

# KIC 009518710

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009518710-01	OBS	3207.01	0.954328	132.488665	7.3	5.434	10.9	5.8	2.79	7056	0.77	31872.41
009518710-02	OBS	No	234.293932	139.664765	200.0	2.871	10.8	10.3	2.79	7056	4.38	20.73
009518710-03	OBS	No	21.258857	132.247946	61.6	3.971	8.0	6.9	2.79	7056	2.50	508.50
009518710-04	OBS	No	131.524599	184.773916	137.6	7.073	7.4	7.8	2.79	7056	3.58	44.77
009518710-05	OBS	No	95.052209	153.457127	162.4	3.175	7.9	7.4	2.79	7056	4.12	69.03
009518710-06	OBS	No	341.755025	167.131313	163.9	5.396	7.9	8.2	2.79	7056	4.01	12.53
009518710-07	OBS	No	46.248098	177.000352	71.9	5.711	7.7	6.6	2.79	7056	2.69	180.39

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009518710-01	OBS	FP	0.00	1	0	0	0	LPP_DV
009518710-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009518710-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_ZUMA—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009518710-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009518710-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT
009518710-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
009518710-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_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.

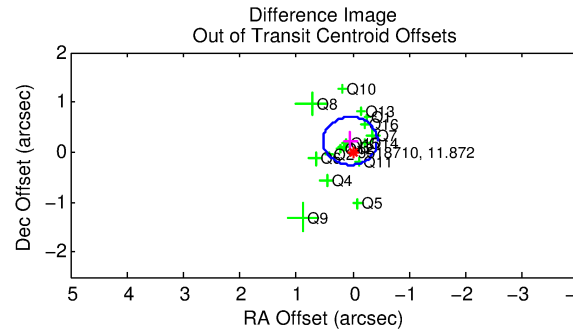
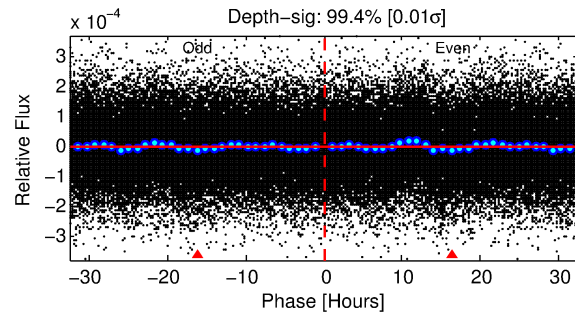
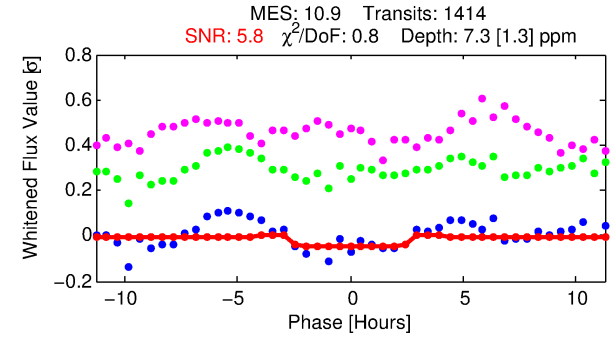
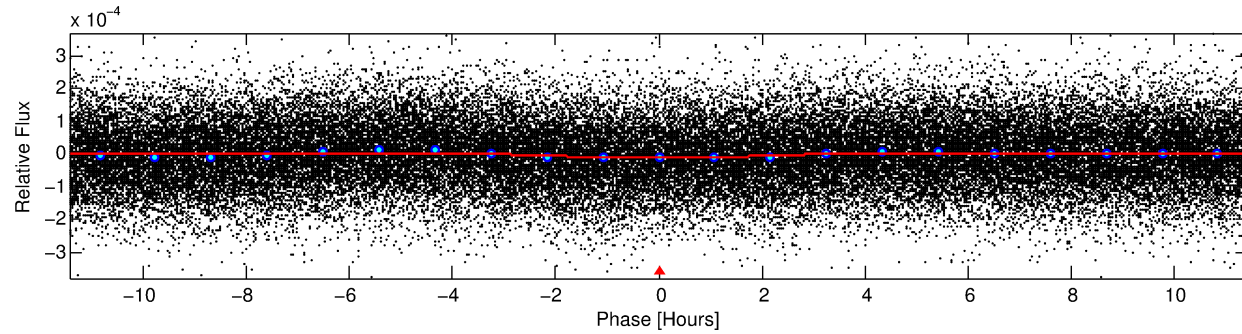
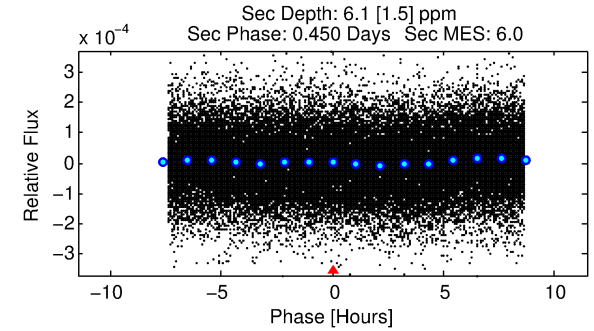
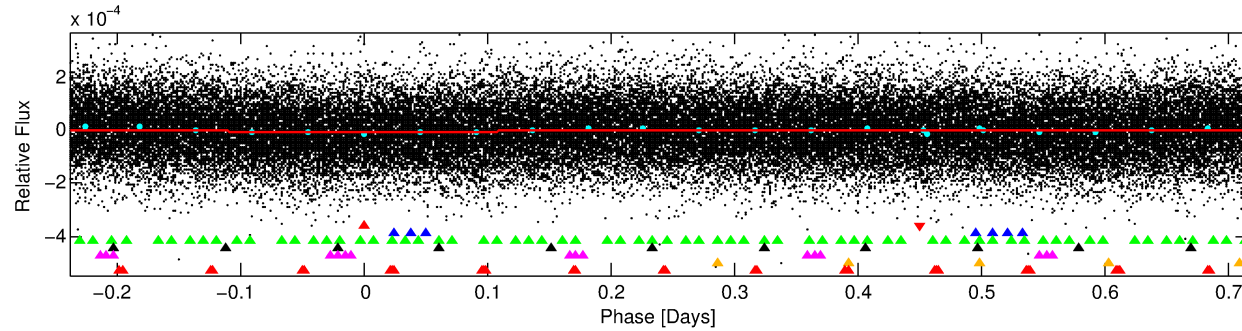
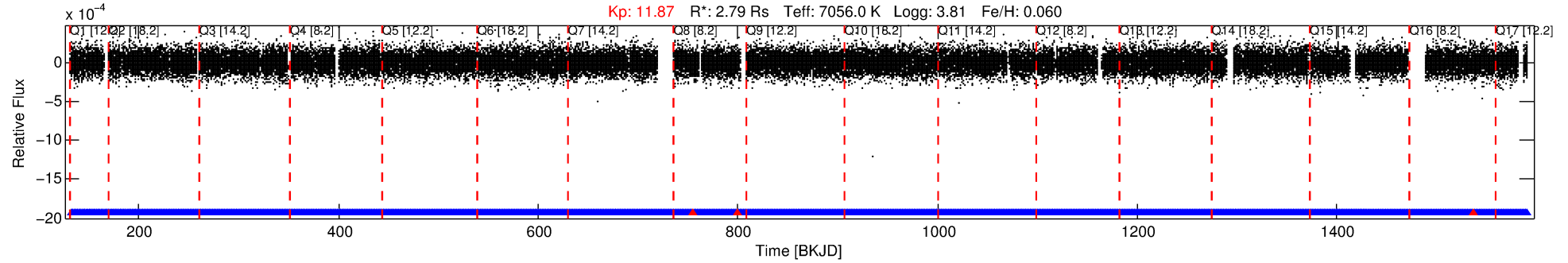
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 009518710-01

No Significant Match Found

# DV One-Page Summary

KIC: 9518710 Candidate: 1 of 7 Period: 0.954 d  
KOI: K03207.01 Corr: 0.864



## DV Fit Results:

Period = 0.95433 [0.00002] d  
Epoch = 132.4887 [0.0068] BKJD  
Rp/R\* = 0.0025 [0.0010]  
a/R\* = 1.39 [1.49]  
b = 0.46 [3.79]  
Seff = 31872.41 [15021.05]  
Teq = 3407 [401] K  
Rp = 0.77 [0.38] Re  
a = 0.0232 [0.0067] AU  
Ag = 3.04 [2.81] [0.73σ]  
Teffp = 6958 [1425] K [2.40σ]

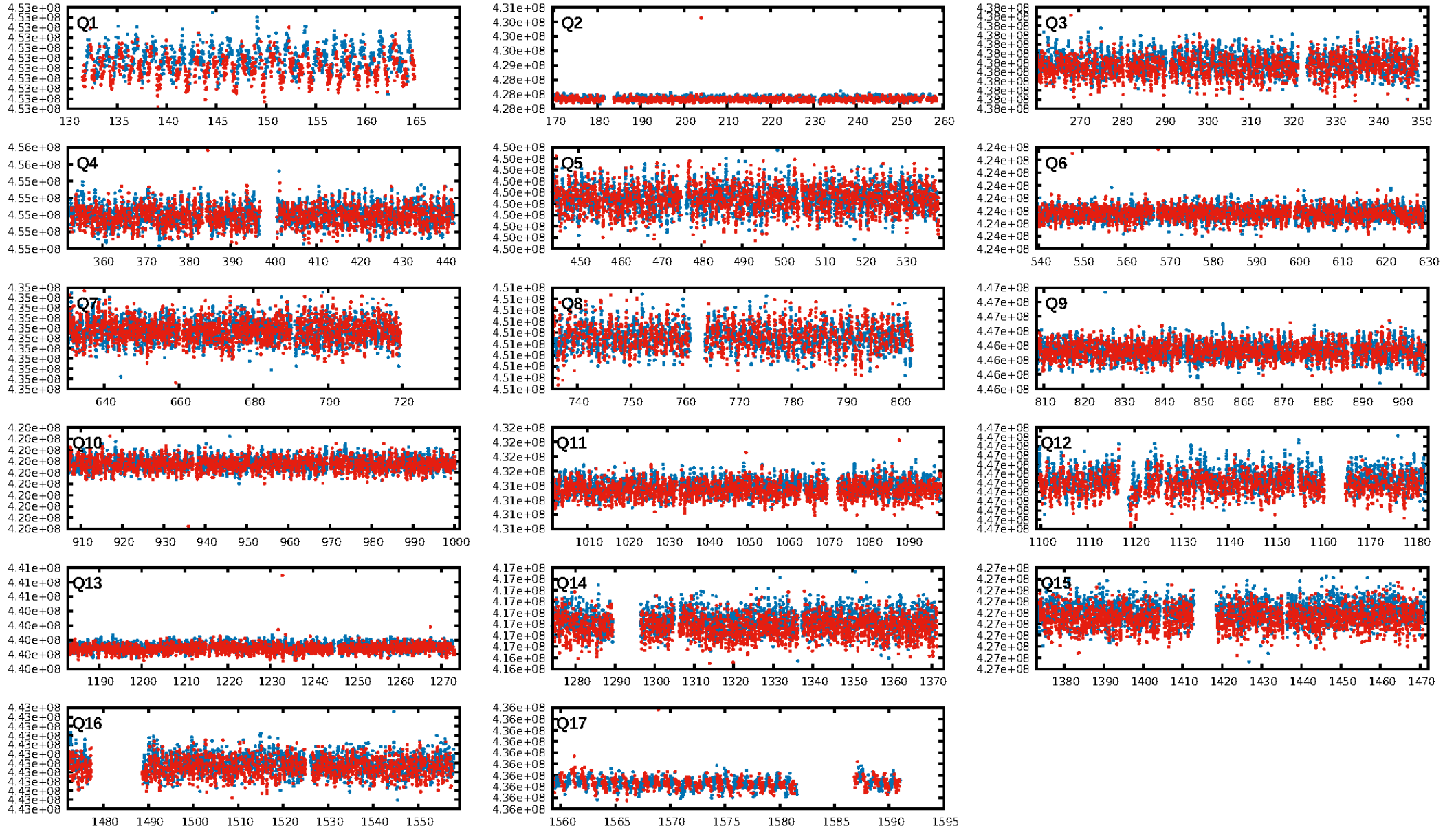
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [72.40σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 5.26e-16  
RollingBand-fgt: 1.00 [1346/1349]  
GhostDiagnostic-chr: 1.263  
Centroid-sig: N/A  
Centroid-so: 1.117 arcsec [1.07σ]  
OotOffset-rm: 0.230 arcsec [1.44σ]  
KicOffset-rm: 0.277 arcsec [1.66σ]  
OotOffset-st: 4/4/4/4 [16]  
KicOffset-st: 4/4/4/4 [16]  
DiffImageQuality-fgm: 1.00 [16/16]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 16:33:05 Z

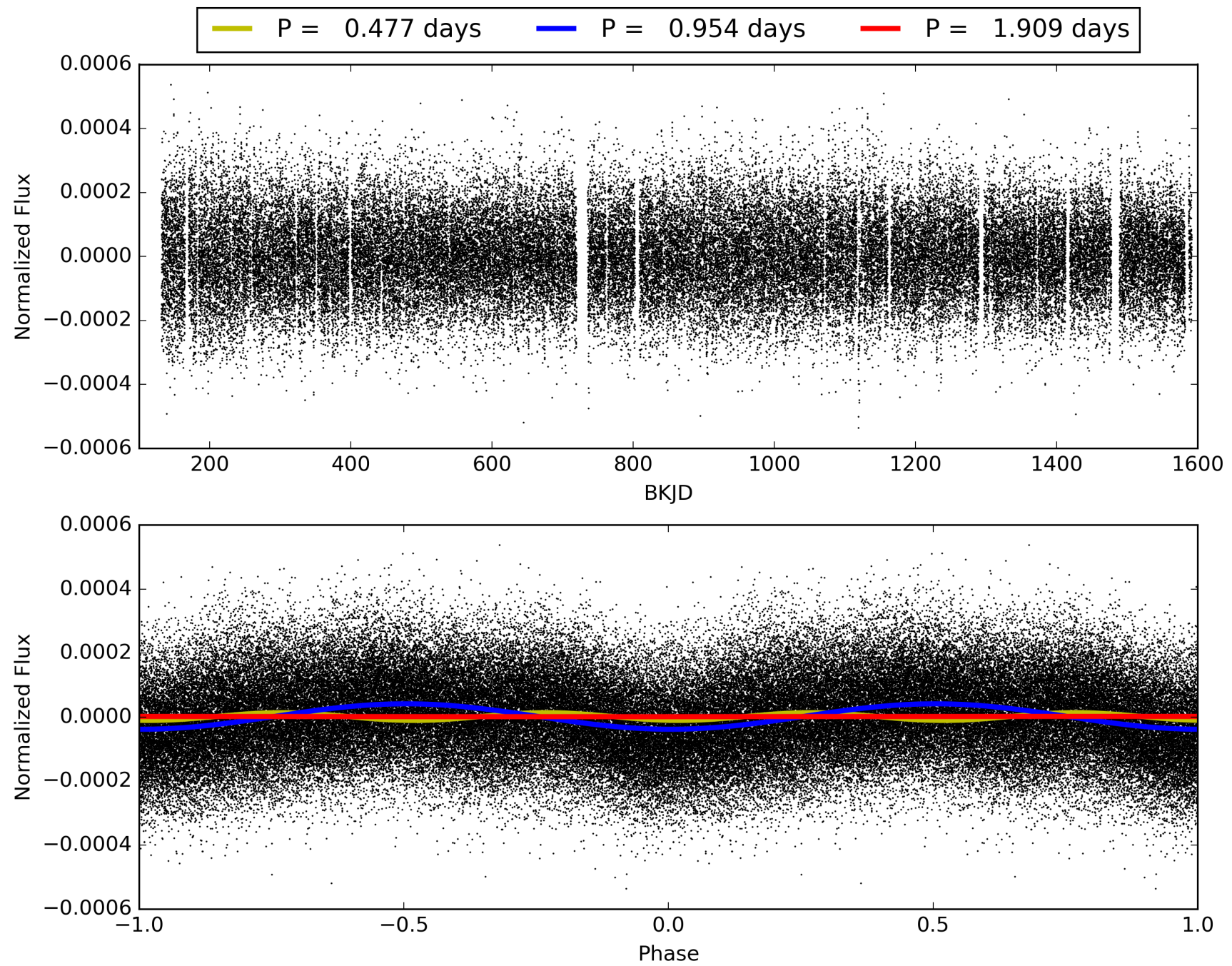
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 009518710-01, PDC Light Curves





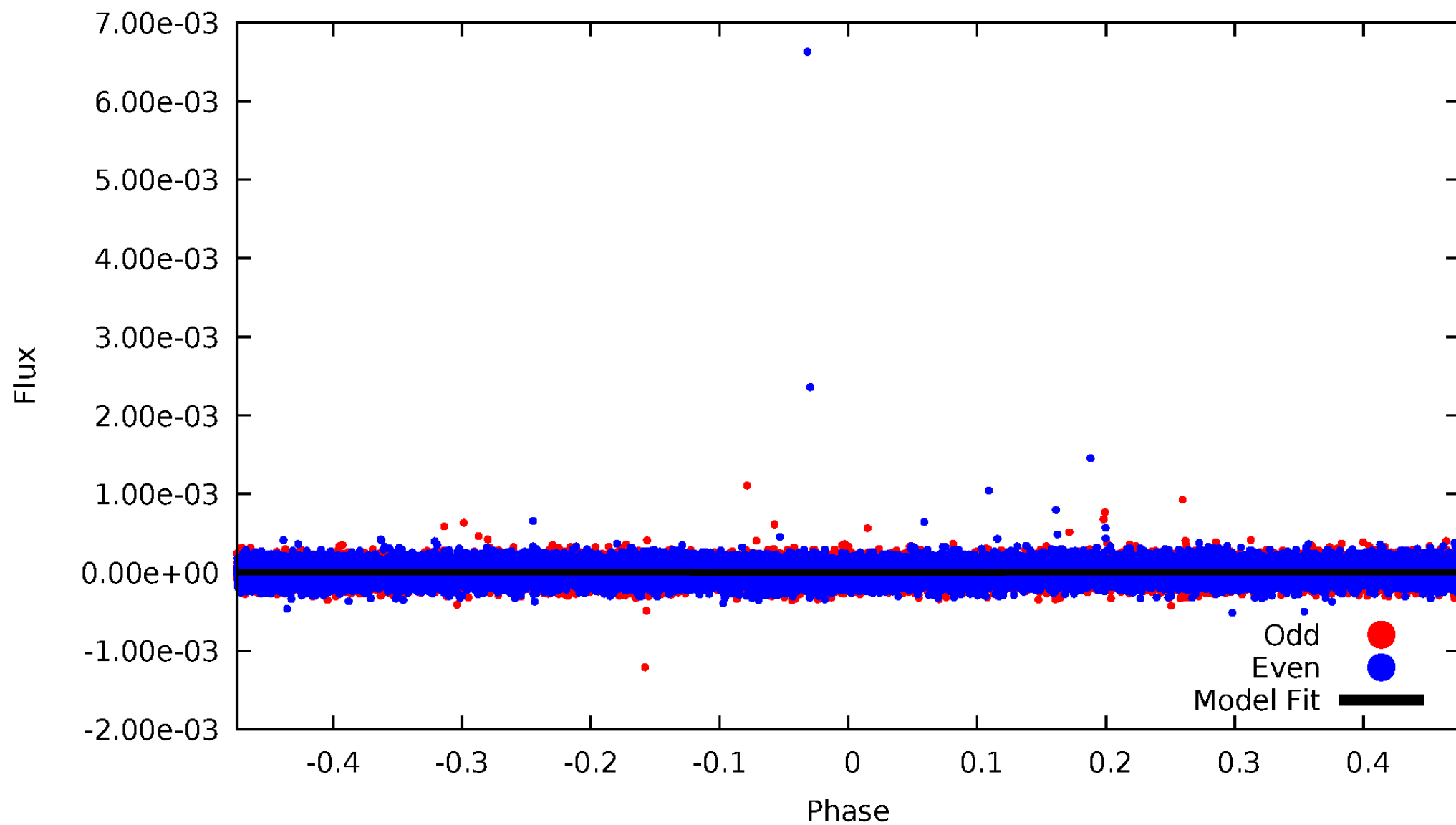
TCE 009518710-01





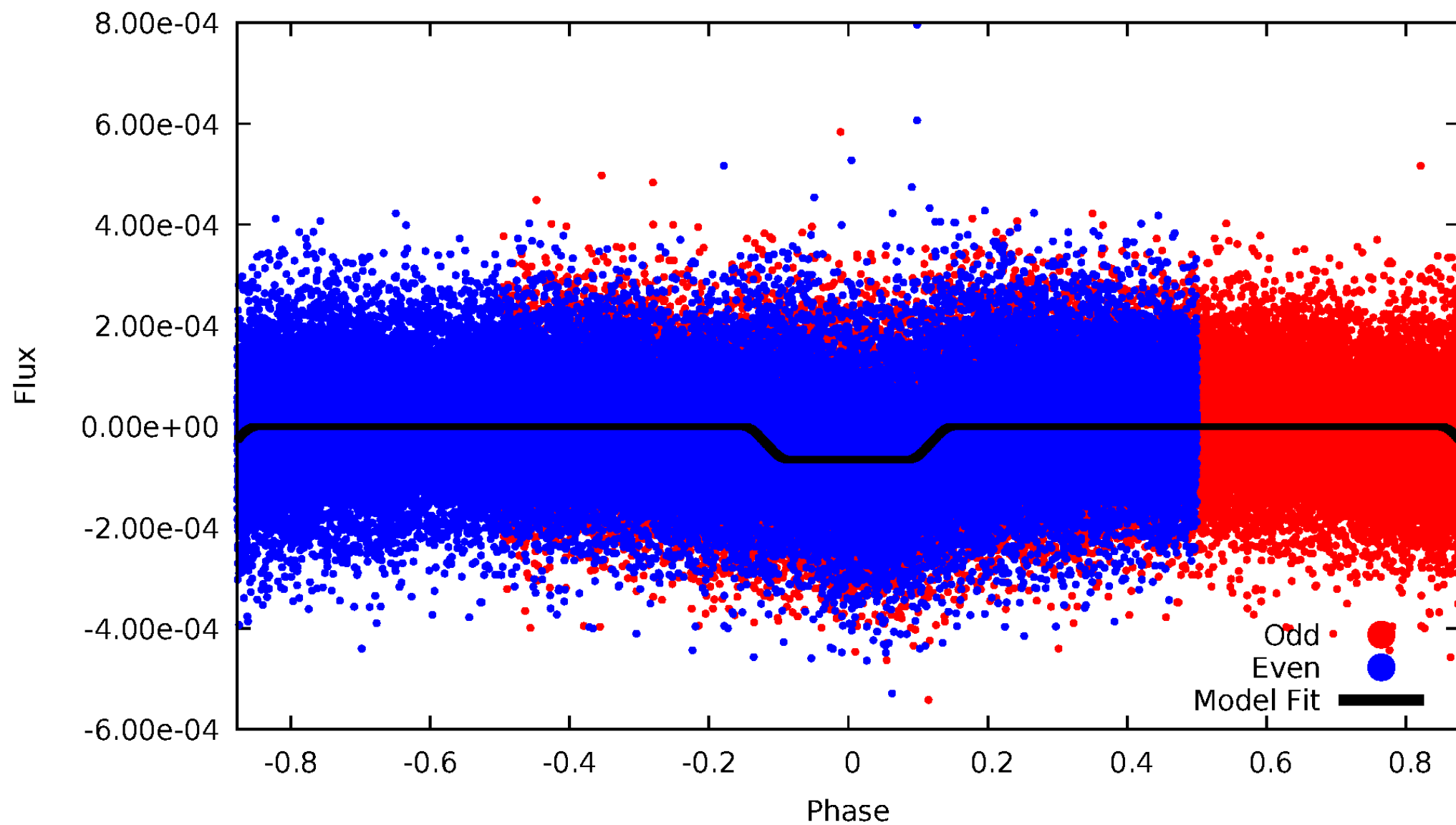
# DV Odd/Even

TCE 009518710-01

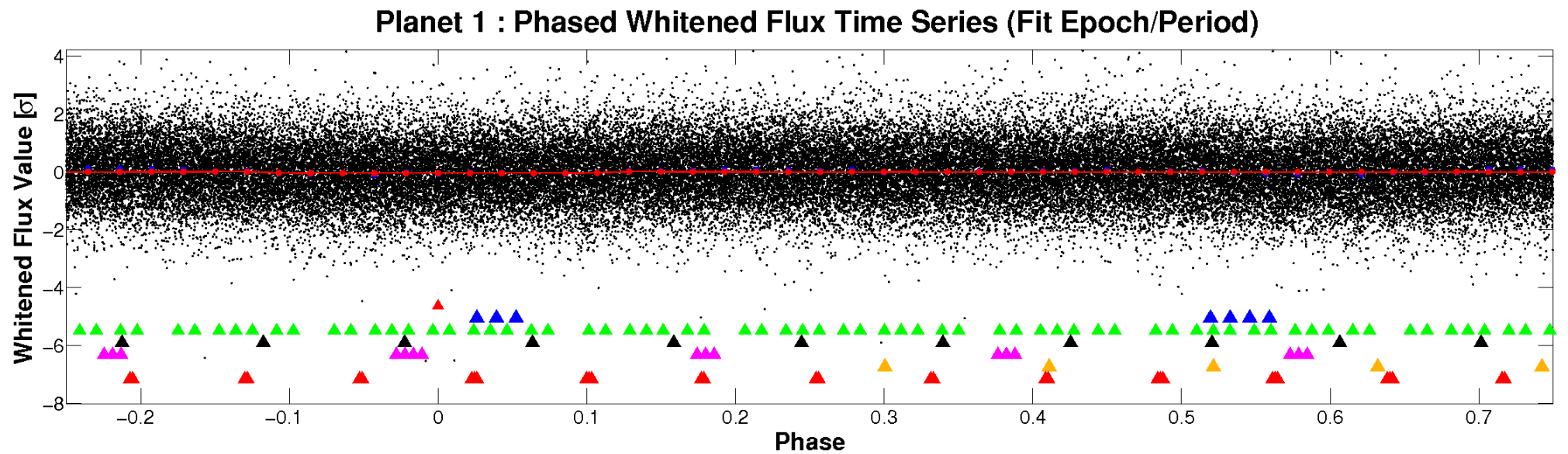
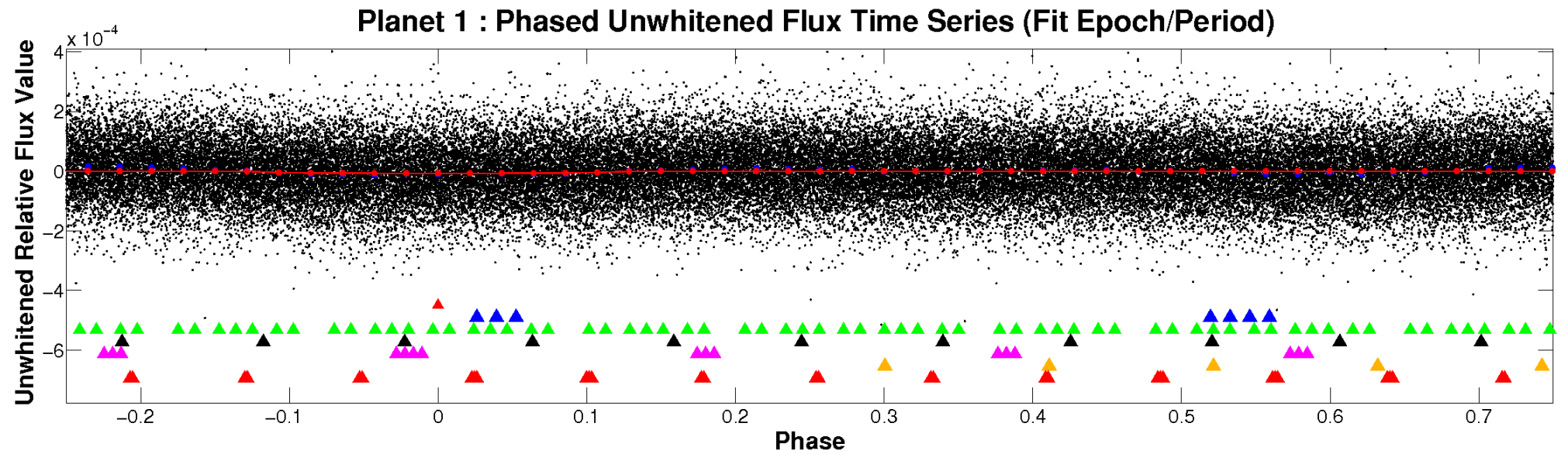


# ALT Odd/Even

TCE 009518710-01



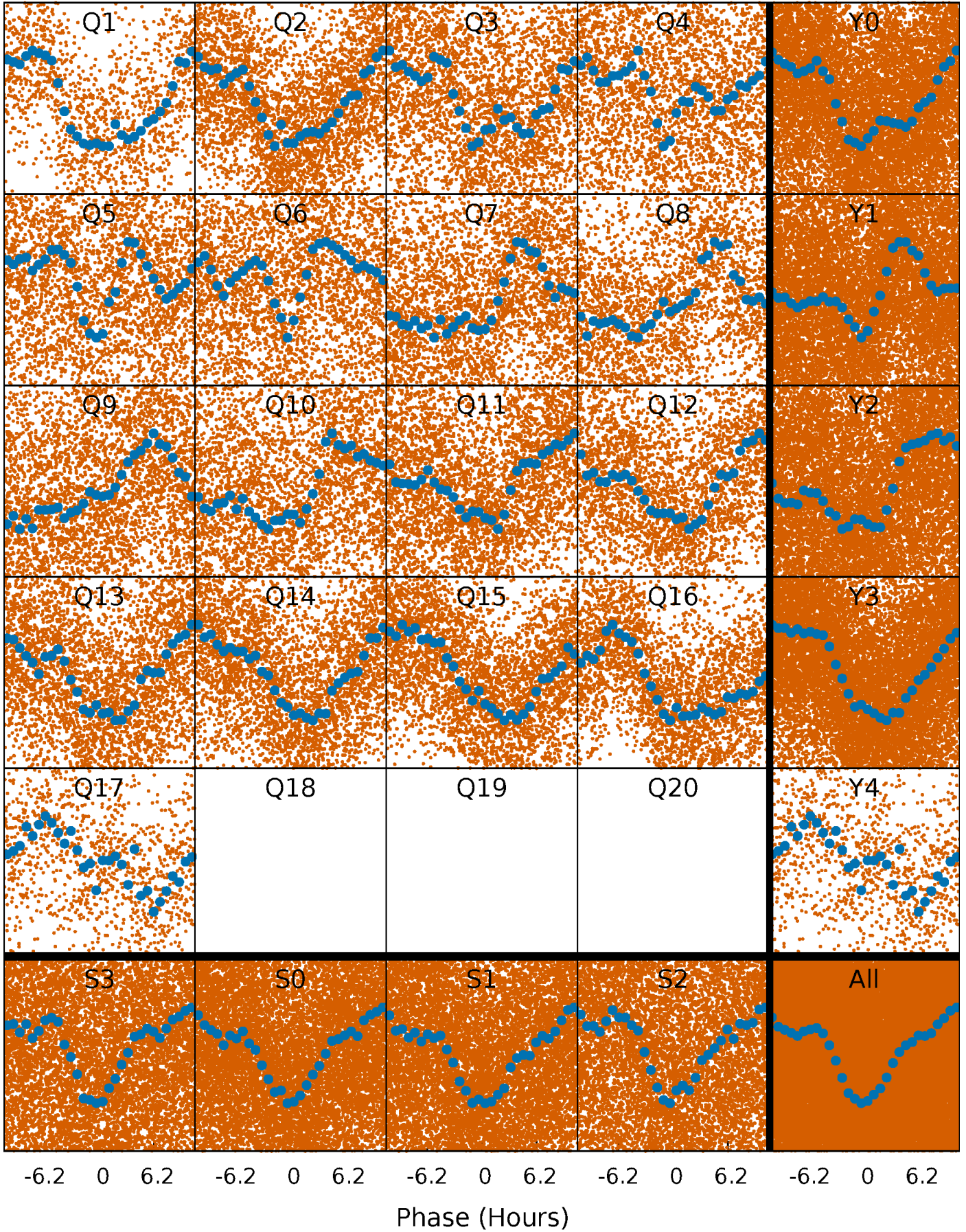
# Non-Whitened Vs. Whitened Light Curve





# PDC Quarter-Phased Transit Curves

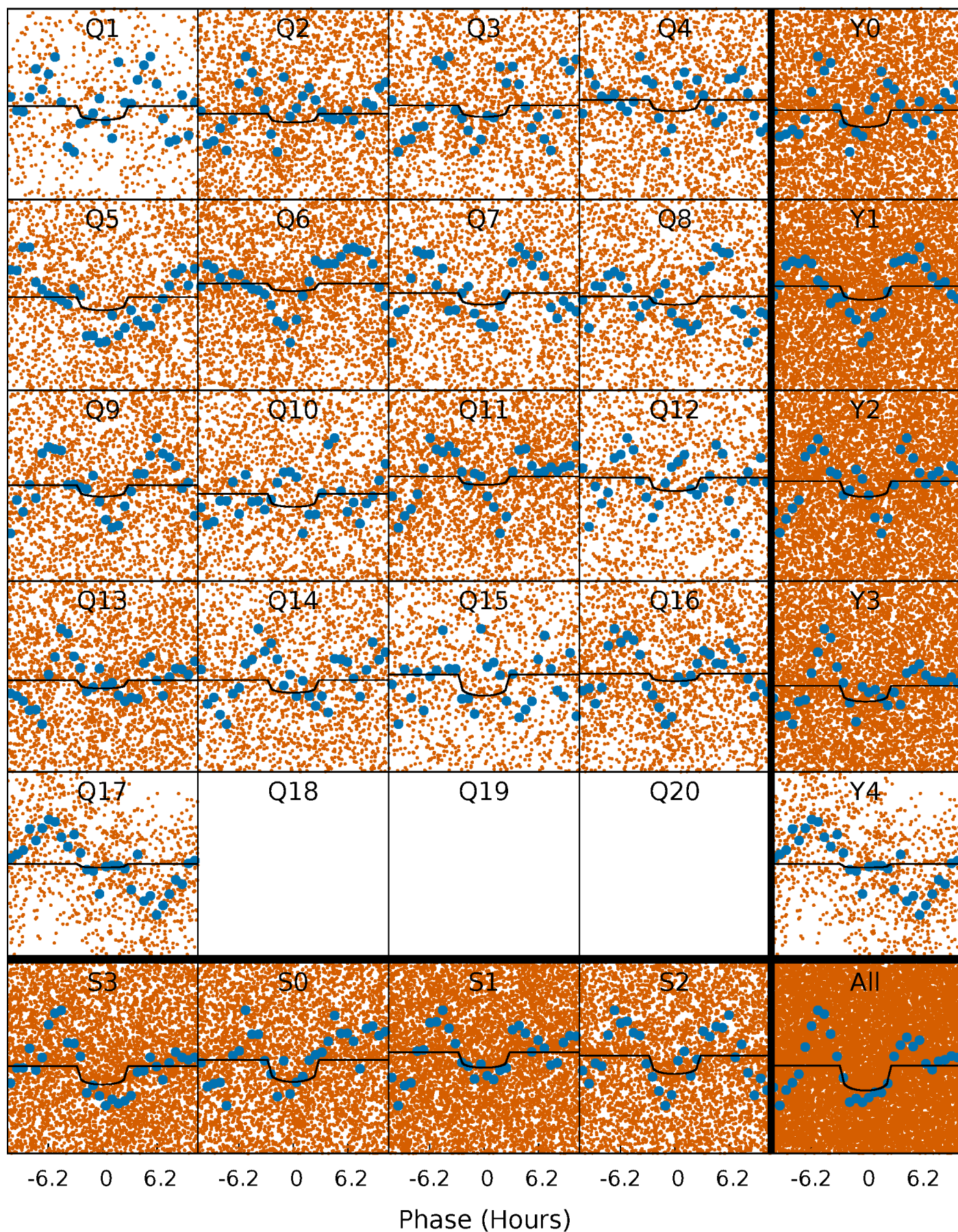
TCE 009518710-01 P= 0.954328 Days  $T_0=132.488665$  (BKJD)





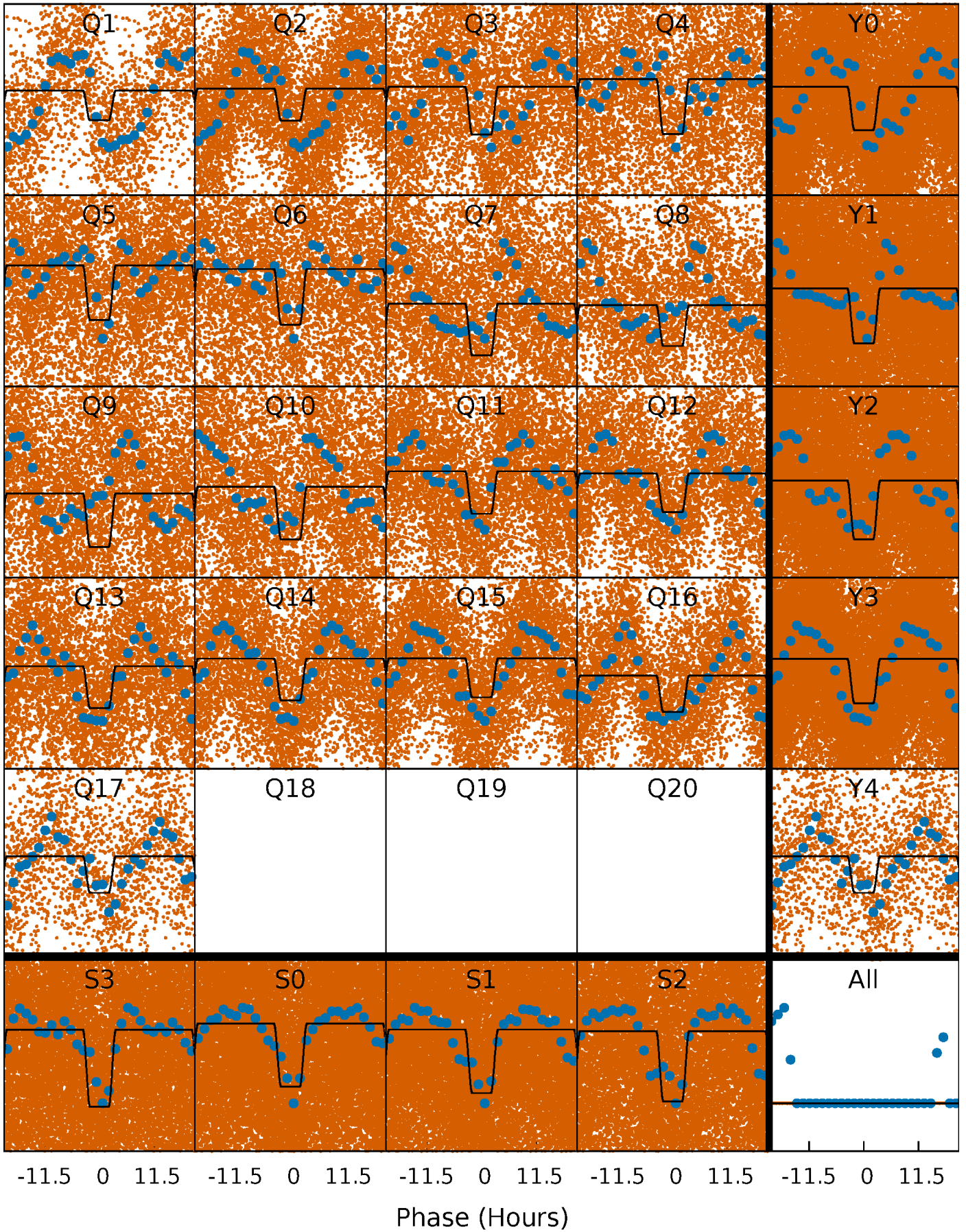
# DV Quarter-Phased Transit Curves

TCE 009518710-01 P= 0.954328 Days  $T_0=132.488665$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 009518710-01   P= 0.954525 Days    $T_0=132.352009$  (BKJD)

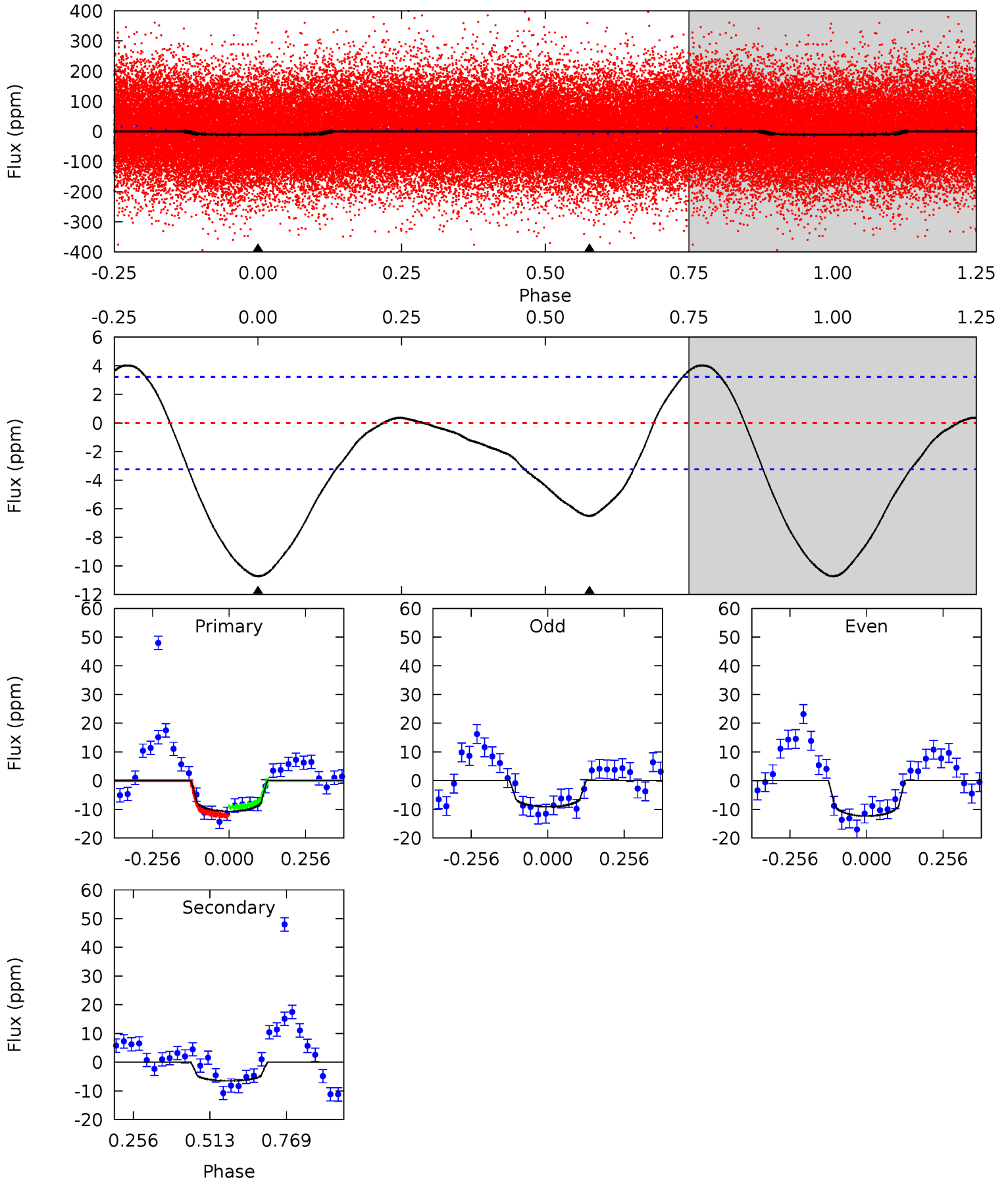




# DV Model-Shift Uniqueness Test

009518710-01, P = 0.954328 Days, E = 130.580009 Days

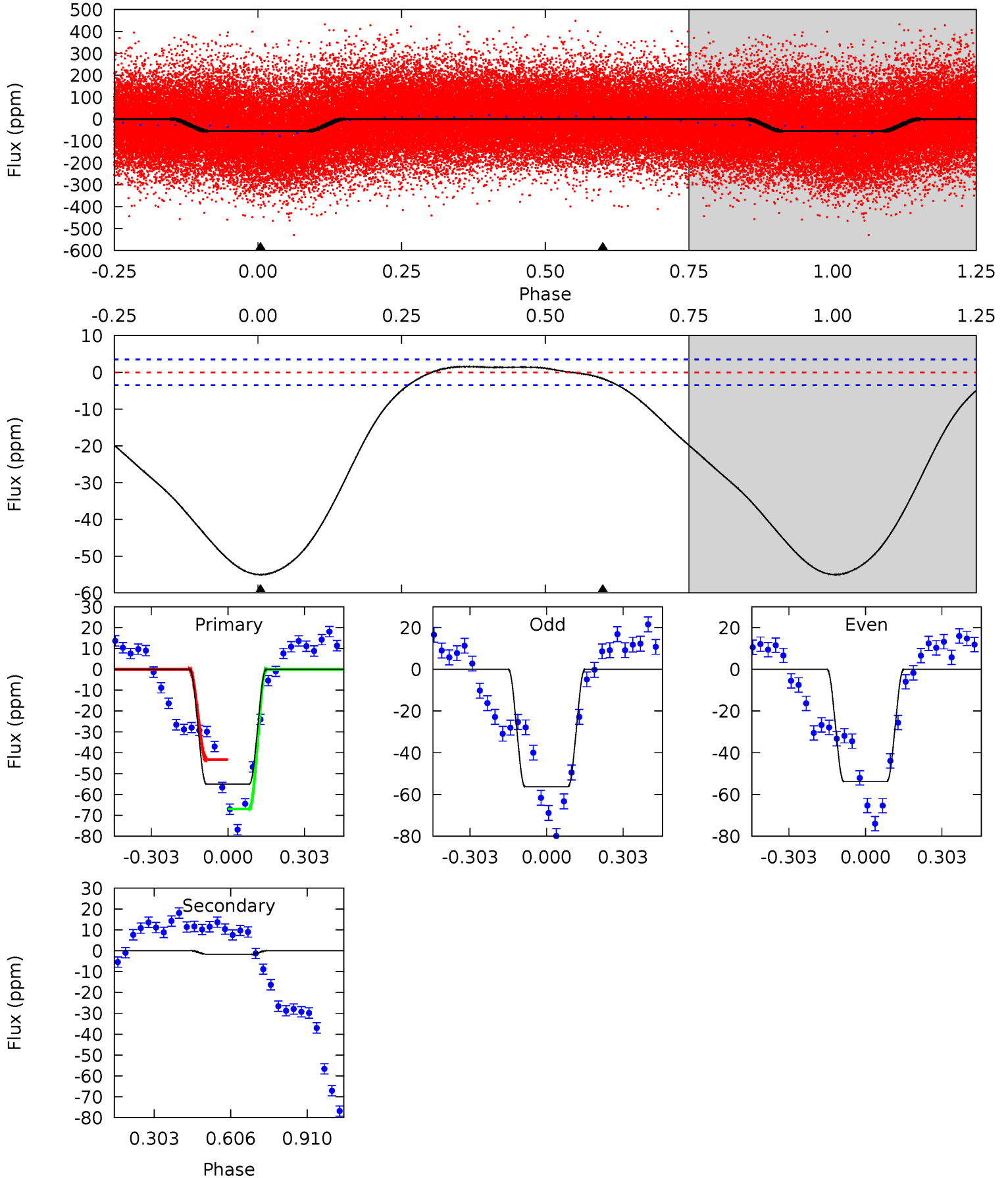
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
14.5	8.78	0	0	4.36	1.13	0.43	14.5	14.5	8.78	8.78	2.19	0.98	0.27	1.93



# Alt Model-Shift Uniqueness Test

009518710-01, P = 0.954525 Days, E = 131.397484 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
68.1	2.13	0	0	4.33	1.03	2.27	68.1	68.1	2.13	2.13	1.52	0.88	0.03	15.0



### Stellar Parameters For KIC 009518710

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7056^{+169}_{-253}$	$3.813^{+0.259}_{-0.111}$	$0.060^{+0.200}_{-0.300}$	$2.785^{+0.469}_{-0.871}$	$1.836^{+0.191}_{-0.354}$	$0.120^{+0.195}_{-0.041}$
	+2%/-4%	+7%/-3%	+333%/-500%	+17%/-31%	+10%/-19%	+163%/-34%
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 009518710-01 / KOI 3207.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-7 \pm 1$	$0.72^{+0.29}_{-0.29}$	$4699^{+287}_{-410}$	$6917^{+2464}_{-1161}$	$3.644^{+6.661}_{-1.761}$
Alt.	$-2 \pm 1$	$2.38^{+0.44}_{-0.46}$	$4680^{+281}_{-396}$	$-3841^{+334}_{-258}$	$0.086^{+0.066}_{-0.046}$

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



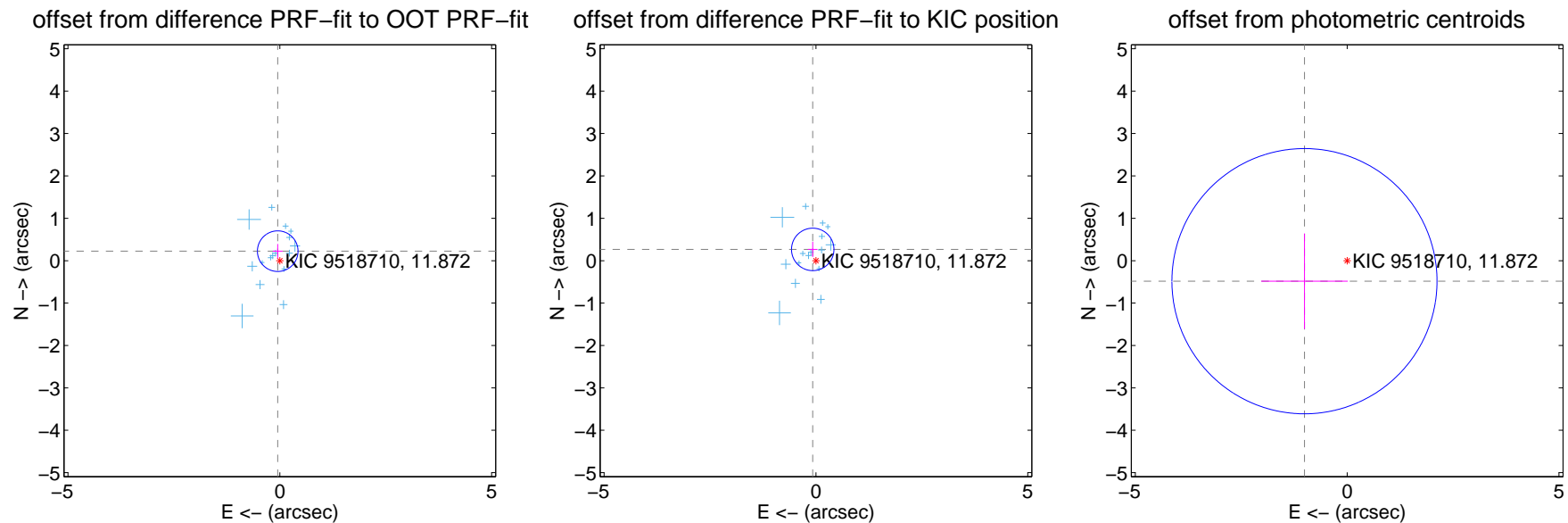
## DV Centroid Data

Supplemental centroid analysis for 009518710-01. **Kepler magnitude: 11.87.** Transit SNR 5.78

There are 16 quarters with good PRF difference image offsets

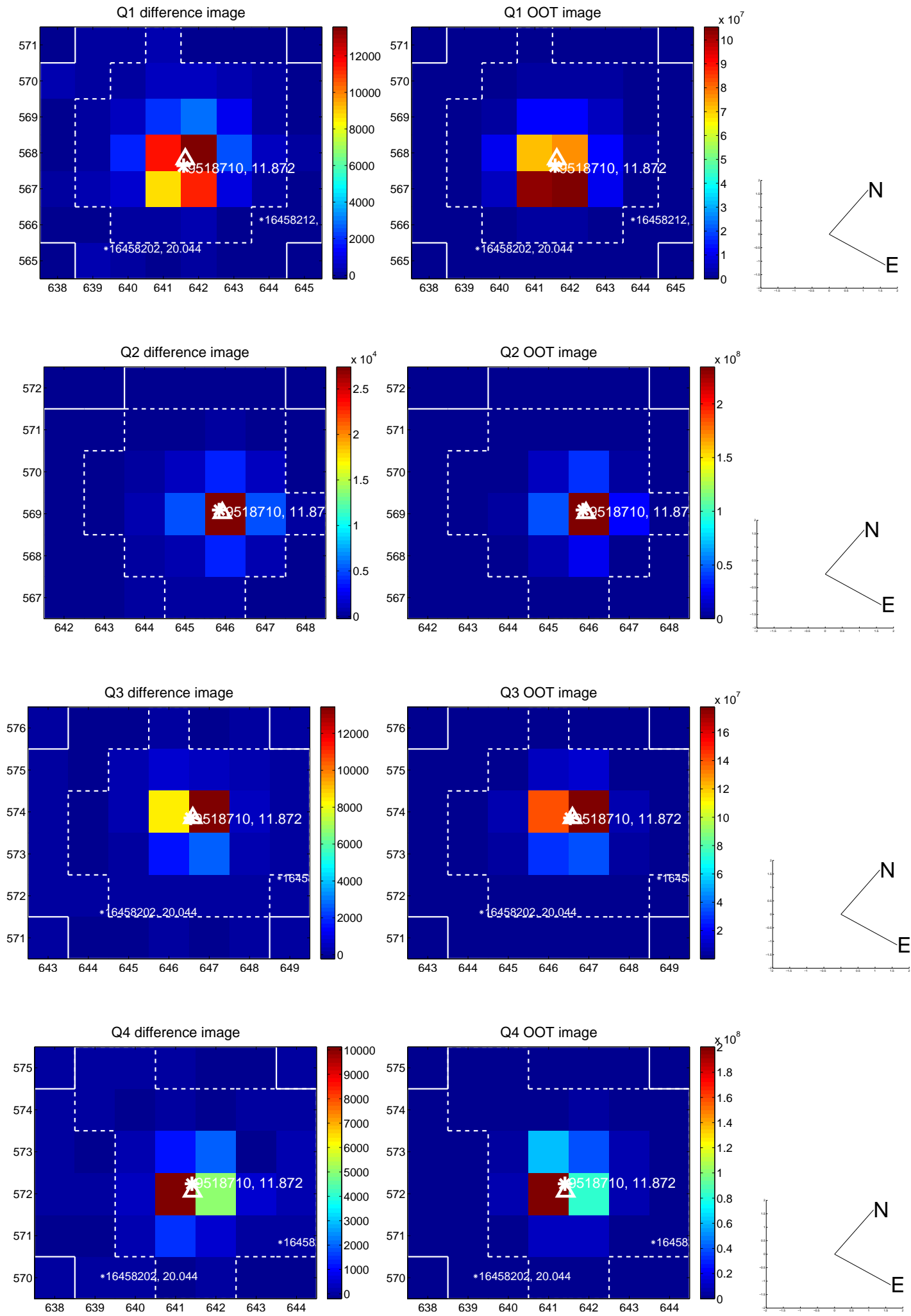
The direct PRF centroid is offset from the target star catalog position by about 0.09 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.230 \pm 0.160$	1.44	$0.049 \pm 0.115$	$0.225 \pm 0.169$
PRF-fit source offset from KIC position	$0.277 \pm 0.167$	1.66	$0.075 \pm 0.113$	$0.266 \pm 0.179$
photometric centroid source offset	$1.12 \pm 1.04$	1.07	$1.01 \pm 1.02$	$-0.48 \pm 1.13$

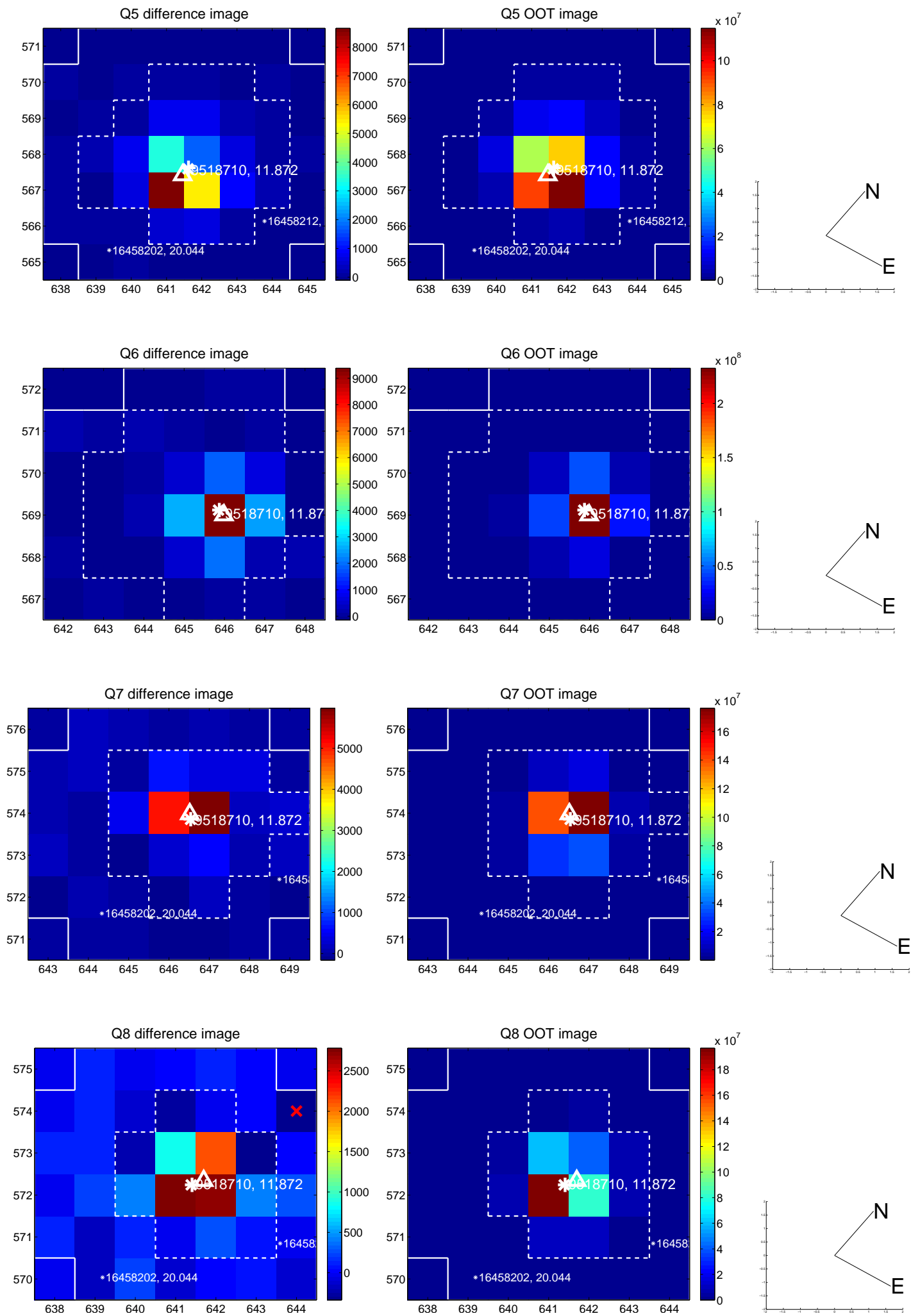


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

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

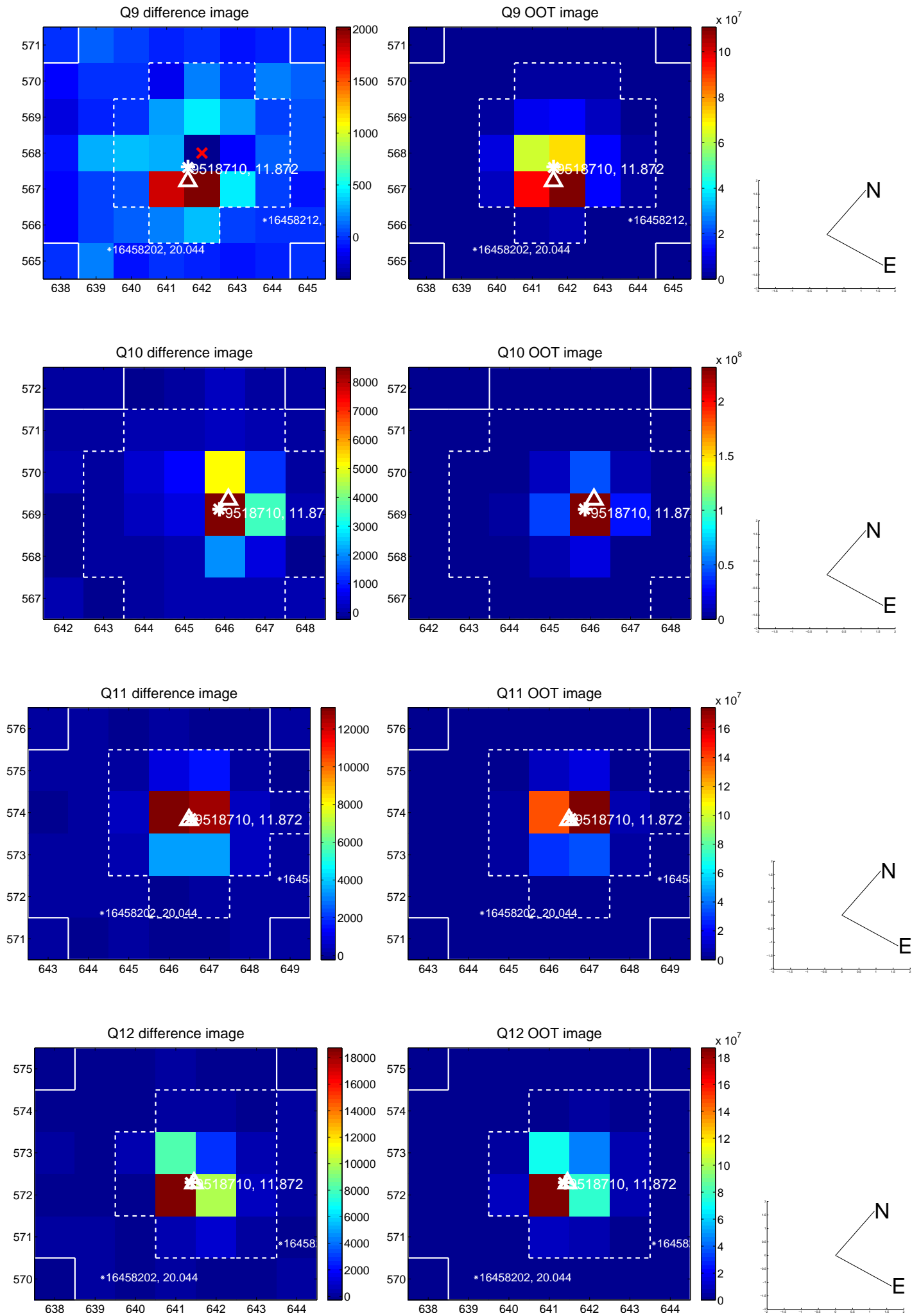


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

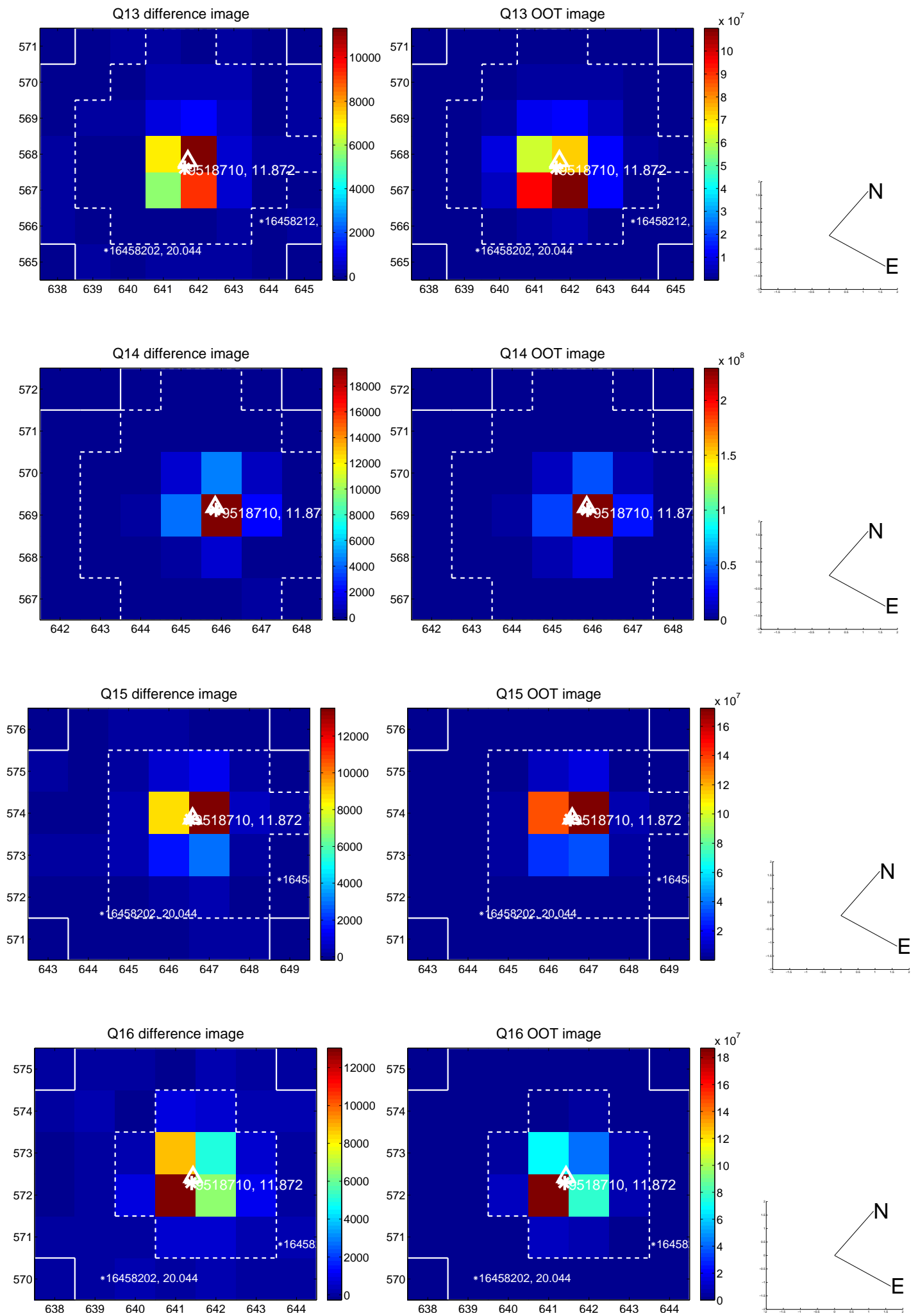




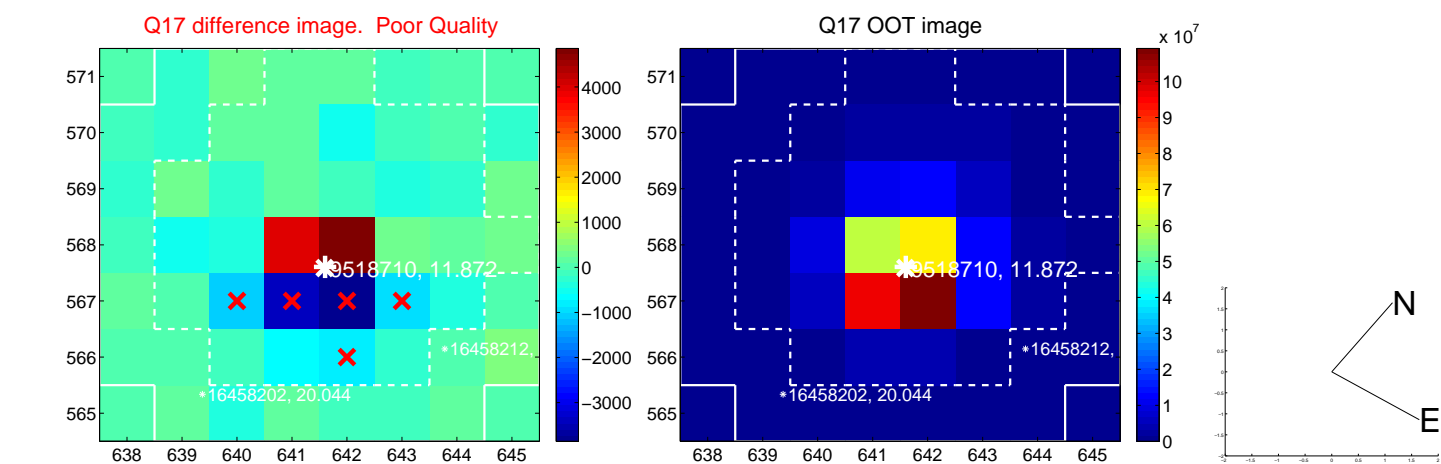
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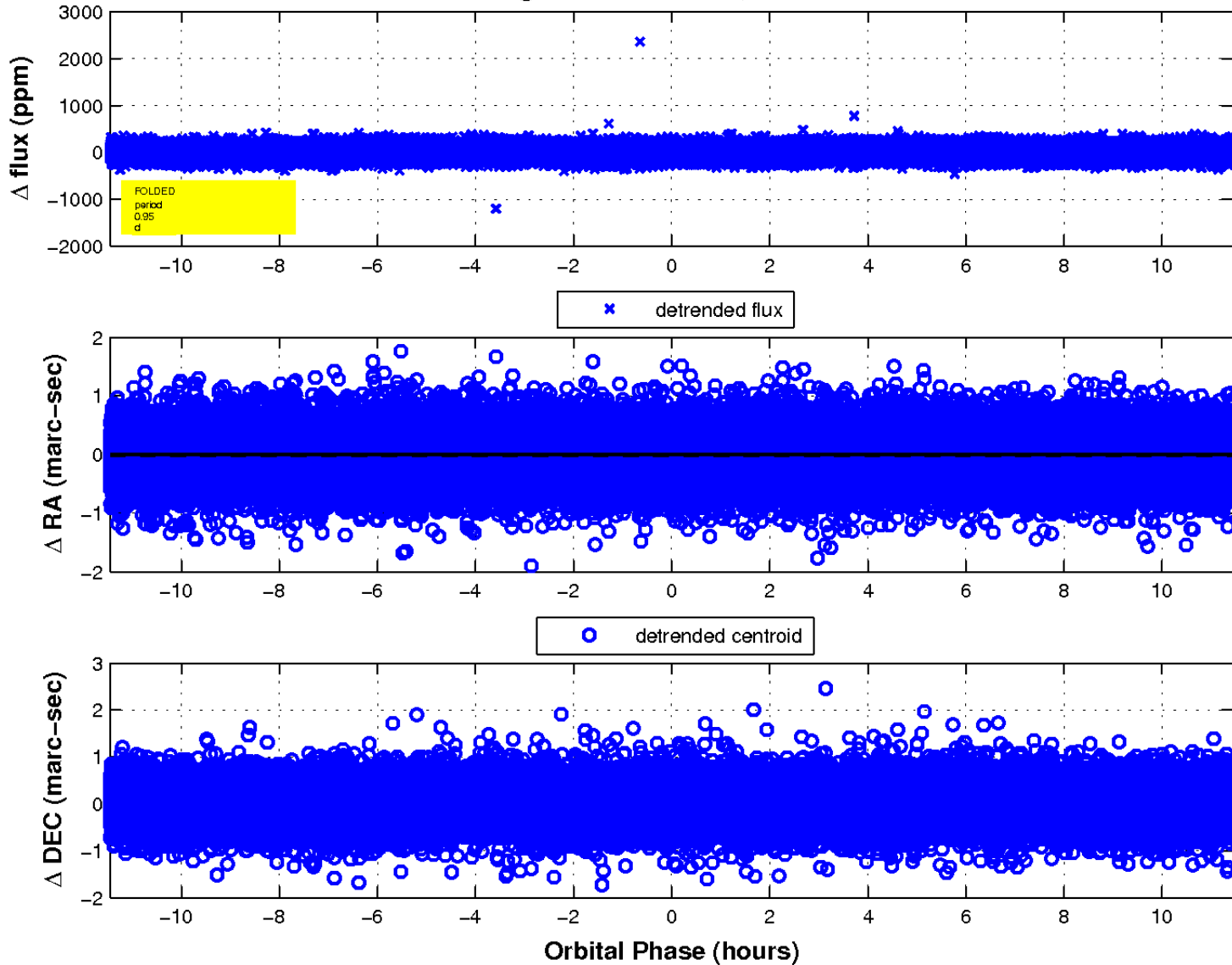
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

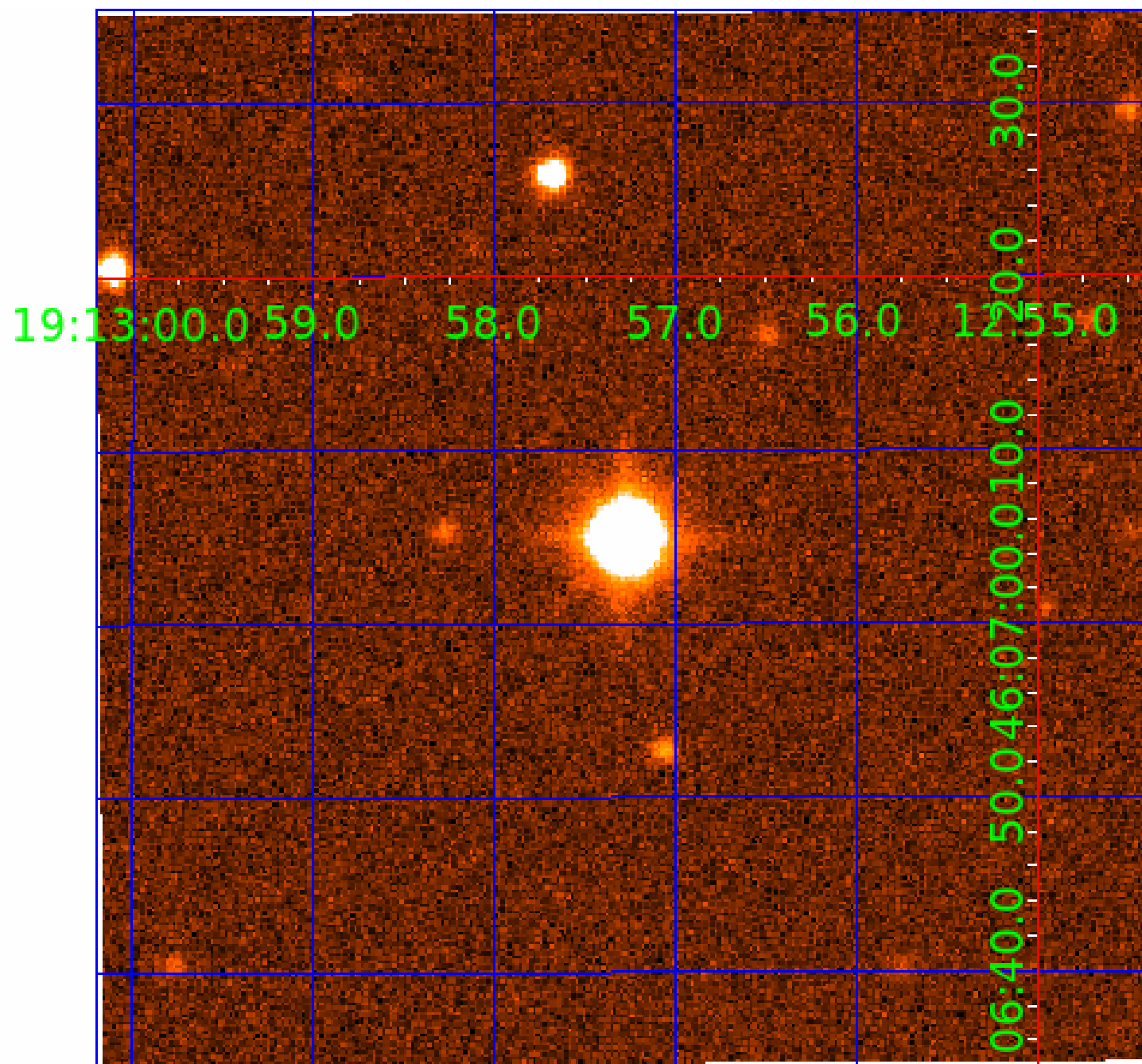


fluxWeightedCentroids, Planet 1 of 7



UKIRT Image

Declination



# KIC 009518710

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009518710-01	OBS	3207.01	0.954328	132.488665	7.3	5.434	10.9	5.8	2.79	7056	0.77	31872.41
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009518710-03	OBS	No	21.258857	132.247946	61.6	3.971	8.0	6.9	2.79	7056	2.50	508.50
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## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009518710-01	OBS	FP	0.00	1	0	0	0	LPP_DV
009518710-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009518710-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_ZUMA—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009518710-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009518710-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT
009518710-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
009518710-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_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 009518710-02

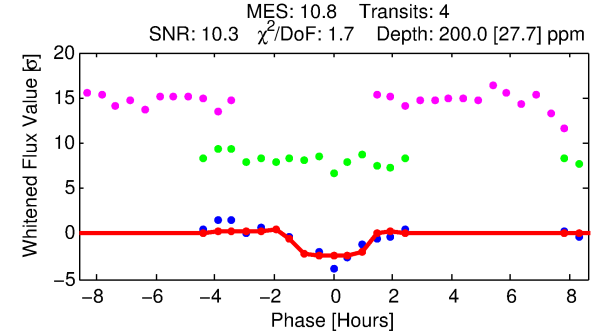
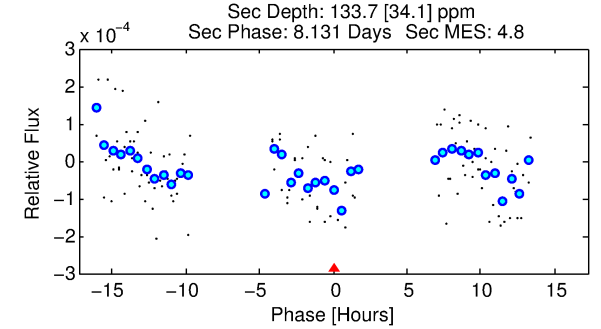
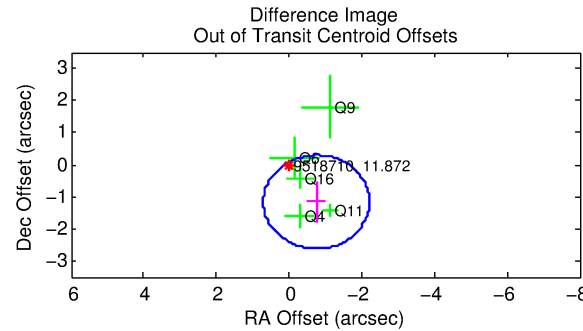
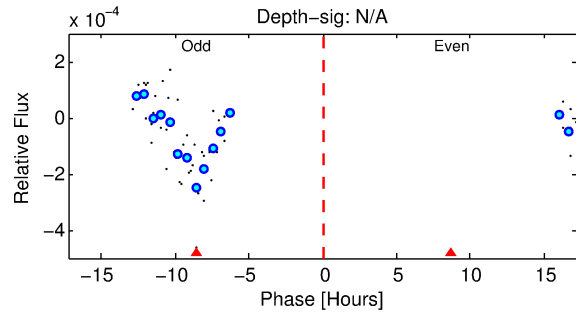
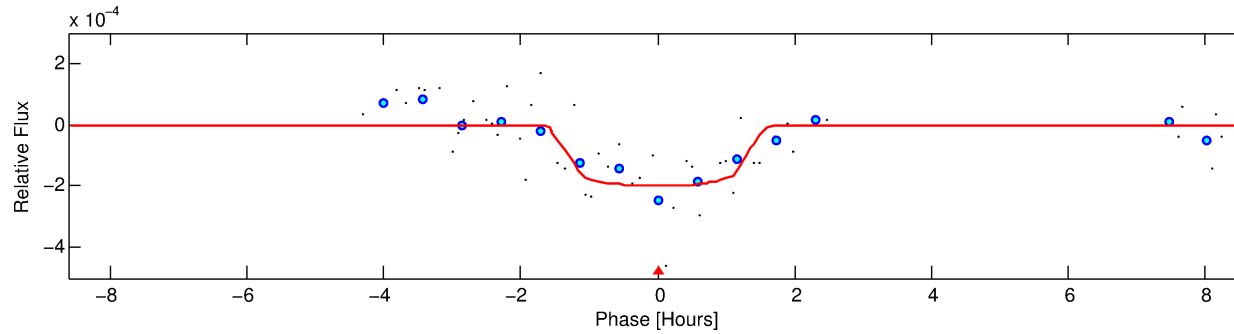
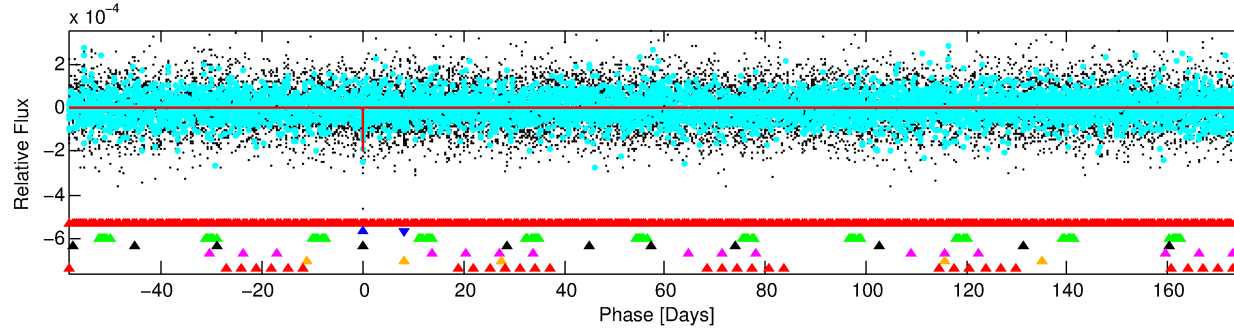
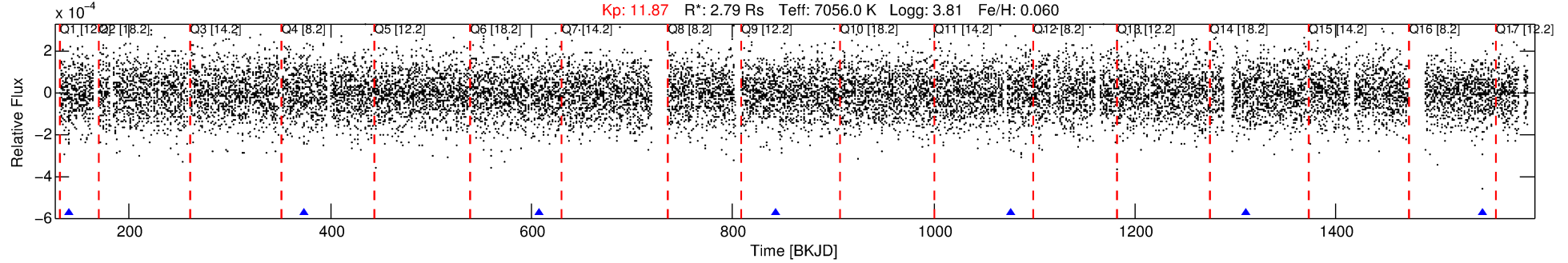
No Significant Match Found

# DV One-Page Summary

KIC: 9518710 Candidate: 2 of 7 Period: 234.294 d

KOI: K03207 Corr: No Ephemeris Match

Kp: 11.87 R\*: 2.79 Rs Teff: 7056.0 K Logg: 3.81 Fe/H: 0.060



## DV Fit Results:

Period = 234.29393 [0.00185] d  
Epoch = 139.6648 [0.0071] BKJD  
Rp/R\* = 0.0144 [0.0128]  
a/R\* = 371.58 [2018.40]  
b = 0.82 [2.15]  
Seff = 20.73 [9.77]  
Teq = 544 [64] K  
Rp = 4.38 [4.13] Re  
a = 0.9115 [0.2626] AU  
Ag = 3184.28 [5891.62] [0.54σ]  
Teffp = 6320 [2845] K [2.03σ]

## DV Diagnostic Results:

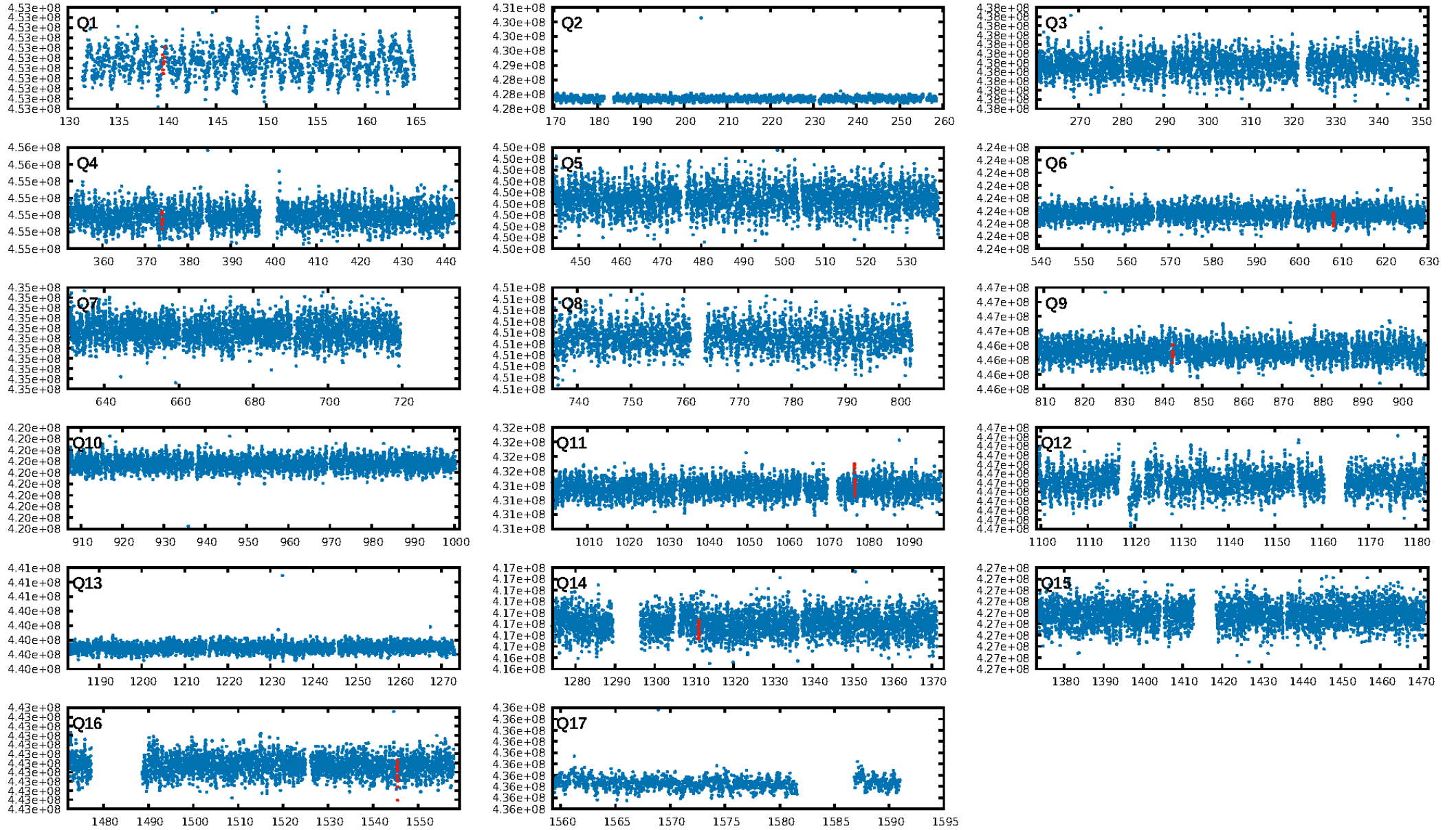
ShortPeriod-sig: 100.0% [323.11σ]  
LongPeriod-sig: 100.0% [421.95σ]  
ModelChiSquare2-sig: 16.9%  
ModelChiSquareGof-sig: 43.1%  
Bootstrap-pfa: 2.02e-14  
RollingBand-fgt: 1.00 [3/3]  
**GhostDiagnostic-chr: 0.9748**  
Centroid-sig: N/A  
Centroid-so: 0.402 arcsec [0.52σ]  
OotOffset-rm: 1.384 arcsec [2.85σ]  
KicOffset-rm: 1.346 arcsec [2.90σ]  
OotOffset-st: 1/1/2/1 [5]  
KicOffset-st: 1/1/2/1 [5]  
DiffImageQuality-fgm: 1.00 [5/5]  
DiffImageOverlap-fno: 0.43 [3/7]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 16:33:18 Z

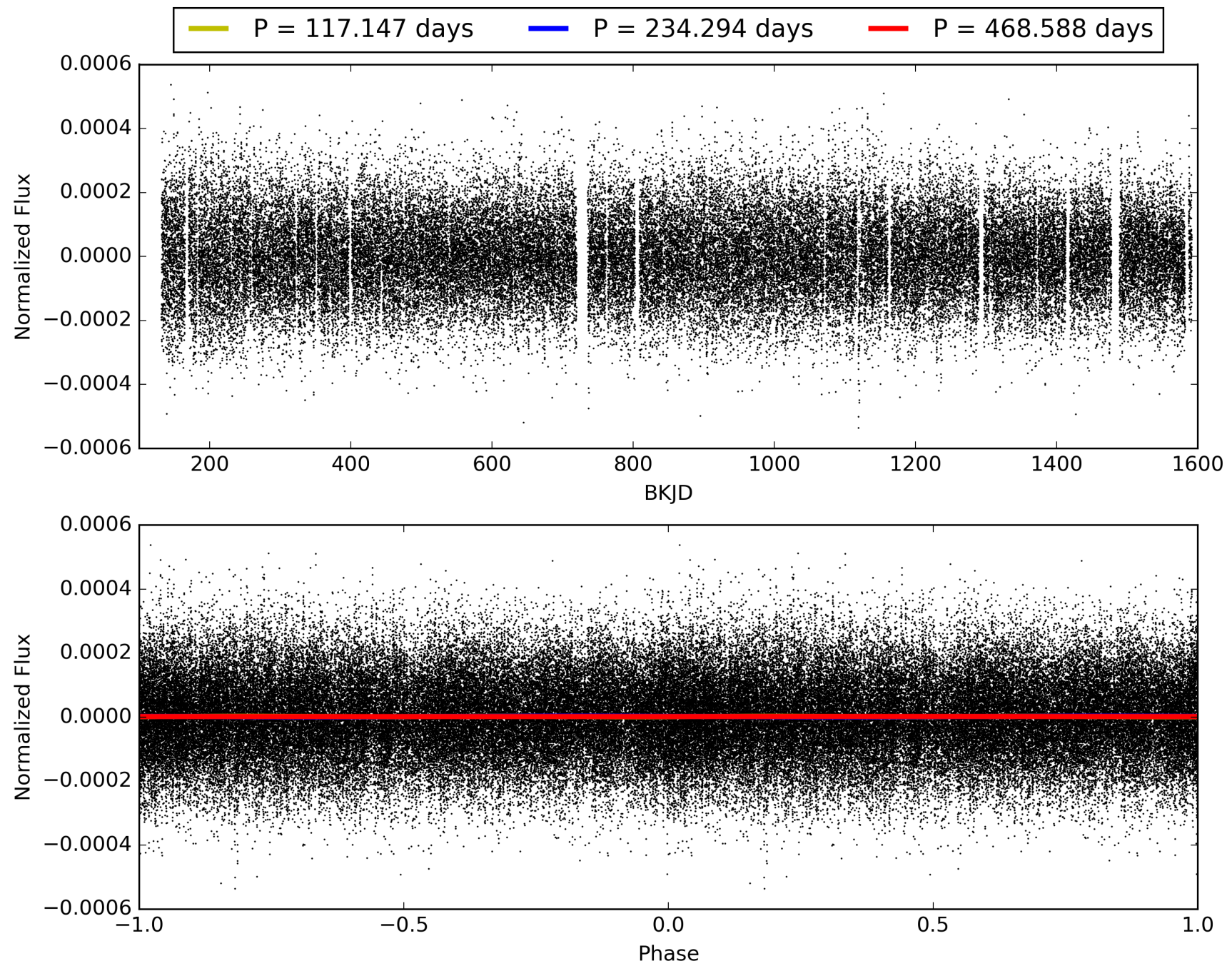
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 009518710-02, PDC Light Curves

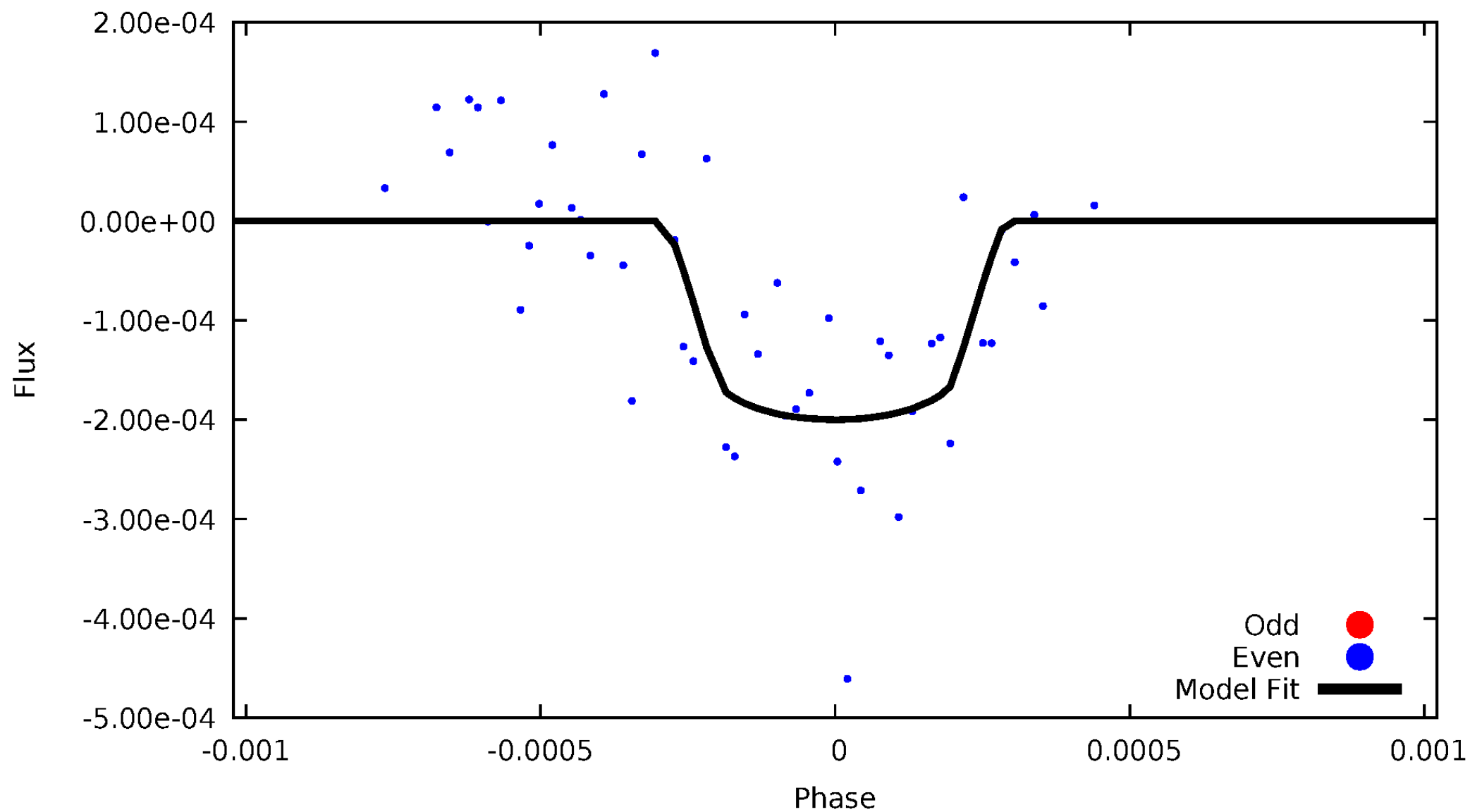


TCE 009518710-02

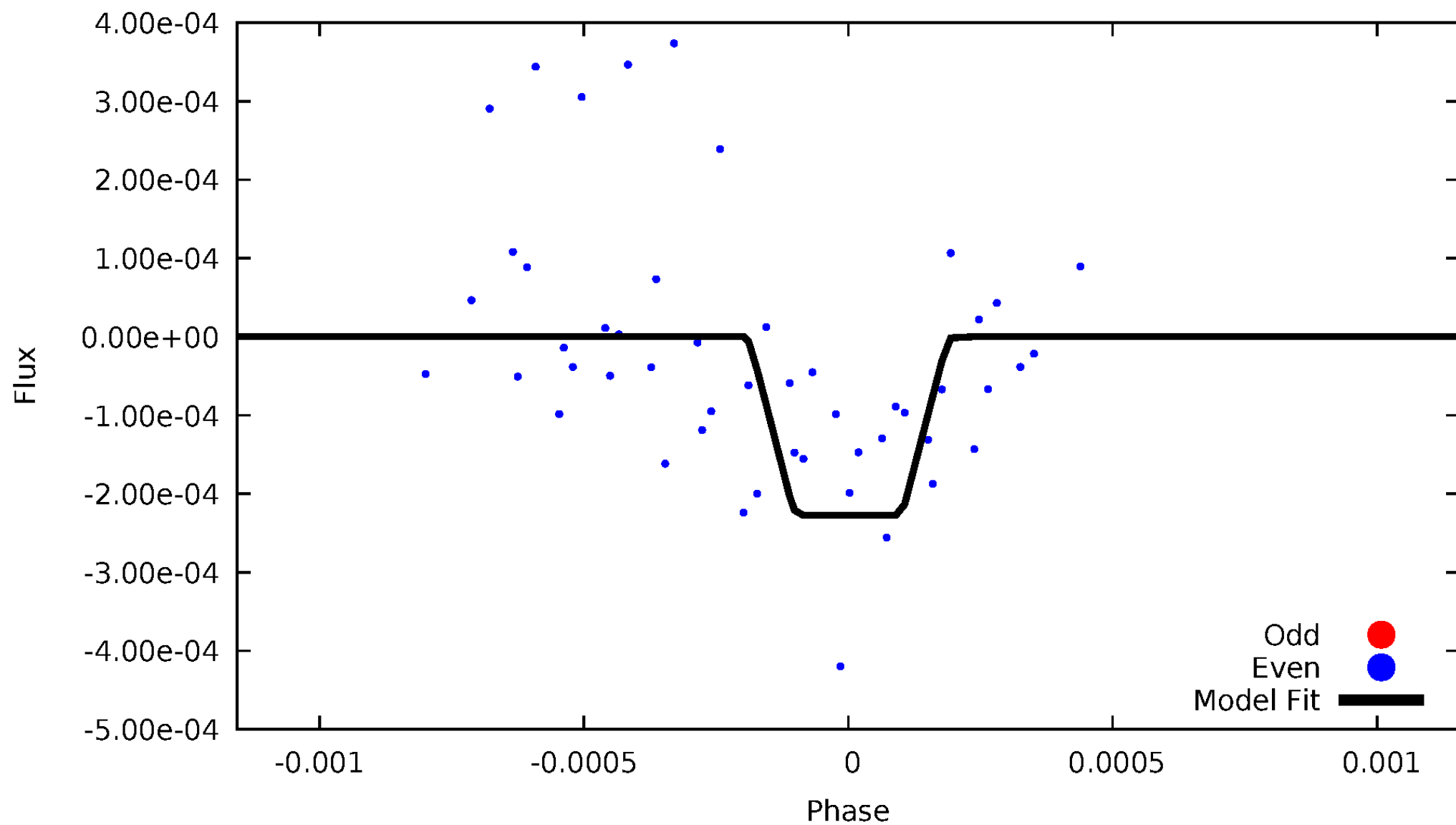


# DV Odd/Even

TCE 009518710-02

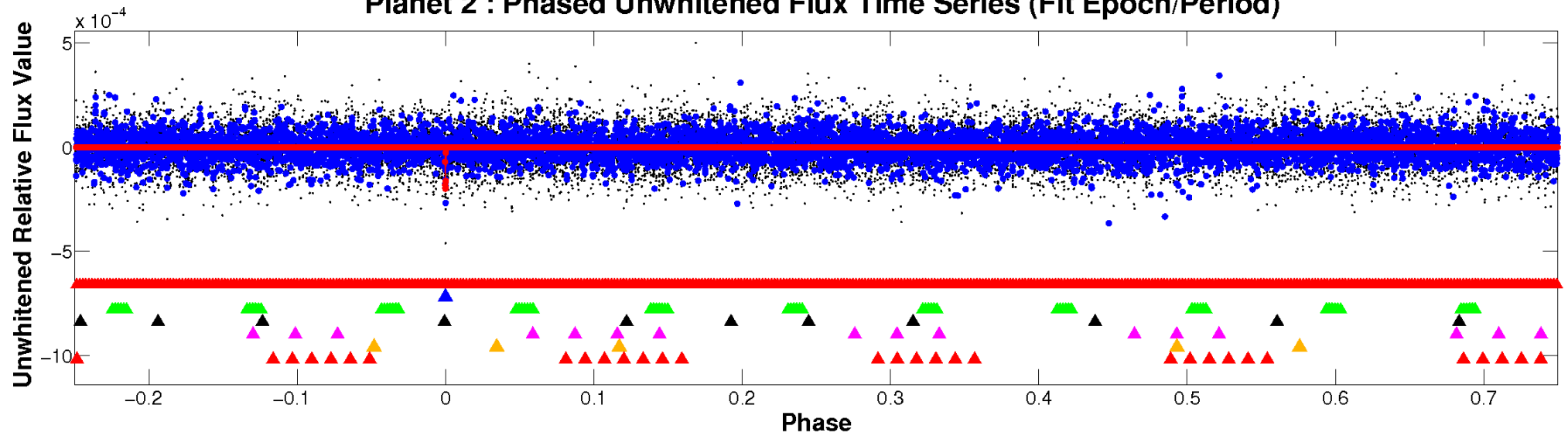


TCE 009518710-02

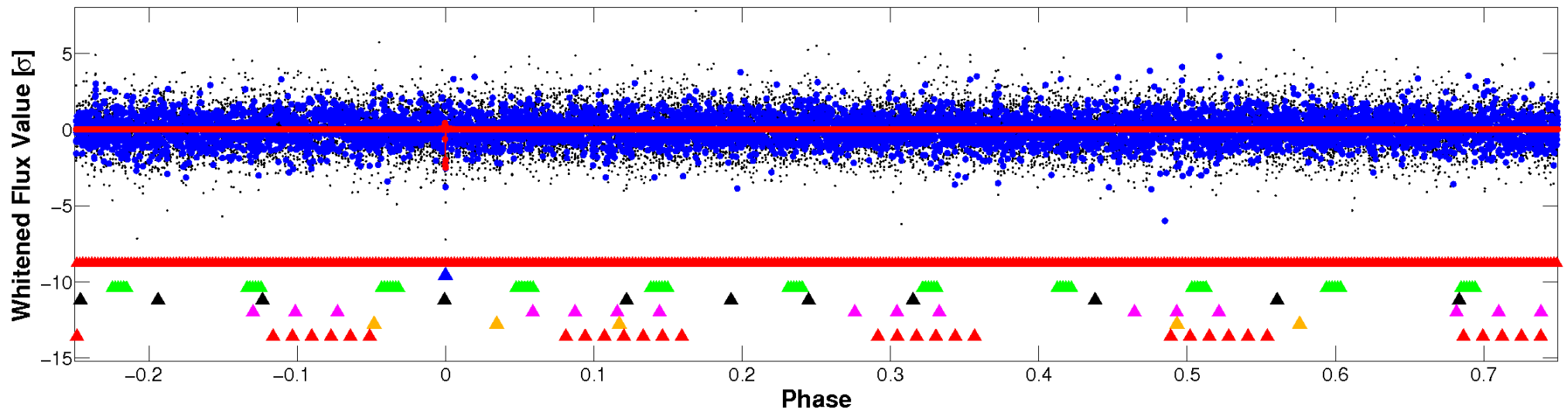


# Non-Whitened Vs. Whitened Light Curve

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

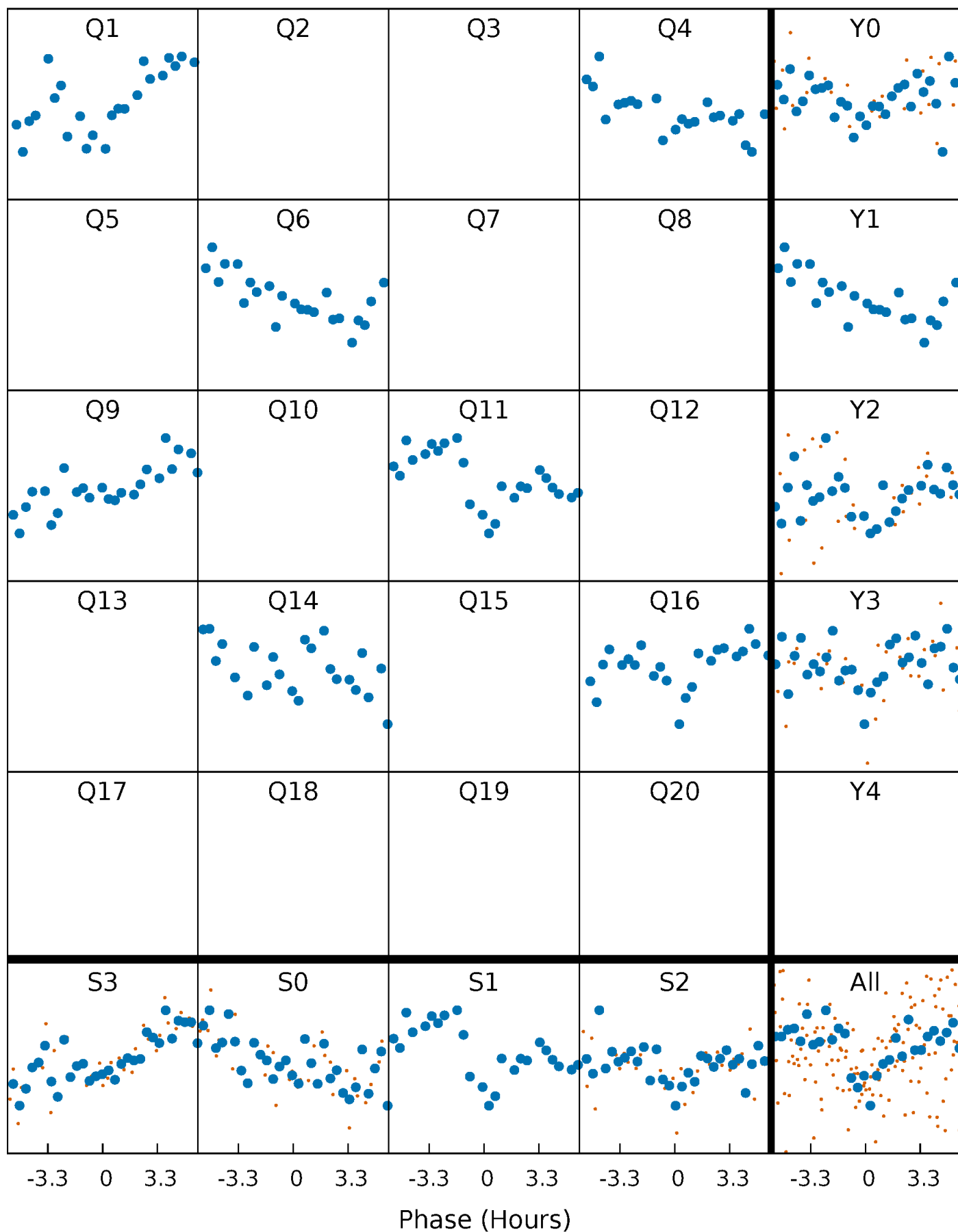


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

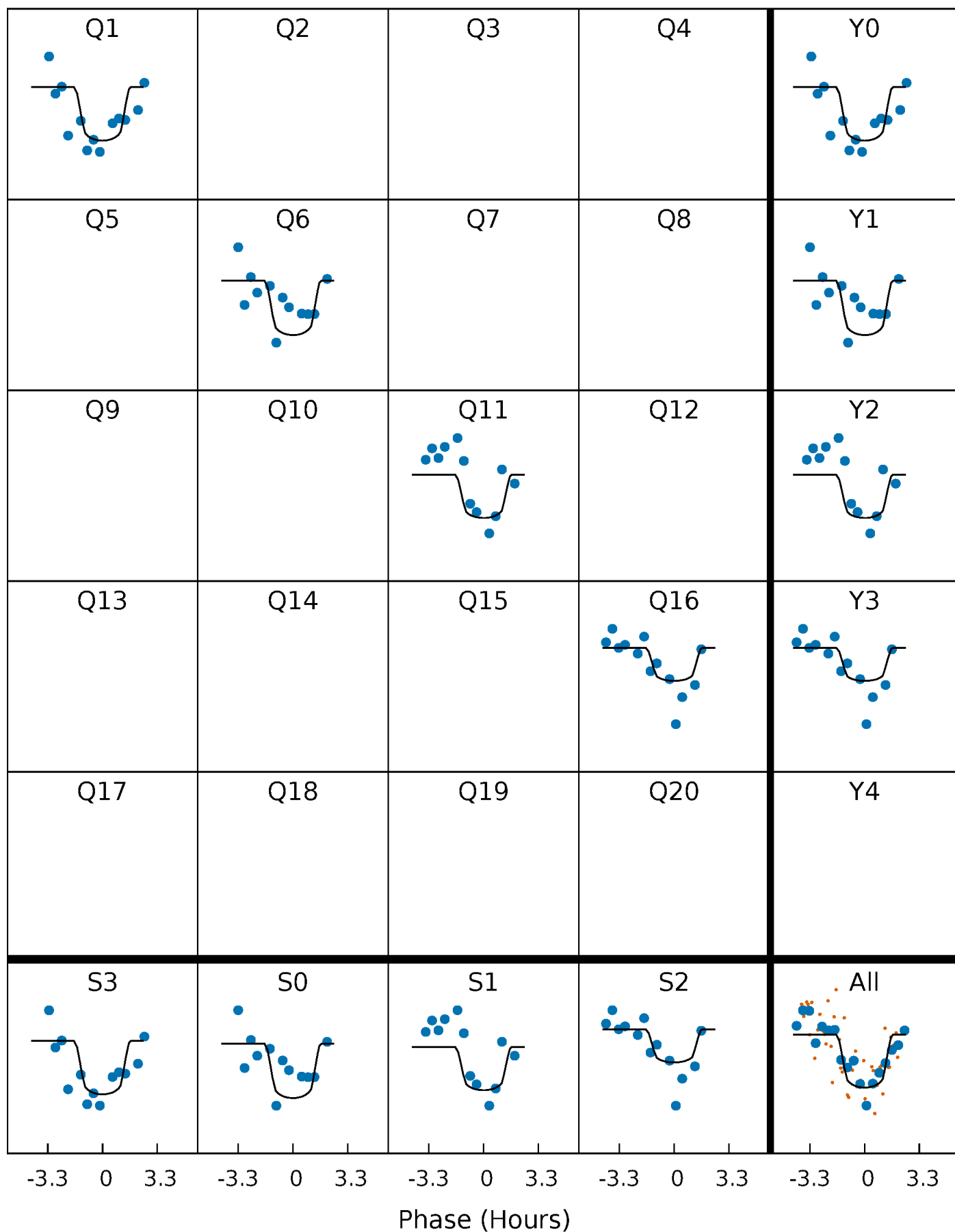
TCE 009518710-02 P=234.293932 Days  $T_0=139.664764$  (BKJD)





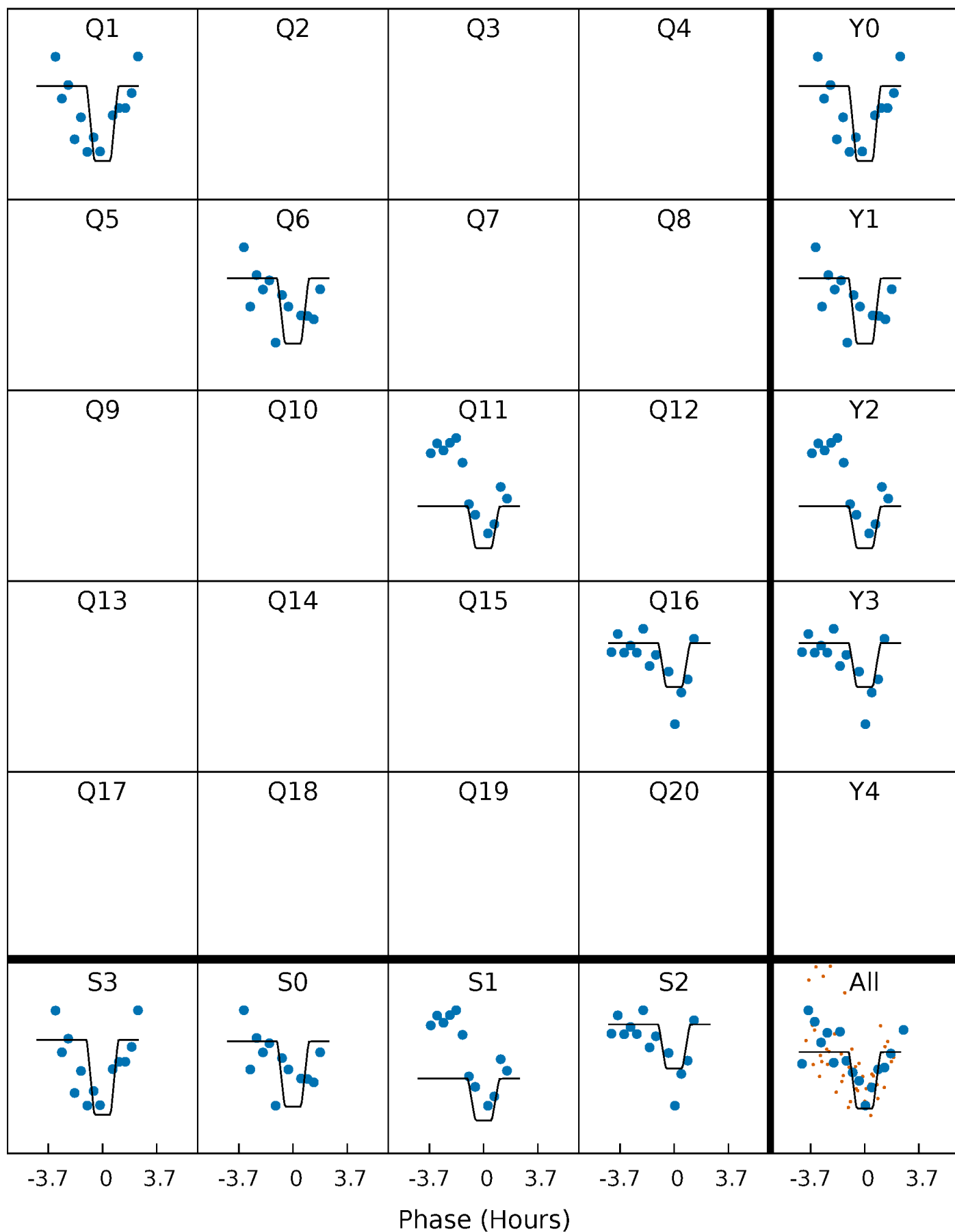
# DV Quarter-Phased Transit Curves

TCE 009518710-02 P=234.293932 Days  $T_0=139.664764$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

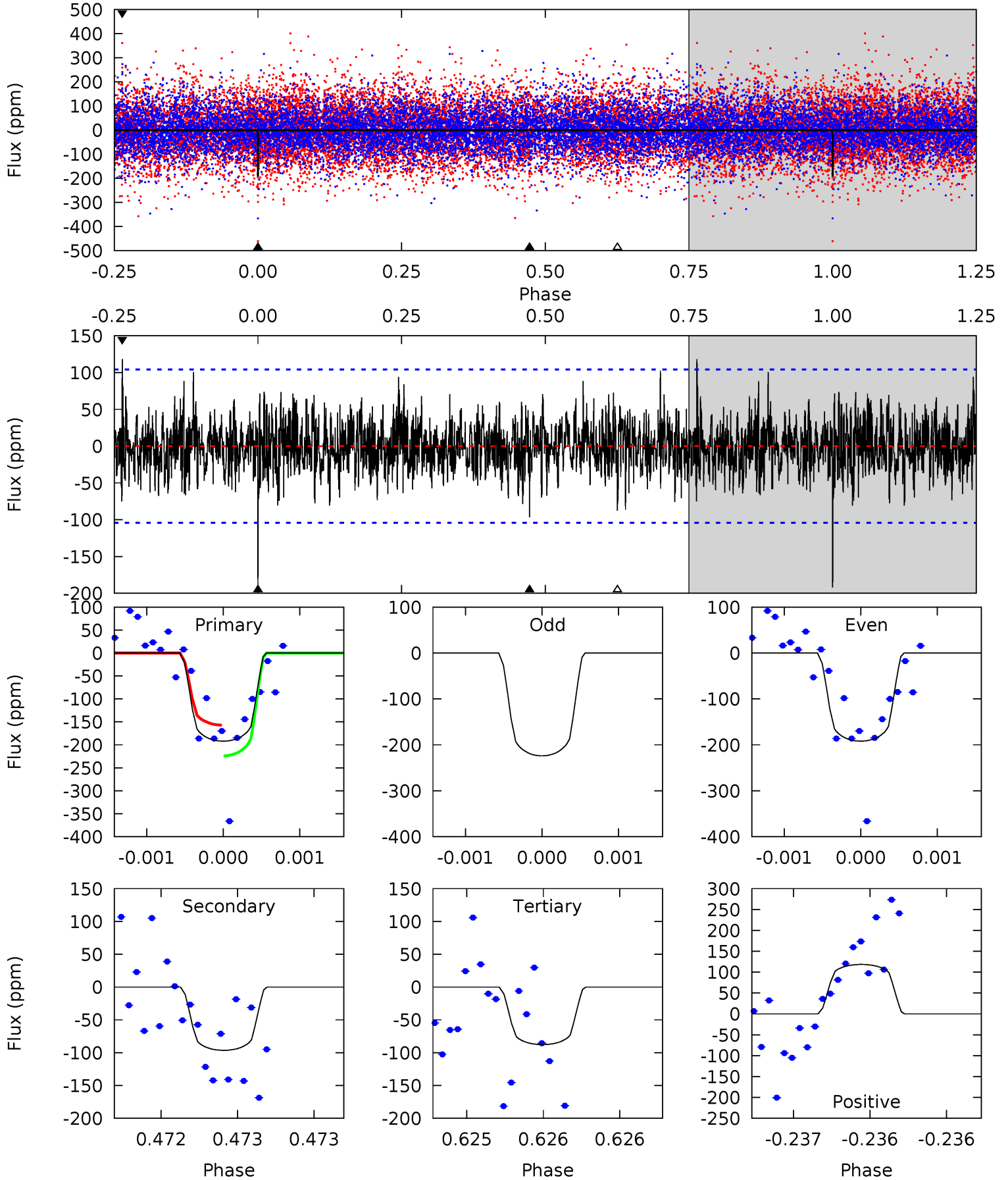
TCE 009518710-02 P=234.295255 Days  $T_0=139.665128$  (BKJD)



# DV Model-Shift Uniqueness Test

009518710-02, P = 234.293932 Days, E = 139.664764 Days

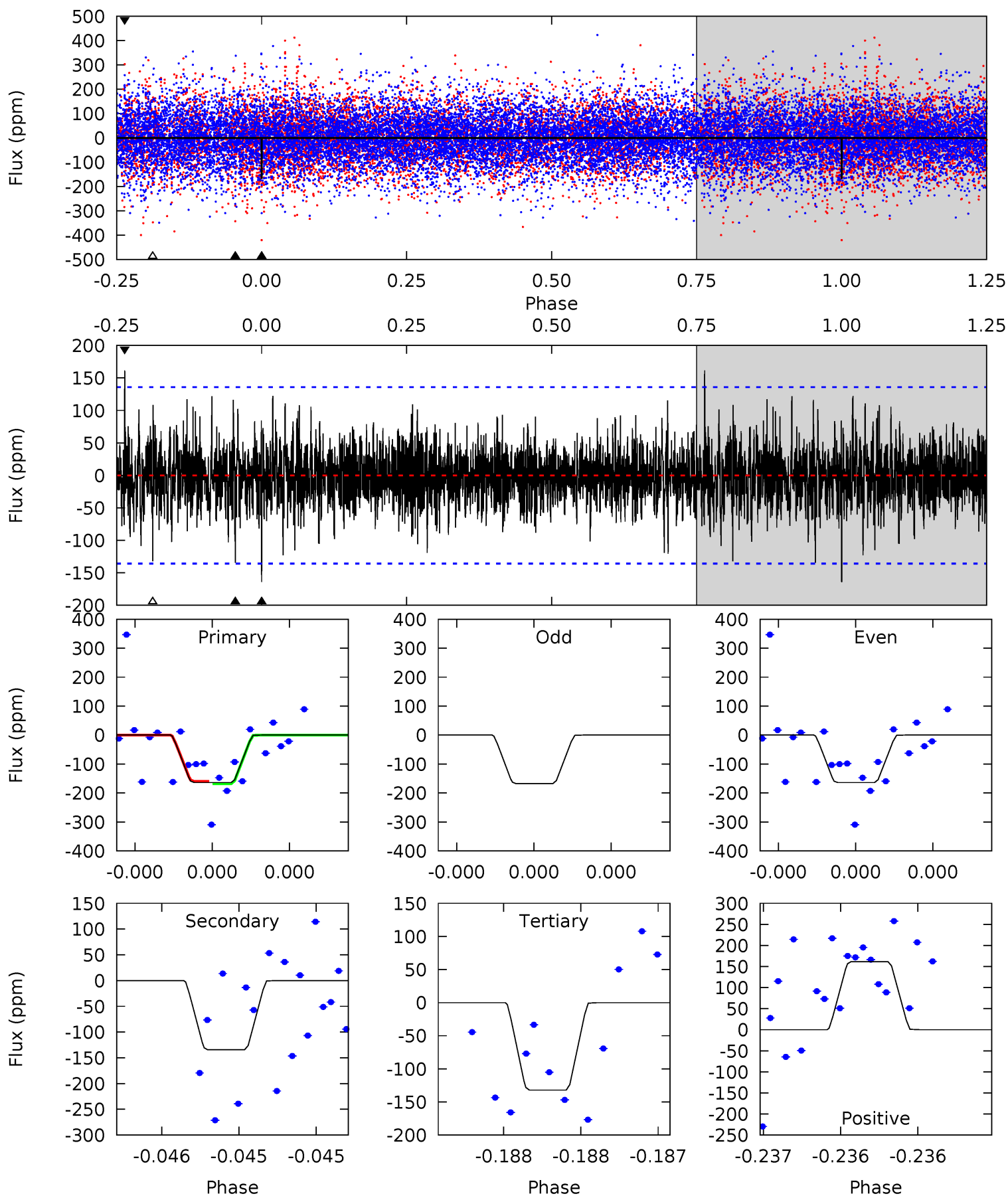
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.2	5.15	4.68	6.32	5.56	3.46	1.47	5.56	3.93	0.47	-1.17	1.02	1.08	0.38	1.78



# Alt Model-Shift Uniqueness Test

009518710-02, P = 234.295255 Days, E = 139.665128 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
6.80	5.58	5.47	6.70	5.63	3.56	1.44	1.33	0.11	0.10	-1.12	0.09	1.20	0.50	0.15



### Stellar Parameters For KIC 009518710

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7056^{+169}_{-253}$	$3.813^{+0.259}_{-0.111}$	$0.060^{+0.200}_{-0.300}$	$2.785^{+0.469}_{-0.871}$	$1.836^{+0.191}_{-0.354}$	$0.120^{+0.195}_{-0.041}$
	+2%/-4%	+7%/-3%	+333%/-500%	+17%/-31%	+10%/-19%	+163%/-34%
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 009518710-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-97 \pm 19$	$4.59^{+3.99}_{-2.85}$	$749^{+46}_{-61}$	$5406^{+3950}_{-1128}$	$2025^{+11005}_{-1440}$
Alt.	$-135 \pm 24$	$4.67^{+3.54}_{-2.75}$	$746^{+47}_{-61}$	$5884^{+4164}_{-1280}$	$2850^{+14497}_{-1950}$

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

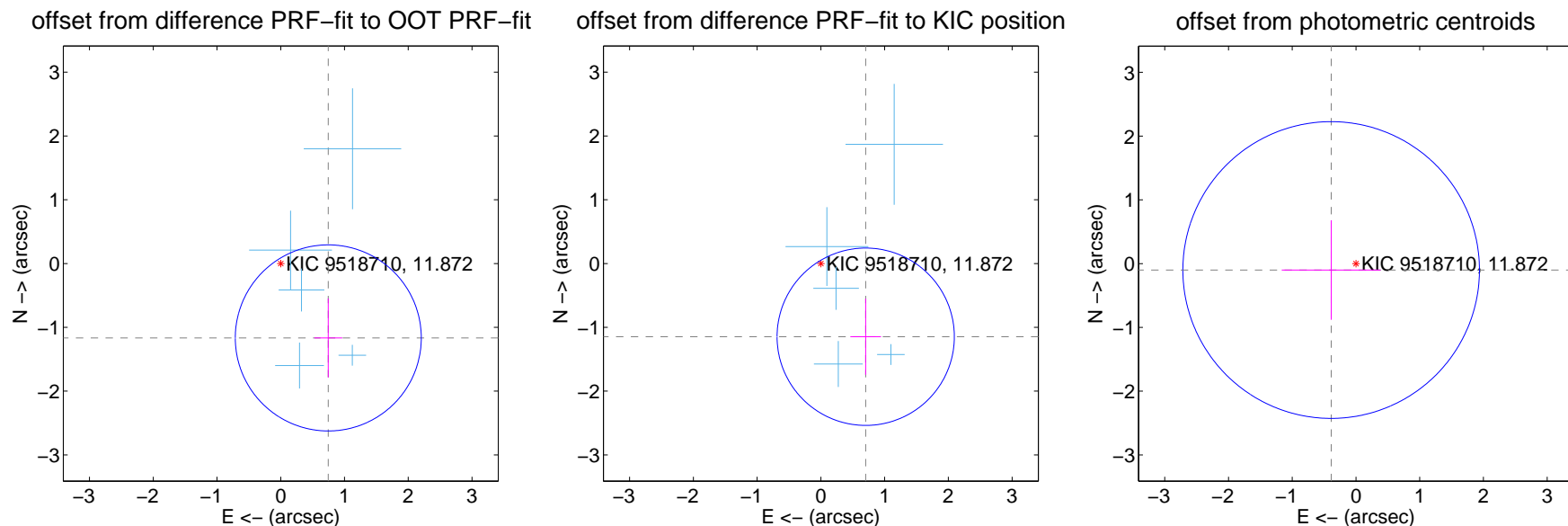
## DV Centroid Data

Supplemental centroid analysis for 009518710-02. **Kepler magnitude: 11.87.** Transit SNR 10.27

There are 5 quarters with good PRF difference image offsets

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

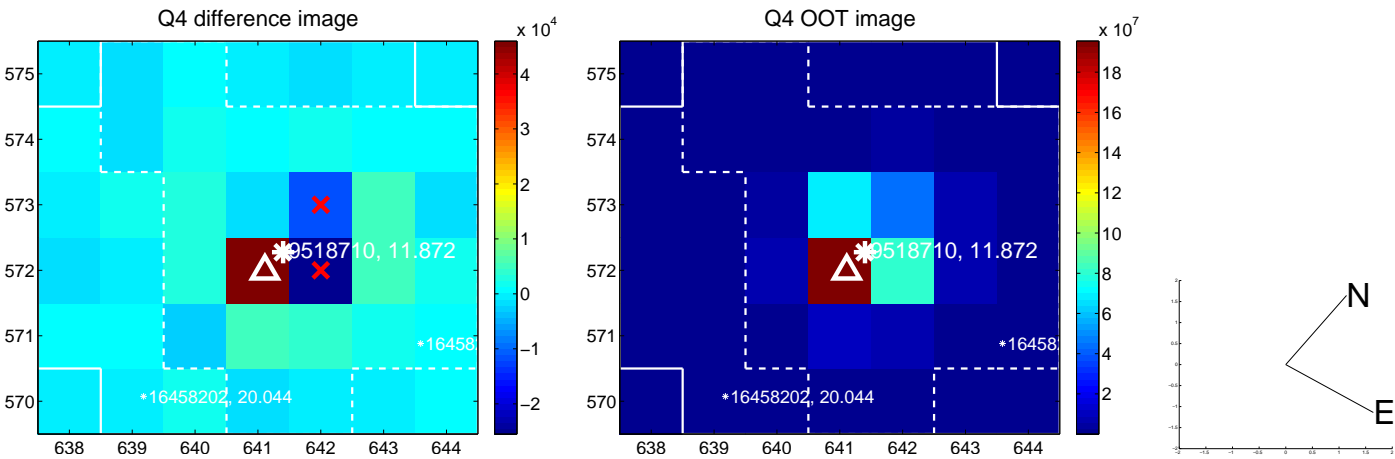
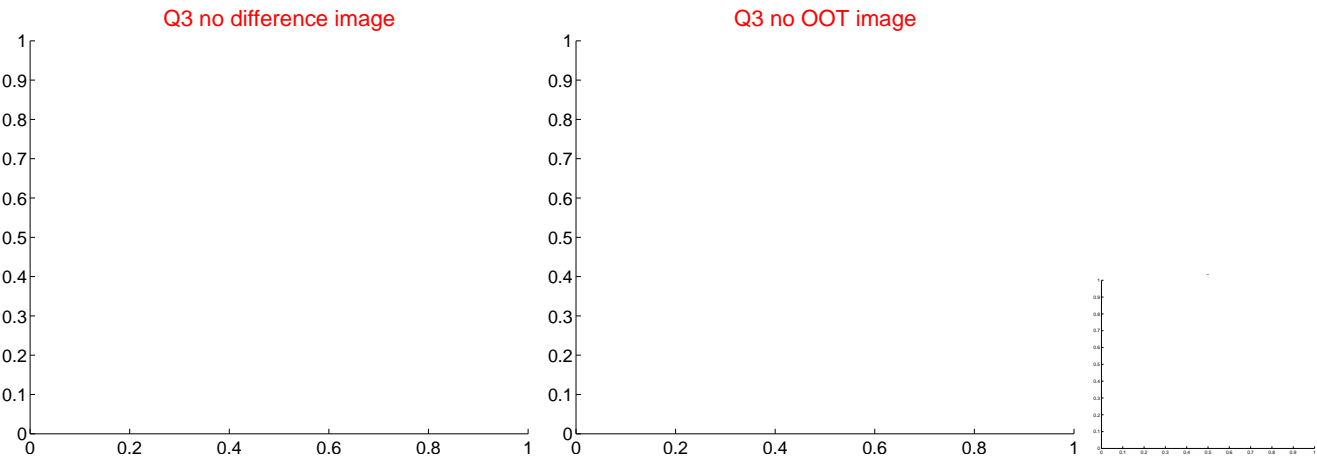
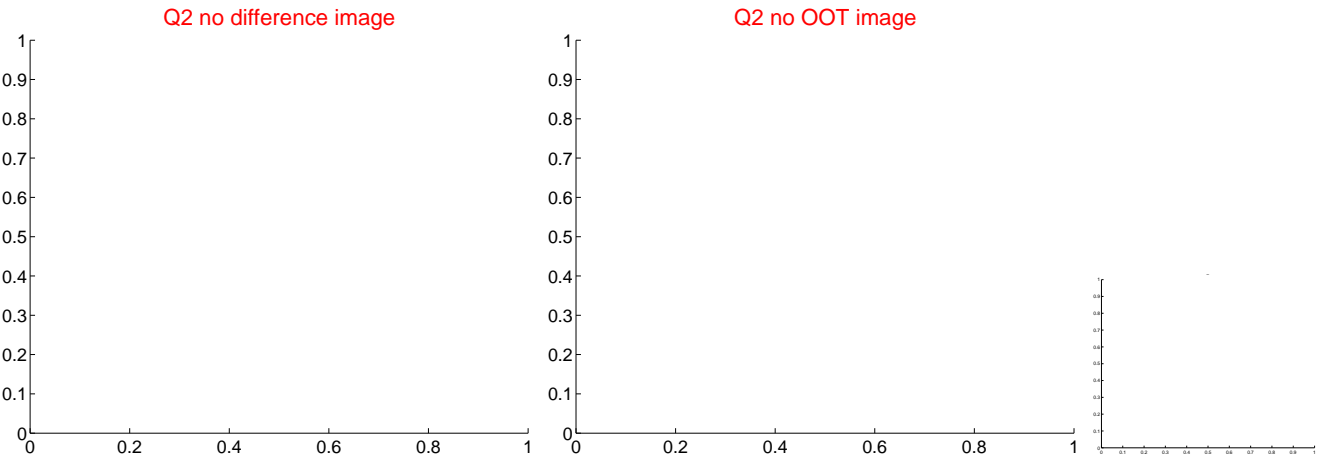
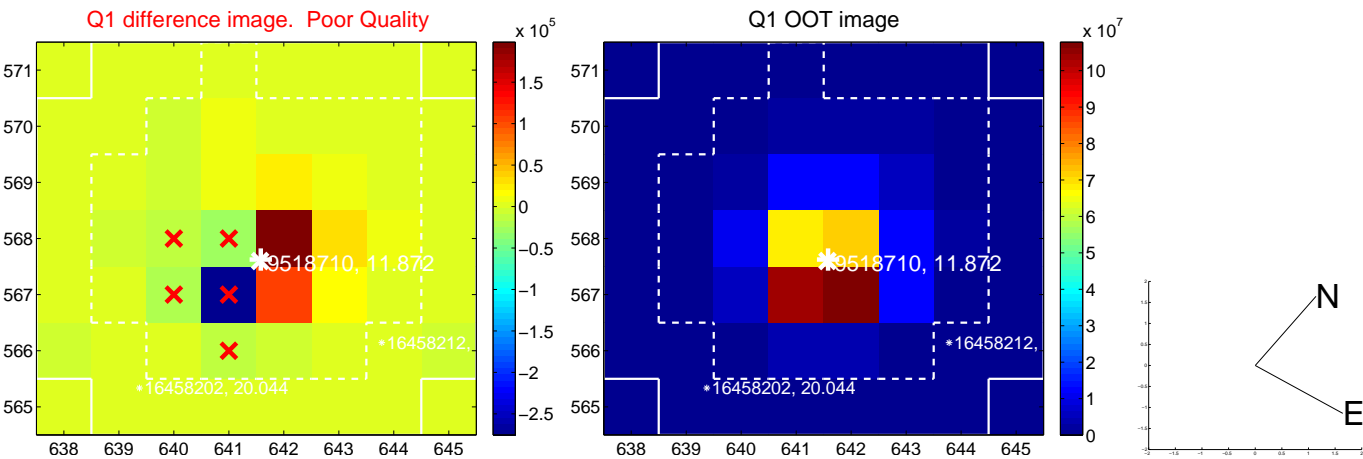
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.384 \pm 0.486$	2.85	$-0.746 \pm 0.219$	$-1.166 \pm 0.619$
PRF-fit source offset from KIC position	$1.346 \pm 0.463$	2.90	$-0.703 \pm 0.241$	$-1.147 \pm 0.597$
photometric centroid source offset	$0.40 \pm 0.78$	0.52	$0.39 \pm 0.78$	$-0.10 \pm 0.78$



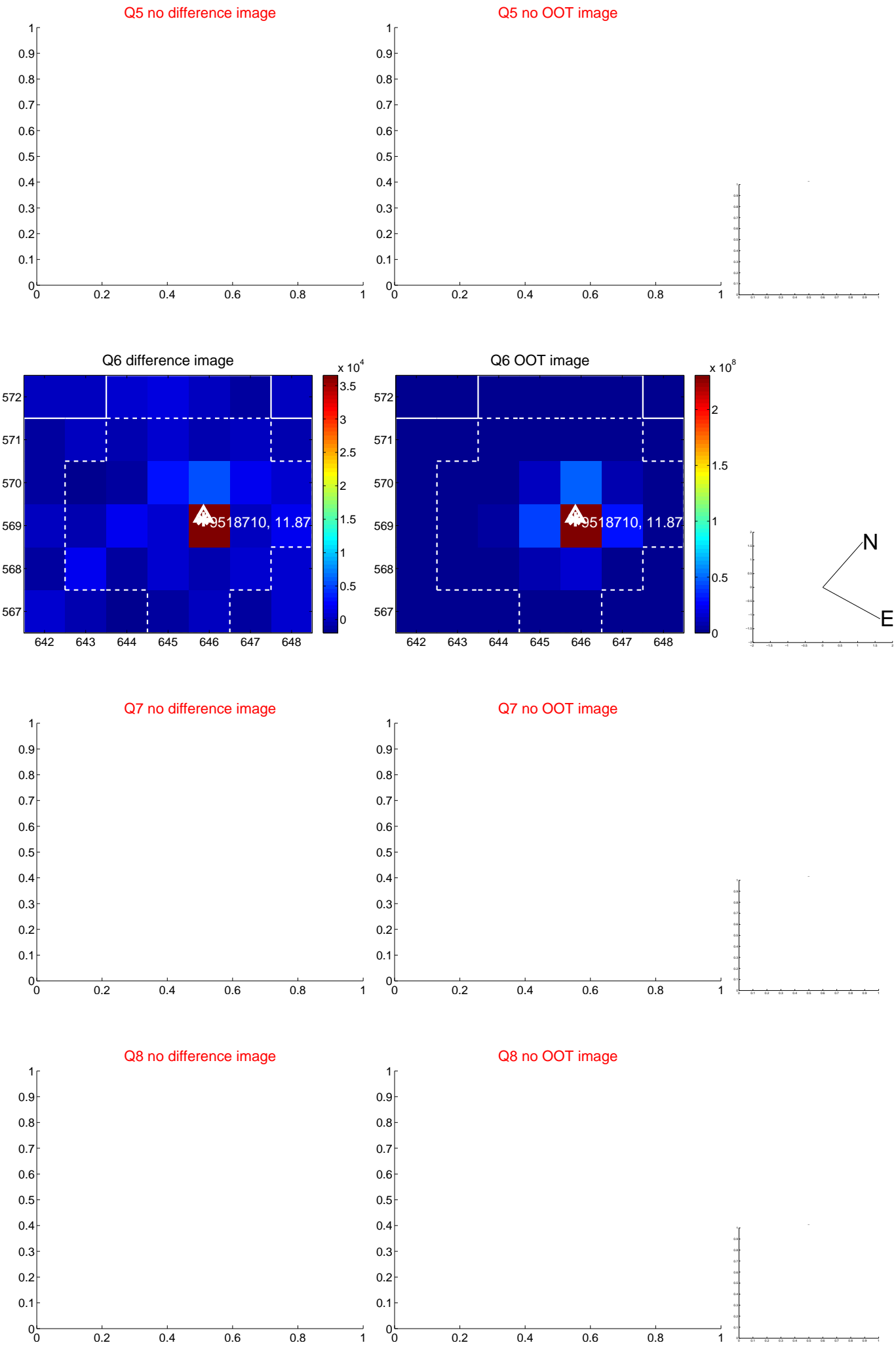
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



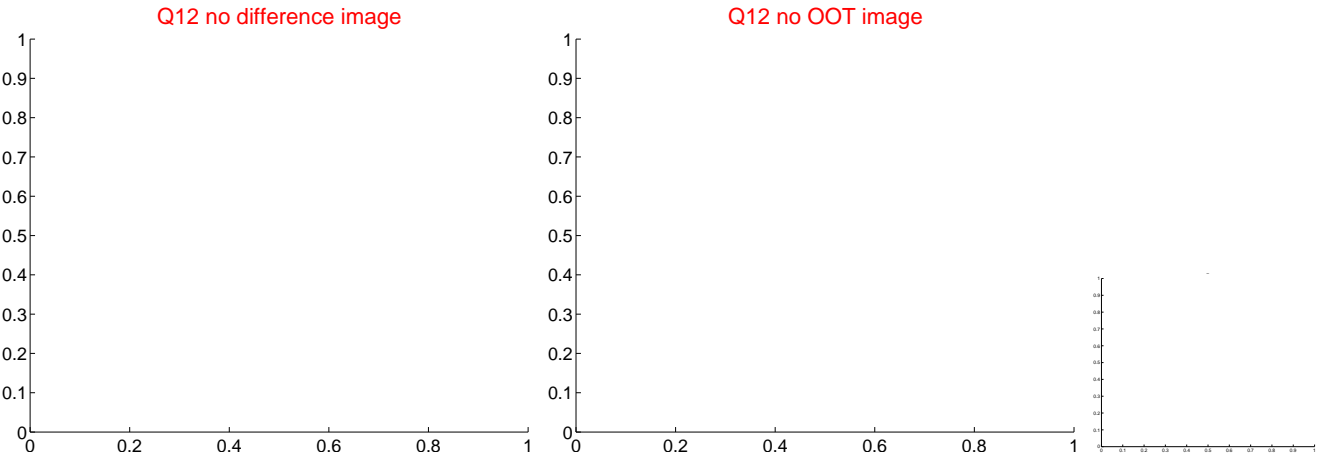
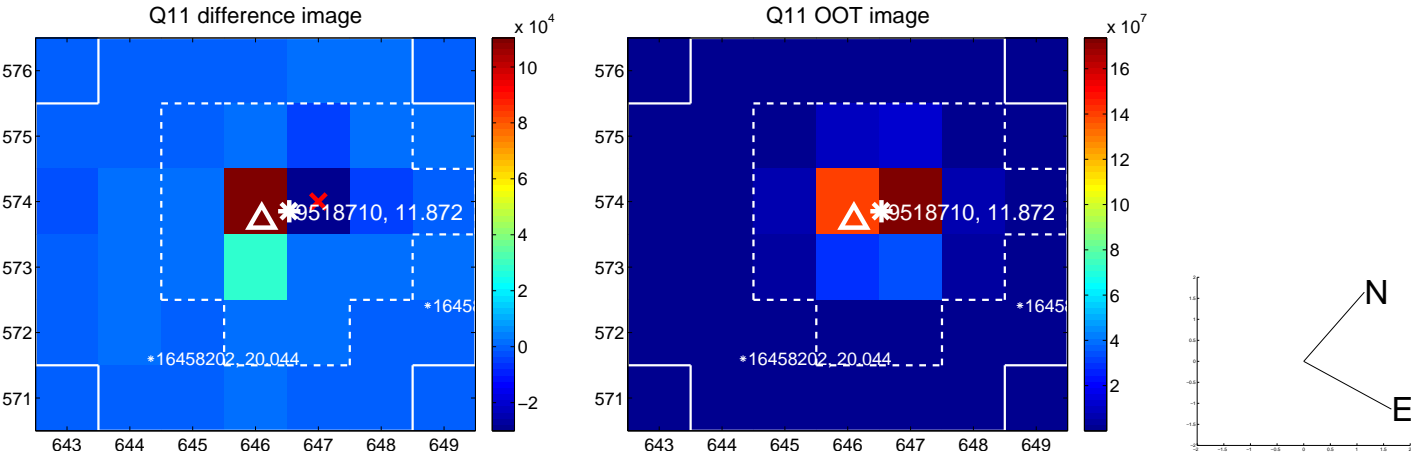
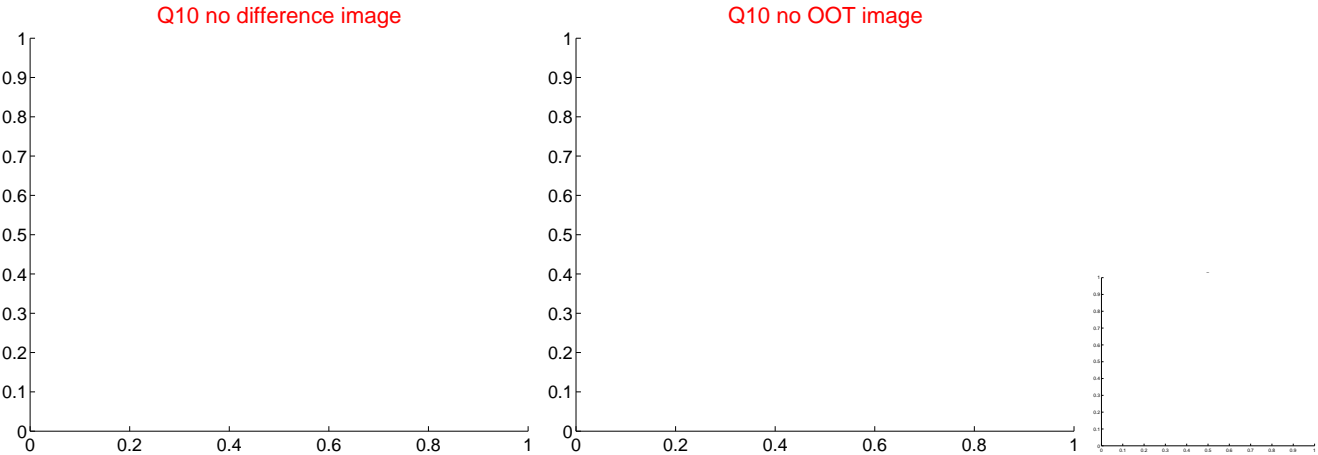
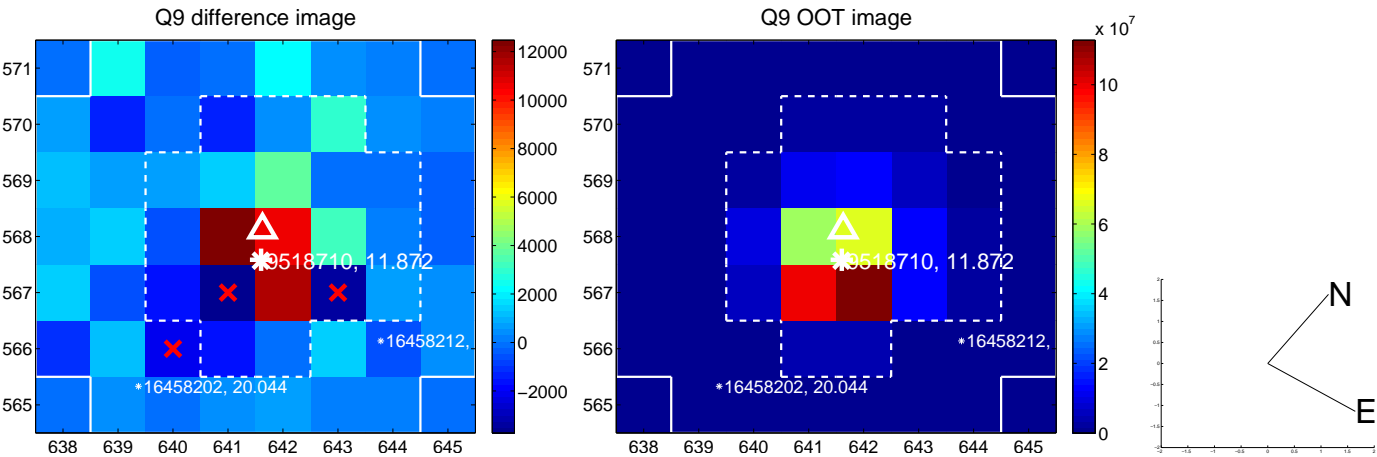
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



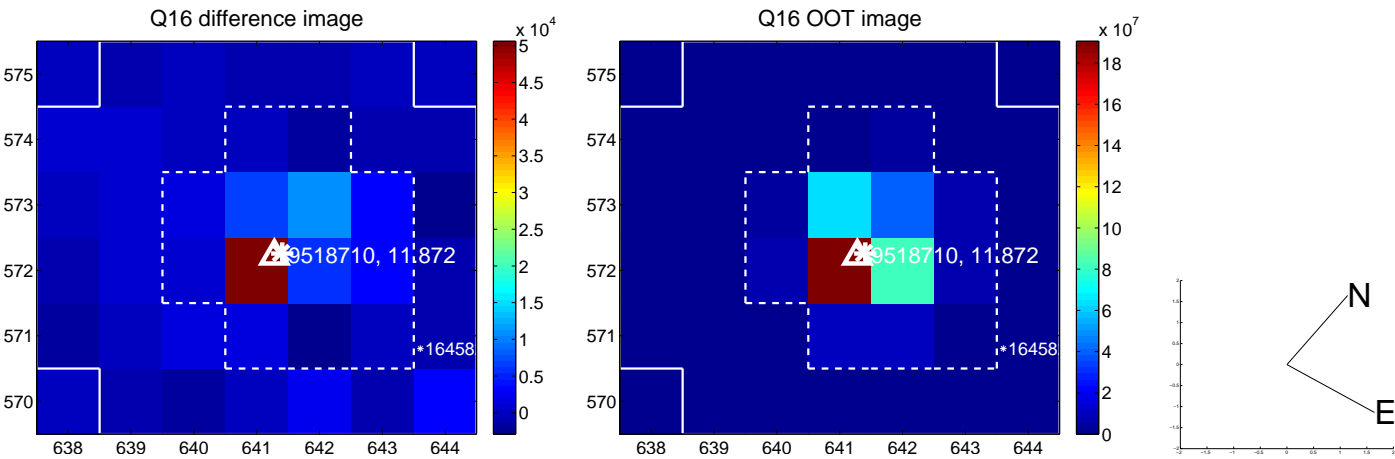
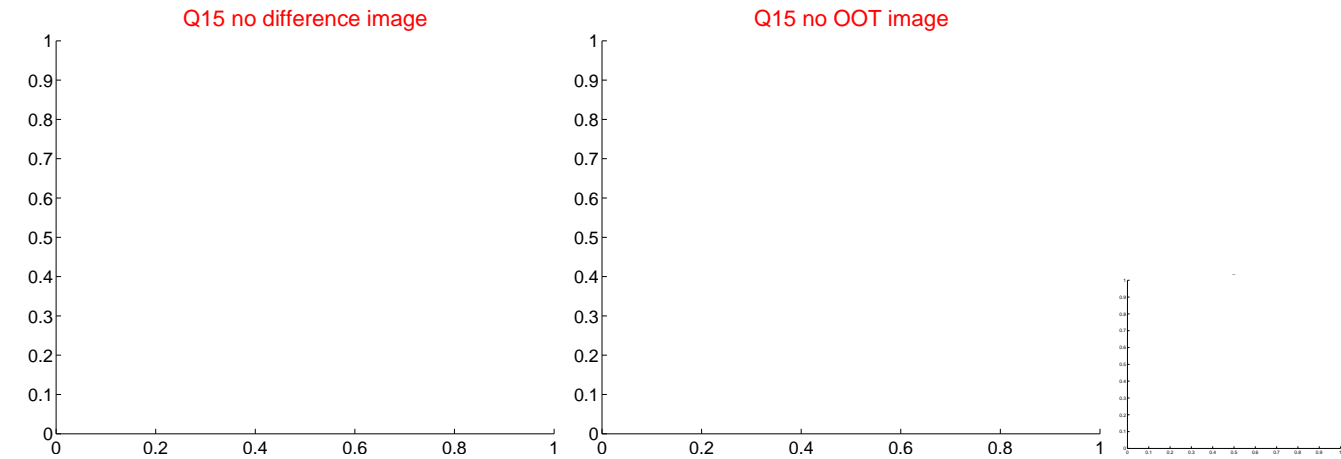
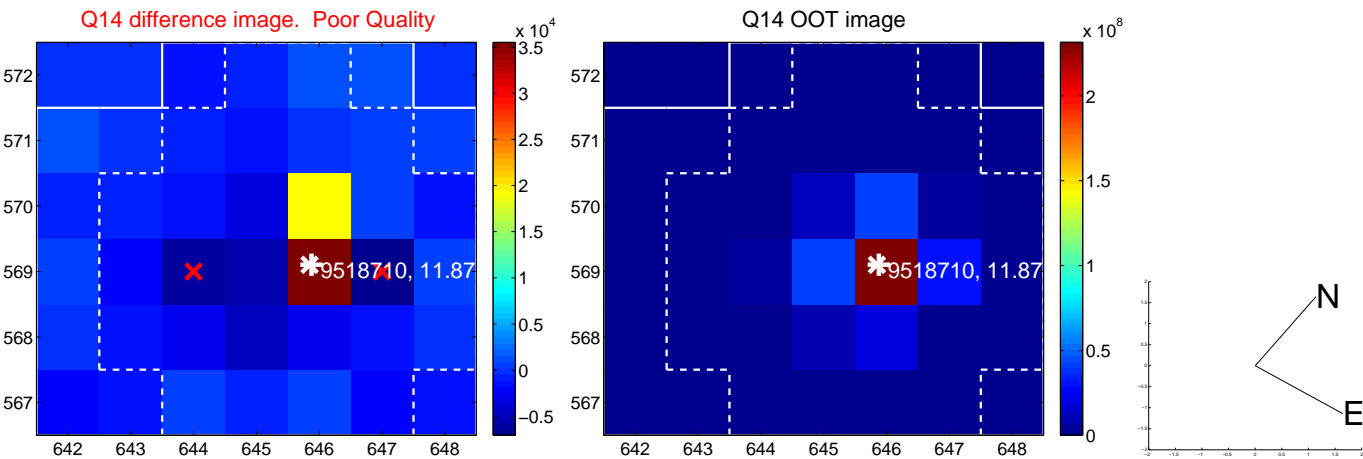
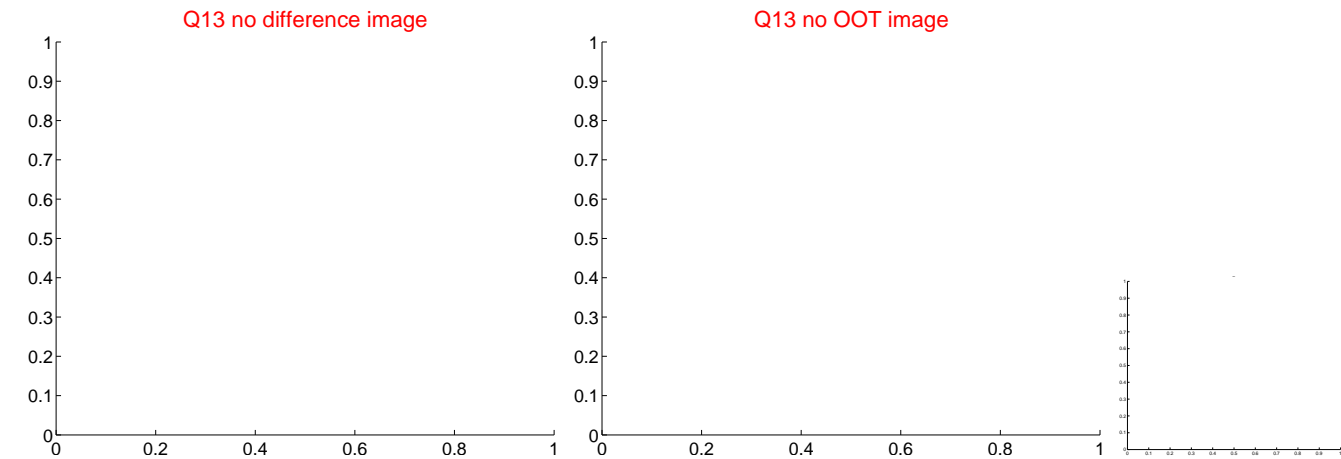
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

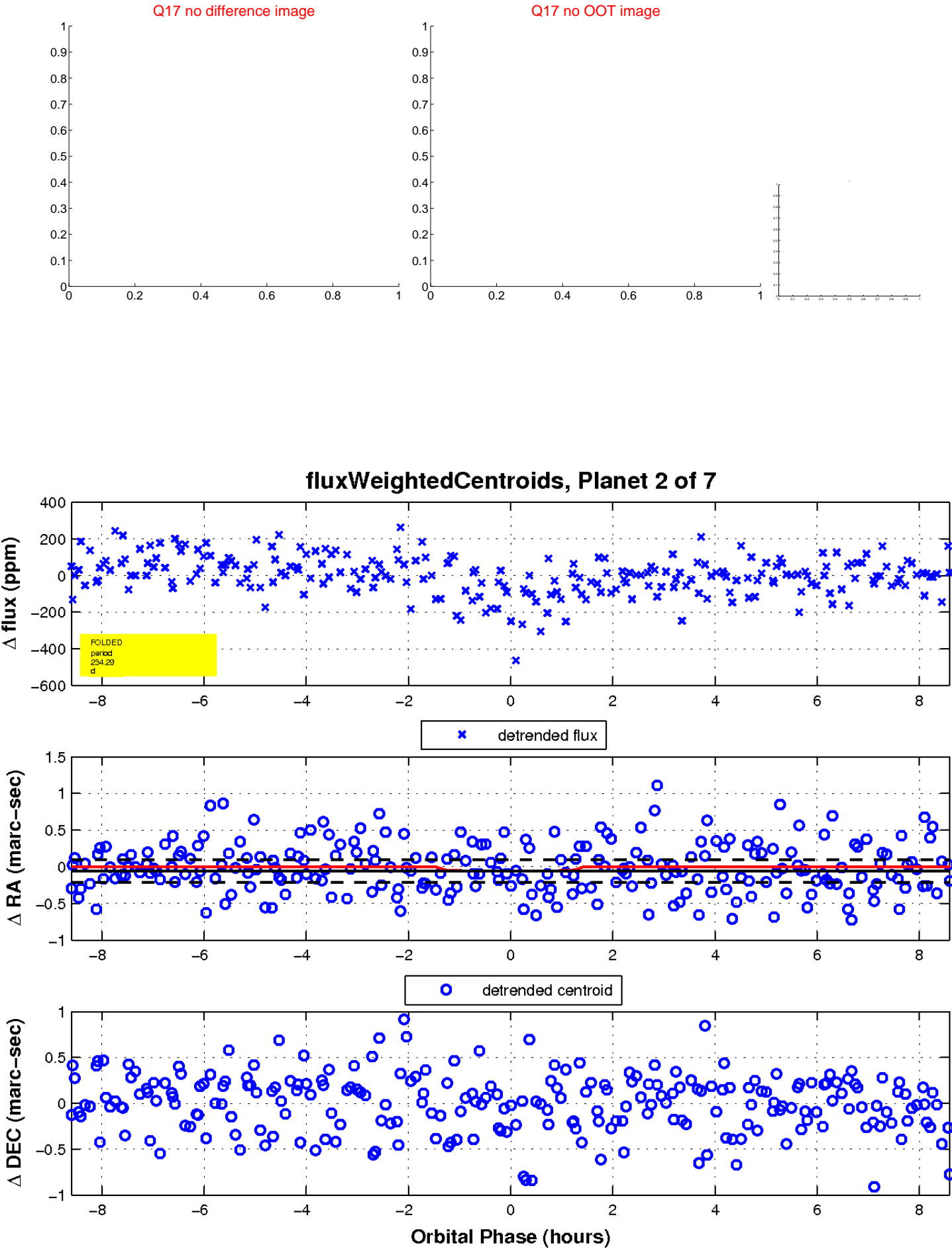


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



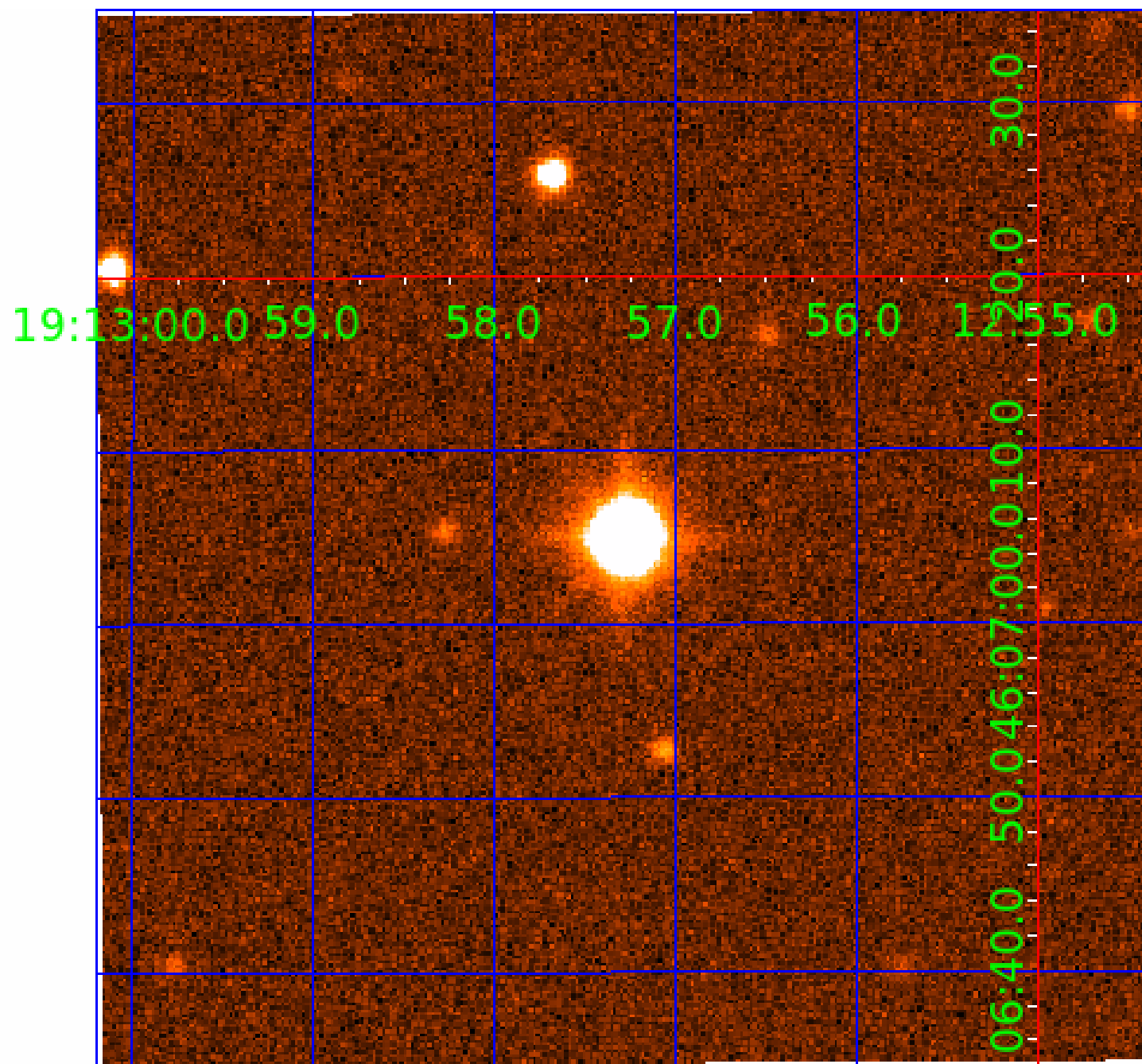


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 009518710

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009518710-01	OBS	3207.01	0.954328	132.488665	7.3	5.434	10.9	5.8	2.79	7056	0.77	31872.41
009518710-02	OBS	No	234.293932	139.664765	200.0	2.871	10.8	10.3	2.79	7056	4.38	20.73
009518710-03	OBS	No	21.258857	132.247946	61.6	3.971	8.0	6.9	2.79	7056	2.50	508.50
009518710-04	OBS	No	131.524599	184.773916	137.6	7.073	7.4	7.8	2.79	7056	3.58	44.77
009518710-05	OBS	No	95.052209	153.457127	162.4	3.175	7.9	7.4	2.79	7056	4.12	69.03
009518710-06	OBS	No	341.755025	167.131313	163.9	5.396	7.9	8.2	2.79	7056	4.01	12.53
009518710-07	OBS	No	46.248098	177.000352	71.9	5.711	7.7	6.6	2.79	7056	2.69	180.39

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009518710-01	OBS	FP	0.00	1	0	0	0	LPP_DV
009518710-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009518710-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_ZUMA—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009518710-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009518710-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT
009518710-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
009518710-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_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 009518710-03

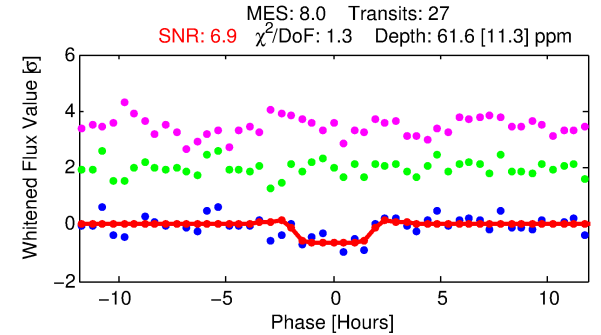
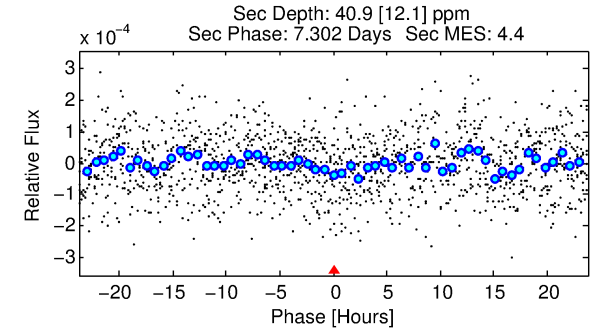
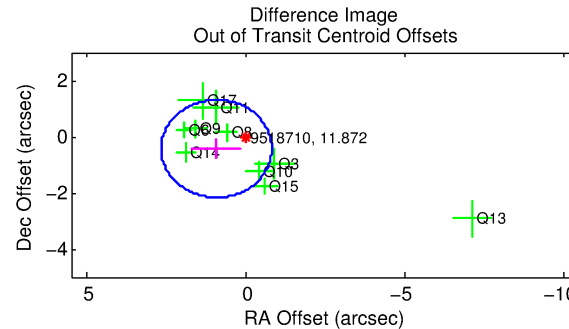
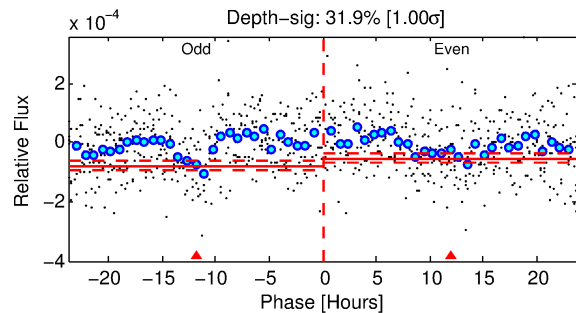
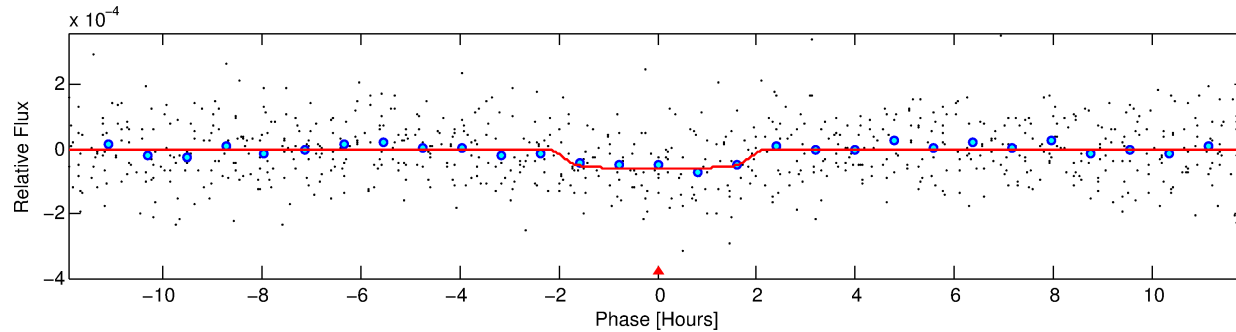
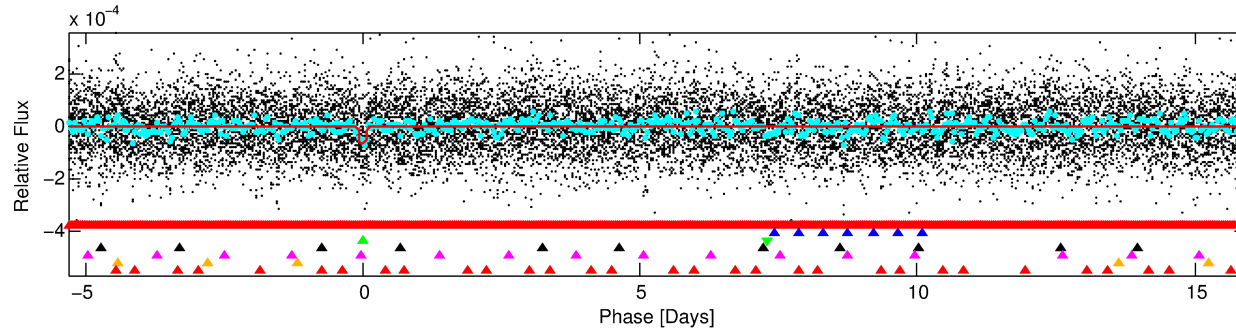
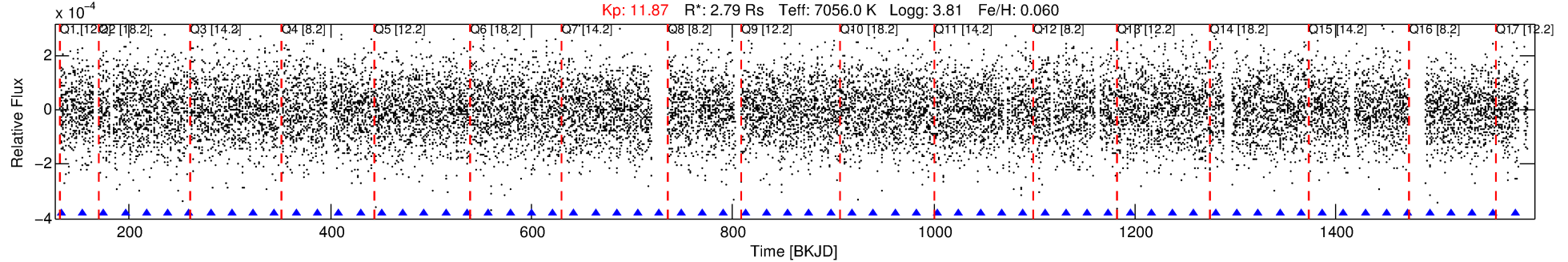
No Significant Match Found

# DV One-Page Summary

KIC: 9518710 Candidate: 3 of 7 Period: 21.259 d

KOI: K03207 Corr: No Ephemeris Match

Kp: 11.87 R\*: 2.79 Rs Teff: 7056.0 K Logg: 3.81 Fe/H: 0.060



## DV Fit Results:

Period = 21.25886 [0.00035] d  
Epoch = 132.2479 [0.0148] BKJD  
Rp/R\* = 0.0082 [0.0039]  
a/R\* = 20.58 [58.84]  
b = 0.87 [0.78]  
Seff = 508.50 [239.65]  
Teq = 1211 [143] K  
Rp = 2.50 [1.42] Re  
a = 0.1841 [0.0530] AU  
Ag = 122.50 [133.82] [0.91σ]  
Teffp = 6228 [1567] K [3.19σ]

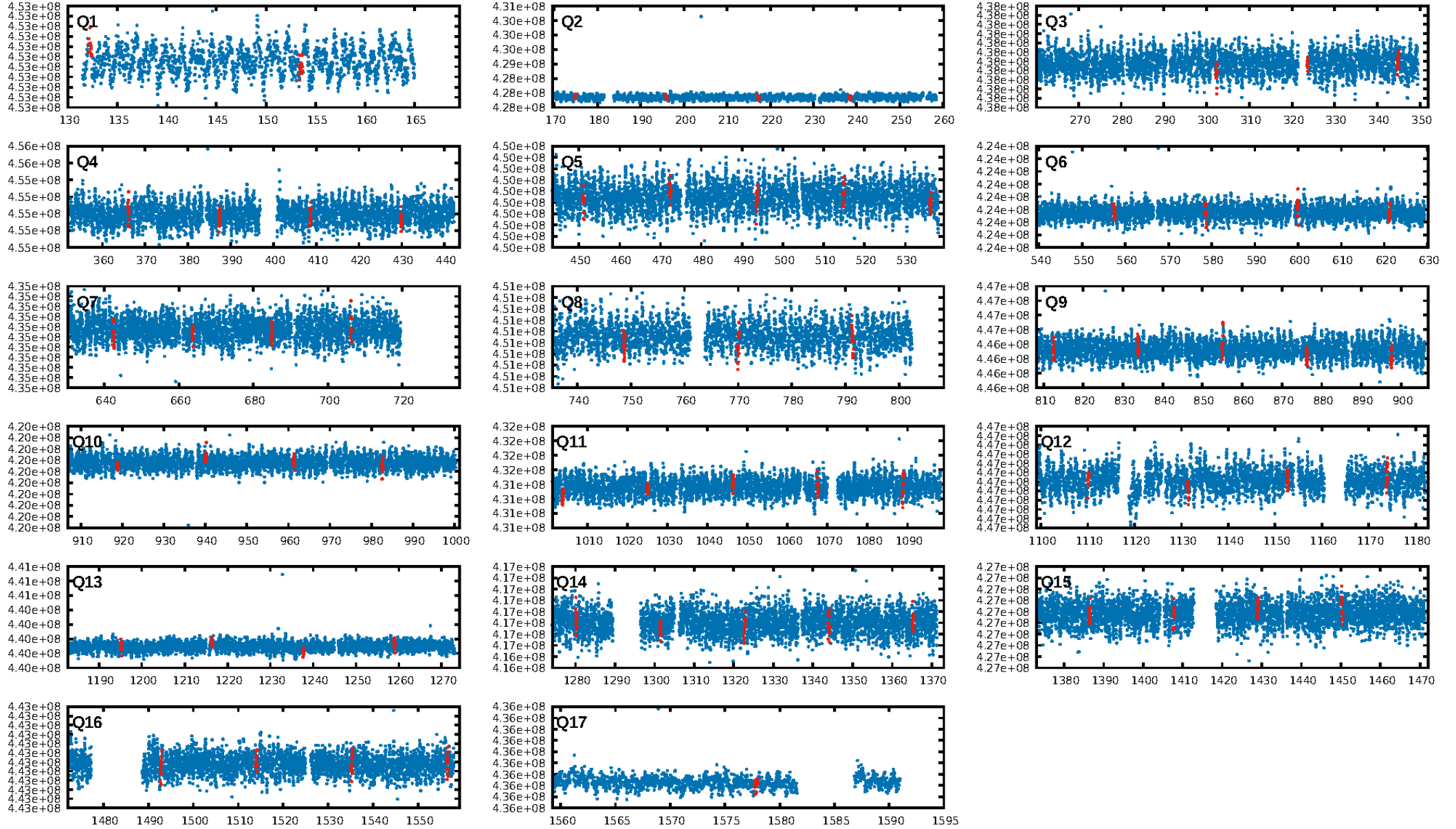
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [72.40σ]  
LongPeriod-sig: 100.0% [86.21σ]  
ModelChiSquare2-sig: 1.4%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 8.91e-10**  
RollingBand-fgt: 1.00 [26/26]  
GhostDiagnostic-chr: -0.4921  
Centroid-sig: N/A  
Centroid-so: 0.620 arcsec [0.86σ]  
OotOffset-rm: 1.027 arcsec [1.77σ]  
OotOffset-st: 3/3/1/3 [10]  
KicOffset-rm: 1.049 arcsec [1.66σ]  
KicOffset-st: 3/3/1/3 [10]  
DiffImageQuality-fgm: 0.80 [8/10]  
DiffImageOverlap-fno: 0.00 [0/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 16:33:22 Z

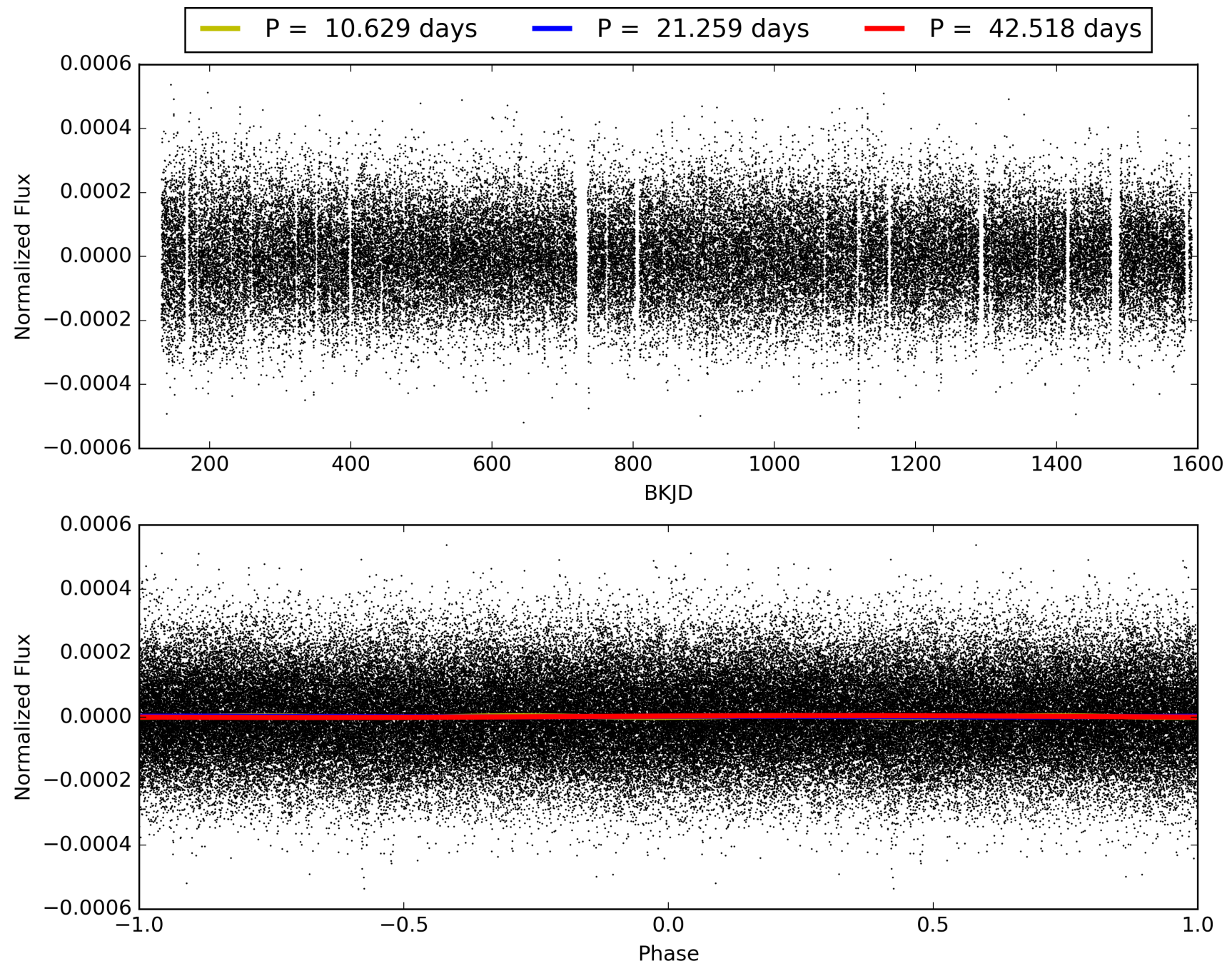
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 009518710-03, PDC Light Curves



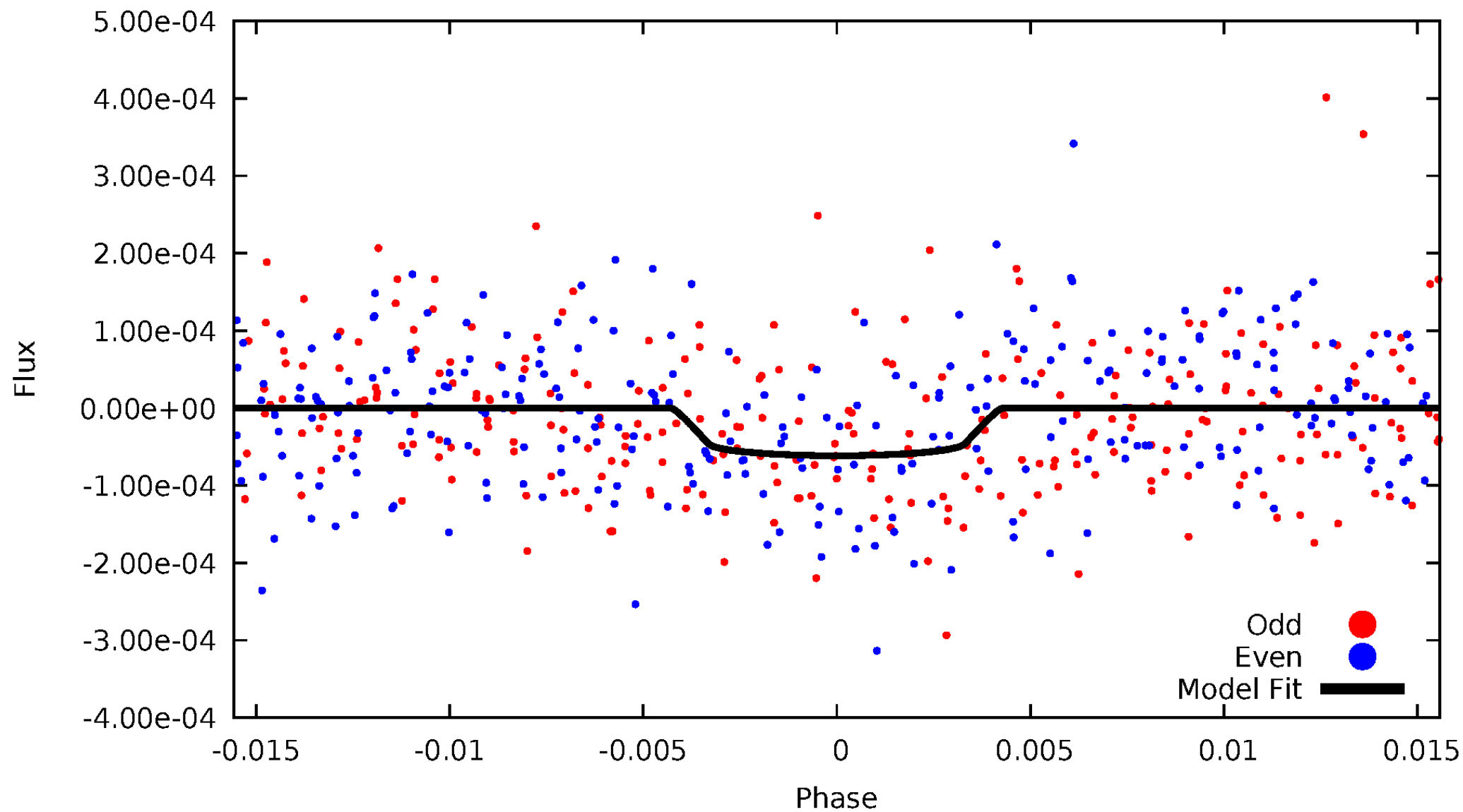


TCE 009518710-03



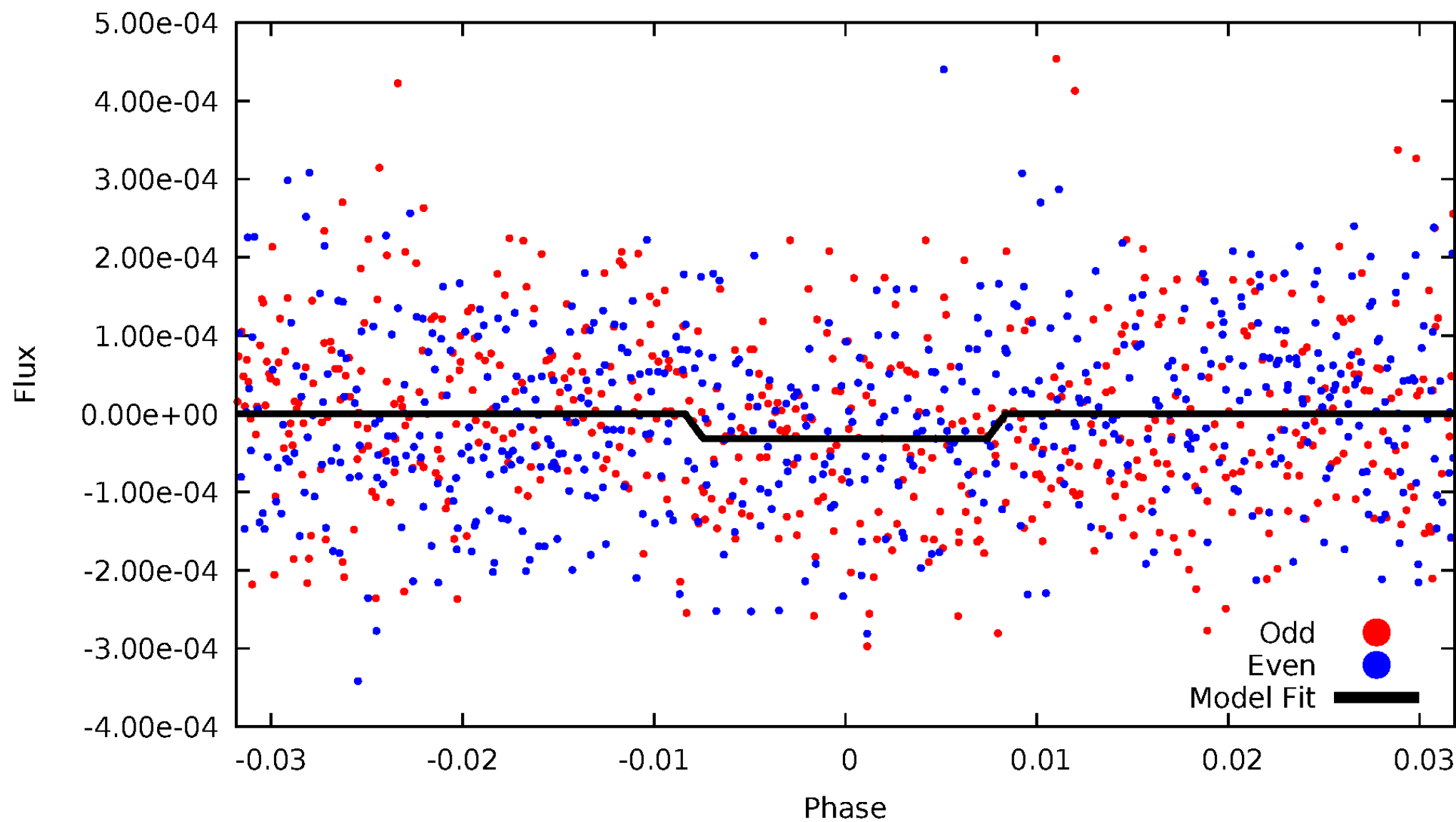
# DV Odd/Even

TCE 009518710-03



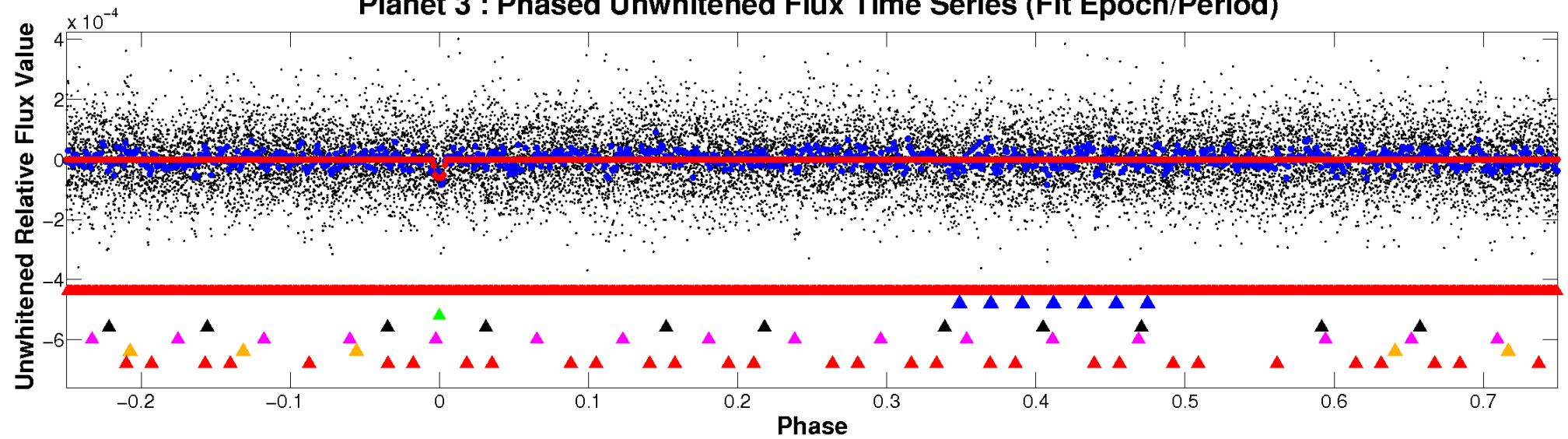
# ALT Odd/Even

TCE 009518710-03

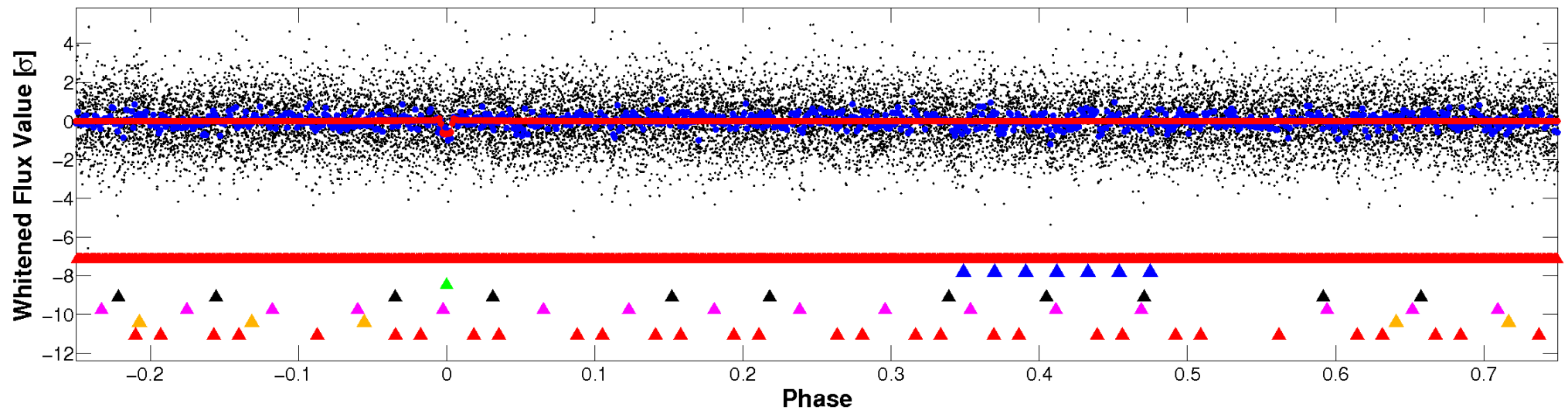


# Non-Whitened Vs. Whitened Light Curve

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

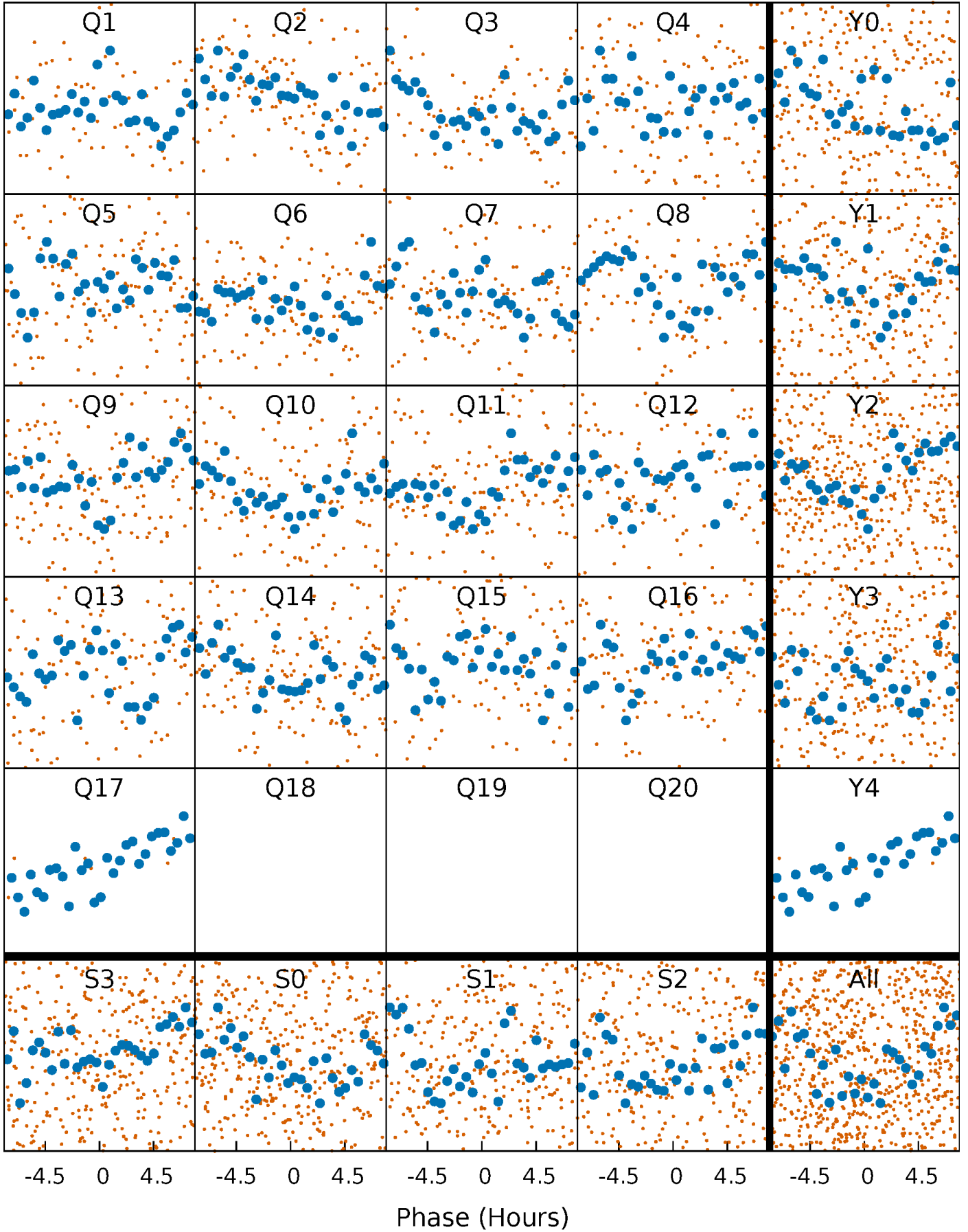


## Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



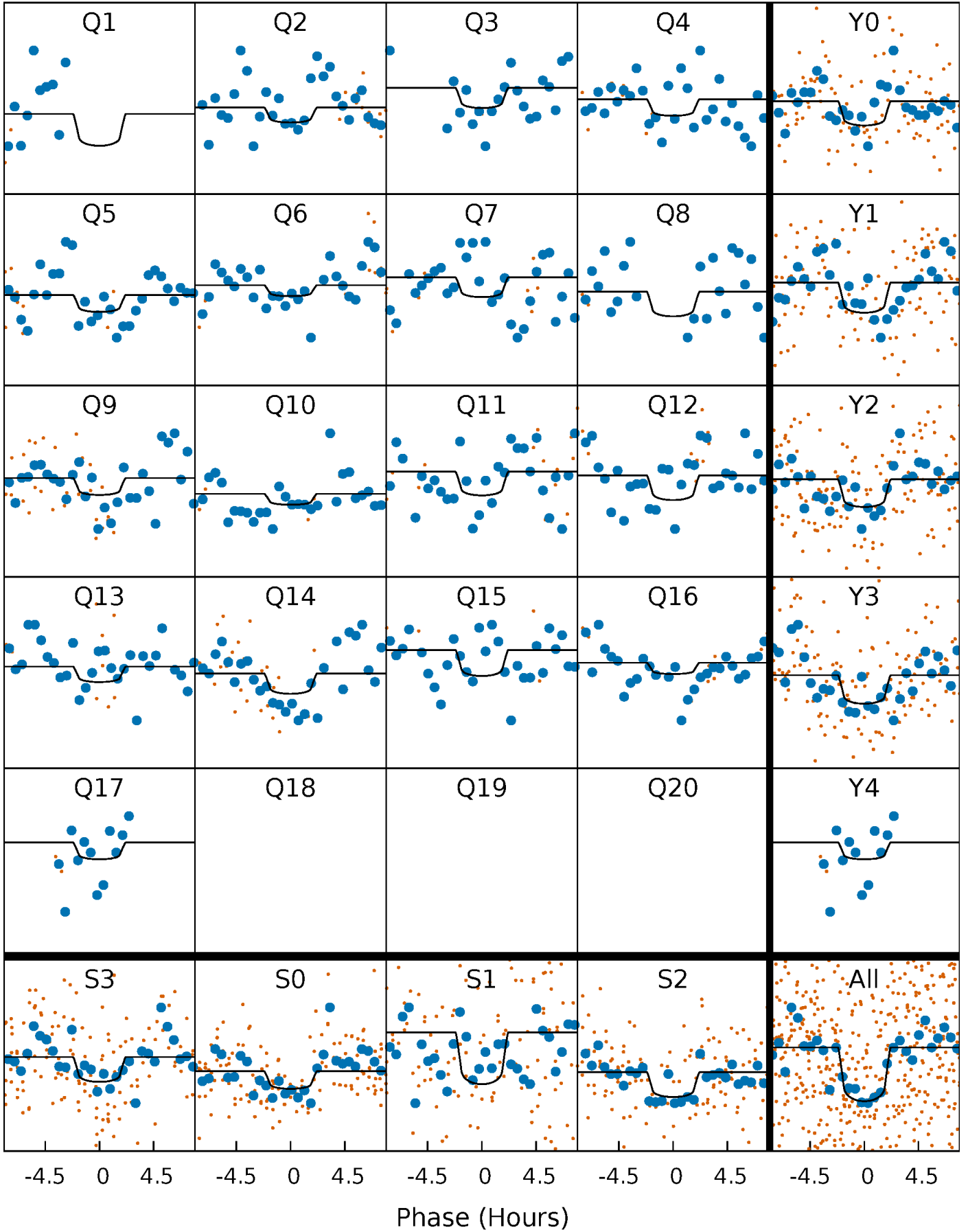
# PDC Quarter-Phased Transit Curves

TCE 009518710-03 P= 21.258857 Days  $T_0=132.247946$  (BKJD)



# DV Quarter-Phased Transit Curves

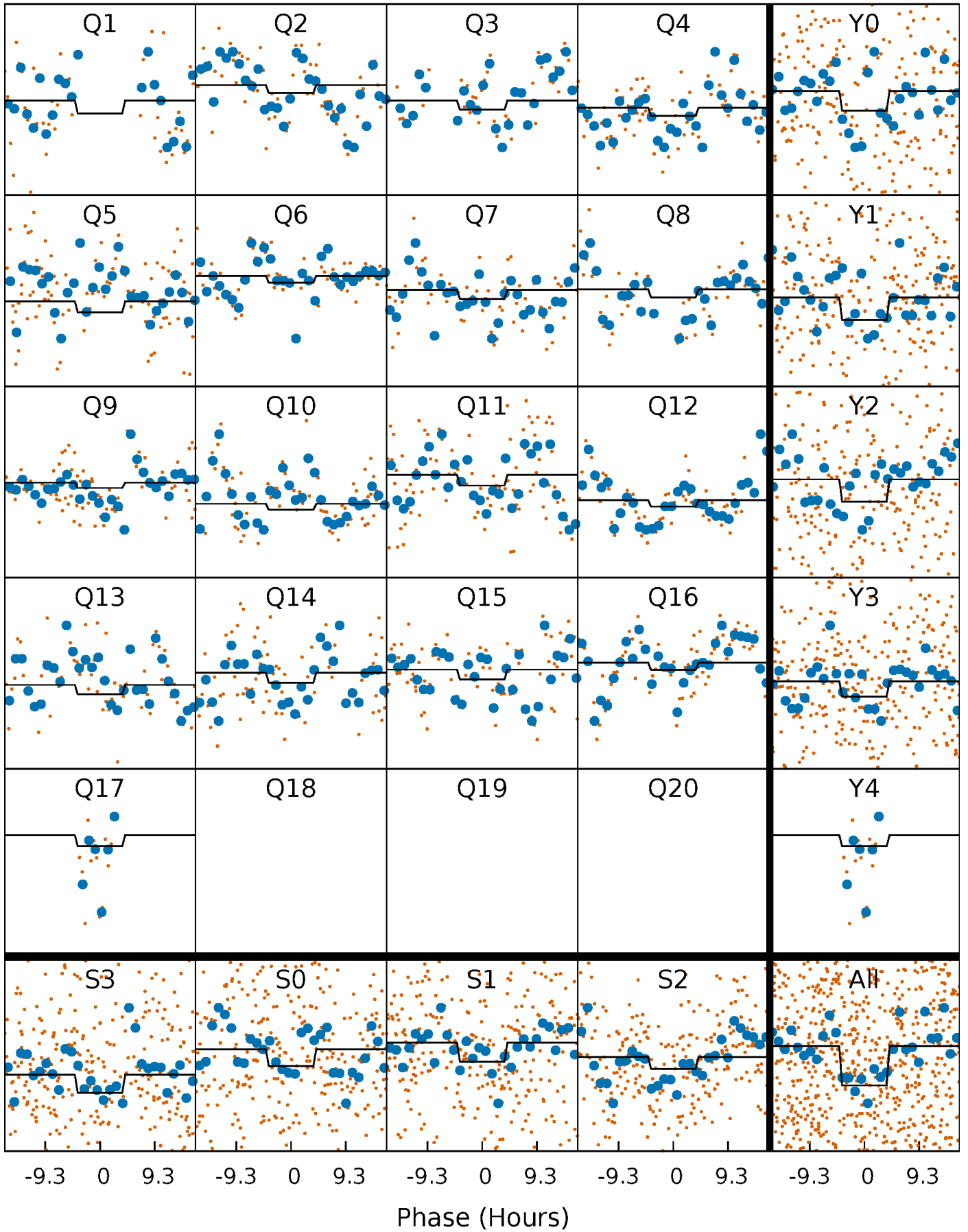
TCE 009518710-03   P= 21.258857 Days    $T_0=132.247946$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

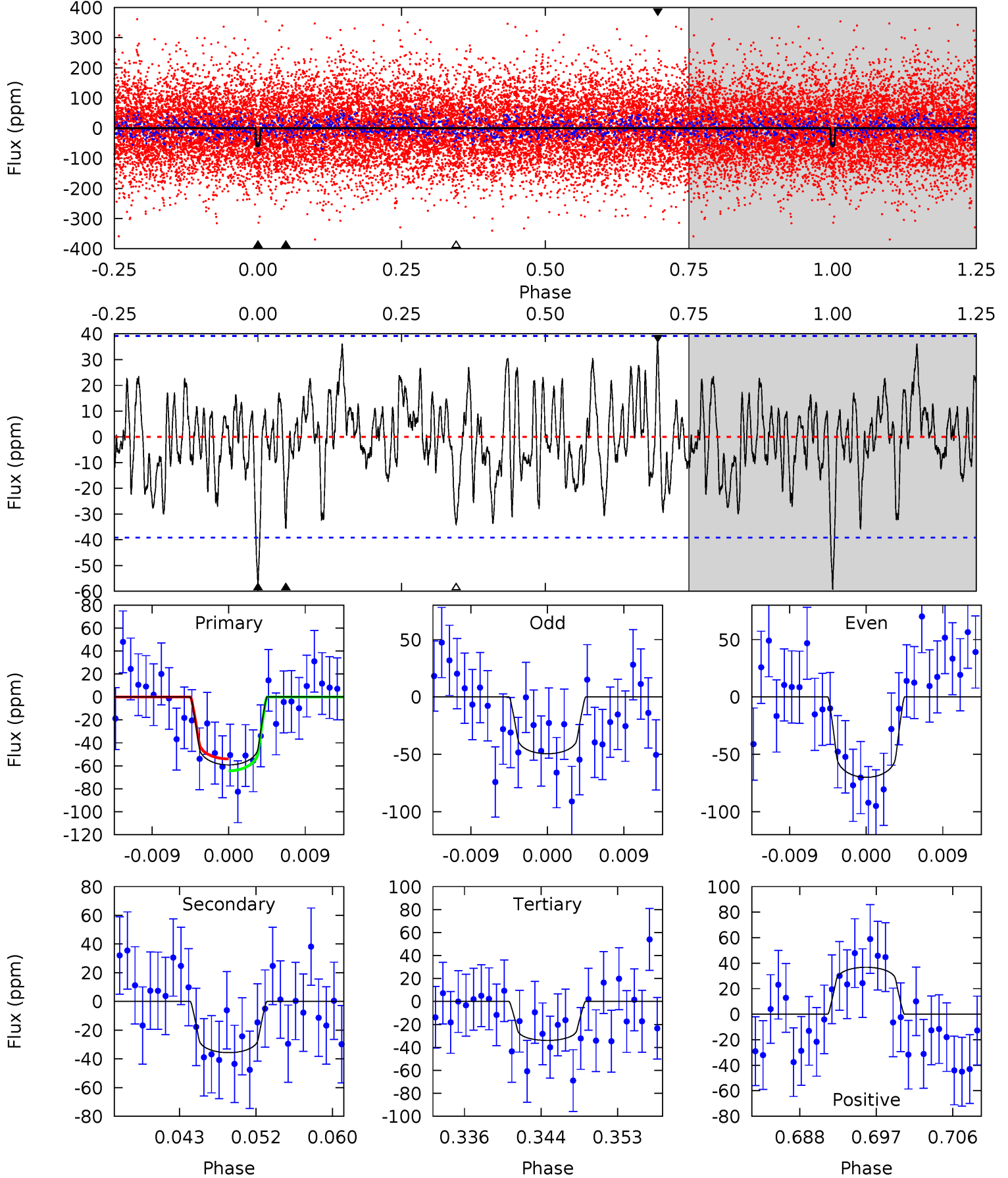
TCE 009518710-03   P= 21.257967 Days    $T_0=132.302698$  (BKJD)



# DV Model-Shift Uniqueness Test

009518710-03, P = 21.258857 Days, E = 110.989089 Days

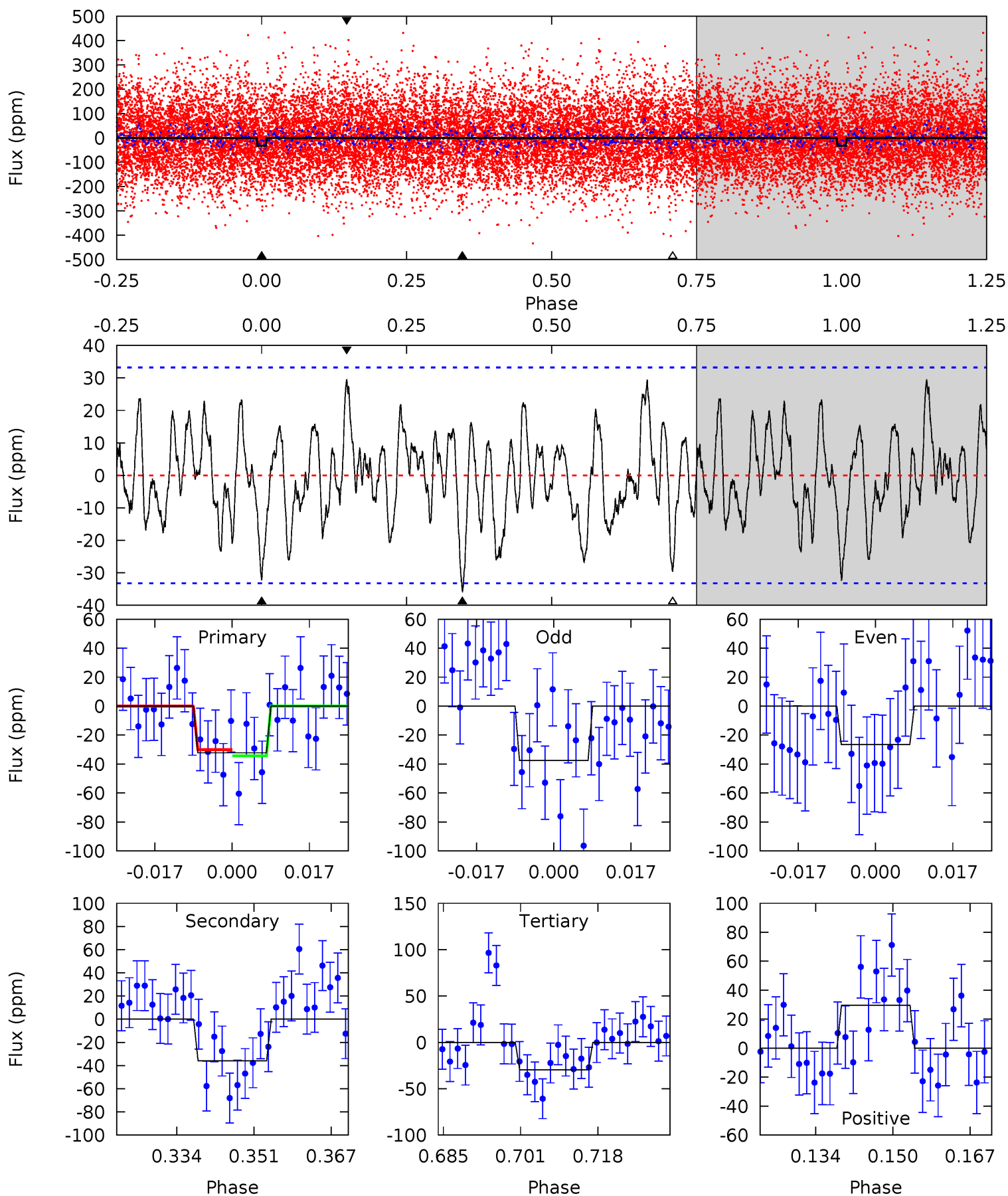
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.64	4.60	4.38	4.75	5.06	2.63	1.73	3.26	2.89	0.22	-0.15	1.32	0.60	0.38	0.67



# Alt Model-Shift Uniqueness Test

009518710-03, P = 21.257967 Days, E = 111.044731 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
4.78	5.32	4.40	4.40	4.93	2.39	1.73	0.38	0.38	0.92	0.92	0.82	0.95	0.45	0.31



### Stellar Parameters For KIC 009518710

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$7056^{+169}_{-253}$	$3.813^{+0.259}_{-0.111}$	$0.060^{+0.200}_{-0.300}$	$2.785^{+0.469}_{-0.871}$	$1.836^{+0.191}_{-0.354}$	$0.120^{+0.195}_{-0.041}$
	+2%/-4%	+7%/-3%	+333%/-500%	+17%/-31%	+10%/-19%	+163%/-34%
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 009518710-03 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-36 \pm 8$	$2.50^{+1.16}_{-1.15}$	$1670^{+104}_{-144}$	$5853^{+1892}_{-967}$	$107^{+238}_{-61}$
Alt.	$-36 \pm 7$	$1.79^{+1.17}_{-1.05}$	$1666^{+103}_{-137}$	$6932^{+5223}_{-1533}$	$220^{+917}_{-145}$

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

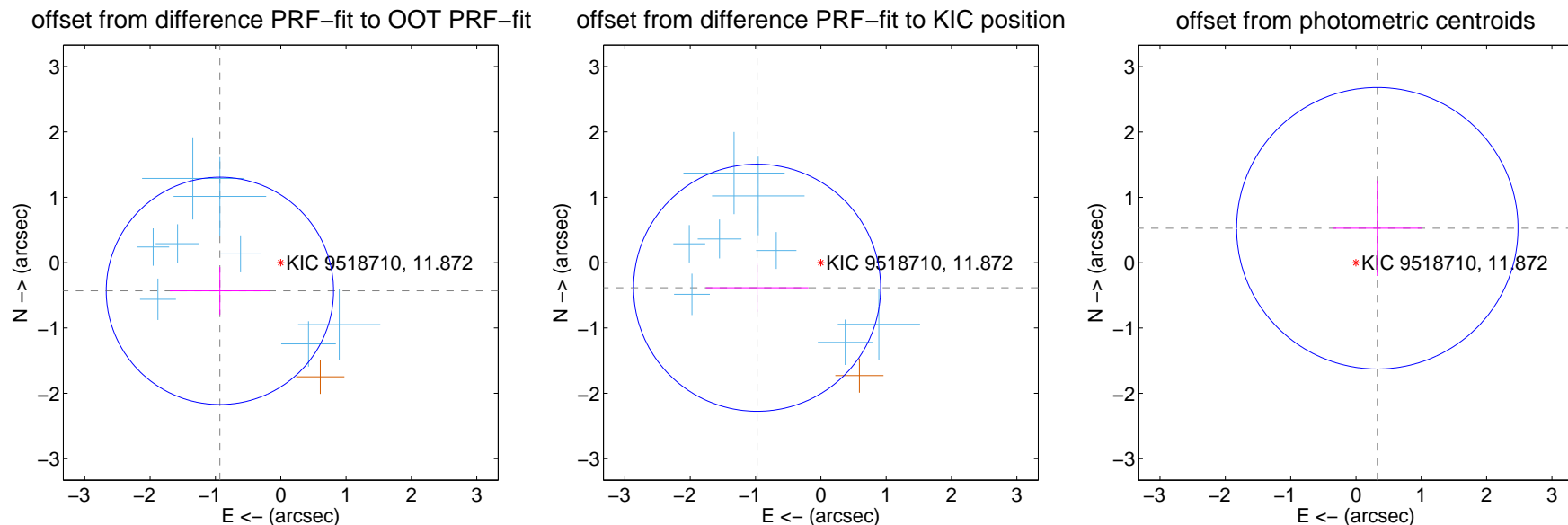
## DV Centroid Data

Supplemental centroid analysis for 009518710-03. **Kepler magnitude: 11.87.** Transit SNR 6.86

There are 8 quarters with good PRF difference image offsets

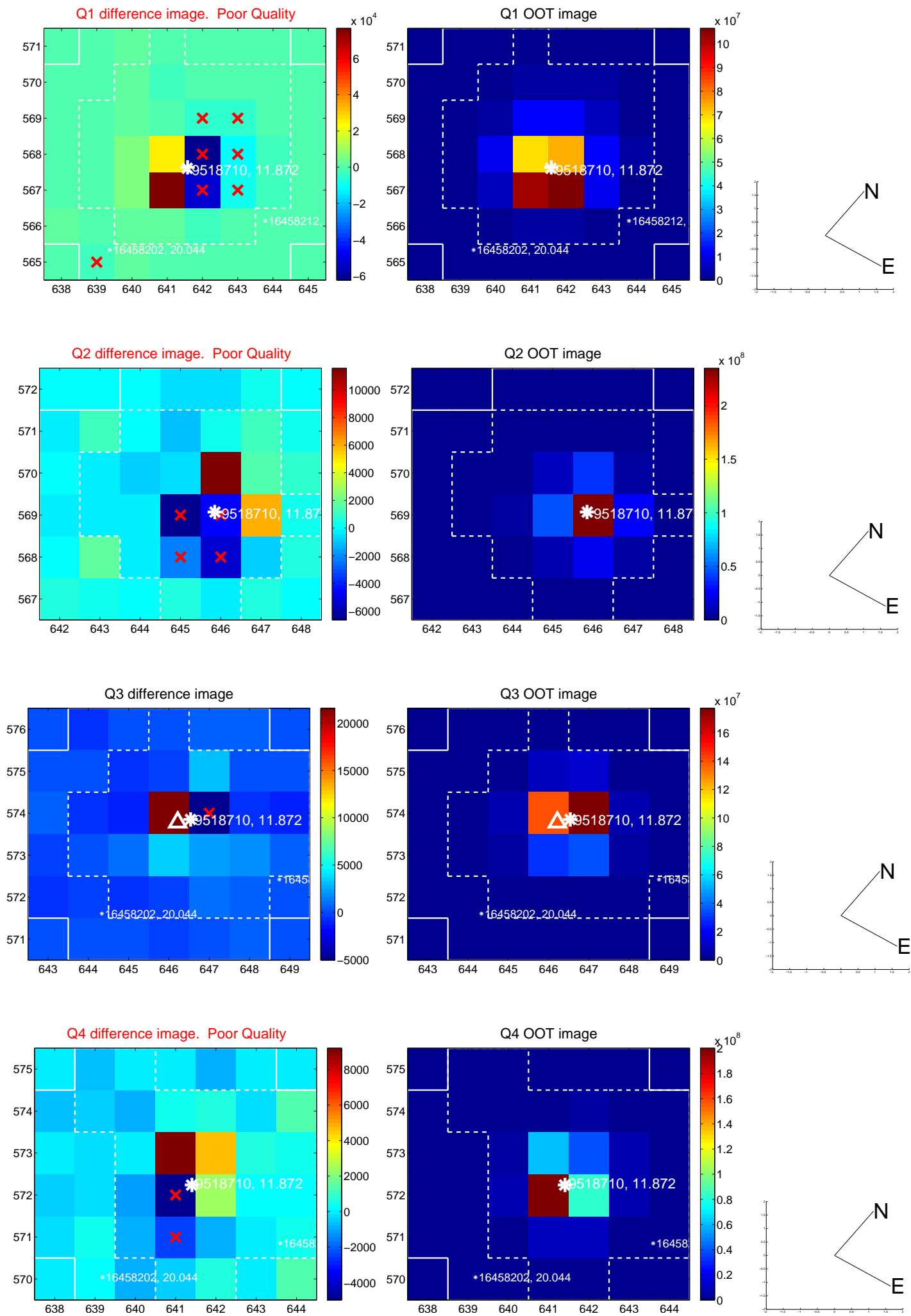
The direct PRF centroid is offset from the target star catalog position by about 0.08 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.027 \pm 0.580$	1.77	$0.932 \pm 0.765$	$-0.432 \pm 0.365$
PRF-fit source offset from KIC position	$1.049 \pm 0.630$	1.66	$0.976 \pm 0.785$	$-0.385 \pm 0.370$
photometric centroid source offset	$0.62 \pm 0.72$	0.86	$-0.33 \pm 0.68$	$0.53 \pm 0.73$



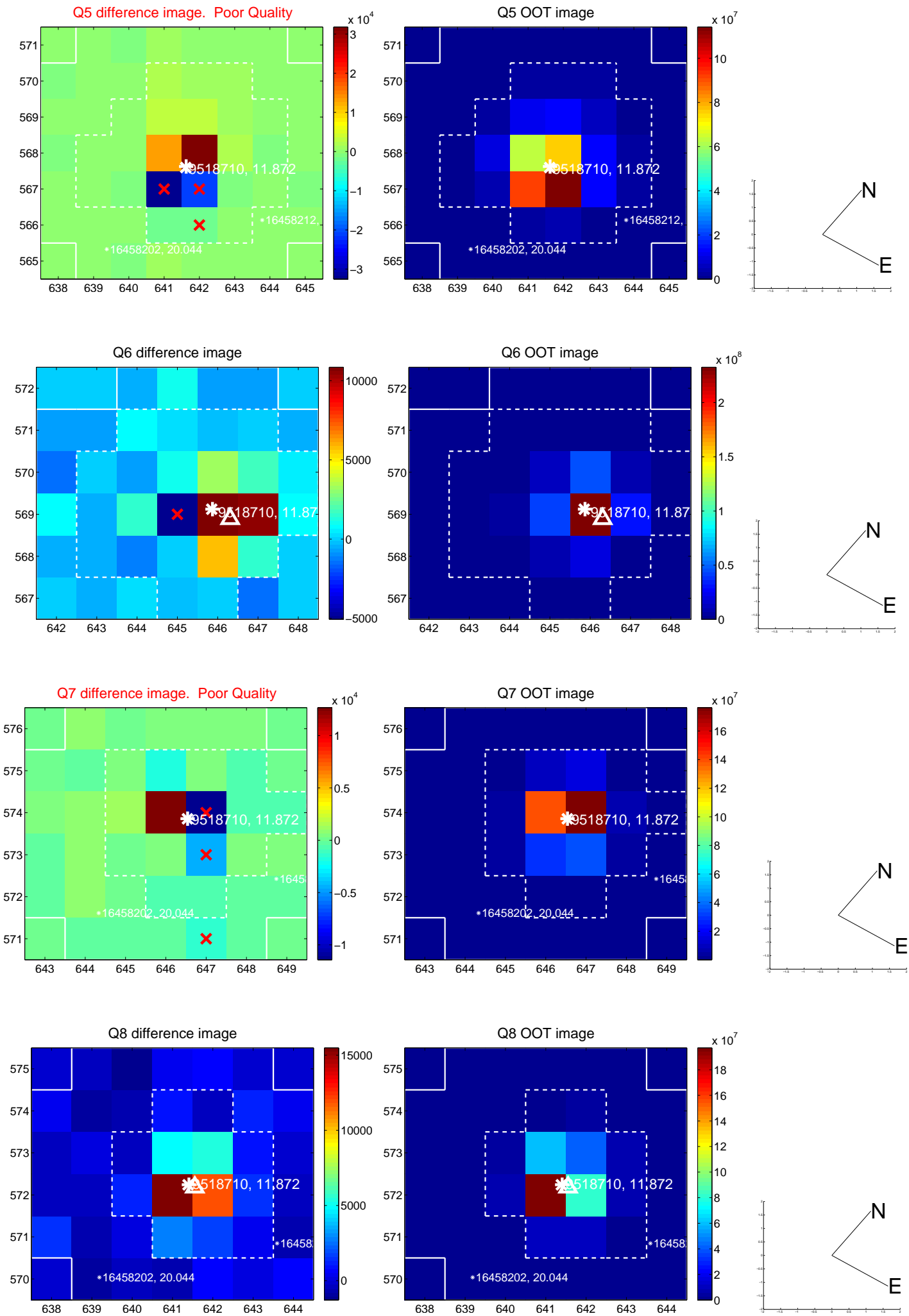
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

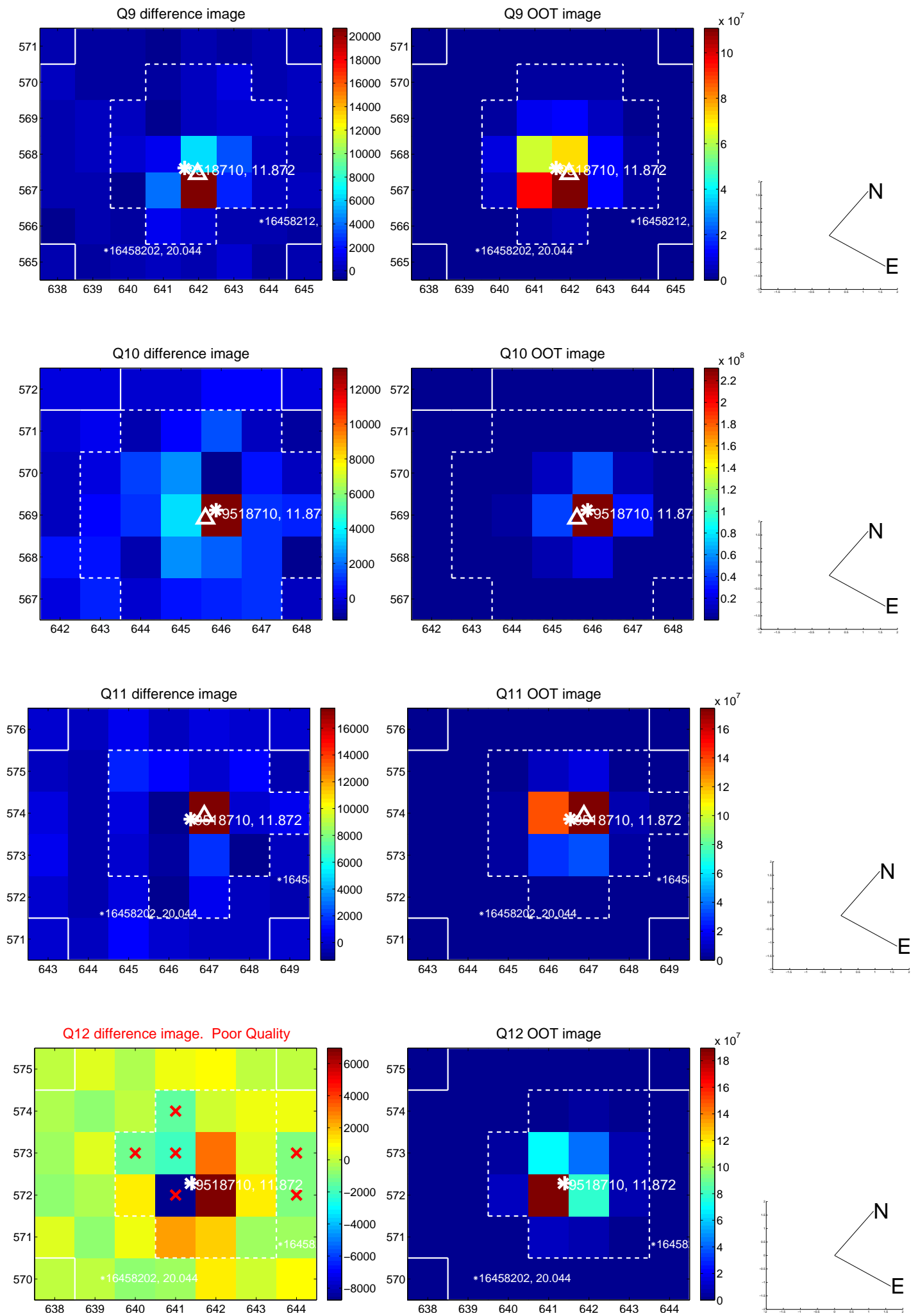




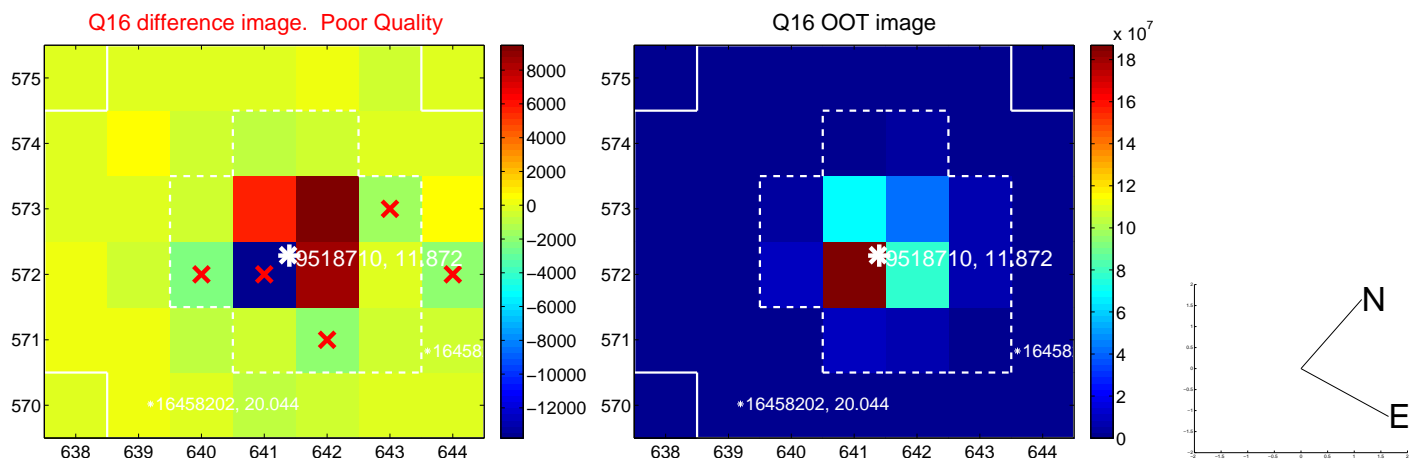
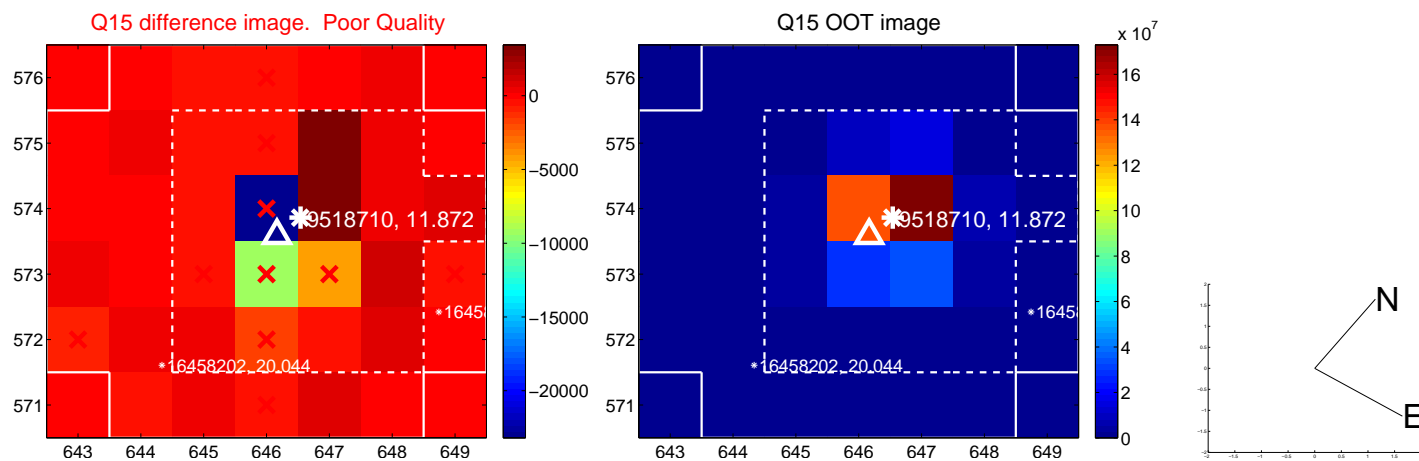
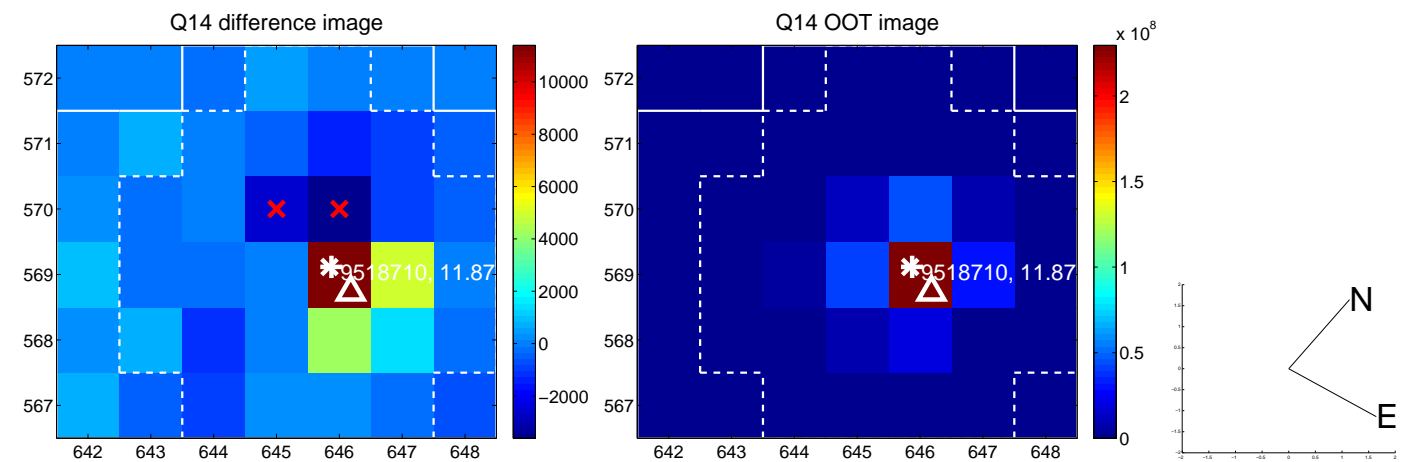
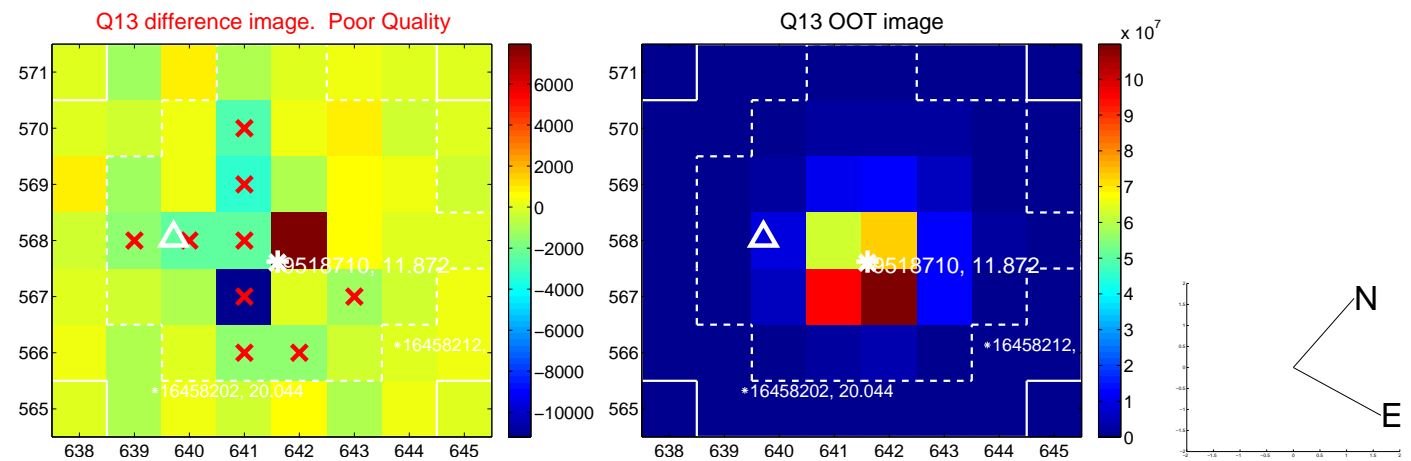
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



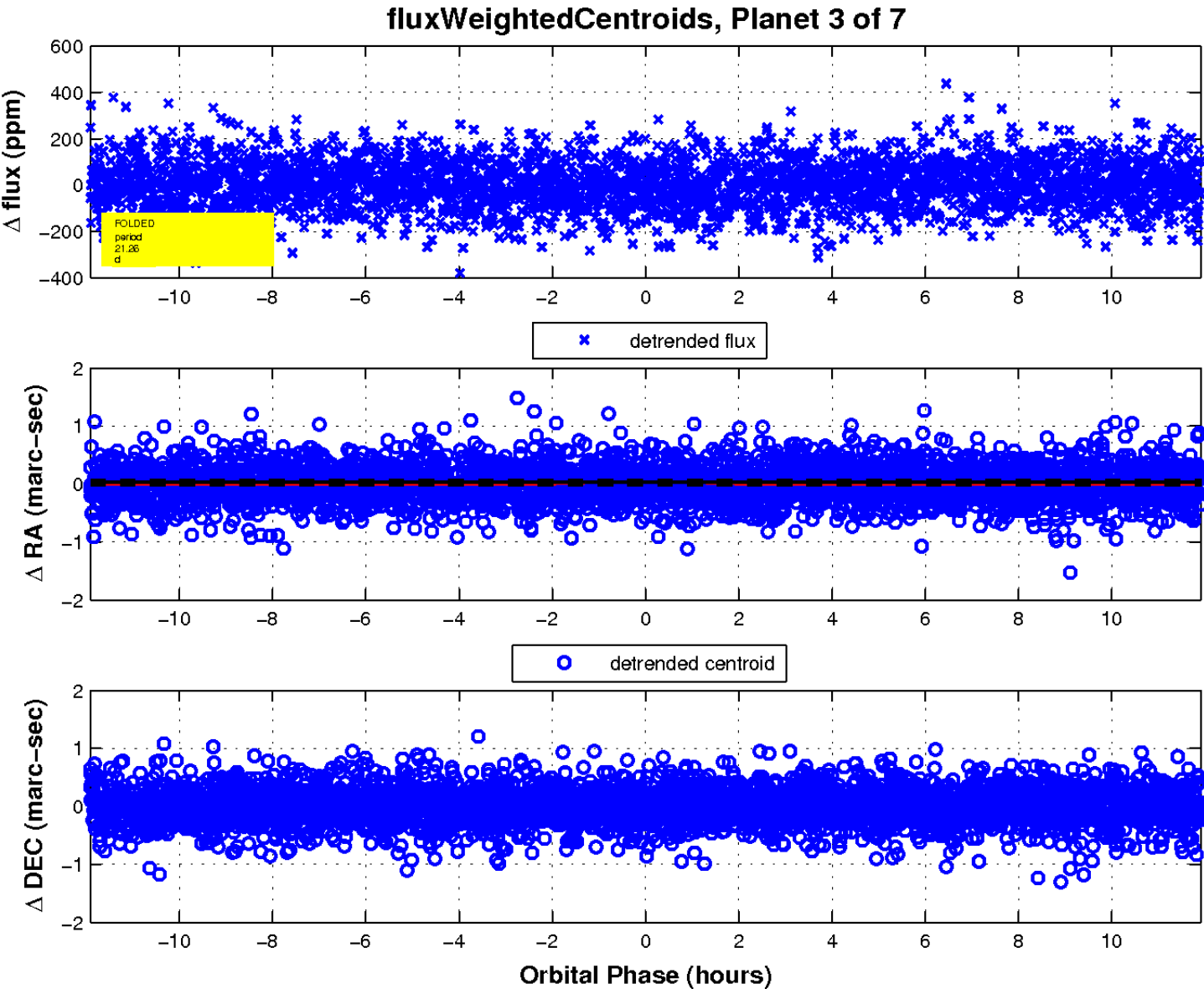
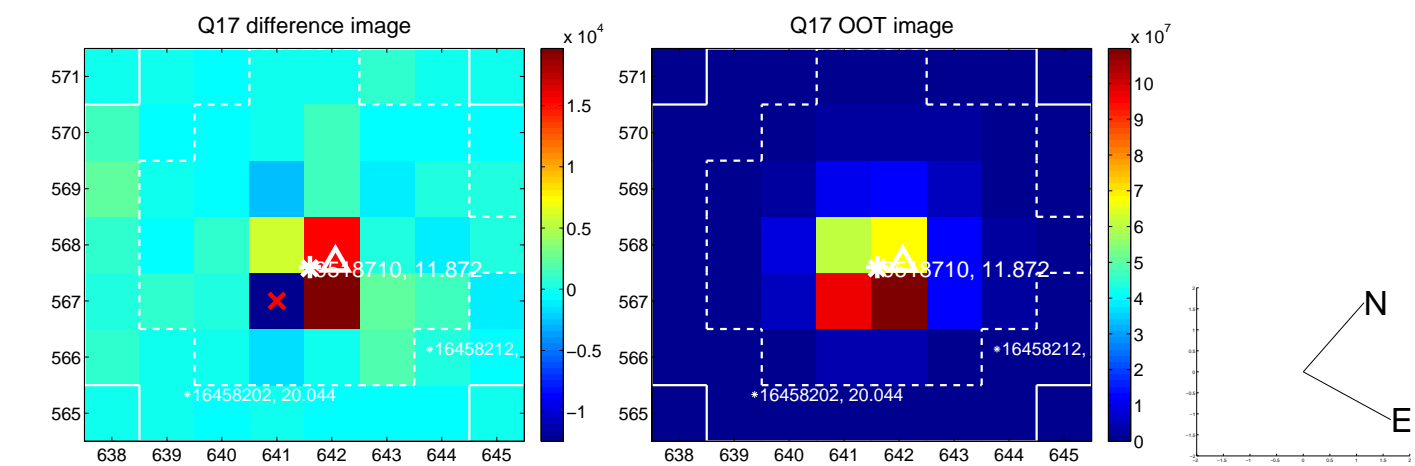
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

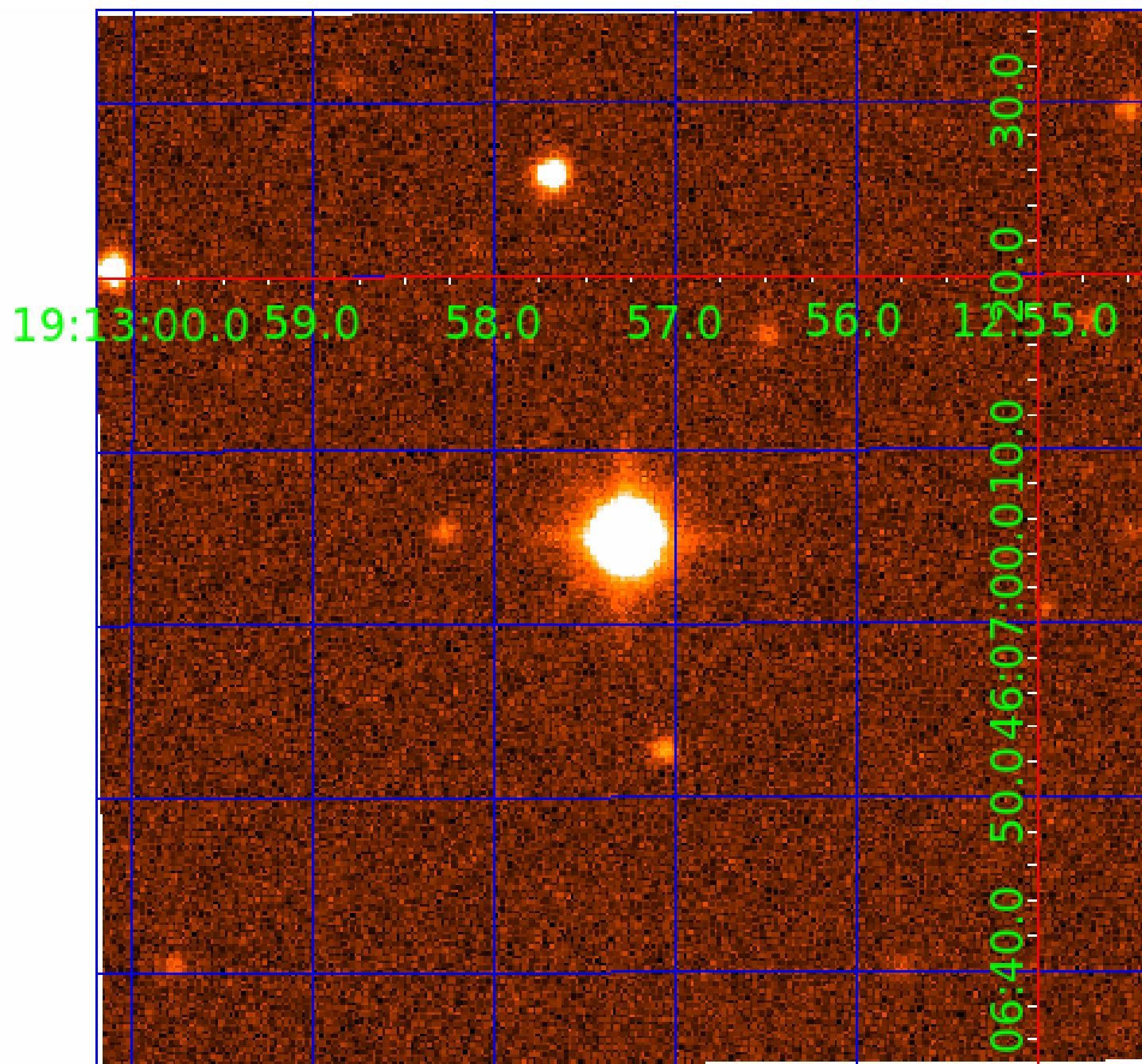


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 009518710

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009518710-01	OBS	3207.01	0.954328	132.488665	7.3	5.434	10.9	5.8	2.79	7056	0.77	31872.41
009518710-02	OBS	No	234.293932	139.664765	200.0	2.871	10.8	10.3	2.79	7056	4.38	20.73
009518710-03	OBS	No	21.258857	132.247946	61.6	3.971	8.0	6.9	2.79	7056	2.50	508.50
009518710-04	OBS	No	131.524599	184.773916	137.6	7.073	7.4	7.8	2.79	7056	3.58	44.77
009518710-05	OBS	No	95.052209	153.457127	162.4	3.175	7.9	7.4	2.79	7056	4.12	69.03
009518710-06	OBS	No	341.755025	167.131313	163.9	5.396	7.9	8.2	2.79	7056	4.01	12.53
009518710-07	OBS	No	46.248098	177.000352	71.9	5.711	7.7	6.6	2.79	7056	2.69	180.39

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009518710-01	OBS	FP	0.00	1	0	0	0	LPP_DV
009518710-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009518710-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_ZUMA—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009518710-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009518710-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT
009518710-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
009518710-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_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 009518710-04

No Significant Match Found

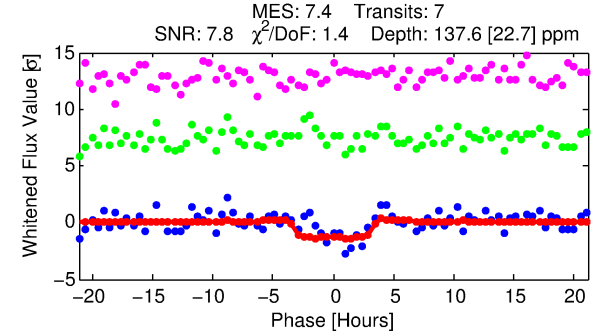
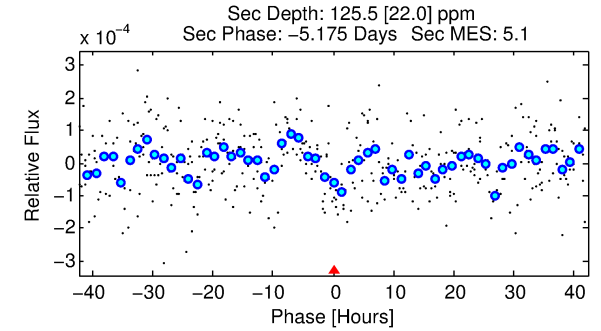
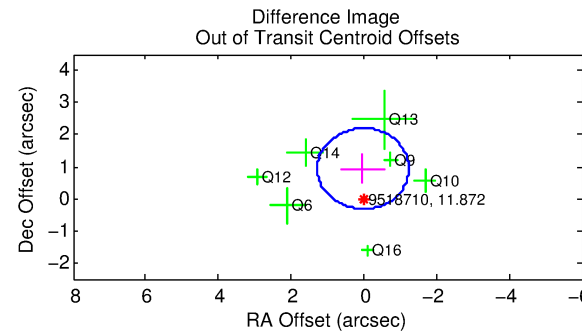
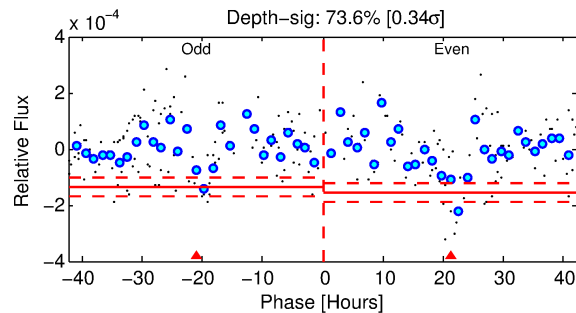
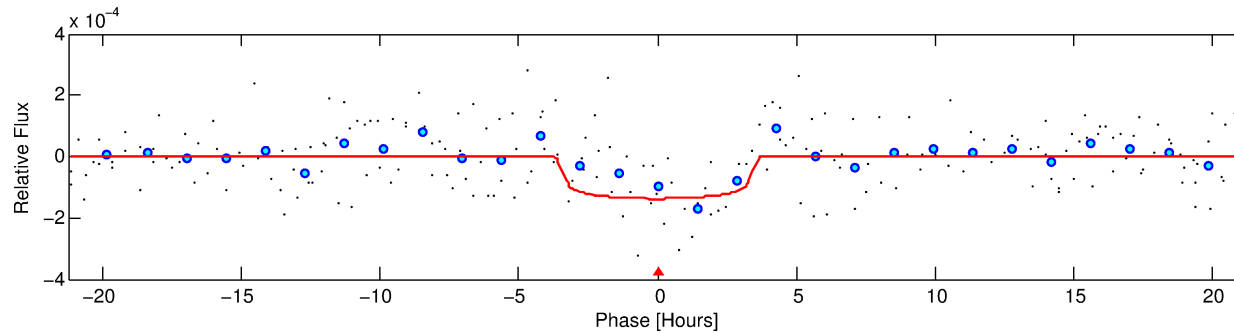
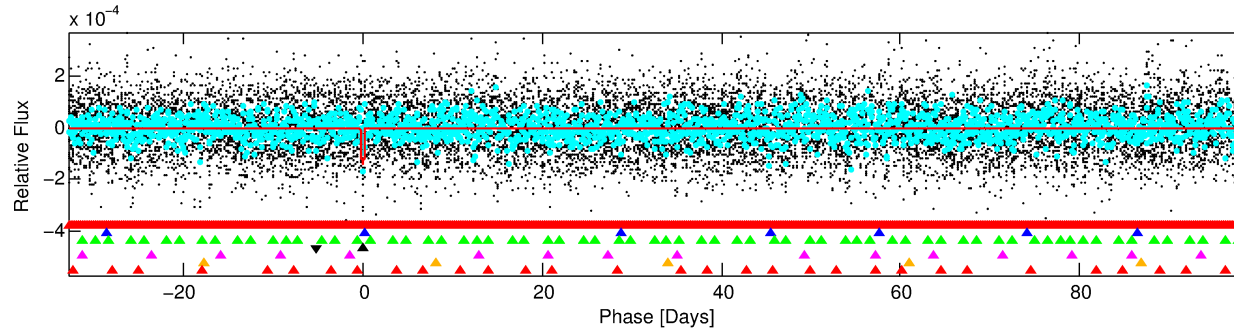
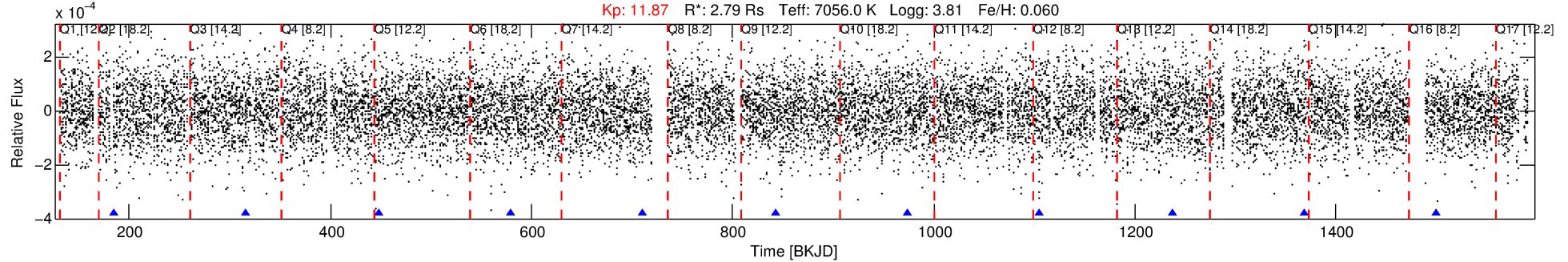


# DV One-Page Summary

KIC: 9518710 Candidate: 4 of 7 Period: 131.525 d

KOI: K03207 Corr: No Ephemeris Match

Kp: 11.87 R\*: 2.79 Rs Teff: 7056.0 K Logg: 3.81 Fe/H: 0.060



## DV Fit Results:

Period = 131.52460 [0.00310] d  
Epoch = 184.7739 [0.0161] BKJD  
Rp/R\* = 0.0118 [0.0064]  
a/R\* = 90.51 [292.81]  
b = 0.79 [1.57]  
Seff = 44.77 [21.10]  
Teq = 660 [78] K  
Rp = 3.58 [2.25] Re  
a = 0.6203 [0.1787] AU  
Ag = 2068.75 [2459.01] [0.84σ]  
Teffp = 6878 [1908] K [3.26σ]

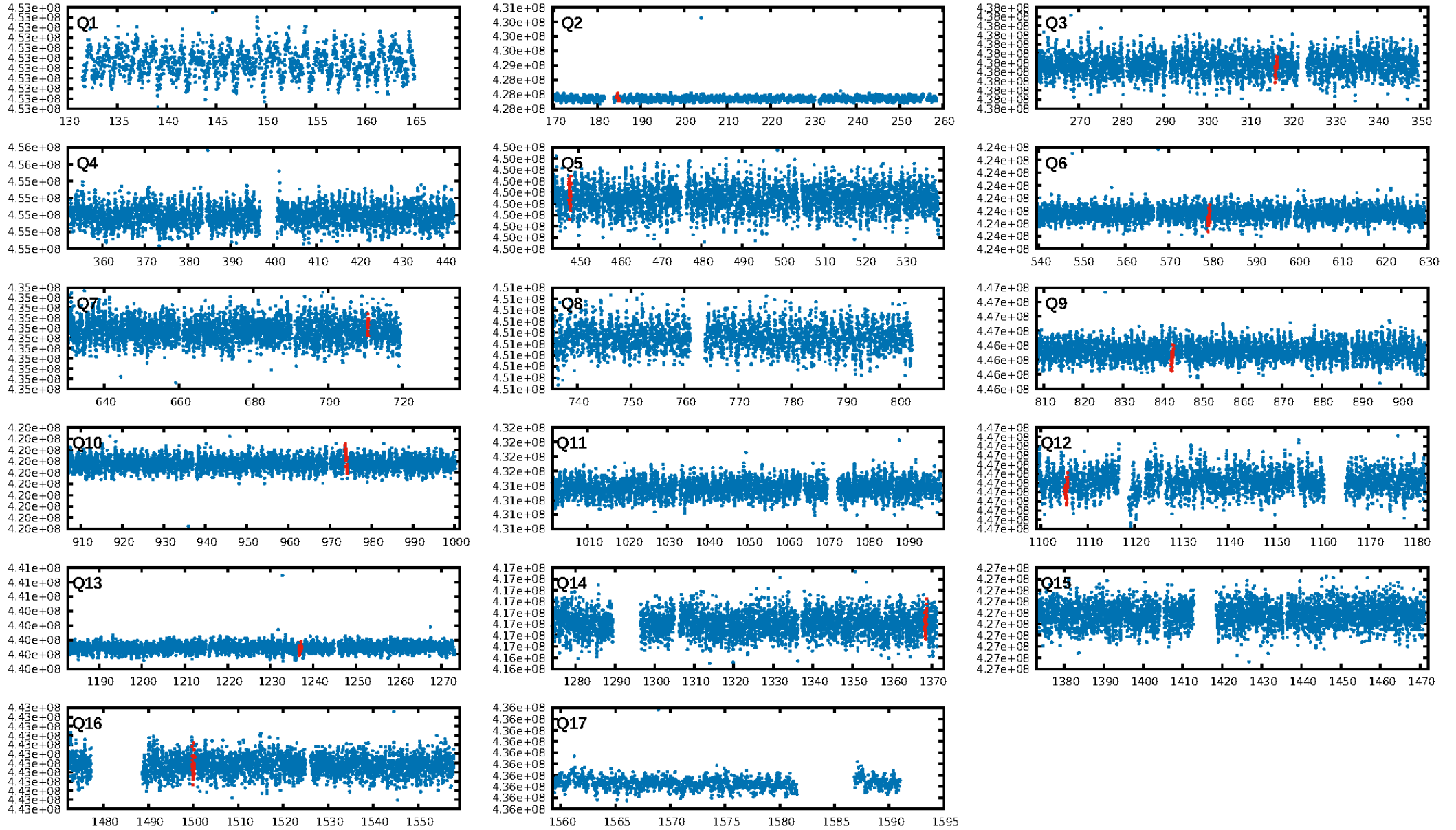
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [112.90σ]  
LongPeriod-sig: 100.0% [323.11σ]  
ModelChiSquare2-sig: 1.9%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 1.57e-07**  
RollingBand-fgt: 1.00 [7/7]  
GhostDiagnostic-chr: 1.174  
Centroid-sig: N/A  
Centroid-so: 1.222 arcsec [1.91σ]  
OotOffset-rm: 0.938 arcsec [2.24σ]  
KicOffset-rm: 1.008 arcsec [2.29σ]  
OotOffset-st: 3/0/2/2 [7]  
KicOffset-st: 3/0/2/2 [7]  
DiffImageQuality-fgm: 0.71 [5/7]  
DiffImageOverlap-fno: 0.00 [0/9]

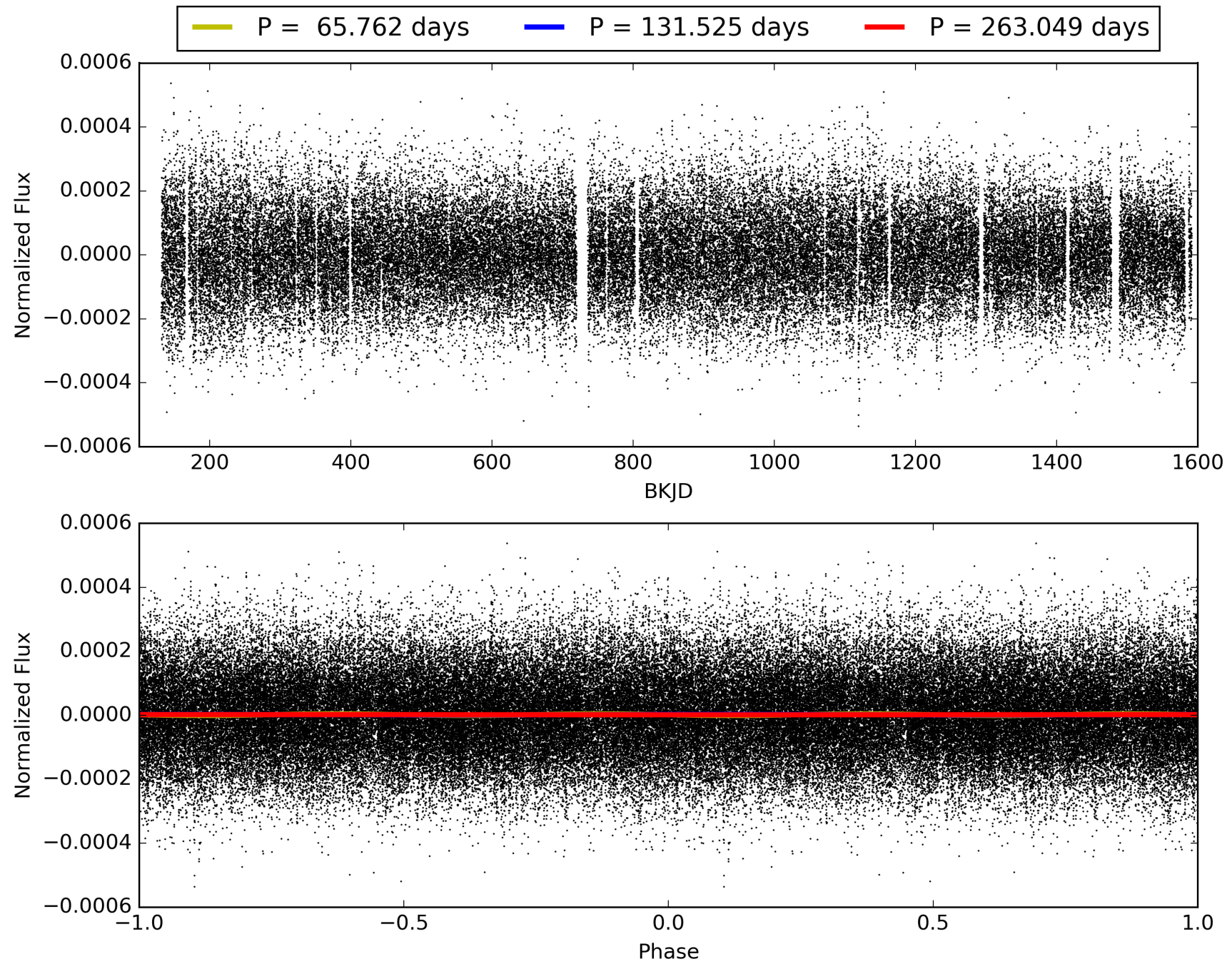
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 16:33:26 Z

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

# TCE 009518710-04, PDC Light Curves

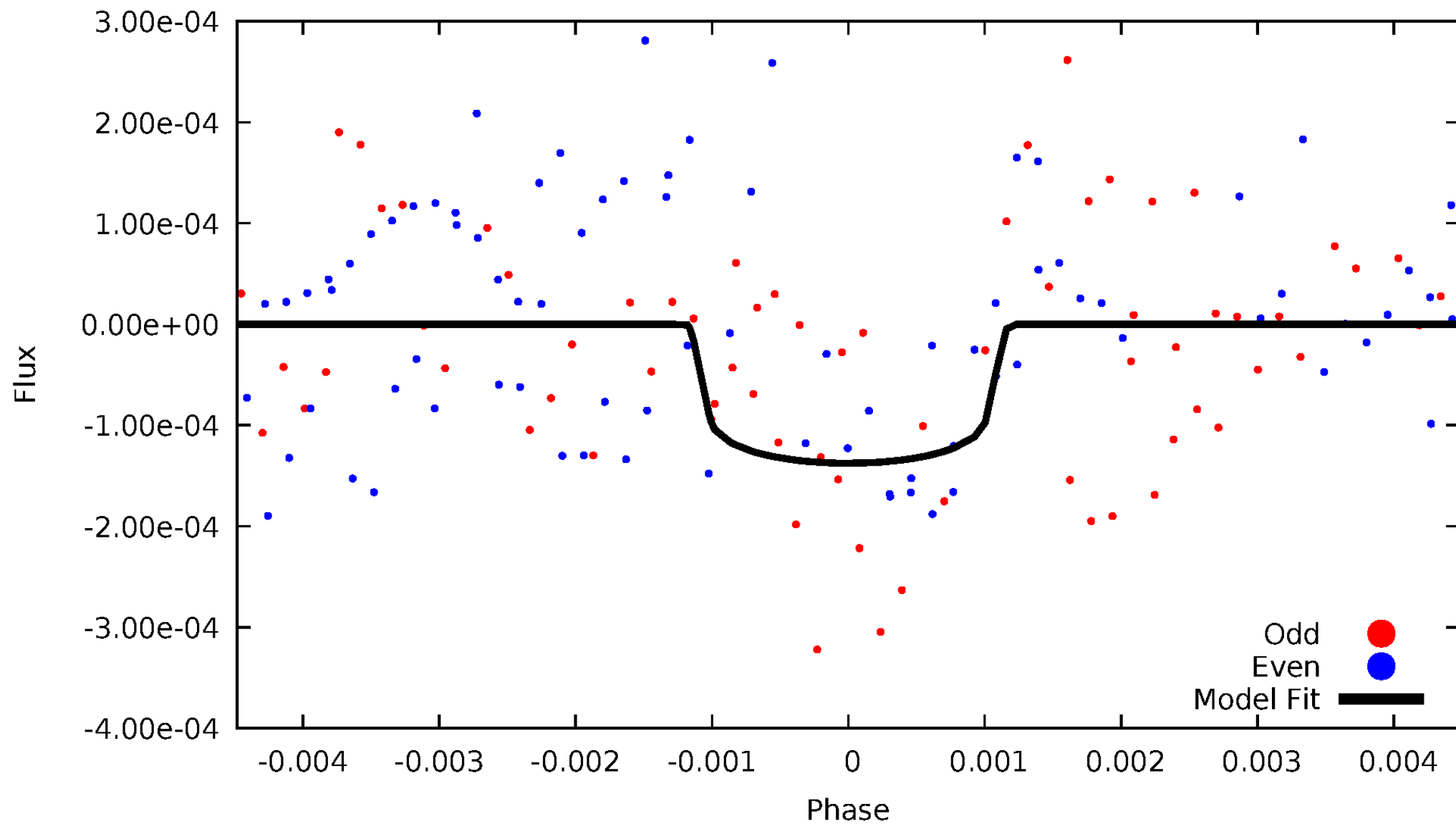


TCE 009518710-04



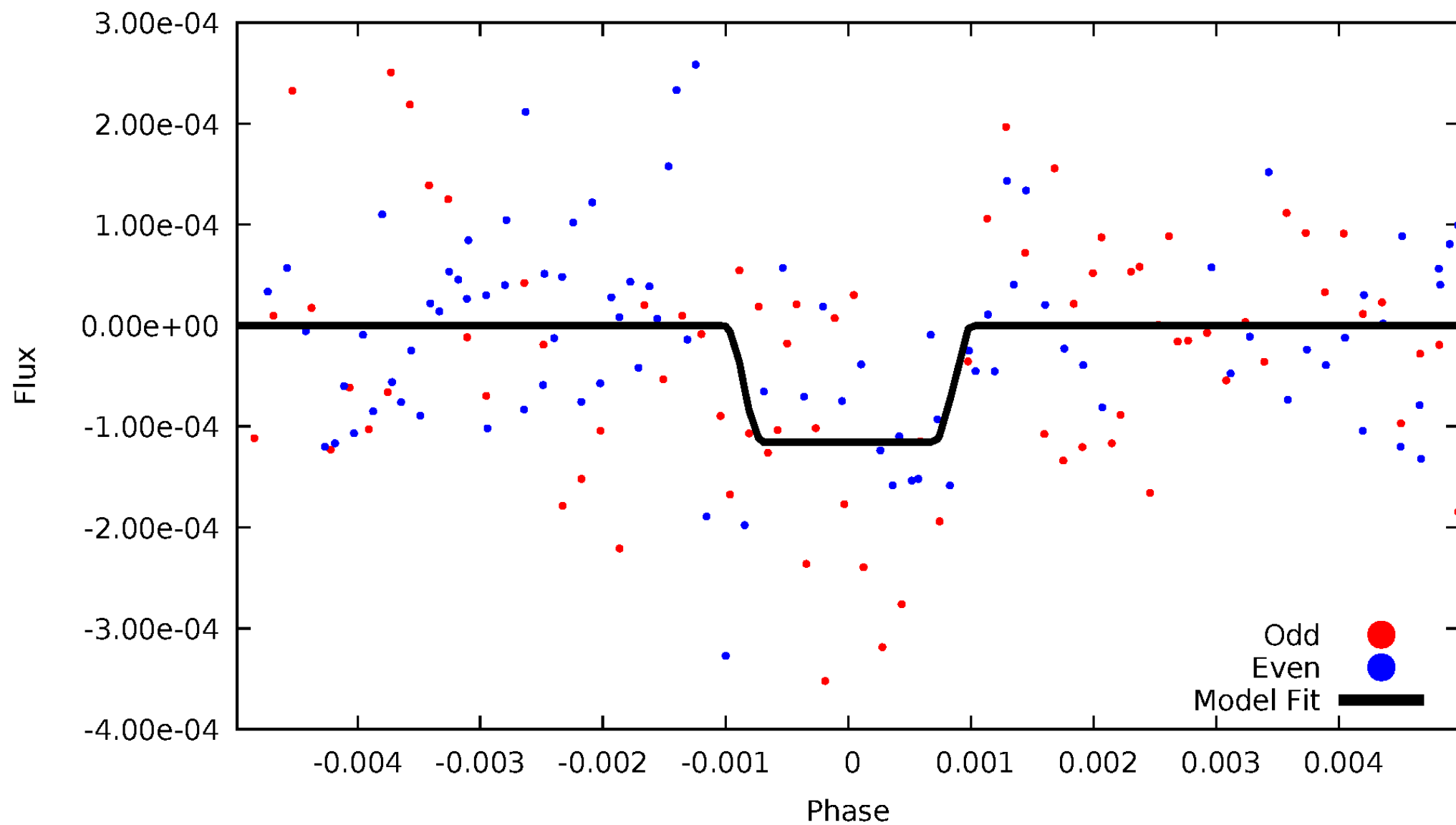
# DV Odd/Even

TCE 009518710-04



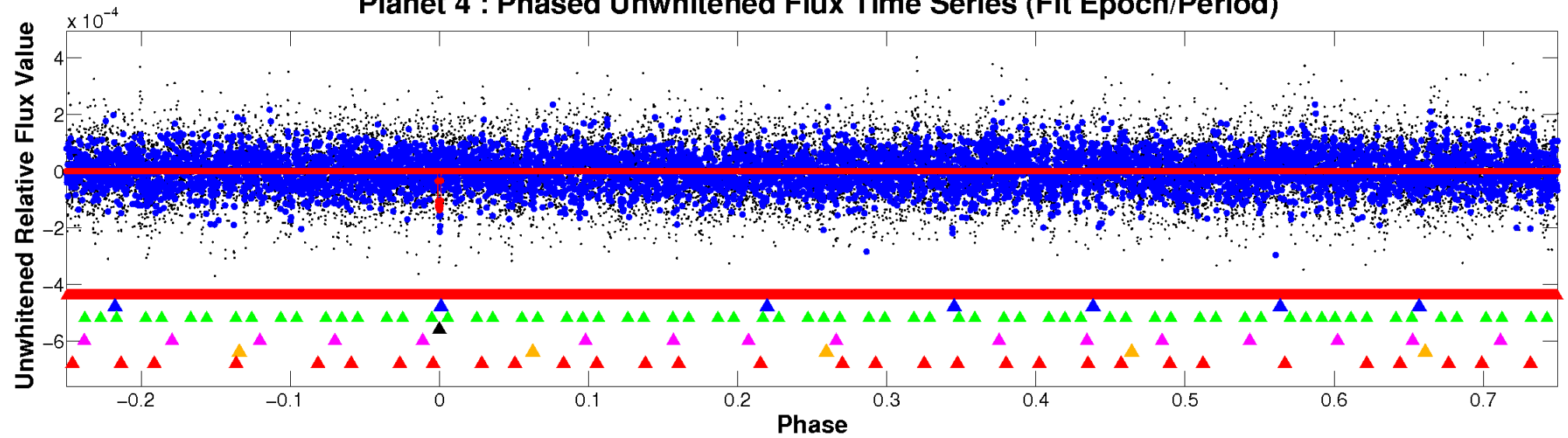
# ALT Odd/Even

TCE 009518710-04

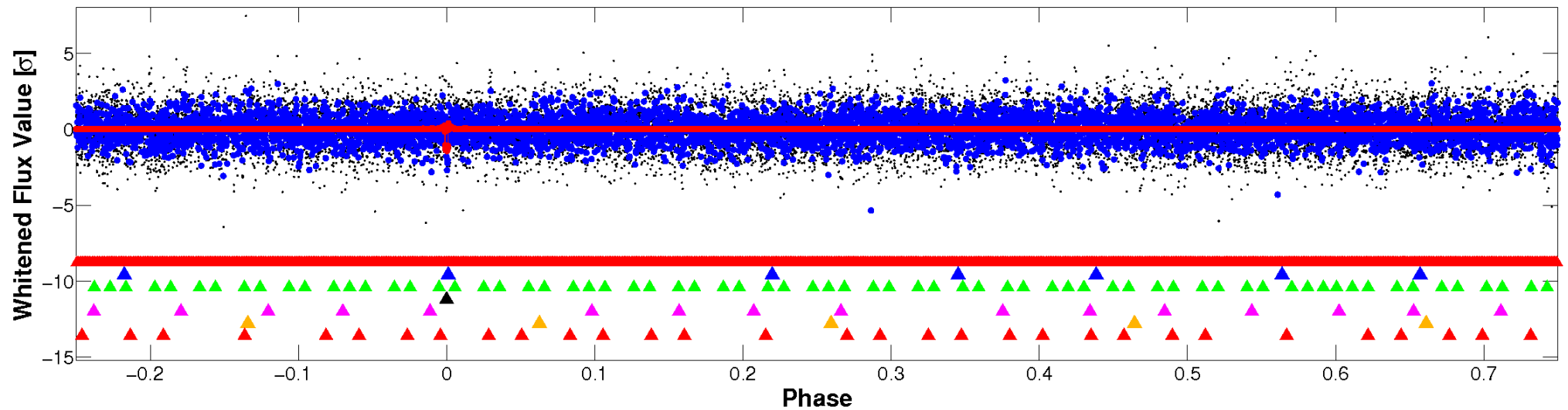


# Non-Whitened Vs. Whitened Light Curve

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



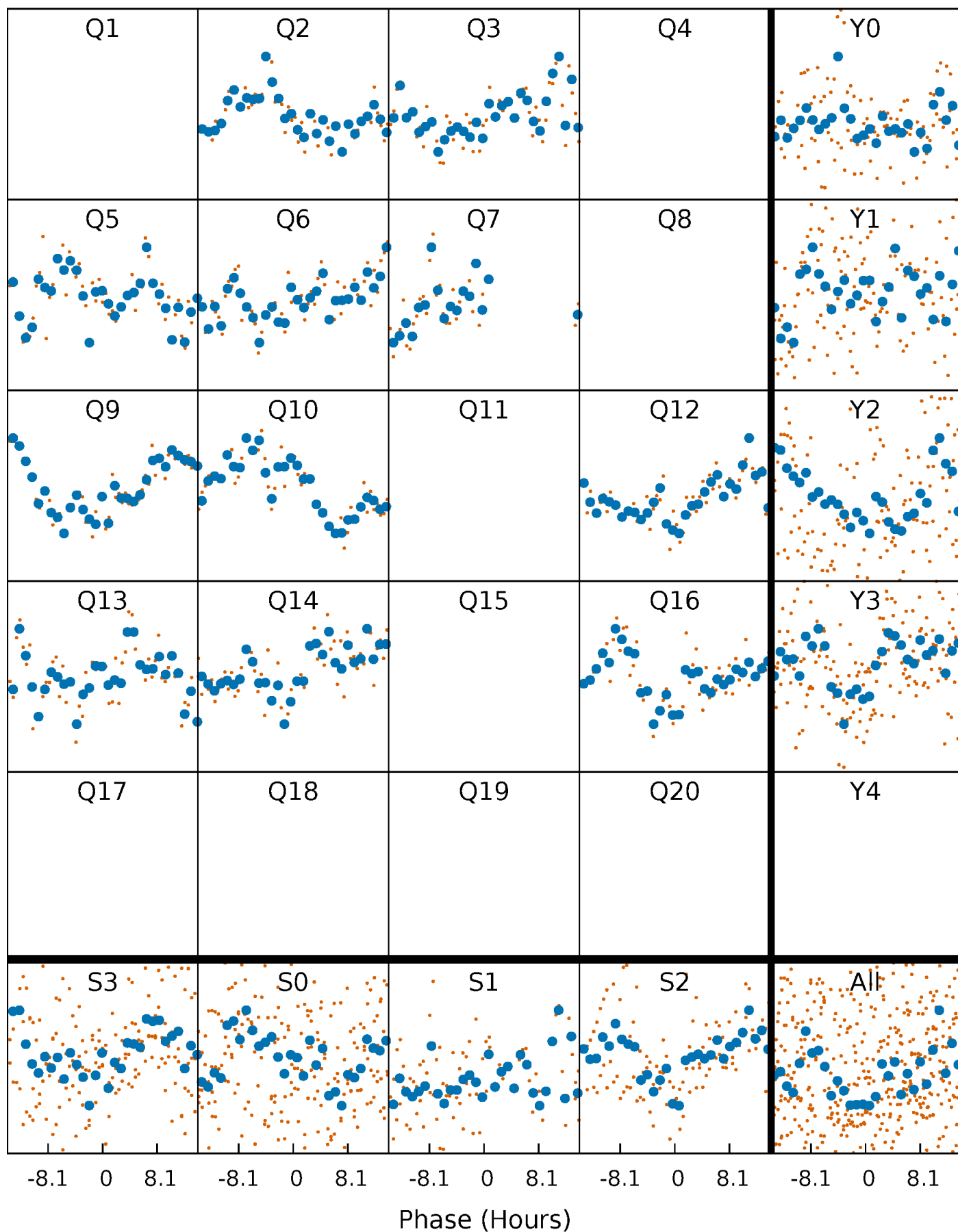
## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)





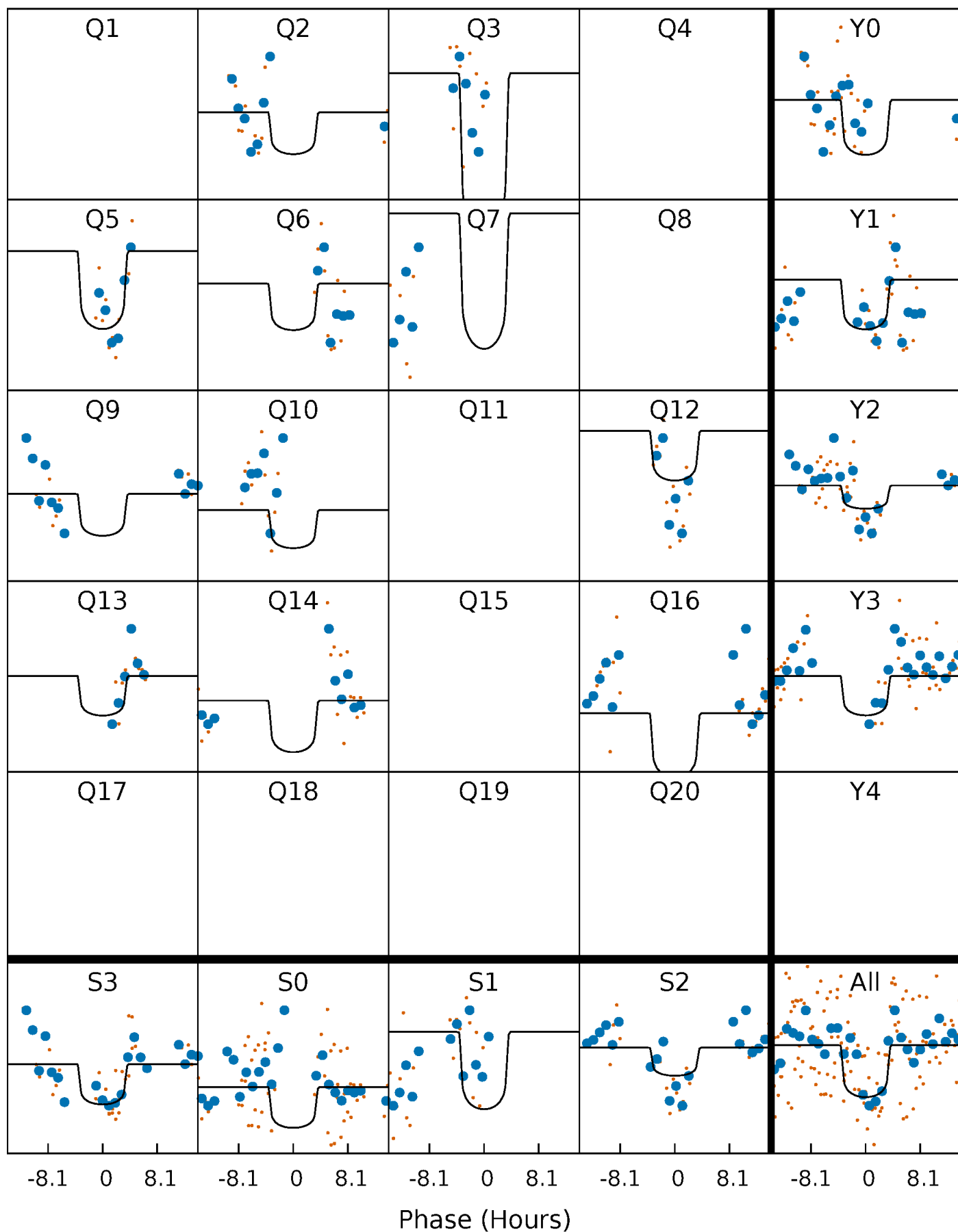
# PDC Quarter-Phased Transit Curves

TCE 009518710-04 P=131.524599 Days  $T_0=184.773916$  (BKJD)



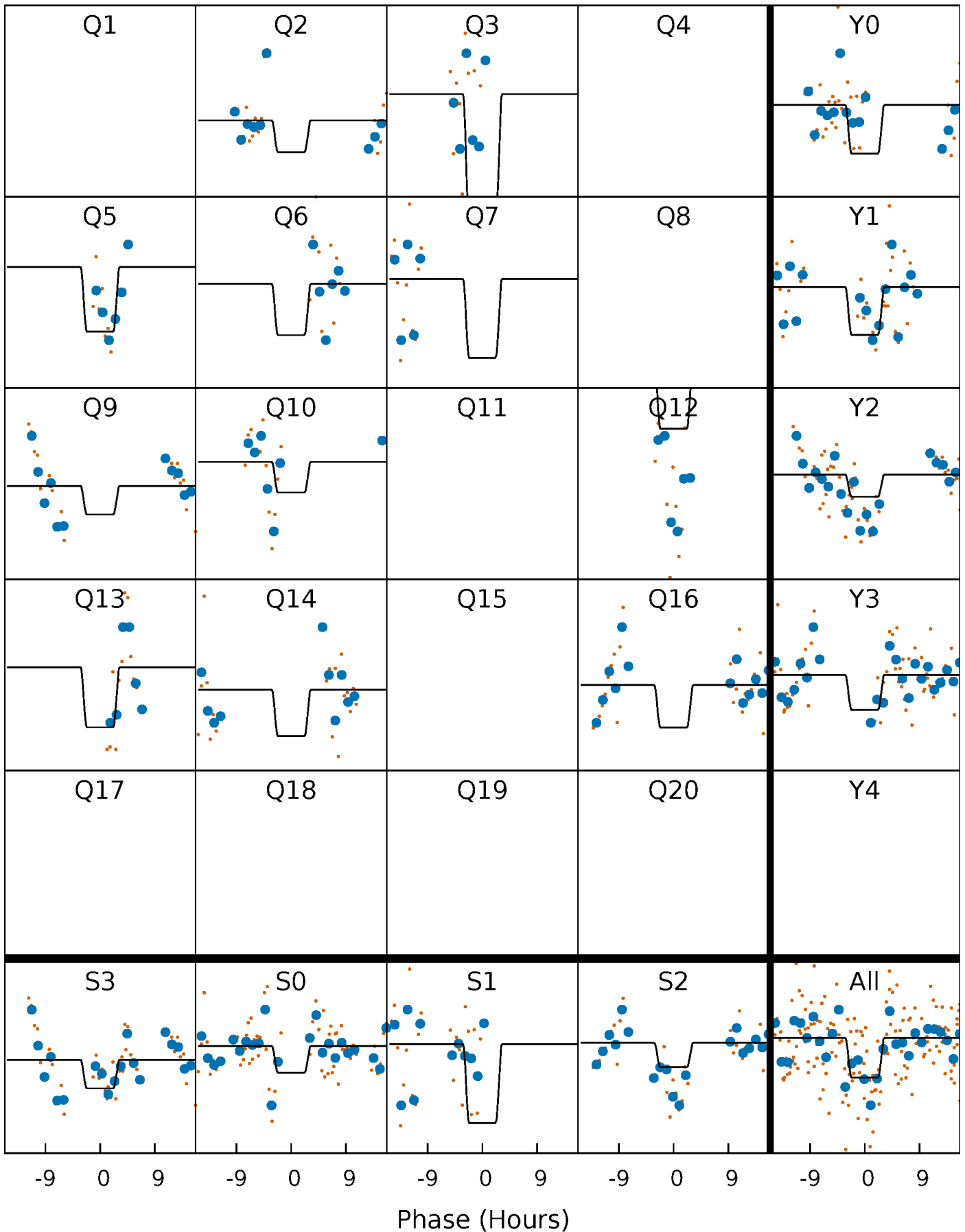
# DV Quarter-Phased Transit Curves

TCE 009518710-04 P=131.524599 Days  $T_0=184.773916$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

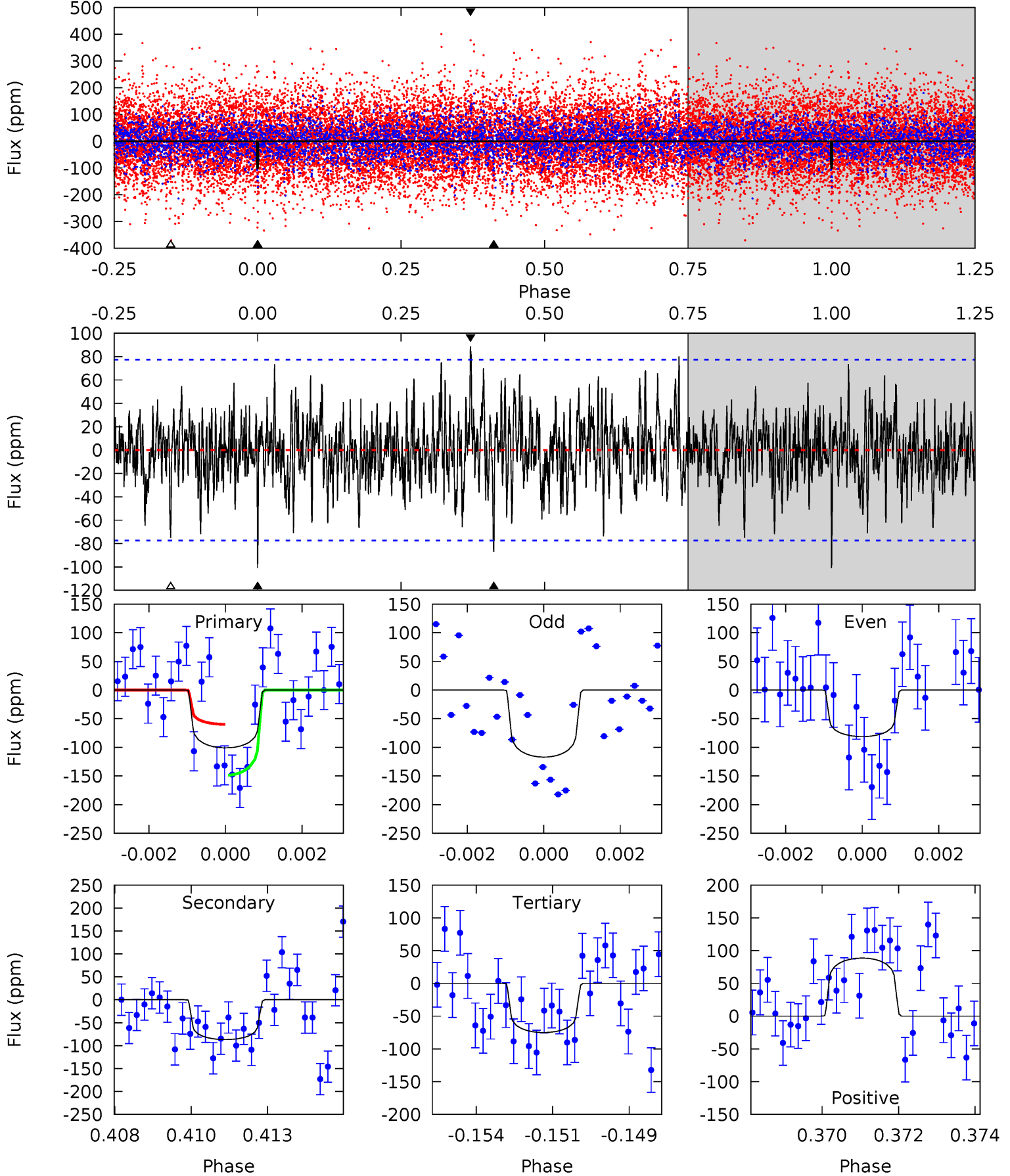
TCE 009518710-04 P=131.522310 Days  $T_0=184.784573$  (BKJD)



# DV Model-Shift Uniqueness Test

009518710-04, P = 131.524599 Days, E = 53.249317 Days

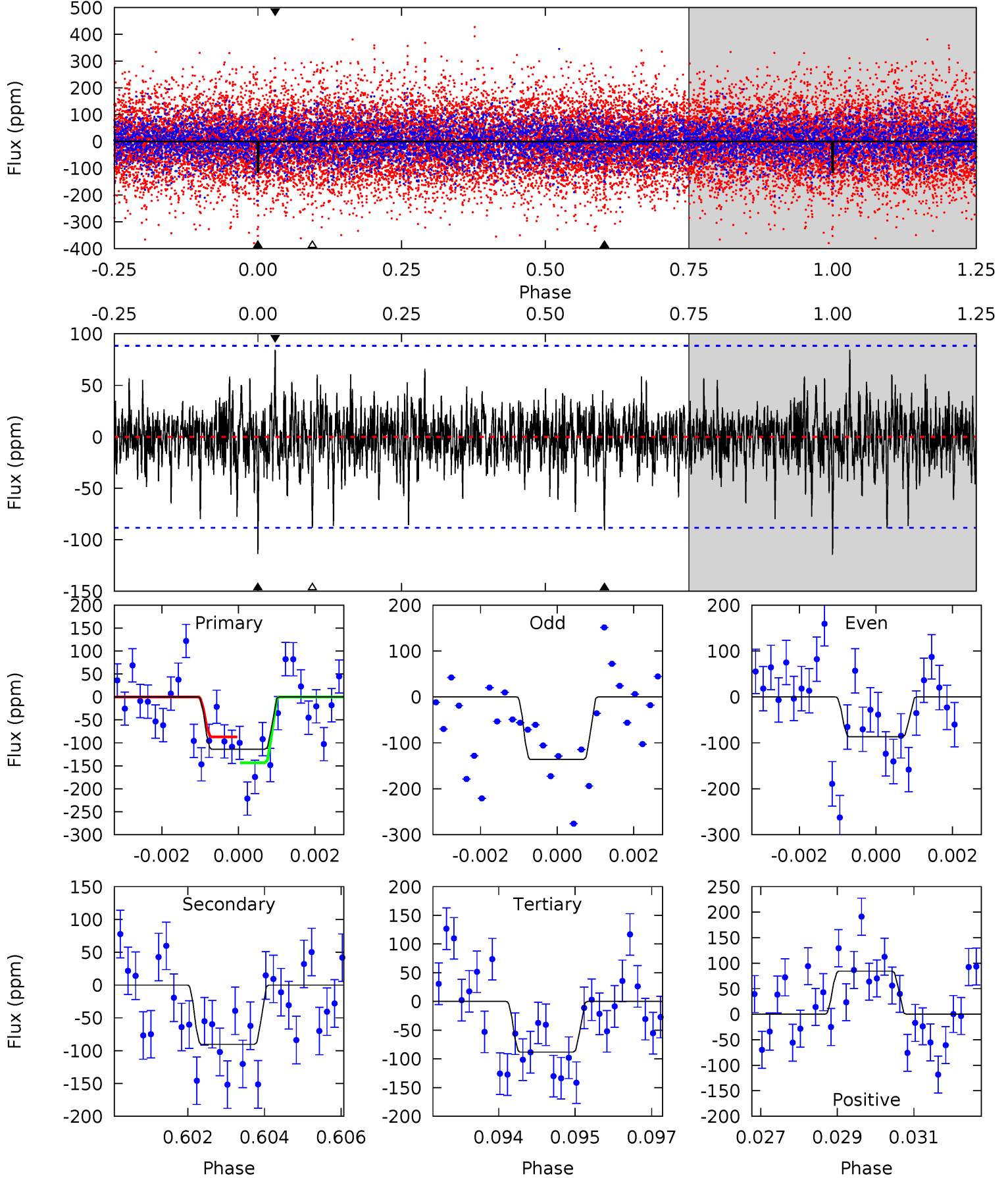
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.90	5.94	5.13	6.06	5.29	3.04	1.63	1.77	0.84	0.81	-0.12	1.22	0.85	0.47	3.04



# Alt Model-Shift Uniqueness Test

009518710-04, P = 131.522310 Days, E = 53.262263 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
6.86	5.46	5.32	5.09	5.33	3.10	1.22	1.54	1.77	0.14	0.37	1.49	1.19	0.43	1.69



### Stellar Parameters For KIC 009518710

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7056^{+169}_{-253}$	$3.813^{+0.259}_{-0.111}$	$0.060^{+0.200}_{-0.300}$	$2.785^{+0.469}_{-0.871}$	$1.836^{+0.191}_{-0.354}$	$0.120^{+0.195}_{-0.041}$
	+2%/-4%	+7%/-3%	+333%/-500%	+17%/-31%	+10%/-19%	+163%/-34%
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 009518710-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-87 \pm 15$	$3.49^{+1.96}_{-1.76}$	$902^{+60}_{-76}$	$6098^{+3040}_{-1129}$	$1489^{+4551}_{-901}$
Alt.	$-90 \pm 17$	$3.34^{+2.06}_{-1.81}$	$909^{+52}_{-74}$	$6392^{+3687}_{-1284}$	$1741^{+6479}_{-1077}$

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

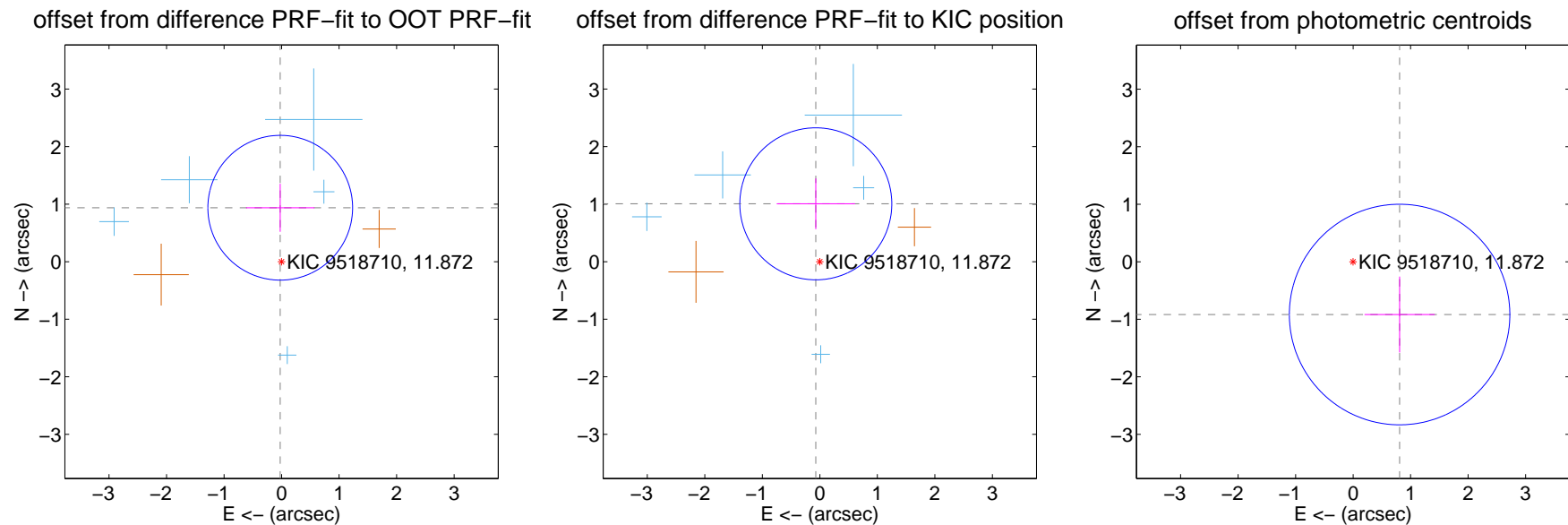
## DV Centroid Data

Supplemental centroid analysis for 009518710-04. **Kepler magnitude: 11.87.** Transit SNR 7.82

There are 5 quarters with good PRF difference image offsets

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

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.938 \pm 0.419$	2.24	$0.023 \pm 0.594$	$0.937 \pm 0.417$
PRF-fit source offset from KIC position	$1.008 \pm 0.440$	2.29	$0.070 \pm 0.680$	$1.005 \pm 0.441$
photometric centroid source offset	$1.22 \pm 0.64$	1.91	$-0.81 \pm 0.61$	$-0.92 \pm 0.66$



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



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

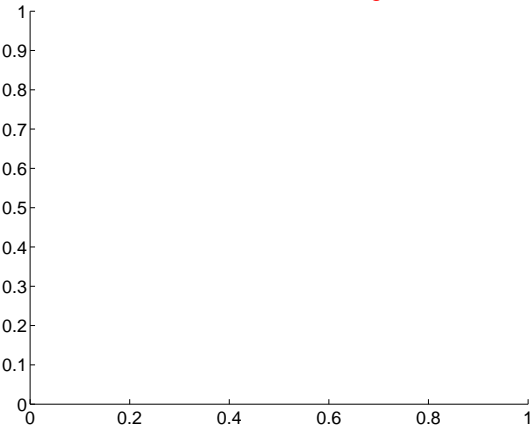
Q1 no difference image



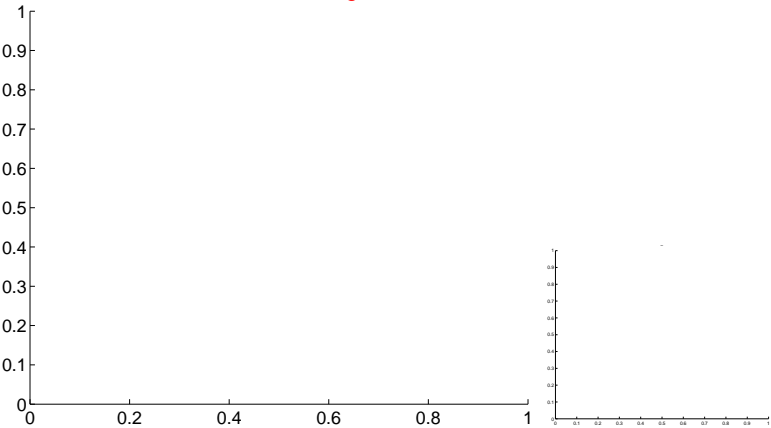
Q1 no OOT image



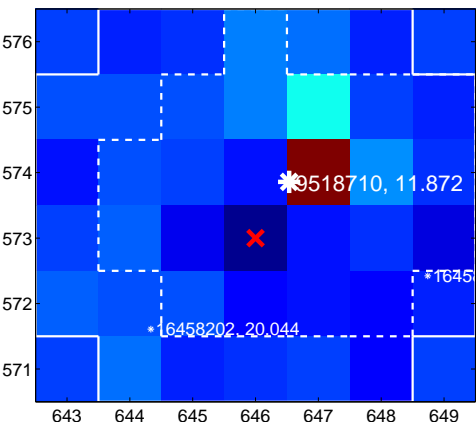
Q2 no difference image



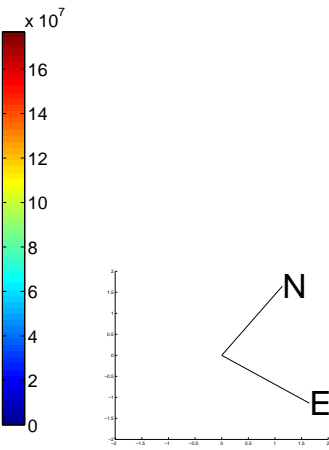
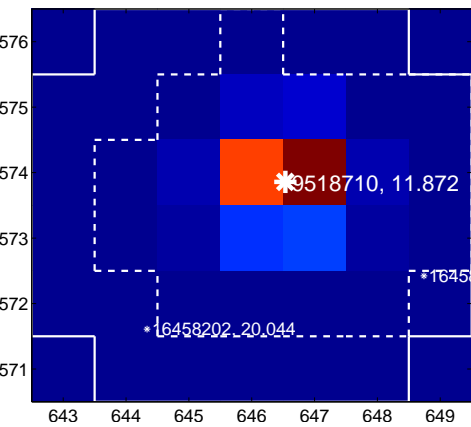
Q2 no OOT image



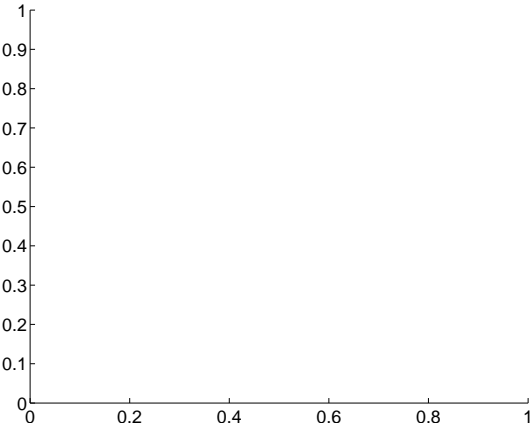
Q3 difference image. Poor Quality



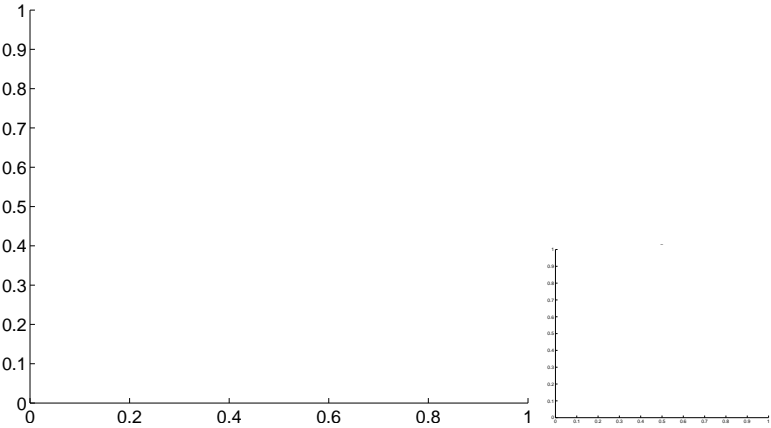
Q3 OOT image



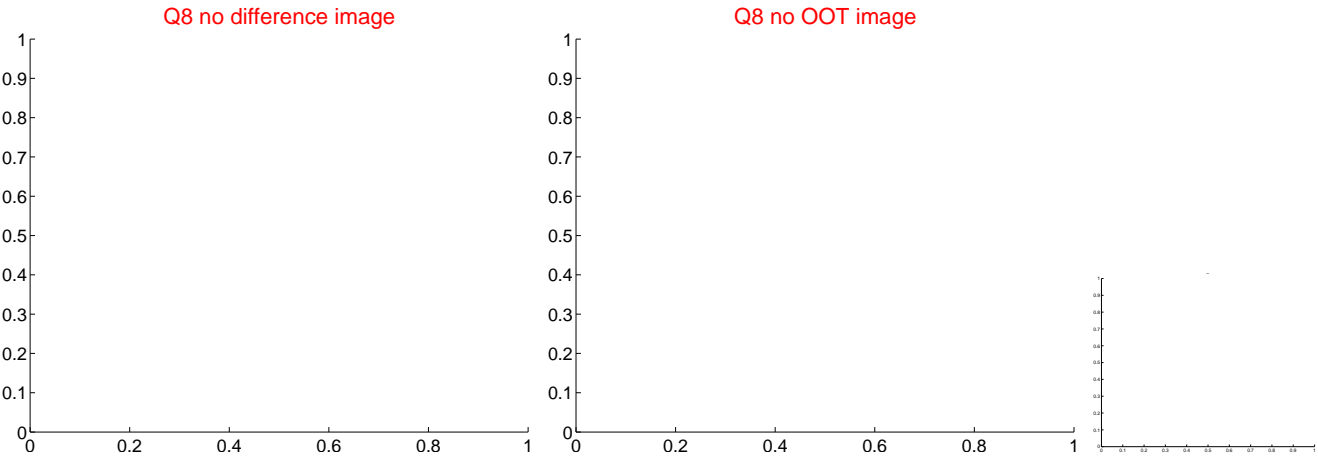
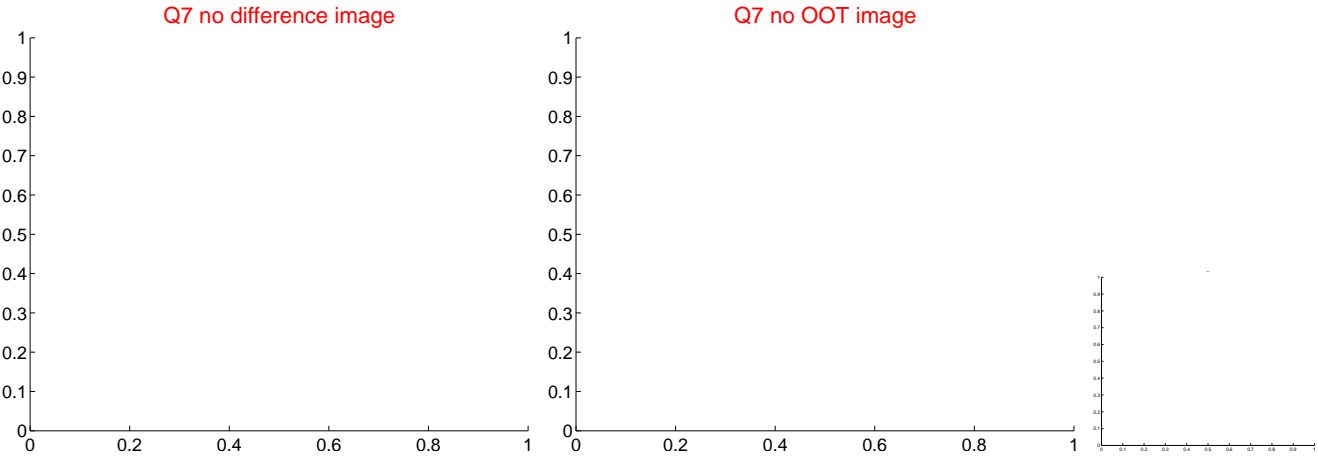
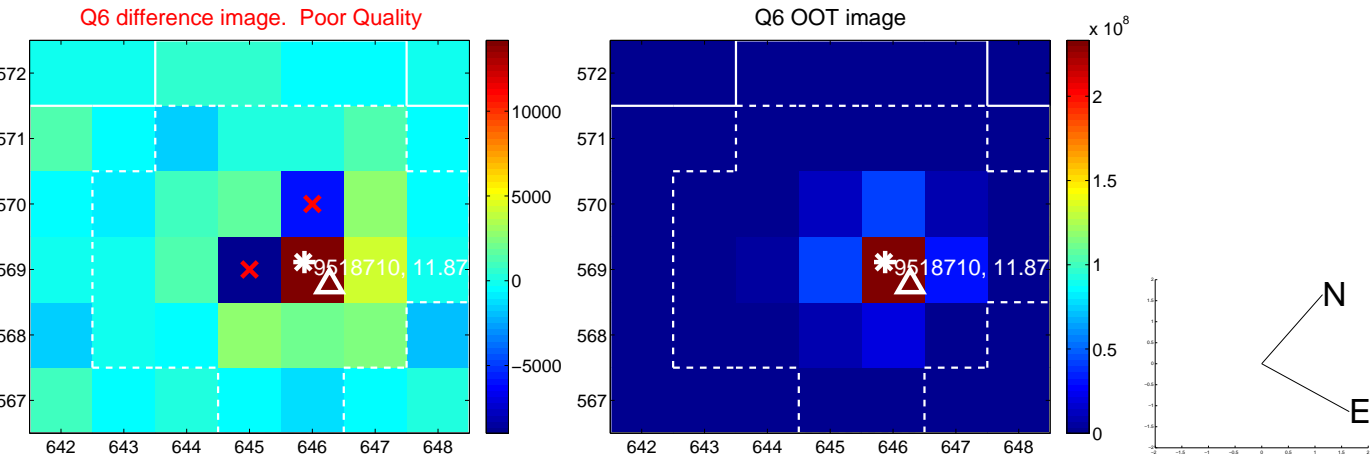
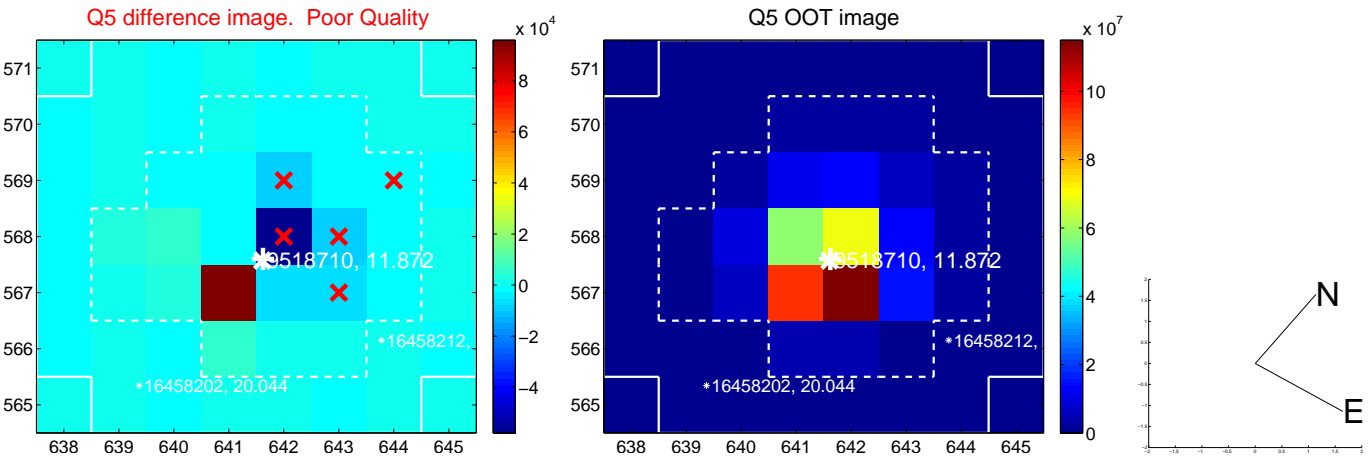
Q4 no difference image



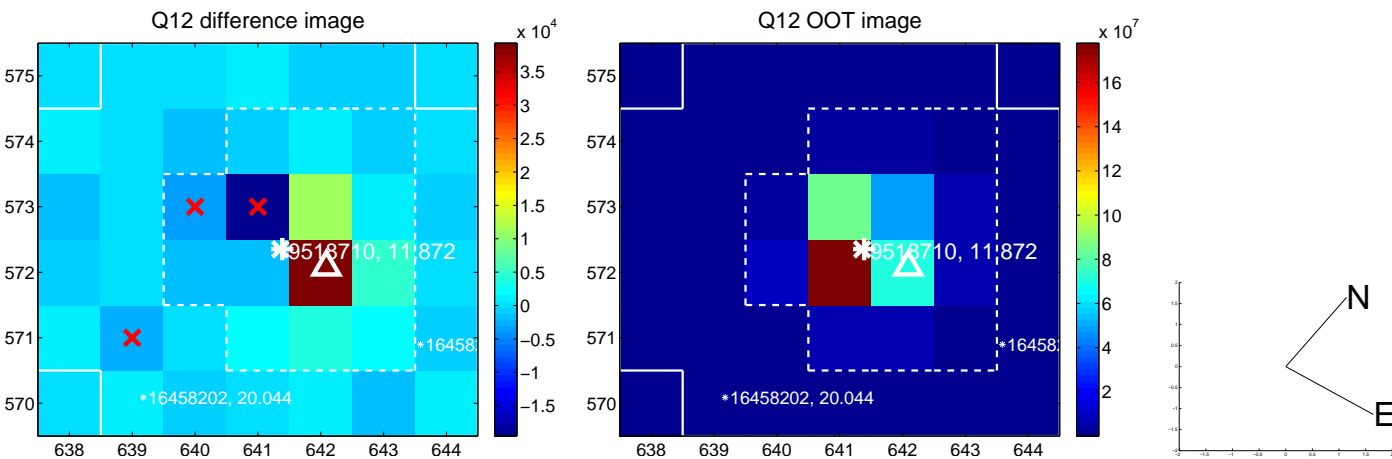
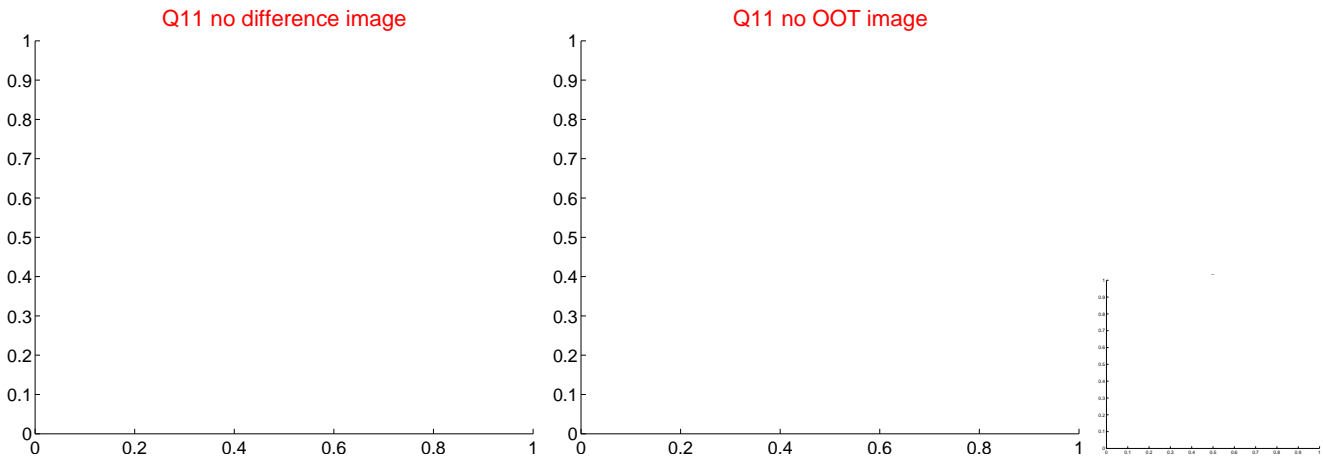
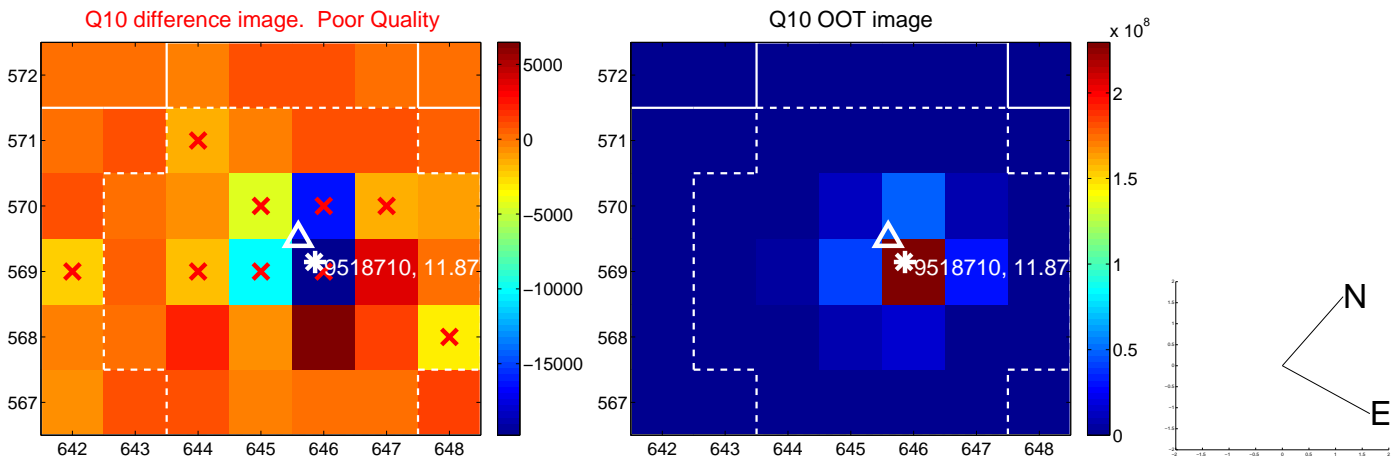
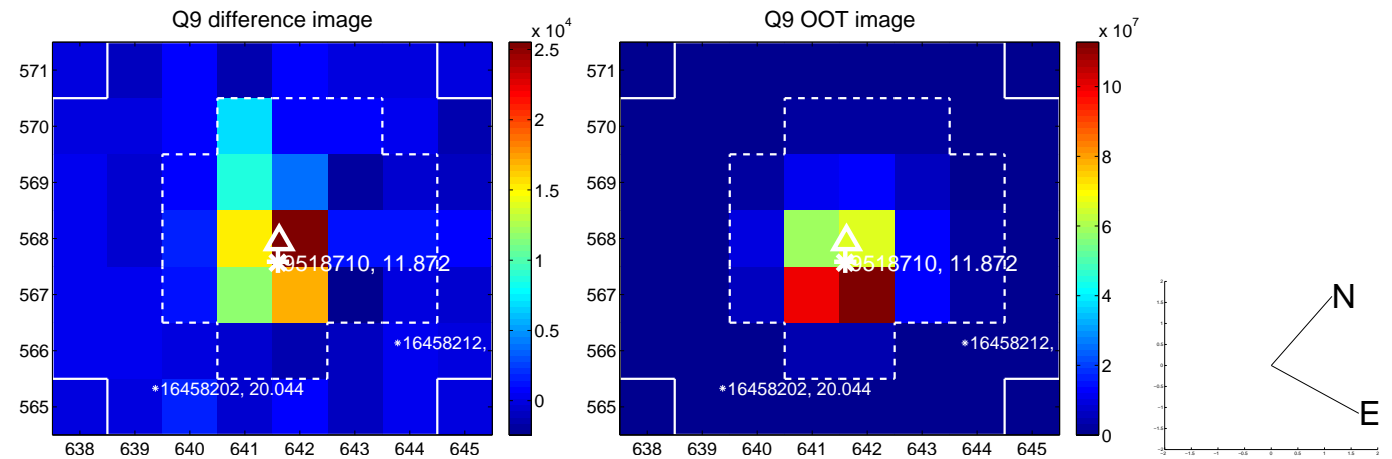
Q4 no OOT image



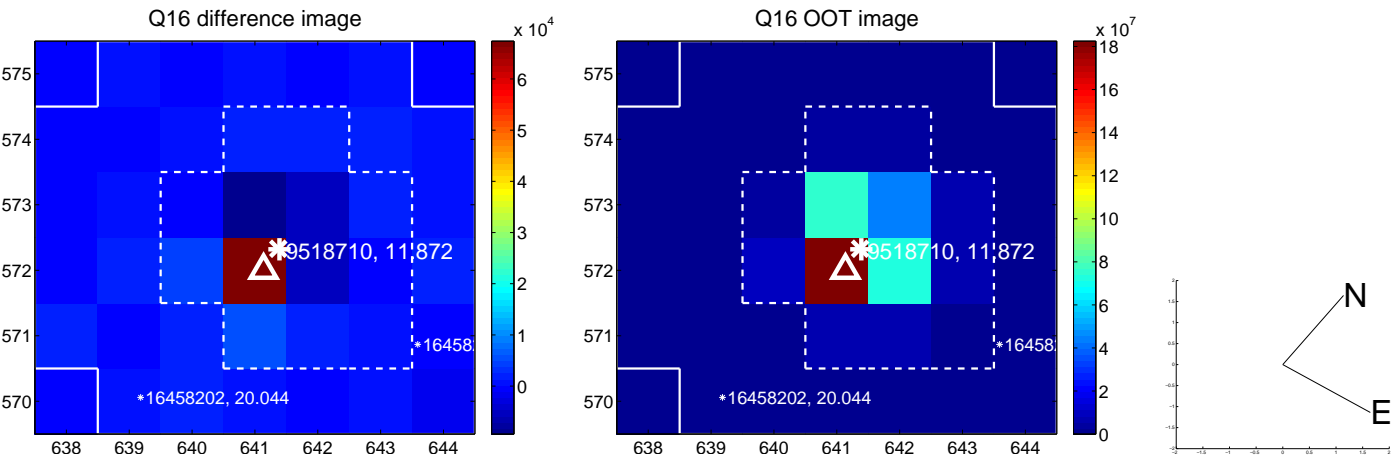
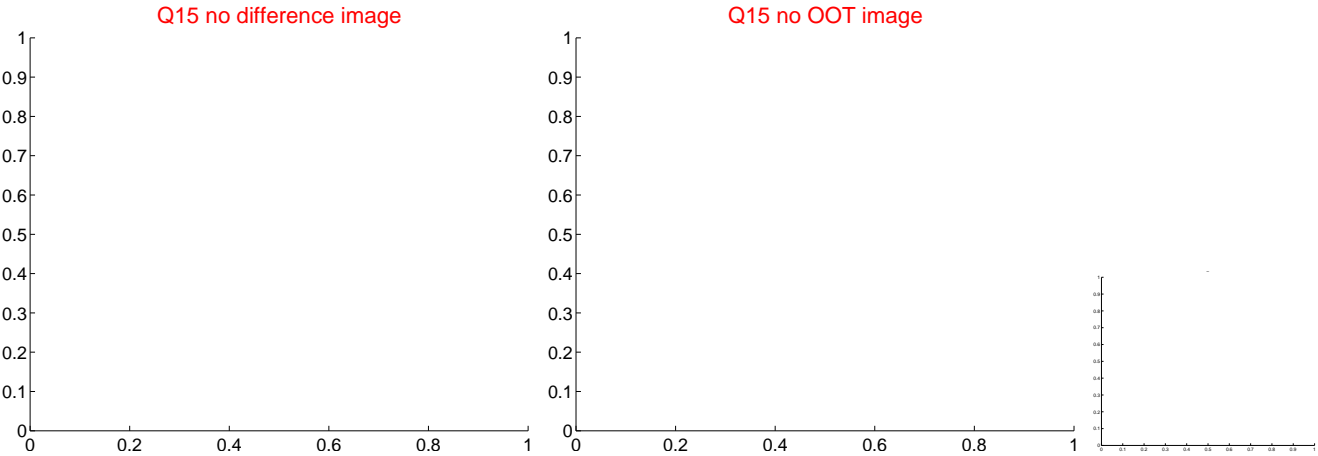
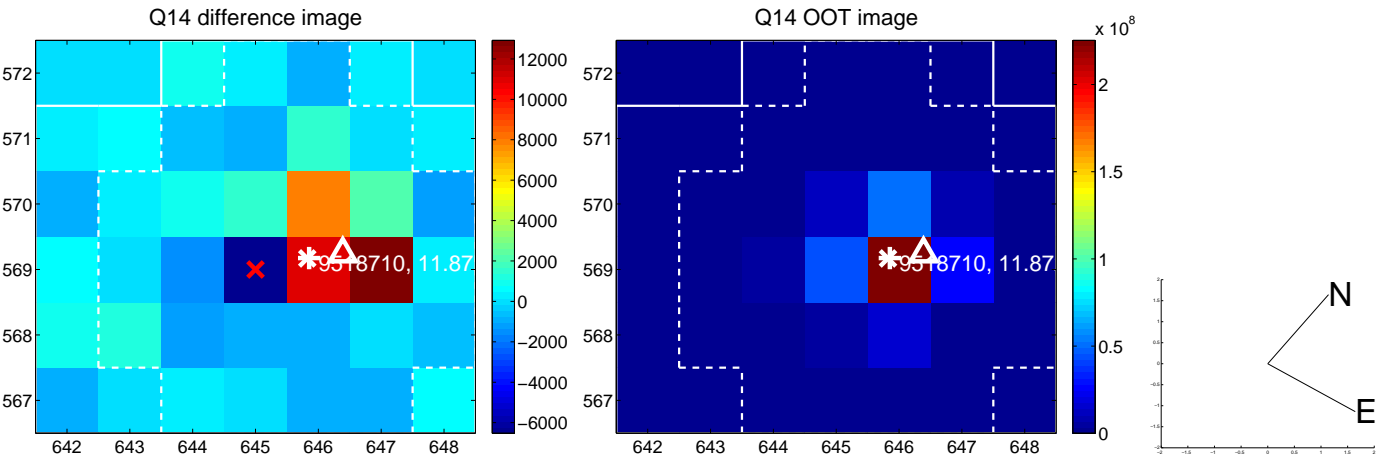
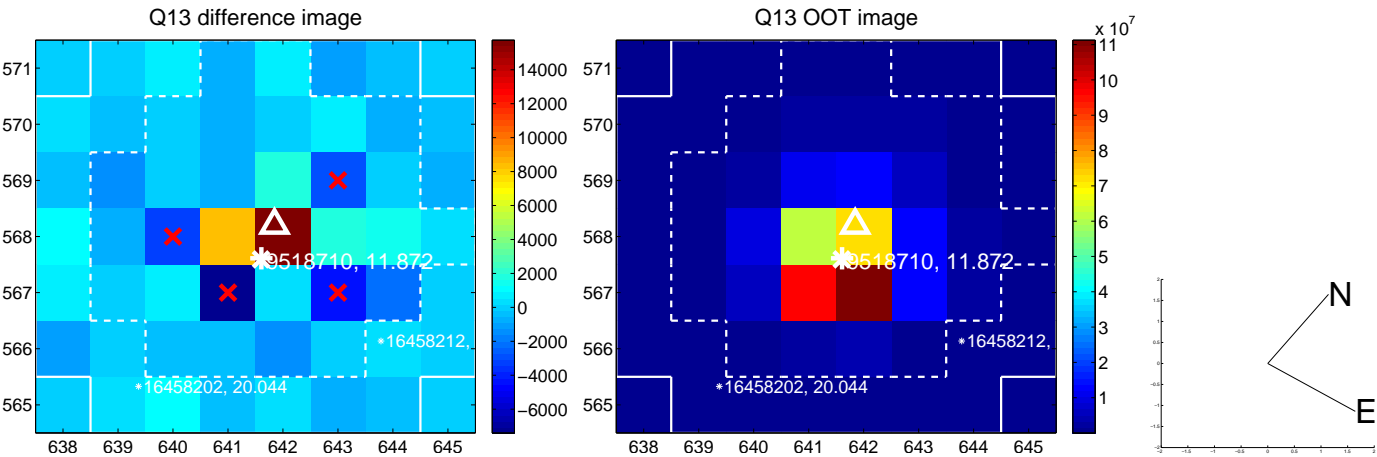
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



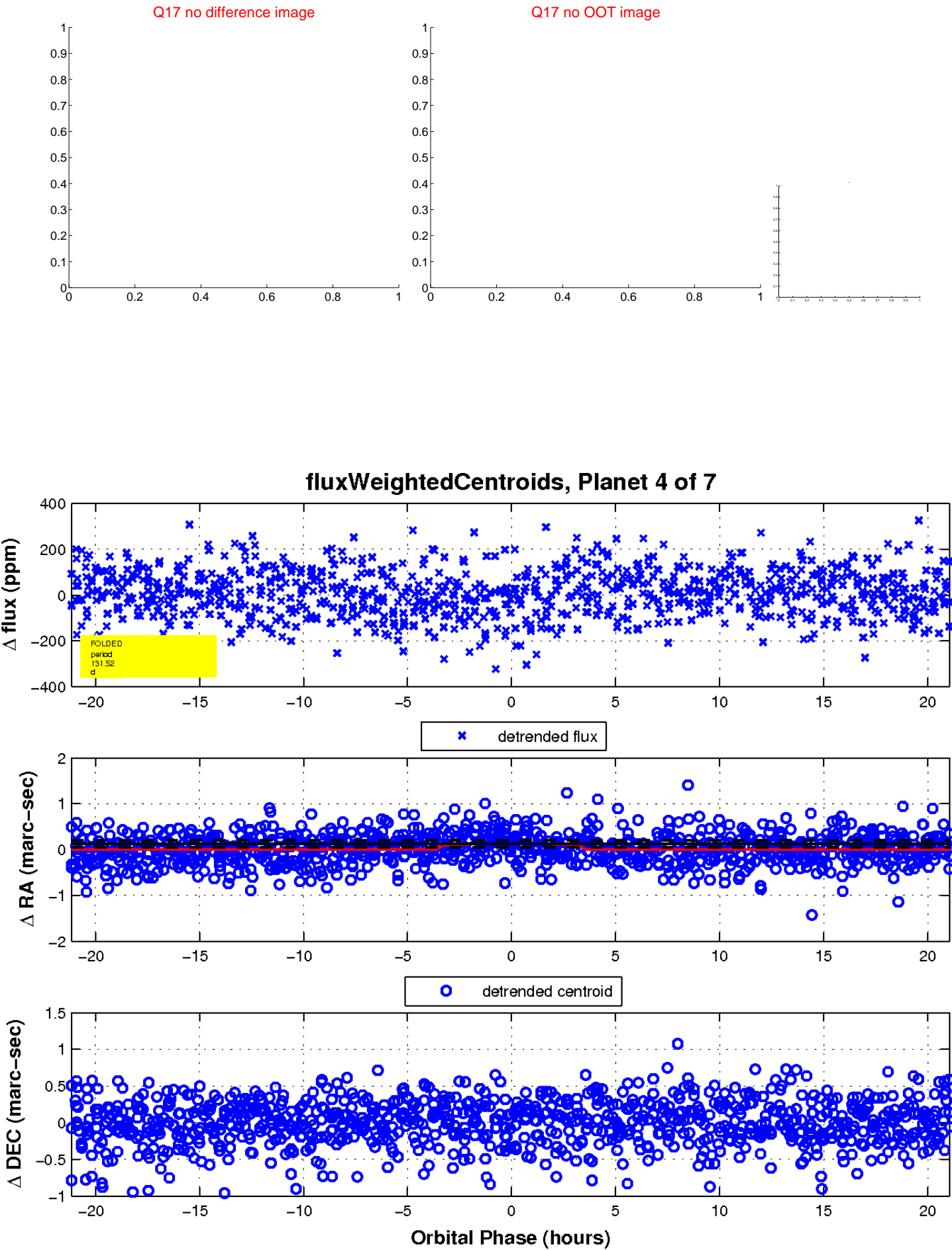
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

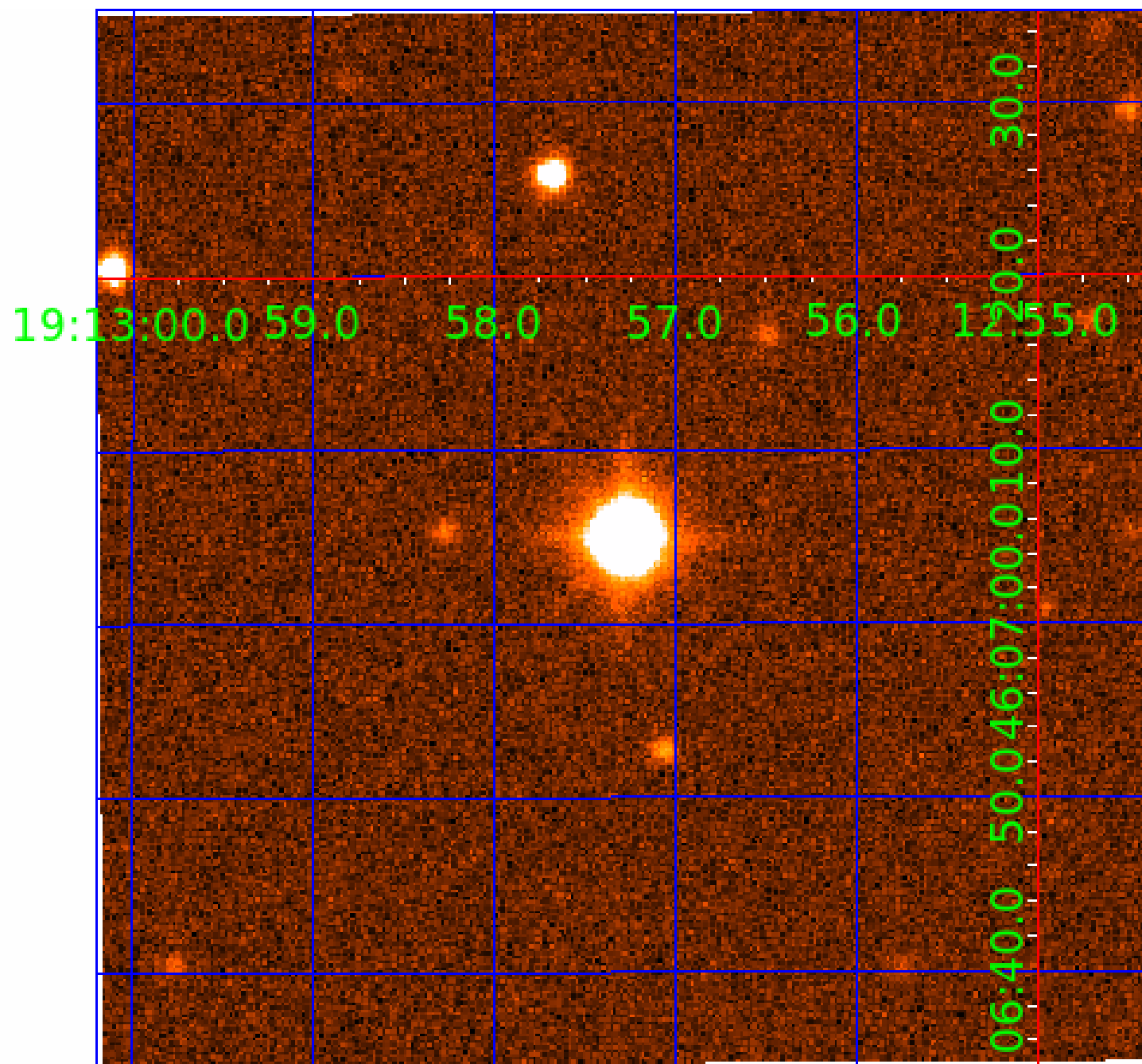


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 009518710

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009518710-01	OBS	3207.01	0.954328	132.488665	7.3	5.434	10.9	5.8	2.79	7056	0.77	31872.41
009518710-02	OBS	No	234.293932	139.664765	200.0	2.871	10.8	10.3	2.79	7056	4.38	20.73
009518710-03	OBS	No	21.258857	132.247946	61.6	3.971	8.0	6.9	2.79	7056	2.50	508.50
009518710-04	OBS	No	131.524599	184.773916	137.6	7.073	7.4	7.8	2.79	7056	3.58	44.77
009518710-05	OBS	No	95.052209	153.457127	162.4	3.175	7.9	7.4	2.79	7056	4.12	69.03
009518710-06	OBS	No	341.755025	167.131313	163.9	5.396	7.9	8.2	2.79	7056	4.01	12.53
009518710-07	OBS	No	46.248098	177.000352	71.9	5.711	7.7	6.6	2.79	7056	2.69	180.39

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009518710-01	OBS	FP	0.00	1	0	0	0	LPP_DV
009518710-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009518710-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_ZUMA—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009518710-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009518710-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT
009518710-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
009518710-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_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 009518710-05

No Significant Match Found

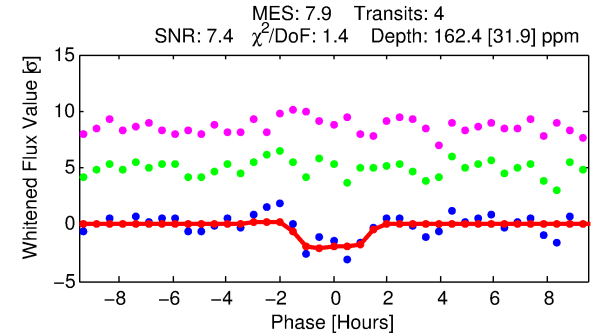
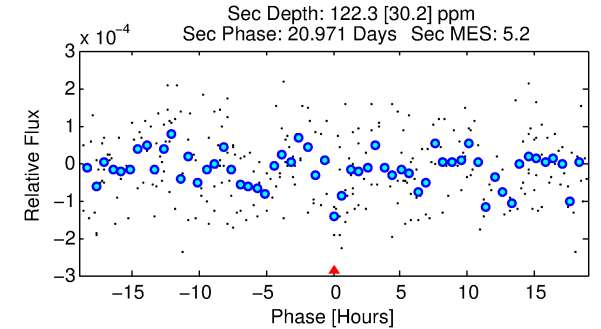
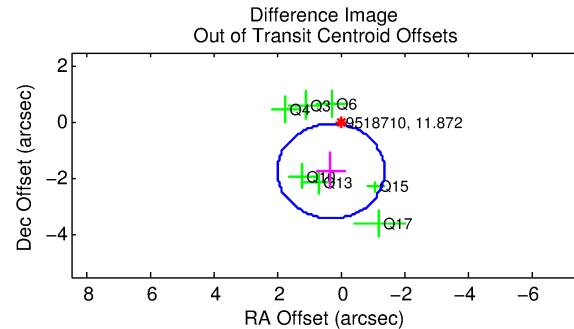
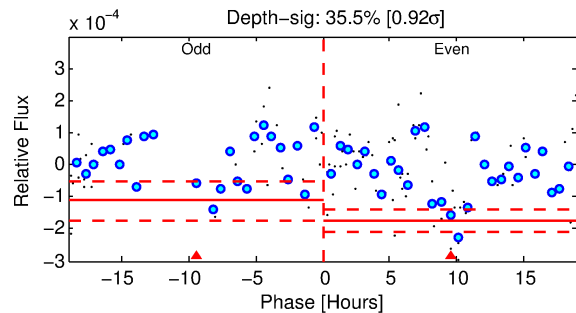
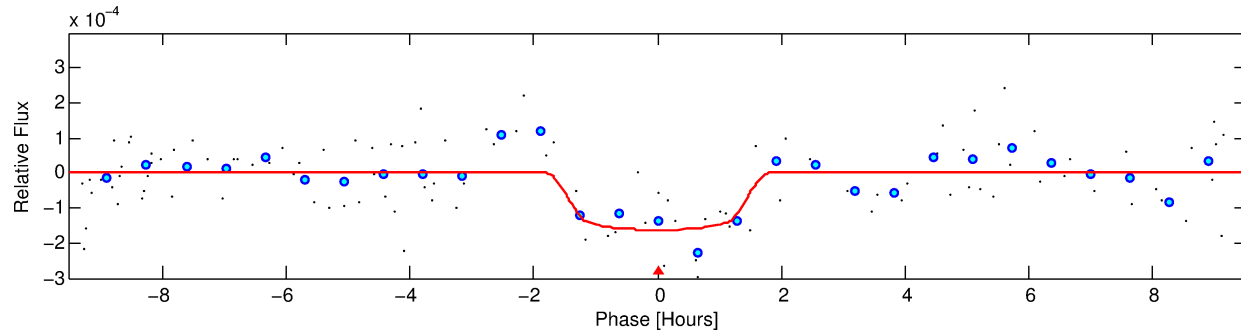
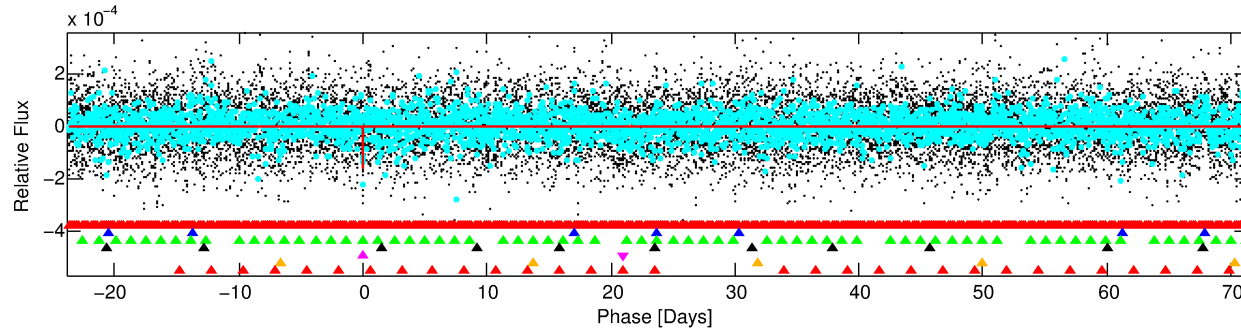
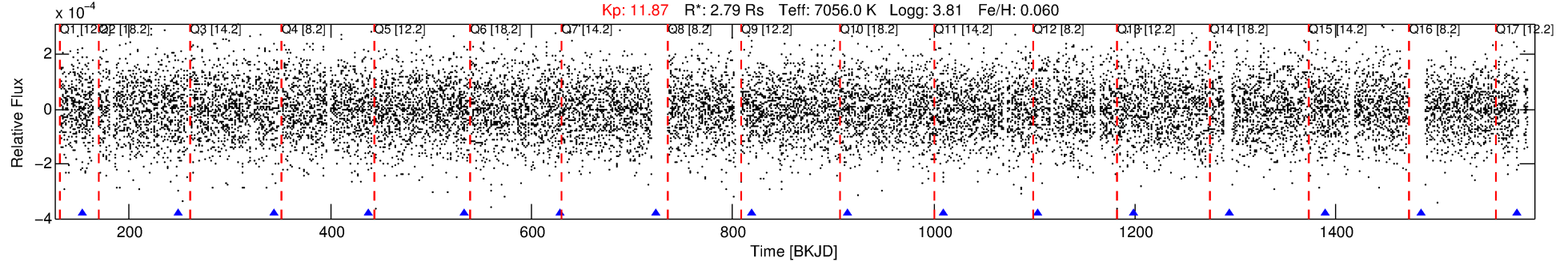


# DV One-Page Summary

KIC: 9518710 Candidate: 5 of 7 Period: 95.052 d

KOI: K03207 Corr: No Ephemeris Match

Kp: 11.87 R\*: 2.79 Rs Teff: 7056.0 K Logg: 3.81 Fe/H: 0.060

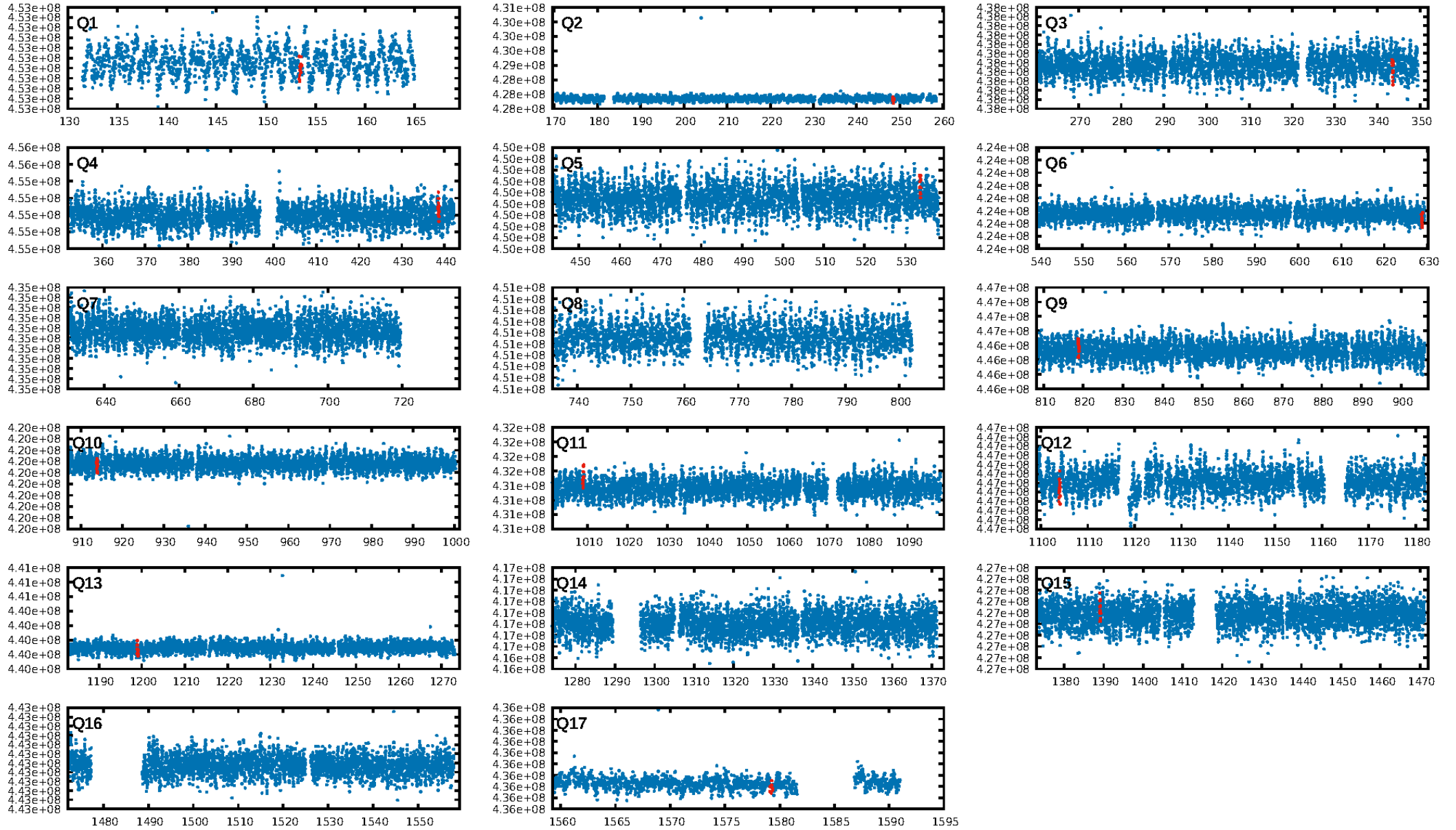


DV Fit Results:	DV Diagnostic Results:
Period = 95.05221 [0.00239] d	ShortPeriod-sig: 100.0% [179.24σ]
Epoch = 153.4571 [0.0174] BKJD	LongPeriod-sig: 100.0% [112.90σ]
Rp/R* = 0.0136 [0.0148]	ModelChiSquare2-sig: 41.2%
a/R* = 106.82 [710.07]	ModelChiSquareGof-sig: 94.8%
b = 0.90 [1.43]	Bootstrap-pfa: 1.09e-08
Seff = 69.03 [32.53]	RollingBand-fgt: 1.00 [4/4]
Teq = 735 [87] K	GhostDiagnostic-chr: -3.261
Rp = 4.12 [4.68] Re	Centroid-sig: N/A
a = 0.4995 [0.1439] AU	Centroid-so: 1.349 arcsec [1.83σ]
Ag = 987.80 [2212.67] [0.45σ]	OotOffset-rm: 1.762 arcsec [3.13σ]
Teffp = 6371 [3503] K [1.61σ]	KicOffset-rm: 1.734 arcsec [3.14σ]
	OotOffset-st: 2/2/1/2 [7]
	KicOffset-st: 2/2/1/2 [7]
	DiffImageQuality-fgm: 0.29 [2/7]
	DiffImageOverlap-fno: 0.00 [0/12]

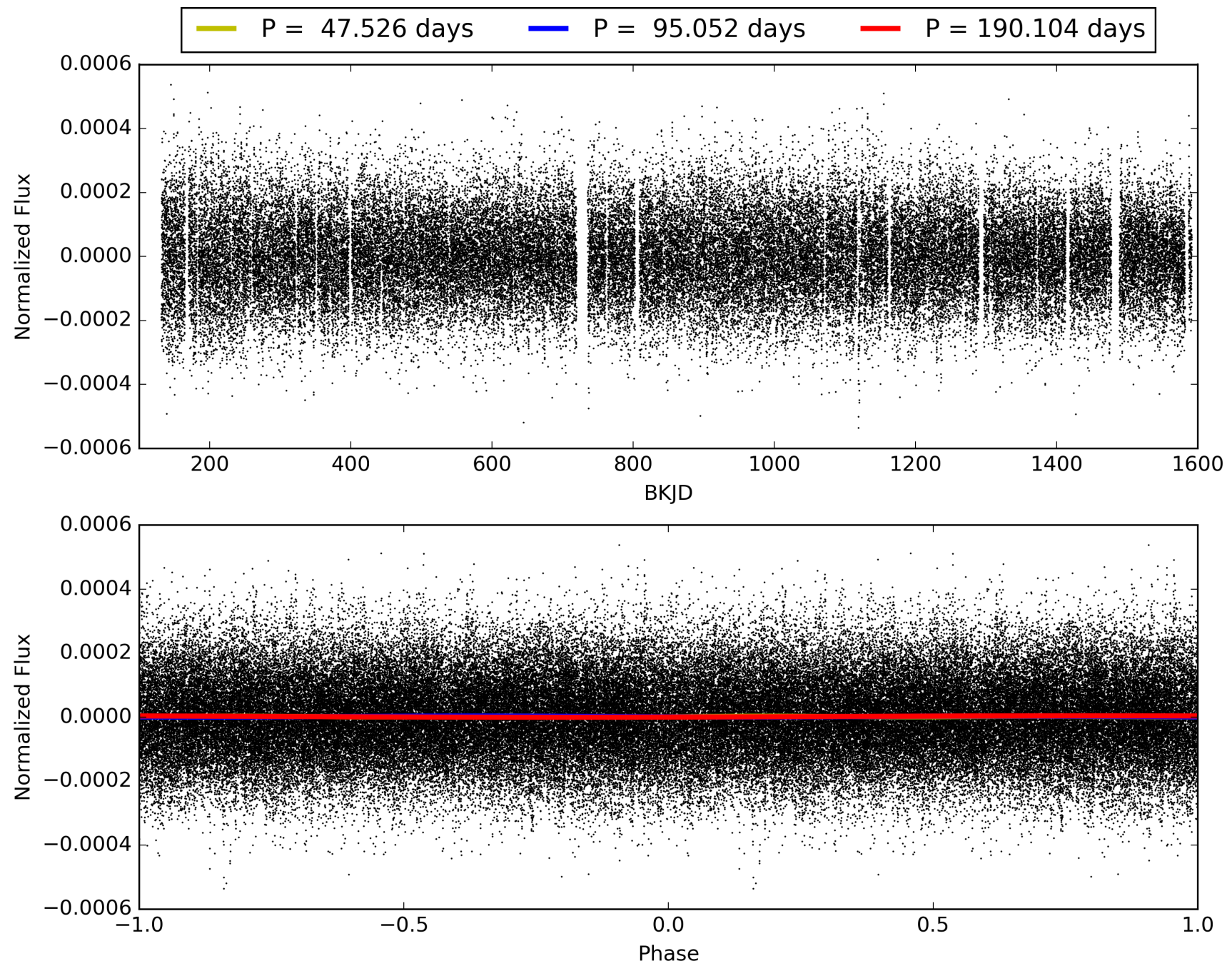
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 16:33:30 Z

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

# TCE 009518710-05, PDC Light Curves

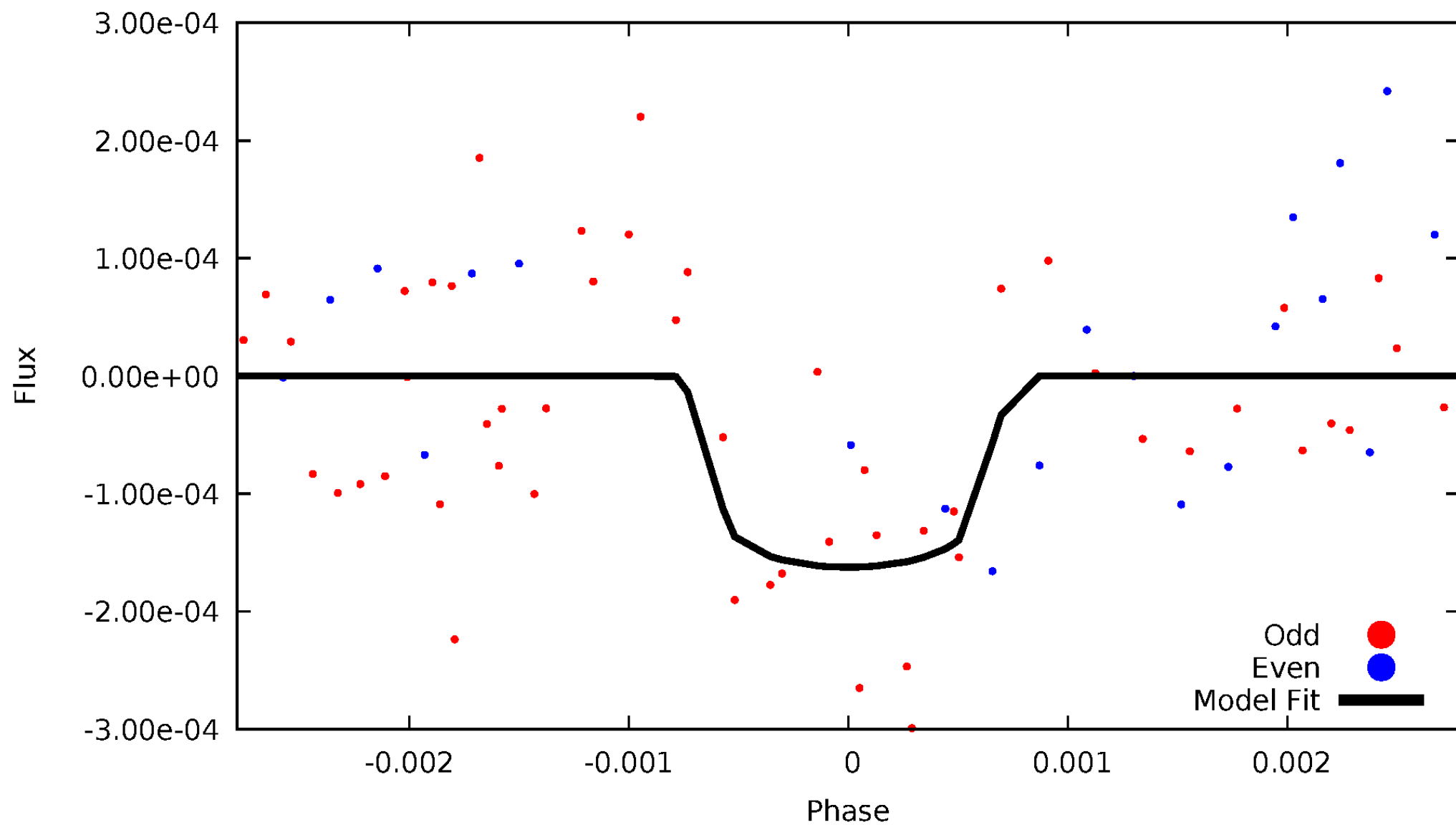


TCE 009518710-05



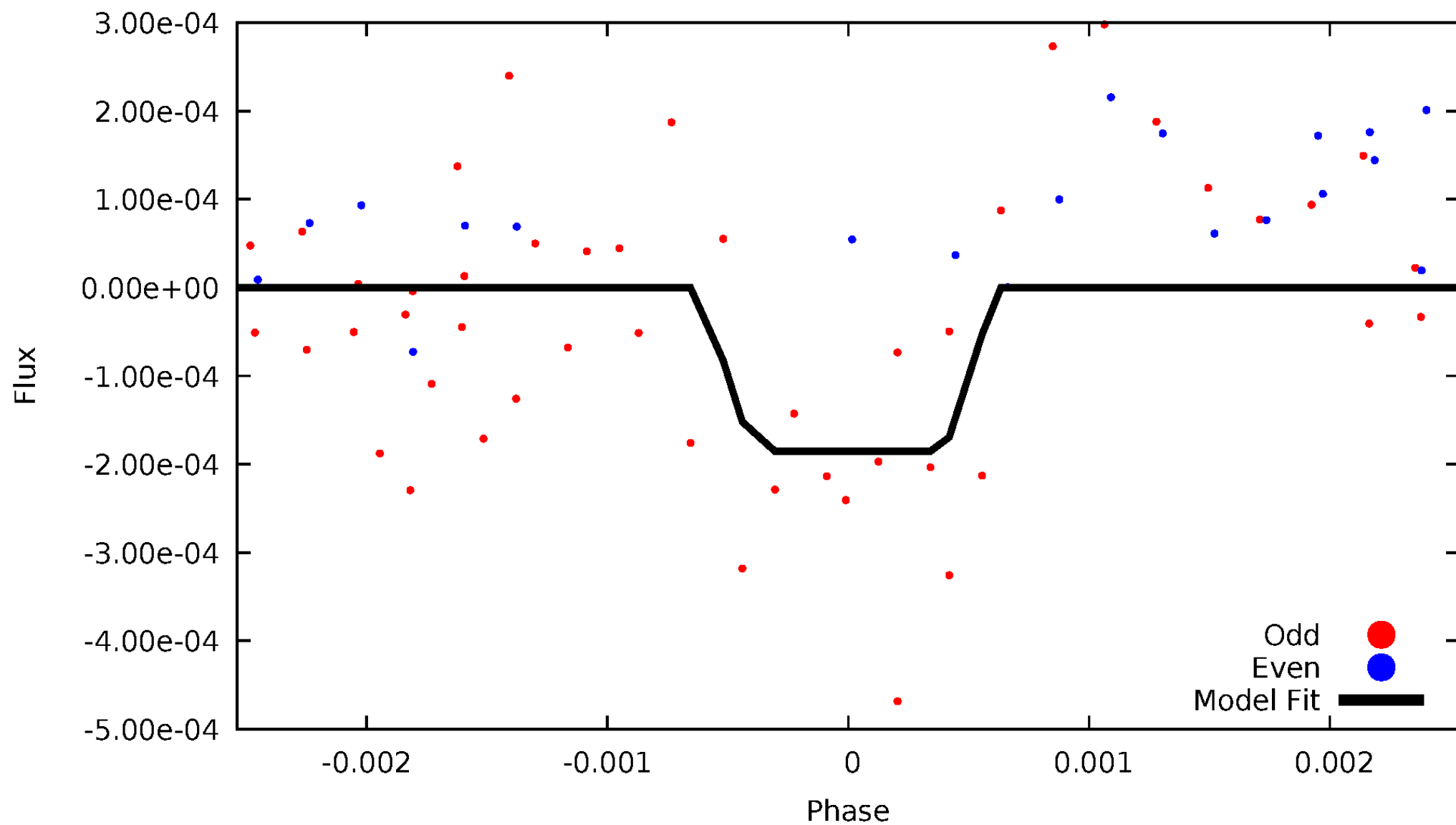
# DV Odd/Even

TCE 009518710-05



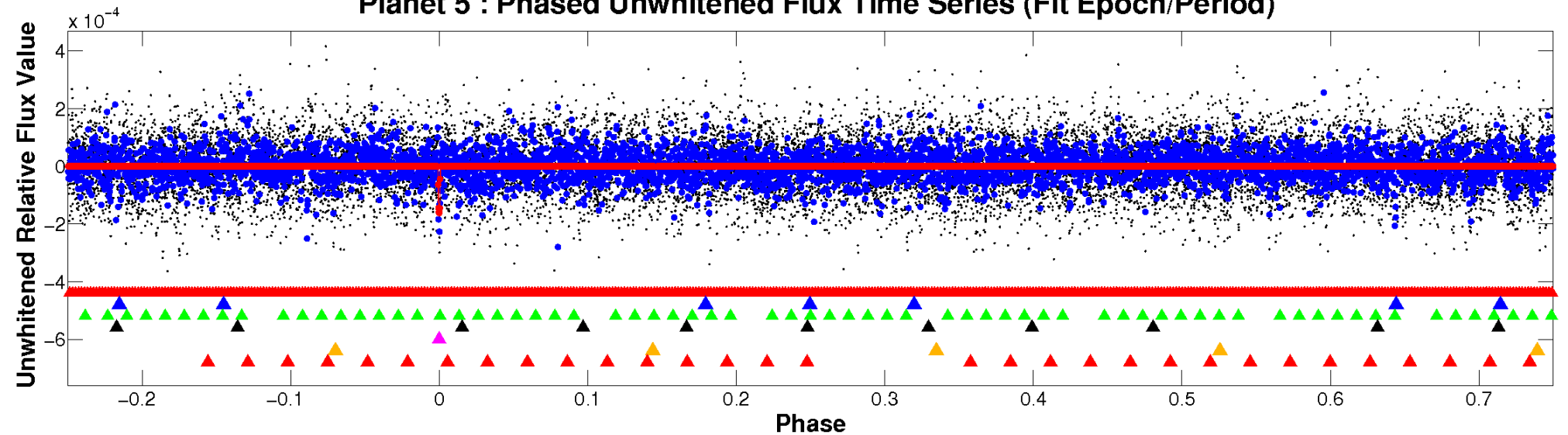
# ALT Odd/Even

TCE 009518710-05

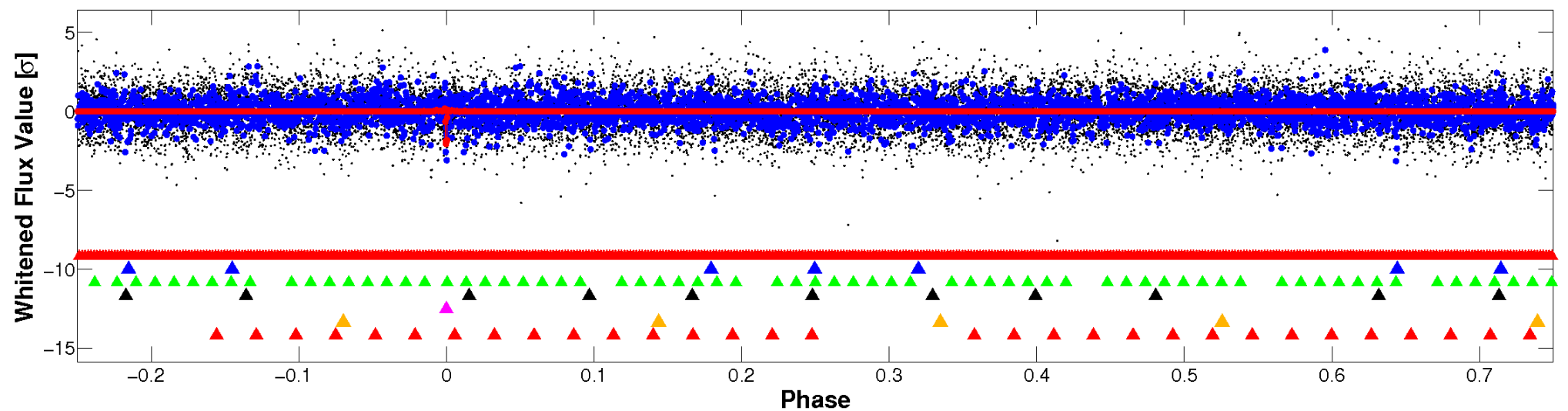


# Non-Whitened Vs. Whitened Light Curve

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



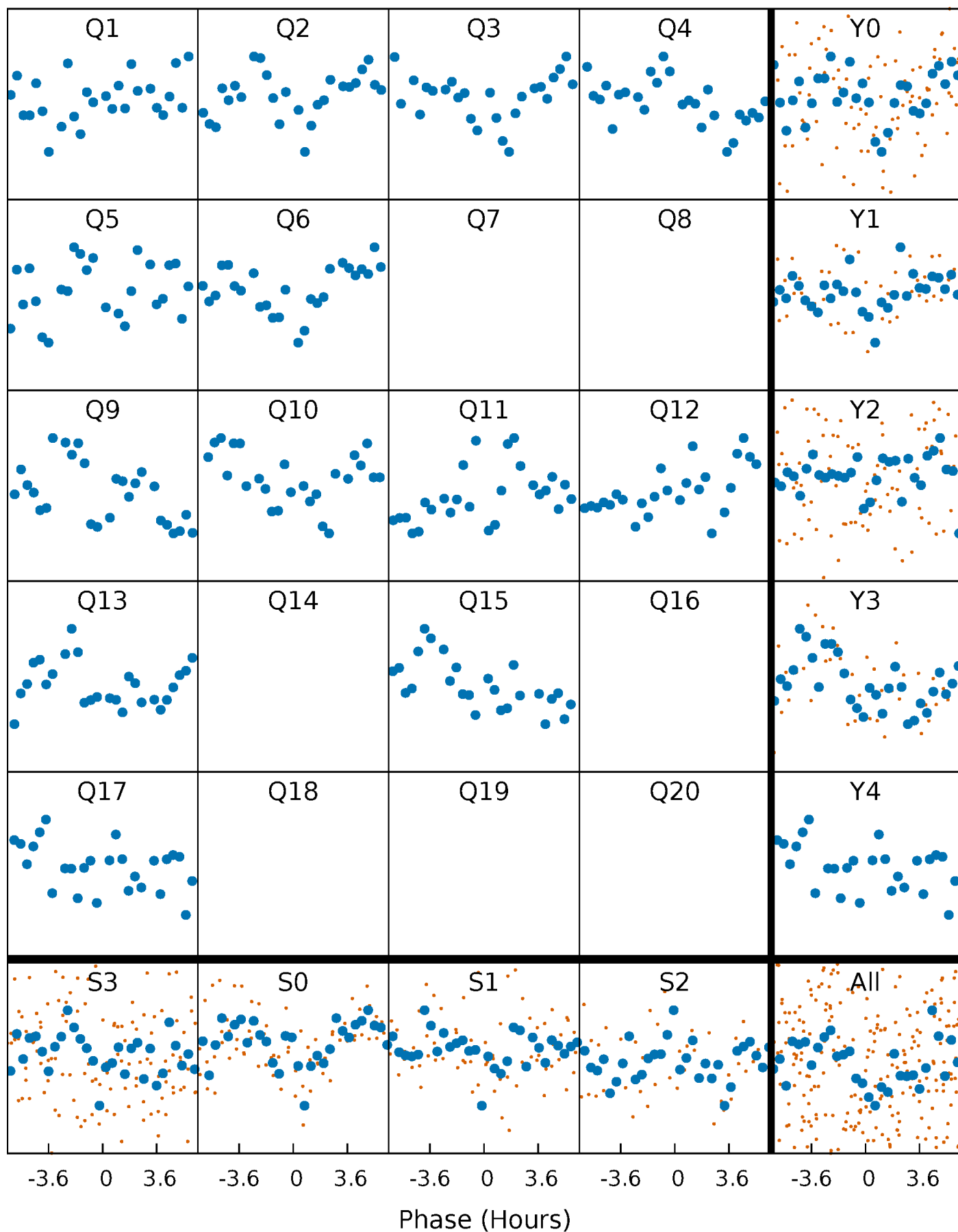
## Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)





# PDC Quarter-Phased Transit Curves

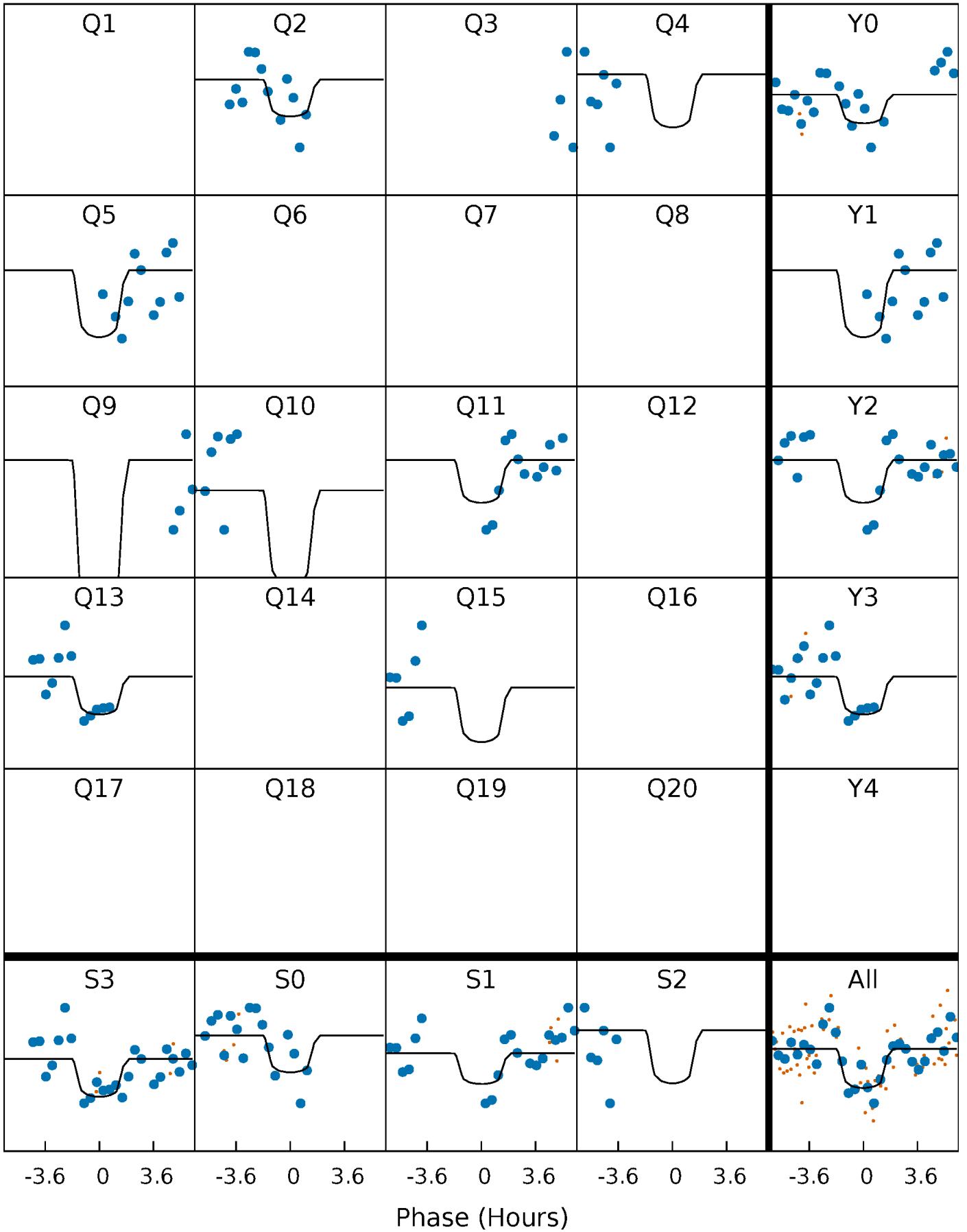
TCE 009518710-05   P= 95.052209 Days    $T_0=153.457127$  (BKJD)





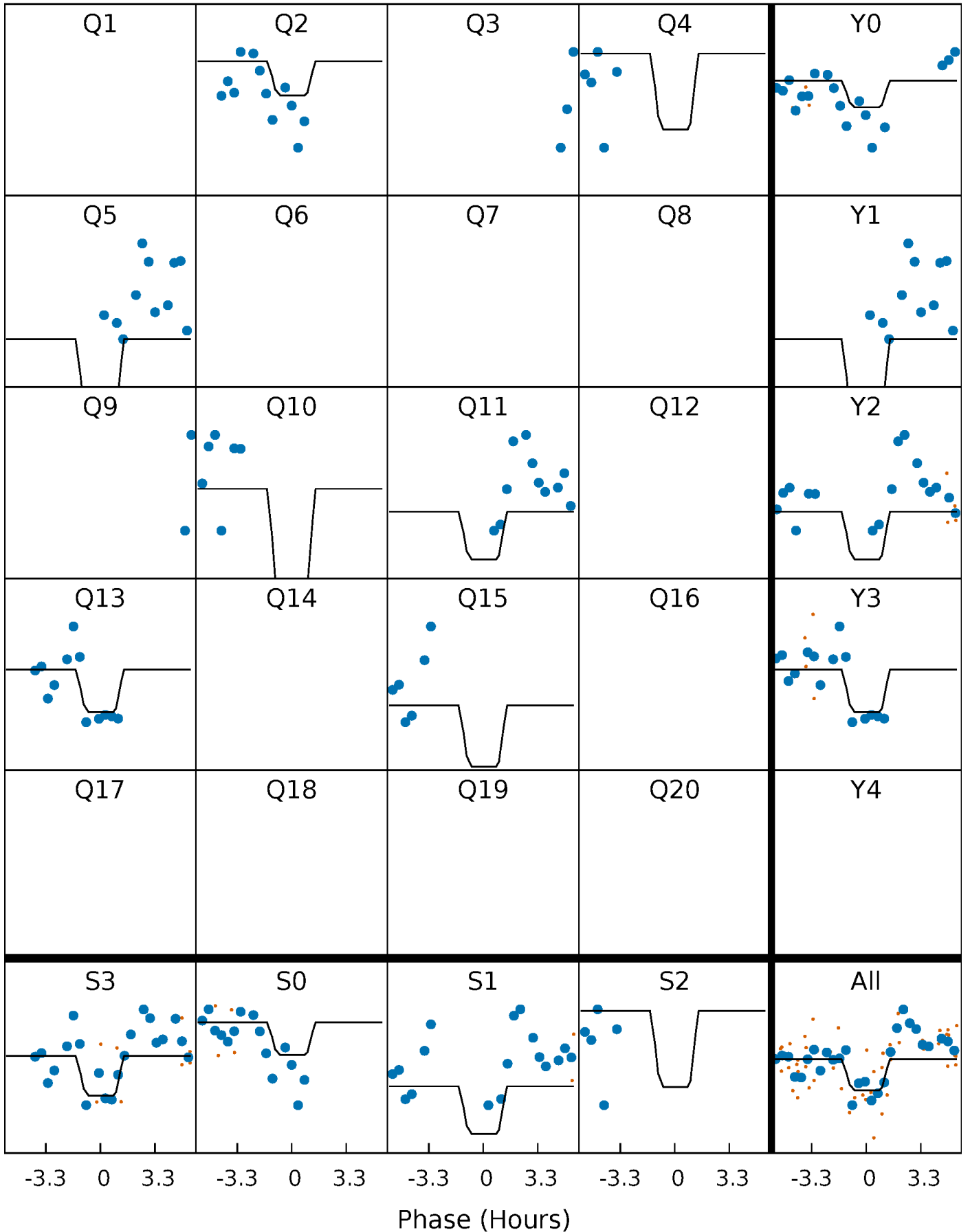
# DV Quarter-Phased Transit Curves

TCE 009518710-05     $P = 95.052209$  Days     $T_0 = 153.457127$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

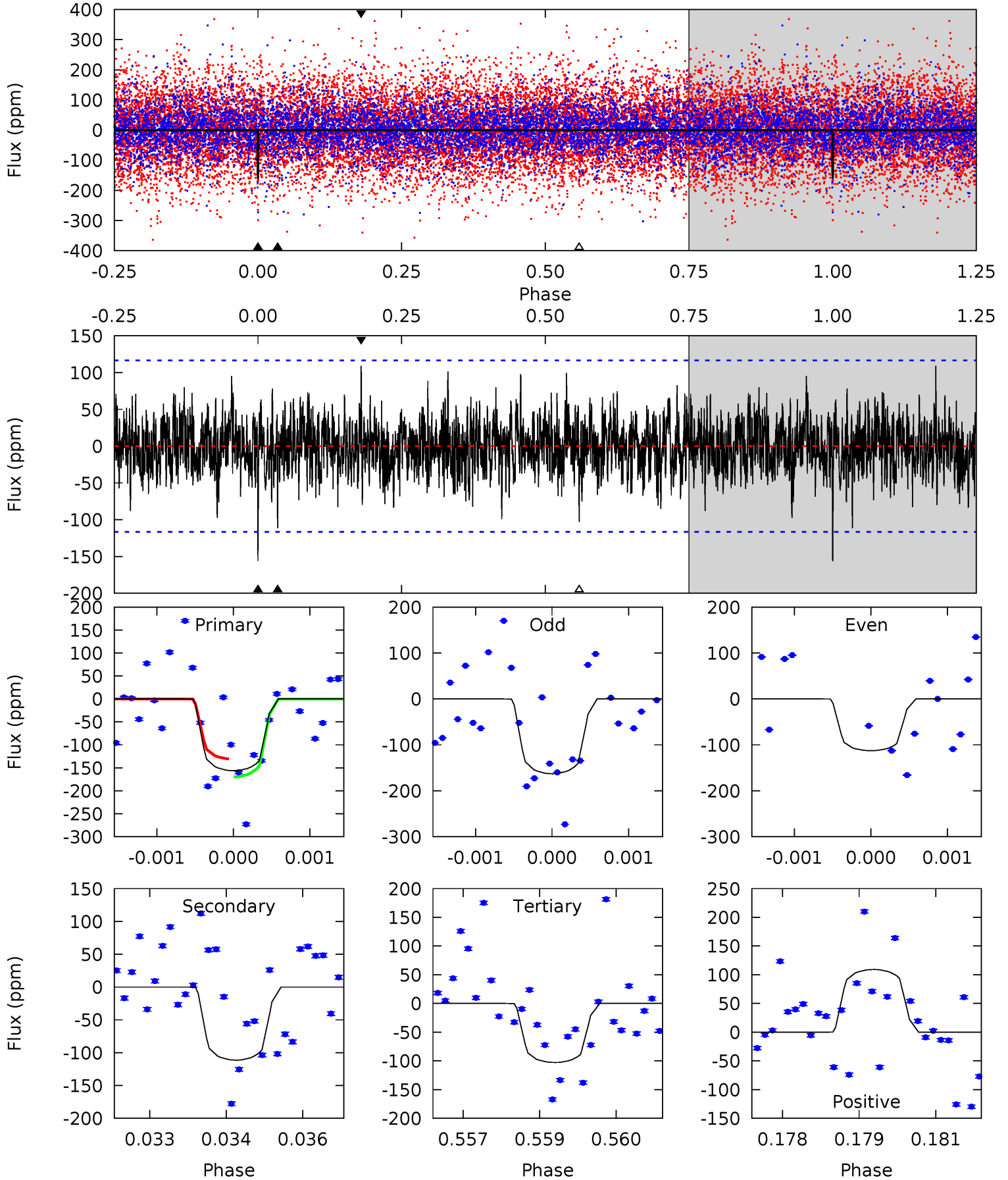
TCE 009518710-05   P= 95.049386 Days    $T_0=153.468006$  (BKJD)



# DV Model-Shift Uniqueness Test

009518710-05, P = 95.052209 Days, E = 58.404918 Days

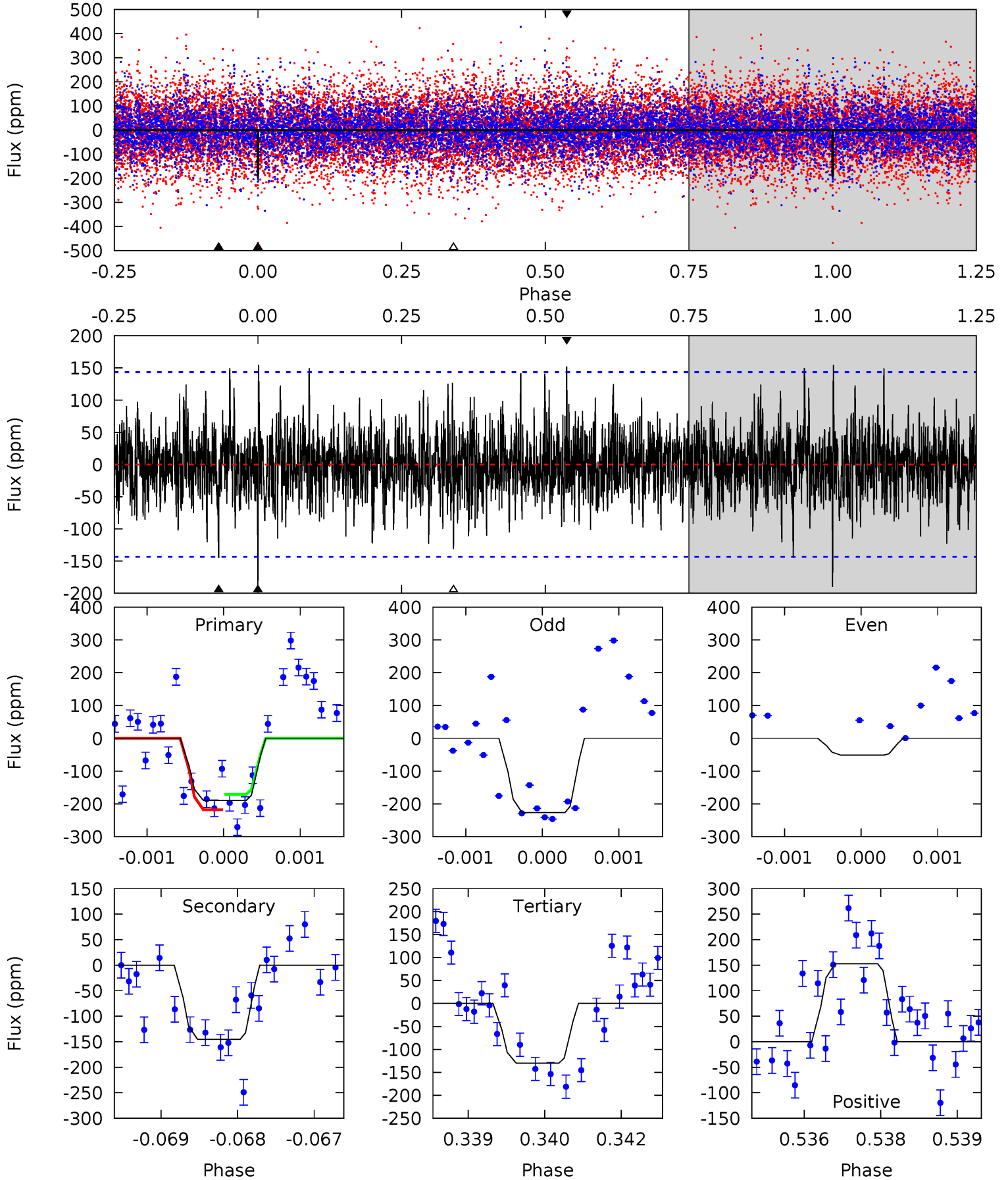
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.21	5.14	4.75	5.04	5.38	3.18	1.35	2.46	2.17	0.40	0.11	0.85	1.05	0.41	0.88



# Alt Model-Shift Uniqueness Test

009518710-05, P = 95.049386 Days, E = 58.418620 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.17	5.49	4.91	5.77	5.43	3.25	1.48	2.26	1.40	0.57	-0.28	2.33	0.98	0.45	0.85



### Stellar Parameters For KIC 009518710

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7056^{+169}_{-253}$	$3.813^{+0.259}_{-0.111}$	$0.060^{+0.200}_{-0.300}$	$2.785^{+0.469}_{-0.871}$	$1.836^{+0.191}_{-0.354}$	$0.120^{+0.195}_{-0.041}$
	+2%/-4%	+7%/-3%	+333%/-500%	+17%/-31%	+10%/-19%	+163%/-34%
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 009518710-05 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-111 \pm 22$	$5.08^{+4.17}_{-3.34}$	$1013^{+68}_{-77}$	$5451^{+4526}_{-1146}$	$593^{+4533}_{-416}$
Alt.	$-145 \pm 26$	$4.97^{+3.90}_{-3.29}$	$1014^{+56}_{-76}$	$5873^{+5170}_{-1280}$	$794^{+5857}_{-542}$

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

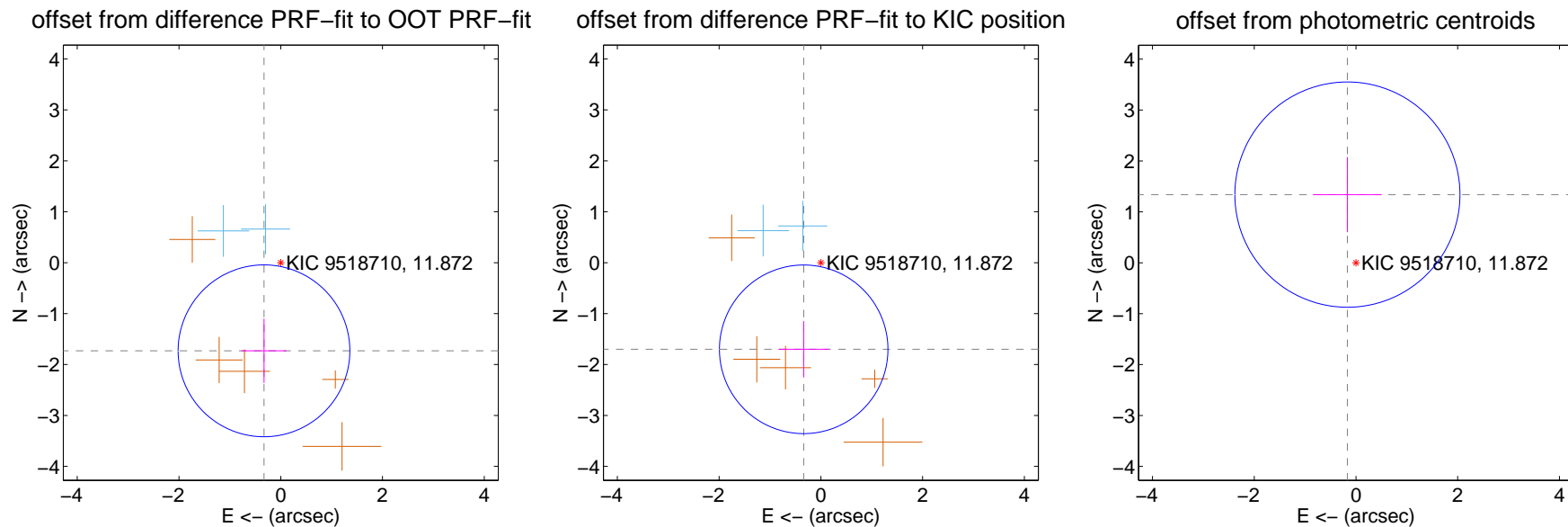
## DV Centroid Data

Supplemental centroid analysis for 009518710-05. **Kepler magnitude: 11.87.** Transit SNR 7.43

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

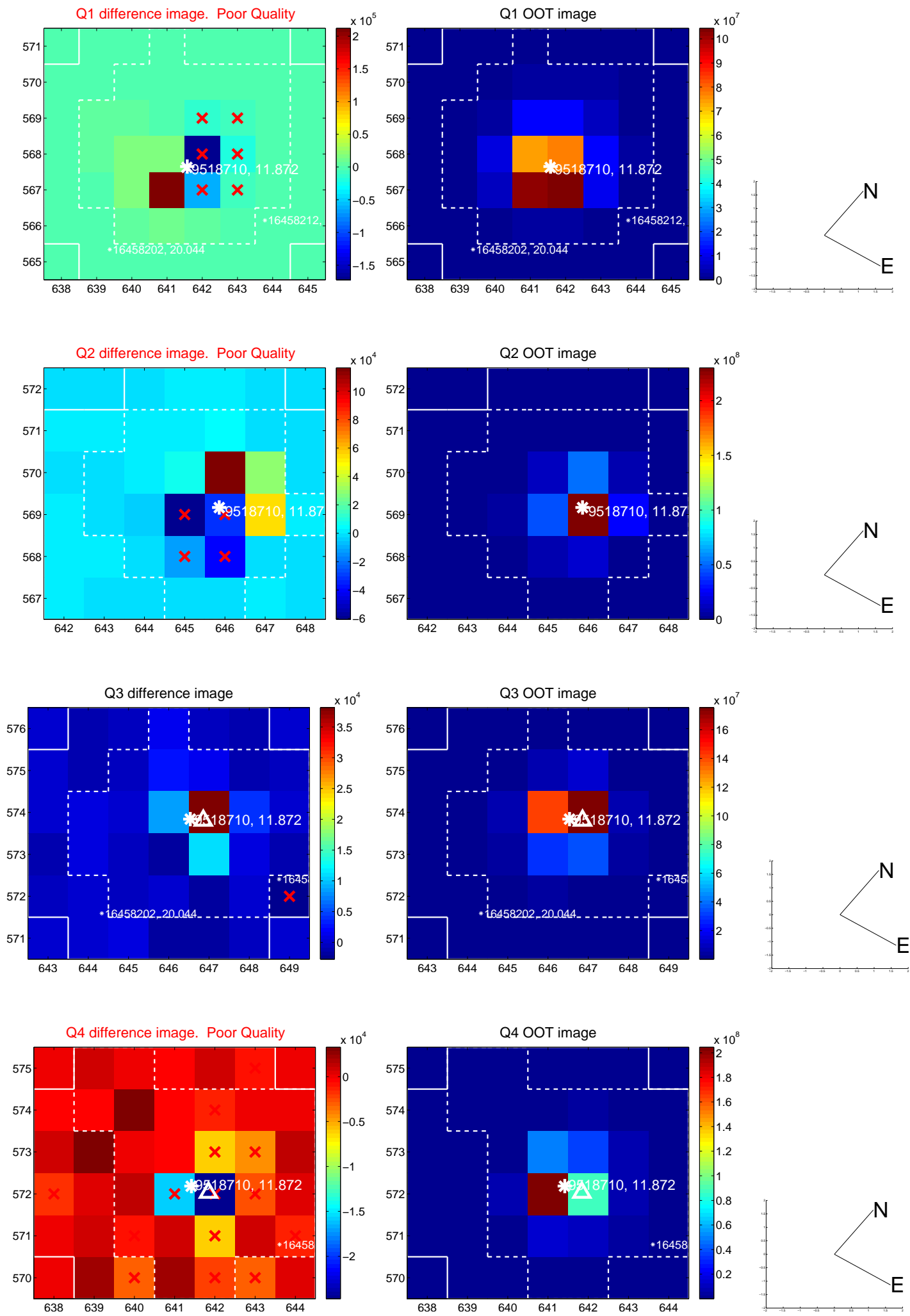
The direct PRF centroid is offset from the target star catalog position by about 0.08 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b><math>1.762 \pm 0.562</math></b>	<b>3.13</b>	$0.330 \pm 0.444$	$-1.730 \pm 0.632$
PRF-fit source offset from KIC position	<b><math>1.734 \pm 0.552</math></b>	<b>3.14</b>	$0.337 \pm 0.496$	$-1.701 \pm 0.554$
photometric centroid source offset	$1.35 \pm 0.74$	1.83	$0.17 \pm 0.68$	$1.34 \pm 0.74$



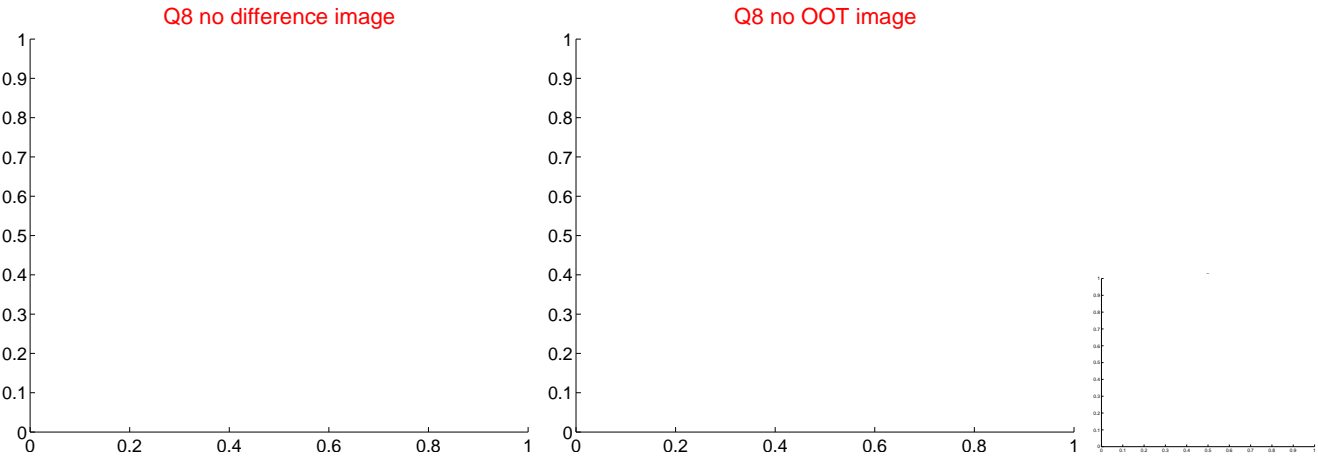
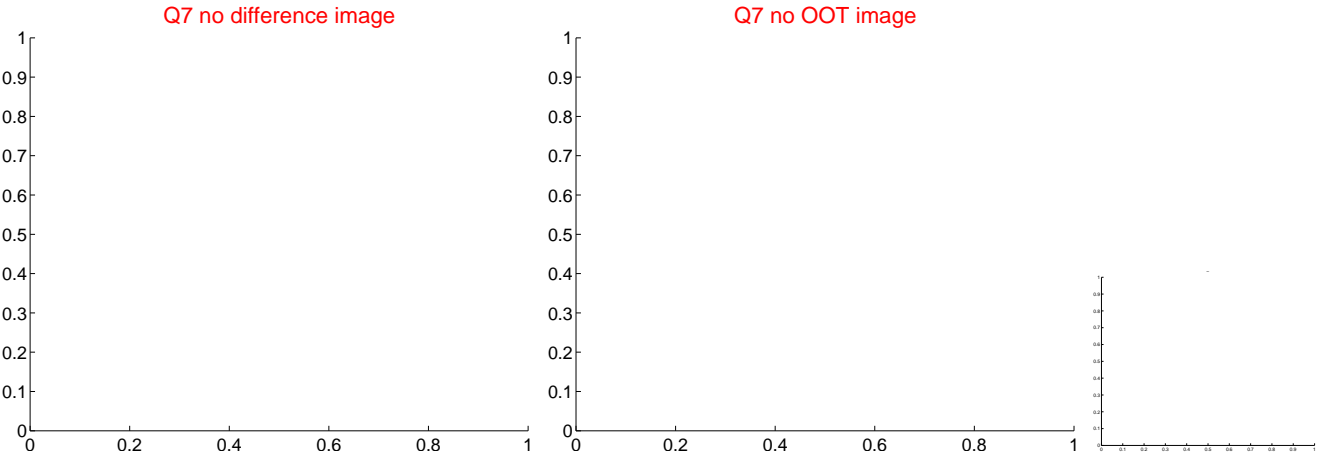
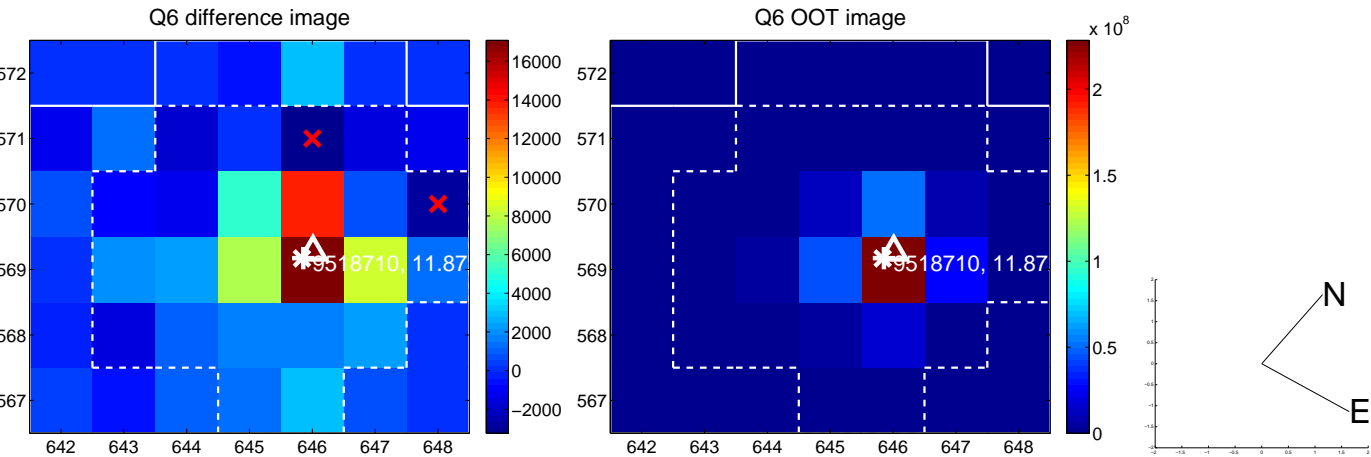
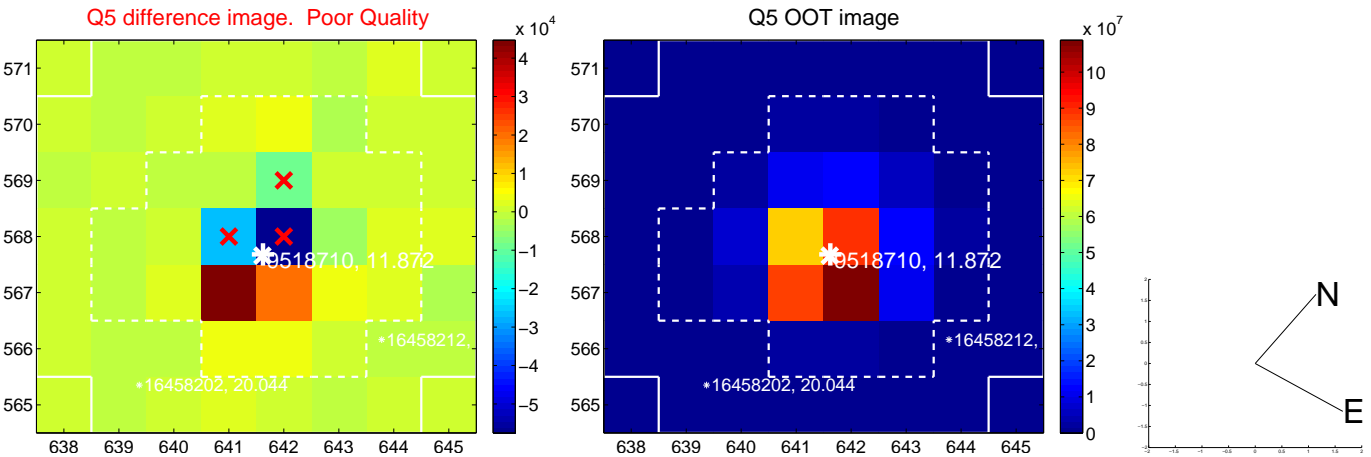
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

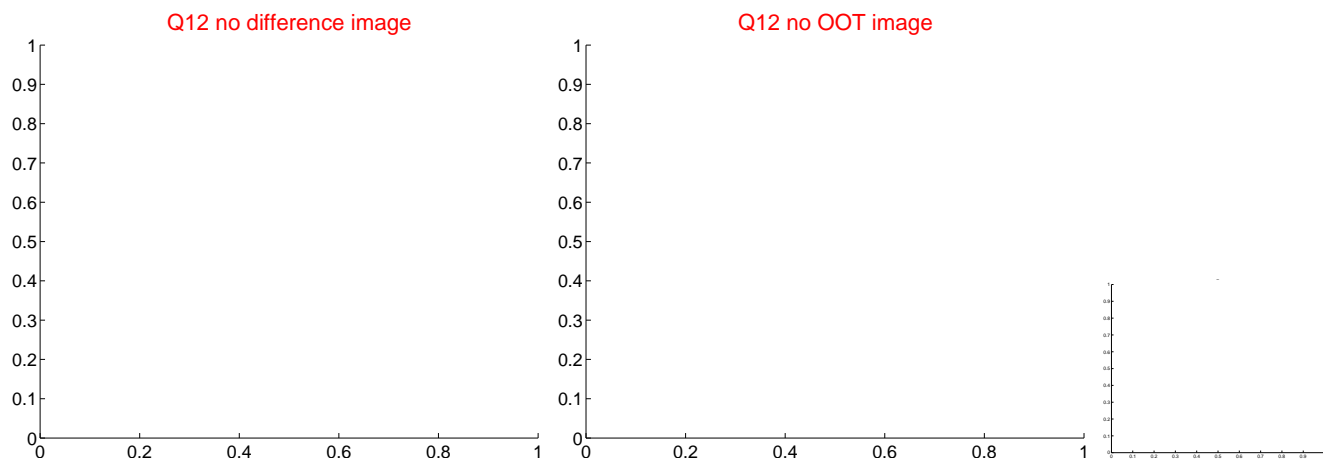
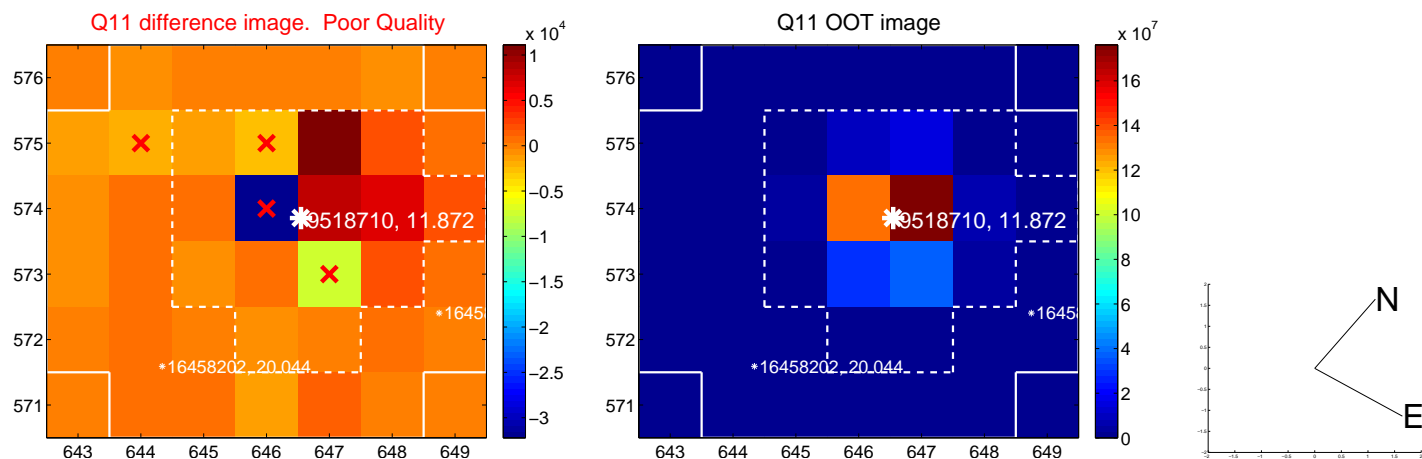
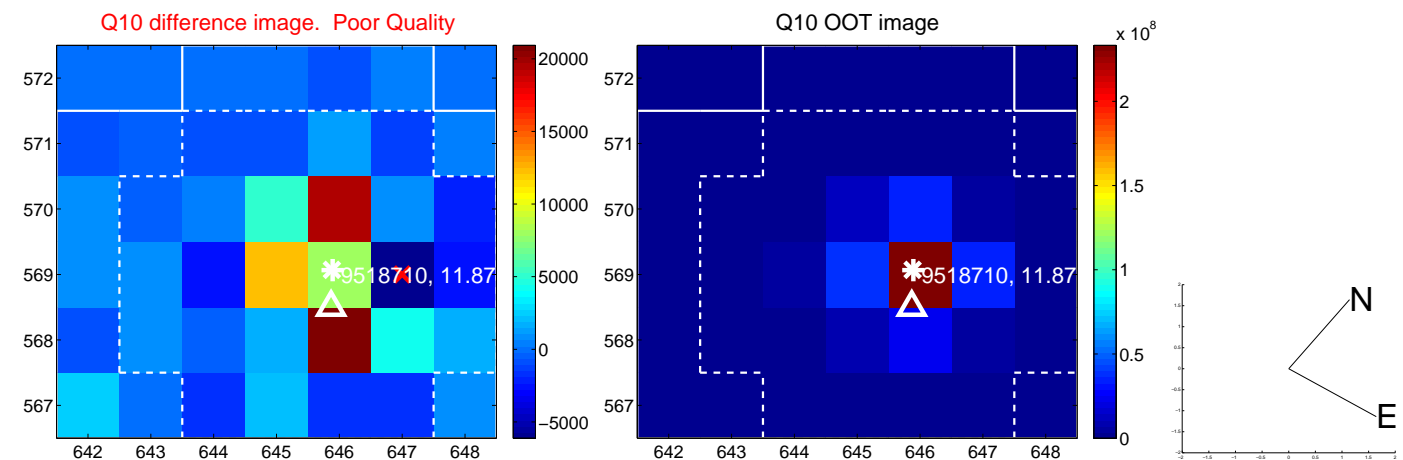
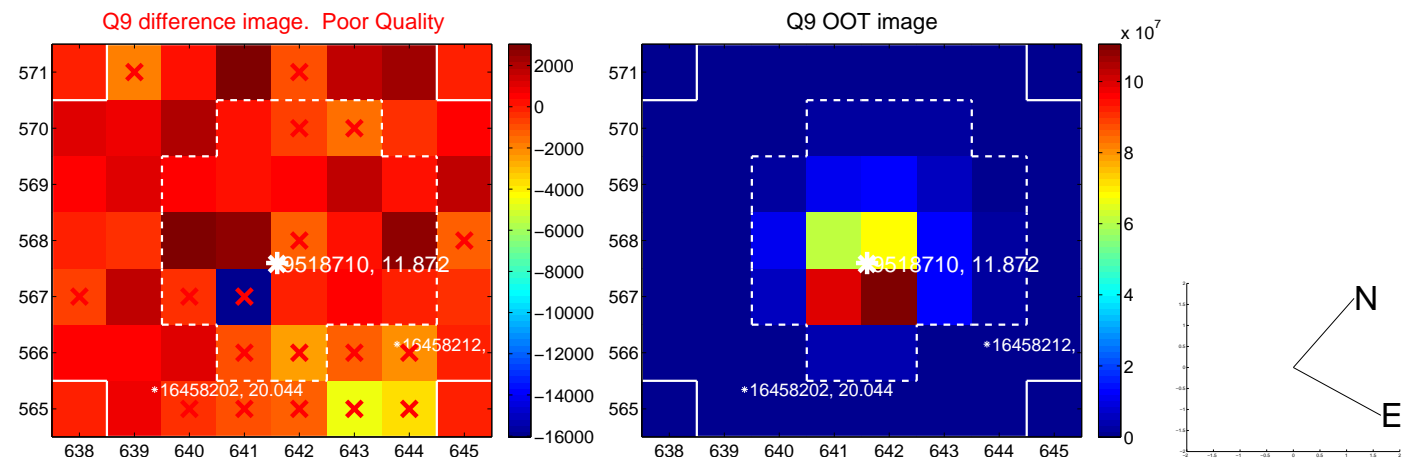




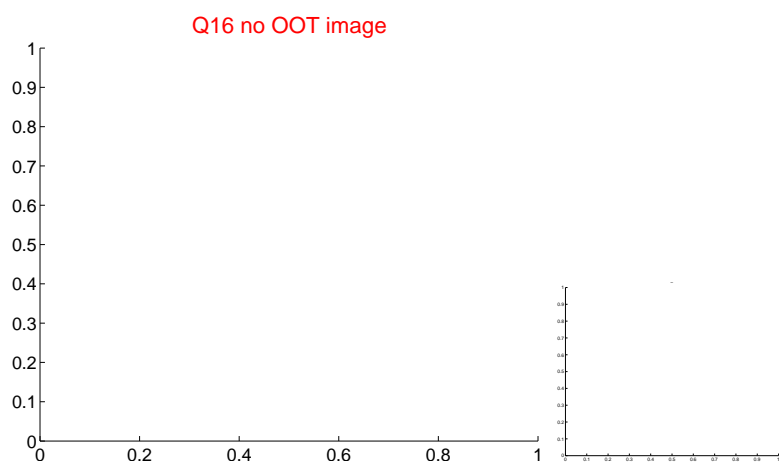
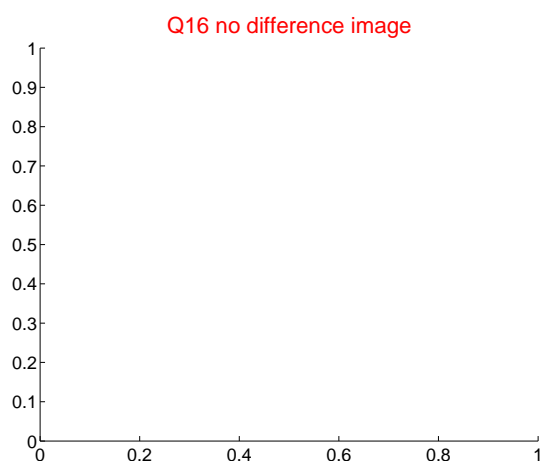
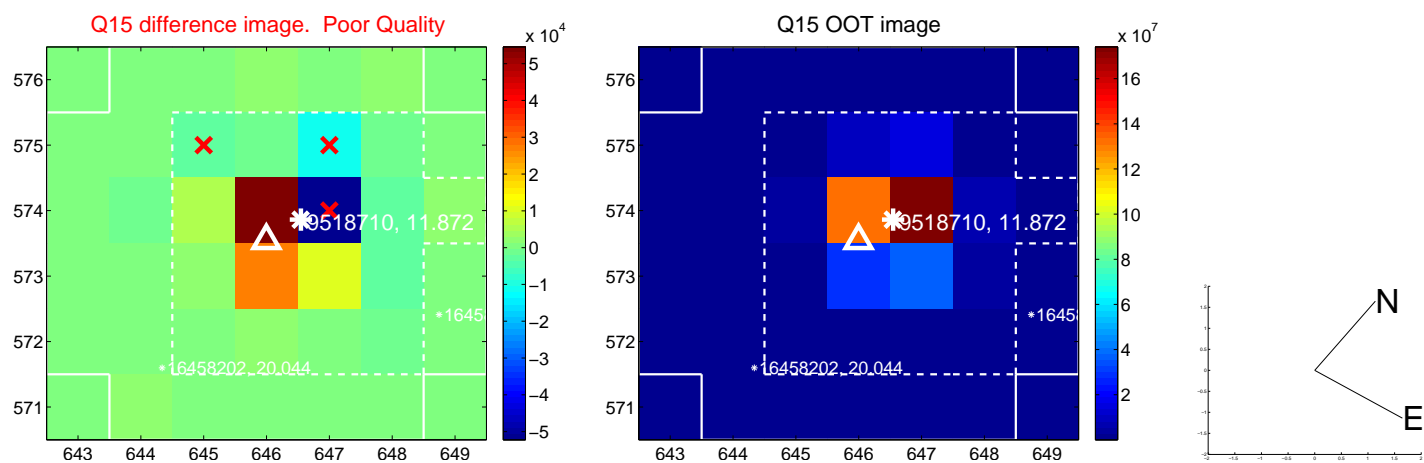
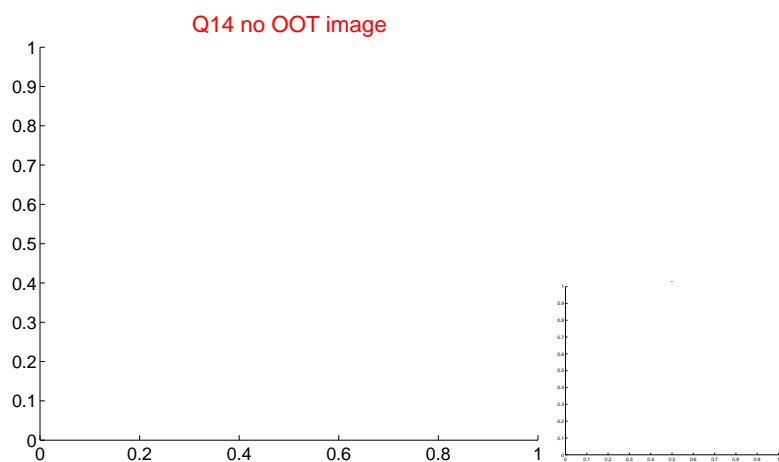
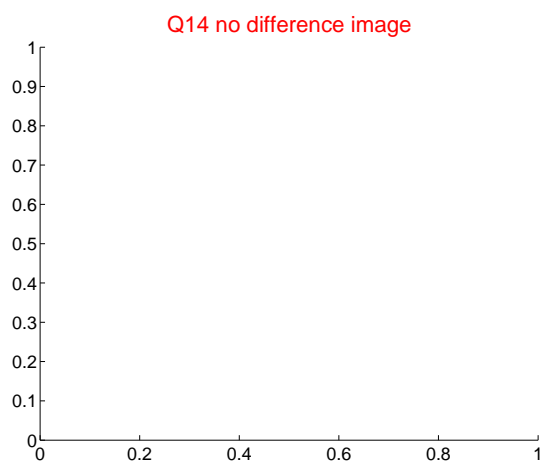
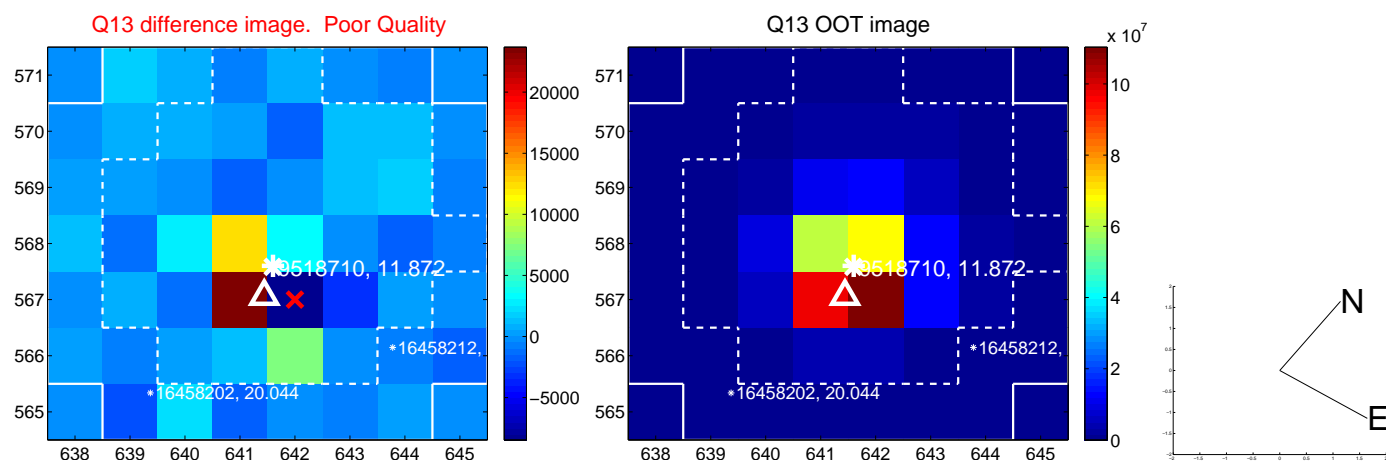
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



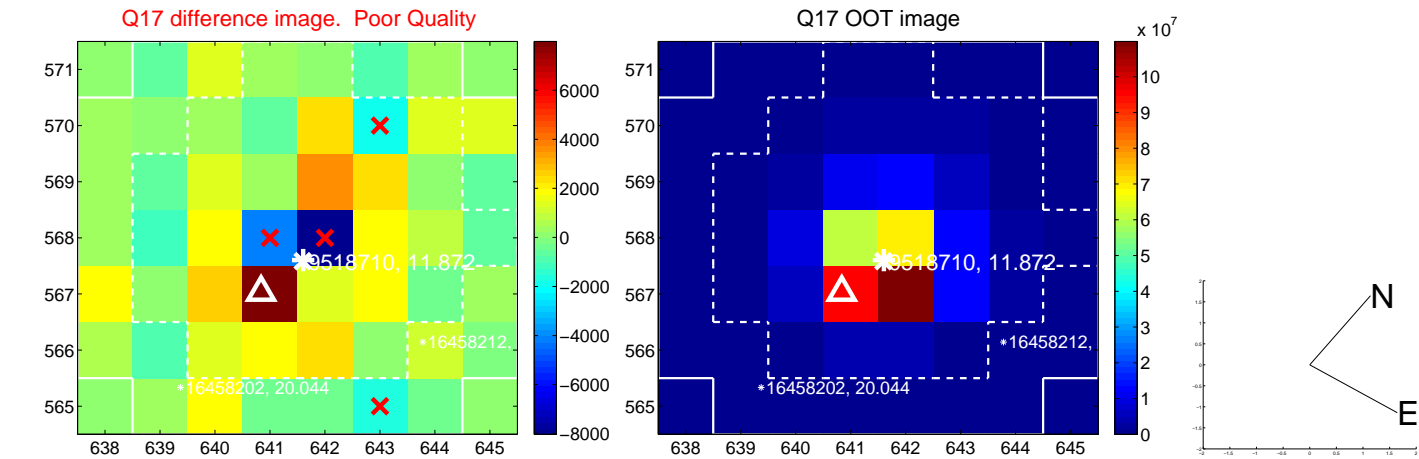
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



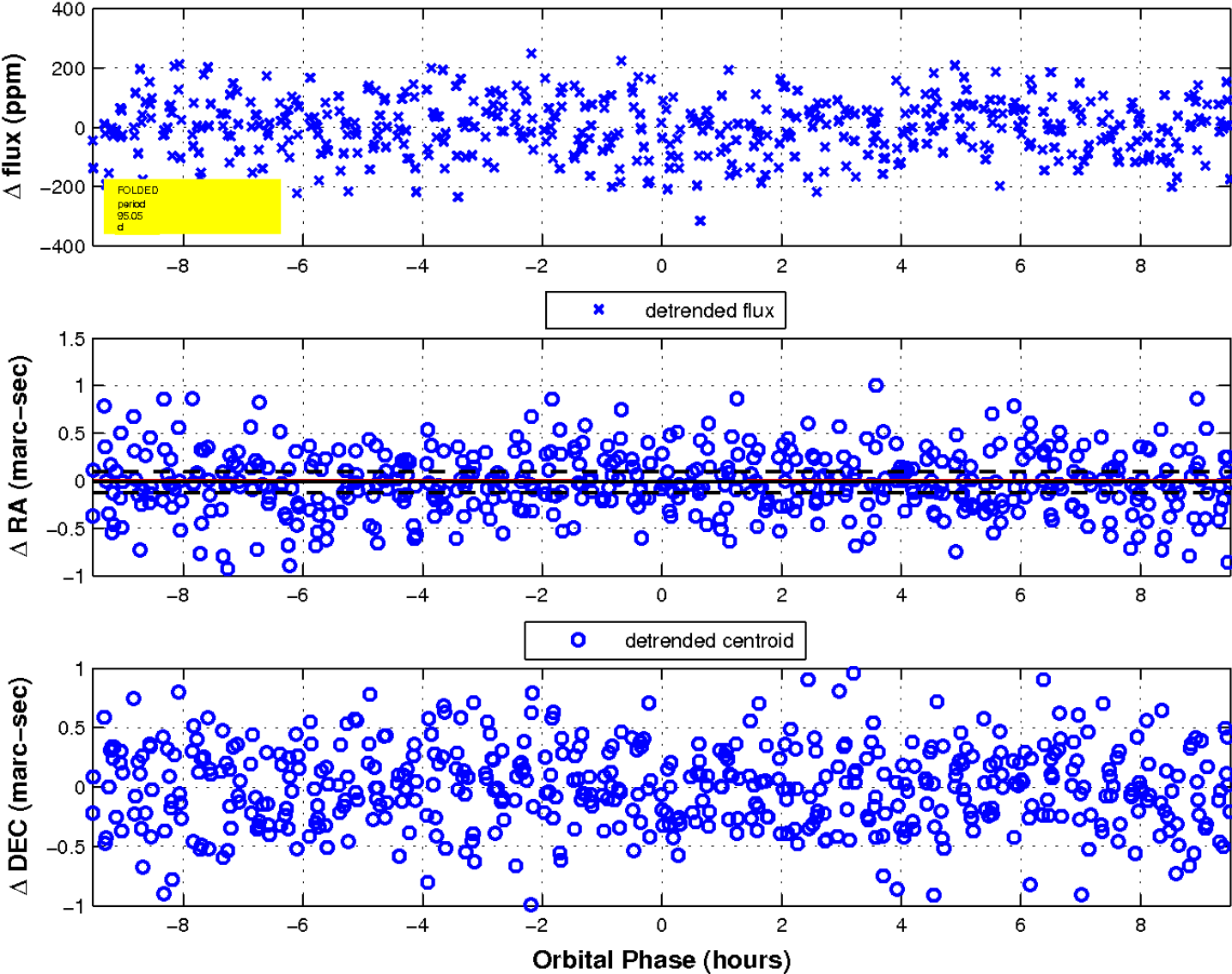
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

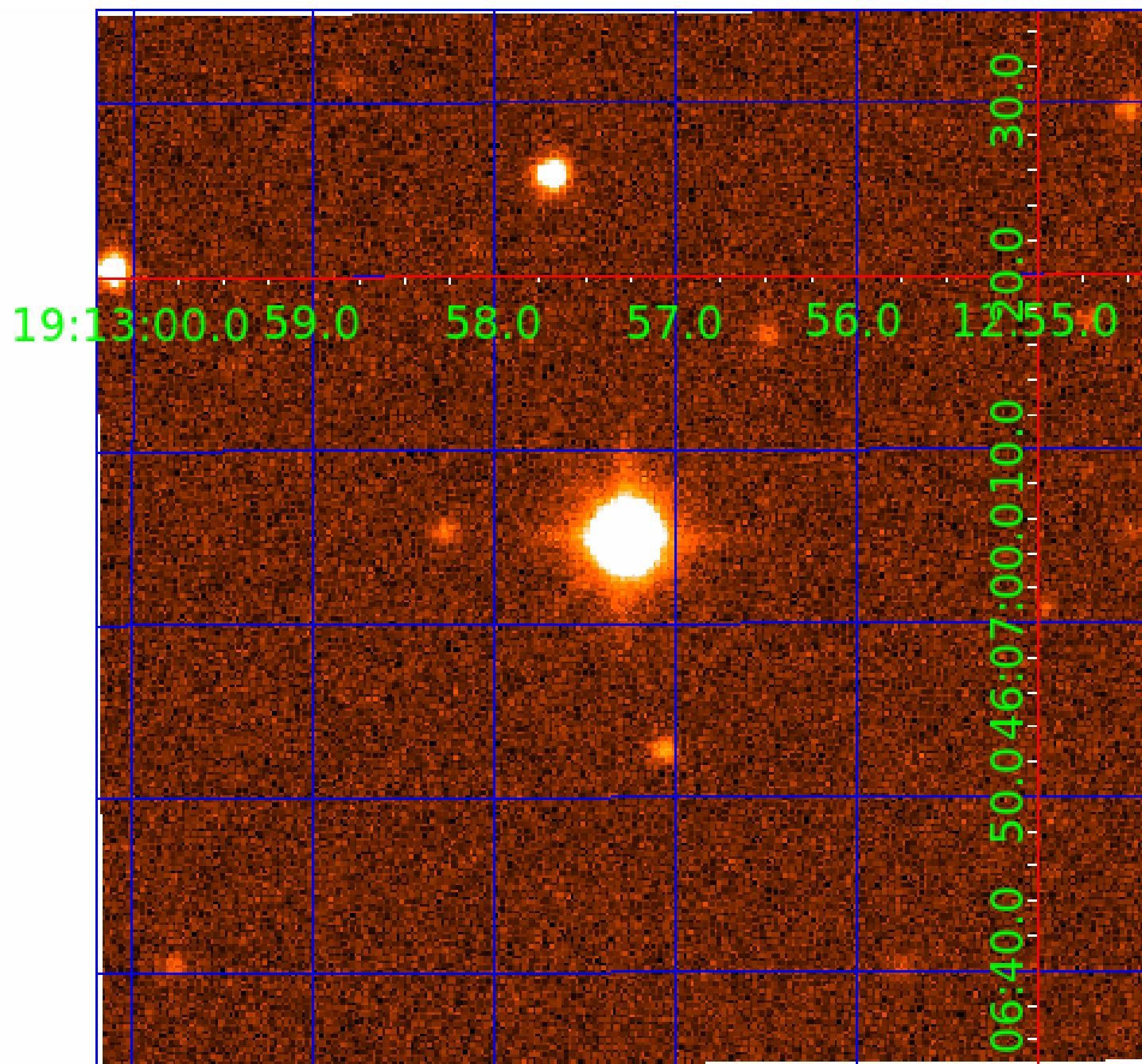


fluxWeightedCentroids, Planet 5 of 7



UKIRT Image

Declination



# KIC 009518710

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009518710-01	OBS	3207.01	0.954328	132.488665	7.3	5.434	10.9	5.8	2.79	7056	0.77	31872.41
009518710-02	OBS	No	234.293932	139.664765	200.0	2.871	10.8	10.3	2.79	7056	4.38	20.73
009518710-03	OBS	No	21.258857	132.247946	61.6	3.971	8.0	6.9	2.79	7056	2.50	508.50
009518710-04	OBS	No	131.524599	184.773916	137.6	7.073	7.4	7.8	2.79	7056	3.58	44.77
009518710-05	OBS	No	95.052209	153.457127	162.4	3.175	7.9	7.4	2.79	7056	4.12	69.03
009518710-06	OBS	No	341.755025	167.131313	163.9	5.396	7.9	8.2	2.79	7056	4.01	12.53
009518710-07	OBS	No	46.248098	177.000352	71.9	5.711	7.7	6.6	2.79	7056	2.69	180.39

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009518710-01	OBS	FP	0.00	1	0	0	0	LPP_DV
009518710-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009518710-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_ZUMA—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009518710-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009518710-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT
009518710-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
009518710-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_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 009518710-06

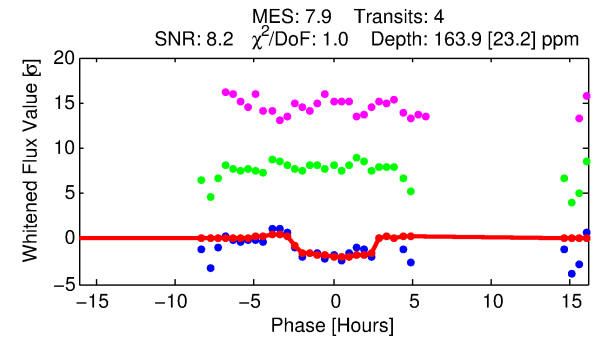
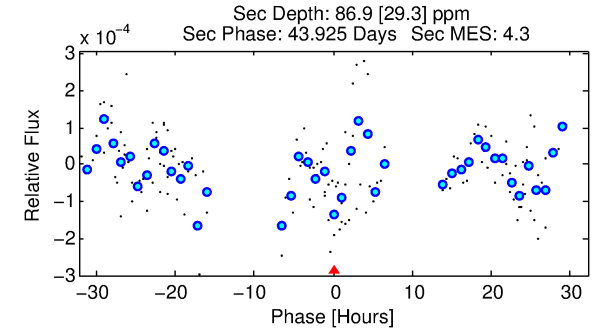
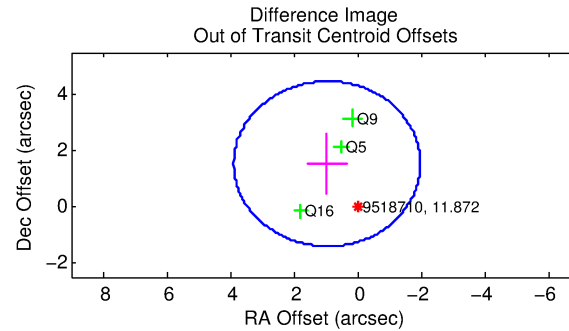
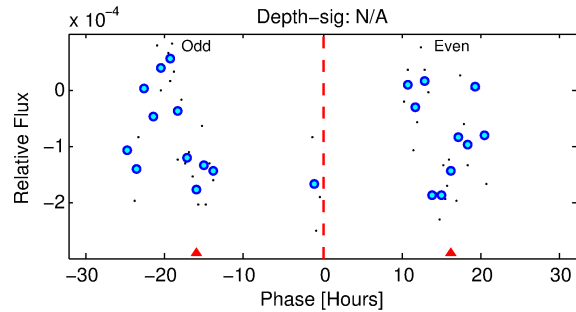
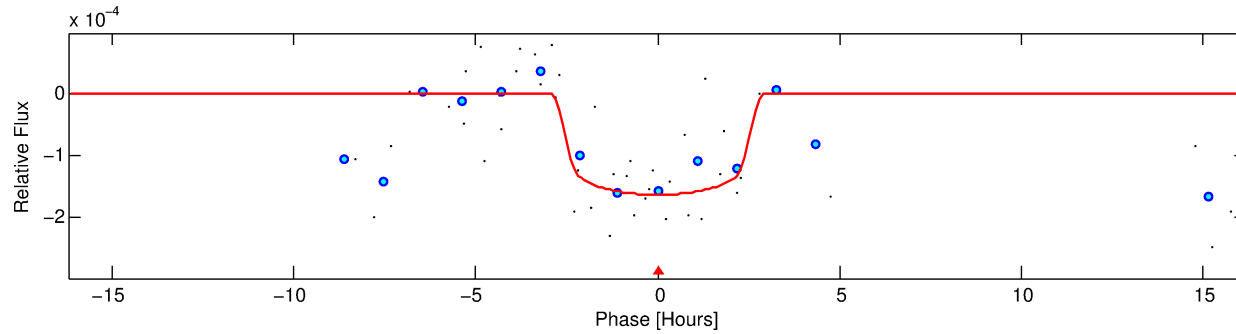
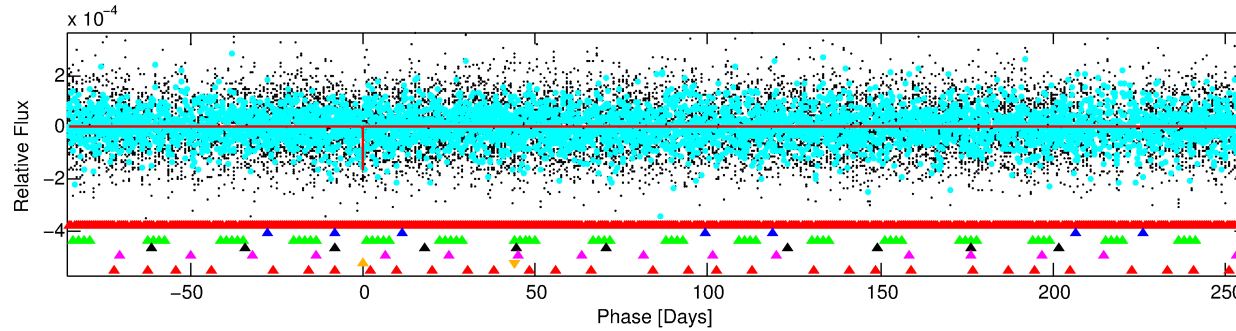
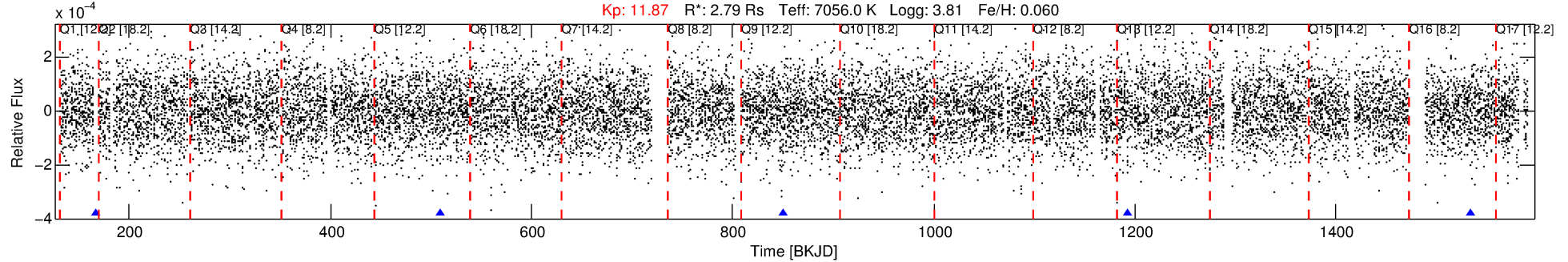
No Significant Match Found

# DV One-Page Summary

KIC: 9518710 Candidate: 6 of 7 Period: 341.755 d

KOI: K03207 Corr: No Ephemeris Match

Kp: 11.87 R\*: 2.79 Rs Teff: 7056.0 K Logg: 3.81 Fe/H: 0.060



## DV Fit Results:

Period = 341.75503 [0.01881] d  
Epoch = 167.1313 [0.0342] BKJD  
Rp/R\* = 0.0132 [0.0079]  
a/R\* = 270.39 [1002.74]  
b = 0.85 [1.23]  
Seff = 12.53 [5.91]  
Teq = 480 [57] K  
Rp = 4.01 [2.72] Re  
a = 1.1723 [0.3377] AU  
Ag = 4093.90 [5444.21] [0.75σ]  
Teffp = 5934 [1869] K [2.92σ]

## DV Diagnostic Results:

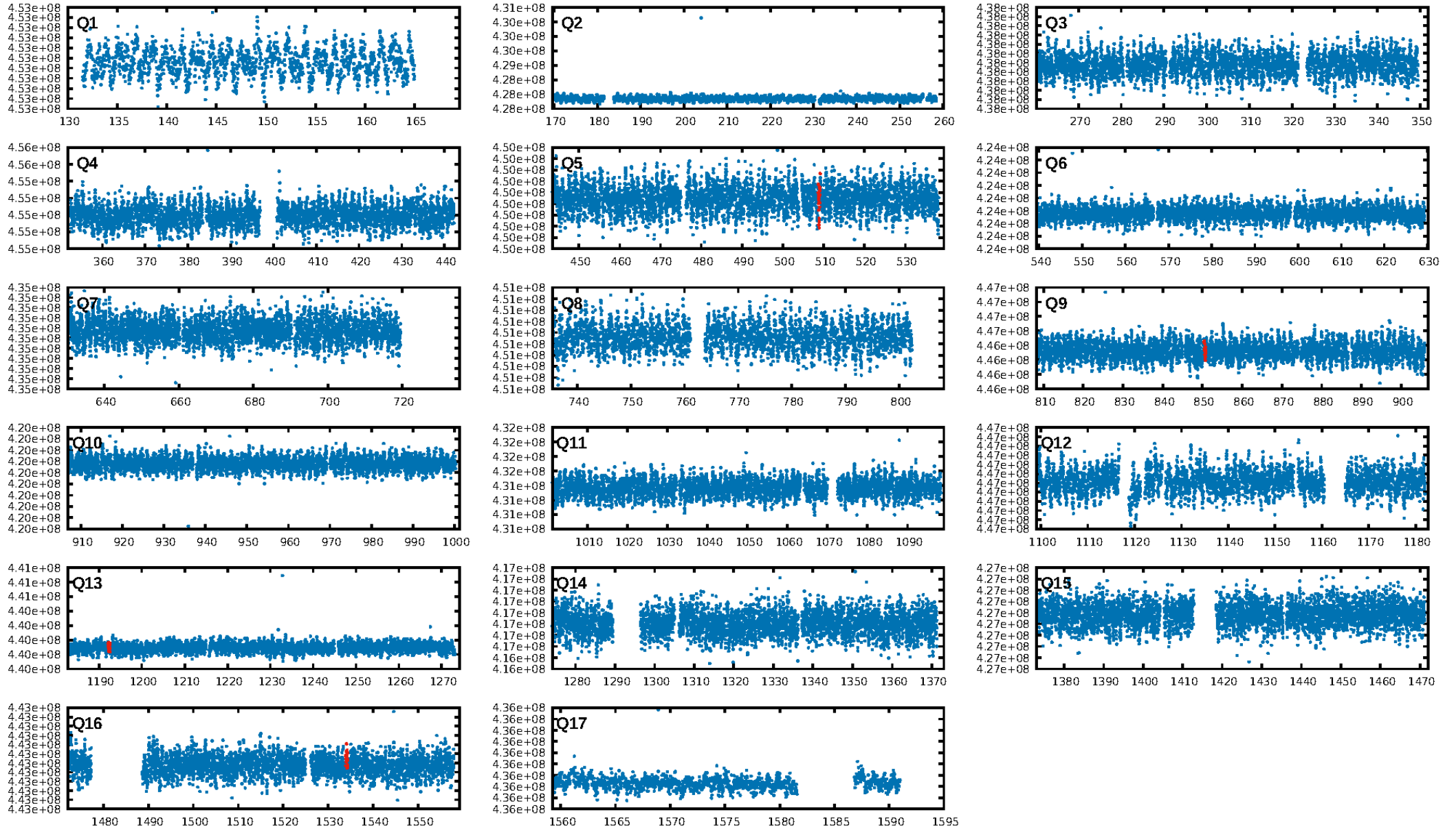
ShortPeriod-sig: 100.0% [421.95σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 41.5%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 1.46e-08**  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: 2.693  
Centroid-sig: N/A  
Centroid-so: 0.649 arcsec [0.59σ]  
OotOffset-rm: 1.801 arcsec [1.84σ]  
KicOffset-rm: 1.882 arcsec [1.83σ]  
OotOffset-st: 0/0/1/2 [3]  
KicOffset-st: 0/0/1/2 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 0.00 [0/3]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 16:33:35 Z

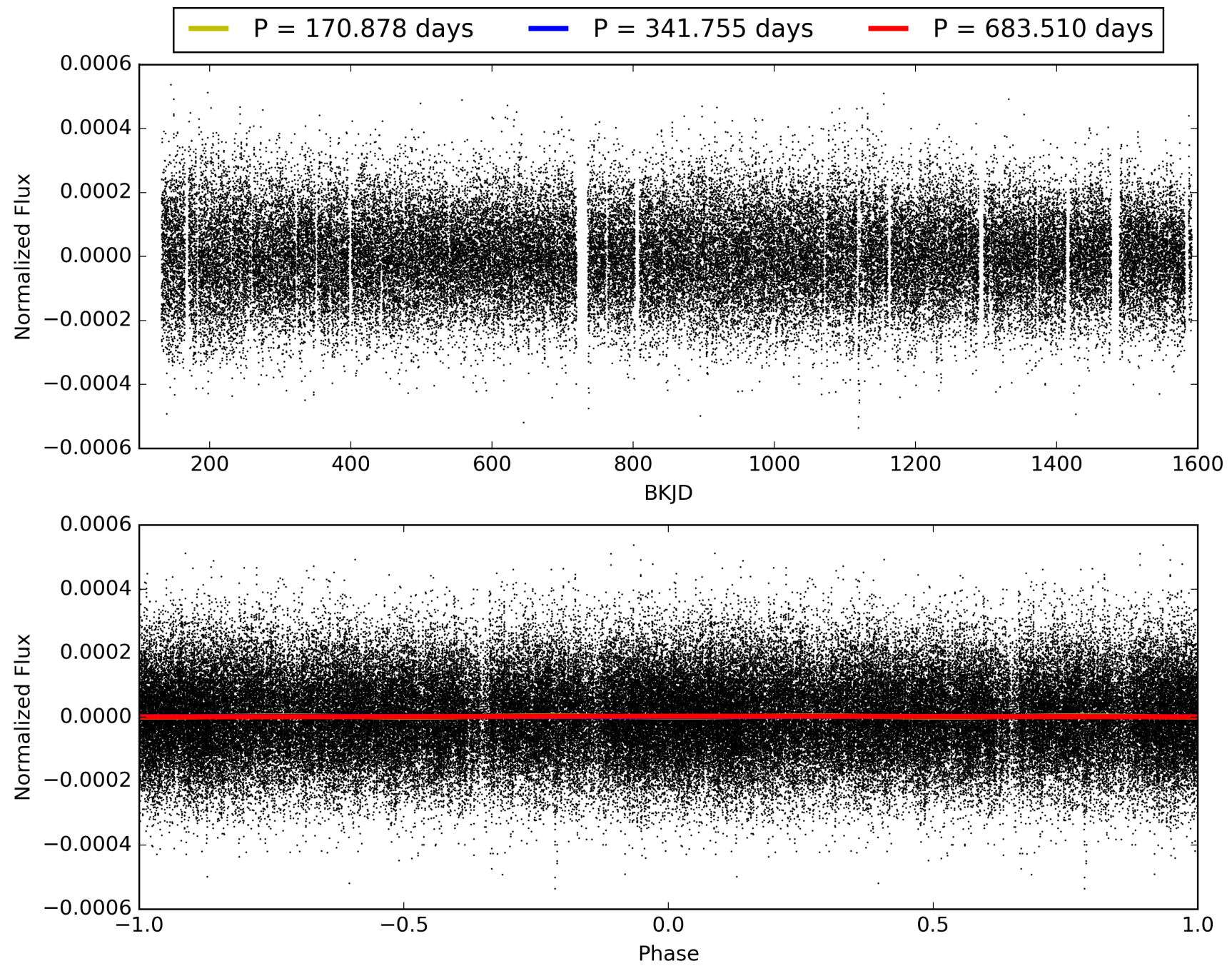
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 009518710-06, PDC Light Curves

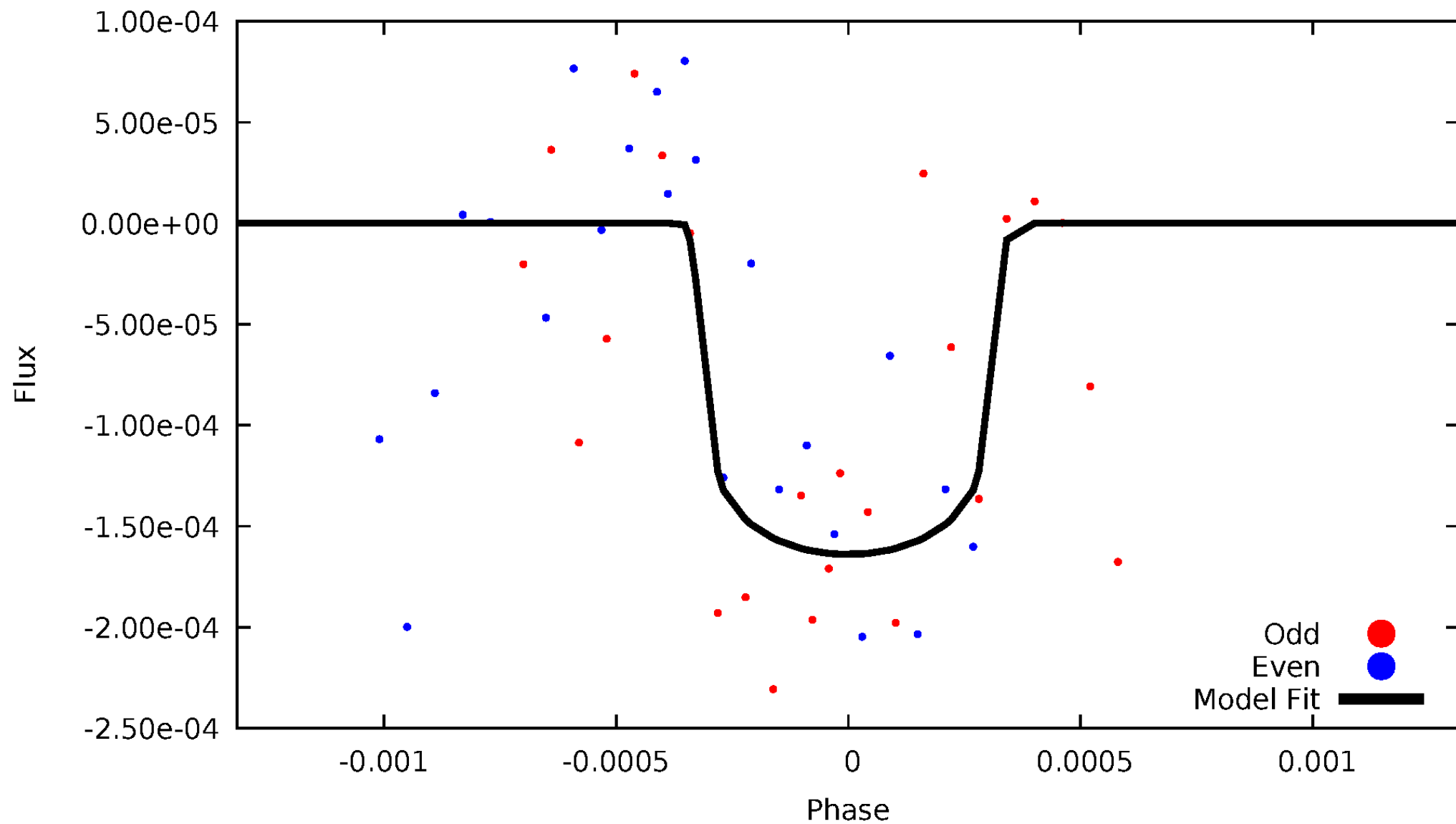


TCE 009518710-06



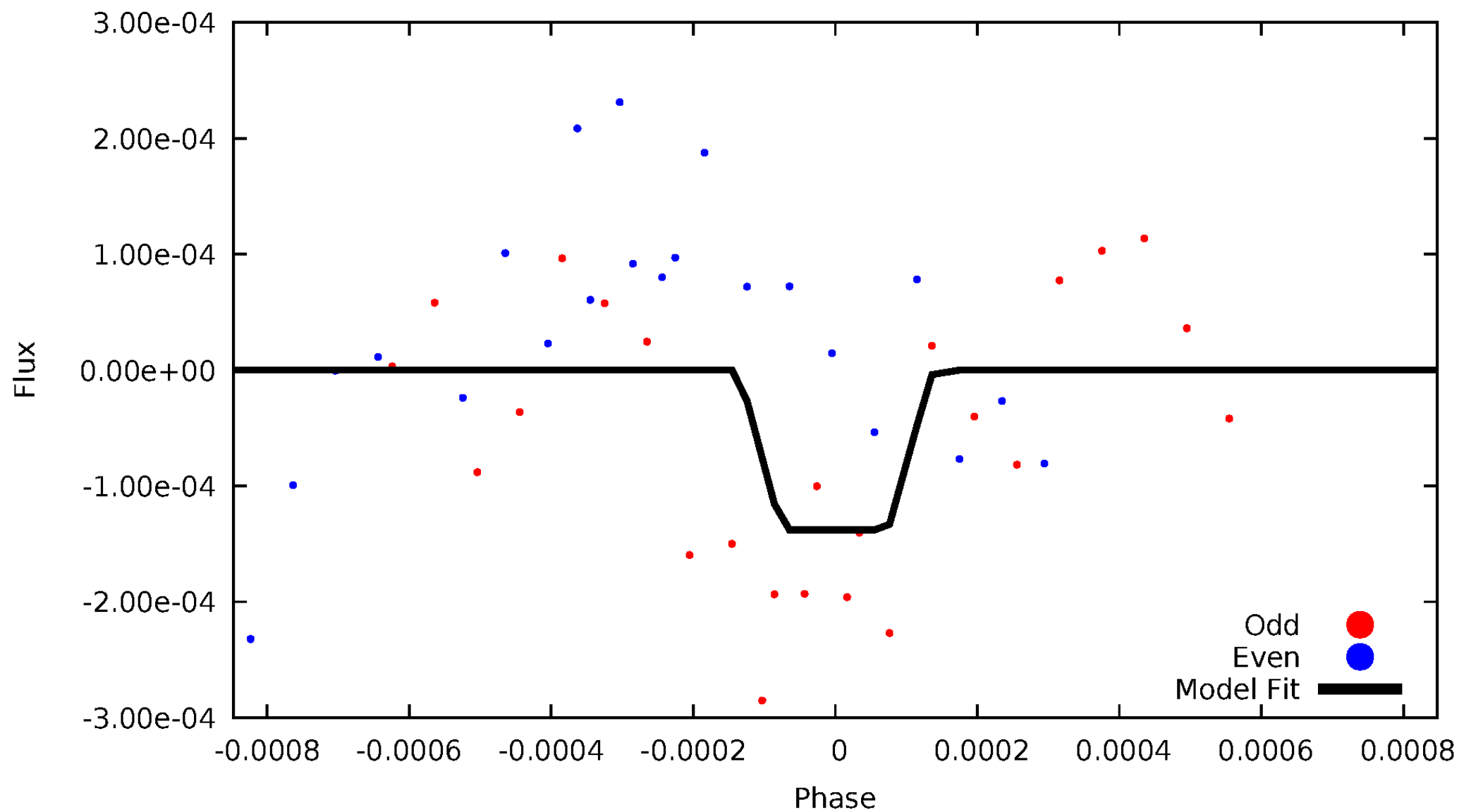
# DV Odd/Even

TCE 009518710-06



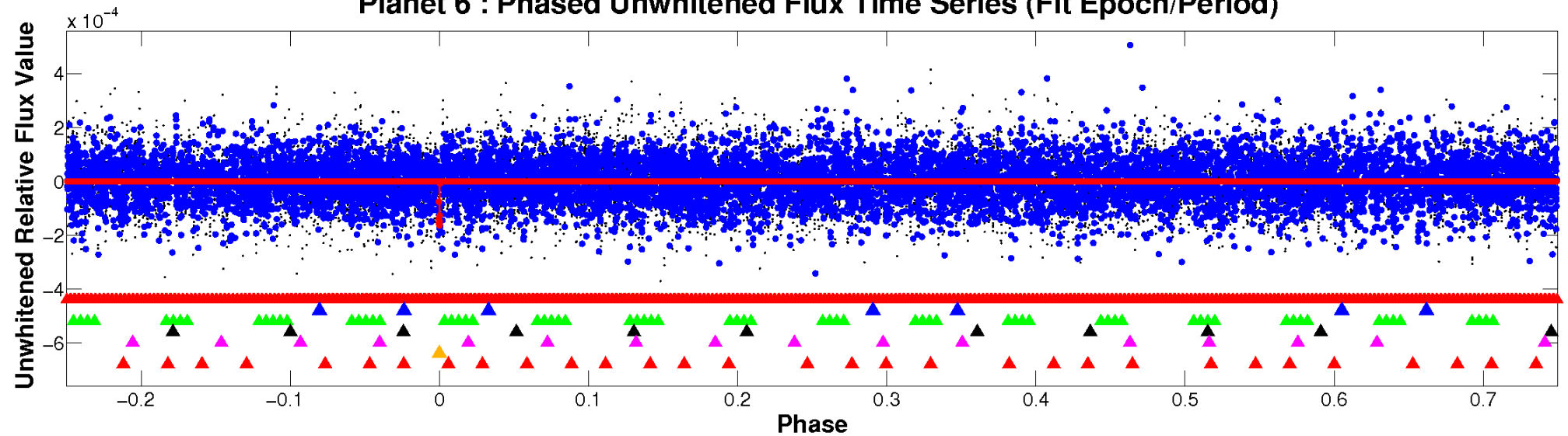
# ALT Odd/Even

TCE 009518710-06

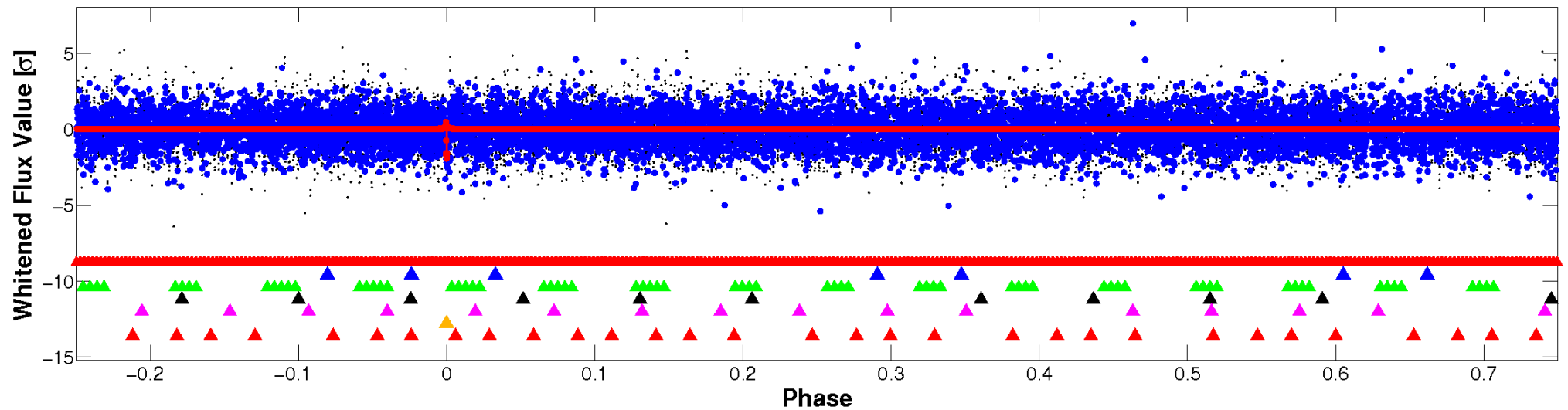


# Non-Whitened Vs. Whitened Light Curve

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

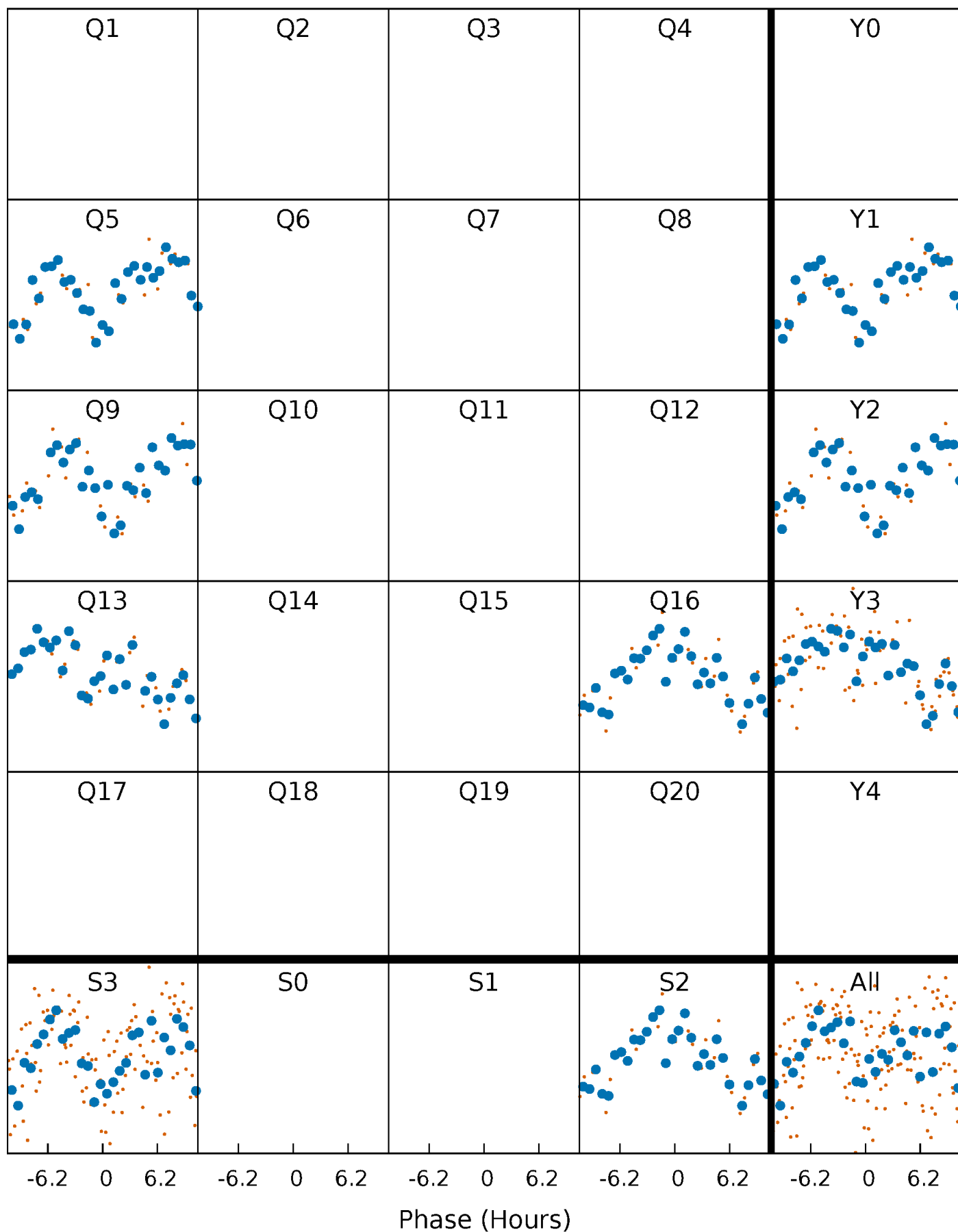


## Planet 6 : Phased Whitened Flux Time Series (Fit Epoch/Period)



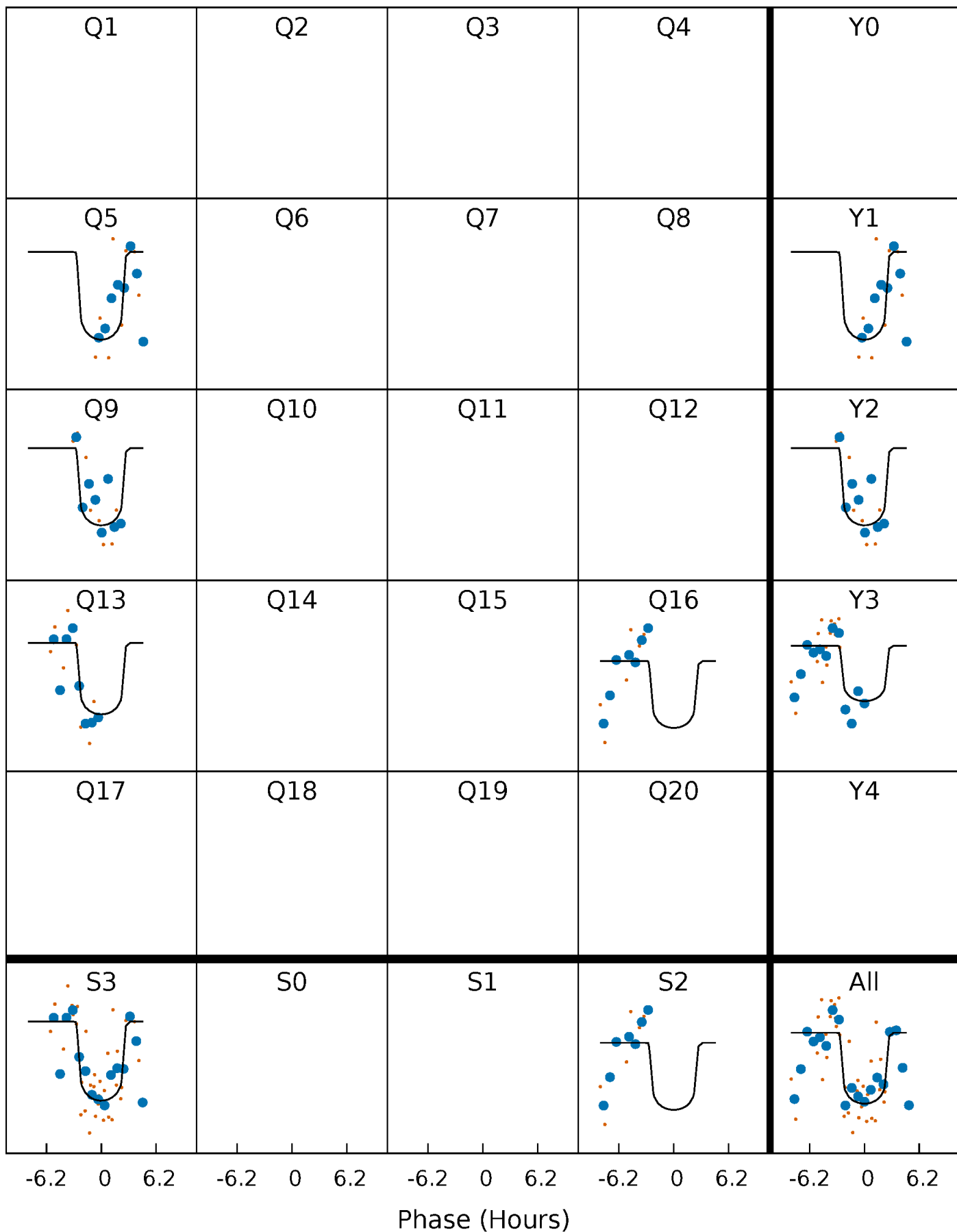
# PDC Quarter-Phased Transit Curves

TCE 009518710-06     $P=341.755025$  Days     $T_0=167.131313$  (BKJD)



# DV Quarter-Phased Transit Curves

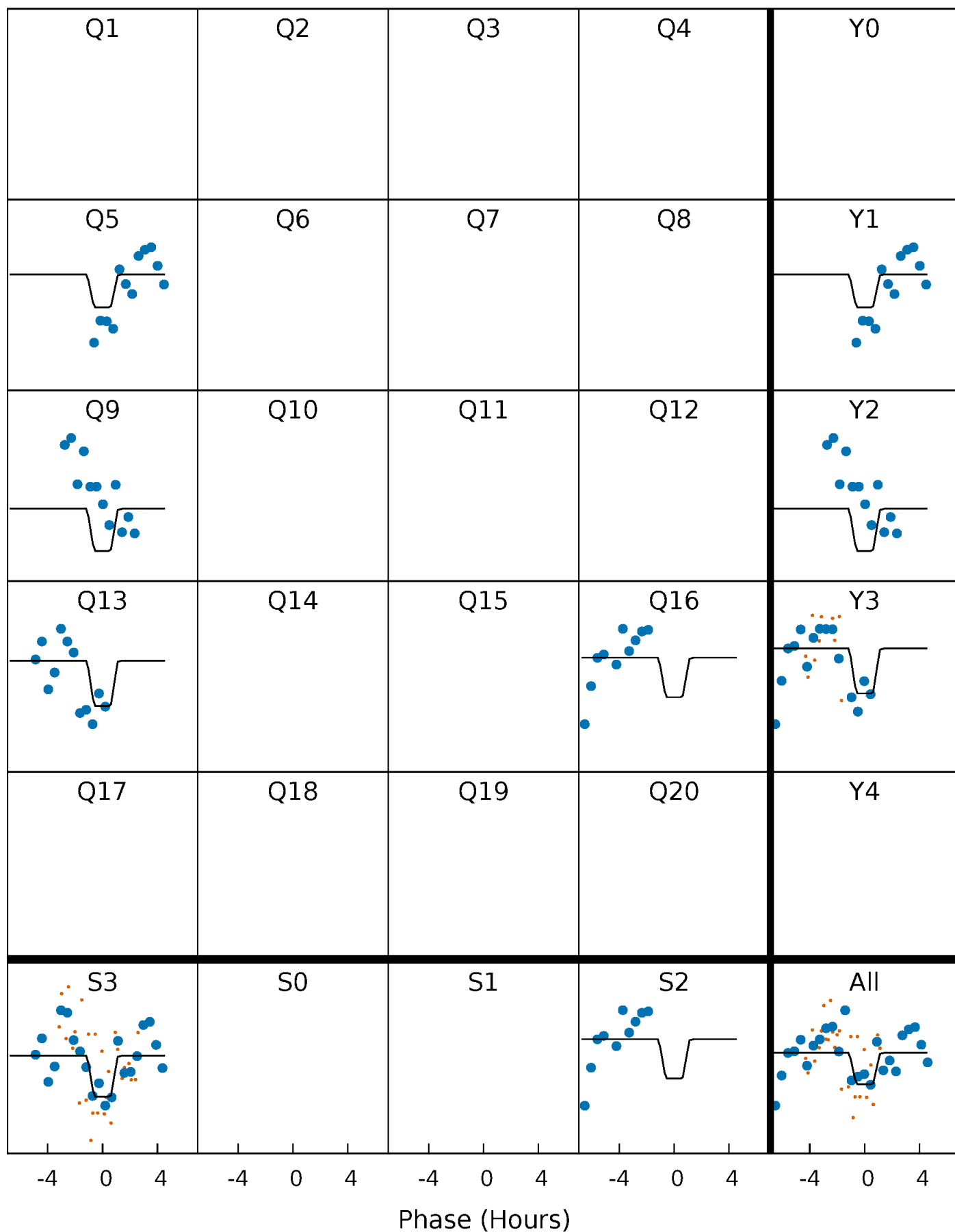
TCE 009518710-06 P=341.755025 Days  $T_0=167.131313$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

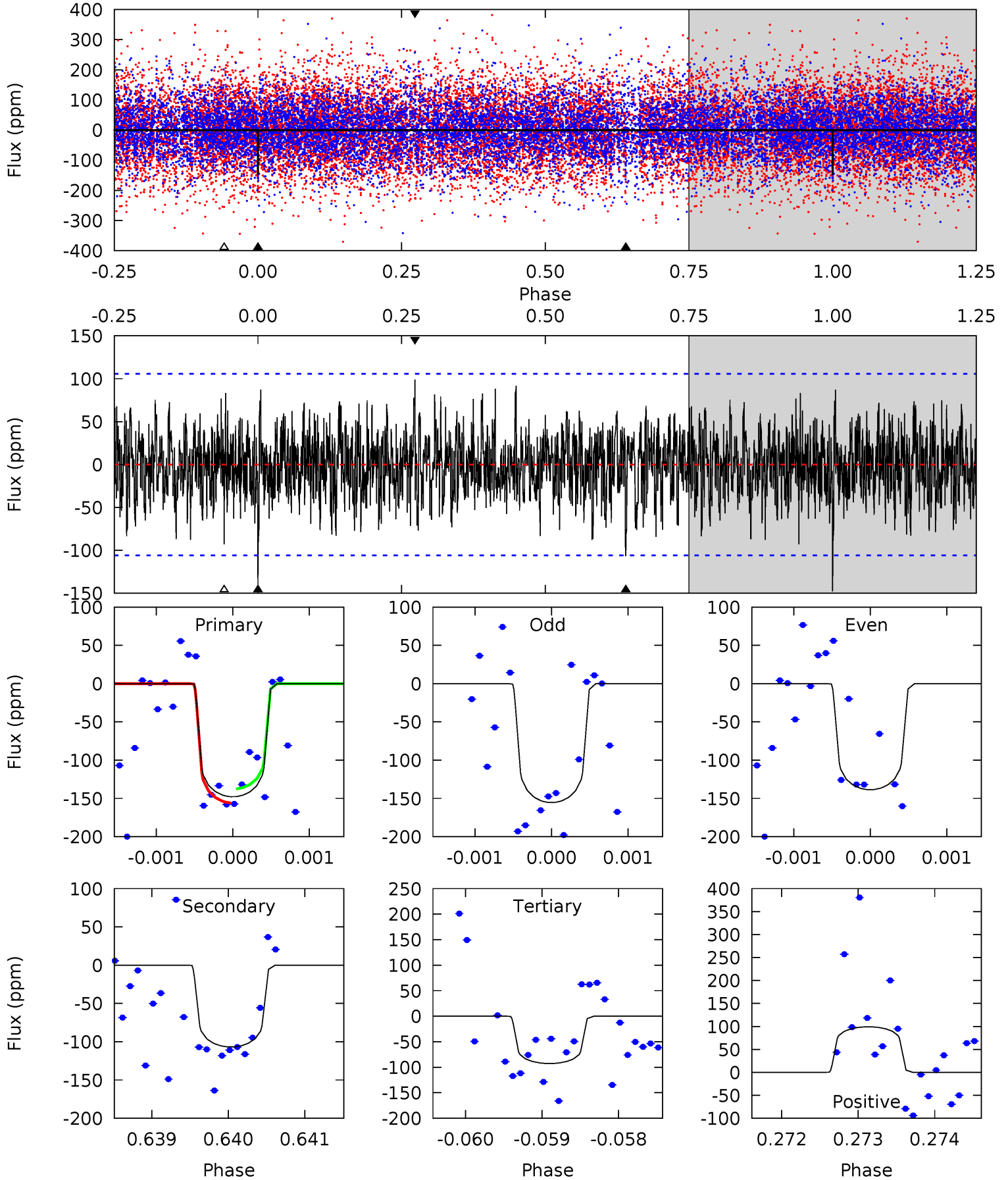
TCE 009518710-06 P=341.737669 Days  $T_0=167.157407$  (BKJD)



# DV Model-Shift Uniqueness Test

009518710-06, P = 341.755025 Days, E = 167.131313 Days

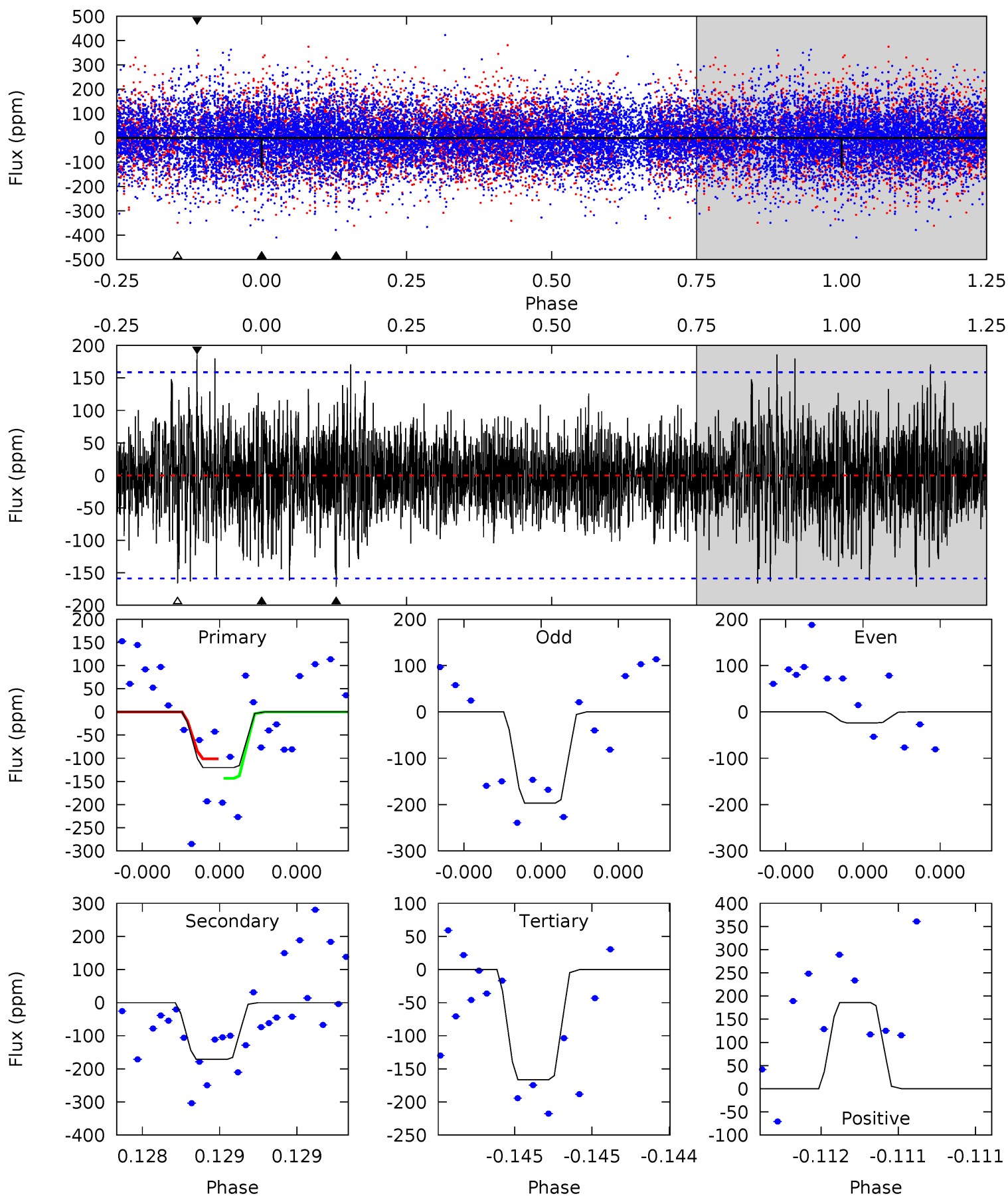
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.70	5.56	4.83	5.17	5.52	3.39	1.52	2.87	2.53	0.73	0.40	0.44	1.11	0.40	0.47



# Alt Model-Shift Uniqueness Test

009518710-06, P = 341.737669 Days, E = 167.157407 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
4.28	6.12	5.93	6.63	5.66	3.62	1.54	-1.65	-2.34	0.19	-0.51	3.13	0.81	0.52	0.75



### Stellar Parameters For KIC 009518710

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7056^{+169}_{-253}$	$3.813^{+0.259}_{-0.111}$	$0.060^{+0.200}_{-0.300}$	$2.785^{+0.469}_{-0.871}$	$1.836^{+0.191}_{-0.354}$	$0.120^{+0.195}_{-0.041}$
	+2%/-4%	+7%/-3%	+333%/-500%	+17%/-31%	+10%/-19%	+163%/-34%
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 009518710-06 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-107 \pm 19$	$3.99^{+2.44}_{-2.15}$	$662^{+37}_{-53}$	$6027^{+3703}_{-1174}$	$5027^{+20312}_{-3193}$
Alt.	$-172 \pm 28$	$3.47^{+2.36}_{-1.96}$	$662^{+35}_{-53}$	$7312^{+6115}_{-1700}$	$10666^{+46501}_{-6915}$

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

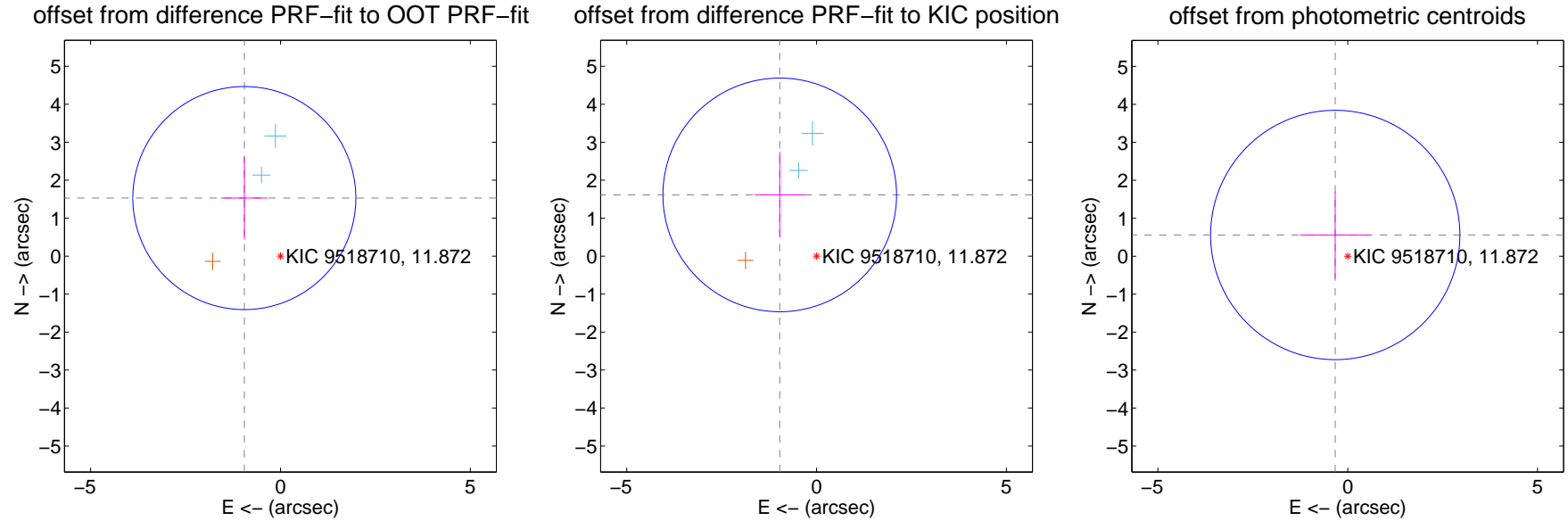
## DV Centroid Data

Supplemental centroid analysis for 009518710-06. **Kepler magnitude: 11.87.** Transit SNR 8.18

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

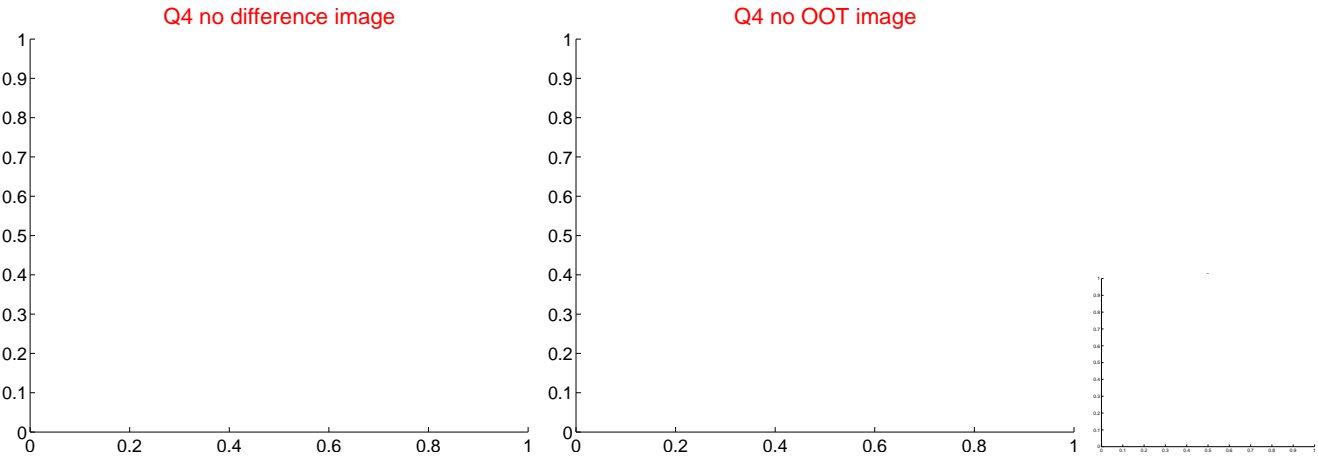
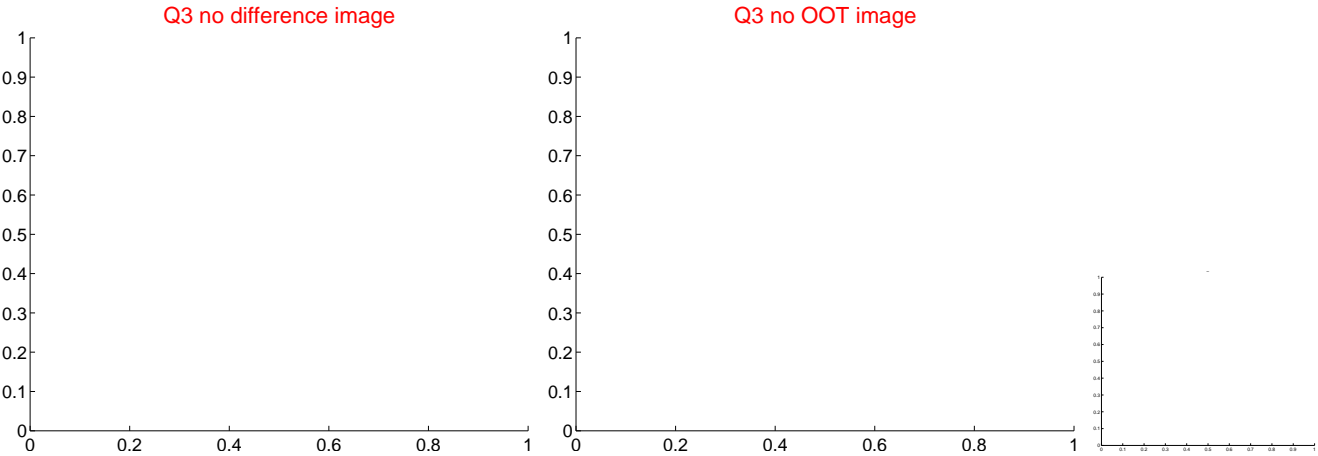
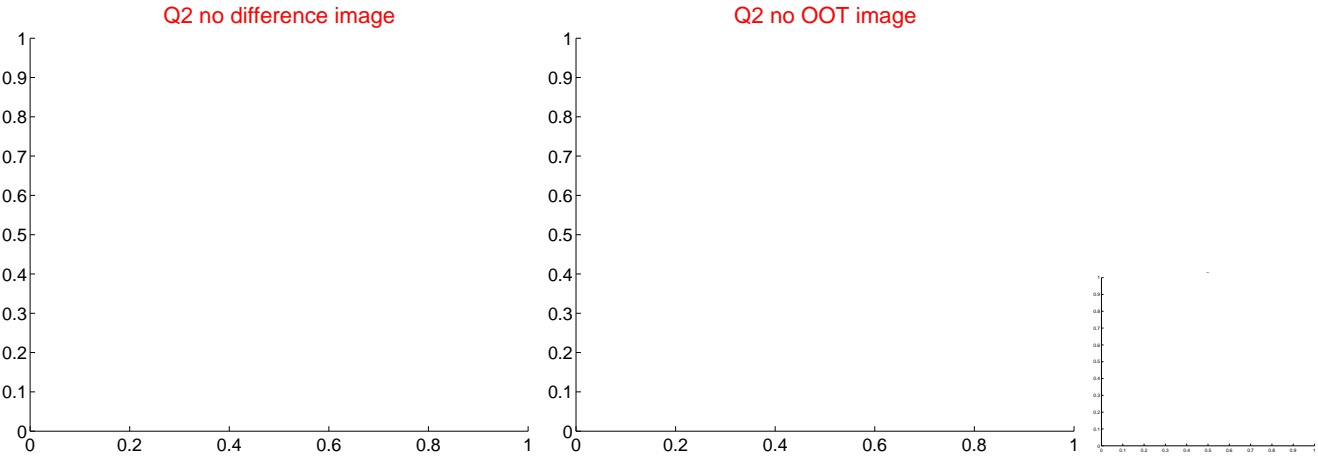
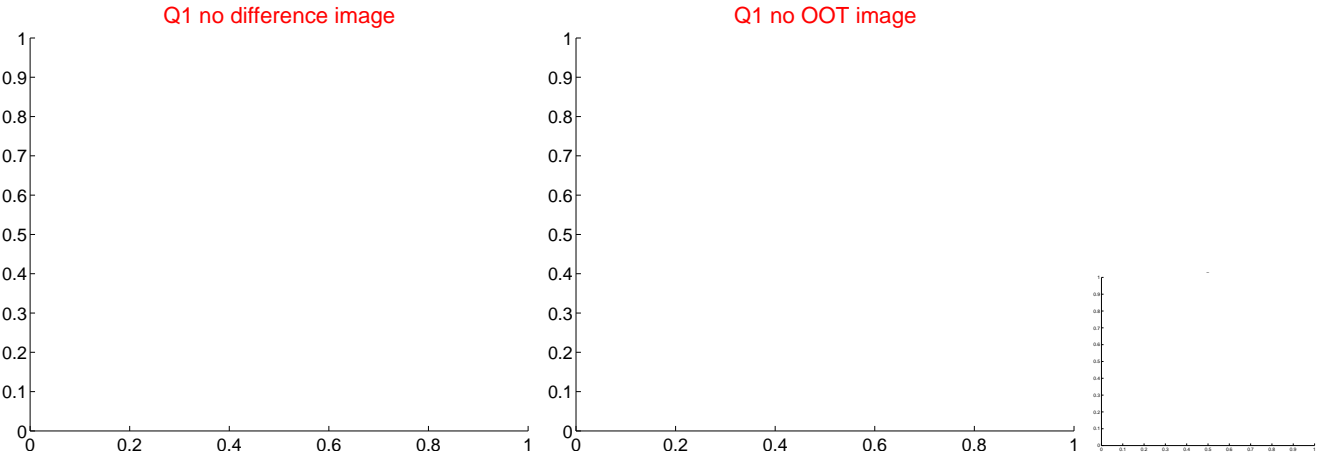
The direct PRF centroid is offset from the target star catalog position by about 0.09 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.801 \pm 0.979$	1.84	$0.951 \pm 0.613$	$1.529 \pm 1.088$
PRF-fit source offset from KIC position	$1.882 \pm 1.026$	1.83	$0.970 \pm 0.664$	$1.612 \pm 1.128$
photometric centroid source offset	$0.65 \pm 1.09$	0.59	$0.33 \pm 0.93$	$0.56 \pm 1.15$

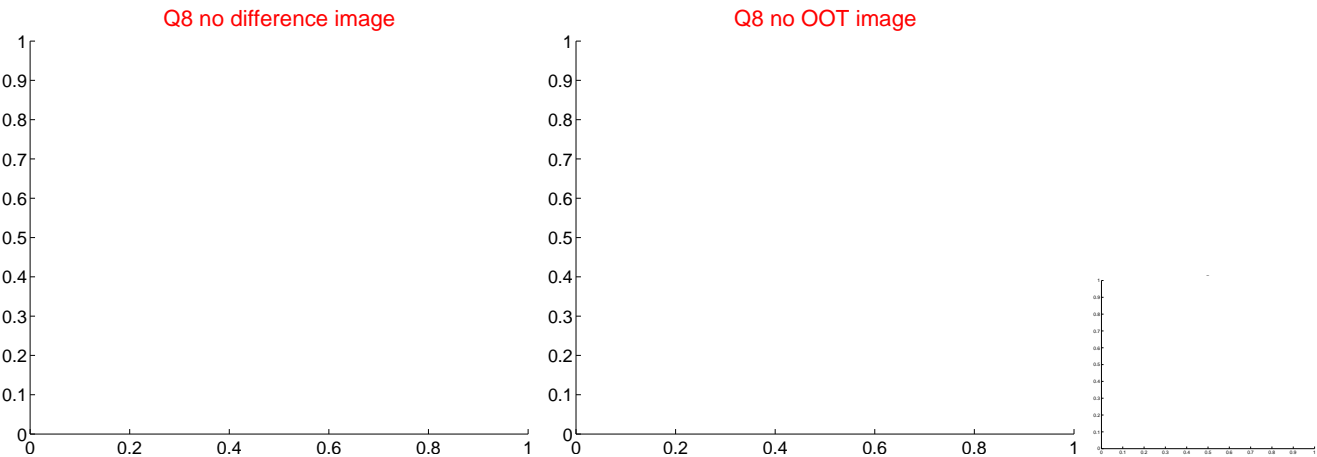
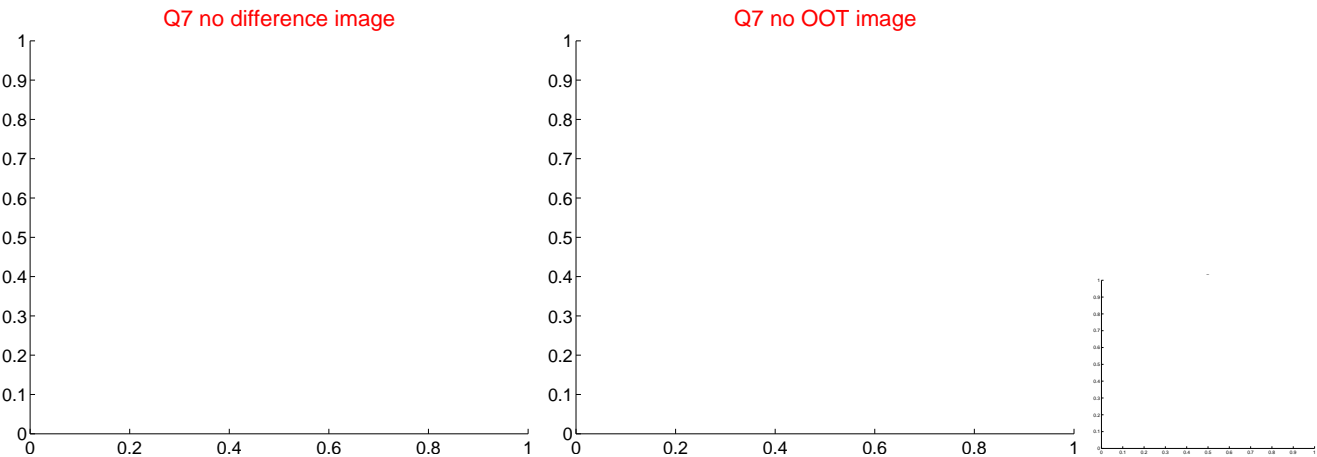
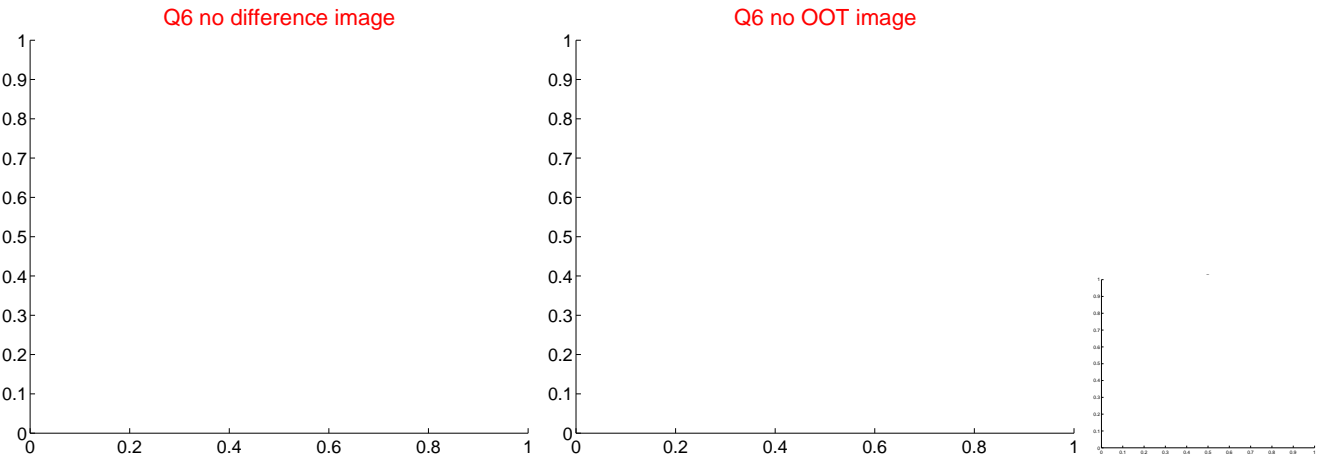
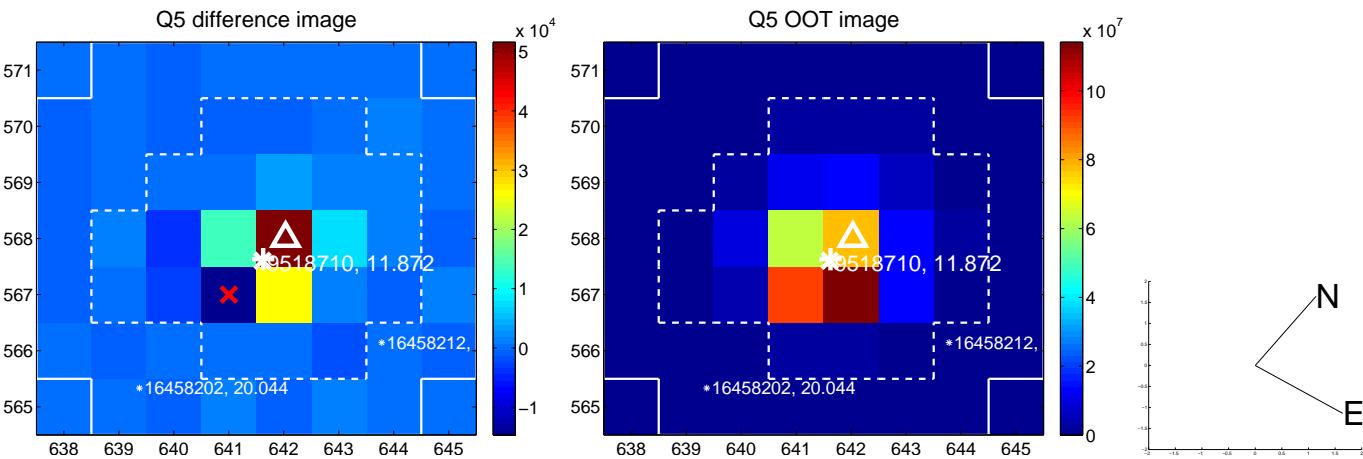


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

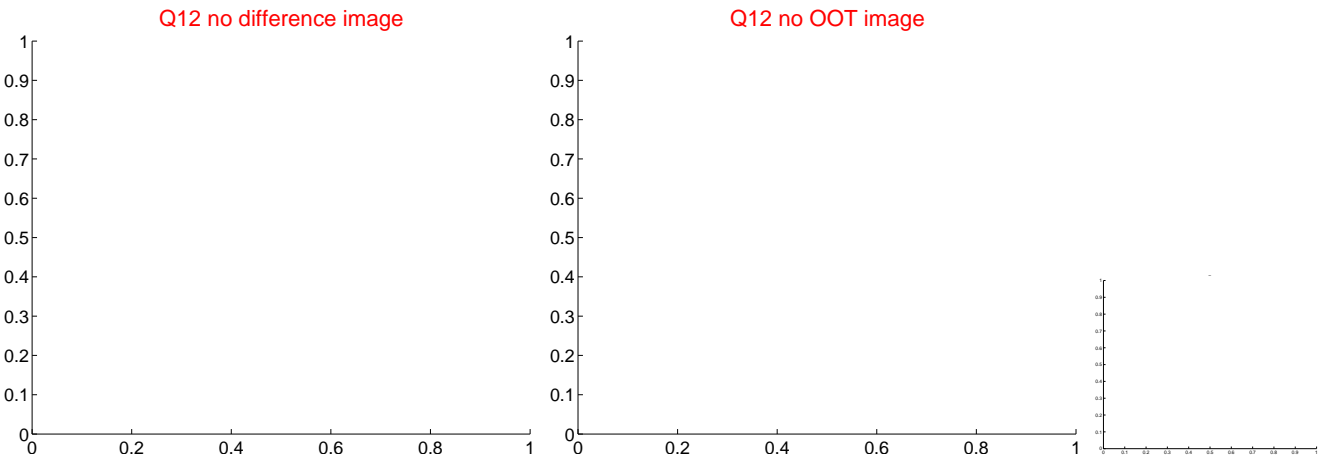
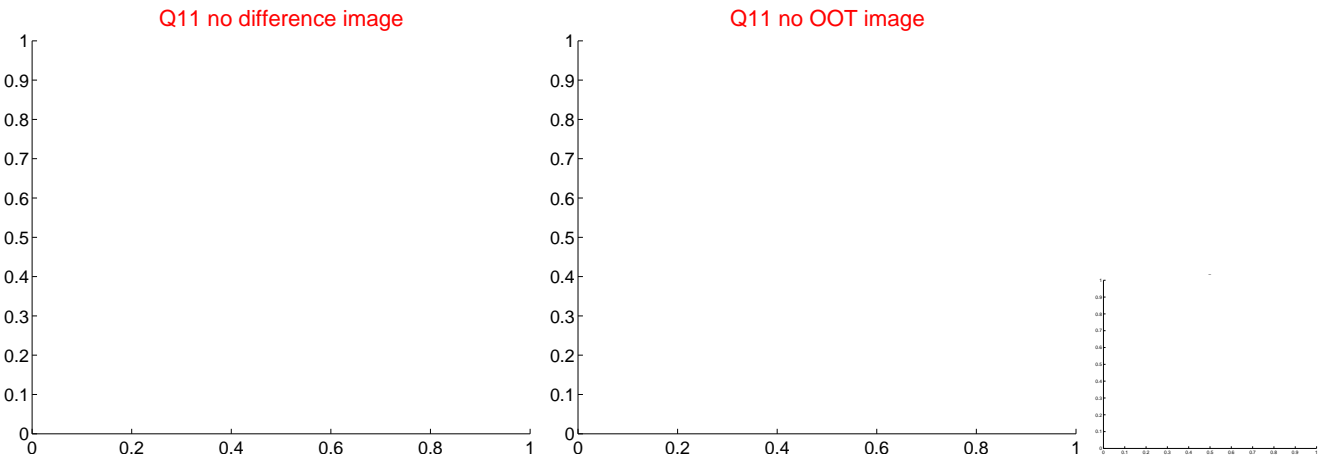
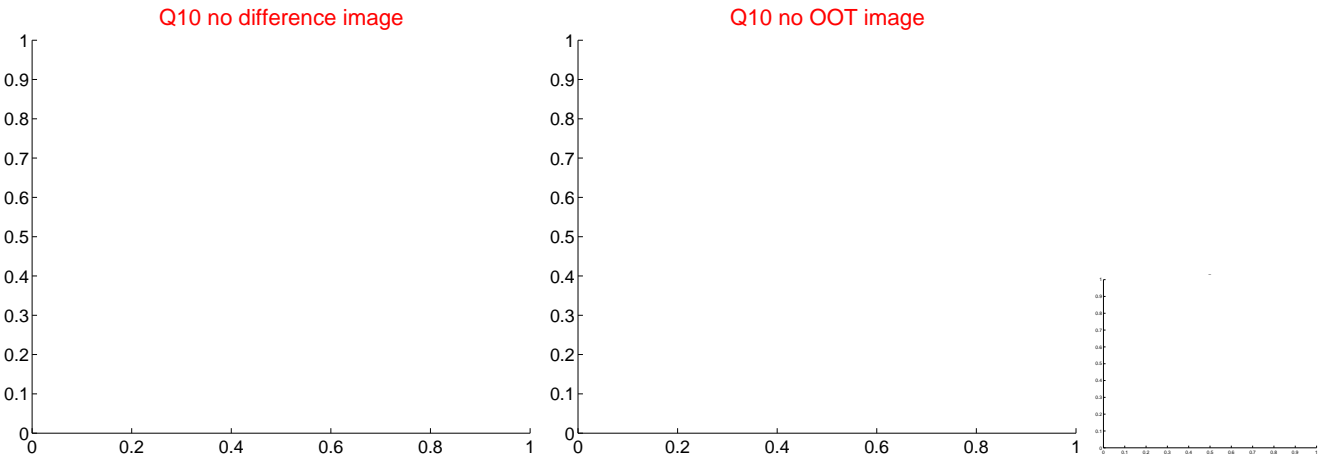
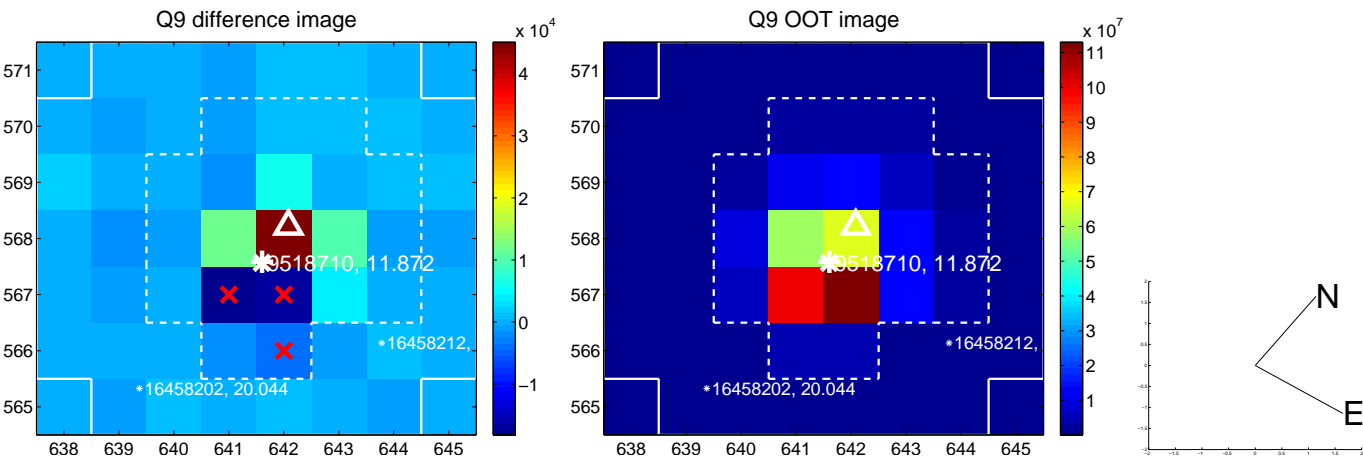


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

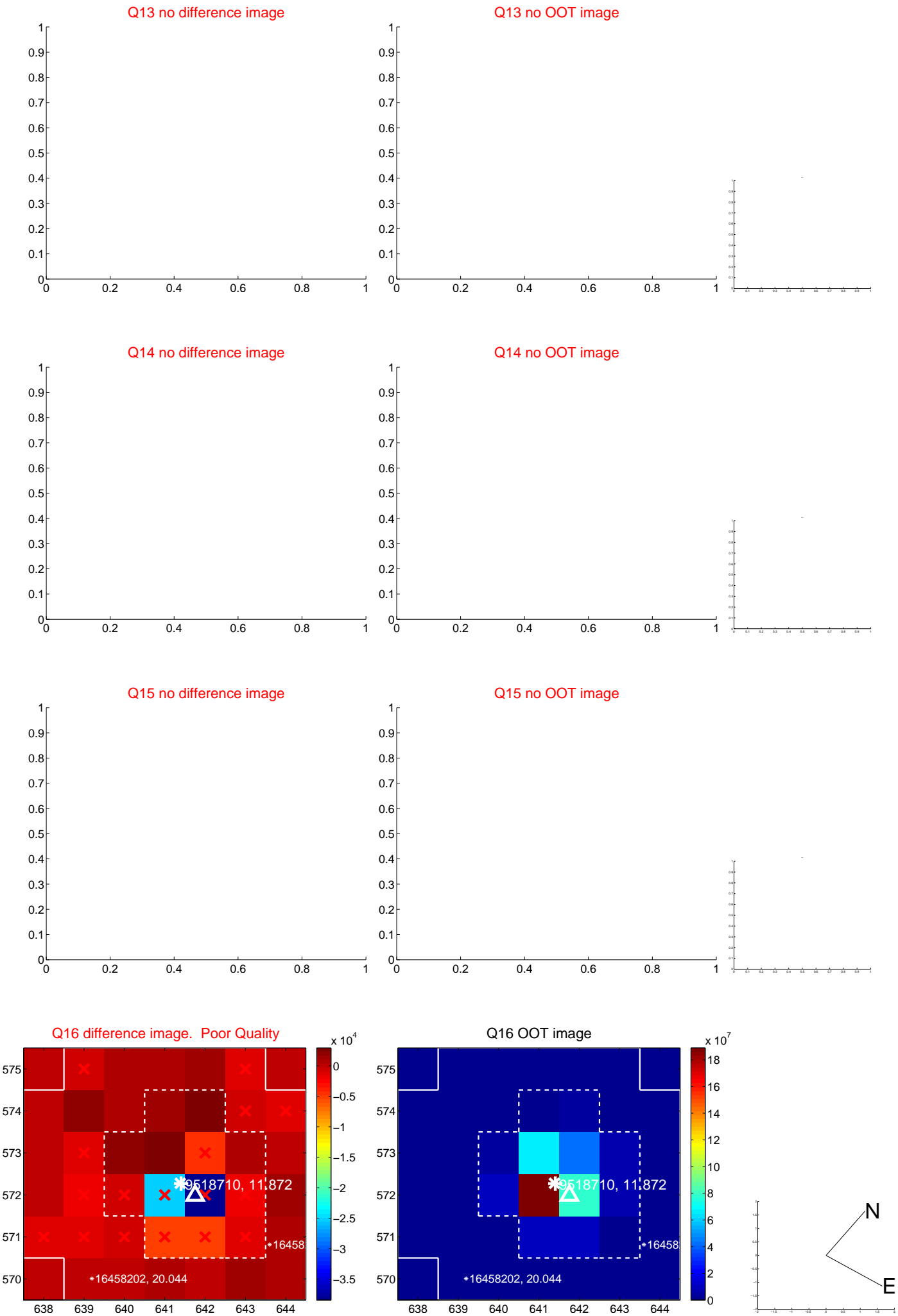




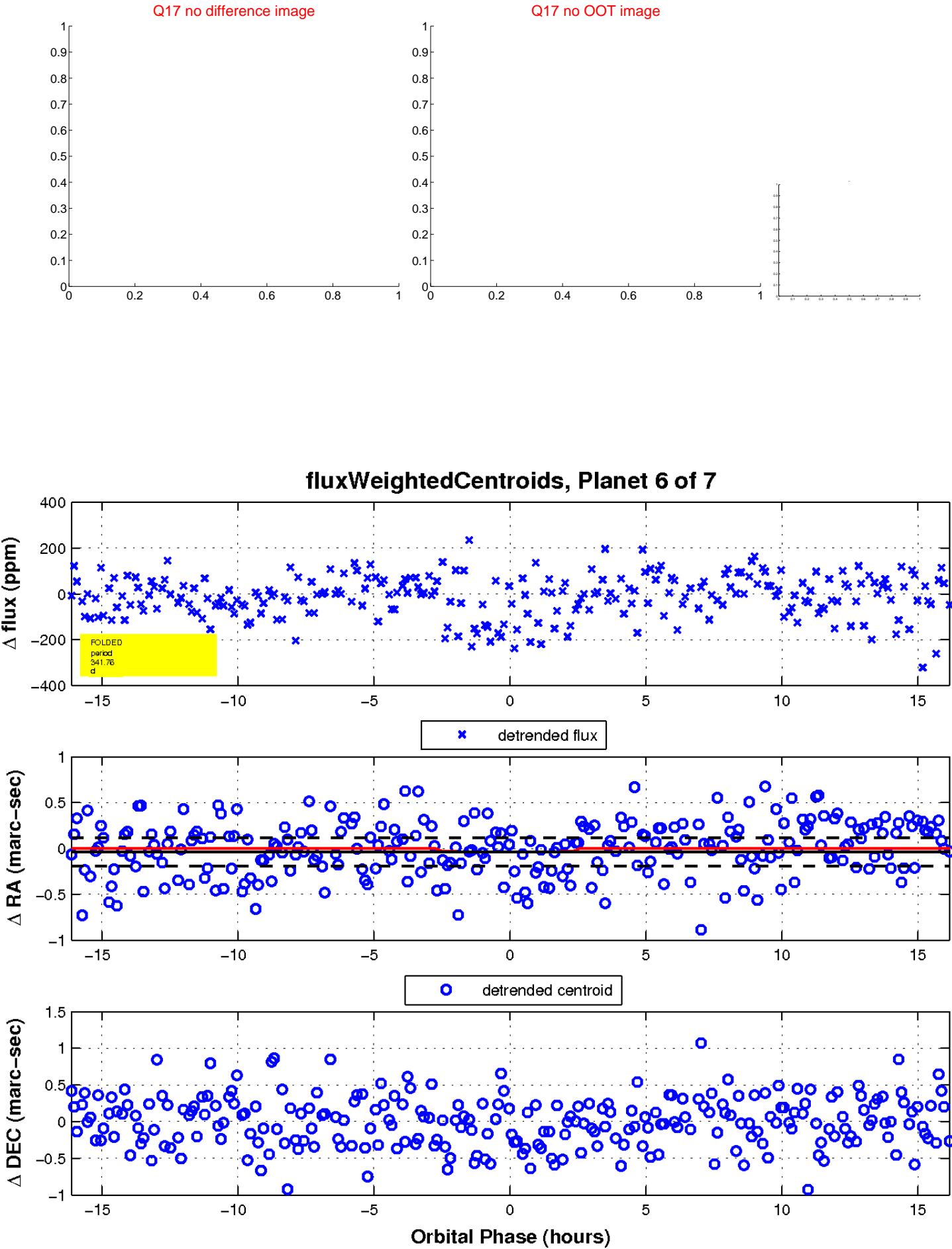
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

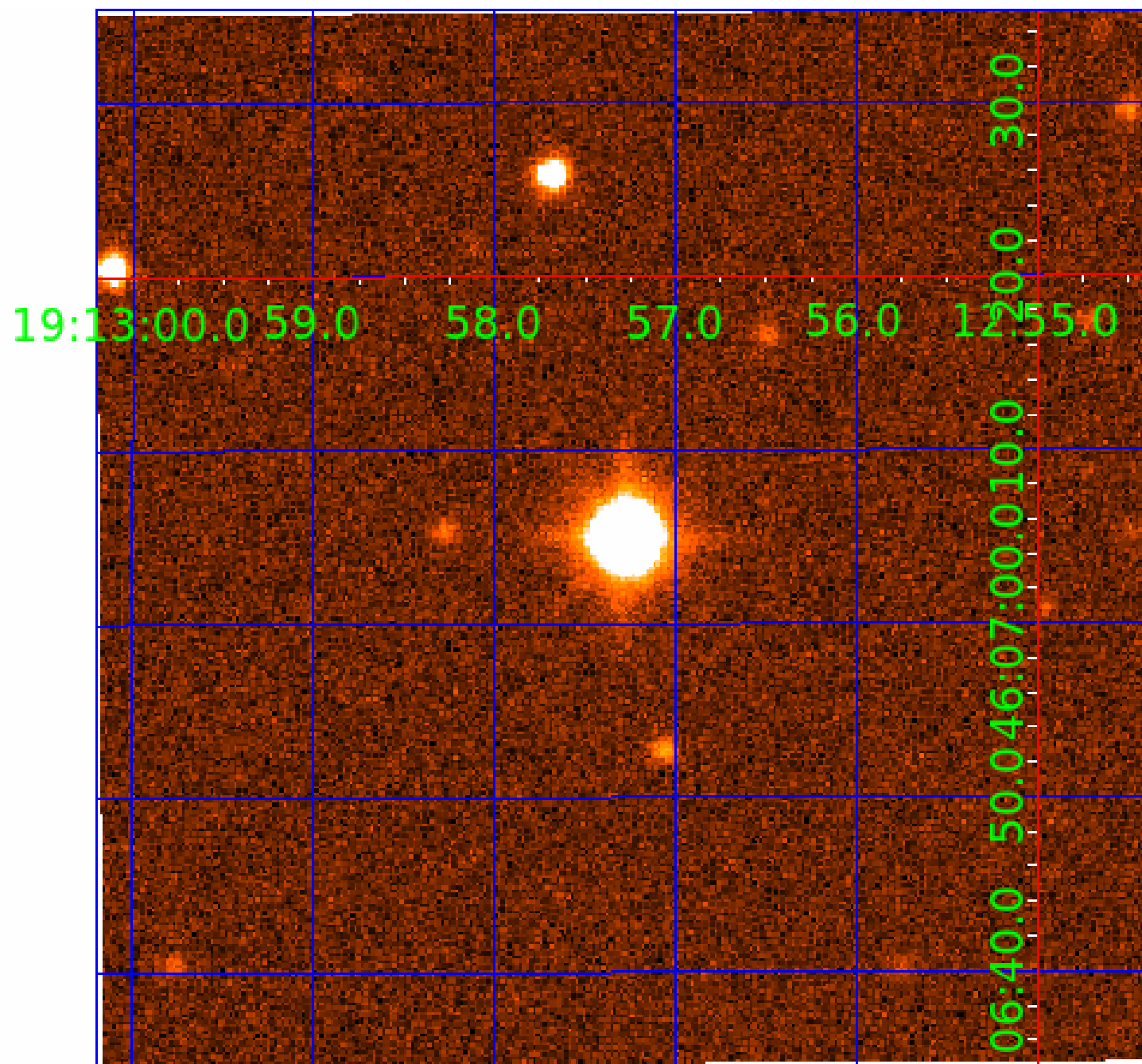


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 009518710

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009518710-01	OBS	3207.01	0.954328	132.488665	7.3	5.434	10.9	5.8	2.79	7056	0.77	31872.41
009518710-02	OBS	No	234.293932	139.664765	200.0	2.871	10.8	10.3	2.79	7056	4.38	20.73
009518710-03	OBS	No	21.258857	132.247946	61.6	3.971	8.0	6.9	2.79	7056	2.50	508.50
009518710-04	OBS	No	131.524599	184.773916	137.6	7.073	7.4	7.8	2.79	7056	3.58	44.77
009518710-05	OBS	No	95.052209	153.457127	162.4	3.175	7.9	7.4	2.79	7056	4.12	69.03
009518710-06	OBS	No	341.755025	167.131313	163.9	5.396	7.9	8.2	2.79	7056	4.01	12.53
009518710-07	OBS	No	46.248098	177.000352	71.9	5.711	7.7	6.6	2.79	7056	2.69	180.39

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009518710-01	OBS	FP	0.00	1	0	0	0	LPP_DV
009518710-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009518710-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_ZUMA—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009518710-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009518710-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT
009518710-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
009518710-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_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.

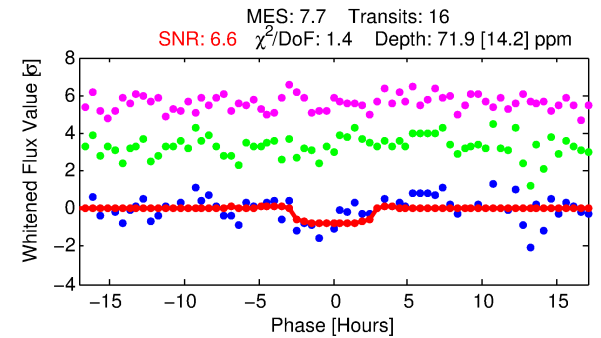
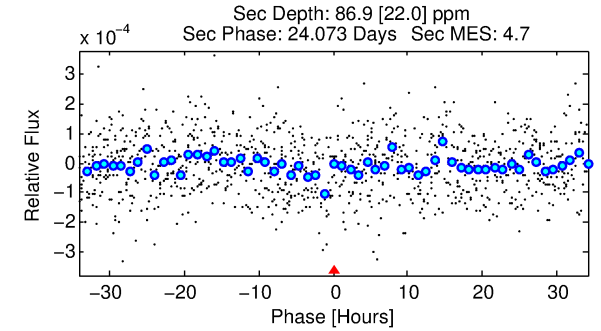
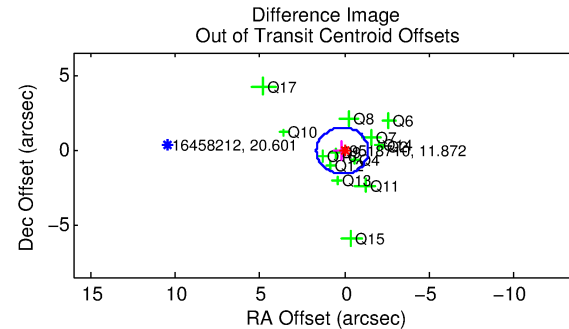
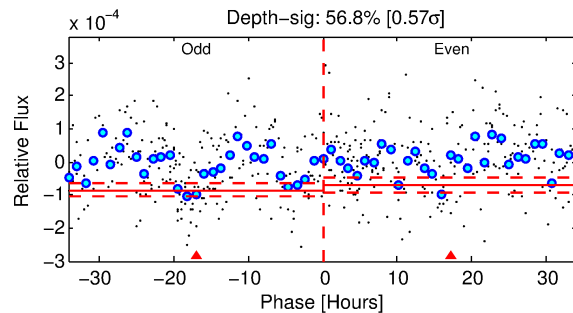
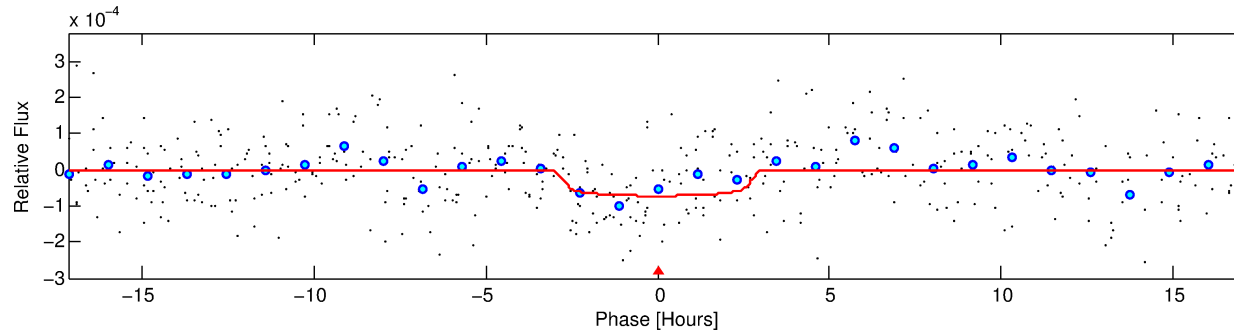
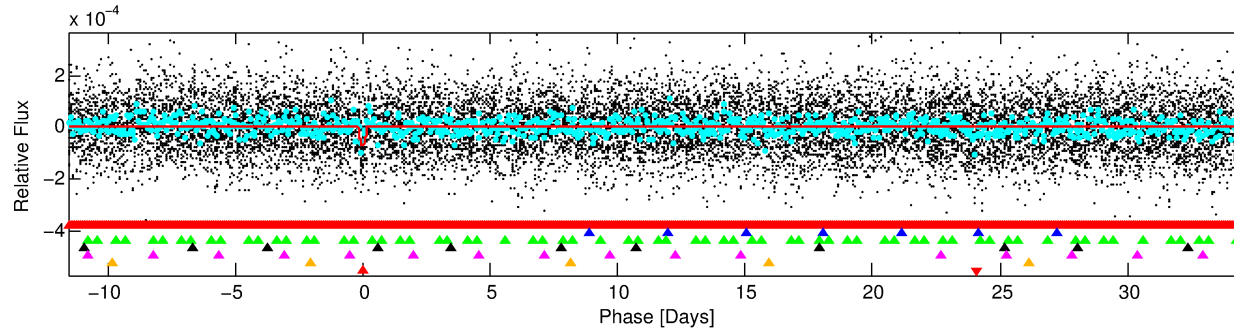
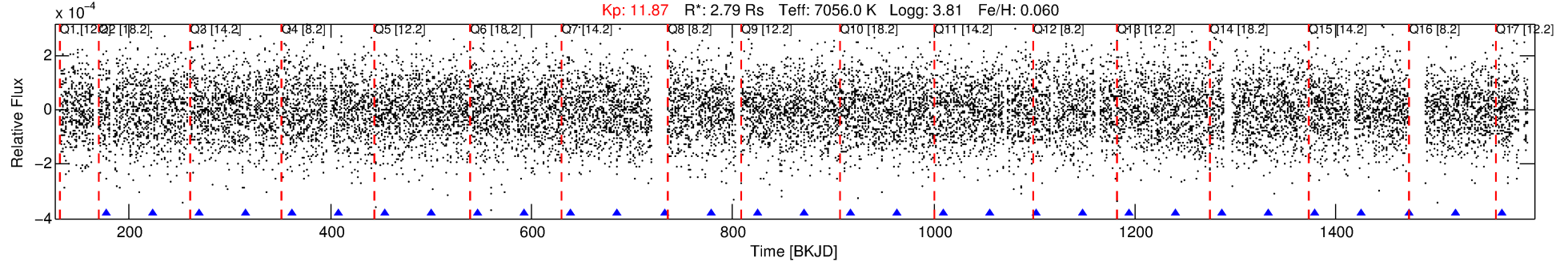
Ephemeris Match Information For 009518710-07

No Significant Match Found

# DV One-Page Summary

KIC: 9518710 Candidate: 7 of 7 Period: 46.248 d  
KOI: K03207 Corr: No Ephemeris Match

Kp: 11.87 R\*: 2.79 Rs Teff: 7056.0 K Logg: 3.81 Fe/H: 0.060



## DV Fit Results:

Period = 46.24810 [0.00087] d  
Epoch = 177.0004 [0.0165] BKJD  
Rp/R\* = 0.0088 [0.0048]  
a/R\* = 31.58 [103.67]  
b = 0.87 [0.92]  
Seff = 180.39 [85.02]  
Teq = 935 [110] K  
Rp = 2.69 [1.69] Re  
a = 0.3090 [0.0890] AU  
Ag = 631.18 [760.46] [0.83σ]  
Teffp = 7242 [2041] K [3.09σ]

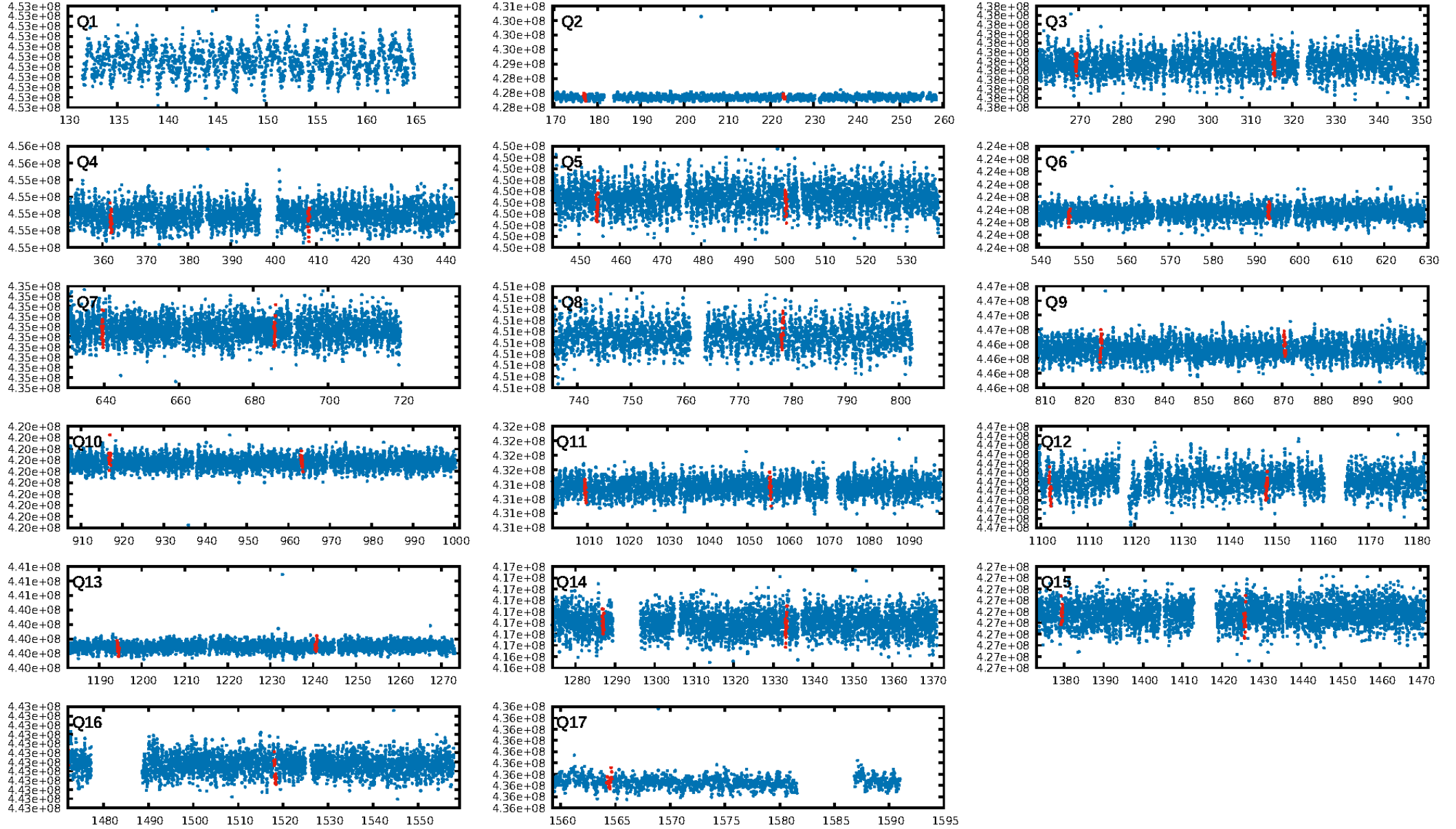
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [86.21σ]  
LongPeriod-sig: 100.0% [179.24σ]  
ModelChiSquare2-sig: 1.6%  
ModelChiSquareGe-sig: 100.0%  
Bootstrap-pfa: 6.15e-08  
RollingBand-fgt: 1.00 [15/15]  
GhostDiagnostic-chr: -69.39  
Centroid-sig: N/A  
Centroid-so: 1.471 arcsec [1.82σ]  
OotOffset-rm: 0.141 arcsec [0.27σ]  
KicOffset-rm: 0.165 arcsec [0.35σ]  
OotOffset-st: 4/3/4/3 [14]  
KicOffset-st: 4/3/4/3 [14]  
DiffImageQuality-fgm: 0.36 [5/14]  
DiffImageOverlap-fno: 0.00 [0/16]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 16:33:39 Z

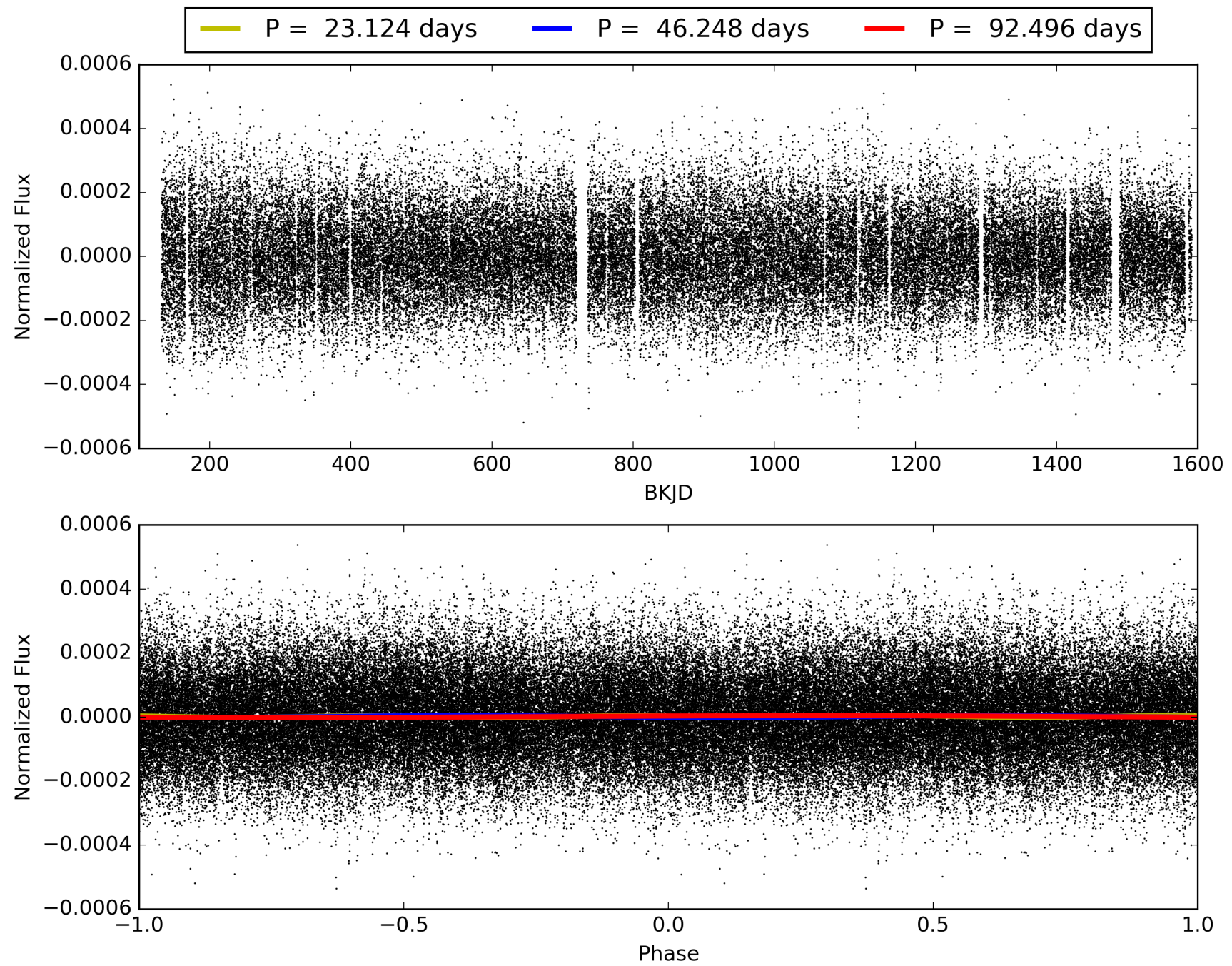
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 009518710-07, PDC Light Curves





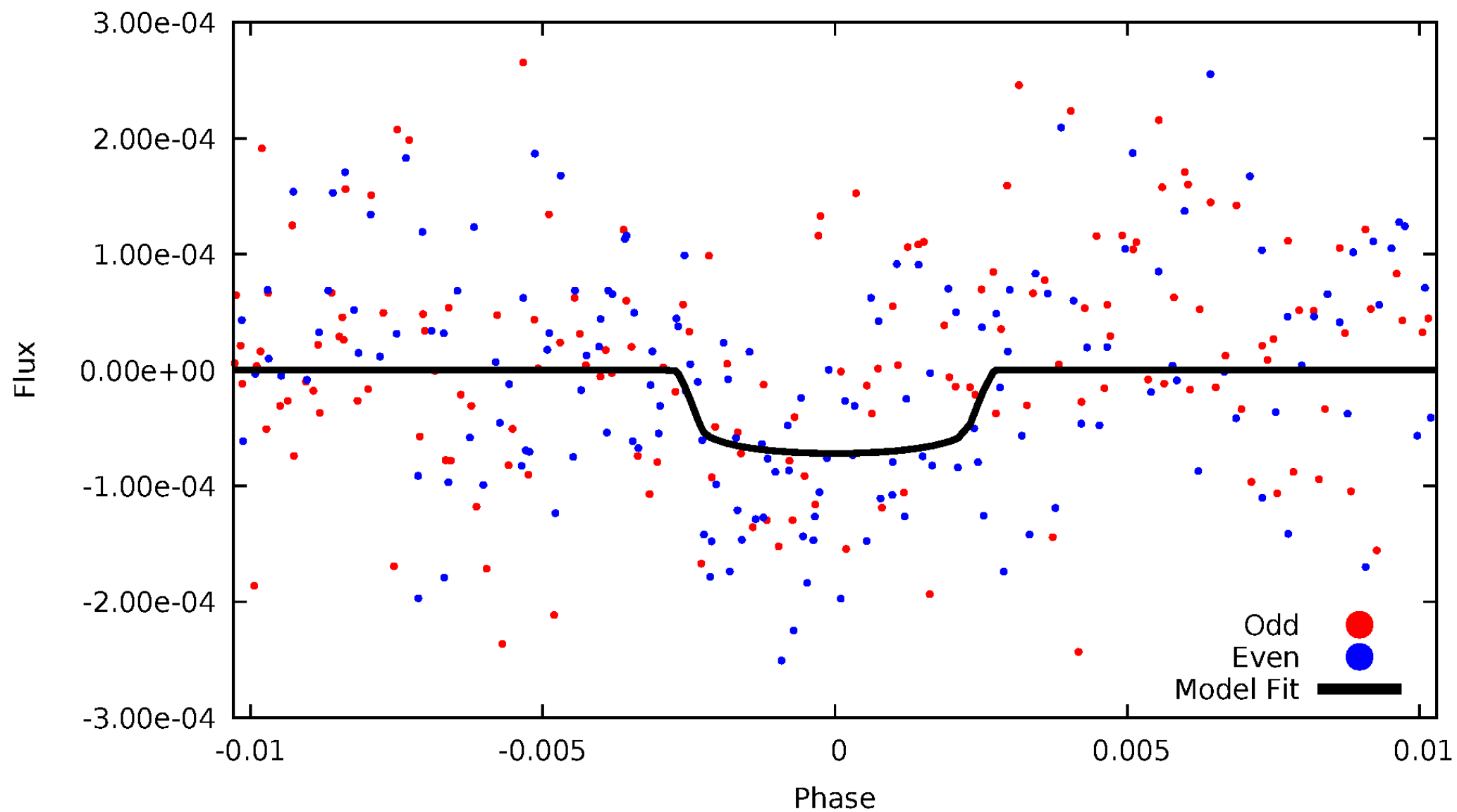
TCE 009518710-07





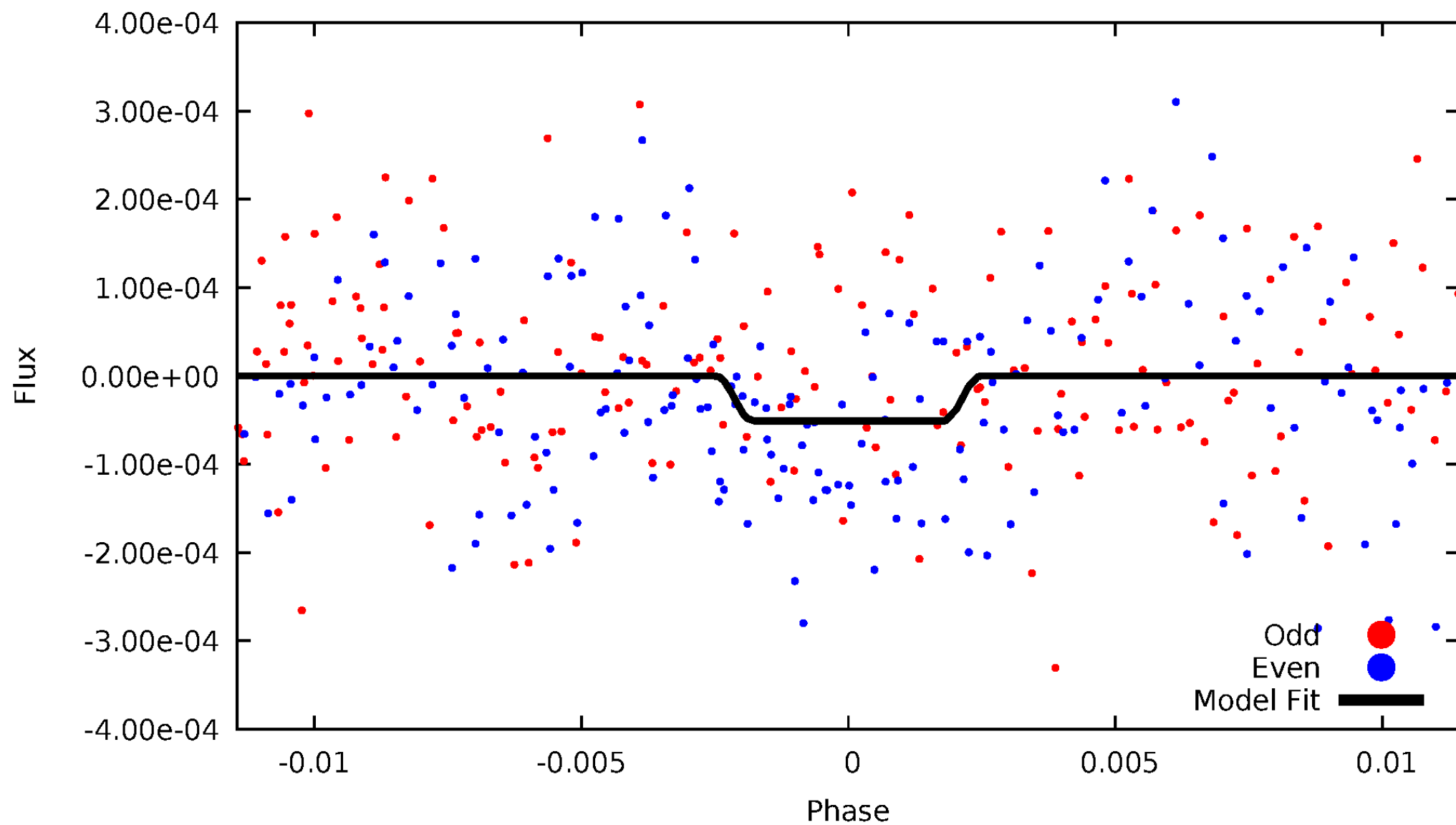
# DV Odd/Even

TCE 009518710-07



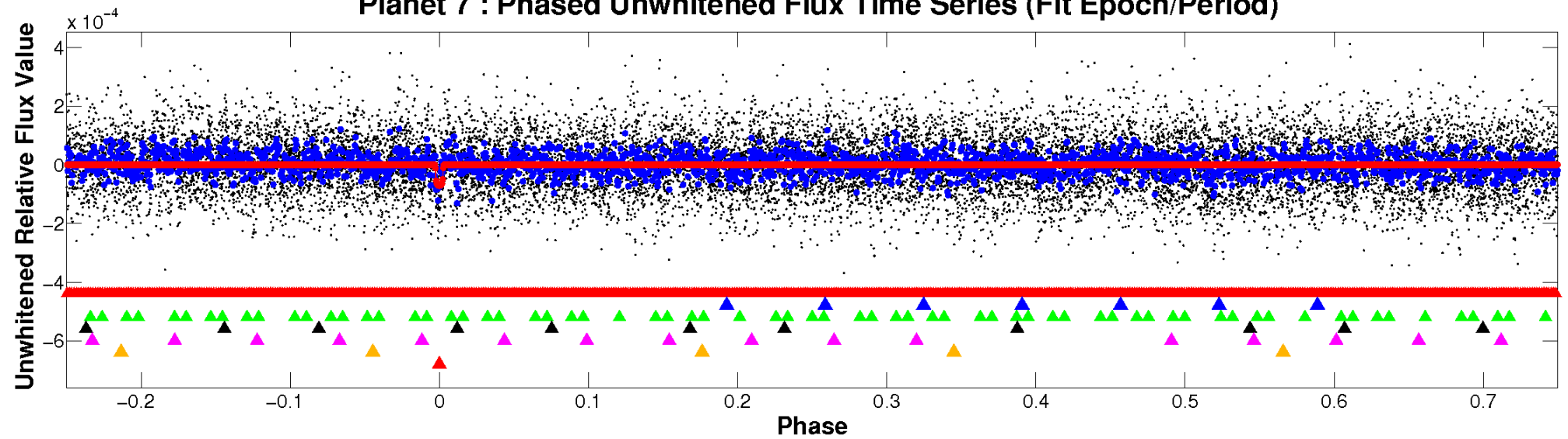
# ALT Odd/Even

TCE 009518710-07

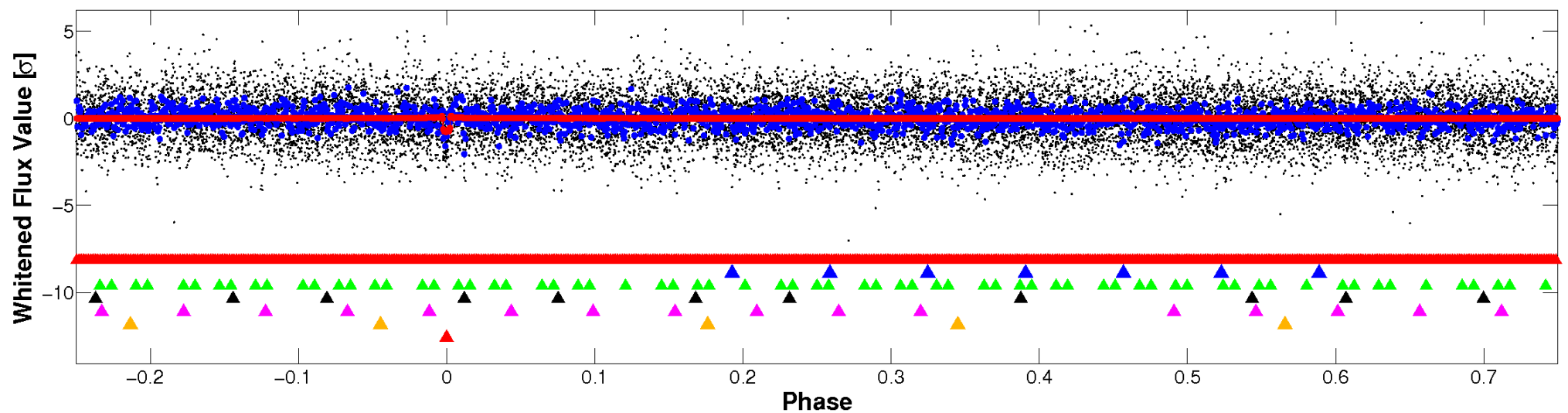


# Non-Whitened Vs. Whitened Light Curve

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

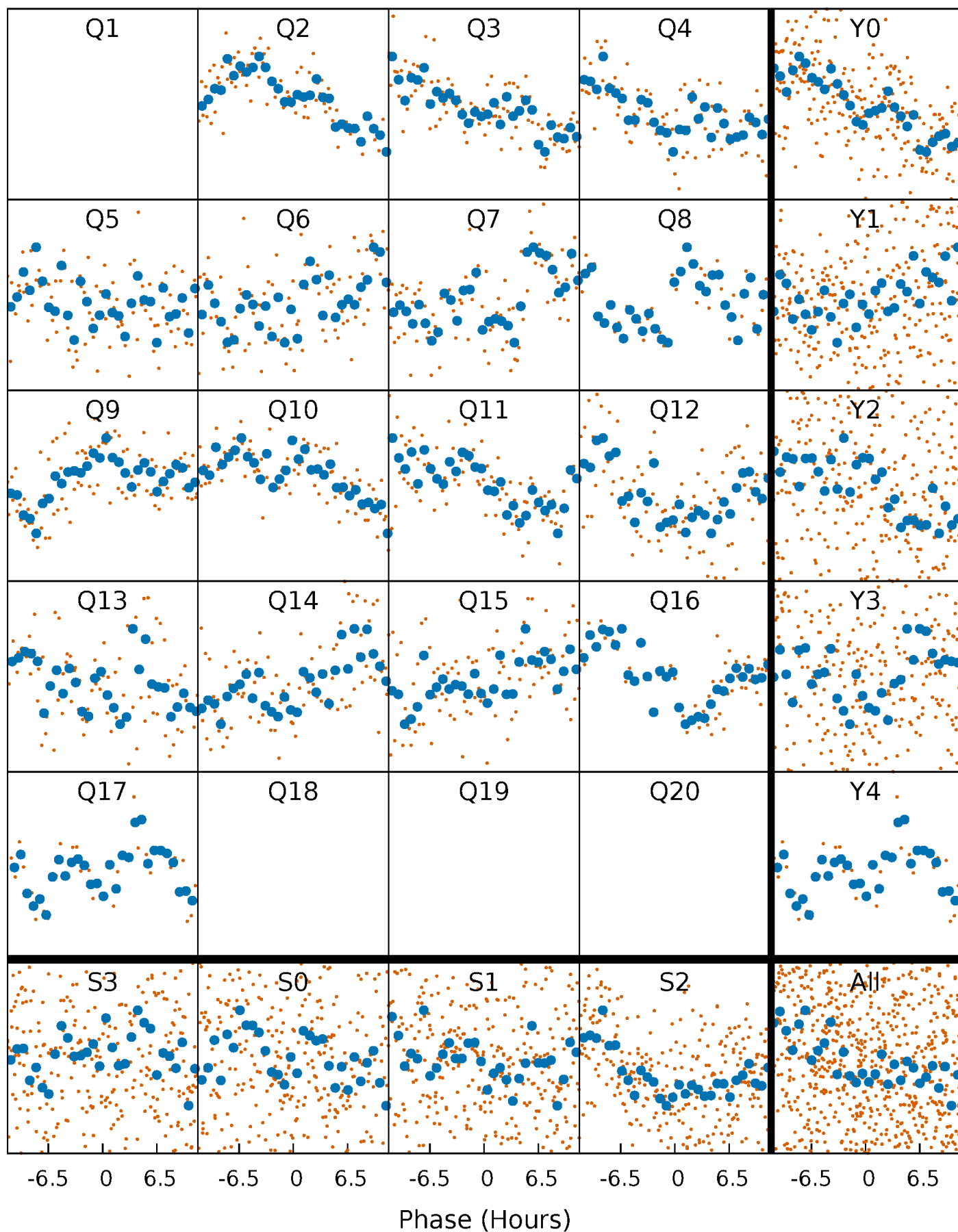


## Planet 7 : Phased Whitened Flux Time Series (Fit Epoch/Period)



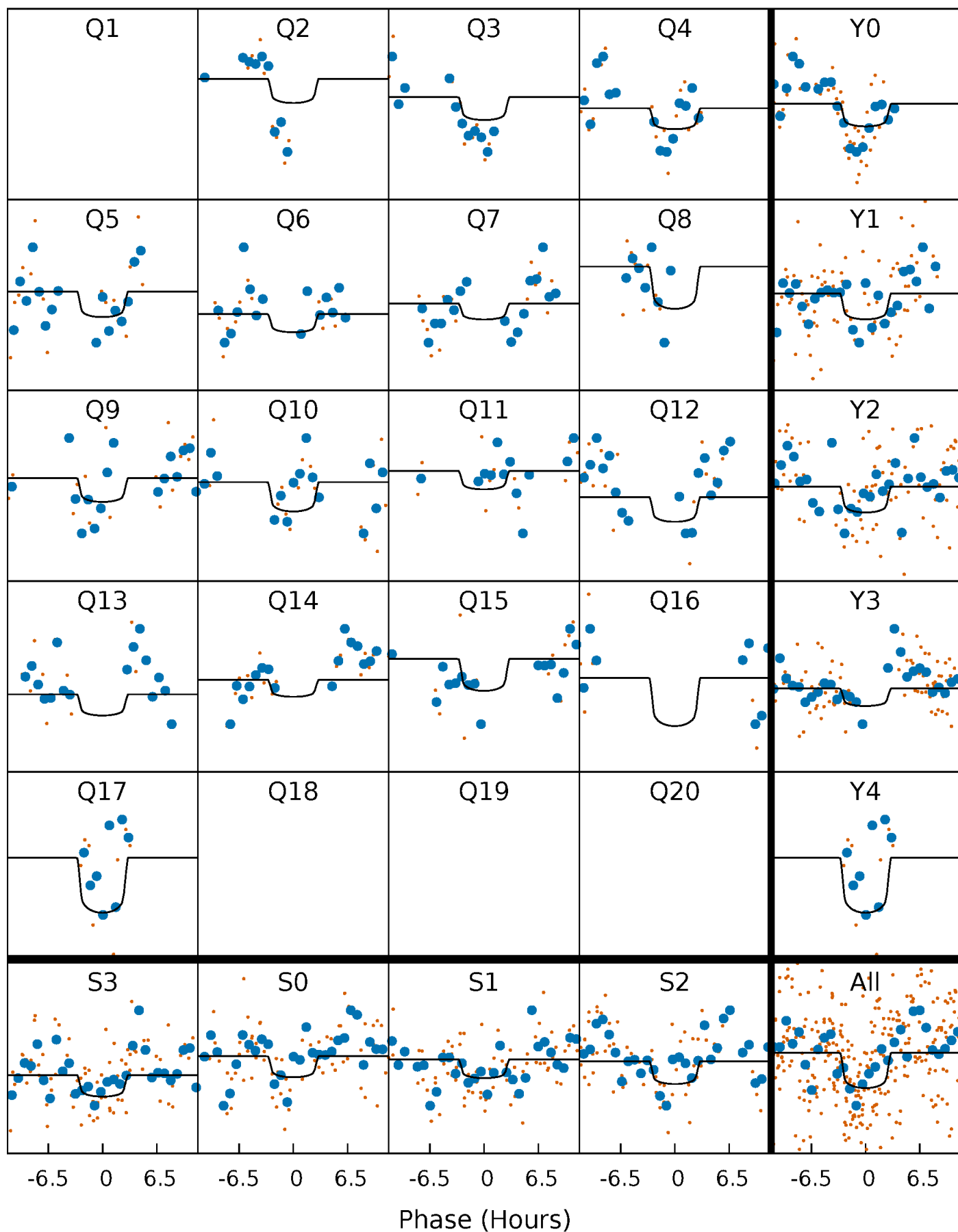
# PDC Quarter-Phased Transit Curves

TCE 009518710-07     $P = 46.248098$  Days     $T_0 = 177.000352$  (BKJD)



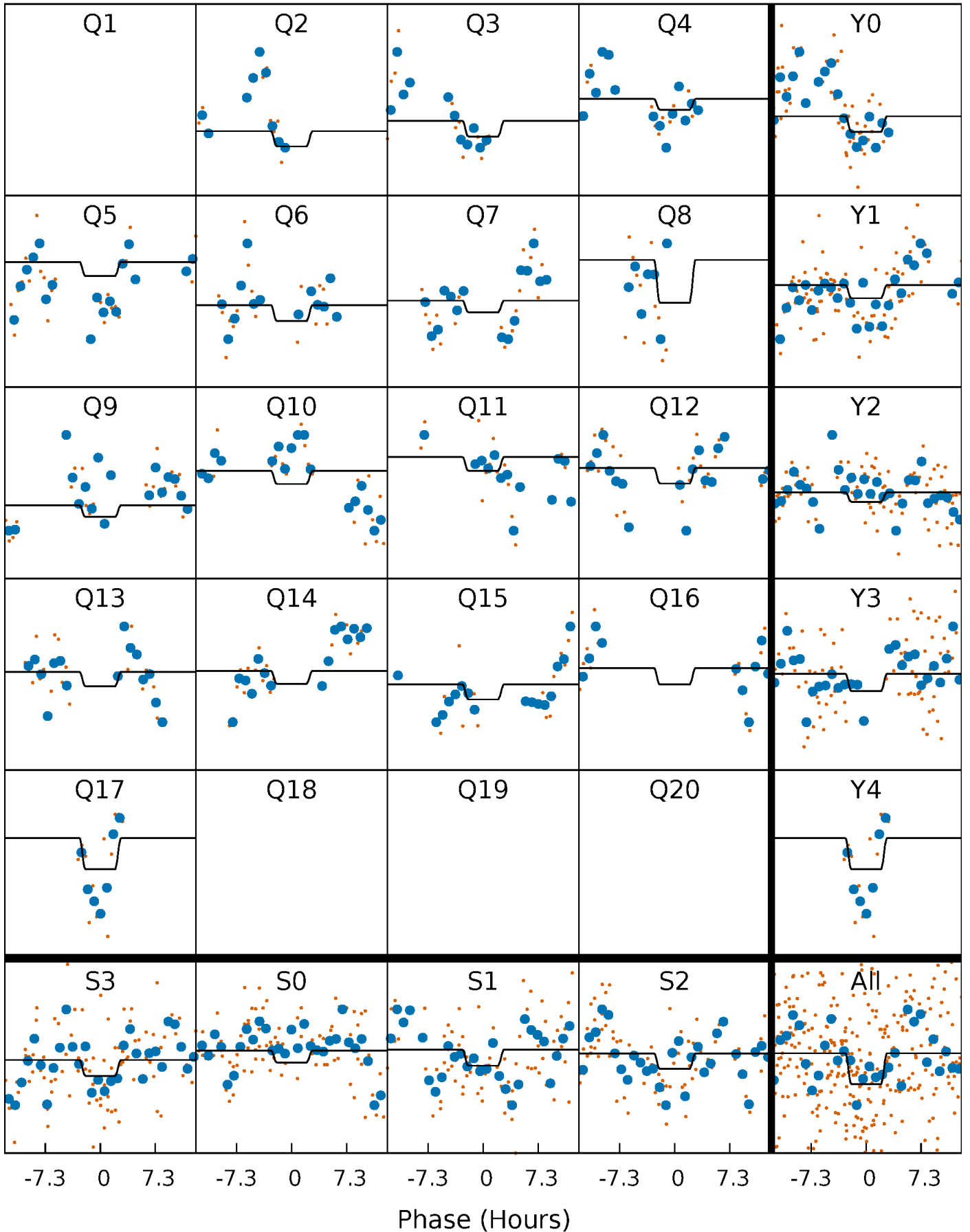
# DV Quarter-Phased Transit Curves

TCE 009518710-07     $P = 46.248098$  Days     $T_0 = 177.000352$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

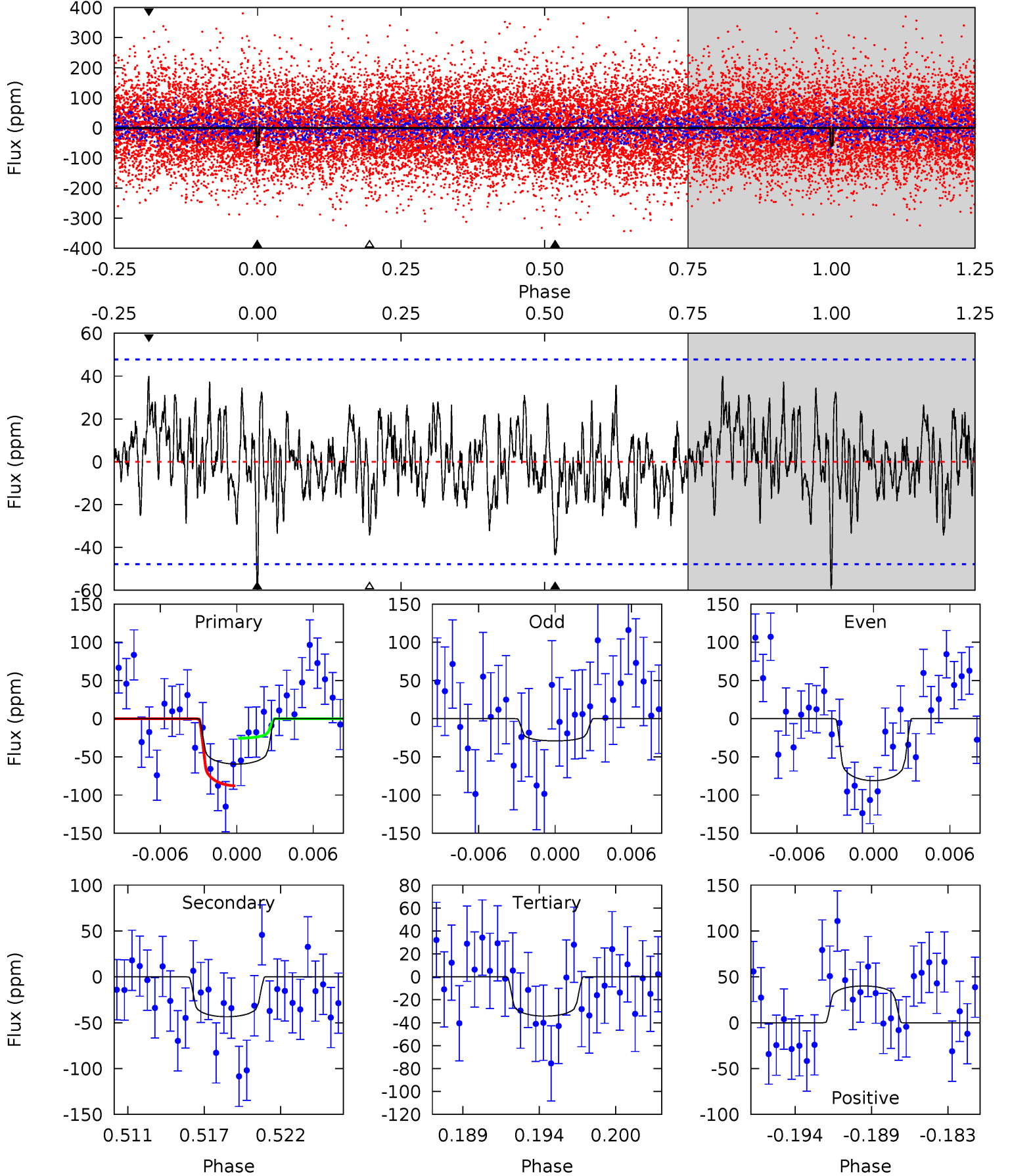
TCE 009518710-07     $P = 46.248093$  Days     $T_0 = 177.013882$  (BKJD)



# DV Model-Shift Uniqueness Test

009518710-07, P = 46.248098 Days, E = 130.752254 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
6.38	4.68	3.69	4.30	5.14	2.77	1.42	2.70	2.09	0.99	0.38	2.75	0.98	0.40	3.34

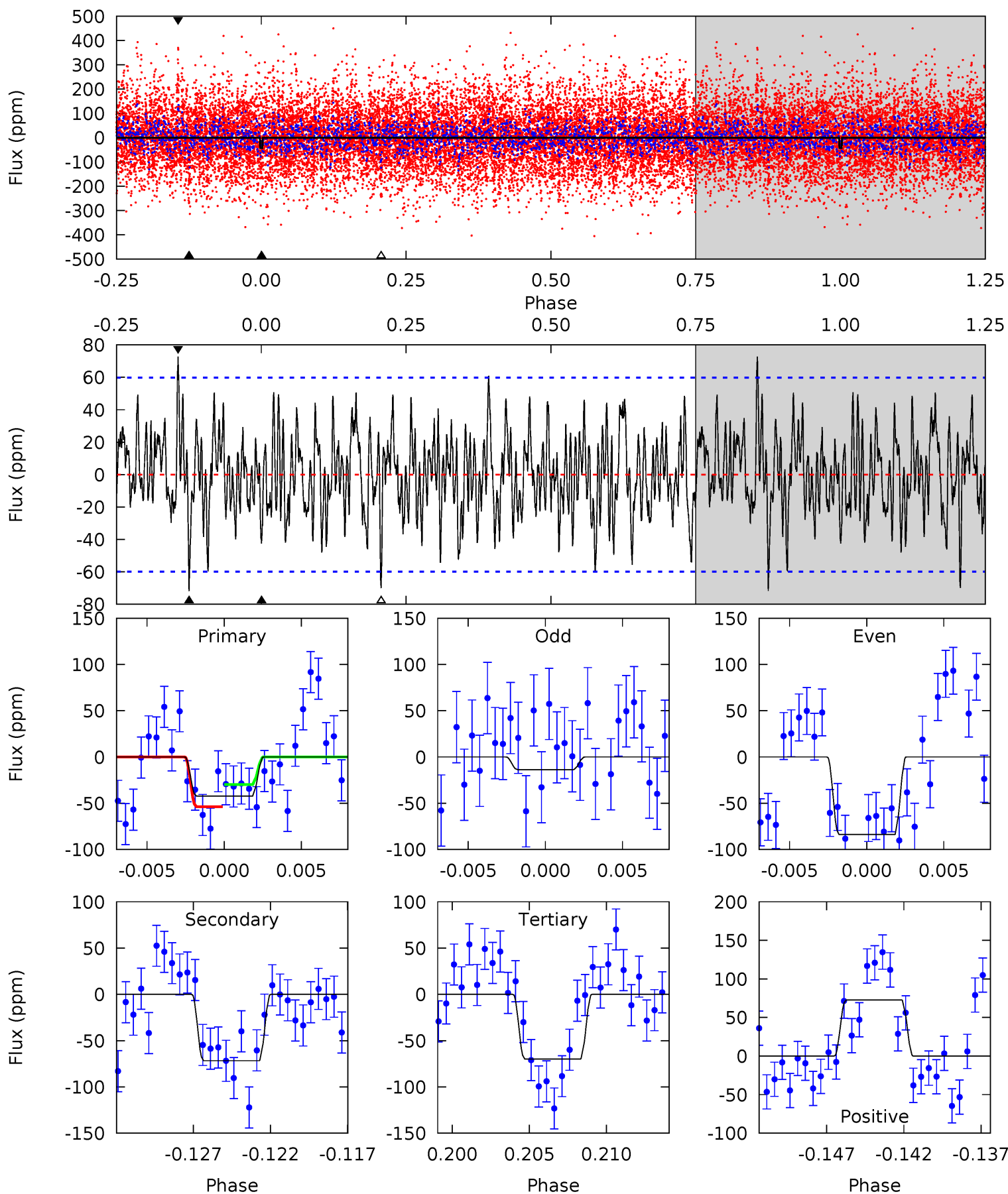




# Alt Model-Shift Uniqueness Test

009518710-07, P = 46.248093 Days, E = 130.765789 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
3.66	6.18	6.03	6.27	5.16	2.81	1.91	-2.37	-2.61	0.15	-0.08	3.01	0.87	0.50	1.03



### Stellar Parameters For KIC 009518710

	$T_{\text{eff}} (K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7056^{+169}_{-253}$	$3.813^{+0.259}_{-0.111}$	$0.060^{+0.200}_{-0.300}$	$2.785^{+0.469}_{-0.871}$	$1.836^{+0.191}_{-0.354}$	$0.120^{+0.195}_{-0.041}$
	+2%/-4%	+7%/-3%	+333%/-500%	+17%/-31%	+10%/-19%	+163%/-34%
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 009518710-07 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-44 \pm 9$	$2.53^{+1.49}_{-1.23}$	$1280^{+80}_{-101}$	$5984^{+2565}_{-1077}$	$350^{+886}_{-210}$
Alt.	$-72 \pm 12$	$2.16^{+1.35}_{-1.26}$	$1285^{+81}_{-109}$	$7437^{+6579}_{-1531}$	$790^{+3849}_{-496}$

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

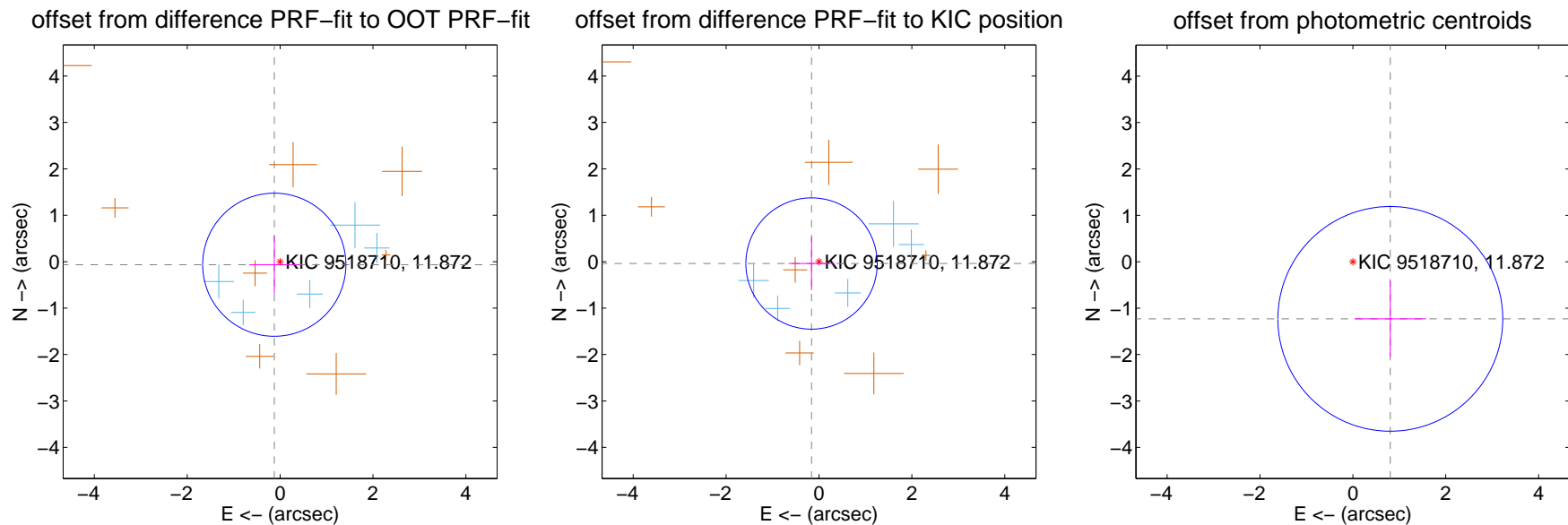
## DV Centroid Data

Supplemental centroid analysis for 009518710-07. **Kepler magnitude: 11.87.** Transit SNR 6.60

There are 5 quarters with good PRF difference image offsets

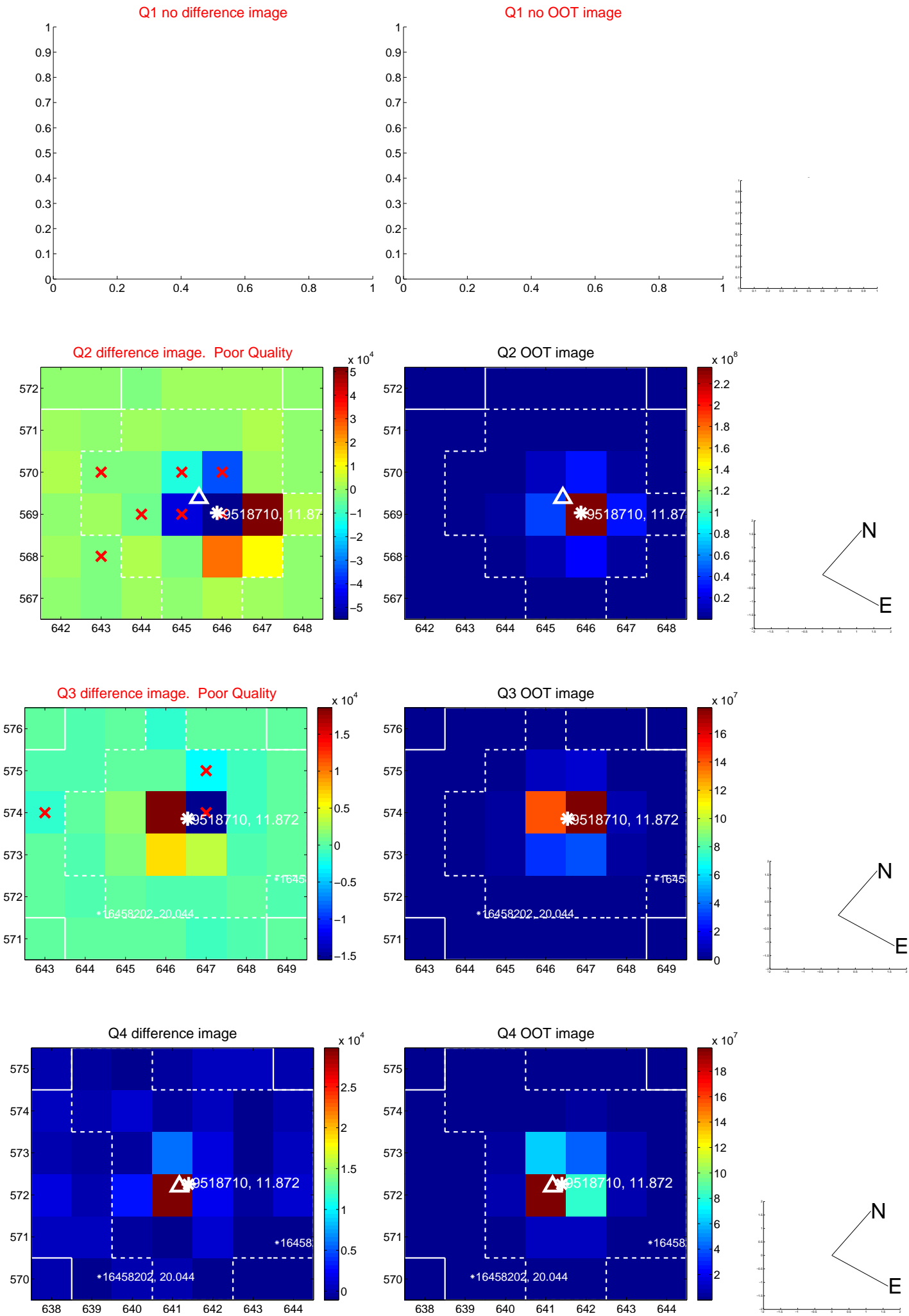
The direct PRF centroid is offset from the target star catalog position by about 0.08 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.141 \pm 0.514$	0.27	$0.125 \pm 0.539$	$-0.065 \pm 0.621$
PRF-fit source offset from KIC position	$0.165 \pm 0.471$	0.35	$0.160 \pm 0.493$	$-0.039 \pm 0.574$
photometric centroid source offset	$1.47 \pm 0.81$	1.82	$-0.81 \pm 0.77$	$-1.23 \pm 0.82$

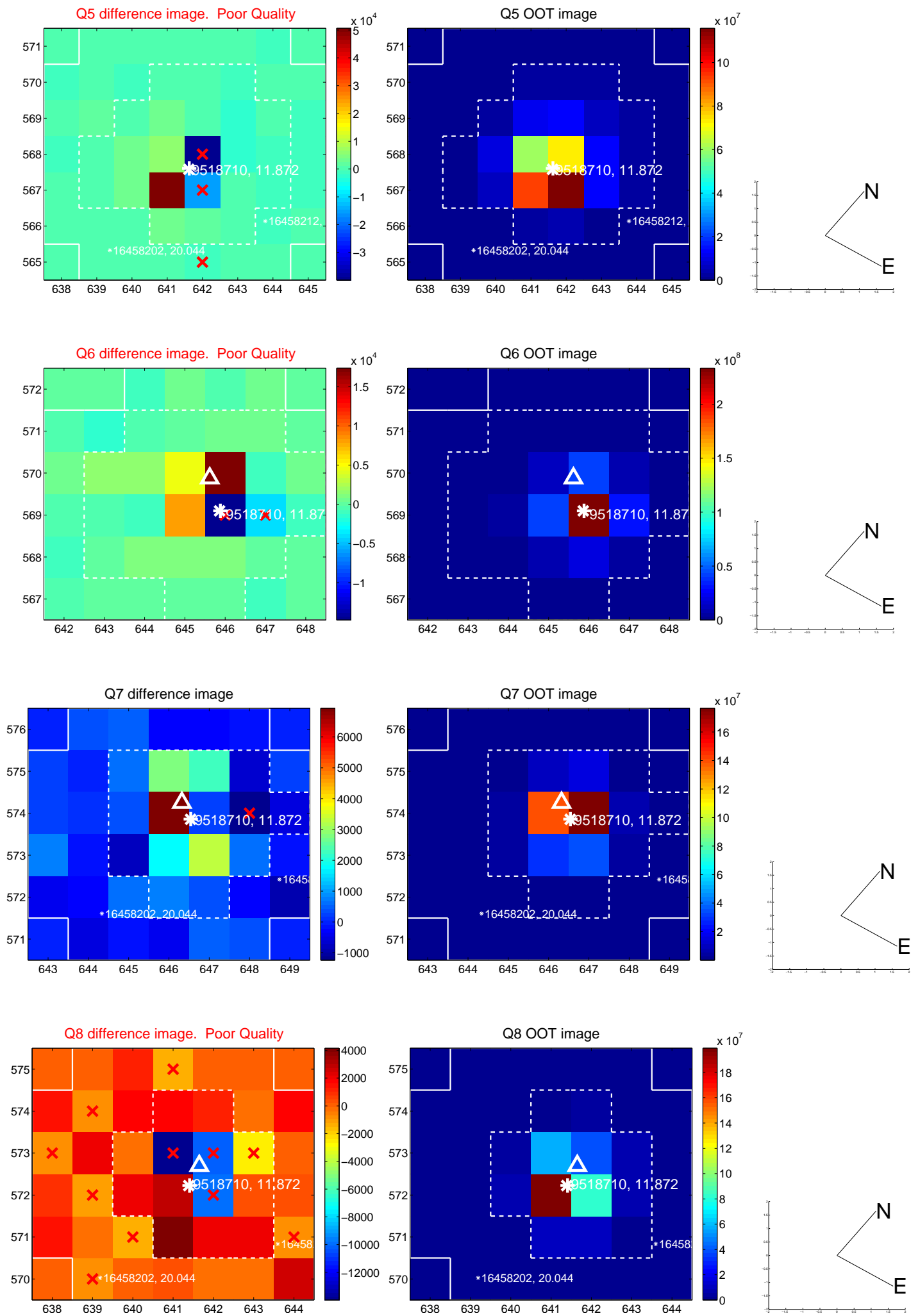


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

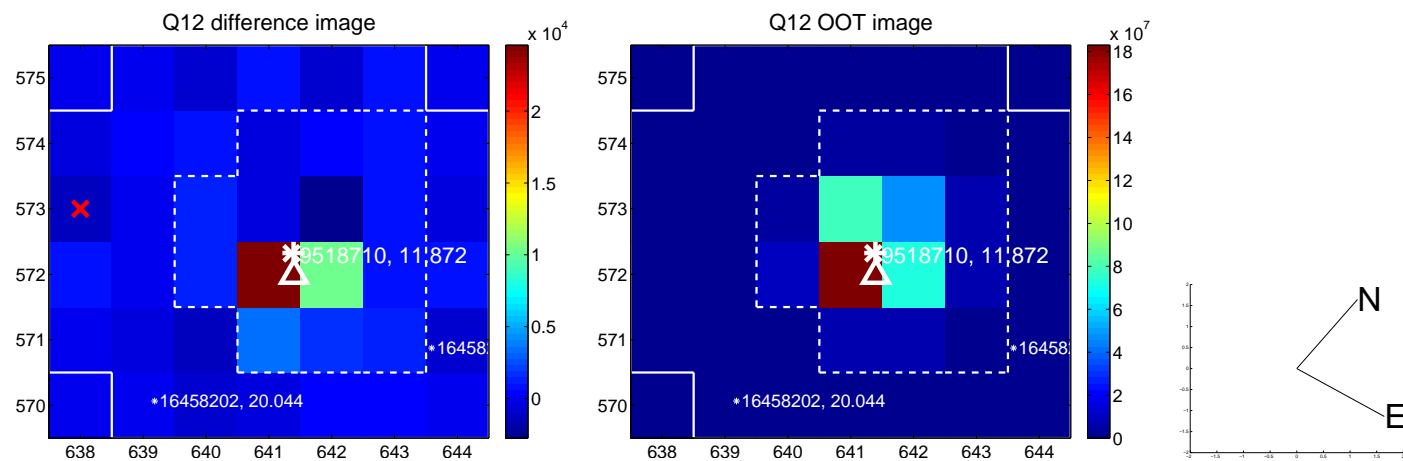
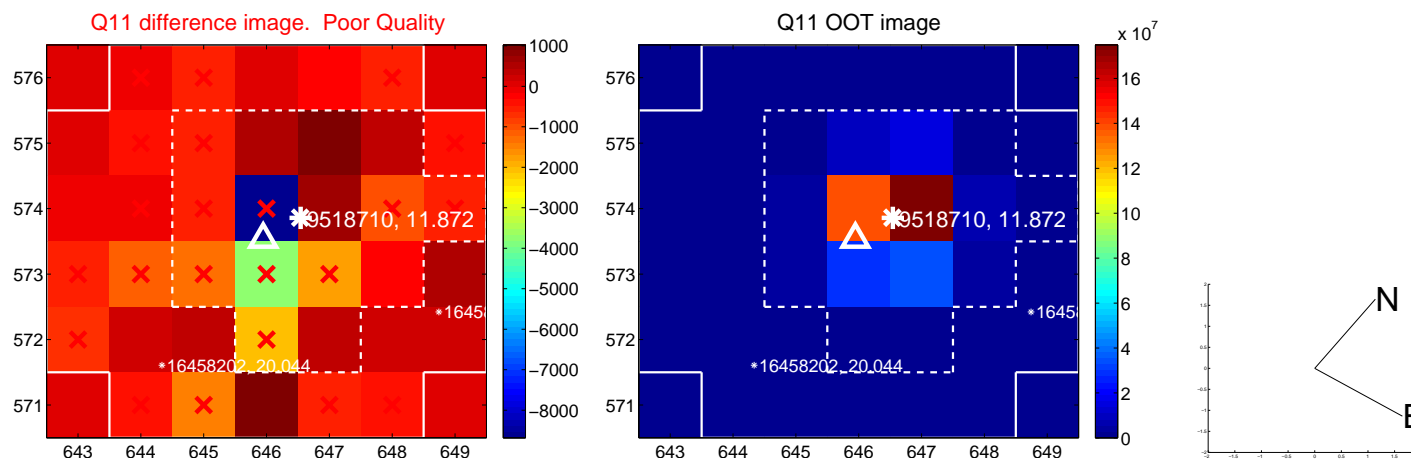
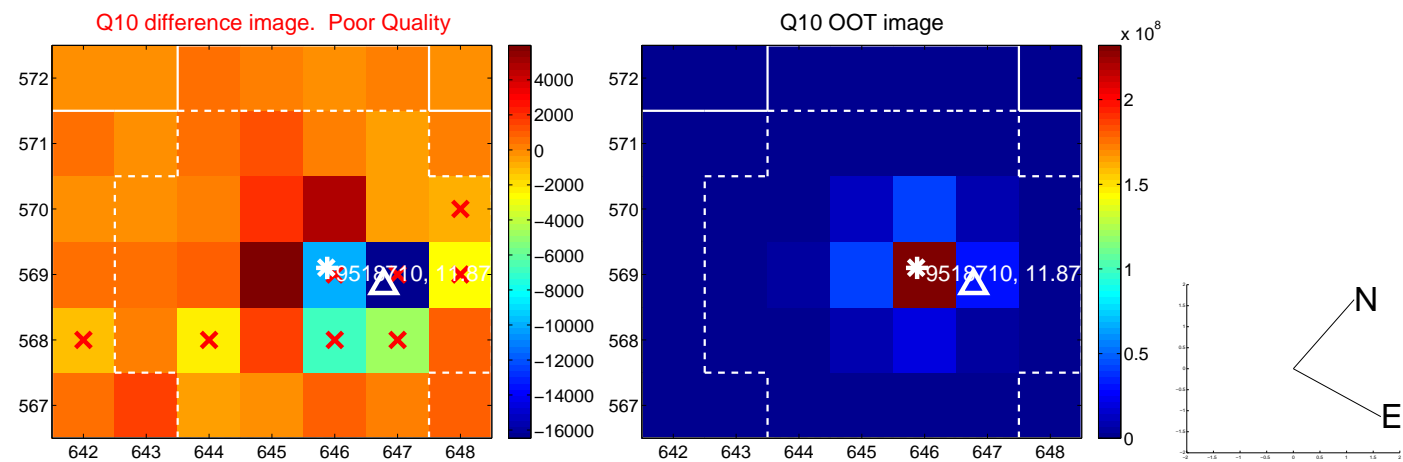
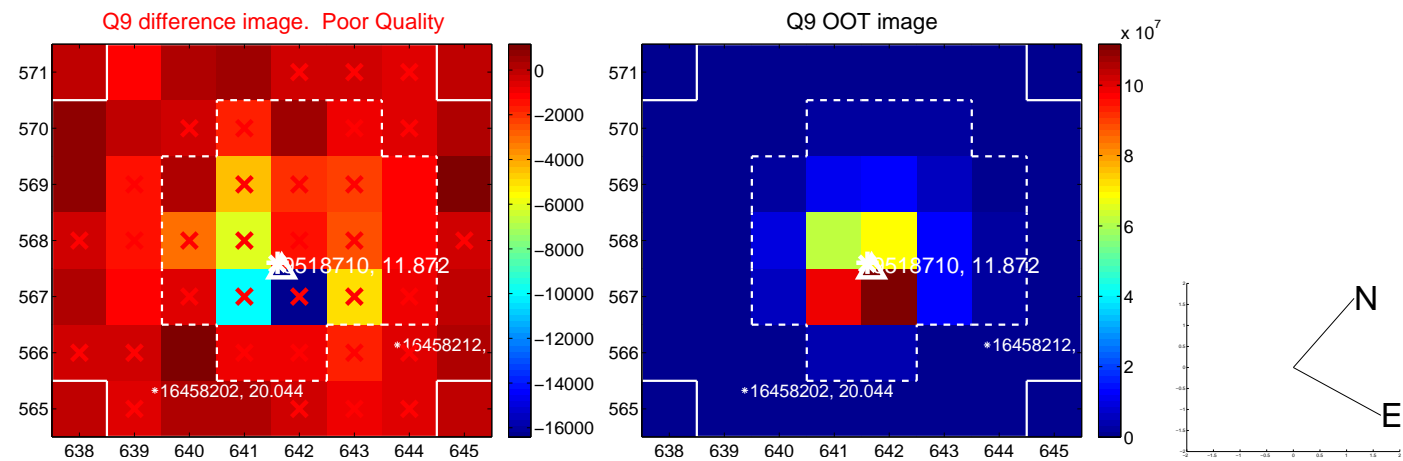
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



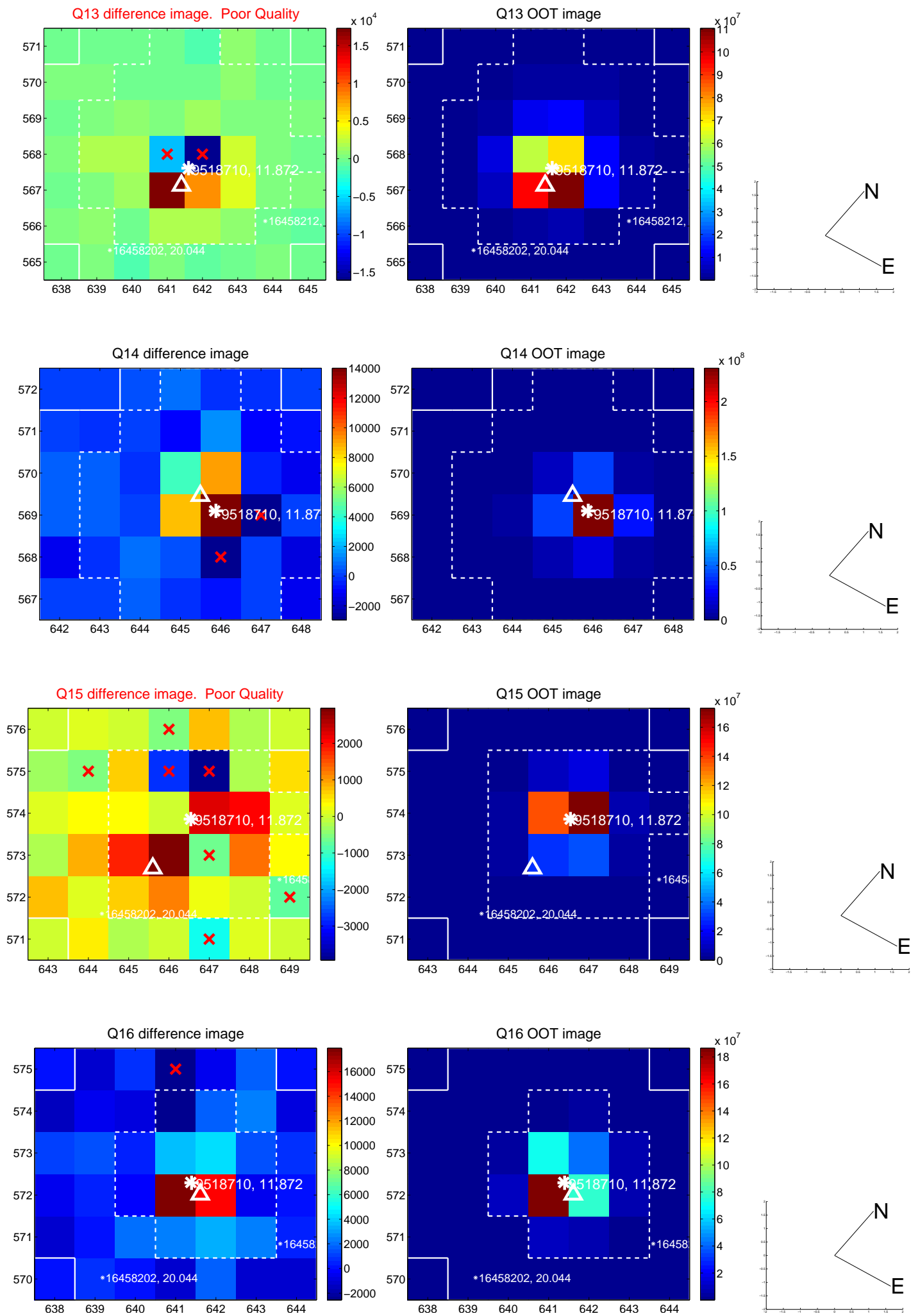
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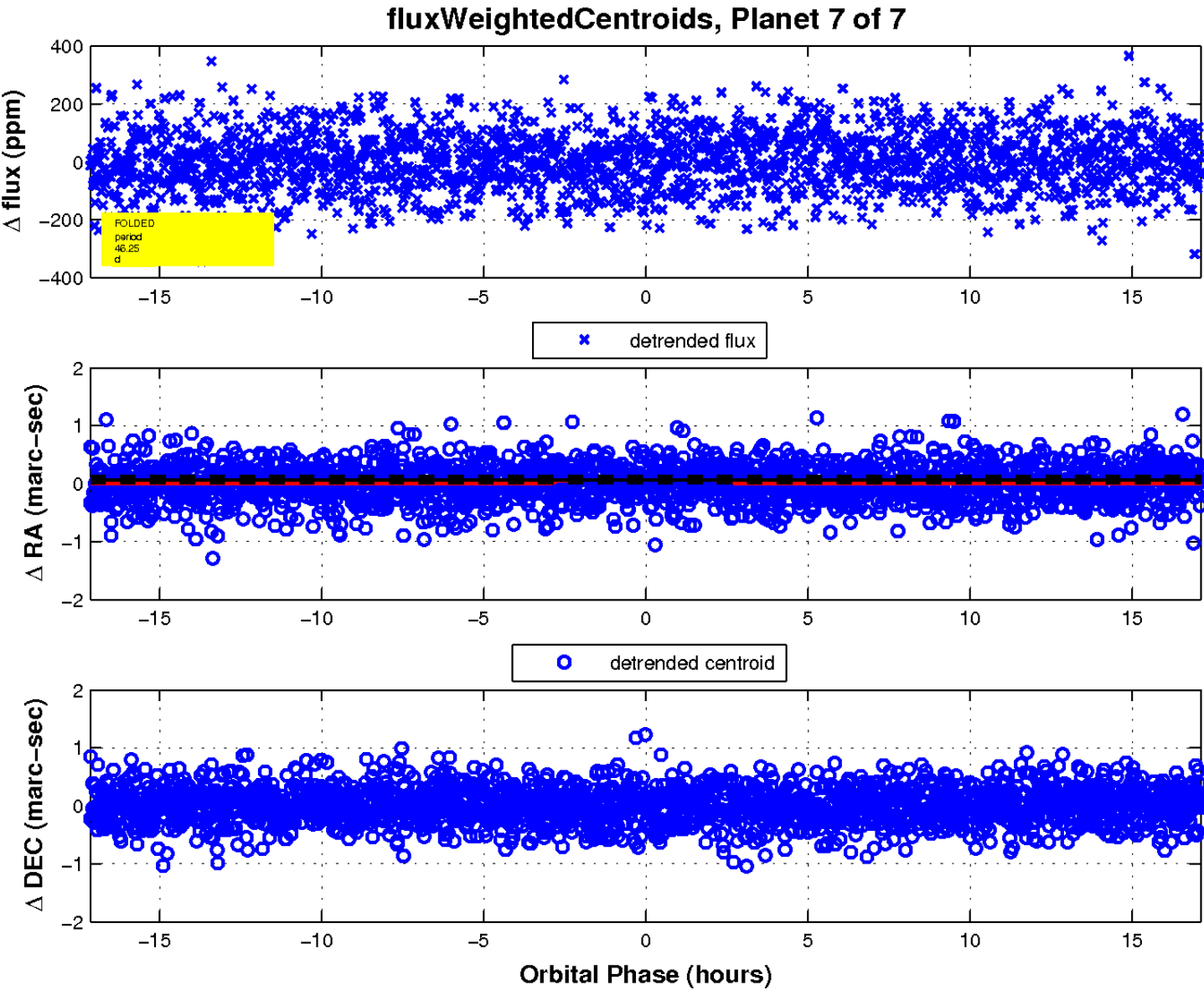
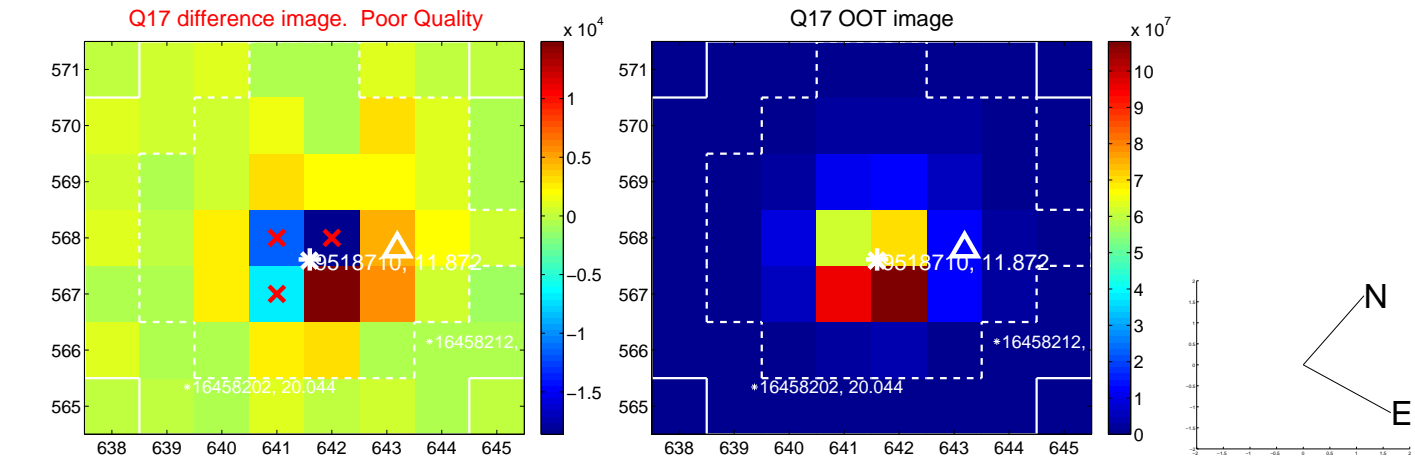
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white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image

Declination

