

# KIC 005988140

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005988140-01	OBS	No	0.969077	132.109250	12.0	4.732	21.2	16.2	6.14	7404	2.43	0.00
005988140-02	OBS	No	88.965252	218.917334	67.3	5.733	9.2	4.4	6.14	7404	6.25	352.14

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005988140-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—CENT_SATURATED
005988140-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_SATURATED

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

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

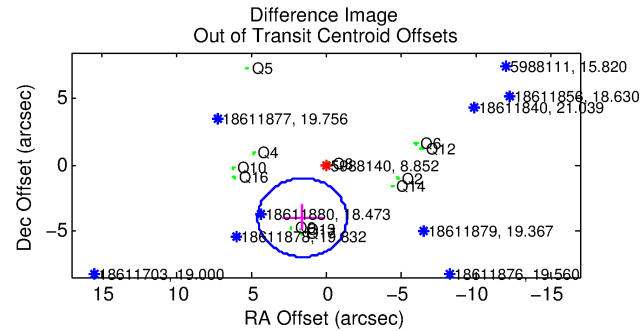
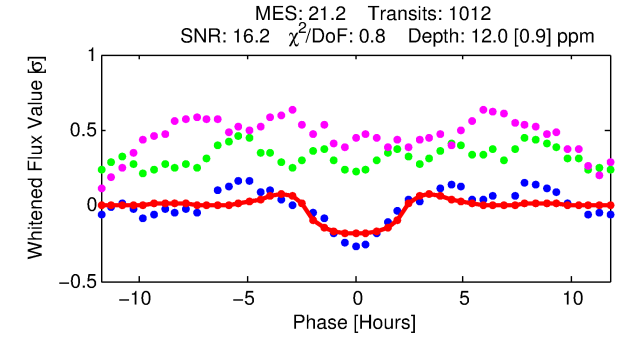
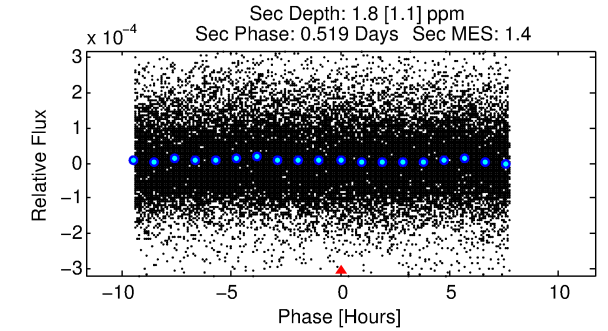
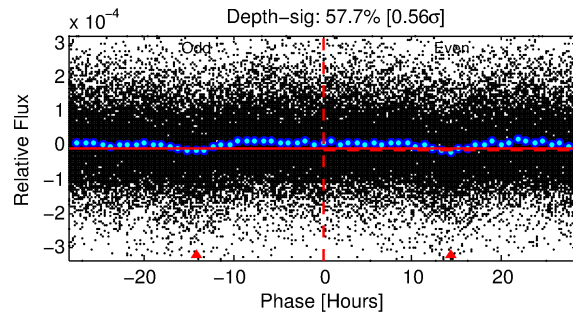
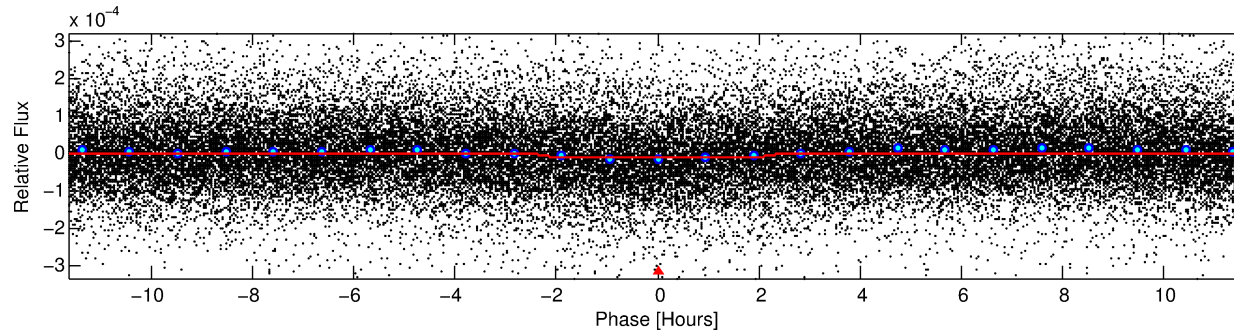
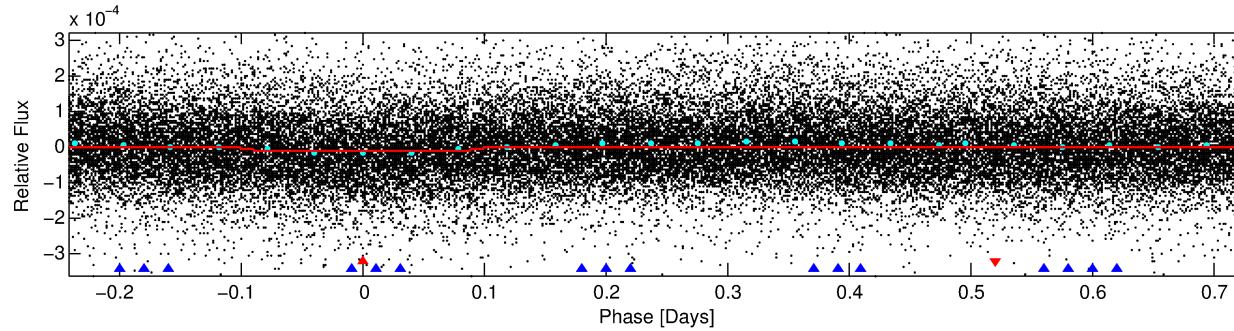
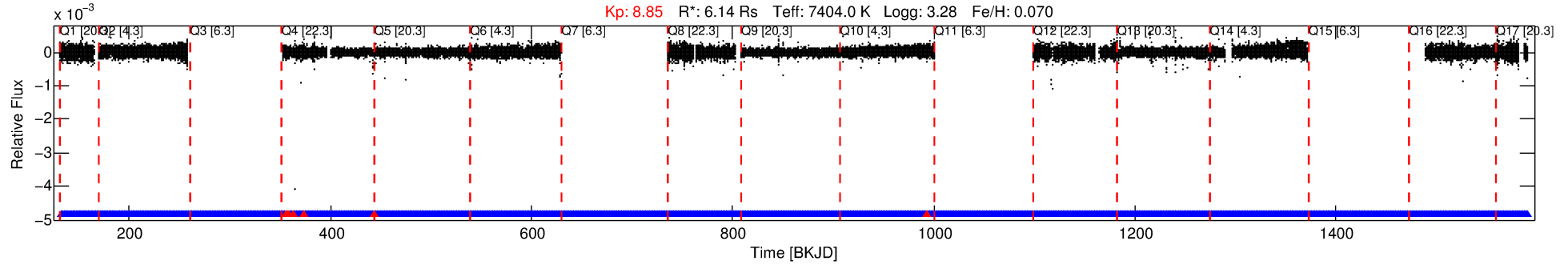
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 005988140-01

No Significant Match Found

# DV One-Page Summary

KIC: 5988140 Candidate: 1 of 2 Period: 0.969 d



## DV Fit Results:

Period = 0.96908 [0.00001] d  
Epoch = 132.1092 [0.0032] BKJD  
Rp/R\* = 0.0036 [0.0007]  
a/R\* = 1.21 [0.45]  
b = 0.87 [0.34]  
Seff = N/A  
Teq = N/A  
Rp = 2.43 [1.17] Re  
a = N/A  
Ag = N/A  
Teff = N/A

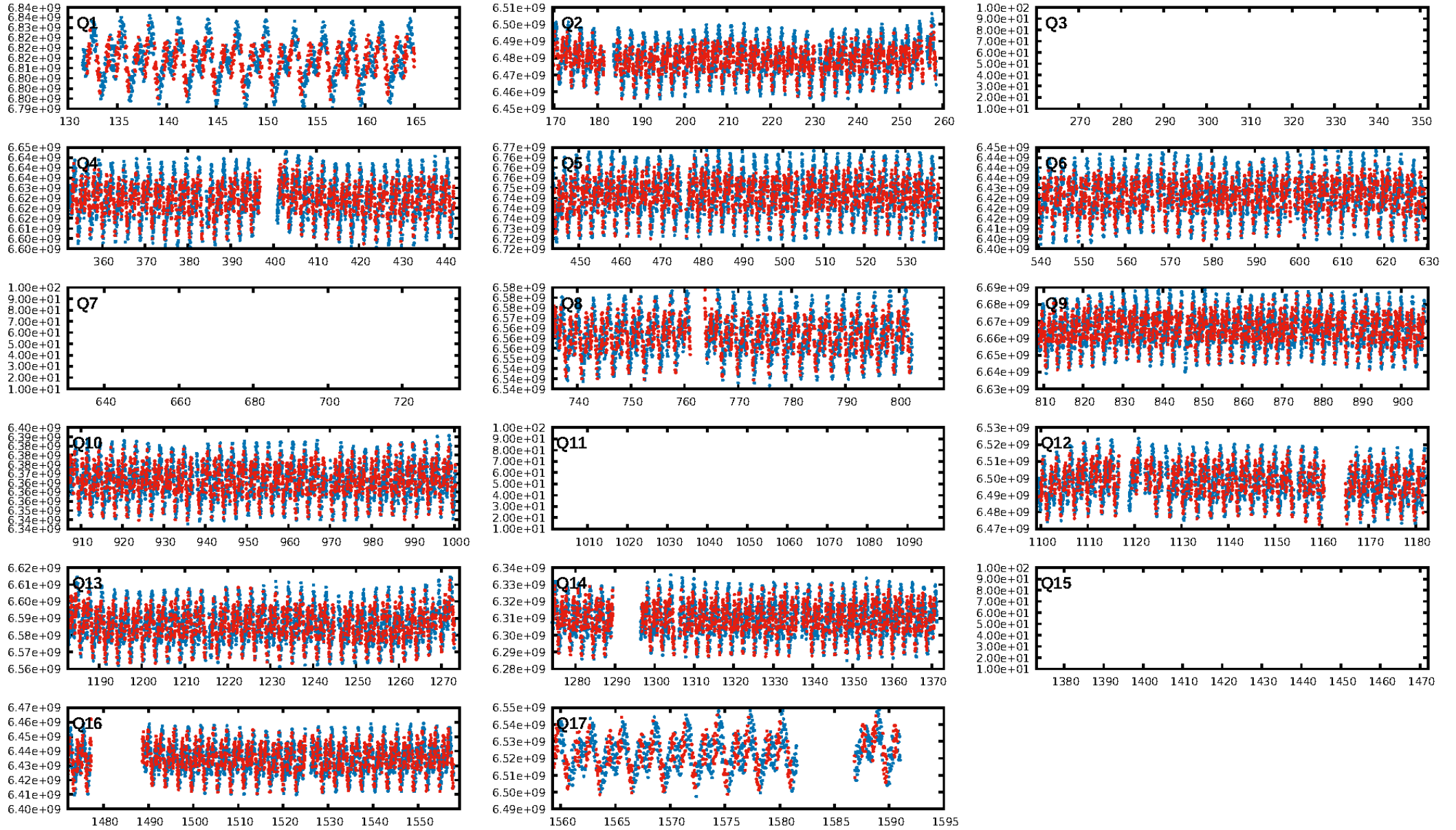
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [284.10 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 9.54e-95  
RollingBand-fgt: 0.99 [943/950]  
GhostDiagnostic-chr: N/A  
Centroid-sig: N/A  
Centroid-so: 7.051 arcsec [3.20 $\sigma$ ]  
OotOffset-rm: 4.305 arcsec [4.34 $\sigma$ ]  
KicOffset-rm: 5.550 arcsec [5.00 $\sigma$ ]  
OotOffset-st: 4/0/4/5 [13]  
KicOffset-st: 4/0/4/5 [13]  
DiffImageQuality-fgm: 0.00 [0/13]  
DiffImageOverlap-fno: 1.00 [13/13]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 15:11:21 Z

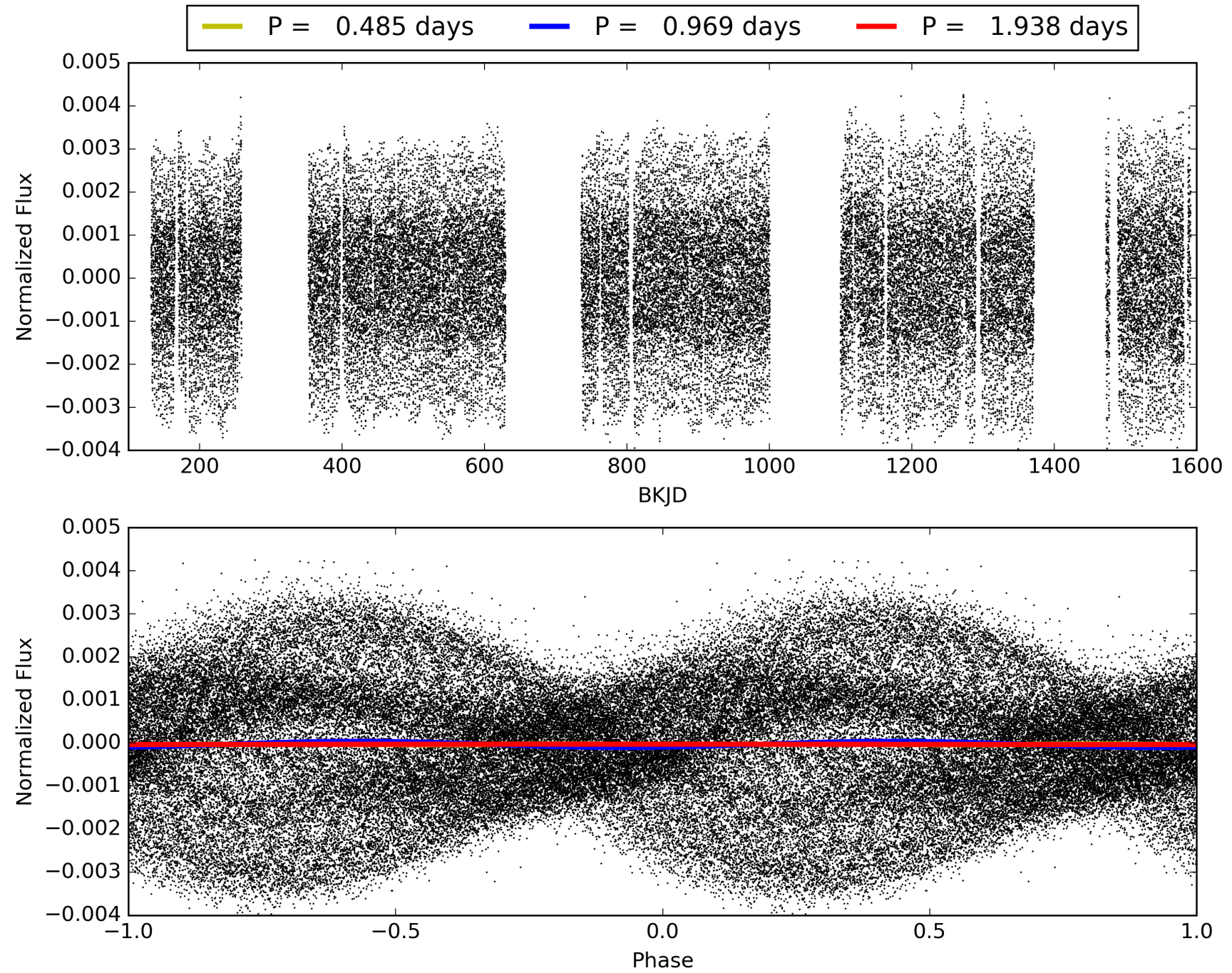
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 005988140-01, PDC Light Curves



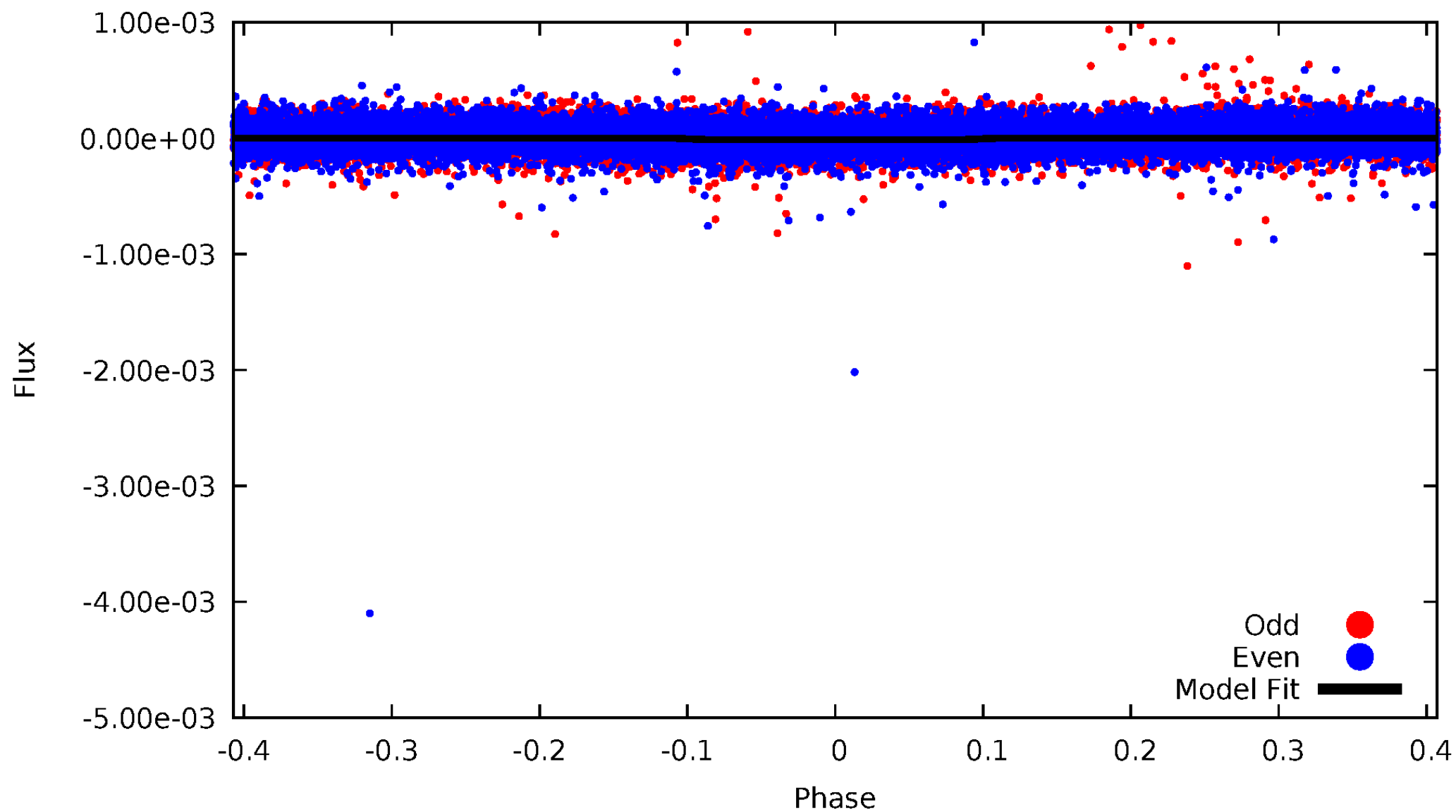


TCE 005988140-01



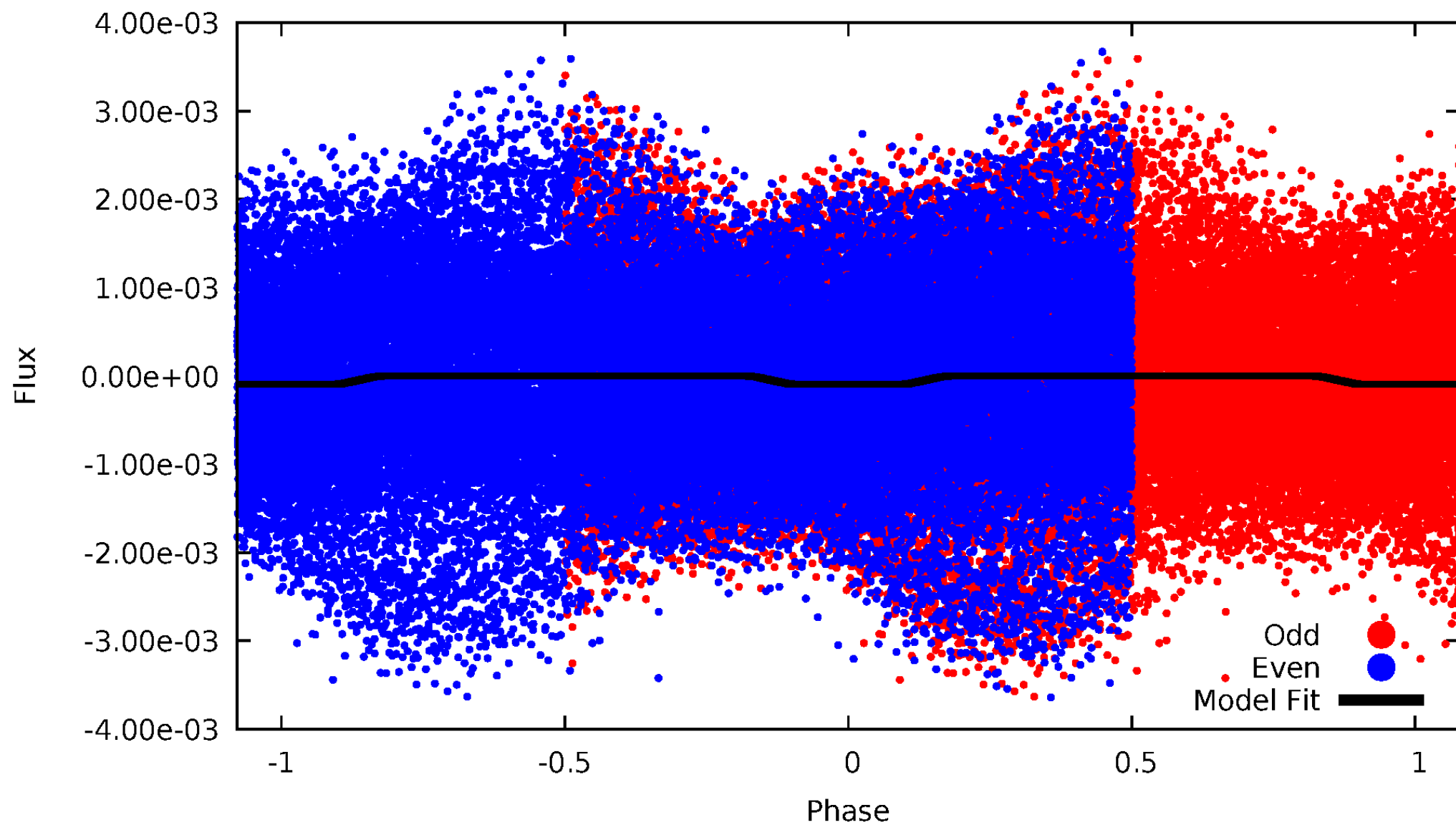
# DV Odd/Even

TCE 005988140-01



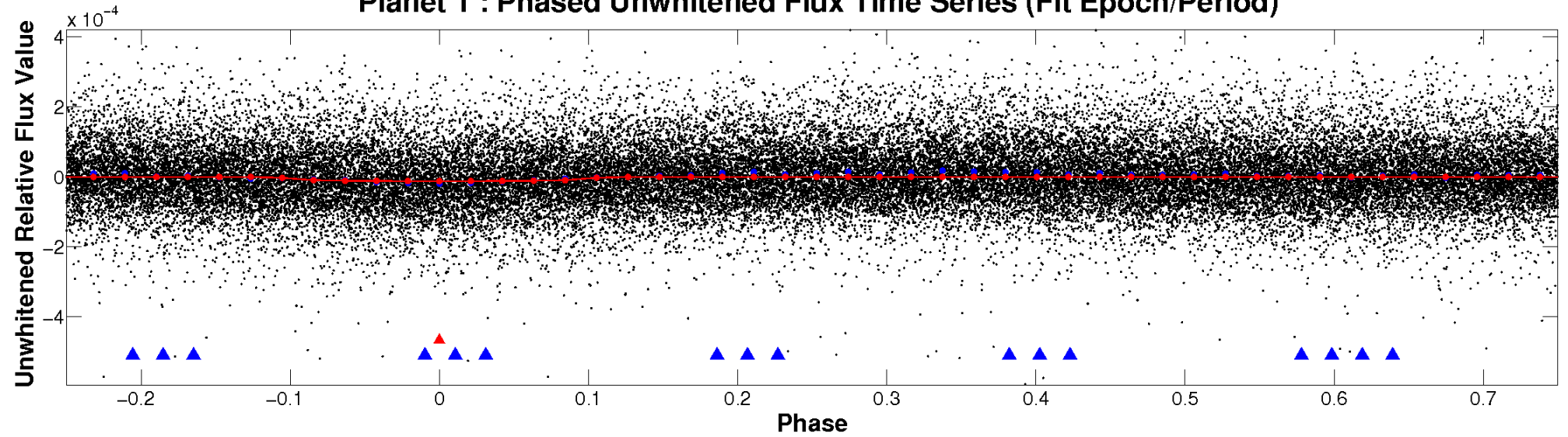
# ALT Odd/Even

TCE 005988140-01

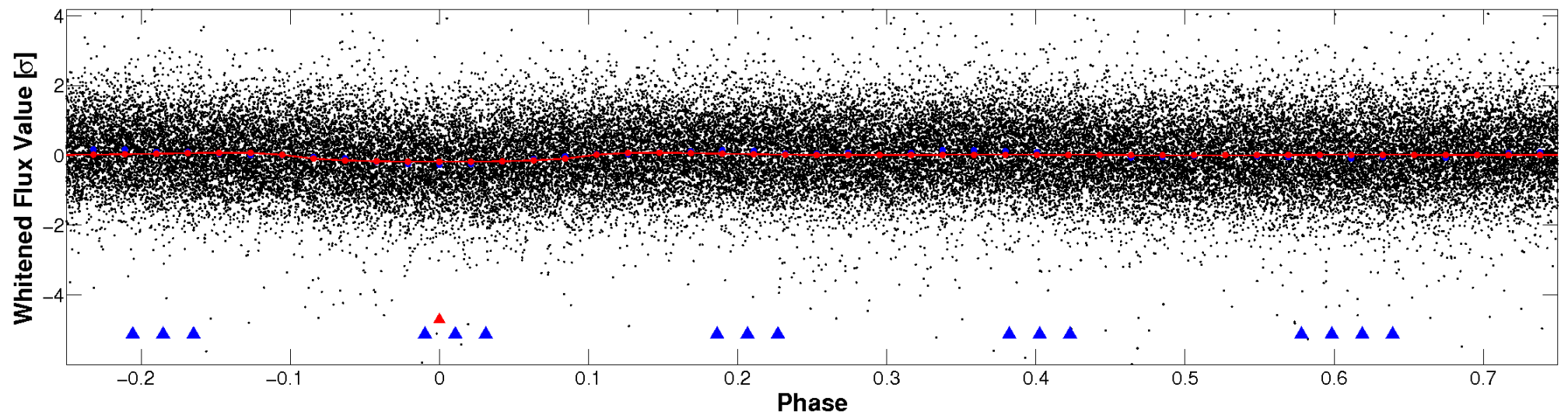


# Non-Whitened Vs. Whitened Light Curve

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



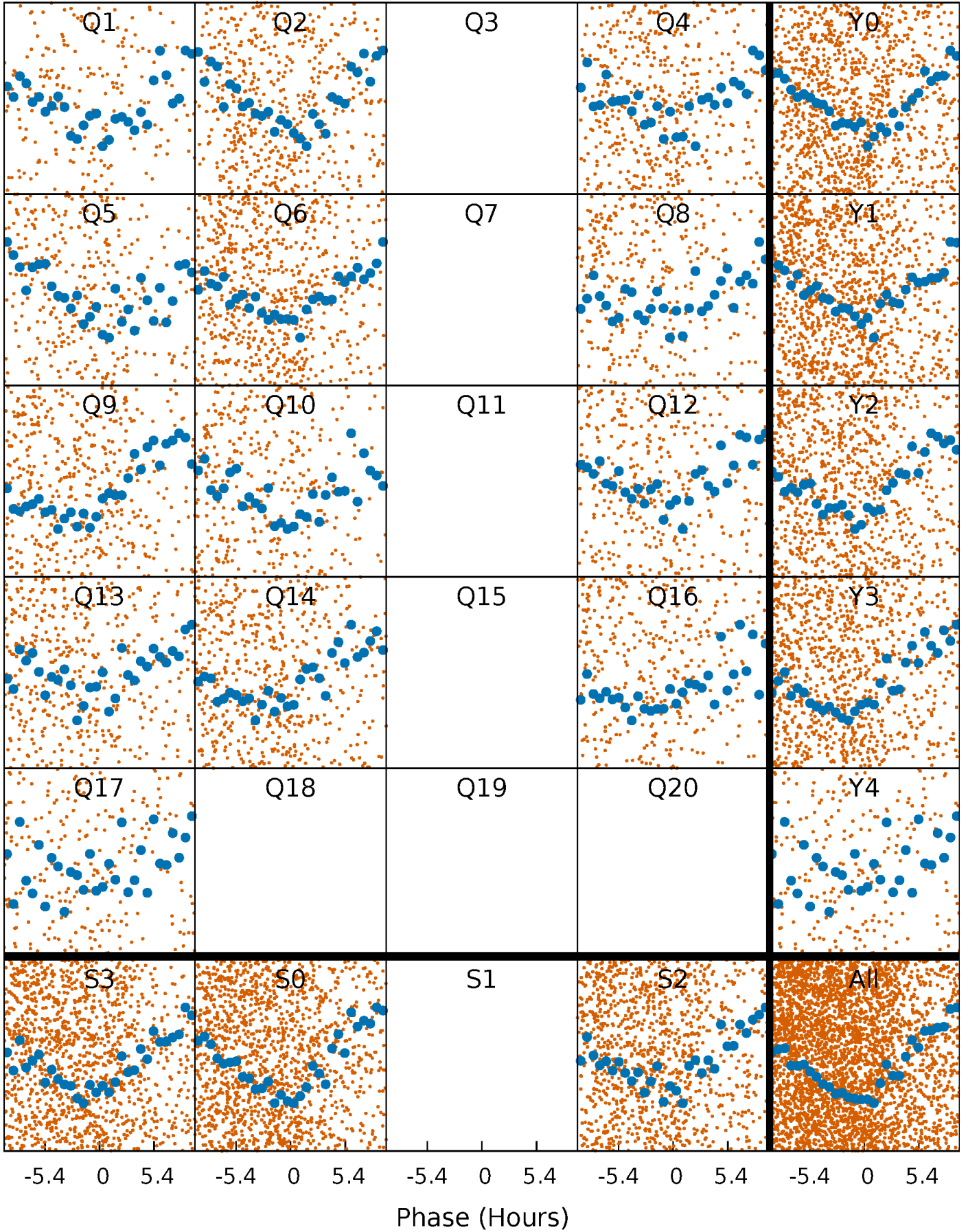
**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**





# PDC Quarter-Phased Transit Curves

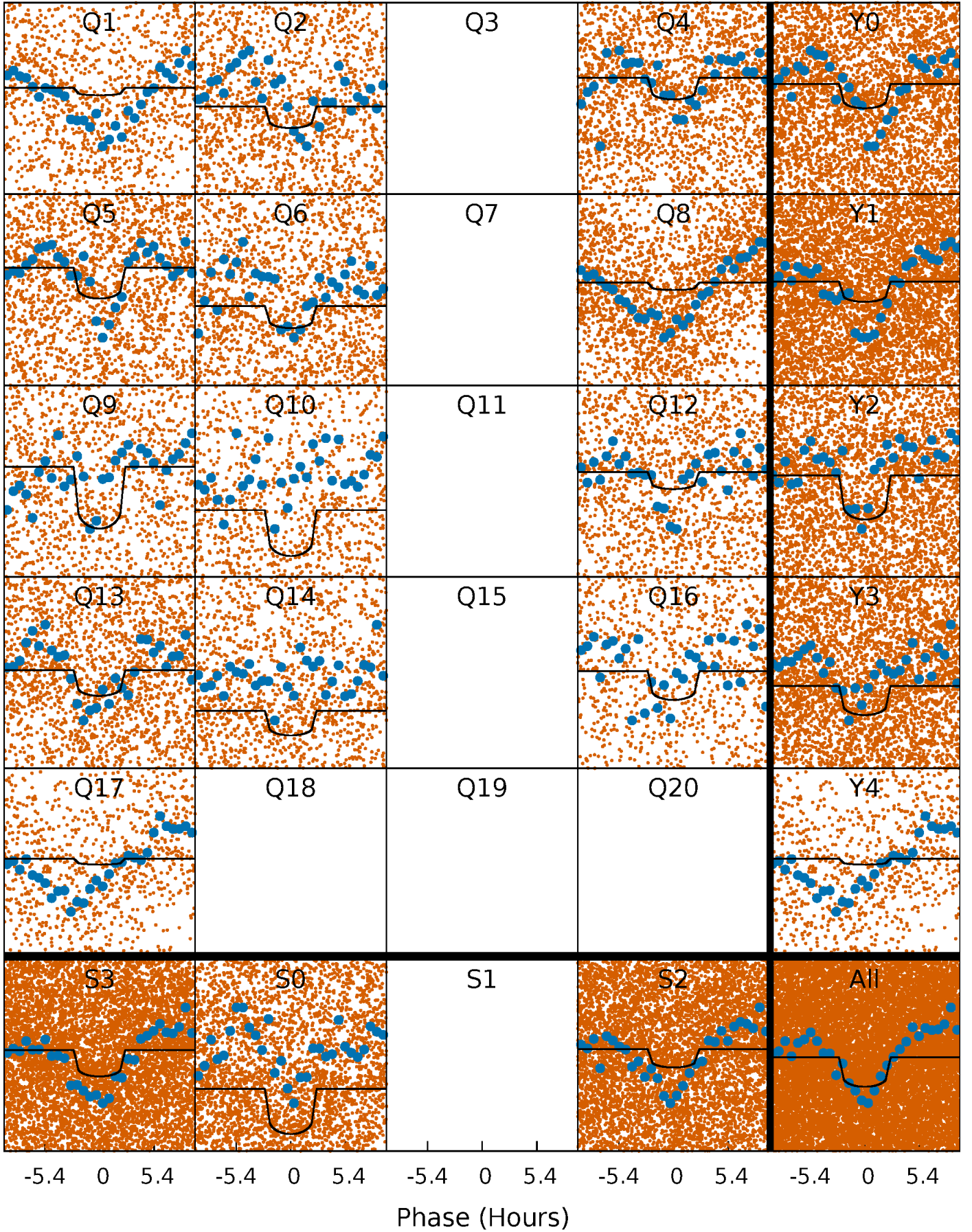
TCE 005988140-01   P= 0.969077 Days    $T_0=132.109250$  (BKJD)





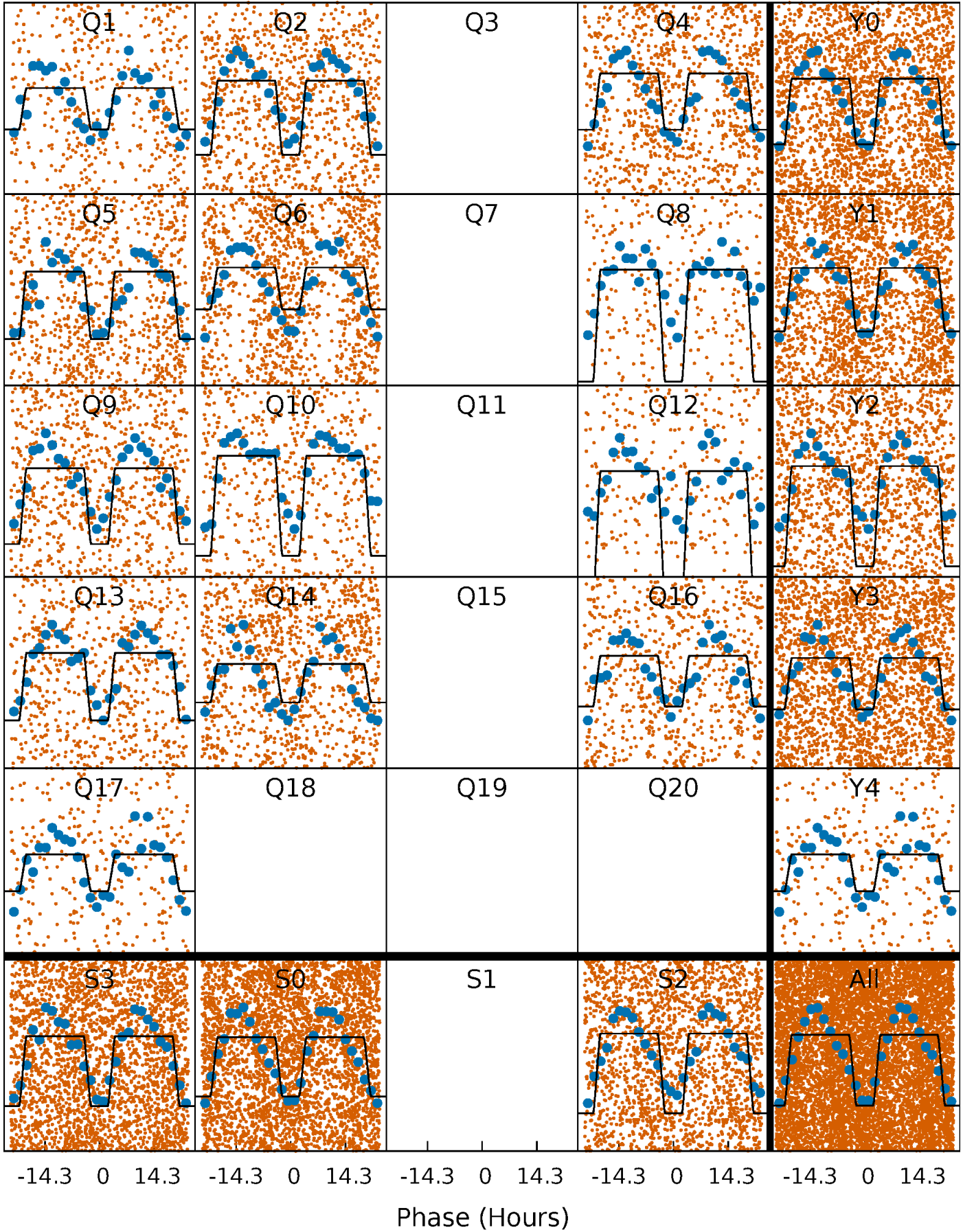
# DV Quarter-Phased Transit Curves

TCE 005988140-01   P= 0.969077 Days    $T_0=132.109250$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

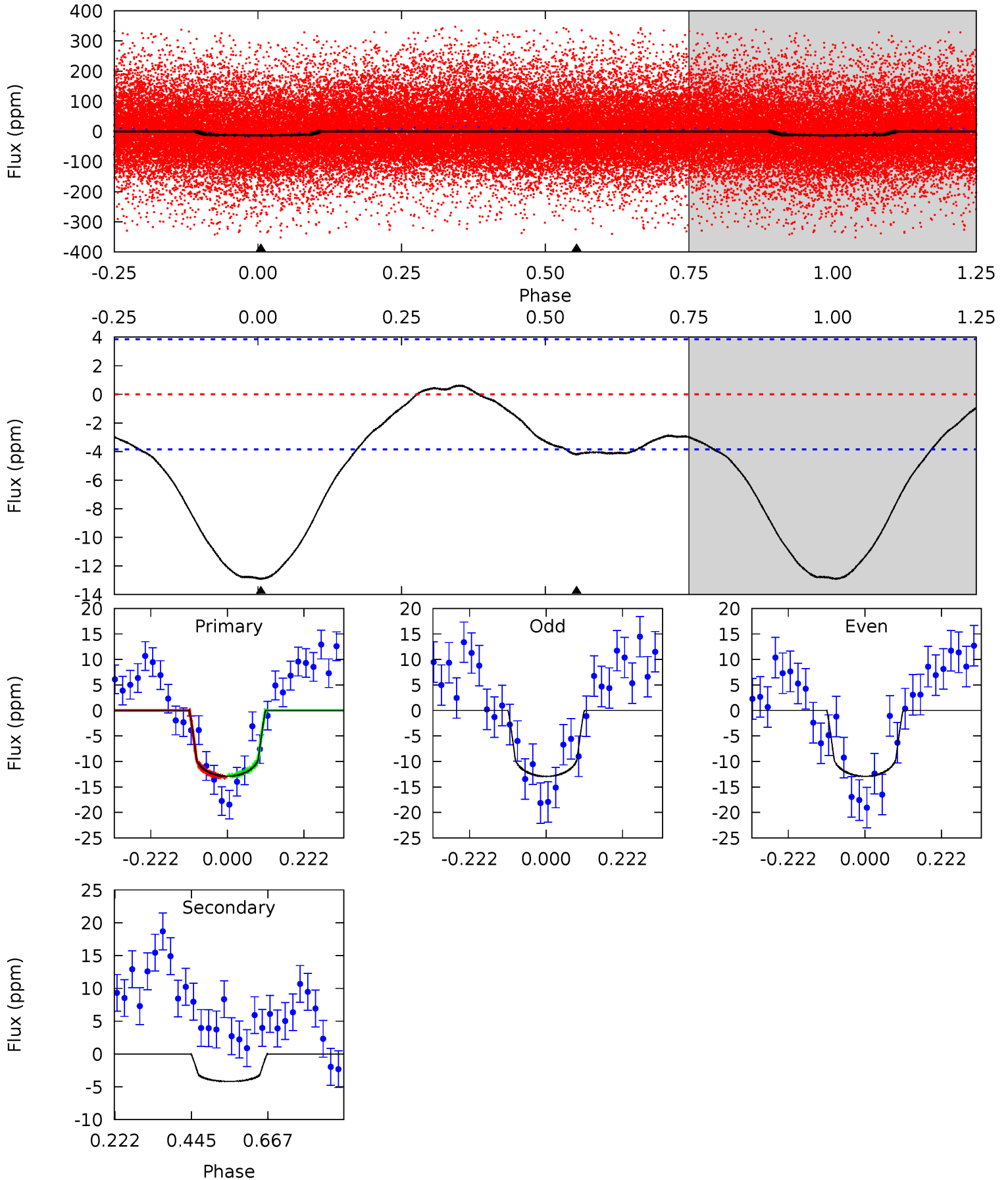
TCE 005988140-01 P= 0.968973 Days  $T_0=132.153683$  (BKJD)



# DV Model-Shift Uniqueness Test

005988140-01, P = 0.969077 Days, E = 131.140173 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
14.7	4.78	0	0	4.39	1.22	1.12	14.7	14.7	4.78	4.78	0.01	1.60	0.05	0.16

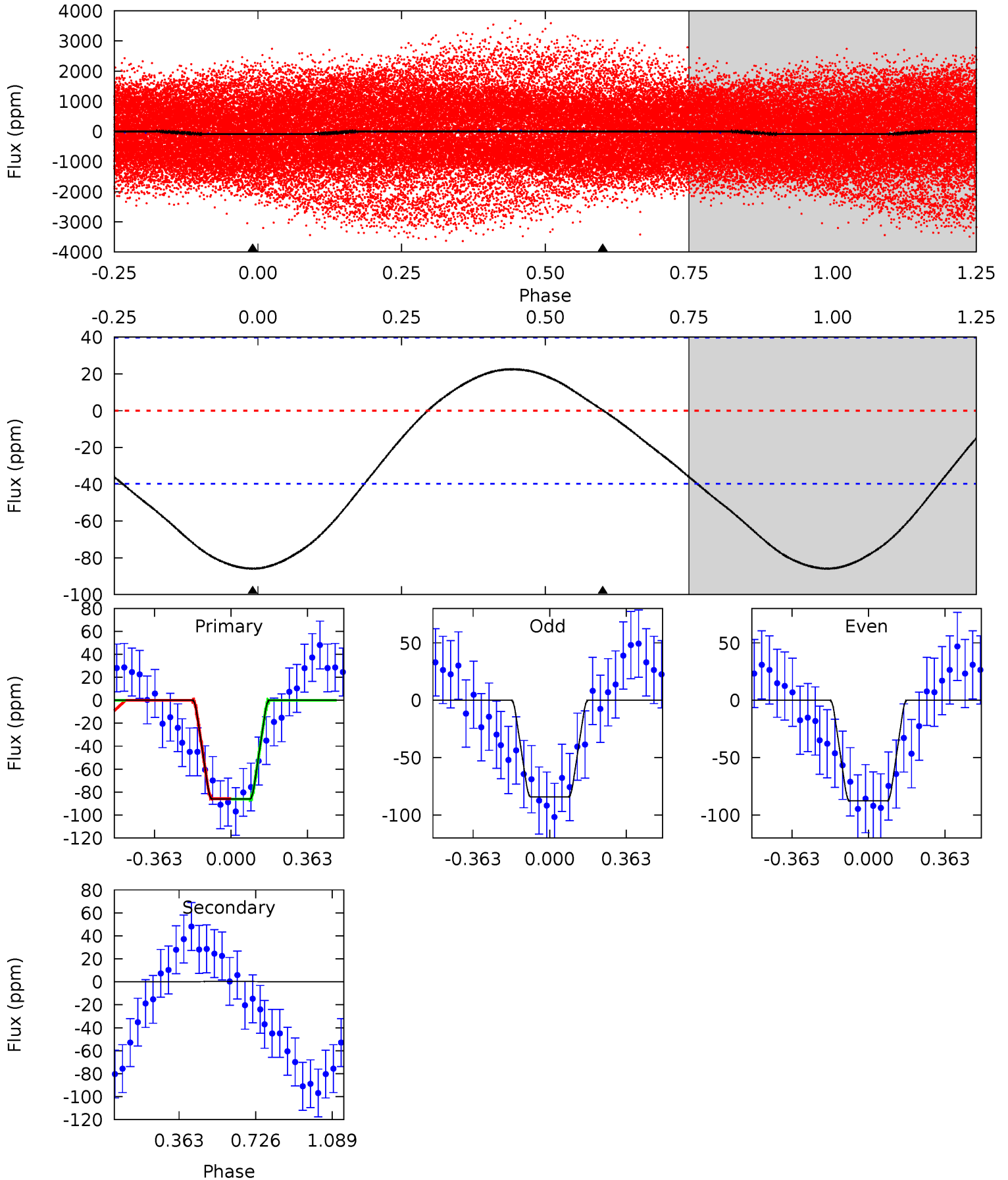




# Alt Model-Shift Uniqueness Test

005988140-01, P = 0.968973 Days, E = 131.184710 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
9.27	-0.03	0	0	4.29	0.91	0.91	9.27	9.27	-0.03	-0.03	0.19	0.53	0.21	0.03





### Stellar Parameters For KIC 005988140

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$7404^{+117}_{-175}$	$3.278^{+0.424}_{-0.106}$	$0.070^{+0.150}_{-0.250}$	$6.143^{+0.967}_{-2.707}$	$2.608^{+0.211}_{-0.633}$	$0.016^{+0.064}_{-0.005}$
	+2%/-2%	+13%/-3%	+214%/-357%	+16%/-44%	+8%/-24%	+406%/-34%
Source	SPE4	SPE4	SPE4	DSEP		

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

### Secondary Eclipse Parameters for KIC 005988140-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-4 \pm 1$	$2.29^{+0.59}_{-0.69}$	$6867^{+341}_{-784}$	$2750^{+2367}_{-7388}$	$0.306^{+0.315}_{-0.122}$
Alt.	$0 \pm 9$	$6.24^{+1.01}_{-1.45}$	$6843^{+405}_{-814}$	$-5518^{+664}_{-479}$	$-0.000^{+0.098}_{-0.095}$

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

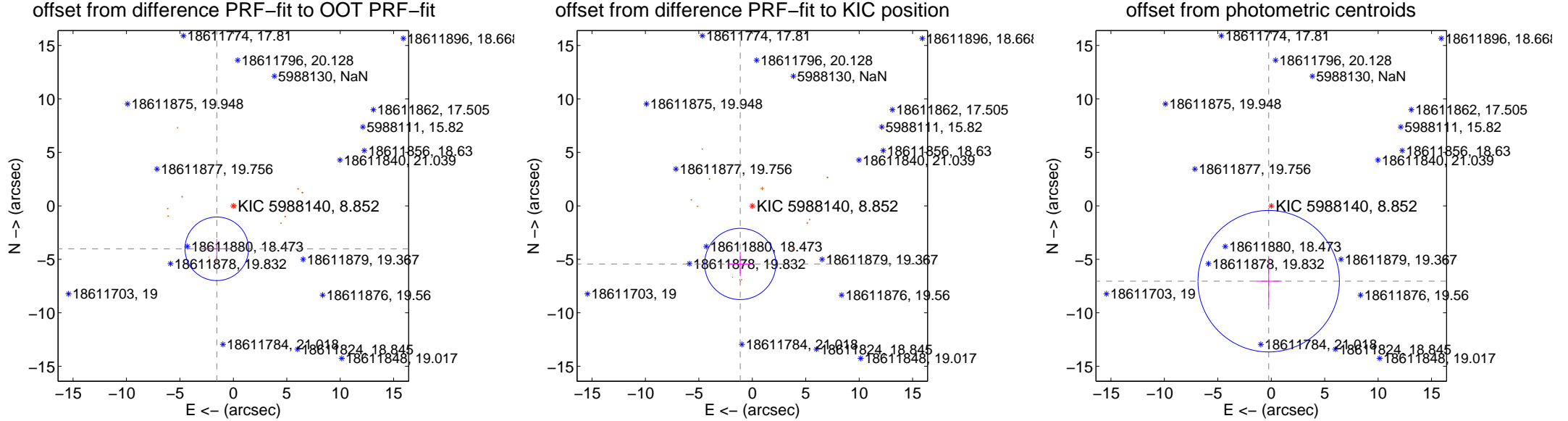
## DV Centroid Data

Supplemental centroid analysis for 005988140-01. **Kepler magnitude: 8.85.** Transit SNR 16.25

**There are 0 quarters with good PRF difference image offsets**

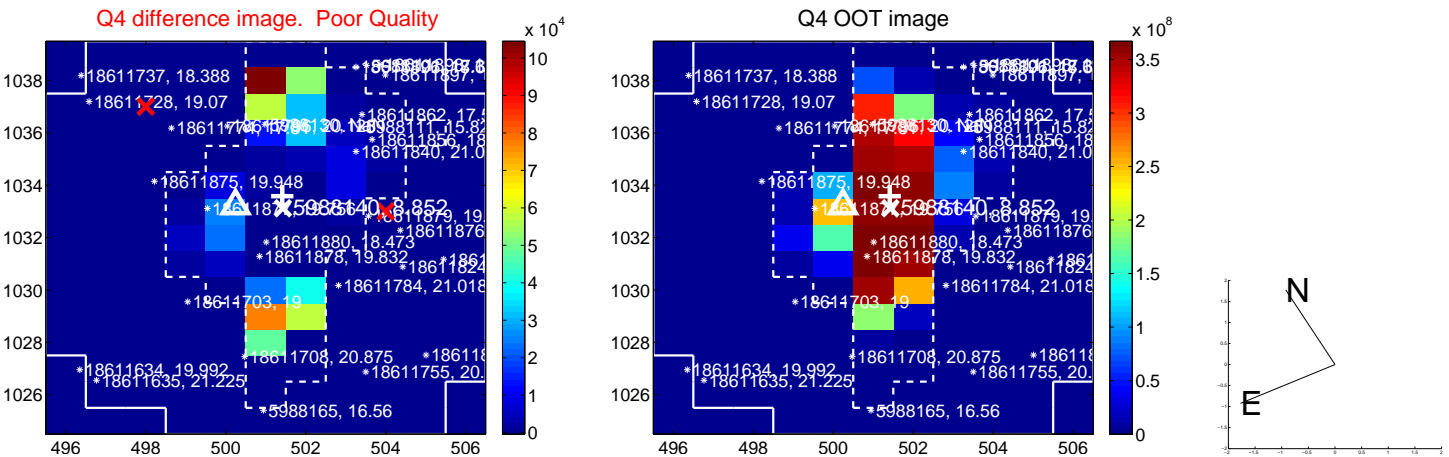
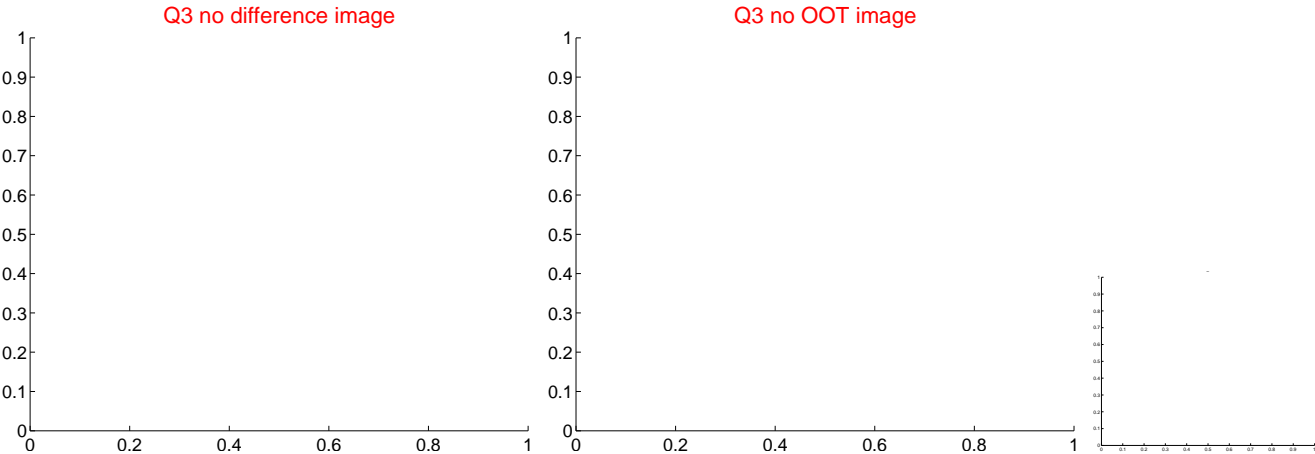
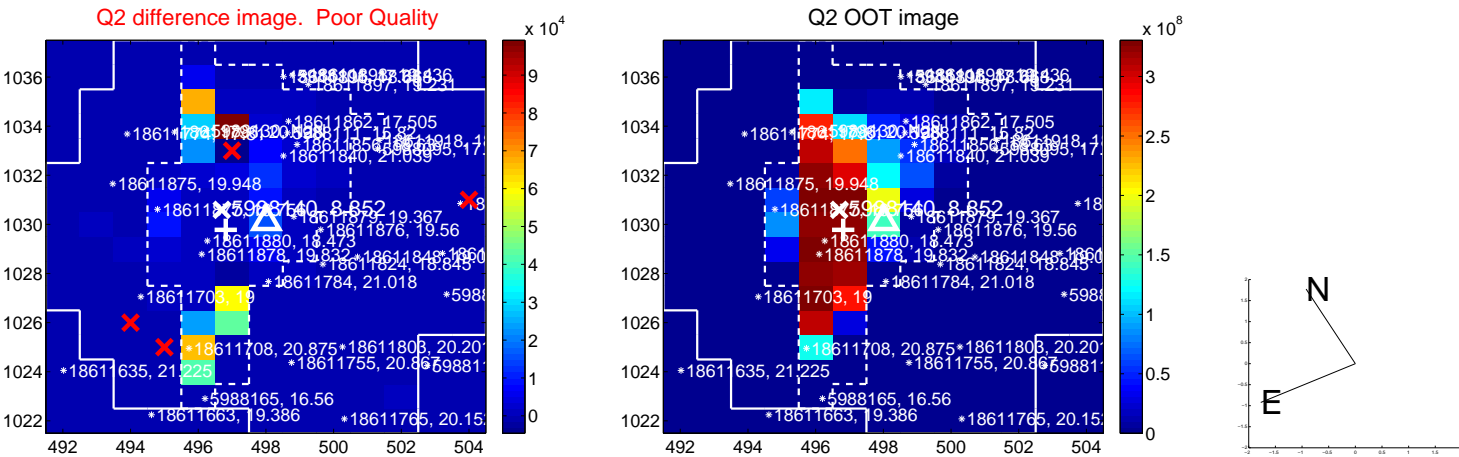
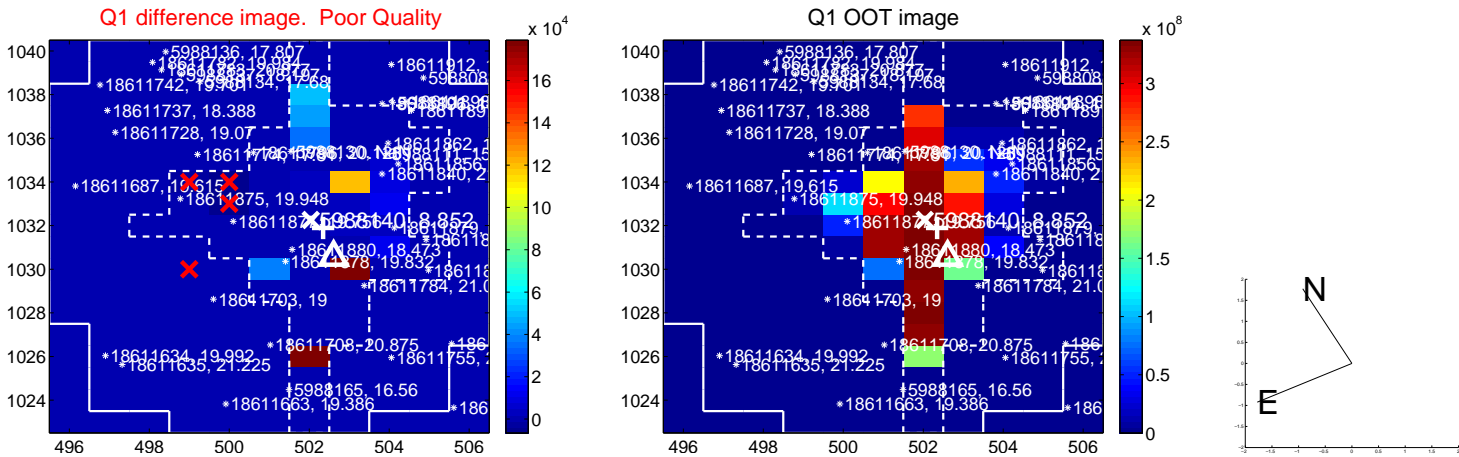
The direct PRF centroid is offset from the target star catalog position by about 1.82 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b><math>4.305 \pm 0.992</math></b>	<b>4.34</b>	$1.552 \pm 1.318$	$-4.016 \pm 0.902$
PRF-fit source offset from KIC position	<b><math>5.550 \pm 1.110</math></b>	<b>5.00</b>	$1.130 \pm 1.192$	$-5.434 \pm 1.138$
photometric centroid source offset	<b><math>7.05 \pm 2.21</math></b>	<b>3.20</b>	$0.24 \pm 1.23$	$-7.05 \pm 2.21$

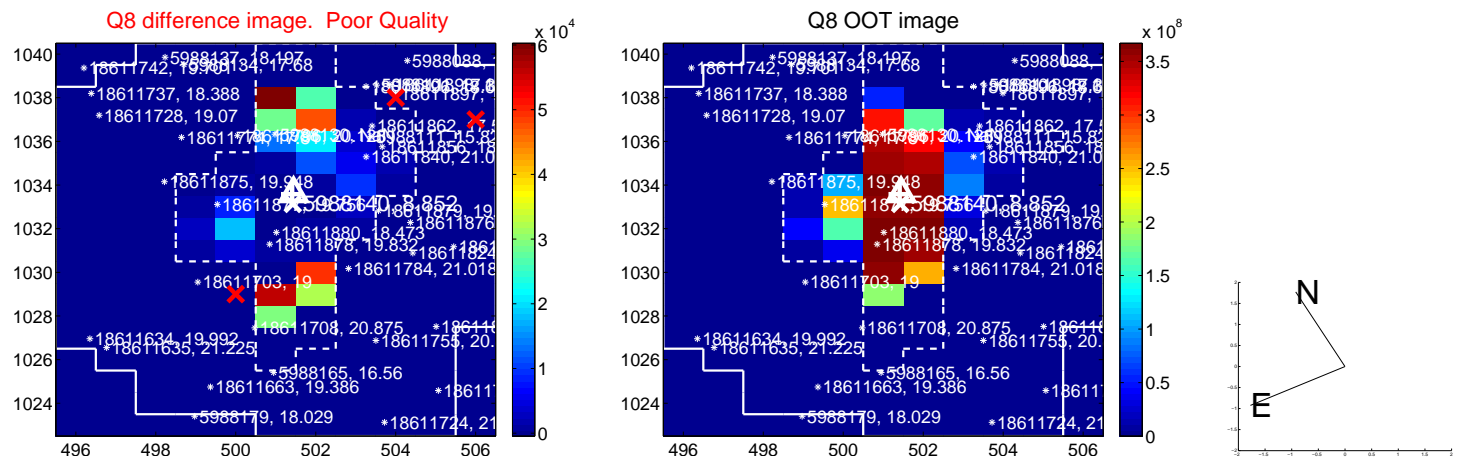
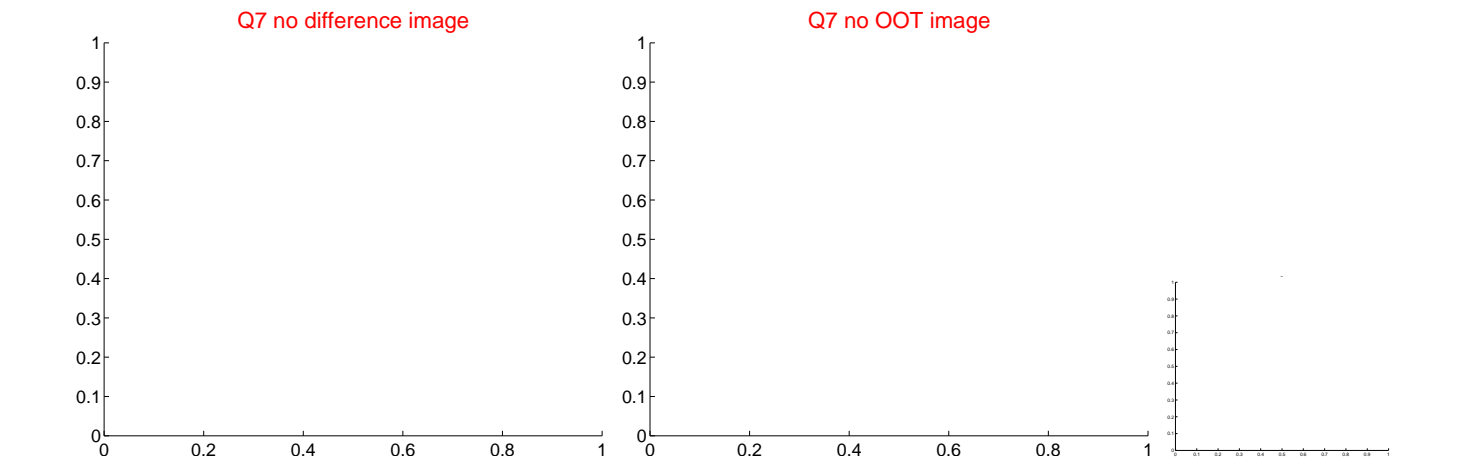
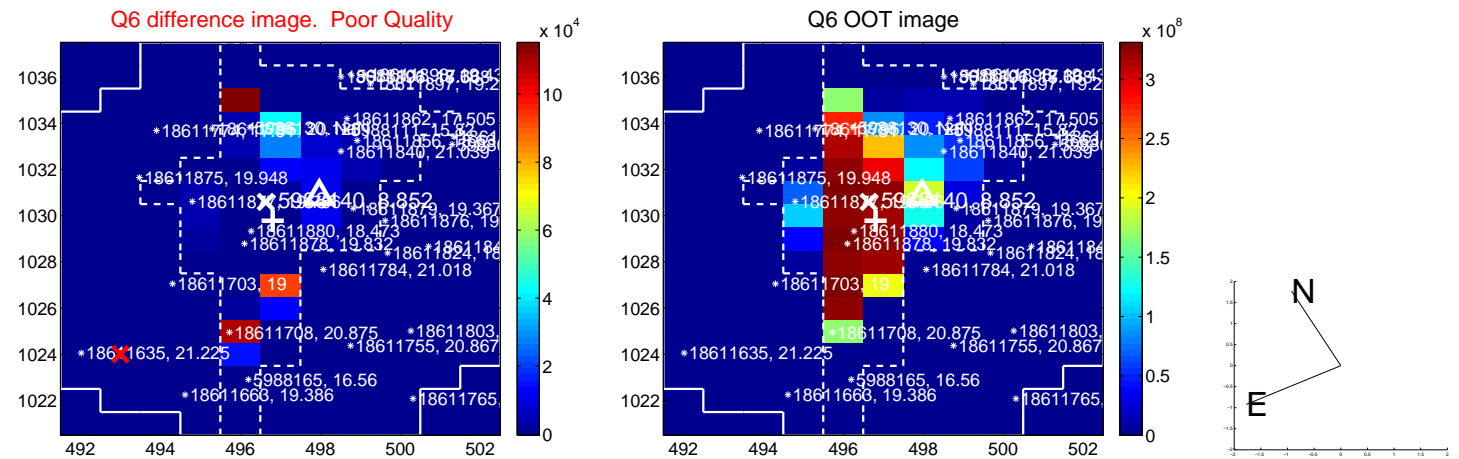
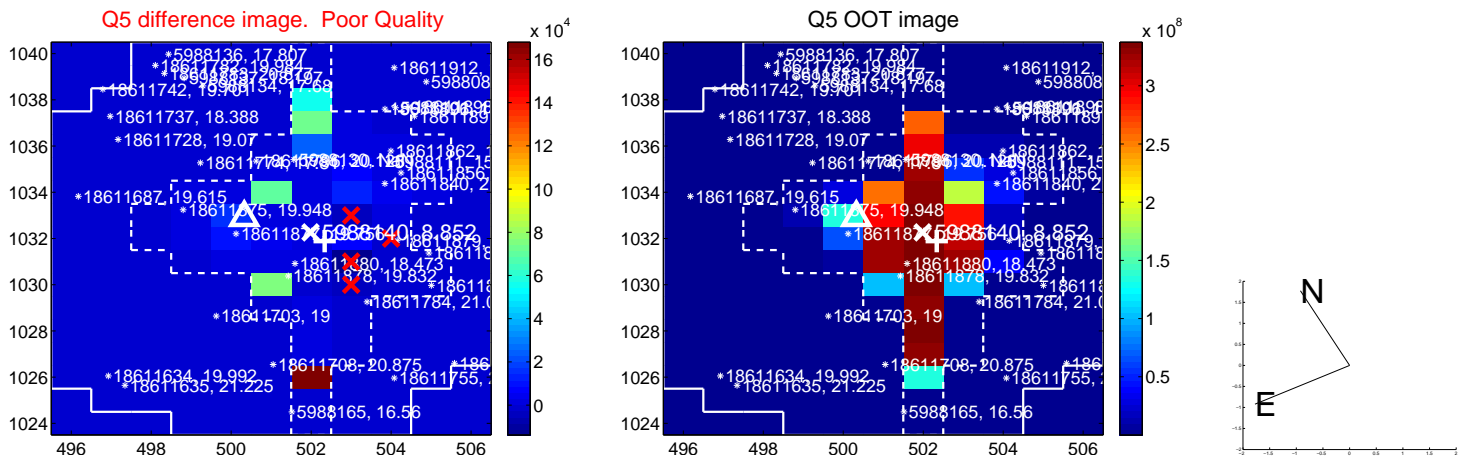


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: 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 ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.

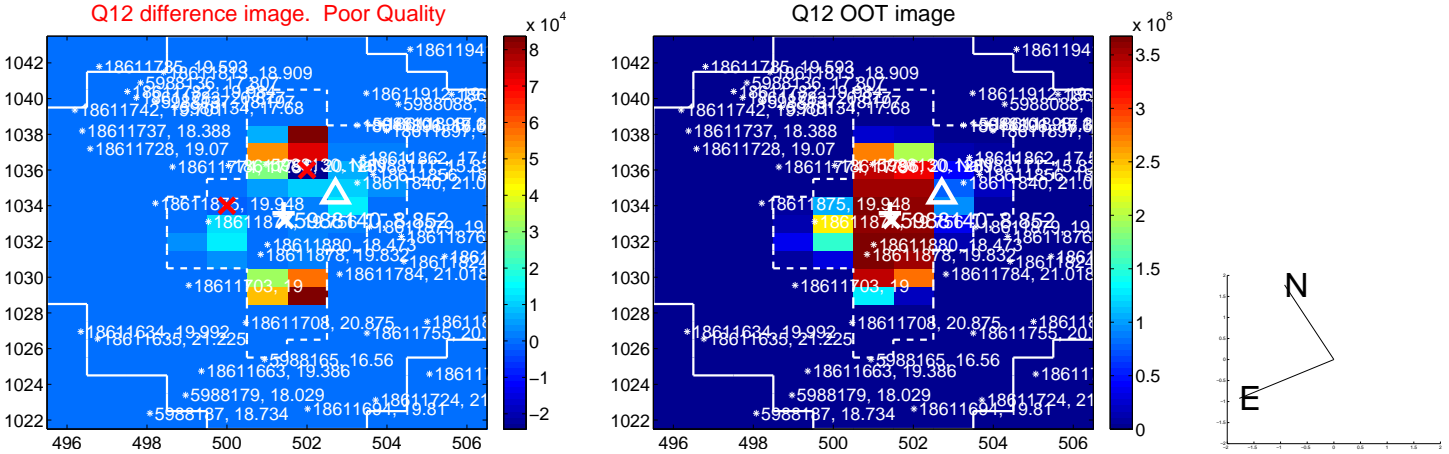
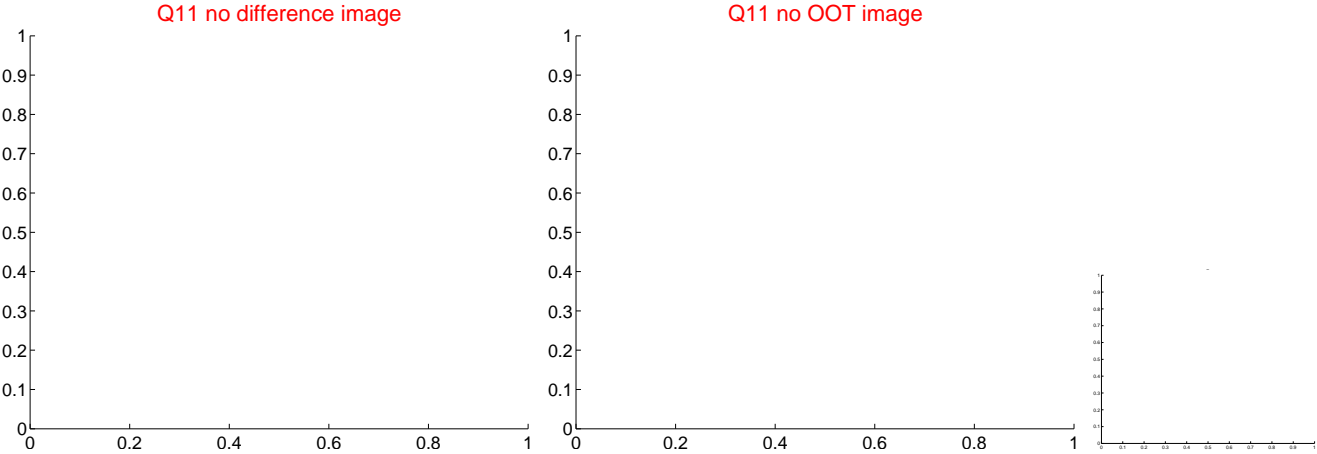
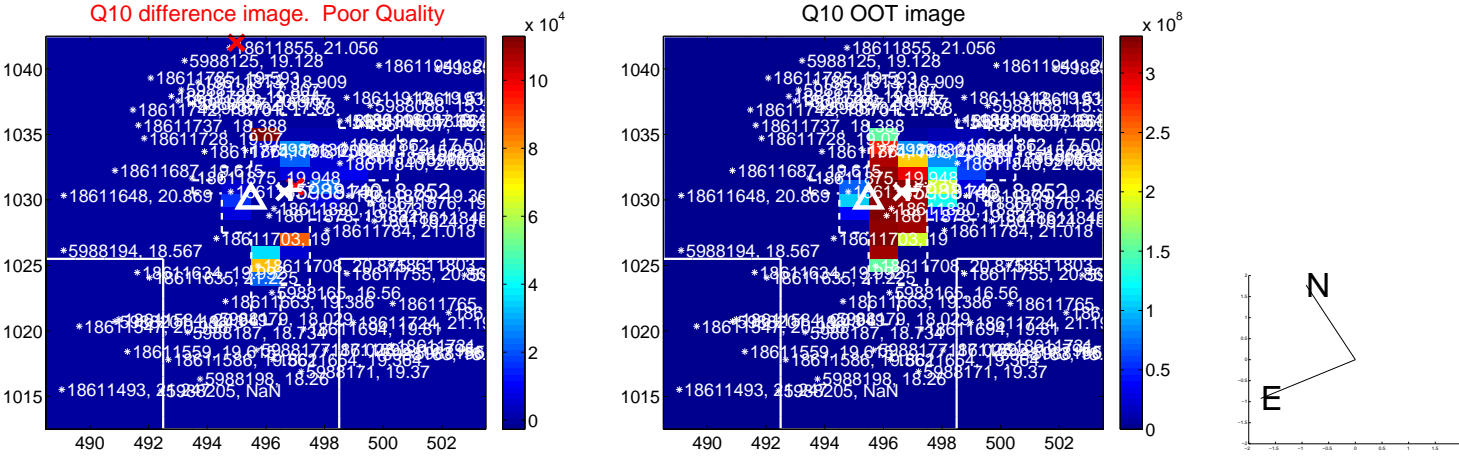
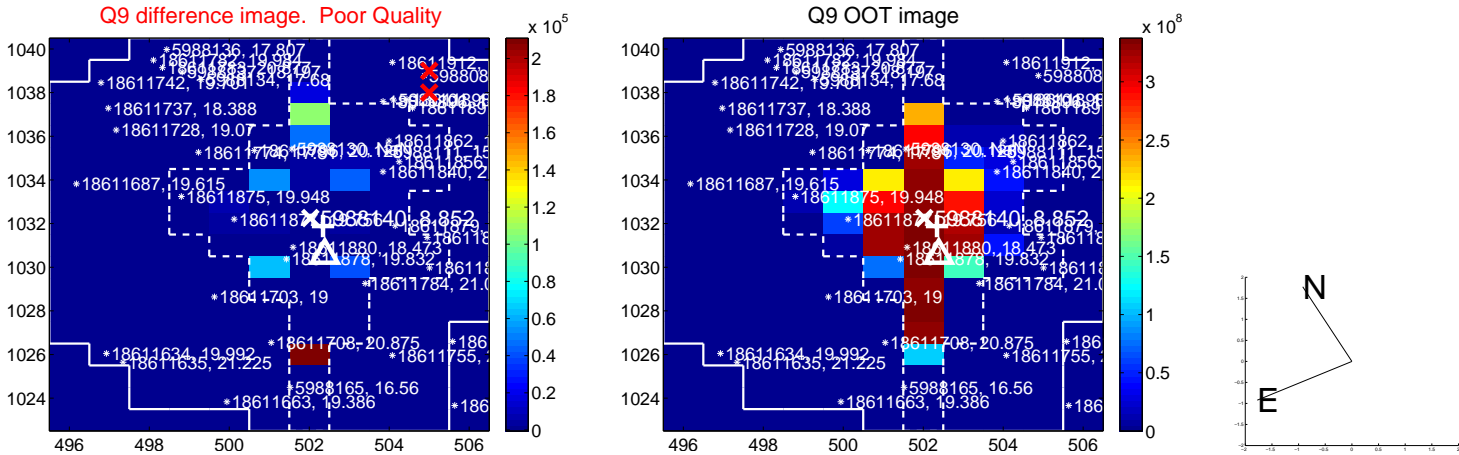


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

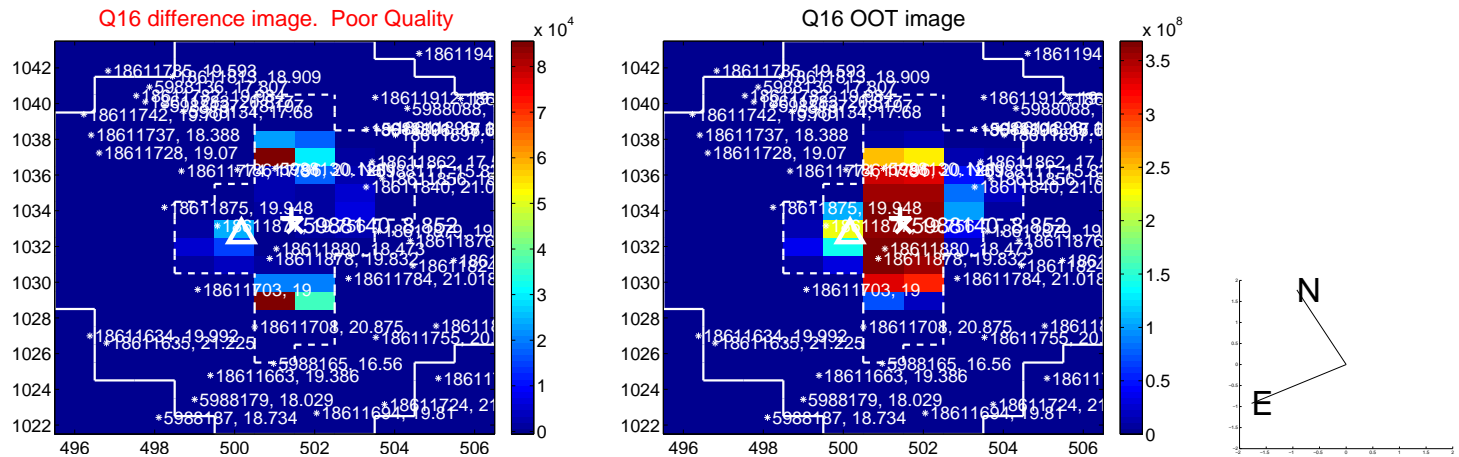
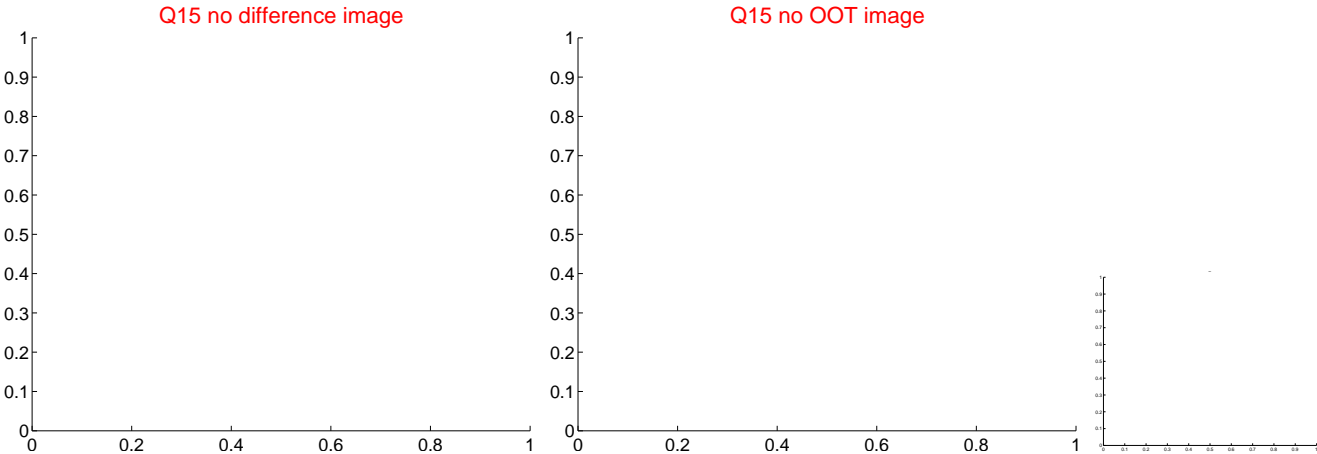
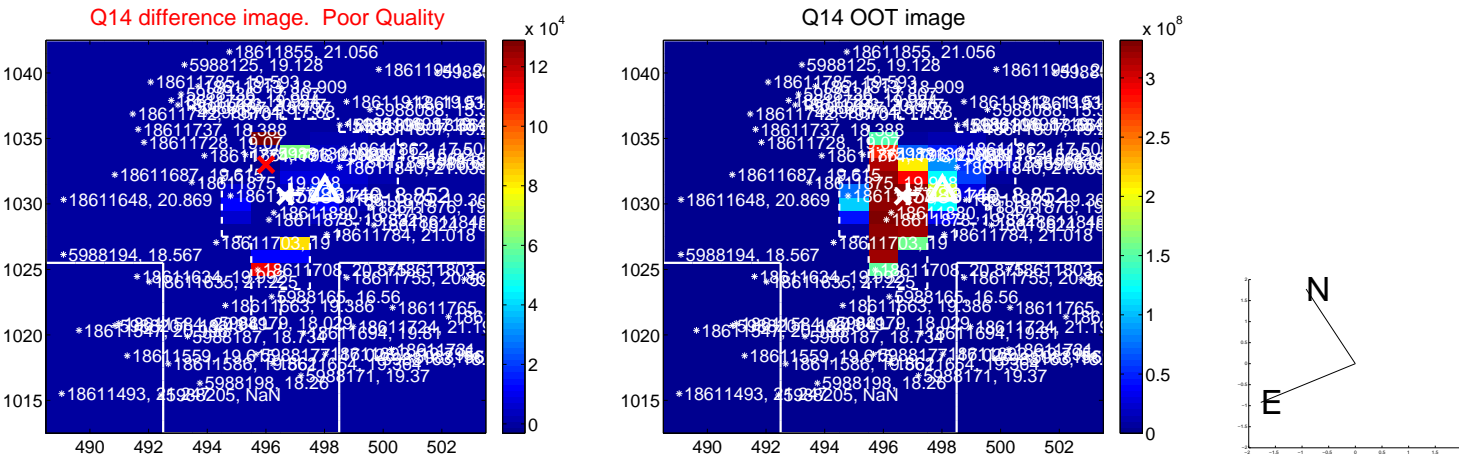
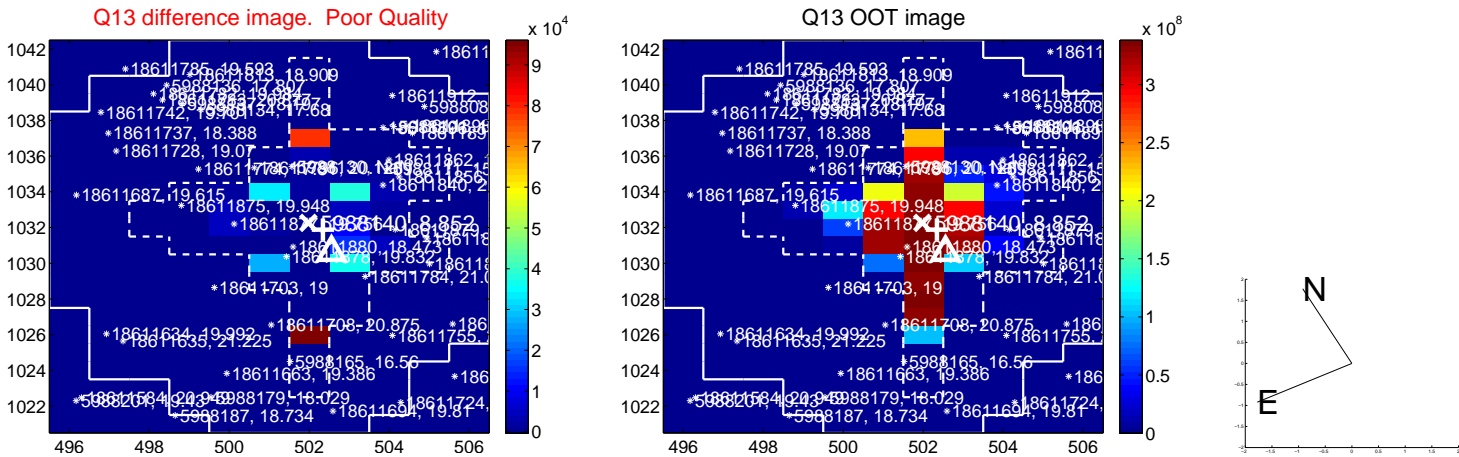




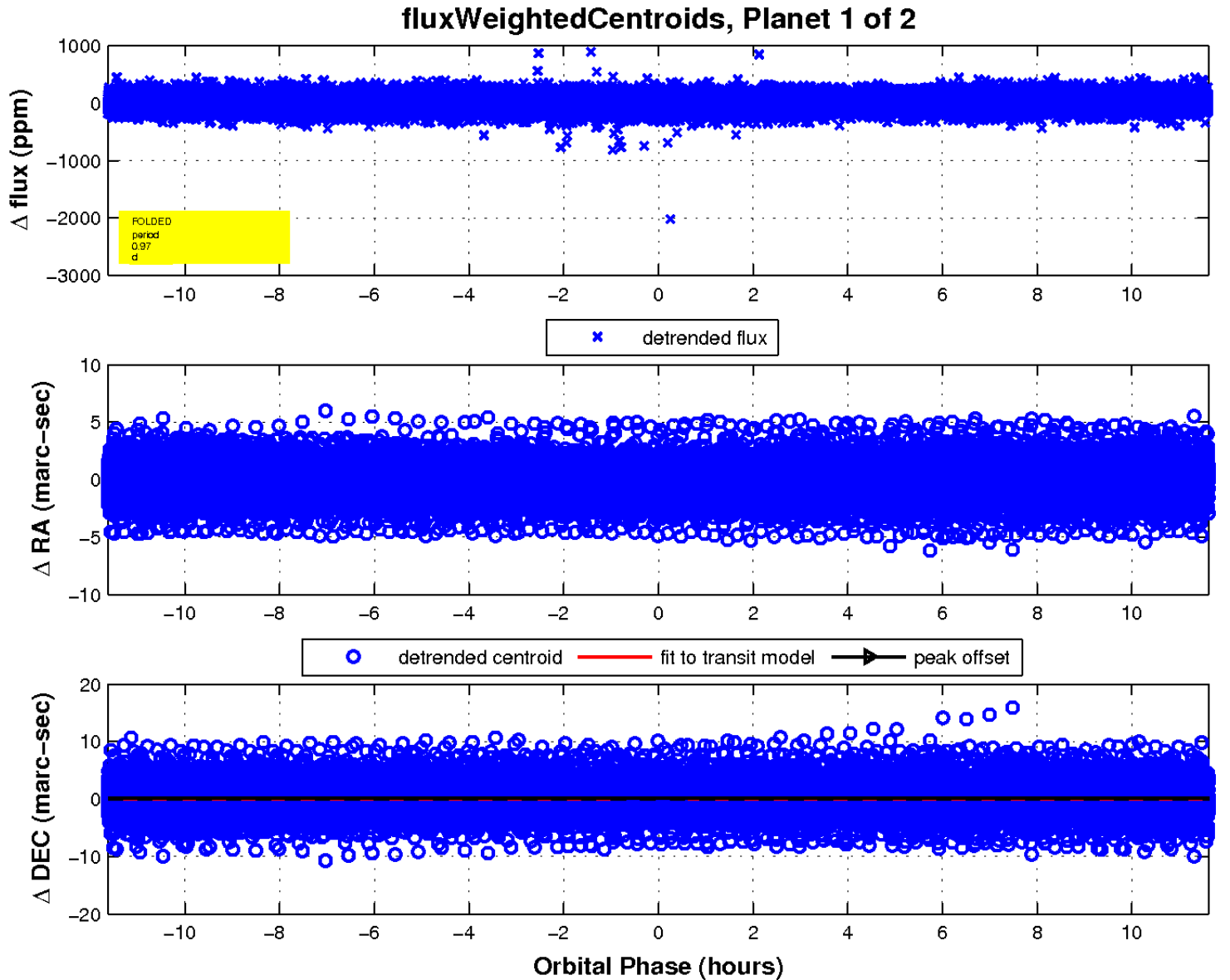
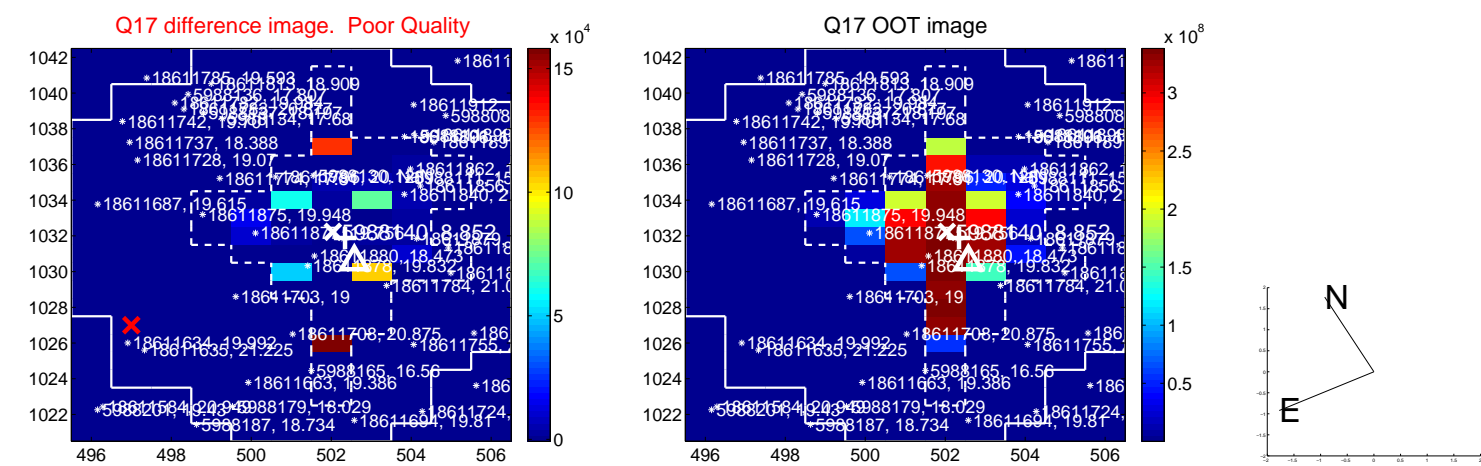
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



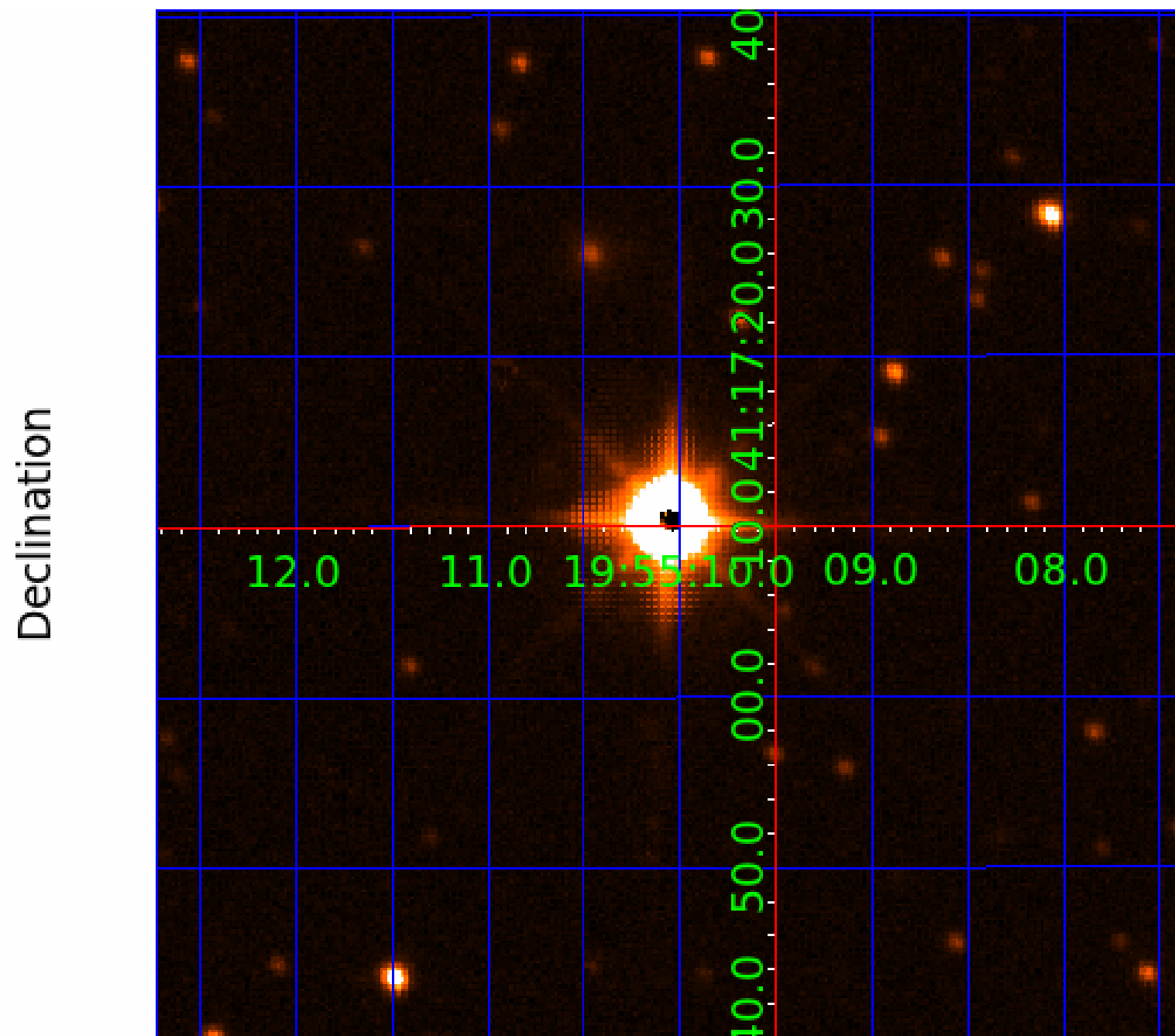
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.



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



UKIRT Image





# KIC 005988140

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005988140-01	OBS	No	0.969077	132.109250	12.0	4.732	21.2	16.2	6.14	7404	2.43	0.00
005988140-02	OBS	No	88.965252	218.917334	67.3	5.733	9.2	4.4	6.14	7404	6.25	352.14

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005988140-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—CENT_SATURATED
005988140-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_SATURATED

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

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

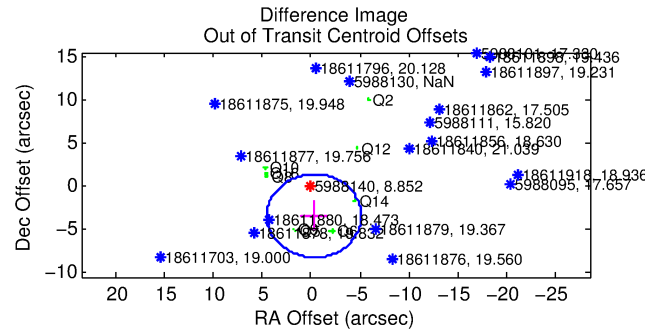
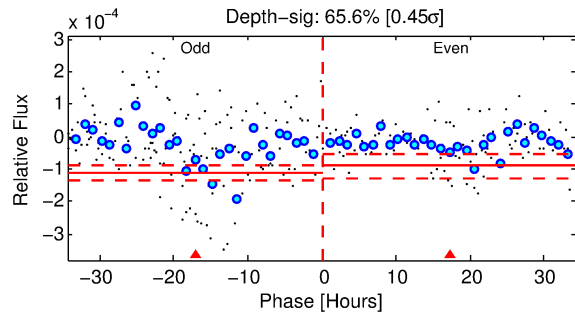
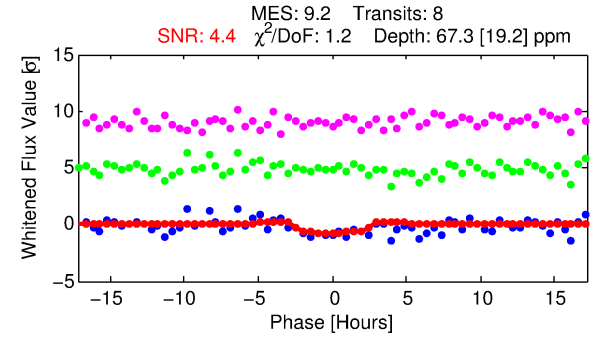
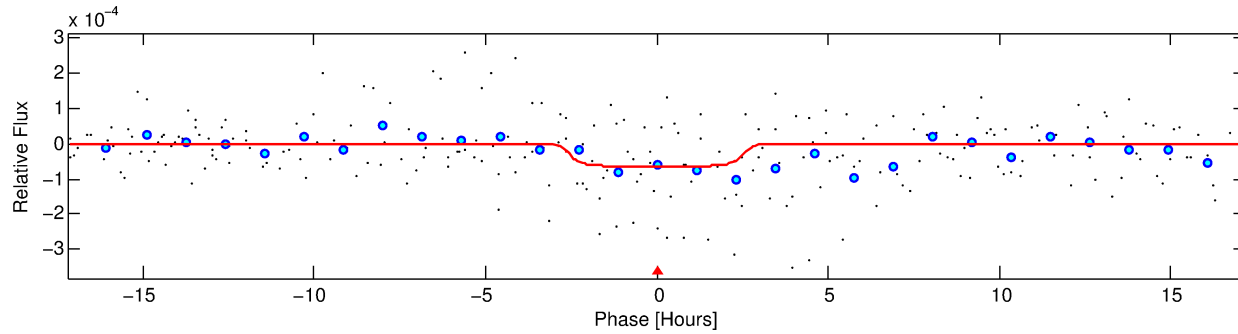
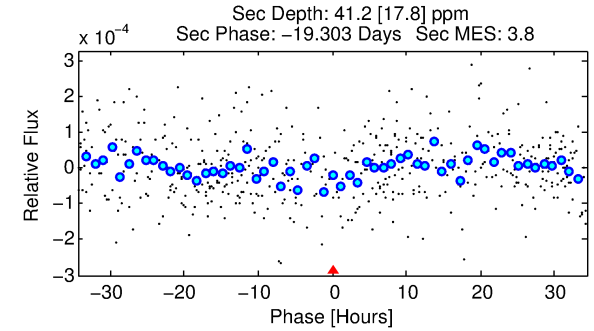
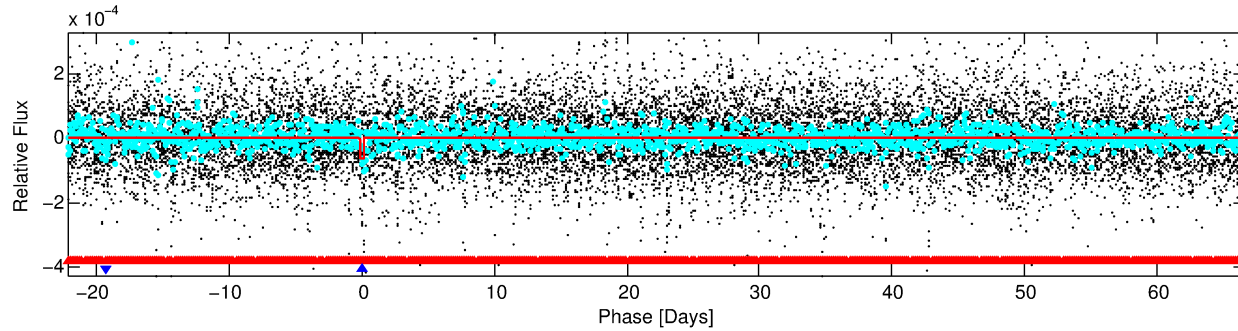
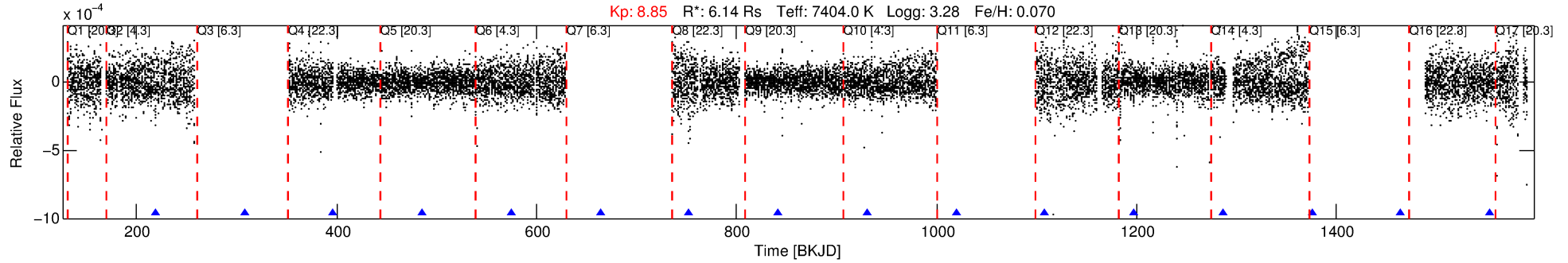
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 005988140-02

No Significant Match Found

# DV One-Page Summary

KIC: 5988140 Candidate: 2 of 2 Period: 88.965 d



## DV Fit Results:

Period = 88.96525 [0.00314] d  
Epoch = 218.9173 [0.0299] BKJD  
Rp/R\* = 0.0093 [0.0034]  
a/R\* = 38.20 [78.28]  
b = 0.96 [0.19]  
Seff = 352.14 [253.66]  
Teq = 1105 [199] K  
Rp = 6.26 [3.58] Re  
a = 0.5372 [0.2355] AU  
Ag = 166.94 [185.06] [0.90σ]  
Teff = 6139 [1309] K [3.80σ]

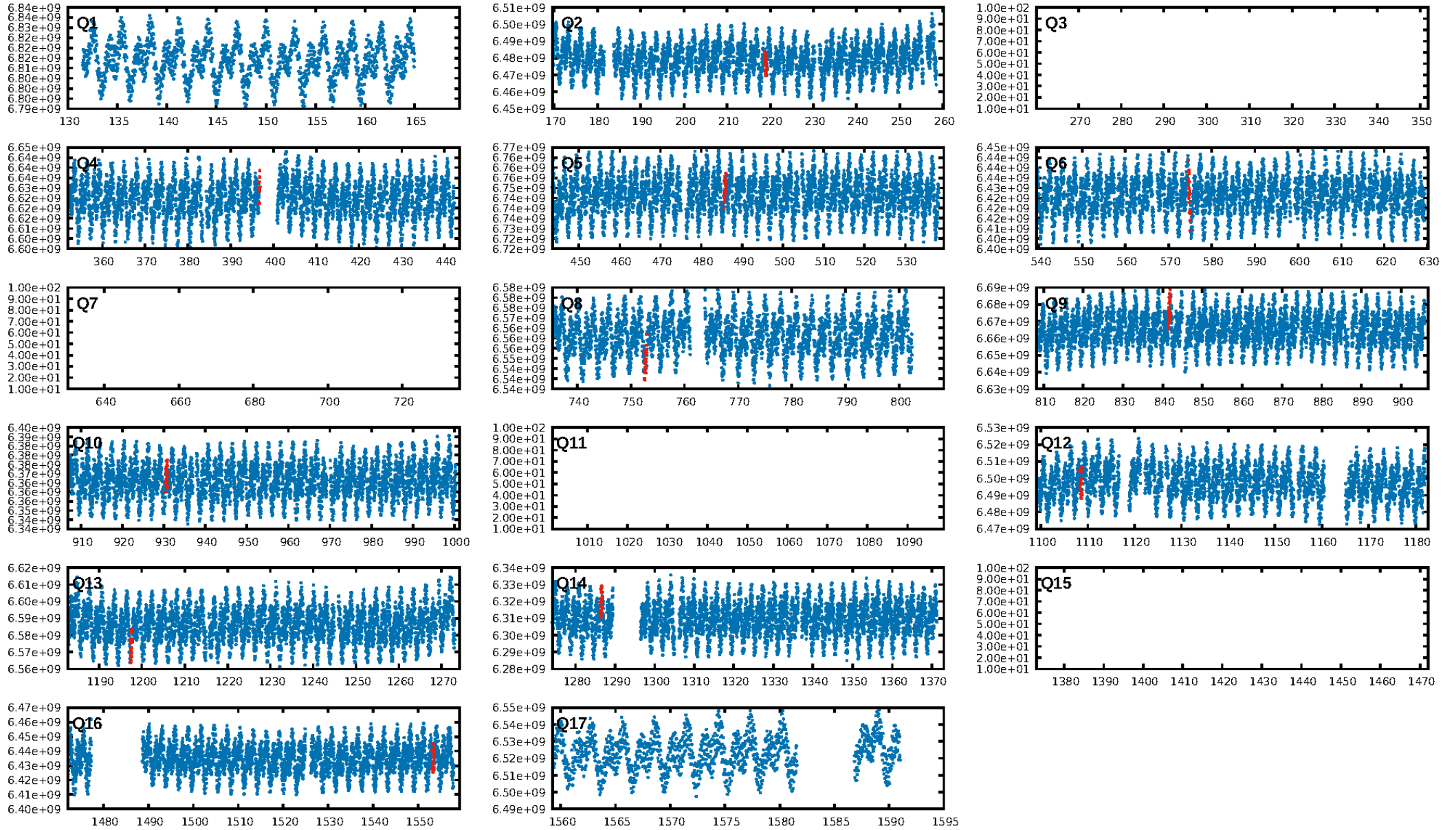
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [284.10σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 6.30e-11  
RollingBand-fgt: 1.00 [8/8]  
GhostDiagnostic-chr: N/A  
Centroid-sig: N/A  
Centroid-so: 4.984 arcsec [2.11σ]  
OotOffset-rm: 3.427 arcsec [2.13σ]  
KicOffset-rm: 4.593 arcsec [2.40σ]  
OotOffset-st: 4/0/3/2 [9]  
KicOffset-st: 4/0/3/2 [9]  
DiffImageQuality-fgm: 0.00 [0/9]  
DiffImageOverlap-fno: 0.00 [0/9]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 15:11:30 Z

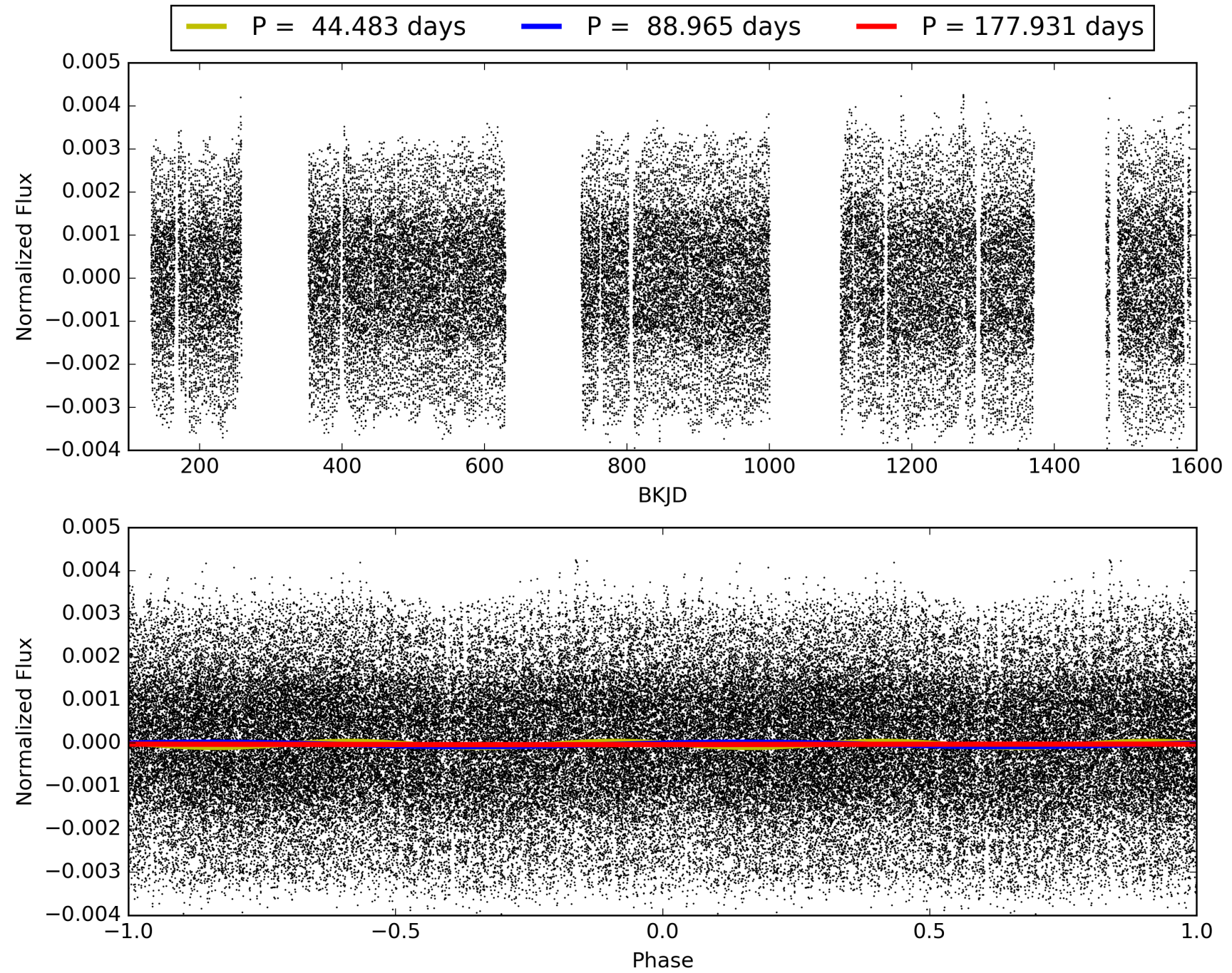
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 005988140-02, PDC Light Curves





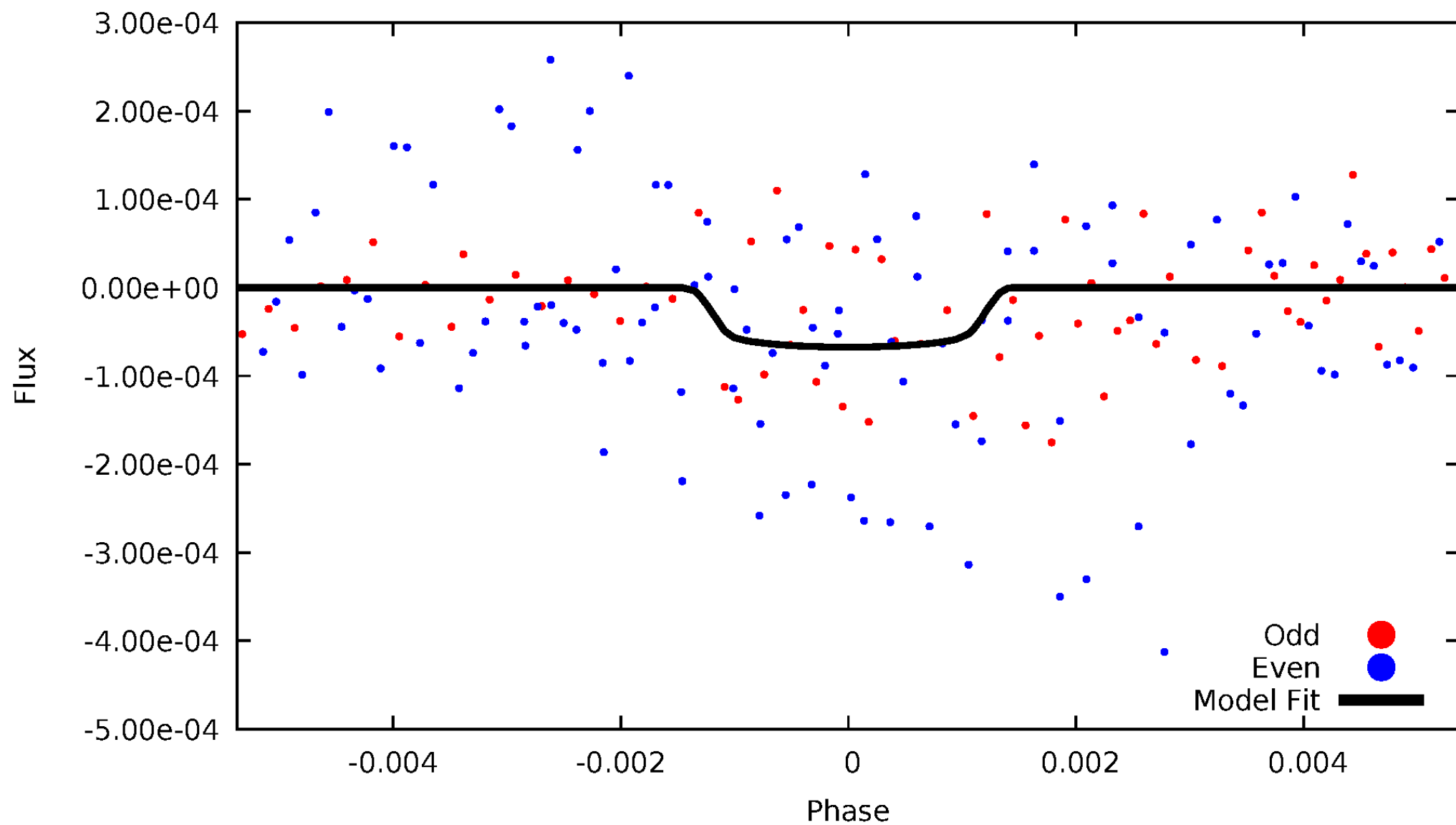
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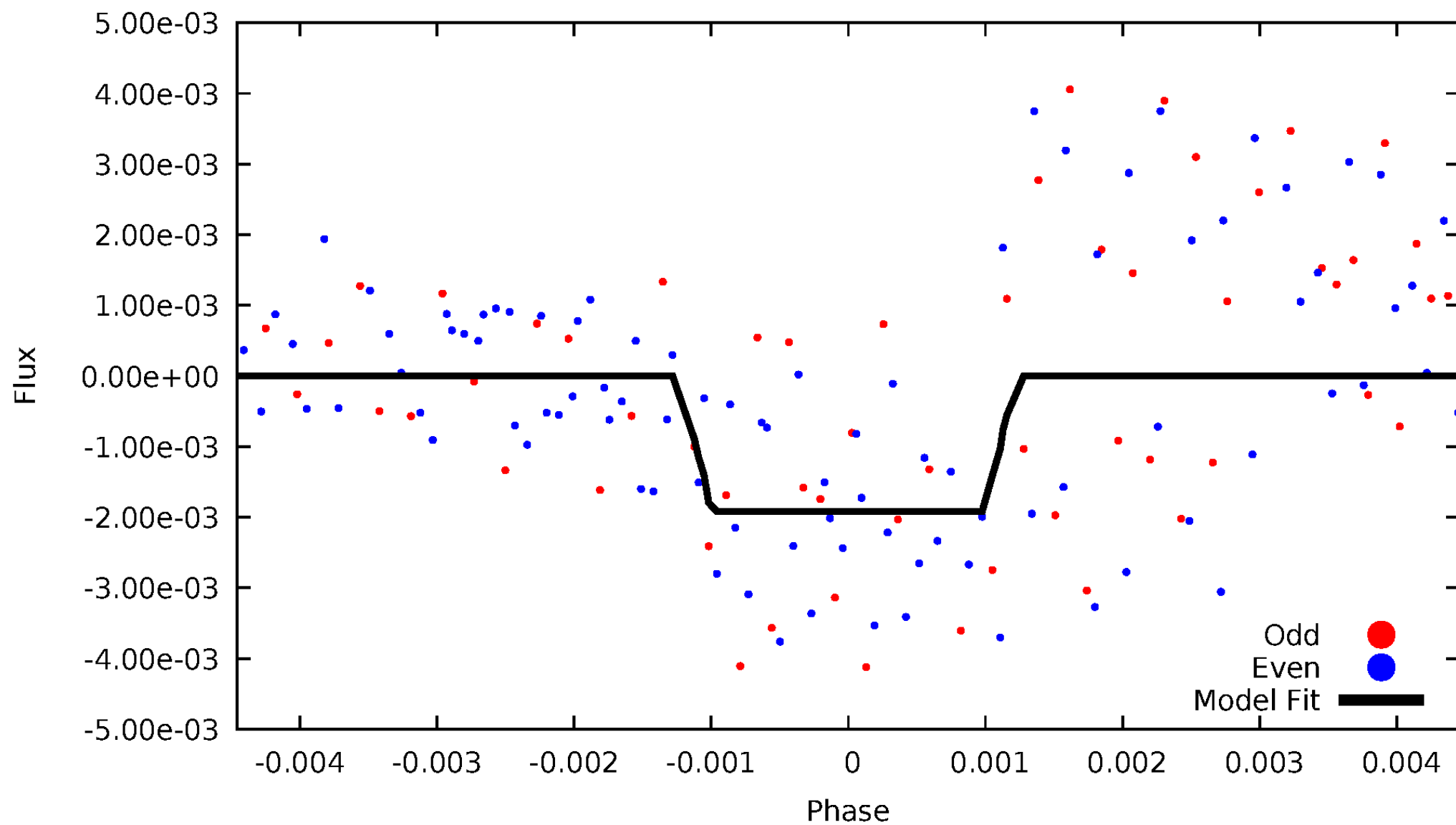
# DV Odd/Even

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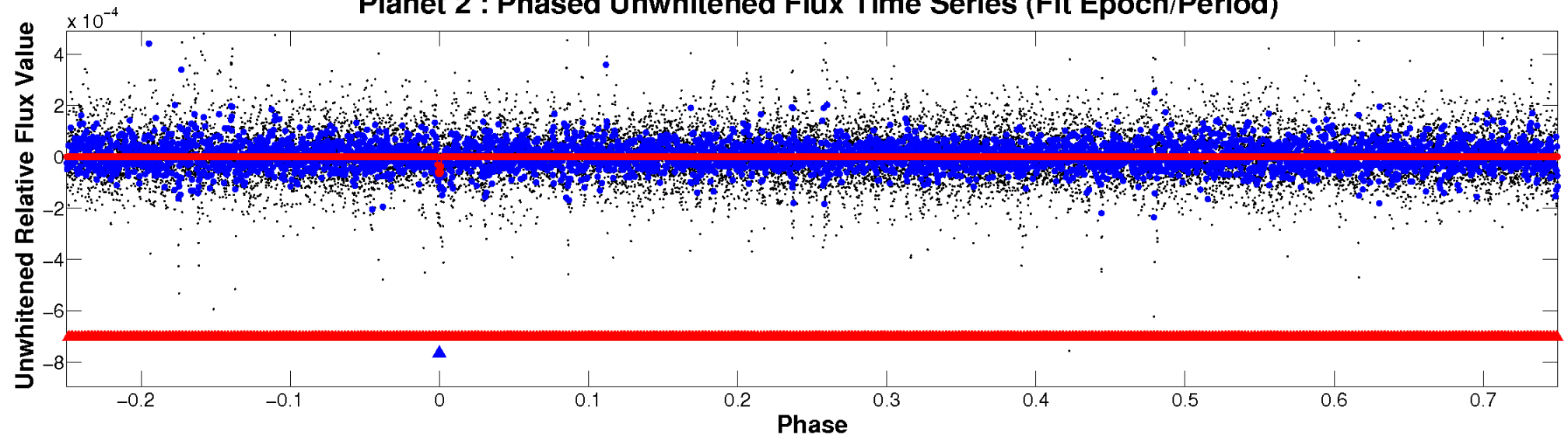
# ALT Odd/Even

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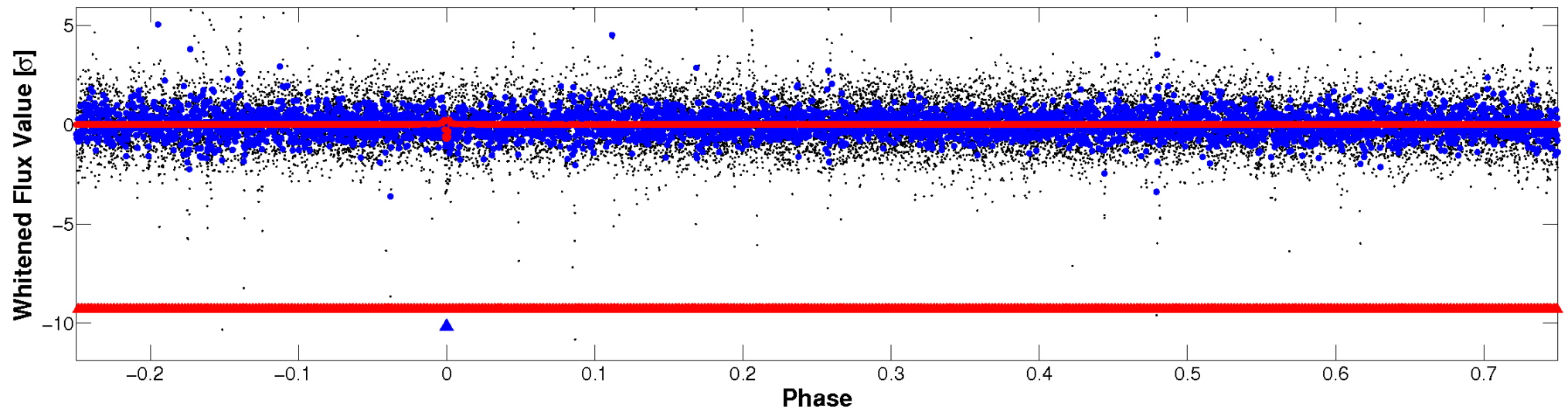


# Non-Whitened Vs. Whitened Light Curve

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

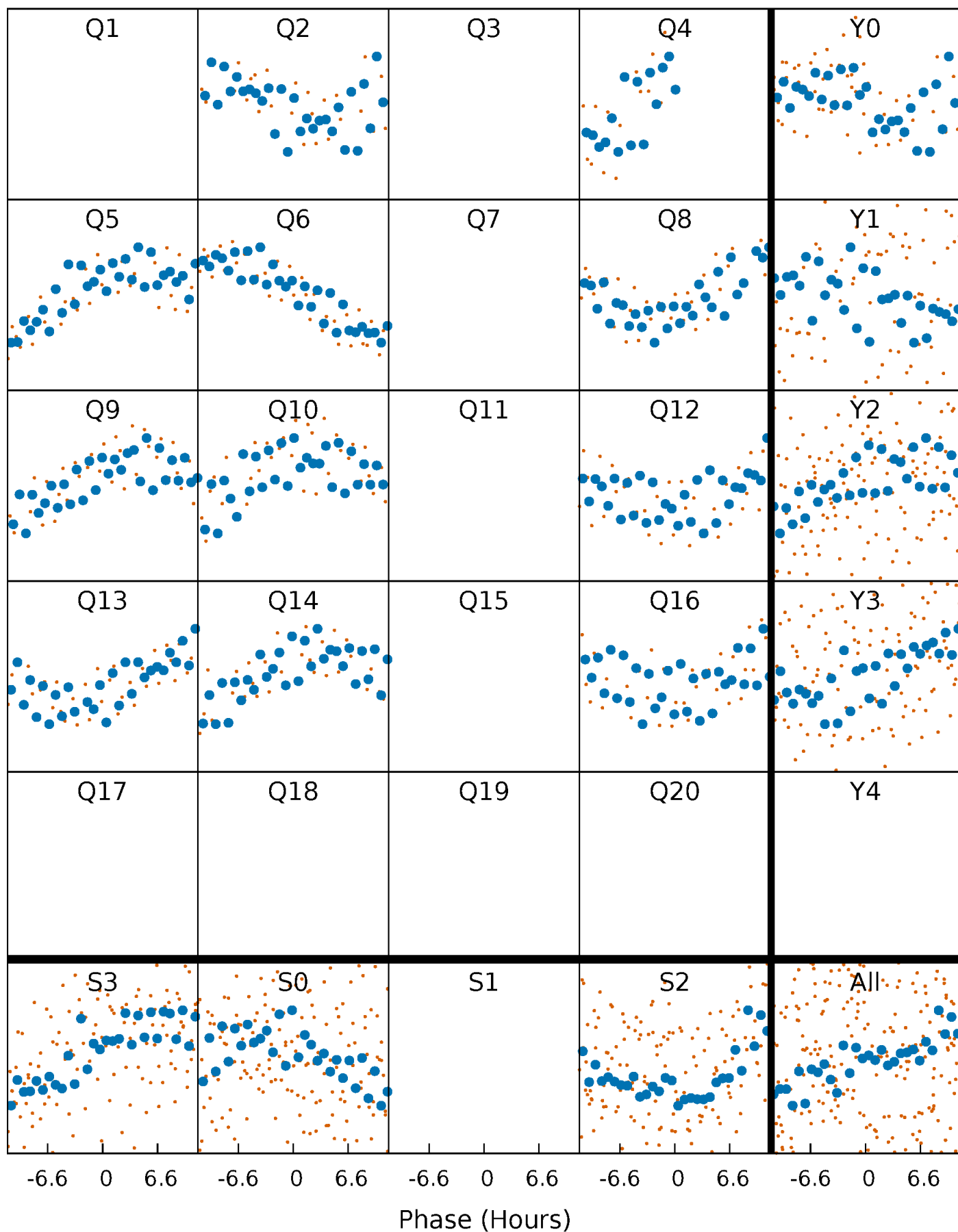


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



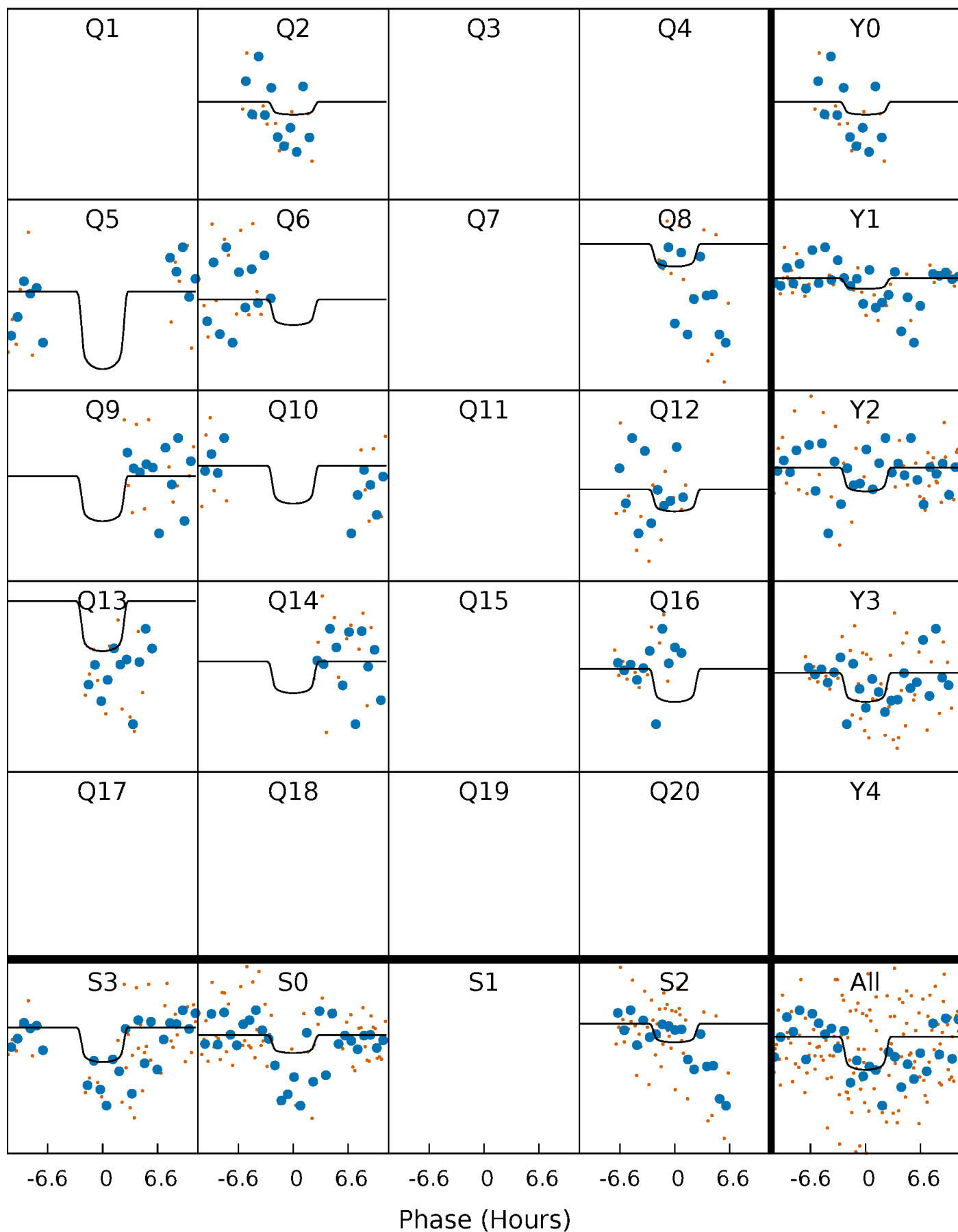
# PDC Quarter-Phased Transit Curves

TCE 005988140-02   P= 88.965252 Days    $T_0=218.917334$  (BKJD)



# DV Quarter-Phased Transit Curves

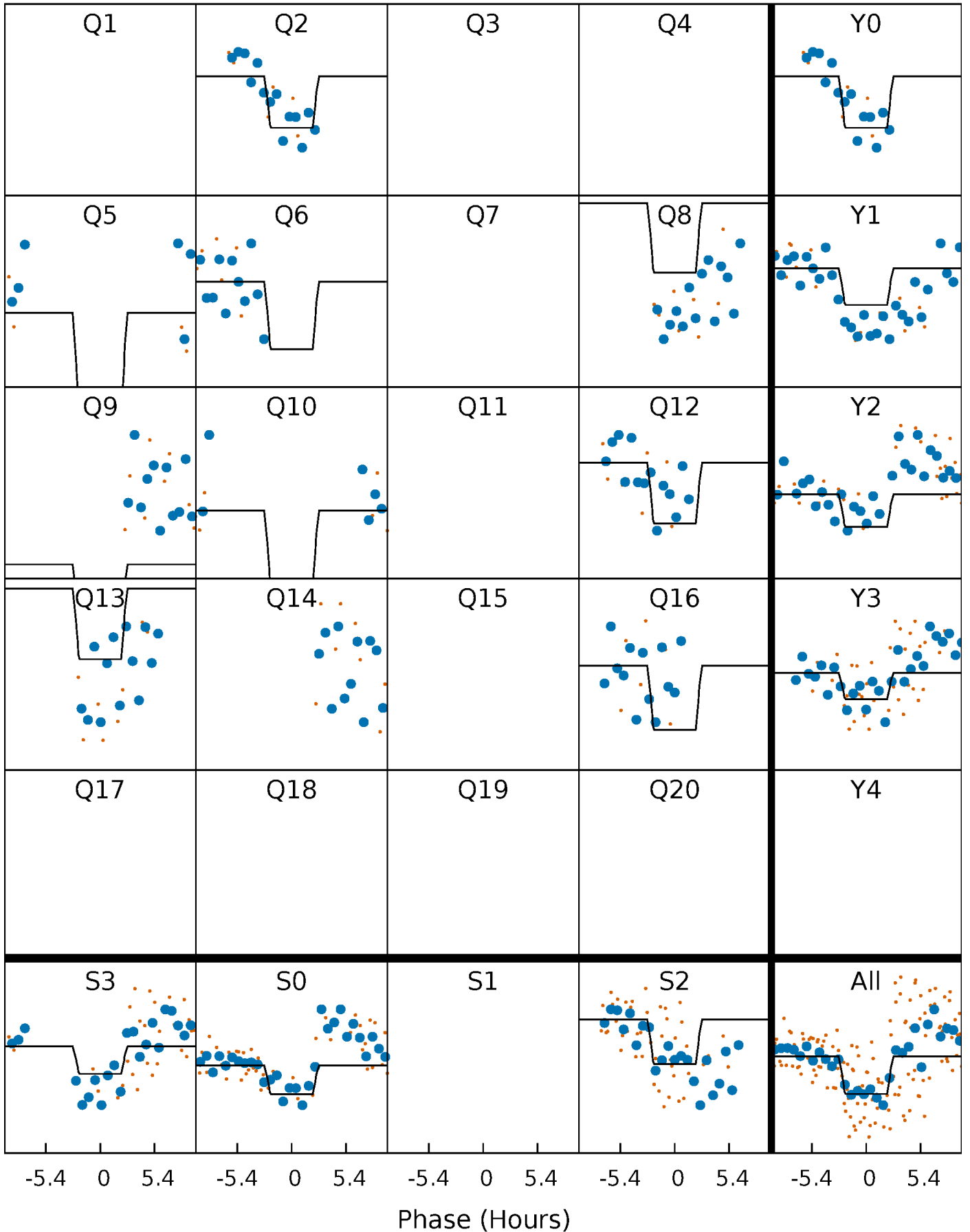
TCE 005988140-02   P= 88.965252 Days    $T_0=218.917334$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

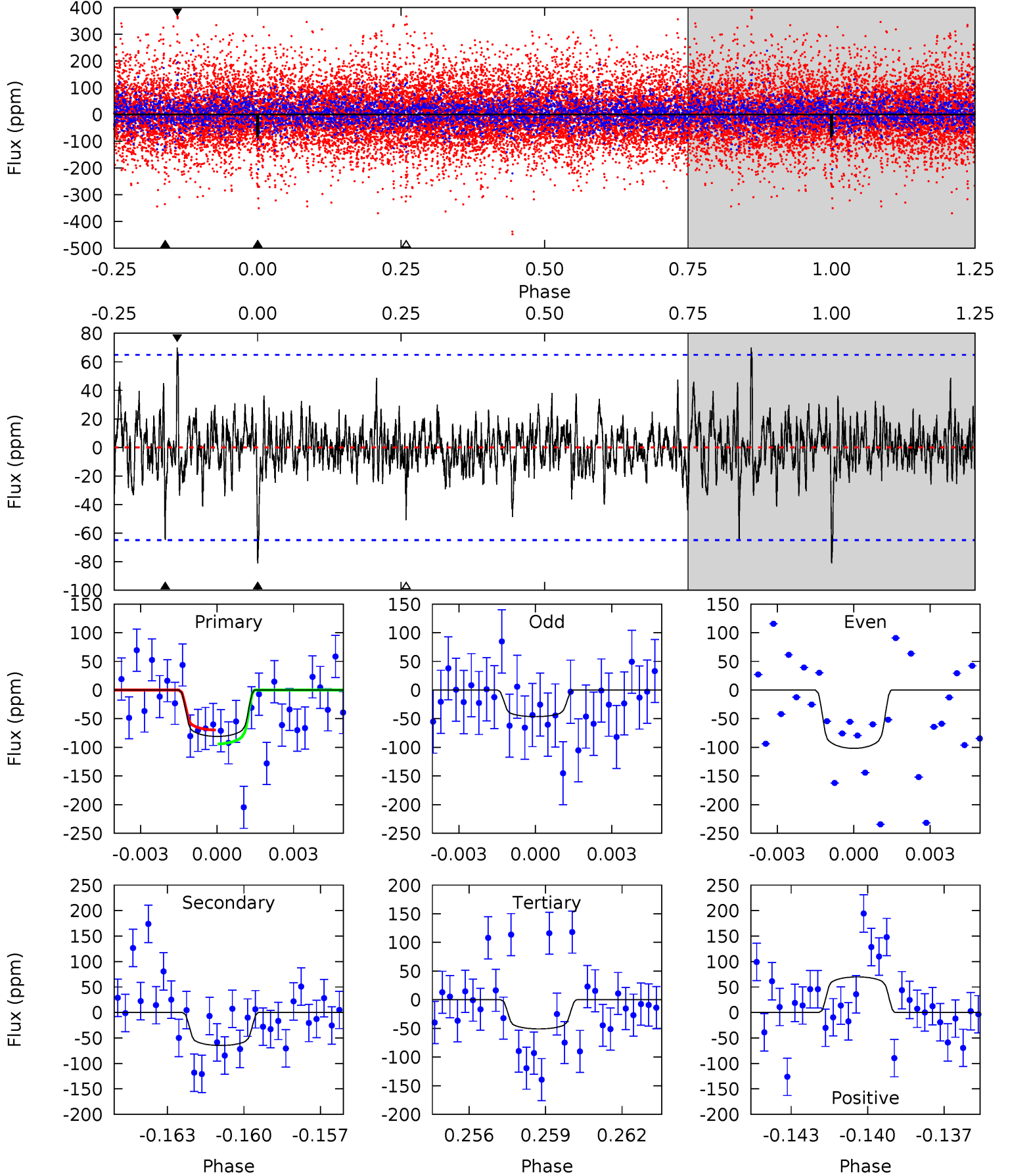
TCE 005988140-02 P= 88.964987 Days  $T_0=218.924548$  (BKJD)



# DV Model-Shift Uniqueness Test

005988140-02, P = 88.965252 Days, E = 129.952082 Days

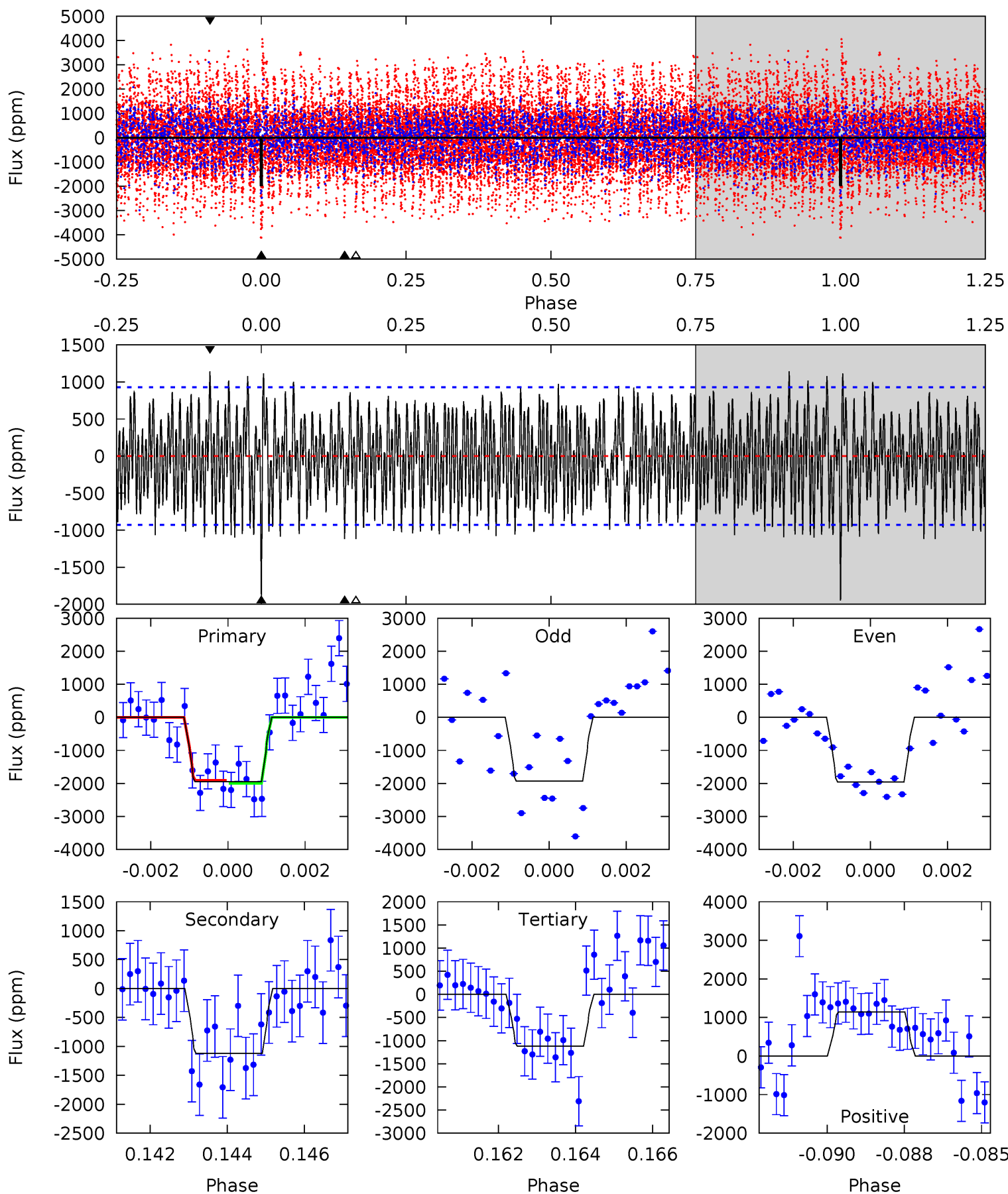
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.57	5.24	4.12	5.66	5.26	2.98	1.08	2.45	0.90	1.12	-0.42	2.22	0.43	0.46	0.99



# Alt Model-Shift Uniqueness Test

005988140-02, P = 88.964987 Days, E = 129.959561 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.2	6.40	6.39	6.54	5.31	3.06	2.68	4.76	4.61	0.00	-0.14	0.08	1.16	0.37	0.24



### Stellar Parameters For KIC 005988140

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$7404^{+117}_{-175}$	$3.278^{+0.424}_{-0.106}$	$0.070^{+0.150}_{-0.250}$	$6.143^{+0.967}_{-2.707}$	$2.608^{+0.211}_{-0.633}$	$0.016^{+0.064}_{-0.005}$
	+2%/-2%	+13%/-3%	+214%/-357%	+16%/-44%	+8%/-24%	+406%/-34%
Source	SPE4	SPE4	SPE4	DSEP		

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

### Secondary Eclipse Parameters for KIC 005988140-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-65 \pm 12$	$5.70^{+2.48}_{-2.24}$	$1512^{+86}_{-179}$	$6761^{+2127}_{-993}$	$302^{+529}_{-153}$
Alt.	$-1118 \pm 175$	$27.87^{+4.54}_{-6.05}$	$1513^{+90}_{-154}$	$6359^{+403}_{-360}$	$226^{+141}_{-65}$

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

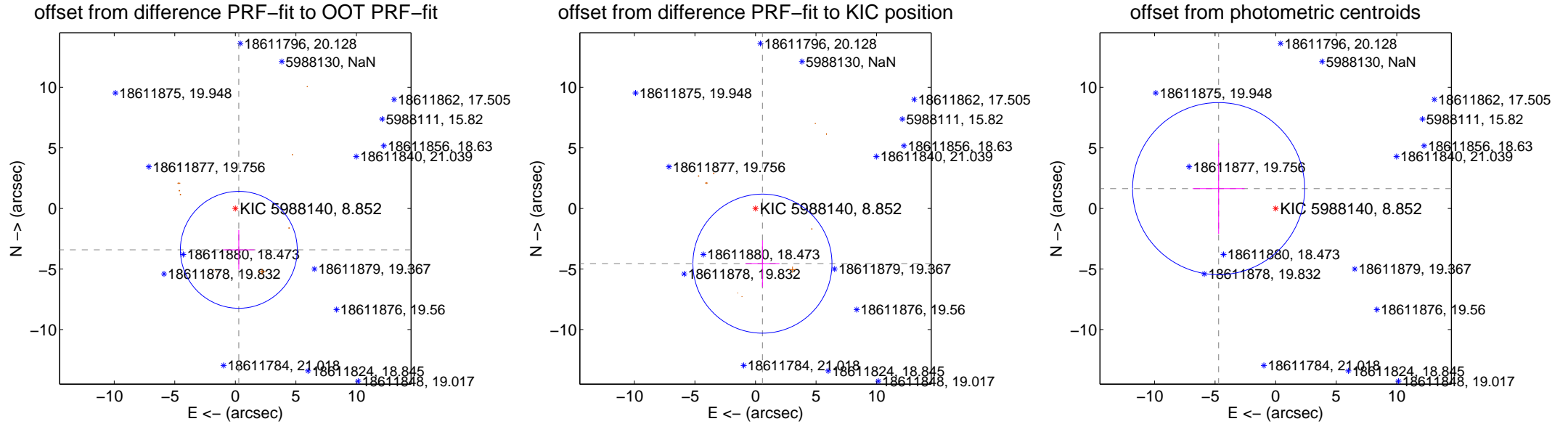
## DV Centroid Data

Supplemental centroid analysis for 005988140-02. **Kepler magnitude: 8.85.** Transit SNR 4.40

**There are 0 quarters with good PRF difference image offsets**

The direct PRF centroid is offset from the target star catalog position by about 1.21 arcsec

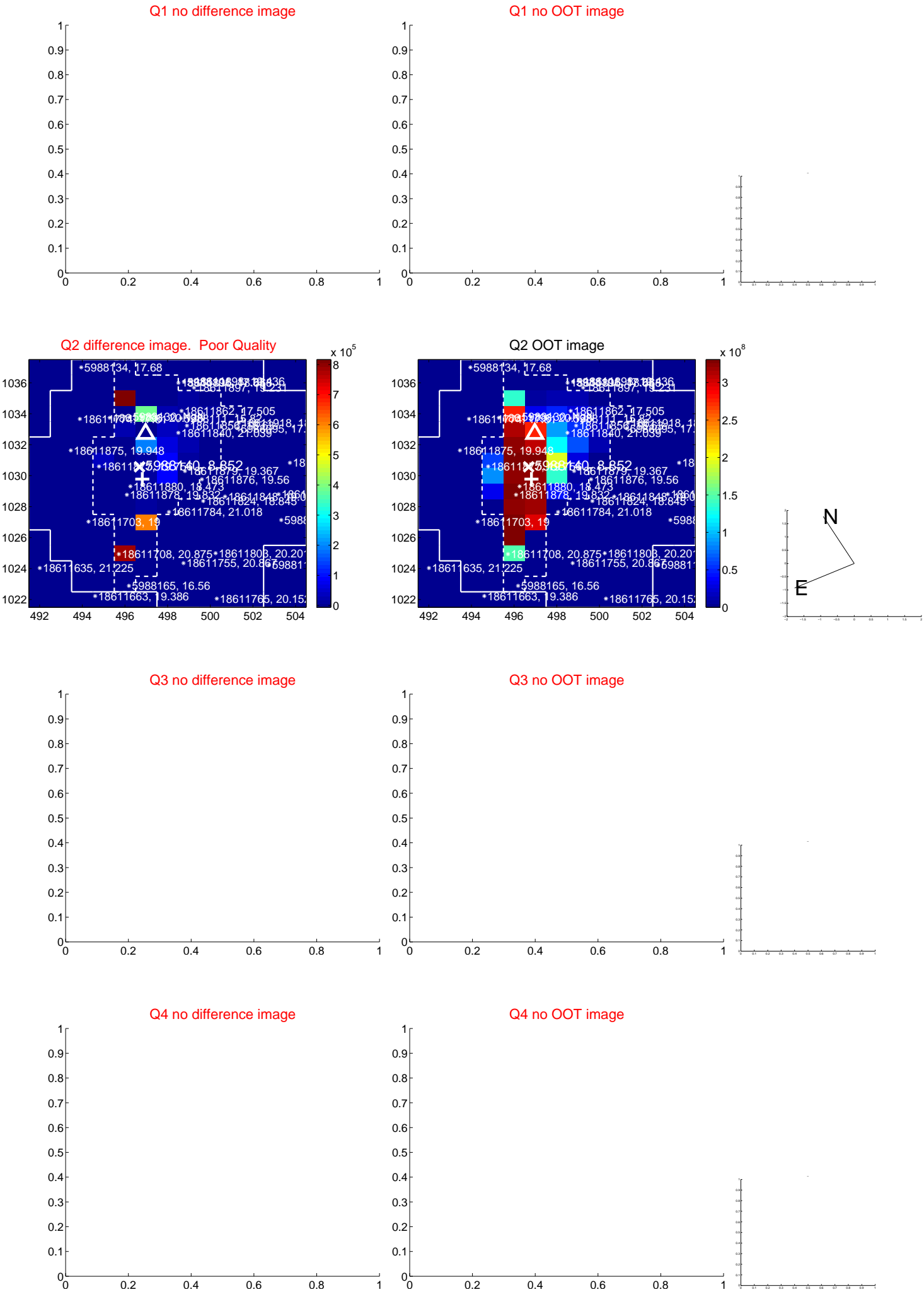
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$3.427 \pm 1.608$	2.13	$-0.288 \pm 1.292$	$-3.415 \pm 1.641$
PRF-fit source offset from KIC position	$4.593 \pm 1.913$	2.40	$-0.574 \pm 1.408$	$-4.557 \pm 1.920$
photometric centroid source offset	$4.98 \pm 2.37$	2.11	$4.71 \pm 2.14$	$1.64 \pm 3.74$



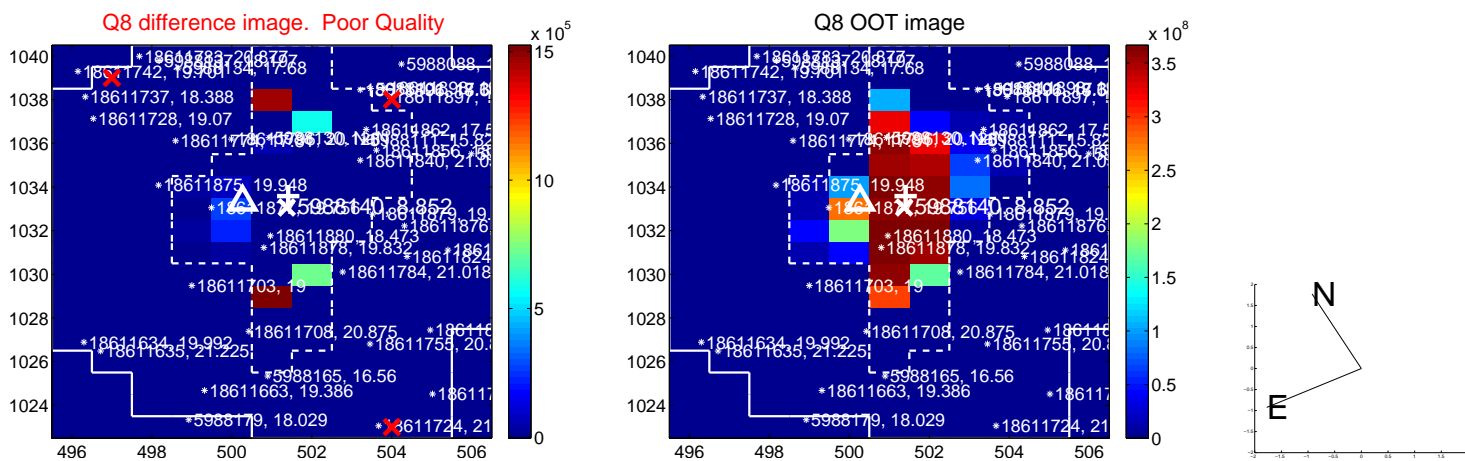
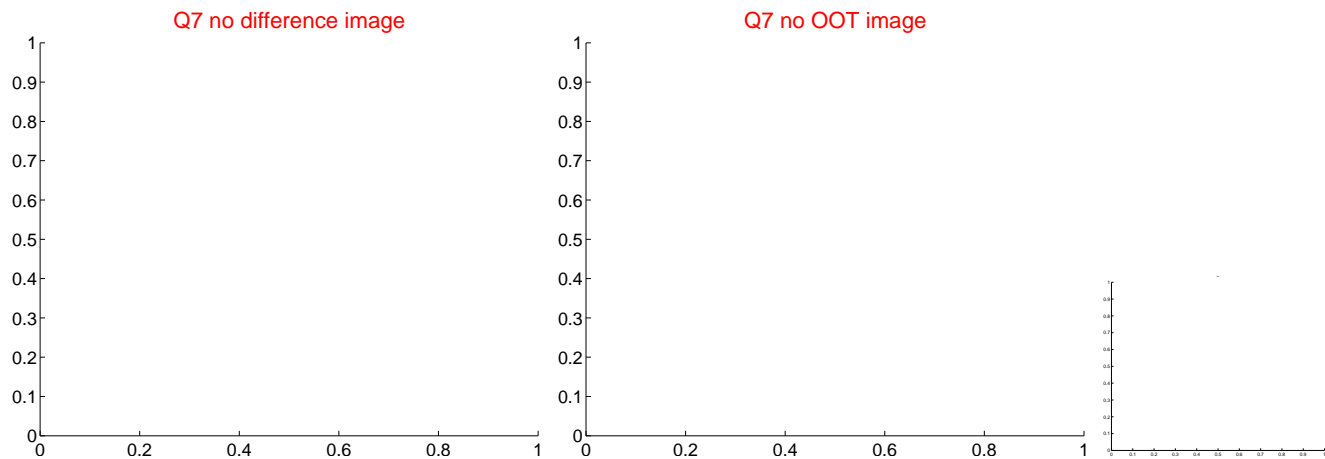
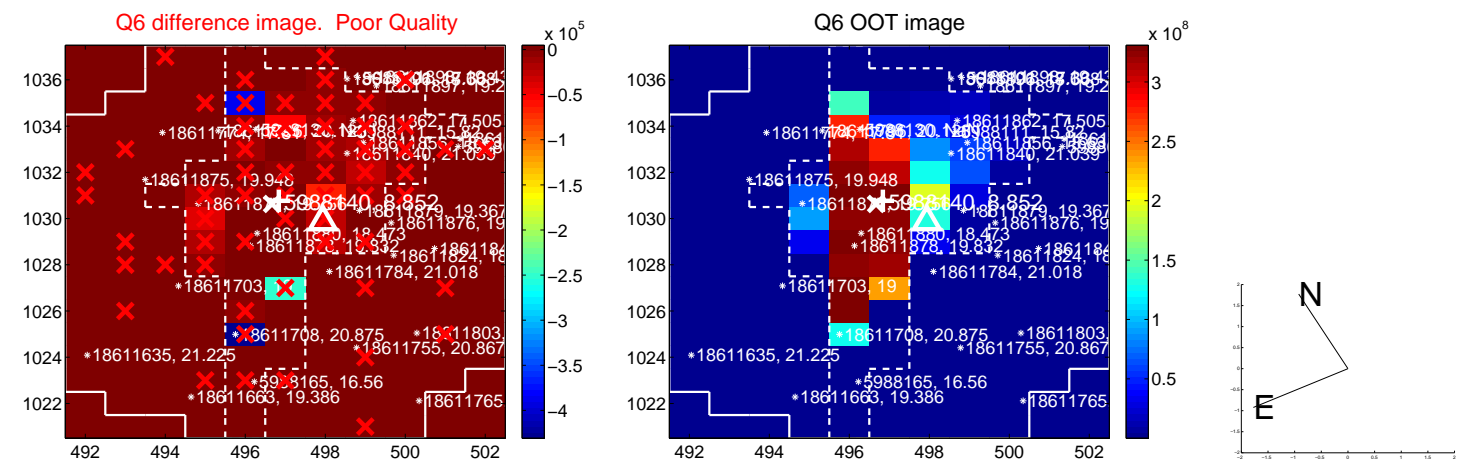
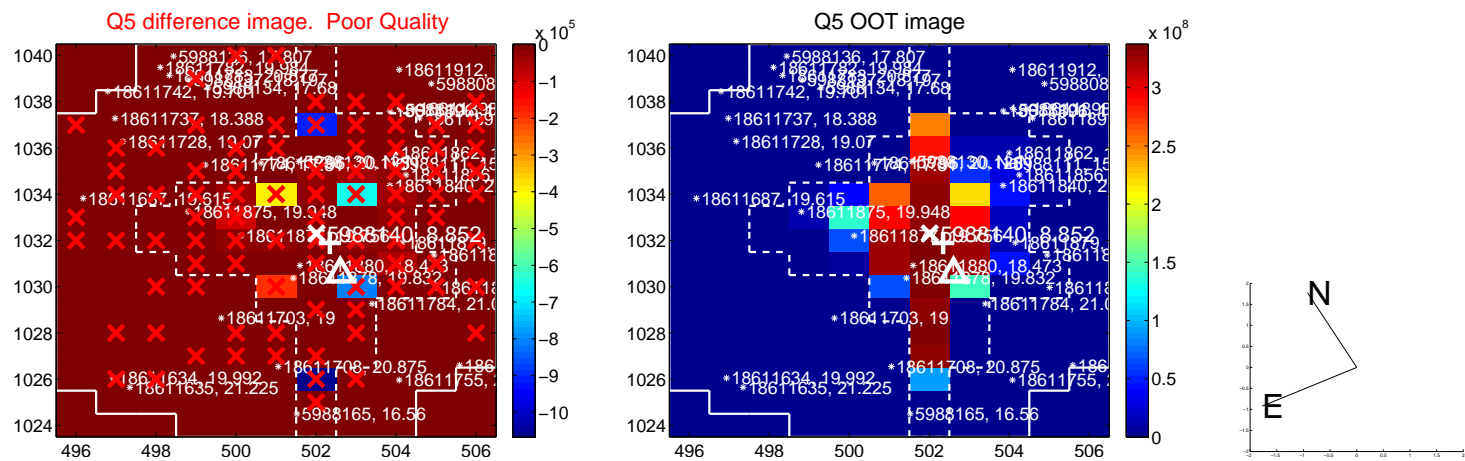
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



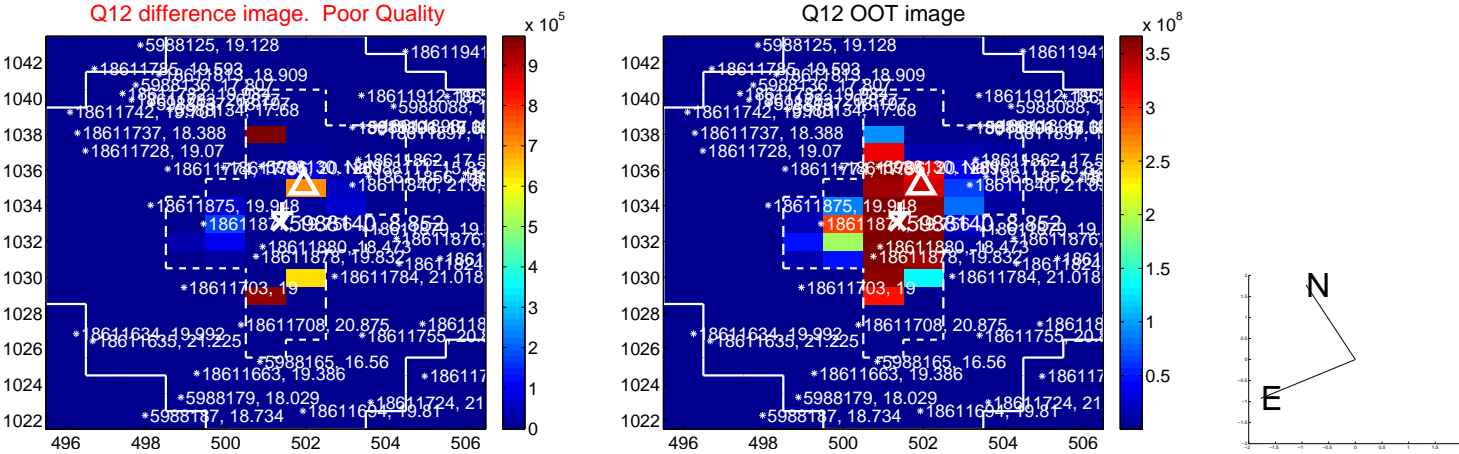
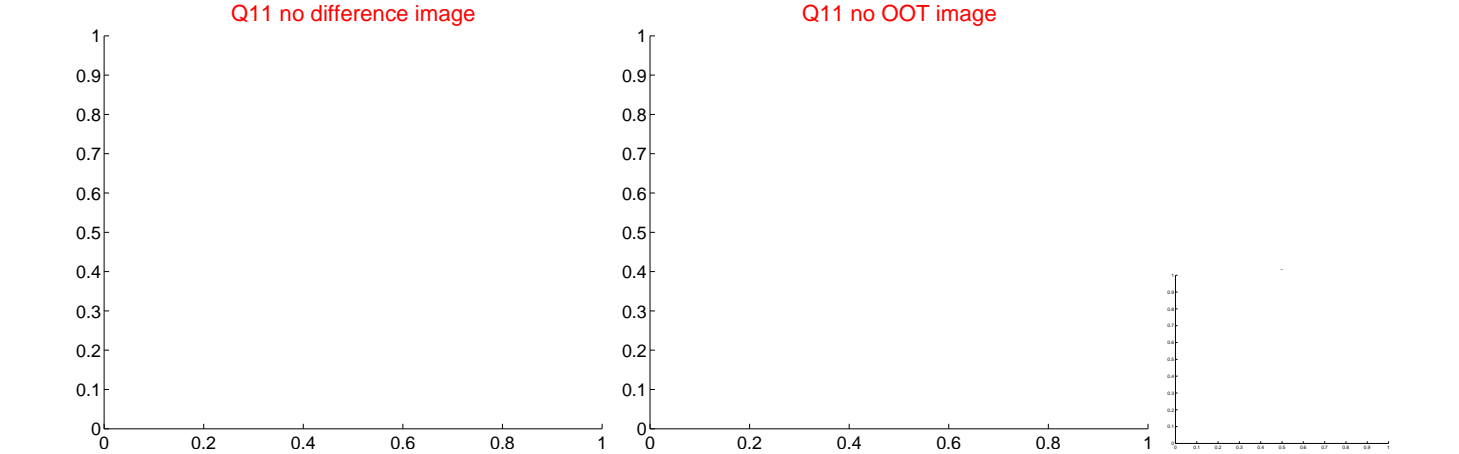
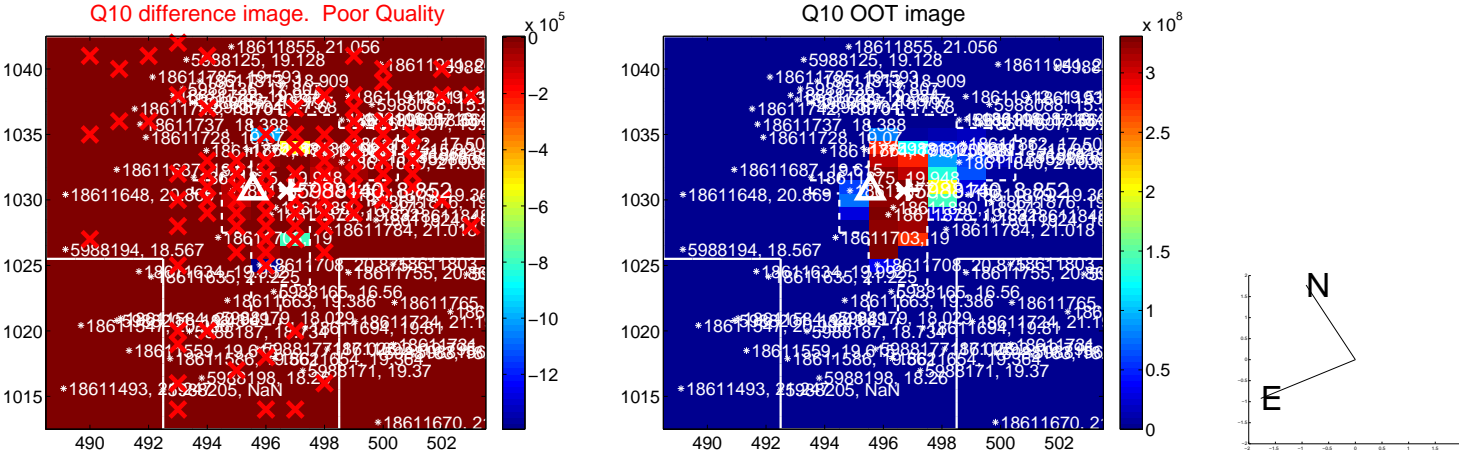
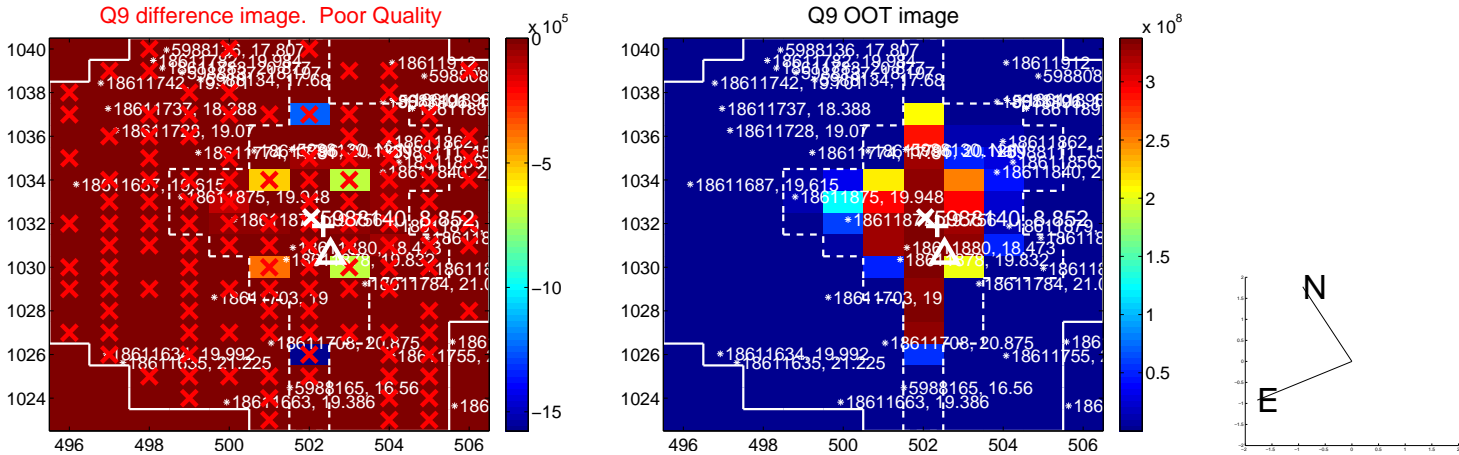
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



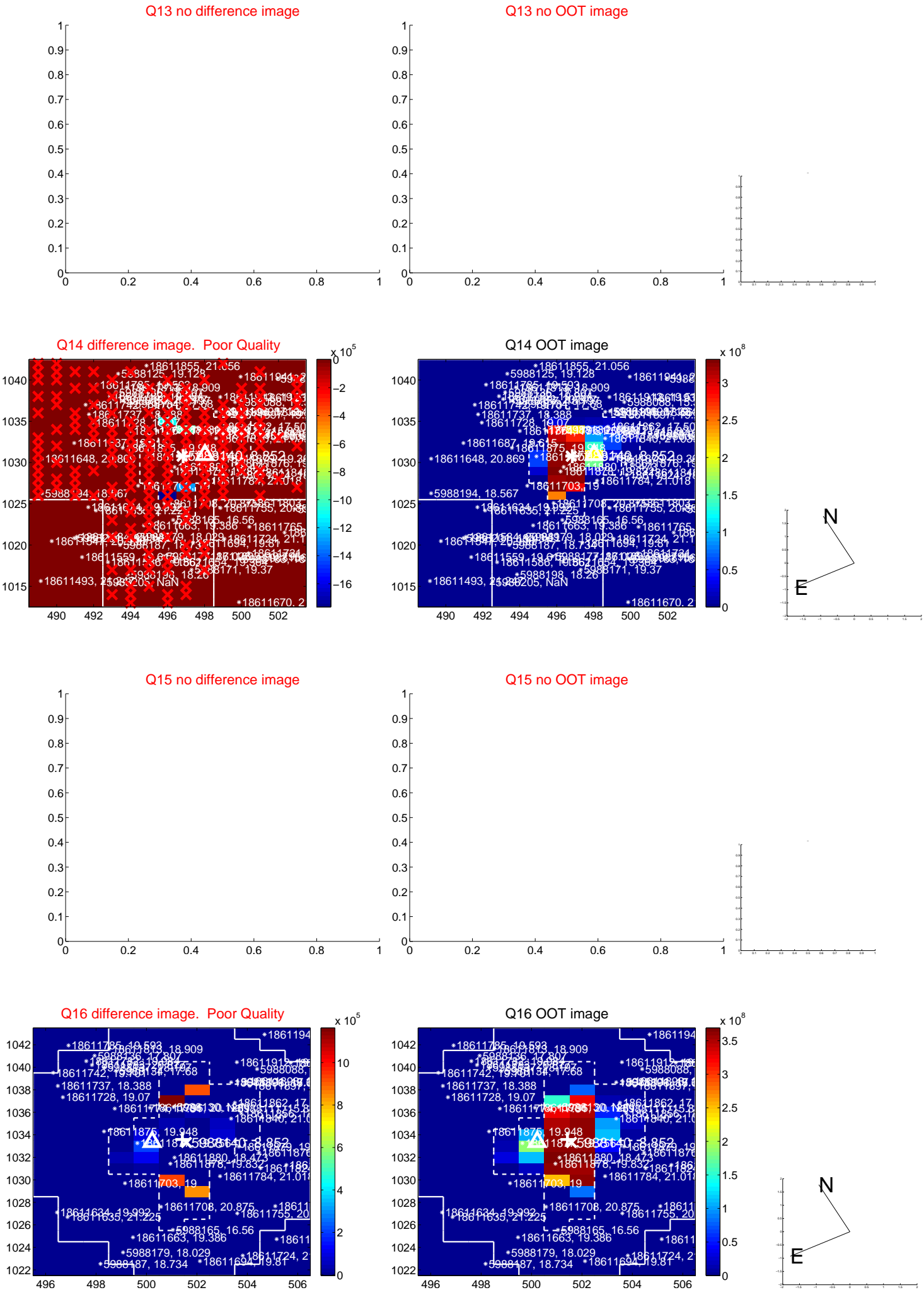
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



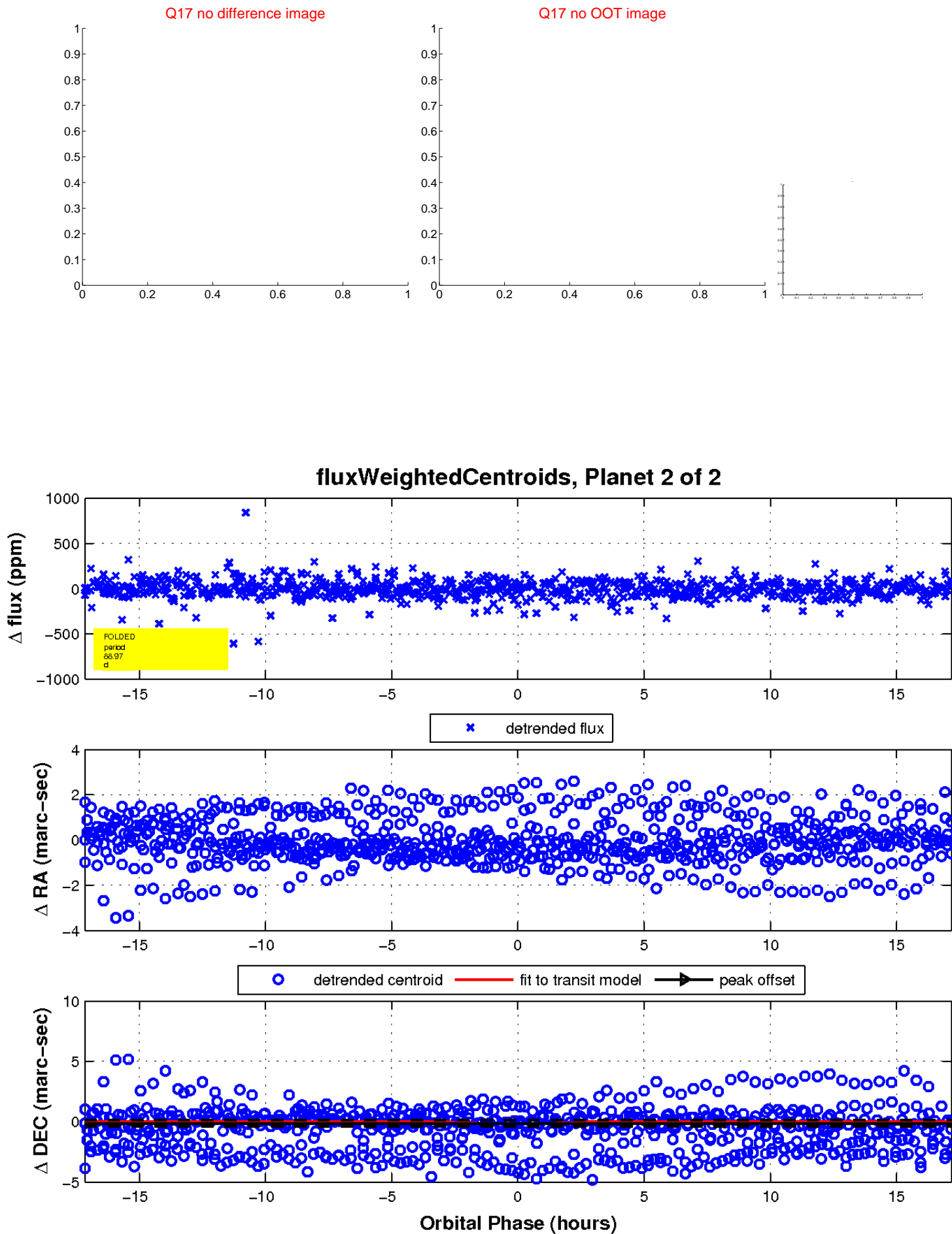
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.



white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.



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





UKIRT Image

