

# KIC 008539939

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008539939-01	OBS	No	1.662014	132.555349	42.3	2.204	12.4	13.6	1.97	7316	1.51	9726.88
008539939-02	OBS	No	1.661802	132.092268	2.9	11.998	12.0	1.8	1.97	7316	0.38	9728.53
008539939-03	OBS	No	29.779603	136.093972	306.4	1.609	14.5	14.9	1.97	7316	3.92	207.46
008539939-04	OBS	No	23.071110	153.308159	371.9	0.866	12.8	11.2	1.97	7316	4.50	291.56
008539939-05	OBS	No	20.445838	145.452169	190.0	2.167	12.1	11.3	1.97	7316	2.82	342.51
008539939-06	OBS	No	14.668596	133.821649	101.2	4.250	10.8	10.0	1.97	7316	2.22	533.30
008539939-07	OBS	No	28.367532	133.353696	172.0	2.973	10.4	9.1	1.97	7316	2.99	221.34
008539939-08	OBS	No	102.224919	162.703297	190.3	3.120	11.2	9.1	1.97	7316	2.80	40.06

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008539939-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
008539939-02	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—SAME_NTL_PERIOD
008539939-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
008539939-04	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
008539939-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—CENT_FEW_MEAS
008539939-06	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—HALO_GHOST
008539939-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
008539939-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—SAME_NTL_PERIOD

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

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

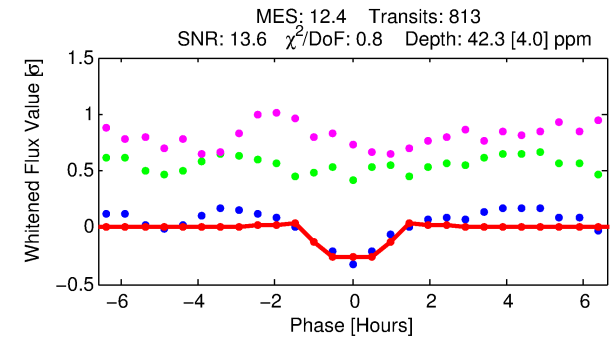
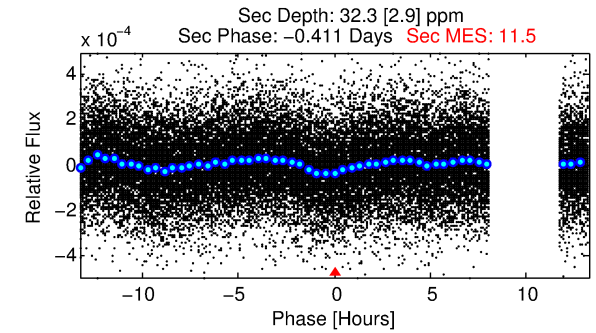
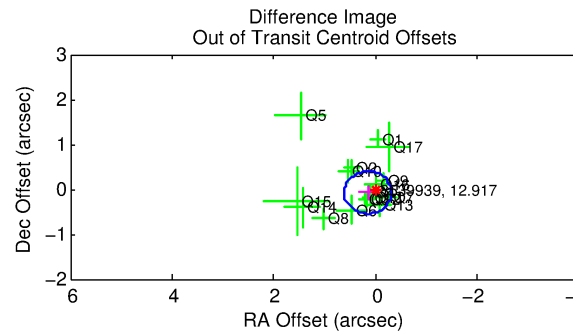
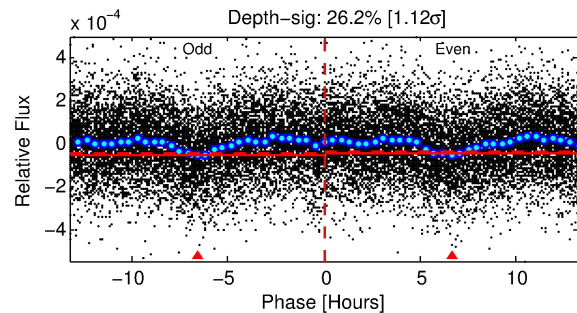
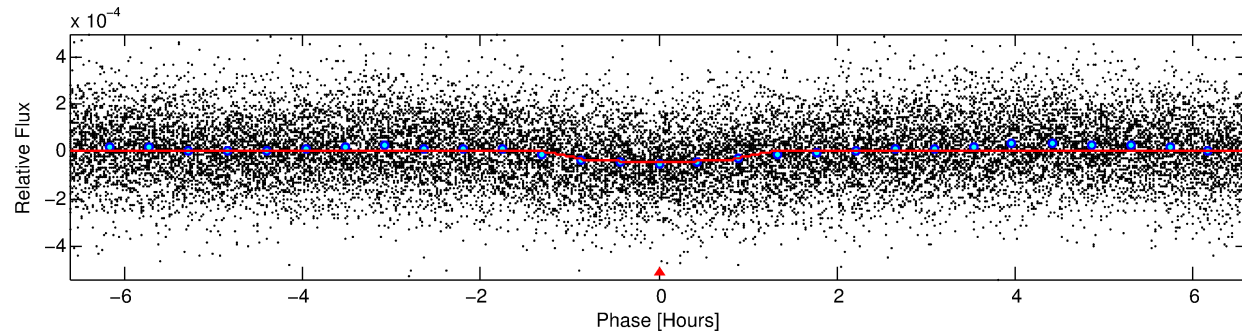
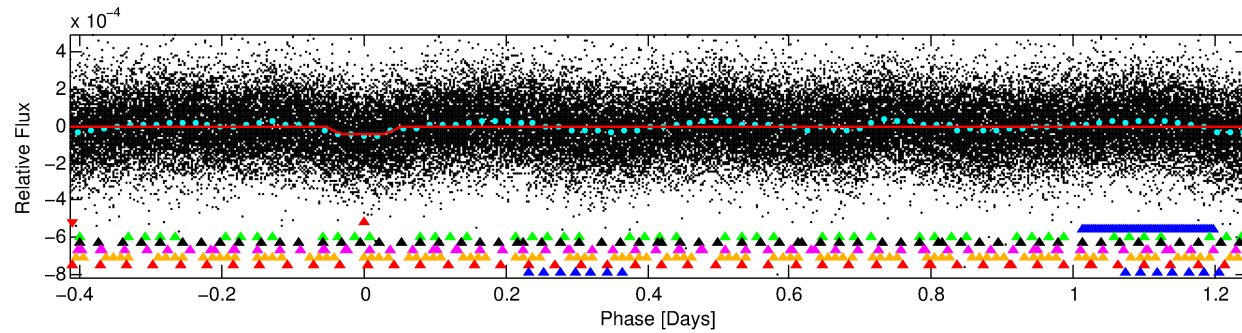
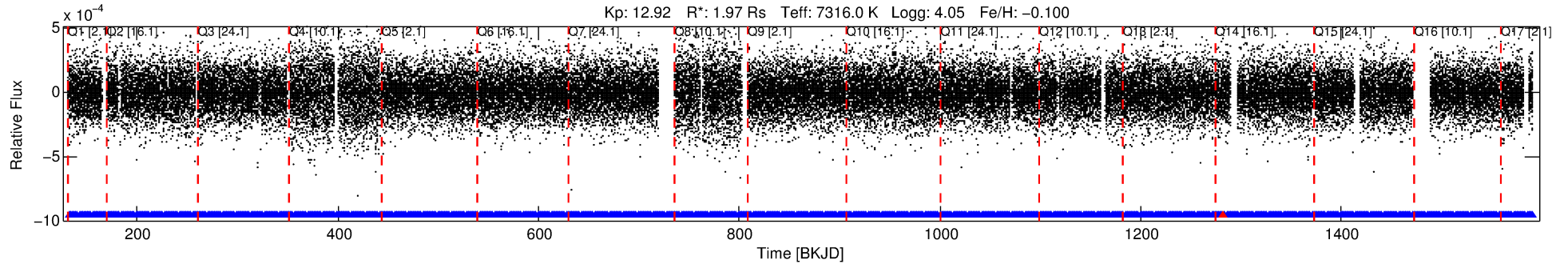
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 008539939-01

No Significant Match Found

# DV One-Page Summary

KIC: 8539939 Candidate: 1 of 8 Period: 1.662 d



## DV Fit Results:

Period = 1.66201 [0.00001] d  
Epoch = 132.5553 [0.0020] BKJD  
Rp/R\* = 0.0071 [0.0020]  
a/R\* = 2.49 [3.83]  
b = 0.92 [0.29]  
Seff = 9726.88 [3650.38]  
Teq = 2532 [238] K  
Rp = 1.52 [0.60] Re  
a = 0.0320 [0.0073] AU  
Ag = 7.93 [5.30] [1.31σ]  
Teffp = 6571 [987] K [3.98σ]

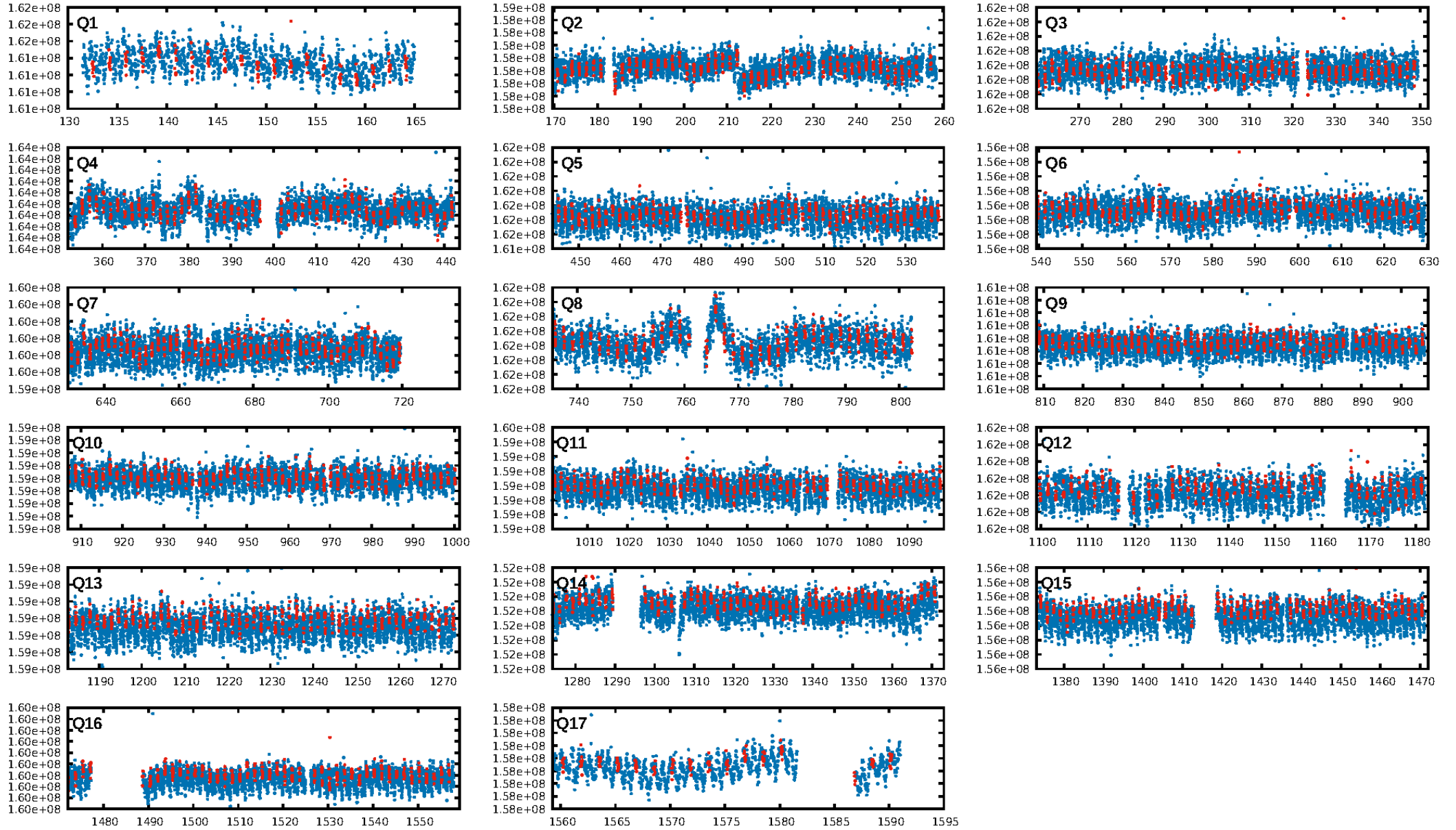
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: 100.0% [65.21σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 3.20e-11  
RollingBand-fgt: 1.00 [776/777]  
GhostDiagnostic-chr: 2.615  
Centroid-sig: N/A  
Centroid-so: 0.615 arcsec [0.96σ]  
OotOffset-rm: 0.171 arcsec [1.10σ]  
KicOffset-rm: 0.121 arcsec [0.77σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 0.76 [13/17]

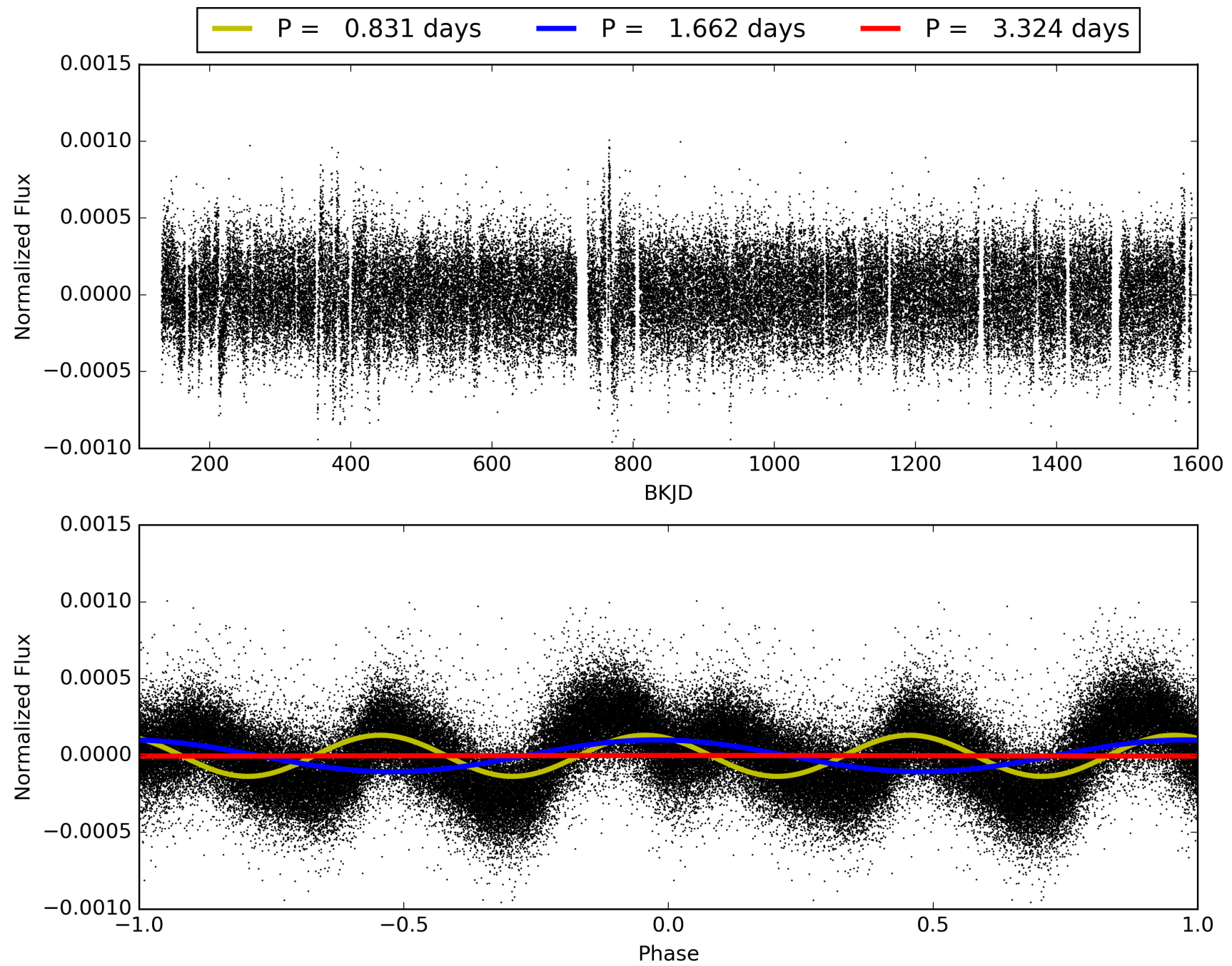
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This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 008539939-01, PDC Light Curves



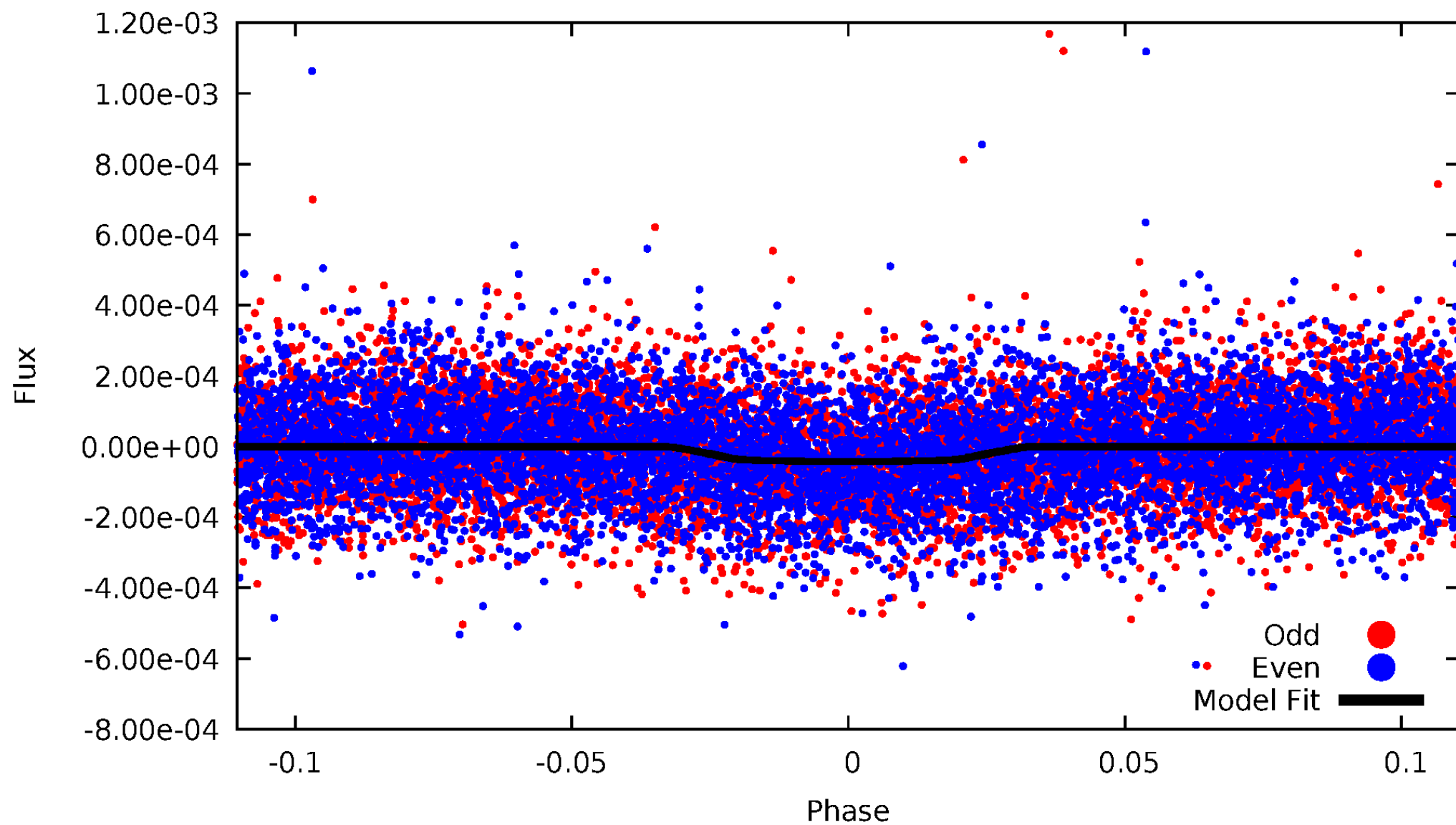
TCE 008539939-01





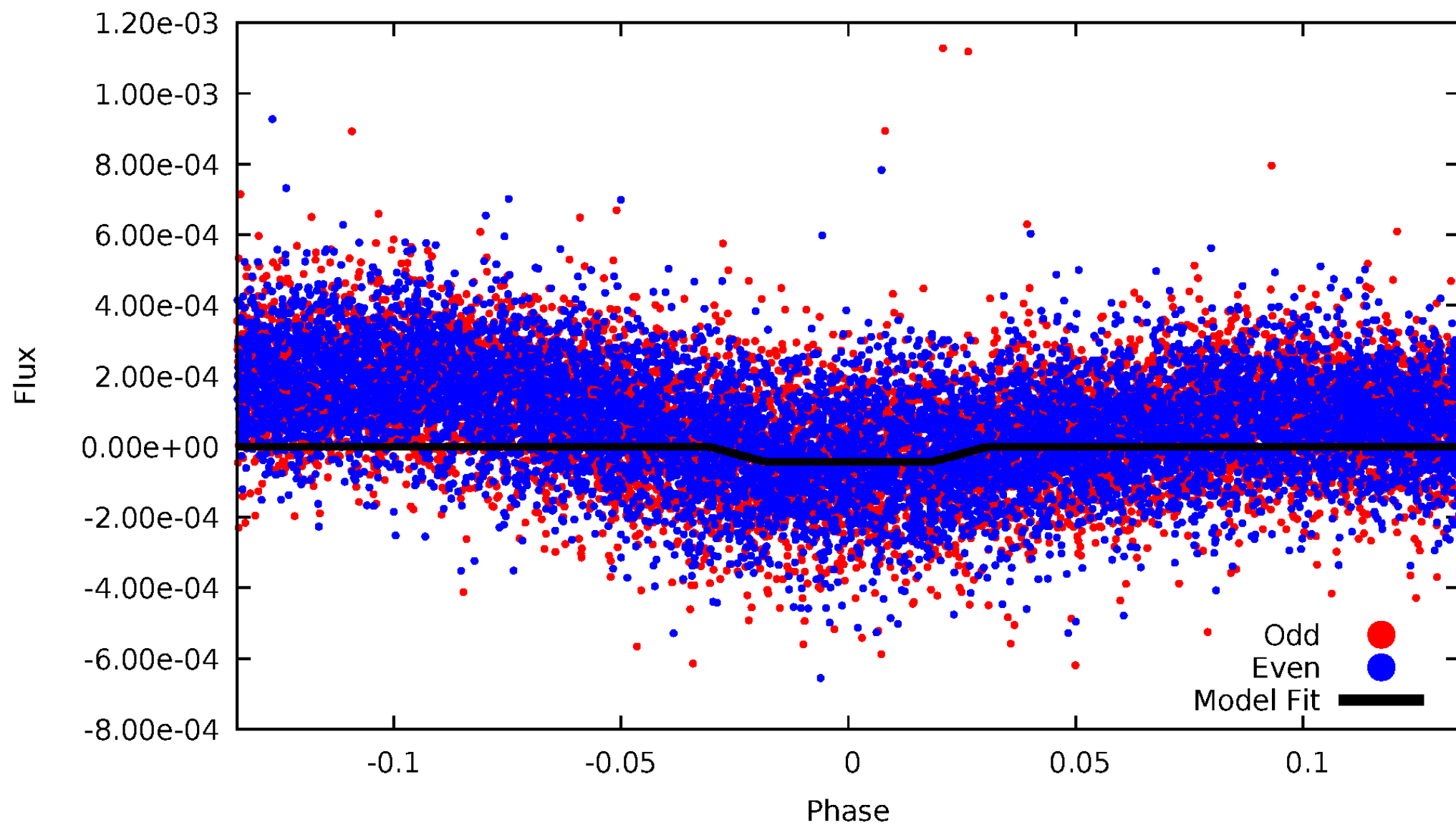
# DV Odd/Even

TCE 008539939-01

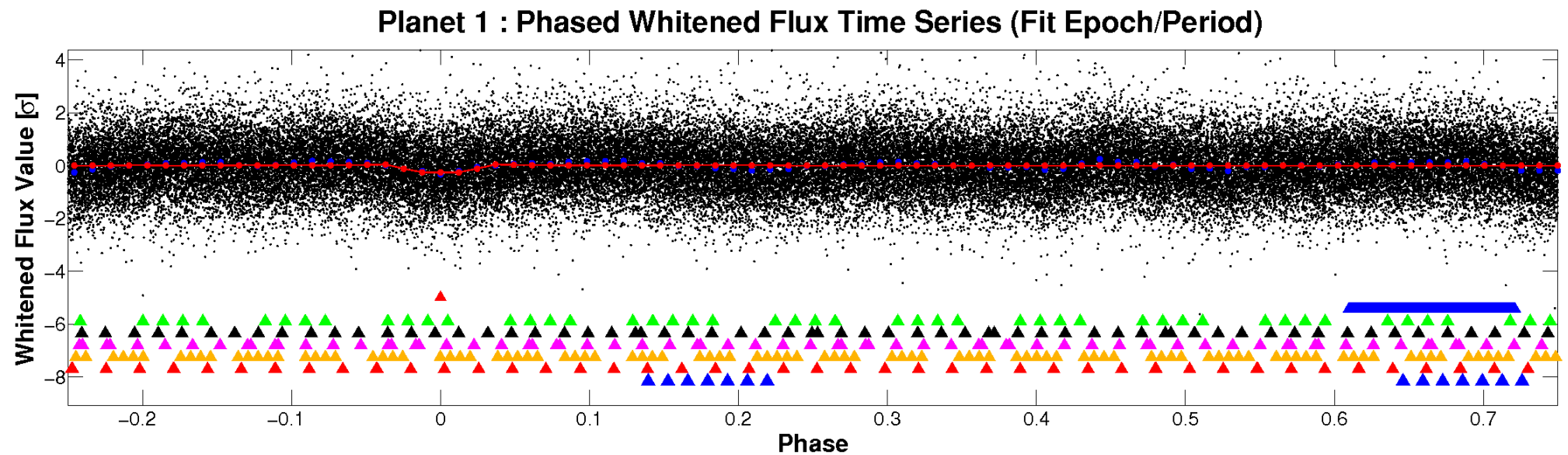
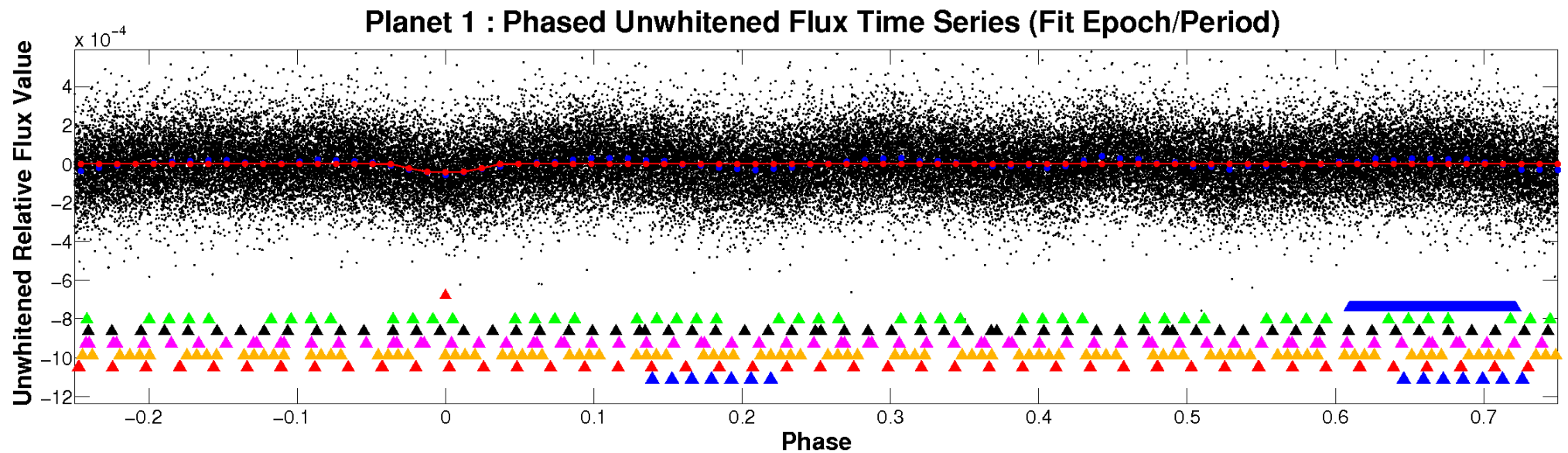


# ALT Odd/Even

TCE 008539939-01

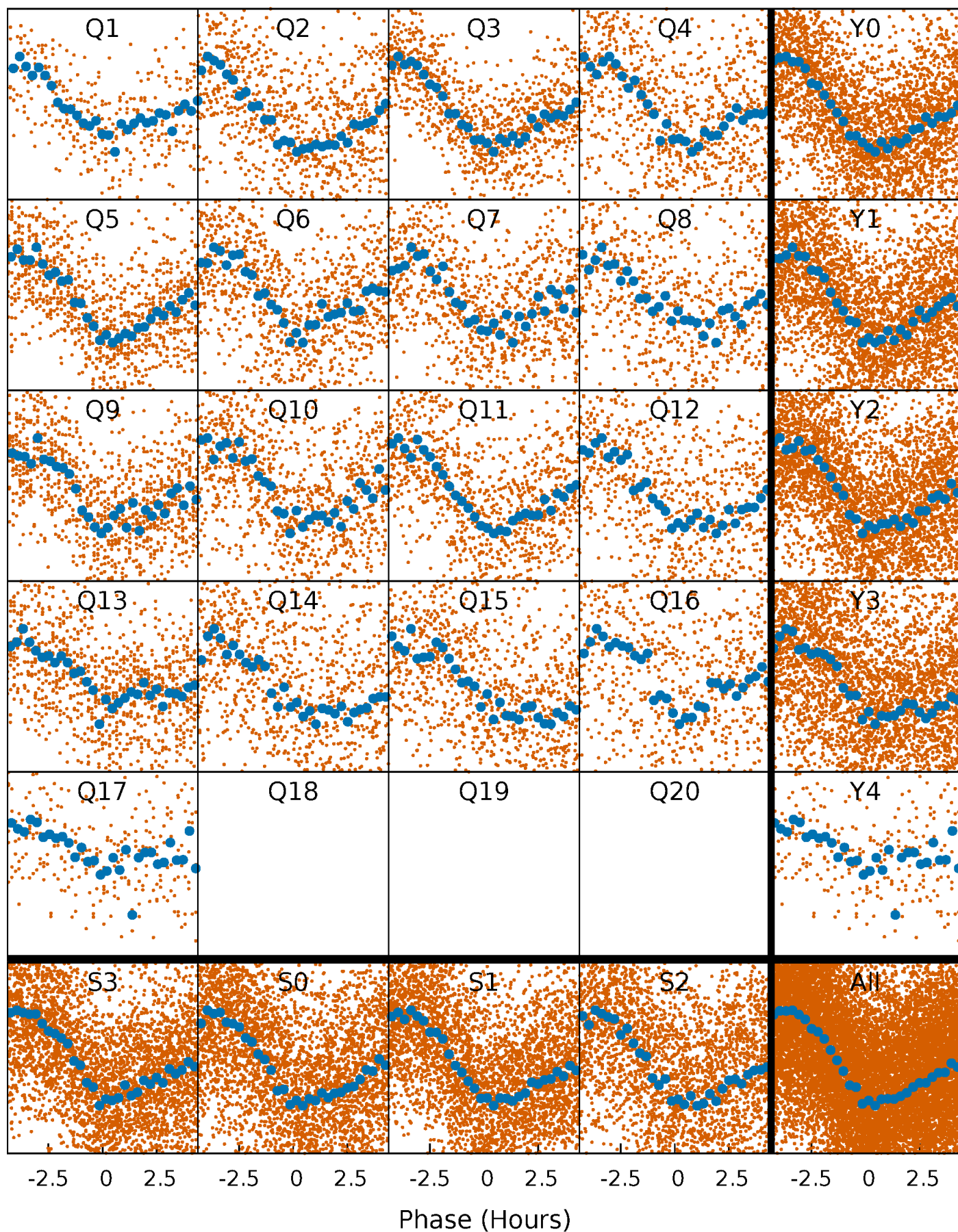


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

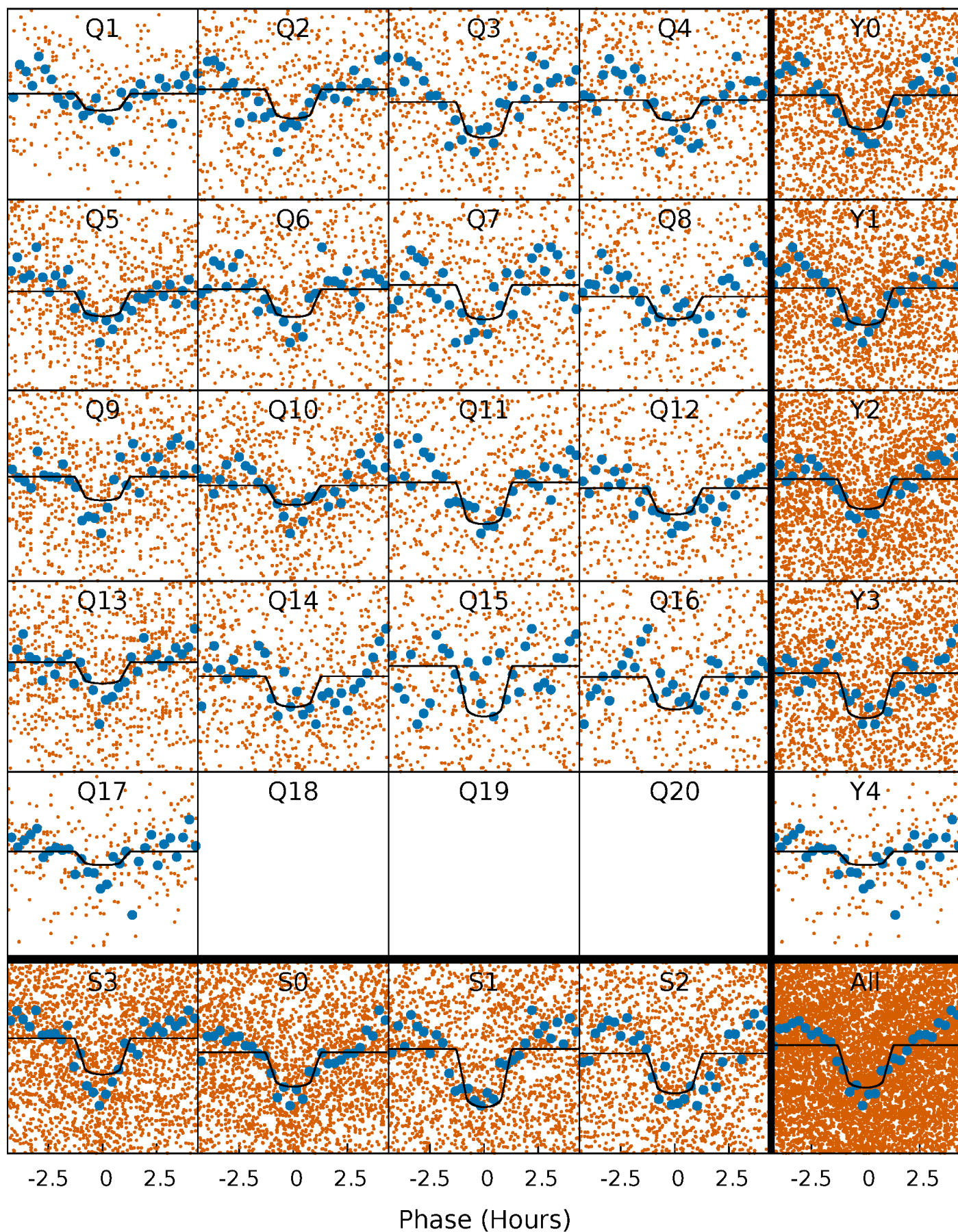
TCE 008539939-01 P= 1.662014 Days  $T_0=132.555349$  (BKJD)





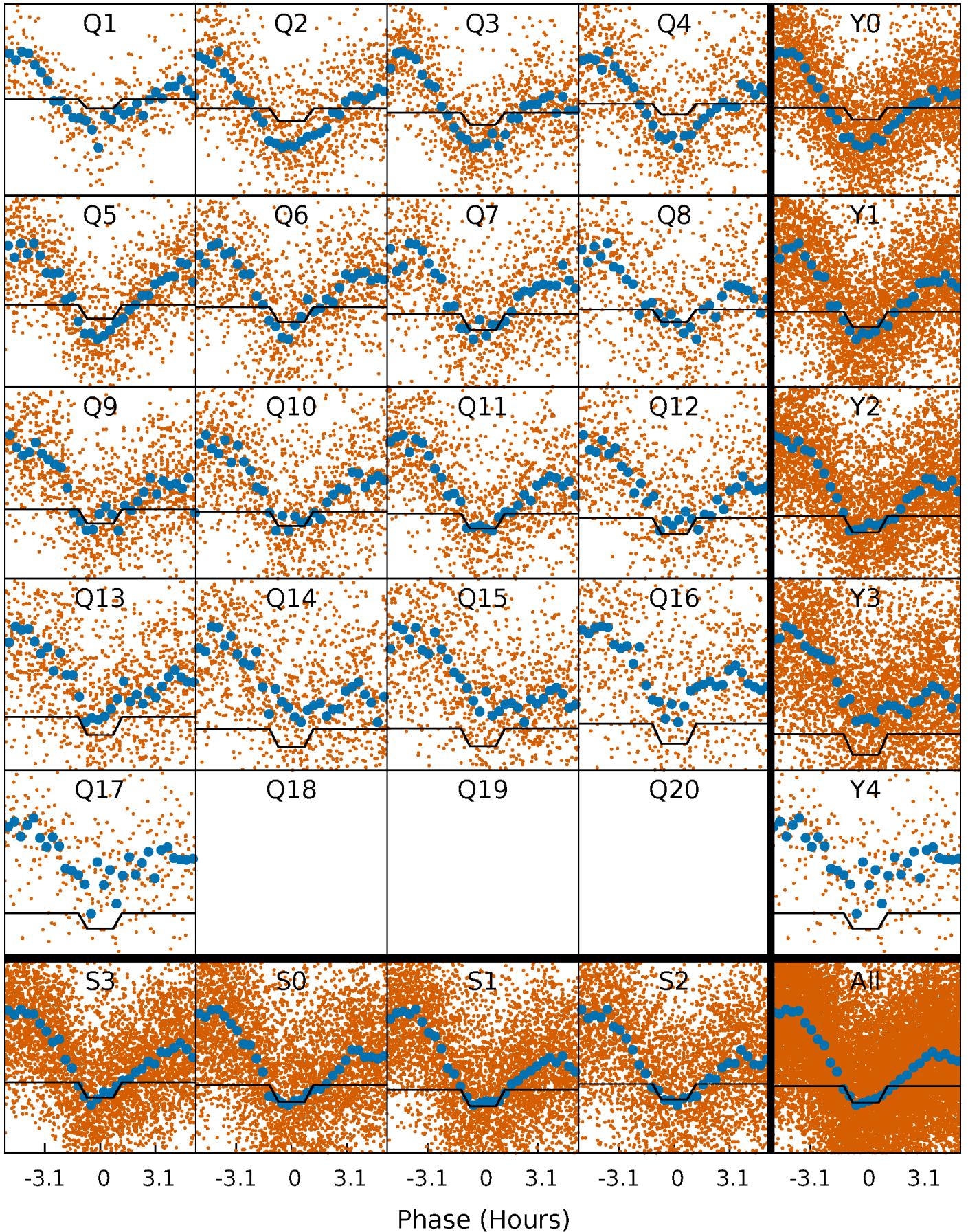
# DV Quarter-Phased Transit Curves

TCE 008539939-01 P= 1.662014 Days  $T_0=132.555349$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

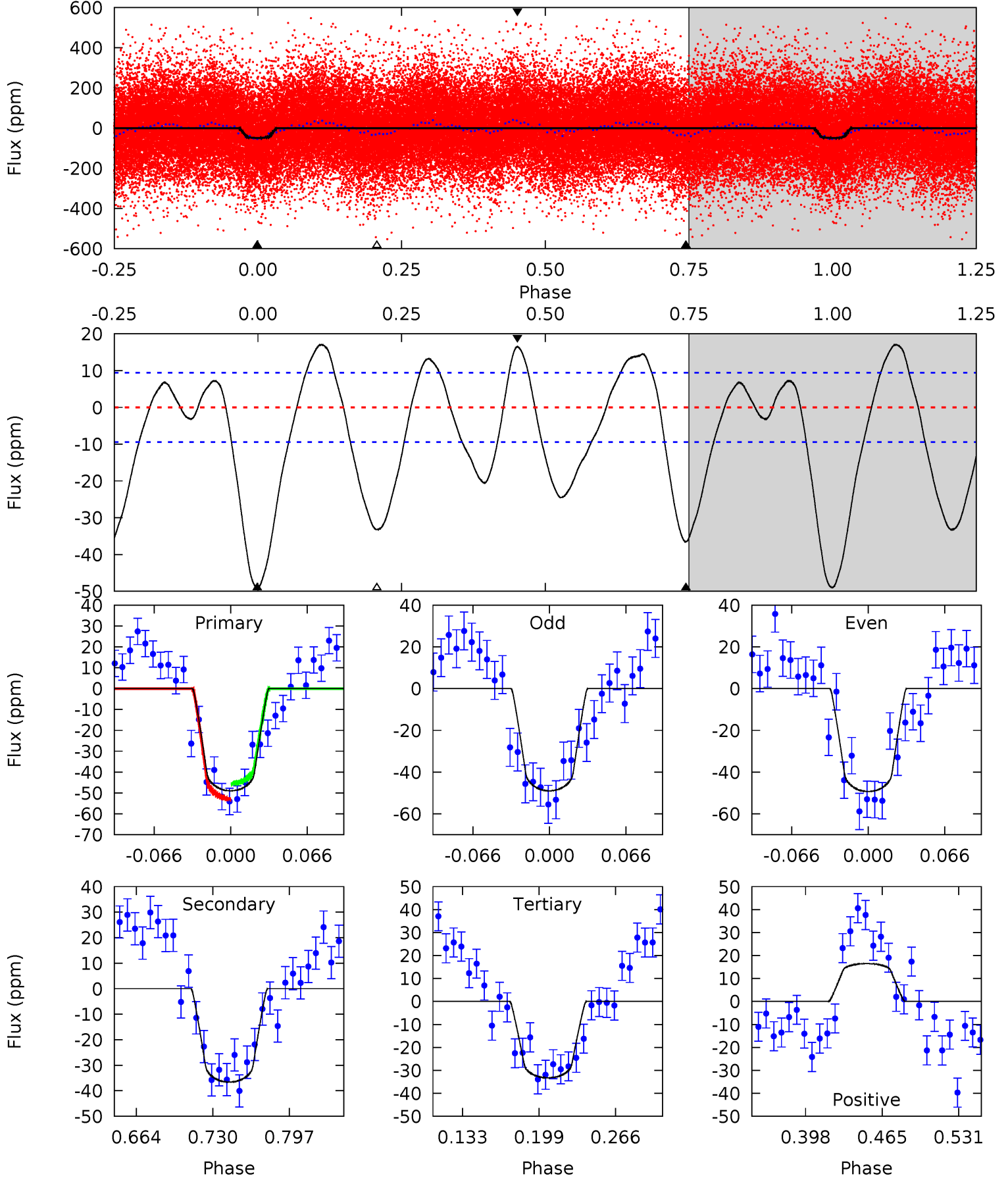
TCE 008539939-01 P= 1.662005 Days  $T_0=132.583480$  (BKJD)



# DV Model-Shift Uniqueness Test

008539939-01, P = 1.662014 Days, E = 130.893335 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
24.1	18.0	16.4	8.12	4.65	1.84	6.78	7.74	16.0	1.64	9.90	0.08	0.95	0.26	1.78

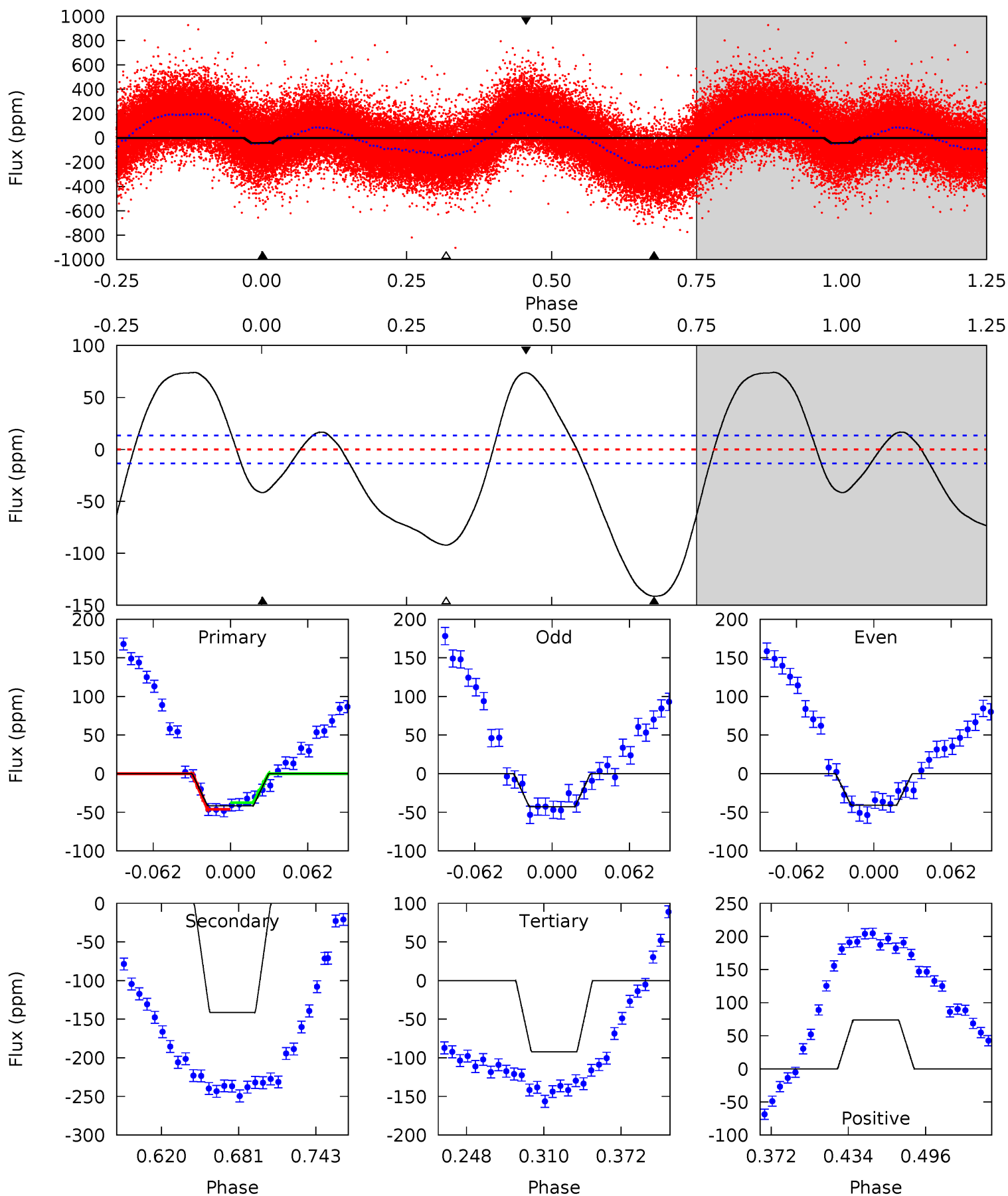




# Alt Model-Shift Uniqueness Test

008539939-01, P = 1.662005 Days, E = 130.921475 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
14.4	48.9	31.9	25.6	4.66	1.87	19.5	-17.5	-11.2	17.0	23.3	0.35	0.90	0.34	1.46





### Stellar Parameters For KIC 008539939

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7316^{+228}_{-304}$	$4.048^{+0.185}_{-0.167}$	$-0.100^{+0.250}_{-0.350}$	$1.969^{+0.533}_{-0.533}$	$1.577^{+0.199}_{-0.273}$	$0.291^{+0.326}_{-0.134}$
	+3%/-4%	+5%/-4%	+250%/-350%	+27%/-27%	+13%/-17%	+112%/-46%
Source	KIC0	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 008539939-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-37 \pm 2$	$1.49^{+0.51}_{-0.45}$	$3524^{+275}_{-255}$	$6616^{+1480}_{-812}$	$9.137^{+9.460}_{-4.029}$
Alt.	$-141 \pm 3$	$1.39^{+0.49}_{-0.47}$	$3519^{+253}_{-258}$	$10854^{+4242}_{-2031}$	$41^{+47}_{-19}$

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

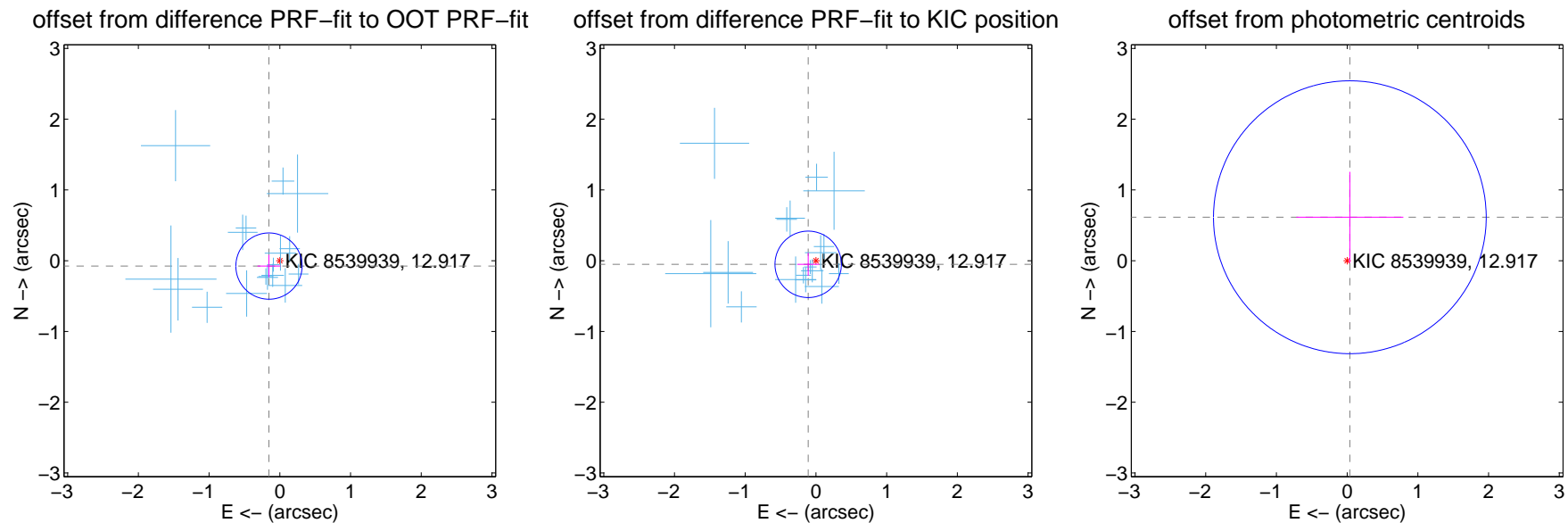
## DV Centroid Data

Supplemental centroid analysis for 008539939-01. Kepler magnitude: 12.92. Transit SNR 13.62

There are 17 quarters with good PRF difference image offsets

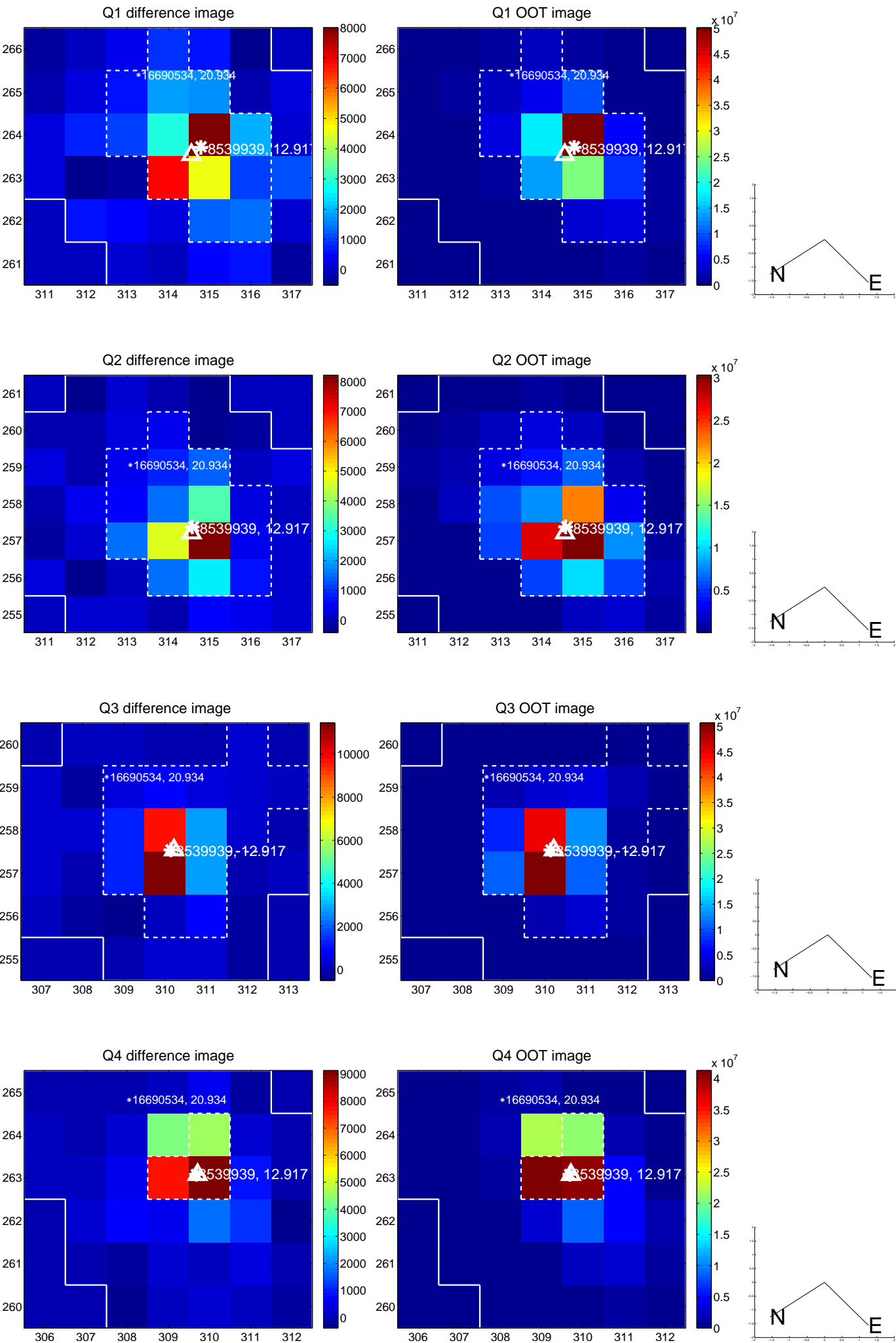
The direct PRF centroid is offset from the target star catalog position by about 0.04 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.171 \pm 0.156$	1.10	$0.153 \pm 0.162$	$-0.076 \pm 0.158$
PRF-fit source offset from KIC position	$0.121 \pm 0.156$	0.77	$0.109 \pm 0.154$	$-0.051 \pm 0.162$
photometric centroid source offset	$0.62 \pm 0.64$	0.96	$-0.04 \pm 0.76$	$0.61 \pm 0.64$

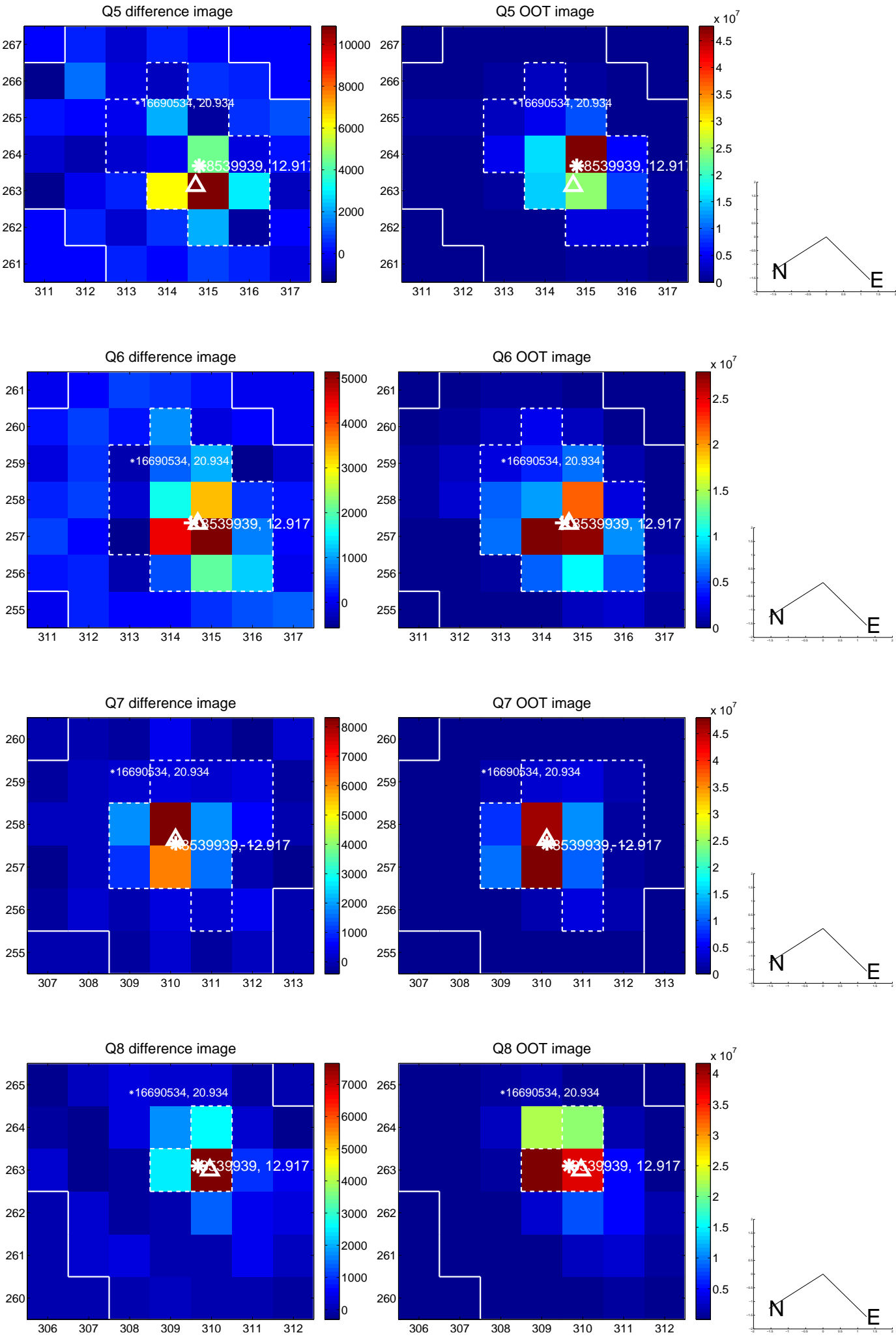


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

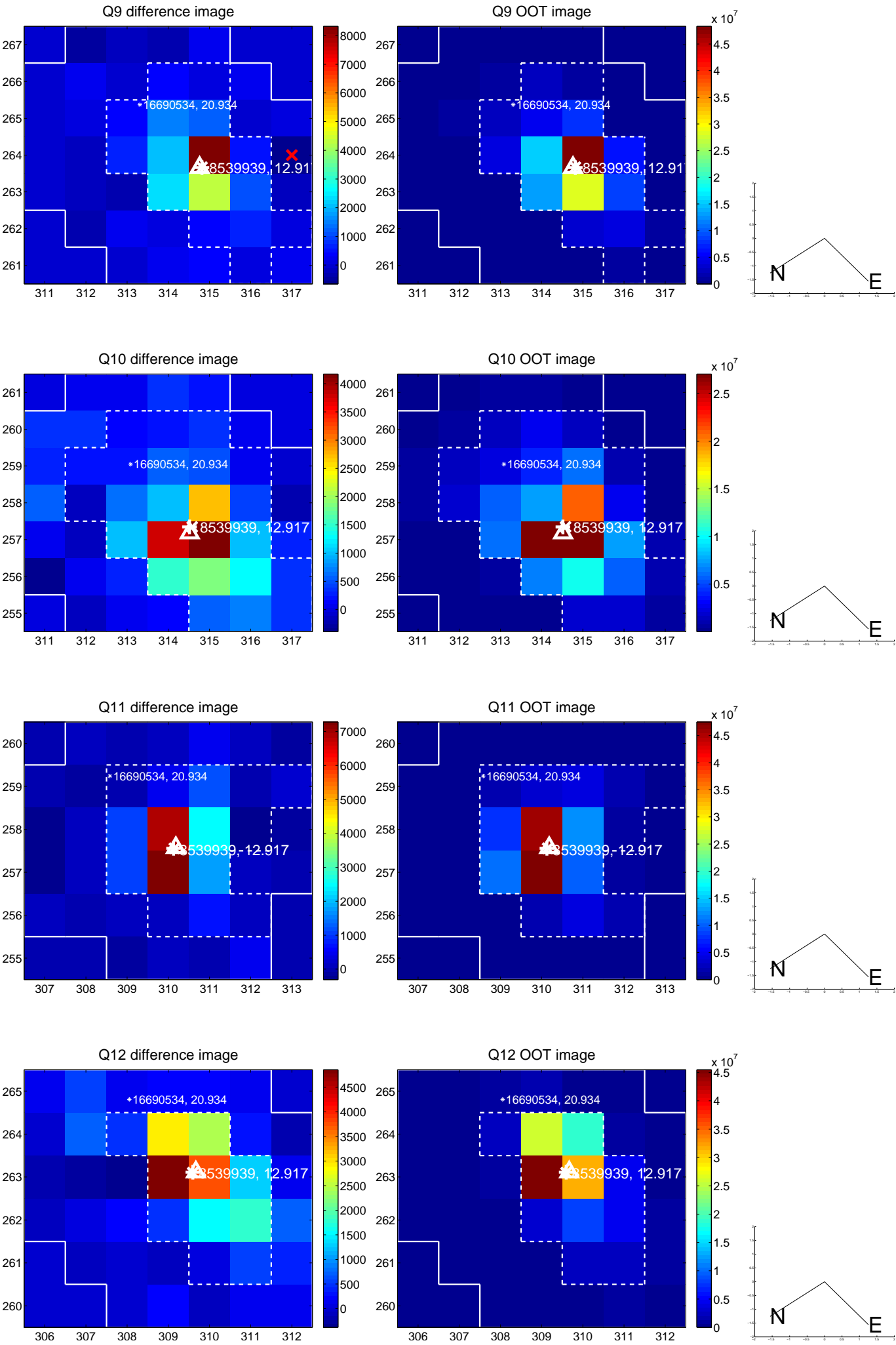


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

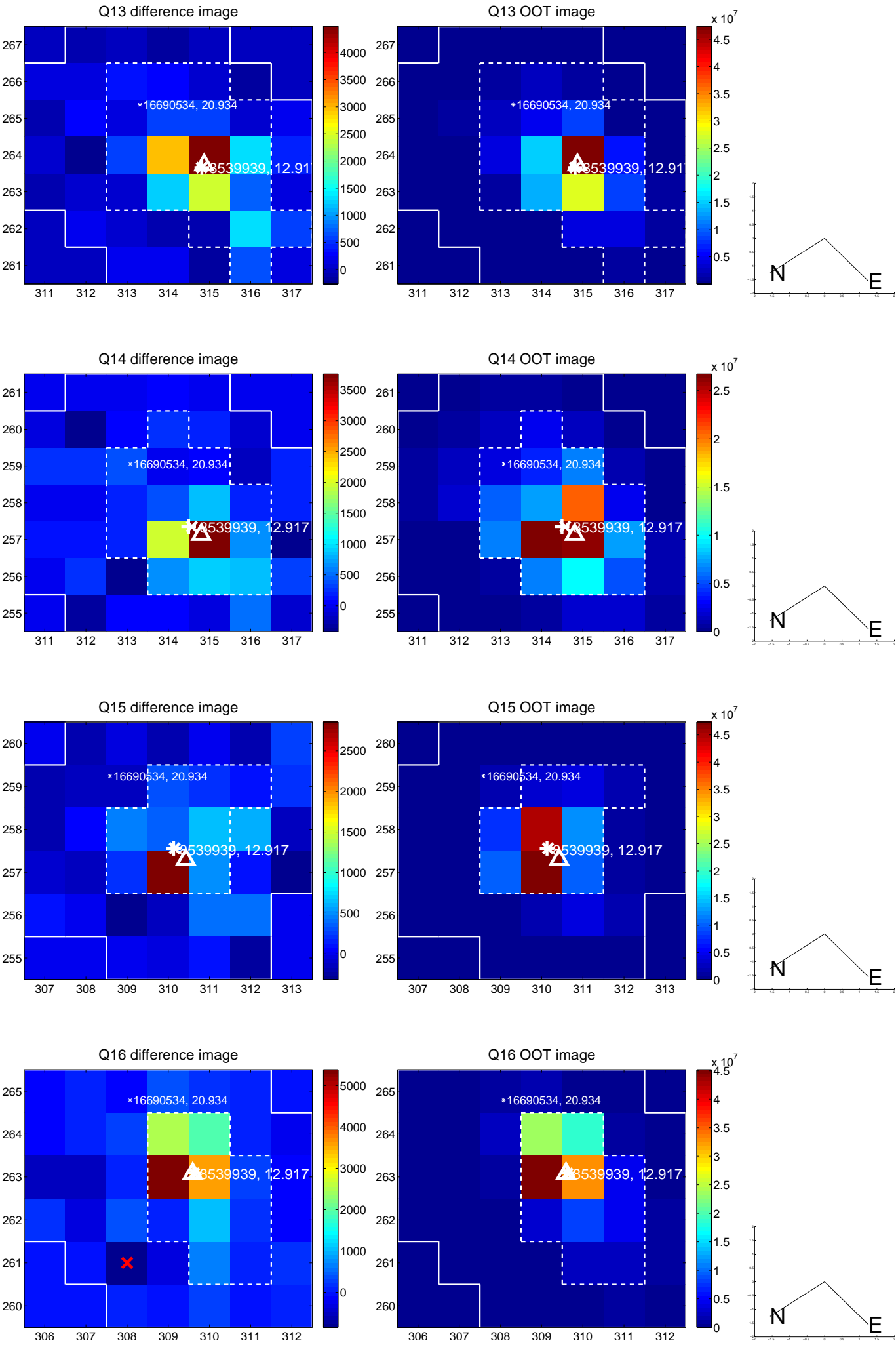




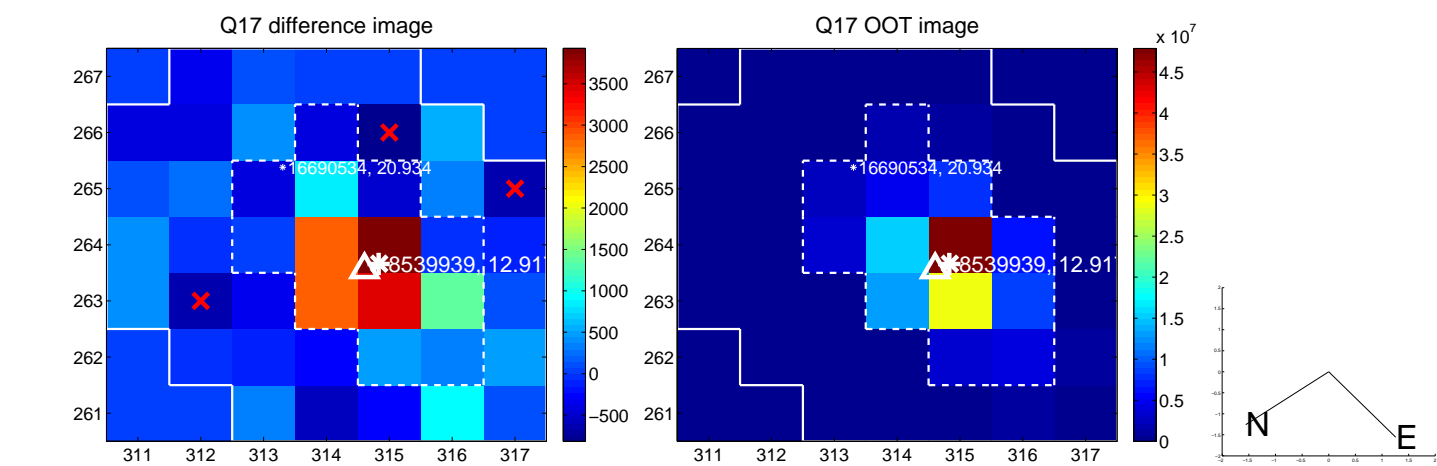
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



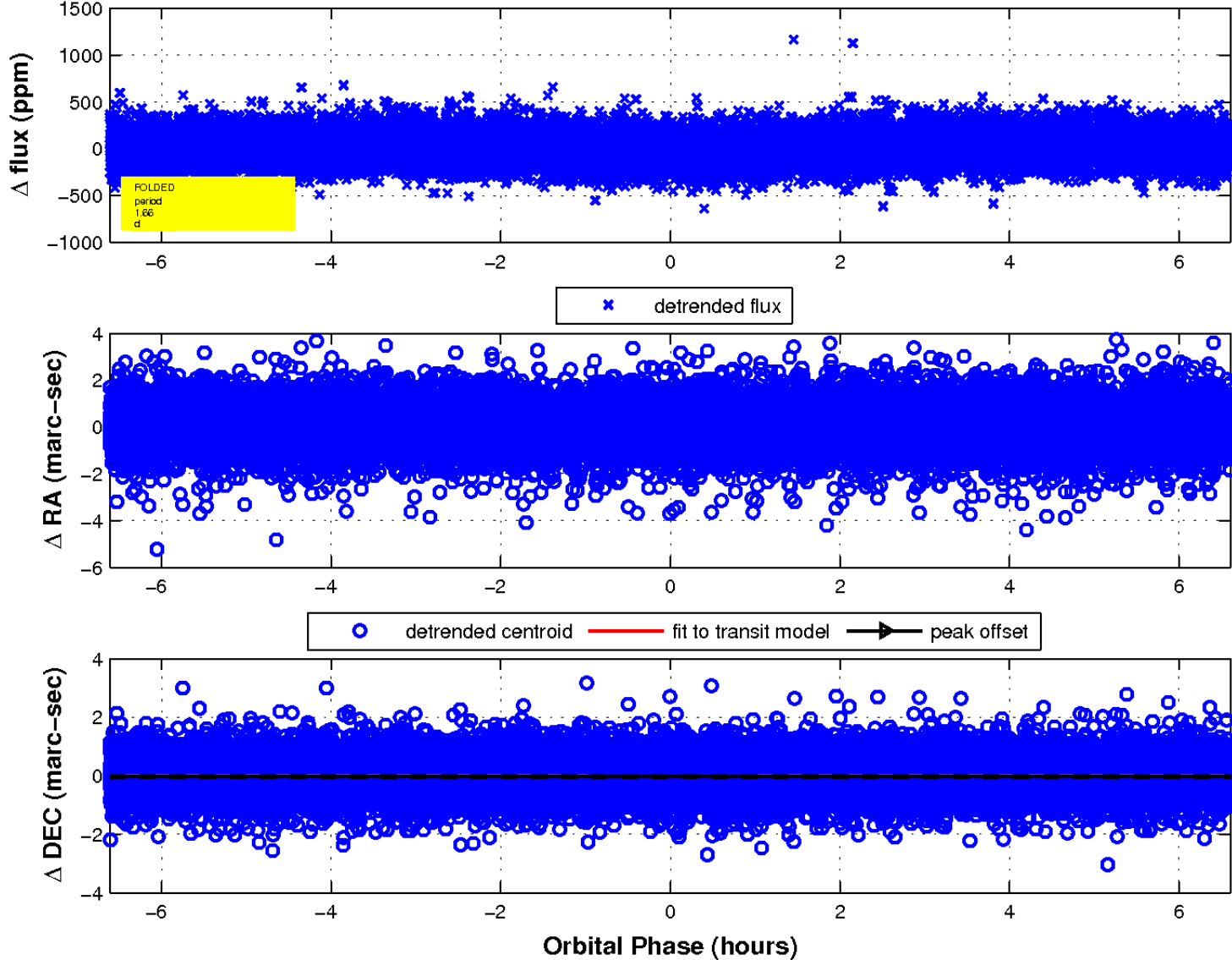
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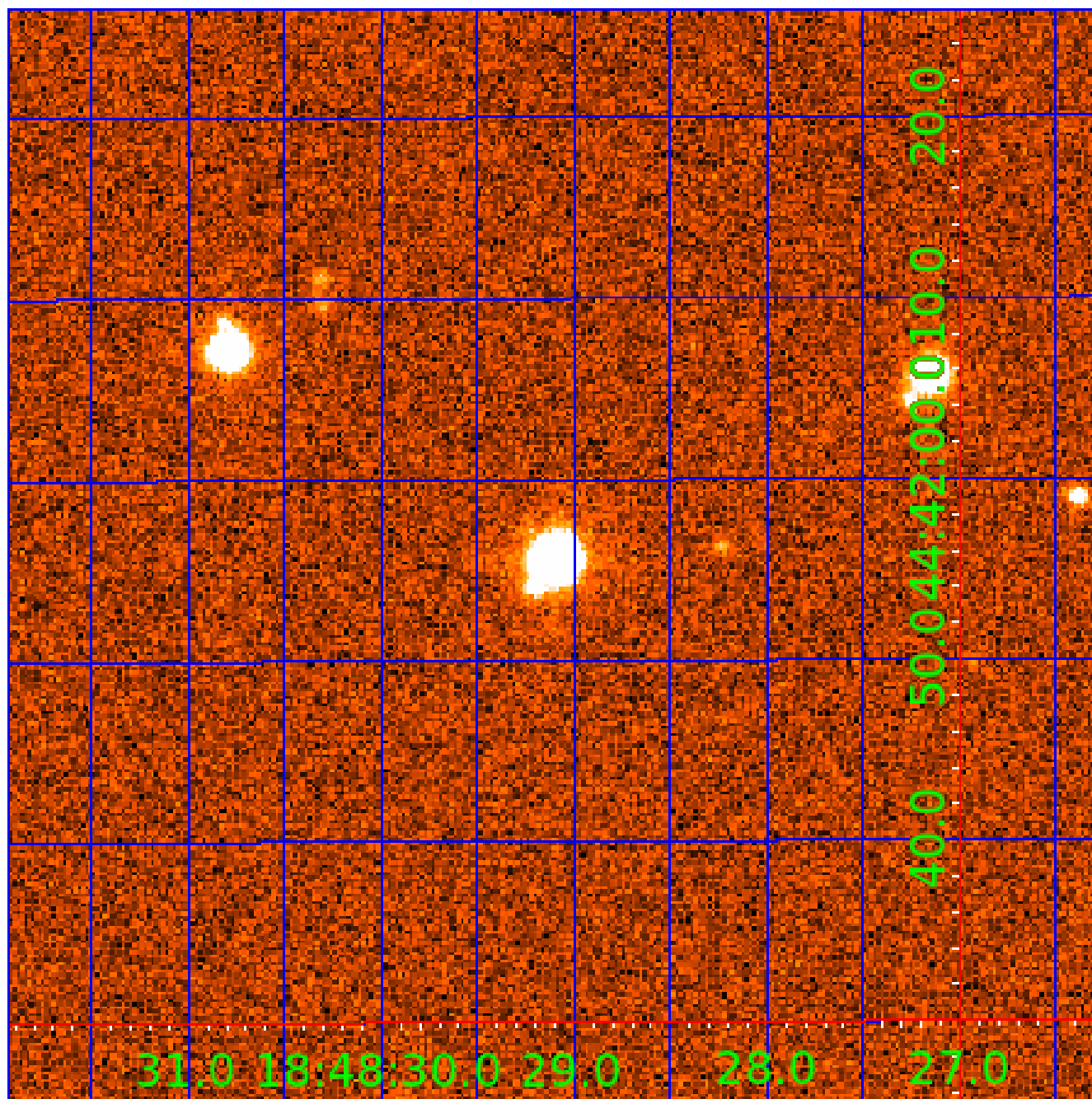


fluxWeightedCentroids, Planet 1 of 8



UKIRT Image

Declination



# KIC 008539939

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008539939-01	OBS	No	1.662014	132.555349	42.3	2.204	12.4	13.6	1.97	7316	1.51	9726.88
008539939-02	OBS	No	1.661802	132.092268	2.9	11.998	12.0	1.8	1.97	7316	0.38	9728.53
008539939-03	OBS	No	29.779603	136.093972	306.4	1.609	14.5	14.9	1.97	7316	3.92	207.46
008539939-04	OBS	No	23.071110	153.308159	371.9	0.866	12.8	11.2	1.97	7316	4.50	291.56
008539939-05	OBS	No	20.445838	145.452169	190.0	2.167	12.1	11.3	1.97	7316	2.82	342.51
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008539939-07	OBS	No	28.367532	133.353696	172.0	2.973	10.4	9.1	1.97	7316	2.99	221.34
008539939-08	OBS	No	102.224919	162.703297	190.3	3.120	11.2	9.1	1.97	7316	2.80	40.06

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008539939-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
008539939-02	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—SAME_NTL_PERIOD
008539939-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
008539939-04	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
008539939-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—CENT_FEW_MEAS
008539939-06	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—HALO_GHOST
008539939-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
008539939-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—SAME_NTL_PERIOD

**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.

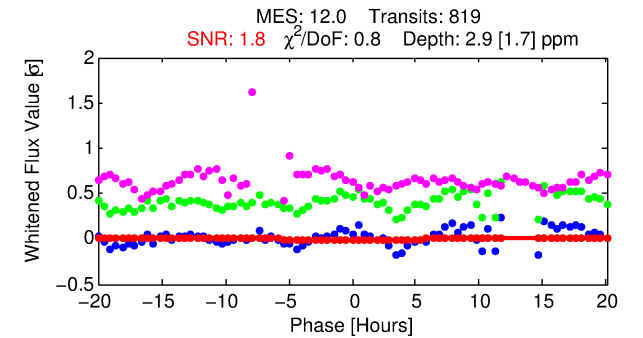
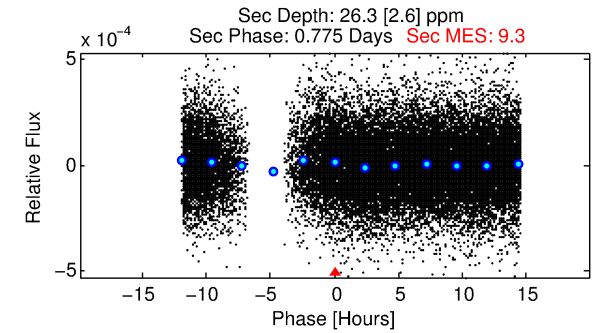
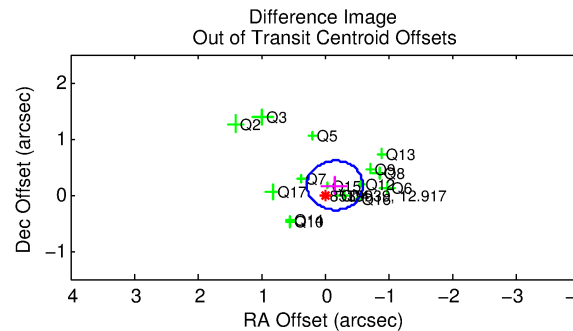
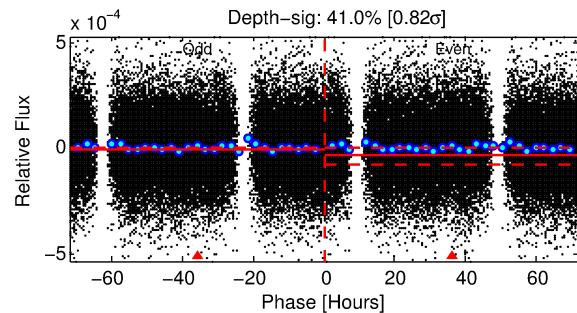
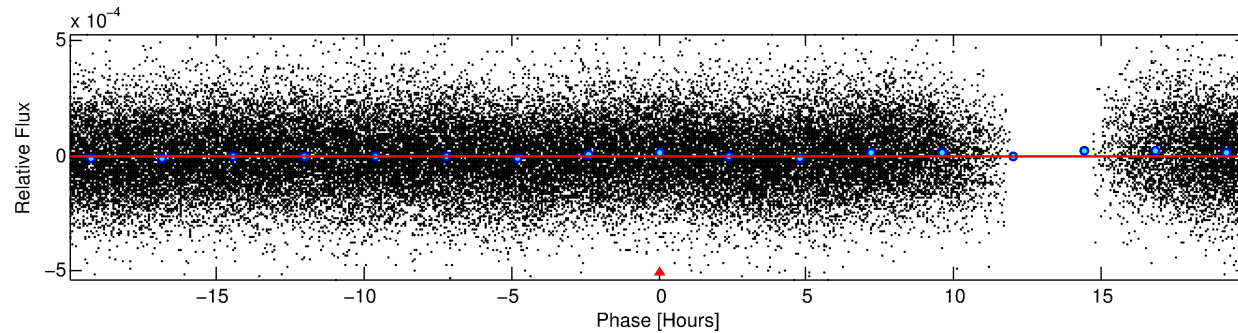
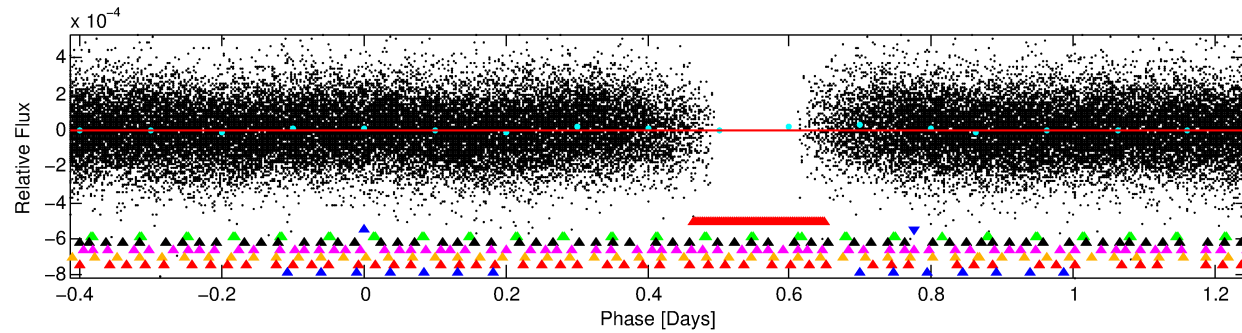
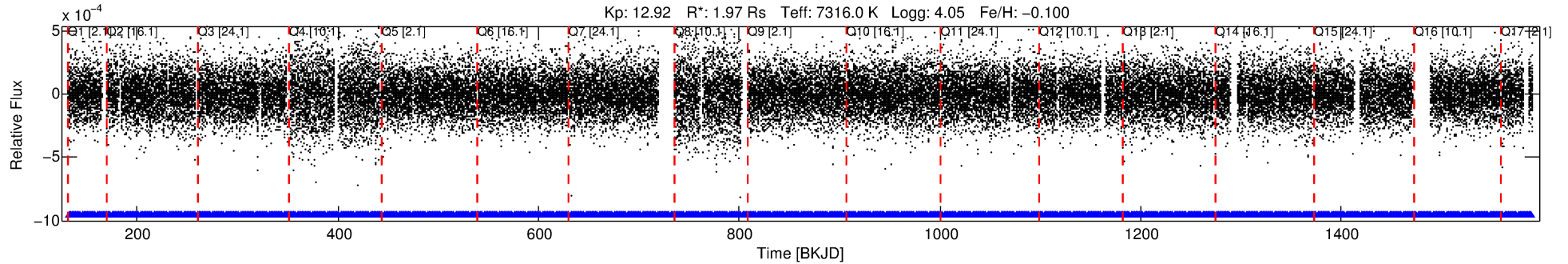
## Ephemeris Match Information For 008539939-02

No Significant Match Found



# DV One-Page Summary

KIC: 8539939 Candidate: 2 of 8 Period: 1.662 d



## DV Fit Results:

Period = 1.66180 [0.00014] d  
Epoch = 132.0923 [0.0390] BKJD  
Rp/R\* = 0.0018 [0.0024]  
a/R\* = 1.06 [1.00]  
b = 0.88 [2.24]  
Seff = 9728.53 [3651.00]  
Teq = 2532 [238] K  
Rp = 0.38 [0.52] Re  
a = 0.0320 [0.0073] AU  
Ag = 100.32 [266.67] [0.37 $\sigma$ ]  
Teffp = 12392 [8185] K [1.20 $\sigma$ ]

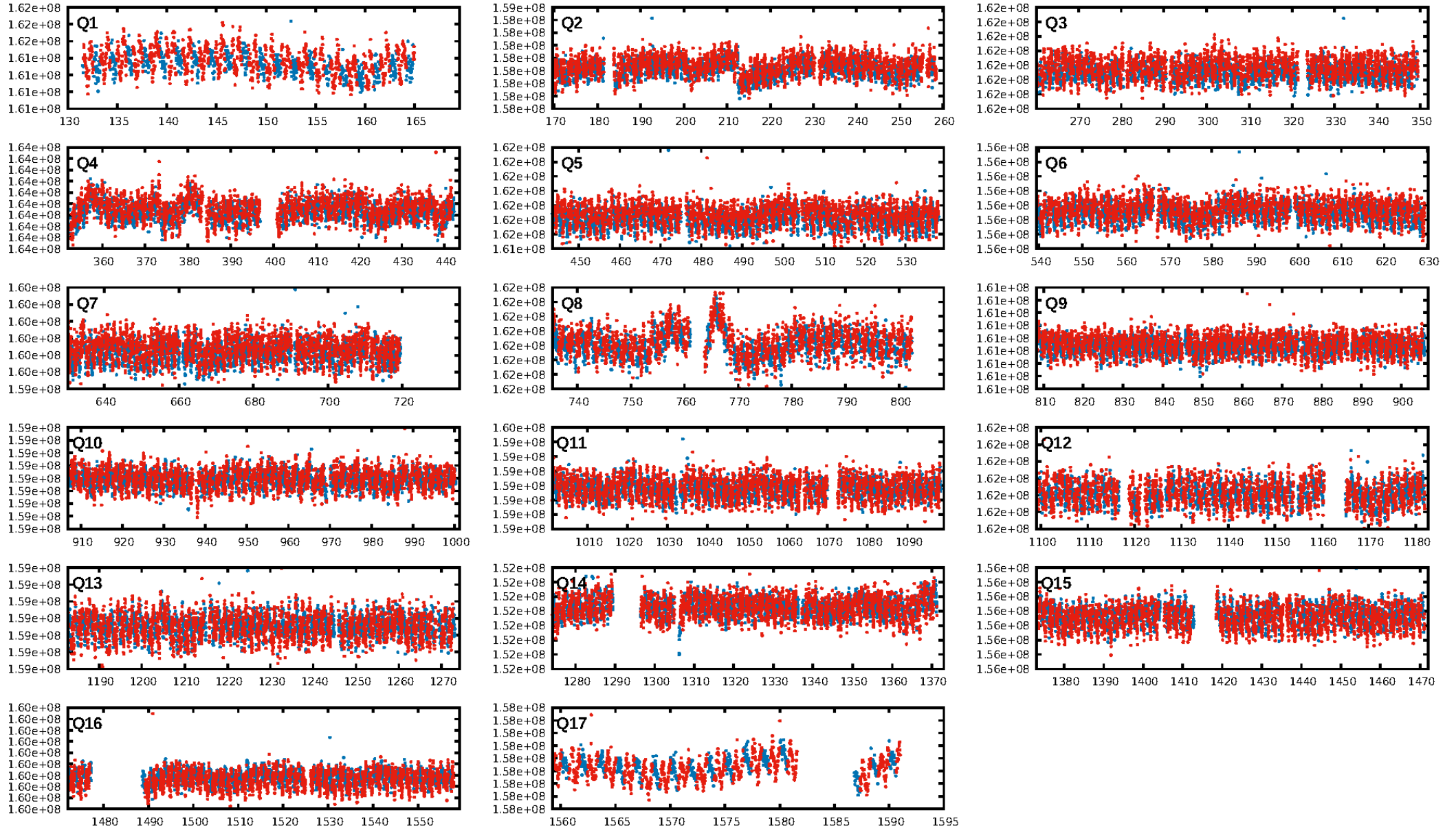
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 4.42e-14  
RollingBand-fgt: 1.00 [782/782]  
GhostDiagnostic-chr: N/A  
Centroid-sig: N/A  
Centroid-so: N/A  
OotOffset-rm: 0.230 arcsec [1.58 $\sigma$ ]  
KicOffset-rm: 0.298 arcsec [2.17 $\sigma$ ]  
OotOffset-st: 4/4/4/4 [16]  
KicOffset-st: 4/4/4/4 [16]  
DiffImageQuality-fgm: 1.00 [16/16]  
DiffImageOverlap-fno: 0.00 [0/17]

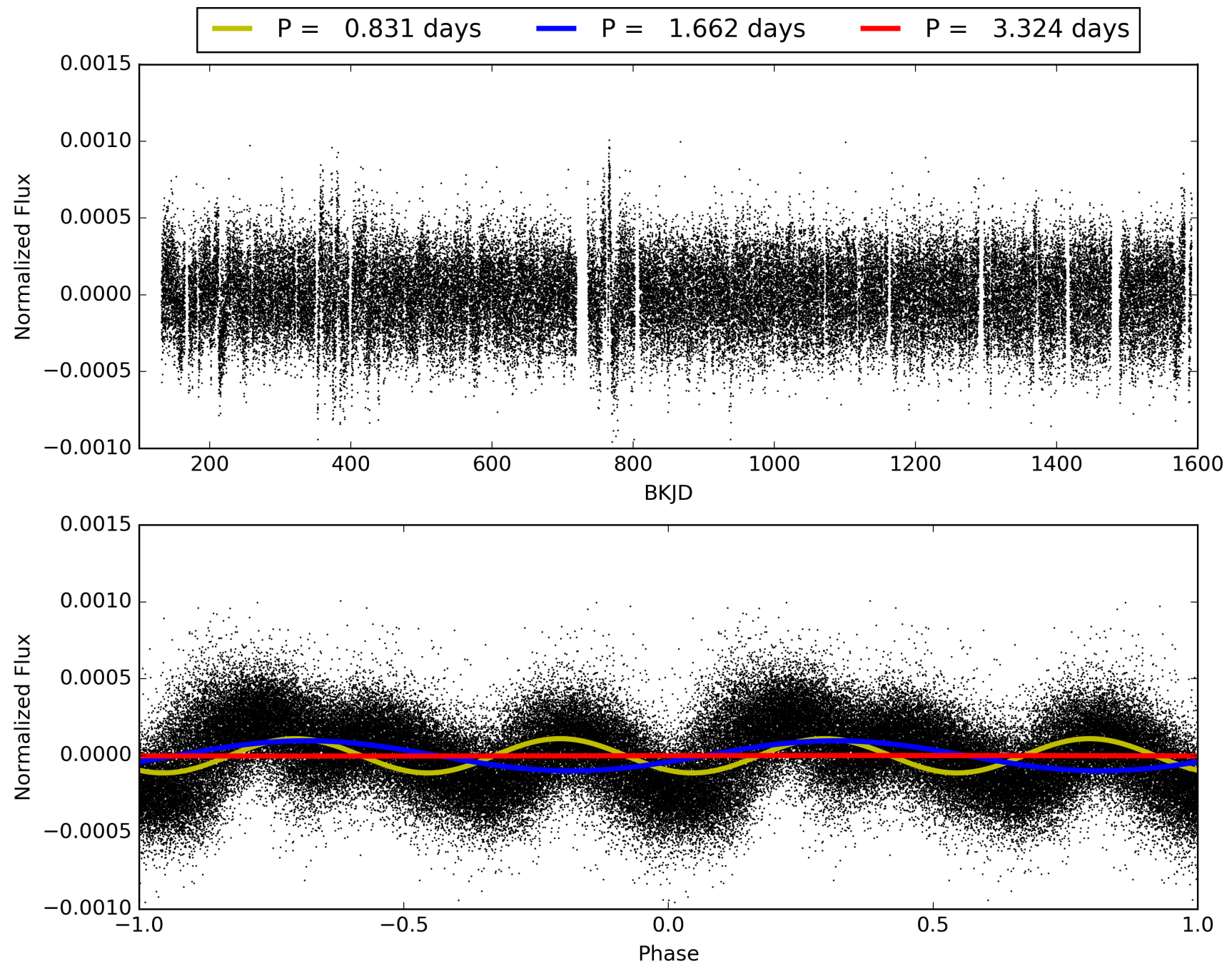
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 08:00:31 Z

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

# TCE 008539939-02, PDC Light Curves

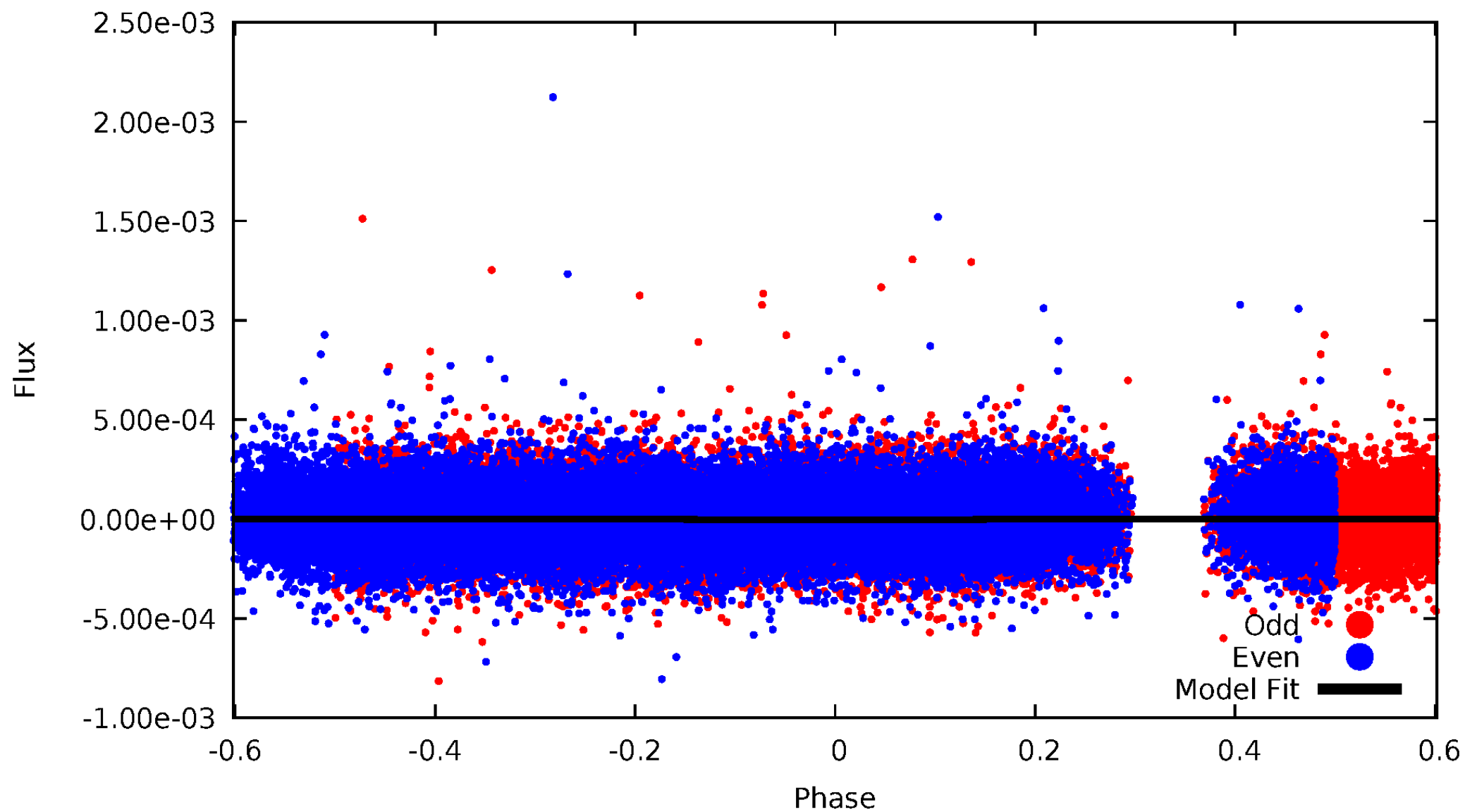


TCE 008539939-02



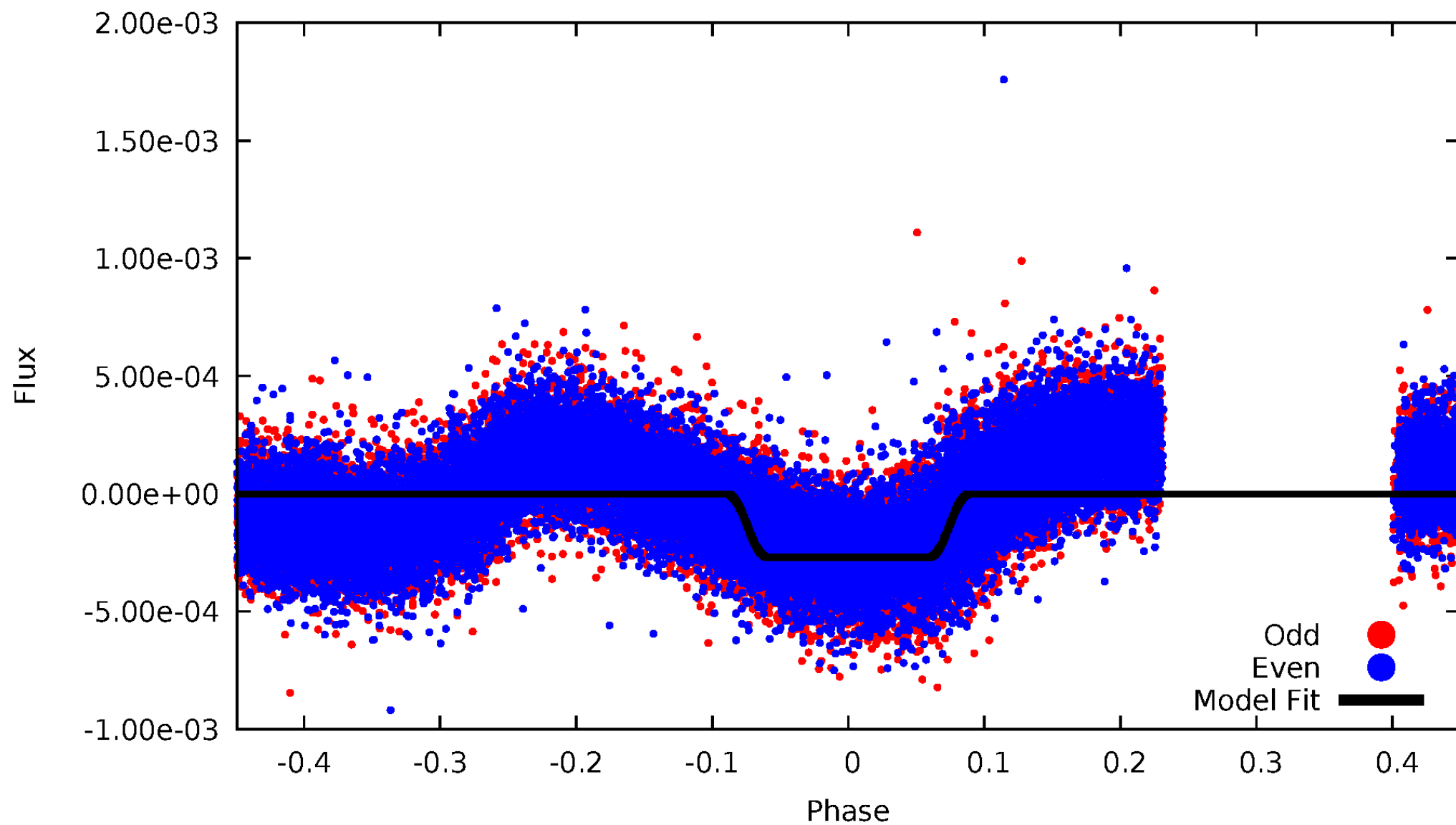
# DV Odd/Even

TCE 008539939-02



# ALT Odd/Even

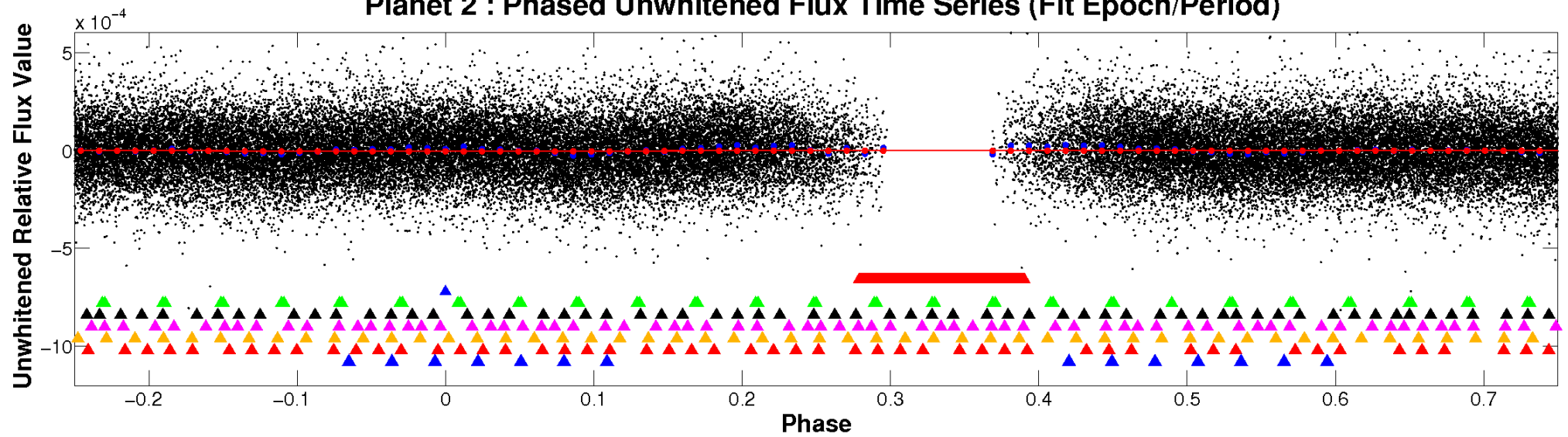
TCE 008539939-02



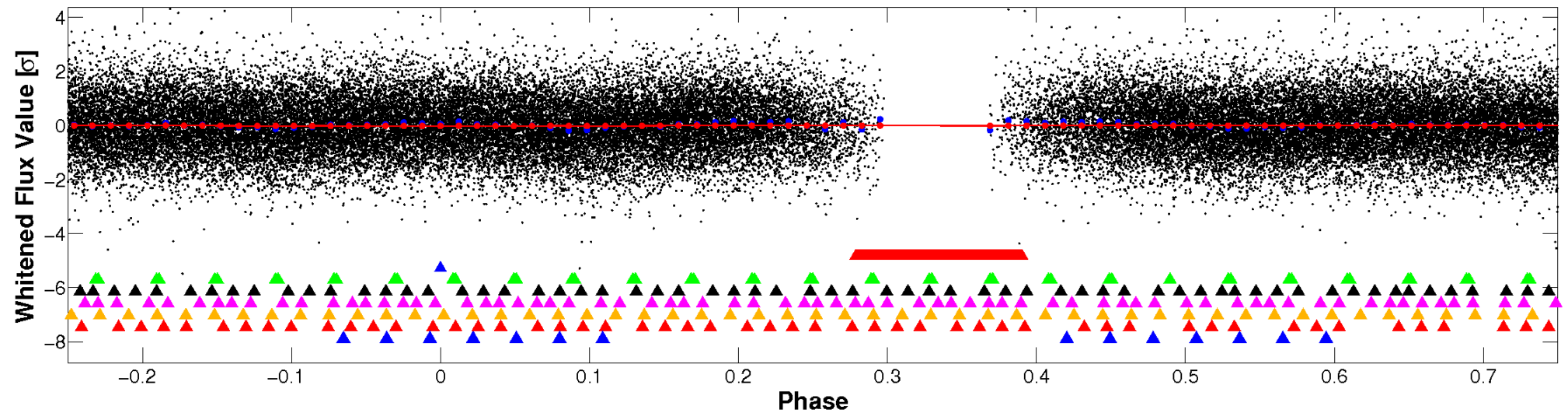


# Non-Whitened Vs. Whitened Light Curve

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

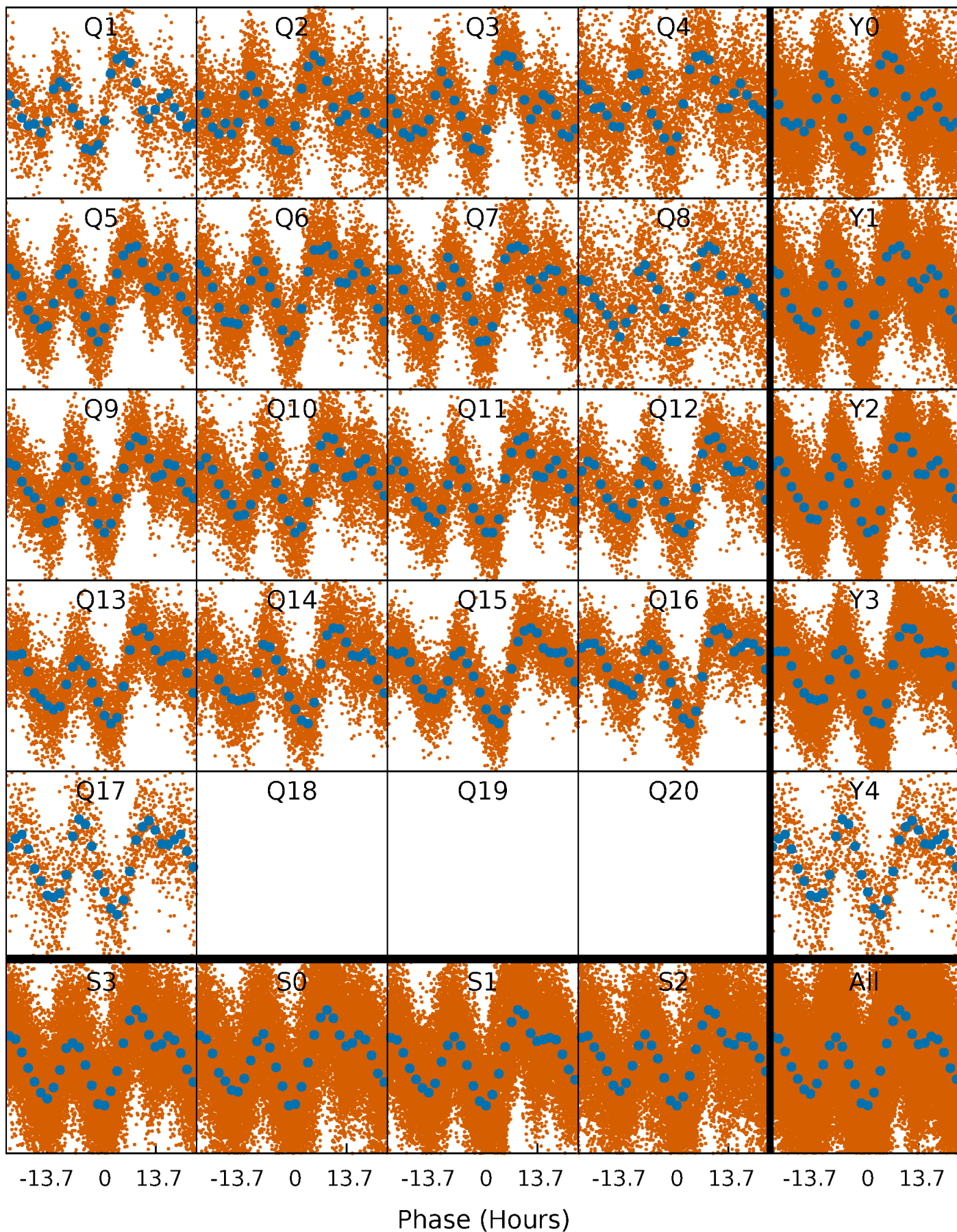


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

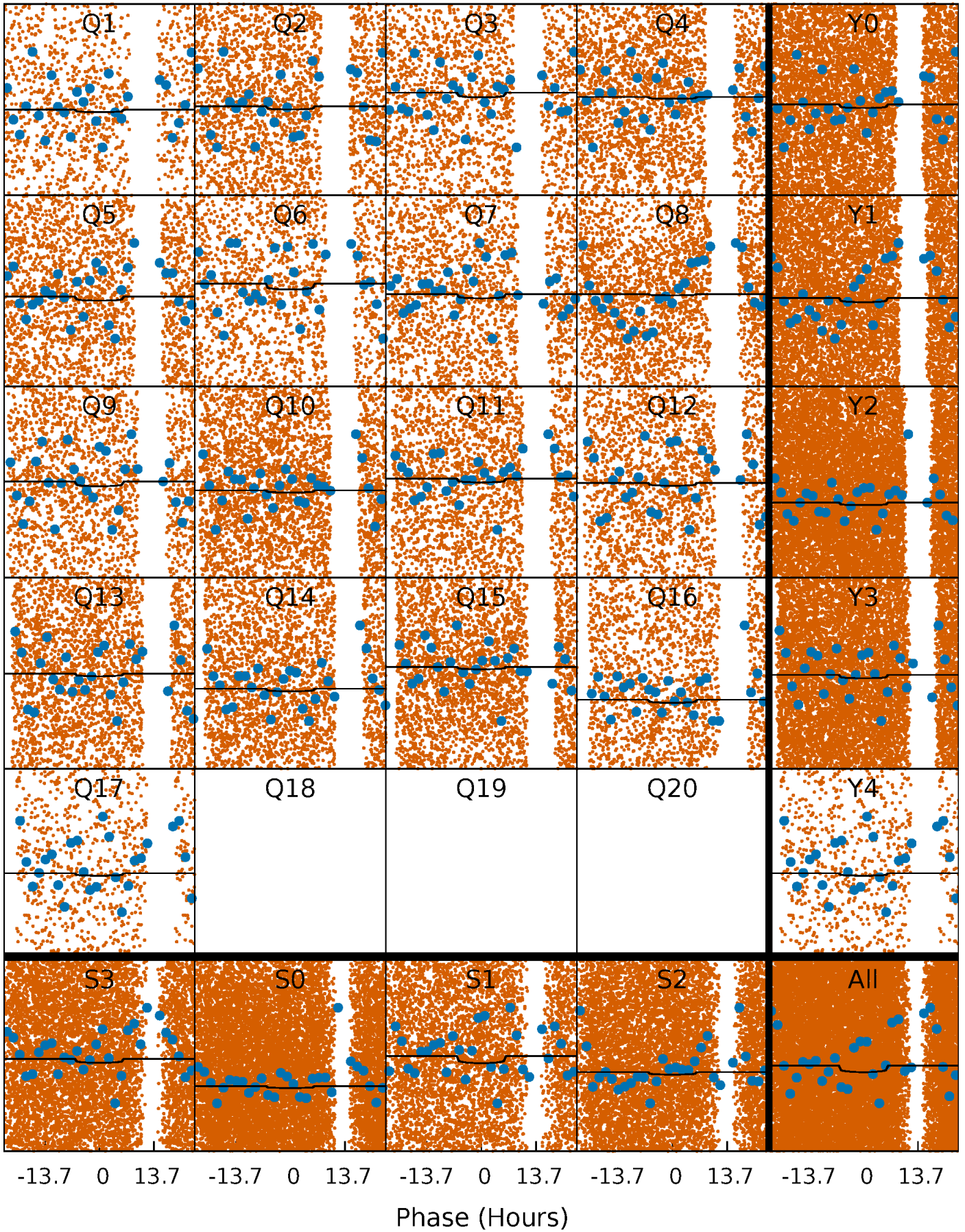
TCE 008539939-02   P= 1.661802 Days    $T_0=132.092268$  (BKJD)





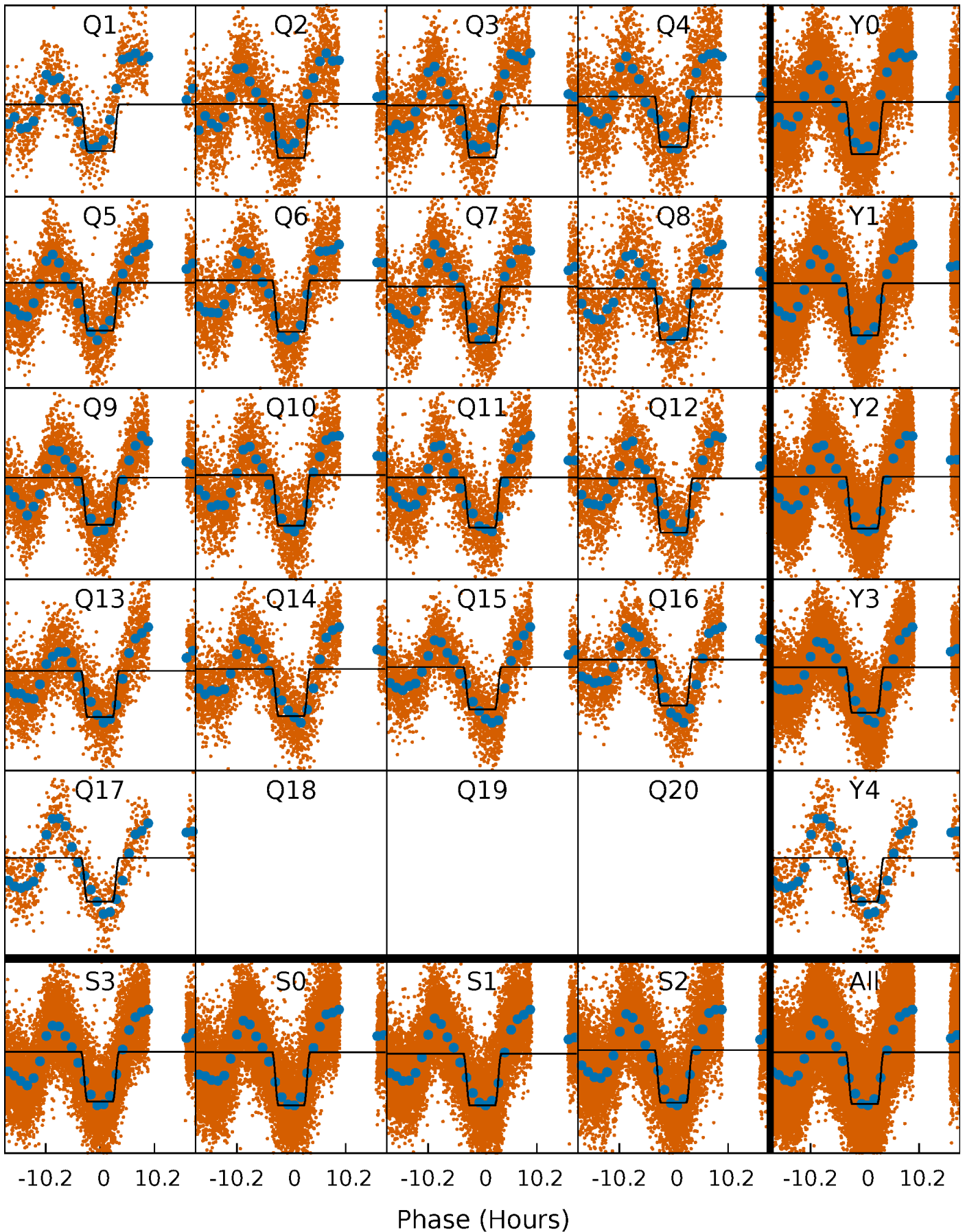
# DV Quarter-Phased Transit Curves

TCE 008539939-02   P= 1.661802 Days    $T_0=132.092268$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

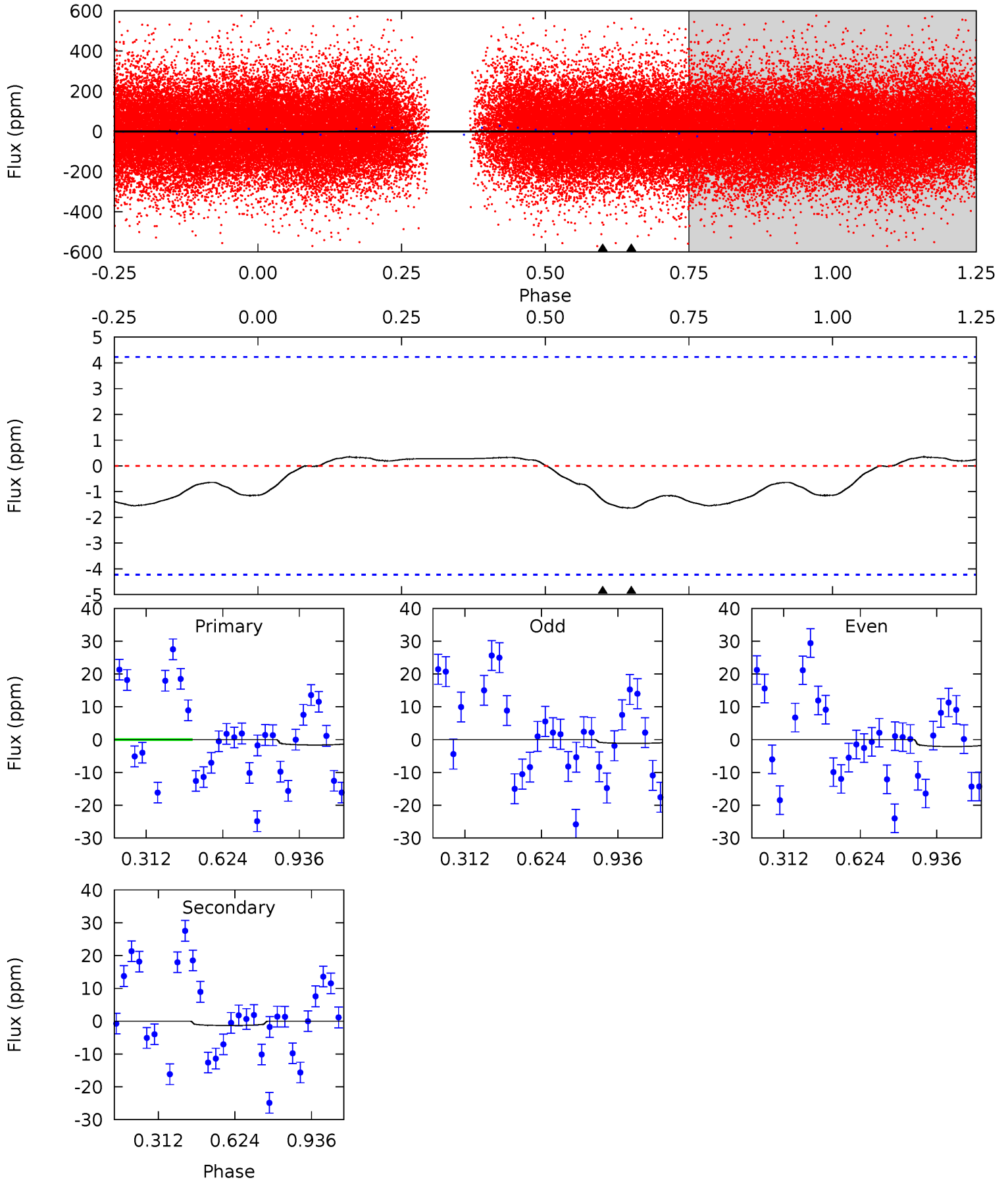
TCE 008539939-02   P= 1.661994 Days    $T_0=132.038206$  (BKJD)



# DV Model-Shift Uniqueness Test

008539939-02, P = 1.661802 Days, E = 130.430466 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
1.68	1.35	0	0	4.32	1.01	0.56	1.68	1.68	1.35	1.35	0.51	0.06	0.18	1.70

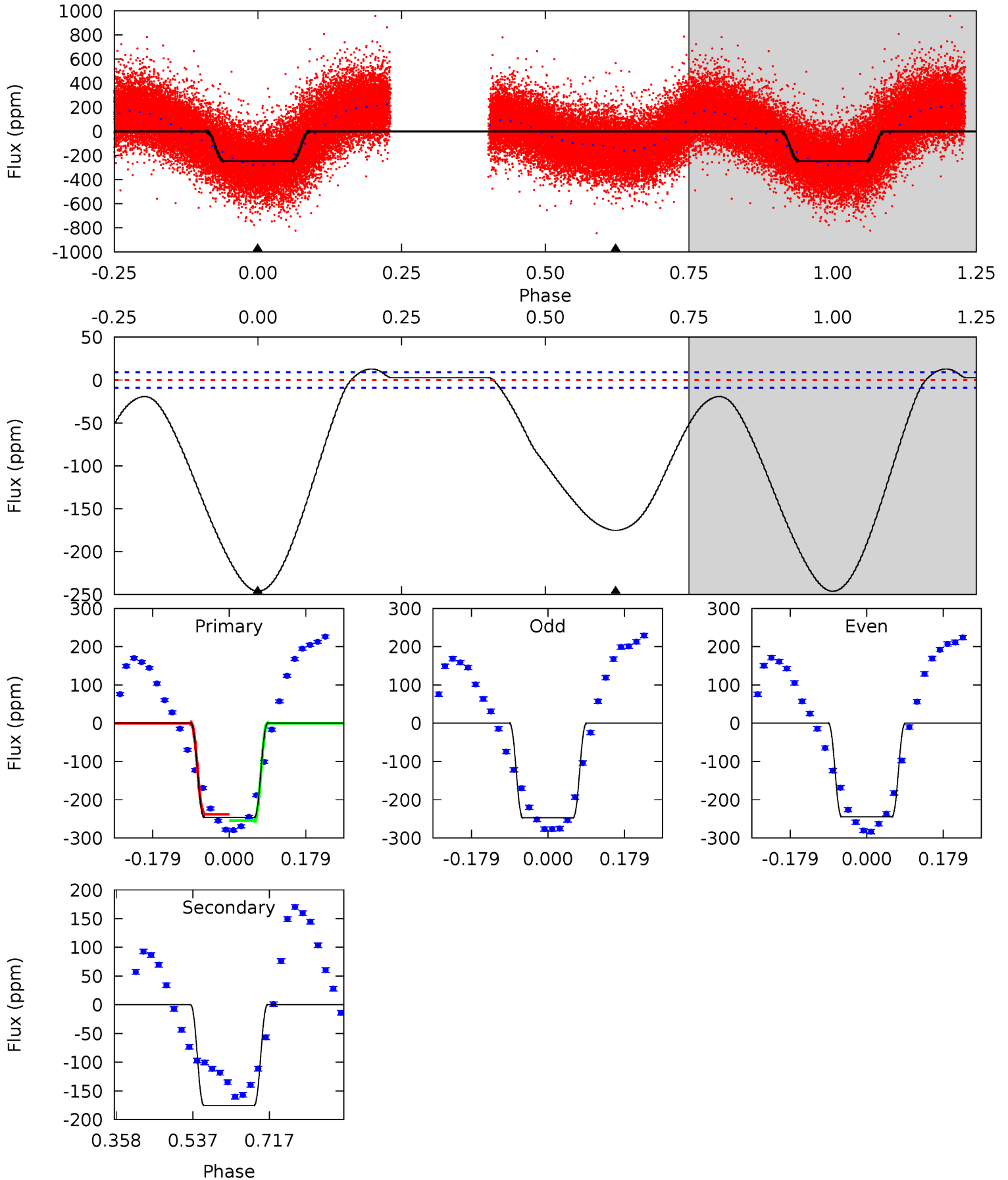




# Alt Model-Shift Uniqueness Test

008539939-02, P = 1.661994 Days, E = 130.376212 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
122.2	87.0	0	0	4.44	1.34	7.36	122.2	122.2	87.0	87.0	0.62	0.99	0.05	3.98



### Stellar Parameters For KIC 008539939

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7316^{+228}_{-304}$	$4.048^{+0.185}_{-0.167}$	$-0.100^{+0.250}_{-0.350}$	$1.969^{+0.533}_{-0.533}$	$1.577^{+0.199}_{-0.273}$	$0.291^{+0.326}_{-0.134}$
	+3%/-4%	+5%/-4%	+250%/-350%	+27%/-27%	+13%/-17%	+112%/-46%
Source	KIC0	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 008539939-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-1 \pm 1$	$0.51^{+0.43}_{-0.33}$	$3530^{+276}_{-289}$	$4746^{+3592}_{-2720}$	$2.458^{+16.581}_{-2.154}$
Alt.	$-175 \pm 2$	$3.53^{+0.79}_{-0.72}$	$3528^{+289}_{-254}$	$6405^{+577}_{-463}$	$7.802^{+4.175}_{-2.500}$

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

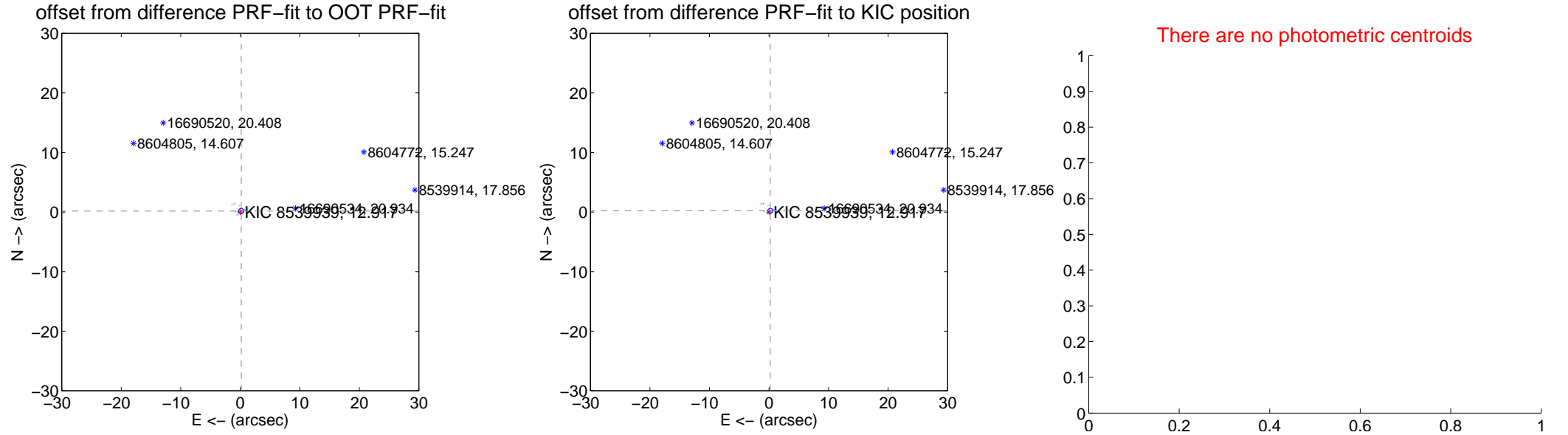
## DV Centroid Data

Supplemental centroid analysis for 008539939-02. Kepler magnitude: 12.92. Transit SNR 1.77

There are 16 quarters with good PRF difference image offsets

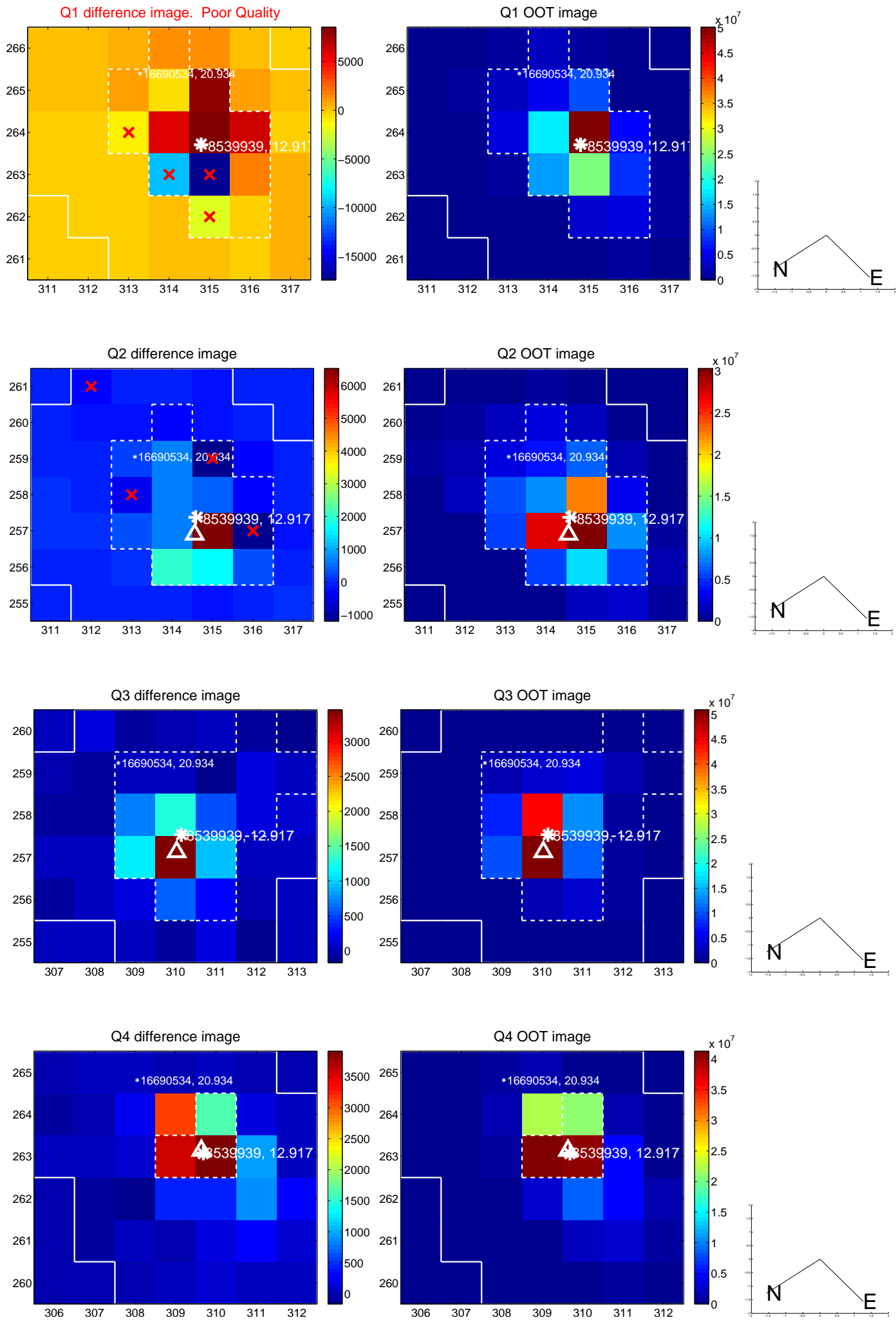
The direct PRF centroid is offset from the target star catalog position by about 0.04 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.230 \pm 0.146$	1.58	$-0.160 \pm 0.192$	$0.166 \pm 0.153$
PRF-fit source offset from KIC position	$0.298 \pm 0.137$	2.17	$-0.211 \pm 0.152$	$0.209 \pm 0.121$
photometric centroid source offset	—	—	—	—

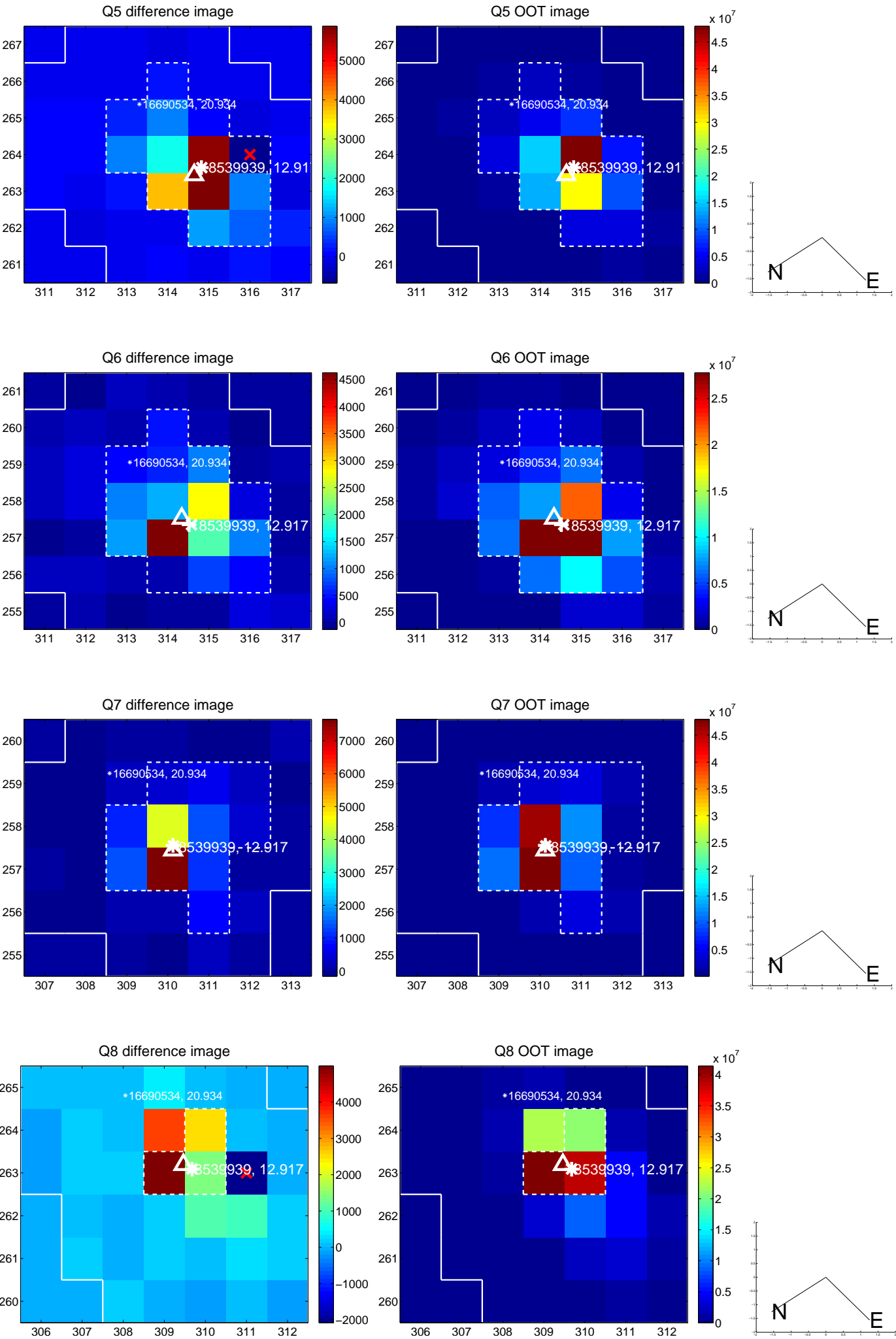


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

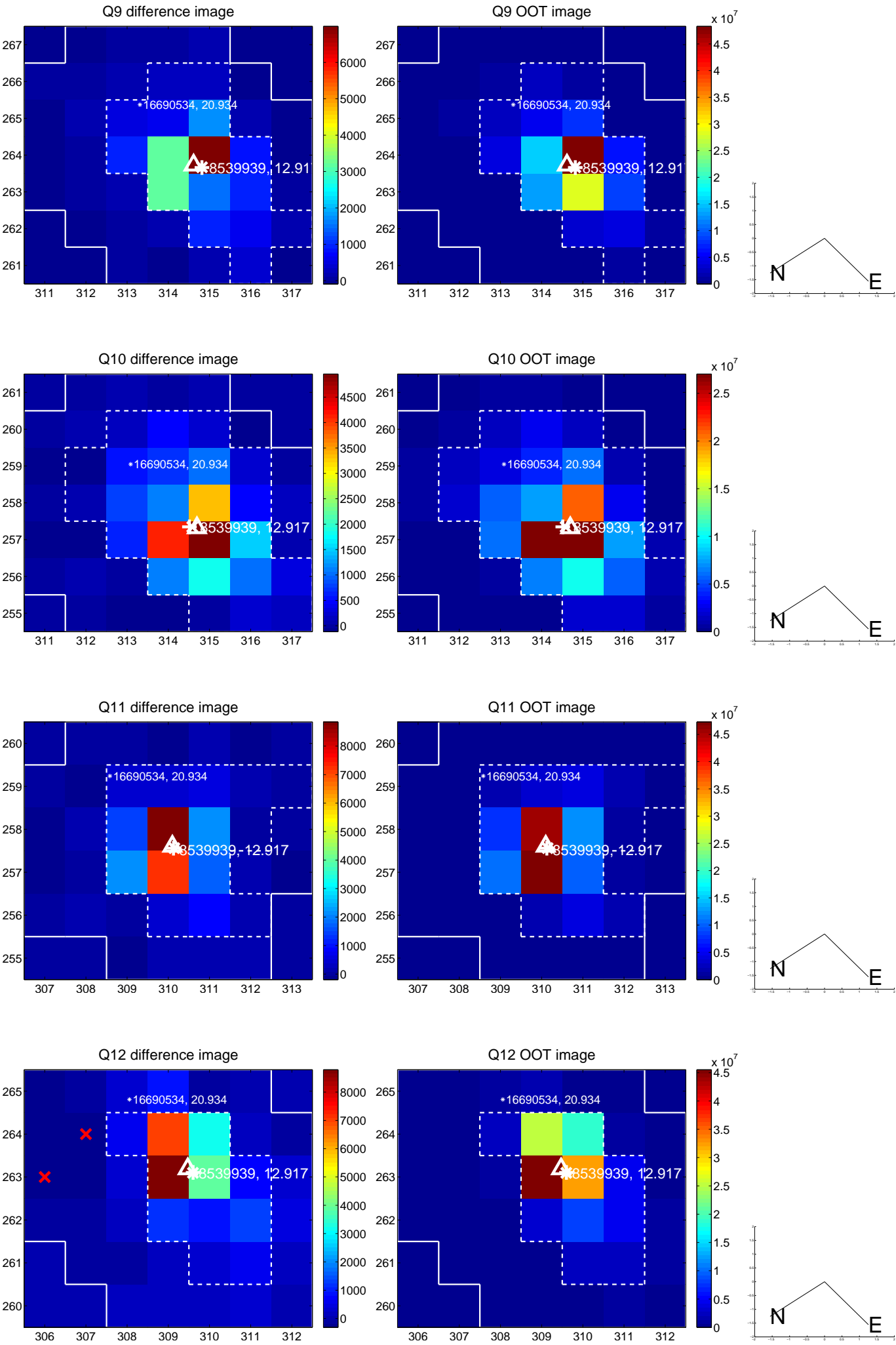


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

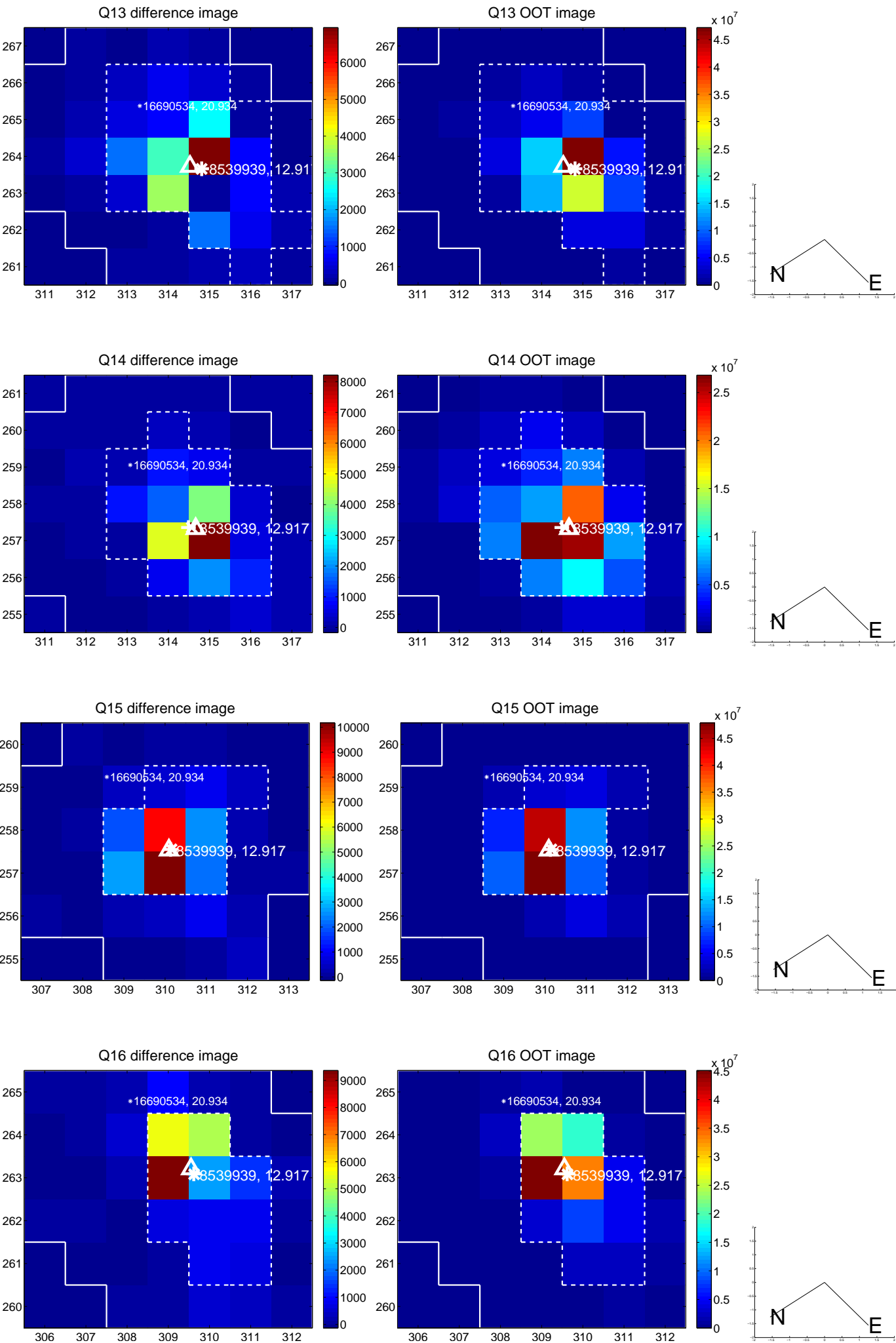




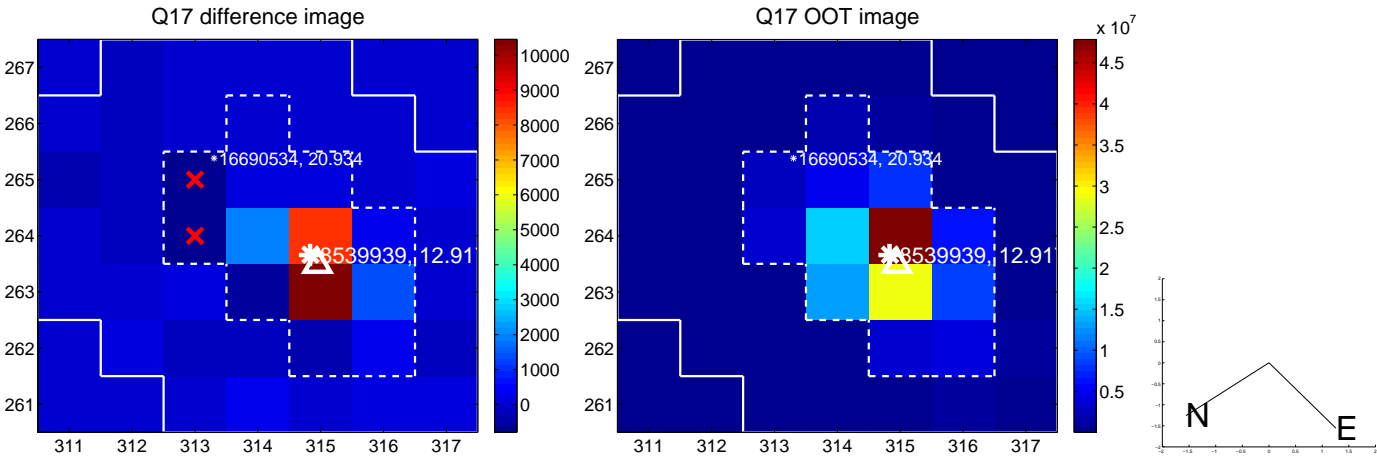
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



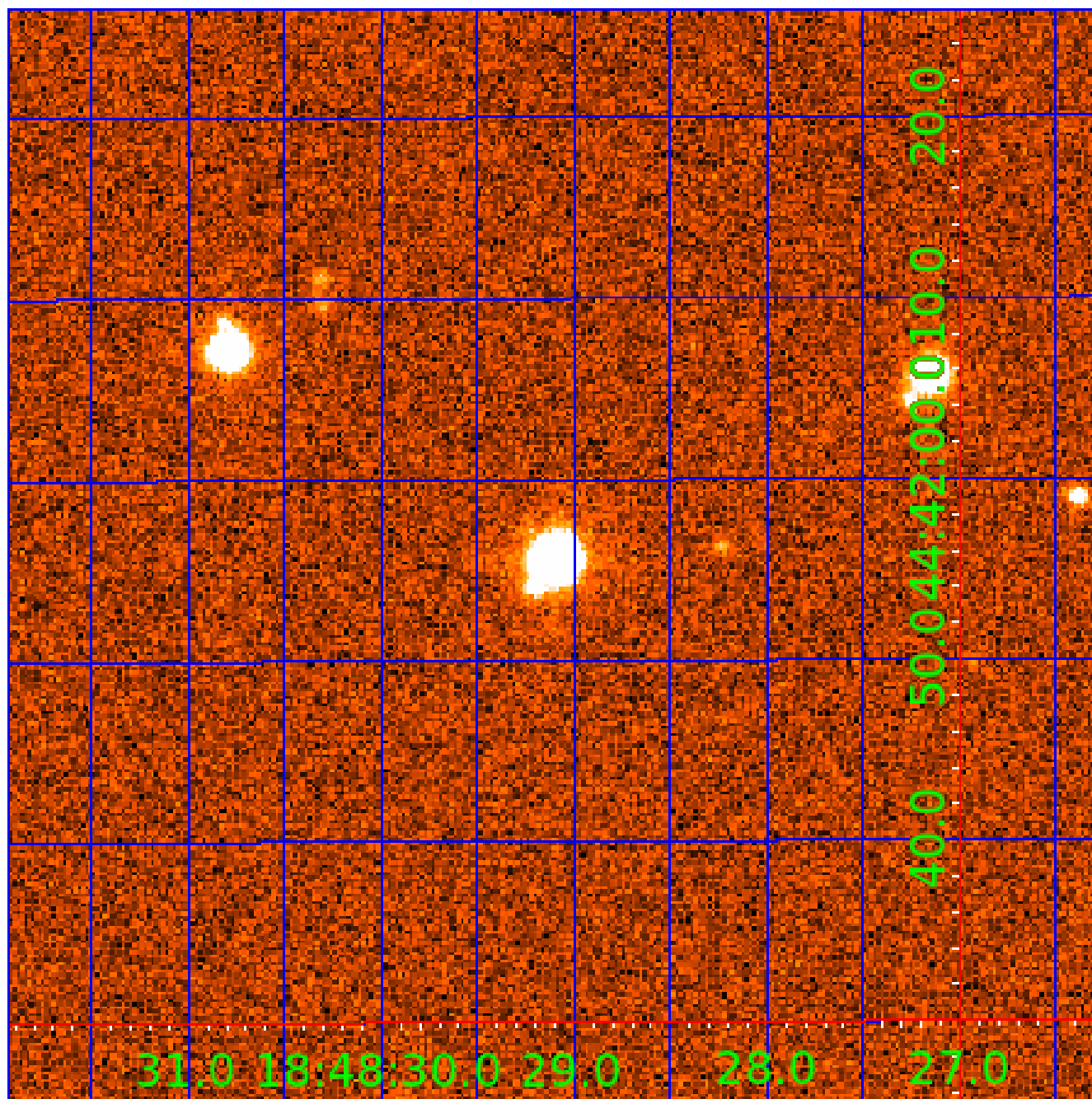
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



folded centroid time series figure for this object.

UKIRT Image

Declination



# KIC 008539939

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008539939-01	OBS	No	1.662014	132.555349	42.3	2.204	12.4	13.6	1.97	7316	1.51	9726.88
008539939-02	OBS	No	1.661802	132.092268	2.9	11.998	12.0	1.8	1.97	7316	0.38	9728.53
008539939-03	OBS	No	29.779603	136.093972	306.4	1.609	14.5	14.9	1.97	7316	3.92	207.46
008539939-04	OBS	No	23.071110	153.308159	371.9	0.866	12.8	11.2	1.97	7316	4.50	291.56
008539939-05	OBS	No	20.445838	145.452169	190.0	2.167	12.1	11.3	1.97	7316	2.82	342.51
008539939-06	OBS	No	14.668596	133.821649	101.2	4.250	10.8	10.0	1.97	7316	2.22	533.30
008539939-07	OBS	No	28.367532	133.353696	172.0	2.973	10.4	9.1	1.97	7316	2.99	221.34
008539939-08	OBS	No	102.224919	162.703297	190.3	3.120	11.2	9.1	1.97	7316	2.80	40.06

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008539939-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
008539939-02	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—SAME_NTL_PERIOD
008539939-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
008539939-04	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
008539939-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—CENT_FEW_MEAS
008539939-06	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—HALO_GHOST
008539939-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
008539939-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—SAME_NTL_PERIOD

**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.

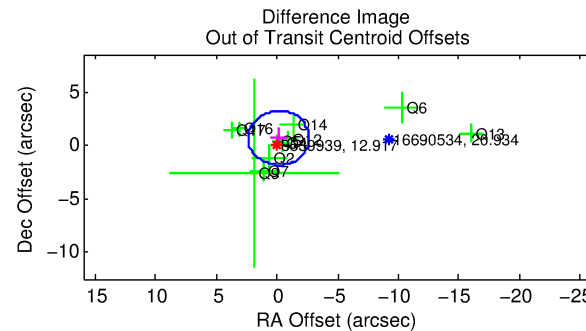
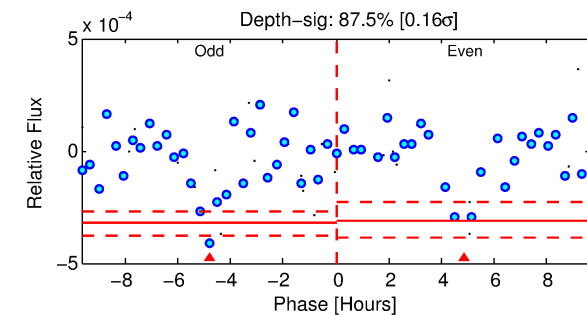
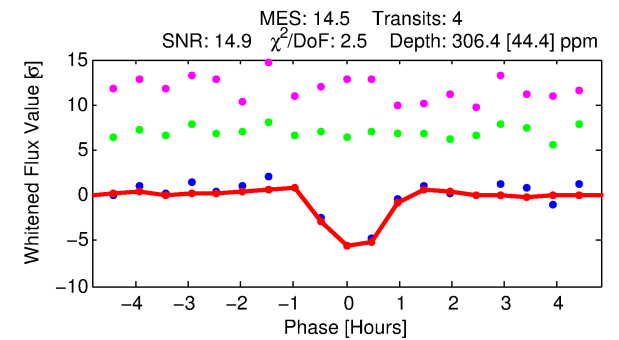
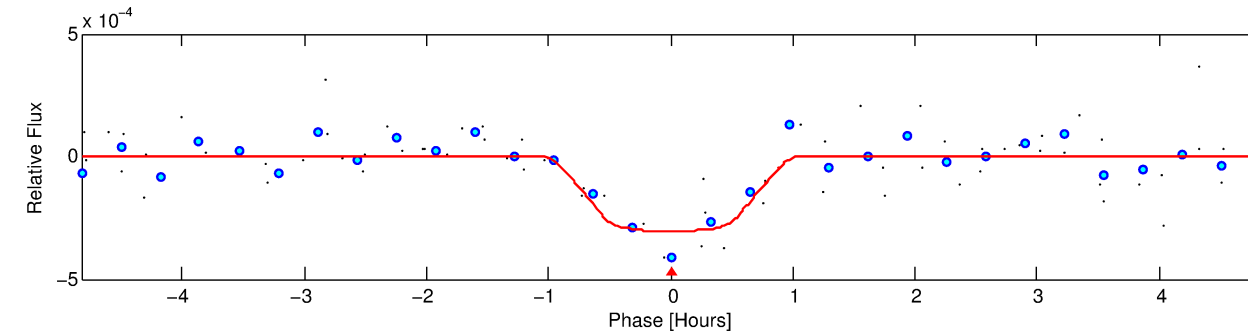
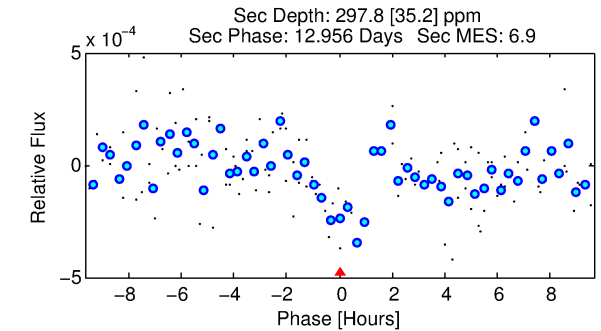
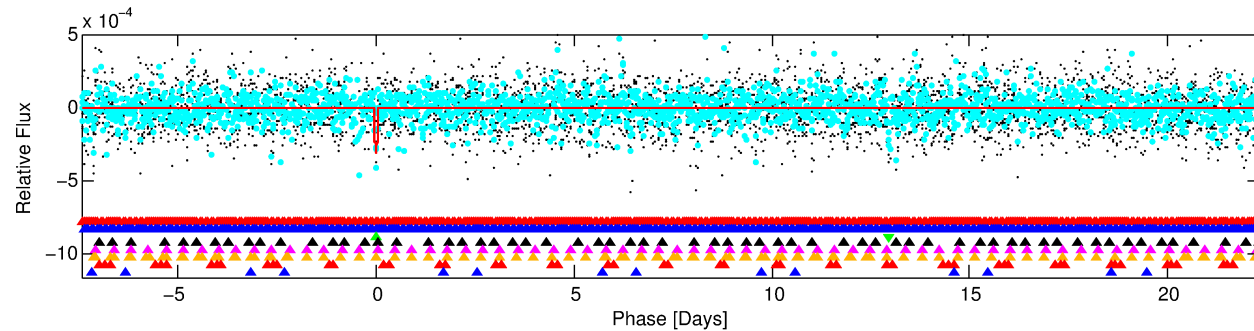
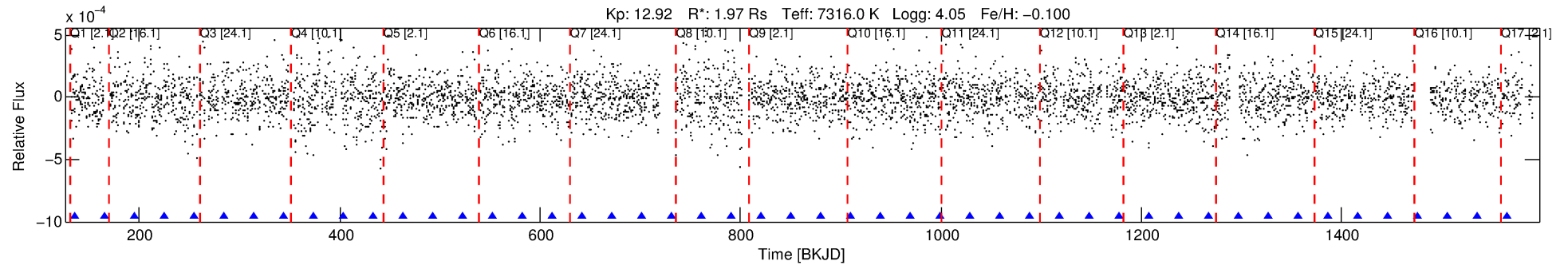
## Ephemeris Match Information For 008539939-03

No Significant Match Found



# DV One-Page Summary

KIC: 8539939 Candidate: 3 of 8 Period: 29.780 d



## DV Fit Results:

Period = 29.77960 [0.00034] d  
Epoch = 136.0940 [0.0105] BKJD  
Rp/R\* = 0.0183 [0.0188]  
a/R\* = 75.44 [484.49]  
b = 0.87 [1.86]  
Seff = 207.46 [77.86]  
Teq = 968 [91] K  
Rp = 3.92 [4.18] Re  
a = 0.2190 [0.0503] AU  
Ag = 510.96 [1068.22] [0.48 $\sigma$ ]  
Teffp = 7114 [3681] K [1.67 $\sigma$ ]

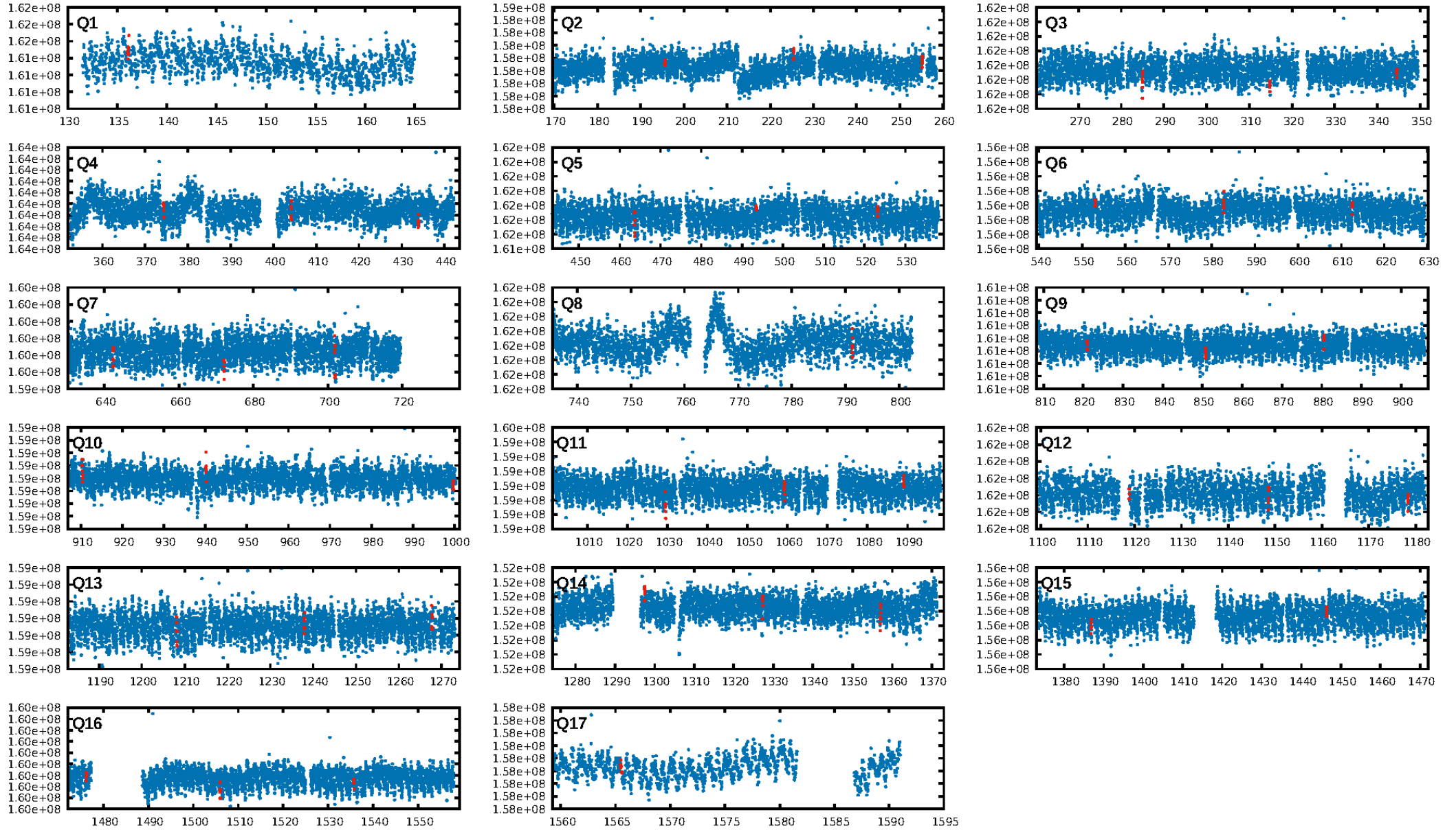
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [10.03 $\sigma$ ]  
LongPeriod-sig: 100.0% [495.33 $\sigma$ ]  
ModelChiSquare2-sig: 3.7%  
ModelChiSquareGof-sig: 26.9%  
Bootstrap-pfa: 1.82e-14  
RollingBand-fgt: 1.00 [4/4]  
**GhostDiagnostic-chr: 16.86**  
Centroid-sig: N/A  
Centroid-so: 0.690 arcsec [1.46 $\sigma$ ]  
OotOffset-rm: 0.690 arcsec [0.82 $\sigma$ ]  
KicOffset-rm: 0.729 arcsec [0.87 $\sigma$ ]  
OotOffset-st: 3/1/3/4 [11]  
KicOffset-st: 3/1/3/4 [11]  
DiffImageQuality-fgm: 0.27 [3/11]  
DiffImageOverlap-fno: 0.35 [6/17]

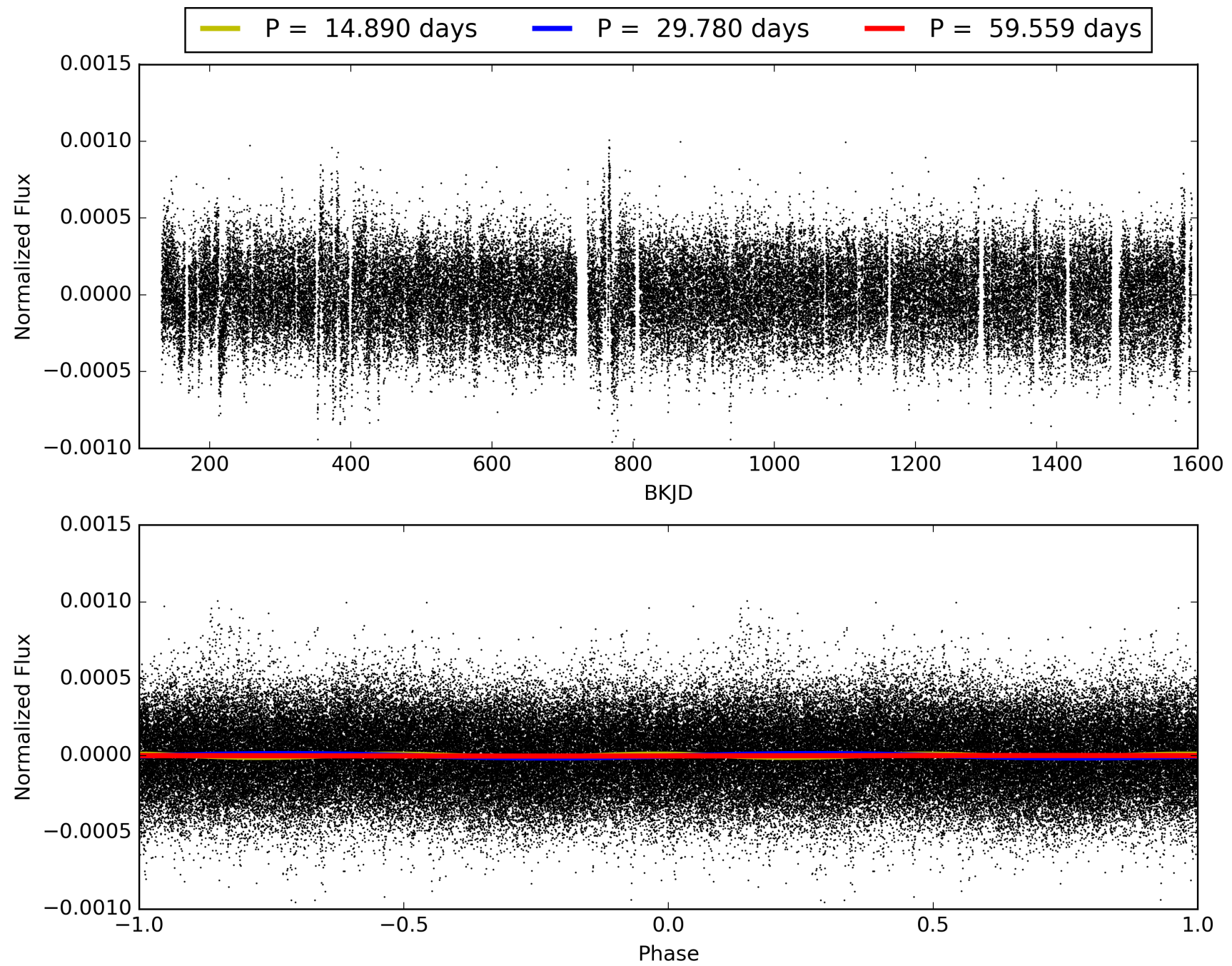
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 08:00:40 Z

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

# TCE 008539939-03, PDC Light Curves

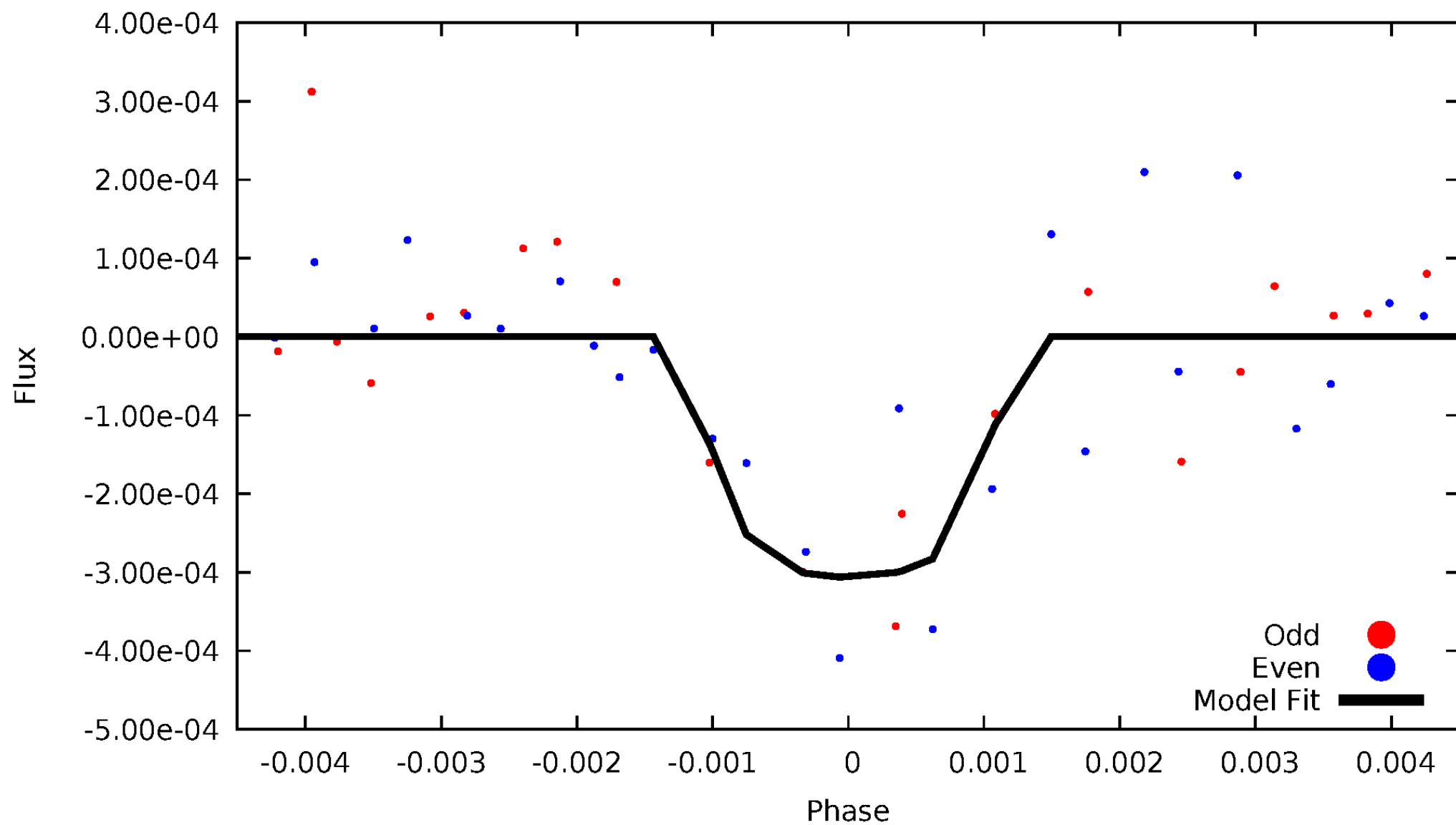


TCE 008539939-03



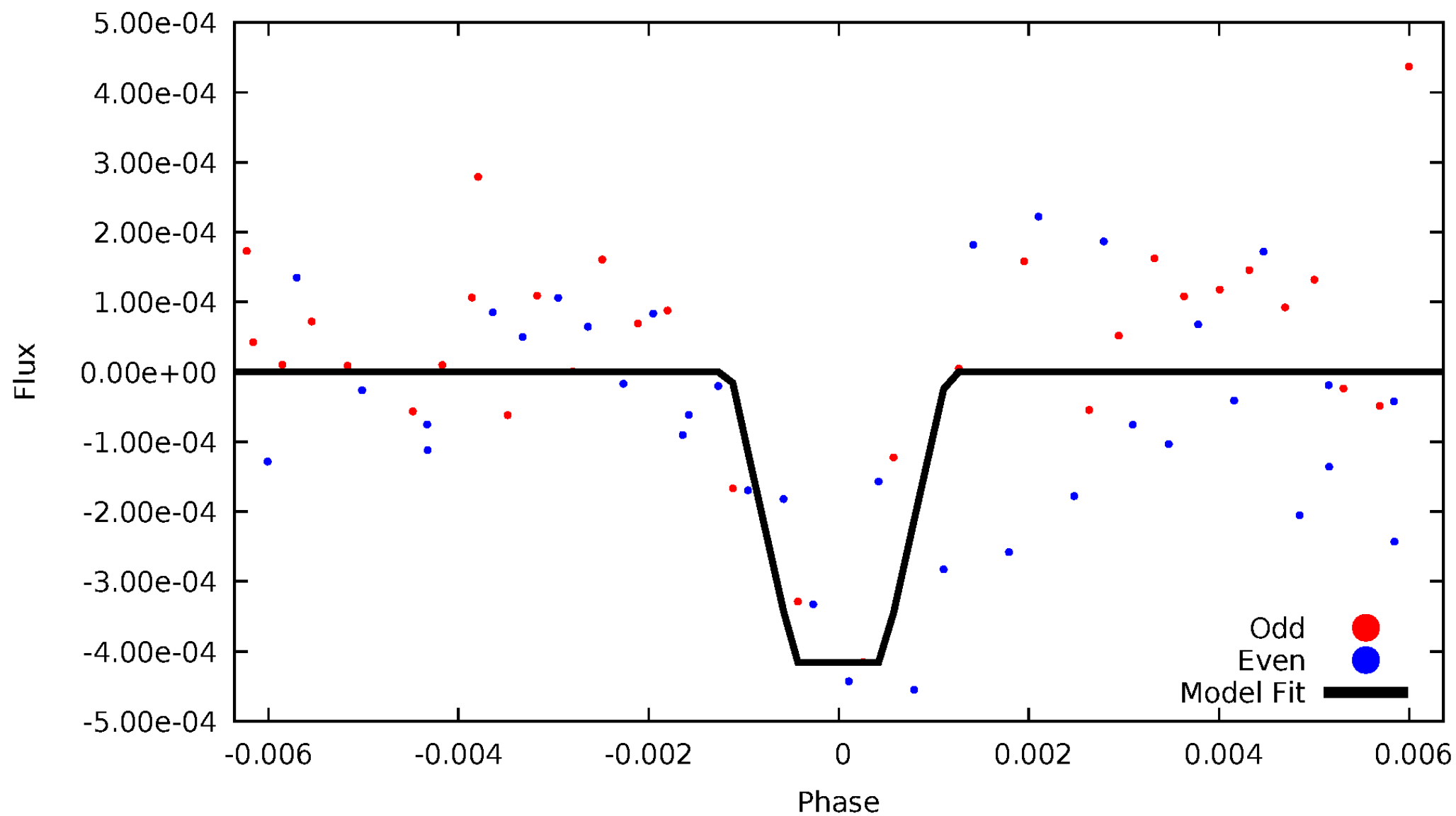
# DV Odd/Even

TCE 008539939-03



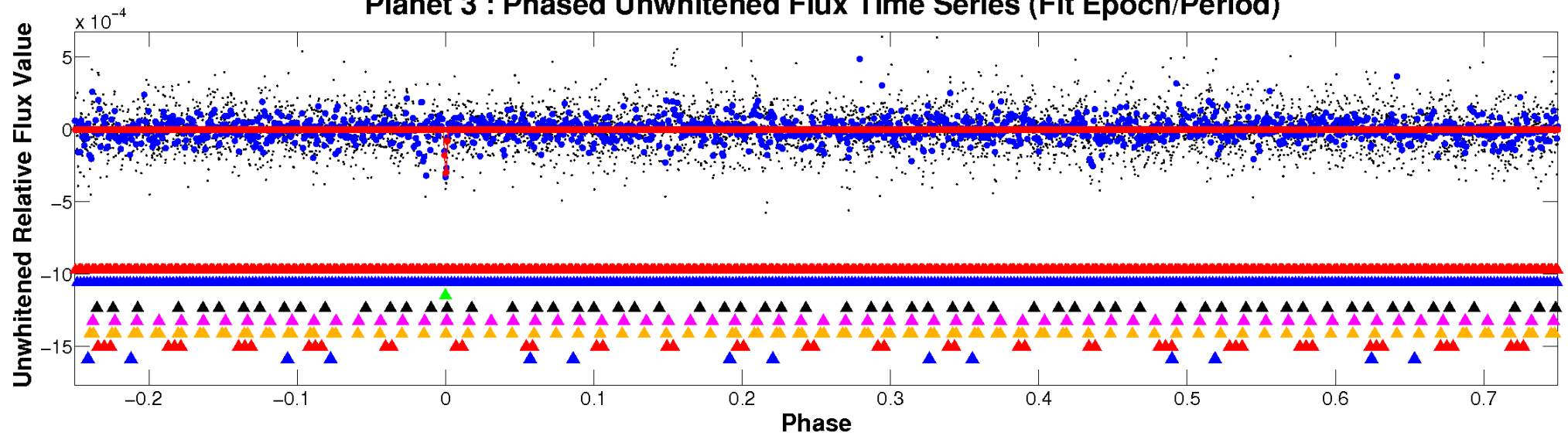
# ALT Odd/Even

TCE 008539939-03

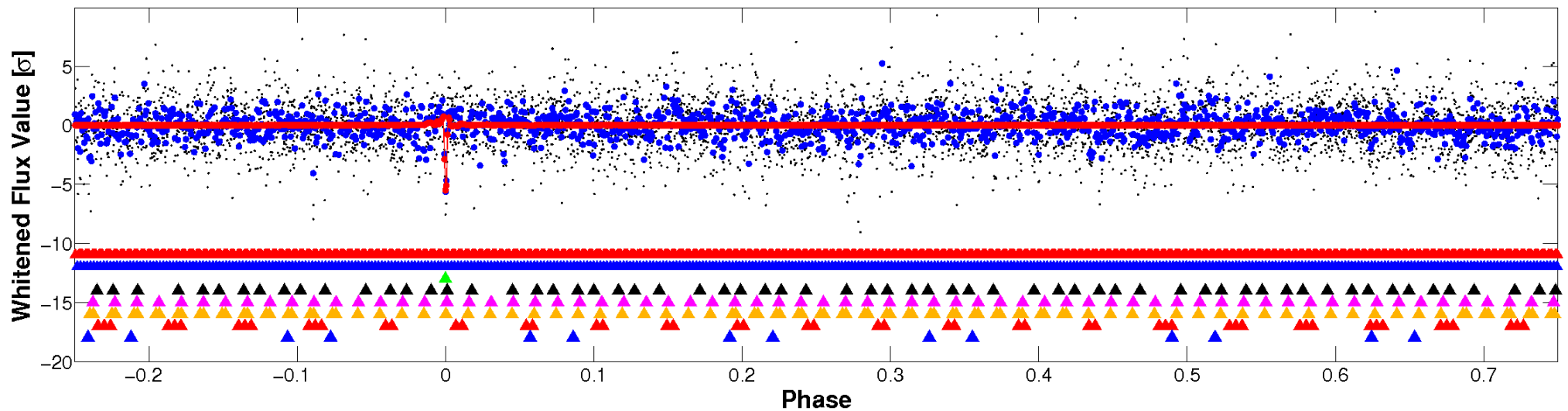


# Non-Whitened Vs. Whitened Light Curve

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



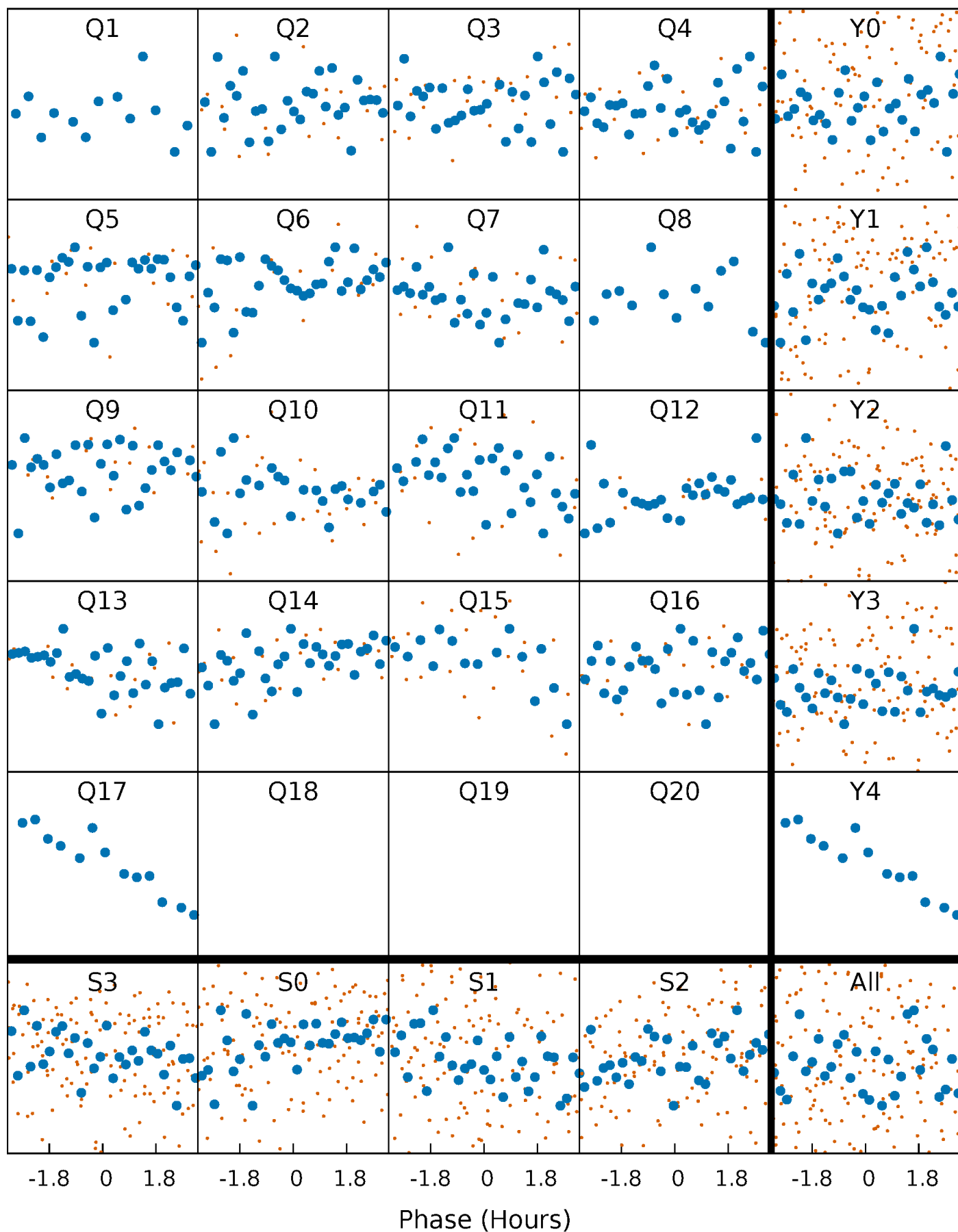
## Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)





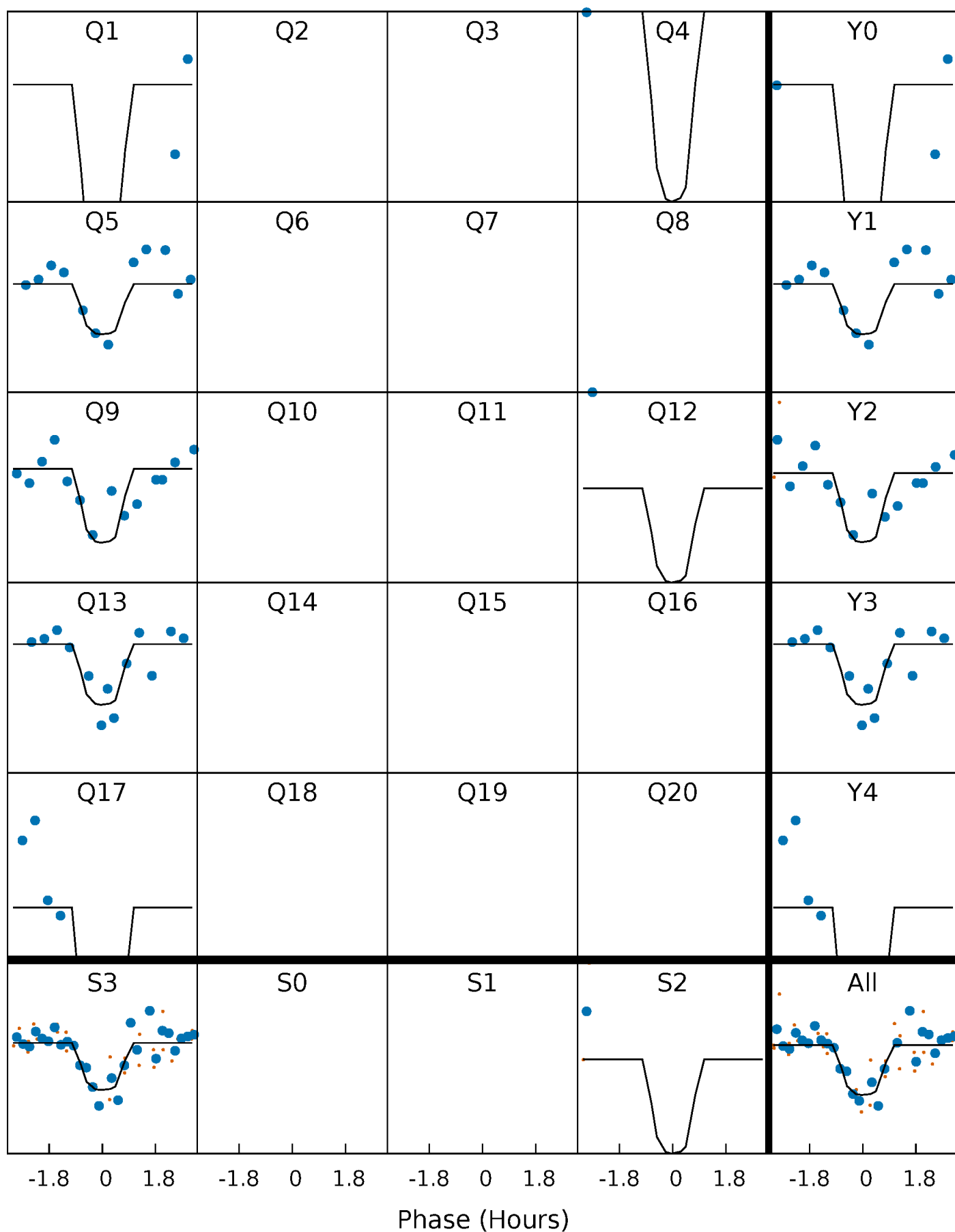
# PDC Quarter-Phased Transit Curves

TCE 008539939-03   P= 29.779603 Days    $T_0=136.093972$  (BKJD)



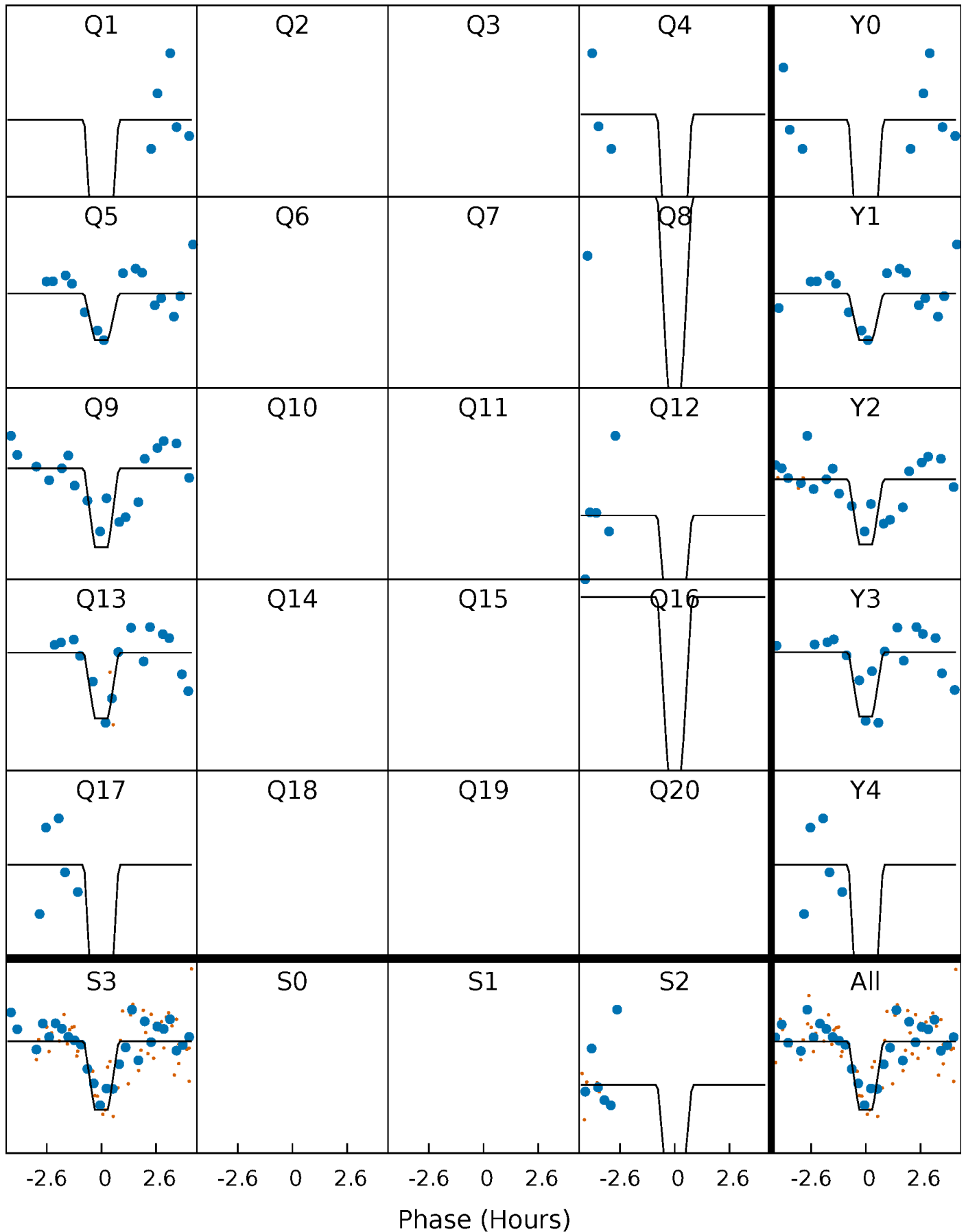
# DV Quarter-Phased Transit Curves

TCE 008539939-03   P= 29.779603 Days    $T_0=136.093972$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

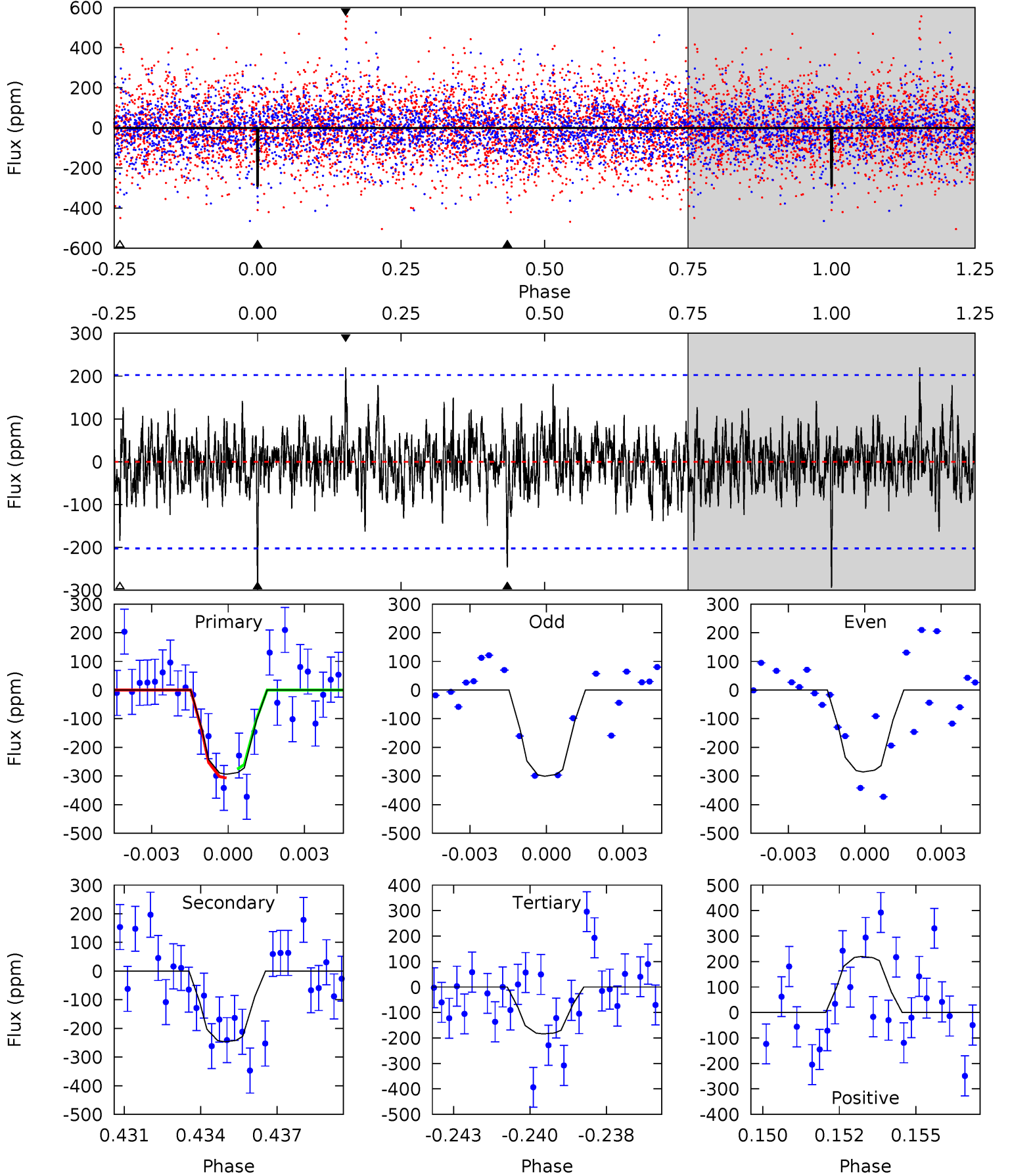
TCE 008539939-03     $P = 29.779291$  Days     $T_0 = 136.100177$  (BKJD)



# DV Model-Shift Uniqueness Test

008539939-03, P = 29.779603 Days, E = 106.314369 Days

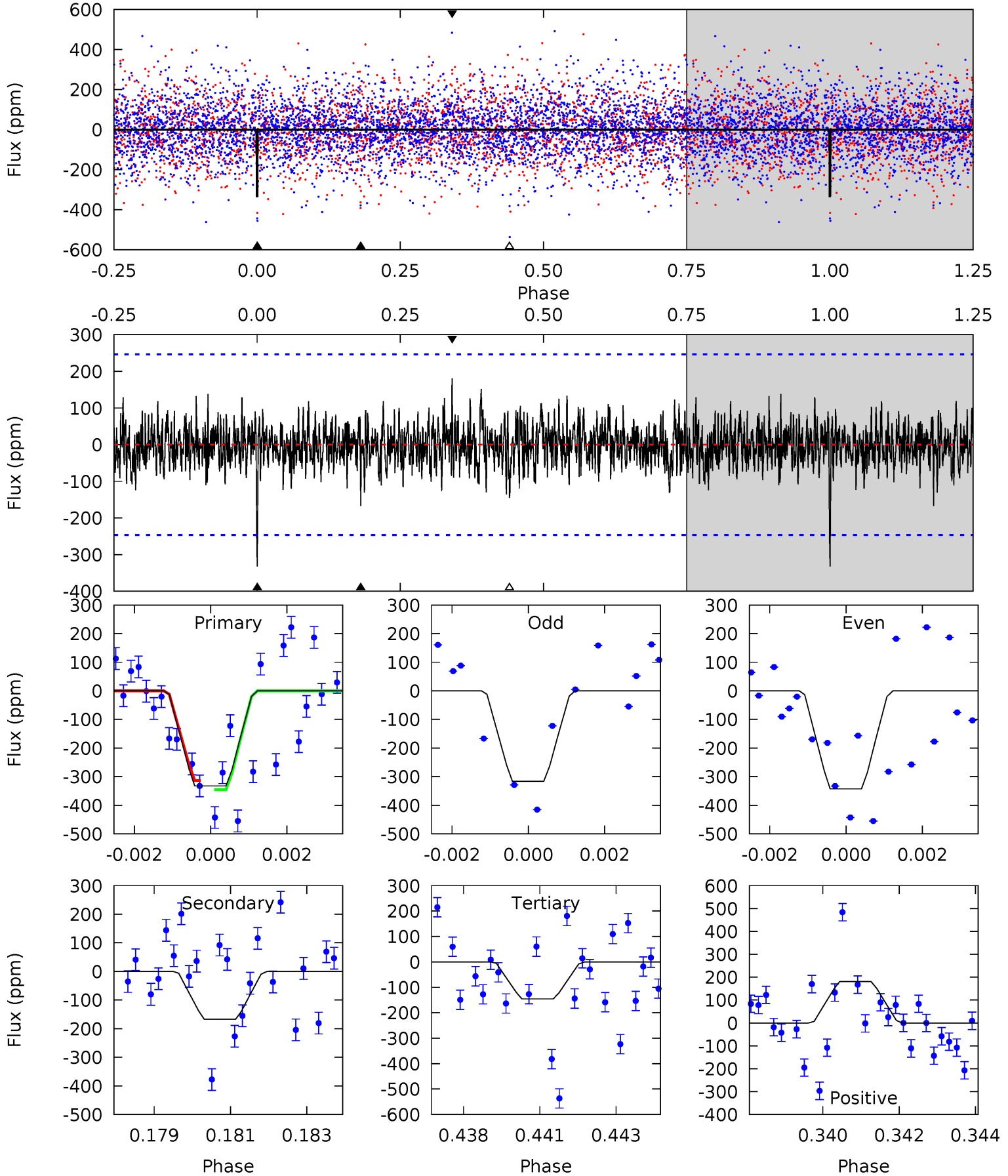
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.64	6.41	4.78	5.71	5.26	2.97	1.30	2.86	1.93	1.63	0.70	0.19	0.99	0.43	0.41



# Alt Model-Shift Uniqueness Test

008539939-03, P = 29.779291 Days, E = 106.320886 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
7.18	3.61	3.14	3.90	5.32	3.08	0.99	4.03	3.28	0.46	-0.29	0.29	0.95	0.35	0.33



### Stellar Parameters For KIC 008539939

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7316^{+228}_{-304}$	$4.048^{+0.185}_{-0.167}$	$-0.100^{+0.250}_{-0.350}$	$1.969^{+0.533}_{-0.533}$	$1.577^{+0.199}_{-0.273}$	$0.291^{+0.326}_{-0.134}$
	+3%/-4%	+5%/-4%	+250%/-350%	+27%/-27%	+13%/-17%	+112%/-46%
Source	KIC0	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 008539939-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-247 \pm 38$	$4.69^{+3.72}_{-3.01}$	$1349^{+103}_{-99}$	$6071^{+4643}_{-1378}$	$296^{+1822}_{-206}$
Alt.	$-167 \pm 46$	$5.05^{+3.85}_{-3.02}$	$1350^{+107}_{-108}$	$5304^{+3520}_{-1085}$	$173^{+897}_{-125}$

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



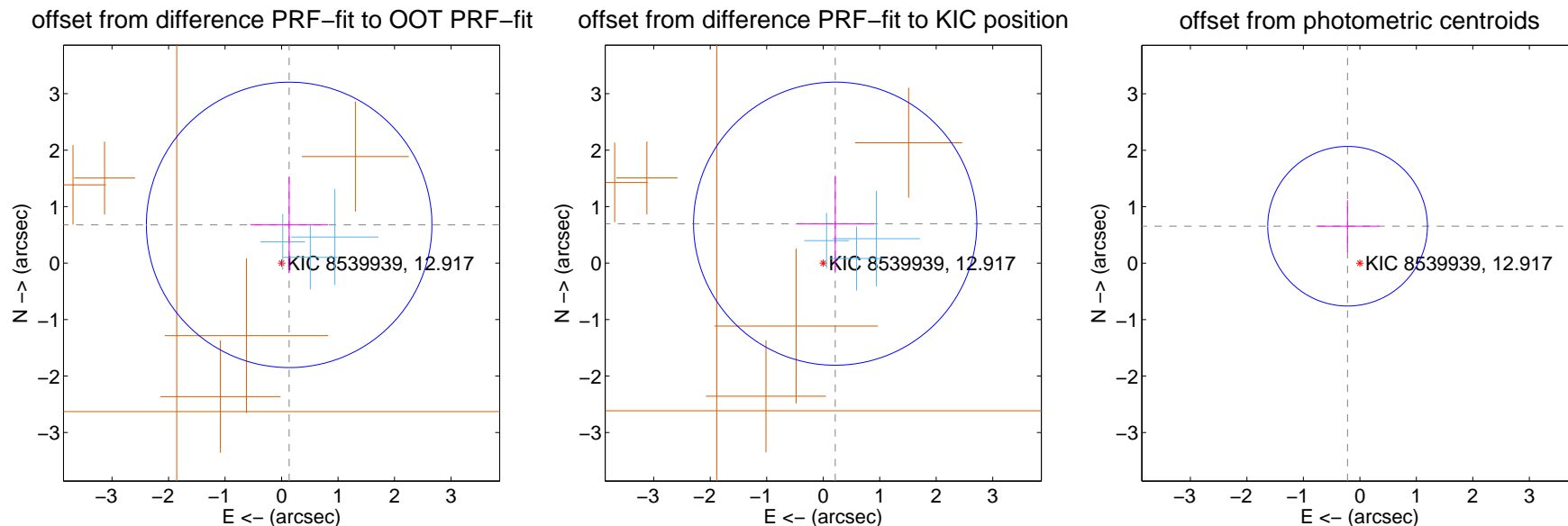
## DV Centroid Data

Supplemental centroid analysis for 008539939-03. Kepler magnitude: 12.92. Transit SNR 14.93

There are 3 quarters with good PRF difference image offsets

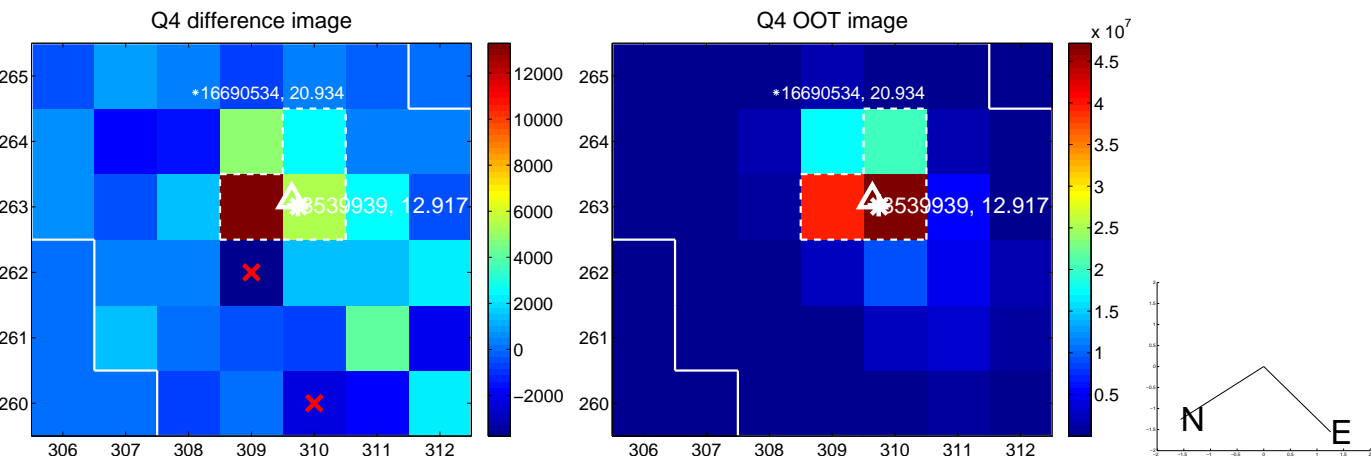
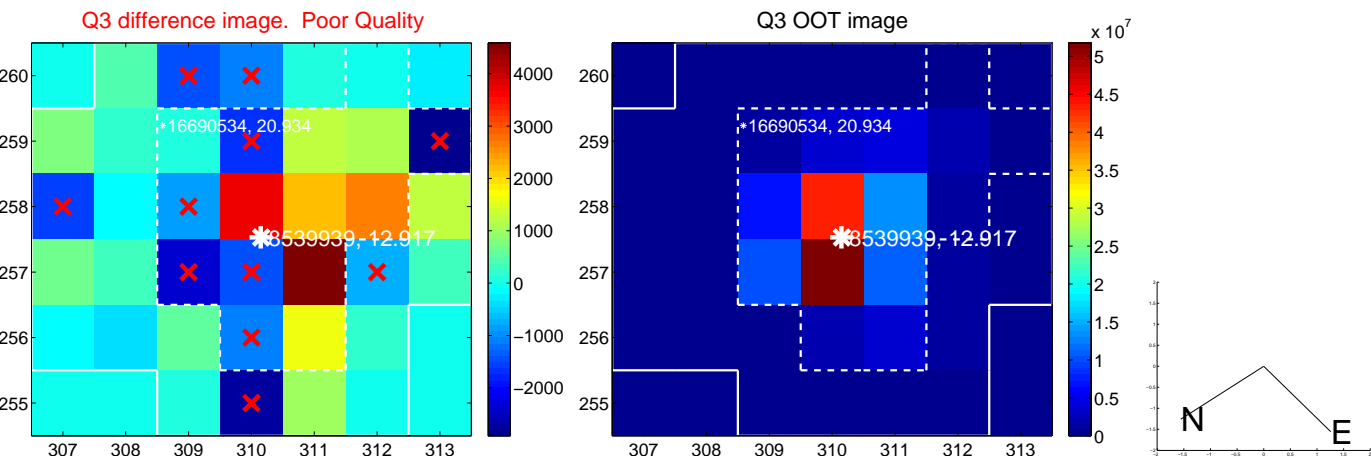
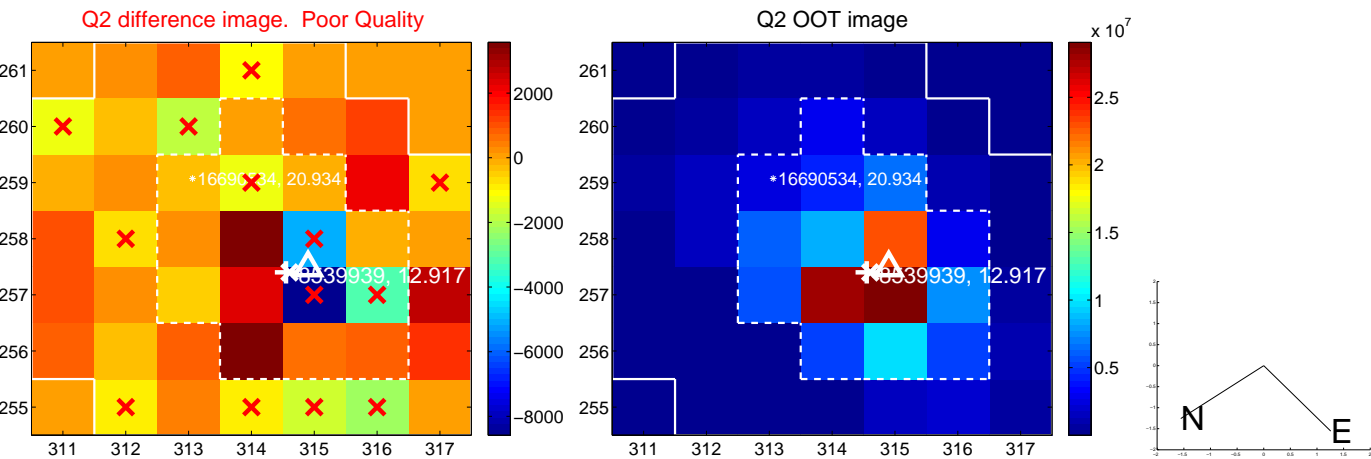
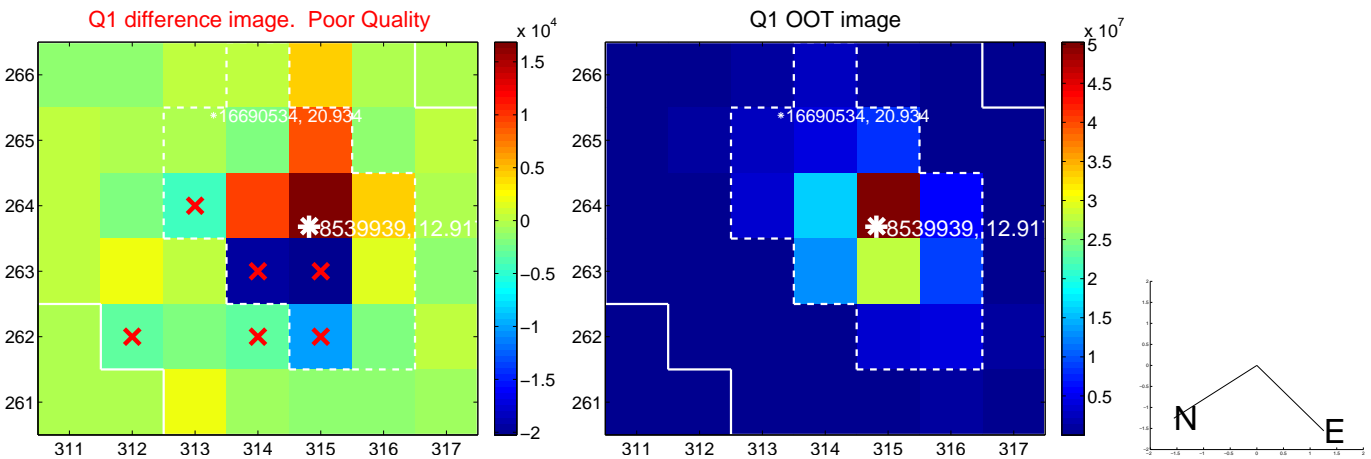
The direct PRF centroid is offset from the target star catalog position by about 0.04 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.690 \pm 0.842$	0.82	$-0.135 \pm 0.688$	$0.677 \pm 0.848$
PRF-fit source offset from KIC position	$0.729 \pm 0.836$	0.87	$-0.212 \pm 0.688$	$0.698 \pm 0.848$
photometric centroid source offset	$0.69 \pm 0.47$	1.46	$0.22 \pm 0.56$	$0.65 \pm 0.46$

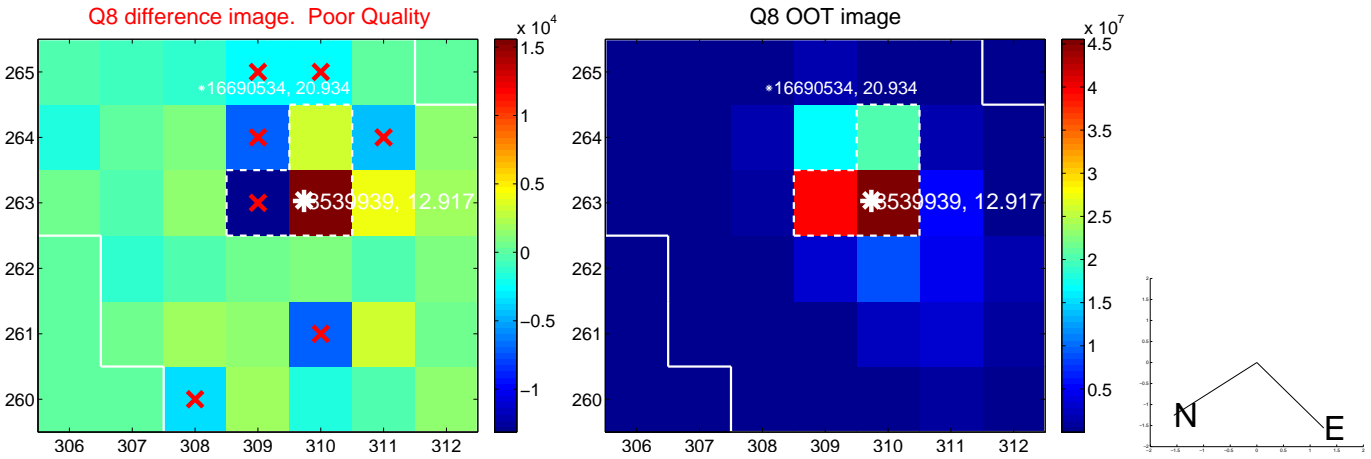
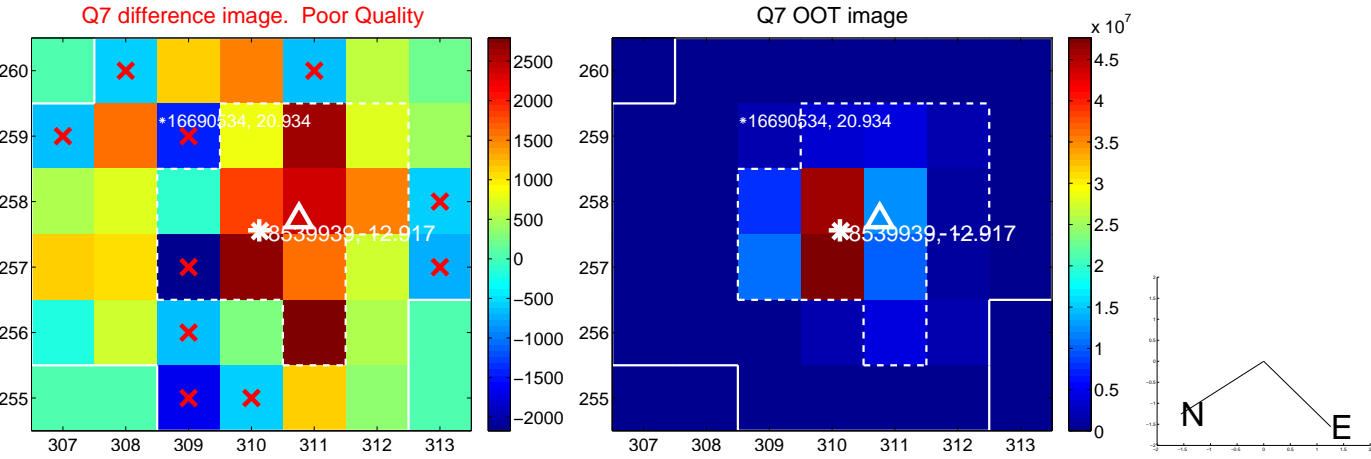
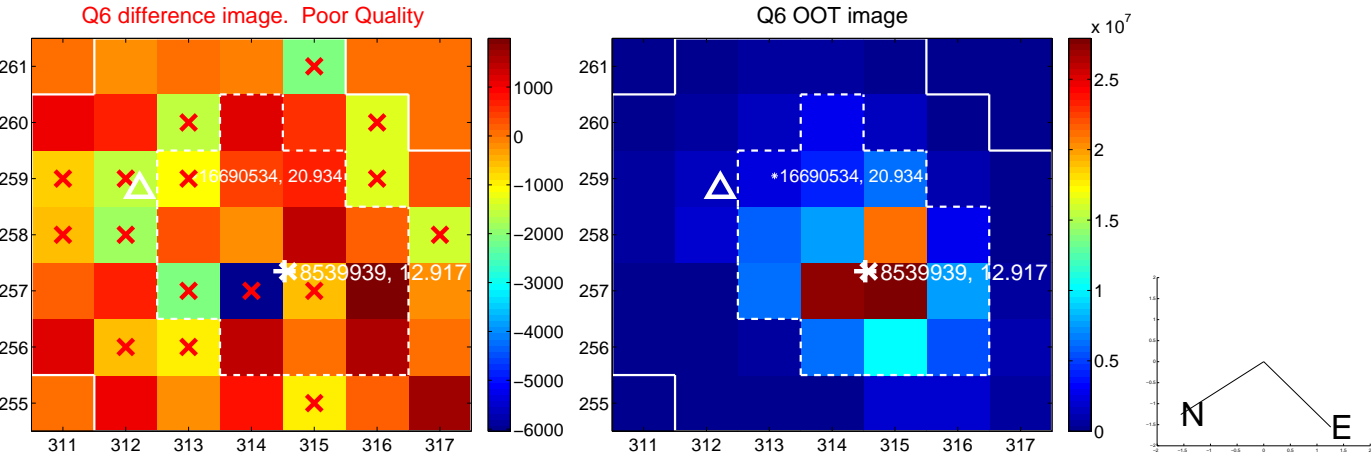
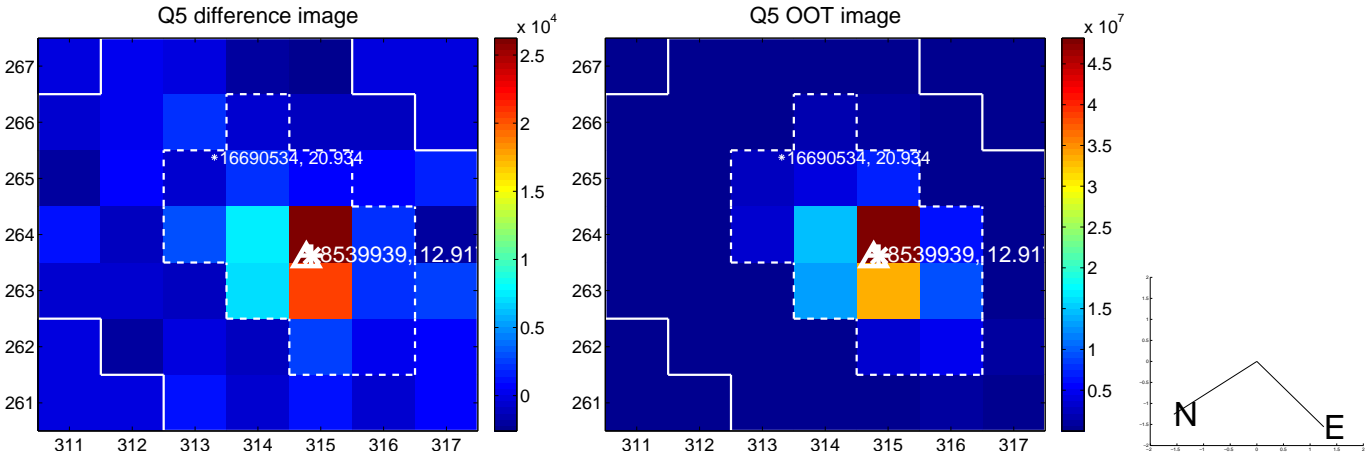


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

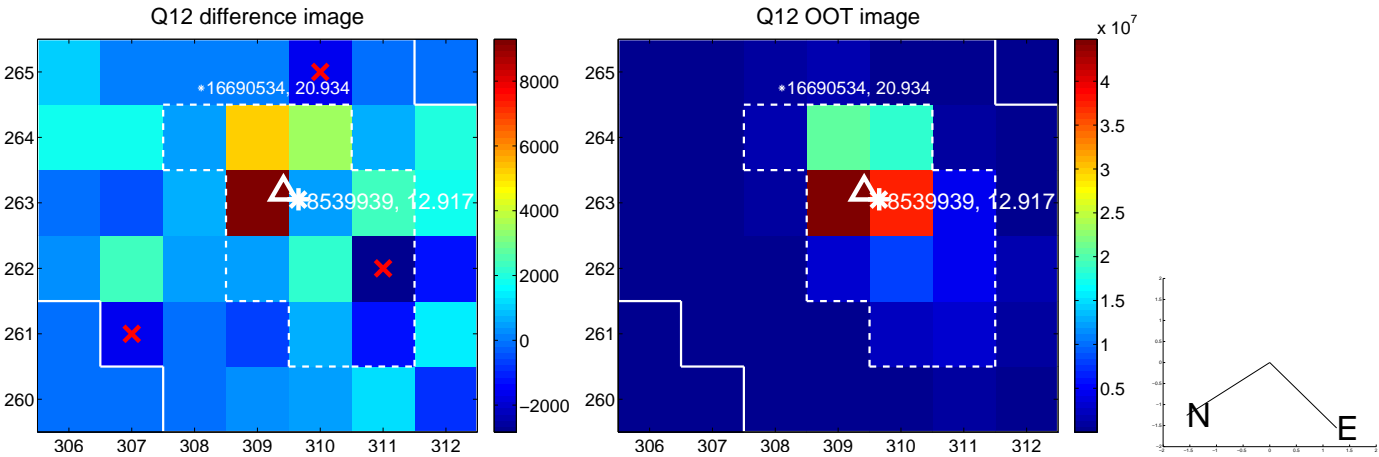
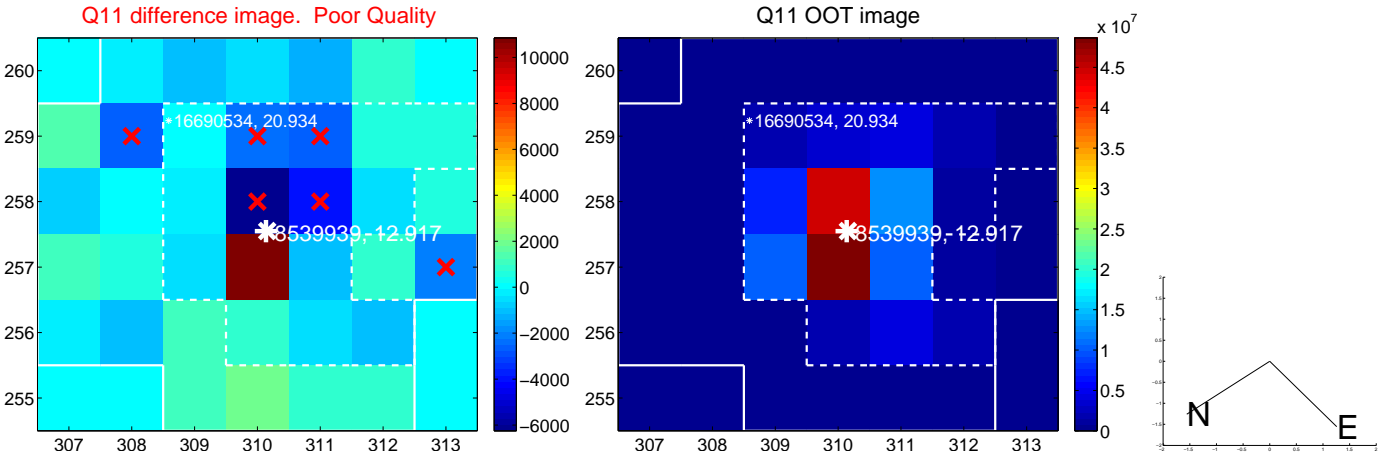
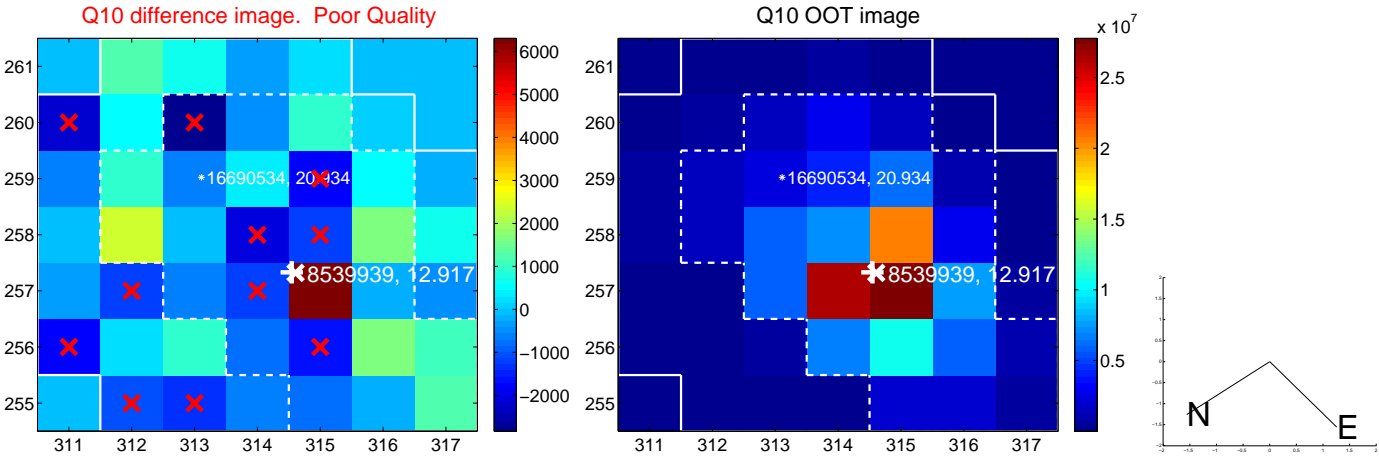
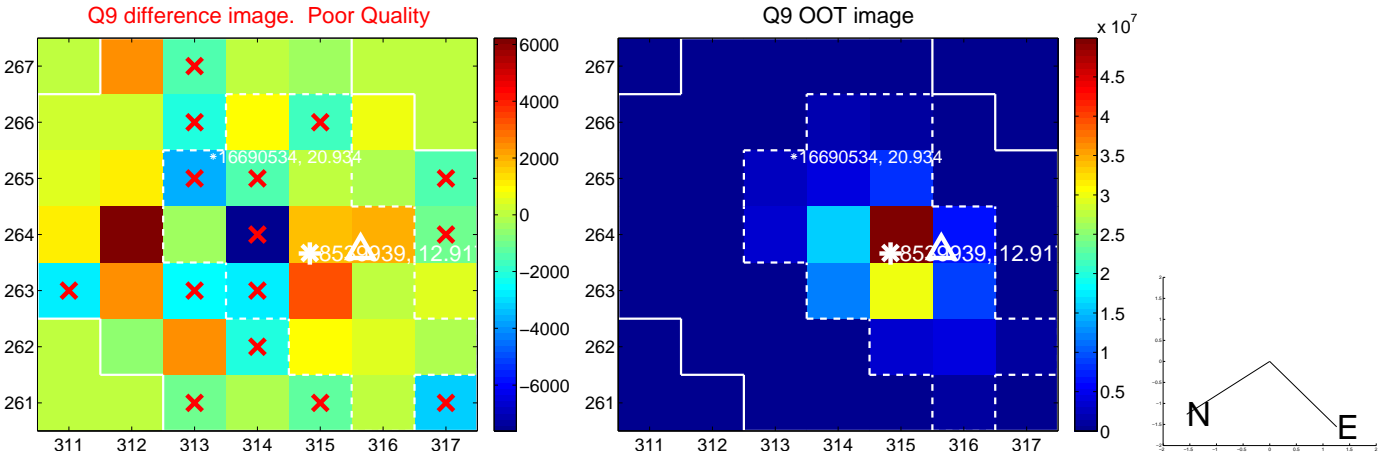
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



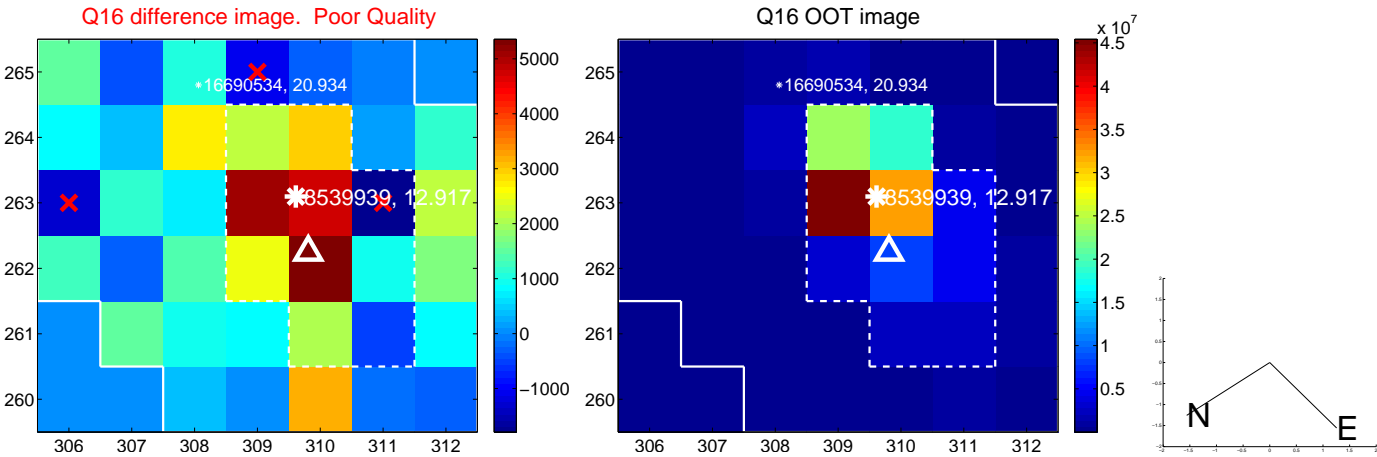
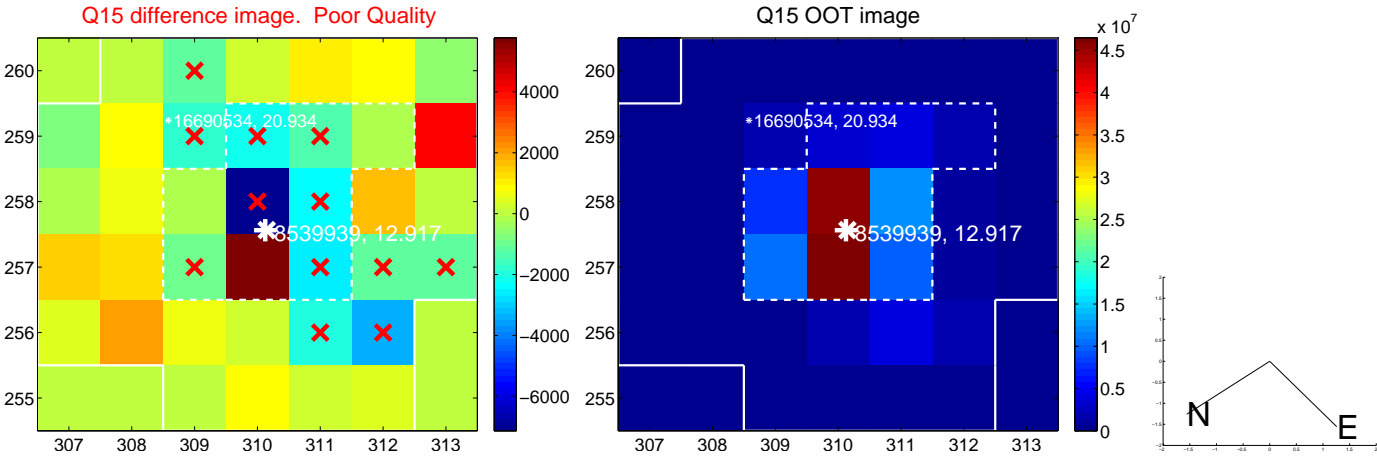
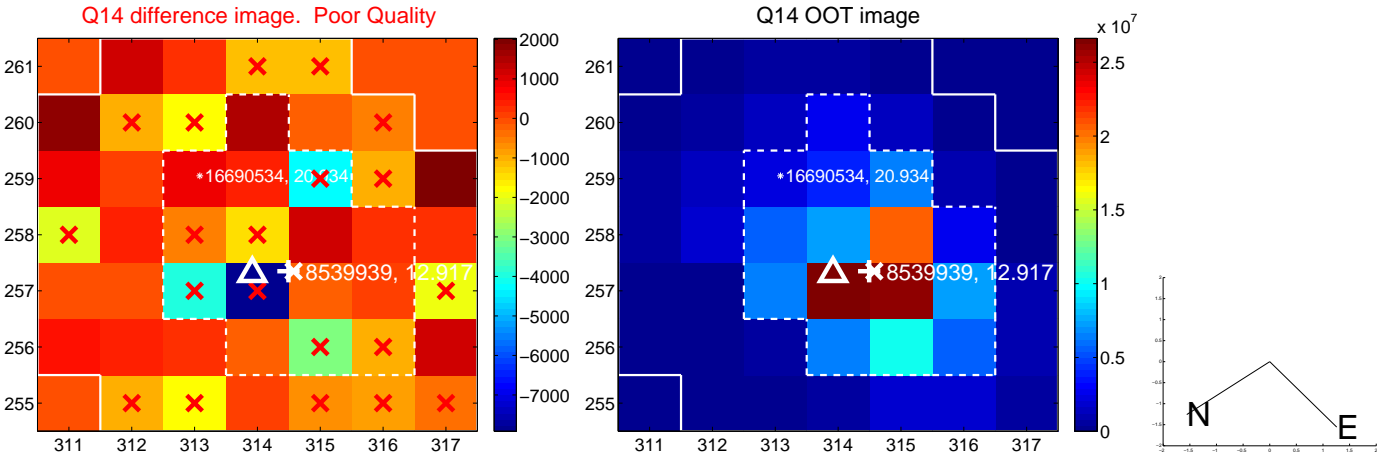
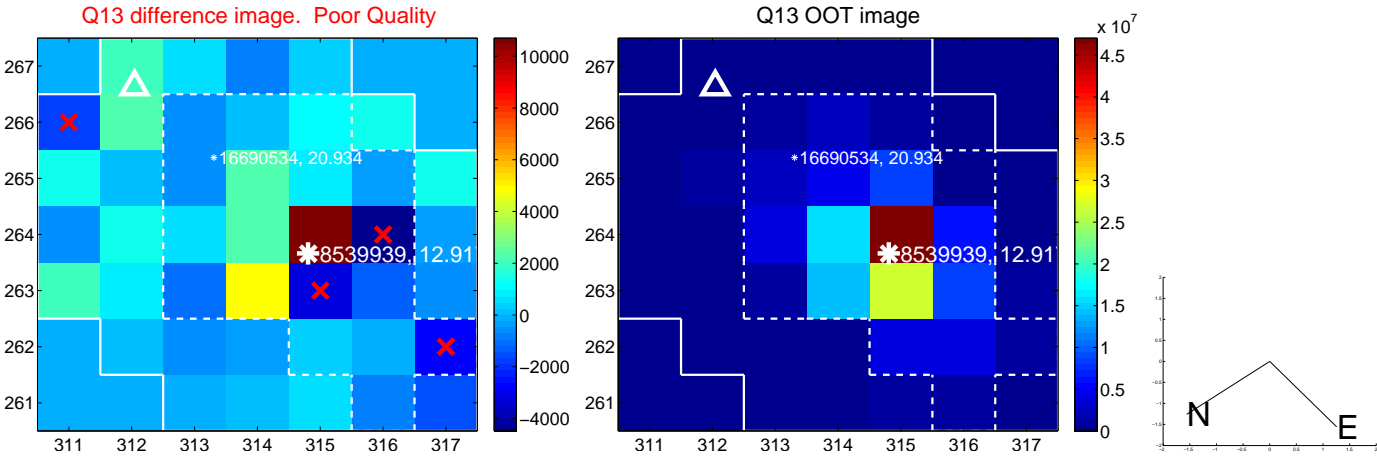
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



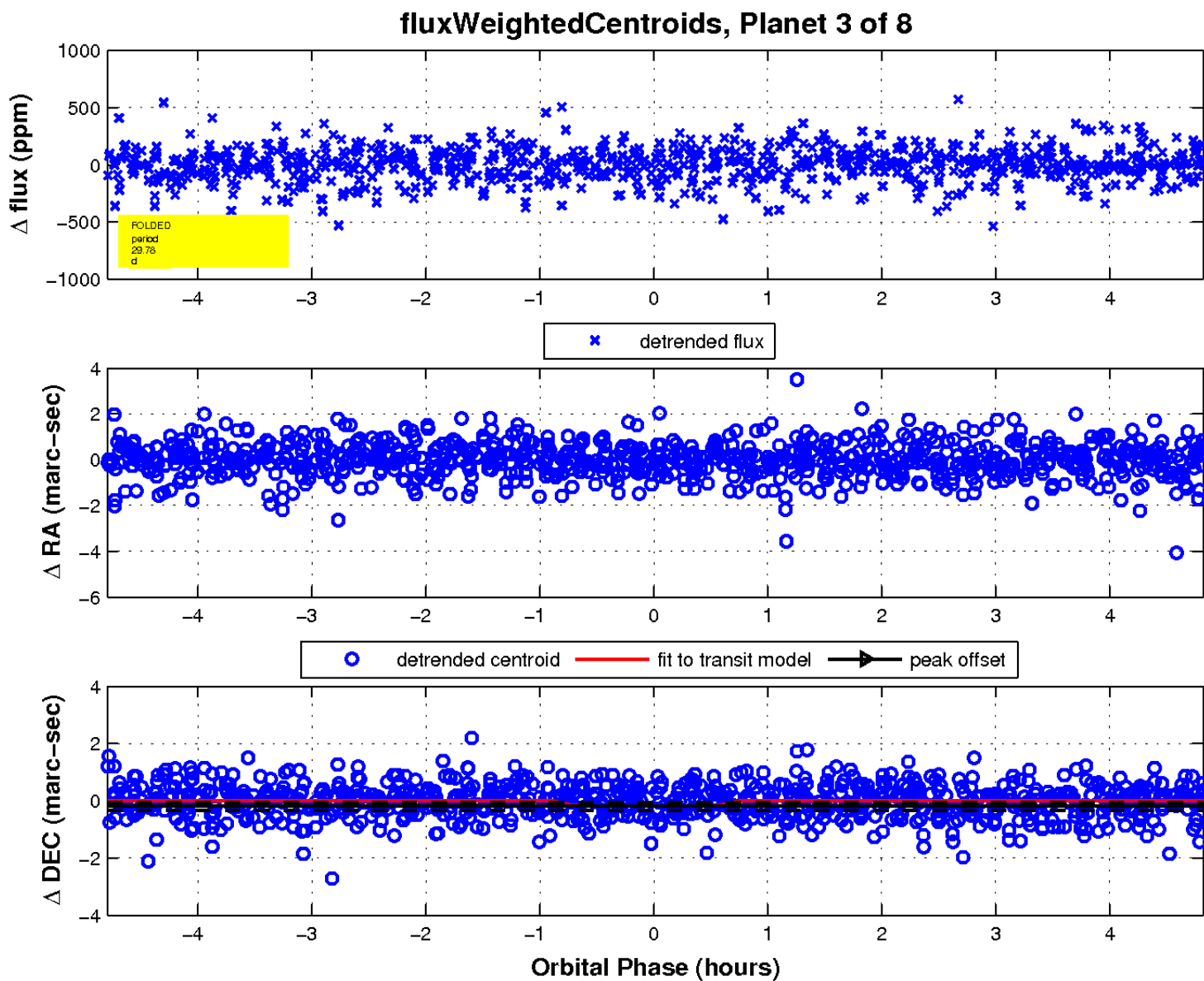
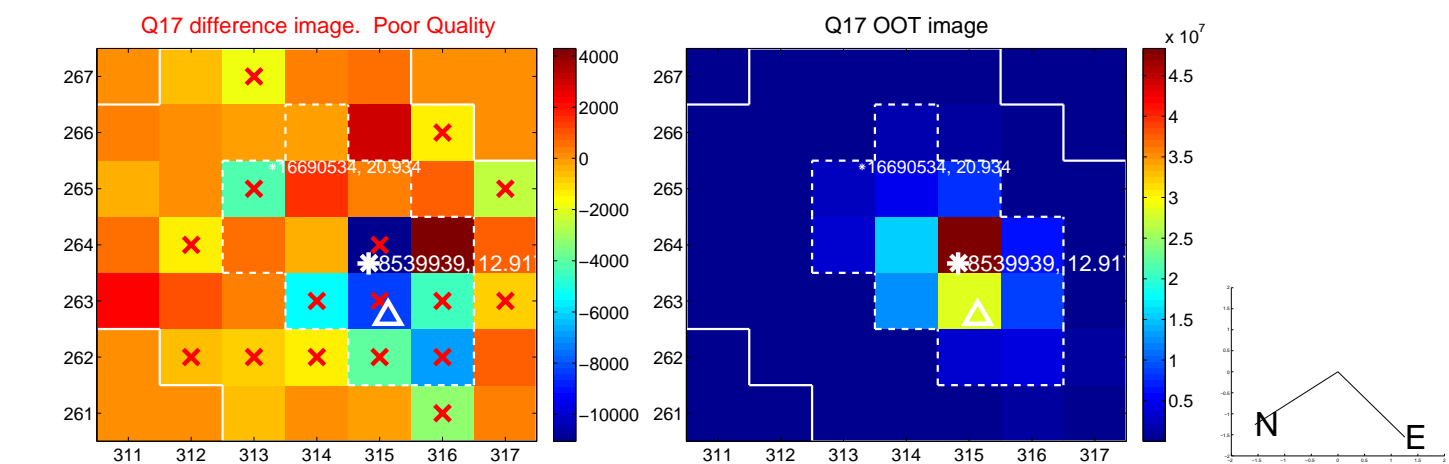
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



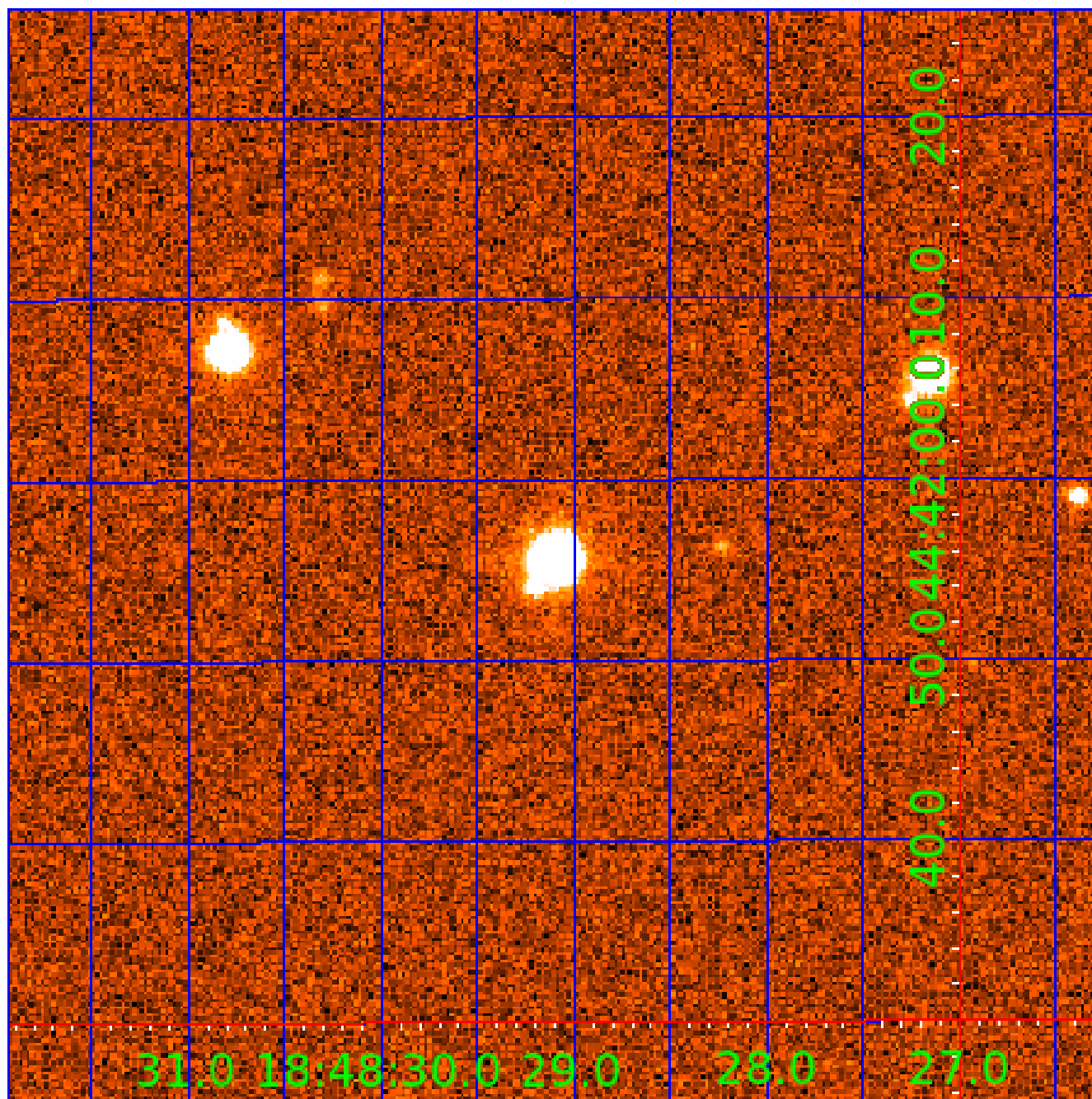
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image

Declination



# KIC 008539939

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008539939-01	OBS	No	1.662014	132.555349	42.3	2.204	12.4	13.6	1.97	7316	1.51	9726.88
008539939-02	OBS	No	1.661802	132.092268	2.9	11.998	12.0	1.8	1.97	7316	0.38	9728.53
008539939-03	OBS	No	29.779603	136.093972	306.4	1.609	14.5	14.9	1.97	7316	3.92	207.46
008539939-04	OBS	No	23.071110	153.308159	371.9	0.866	12.8	11.2	1.97	7316	4.50	291.56
008539939-05	OBS	No	20.445838	145.452169	190.0	2.167	12.1	11.3	1.97	7316	2.82	342.51
008539939-06	OBS	No	14.668596	133.821649	101.2	4.250	10.8	10.0	1.97	7316	2.22	533.30
008539939-07	OBS	No	28.367532	133.353696	172.0	2.973	10.4	9.1	1.97	7316	2.99	221.34
008539939-08	OBS	No	102.224919	162.703297	190.3	3.120	11.2	9.1	1.97	7316	2.80	40.06

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008539939-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
008539939-02	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—SAME_NTL_PERIOD
008539939-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
008539939-04	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
008539939-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—CENT_FEW_MEAS
008539939-06	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—HALO_GHOST
008539939-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
008539939-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—SAME_NTL_PERIOD

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

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

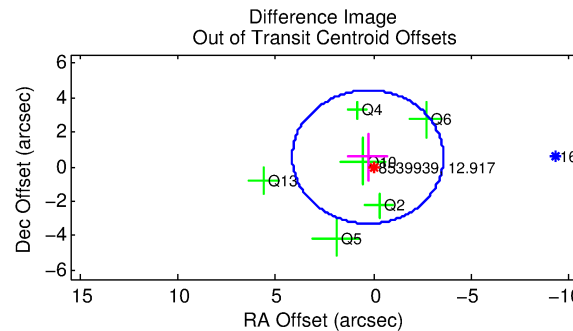
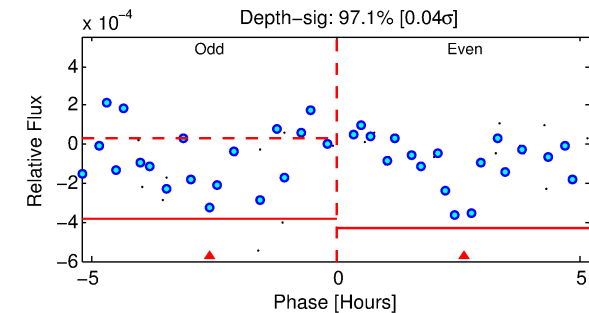
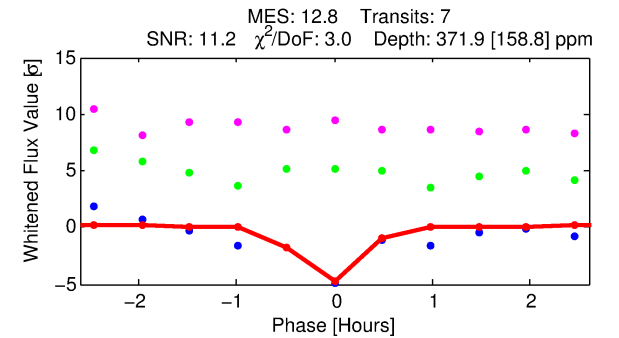
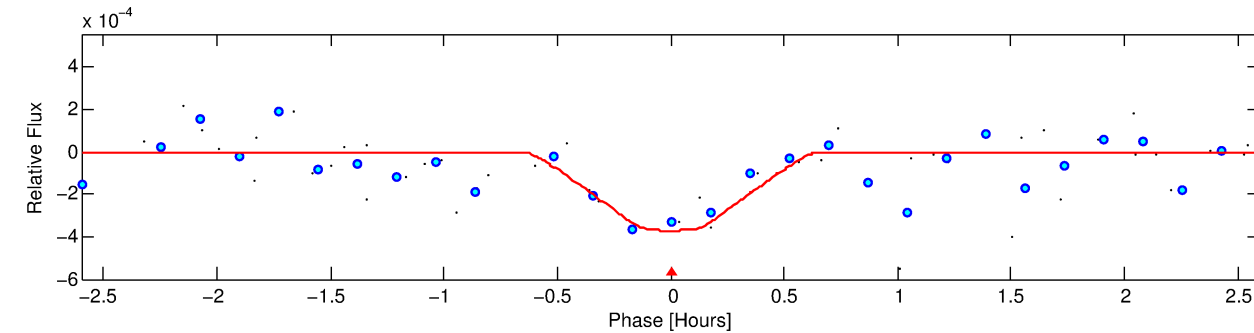
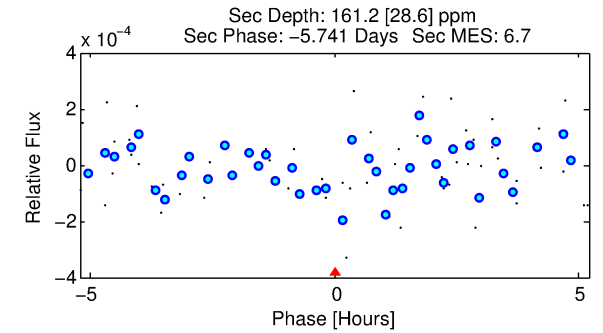
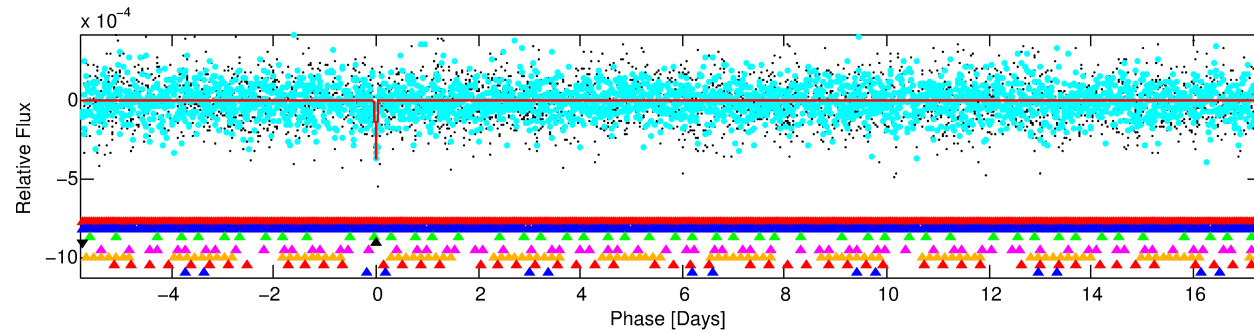
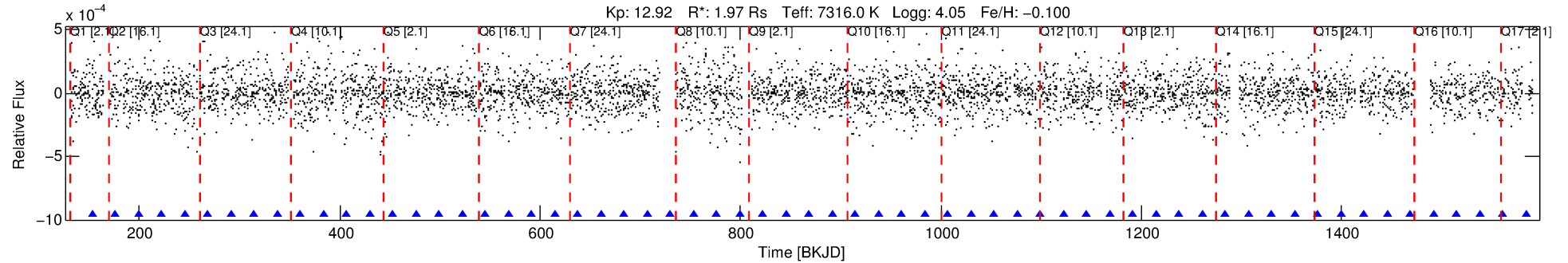
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008539939-04

No Significant Match Found

# DV One-Page Summary

KIC: 8539939 Candidate: 4 of 8 Period: 23.071 d



## DV Fit Results:

Period = 23.07111 [0.00020] d  
Epoch = 153.3082 [0.0063] BKJD  
Rp/R\* = 0.0209 [0.0280]  
a/R\* = 92.50 [718.77]  
b = 0.91 [1.43]  
Seff = 291.56 [109.42]  
Teq = 1054 [99] K  
Rp = 4.50 [6.13] Re  
a = 0.1847 [0.0424] AU  
Ag = 149.44 [402.92] [0.37σ]  
Teffp = 5696 [3817] K [1.22σ]

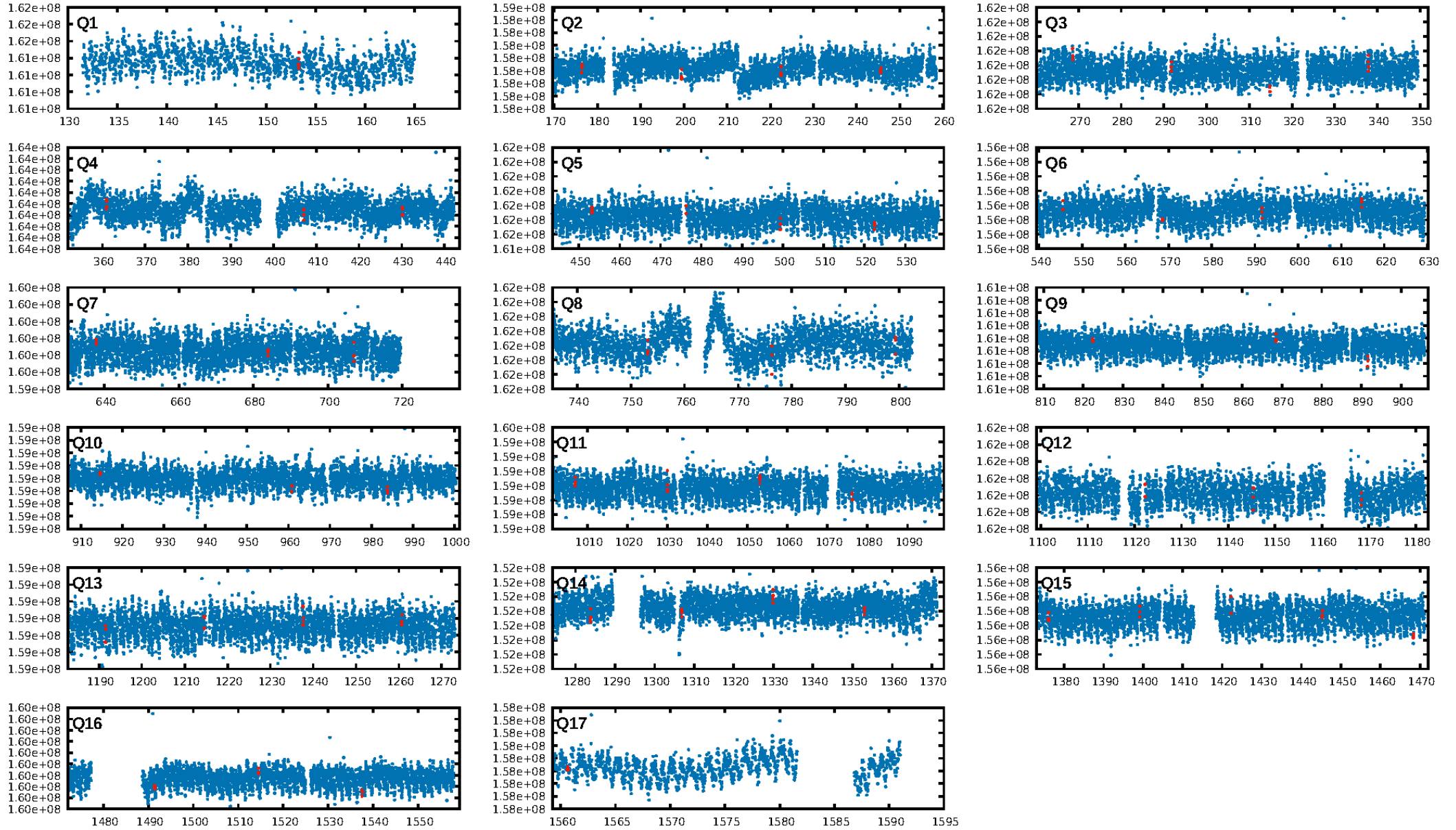
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [26.99σ]  
LongPeriod-sig: 100.0% [41.05σ]  
ModelChiSquare2-sig: 38.4%  
ModelChiSquareGof-sig: 89.0%  
**Bootstrap-pfa: 6.18e-12**  
RollingBand-fgt: 1.00 [7/7]  
**GhostDiagnostic-chr: -0.6434**  
Centroid-sig: N/A  
Centroid-so: 0.432 arcsec [0.81σ]  
OotOffset-rm: 0.630 arcsec [0.49σ]  
KicOffset-rm: 0.650 arcsec [0.50σ]  
OotOffset-st: 3/0/1/2 [6]  
KicOffset-st: 3/0/1/2 [6]  
DiffImageQuality-fgm: 0.33 [2/6]  
DiffImageOverlap-fno: 0.41 [7/17]

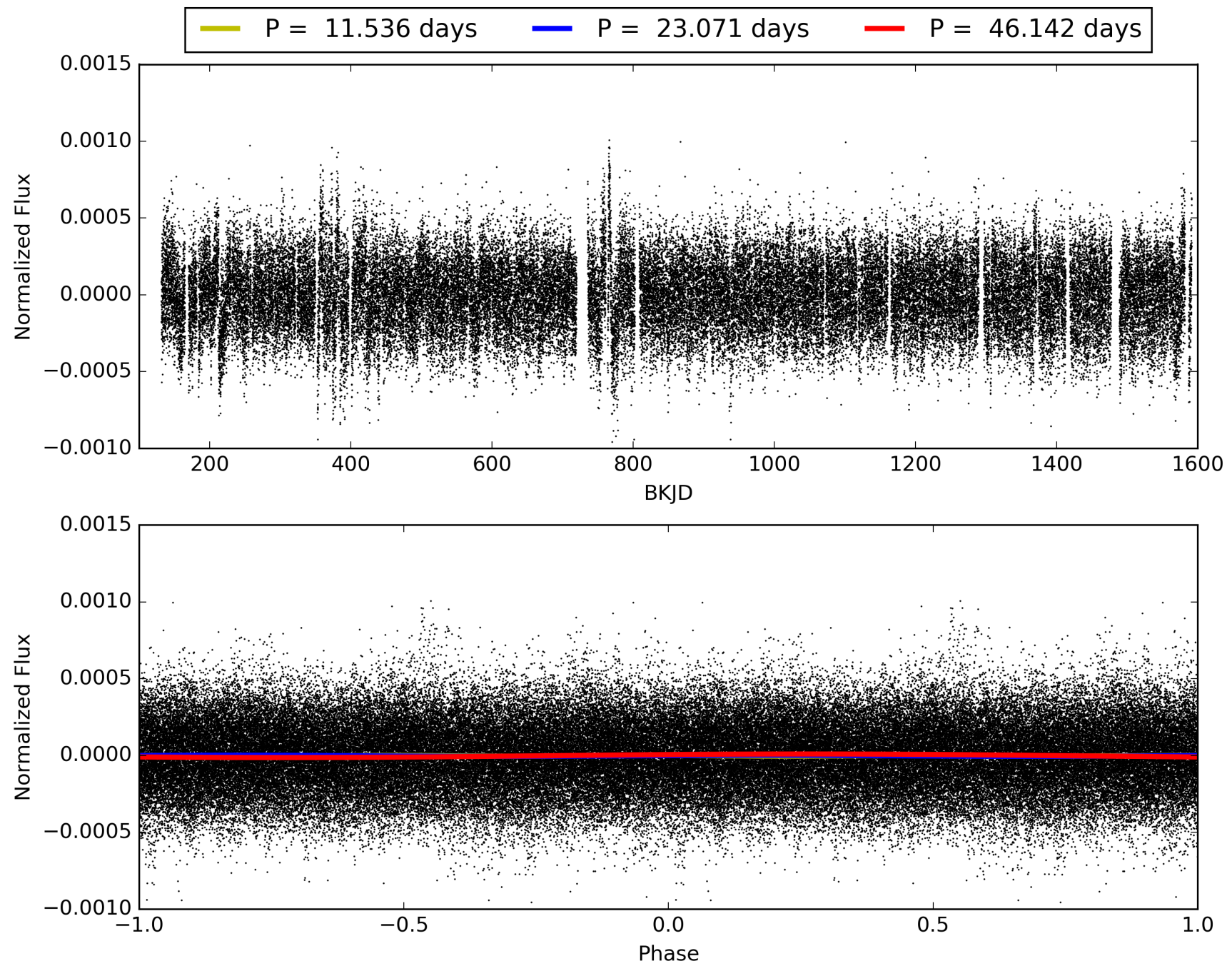
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 08:00:44 Z

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

# TCE 008539939-04, PDC Light Curves

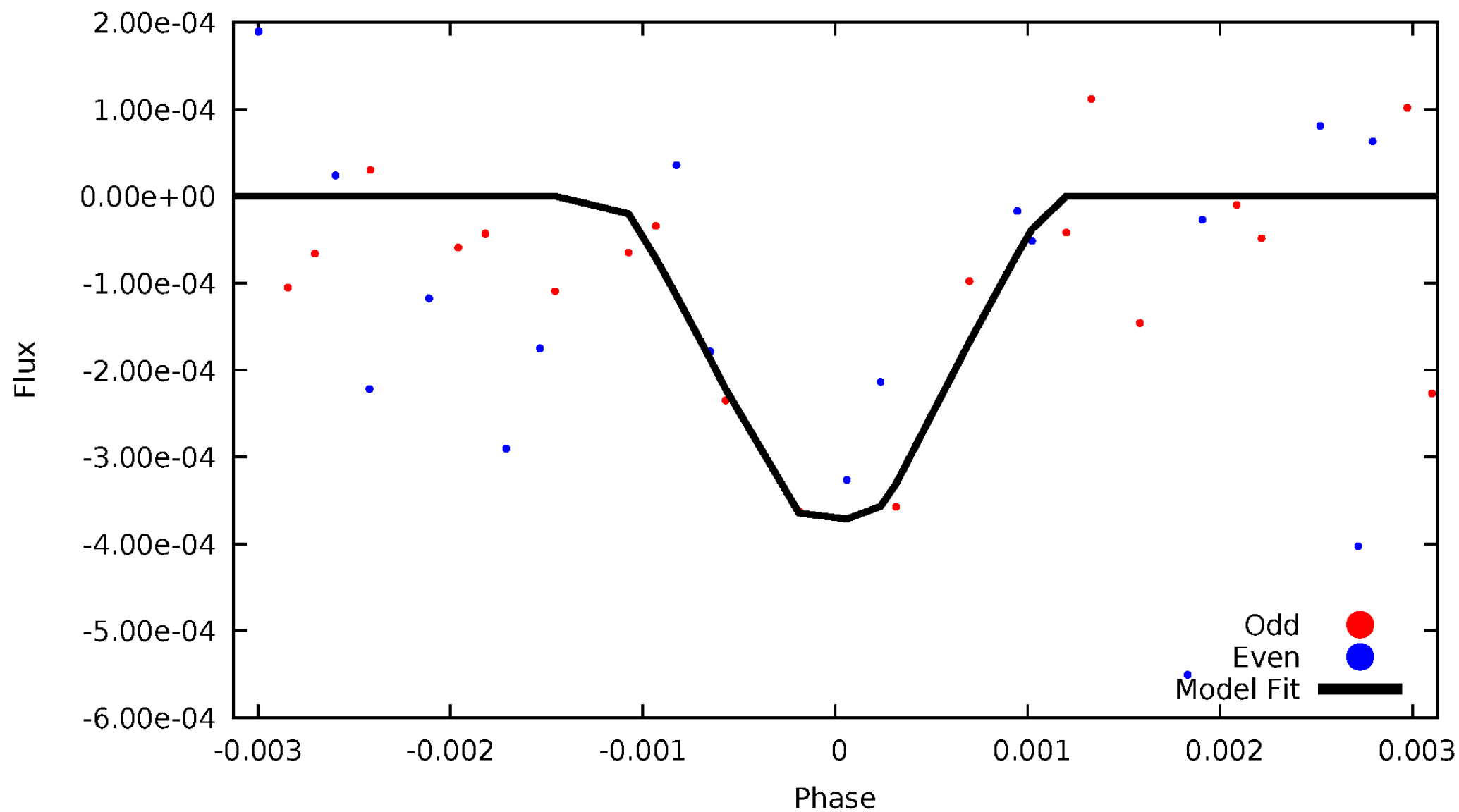


TCE 008539939-04



# DV Odd/Even

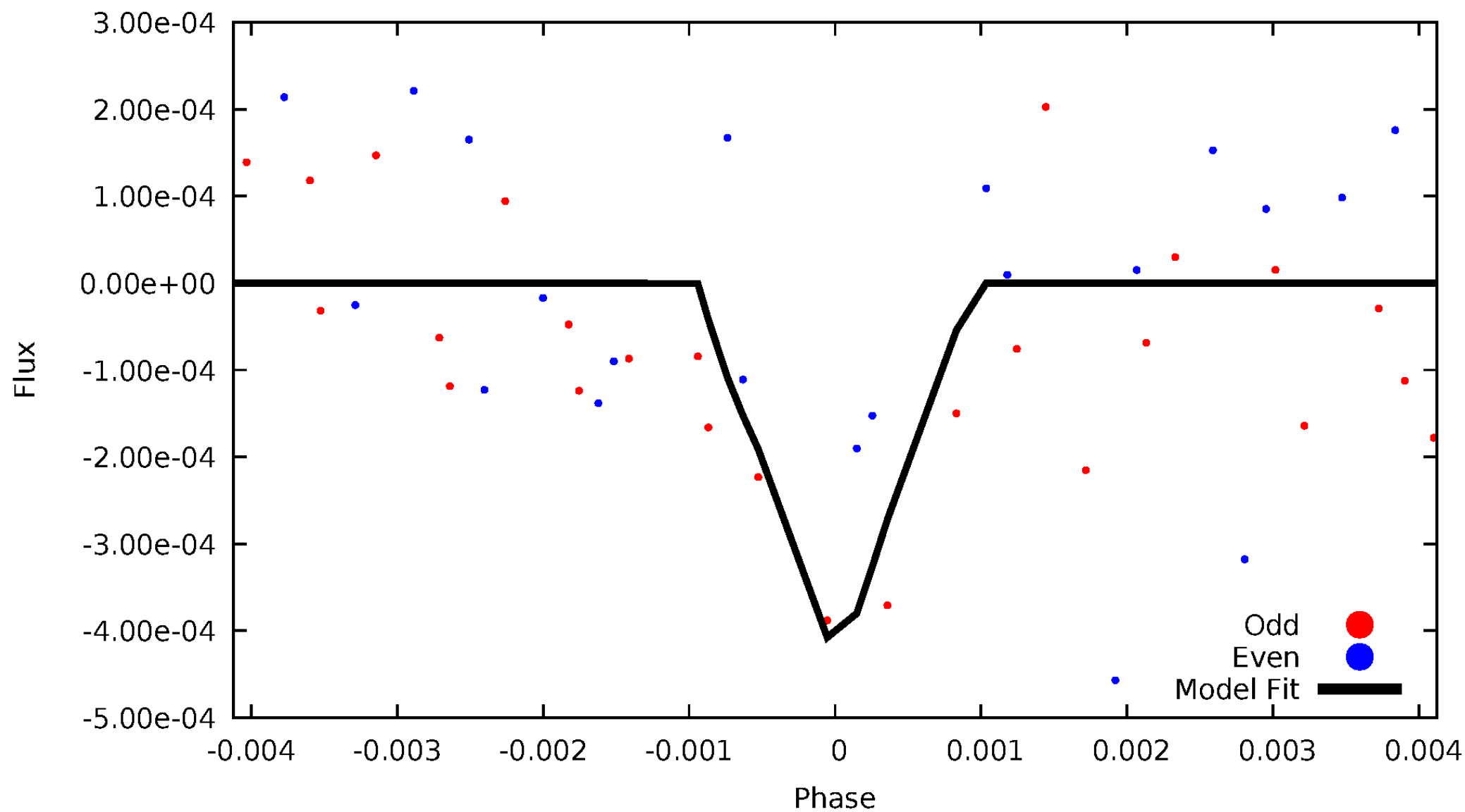
TCE 008539939-04





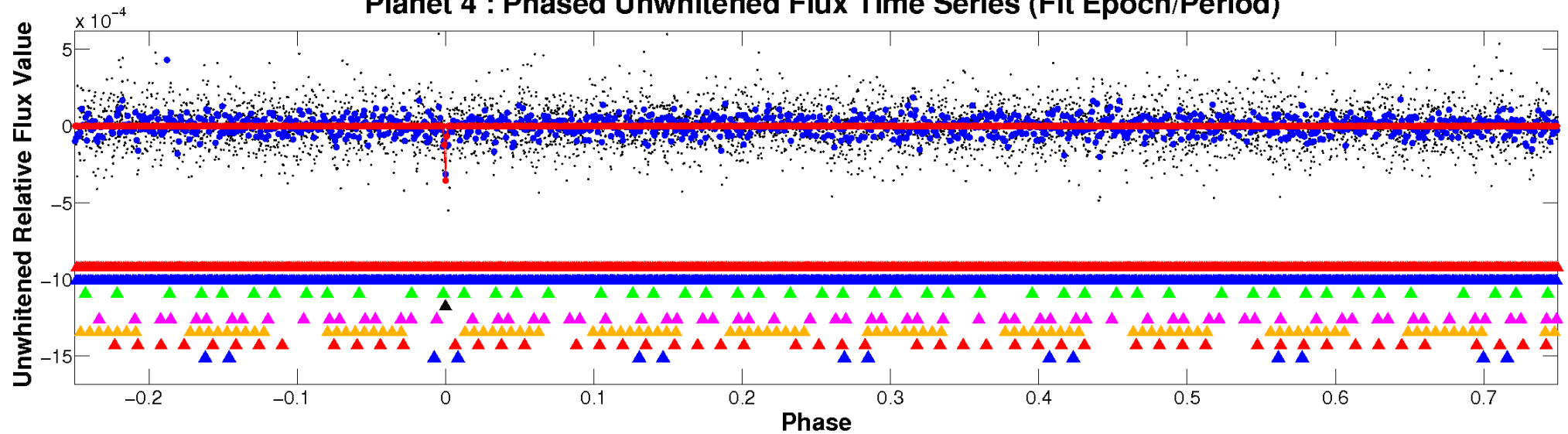
# ALT Odd/Even

TCE 008539939-04

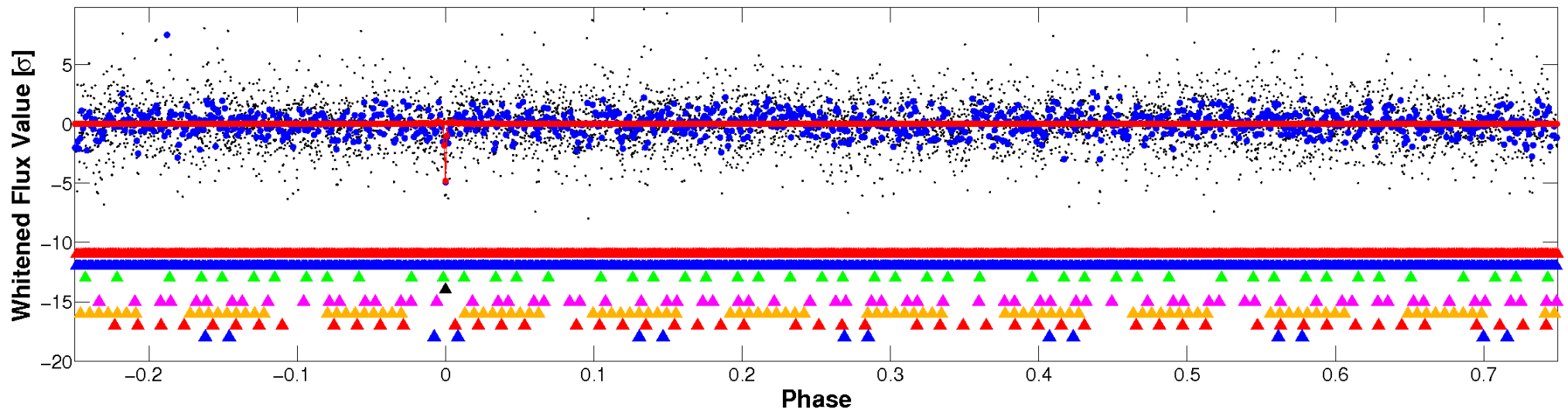


# Non-Whitened Vs. Whitened Light Curve

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

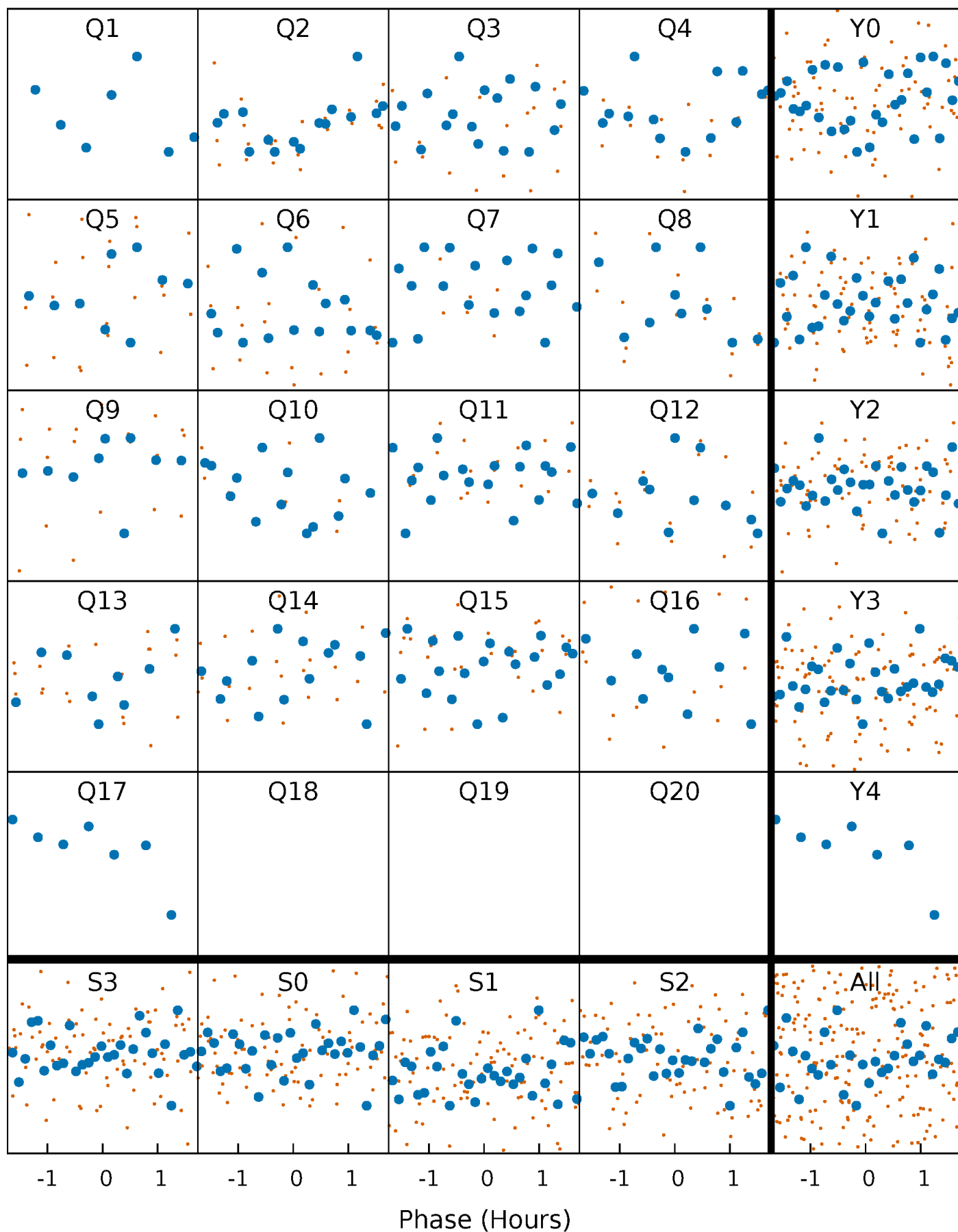


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



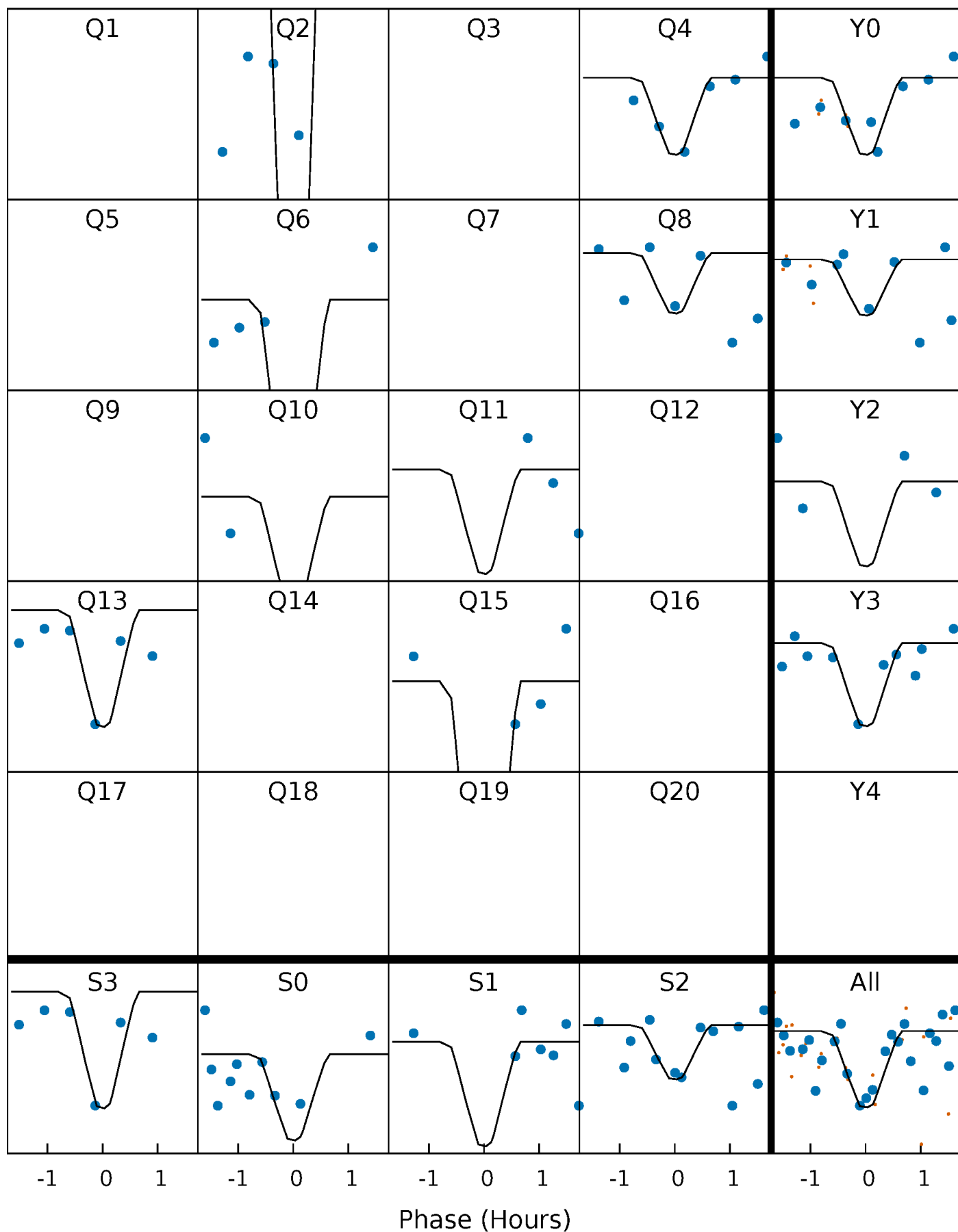
# PDC Quarter-Phased Transit Curves

TCE 008539939-04   P= 23.071110 Days    $T_0=153.308159$  (BKJD)



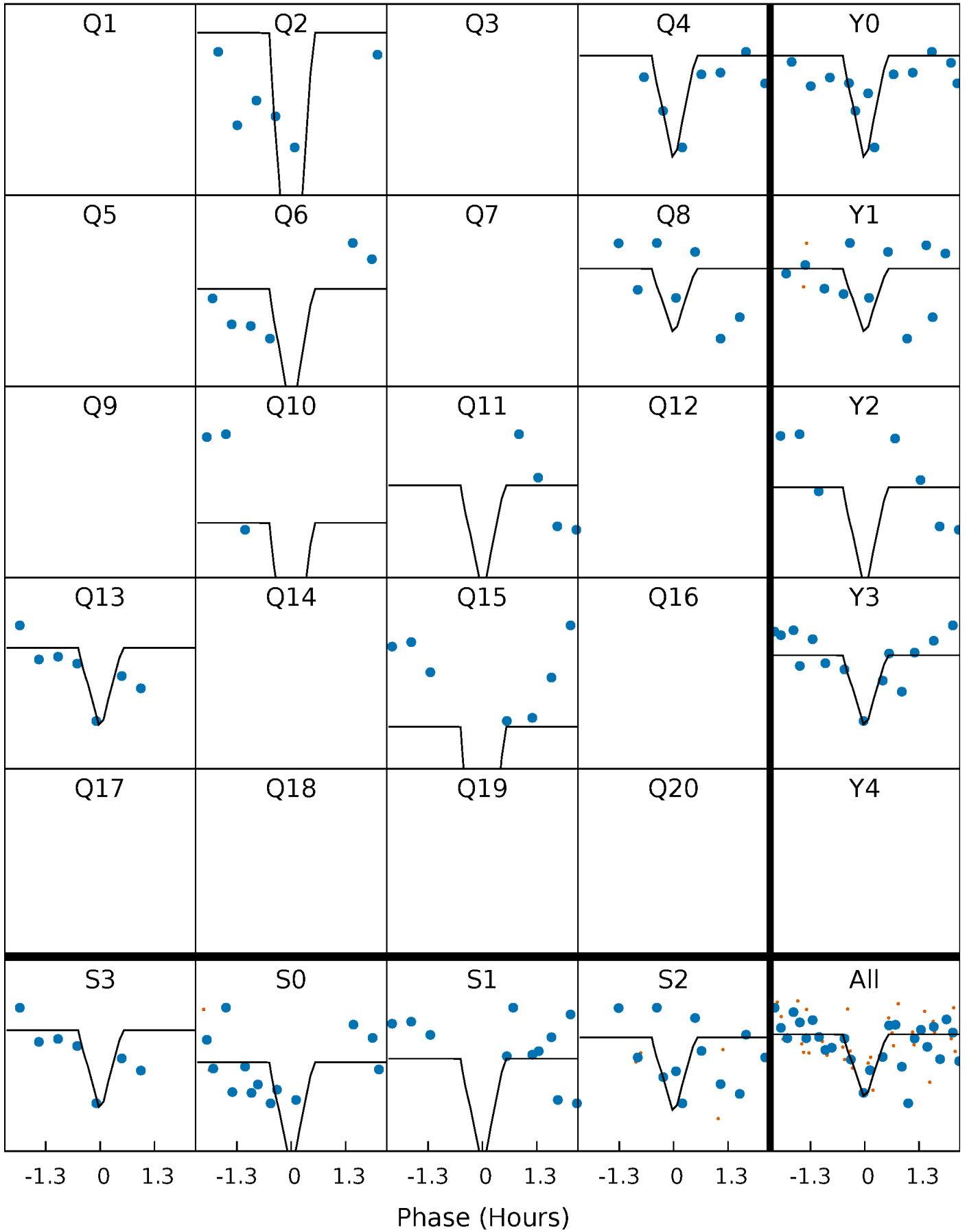
# DV Quarter-Phased Transit Curves

TCE 008539939-04 P= 23.071110 Days  $T_0=153.308159$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

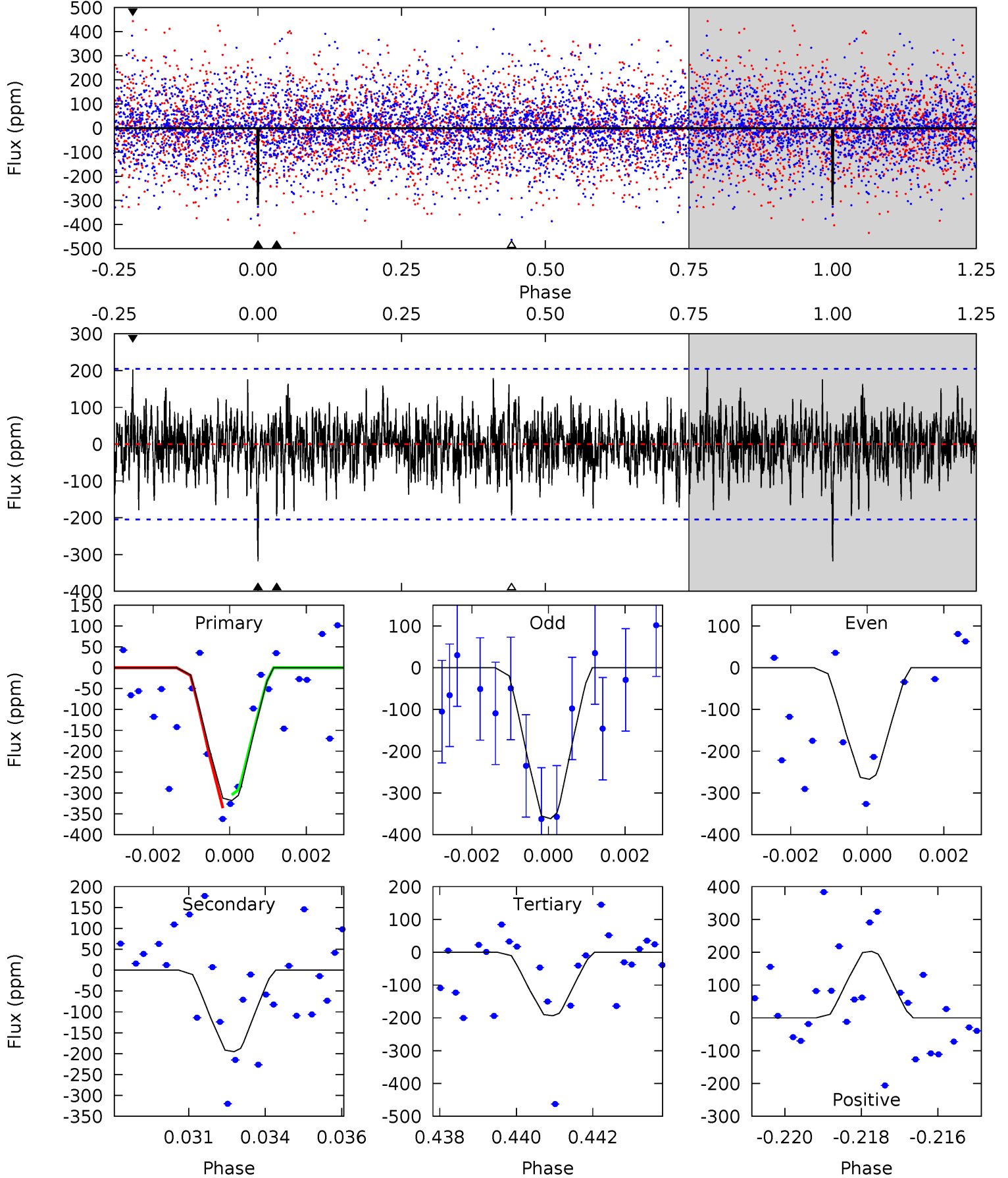
TCE 008539939-04 P= 23.071049 Days  $T_0=153.307823$  (BKJD)



# DV Model-Shift Uniqueness Test

008539939-04, P = 23.071110 Days, E = 130.237049 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
8.27	5.07	5.03	5.27	5.32	3.08	1.43	3.24	3.01	0.04	-0.20	1.24	1.02	0.39	0.42

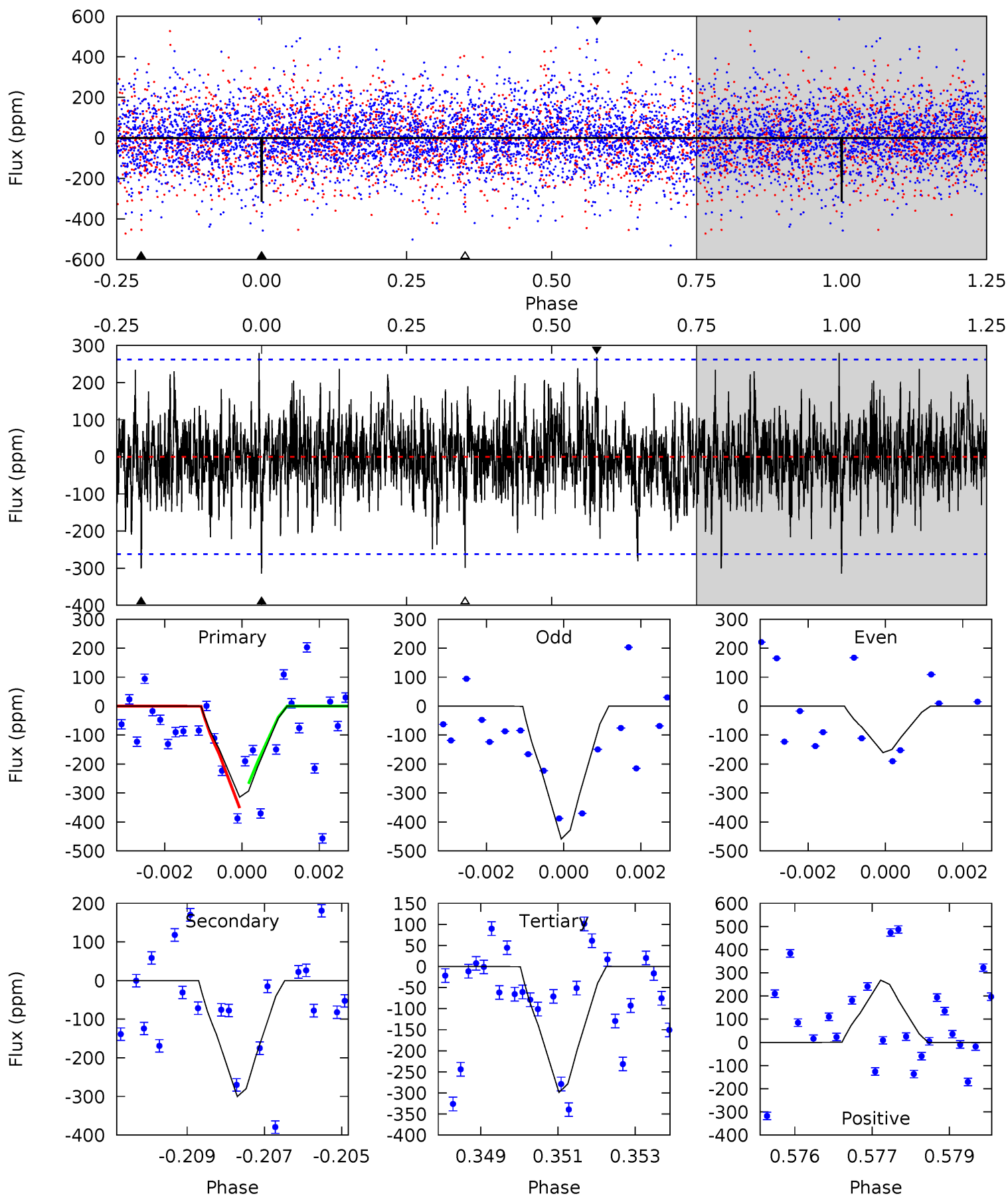




# Alt Model-Shift Uniqueness Test

008539939-04,  $P = 23.071049$  Days,  $E = 130.236774$  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
6.41	6.13	6.10	5.48	5.35	3.13	1.53	0.32	0.94	0.03	0.65	3.00	1.05	0.47	0.84



### Stellar Parameters For KIC 008539939

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7316^{+228}_{-304}$	$4.048^{+0.185}_{-0.167}$	$-0.100^{+0.250}_{-0.350}$	$1.969^{+0.533}_{-0.533}$	$1.577^{+0.199}_{-0.273}$	$0.291^{+0.326}_{-0.134}$
	+3%/-4%	+5%/-4%	+250%/-350%	+27%/-27%	+13%/-17%	+112%/-46%
Source	KIC0	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 008539939-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-195 \pm 38$	$6.01^{+5.25}_{-3.74}$	$1468^{+112}_{-105}$	$5133^{+3661}_{-1128}$	$98^{+654}_{-71}$
Alt.	$-300 \pm 49$	$5.96^{+5.42}_{-4.19}$	$1466^{+107}_{-105}$	$5641^{+6063}_{-1312}$	$152^{+1513}_{-110}$

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

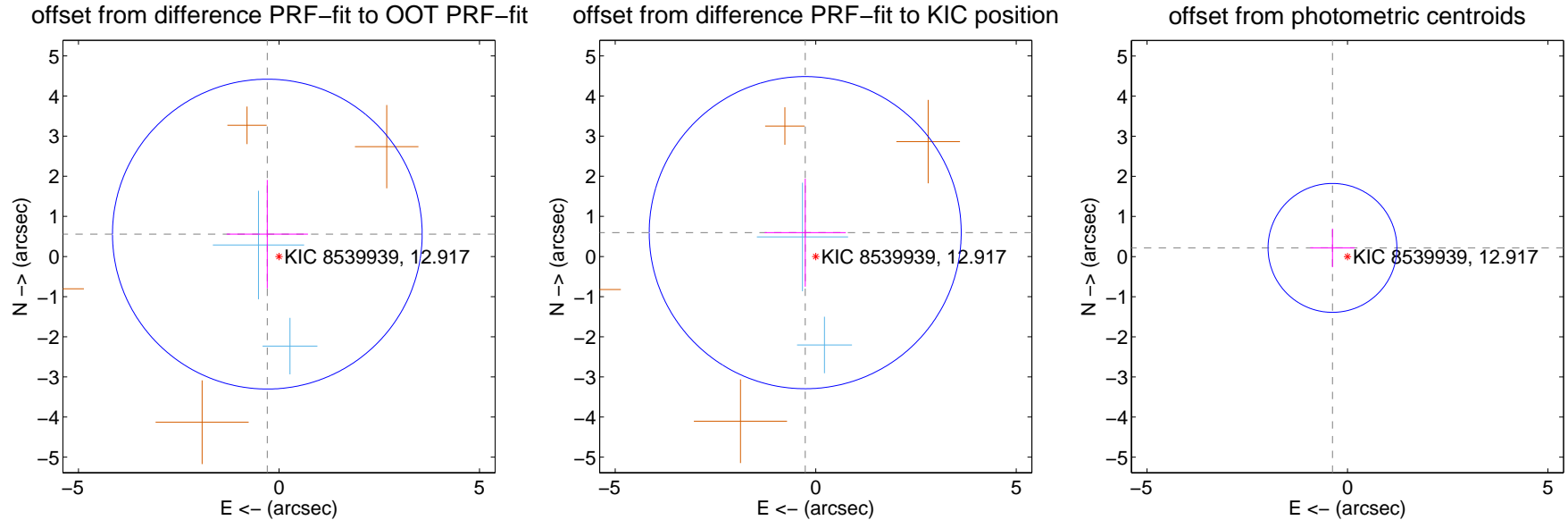
## DV Centroid Data

Supplemental centroid analysis for 008539939-04. Kepler magnitude: 12.92. Transit SNR 11.21

There are 2 quarters with good PRF difference image offsets

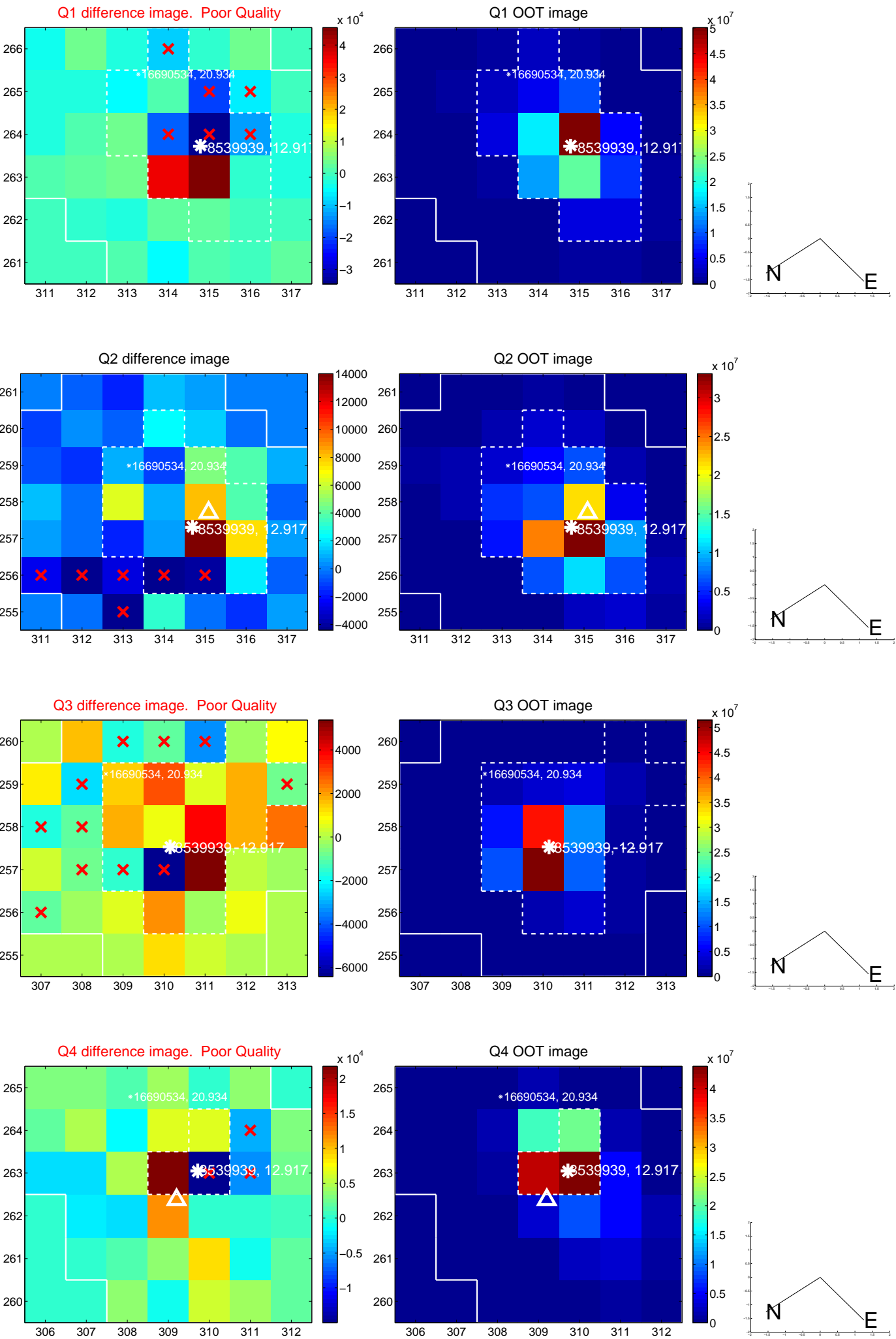
The direct PRF centroid is offset from the target star catalog position by about 0.02 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.630 \pm 1.287$	0.49	$0.291 \pm 1.014$	$0.558 \pm 1.352$
PRF-fit source offset from KIC position	$0.650 \pm 1.296$	0.50	$0.262 \pm 1.013$	$0.595 \pm 1.345$
photometric centroid source offset	$0.43 \pm 0.54$	0.81	$0.37 \pm 0.55$	$0.22 \pm 0.48$



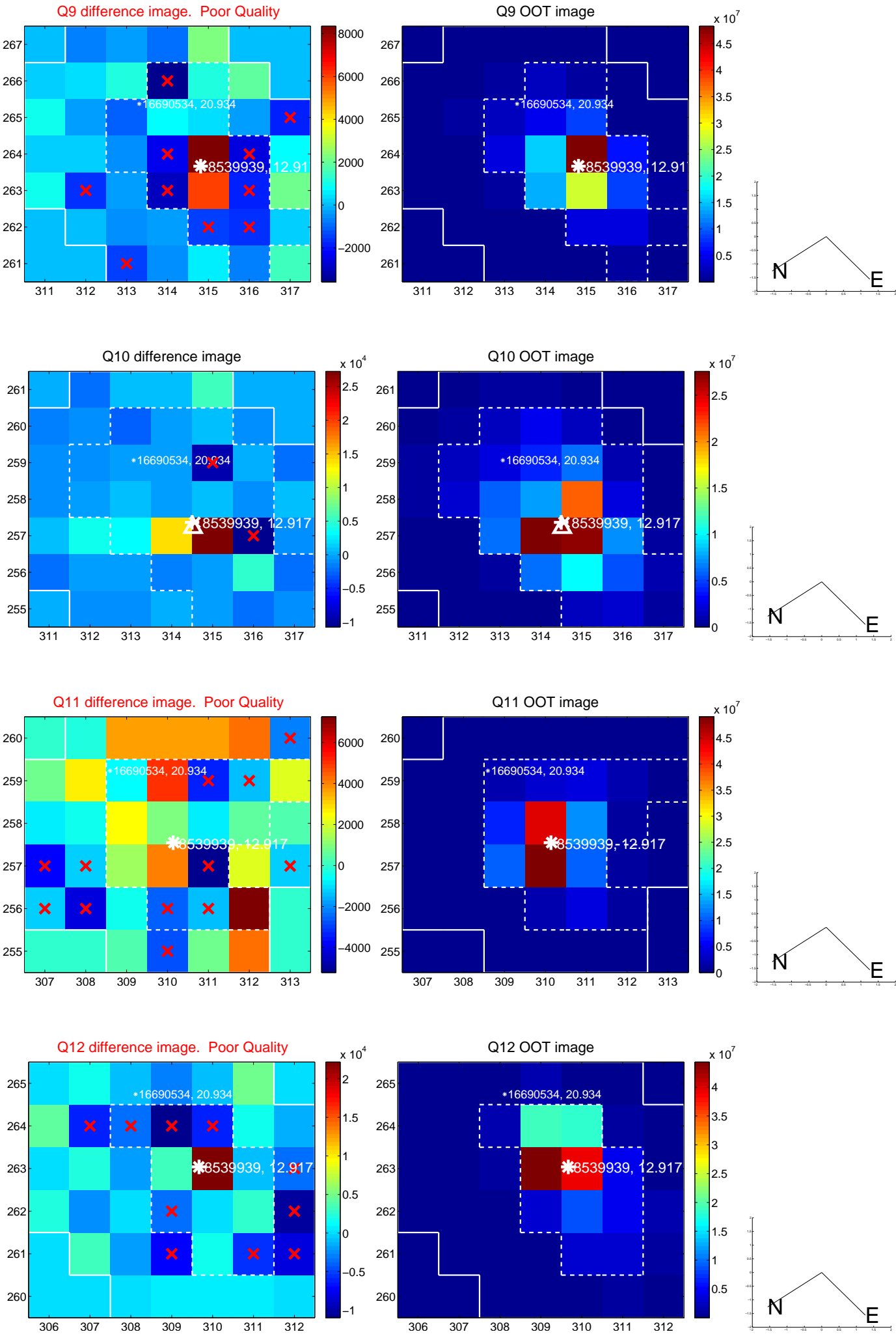
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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



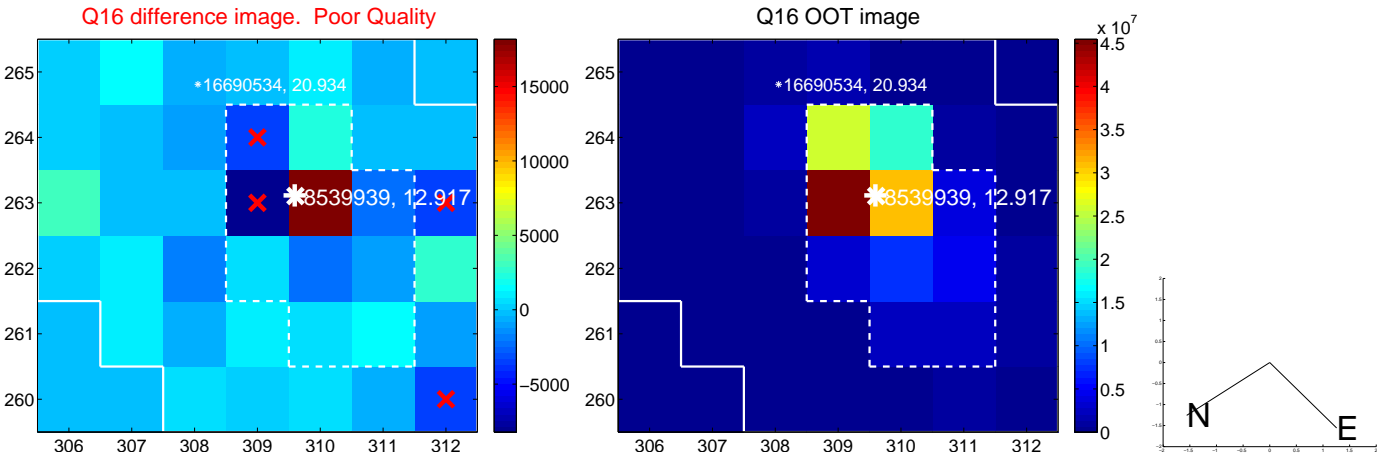
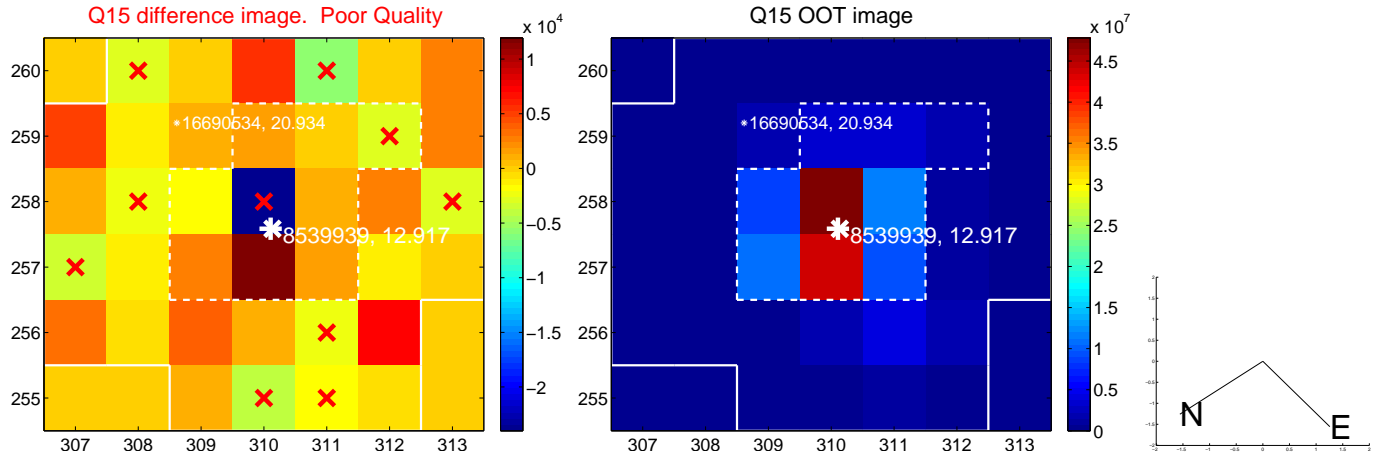
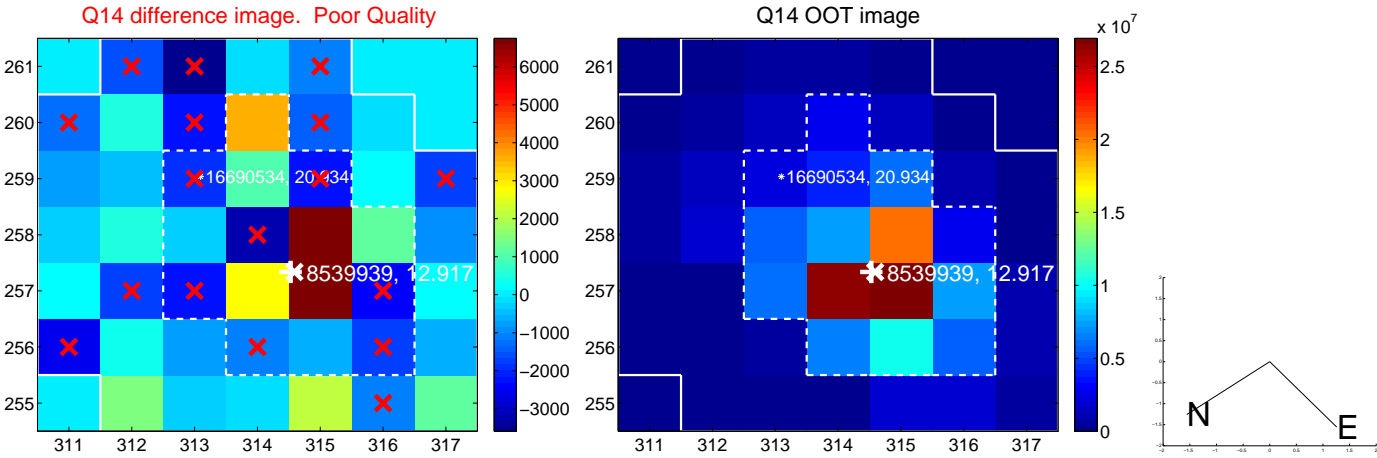
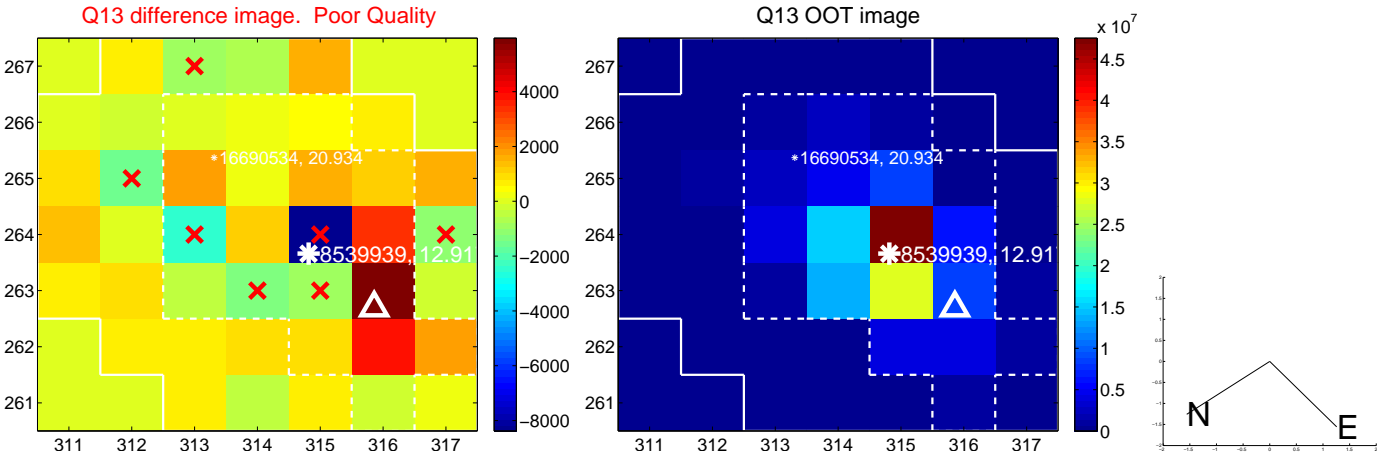


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

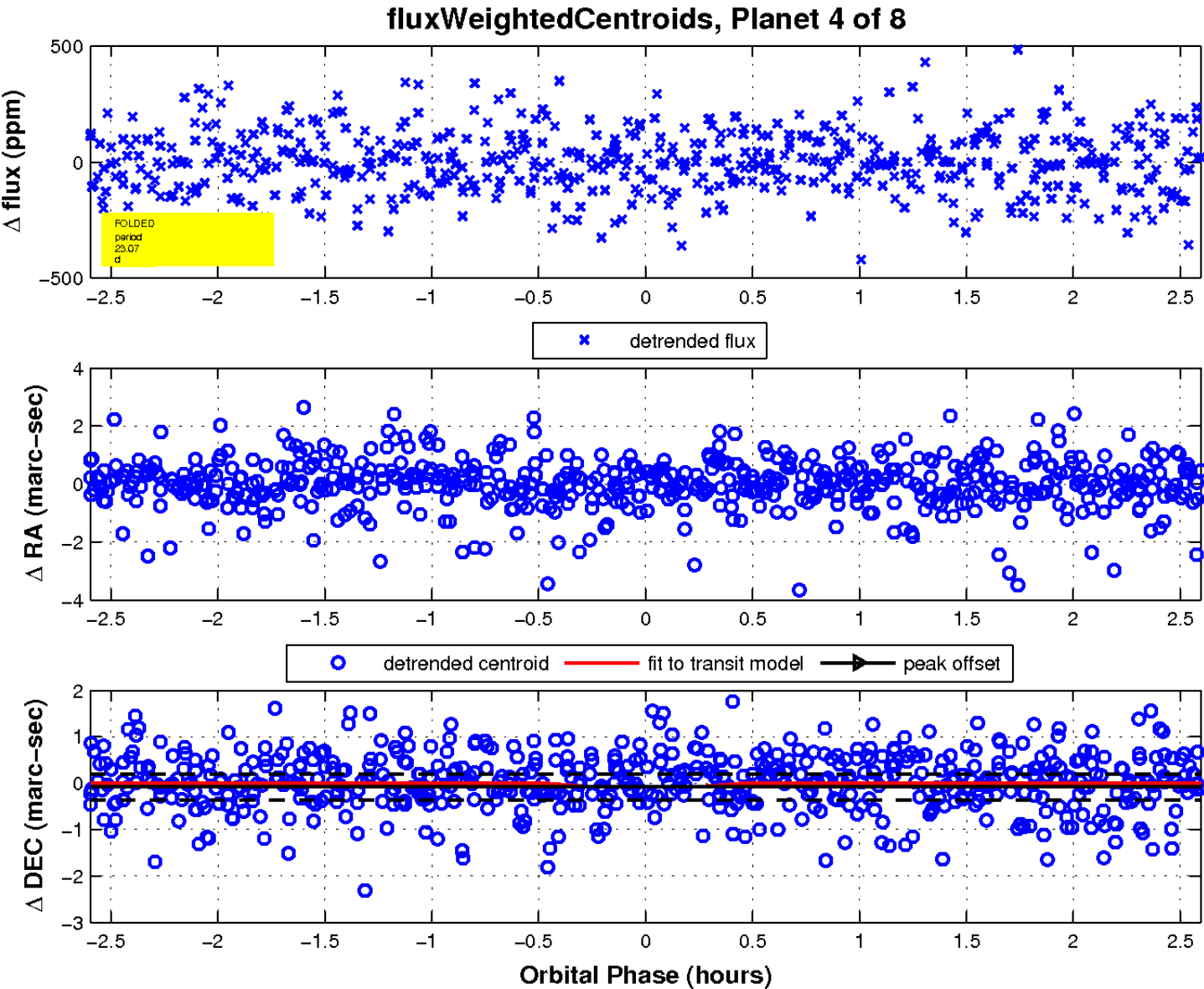
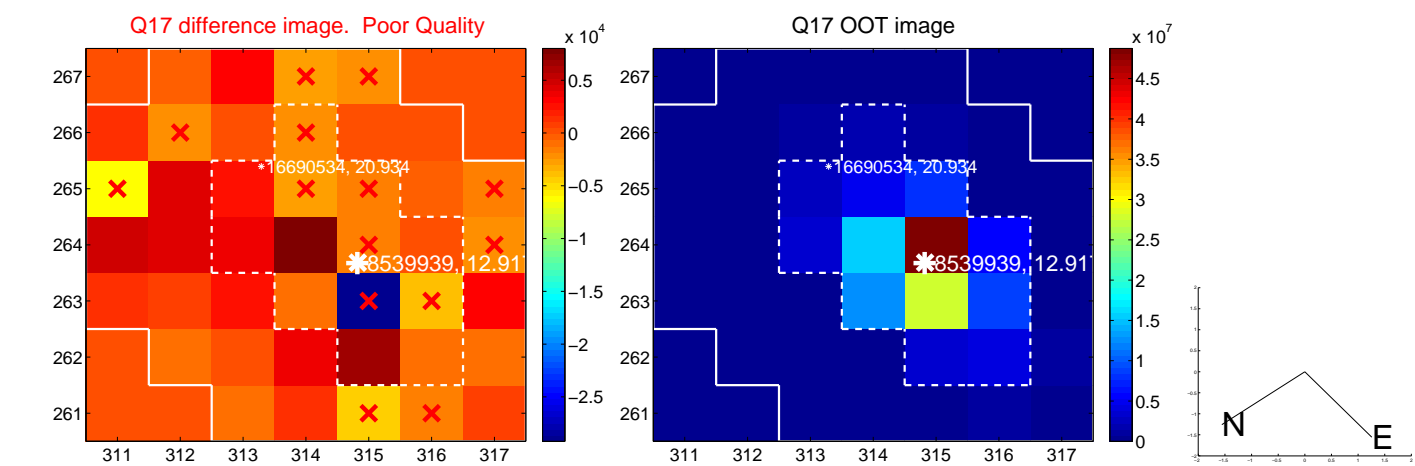




white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

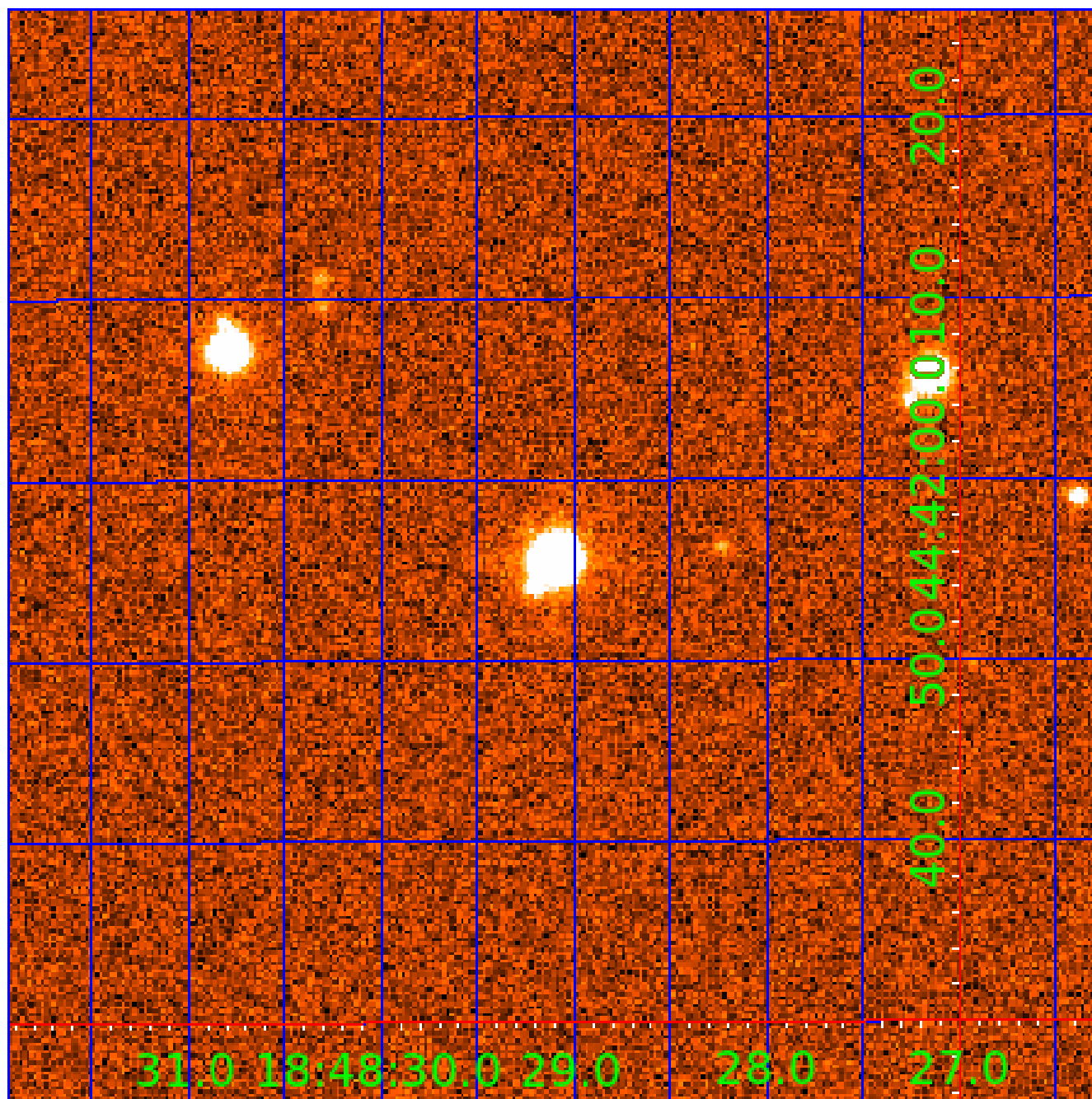


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 008539939

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008539939-01	OBS	No	1.662014	132.555349	42.3	2.204	12.4	13.6	1.97	7316	1.51	9726.88
008539939-02	OBS	No	1.661802	132.092268	2.9	11.998	12.0	1.8	1.97	7316	0.38	9728.53
008539939-03	OBS	No	29.779603	136.093972	306.4	1.609	14.5	14.9	1.97	7316	3.92	207.46
008539939-04	OBS	No	23.071110	153.308159	371.9	0.866	12.8	11.2	1.97	7316	4.50	291.56
008539939-05	OBS	No	20.445838	145.452169	190.0	2.167	12.1	11.3	1.97	7316	2.82	342.51
008539939-06	OBS	No	14.668596	133.821649	101.2	4.250	10.8	10.0	1.97	7316	2.22	533.30
008539939-07	OBS	No	28.367532	133.353696	172.0	2.973	10.4	9.1	1.97	7316	2.99	221.34
008539939-08	OBS	No	102.224919	162.703297	190.3	3.120	11.2	9.1	1.97	7316	2.80	40.06

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008539939-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
008539939-02	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—SAME_NTL_PERIOD
008539939-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
008539939-04	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
008539939-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—CENT_FEW_MEAS
008539939-06	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—HALO_GHOST
008539939-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
008539939-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—SAME_NTL_PERIOD

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

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

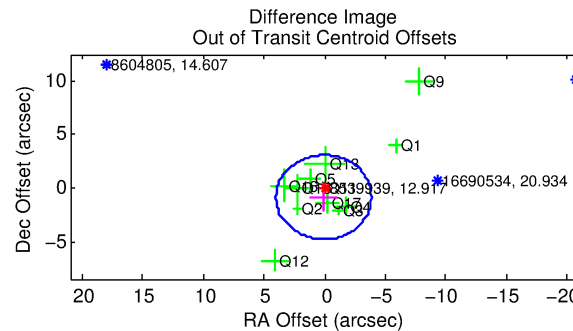
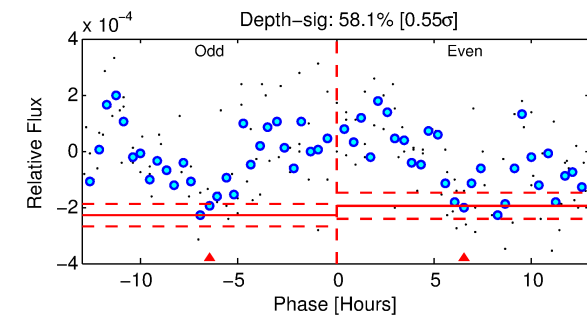
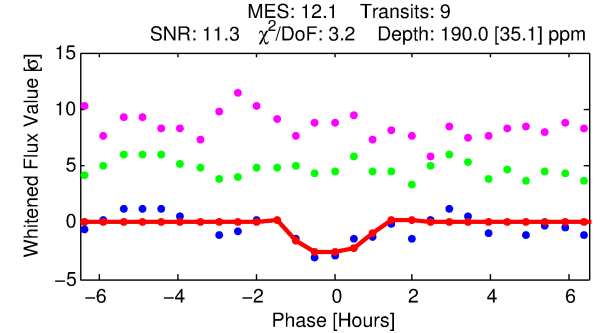
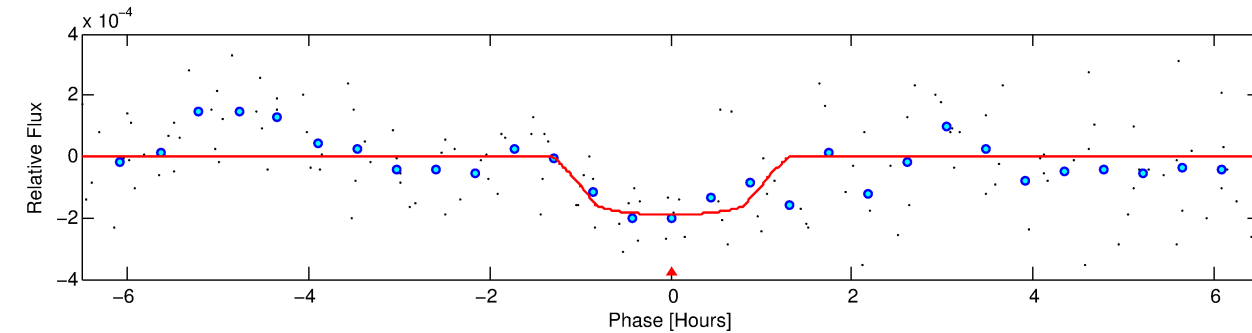
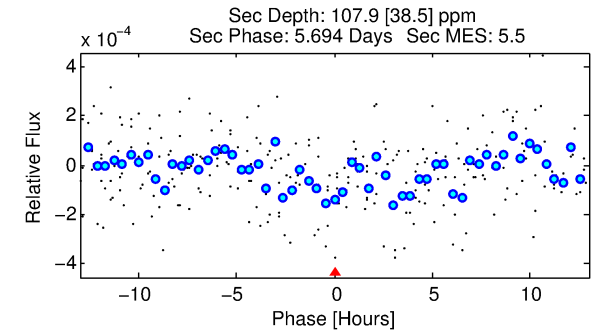
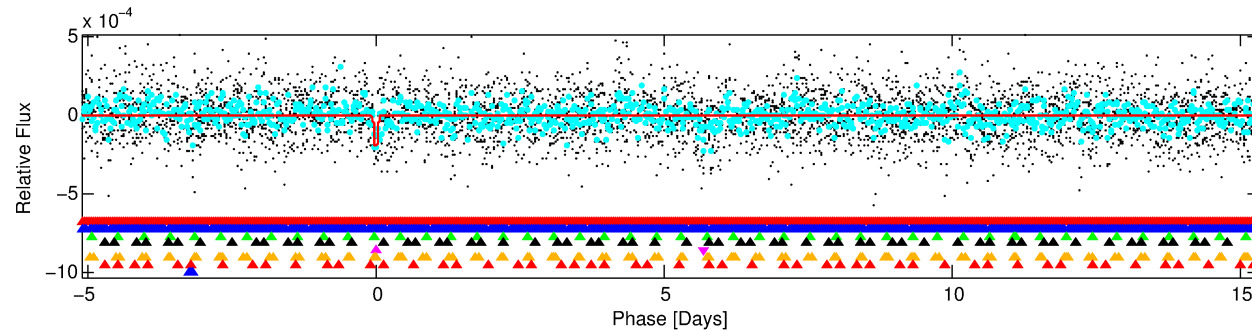
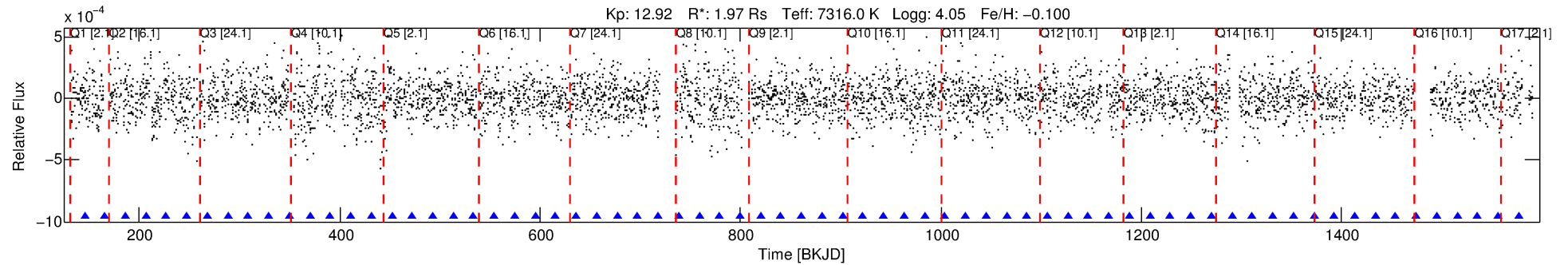
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008539939-05

No Significant Match Found

# DV One-Page Summary

KIC: 8539939 Candidate: 5 of 8 Period: 20.446 d



## DV Fit Results:

Period = 20.44584 [0.00025] d  
Epoch = 145.4522 [0.0099] BKJD  
Rp/R\* = 0.0131 [0.0165]  
a/R\* = 63.70 [479.39]  
b = 0.50 [11.58]  
Seff = 342.52 [128.54]  
Teq = 1097 [103] K  
Rp = 2.82 [3.63] Re  
a = 0.1705 [0.0391] AU  
Ag = 216.82 [556.15] [0.39σ]  
Teffp = 6508 [4146] K [1.30σ]

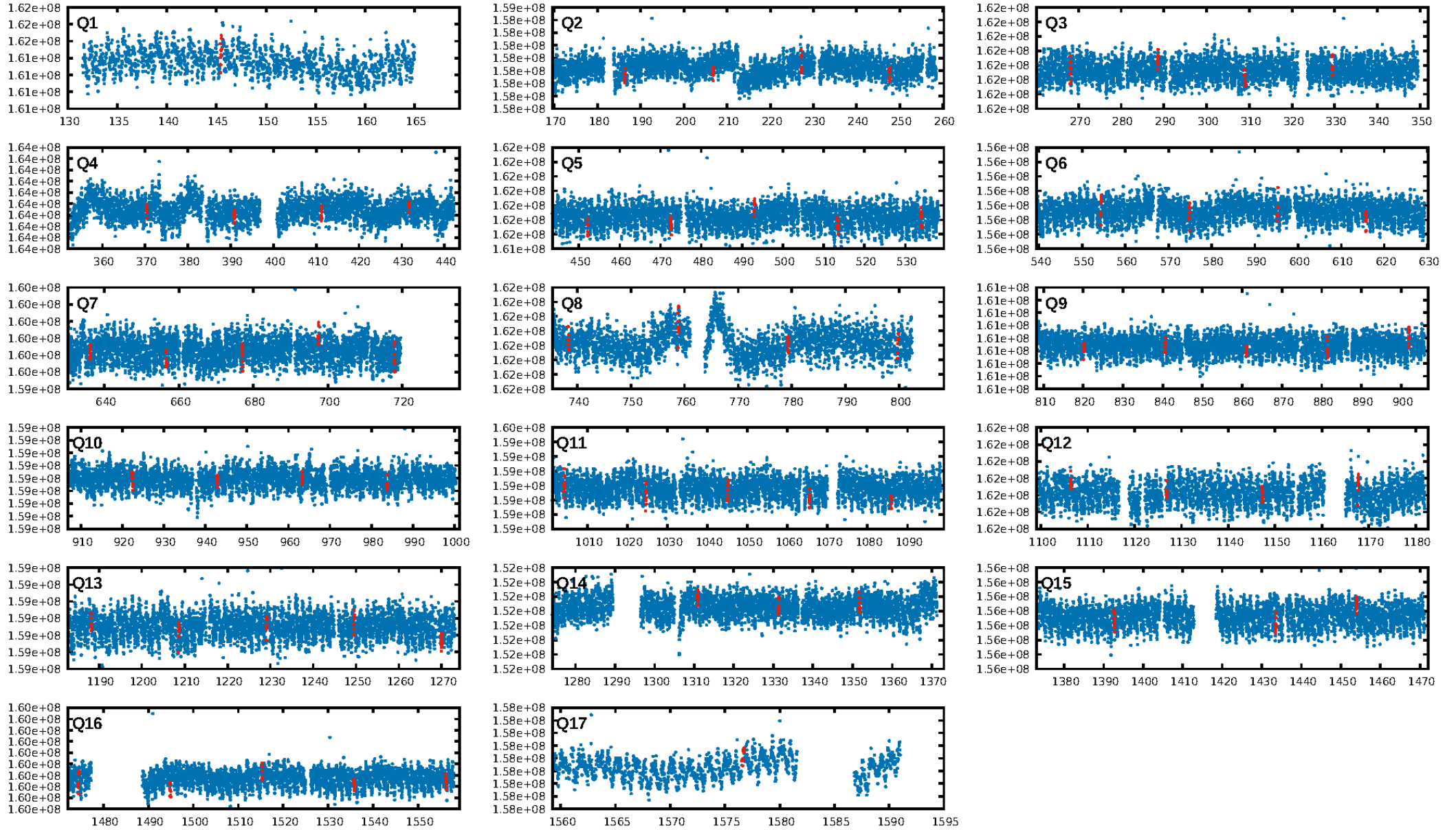
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [29.06σ]  
LongPeriod-sig: 100.0% [26.99σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 20.3%  
Bootstrap-pfa: 6.87e-11  
RollingBand-fgt: 1.00 [9/9]  
GhostDiagnostic-chr: -0.4189  
Centroid-sig: N/A  
Centroid-so: 0.783 arcsec [1.40σ]  
OotOffset-rm: 0.866 arcsec [0.66σ]  
KicOffset-rm: 0.816 arcsec [0.77σ]  
OotOffset-st: 1/3/3/5 [12]  
KicOffset-st: 1/3/3/5 [12]  
DiffImageQuality-fgm: 0.17 [2/12]  
DiffImageOverlap-fno: 0.41 [7/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 08:00:48 Z

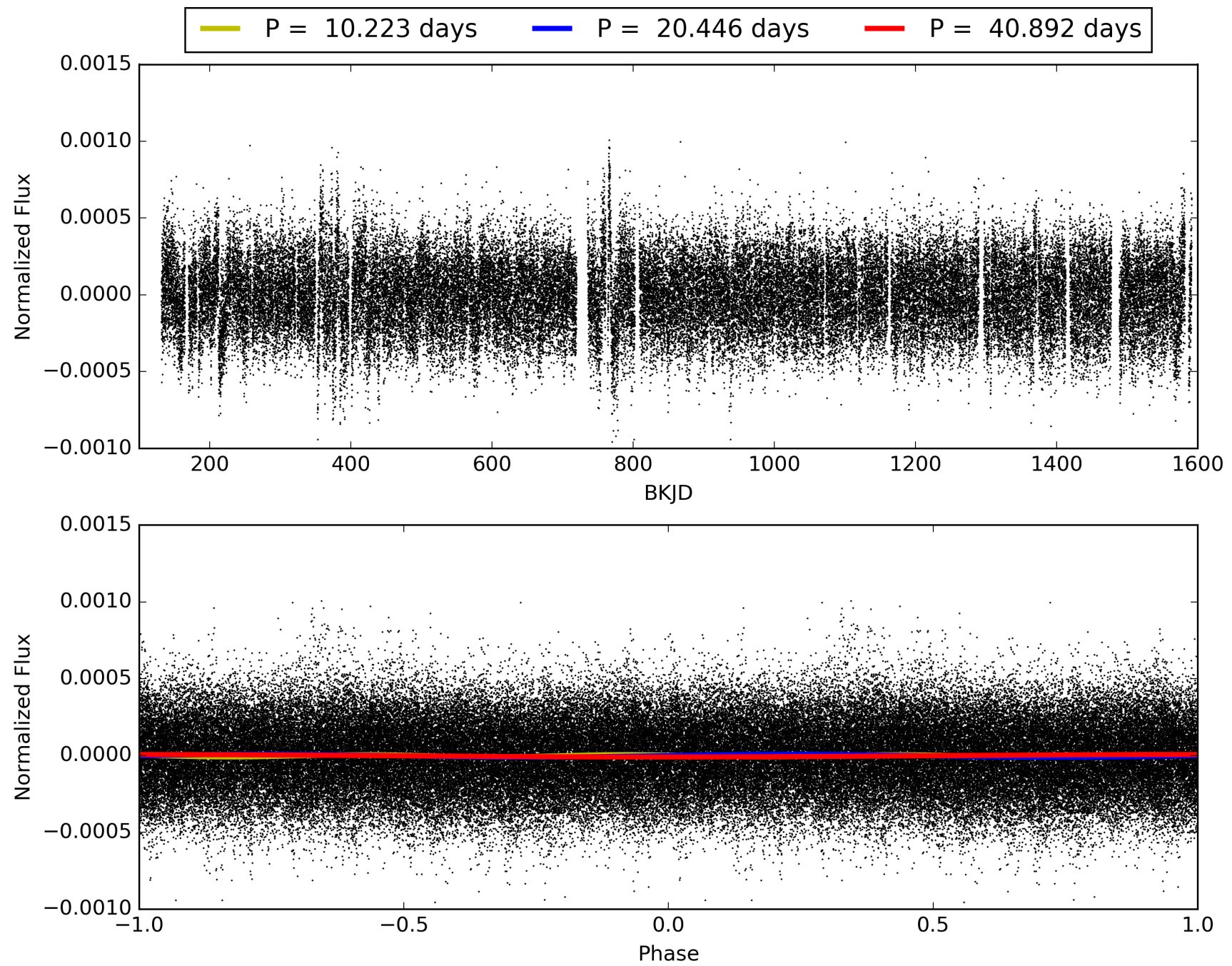
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 008539939-05, PDC Light Curves



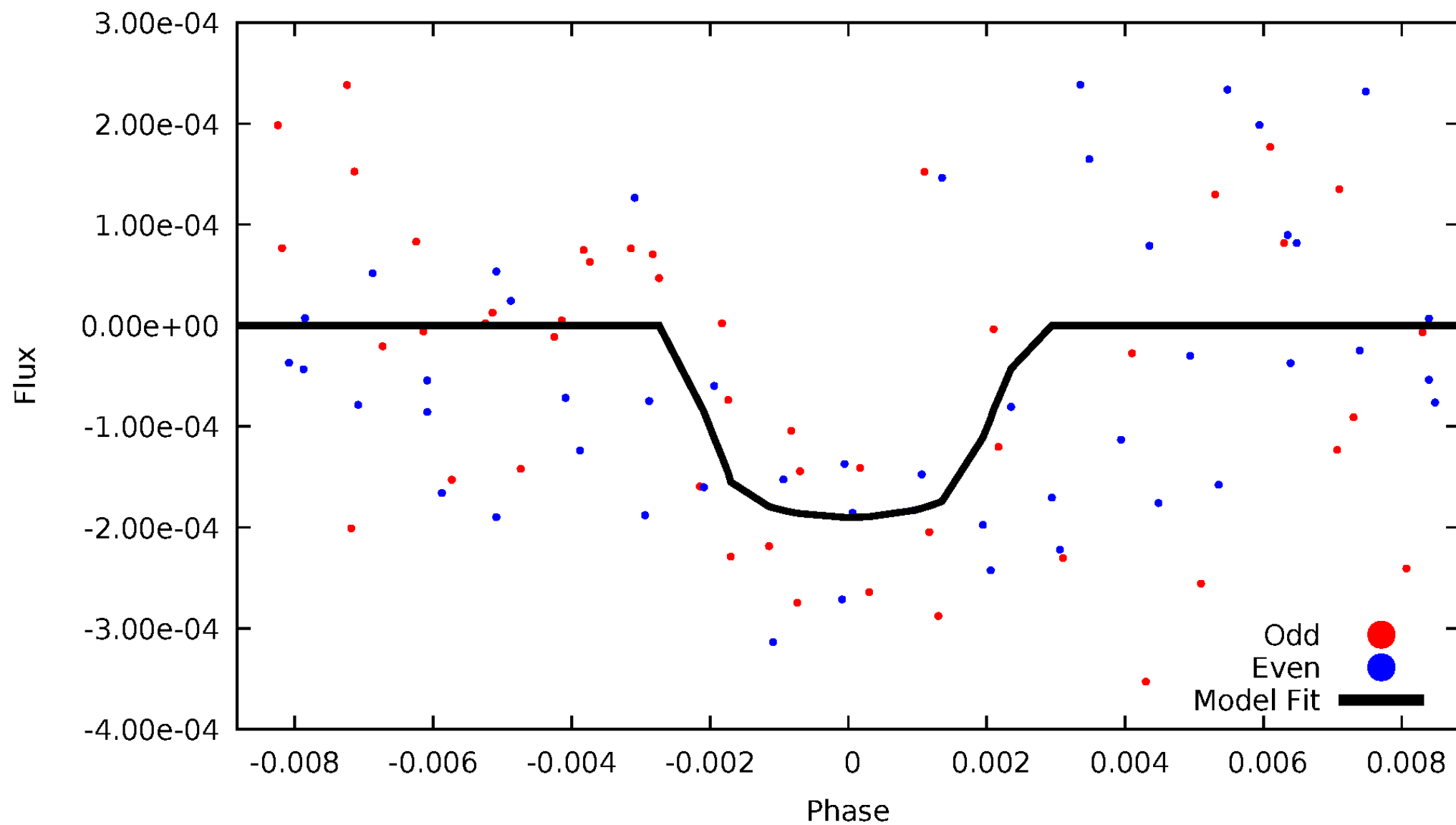


TCE 008539939-05



# DV Odd/Even

TCE 008539939-05



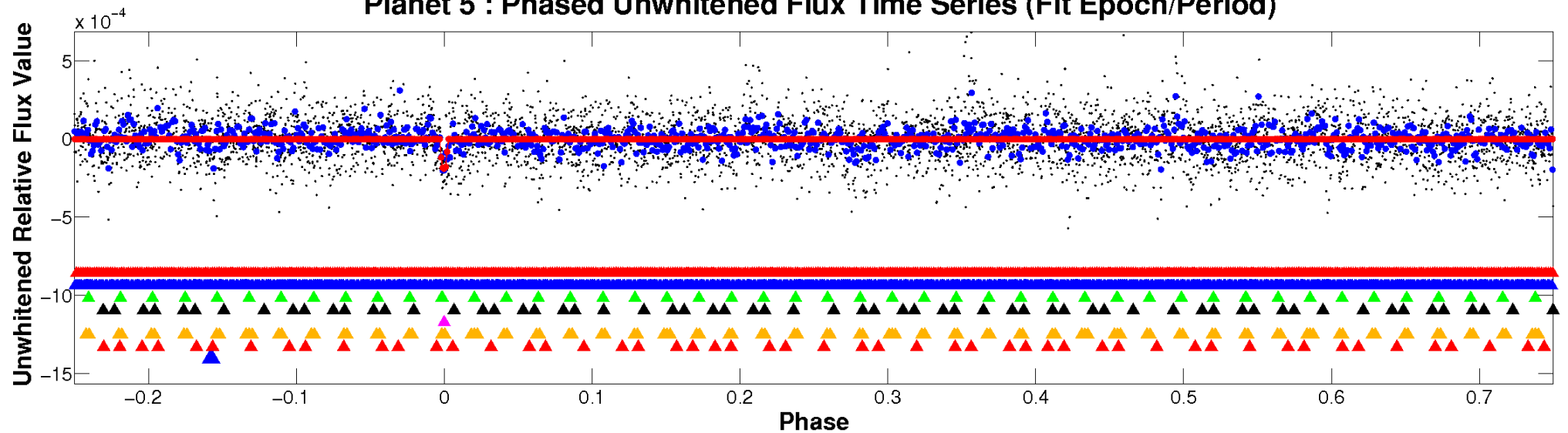


ALT Odd/Even

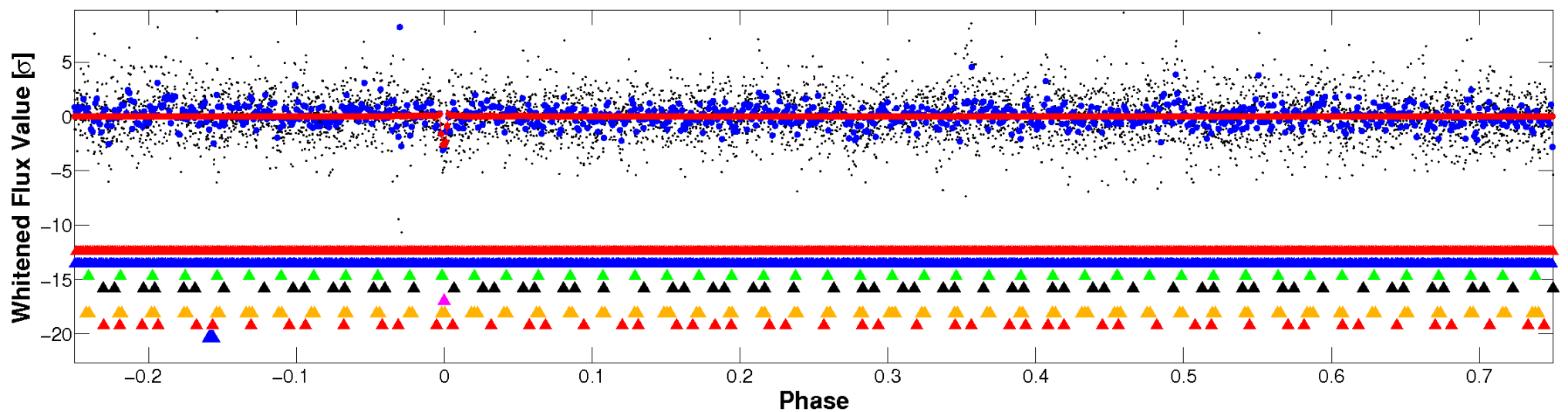
This plot does not exist for this TCE.

# Non-Whitened Vs. Whitened Light Curve

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

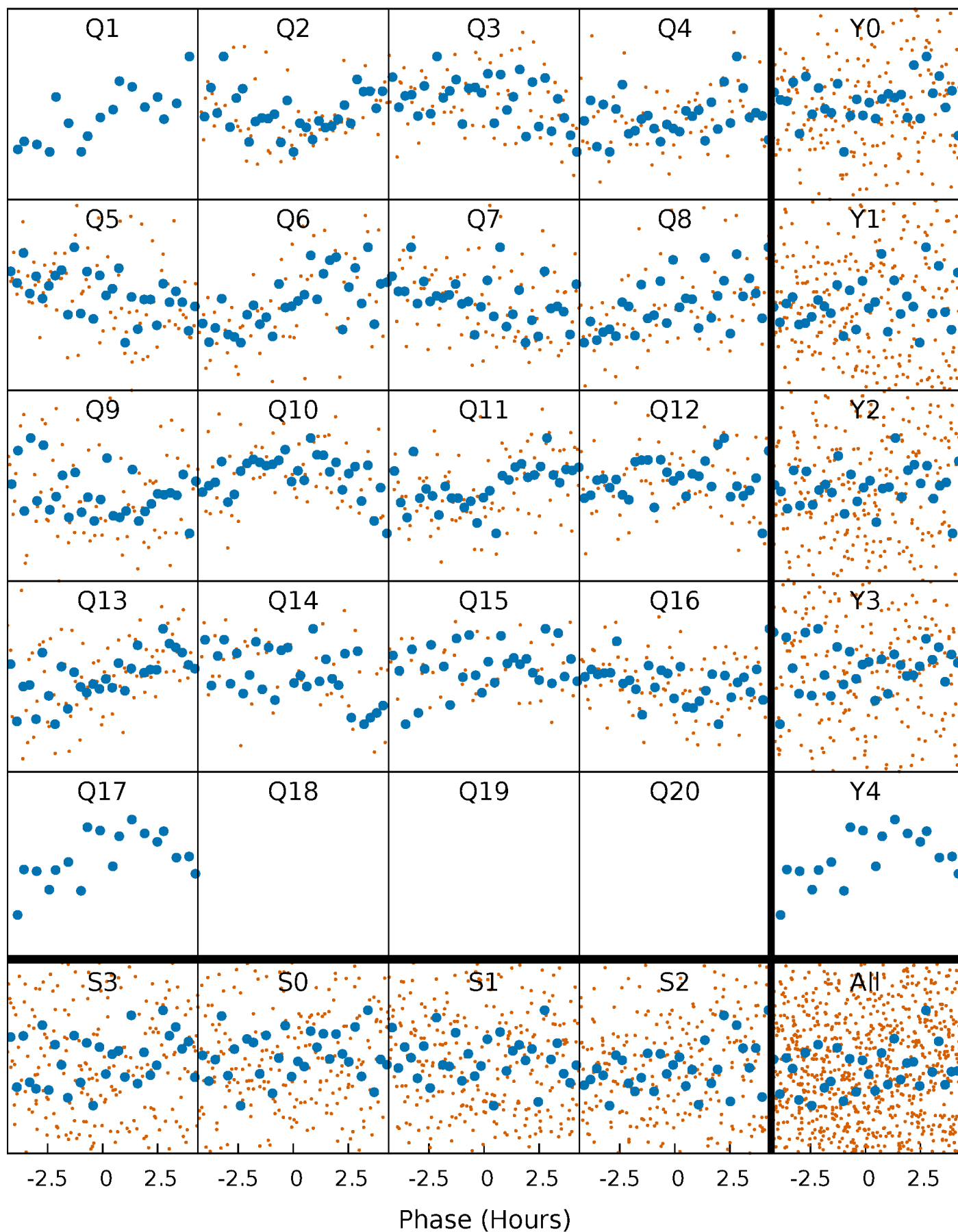


## Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

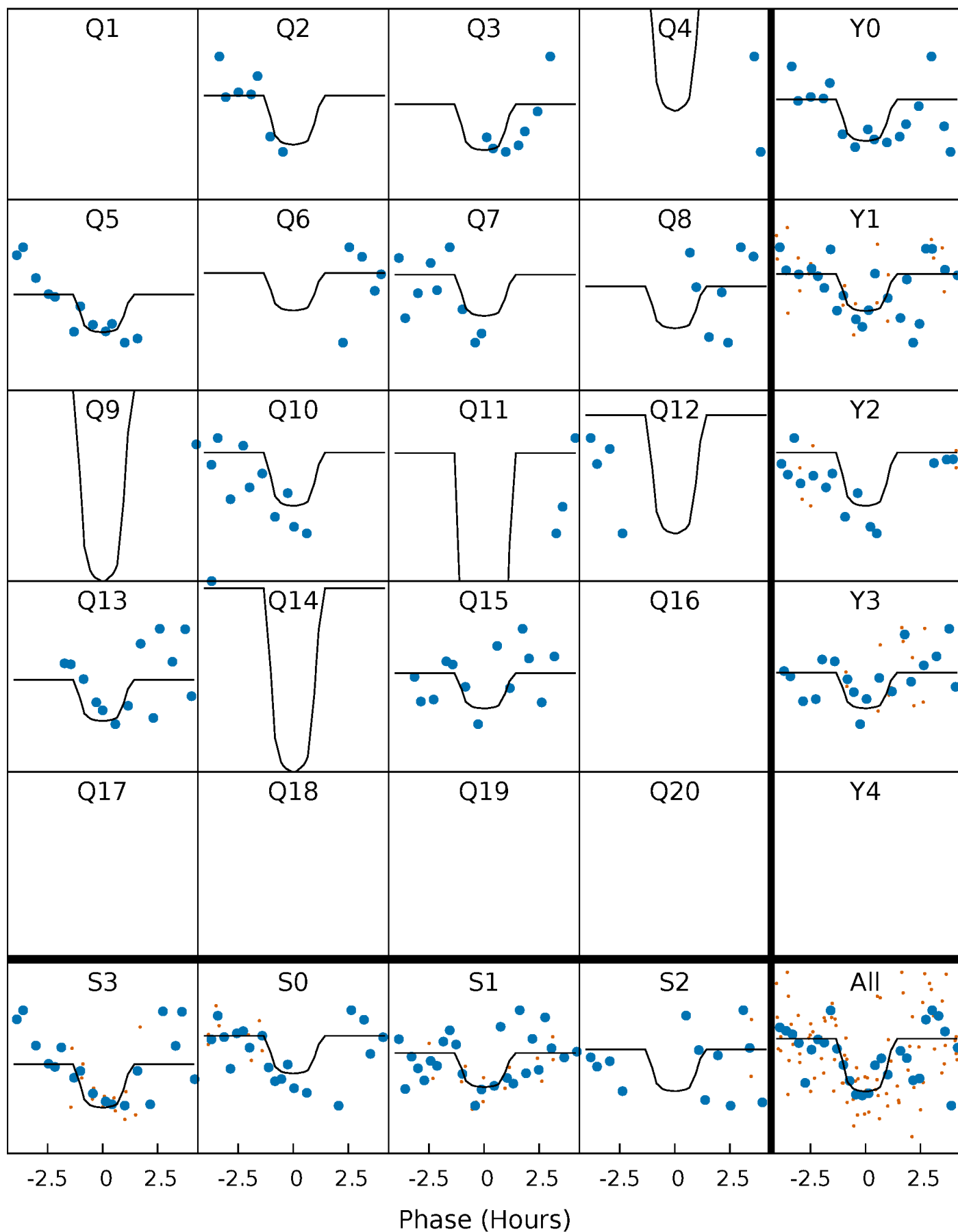
TCE 008539939-05     $P = 20.445838$  Days     $T_0 = 145.452169$  (BKJD)





# DV Quarter-Phased Transit Curves

TCE 008539939-05     $P = 20.445838$  Days     $T_0 = 145.452169$  (BKJD)

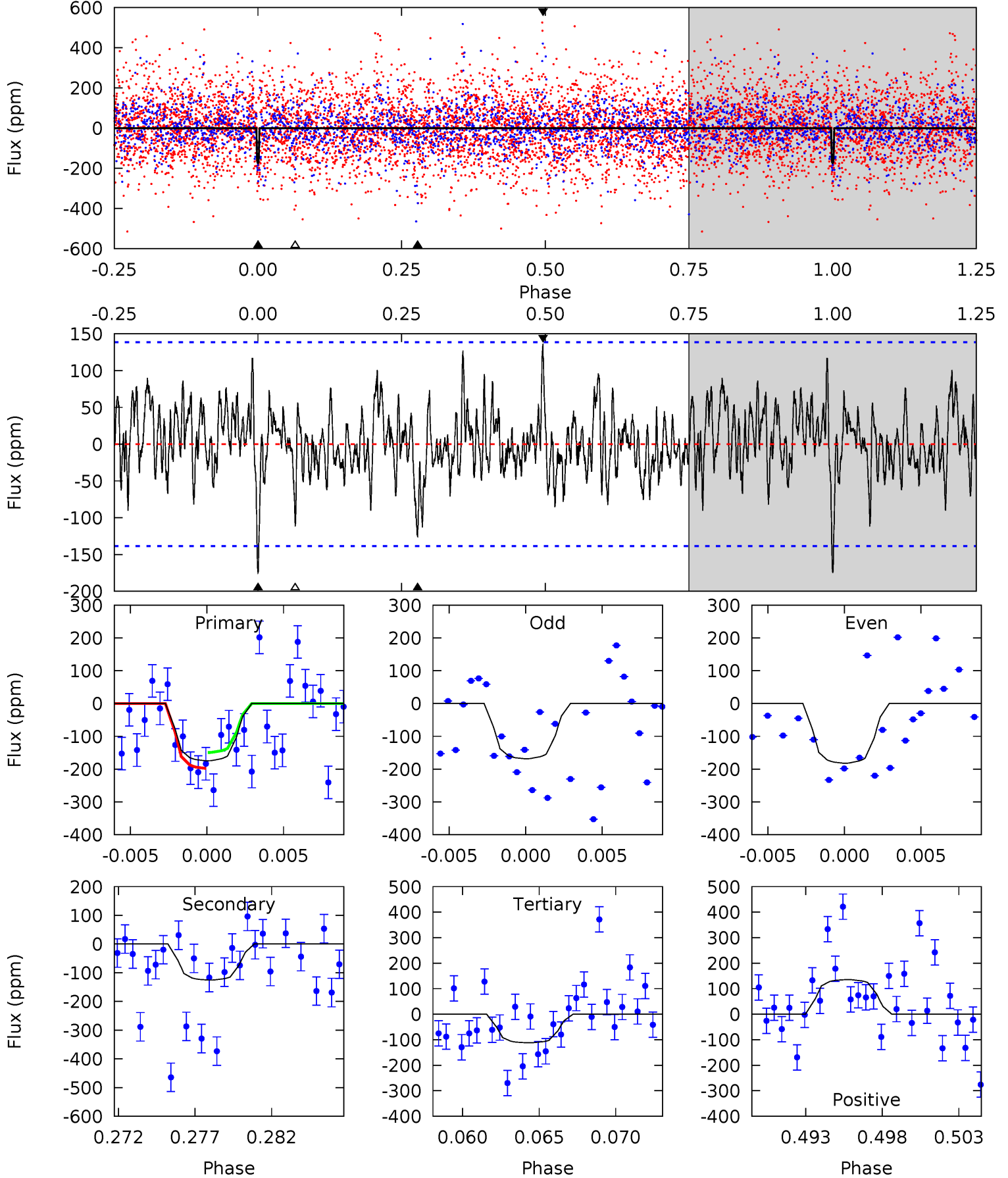


This plot does not exist for this TCE.

# DV Model-Shift Uniqueness Test

008539939-05, P = 20.445838 Days, E = 125.006331 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.50	4.67	4.17	5.05	5.16	2.80	1.41	2.33	1.45	0.50	-0.38	0.25	0.75	0.44	0.91



## Alt Model-Shift Uniqueness Test

This plot does not exist for this TCE.

### Stellar Parameters For KIC 008539939

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7316^{+228}_{-304}$	$4.048^{+0.185}_{-0.167}$	$-0.100^{+0.250}_{-0.350}$	$1.969^{+0.533}_{-0.533}$	$1.577^{+0.199}_{-0.273}$	$0.291^{+0.326}_{-0.134}$
	+3%/-4%	+5%/-4%	+250%/-350%	+27%/-27%	+13%/-17%	+112%/-46%
Source	KIC0	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 008539939-05 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-125 \pm 27$	$3.76^{+3.25}_{-2.48}$	$1526^{+119}_{-111}$	$5737^{+5067}_{-1356}$	$142^{+1059}_{-104}$
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  $A_{\text{obs}} \gg 1.0$

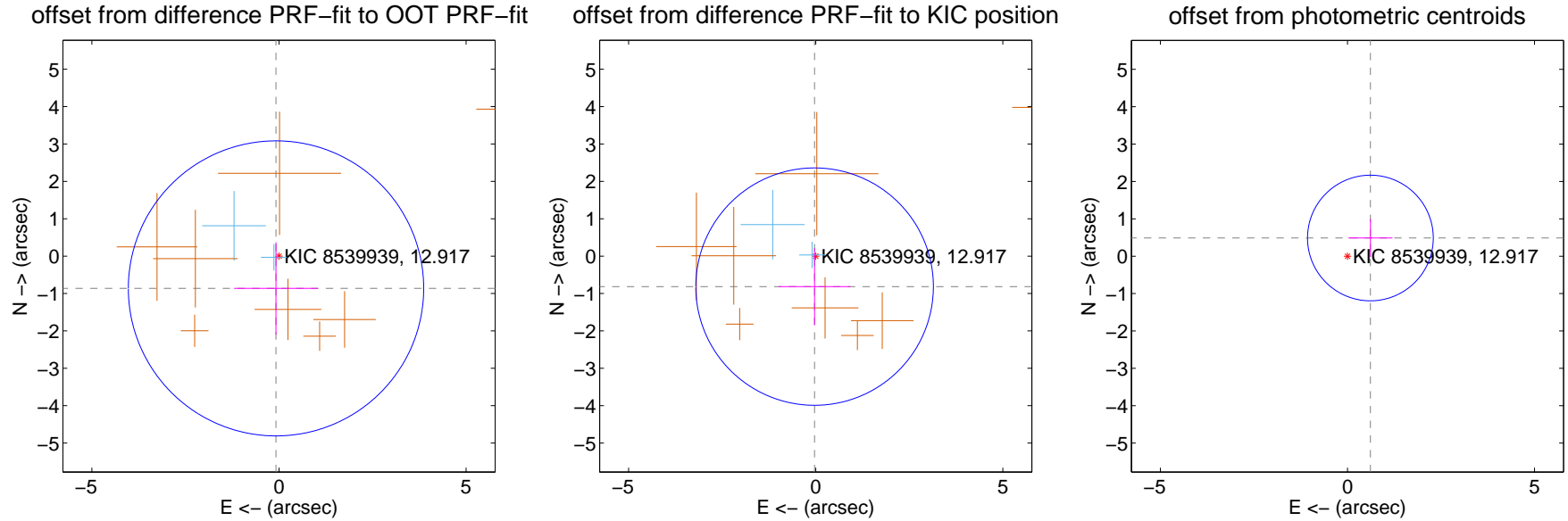
## DV Centroid Data

Supplemental centroid analysis for 008539939-05. Kepler magnitude: 12.92. Transit SNR 11.28

There are 2 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.04 arcsec

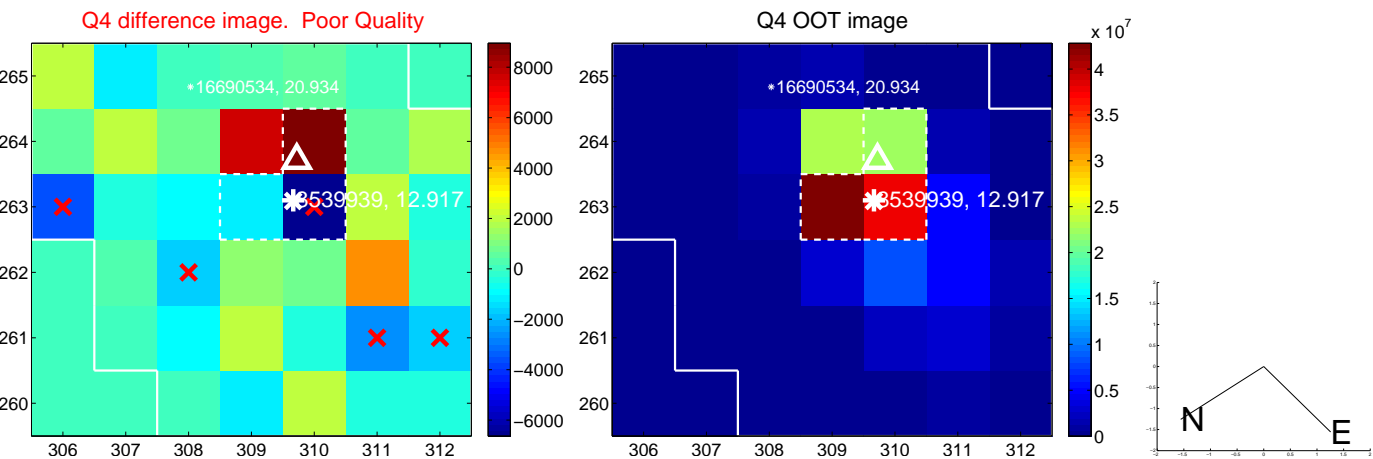
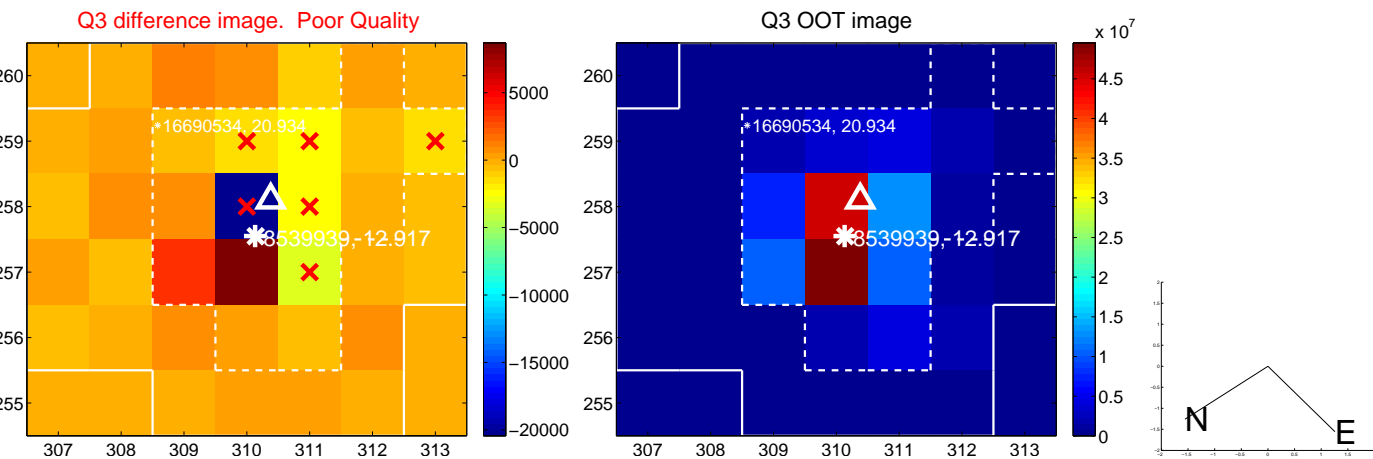
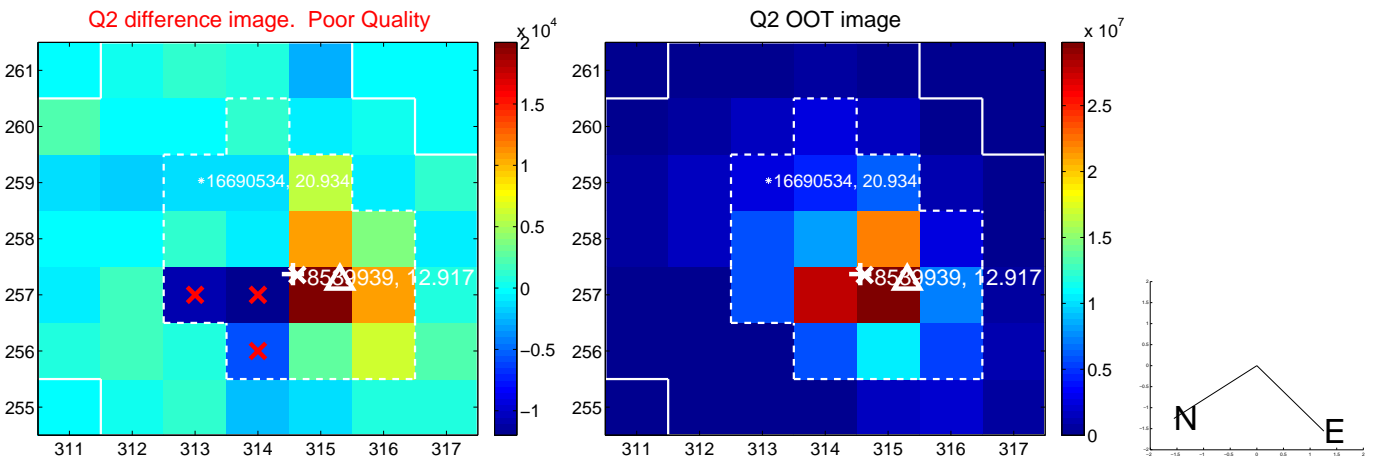
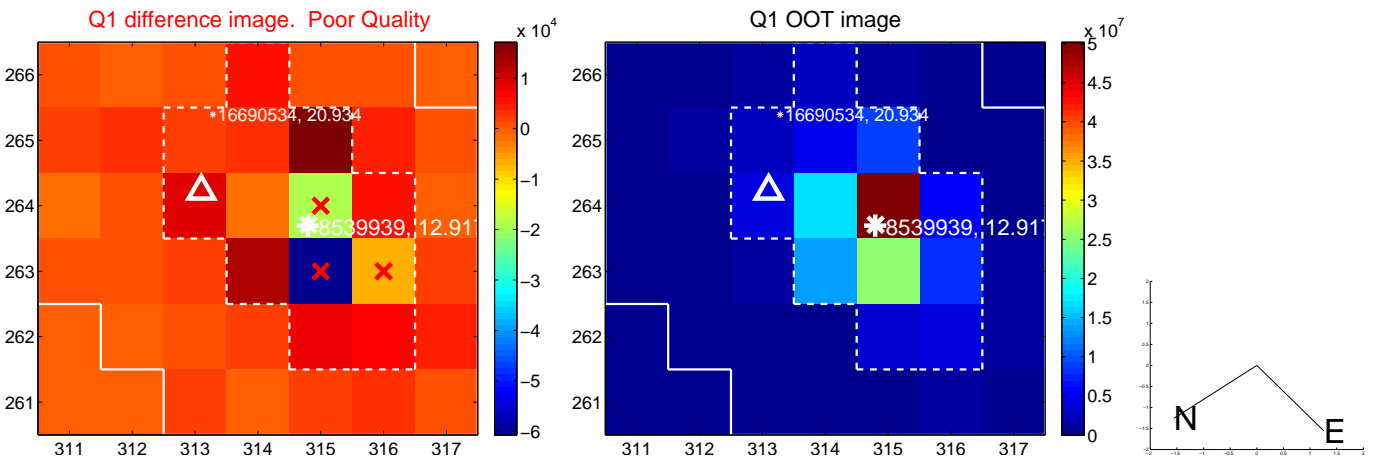
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.866 \pm 1.315$	0.66	$0.079 \pm 1.122$	$-0.863 \pm 1.233$
PRF-fit source offset from KIC position	$0.816 \pm 1.058$	0.77	$0.030 \pm 0.958$	$-0.815 \pm 1.031$
photometric centroid source offset	$0.78 \pm 0.56$	1.40	$-0.61 \pm 0.59$	$0.49 \pm 0.51$



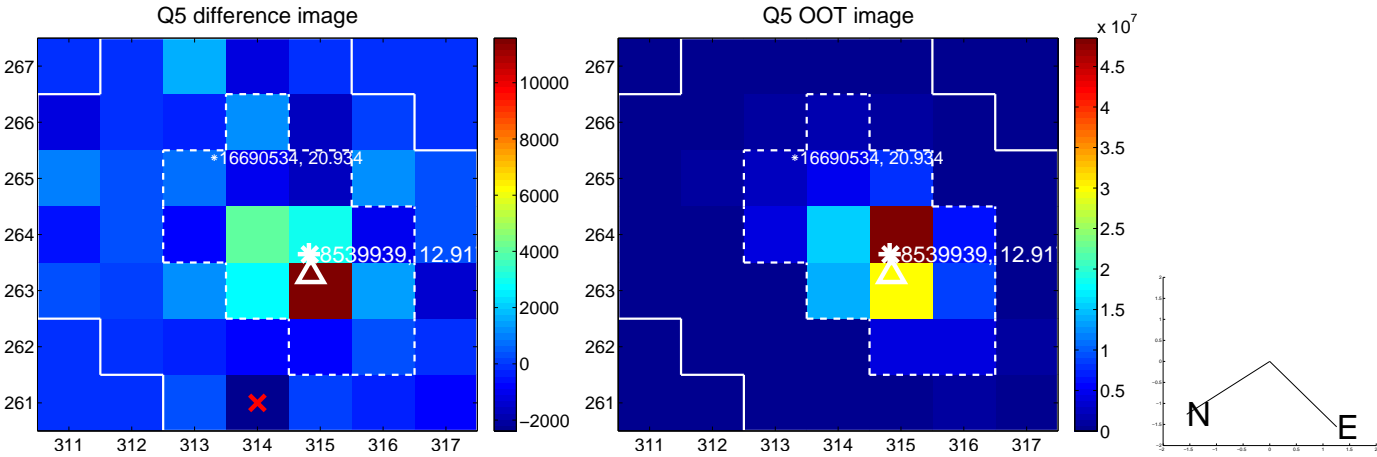
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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



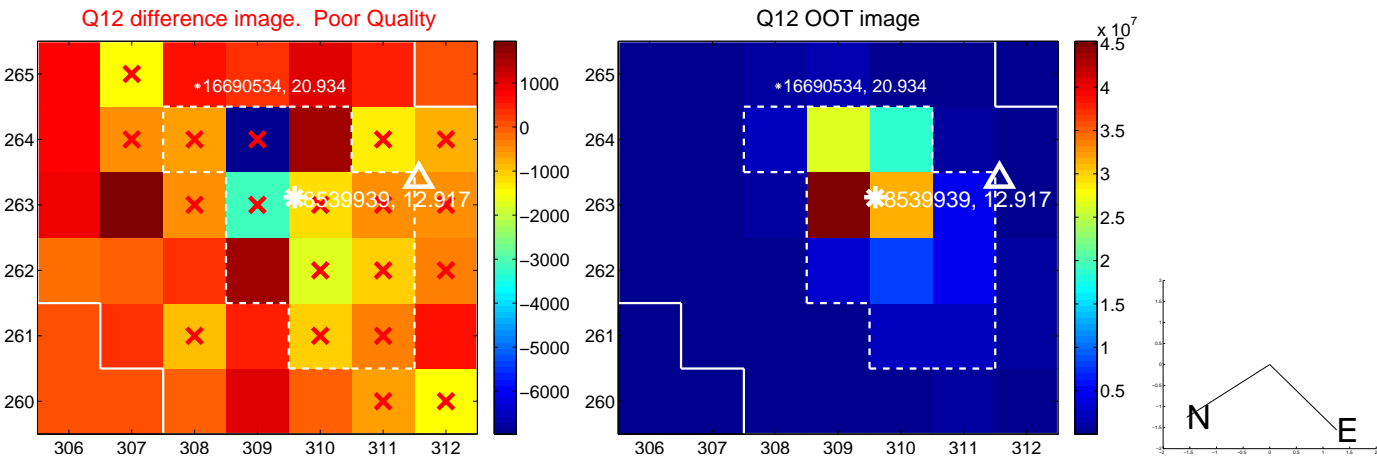
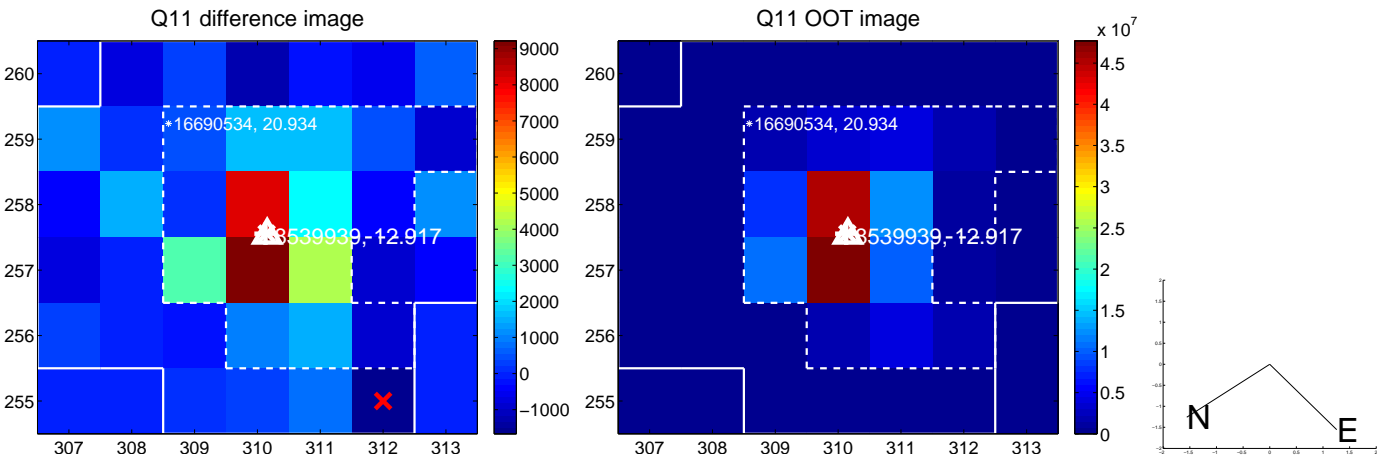
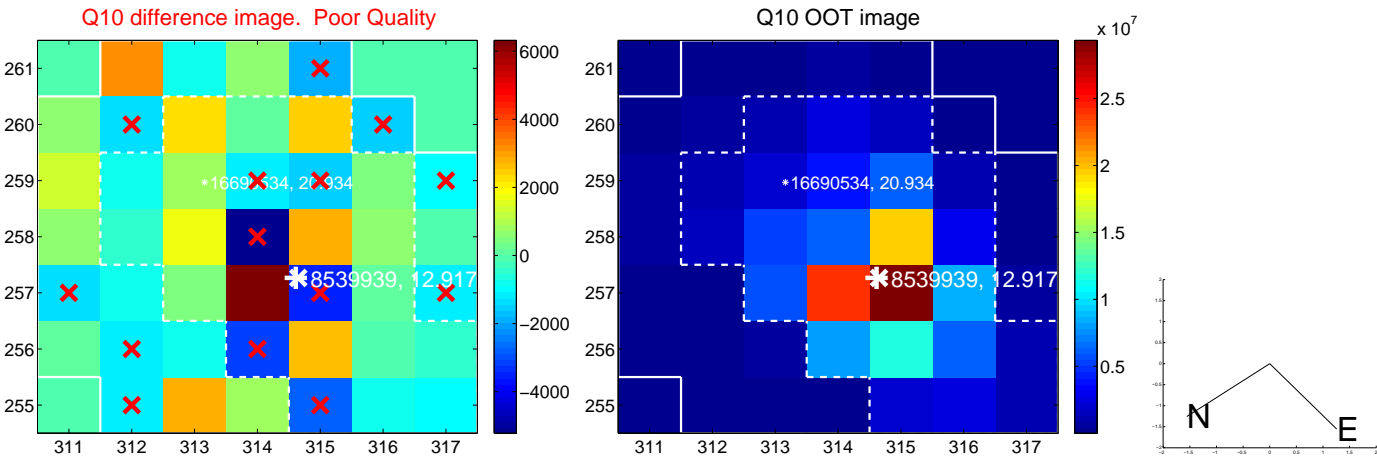
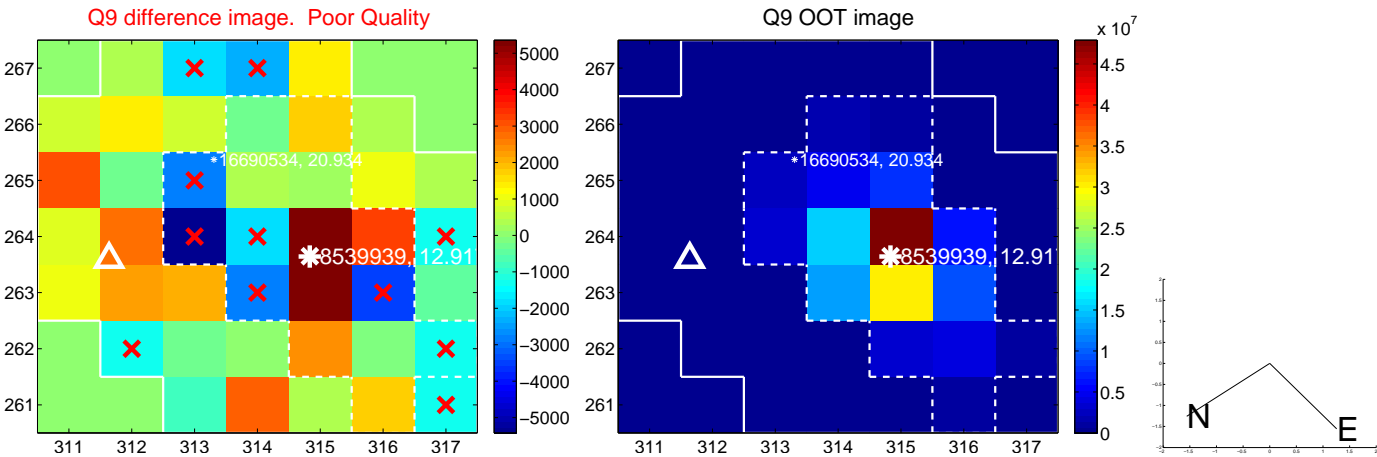
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



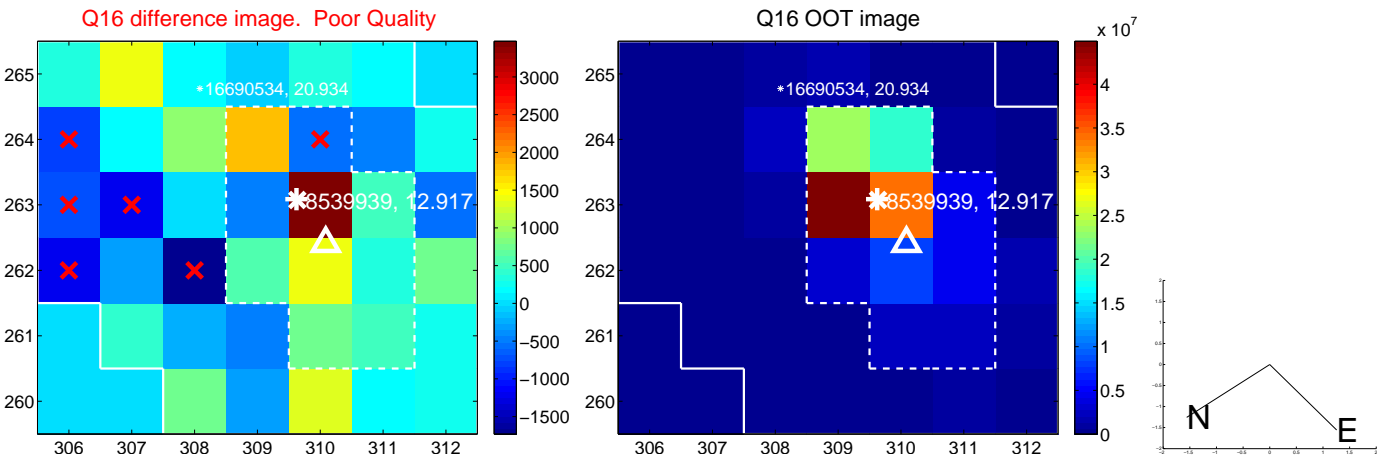
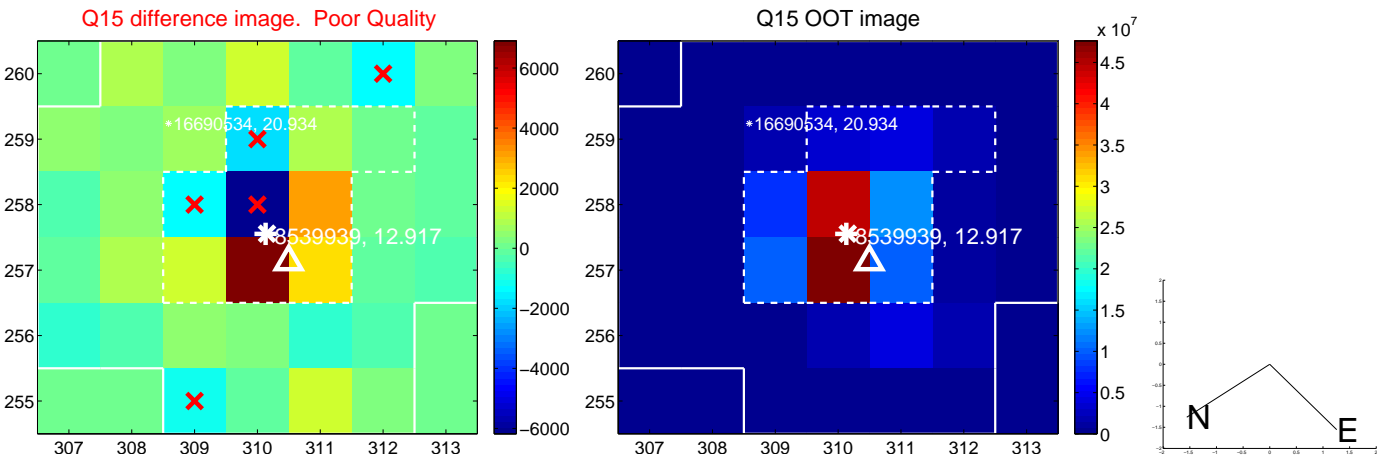
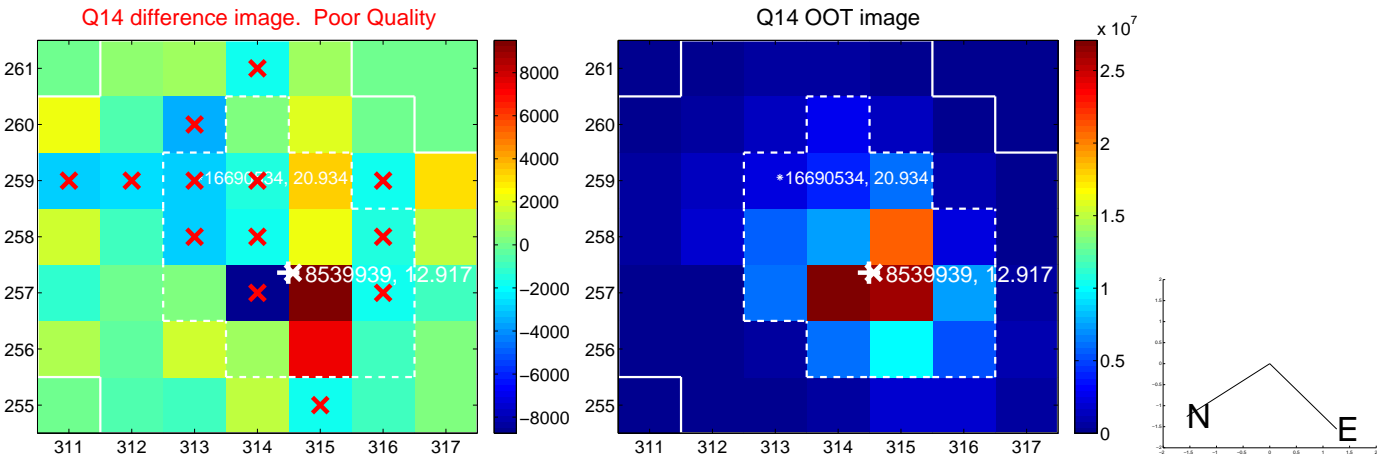
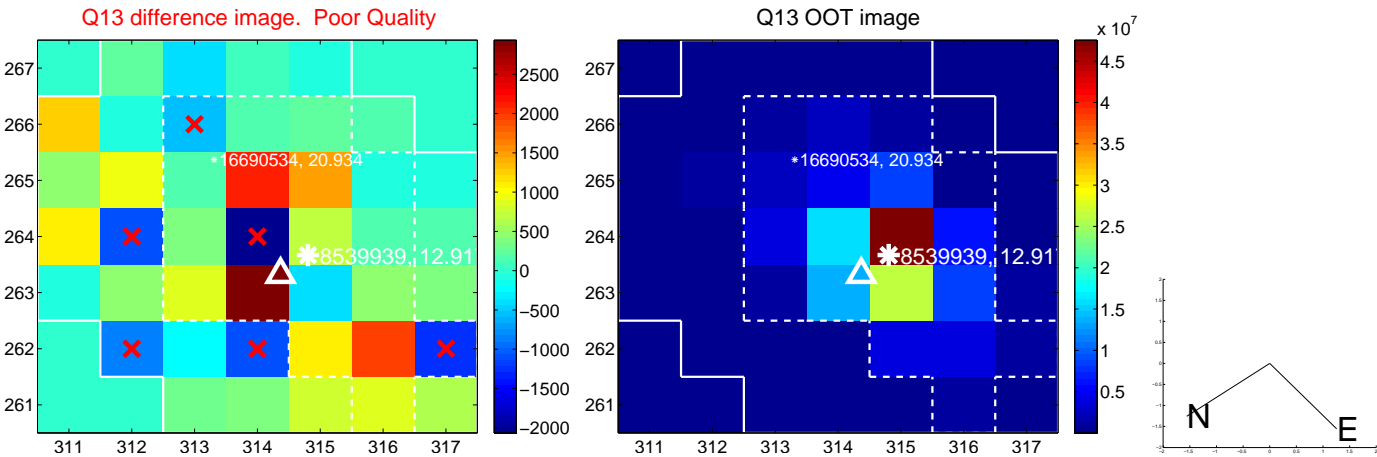
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



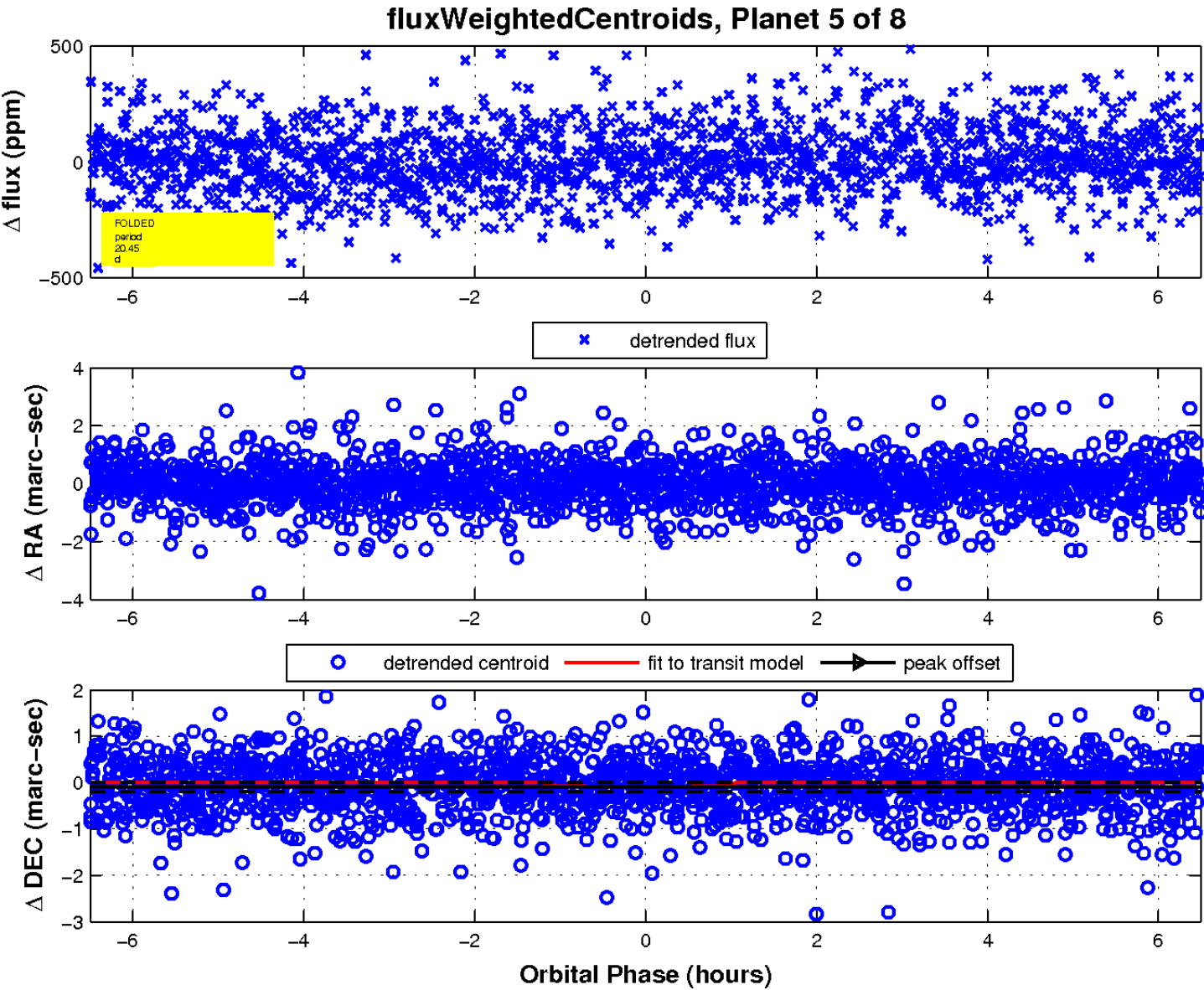
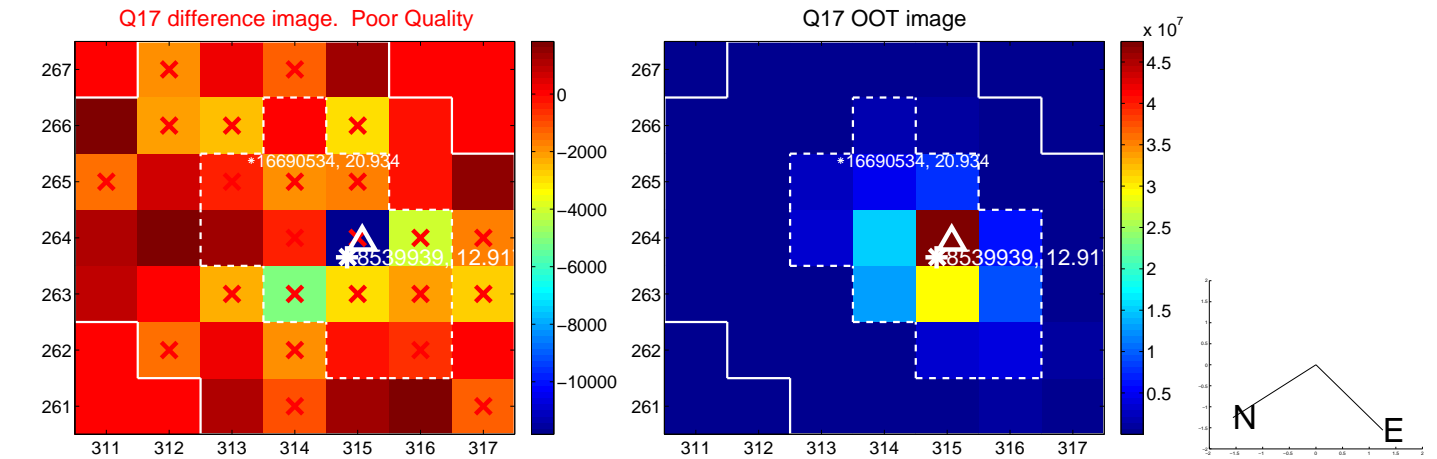
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

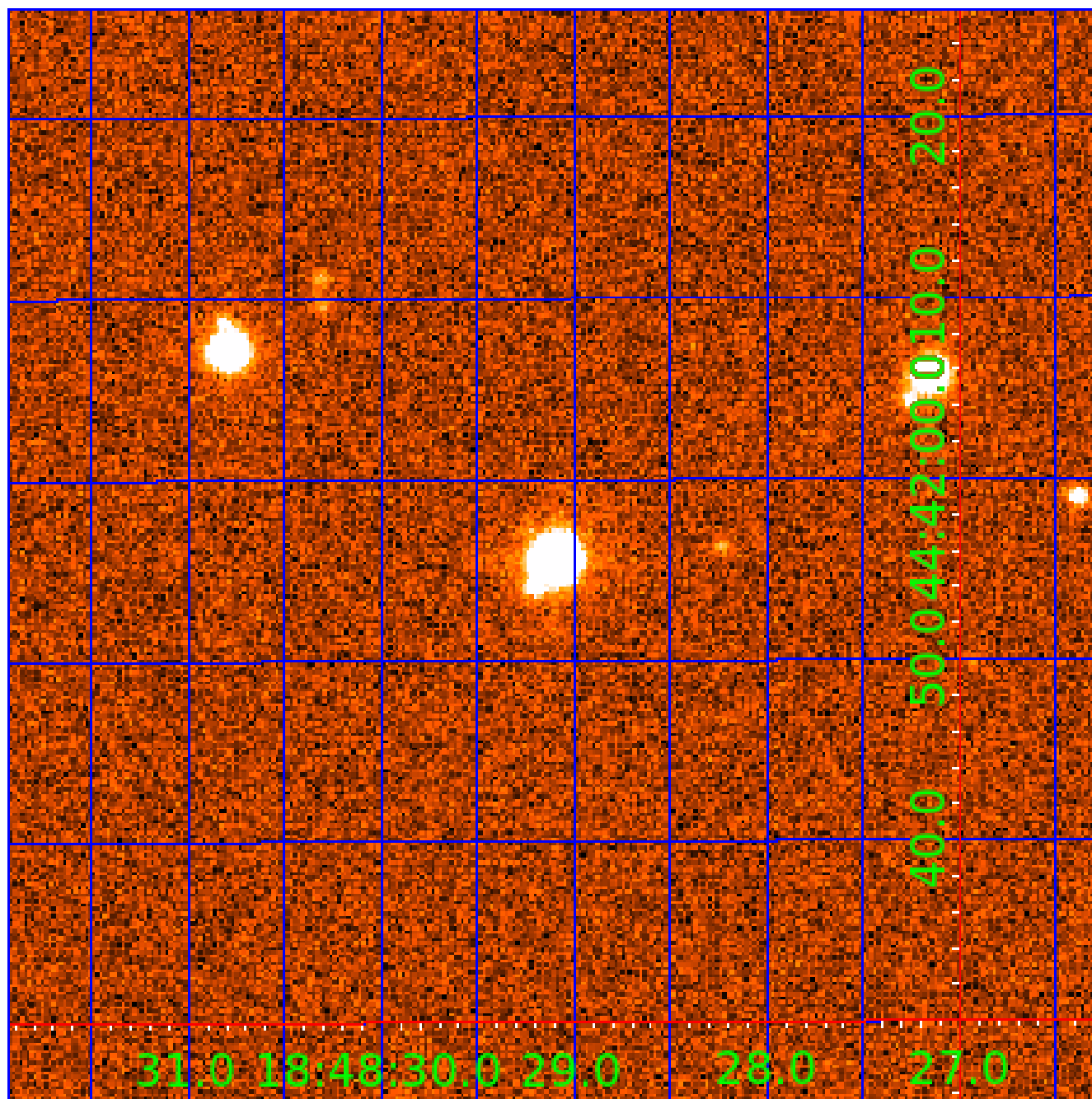


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 008539939

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008539939-01	OBS	No	1.662014	132.555349	42.3	2.204	12.4	13.6	1.97	7316	1.51	9726.88
008539939-02	OBS	No	1.661802	132.092268	2.9	11.998	12.0	1.8	1.97	7316	0.38	9728.53
008539939-03	OBS	No	29.779603	136.093972	306.4	1.609	14.5	14.9	1.97	7316	3.92	207.46
008539939-04	OBS	No	23.071110	153.308159	371.9	0.866	12.8	11.2	1.97	7316	4.50	291.56
008539939-05	OBS	No	20.445838	145.452169	190.0	2.167	12.1	11.3	1.97	7316	2.82	342.51
008539939-06	OBS	No	14.668596	133.821649	101.2	4.250	10.8	10.0	1.97	7316	2.22	533.30
008539939-07	OBS	No	28.367532	133.353696	172.0	2.973	10.4	9.1	1.97	7316	2.99	221.34
008539939-08	OBS	No	102.224919	162.703297	190.3	3.120	11.2	9.1	1.97	7316	2.80	40.06

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008539939-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
008539939-02	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—SAME_NTL_PERIOD
008539939-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
008539939-04	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
008539939-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—CENT_FEW_MEAS
008539939-06	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—HALO_GHOST
008539939-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
008539939-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—SAME_NTL_PERIOD

**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.

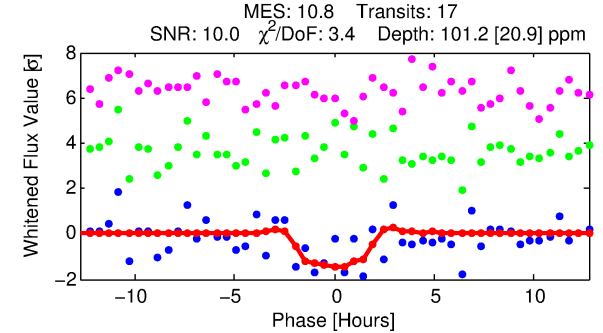
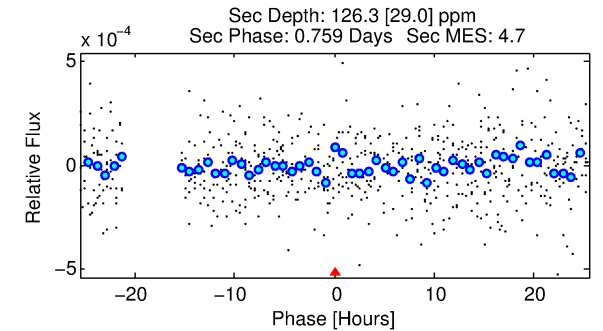
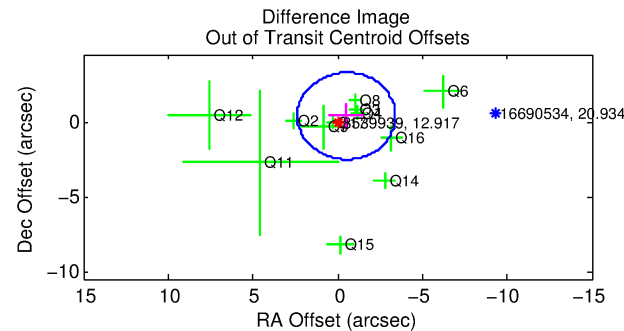
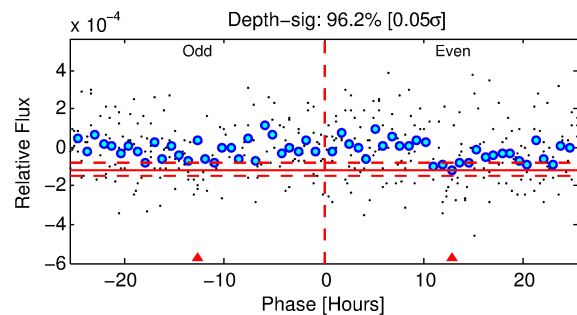
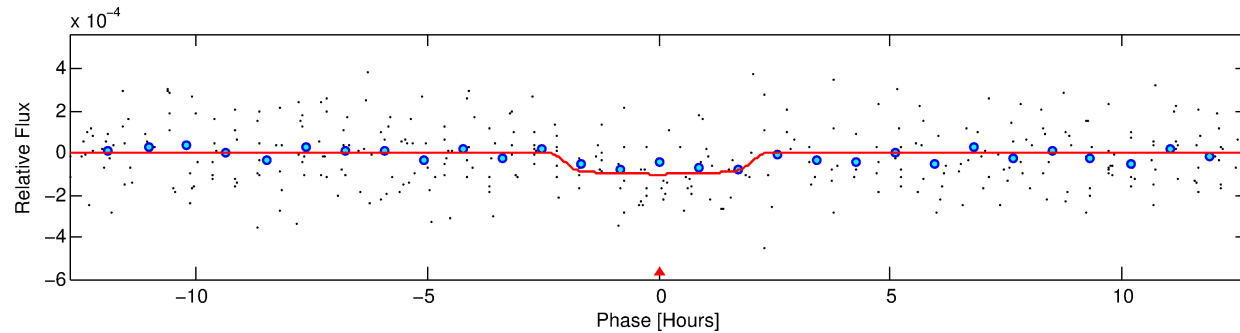
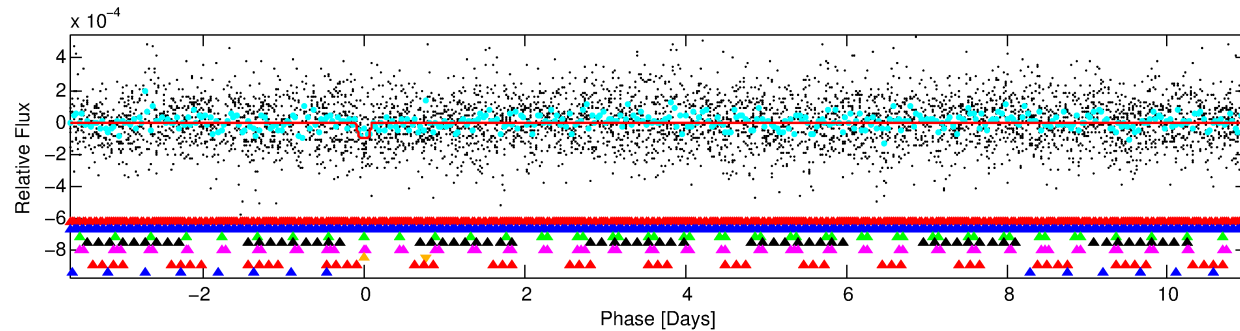
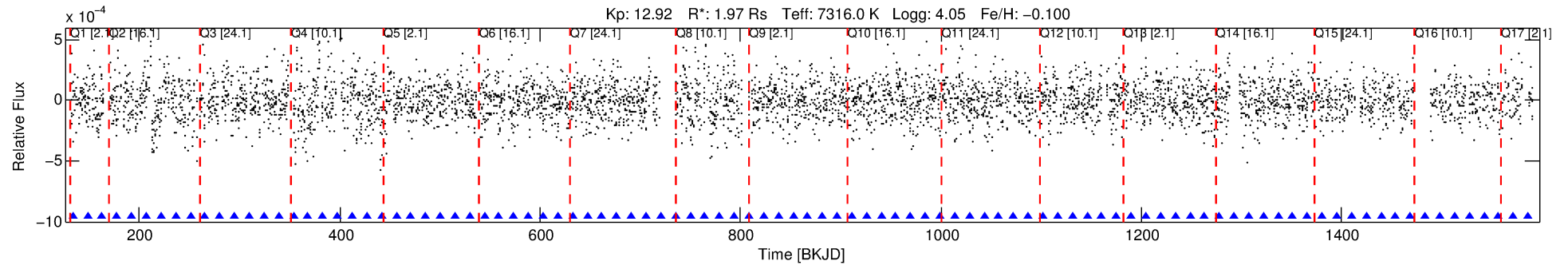
Ephemeris Match Information For 008539939-06

No Significant Match Found



# DV One-Page Summary

KIC: 8539939 Candidate: 6 of 8 Period: 14.669 d



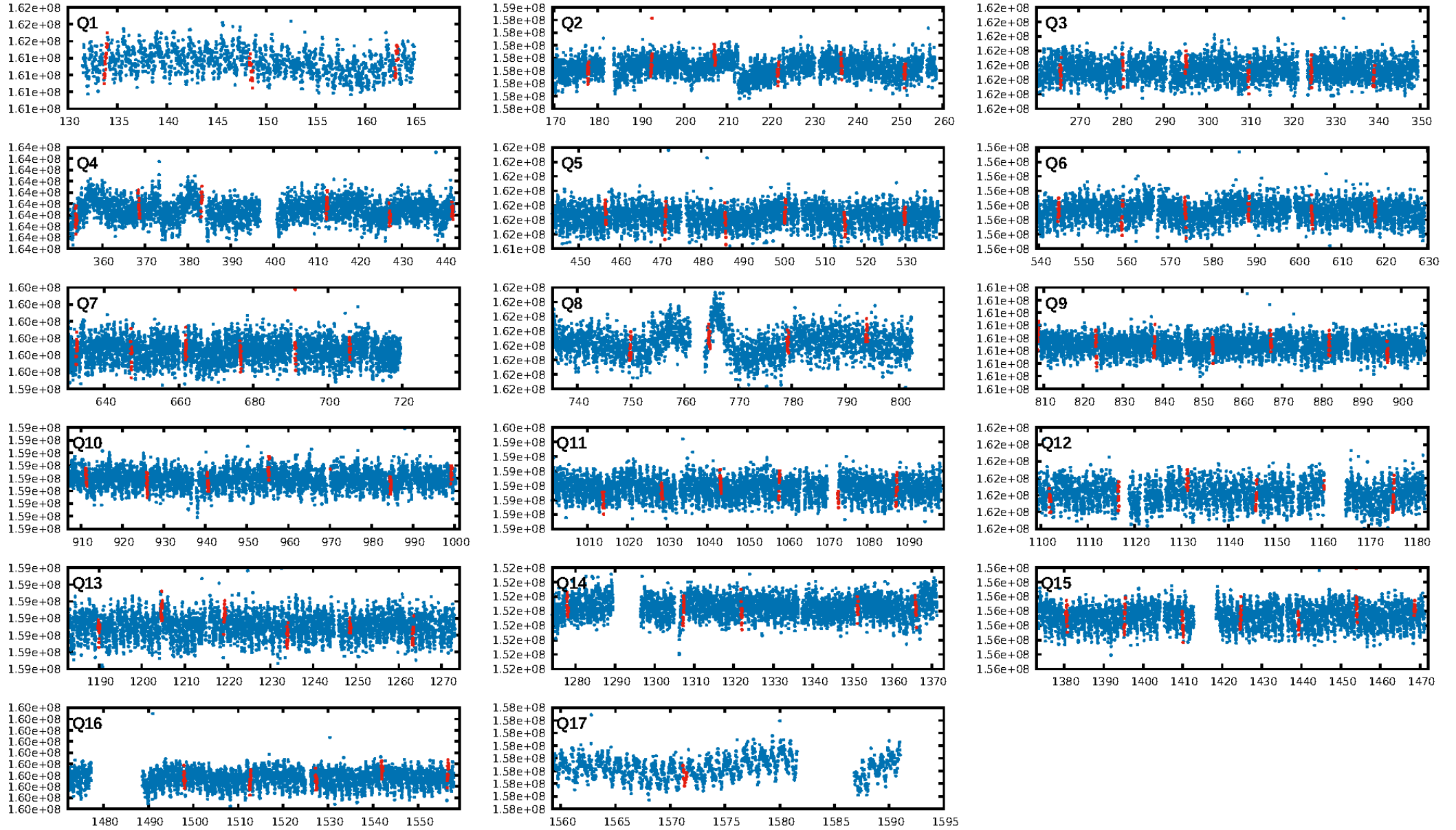
## DV Fit Results:

Period = 14.66860 [0.00039] d  
Epoch = 133.8216 [0.0195] BKJD  
Rp/R\* = 0.0103 [0.0117]  
a/R\* = 14.76 [104.36]  
b = 0.84 [2.49]  
Seff = 533.30 [200.14]  
Teq = 1225 [115] K  
Rp = 2.22 [2.58] Re  
a = 0.1366 [0.0314] AU  
Ag = 262.99 [603.79] [0.43 $\sigma$ ]  
Teffp = 7629 [4343] K [1.47 $\sigma$ ]

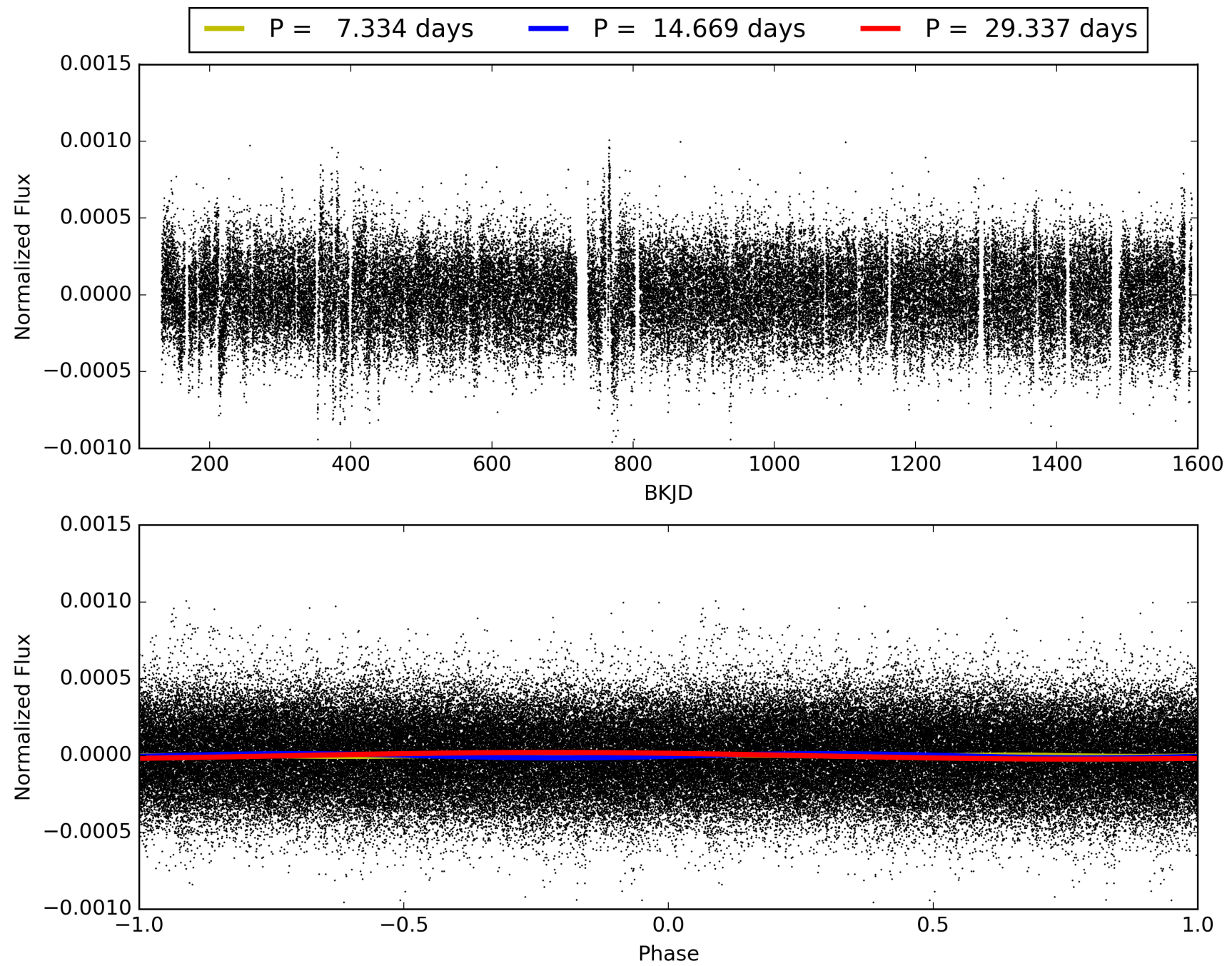
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [65.21 $\sigma$ ]  
LongPeriod-sig: 100.0% [29.06 $\sigma$ ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 84.7%  
Bootstrap-pfa: 2.61e-09  
RollingBand-fgt: 1.00 [17/17]  
GhostDiagnostic-chr: -0.06884  
Centroid-sig: N/A  
Centroid-so: 0.701 arcsec [1.05 $\sigma$ ]  
OotOffset-rm: 0.642 arcsec [0.66 $\sigma$ ]  
KicOffset-rm: 0.679 arcsec [0.75 $\sigma$ ]  
OotOffset-st: 3/4/4/2 [13]  
KicOffset-st: 3/4/4/2 [13]  
DiffImageQuality-fgm: 0.31 [4/13]  
DiffImageOverlap-fno: 0.06 [1/17]

# TCE 008539939-06, PDC Light Curves

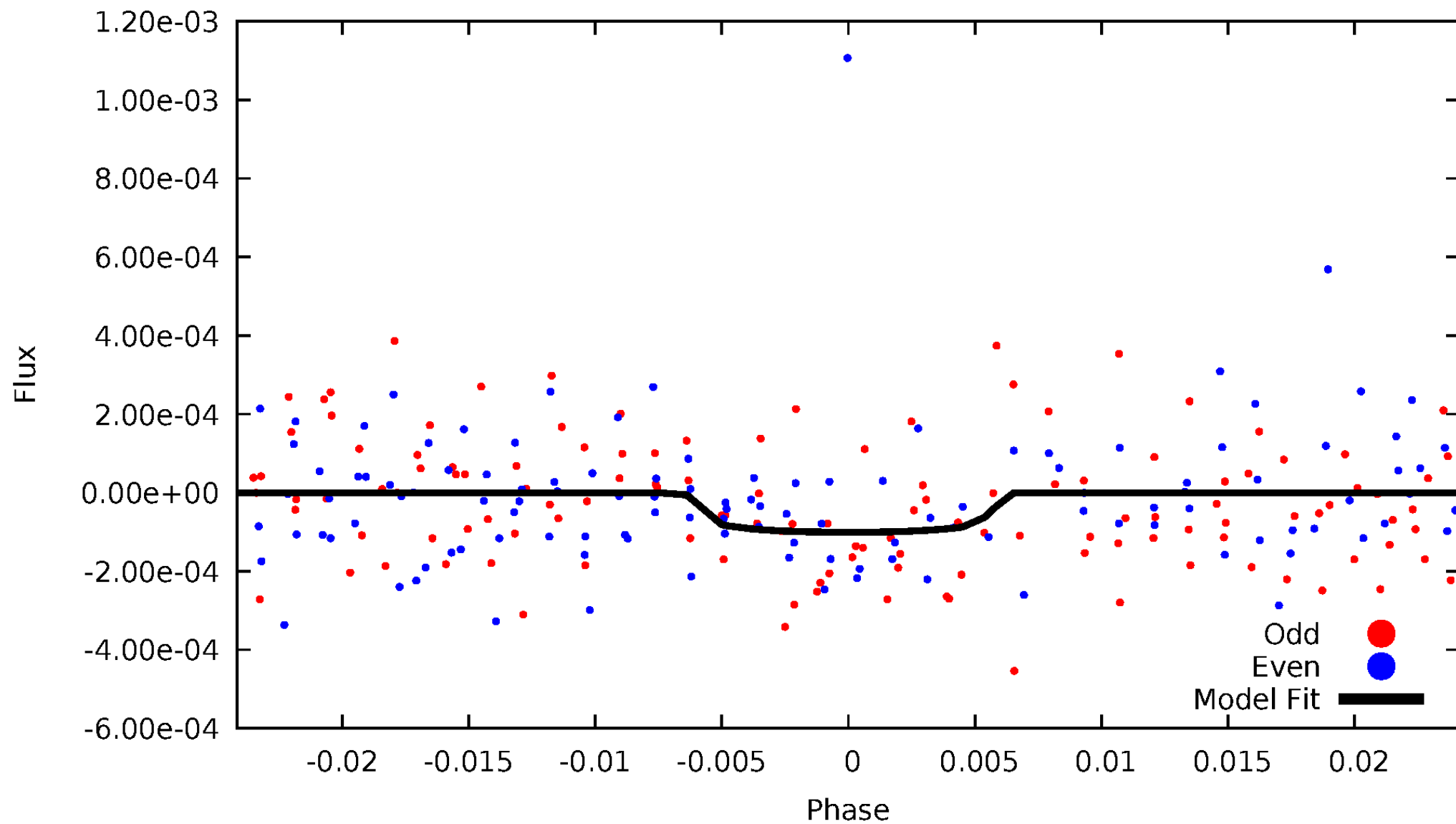


TCE 008539939-06



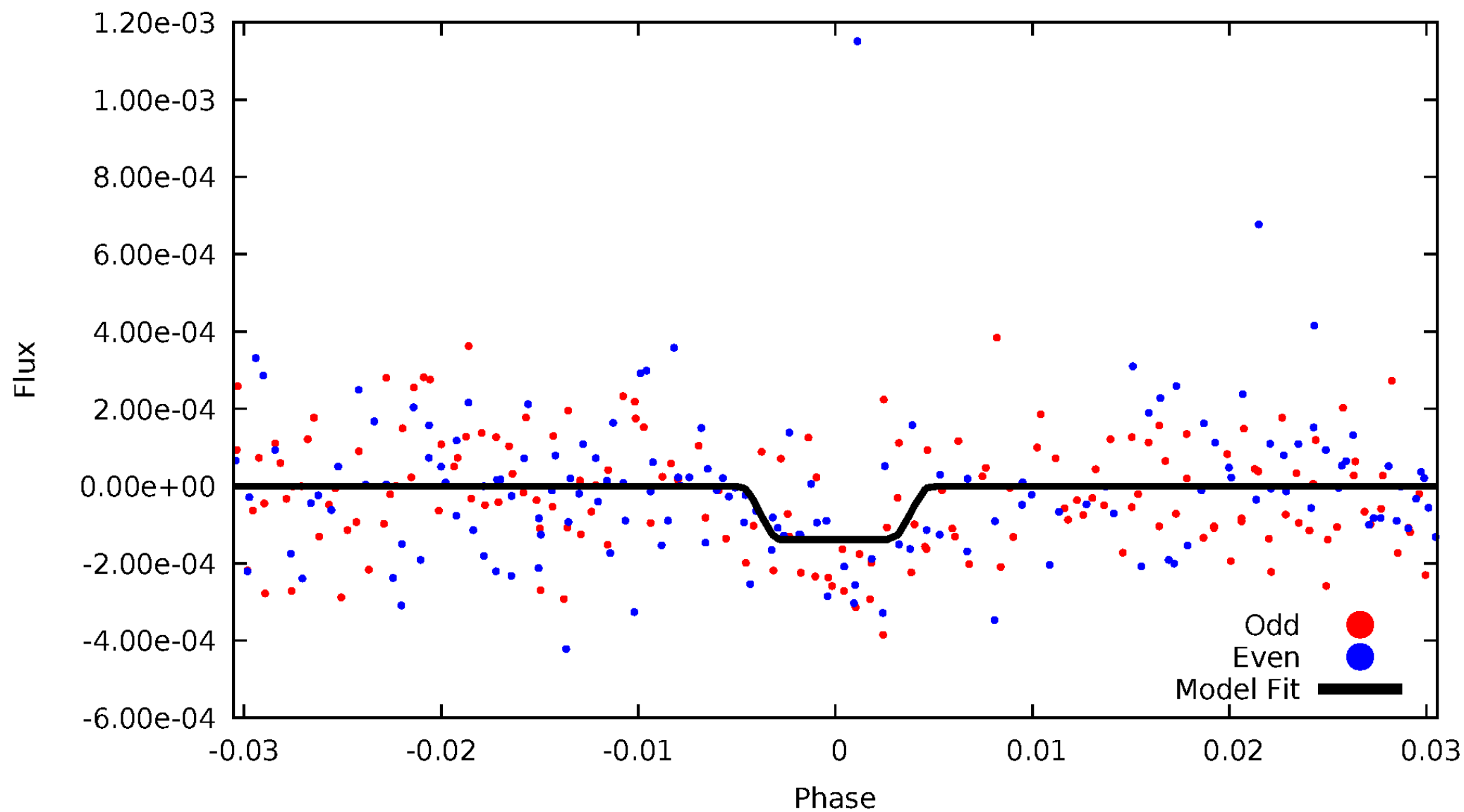
# DV Odd/Even

TCE 008539939-06



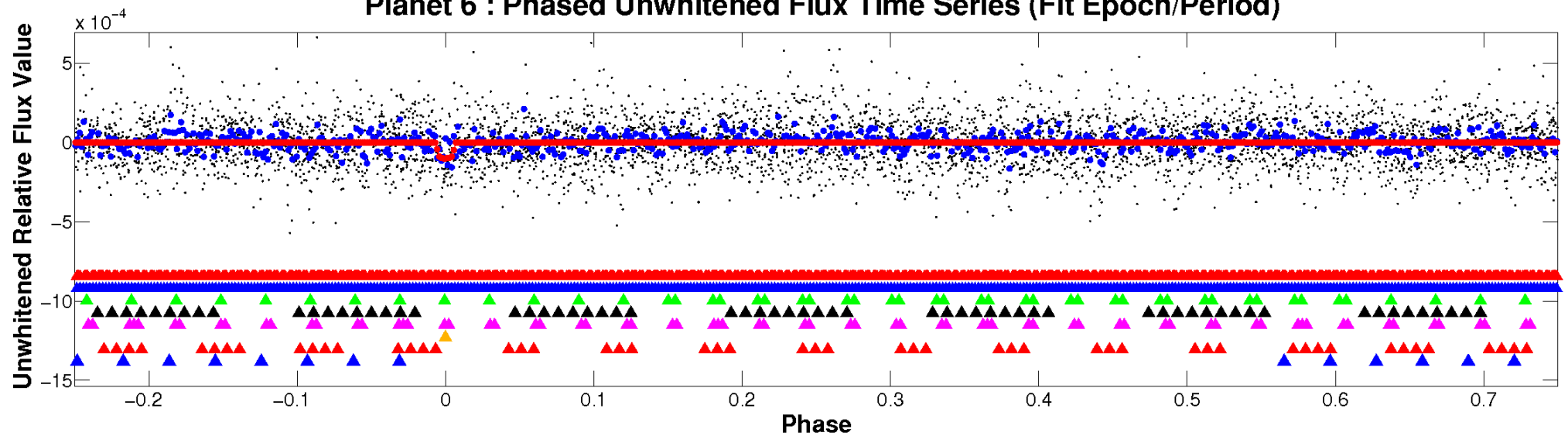
# ALT Odd/Even

TCE 008539939-06

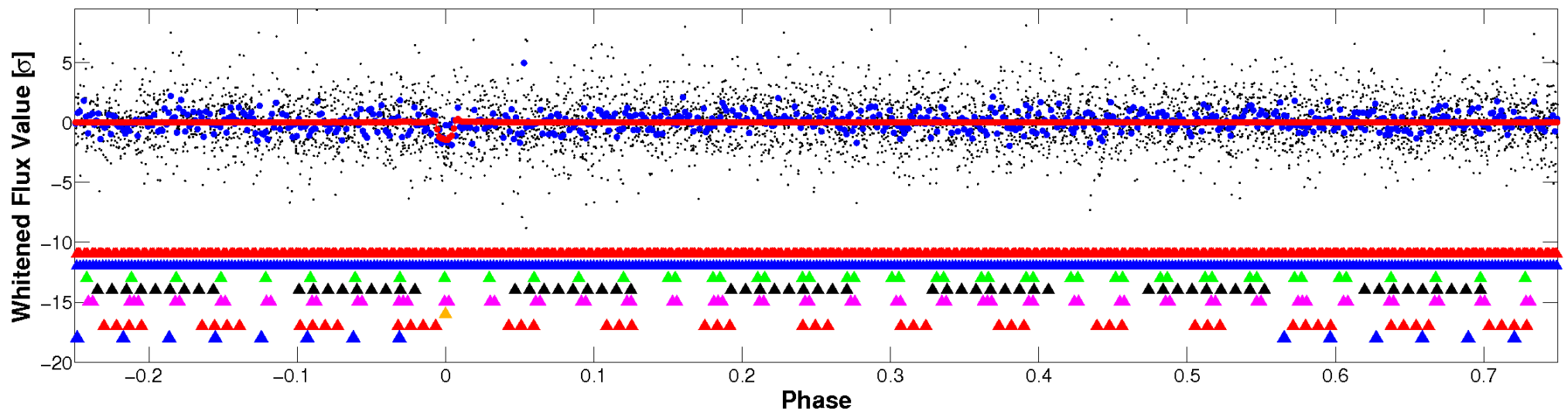


# Non-Whitened Vs. Whitened Light Curve

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



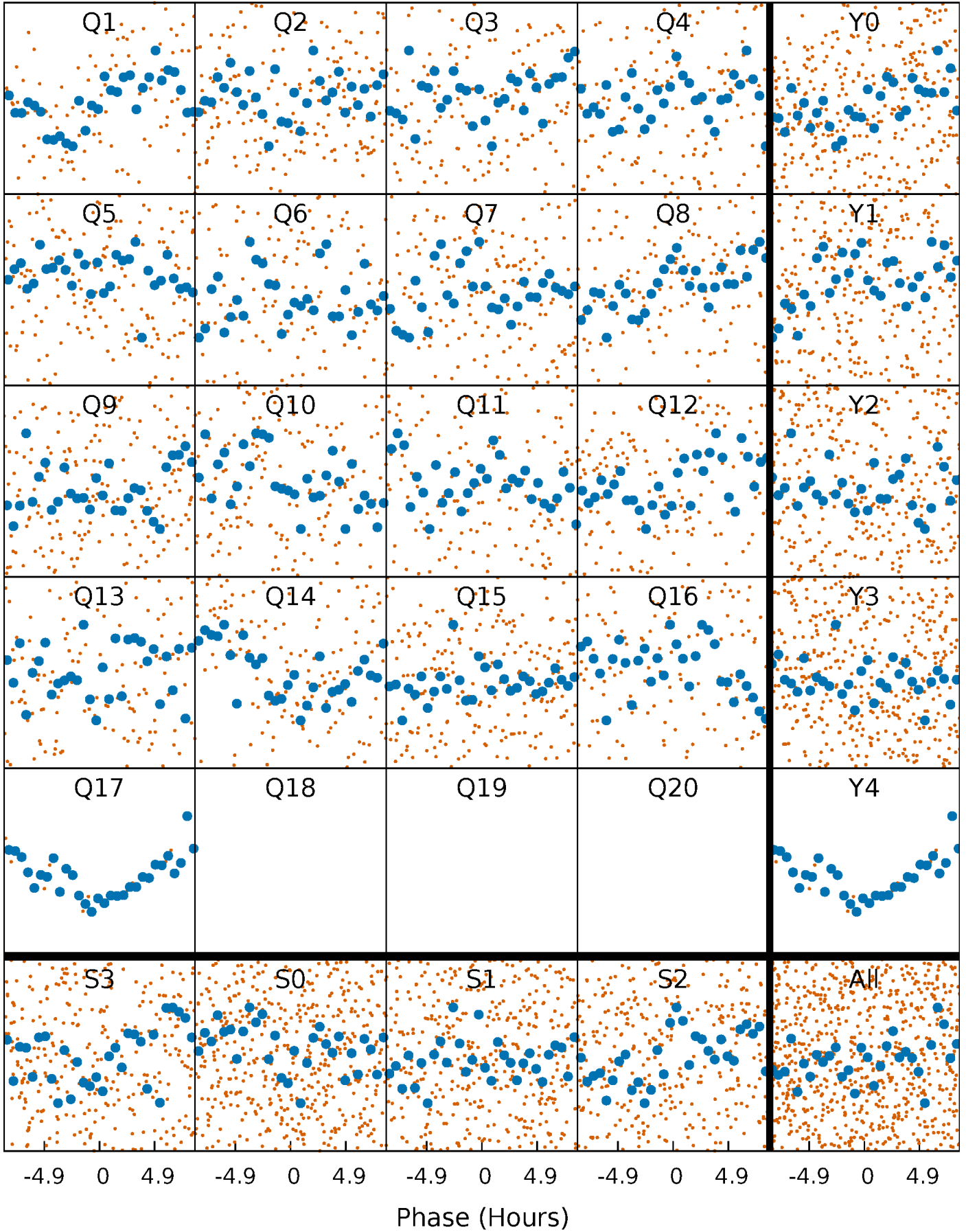
## Planet 6 : Phased Whitened Flux Time Series (Fit Epoch/Period)





# PDC Quarter-Phased Transit Curves

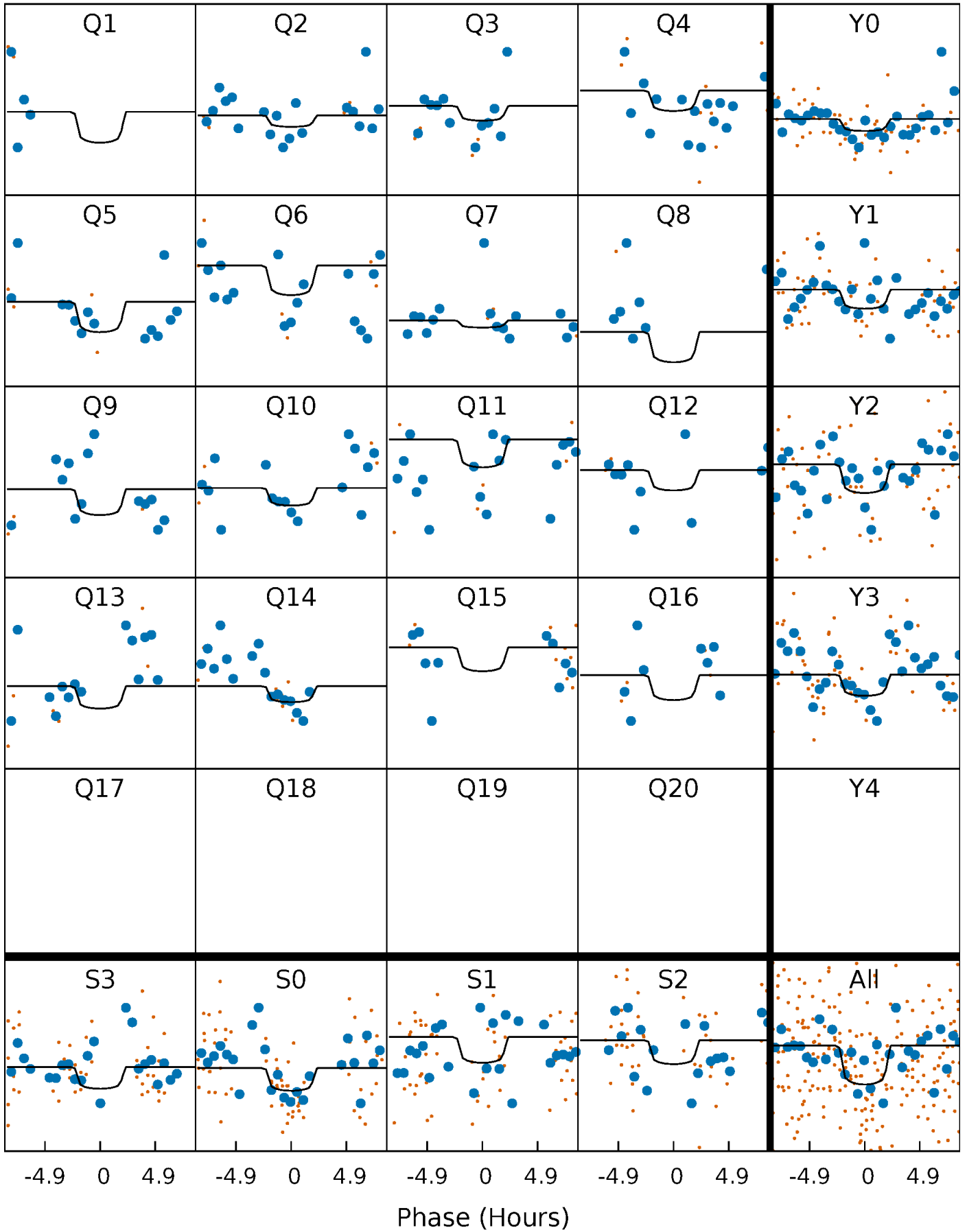
TCE 008539939-06   P= 14.668596 Days    $T_0=133.821649$  (BKJD)





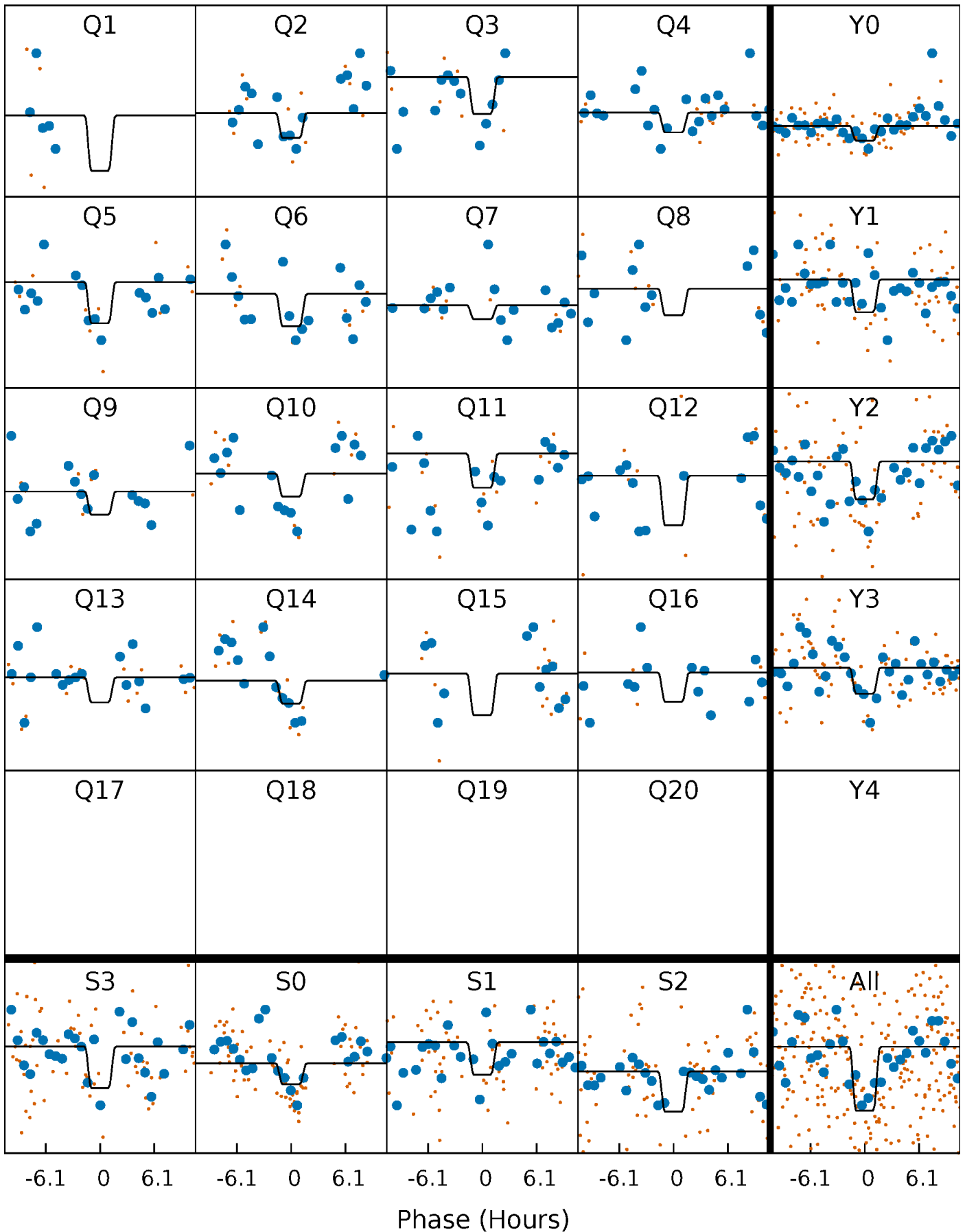
# DV Quarter-Phased Transit Curves

TCE 008539939-06   P= 14.668596 Days    $T_0=133.821649$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

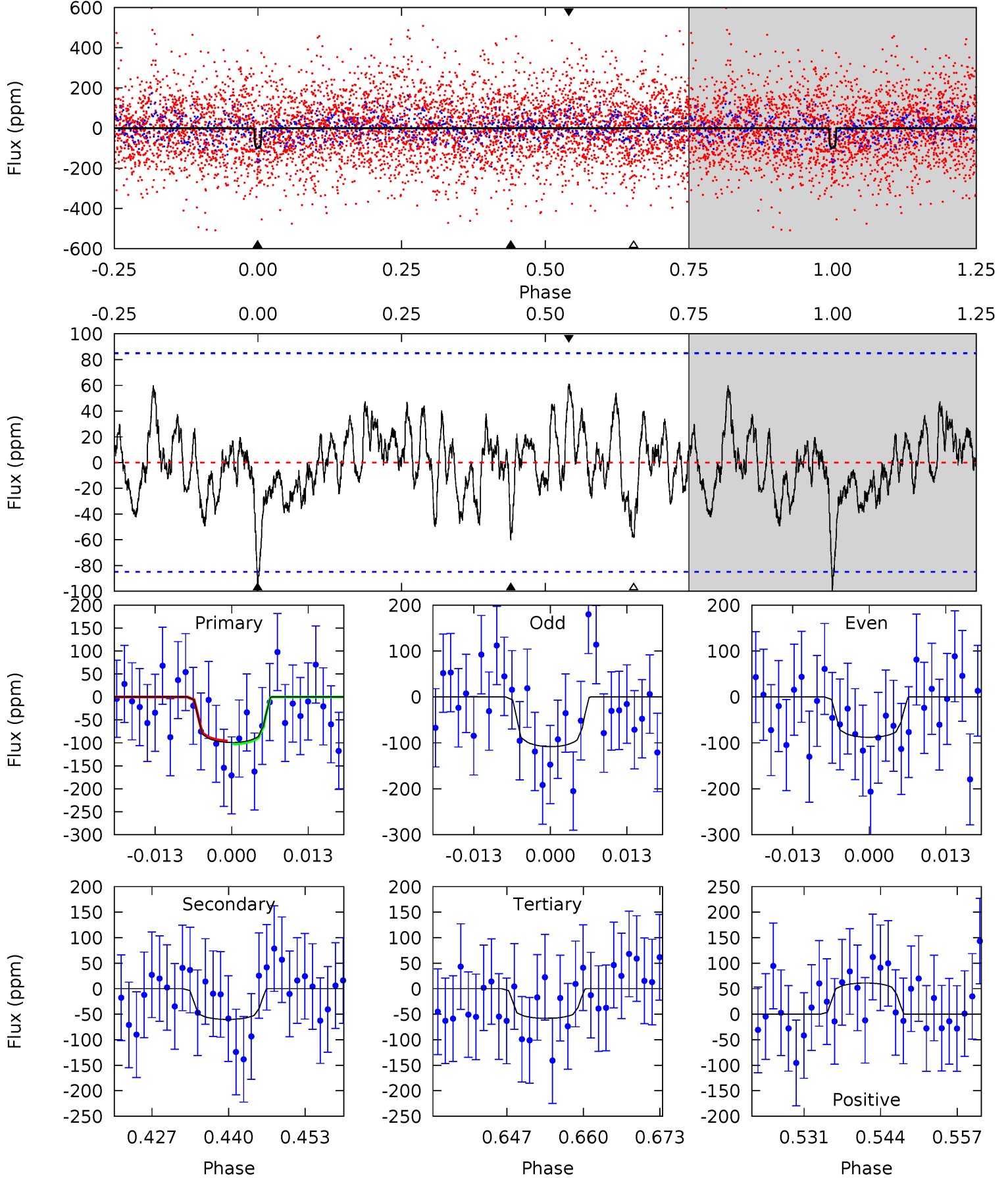
TCE 008539939-06 P= 14.669195 Days  $T_0=133.782023$  (BKJD)



# DV Model-Shift Uniqueness Test

008539939-06, P = 14.668596 Days, E = 119.153053 Days

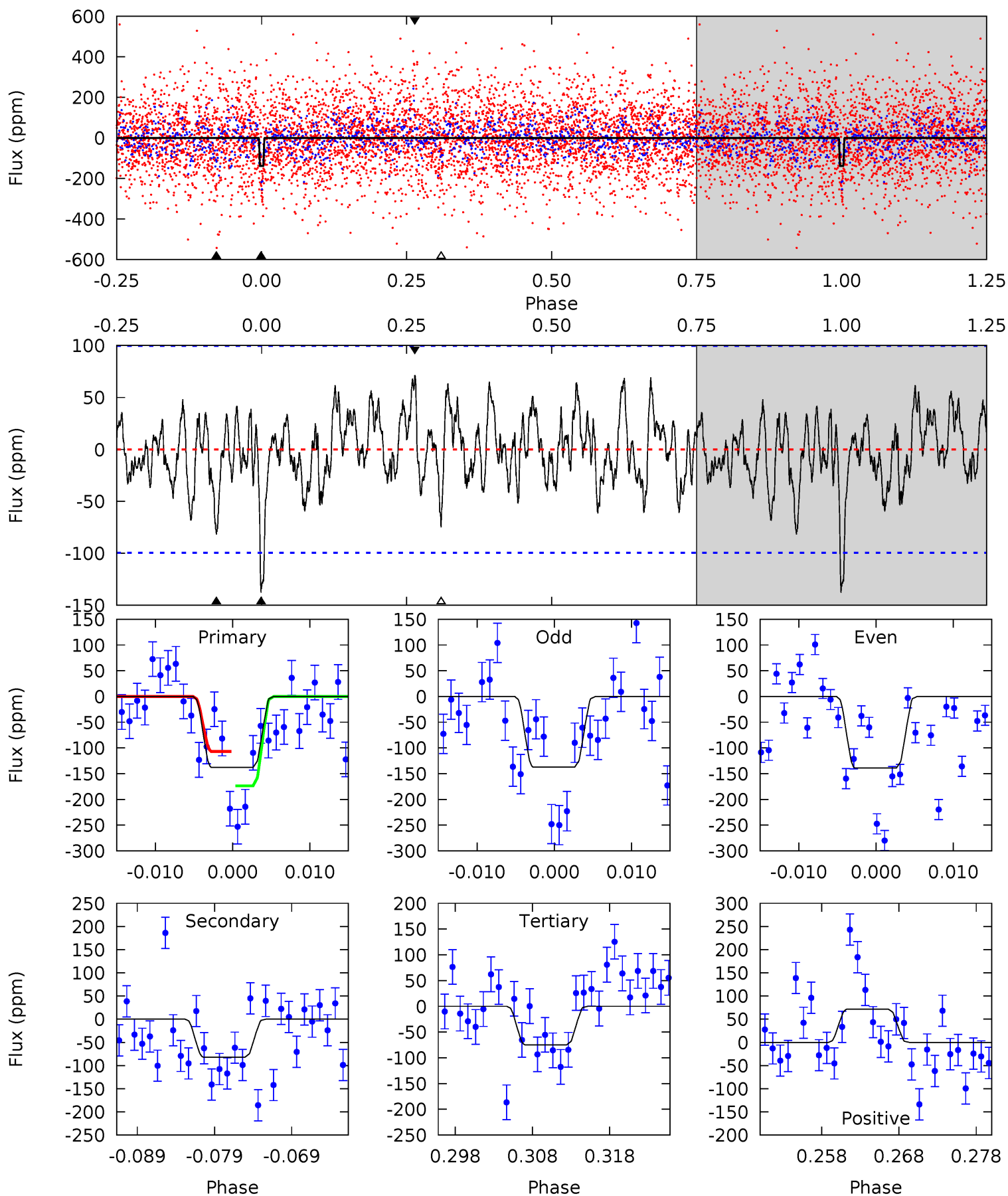
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.82	3.53	3.41	3.59	4.98	2.49	1.31	2.41	2.23	0.12	-0.06	0.59	0.60	0.38	0



# Alt Model-Shift Uniqueness Test

008539939-06, P = 14.669195 Days, E = 119.112828 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
6.97	4.14	3.78	3.61	5.03	2.58	1.40	3.19	3.36	0.36	0.53	0.04	0.45	0.34	1.69



### Stellar Parameters For KIC 008539939

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7316^{+228}_{-304}$	$4.048^{+0.185}_{-0.167}$	$-0.100^{+0.250}_{-0.350}$	$1.969^{+0.533}_{-0.533}$	$1.577^{+0.199}_{-0.273}$	$0.291^{+0.326}_{-0.134}$
	+3%/-4%	+5%/-4%	+250%/-350%	+27%/-27%	+13%/-17%	+112%/-46%
Source	KIC0	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 008539939-06 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-60 \pm 17$	$2.82^{+2.24}_{-1.75}$	$1705^{+136}_{-128}$	$5525^{+3884}_{-1221}$	$77^{+474}_{-55}$
Alt.	$-82 \pm 20$	$2.96^{+2.38}_{-1.86}$	$1710^{+136}_{-126}$	$5818^{+5034}_{-1325}$	$92^{+634}_{-64}$

$T_{\text{max}}$  = 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

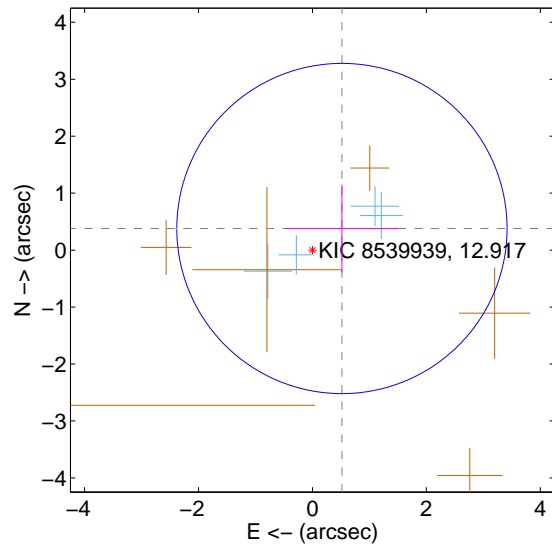
Supplemental centroid analysis for 008539939-06. Kepler magnitude: 12.92. Transit SNR 10.00

There are 4 quarters with good PRF difference image offsets

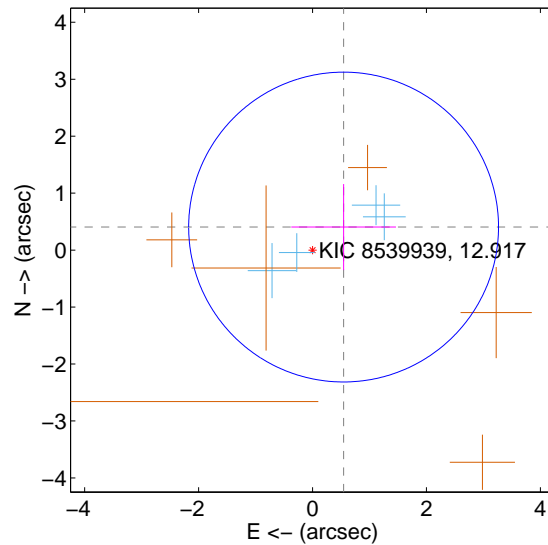
The direct PRF centroid is offset from the target star catalog position by about 0.04 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.642 \pm 0.966$	0.66	$-0.518 \pm 0.989$	$0.379 \pm 0.770$
PRF-fit source offset from KIC position	$0.679 \pm 0.907$	0.75	$-0.545 \pm 0.919$	$0.404 \pm 0.756$
photometric centroid source offset	$0.70 \pm 0.67$	1.05	$-0.49 \pm 0.72$	$0.50 \pm 0.61$

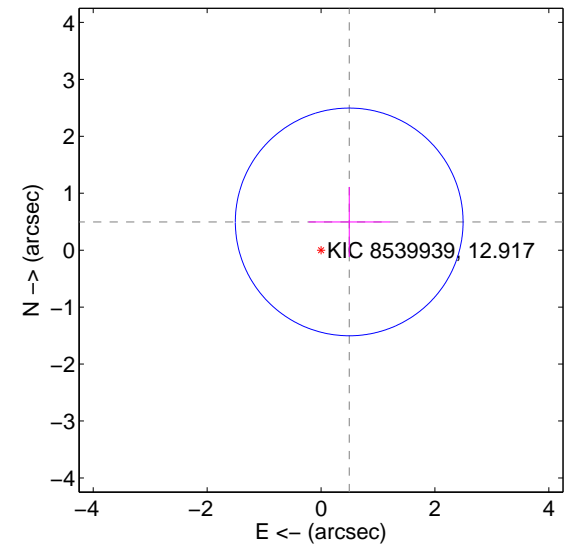
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

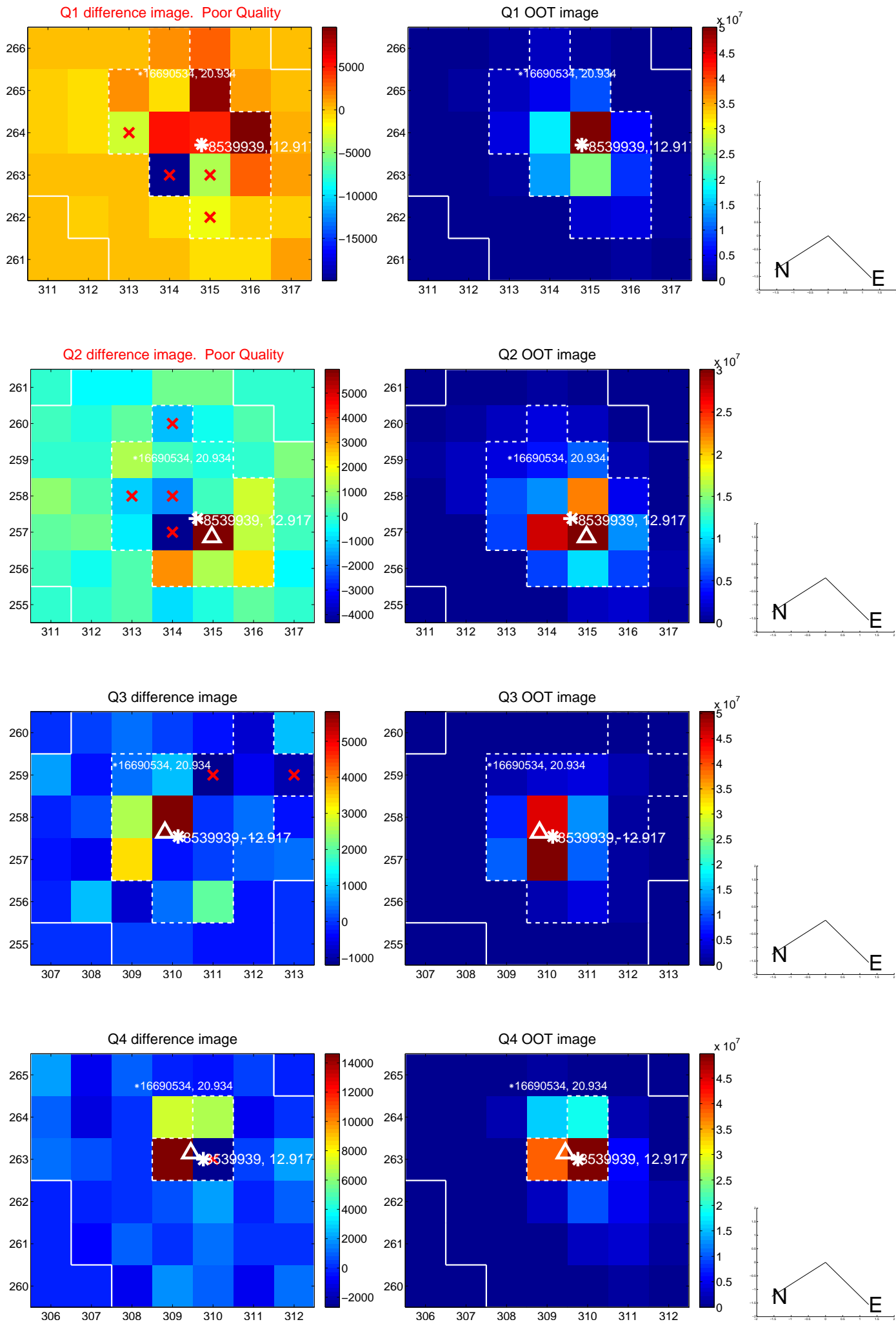


offset from photometric centroids



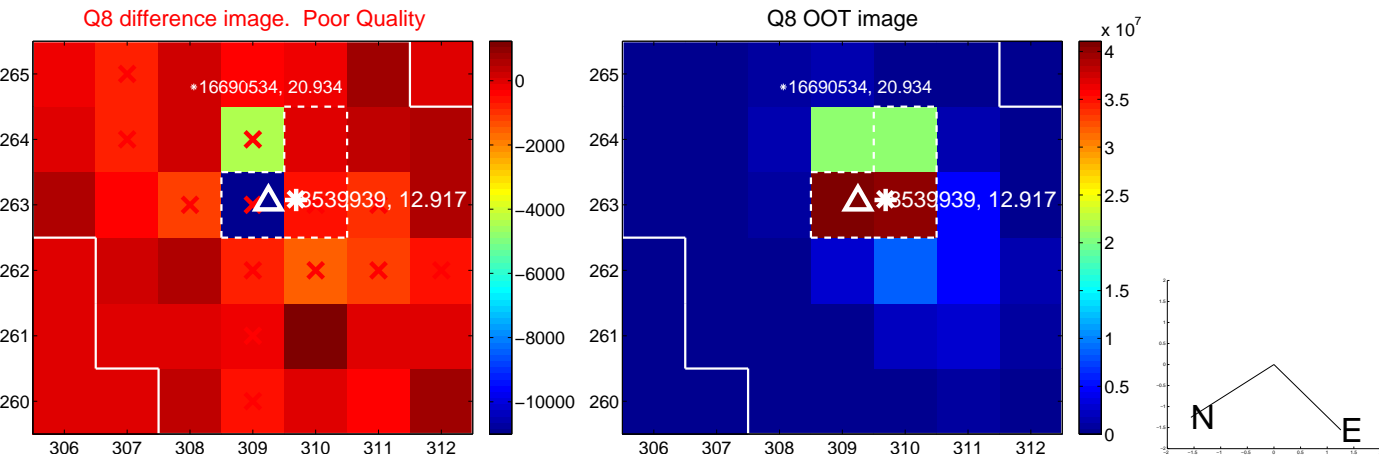
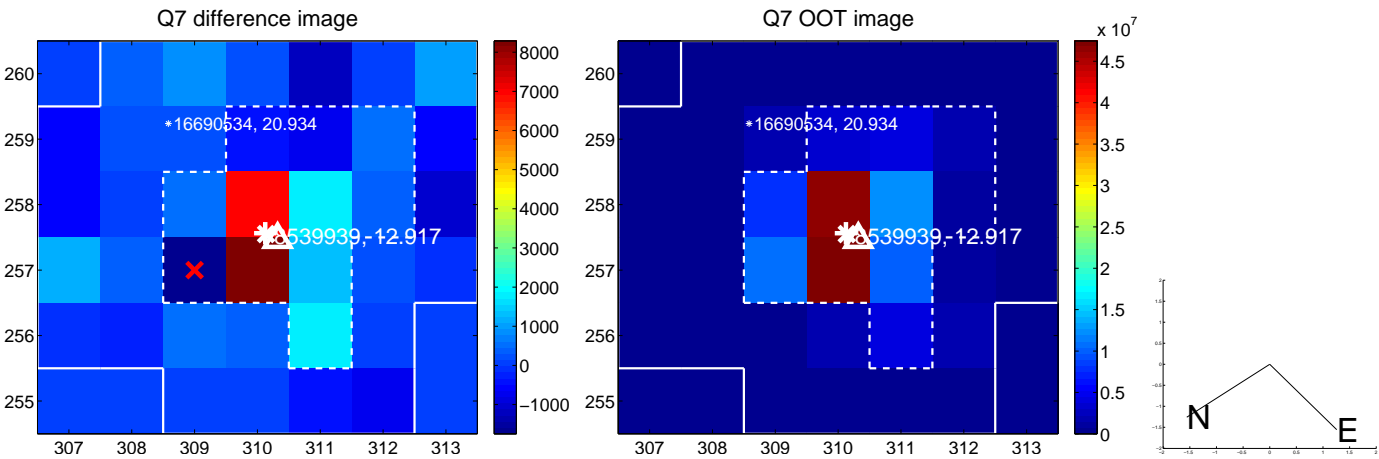
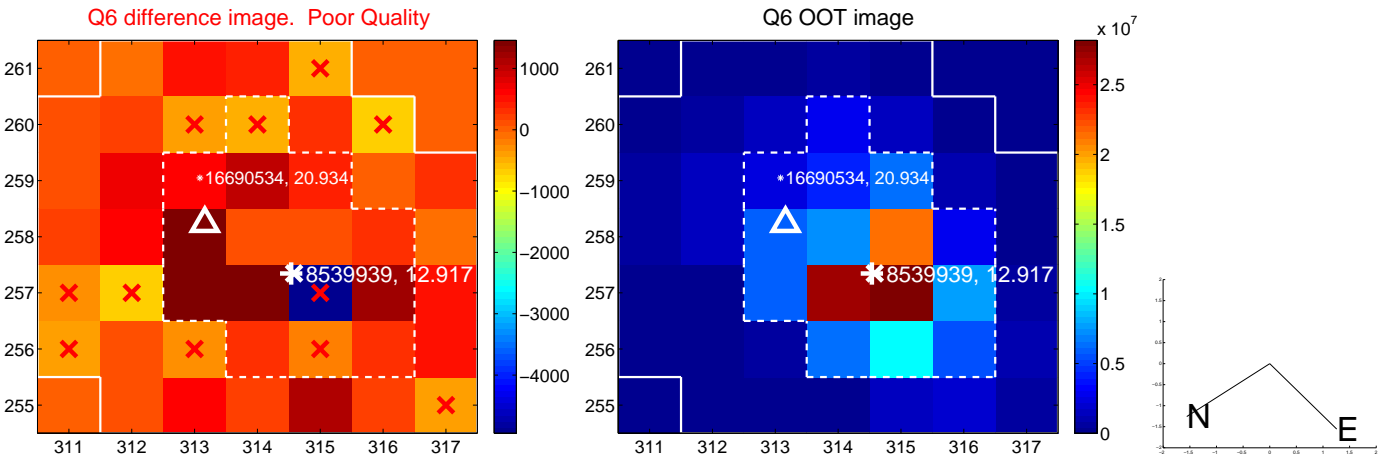
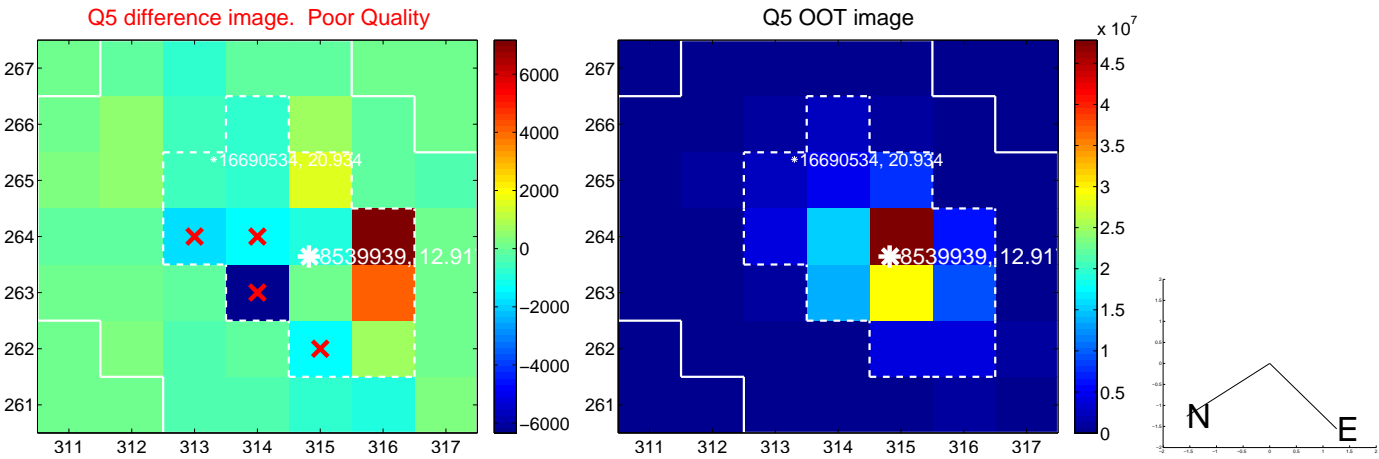
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

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

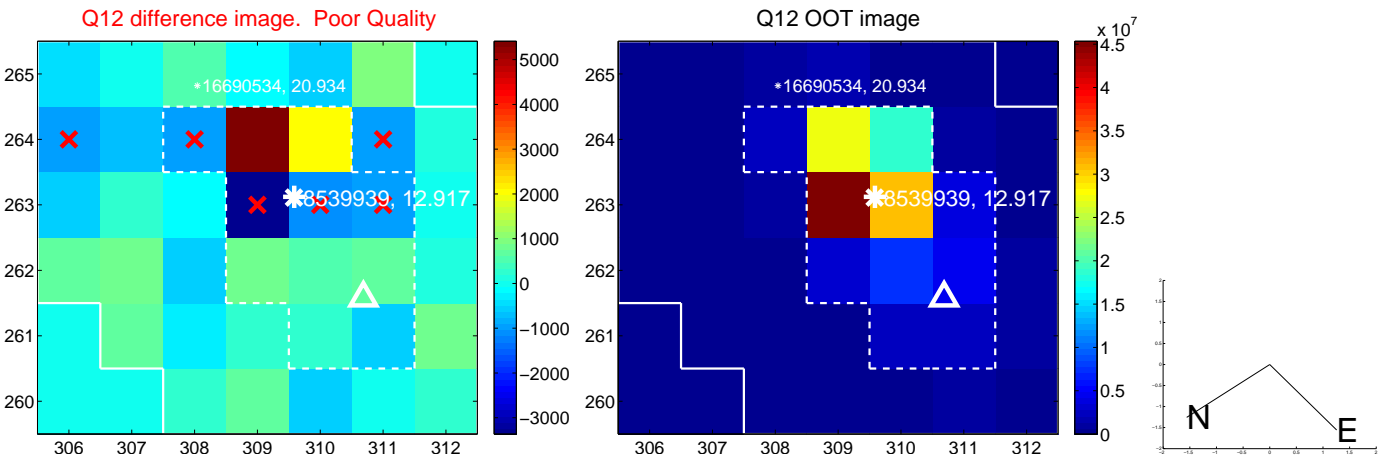
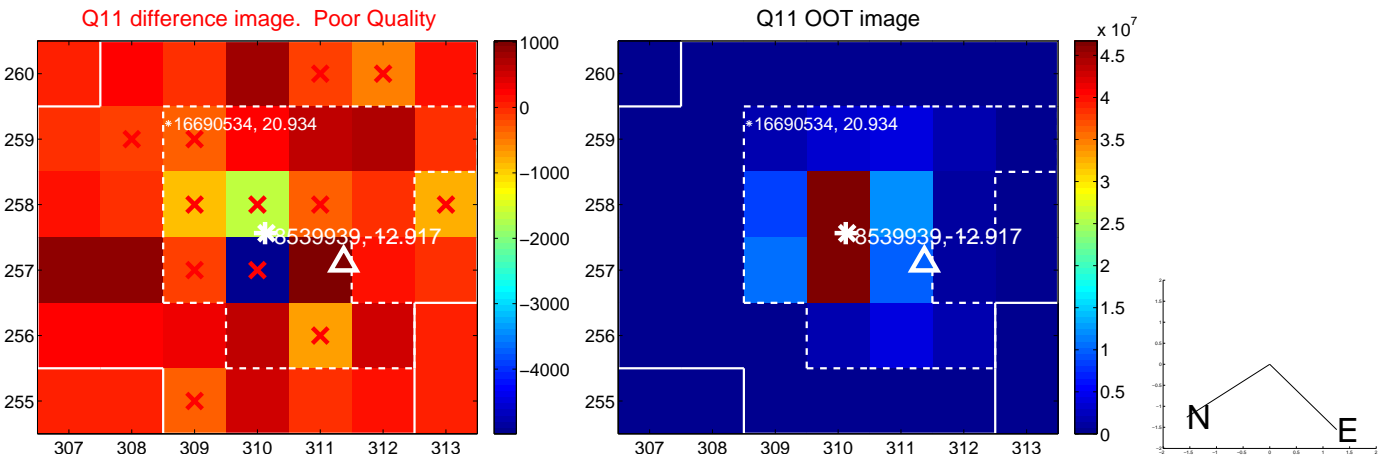
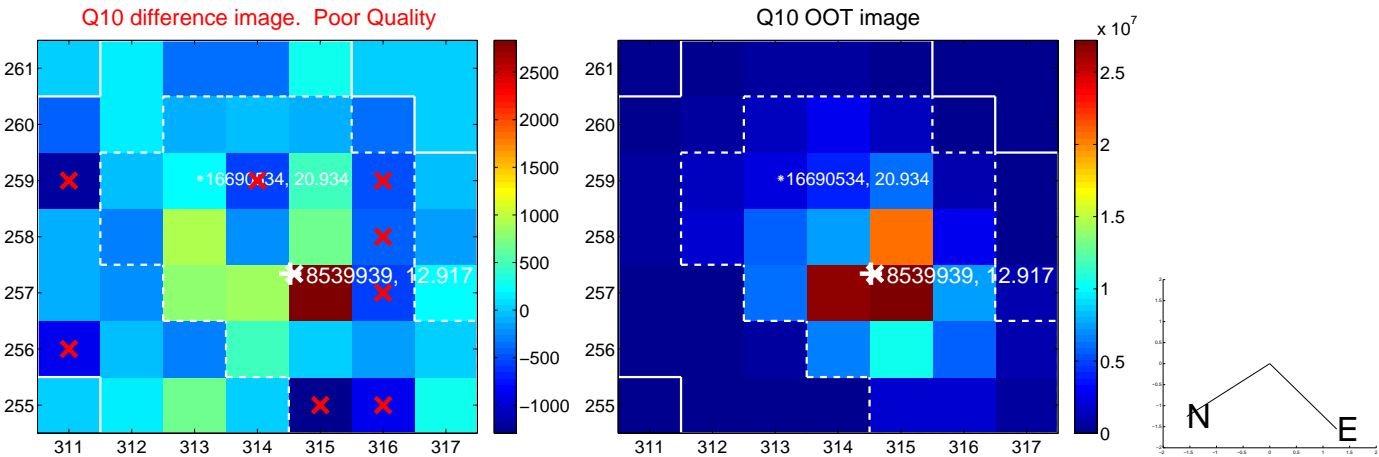
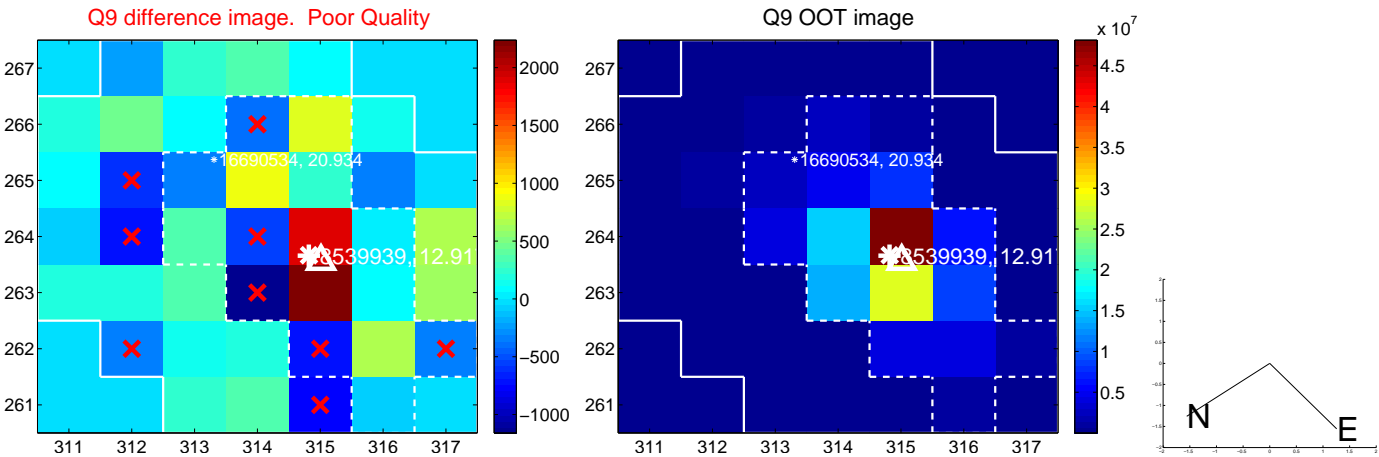




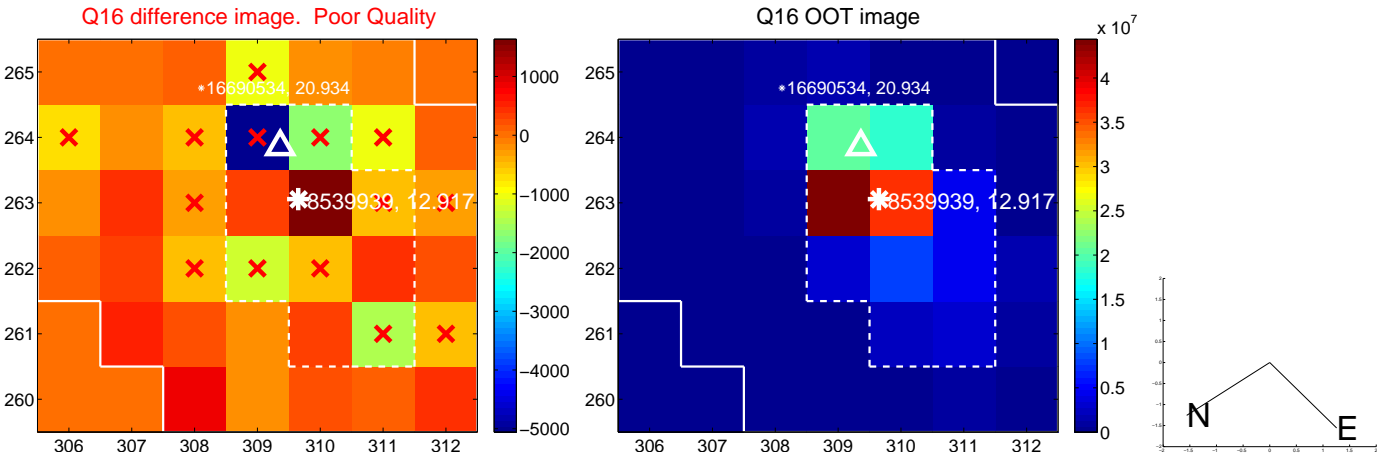
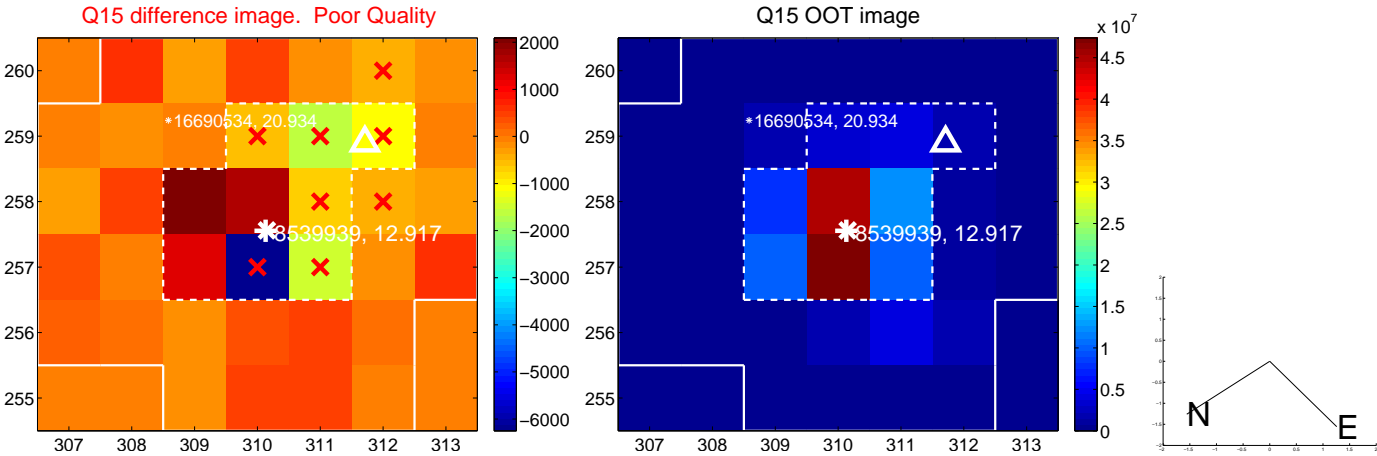
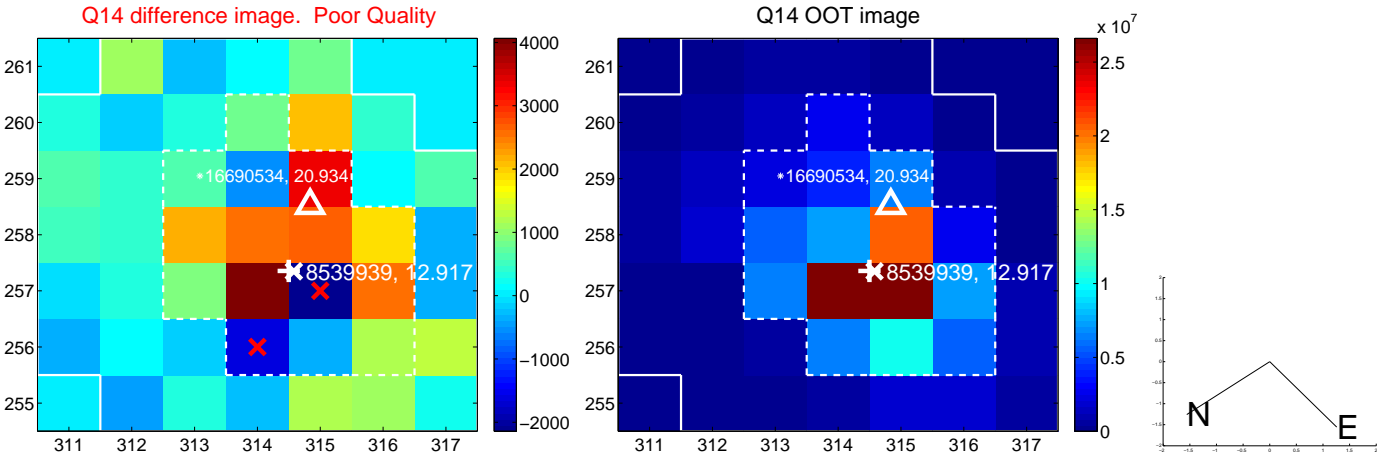
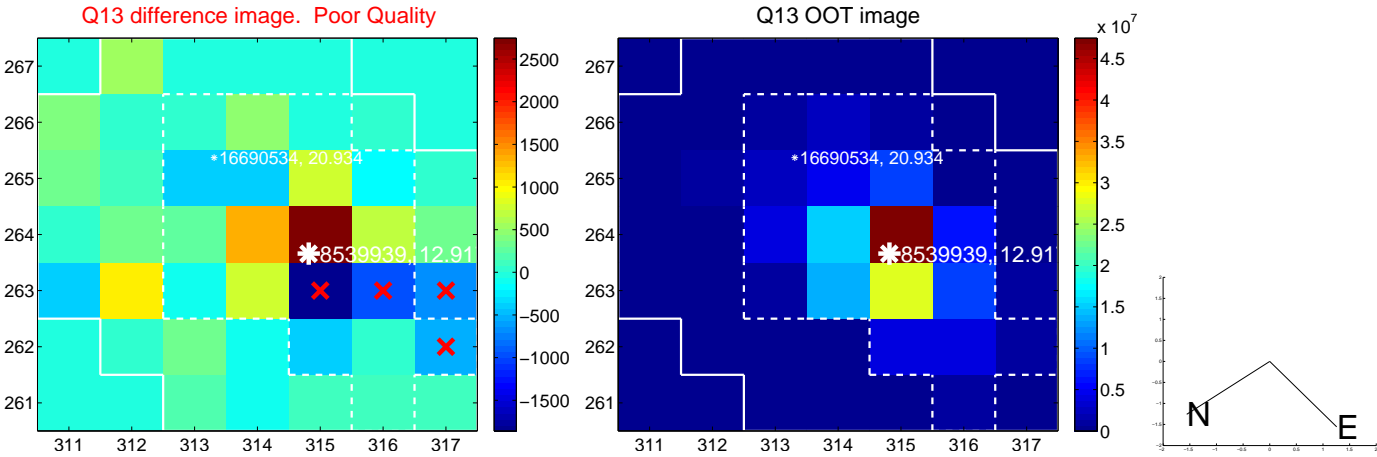
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



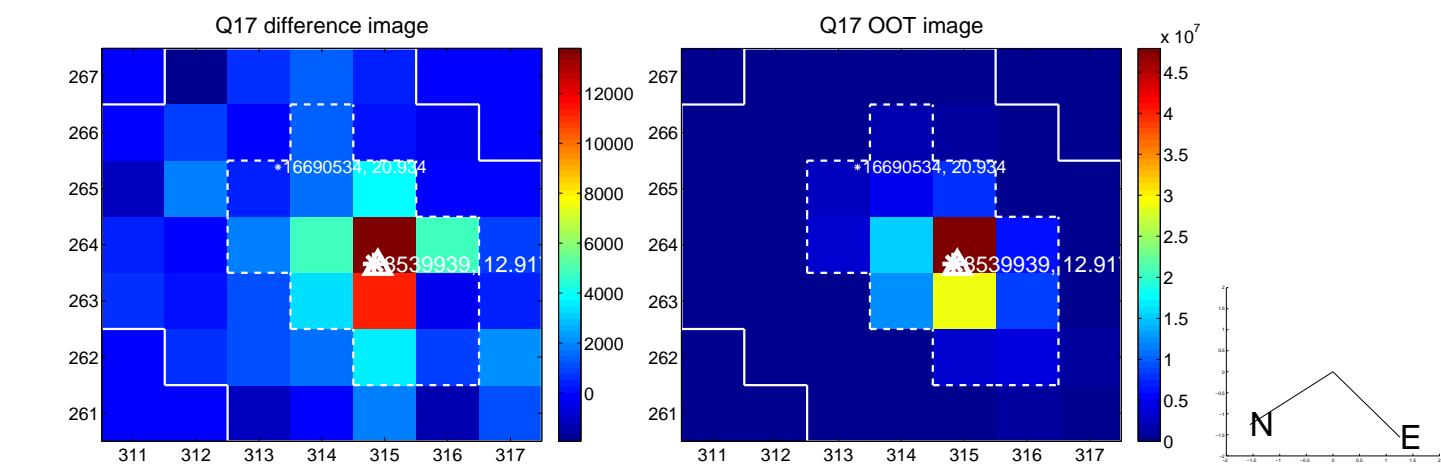
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



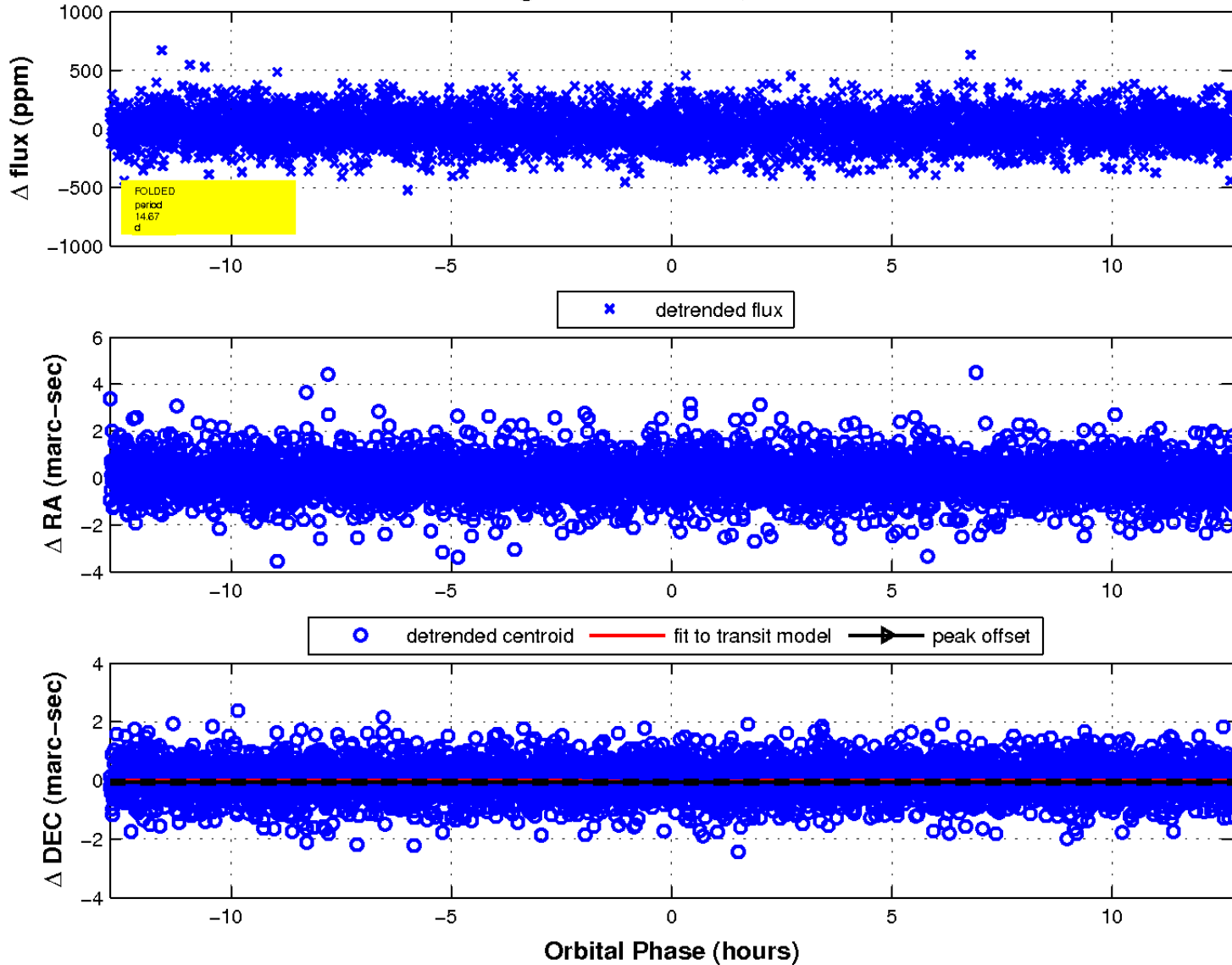
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

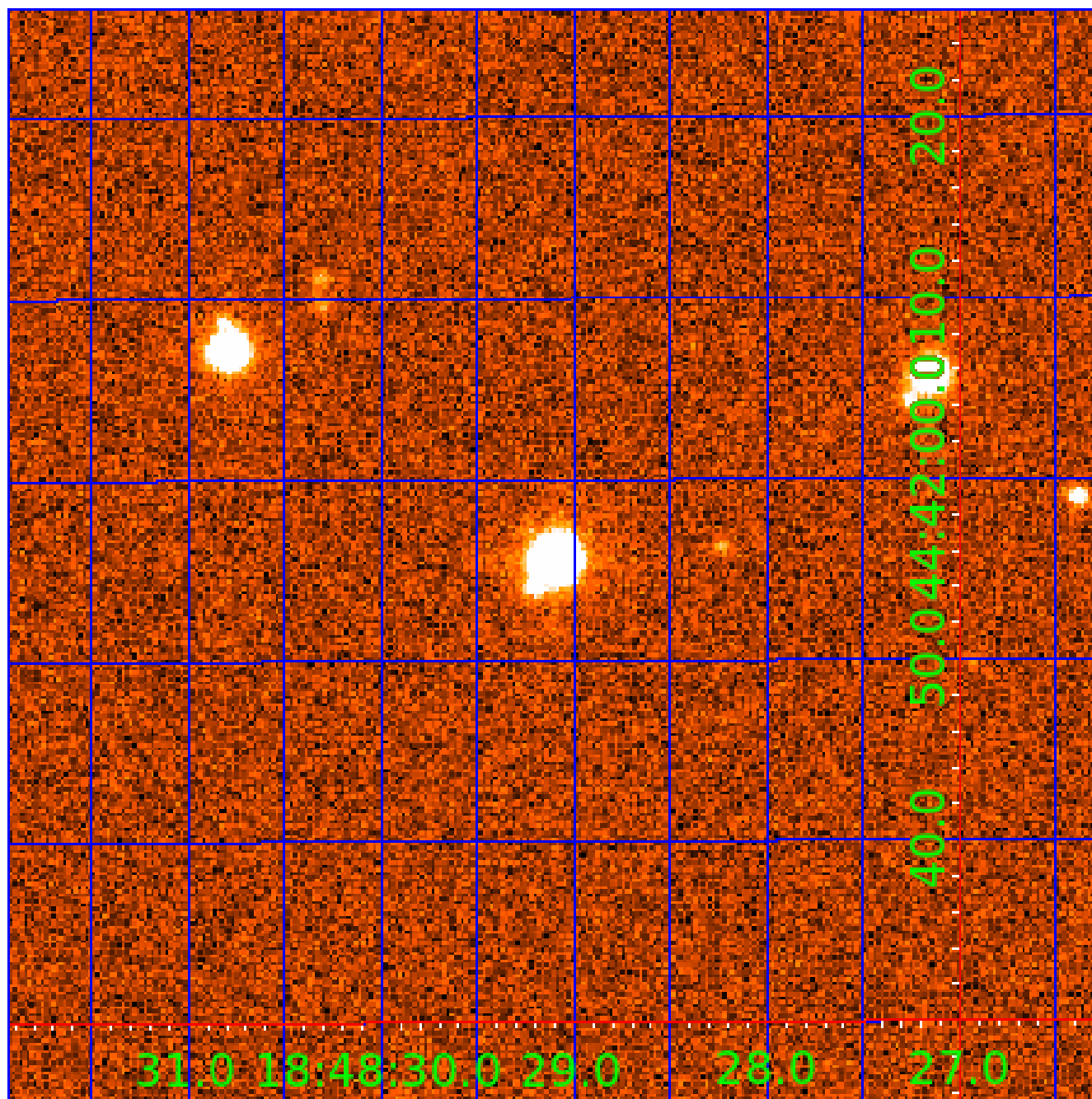


fluxWeightedCentroids, Planet 6 of 8



UKIRT Image

Declination



# KIC 008539939

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008539939-01	OBS	No	1.662014	132.555349	42.3	2.204	12.4	13.6	1.97	7316	1.51	9726.88
008539939-02	OBS	No	1.661802	132.092268	2.9	11.998	12.0	1.8	1.97	7316	0.38	9728.53
008539939-03	OBS	No	29.779603	136.093972	306.4	1.609	14.5	14.9	1.97	7316	3.92	207.46
008539939-04	OBS	No	23.071110	153.308159	371.9	0.866	12.8	11.2	1.97	7316	4.50	291.56
008539939-05	OBS	No	20.445838	145.452169	190.0	2.167	12.1	11.3	1.97	7316	2.82	342.51
008539939-06	OBS	No	14.668596	133.821649	101.2	4.250	10.8	10.0	1.97	7316	2.22	533.30
008539939-07	OBS	No	28.367532	133.353696	172.0	2.973	10.4	9.1	1.97	7316	2.99	221.34
008539939-08	OBS	No	102.224919	162.703297	190.3	3.120	11.2	9.1	1.97	7316	2.80	40.06

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008539939-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
008539939-02	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—SAME_NTL_PERIOD
008539939-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
008539939-04	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
008539939-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—CENT_FEW_MEAS
008539939-06	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—HALO_GHOST
008539939-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
008539939-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—SAME_NTL_PERIOD

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

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

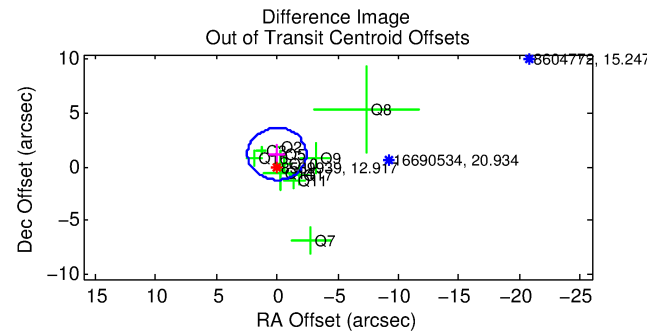
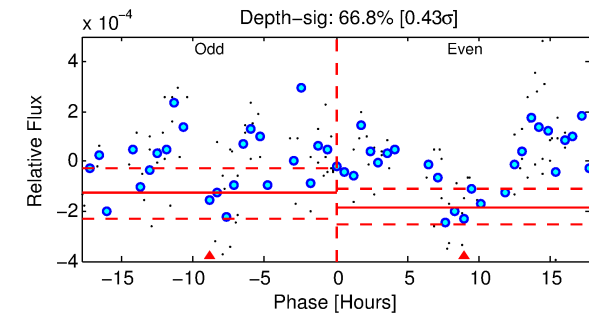
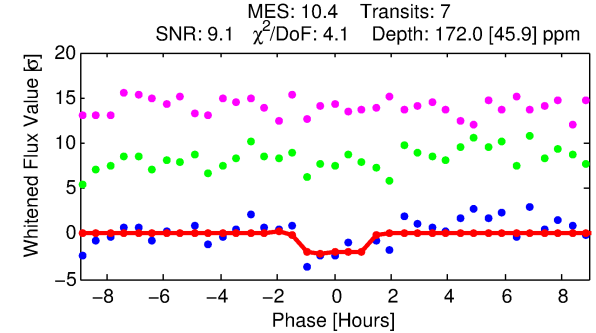
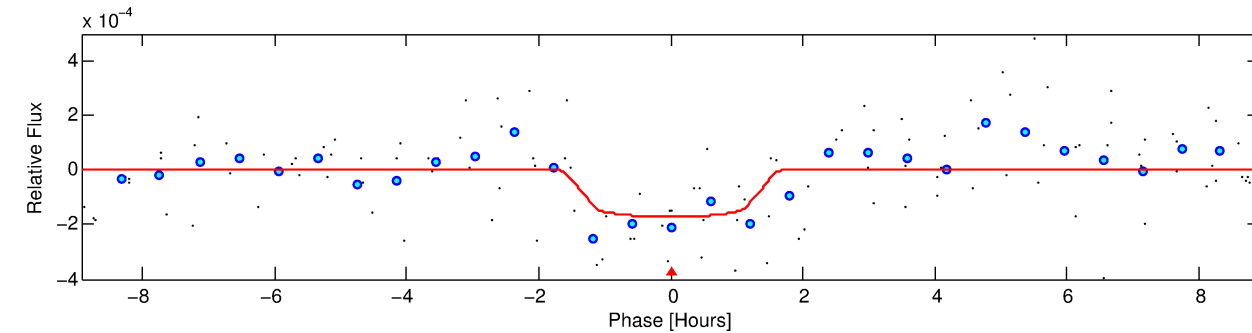
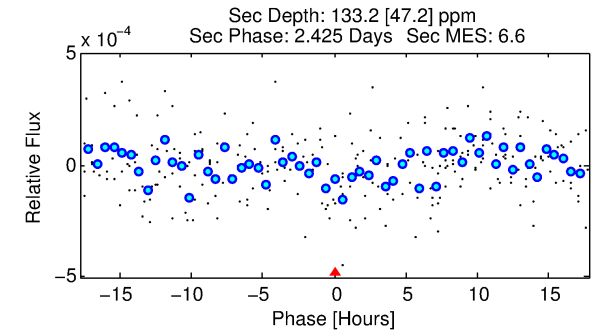
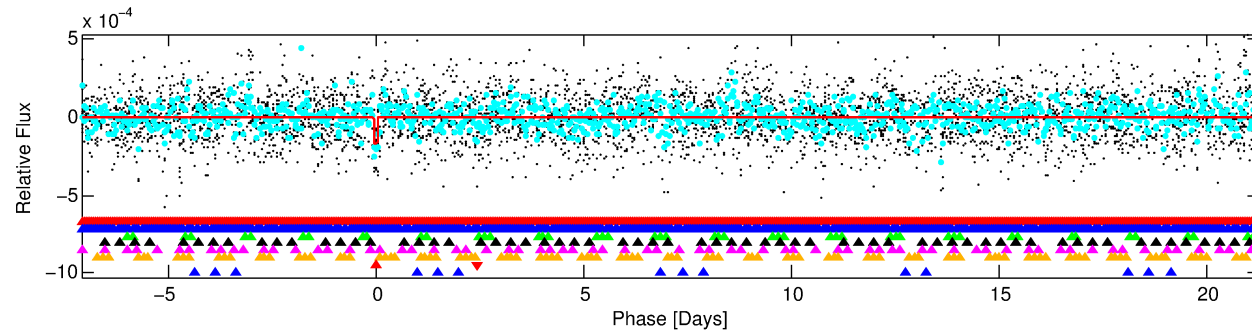
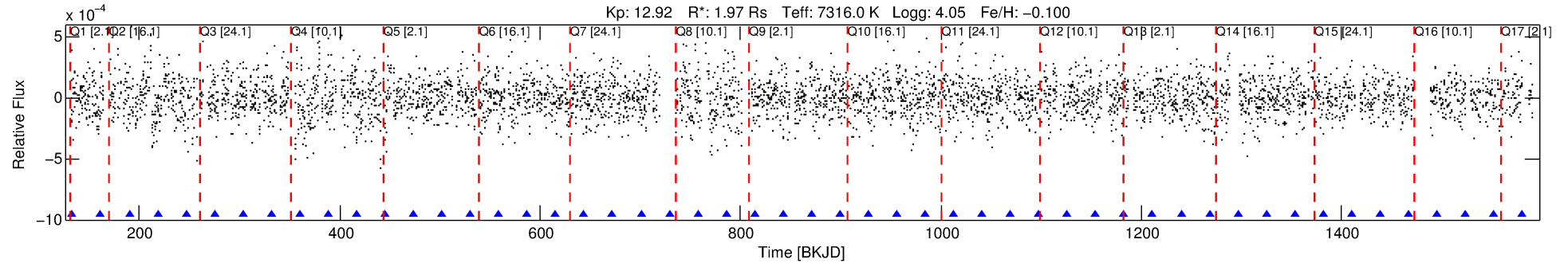
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008539939-07

No Significant Match Found

# DV One-Page Summary

KIC: 8539939 Candidate: 7 of 8 Period: 28.368 d



## DV Fit Results:

Period = 28.36753 [0.00078] d  
Epoch = 133.3537 [0.0248] BKJD  
Rp/R\* = 0.0139 [0.0123]  
a/R\* = 34.01 [183.97]  
b = 0.90 [1.16]  
Seff = 221.34 [83.07]  
Teq = 984 [92] K  
Rp = 2.99 [2.76] Re  
a = 0.2120 [0.0487] AU  
Ag = 367.72 [671.57] [0.55 $\sigma$ ]  
Teffp = 6659 [3001] K [1.89 $\sigma$ ]

## DV Diagnostic Results:

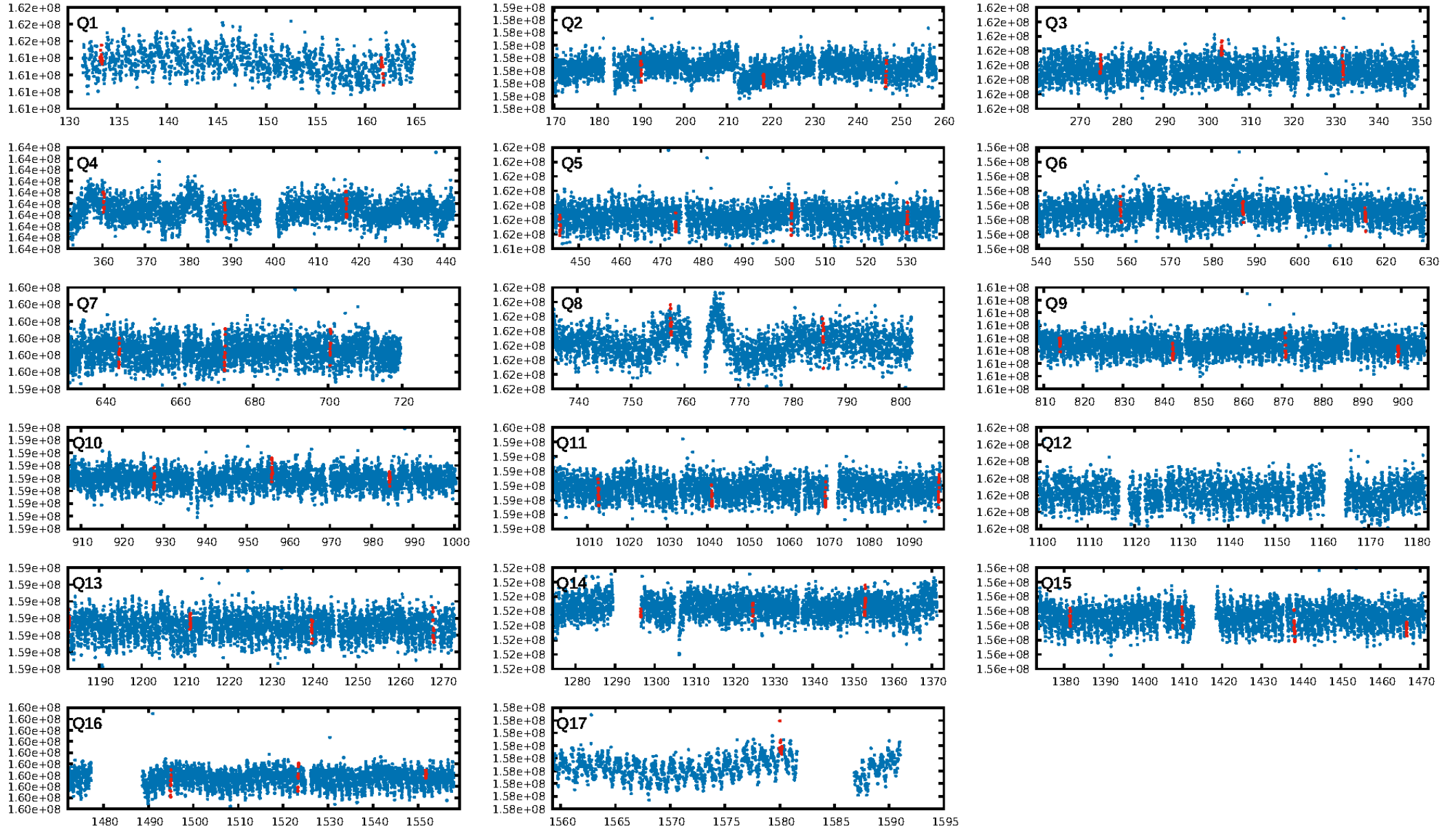
ShortPeriod-sig: 100.0% [41.05 $\sigma$ ]  
LongPeriod-sig: 100.0% [10.03 $\sigma$ ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 10.1%  
Bootstrap-pfa: 9.25e-10  
RollingBand-fgt: 1.00 [7/7]  
GhostDiagnostic-chr: 2.298  
Centroid-sig: N/A  
Centroid-so: 0.644 arcsec [1.05 $\sigma$ ]  
OotOffset-rm: 1.185 arcsec [1.46 $\sigma$ ]  
KicOffset-rm: 1.260 arcsec [1.34 $\sigma$ ]  
OotOffset-st: 3/3/2/3 [11]  
KicOffset-st: 3/3/2/3 [11]  
DiffImageQuality-fgm: 0.27 [3/11]  
DiffImageOverlap-fno: 0.12 [2/16]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 08:00:54 Z

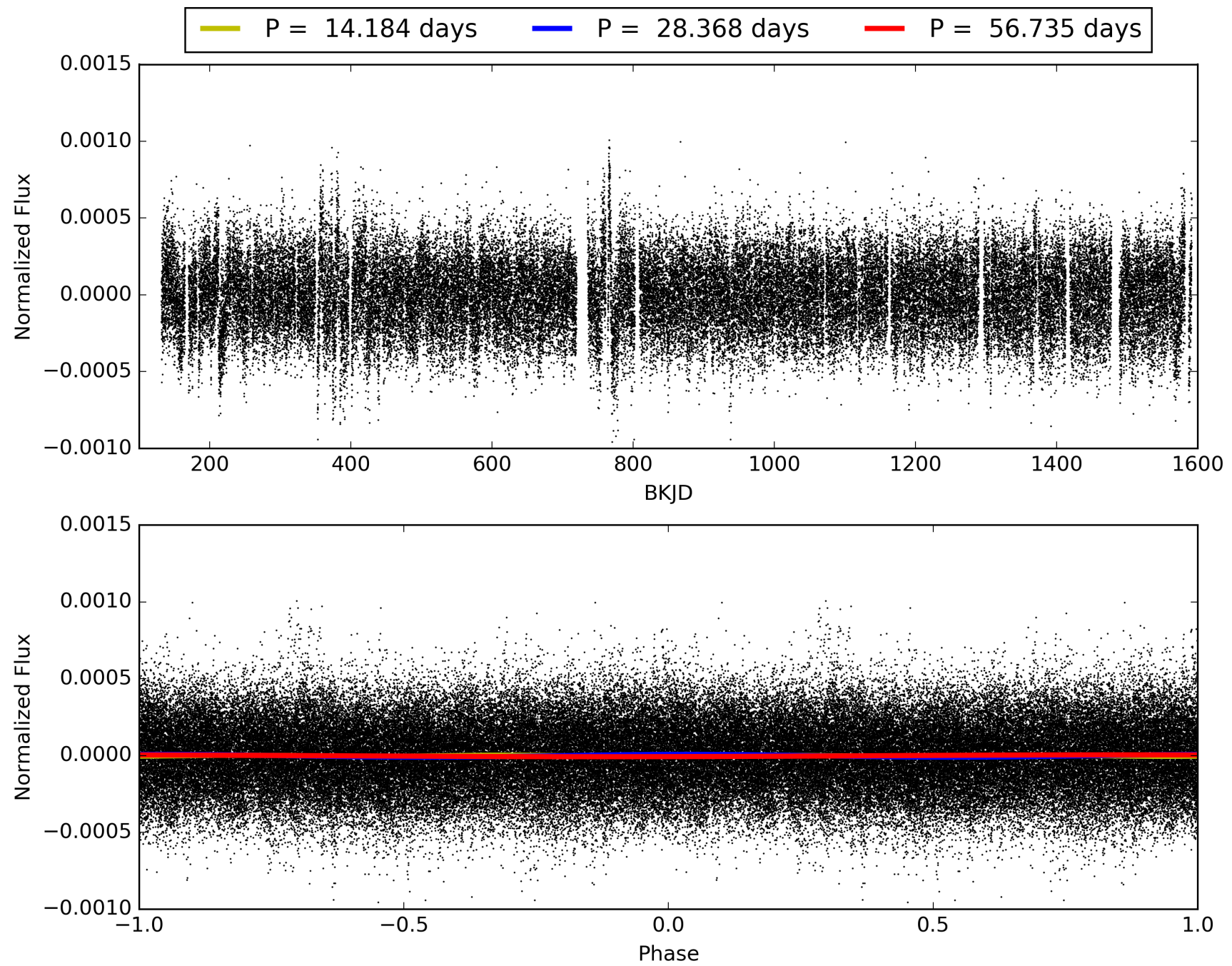
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 008539939-07, PDC Light Curves

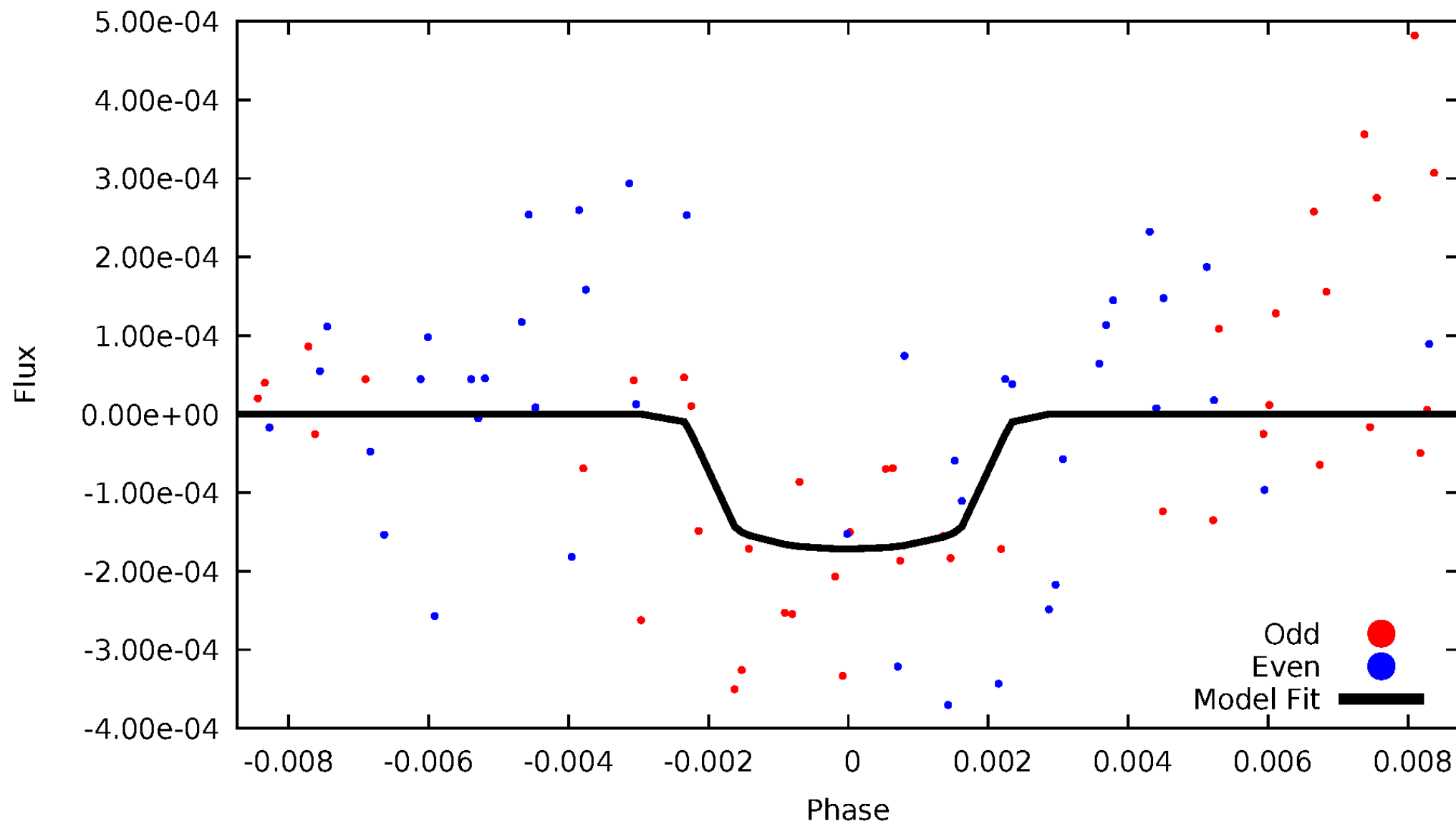


TCE 008539939-07



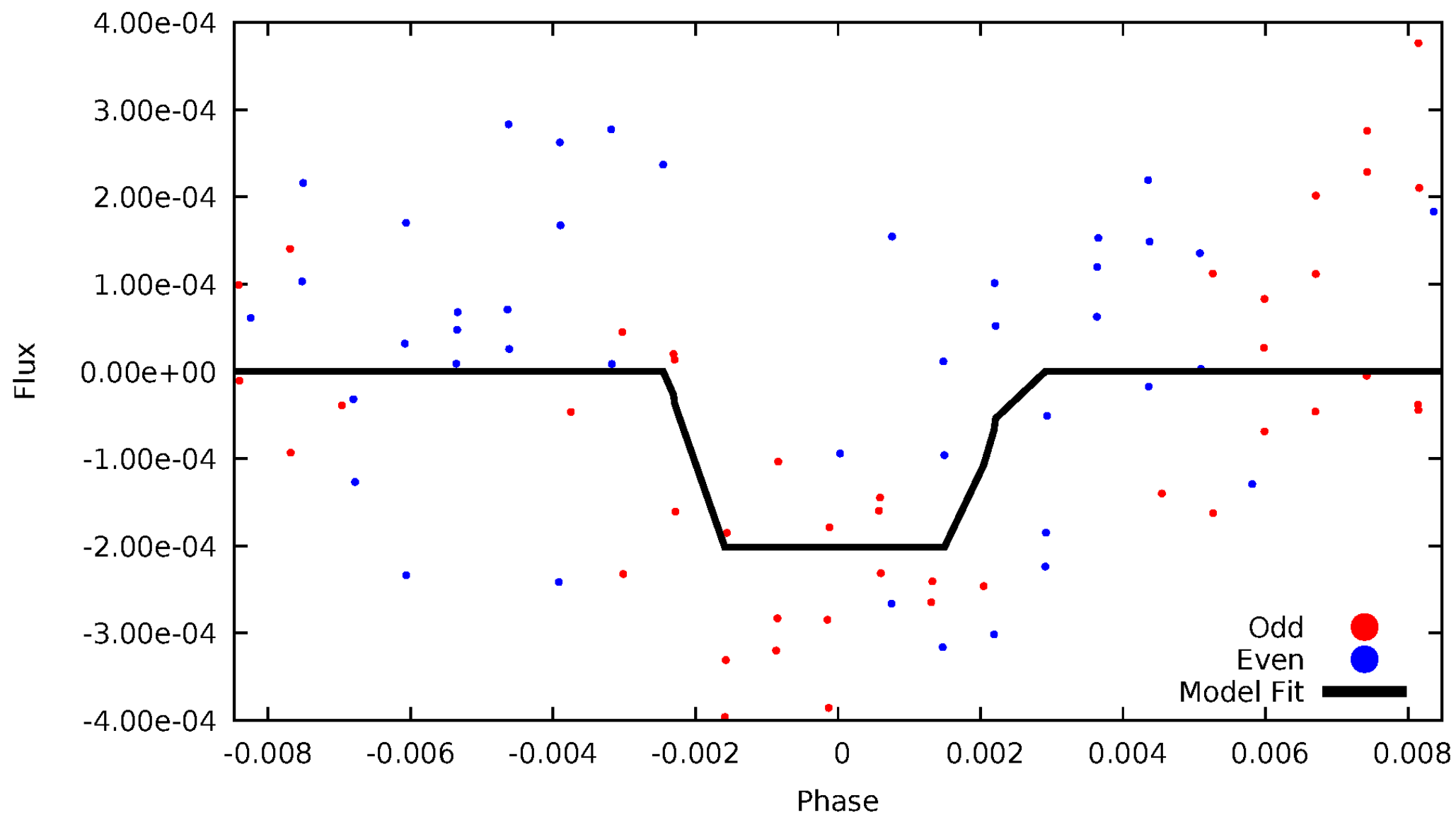
# DV Odd/Even

TCE 008539939-07



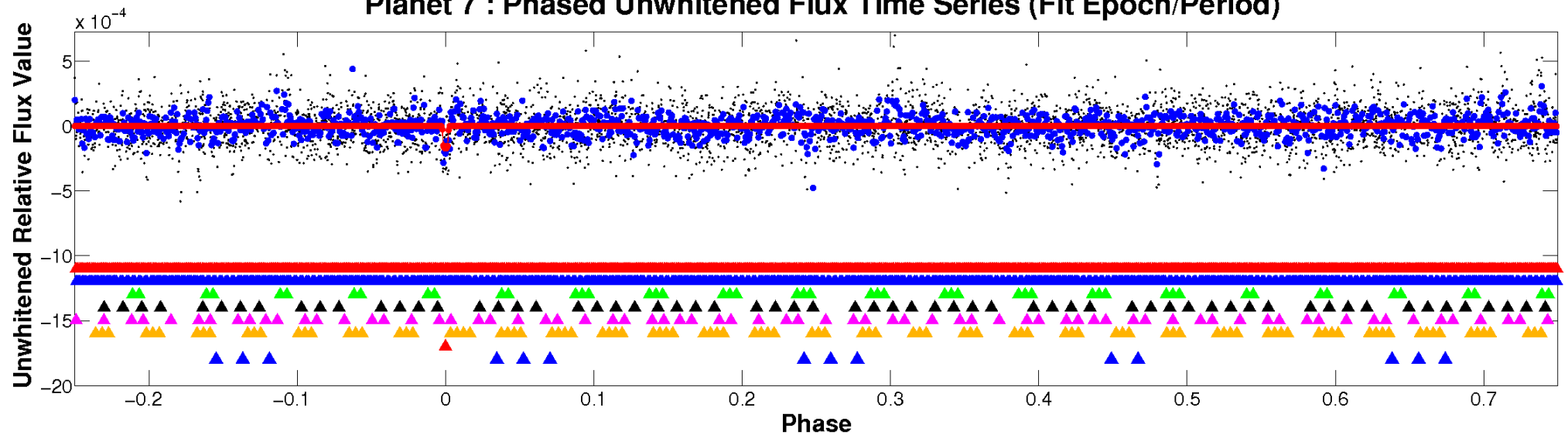
# ALT Odd/Even

TCE 008539939-07

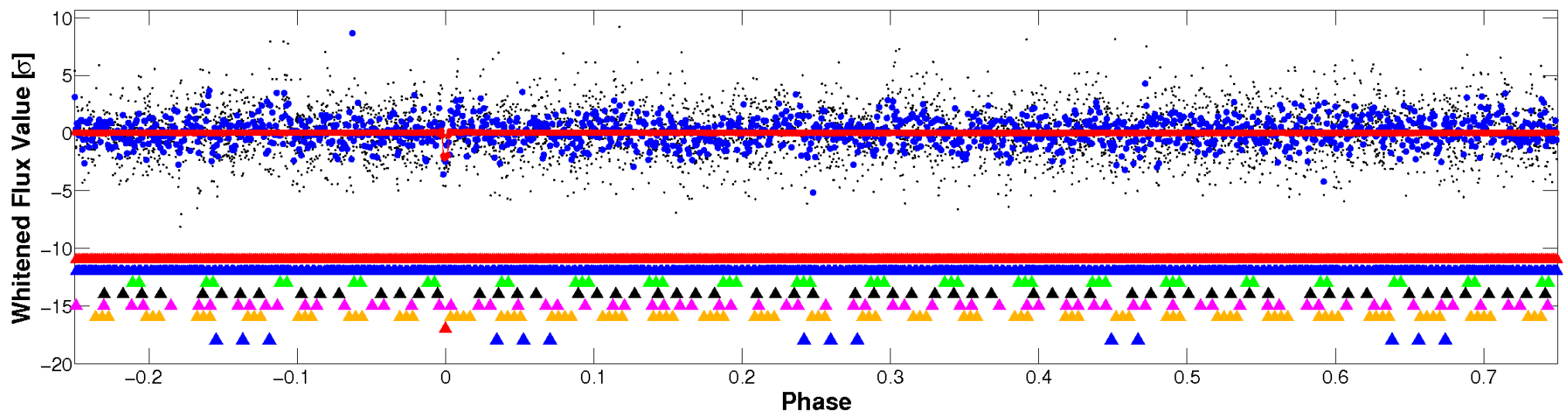


# Non-Whitened Vs. Whitened Light Curve

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

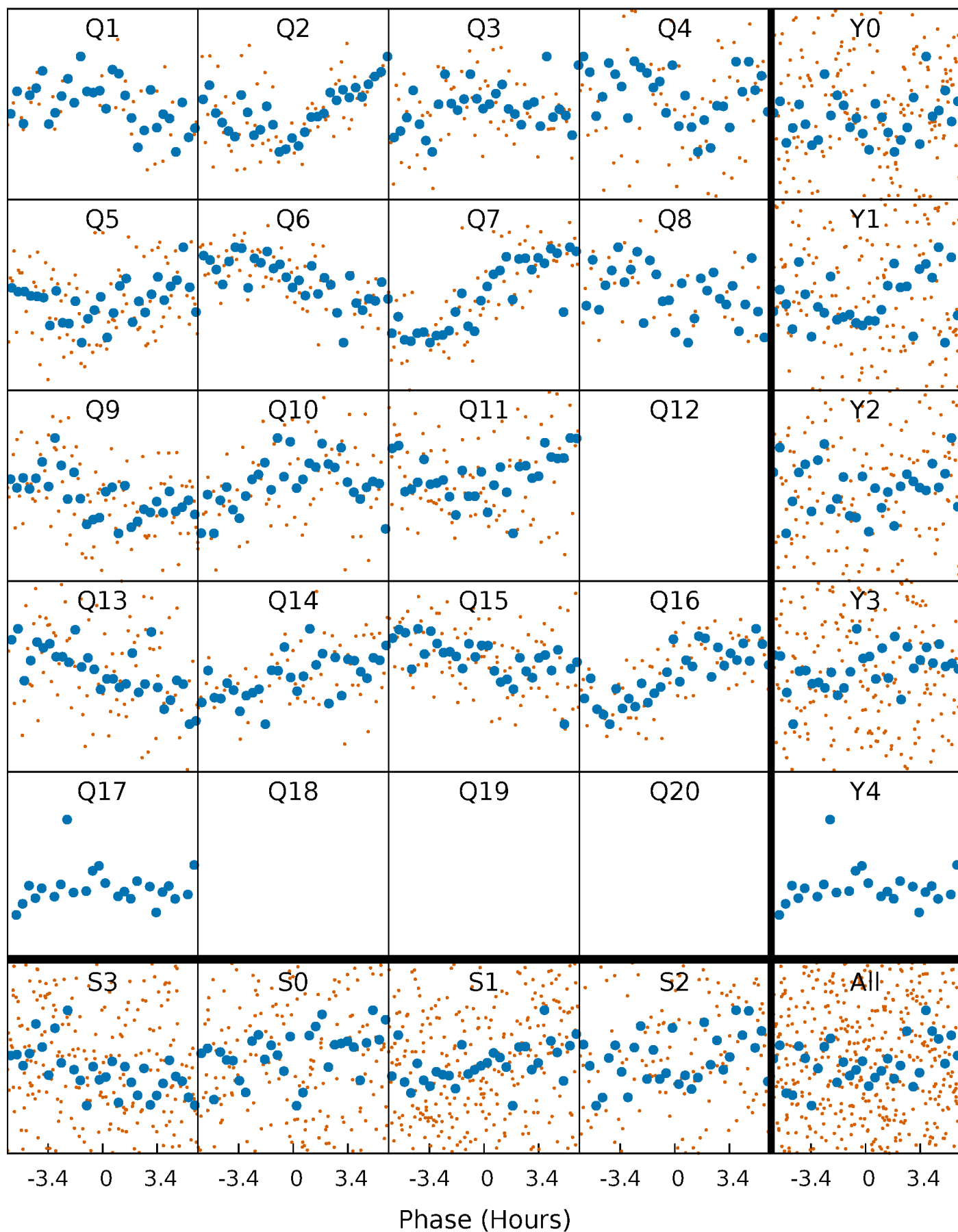


## Planet 7 : Phased Whitened Flux Time Series (Fit Epoch/Period)



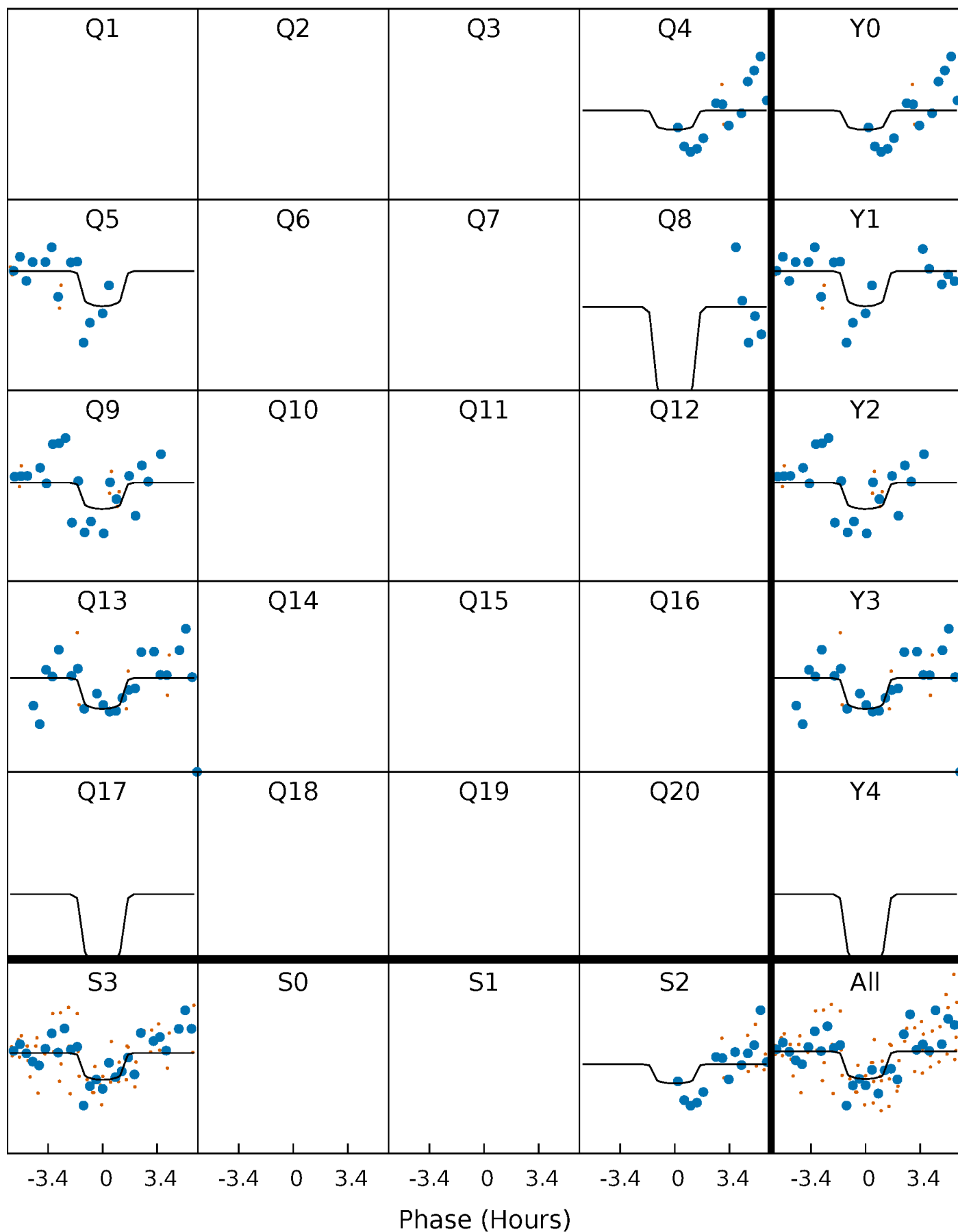
# PDC Quarter-Phased Transit Curves

TCE 008539939-07   P= 28.367532 Days    $T_0=133.353696$  (BKJD)



# DV Quarter-Phased Transit Curves

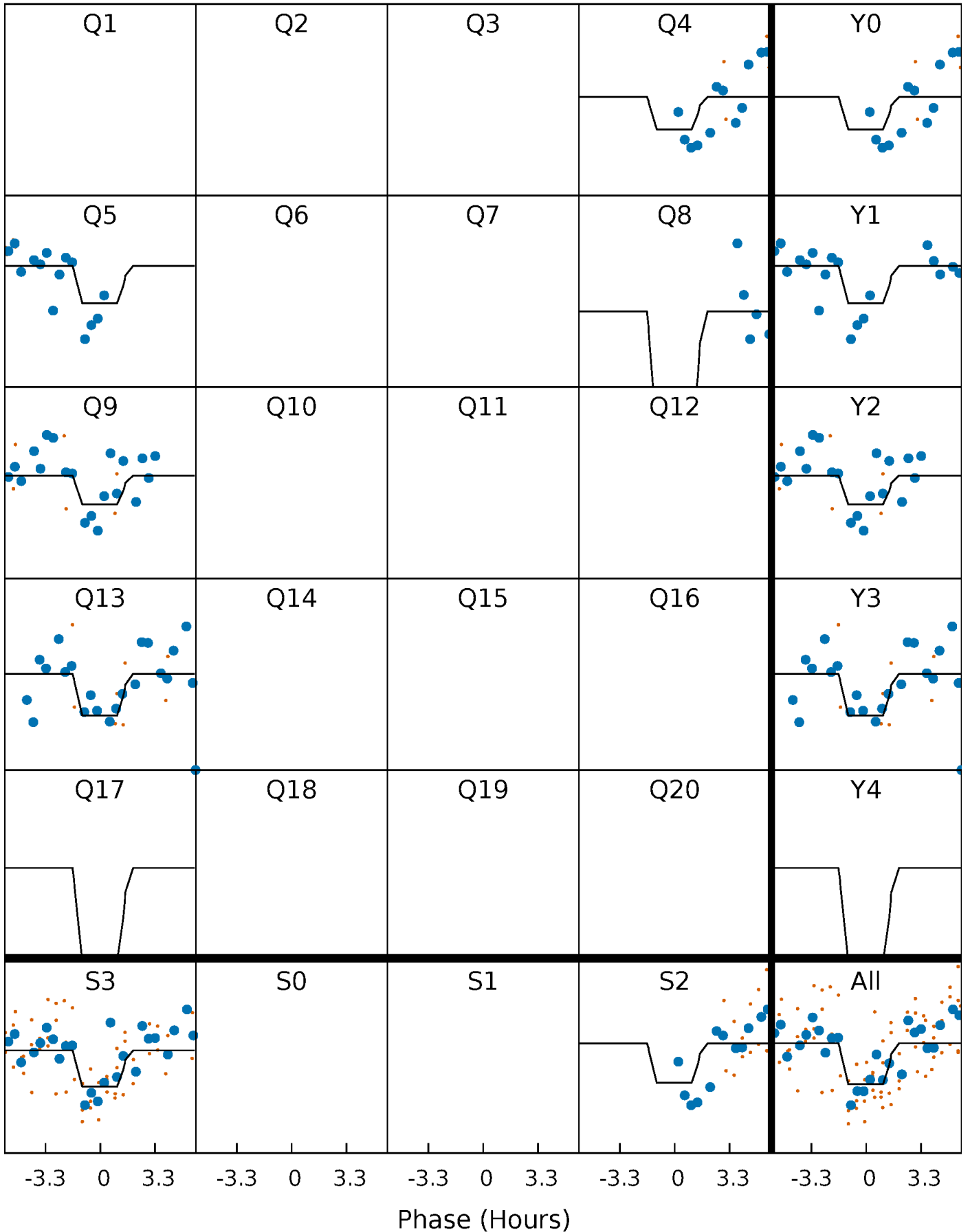
TCE 008539939-07     $P = 28.367532$  Days     $T_0 = 133.353696$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

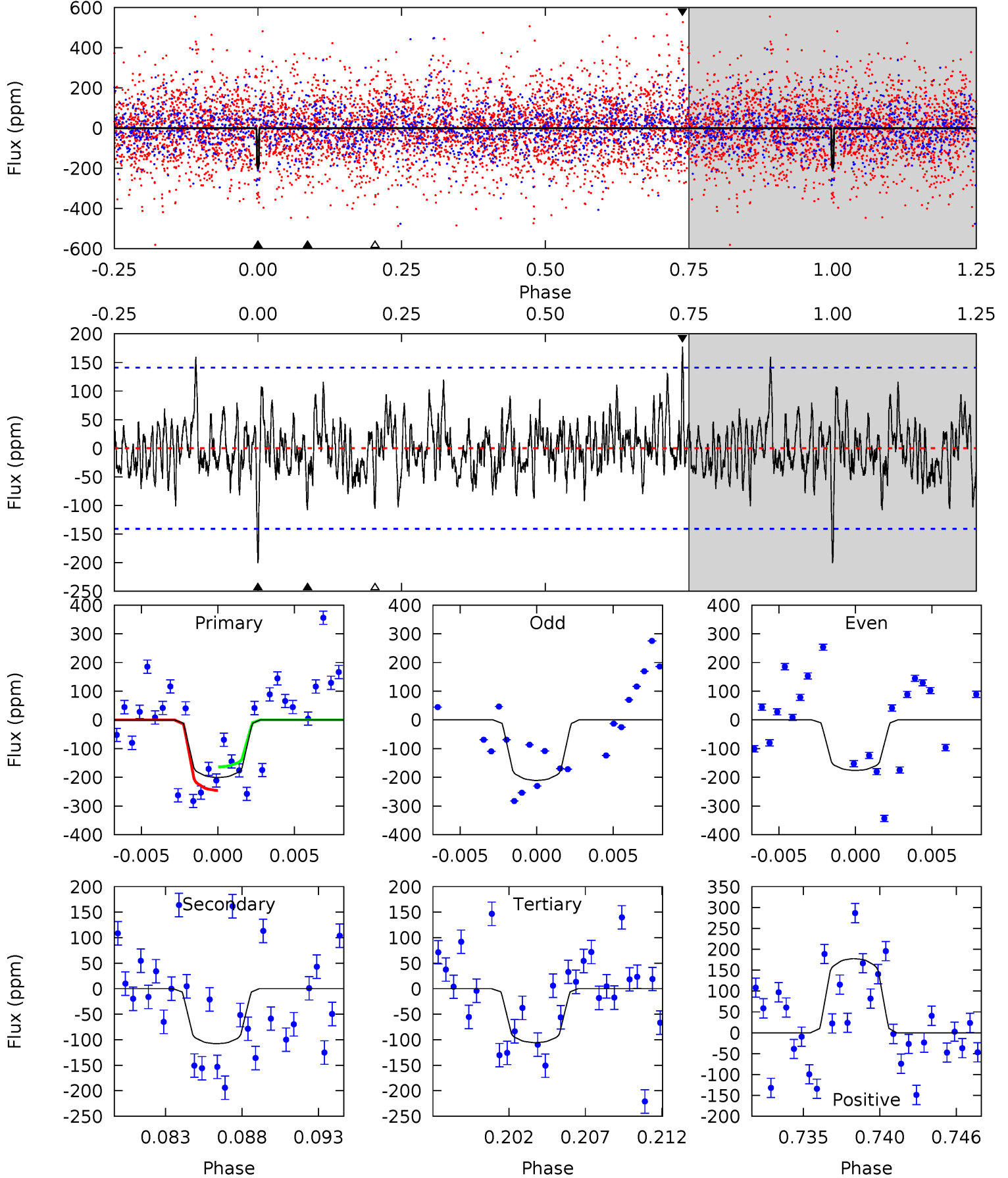
TCE 008539939-07     $P = 28.367711$  Days     $T_0 = 133.350631$  (BKJD)



# DV Model-Shift Uniqueness Test

008539939-07, P = 28.367532 Days, E = 104.986164 Days

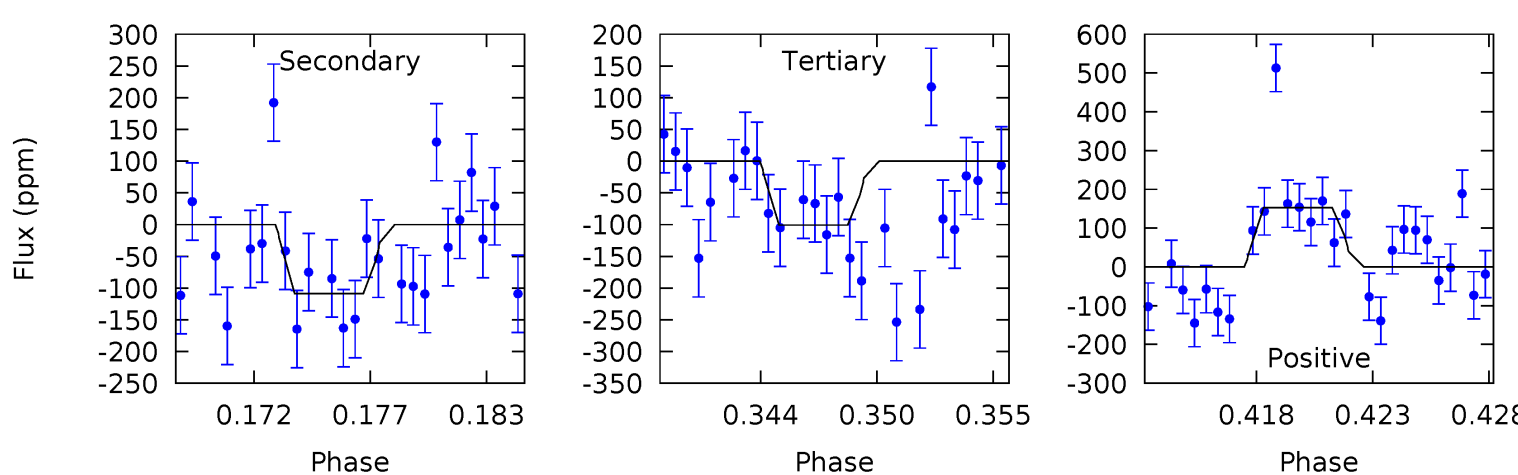
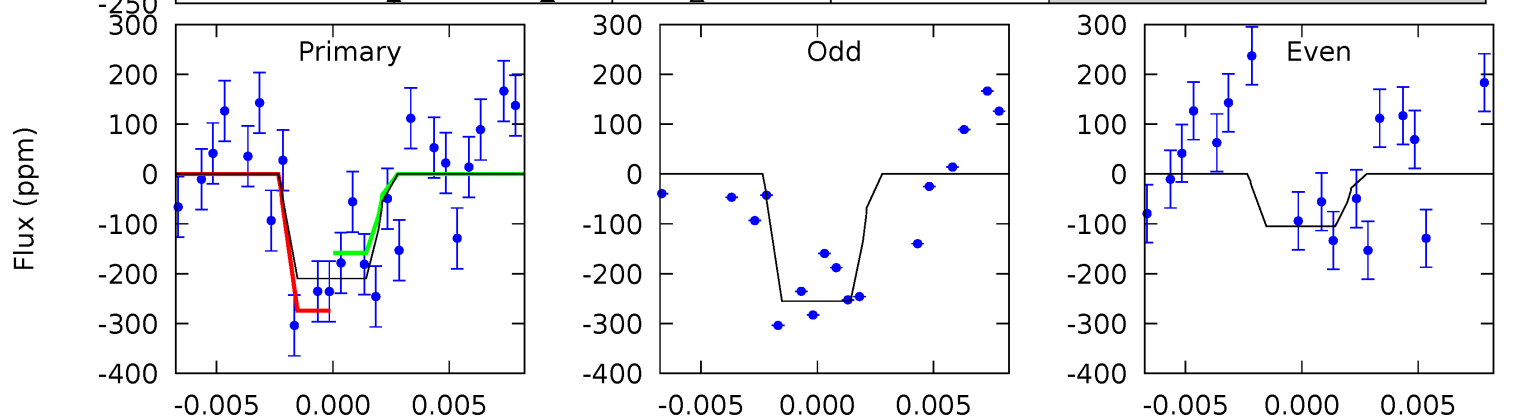
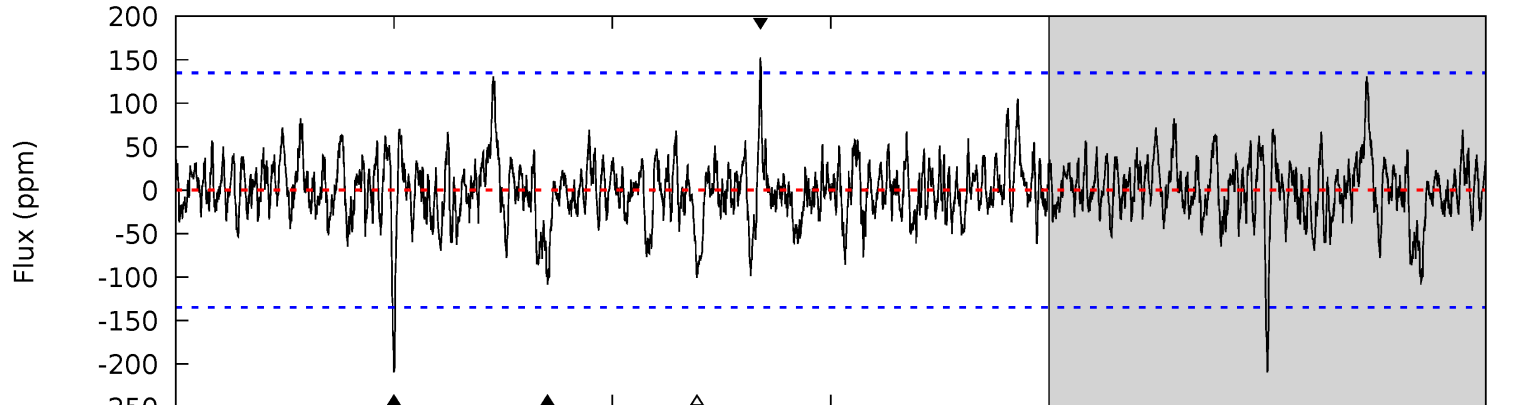
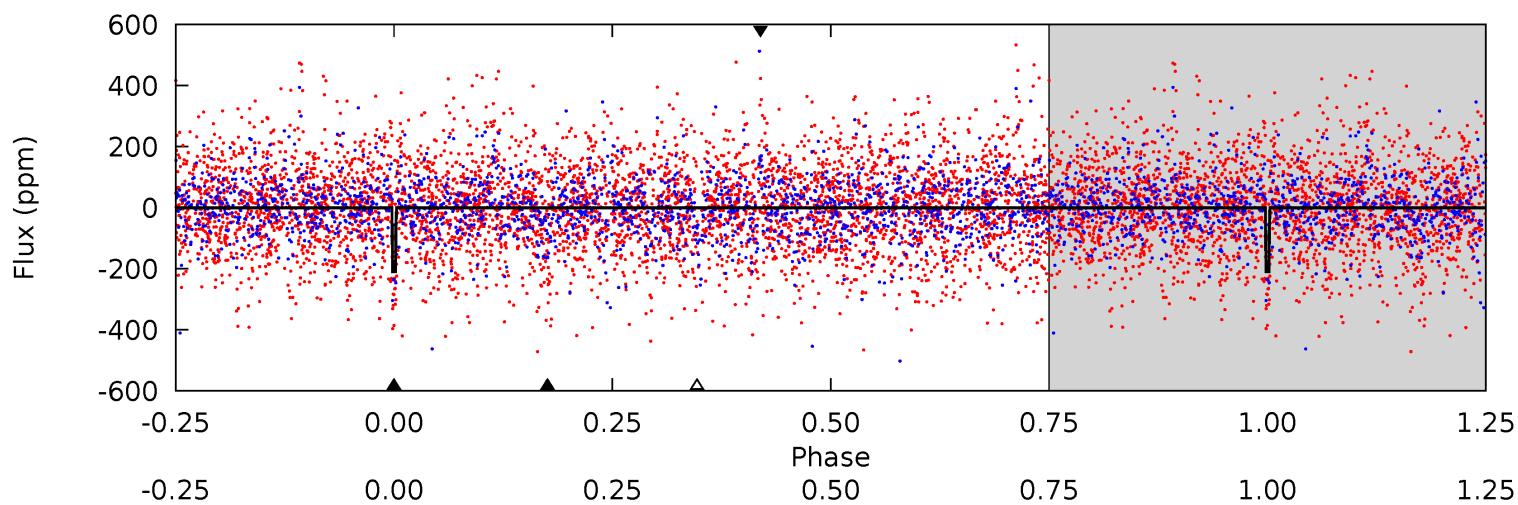
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.35	3.94	3.87	6.50	5.15	2.80	1.46	3.49	0.85	0.08	-2.56	0.62	0.89	0.47	1.48



# Alt Model-Shift Uniqueness Test

008539939-07, P = 28.367711 Days, E = 104.982920 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
8.01	4.16	3.85	5.83	5.15	2.79	1.17	4.16	2.18	0.31	-1.67	2.78	0.73	0.42	2.19



### Stellar Parameters For KIC 008539939

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7316^{+228}_{-304}$	$4.048^{+0.185}_{-0.167}$	$-0.100^{+0.250}_{-0.350}$	$1.969^{+0.533}_{-0.533}$	$1.577^{+0.199}_{-0.273}$	$0.291^{+0.326}_{-0.134}$
	+3%/-4%	+5%/-4%	+250%/-350%	+27%/-27%	+13%/-17%	+112%/-46%
Source	KIC0	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 008539939-07 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-108 \pm 27$	$3.27^{+2.41}_{-1.97}$	$1366^{+111}_{-101}$	$5865^{+4415}_{-1297}$	$241^{+1281}_{-164}$
Alt.	$-109 \pm 26$	$3.51^{+2.67}_{-2.06}$	$1371^{+105}_{-102}$	$5683^{+3488}_{-1206}$	$202^{+980}_{-134}$

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

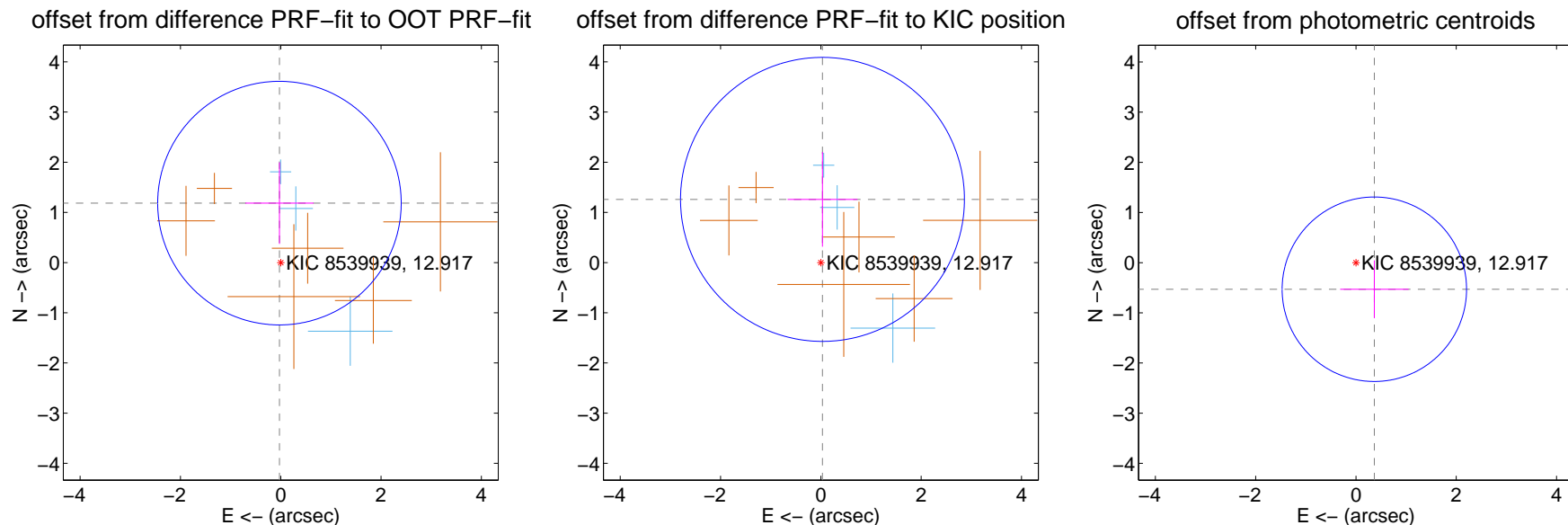
## DV Centroid Data

Supplemental centroid analysis for 008539939-07. Kepler magnitude: 12.92. Transit SNR 9.08

There are 3 quarters with good PRF difference image offsets

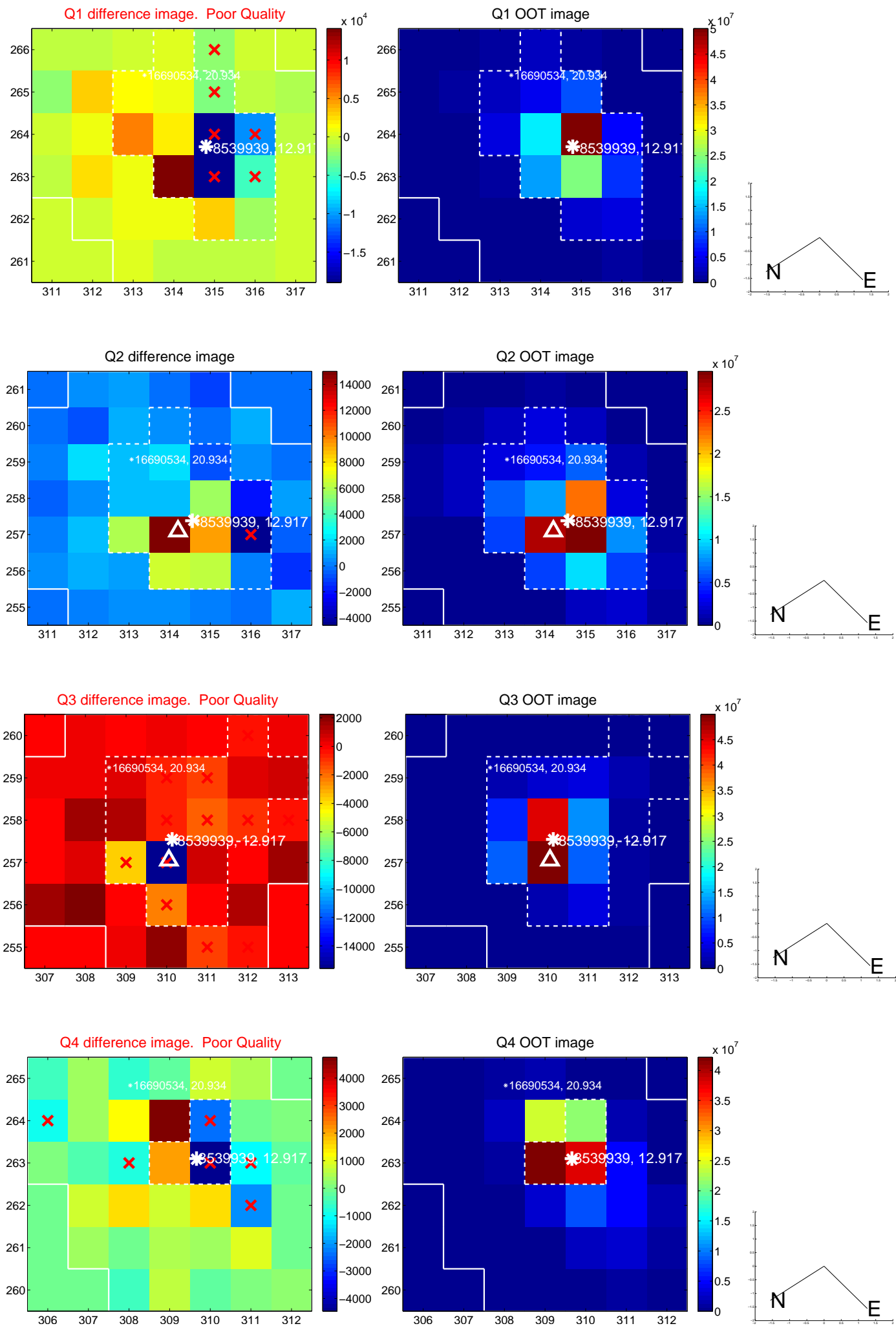
The direct PRF centroid is offset from the target star catalog position by about 0.04 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.185 \pm 0.809$	1.46	$0.026 \pm 0.681$	$1.185 \pm 0.812$
PRF-fit source offset from KIC position	$1.260 \pm 0.943$	1.34	$-0.032 \pm 0.696$	$1.259 \pm 0.942$
photometric centroid source offset	$0.64 \pm 0.61$	1.05	$-0.37 \pm 0.68$	$-0.53 \pm 0.58$

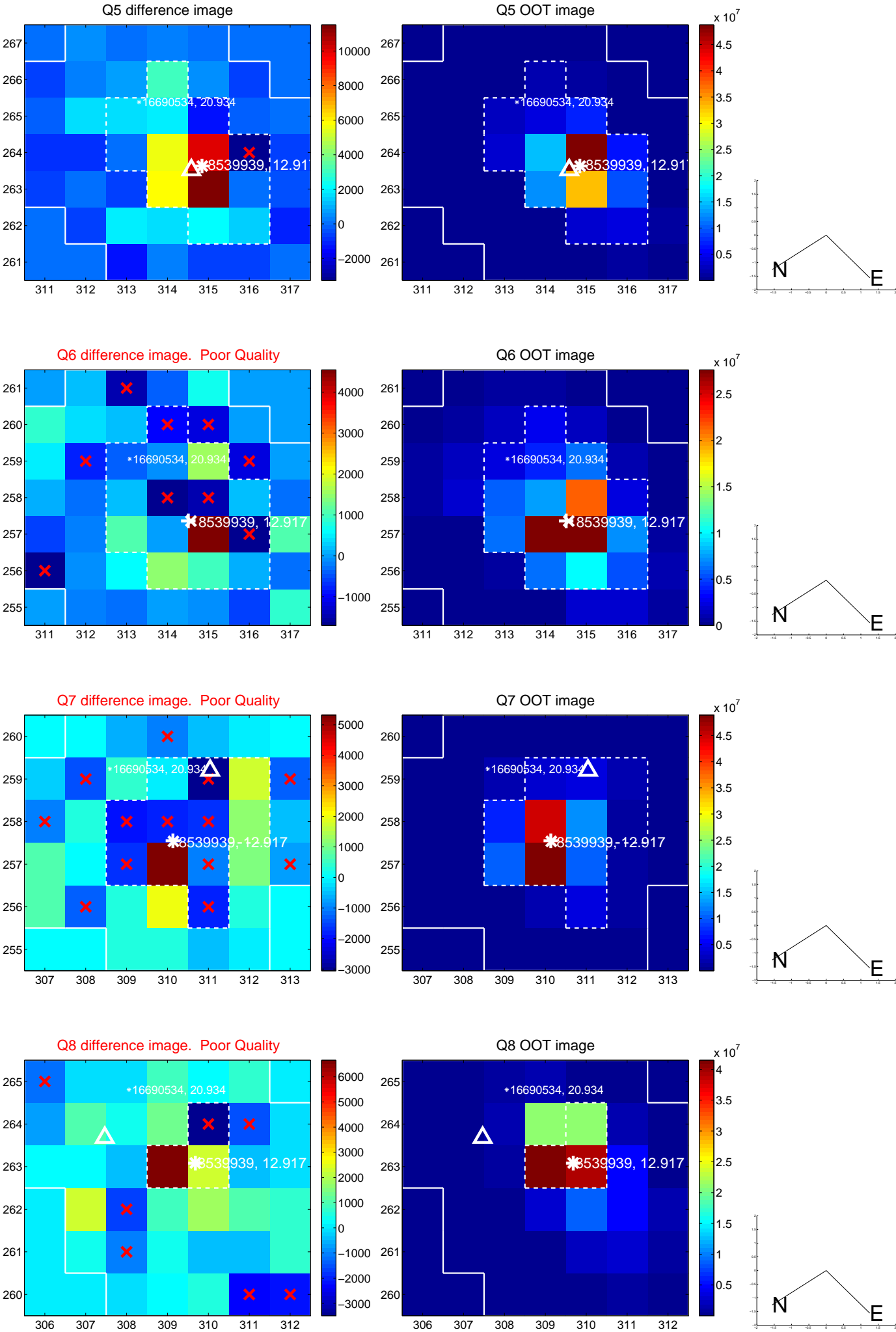


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

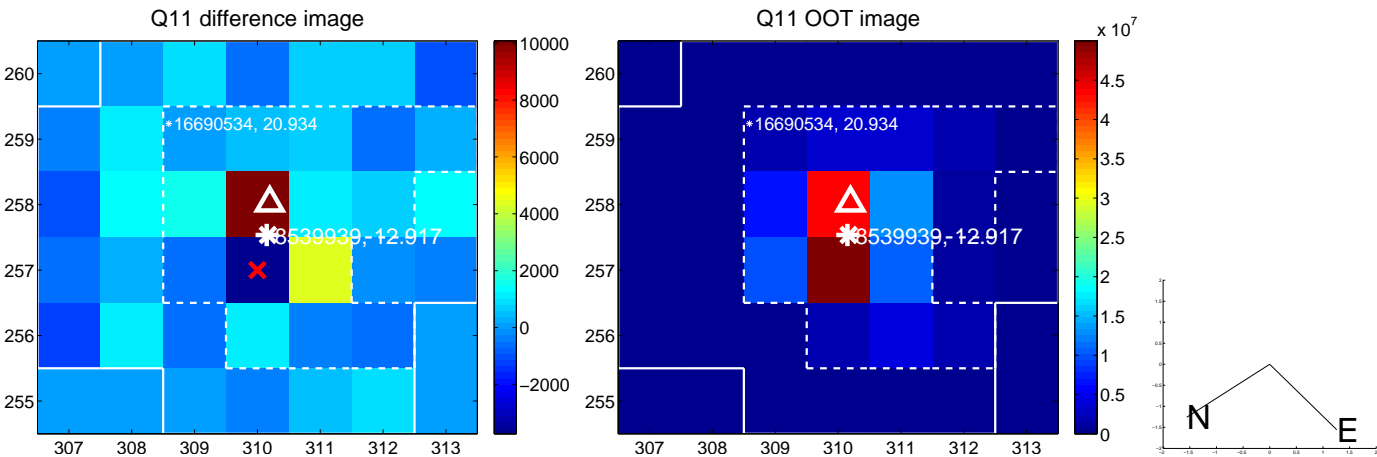
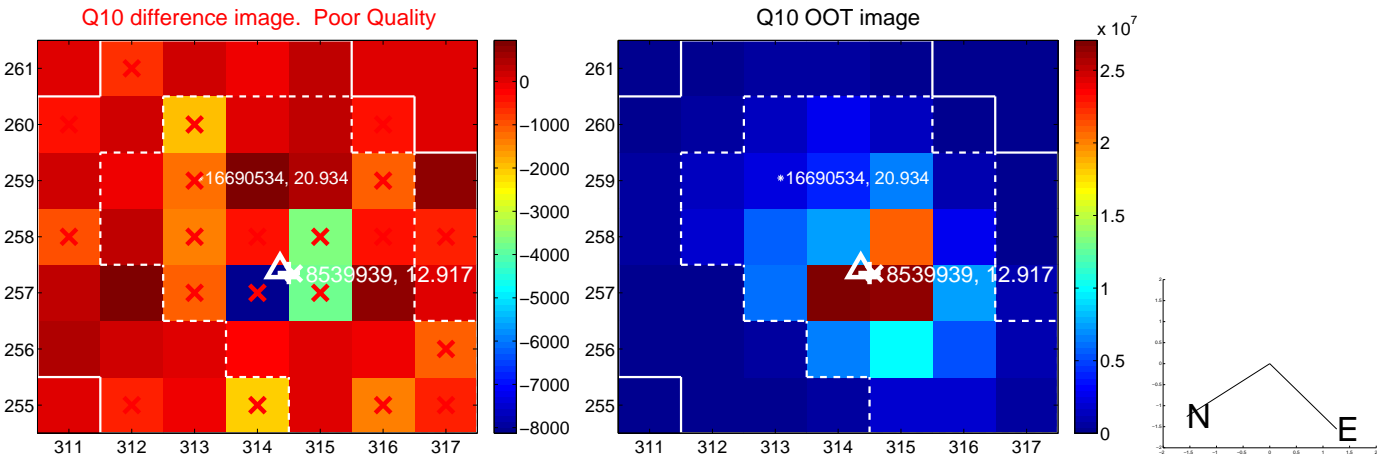
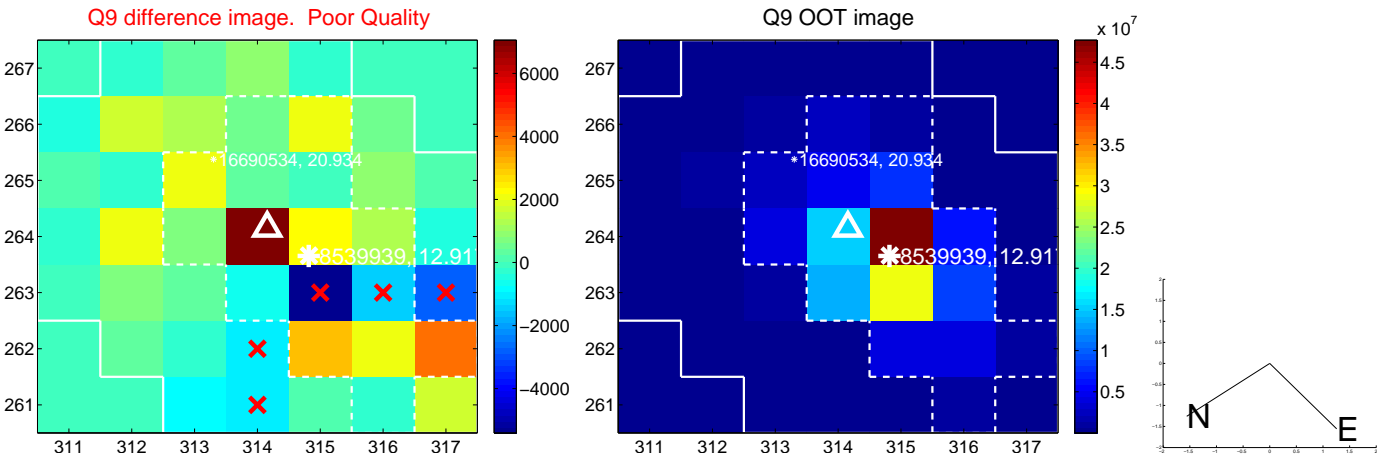


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

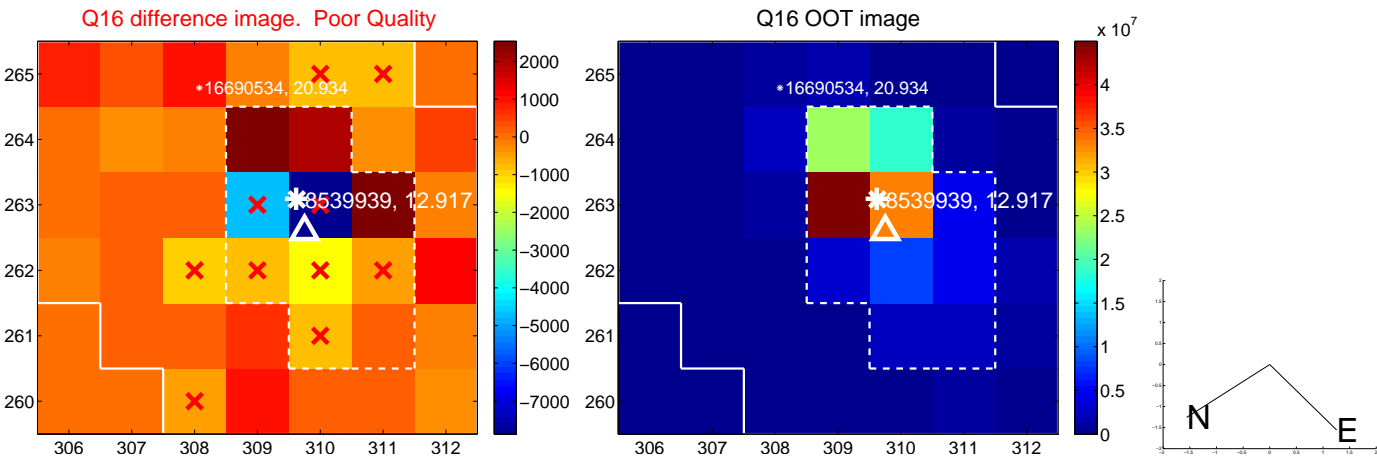
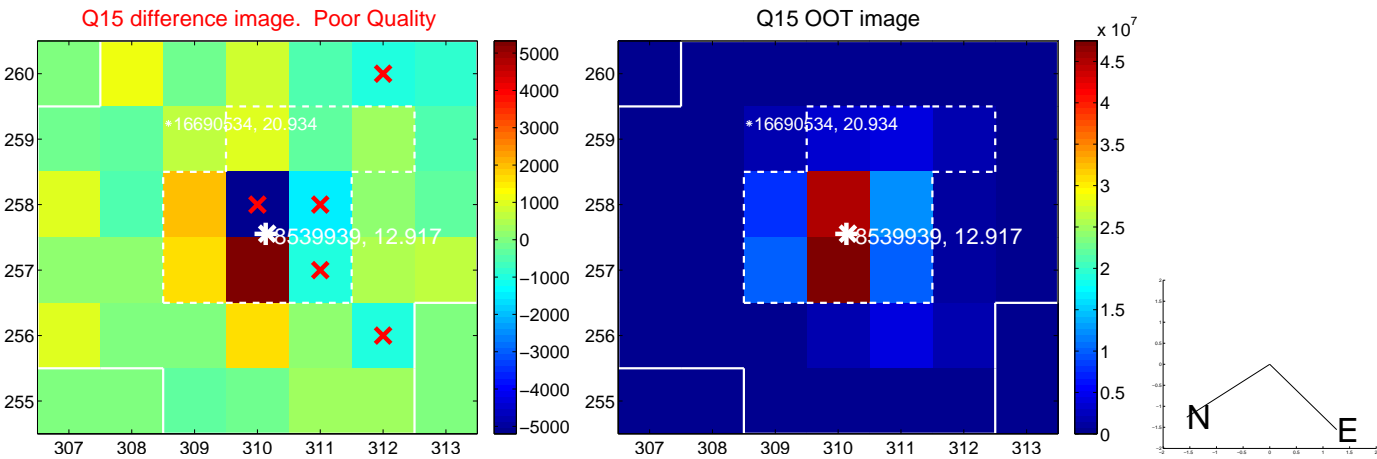
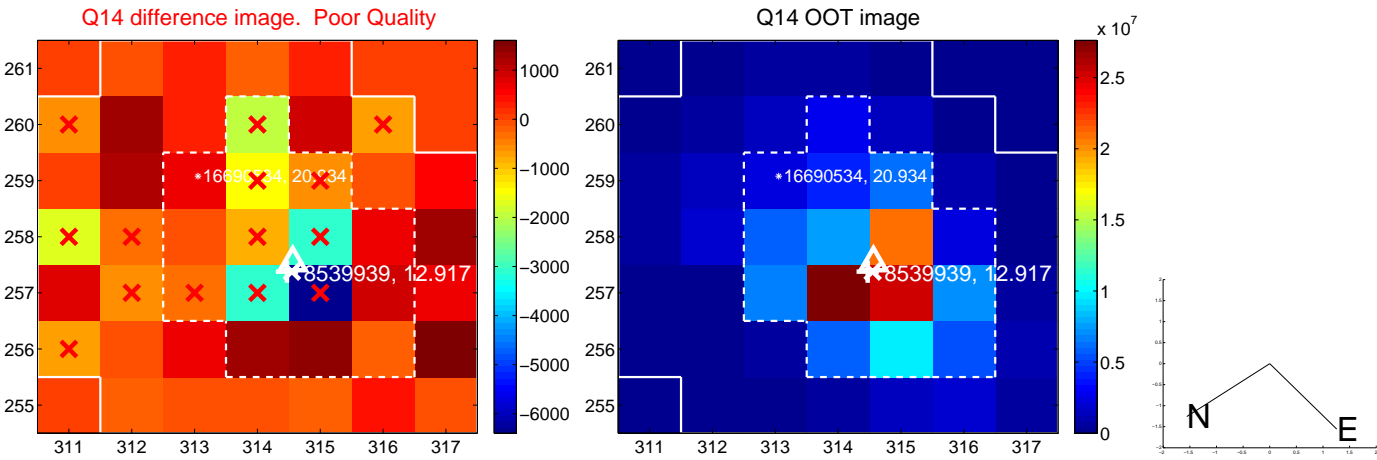
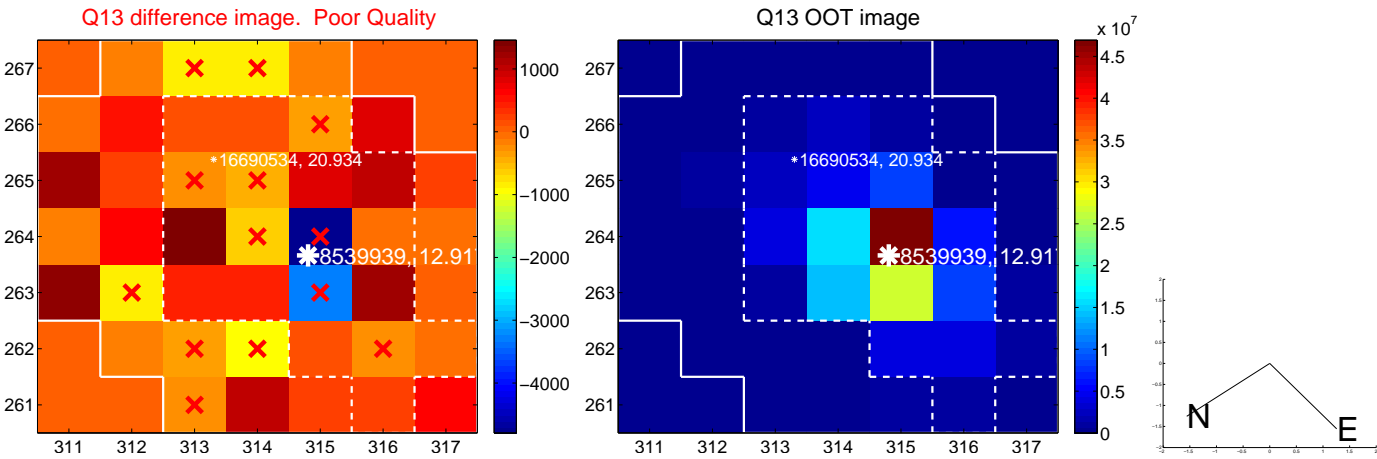




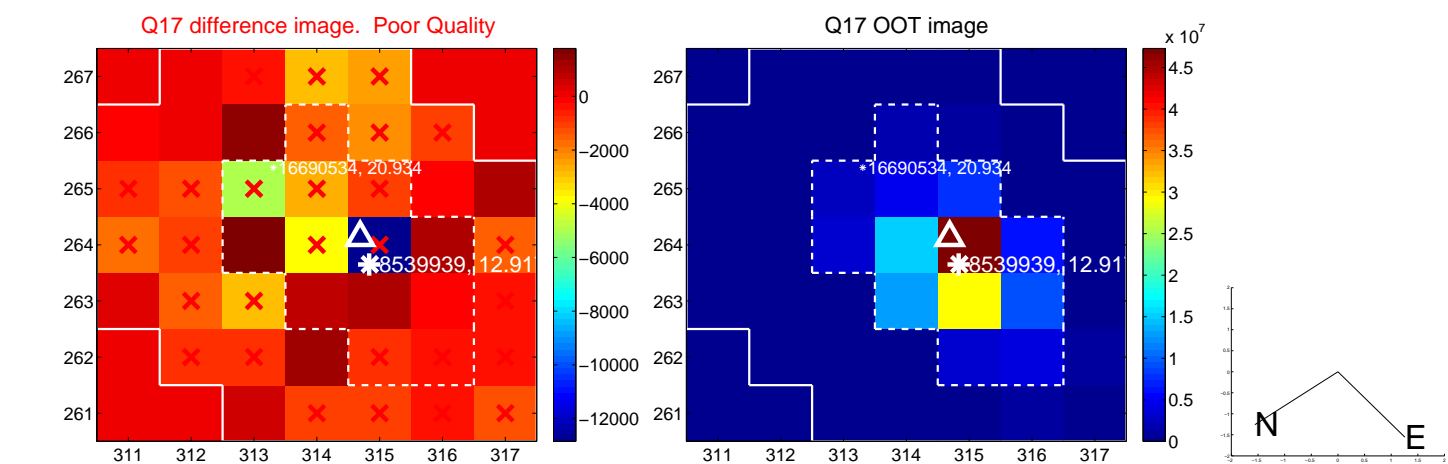
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



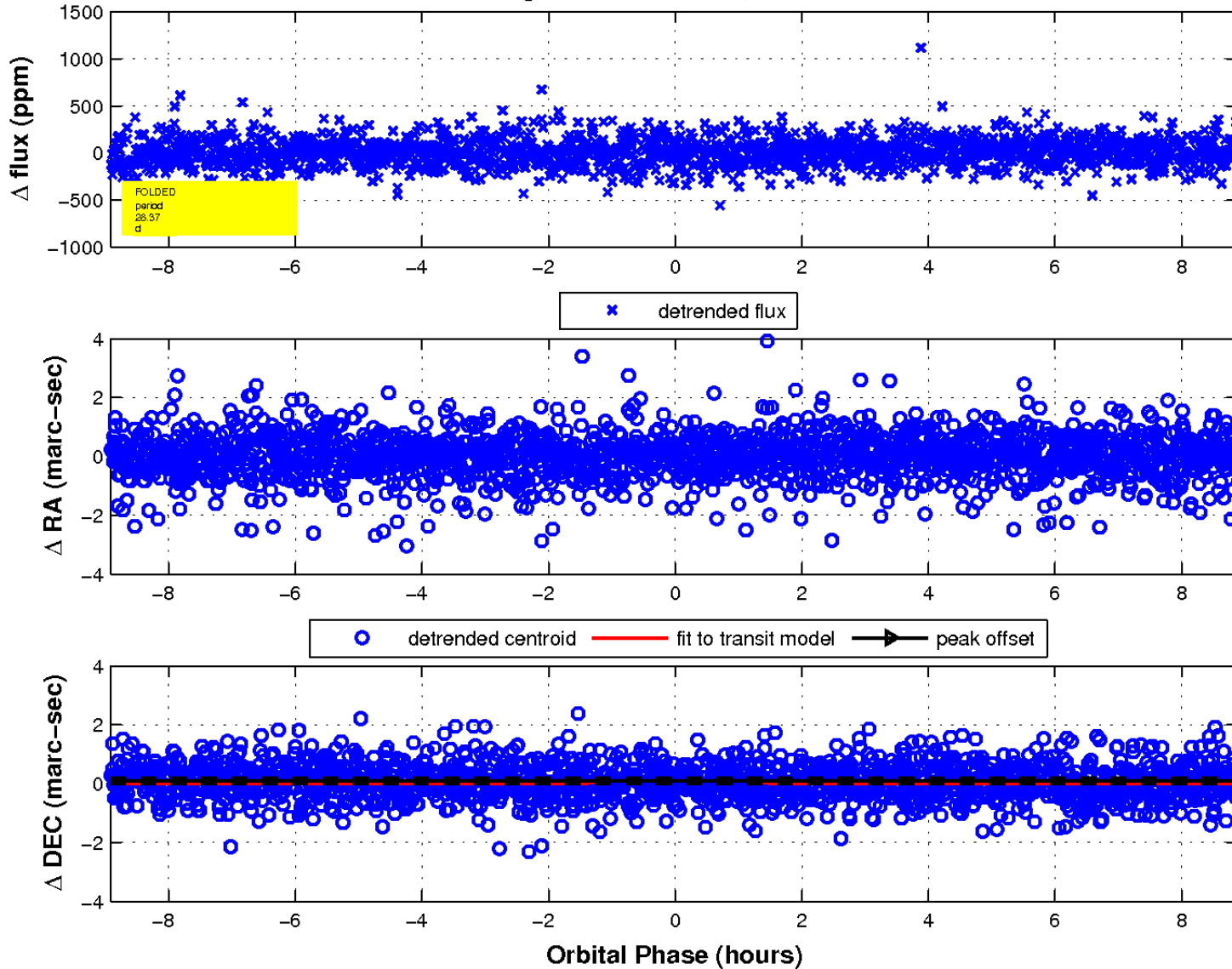
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

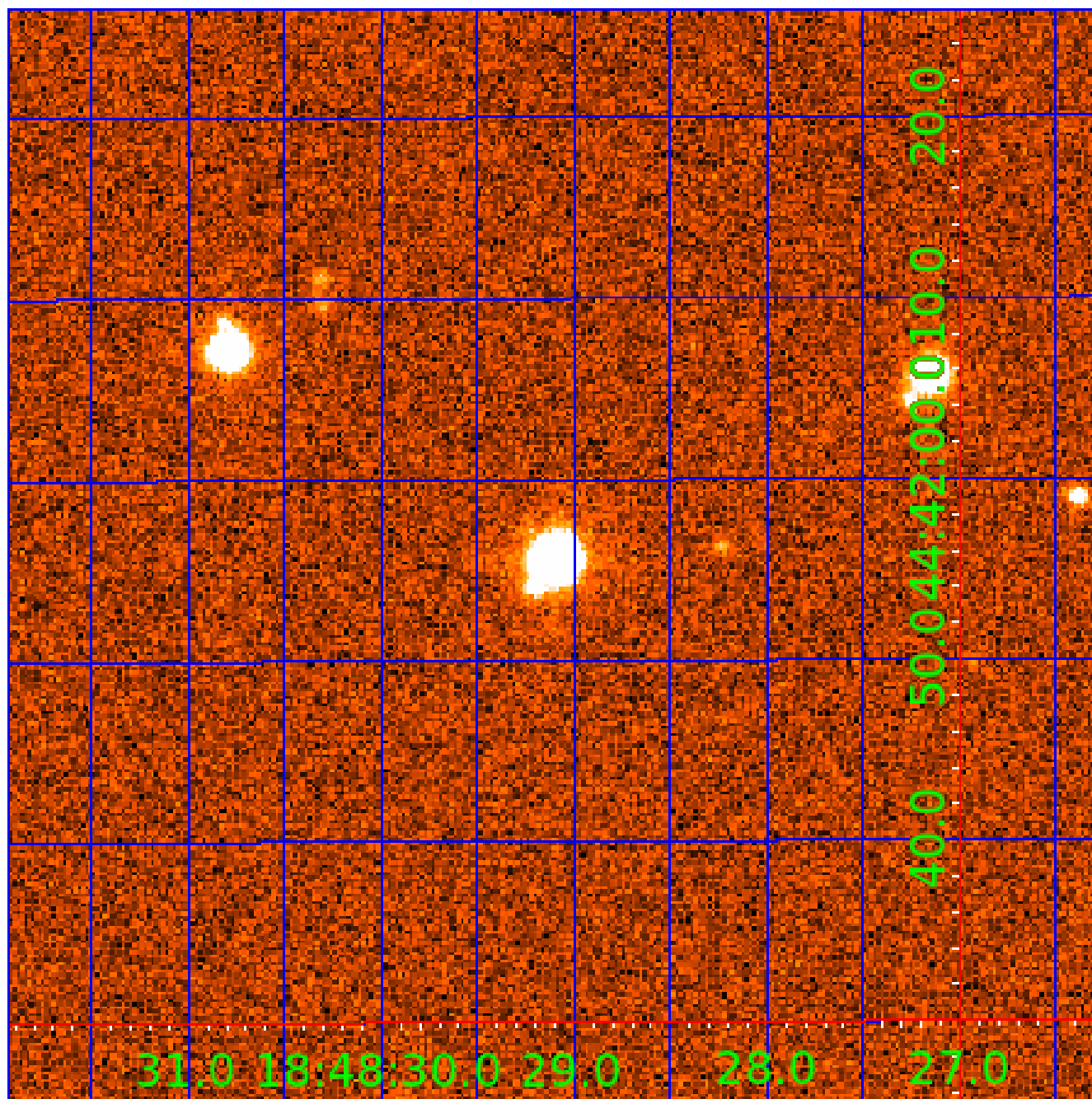


fluxWeightedCentroids, Planet 7 of 8



UKIRT Image

Declination



# KIC 008539939

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008539939-01	OBS	No	1.662014	132.555349	42.3	2.204	12.4	13.6	1.97	7316	1.51	9726.88
008539939-02	OBS	No	1.661802	132.092268	2.9	11.998	12.0	1.8	1.97	7316	0.38	9728.53
008539939-03	OBS	No	29.779603	136.093972	306.4	1.609	14.5	14.9	1.97	7316	3.92	207.46
008539939-04	OBS	No	23.071110	153.308159	371.9	0.866	12.8	11.2	1.97	7316	4.50	291.56
008539939-05	OBS	No	20.445838	145.452169	190.0	2.167	12.1	11.3	1.97	7316	2.82	342.51
008539939-06	OBS	No	14.668596	133.821649	101.2	4.250	10.8	10.0	1.97	7316	2.22	533.30
008539939-07	OBS	No	28.367532	133.353696	172.0	2.973	10.4	9.1	1.97	7316	2.99	221.34
008539939-08	OBS	No	102.224919	162.703297	190.3	3.120	11.2	9.1	1.97	7316	2.80	40.06

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008539939-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
008539939-02	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—SAME_NTL_PERIOD
008539939-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
008539939-04	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
008539939-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—CENT_FEW_MEAS
008539939-06	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—HALO_GHOST
008539939-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
008539939-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—SAME_NTL_PERIOD

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

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

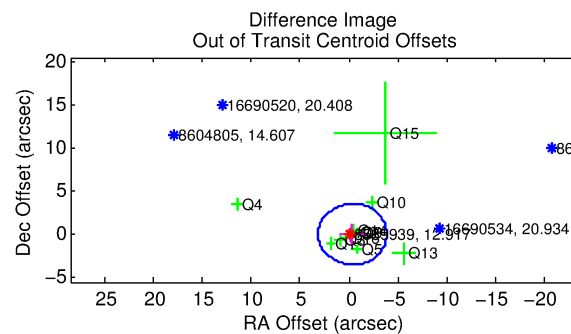
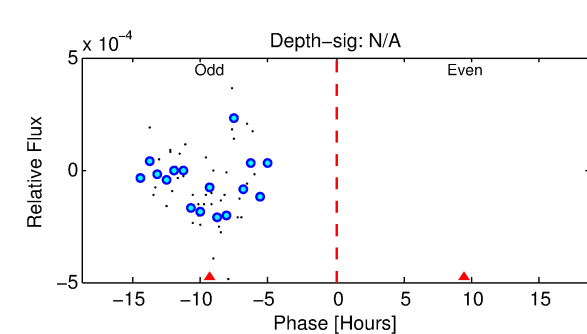
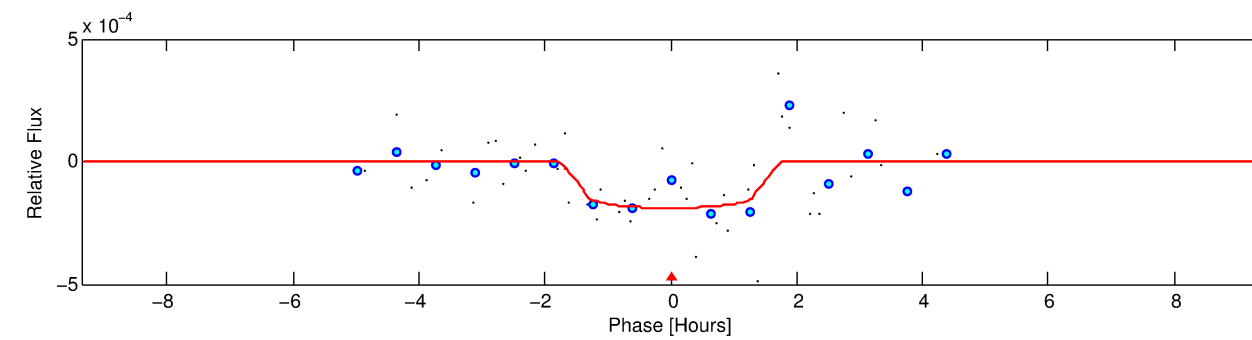
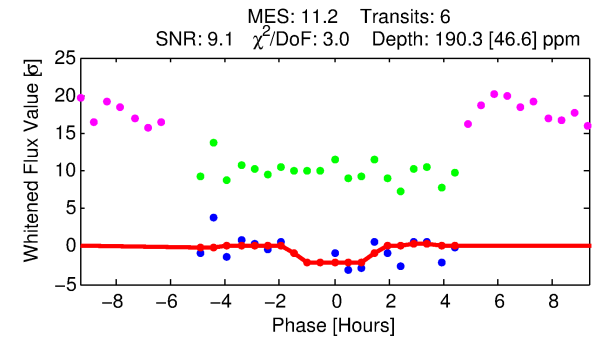
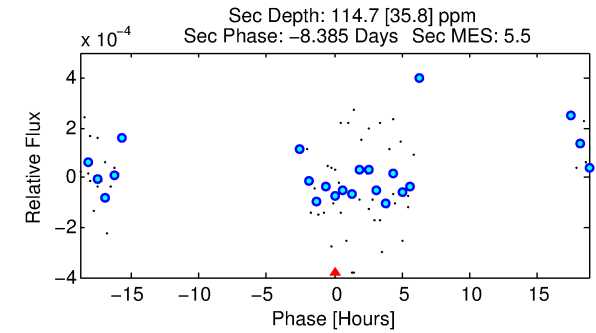
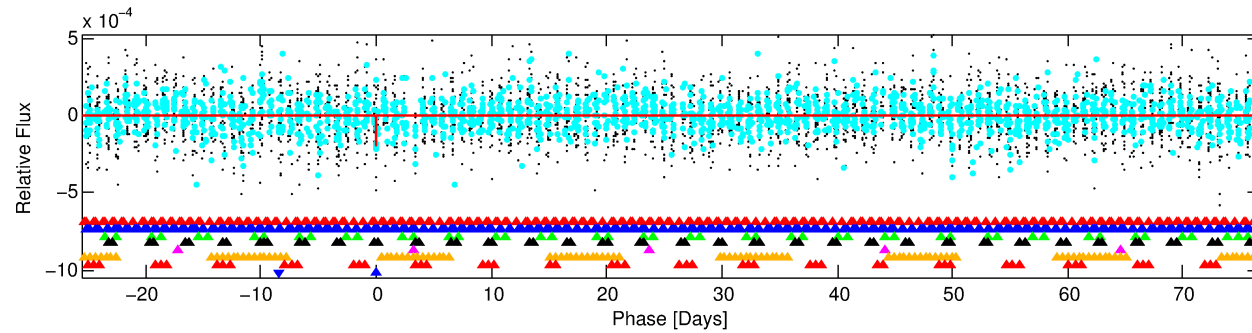
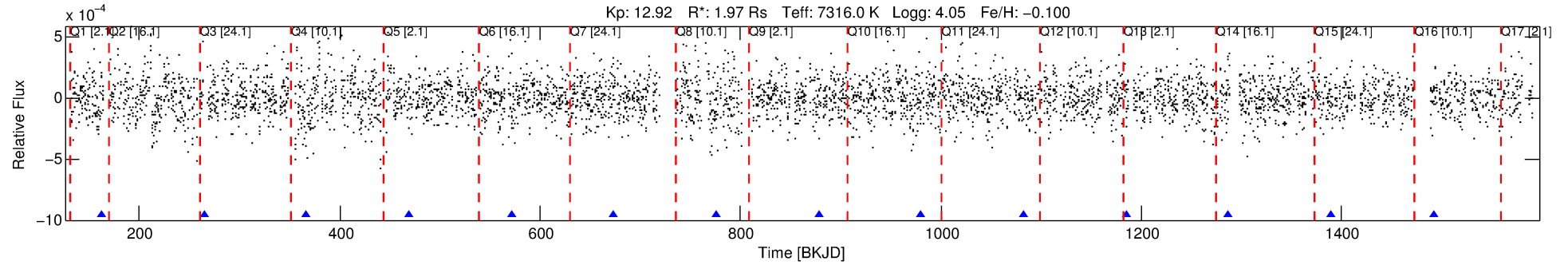
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 008539939-08

No Significant Match Found

# DV One-Page Summary

KIC: 8539939 Candidate: 8 of 8 Period: 102.225 d



## DV Fit Results:

Period = 102.22492 [0.00299] d  
Epoch = 162.7033 [0.0192] BKJD  
Rp/R\* = 0.0130 [0.0274]  
a/R\* = 231.49 [2927.55]  
b = 0.41 [25.50]  
Seff = 40.06 [15.04]  
Teq = 642 [60] K  
Rp = 2.80 [5.93] Re  
a = 0.4984 [0.1144] AU  
Ag = 2002.07 [8473.96] [0.24 $\sigma$ ]  
Teffp = 6635 [7004] K [0.86 $\sigma$ ]

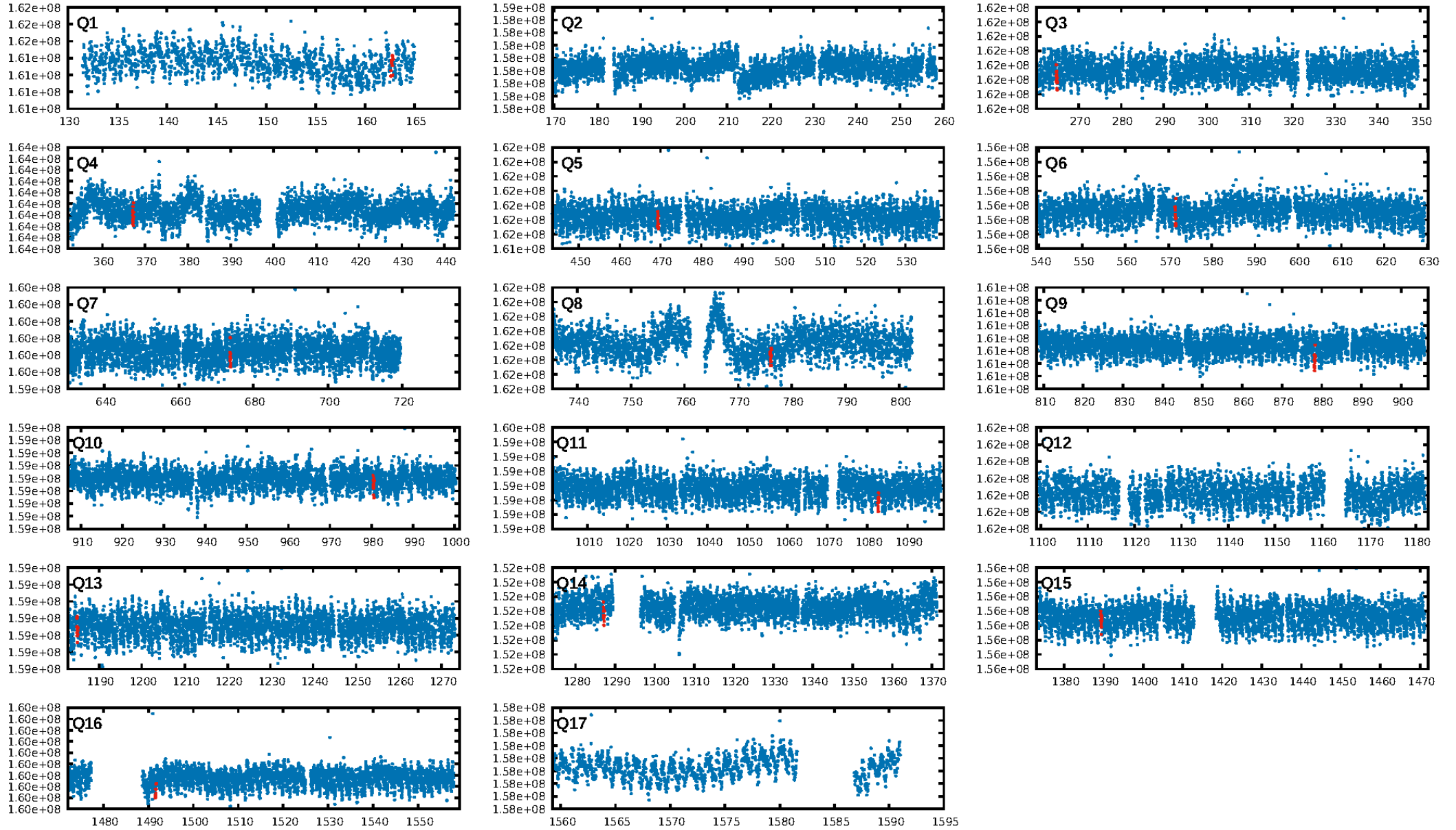
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [495.33 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.1%  
ModelChiSquareGof-sig: 68.3%  
Bootstrap-pfa: 7.78e-09  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: 16.26  
Centroid-sig: N/A  
Centroid-so: 0.470 arcsec [0.47 $\sigma$ ]  
OotOffset-rm: 0.339 arcsec [0.29 $\sigma$ ]  
KicOffset-rm: 0.395 arcsec [0.29 $\sigma$ ]  
OotOffset-st: 2/3/2/4 [11]  
KicOffset-st: 2/3/2/4 [11]  
DiffImageQuality-fgm: 0.55 [6/11]  
DiffImageOverlap-fno: 0.00 [0/13]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 08:00:58 Z

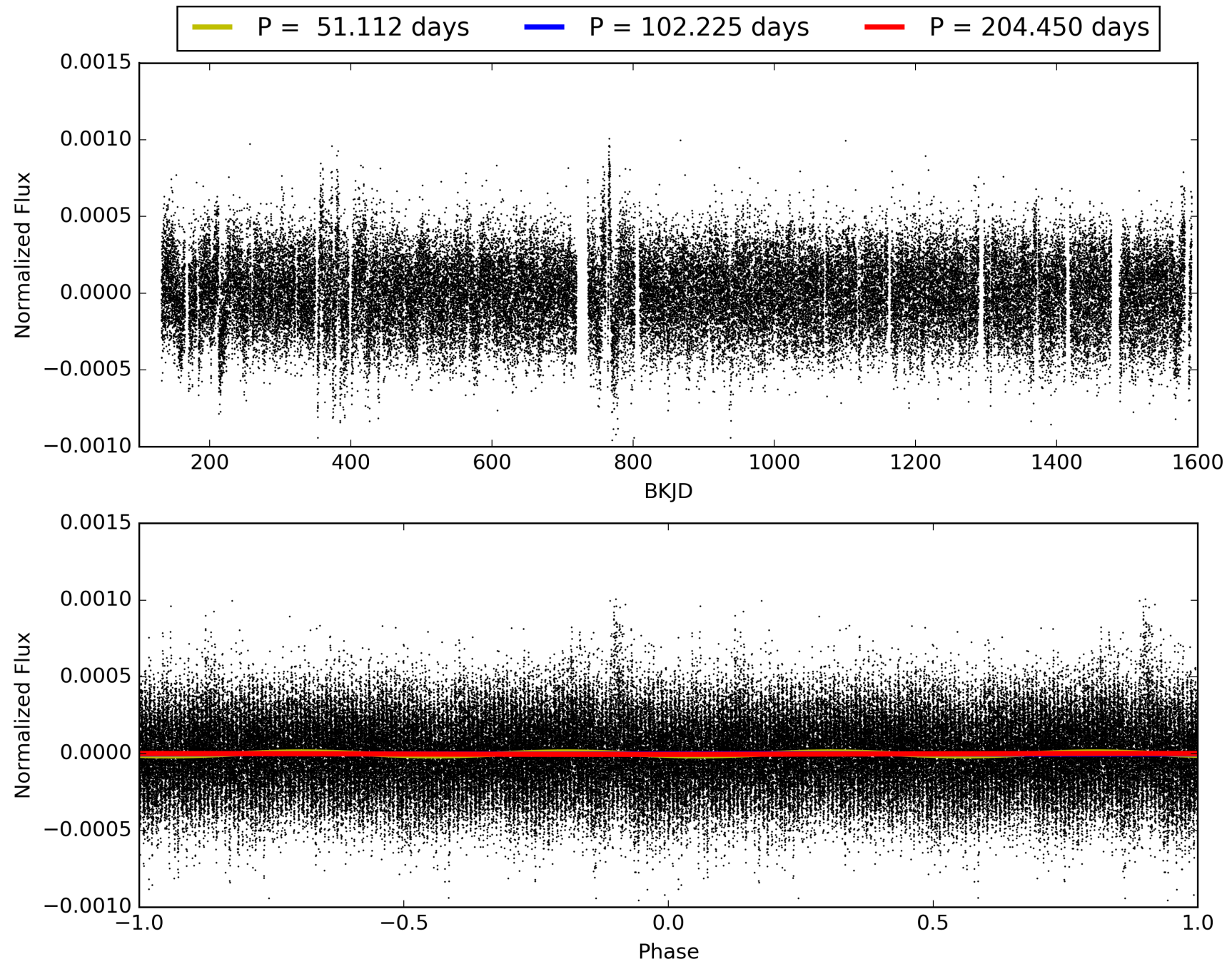
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 008539939-08, PDC Light Curves





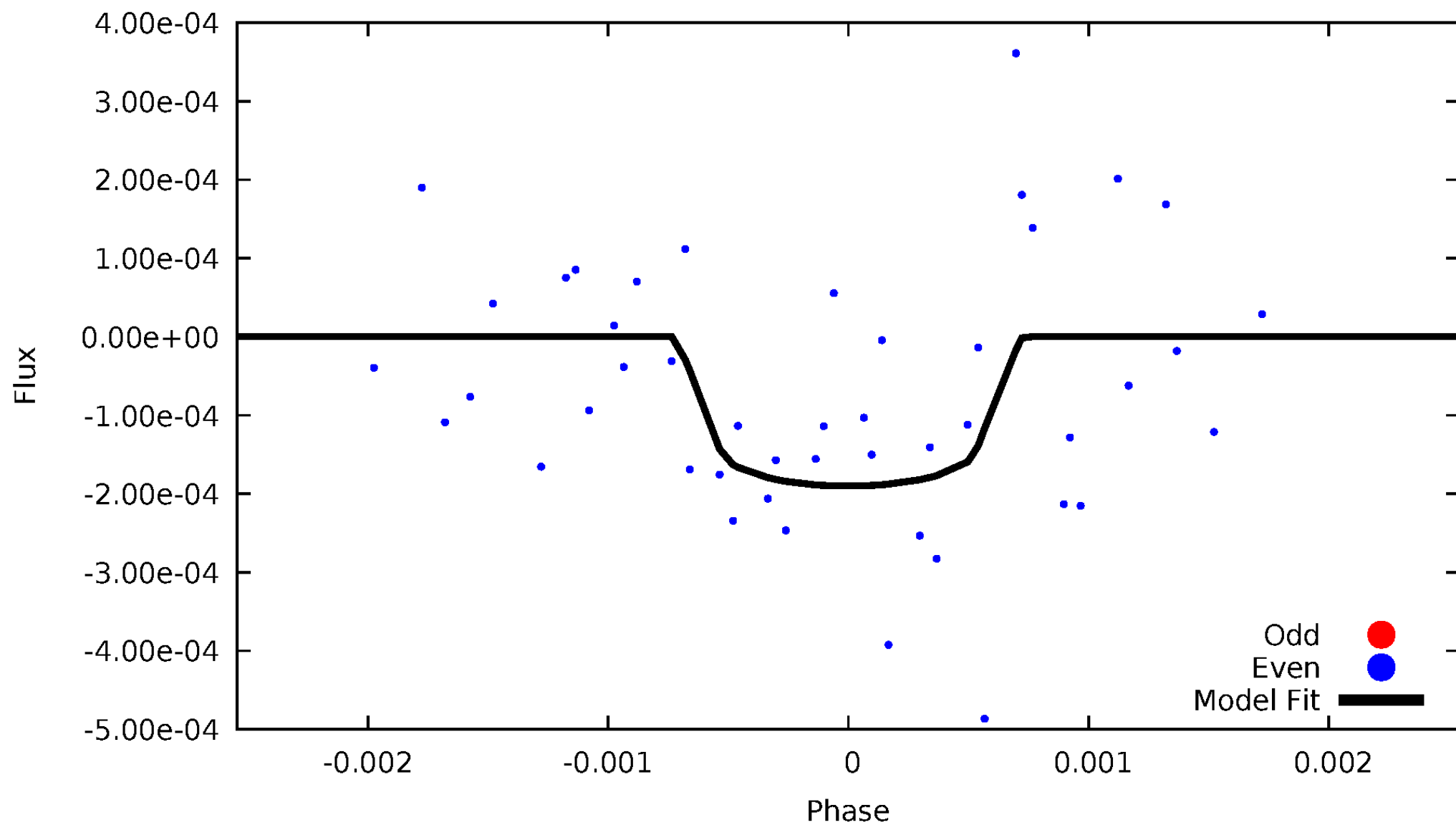
TCE 008539939-08





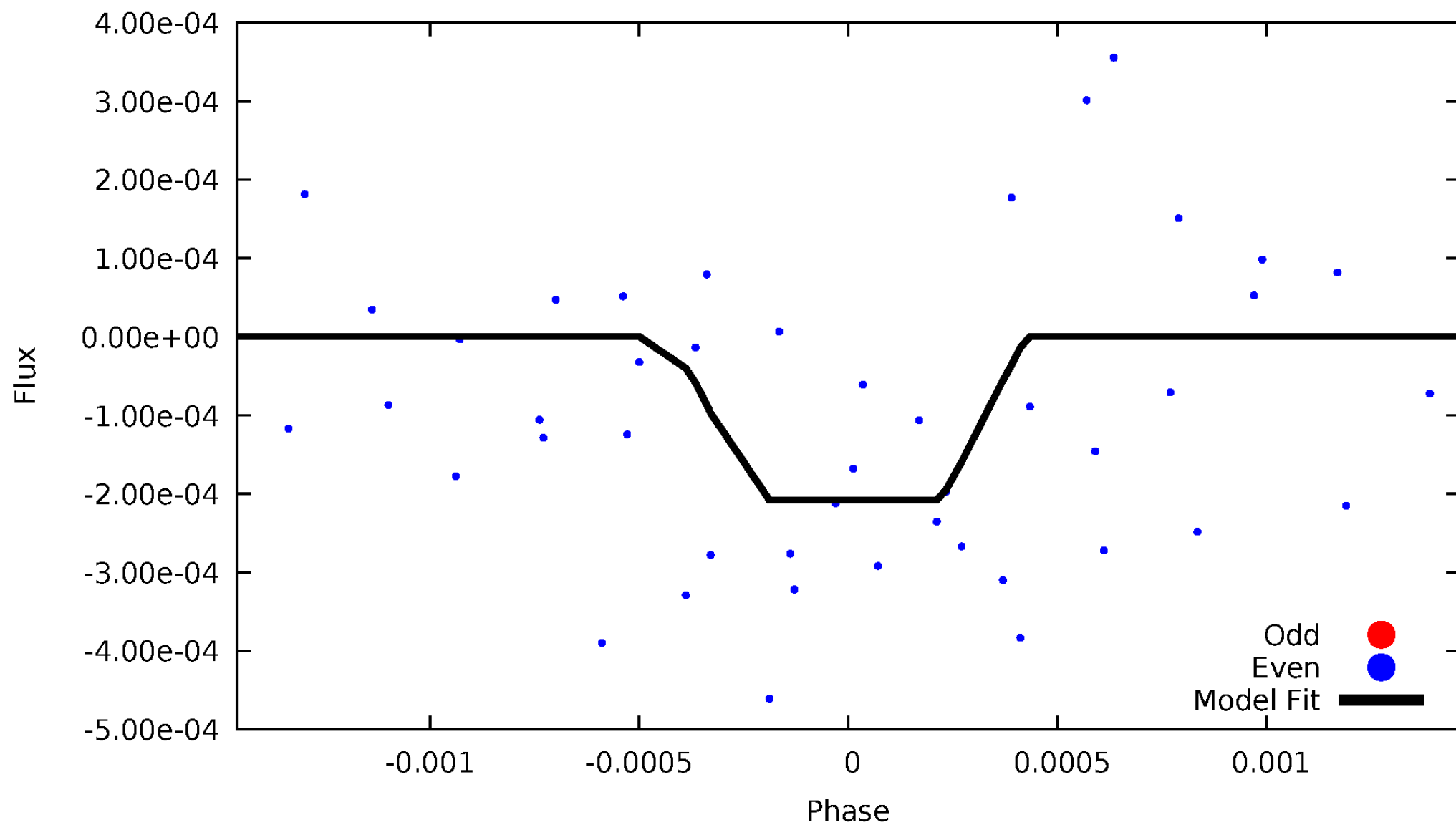
# DV Odd/Even

TCE 008539939-08



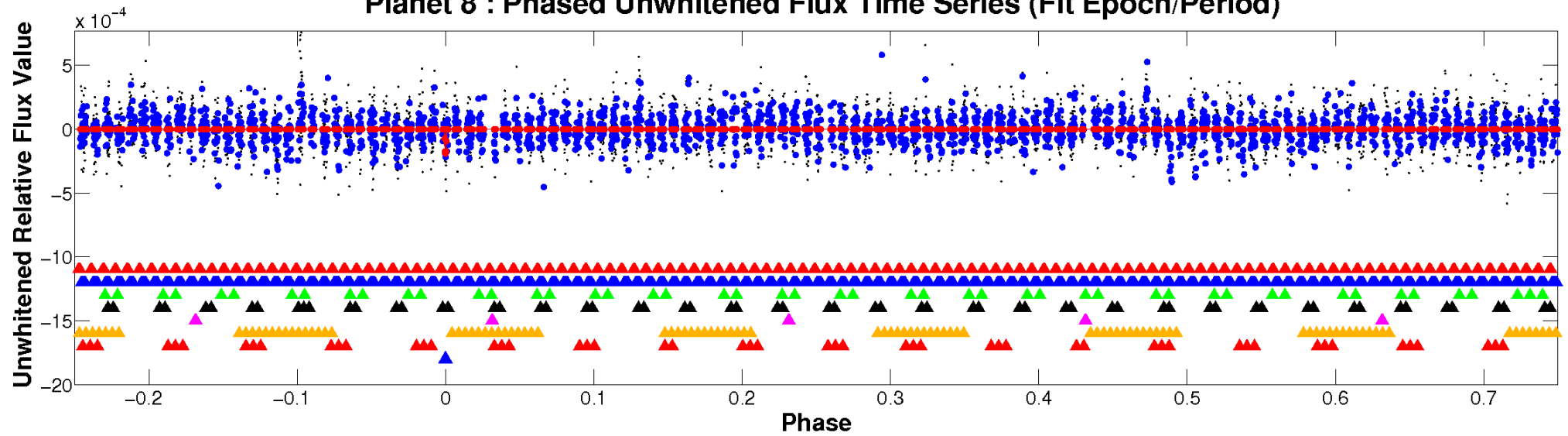
# ALT Odd/Even

TCE 008539939-08

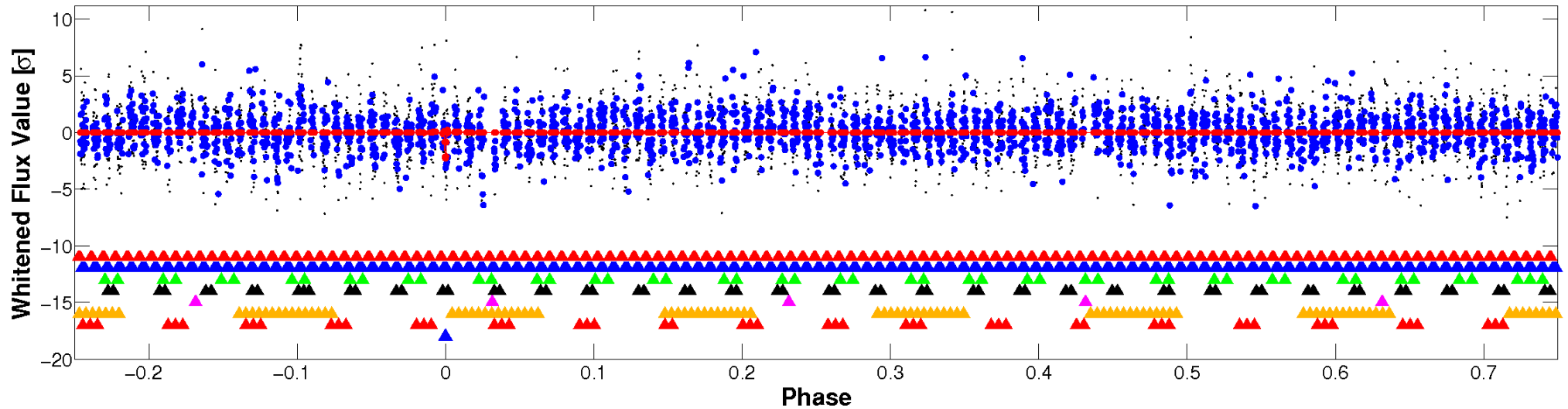


# Non-Whitened Vs. Whitened Light Curve

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

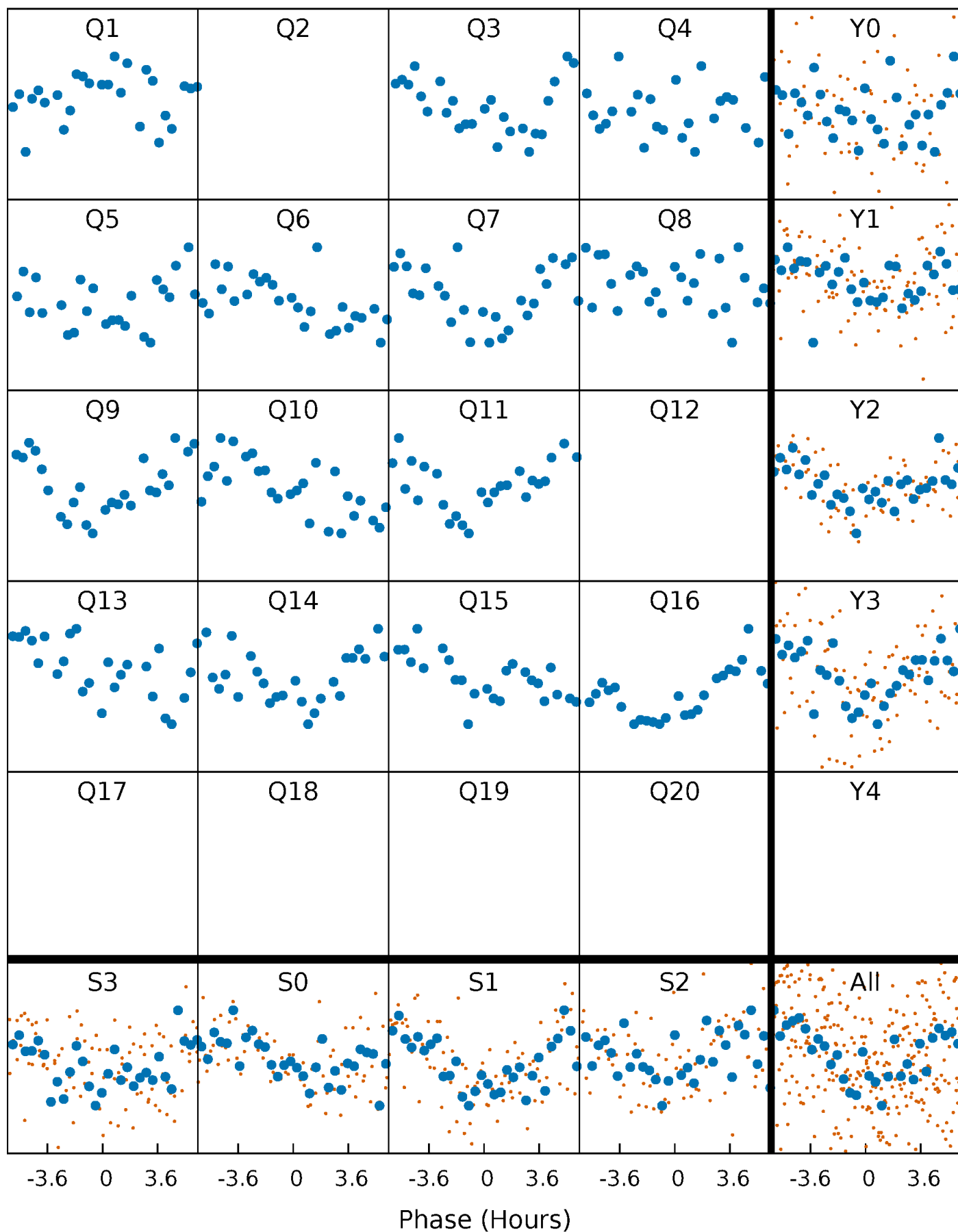


## Planet 8 : Phased Whitened Flux Time Series (Fit Epoch/Period)



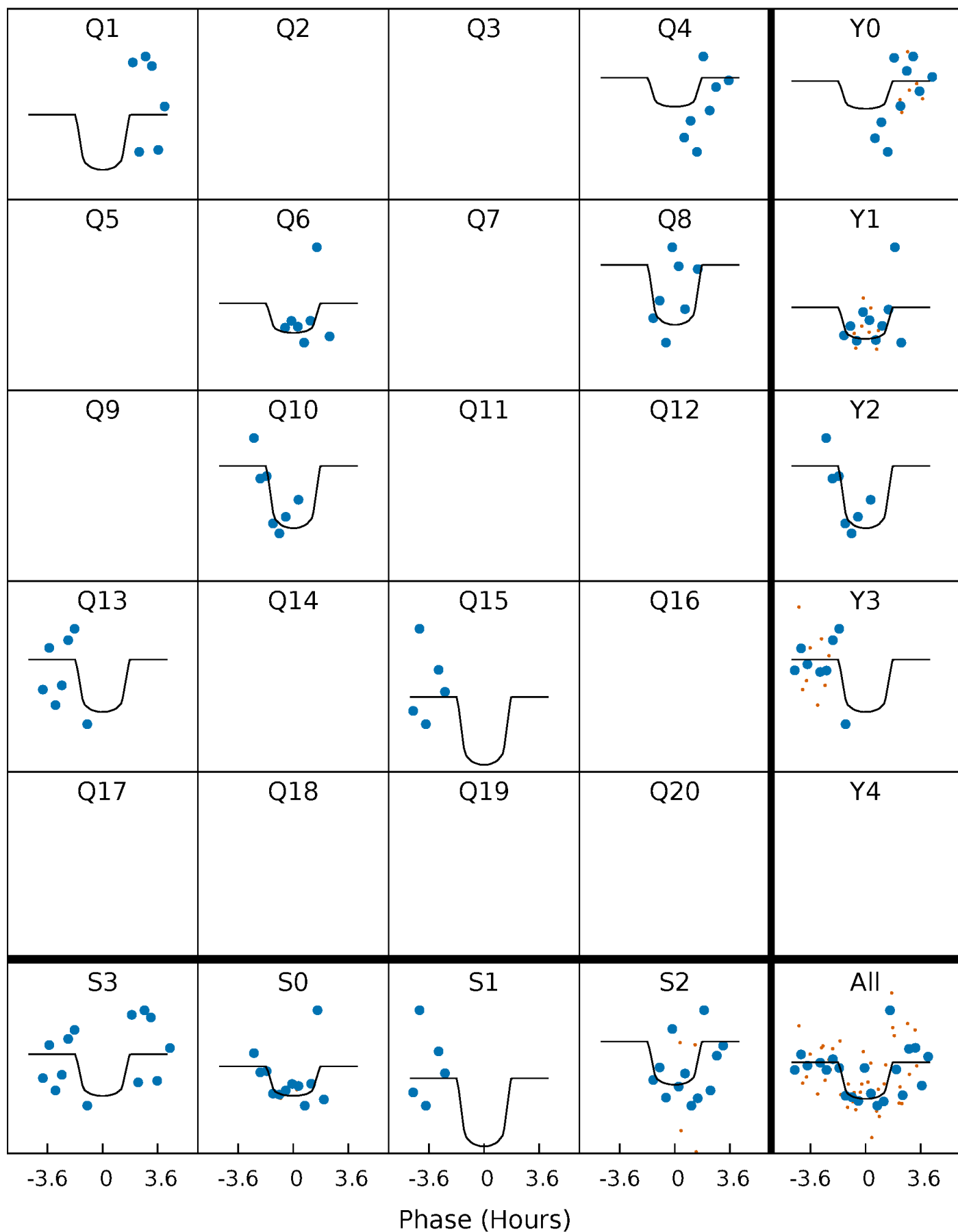
# PDC Quarter-Phased Transit Curves

TCE 008539939-08 P=102.224919 Days  $T_0=162.703297$  (BKJD)



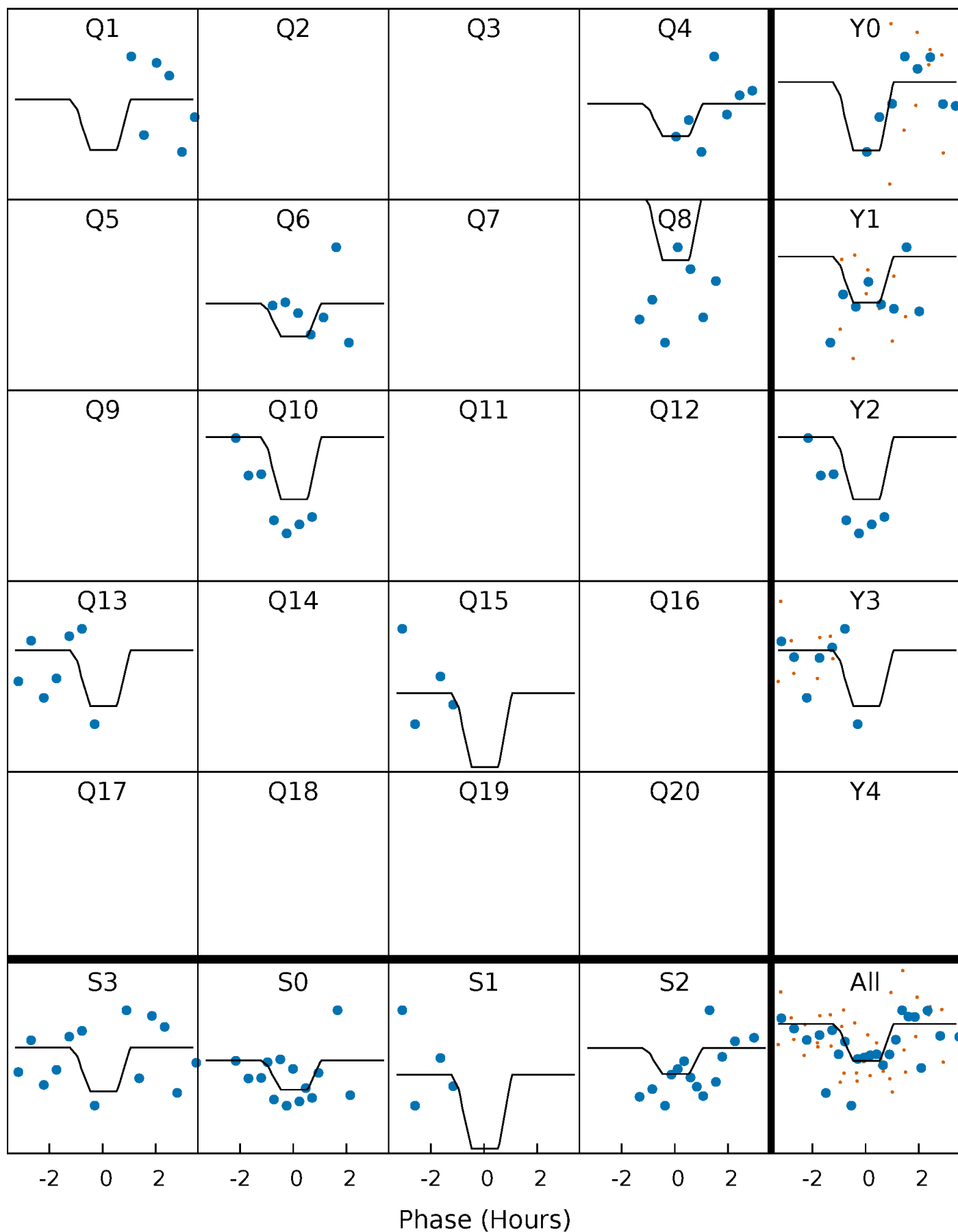
# DV Quarter-Phased Transit Curves

TCE 008539939-08 P=102.224919 Days  $T_0=162.703297$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

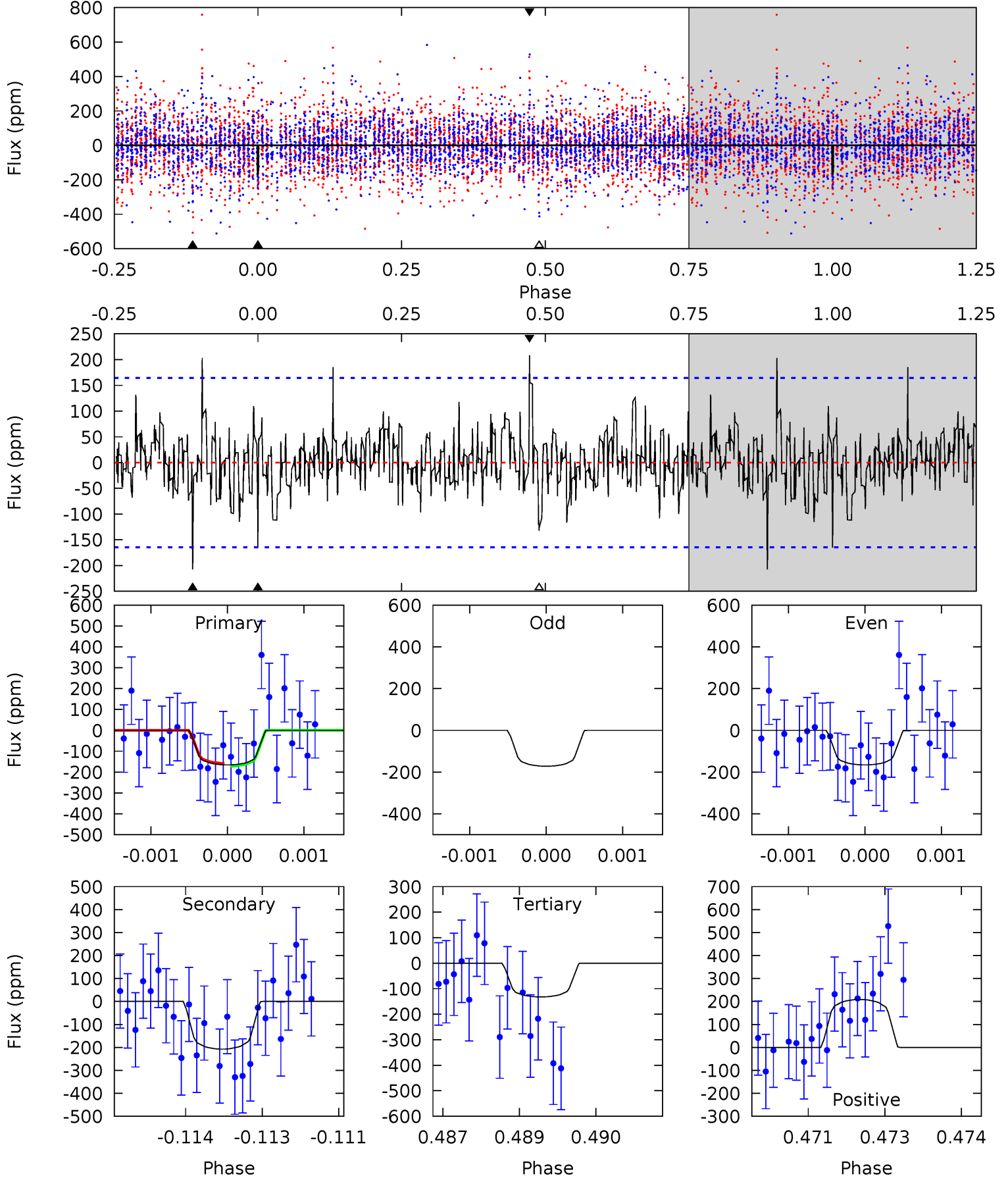
TCE 008539939-08 P=102.218037 Days  $T_0=162.737268$  (BKJD)



# DV Model-Shift Uniqueness Test

008539939-08,  $P = 102.224919$  Days,  $E = 60.478378$  Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.42	6.78	4.32	6.82	5.39	3.19	1.42	1.09	-1.41	2.46	-0.04	0.13	1.28	0.50	0.21

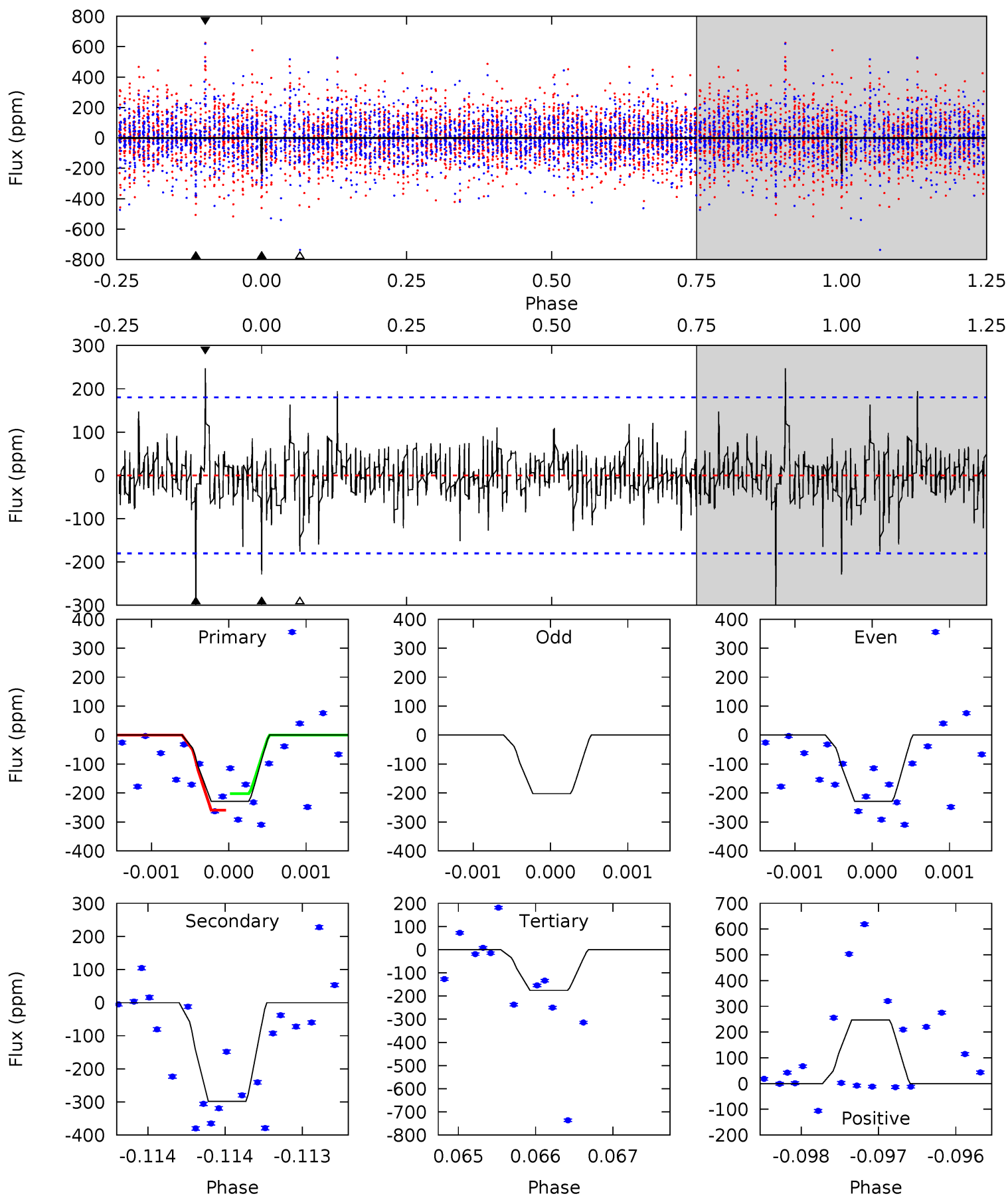




# Alt Model-Shift Uniqueness Test

008539939-08, P = 102.218037 Days, E = 60.519231 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.96	9.08	5.35	7.53	5.49	3.35	1.42	1.60	-0.58	3.72	1.54	0.47	1.10	0.45	0.87



### Stellar Parameters For KIC 008539939

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$7316^{+228}_{-304}$	$4.048^{+0.185}_{-0.167}$	$-0.100^{+0.250}_{-0.350}$	$1.969^{+0.533}_{-0.533}$	$1.577^{+0.199}_{-0.273}$	$0.291^{+0.326}_{-0.134}$
	+3%/-4%	+5%/-4%	+250%/-350%	+27%/-27%	+13%/-17%	+112%/-46%
Source	KIC0	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 008539939-08 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-207 \pm 31$	$5.40^{+4.89}_{-3.75}$	$897^{+67}_{-70}$	$5502^{+5176}_{-1287}$	$974^{+8891}_{-712}$
Alt.	$-298 \pm 33$	$5.27^{+5.55}_{-3.58}$	$895^{+68}_{-65}$	$5921^{+7298}_{-1559}$	$1397^{+12845}_{-1063}$

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

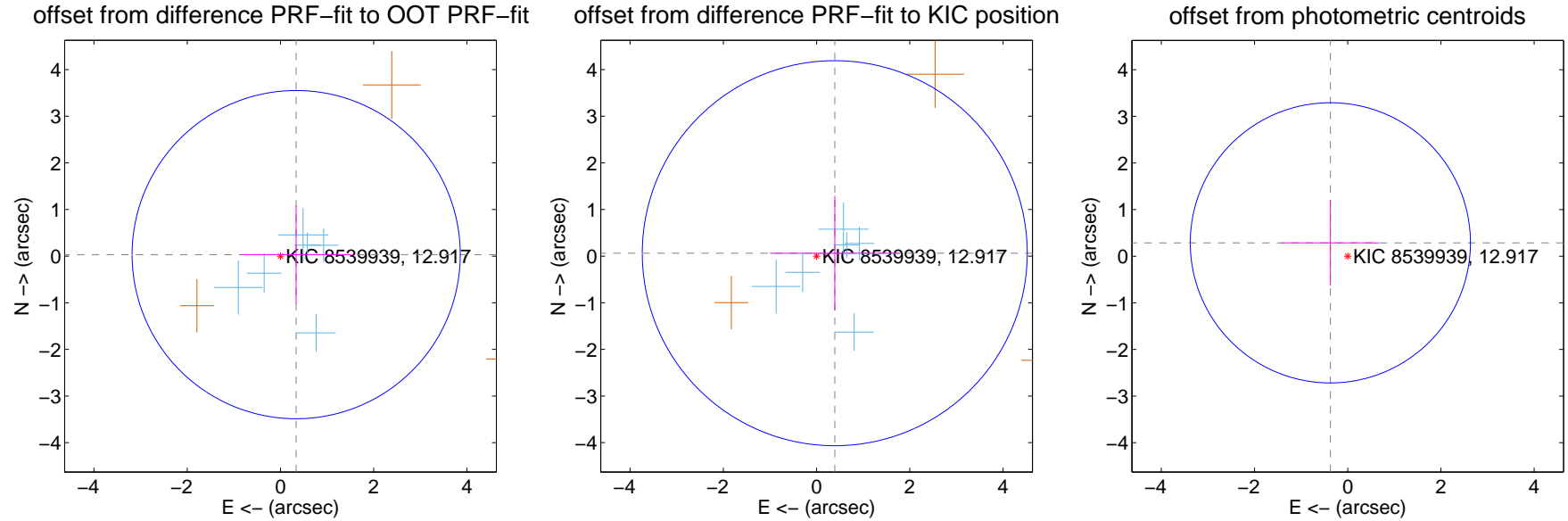
## DV Centroid Data

Supplemental centroid analysis for 008539939-08. Kepler magnitude: 12.92. Transit SNR 9.06

There are 6 quarters with good PRF difference image offsets

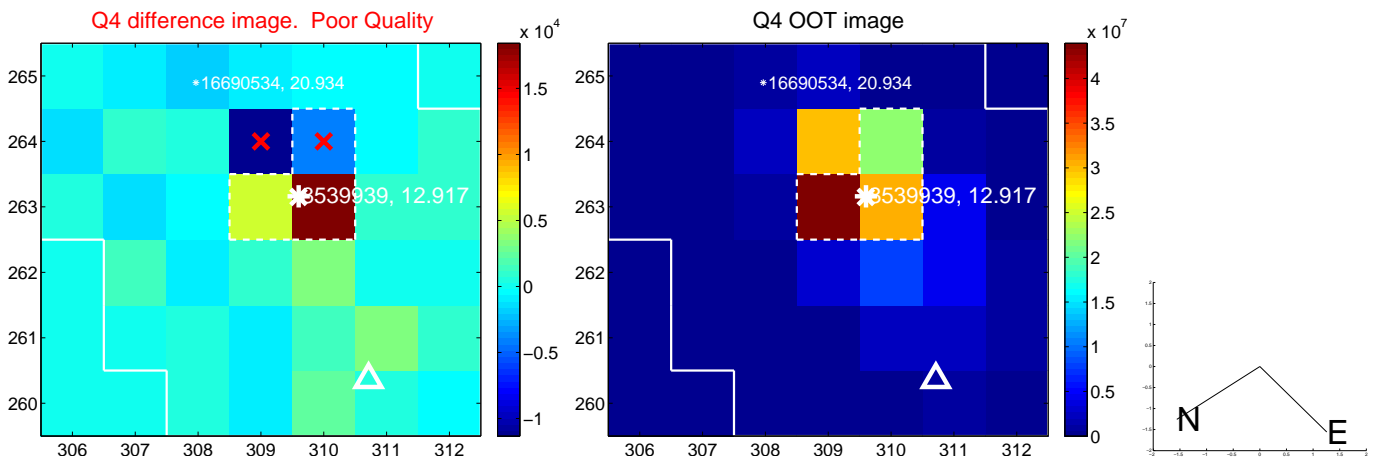
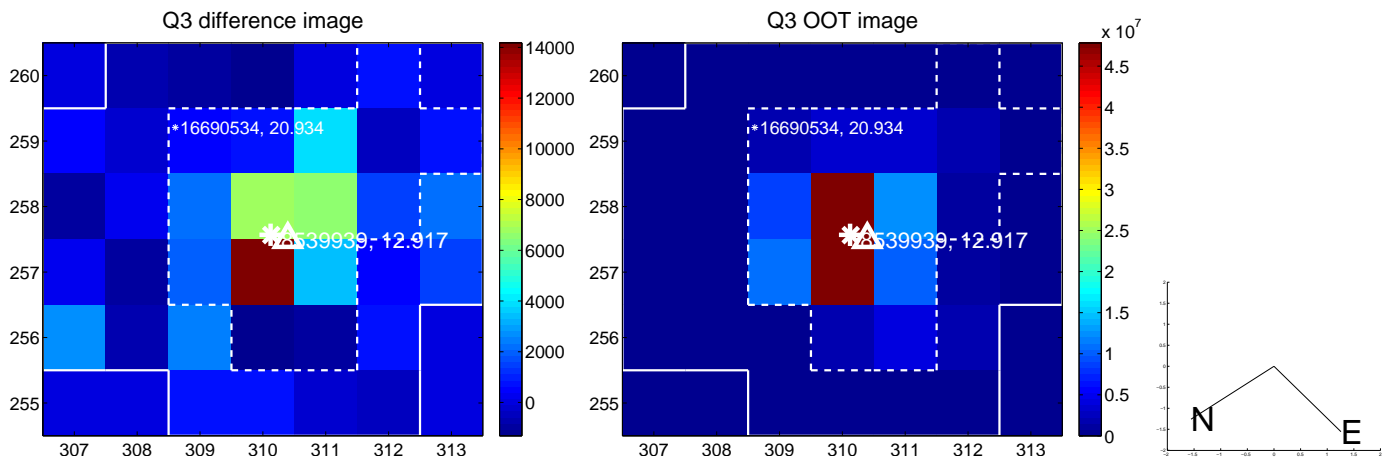
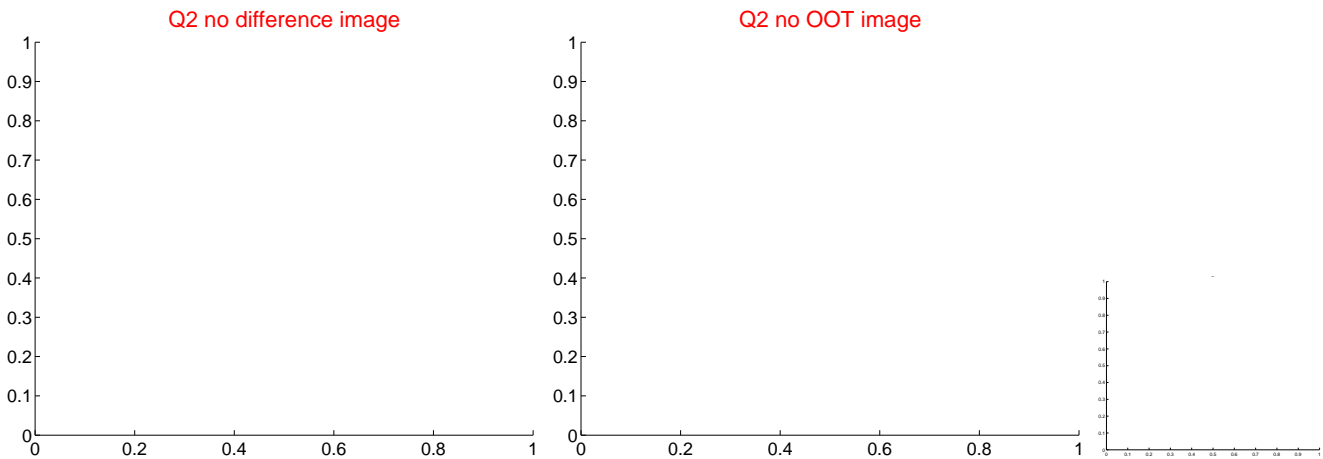
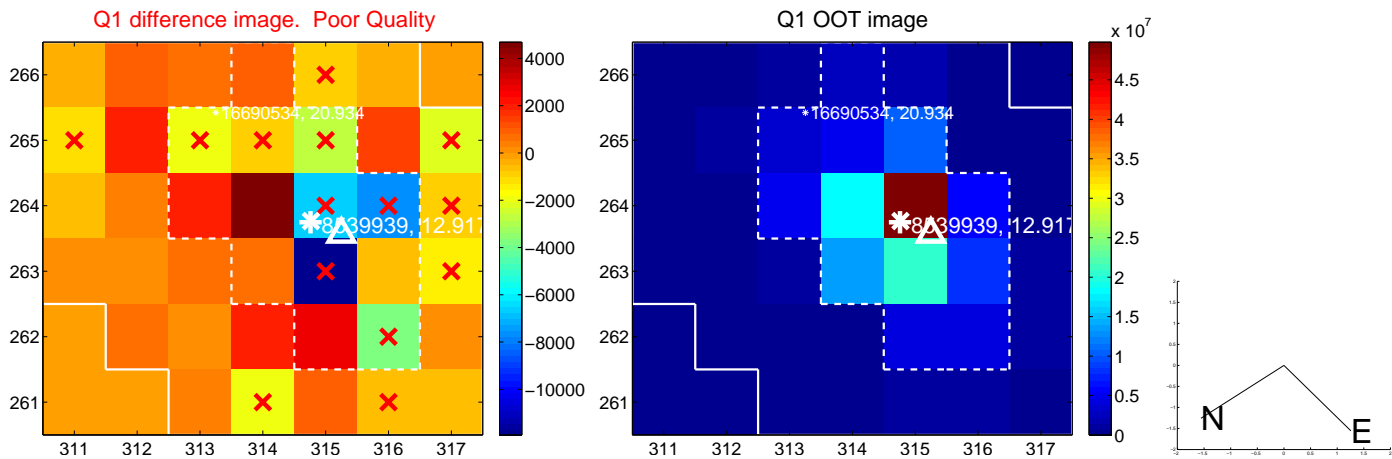
The direct PRF centroid is offset from the target star catalog position by about 0.05 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.339 \pm 1.173$	0.29	$-0.337 \pm 1.179$	$0.032 \pm 1.049$
PRF-fit source offset from KIC position	$0.395 \pm 1.376$	0.29	$-0.390 \pm 1.389$	$0.063 \pm 1.232$
photometric centroid source offset	$0.47 \pm 1.00$	0.47	$0.37 \pm 1.05$	$0.29 \pm 0.92$

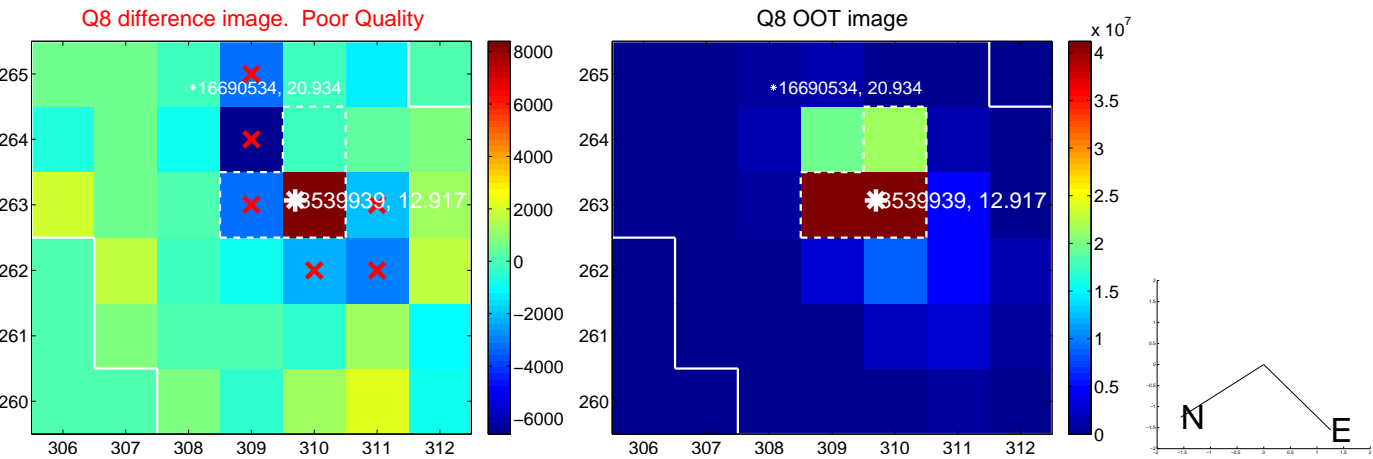
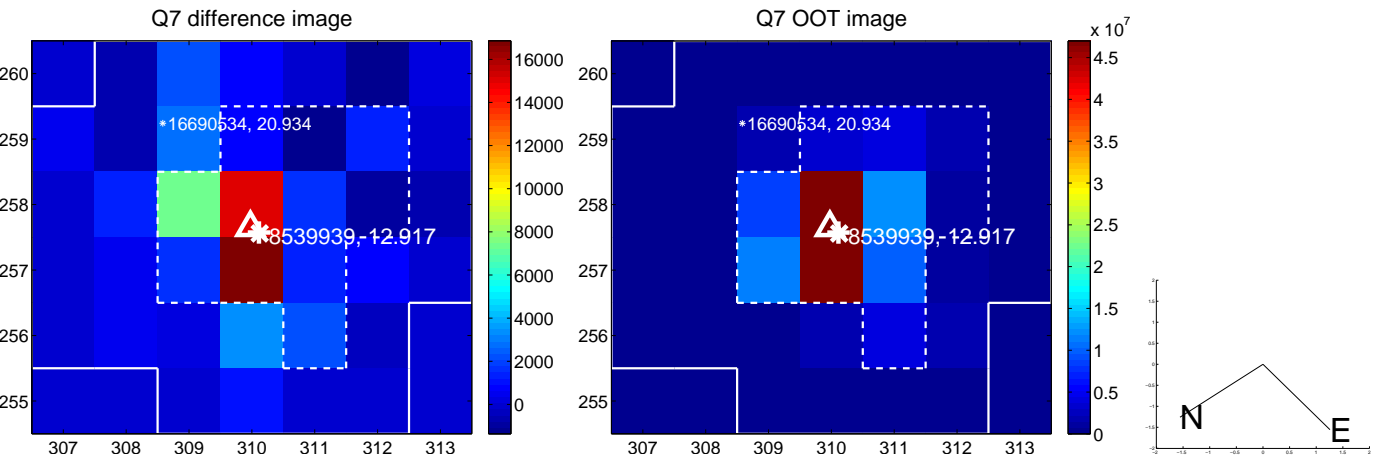
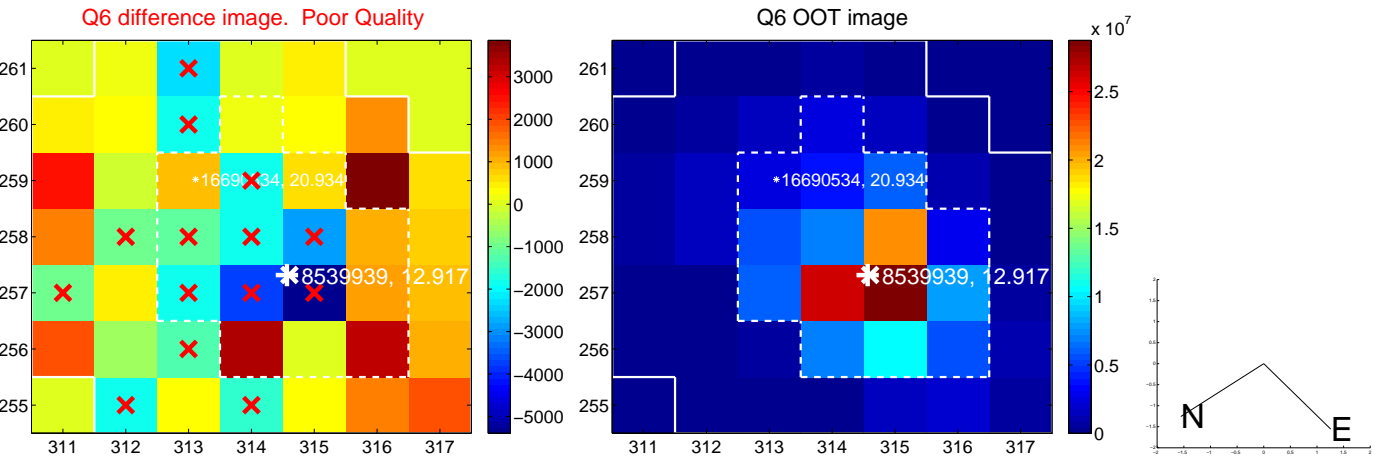
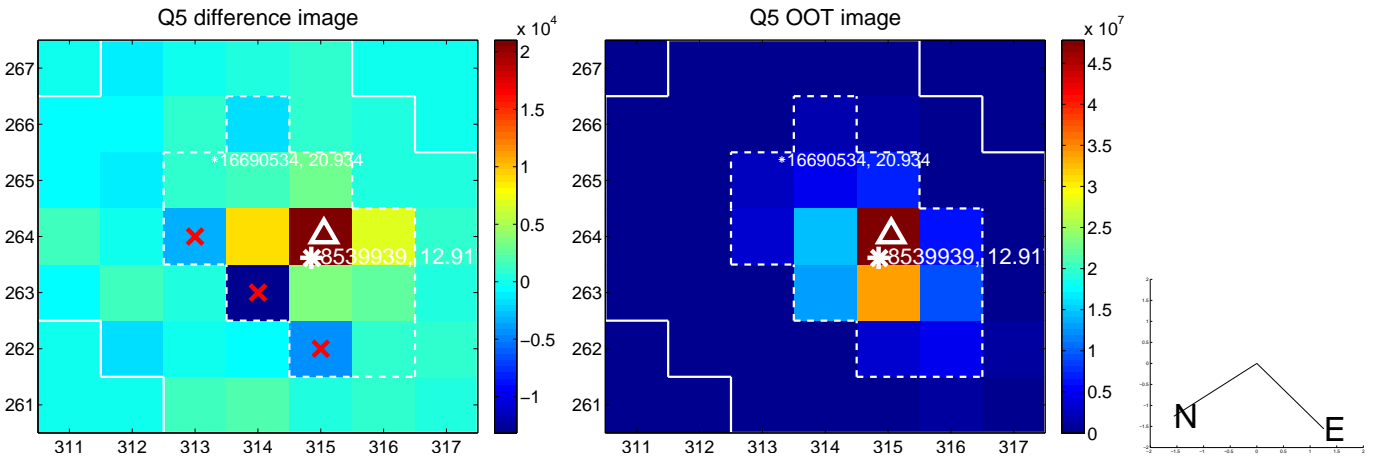


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

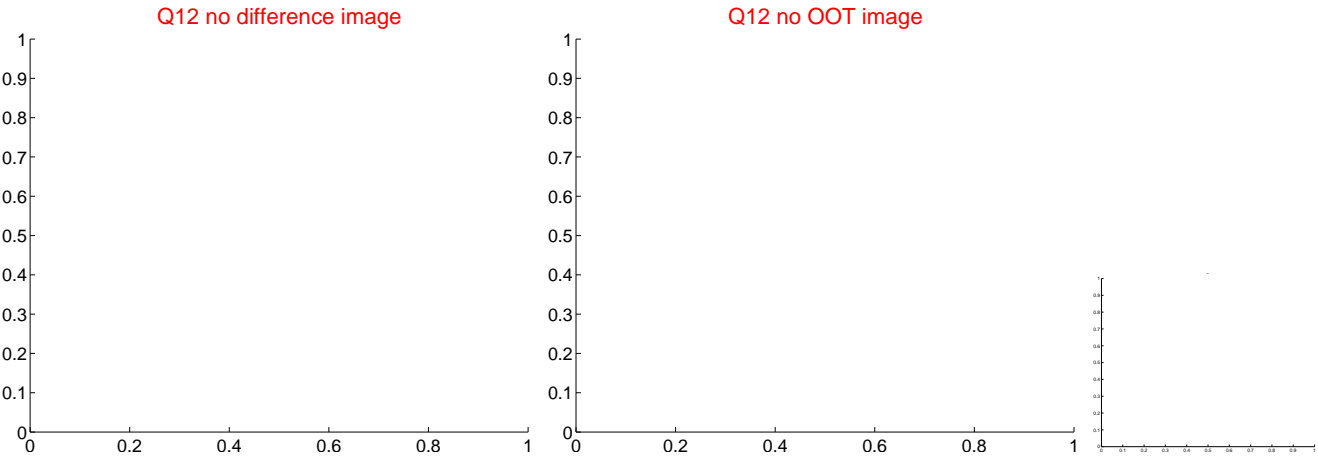
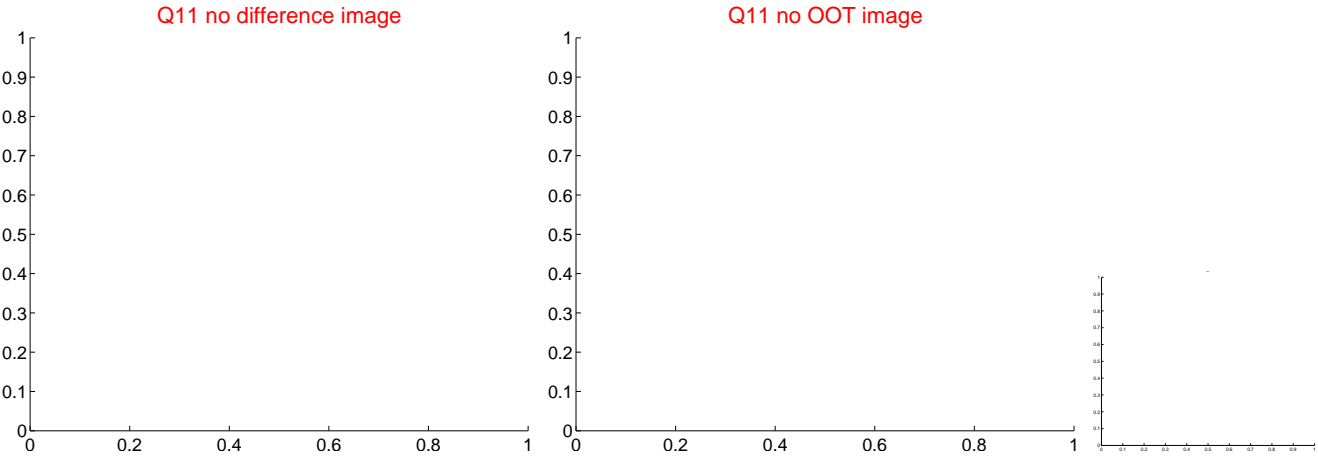
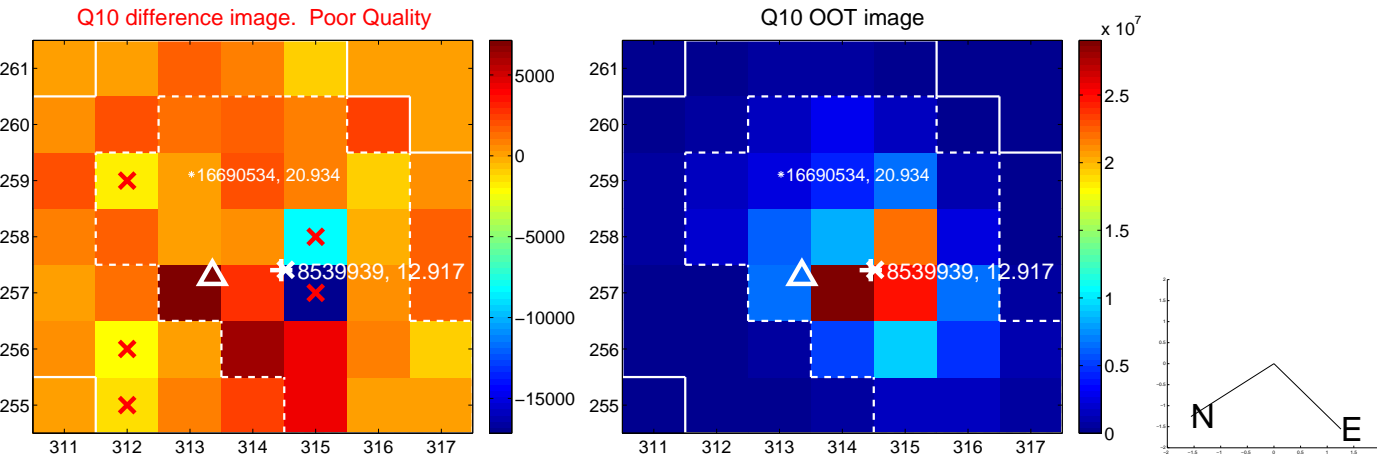
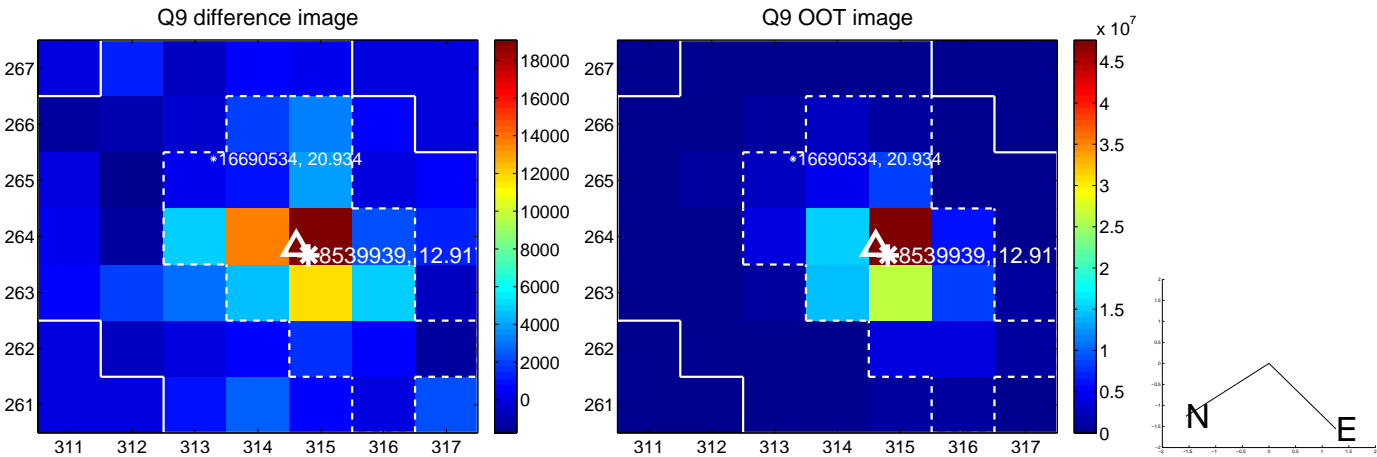
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



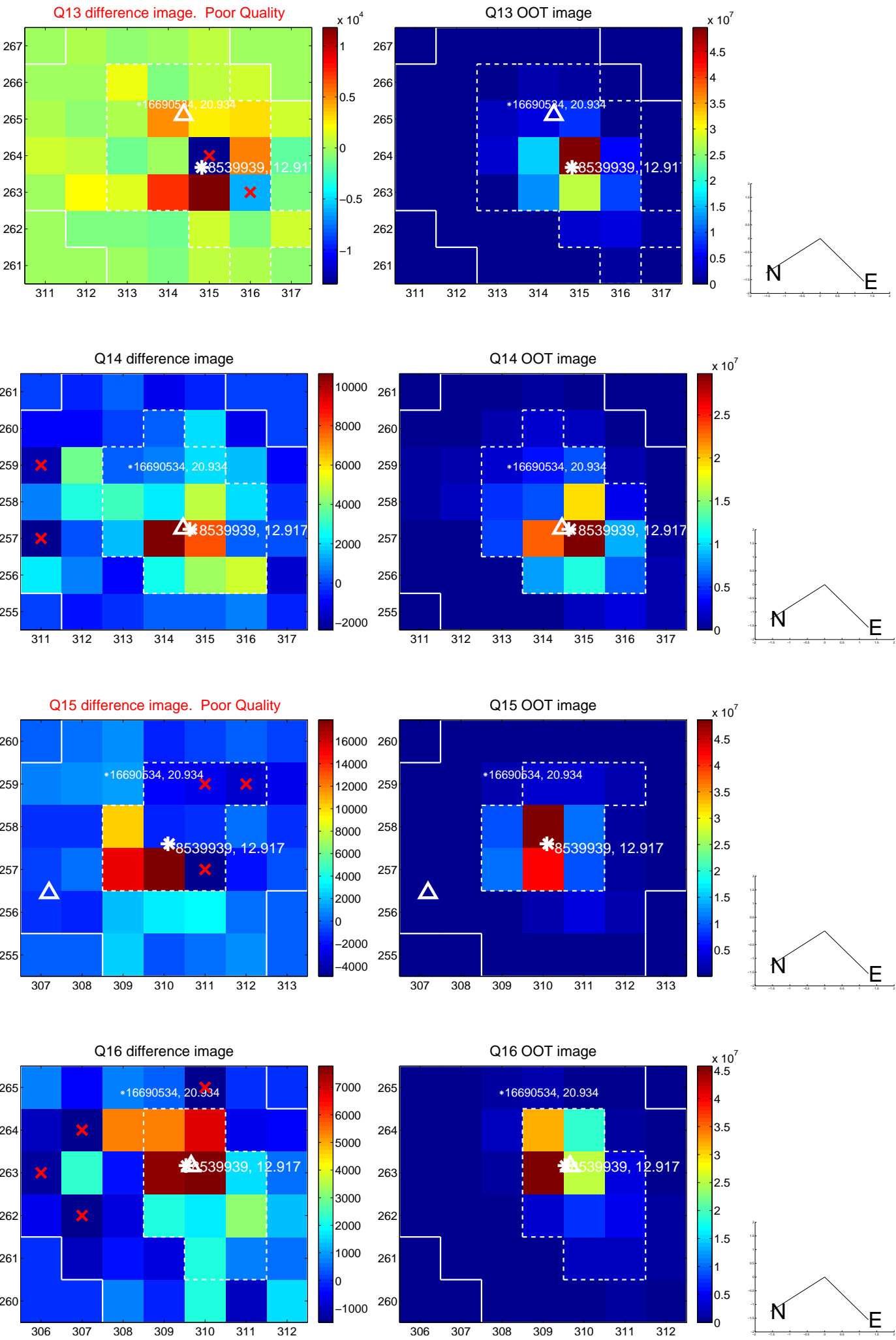
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



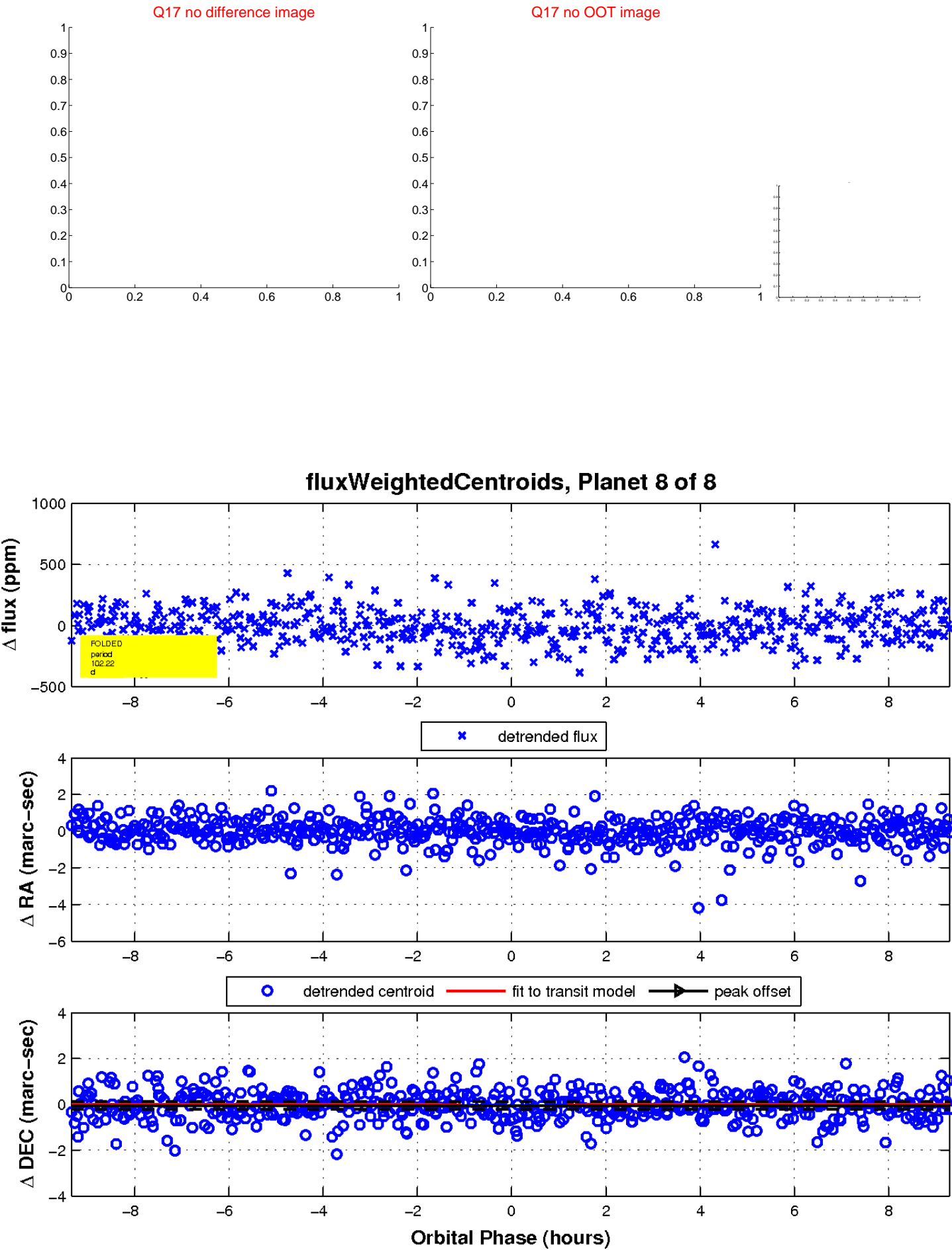
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

