

# KIC 006954721

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006954721-01	OBS	No	2.818716	133.689089	95.2	19.989	8.7	10.9	0.27	3342	0.27	12.54
006954721-02	OBS	No	50.595035	149.621793	992.8	5.284	9.8	11.1	0.27	3342	1.03	0.27
006954721-03	OBS	No	25.492035	135.144241	387.8	8.473	9.4	7.1	0.27	3342	0.56	0.67
006954721-04	OBS	No	40.517180	132.111181	462.7	21.523	24.2	8.0	0.27	3342	0.64	0.36

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006954721-01	OBS	FP	0.00	1	0	0	1	LPP_DV—CENT_KIC_POS—EPHEM_MATCH
006954721-02	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_FEW_DIFFS—HALO_GHOST
006954721-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_KIC_POS
006954721-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

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

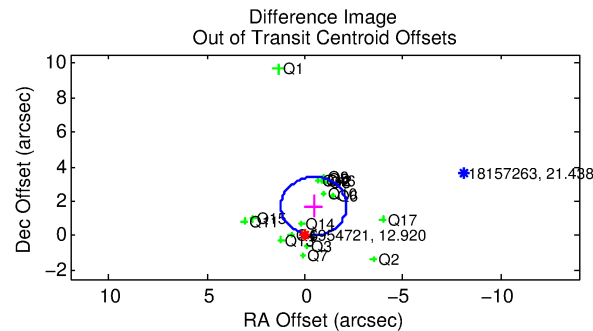
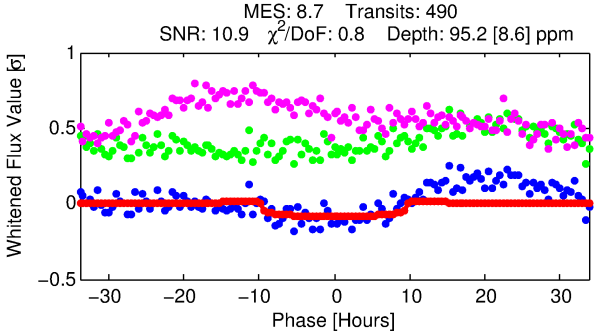
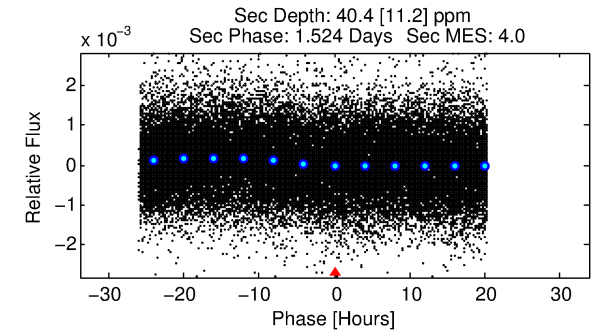
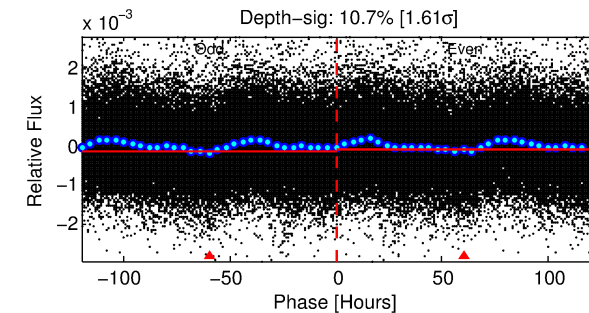
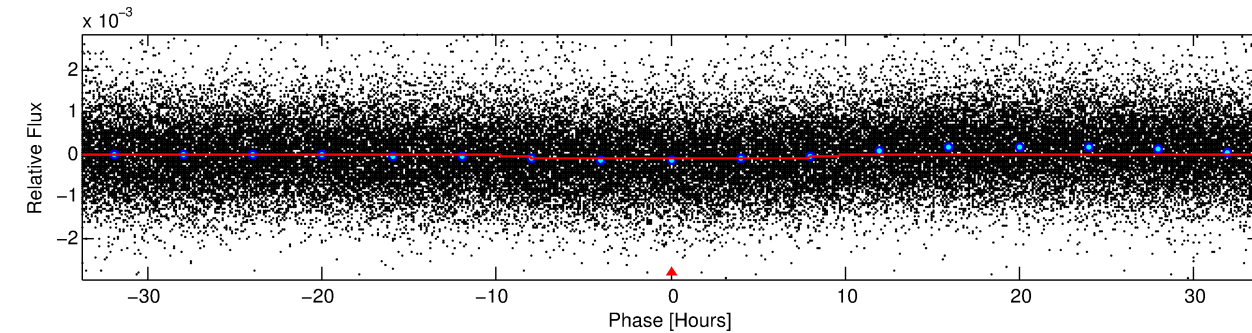
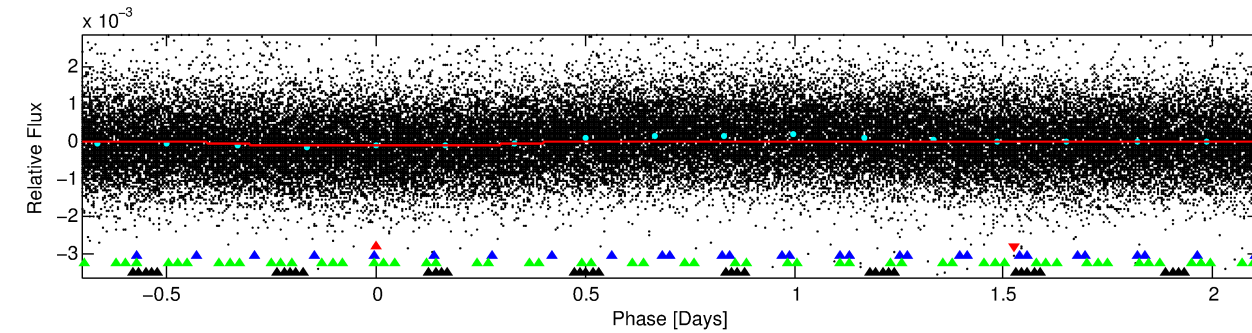
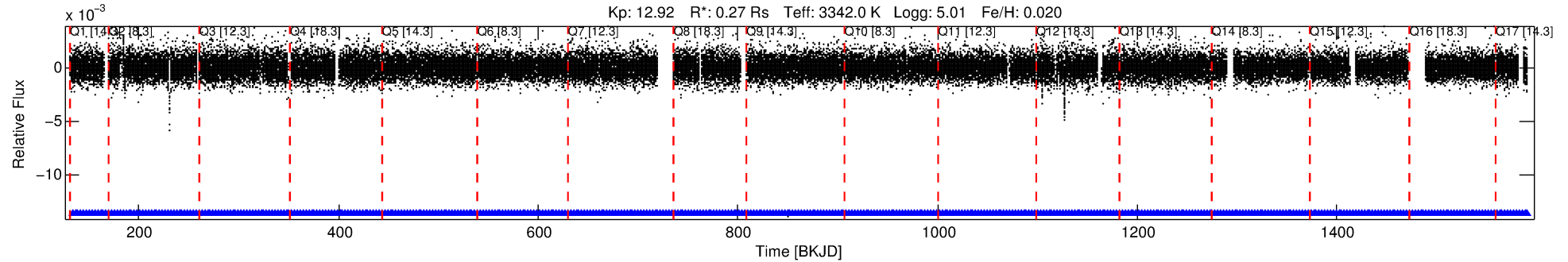
## Ephemeris Match Information For 006954721-01

TCE (1)	KIC	Parent (2)	Parent KIC	$P_1:P_2$	Dist ( $''$ )	$\Delta$ Row	$\Delta$ Col	$m_2$	$m_1$	$D_2/D_1$	Mechanism	Flag	$\sigma_P$	$\sigma_T$
006954721-01	6954721	006954748-01	6954748	1:1	24.8	0	6	13.81	12.92	2.18	Direct-PRF	1	2.40	0.33

**Notes:**  $P_1:P_2$  is the period ratio. Dist is the distance in arcseconds.  $\Delta$ Row and  $\Delta$ Col are the number of pixels apart in row and column.  $m_2$  and  $m_1$  are the magnitudes of the parent and child.  $D_2/D_1$  is the parent's transit depth divided by the child's.  $\sigma_P$  and  $\sigma_T$  are the significance of the match in period and epoch. For a match to be considered significant  $\sigma_P < 5.0$  and  $\sigma_T < 5.0$ . Matches which have  $\sigma_P$  and  $\sigma_T$  very close to this cutoff should receive extra scrutiny, especially if the period ratio is very large.

# DV One-Page Summary

KIC: 6954721 Candidate: 1 of 4 Period: 2.819 d



## DV Fit Results:

Period = 2.81872 [0.00006] d  
Epoch = 133.6891 [0.0147] BKJD  
Rp/R\* = 0.0094 [0.0058]  
a/R\* = 1.17 [0.82]  
b = 0.64 [2.46]  
Seff = 12.54 [3.98]  
Teq = 480 [38] K  
Rp = 0.27 [0.19] Re  
a = 0.0250 [0.0061] AU  
Ag = 189.57 [248.23] [0.76σ]  
Teffp = 2753 [884] K [2.57σ]

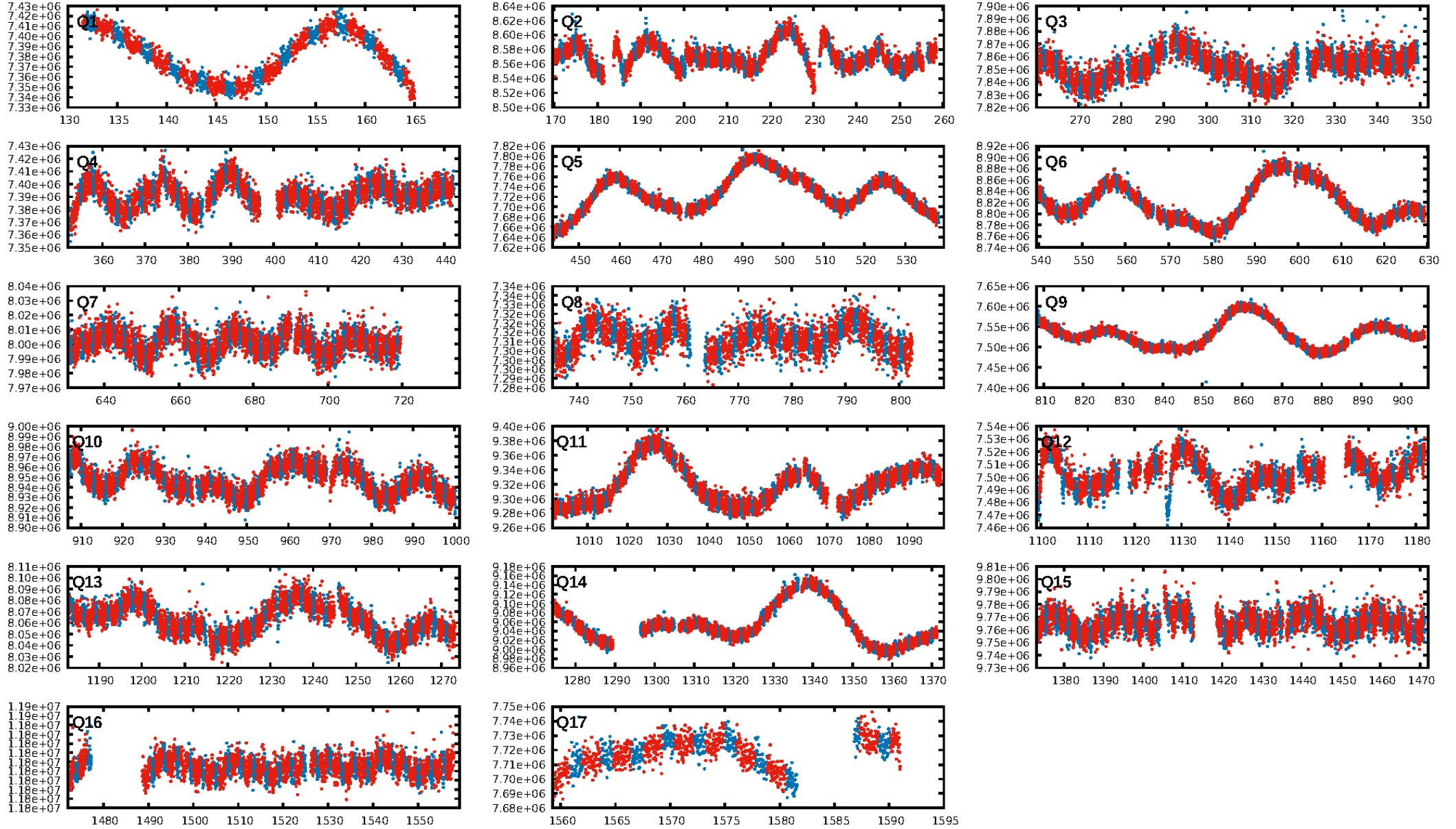
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [25.06σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [468/468]  
GhostDiagnostic-chr: 0.2593  
Centroid-sig: 0.0%  
Centroid-so: 0.491 arcsec [0.95σ]  
OotOffset-rm: 1.772 arcsec [3.16σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-rm: 0.541 arcsec [0.81σ]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.00 [0/17]  
DiffImageOverlap-fno: 1.00 [17/17]

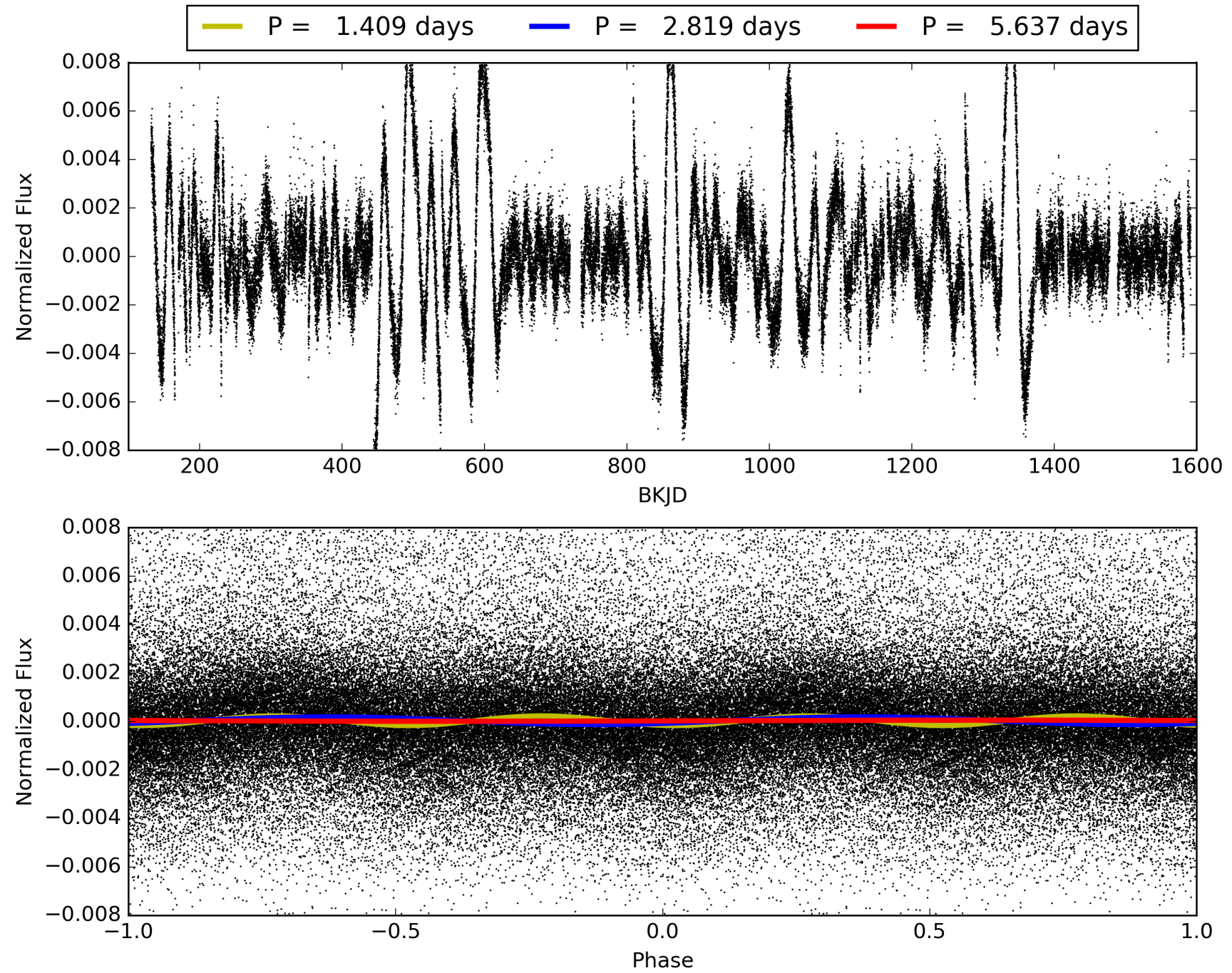
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 03-Feb-2016 07:58:12 Z

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

# TCE 006954721-01, PDC Light Curves



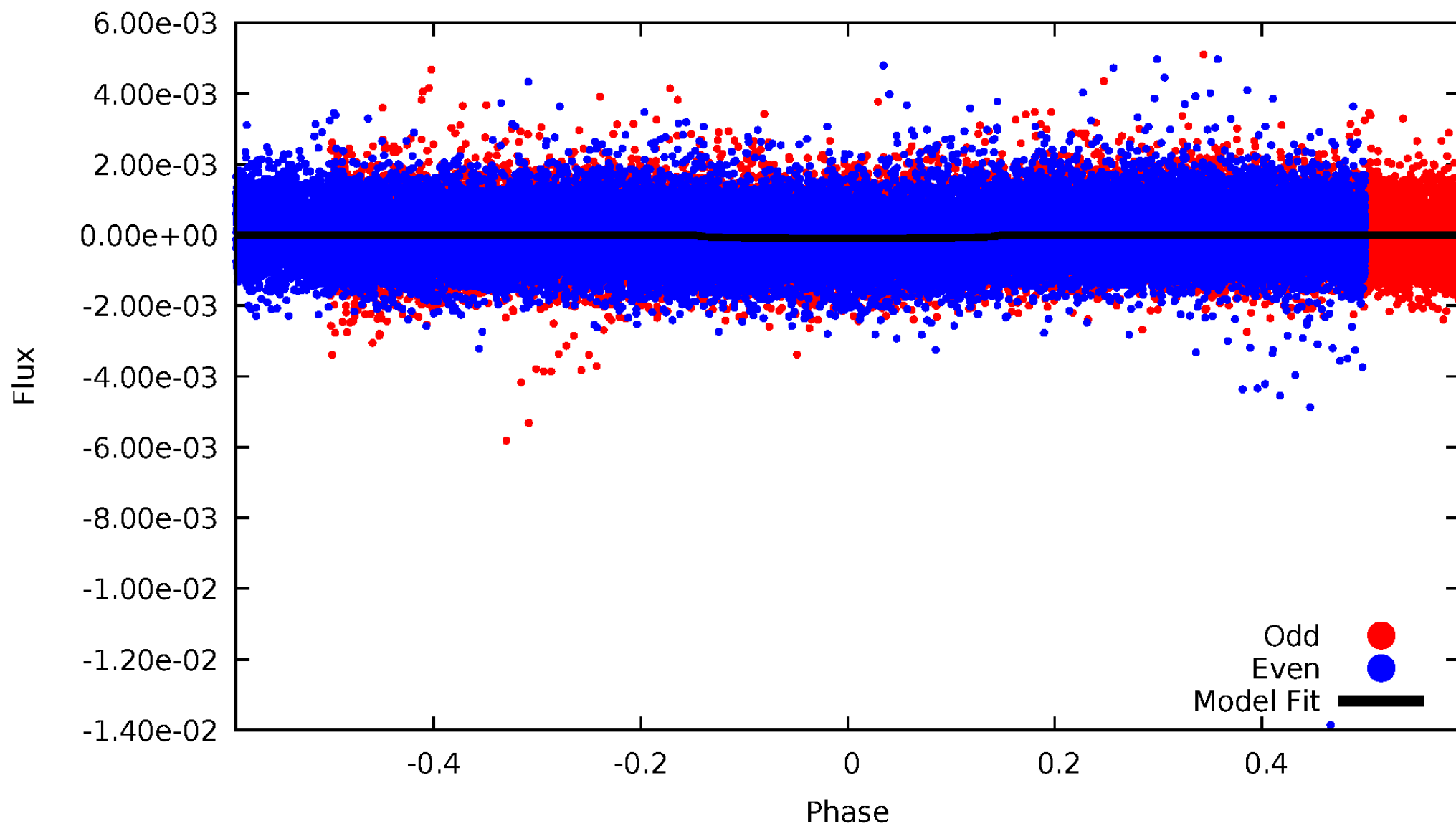
TCE 006954721-01





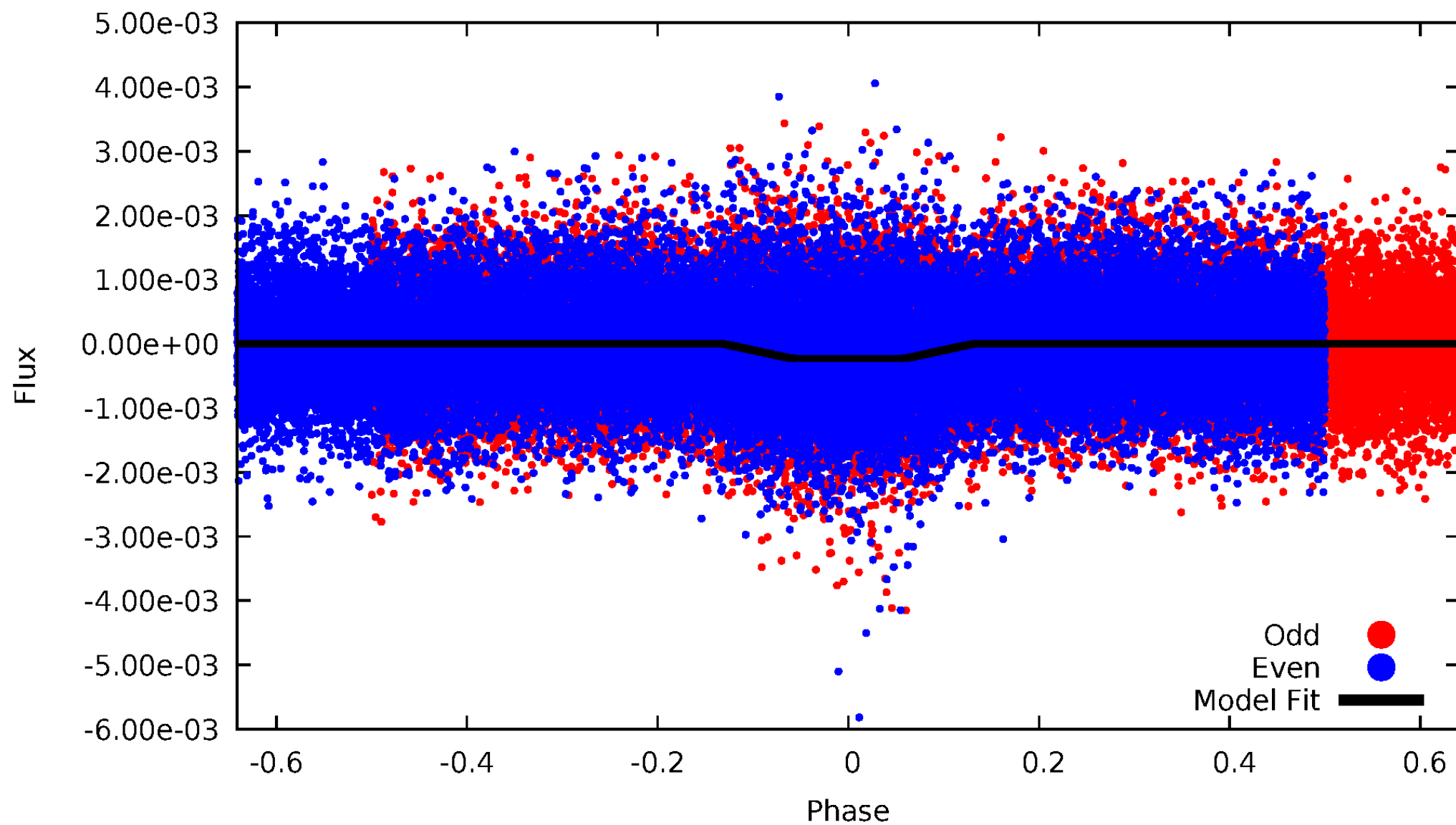
# DV Odd/Even

TCE 006954721-01



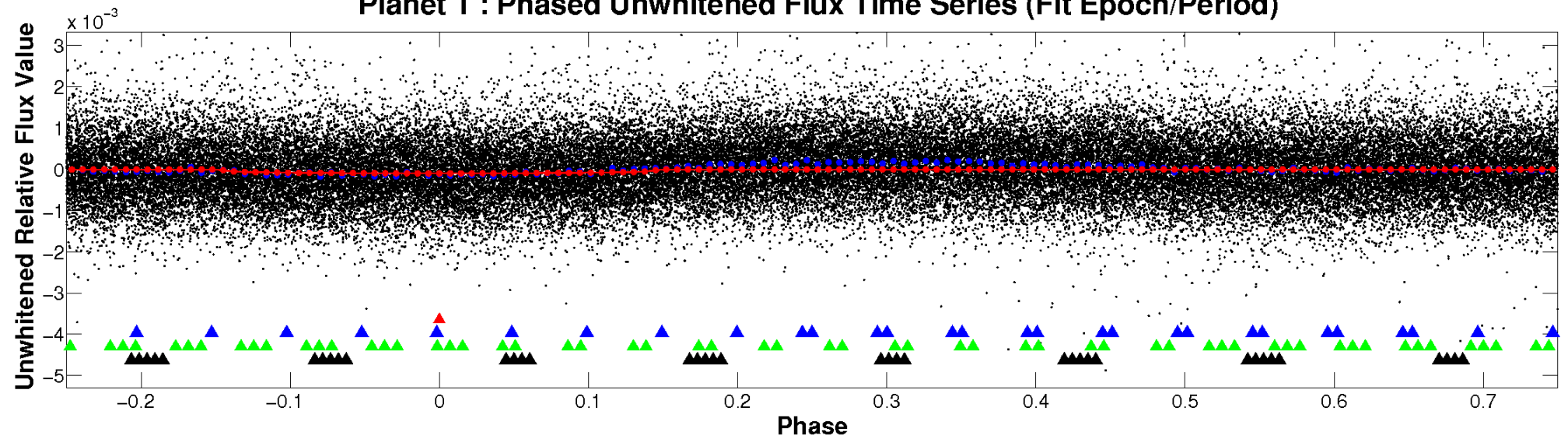
# ALT Odd/Even

TCE 006954721-01

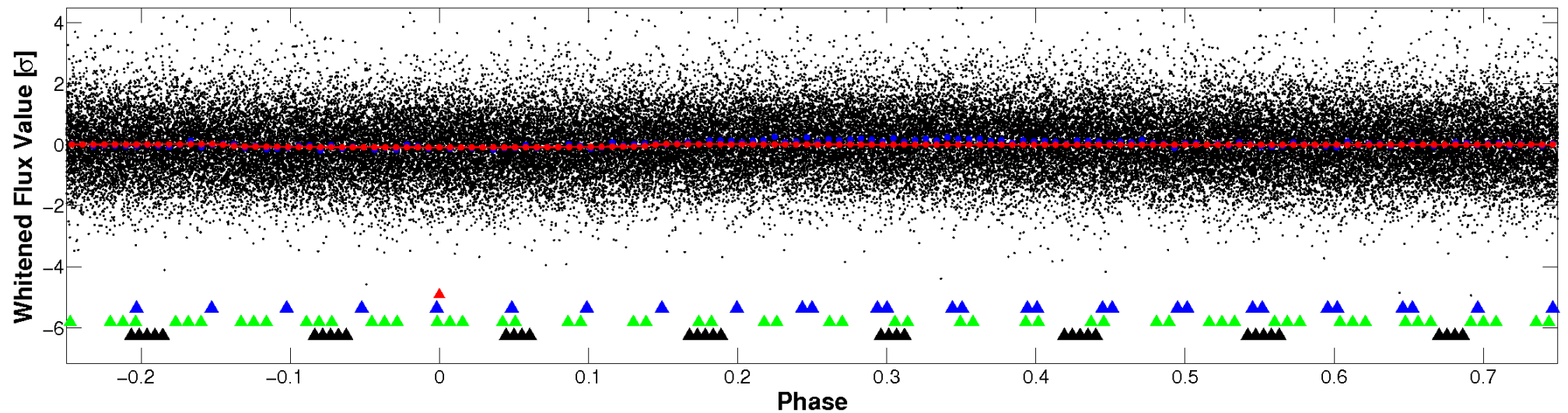


# Non-Whitened Vs. Whitened Light Curve

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

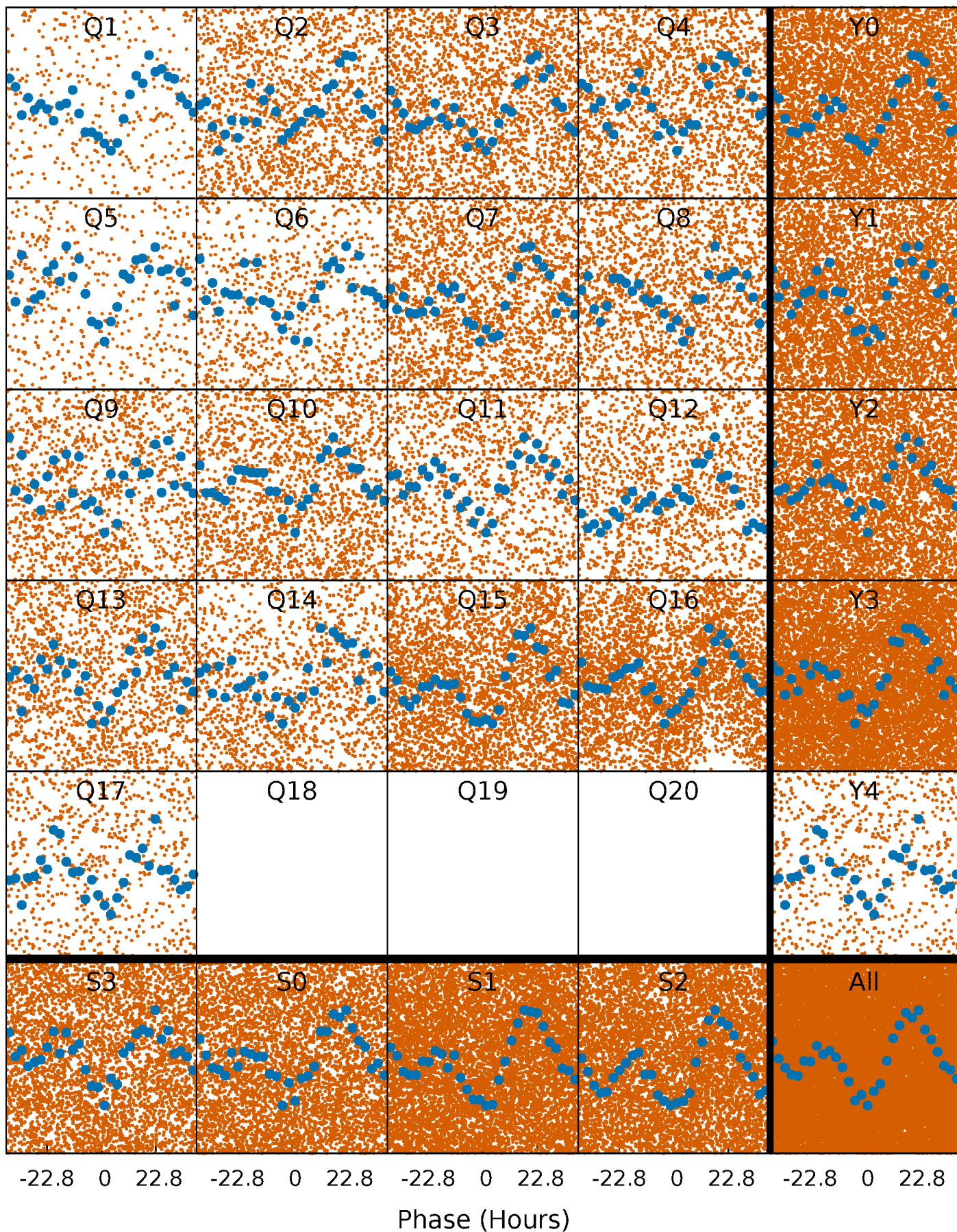


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

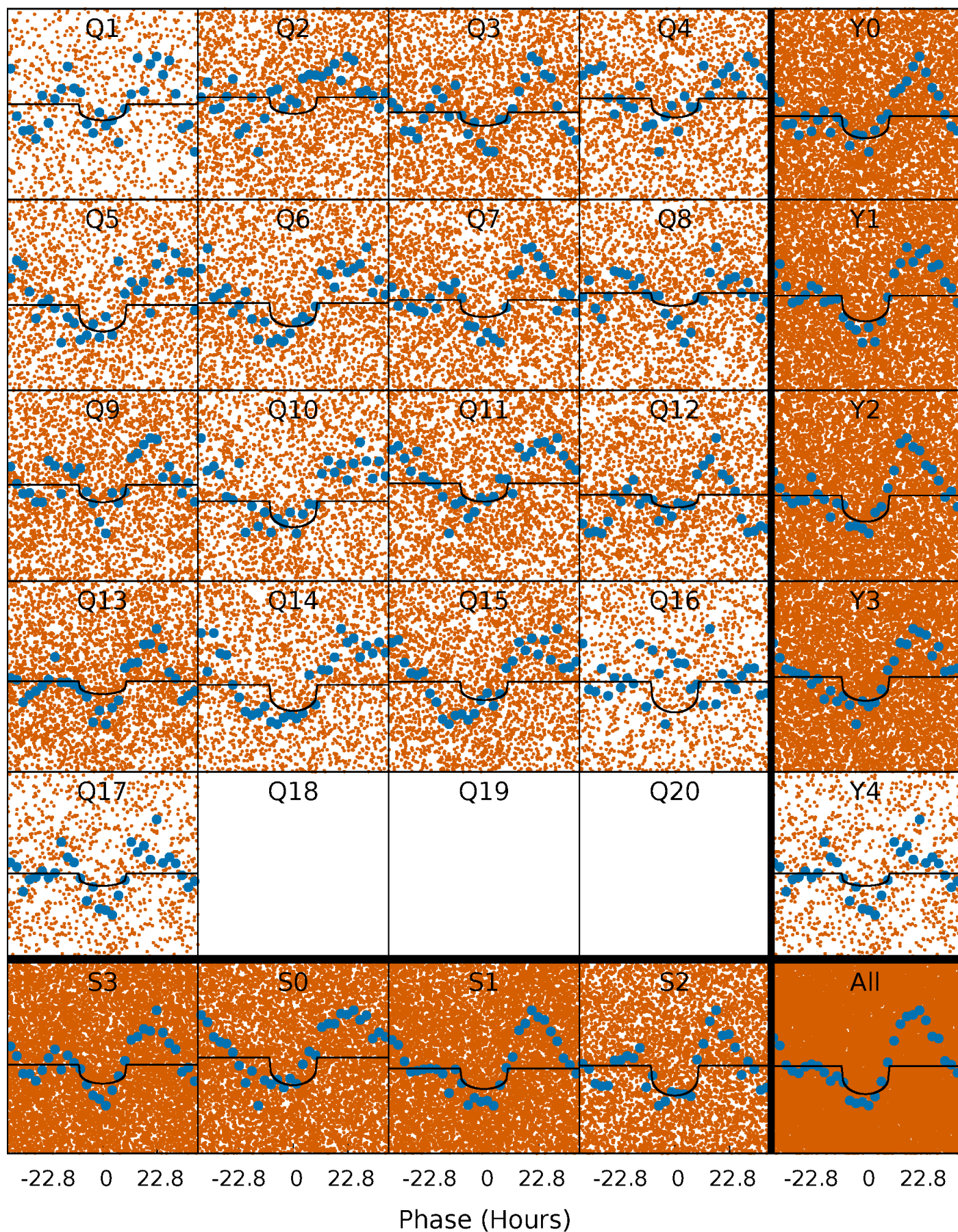
TCE 006954721-01 P= 2.818716 Days  $T_0=133.689089$  (BKJD)





# DV Quarter-Phased Transit Curves

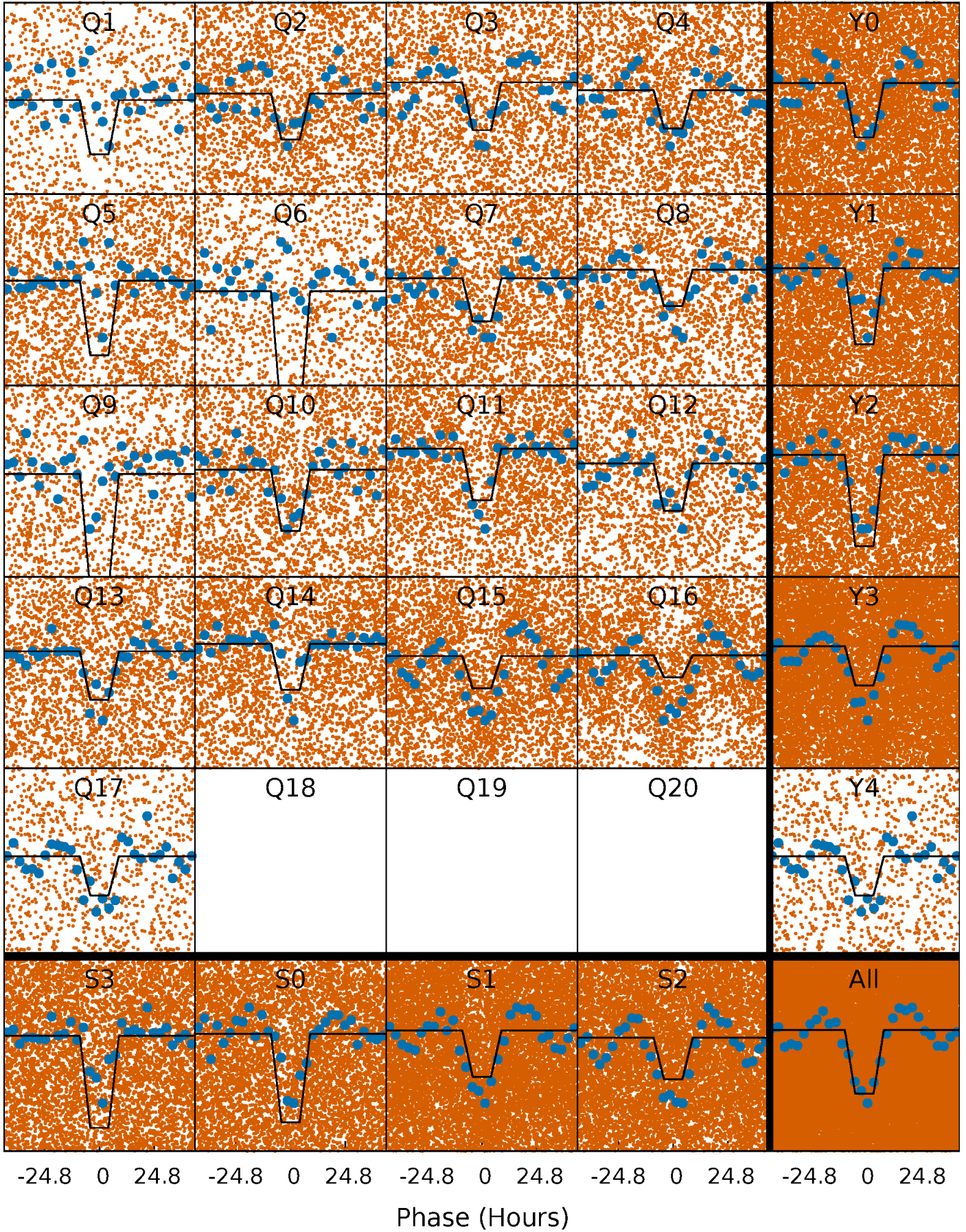
TCE 006954721-01 P= 2.818716 Days  $T_0=133.689089$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

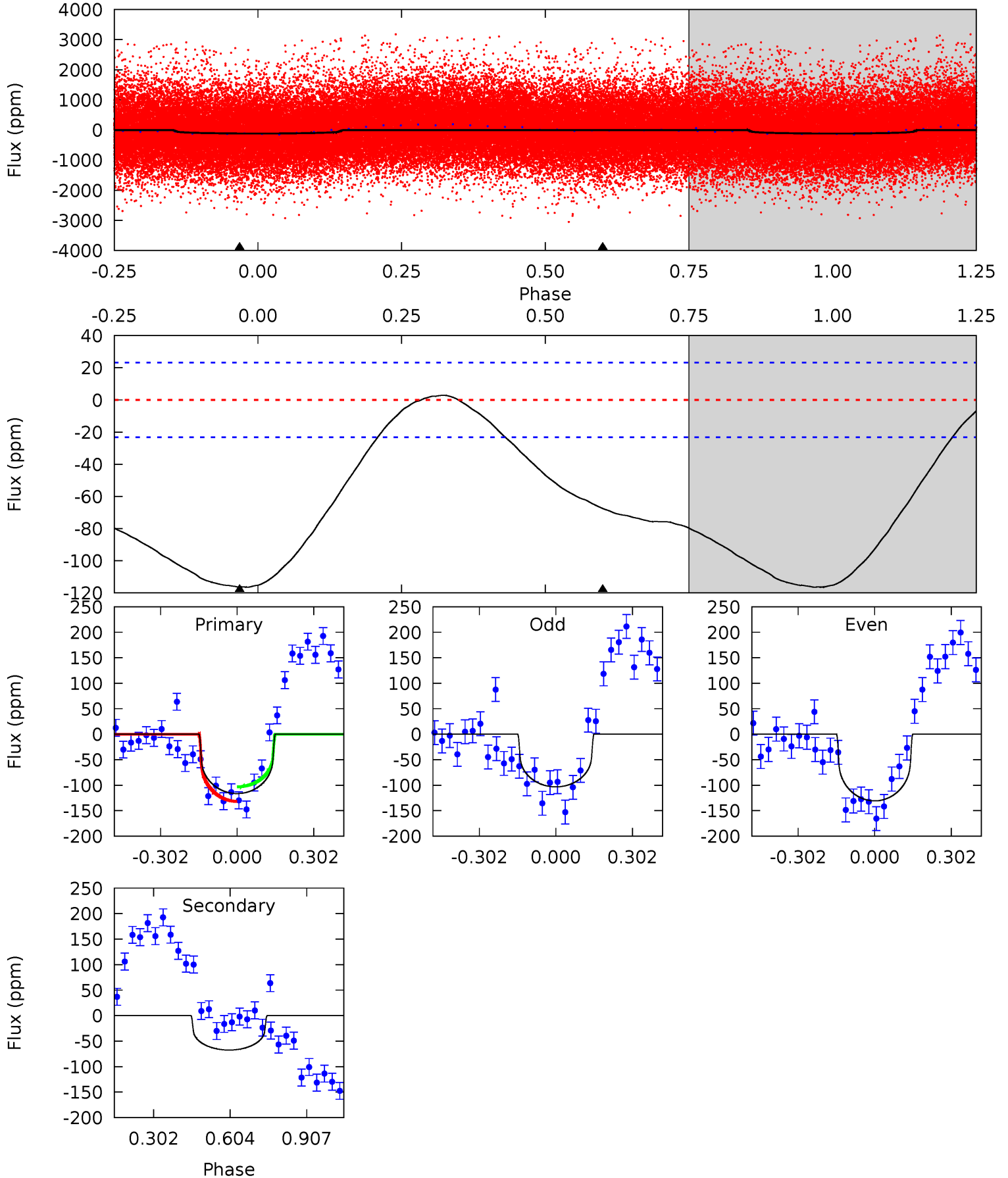
TCE 006954721-01 P= 2.818510 Days  $T_0=133.810093$  (BKJD)



# DV Model-Shift Uniqueness Test

006954721-01, P = 2.818716 Days, E = 130.870373 Days

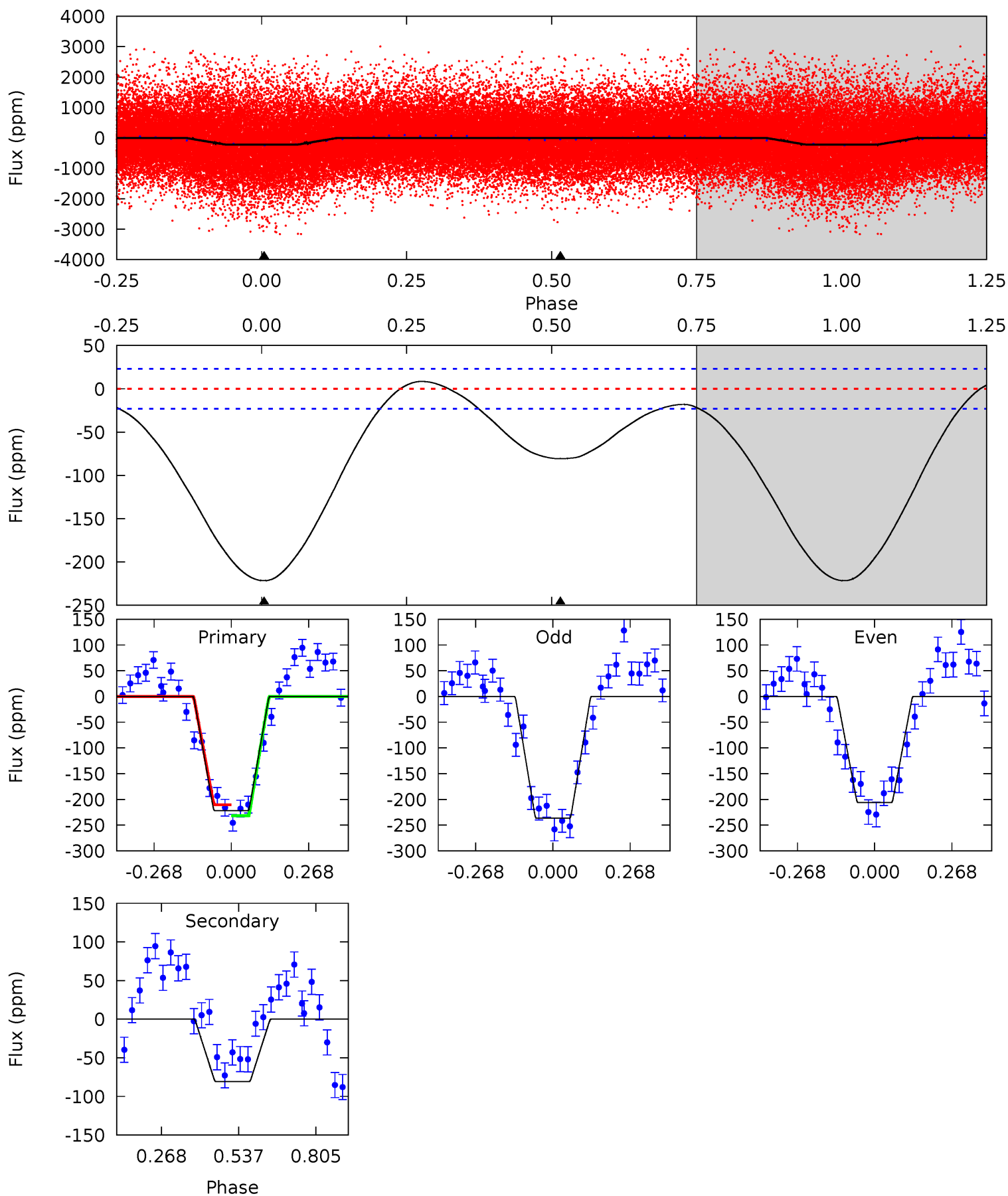
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
21.7	12.6	0	0	4.33	1.03	0.82	21.7	21.7	12.6	12.6	2.55	0.89	0.02	2.73



# Alt Model-Shift Uniqueness Test

006954721-01, P = 2.818510 Days, E = 130.991583 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
41.9	15.3	0	0	4.35	1.11	2.91	41.9	41.9	15.3	15.3	2.89	0.76	0.04	1.94





### Stellar Parameters For KIC 006954721

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3342^{+109}_{-89}$	$5.011^{+0.103}_{-0.115}$	$0.020^{+0.250}_{-0.250}$	$0.265^{+0.091}_{-0.074}$	$0.264^{+0.110}_{-0.090}$	$19.960^{+15.380}_{-8.650}$
	+3%/-3%	+2%/-2%	+1250%/-1250%	+34%/-28%	+42%/-34%	+77%/-43%
Source	PHO54	PHO54	PHO54	DSEP		

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

### Secondary Eclipse Parameters for KIC 006954721-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-68 \pm 5$	$0.29^{+0.18}_{-0.15}$	$677^{+45}_{-38}$	$3180^{+848}_{-406}$	$276^{+912}_{-166}$
Alt.	$-81 \pm 5$	$0.44^{+0.20}_{-0.18}$	$679^{+40}_{-37}$	$2915^{+428}_{-283}$	$145^{+253}_{-75}$

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

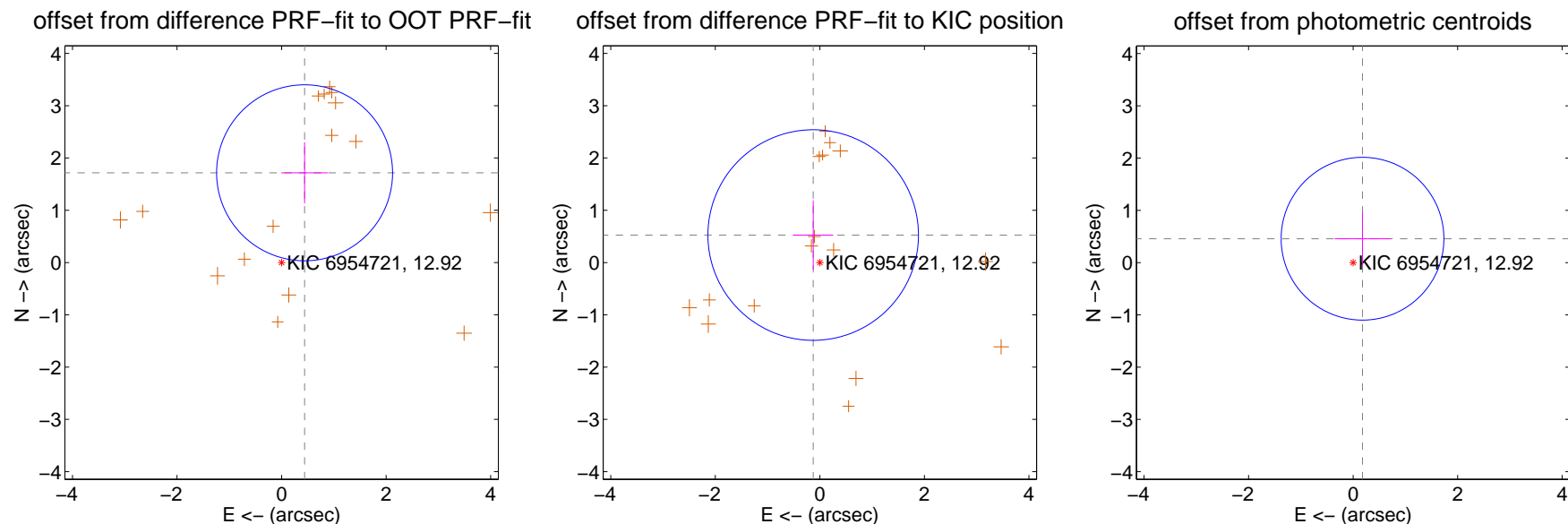
## DV Centroid Data

Supplemental centroid analysis for 006954721-01. Kepler magnitude: 12.92. Transit SNR 10.86

There are 0 quarters with good PRF difference image offsets

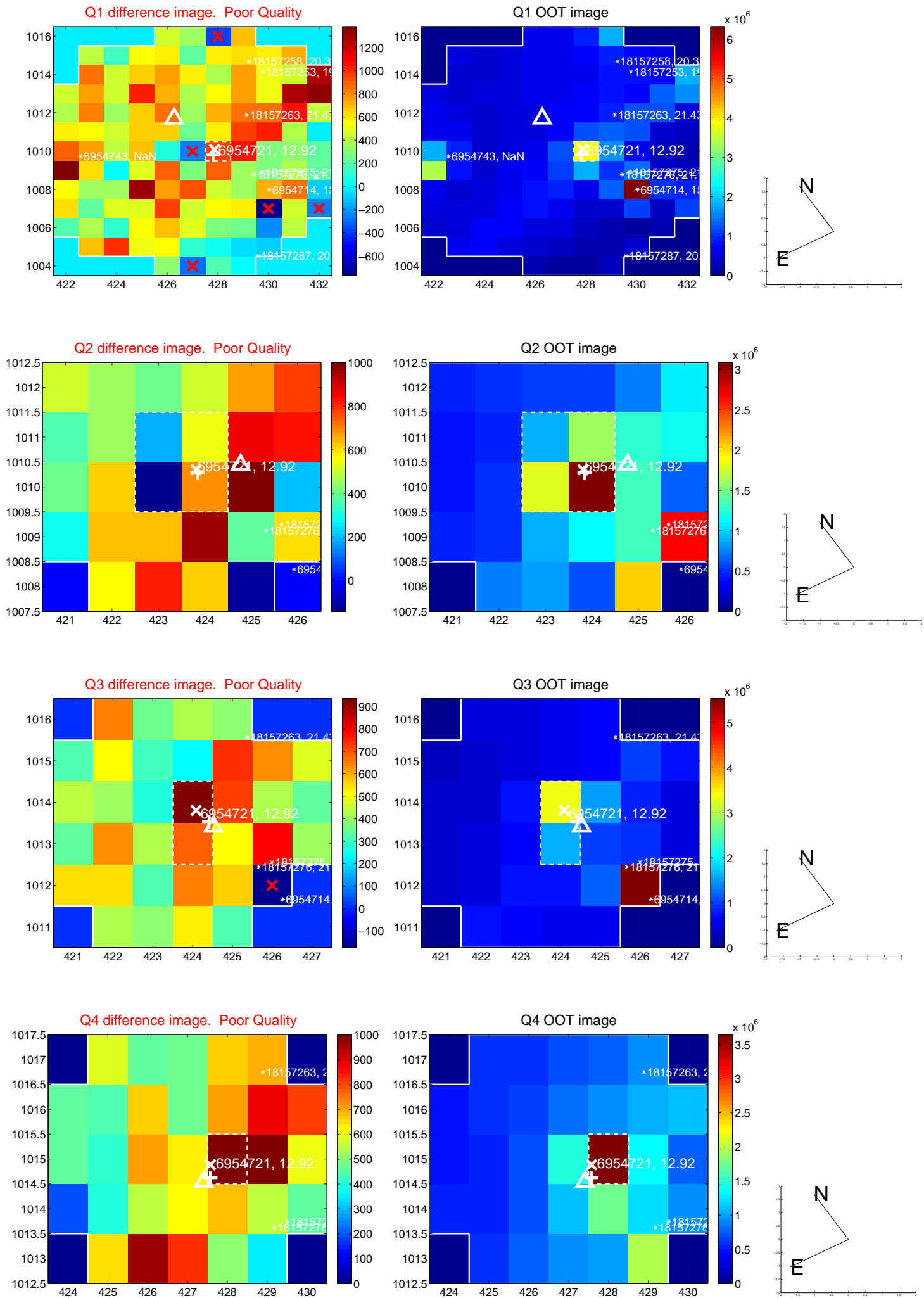
The direct PRF centroid is offset from the target star catalog position by about 1.25 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b>1.772 <math>\pm</math> 0.561</b>	<b>3.16</b>	-0.440 $\pm$ 0.445	1.716 $\pm$ 0.583
PRF-fit source offset from KIC position	0.541 $\pm$ 0.671	0.81	0.127 $\pm$ 0.384	0.526 $\pm$ 0.662
photometric centroid source offset	0.49 $\pm$ 0.52	0.95	-0.18 $\pm$ 0.53	0.46 $\pm$ 0.52

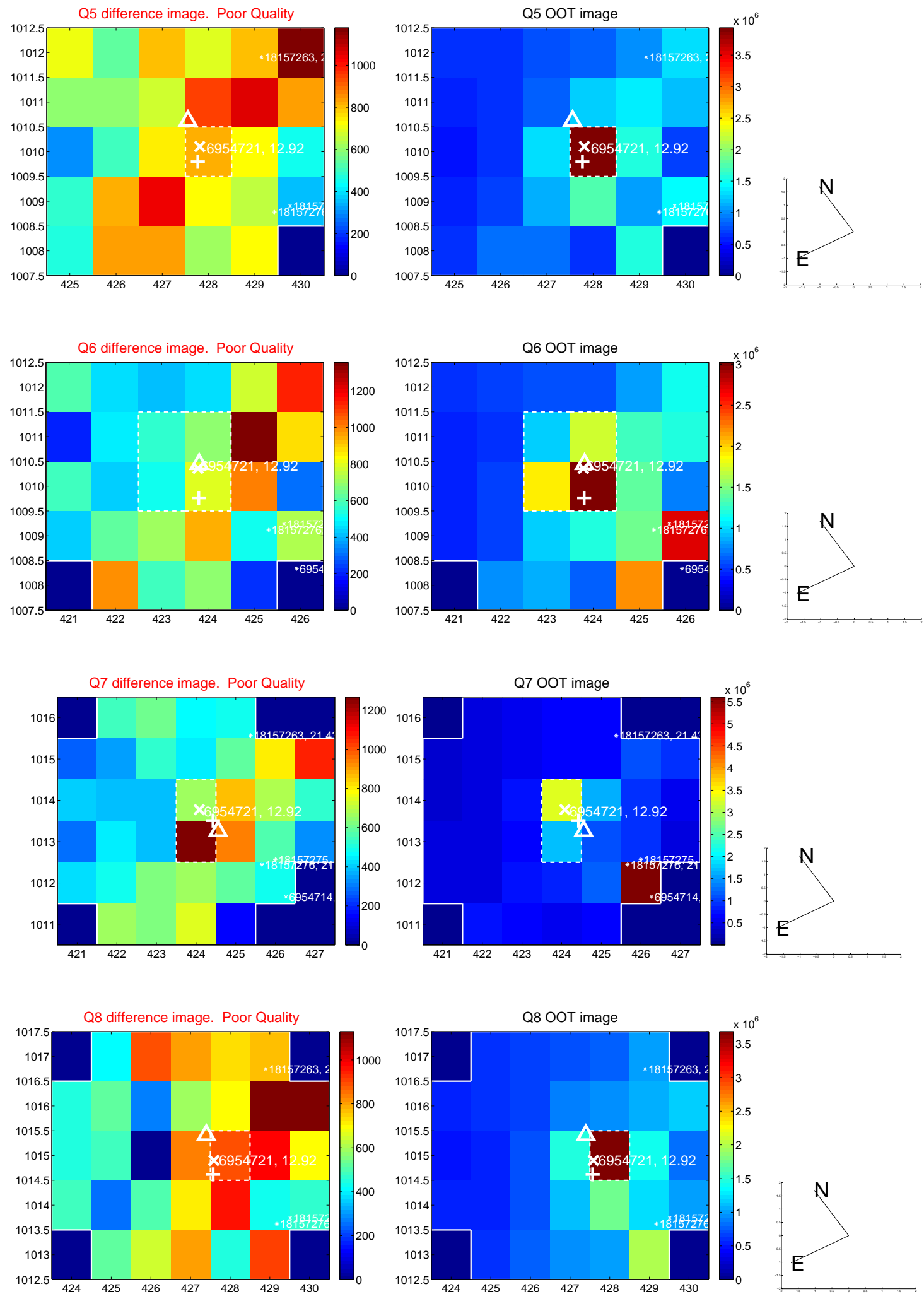


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

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

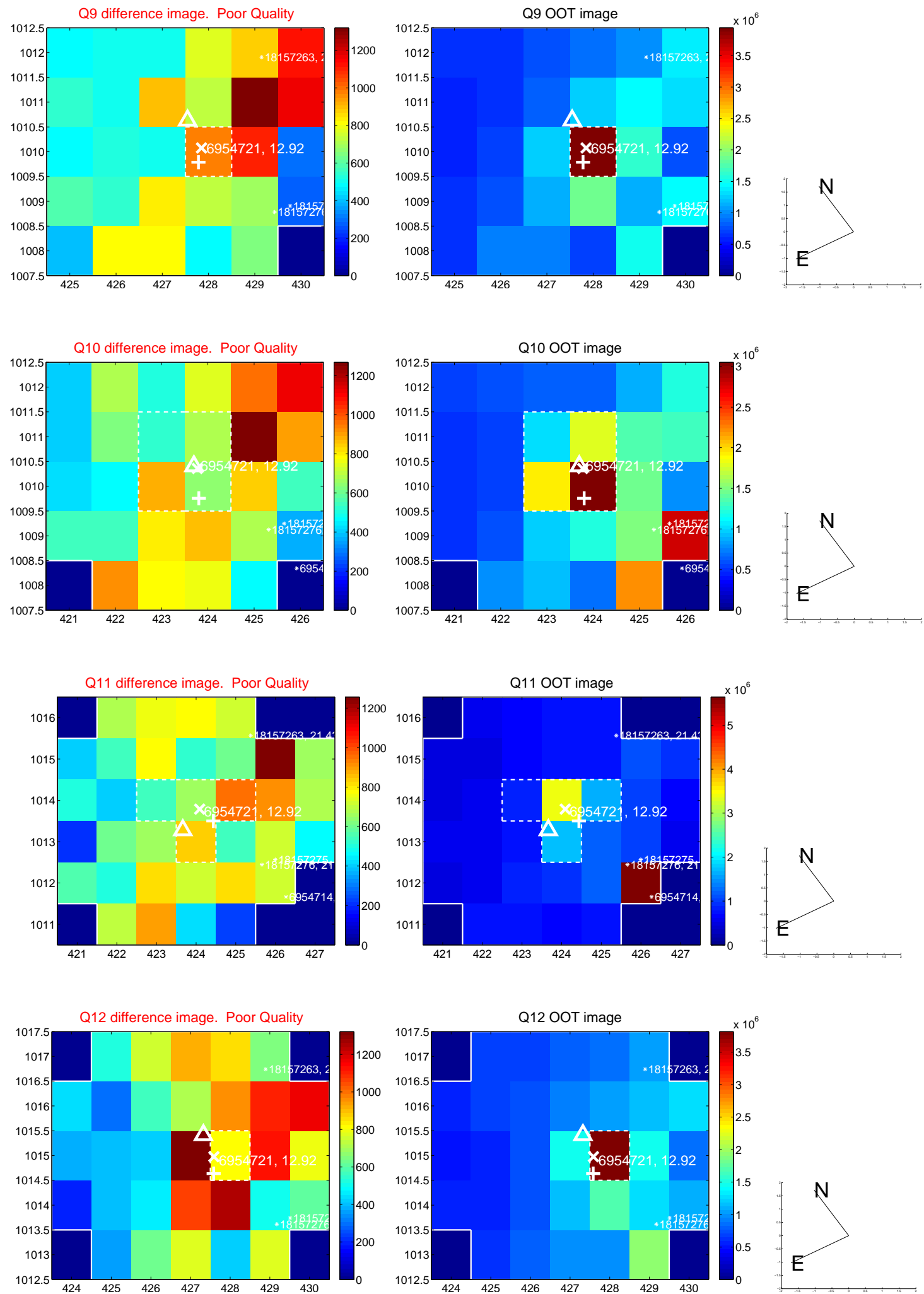


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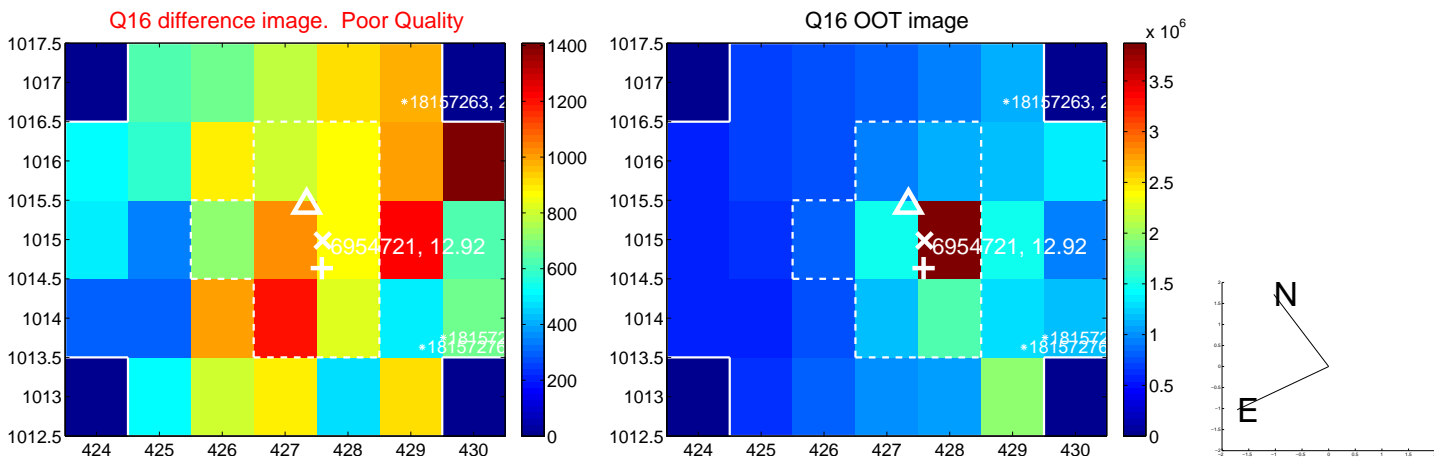
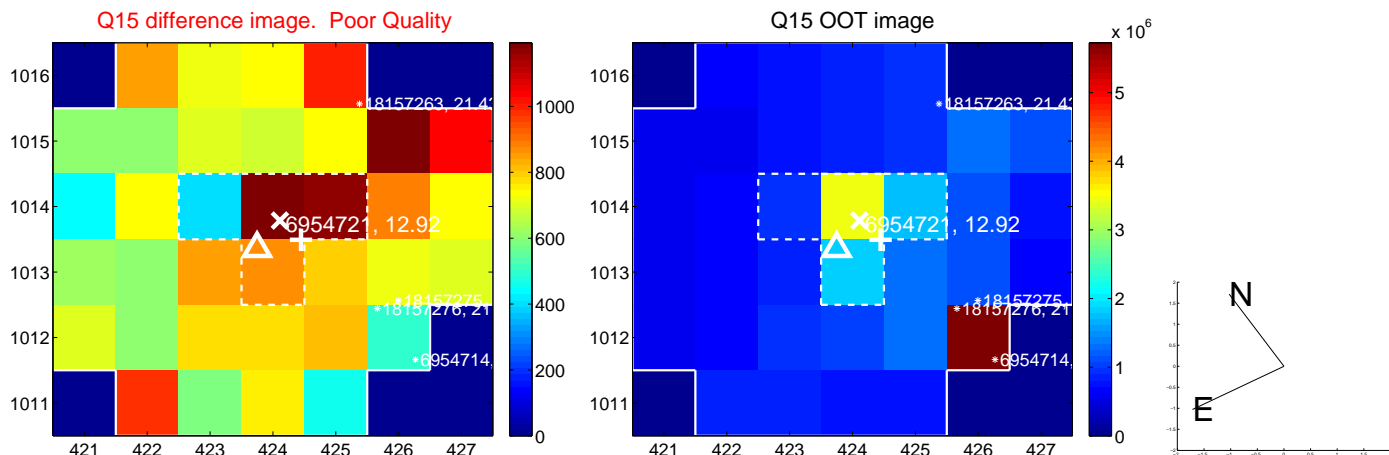
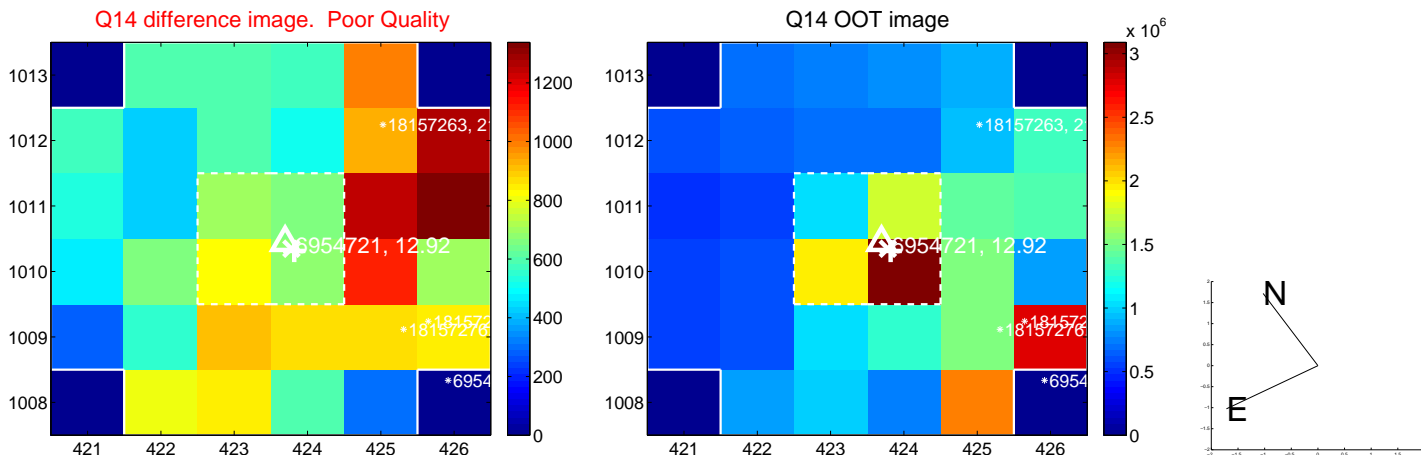
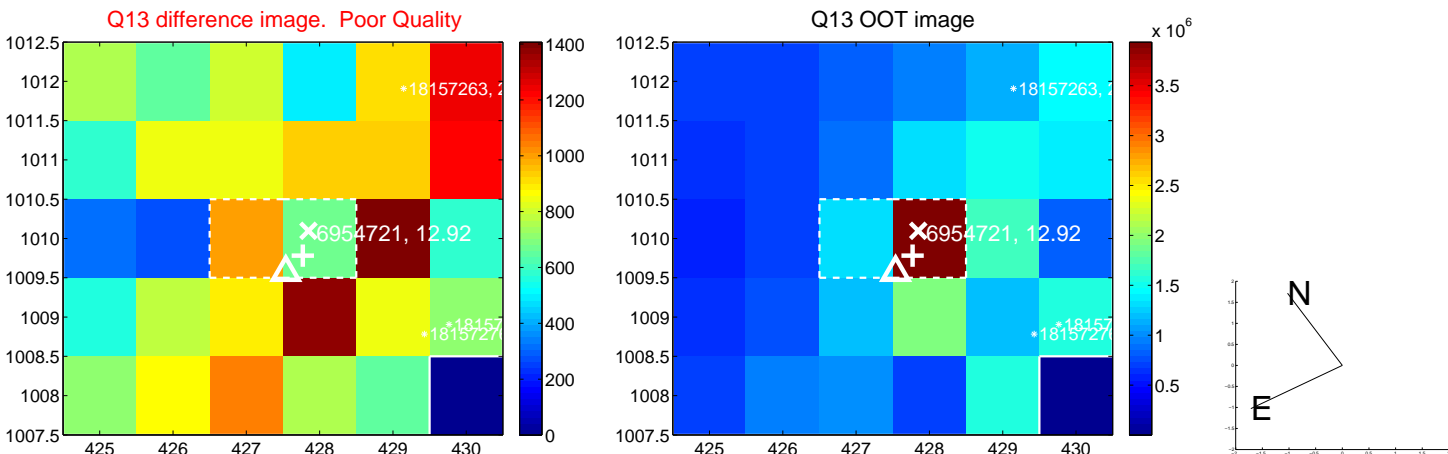




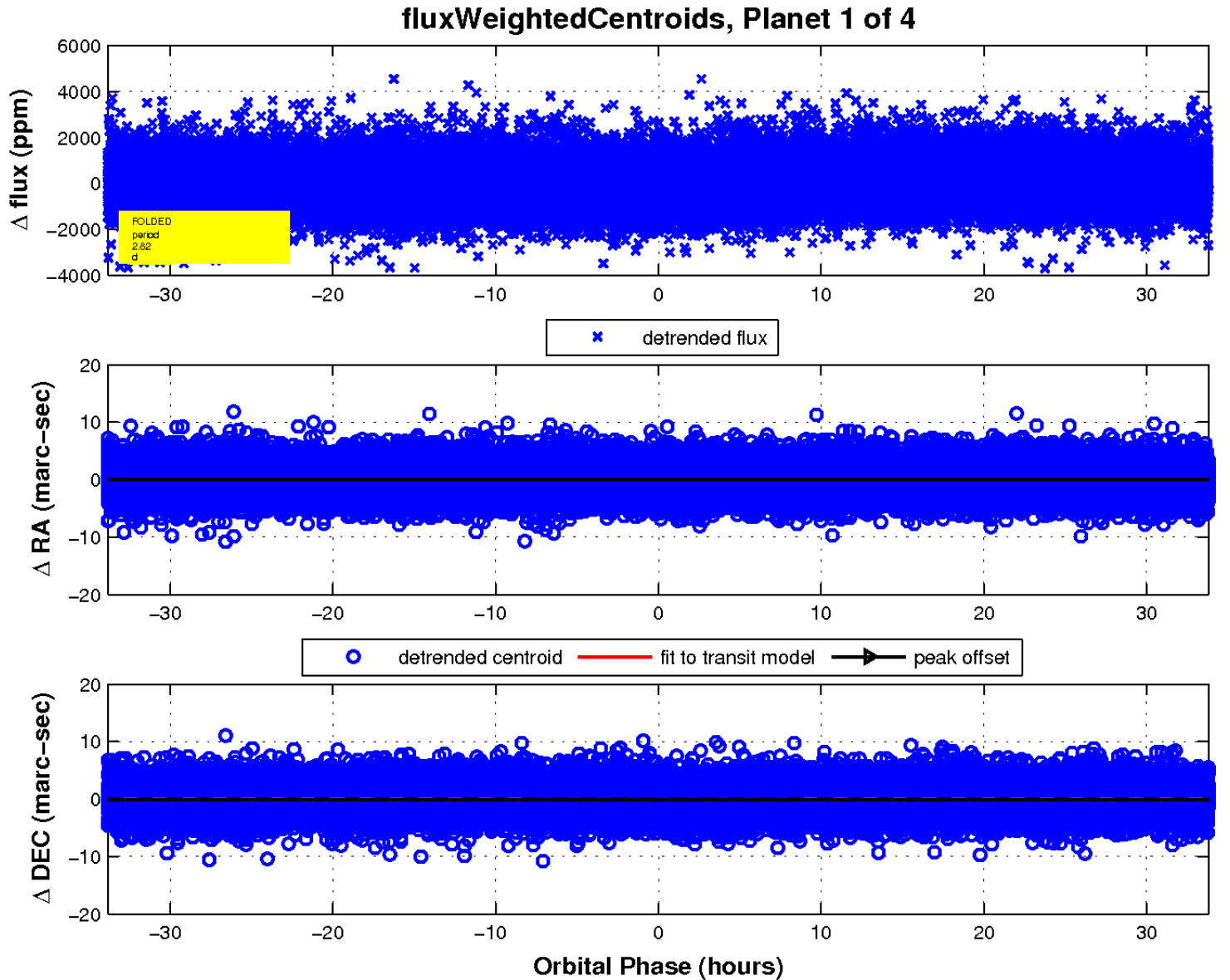
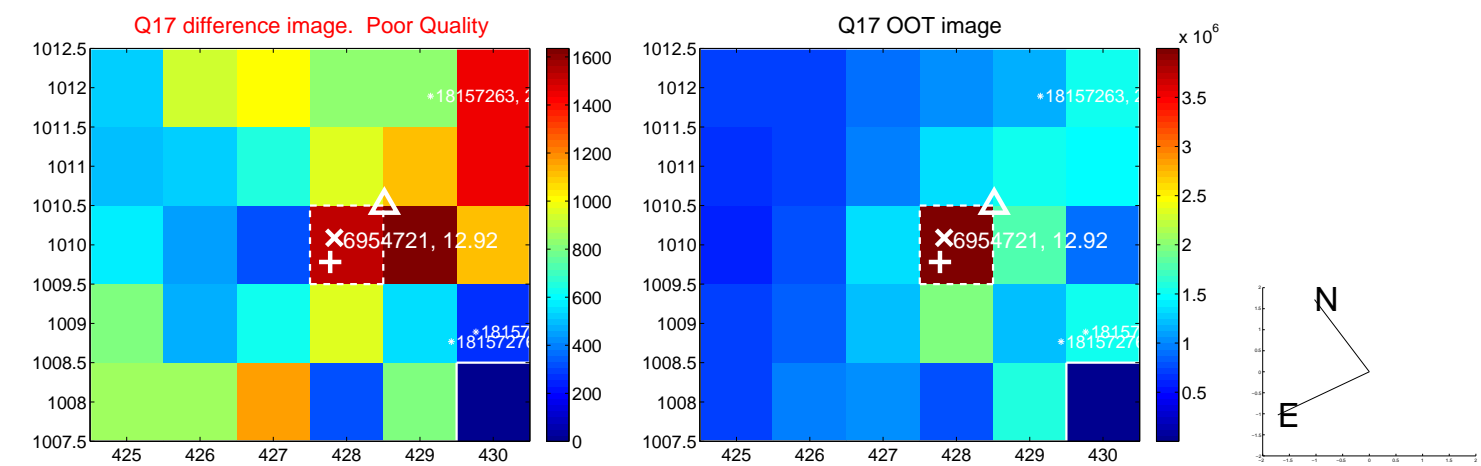
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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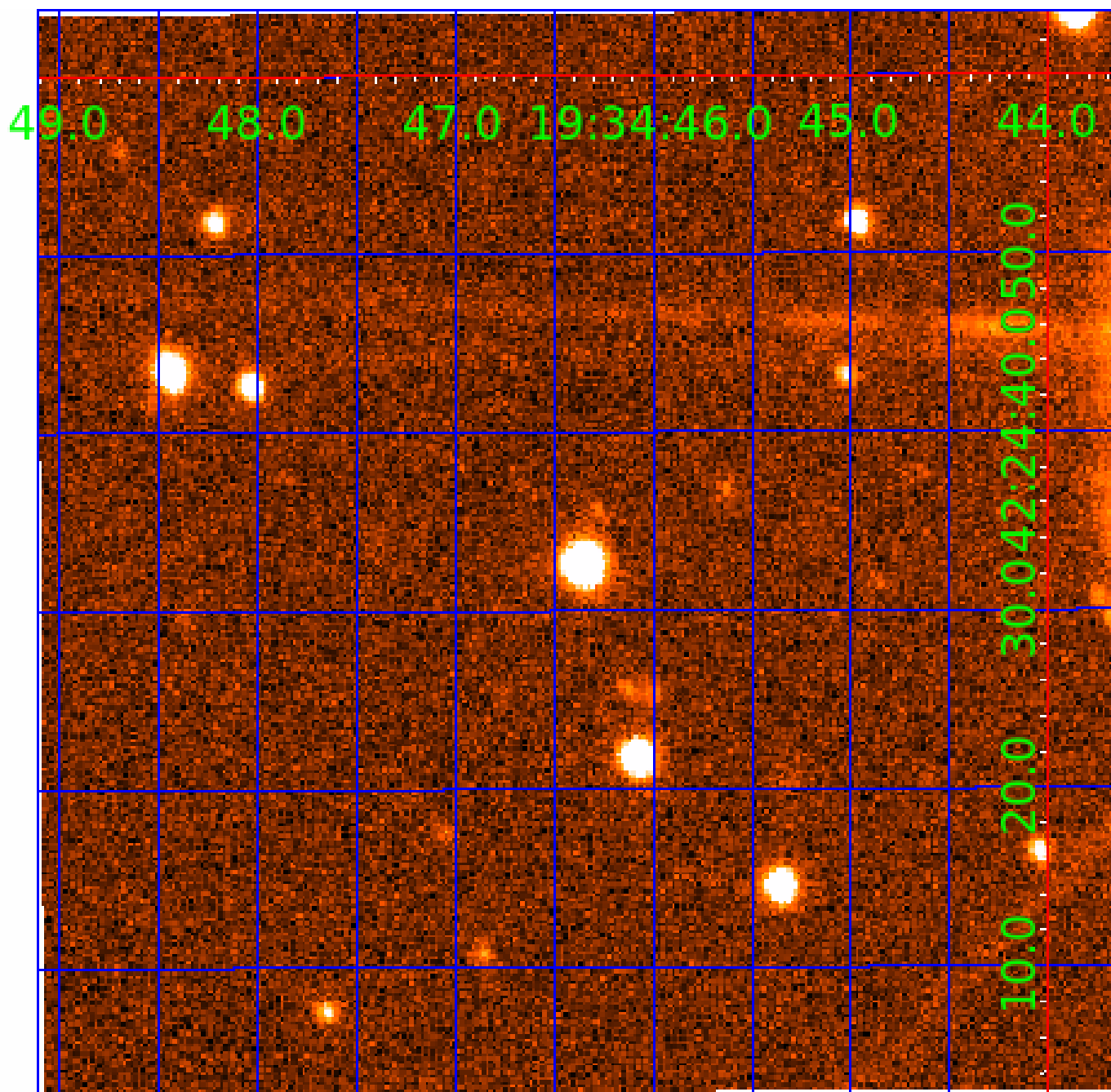


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 006954721

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
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## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
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006954721-02	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_FEW_DIFFS—HALO_GHOST
006954721-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_KIC_POS
006954721-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

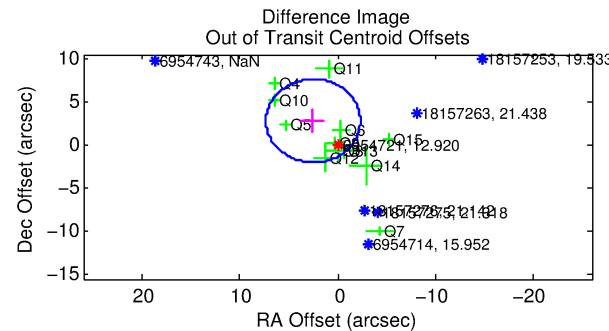
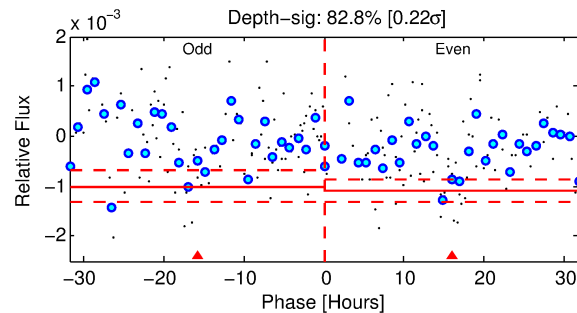
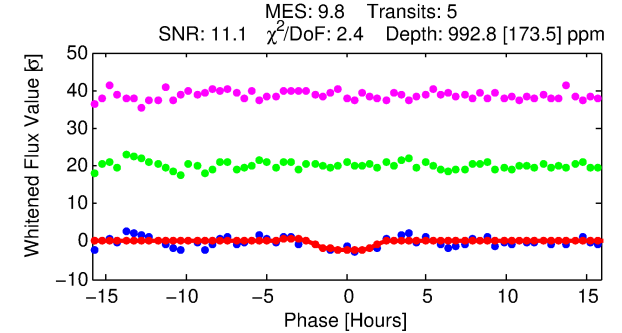
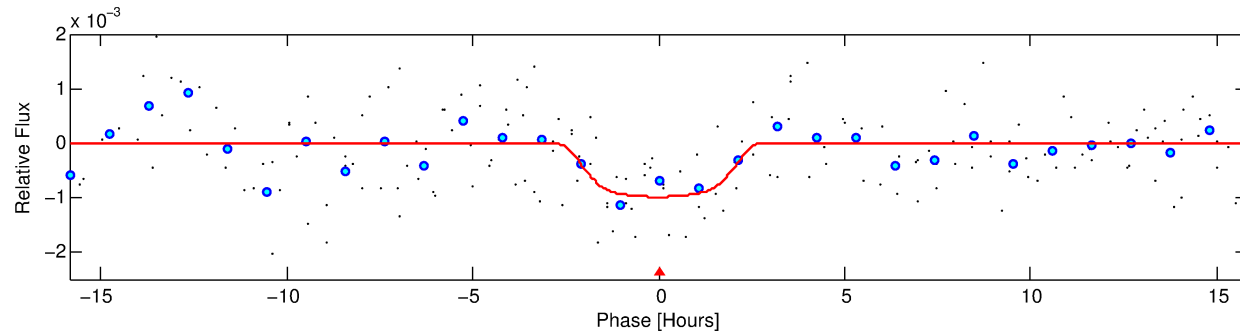
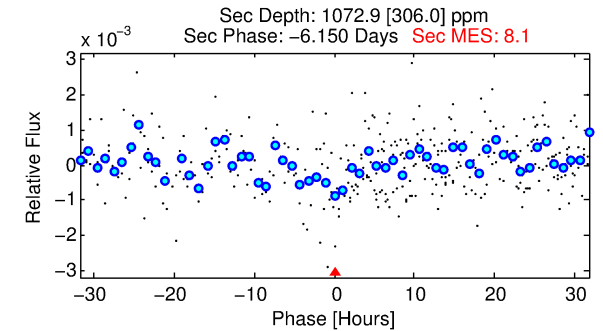
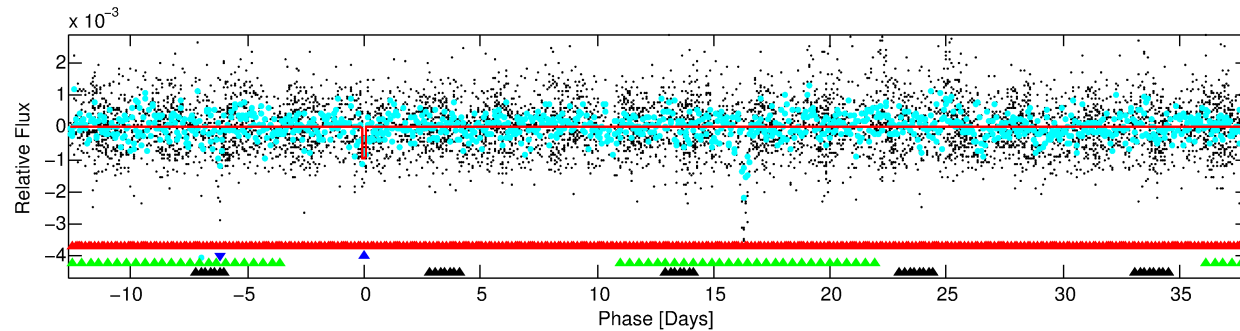
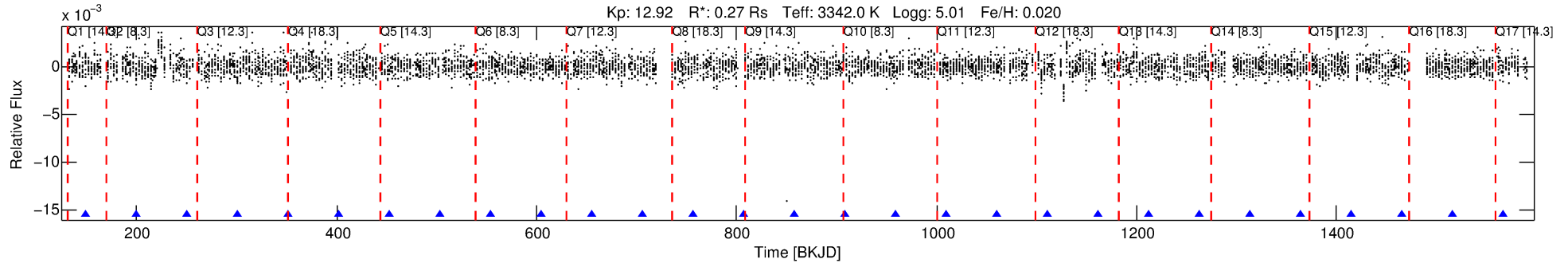
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 006954721-02

No Significant Match Found

# DV One-Page Summary

KIC: 6954721 Candidate: 2 of 4 Period: 50.595 d



## DV Fit Results:

Period = 50.59503 [0.00091] d  
Epoch = 149.6218 [0.0166] BKJD  
Rp/R\* = 0.0358 [0.0074]  
a/R\* = 33.54 [22.06]  
b = 0.93 [0.10]  
Seff = 0.27 [0.08]  
Teq = 183 [15] K  
Rp = 1.04 [0.41] Re  
a = 0.1715 [0.0421] AU  
Ag = 16202.43 [9365.19] [1.73 $\sigma$ ]  
Teffp = 3197 [413] K [7.29 $\sigma$ ]

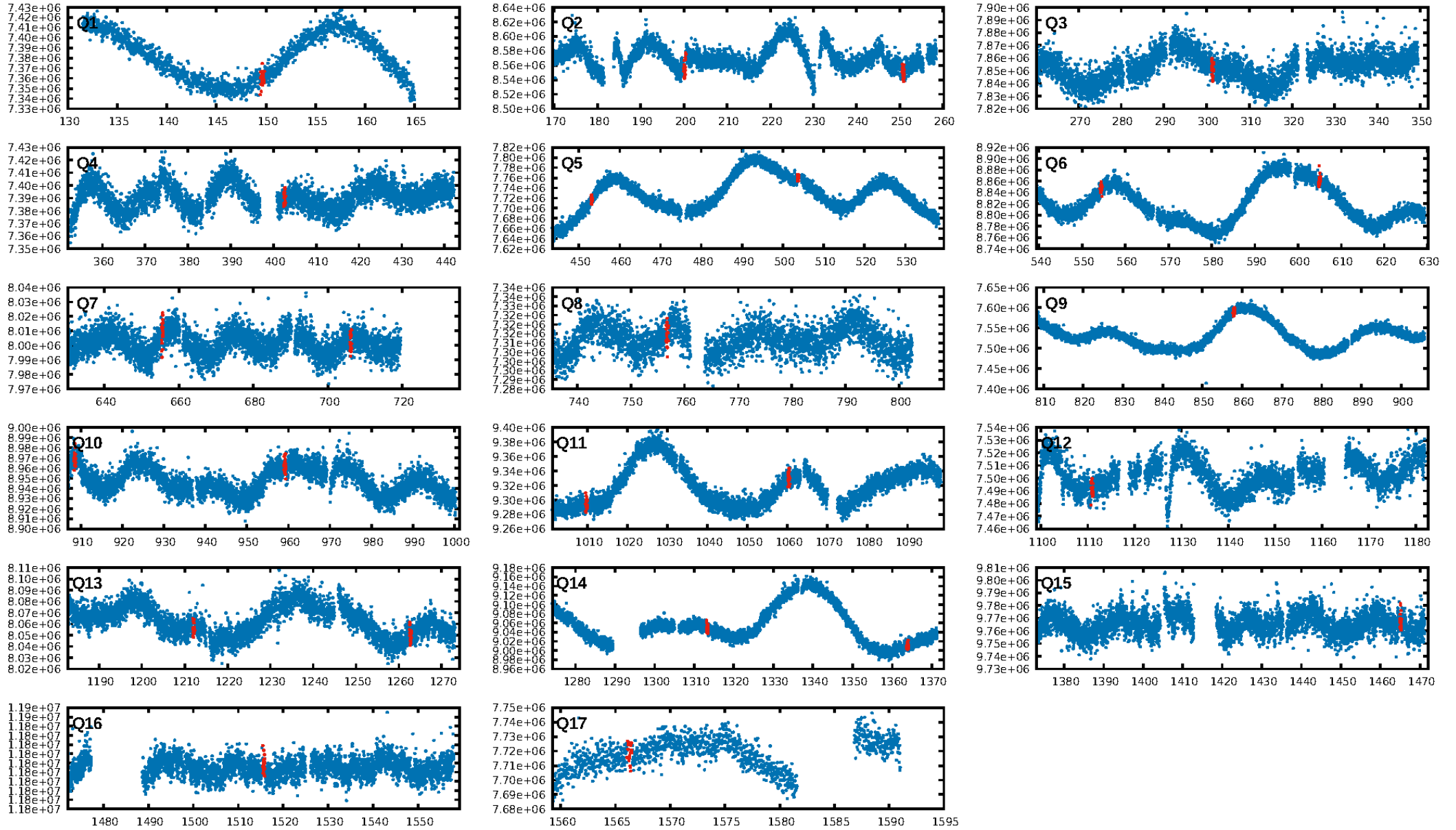
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [10.91 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 24.3%  
ModelChiSquareGof-sig: 85.2%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: -0.05091  
Centroid-sig: 14.3%  
Centroid-so: 1.254 arcsec [2.80 $\sigma$ ]  
OotOffset-rm: 3.756 arcsec [2.34 $\sigma$ ]  
OotOffset-st: 3/4/3/2 [12]  
KicOffset-rm: 3.279 arcsec [2.20 $\sigma$ ]  
KicOffset-st: 3/4/3/2 [12]  
DiffImageQuality-fgm: 0.00 [0/12]  
DiffImageOverlap-fno: 0.50 [8/16]

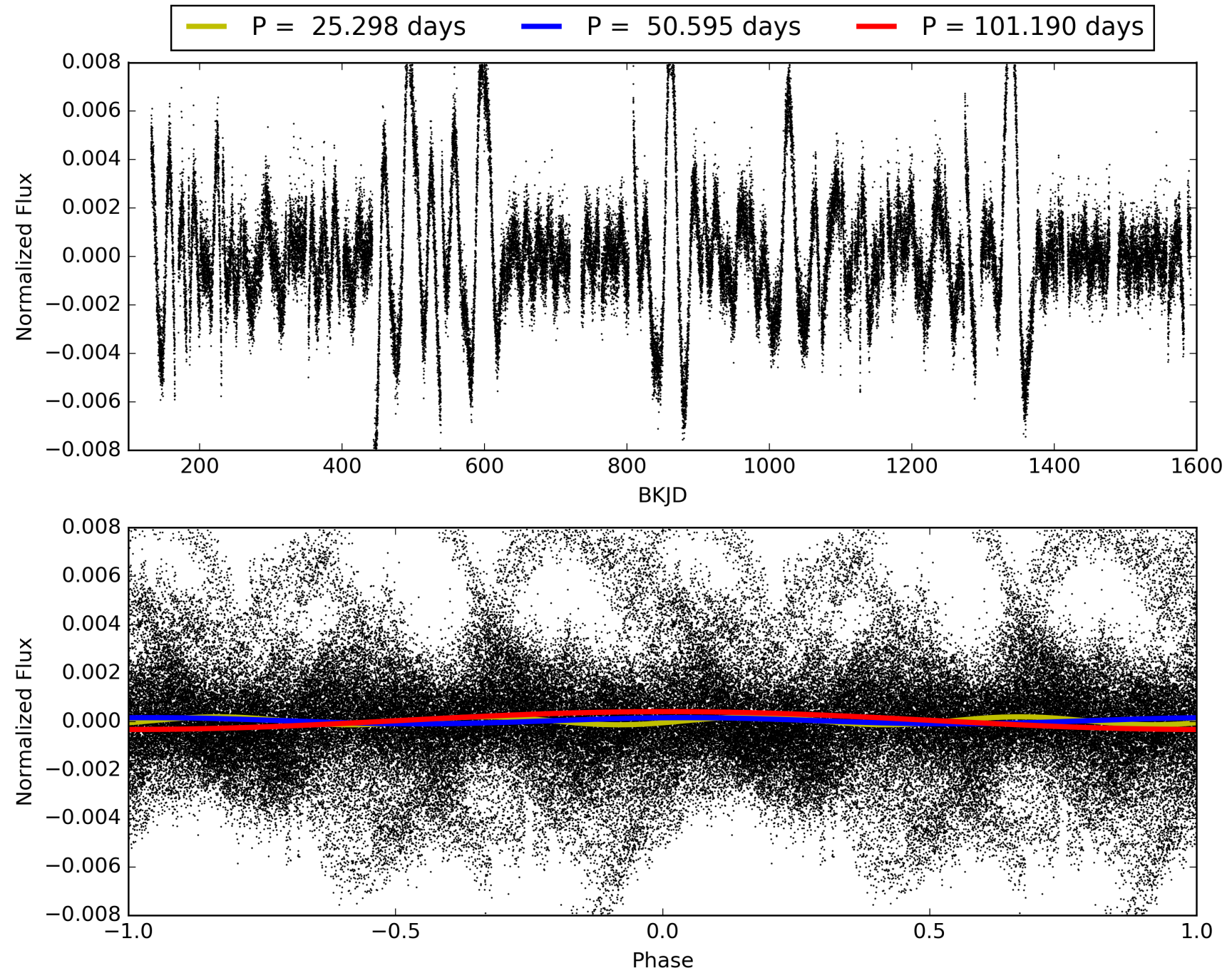
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 03-Feb-2016 07:58:23 Z

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

# TCE 006954721-02, PDC Light Curves

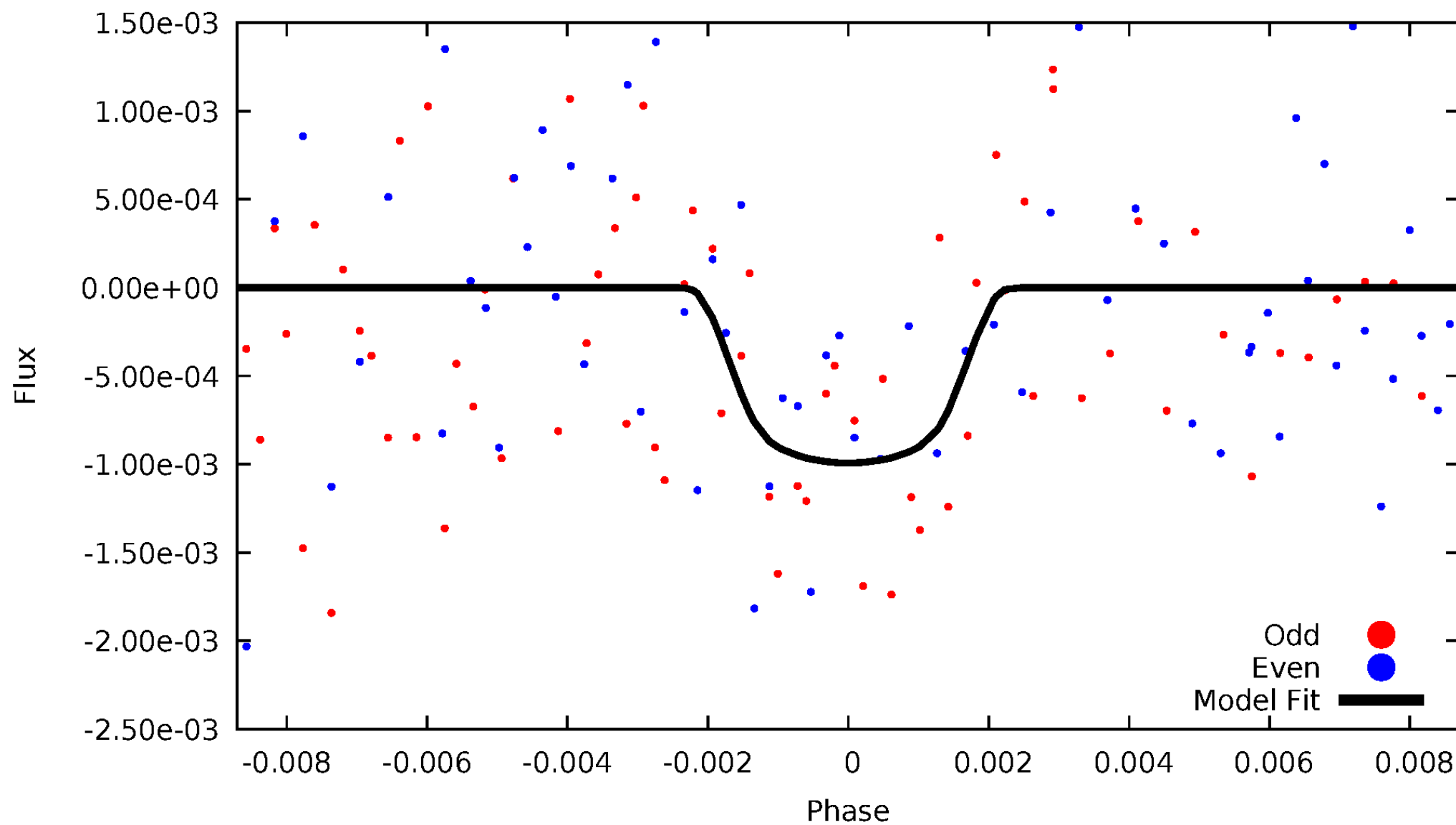


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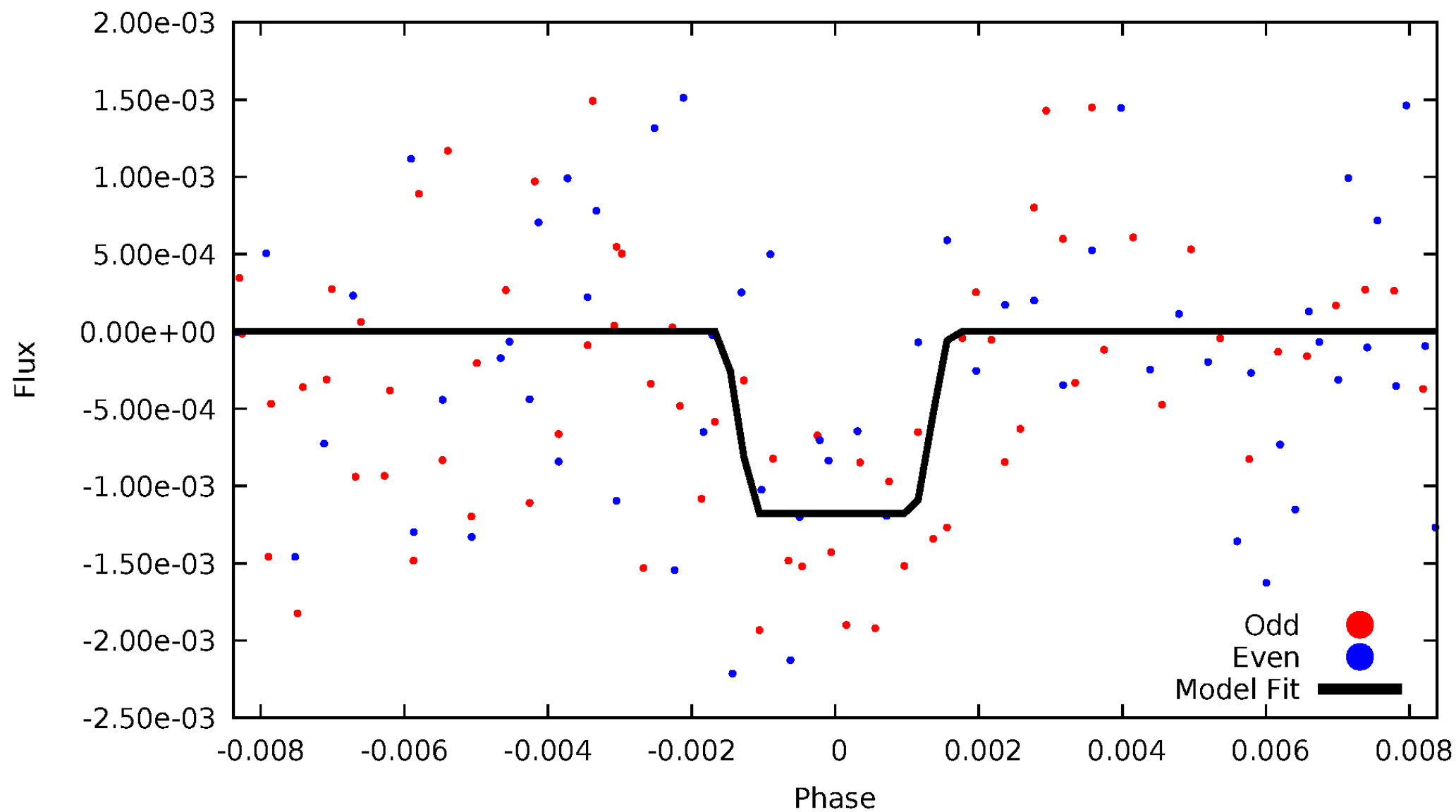
# DV Odd/Even

TCE 006954721-02



# ALT Odd/Even

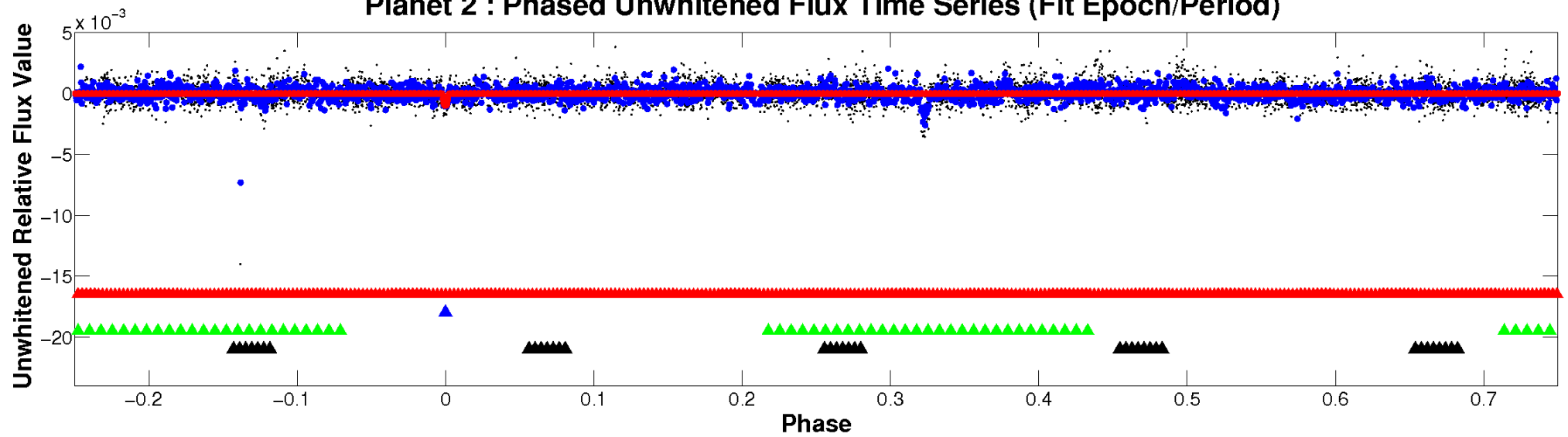
TCE 006954721-02



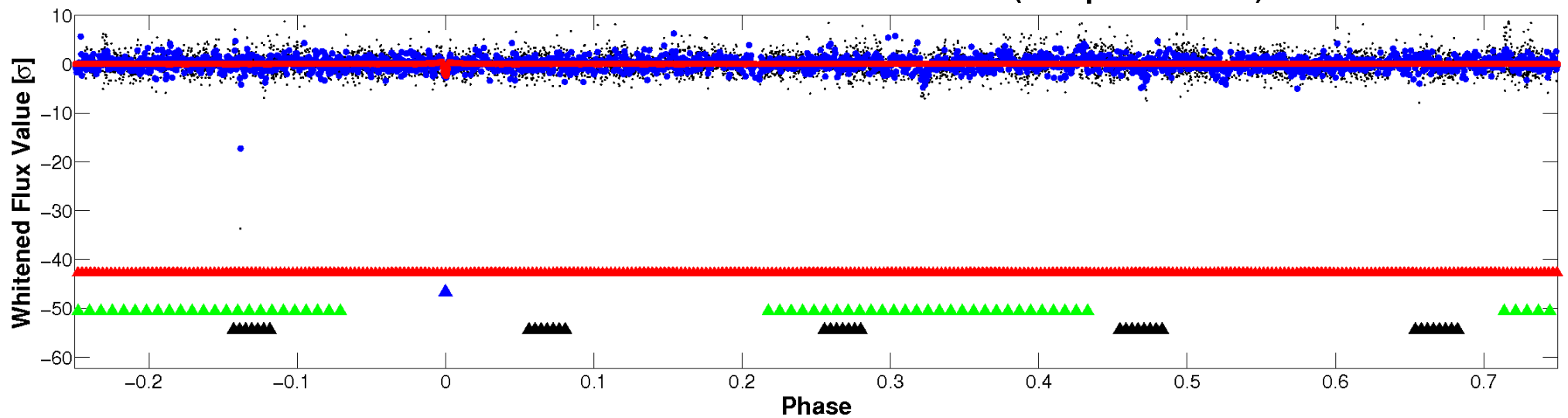


# Non-Whitened Vs. Whitened Light Curve

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

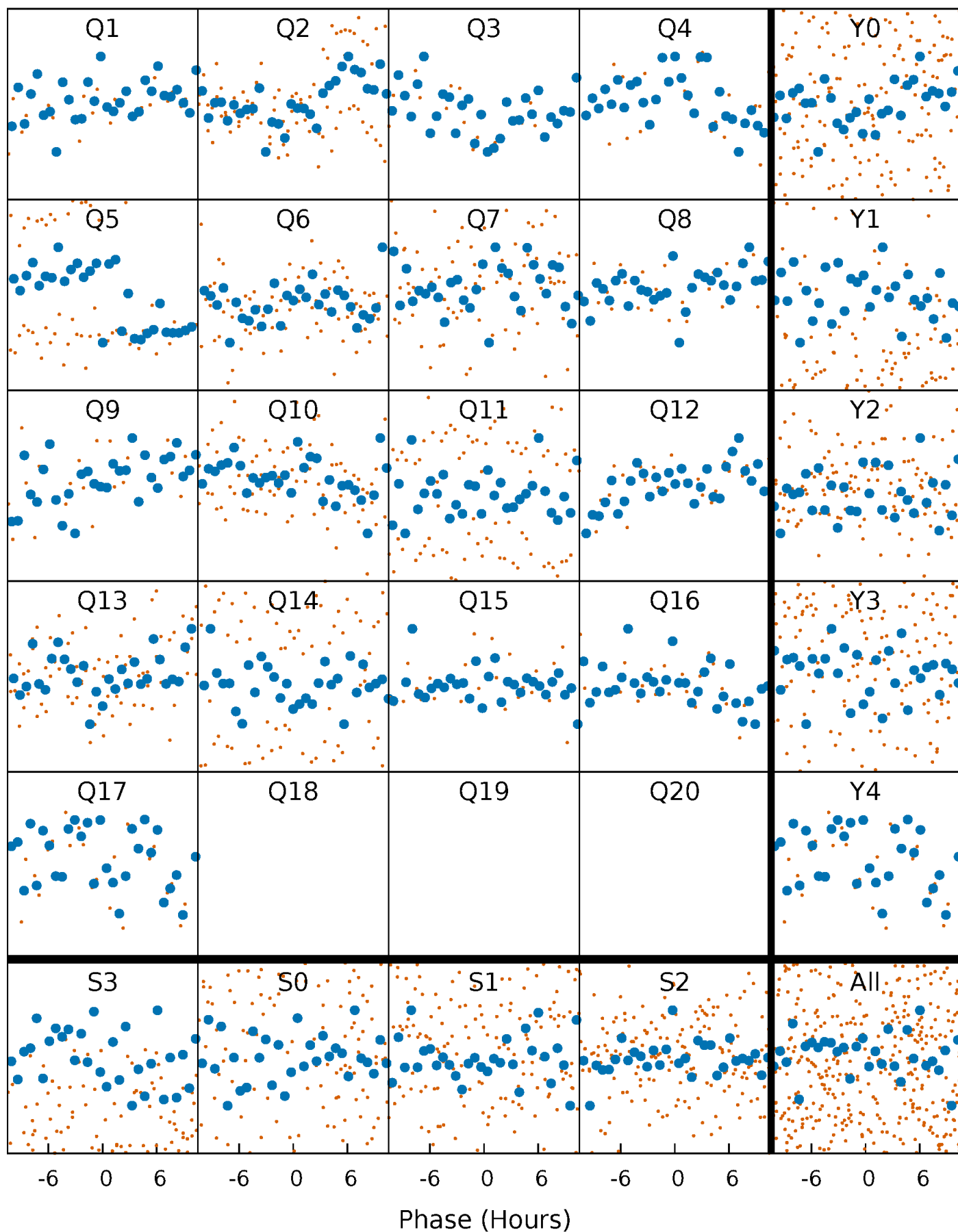


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



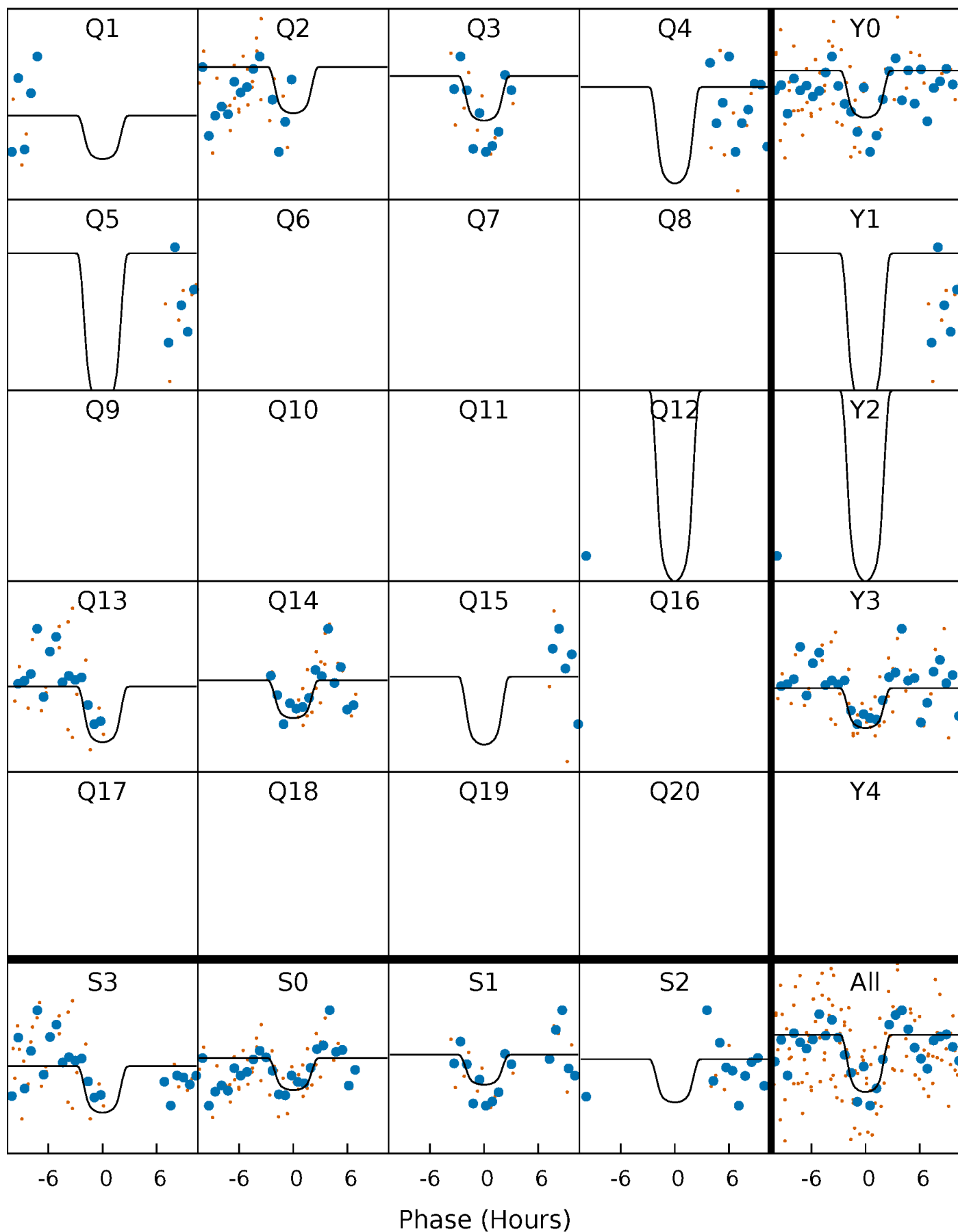
# PDC Quarter-Phased Transit Curves

TCE 006954721-02   P= 50.595035 Days    $T_0=149.621793$  (BKJD)



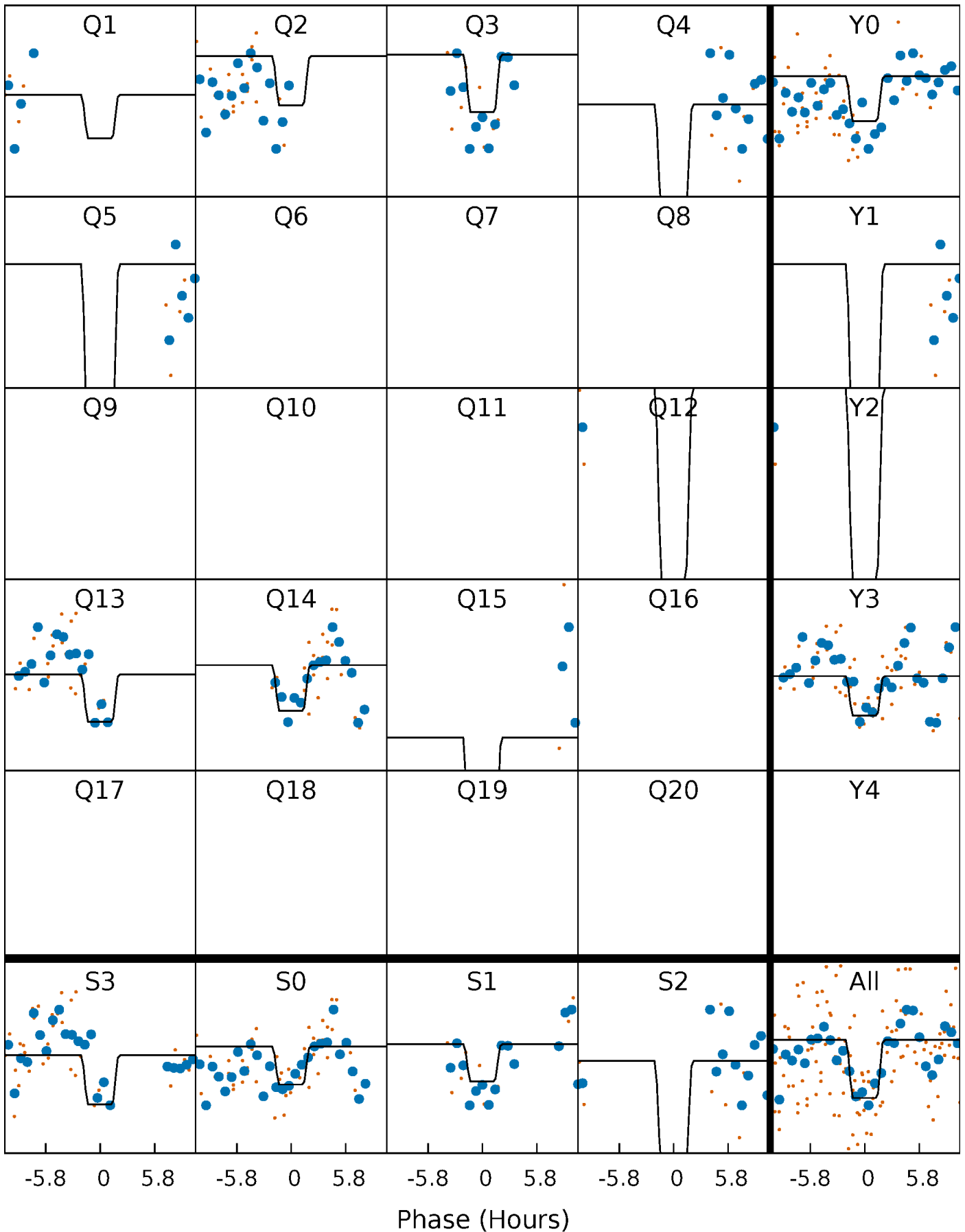
# DV Quarter-Phased Transit Curves

TCE 006954721-02     $P = 50.595035$  Days     $T_0 = 149.621793$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

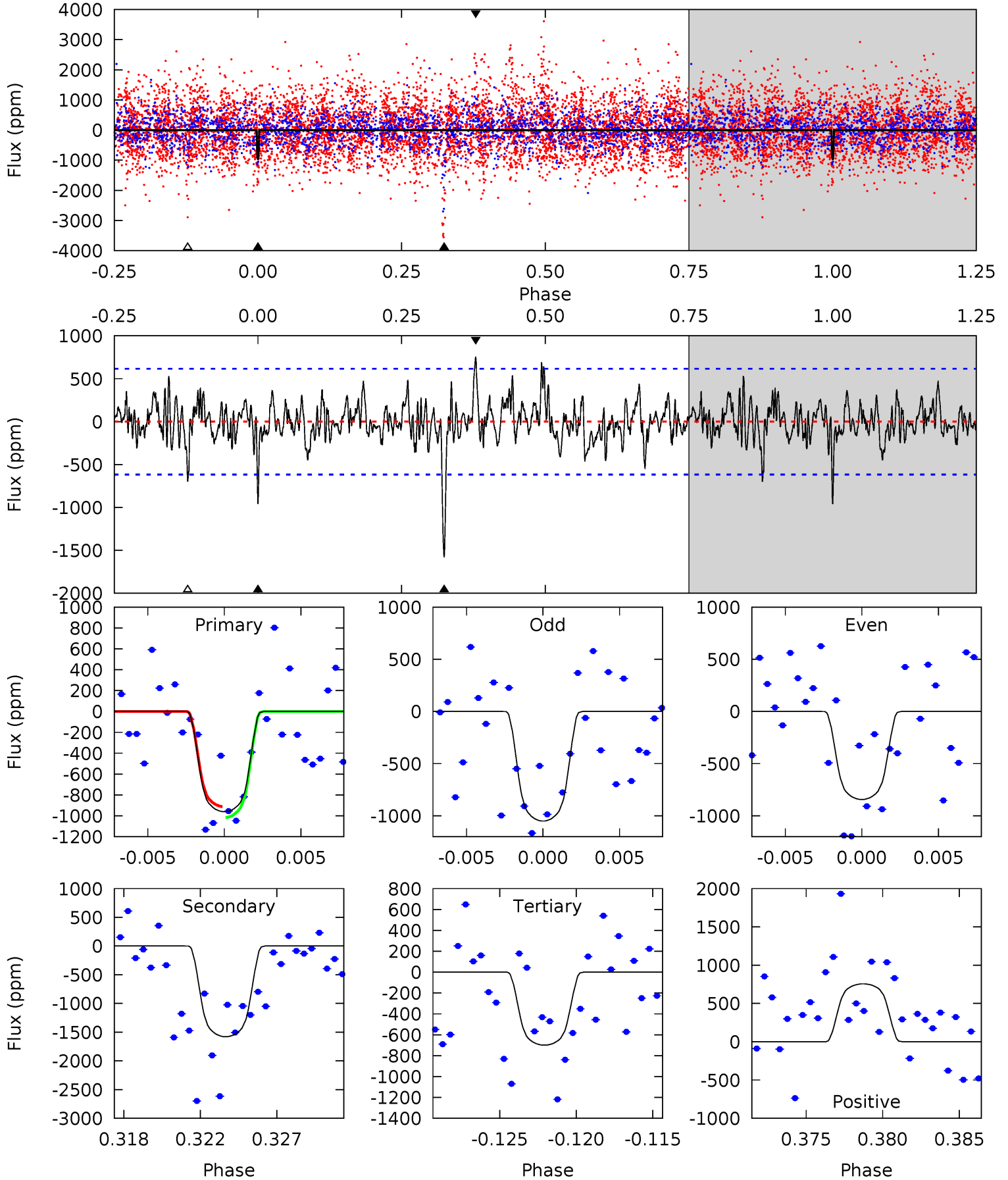
TCE 006954721-02 P= 50.593223 Days  $T_0=149.629956$  (BKJD)



# DV Model-Shift Uniqueness Test

006954721-02, P = 50.595035 Days, E = 99.026758 Days

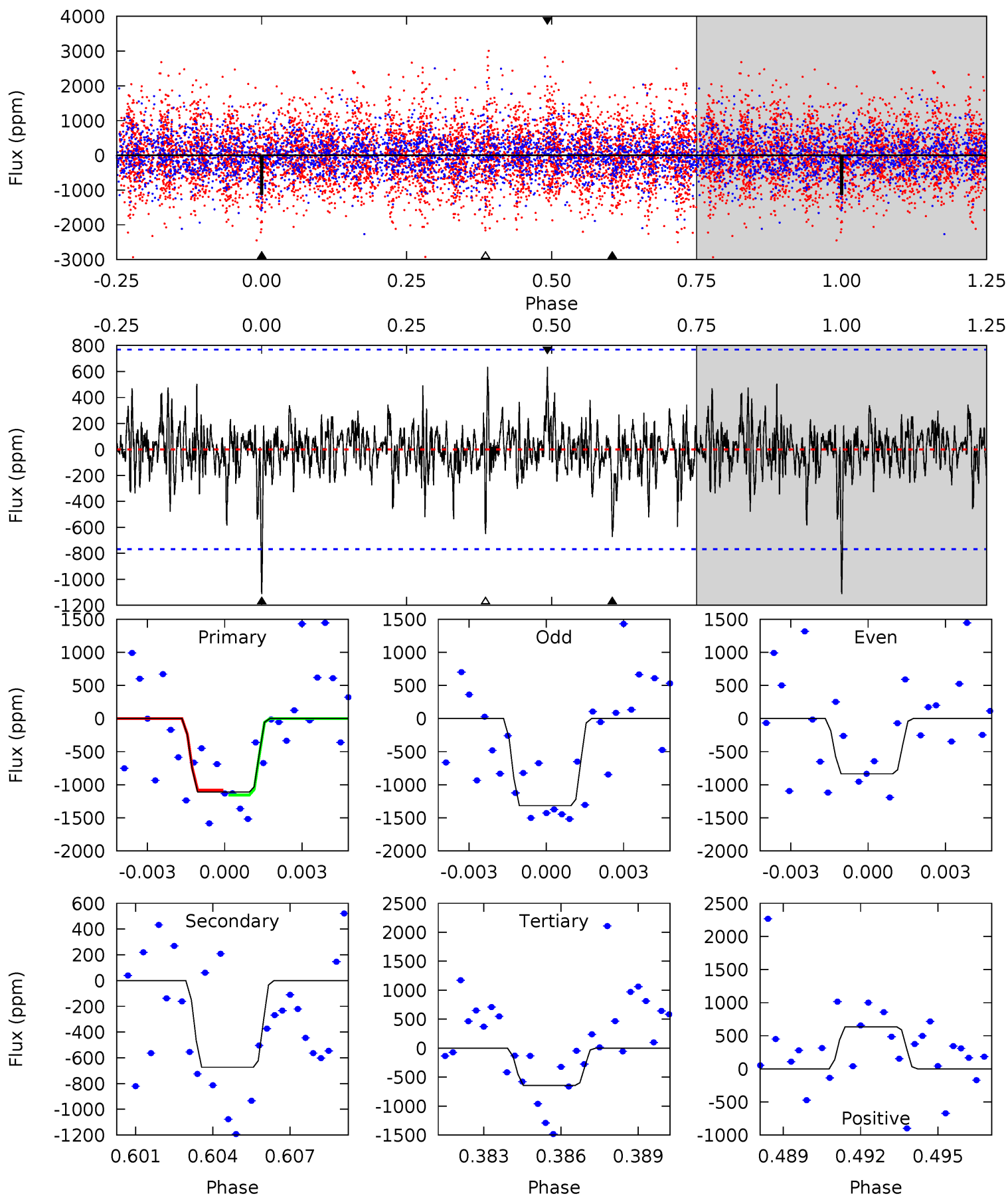
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.04	13.2	5.86	6.33	5.16	2.82	1.61	2.19	1.71	7.37	6.90	0.86	1.16	0.32	0.44



# Alt Model-Shift Uniqueness Test

006954721-02, P = 50.593223 Days, E = 99.036733 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
7.61	4.60	4.41	4.35	5.25	2.97	1.12	3.19	3.26	0.19	0.26	1.67	0.93	0.36	0.25





### Stellar Parameters For KIC 006954721

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3342^{+109}_{-89}$	$5.011^{+0.103}_{-0.115}$	$0.020^{+0.250}_{-0.250}$	$0.265^{+0.091}_{-0.074}$	$0.264^{+0.110}_{-0.090}$	$19.960^{+15.380}_{-8.650}$
	+3%/-3%	+2%/-2%	+1250%/-1250%	+34%/-28%	+42%/-34%	+77%/-43%
Source	PHO54	PHO54	PHO54	DSEP		

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

### Secondary Eclipse Parameters for KIC 006954721-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	-1579±119	$1.05^{+0.30}_{-0.26}$	$259^{+16}_{-16}$	$3463^{+290}_{-215}$	$23797^{+15112}_{-8790}$
Alt.	-673±146	$1.00^{+0.33}_{-0.28}$	$258^{+16}_{-14}$	$3082^{+287}_{-208}$	$10839^{+8313}_{-4301}$

$T_{\text{max}}$  = 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

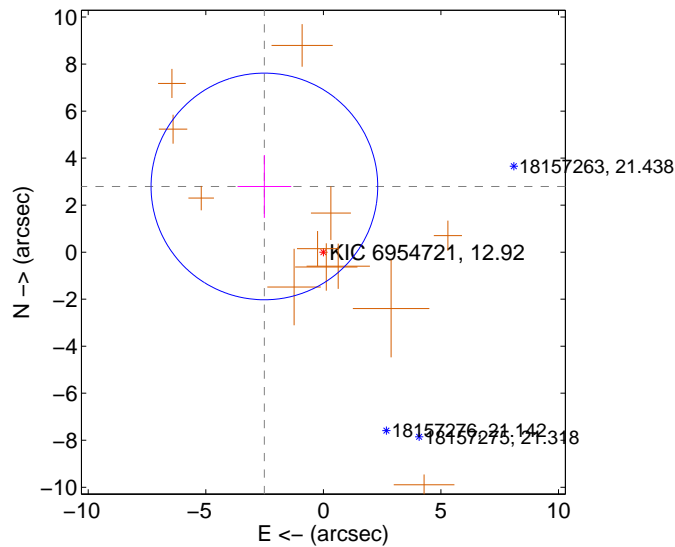
Supplemental centroid analysis for 006954721-02. Kepler magnitude: 12.92. Transit SNR 11.05

There are 0 quarters with good PRF difference image offsets

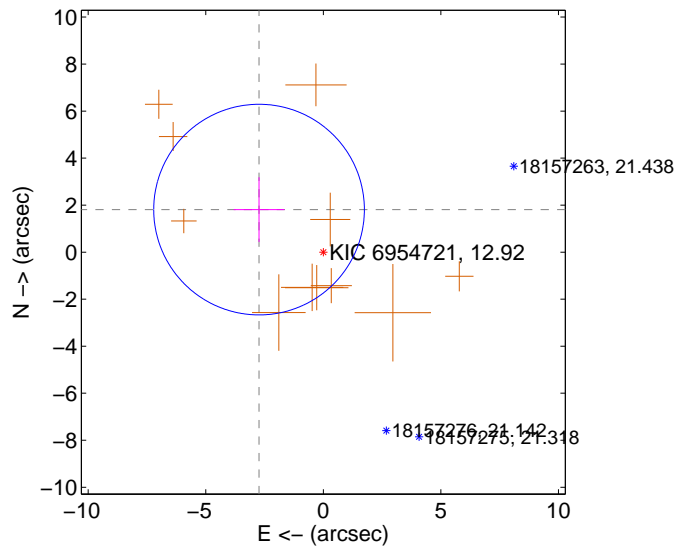
The direct PRF centroid is offset from the target star catalog position by about 1.80 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$3.756 \pm 1.607$	2.34	$2.509 \pm 1.140$	$2.795 \pm 1.338$
PRF-fit source offset from KIC position	$3.279 \pm 1.493$	2.20	$2.734 \pm 1.075$	$1.811 \pm 1.376$
photometric centroid source offset	$1.25 \pm 0.45$	2.80	$-0.78 \pm 0.45$	$-0.98 \pm 0.44$

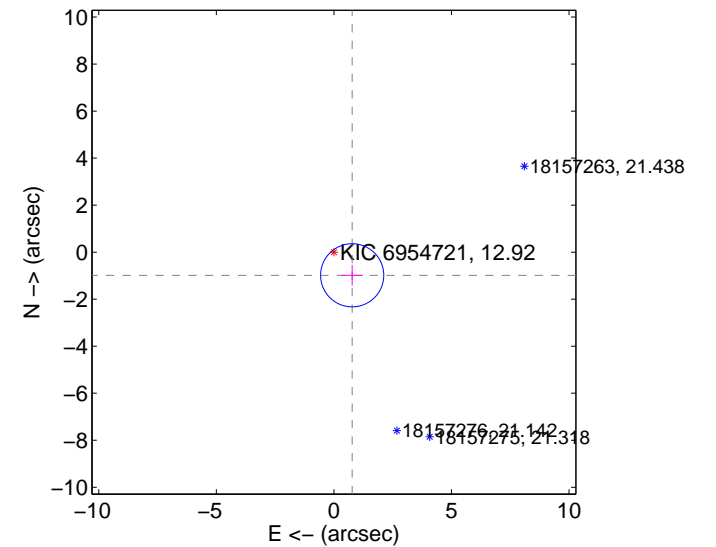
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

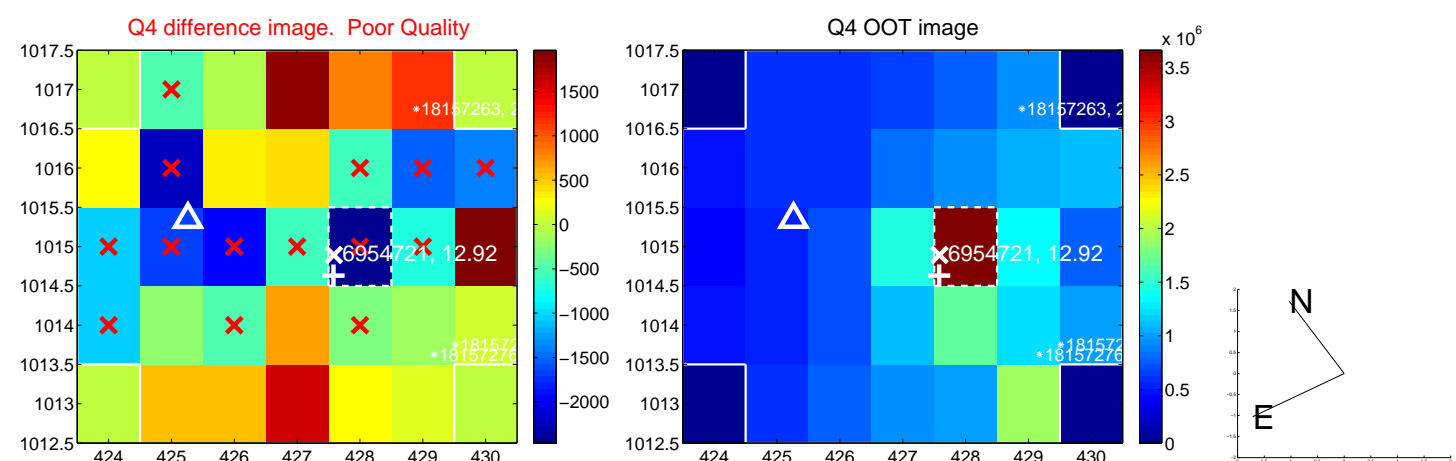
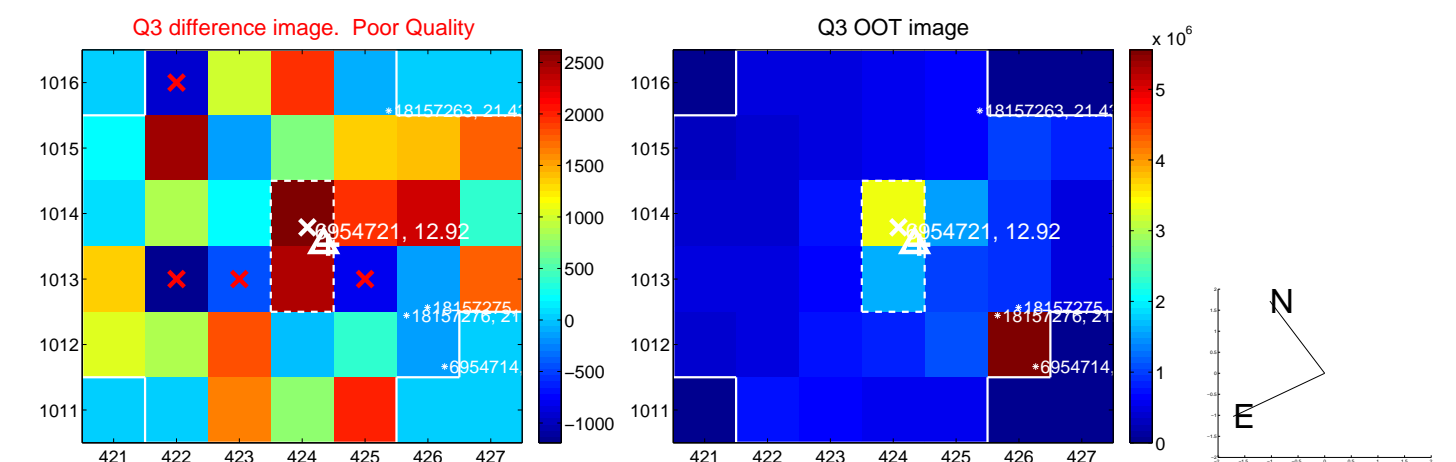
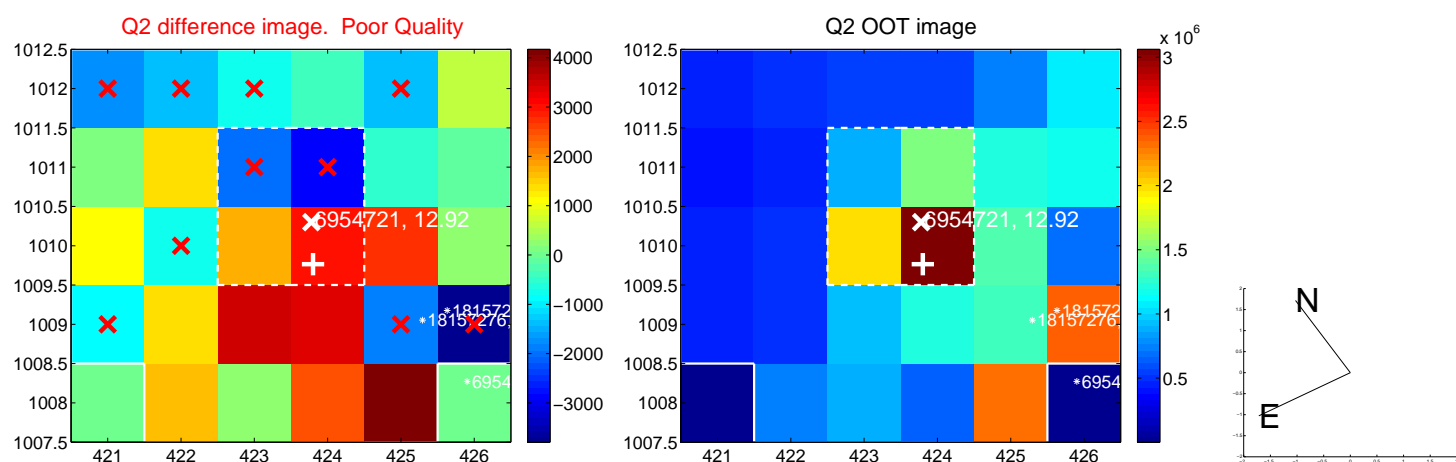
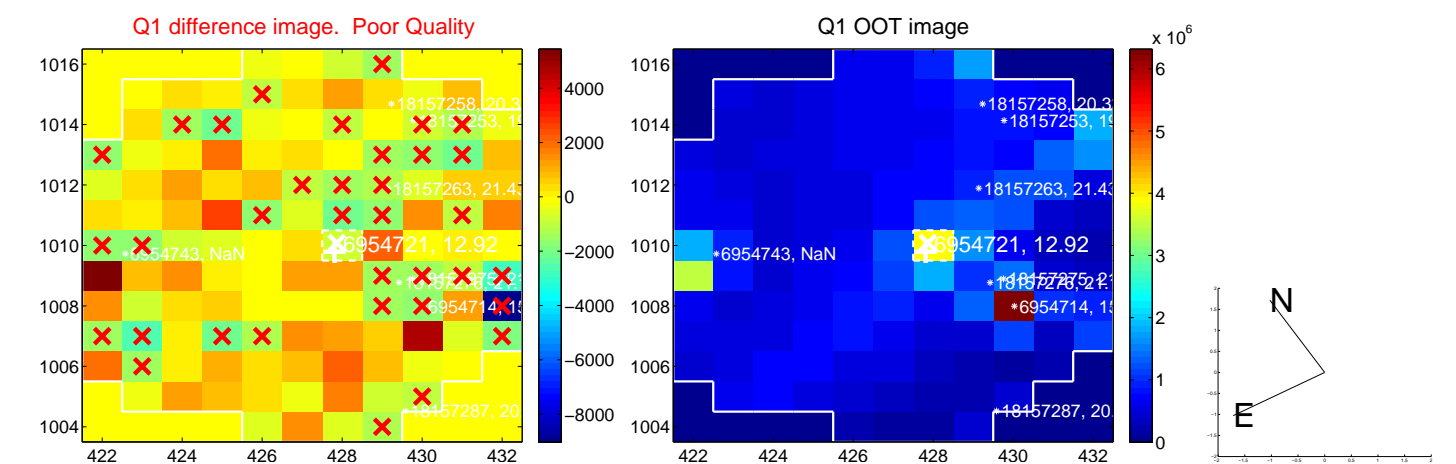


offset from photometric centroids

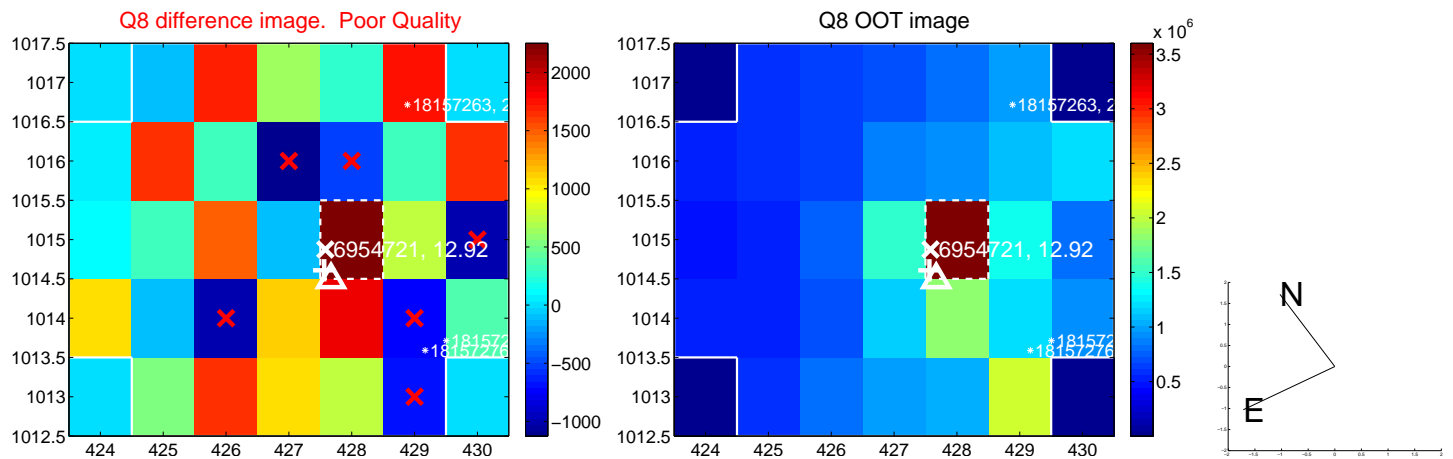
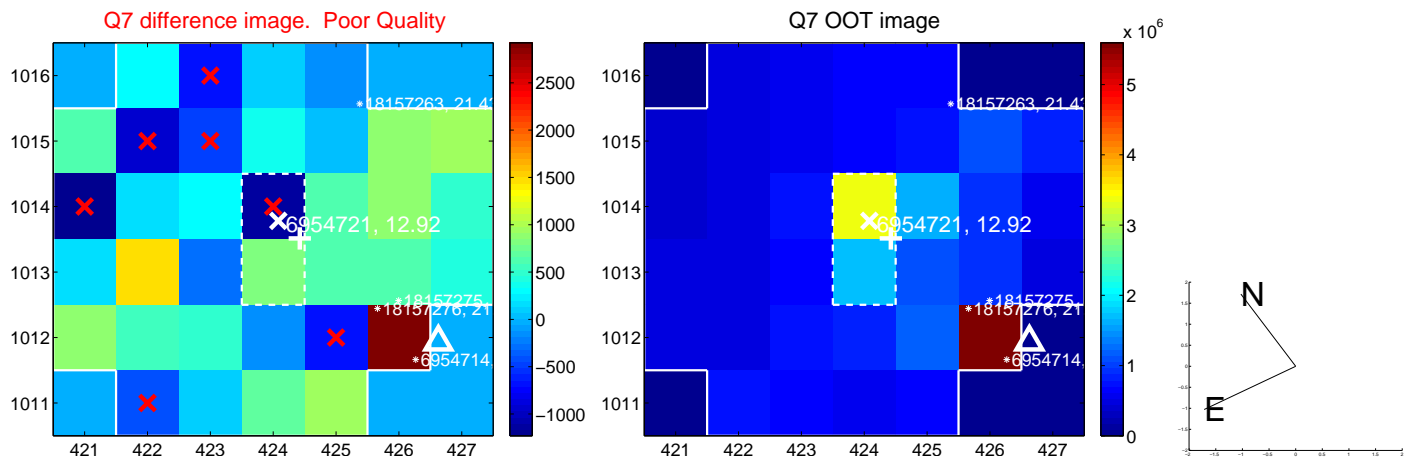
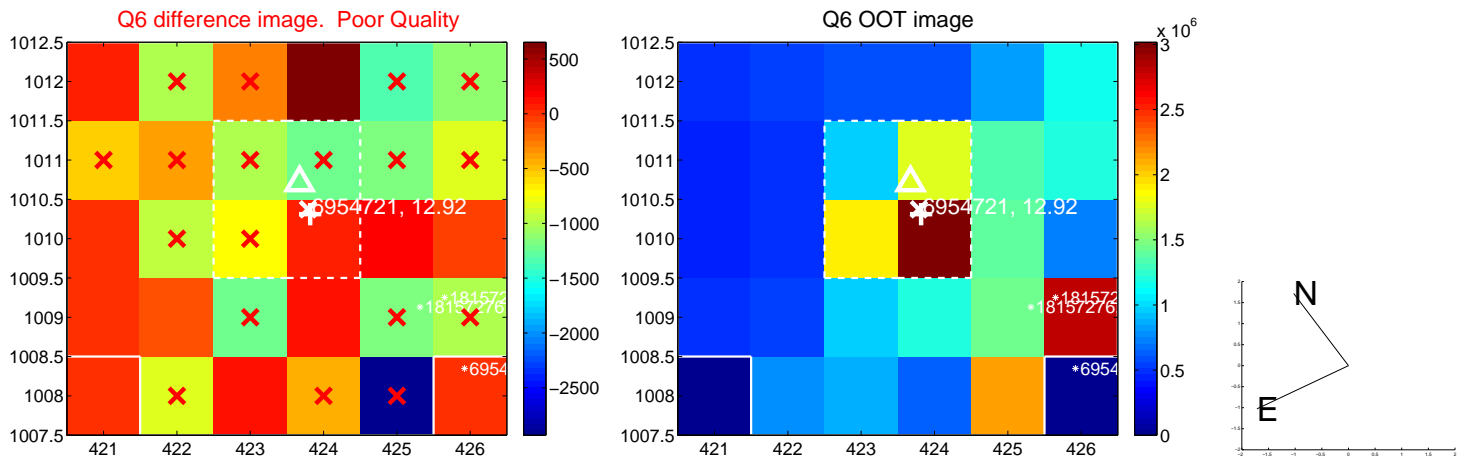
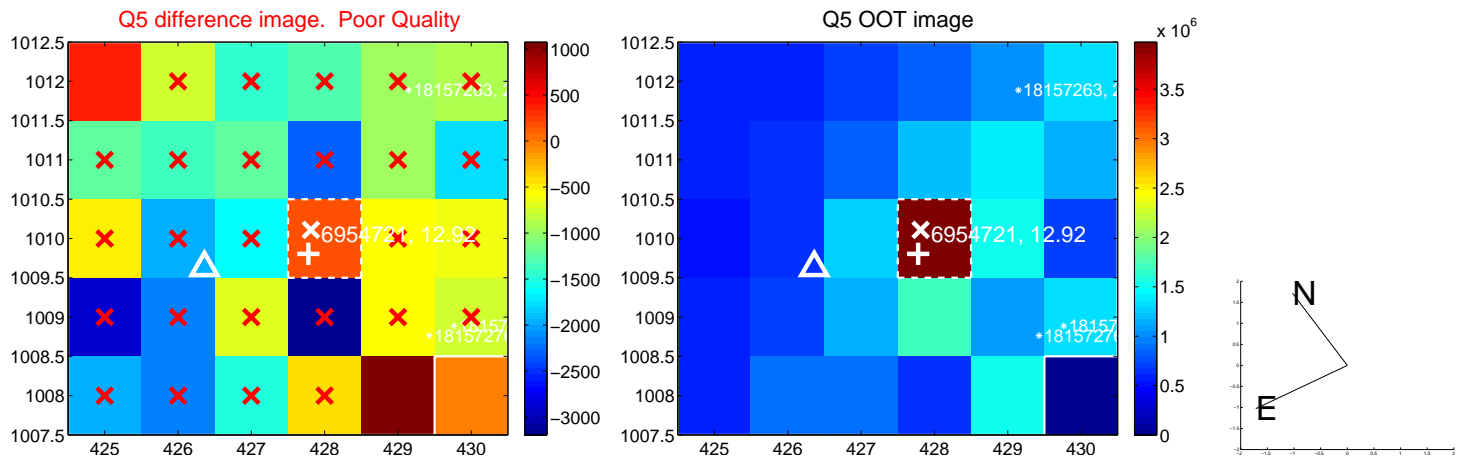


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

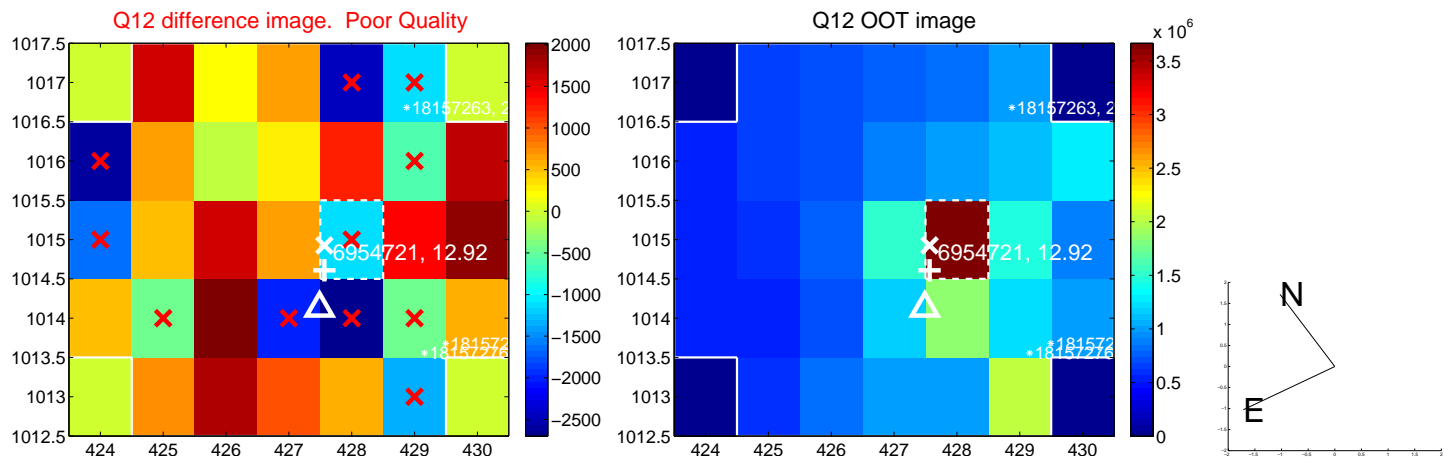
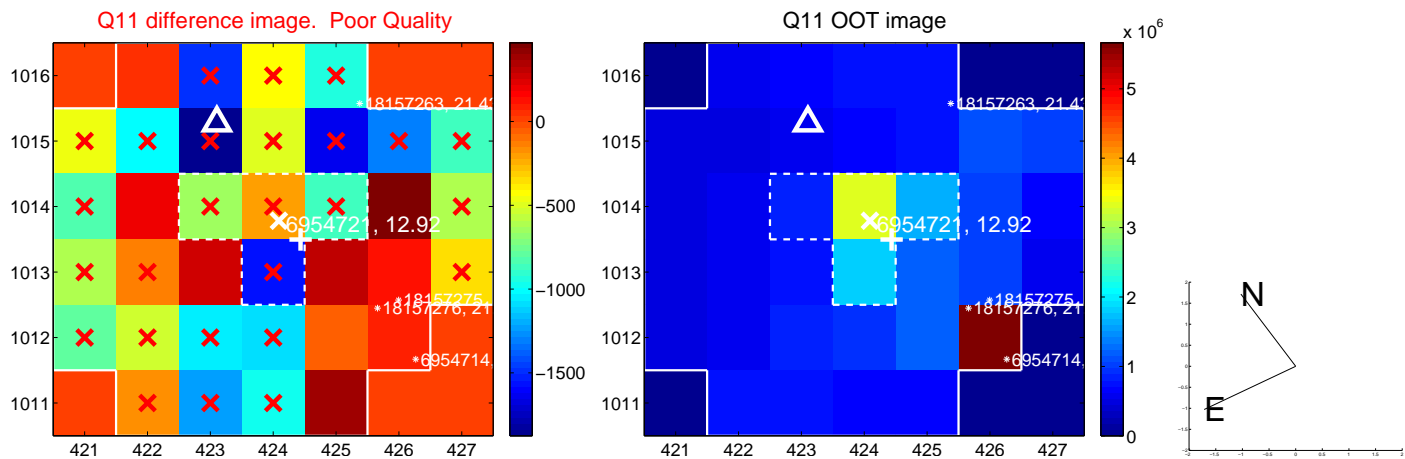
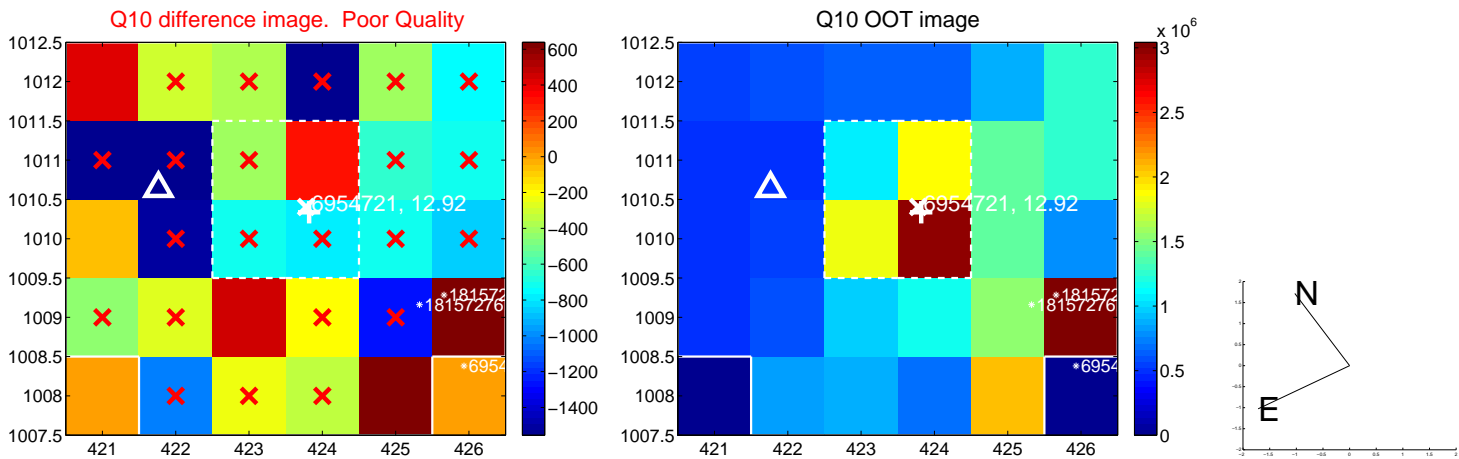
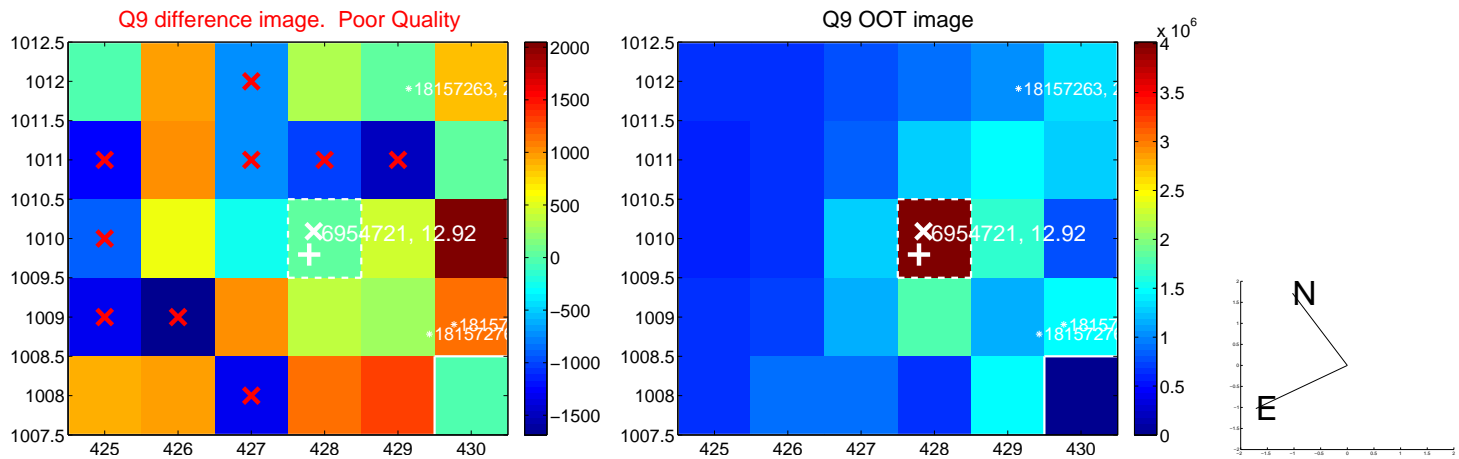
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

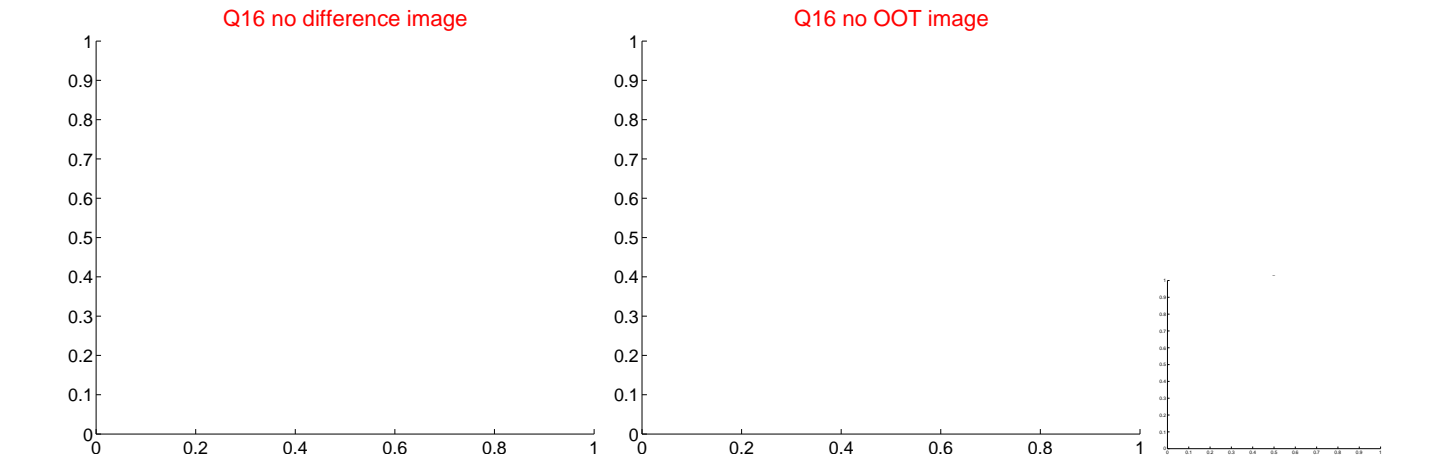
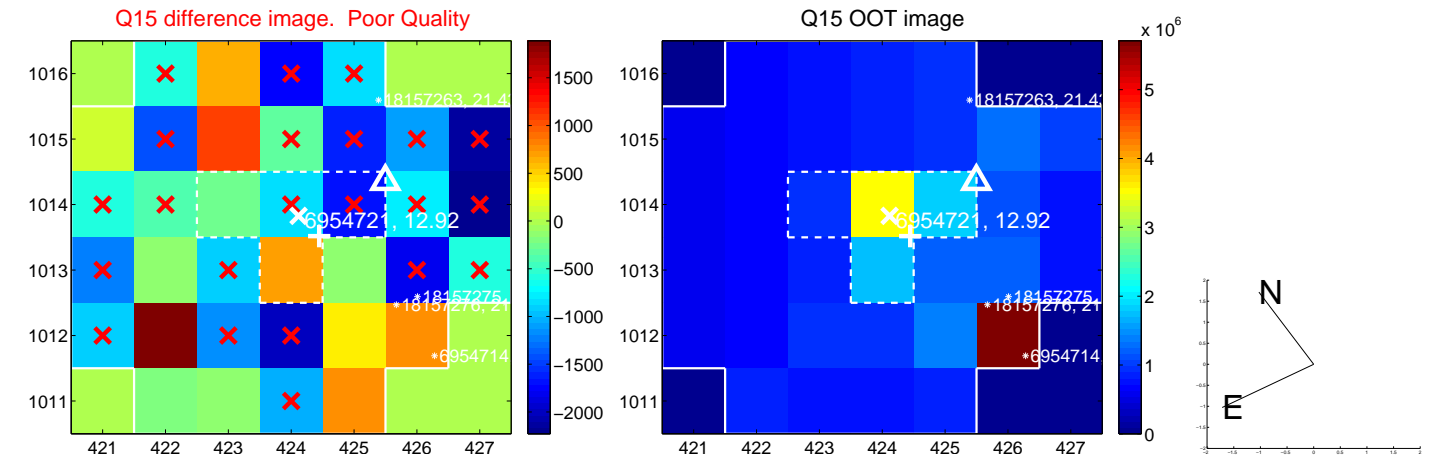
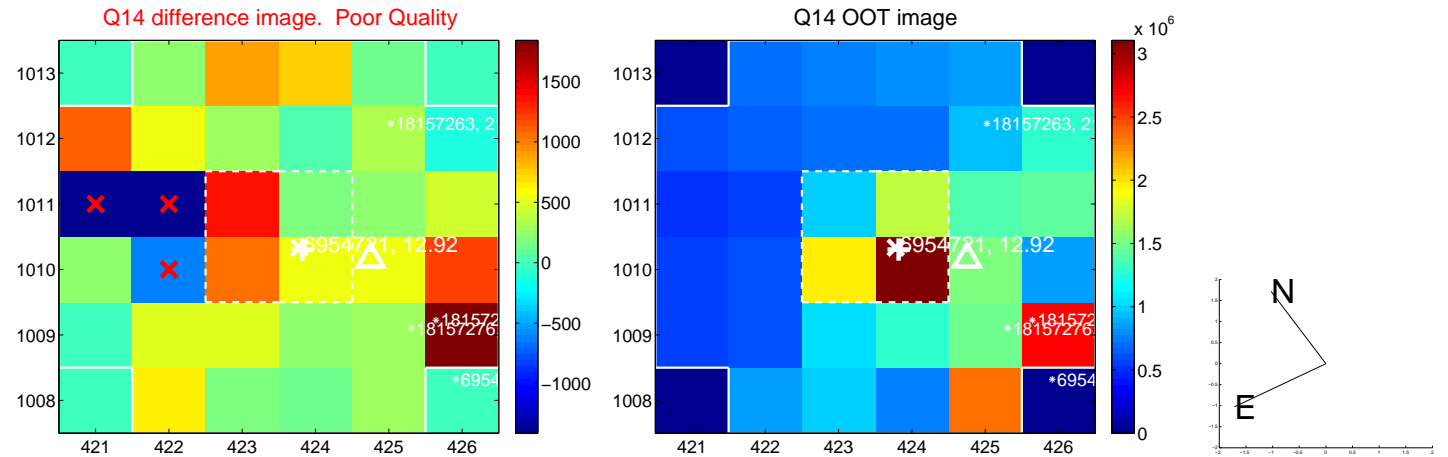
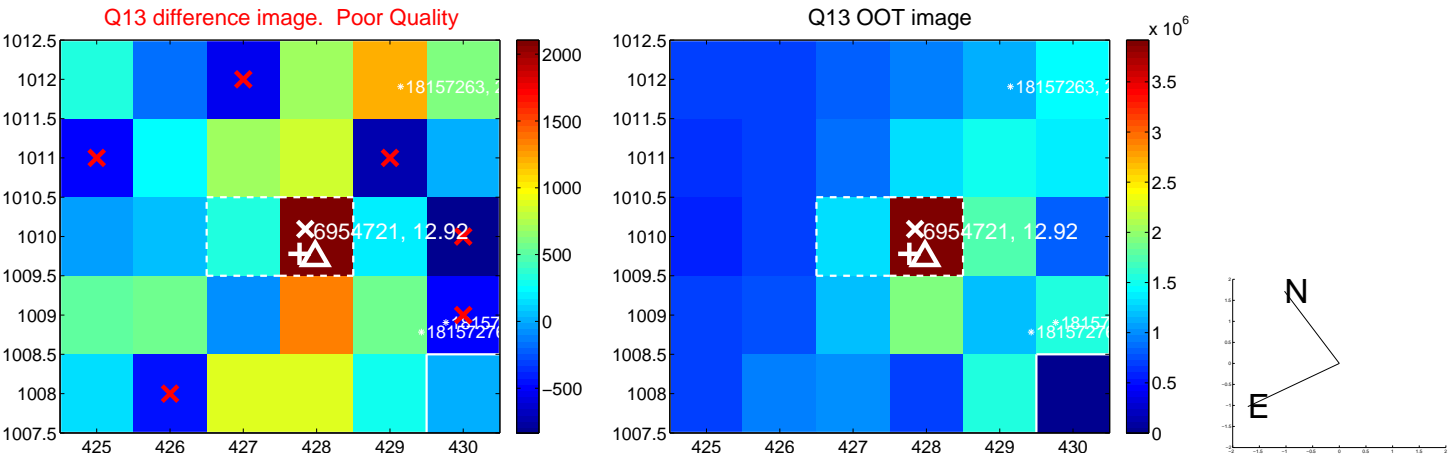


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

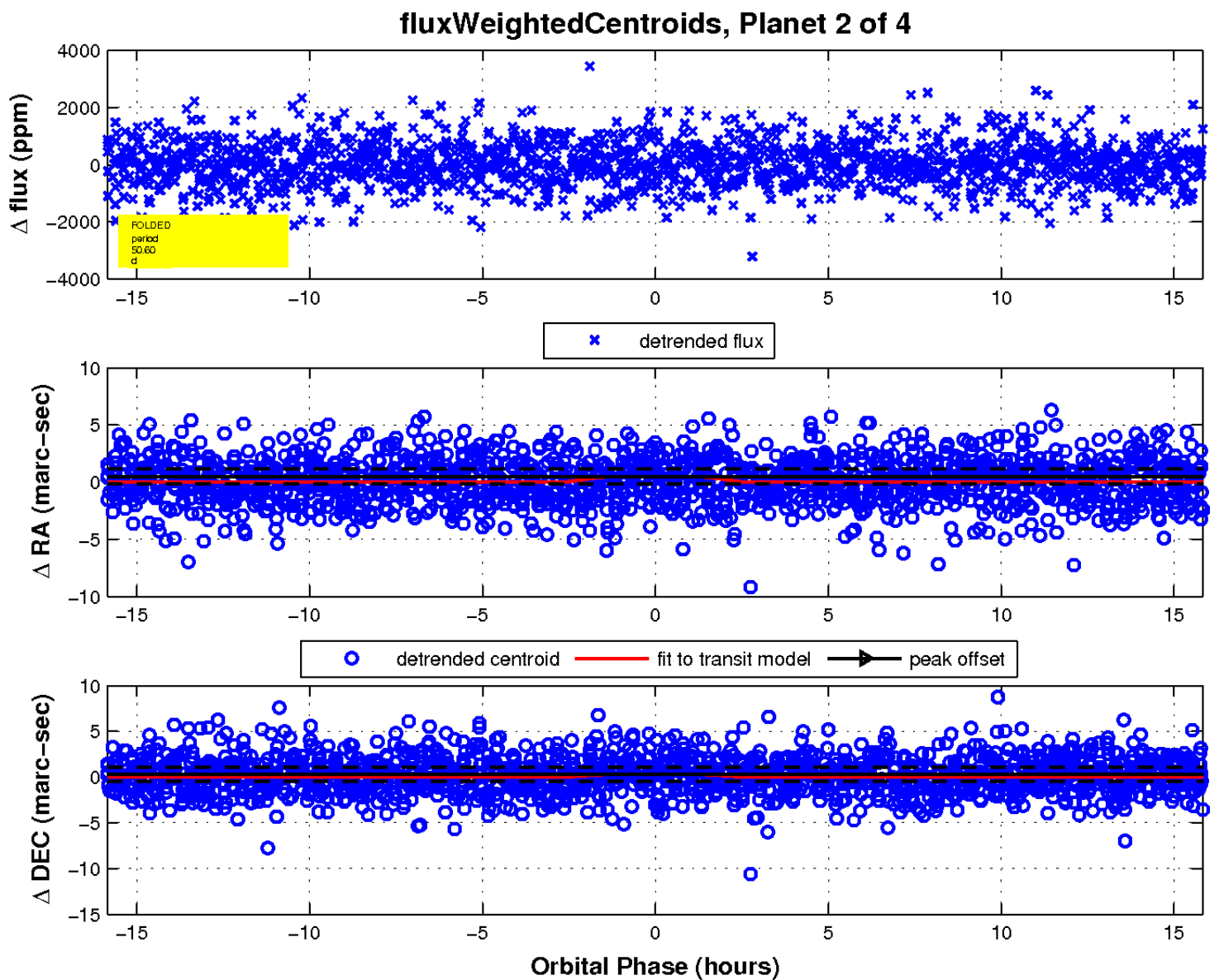
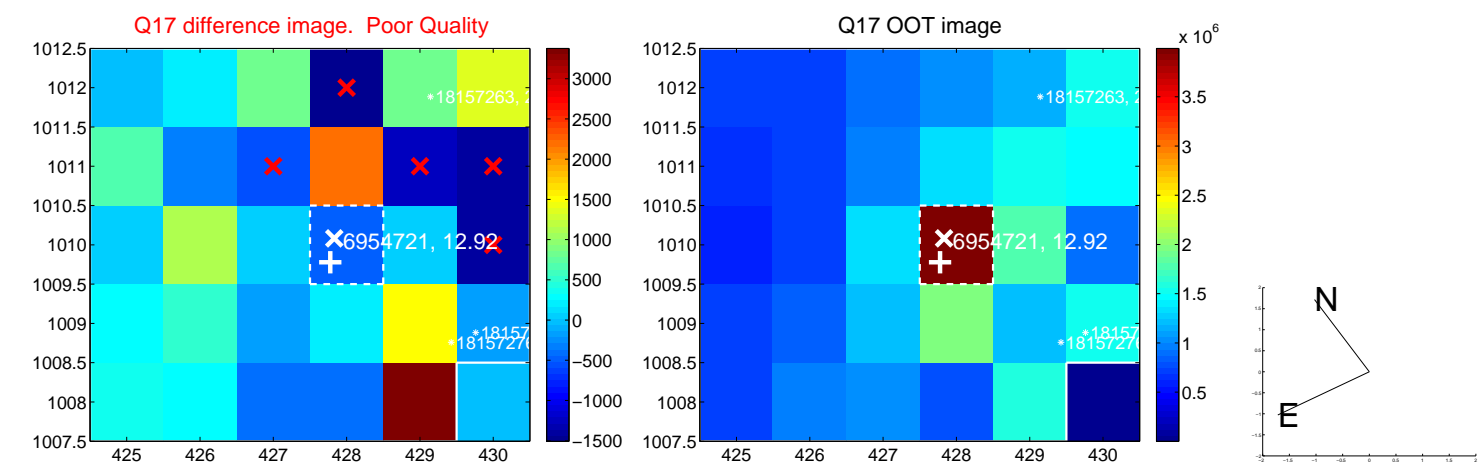




white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

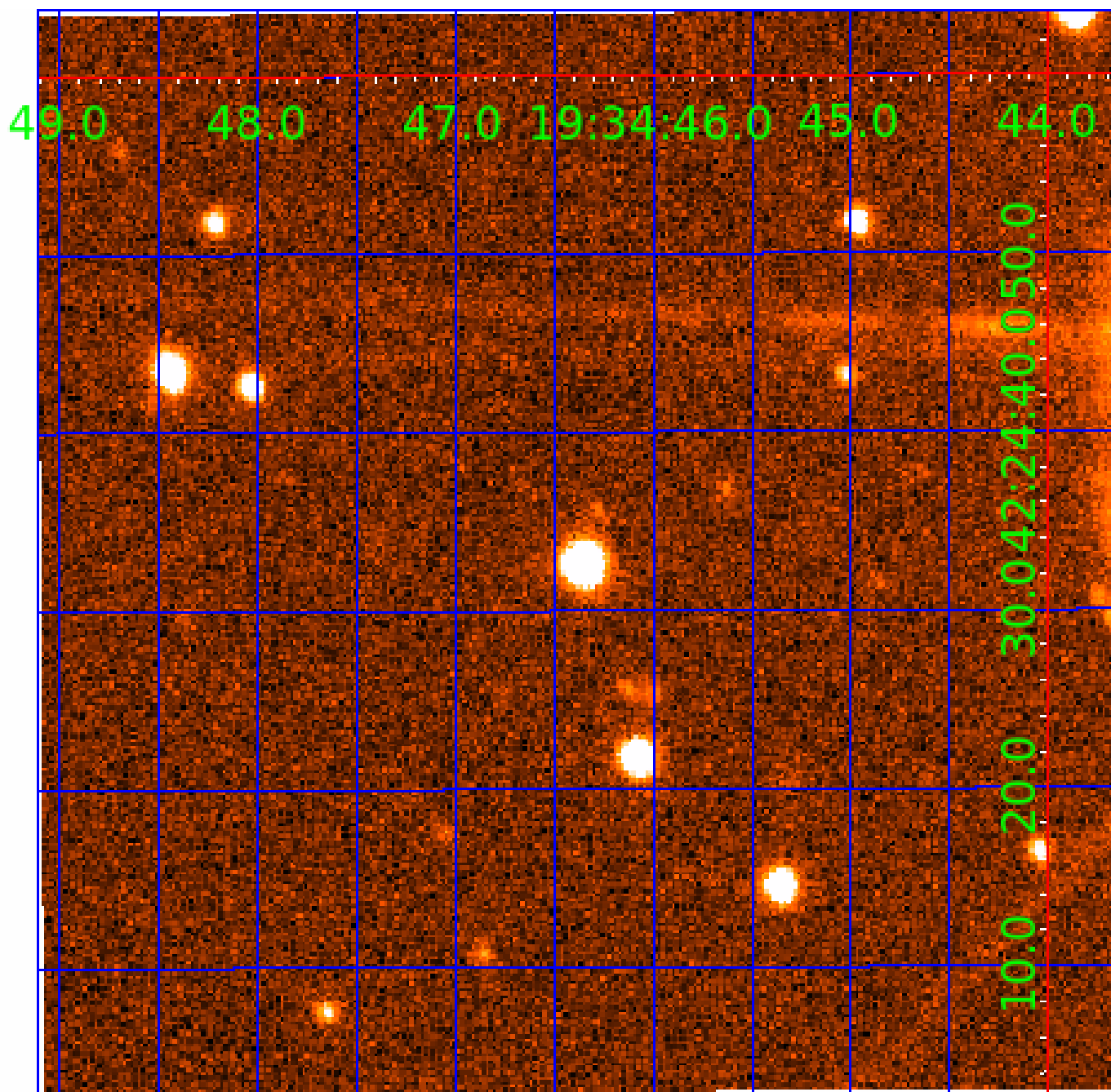


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 006954721

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006954721-01	OBS	No	2.818716	133.689089	95.2	19.989	8.7	10.9	0.27	3342	0.27	12.54
006954721-02	OBS	No	50.595035	149.621793	992.8	5.284	9.8	11.1	0.27	3342	1.03	0.27
006954721-03	OBS	No	25.492035	135.144241	387.8	8.473	9.4	7.1	0.27	3342	0.56	0.67
006954721-04	OBS	No	40.517180	132.111181	462.7	21.523	24.2	8.0	0.27	3342	0.64	0.36

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006954721-01	OBS	FP	0.00	1	0	0	1	LPP_DV—CENT_KIC_POS—EPHEM_MATCH
006954721-02	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_FEW_DIFFS—HALO_GHOST
006954721-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_KIC_POS
006954721-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

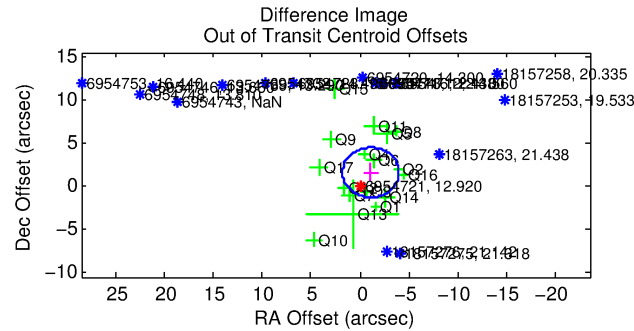
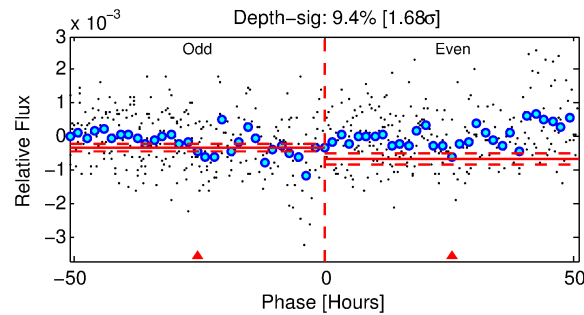
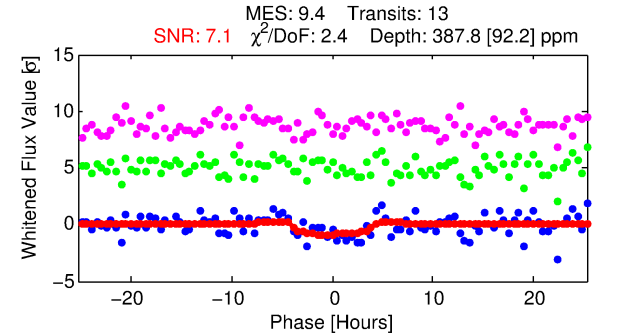
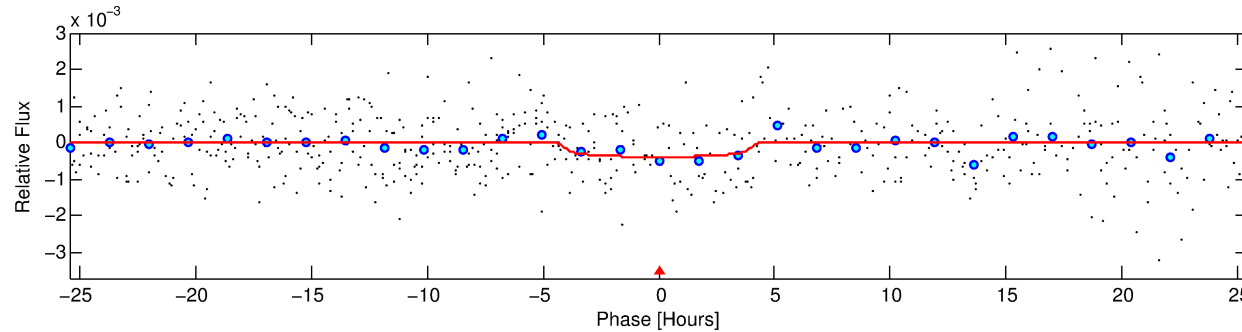
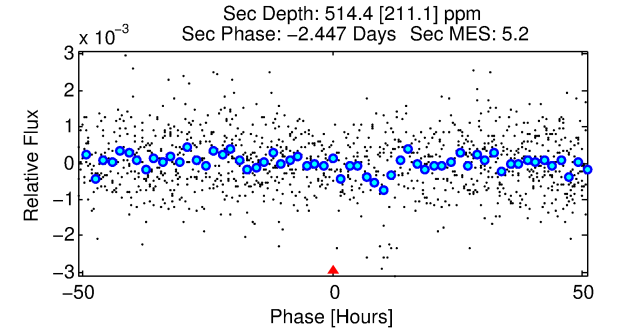
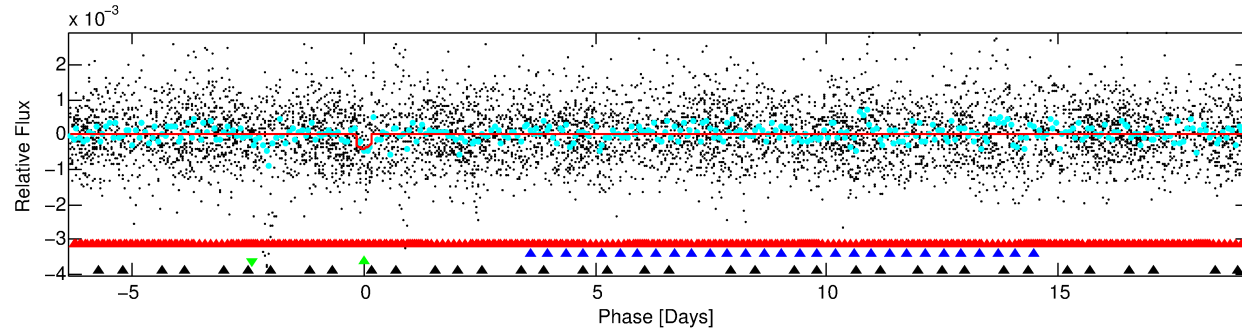
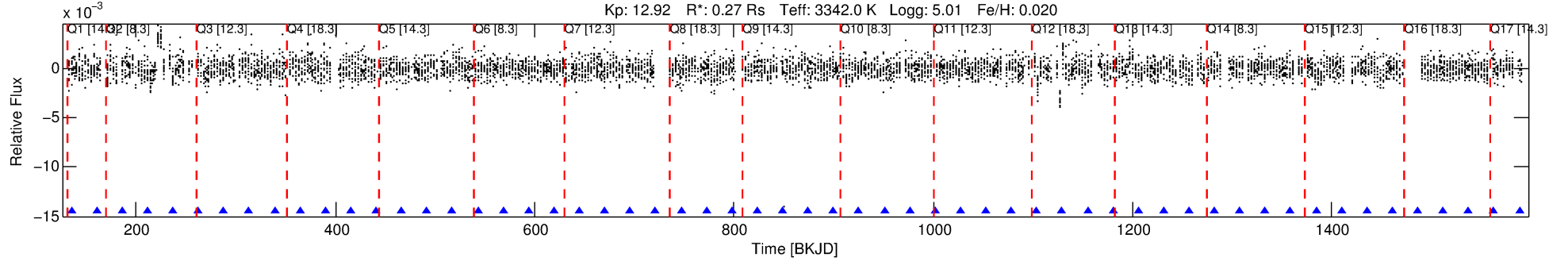
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 006954721-03

No Significant Match Found

# DV One-Page Summary

KIC: 6954721 Candidate: 3 of 4 Period: 25.492 d



## DV Fit Results:

Period = 25.49204 [0.00102] d  
Epoch = 135.1442 [0.0305] BKJD  
Rp/R\* = 0.0193 [0.0241]  
a/R\* = 16.74 [87.95]  
b = 0.71 [3.65]  
Seff = 0.67 [0.21]  
Teff = 230 [18] K  
Rp = 0.56 [0.72] Re  
a = 0.1086 [0.0266] AU  
Ag = 10710.67 [27230.46] [0.39σ]  
Teffp = 3623 [2291] K [1.48σ]

## DV Diagnostic Results:

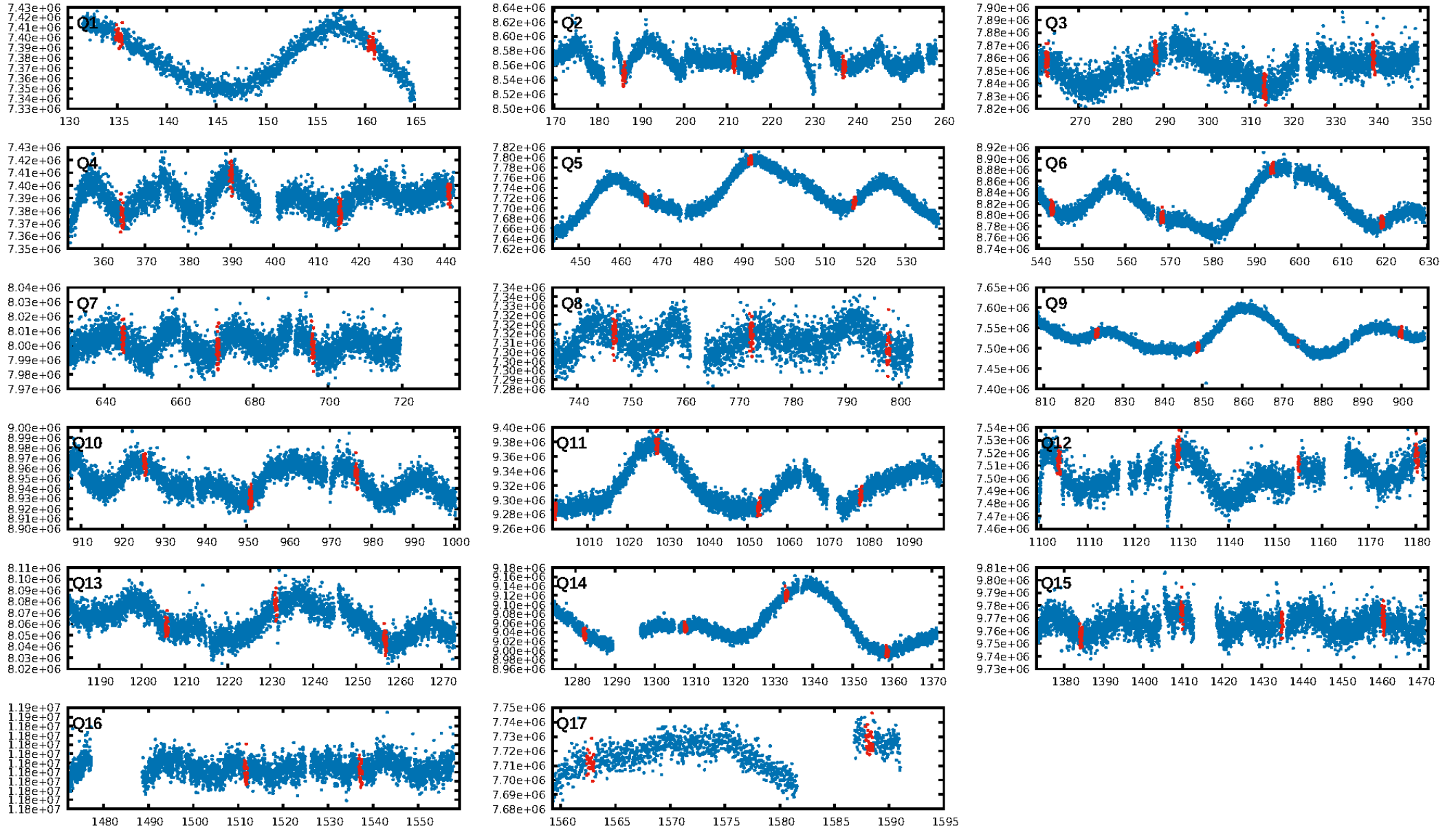
ShortPeriod-sig: 100.0% [25.06σ]  
LongPeriod-sig: 100.0% [15.59σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 99.7%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [11/11]  
GhostDiagnostic-chr: -2.46  
Centroid-sig: 89.6%  
Centroid-so: 0.593 arcsec [1.07σ]  
OotOffset-rm: 1.926 arcsec [2.01σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-rm: 0.882 arcsec [1.00σ]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.00 [0/17]  
DiffImageOverlap-fno: 0.35 [6/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 03-Feb-2016 07:58:27 Z

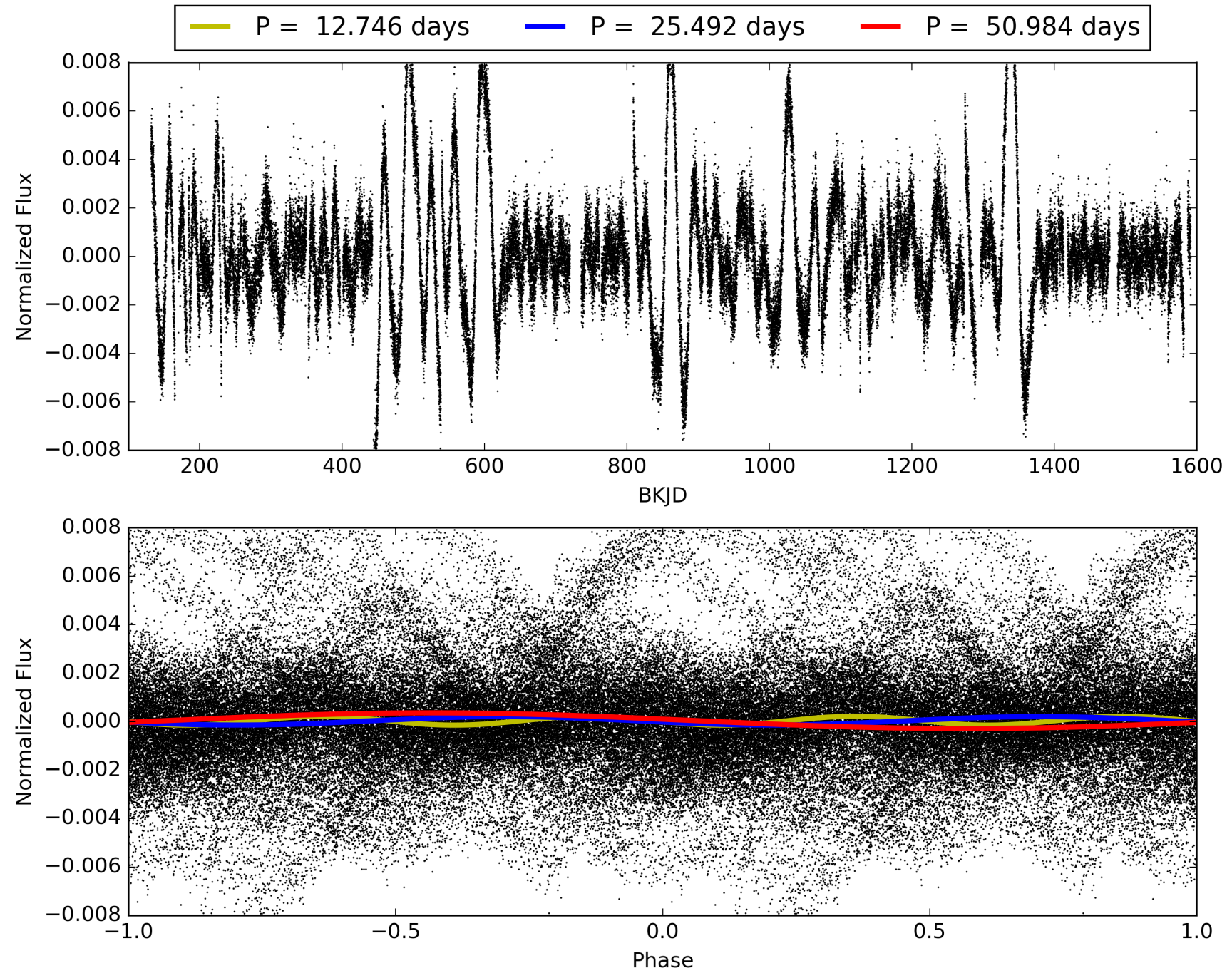
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 006954721-03, PDC Light Curves

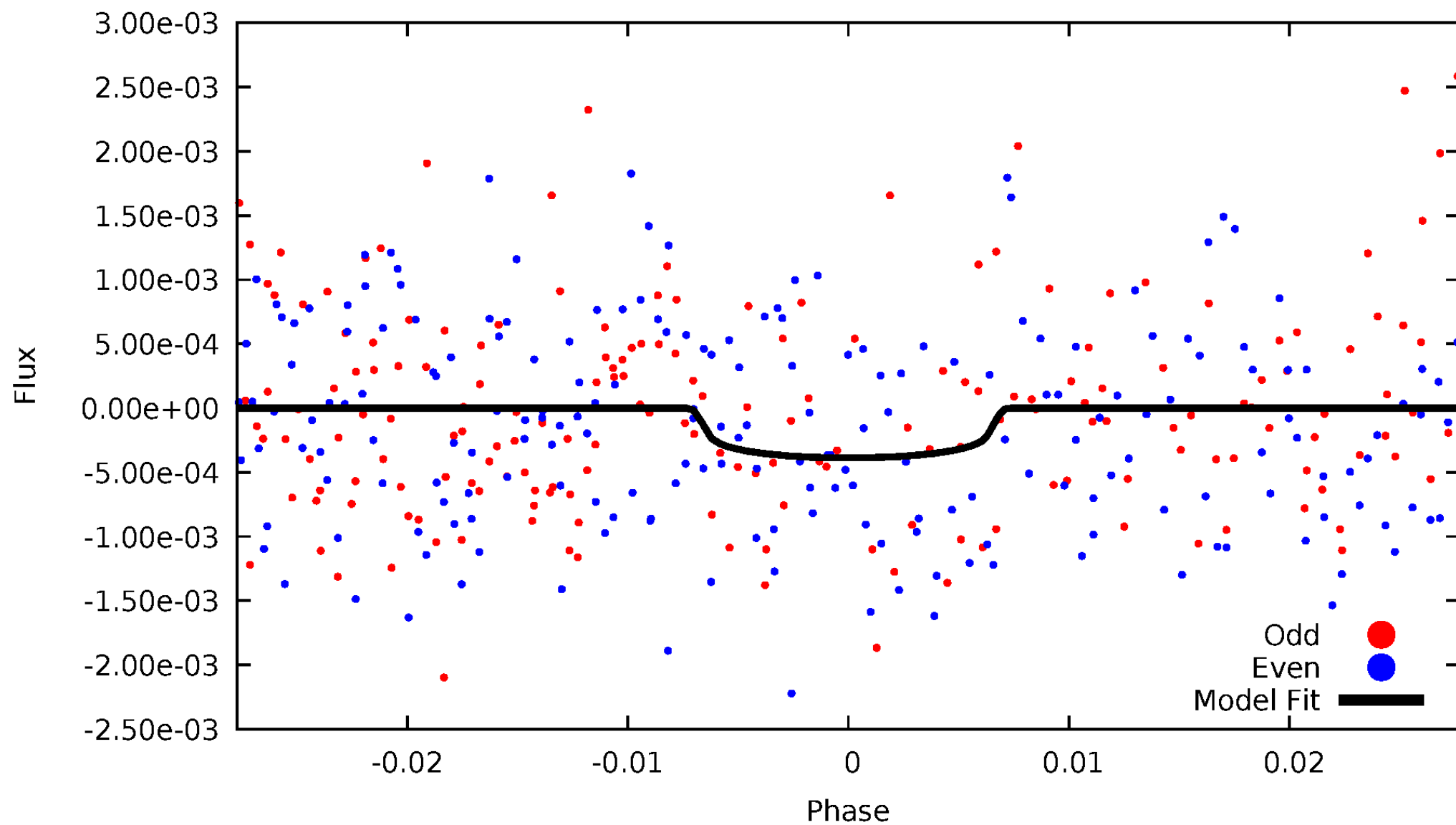


TCE 006954721-03



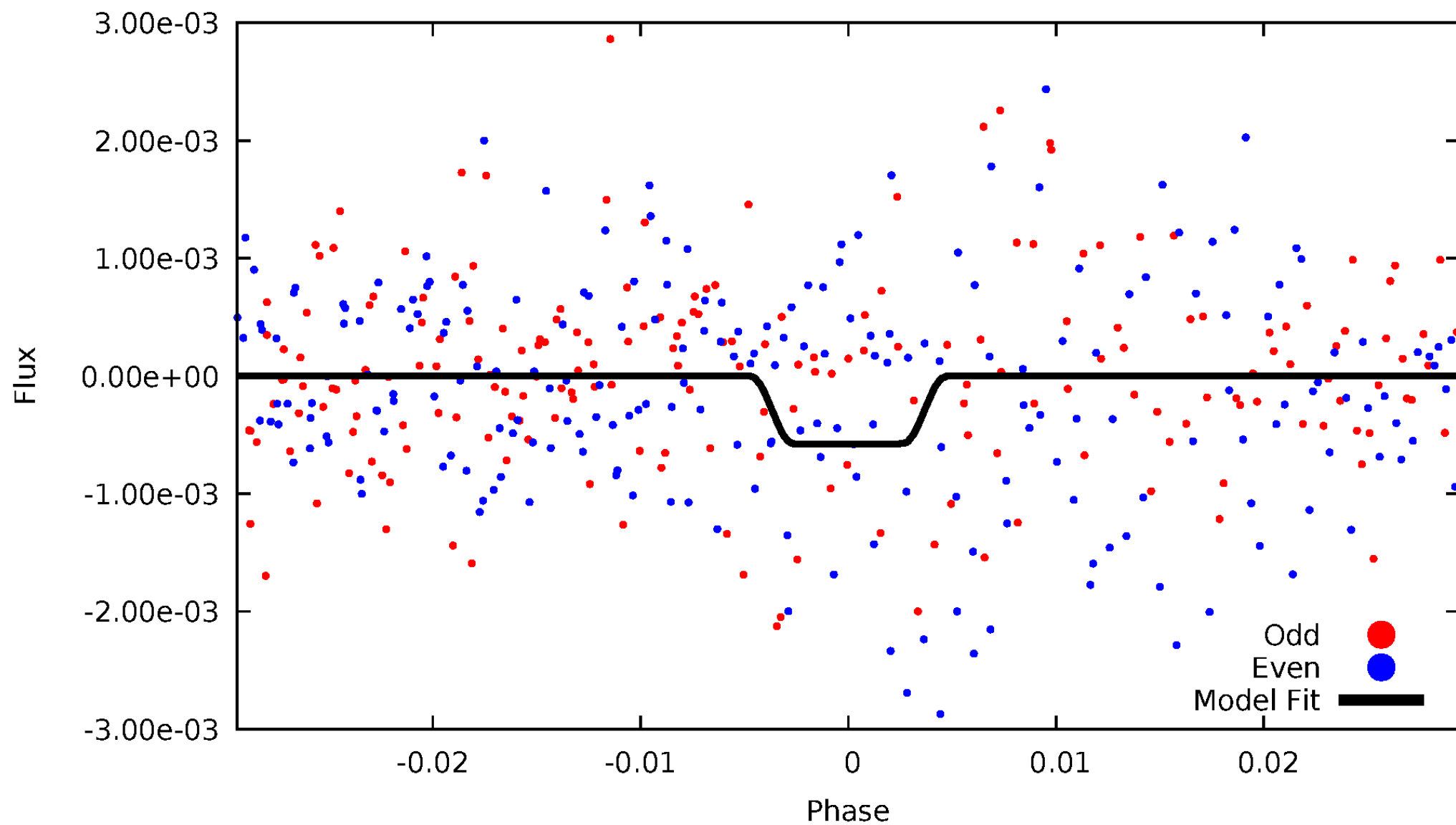
# DV Odd/Even

TCE 006954721-03



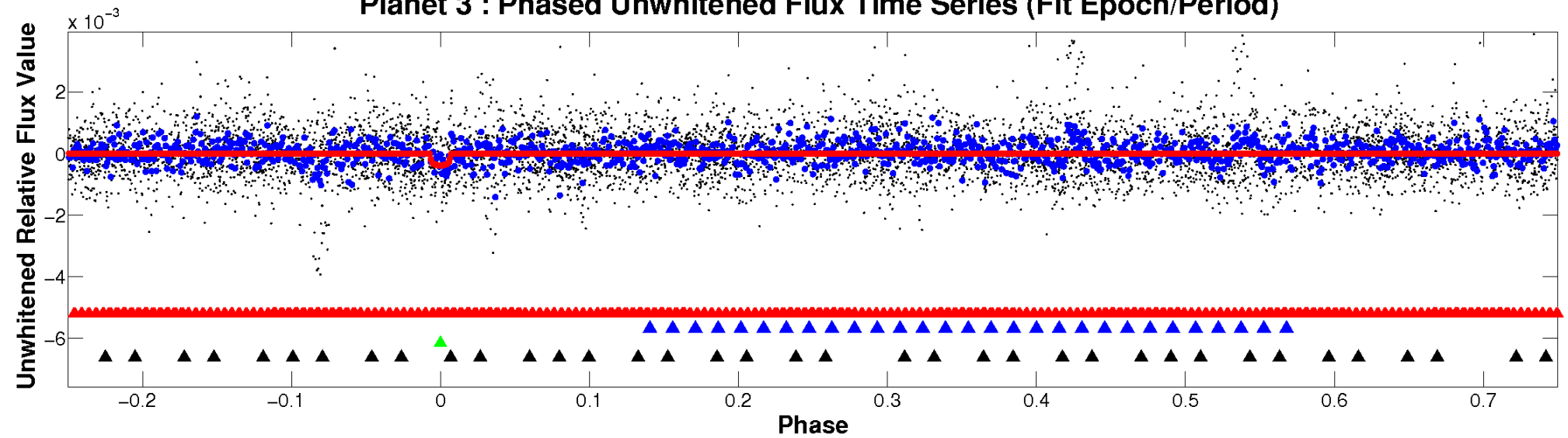
# ALT Odd/Even

TCE 006954721-03

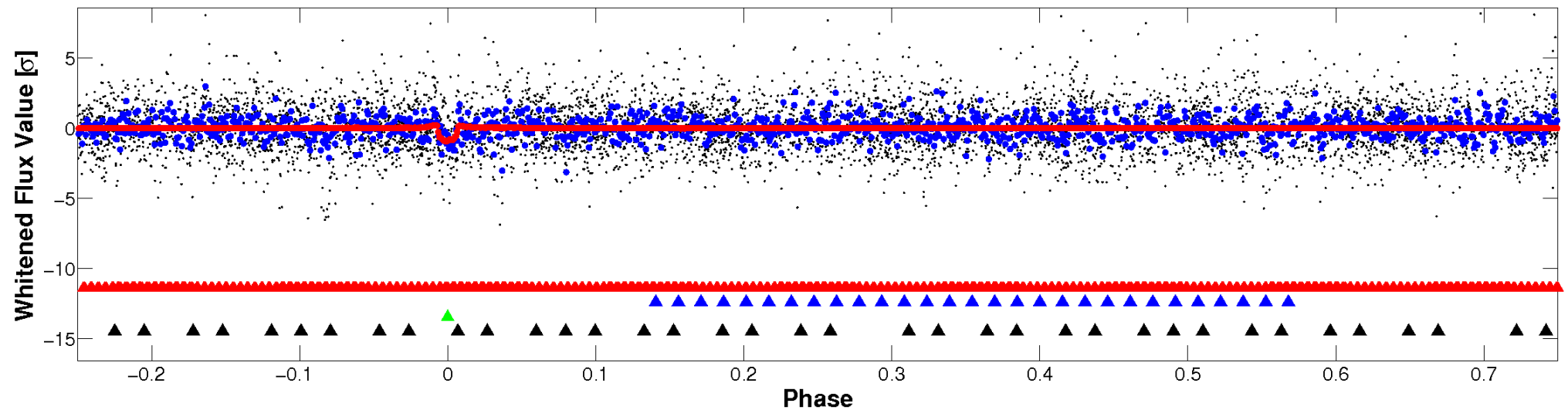


# Non-Whitened Vs. Whitened Light Curve

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

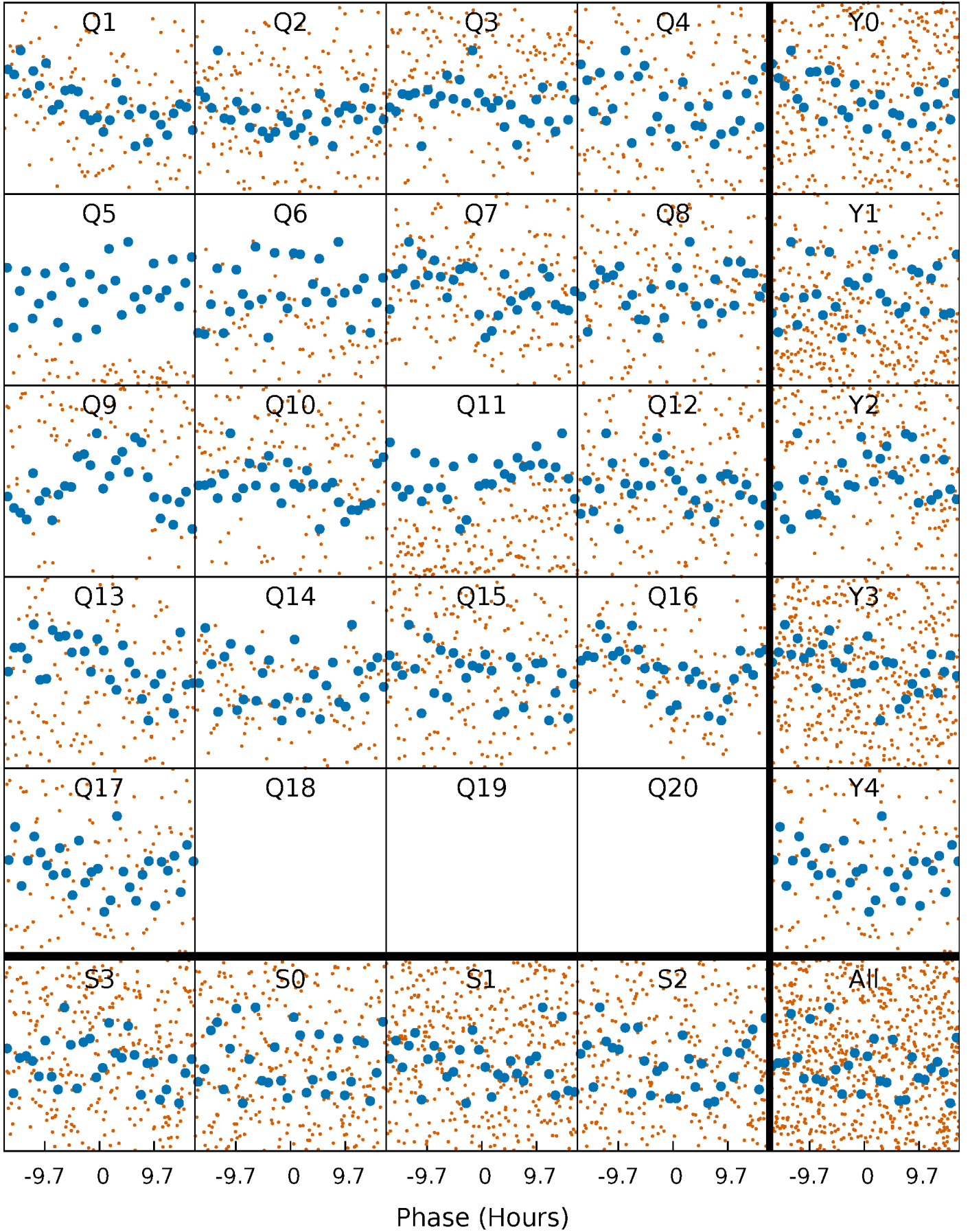


## Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

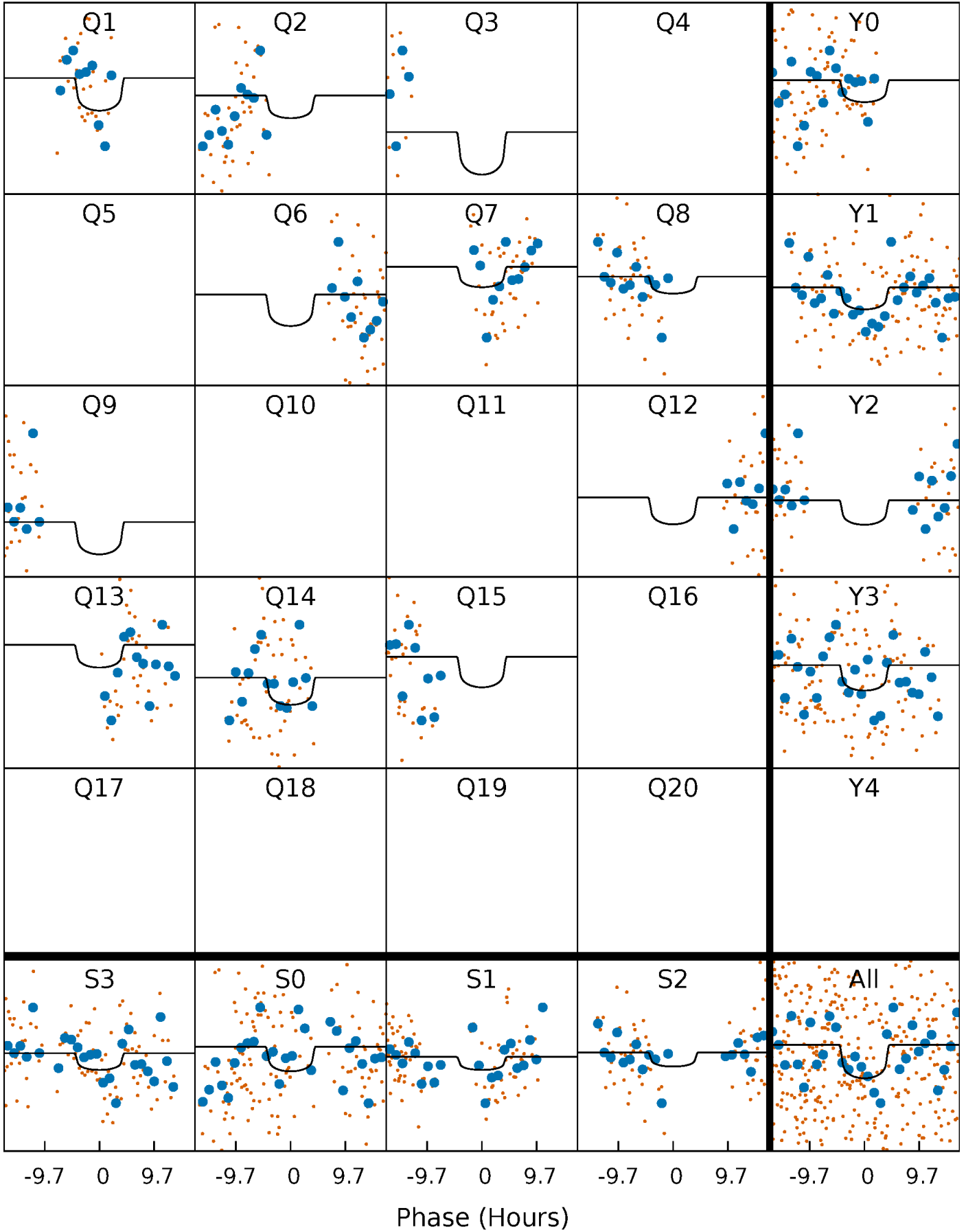
TCE 006954721-03   P= 25.492035 Days    $T_0=135.144240$  (BKJD)





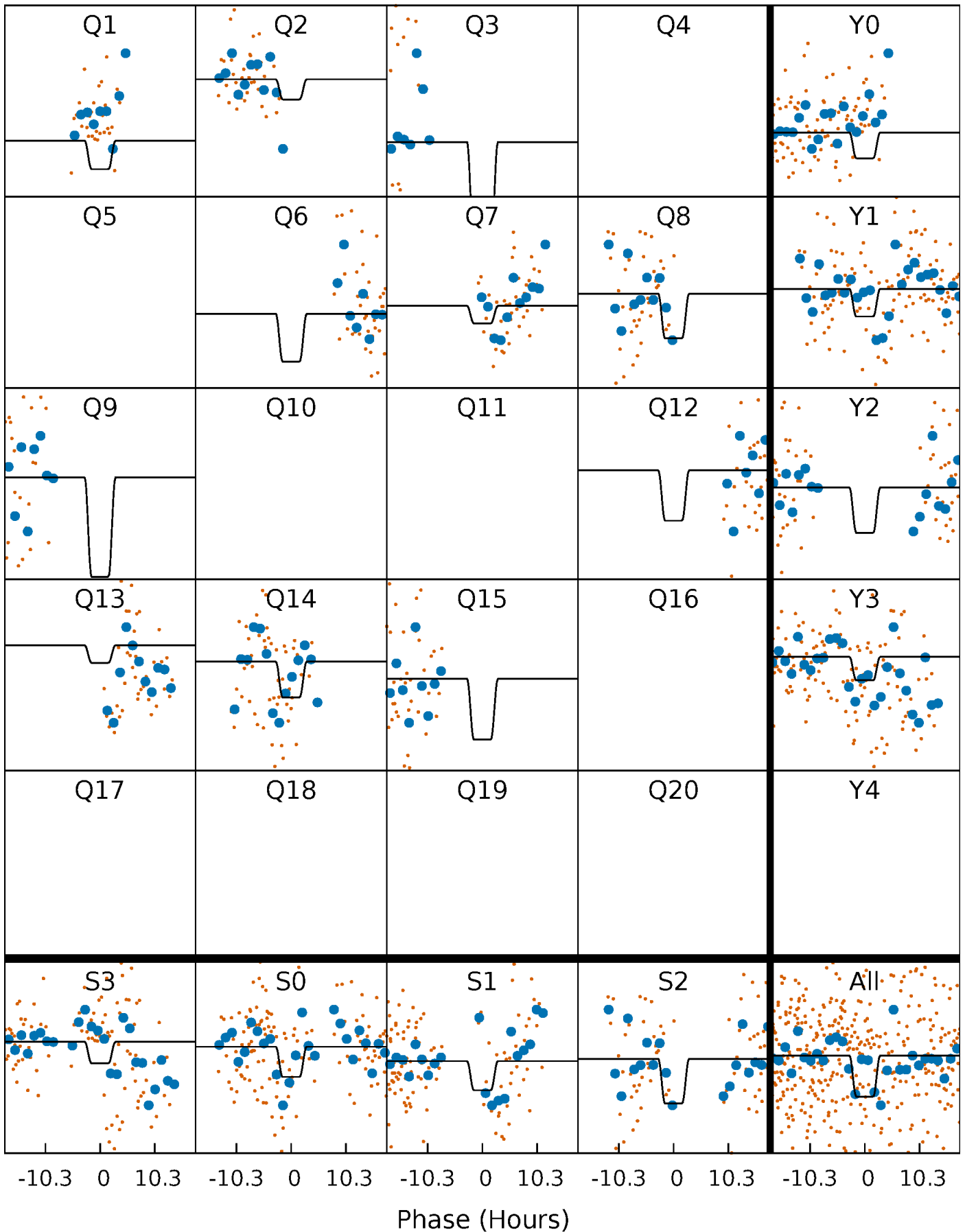
# DV Quarter-Phased Transit Curves

TCE 006954721-03   P= 25.492035 Days    $T_0=135.144240$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

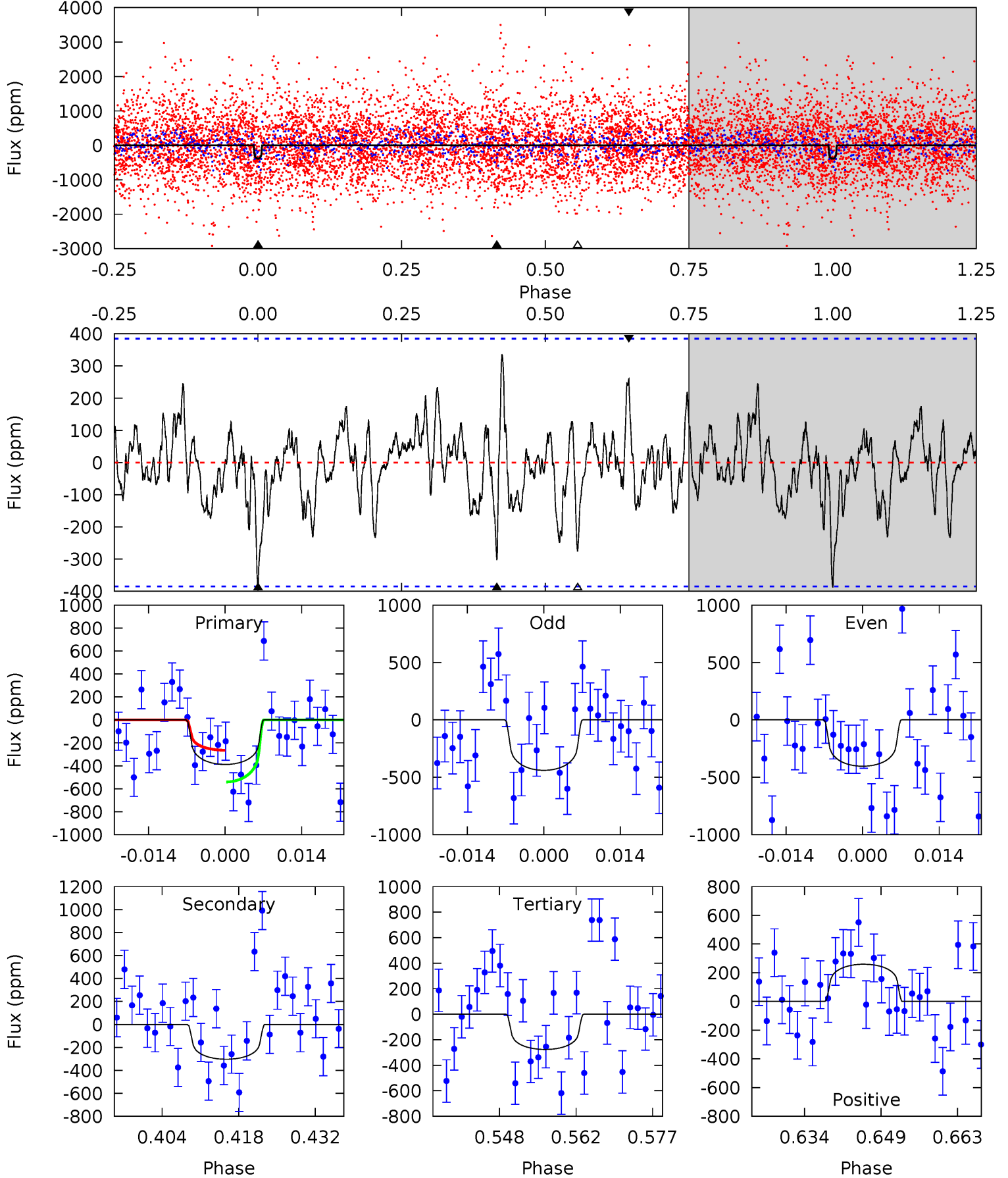
TCE 006954721-03   P= 25.493733 Days    $T_0=135.055858$  (BKJD)



# DV Model-Shift Uniqueness Test

006954721-03, P = 25.492035 Days, E = 109.652205 Days

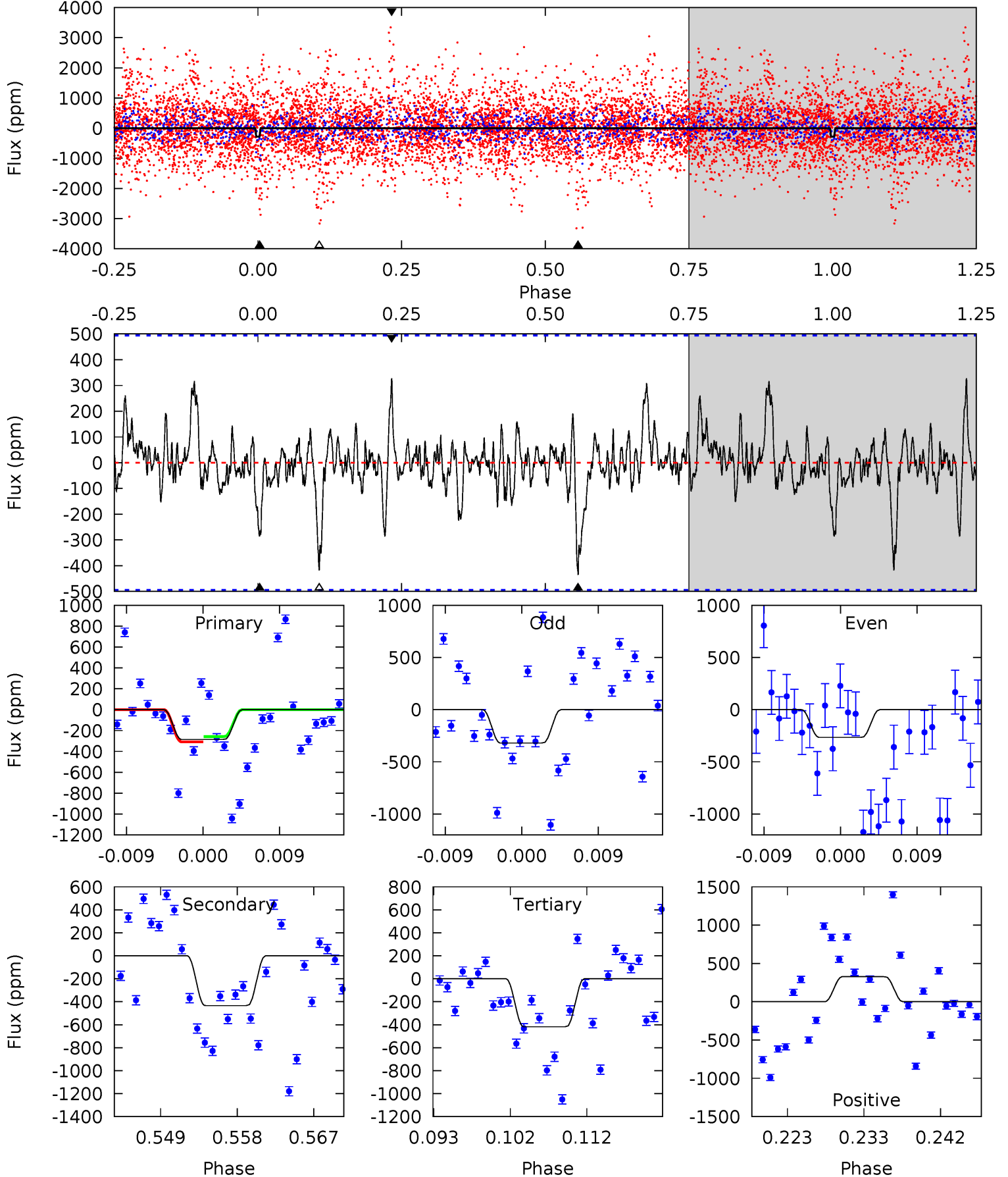
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.00	3.90	3.56	3.34	4.96	2.45	1.21	1.44	1.66	0.35	0.56	0.22	1.82	0.46	1.78



# Alt Model-Shift Uniqueness Test

006954721-03, P = 25.493733 Days, E = 109.562125 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
2.92	4.42	4.27	3.34	5.04	2.60	0.90	-1.35	-0.42	0.15	1.08	0.27	1.95	0.43	0.26



### Stellar Parameters For KIC 006954721

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3342^{+109}_{-89}$	$5.011^{+0.103}_{-0.115}$	$0.020^{+0.250}_{-0.250}$	$0.265^{+0.091}_{-0.074}$	$0.264^{+0.110}_{-0.090}$	$19.960^{+15.380}_{-8.650}$
	+3%/-3%	+2%/-2%	+1250%/-1250%	+34%/-28%	+42%/-34%	+77%/-43%
Source	PHO54	PHO54	PHO54	DSEP		

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

### Secondary Eclipse Parameters for KIC 006954721-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-303 \pm 78$	$0.76^{+0.70}_{-0.51}$	$327^{+19}_{-20}$	$2971^{+1282}_{-464}$	$3292^{+26855}_{-2403}$
Alt.	$-434 \pm 98$	$0.84^{+0.68}_{-0.51}$	$323^{+21}_{-17}$	$3048^{+1064}_{-444}$	$3919^{+23244}_{-2674}$

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

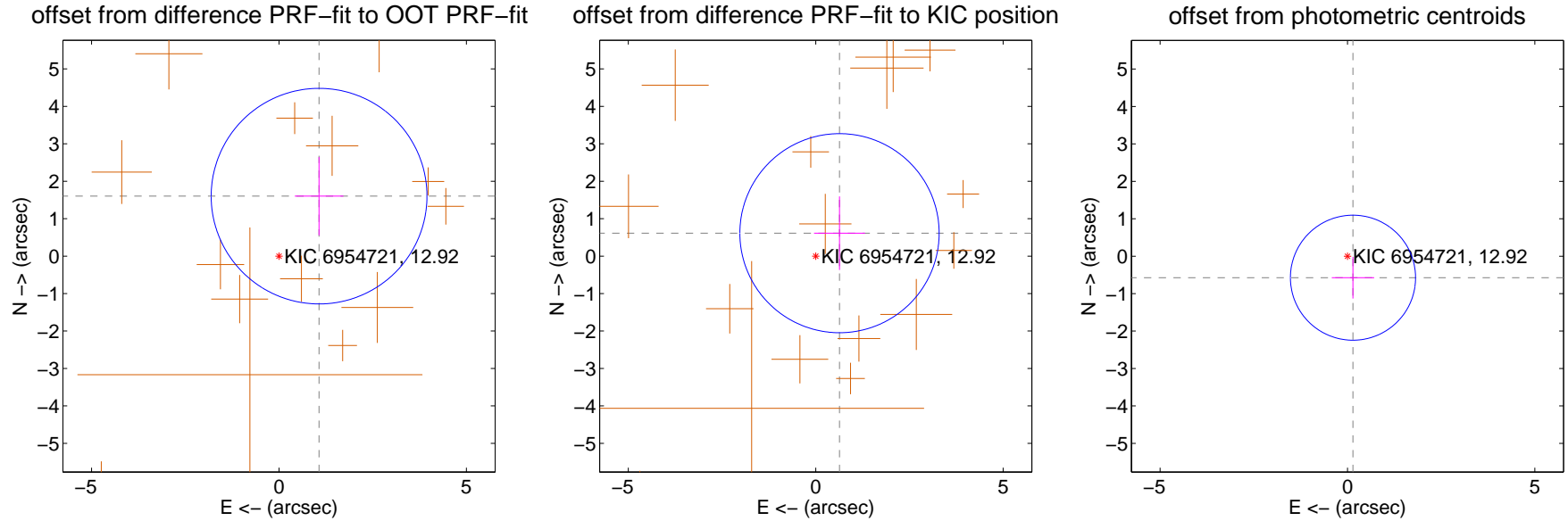
## DV Centroid Data

Supplemental centroid analysis for 006954721-03. Kepler magnitude: 12.92. Transit SNR 7.06

There are 0 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 1.22 arcsec

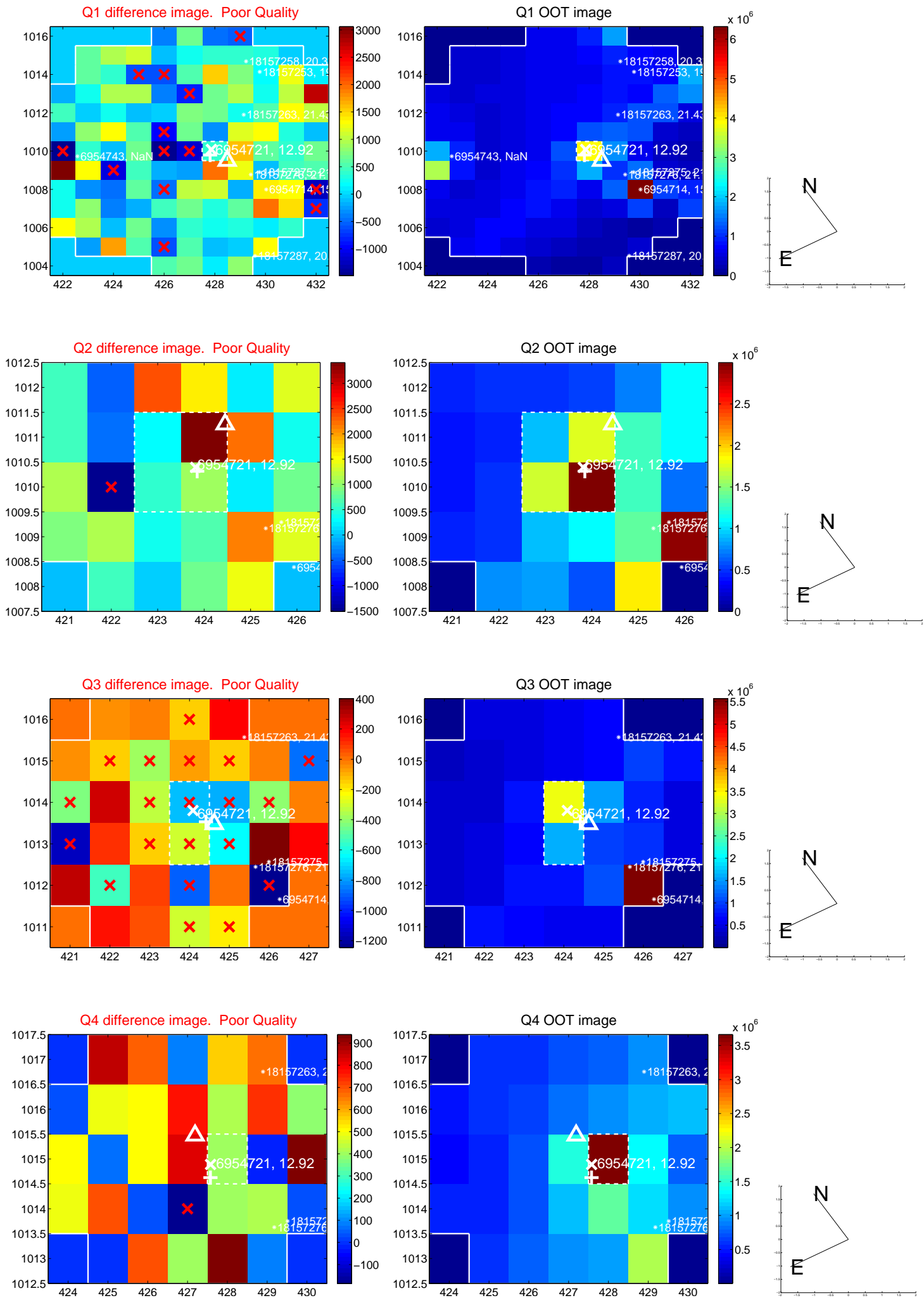
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.926 \pm 0.960$	2.01	$-1.069 \pm 0.647$	$1.602 \pm 1.043$
PRF-fit source offset from KIC position	$0.882 \pm 0.886$	1.00	$-0.635 \pm 0.680$	$0.613 \pm 0.983$
photometric centroid source offset	$0.59 \pm 0.56$	1.07	$-0.15 \pm 0.57$	$-0.57 \pm 0.56$



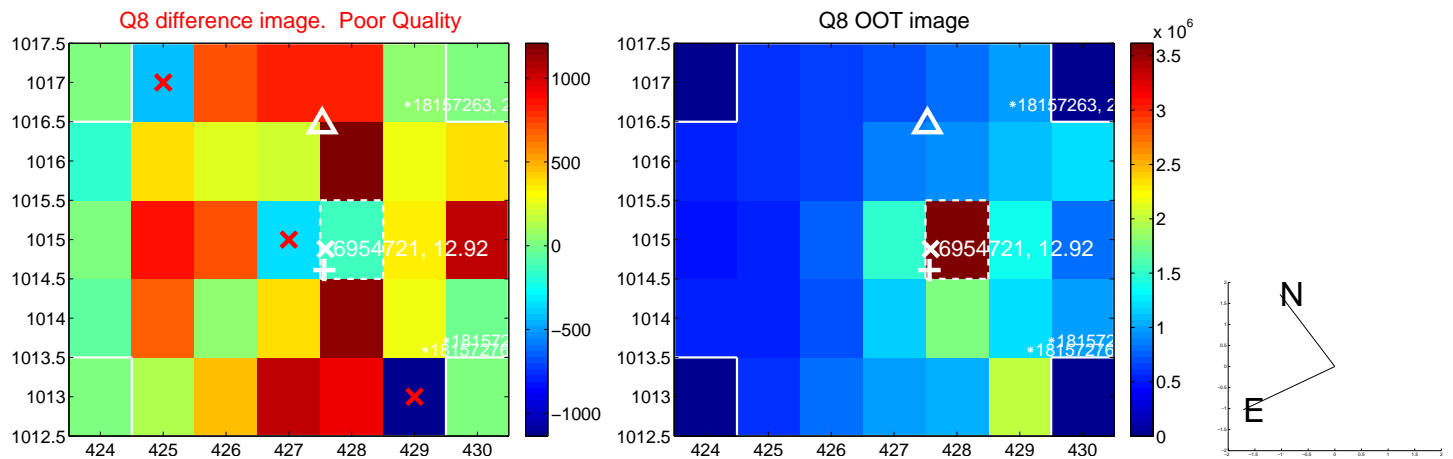
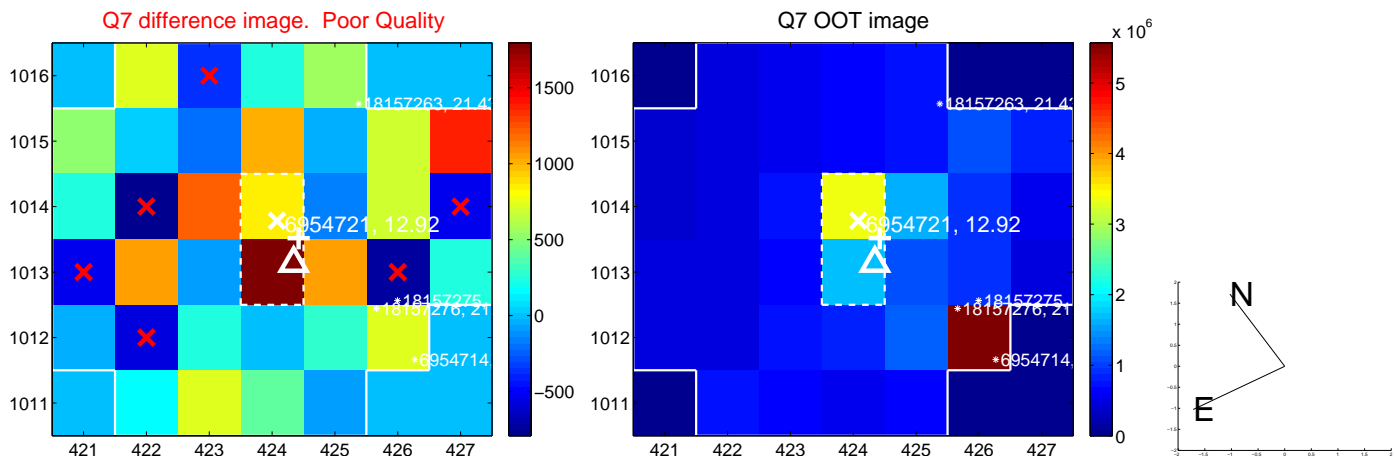
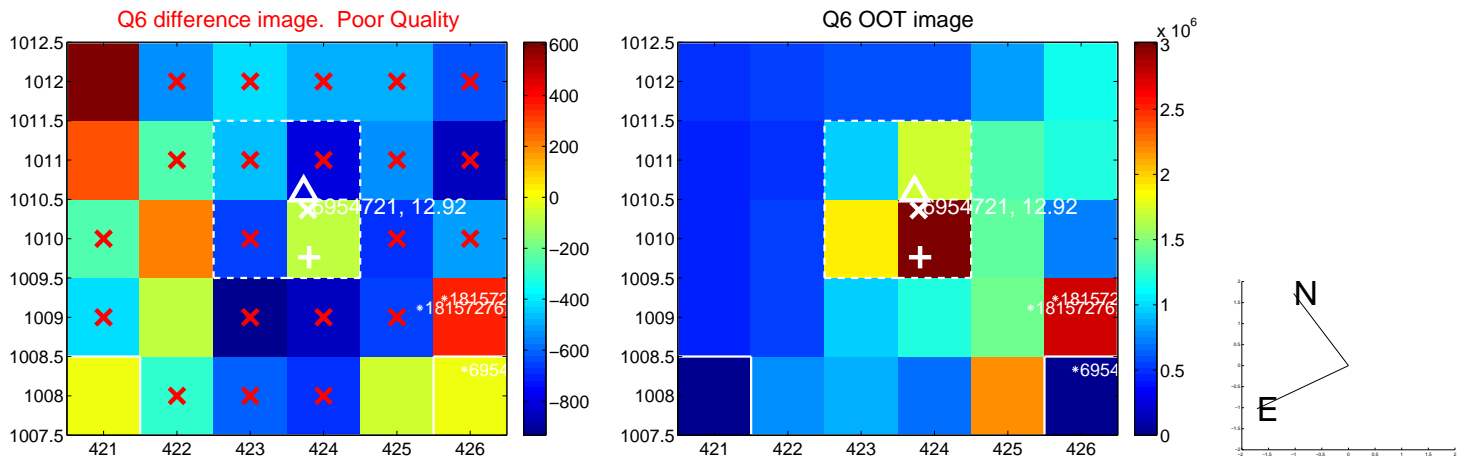
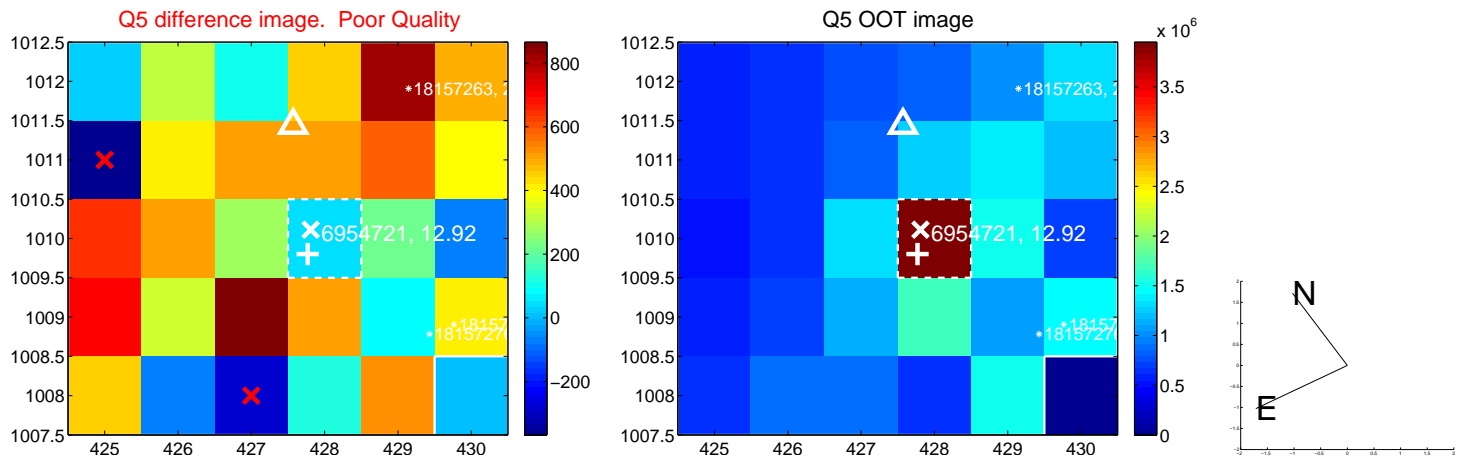
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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



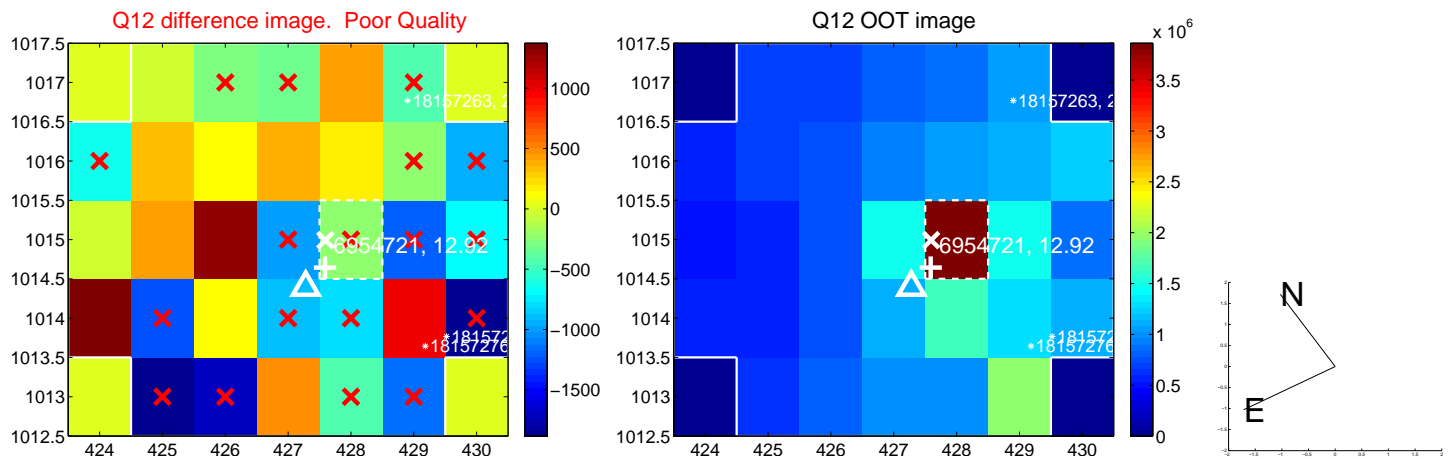
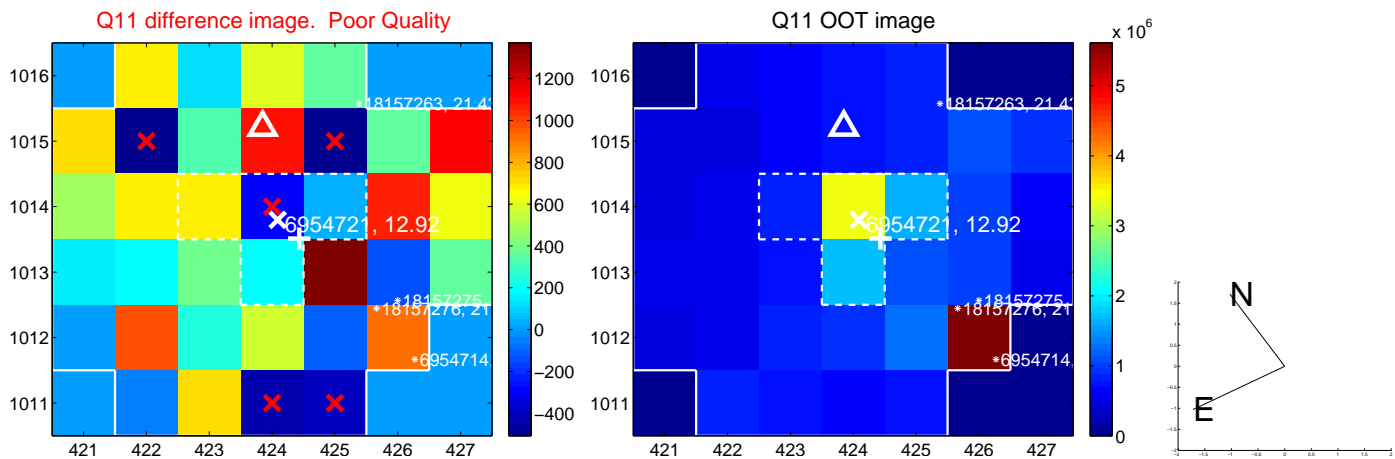
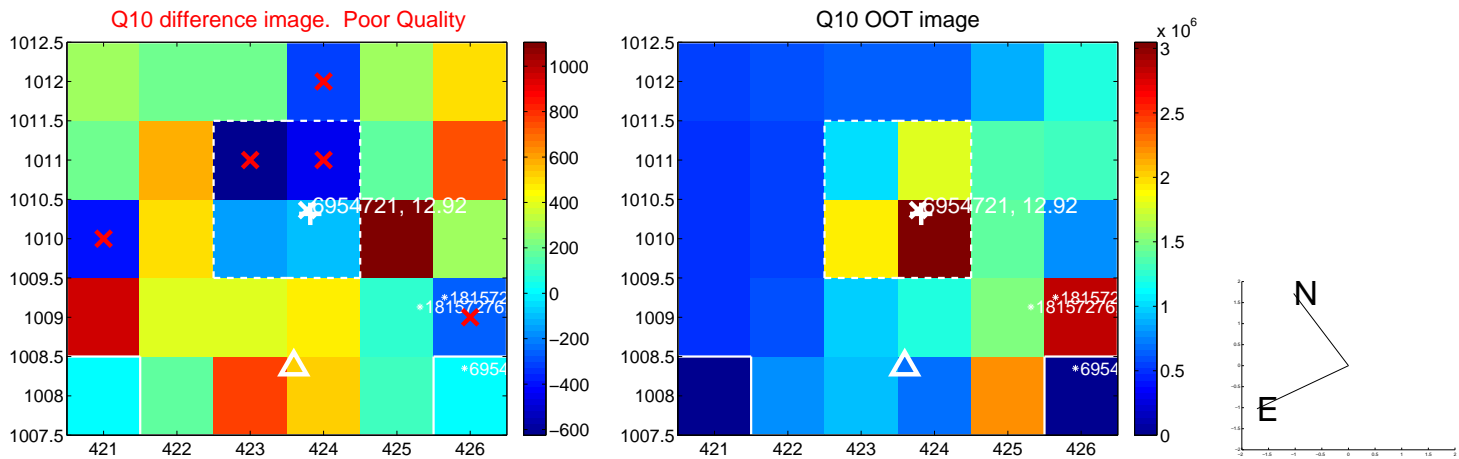
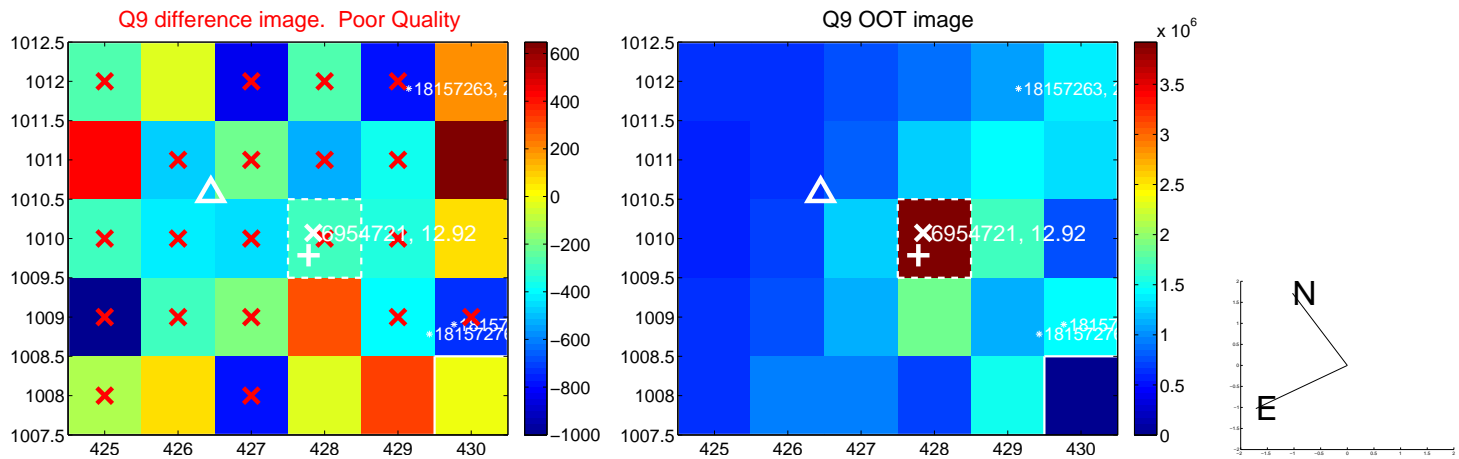
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



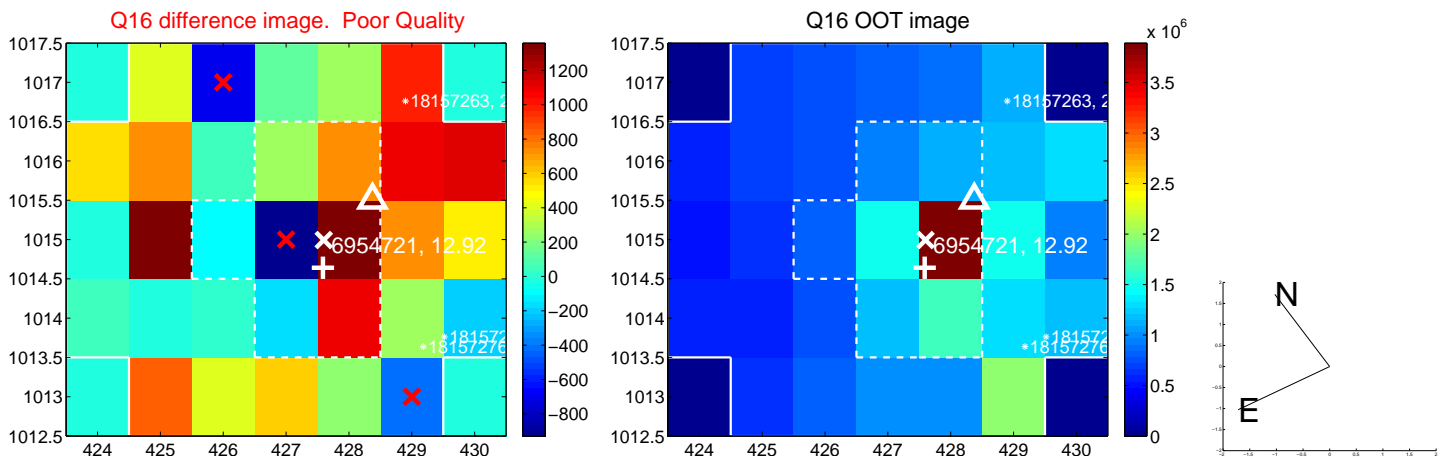
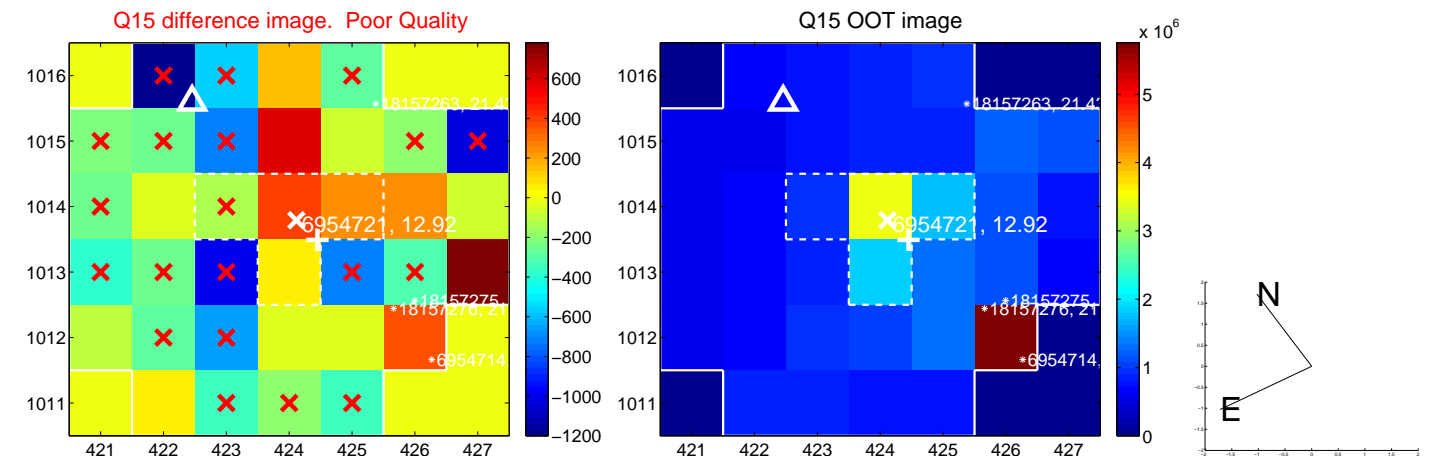
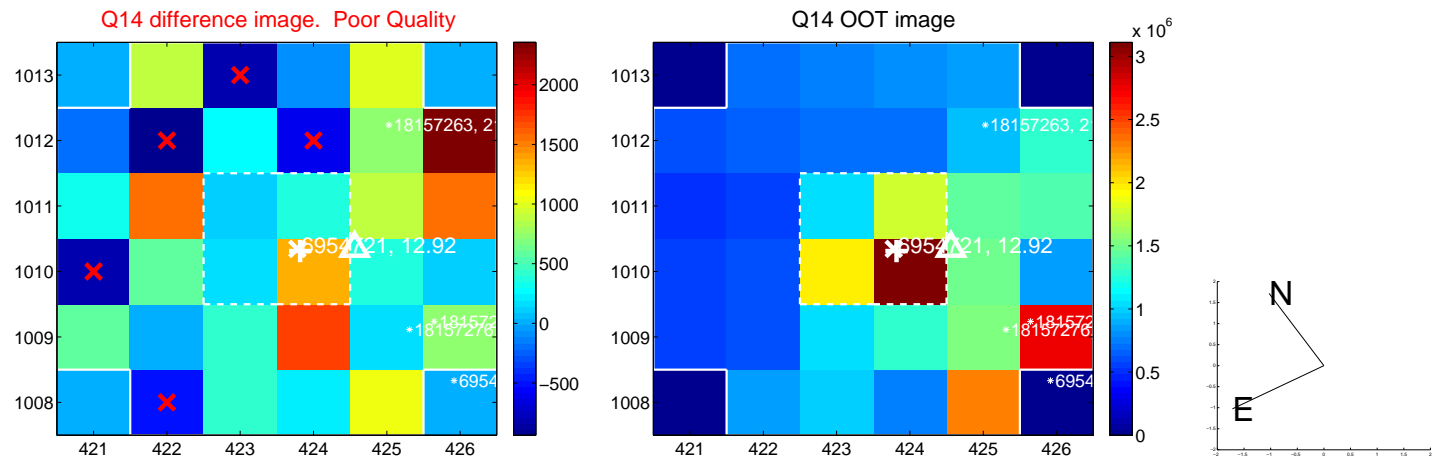
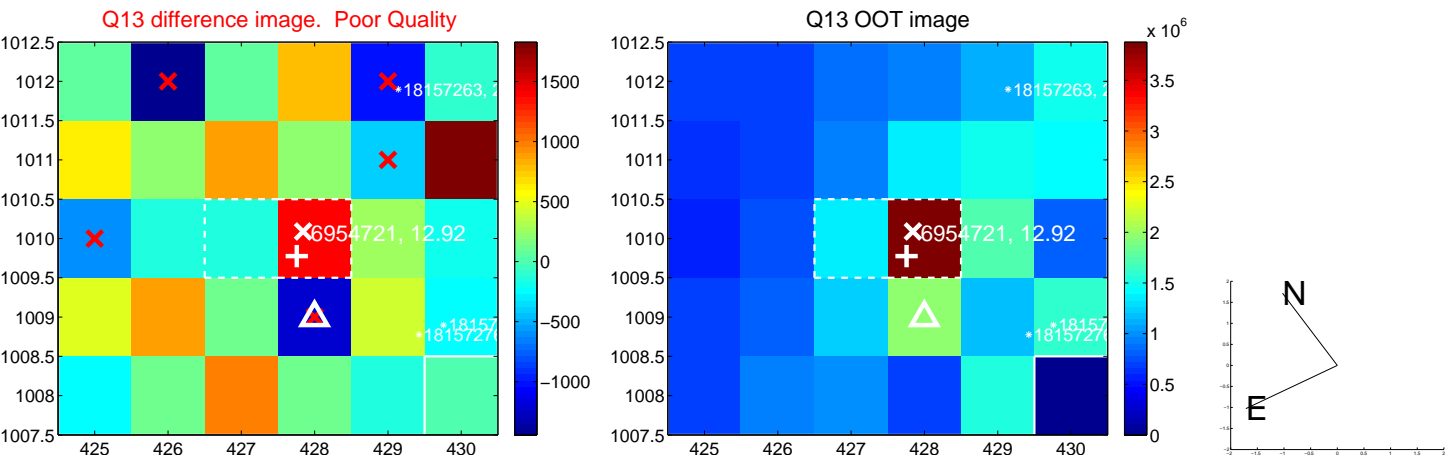
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



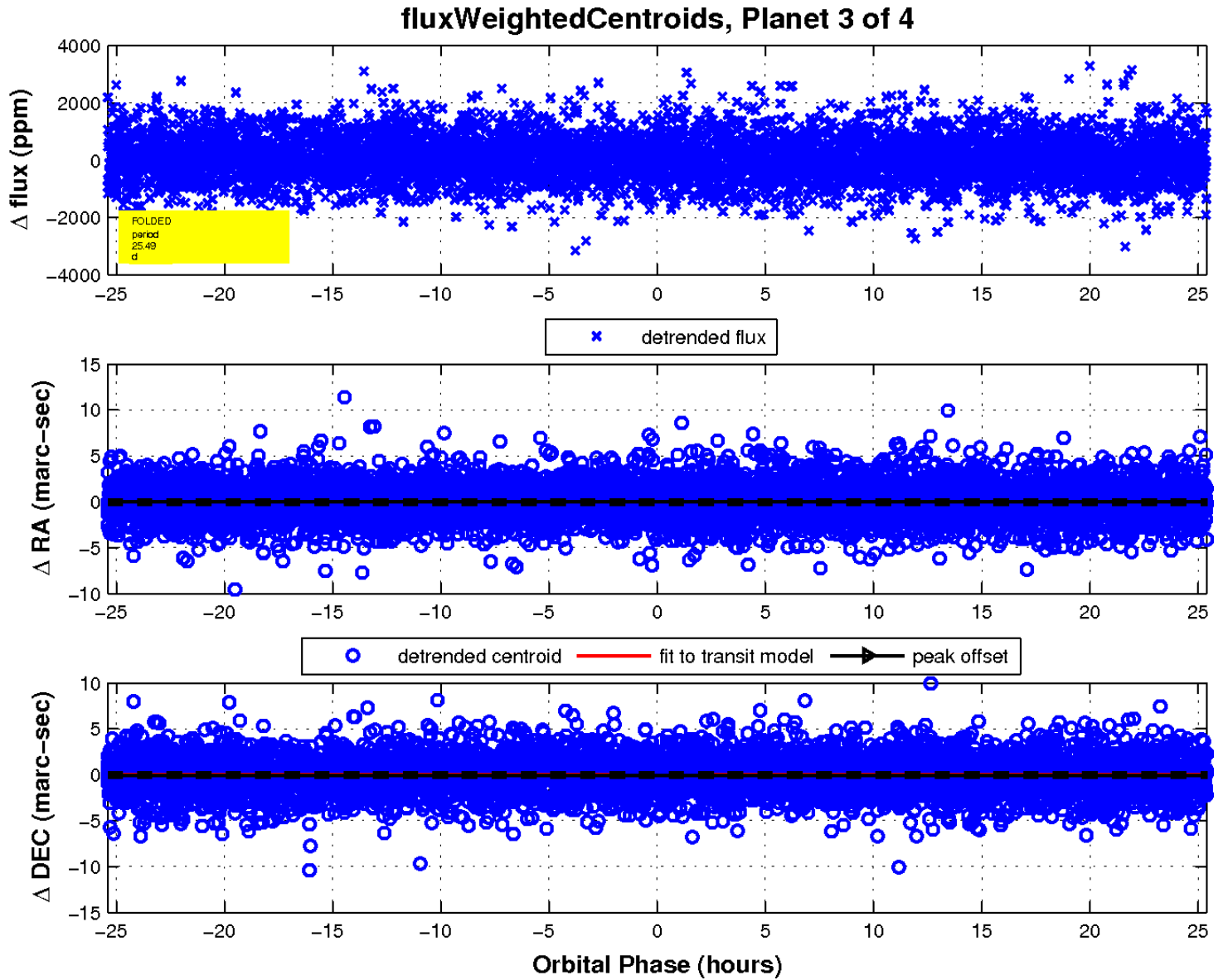
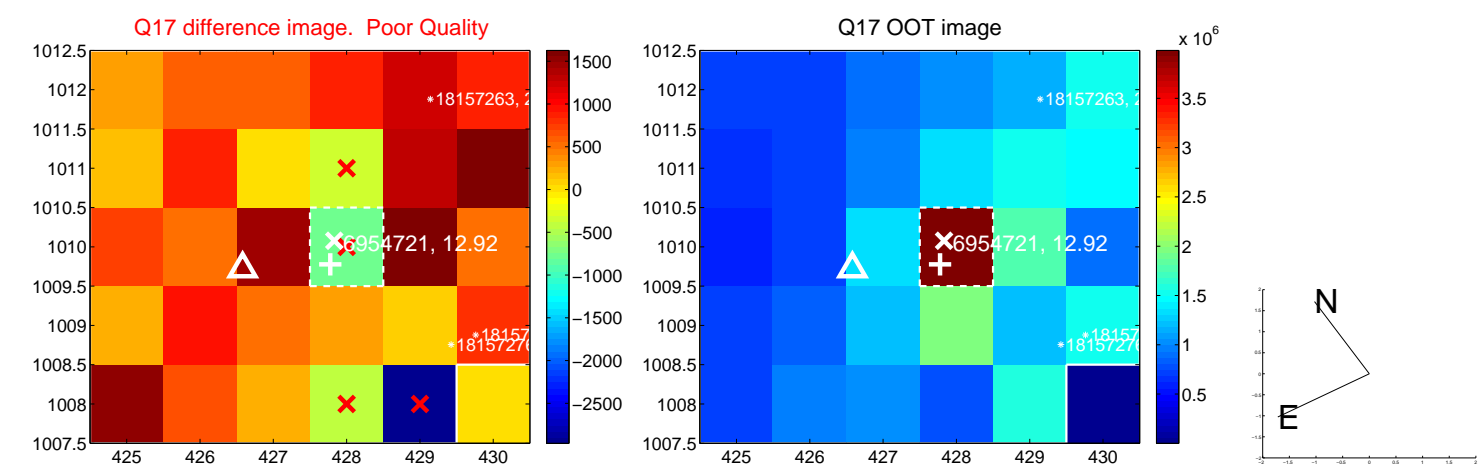
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

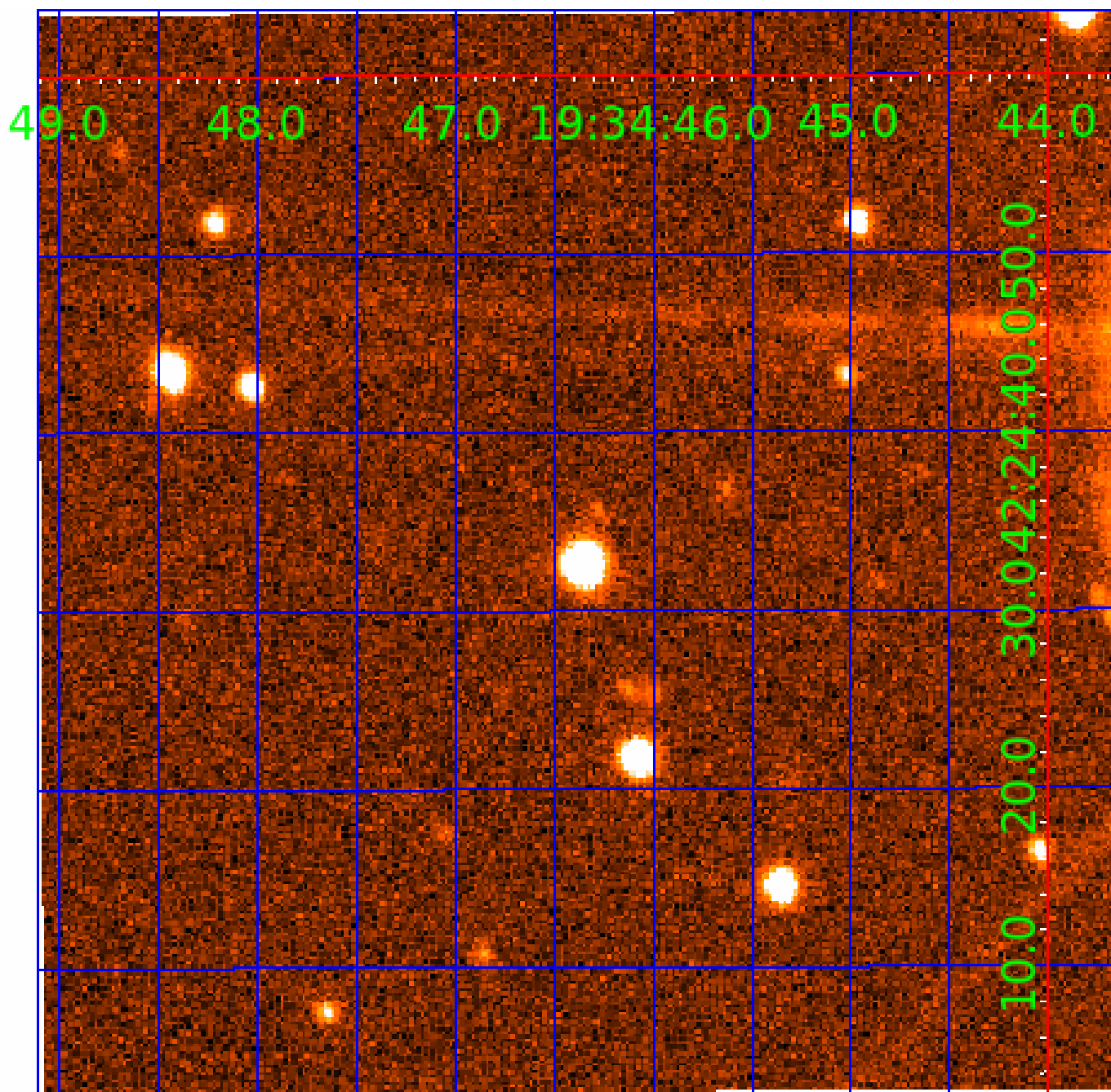


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 006954721

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006954721-01	OBS	No	2.818716	133.689089	95.2	19.989	8.7	10.9	0.27	3342	0.27	12.54
006954721-02	OBS	No	50.595035	149.621793	992.8	5.284	9.8	11.1	0.27	3342	1.03	0.27
006954721-03	OBS	No	25.492035	135.144241	387.8	8.473	9.4	7.1	0.27	3342	0.56	0.67
006954721-04	OBS	No	40.517180	132.111181	462.7	21.523	24.2	8.0	0.27	3342	0.64	0.36

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006954721-01	OBS	FP	0.00	1	0	0	1	LPP_DV—CENT_KIC_POS—EPHEM_MATCH
006954721-02	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_FEW_DIFFS—HALO_GHOST
006954721-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_KIC_POS
006954721-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

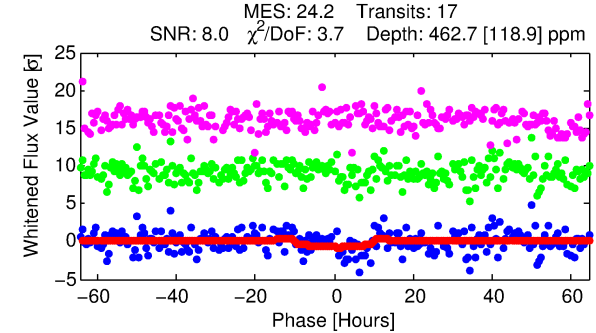
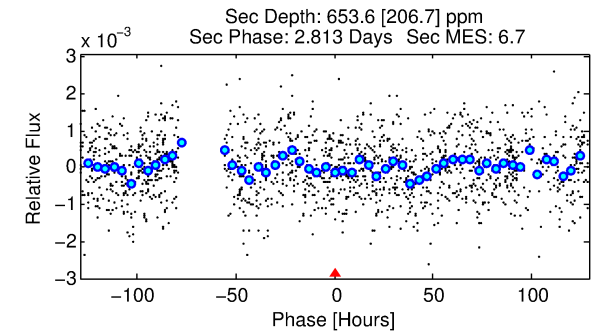
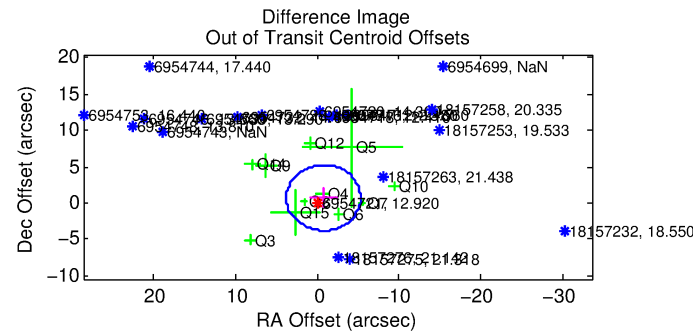
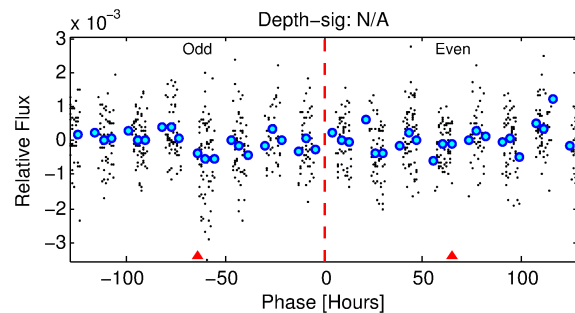
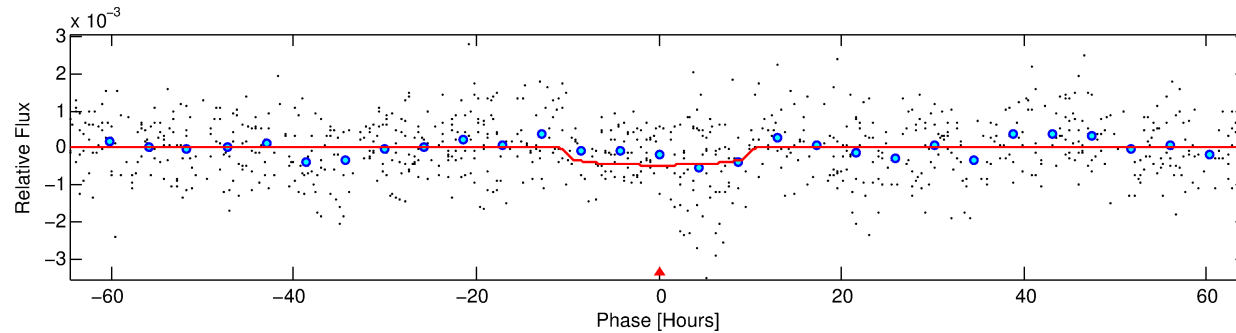
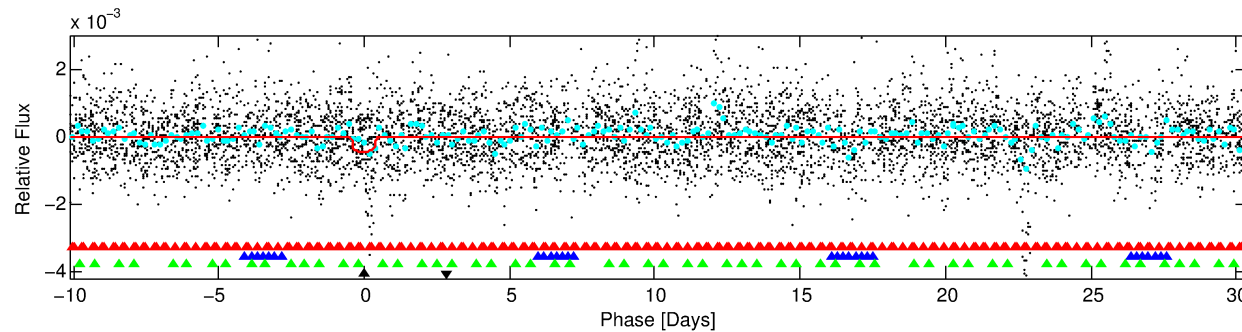
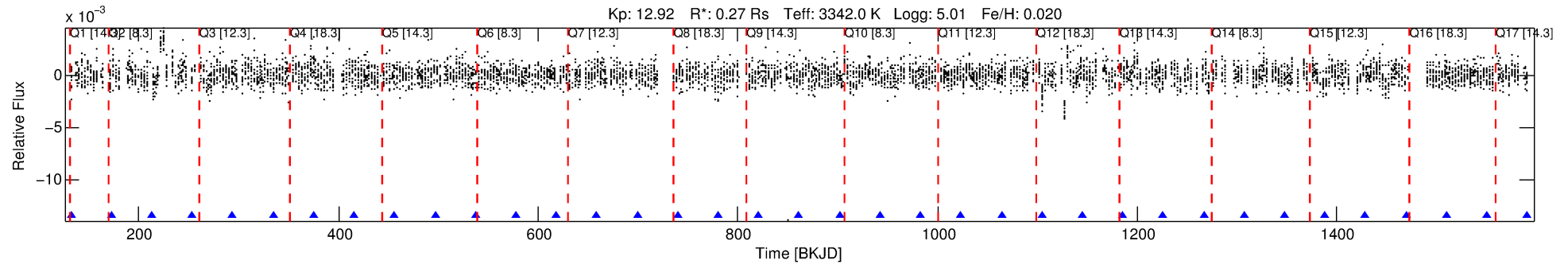
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 006954721-04

No Significant Match Found

# DV One-Page Summary

KIC: 6954721 Candidate: 4 of 4 Period: 40.517 d



## DV Fit Results:

Period = 40.51718 [0.00456] d  
Epoch = 132.1112 [0.0823] BKJD  
Rp/R\* = 0.0219 [0.0086]  
a/R\* = 9.02 [13.68]  
b = 0.81 [0.66]  
Seff = 0.36 [0.11]  
Teq = 197 [16] K  
Rp = 0.63 [0.33] Re  
a = 0.1479 [0.0363] AU  
Ag = 19525.65 [17445.20] [1.12σ]  
Teffp = 3607 [771] K [4.42σ]

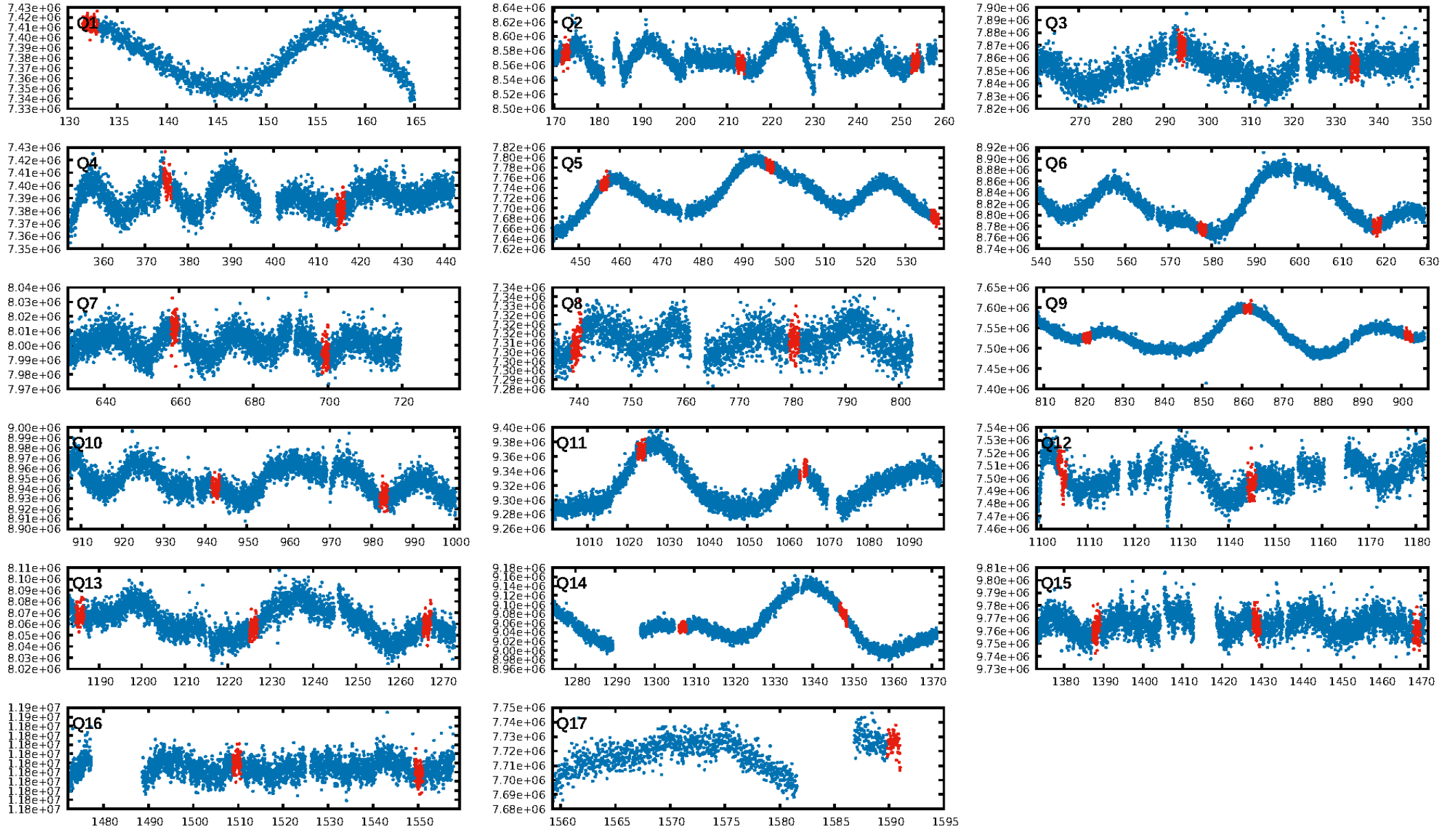
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [15.59σ]  
LongPeriod-sig: 100.0% [10.91σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [16/16]  
GhostDiagnostic-chr: 17.48  
Centroid-sig: 0.0%  
Centroid-so: 0.882 arcsec [2.27σ]  
OotOffset-rm: 1.041 arcsec [0.69σ]  
KicOffset-rm: 0.894 arcsec [0.60σ]  
OotOffset-st: 3/3/3/2 [11]  
KicOffset-st: 3/3/3/2 [11]  
DiffImageQuality-fgm: 0.00 [0/11]  
DiffImageOverlap-fno: 0.00 [0/13]

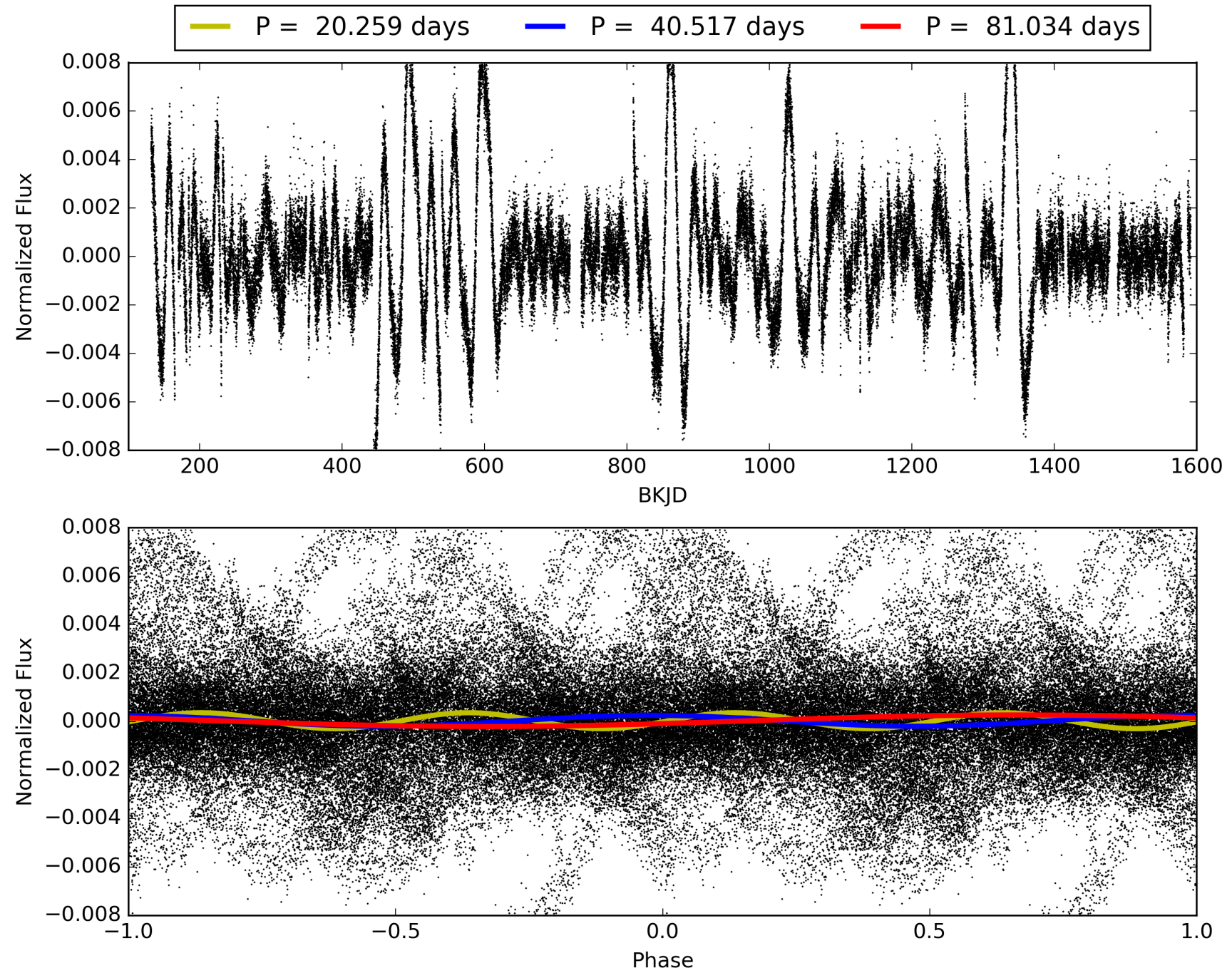
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 03-Feb-2016 07:58:31 Z

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

# TCE 006954721-04, PDC Light Curves

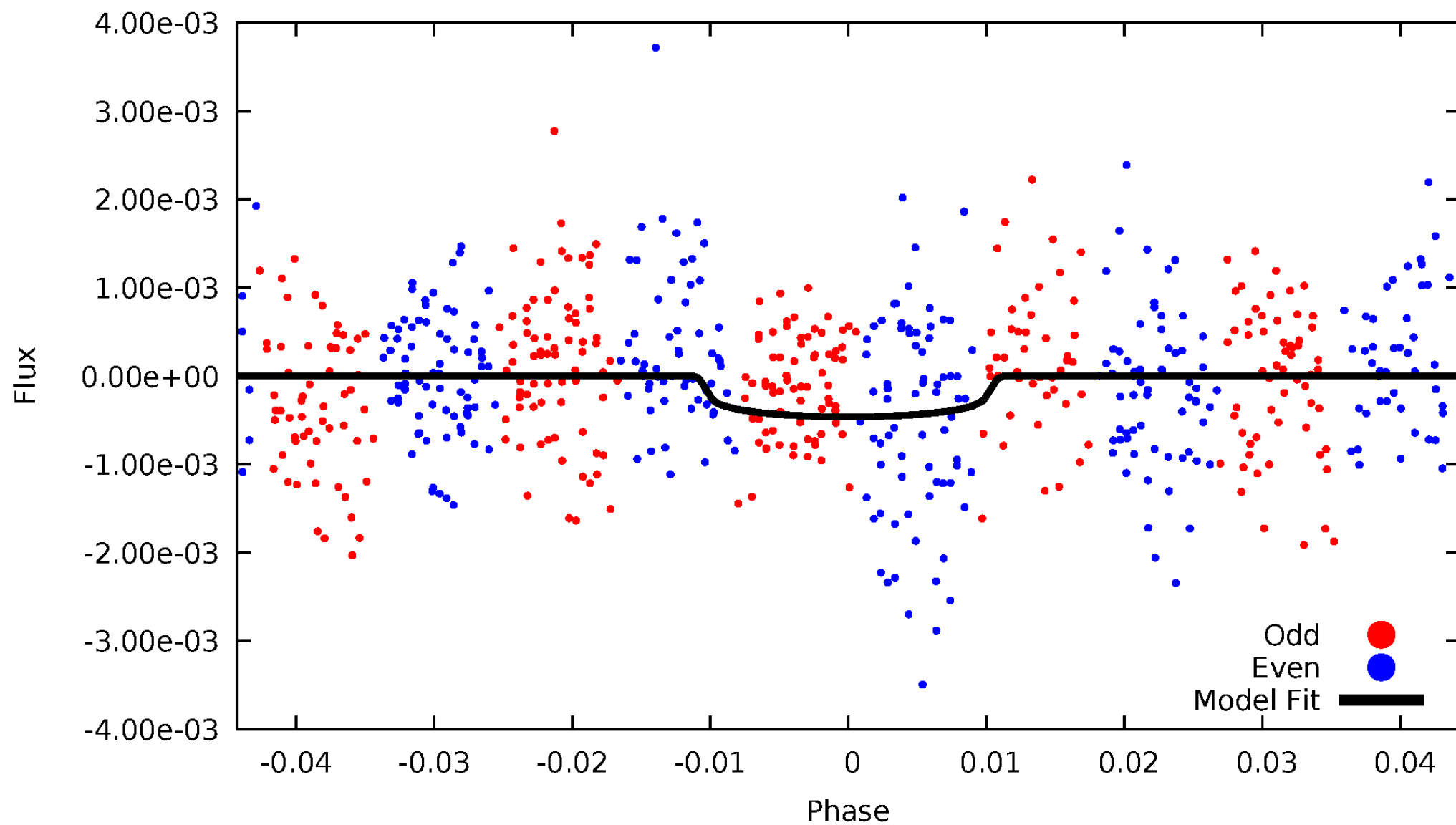


TCE 006954721-04



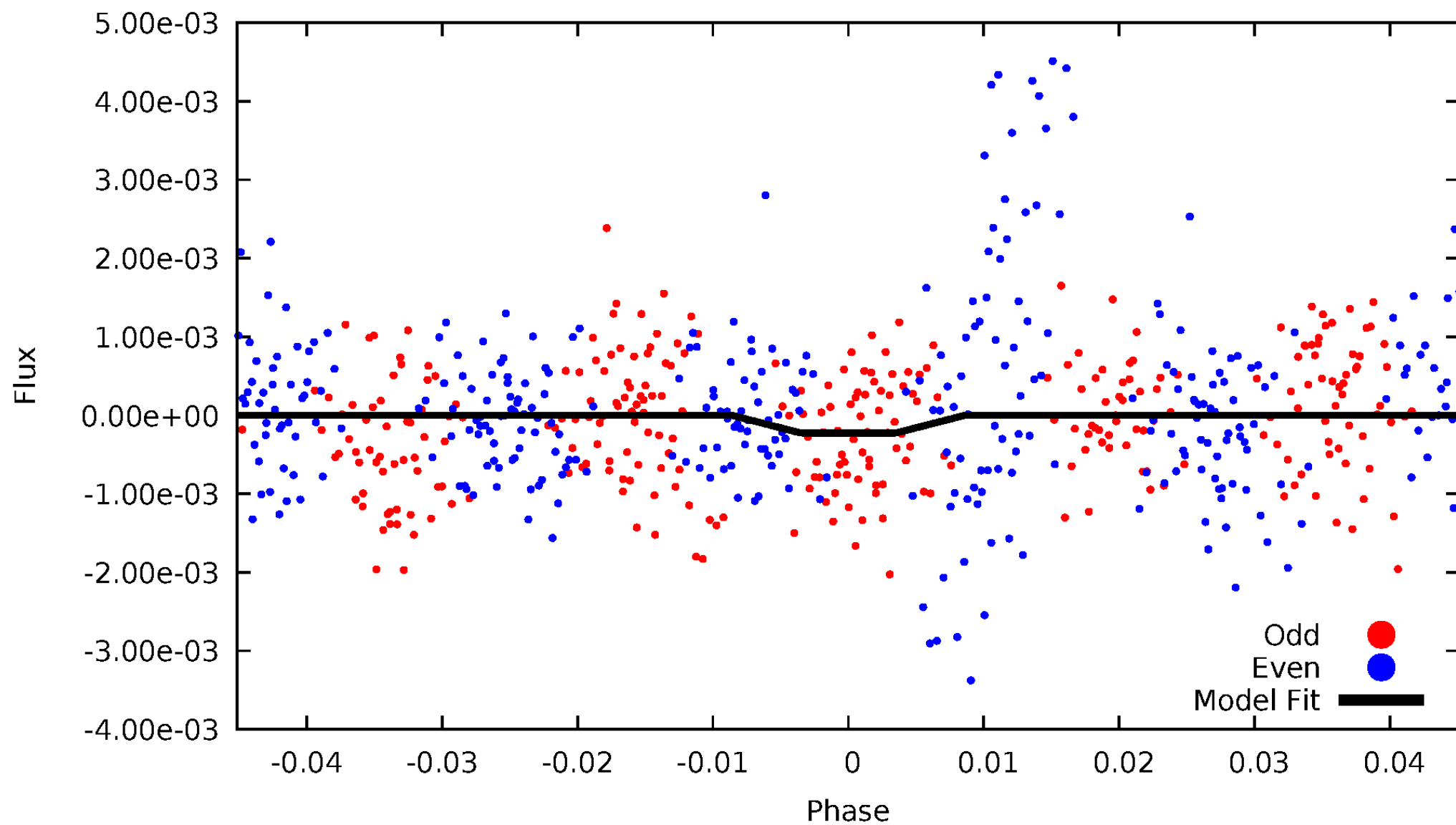
# DV Odd/Even

TCE 006954721-04



# ALT Odd/Even

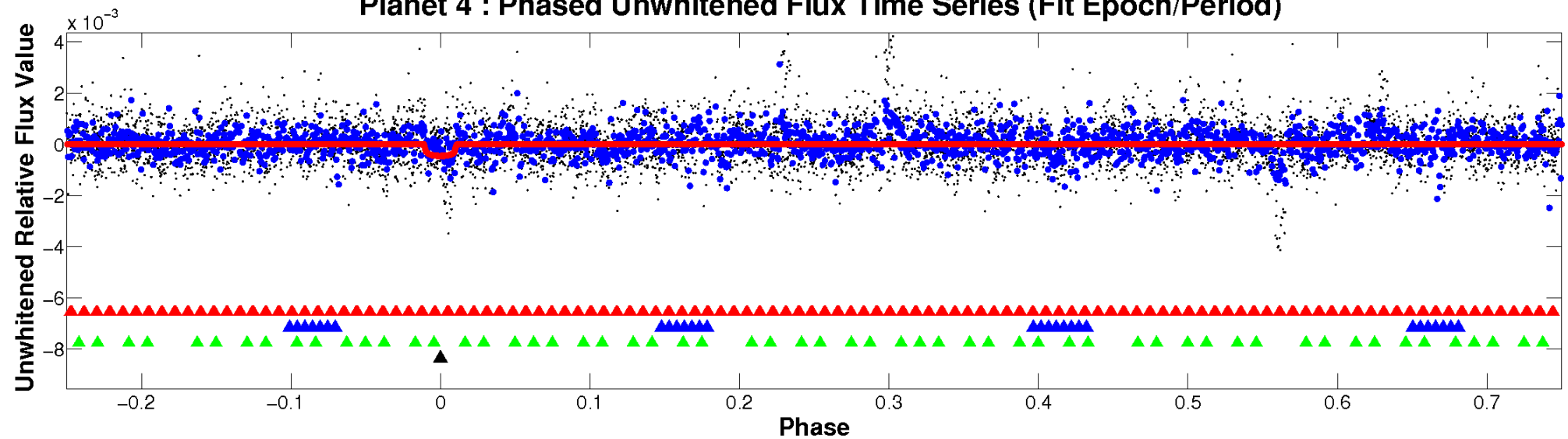
TCE 006954721-04



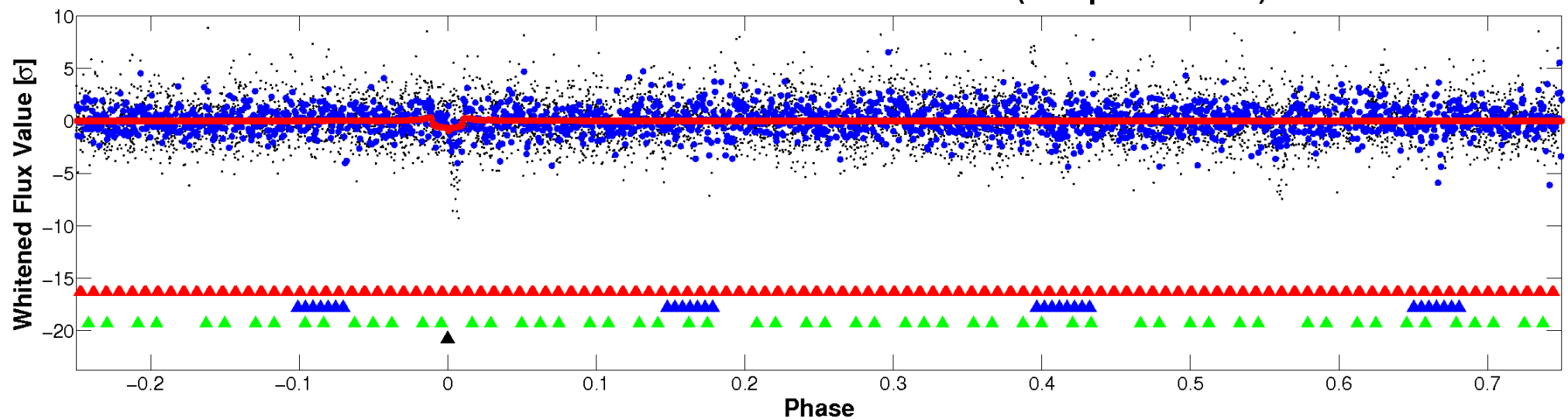


# Non-Whitened Vs. Whitened Light Curve

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

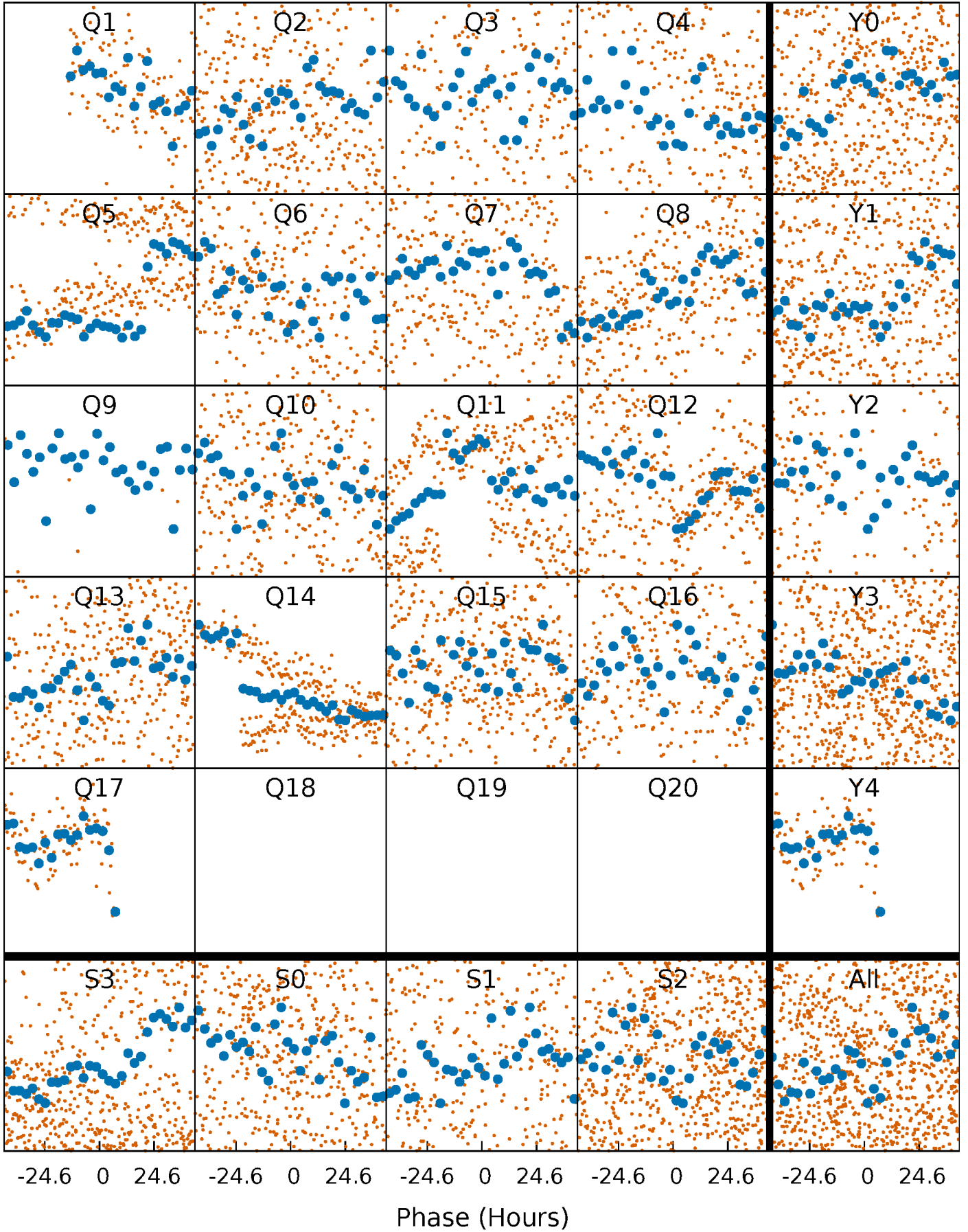


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



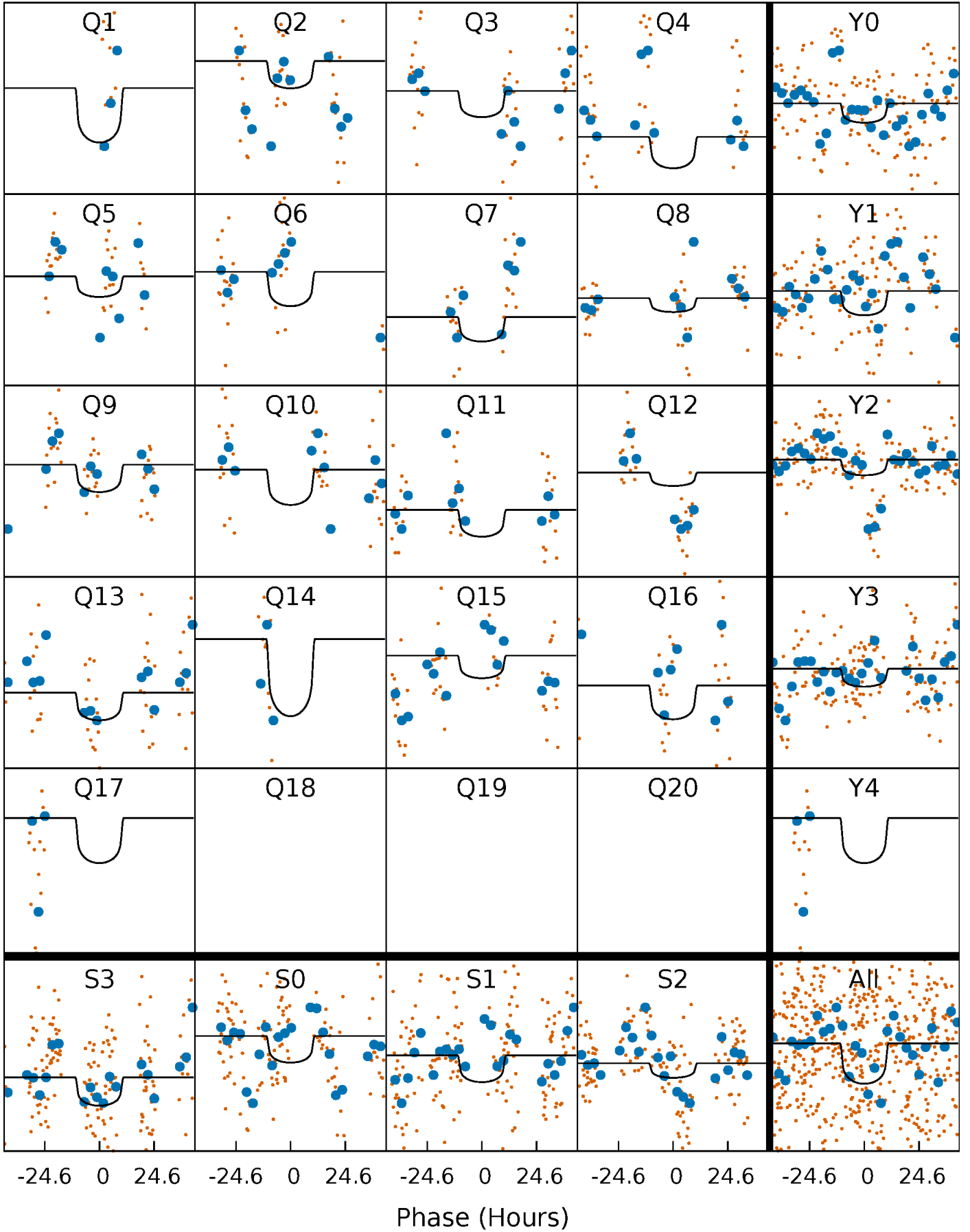
# PDC Quarter-Phased Transit Curves

TCE 006954721-04 P= 40.517180 Days  $T_0=132.111181$  (BKJD)



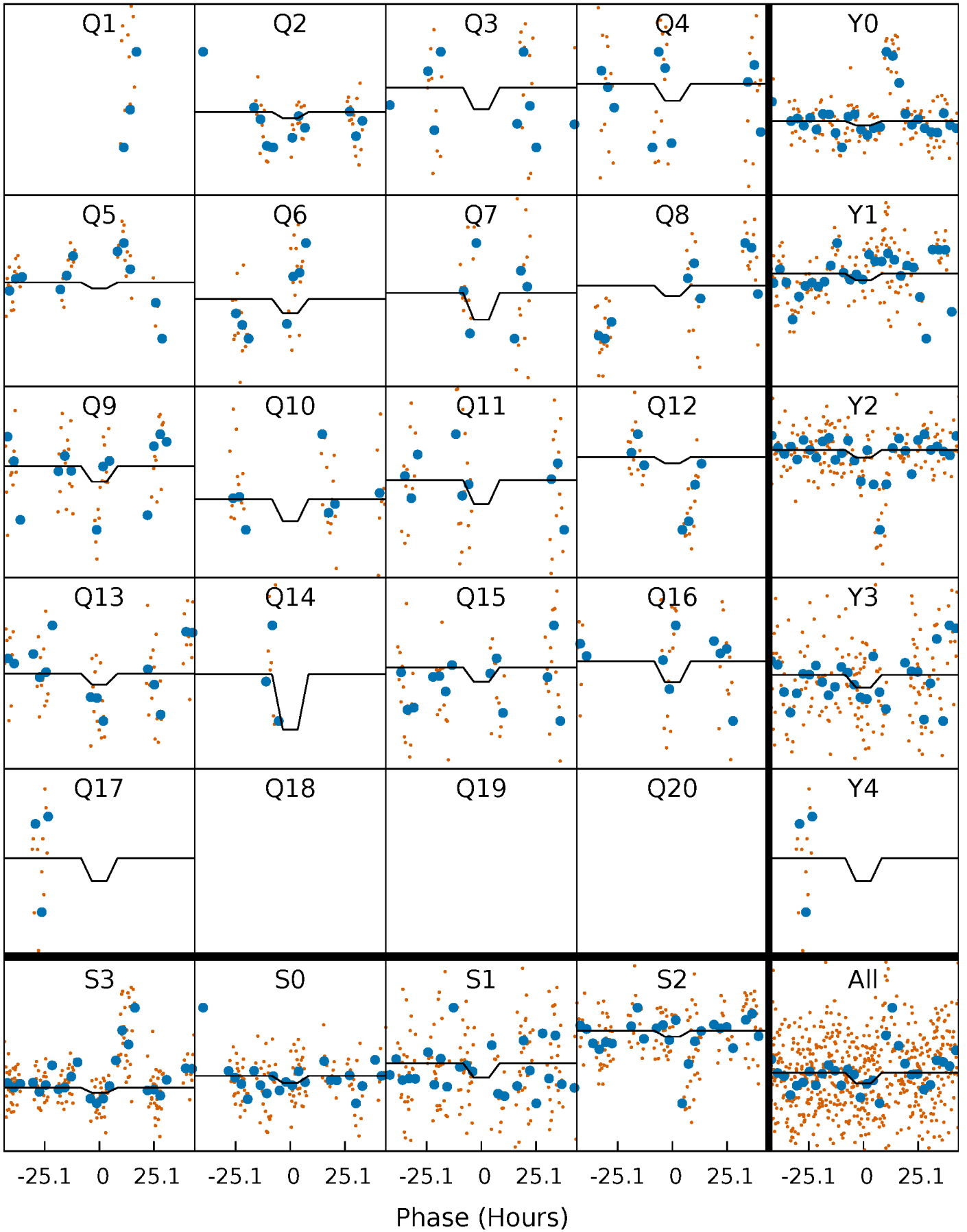
# DV Quarter-Phased Transit Curves

TCE 006954721-04   P= 40.517180 Days    $T_0=132.111181$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

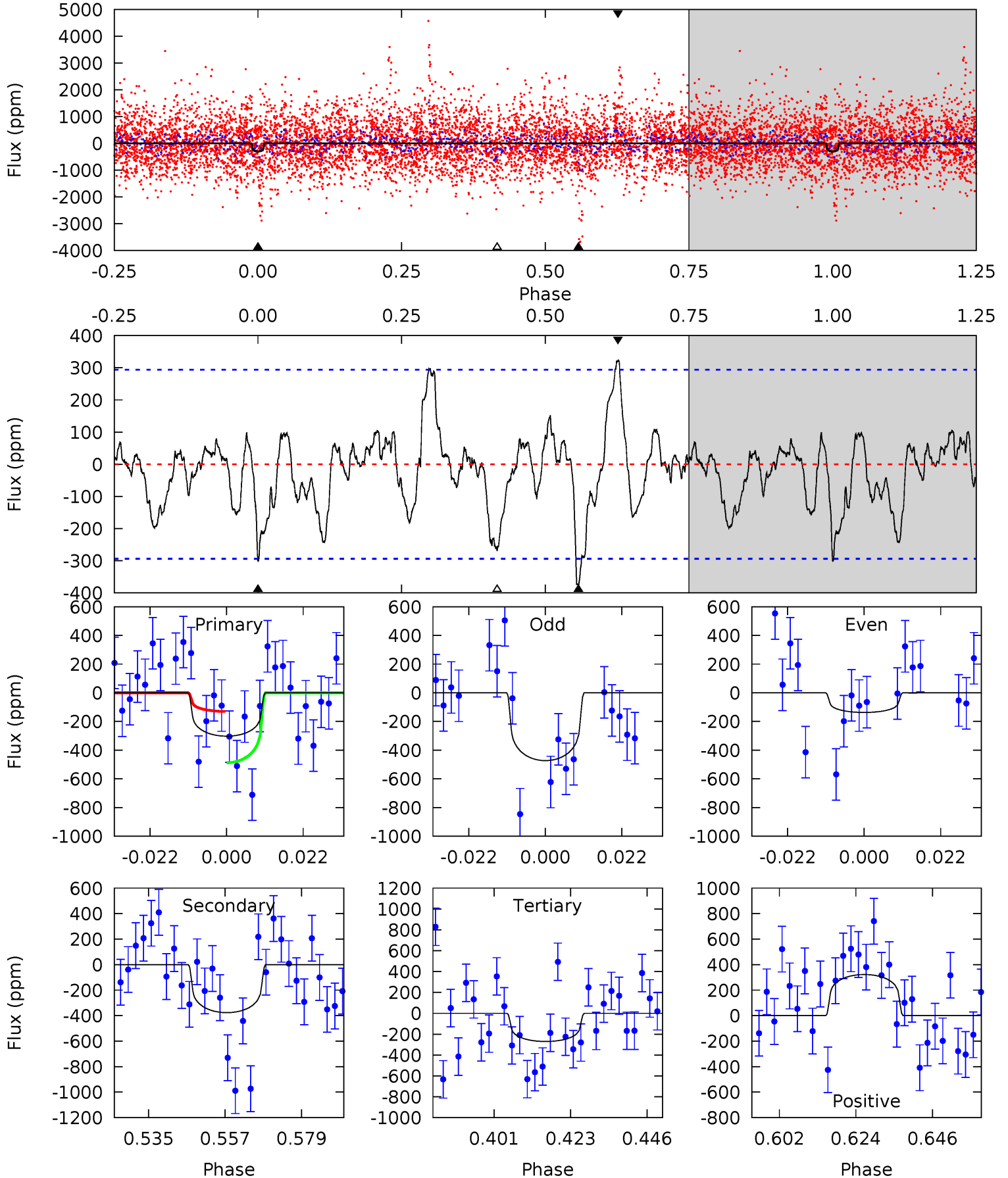
TCE 006954721-04   P= 40.526522 Days    $T_0=131.738090$  (BKJD)



# DV Model-Shift Uniqueness Test

006954721-04, P = 40.517180 Days, E = 132.111181 Days

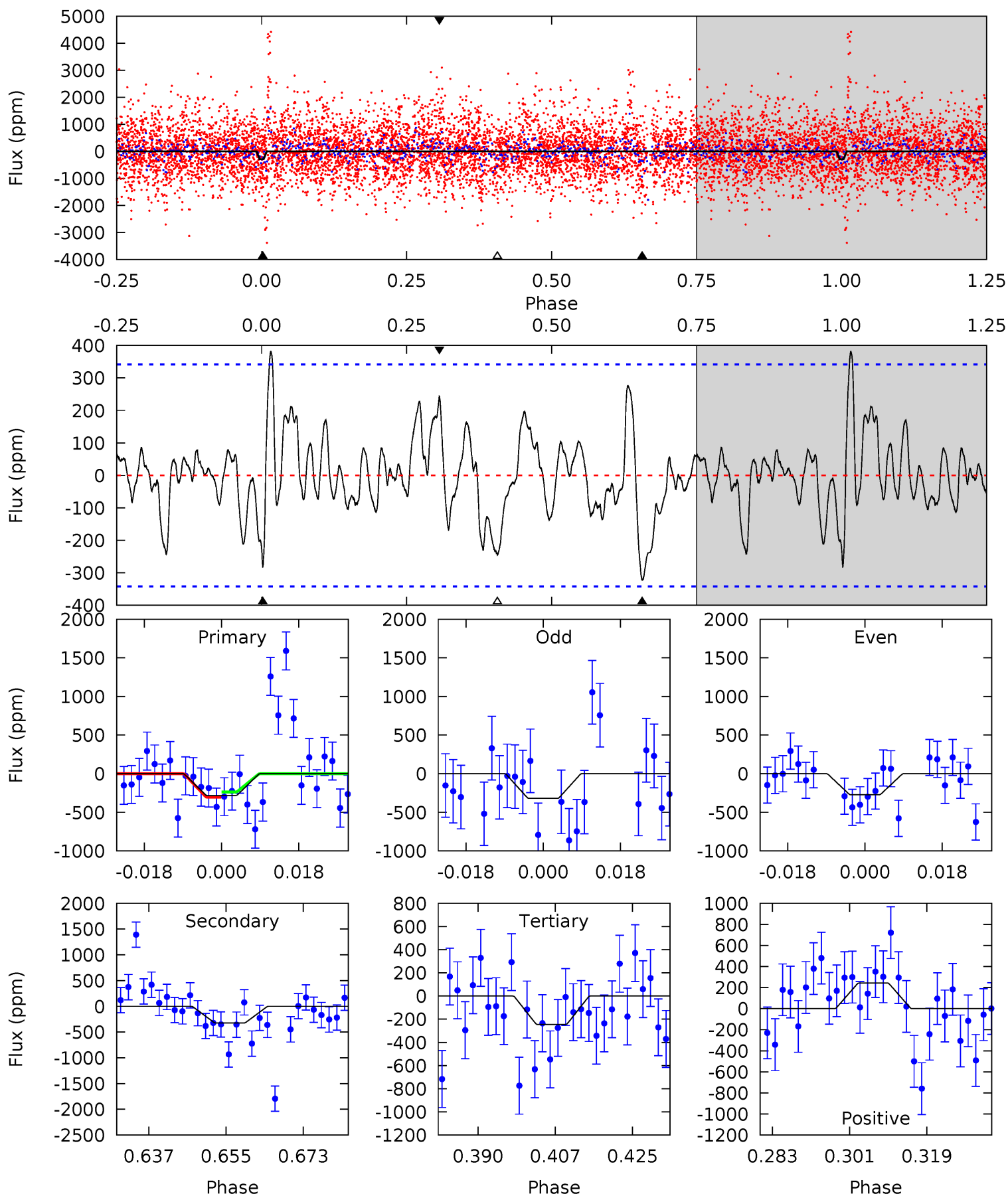
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.01	6.24	4.47	5.34	4.87	2.29	1.73	0.54	-0.33	1.77	0.90	2.81	1.16	0.46	2.98



# Alt Model-Shift Uniqueness Test

006954721-04, P = 40.526522 Days, E = 131.738090 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
4.07	4.64	3.52	3.50	4.92	2.37	1.43	0.55	0.57	1.12	1.14	0.34	3.29	0.54	0.49



### Stellar Parameters For KIC 006954721

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3342^{+109}_{-89}$	$5.011^{+0.103}_{-0.115}$	$0.020^{+0.250}_{-0.250}$	$0.265^{+0.091}_{-0.074}$	$0.264^{+0.110}_{-0.090}$	$19.960^{+15.380}_{-8.650}$
	+3%/-3%	+2%/-2%	+1250%/-1250%	+34%/-28%	+42%/-34%	+77%/-43%
Source	PHO54	PHO54	PHO54	DSEP		

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

### Secondary Eclipse Parameters for KIC 006954721-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-377 \pm 60$	$0.65^{+0.29}_{-0.28}$	$278^{+17}_{-16}$	$3217^{+579}_{-307}$	$10673^{+19875}_{-5354}$
Alt.	$-323 \pm 70$	$0.46^{+0.26}_{-0.23}$	$278^{+18}_{-15}$	$3505^{+889}_{-467}$	$19255^{+51245}_{-11717}$

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



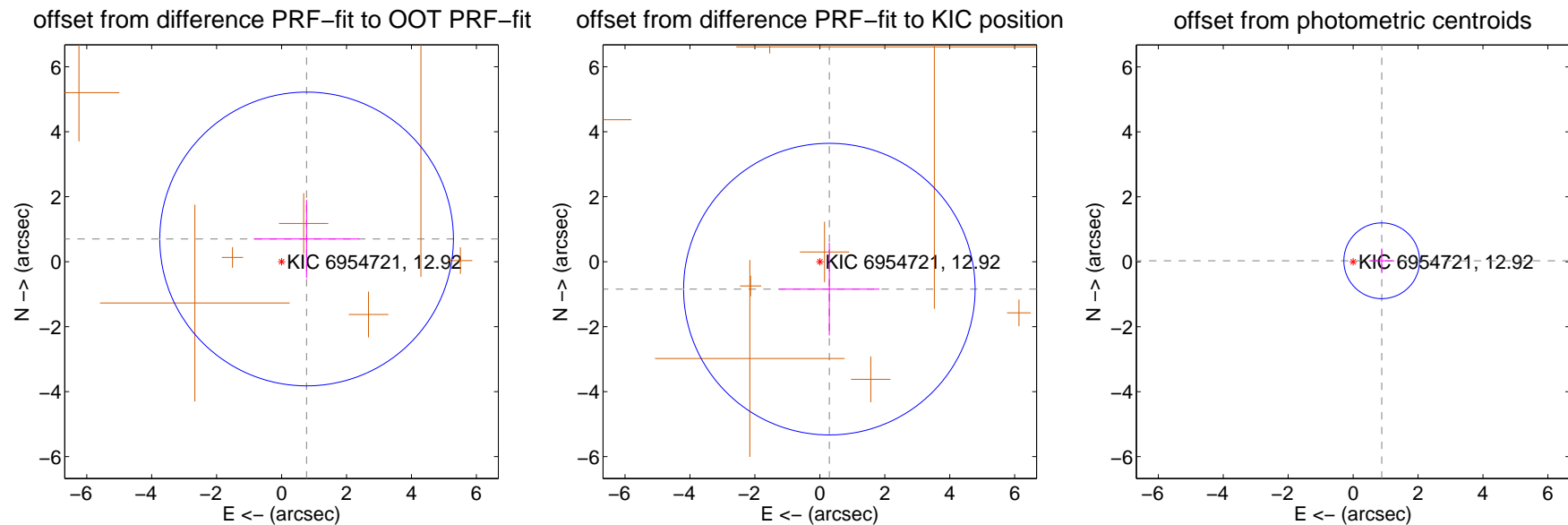
## DV Centroid Data

Supplemental centroid analysis for 006954721-04. Kepler magnitude: 12.92. Transit SNR 7.97

There are 0 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 1.78 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.041 \pm 1.507$	0.69	$-0.771 \pm 1.629$	$0.699 \pm 1.202$
PRF-fit source offset from KIC position	$0.894 \pm 1.496$	0.60	$-0.293 \pm 1.544$	$-0.845 \pm 1.425$
photometric centroid source offset	$0.88 \pm 0.39$	2.27	$-0.88 \pm 0.39$	$0.03 \pm 0.38$



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

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

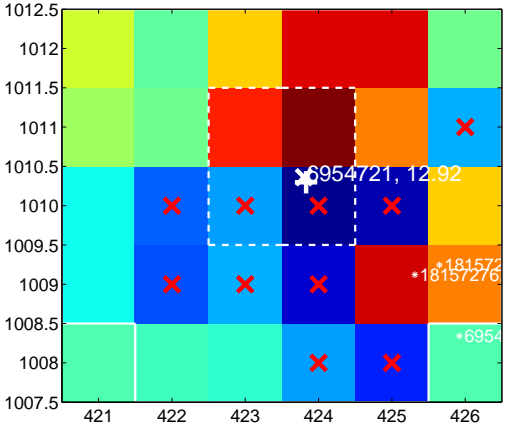
Q1 no difference image



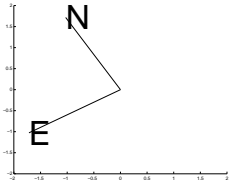
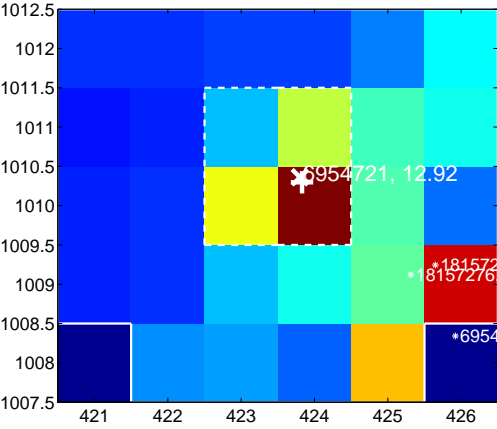
Q1 no OOT image



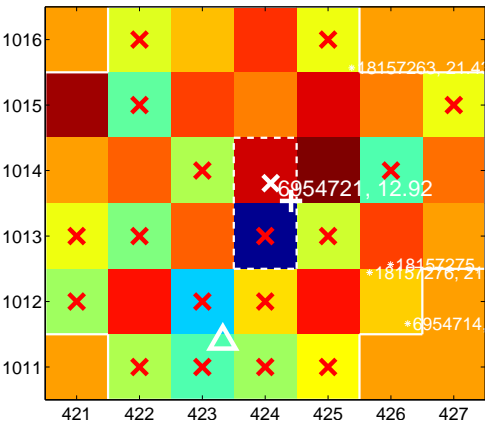
Q2 difference image. Poor Quality



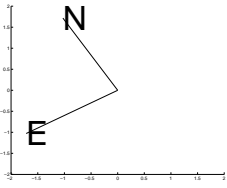
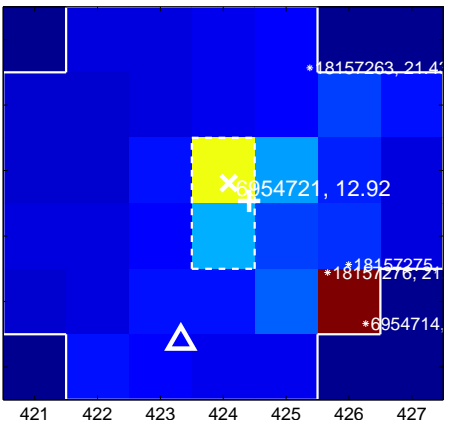
Q2 OOT image



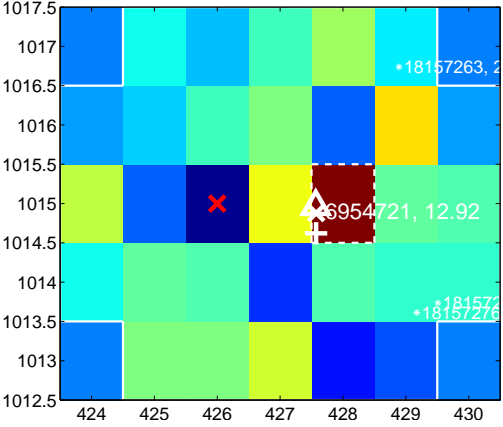
Q3 difference image. Poor Quality



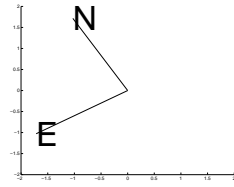
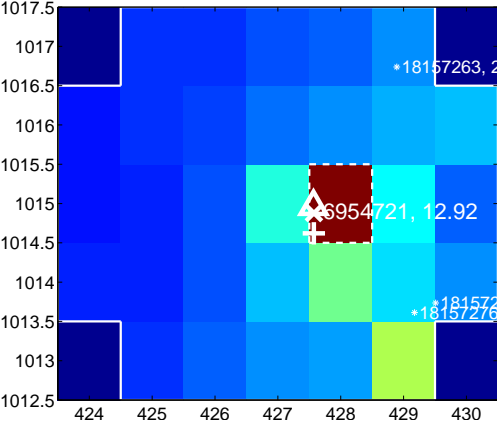
Q3 OOT image



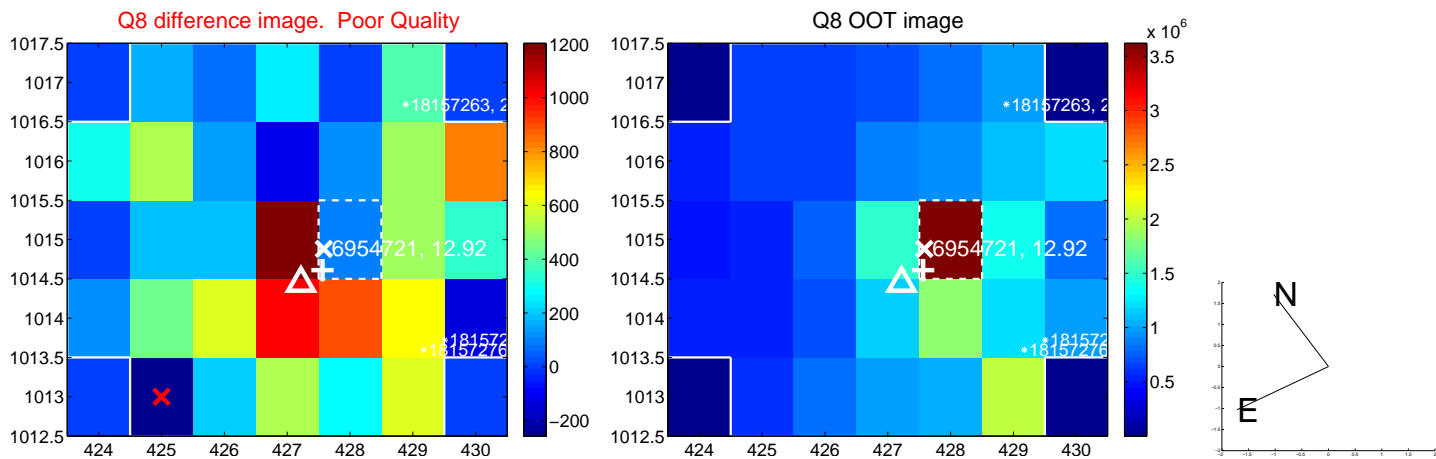
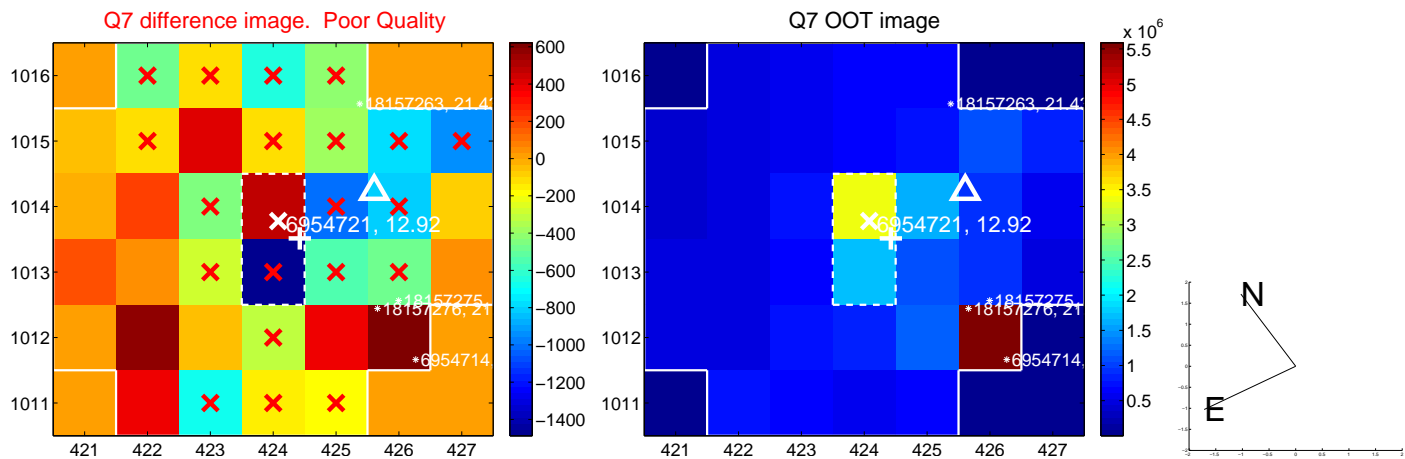
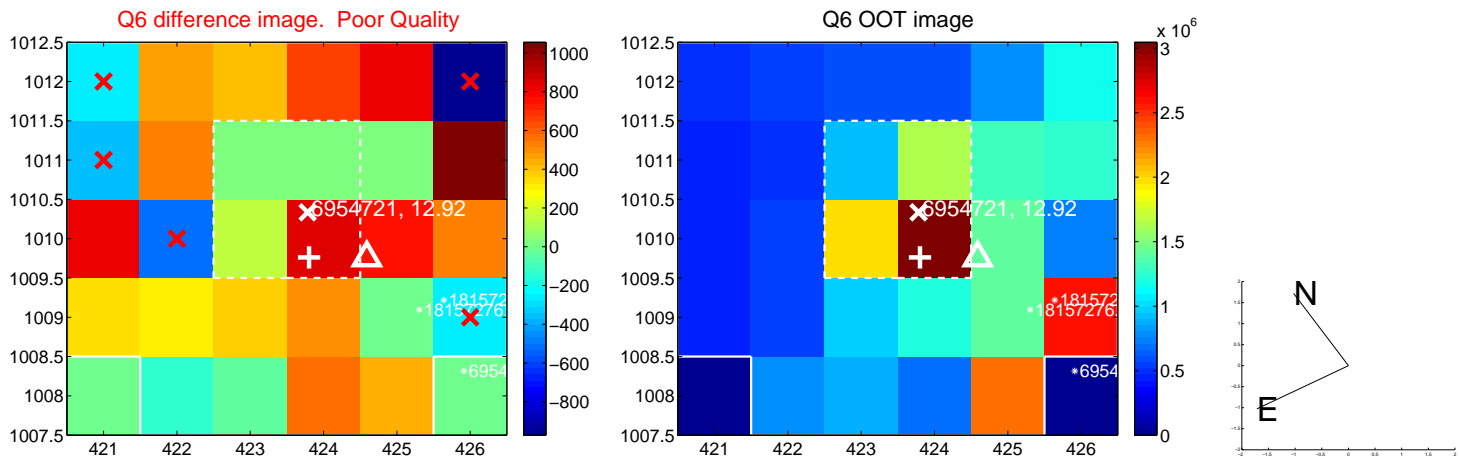
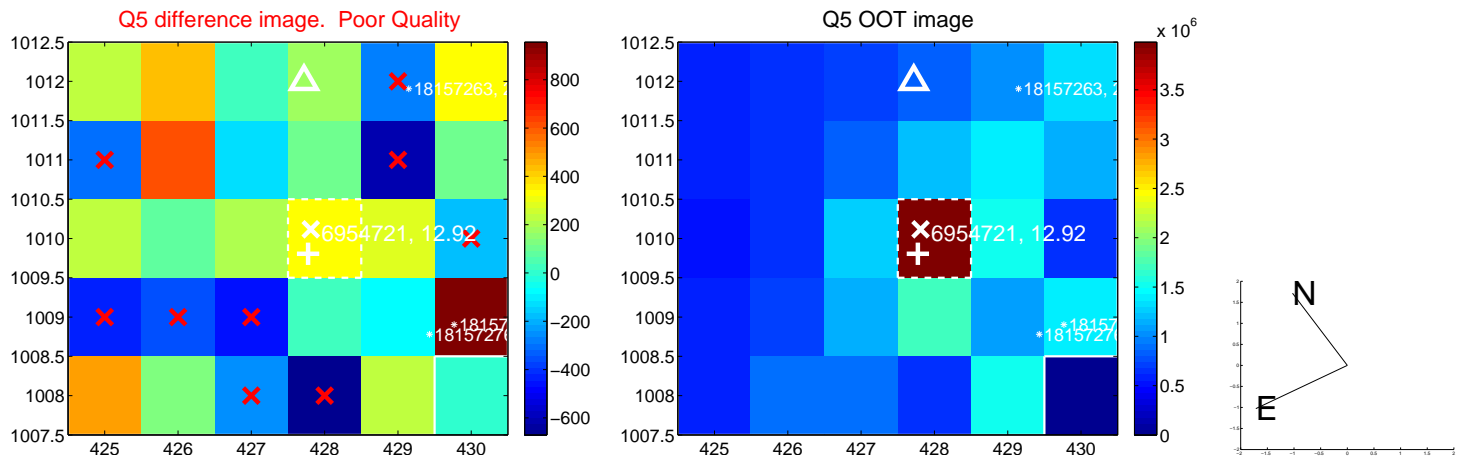
Q4 difference image. Poor Quality



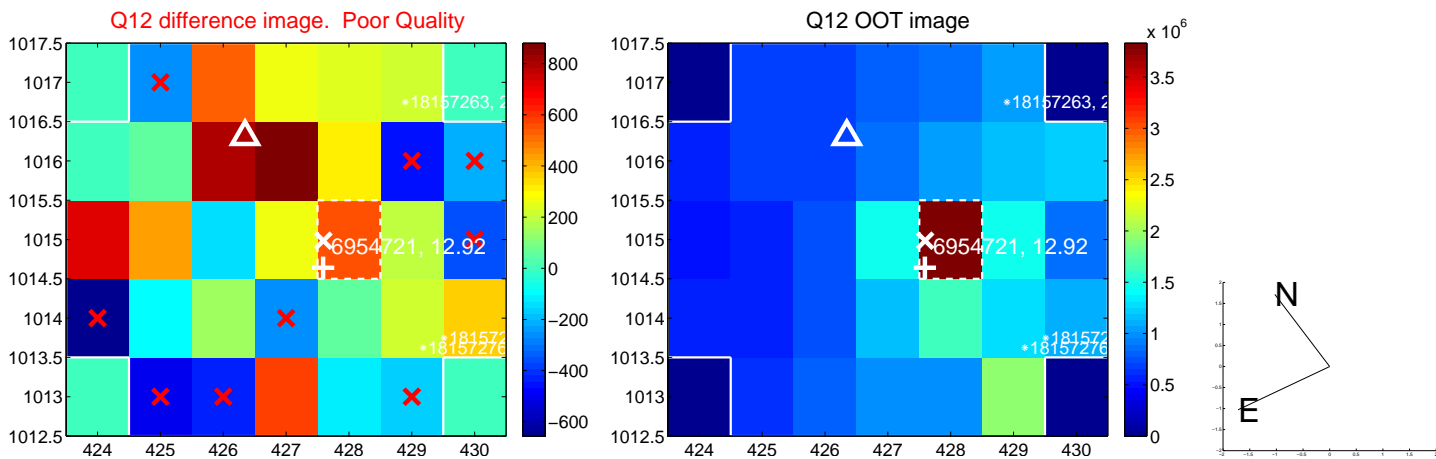
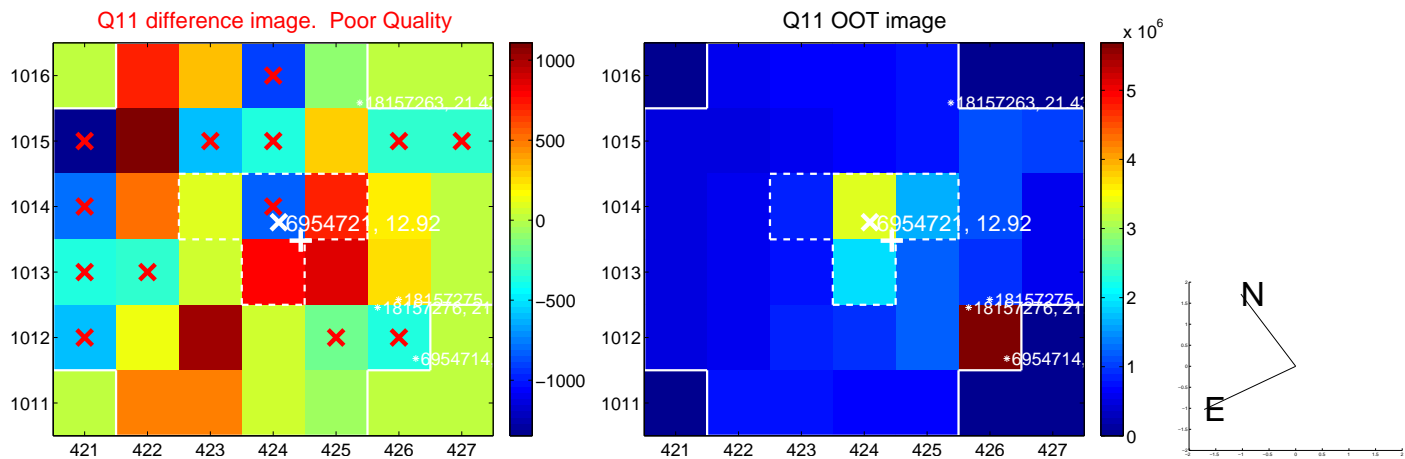
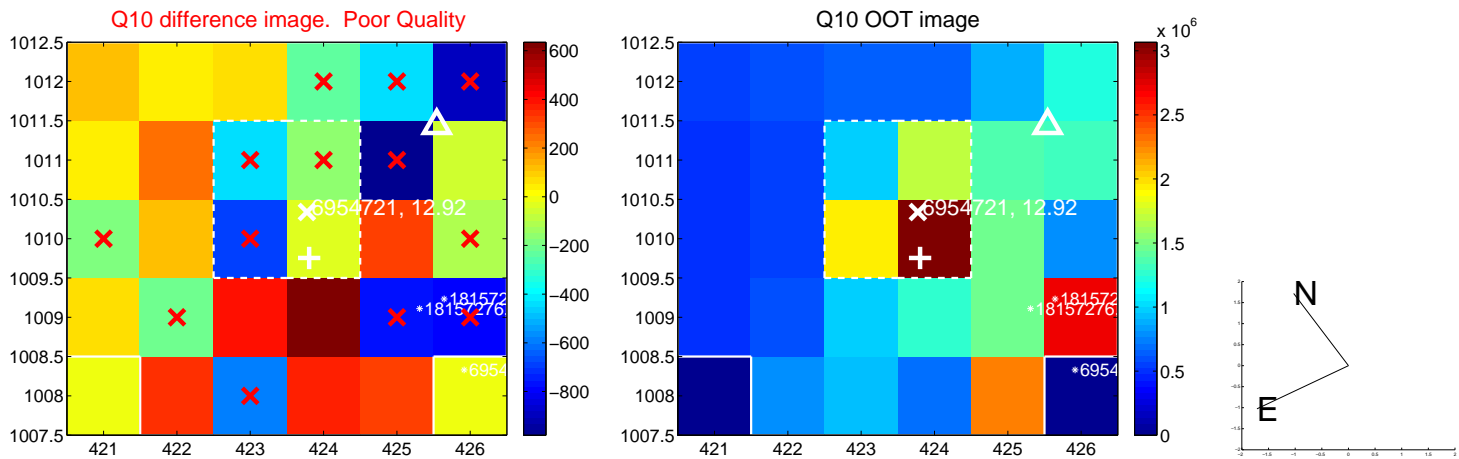
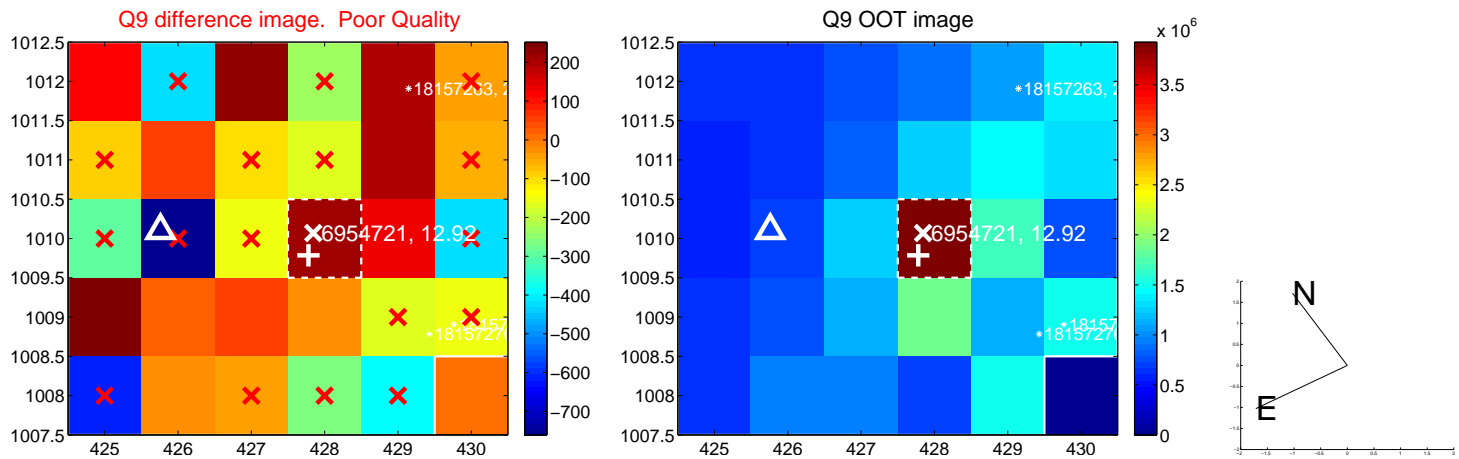
Q4 OOT image



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



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

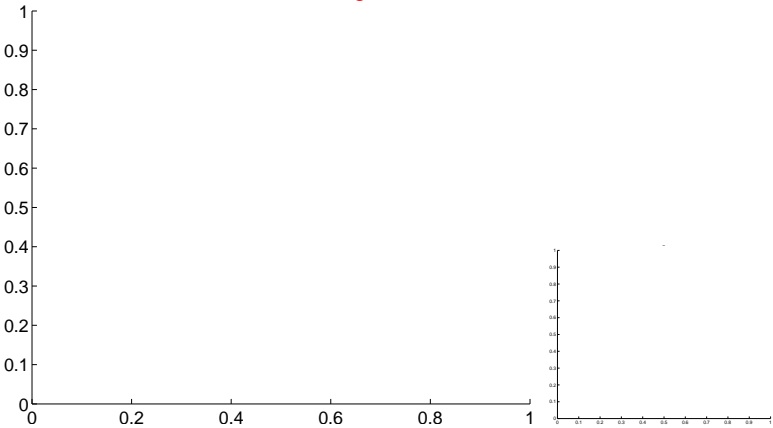


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

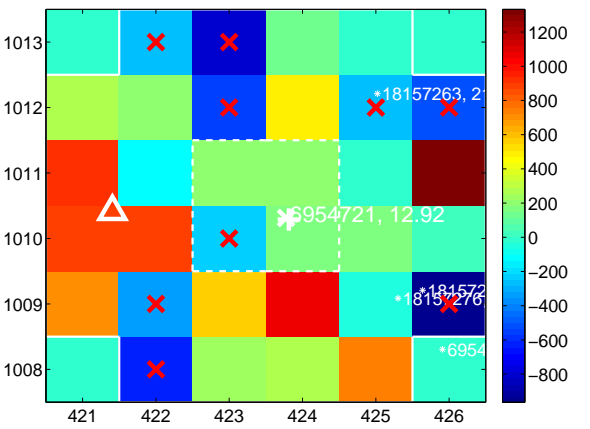
Q13 no difference image



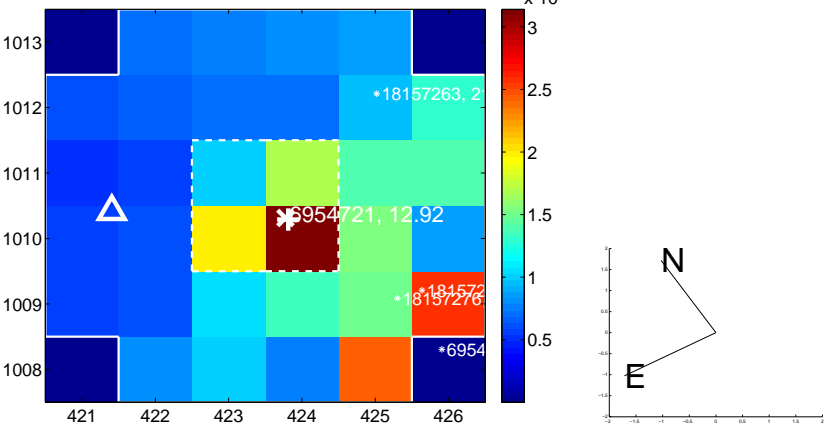
Q13 no OOT image



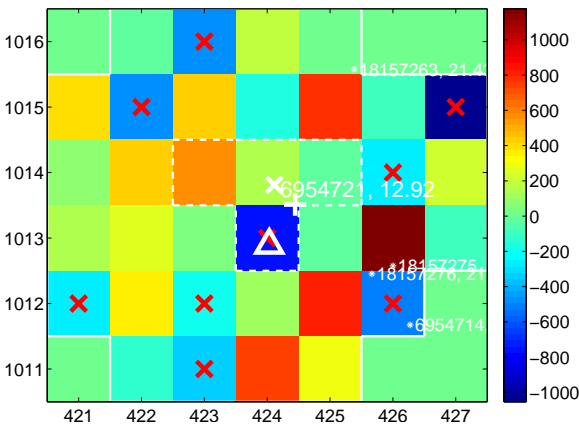
Q14 difference image. Poor Quality



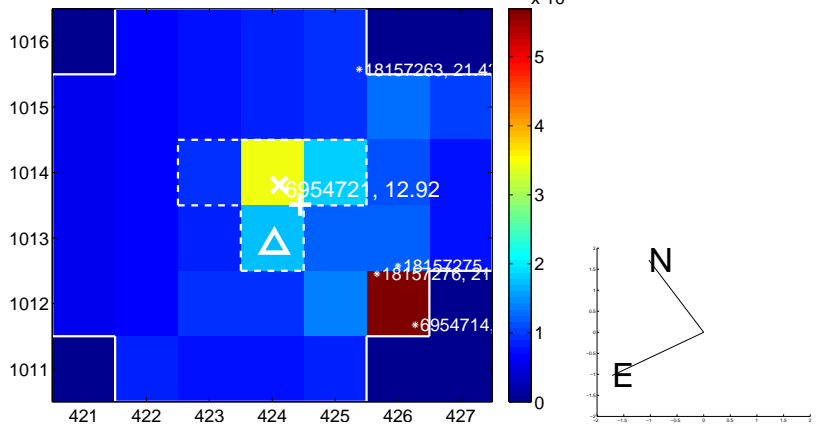
Q14 OOT image



Q15 difference image. Poor Quality



Q15 OOT image



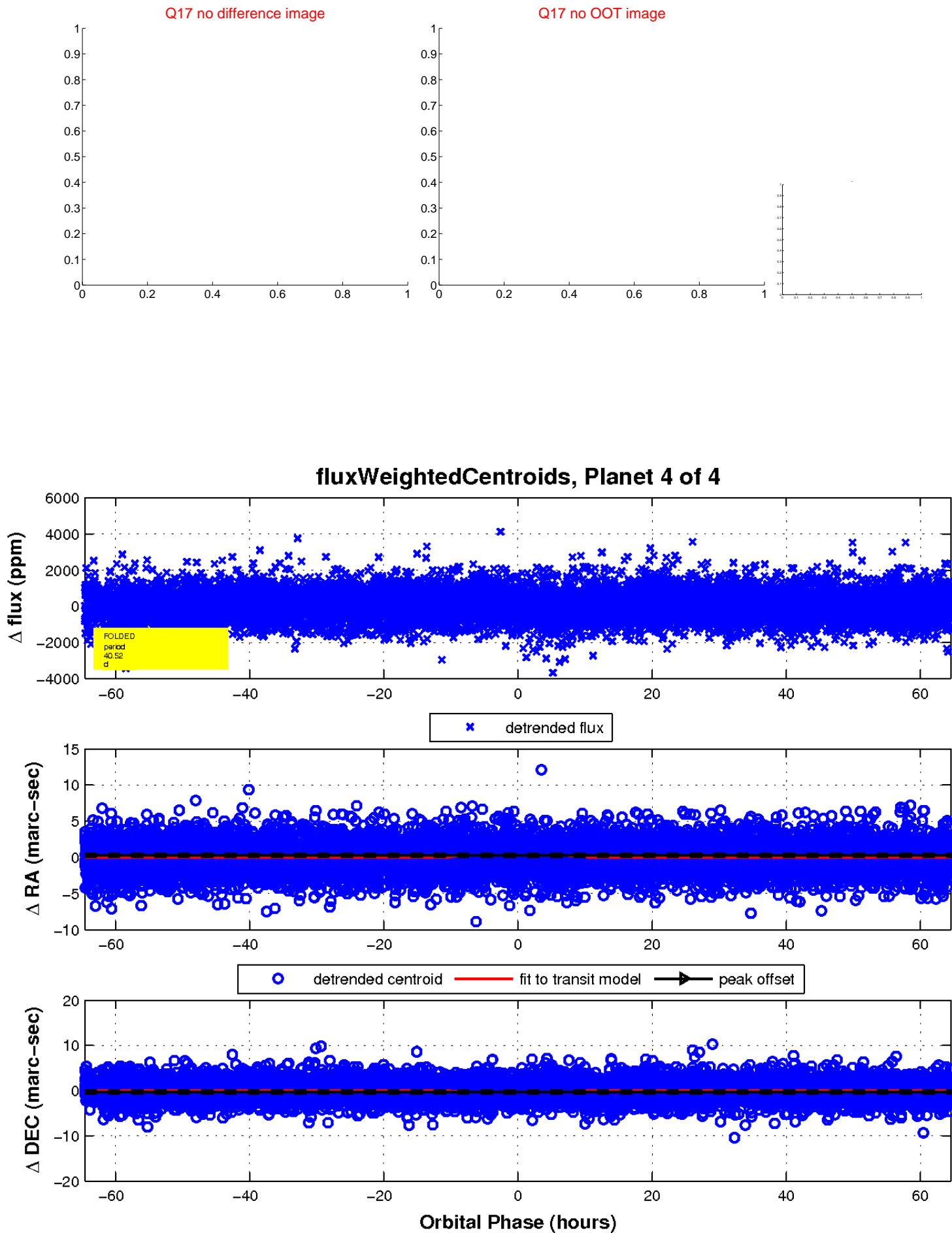
Q16 no difference image



Q16 no OOT image



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



UKIRT Image

Declination

