

# KIC 004650137

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004650137-01	OBS	No	1.056731	132.048022	19.9	3.443	8.1	7.9	4.35	7128	2.27	66426.10
004650137-02	OBS	No	0.528354	131.783556	17.8	3.449	9.0	9.9	4.35	7128	2.15	0.00
004650137-03	OBS	No	30.983029	151.404981	376.2	1.177	12.6	13.1	4.35	7128	8.75	734.73
004650137-04	OBS	No	15.954549	132.079704	227.8	2.521	11.3	11.6	4.35	7128	7.44	1780.10
004650137-05	OBS	No	4.805716	133.000068	96.6	2.358	10.6	8.4	4.35	7128	5.00	8816.19
004650137-06	OBS	No	34.748958	163.778320	284.5	2.777	10.5	10.8	4.35	7128	8.31	630.52

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004650137-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
004650137-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—SAME_NTL_PERIOD
004650137-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—HALO_GHOST
004650137-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
004650137-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004650137-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

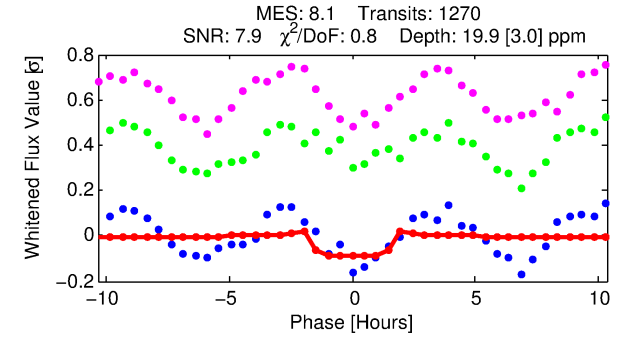
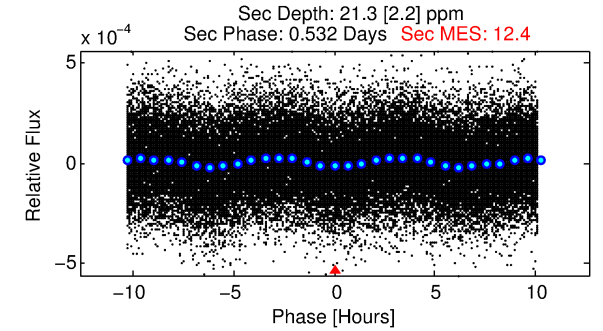
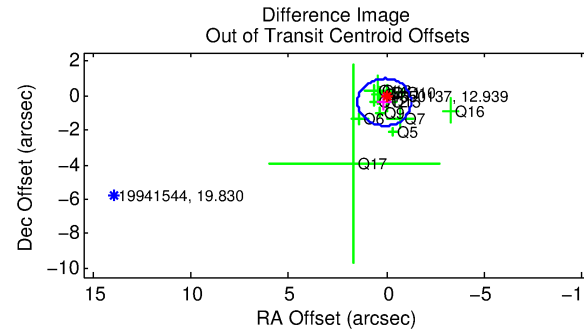
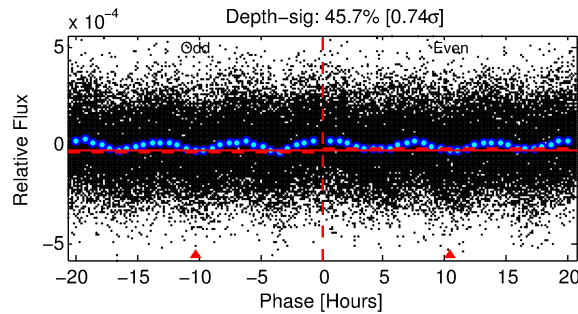
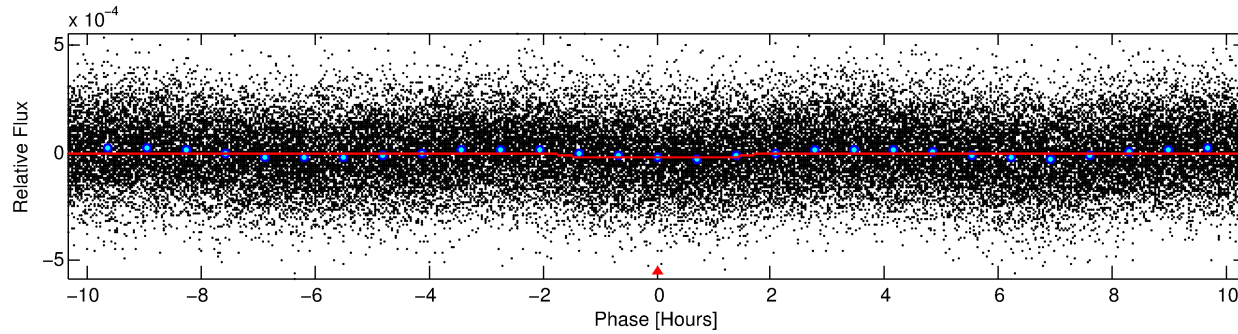
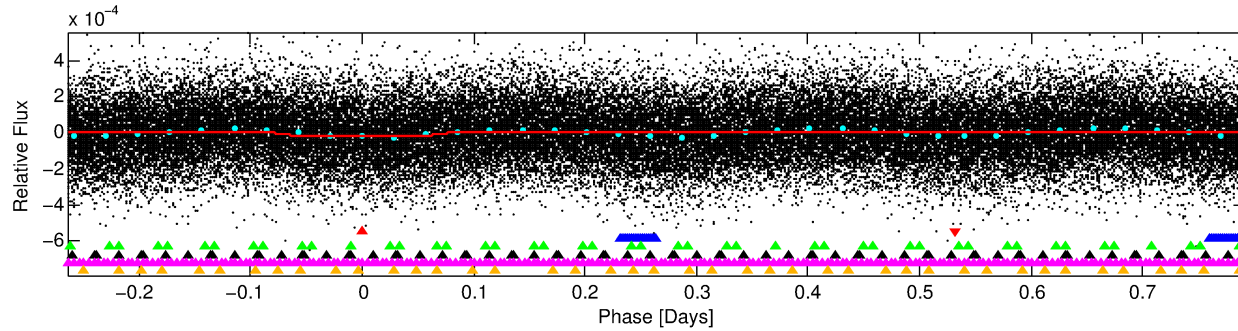
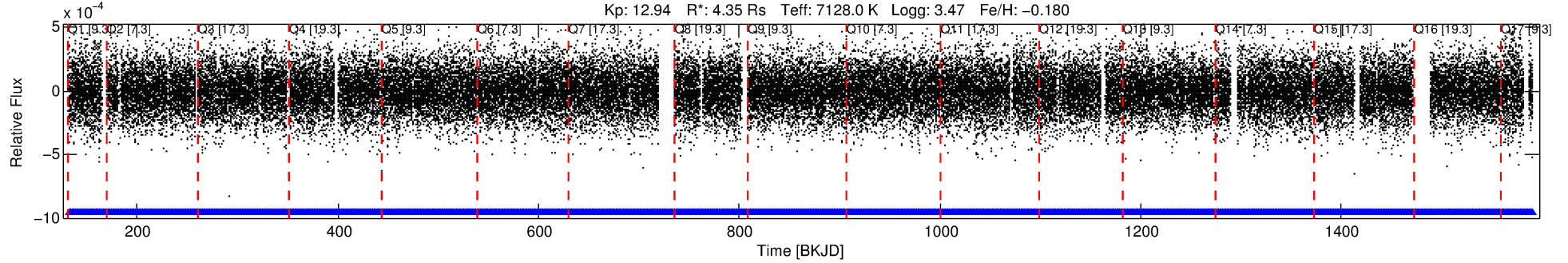
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004650137-01

No Significant Match Found

# DV One-Page Summary

KIC: 4650137 Candidate: 1 of 6 Period: 1.057 d



## DV Fit Results:

Period = 1.05673 [0.00001] d  
Epoch = 132.0480 [0.0036] BKJD  
Rp/R\* = 0.0048 [0.0013]  
a/R\* = 1.41 [1.08]  
b = 0.90 [0.33]  
Seff = 66426.10 [40681.46]  
Teq = 4094 [627] K  
Rp = 2.27 [1.09] Re  
a = 0.0257 [0.0096] AU  
Ag = 1.49 [1.22] [0.40 $\sigma$ ]  
Teffp = 6993 [1009] K [2.44 $\sigma$ ]

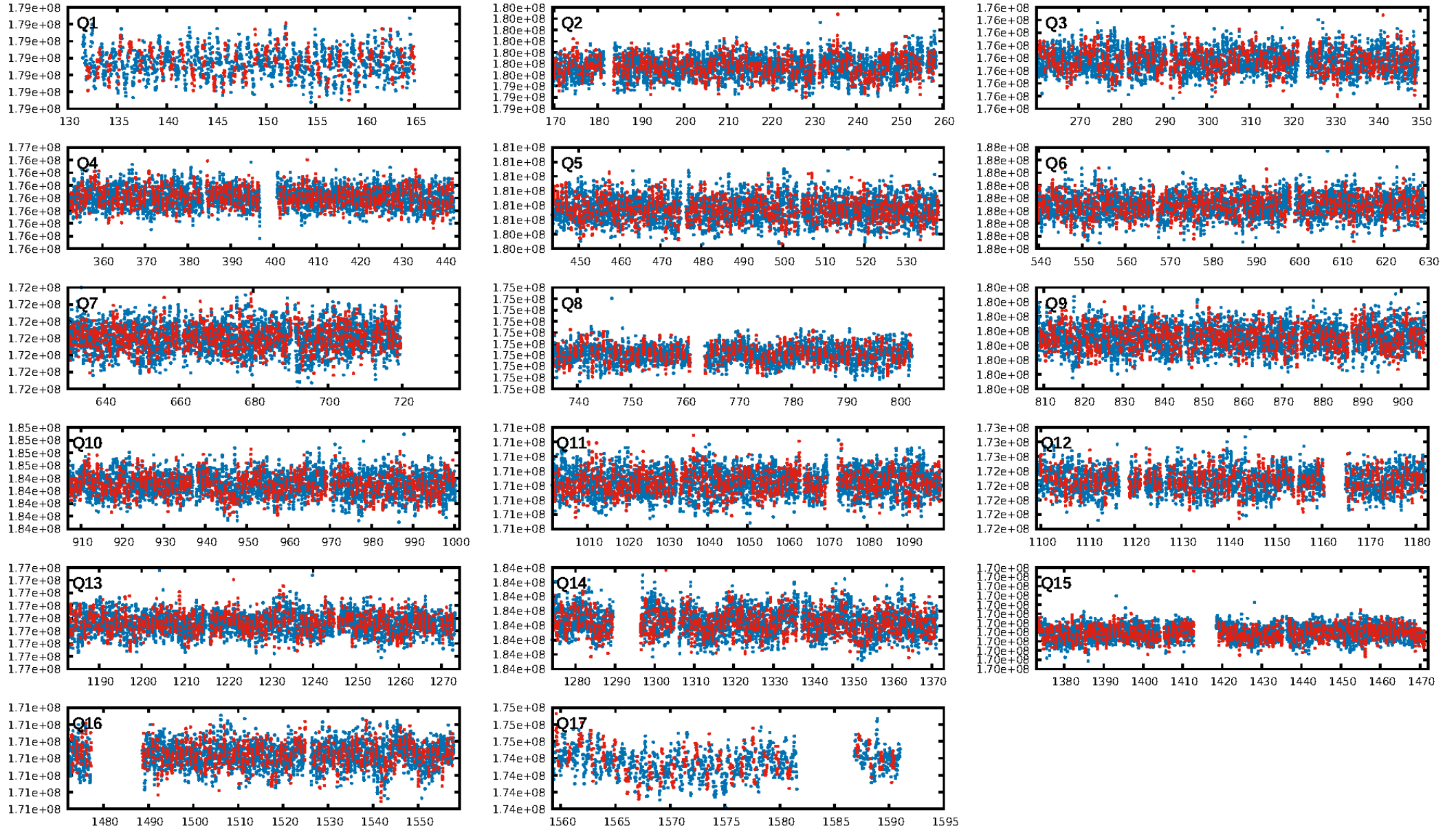
## DV Diagnostic Results:

ShortPeriod-sig: 99.1% [2.60 $\sigma$ ]  
LongPeriod-sig: 100.0% [21.56 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 7.88e-30  
RollingBand-fgt: 1.00 [1213/1213]  
GhostDiagnostic-chr: 38.88  
Centroid-sig: N/A  
Centroid-so: N/A  
OotOffset-rm: 0.401 arcsec [0.88 $\sigma$ ]  
KicOffset-rm: 0.271 arcsec [0.64 $\sigma$ ]  
OotOffset-st: 3/3/3/4 [13]  
KicOffset-st: 3/3/3/4 [13]  
DiffImageQuality-fgm: 0.77 [10/13]  
DiffImageOverlap-fno: 0.00 [0/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 14:43:08 Z

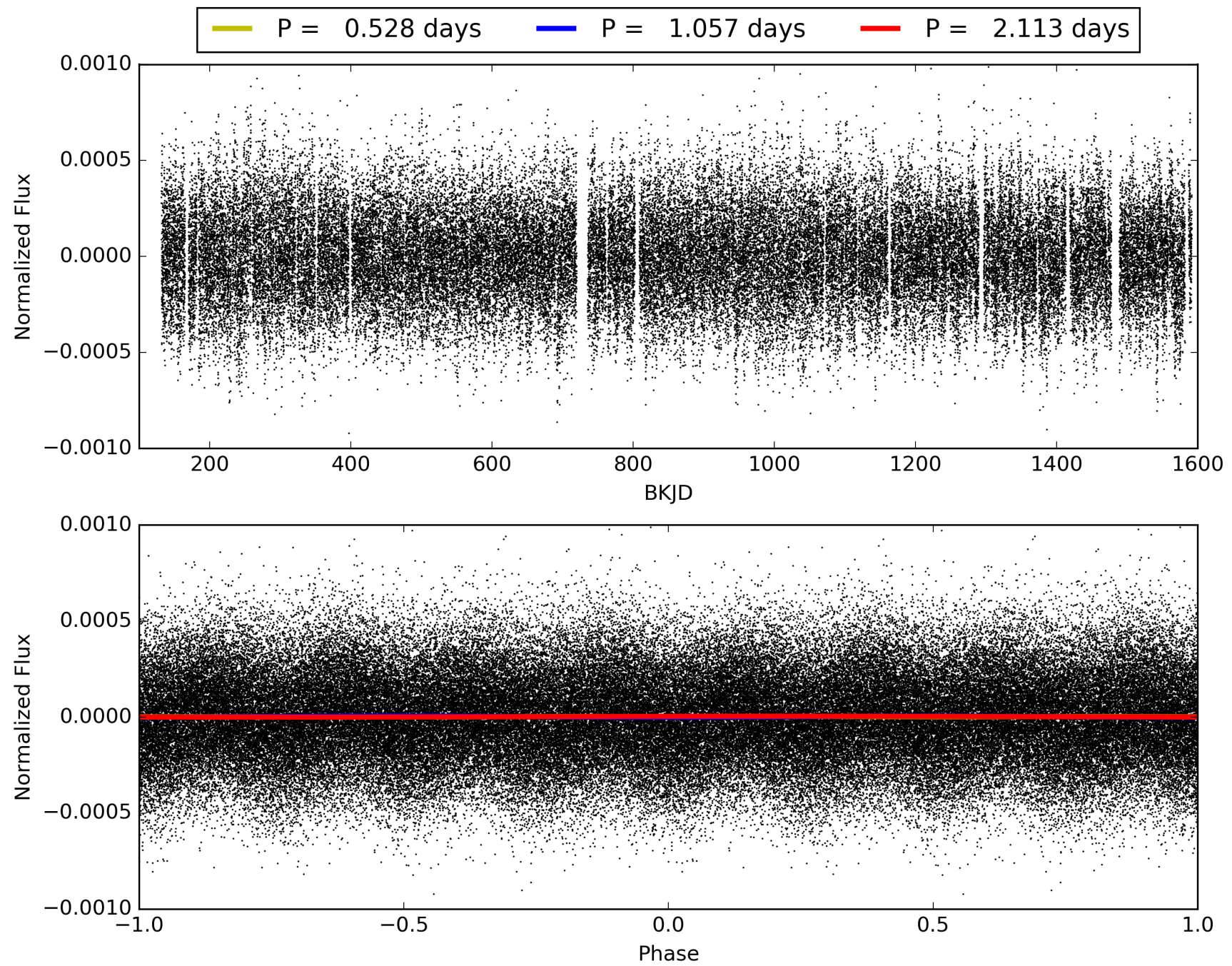
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 004650137-01, PDC Light Curves





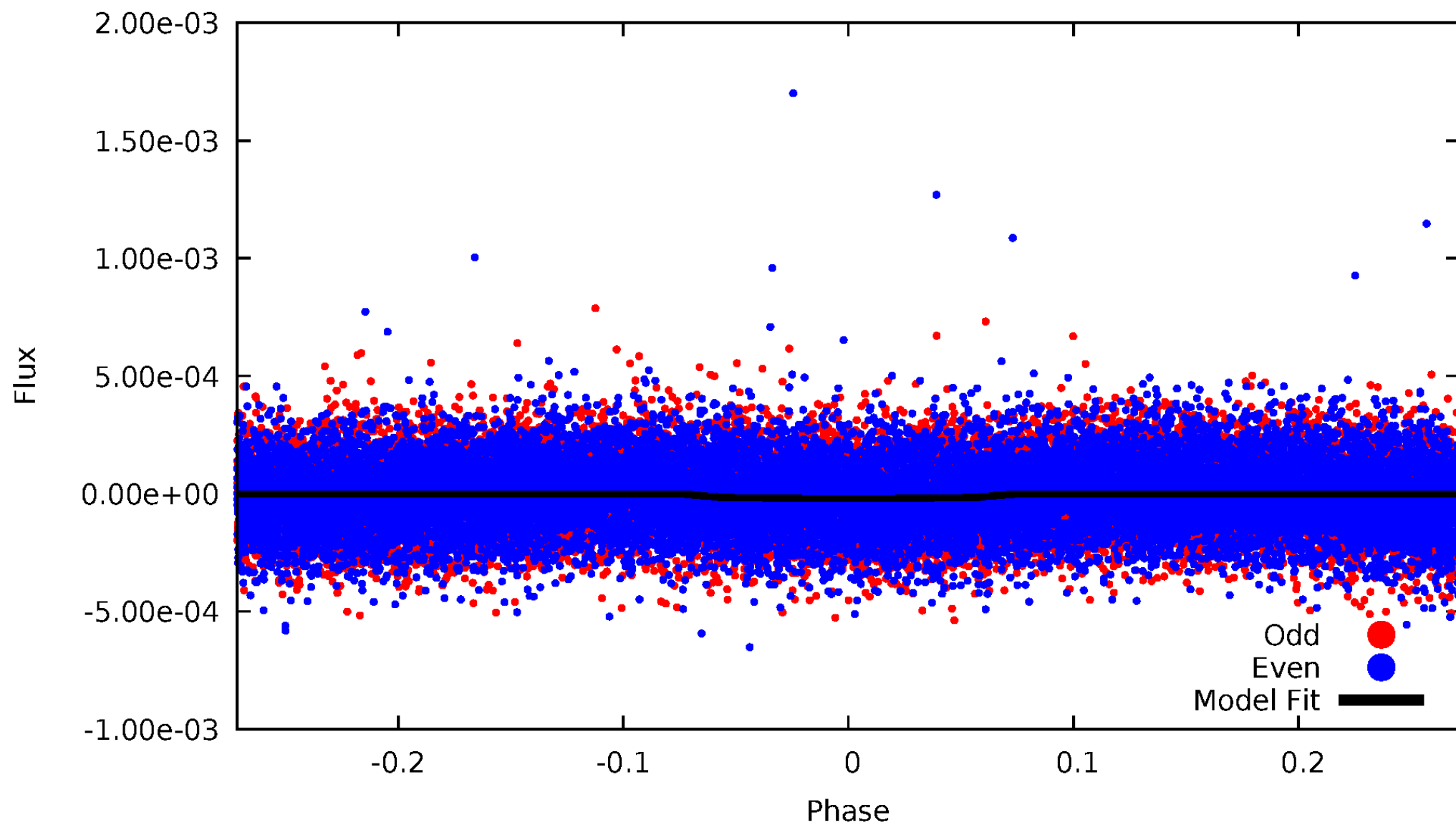
TCE 004650137-01





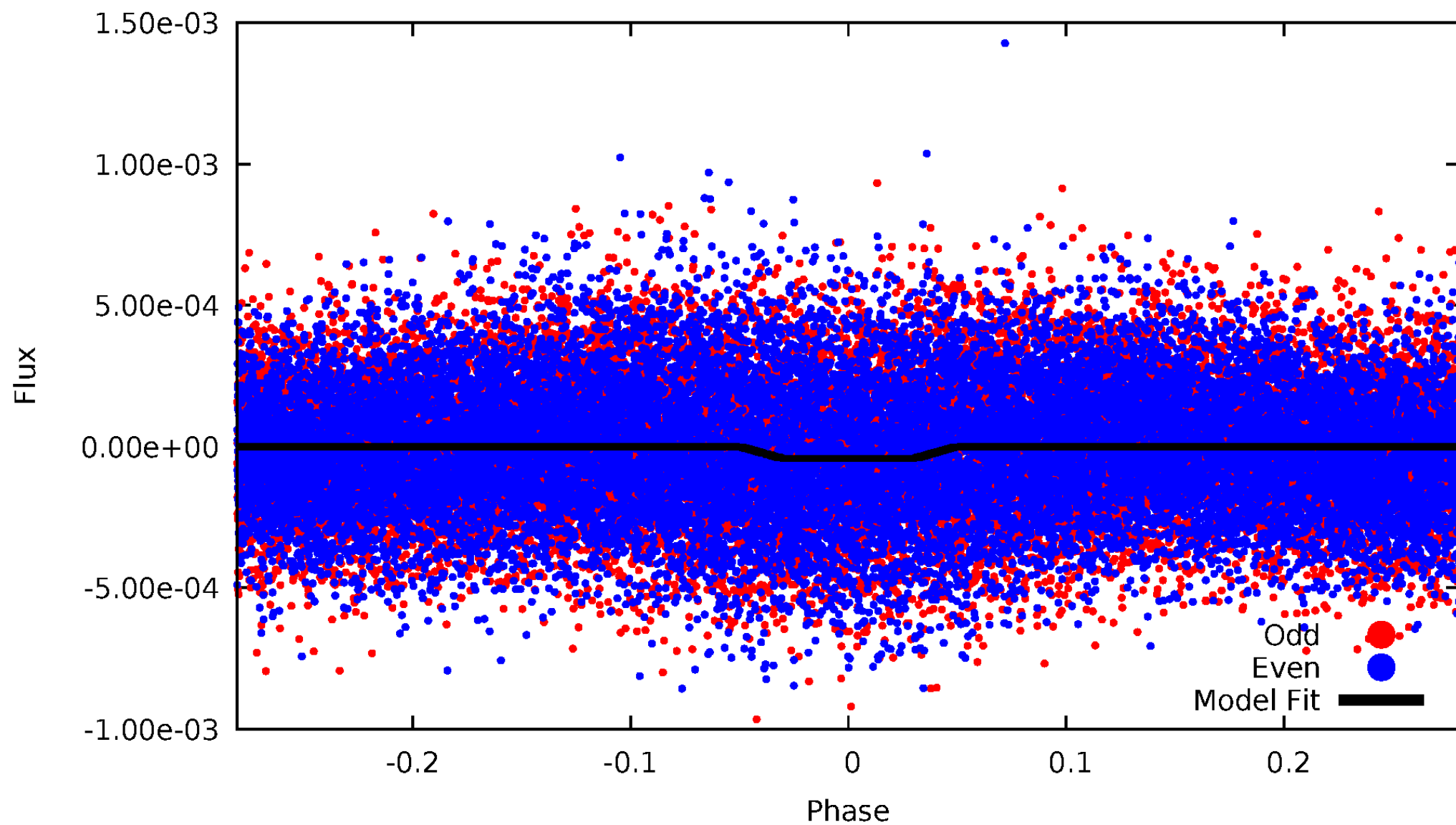
# DV Odd/Even

TCE 004650137-01

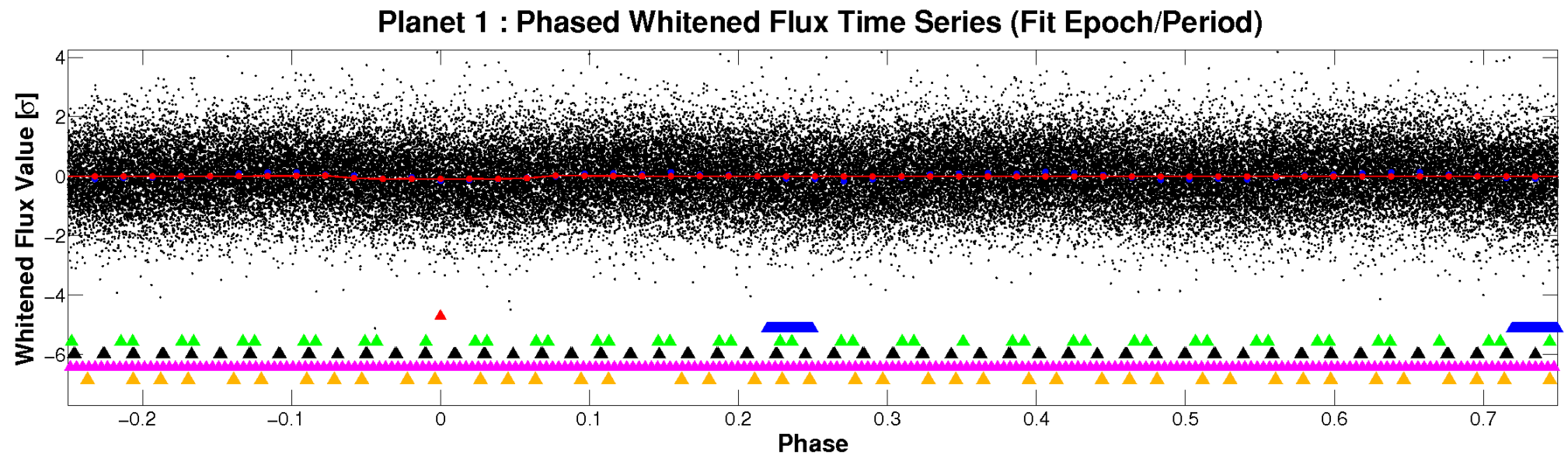
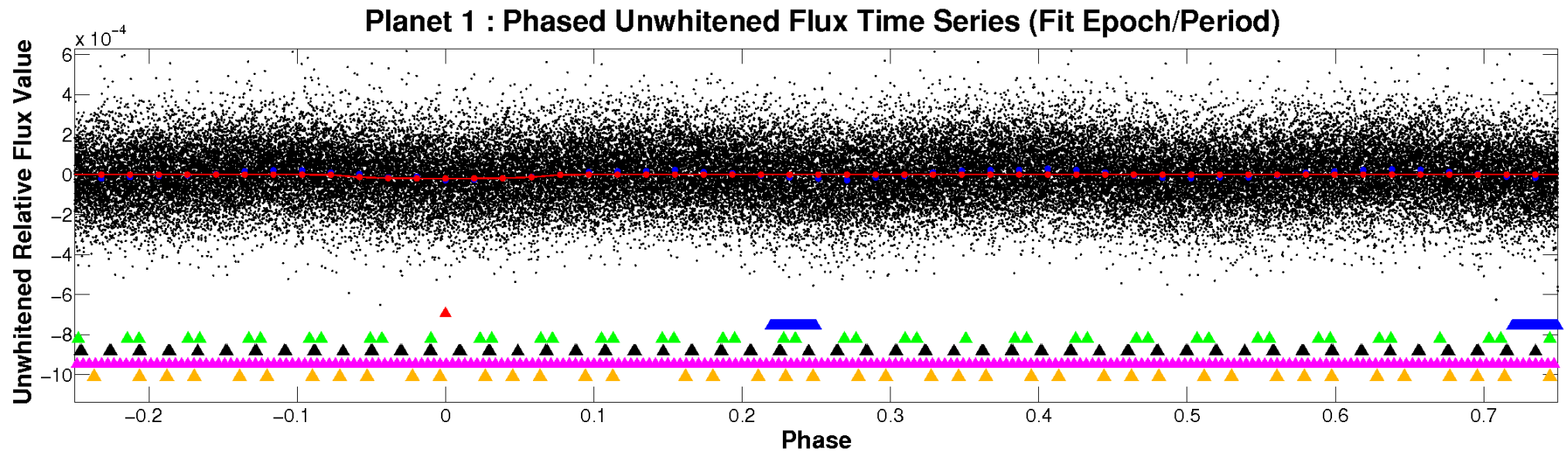


# ALT Odd/Even

TCE 004650137-01



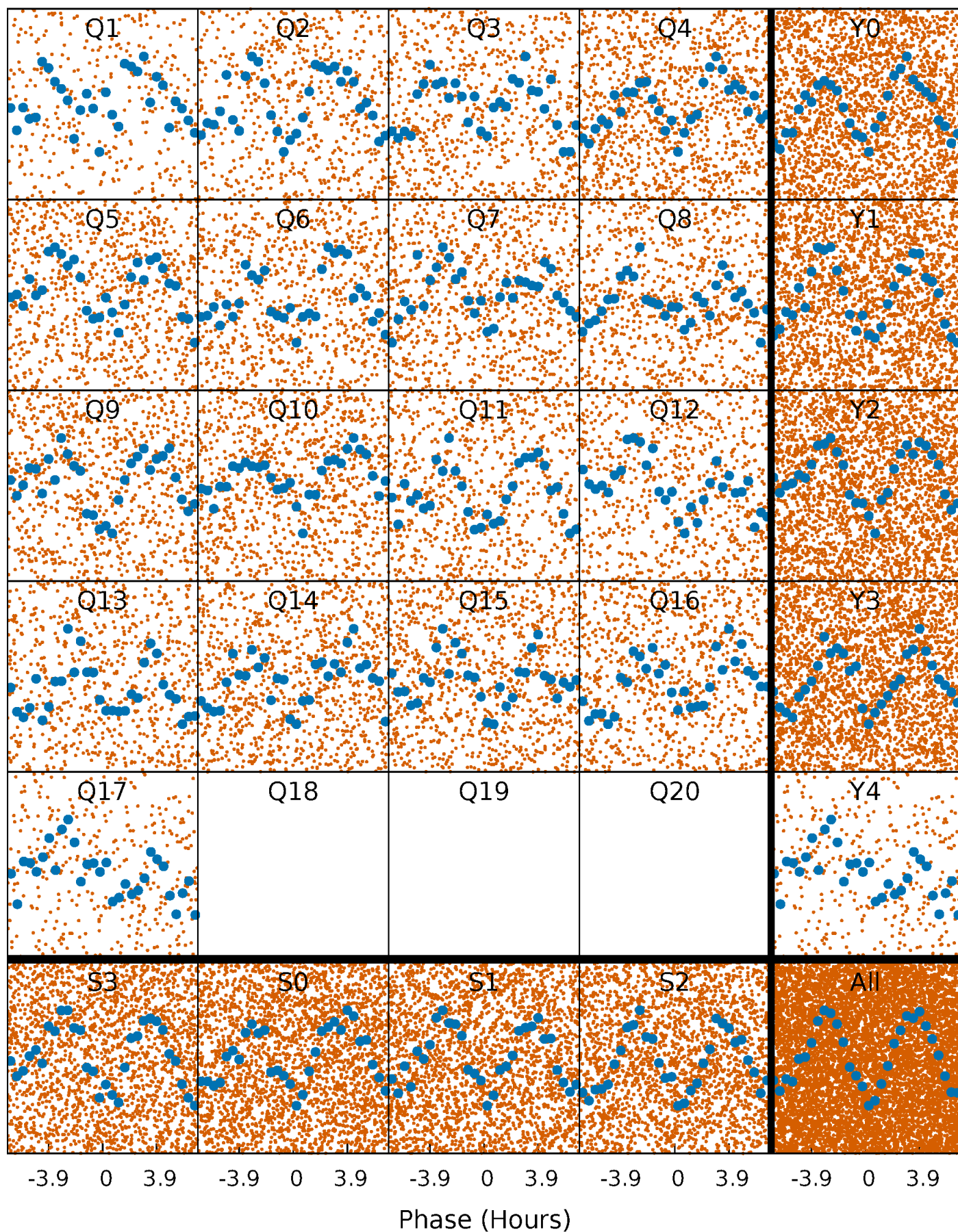
# Non-Whitened Vs. Whitened Light Curve





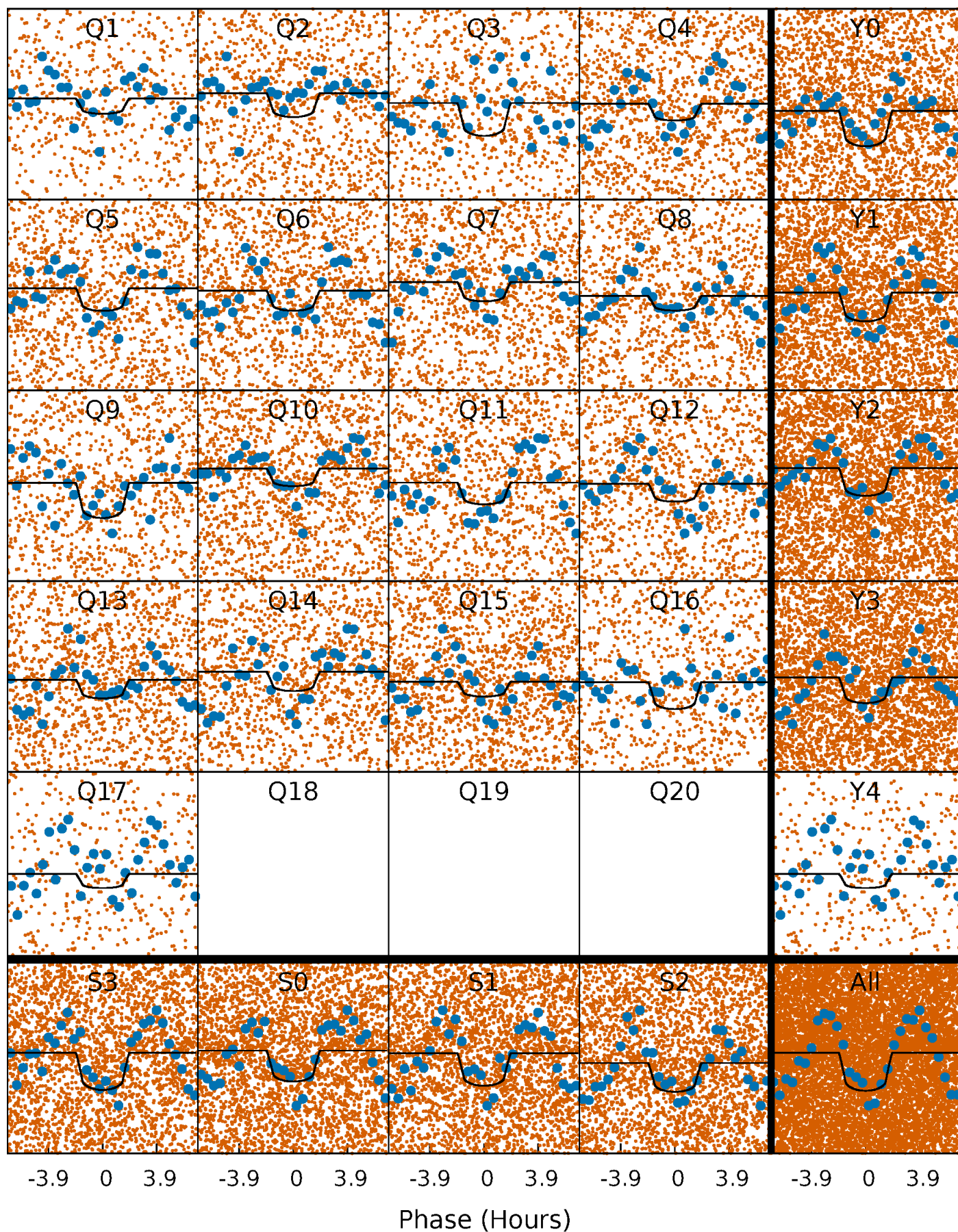
# PDC Quarter-Phased Transit Curves

TCE 004650137-01 P= 1.056731 Days  $T_0=132.048022$  (BKJD)



# DV Quarter-Phased Transit Curves

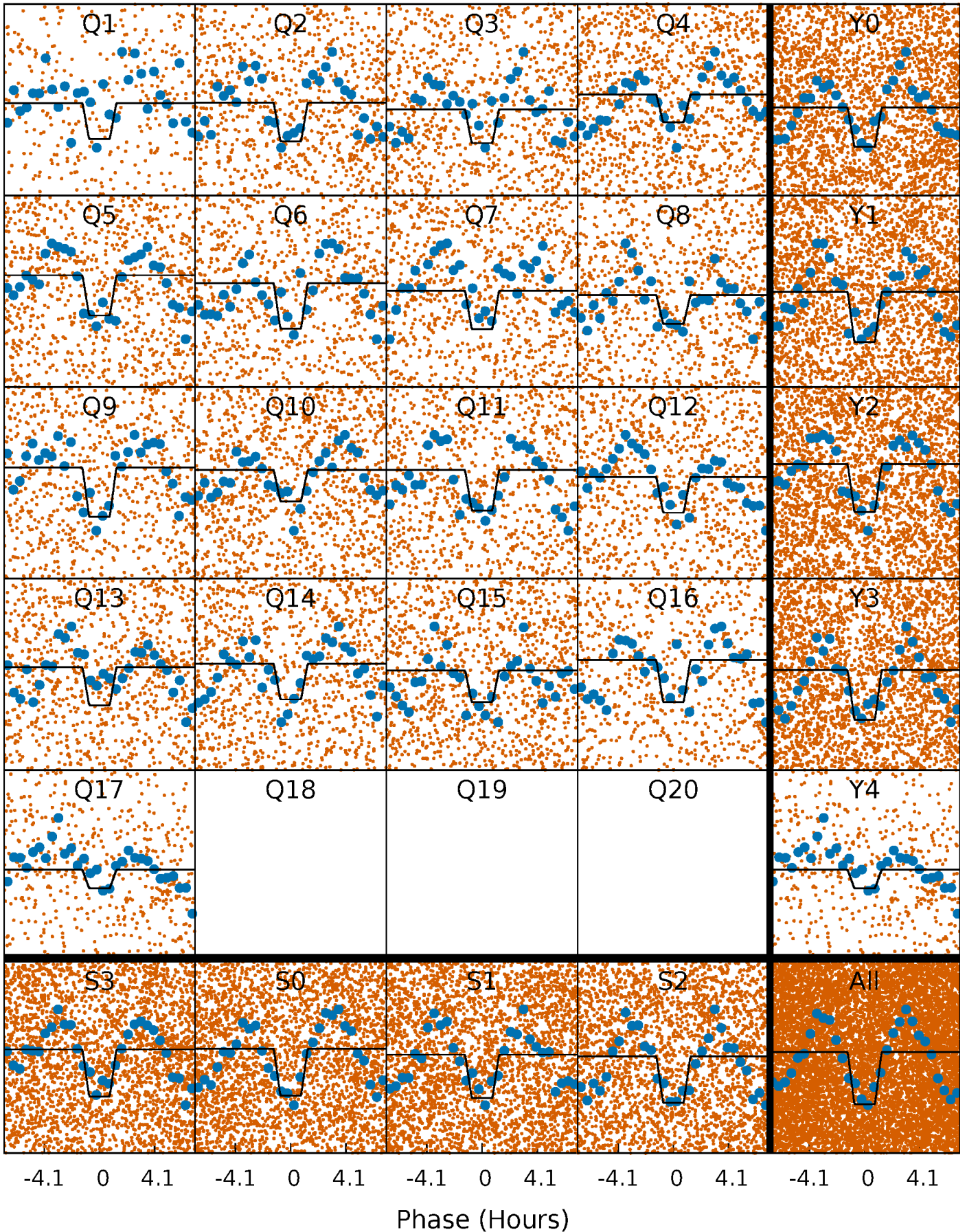
TCE 004650137-01 P= 1.056731 Days  $T_0=132.048022$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

TCE 004650137-01 P= 1.056752 Days  $T_0=132.047187$  (BKJD)

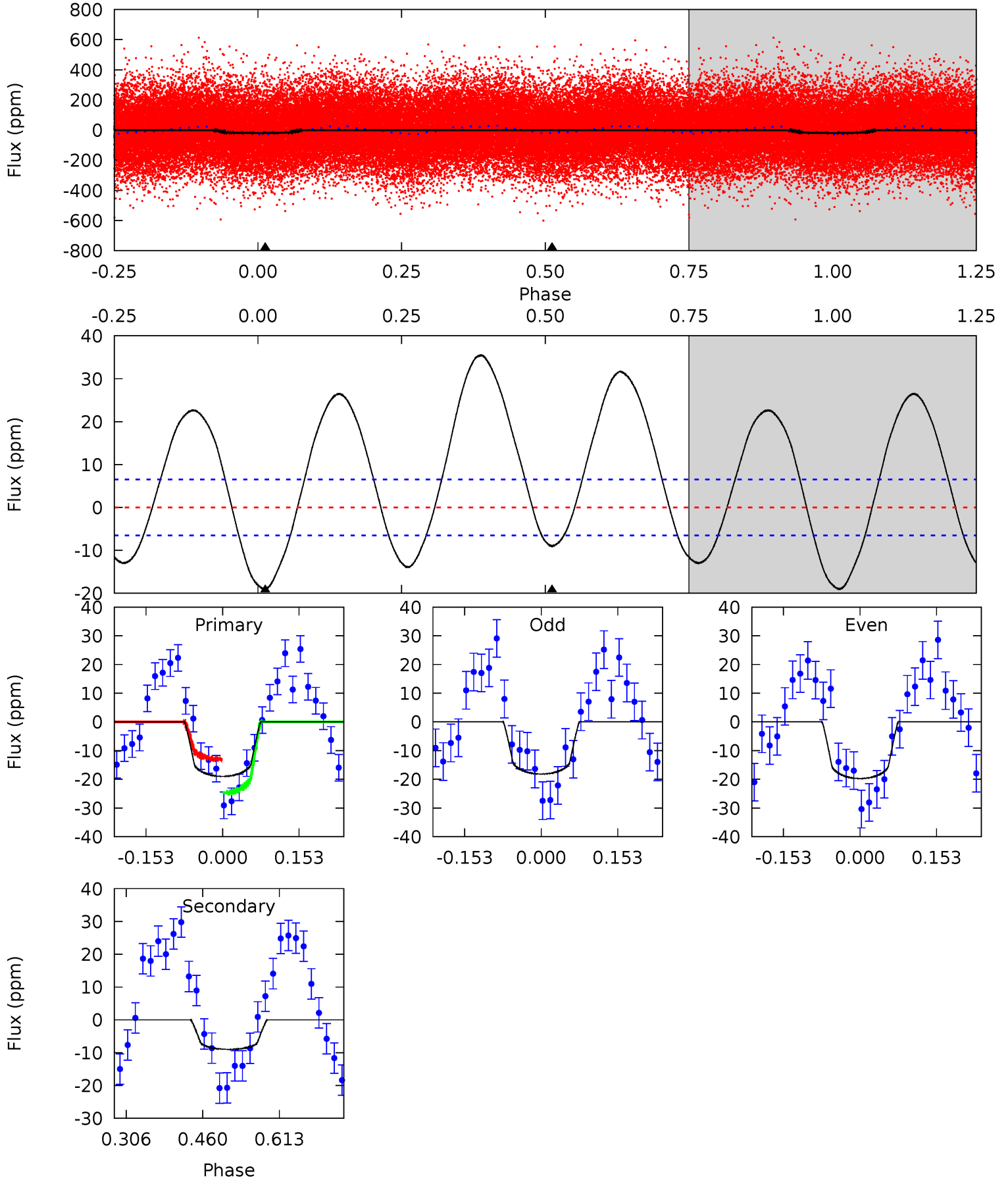




# DV Model-Shift Uniqueness Test

004650137-01, P = 1.056731 Days, E = 130.991291 Days

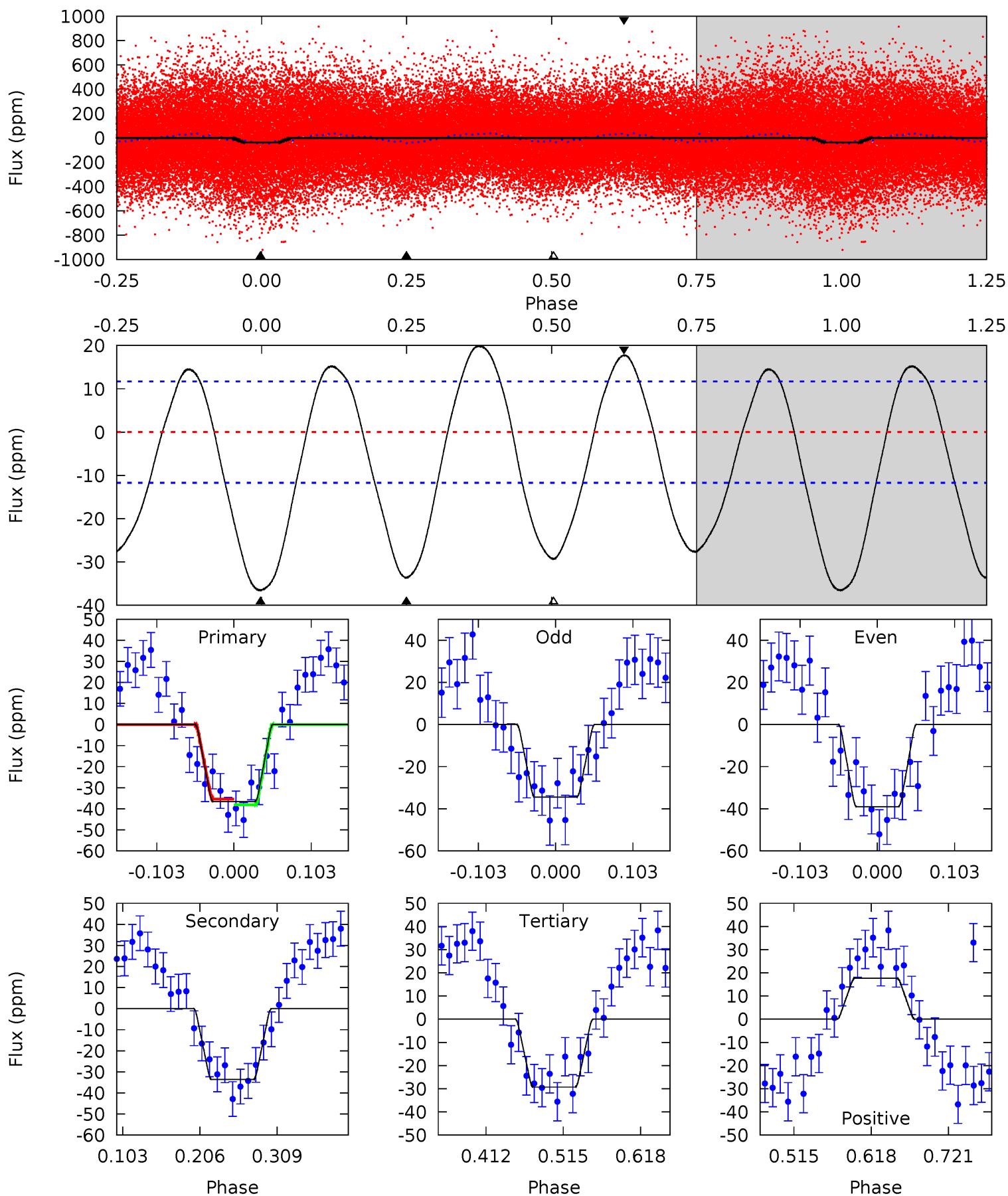
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
13.0	6.17	0	0	4.47	1.43	8.31	13.0	13.0	6.17	6.17	0.54	0.91	0.65	4.00



# Alt Model-Shift Uniqueness Test

004650137-01, P = 1.056752 Days, E = 130.990435 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
14.2	13.1	11.4	6.90	4.56	1.63	6.53	2.83	7.34	1.70	6.21	0.87	0.99	0.35	0.51



### Stellar Parameters For KIC 004650137

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$7128^{+191}_{-255}$	$3.466^{+0.348}_{-0.061}$	$-0.180^{+0.250}_{-0.250}$	$4.348^{+0.286}_{-1.716}$	$2.019^{+0.066}_{-0.374}$	$0.035^{+0.088}_{-0.007}$
	+3%/-4%	+10%/-2%	+139%/-139%	+7%/-39%	+3%/-19%	+255%/-20%
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 004650137-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-9 \pm 1$	$2.07^{+0.69}_{-0.64}$	$5613^{+299}_{-539}$	$4966^{+1273}_{-988}$	$0.724^{+0.873}_{-0.311}$
Alt.	$-34 \pm 3$	$2.85^{+0.74}_{-0.73}$	$5588^{+313}_{-560}$	$6295^{+1032}_{-727}$	$1.472^{+1.189}_{-0.527}$

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



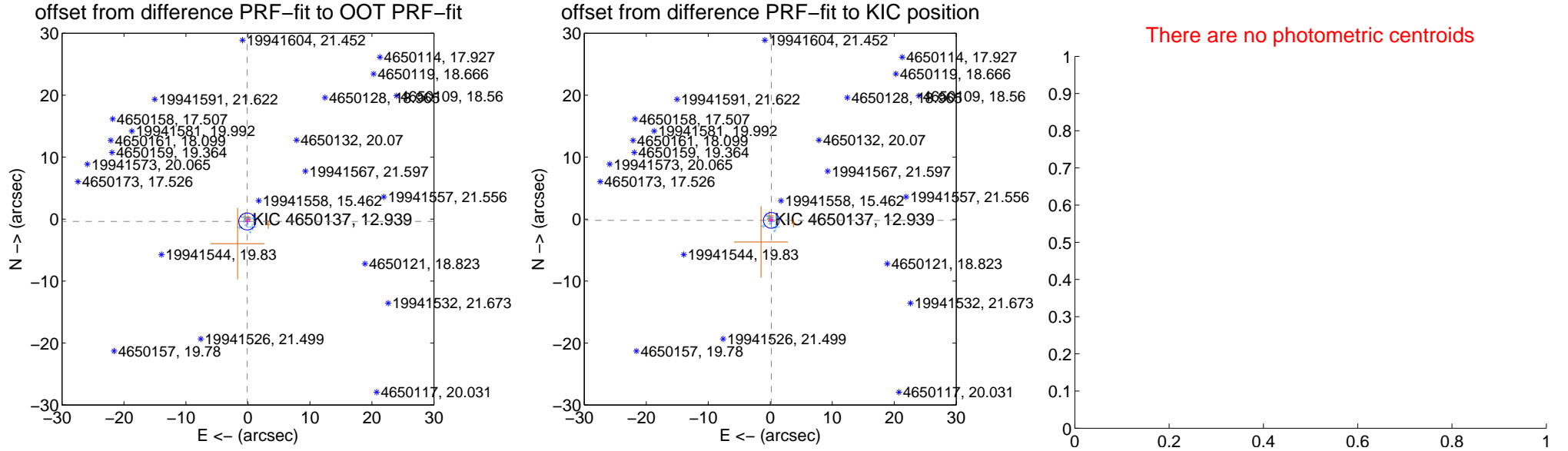
## DV Centroid Data

Supplemental centroid analysis for 004650137-01. Kepler magnitude: 12.94. Transit SNR 7.90

There are 10 quarters with good PRF difference image offsets

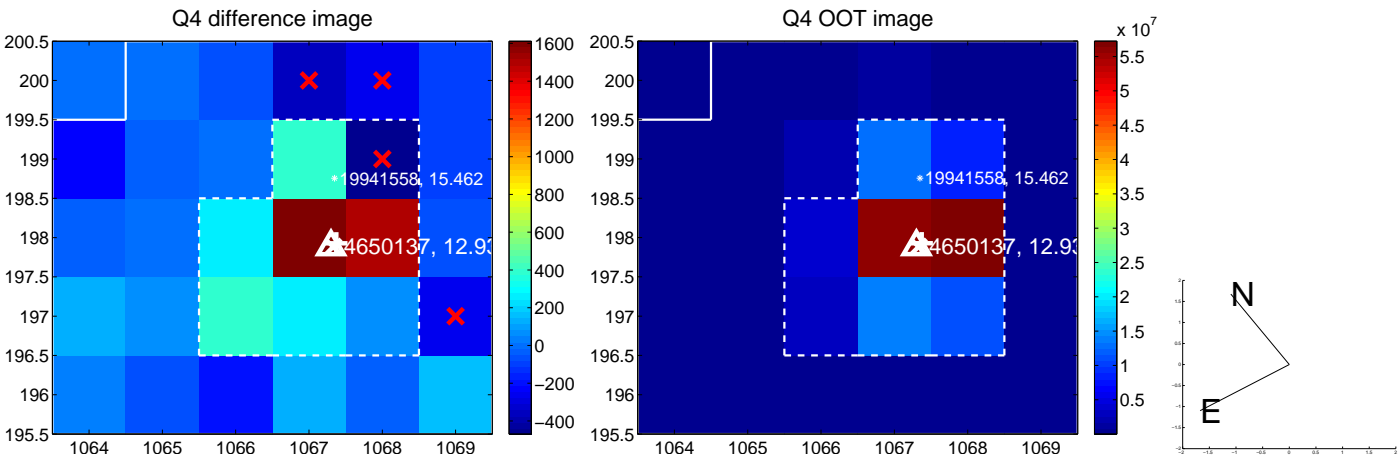
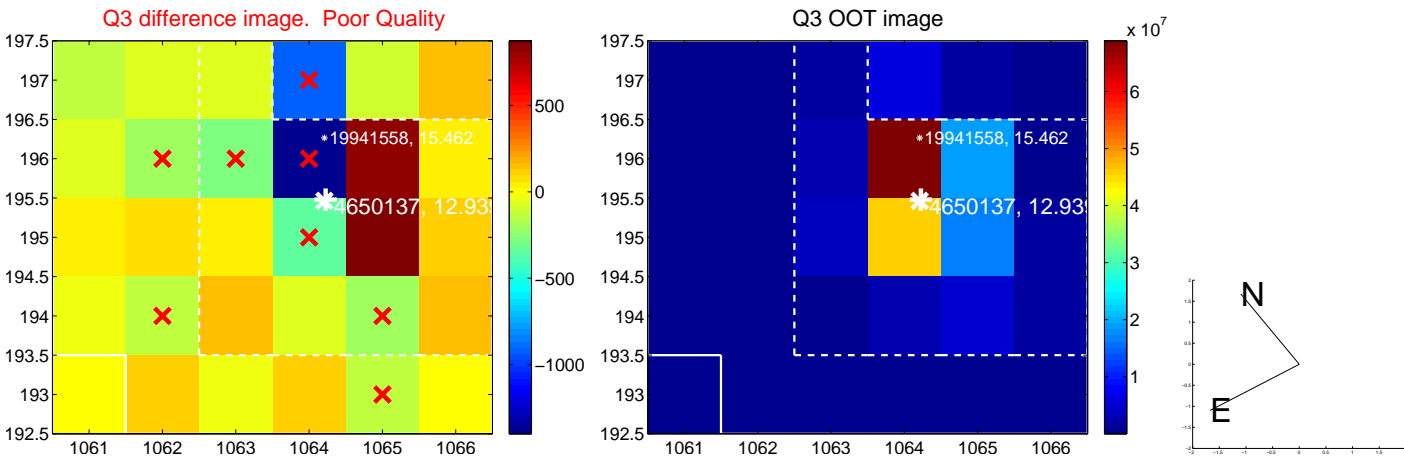
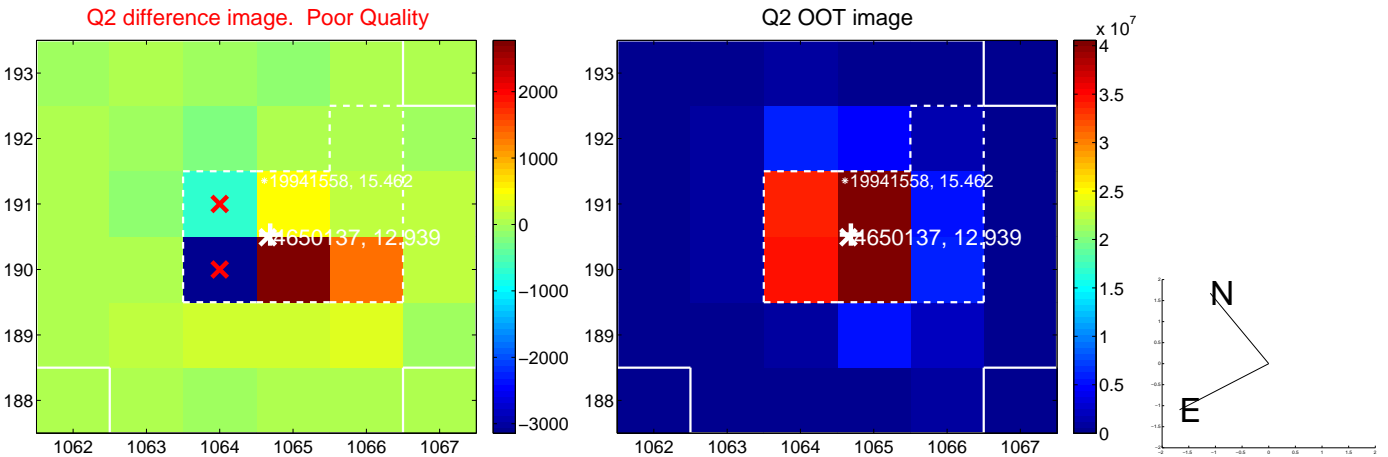
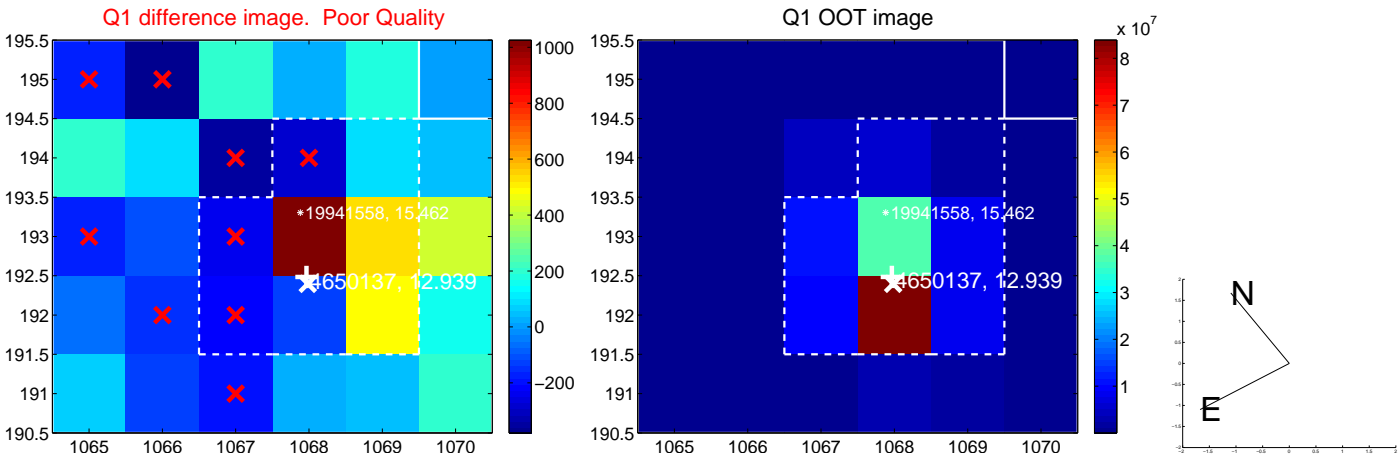
The direct PRF centroid is offset from the target star catalog position by about 0.33 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.401 \pm 0.456$	0.88	$0.120 \pm 0.360$	$-0.383 \pm 0.464$
PRF-fit source offset from KIC position	$0.271 \pm 0.425$	0.64	$-0.173 \pm 0.360$	$-0.209 \pm 0.464$
photometric centroid source offset	—	—	—	—

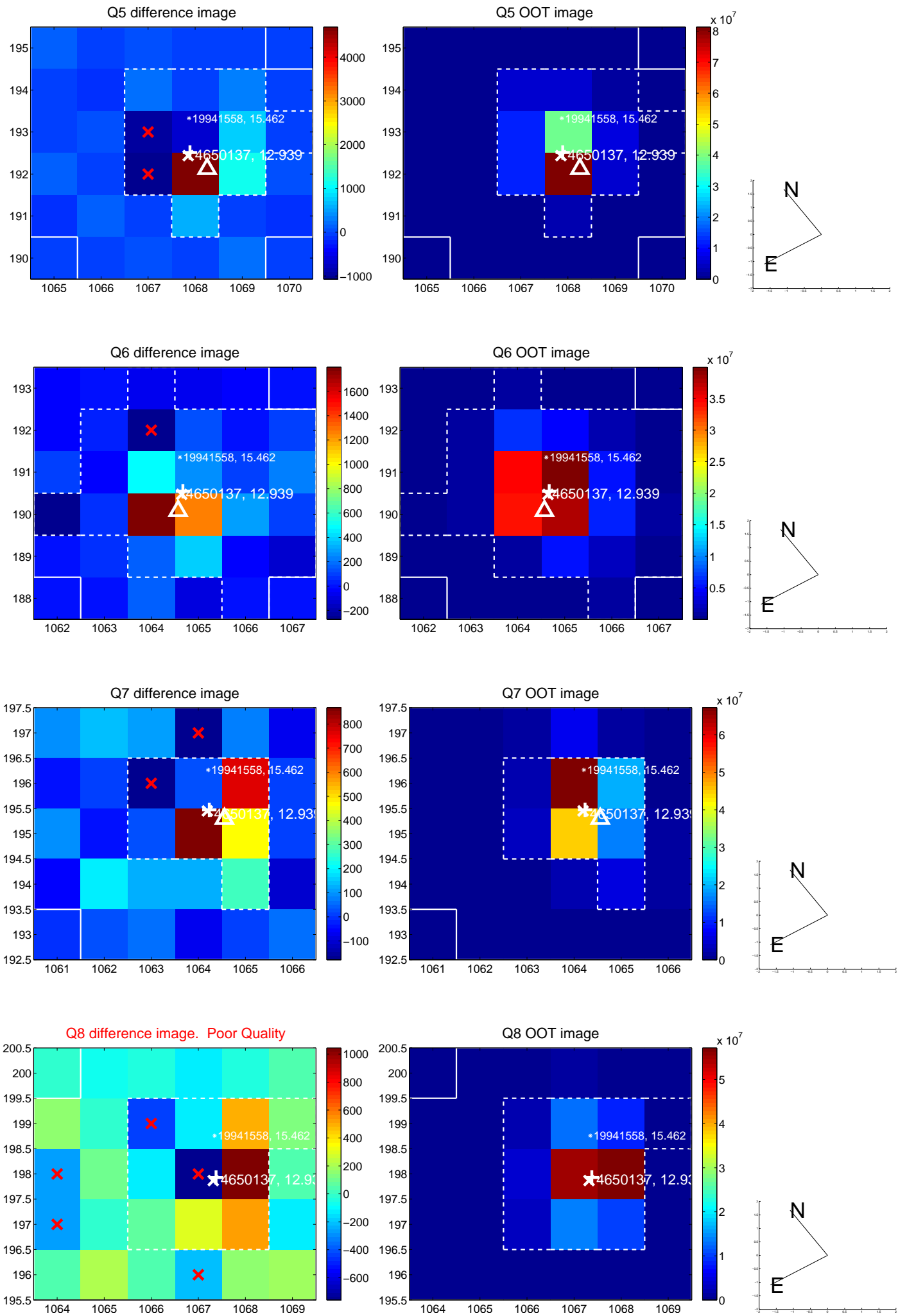


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

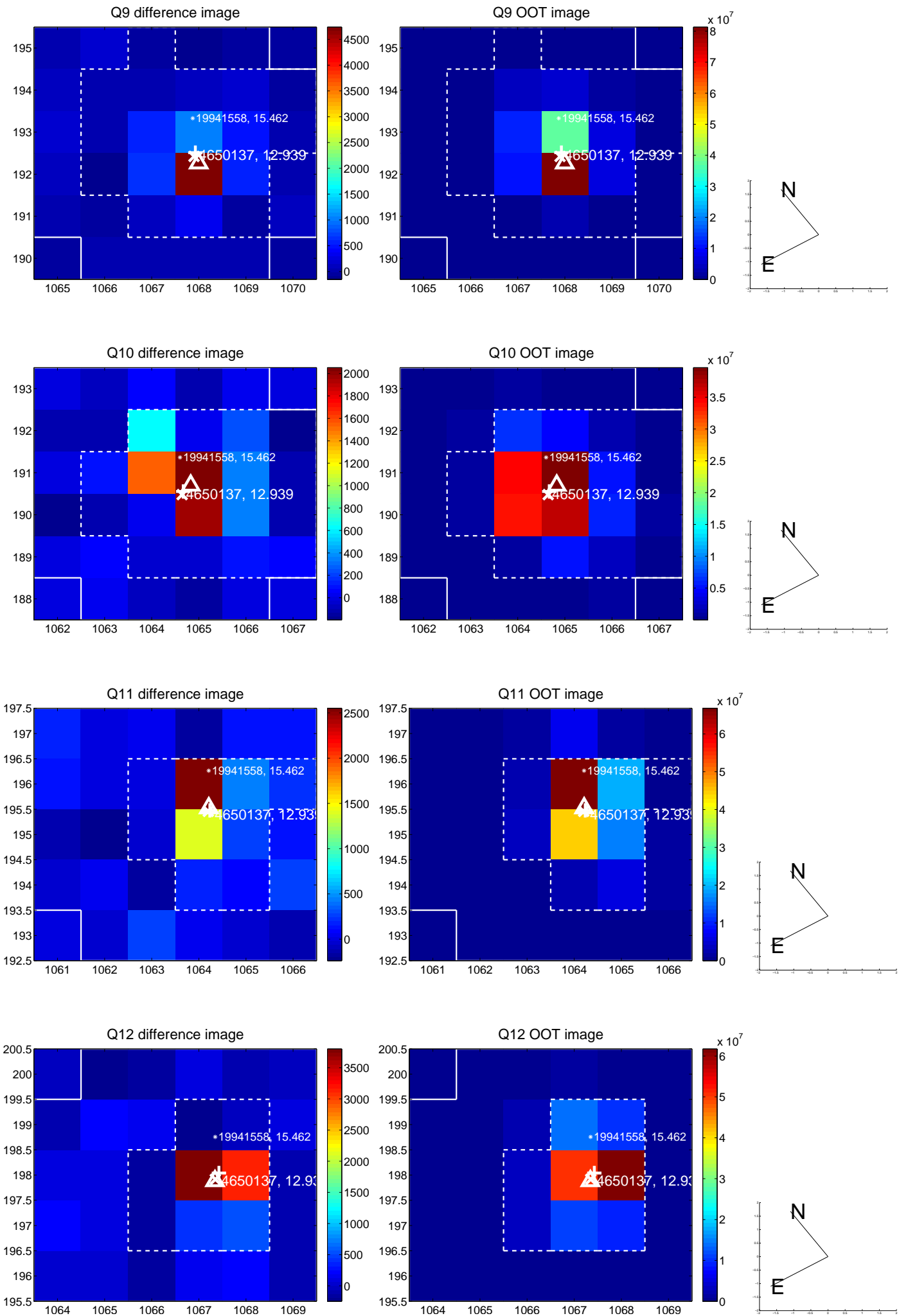


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

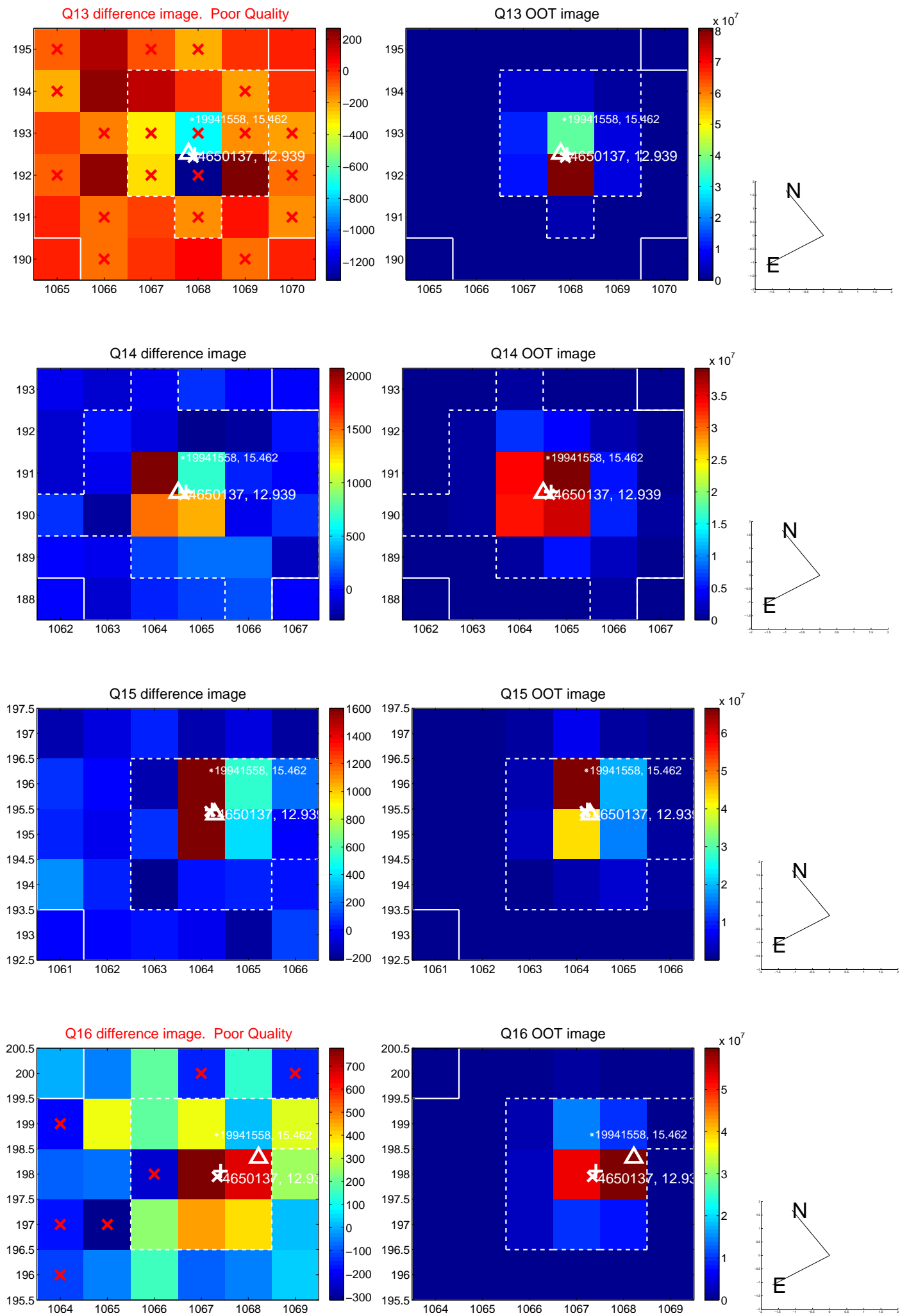




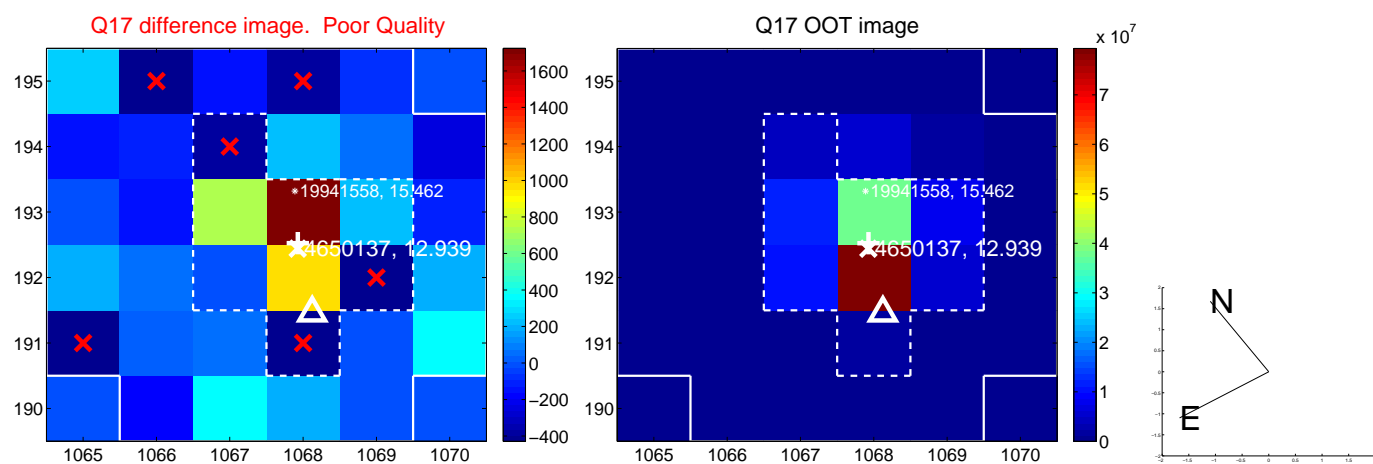
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white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

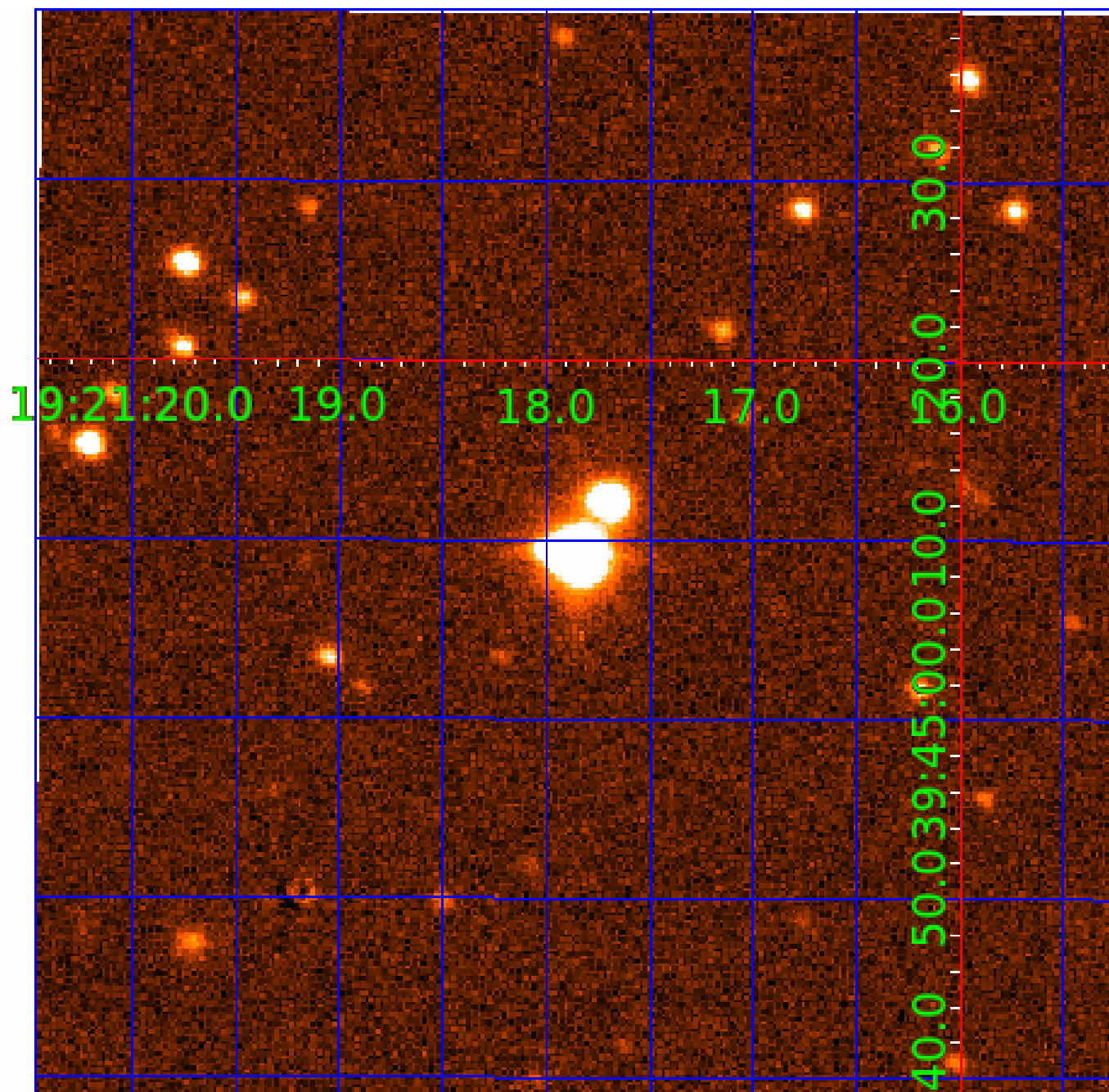


folded centroid time series figure for this object.



UKIRT Image

Declination



# KIC 004650137

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004650137-01	OBS	No	1.056731	132.048022	19.9	3.443	8.1	7.9	4.35	7128	2.27	66426.10
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004650137-04	OBS	No	15.954549	132.079704	227.8	2.521	11.3	11.6	4.35	7128	7.44	1780.10
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004650137-06	OBS	No	34.748958	163.778320	284.5	2.777	10.5	10.8	4.35	7128	8.31	630.52

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004650137-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
004650137-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—SAME_NTL_PERIOD
004650137-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—HALO_GHOST
004650137-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
004650137-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004650137-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

**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.

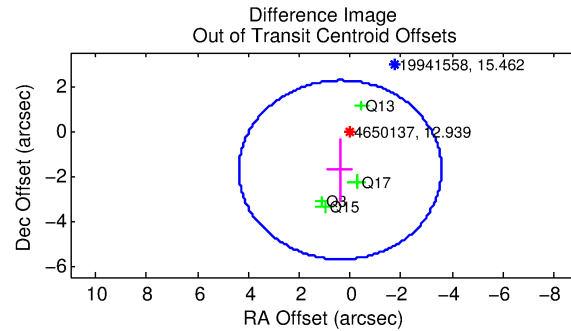
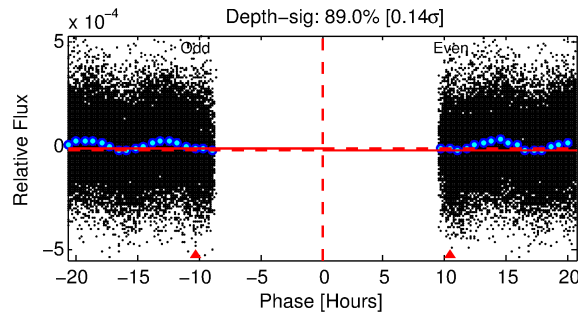
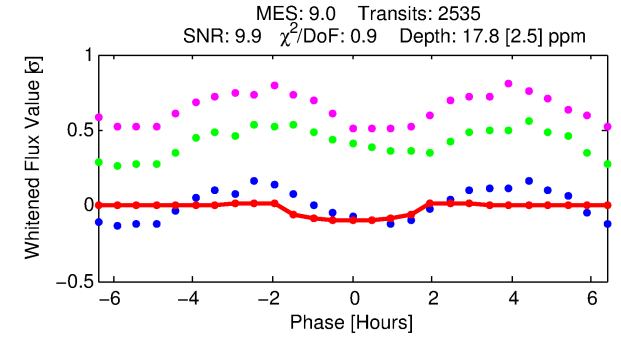
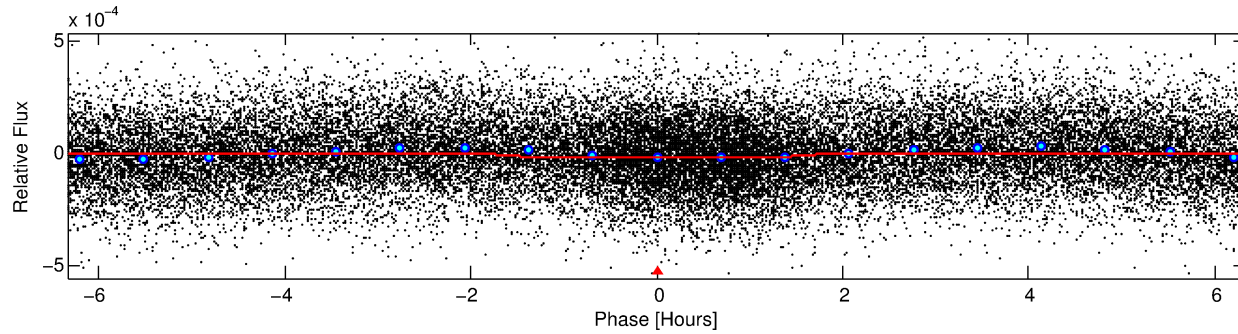
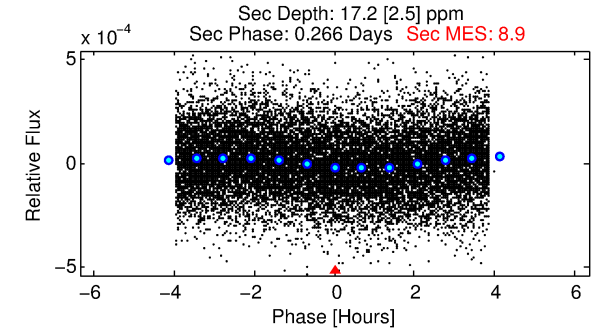
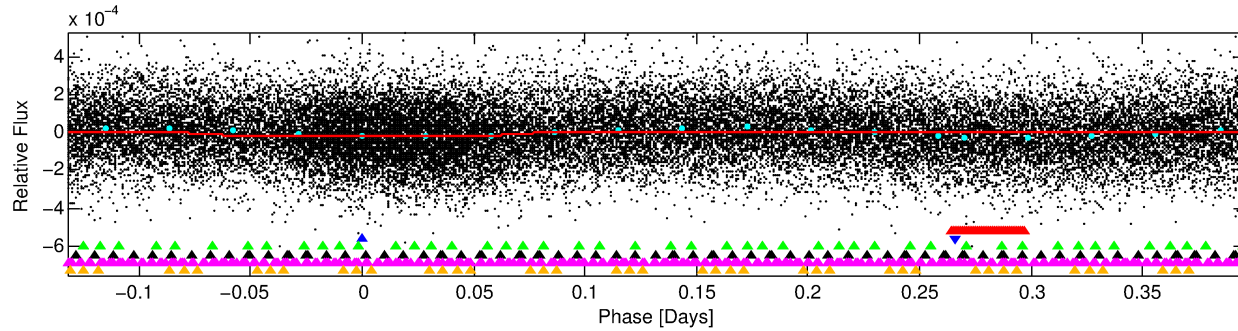
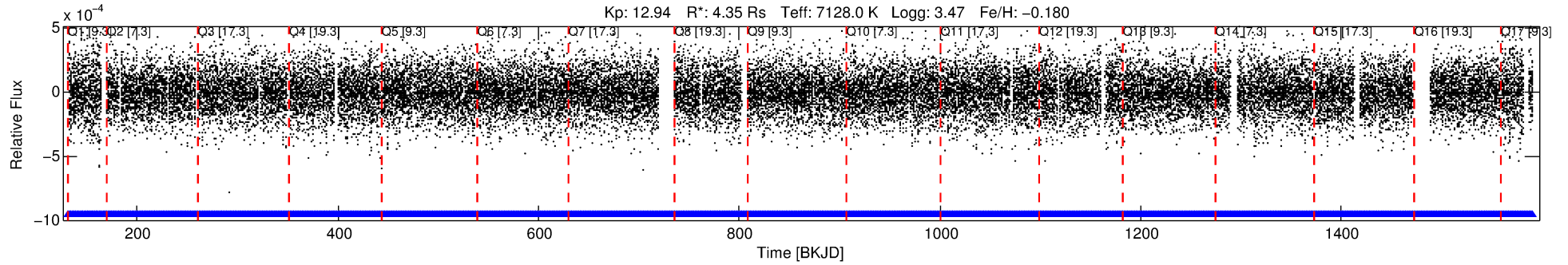
## Ephemeris Match Information For 004650137-02

No Significant Match Found



# DV One-Page Summary

KIC: 4650137 Candidate: 2 of 6 Period: 0.528 d



## DV Fit Results:

Period = 0.52835 [0.00001] d  
Epoch = 131.7836 [0.0038] BKJD  
Rp/R\* = 0.0045 [0.0027]  
a/R\* = 1.08 [0.51]  
b = 0.90 [0.74]  
Seff = N/A  
Teq = N/A  
Rp = 2.15 [1.52] Re  
a = N/A  
Ag = N/A  
Teffp = N/A

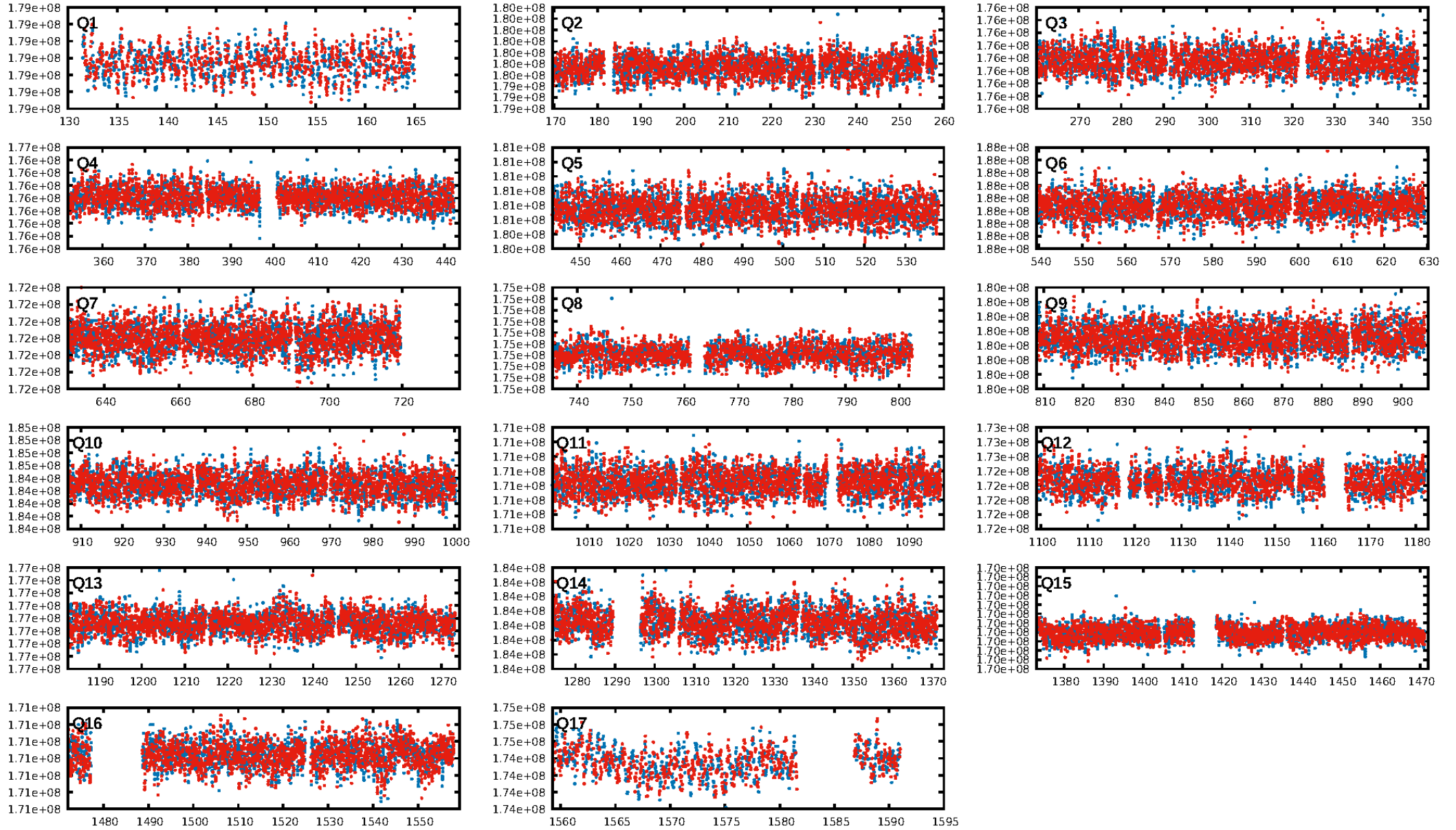
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 99.1% [2.60σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 9.74e-16  
RollingBand-fgt: 1.00 [2421/2421]  
GhostDiagnostic-chr: 1.548  
Centroid-sig: N/A  
Centroid-so: N/A  
OotOffset-rm: 1.775 arcsec [1.34σ]  
KicOffset-rm: 1.613 arcsec [1.16σ]  
OotOffset-st: 0/2/0/2 [4]  
KicOffset-st: 0/2/0/2 [4]  
DiffImageQuality-fgm: 0.75 [3/4]  
DiffImageOverlap-fno: 0.00 [0/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 14:43:22 Z

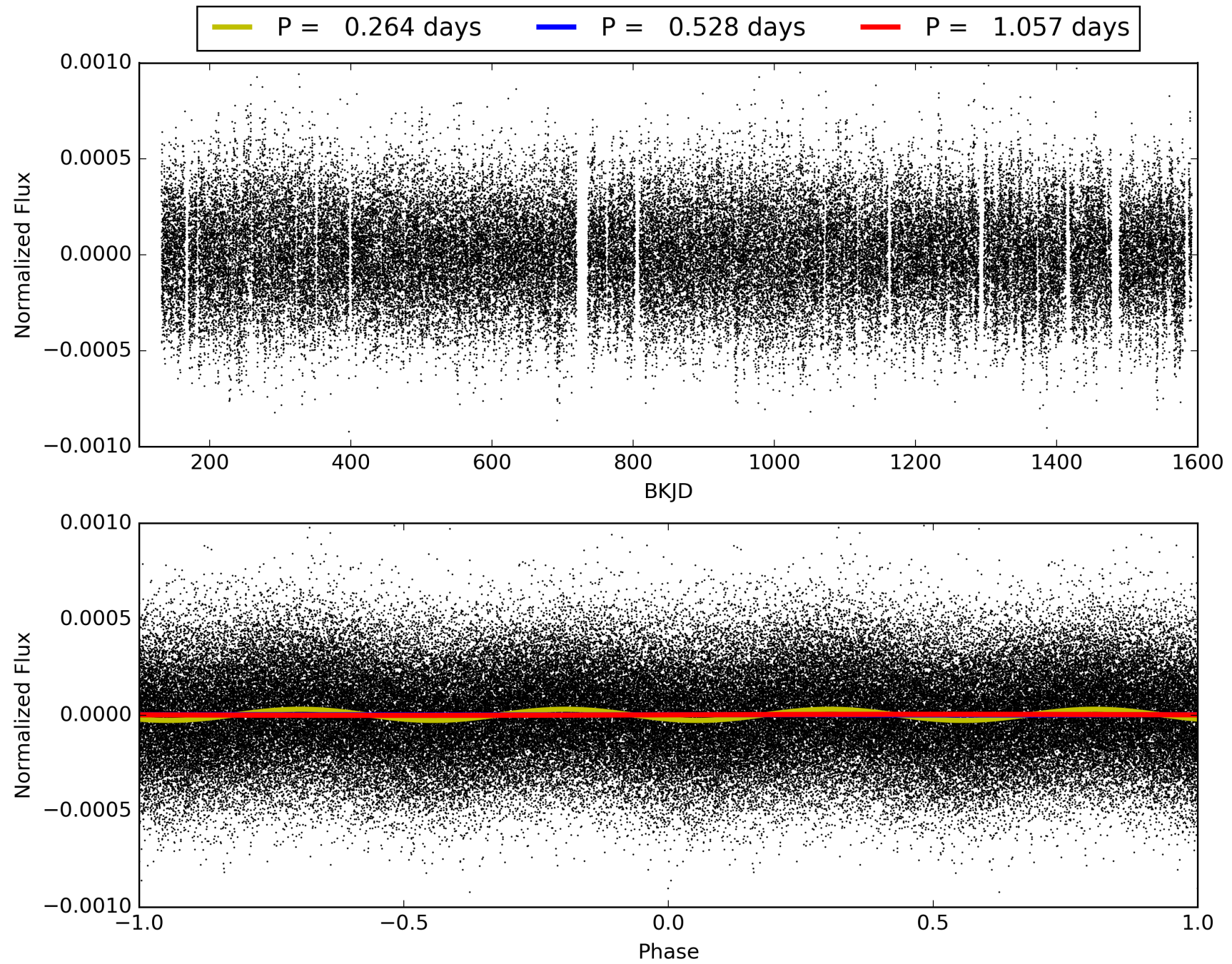
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 004650137-02, PDC Light Curves



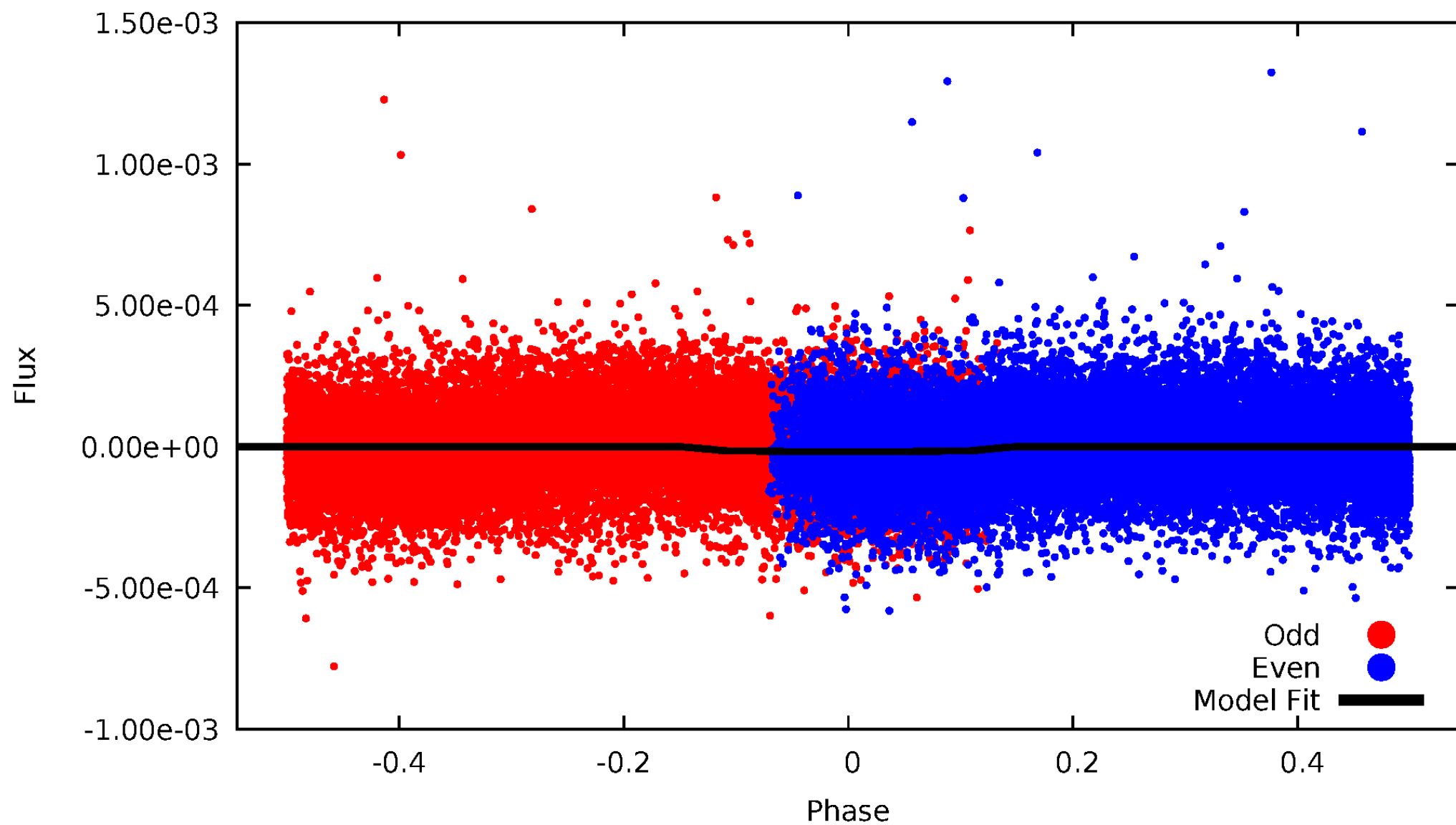


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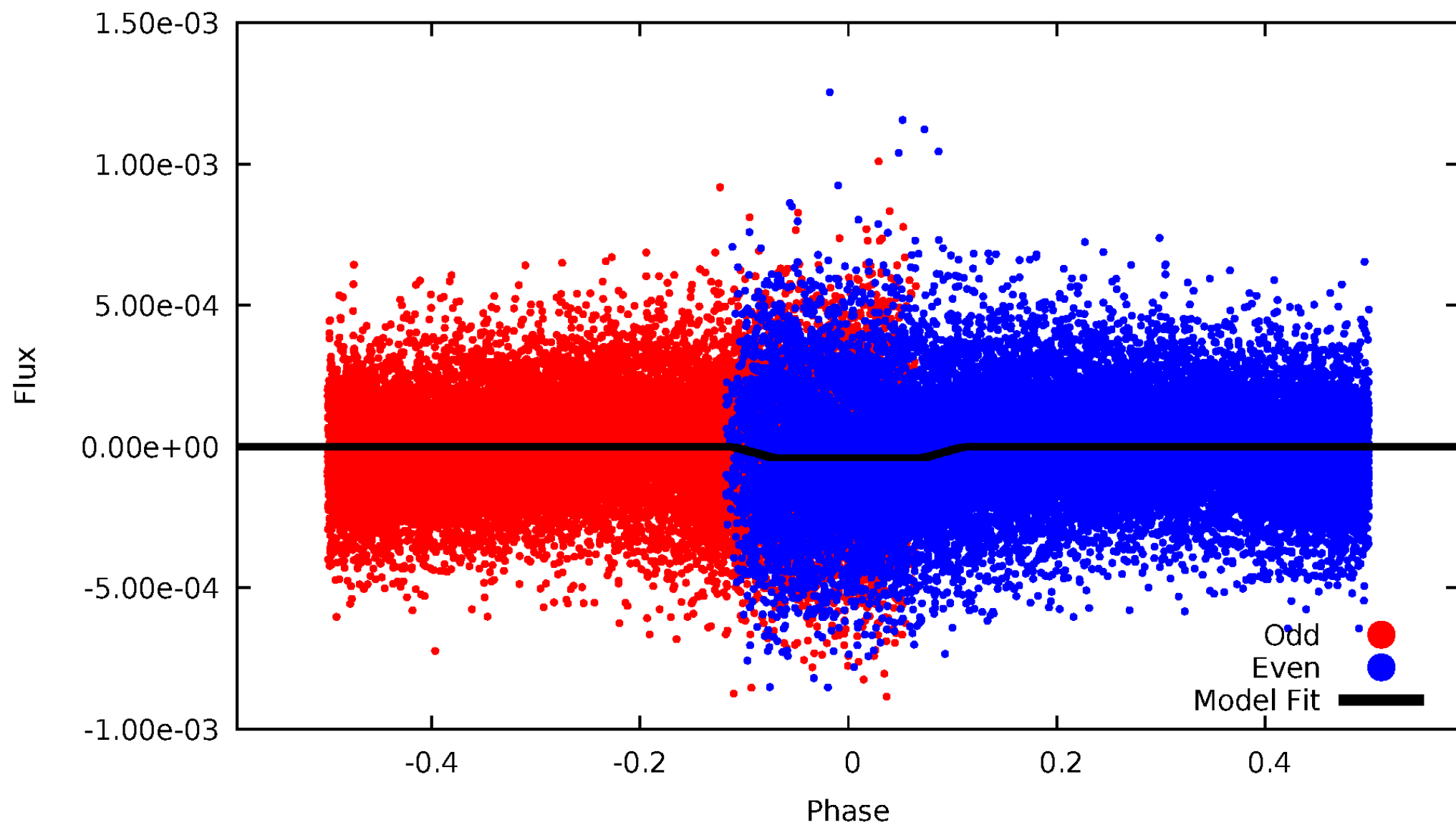
# DV Odd/Even

TCE 004650137-02



# ALT Odd/Even

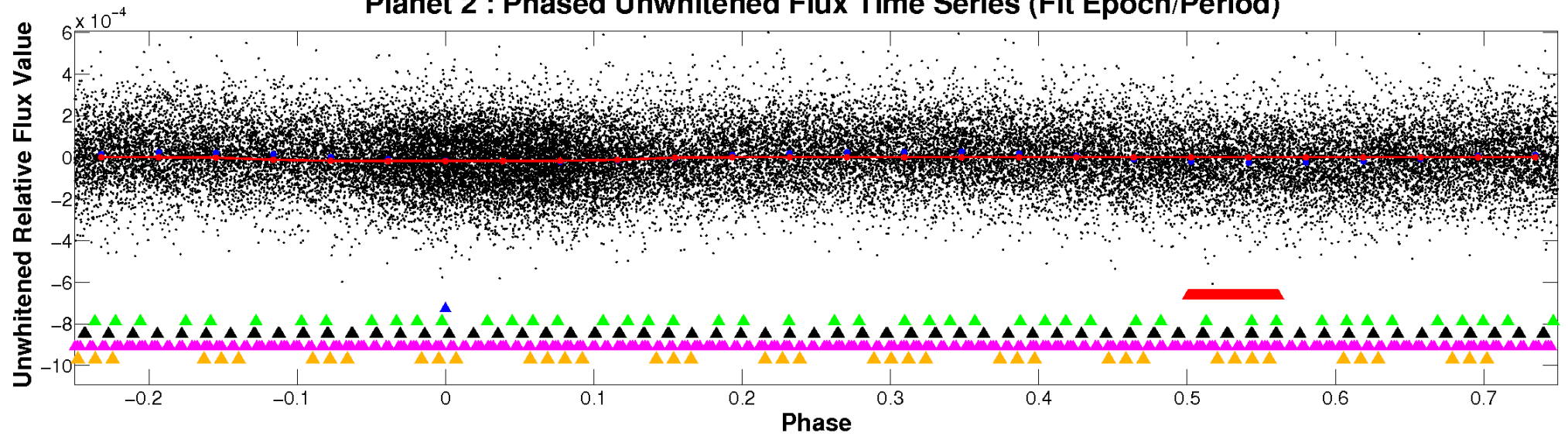
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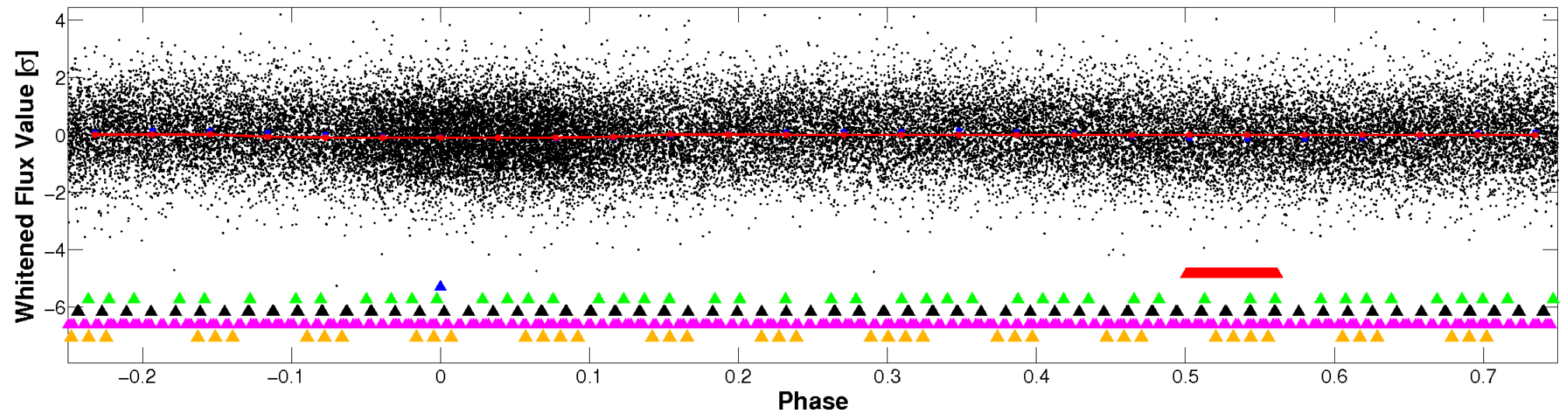


# Non-Whitened Vs. Whitened Light Curve

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

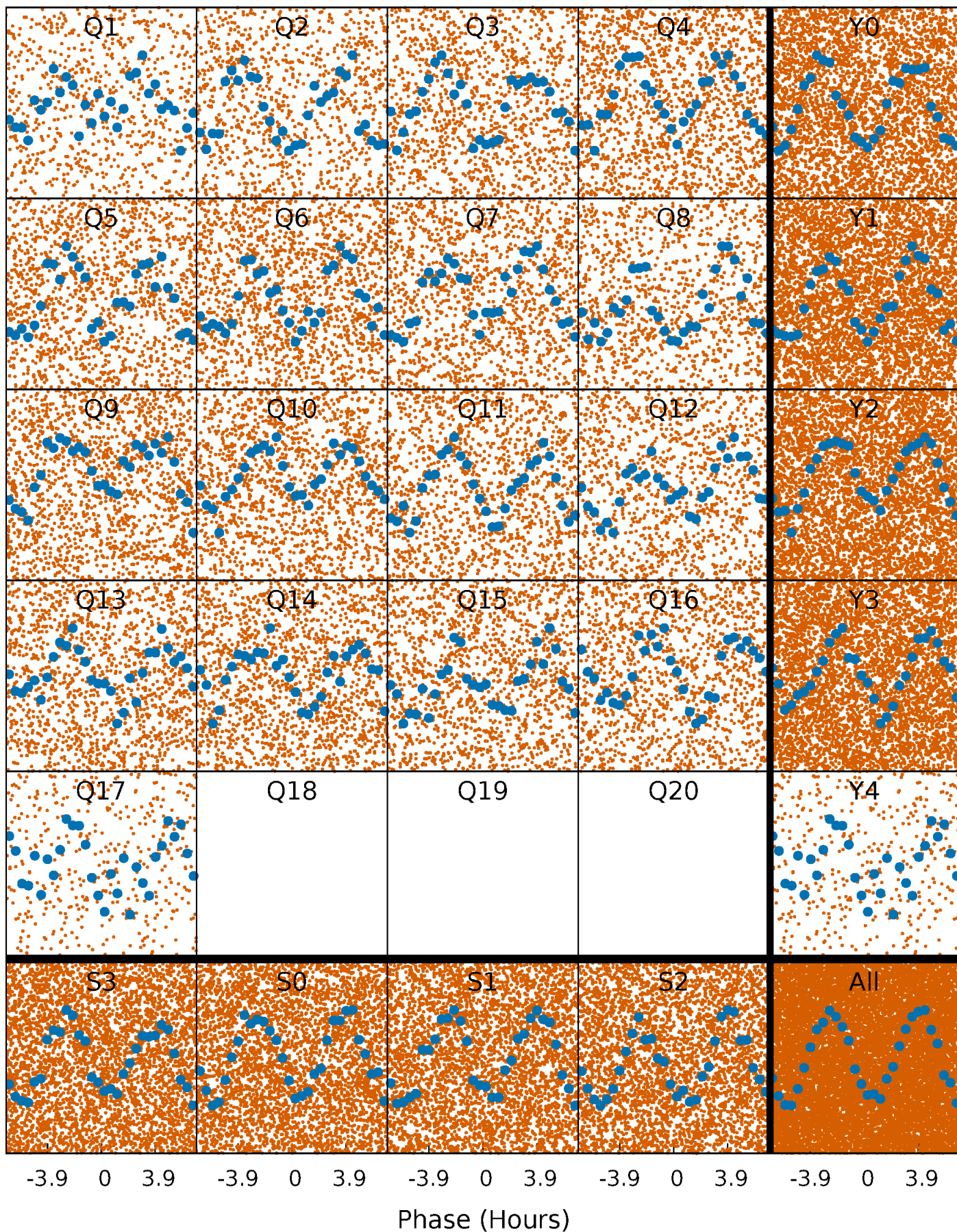


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

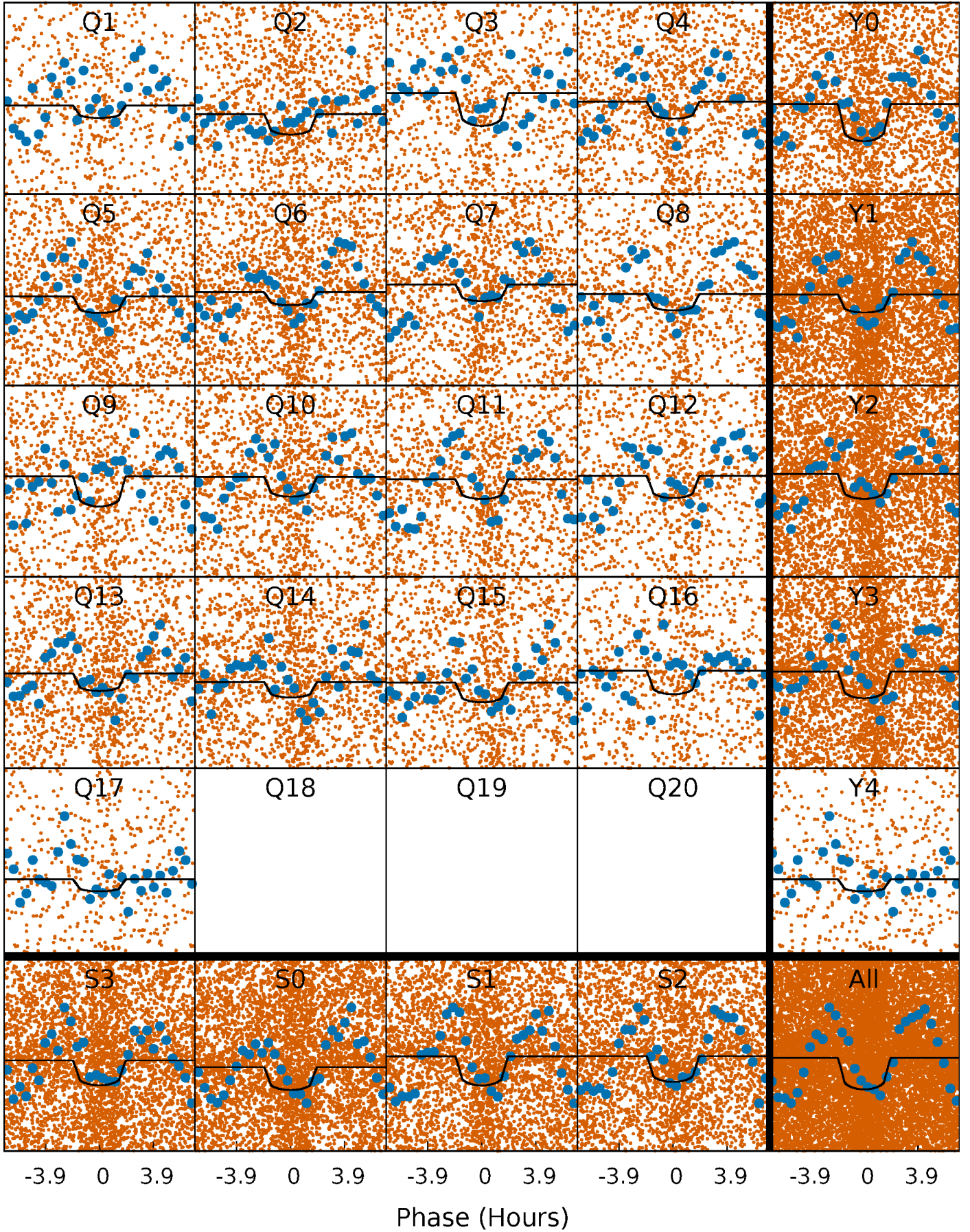
TCE 004650137-02   P= 0.528354 Days    $T_0=131.783556$  (BKJD)





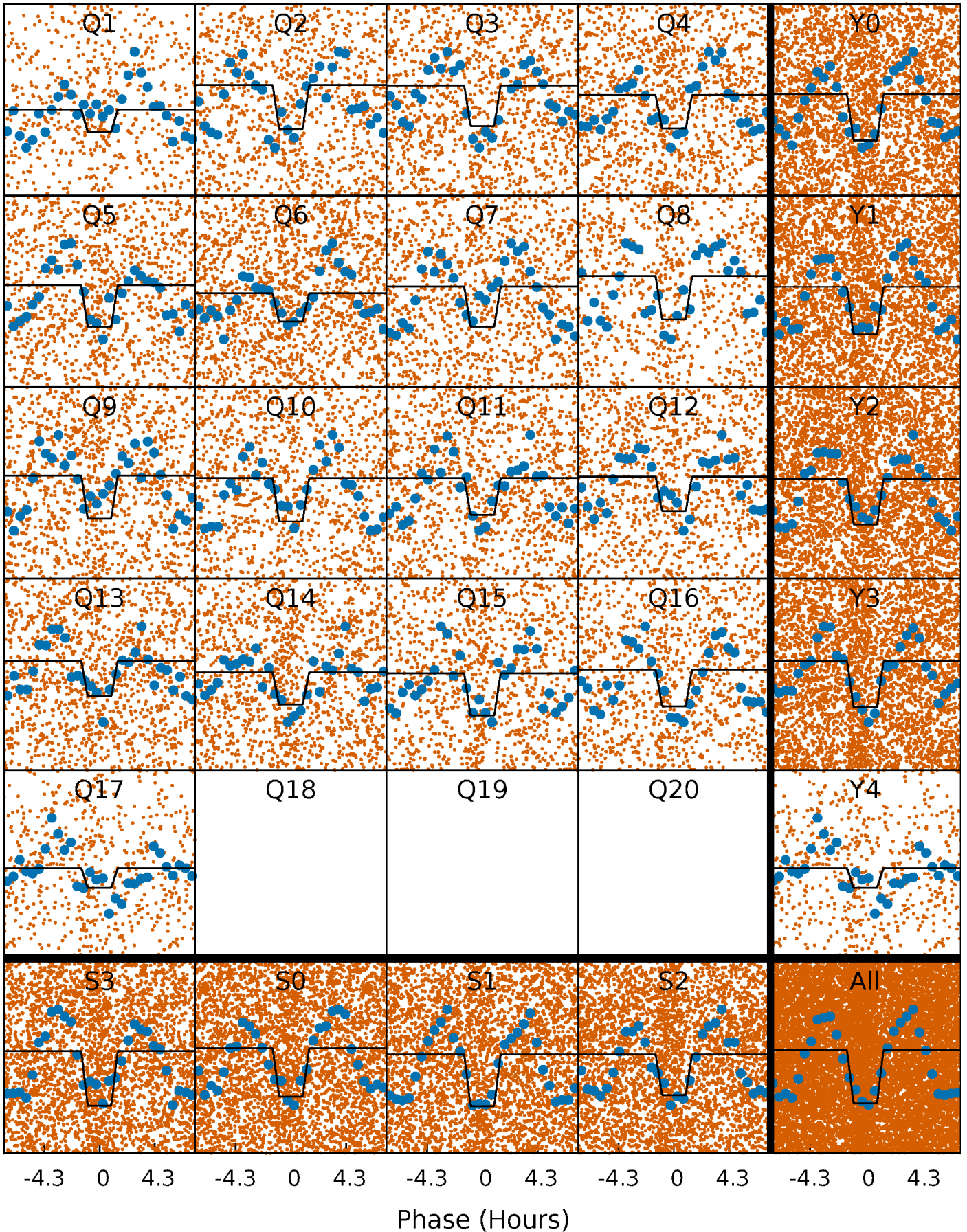
# DV Quarter-Phased Transit Curves

TCE 004650137-02   P= 0.528354 Days    $T_0=131.783556$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 004650137-02   P= 0.528374 Days    $T_0=131.784562$  (BKJD)

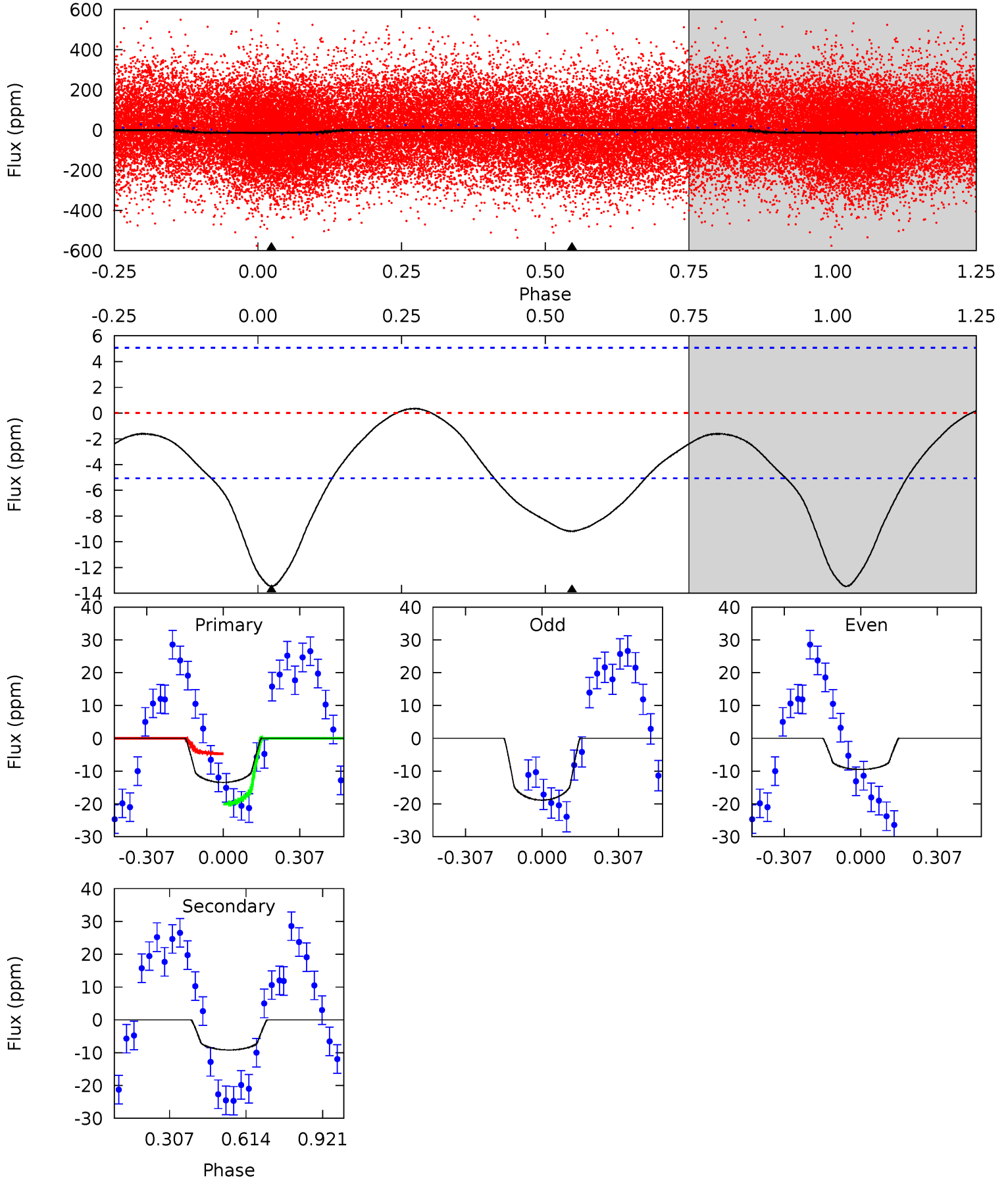




# DV Model-Shift Uniqueness Test

004650137-02, P = 0.528354 Days, E = 131.255202 Days

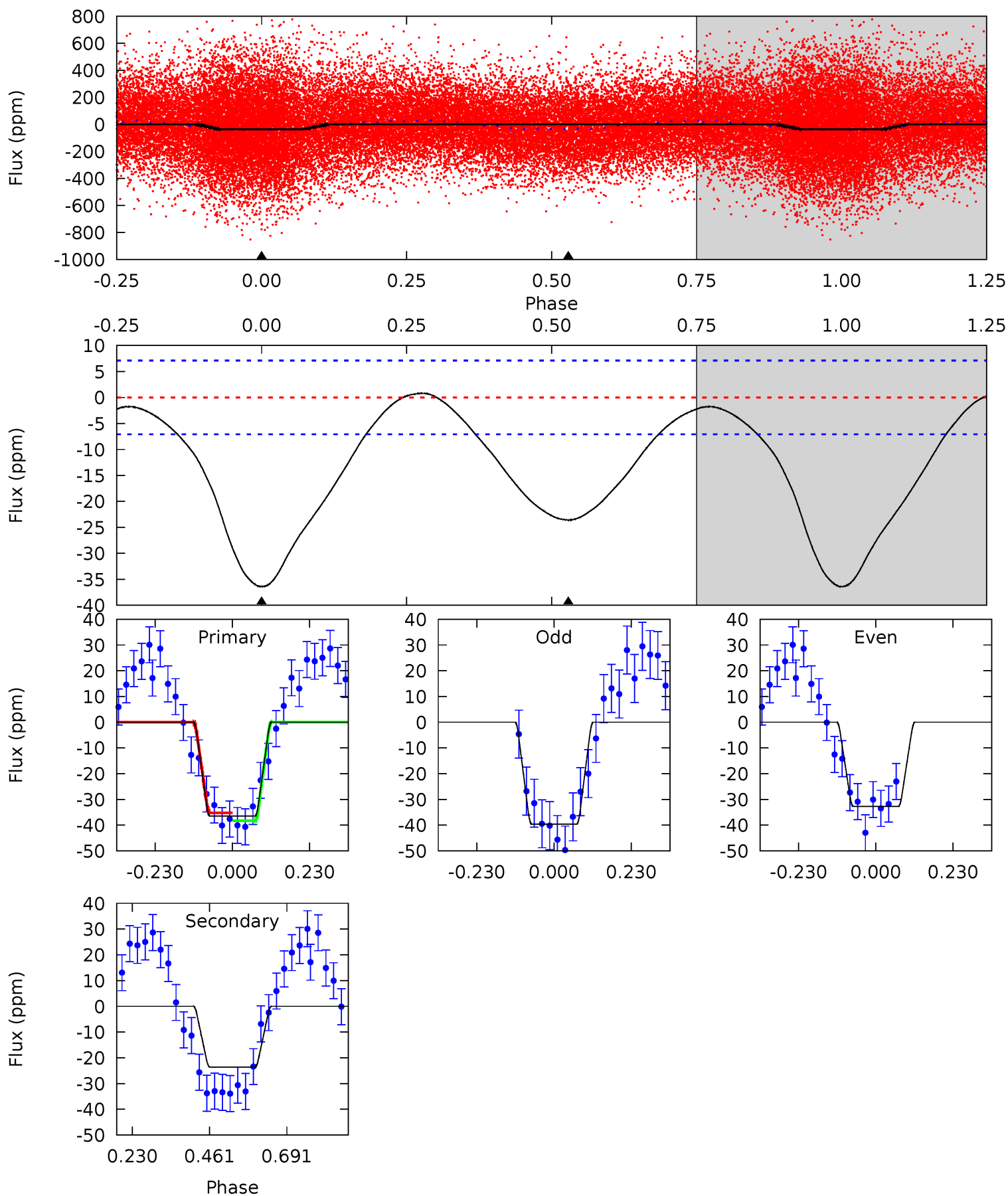
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.5	7.83	0	0	4.32	1.02	0.74	11.5	11.5	7.83	7.83	4.05	1.13	0.02	6.54



# Alt Model-Shift Uniqueness Test

004650137-02, P = 0.528374 Days, E = 131.256188 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
22.5	14.6	0	0	4.39	1.20	0.65	22.5	22.5	14.6	14.6	2.06	0.97	0.02	0.73



### Stellar Parameters For KIC 004650137

	$T_{\text{eff}} (K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7128^{+191}_{-255}$	$3.466^{+0.348}_{-0.061}$	$-0.180^{+0.250}_{-0.250}$	$4.348^{+0.286}_{-1.716}$	$2.019^{+0.066}_{-0.374}$	$0.035^{+0.088}_{-0.007}$
	+3%/-4%	+10%/-2%	+139%/-139%	+7%/-39%	+3%/-19%	+255%/-20%
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 004650137-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-9 \pm 1$	$2.00^{+1.21}_{-1.07}$	$7022^{+392}_{-676}$	$3413^{+4720}_{-8512}$	$0.327^{+1.228}_{-0.201}$
Alt.	$-24 \pm 2$	$2.70^{+1.25}_{-1.16}$	$7026^{+392}_{-703}$	$4749^{+2987}_{-9220}$	$0.455^{+0.925}_{-0.245}$

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

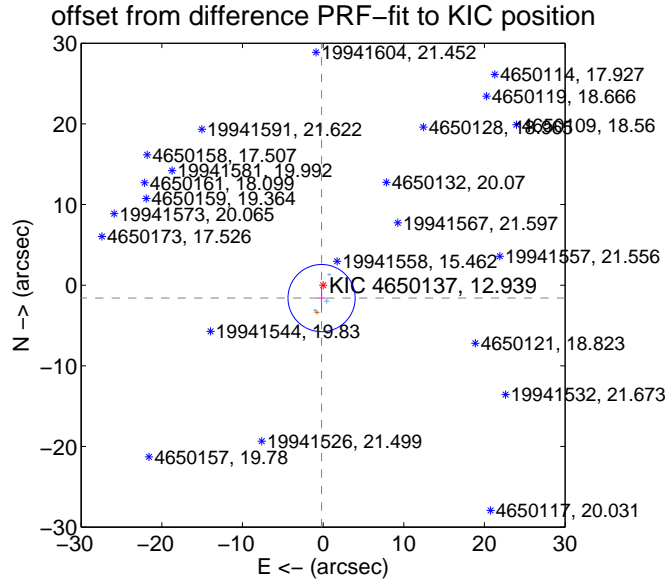
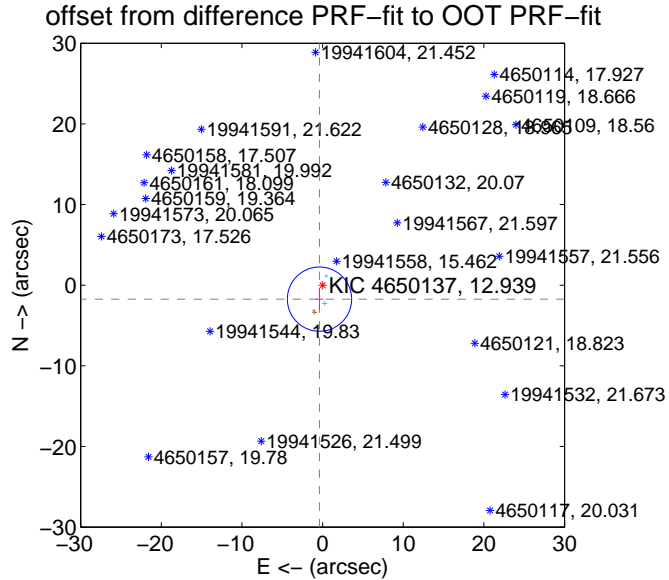
## DV Centroid Data

Supplemental centroid analysis for 004650137-02. Kepler magnitude: 12.94. Transit SNR 9.93

There are 3 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.33 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.775 \pm 1.328$	1.34	$0.385 \pm 0.474$	$-1.732 \pm 1.356$
PRF-fit source offset from KIC position	$1.613 \pm 1.388$	1.16	$0.191 \pm 0.516$	$-1.601 \pm 1.397$
photometric centroid source offset	—	—	—	—

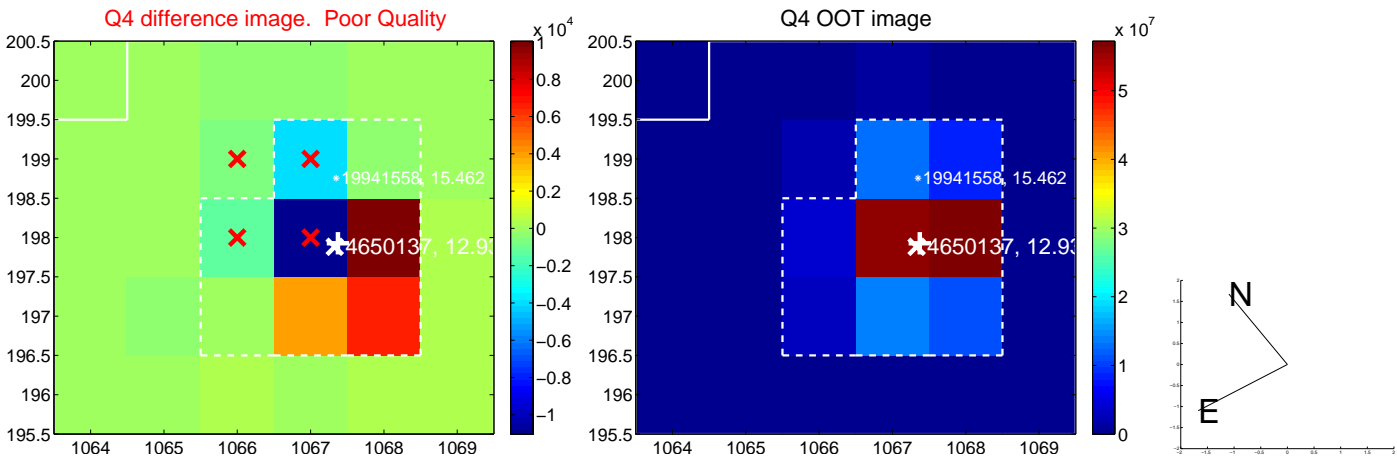
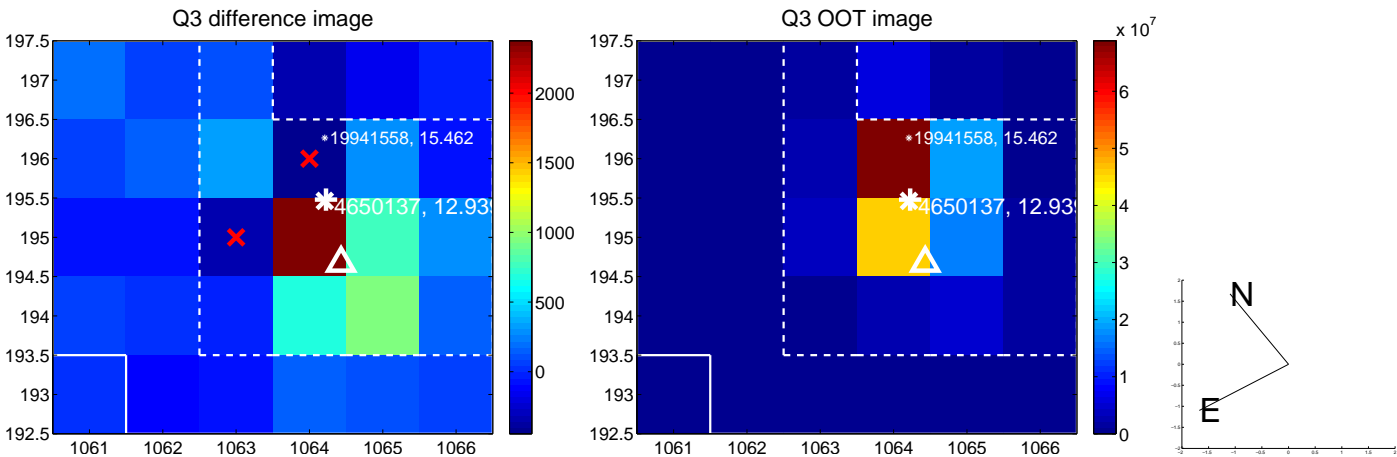
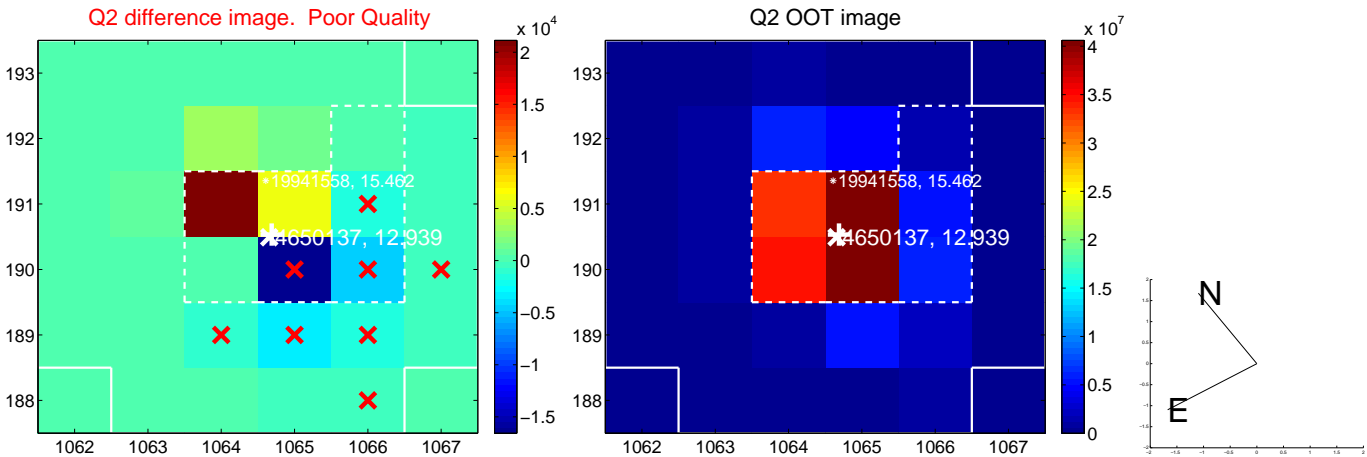
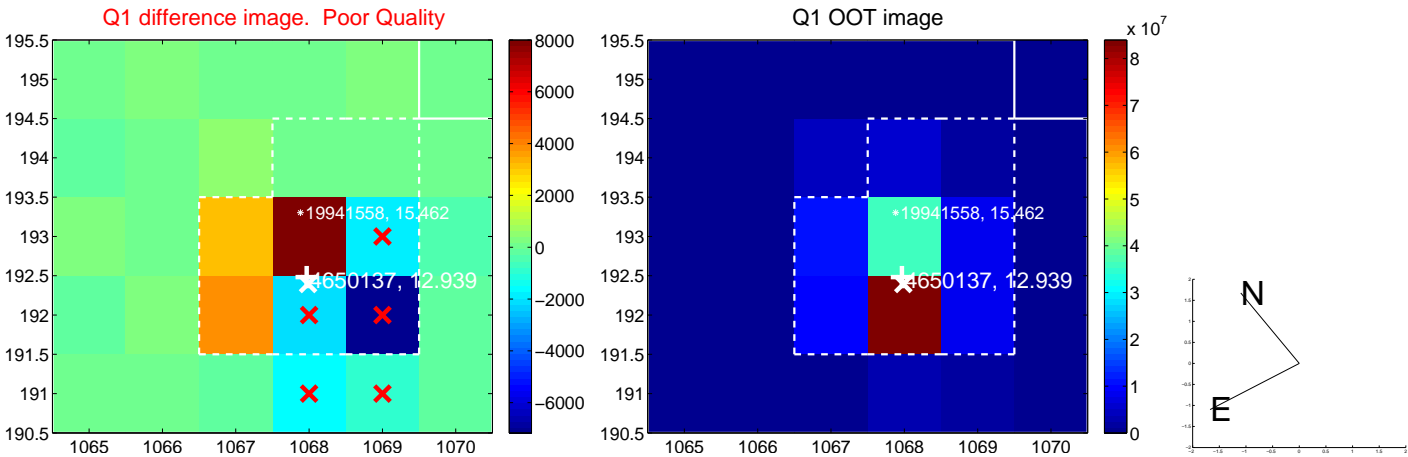


There are no photometric centroids

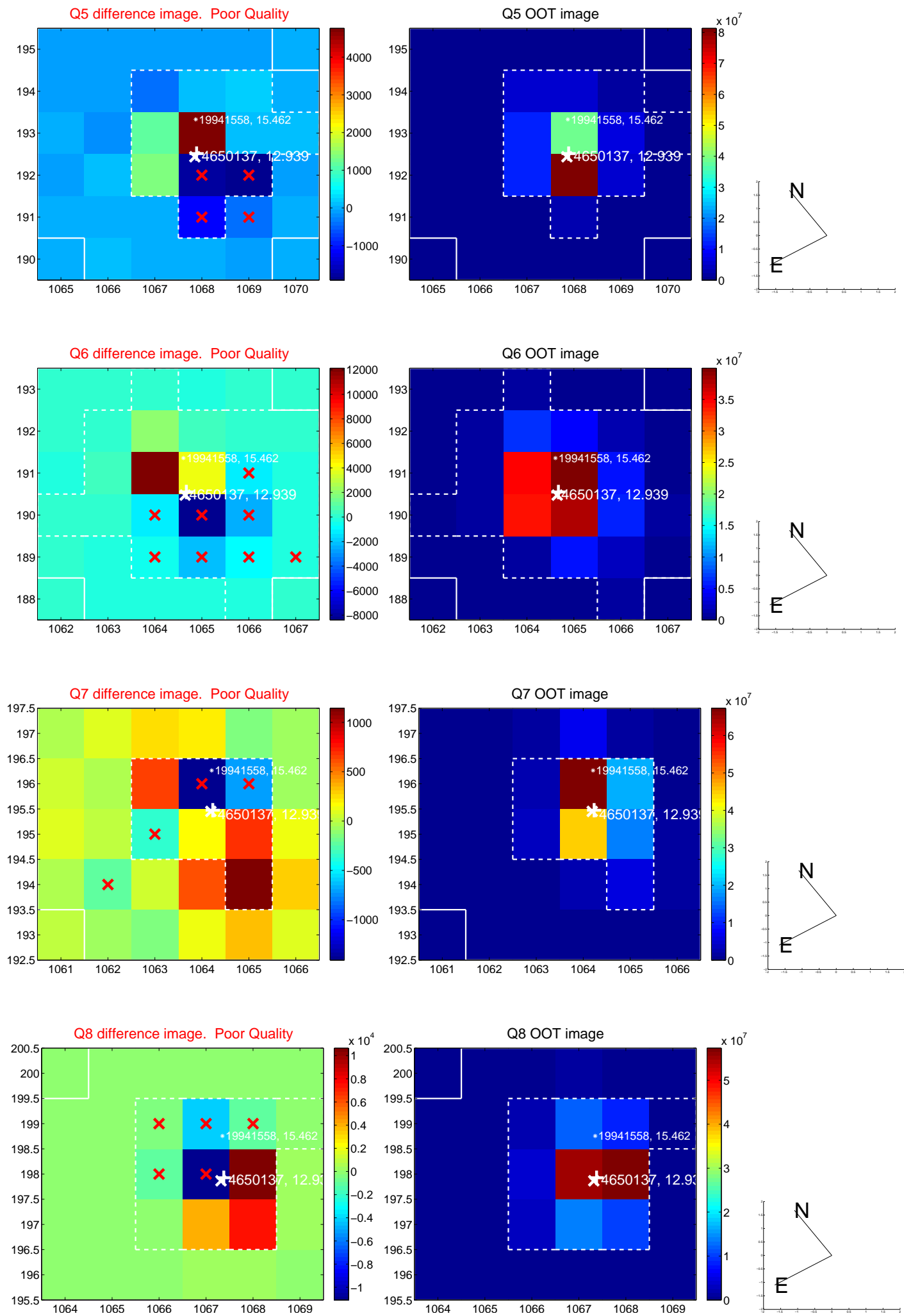
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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



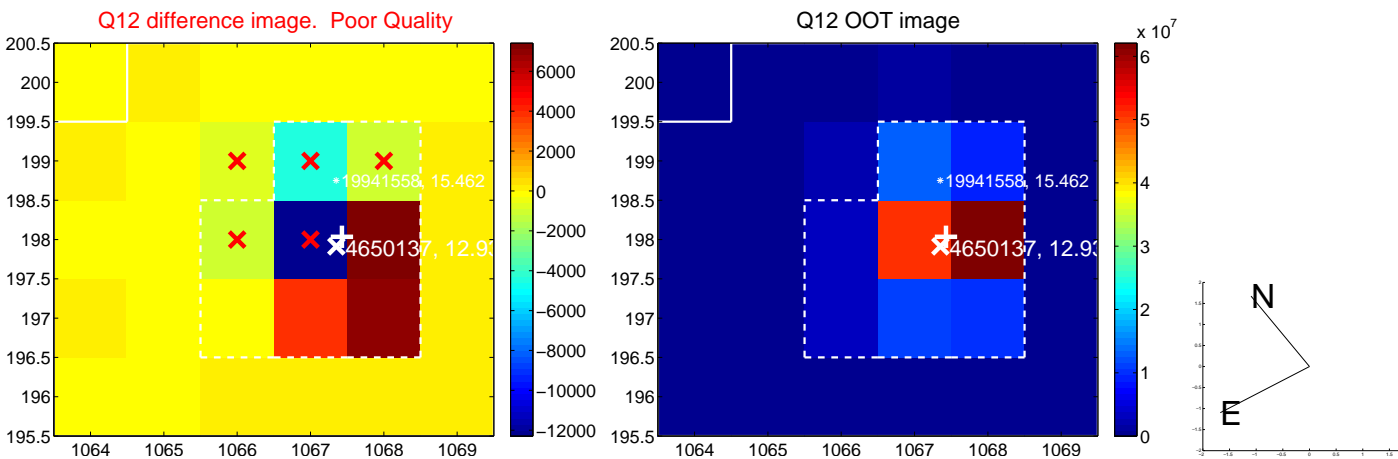
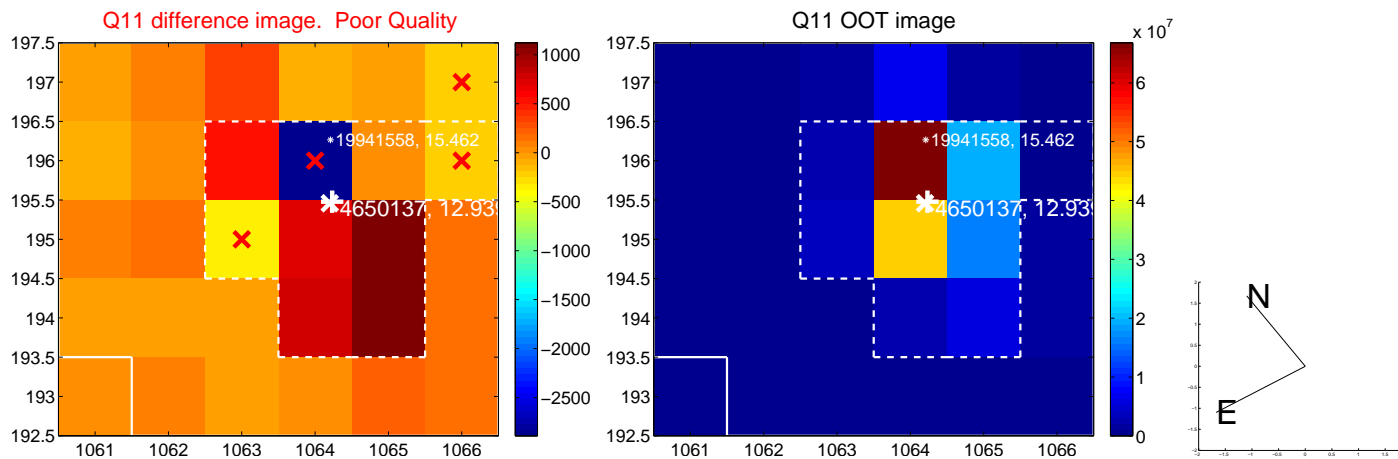
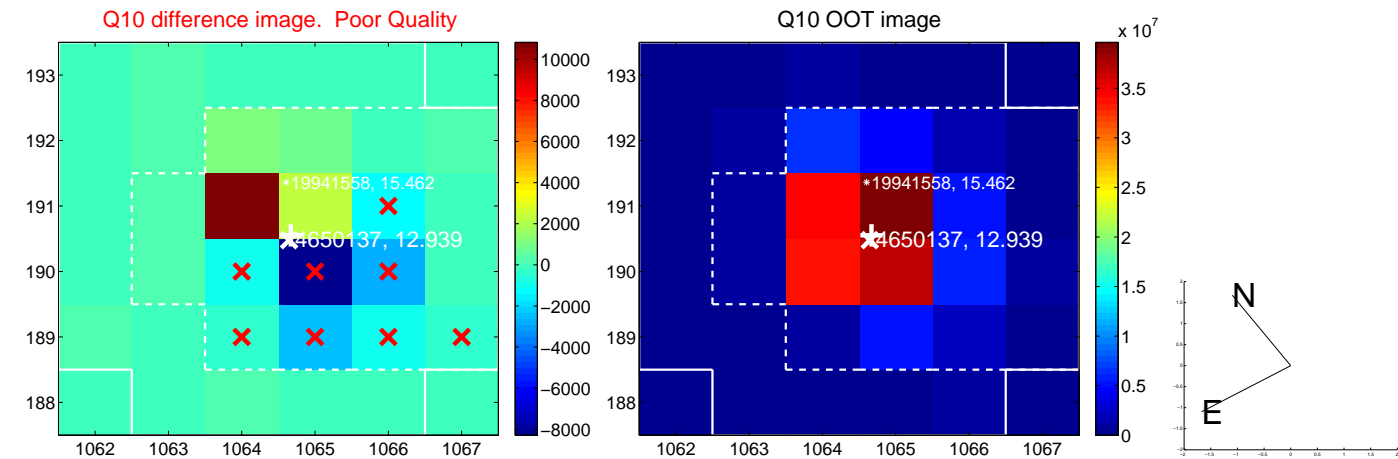
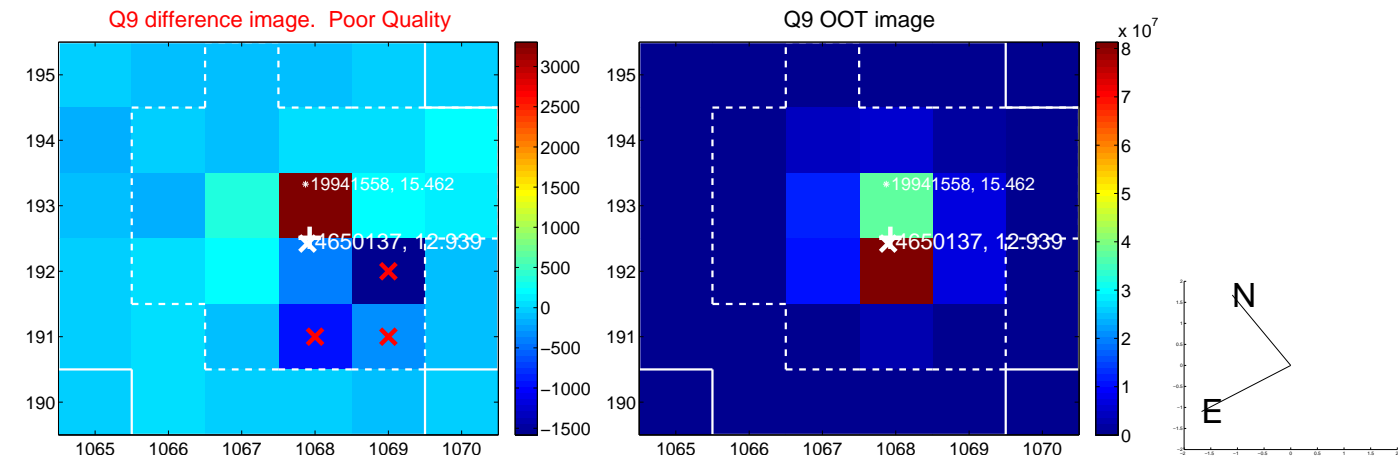
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



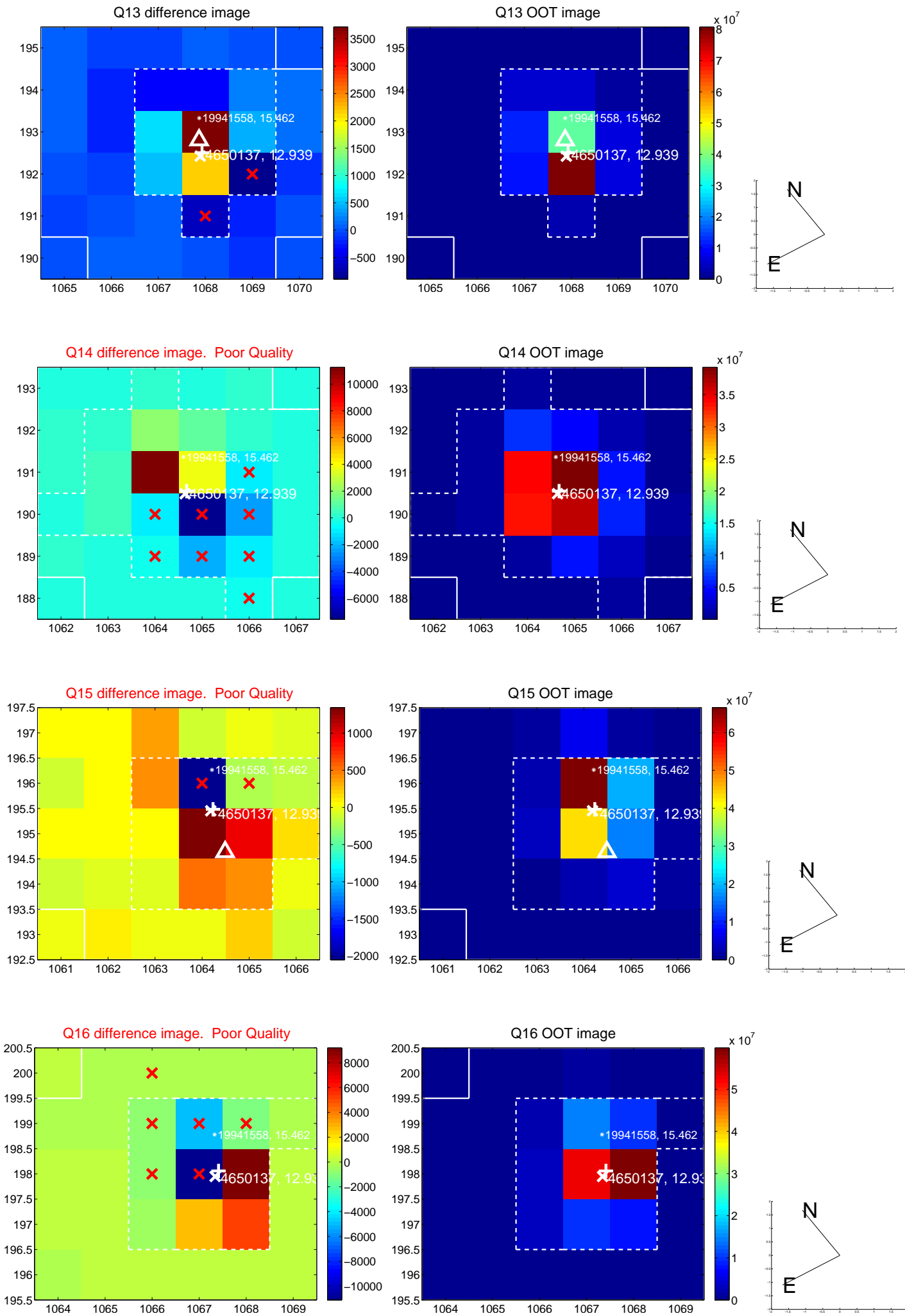
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



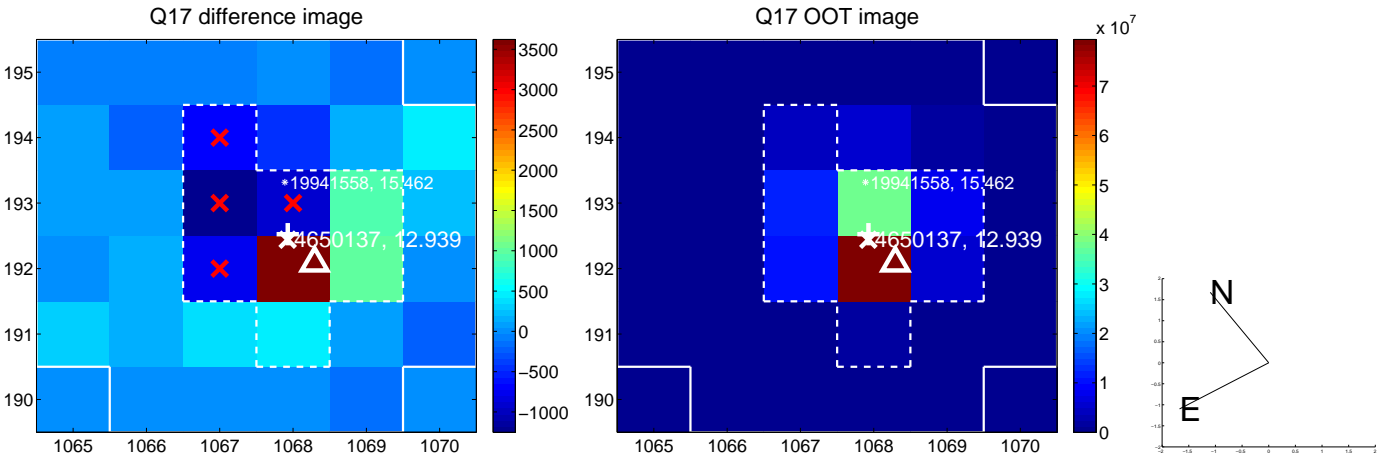
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



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

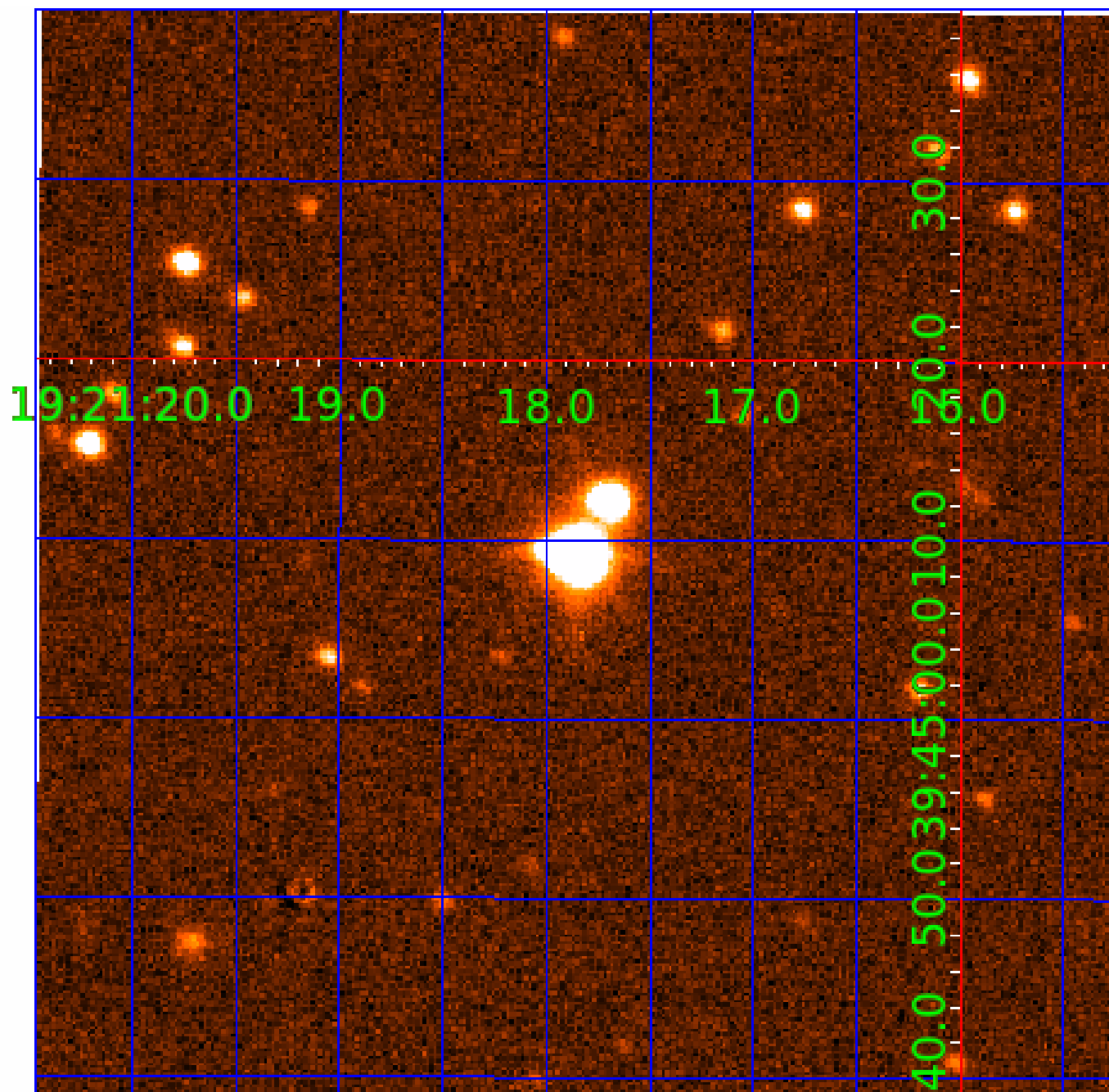


folded centroid time series figure for this object.



UKIRT Image

Declination



# KIC 004650137

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004650137-01	OBS	No	1.056731	132.048022	19.9	3.443	8.1	7.9	4.35	7128	2.27	66426.10
004650137-02	OBS	No	0.528354	131.783556	17.8	3.449	9.0	9.9	4.35	7128	2.15	0.00
004650137-03	OBS	No	30.983029	151.404981	376.2	1.177	12.6	13.1	4.35	7128	8.75	734.73
004650137-04	OBS	No	15.954549	132.079704	227.8	2.521	11.3	11.6	4.35	7128	7.44	1780.10
004650137-05	OBS	No	4.805716	133.000068	96.6	2.358	10.6	8.4	4.35	7128	5.00	8816.19
004650137-06	OBS	No	34.748958	163.778320	284.5	2.777	10.5	10.8	4.35	7128	8.31	630.52

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004650137-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
004650137-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—SAME_NTL_PERIOD
004650137-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—HALO_GHOST
004650137-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
004650137-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004650137-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

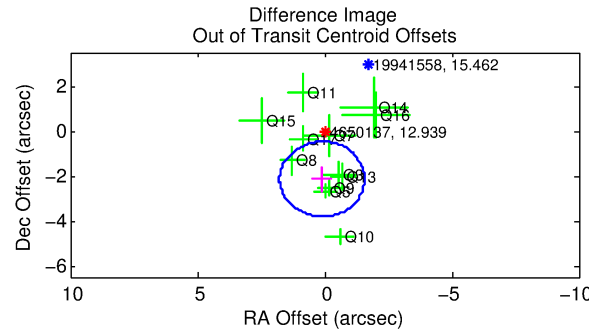
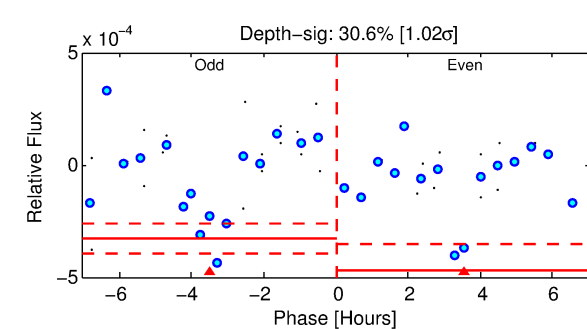
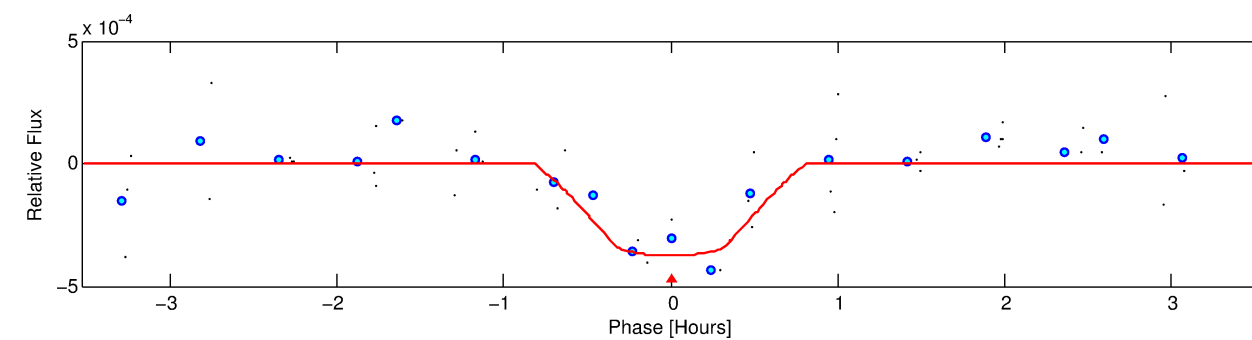
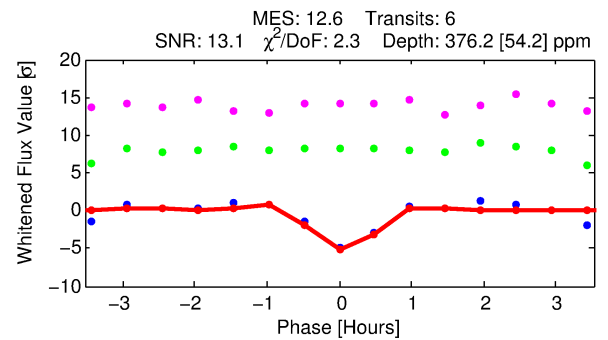
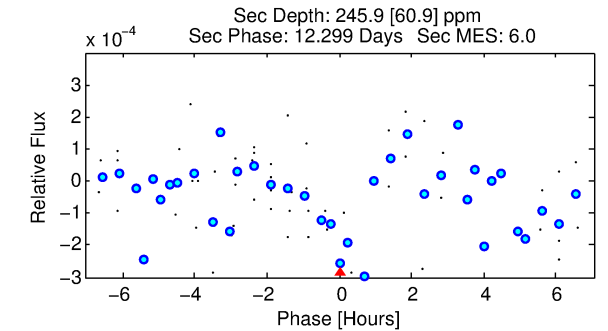
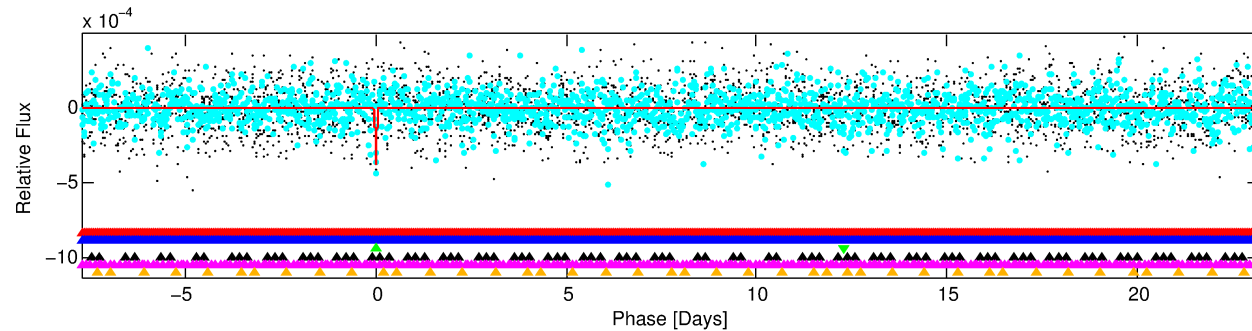
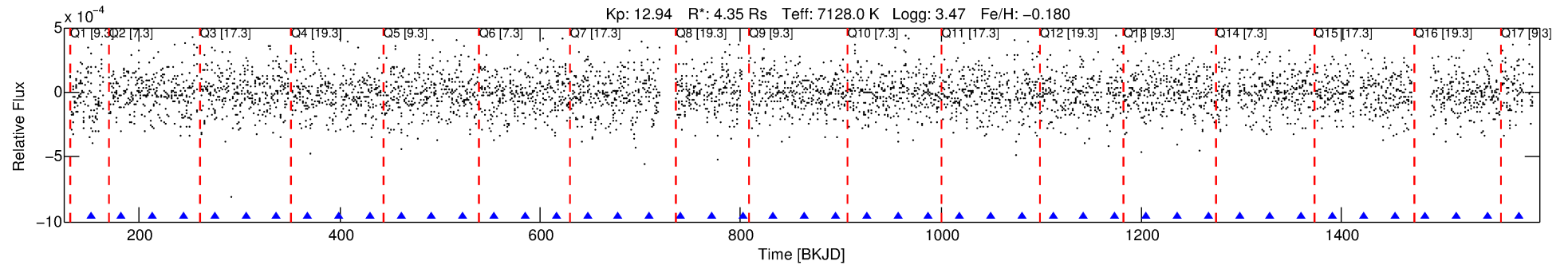
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 004650137-03

No Significant Match Found

# DV One-Page Summary

KIC: 4650137 Candidate: 3 of 6 Period: 30.983 d



## DV Fit Results:

Period = 30.98303 [0.00024] d  
Epoch = 151.4050 [0.0077] BKJD  
Rp/R\* = 0.0184 [0.0304]  
a/R\* = 178.80 [1483.17]  
b = 0.50 [12.99]  
Seff = 734.73 [449.97]  
Teq = 1328 [203] K  
Rp = 8.75 [14.82] Re  
a = 0.2440 [0.0915] AU  
Ag = 105.24 [353.43] [0.29 $\sigma$ ]  
Teffp = 6574 [5437] K [0.96 $\sigma$ ]

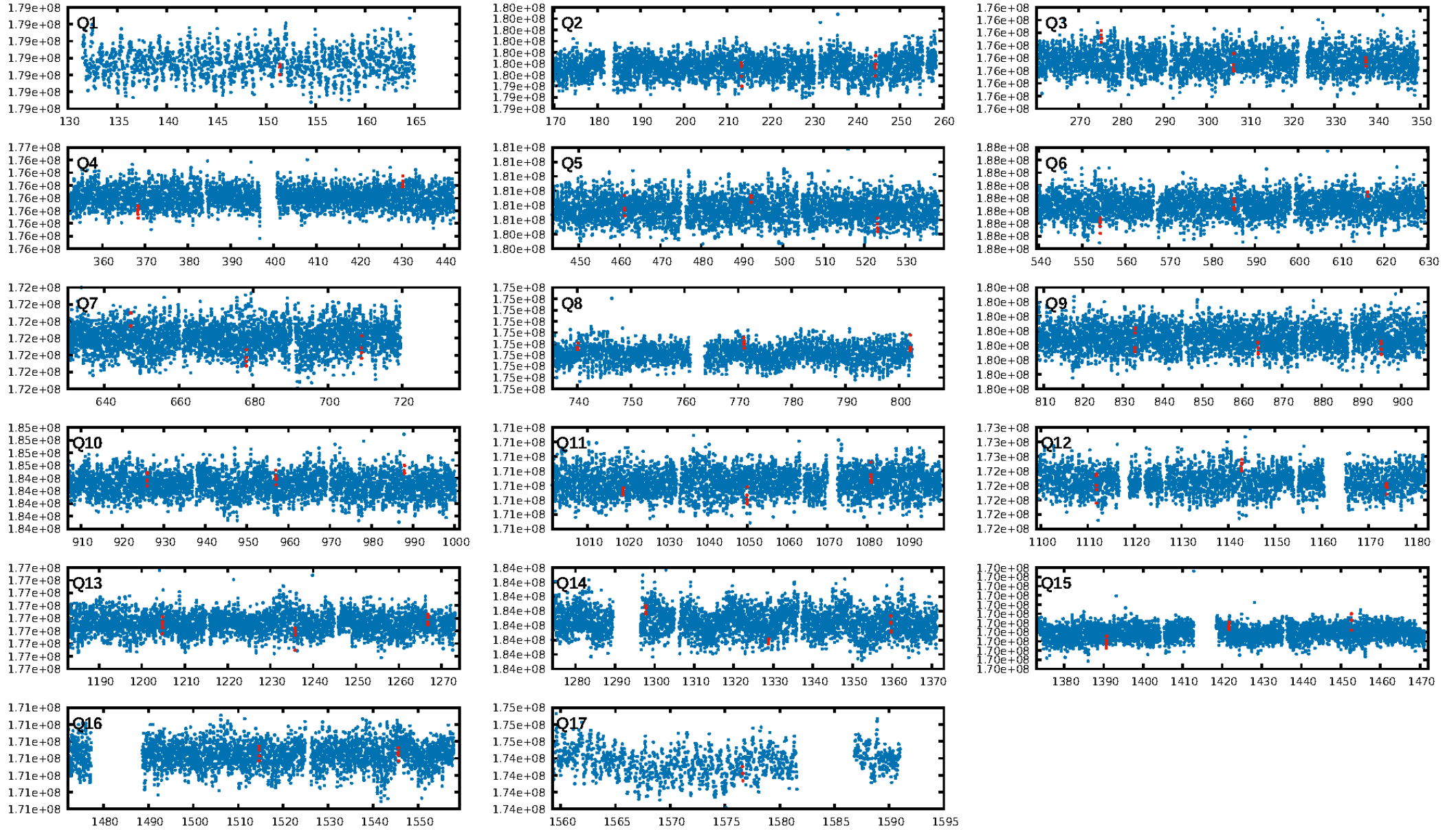
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [129.64 $\sigma$ ]  
LongPeriod-sig: 100.0% [29.96 $\sigma$ ]  
ModelChiSquare2-sig: 3.1%  
ModelChiSquareGof-sig: 68.7%  
Bootstrap-pfa: 1.47e-15  
RollingBand-fgt: 1.00 [6/6]  
**GhostDiagnostic-chr: 0.2384**  
Centroid-sig: N/A  
Centroid-so: N/A  
**OotOffset-rm: 2.147 arcsec [3.86 $\sigma$ ]**  
**KicOffset-rm: 1.999 arcsec [4.14 $\sigma$ ]**  
OotOffset-st: 2/4/2/4 [12]  
KicOffset-st: 2/4/2/4 [12]  
DiffImageQuality-fgm: 0.42 [5/12]  
DiffImageOverlap-fno: 0.00 [0/17]

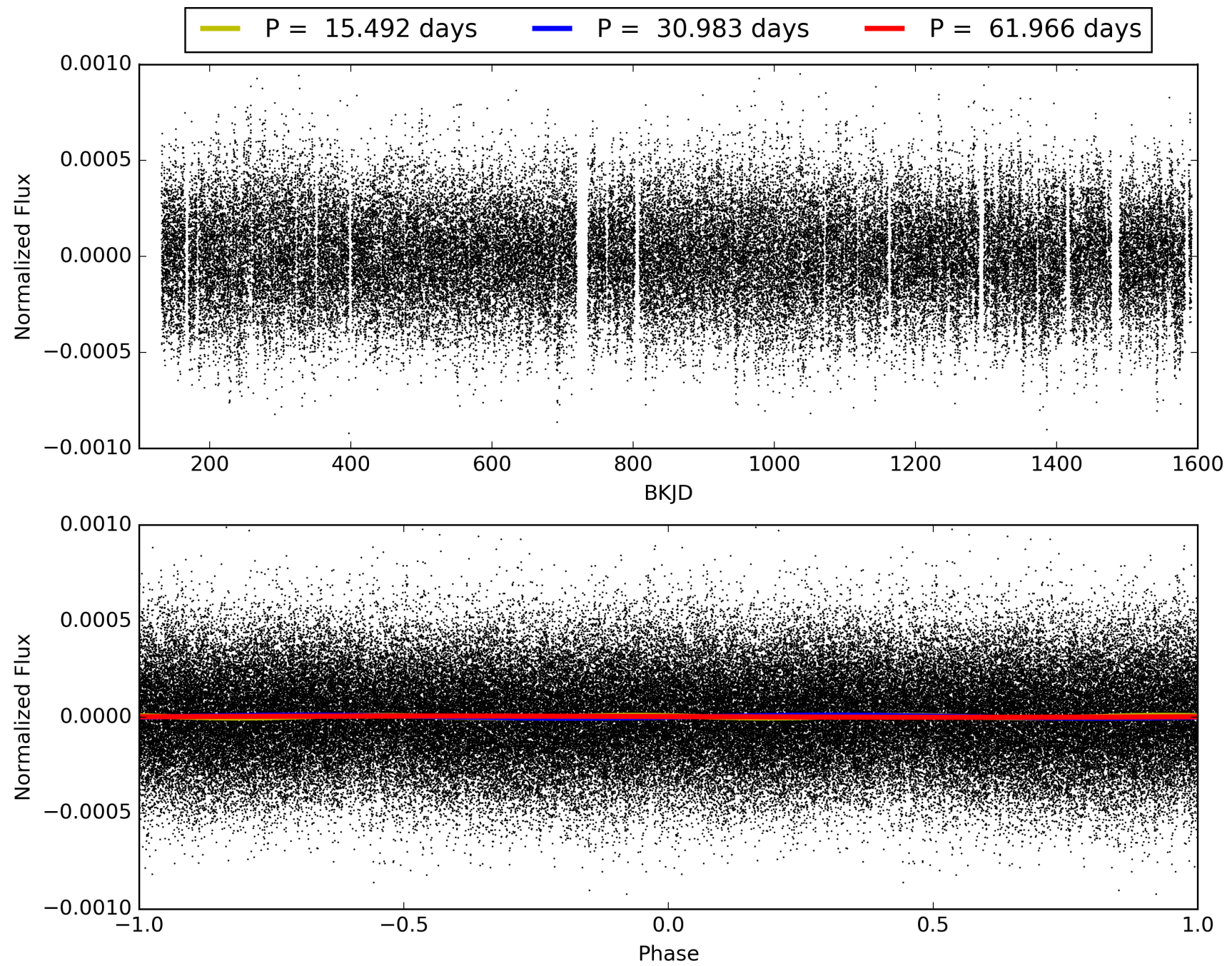
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 14:43:30 Z

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

# TCE 004650137-03, PDC Light Curves



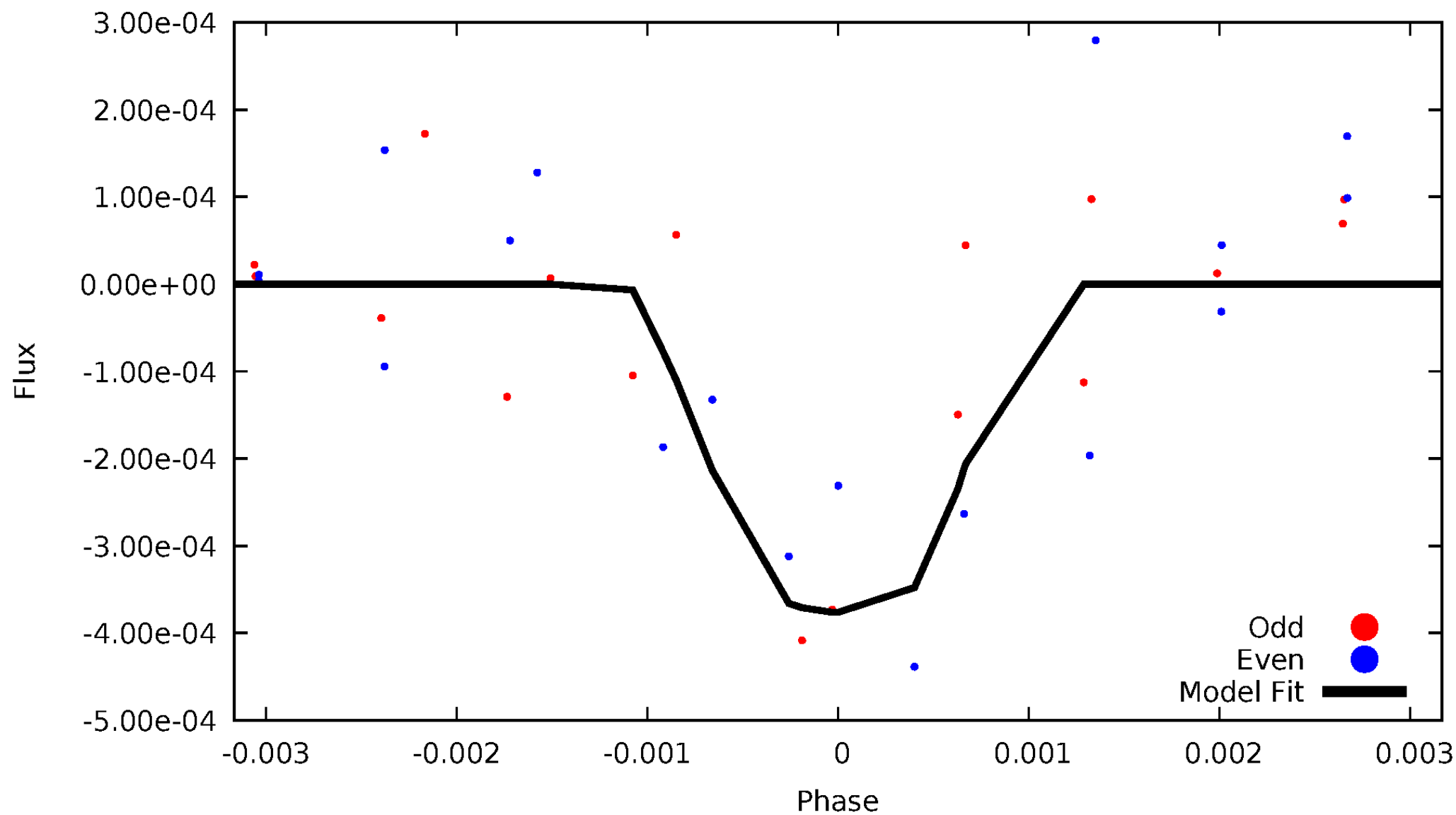
TCE 004650137-03





# DV Odd/Even

TCE 004650137-03



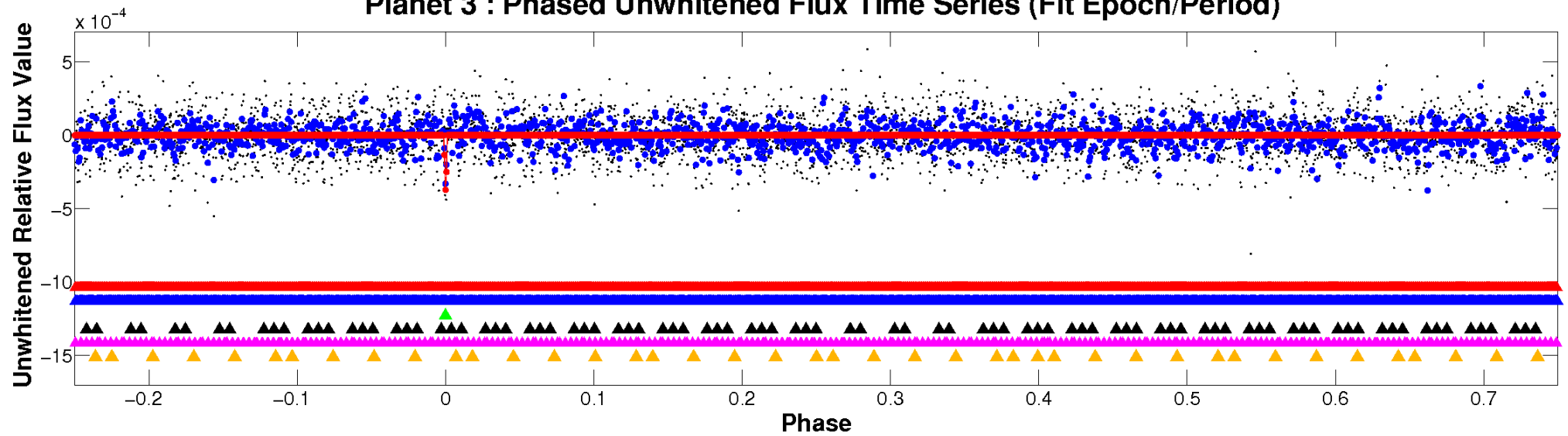


ALT Odd/Even

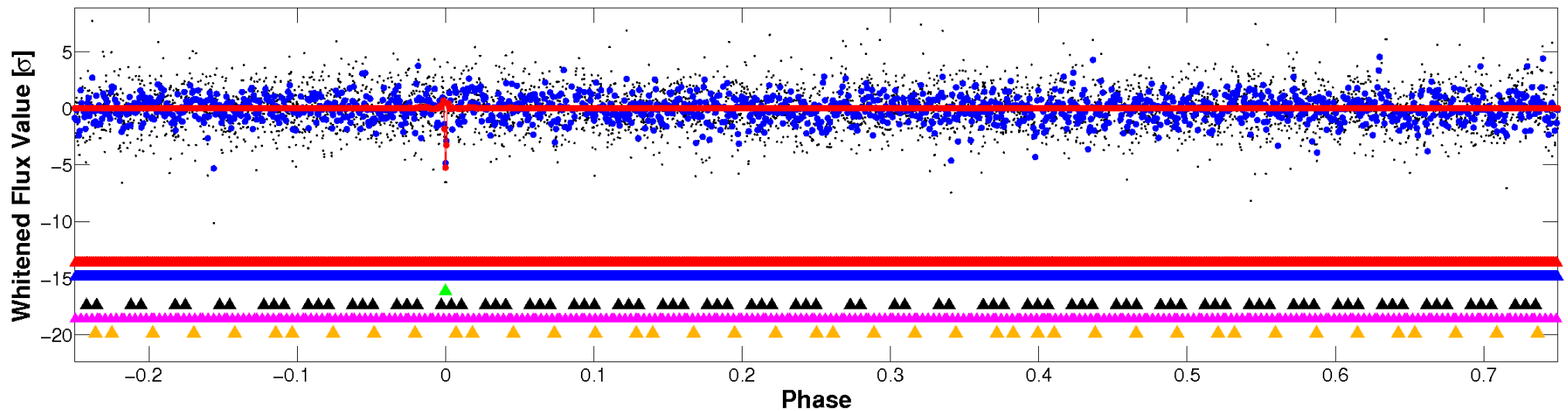
This plot does not exist for this TCE.

# Non-Whitened Vs. Whitened Light Curve

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

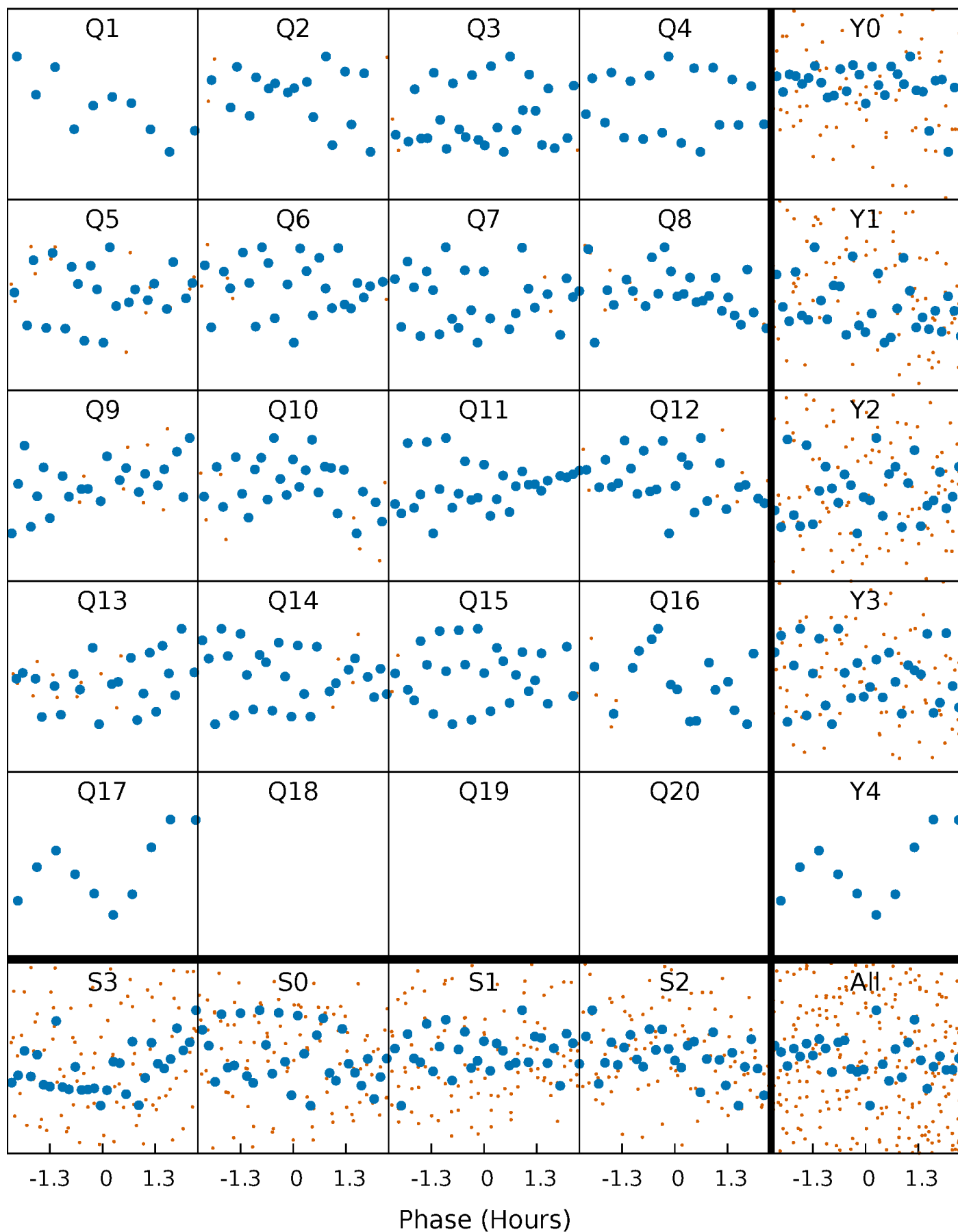


## Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

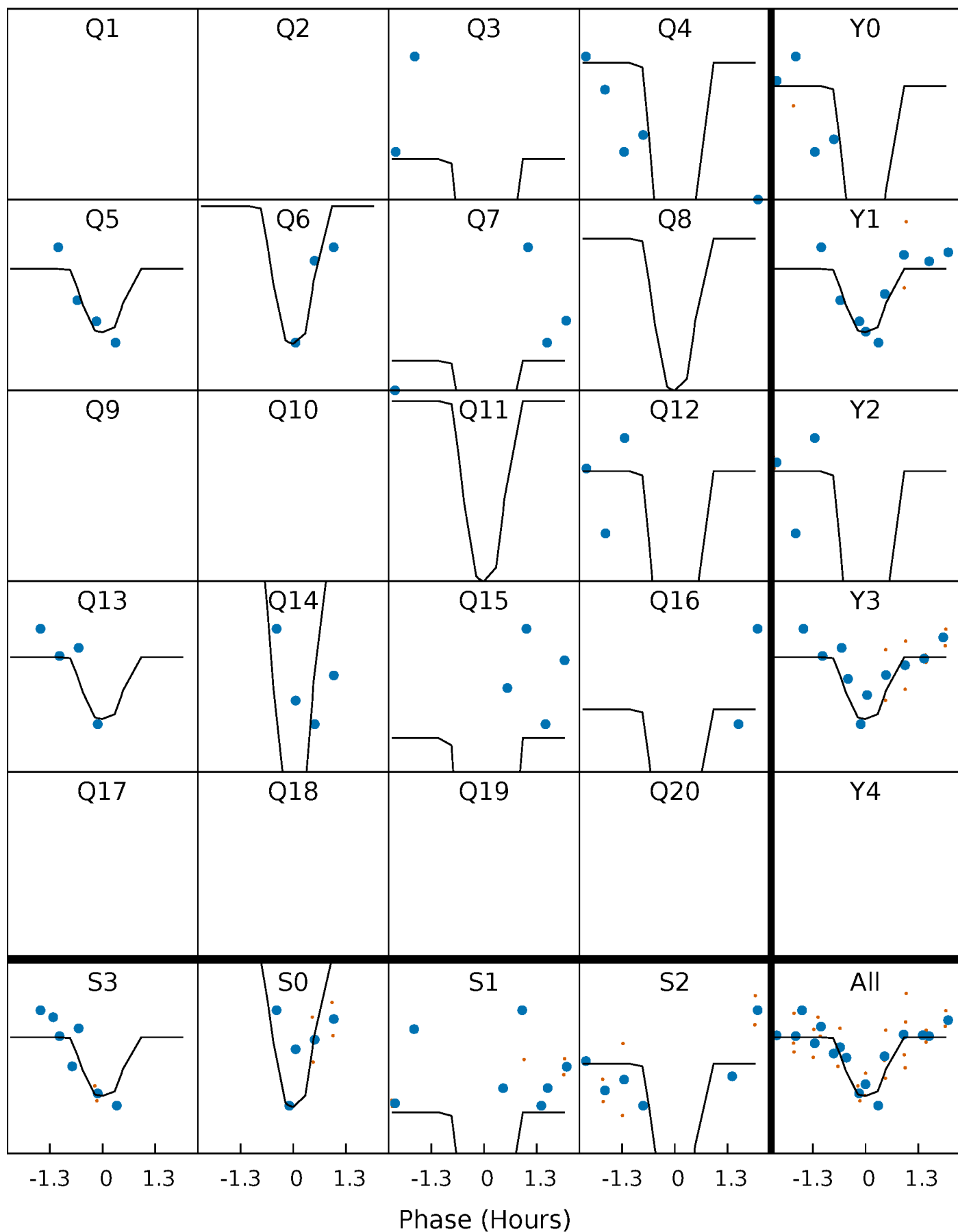
TCE 004650137-03     $P = 30.983029$  Days     $T_0 = 151.404981$  (BKJD)





# DV Quarter-Phased Transit Curves

TCE 004650137-03 P= 30.983029 Days  $T_0=151.404981$  (BKJD)

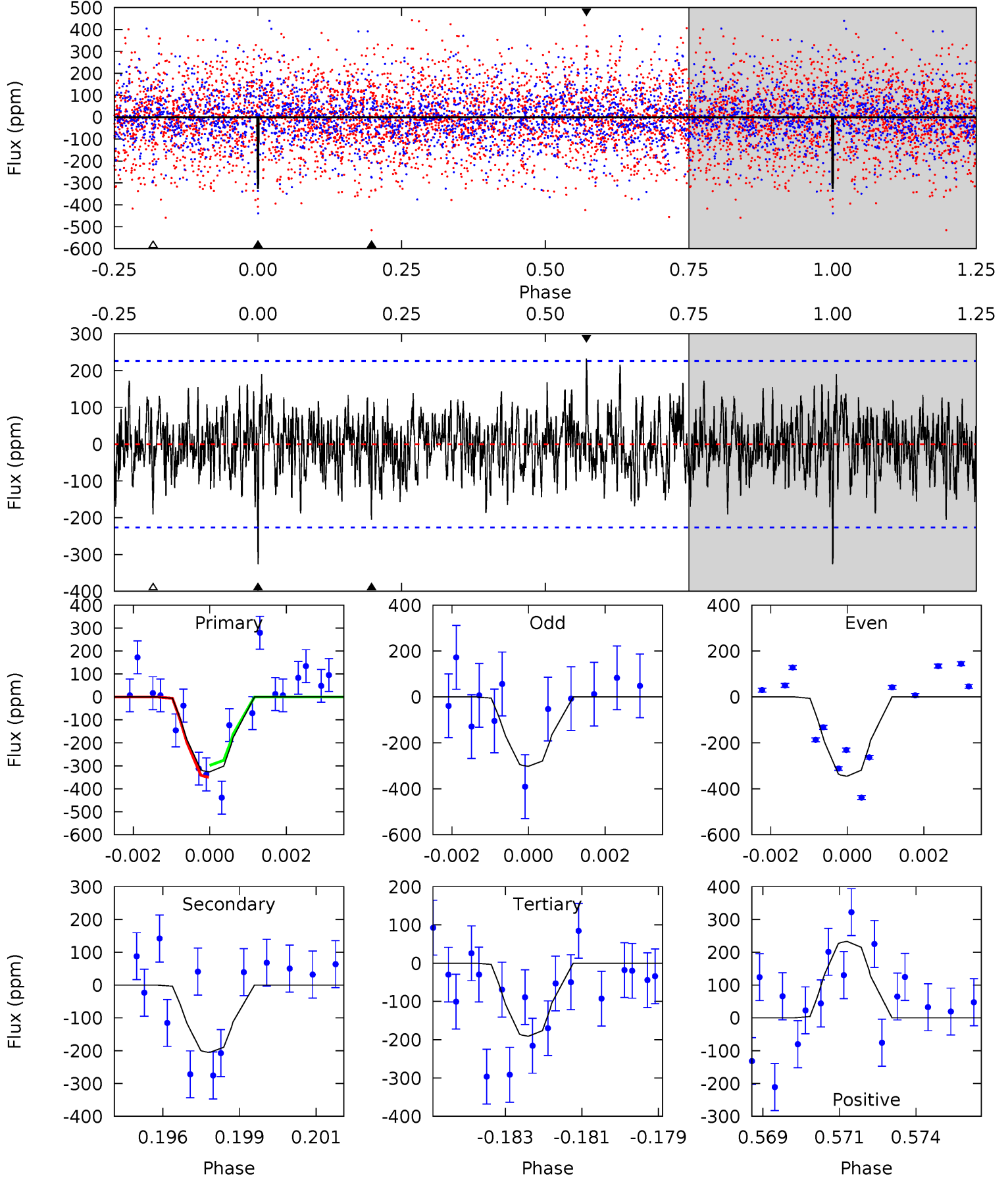


This plot does not exist for this TCE.

# DV Model-Shift Uniqueness Test

004650137-03, P = 30.983029 Days, E = 120.421952 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
7.65	4.81	4.47	5.46	5.31	3.06	1.50	3.18	2.19	0.34	-0.65	0.51	0.99	0.42	0.60



## Alt Model-Shift Uniqueness Test

This plot does not exist for this TCE.

### Stellar Parameters For KIC 004650137

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$7128^{+191}_{-255}$	$3.466^{+0.348}_{-0.061}$	$-0.180^{+0.250}_{-0.250}$	$4.348^{+0.286}_{-1.716}$	$2.019^{+0.066}_{-0.374}$	$0.035^{+0.088}_{-0.007}$
	+3%/-4%	+10%/-2%	+139%/-139%	+7%/-39%	+3%/-19%	+255%/-20%
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 004650137-03 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-205 \pm 43$	$13.00^{+11.27}_{-8.58}$	$1819^{+95}_{-164}$	$4988^{+3888}_{-1057}$	$39^{+300}_{-28}$
Alt.	N/A	N/A	N/A	N/A	N/A

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



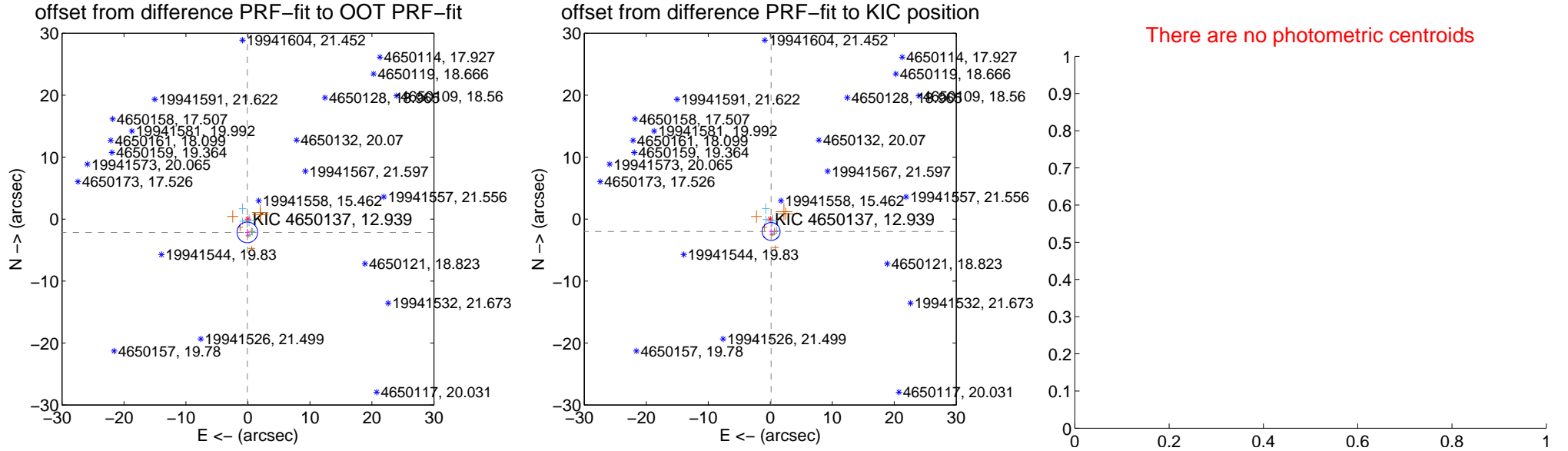
## DV Centroid Data

Supplemental centroid analysis for 004650137-03. Kepler magnitude: 12.94. Transit SNR 13.11

There are 5 quarters with good PRF difference image offsets

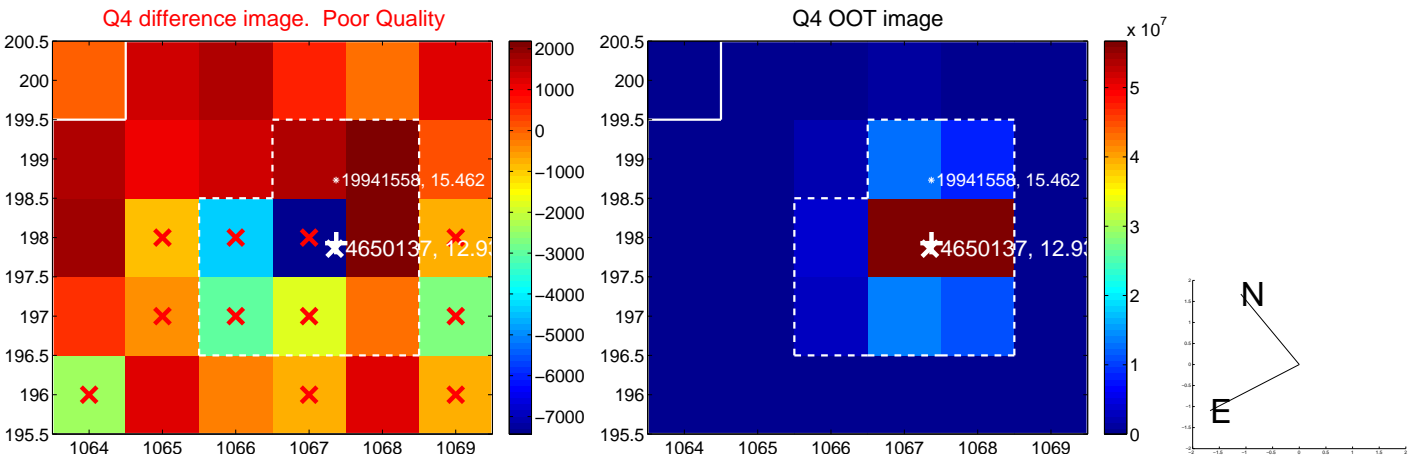
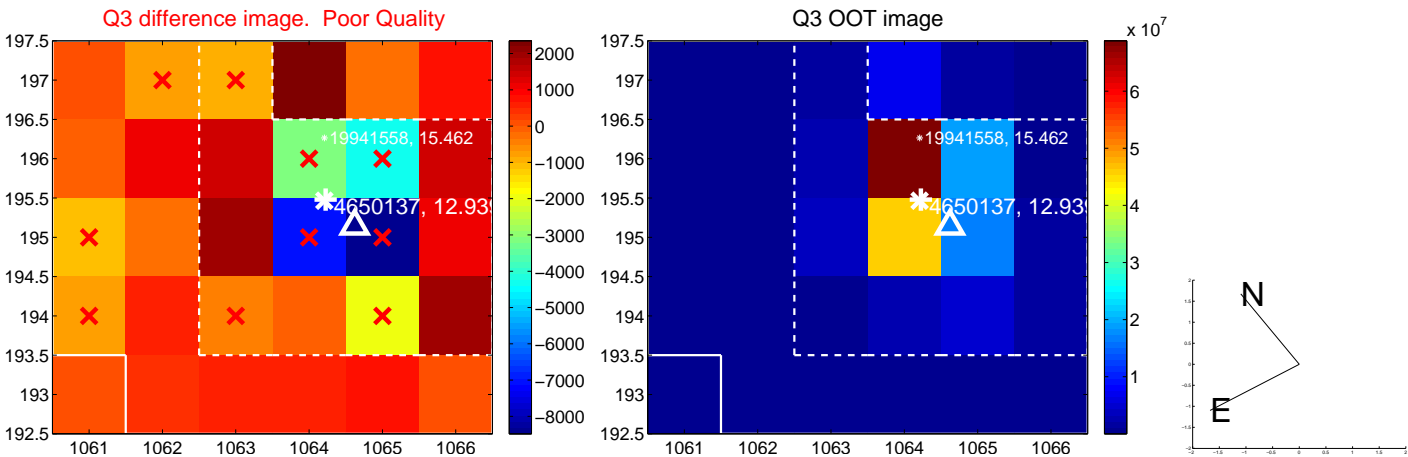
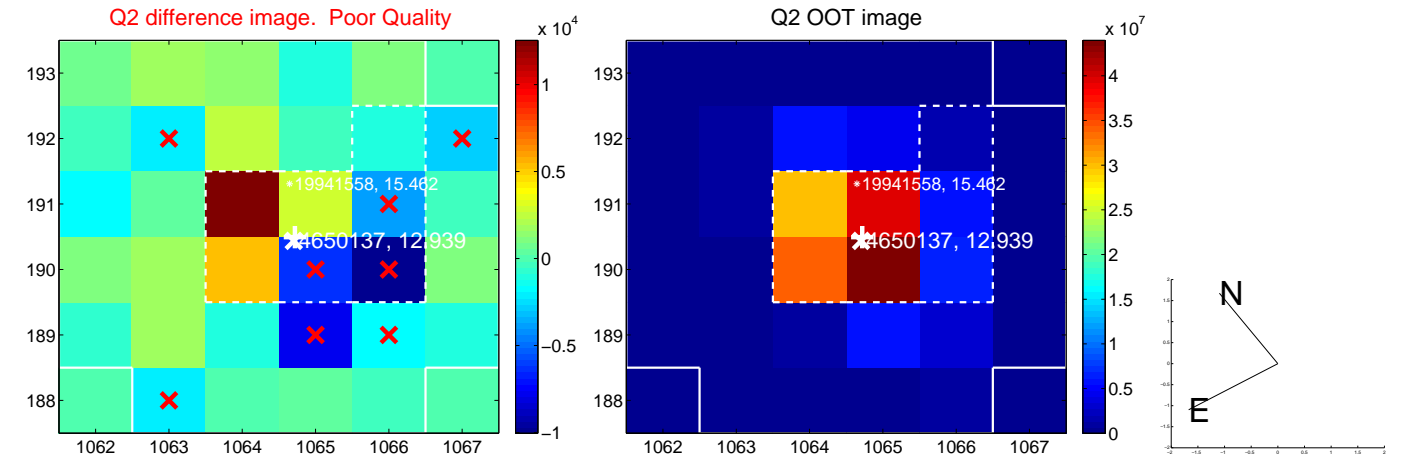
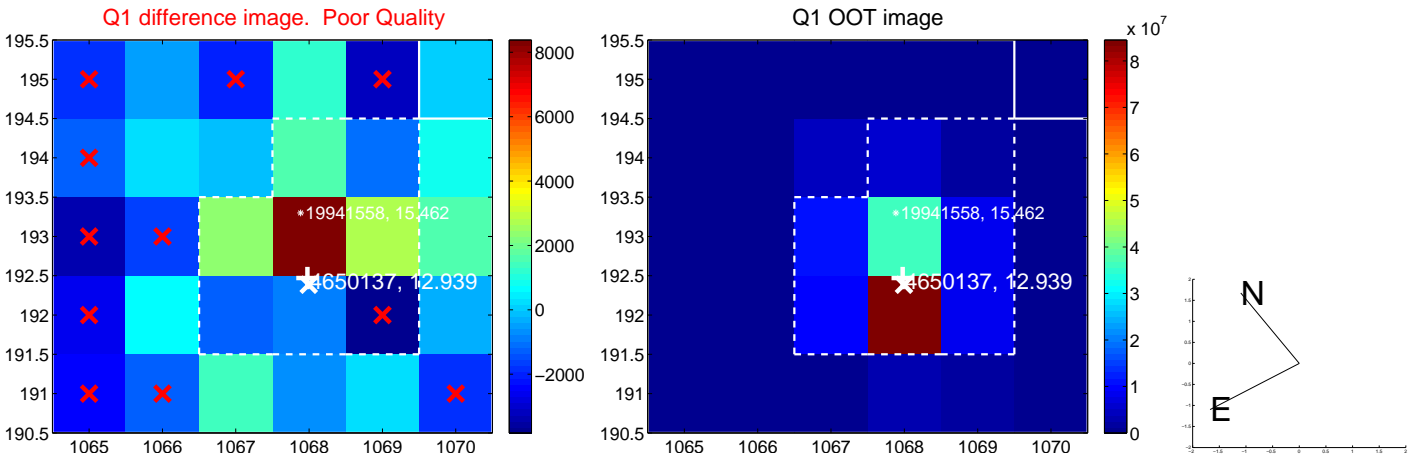
The direct PRF centroid is offset from the target star catalog position by about 0.33 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.147 \pm 0.556$	3.86	$0.104 \pm 0.339$	$-2.144 \pm 0.559$
PRF-fit source offset from KIC position	$1.999 \pm 0.483$	4.14	$-0.140 \pm 0.307$	$-1.994 \pm 0.483$
photometric centroid source offset	—	—	—	—

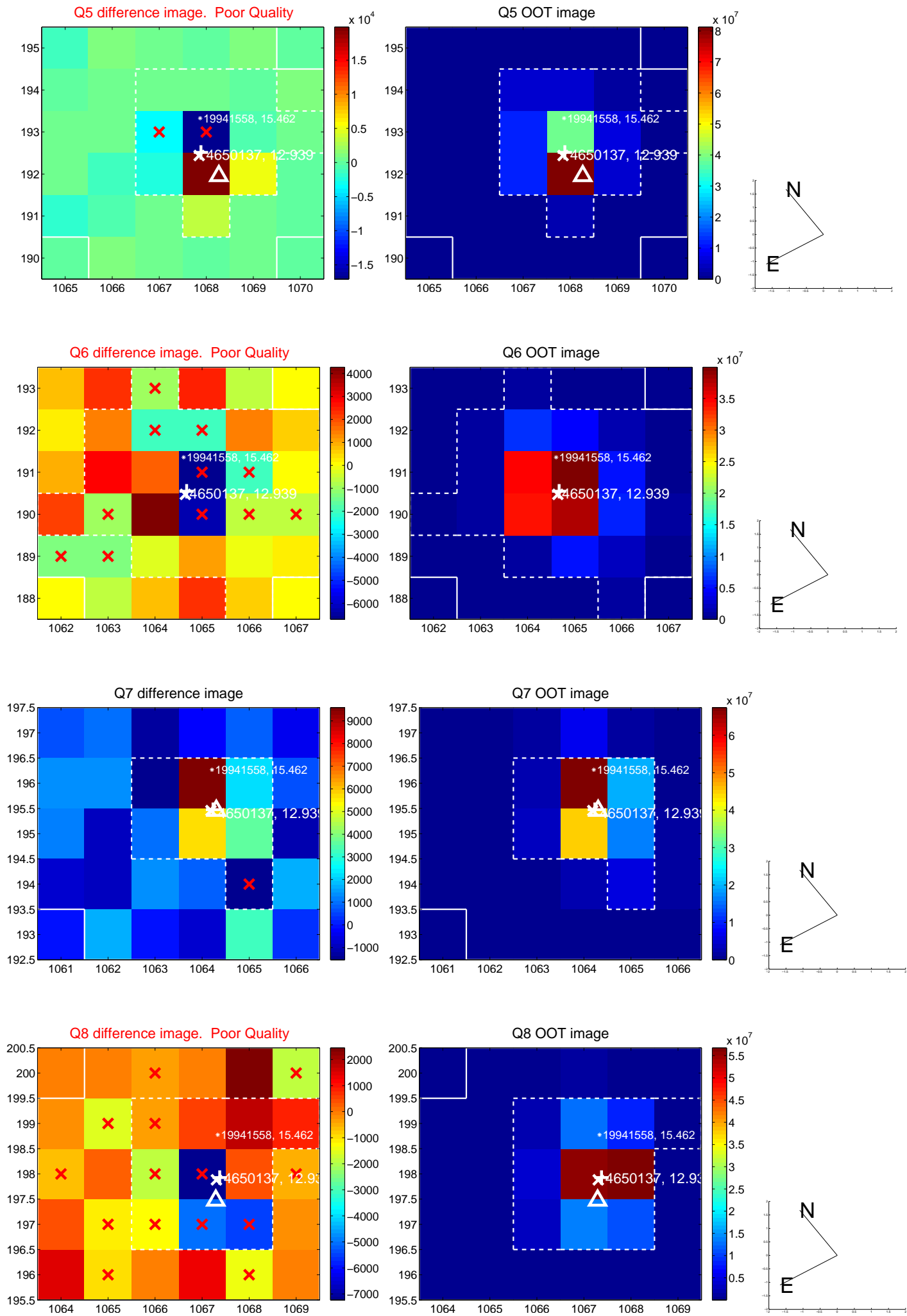


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

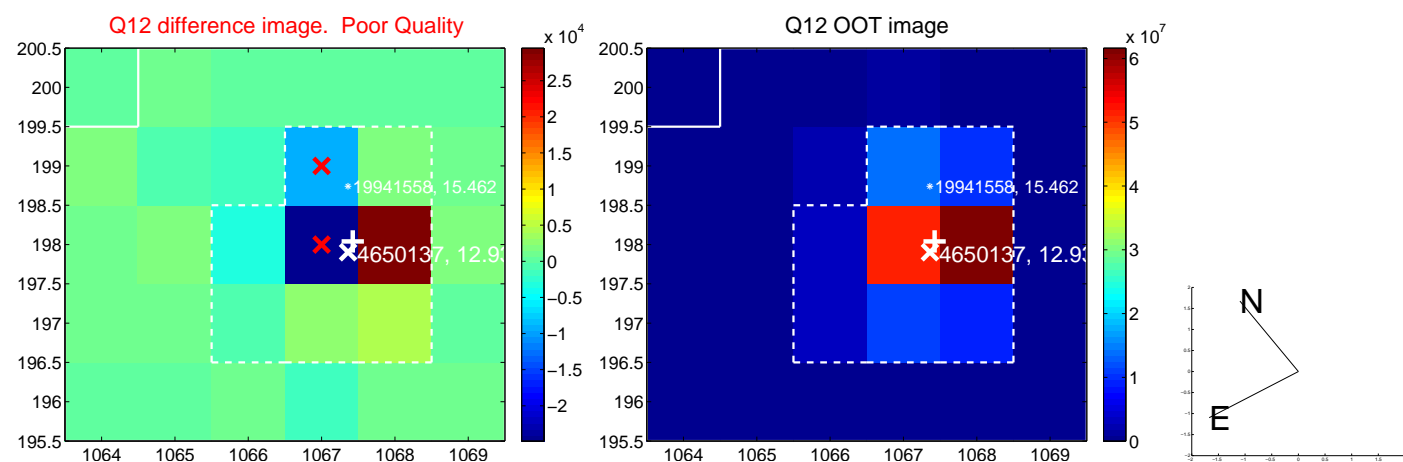
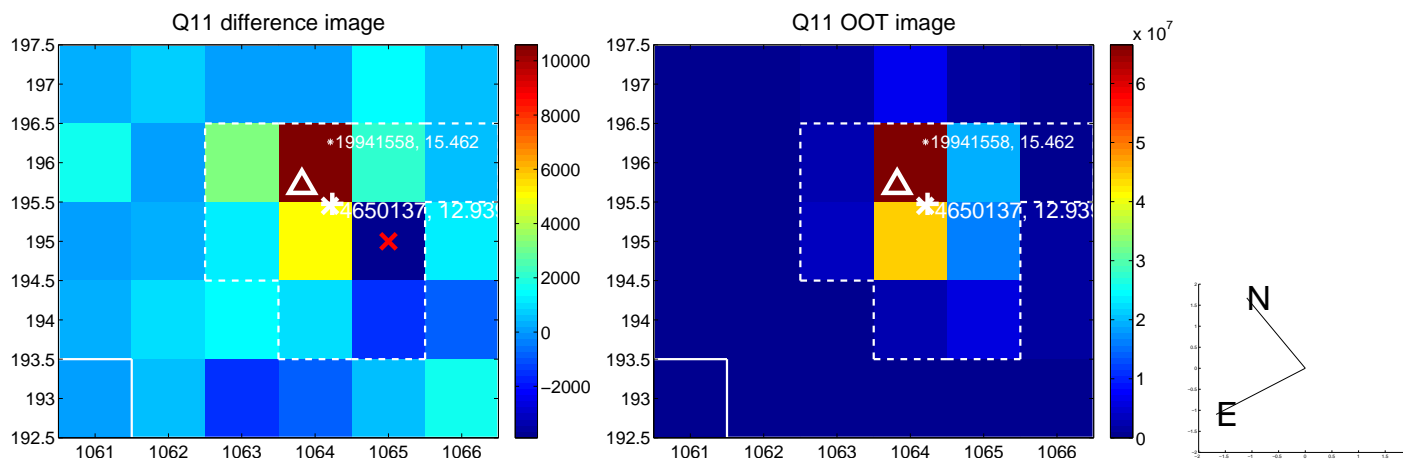
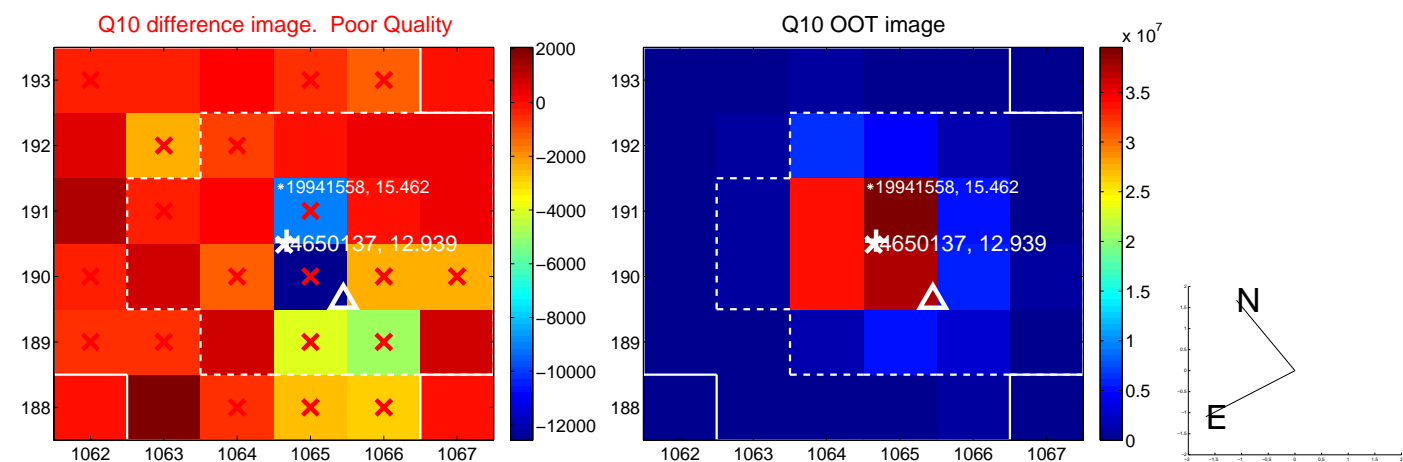
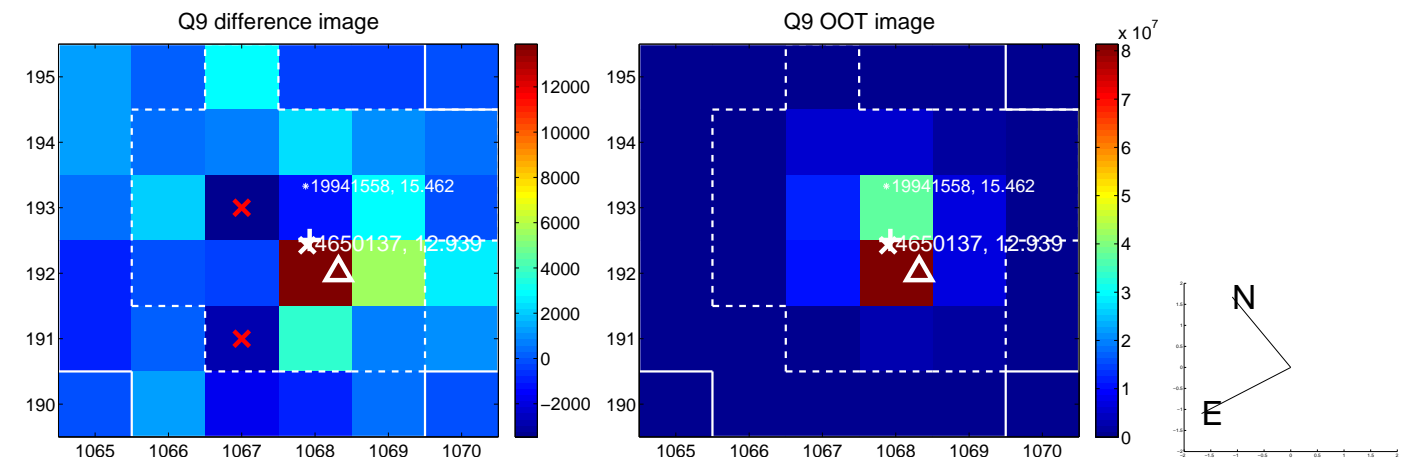
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



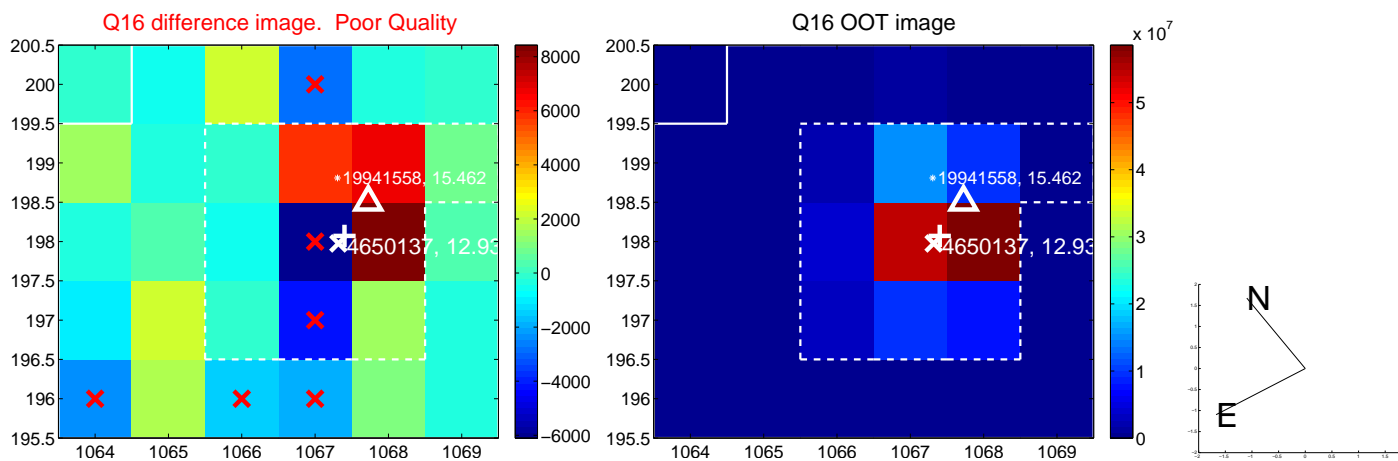
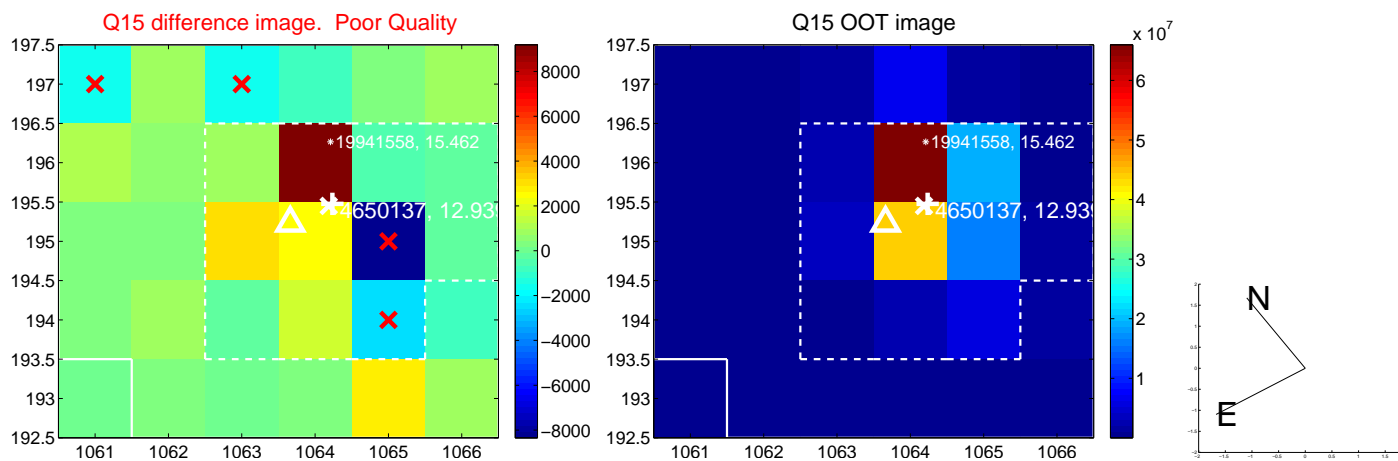
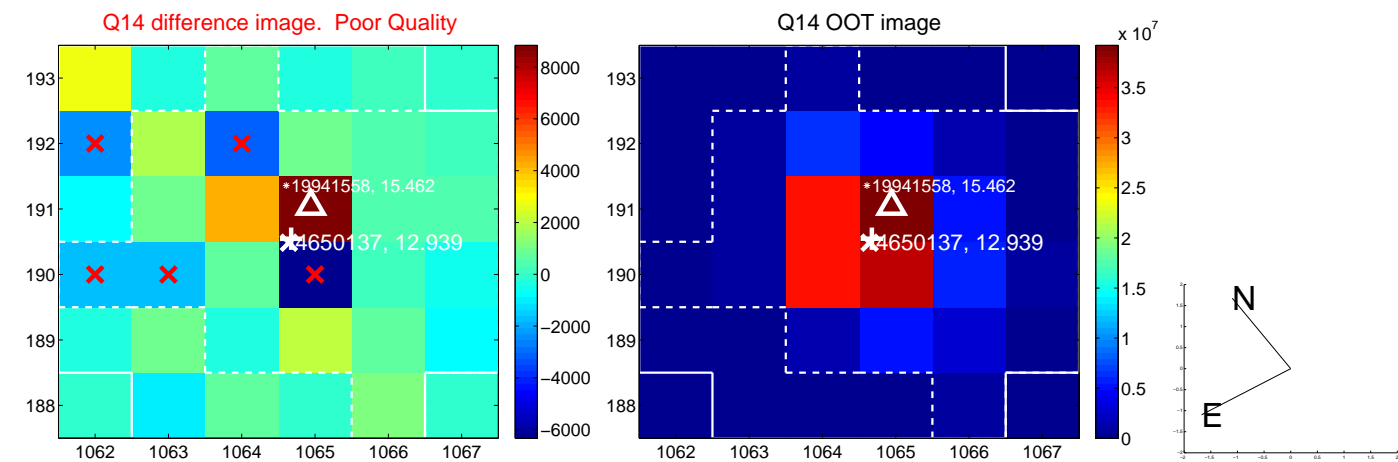
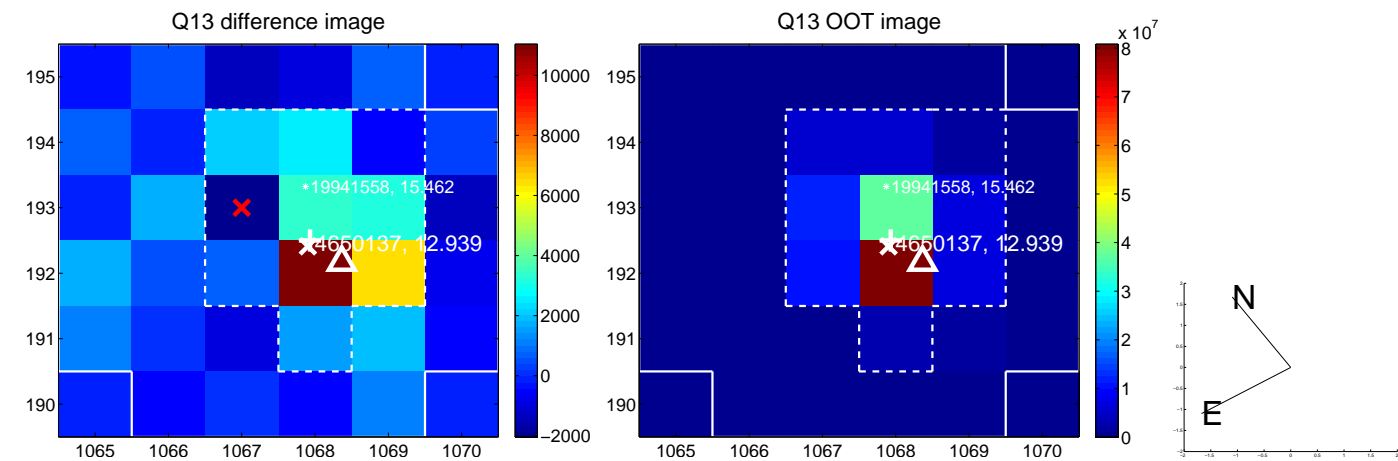
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

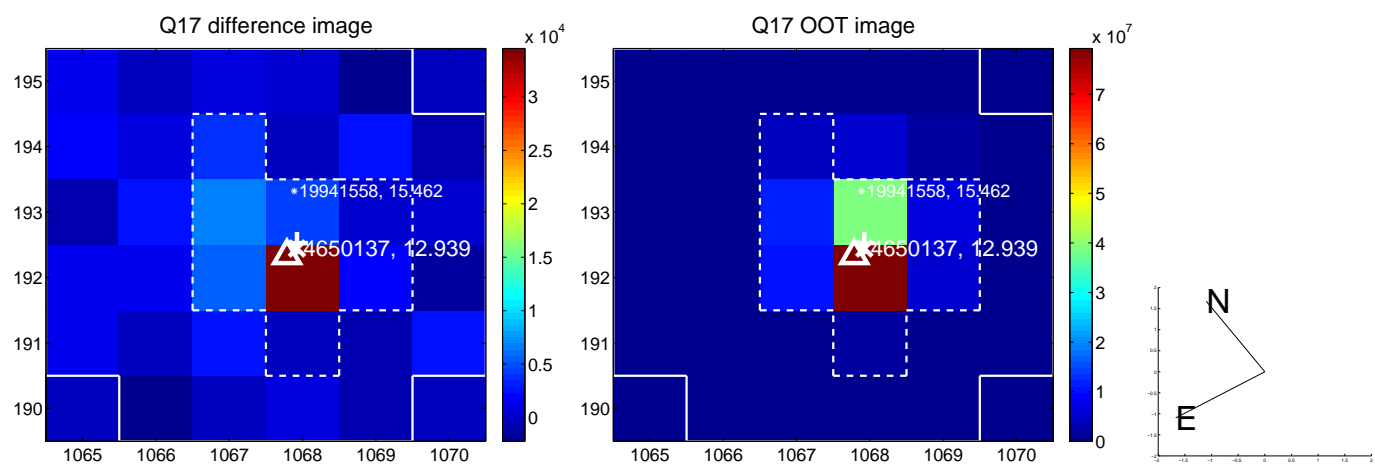


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





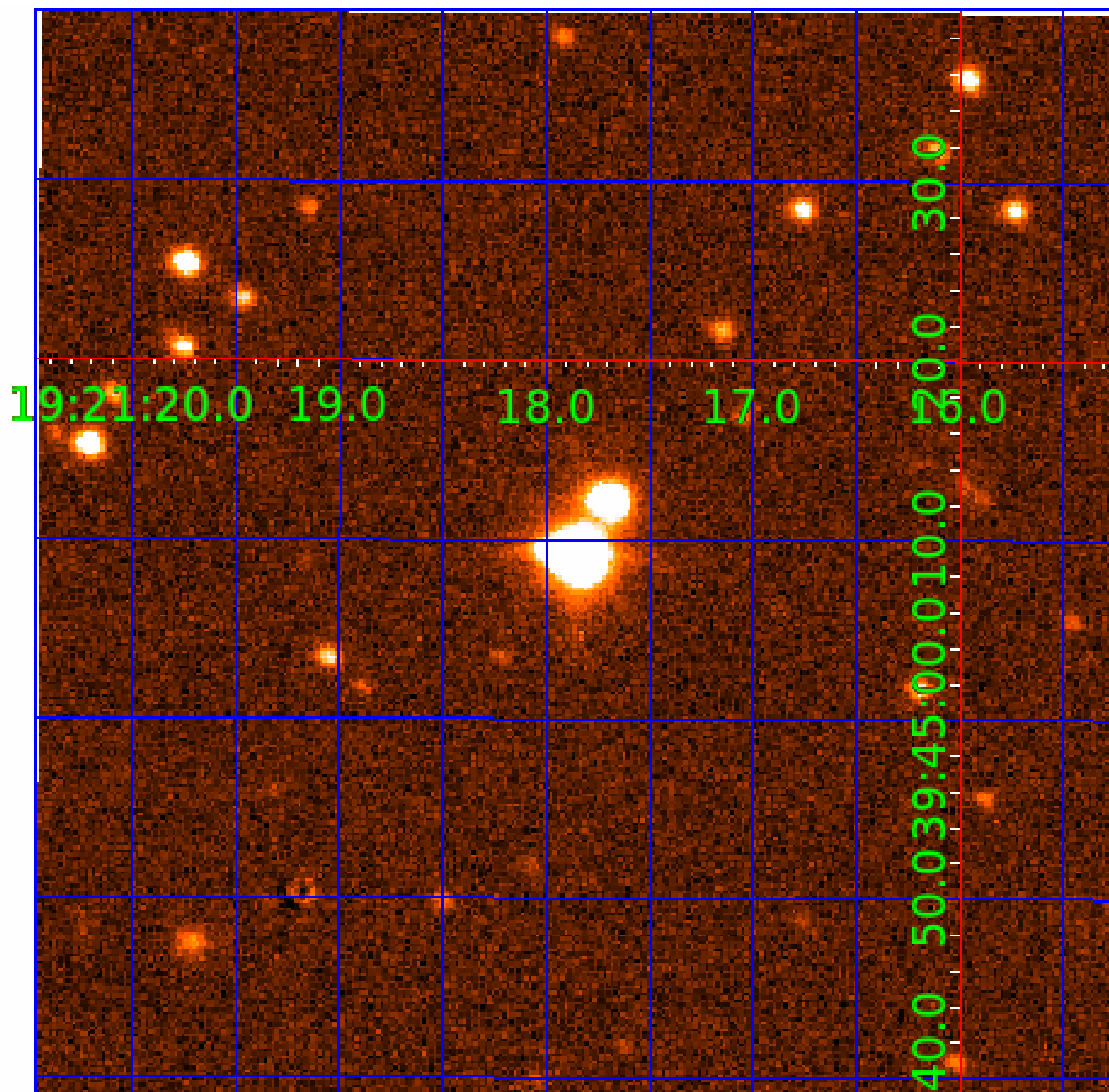
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



folded centroid time series figure for this object.

UKIRT Image

Declination



# KIC 004650137

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004650137-01	OBS	No	1.056731	132.048022	19.9	3.443	8.1	7.9	4.35	7128	2.27	66426.10
004650137-02	OBS	No	0.528354	131.783556	17.8	3.449	9.0	9.9	4.35	7128	2.15	0.00
004650137-03	OBS	No	30.983029	151.404981	376.2	1.177	12.6	13.1	4.35	7128	8.75	734.73
004650137-04	OBS	No	15.954549	132.079704	227.8	2.521	11.3	11.6	4.35	7128	7.44	1780.10
004650137-05	OBS	No	4.805716	133.000068	96.6	2.358	10.6	8.4	4.35	7128	5.00	8816.19
004650137-06	OBS	No	34.748958	163.778320	284.5	2.777	10.5	10.8	4.35	7128	8.31	630.52

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004650137-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
004650137-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—SAME_NTL_PERIOD
004650137-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—HALO_GHOST
004650137-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
004650137-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004650137-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

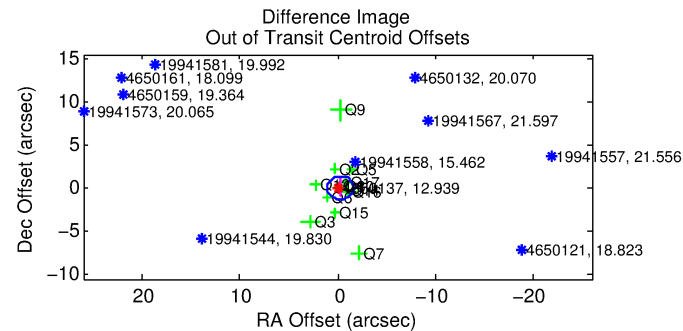
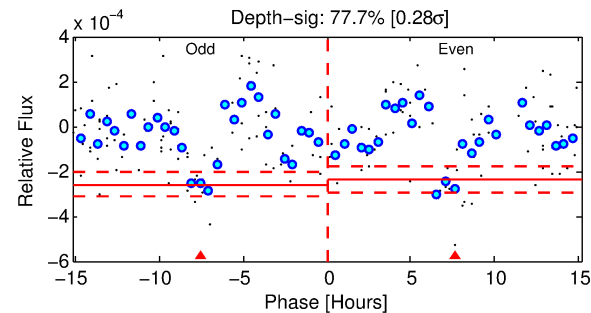
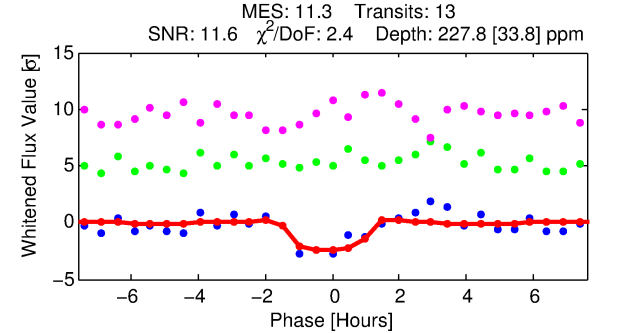
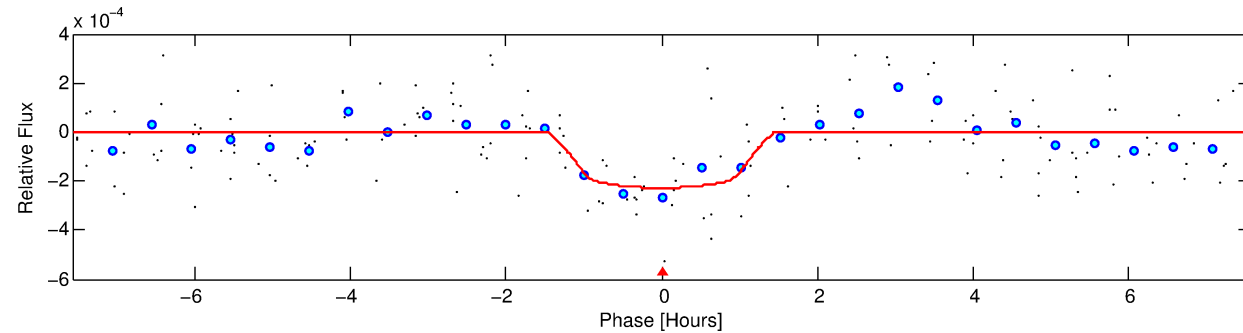
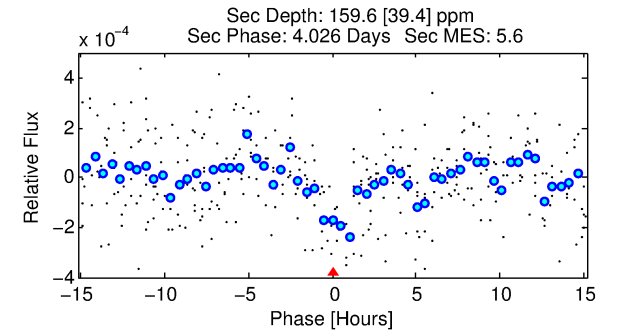
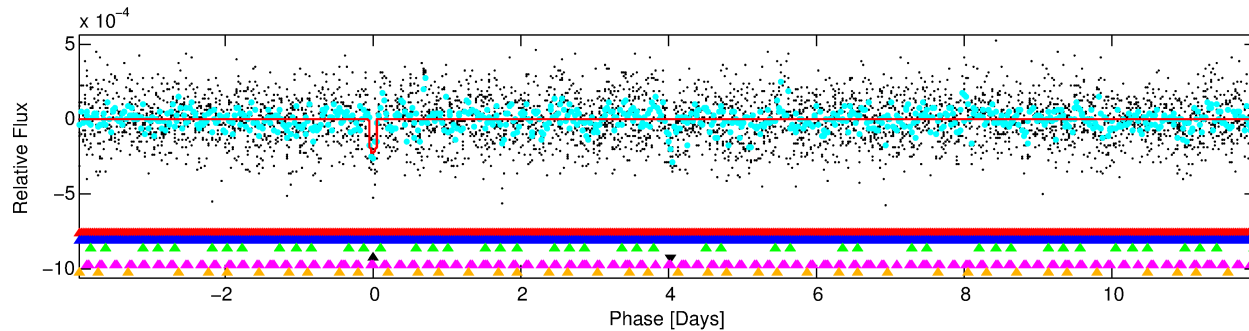
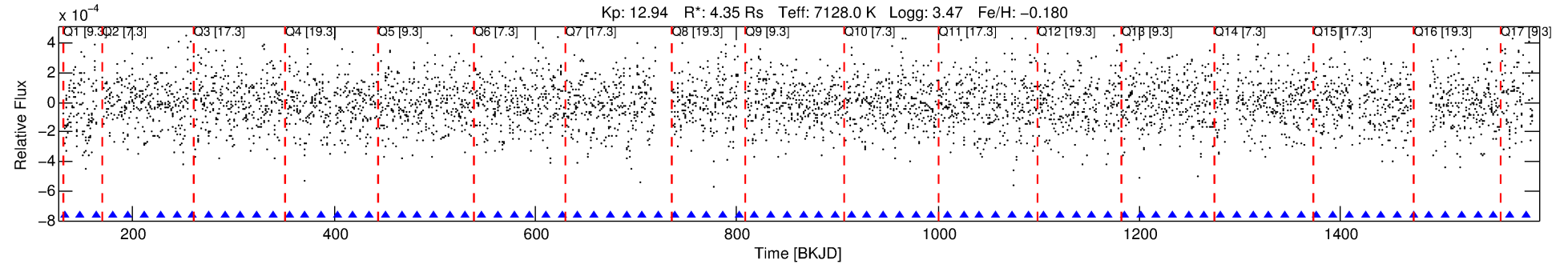
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004650137-04

No Significant Match Found

# DV One-Page Summary

KIC: 4650137 Candidate: 4 of 6 Period: 15.955 d



## DV Fit Results:

Period = 15.95455 [0.00020] d  
Epoch = 132.0797 [0.0088] BKJD  
Rp/R\* = 0.0157 [0.0178]  
a/R\* = 26.90 [168.61]  
b = 0.85 [2.08]  
Seff = 1780.10 [1090.19]  
Teq = 1656 [254] K  
Rp = 7.44 [8.96] Re  
a = 0.1567 [0.0588] AU  
Ag = 38.99 [92.20] [0.41σ]  
Teffp = 6399 [3668] K [1.29σ]

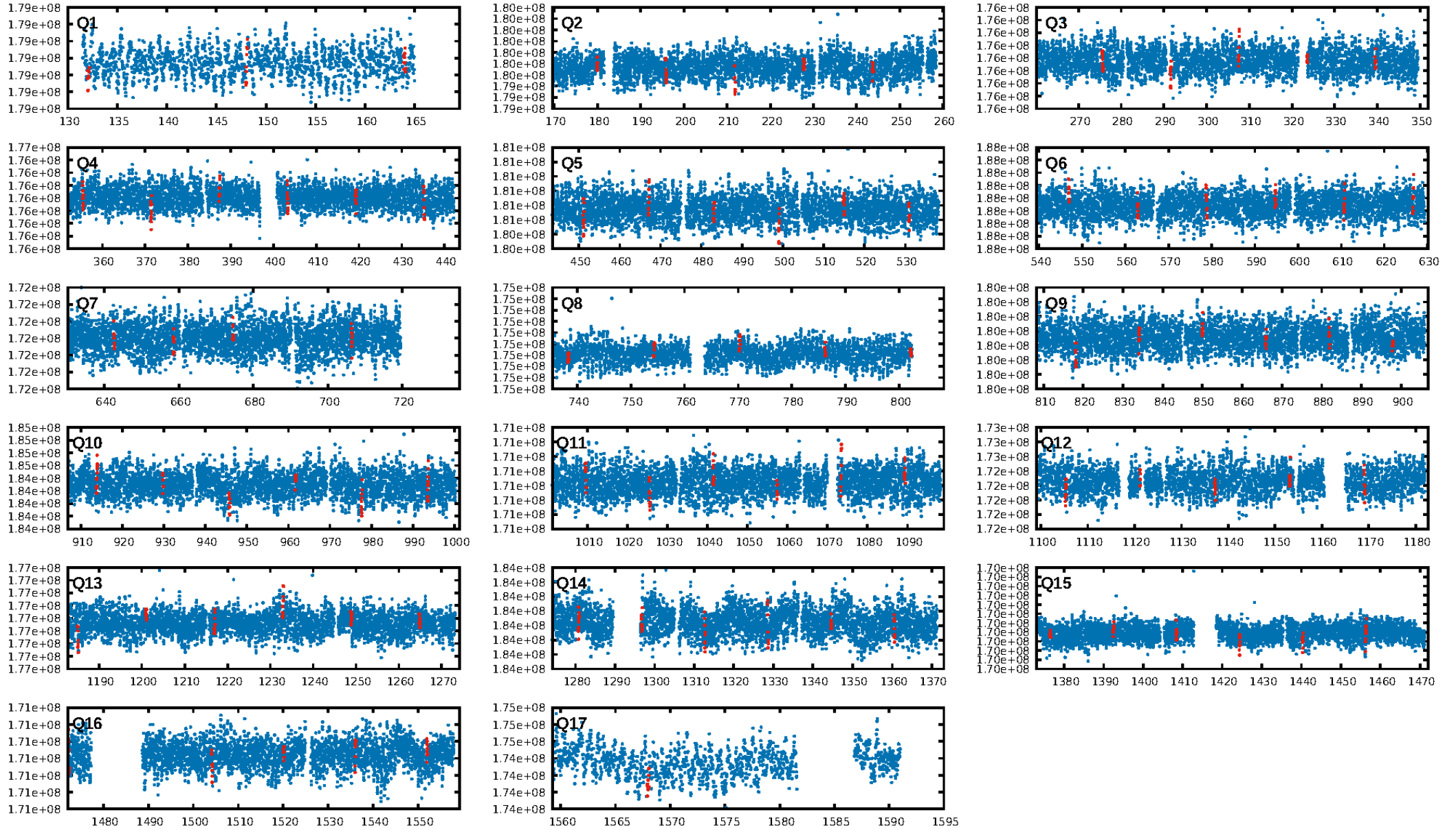
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [77.51σ]  
LongPeriod-sig: 100.0% [129.64σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 99.9%  
Bootstrap-pfa: 1.72e-20  
RollingBand-fgt: 1.00 [13/13]  
GhostDiagnostic-chr: 1.478  
Centroid-sig: N/A  
Centroid-so: N/A  
OotOffset-rm: 0.269 arcsec [0.60σ]  
KicOffset-rm: 0.552 arcsec [1.10σ]  
OotOffset-st: 4/3/4/3 [14]  
KicOffset-st: 4/3/4/3 [14]  
DiffImageQuality-fgm: 0.57 [8/14]  
DiffImageOverlap-fno: 0.00 [0/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 14:43:33 Z

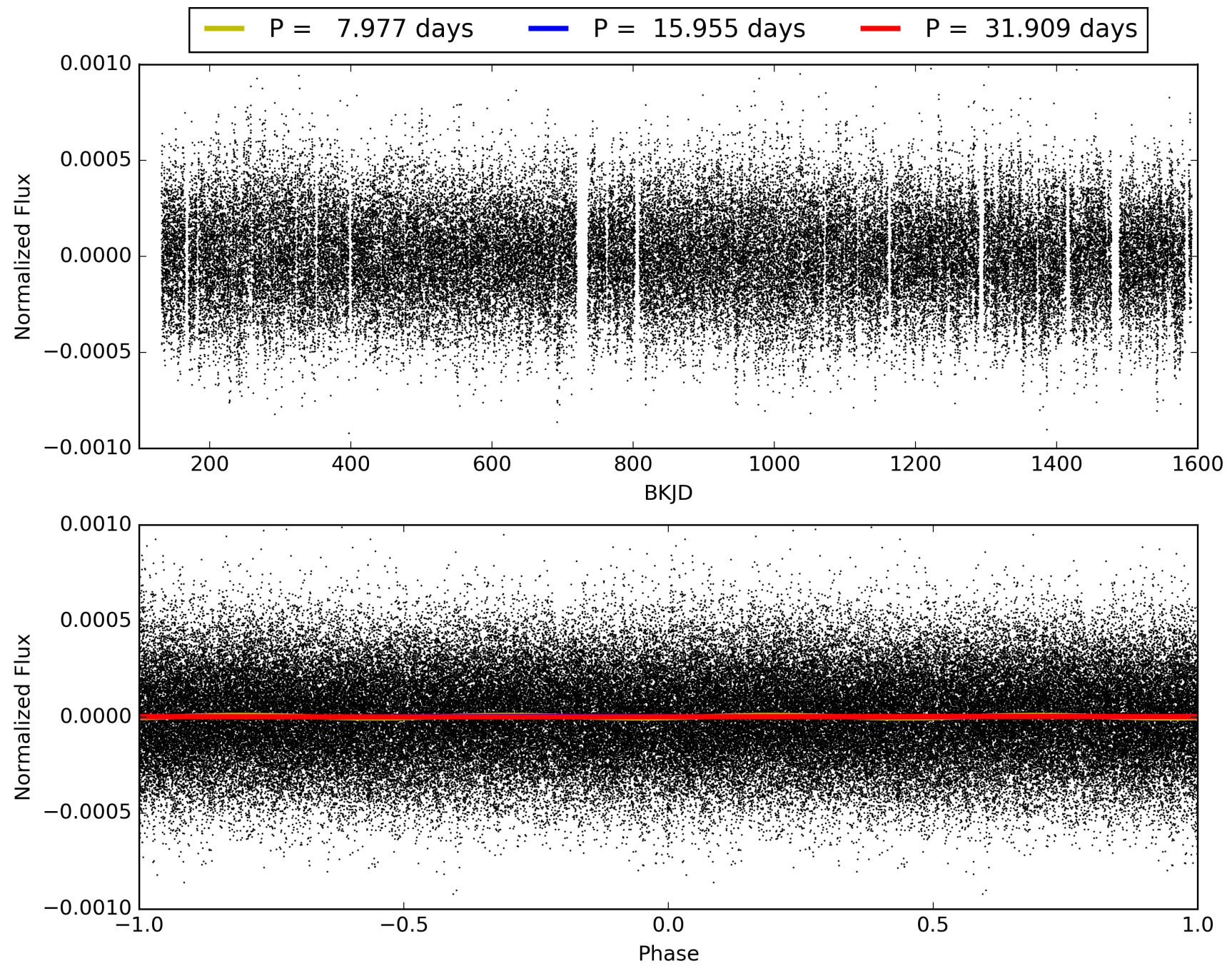
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 004650137-04, PDC Light Curves



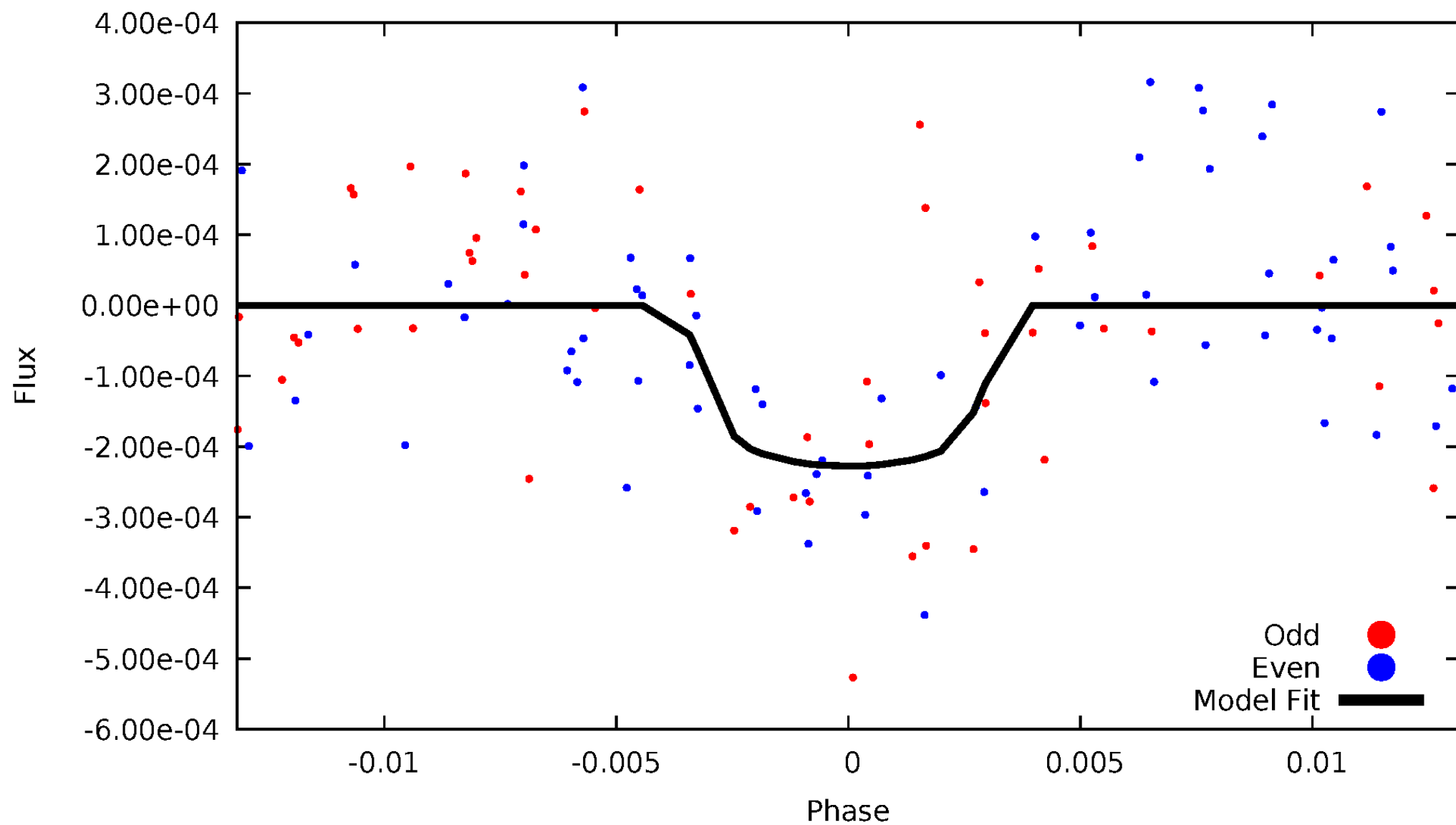


TCE 004650137-04



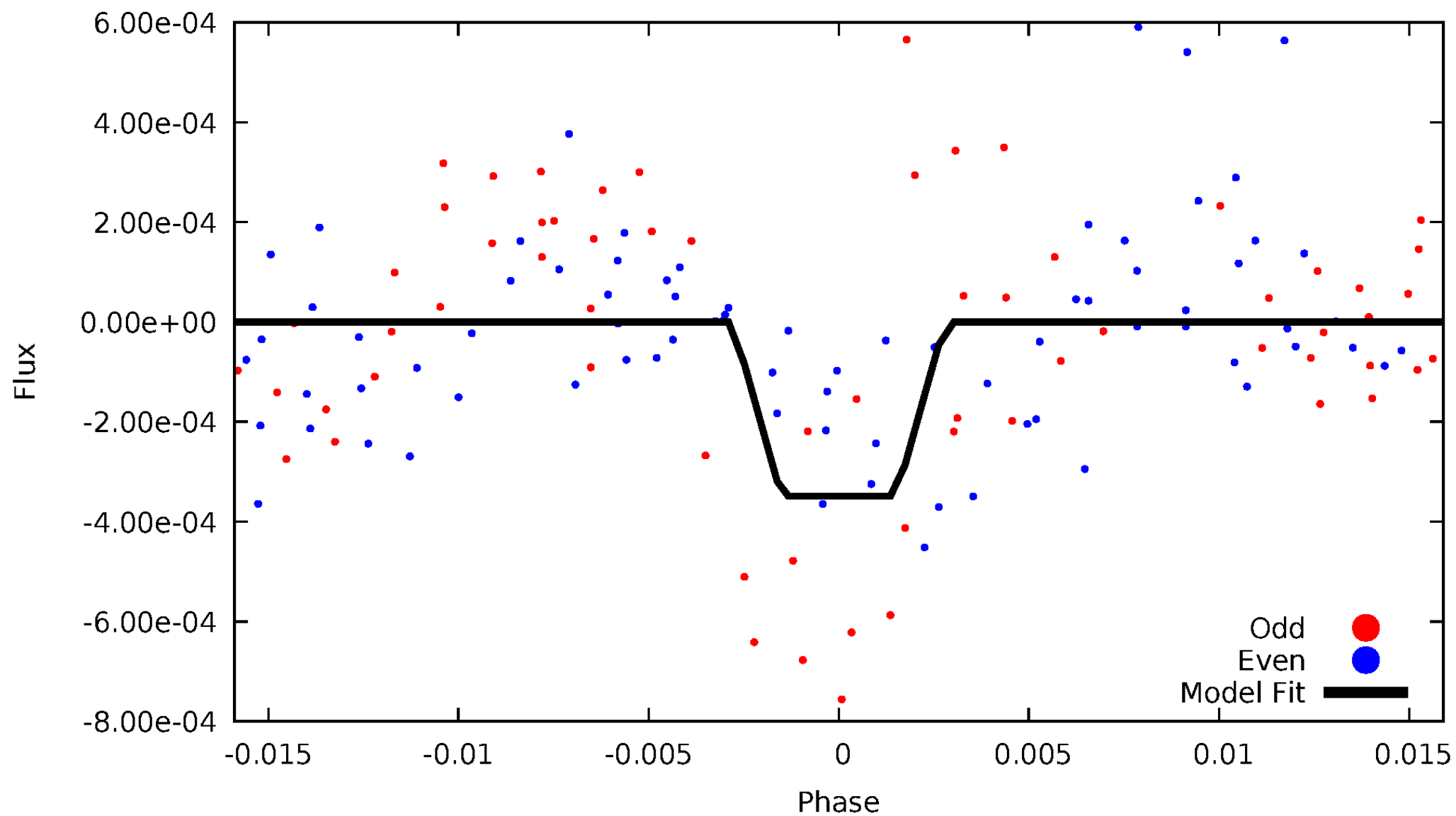
# DV Odd/Even

TCE 004650137-04



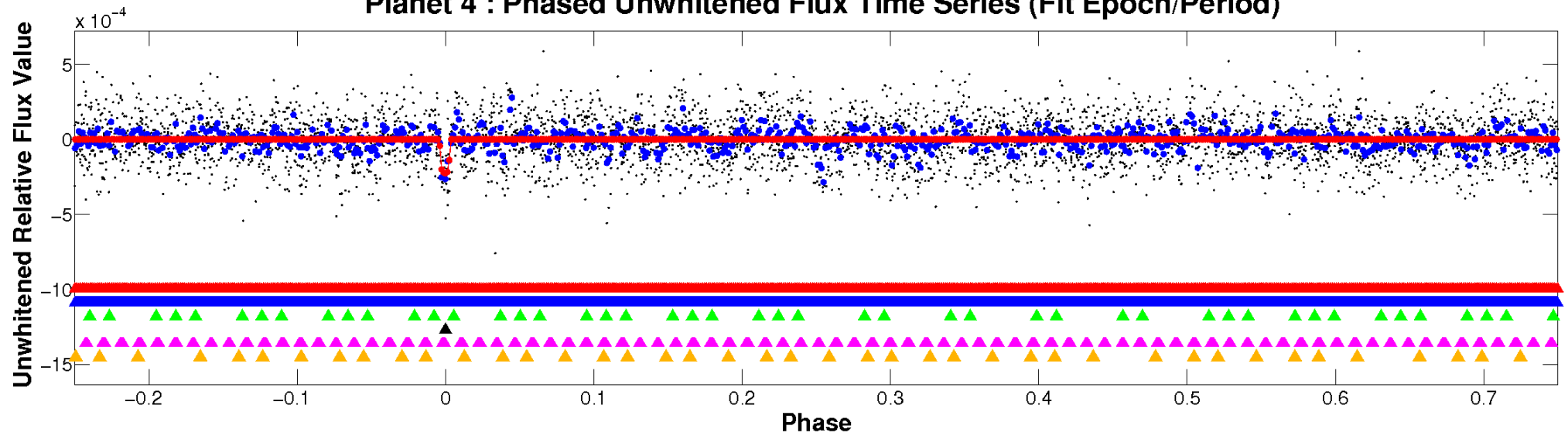
# ALT Odd/Even

TCE 004650137-04

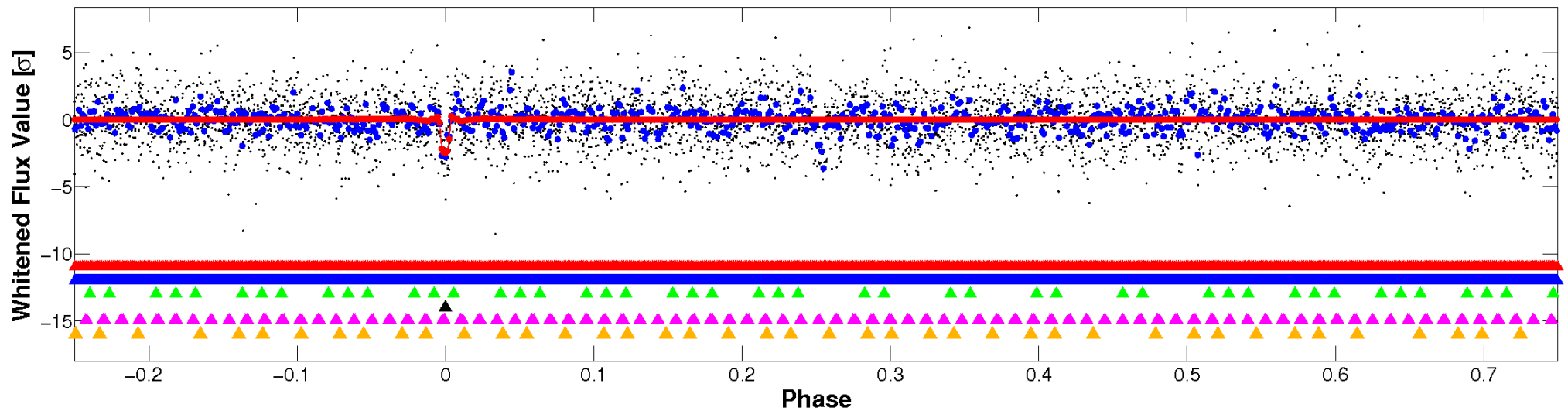


# Non-Whitened Vs. Whitened Light Curve

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

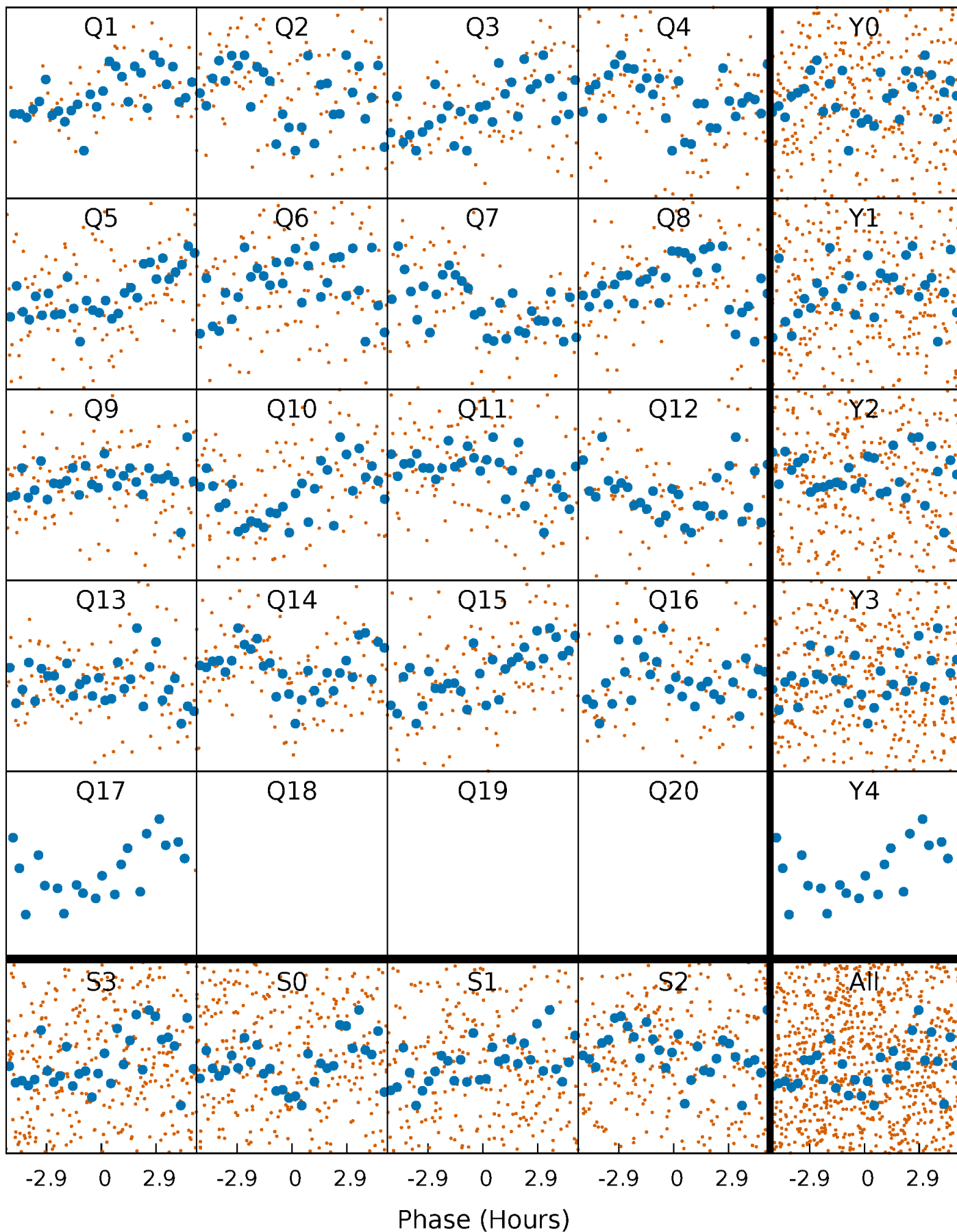


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



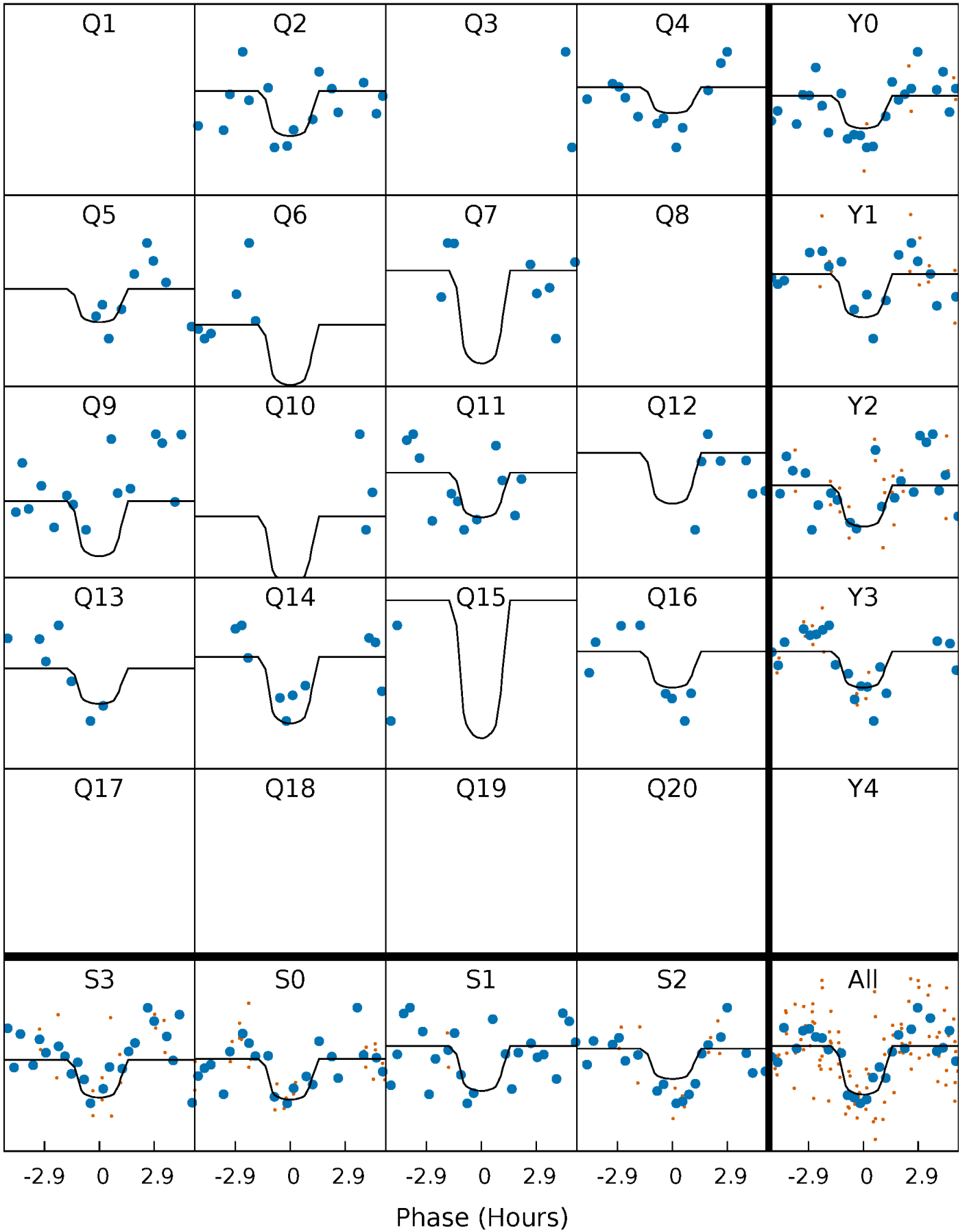
# PDC Quarter-Phased Transit Curves

TCE 004650137-04 P= 15.954549 Days  $T_0=132.079704$  (BKJD)



# DV Quarter-Phased Transit Curves

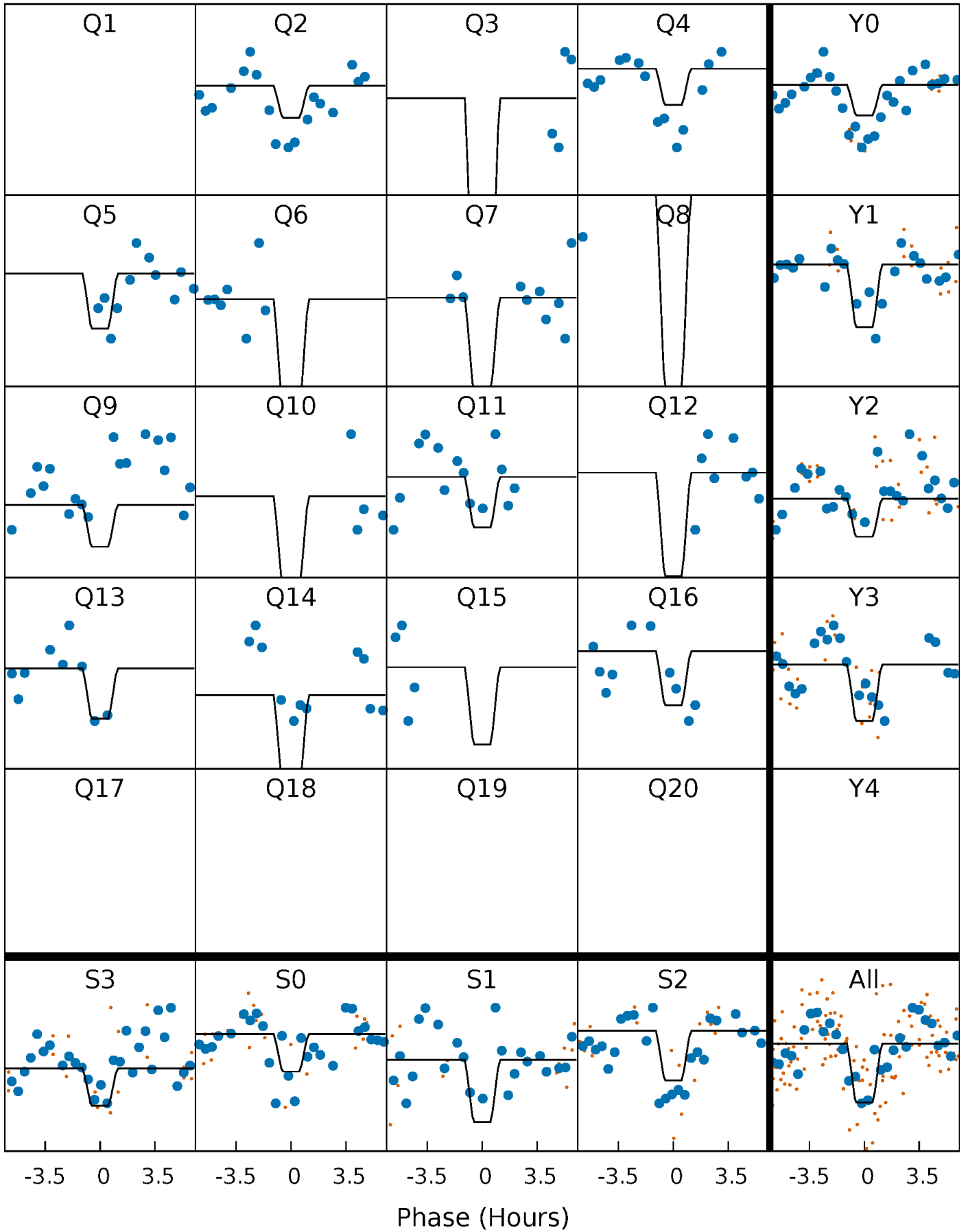
TCE 004650137-04 P= 15.954549 Days  $T_0=132.079704$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

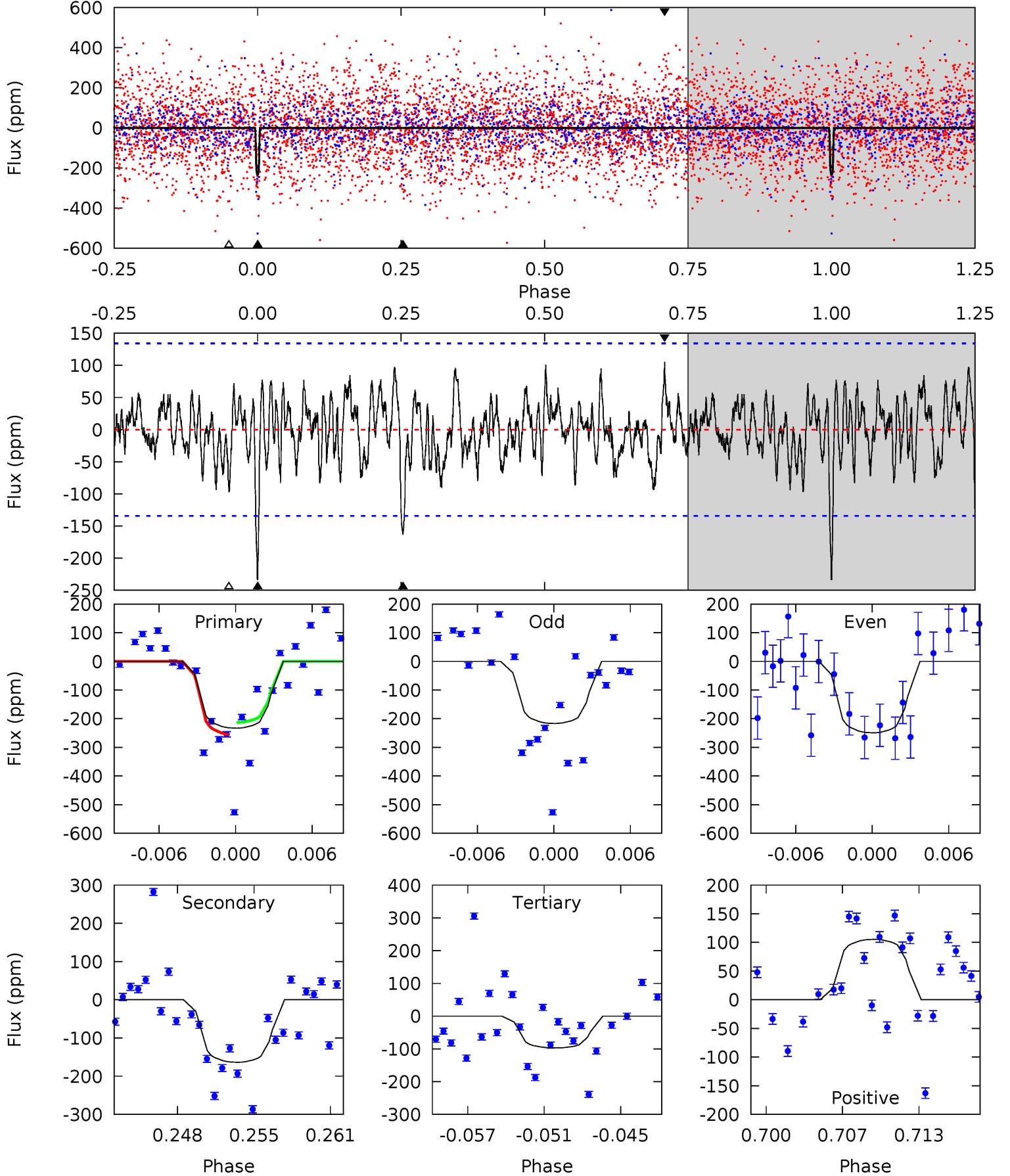
TCE 004650137-04   P= 15.954407 Days    $T_0=132.082206$  (BKJD)



# DV Model-Shift Uniqueness Test

004650137-04,  $P = 15.954549$  Days,  $E = 116.125155$  Days

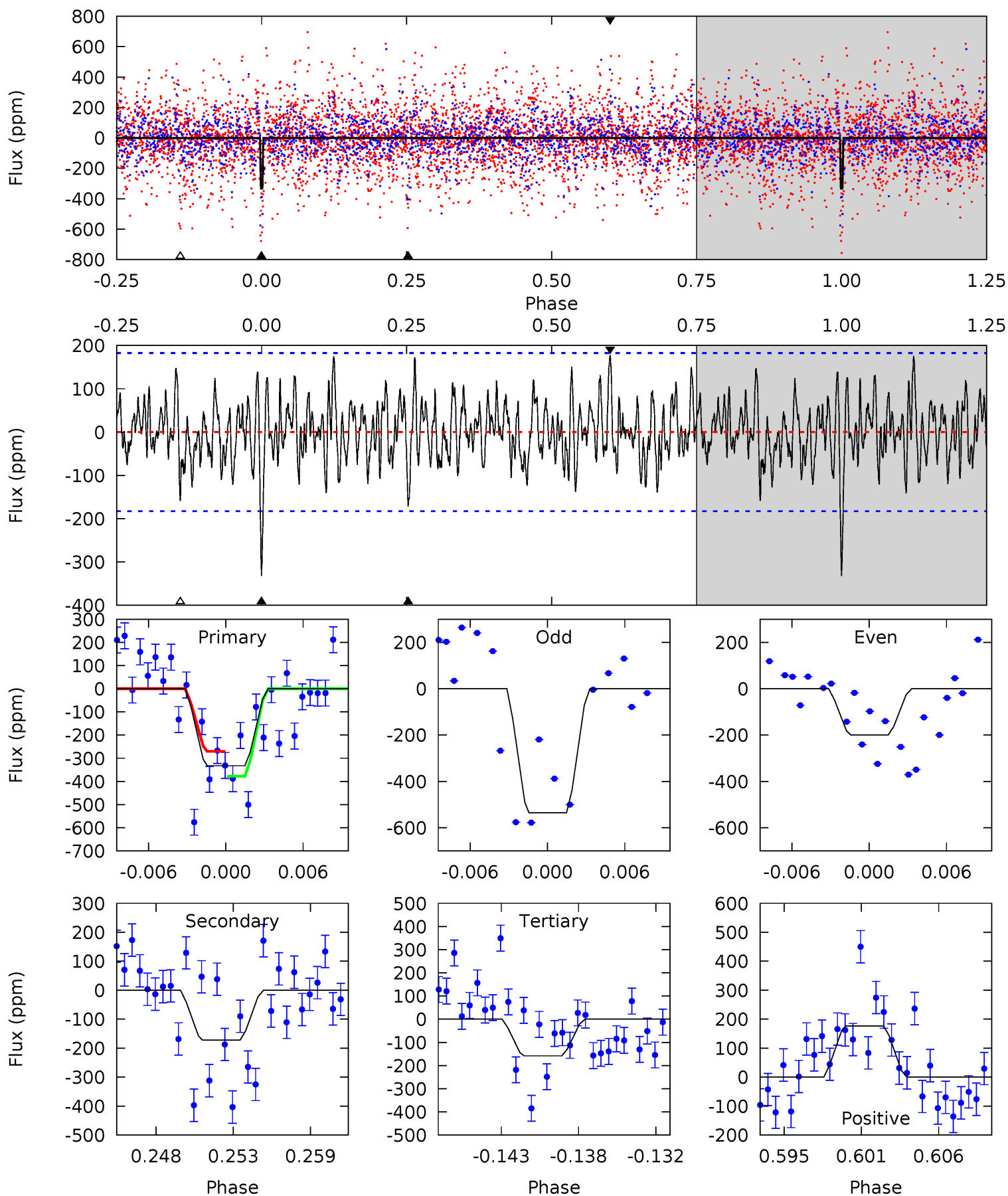
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.88	6.23	3.69	4.01	5.11	2.73	1.42	5.19	4.87	2.54	2.22	0.62	0.74	0.31	0.80



# Alt Model-Shift Uniqueness Test

004650137-04, P = 15.954407 Days, E = 116.127799 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.35	4.84	4.45	4.96	5.14	2.78	1.66	4.89	4.38	0.39	-0.12	4.50	1.34	0.35	1.47



### Stellar Parameters For KIC 004650137

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$7128^{+191}_{-255}$	$3.466^{+0.348}_{-0.061}$	$-0.180^{+0.250}_{-0.250}$	$4.348^{+0.286}_{-1.716}$	$2.019^{+0.066}_{-0.374}$	$0.035^{+0.088}_{-0.007}$
	+3%/-4%	+10%/-2%	+139%/-139%	+7%/-39%	+3%/-19%	+255%/-20%
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 004650137-04 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-164 \pm 26$	$8.51^{+7.28}_{-5.11}$	$2280^{+101}_{-210}$	$5649^{+4475}_{-1255}$	$29^{+165}_{-20}$
Alt.	$-172 \pm 36$	$9.55^{+7.98}_{-6.06}$	$2275^{+114}_{-205}$	$5462^{+4434}_{-1190}$	$25^{+160}_{-18}$

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

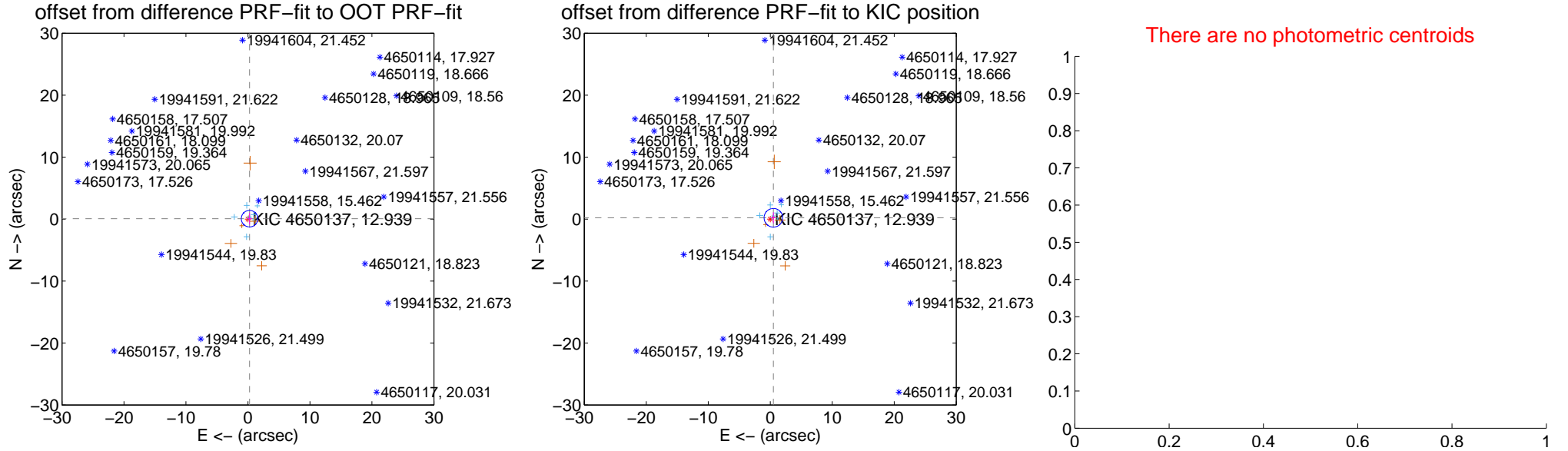
## DV Centroid Data

Supplemental centroid analysis for 004650137-04. Kepler magnitude: 12.94. Transit SNR 11.56

There are 8 quarters with good PRF difference image offsets

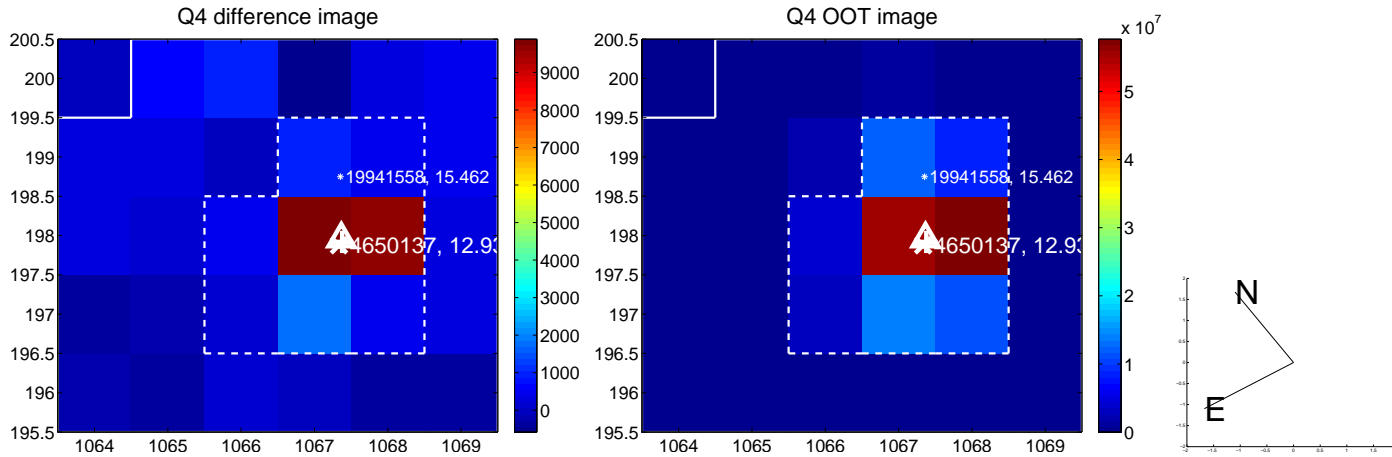
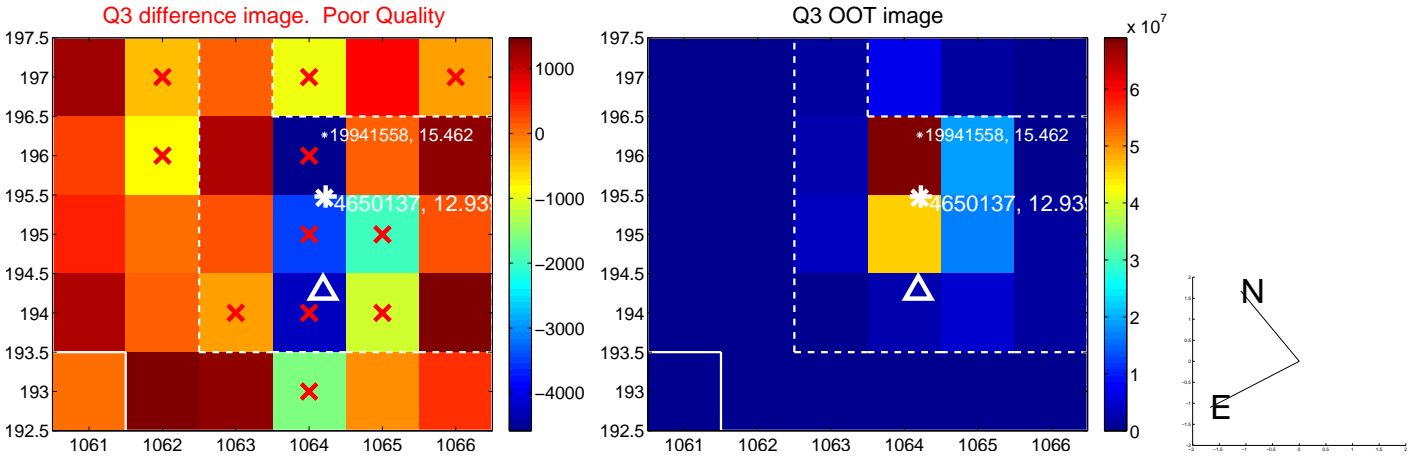
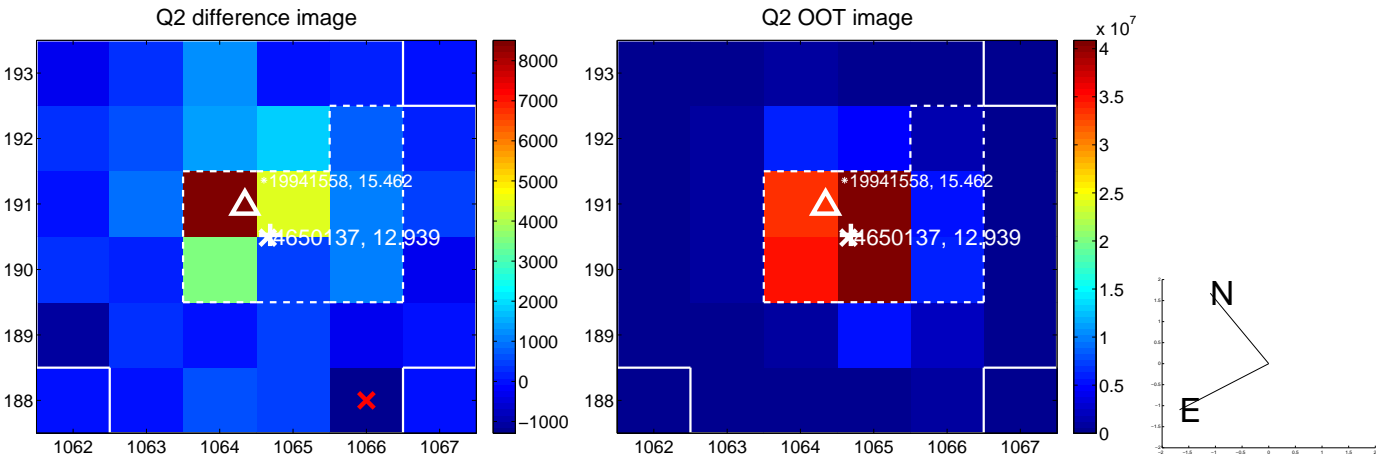
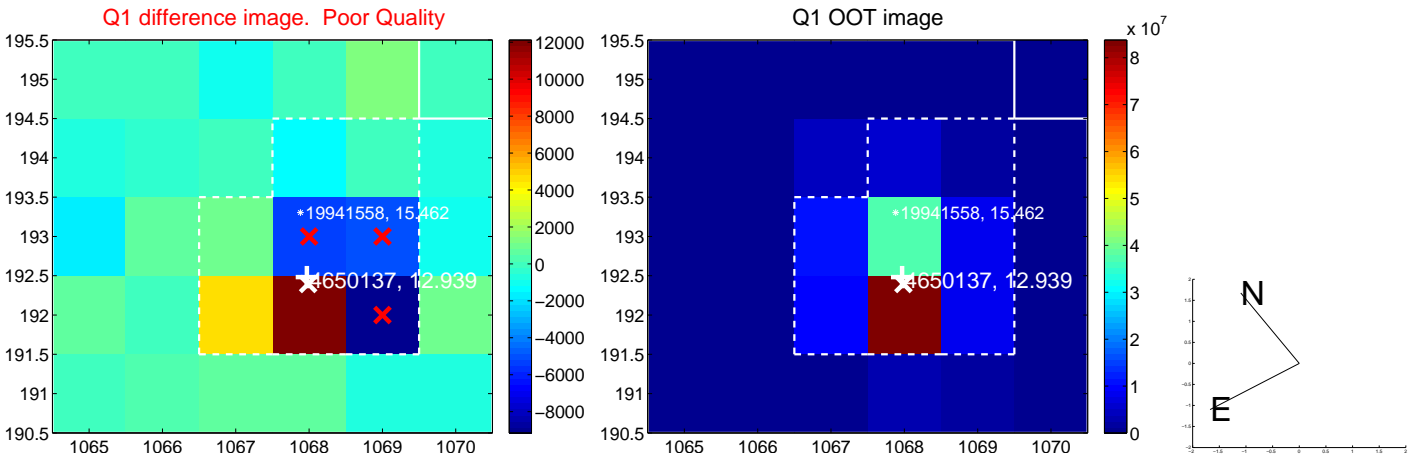
The direct PRF centroid is offset from the target star catalog position by about 0.33 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.269 \pm 0.445$	0.60	$-0.260 \pm 0.369$	$0.069 \pm 0.924$
PRF-fit source offset from KIC position	$0.552 \pm 0.501$	1.10	$-0.510 \pm 0.368$	$0.212 \pm 0.888$
photometric centroid source offset	—	—	—	—



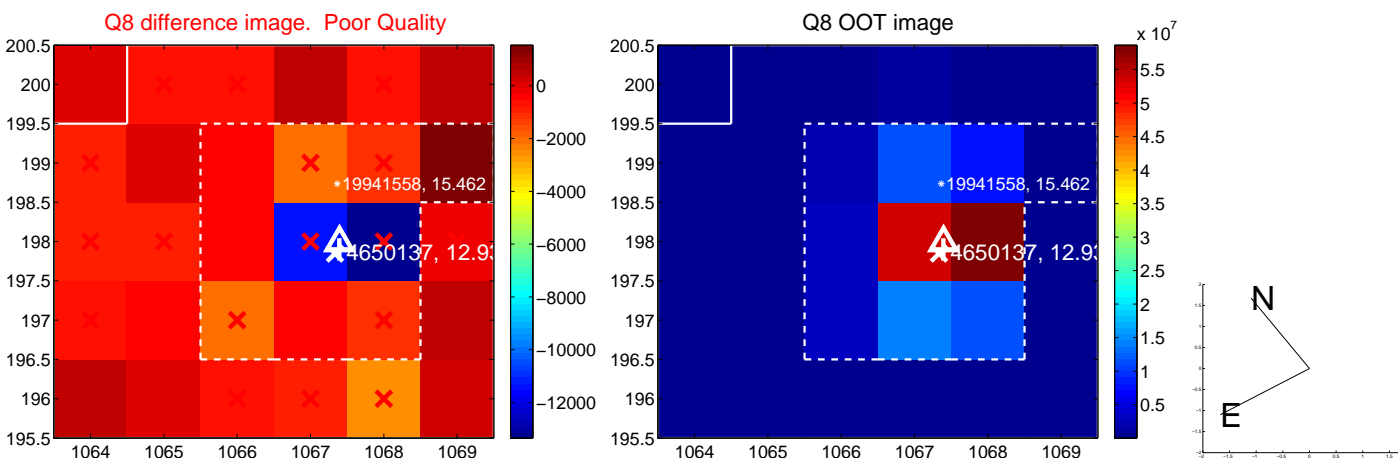
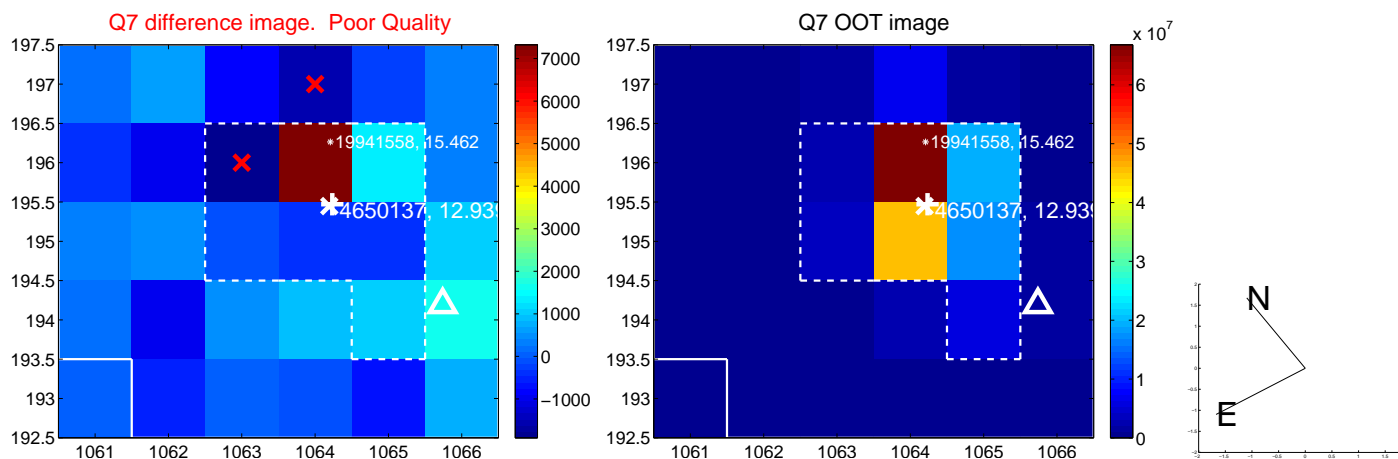
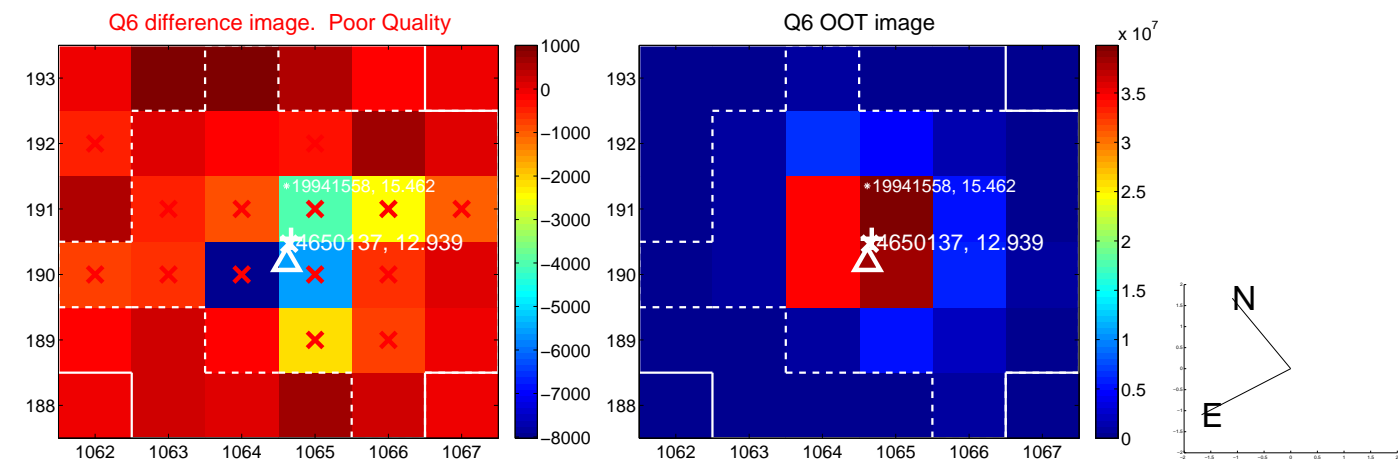
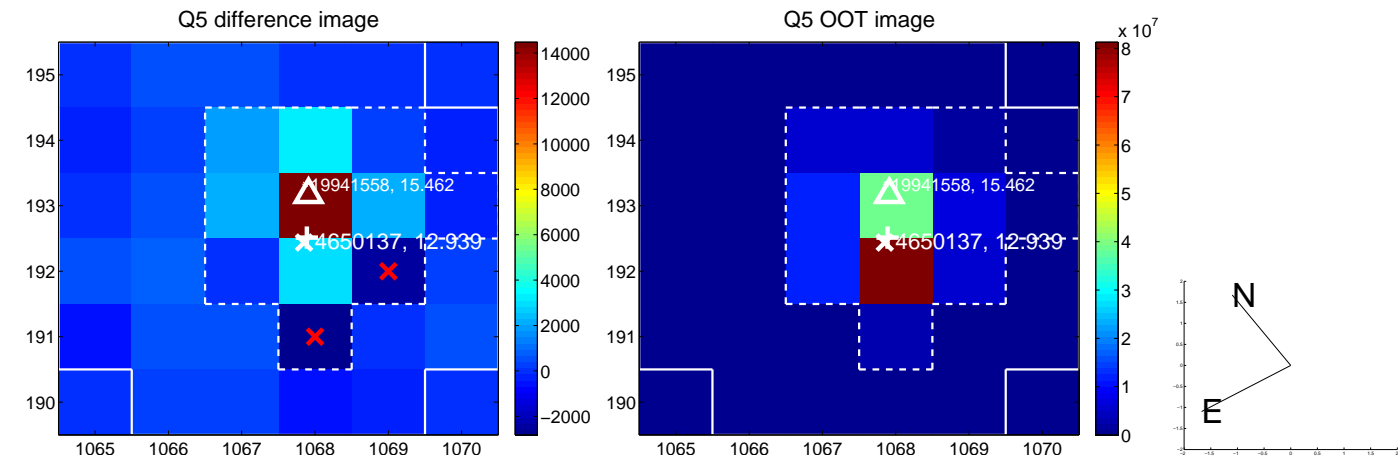
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

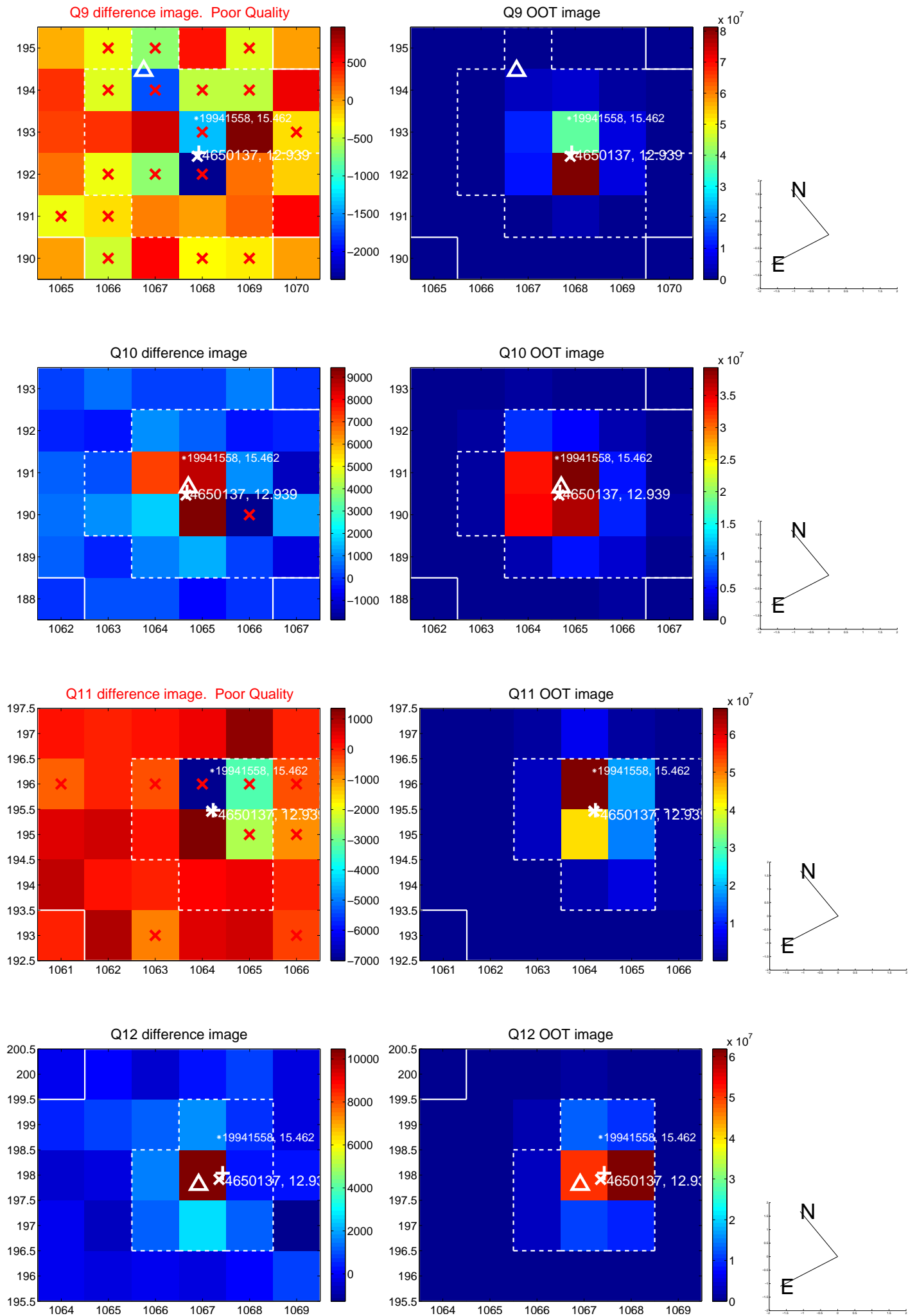




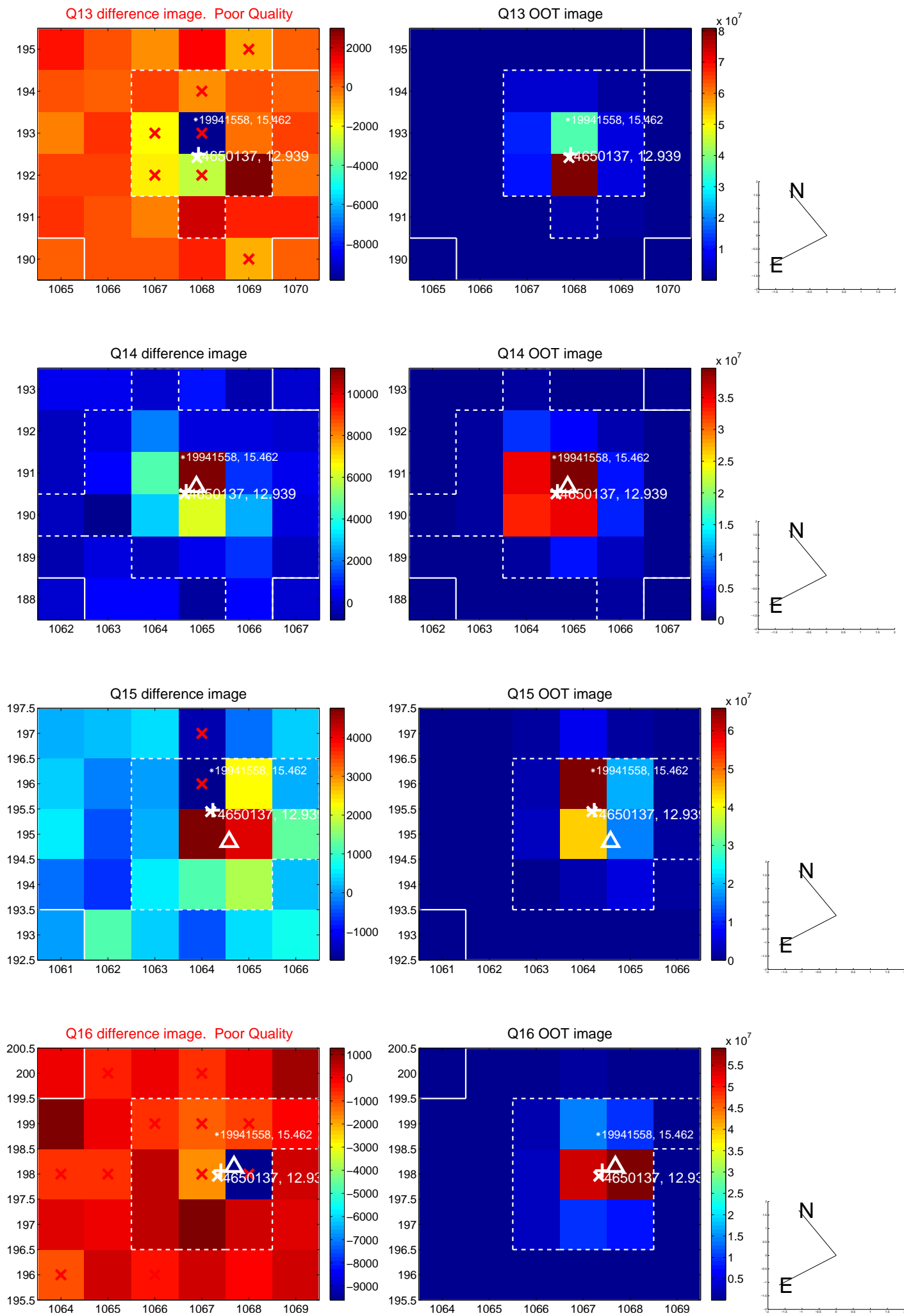
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



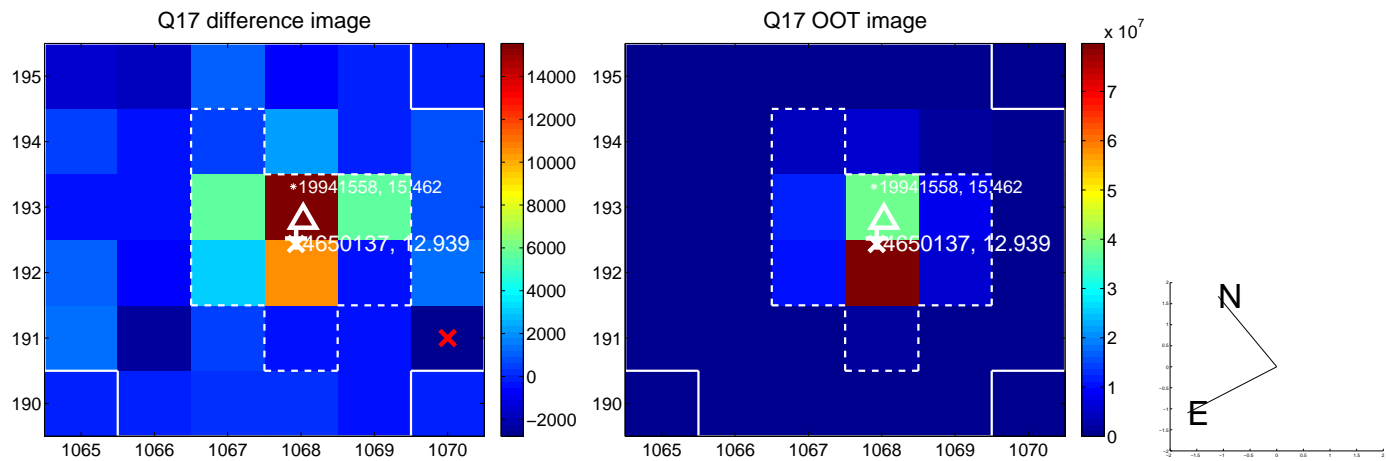
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



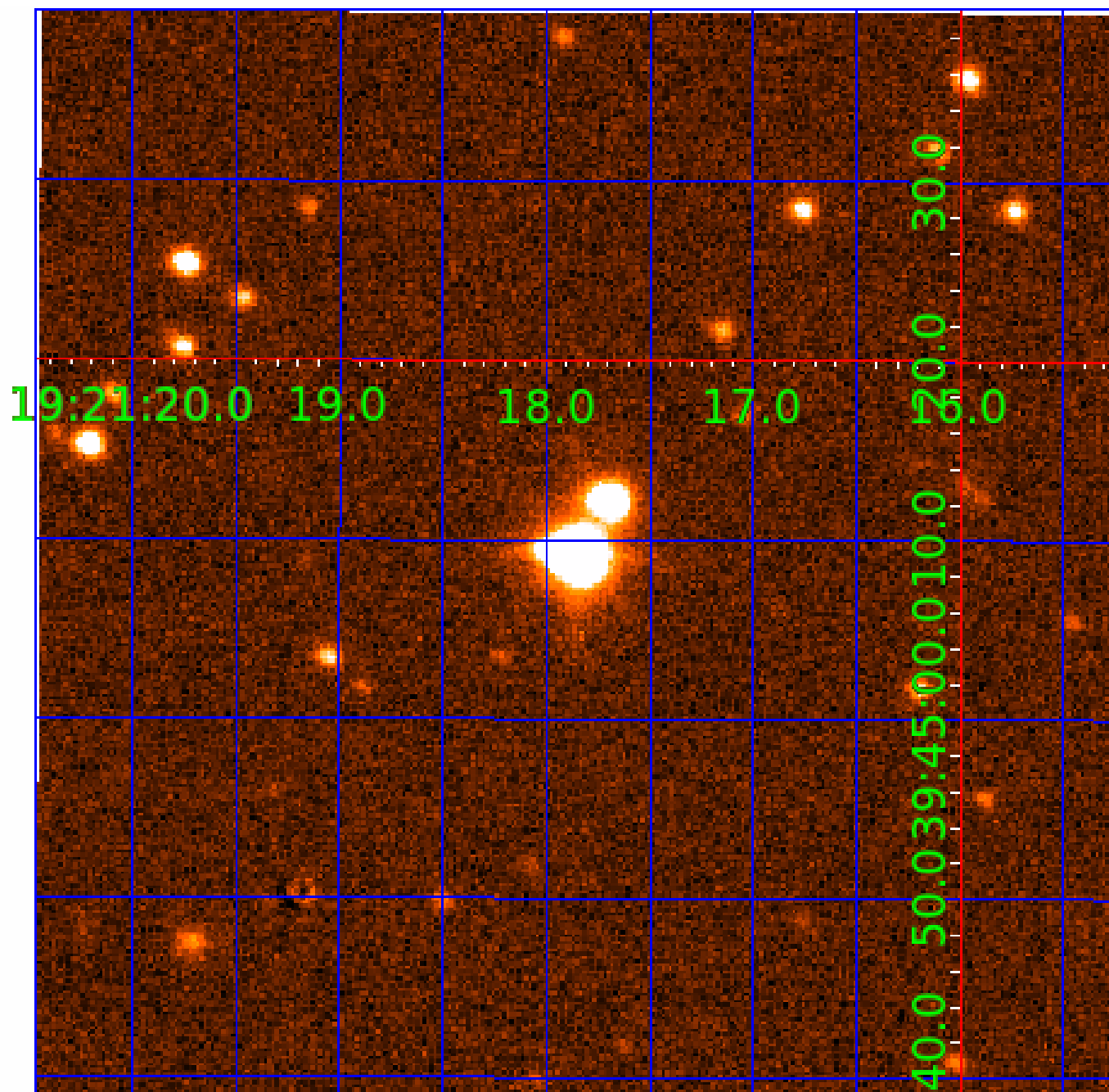
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



folded centroid time series figure for this object.

UKIRT Image

Declination



# KIC 004650137

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004650137-01	OBS	No	1.056731	132.048022	19.9	3.443	8.1	7.9	4.35	7128	2.27	66426.10
004650137-02	OBS	No	0.528354	131.783556	17.8	3.449	9.0	9.9	4.35	7128	2.15	0.00
004650137-03	OBS	No	30.983029	151.404981	376.2	1.177	12.6	13.1	4.35	7128	8.75	734.73
004650137-04	OBS	No	15.954549	132.079704	227.8	2.521	11.3	11.6	4.35	7128	7.44	1780.10
004650137-05	OBS	No	4.805716	133.000068	96.6	2.358	10.6	8.4	4.35	7128	5.00	8816.19
004650137-06	OBS	No	34.748958	163.778320	284.5	2.777	10.5	10.8	4.35	7128	8.31	630.52

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004650137-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
004650137-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—SAME_NTL_PERIOD
004650137-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—HALO_GHOST
004650137-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
004650137-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004650137-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

**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.

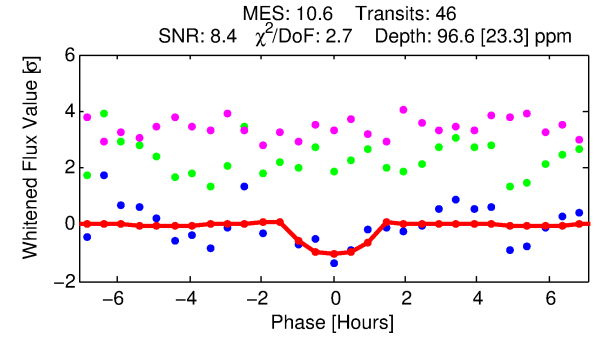
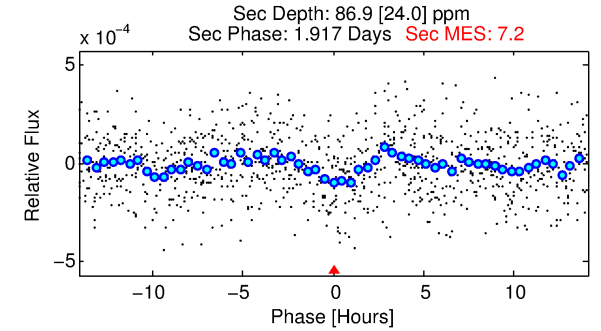
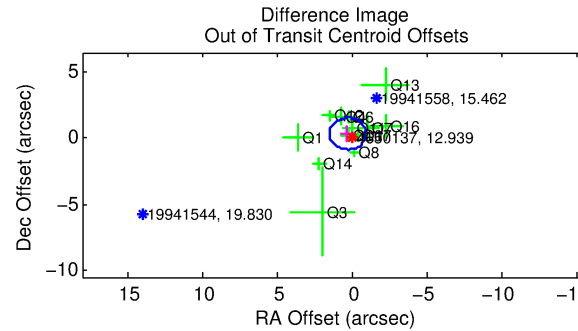
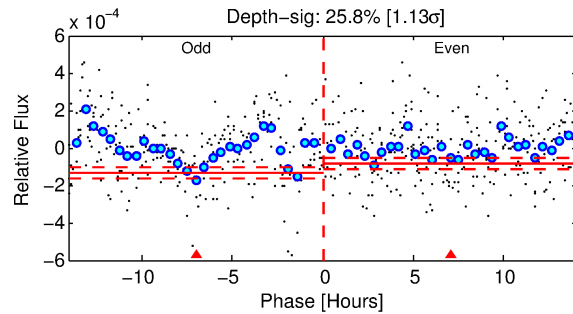
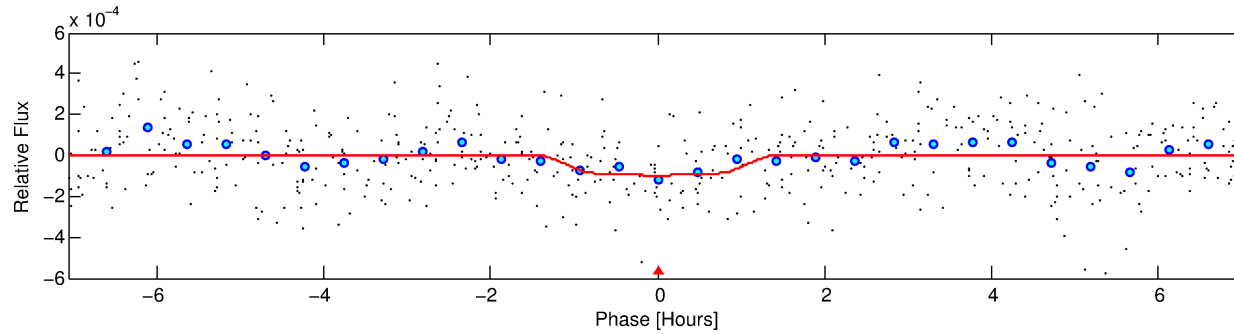
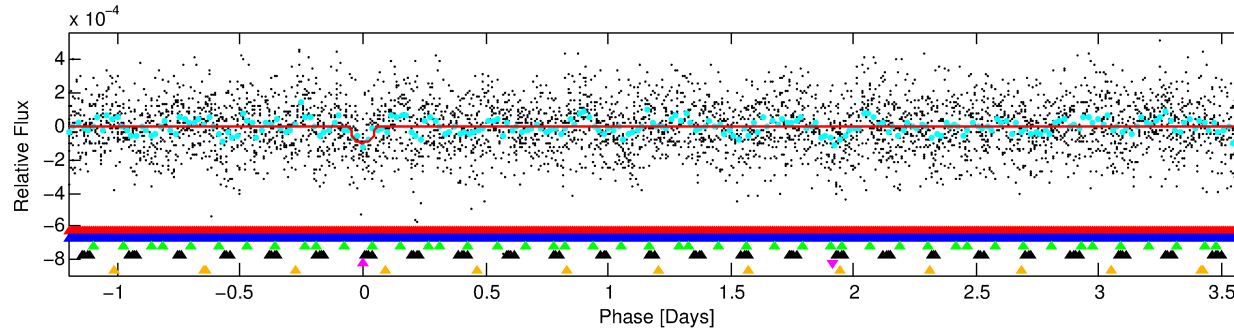
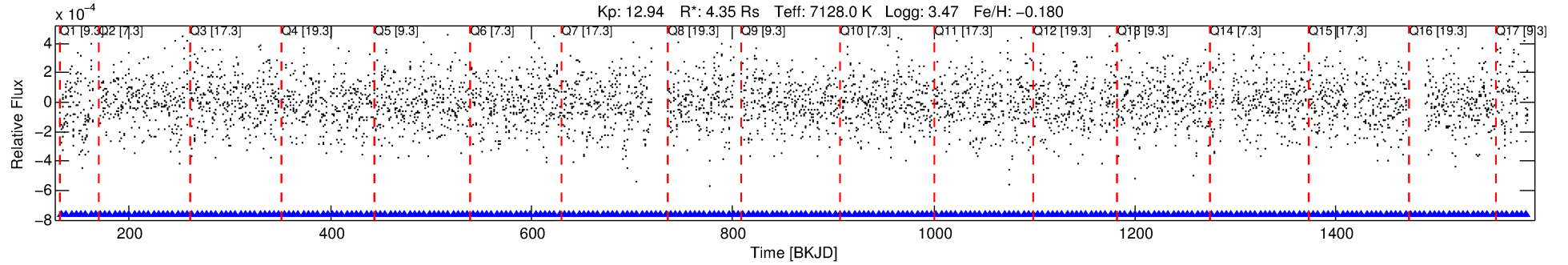
## Ephemeris Match Information For 004650137-05

No Significant Match Found



# DV One-Page Summary

KIC: 4650137 Candidate: 5 of 6 Period: 4.806 d



## DV Fit Results:

Period = 4.80572 [0.00006] d  
Epoch = 133.0001 [0.0082] BKJD  
Rp/R\* = 0.0105 [0.0129]  
a/R\* = 7.30 [50.08]  
b = 0.90 [1.54]  
Seff = 8816.19 [5399.31]  
Teq = 2471 [378] K  
Rp = 5.00 [6.45] Re  
a = 0.0704 [0.0264] AU  
Ag = 9.49 [24.15] [0.35 $\sigma$ ]  
Teffp = 6706 [4153] K [1.02 $\sigma$ ]

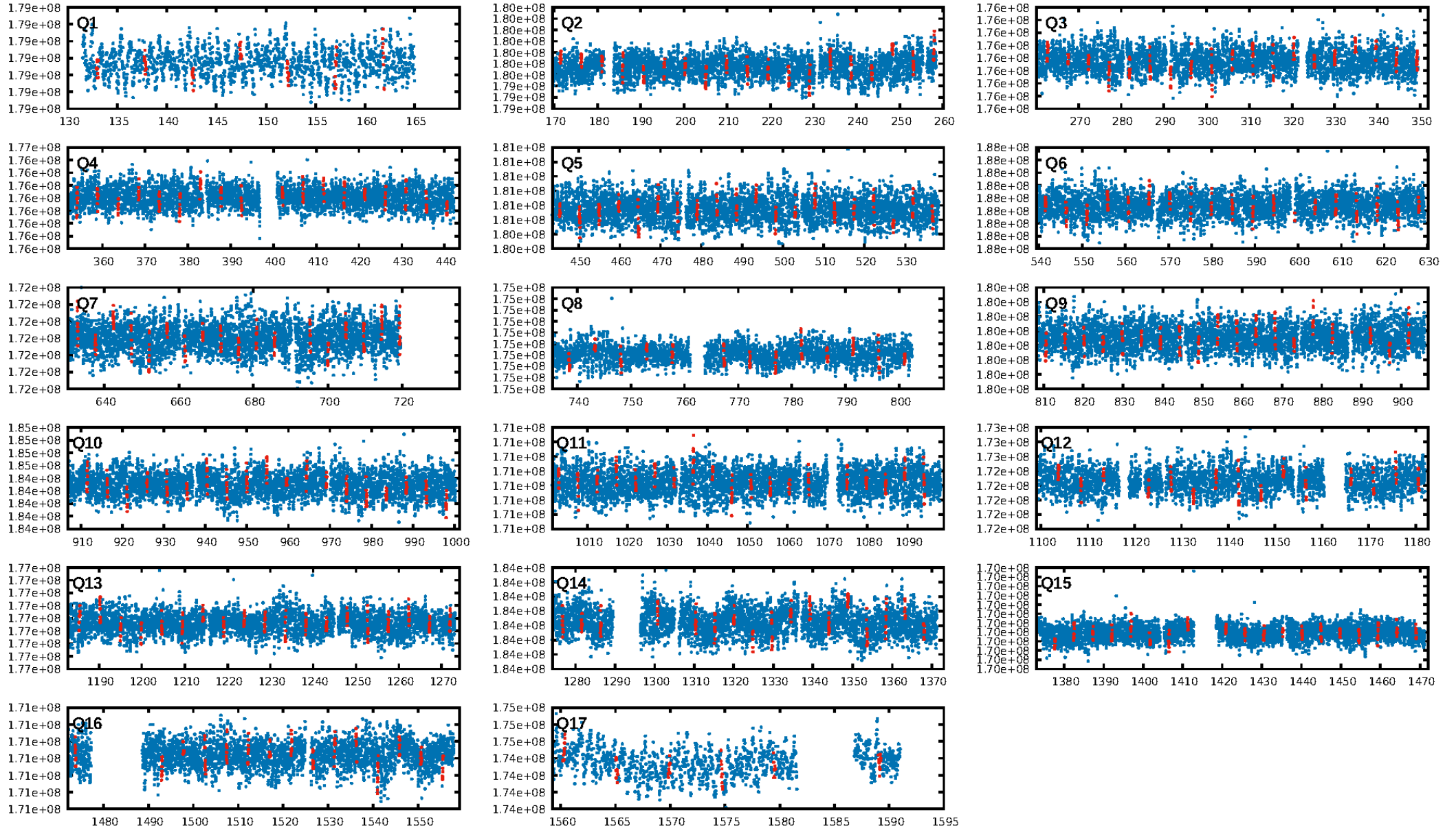
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [21.56 $\sigma$ ]  
LongPeriod-sig: 100.0% [77.51 $\sigma$ ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 2.79e-19  
RollingBand-fgt: 1.00 [44/44]  
GhostDiagnostic-chr: 2.463  
Centroid-sig: N/A  
Centroid-so: N/A  
OotOffset-rm: 0.439 arcsec [1.09 $\sigma$ ]  
KicOffset-rm: 0.523 arcsec [0.81 $\sigma$ ]  
OotOffset-st: 3/3/4/3 [13]  
KicOffset-st: 3/3/4/3 [13]  
DiffImageQuality-fgm: 0.54 [7/13]  
DiffImageOverlap-fno: 0.00 [0/17]

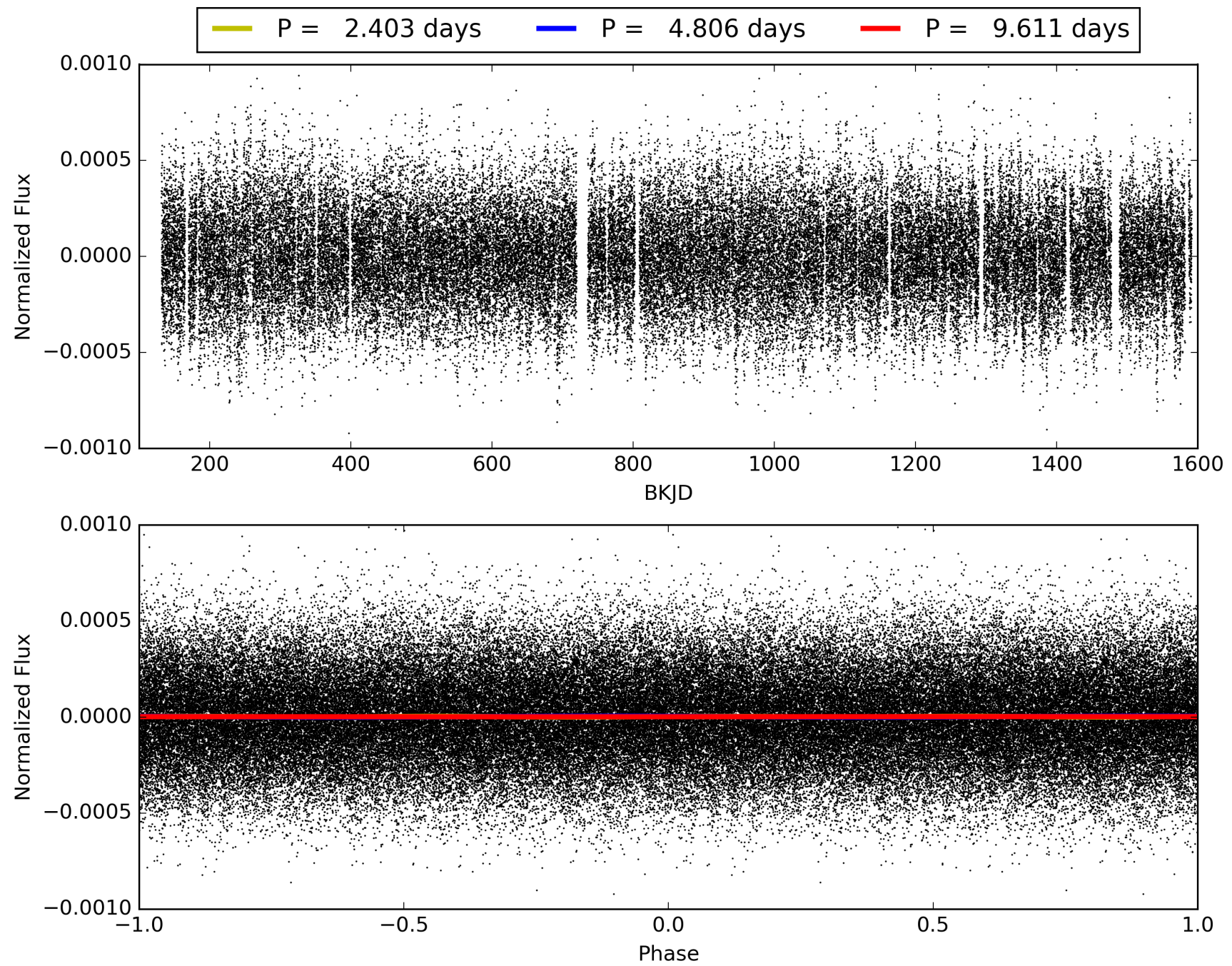
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 14:43:36 Z

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

# TCE 004650137-05, PDC Light Curves

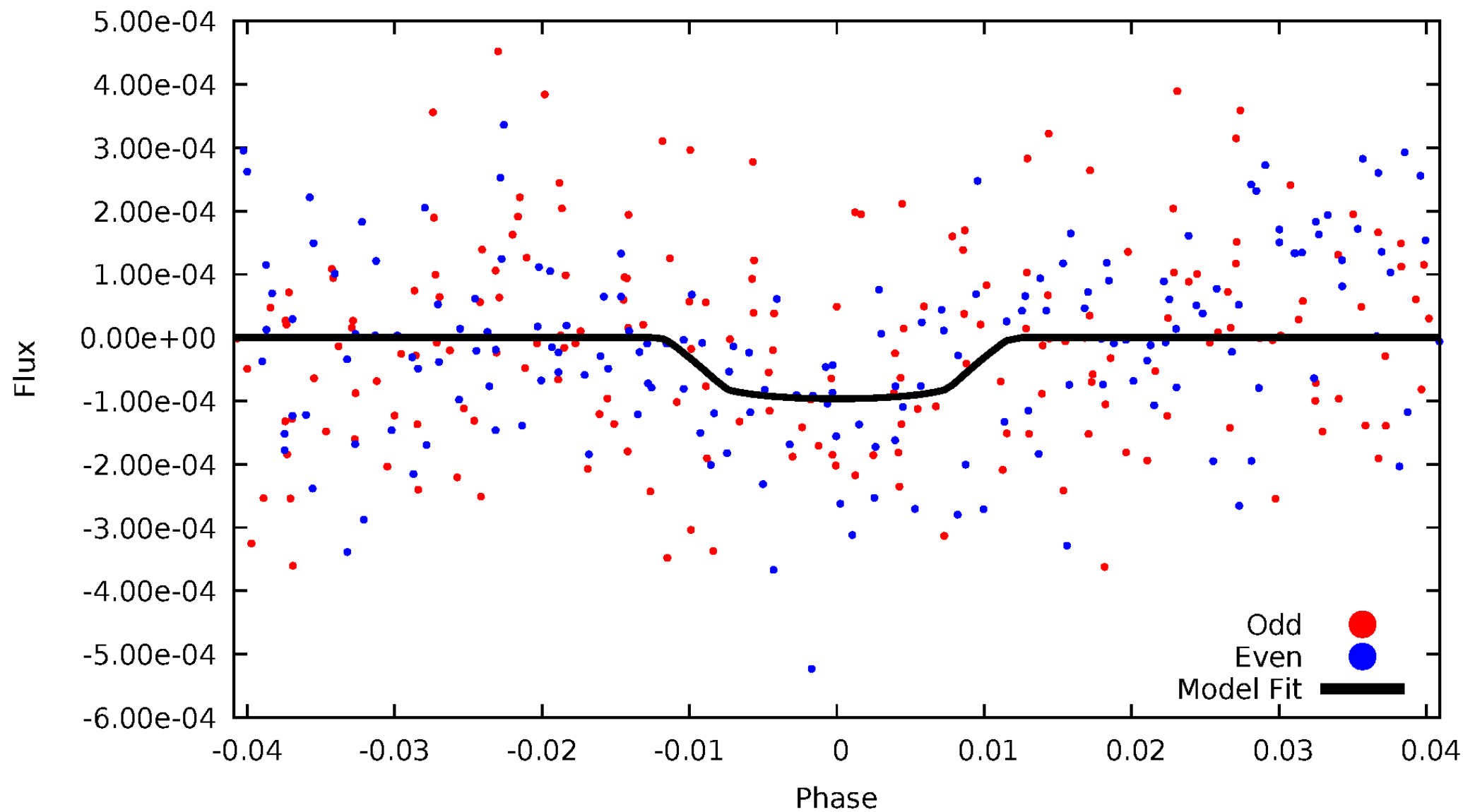


TCE 004650137-05



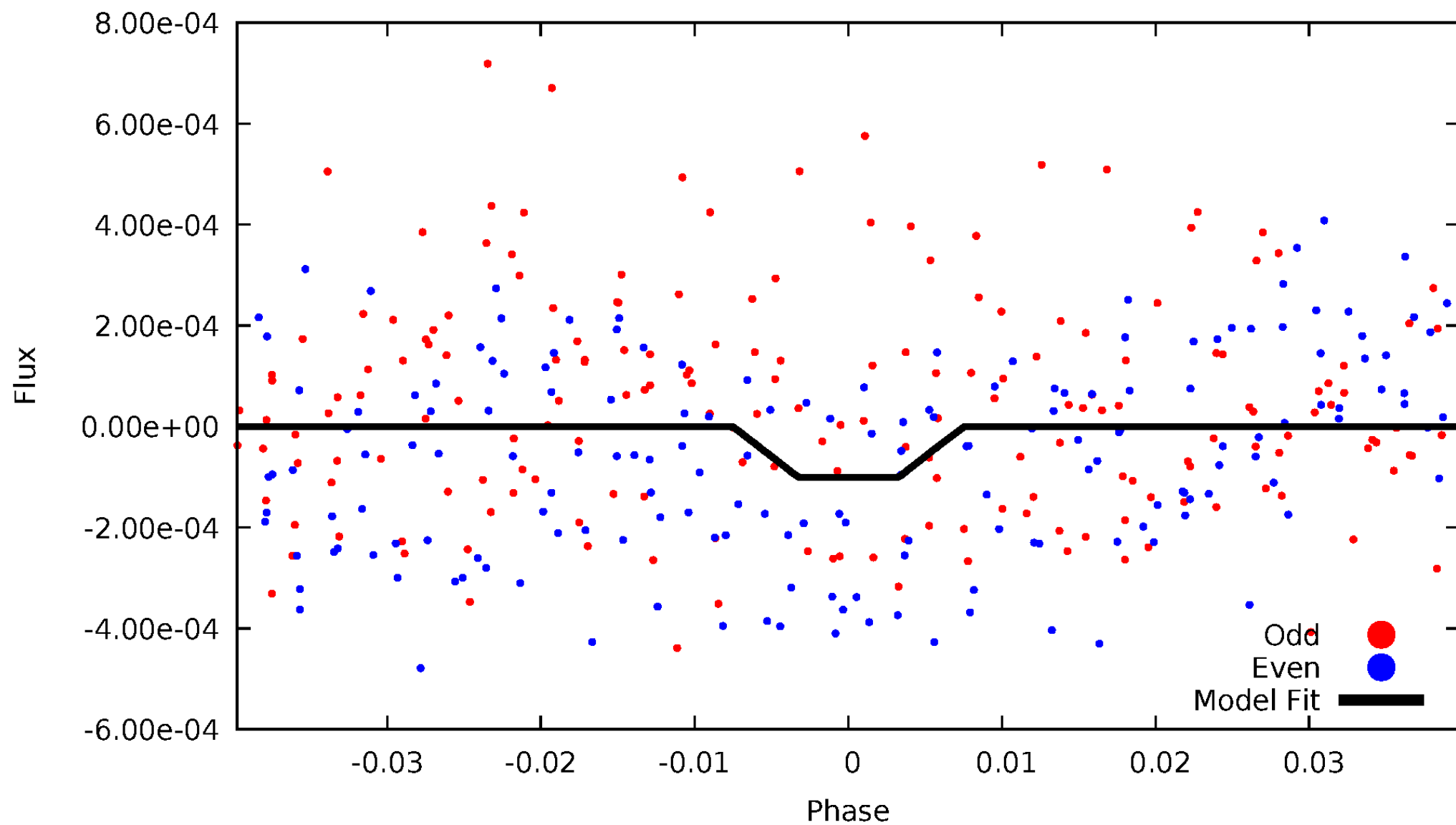
# DV Odd/Even

TCE 004650137-05



# ALT Odd/Even

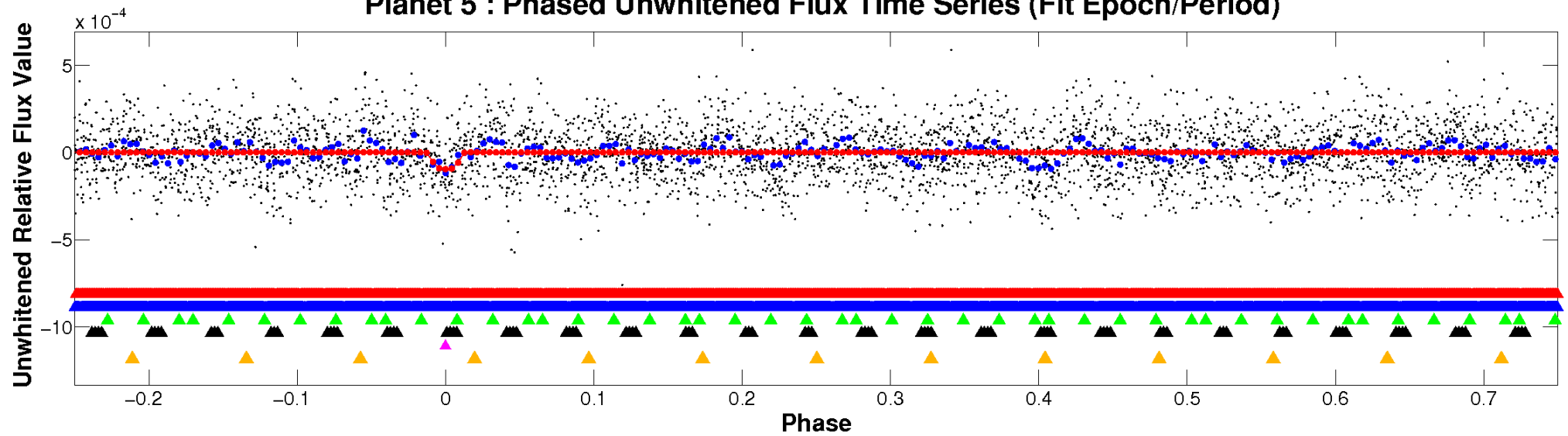
TCE 004650137-05



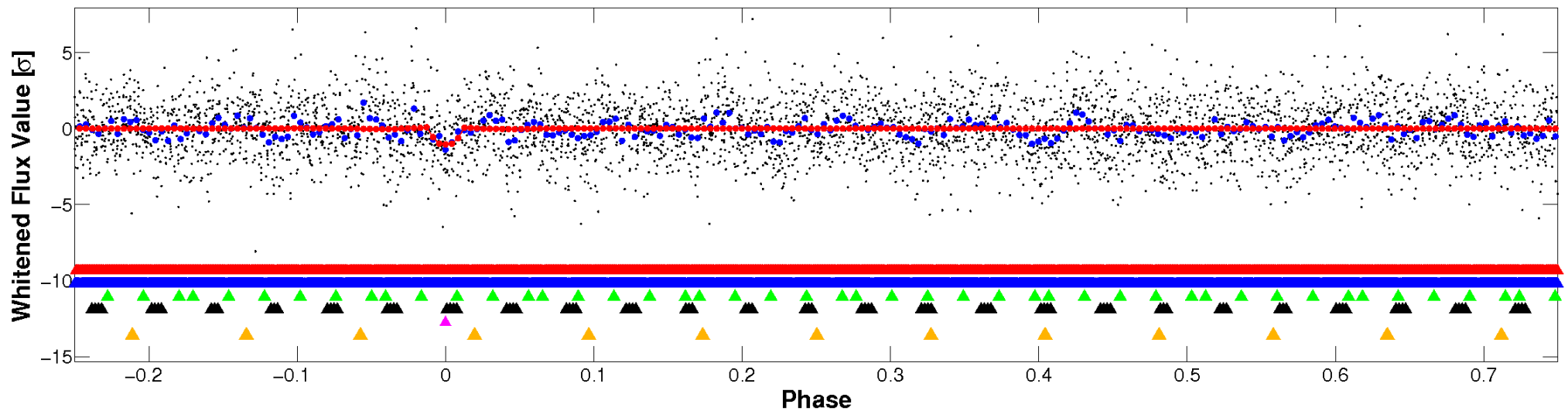


# Non-Whitened Vs. Whitened Light Curve

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



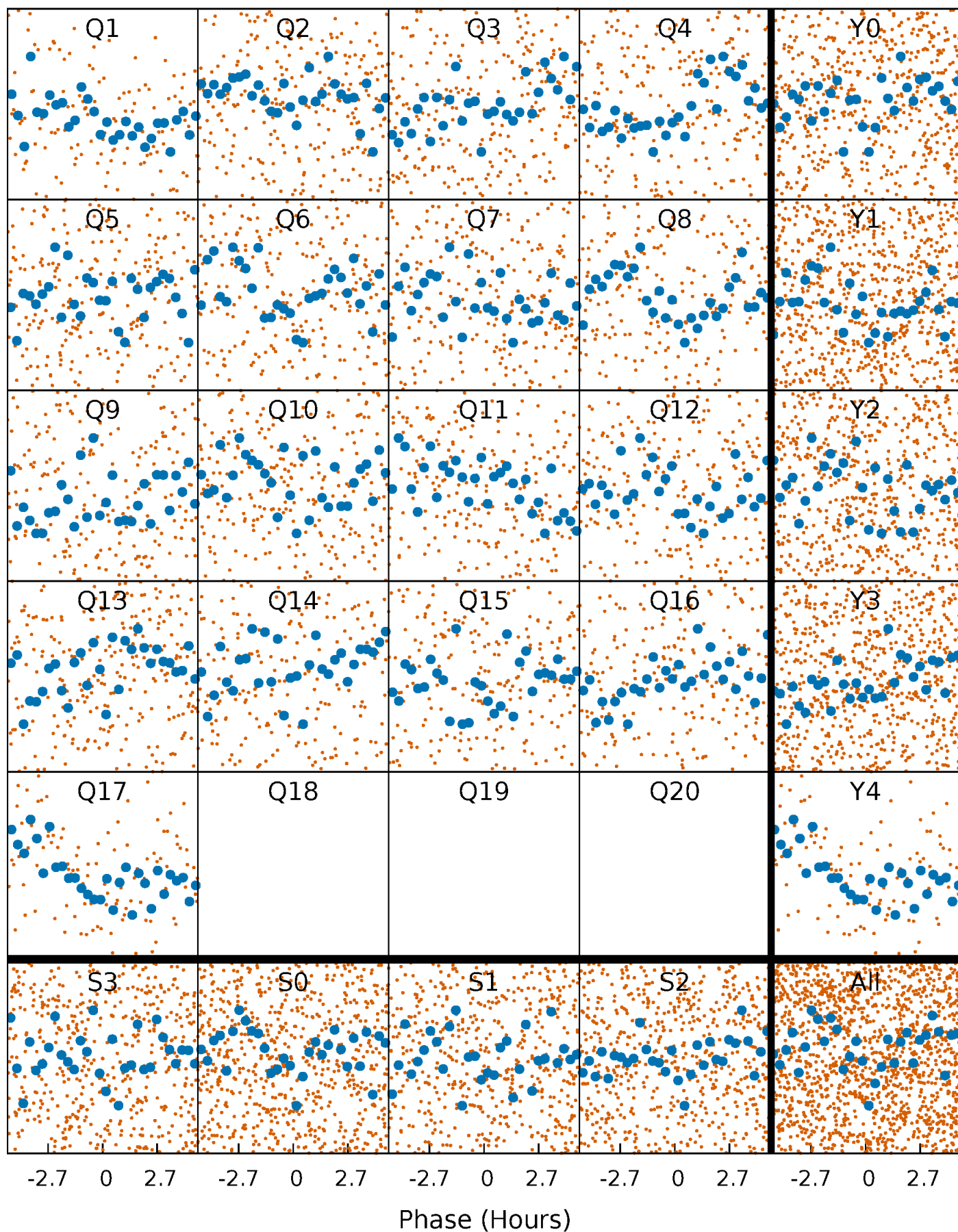
## Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)





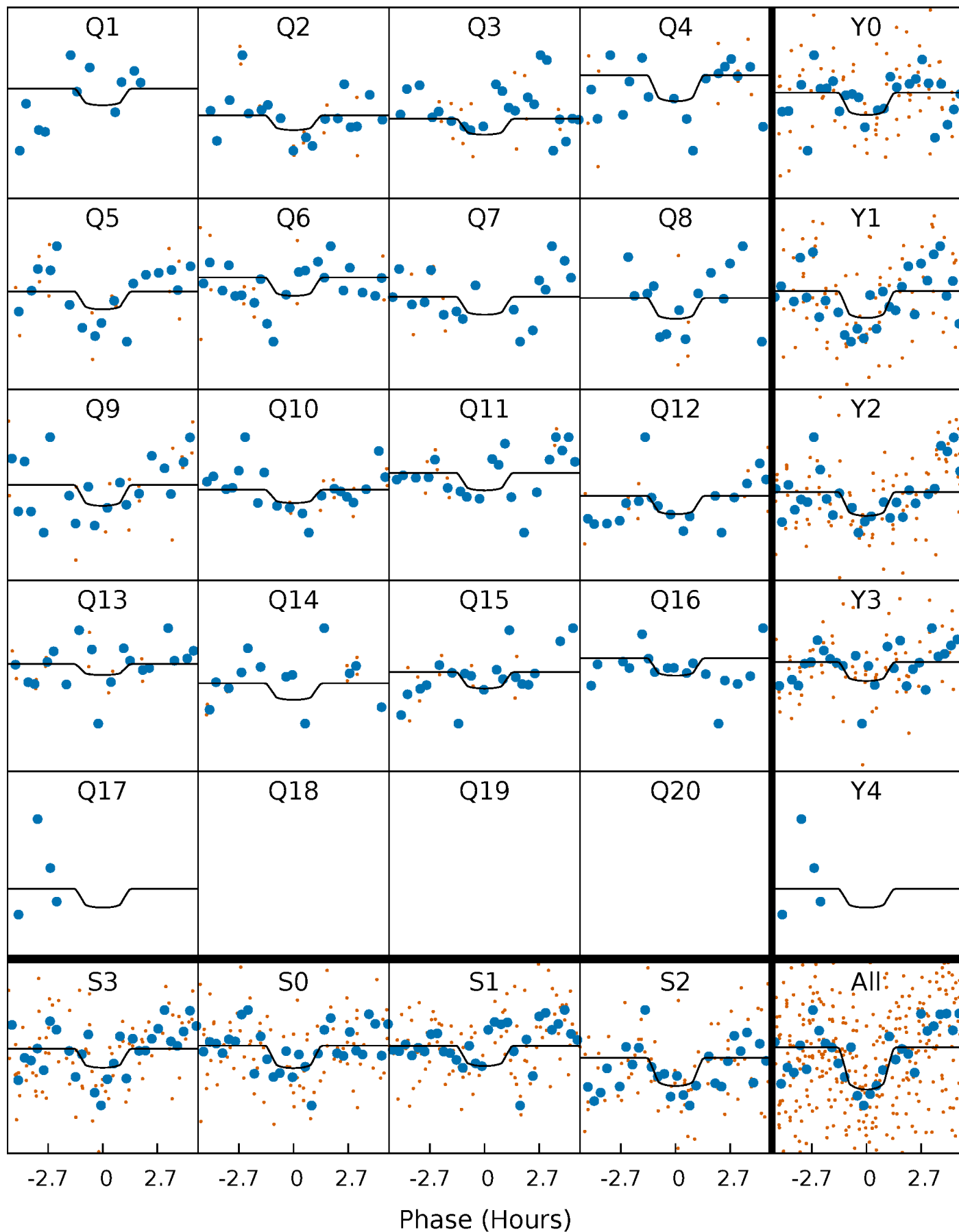
# PDC Quarter-Phased Transit Curves

TCE 004650137-05     $P = 4.805716$  Days     $T_0 = 133.000068$  (BKJD)



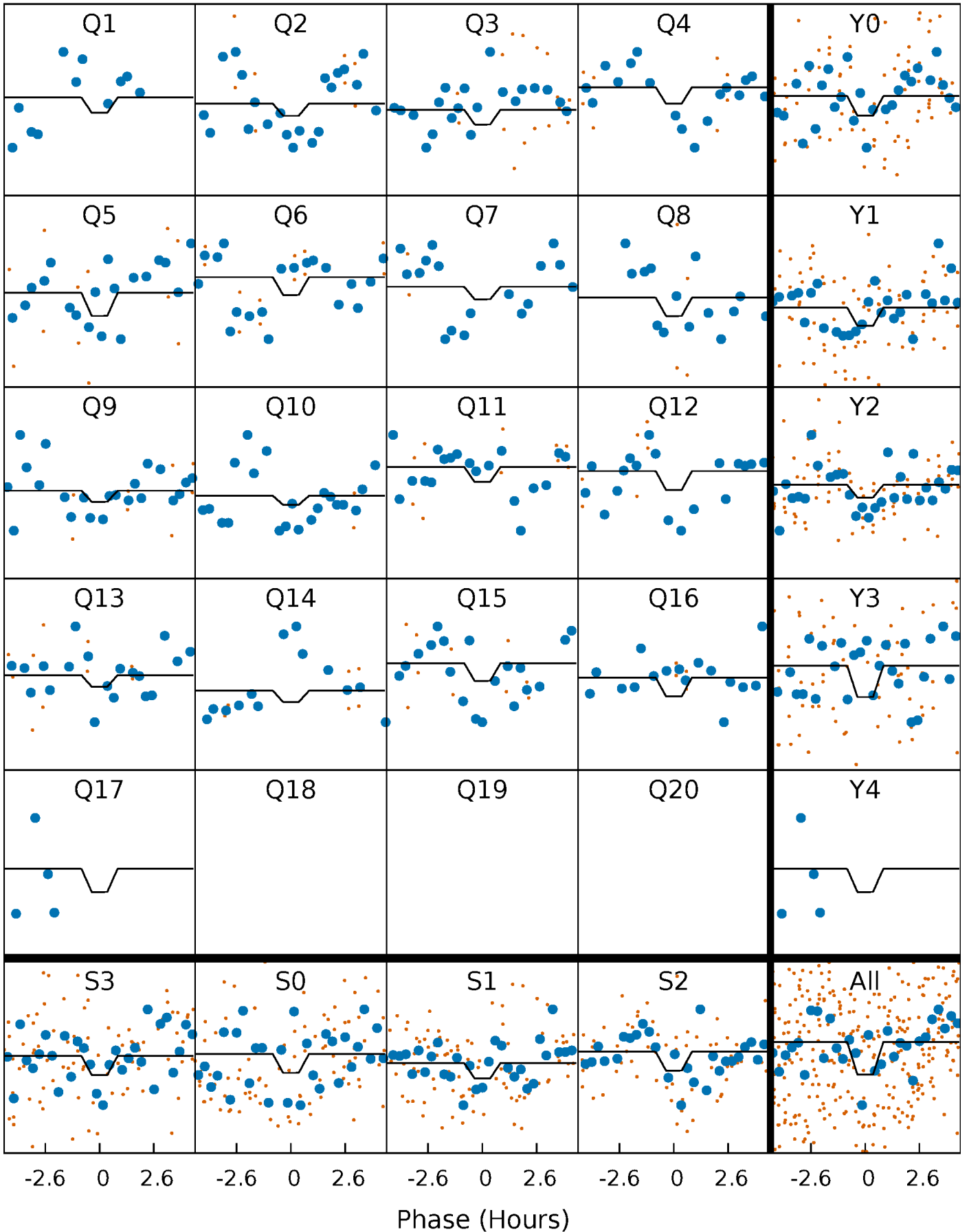
# DV Quarter-Phased Transit Curves

TCE 004650137-05   P= 4.805716 Days    $T_0=133.000068$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

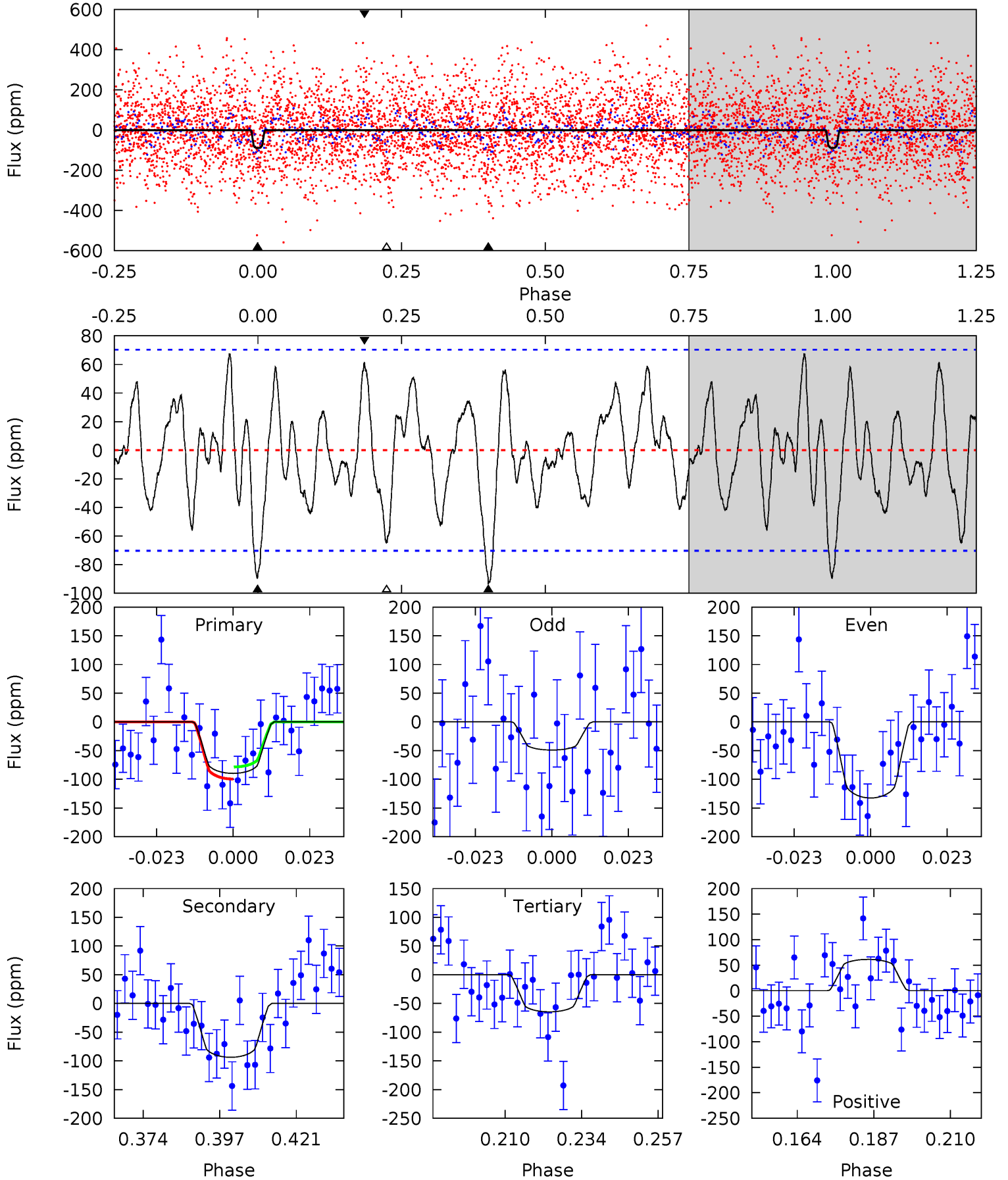
TCE 004650137-05   P= 4.805682 Days    $T_0=133.003233$  (BKJD)



# DV Model-Shift Uniqueness Test

004650137-05, P = 4.805716 Days, E = 128.194352 Days

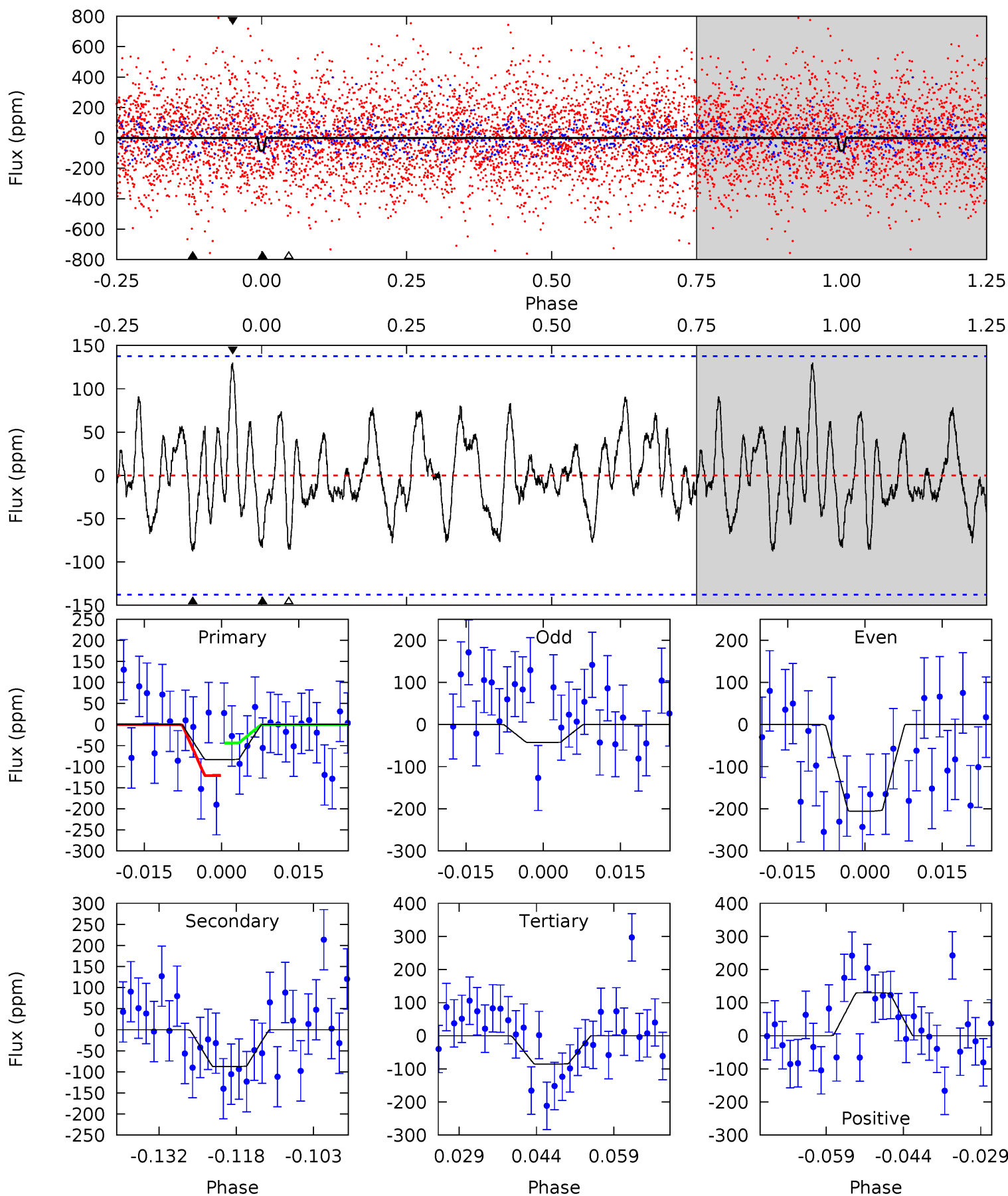
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.20	6.48	4.47	4.24	4.86	2.27	1.88	1.74	1.97	2.02	2.25	2.88	0.84	0.42	0.72



# Alt Model-Shift Uniqueness Test

004650137-05, P = 4.805682 Days, E = 128.197551 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
3.00	3.15	3.08	4.66	4.95	2.44	1.38	-0.08	-1.66	0.07	-1.51	2.92	0.43	0.60	1.39



### Stellar Parameters For KIC 004650137

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$7128^{+191}_{-255}$	$3.466^{+0.348}_{-0.061}$	$-0.180^{+0.250}_{-0.250}$	$4.348^{+0.286}_{-1.716}$	$2.019^{+0.066}_{-0.374}$	$0.035^{+0.088}_{-0.007}$
	+3%/-4%	+10%/-2%	+139%/-139%	+7%/-39%	+3%/-19%	+255%/-20%
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 004650137-05 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-94 \pm 14$	$6.02^{+5.16}_{-3.76}$	$3352^{+189}_{-308}$	$5731^{+4849}_{-1333}$	$6.873^{+44.058}_{-4.838}$
Alt.	$-88 \pm 28$	$5.69^{+5.15}_{-3.69}$	$3372^{+188}_{-306}$	$5796^{+4750}_{-1525}$	$7.241^{+47.912}_{-5.418}$

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



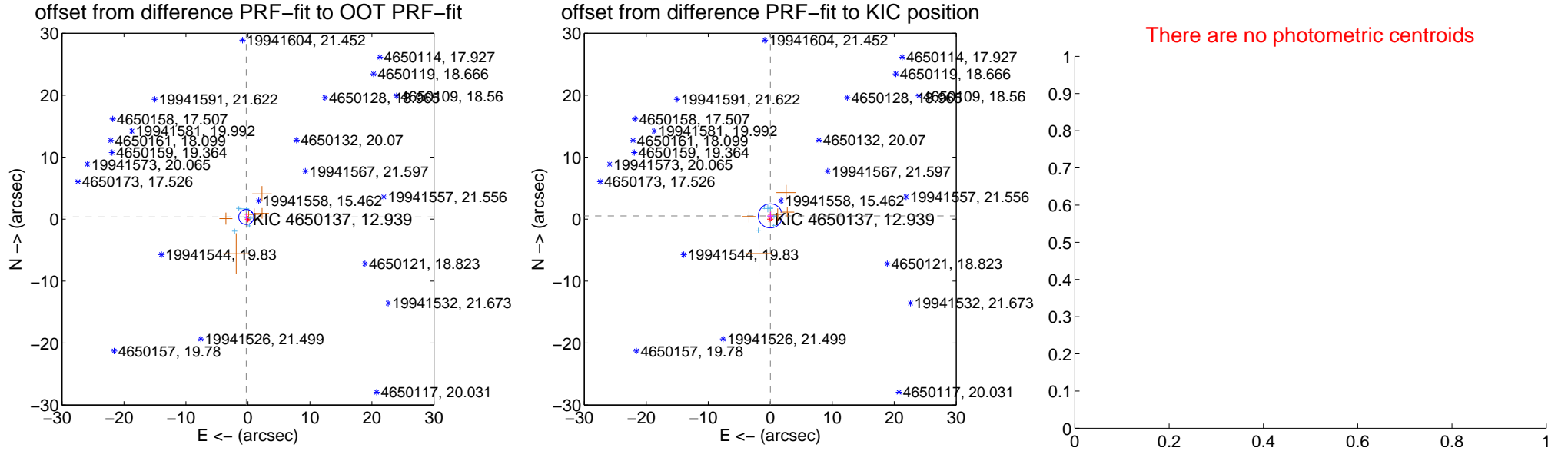
## DV Centroid Data

Supplemental centroid analysis for 004650137-05. Kepler magnitude: 12.94. Transit SNR 8.40

There are 7 quarters with good PRF difference image offsets

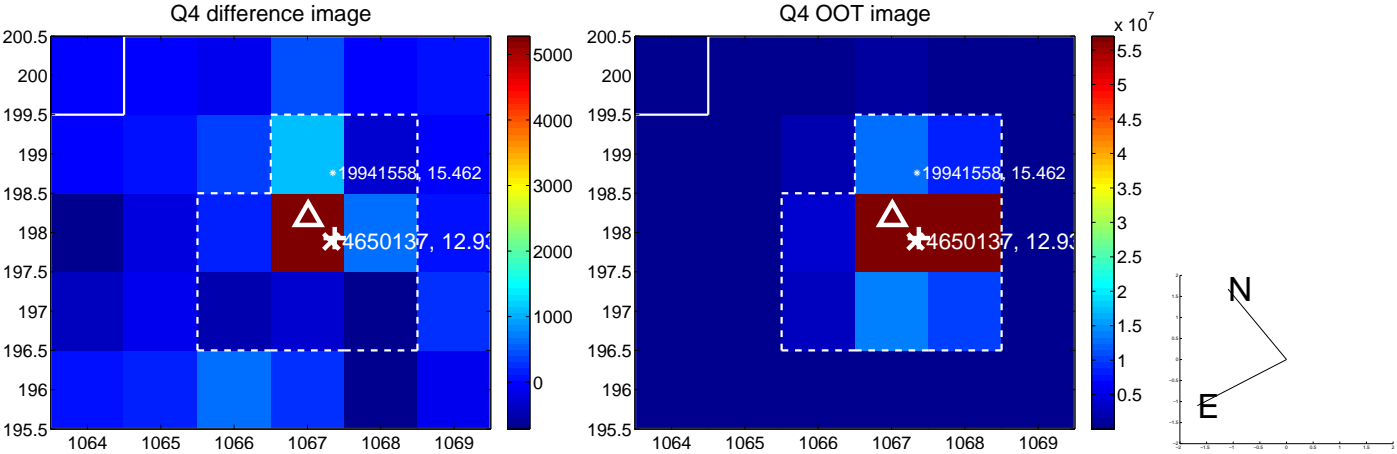
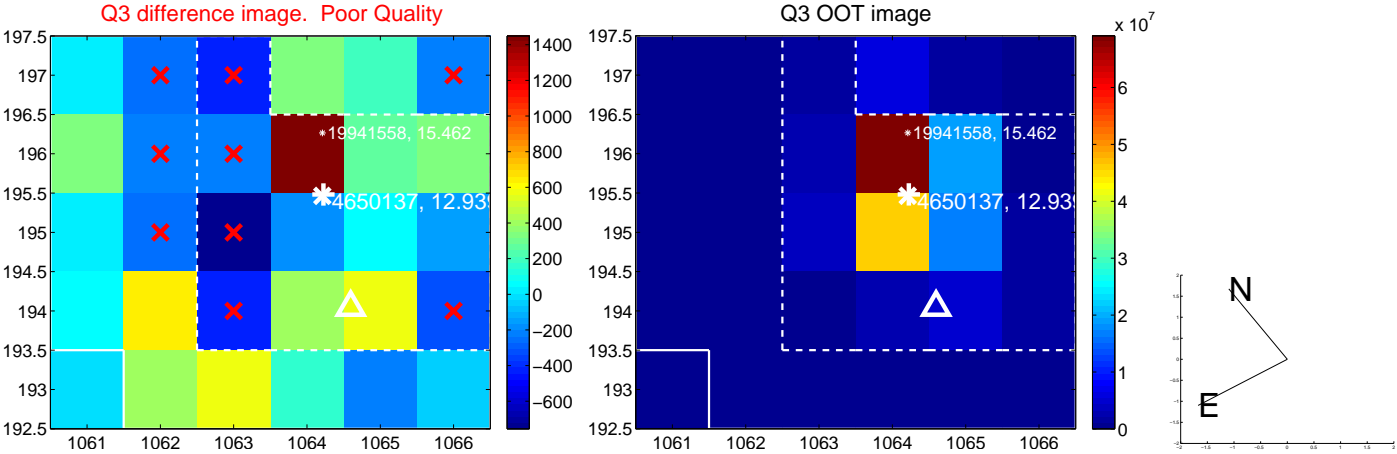
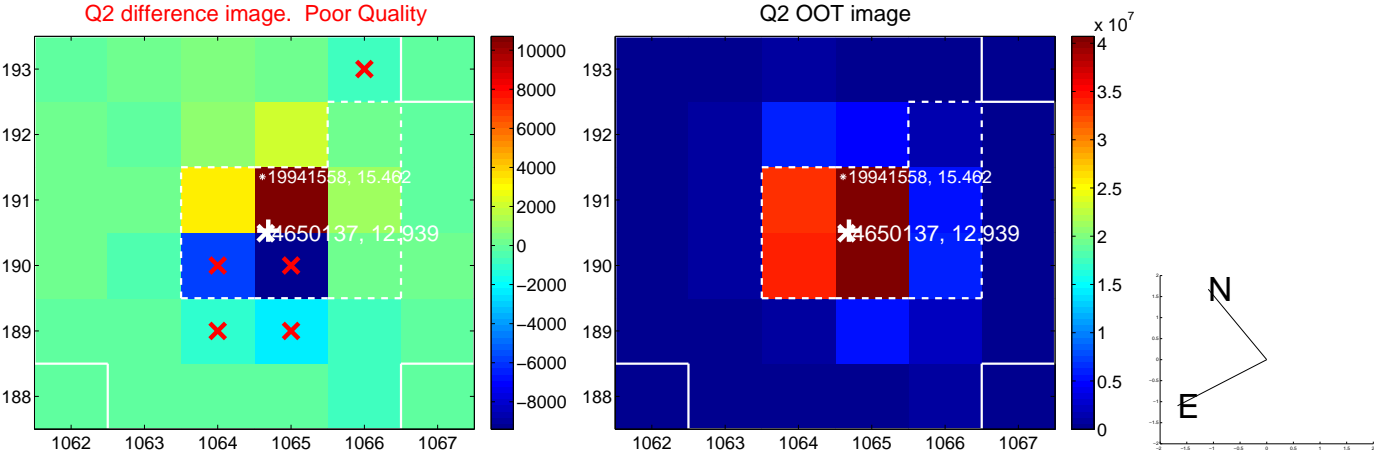
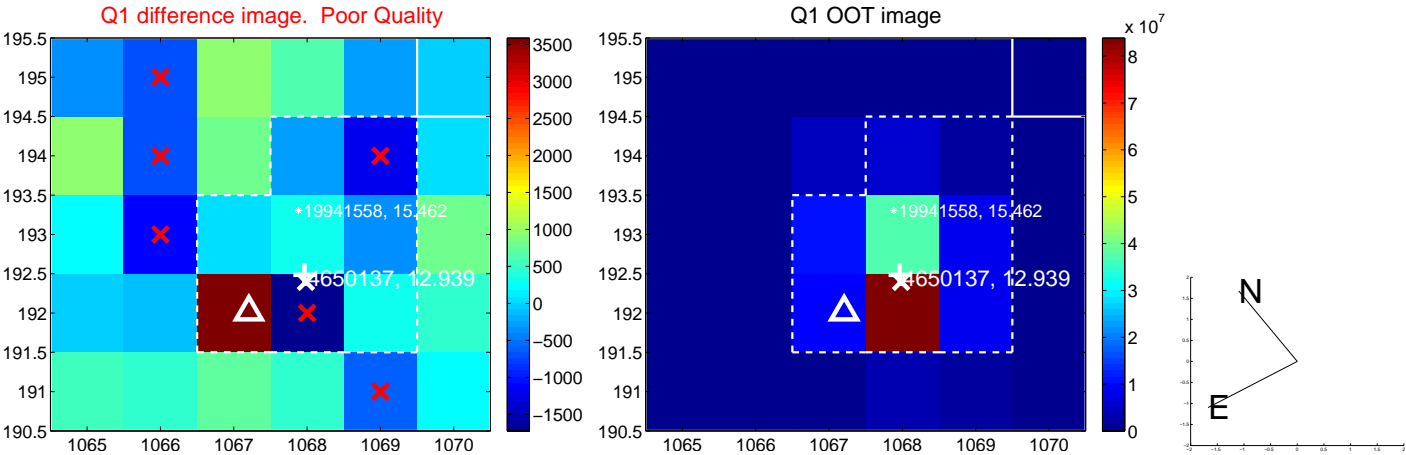
The direct PRF centroid is offset from the target star catalog position by about 0.33 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.439 \pm 0.404$	1.09	$0.275 \pm 0.455$	$0.342 \pm 0.599$
PRF-fit source offset from KIC position	$0.523 \pm 0.647$	0.81	$-0.015 \pm 0.499$	$0.523 \pm 0.640$
photometric centroid source offset	—	—	—	—

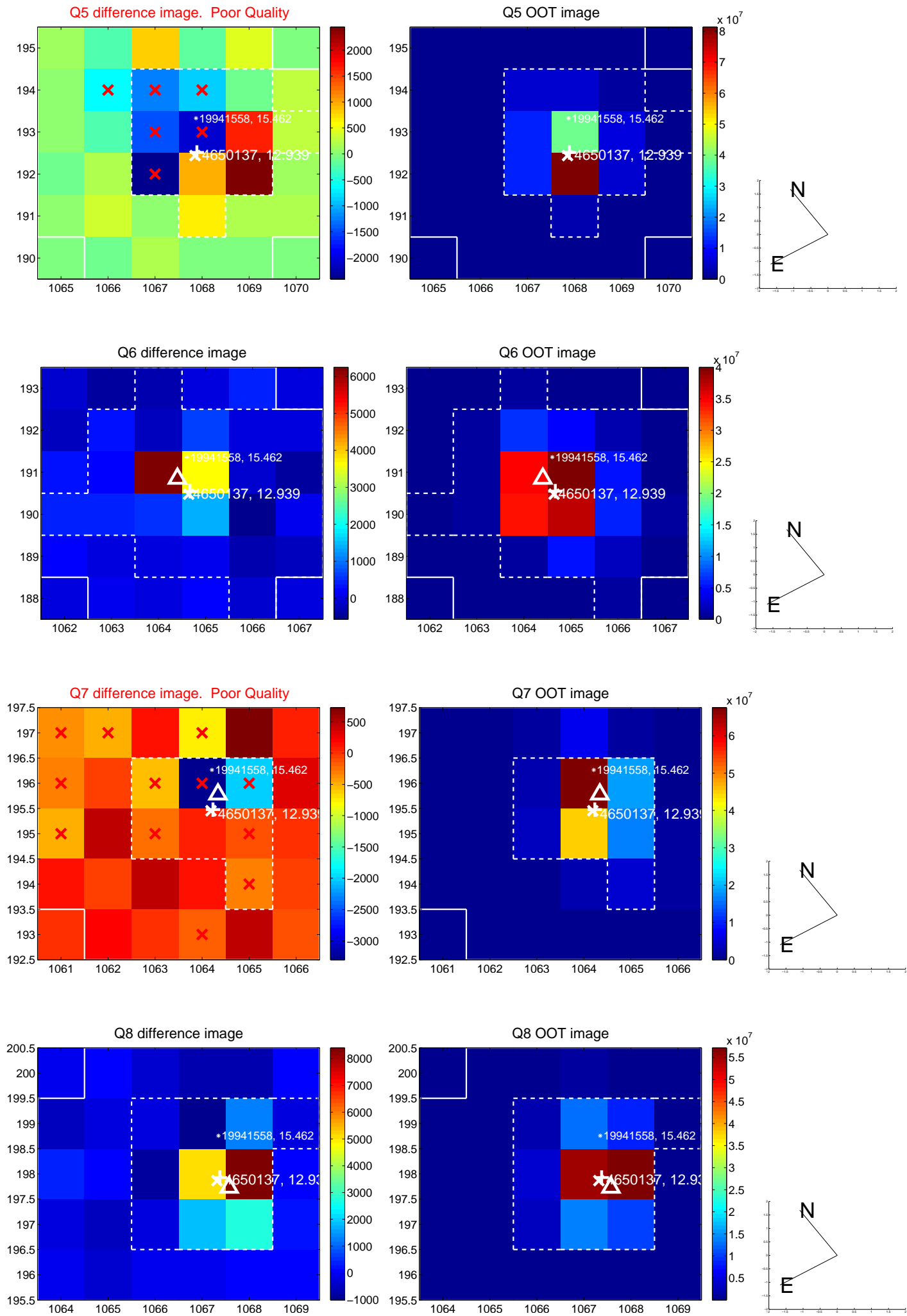


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

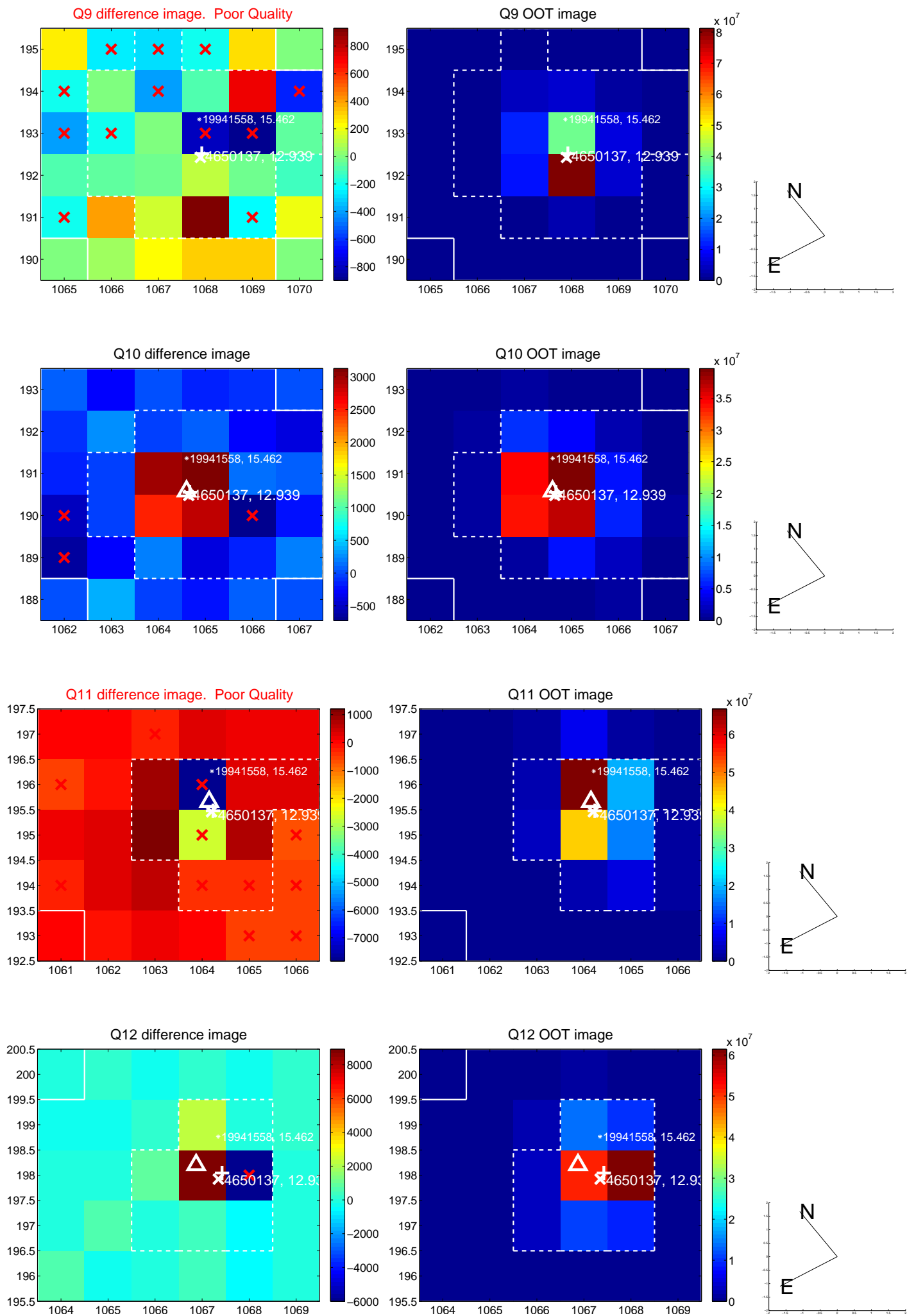
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



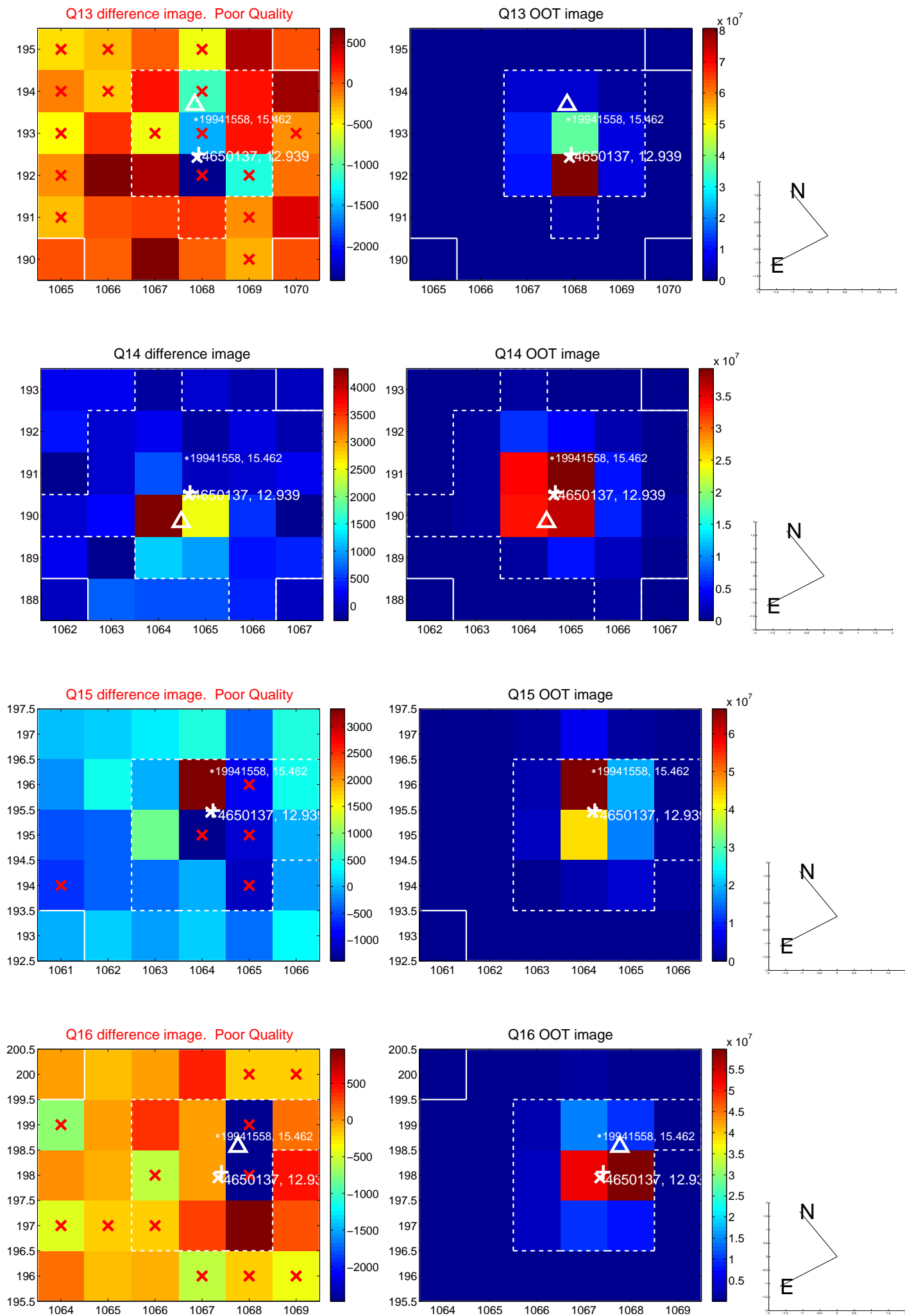
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



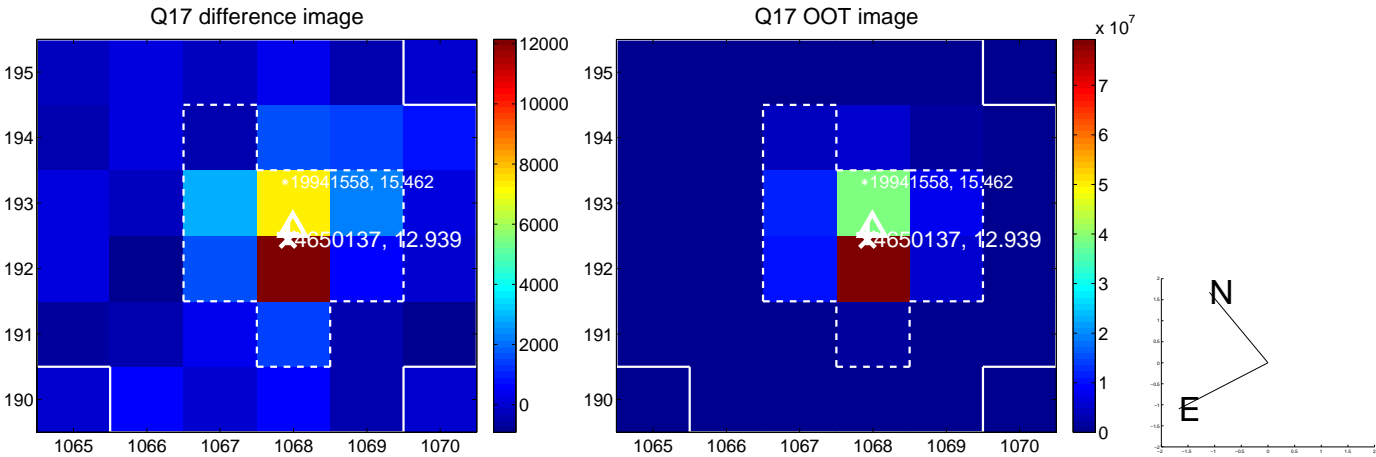
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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.

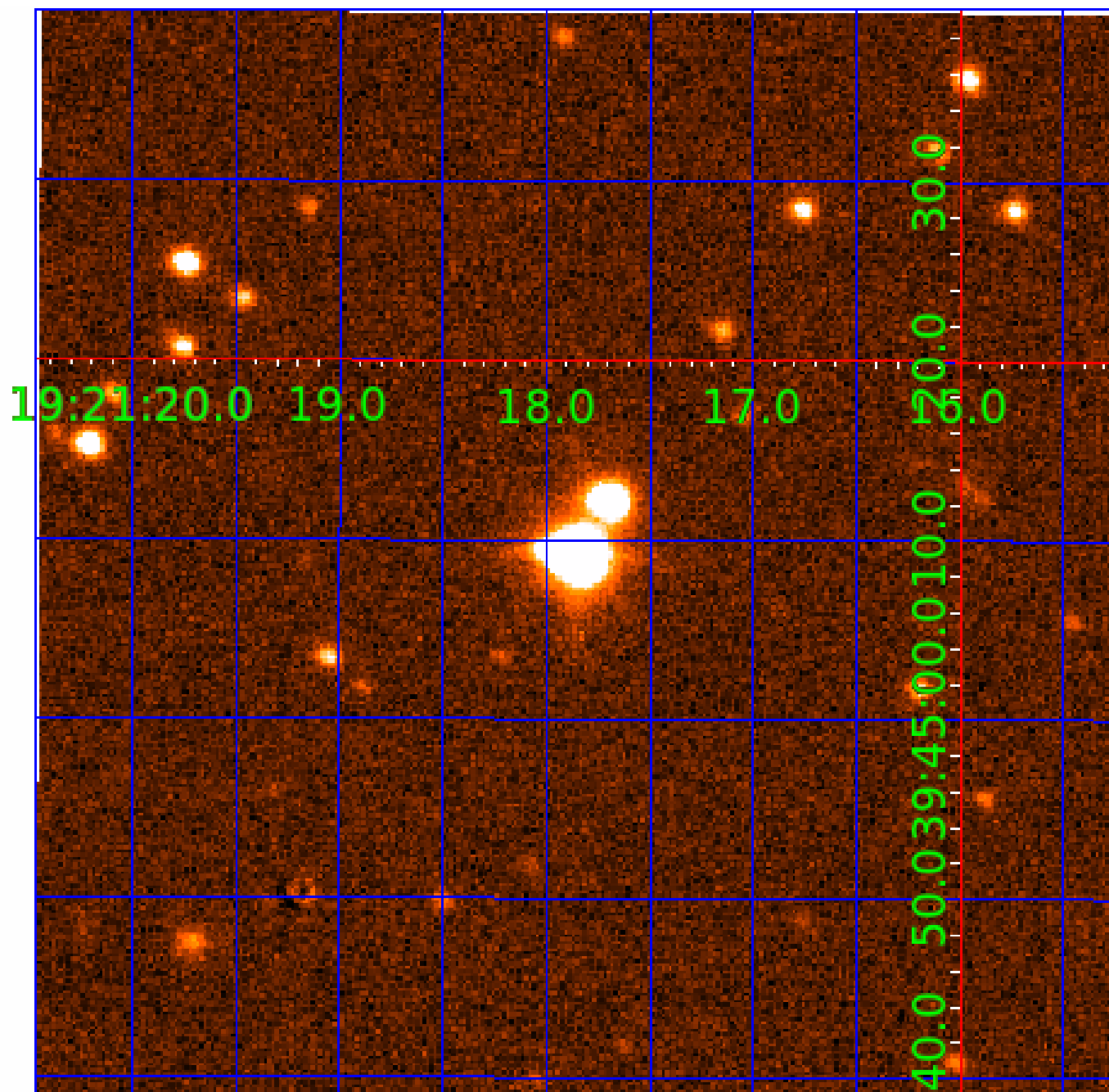


folded centroid time series figure for this object.



UKIRT Image

Declination



# KIC 004650137

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004650137-01	OBS	No	1.056731	132.048022	19.9	3.443	8.1	7.9	4.35	7128	2.27	66426.10
004650137-02	OBS	No	0.528354	131.783556	17.8	3.449	9.0	9.9	4.35	7128	2.15	0.00
004650137-03	OBS	No	30.983029	151.404981	376.2	1.177	12.6	13.1	4.35	7128	8.75	734.73
004650137-04	OBS	No	15.954549	132.079704	227.8	2.521	11.3	11.6	4.35	7128	7.44	1780.10
004650137-05	OBS	No	4.805716	133.000068	96.6	2.358	10.6	8.4	4.35	7128	5.00	8816.19
004650137-06	OBS	No	34.748958	163.778320	284.5	2.777	10.5	10.8	4.35	7128	8.31	630.52

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004650137-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
004650137-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—SAME_NTL_PERIOD
004650137-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—HALO_GHOST
004650137-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
004650137-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004650137-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

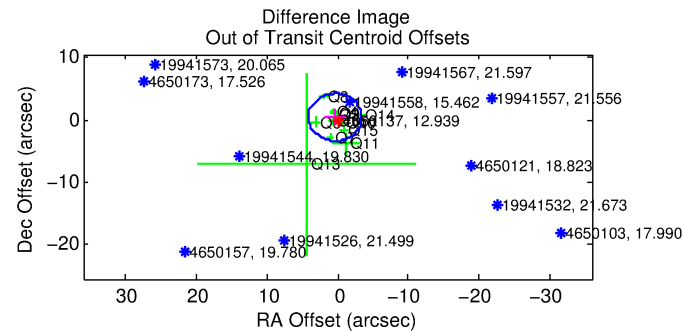
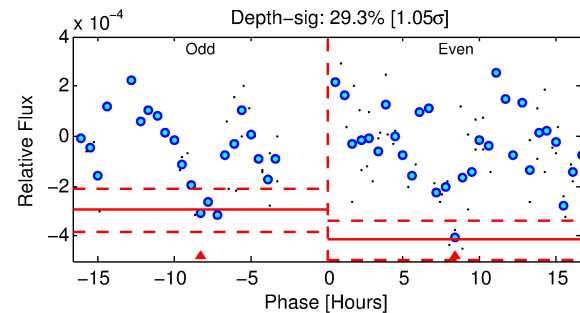
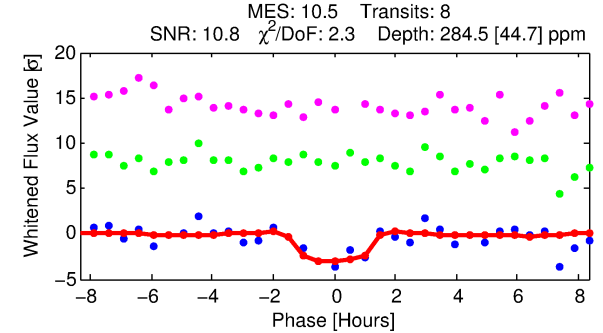
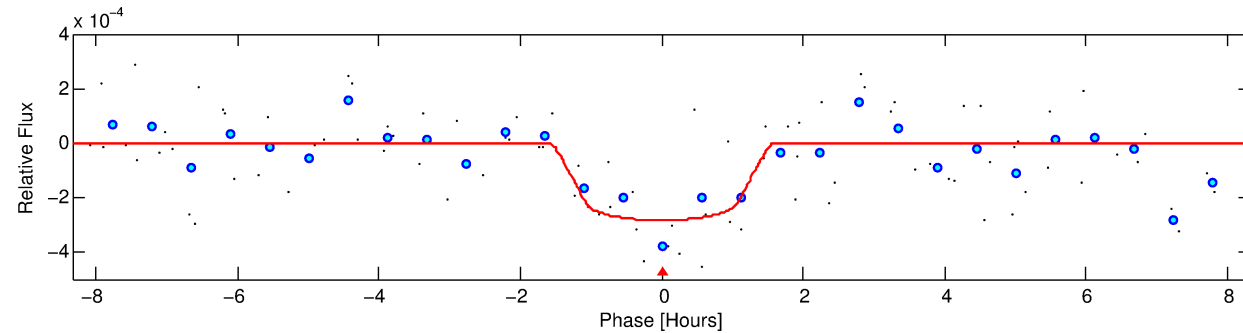
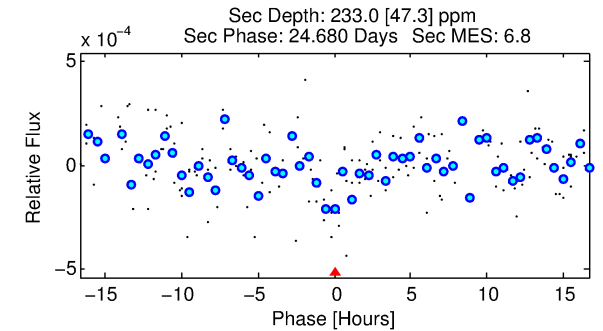
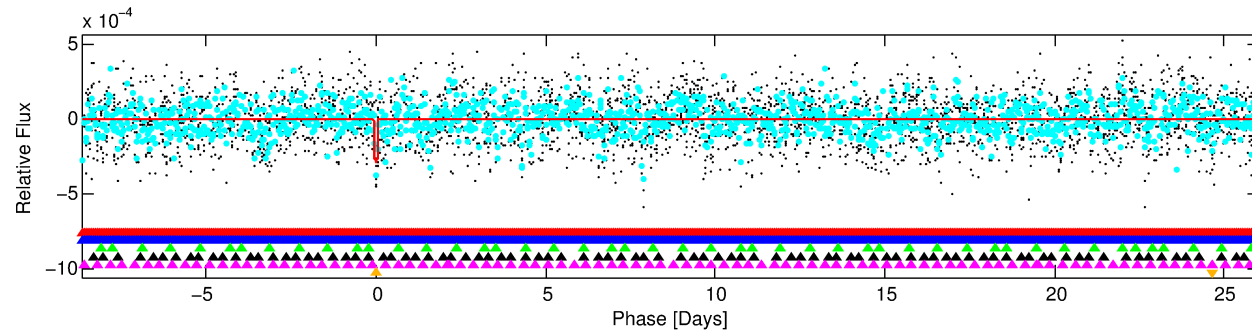
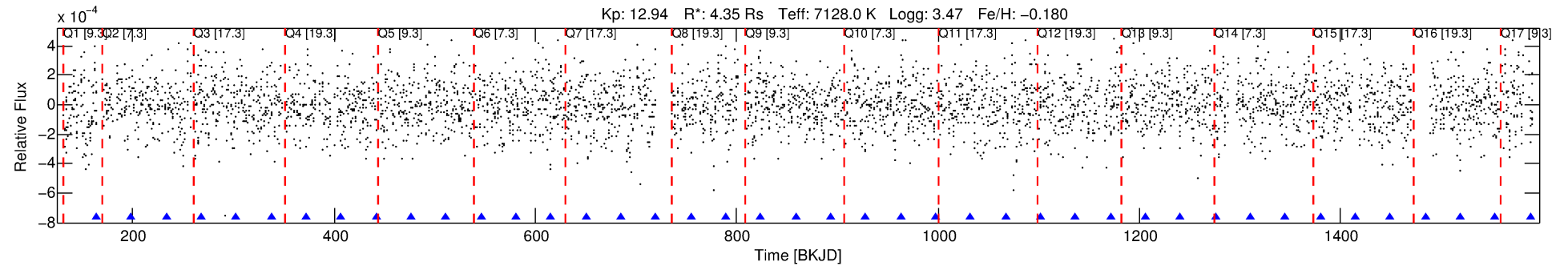
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 004650137-06

No Significant Match Found

# DV One-Page Summary

KIC: 4650137 Candidate: 6 of 6 Period: 34.749 d



## DV Fit Results:

Period = 34.74896 [0.00046] d  
Epoch = 163.7783 [0.0097] BKJD  
Rp/R\* = 0.0175 [0.0152]  
a/R\* = 53.58 [256.45]  
b = 0.85 [1.60]  
Seff = 630.53 [386.15]  
Teq = 1278 [196] K  
Rp = 8.31 [7.93] Re  
a = 0.2633 [0.0987] AU  
Ag = 128.80 [238.08] [0.54σ]  
Teffp = 6655 [2921] K [1.84σ]

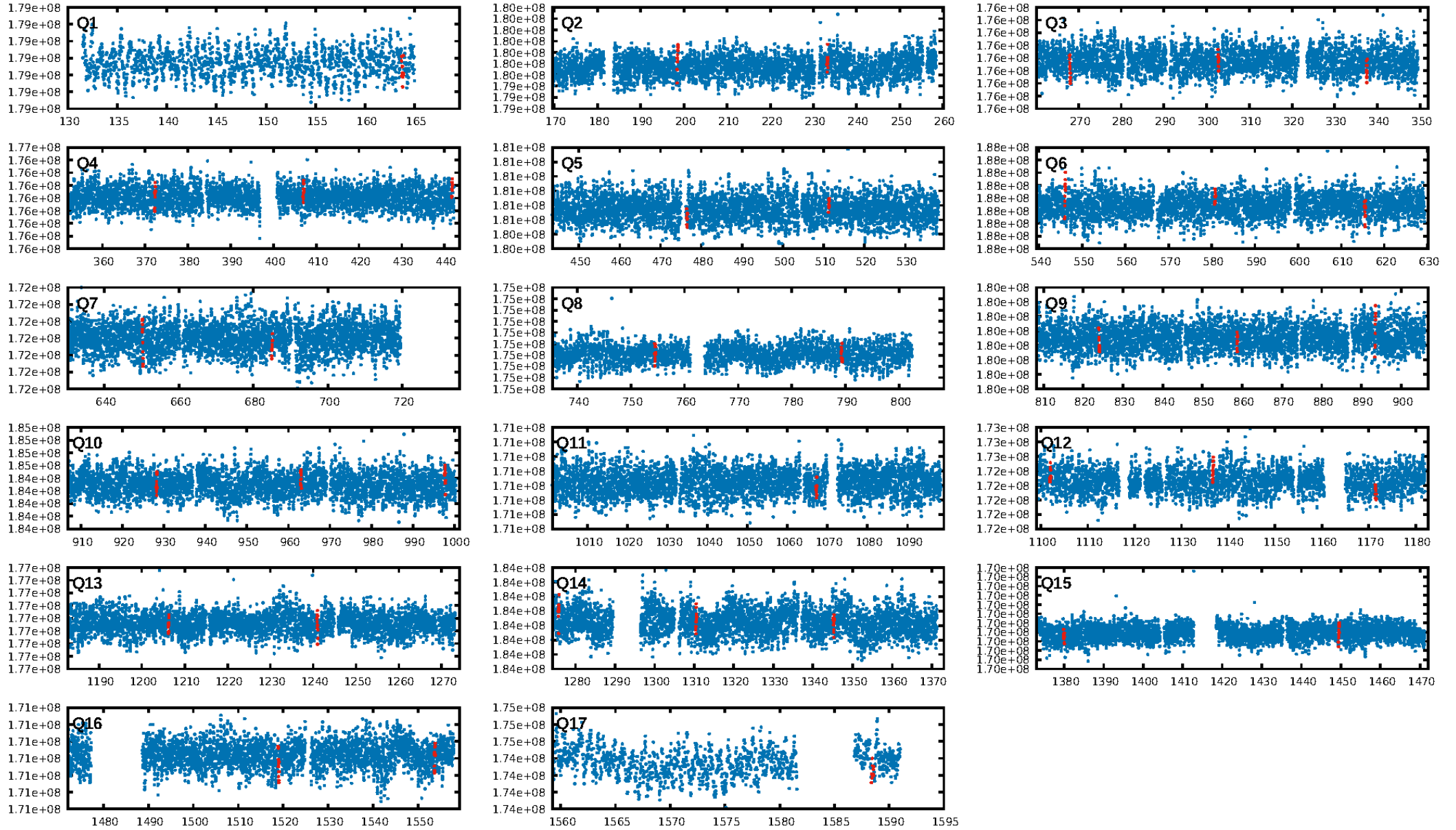
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [29.96σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.2%  
ModelChiSquareGof-sig: 99.9%  
Bootstrap-pfa: 2.50e-24  
RollingBand-fgt: 1.00 [8/8]  
GhostDiagnostic-chr: -0.8347  
Centroid-sig: N/A  
Centroid-so: N/A  
OotOffset-rm: 0.564 arcsec [0.45σ]  
KicOffset-rm: 0.544 arcsec [0.44σ]  
OotOffset-st: 3/4/3/2 [12]  
KicOffset-st: 3/4/3/2 [12]  
DiffImageQuality-fgm: 0.50 [6/12]  
DiffImageOverlap-fno: 0.00 [0/17]

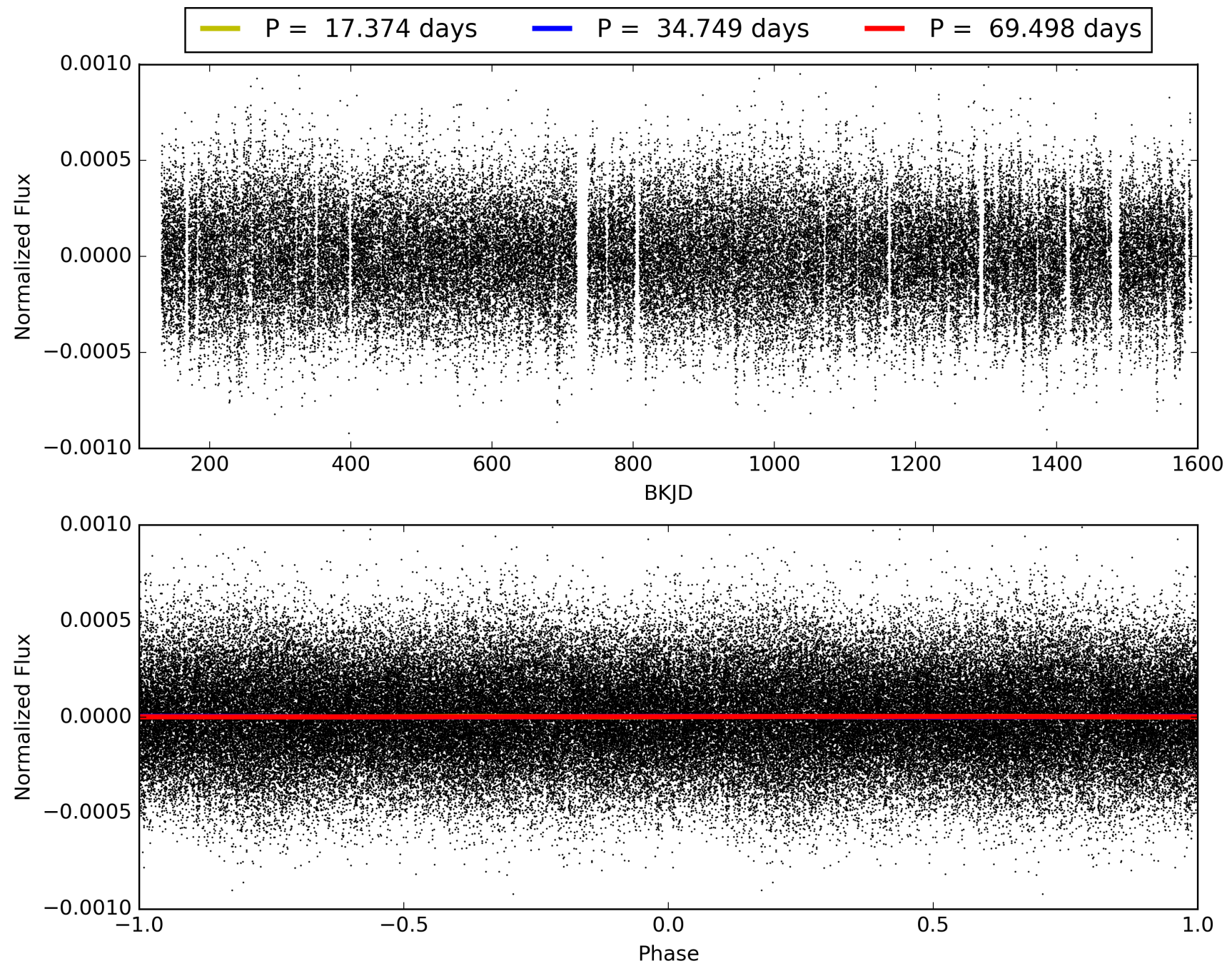
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 14:43:39 Z

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

# TCE 004650137-06, PDC Light Curves

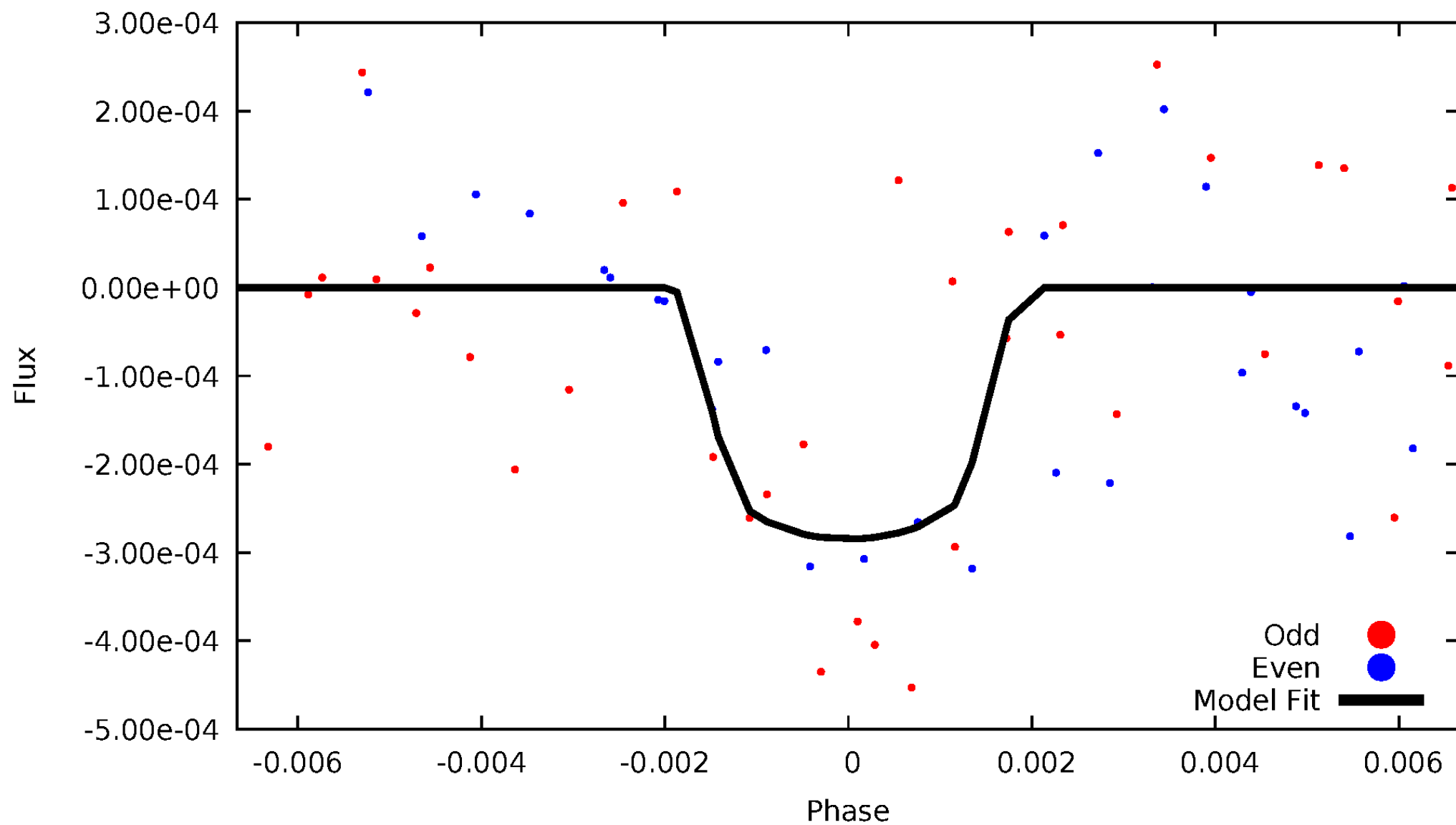


TCE 004650137-06



# DV Odd/Even

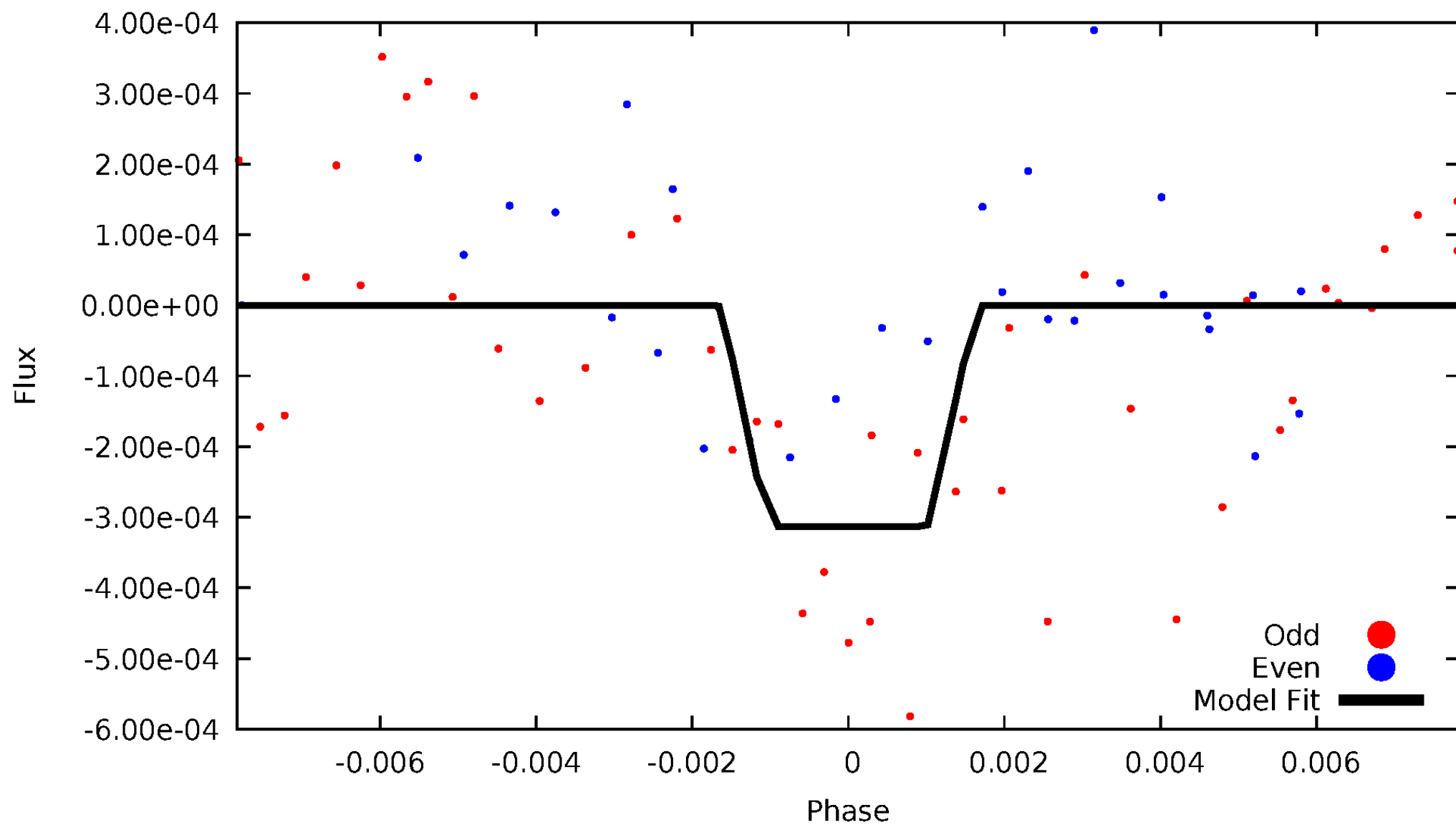
TCE 004650137-06





# ALT Odd/Even

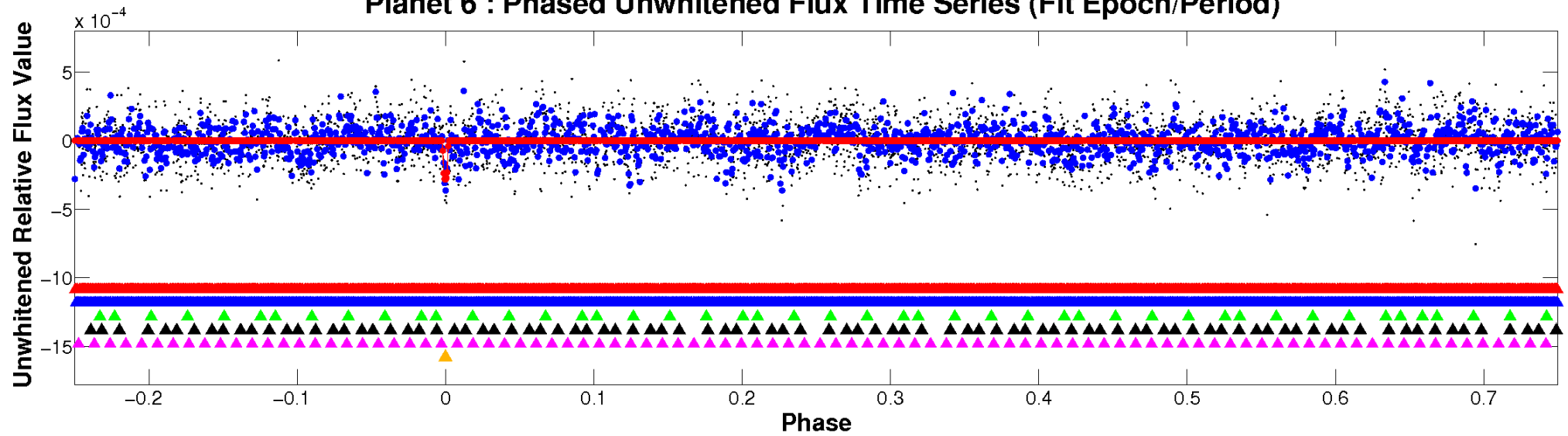
TCE 004650137-06



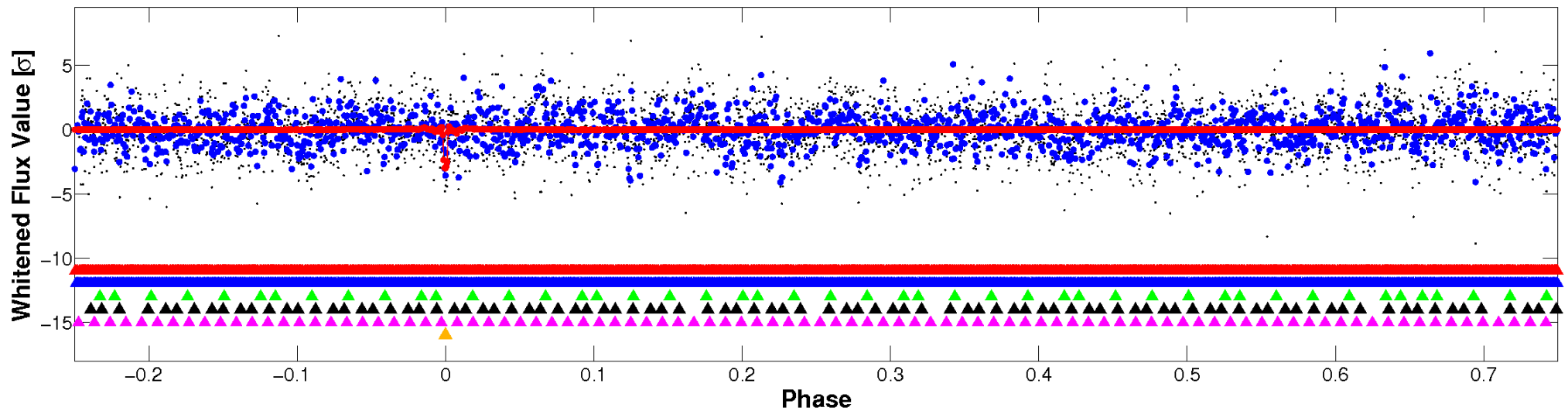


# Non-Whitened Vs. Whitened Light Curve

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

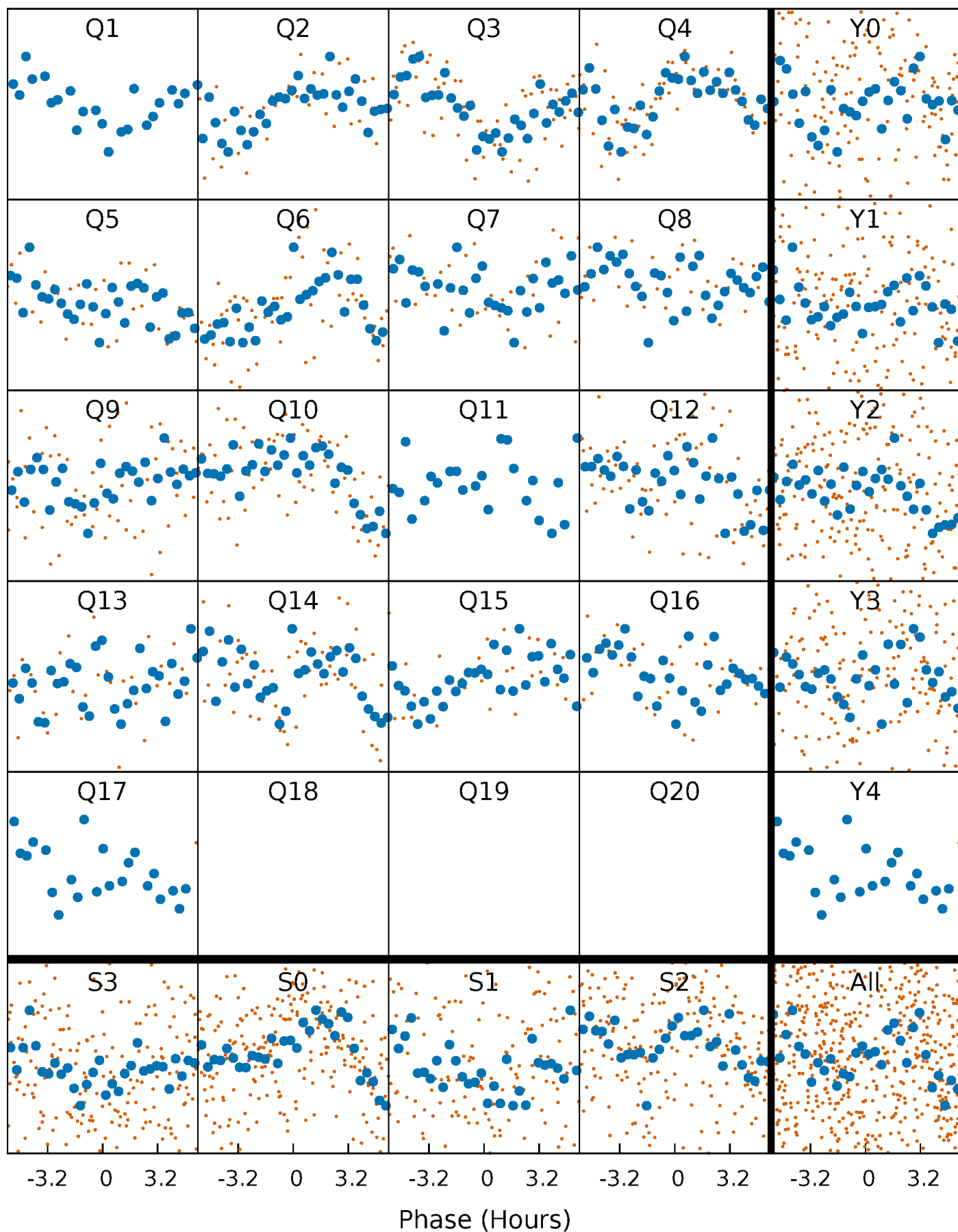


## Planet 6 : Phased Whitened Flux Time Series (Fit Epoch/Period)



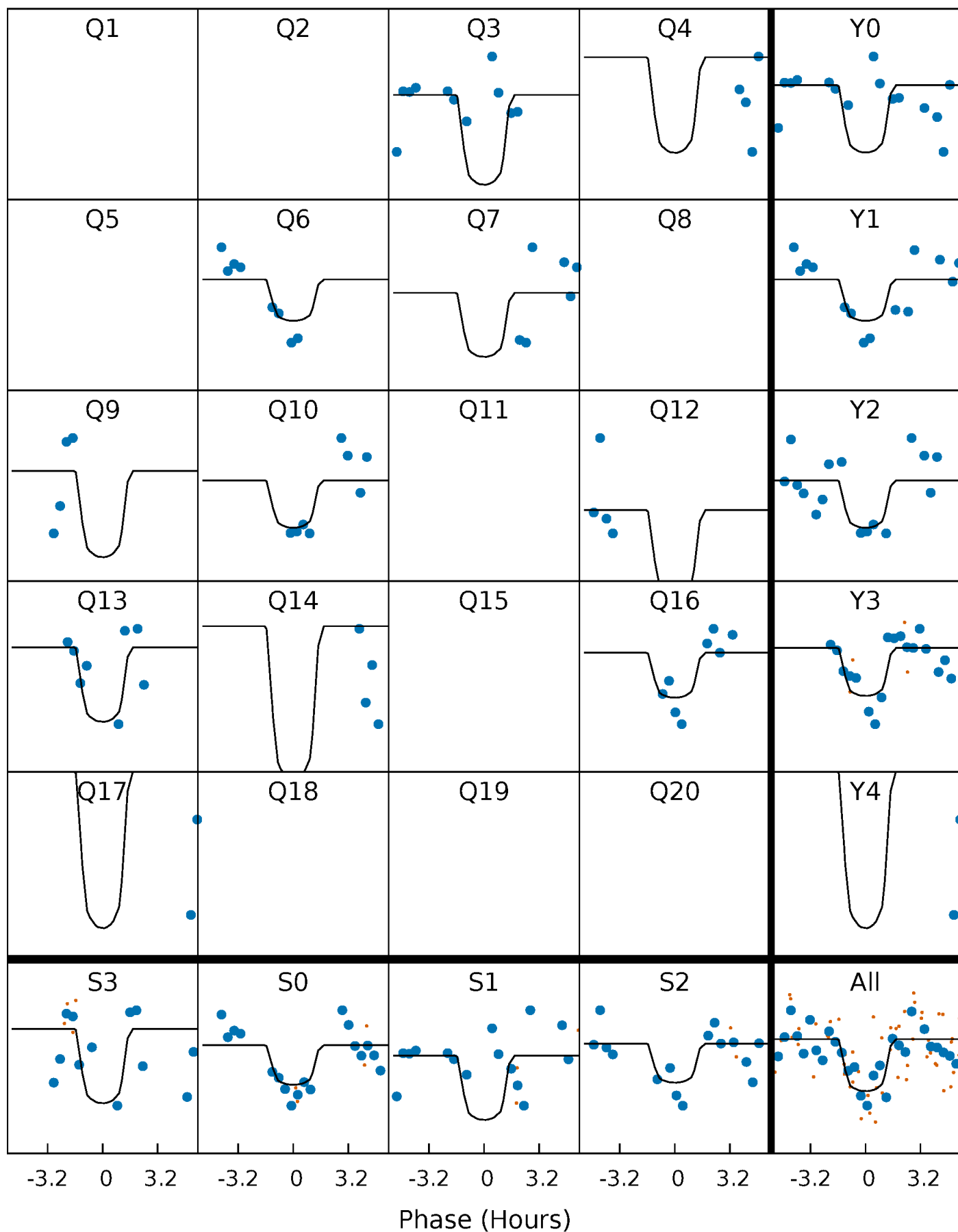
# PDC Quarter-Phased Transit Curves

TCE 004650137-06 P= 34.748958 Days  $T_0=163.778320$  (BKJD)



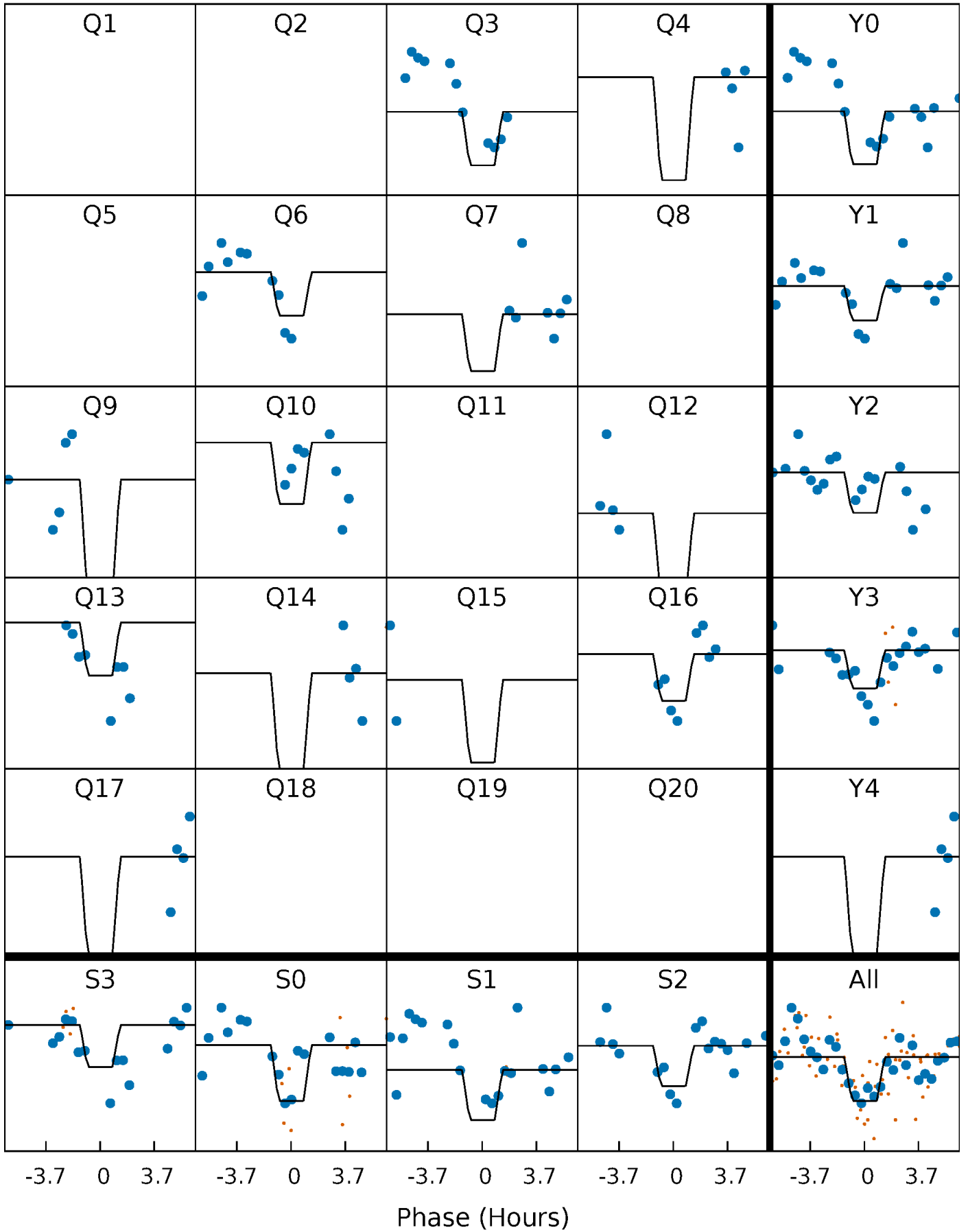
# DV Quarter-Phased Transit Curves

TCE 004650137-06 P= 34.748958 Days  $T_0=163.778320$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

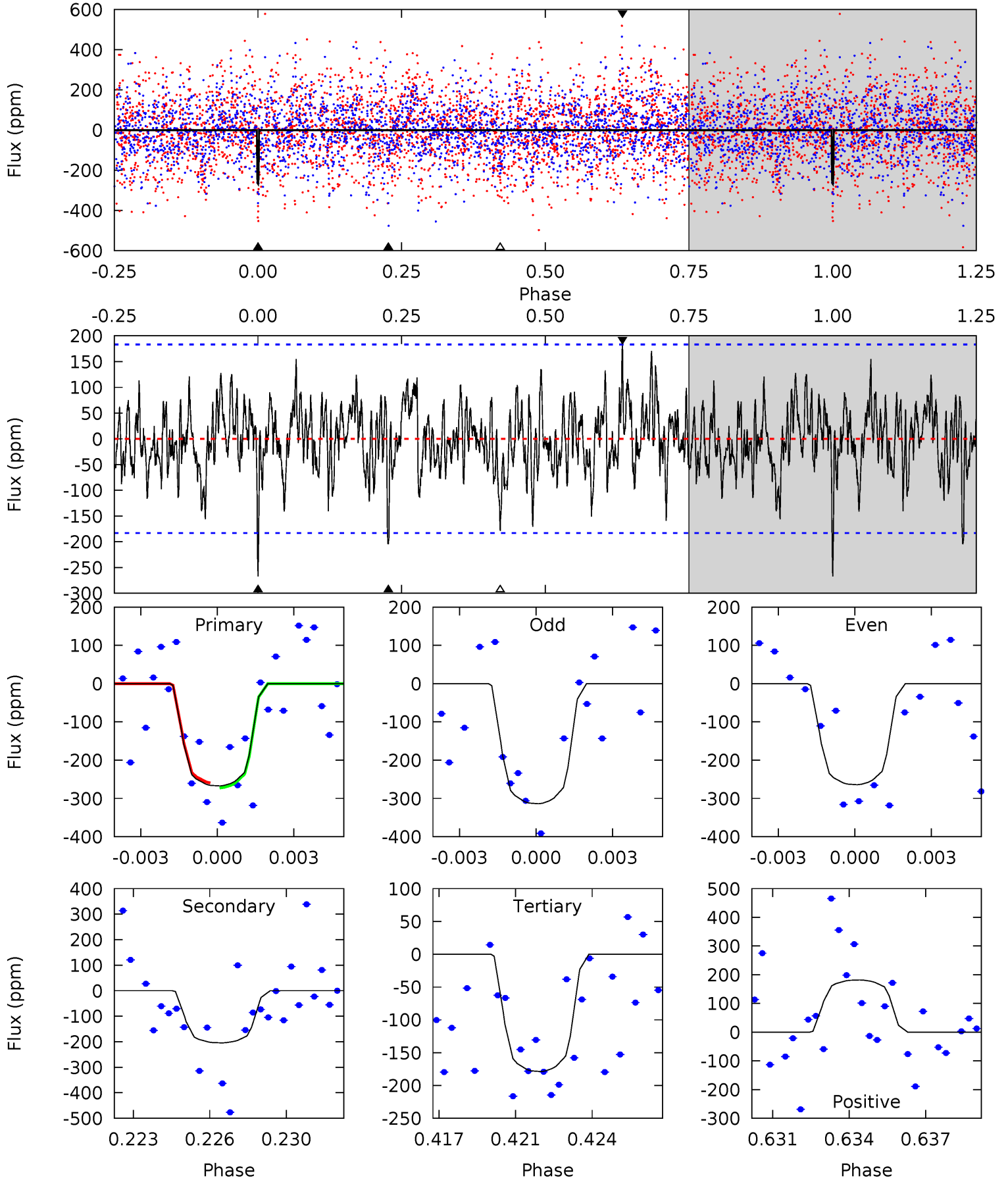
TCE 004650137-06 P= 34.749123 Days  $T_0=163.786118$  (BKJD)



# DV Model-Shift Uniqueness Test

004650137-06, P = 34.748958 Days, E = 129.029362 Days

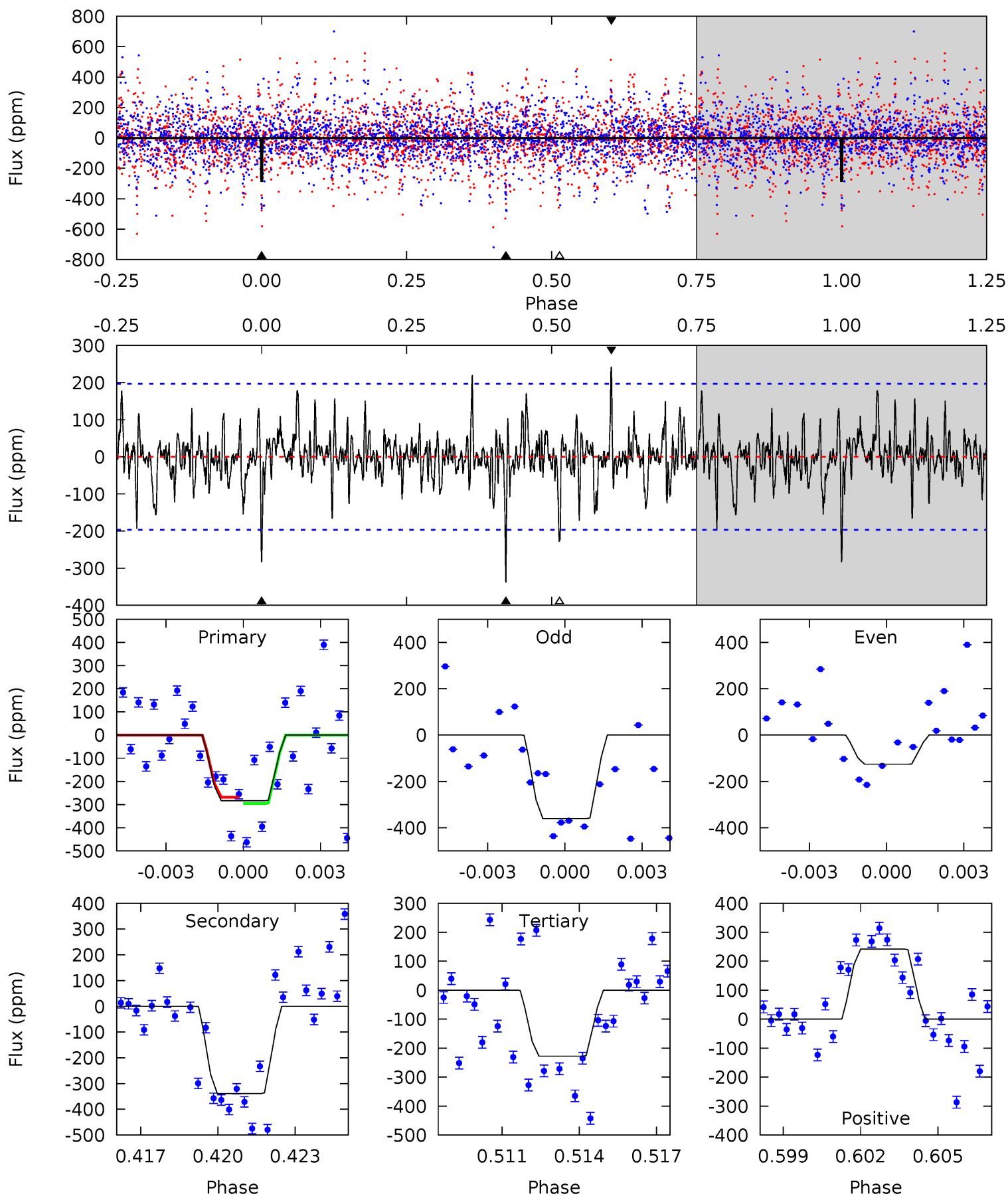
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.65	5.85	5.11	5.20	5.24	2.94	1.62	2.53	2.45	0.73	0.65	0.66	0.72	0.40	0.18



# Alt Model-Shift Uniqueness Test

004650137-06, P = 34.749123 Days, E = 129.036995 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
7.56	9.04	6.07	6.45	5.24	2.95	1.44	1.48	1.10	2.96	2.58	2.83	0.97	0.42	0.36



### Stellar Parameters For KIC 004650137

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7128^{+191}_{-255}$	$3.466^{+0.348}_{-0.061}$	$-0.180^{+0.250}_{-0.250}$	$4.348^{+0.286}_{-1.716}$	$2.019^{+0.066}_{-0.374}$	$0.035^{+0.088}_{-0.007}$
	+3%/-4%	+10%/-2%	+139%/-139%	+7%/-39%	+3%/-19%	+255%/-20%
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 004650137-06 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-204 \pm 35$	$9.16^{+6.44}_{-5.86}$	$1750^{+91}_{-163}$	$5833^{+5005}_{-1186}$	$91^{+584}_{-60}$
Alt.	$-339 \pm 37$	$8.18^{+6.43}_{-5.21}$	$1752^{+86}_{-163}$	$6961^{+7511}_{-1609}$	$187^{+1251}_{-126}$

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



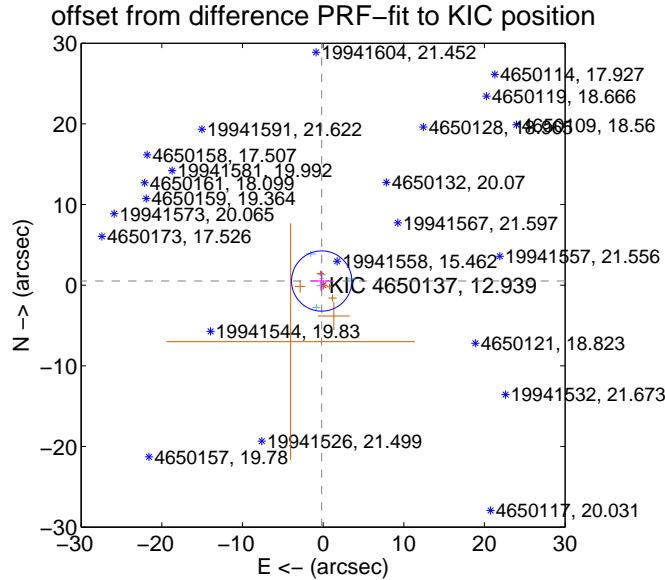
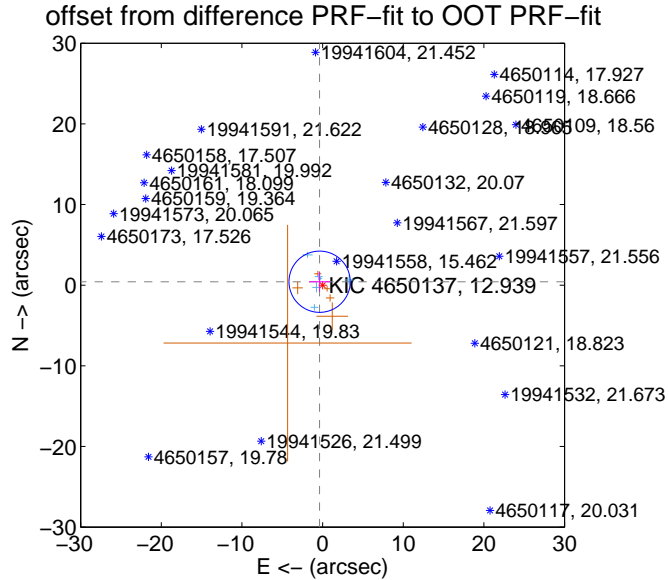
## DV Centroid Data

Supplemental centroid analysis for 004650137-06. Kepler magnitude: 12.94. Transit SNR 10.75

There are 6 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.52 arcsec

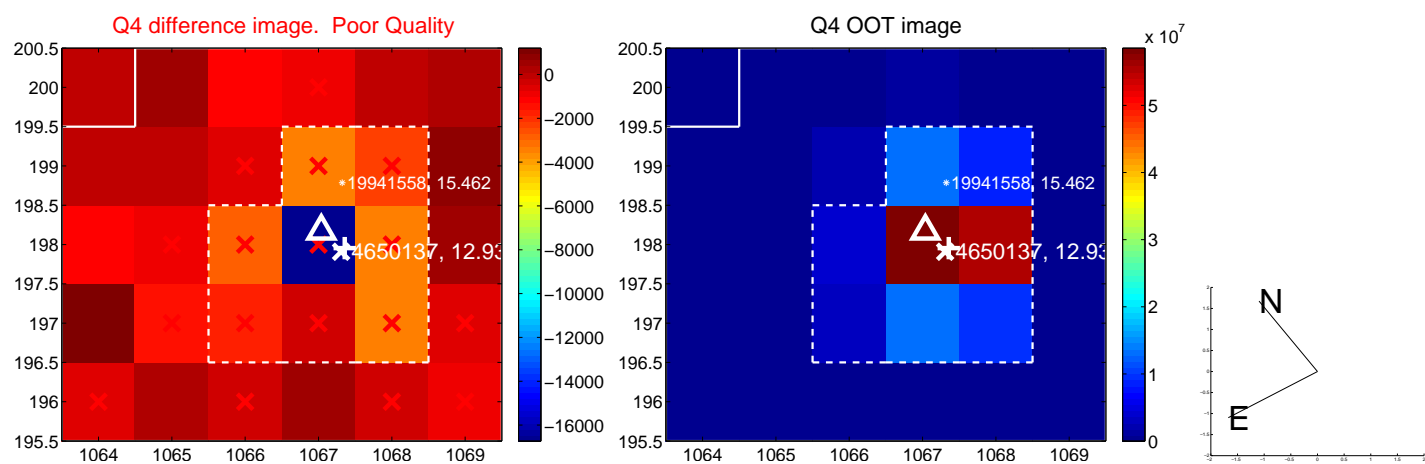
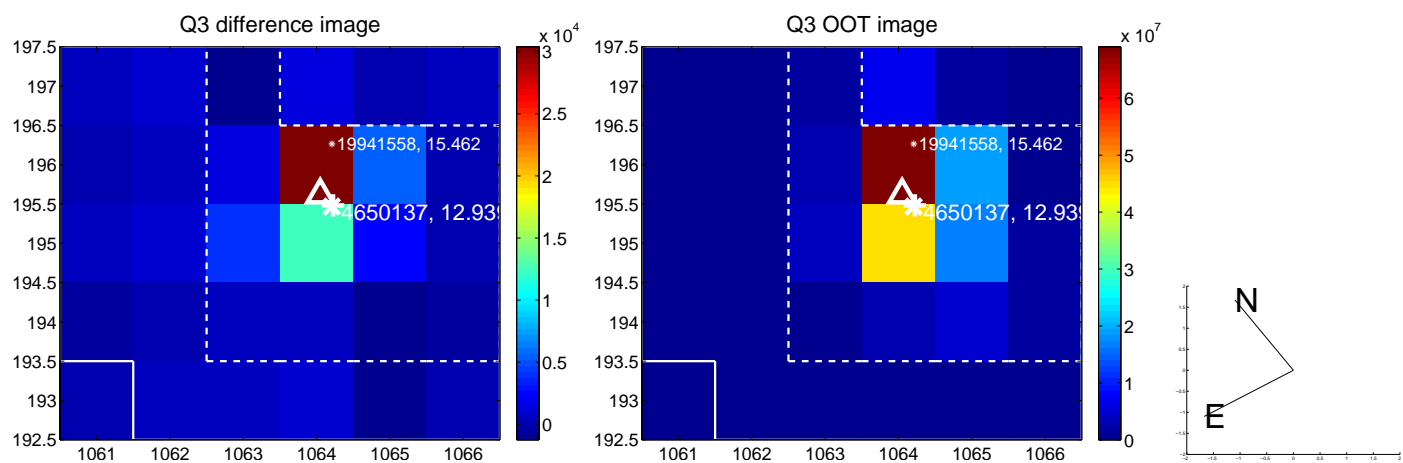
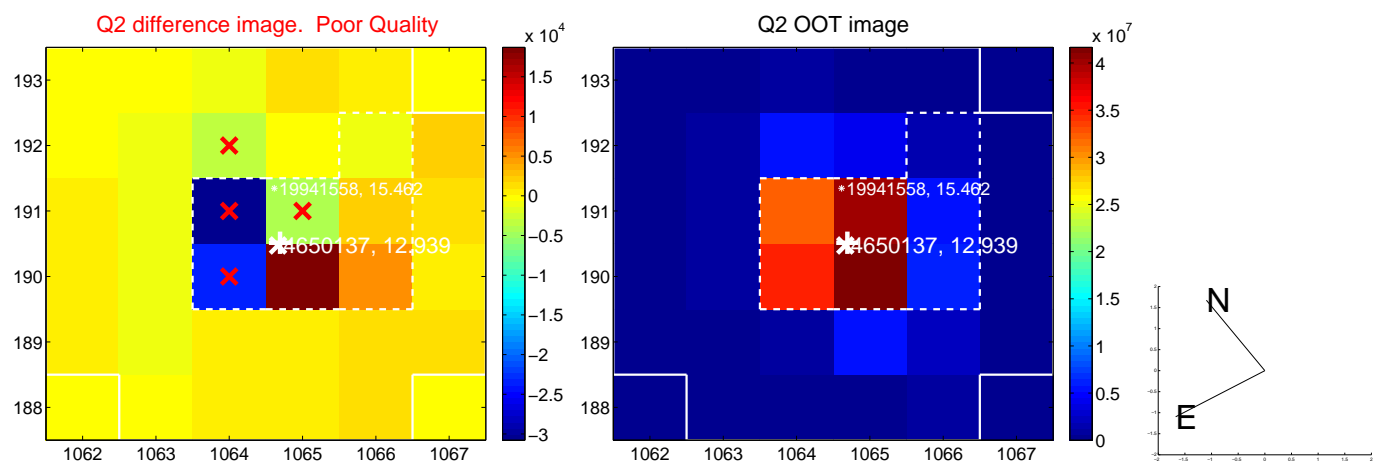
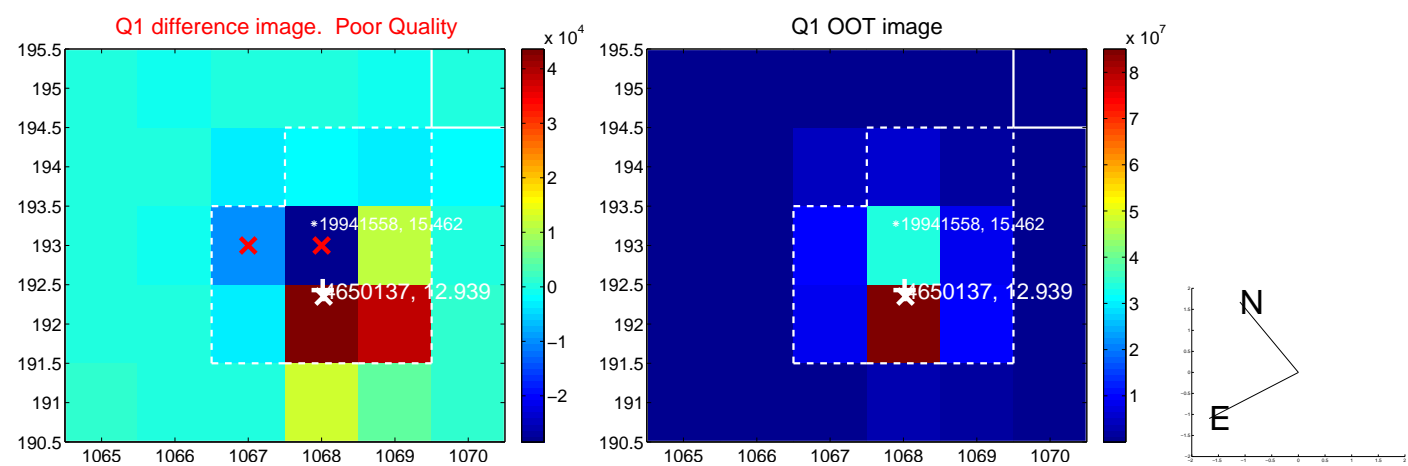
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.564 \pm 1.265$	0.45	$0.369 \pm 1.300$	$0.426 \pm 1.238$
PRF-fit source offset from KIC position	$0.544 \pm 1.245$	0.44	$0.178 \pm 1.300$	$0.514 \pm 1.238$
photometric centroid source offset	—	—	—	—



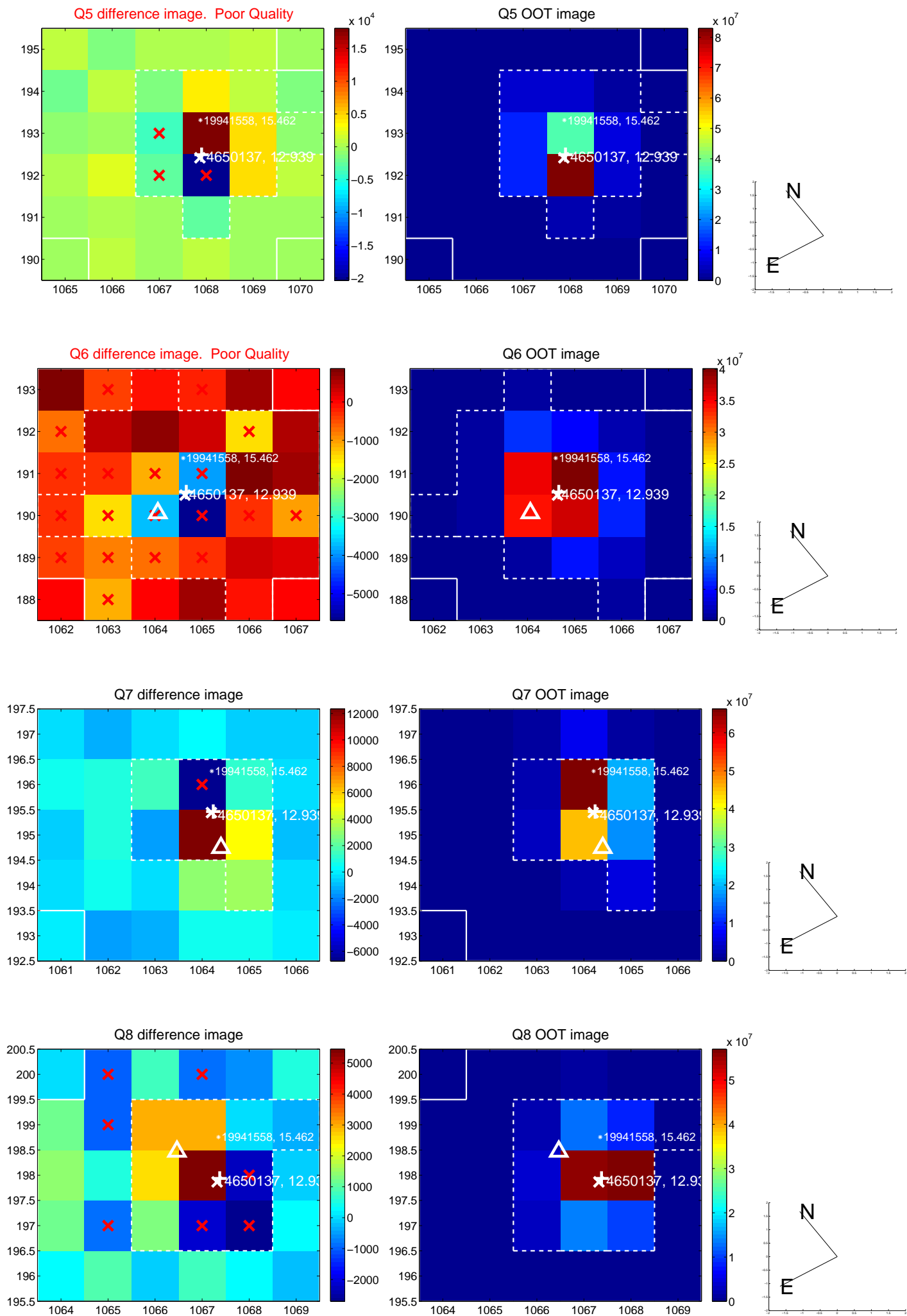
There are no photometric centroids

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

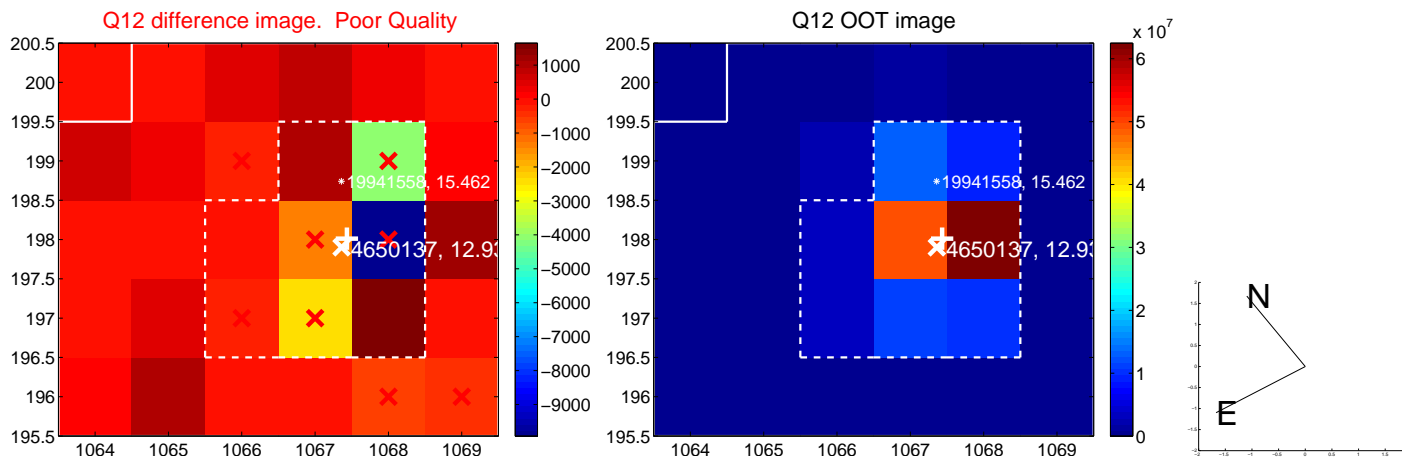
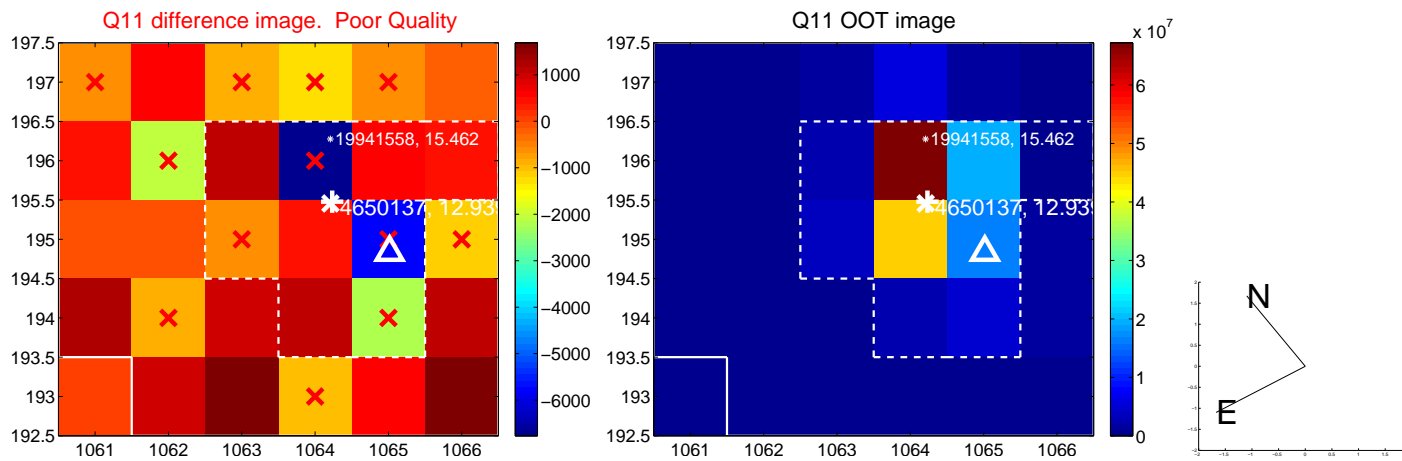
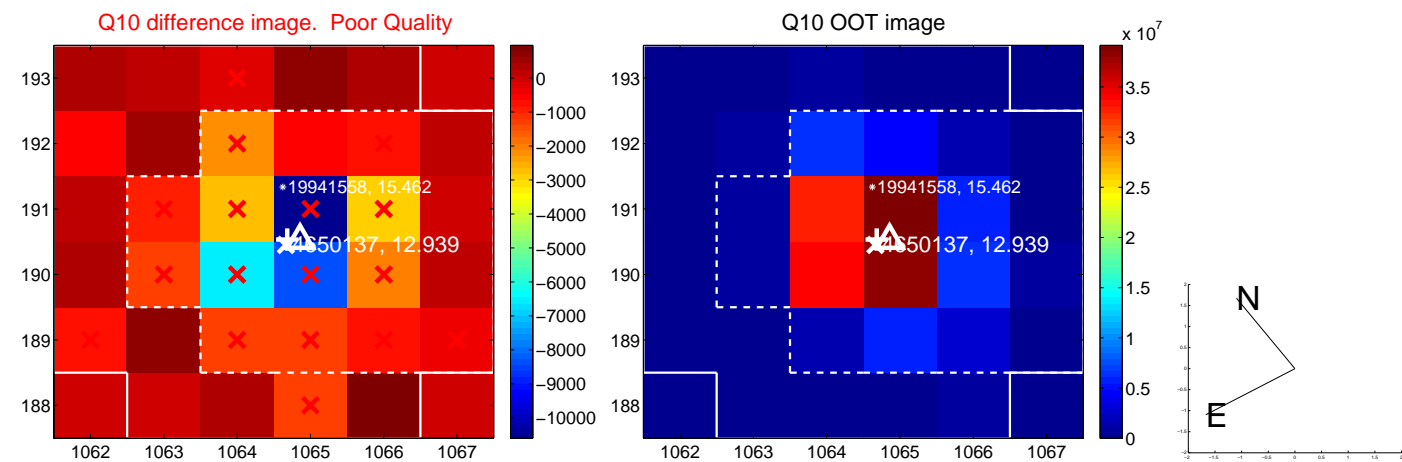
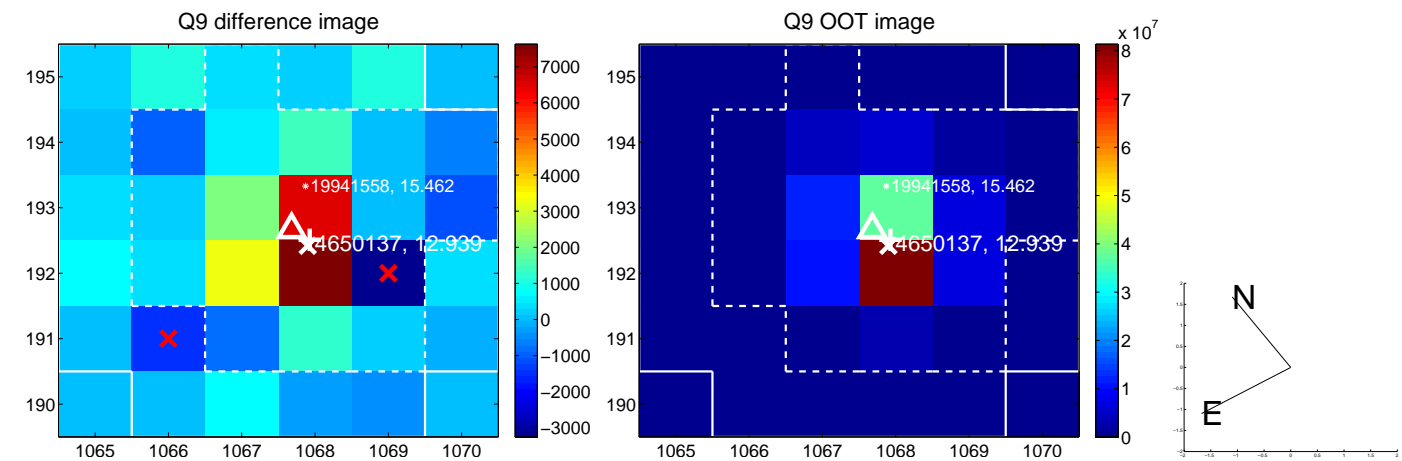
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



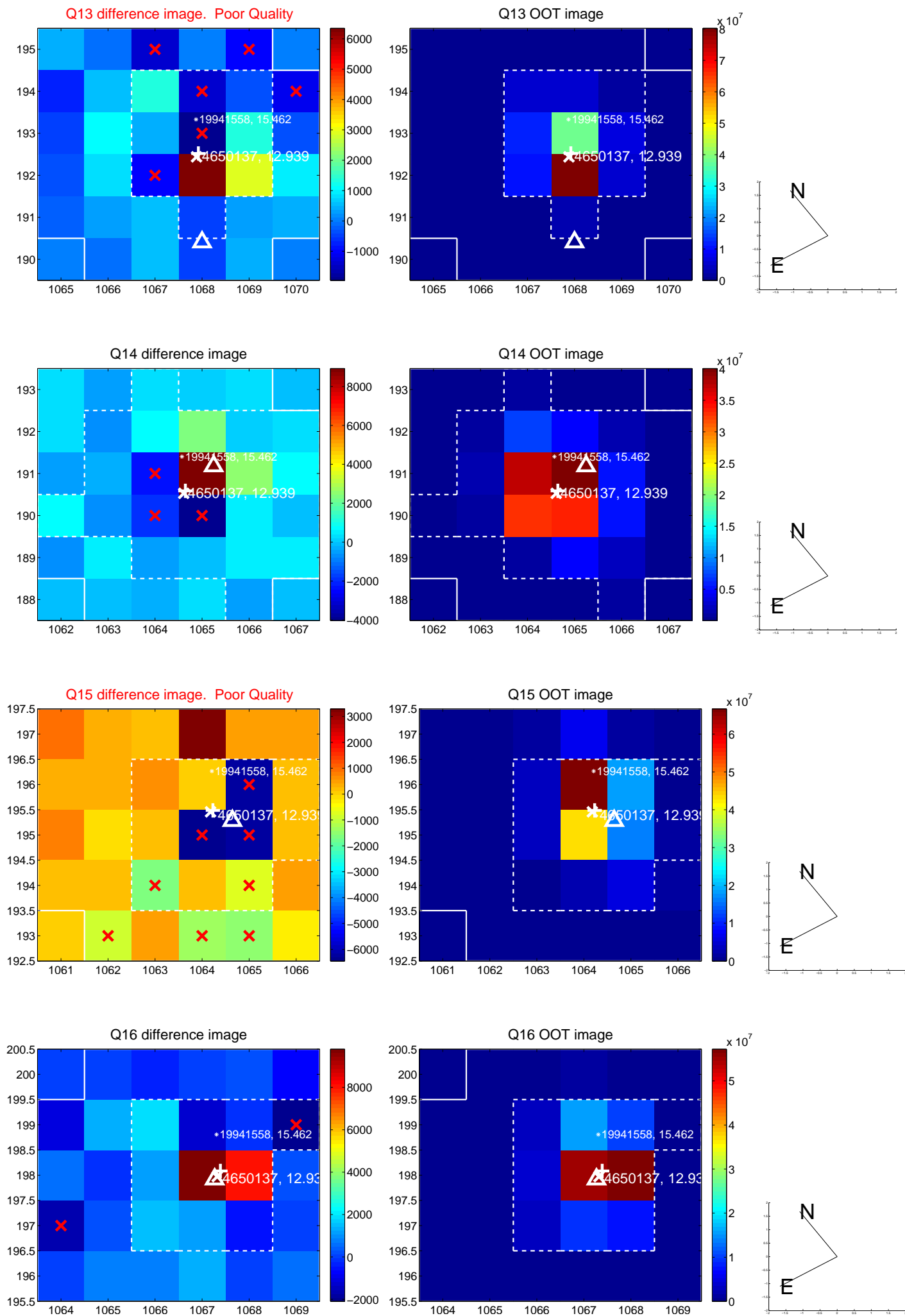
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



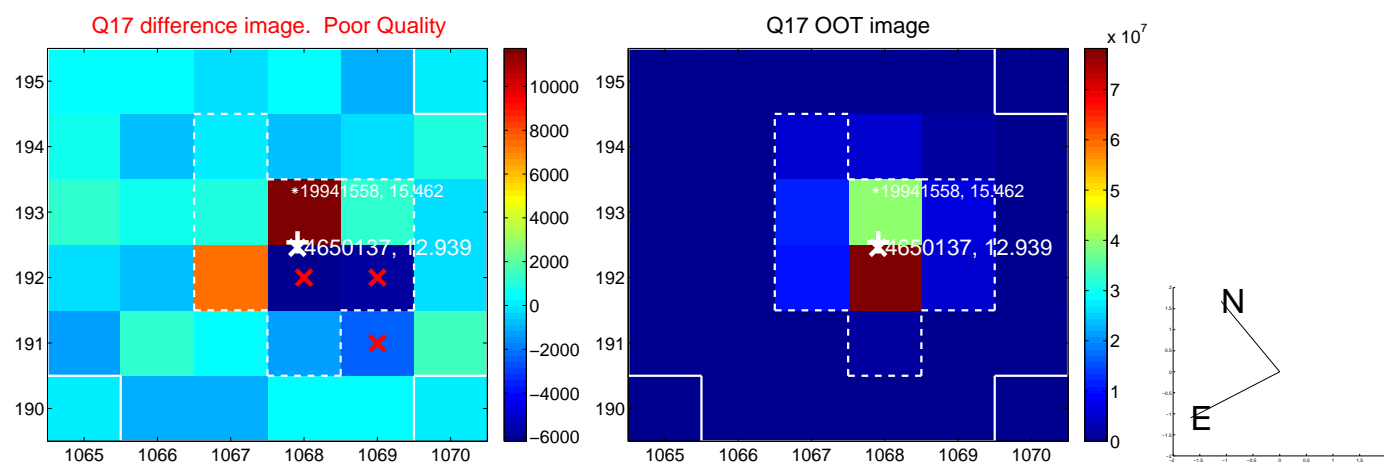
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



folded centroid time series figure for this object.



UKIRT Image

Declination

