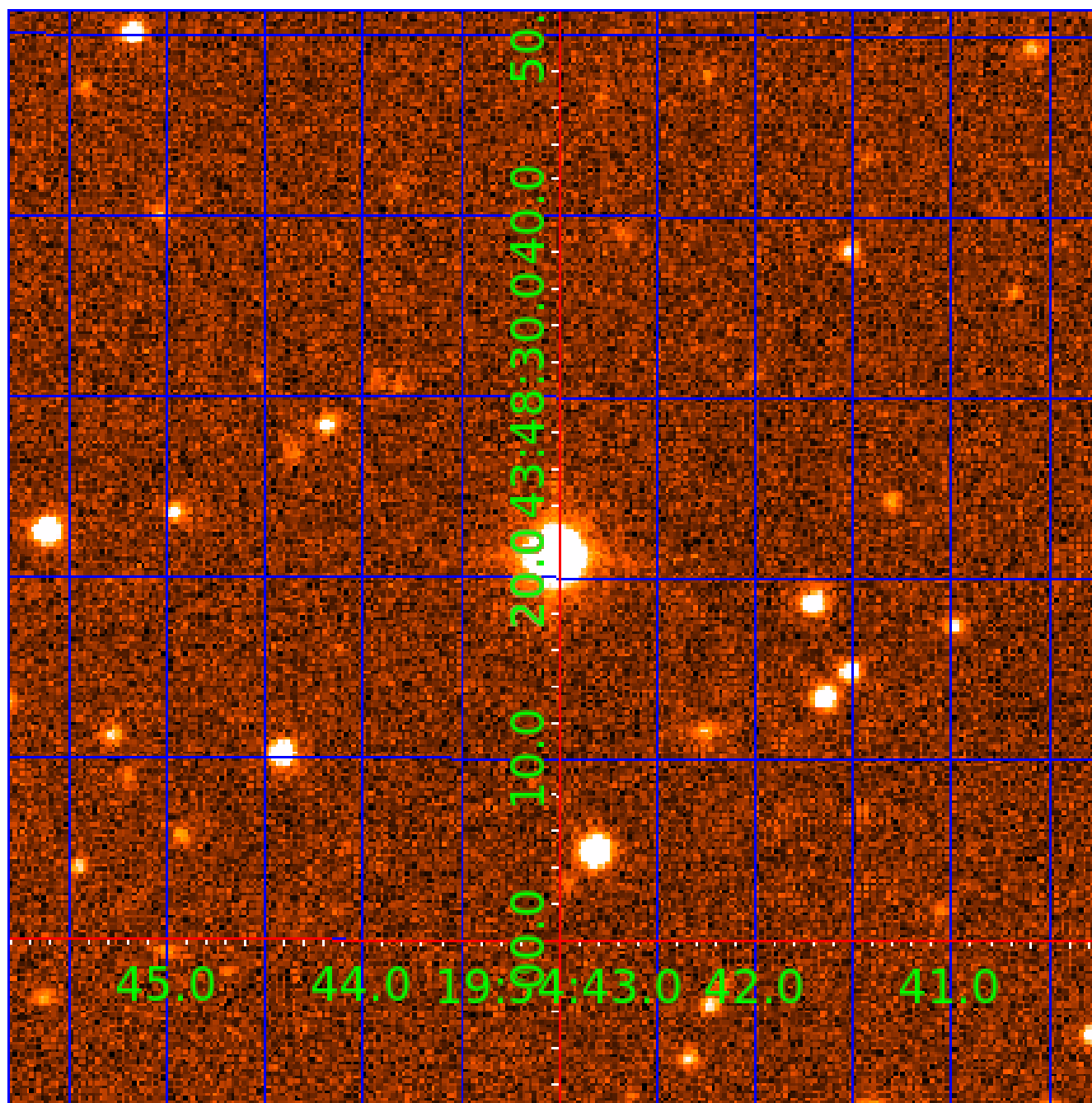
fluxWeightedCentroids, Planet 6 of 9





UKIRT Image

Declination



## KIC 008052016

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008052016-01	OBS	No	2.605256	133.117659	31.9	19.238	9.6	7.3	1.99	6212	1.16	3524.60
008052016-02	OBS	No	67.763122	134.382802	184.4	6.496	25.0	11.1	1.99	6212	3.03	45.73
008052016-03	OBS	No	26.742080	135.727966	190.8	10.952	18.8	12.1	1.99	6212	2.99	158.00
008052016-04	OBS	No	33.184196	158.831256	176.4	4.858	16.2	7.2	1.99	6212	2.96	118.49
008052016-05	OBS	No	37.315026	162.366643	172.7	3.991	13.1	7.8	1.99	6212	2.88	101.33
008052016-06	OBS	No	37.038602	156.474640	246.9	4.412	12.2	11.5	1.99	6212	3.45	102.34
008052016-07	OBS	No	39.906683	164.120100	244.5	4.294	9.9	10.4	1.99	6212	3.45	92.65
008052016-08	OBS	No	23.077641	133.725683	160.9	6.368	9.5	9.1	1.99	6212	2.90	192.30
008052016-09	OBS	No	28.929926	143.231572	102.0	5.045	8.8	5.4	1.99	6212	2.28	142.27

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008052016-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV
008052016-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
008052016-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—HALO_GHOST
008052016-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
008052016-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
008052016-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT
008052016-07	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—HALO_GHOST
008052016-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
008052016-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

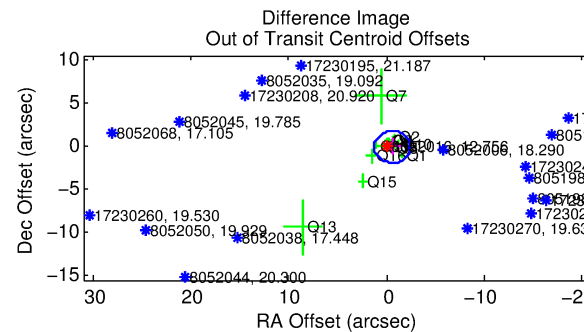
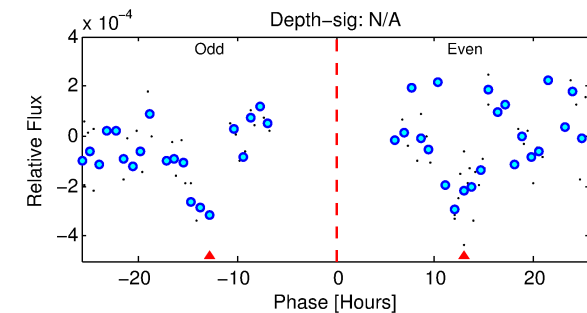
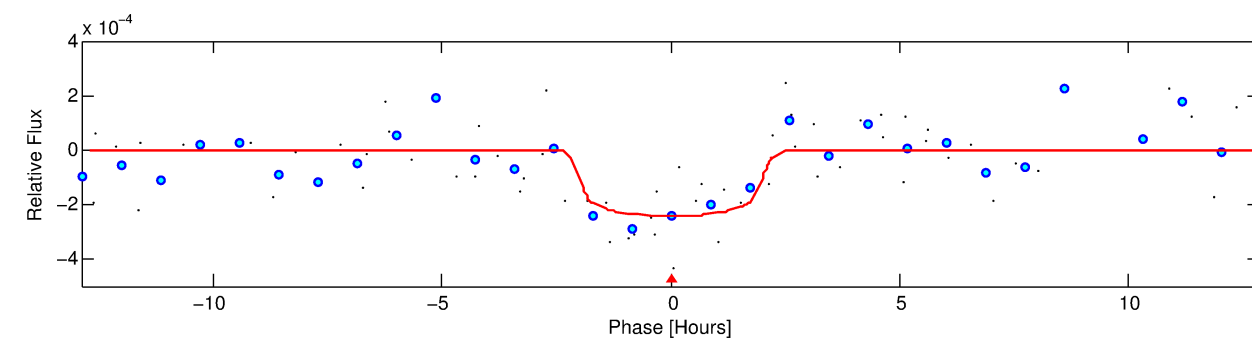
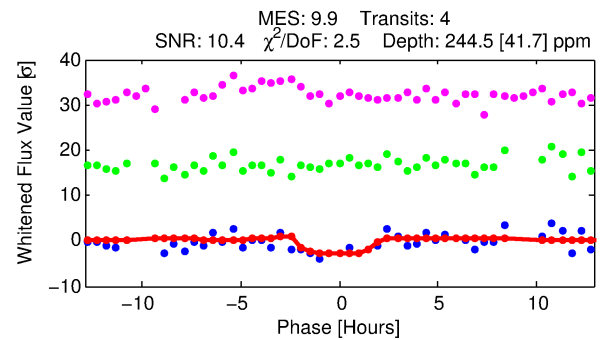
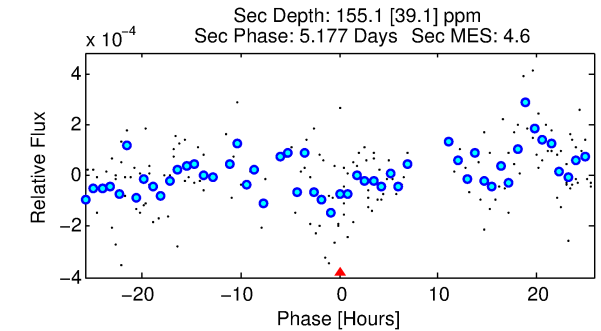
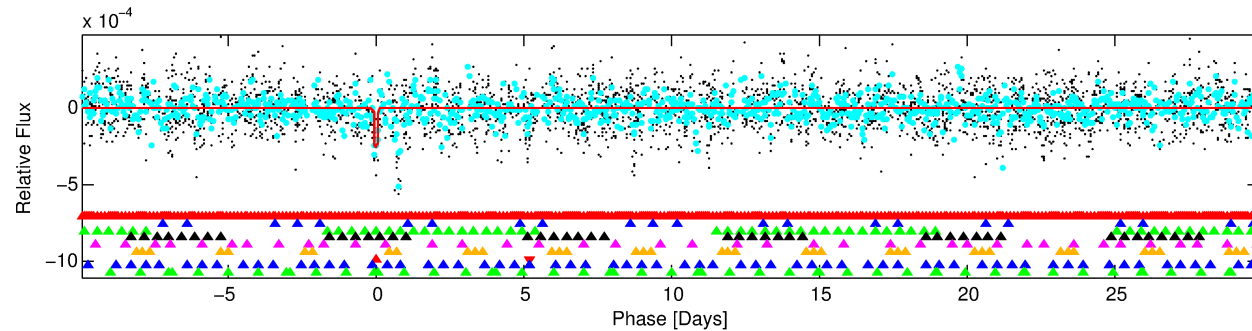
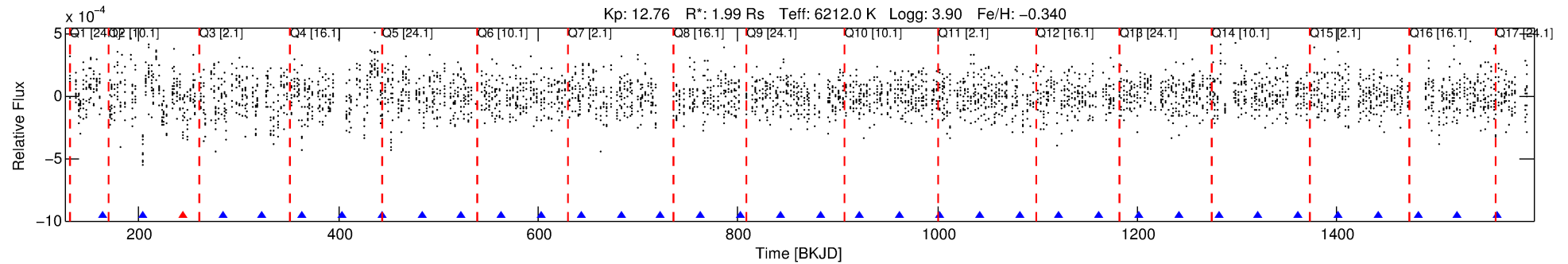
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 008052016-07

No Significant Match Found

# DV One-Page Summary

KIC: 8052016 Candidate: 7 of 9 Period: 39.907 d



## DV Fit Results:

Period = 39.90668 [0.00066] d  
Epoch = 164.1201 [0.0107] BKJD  
Rp/R\* = 0.0159 [0.0179]  
a/R\* = 43.77 [262.04]  
b = 0.81 [2.59]  
Seff = 92.65 [48.01]  
Teff = 791 [102] K  
Rp = 3.45 [4.04] Re  
a = 0.2387 [0.0745] AU  
Ag = 408.47 [950.67] [0.43 $\sigma$ ]  
Teffp = 5499 [3127] K [1.50 $\sigma$ ]

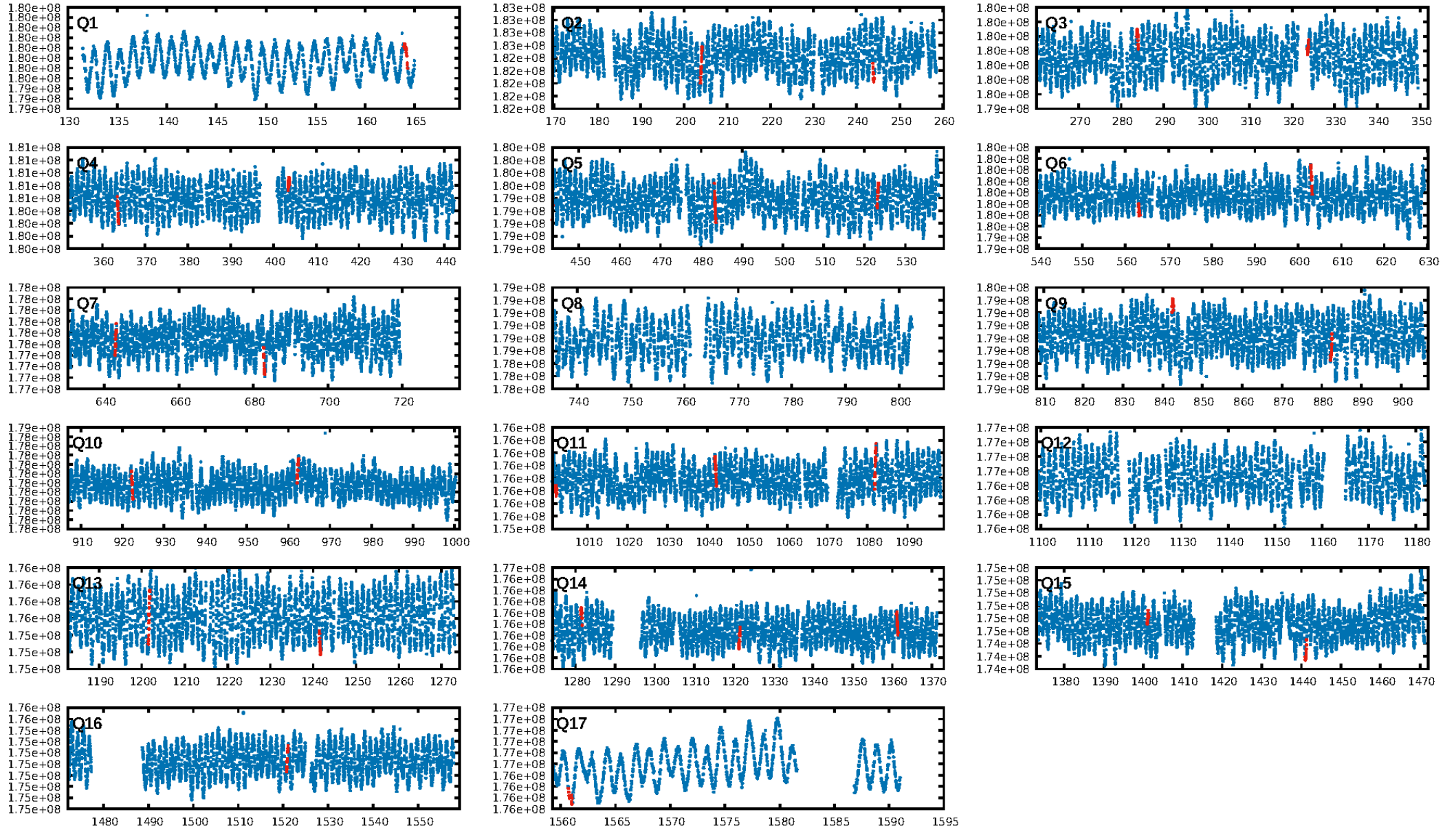
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [10.61 $\sigma$ ]  
LongPeriod-sig: 100.0% [85.86 $\sigma$ ]  
ModelChiSquare2-sig: 0.6%  
ModelChiSquareGof-sig: 86.4%  
Bootstrap-pfa: 3.17e-07  
RollingBand-fgt: 0.75 [3/4]  
GhostDiagnostic-chr: -0.2261  
Centroid-sig: 25.3%  
Centroid-so: 0.612 arcsec [1.21 $\sigma$ ]  
OotOffset-rm: 0.582 arcsec [0.95 $\sigma$ ]  
KicOffset-rm: 0.614 arcsec [0.94 $\sigma$ ]  
OotOffset-st: 3/4/2/4 [13]  
KicOffset-st: 3/4/2/4 [13]  
DiffImageQuality-fgm: 0.23 [3/13]  
DiffImageOverlap-fno: 0.36 [5/14]

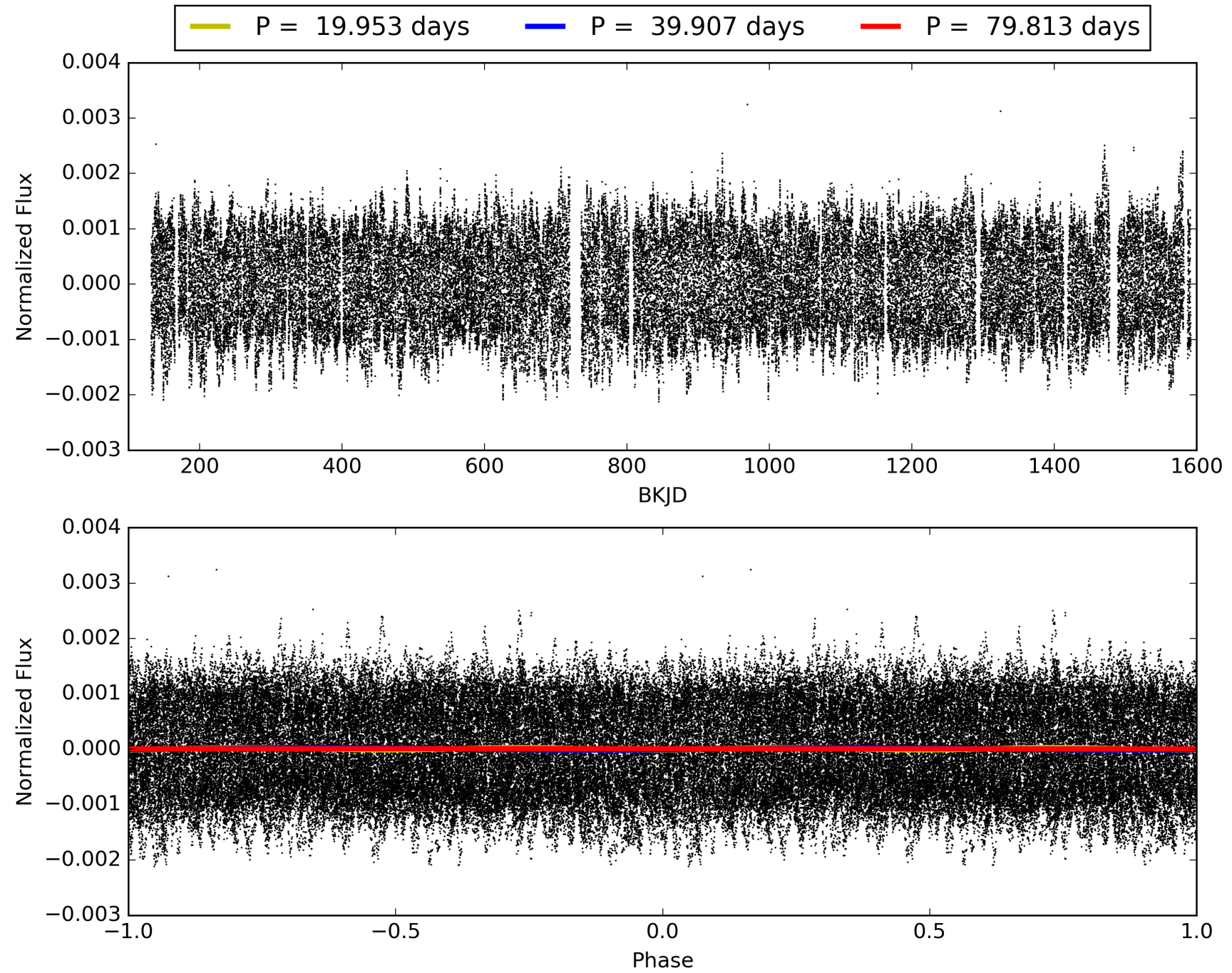
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 23:13:48 Z

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

# TCE 008052016-07, PDC Light Curves



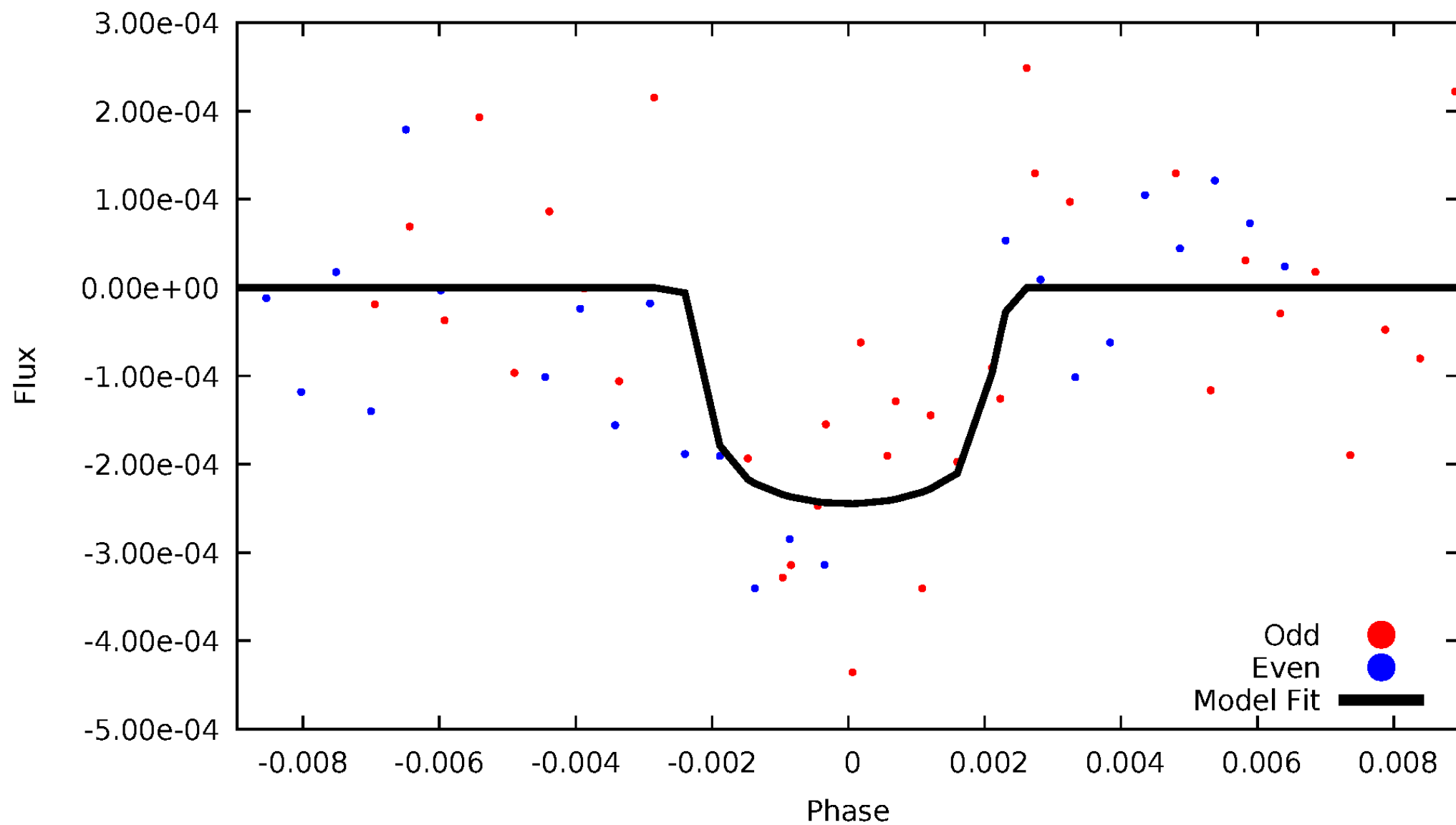
TCE 008052016-07





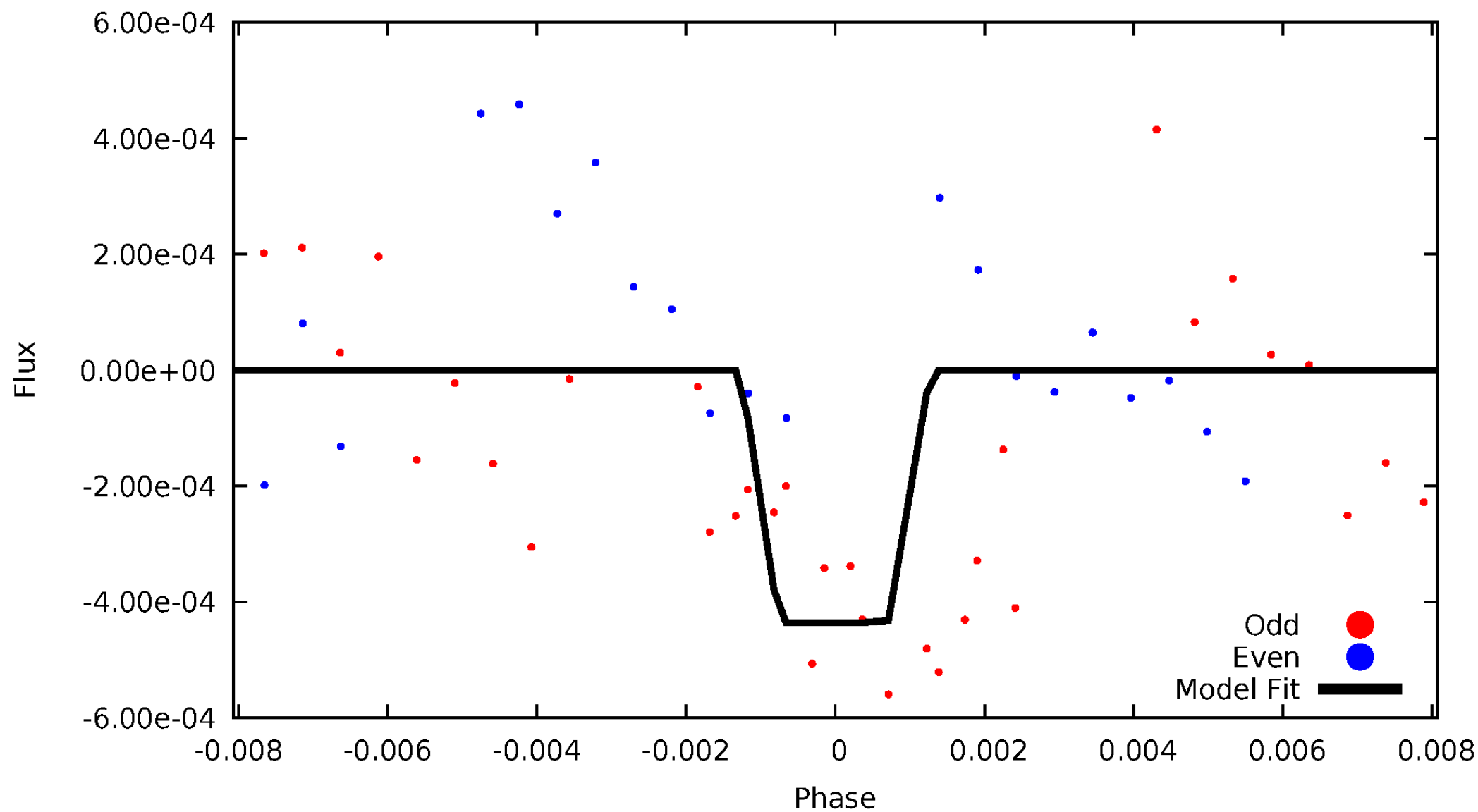
# DV Odd/Even

TCE 008052016-07



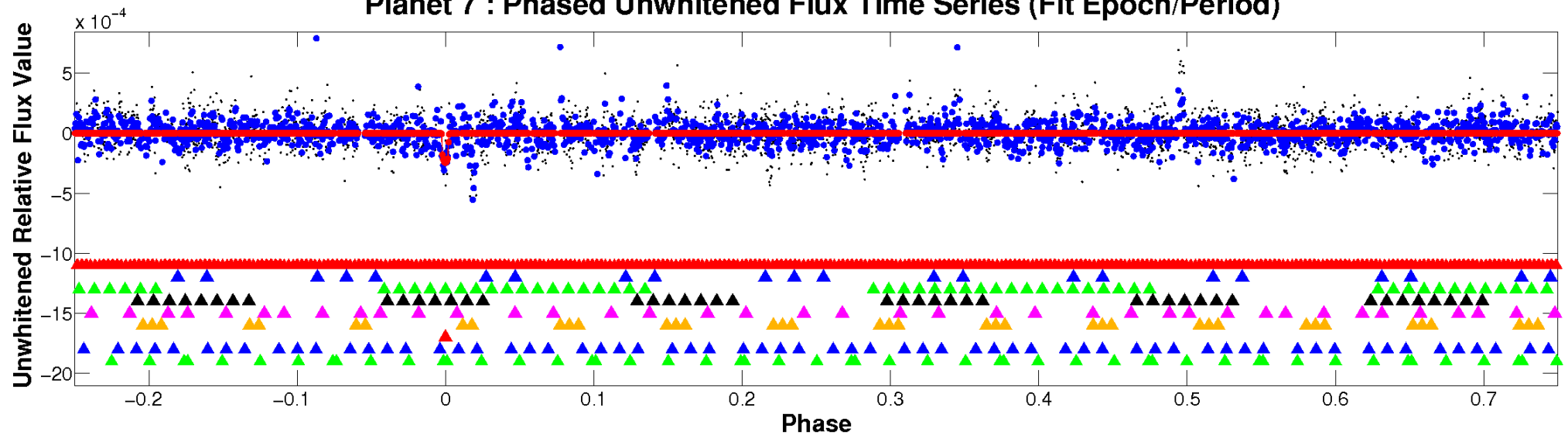
# ALT Odd/Even

TCE 008052016-07

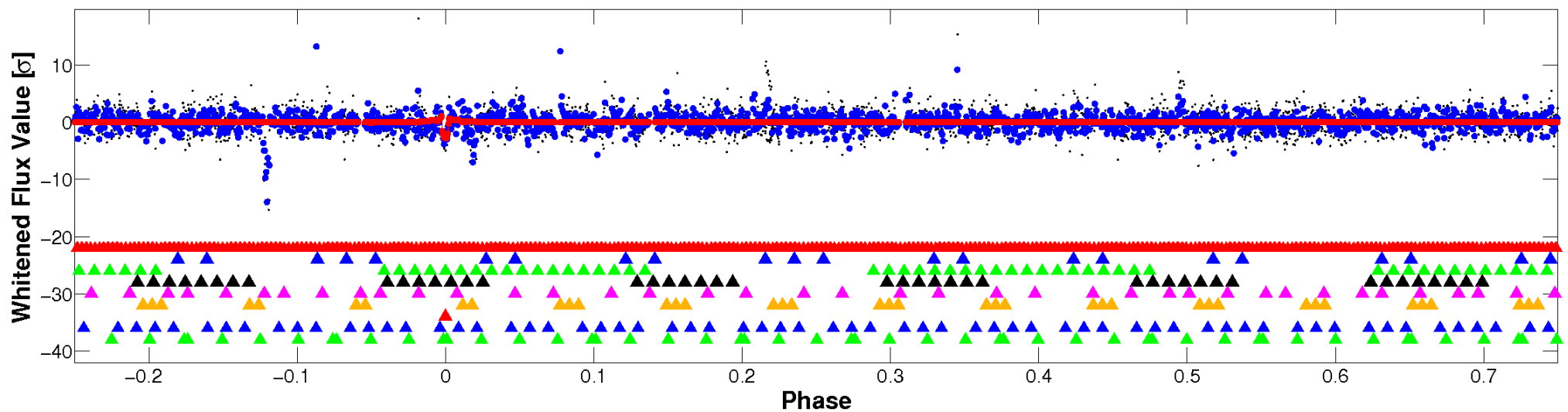


# Non-Whitened Vs. Whitened Light Curve

## Planet 7 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)



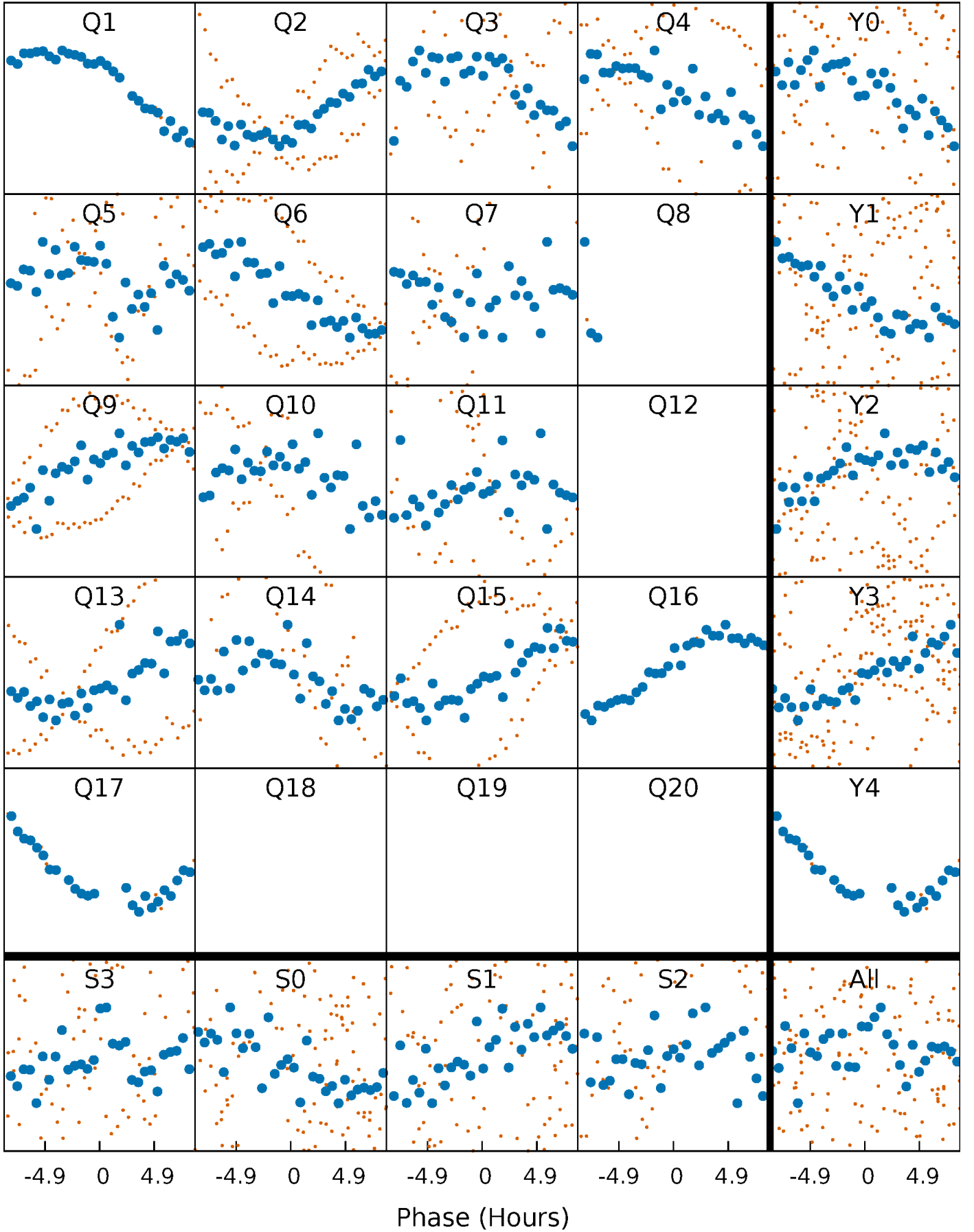
## Planet 7 : Phased Whitened Flux Time Series (Fit Epoch/Period)





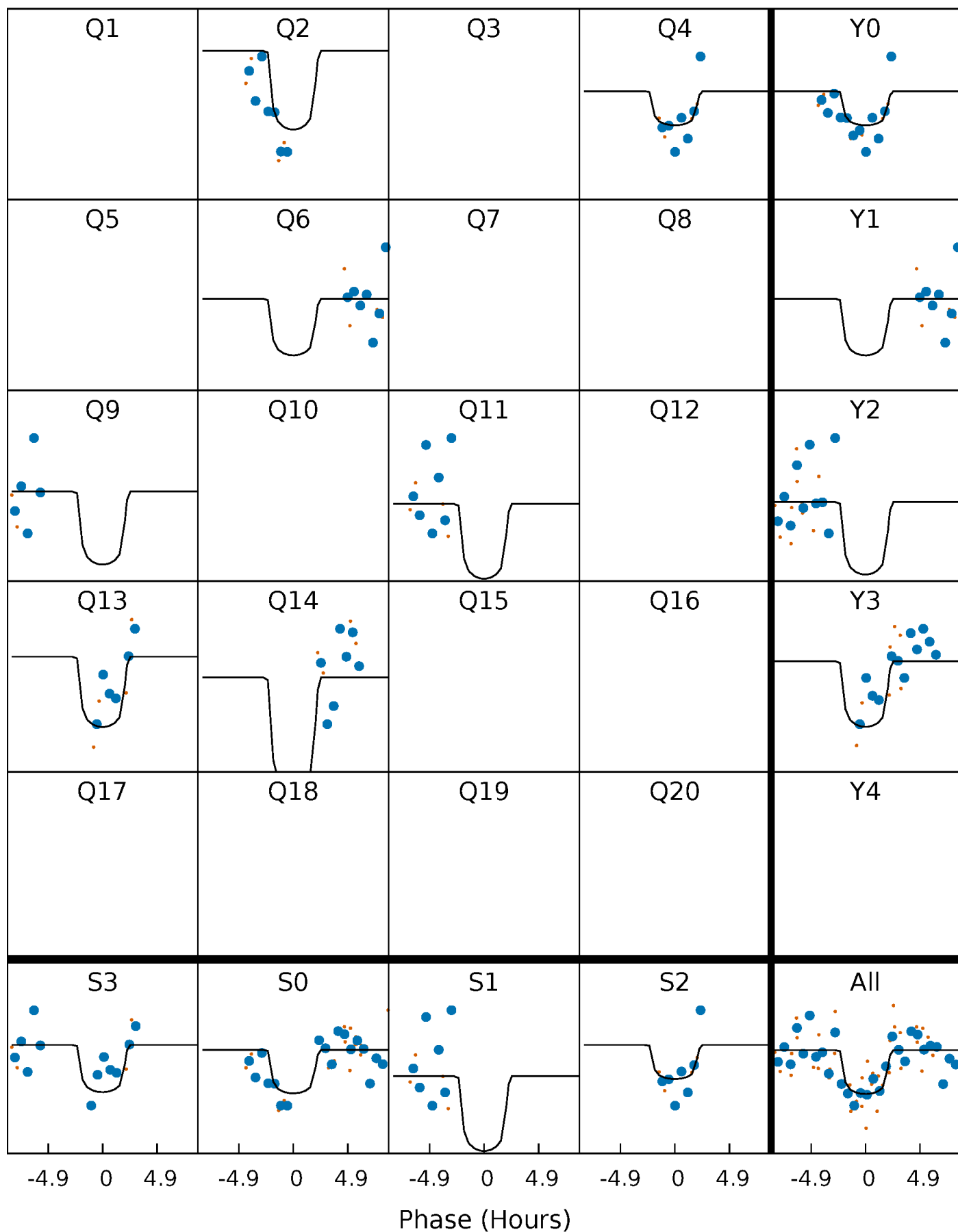
# PDC Quarter-Phased Transit Curves

TCE 008052016-07 P= 39.906683 Days  $T_0=164.120100$  (BKJD)



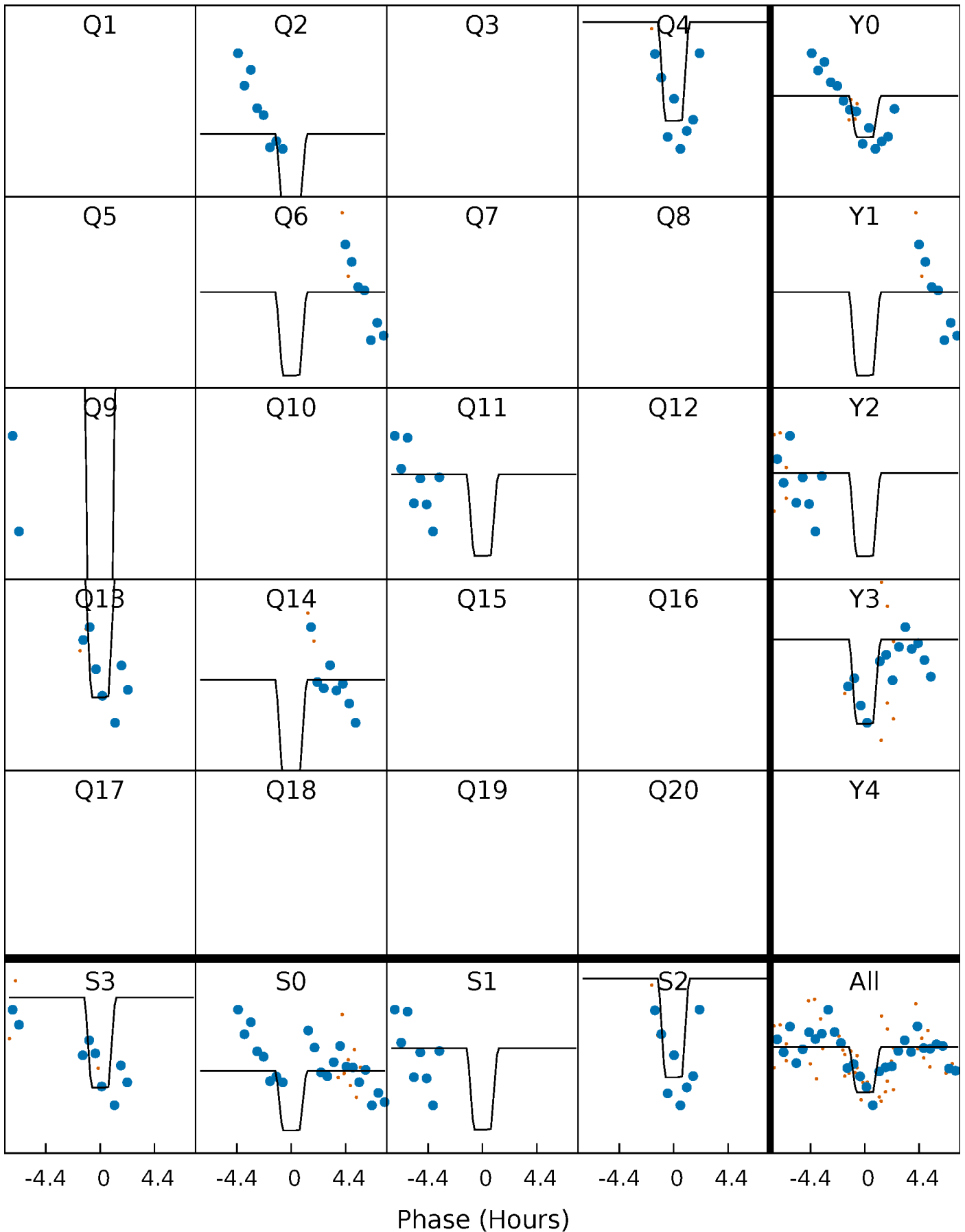
# DV Quarter-Phased Transit Curves

TCE 008052016-07 P= 39.906683 Days  $T_0=164.120100$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

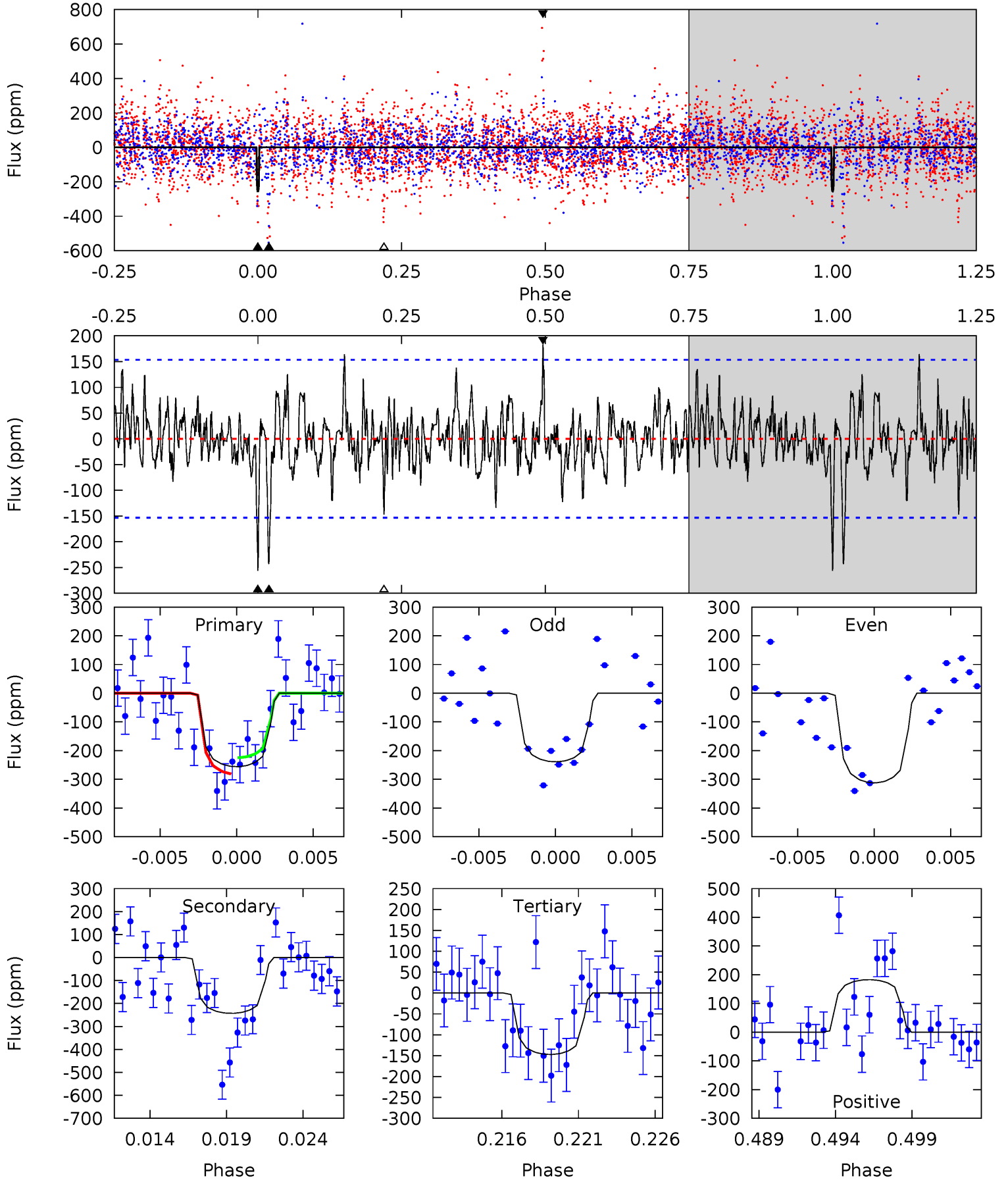
TCE 008052016-07 P= 39.907535 Days  $T_0=164.130622$  (BKJD)



# DV Model-Shift Uniqueness Test

008052016-07, P = 39.906683 Days, E = 124.213417 Days

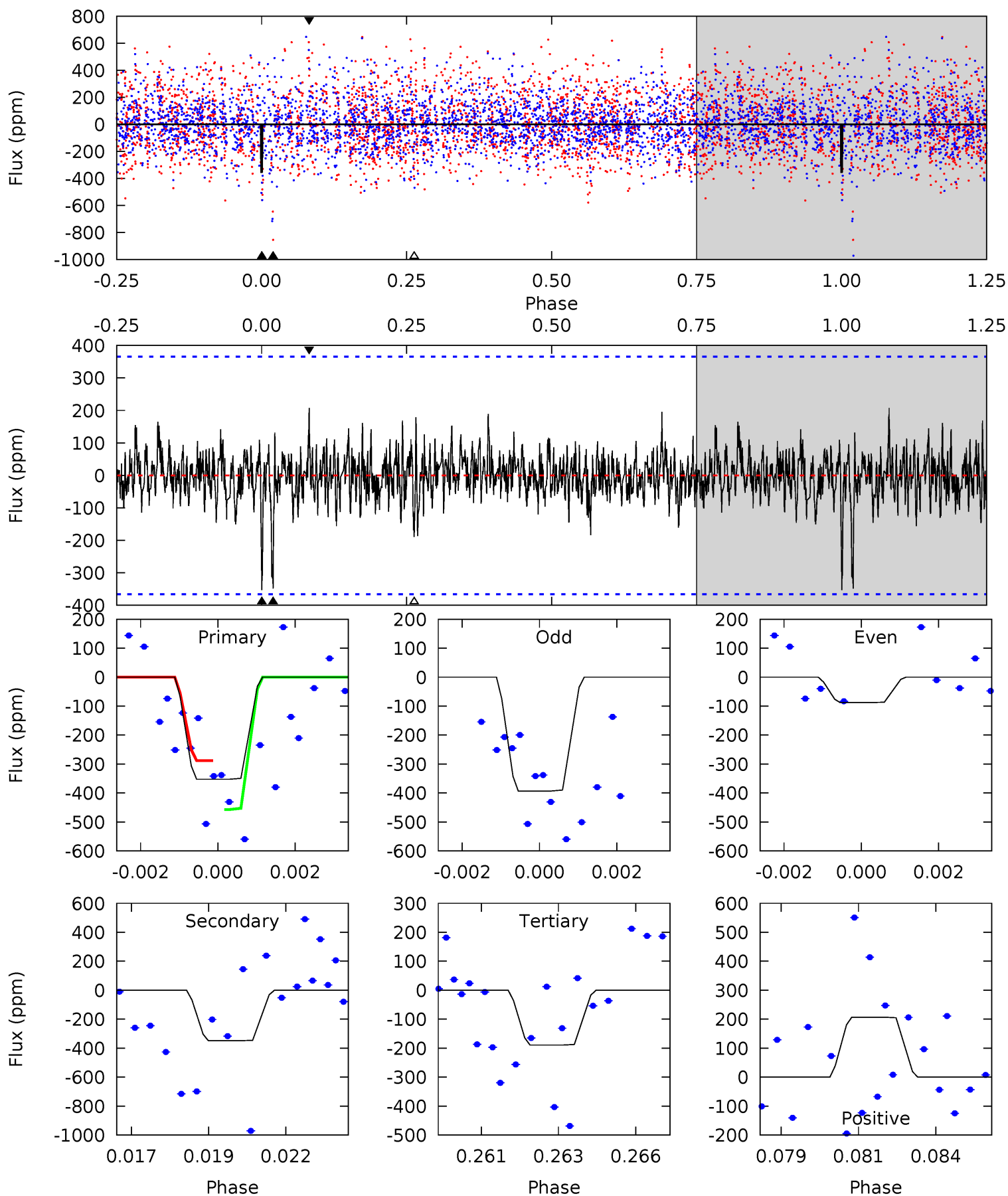
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.63	8.20	4.96	6.17	5.17	2.83	1.49	3.67	2.47	3.23	2.03	1.12	0.89	0.42	0.95



# Alt Model-Shift Uniqueness Test

008052016-07, P = 39.907535 Days, E = 124.223087 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
5.10	5.05	2.74	2.99	5.29	3.04	0.80	2.37	2.11	2.31	2.05	1.50	0.86	0.37	1.17



### Stellar Parameters For KIC 008052016

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6212^{+171}_{-171}$	$3.897^{+0.300}_{-0.100}$	$-0.340^{+0.350}_{-0.300}$	$1.989^{+0.418}_{-0.628}$	$1.138^{+0.225}_{-0.184}$	$0.204^{+0.380}_{-0.074}$
	+3%/-3%	+8%/-3%	+103%/-88%	+21%/-32%	+20%/-16%	+187%/-36%
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 008052016-07 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-243 \pm 30$	$4.09^{+3.31}_{-2.52}$	$1087^{+65}_{-88}$	$5537^{+3994}_{-1188}$	$466^{+3005}_{-326}$
Alt.	$-349 \pm 69$	$4.83^{+3.89}_{-3.00}$	$1080^{+69}_{-91}$	$5457^{+3684}_{-1070}$	$458^{+2646}_{-312}$

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

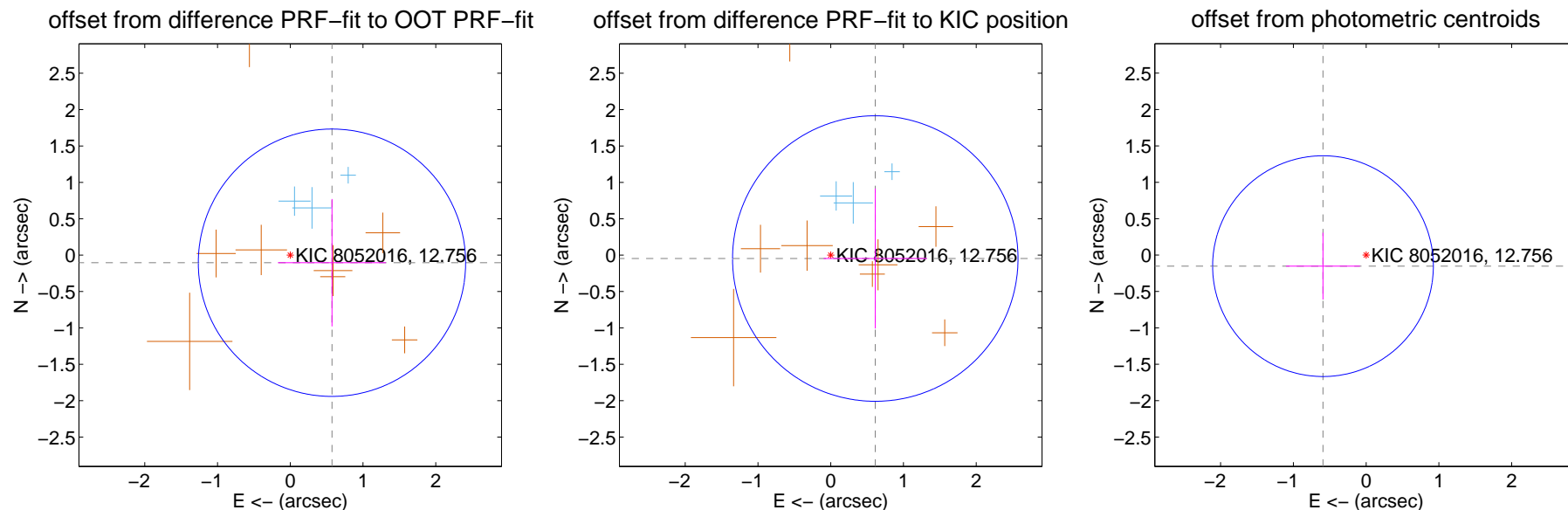
## DV Centroid Data

Supplemental centroid analysis for 008052016-07. Kepler magnitude: 12.76. Transit SNR 10.35

There are 3 quarters with good PRF difference image offsets

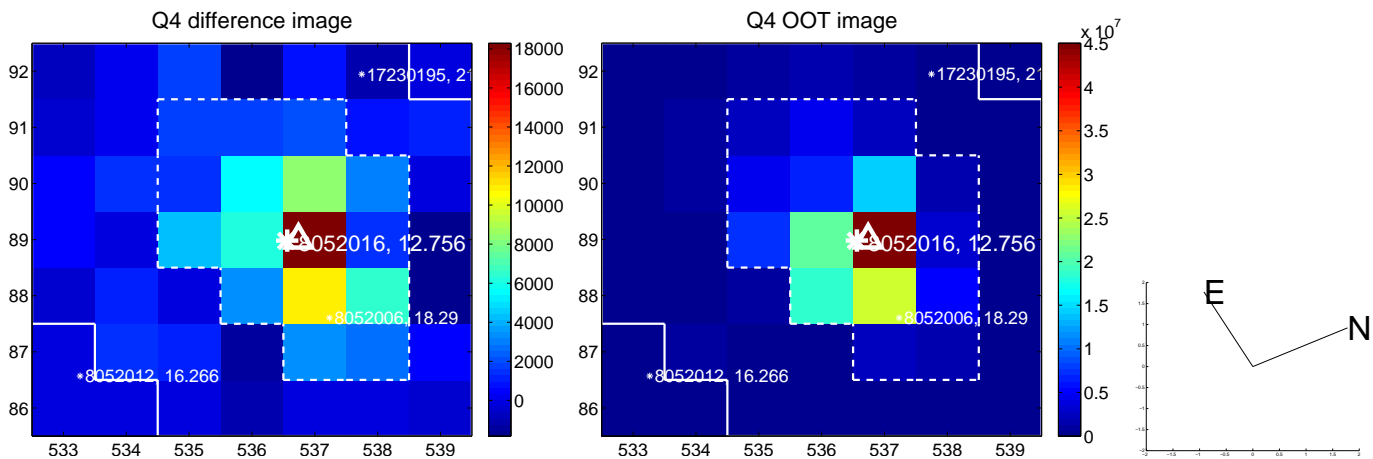
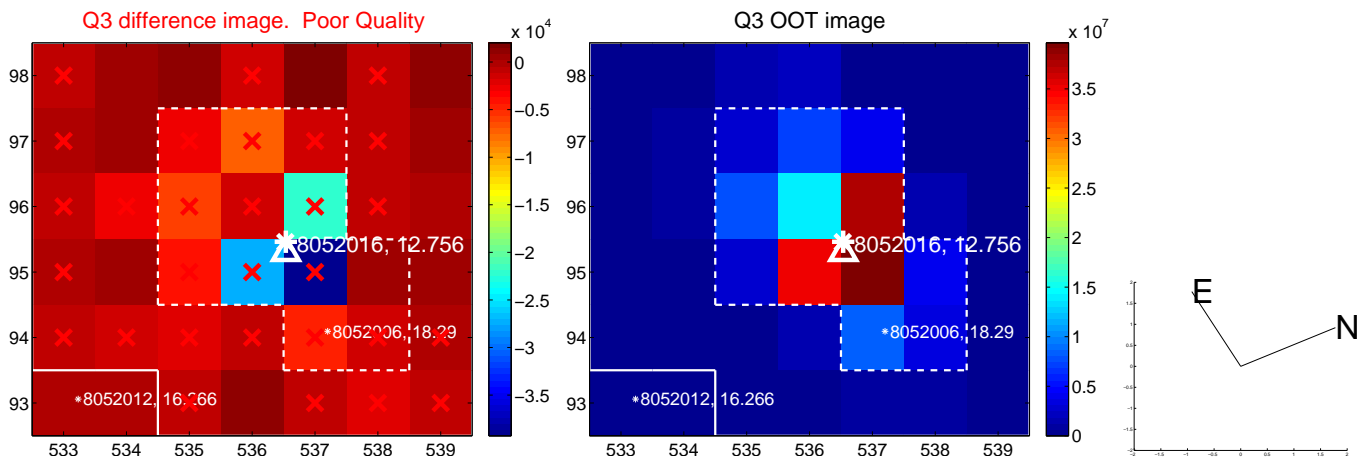
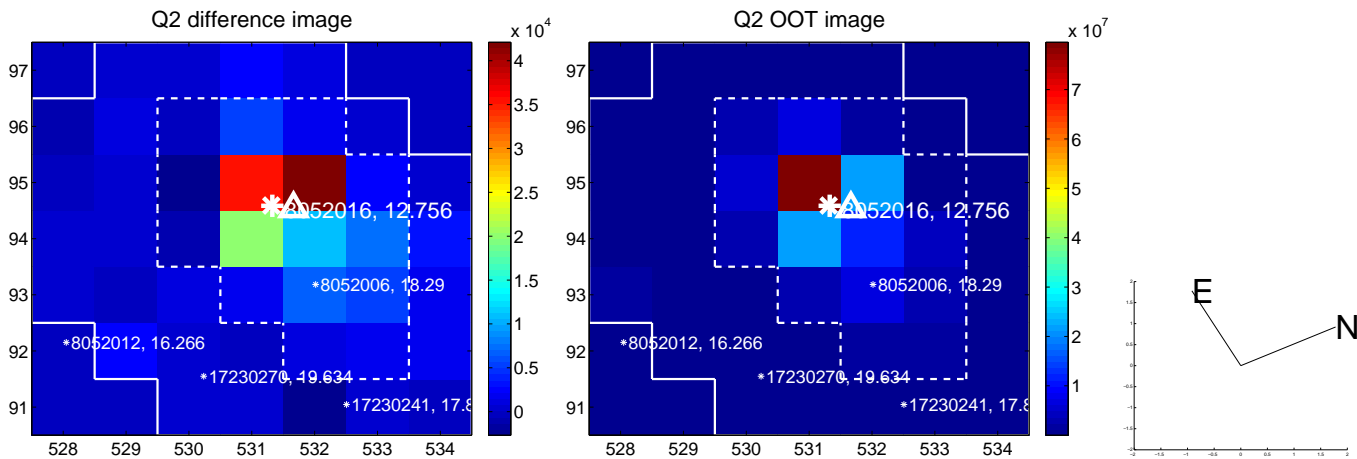
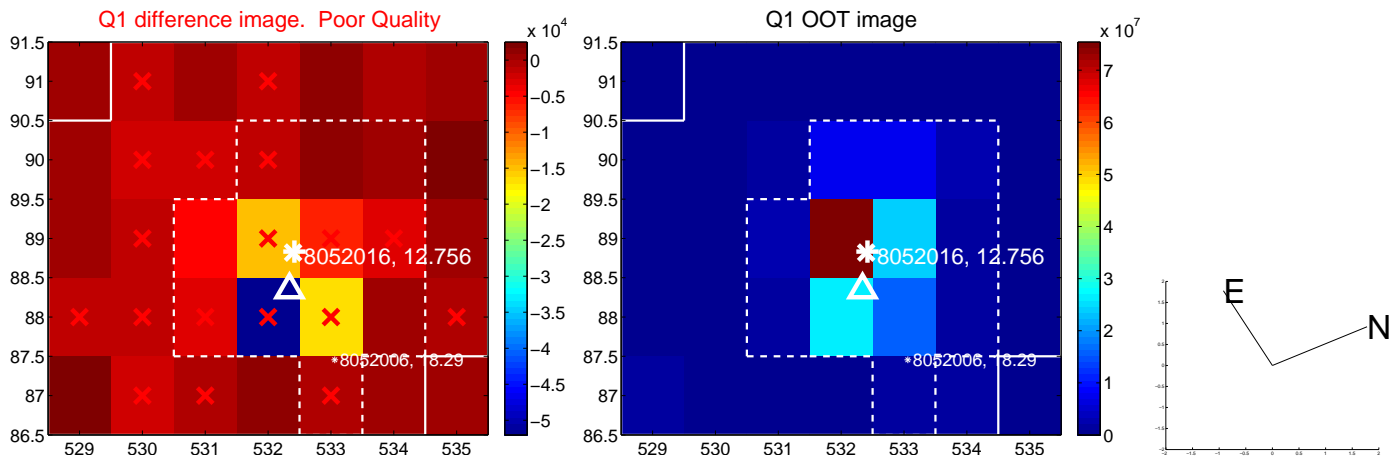
The direct PRF centroid is offset from the target star catalog position by about 0.07 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.582 \pm 0.612$	0.95	$-0.573 \pm 0.743$	$-0.104 \pm 0.875$
PRF-fit source offset from KIC position	$0.614 \pm 0.654$	0.94	$-0.612 \pm 0.709$	$-0.046 \pm 0.962$
photometric centroid source offset	$0.61 \pm 0.51$	1.21	$0.59 \pm 0.51$	$-0.15 \pm 0.46$



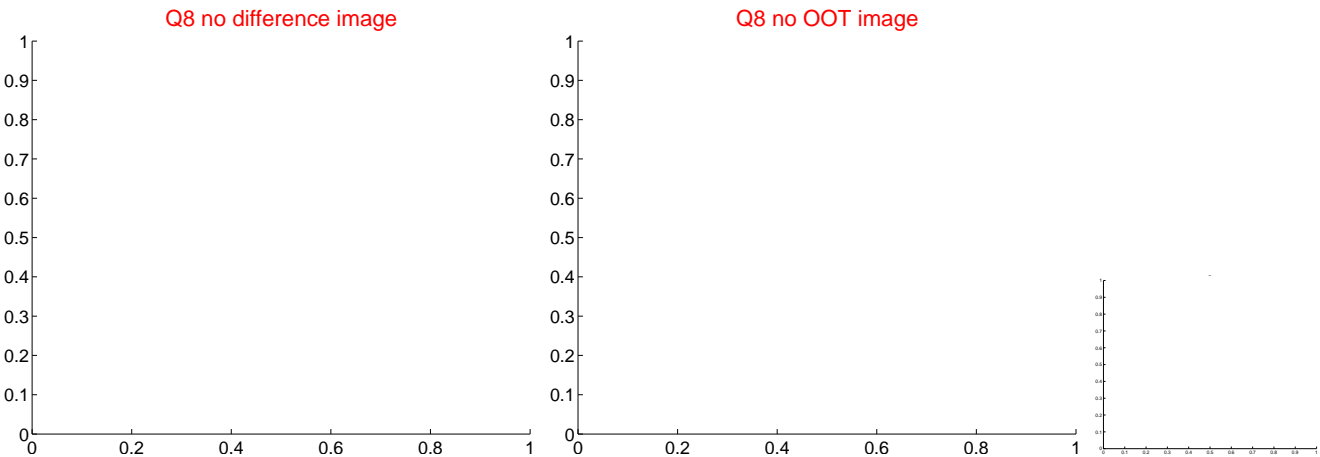
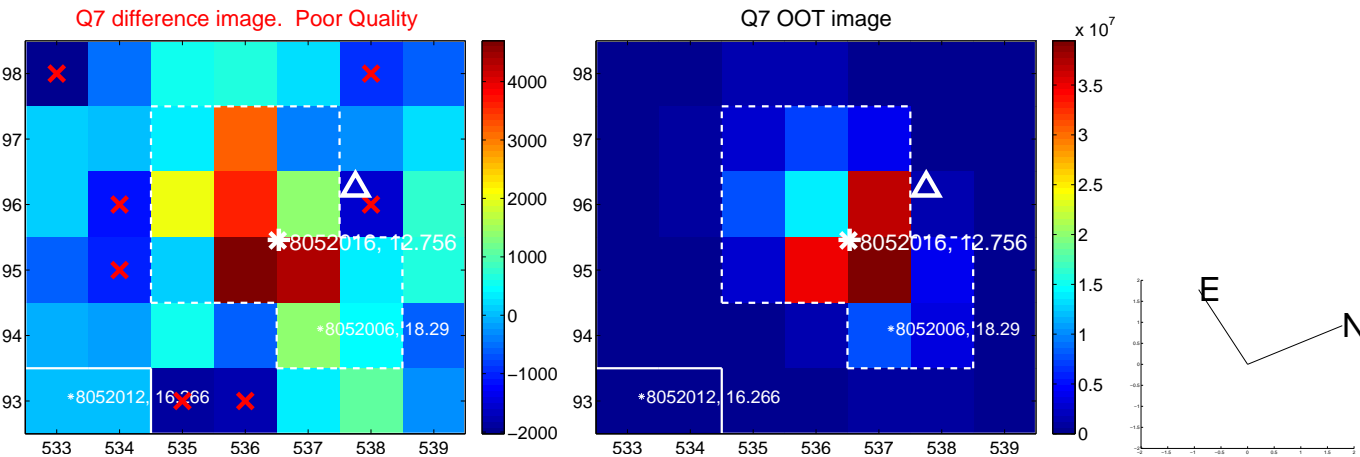
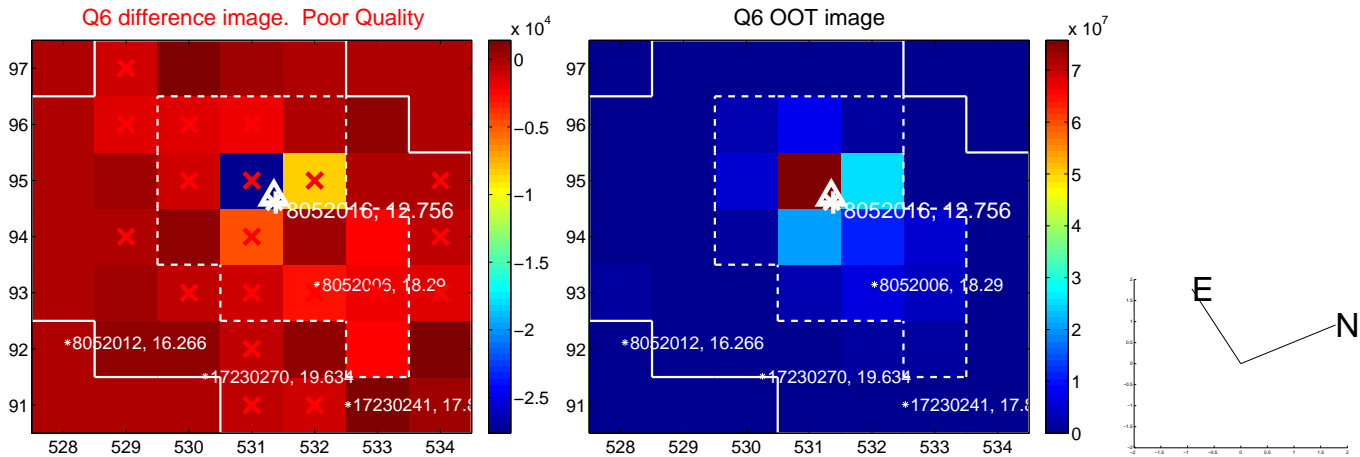
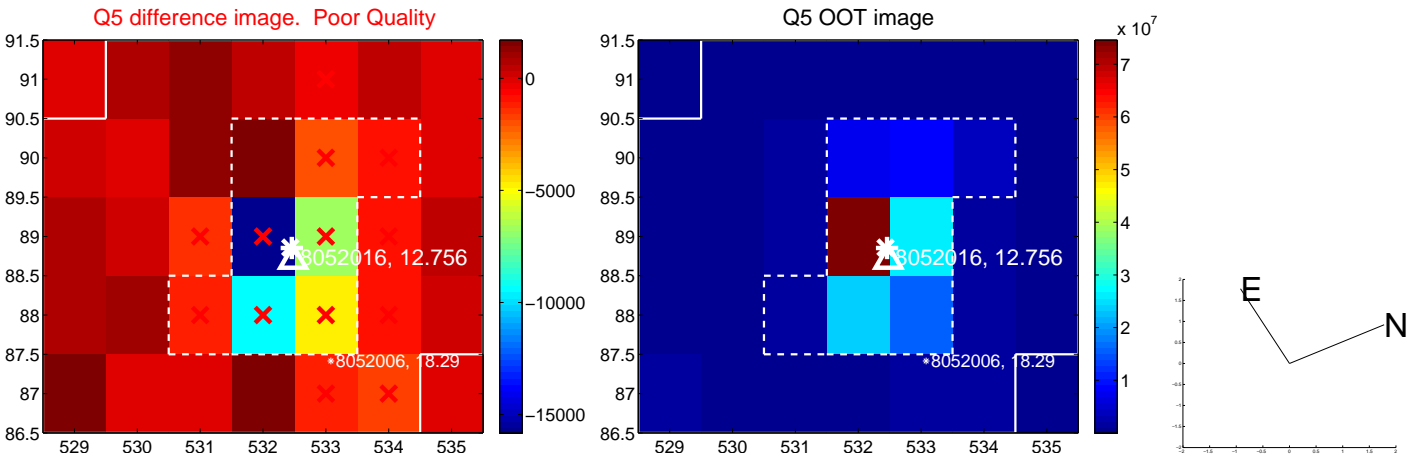
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

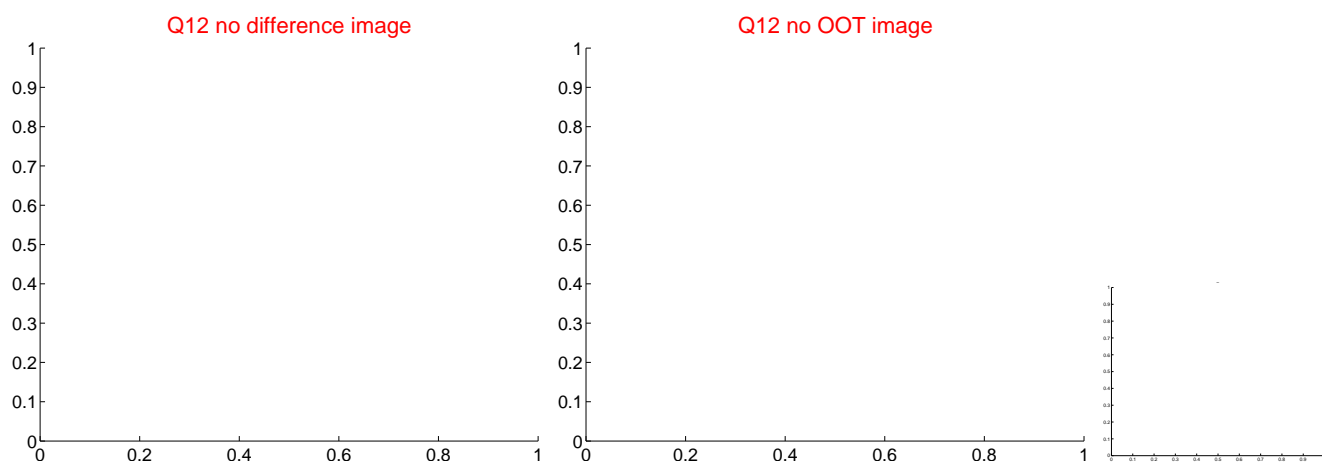
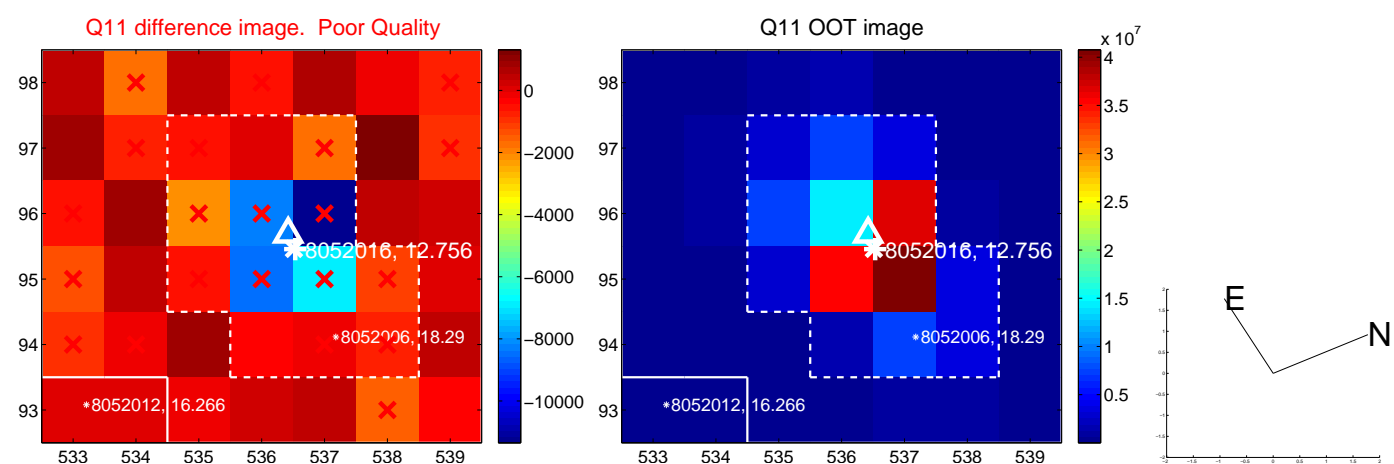
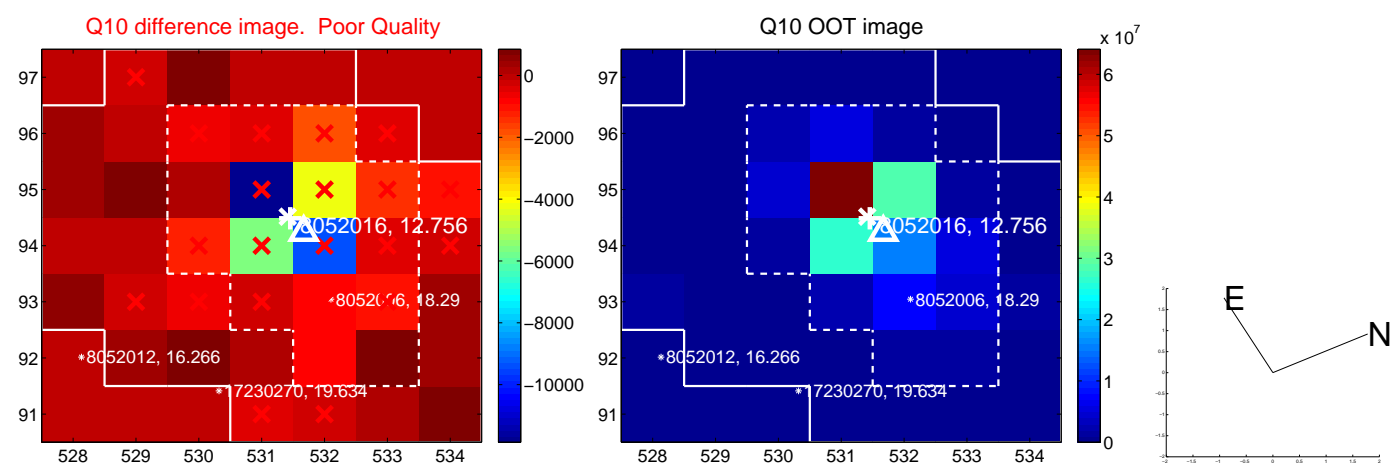
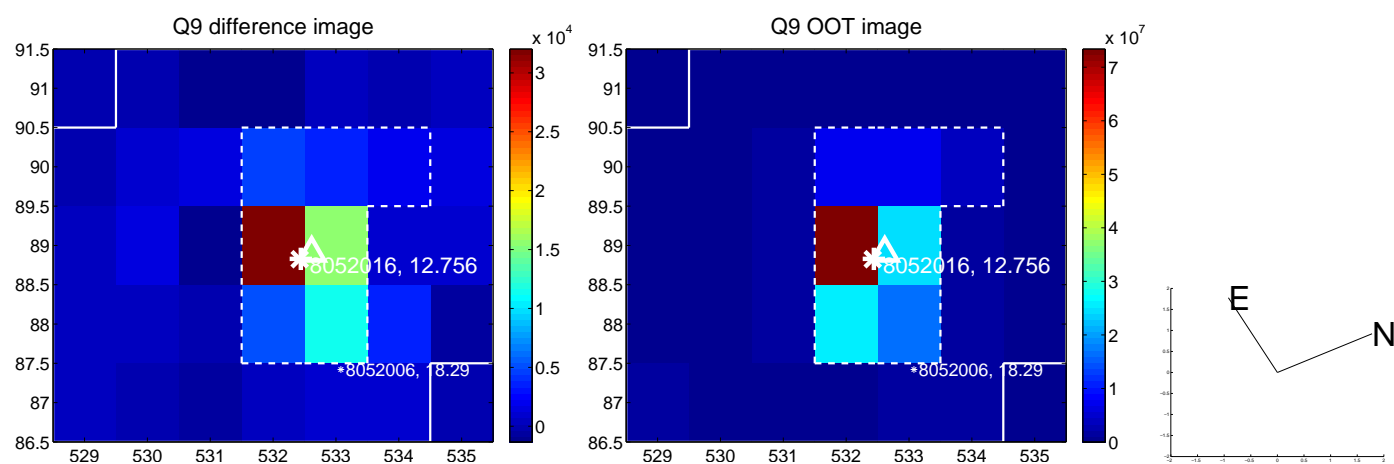




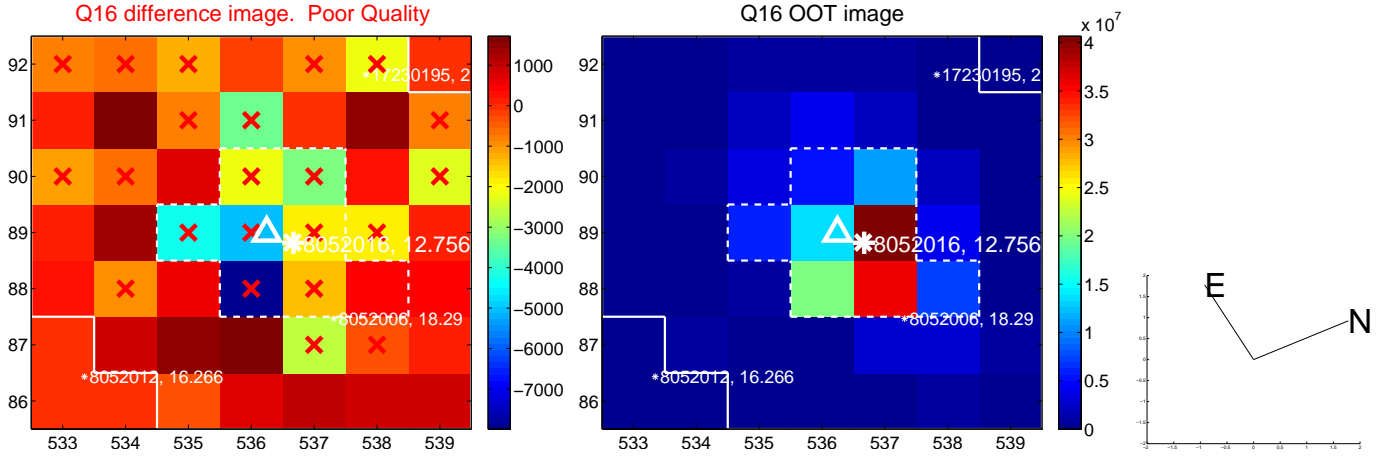
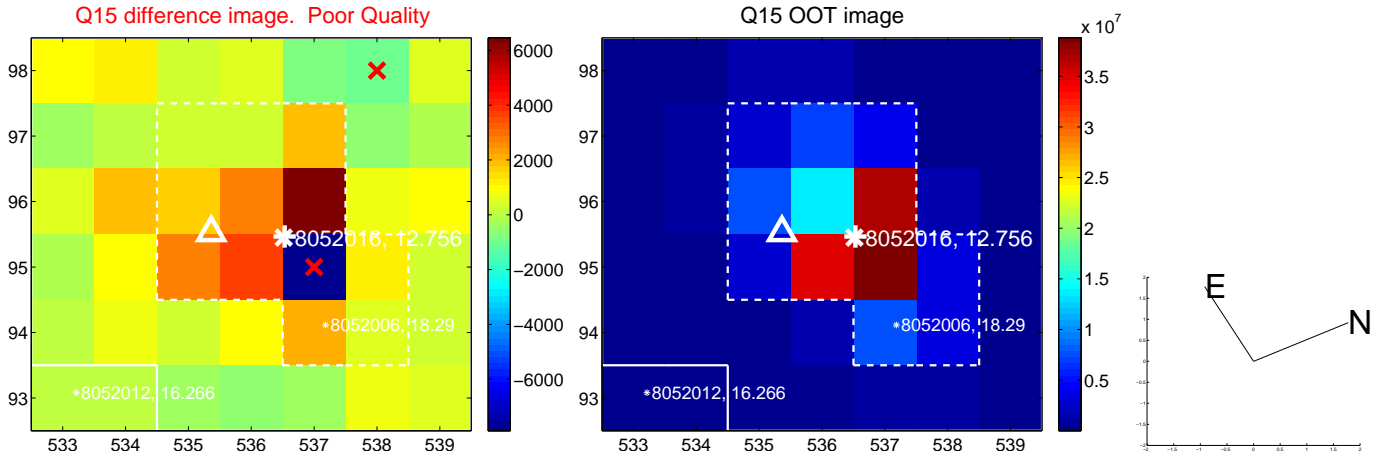
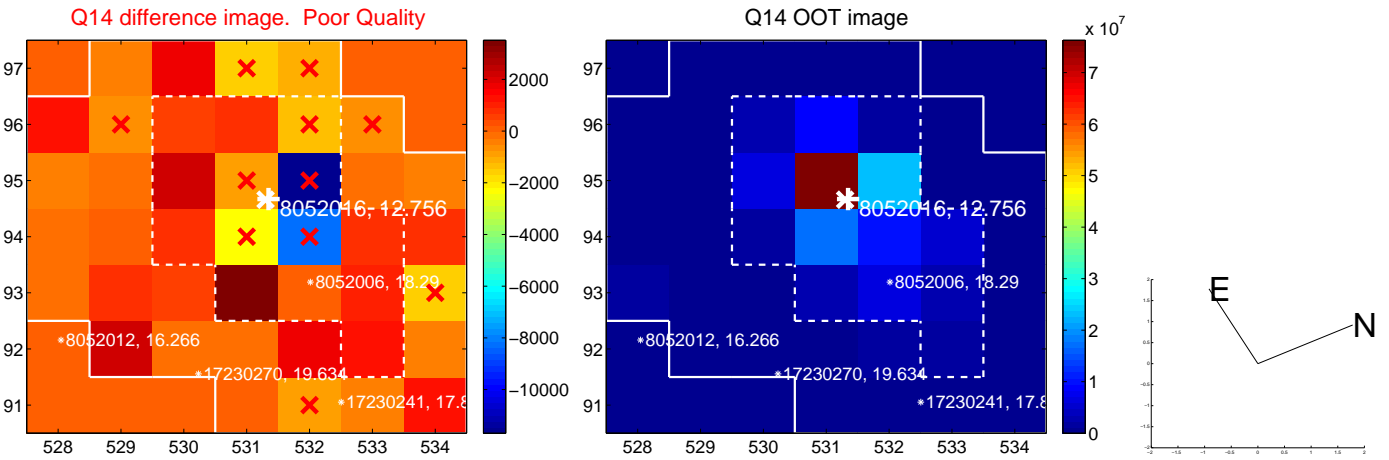
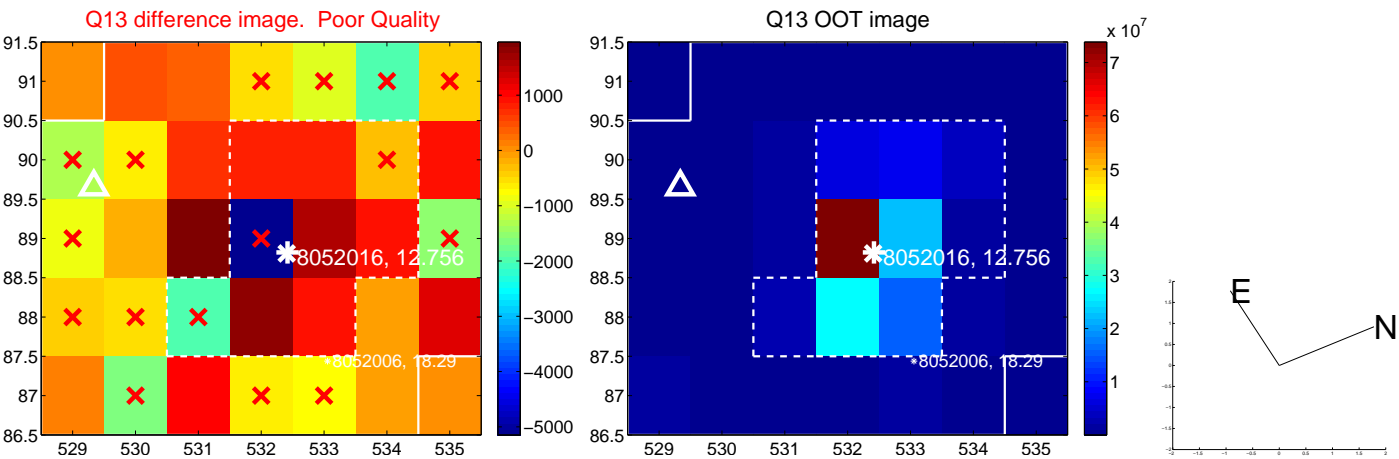
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



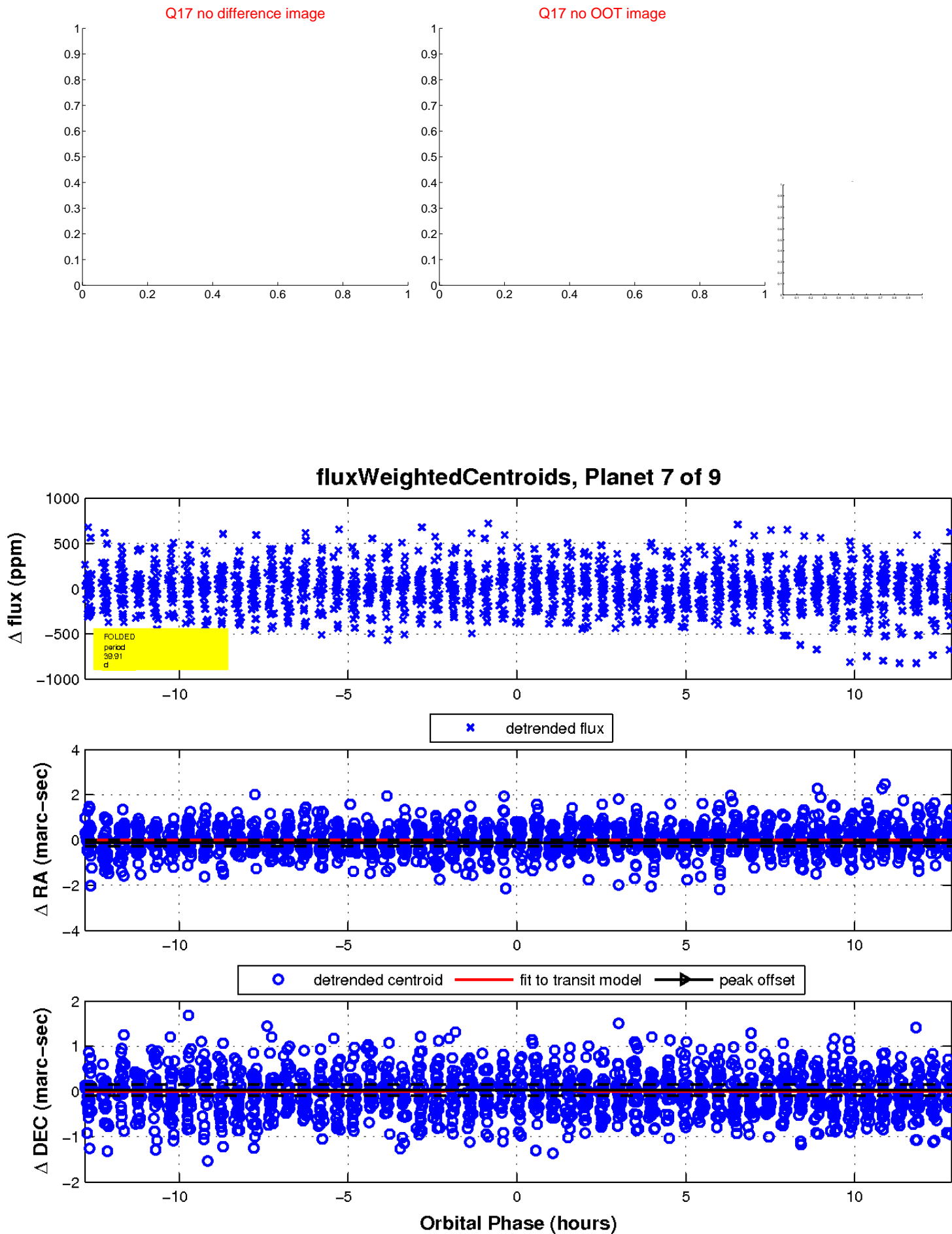
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

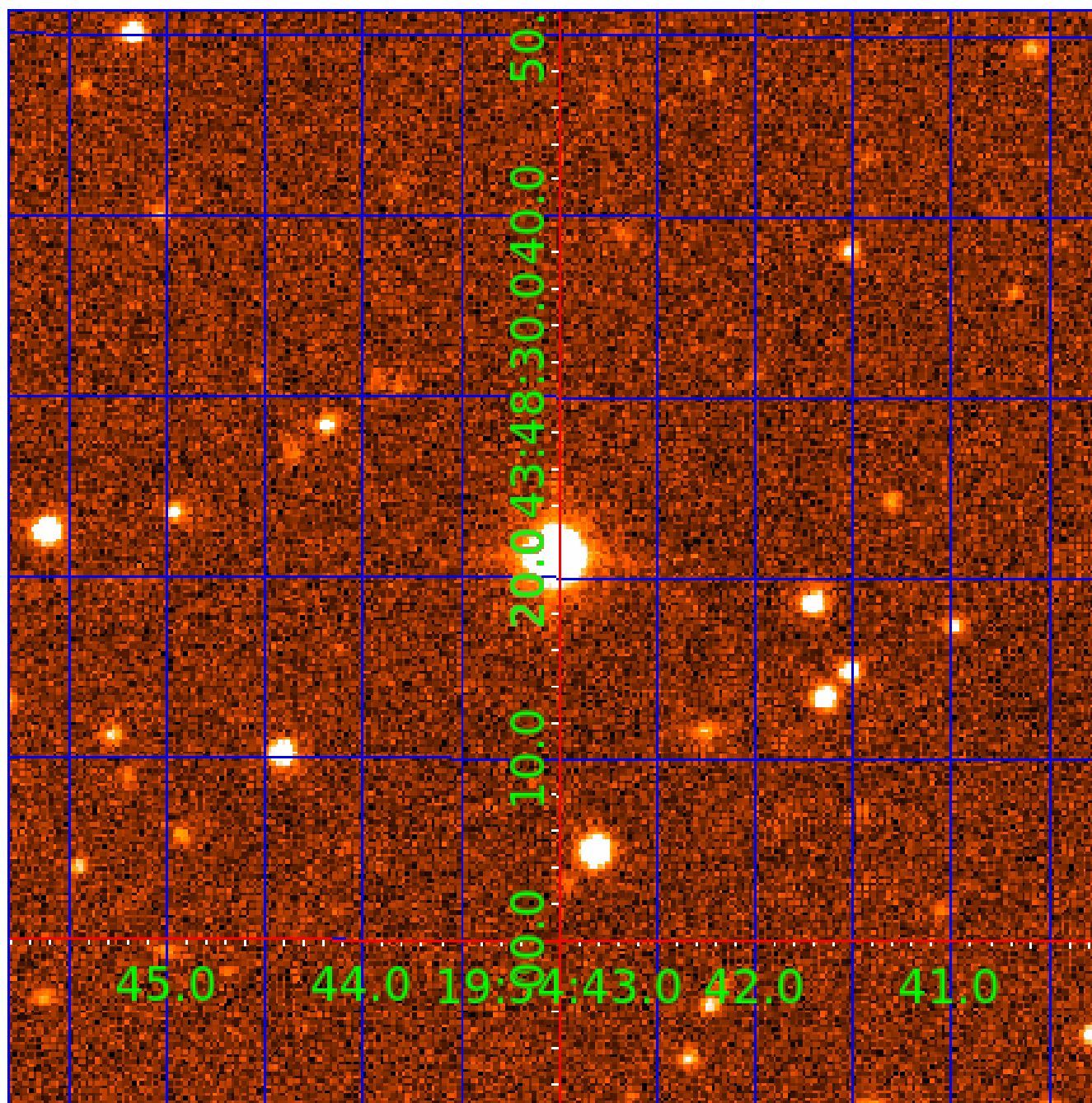


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



## KIC 008052016

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008052016-01	OBS	No	2.605256	133.117659	31.9	19.238	9.6	7.3	1.99	6212	1.16	3524.60
008052016-02	OBS	No	67.763122	134.382802	184.4	6.496	25.0	11.1	1.99	6212	3.03	45.73
008052016-03	OBS	No	26.742080	135.727966	190.8	10.952	18.8	12.1	1.99	6212	2.99	158.00
008052016-04	OBS	No	33.184196	158.831256	176.4	4.858	16.2	7.2	1.99	6212	2.96	118.49
008052016-05	OBS	No	37.315026	162.366643	172.7	3.991	13.1	7.8	1.99	6212	2.88	101.33
008052016-06	OBS	No	37.038602	156.474640	246.9	4.412	12.2	11.5	1.99	6212	3.45	102.34
008052016-07	OBS	No	39.906683	164.120100	244.5	4.294	9.9	10.4	1.99	6212	3.45	92.65
008052016-08	OBS	No	23.077641	133.725683	160.9	6.368	9.5	9.1	1.99	6212	2.90	192.30
008052016-09	OBS	No	28.929926	143.231572	102.0	5.045	8.8	5.4	1.99	6212	2.28	142.27

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008052016-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV
008052016-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
008052016-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—HALO_GHOST
008052016-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
008052016-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
008052016-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT
008052016-07	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—HALO_GHOST
008052016-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
008052016-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

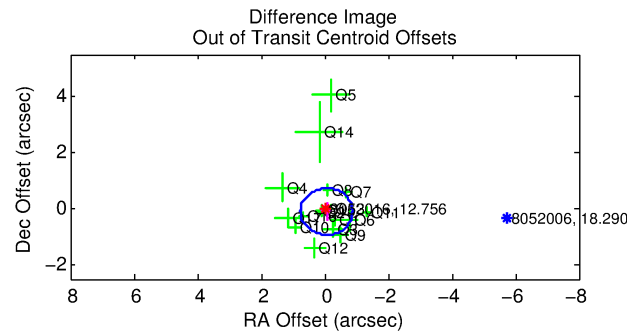
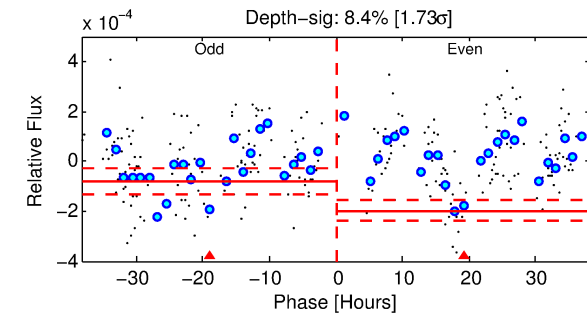
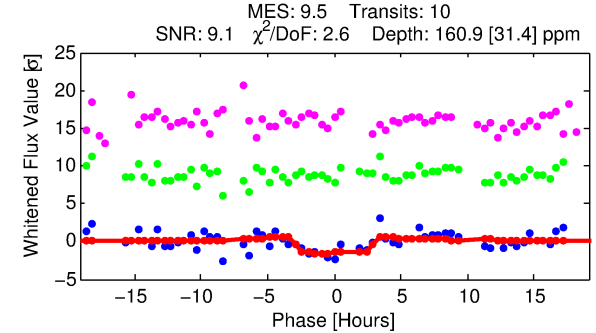
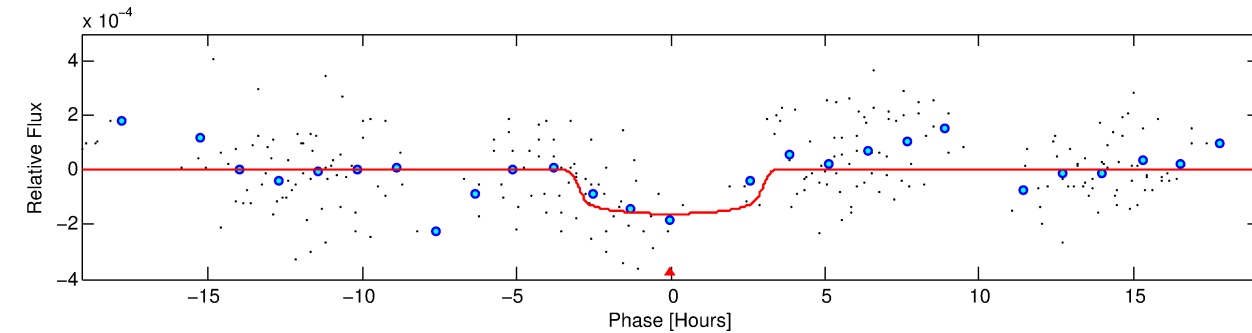
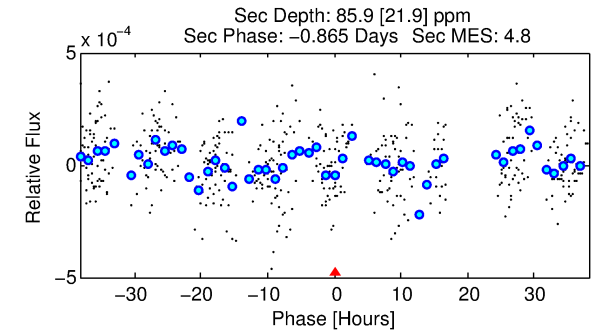
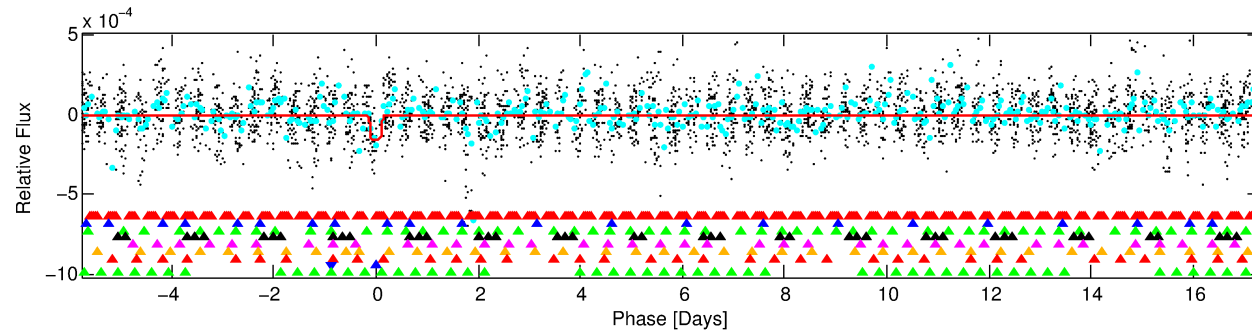
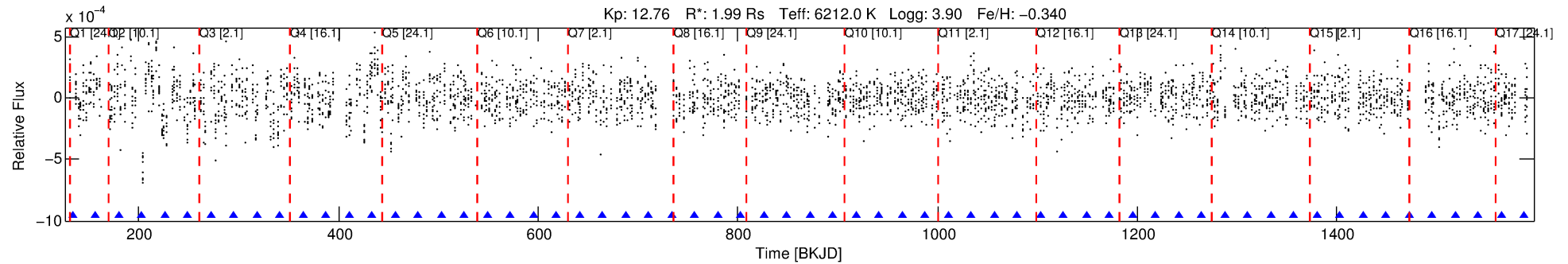
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 008052016-08

No Significant Match Found

# DV One-Page Summary

KIC: 8052016 Candidate: 8 of 9 Period: 23.078 d



## DV Fit Results:

Period = 23.07764 [0.00040] d  
Epoch = 133.7257 [0.0177] BKJD  
Rp/R\* = 0.0134 [0.0055]  
a/R\* = 14.26 [30.33]  
b = 0.87 [0.59]  
Seff = 192.30 [99.65]  
Teq = 950 [123] K  
Rp = 2.90 [1.51] Re  
a = 0.1657 [0.0517] AU  
Ag = 154.57 [155.09] [0.99σ]  
Teffp = 5177 [1130] K [3.72σ]

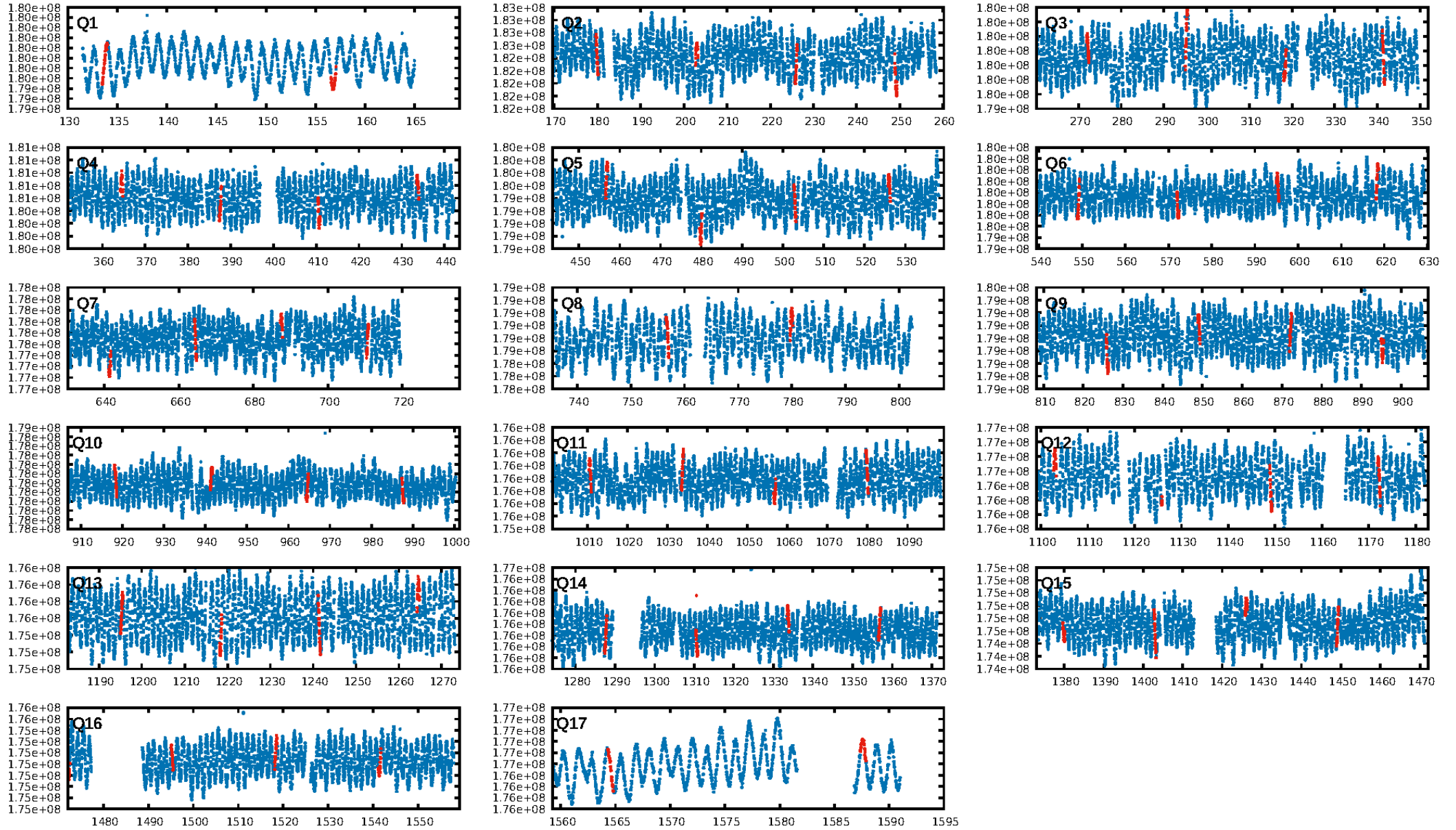
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [24.25σ]  
LongPeriod-sig: 100.0% [6.94σ]  
ModelChiSquare2-sig: 0.2%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 6.66e-07  
RollingBand-fgt: 1.00 [9/9]  
GhostDiagnostic-chr: -4.043  
Centroid-sig: 84.7%  
Centroid-so: 0.132 arcsec [0.30σ]  
OotOffset-rm: 0.116 arcsec [0.42σ]  
KicOffset-rm: 0.080 arcsec [0.41σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.53 [9/17]  
DiffImageOverlap-fno: 0.53 [9/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 23:13:51 Z

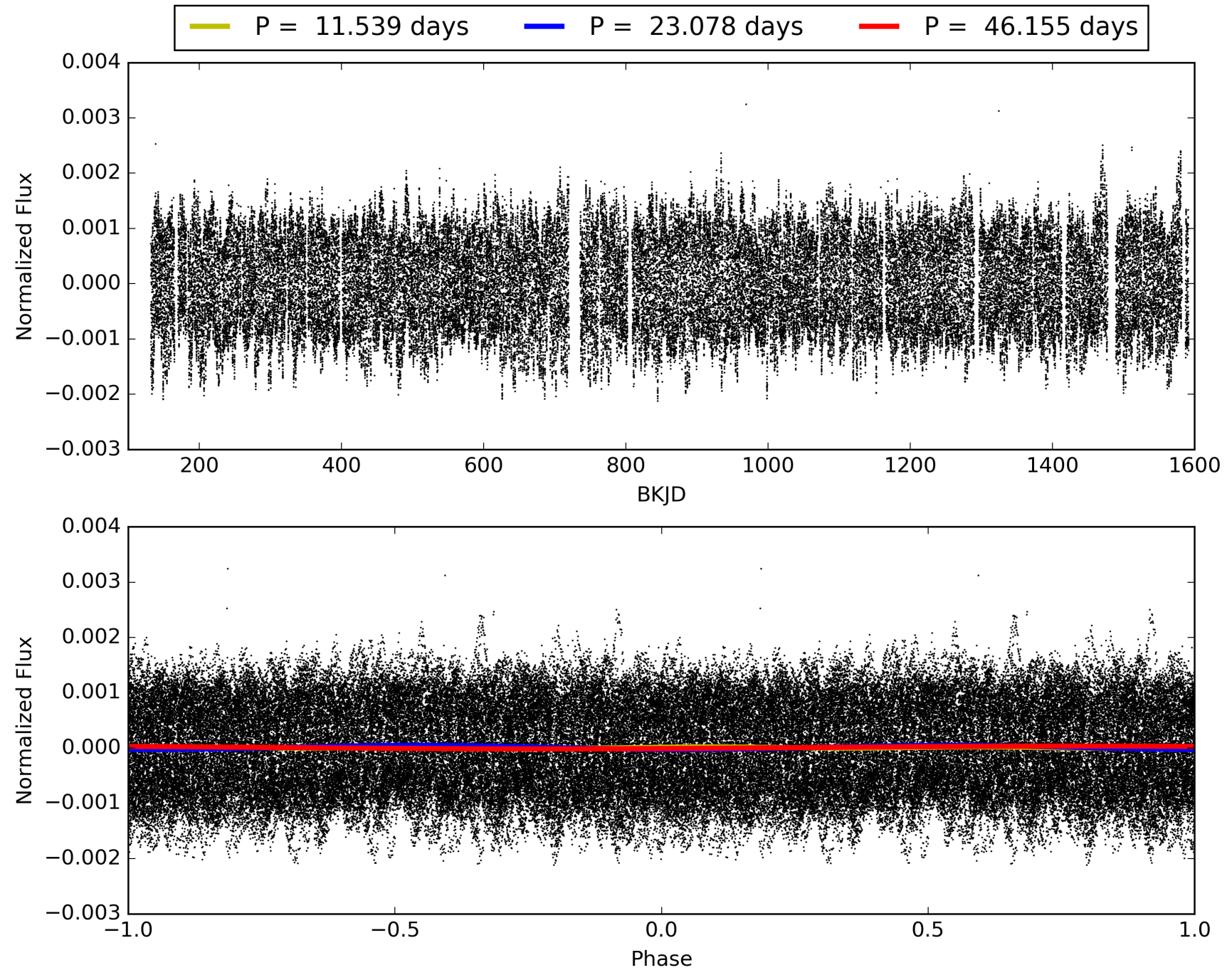
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 008052016-08, PDC Light Curves



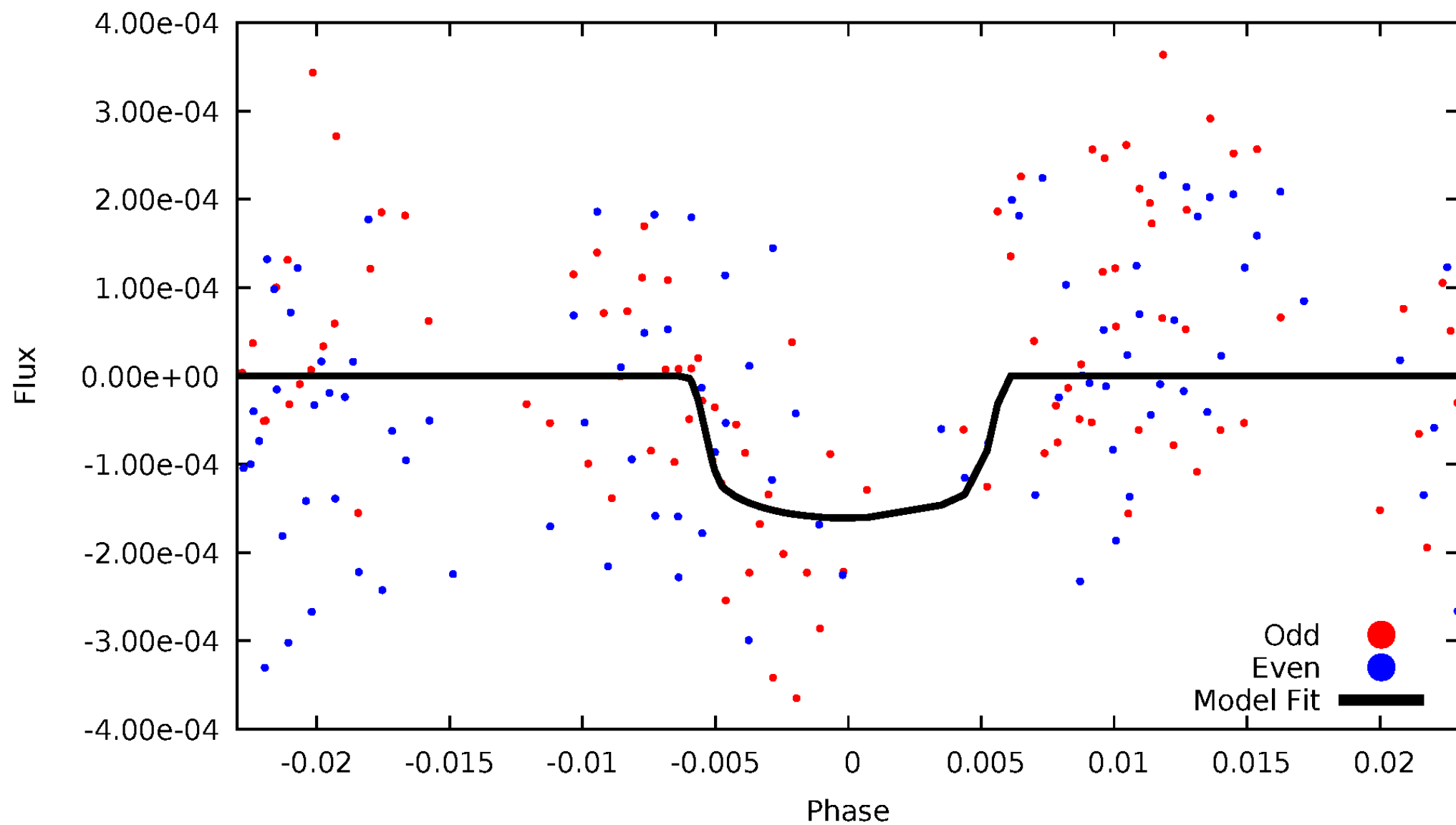


# TCE 008052016-08



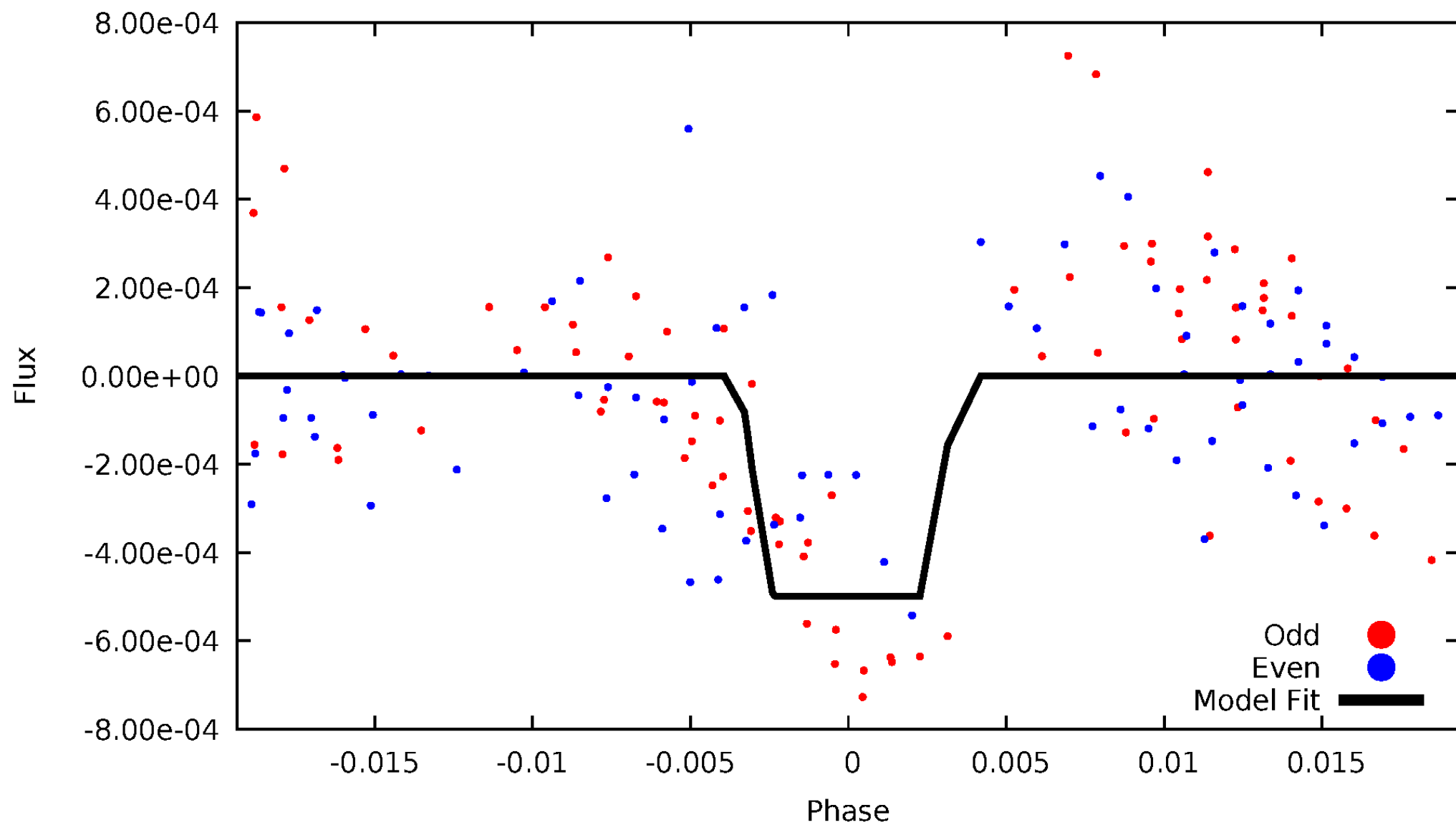
# DV Odd/Even

TCE 008052016-08



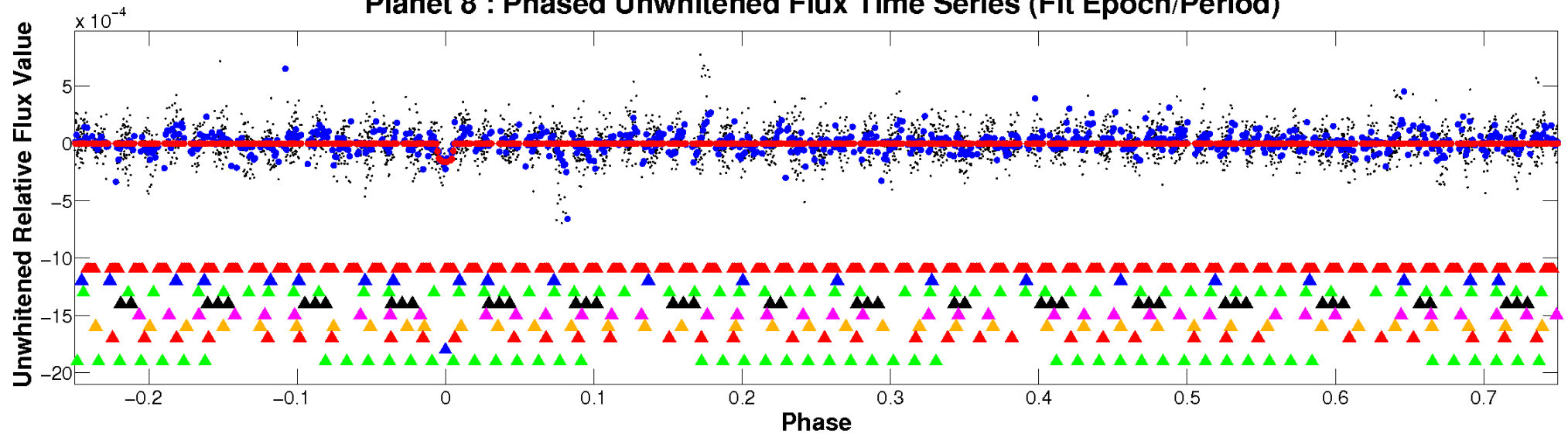
# ALT Odd/Even

TCE 008052016-08

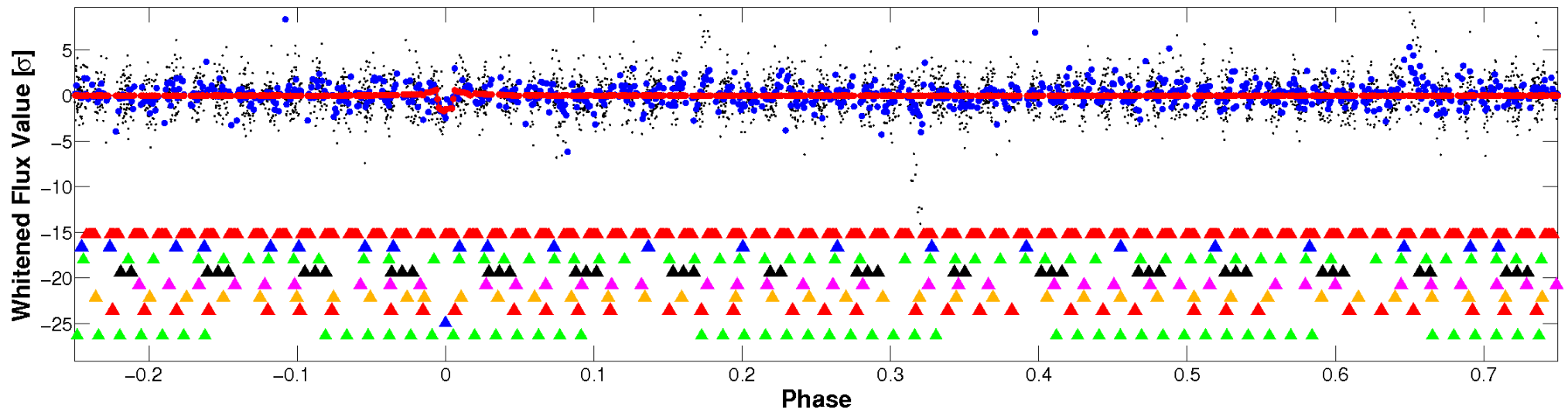


# Non-Whitened Vs. Whitened Light Curve

## Planet 8 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

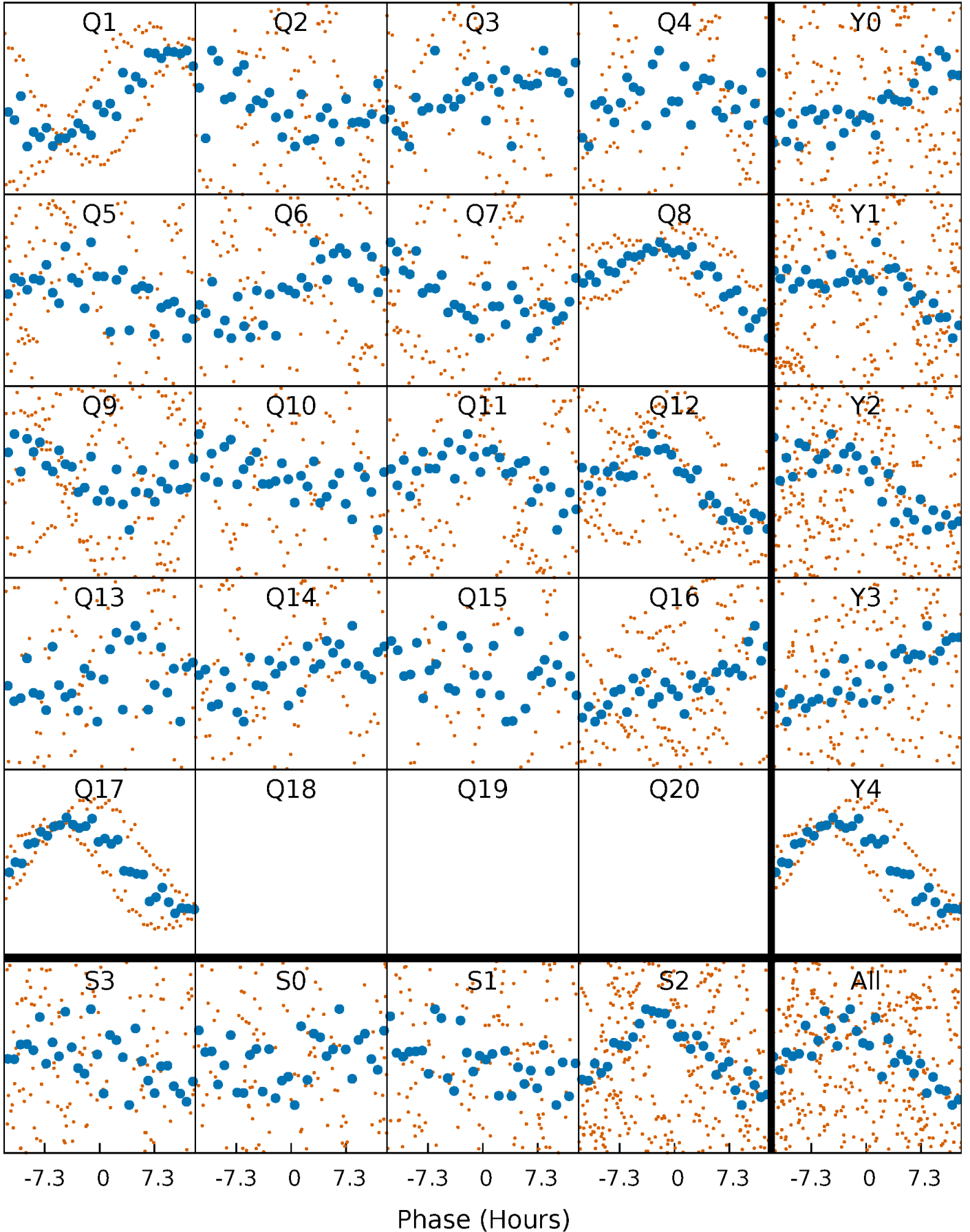


## Planet 8 : Phased Whitened Flux Time Series (Fit Epoch/Period)



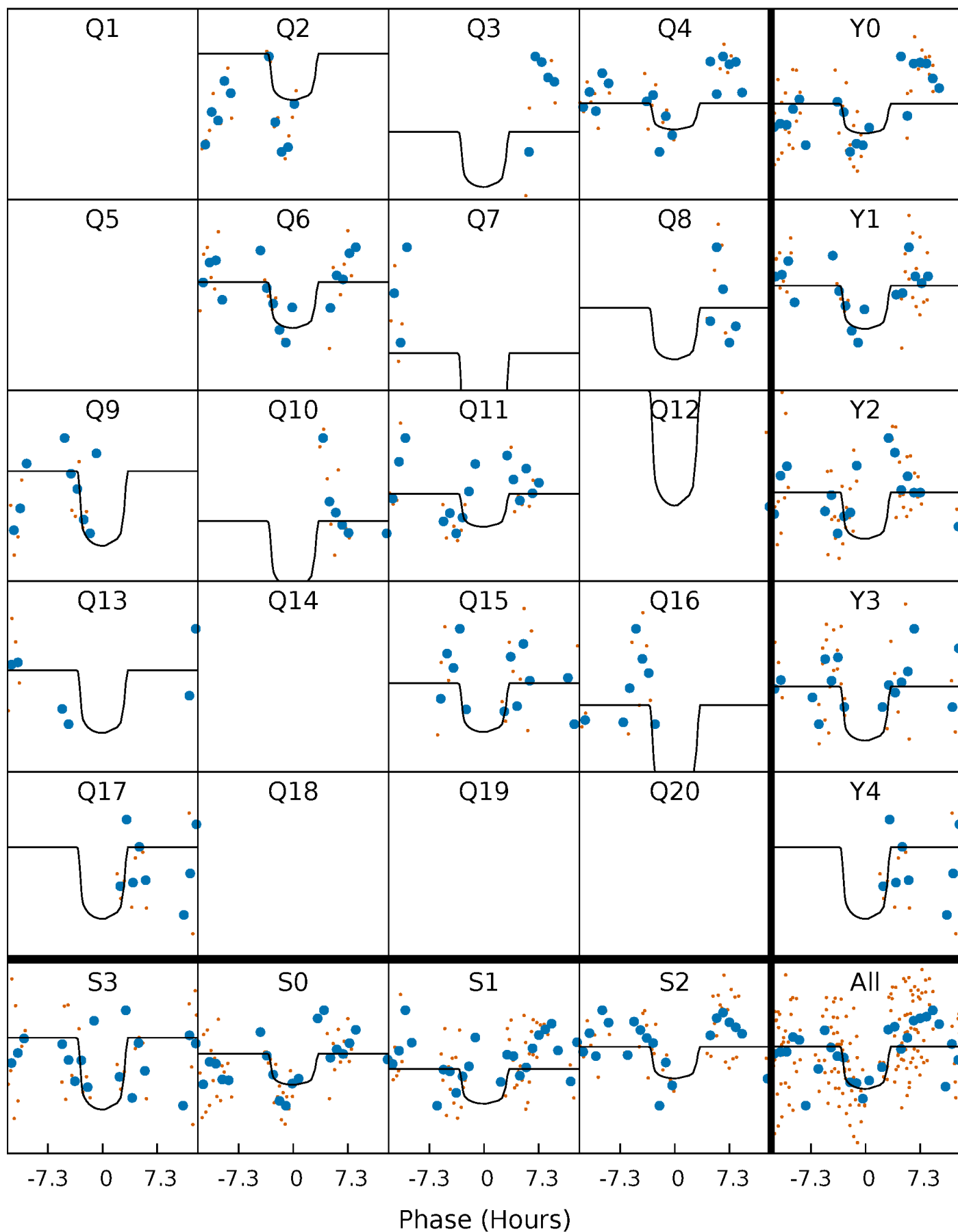
# PDC Quarter-Phased Transit Curves

TCE 008052016-08 P= 23.077641 Days  $T_0=133.725683$  (BKJD)



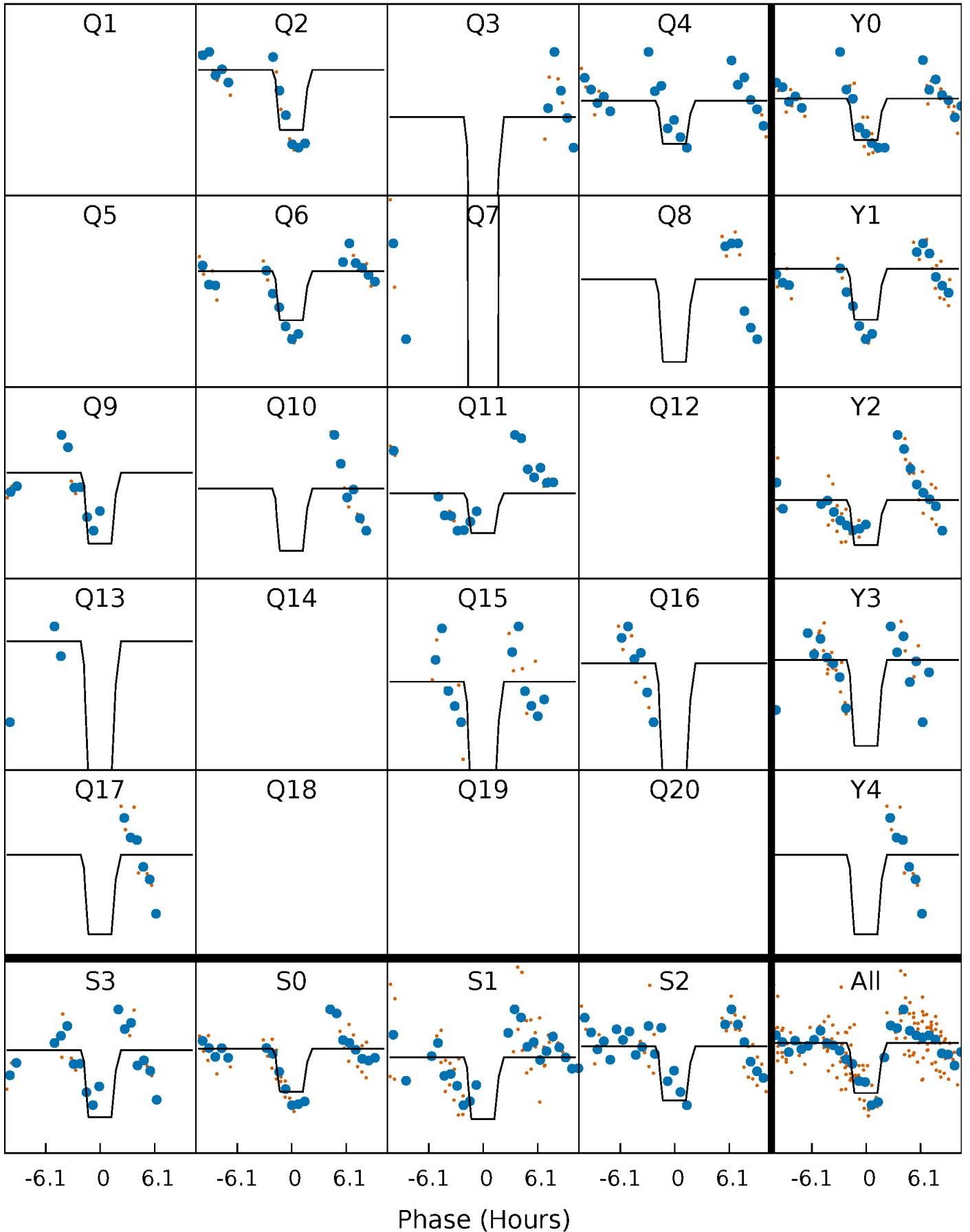
# DV Quarter-Phased Transit Curves

TCE 008052016-08 P= 23.077641 Days  $T_0=133.725683$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

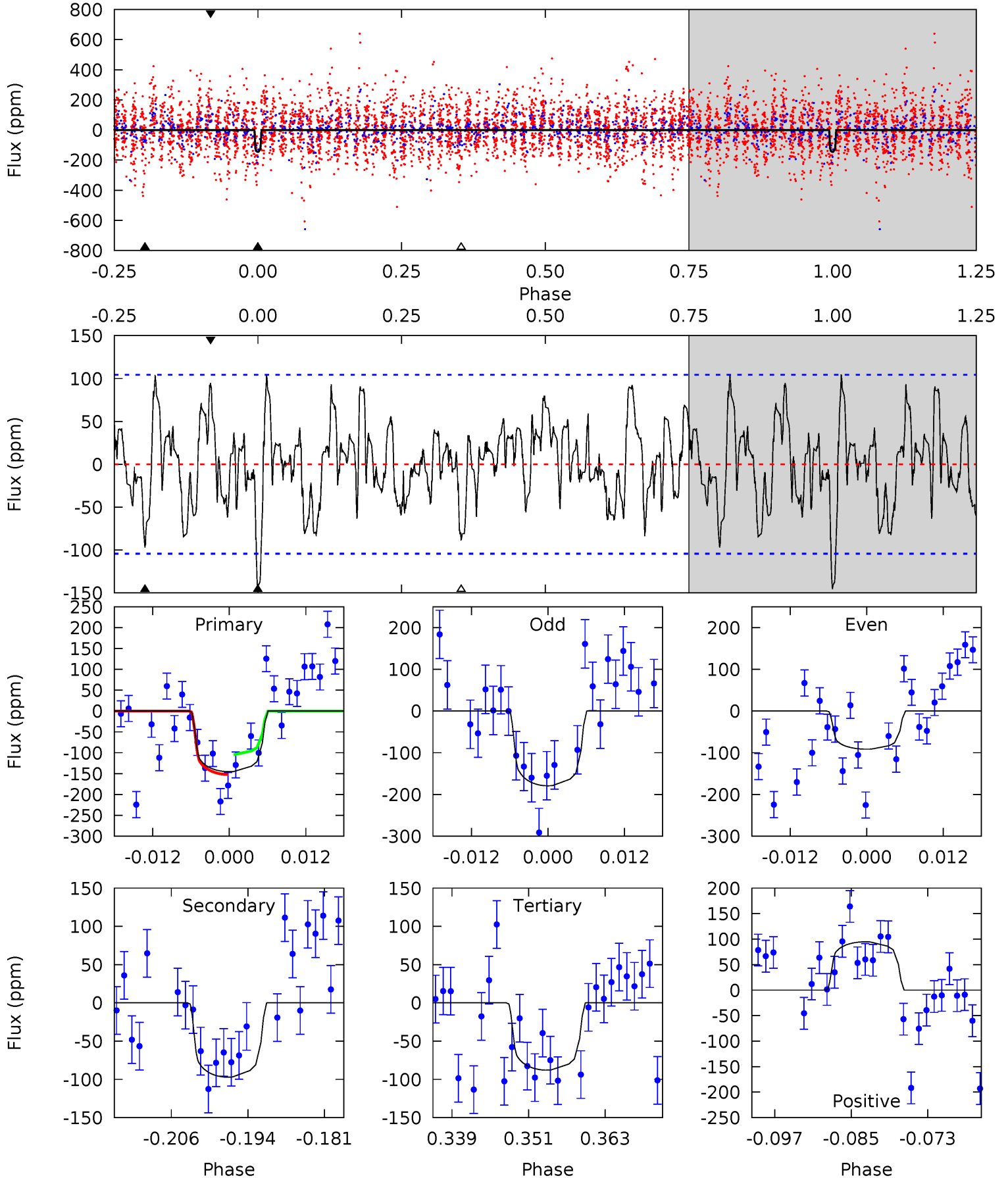
TCE 008052016-08 P= 23.078347 Days  $T_0=133.665690$  (BKJD)



# DV Model-Shift Uniqueness Test

008052016-08, P = 23.077641 Days, E = 110.648042 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
6.96	4.65	4.20	4.53	4.99	2.51	1.75	2.75	2.42	0.44	0.12	2.07	1.00	0.42	0.88

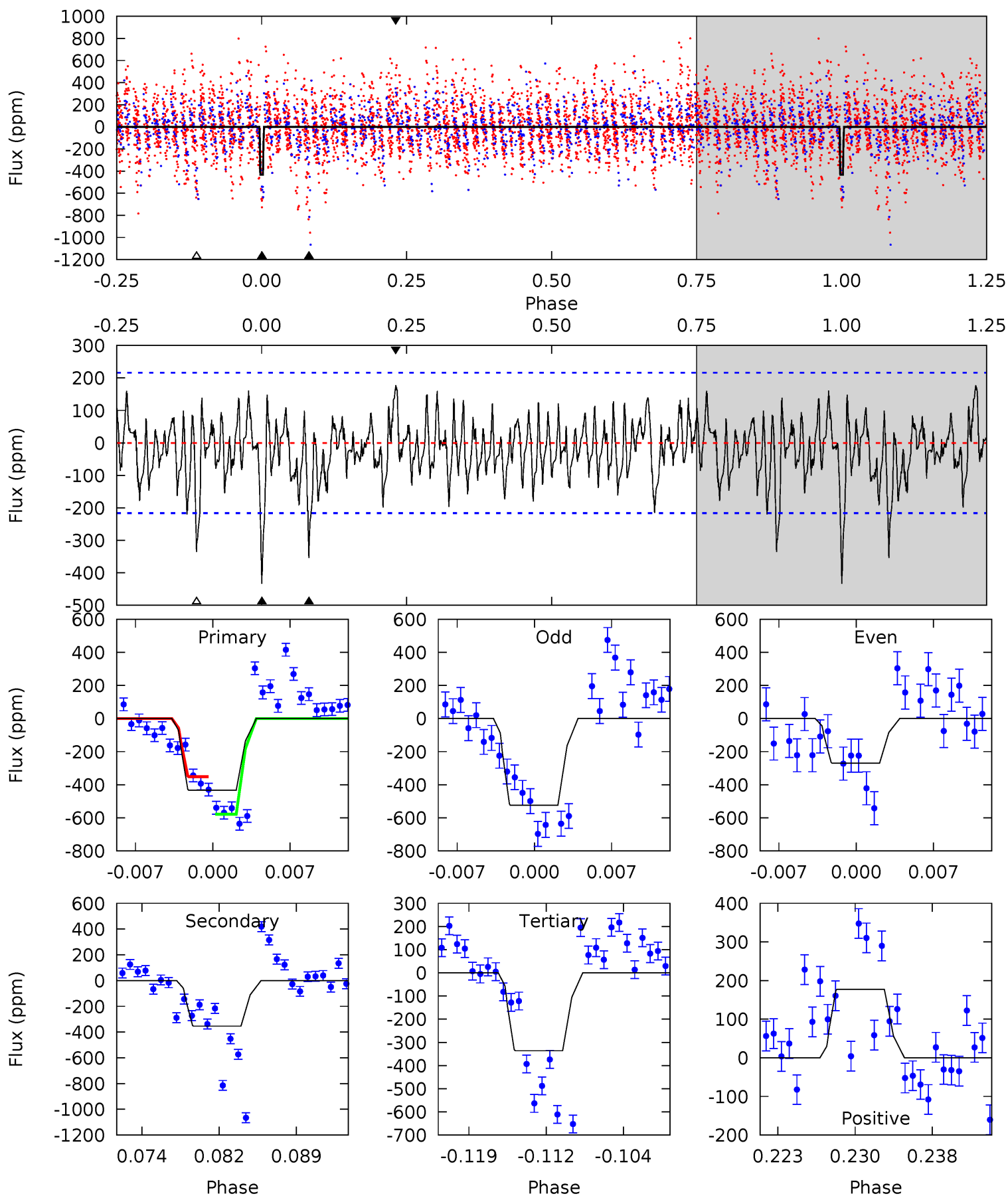




# Alt Model-Shift Uniqueness Test

008052016-08, P = 23.078347 Days, E = 110.587343 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
10.2	8.33	7.90	4.17	5.08	2.68	1.73	2.30	6.03	0.43	4.16	2.91	1.17	0.29	2.57



### Stellar Parameters For KIC 008052016

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6212^{+171}_{-171}$	$3.897^{+0.300}_{-0.100}$	$-0.340^{+0.350}_{-0.300}$	$1.989^{+0.418}_{-0.628}$	$1.138^{+0.225}_{-0.184}$	$0.204^{+0.380}_{-0.074}$
	+3%/-3%	+8%/-3%	+103%/-88%	+21%/-32%	+20%/-16%	+187%/-36%
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 008052016-08 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-97 \pm 21$	$2.81^{+1.25}_{-1.29}$	$1300^{+83}_{-109}$	$5333^{+1817}_{-784}$	$189^{+494}_{-103}$
Alt.	$-354 \pm 43$	$4.60^{+1.51}_{-1.31}$	$1304^{+83}_{-113}$	$5706^{+923}_{-579}$	$261^{+232}_{-115}$

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

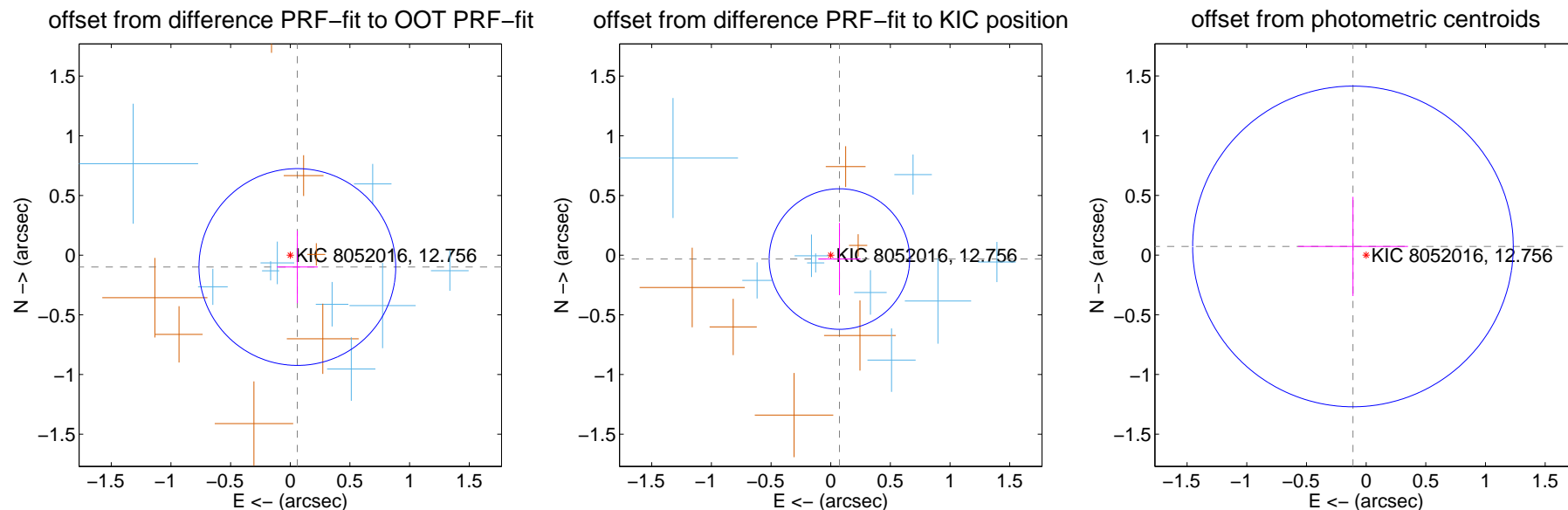
## DV Centroid Data

Supplemental centroid analysis for 008052016-08. Kepler magnitude: 12.76. Transit SNR 9.08

There are 9 quarters with good PRF difference image offsets

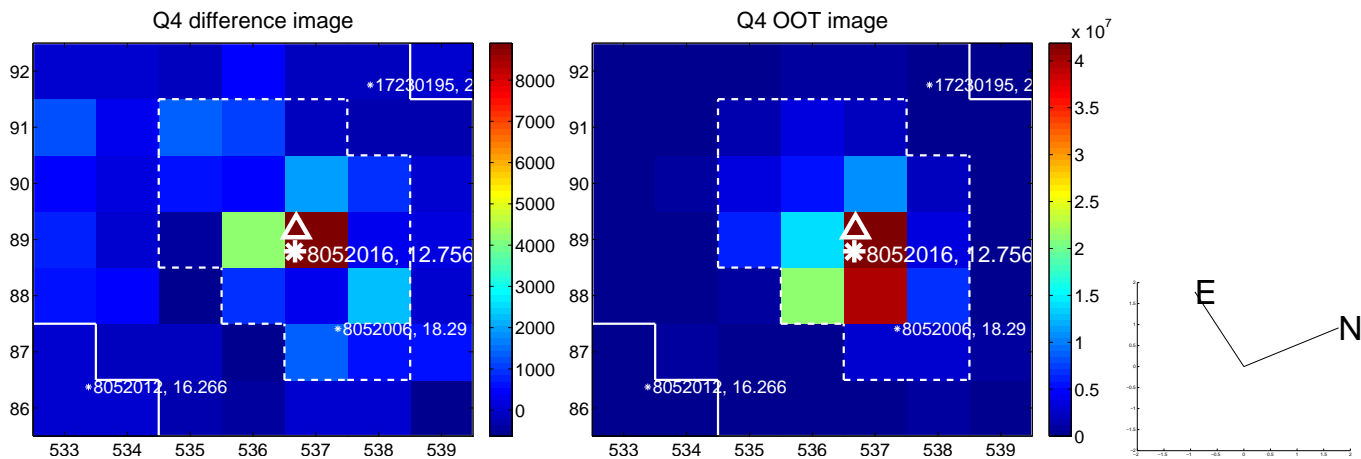
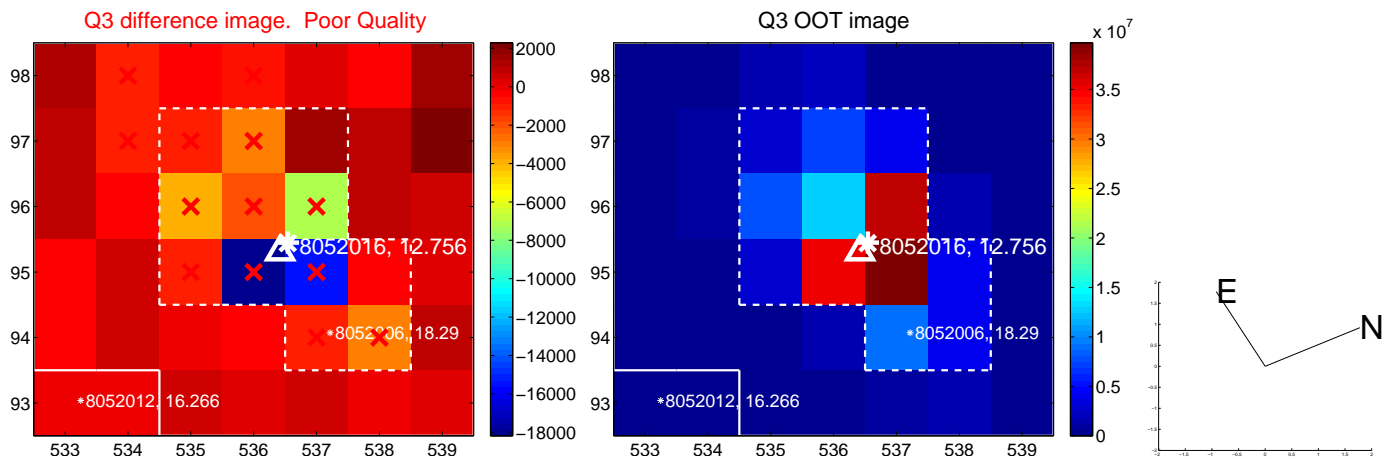
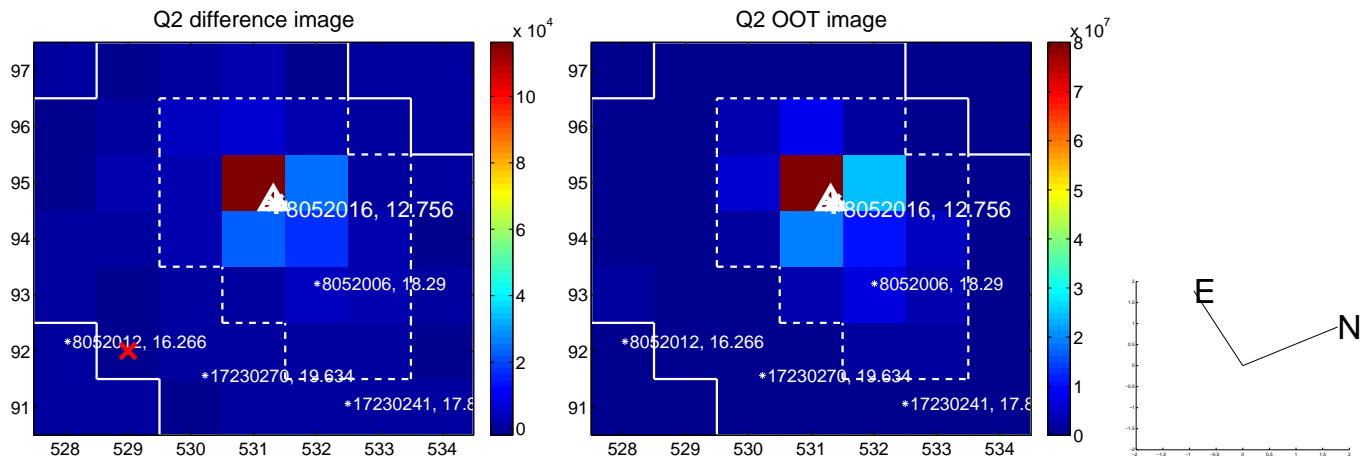
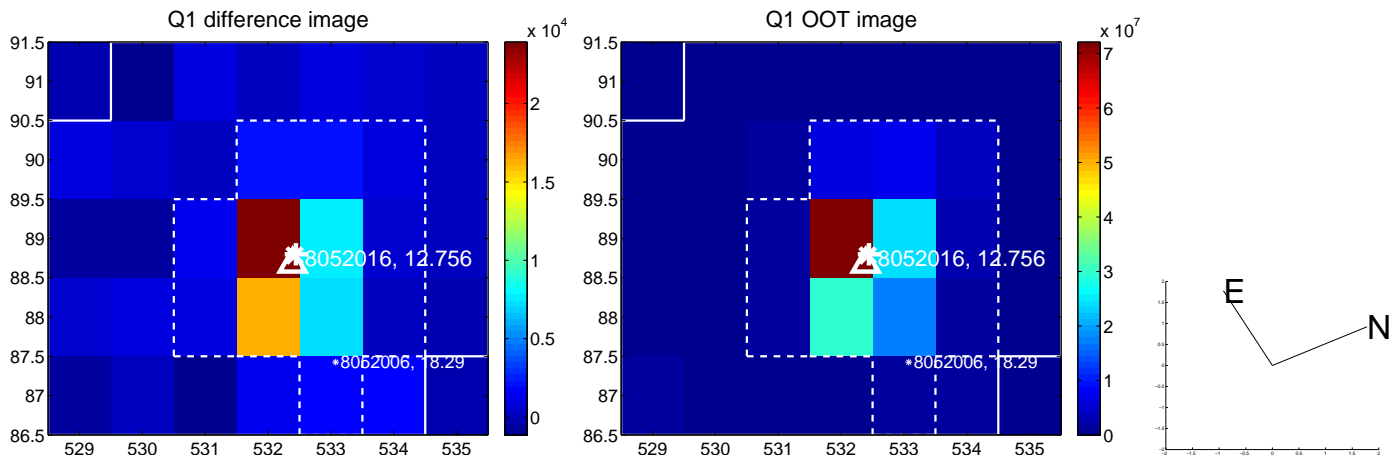
The direct PRF centroid is offset from the target star catalog position by about 0.09 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.116 \pm 0.275$	0.42	$-0.059 \pm 0.171$	$-0.099 \pm 0.303$
PRF-fit source offset from KIC position	$0.080 \pm 0.196$	0.41	$-0.073 \pm 0.177$	$-0.033 \pm 0.303$
photometric centroid source offset	$0.13 \pm 0.45$	0.30	$0.11 \pm 0.46$	$0.07 \pm 0.42$

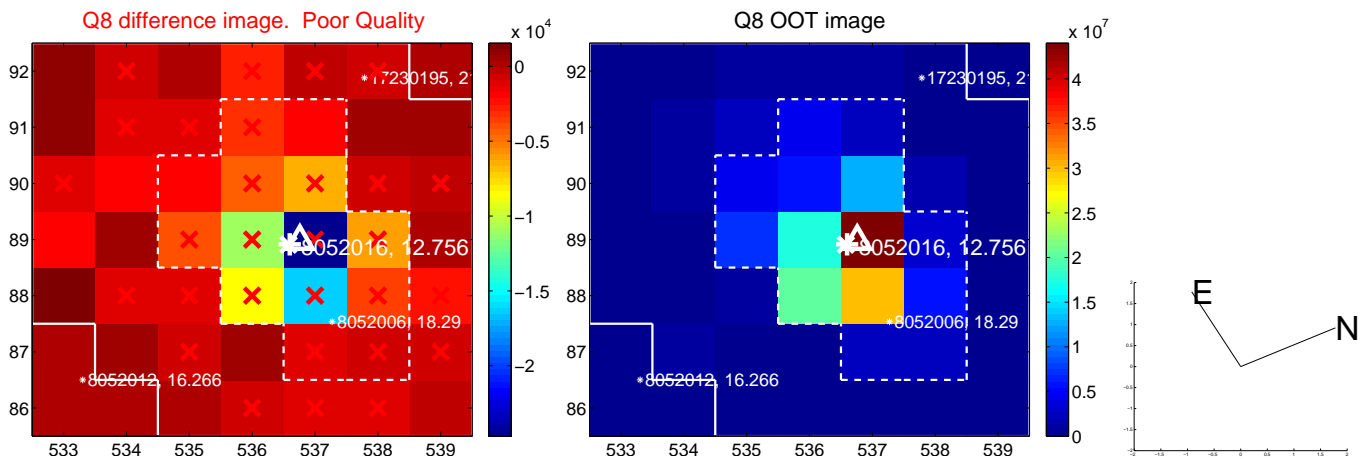
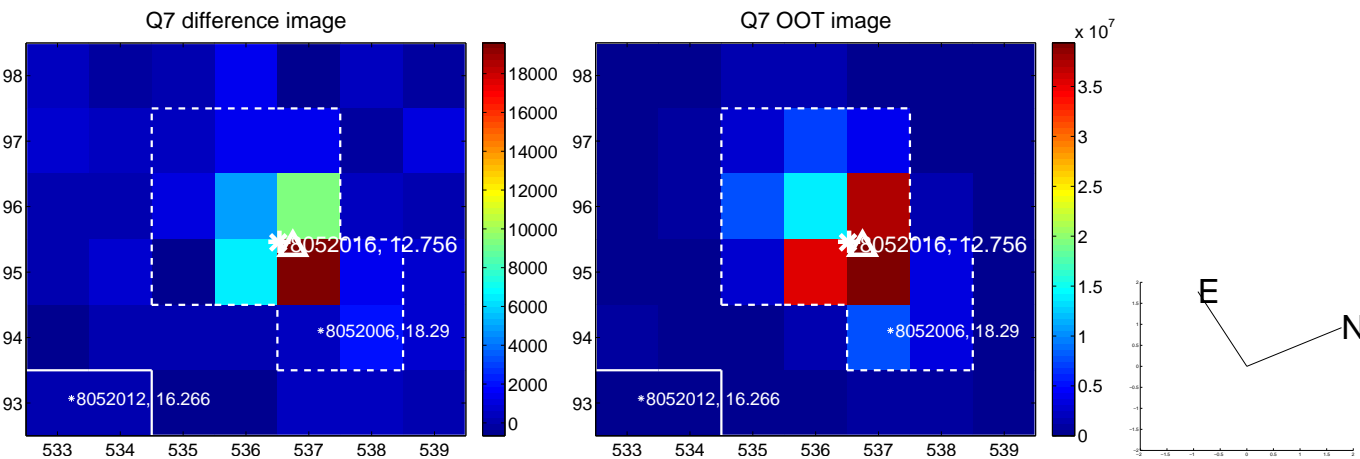
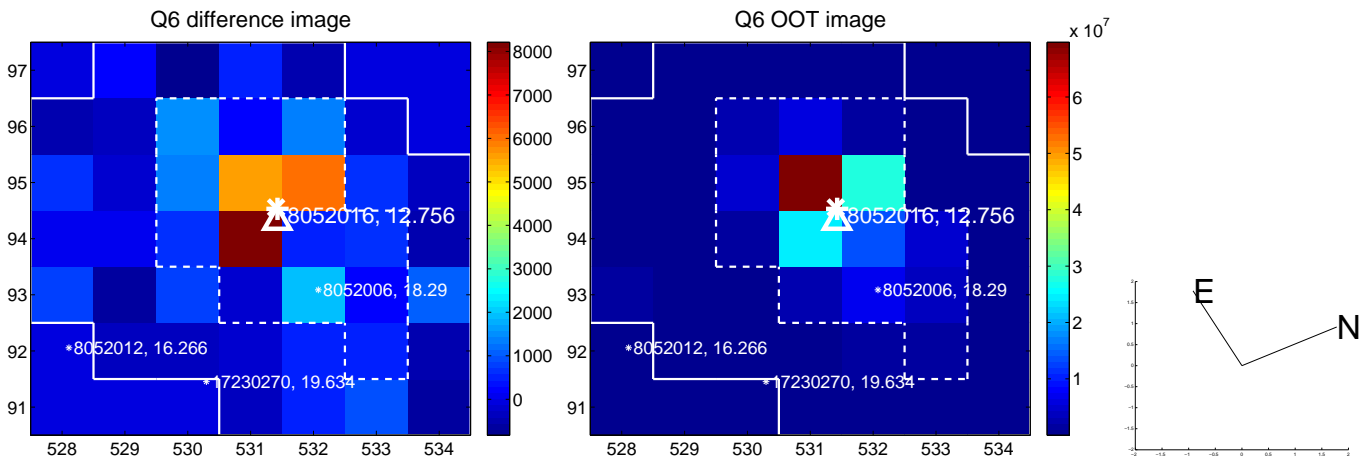
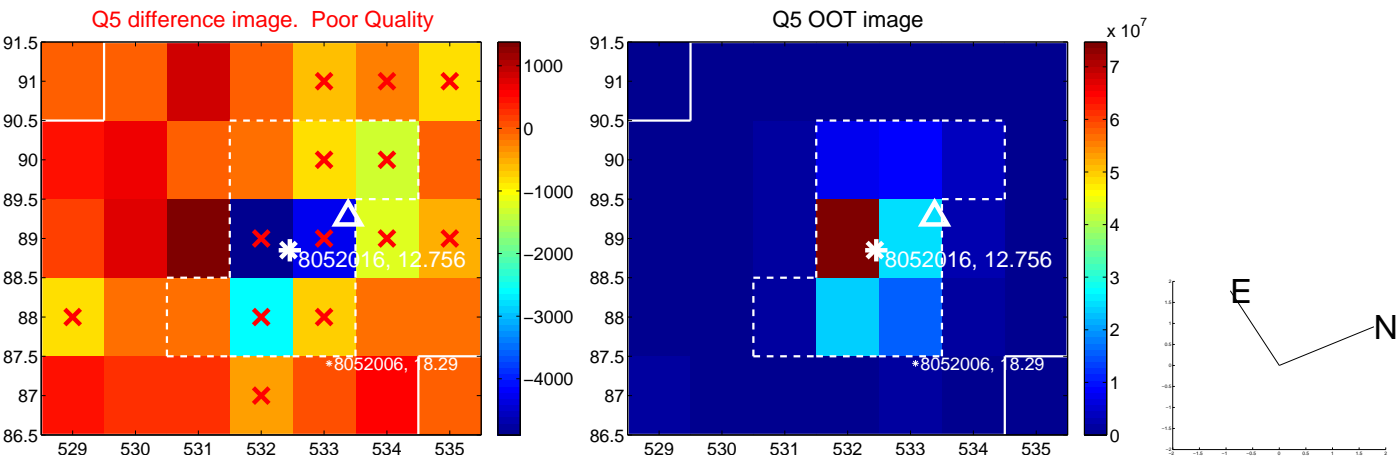


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

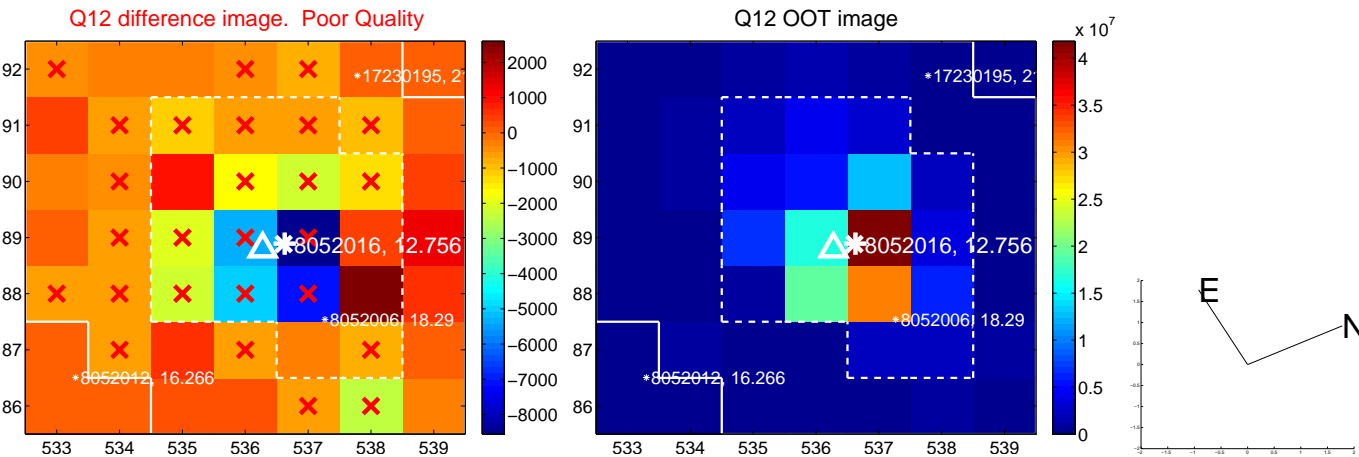
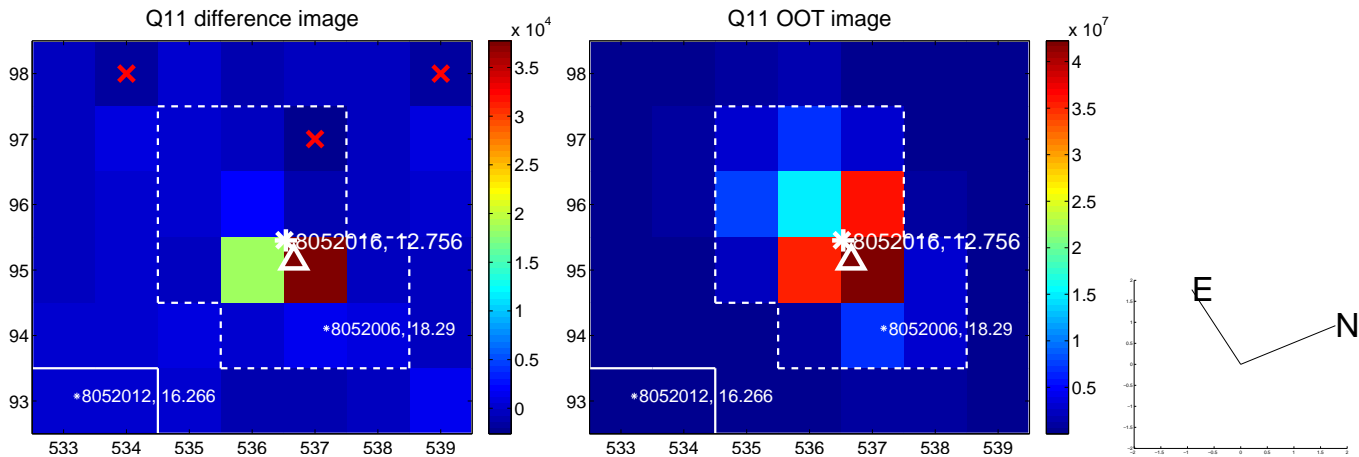
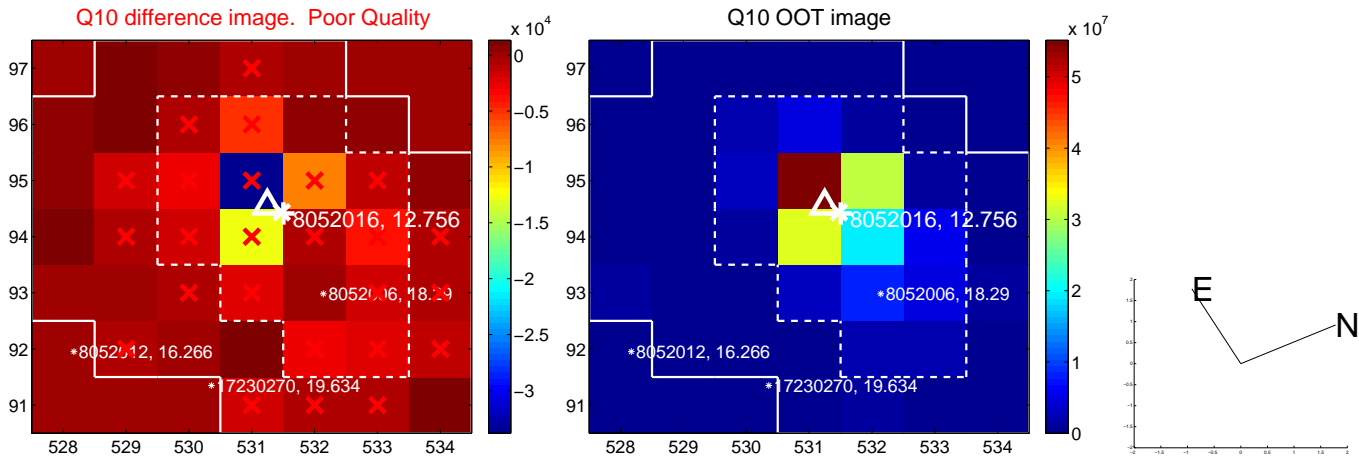
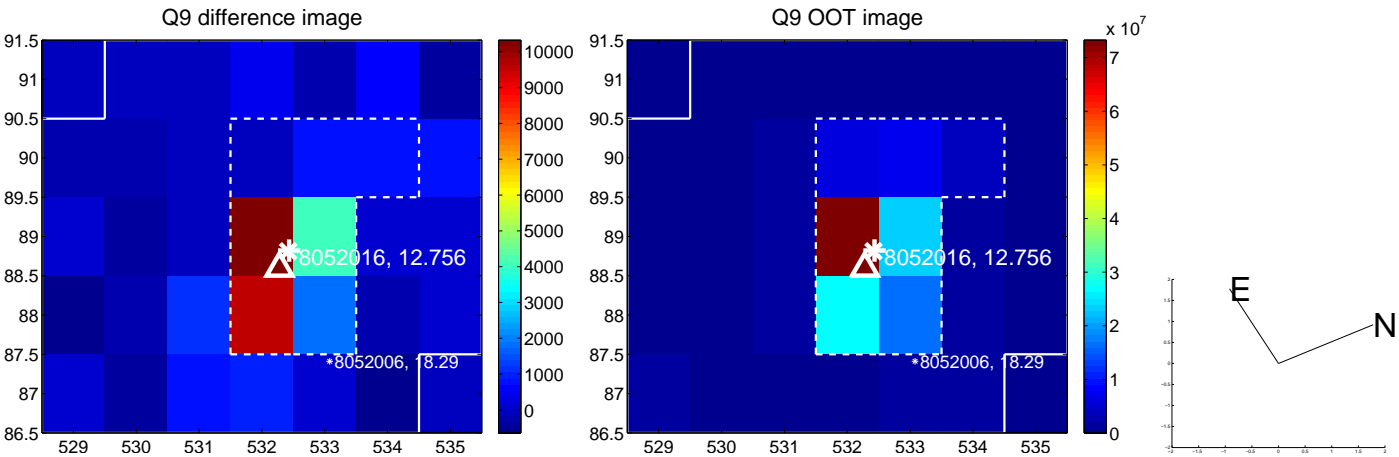
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



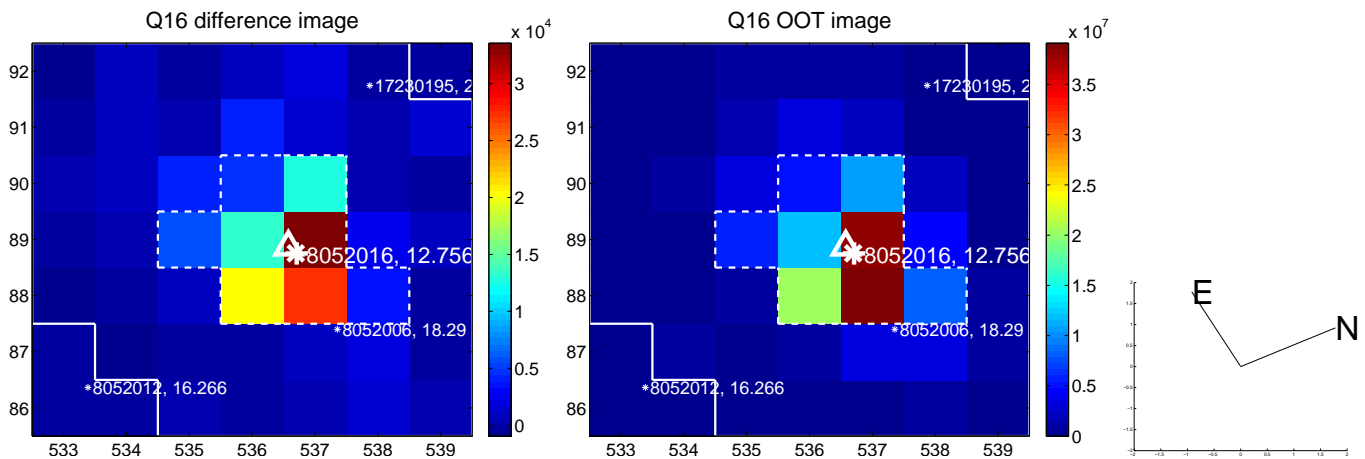
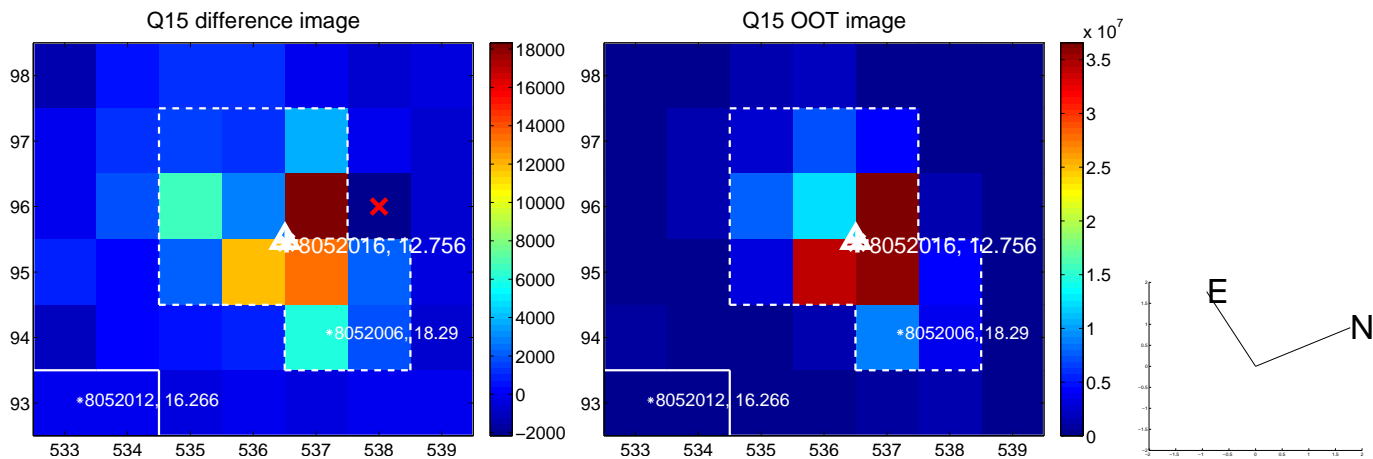
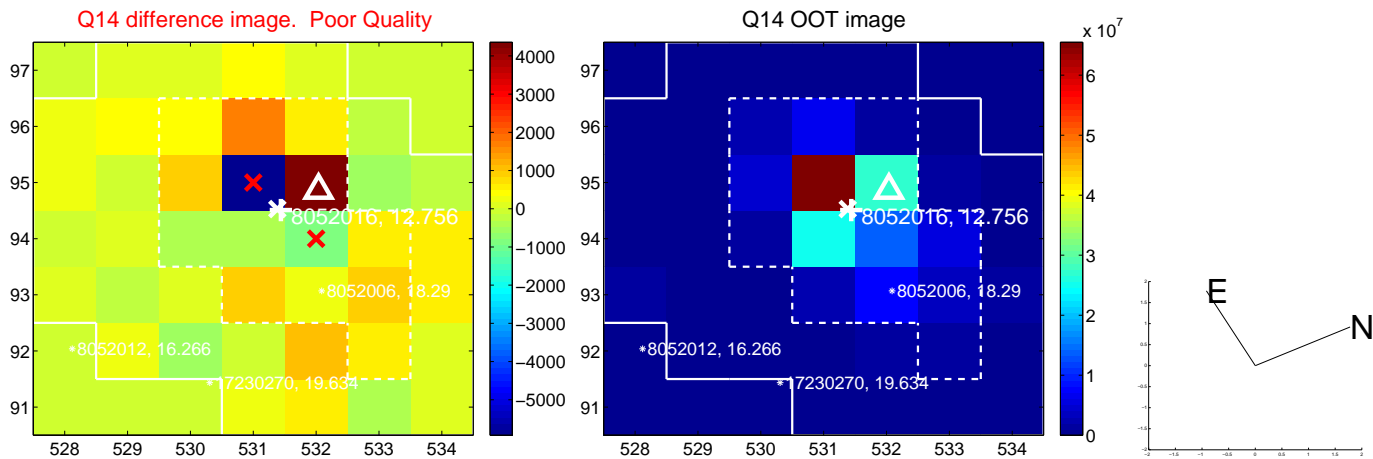
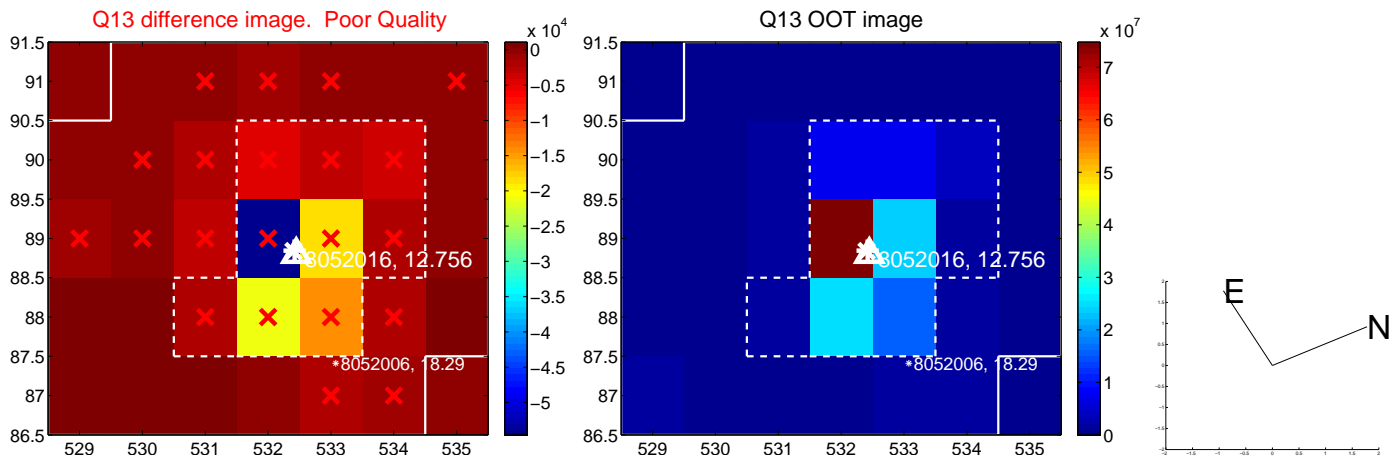
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



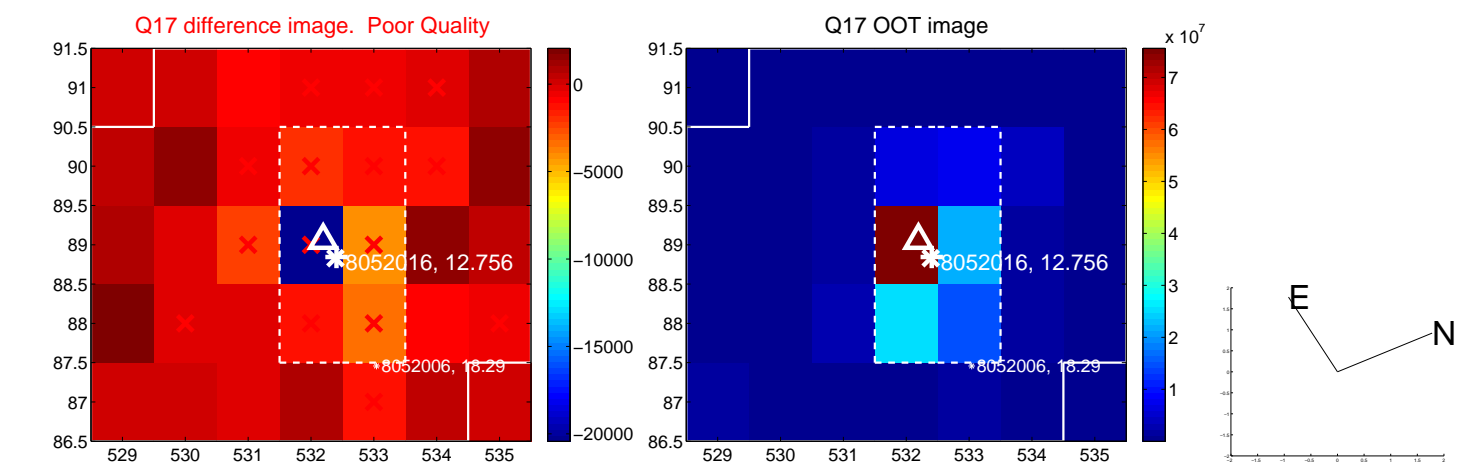
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



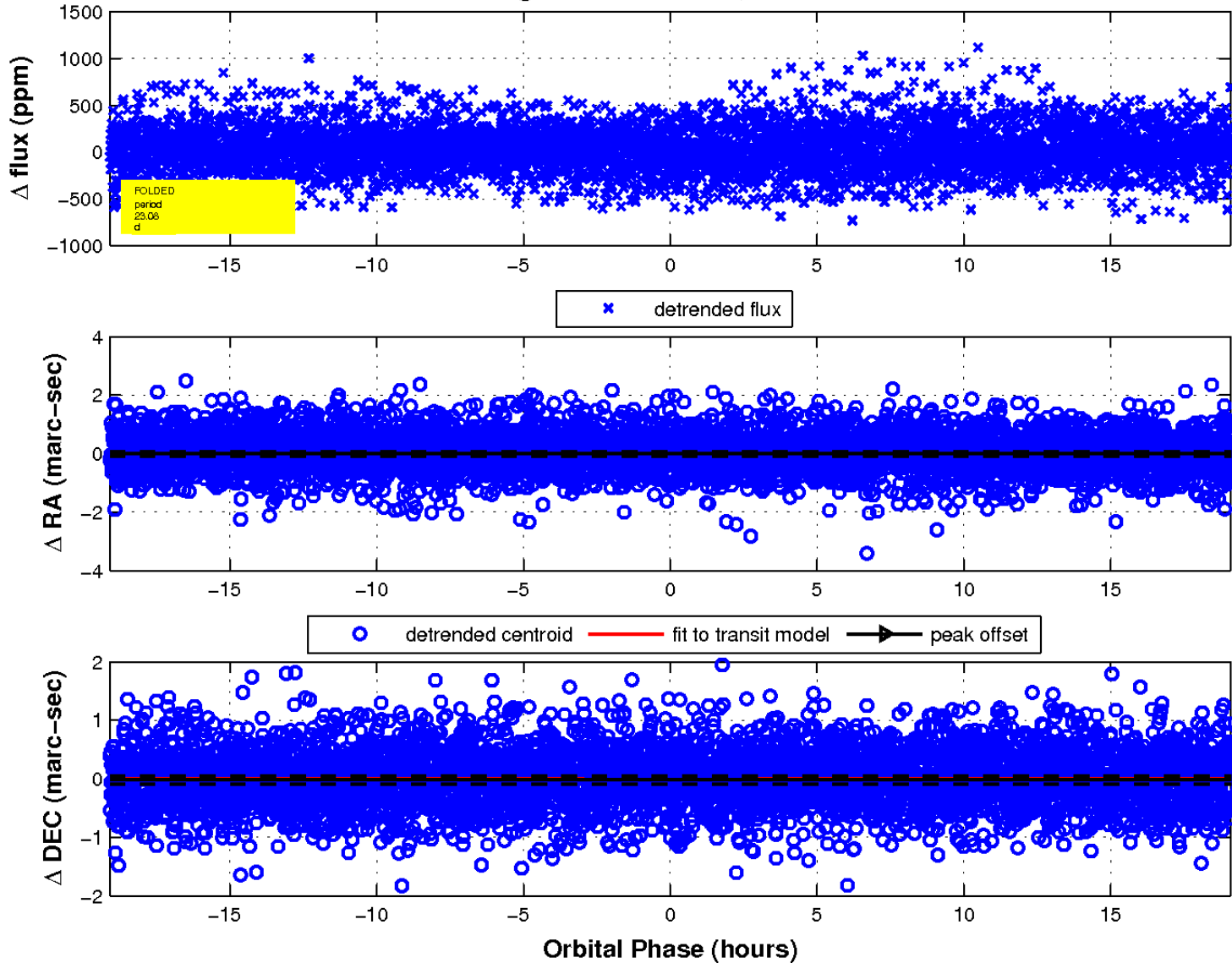
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



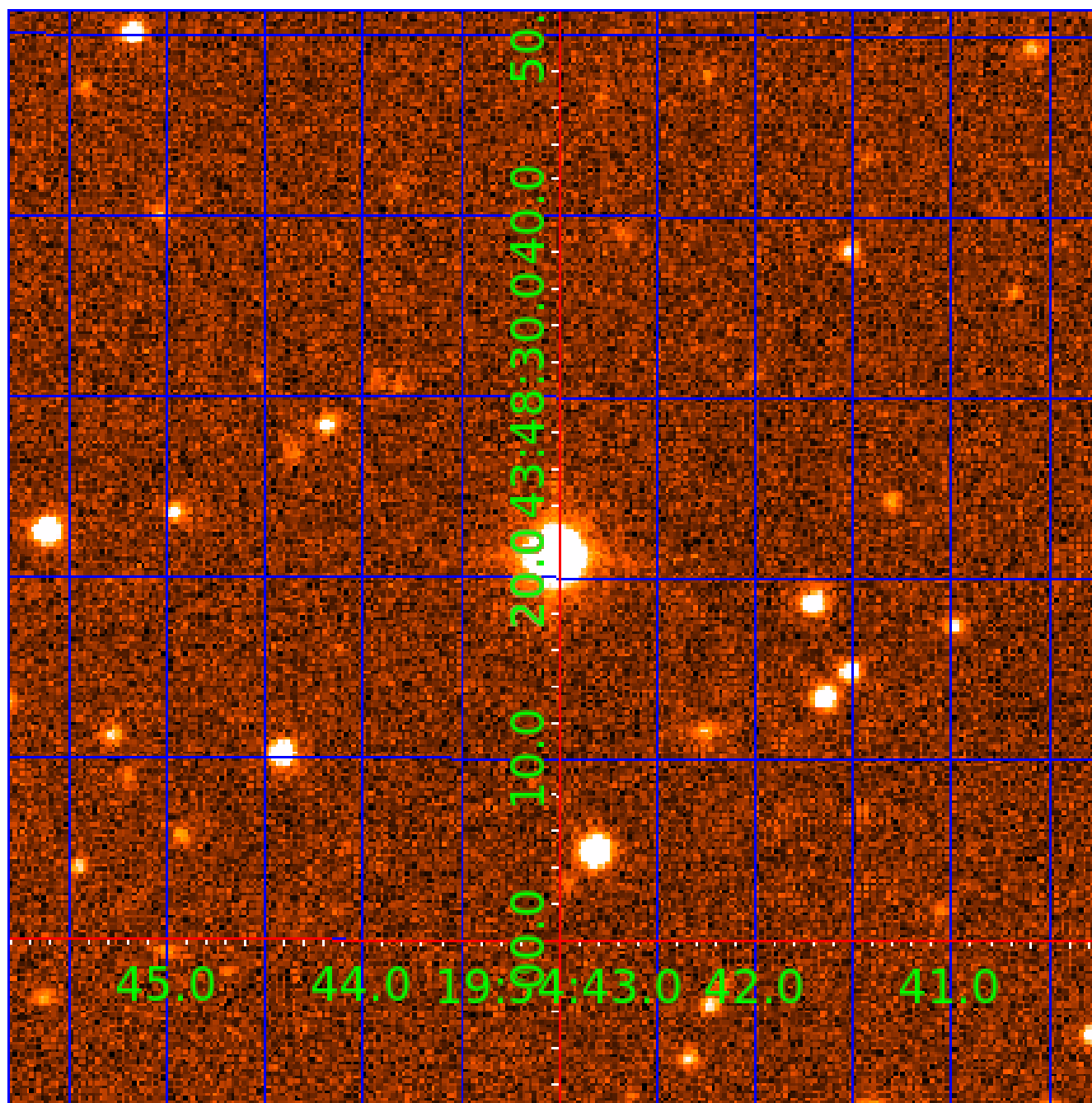
fluxWeightedCentroids, Planet 8 of 9





UKIRT Image

Declination



## KIC 008052016

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008052016-01	OBS	No	2.605256	133.117659	31.9	19.238	9.6	7.3	1.99	6212	1.16	3524.60
008052016-02	OBS	No	67.763122	134.382802	184.4	6.496	25.0	11.1	1.99	6212	3.03	45.73
008052016-03	OBS	No	26.742080	135.727966	190.8	10.952	18.8	12.1	1.99	6212	2.99	158.00
008052016-04	OBS	No	33.184196	158.831256	176.4	4.858	16.2	7.2	1.99	6212	2.96	118.49
008052016-05	OBS	No	37.315026	162.366643	172.7	3.991	13.1	7.8	1.99	6212	2.88	101.33
008052016-06	OBS	No	37.038602	156.474640	246.9	4.412	12.2	11.5	1.99	6212	3.45	102.34
008052016-07	OBS	No	39.906683	164.120100	244.5	4.294	9.9	10.4	1.99	6212	3.45	92.65
008052016-08	OBS	No	23.077641	133.725683	160.9	6.368	9.5	9.1	1.99	6212	2.90	192.30
008052016-09	OBS	No	28.929926	143.231572	102.0	5.045	8.8	5.4	1.99	6212	2.28	142.27

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008052016-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV
008052016-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
008052016-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—HALO_GHOST
008052016-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
008052016-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
008052016-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT
008052016-07	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—HALO_GHOST
008052016-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
008052016-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

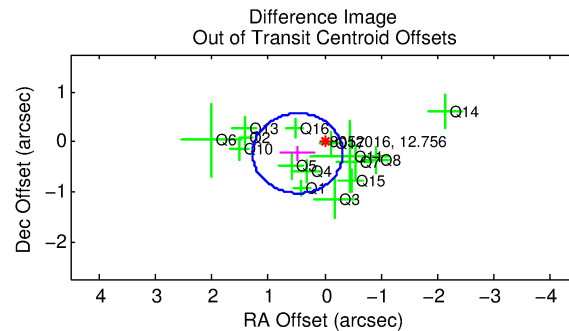
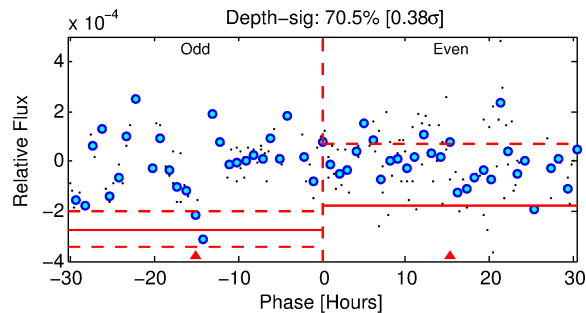
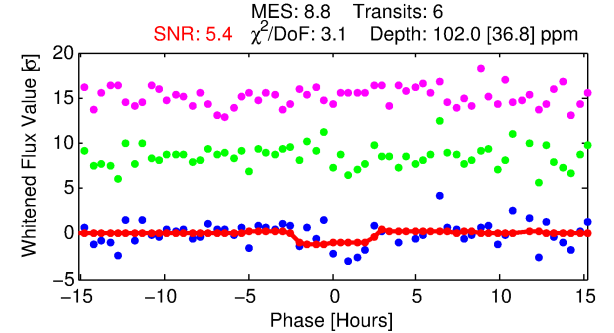
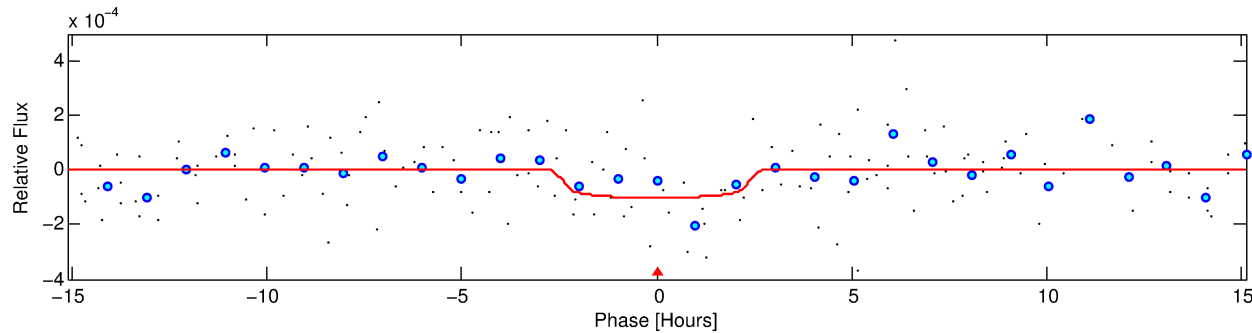
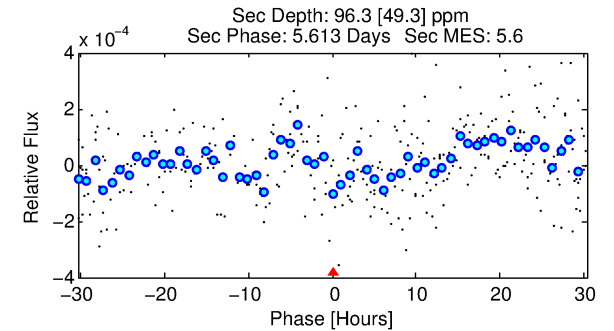
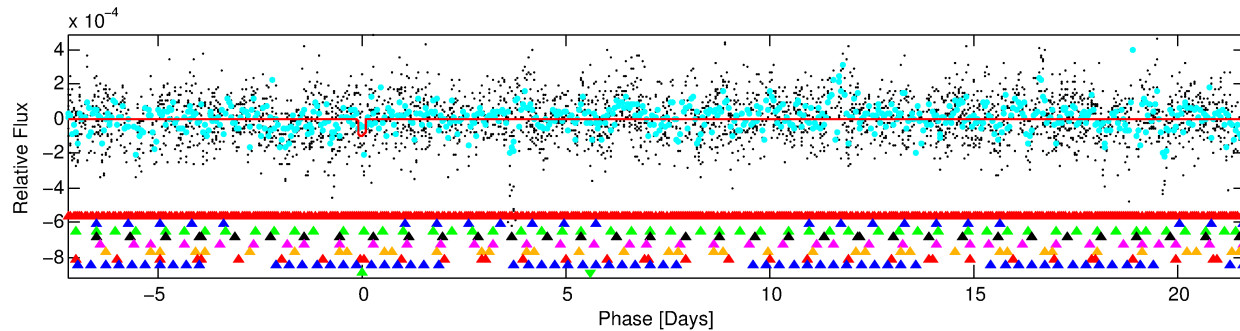
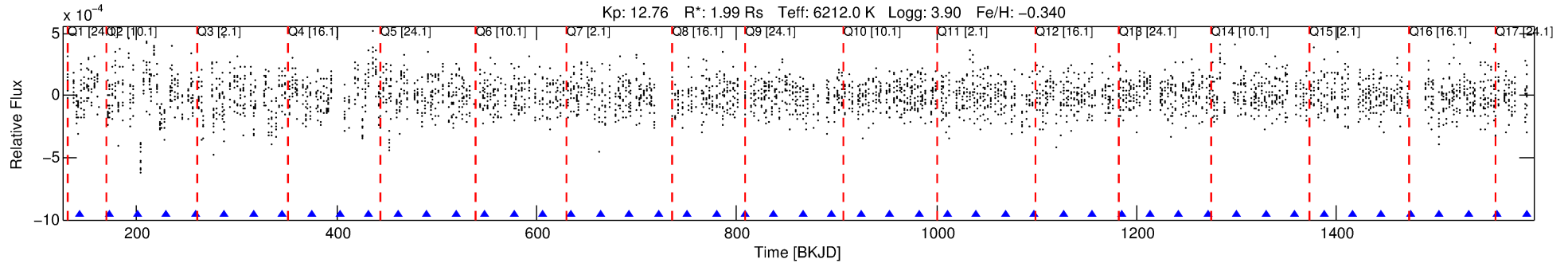
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 008052016-09

No Significant Match Found

# DV One-Page Summary

KIC: 8052016 Candidate: 9 of 9 Period: 28.930 d



## DV Fit Results:

Period = 28.92993 [0.00154] d  
Epoch = 143.2316 [0.0388] BKJD  
Rp/R\* = 0.0105 [0.0212]  
a/R\* = 23.83 [259.36]  
b = 0.85 [3.54]  
Seff = 142.27 [73.72]  
Teq = 881 [114] K  
Rp = 2.28 [4.66] Re  
a = 0.1926 [0.0601] AU  
Ag = 379.12 [1555.91] [0.24σ]  
Teffp = 6008 [6120] K [0.84σ]

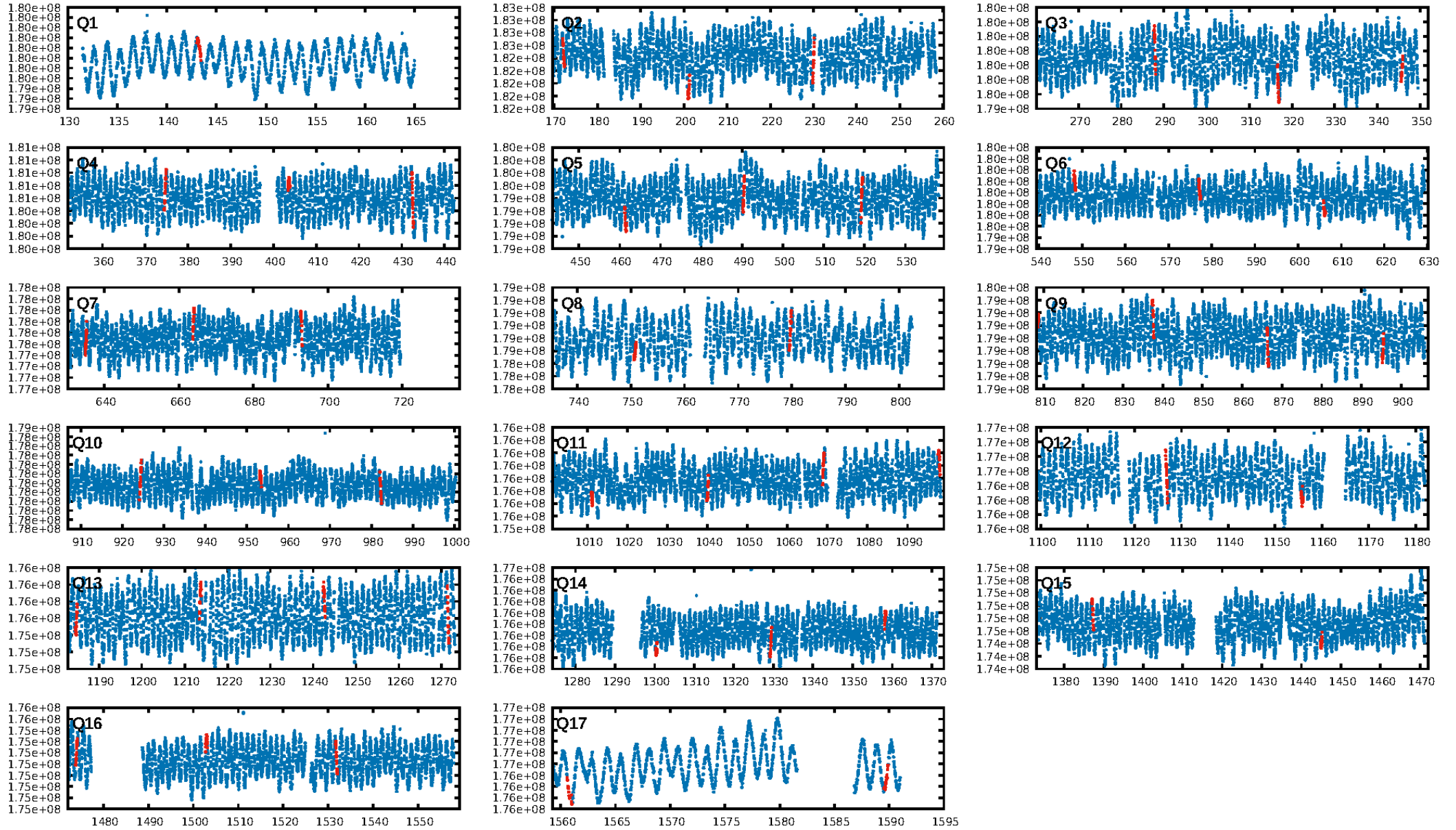
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [4.35σ]  
LongPeriod-sig: 100.0% [14.58σ]  
ModelChiSquare2-sig: 1.3%  
ModelChiSquareGof-sig: 68.5%  
**Bootstrap-pfa: 1.37e-05**  
RollingBand-fgt: 1.00 [6/6]  
**GhostDiagnostic-chr: -6.352**  
Centroid-sig: 81.1%  
Centroid-so: 0.360 arcsec [0.41σ]  
OotOffset-rm: 0.530 arcsec [1.99σ]  
OotOffset-st: 4/4/3/4 [15]  
KicOffset-rm: 0.479 arcsec [1.90σ]  
KicOffset-st: 4/4/3/4 [15]  
DiffImageQuality-fgm: 0.67 [10/15]  
DiffImageOverlap-fno: 0.38 [6/16]

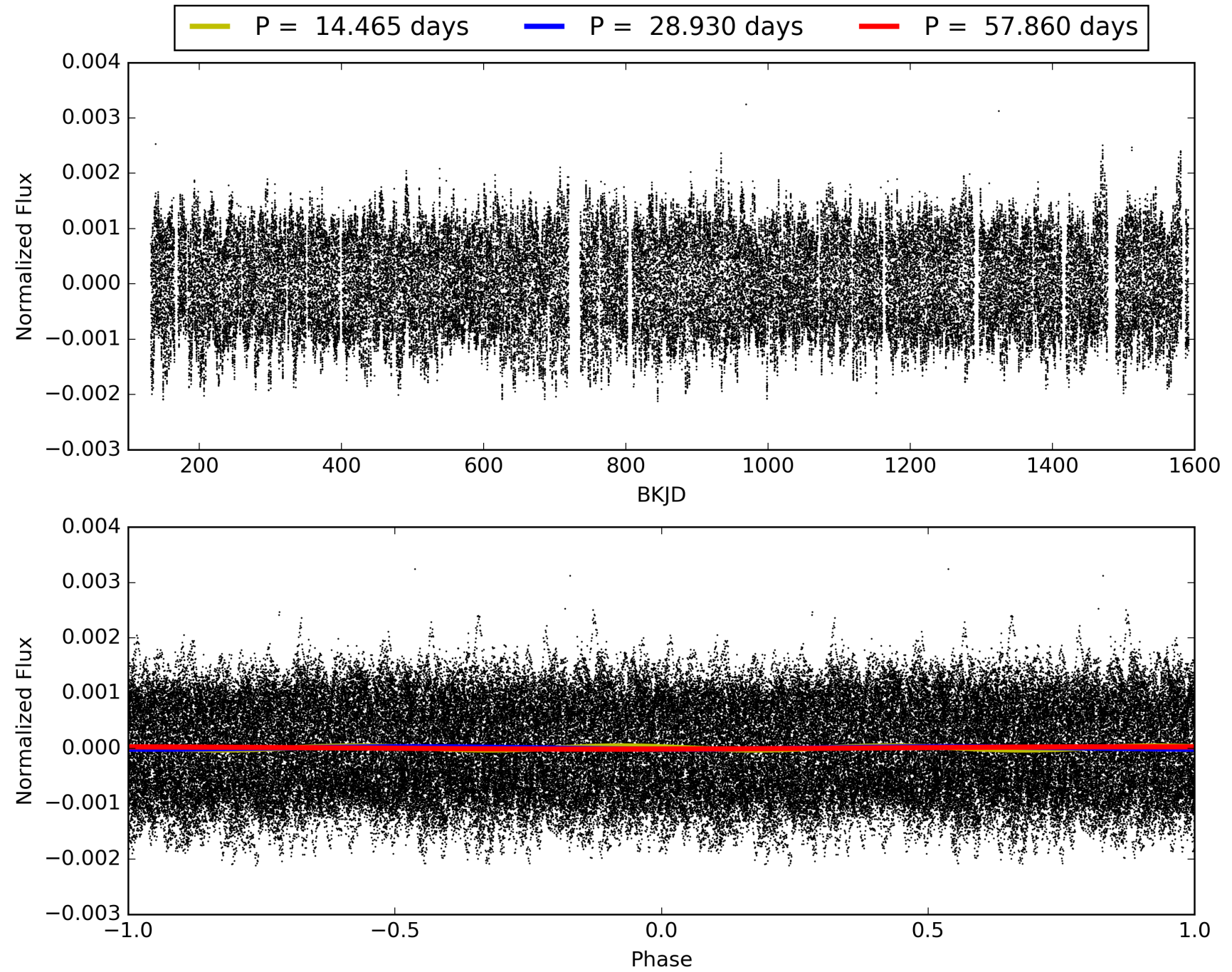
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 23:13:54 Z

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

# TCE 008052016-09, PDC Light Curves



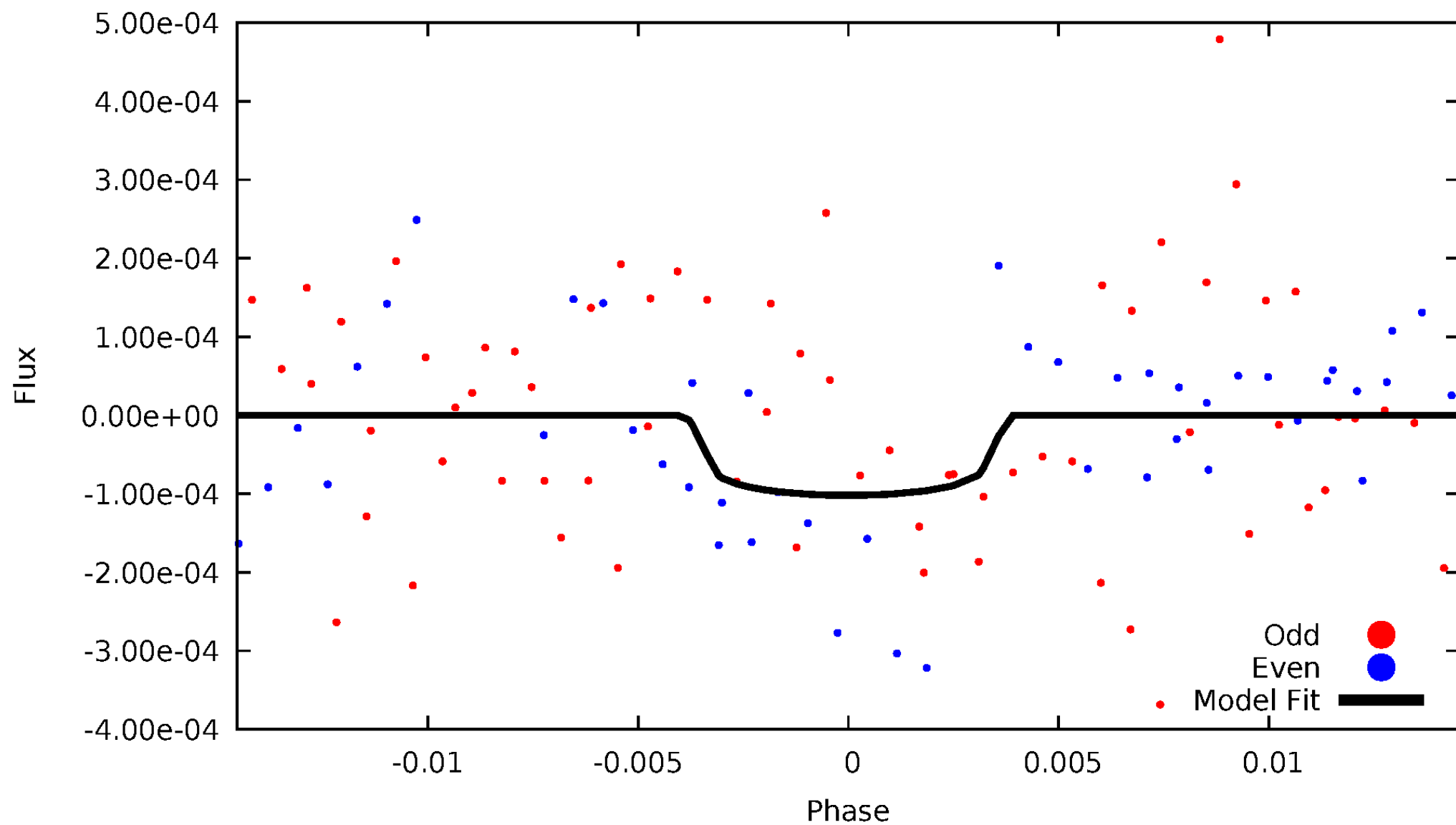
# TCE 008052016-09





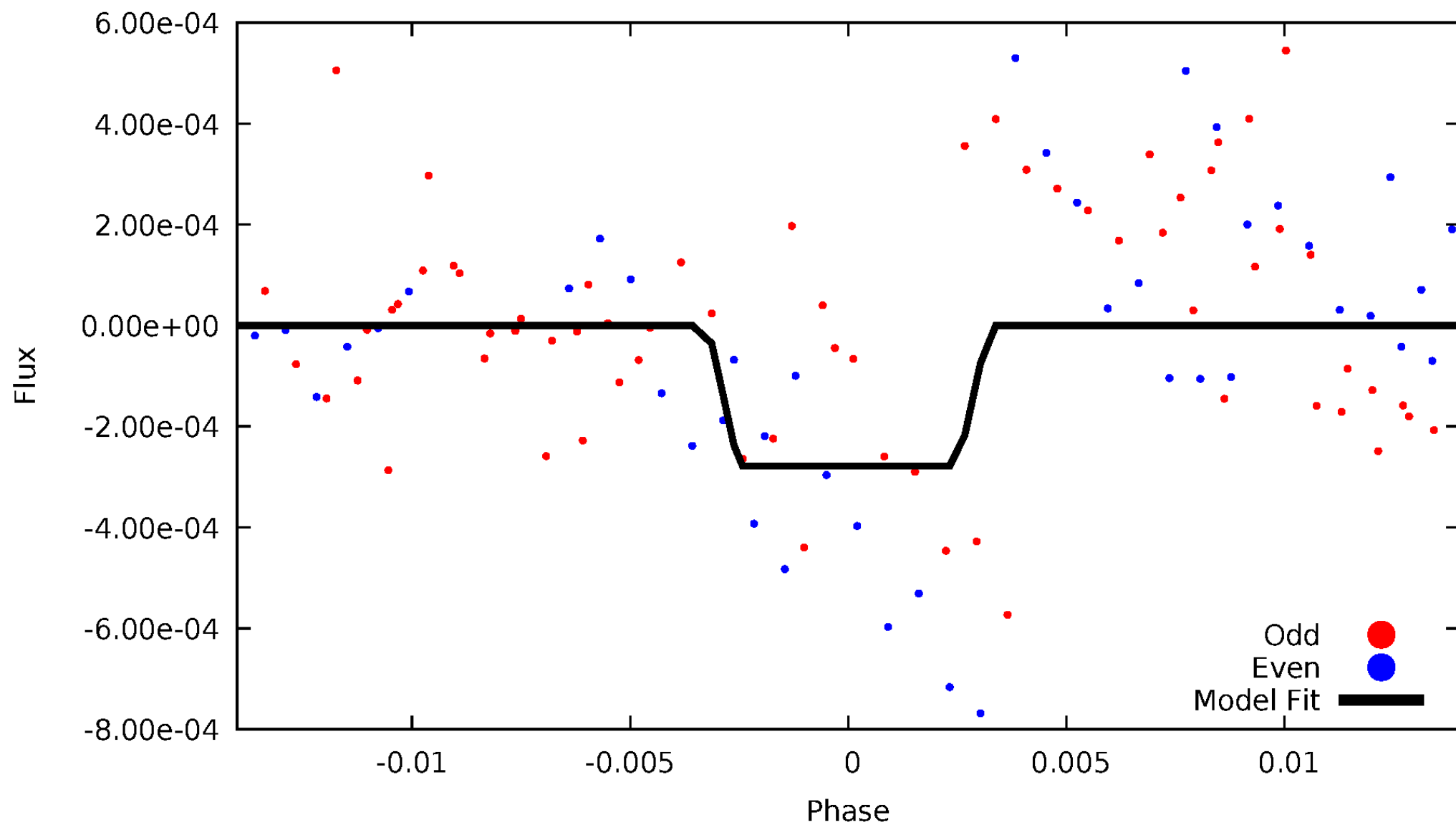
# DV Odd/Even

TCE 008052016-09



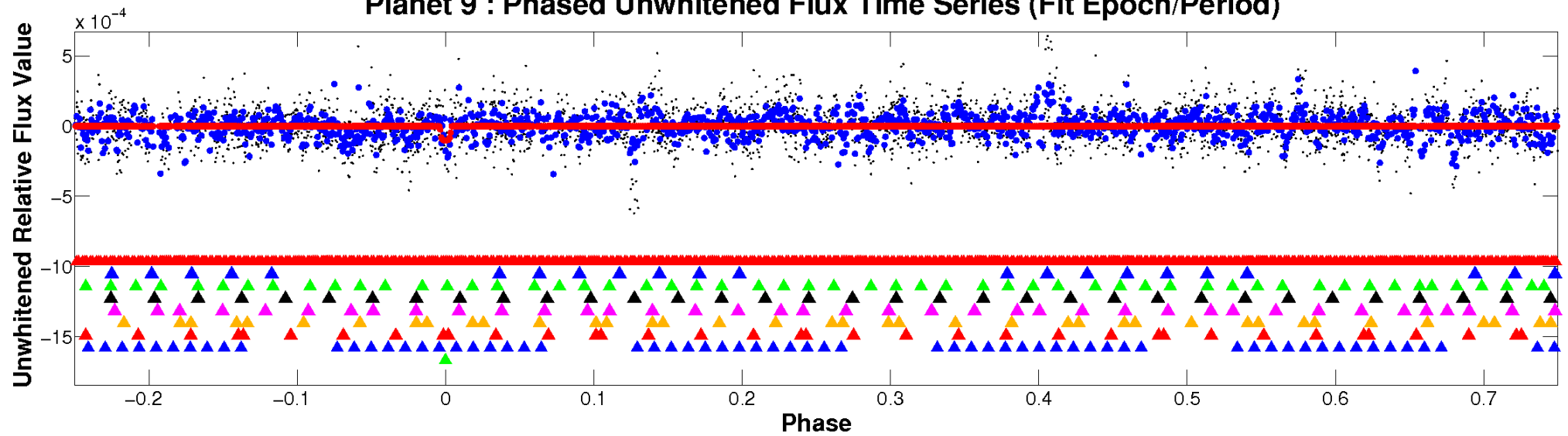
# ALT Odd/Even

TCE 008052016-09

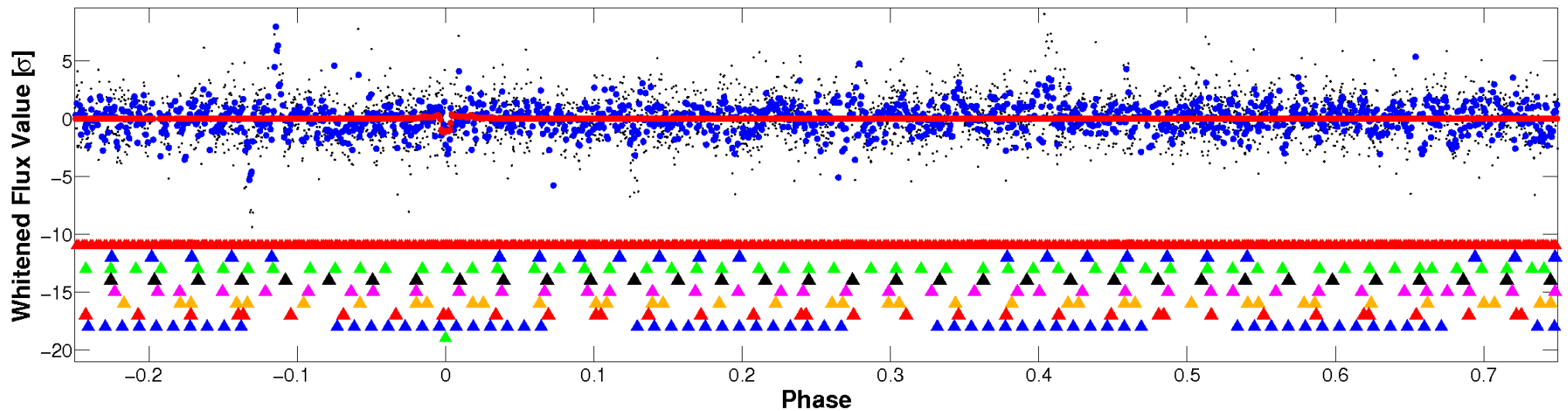


# Non-Whitened Vs. Whitened Light Curve

## Planet 9 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)



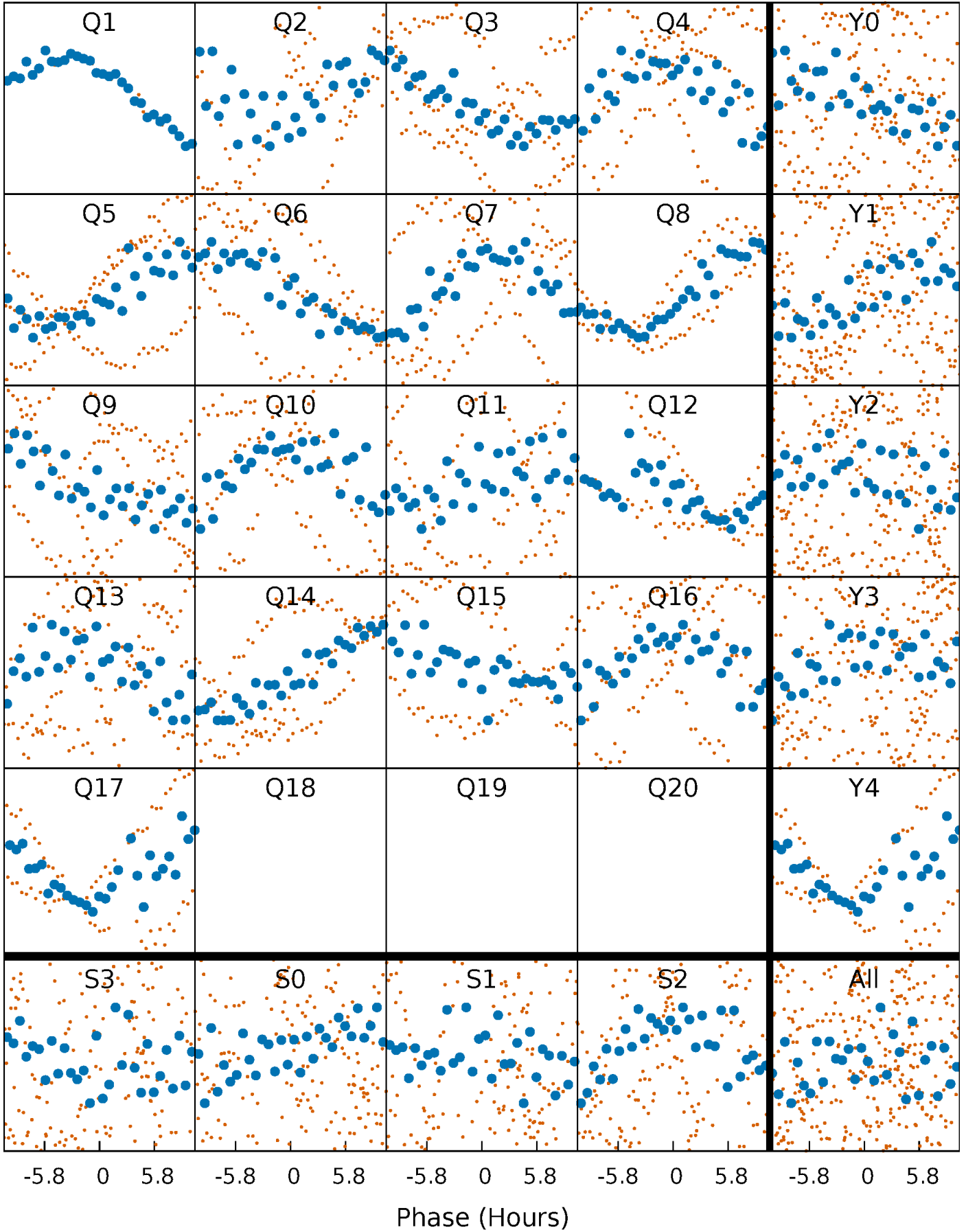
## Planet 9 : Phased Whitened Flux Time Series (Fit Epoch/Period)





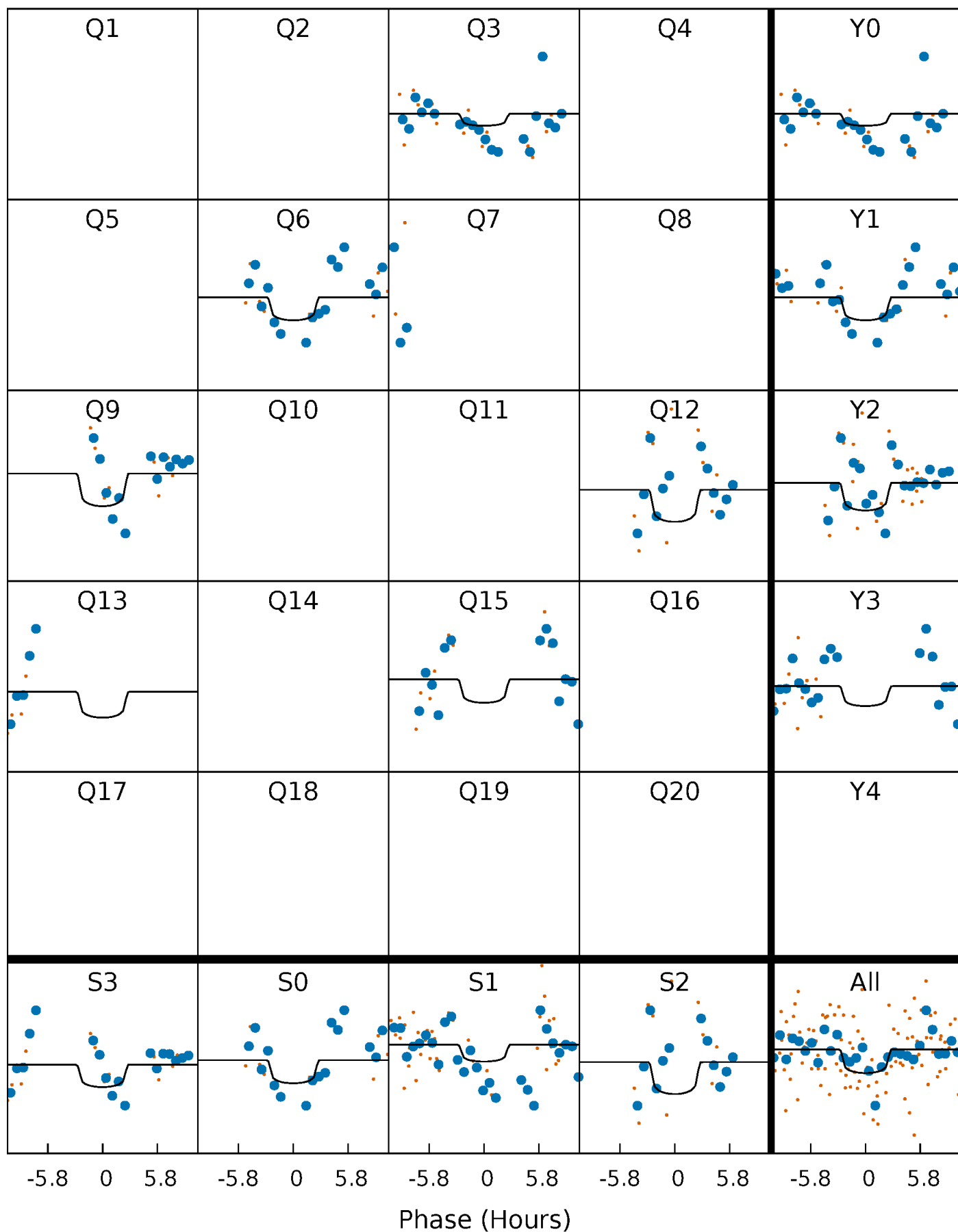
# PDC Quarter-Phased Transit Curves

TCE 008052016-09 P= 28.929926 Days  $T_0=143.231572$  (BKJD)



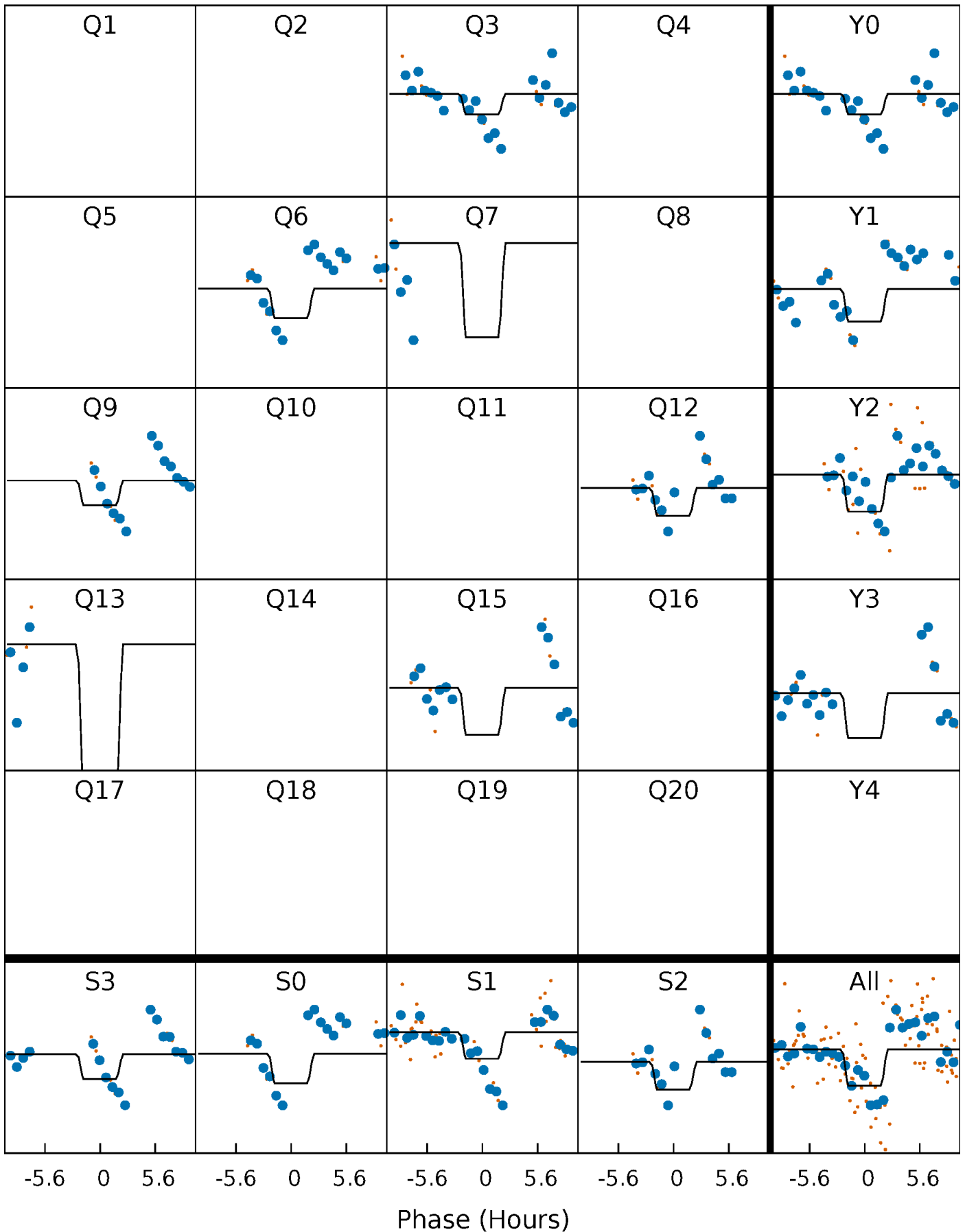
# DV Quarter-Phased Transit Curves

TCE 008052016-09 P= 28.929926 Days  $T_0=143.231572$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

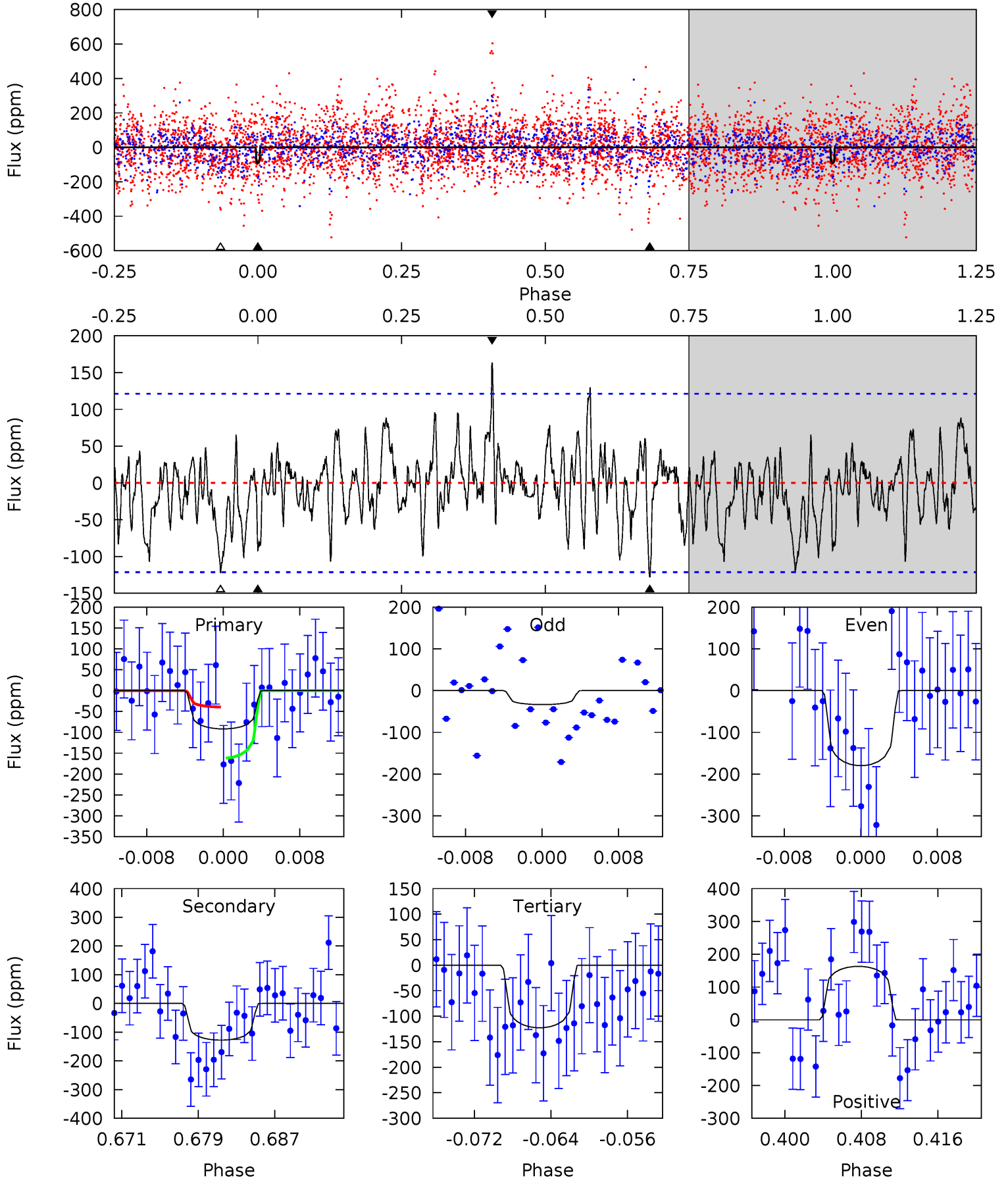
TCE 008052016-09 P= 28.930869 Days  $T_0=143.192119$  (BKJD)



# DV Model-Shift Uniqueness Test

008052016-09, P = 28.929926 Days, E = 114.301646 Days

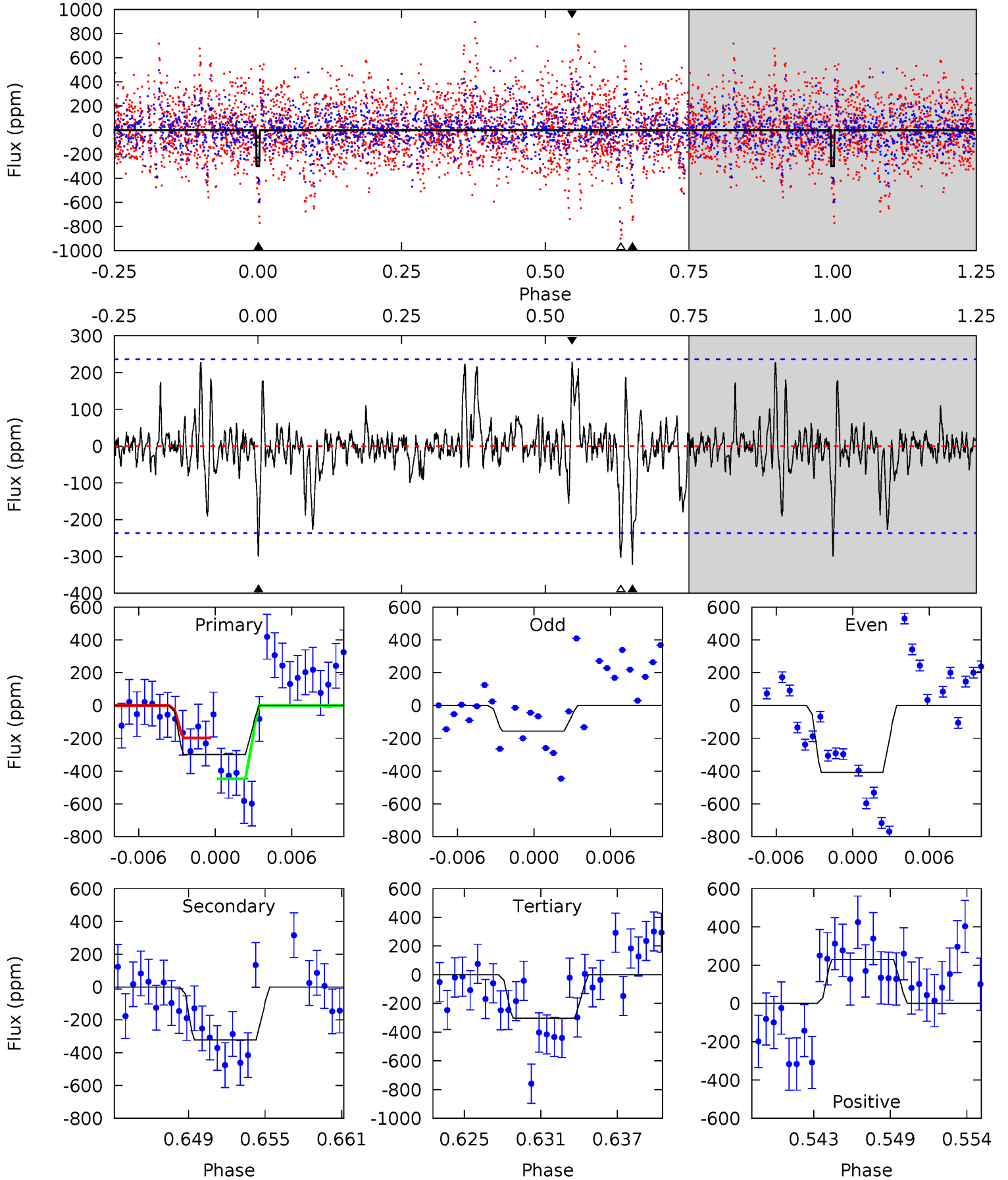
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
3.84	5.34	5.13	6.81	5.07	2.65	1.71	-1.29	-2.97	0.21	-1.48	3.05	0.66	0.56	2.60



# Alt Model-Shift Uniqueness Test

008052016-09, P = 28.930869 Days, E = 114.261250 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
6.50	6.99	6.56	4.97	5.13	2.75	1.32	-0.07	1.53	0.42	2.02	2.78	0.96	0.42	2.71



### Stellar Parameters For KIC 008052016

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6212^{+171}_{-171}$	$3.897^{+0.300}_{-0.100}$	$-0.340^{+0.350}_{-0.300}$	$1.989^{+0.418}_{-0.628}$	$1.138^{+0.225}_{-0.184}$	$0.204^{+0.380}_{-0.074}$
	+3%/-3%	+8%/-3%	+103%/-88%	+21%/-32%	+20%/-16%	+187%/-36%
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 008052016-09 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-128 \pm 24$	$3.82^{+3.65}_{-2.45}$	$1202^{+77}_{-104}$	$4852^{+3583}_{-1030}$	$173^{+1343}_{-125}$
Alt.	$-322 \pm 46$	$4.63^{+4.28}_{-2.98}$	$1200^{+76}_{-94}$	$5501^{+4200}_{-1228}$	$328^{+2043}_{-244}$

$T_{max}$  = 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

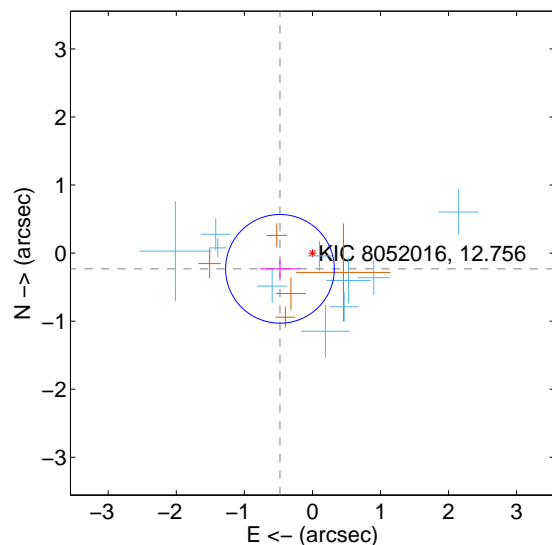
Supplemental centroid analysis for 008052016-09. Kepler magnitude: 12.76. Transit SNR 5.36

There are 10 quarters with good PRF difference image offsets

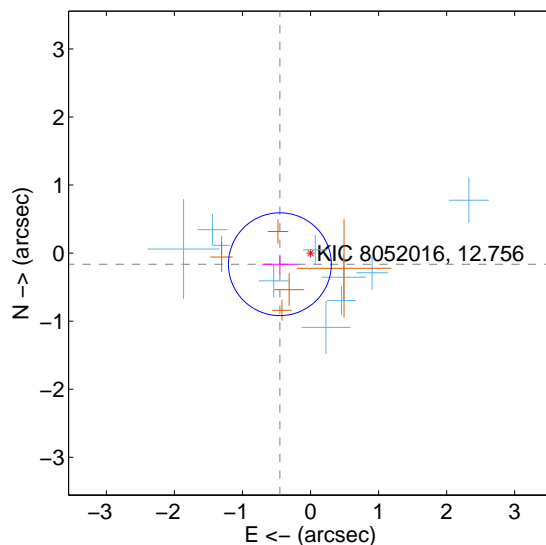
The direct PRF centroid is offset from the target star catalog position by about 0.09 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.530 \pm 0.266$	1.99	$0.477 \pm 0.294$	$-0.231 \pm 0.134$
PRF-fit source offset from KIC position	$0.479 \pm 0.252$	1.90	$0.450 \pm 0.262$	$-0.163 \pm 0.136$
photometric centroid source offset	$0.36 \pm 0.87$	0.41	$-0.32 \pm 0.88$	$-0.16 \pm 0.81$

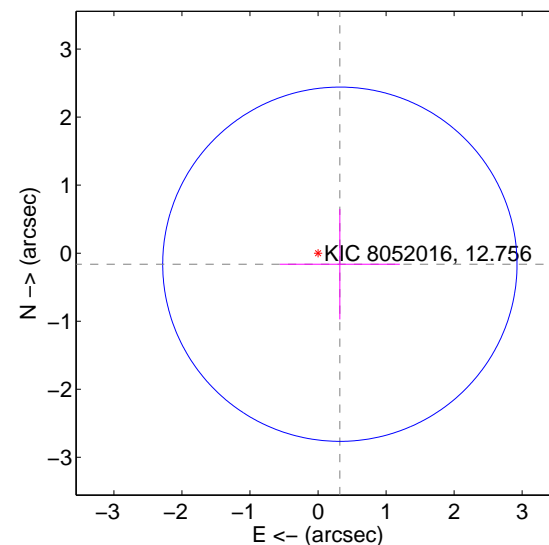
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

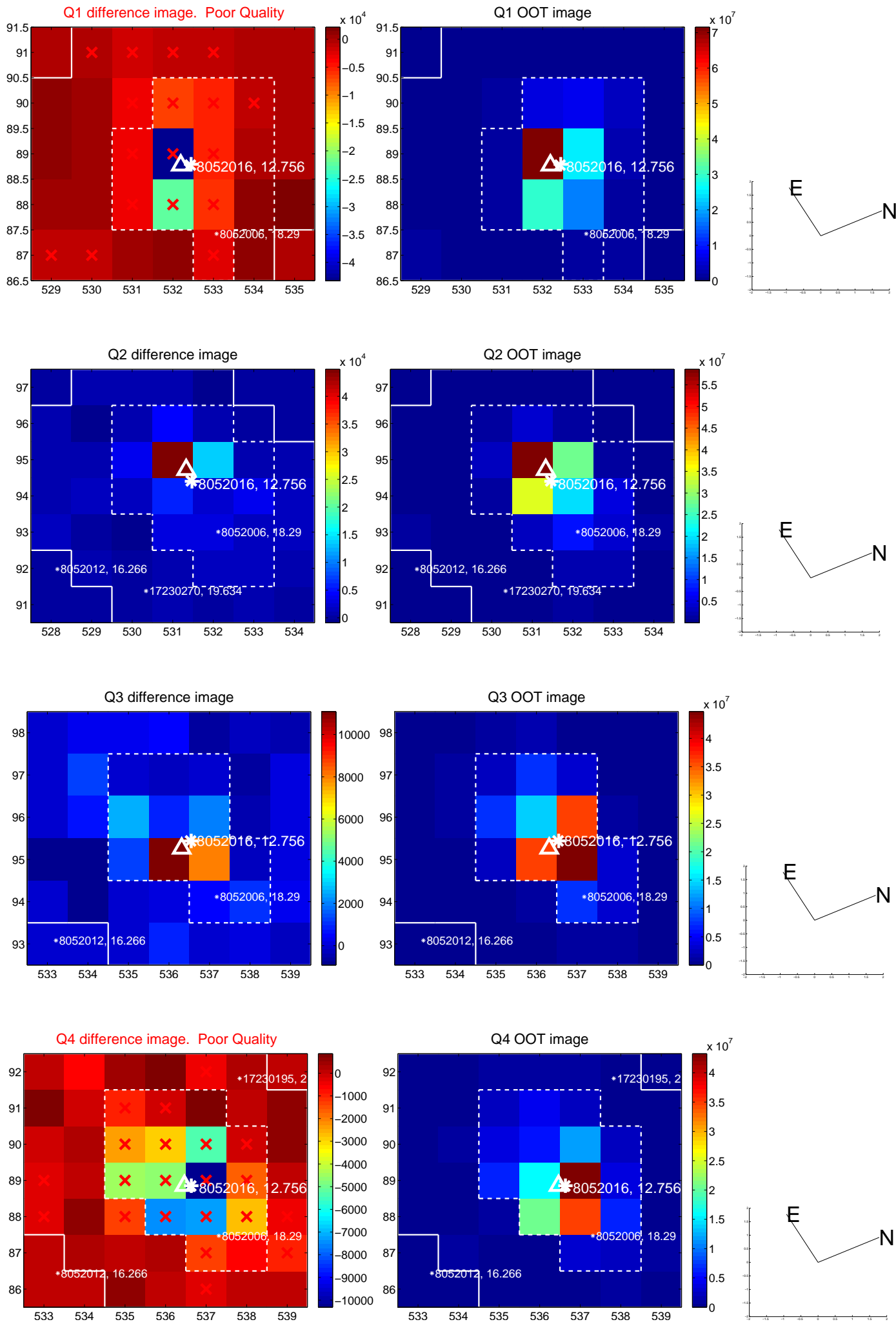


offset from photometric centroids



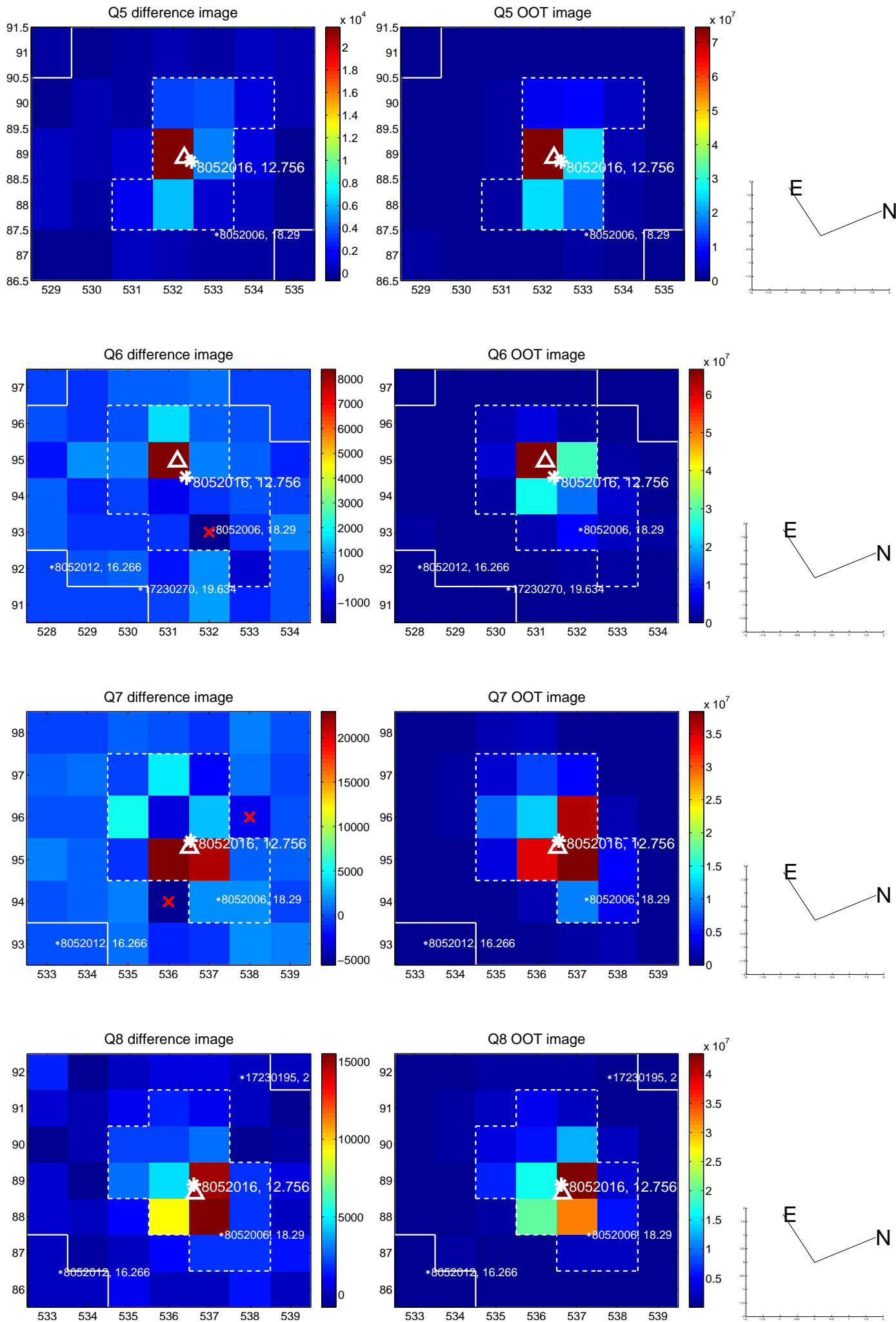
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

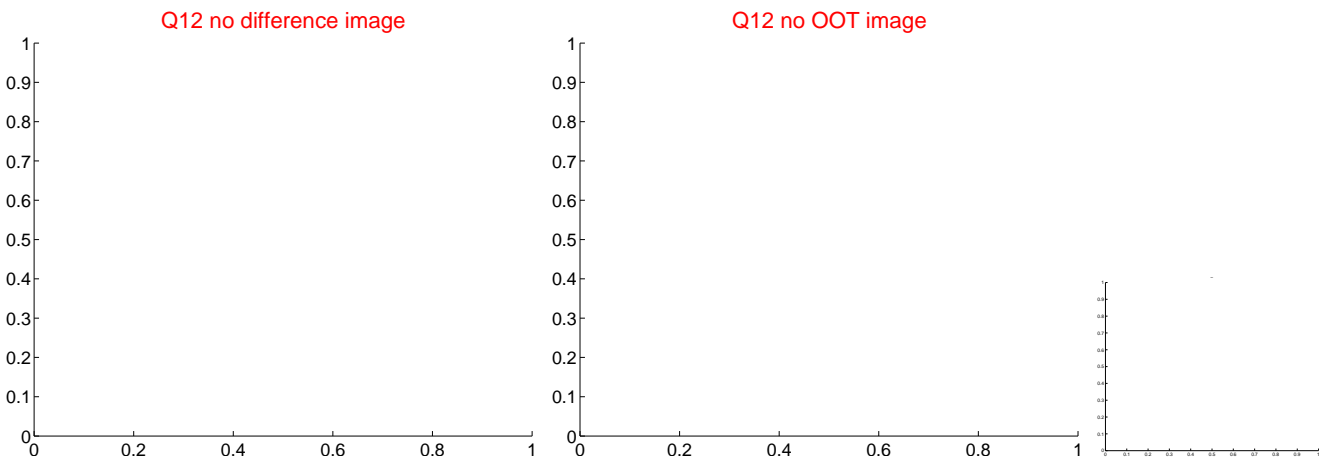
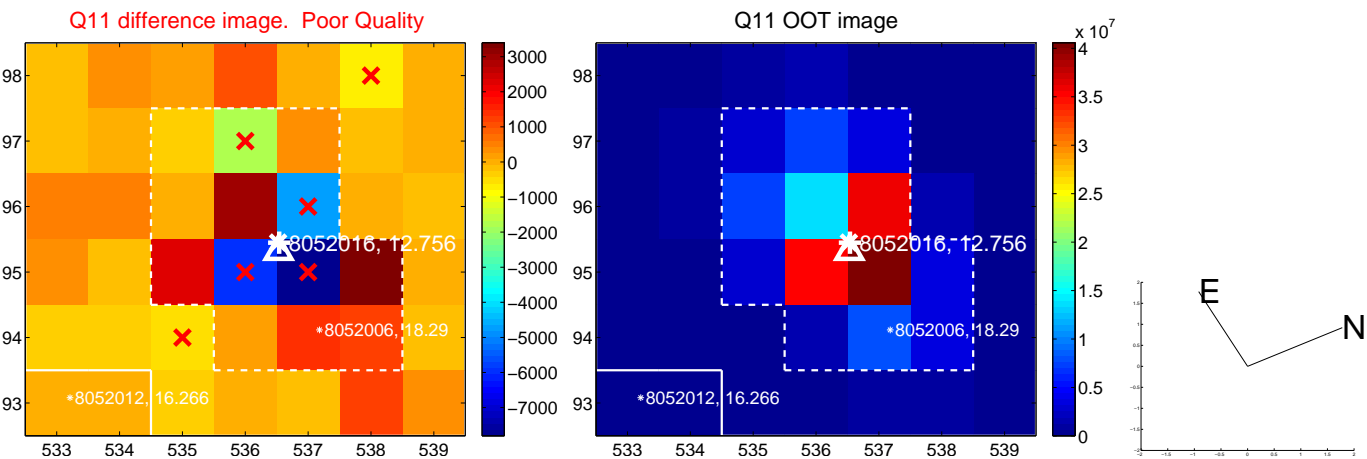
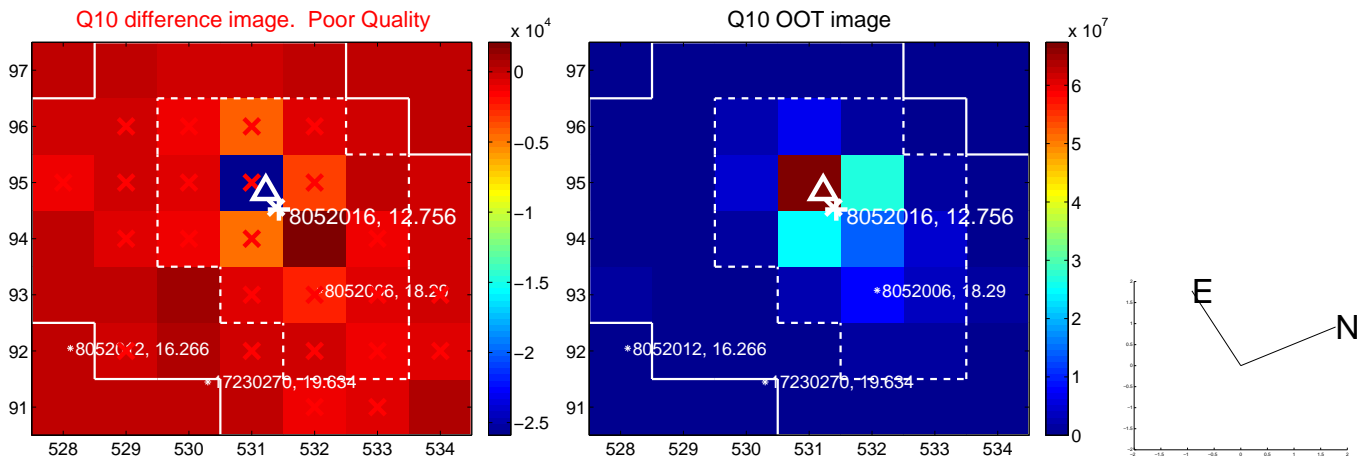
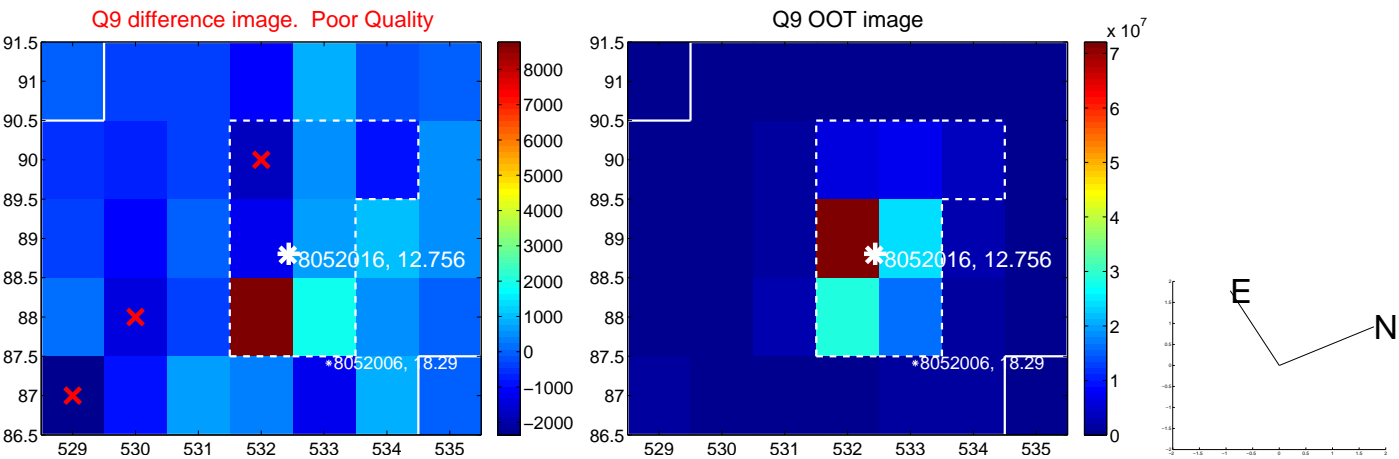




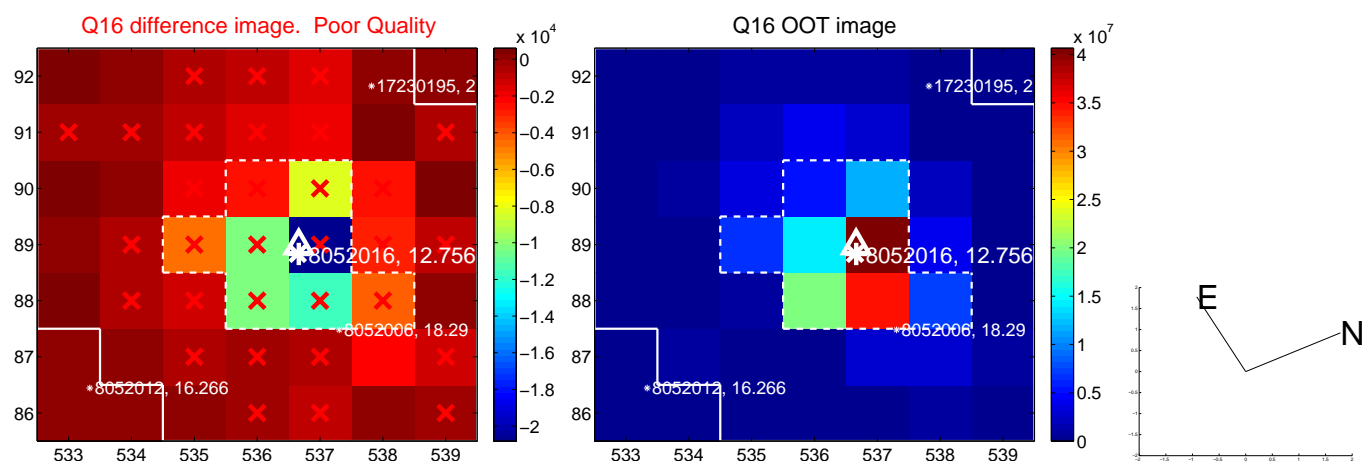
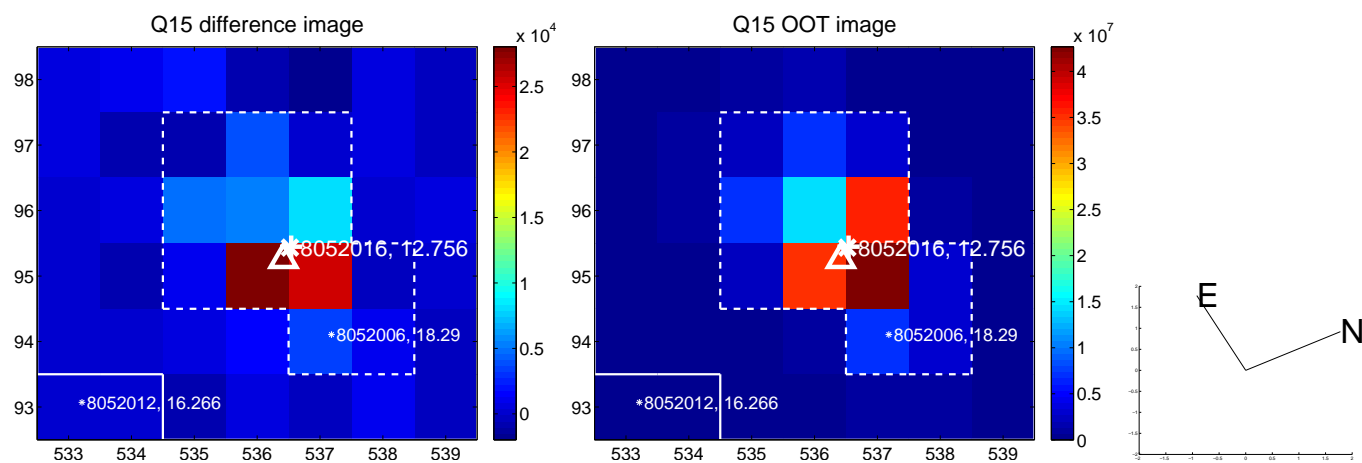
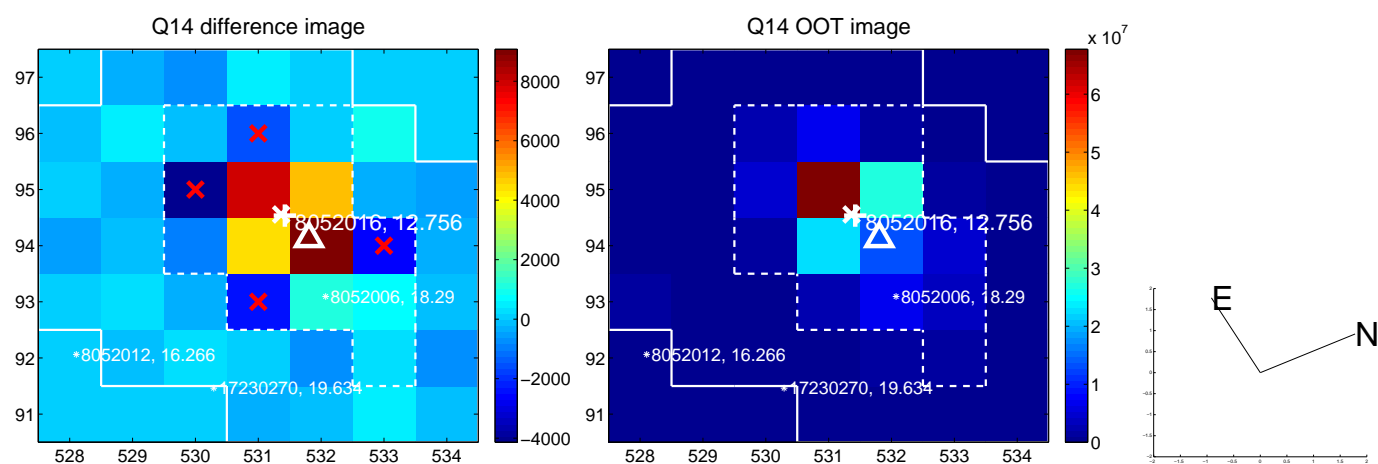
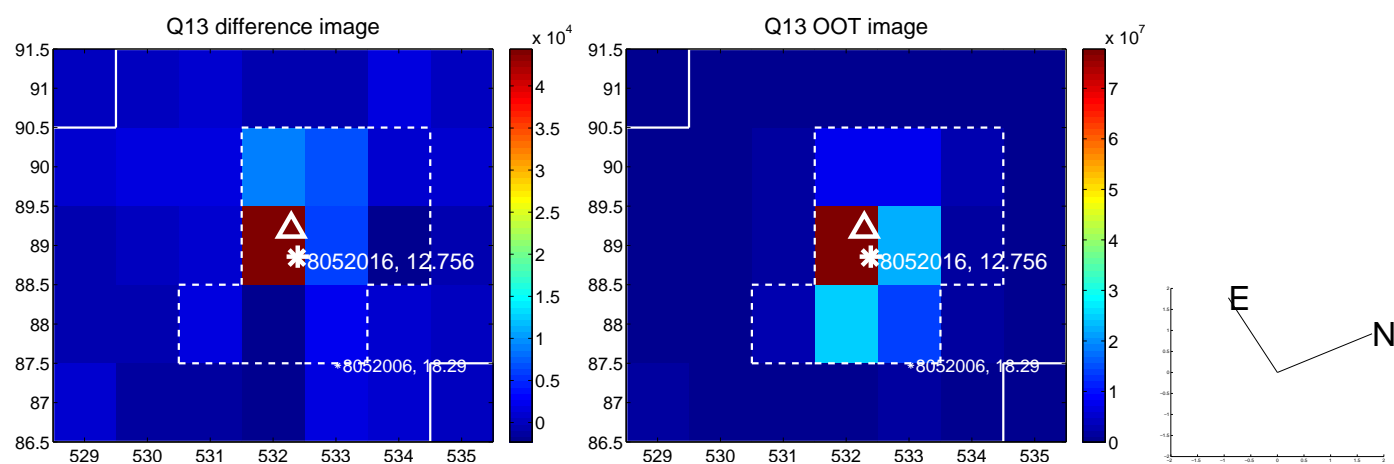
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



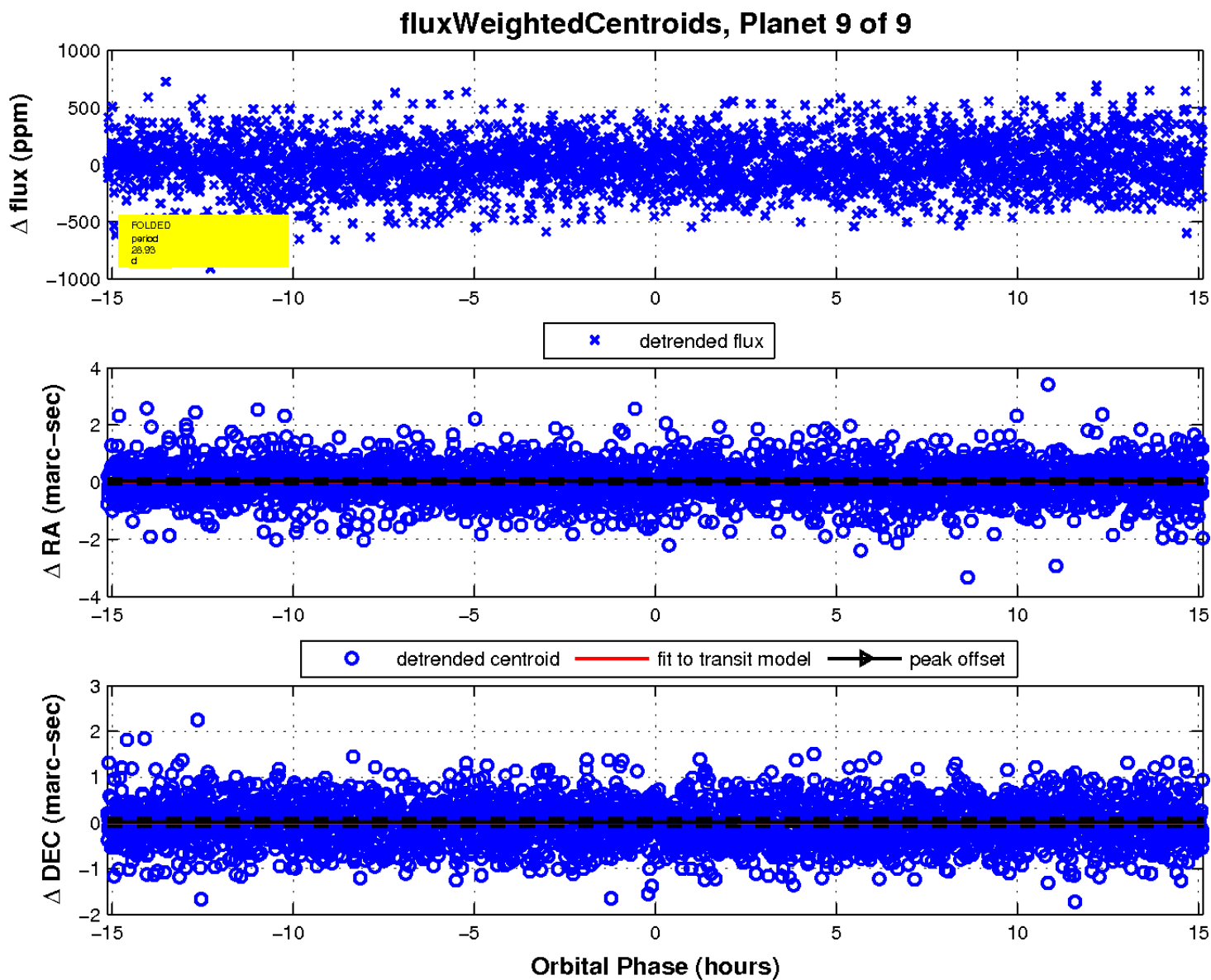
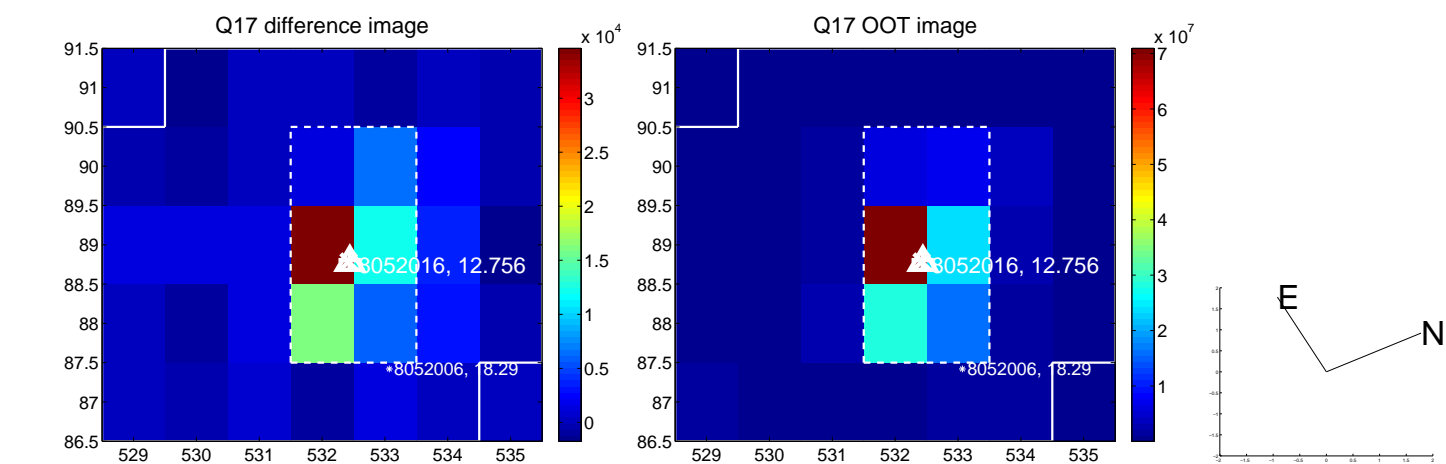
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

