

# KIC 005309078

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005309078-01	OBS	No	0.807230	132.075081	20.7	4.045	11.8	10.5	3.95	6452	2.06	57524.61
005309078-02	OBS	No	106.192098	163.186057	329.5	1.236	8.7	6.7	3.95	6452	8.28	85.98
005309078-03	OBS	No	202.568627	147.975479	225.6	6.936	7.6	7.7	3.95	6452	6.74	36.34
005309078-04	OBS	No	51.849424	163.356385	192.4	2.065	7.2	6.9	3.95	6452	6.26	223.63
005309078-05	OBS	No	37.534480	138.176930	151.1	1.822	7.3	7.9	3.95	6452	5.68	344.04

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005309078-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV
005309078-02	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_UNCERTAIN
005309078-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
005309078-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
005309078-05	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

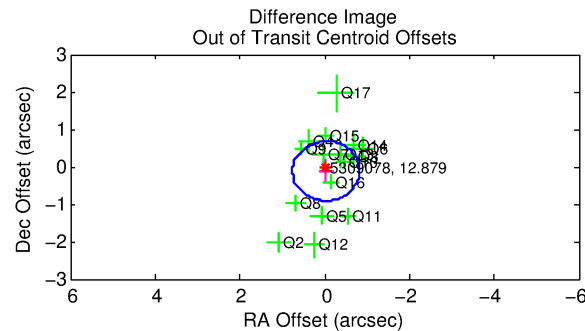
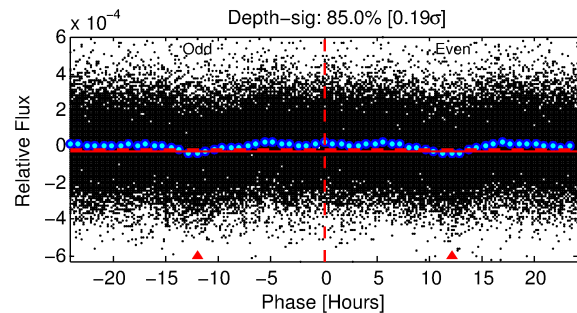
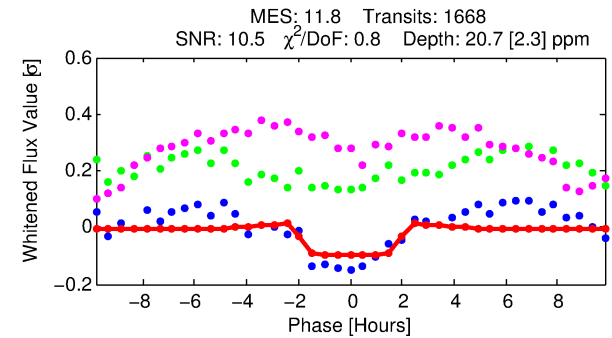
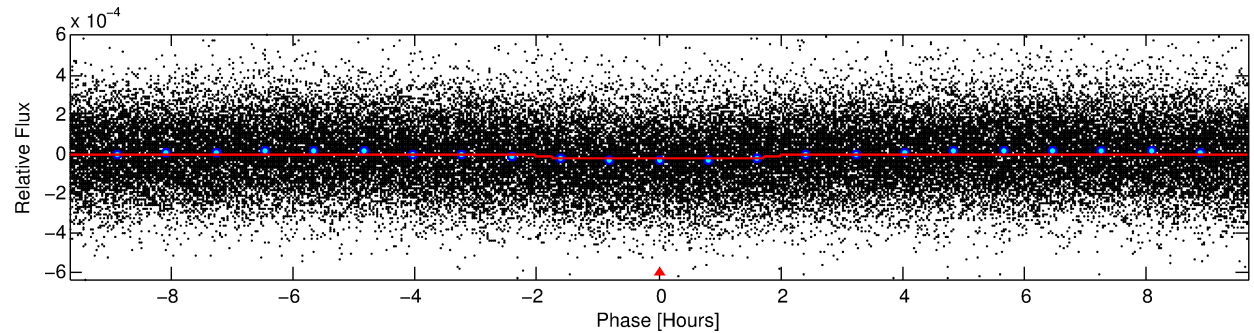
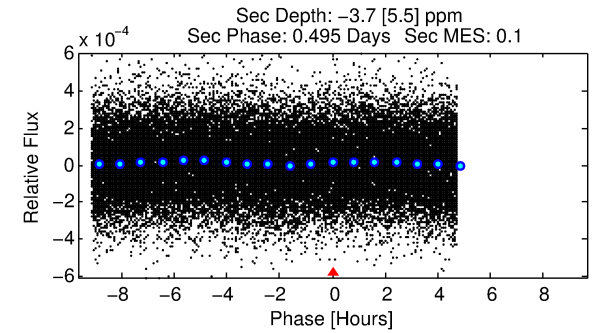
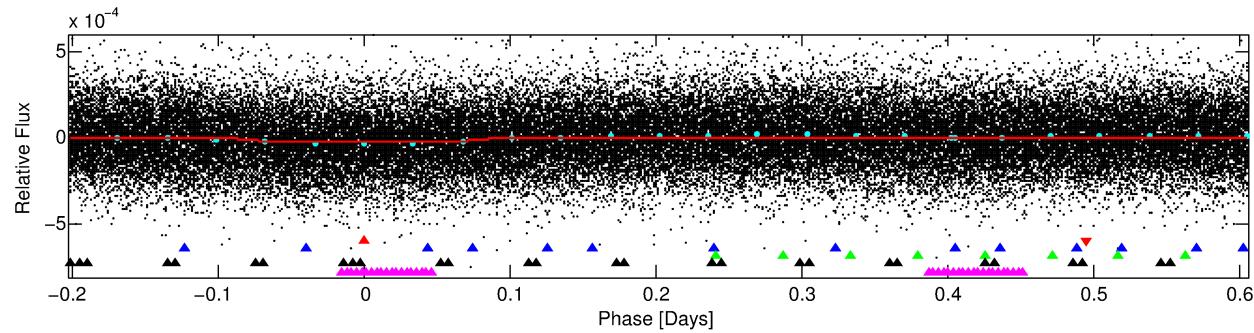
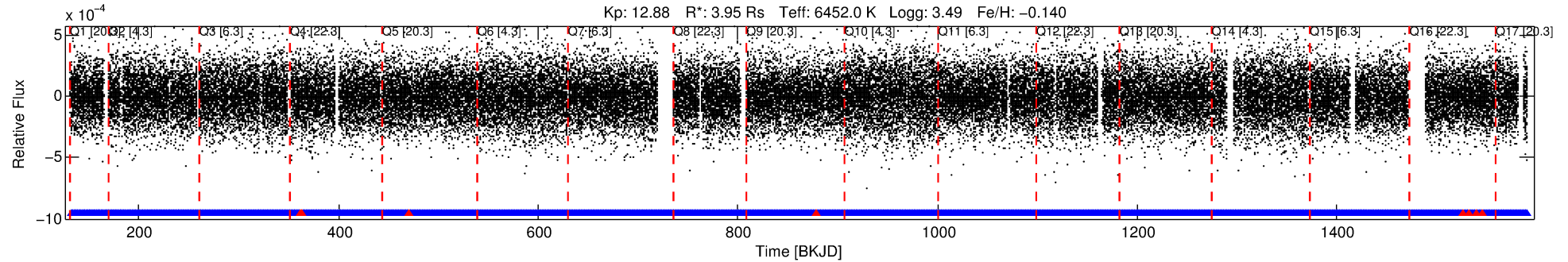
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 005309078-01

No Significant Match Found

# DV One-Page Summary

KIC: 5309078 Candidate: 1 of 5 Period: 0.807 d



## DV Fit Results:

Period = 0.80723 [0.00001] d  
Epoch = 132.0751 [0.0036] BKJD  
Rp/R\* = 0.0048 [0.0021]  
a/R\* = 1.19 [0.88]  
b = 0.88 [0.67]  
Seff = 57524.61 [35758.57]  
Teq = 3949 [614] K  
Rp = 2.06 [1.22] Re  
a = 0.0205 [0.0078] AU  
Ag = N/A  
Teffp = N/A

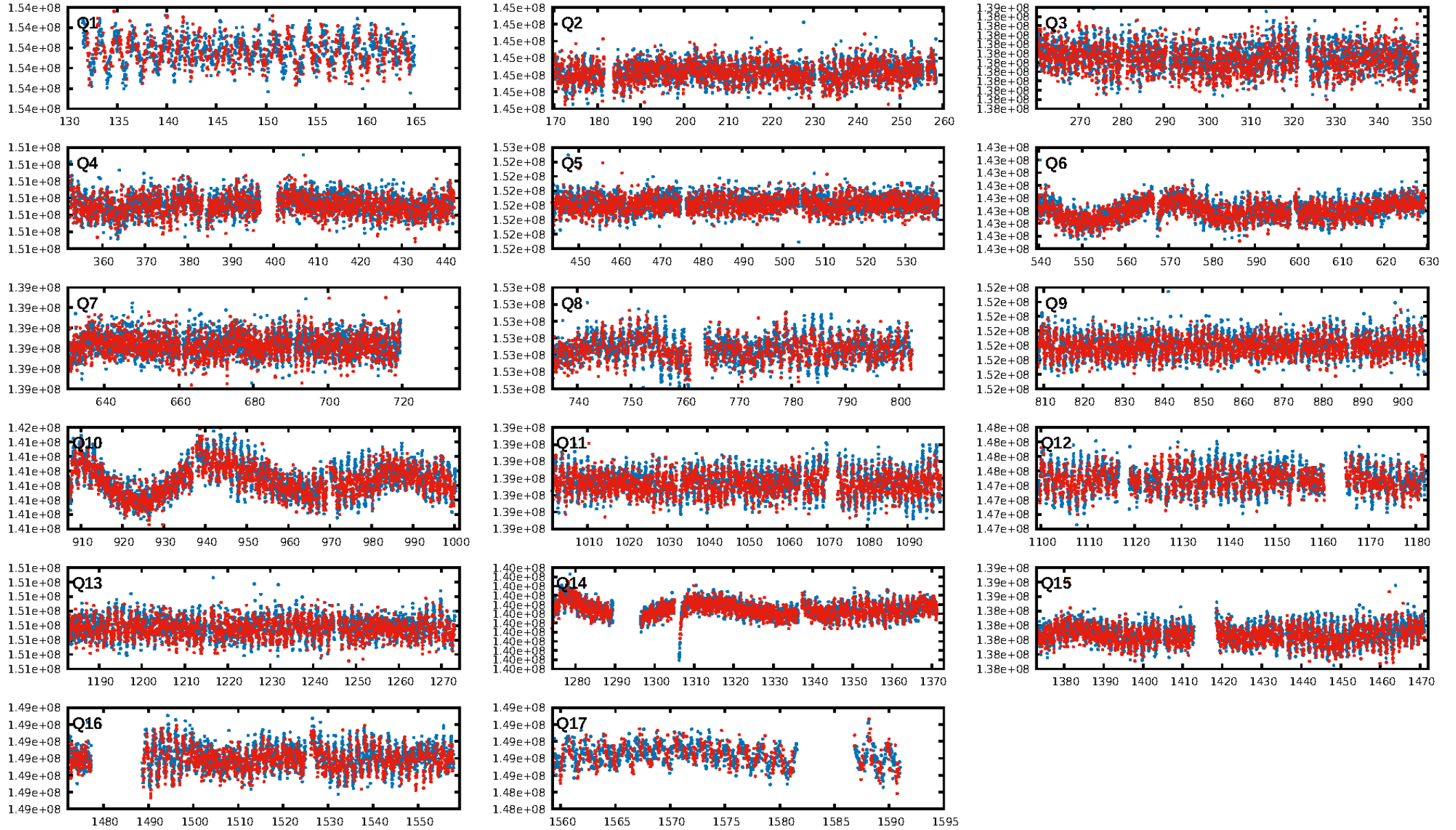
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [198.68σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 2.92e-21  
RollingBand-fgt: 0.99 [1586/1594]  
GhostDiagnostic-chr: 1.865  
Centroid-sig: N/A  
Centroid-so: 1.115 arcsec [1.42σ]  
OotOffset-rm: 0.123 arcsec [0.46σ]  
KicOffset-rm: 0.299 arcsec [1.35σ]  
OotOffset-st: 4/4/4/4 [16]  
KicOffset-st: 4/4/4/4 [16]  
DiffImageQuality-fgm: 0.94 [15/16]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 00:20:18 Z

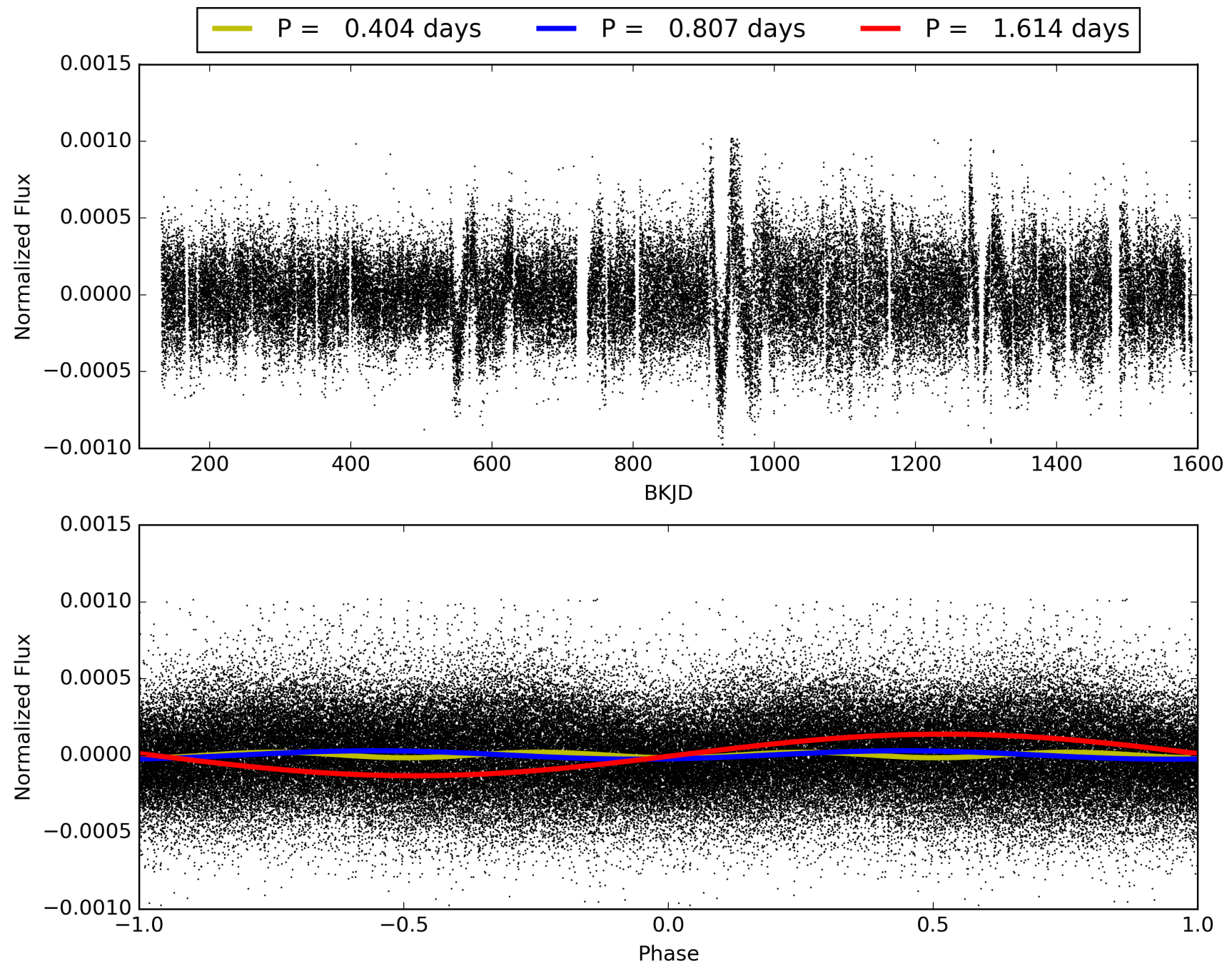
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 005309078-01, PDC Light Curves





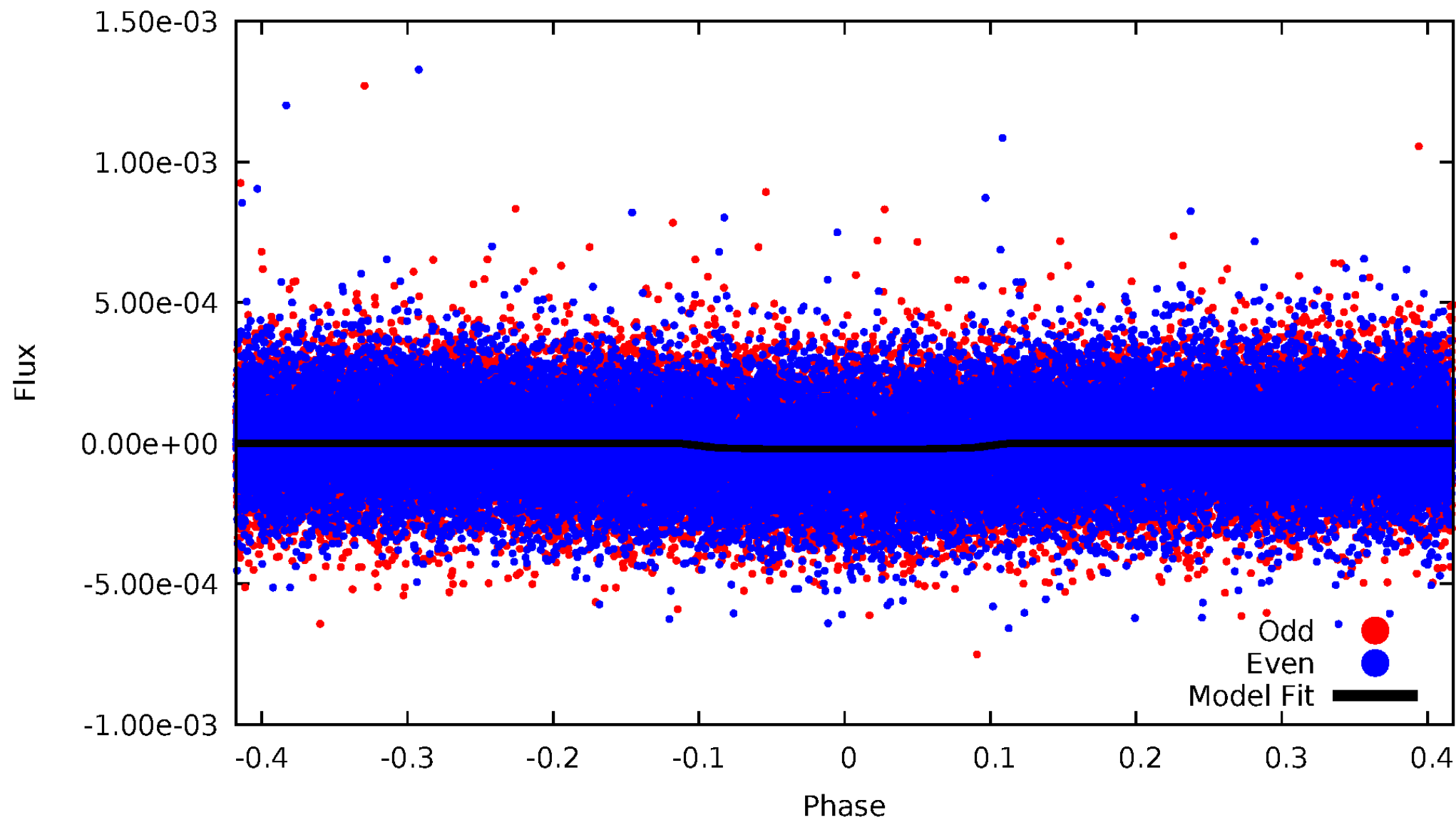
TCE 005309078-01





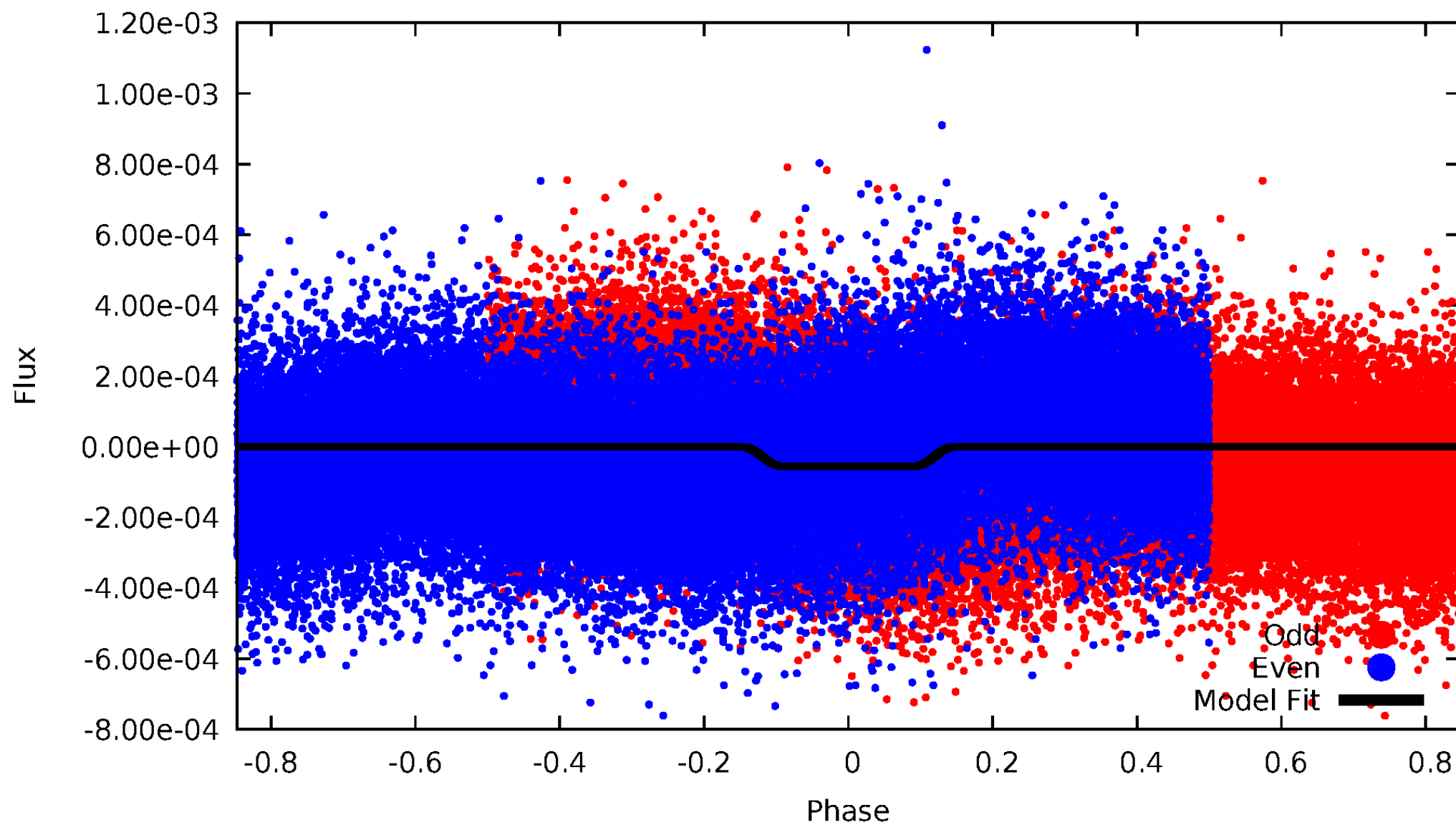
# DV Odd/Even

TCE 005309078-01

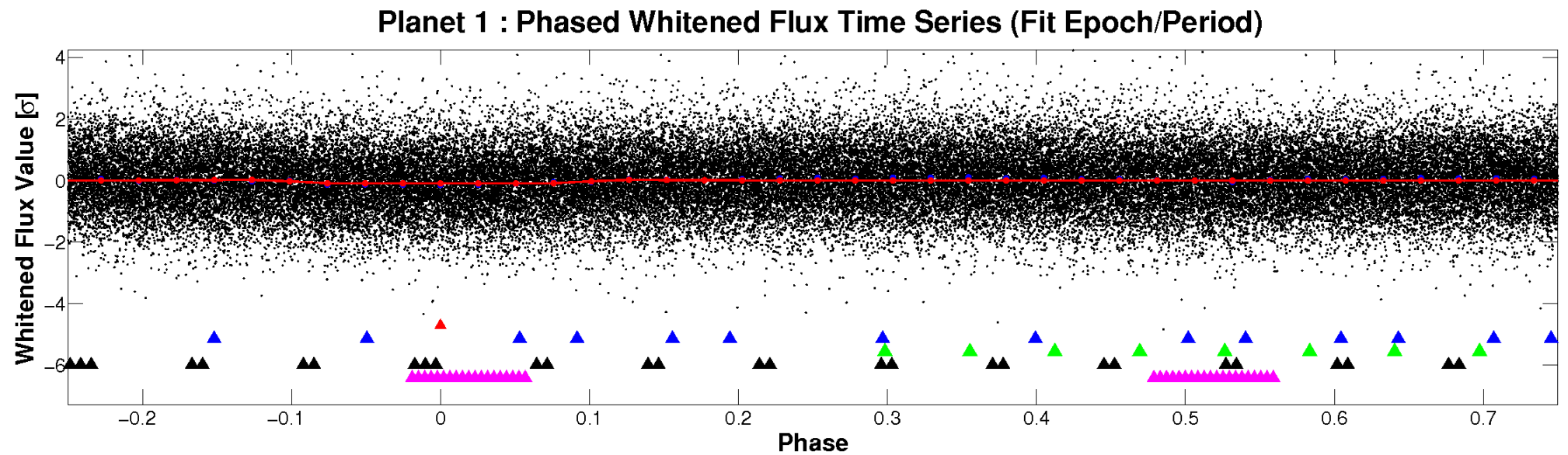
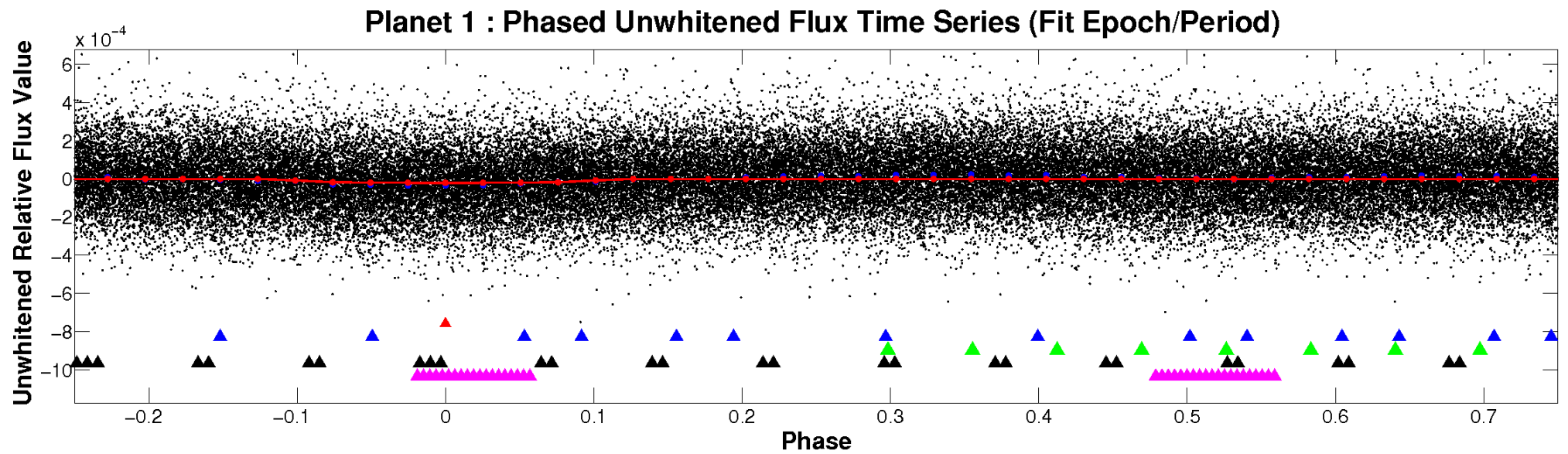


# ALT Odd/Even

TCE 005309078-01



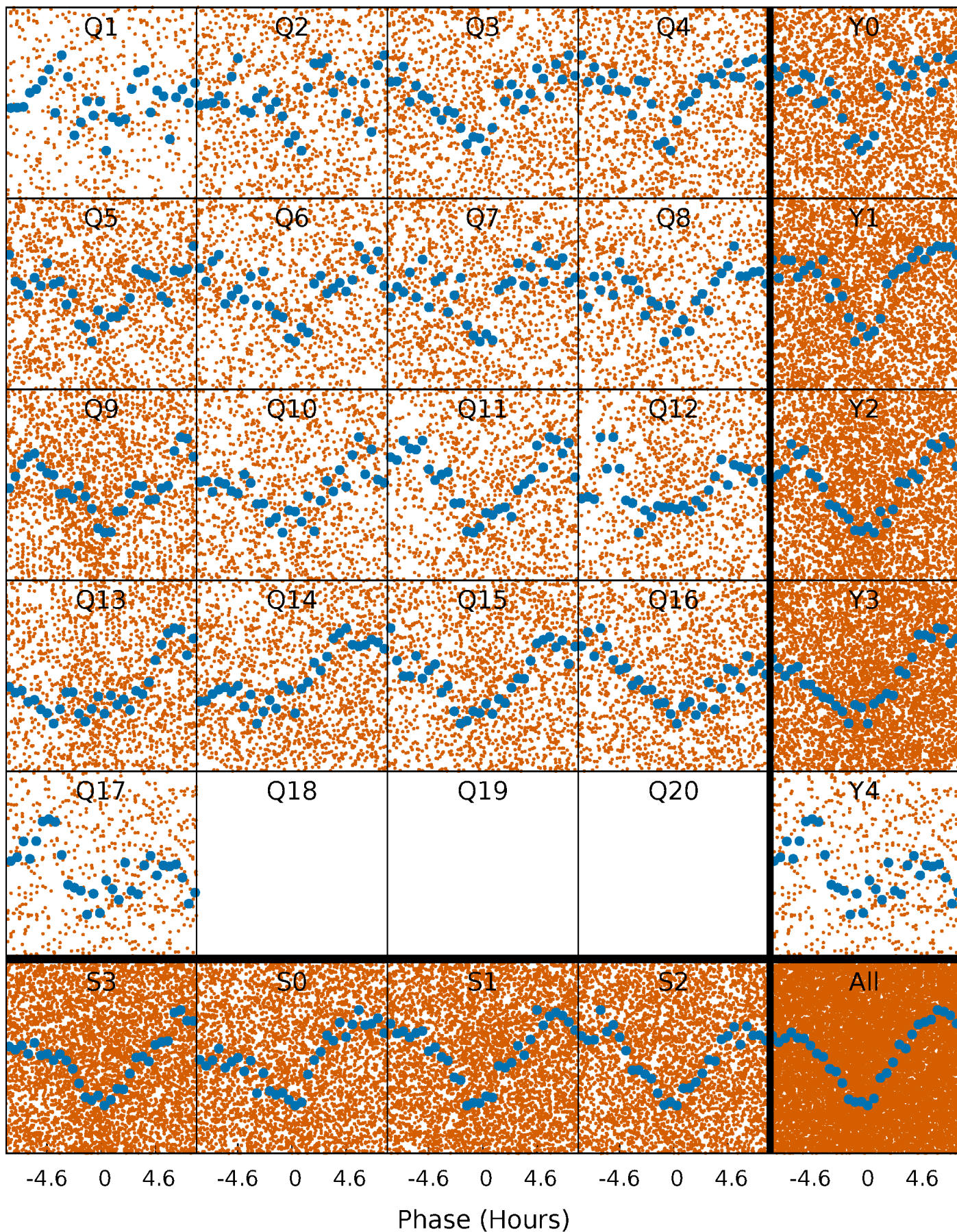
# Non-Whitened Vs. Whitened Light Curve





# PDC Quarter-Phased Transit Curves

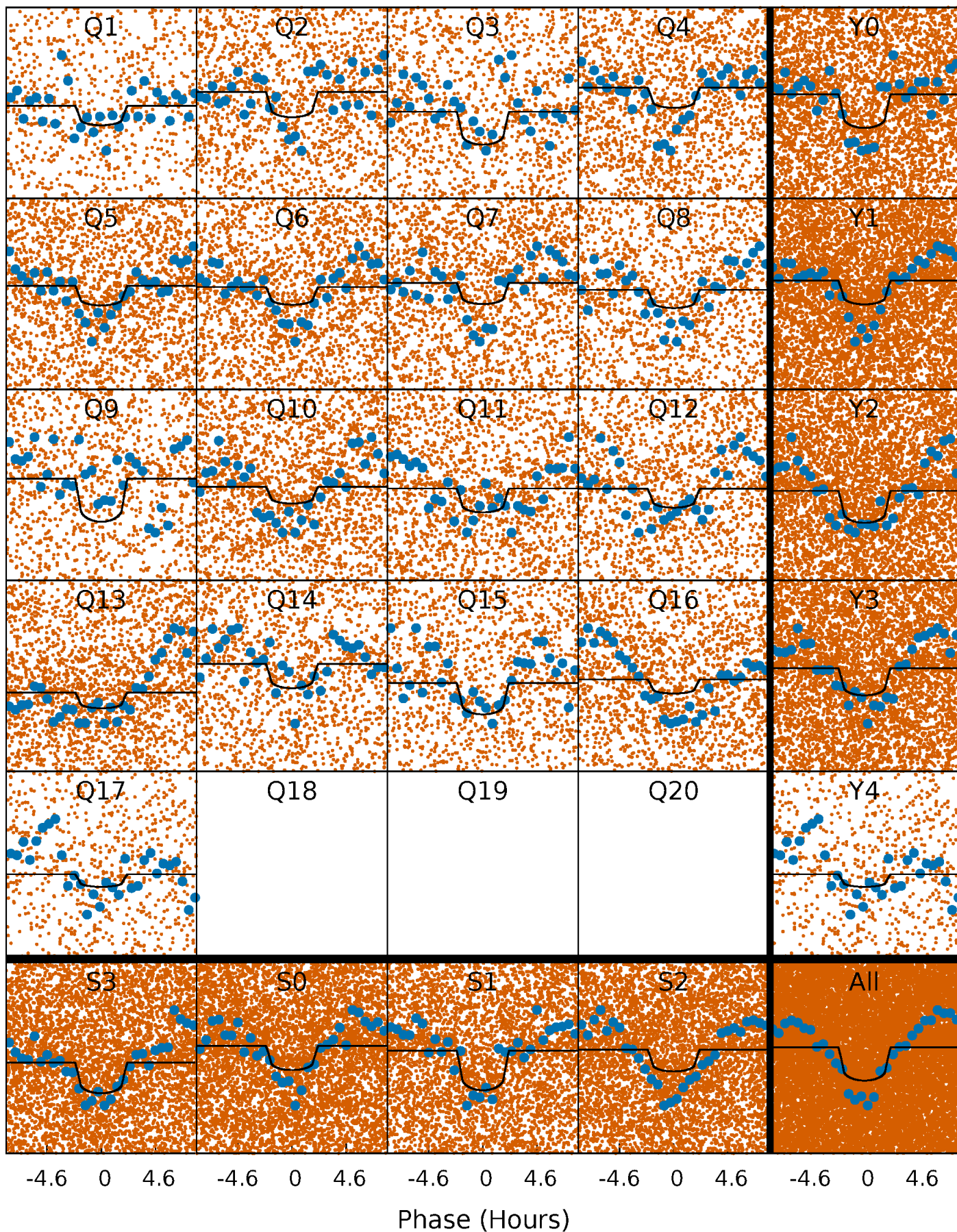
TCE 005309078-01 P= 0.807230 Days  $T_0=132.075081$  (BKJD)





# DV Quarter-Phased Transit Curves

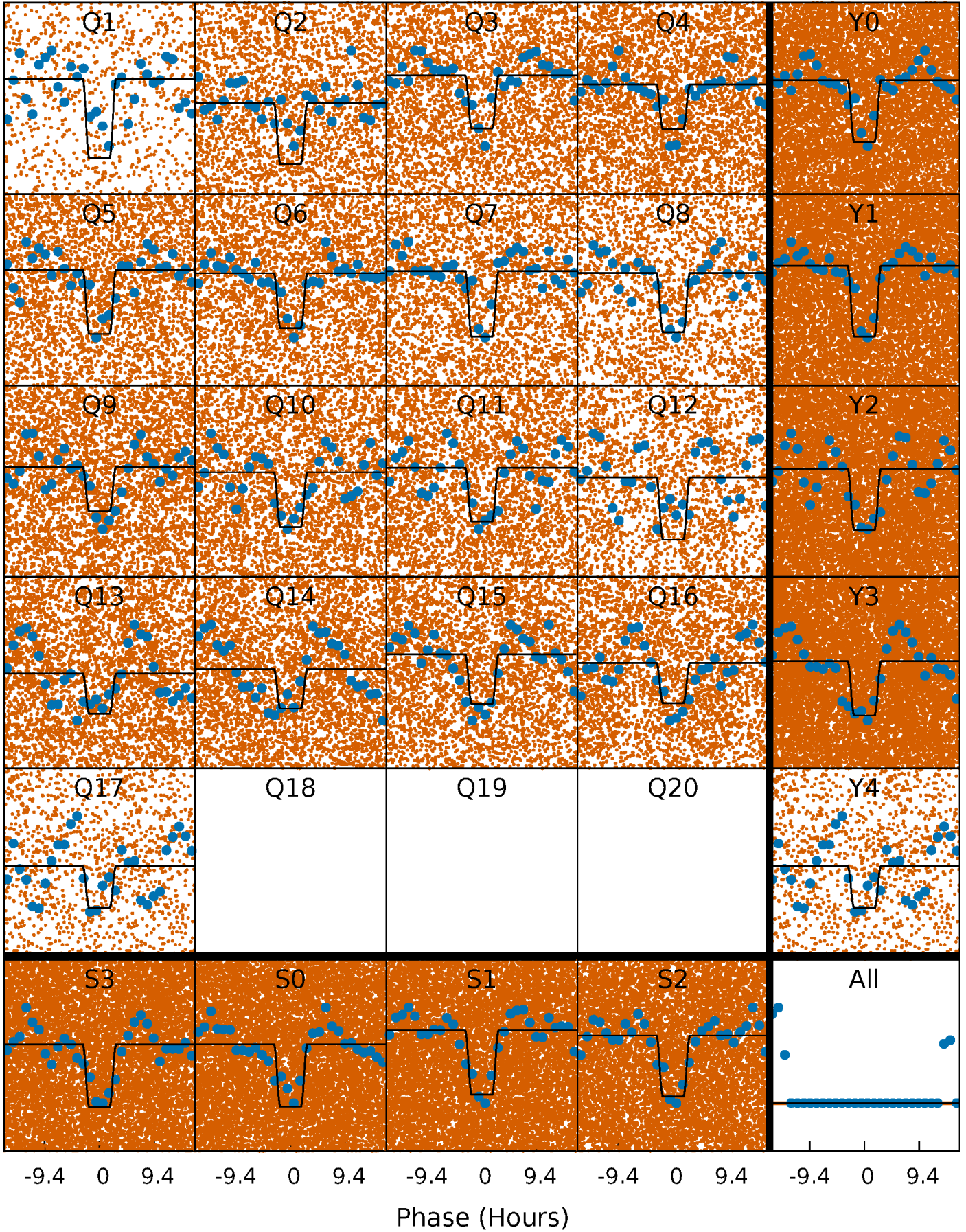
TCE 005309078-01 P= 0.807230 Days  $T_0=132.075081$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

TCE 005309078-01 P= 0.807253 Days  $T_0=132.039220$  (BKJD)

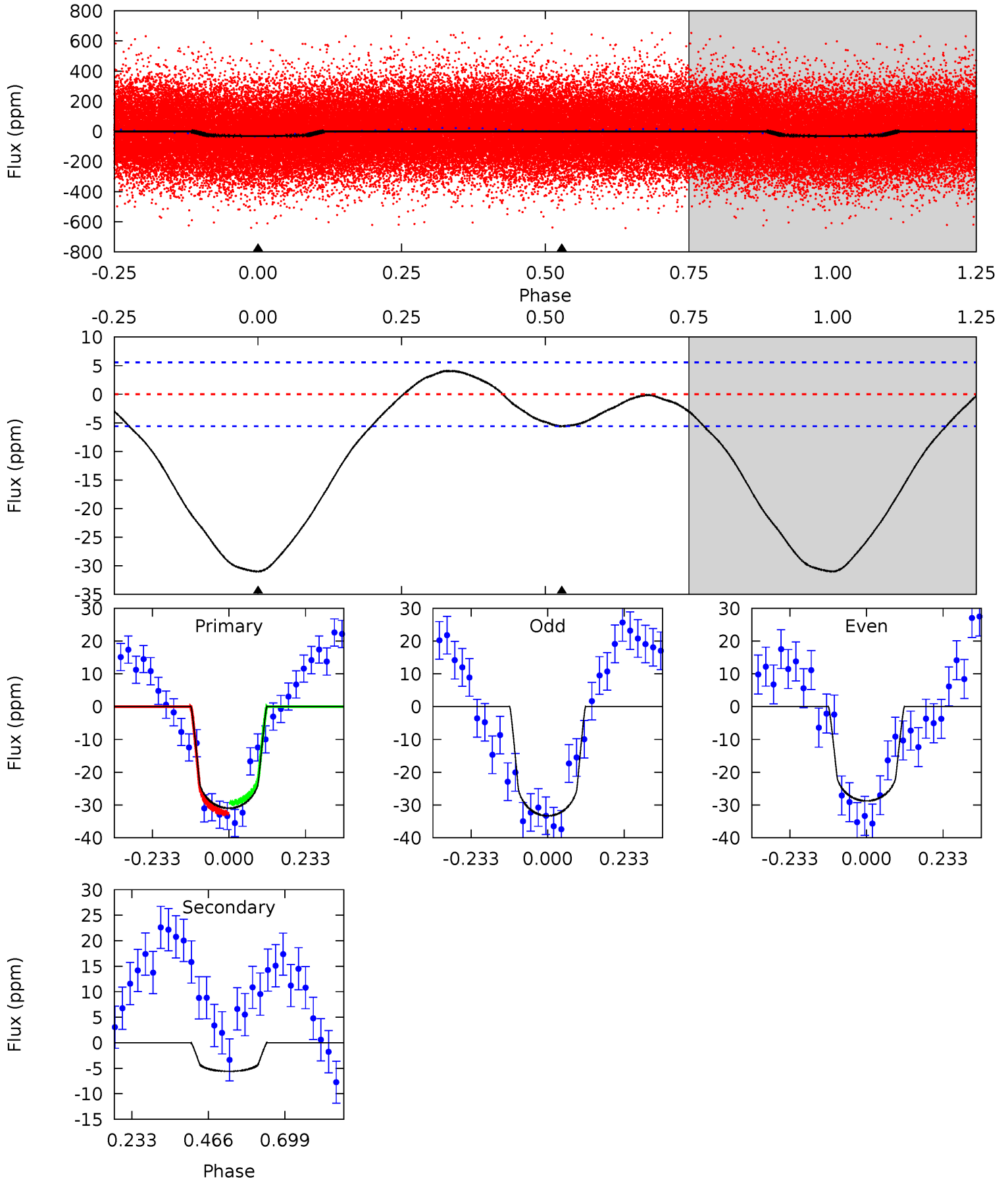




# DV Model-Shift Uniqueness Test

005309078-01, P = 0.807230 Days, E = 131.267851 Days

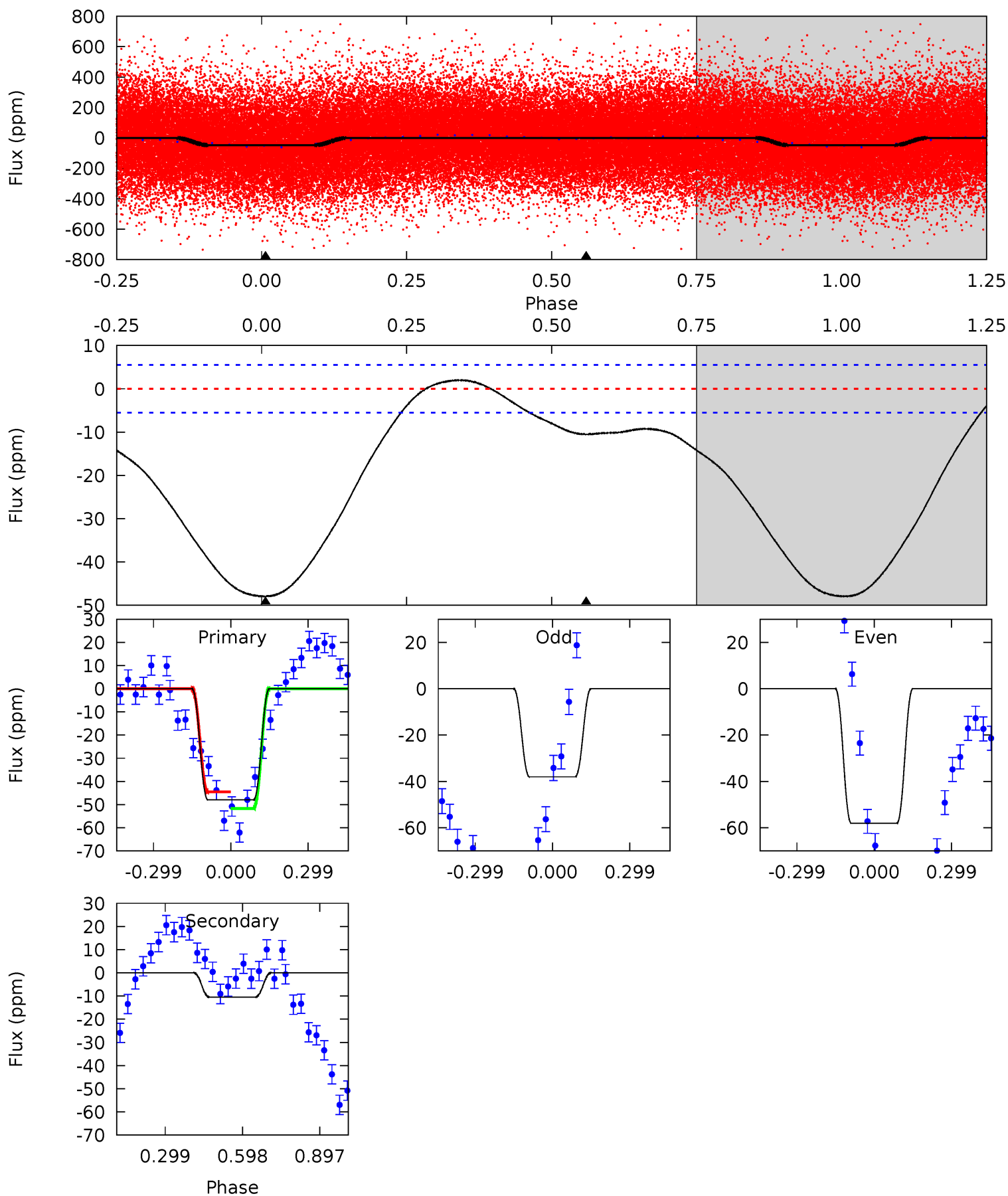
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
24.4	4.41	0	0	4.38	1.19	2.10	24.4	24.4	4.41	4.41	1.78	1.02	0.12	1.21



# Alt Model-Shift Uniqueness Test

005309078-01, P = 0.807253 Days, E = 131.231967 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
37.6	8.24	0	0	4.33	1.04	2.03	37.6	37.6	8.24	8.24	7.56	1.01	0.04	2.74



### Stellar Parameters For KIC 005309078

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6452^{+177}_{-177}$	$3.492^{+0.360}_{-0.090}$	$-0.140^{+0.350}_{-0.300}$	$3.947^{+0.518}_{-1.555}$	$1.764^{+0.175}_{-0.407}$	$0.040^{+0.122}_{-0.012}$
	+3%/-3%	+10%/-3%	+250%/-214%	+13%/-39%	+10%/-23%	+302%/-30%
Source	PHO1	FLK73	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 005309078-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-6\pm 1$	$1.90^{+0.93}_{-0.88}$	$5409^{+299}_{-493}$	$3328^{+2219}_{-7363}$	$0.352^{+0.815}_{-0.195}$
Alt.	$-10\pm 1$	$2.94^{+1.10}_{-0.97}$	$5432^{+326}_{-512}$	$-3051^{+7448}_{-1083}$	$0.273^{+0.355}_{-0.127}$

$T_{max}$  = 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

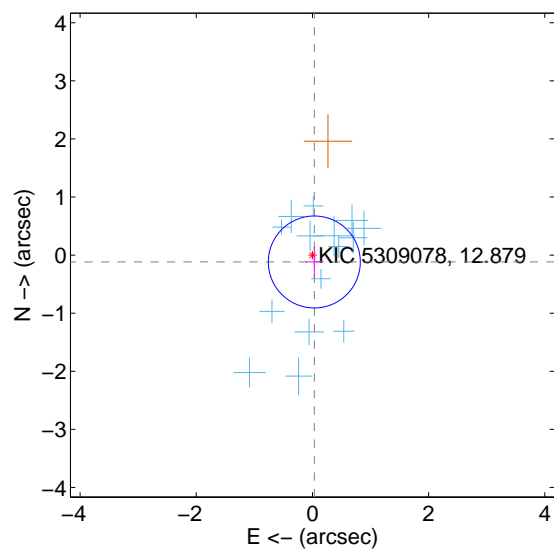
Supplemental centroid analysis for 005309078-01. Kepler magnitude: 12.88. Transit SNR 10.53

There are 15 quarters with good PRF difference image offsets

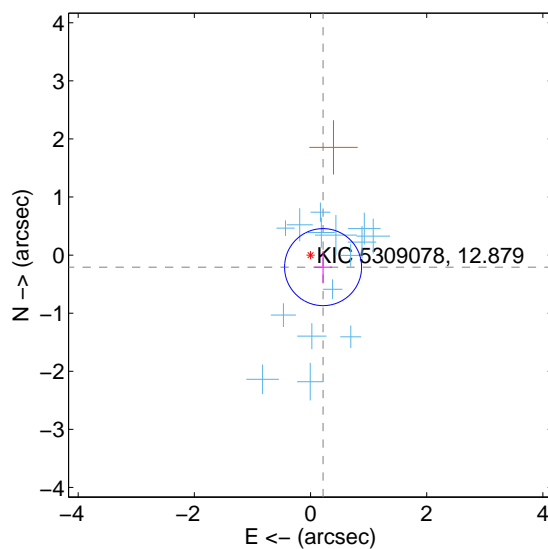
The direct PRF centroid is offset from the target star catalog position by about 0.17 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.123 \pm 0.264$	0.46	$-0.032 \pm 0.152$	$-0.118 \pm 0.270$
PRF-fit source offset from KIC position	$0.299 \pm 0.221$	1.35	$-0.216 \pm 0.153$	$-0.207 \pm 0.277$
photometric centroid source offset	$1.11 \pm 0.79$	1.42	$0.70 \pm 0.89$	$-0.87 \pm 0.71$

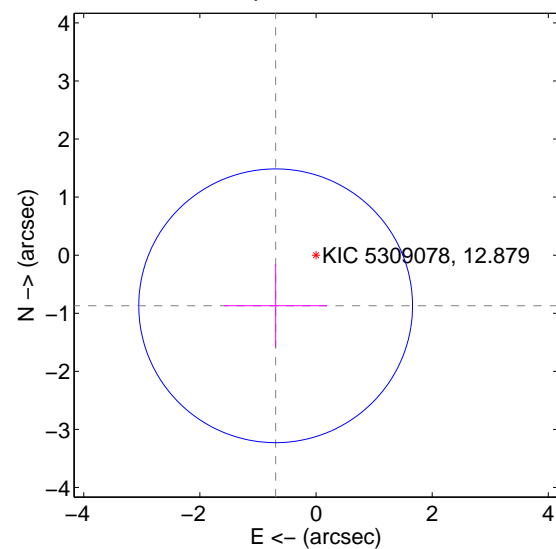
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

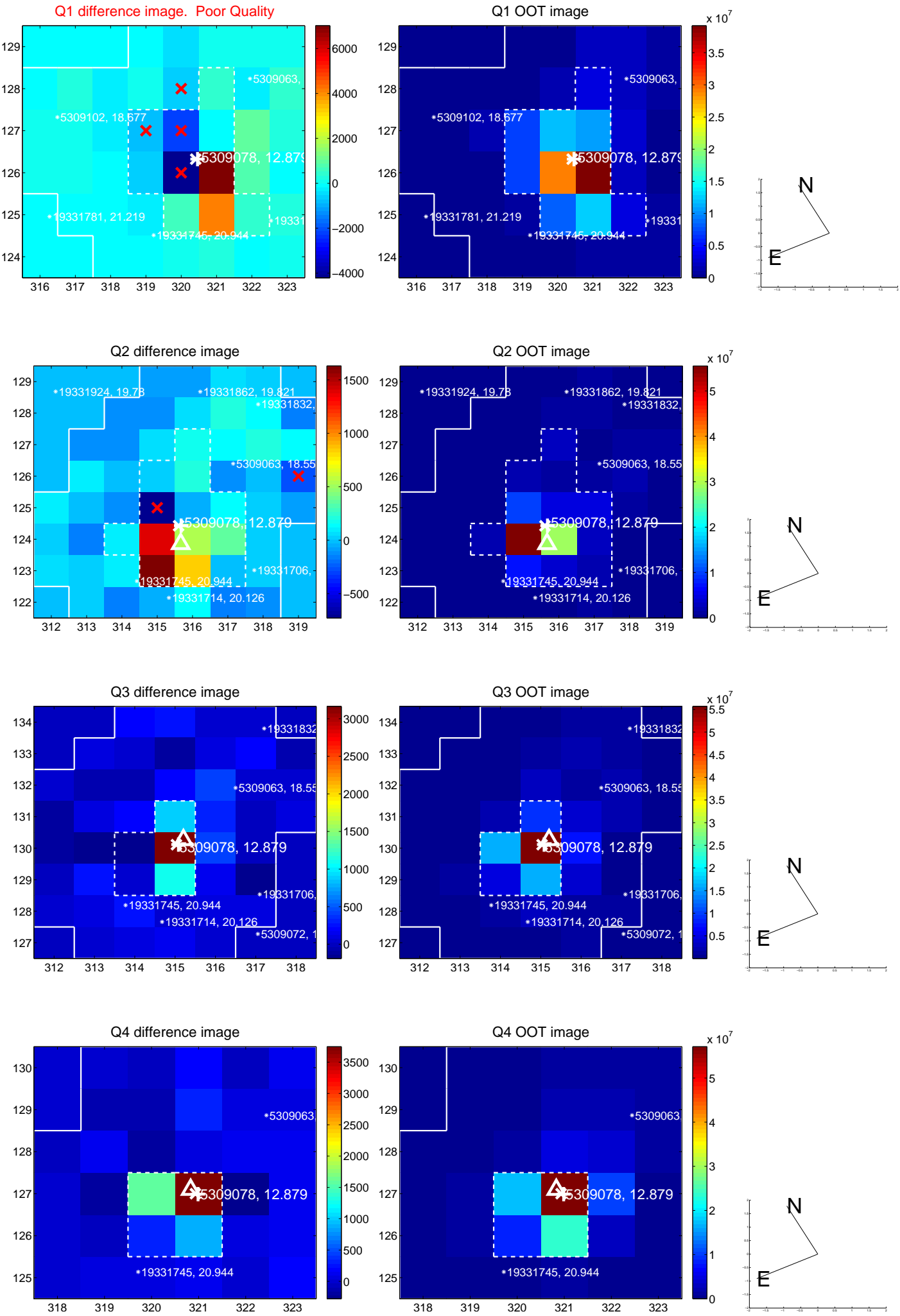


offset from photometric centroids

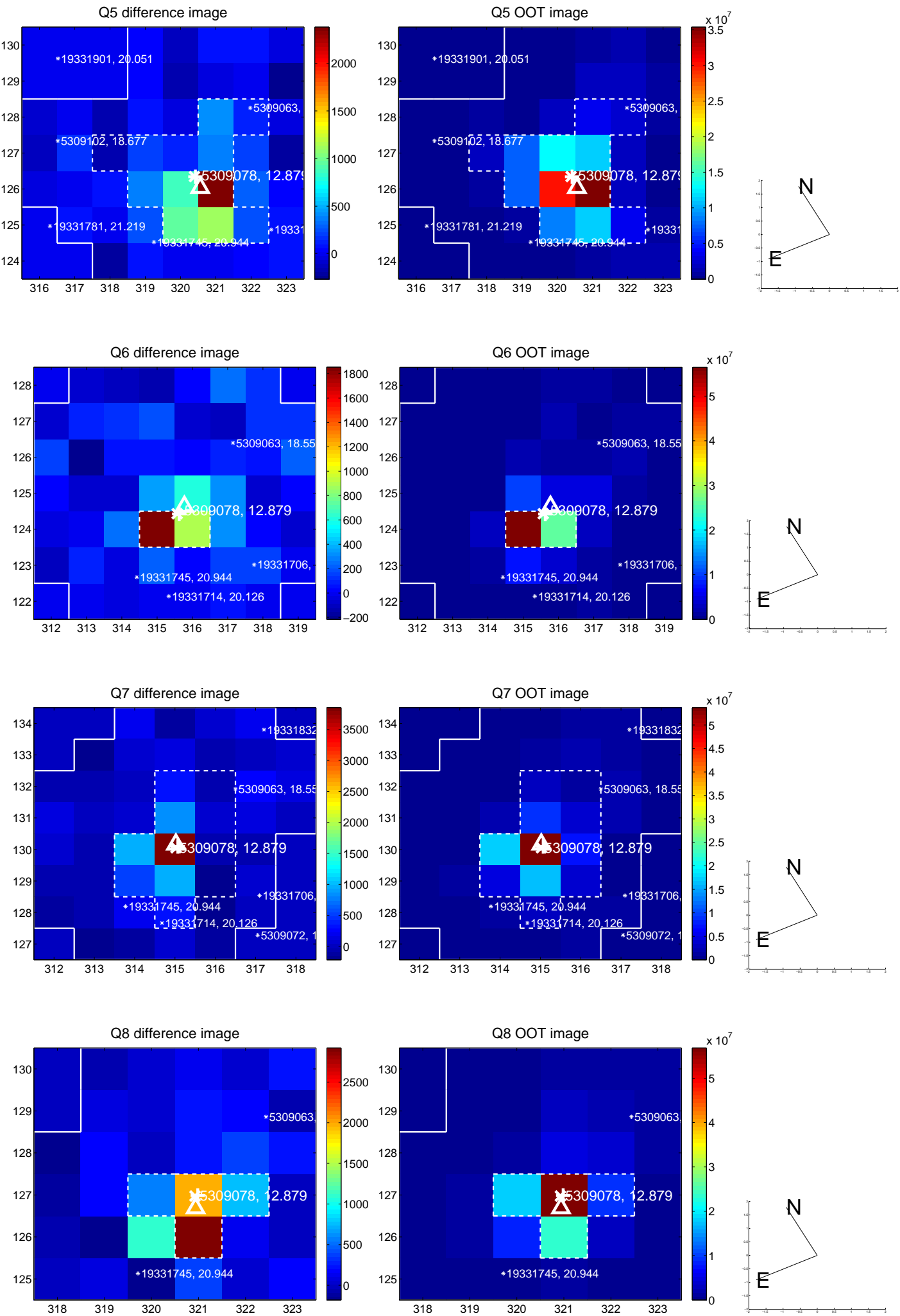


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

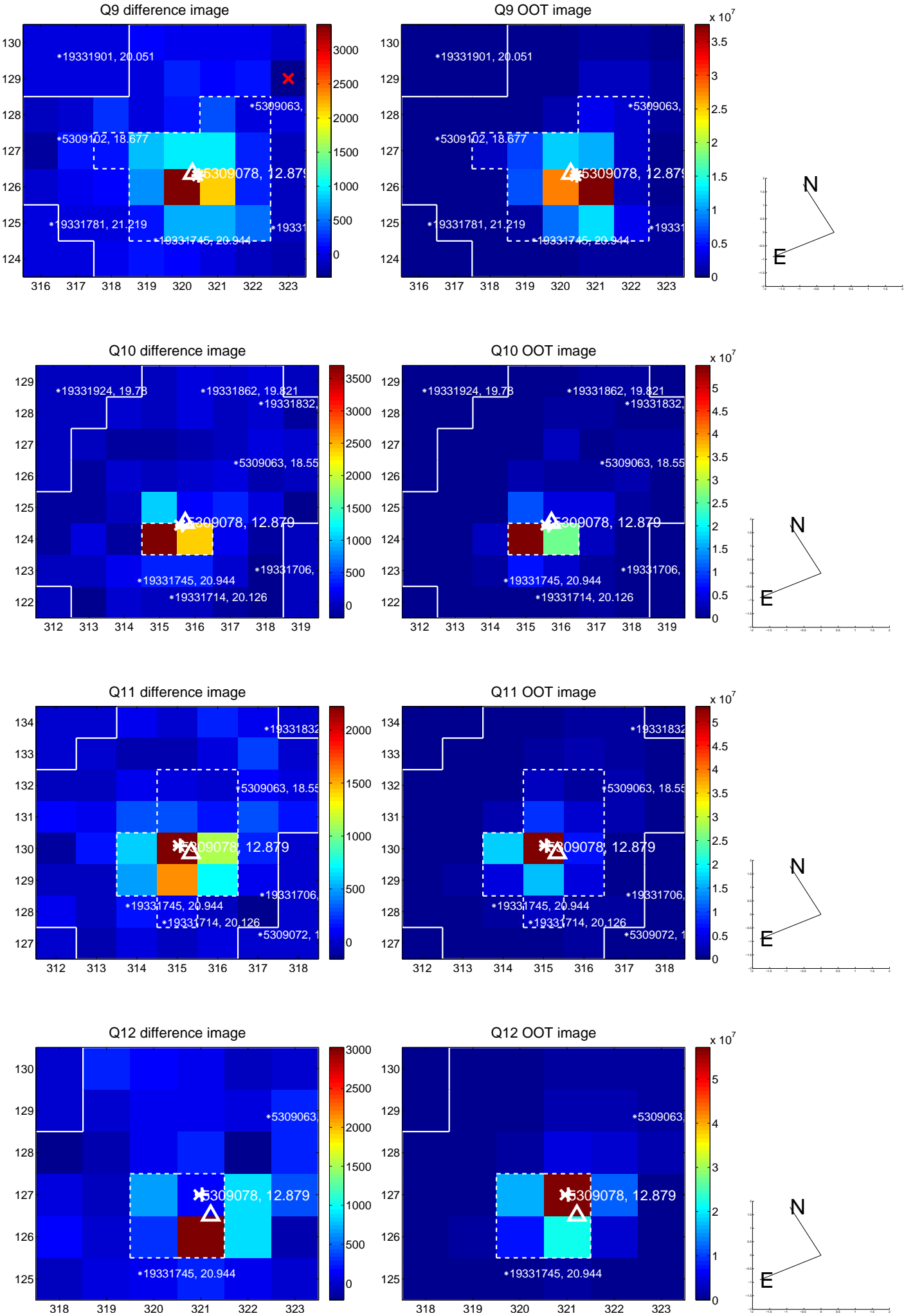


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

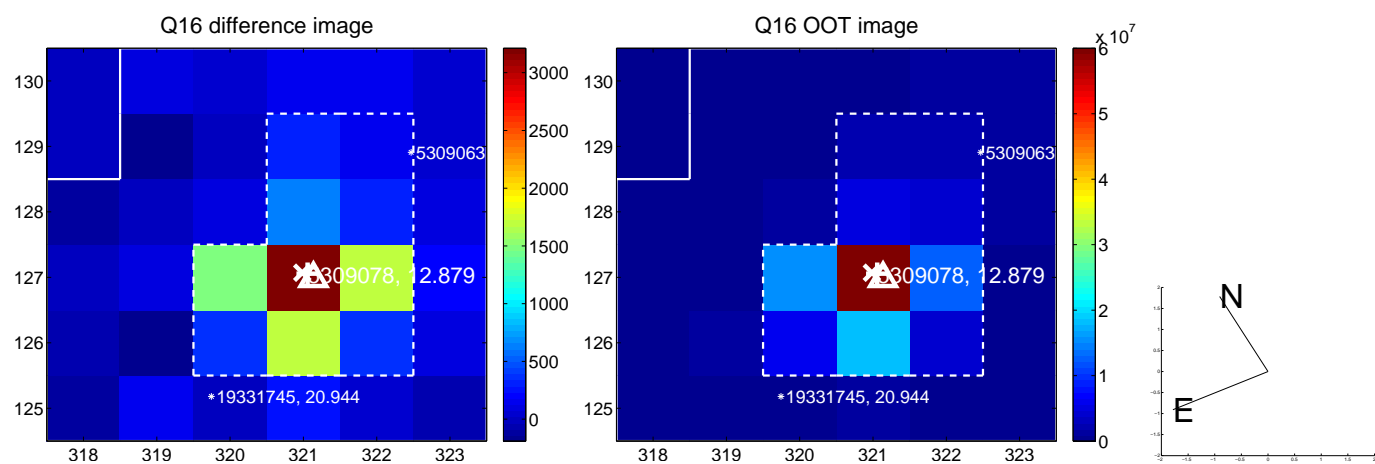
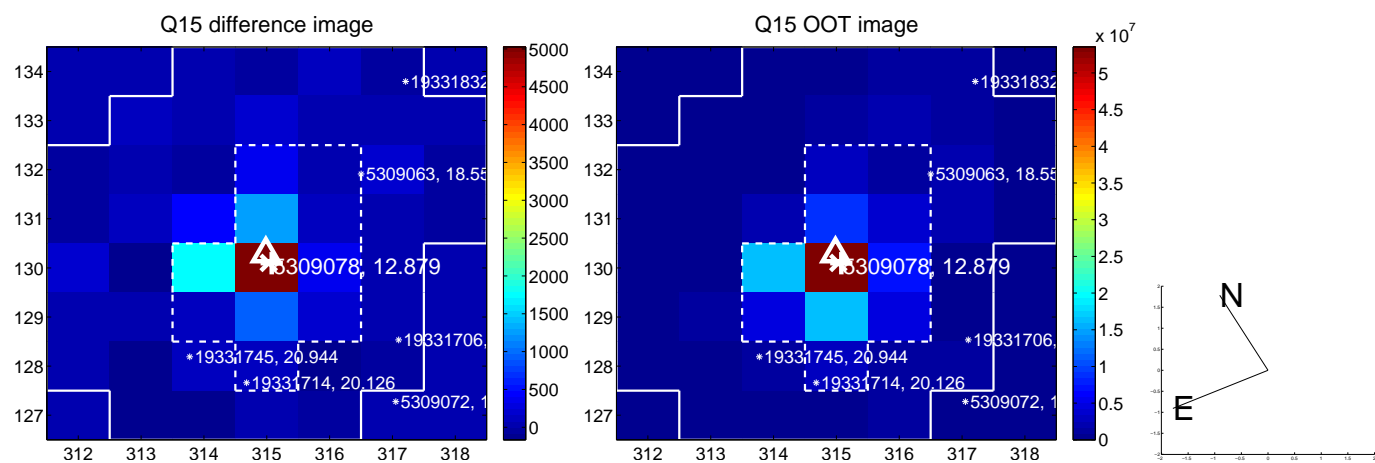
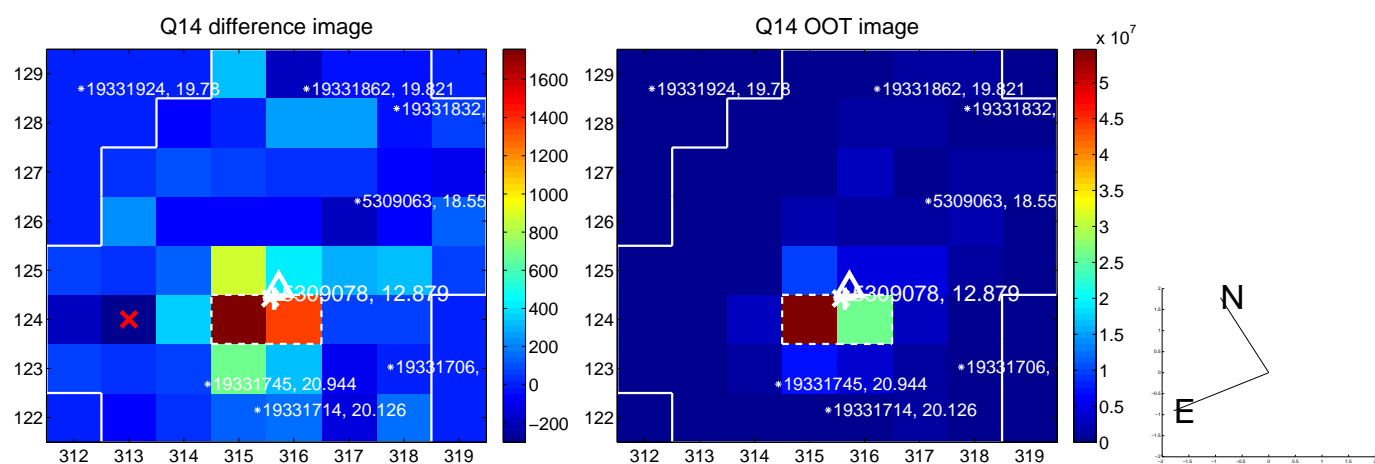
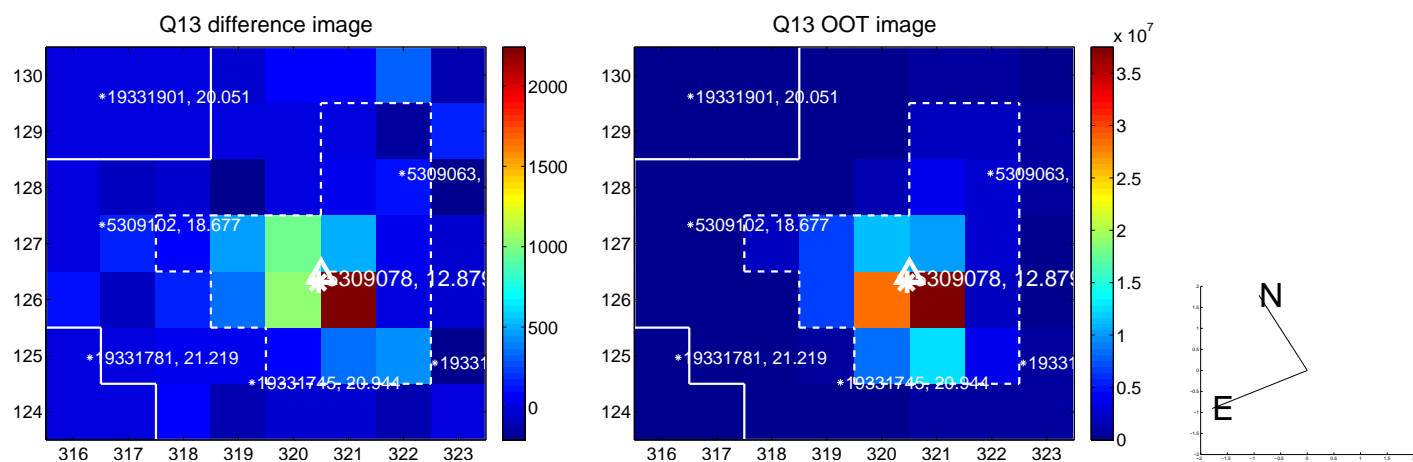




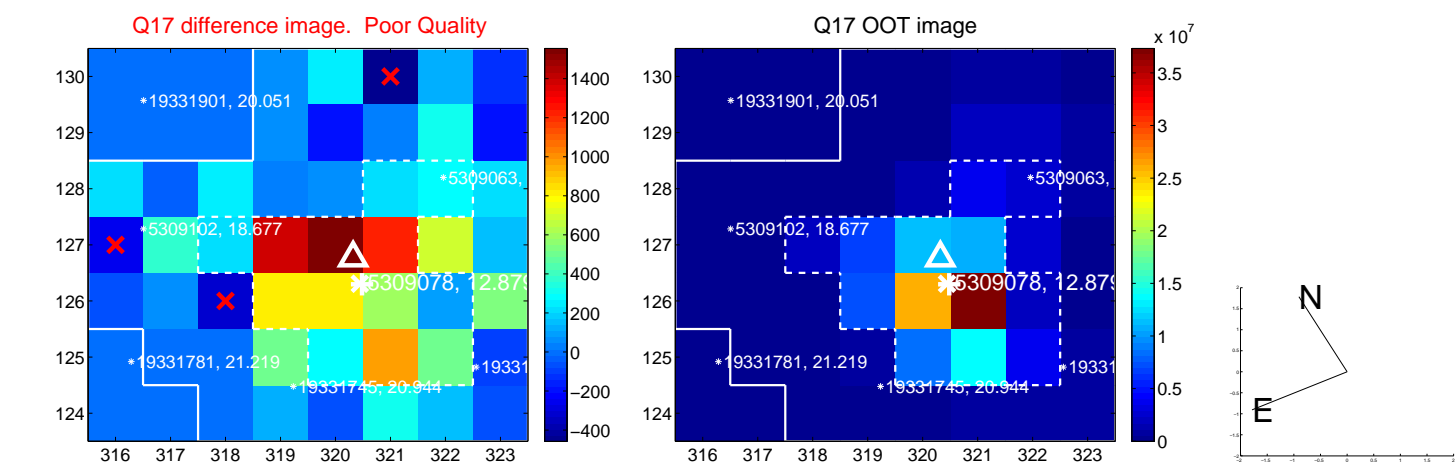
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



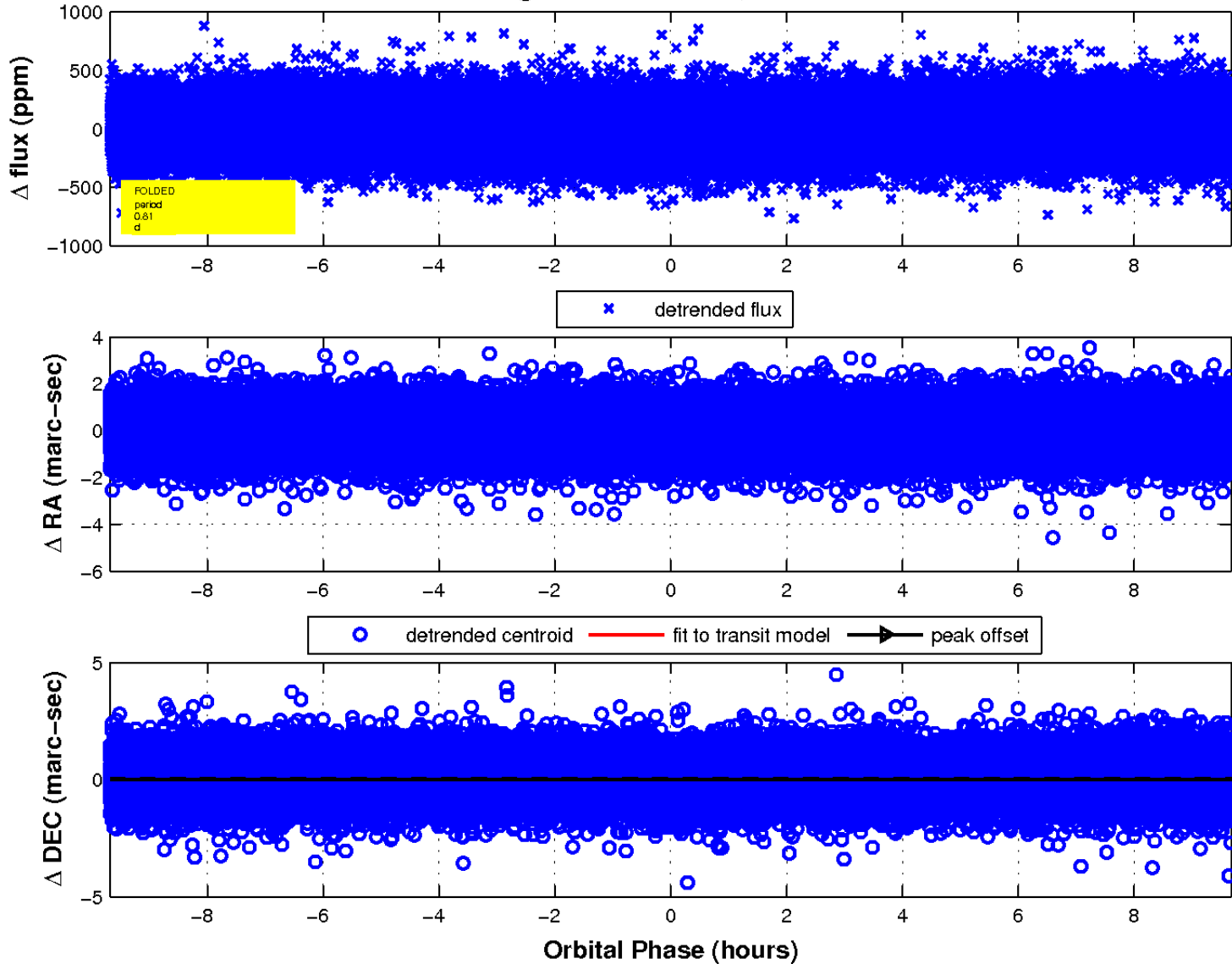
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

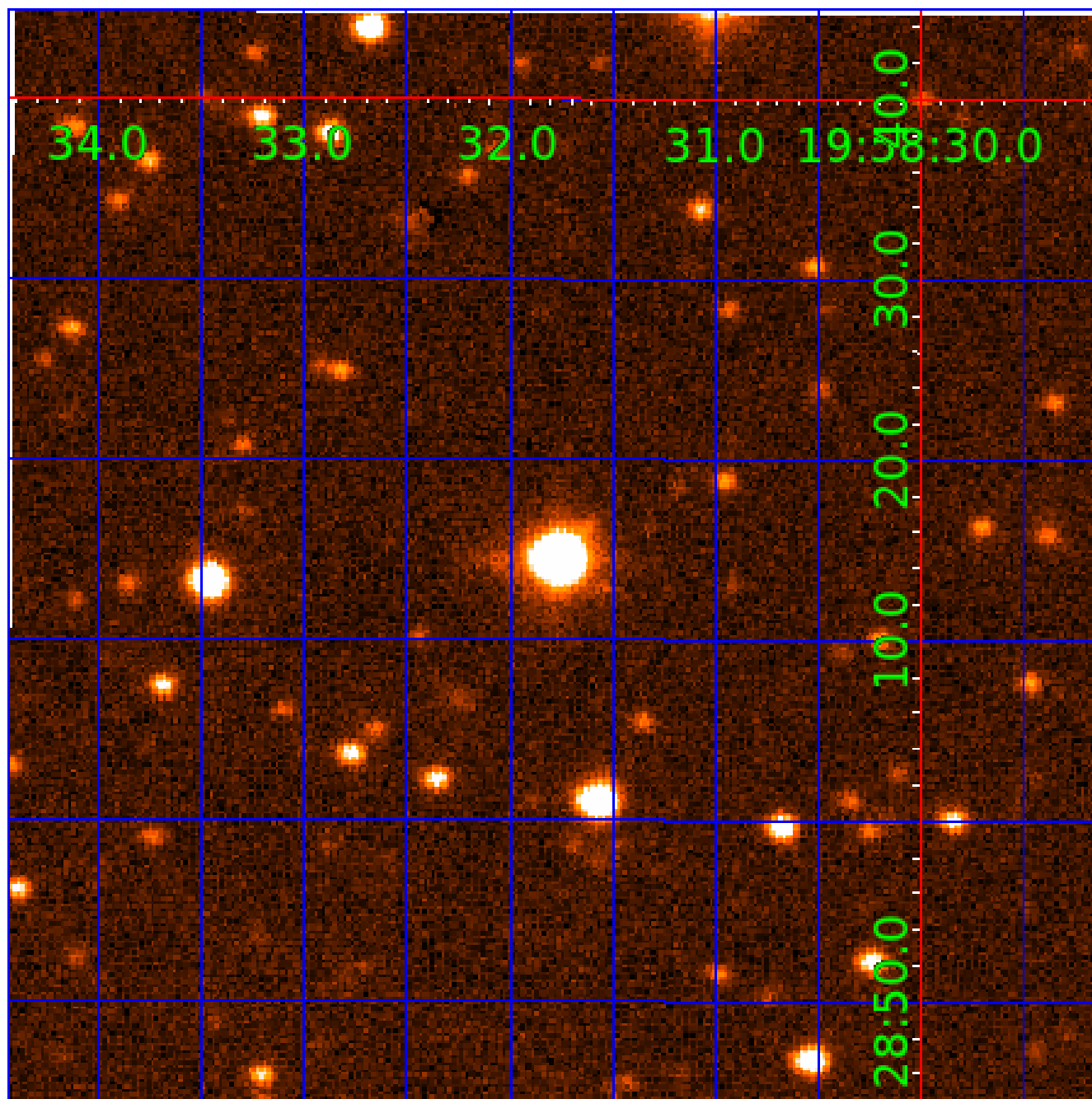


fluxWeightedCentroids, Planet 1 of 5



UKIRT Image

Declination



# KIC 005309078

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005309078-01	OBS	No	0.807230	132.075081	20.7	4.045	11.8	10.5	3.95	6452	2.06	57524.61
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005309078-04	OBS	No	51.849424	163.356385	192.4	2.065	7.2	6.9	3.95	6452	6.26	223.63
005309078-05	OBS	No	37.534480	138.176930	151.1	1.822	7.3	7.9	3.95	6452	5.68	344.04

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005309078-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV
005309078-02	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_UNCERTAIN
005309078-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
005309078-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
005309078-05	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

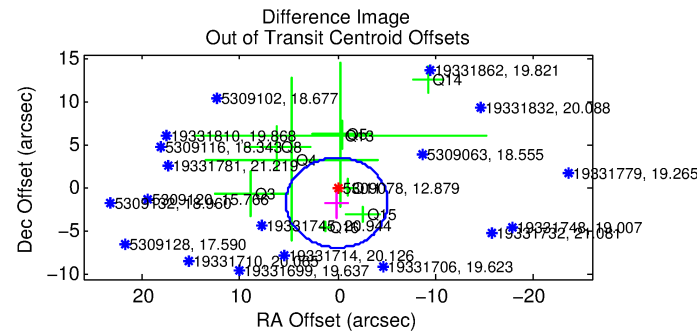
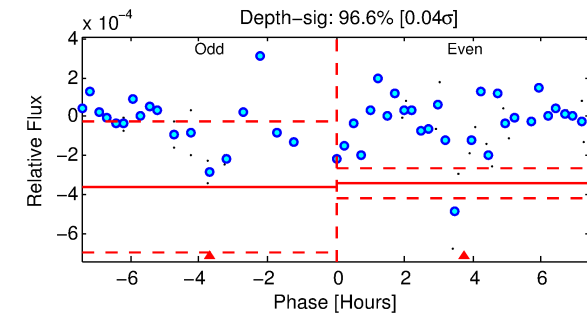
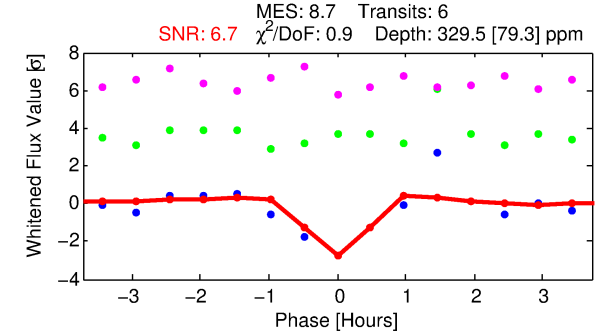
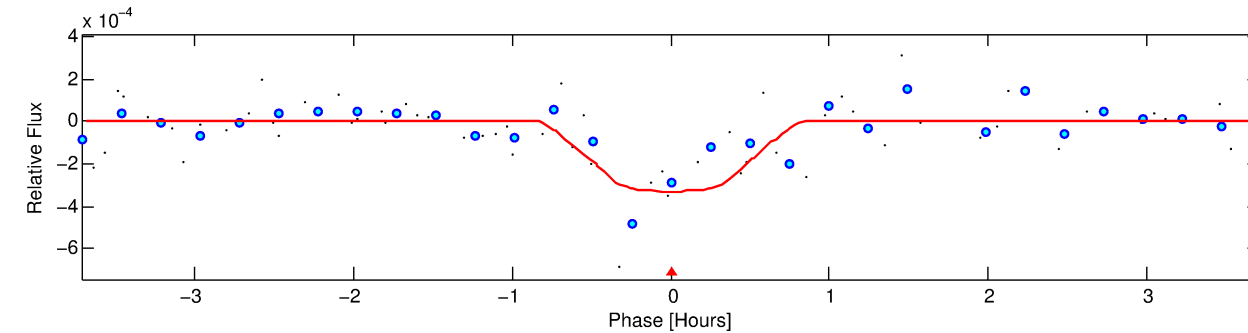
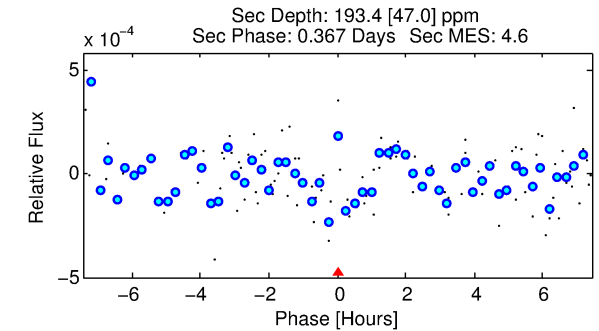
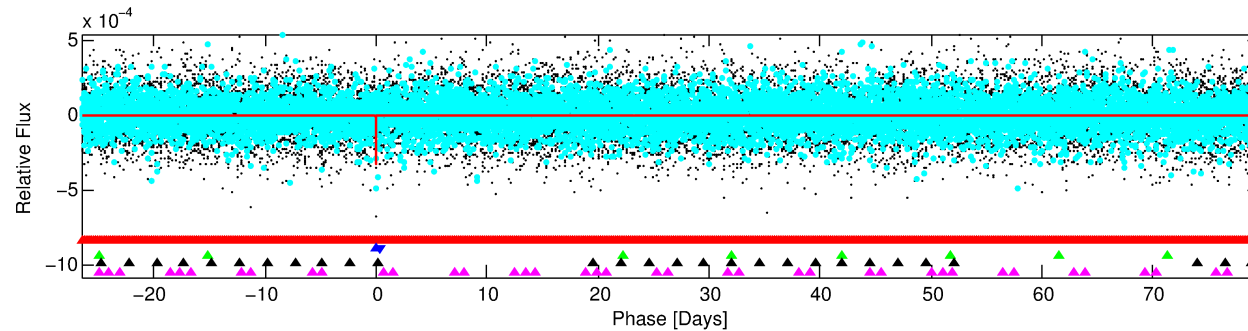
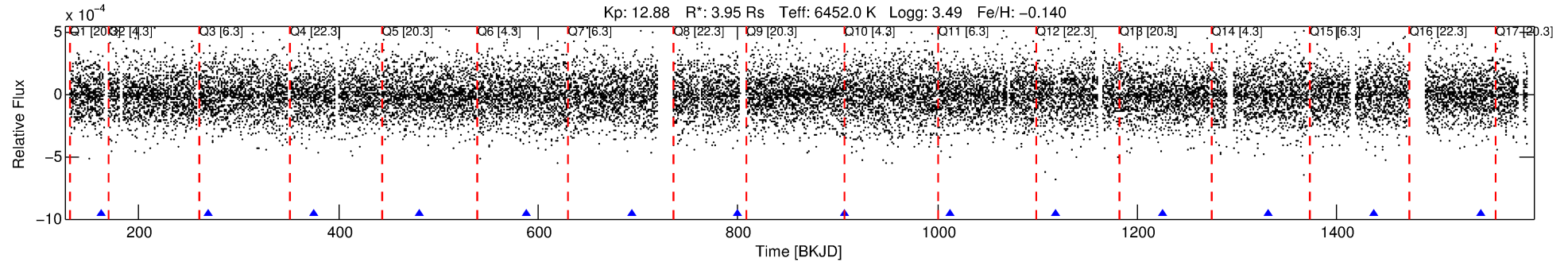
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 005309078-02

No Significant Match Found

# DV One-Page Summary

KIC: 5309078 Candidate: 2 of 5 Period: 106.192 d



## DV Fit Results:

Period = 106.19210 [0.00065] d  
Epoch = 163.1861 [0.0048] BKJD  
Rp/R\* = 0.0192 [0.0261]  
a/R\* = 340.29 [2554.13]  
b = 0.88 [2.01]  
Seff = 85.98 [53.45]  
Teq = 776 [121] K  
Rp = 8.28 [11.72] Re  
a = 0.5304 [0.2022] AU  
Ag = 436.90 [1222.25] [0.36σ]  
Teffp = 5489 [3749] K [1.26σ]

## DV Diagnostic Results:

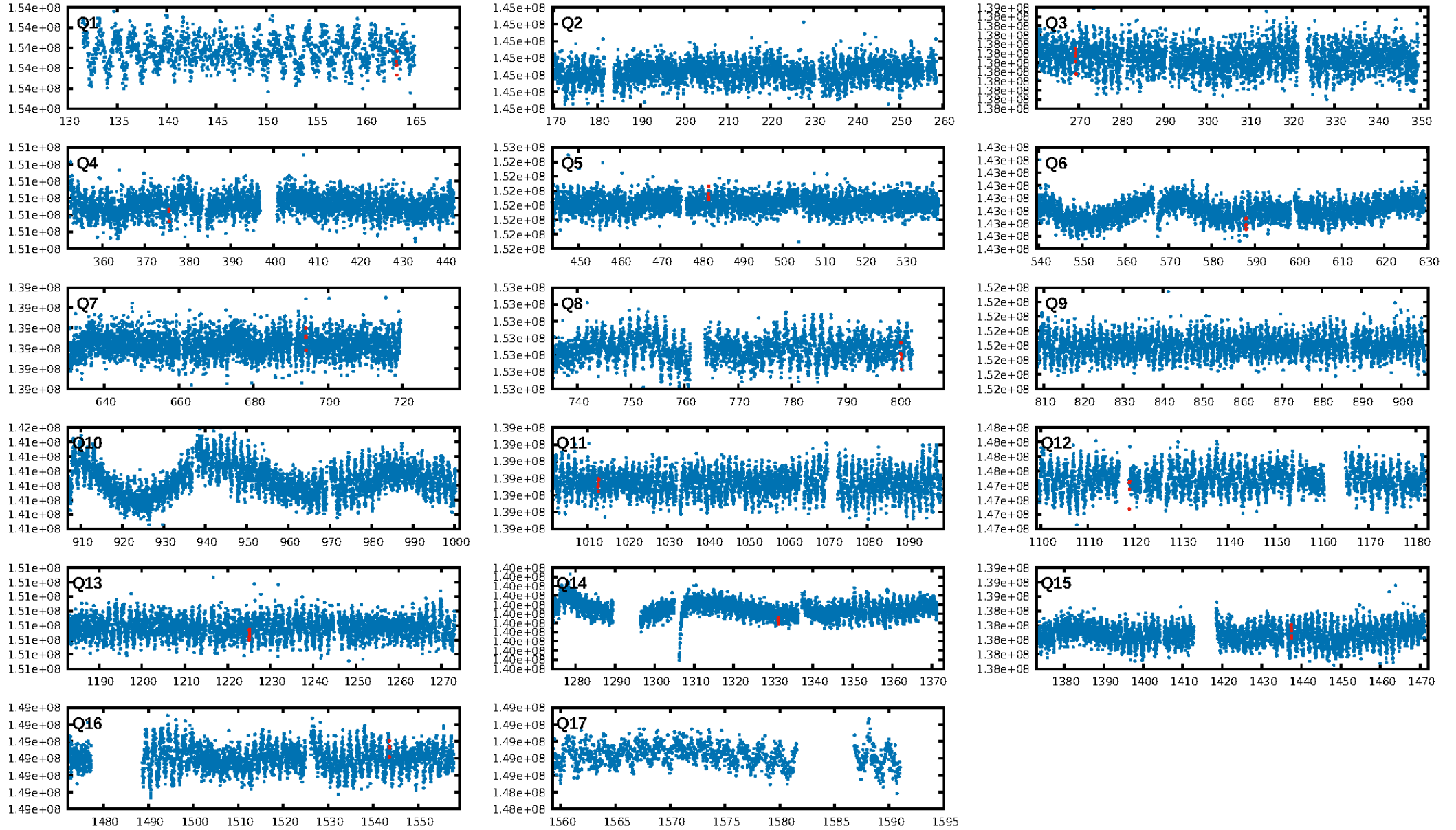
ShortPeriod-sig: 100.0% [541.90σ]  
LongPeriod-sig: 100.0% [328.28σ]  
ModelChiSquare2-sig: 36.4%  
ModelChiSquareGof-sig: 99.0%  
**Bootstrap-pfa: 1.46e-12**  
RollingBand-fgt: 1.00 [5/5]  
**GhostDiagnostic-chr: 0.5489**  
Centroid-sig: N/A  
Centroid-so: 1.513 arcsec [1.40σ]  
OotOffset-rm: 1.669 arcsec [0.96σ]  
KicOffset-rm: 1.716 arcsec [0.97σ]  
OotOffset-st: 1/3/3/2 [9]  
KicOffset-st: 1/3/3/2 [9]  
DiffImageQuality-fgm: 0.11 [1/9]  
DiffImageOverlap-fno: 0.08 [1/12]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 00:20:31 Z

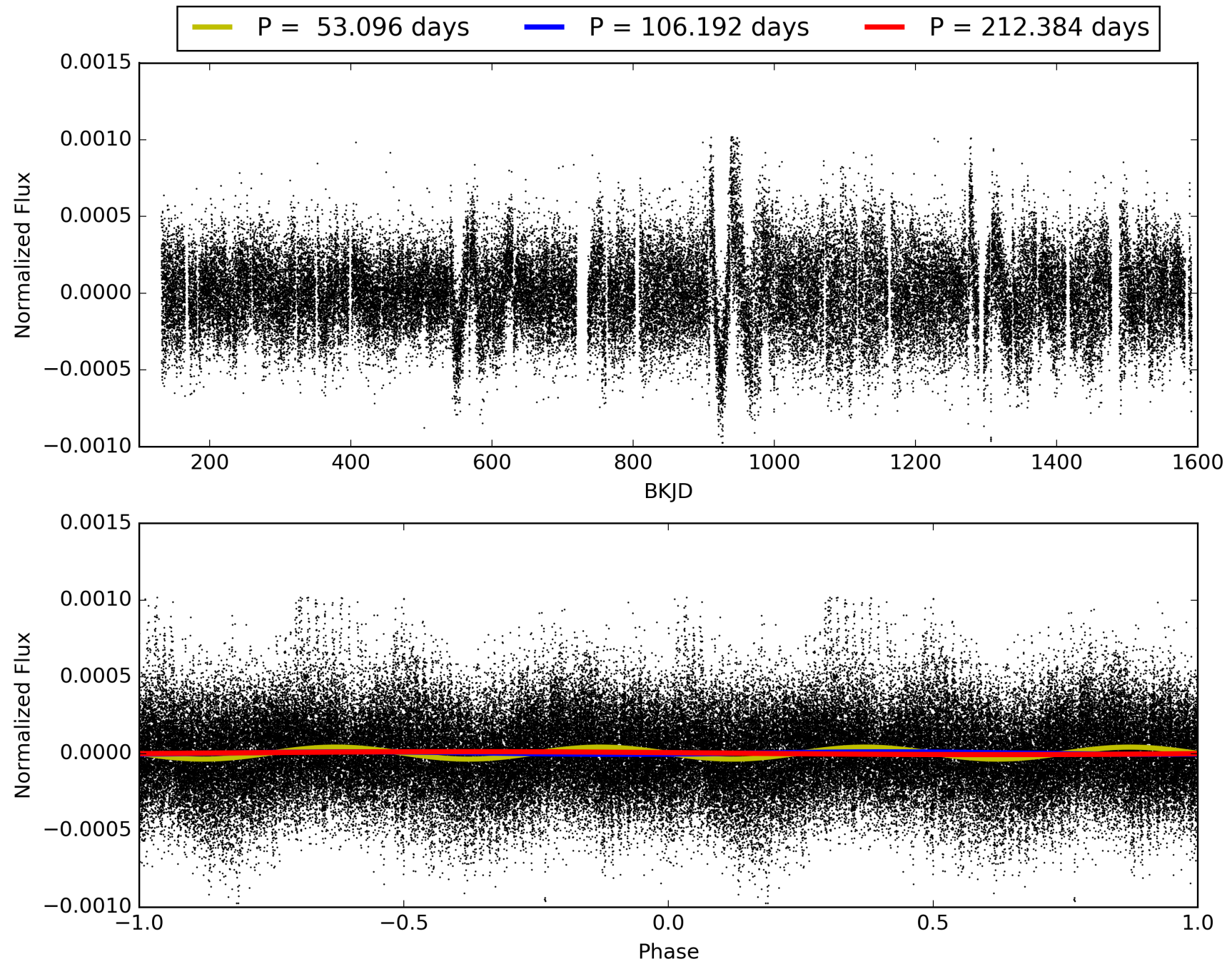
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 005309078-02, PDC Light Curves

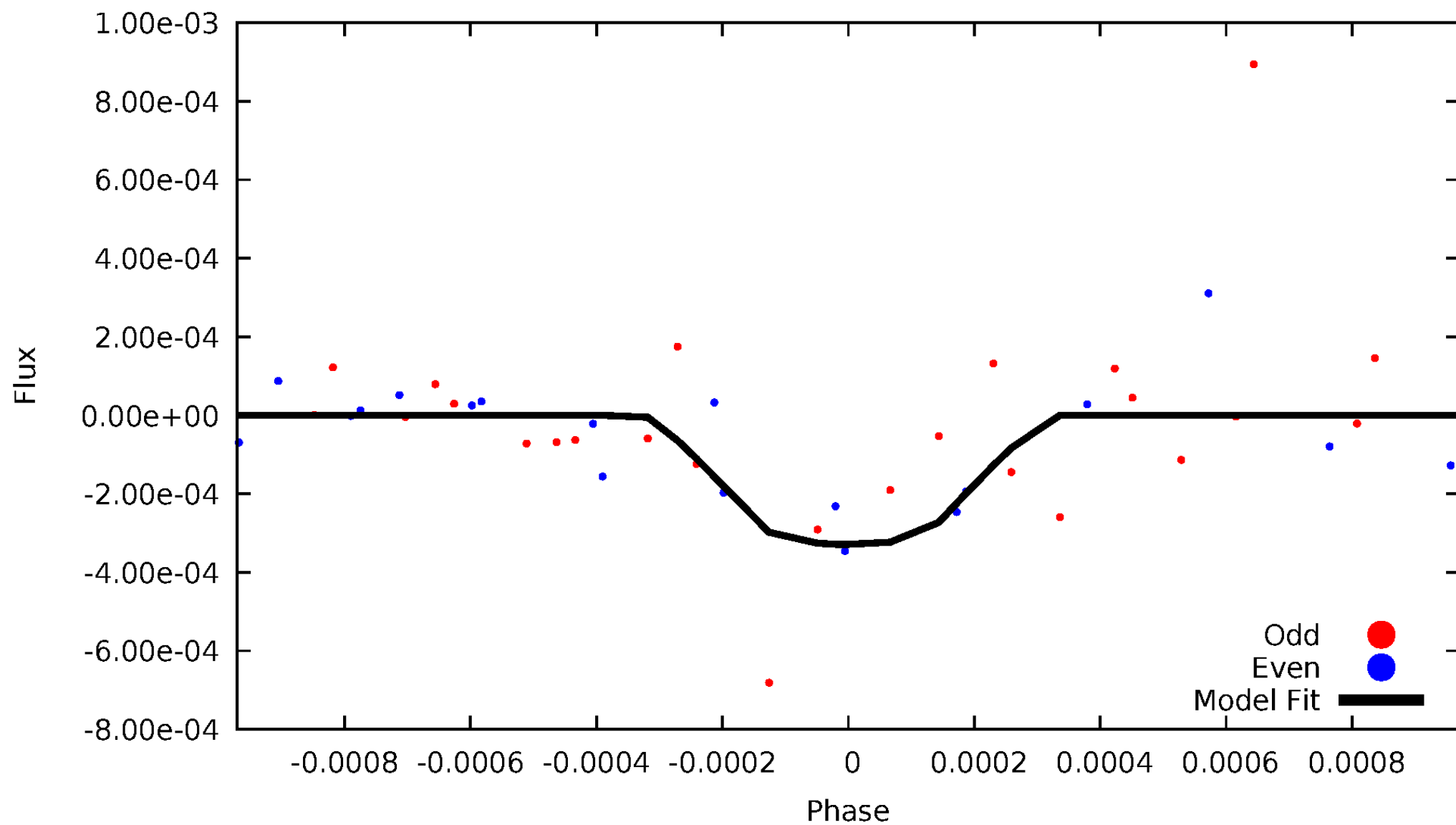


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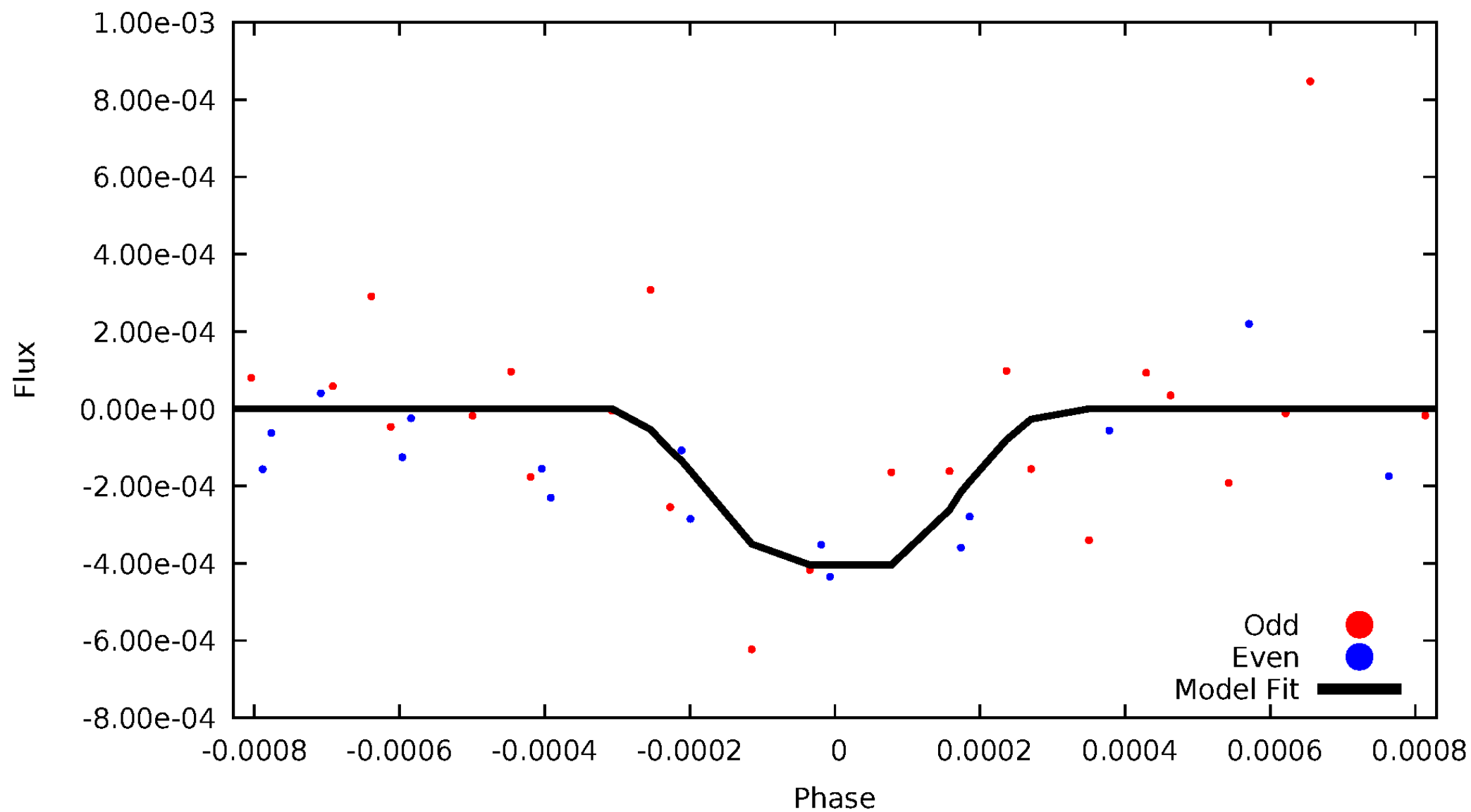
# DV Odd/Even

TCE 005309078-02



# ALT Odd/Even

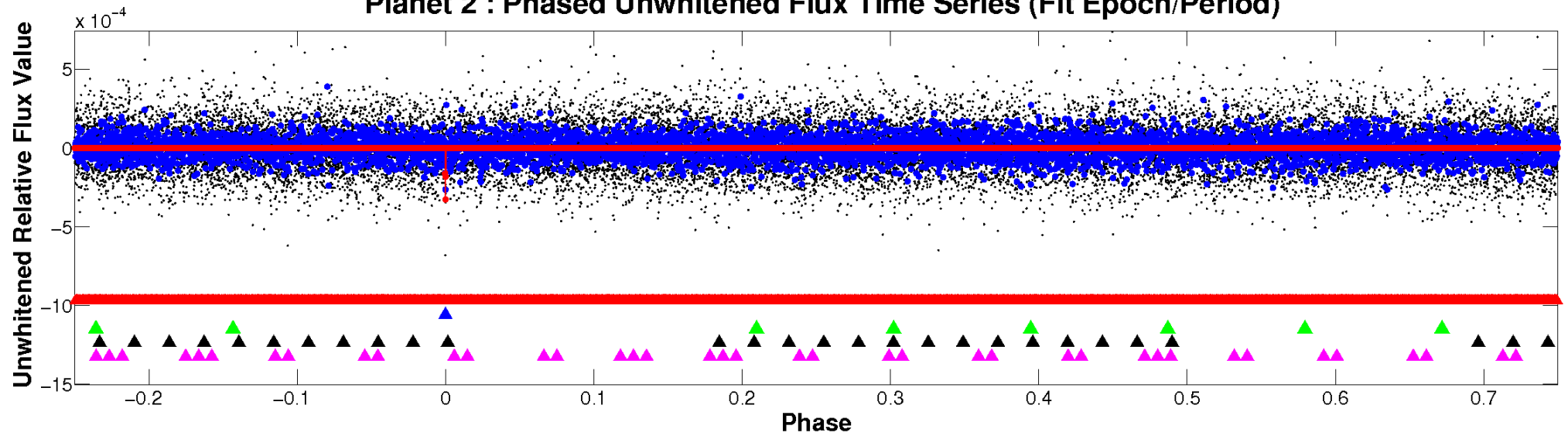
TCE 005309078-02



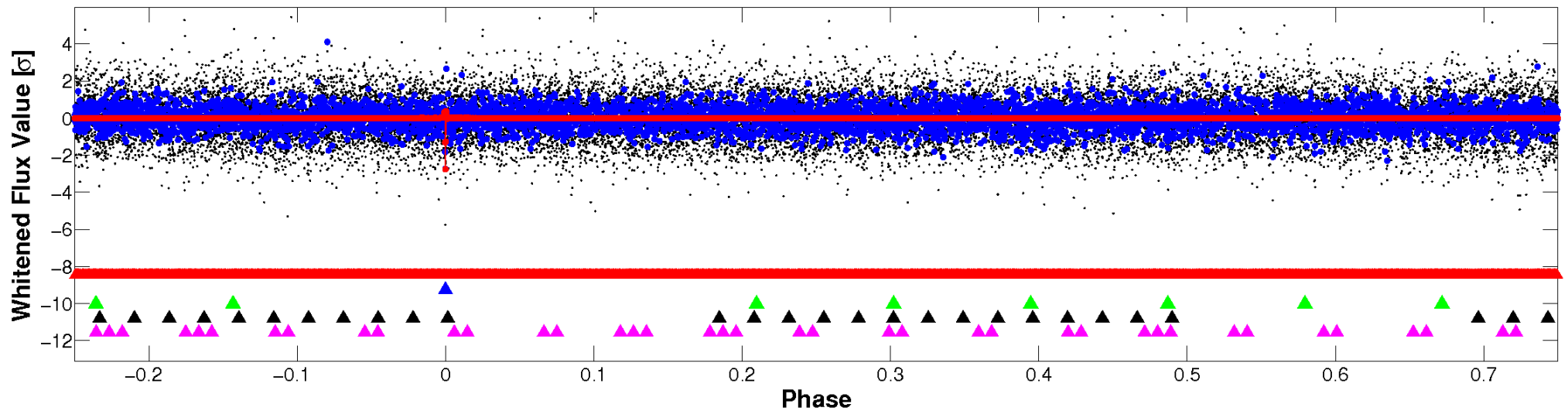


# Non-Whitened Vs. Whitened Light Curve

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

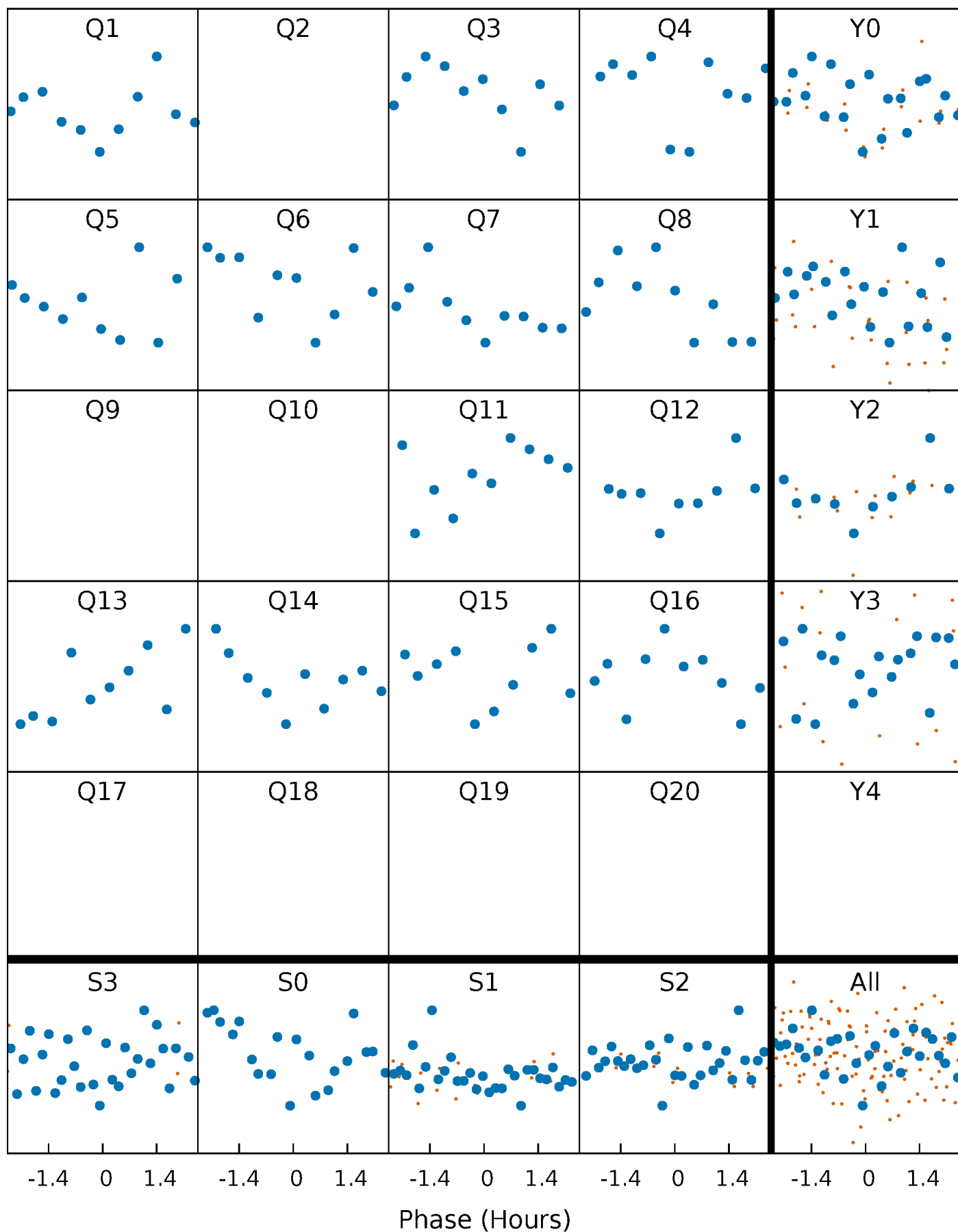


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



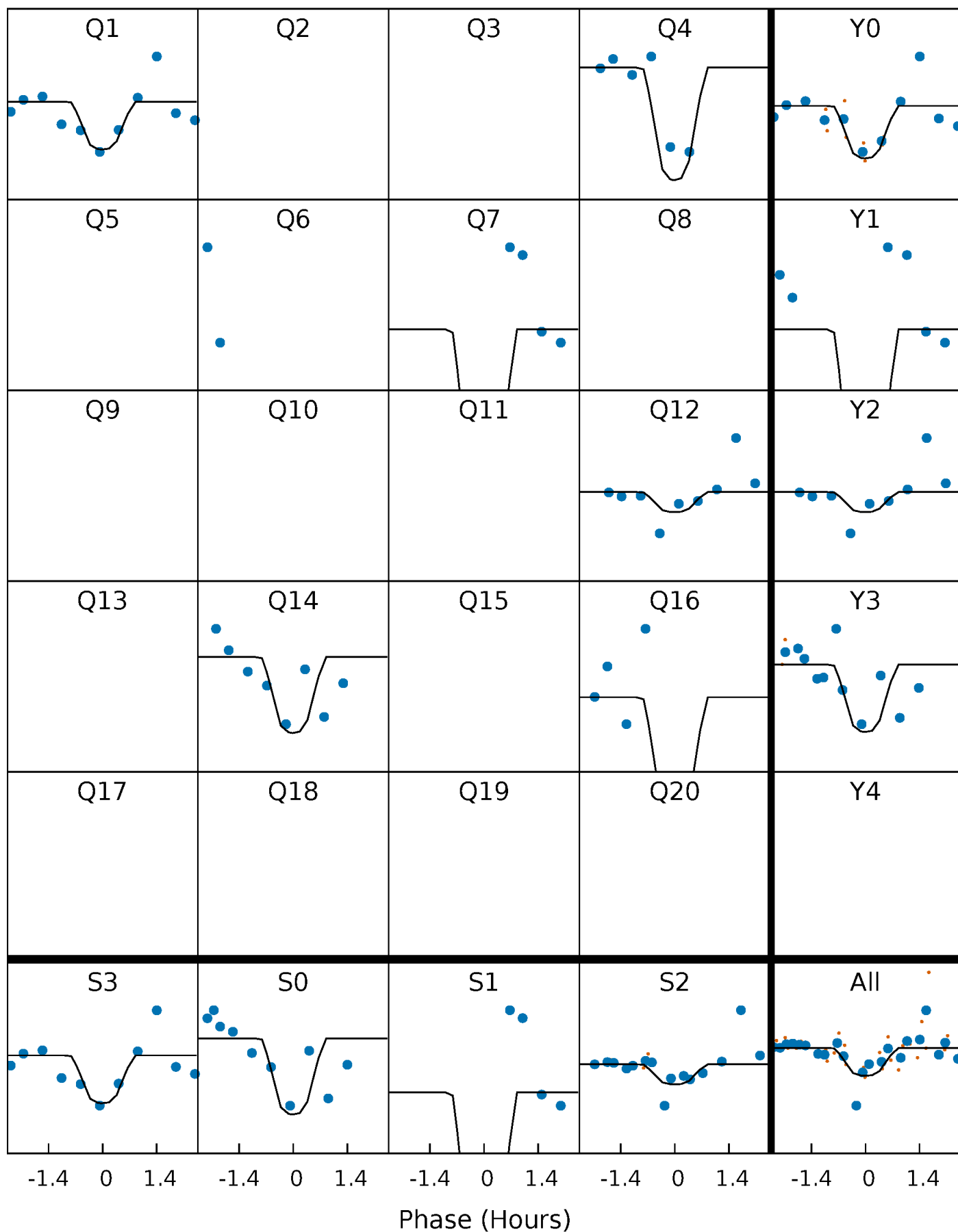
# PDC Quarter-Phased Transit Curves

TCE 005309078-02 P=106.192098 Days  $T_0=163.186057$  (BKJD)



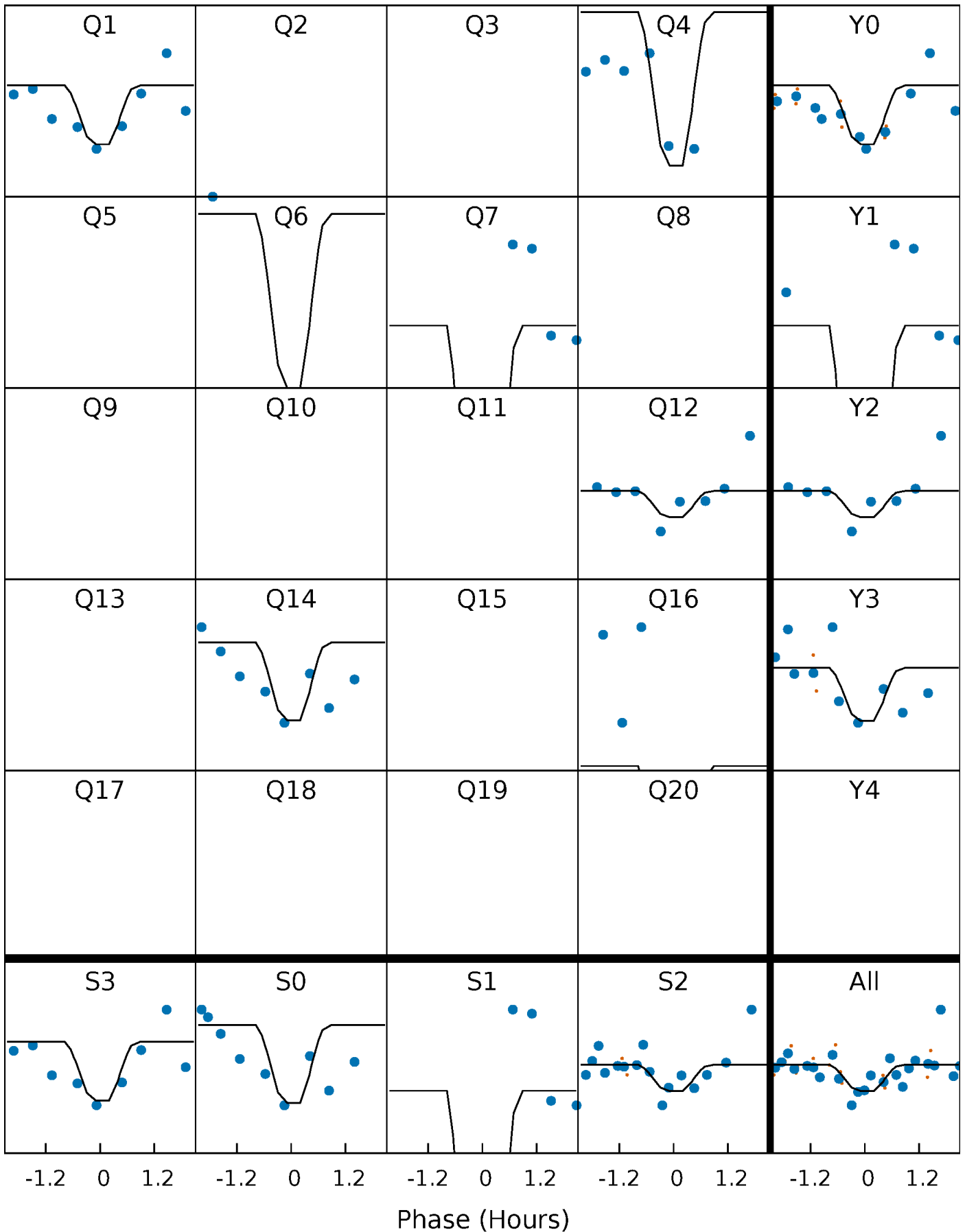
# DV Quarter-Phased Transit Curves

TCE 005309078-02 P=106.192098 Days  $T_0=163.186057$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 005309078-02 P=106.191948 Days  $T_0=163.186191$  (BKJD)

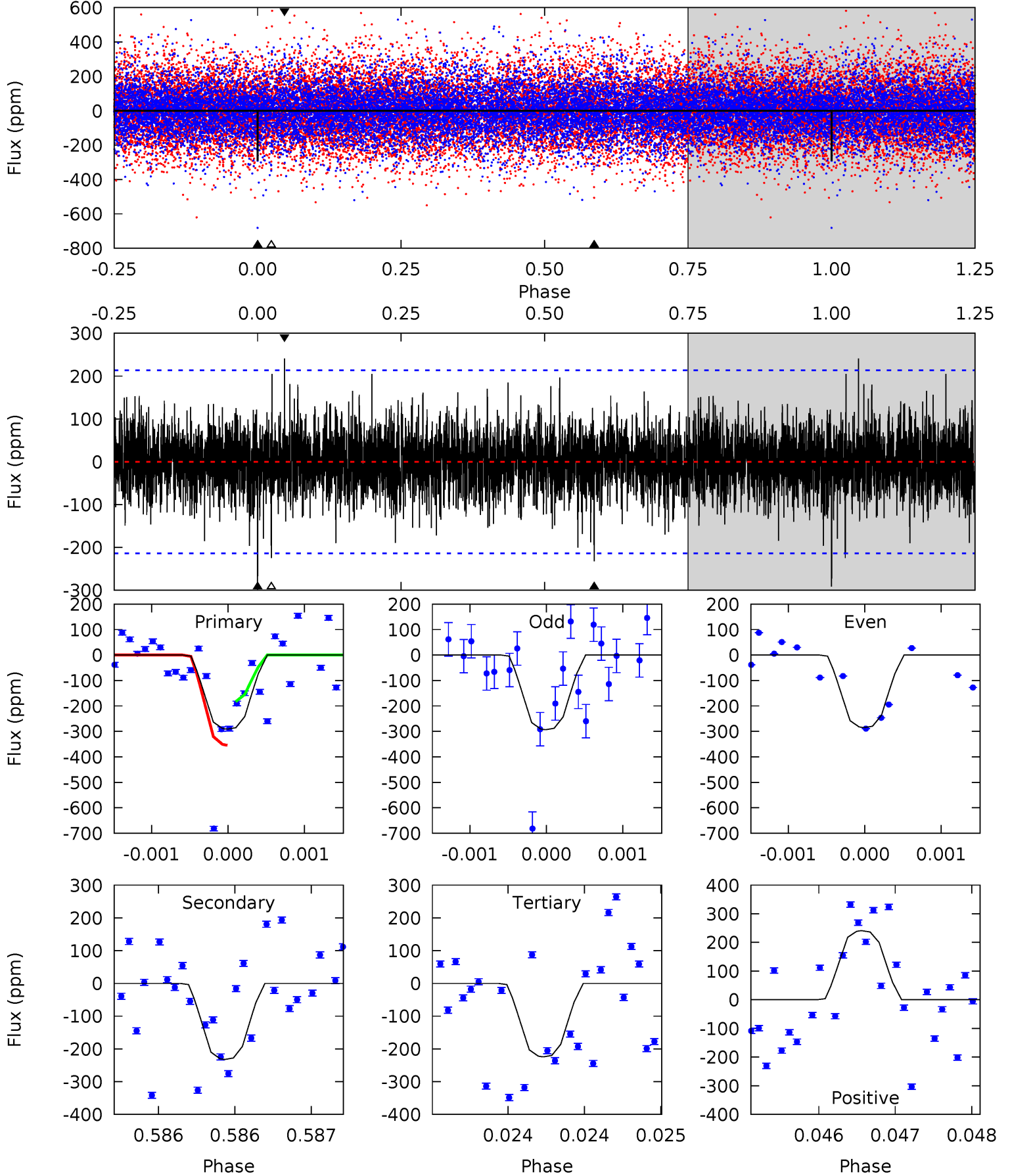




# DV Model-Shift Uniqueness Test

005309078-02, P = 106.192098 Days, E = 56.993959 Days

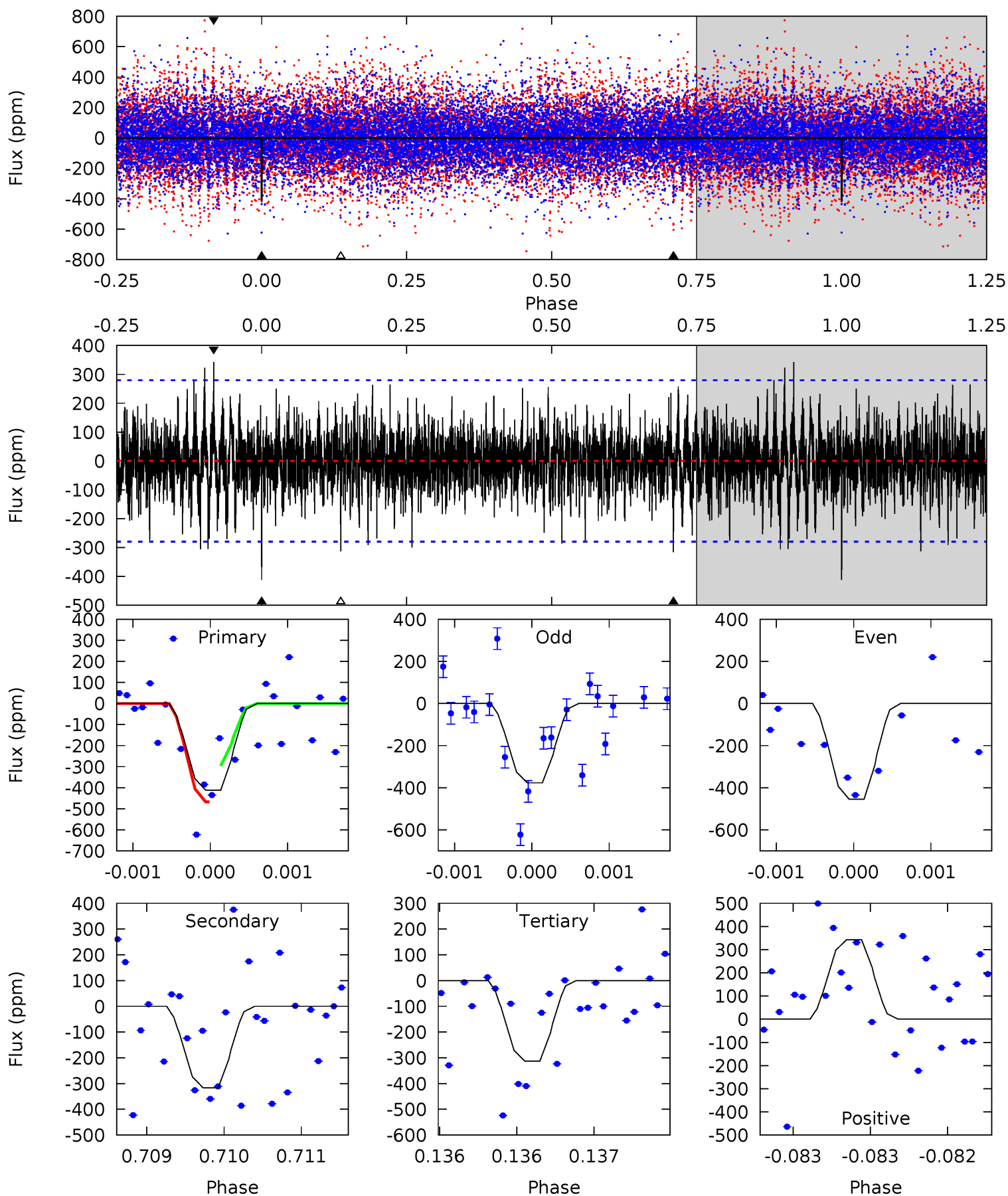
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.52	6.00	5.80	6.23	5.53	3.41	1.39	1.72	1.29	0.20	-0.23	0.11	1.08	0.45	2.19



# Alt Model-Shift Uniqueness Test

005309078-02,  $P = 106.191948$  Days,  $E = 56.994243$  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
8.18	6.28	6.21	6.81	5.55	3.44	1.57	1.96	1.37	0.07	-0.53	0.77	1.04	0.45	1.70



### Stellar Parameters For KIC 005309078

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6452^{+177}_{-177}$	$3.492^{+0.360}_{-0.090}$	$-0.140^{+0.350}_{-0.300}$	$3.947^{+0.518}_{-1.555}$	$1.764^{+0.175}_{-0.407}$	$0.040^{+0.122}_{-0.012}$
	+3%/-3%	+10%/-3%	+250%/-214%	+13%/-39%	+10%/-23%	+302%/-30%
Source	PHO1	FLK73	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 005309078-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-232 \pm 39$	$10.96^{+9.54}_{-7.23}$	$1065^{+59}_{-102}$	$4895^{+3272}_{-1009}$	$294^{+2233}_{-210}$
Alt.	$-316 \pm 50$	$10.59^{+8.89}_{-6.81}$	$1062^{+61}_{-116}$	$5218^{+3943}_{-1108}$	$408^{+2989}_{-283}$

$T_{max}$  = 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

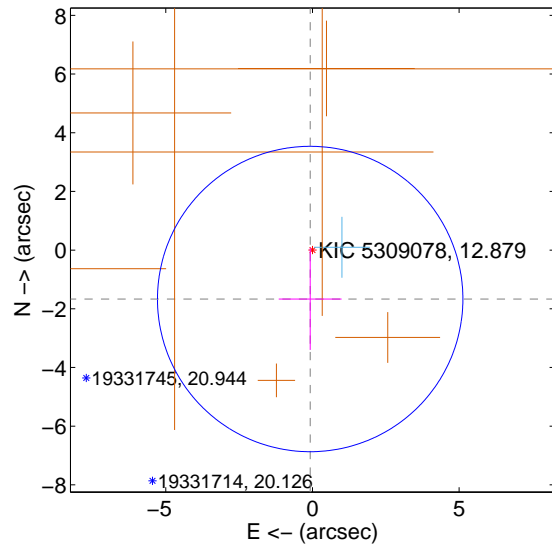
Supplemental centroid analysis for 005309078-02. Kepler magnitude: 12.88. Transit SNR 6.74

There are 1 quarters with good PRF difference image offsets

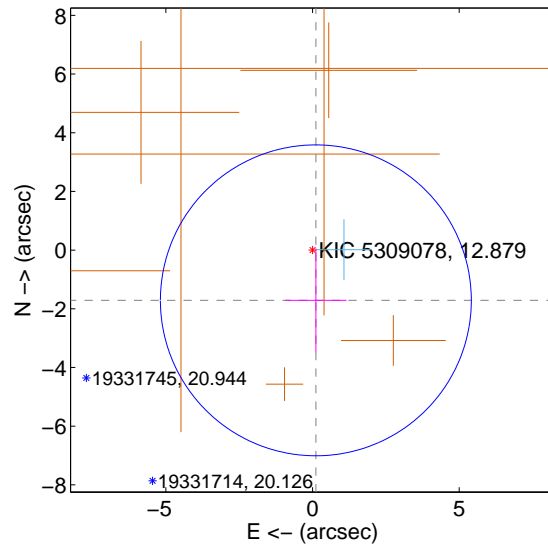
The direct PRF centroid is offset from the target star catalog position by about 0.30 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.669 \pm 1.735$	0.96	$0.077 \pm 1.071$	$-1.667 \pm 1.736$
PRF-fit source offset from KIC position	$1.716 \pm 1.766$	0.97	$-0.113 \pm 1.045$	$-1.712 \pm 1.769$
photometric centroid source offset	$1.51 \pm 1.08$	1.40	$1.46 \pm 1.09$	$0.40 \pm 0.89$

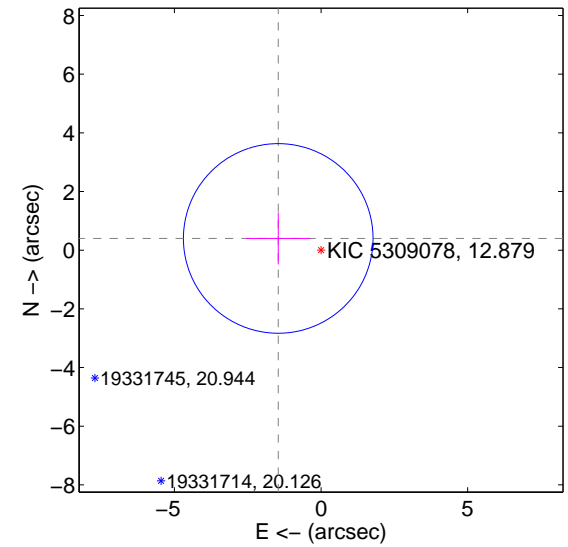
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



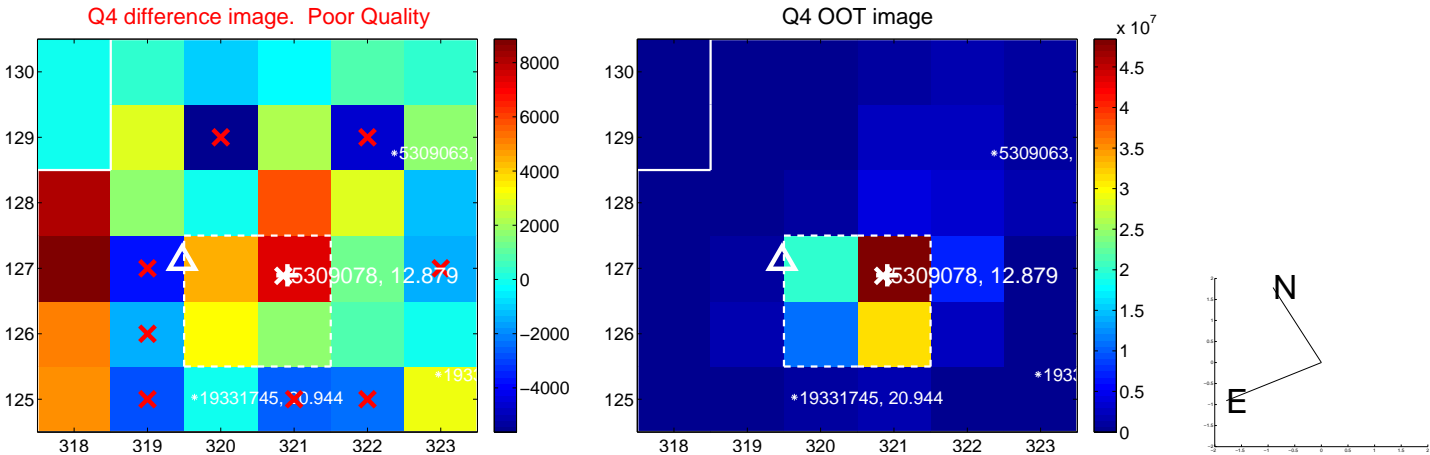
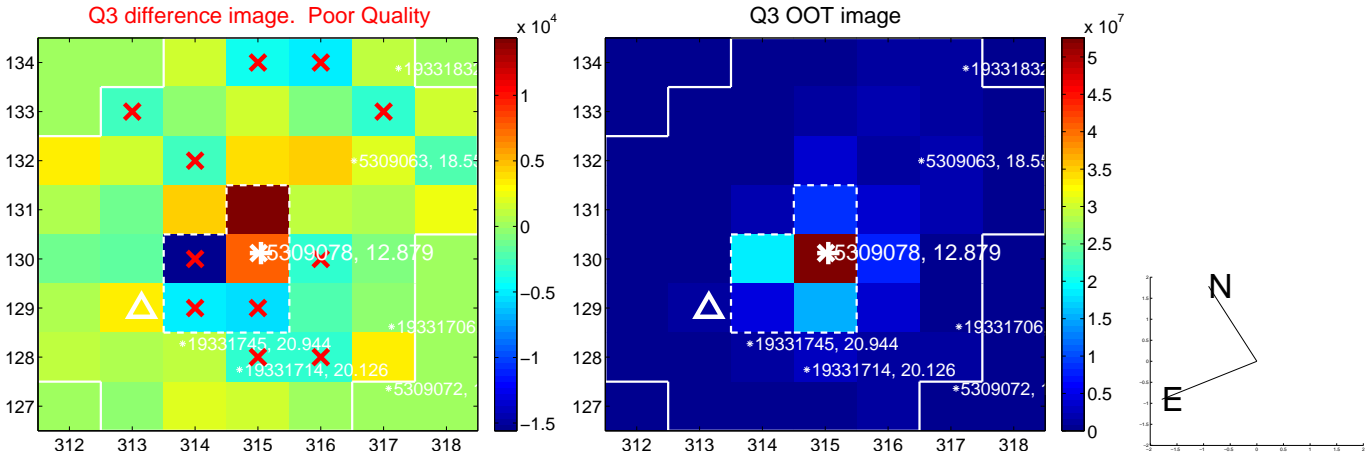
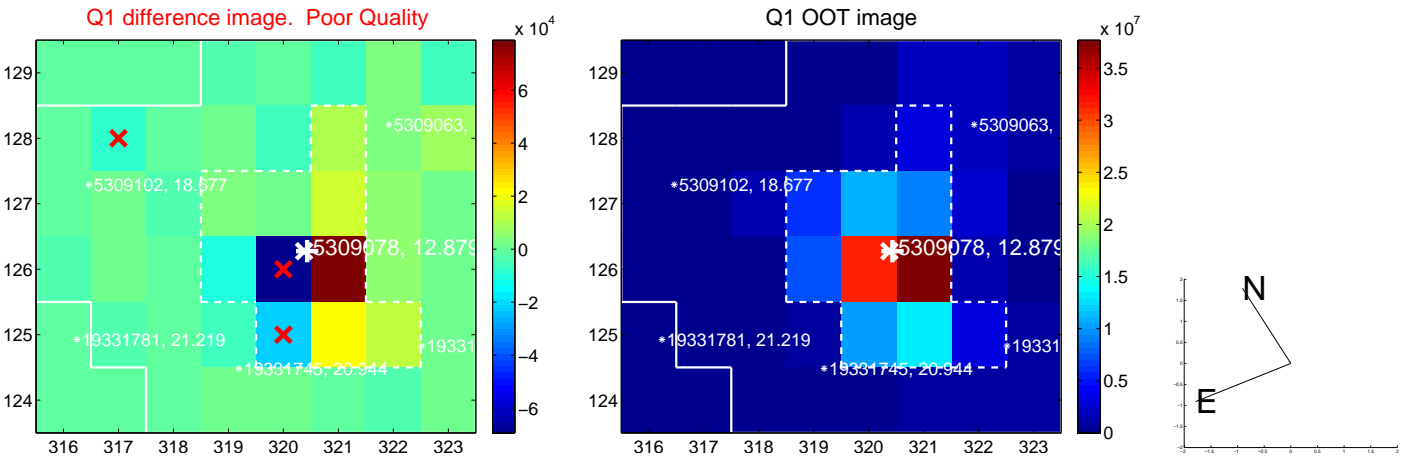
offset from photometric centroids



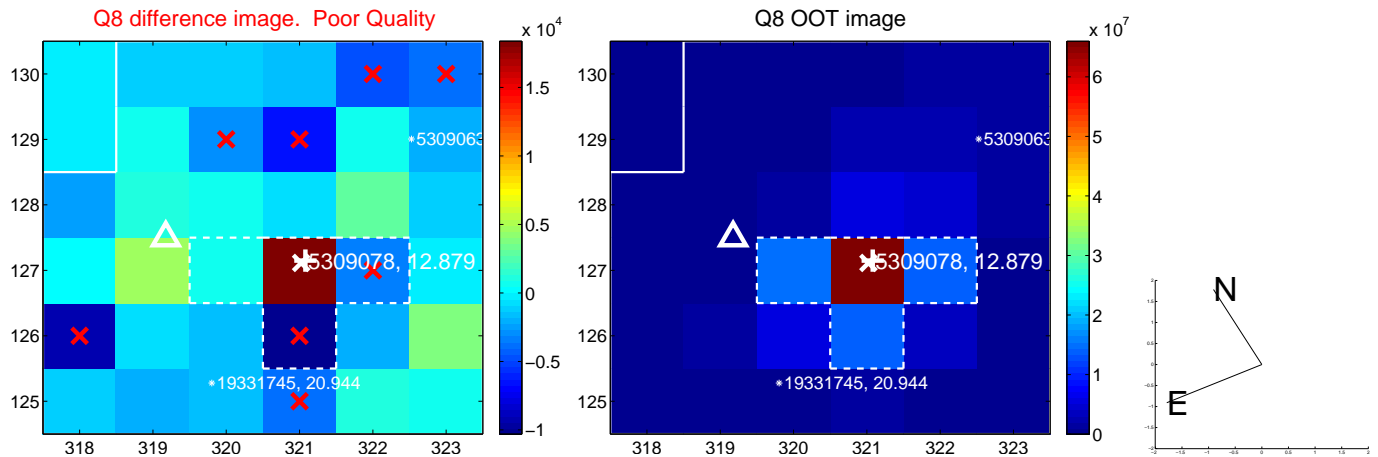
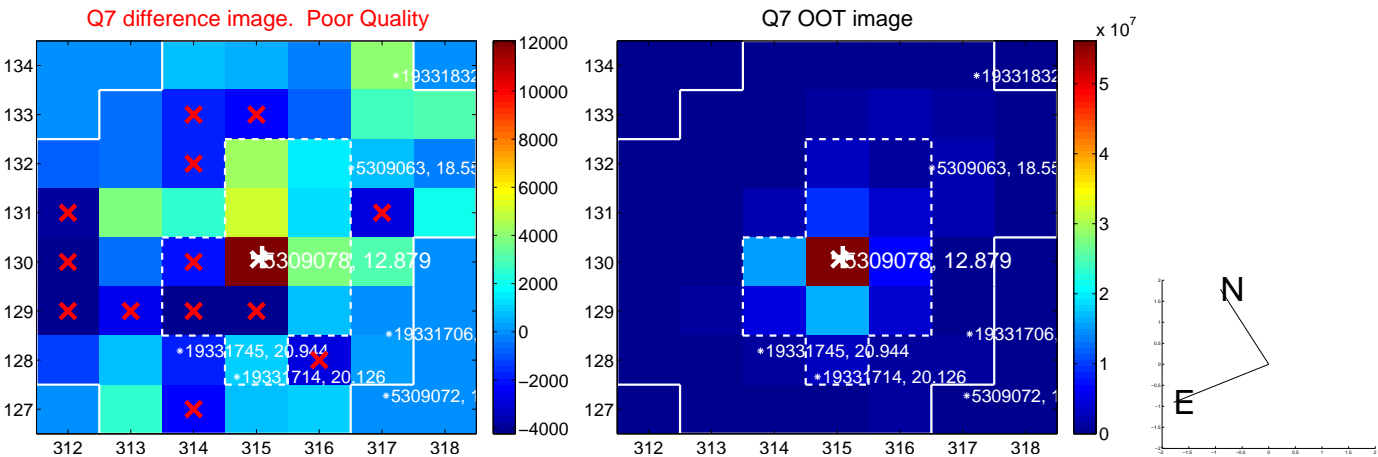
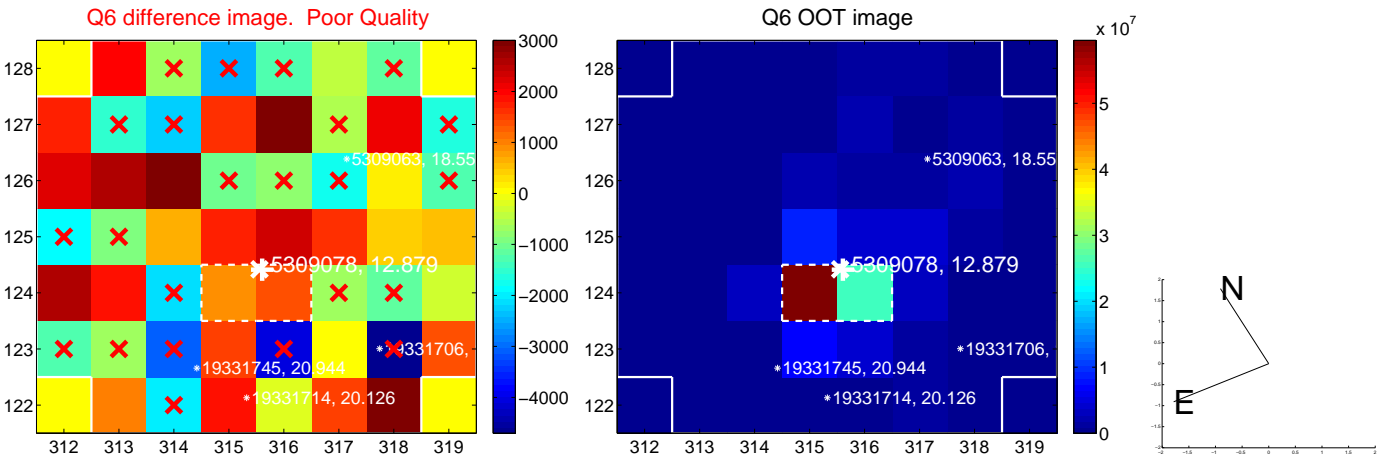
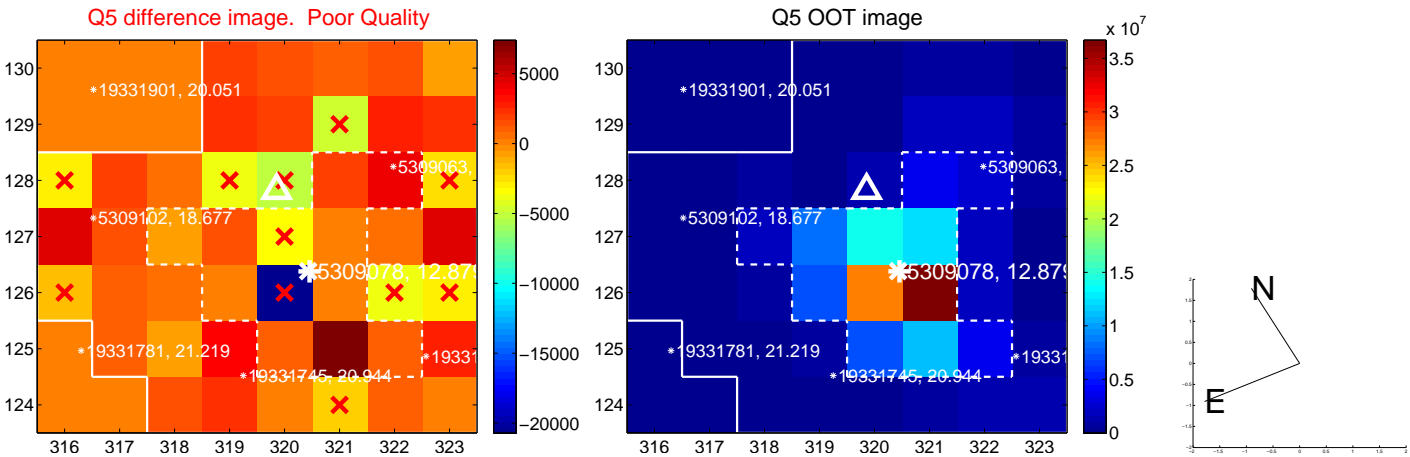
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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



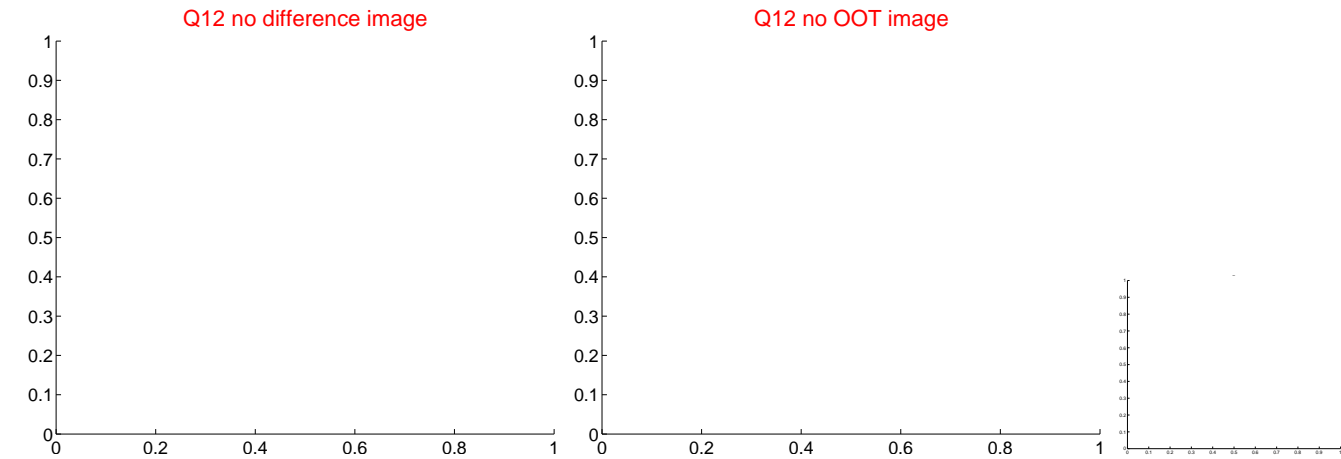
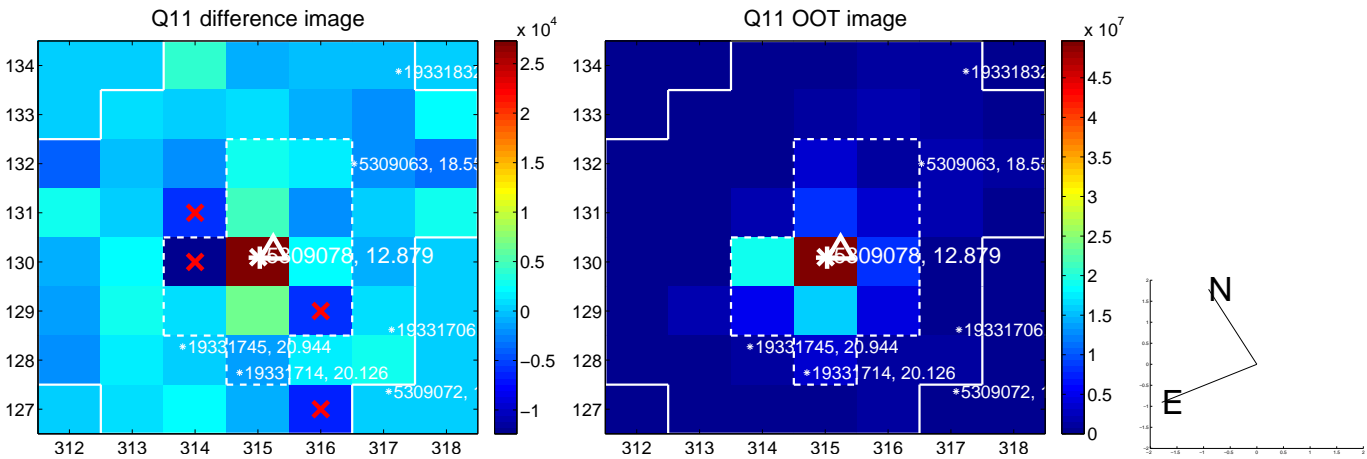
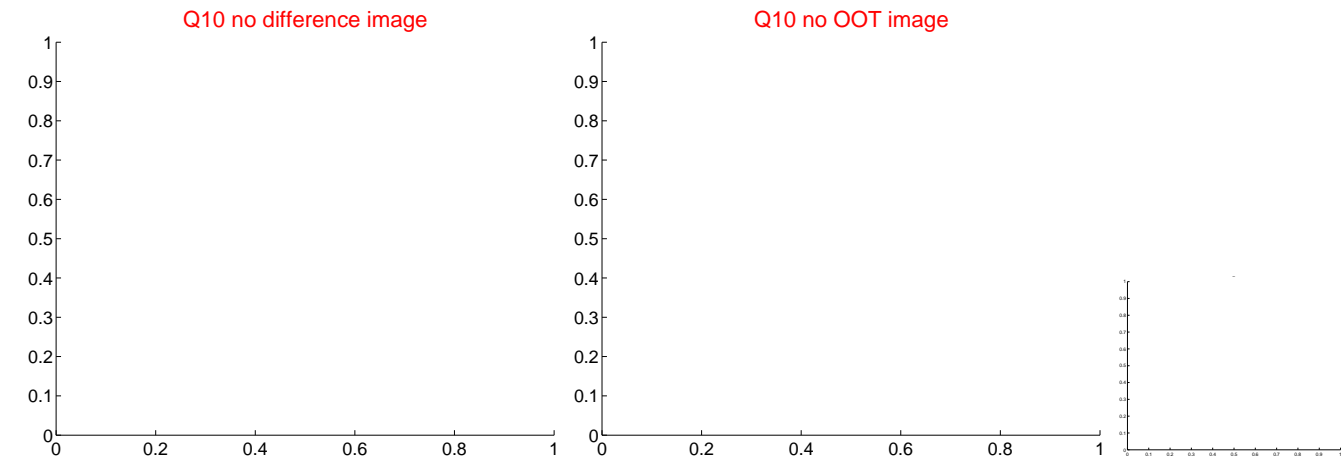
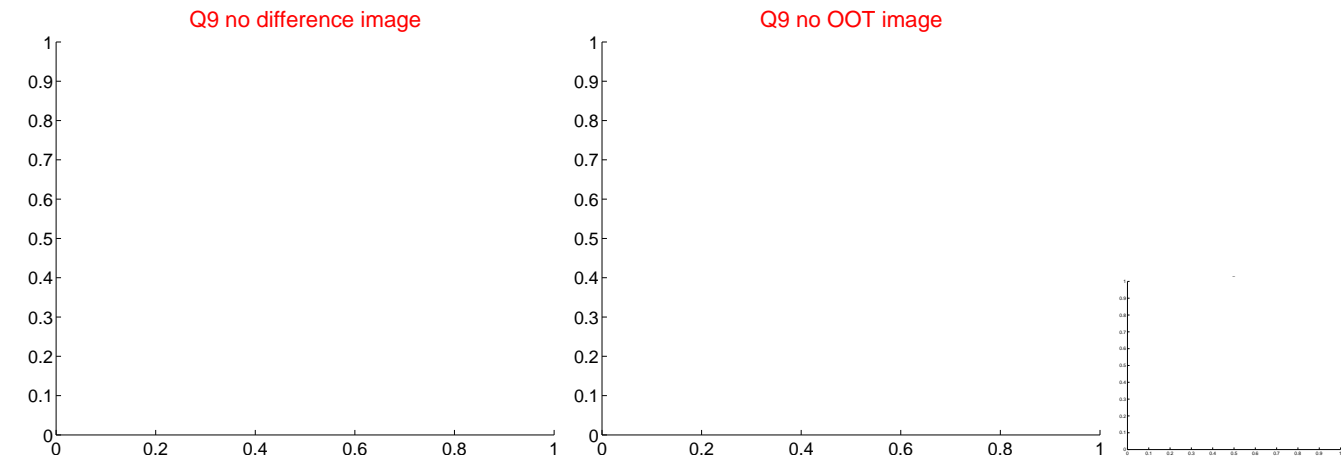
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



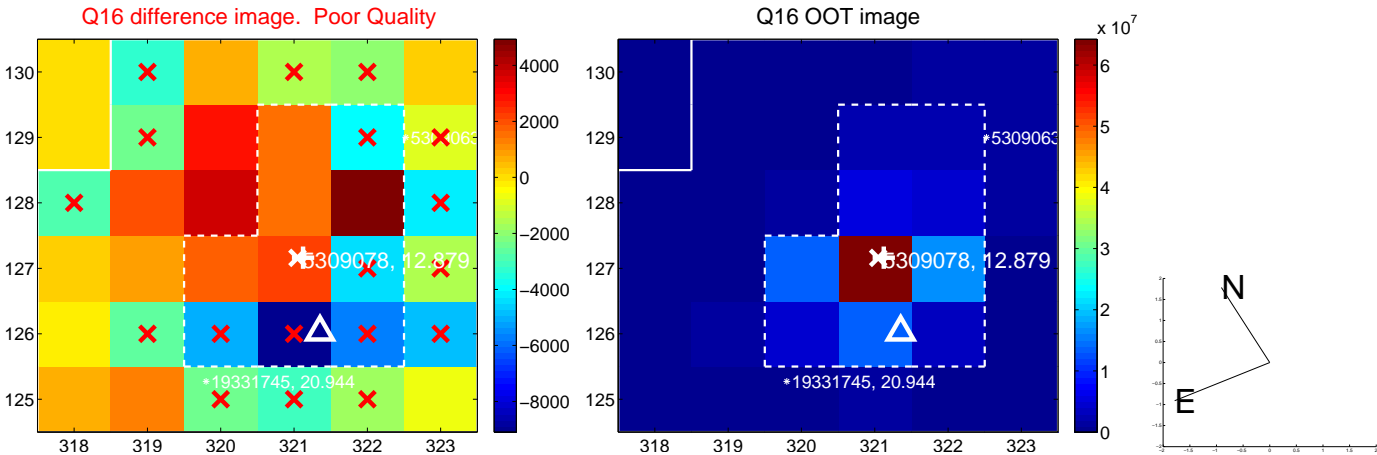
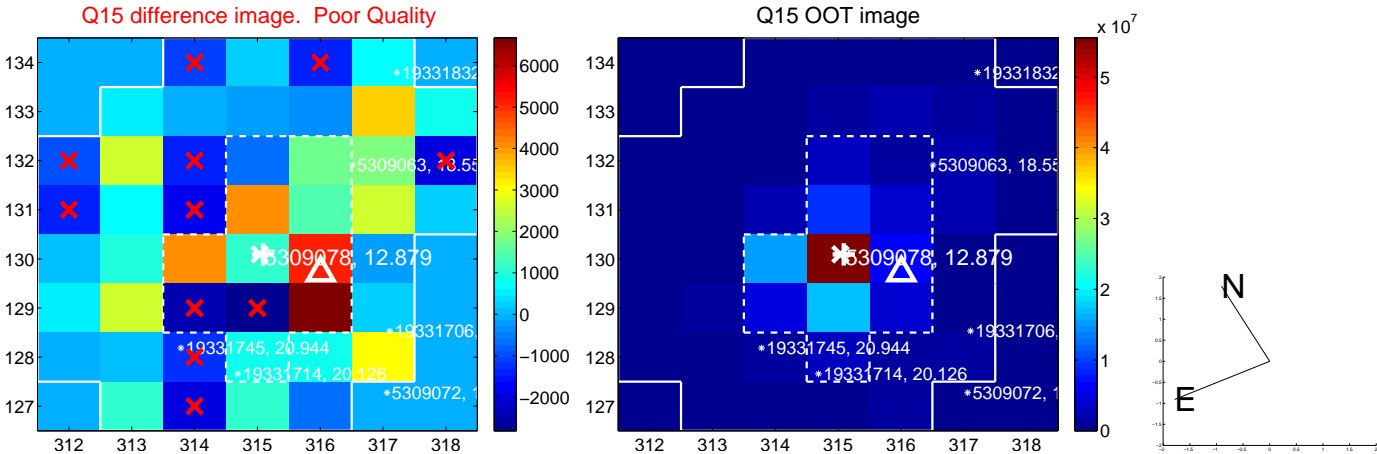
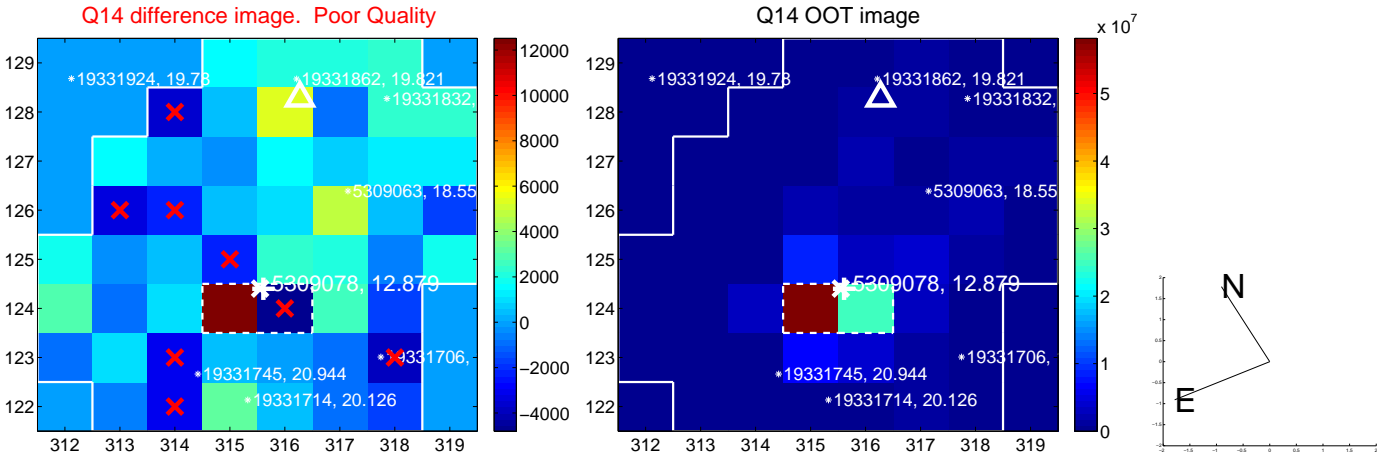
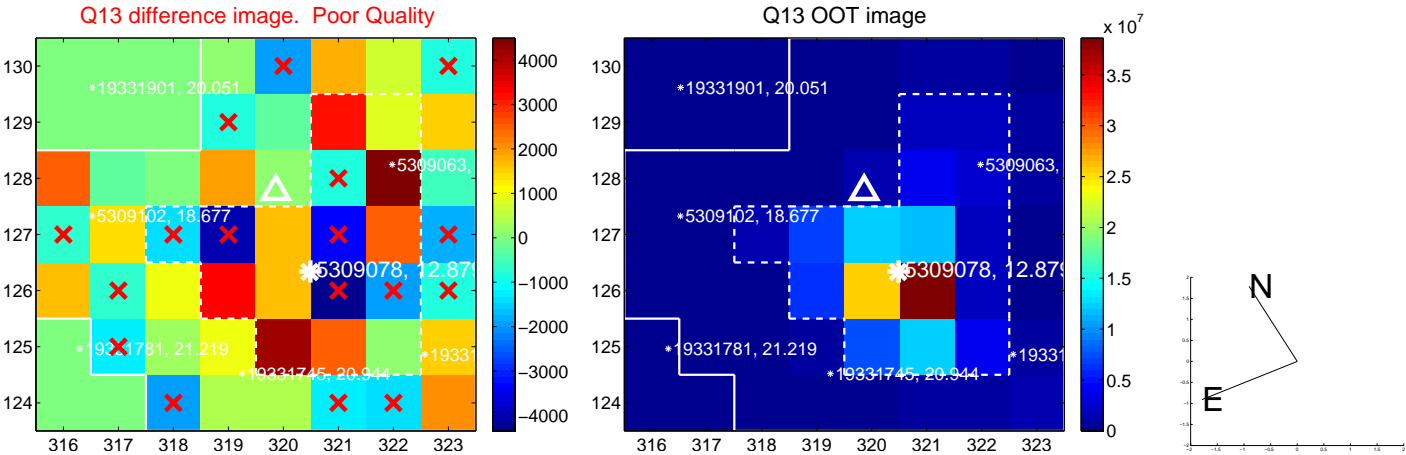
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



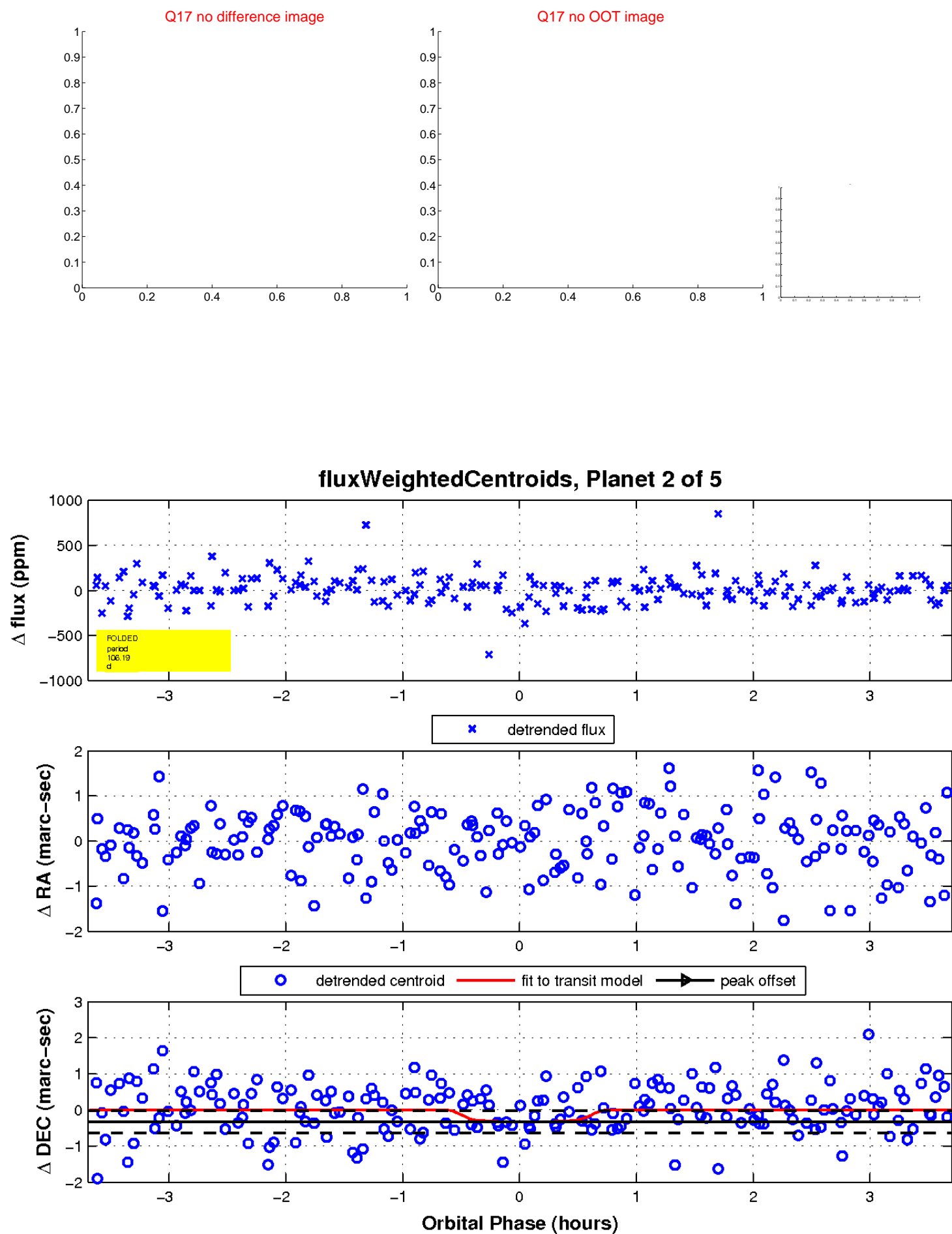
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



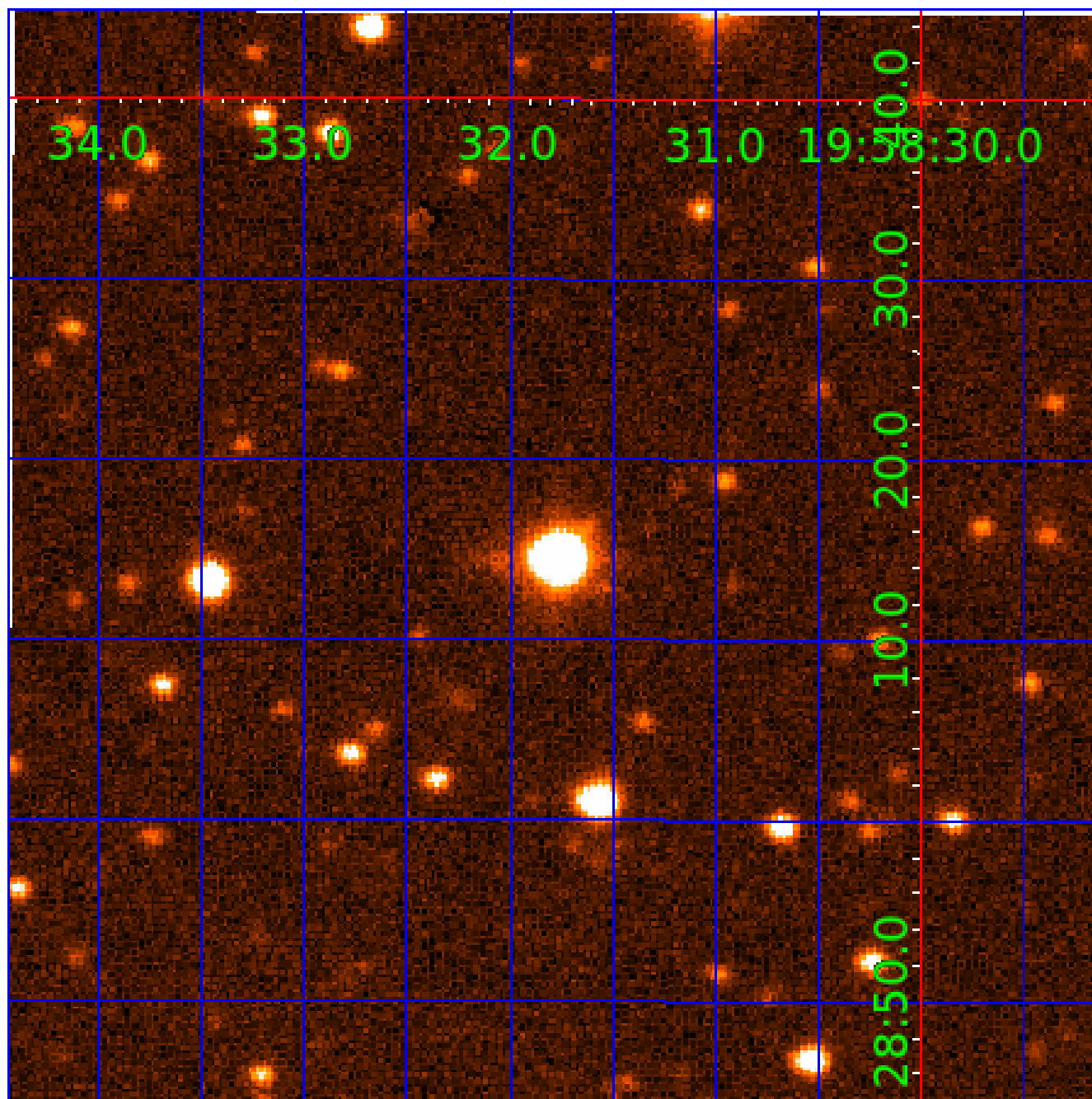
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image

Declination



# KIC 005309078

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005309078-01	OBS	No	0.807230	132.075081	20.7	4.045	11.8	10.5	3.95	6452	2.06	57524.61
005309078-02	OBS	No	106.192098	163.186057	329.5	1.236	8.7	6.7	3.95	6452	8.28	85.98
005309078-03	OBS	No	202.568627	147.975479	225.6	6.936	7.6	7.7	3.95	6452	6.74	36.34
005309078-04	OBS	No	51.849424	163.356385	192.4	2.065	7.2	6.9	3.95	6452	6.26	223.63
005309078-05	OBS	No	37.534480	138.176930	151.1	1.822	7.3	7.9	3.95	6452	5.68	344.04

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005309078-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV
005309078-02	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_UNCERTAIN
005309078-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
005309078-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
005309078-05	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

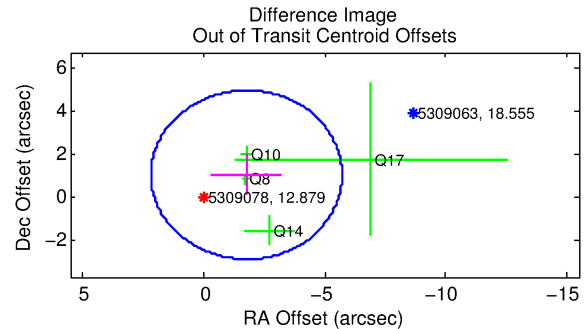
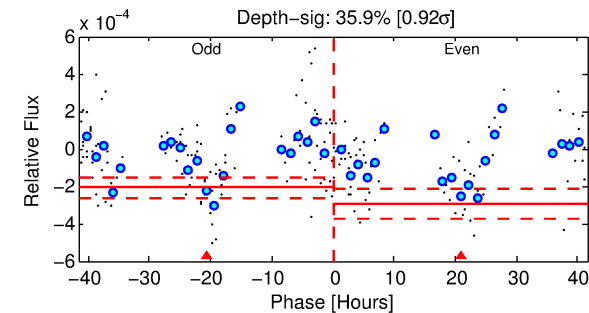
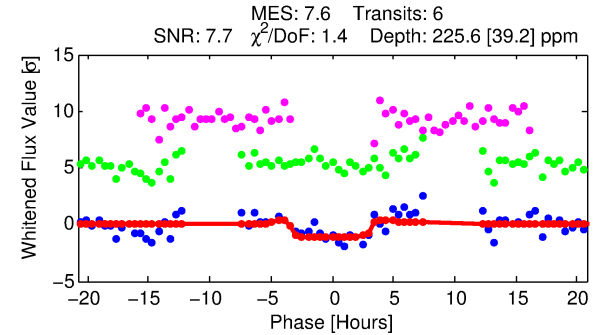
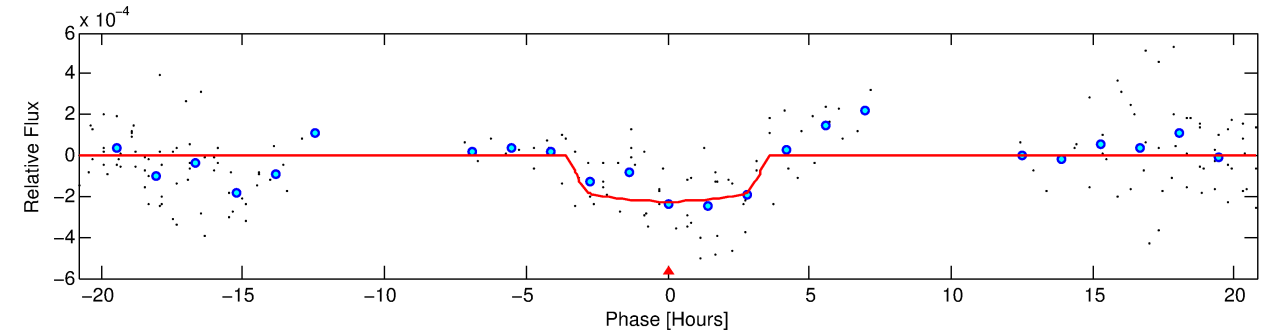
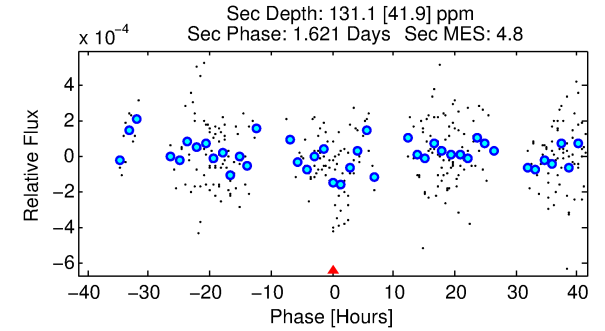
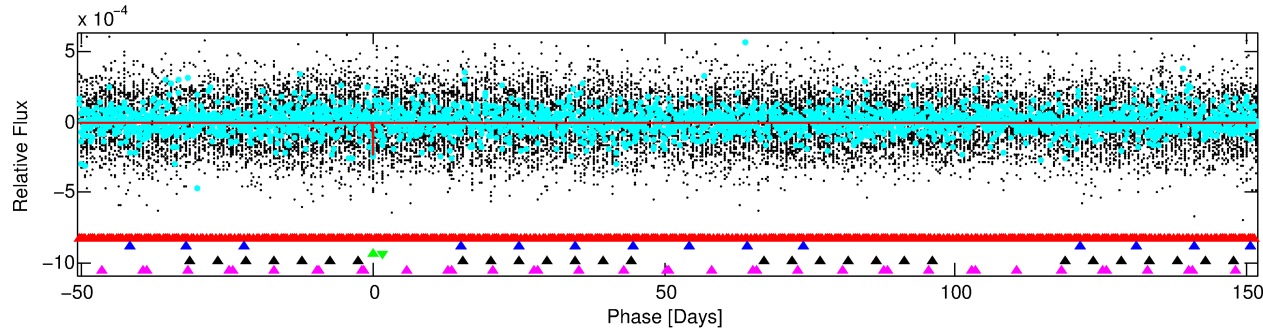
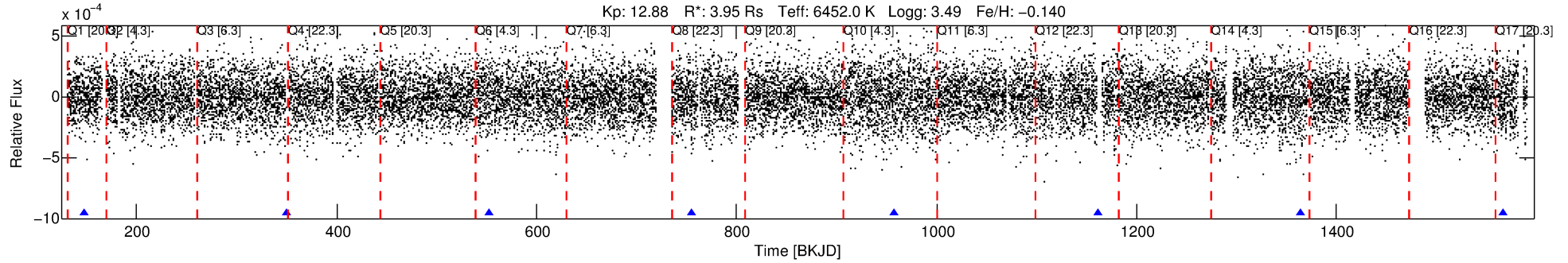
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 005309078-03

No Significant Match Found

# DV One-Page Summary

KIC: 5309078 Candidate: 3 of 5 Period: 202.569 d



## DV Fit Results:

Period = 202.56863 [0.00727] d  
Epoch = 147.9755 [0.0284] BKJD  
Rp/R\* = 0.0156 [0.0101]  
a/R\* = 120.52 [439.28]  
b = 0.86 [1.10]  
Seff = 36.34 [22.59]  
Teq = 626 [97] K  
Rp = 6.74 [5.08] Re  
a = 0.8158 [0.3110] AU  
Ag = 1056.75 [1540.91] [0.69σ]  
Teffp = 5519 [1832] K [2.67σ]

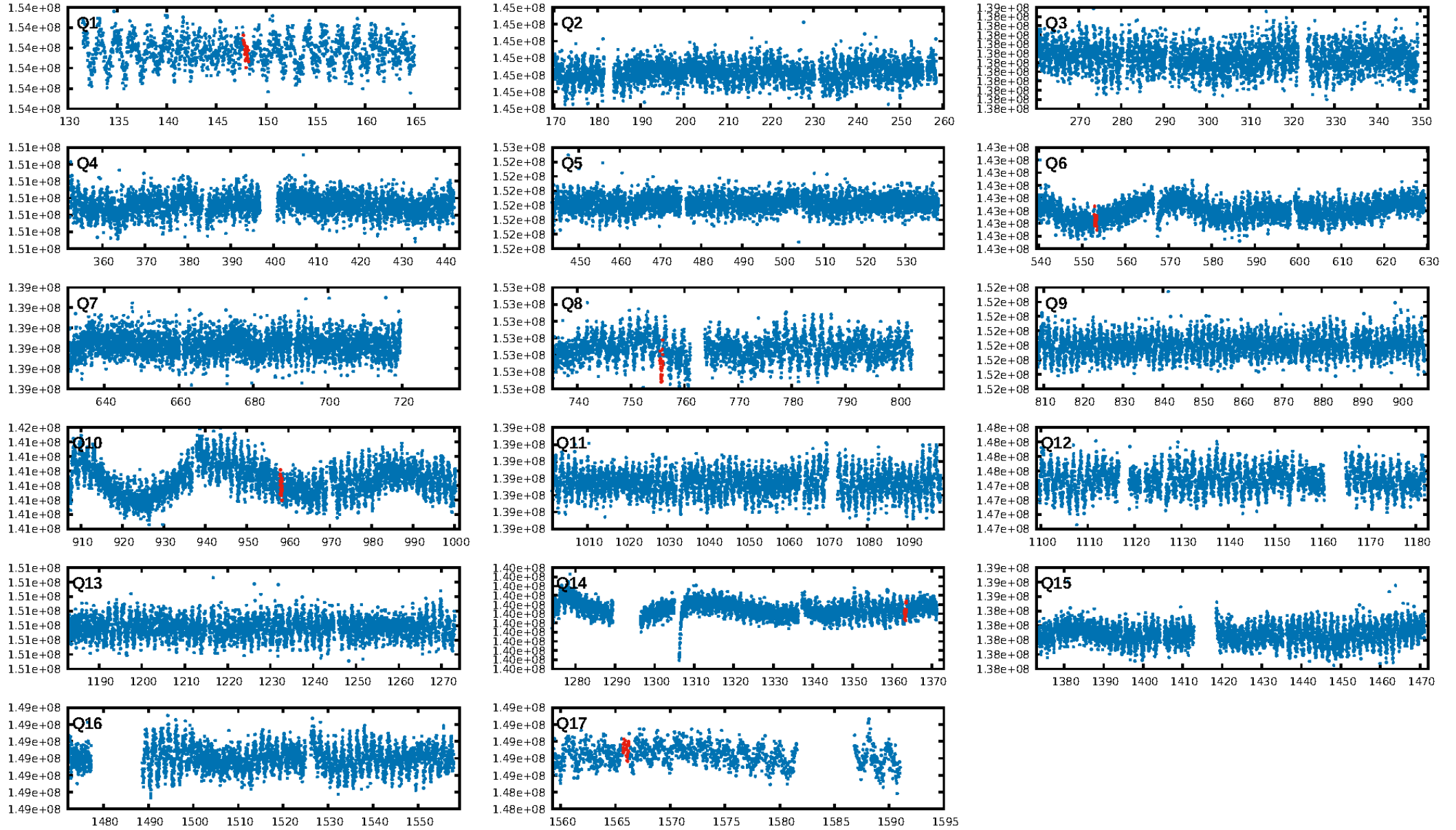
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [328.28σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 4.6%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 5.17e-09**  
RollingBand-fgt: 1.00 [4/4]  
**GhostDiagnostic-chr: -1.393**  
Centroid-sig: N/A  
Centroid-so: 1.094 arcsec [1.24σ]  
OotOffset-rm: 2.049 arcsec [1.56σ]  
KicOffset-rm: 2.221 arcsec [1.65σ]  
OotOffset-st: 2/0/1/1 [4]  
KicOffset-st: 2/0/1/1 [4]  
DiffImageQuality-fgm: 0.50 [2/4]  
DiffImageOverlap-fno: 0.00 [0/6]

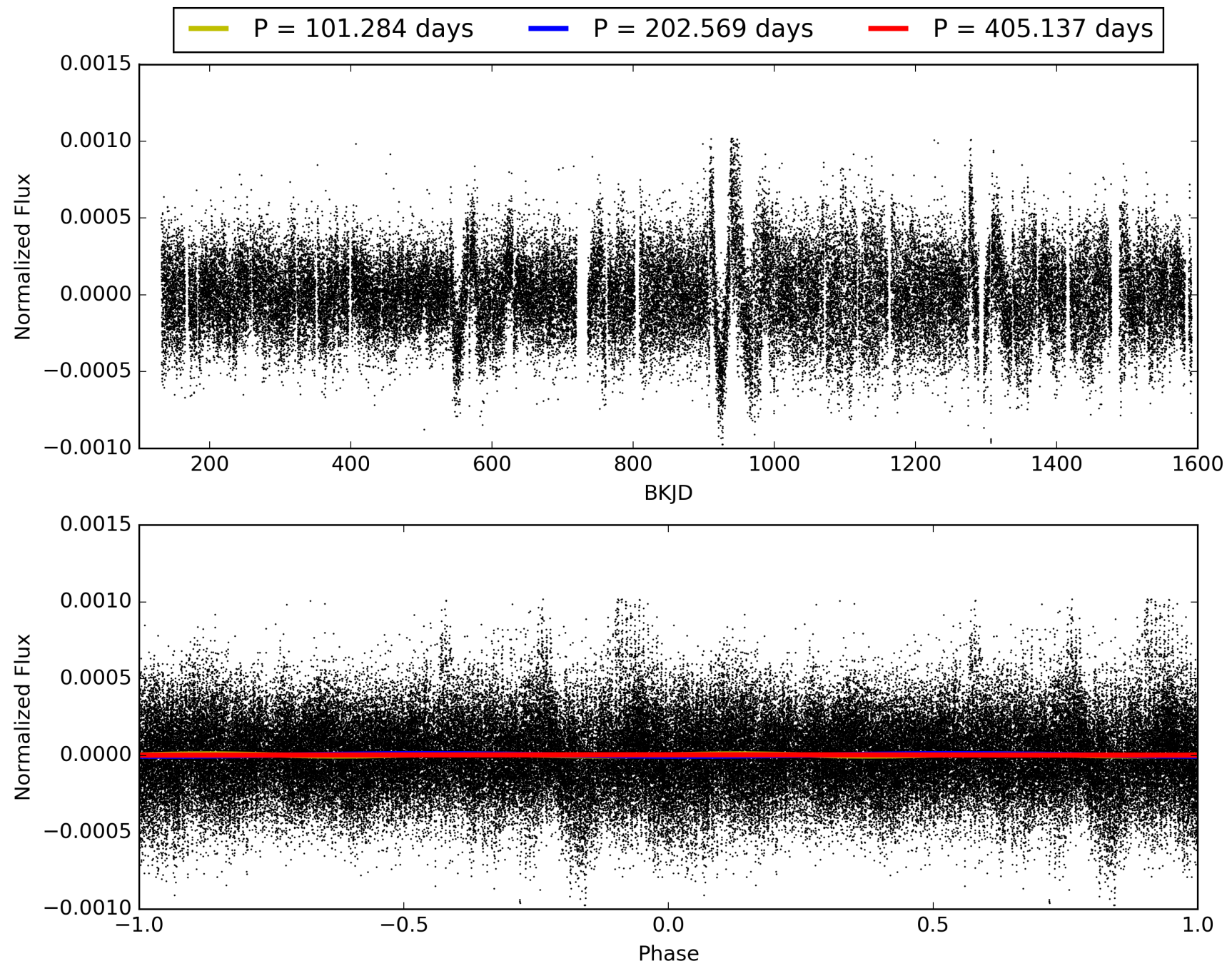
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 00:20:37 Z

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

# TCE 005309078-03, PDC Light Curves



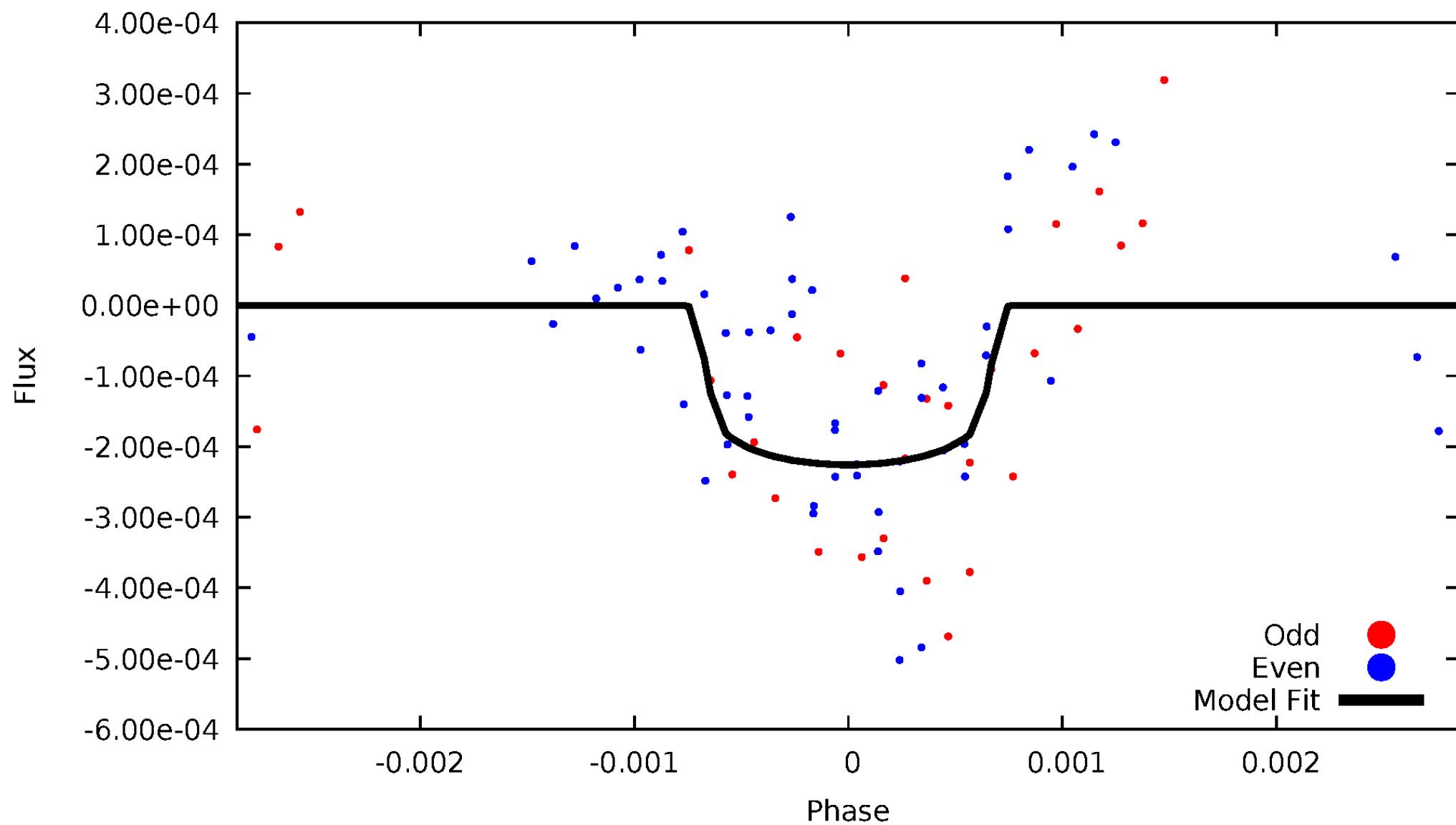
TCE 005309078-03





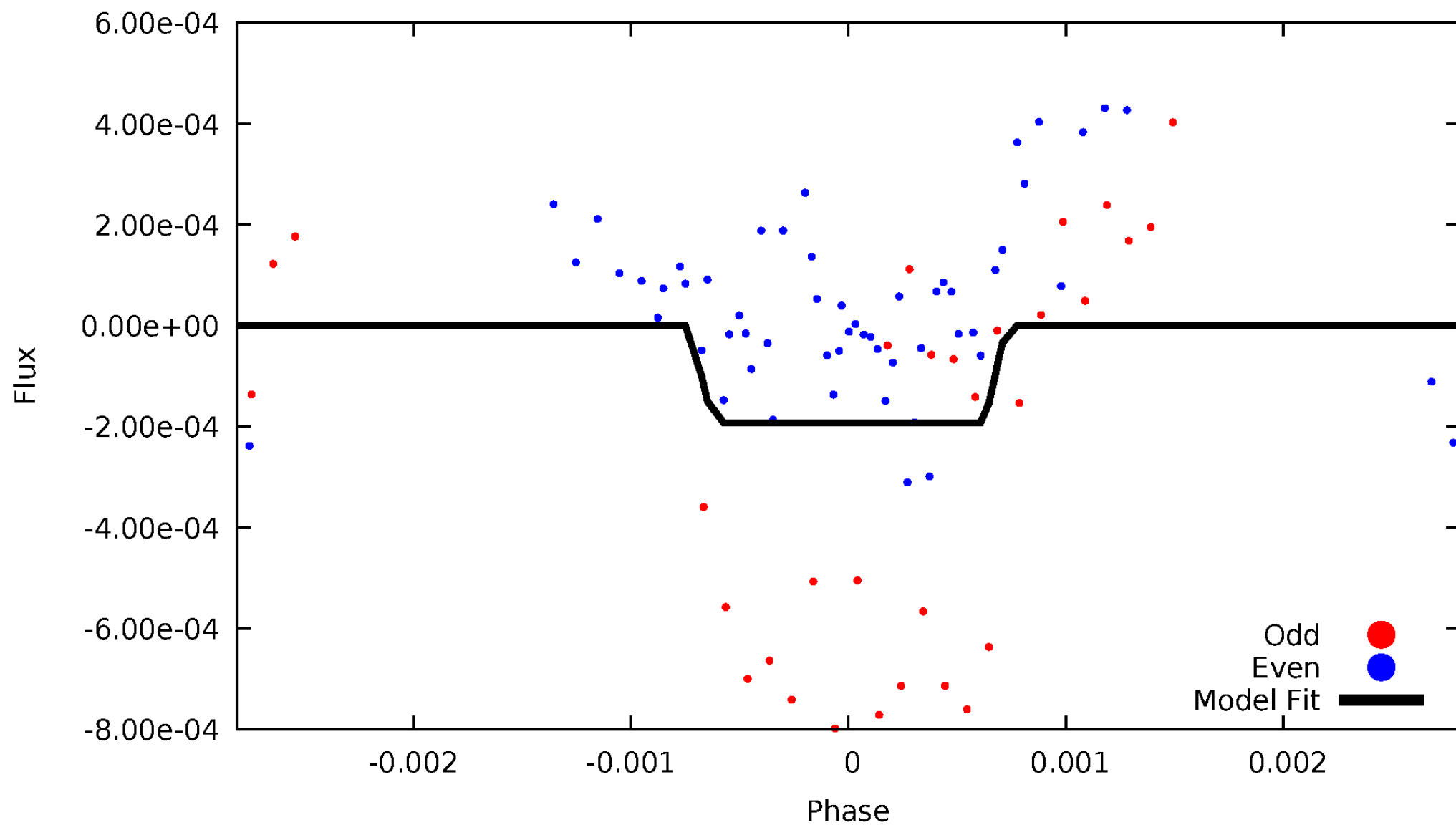
# DV Odd/Even

TCE 005309078-03



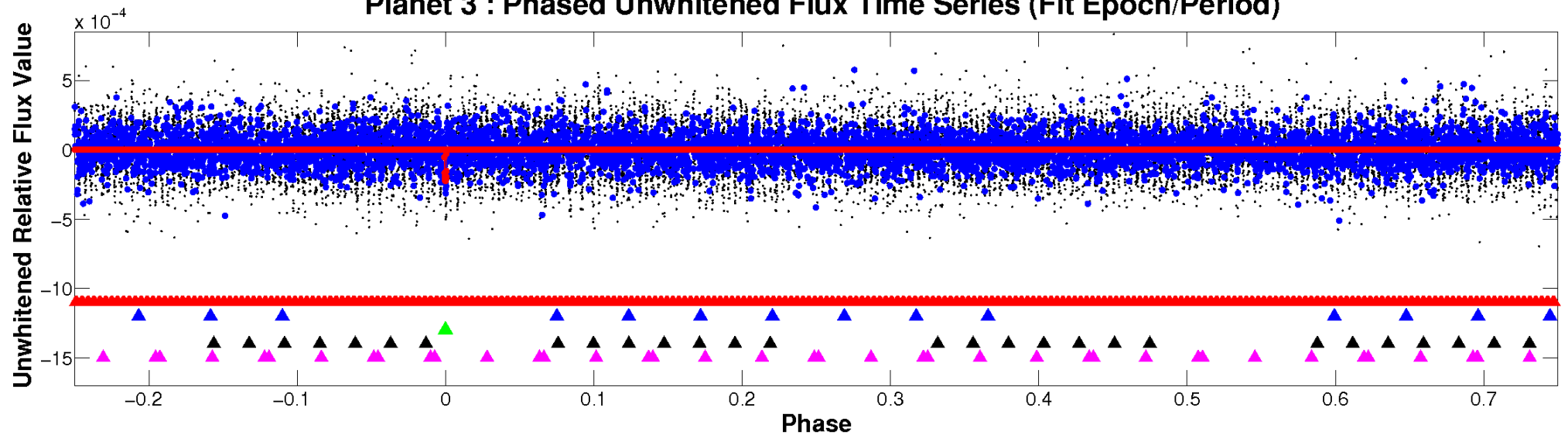
# ALT Odd/Even

TCE 005309078-03

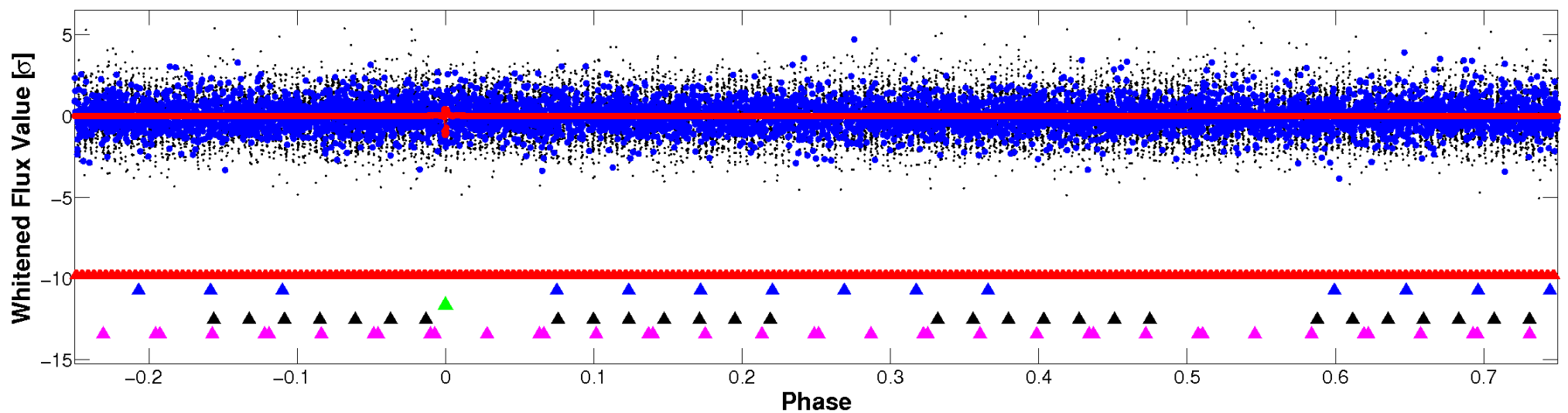


# Non-Whitened Vs. Whitened Light Curve

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

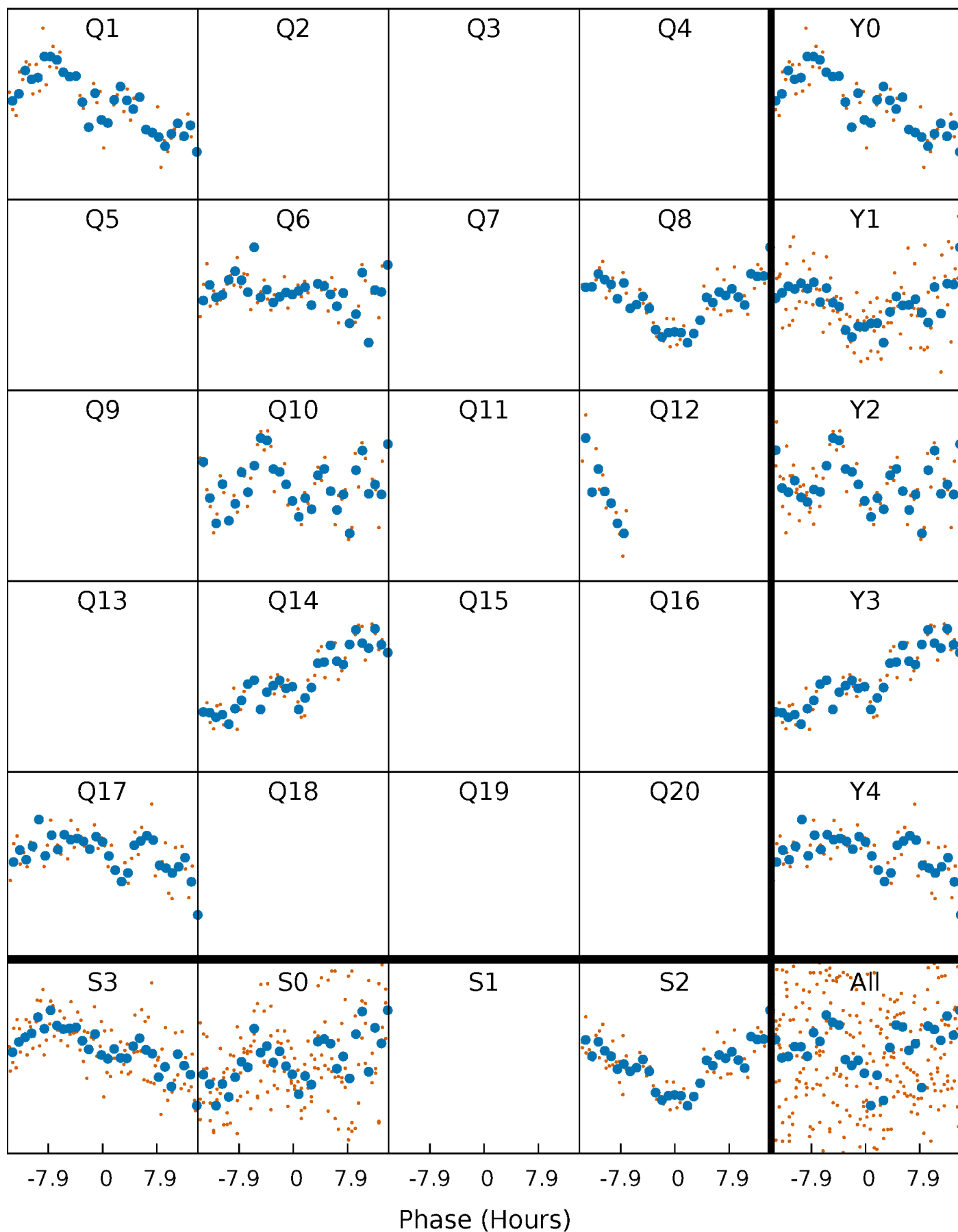


Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



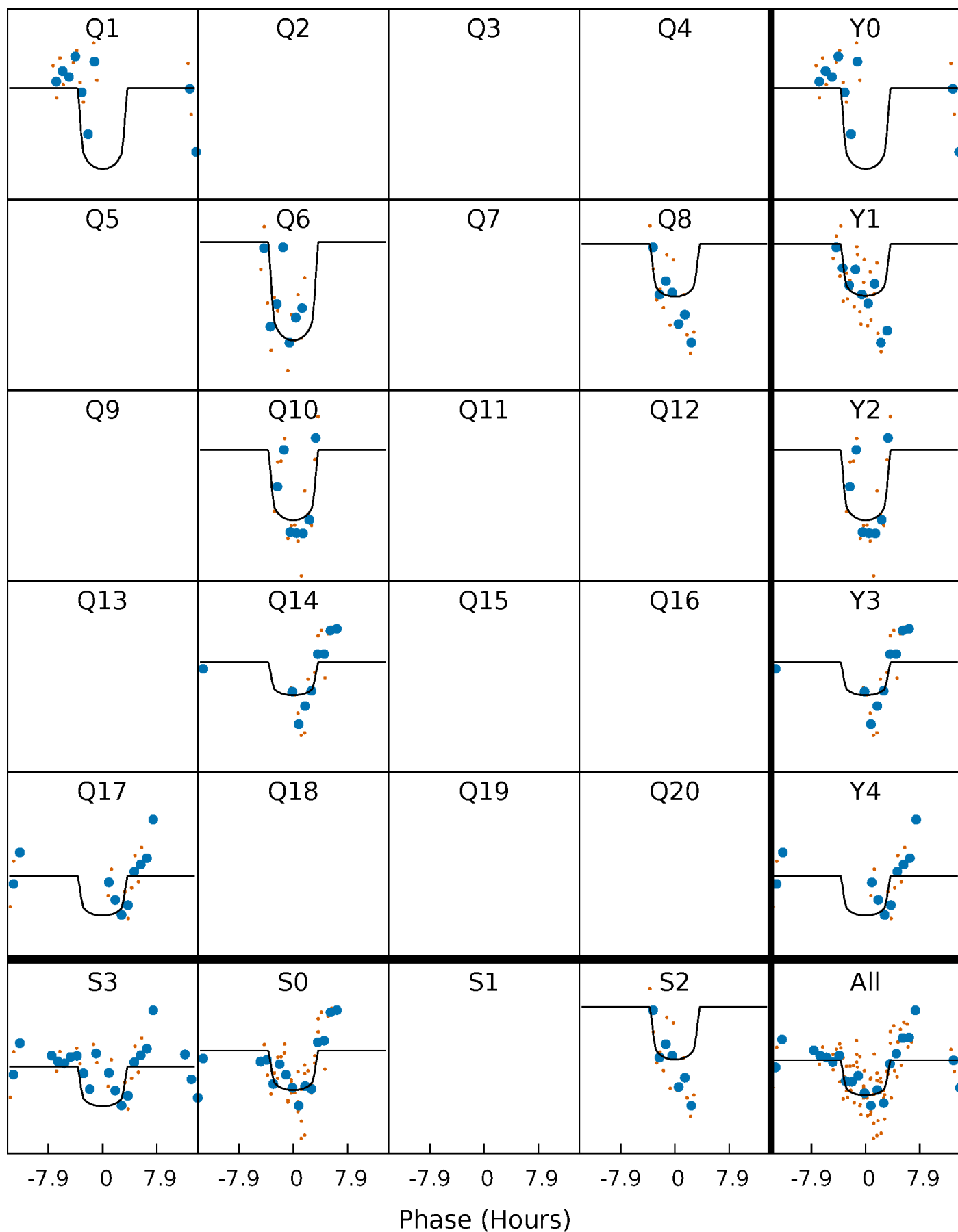
# PDC Quarter-Phased Transit Curves

TCE 005309078-03 P=202.568627 Days  $T_0=147.975479$  (BKJD)



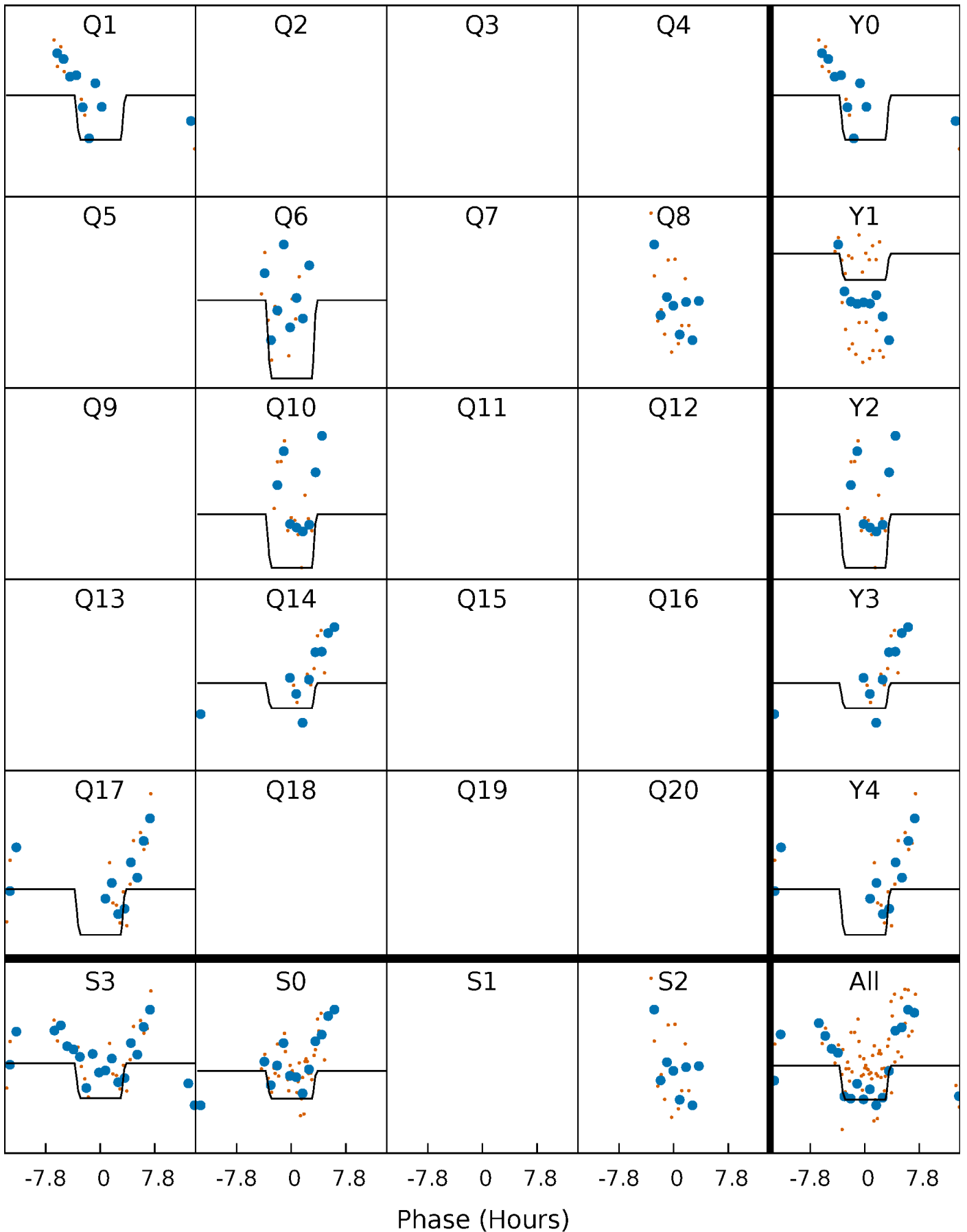
# DV Quarter-Phased Transit Curves

TCE 005309078-03     $P=202.568627$  Days     $T_0=147.975479$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 005309078-03 P=202.571778 Days  $T_0=147.950027$  (BKJD)

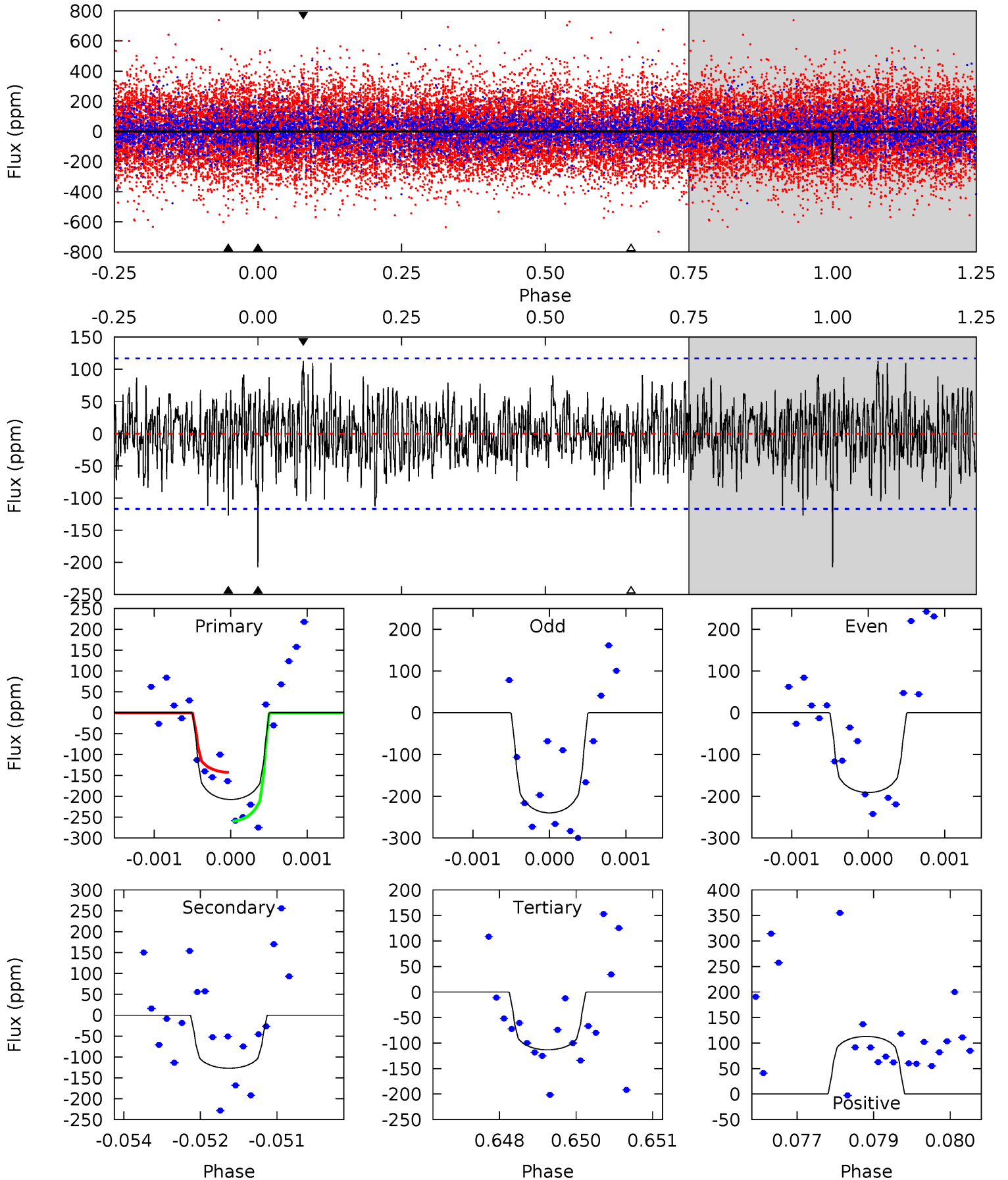




# DV Model-Shift Uniqueness Test

005309078-03, P = 202.568627 Days, E = 147.975479 Days

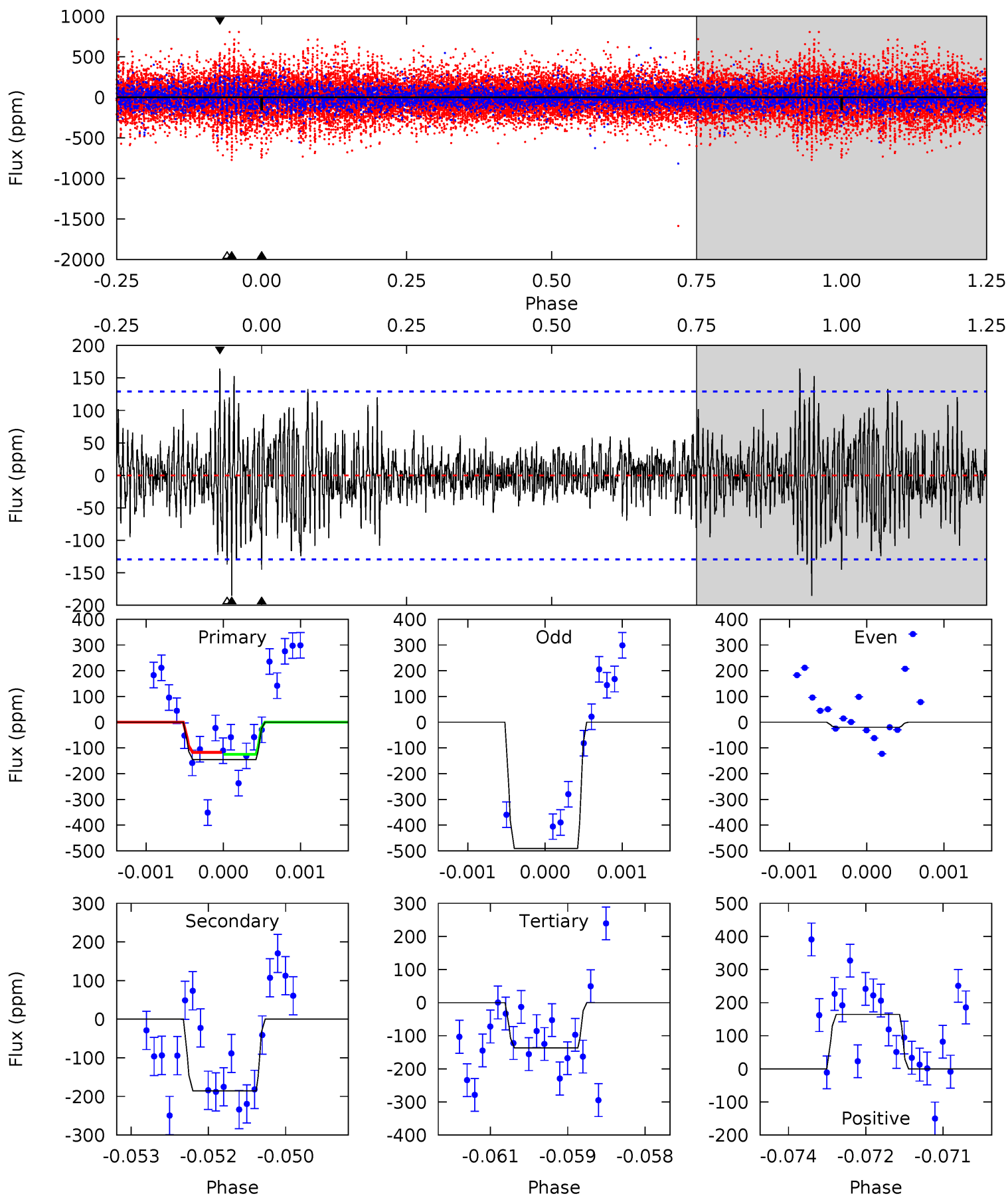
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.56	5.84	5.21	5.20	5.38	3.18	1.64	4.35	4.36	0.63	0.64	1.07	0.97	0.35	2.68



# Alt Model-Shift Uniqueness Test

005309078-03, P = 202.571778 Days, E = 147.950027 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
6.04	7.72	5.71	6.85	5.39	3.19	1.63	0.33	-0.81	2.01	0.87	9.63	3.57	0.47	0.16



### Stellar Parameters For KIC 005309078

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6452^{+177}_{-177}$	$3.492^{+0.360}_{-0.090}$	$-0.140^{+0.350}_{-0.300}$	$3.947^{+0.518}_{-1.555}$	$1.764^{+0.175}_{-0.407}$	$0.040^{+0.122}_{-0.012}$
	+3%/-3%	+10%/-3%	+250%/-214%	+13%/-39%	+10%/-23%	+302%/-30%
Source	PHO1	FLK73	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 005309078-03 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-127 \pm 22$	$6.40^{+4.34}_{-3.65}$	$856^{+50}_{-89}$	$5356^{+2858}_{-935}$	$1142^{+4721}_{-759}$
Alt.	$-185 \pm 24$	$5.88^{+4.08}_{-3.59}$	$857^{+50}_{-90}$	$6131^{+4851}_{-1229}$	$2015^{+10600}_{-1327}$

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

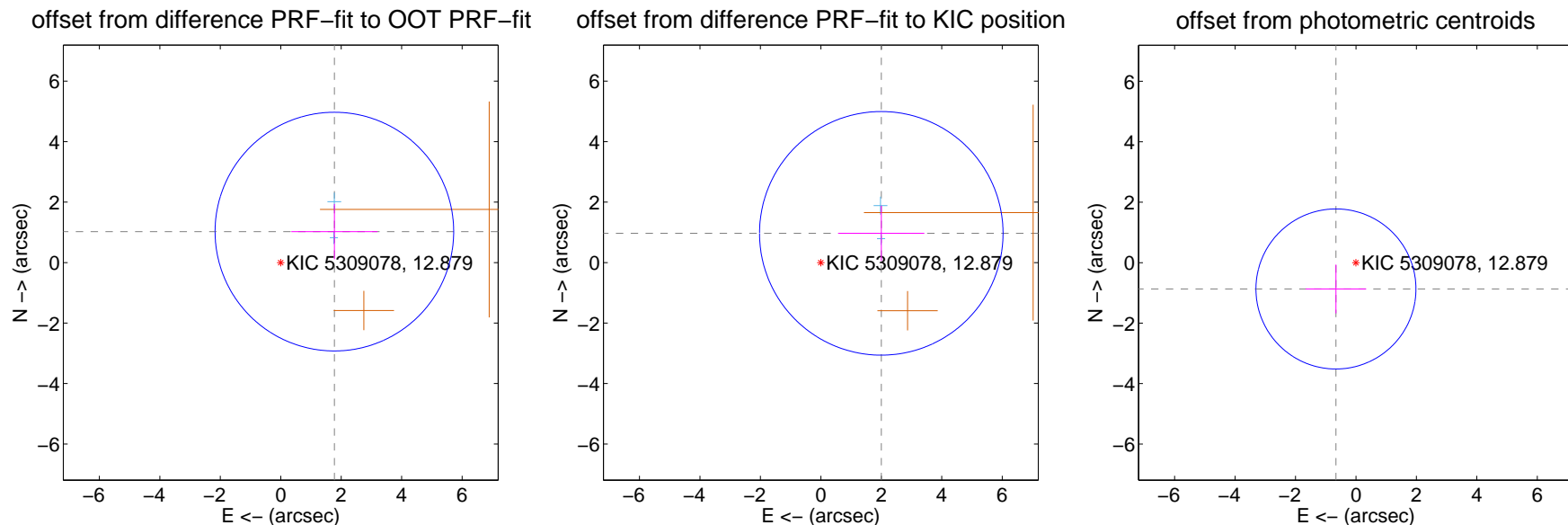
## DV Centroid Data

Supplemental centroid analysis for 005309078-03. Kepler magnitude: 12.88. Transit SNR 7.67

There are 2 quarters with good PRF difference image offsets

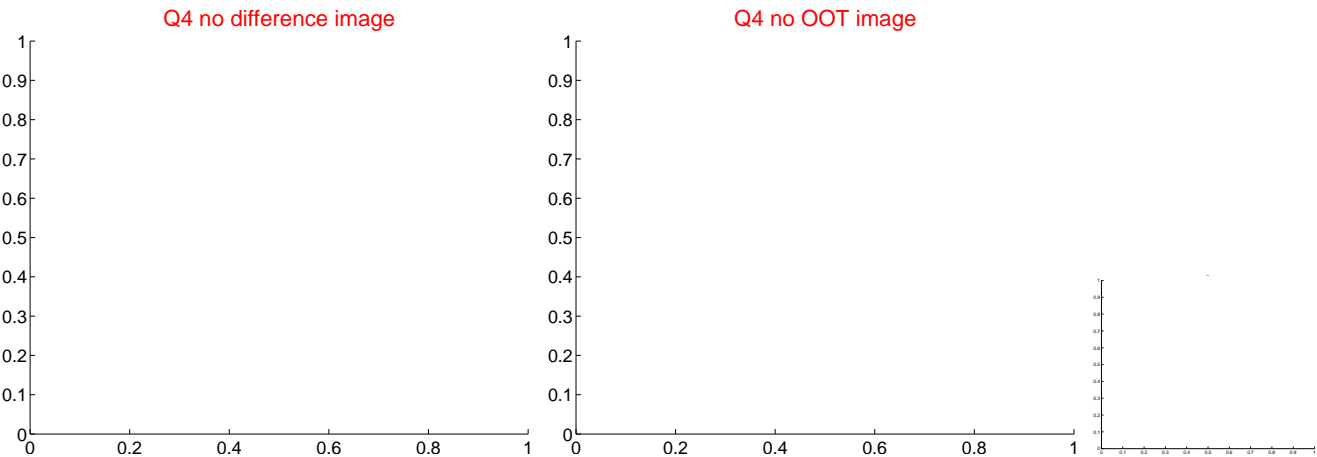
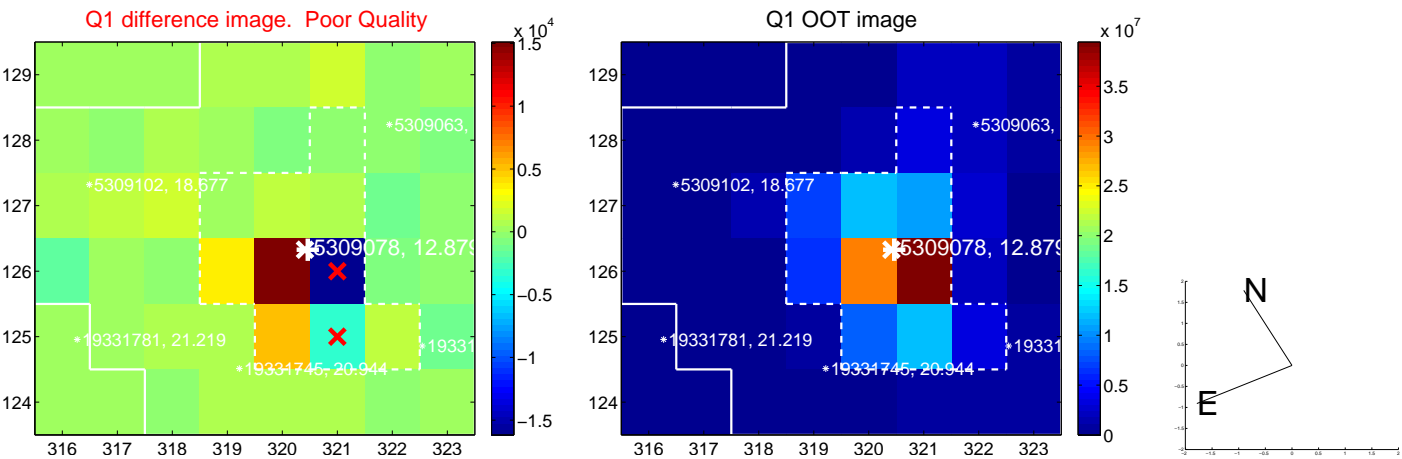
The direct PRF centroid is offset from the target star catalog position by about 0.17 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.049 \pm 1.316$	1.56	$-1.774 \pm 1.424$	$1.024 \pm 0.914$
PRF-fit source offset from KIC position	$2.221 \pm 1.343$	1.65	$-1.999 \pm 1.424$	$0.967 \pm 0.914$
photometric centroid source offset	$1.09 \pm 0.88$	1.24	$0.66 \pm 1.00$	$-0.87 \pm 0.81$

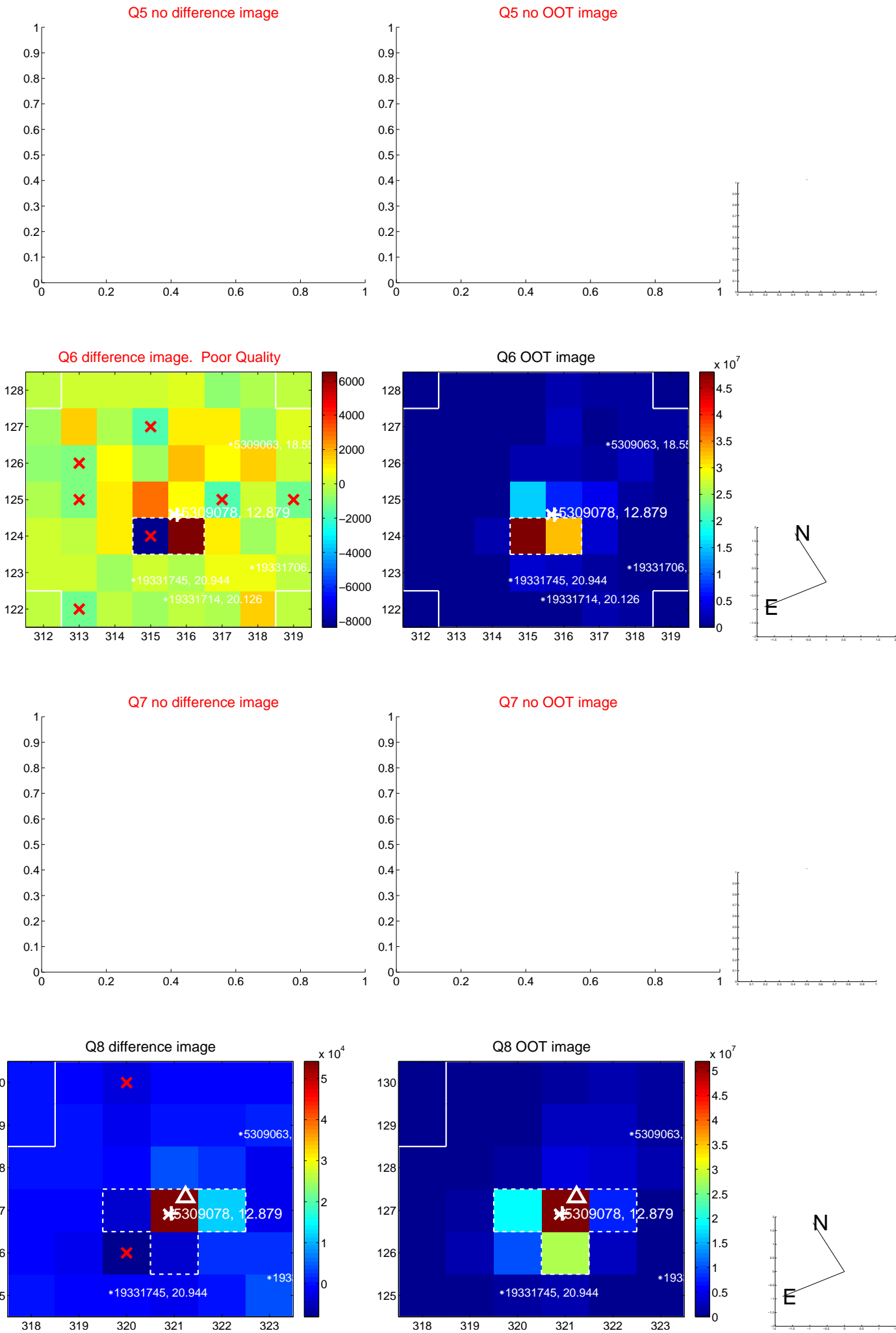


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

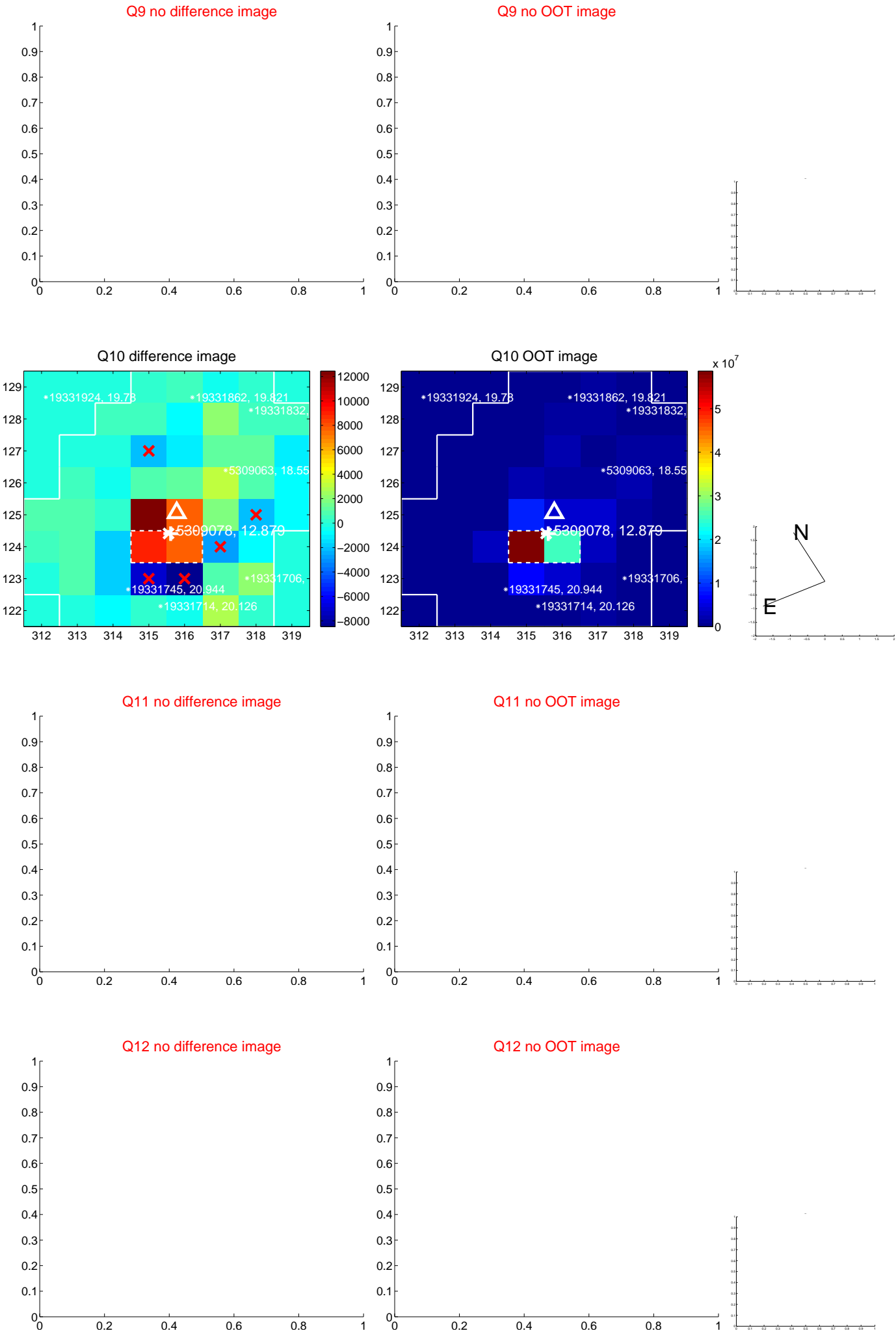


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

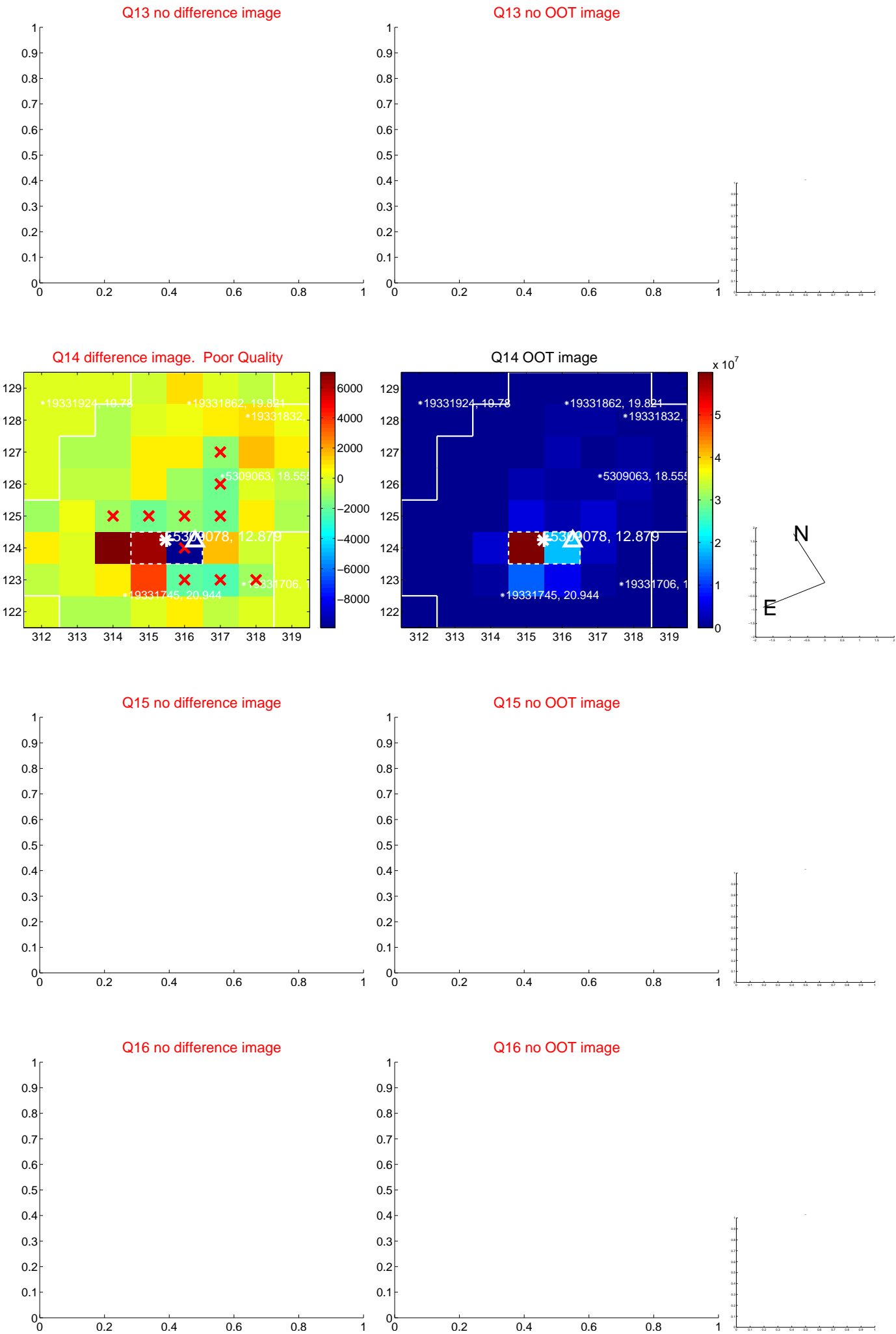




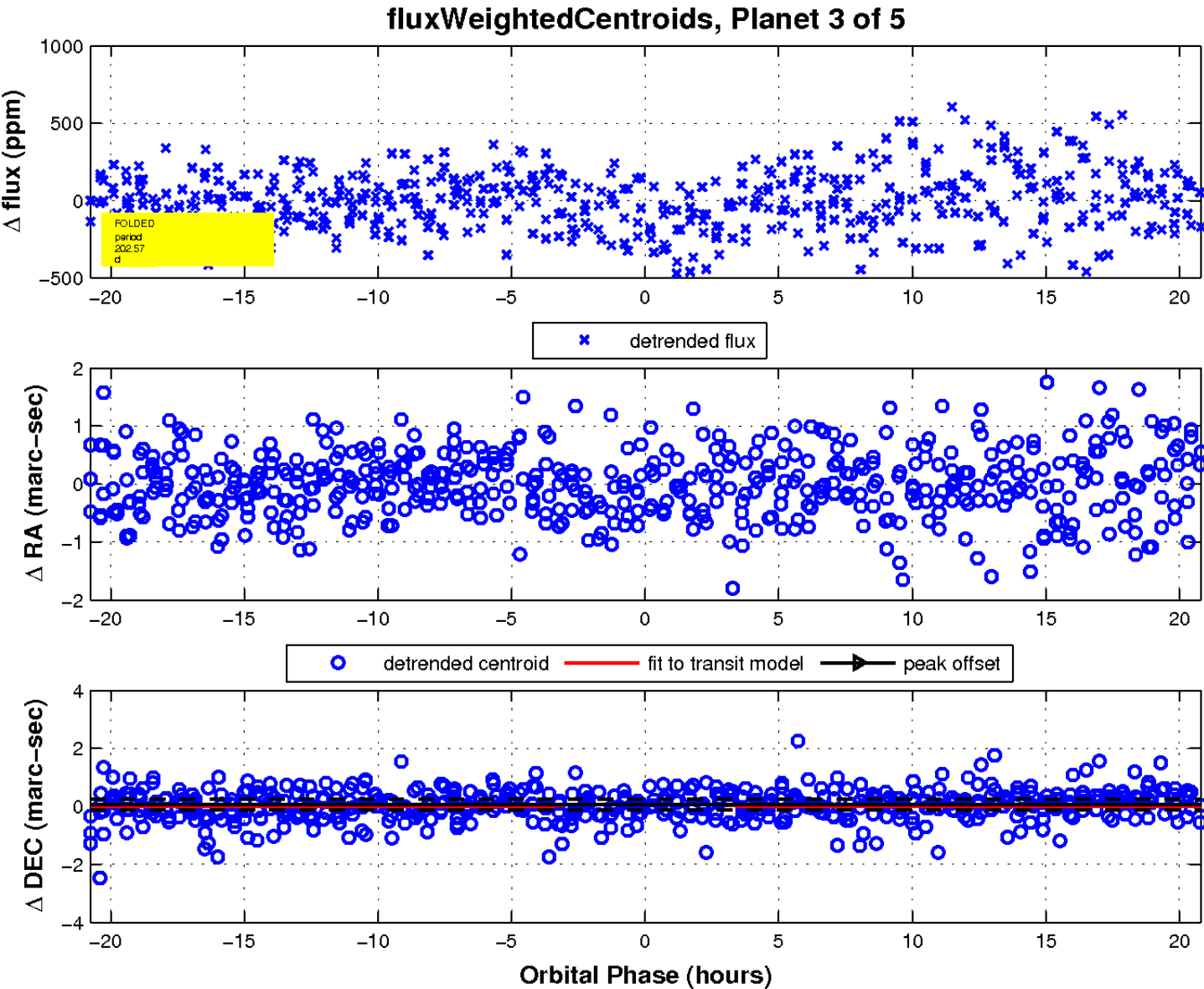
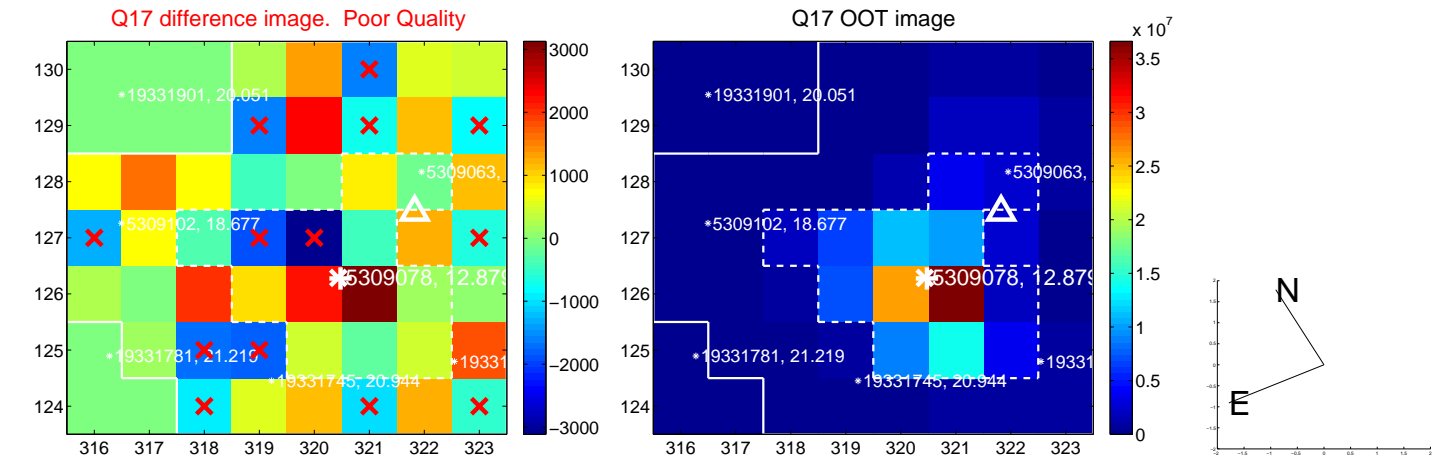
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

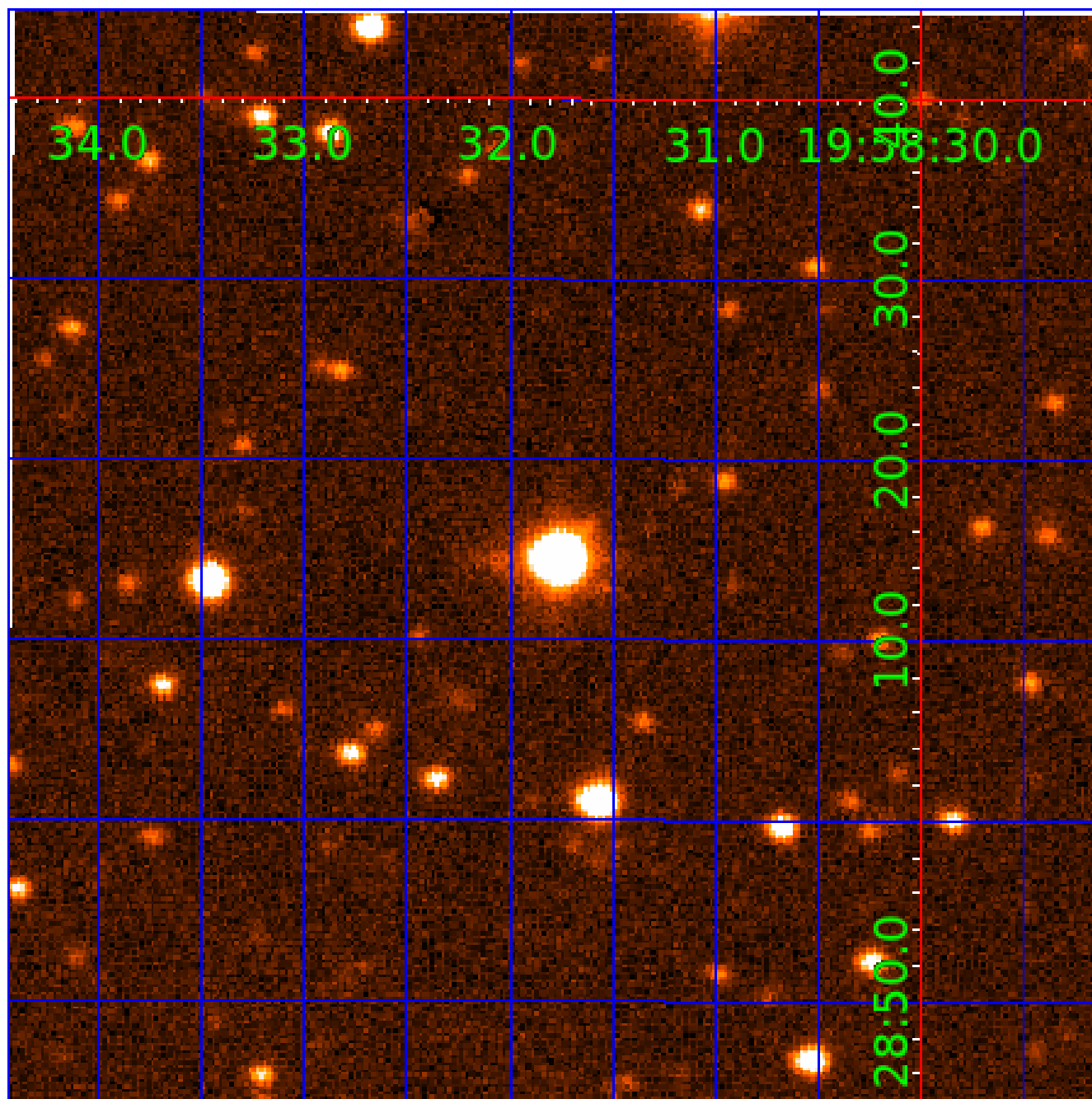


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 005309078

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005309078-01	OBS	No	0.807230	132.075081	20.7	4.045	11.8	10.5	3.95	6452	2.06	57524.61
005309078-02	OBS	No	106.192098	163.186057	329.5	1.236	8.7	6.7	3.95	6452	8.28	85.98
005309078-03	OBS	No	202.568627	147.975479	225.6	6.936	7.6	7.7	3.95	6452	6.74	36.34
005309078-04	OBS	No	51.849424	163.356385	192.4	2.065	7.2	6.9	3.95	6452	6.26	223.63
005309078-05	OBS	No	37.534480	138.176930	151.1	1.822	7.3	7.9	3.95	6452	5.68	344.04

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005309078-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV
005309078-02	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_UNCERTAIN
005309078-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
005309078-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
005309078-05	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

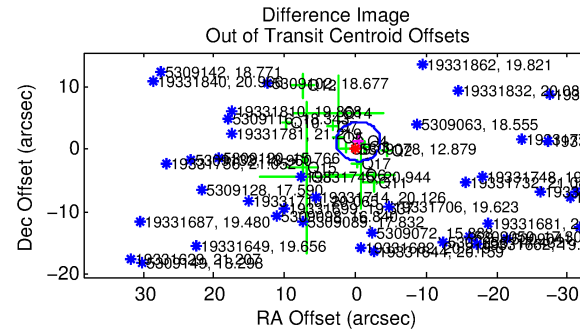
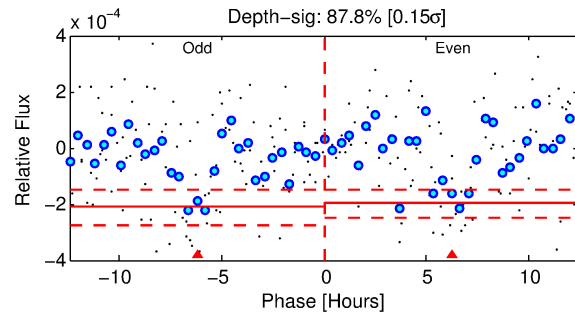
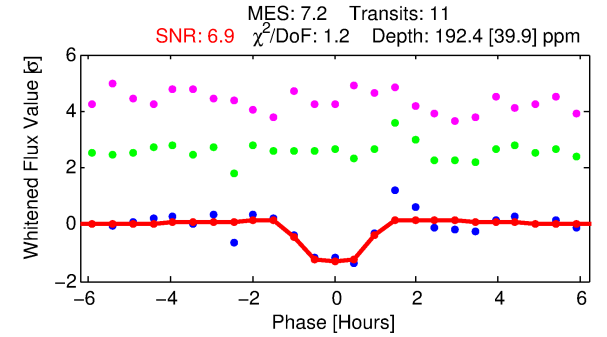
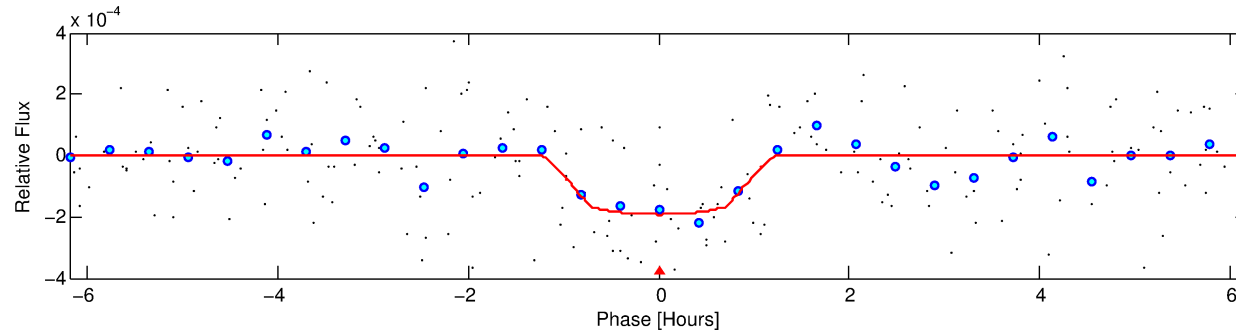
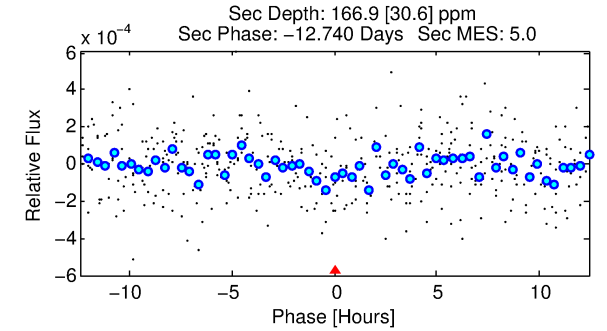
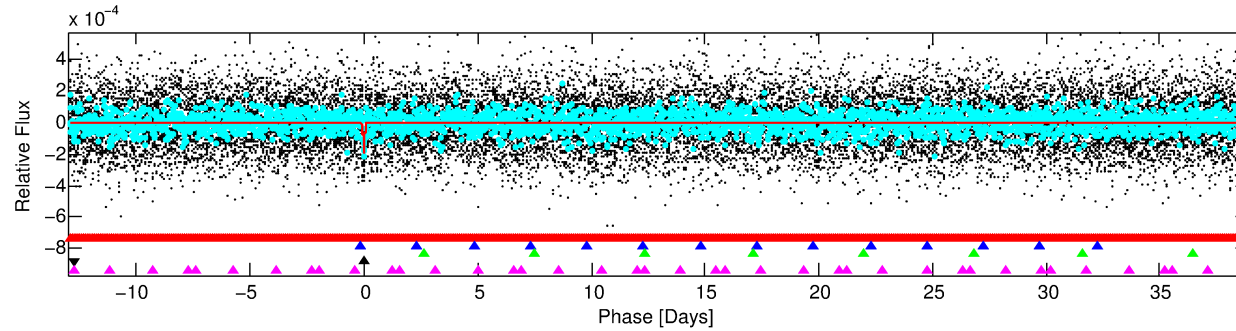
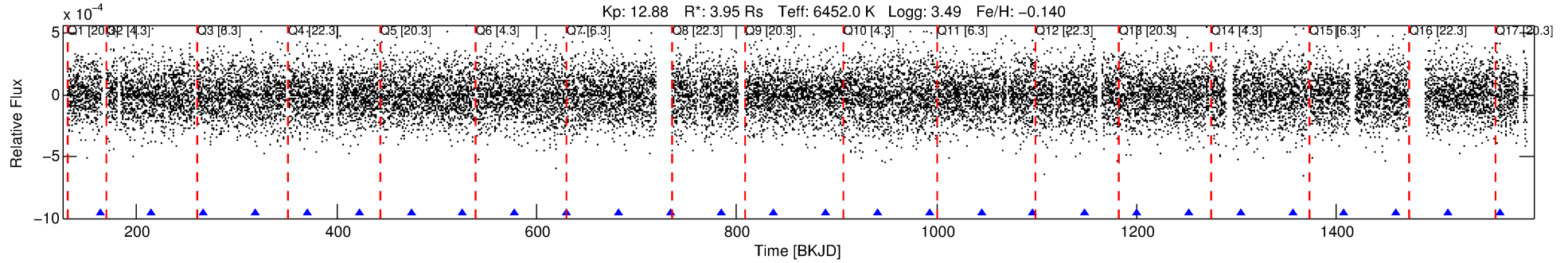
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 005309078-04

No Significant Match Found

# DV One-Page Summary

KIC: 5309078 Candidate: 4 of 5 Period: 51.849 d



## DV Fit Results:

Period = 51.84942 [0.00062] d  
Epoch = 163.3564 [0.0100] BKJD  
Rp/R\* = 0.0145 [0.0472]  
a/R\* = 100.90 [1865.47]  
b = 0.87 [5.35]  
Seff = 223.63 [139.01]  
Teq = 986 [153] K  
Rp = 6.26 [20.47] Re  
a = 0.3289 [0.1254] AU  
Ag = 253.28 [1651.77] [0.15σ]  
Teffp = 6082 [9874] K [0.52σ]

## DV Diagnostic Results:

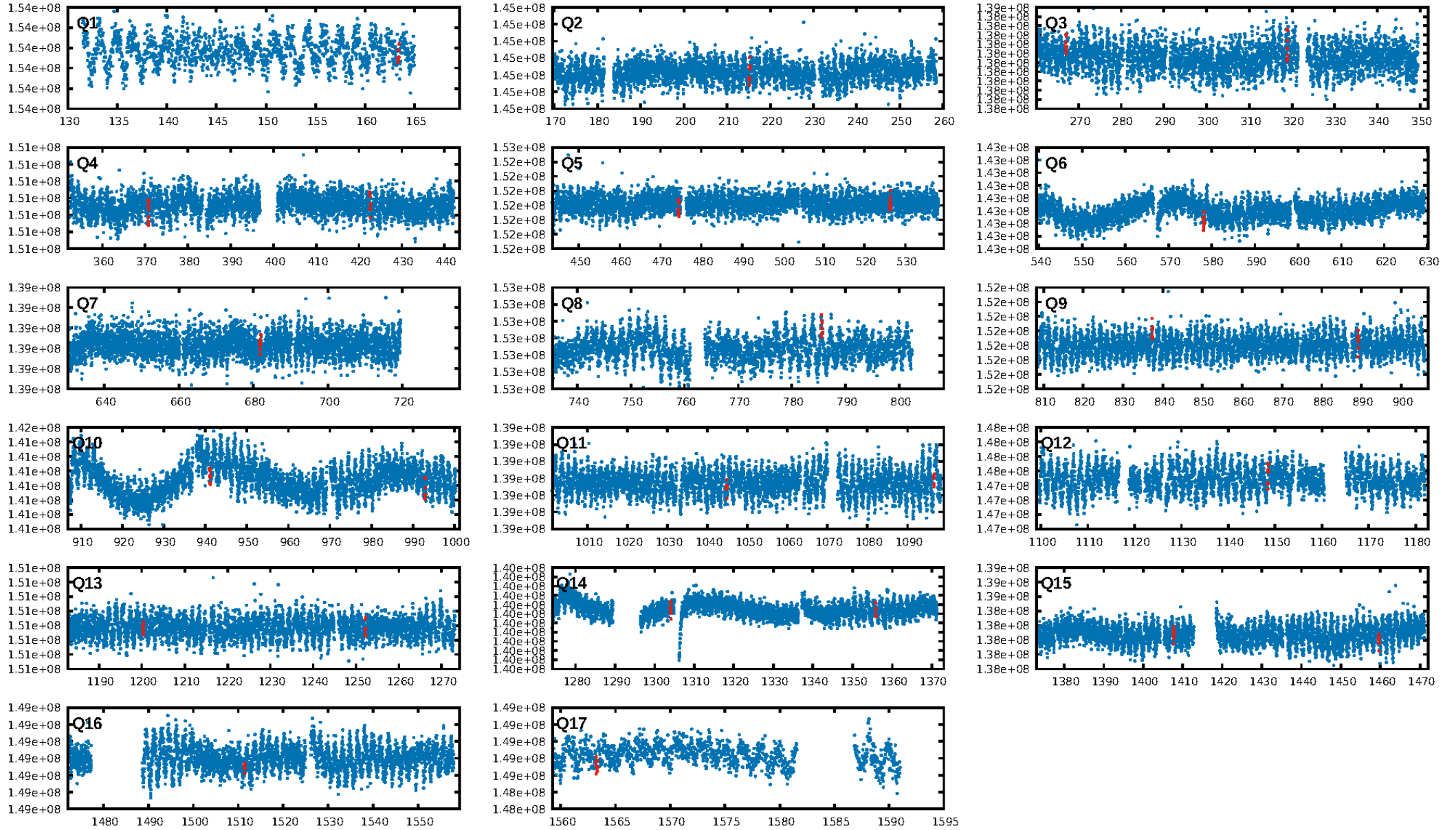
ShortPeriod-sig: 100.0% [124.76σ]  
LongPeriod-sig: 100.0% [541.90σ]  
ModelChiSquare2-sig: 9.2%  
ModelChiSquareGof-sig: 93.3%  
Bootstrap-pfa: 1.29e-08  
RollingBand-fgt: 1.00 [11/11]  
GhostDiagnostic-chr: 1.521  
Centroid-sig: N/A  
Centroid-so: 3.010 arcsec [3.04σ]  
OotOffset-rm: 1.273 arcsec [1.22σ]  
KicOffset-rm: 1.250 arcsec [1.23σ]  
OotOffset-st: 4/4/3/3 [14]  
KicOffset-st: 4/4/3/3 [14]  
DiffImageQuality-fgm: 0.21 [3/14]  
DiffImageOverlap-fno: 0.24 [4/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 00:20:42 Z

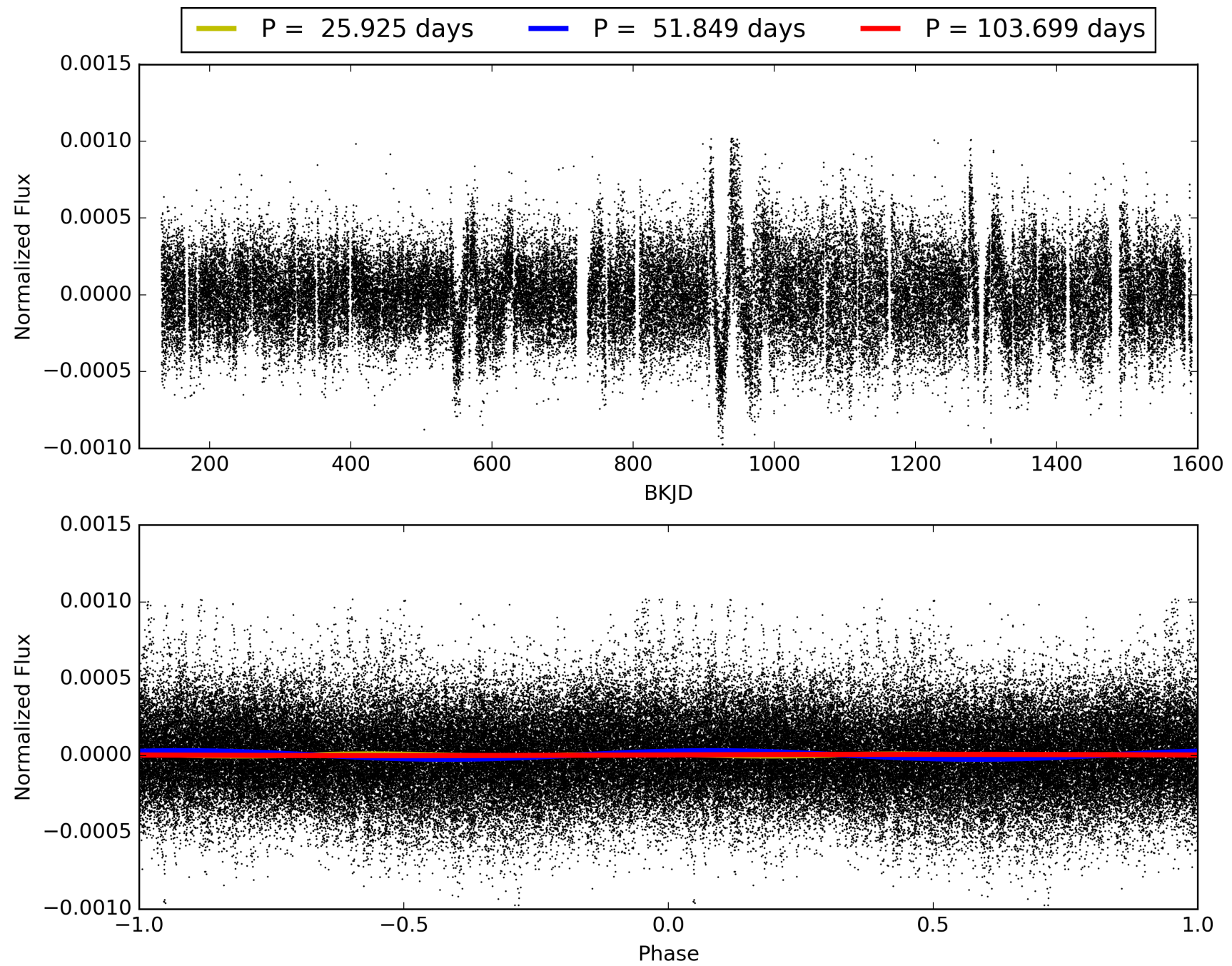
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 005309078-04, PDC Light Curves

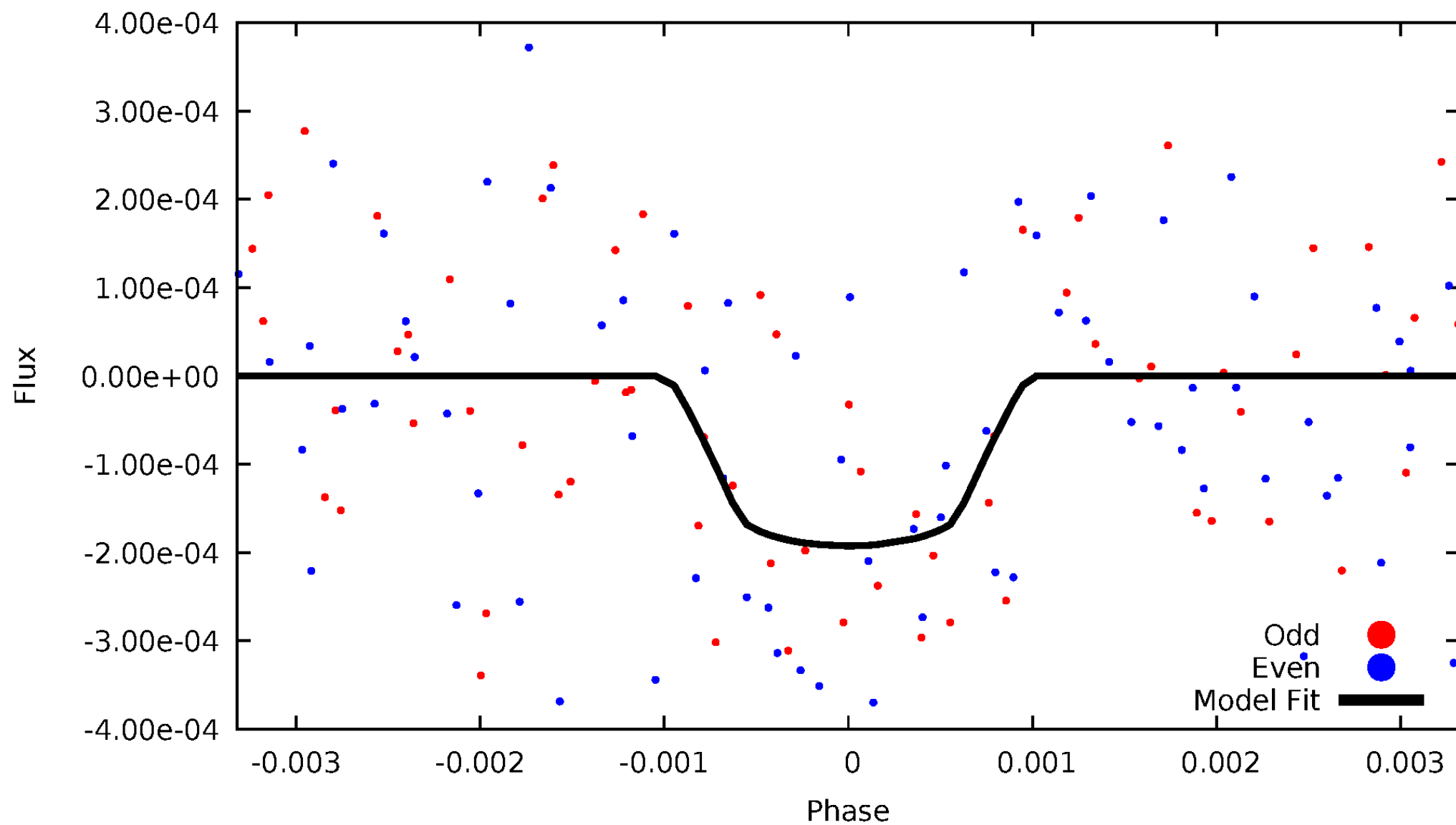


TCE 005309078-04



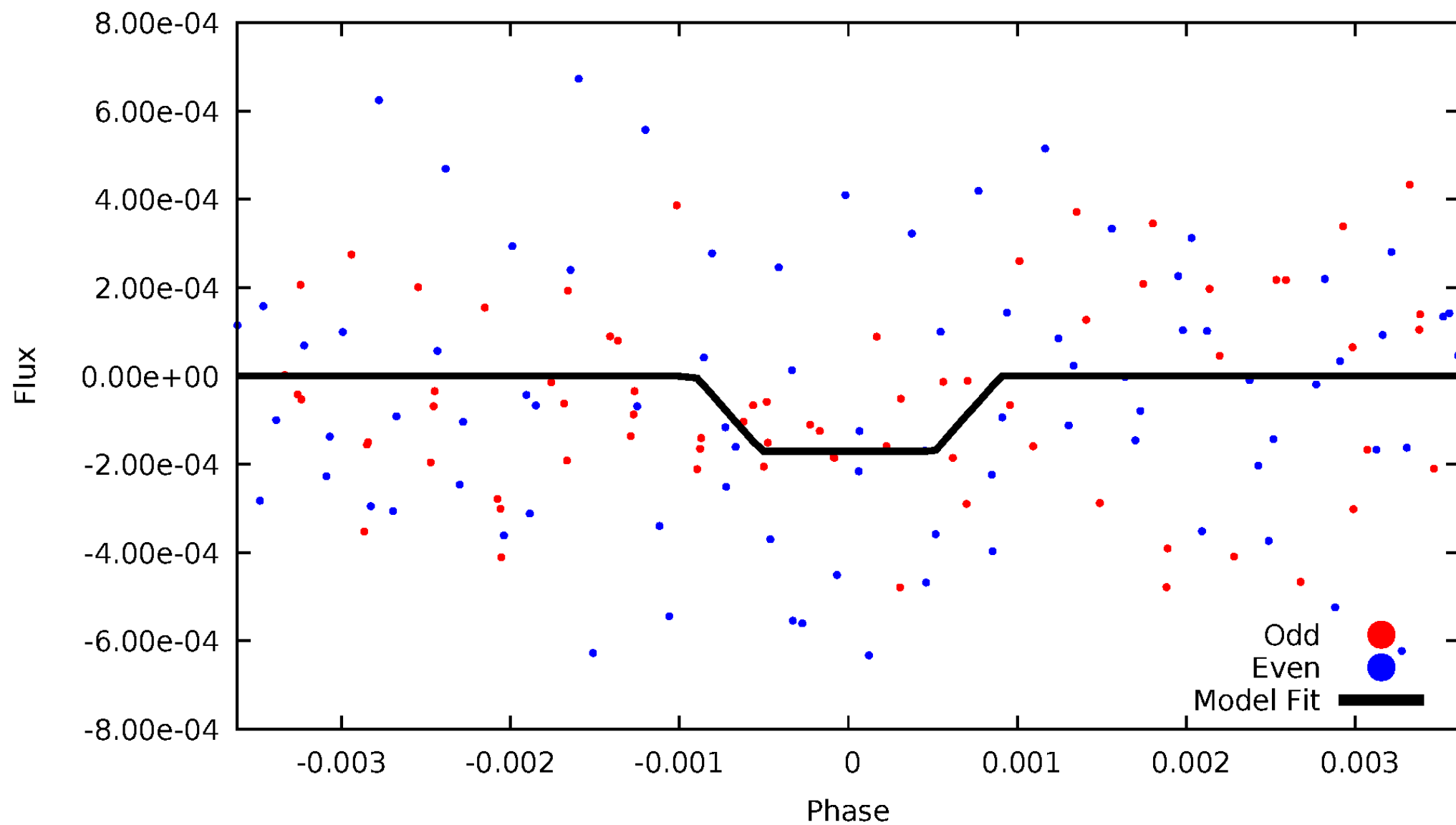
# DV Odd/Even

TCE 005309078-04



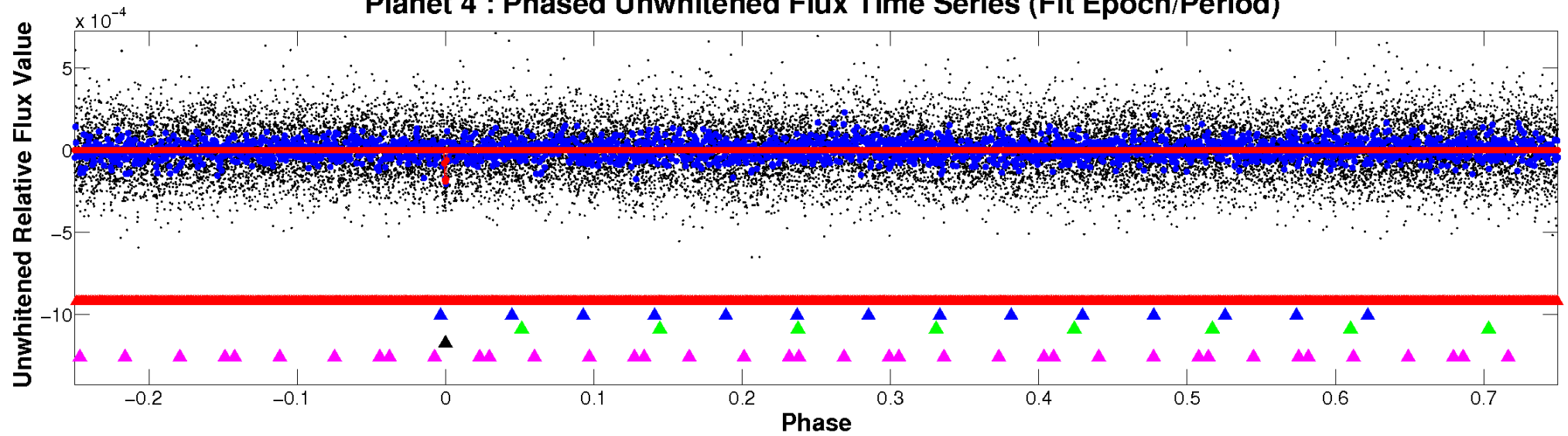
# ALT Odd/Even

TCE 005309078-04

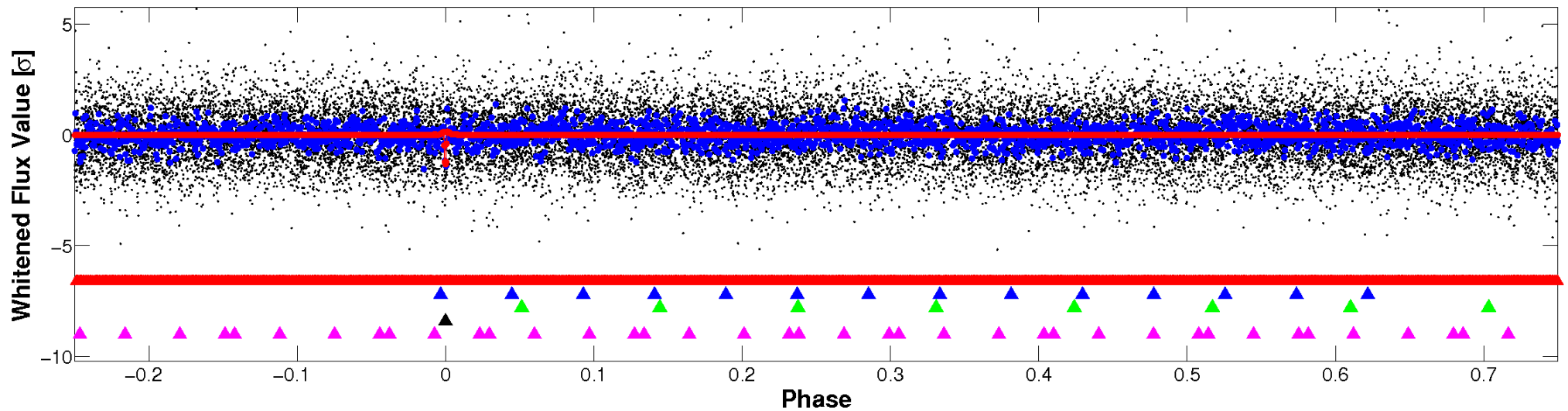


# Non-Whitened Vs. Whitened Light Curve

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

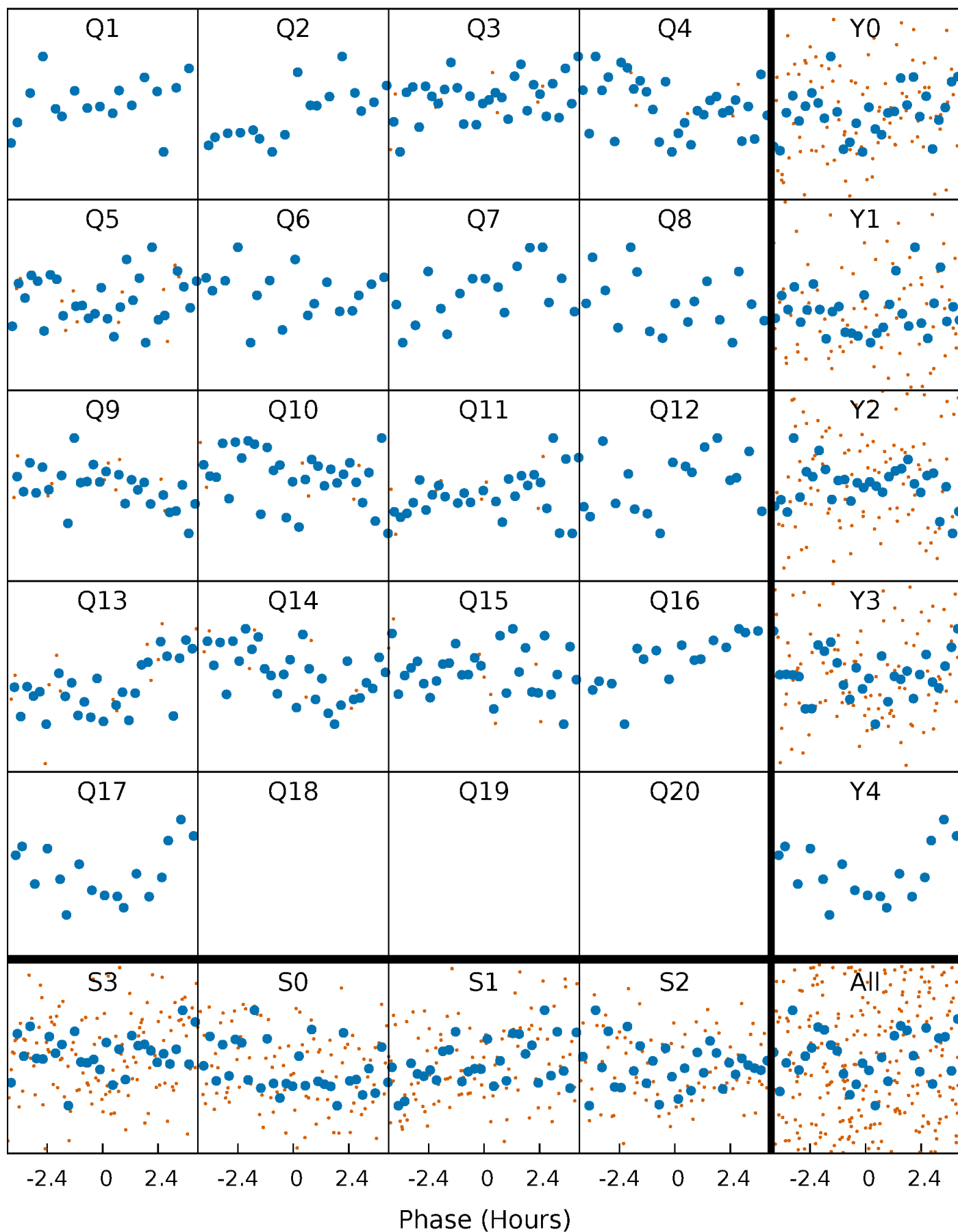


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

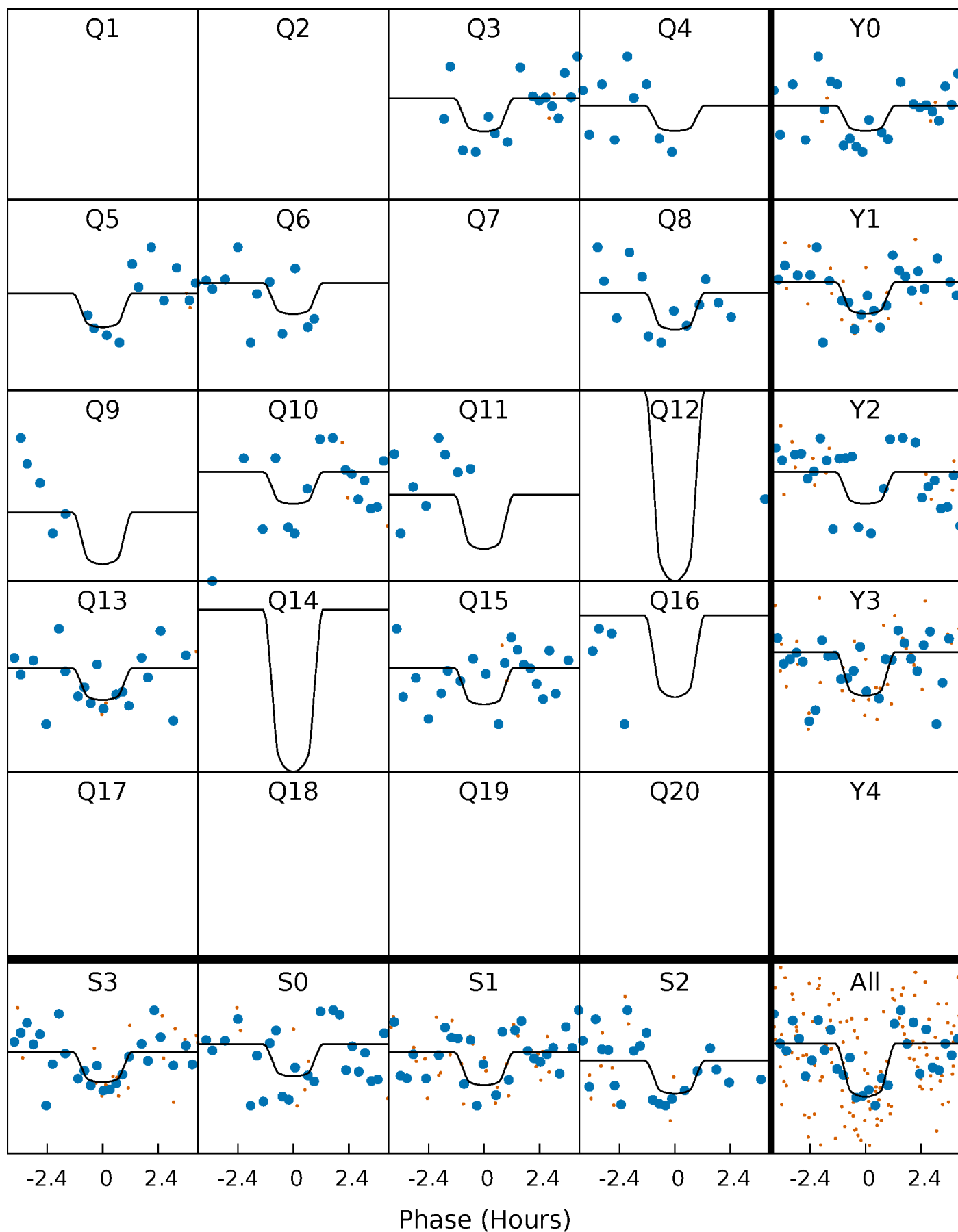
TCE 005309078-04     $P = 51.849424$  Days     $T_0 = 163.356385$  (BKJD)





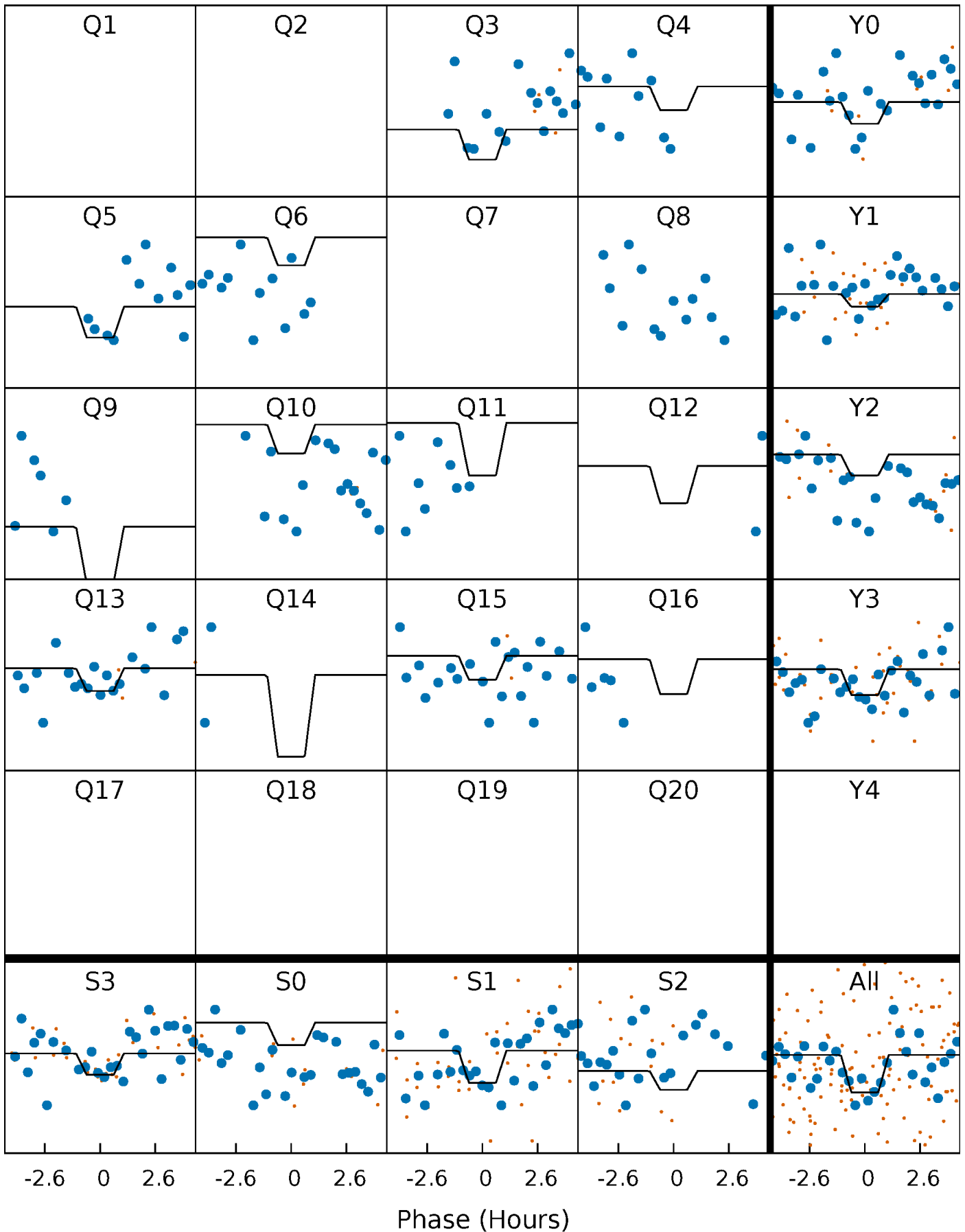
# DV Quarter-Phased Transit Curves

TCE 005309078-04   P= 51.849424 Days    $T_0=163.356385$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

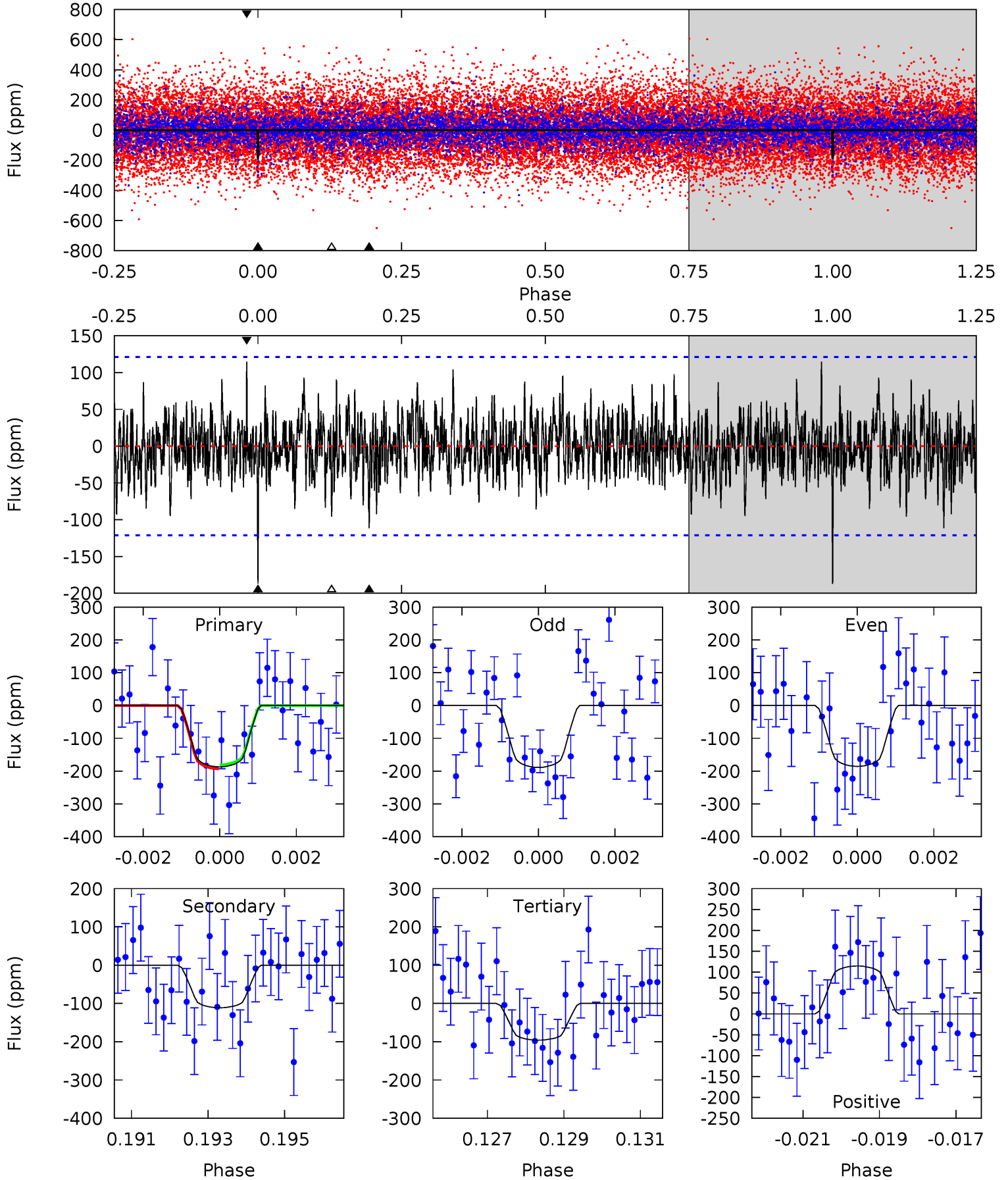
TCE 005309078-04   P= 51.849875 Days    $T_0=163.349870$  (BKJD)



# DV Model-Shift Uniqueness Test

005309078-04, P = 51.849424 Days, E = 111.506961 Days

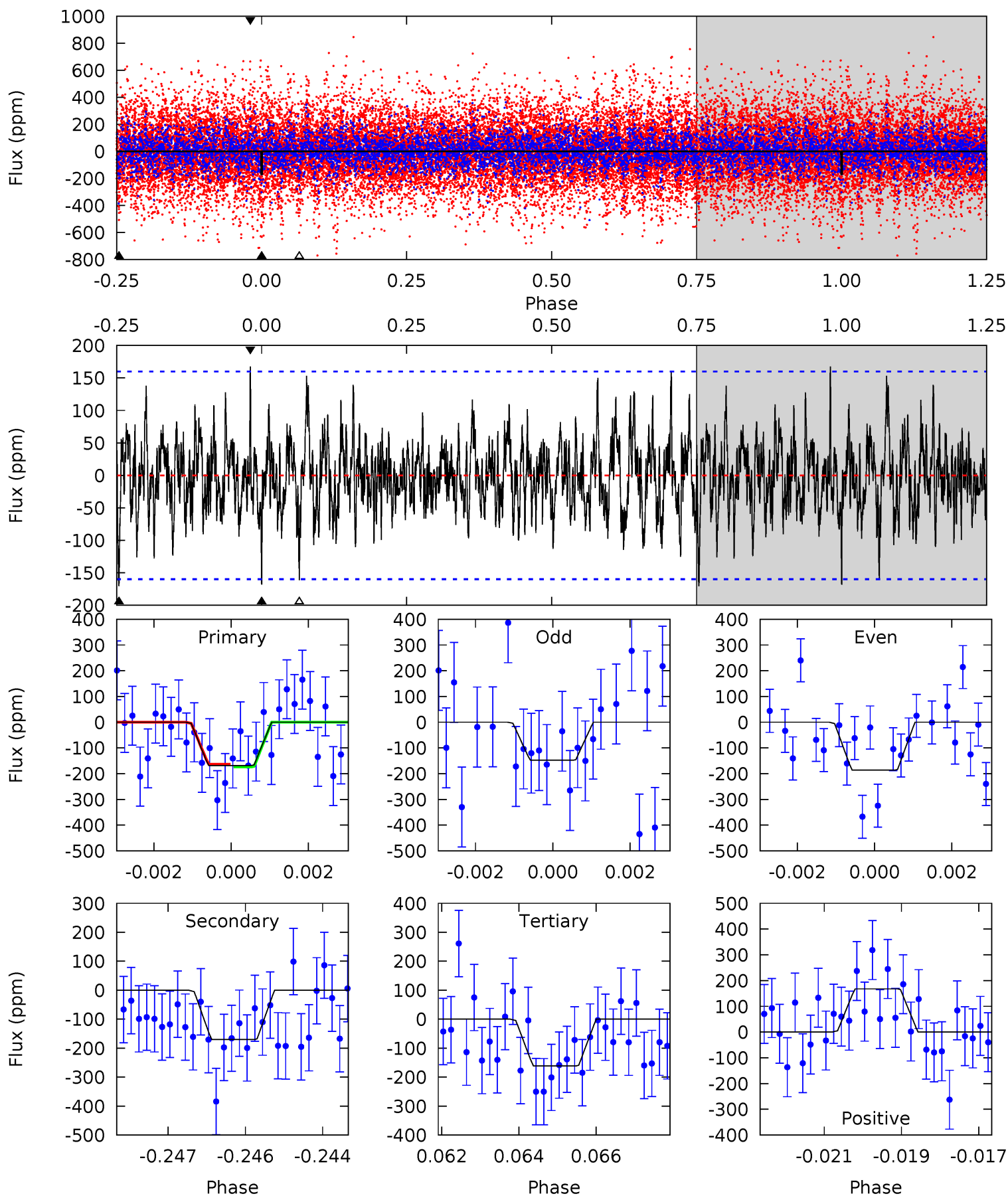
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.25	4.90	4.22	5.06	5.34	3.11	1.37	4.03	3.19	0.68	-0.15	0.07	0.86	0.38	0.27



# Alt Model-Shift Uniqueness Test

005309078-04, P = 51.849875 Days, E = 111.499995 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
5.62	5.70	5.39	5.61	5.35	3.13	1.58	0.23	0.02	0.30	0.09	0.64	1.04	0.50	0.17



### Stellar Parameters For KIC 005309078

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6452^{+177}_{-177}$	$3.492^{+0.360}_{-0.090}$	$-0.140^{+0.350}_{-0.300}$	$3.947^{+0.518}_{-1.555}$	$1.764^{+0.175}_{-0.407}$	$0.040^{+0.122}_{-0.012}$
	+3%/-3%	+10%/-3%	+250%/-214%	+13%/-39%	+10%/-23%	+302%/-30%
Source	PHO1	FLK73	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 005309078-04 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-111 \pm 23$	$14.22^{+16.47}_{-9.87}$	$1350^{+81}_{-141}$	$3822^{+2574}_{-833}$	$33^{+323}_{-26}$
Alt.	$-170 \pm 30$	$15.48^{+14.44}_{-11.08}$	$1351^{+80}_{-131}$	$4091^{+2644}_{-837}$	$44^{+445}_{-33}$

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

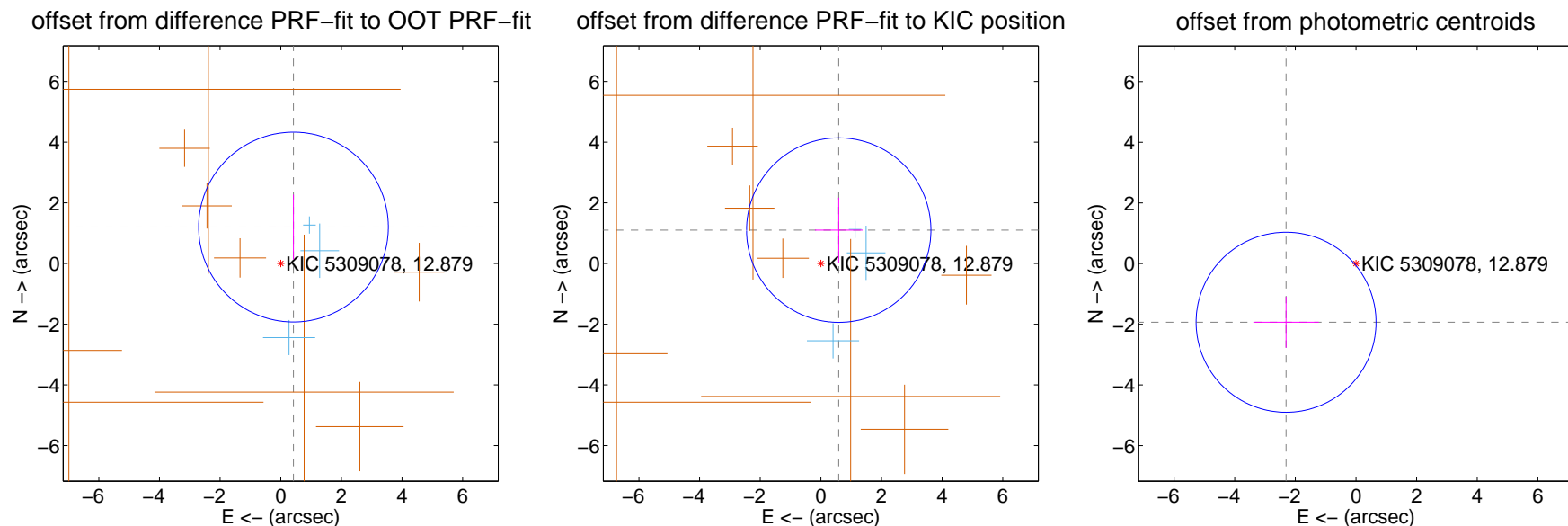
## DV Centroid Data

Supplemental centroid analysis for 005309078-04. Kepler magnitude: 12.88. Transit SNR 6.90

There are 3 quarters with good PRF difference image offsets

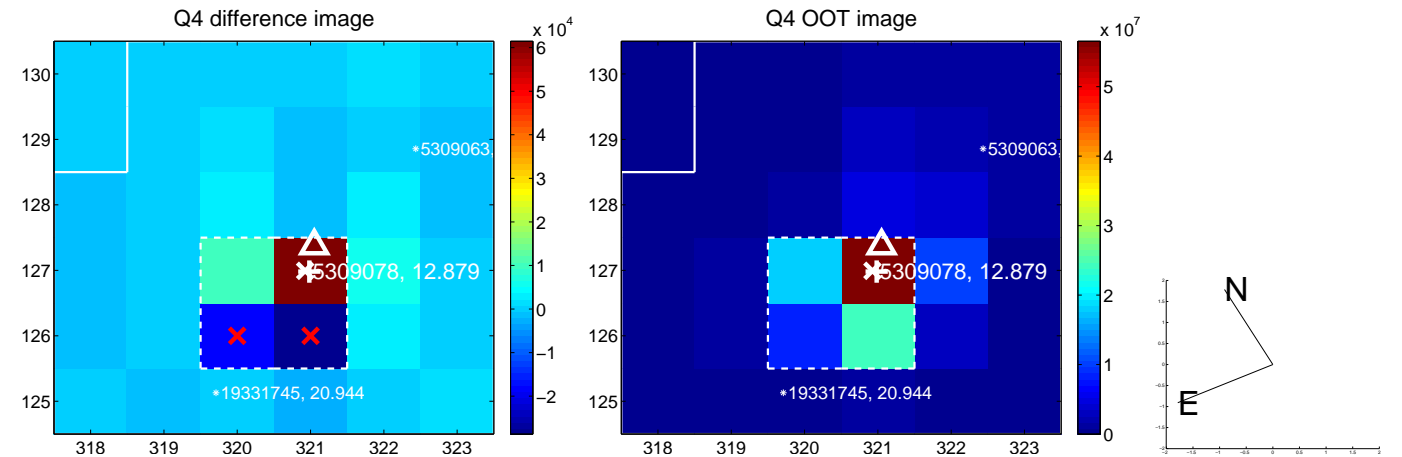
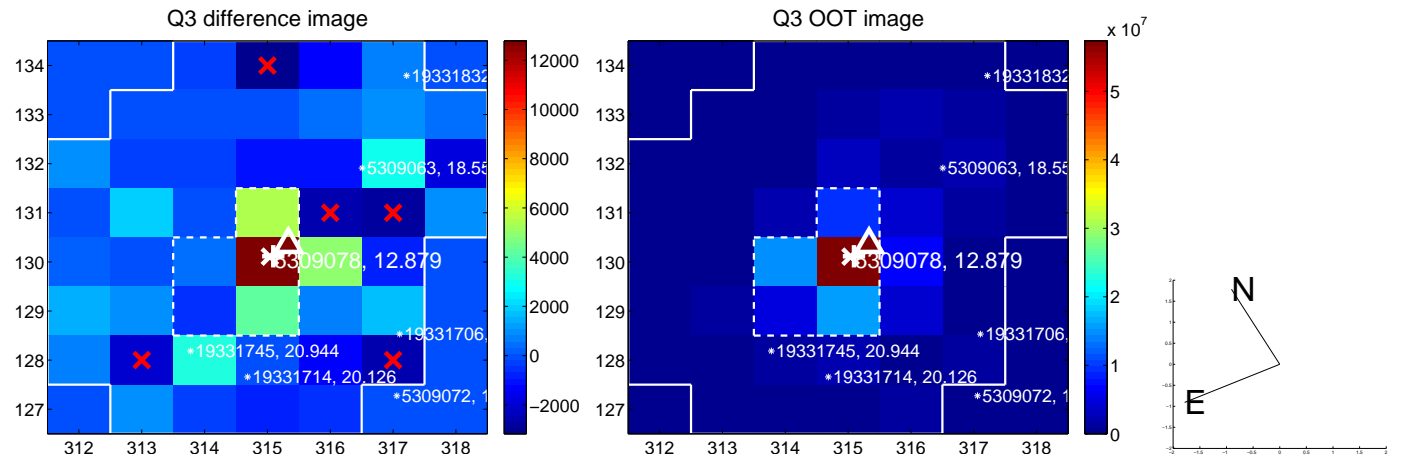
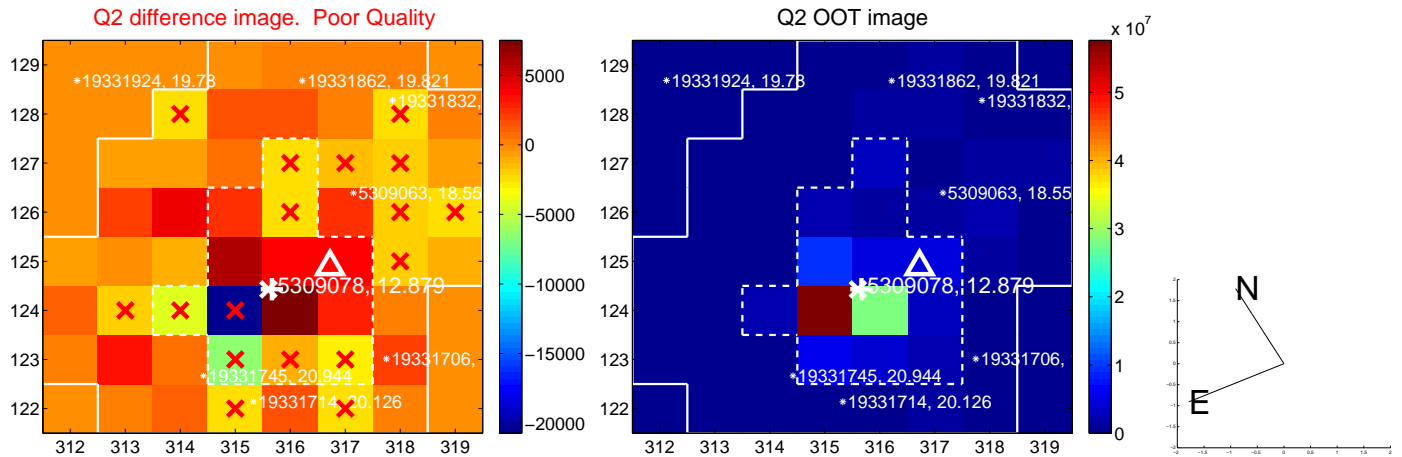
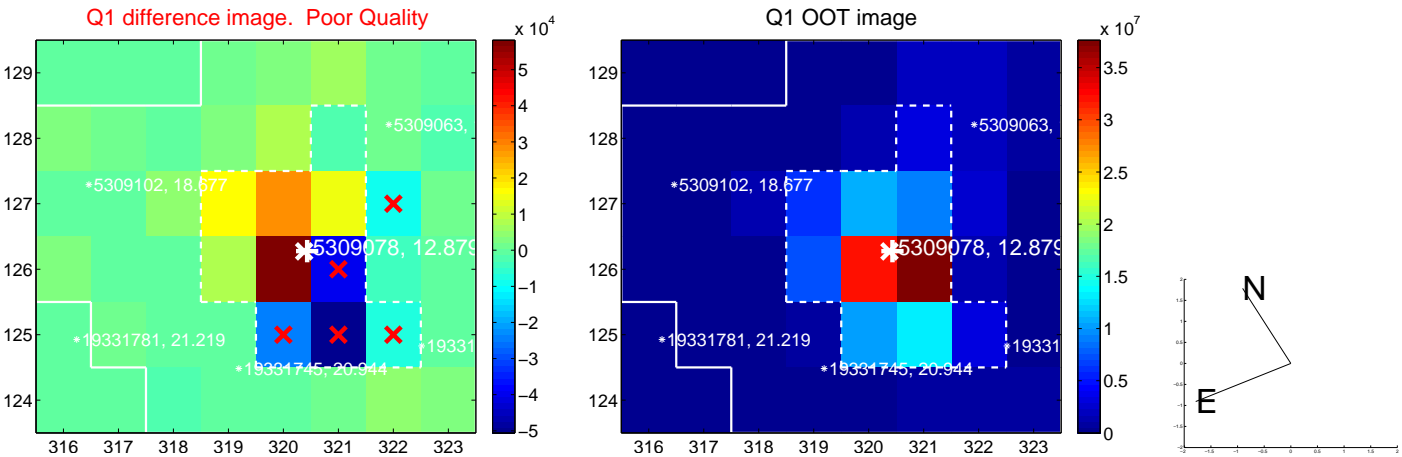
The direct PRF centroid is offset from the target star catalog position by about 0.17 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.273 \pm 1.043$	1.22	$-0.420 \pm 0.786$	$1.202 \pm 1.070$
PRF-fit source offset from KIC position	$1.250 \pm 1.014$	1.23	$-0.590 \pm 0.786$	$1.102 \pm 1.070$
photometric centroid source offset	$3.01 \pm 0.99$	3.04	$2.31 \pm 1.08$	$-1.93 \pm 0.84$



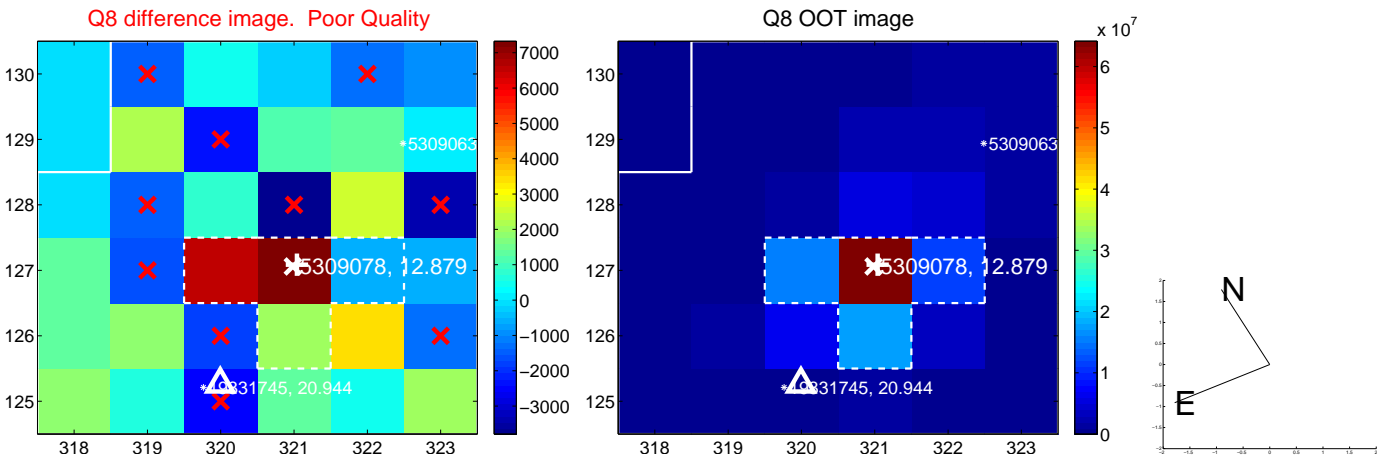
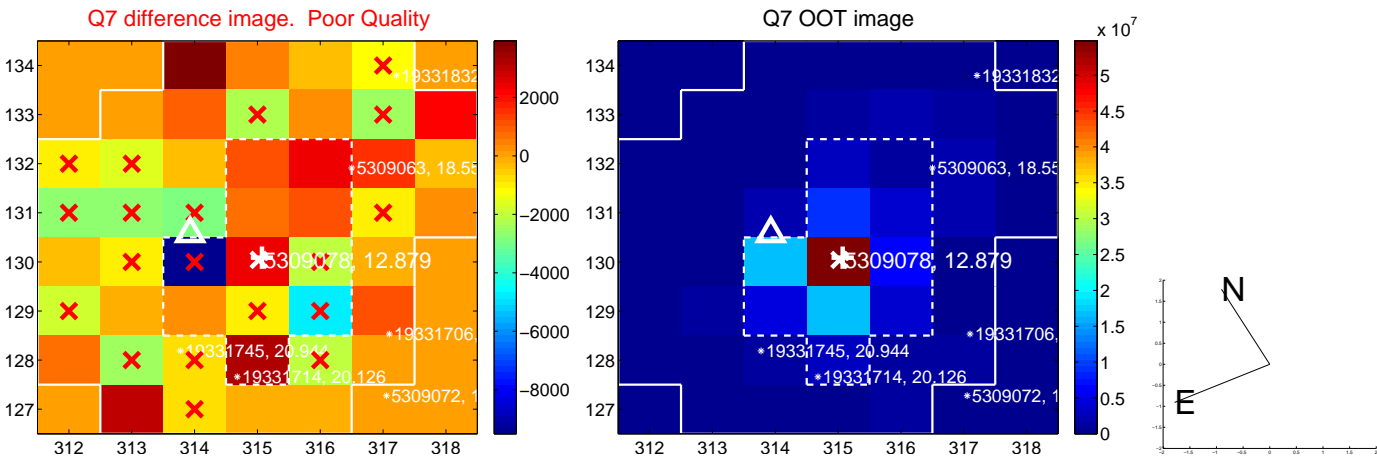
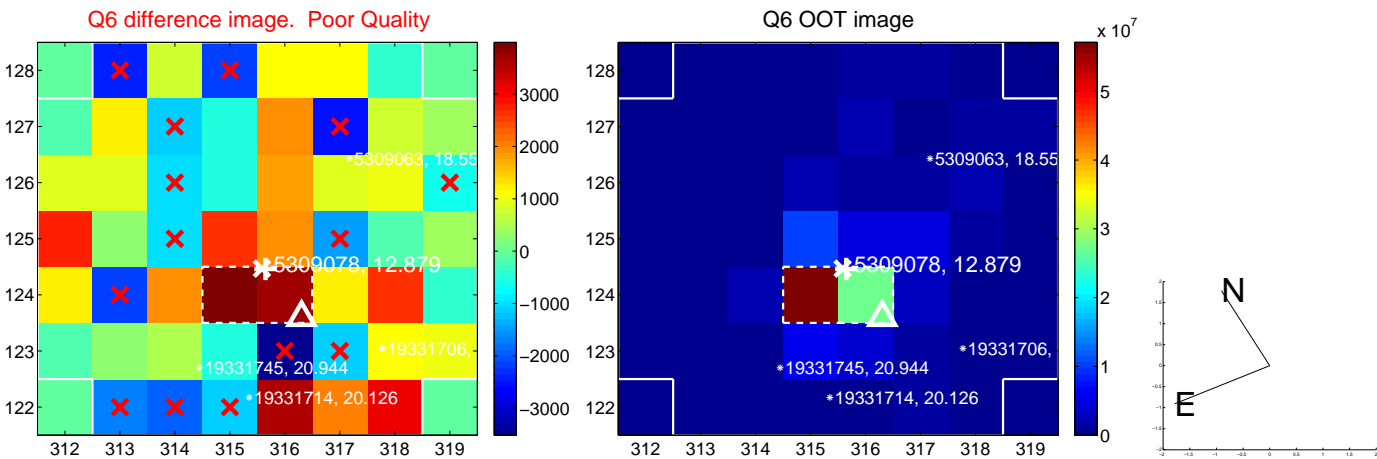
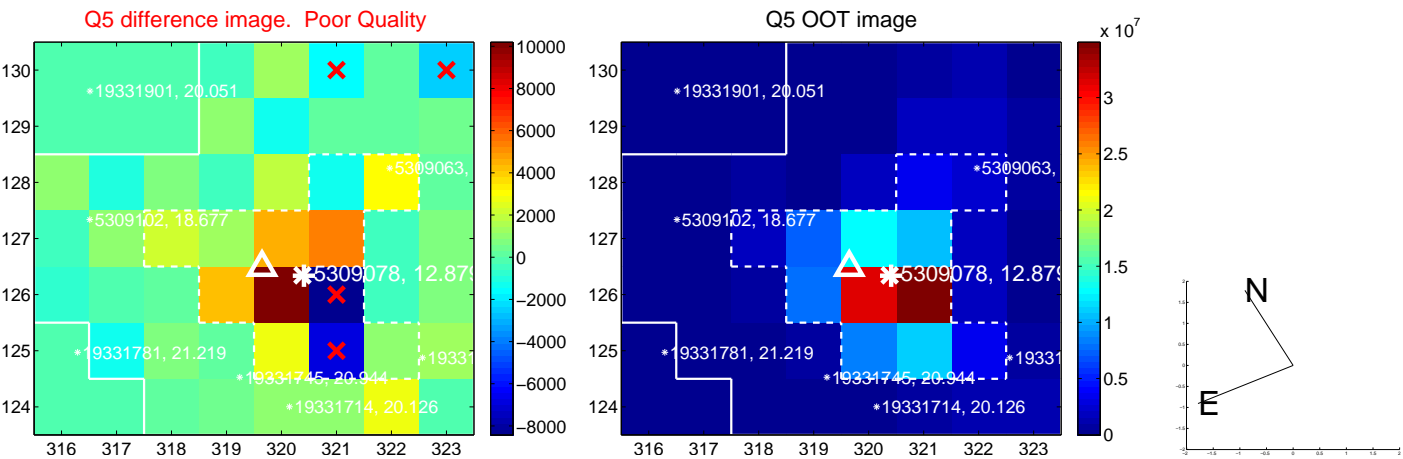
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

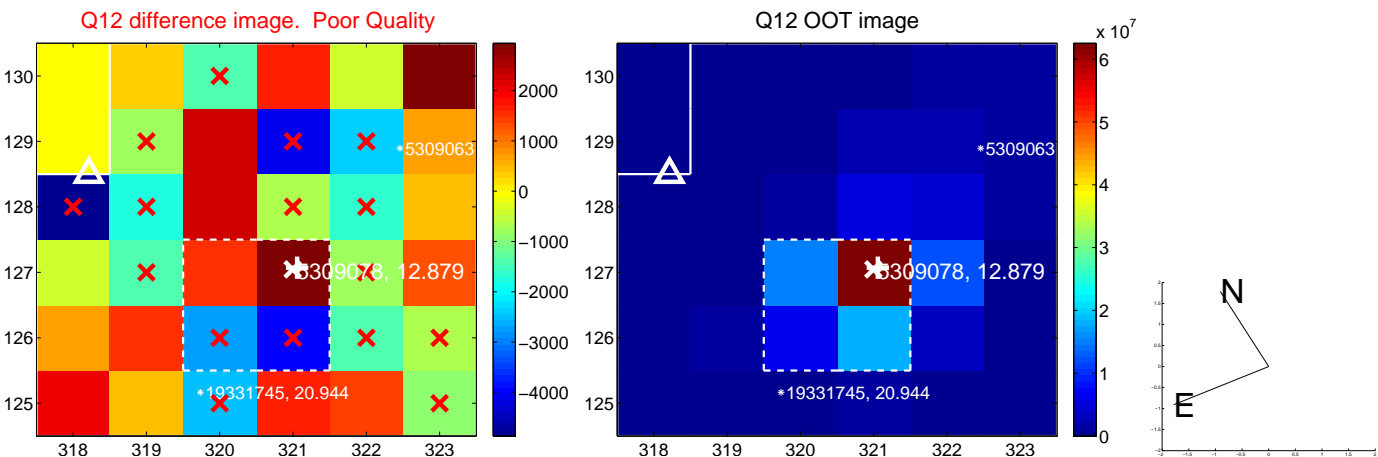
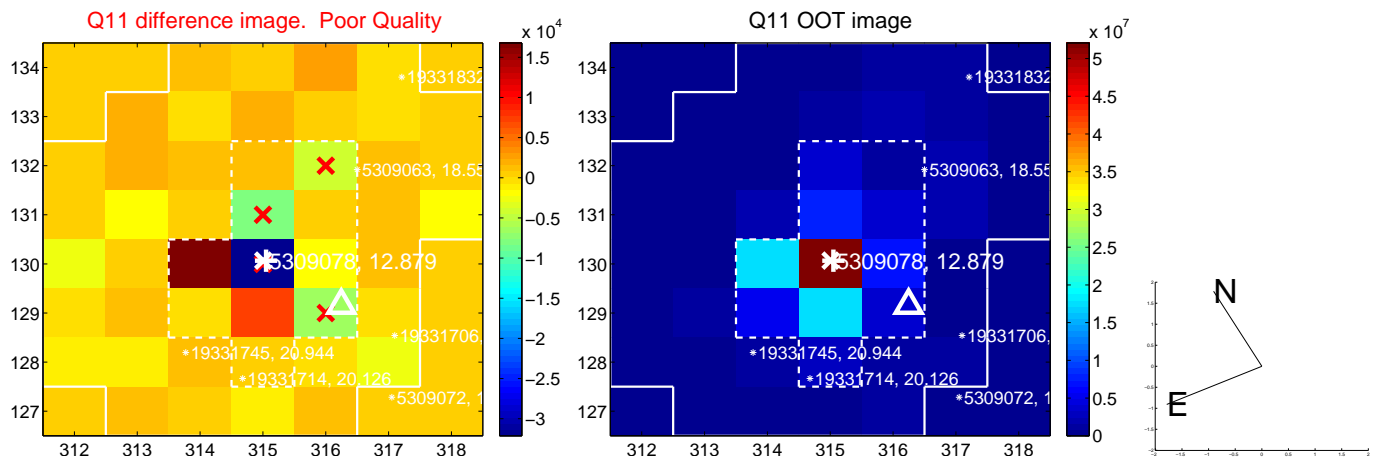
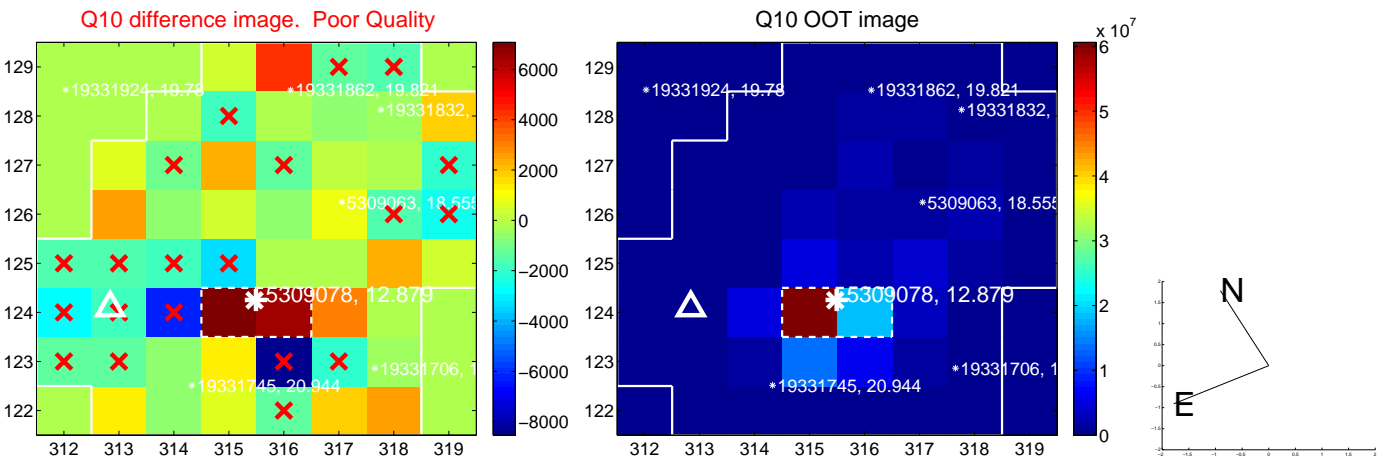
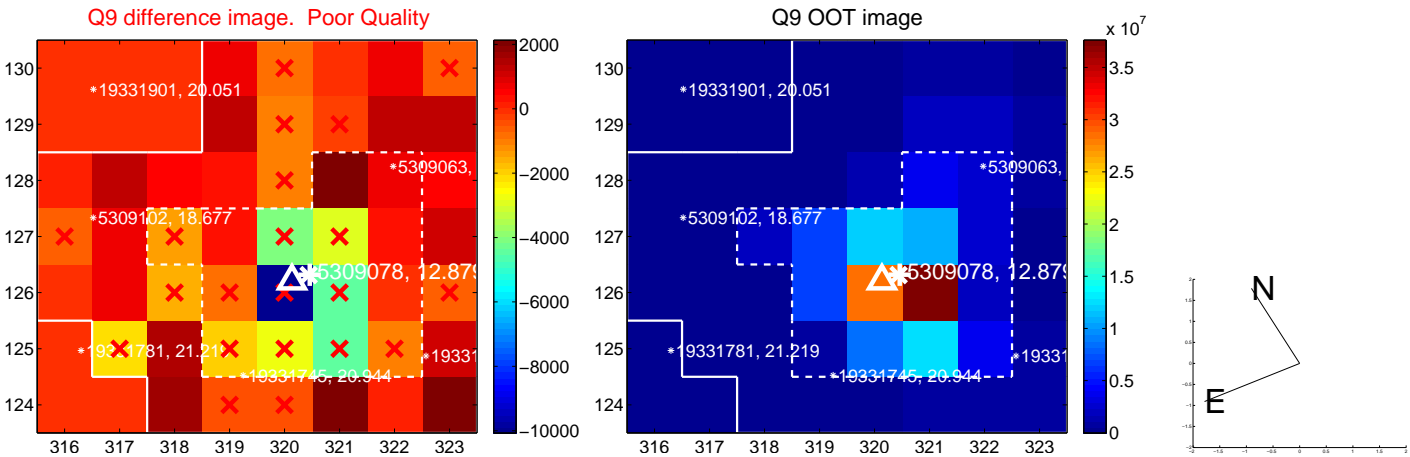




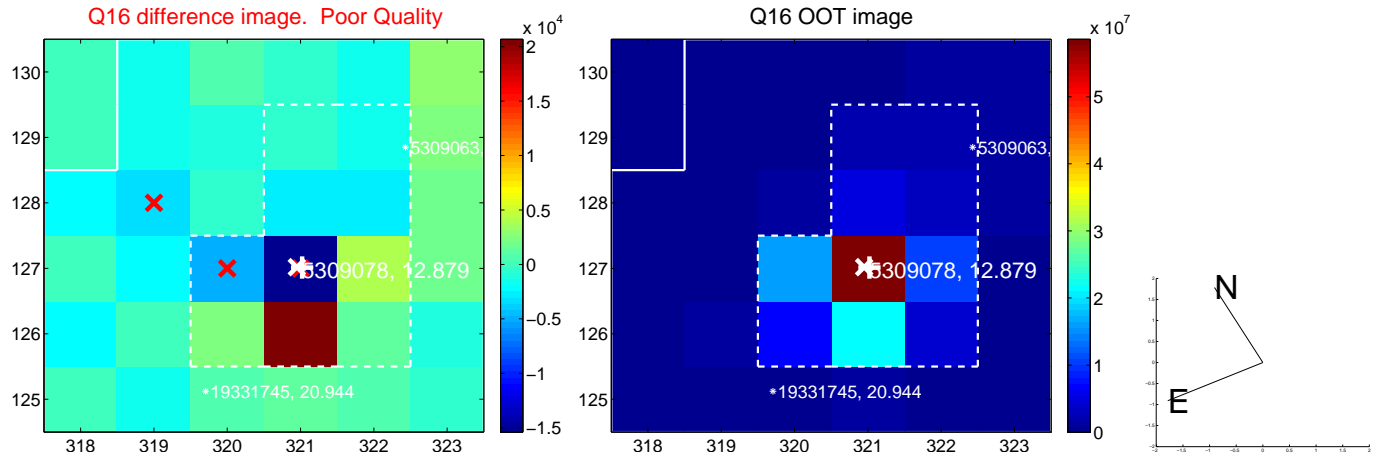
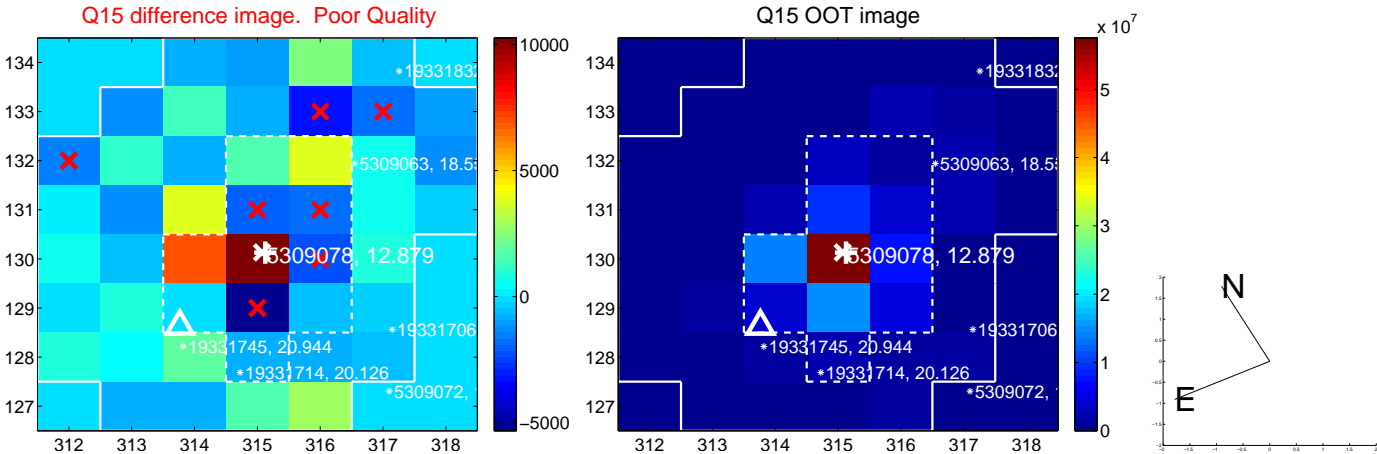
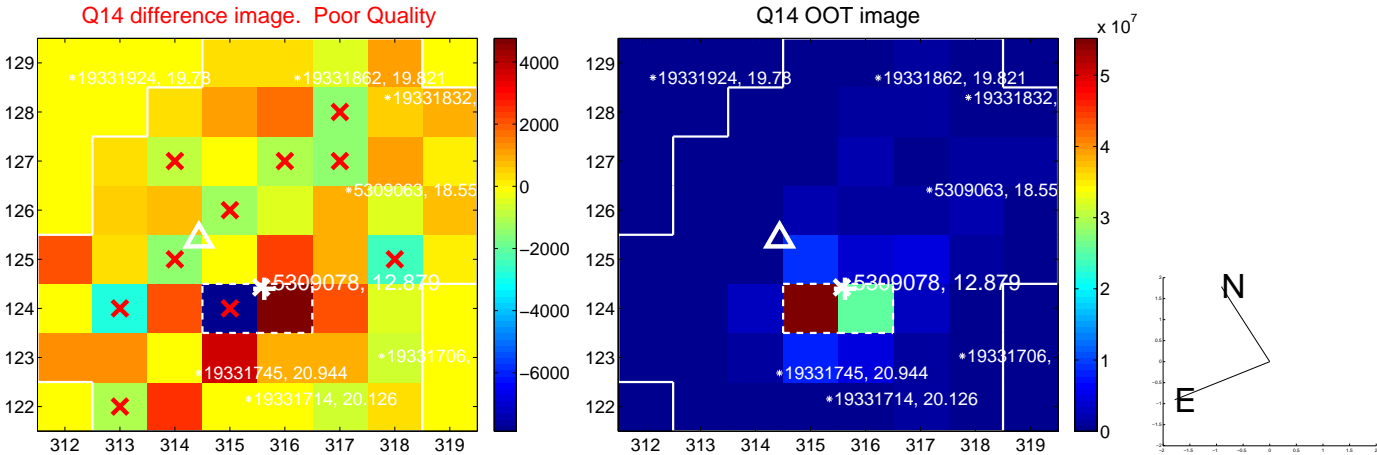
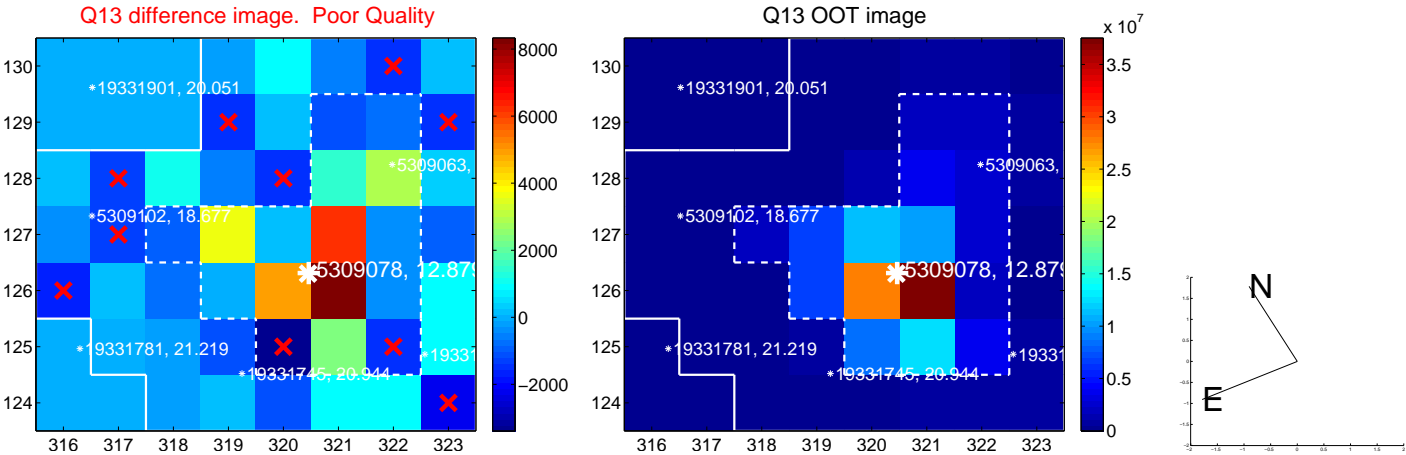
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



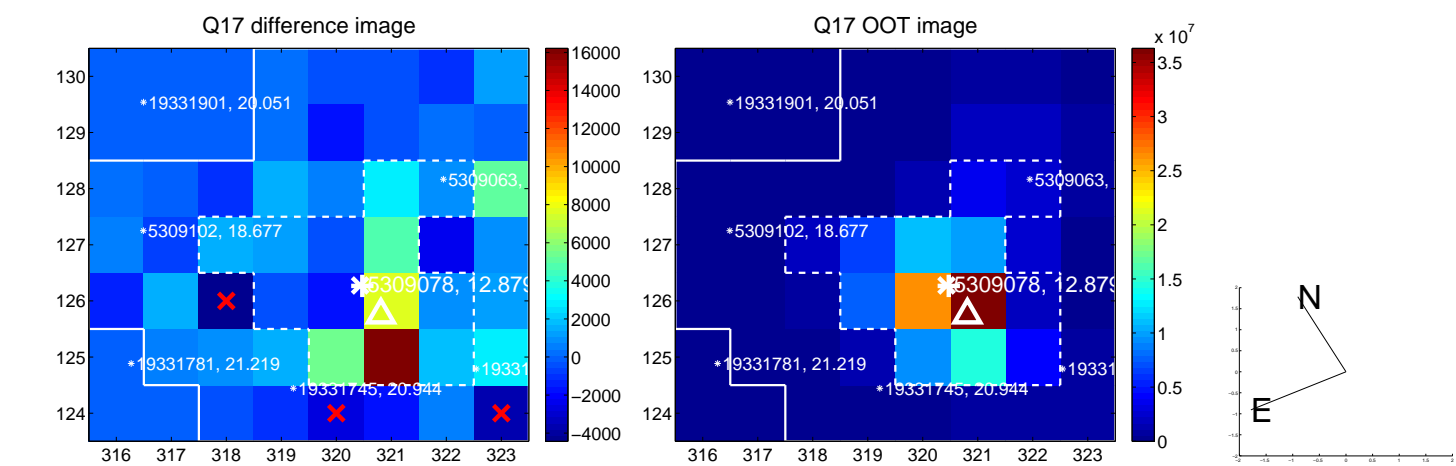
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



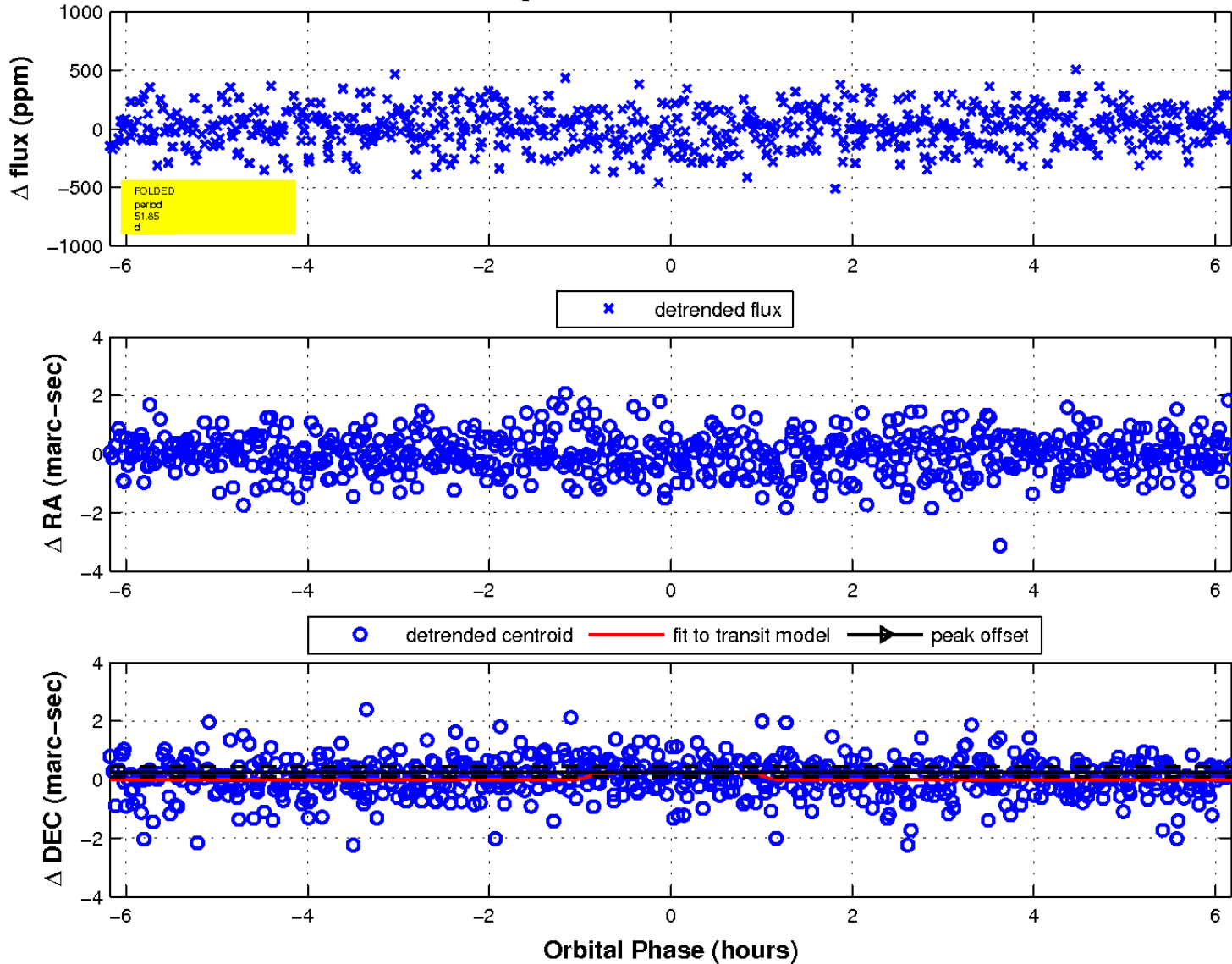
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

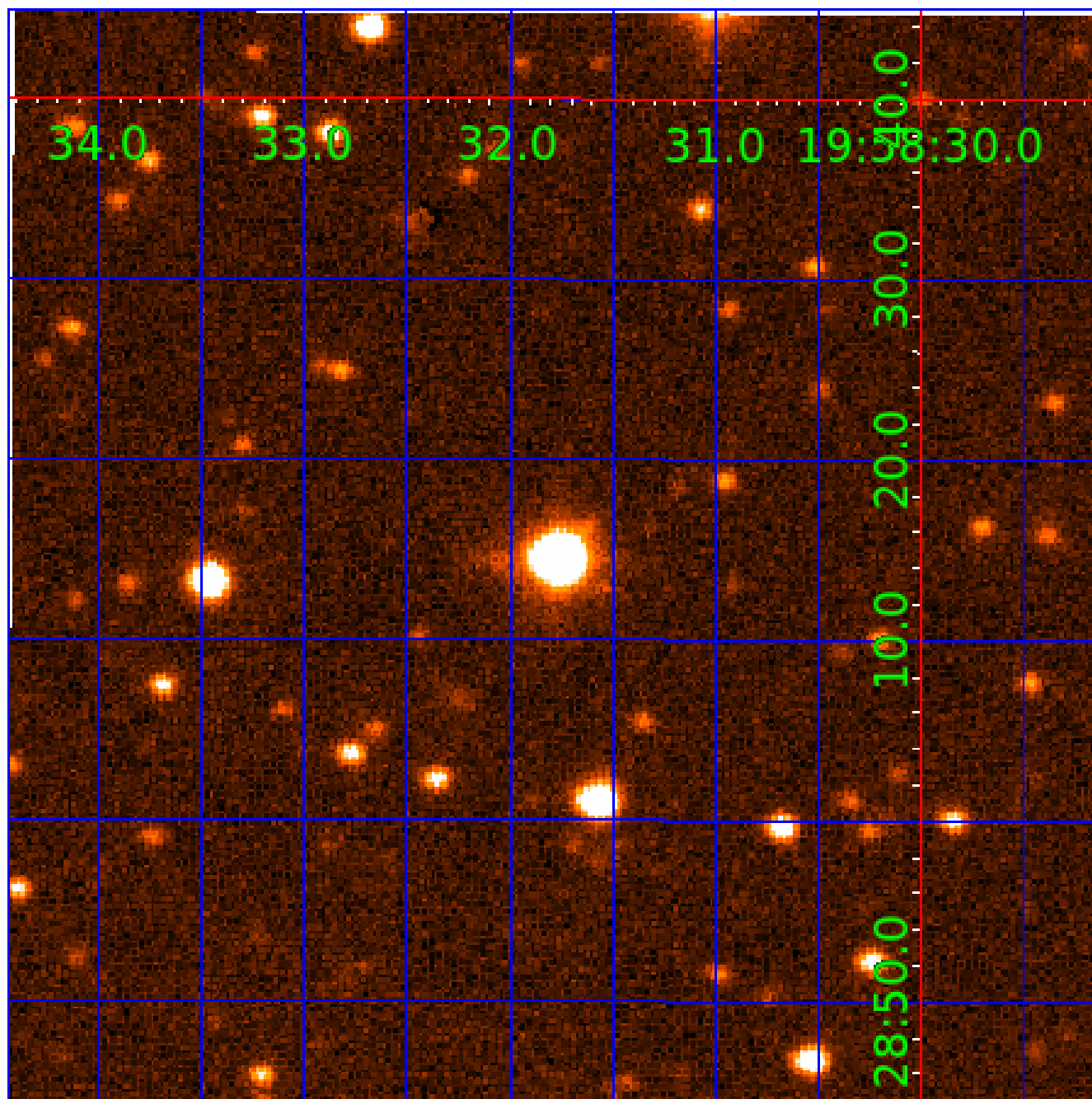


fluxWeightedCentroids, Planet 4 of 5



UKIRT Image

Declination



# KIC 005309078

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005309078-01	OBS	No	0.807230	132.075081	20.7	4.045	11.8	10.5	3.95	6452	2.06	57524.61
005309078-02	OBS	No	106.192098	163.186057	329.5	1.236	8.7	6.7	3.95	6452	8.28	85.98
005309078-03	OBS	No	202.568627	147.975479	225.6	6.936	7.6	7.7	3.95	6452	6.74	36.34
005309078-04	OBS	No	51.849424	163.356385	192.4	2.065	7.2	6.9	3.95	6452	6.26	223.63
005309078-05	OBS	No	37.534480	138.176930	151.1	1.822	7.3	7.9	3.95	6452	5.68	344.04

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005309078-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV
005309078-02	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_UNCERTAIN
005309078-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
005309078-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
005309078-05	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

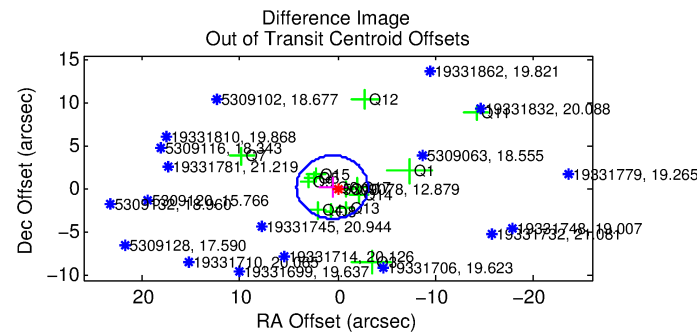
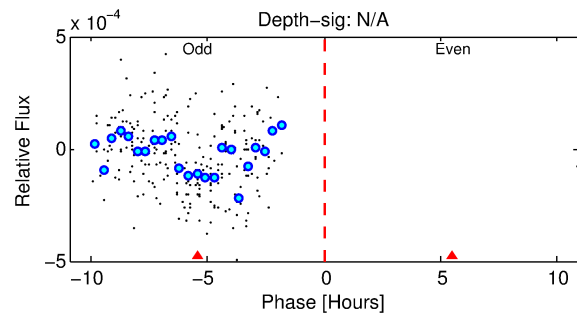
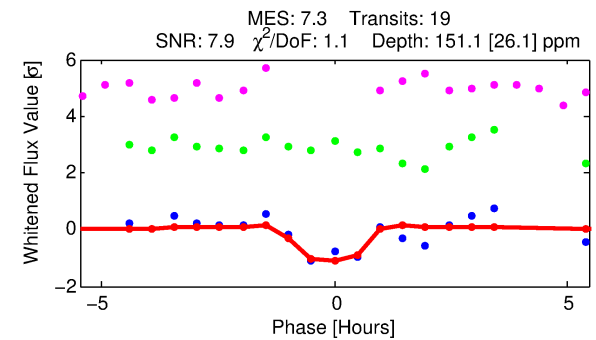
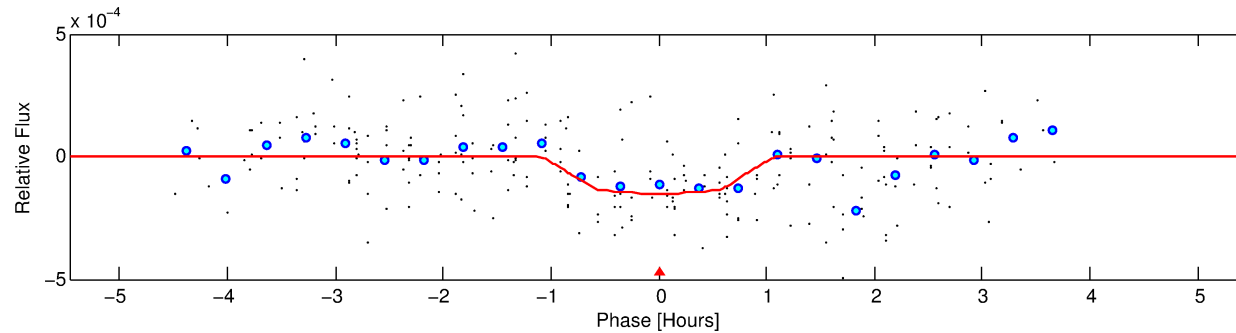
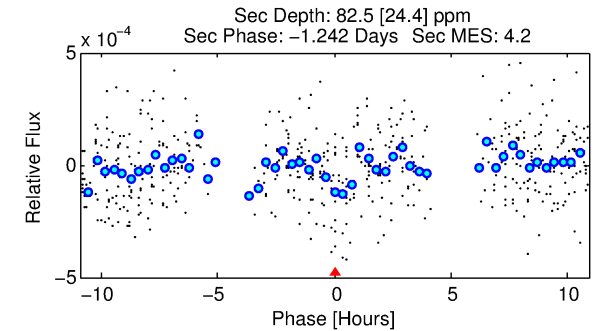
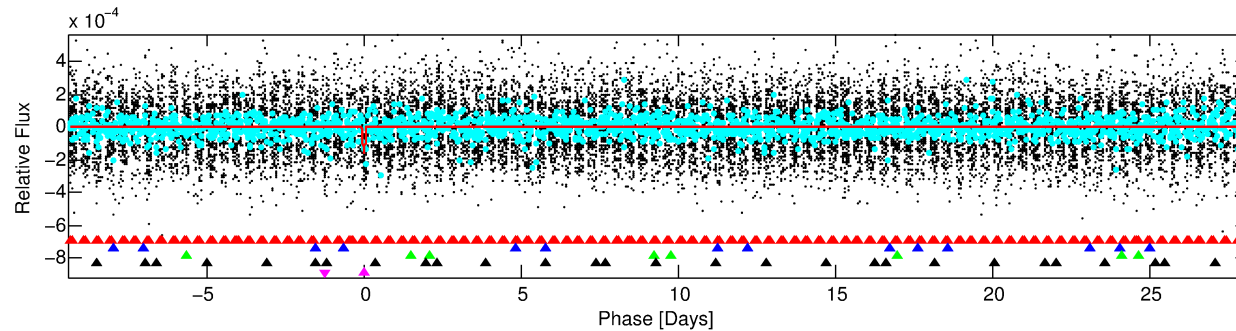
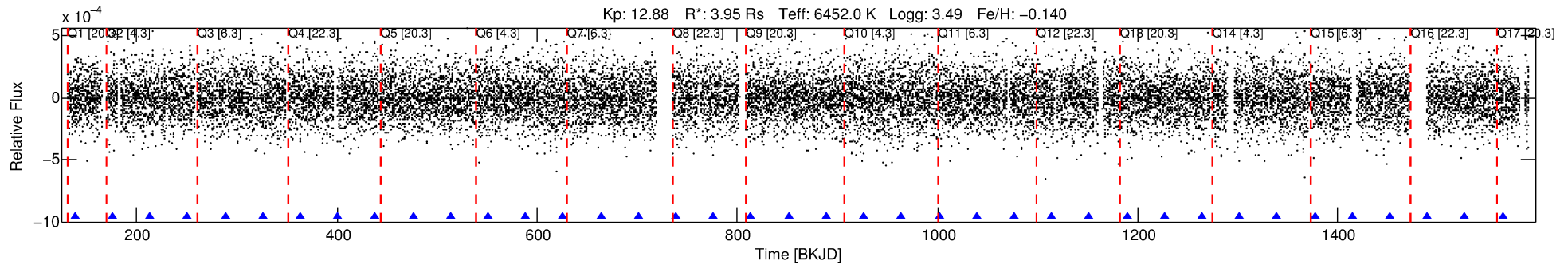
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 005309078-05

No Significant Match Found

# DV One-Page Summary

KIC: 5309078 Candidate: 5 of 5 Period: 37.534 d



## DV Fit Results:

Period = 37.53448 [0.00032] d  
Epoch = 138.1769 [0.0074] BKJD  
Rp/R\* = 0.0132 [0.0113]  
a/R\* = 73.37 [355.22]  
b = 0.90 [1.04]  
Seff = 344.04 [213.86]  
Teq = 1098 [171] K  
Rp = 5.68 [5.34] Re  
a = 0.2652 [0.1011] AU  
Ag = 98.99 [182.05] [0.54σ]  
Teffp = 5356 [2327] K [1.82σ]

## DV Diagnostic Results:

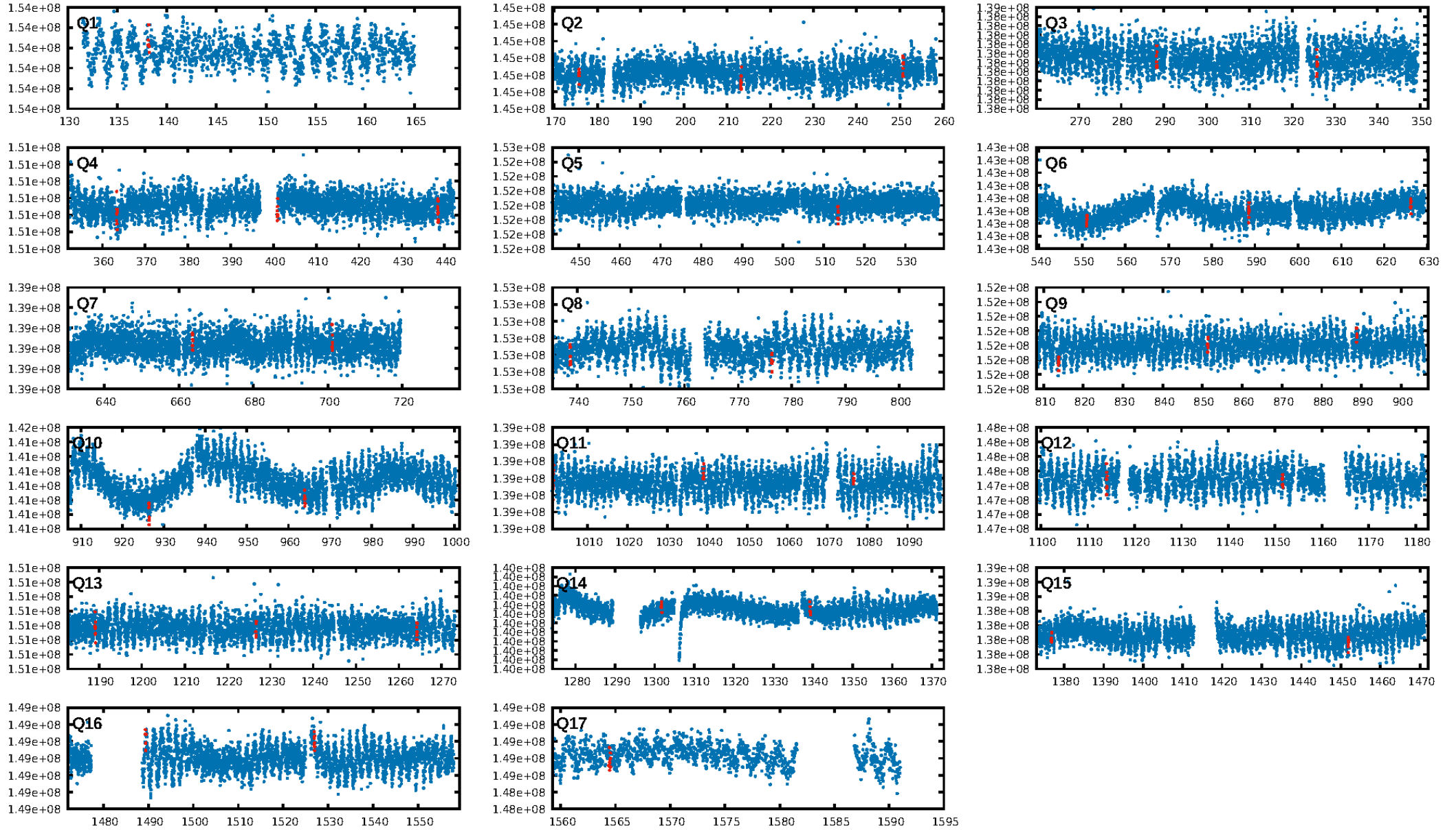
ShortPeriod-sig: 100.0% [198.68σ]  
LongPeriod-sig: 100.0% [124.76σ]  
ModelChiSquare2-sig: 89.4%  
ModelChiSquareGof-sig: 99.4%  
**Bootstrap-pfa: 1.38e-09**  
RollingBand-fgt: 1.00 [17/17]  
GhostDiagnostic-chr: -1.67  
Centroid-sig: N/A  
Centroid-so: 1.223 arcsec [1.28σ]  
OotOffset-rm: 0.607 arcsec [0.50σ]  
KicOffset-rm: 0.418 arcsec [0.38σ]  
OotOffset-st: 3/4/3/5 [15]  
KicOffset-st: 3/4/3/5 [15]  
DiffImageQuality-fgm: 0.40 [6/15]  
DiffImageOverlap-fno: 0.94 [15/16]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 00:20:47 Z

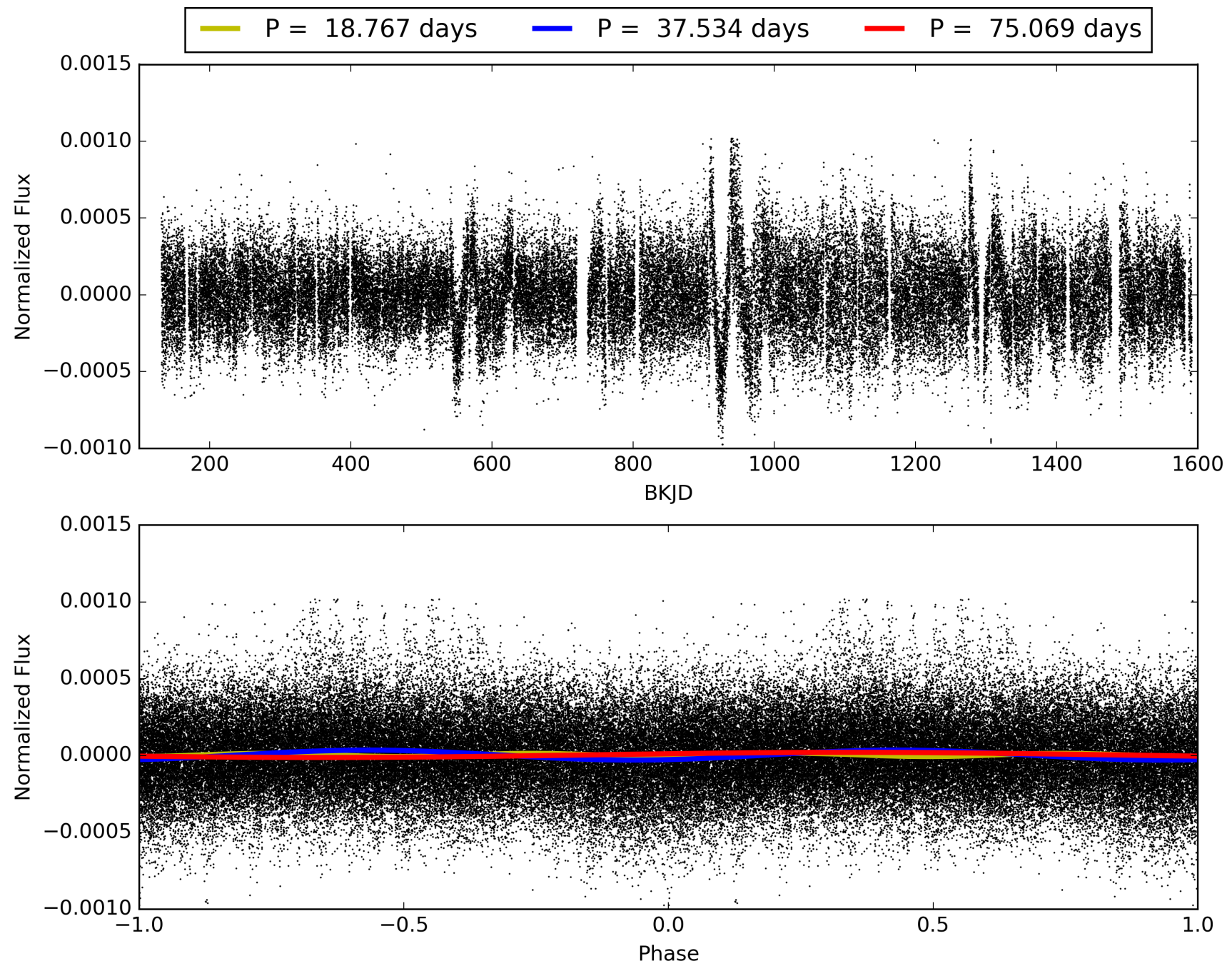
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 005309078-05, PDC Light Curves

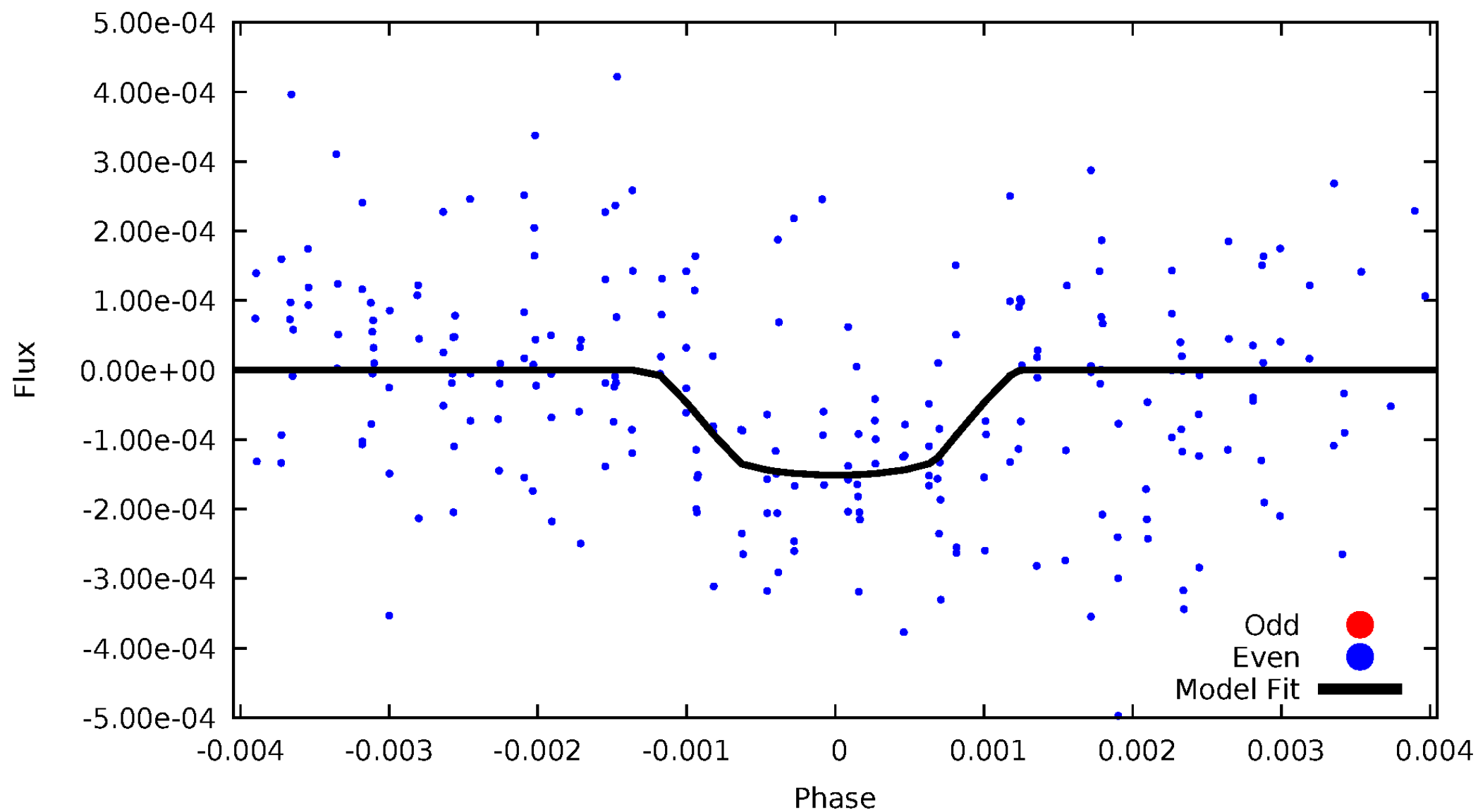


TCE 005309078-05



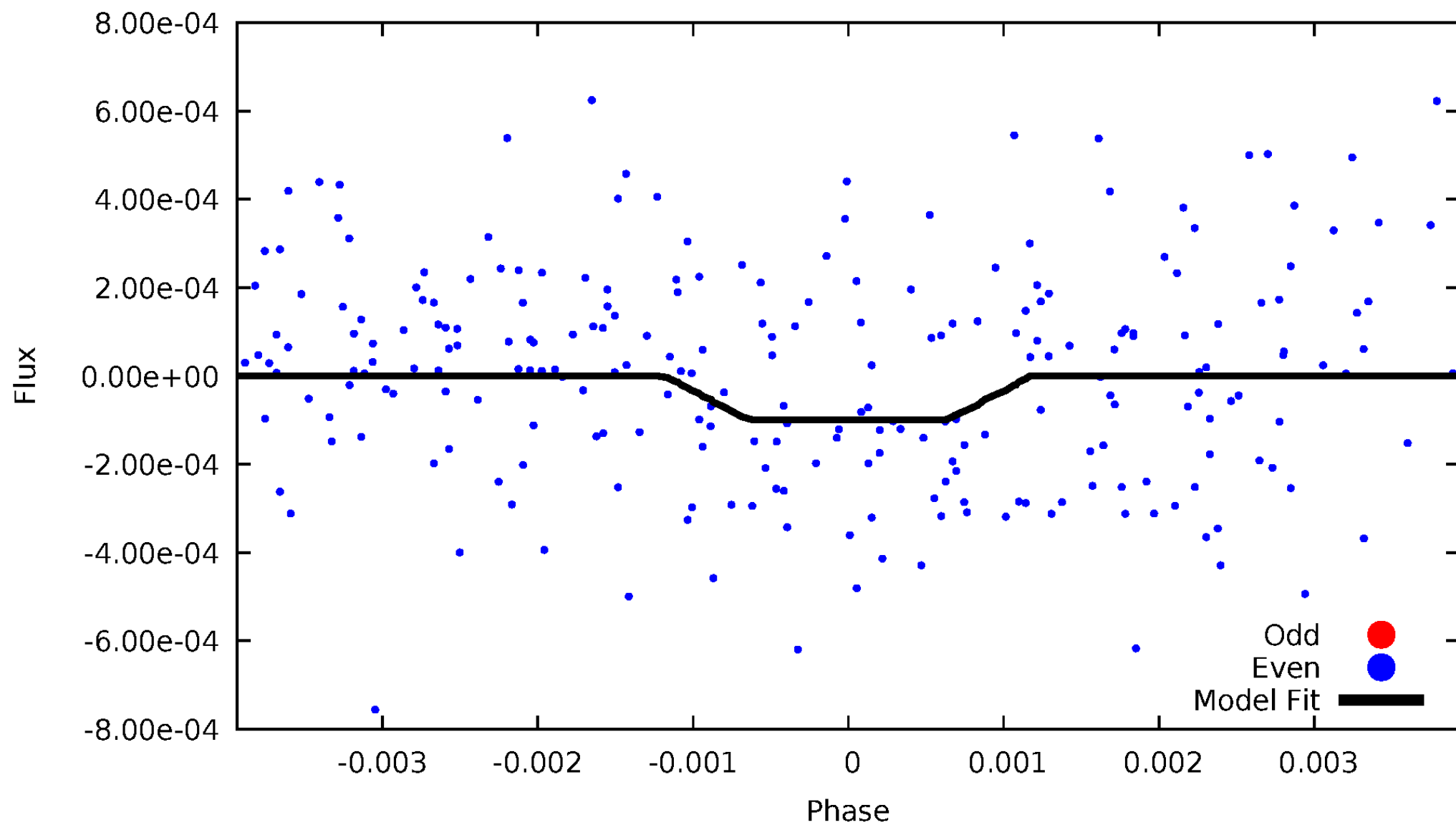
# DV Odd/Even

TCE 005309078-05



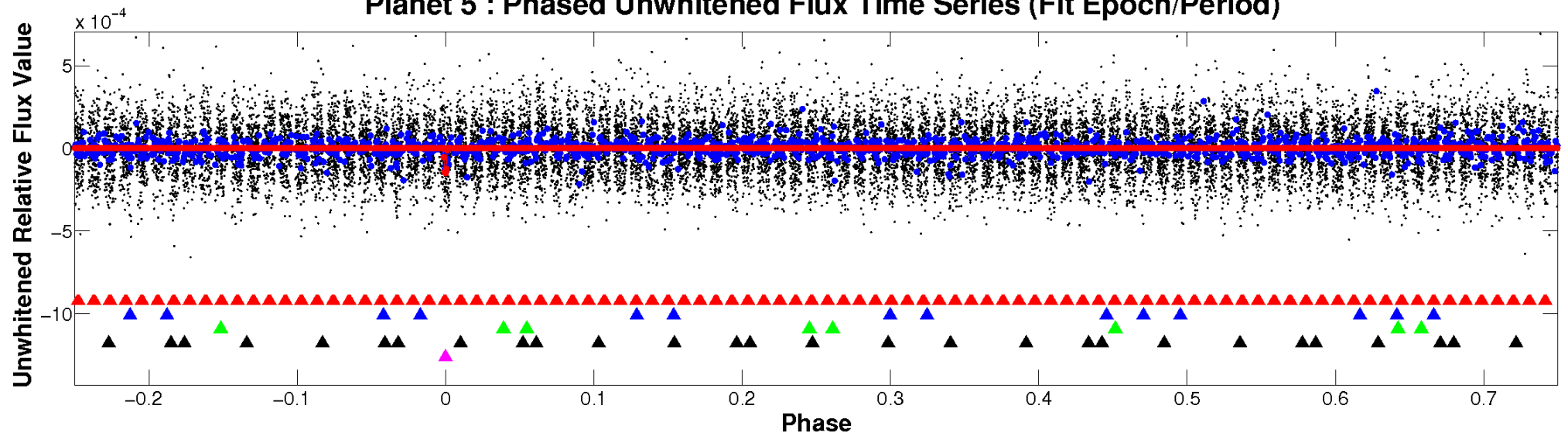
# ALT Odd/Even

TCE 005309078-05

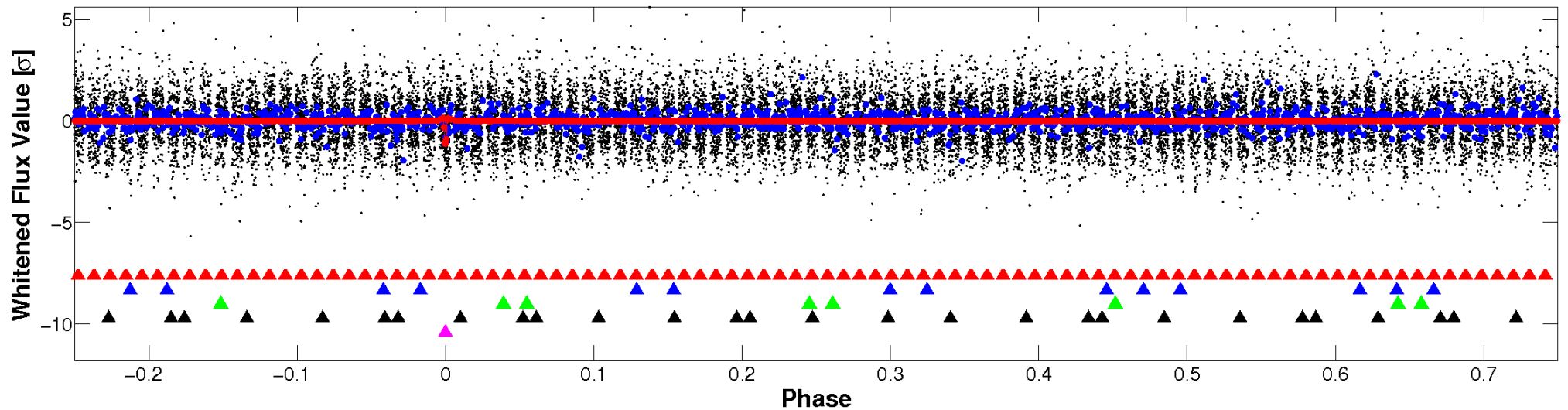


# Non-Whitened Vs. Whitened Light Curve

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

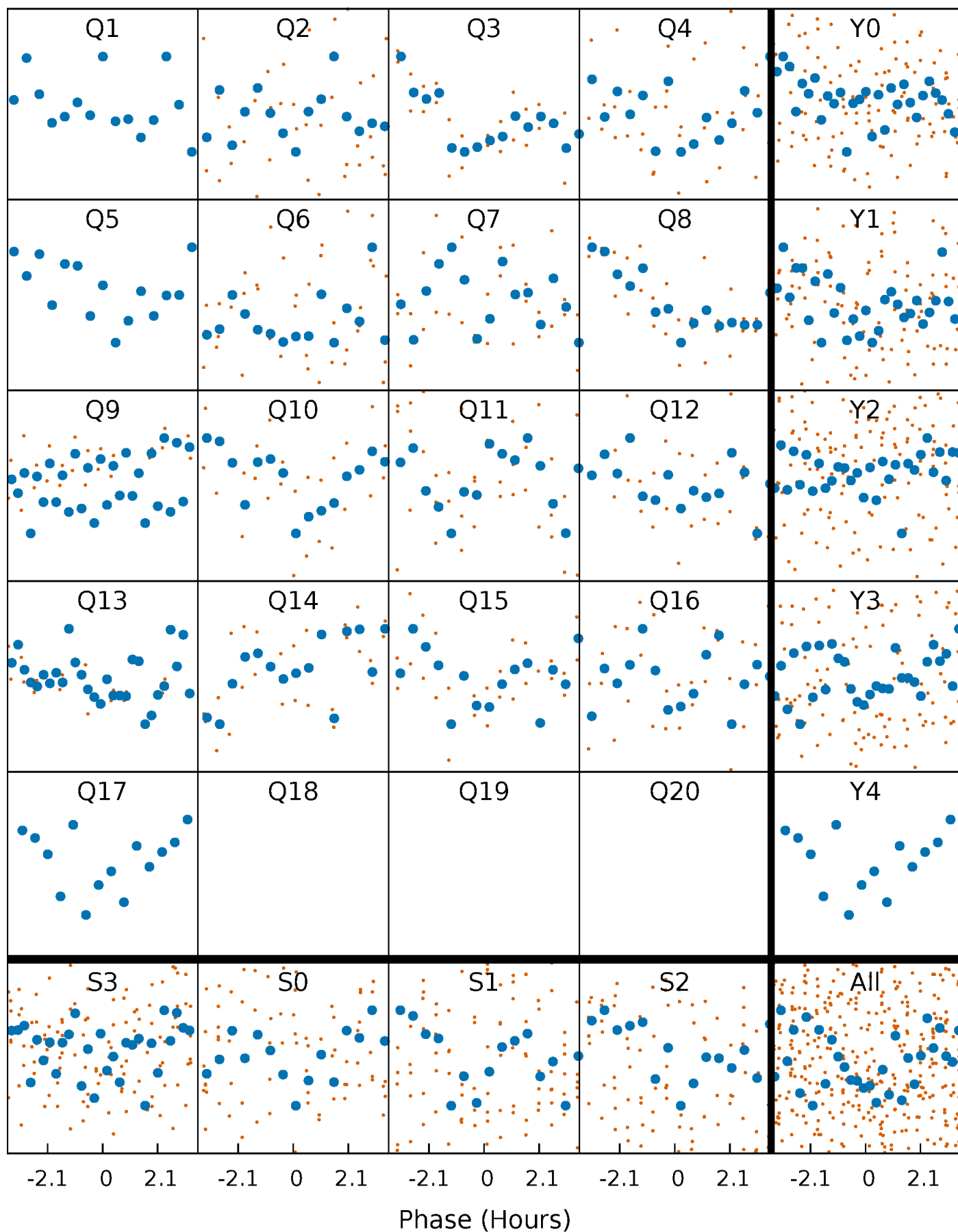


Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)



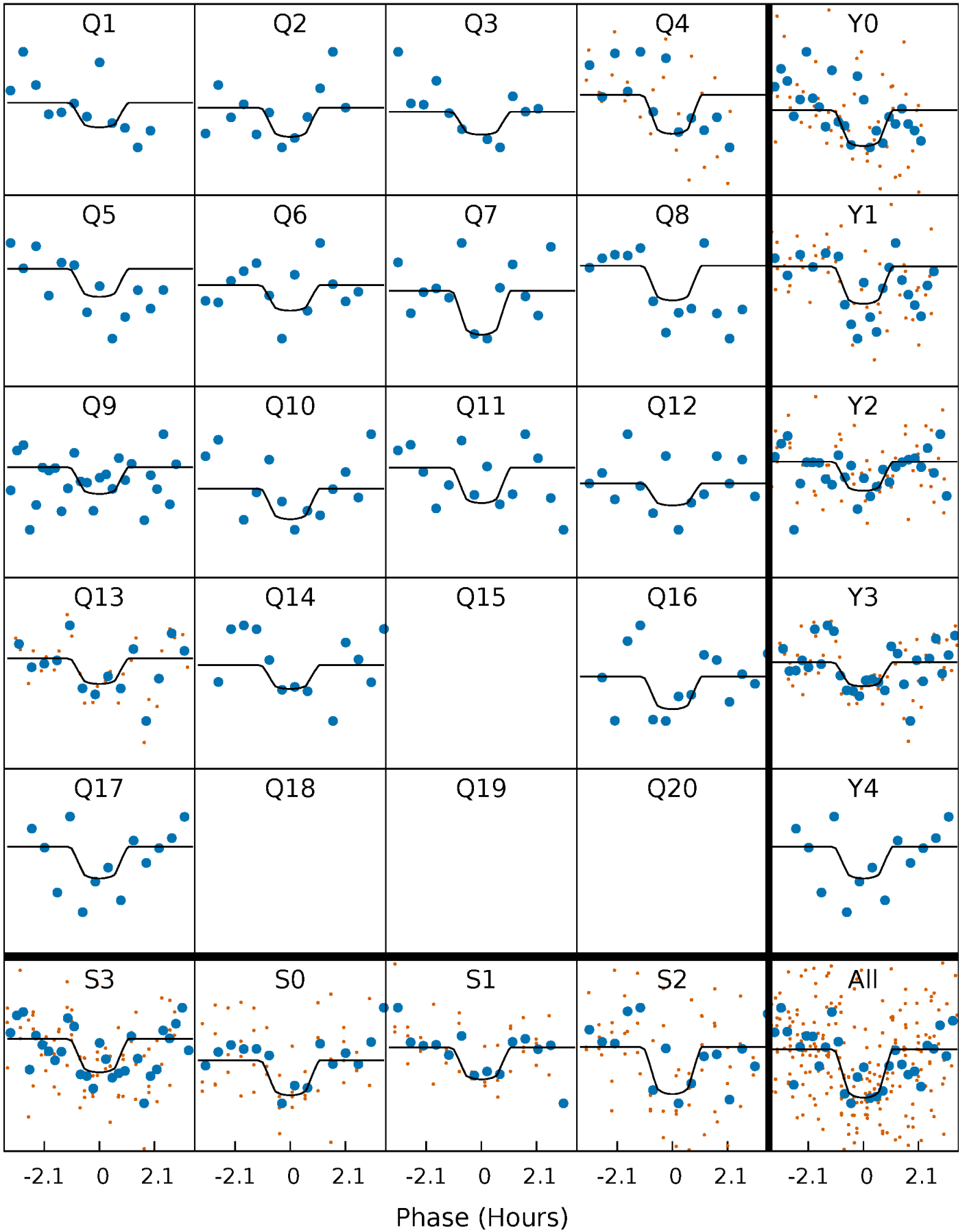
# PDC Quarter-Phased Transit Curves

TCE 005309078-05   P= 37.534480 Days    $T_0=138.176930$  (BKJD)



# DV Quarter-Phased Transit Curves

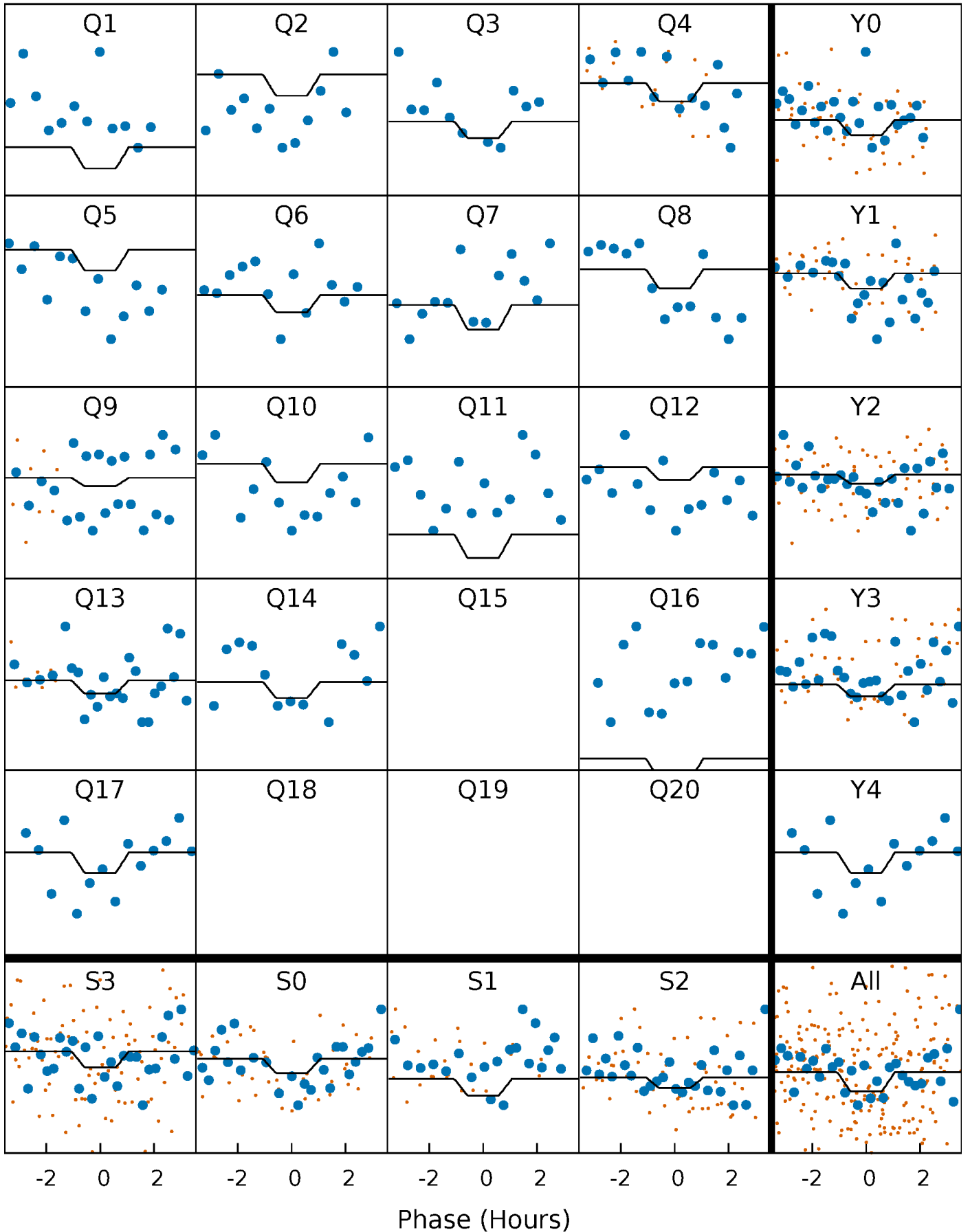
TCE 005309078-05     $P = 37.534480$  Days     $T_0 = 138.176930$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

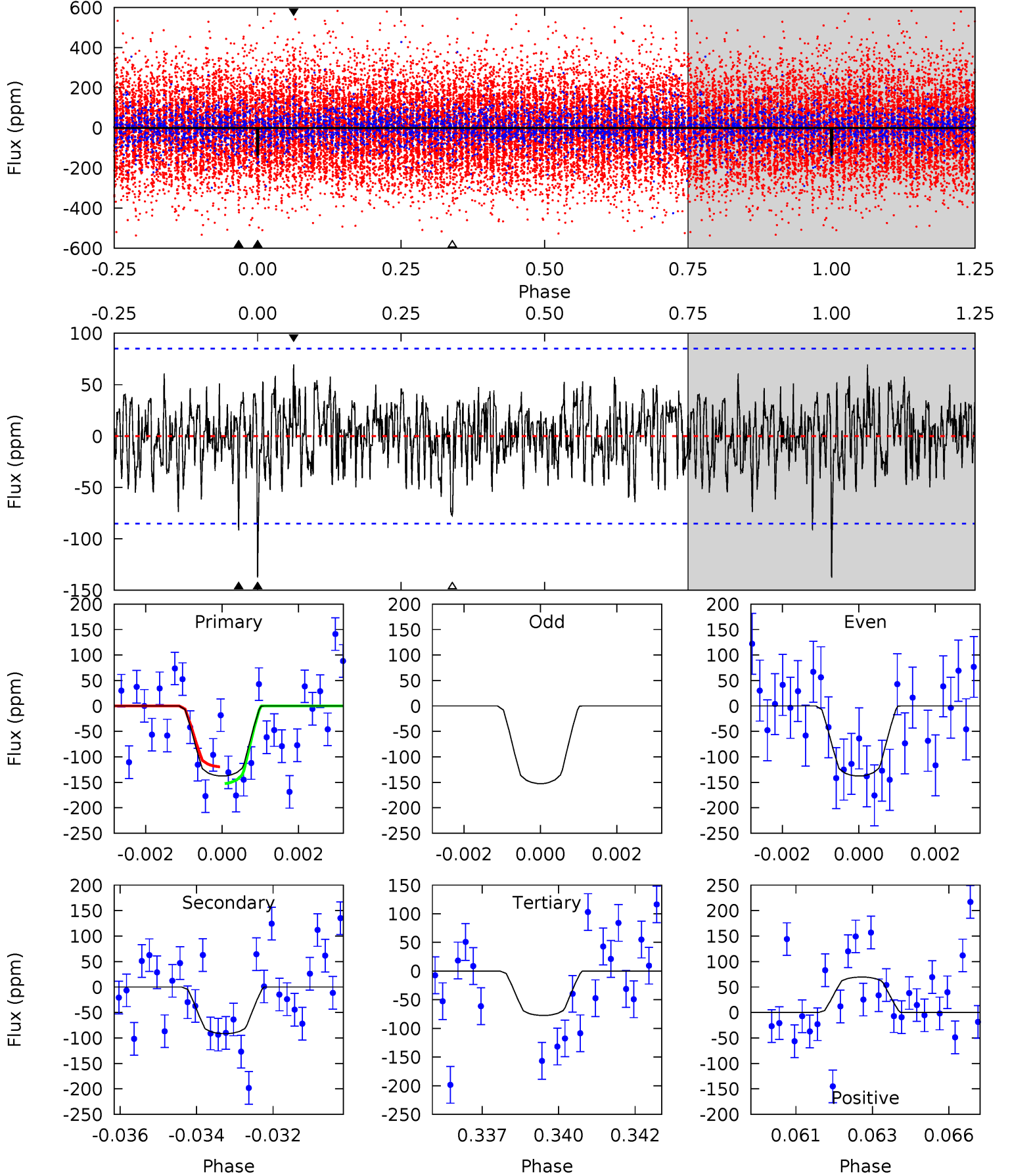
TCE 005309078-05     $P = 37.534744$  Days     $T_0 = 138.173990$  (BKJD)



# DV Model-Shift Uniqueness Test

005309078-05, P = 37.534480 Days, E = 100.642450 Days

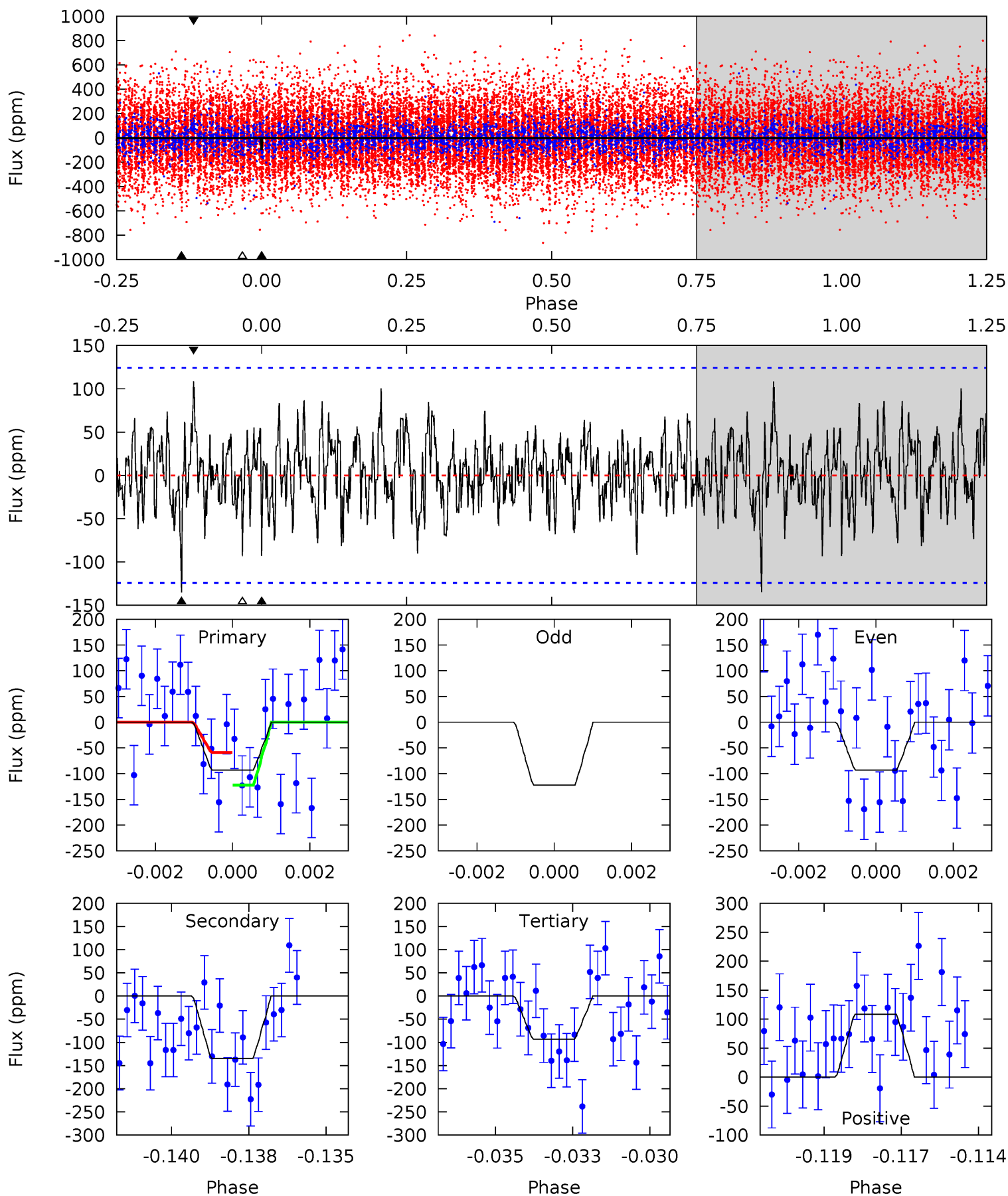
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.55	5.69	4.81	4.32	5.29	3.03	1.48	3.74	4.23	0.88	1.37	0.56	0.97	0.34	1.02



# Alt Model-Shift Uniqueness Test

005309078-05, P = 37.534744 Days, E = 100.639246 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
3.96	5.76	3.98	4.63	5.30	3.04	1.42	-0.02	-0.67	1.78	1.13	0.73	0.70	0.45	1.36



### Stellar Parameters For KIC 005309078

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6452^{+177}_{-177}$	$3.492^{+0.360}_{-0.090}$	$-0.140^{+0.350}_{-0.300}$	$3.947^{+0.518}_{-1.555}$	$1.764^{+0.175}_{-0.407}$	$0.040^{+0.122}_{-0.012}$
	+3%/-3%	+10%/-3%	+250%/-214%	+13%/-39%	+10%/-23%	+302%/-30%
Source	PHO1	FLK73	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 005309078-05 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-92 \pm 16$	$5.82^{+4.44}_{-3.65}$	$1505^{+89}_{-162}$	$5222^{+3278}_{-1046}$	$102^{+586}_{-69}$
Alt.	$-135 \pm 23$	$4.75^{+4.04}_{-3.11}$	$1504^{+91}_{-148}$	$6261^{+6251}_{-1511}$	$231^{+1673}_{-168}$

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

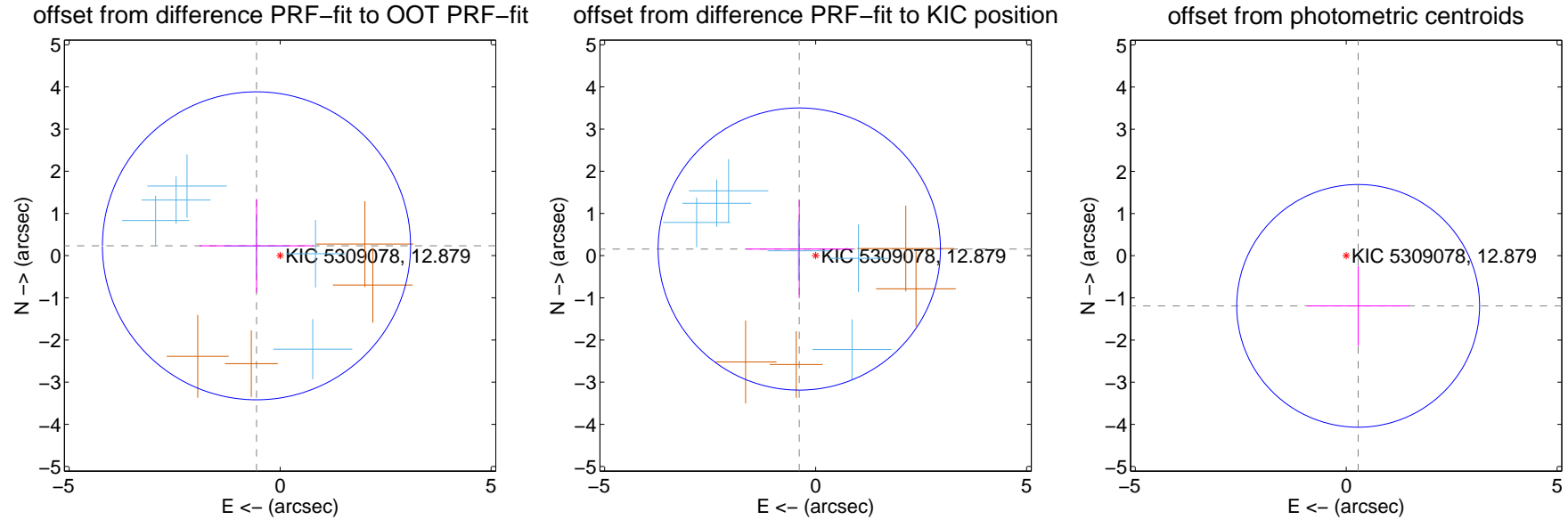
## DV Centroid Data

Supplemental centroid analysis for 005309078-05. Kepler magnitude: 12.88. Transit SNR 7.91

There are 6 quarters with good PRF difference image offsets

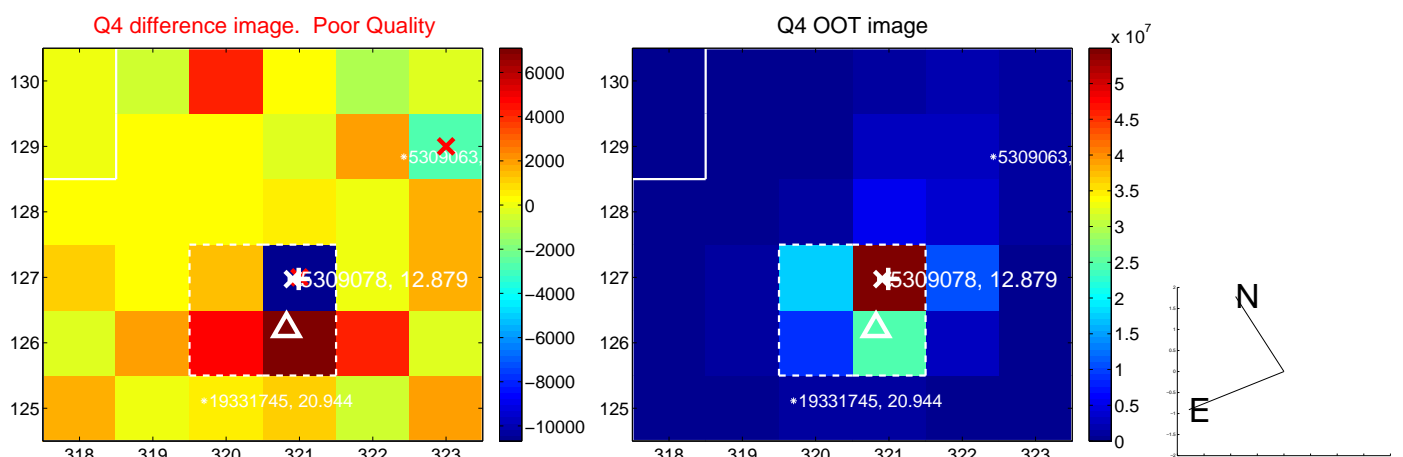
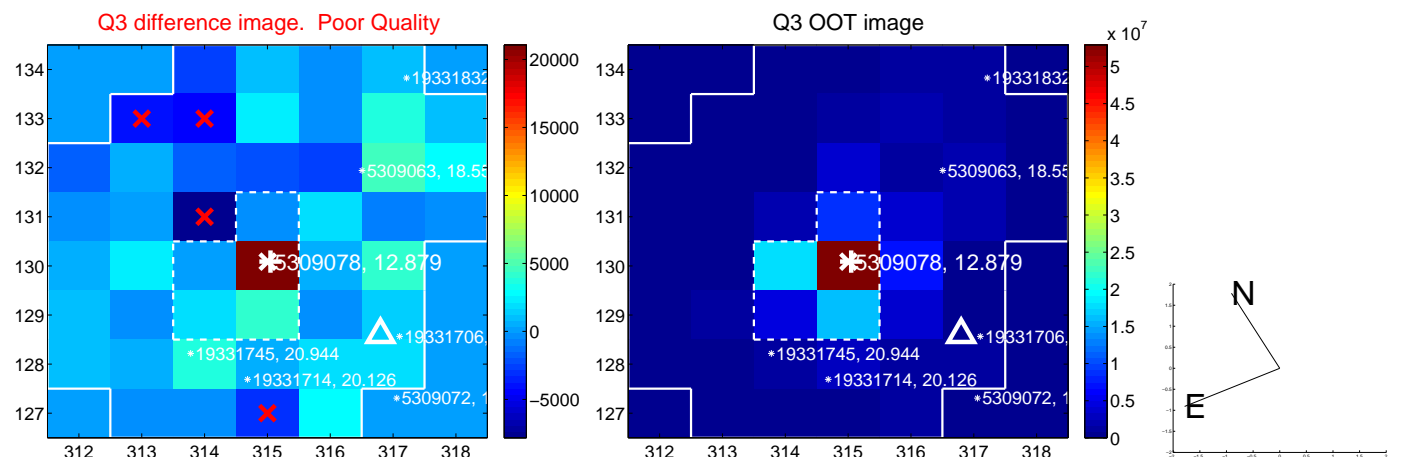
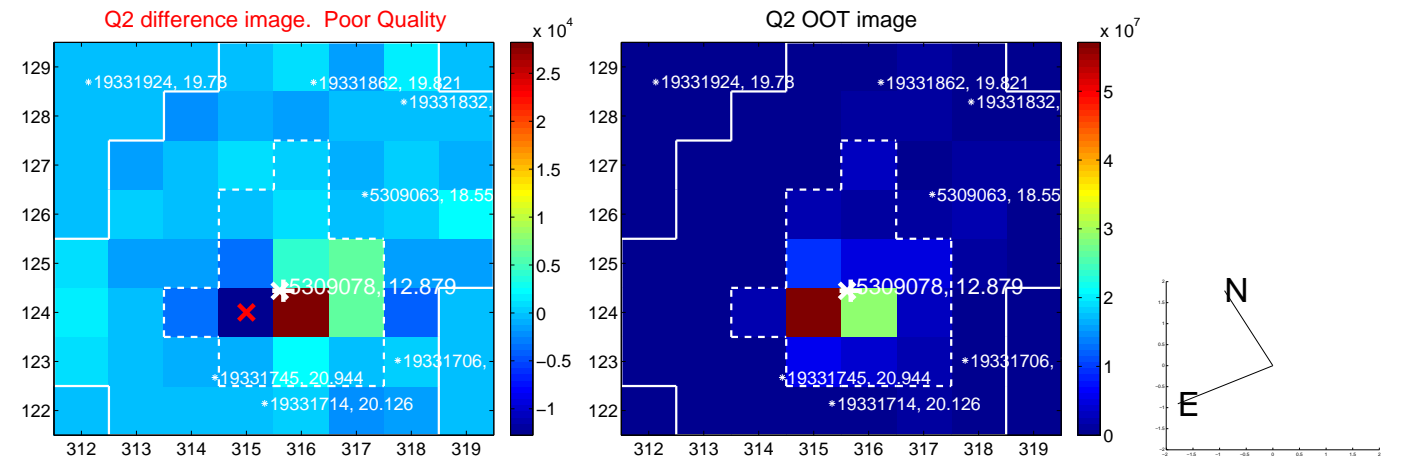
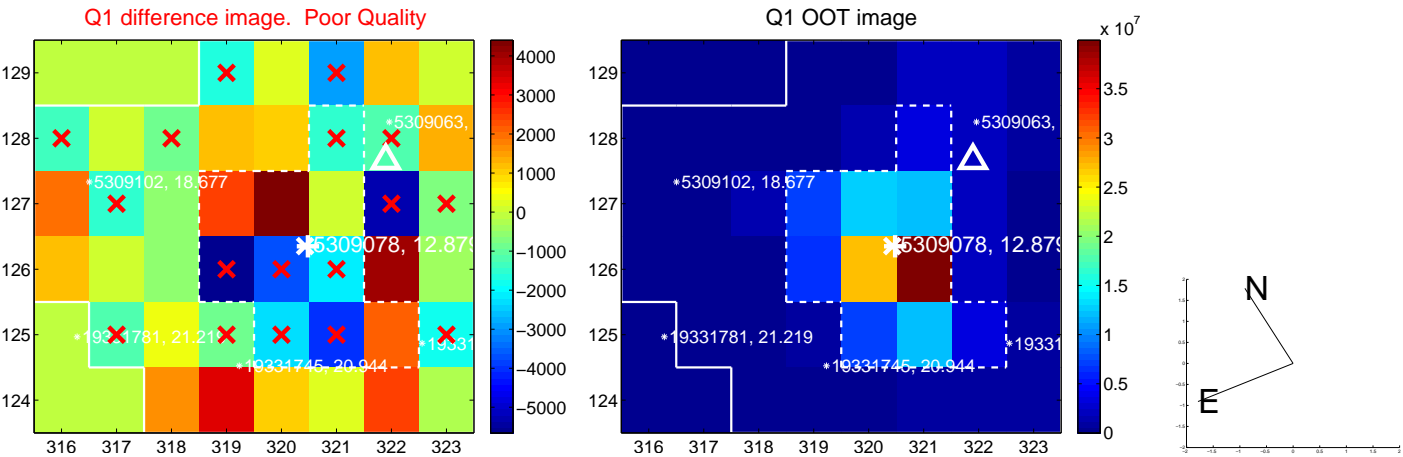
The direct PRF centroid is offset from the target star catalog position by about 0.17 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.607 \pm 1.217$	0.50	$0.560 \pm 1.351$	$0.233 \pm 1.109$
PRF-fit source offset from KIC position	$0.418 \pm 1.115$	0.38	$0.388 \pm 1.259$	$0.157 \pm 1.165$
photometric centroid source offset	$1.22 \pm 0.96$	1.28	$-0.28 \pm 1.21$	$-1.19 \pm 0.94$

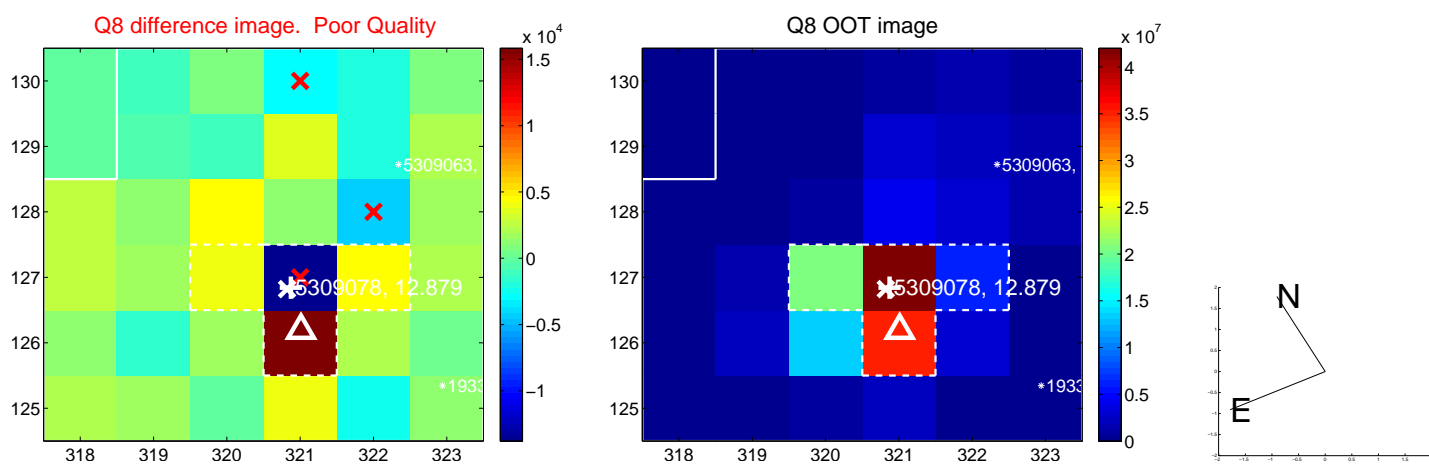
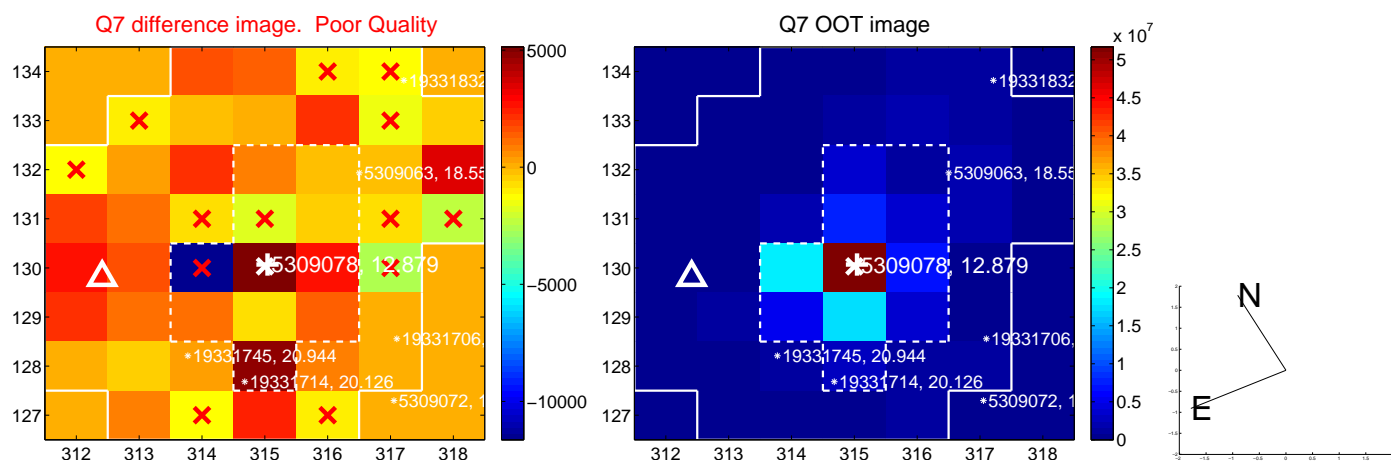
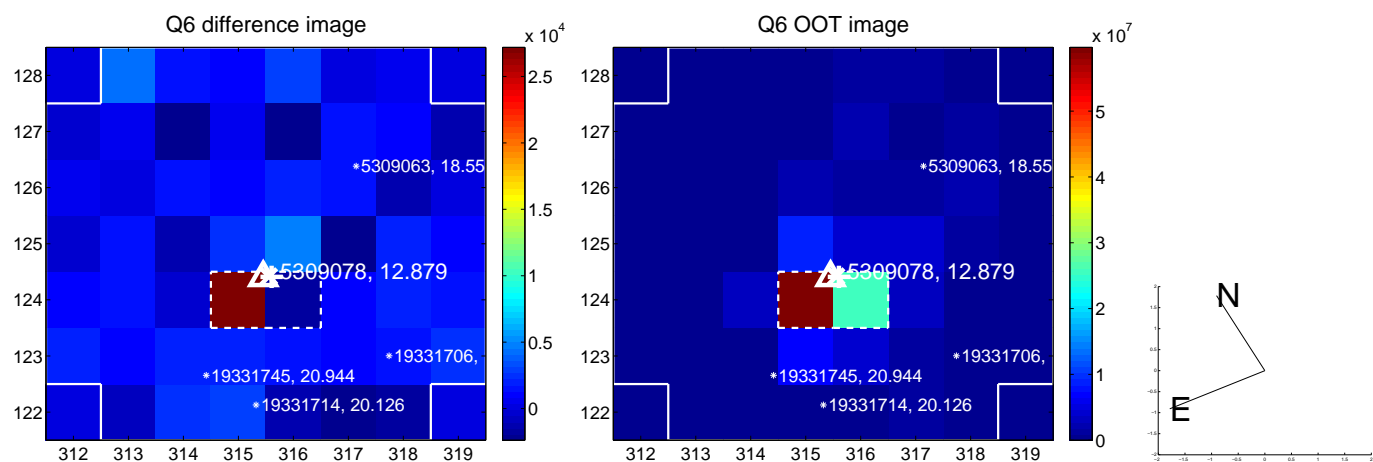
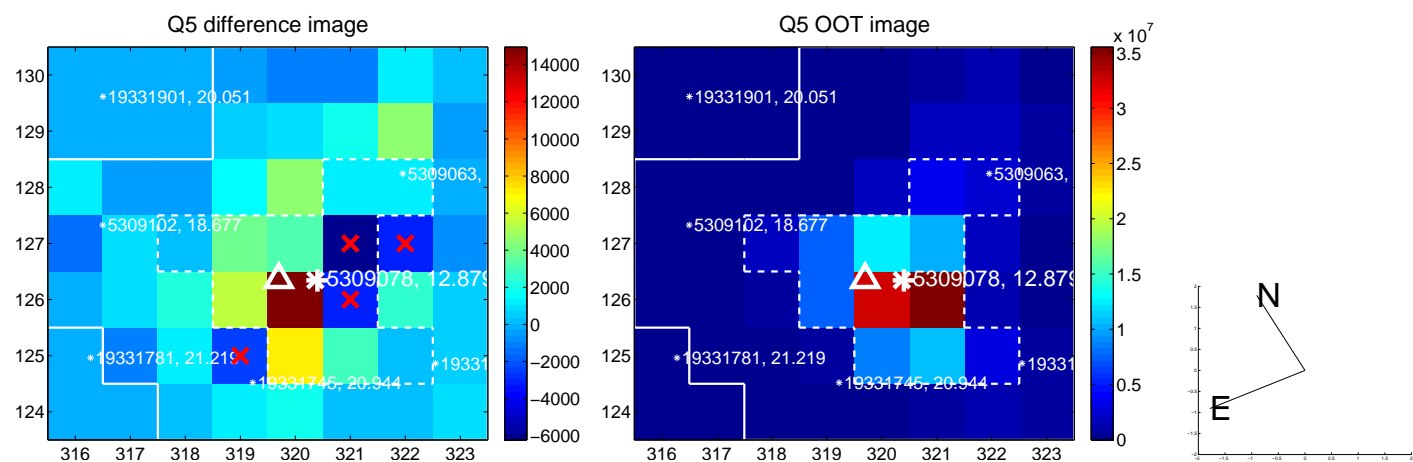


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

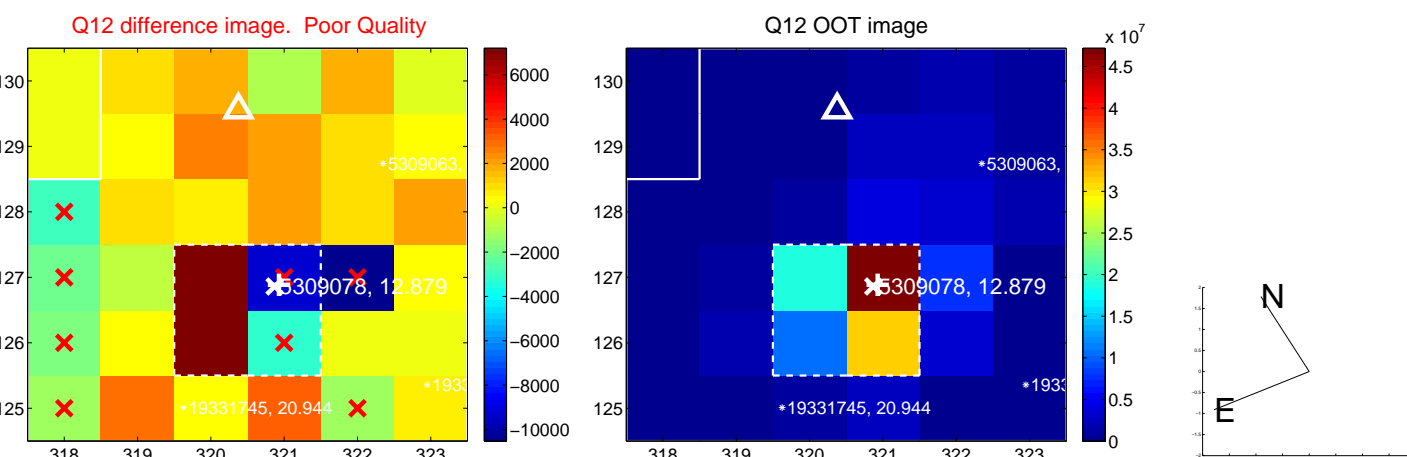
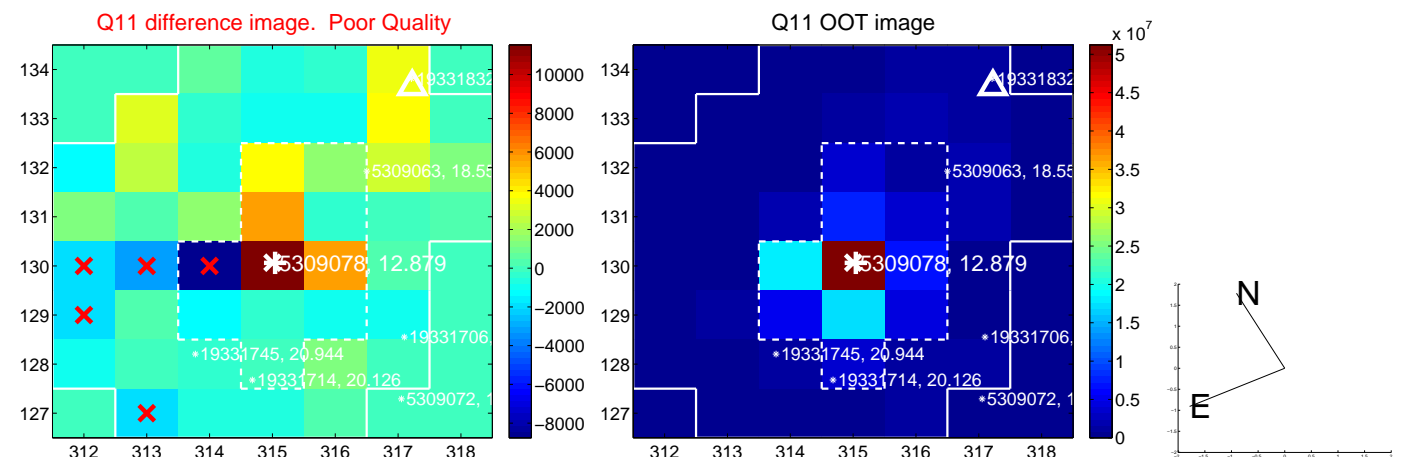
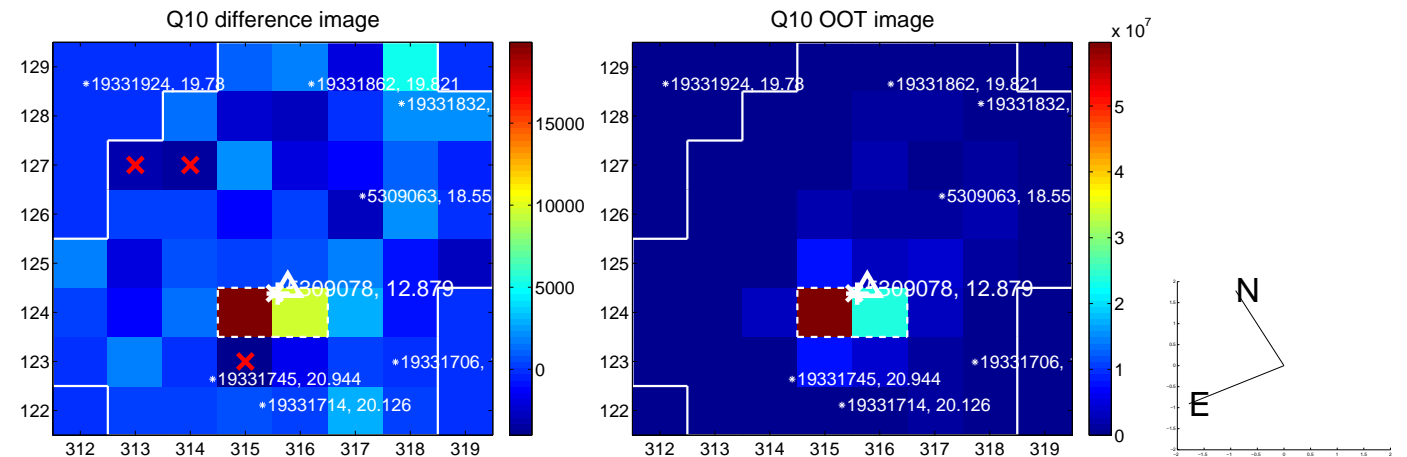
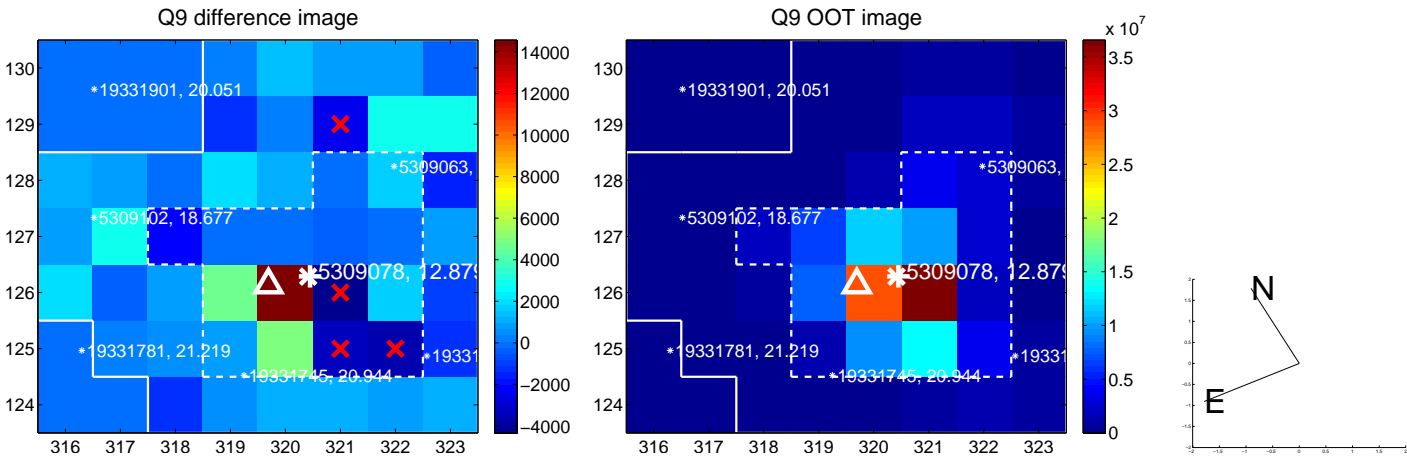


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

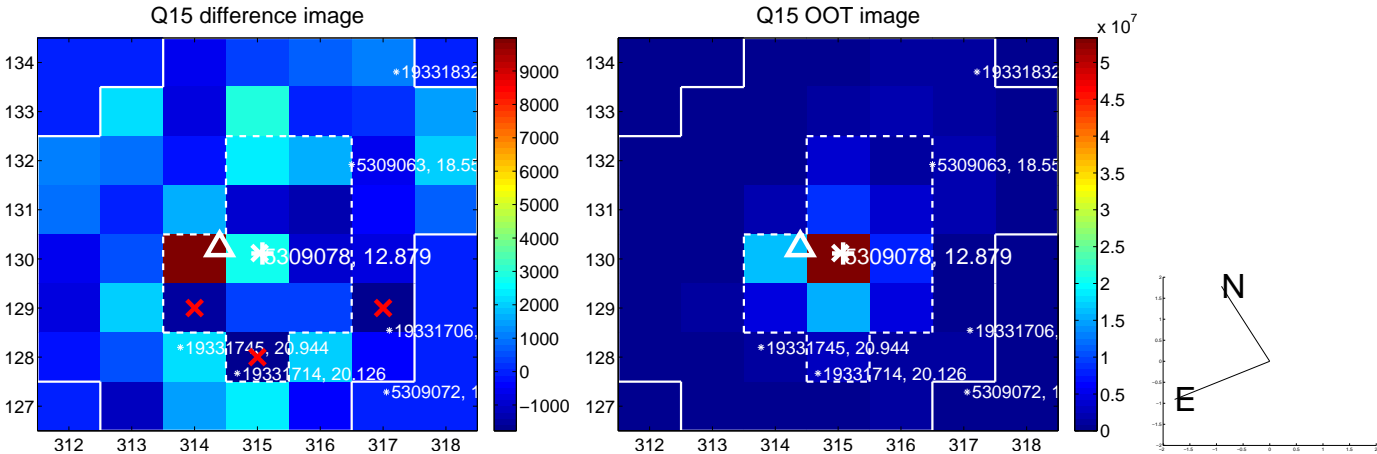
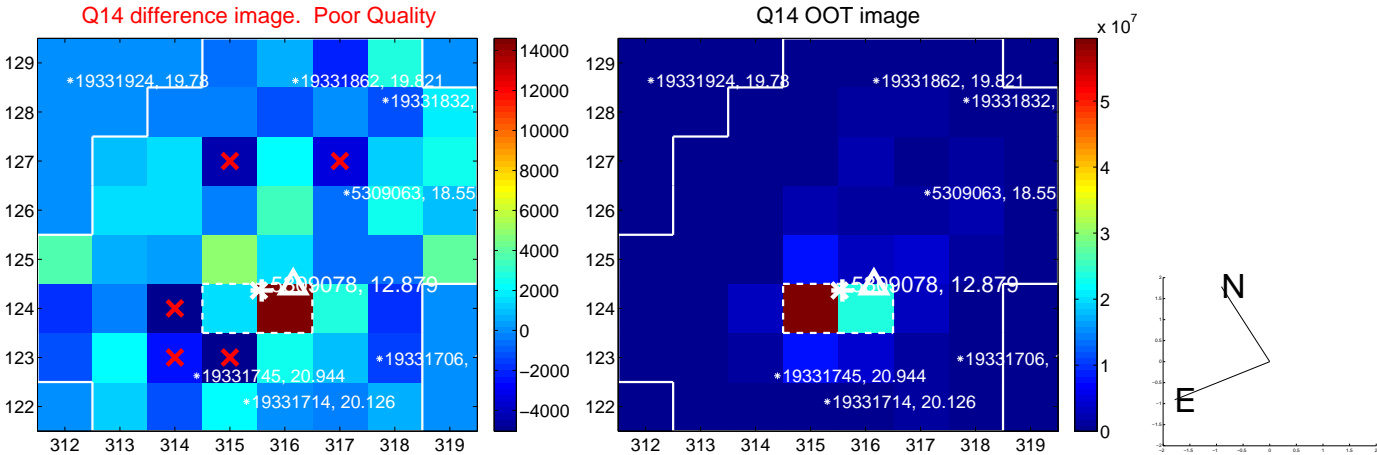
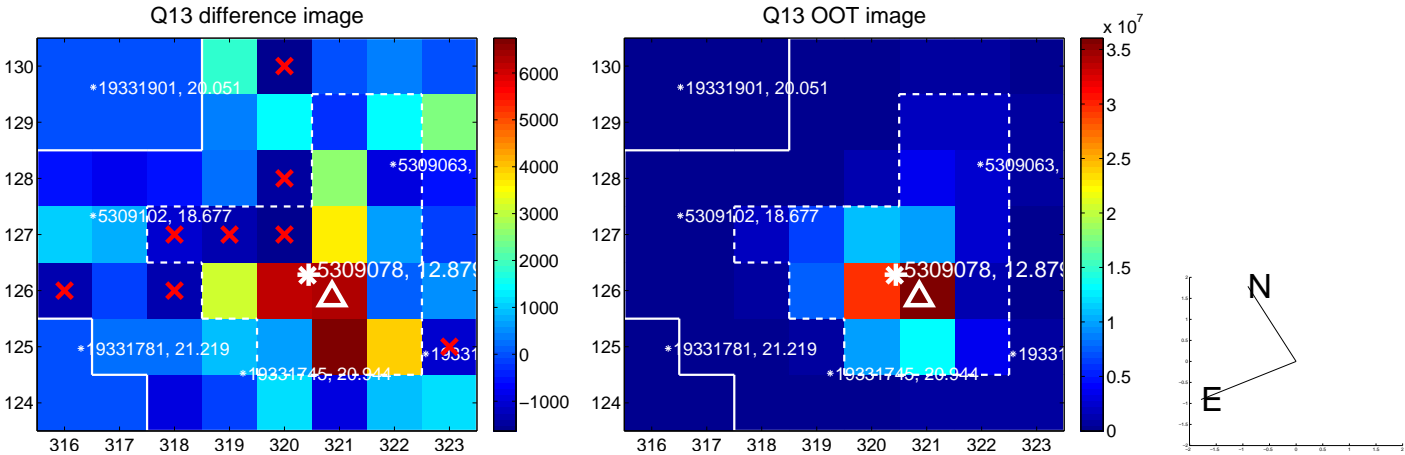




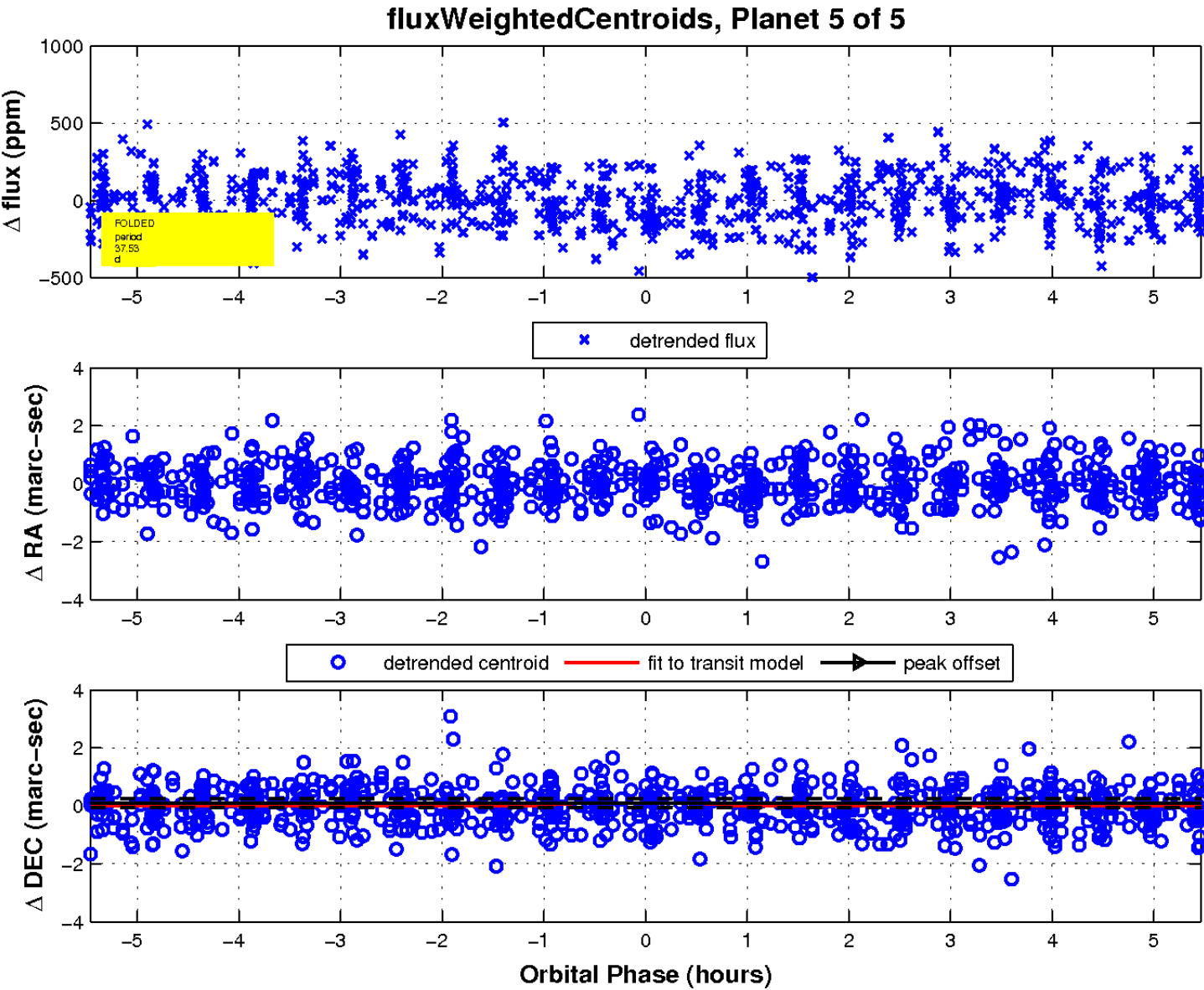
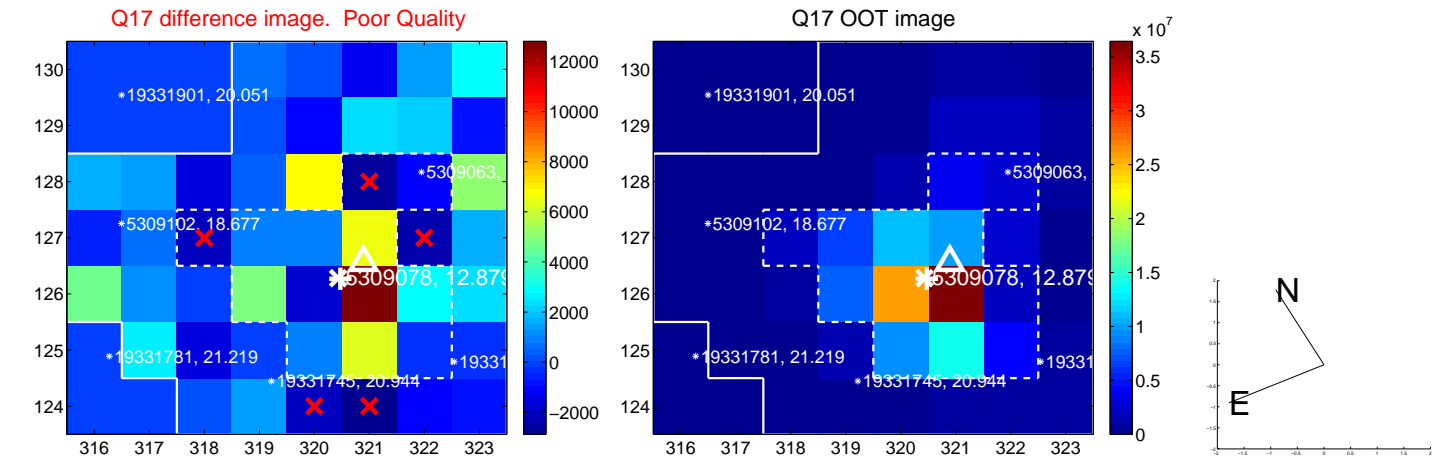
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

