

# KIC 002715135

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
002715135-01	OBS	1024.01	5.747709	133.300020	821.4	1.968	44.5	50.1	0.63	4252	2.03	40.09
002715135-02	OBS	No	1.936738	132.295846	60.5	6.968	8.0	9.0	0.63	4252	0.49	171.00
002715135-03	OBS	No	235.031657	153.712023	951.3	8.780	9.5	9.6	0.63	4252	2.55	0.28
002715135-04	OBS	No	319.425436	387.156938	733.2	12.919	11.1	9.4	0.63	4252	1.87	0.19

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
002715135-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
002715135-02	OBS	FP	0.00	1	0	1	0	LPP_DV—CENT_RESOLVED_OFFSET
002715135-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—CENT_FEW_DIFFS
002715135-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—CENT_FEW_DIFFS

**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.

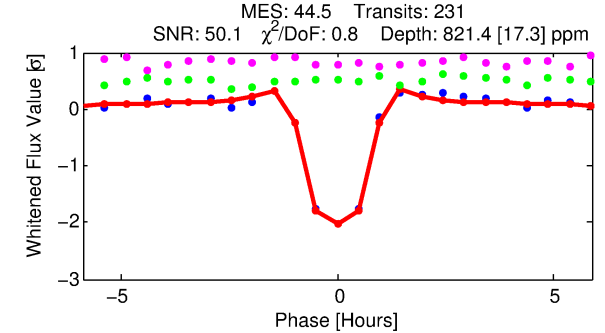
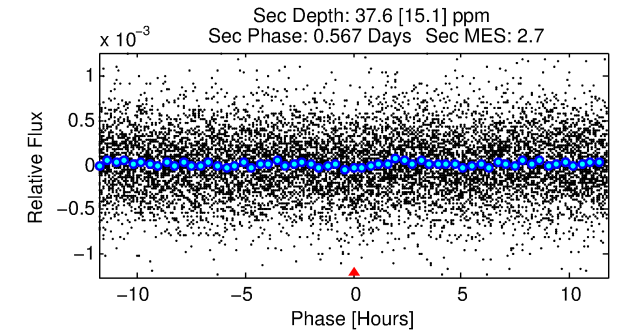
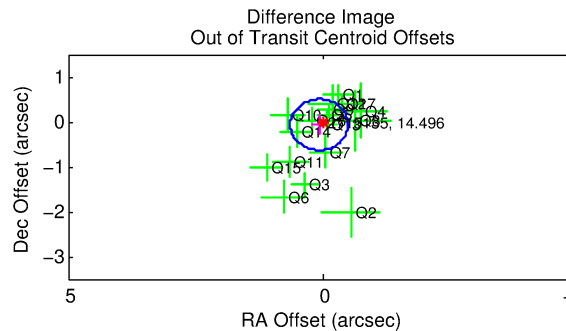
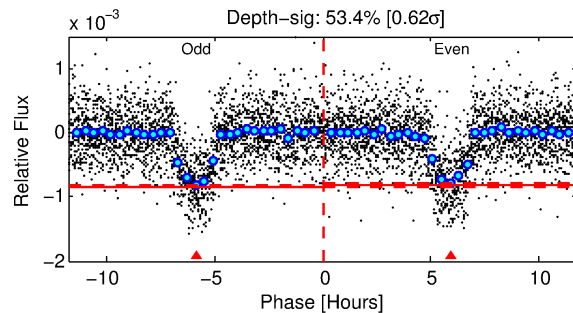
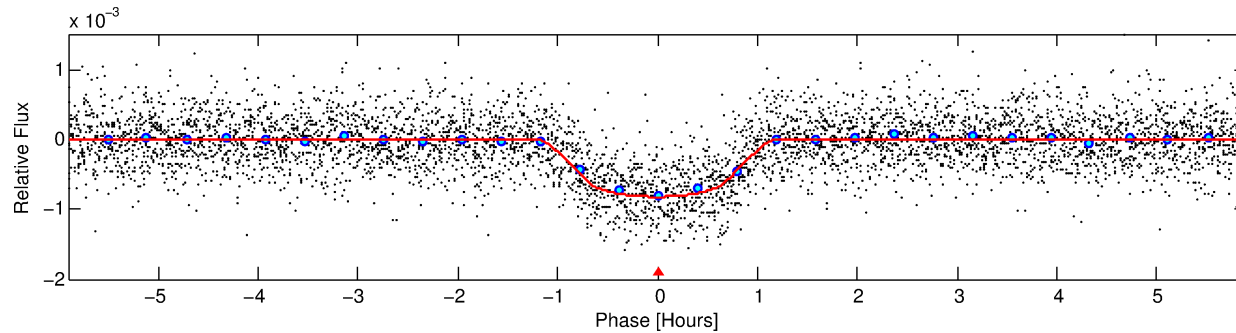
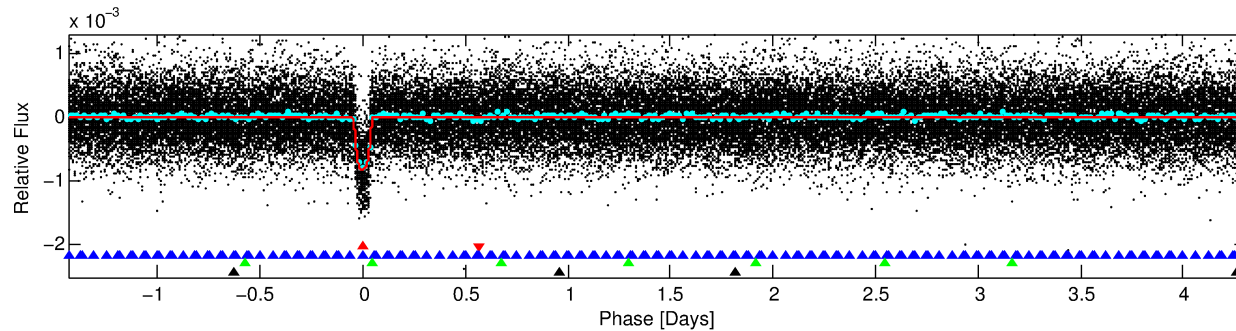
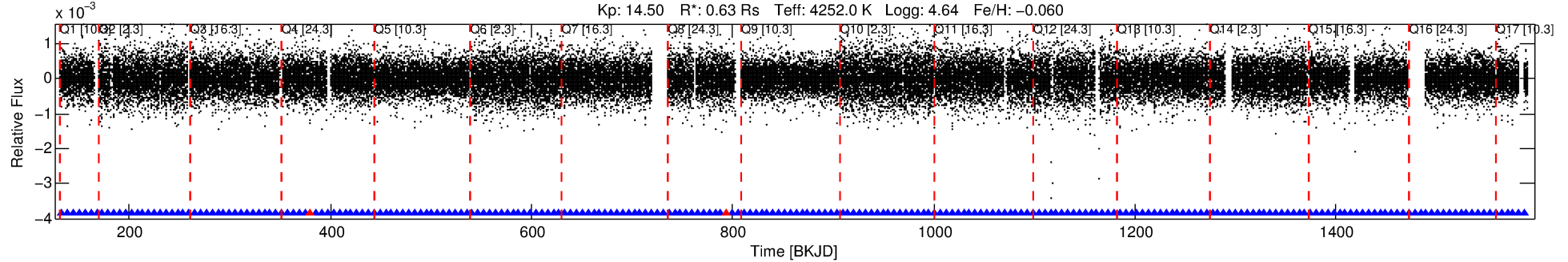
Ephemeris Match Information For 002715135-01

No Significant Match Found

# DV One-Page Summary

KIC: 2715135 Candidate: 1 of 4 Period: 5.748 d  
KOI: K01024.01 Corr: 0.962

Kp: 14.50 R\*: 0.63 Rs Teff: 4252.0 K Logg: 4.64 Fe/H: -0.060



## DV Fit Results:

Period = 5.74771 [0.00001] d  
Epoch = 133.3000 [0.0007] BKJD  
Rp/R\* = 0.0295 [0.0070]  
a/R\* = 14.67 [11.70]  
b = 0.79 [0.39]  
Seff = 40.09 [3.89]  
Teq = 642 [16] K  
Rp = 2.03 [0.49] Re  
a = 0.0540 [0.0022] AU  
Ag = 14.60 [9.11] [1.49σ]  
Teffp = 1939 [304] K [4.27σ]

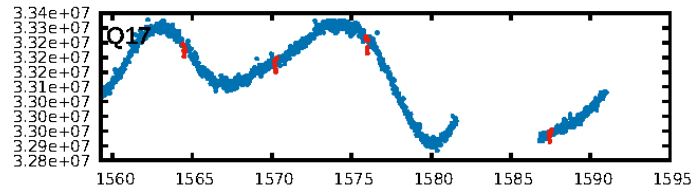
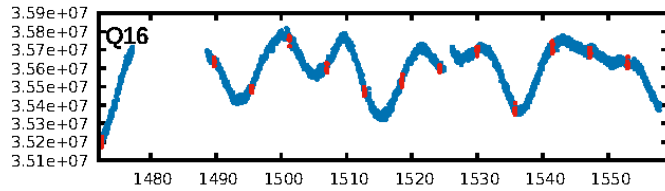
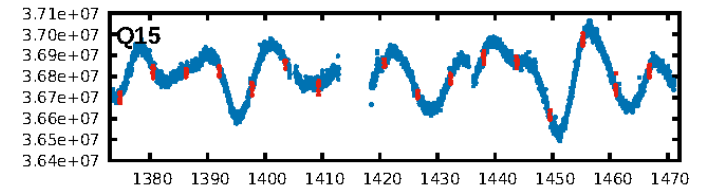
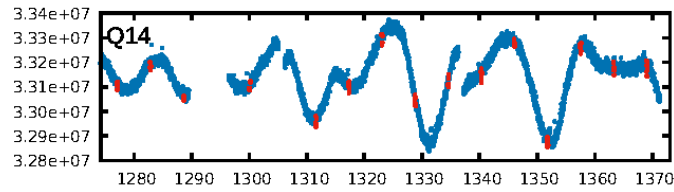
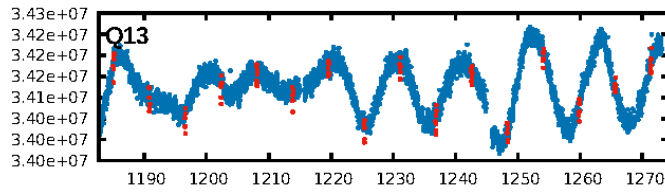
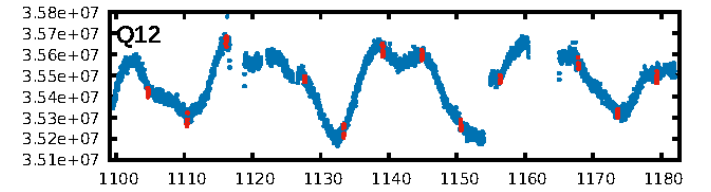
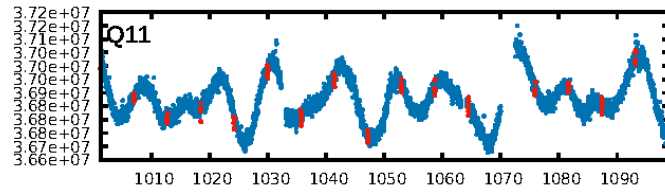
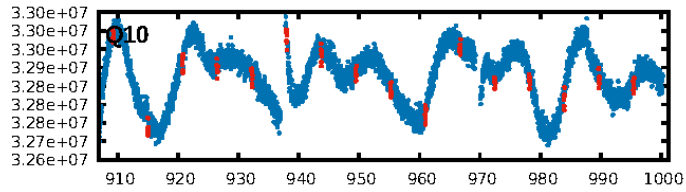
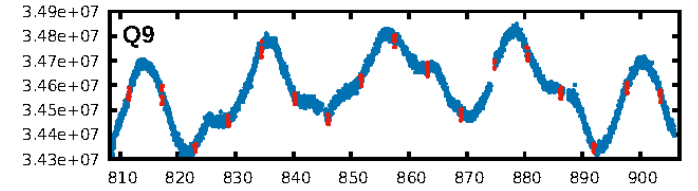
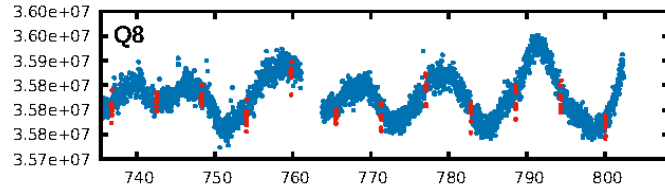
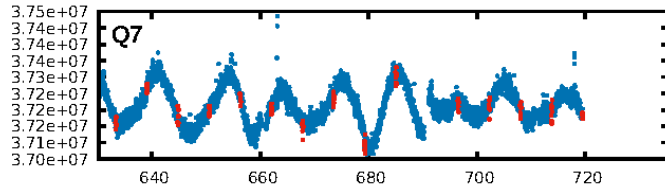
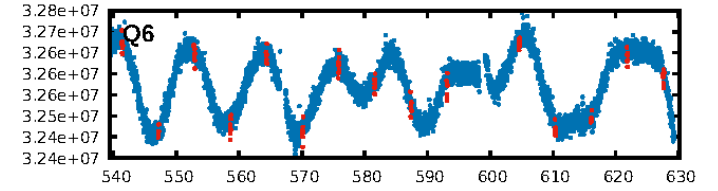
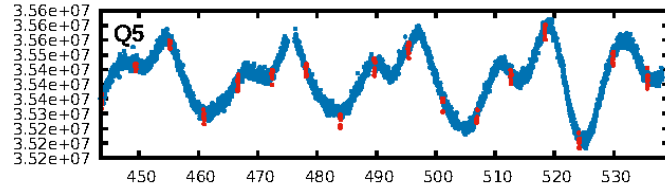
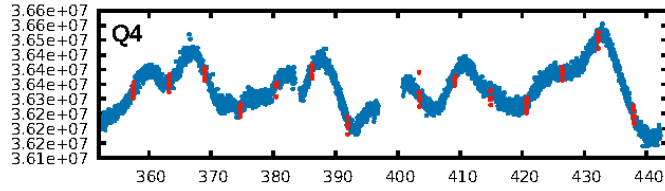
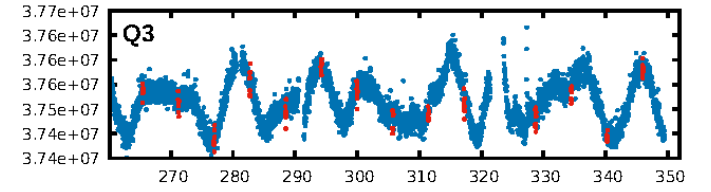
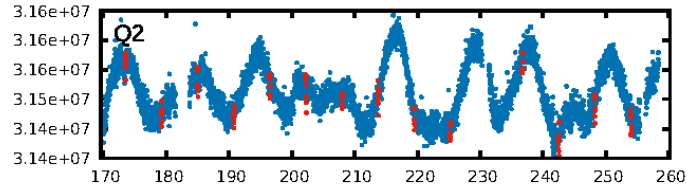
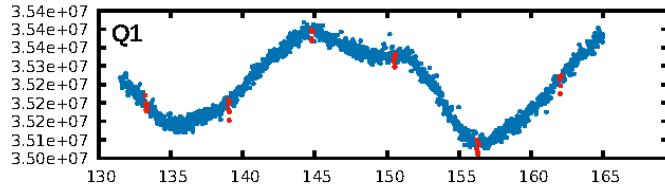
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [12.63σ]  
LongPeriod-sig: 100.0% [611.60σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 0.99 [219/221]  
GhostDiagnostic-chr: 3.254  
Centroid-sig: 0.0%  
Centroid-so: 0.225 arcsec [1.02σ]  
OotOffset-rm: 0.097 arcsec [0.51σ]  
KicOffset-rm: 0.354 arcsec [2.40σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 1.00 [17/17]

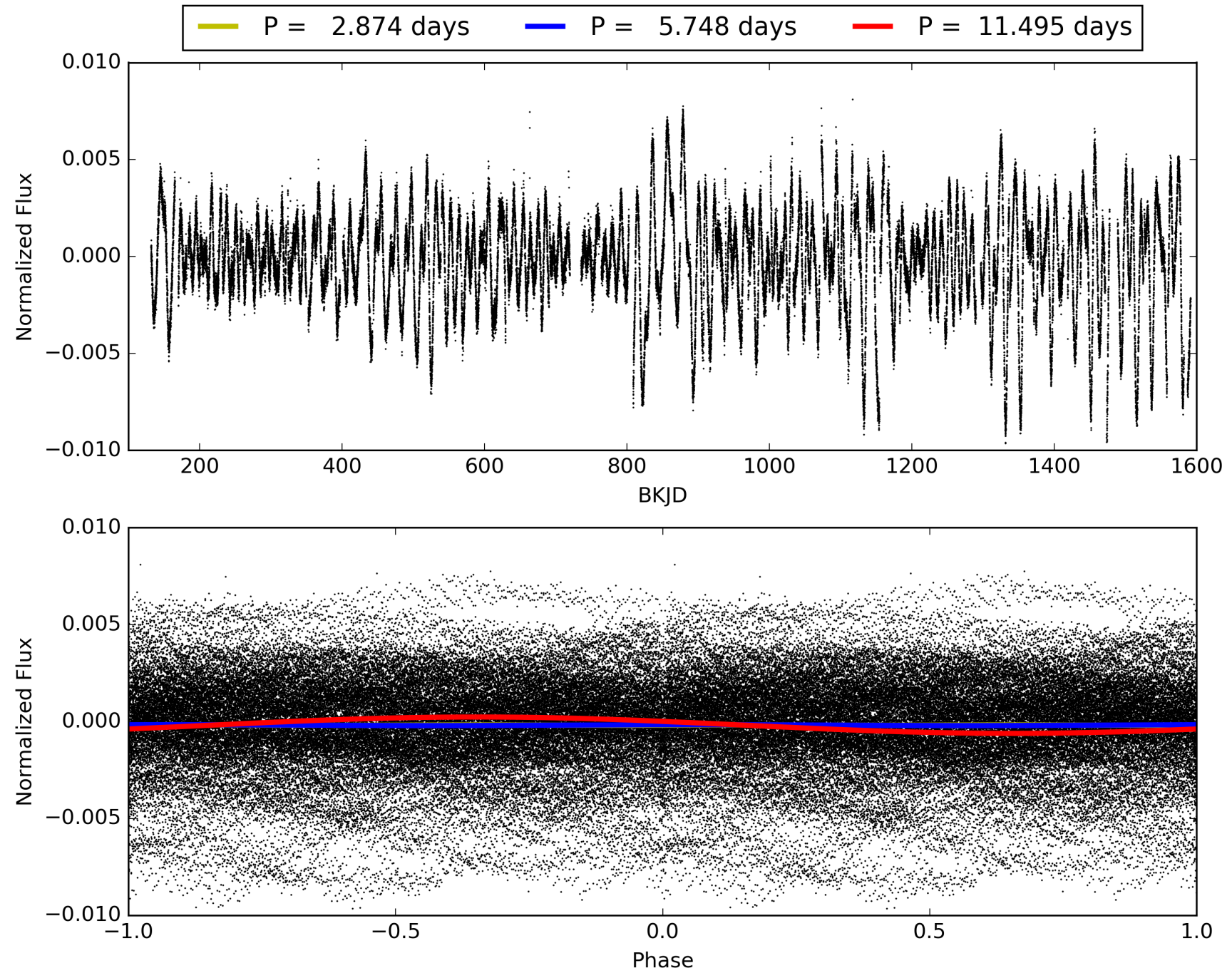
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This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 002715135-01, PDC Light Curves



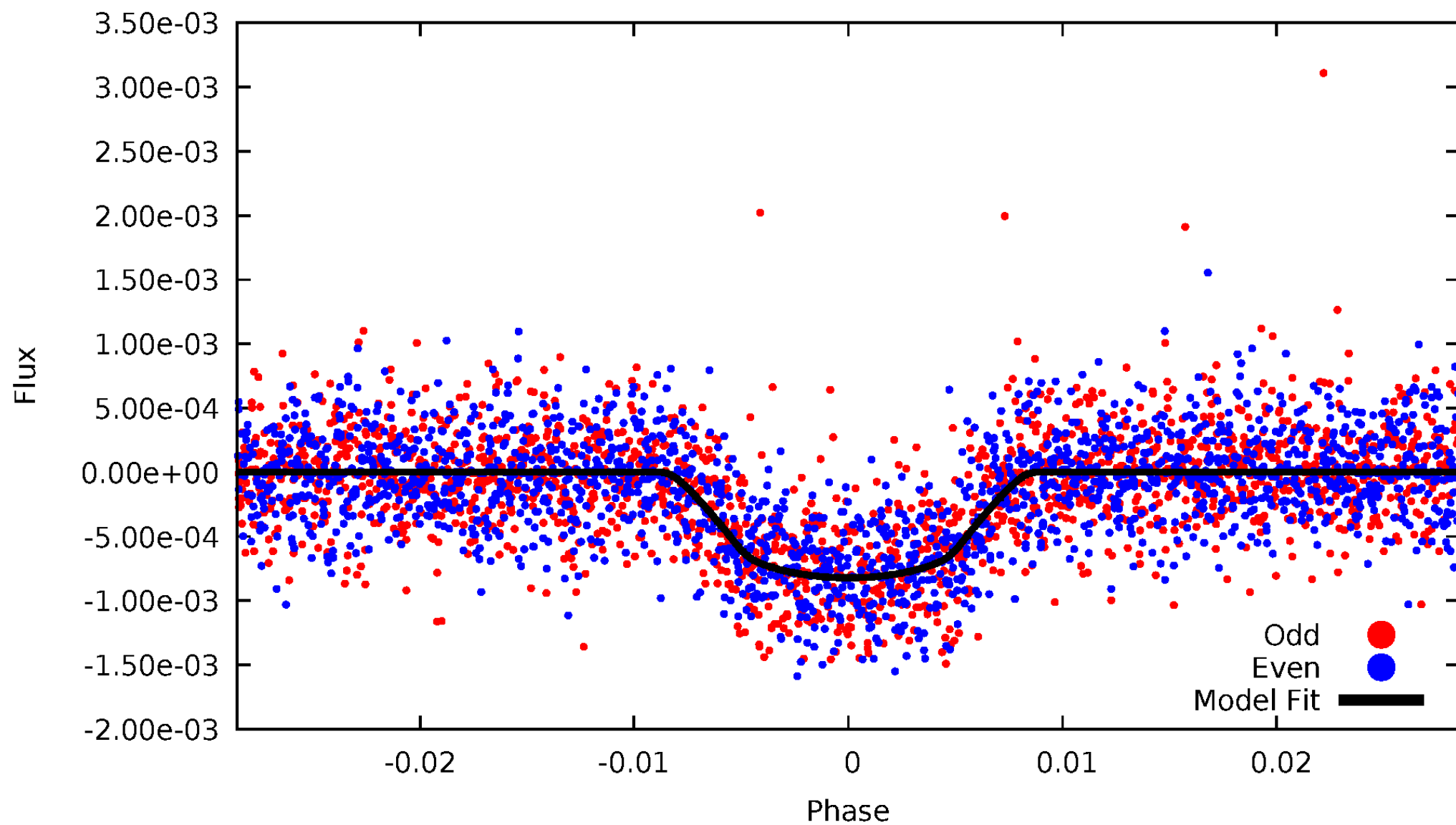
TCE 002715135-01





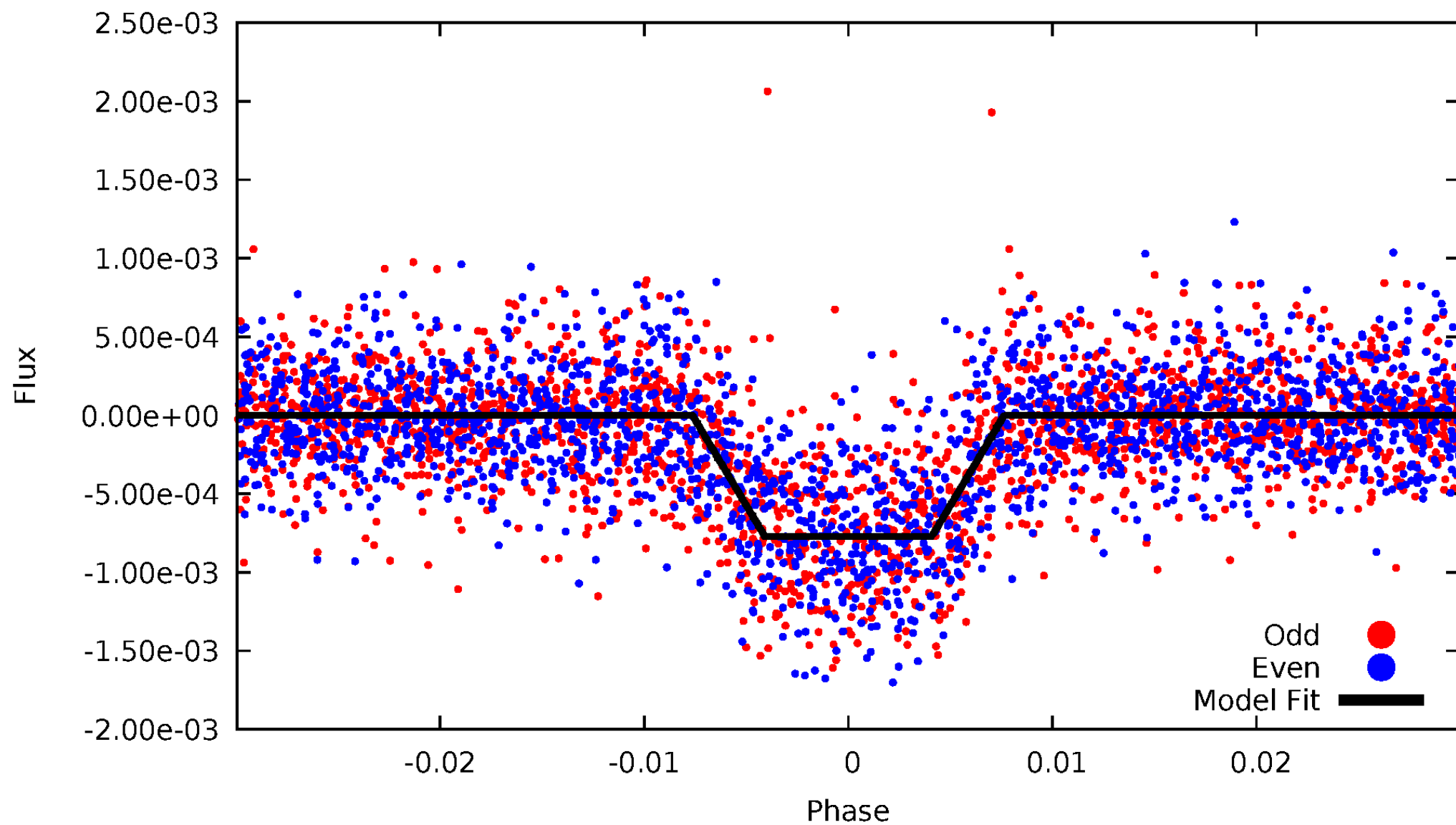
# DV Odd/Even

TCE 002715135-01



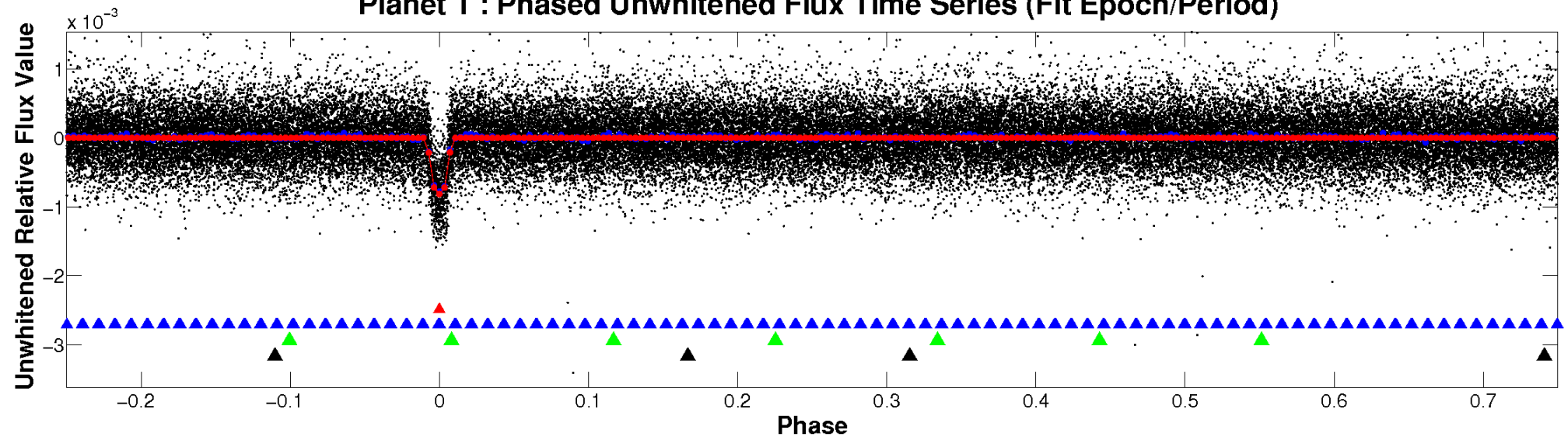
# ALT Odd/Even

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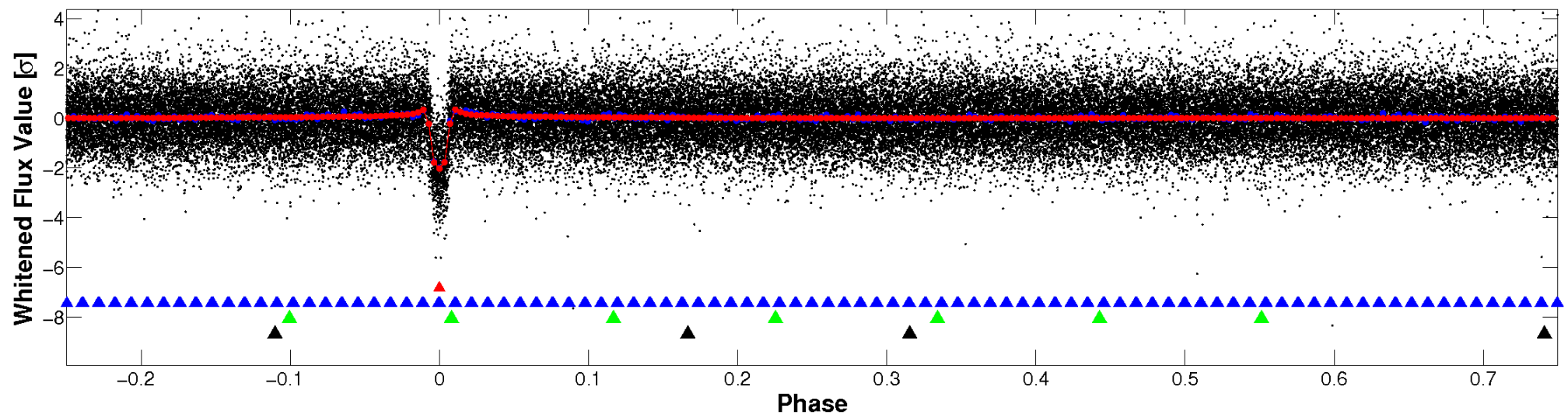


# Non-Whitened Vs. Whitened Light Curve

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

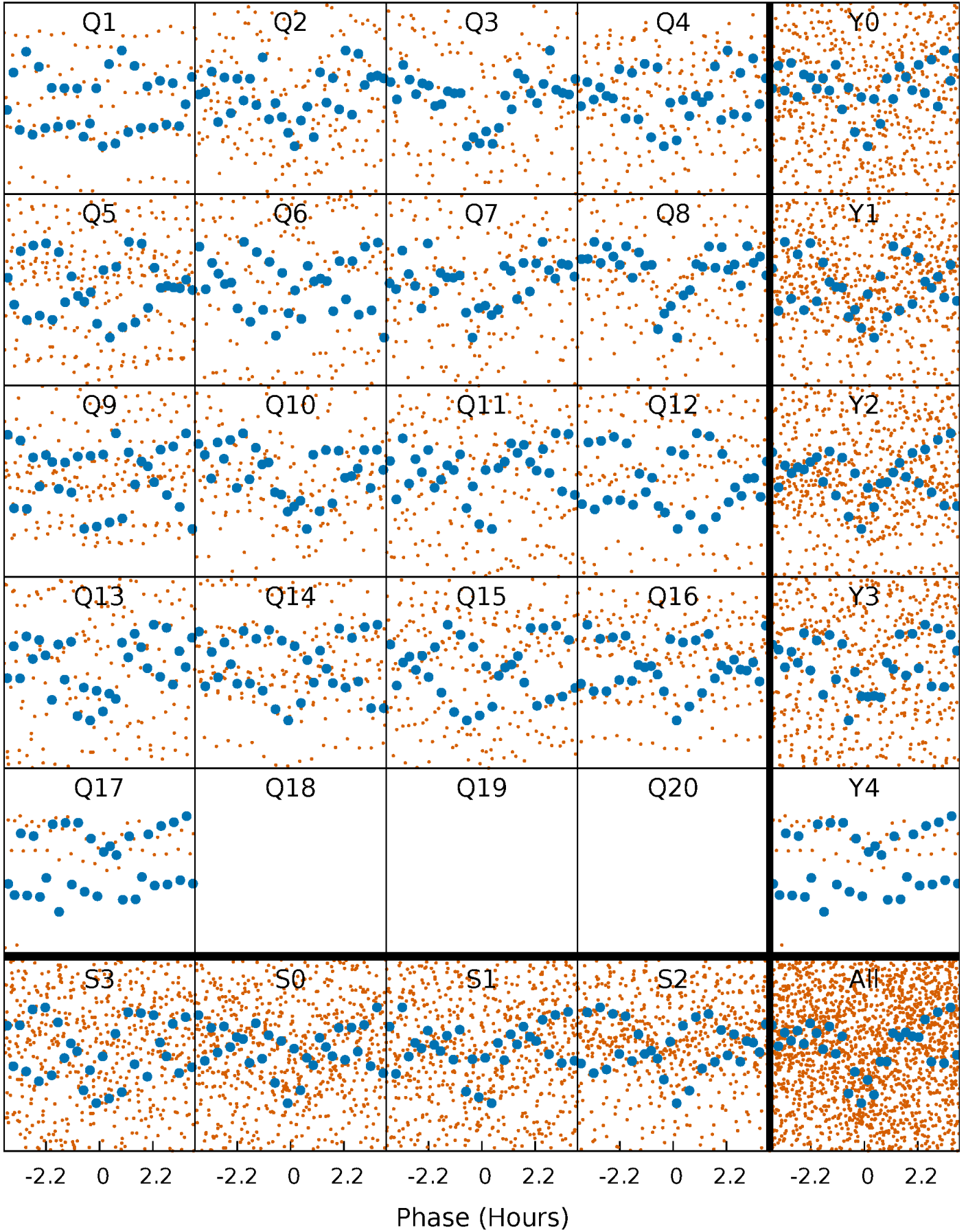


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

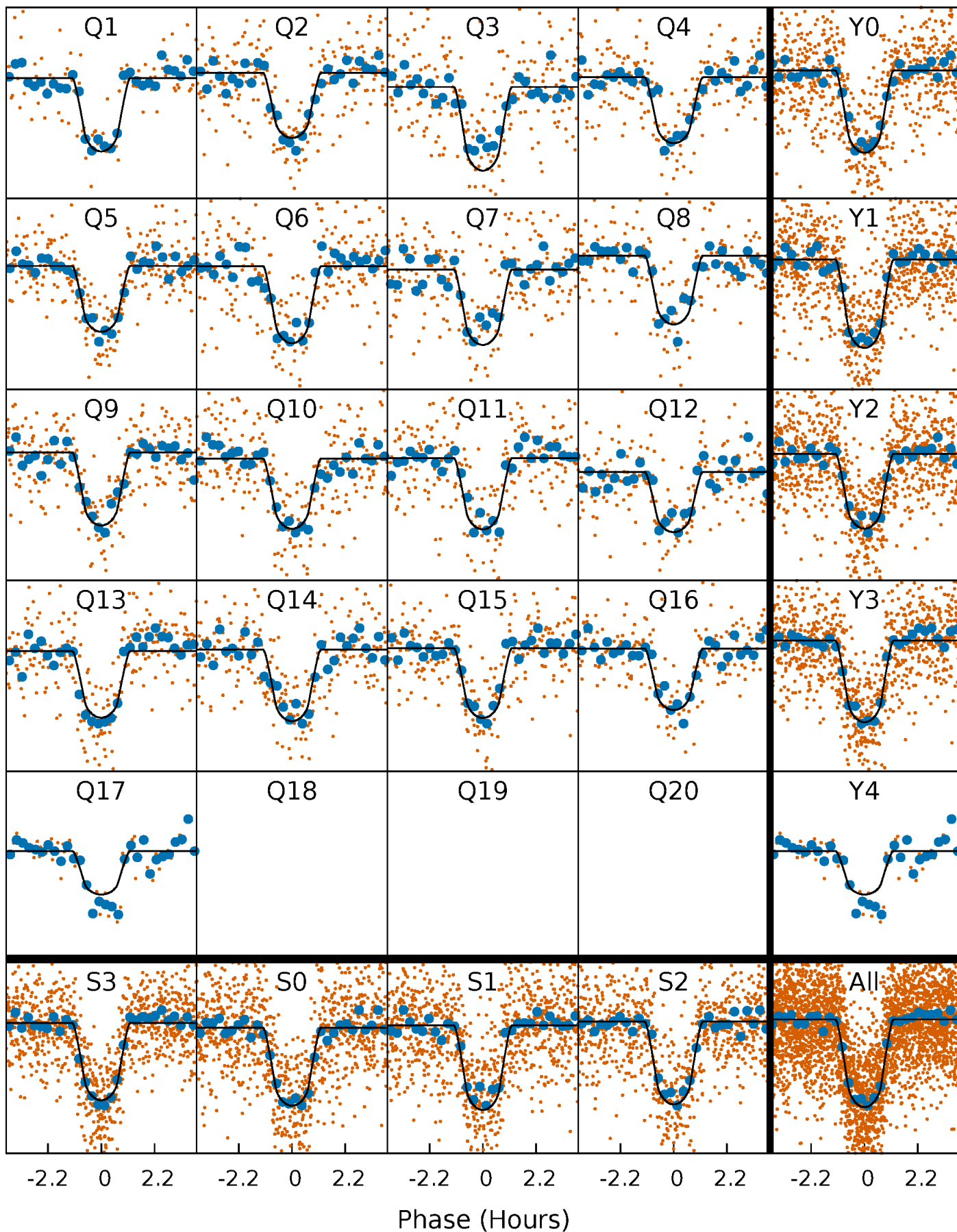
TCE 002715135-01 P= 5.747709 Days  $T_0=133.300020$  (BKJD)





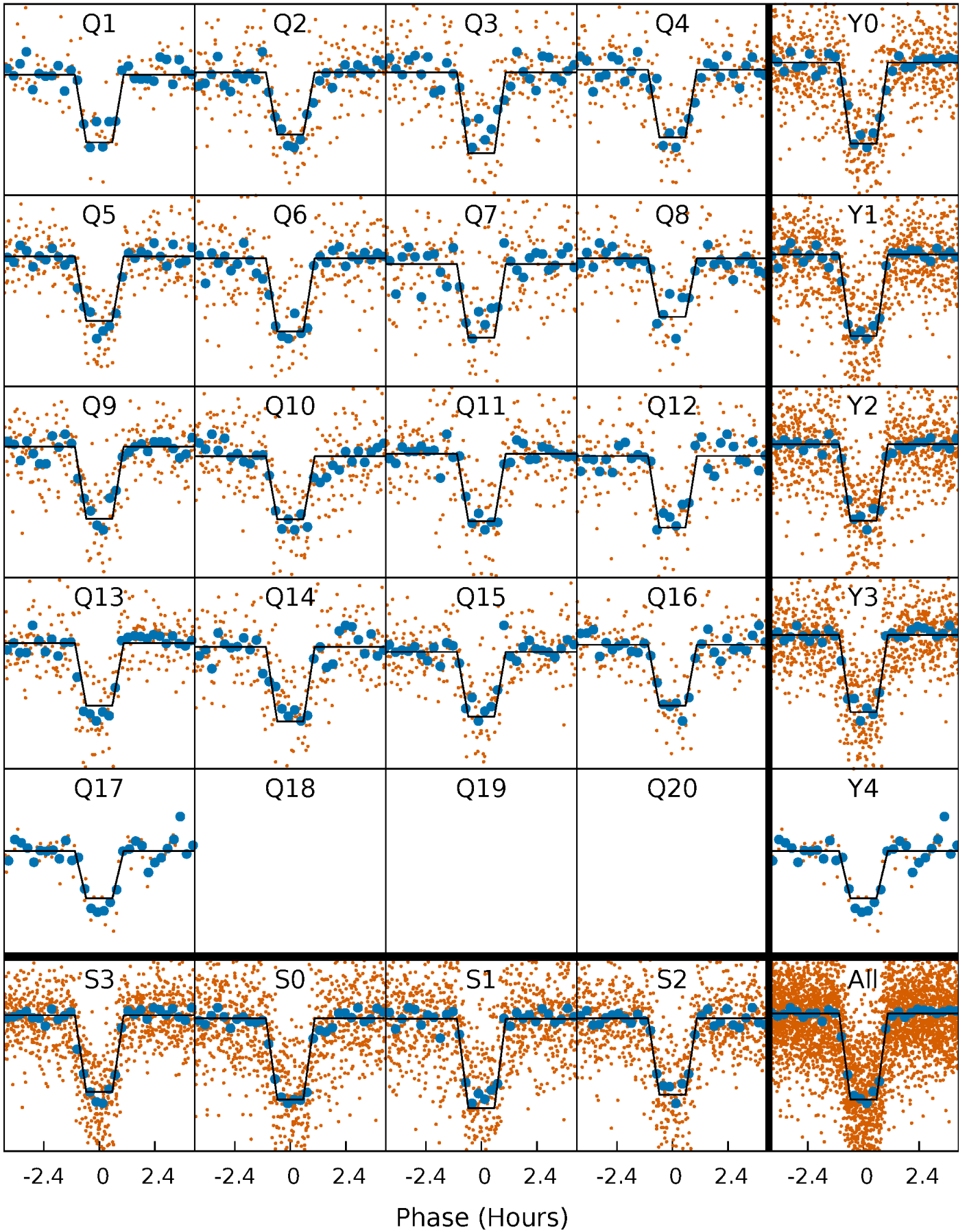
# DV Quarter-Phased Transit Curves

TCE 002715135-01 P= 5.747709 Days  $T_0=133.300020$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

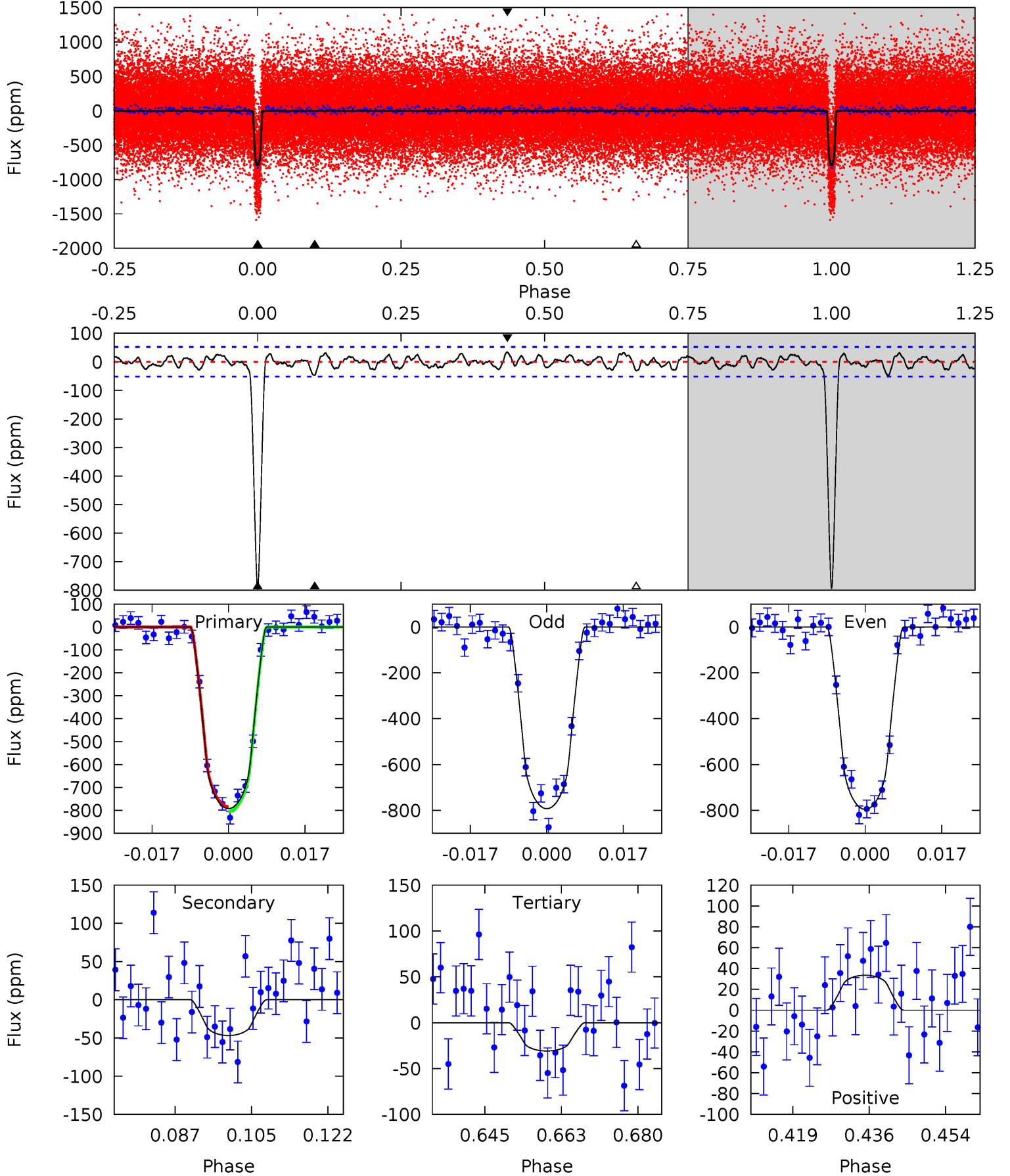
TCE 002715135-01 P= 5.747723 Days  $T_0=133.298434$  (BKJD)



# DV Model-Shift Uniqueness Test

002715135-01, P = 5.747709 Days, E = 127.552311 Days

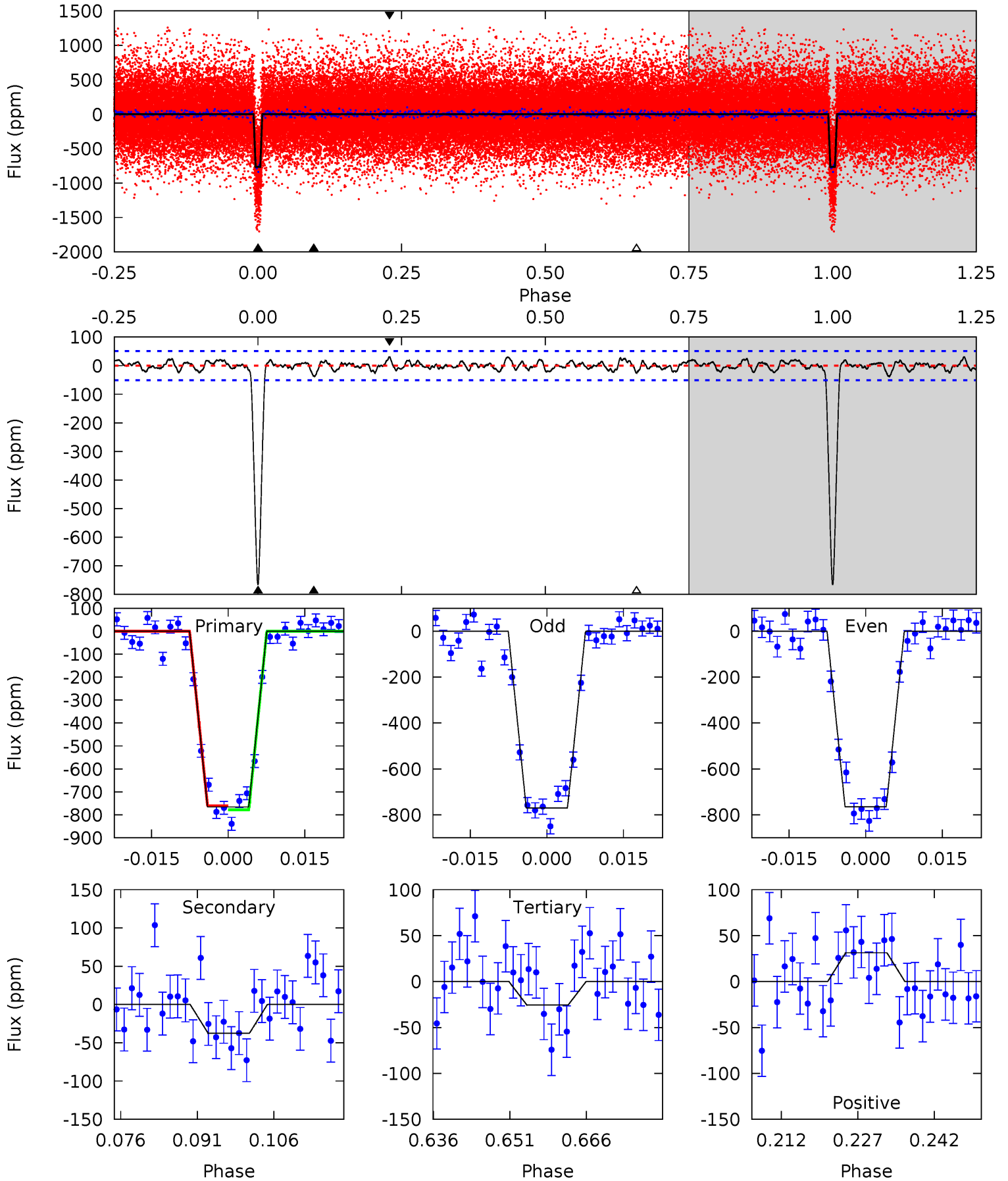
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
75.4	4.46	2.95	3.20	4.92	2.38	1.37	72.5	72.2	1.51	1.26	0.14	1.00	0.04	1.00



# Alt Model-Shift Uniqueness Test

002715135-01, P = 5.747723 Days, E = 127.550711 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
74.6	3.67	2.49	3.05	4.95	2.43	1.11	72.1	71.5	1.17	0.62	0.27	1.01	0.04	0.87





### Stellar Parameters For KIC 002715135

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4252^{+84}_{-84}$	$4.640^{+0.030}_{-0.017}$	$-0.060^{+0.150}_{-0.150}$	$0.632^{+0.025}_{-0.031}$	$0.637^{+0.032}_{-0.032}$	$3.552^{+0.431}_{-0.284}$
	+2%/-2%	+1%/-0%	+250%/-250%	+4%/-5%	+5%/-5%	+12%/-8%
Source	SPE60	SPE60	SPE60	DSEP		

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

### Secondary Eclipse Parameters for KIC 002715135-01 / KOI 1024.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-47 \pm 11$	$2.03^{+0.49}_{-0.51}$	$896^{+18}_{-20}$	$2699^{+236}_{-181}$	$18^{+15}_{-7}$
Alt.	$-38 \pm 10$	$1.91^{+0.50}_{-0.50}$	$893^{+20}_{-20}$	$2666^{+223}_{-202}$	$17^{+14}_{-7}$

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

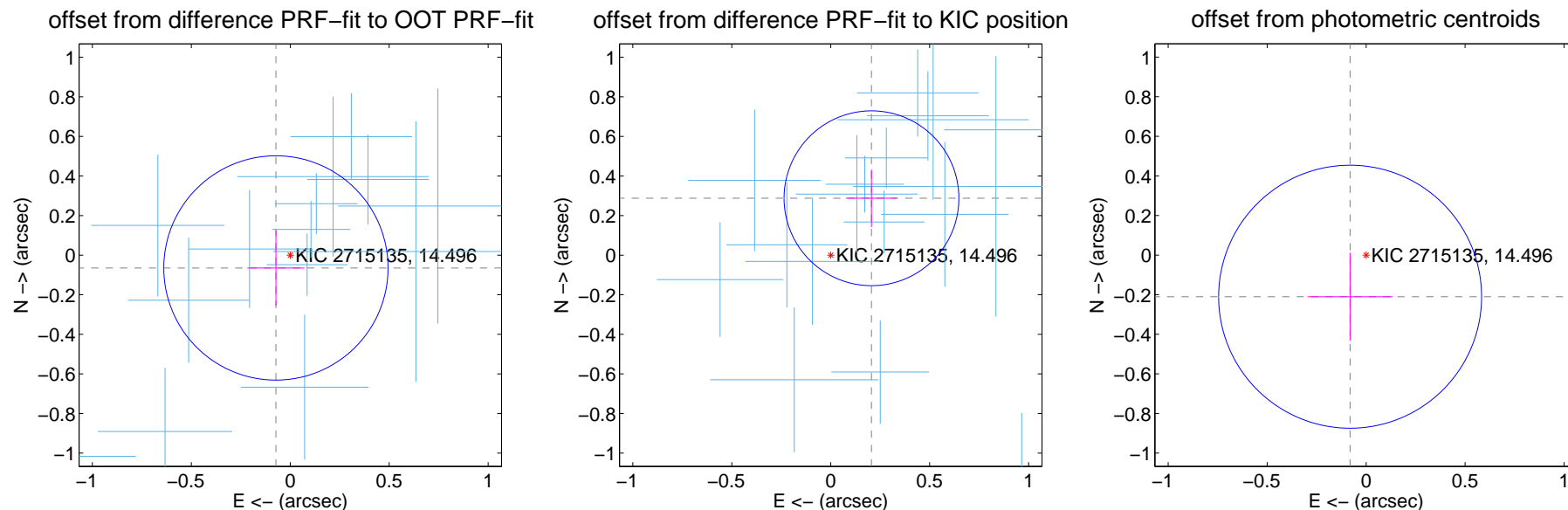
## DV Centroid Data

Supplemental centroid analysis for 002715135-01. Kepler magnitude: 14.50. Transit SNR 50.14

There are 17 quarters with good PRF difference image offsets

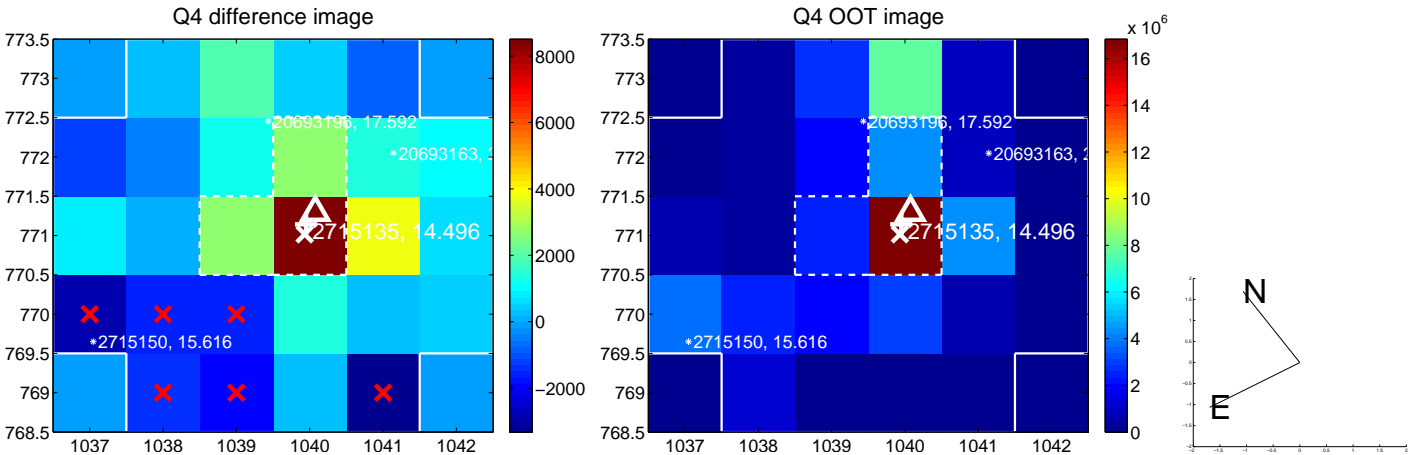
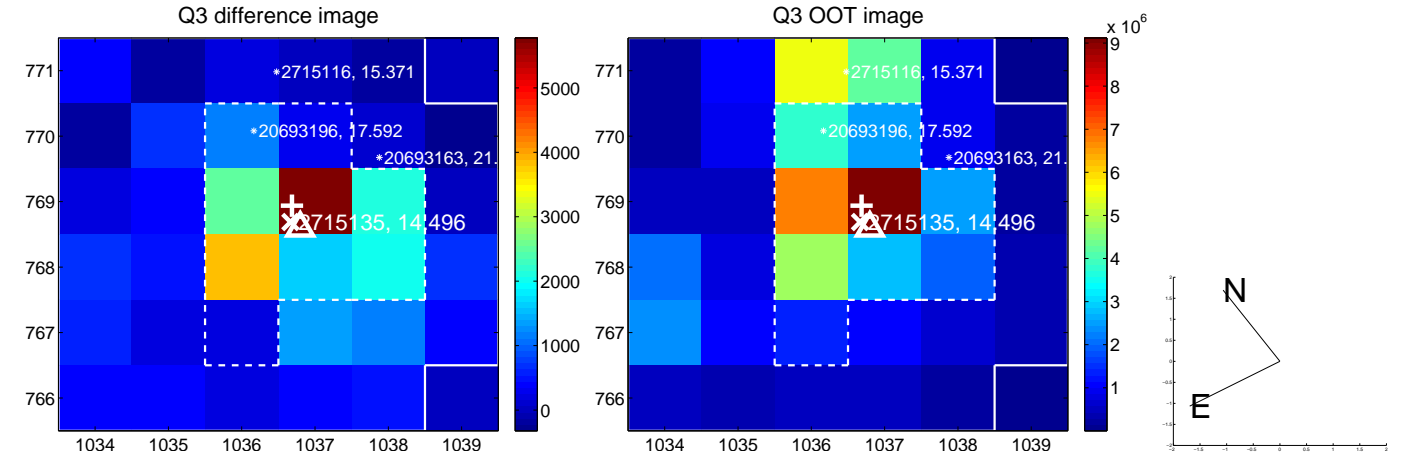
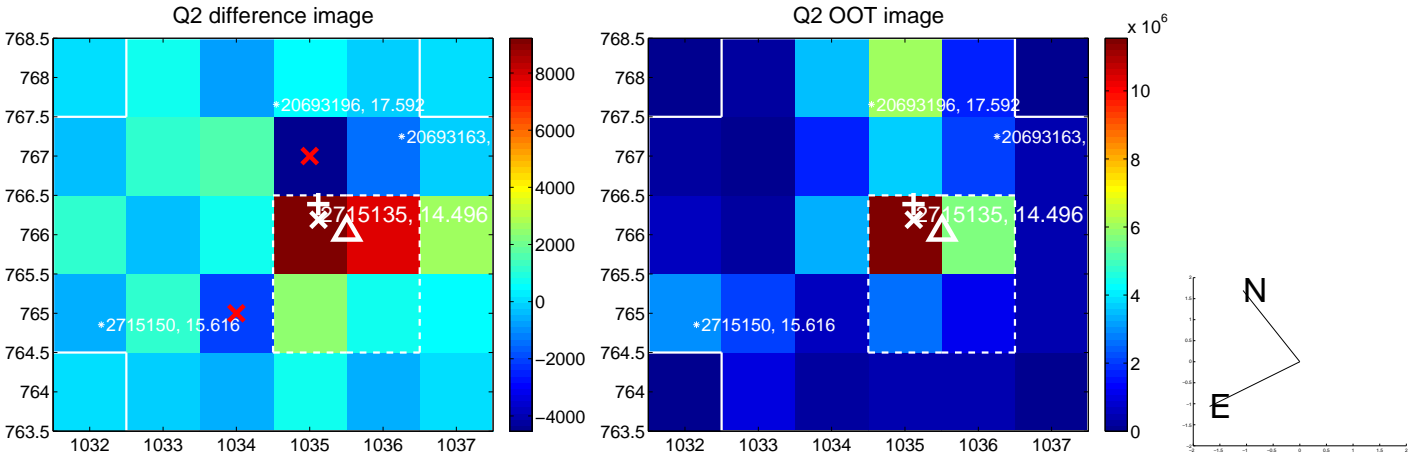
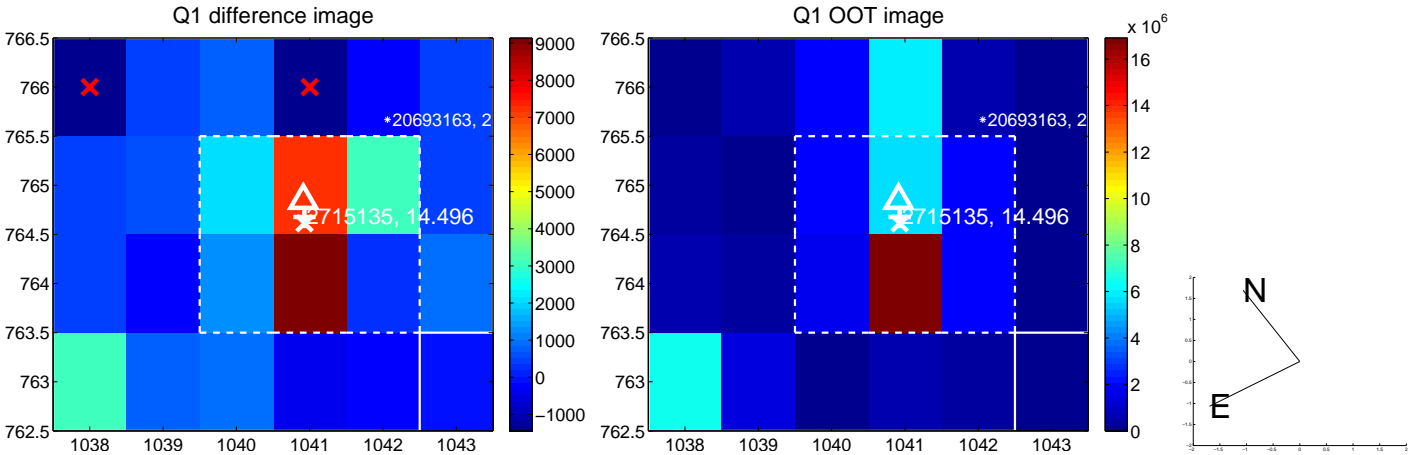
The direct PRF centroid is offset from the target star catalog position by about 0.34 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.097 \pm 0.189$	0.51	$0.073 \pm 0.145$	$-0.065 \pm 0.191$
PRF-fit source offset from KIC position	$0.354 \pm 0.147$	2.40	$-0.206 \pm 0.129$	$0.287 \pm 0.146$
photometric centroid source offset	$0.23 \pm 0.22$	1.02	$0.08 \pm 0.21$	$-0.21 \pm 0.22$

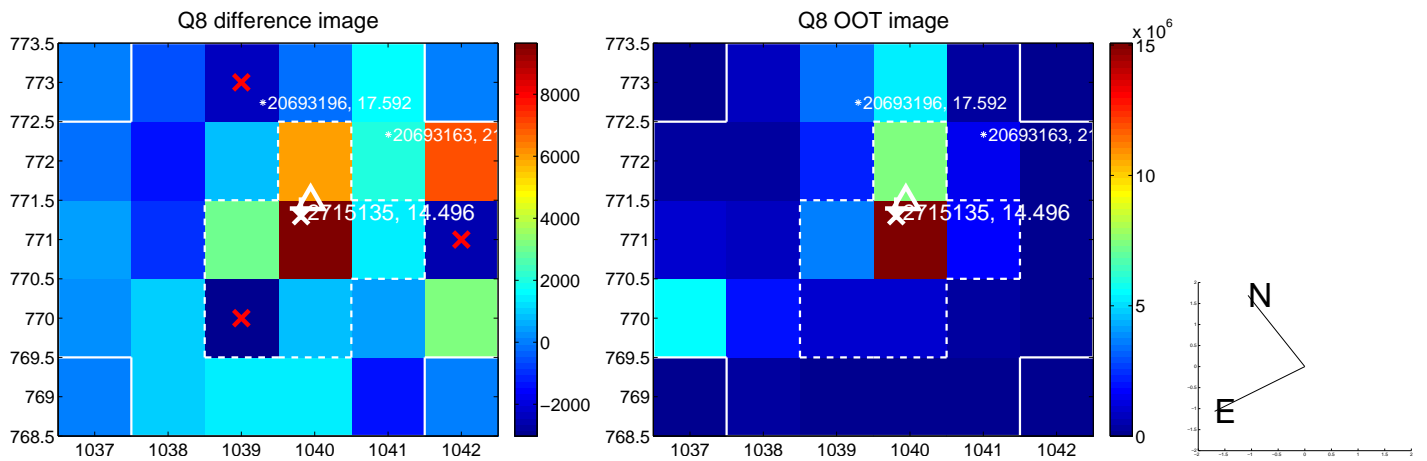
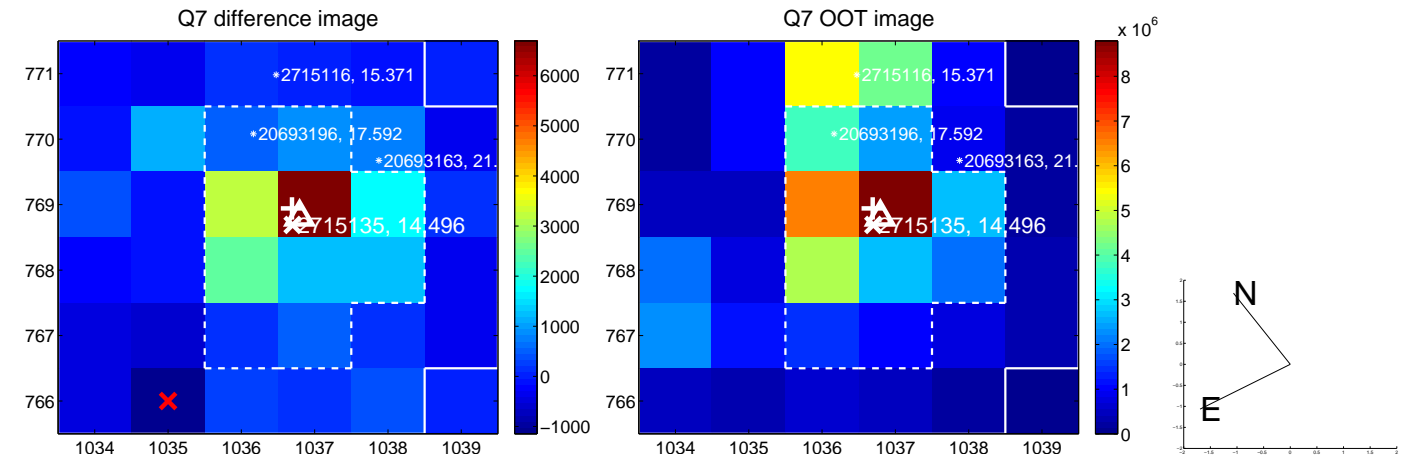
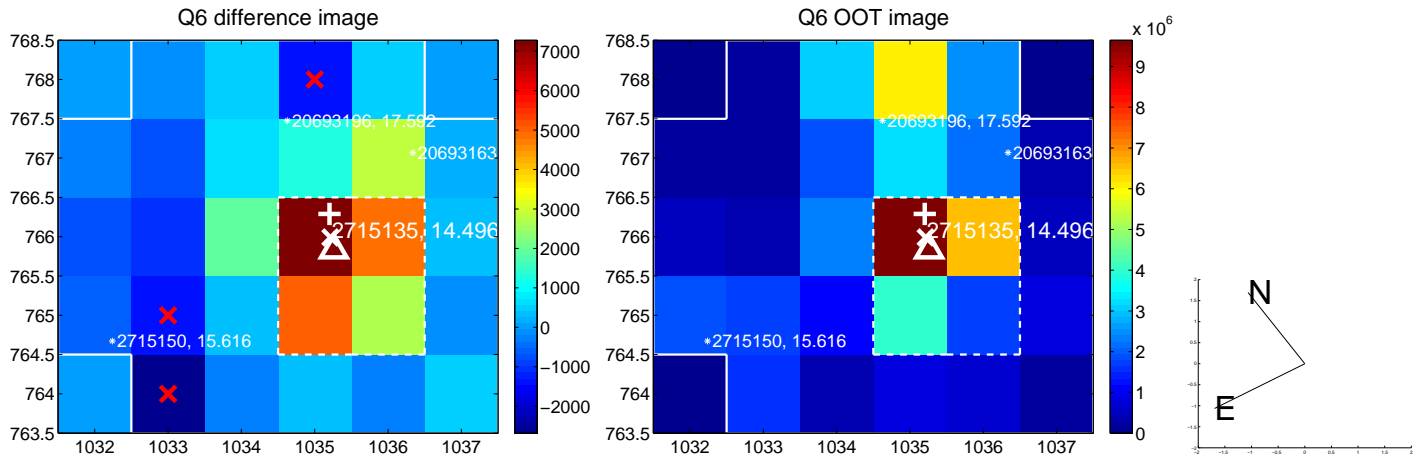
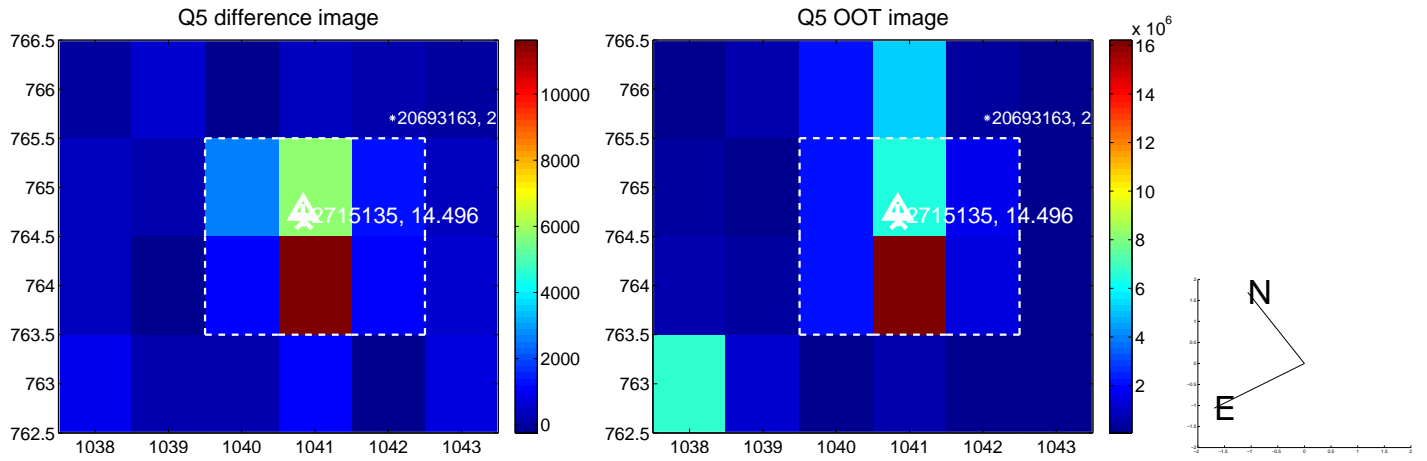


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

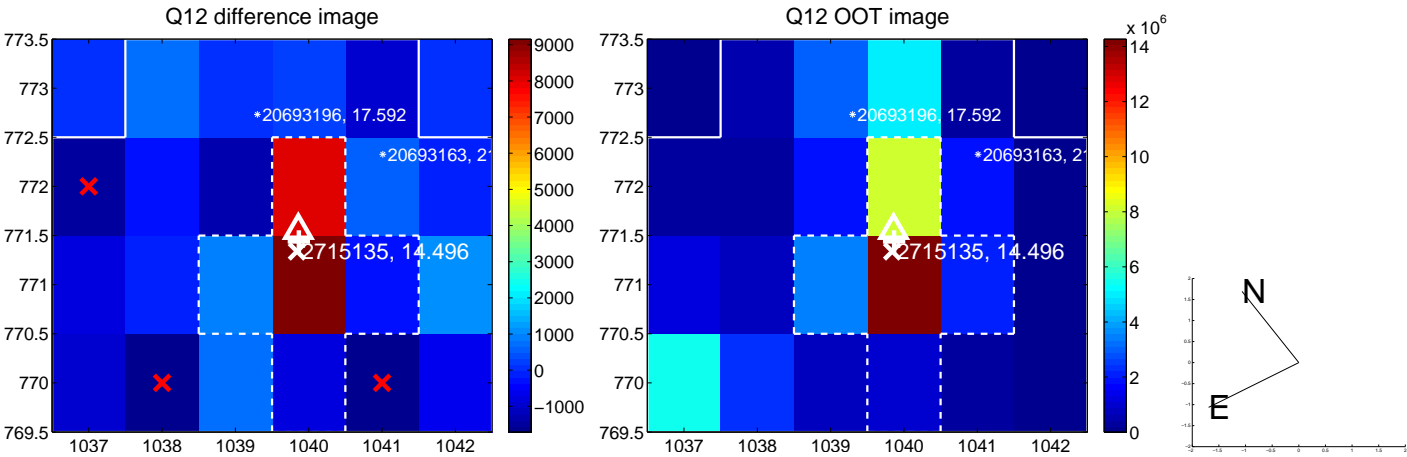
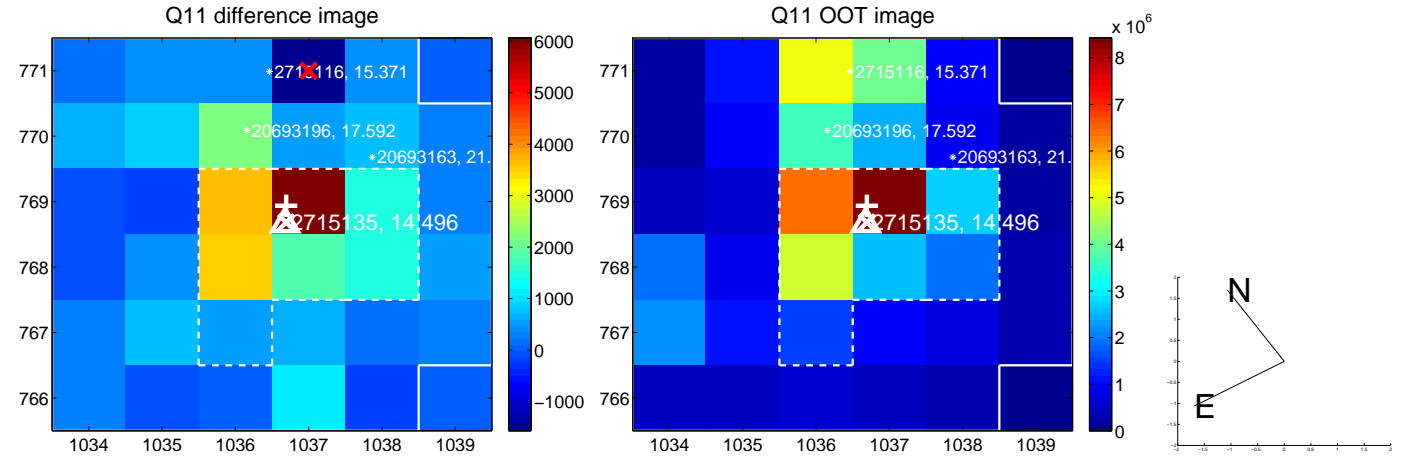
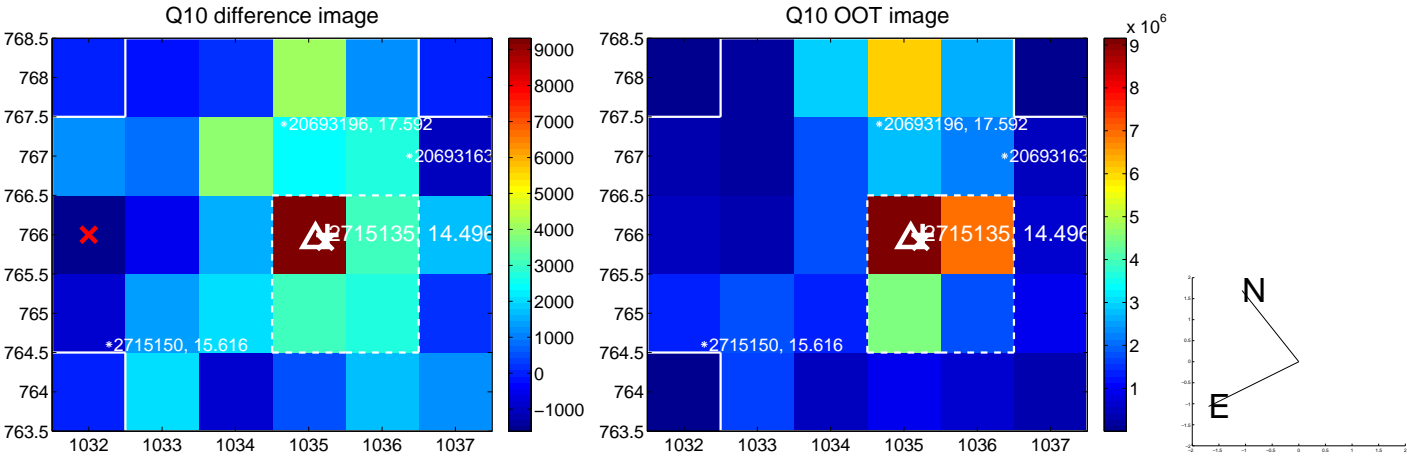
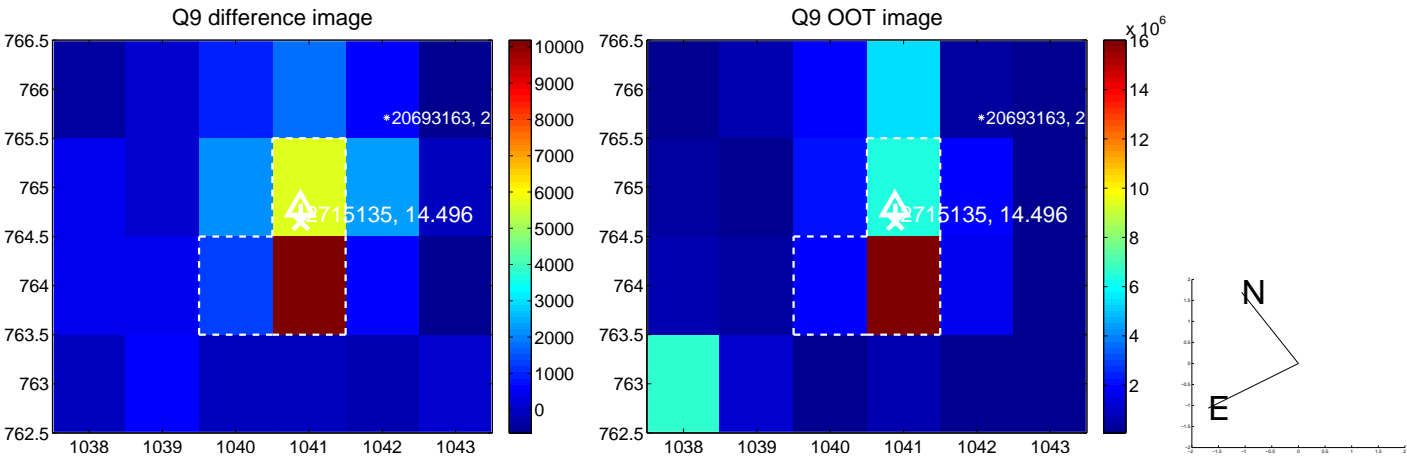


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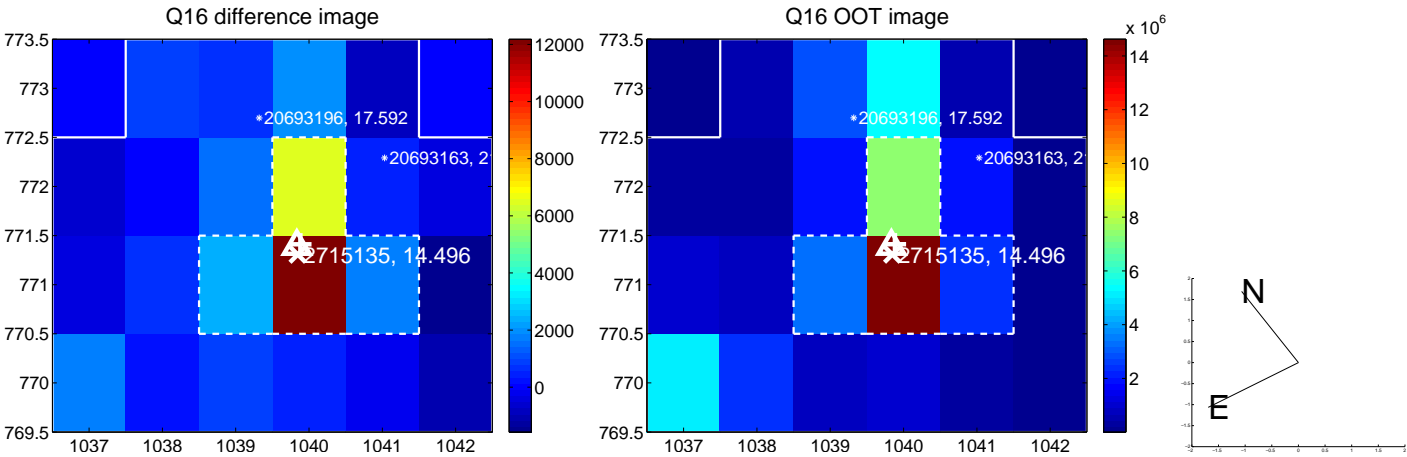
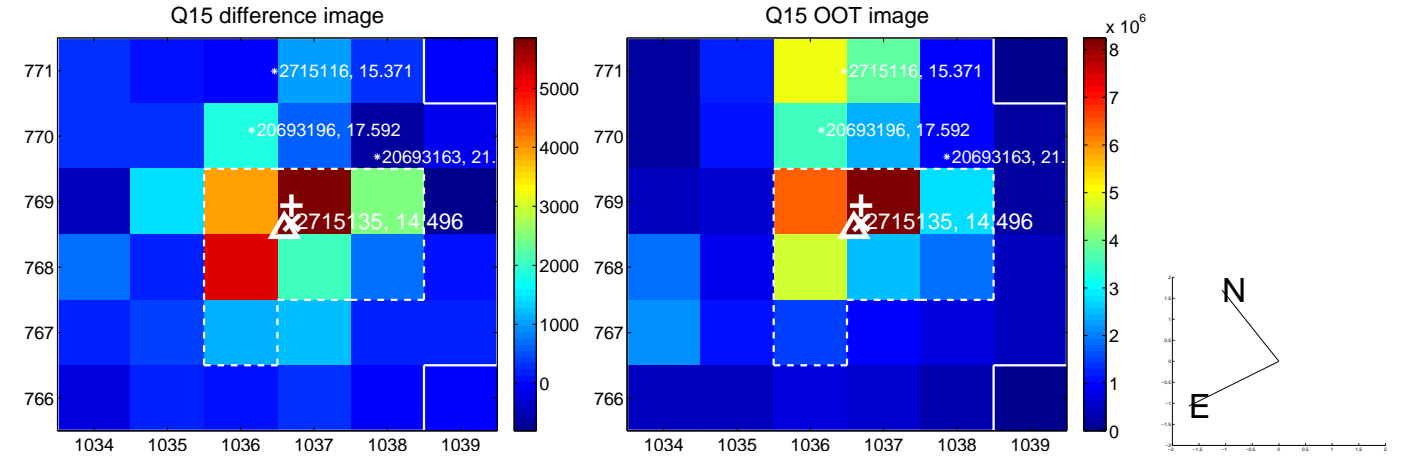
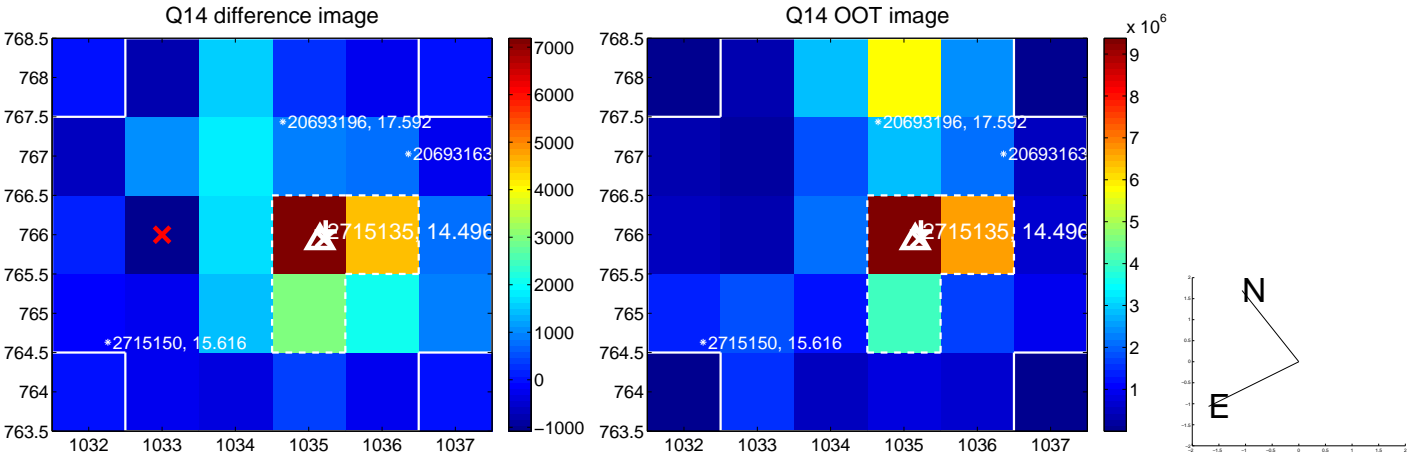
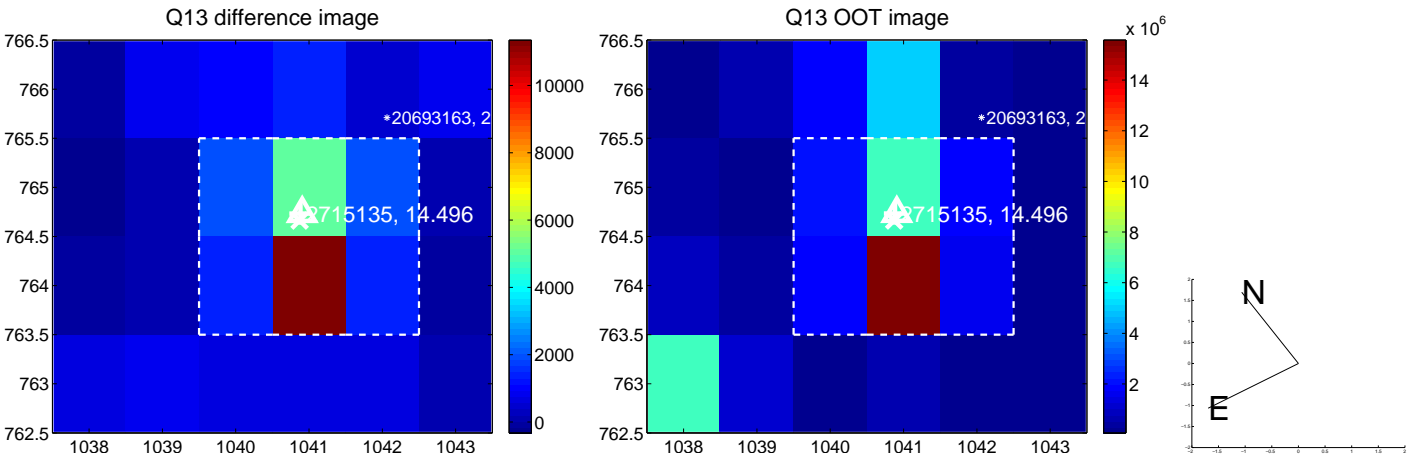




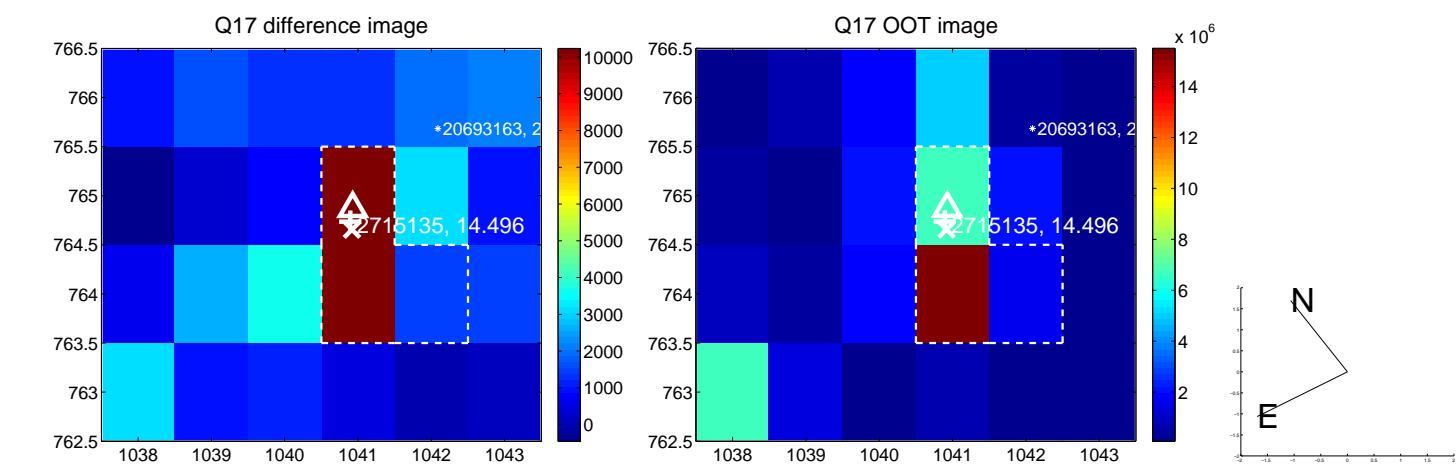
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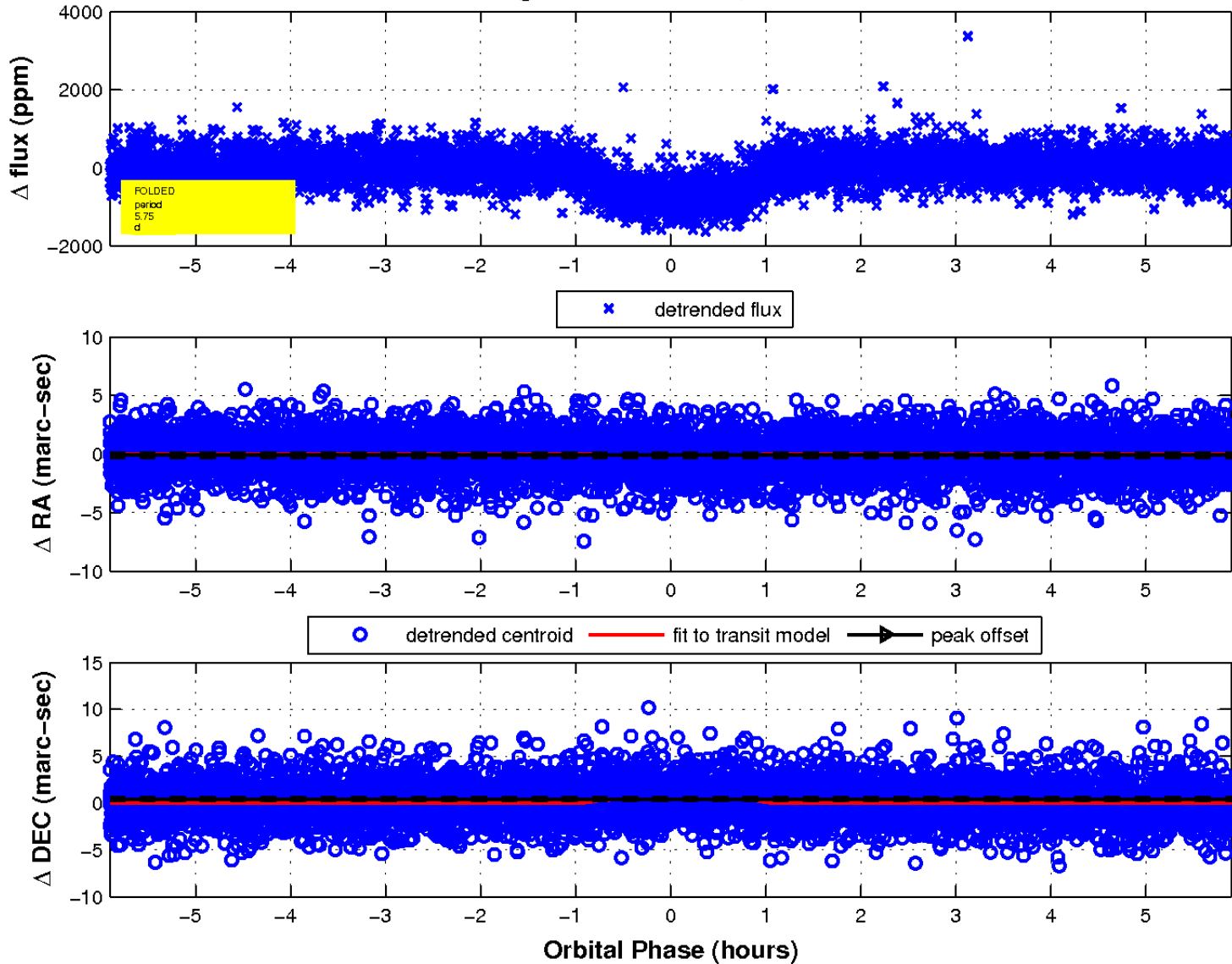
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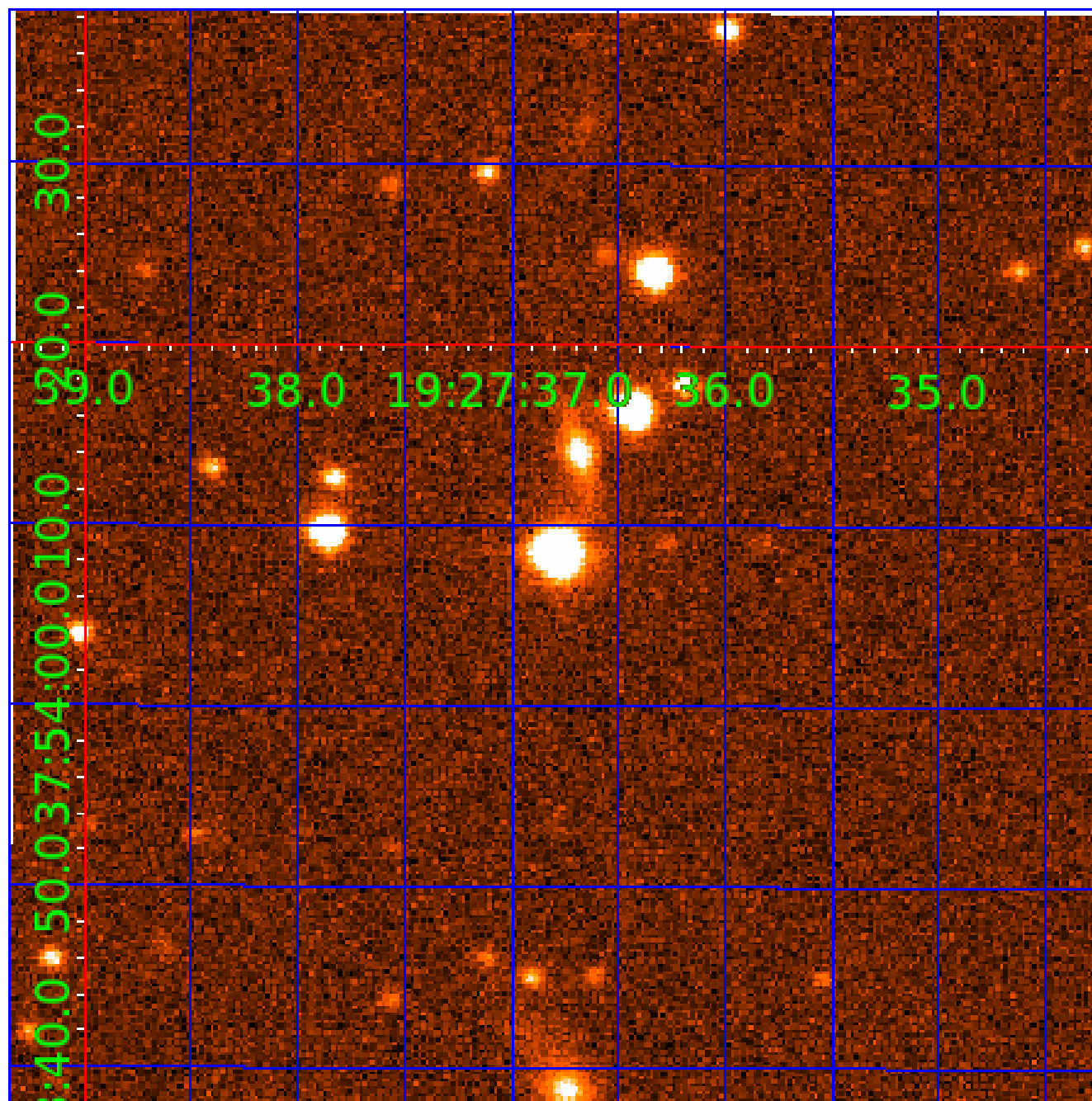


fluxWeightedCentroids, Planet 1 of 4



UKIRT Image

Declination





# KIC 002715135

## Q1-17 DR25 TCE Parameters

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002715135-02	OBS	FP	0.00	1	0	1	0	LPP_DV—CENT_RESOLVED_OFFSET
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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 002715135-02

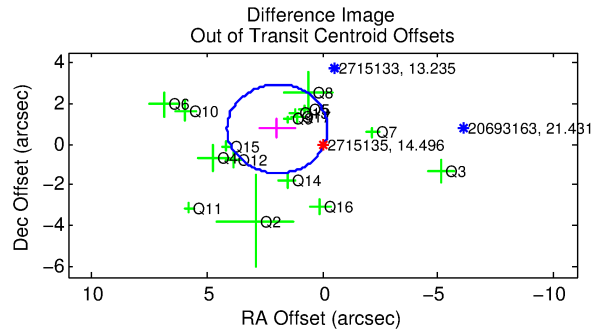
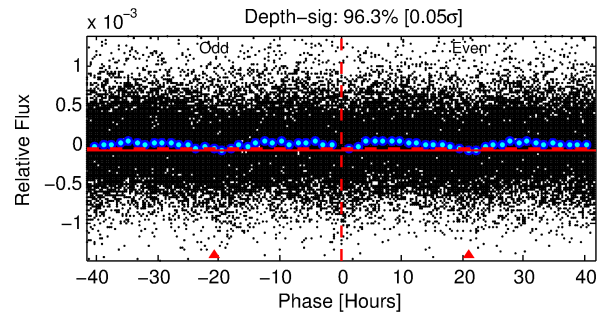
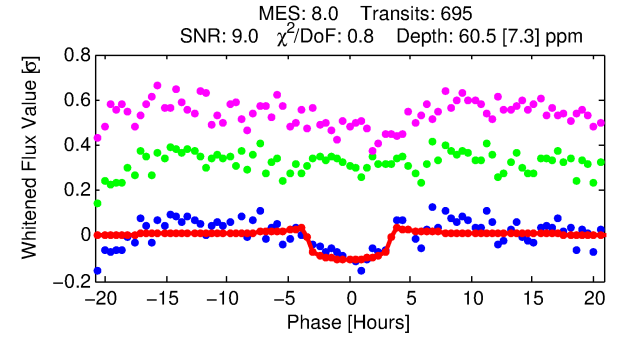
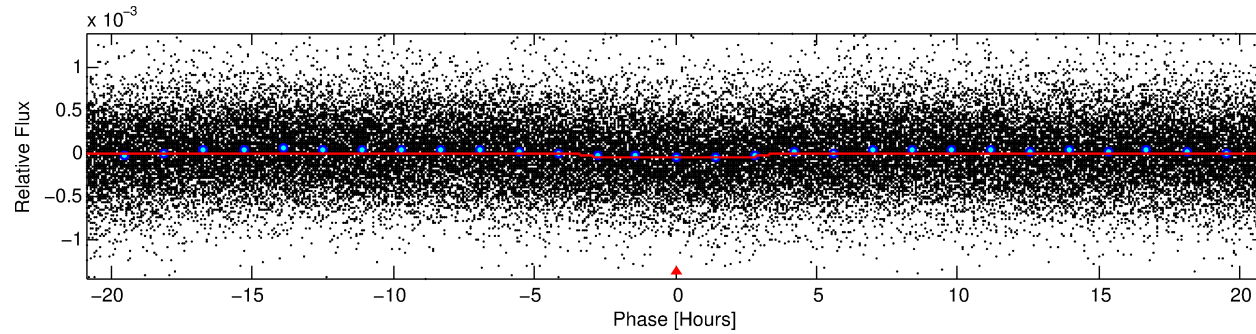
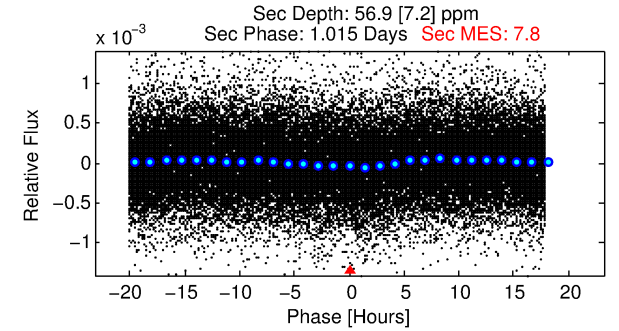
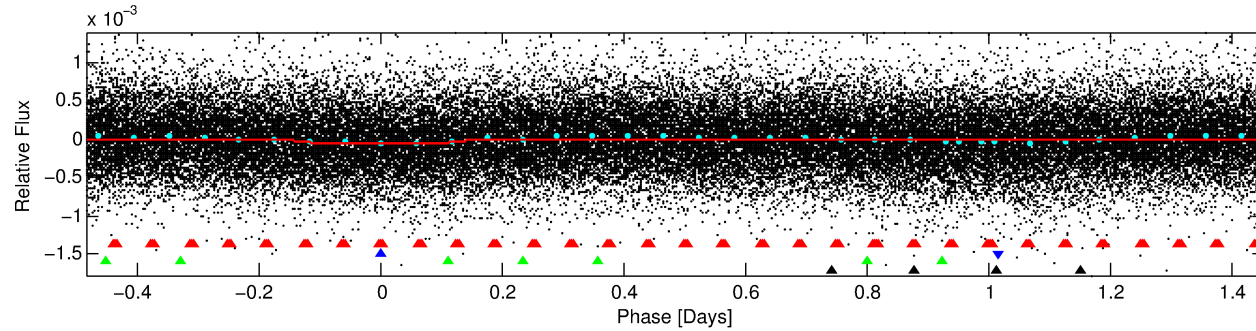
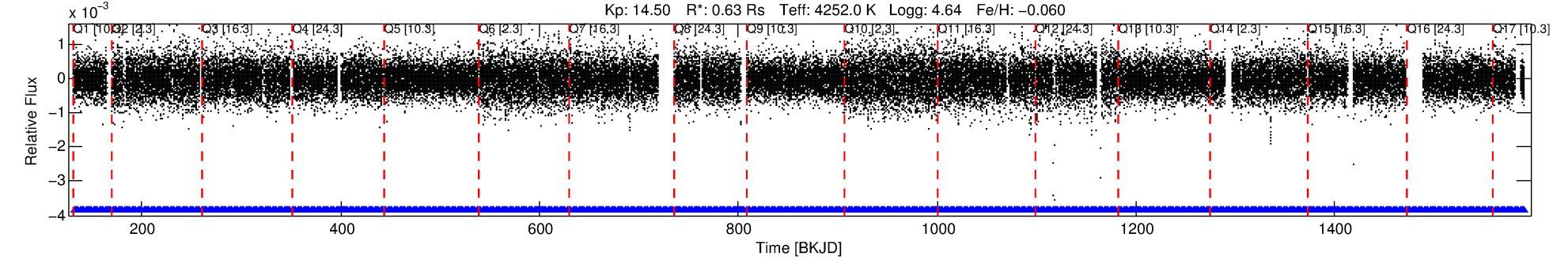
No Significant Match Found

# DV One-Page Summary

KIC: 2715135 Candidate: 2 of 4 Period: 1.937 d

KOI: K01024 Corr: No Ephemeris Match

Kp: 14.50 R\*: 0.63 Rs Teff: 4252.0 K Logg: 4.64 Fe/H: -0.060



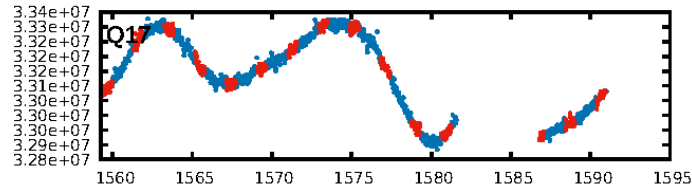
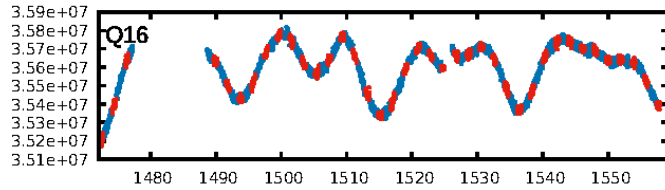
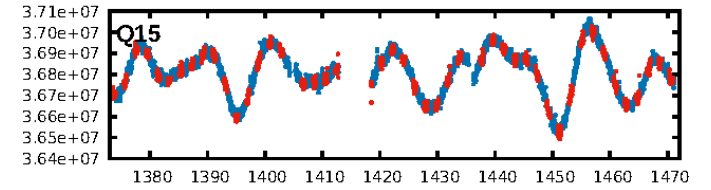
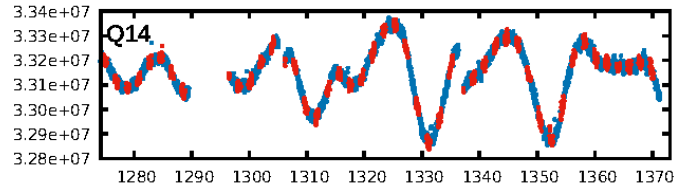
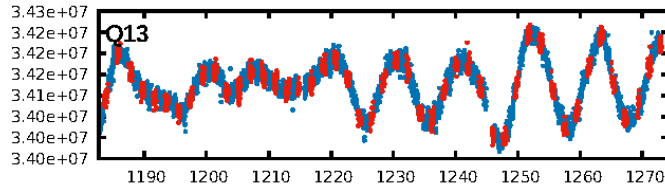
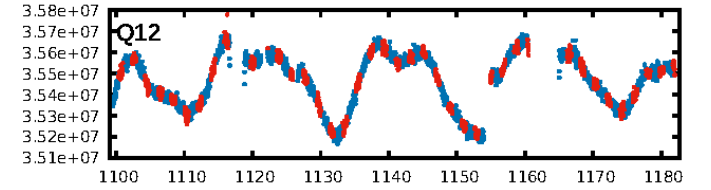
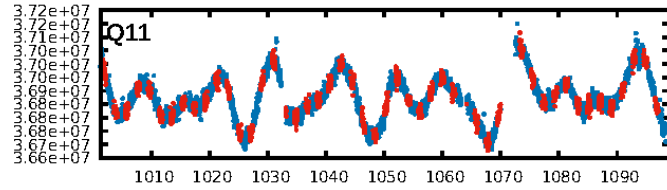
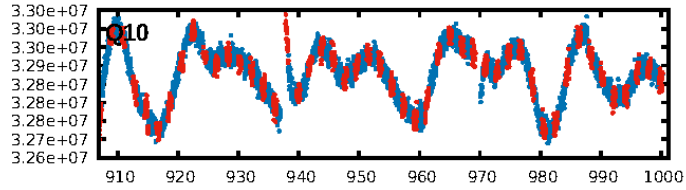
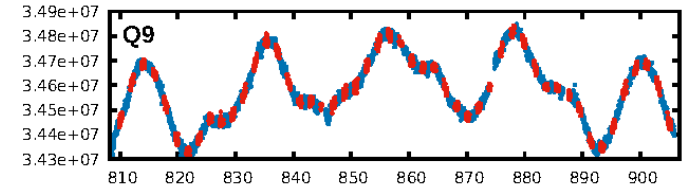
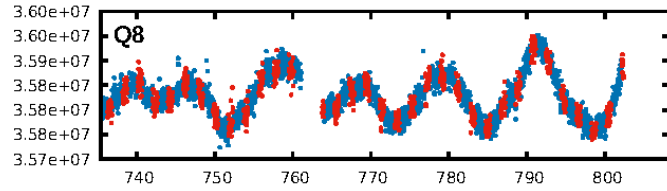
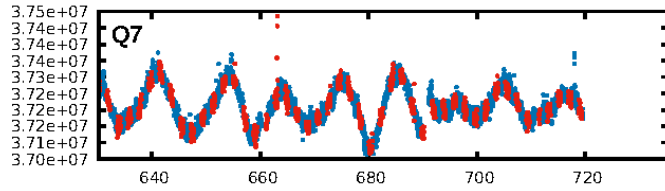
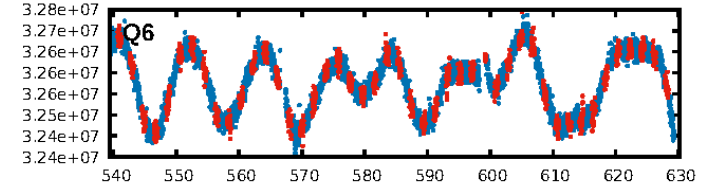
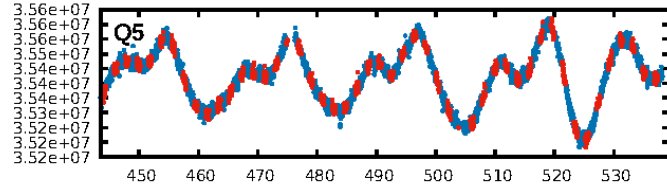
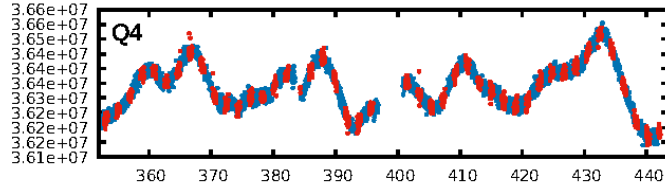
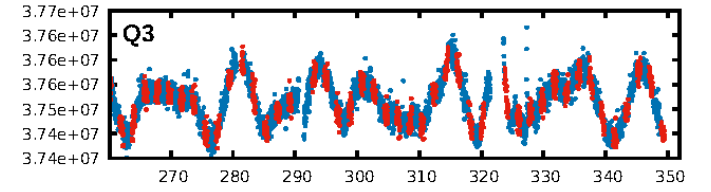
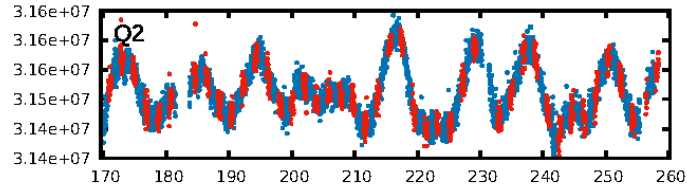
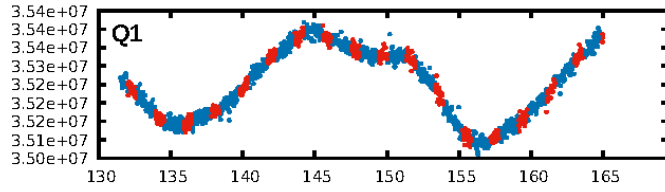
## DV Fit Results:

Period = 1.93674 [0.00002] d  
Epoch = 132.2958 [0.0066] BKJD  
Rp/R\* = 0.0071 [0.0046]  
a/R\* = 2.04 [3.14]  
b = 0.45 [3.72]  
Seff = 171.00 [16.61]  
Teff = 922 [22] K  
Rp = 0.49 [0.32] Re  
a = 0.0262 [0.0010] AU  
Ag = 89.83 [118.15] [0.75σ]  
Teffp = 4389 [1445] K [2.40σ]

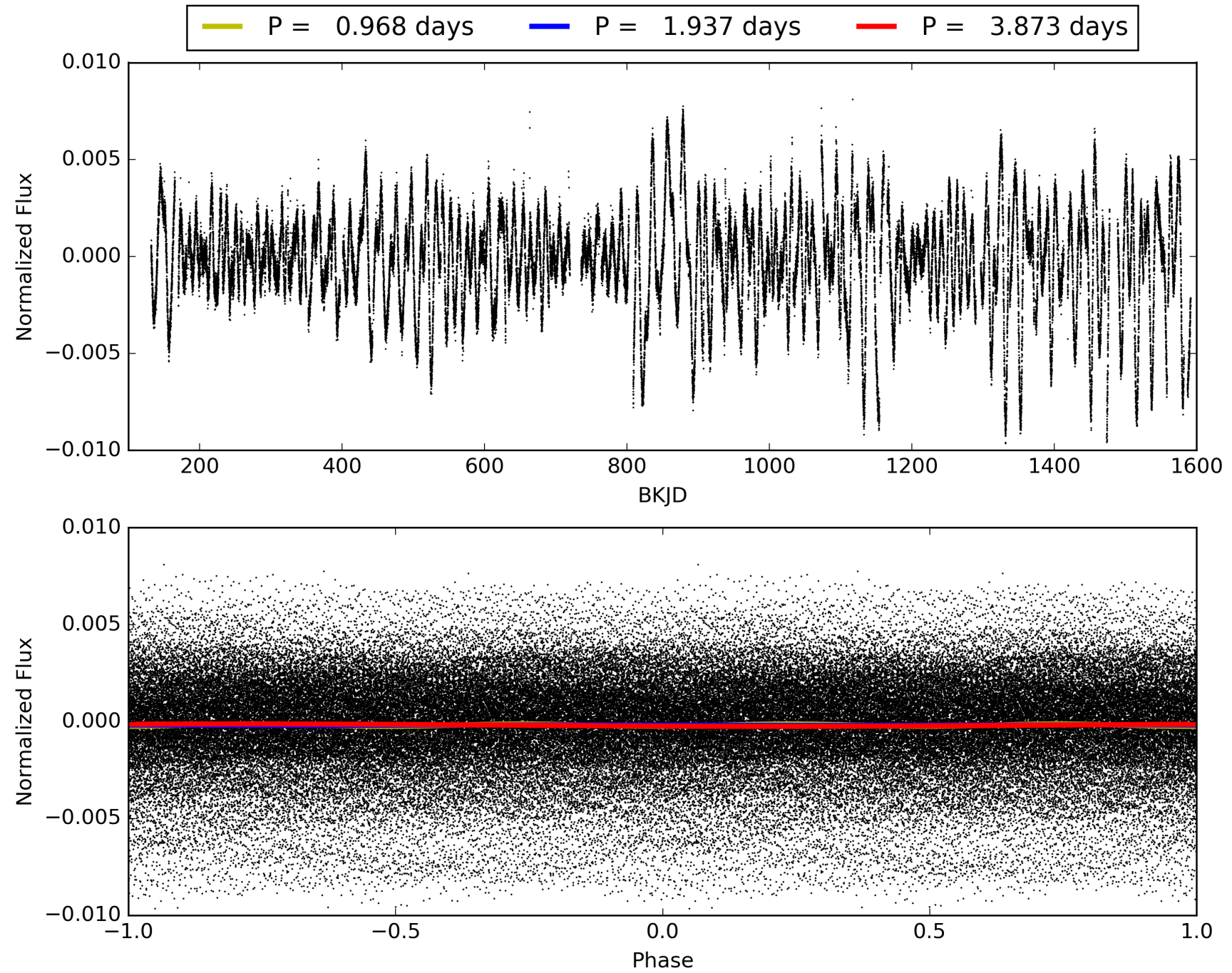
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [12.63σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 5.12e-13  
RollingBand-fgt: 1.00 [663/663]  
GhostDiagnostic-chr: -0.2619  
Centroid-sig: 0.0%  
Centroid-so: 4.006 arcsec [3.65σ]  
OotOffset-rm: 2.090 arcsec [2.88σ]  
KicOffset-rm: 2.155 arcsec [3.18σ]  
OotOffset-st: 4/4/4/4 [16]  
KicOffset-st: 4/4/4/4 [16]  
DiffImageQuality-fgm: 0.00 [0/16]  
DiffImageOverlap-fno: 1.00 [17/17]

# TCE 002715135-02, PDC Light Curves

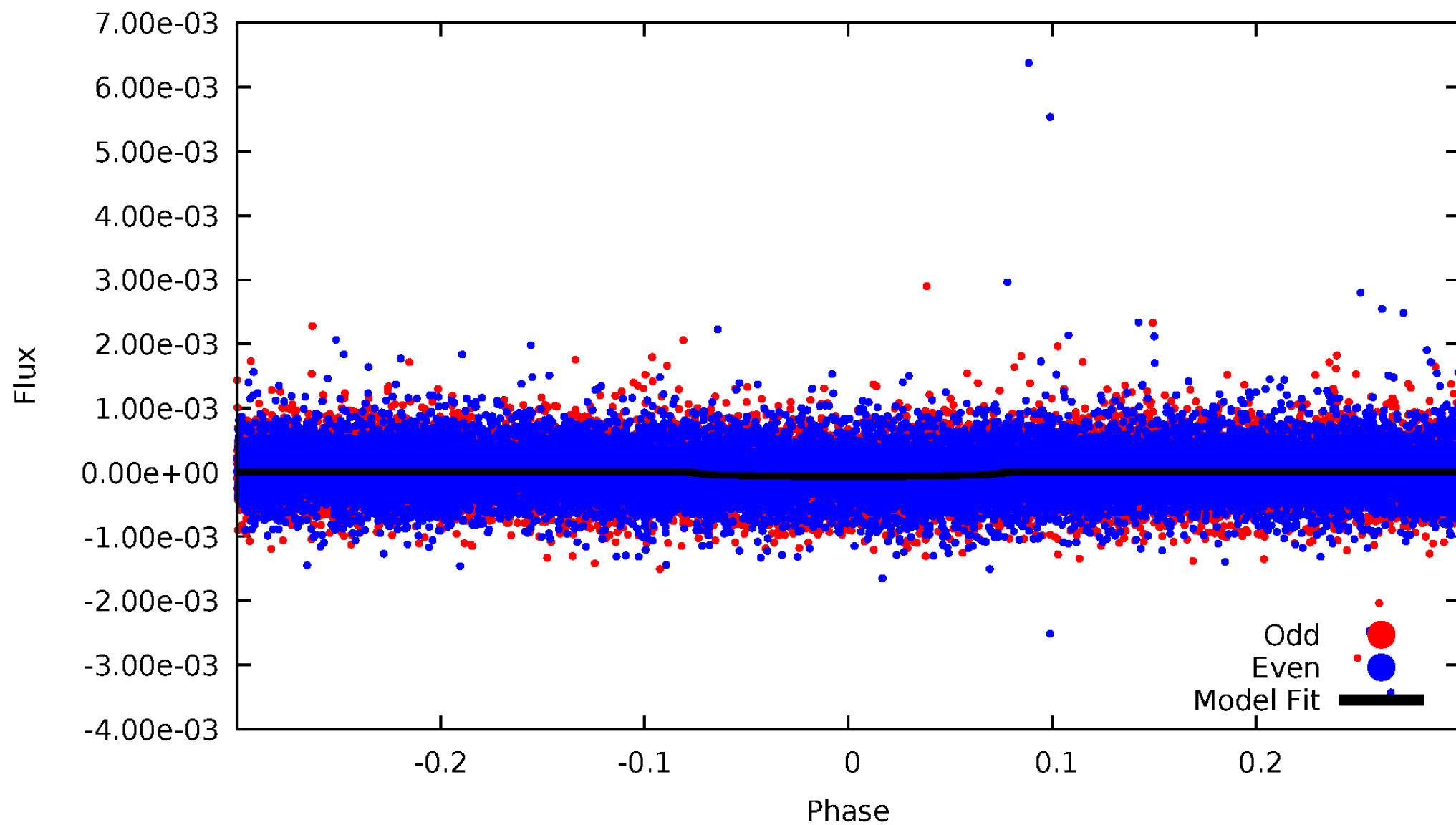


# TCE 002715135-02



# DV Odd/Even

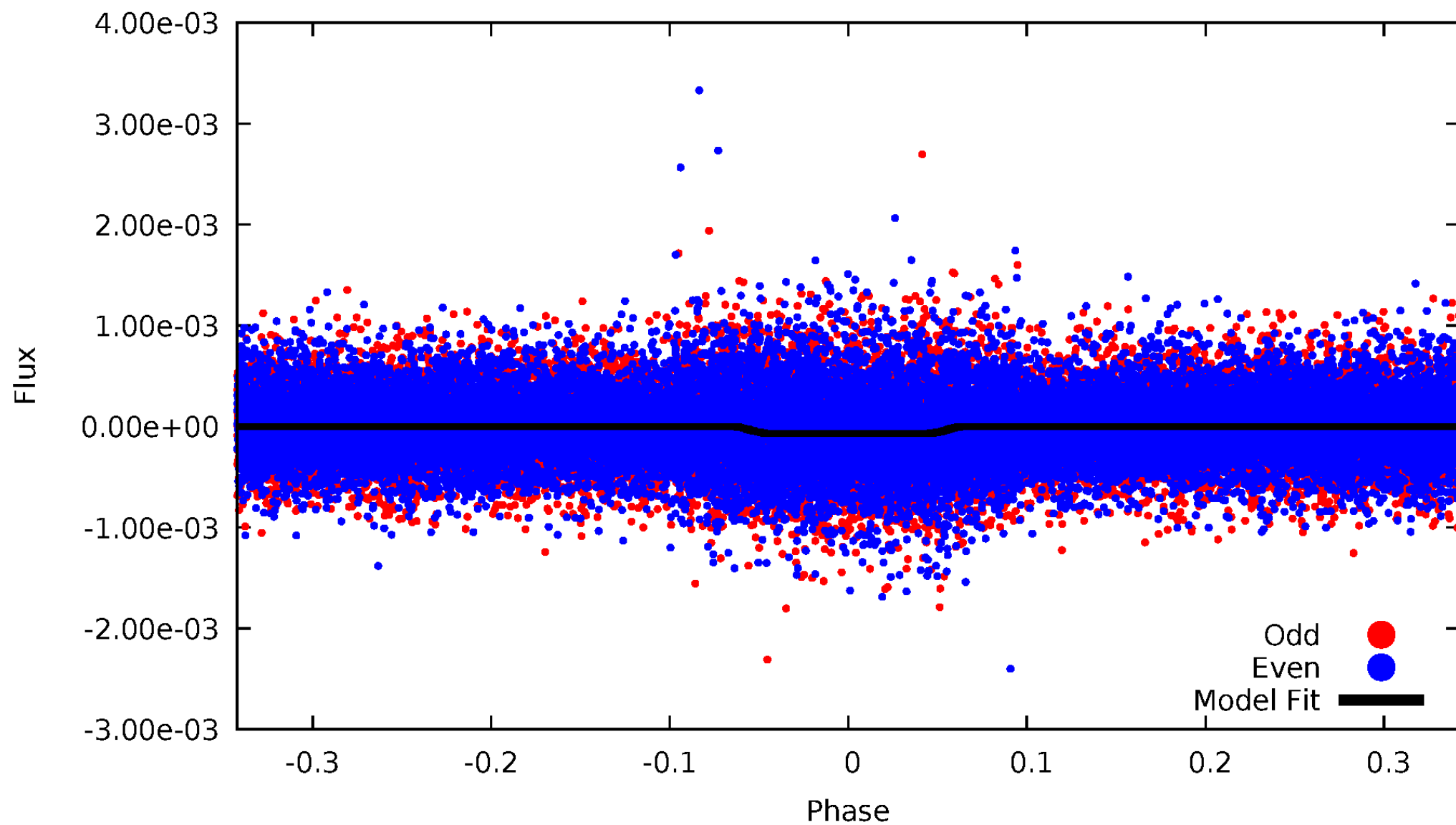
TCE 002715135-02





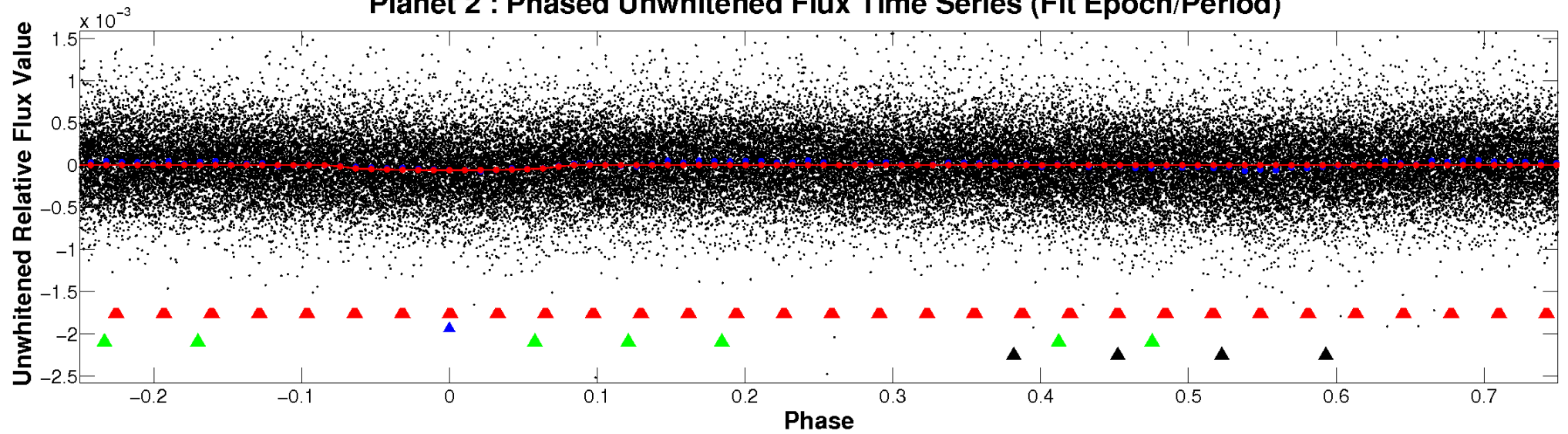
# ALT Odd/Even

TCE 002715135-02

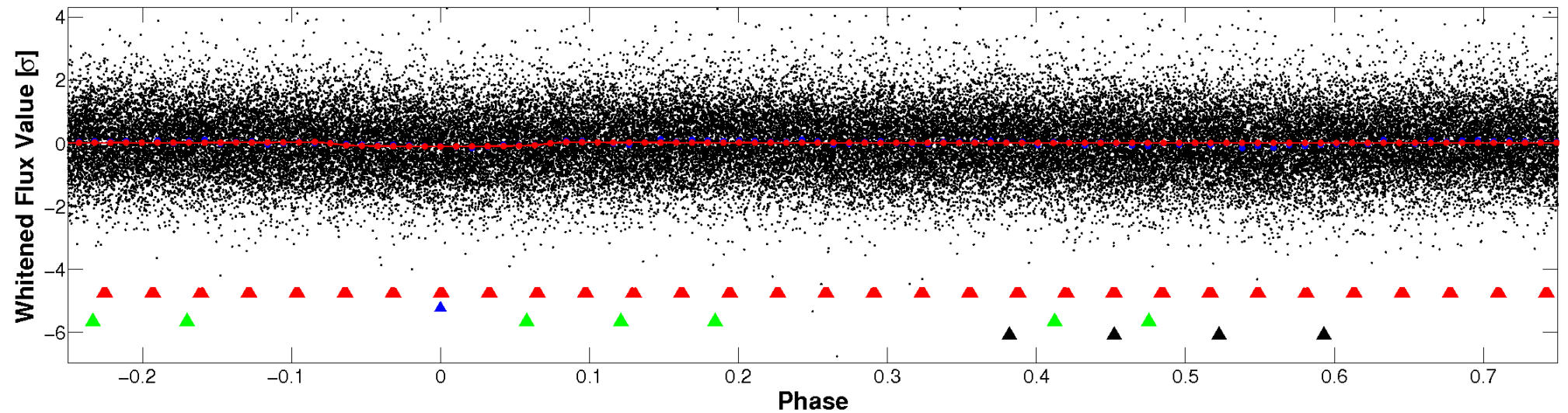


# Non-Whitened Vs. Whitened Light Curve

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



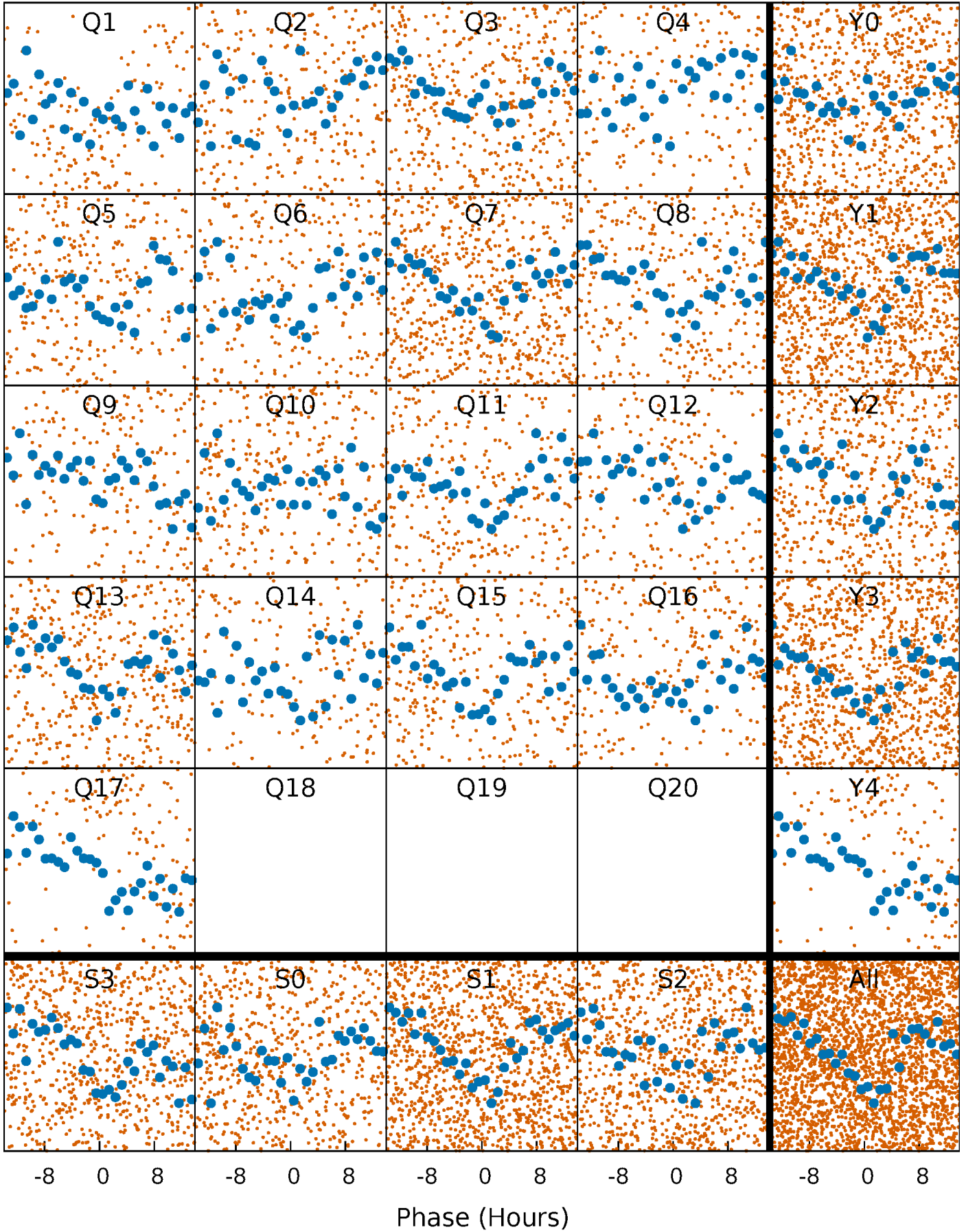
## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)





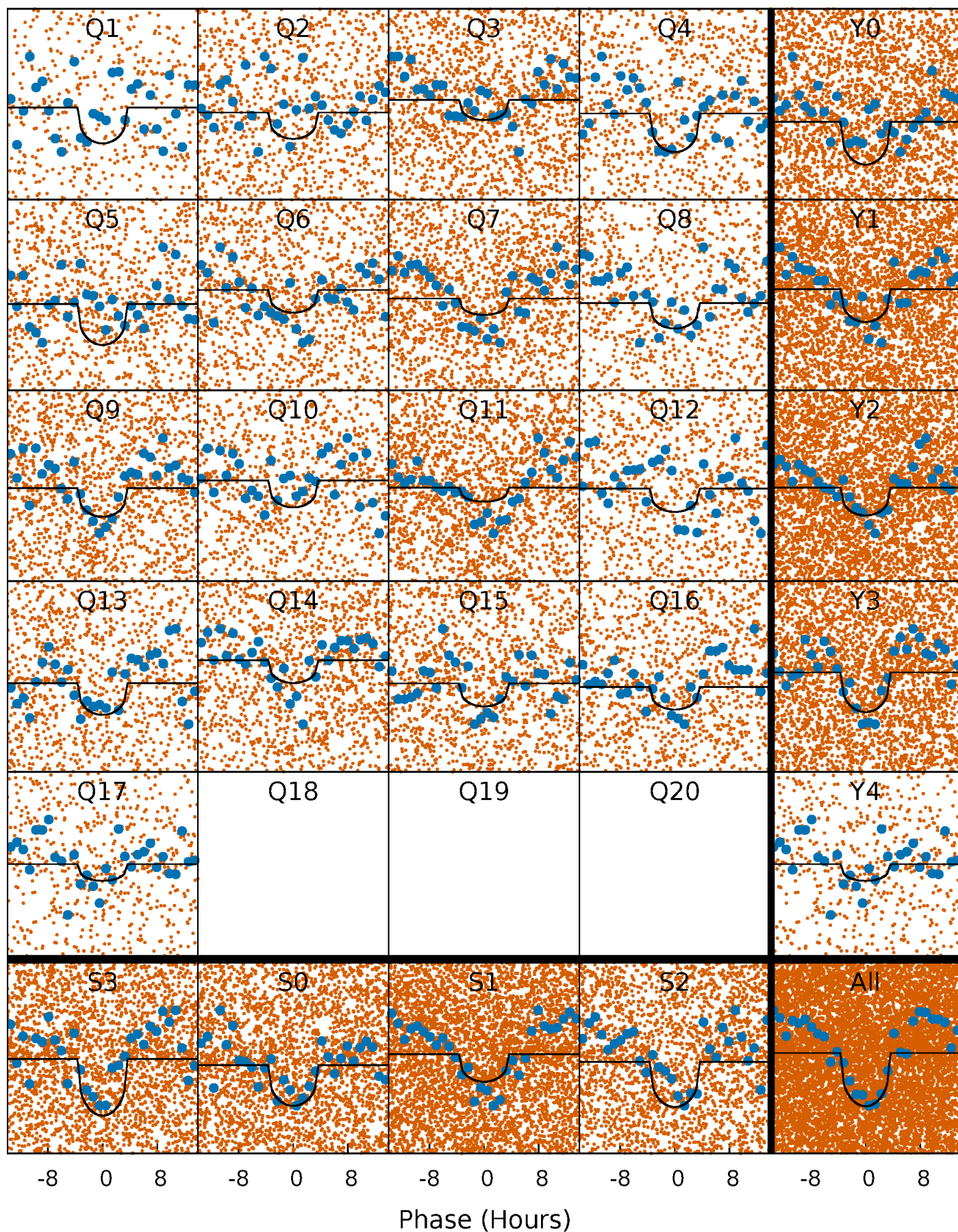
# PDC Quarter-Phased Transit Curves

TCE 002715135-02 P= 1.936738 Days  $T_0=132.295846$  (BKJD)



# DV Quarter-Phased Transit Curves

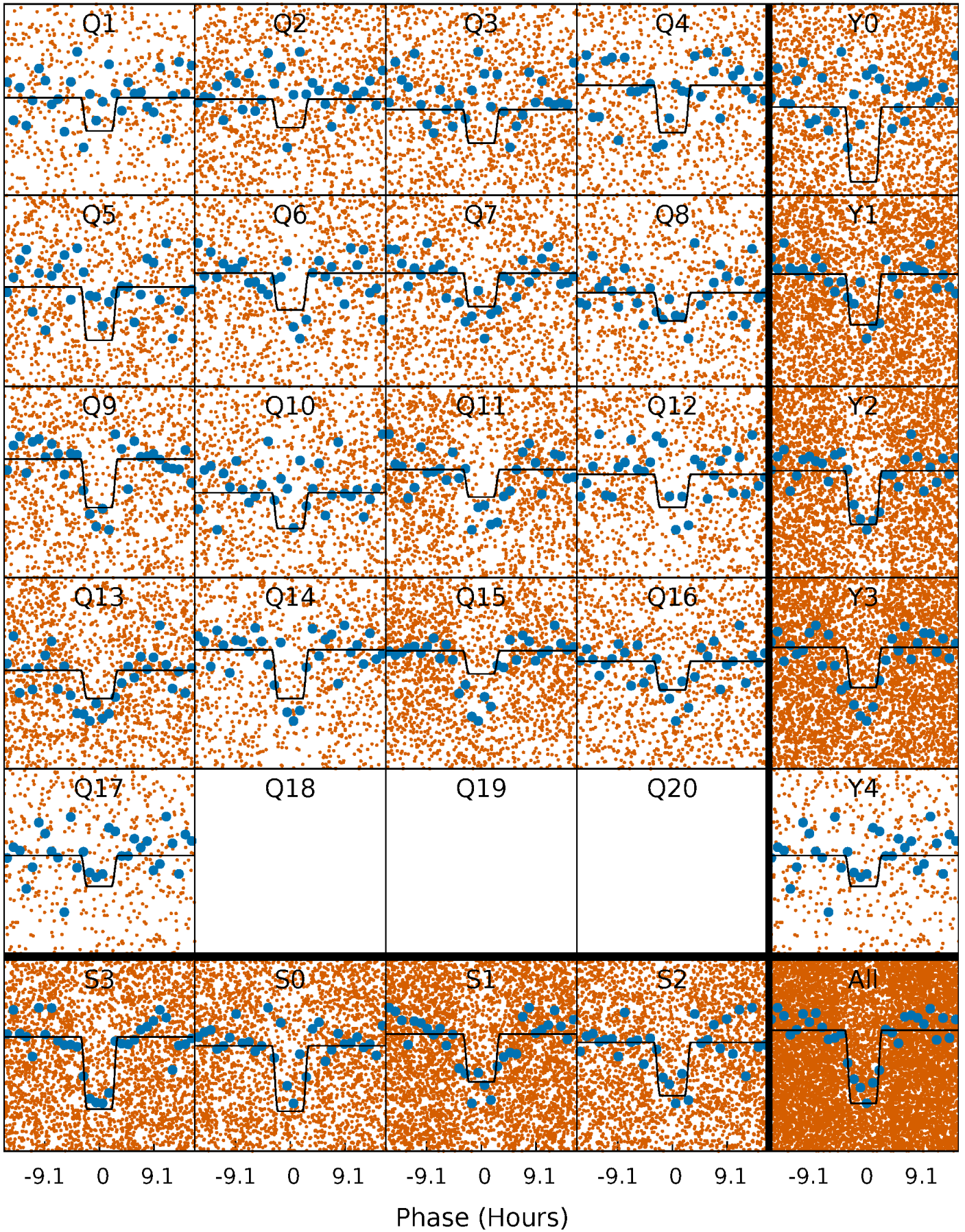
TCE 002715135-02 P= 1.936738 Days  $T_0=132.295846$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

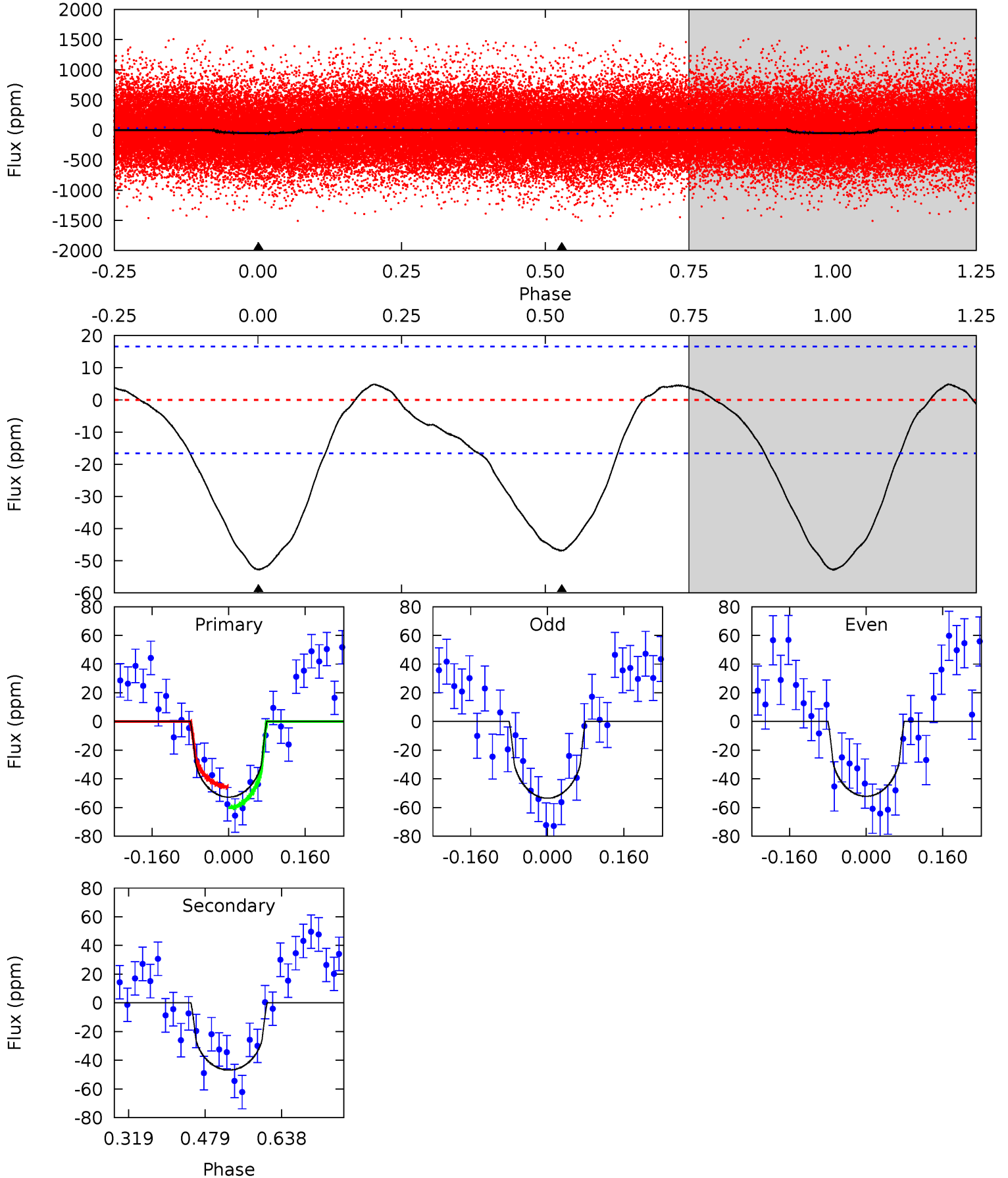
TCE 002715135-02 P= 1.936771 Days  $T_0=132.289293$  (BKJD)



# DV Model-Shift Uniqueness Test

002715135-02, P = 1.936738 Days, E = 130.359108 Days

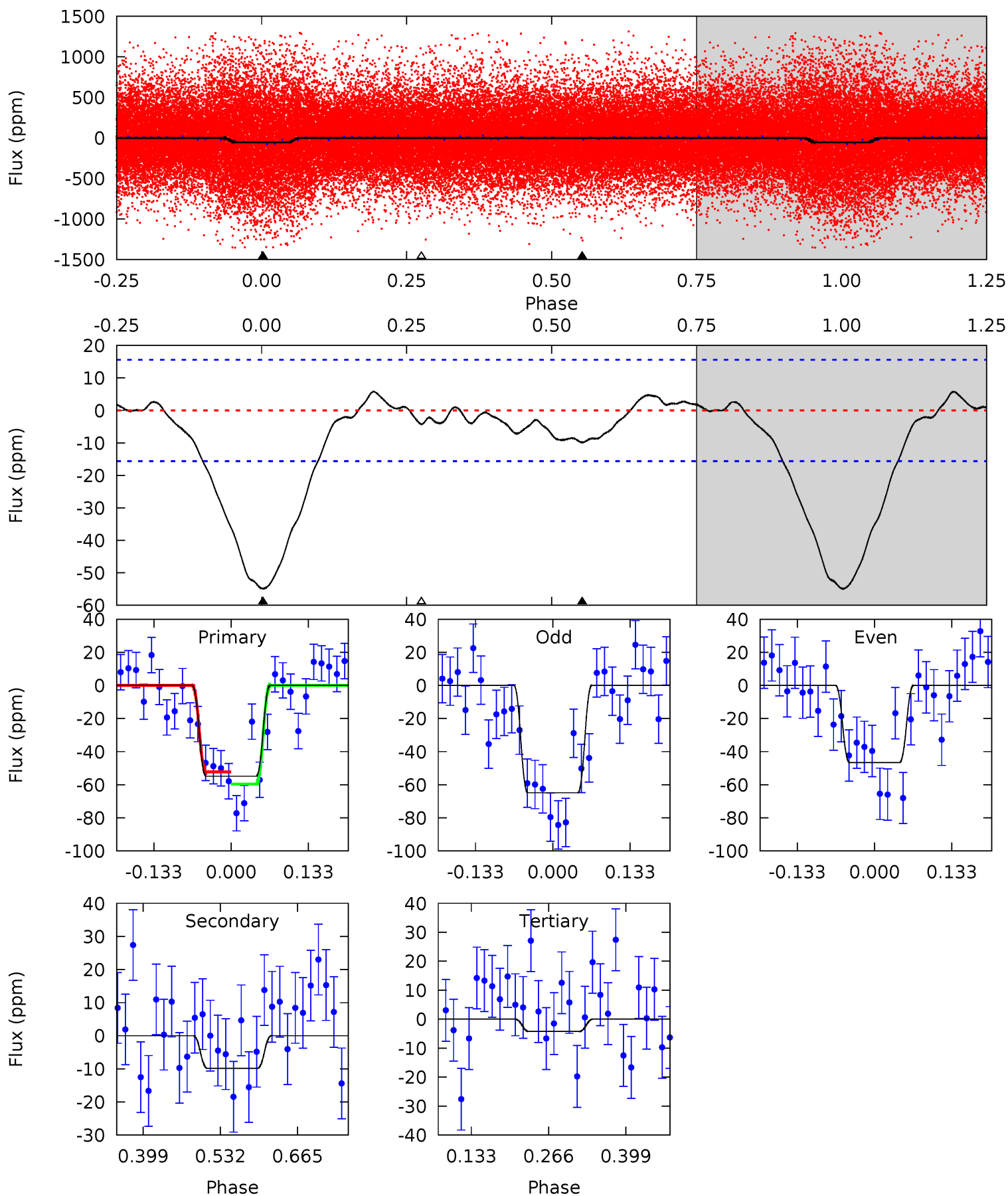
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
14.2	12.6	0	0	4.47	1.41	1.52	14.2	14.2	12.6	12.6	0.18	1.16	0.08	1.97



# Alt Model-Shift Uniqueness Test

002715135-02, P = 1.936771 Days, E = 130.352522 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
15.8	2.84	1.22	0	4.50	1.50	0.75	14.6	15.8	1.62	2.84	2.64	1.18	0.10	1.06



### Stellar Parameters For KIC 002715135

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4252^{+84}_{-84}$	$4.640^{+0.030}_{-0.017}$	$-0.060^{+0.150}_{-0.150}$	$0.632^{+0.025}_{-0.031}$	$0.637^{+0.032}_{-0.032}$	$3.552^{+0.431}_{-0.284}$
	+2%/-2%	+1%/-0%	+250%/-250%	+4%/-5%	+5%/-5%	+12%/-8%
Source	SPE60	SPE60	SPE60	DSEP		

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

### Secondary Eclipse Parameters for KIC 002715135-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-47 \pm 4$	$0.51^{+0.32}_{-0.28}$	$1285^{+30}_{-29}$	$4125^{+1645}_{-633}$	$67^{+265}_{-42}$
Alt.	$-10 \pm 3$	$0.59^{+0.31}_{-0.31}$	$1284^{+26}_{-27}$	$3035^{+862}_{-375}$	$10^{+40}_{-6}$

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

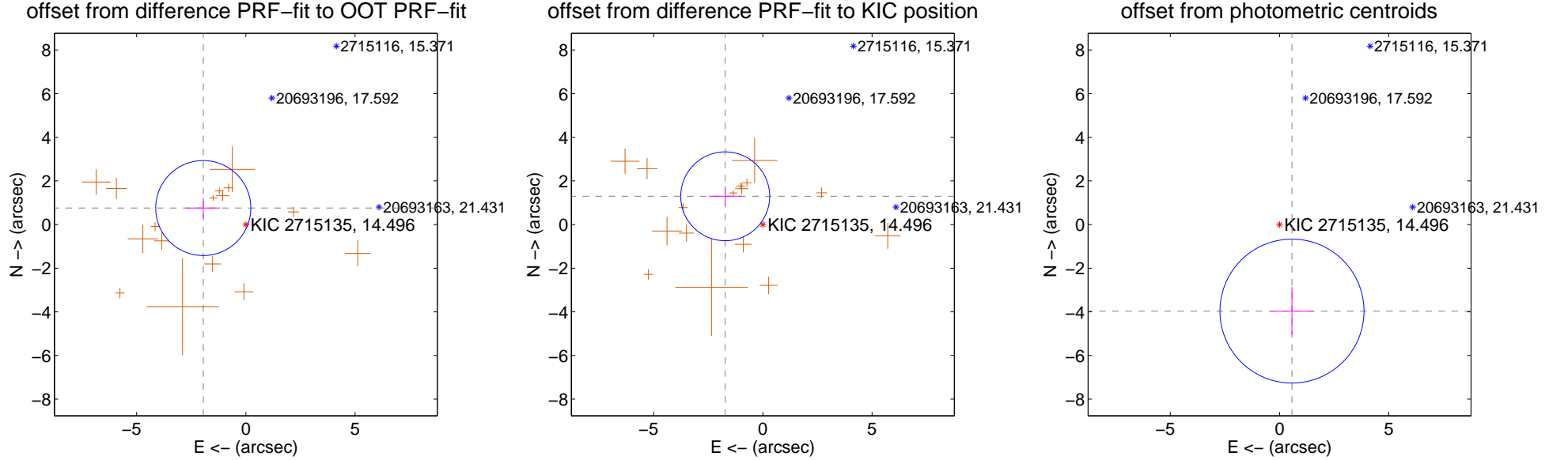
## DV Centroid Data

Supplemental centroid analysis for 002715135-02. Kepler magnitude: 14.50. Transit SNR 9.05

There are 0 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.34 arcsec

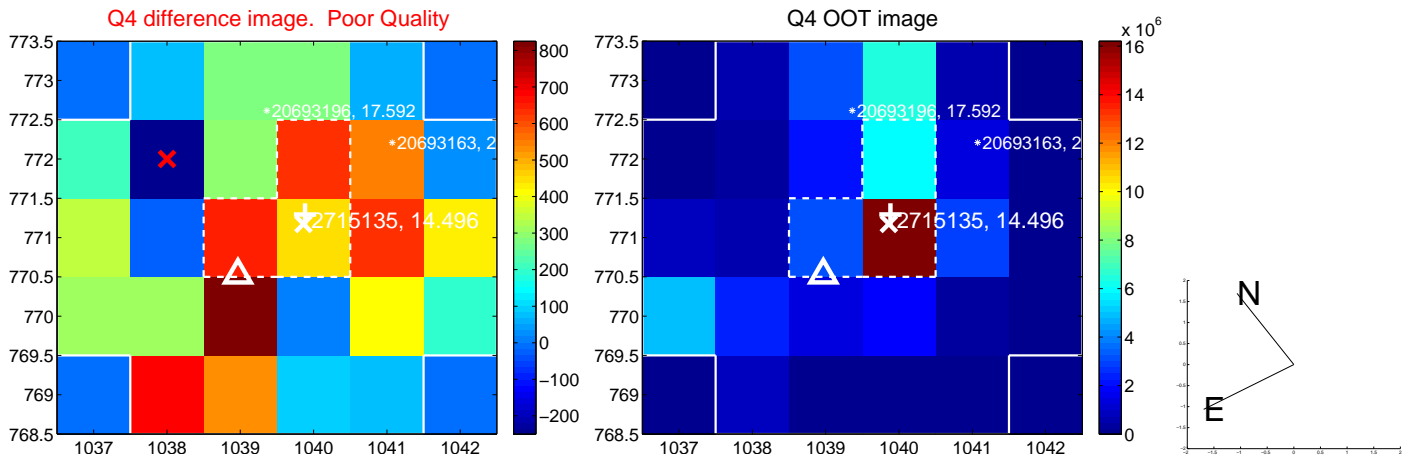
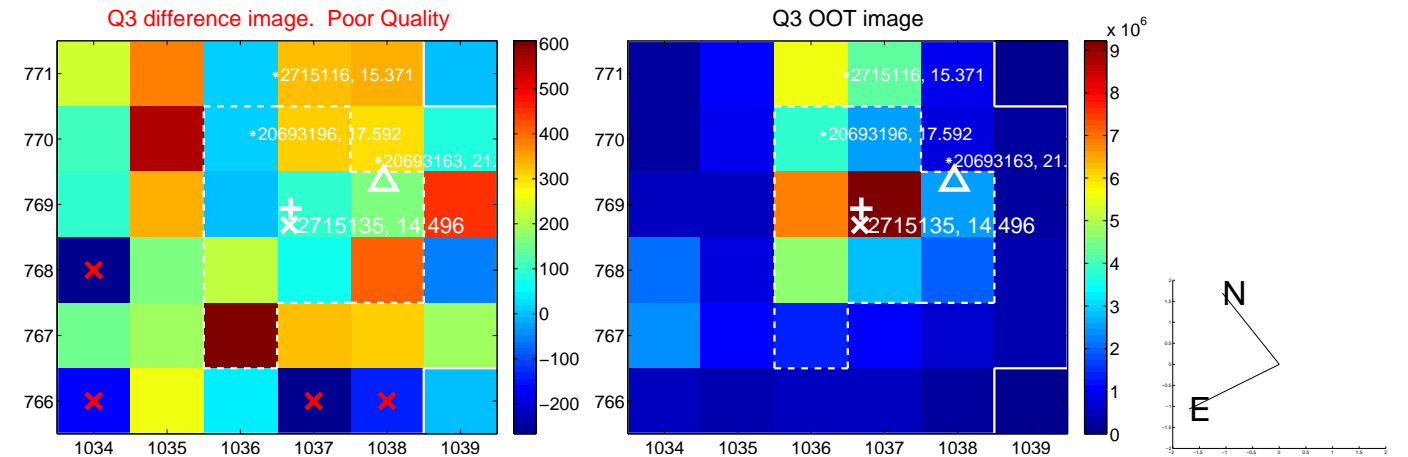
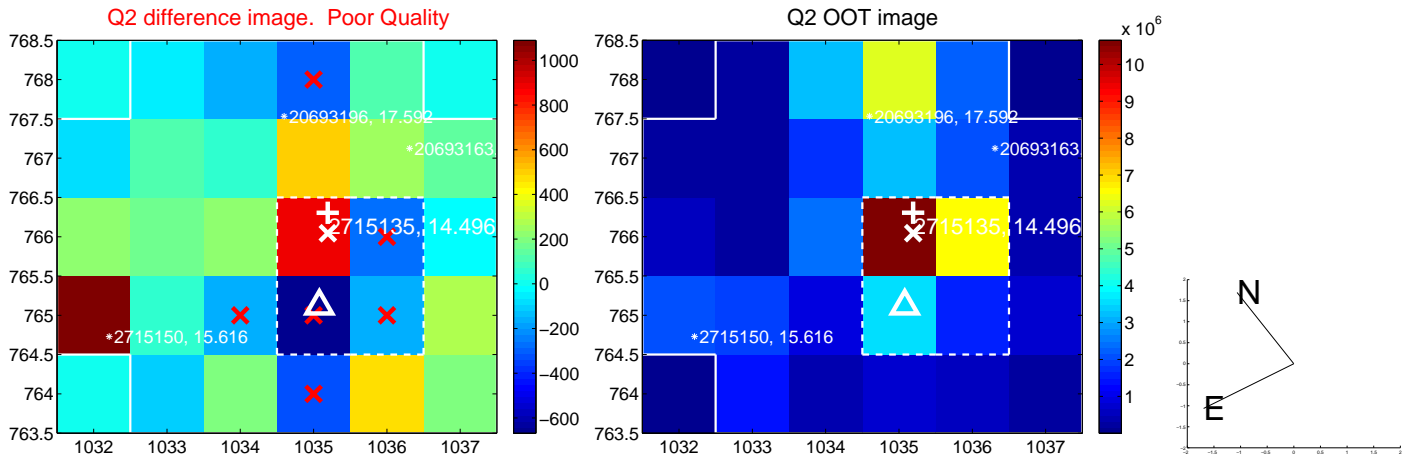
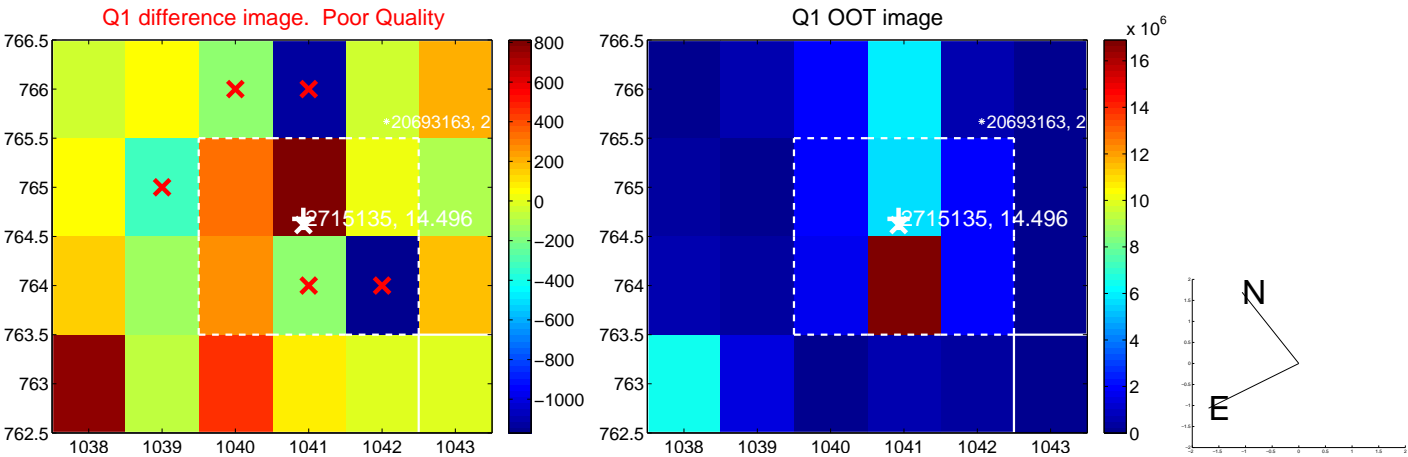
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.090 \pm 0.725$	2.88	$1.949 \pm 0.763$	$0.756 \pm 0.472$
PRF-fit source offset from KIC position	$2.155 \pm 0.678$	3.18	$1.723 \pm 0.756$	$1.294 \pm 0.458$
photometric centroid source offset	$4.01 \pm 1.10$	3.65	$-0.57 \pm 1.00$	$-3.97 \pm 1.10$



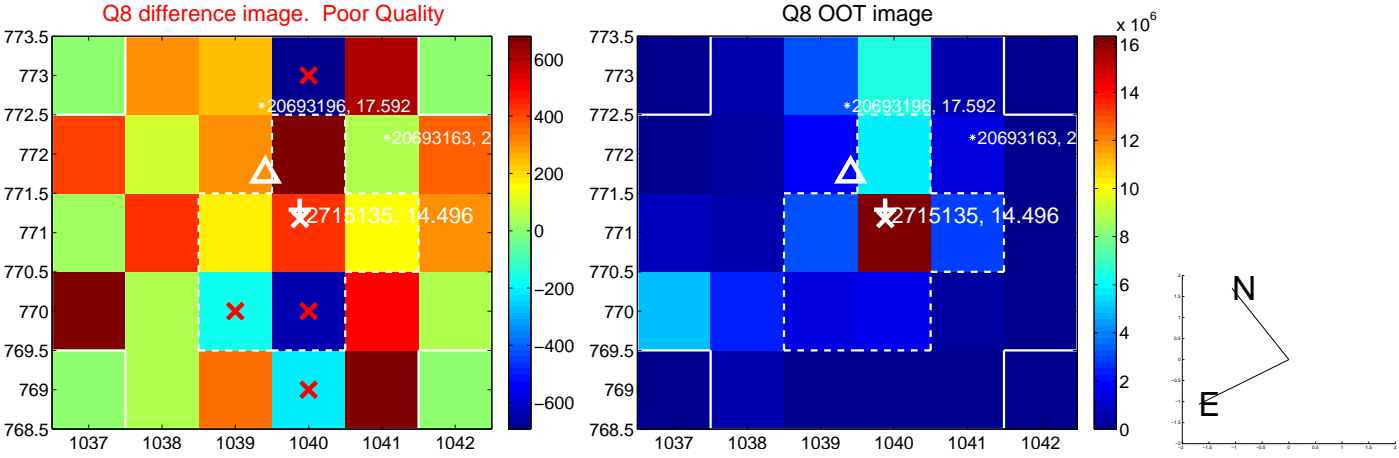
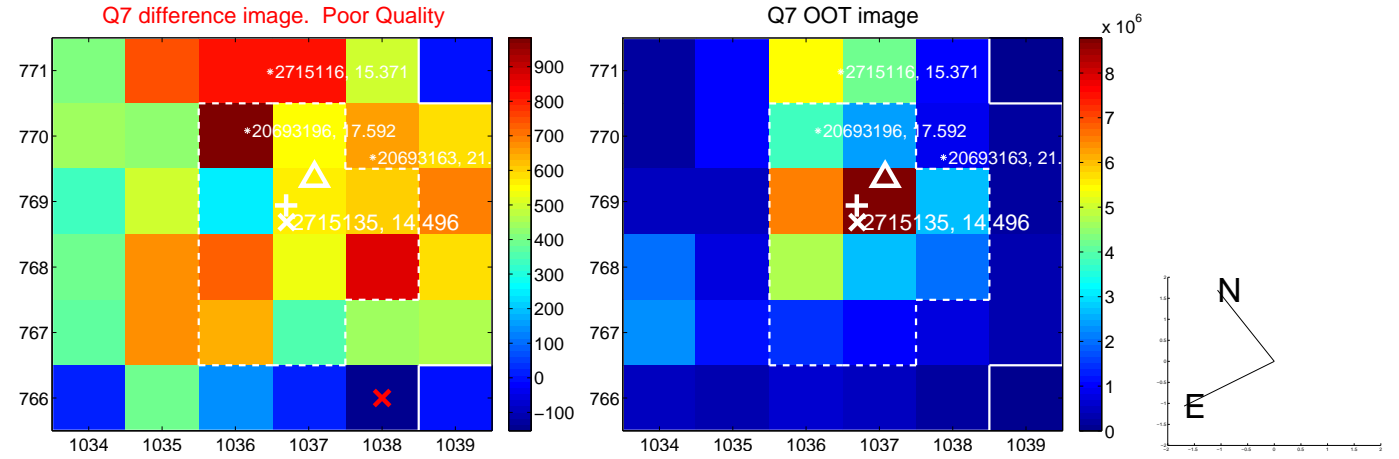
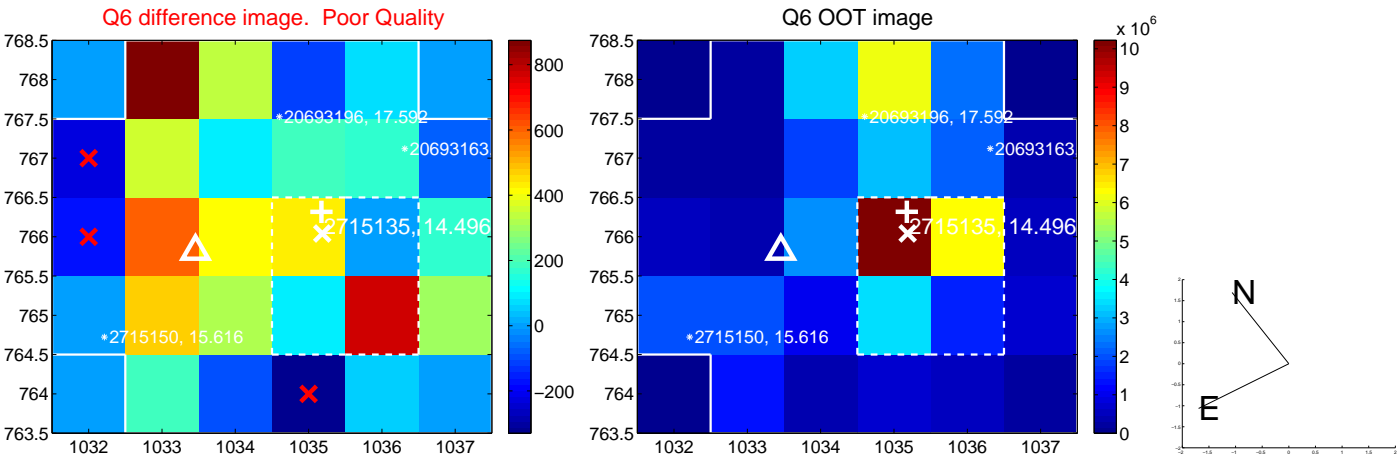
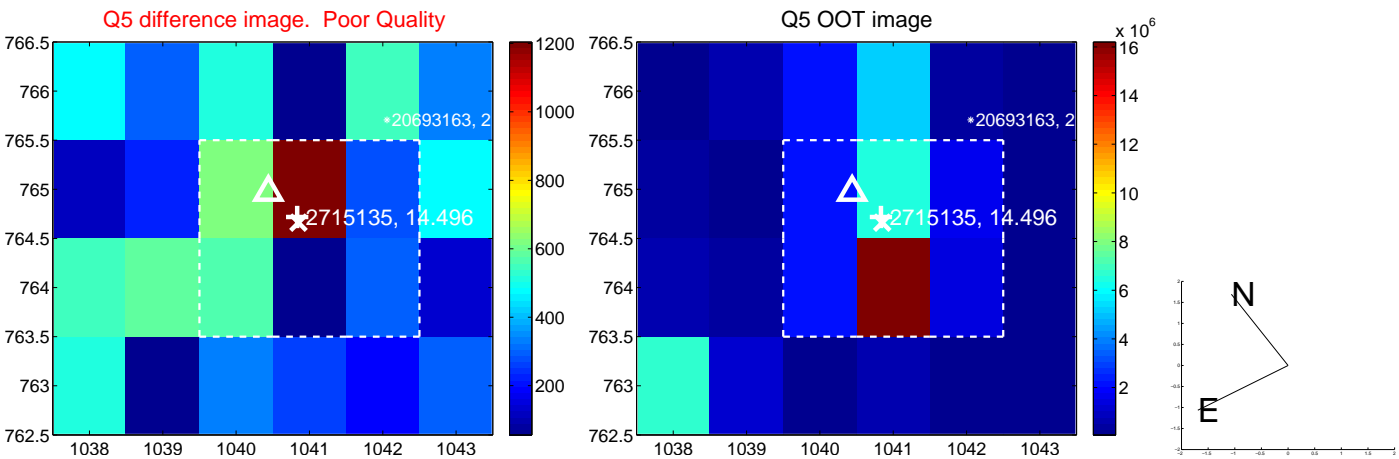
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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



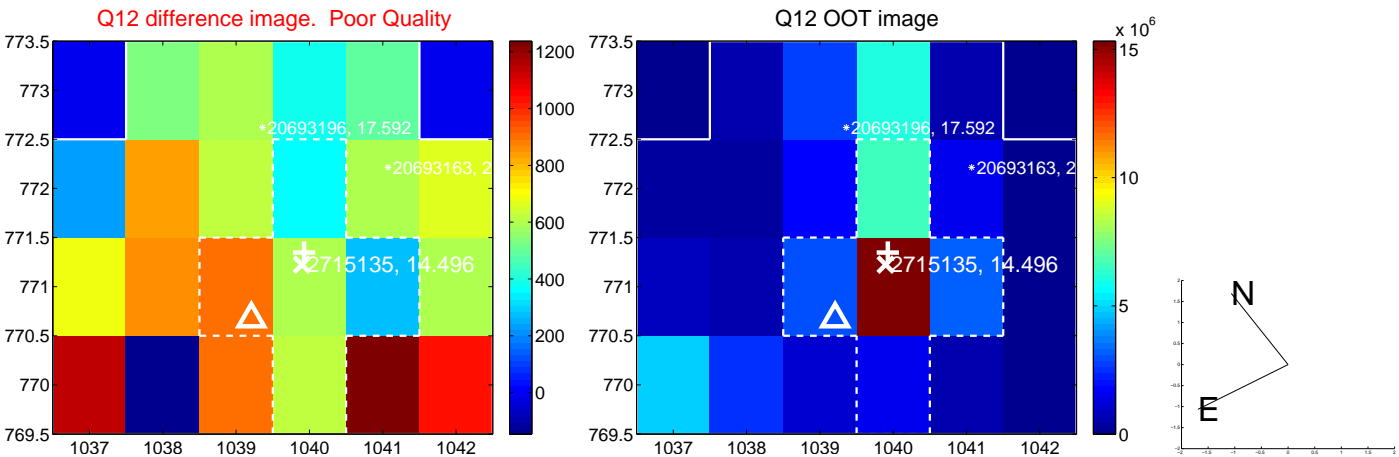
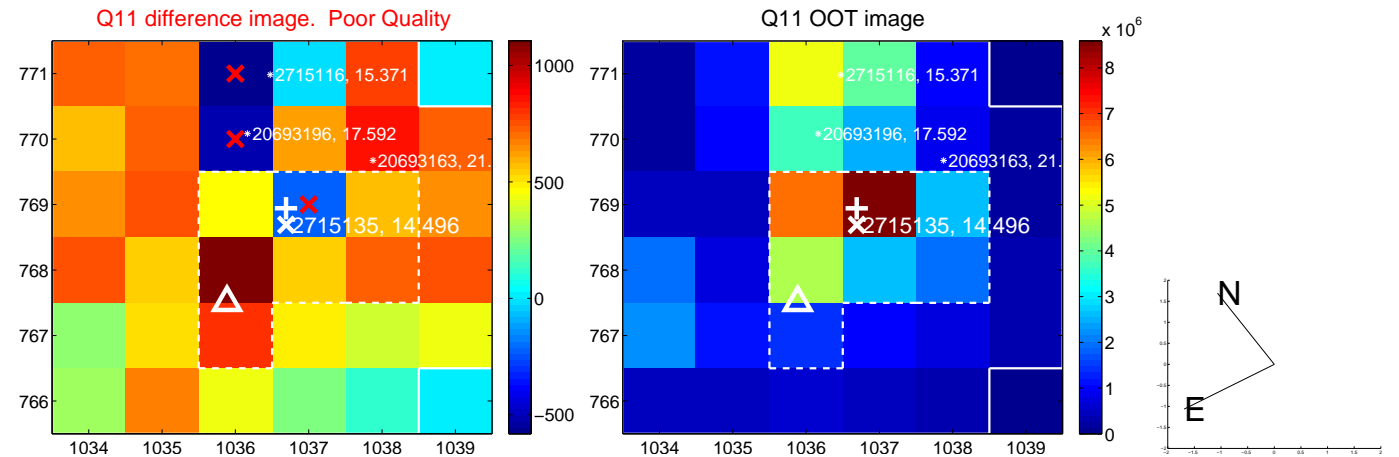
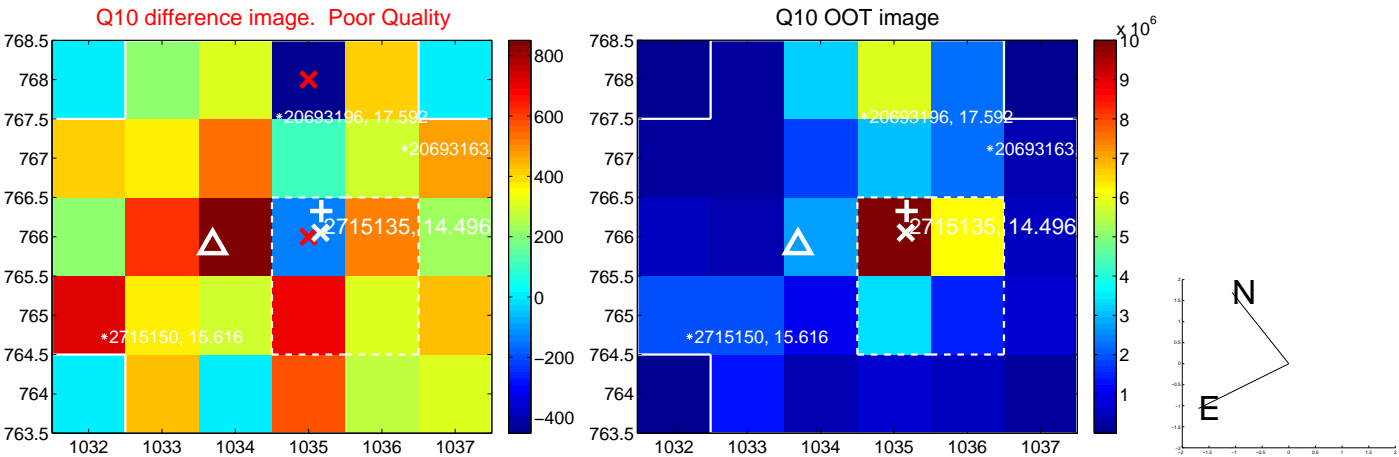
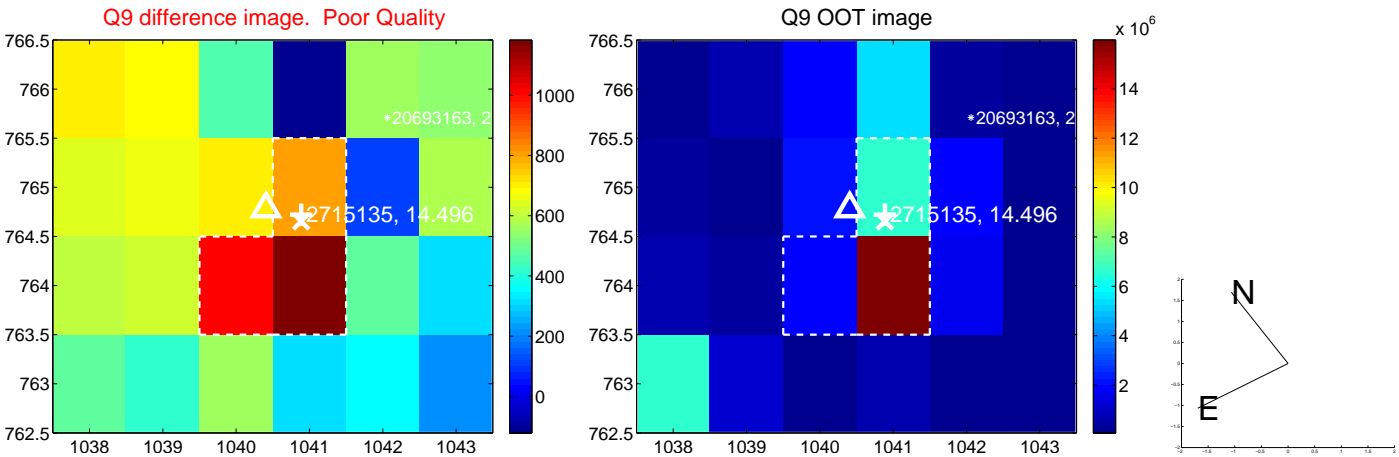
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



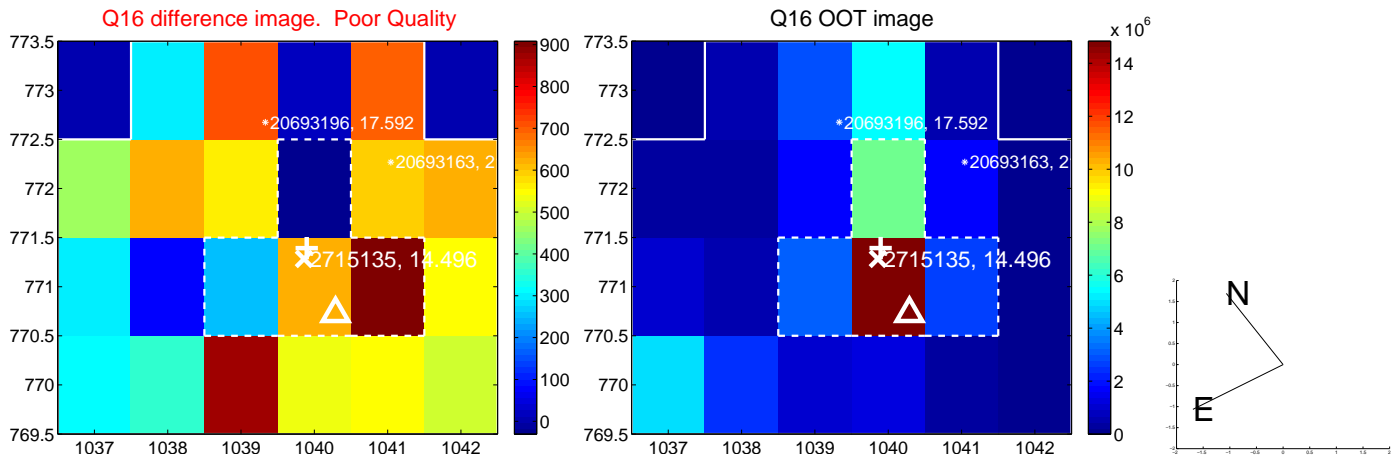
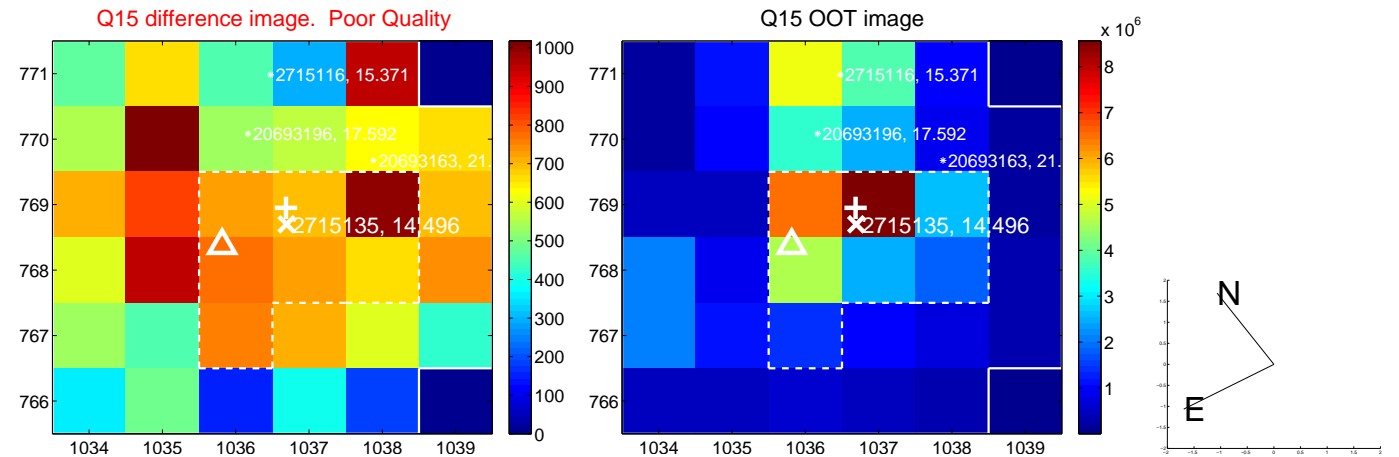
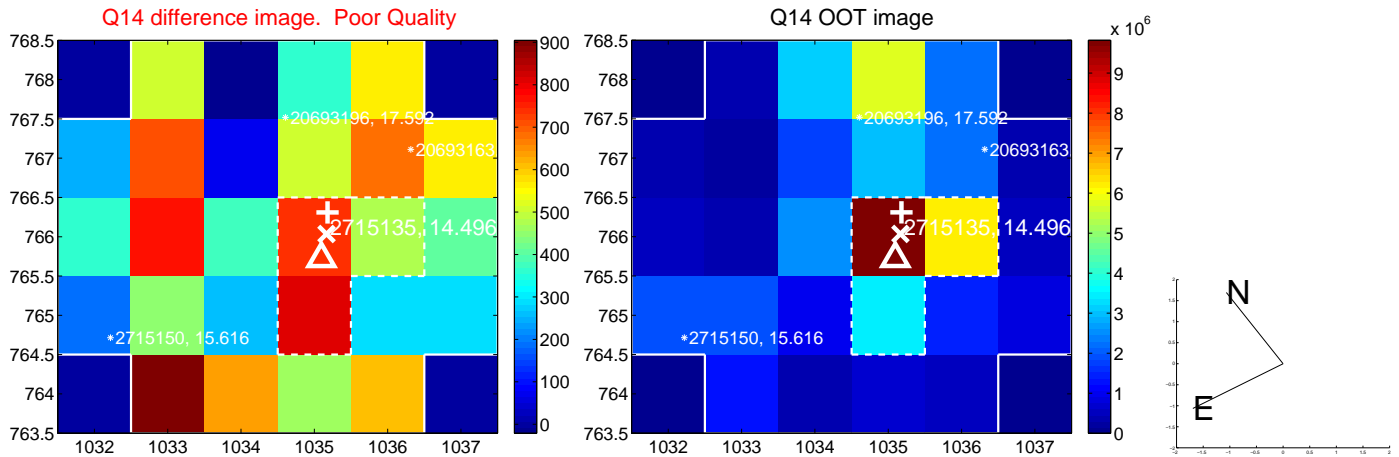
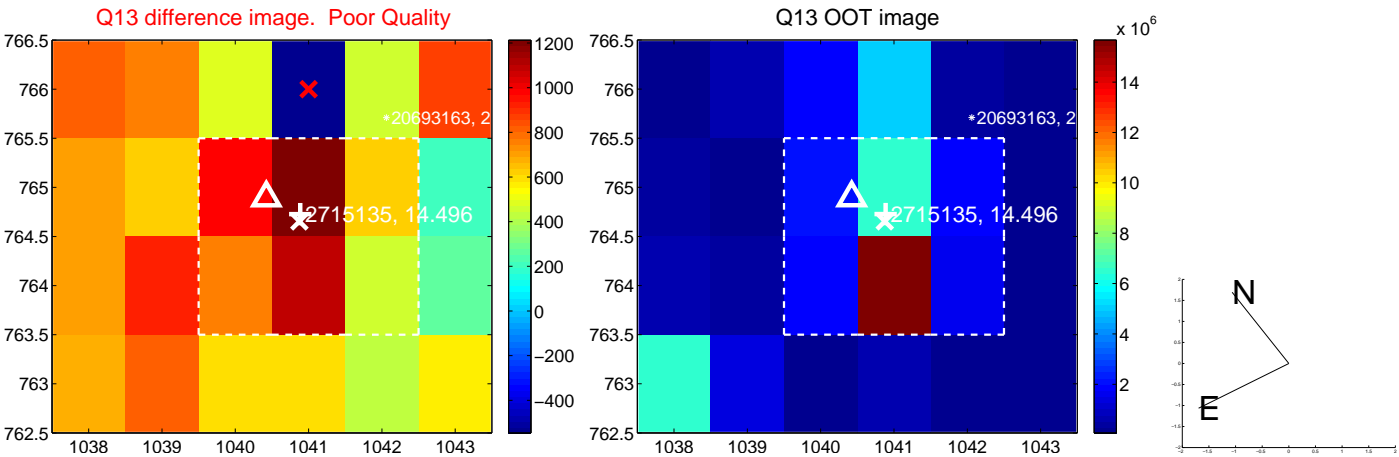
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



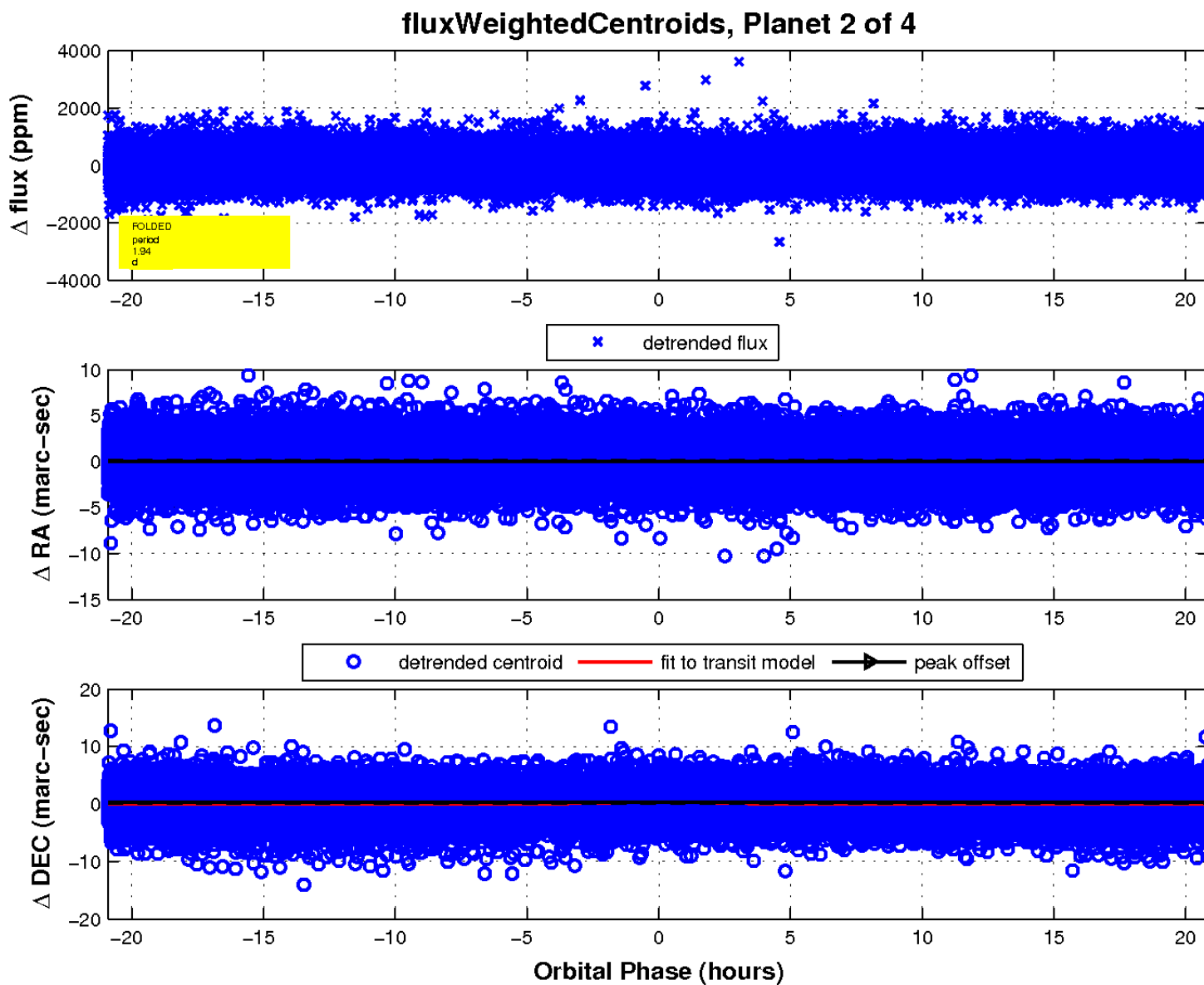
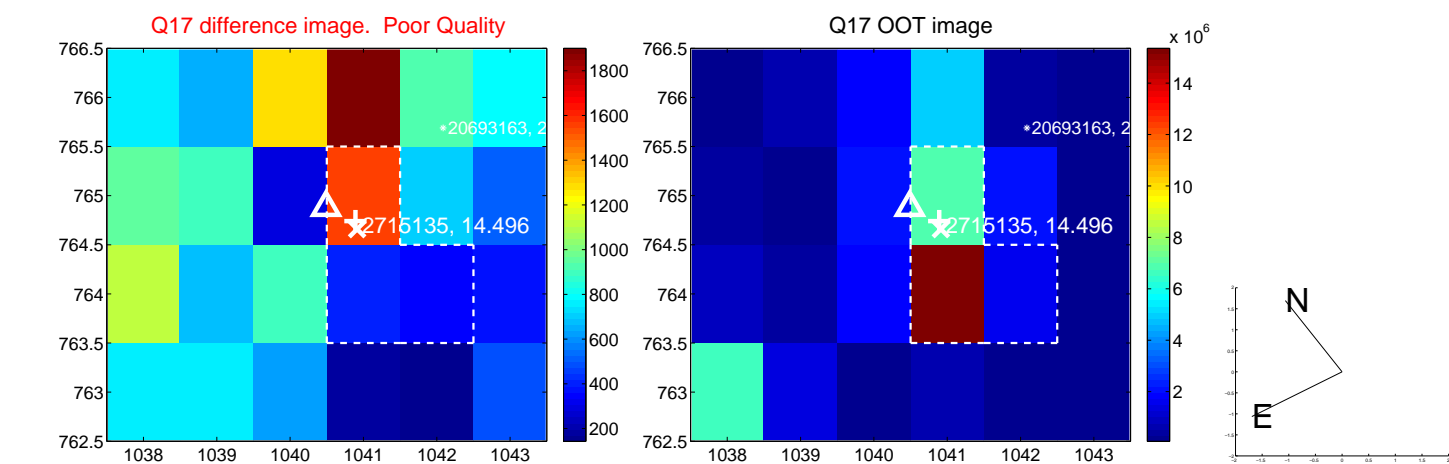
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

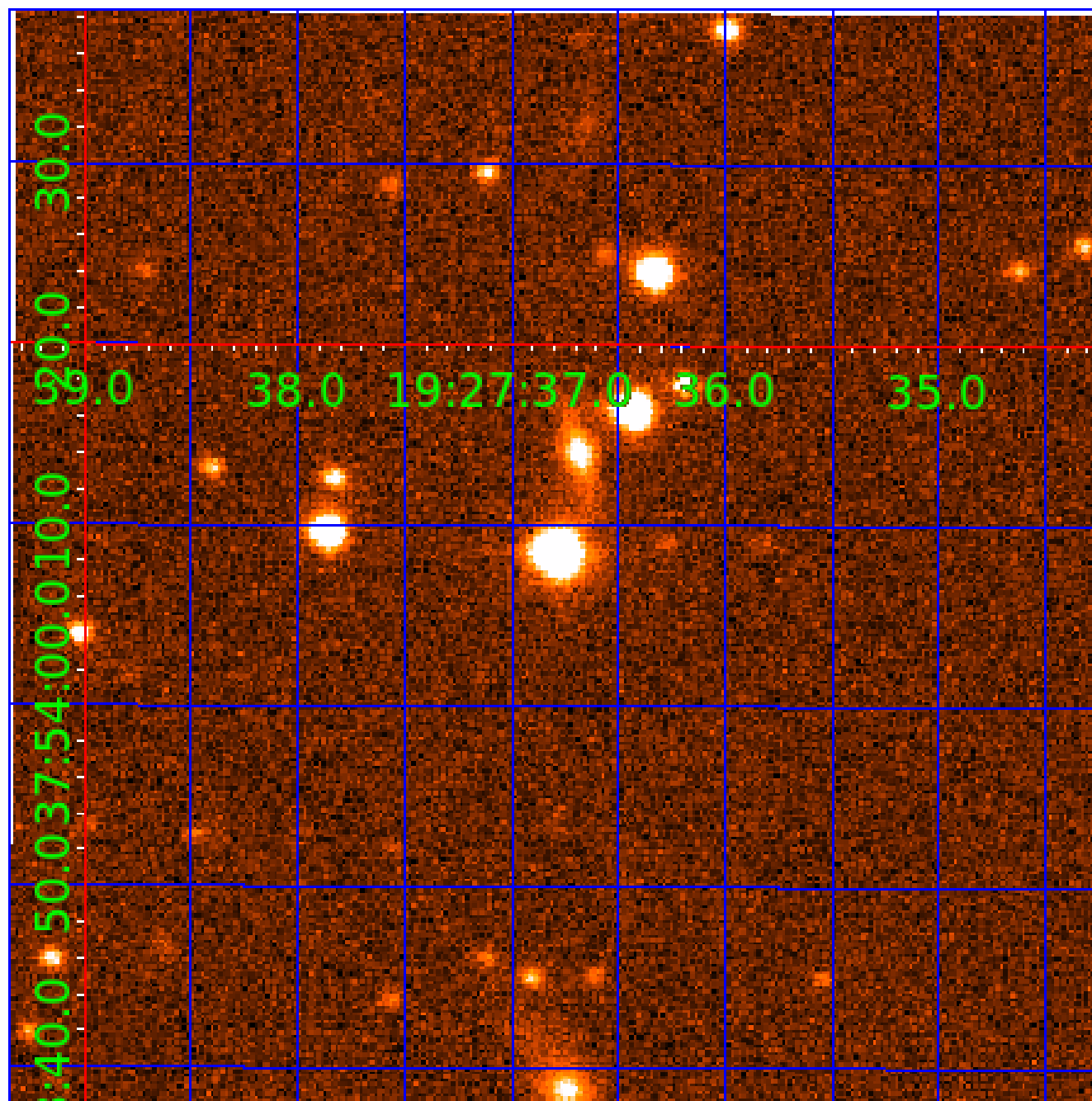


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\Delta$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 002715135

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
002715135-01	OBS	1024.01	5.747709	133.300020	821.4	1.968	44.5	50.1	0.63	4252	2.03	40.09
002715135-02	OBS	No	1.936738	132.295846	60.5	6.968	8.0	9.0	0.63	4252	0.49	171.00
002715135-03	OBS	No	235.031657	153.712023	951.3	8.780	9.5	9.6	0.63	4252	2.55	0.28
002715135-04	OBS	No	319.425436	387.156938	733.2	12.919	11.1	9.4	0.63	4252	1.87	0.19

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
002715135-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
002715135-02	OBS	FP	0.00	1	0	1	0	LPP_DV—CENT_RESOLVED_OFFSET
002715135-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—CENT_FEW_DIFFS
002715135-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—CENT_FEW_DIFFS

**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 002715135-03

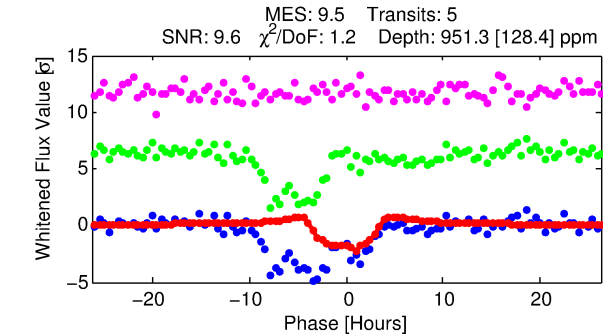
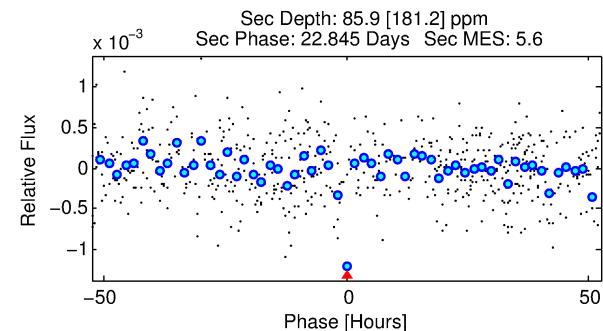
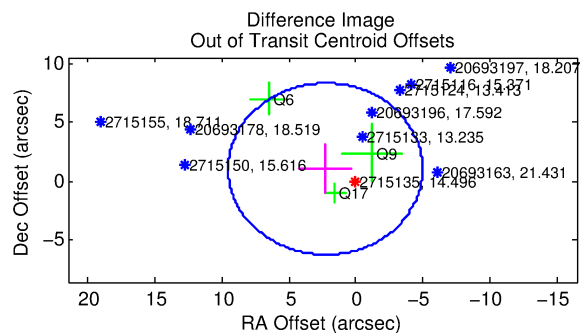
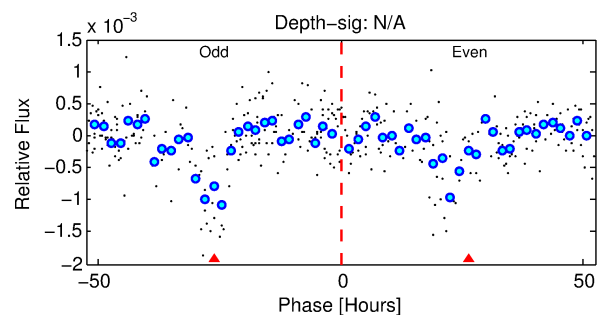
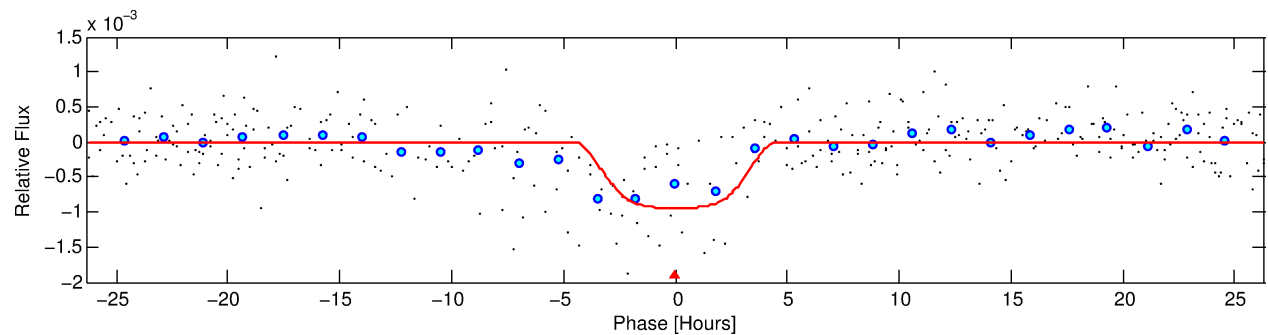
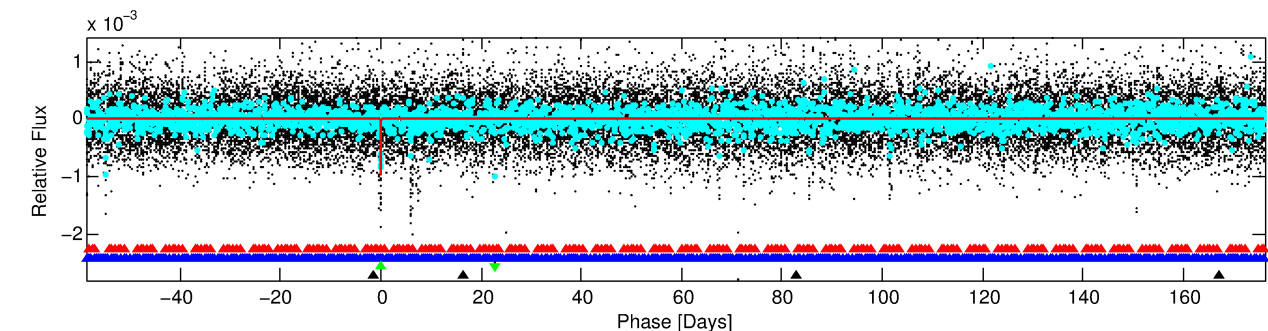
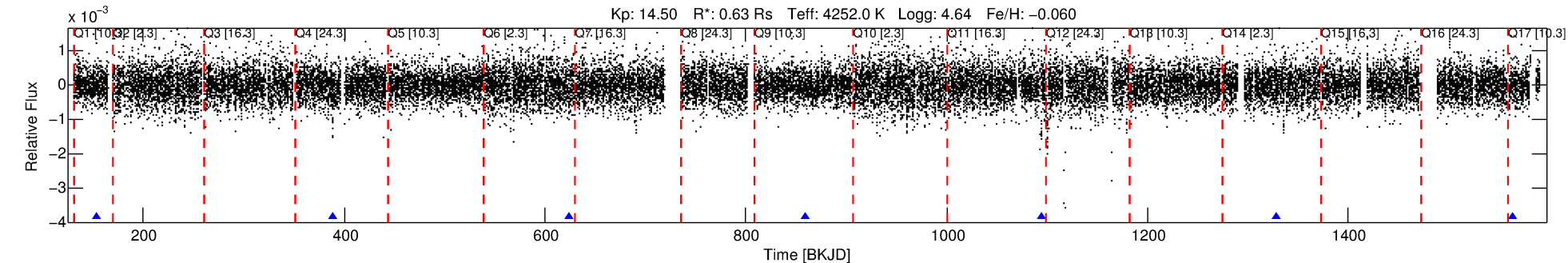
No Significant Match Found



# DV One-Page Summary

KIC: 2715135 Candidate: 3 of 4 Period: 235.032 d  
KOI: K01024 Corr: No Ephemeris Match

Kp: 14.50 R\*: 0.63 Rs Teff: 4252.0 K Logg: 4.64 Fe/H: -0.060



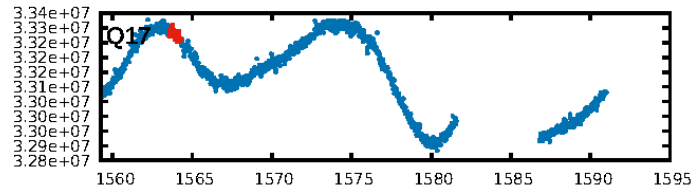
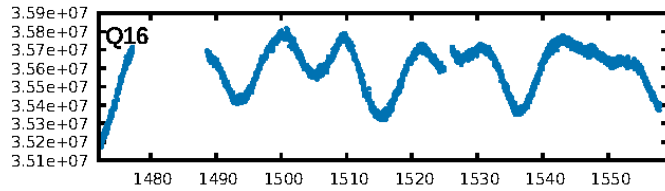
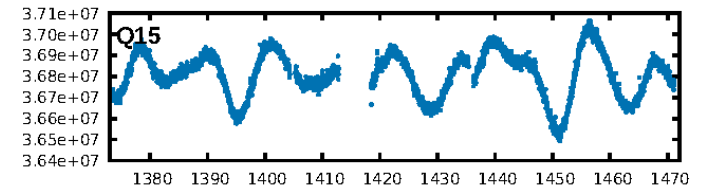
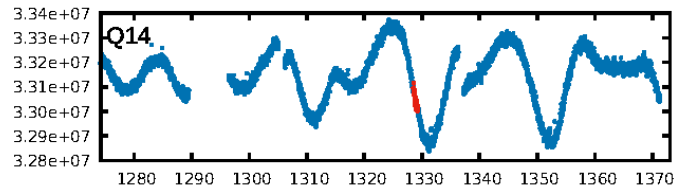
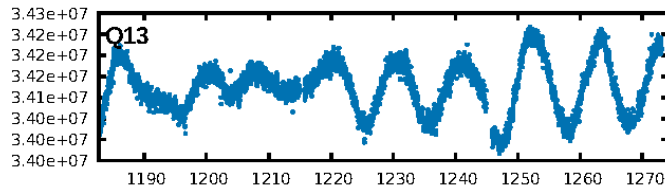
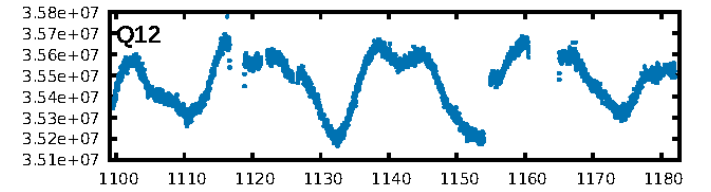
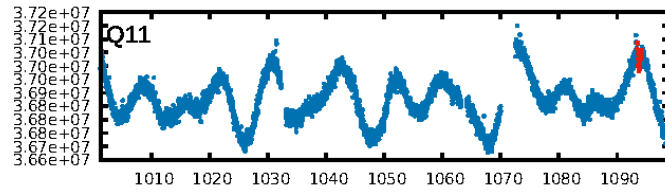
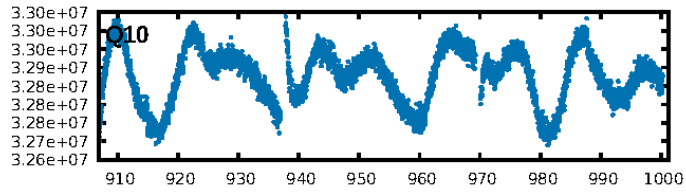
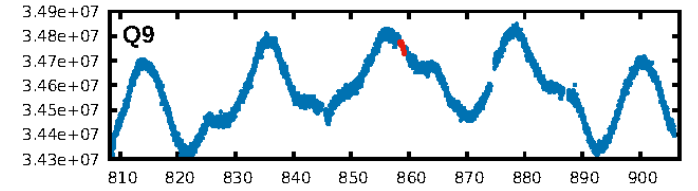
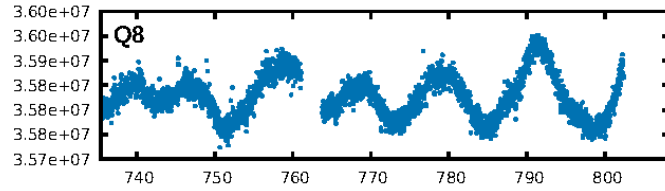
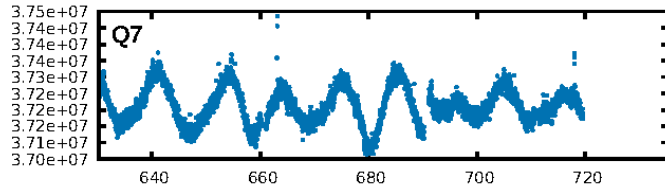
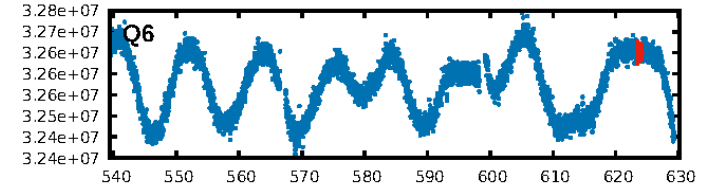
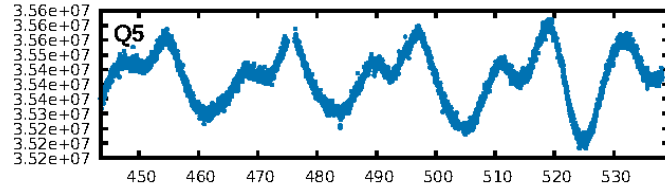
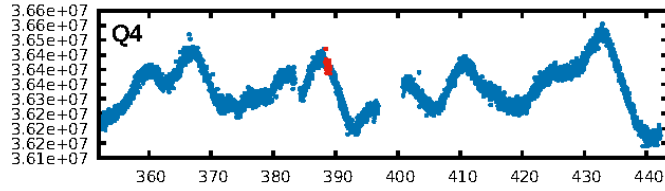
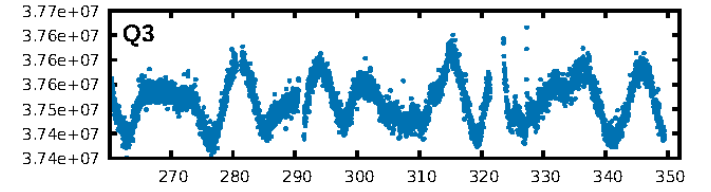
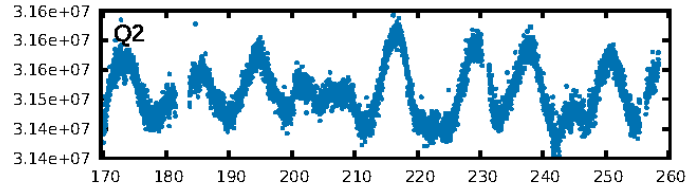
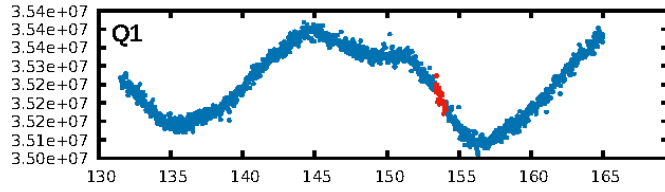
## DV Fit Results:

Period = 235.03166 [0.00531] d  
Epoch = 153.7120 [0.0166] BKJD  
Rp/R\* = 0.0370 [0.0042]  
a/R\* = 88.94 [24.37]  
b = 0.94 [0.04]  
Seff = 0.28 [0.03]  
Teq = 186 [5] K  
Rp = 2.55 [0.32] Re  
a = 0.6411 [0.0256] AU  
Ag = 2978.81 [6325.49] [0.47σ]  
Teffp = 2127 [1130] K [1.72σ]

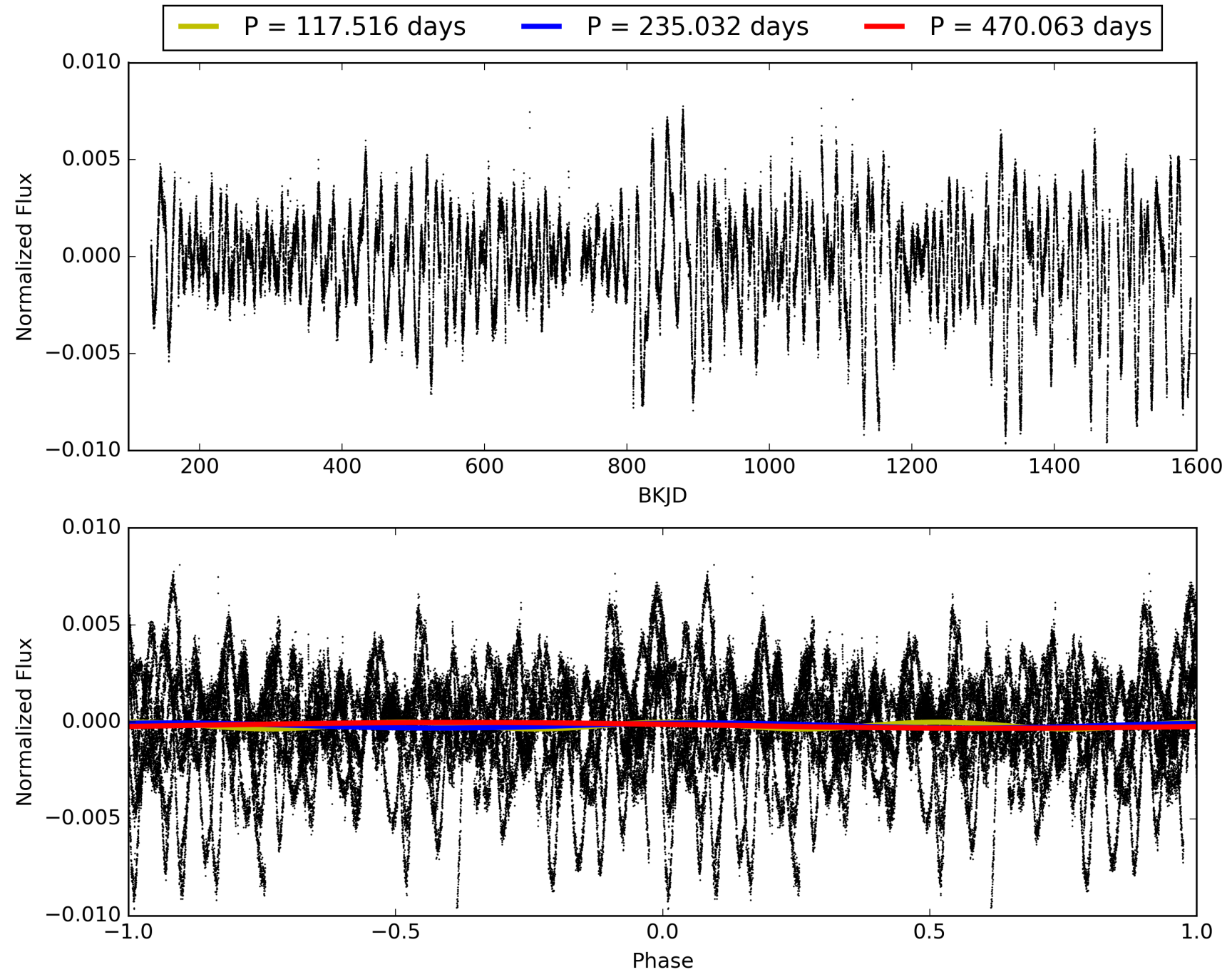
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [611.60σ]  
LongPeriod-sig: 100.0% [129.67σ]  
ModelChiSquare2-sig: 0.2%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 1.68e-12  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: -0.9406  
Centroid-sig: 45.1%  
Centroid-so: 0.689 arcsec [1.10σ]  
OotOffset-rm: 2.521 arcsec [1.04σ]  
KicOffset-rm: 2.555 arcsec [1.01σ]  
OotOffset-st: 1/0/0/2 [3]  
KicOffset-st: 1/0/0/2 [3]  
DiffImageQuality-fgm: 0.00 [0/3]  
DiffImageOverlap-fno: 0.00 [0/6]

# TCE 002715135-03, PDC Light Curves

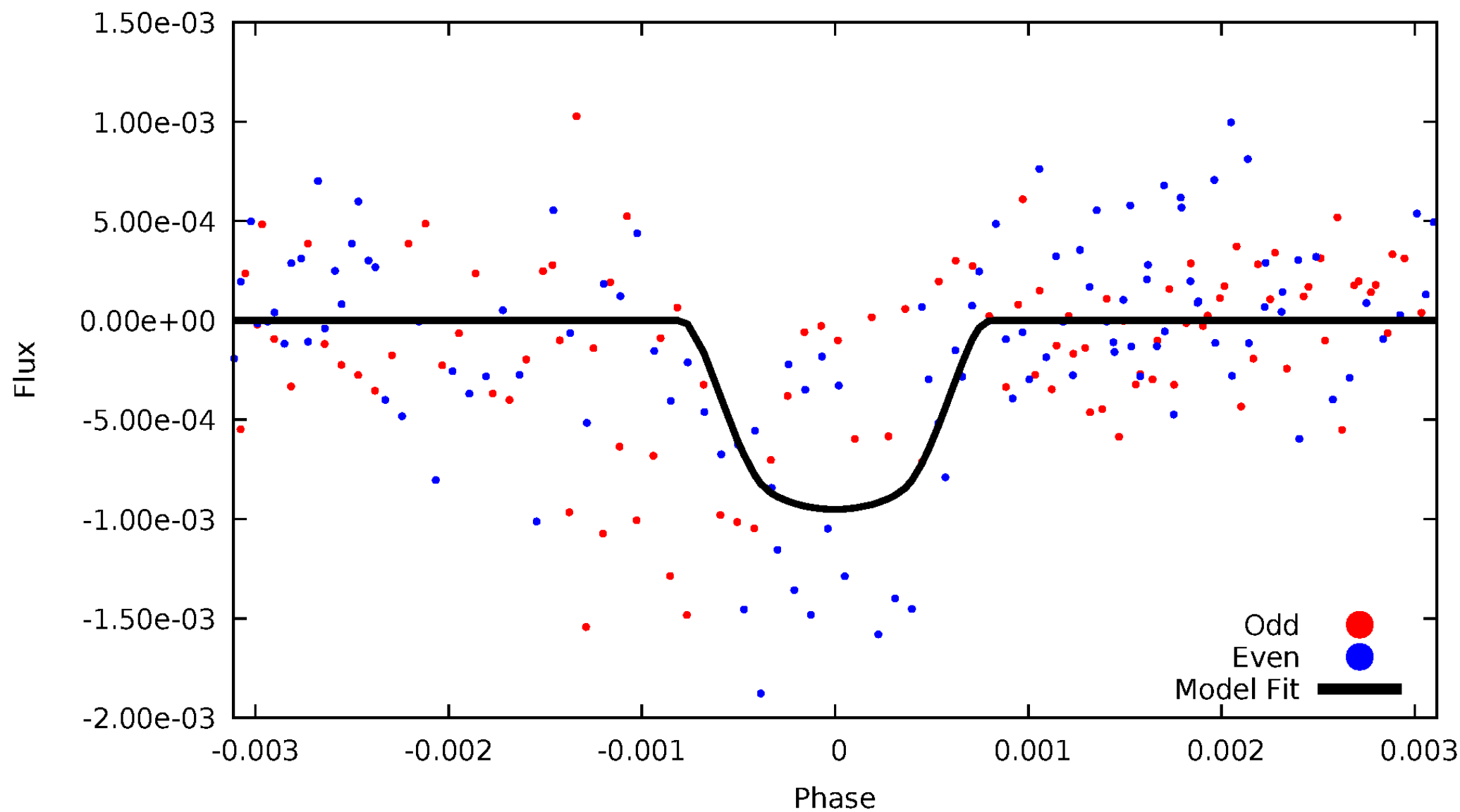


# TCE 002715135-03



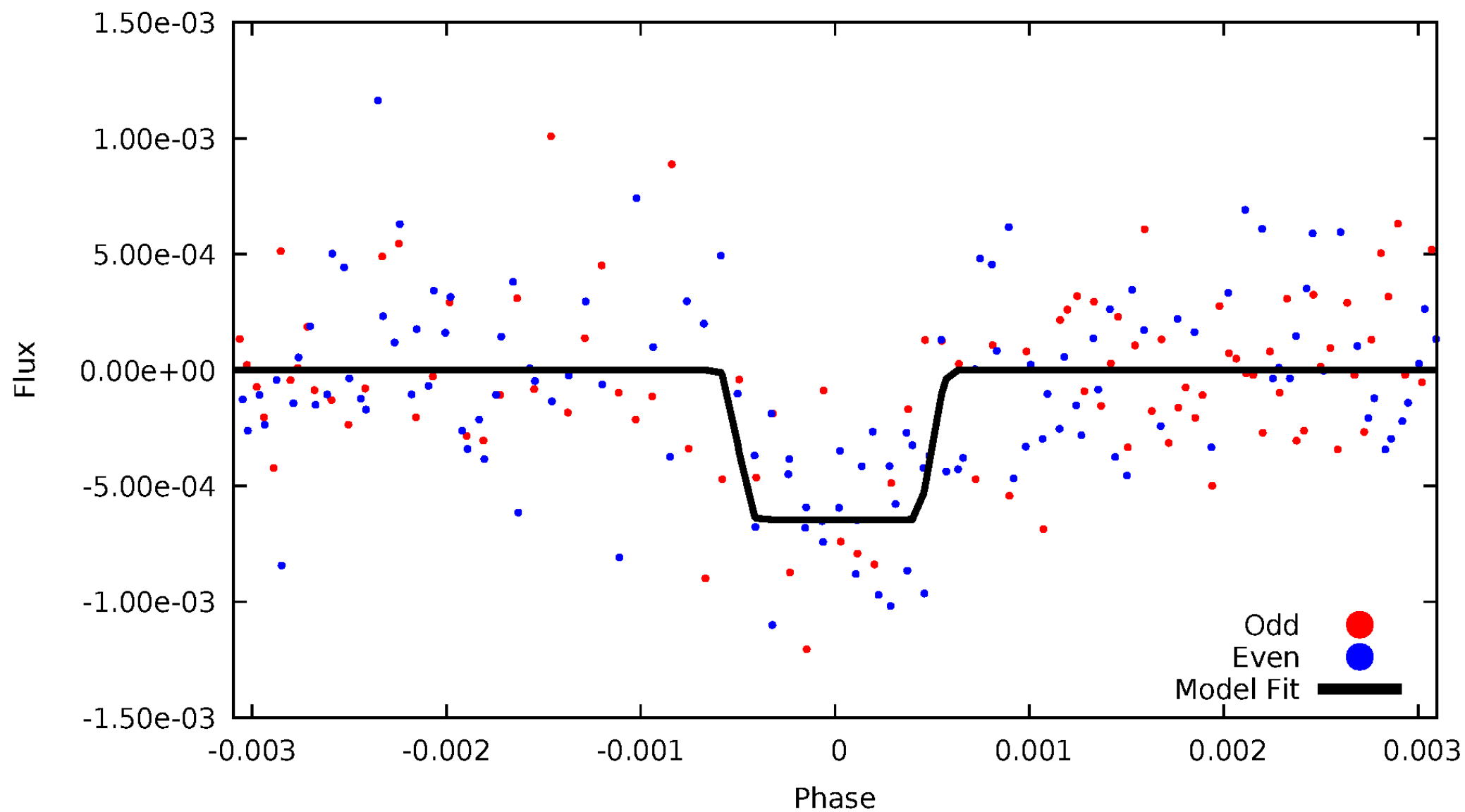
# DV Odd/Even

TCE 002715135-03



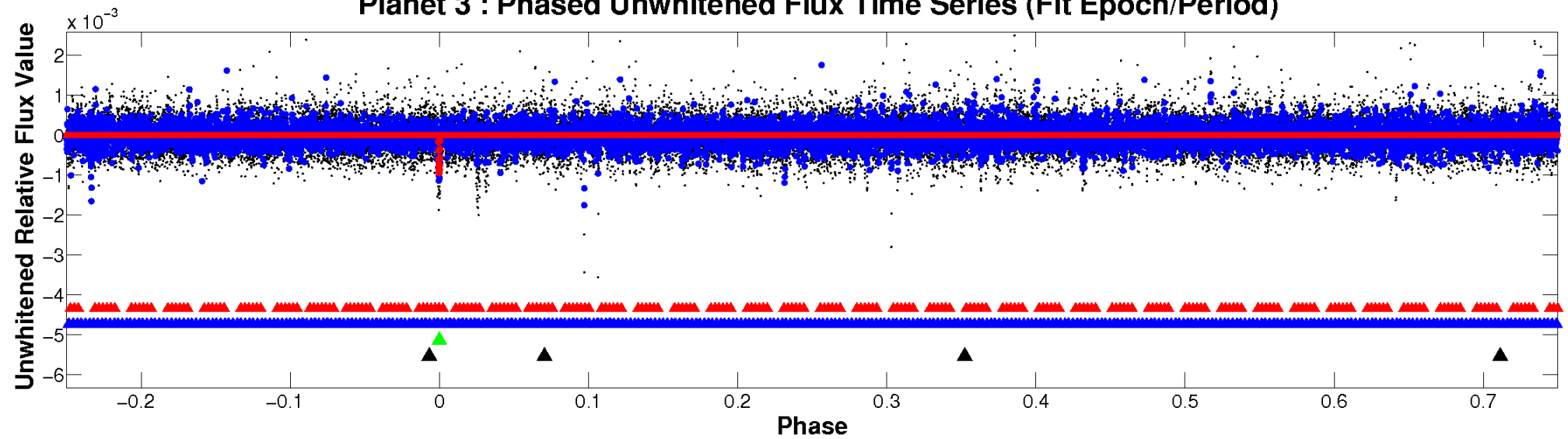
# ALT Odd/Even

TCE 002715135-03

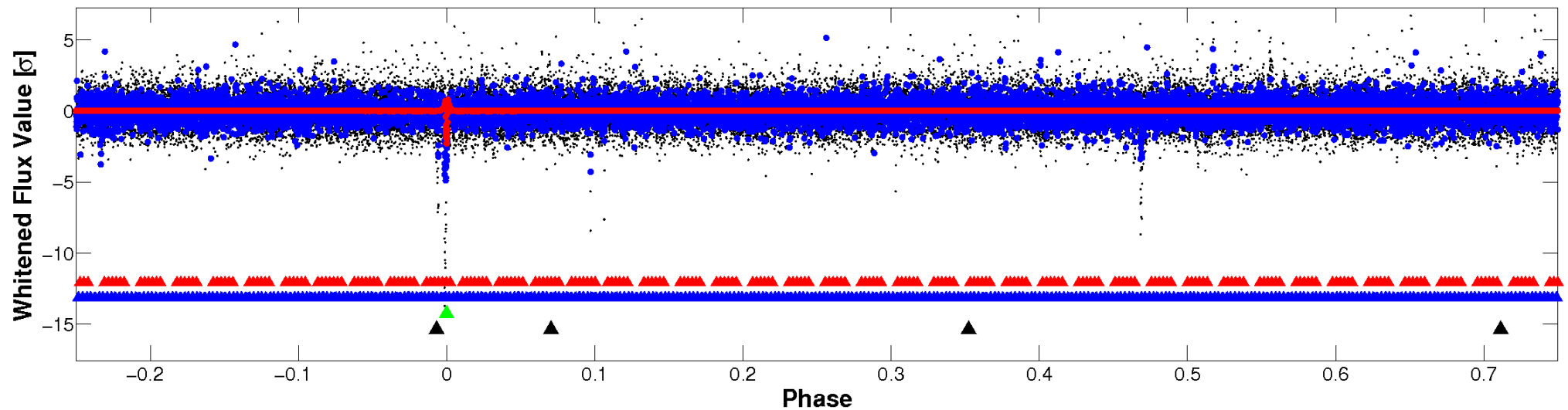


# Non-Whitened Vs. Whitened Light Curve

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

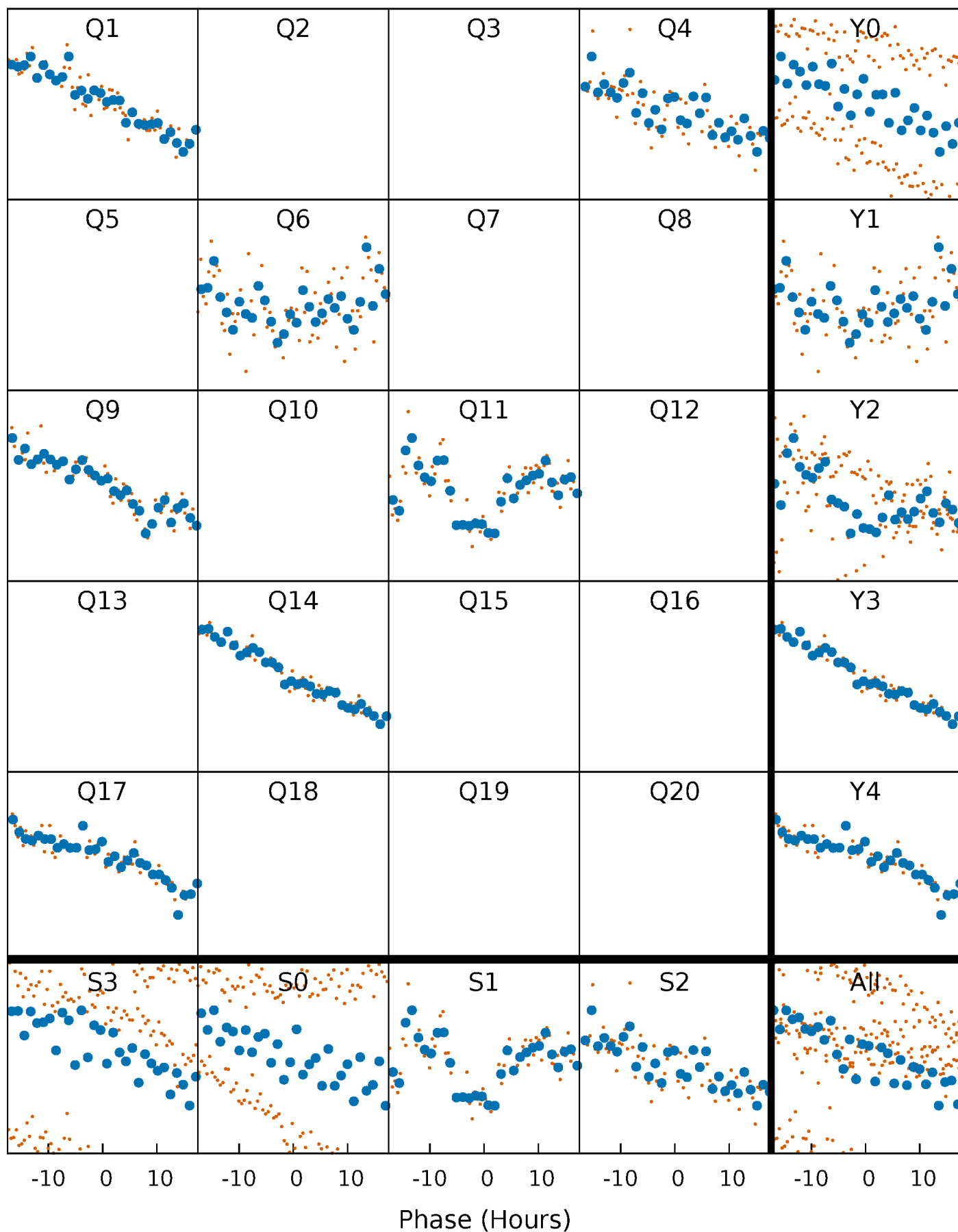


Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

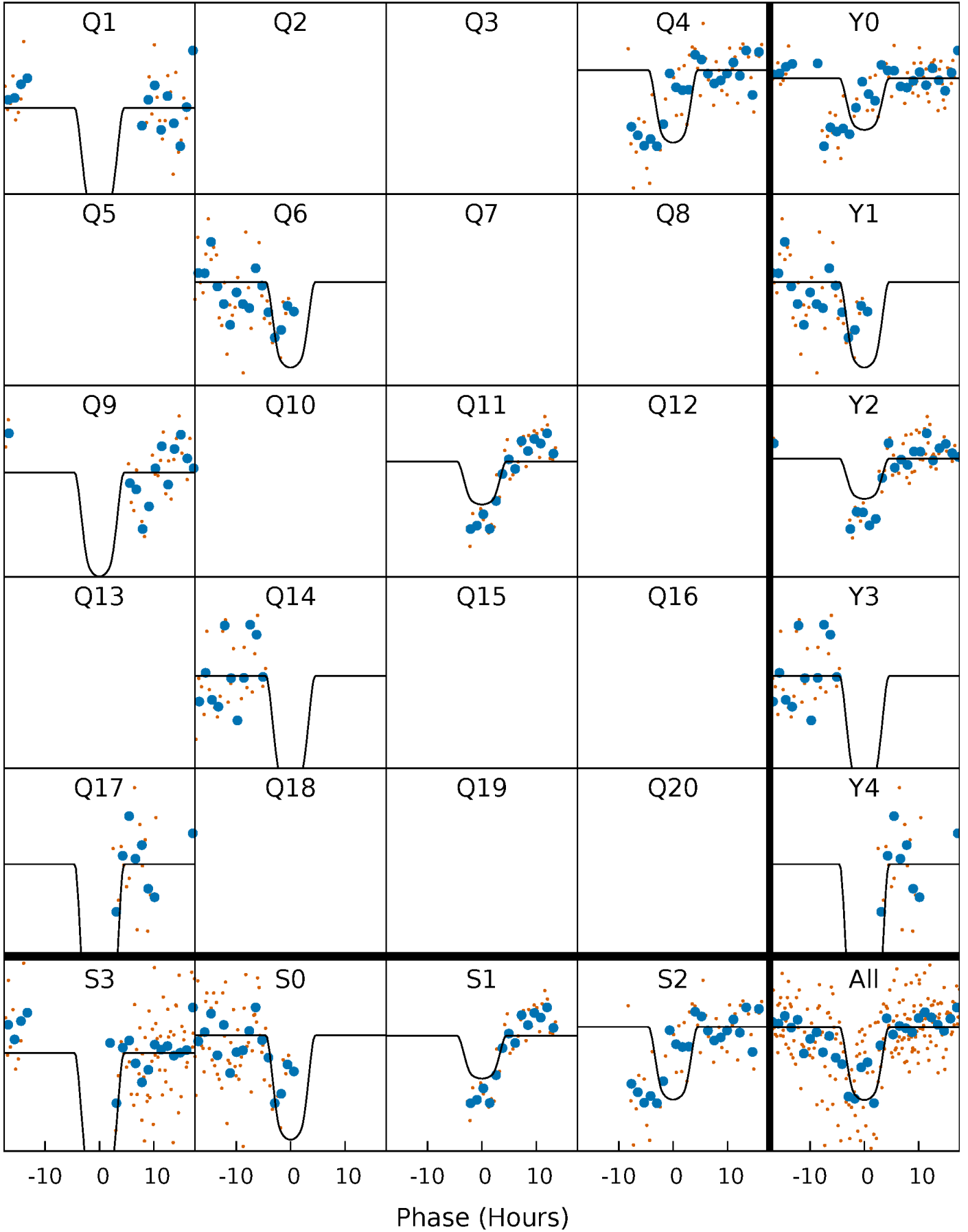
TCE 002715135-03 P=235.031657 Days  $T_0=153.712023$  (BKJD)





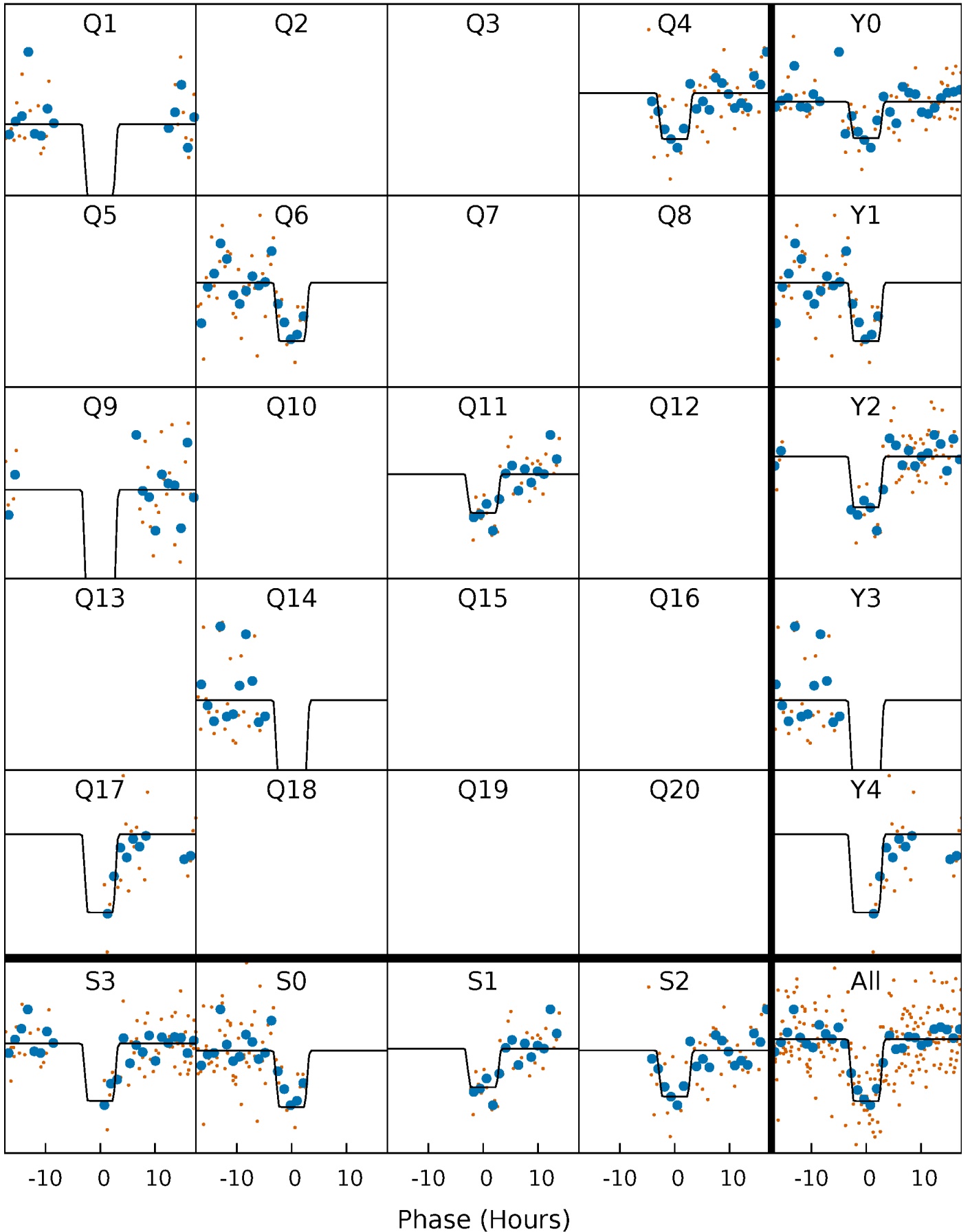
# DV Quarter-Phased Transit Curves

TCE 002715135-03   P=235.031657 Days    $T_0=153.712023$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

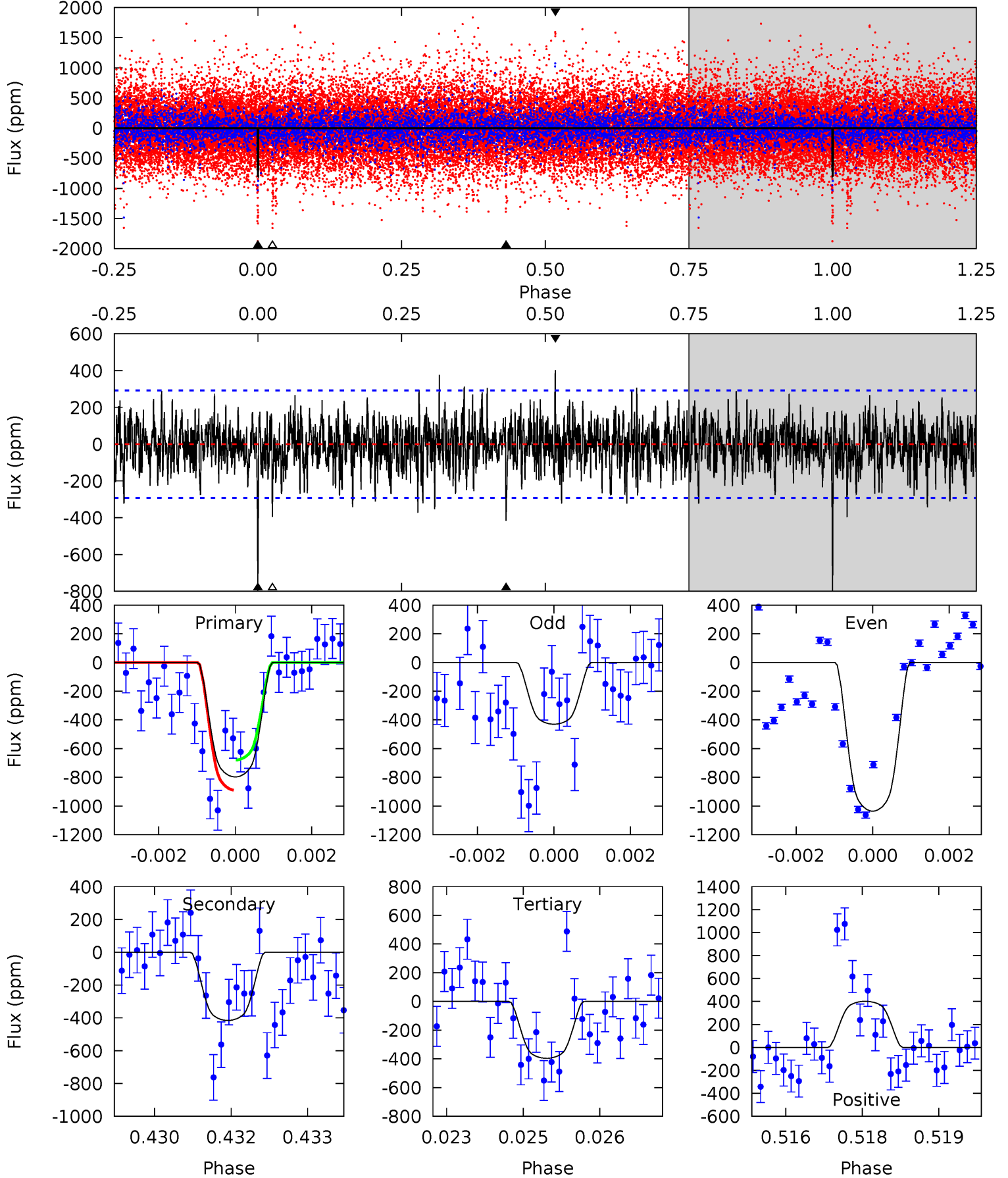
TCE 002715135-03 P=235.075506 Days  $T_0=153.522119$  (BKJD)



# DV Model-Shift Uniqueness Test

002715135-03, P = 235.031657 Days, E = 153.712023 Days

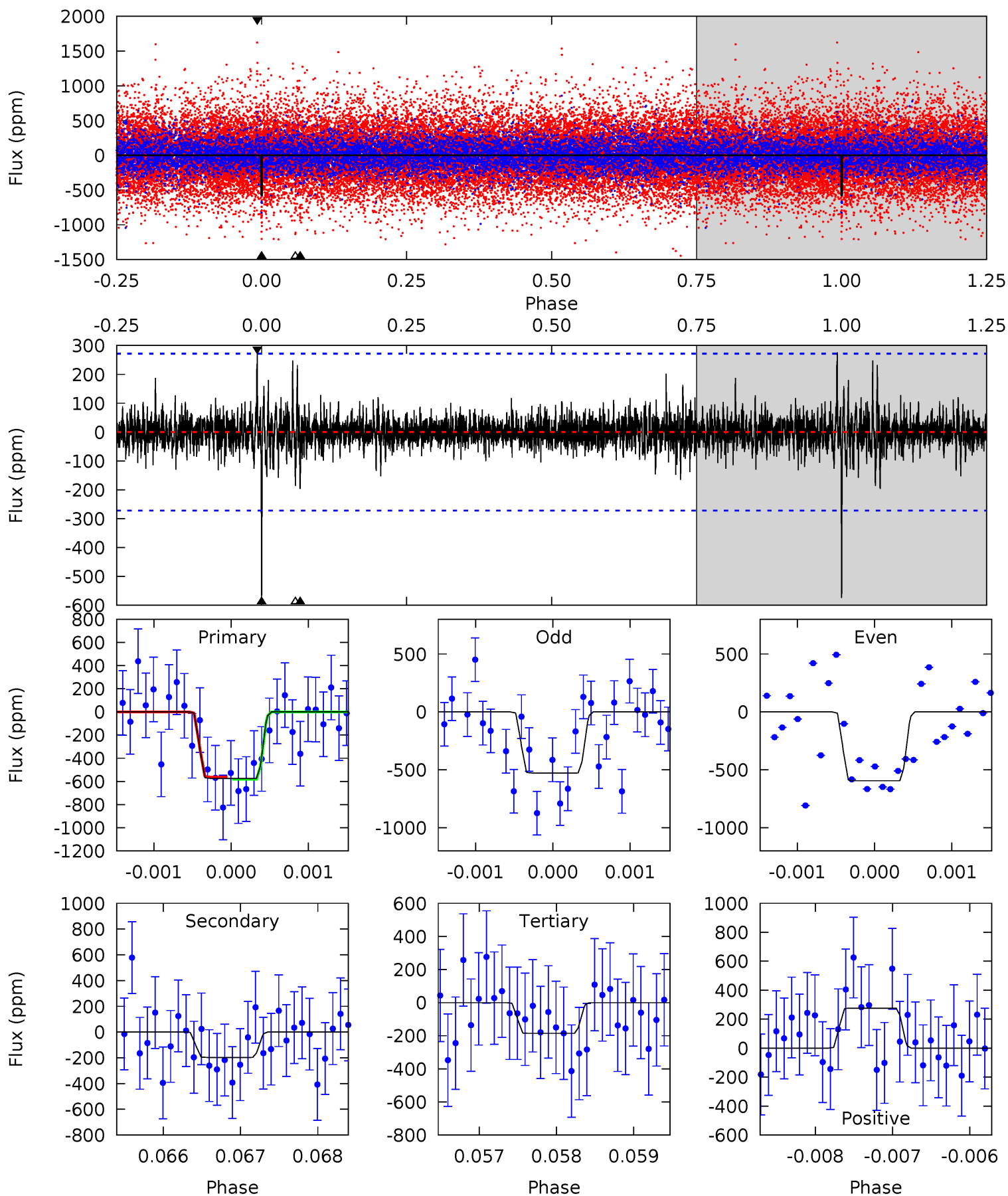
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
14.6	7.63	7.26	7.36	5.36	3.15	1.84	7.36	7.26	0.37	0.26	5.45	1.42	0.33	1.92



# Alt Model-Shift Uniqueness Test

002715135-03, P = 235.075506 Days, E = 153.522119 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
11.4	3.92	3.70	5.50	5.42	3.24	0.84	7.74	5.94	0.22	-1.58	0.62	1.05	0.32	0.18



### Stellar Parameters For KIC 002715135

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4252^{+84}_{-84}$	$4.640^{+0.030}_{-0.017}$	$-0.060^{+0.150}_{-0.150}$	$0.632^{+0.025}_{-0.031}$	$0.637^{+0.032}_{-0.032}$	$3.552^{+0.431}_{-0.284}$
	+2%/-2%	+1%/-0%	+250%/-250%	+4%/-5%	+5%/-5%	+12%/-8%
Source	SPE60	SPE60	SPE60	DSEP		

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

### Secondary Eclipse Parameters for KIC 002715135-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-416 \pm 55$	$2.57^{+0.29}_{-0.29}$	$260^{+6}_{-6}$	$3463^{+169}_{-149}$	$14430^{+4474}_{-3114}$
Alt.	$-197 \pm 50$	$1.76^{+0.27}_{-0.32}$	$260^{+5}_{-5}$	$3467^{+249}_{-202}$	$14572^{+7695}_{-4770}$

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

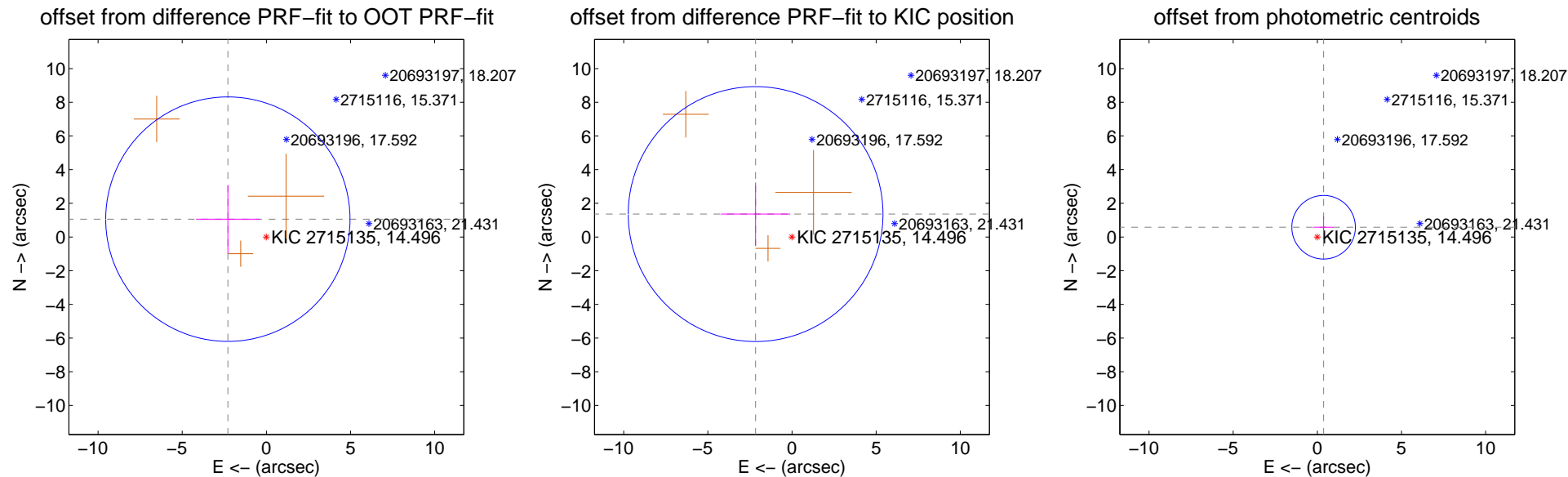
## DV Centroid Data

Supplemental centroid analysis for 002715135-03. Kepler magnitude: 14.50. Transit SNR 9.57

There are 0 quarters with good PRF difference image offsets

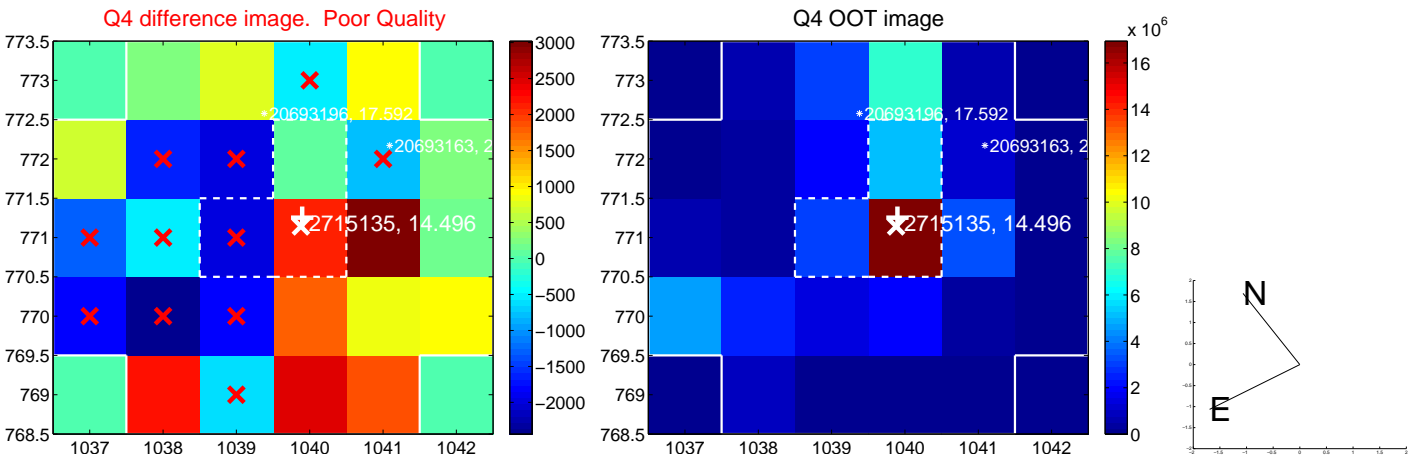
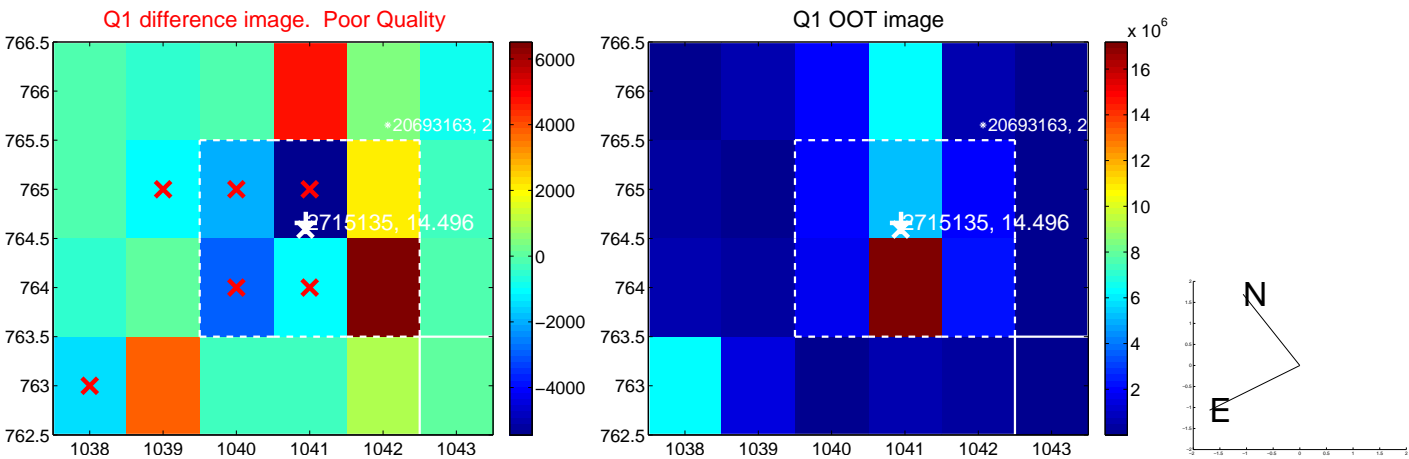
The direct PRF centroid is offset from the target star catalog position by about 0.33 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.521 \pm 2.419$	1.04	$2.287 \pm 1.889$	$1.060 \pm 2.025$
PRF-fit source offset from KIC position	$2.555 \pm 2.522$	1.01	$2.162 \pm 2.056$	$1.362 \pm 1.872$
photometric centroid source offset	$0.69 \pm 0.63$	1.10	$-0.37 \pm 0.59$	$0.58 \pm 0.64$

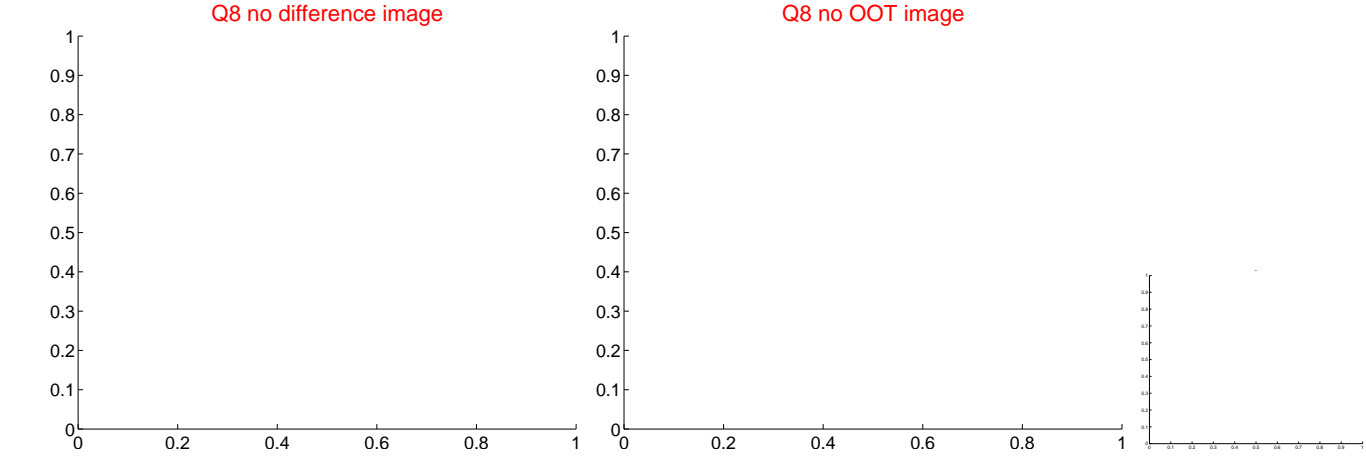
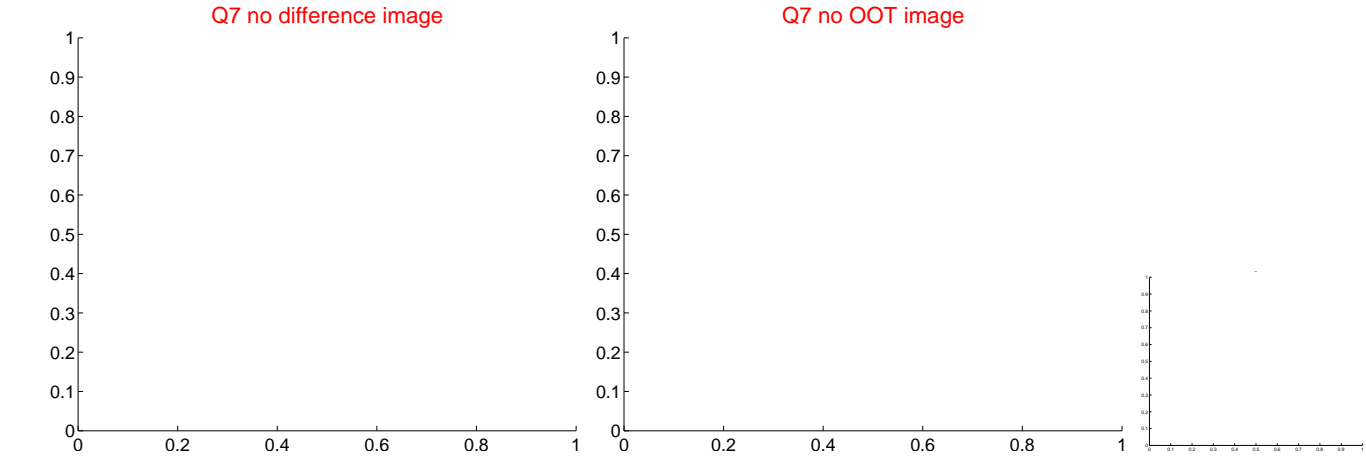
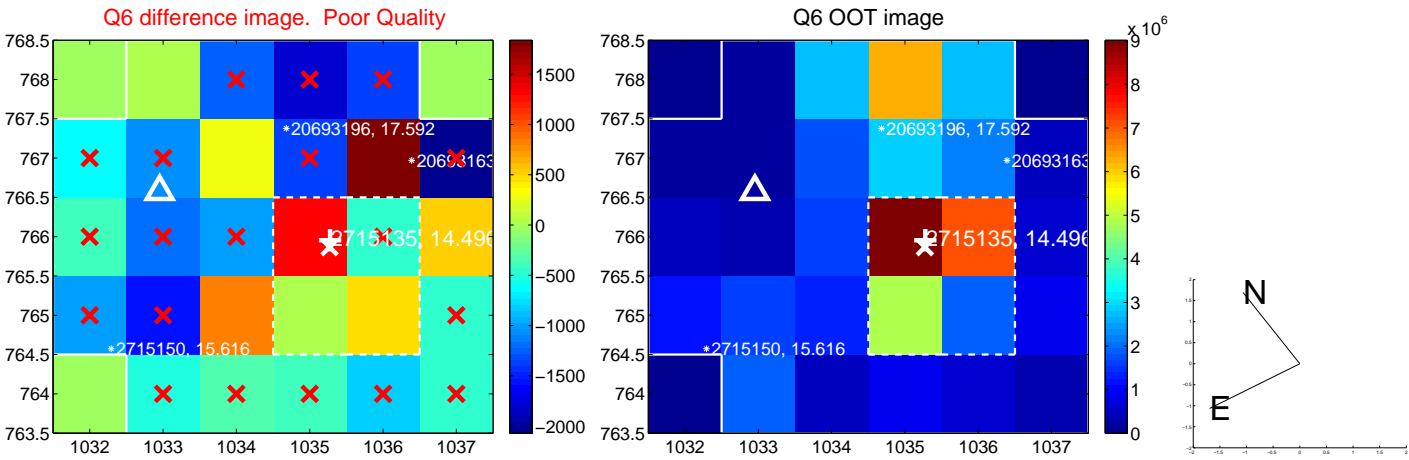
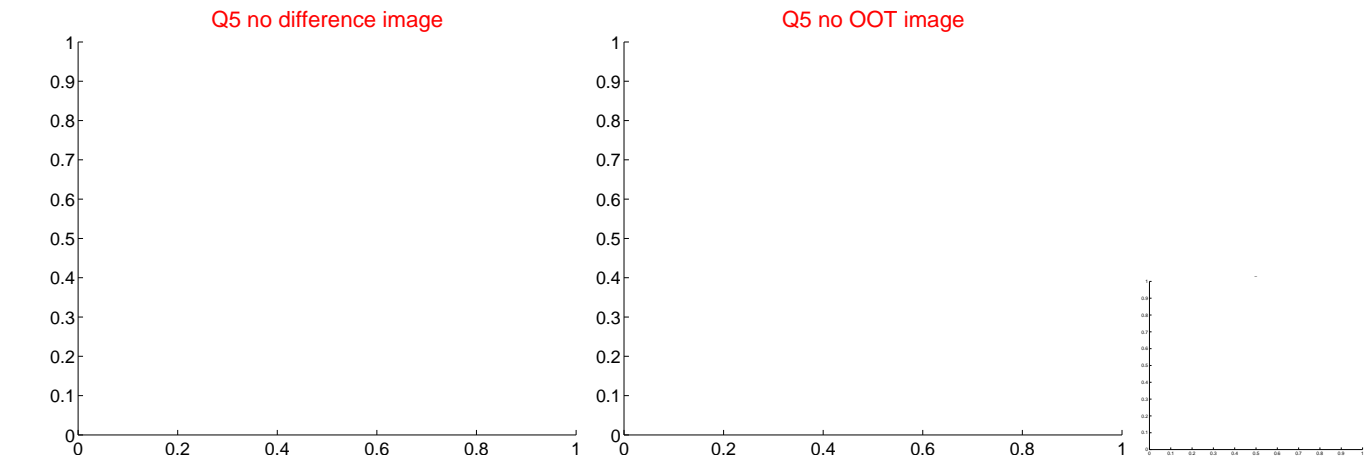


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

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

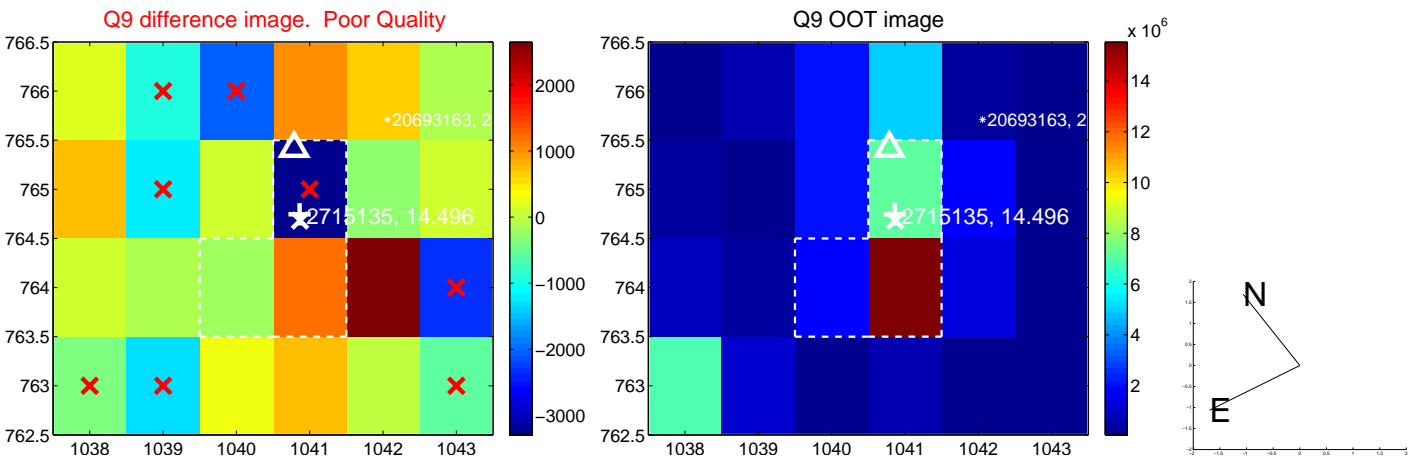


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

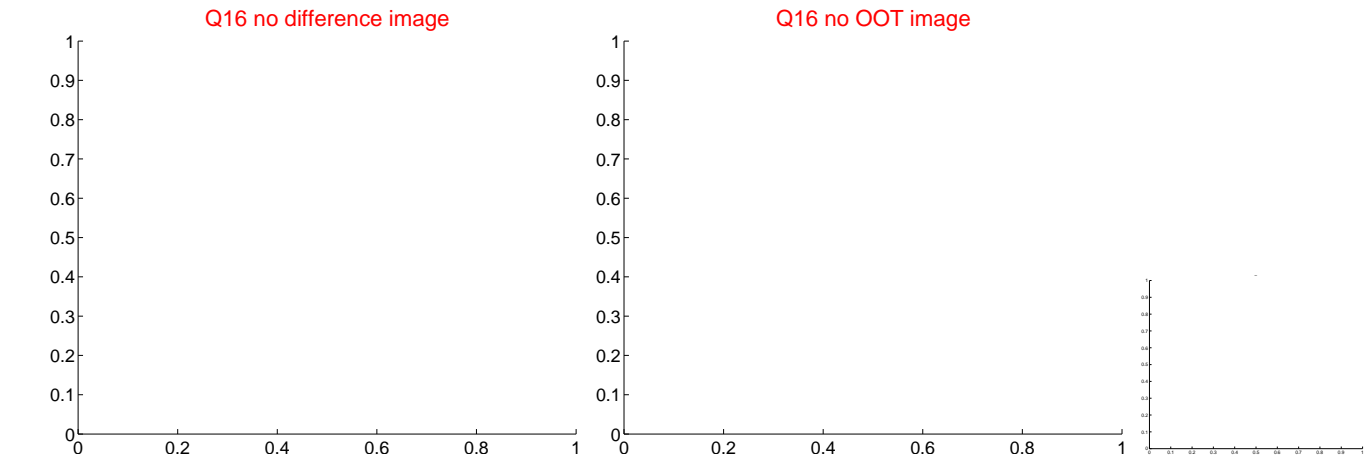
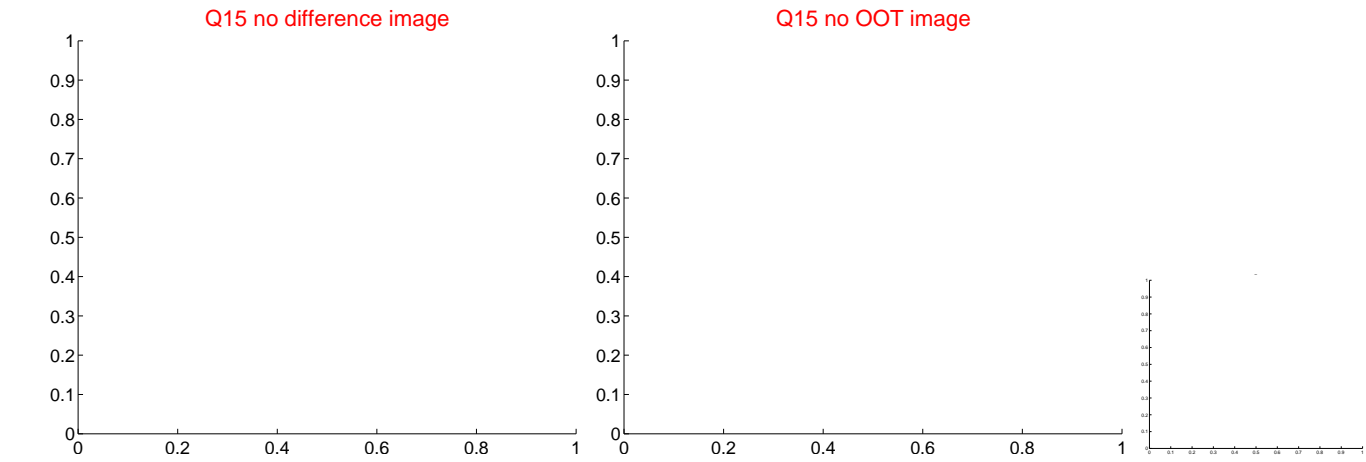
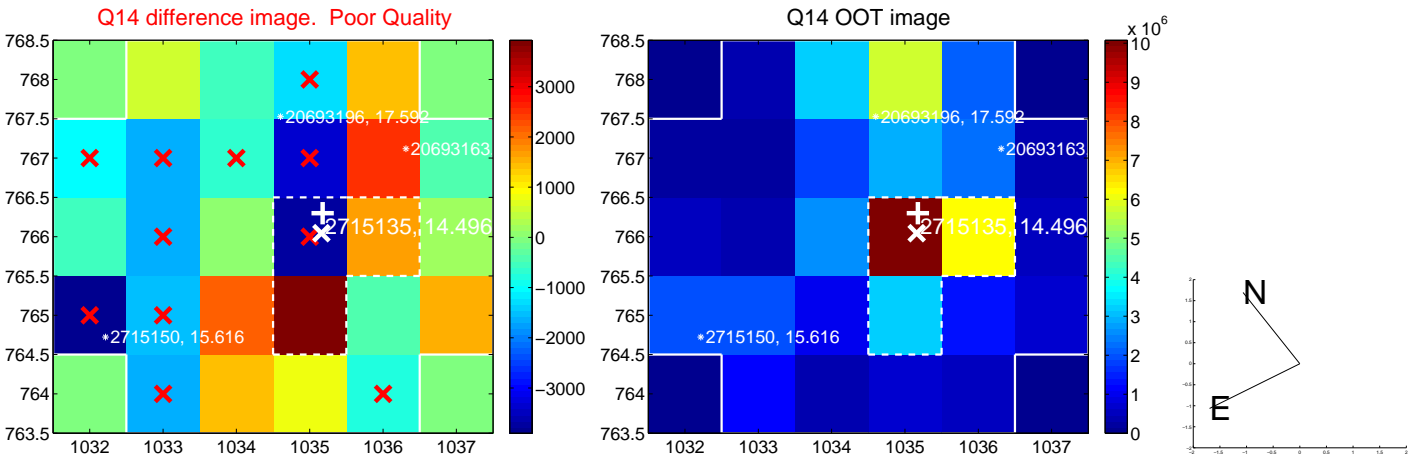
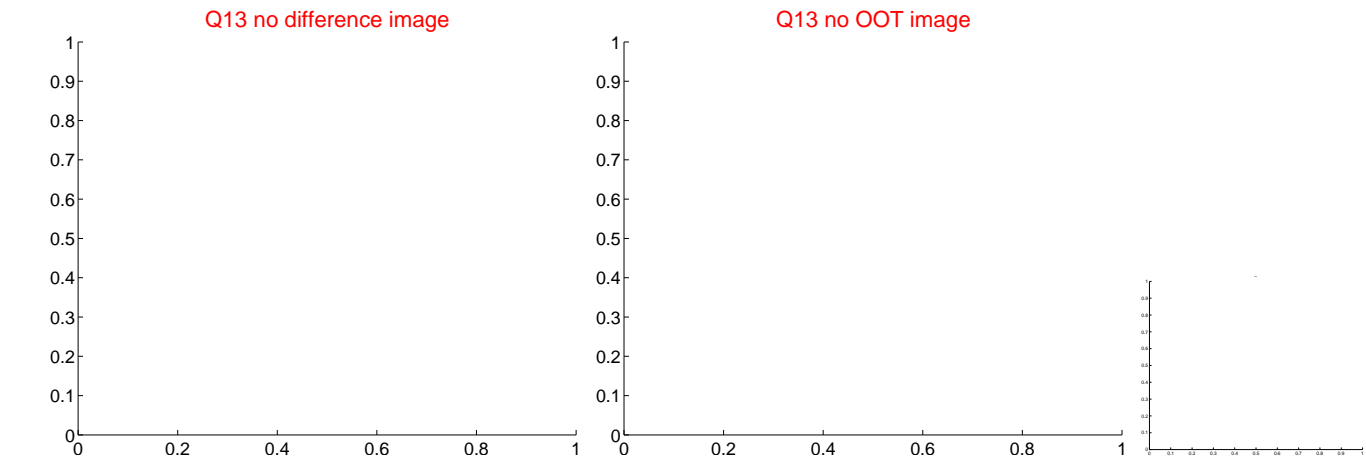




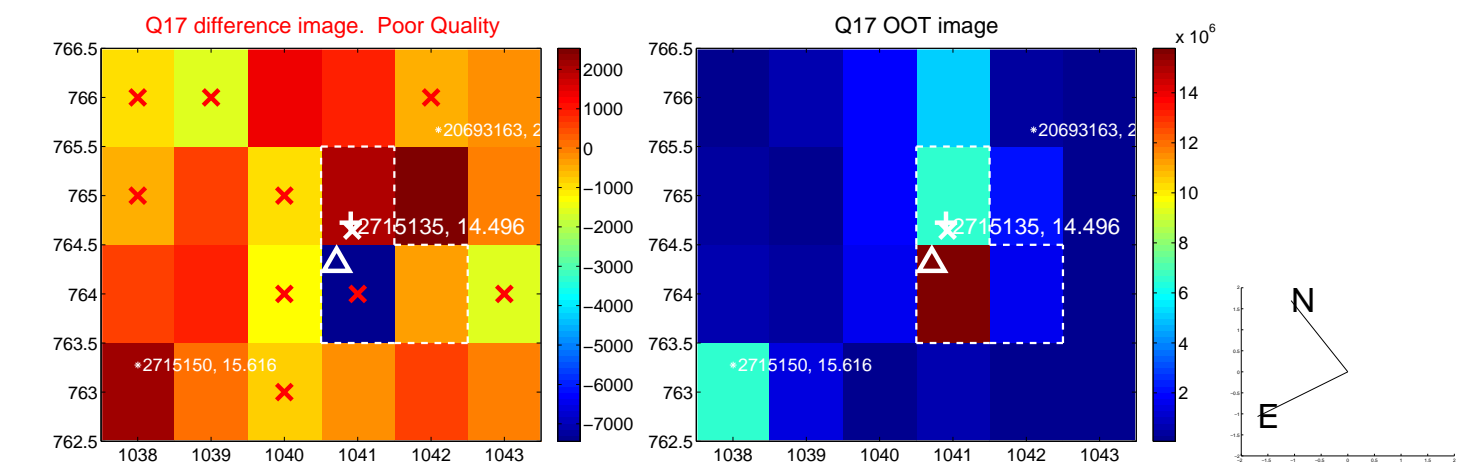
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.



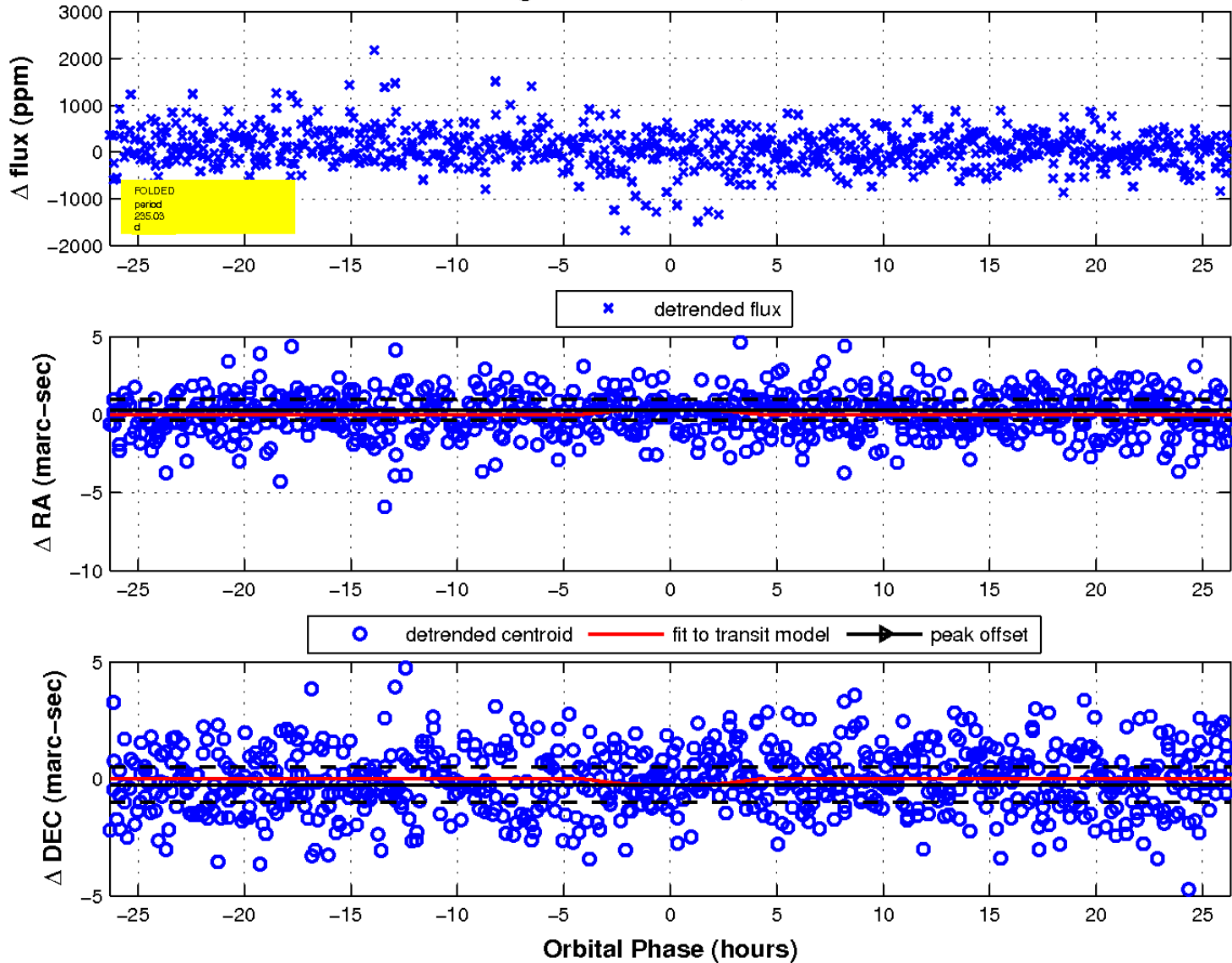
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

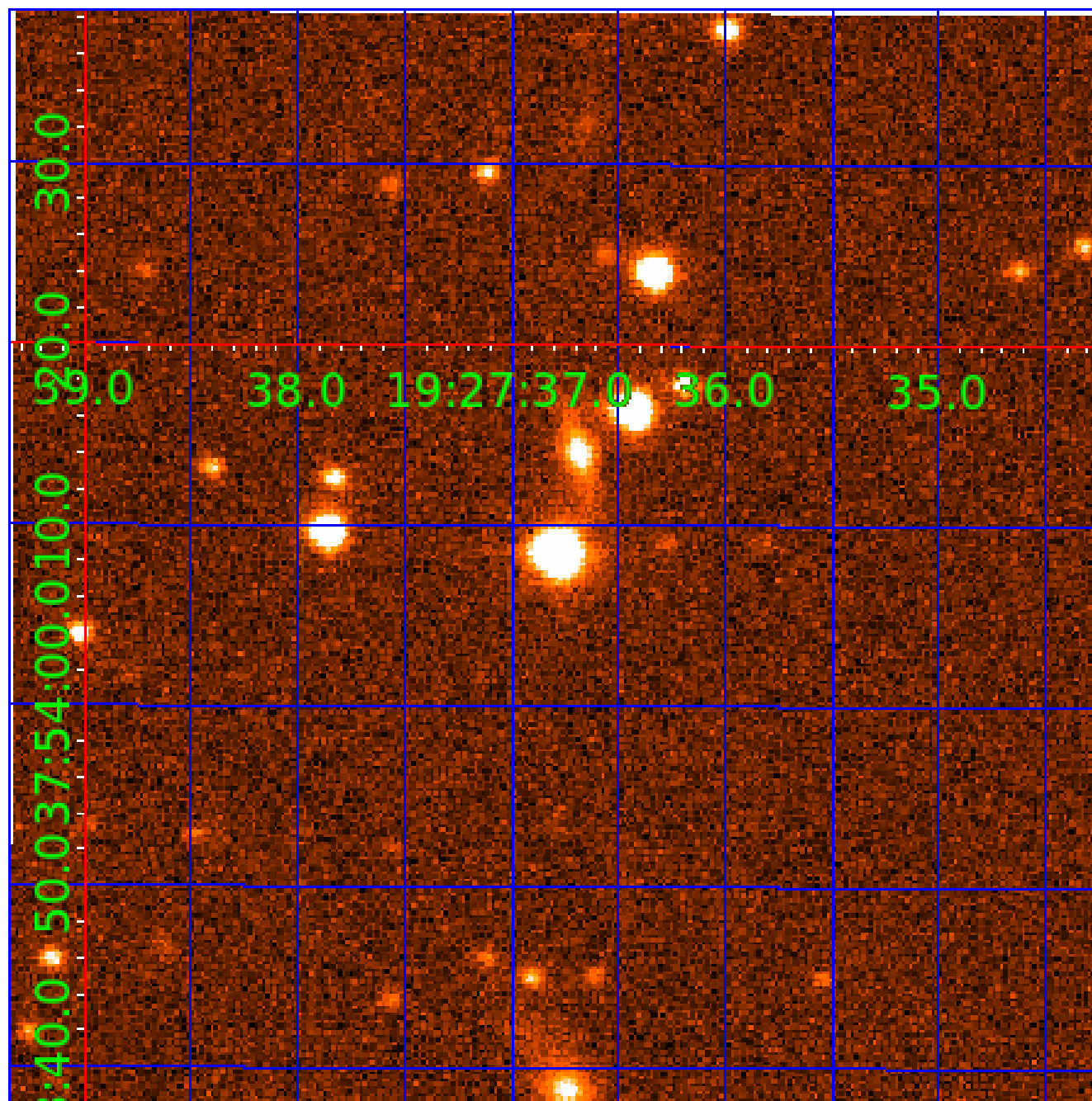


fluxWeightedCentroids, Planet 3 of 4



UKIRT Image

Declination



# KIC 002715135

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
002715135-01	OBS	1024.01	5.747709	133.300020	821.4	1.968	44.5	50.1	0.63	4252	2.03	40.09
002715135-02	OBS	No	1.936738	132.295846	60.5	6.968	8.0	9.0	0.63	4252	0.49	171.00
002715135-03	OBS	No	235.031657	153.712023	951.3	8.780	9.5	9.6	0.63	4252	2.55	0.28
002715135-04	OBS	No	319.425436	387.156938	733.2	12.919	11.1	9.4	0.63	4252	1.87	0.19

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
002715135-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
002715135-02	OBS	FP	0.00	1	0	1	0	LPP_DV—CENT_RESOLVED_OFFSET
002715135-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—CENT_FEW_DIFFS
002715135-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—CENT_FEW_DIFFS

**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.

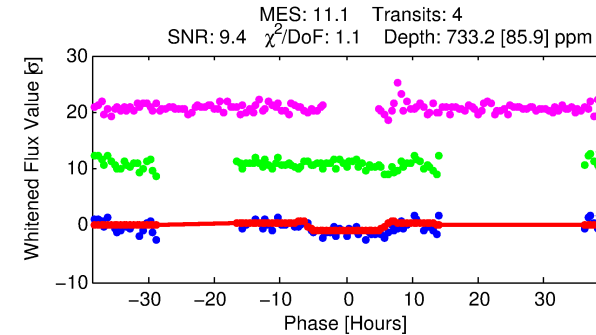
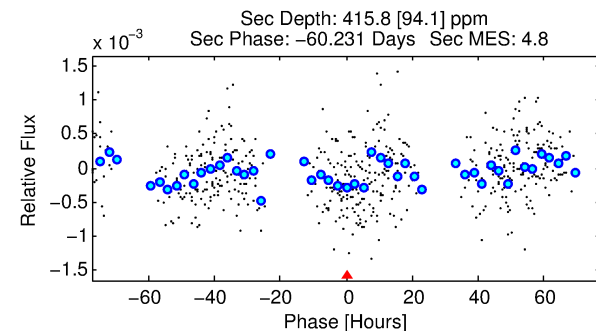
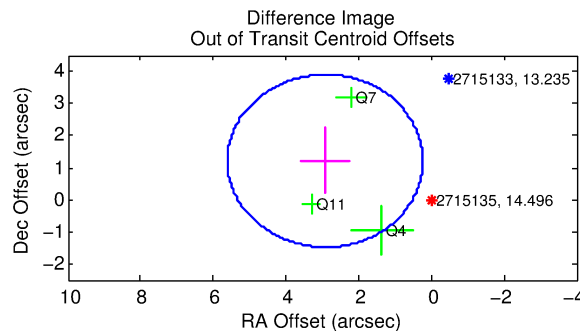
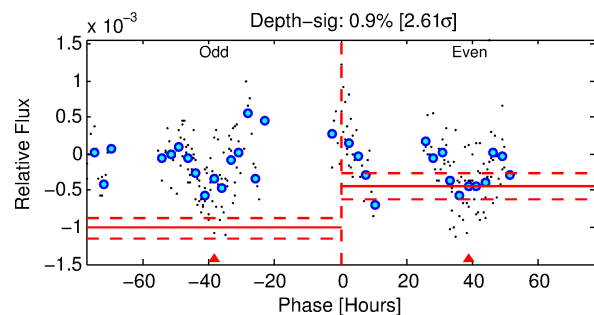
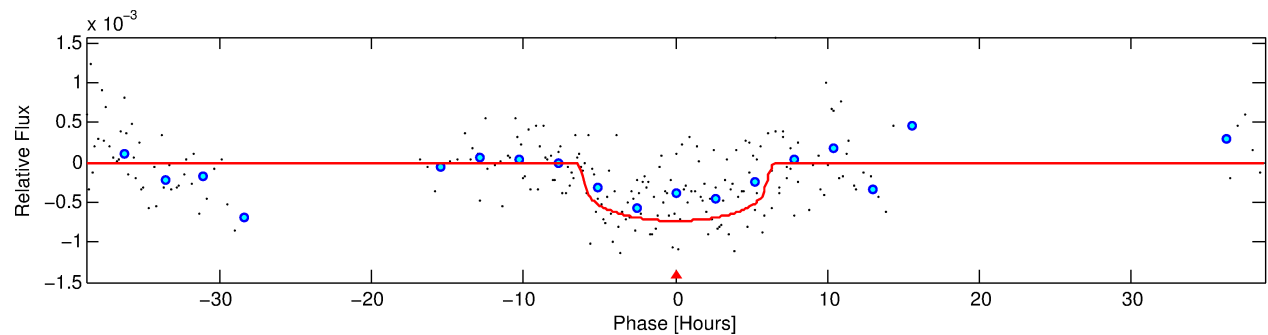
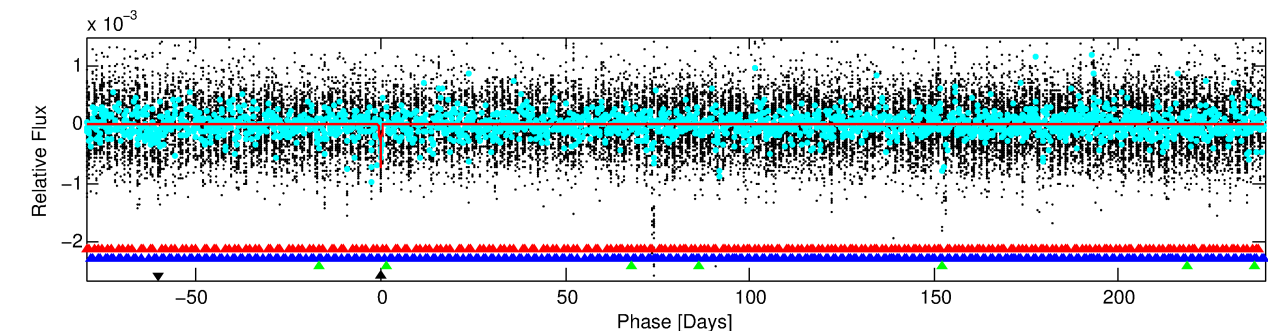
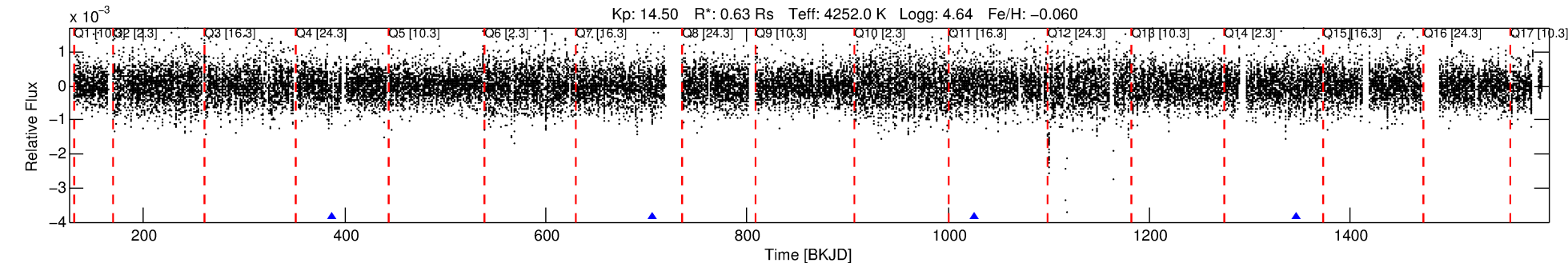
Ephemeris Match Information For 002715135-04

No Significant Match Found

# DV One-Page Summary

KIC: 2715135 Candidate: 4 of 4 Period: 319.425 d  
KOI: K01024 Corr: No Ephemeris Match

Kp: 14.50 R\*: 0.63 Rs Teff: 4252.0 K Logg: 4.64 Fe/H: -0.060



## DV Fit Results:

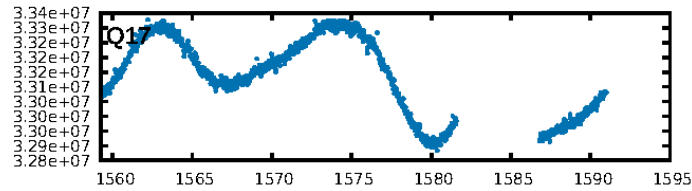
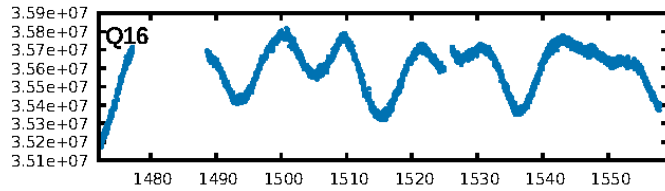
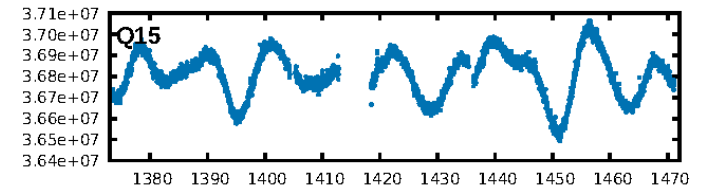
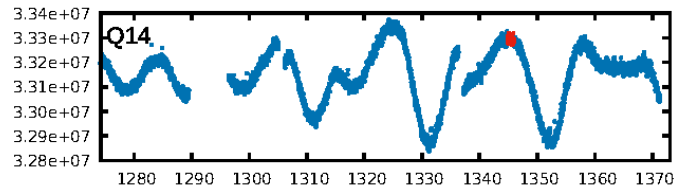
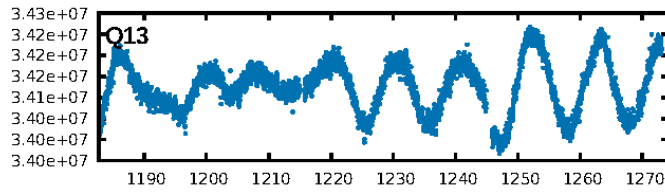
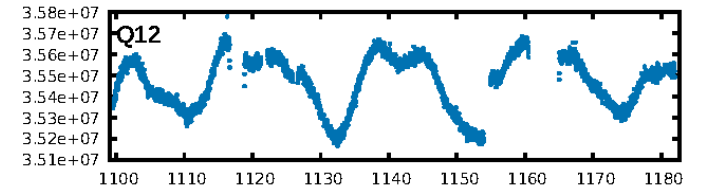
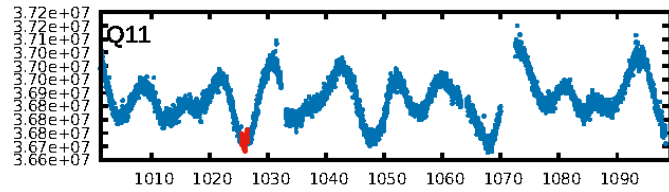
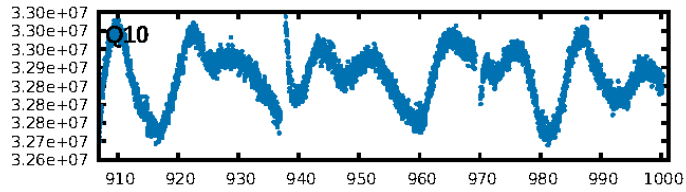
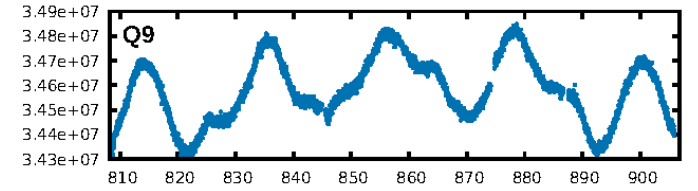
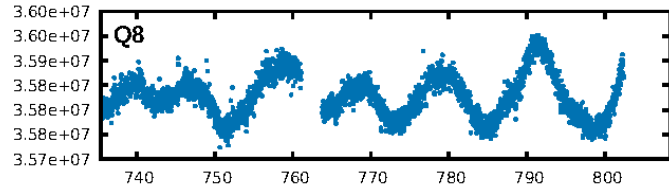
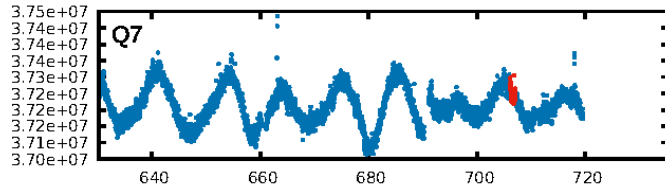
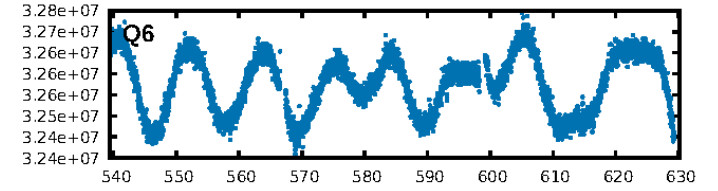
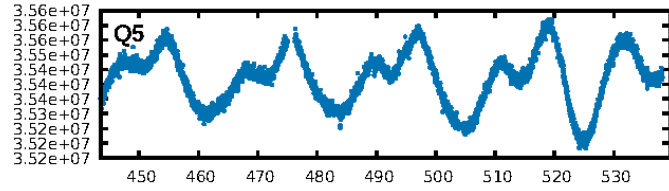
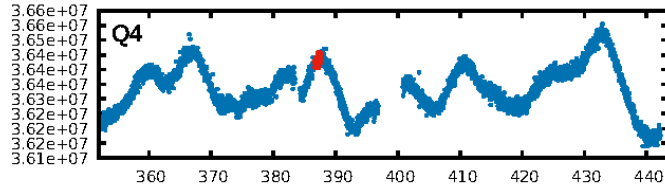
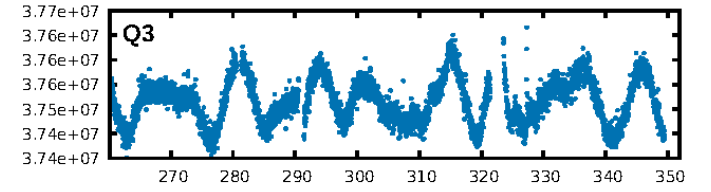
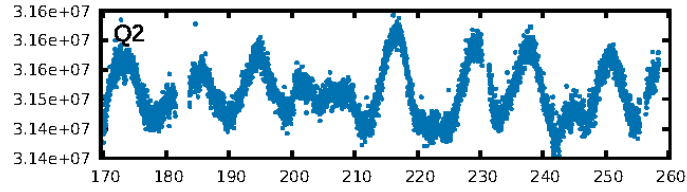
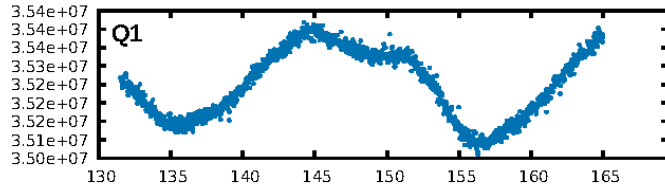
Period = 319.42544 [0.00766] d  
Epoch = 387.1569 [0.0137] BKJD  
Rp/R\* = 0.0271 [0.0070]  
a/R\* = 133.03 [110.90]  
b = 0.75 [0.50]  
Seff = 0.19 [0.02]  
Teq = 168 [4] K  
Rp = 1.87 [0.49] Re  
a = 0.7866 [0.0315] AU  
Ag = 40627.60 [22932.46] [1.77σ]  
Teffp = 3691 [523] K [6.73σ]

## DV Diagnostic Results:

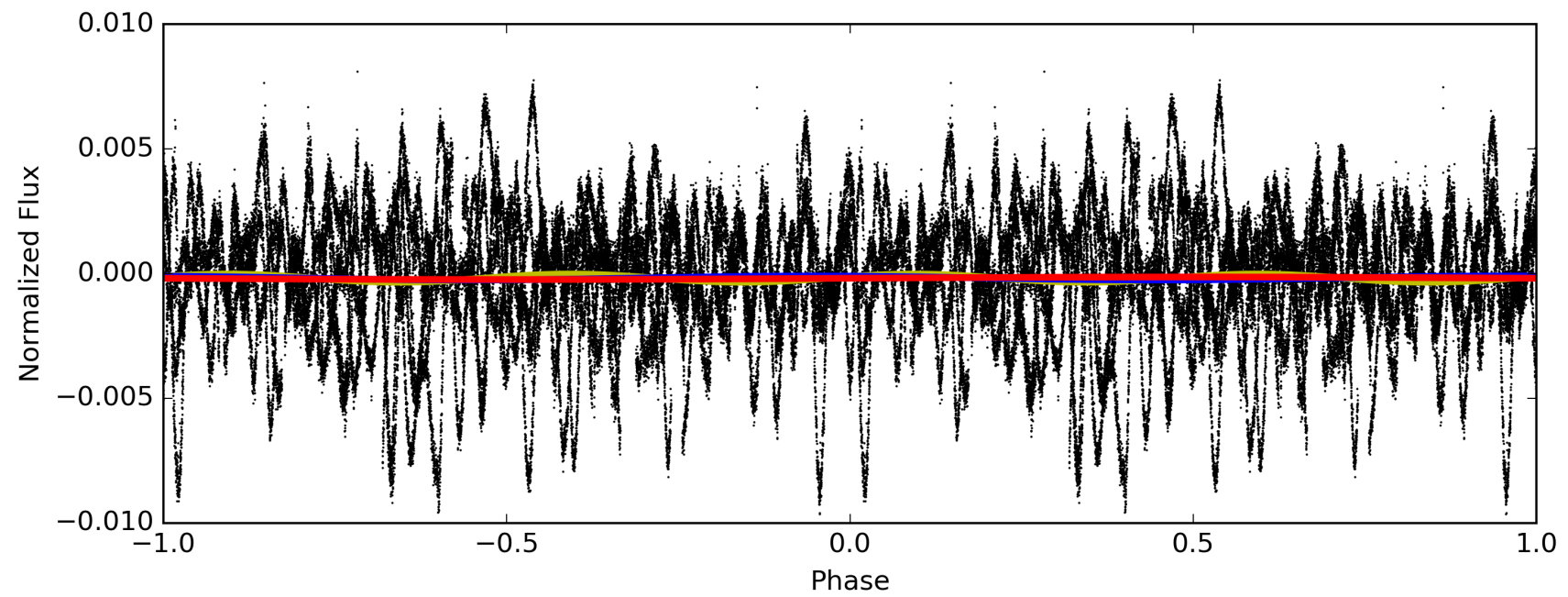
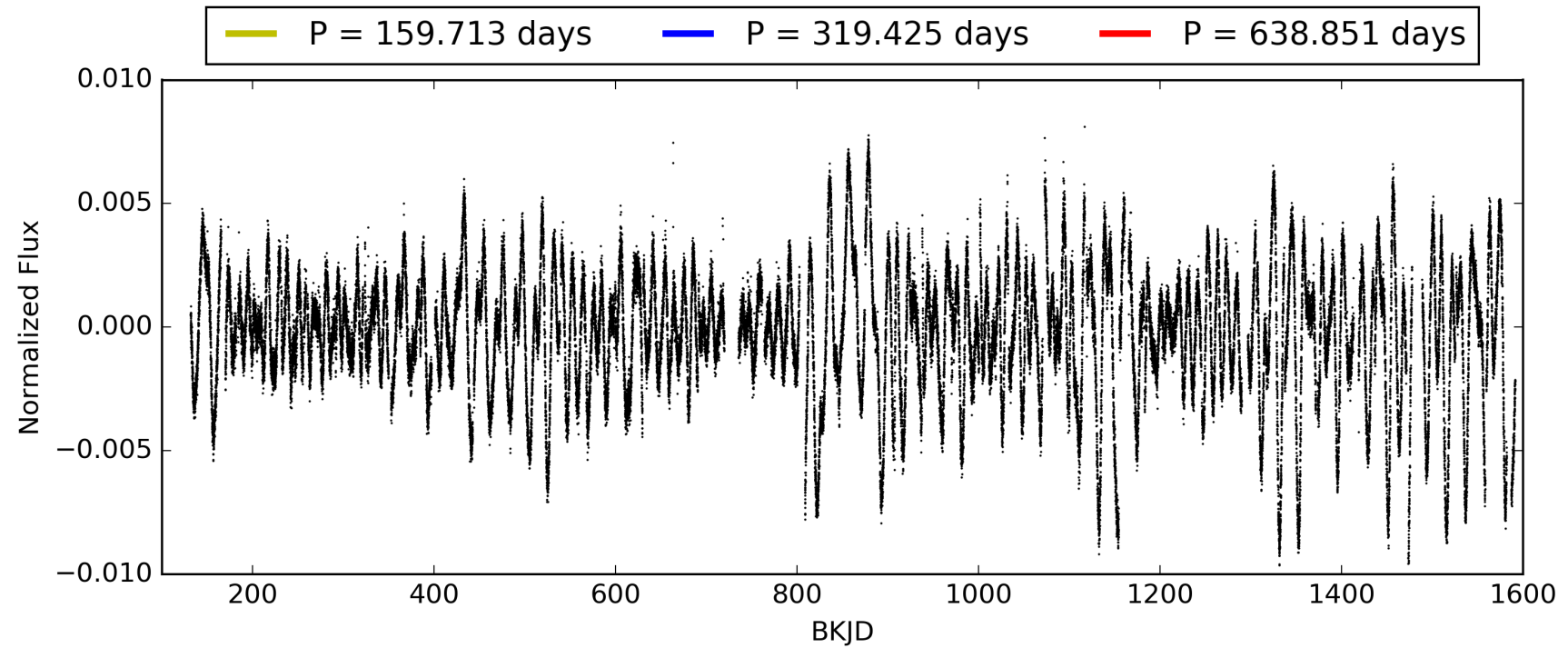
ShortPeriod-sig: 100.0% [129.67σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 99.1%  
Bootstrap-pfa: 2.63e-13  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: -0.7834  
Centroid-sig: 12.2%  
Centroid-so: 1.006 arcsec [0.80σ]  
OotOffset-rm: 3.169 arcsec [3.53σ]  
KicOffset-rm: 3.141 arcsec [3.26σ]  
OotOffset-st: 0/2/1/0 [3]  
KicOffset-st: 0/2/1/0 [3]  
DiffImageQuality-fgm: 0.33 [1/3]  
DiffImageOverlap-fno: 0.00 [0/4]



# TCE 002715135-04, PDC Light Curves

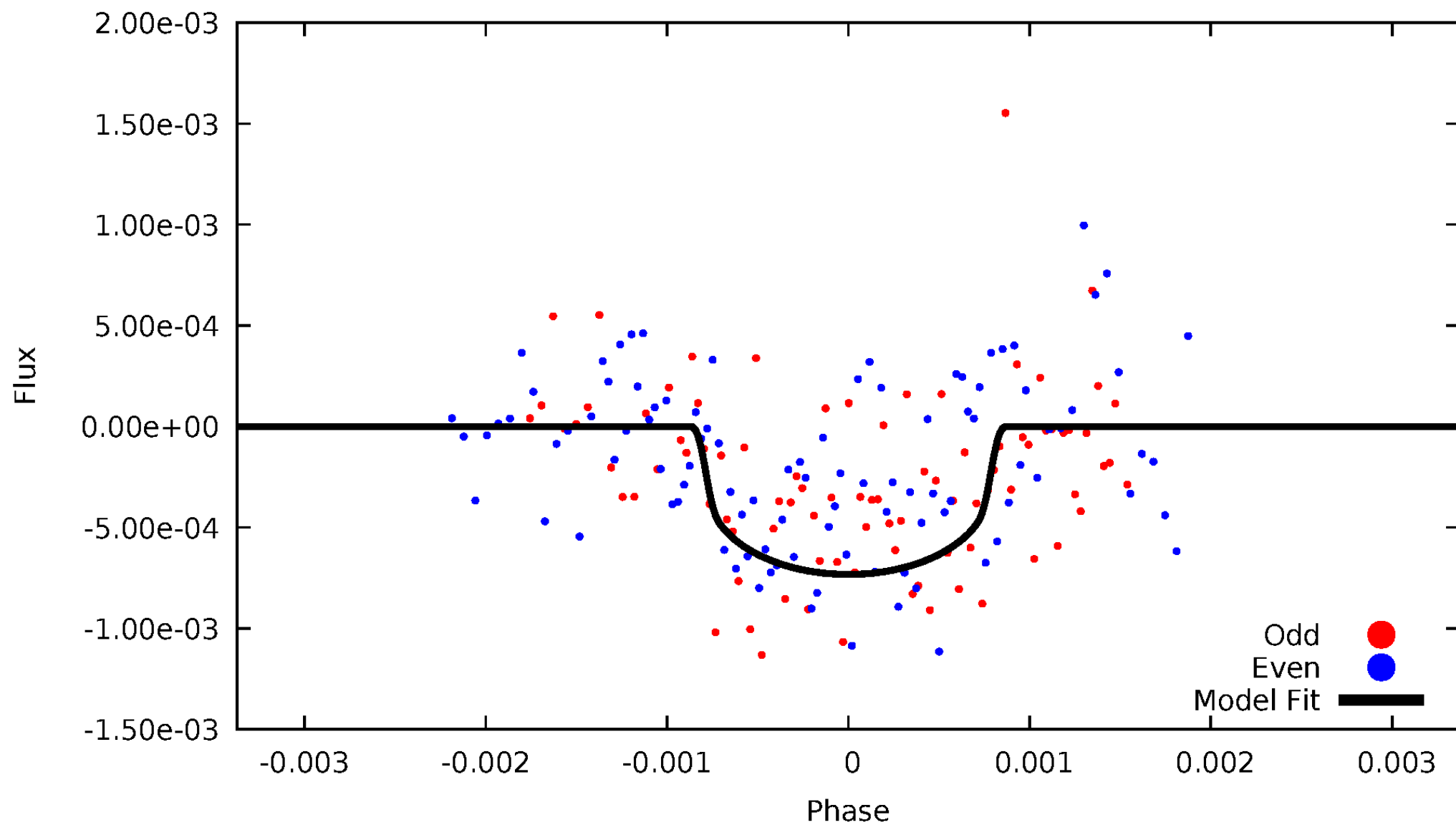


TCE 002715135-04



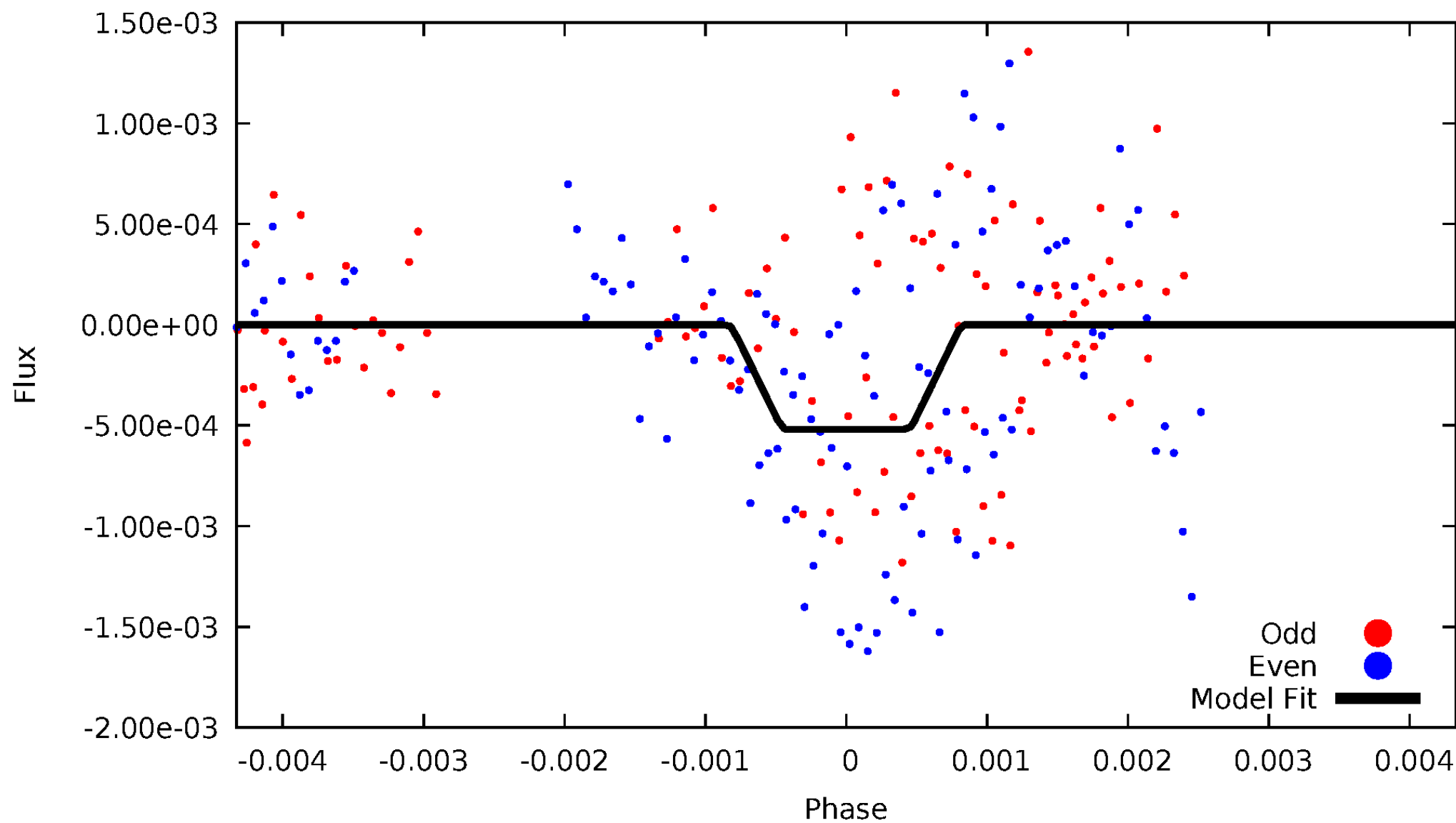
# DV Odd/Even

TCE 002715135-04



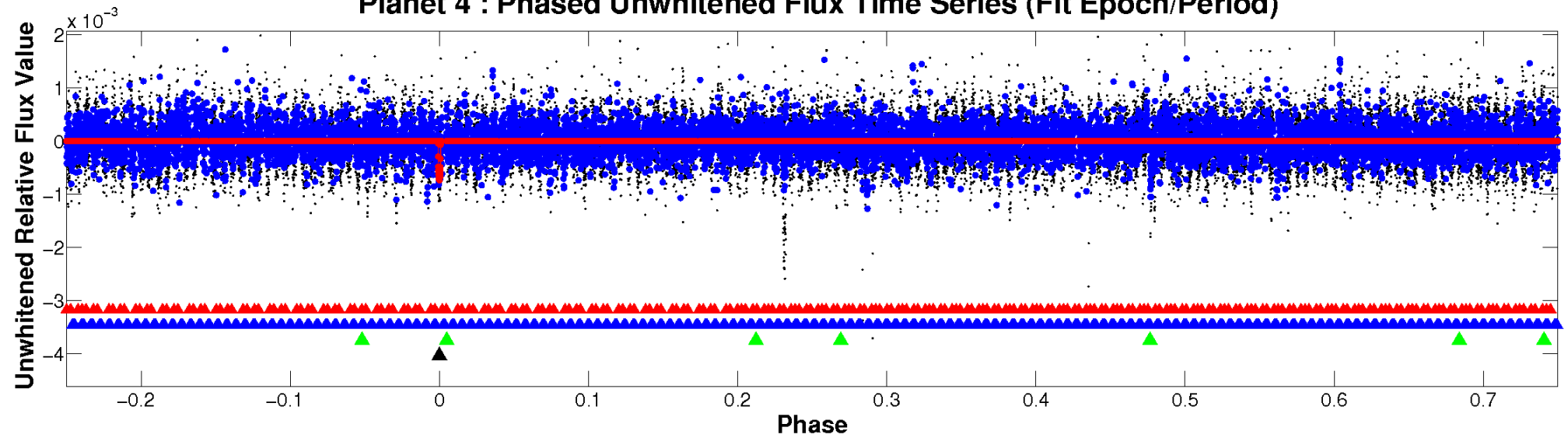
# ALT Odd/Even

TCE 002715135-04

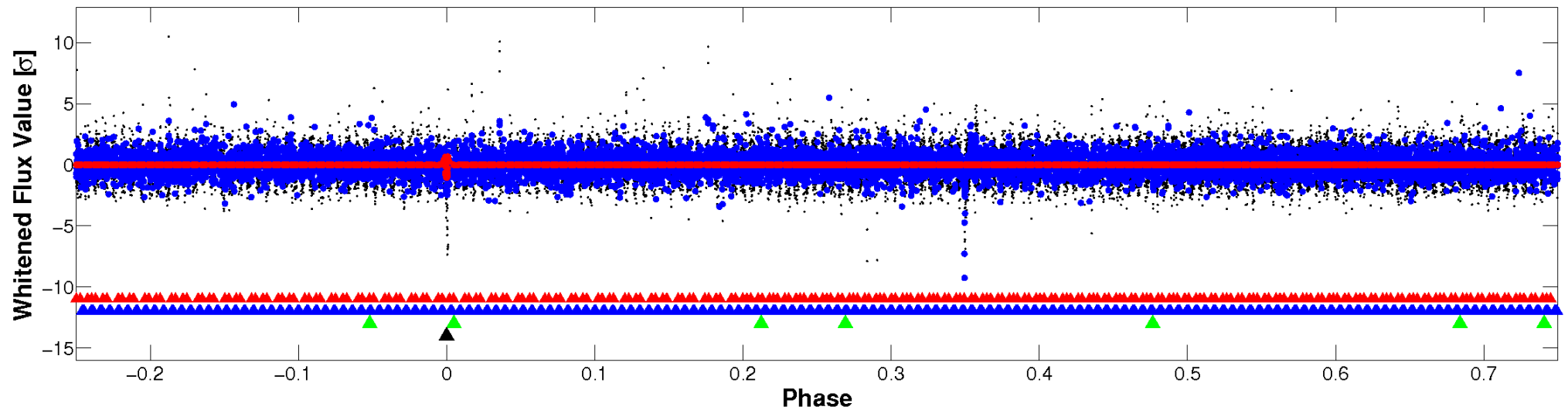


# Non-Whitened Vs. Whitened Light Curve

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

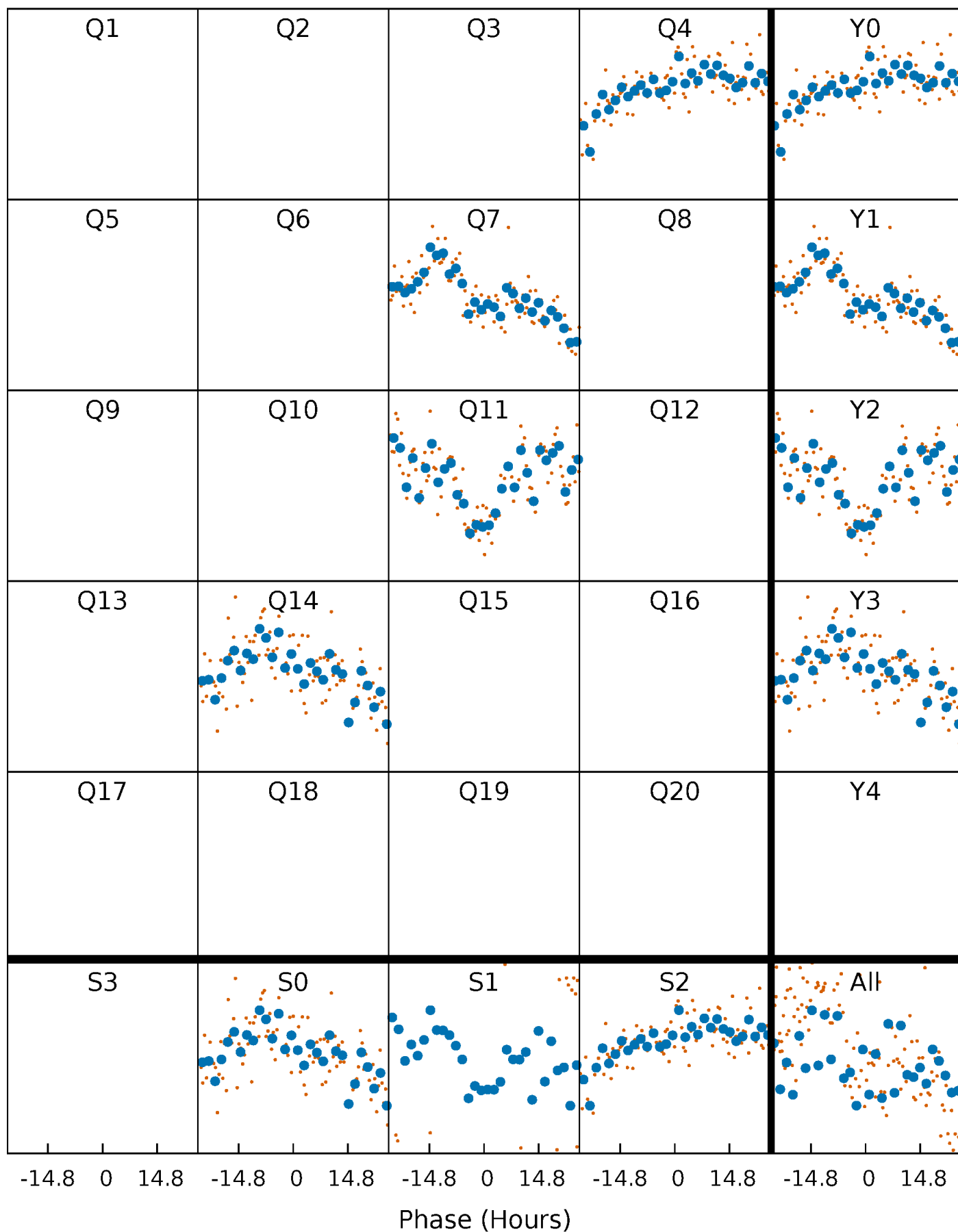


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

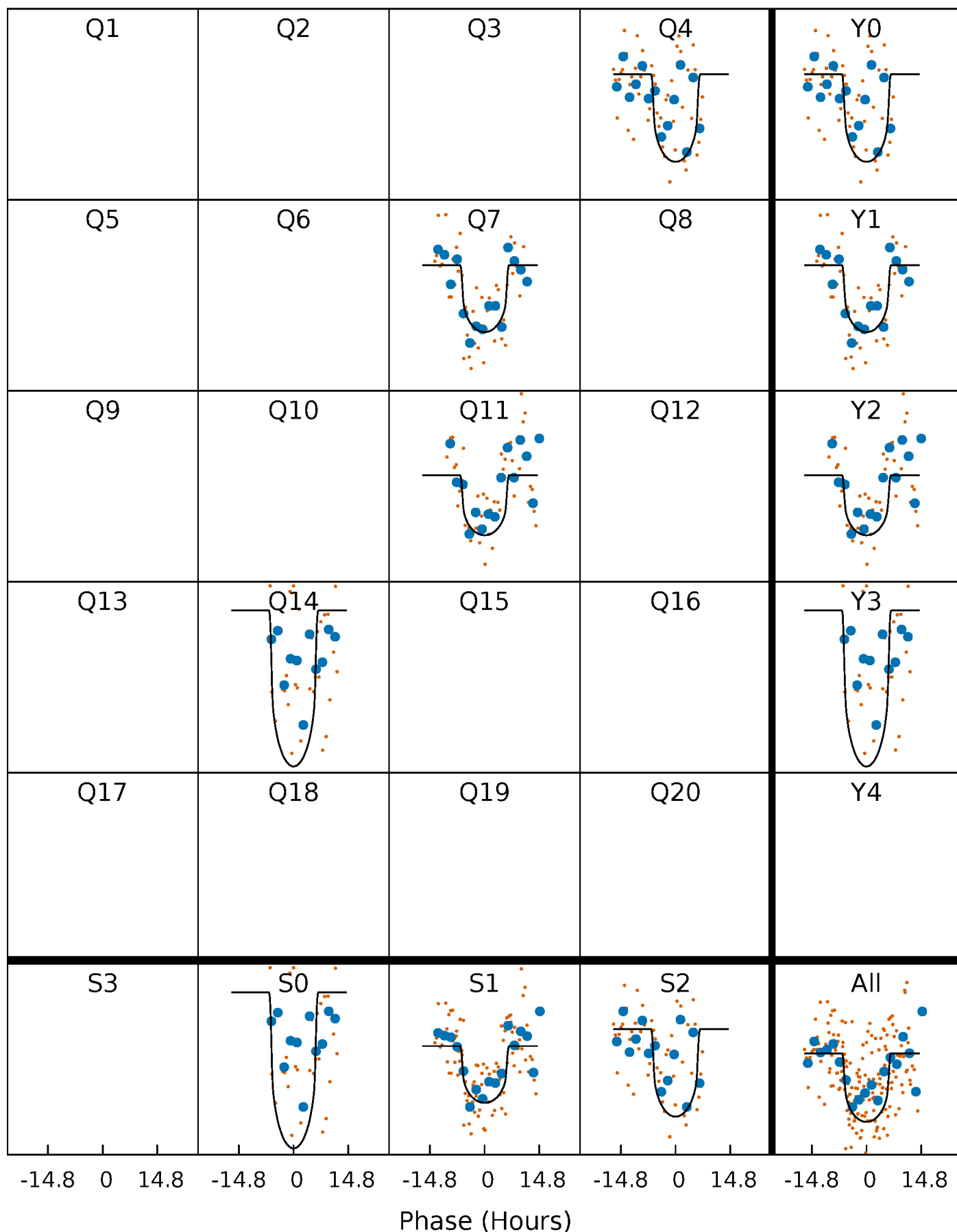
TCE 002715135-04 P=319.425436 Days  $T_0=387.156938$  (BKJD)





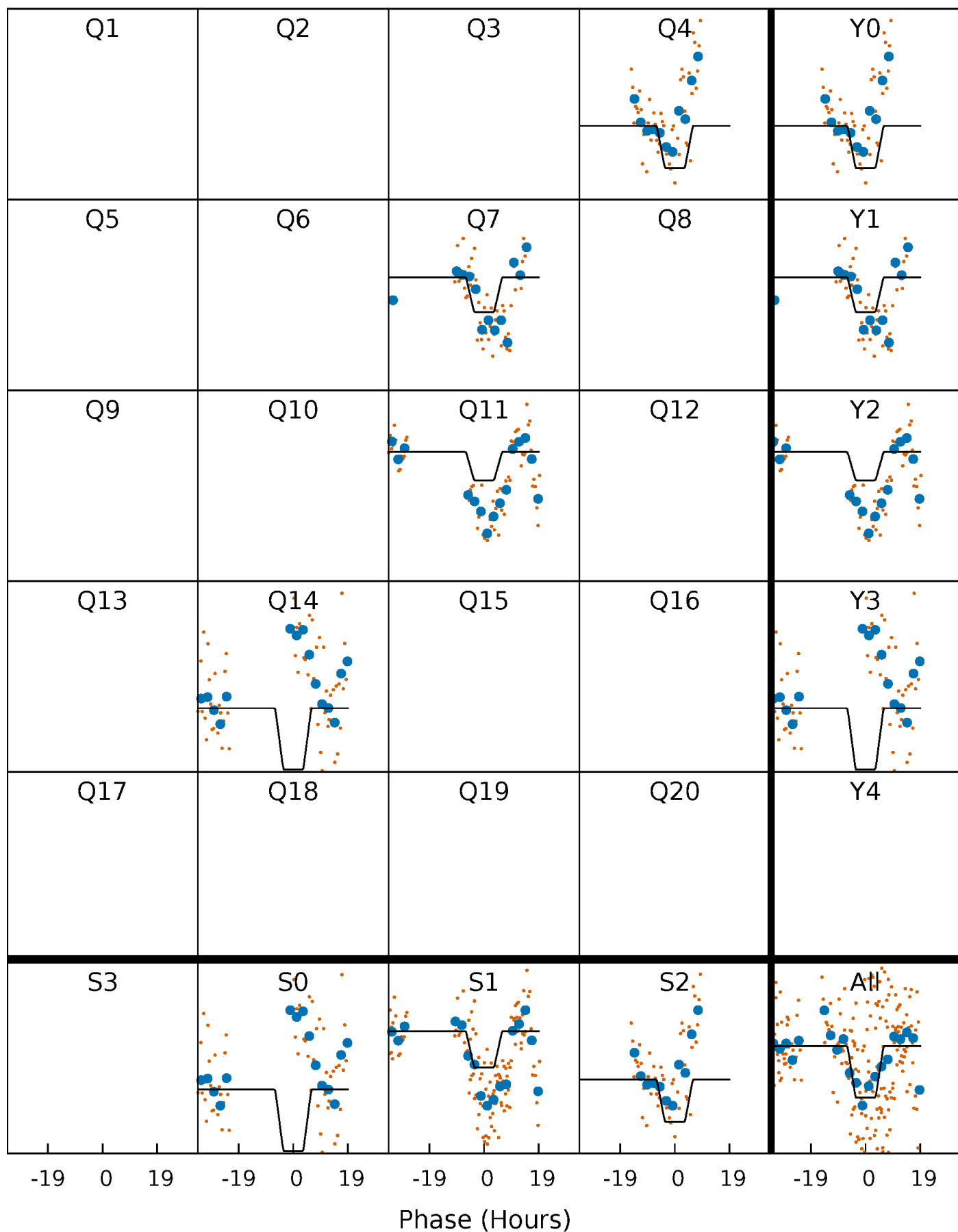
# DV Quarter-Phased Transit Curves

TCE 002715135-04 P=319.425436 Days  $T_0=387.156938$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

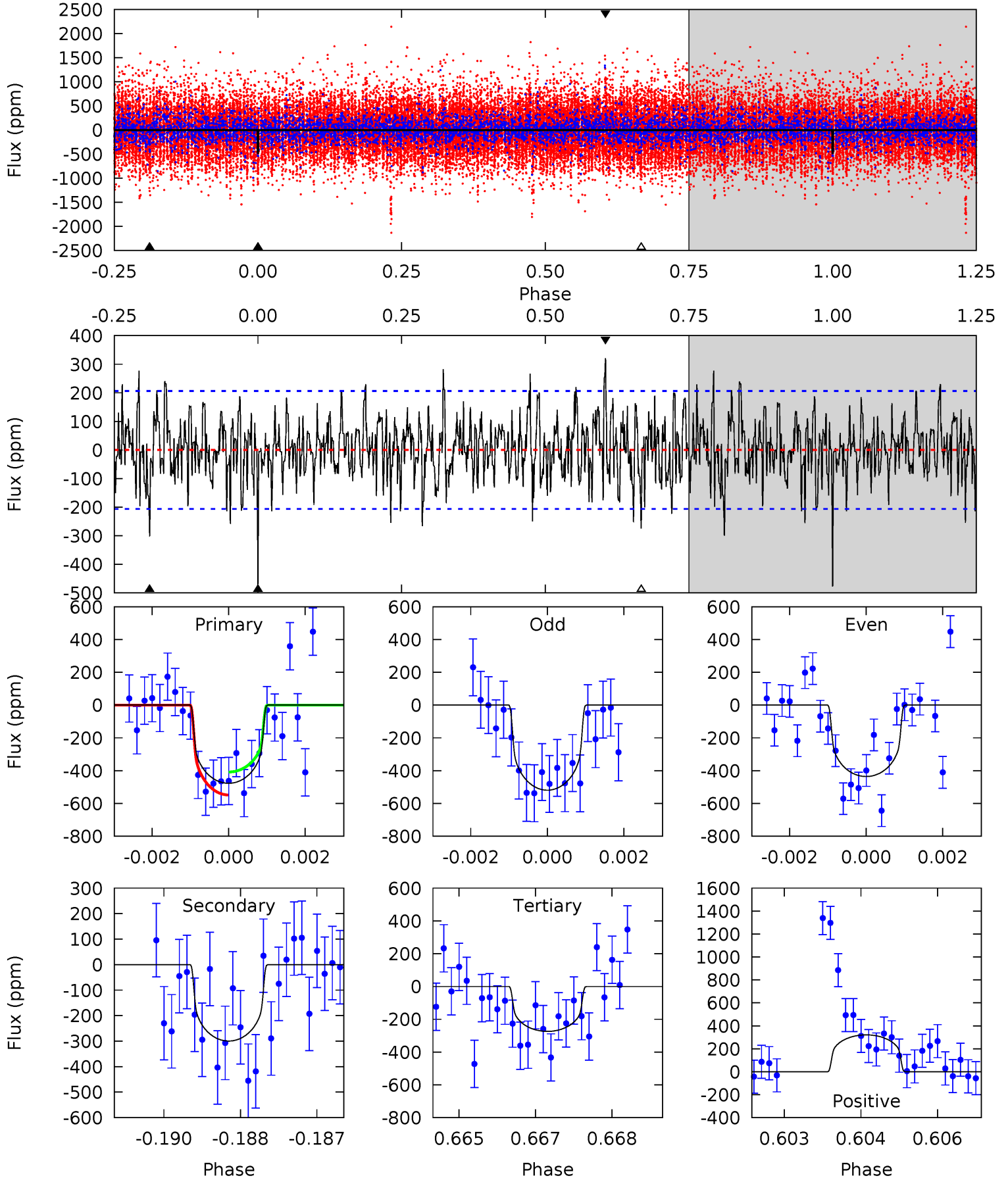
TCE 002715135-04 P=319.356109 Days  $T_0=387.090073$  (BKJD)



# DV Model-Shift Uniqueness Test

002715135-04, P = 319.425436 Days, E = 67.731502 Days

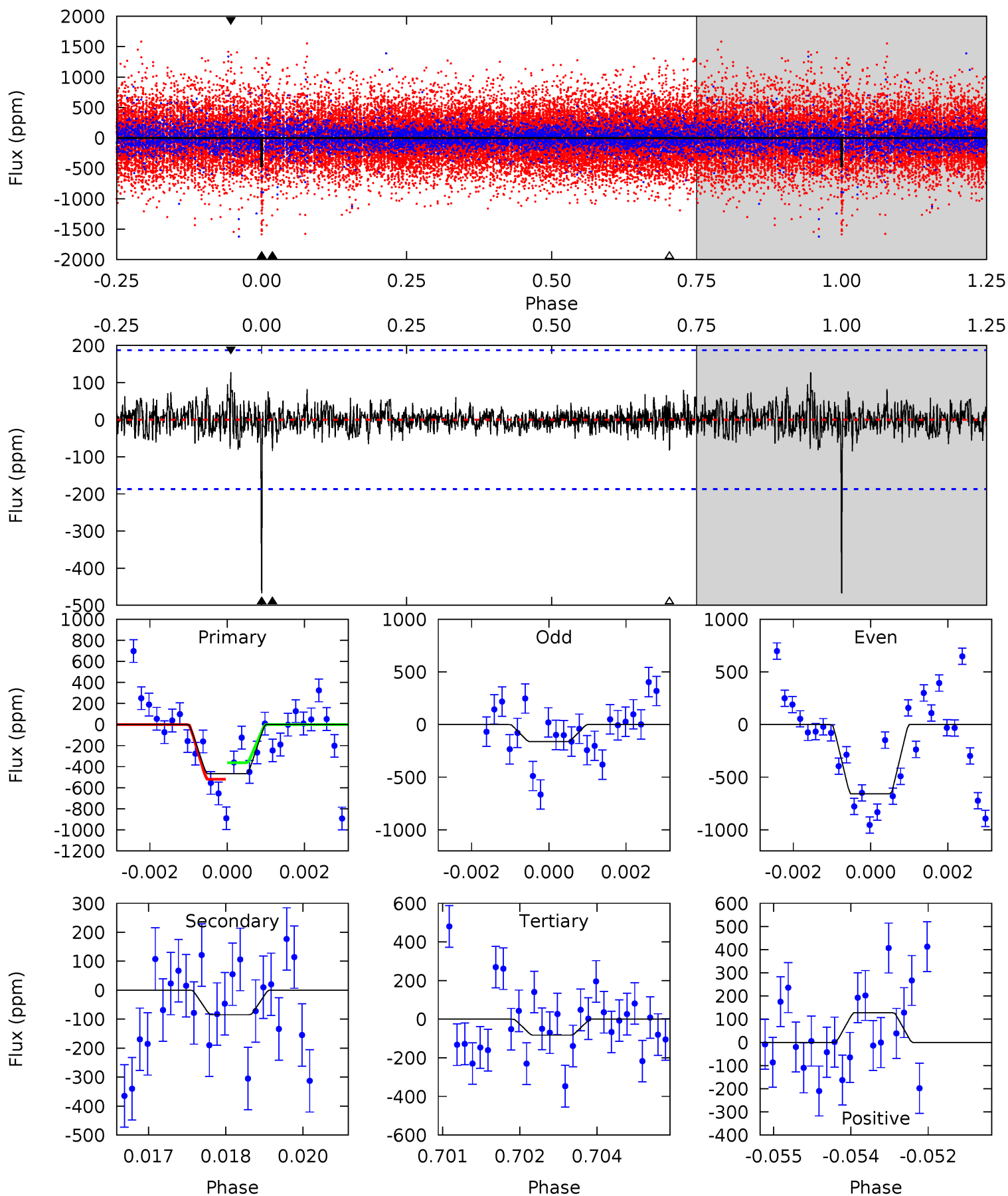
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.4	7.77	7.11	8.33	5.35	3.13	2.32	5.27	4.04	0.66	-0.56	1.08	1.09	0.40	1.82



# Alt Model-Shift Uniqueness Test

002715135-04, P = 319.356109 Days, E = 67.733964 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
13.4	2.42	2.37	3.66	5.36	3.14	0.62	11.0	9.72	0.05	-1.24	7.18	0.95	0.21	2.19



### Stellar Parameters For KIC 002715135

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$4252^{+84}_{-84}$	$4.640^{+0.030}_{-0.017}$	$-0.060^{+0.150}_{-0.150}$	$0.632^{+0.025}_{-0.031}$	$0.637^{+0.032}_{-0.032}$	$3.552^{+0.431}_{-0.284}$
	+2%/-2%	+1%/-0%	+250%/-250%	+4%/-5%	+5%/-5%	+12%/-8%
Source	SPE60	SPE60	SPE60	DSEP		

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

### Secondary Eclipse Parameters for KIC 002715135-04 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-300 \pm 39$	$1.88^{+0.48}_{-0.48}$	$234^{+5}_{-5}$	$3632^{+395}_{-278}$	$29517^{+23647}_{-11408}$
Alt.	$-85 \pm 35$	$1.59^{+0.46}_{-0.49}$	$234^{+5}_{-5}$	$3140^{+406}_{-317}$	$11375^{+13546}_{-6164}$

$T_{\text{max}}$  = 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

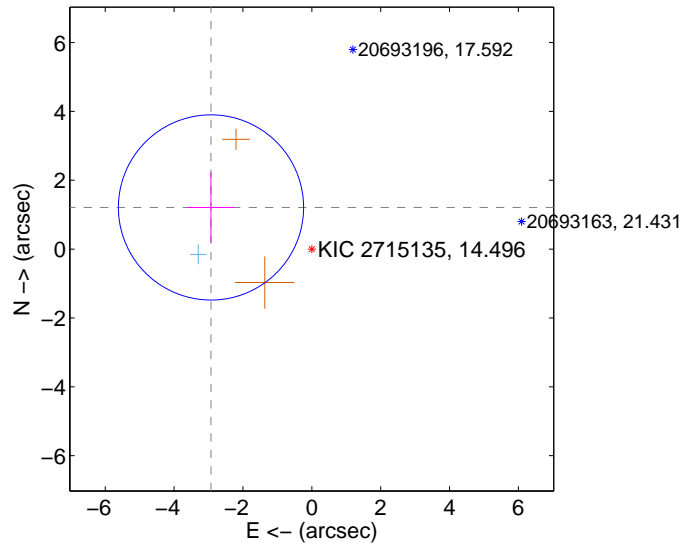
Supplemental centroid analysis for 002715135-04. Kepler magnitude: 14.50. Transit SNR 9.42

There are 1 quarters with good PRF difference image offsets

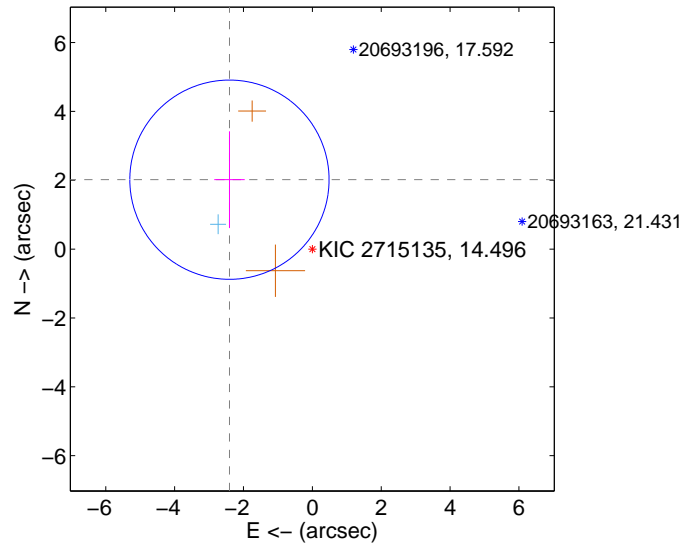
The direct PRF centroid is offset from the target star catalog position by about 1.04 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$3.169 \pm 0.897$	<b>3.53</b>	$2.929 \pm 0.677$	$1.210 \pm 1.020$
PRF-fit source offset from KIC position	$3.141 \pm 0.965$	<b>3.26</b>	$2.408 \pm 0.442$	$2.016 \pm 1.407$
photometric centroid source offset	$1.01 \pm 1.25$	0.80	$0.29 \pm 1.07$	$-0.96 \pm 1.27$

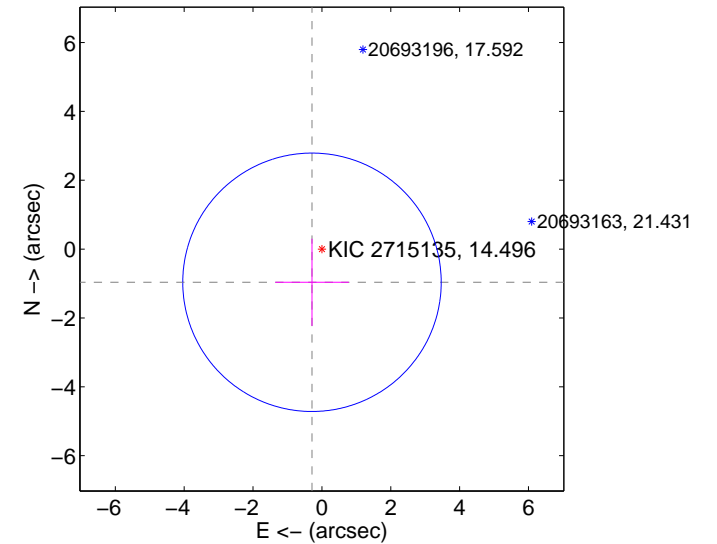
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



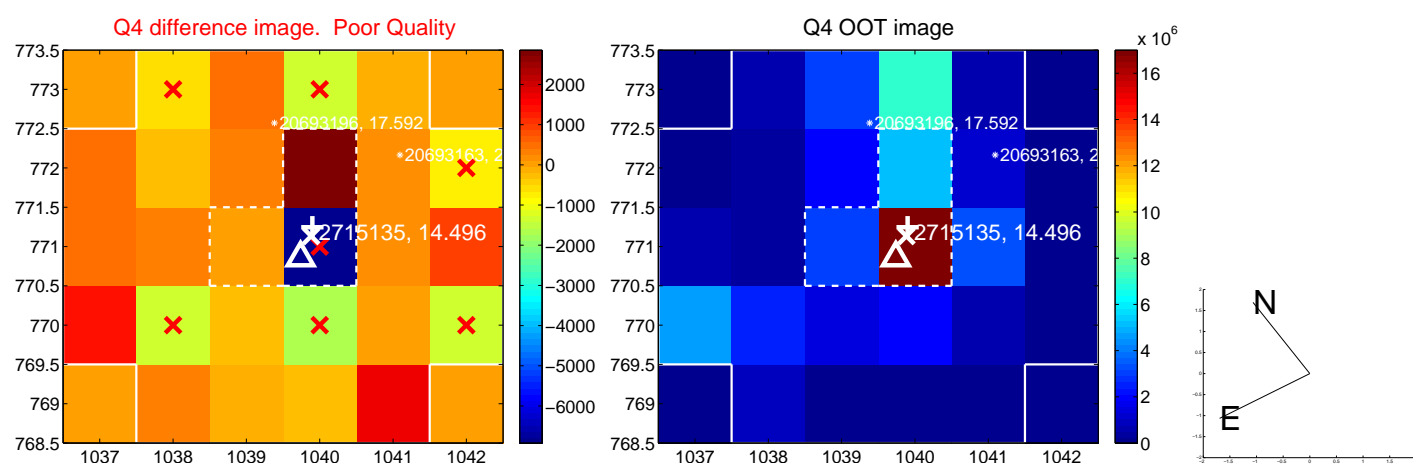
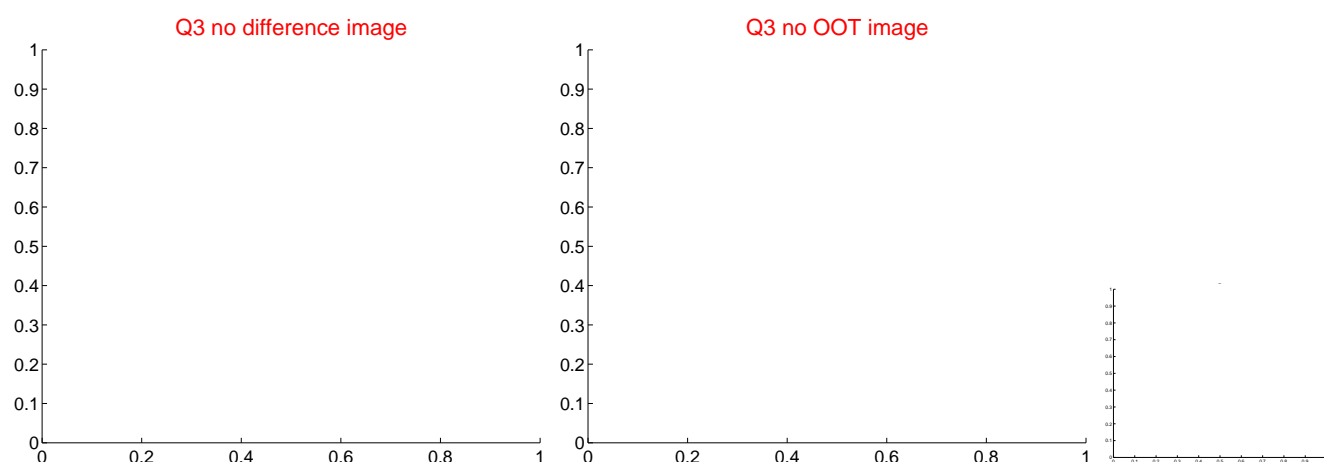
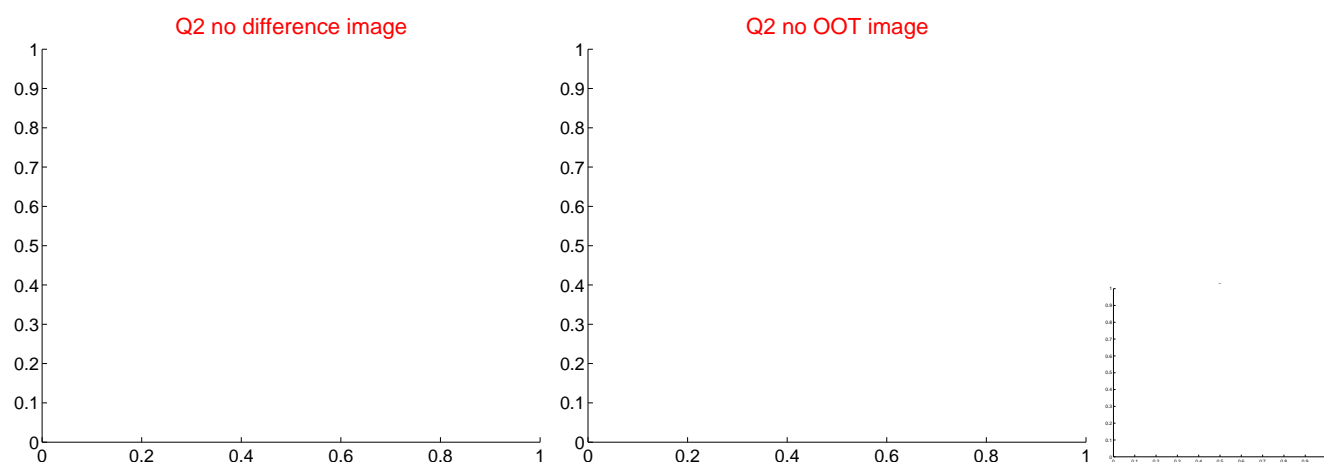
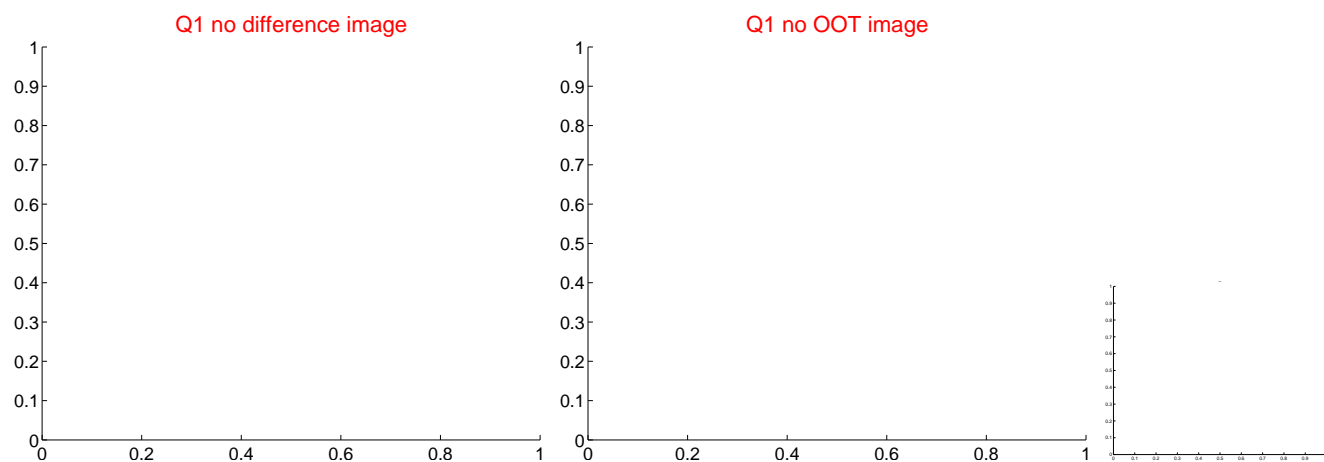
offset from photometric centroids



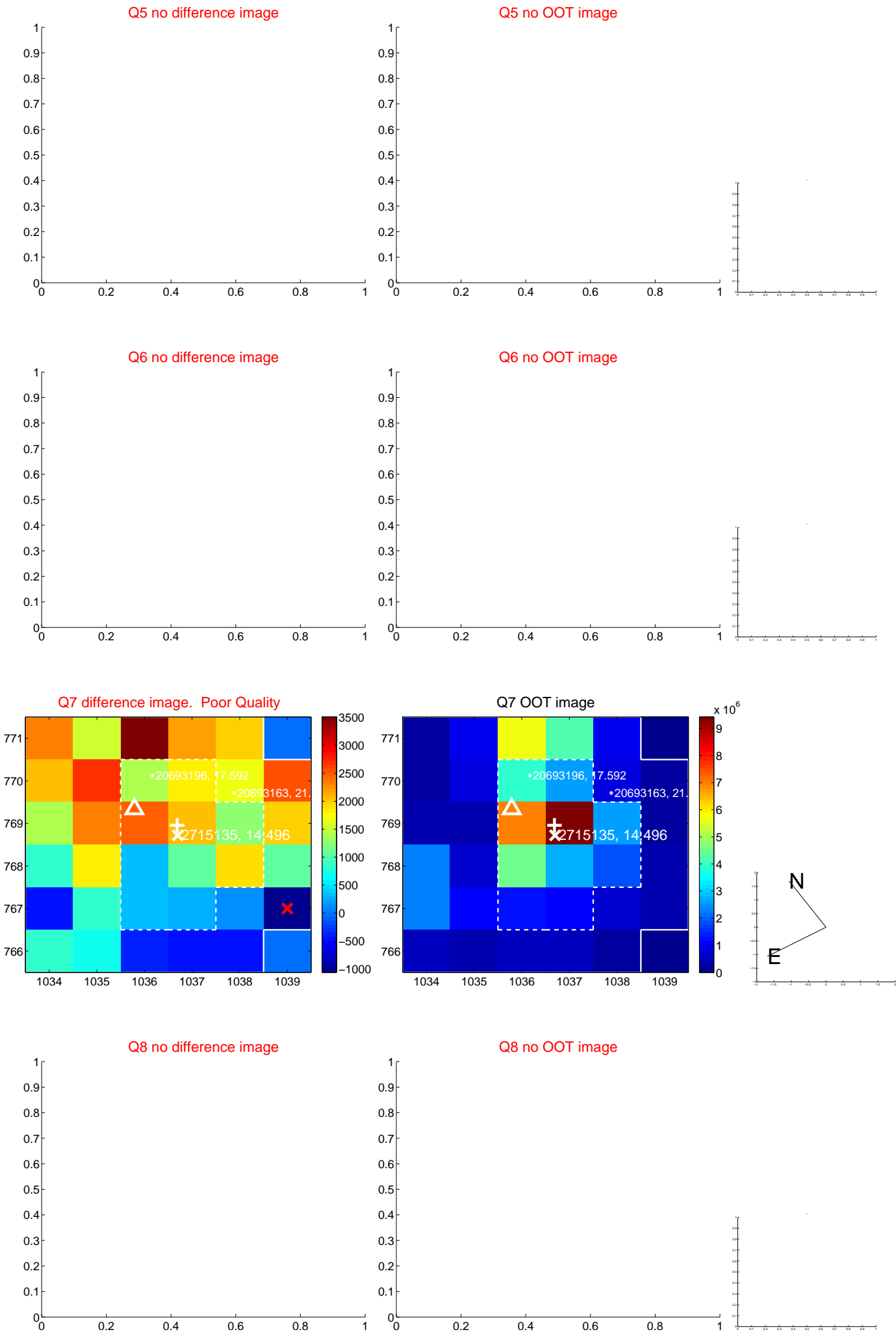
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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



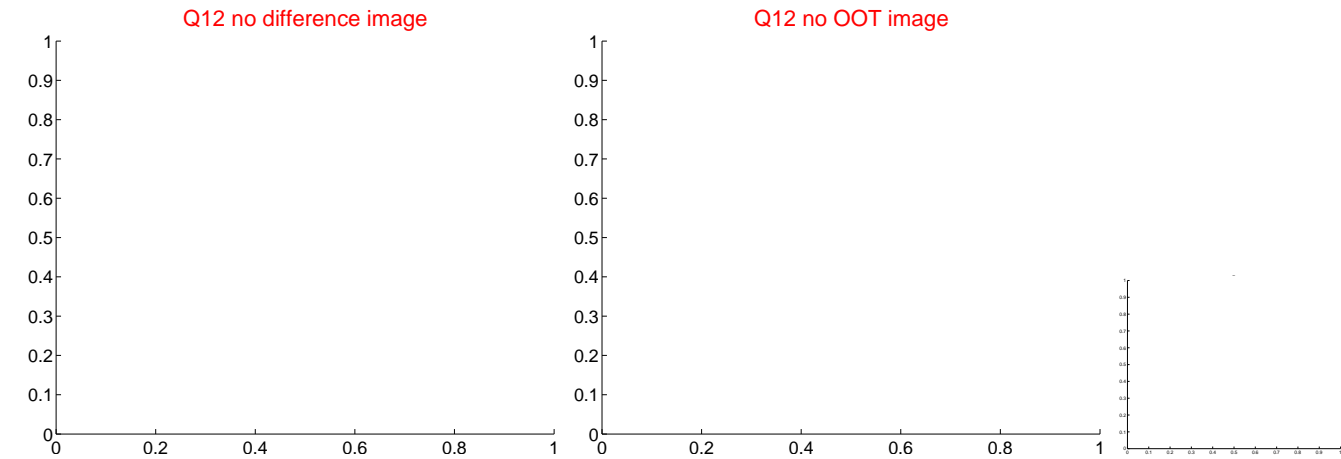
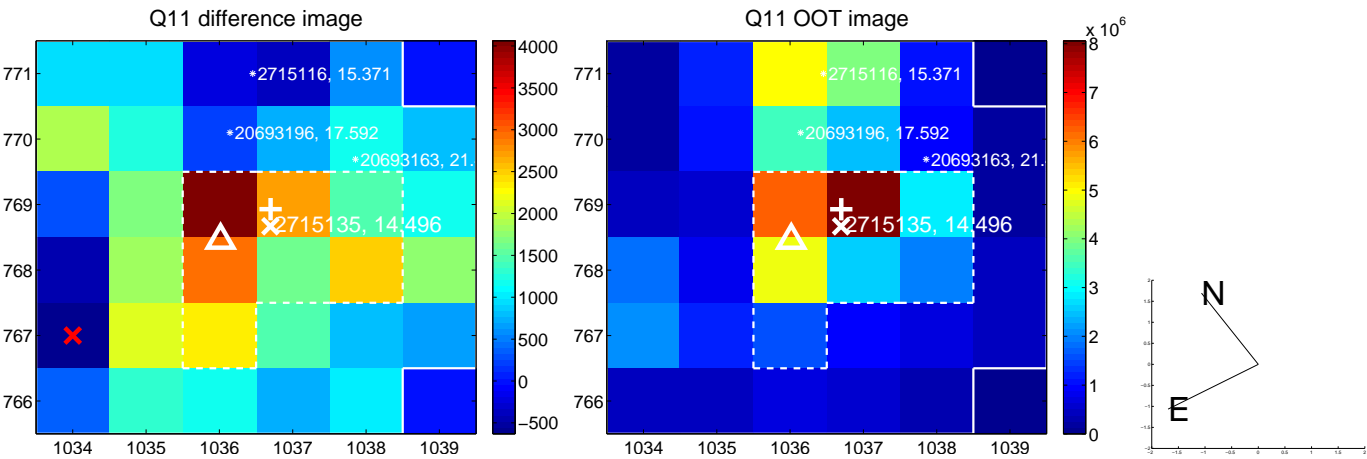
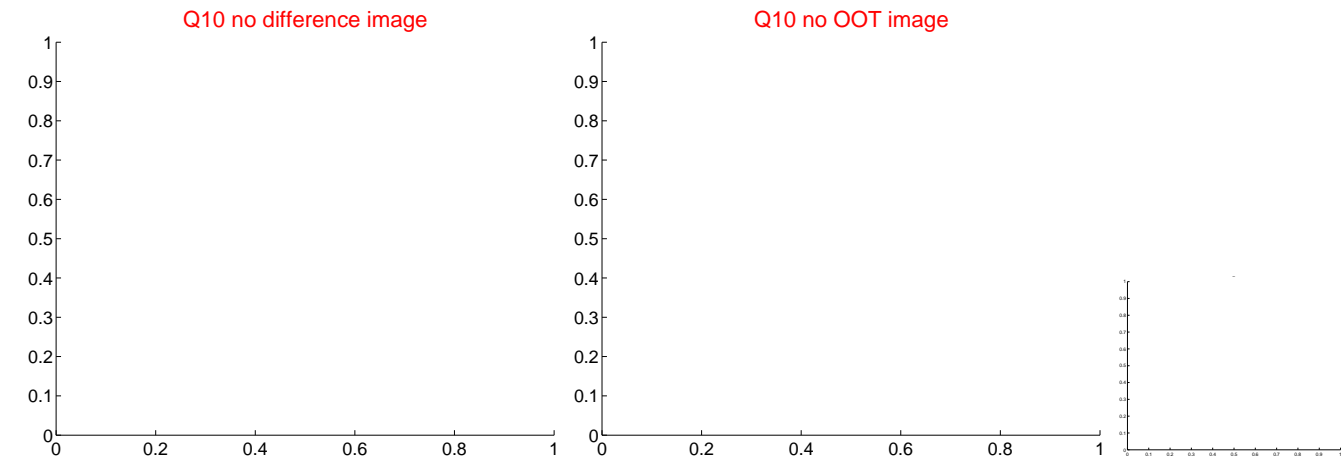
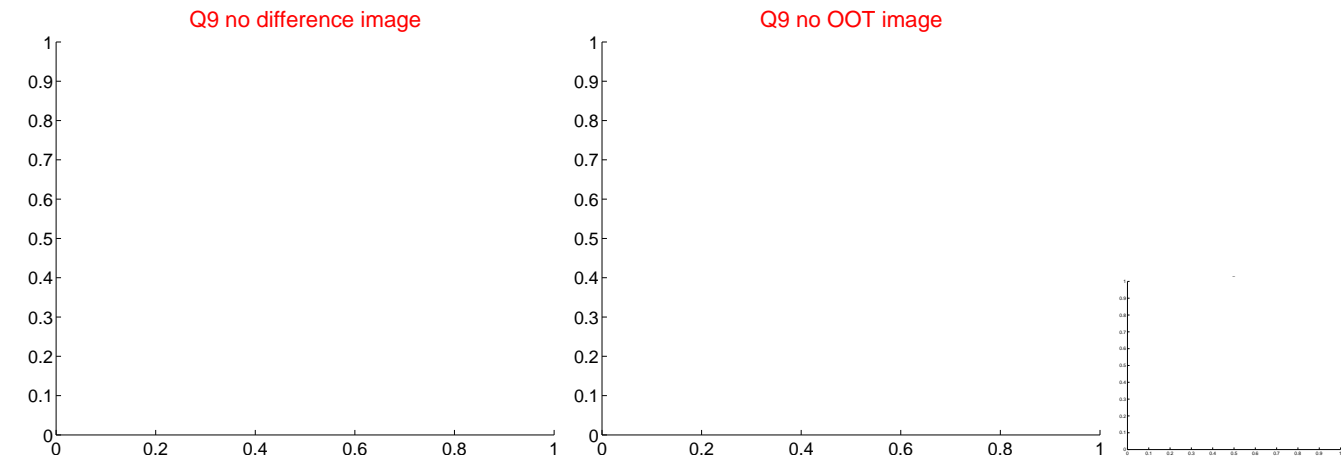
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



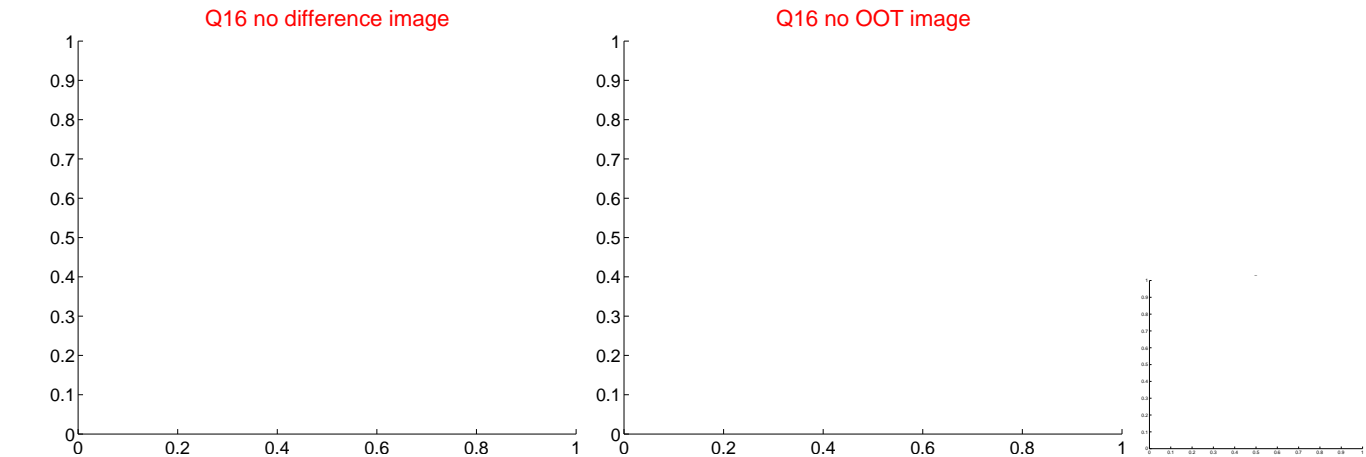
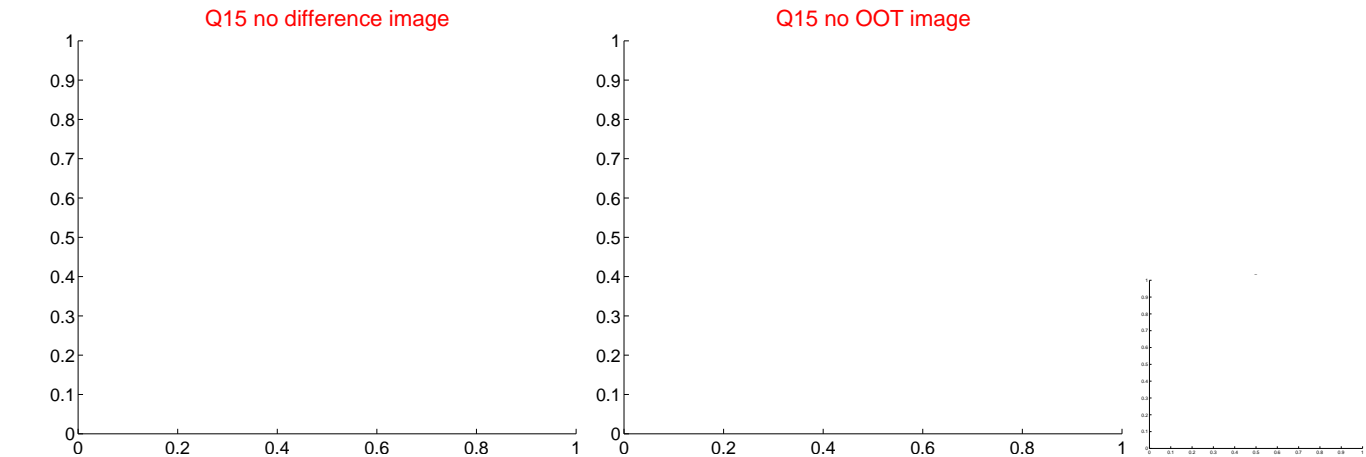
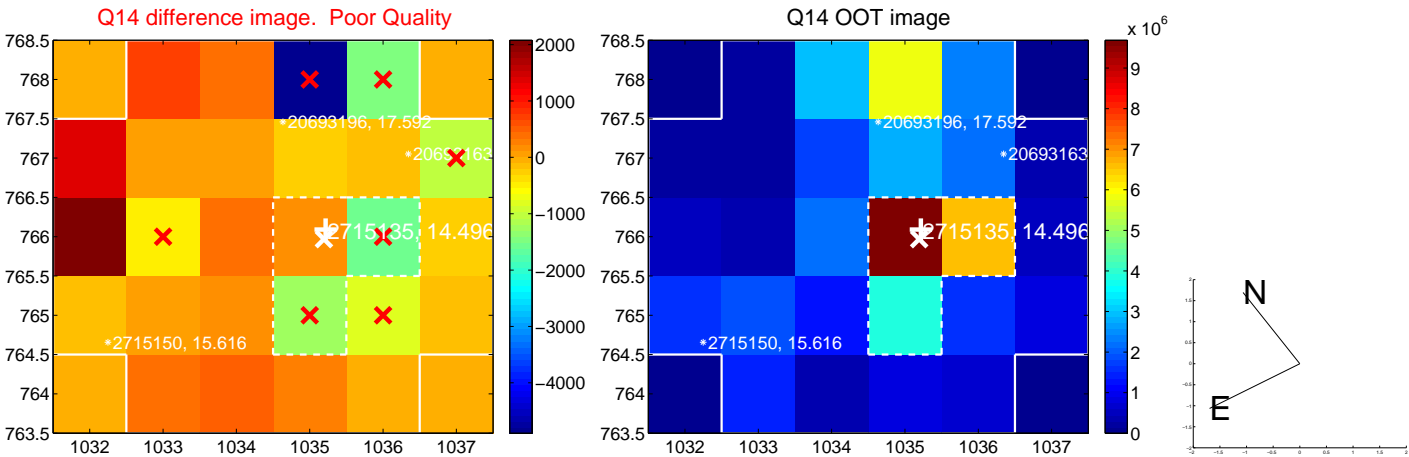
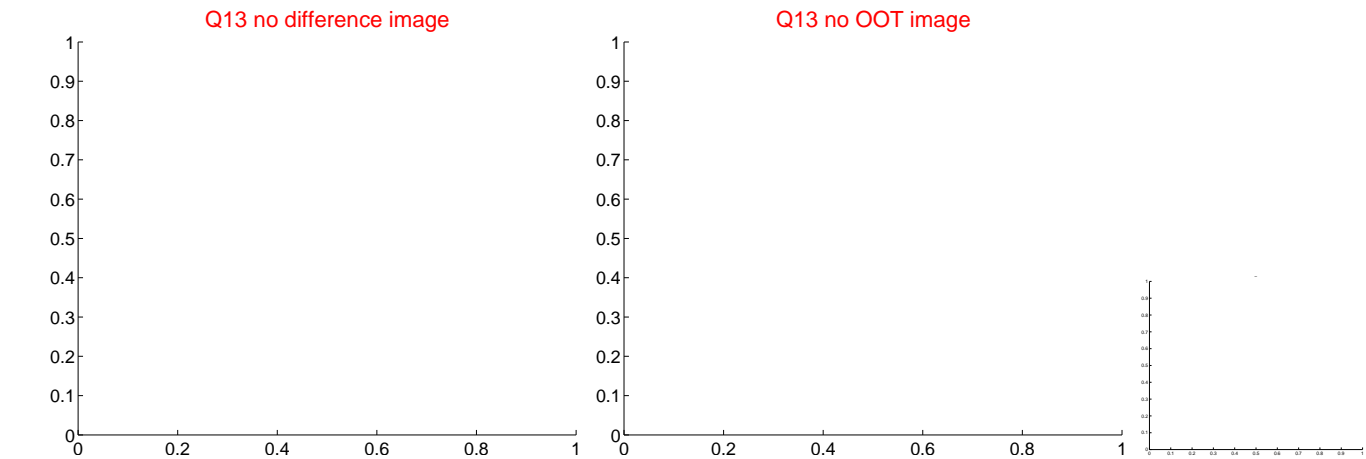
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



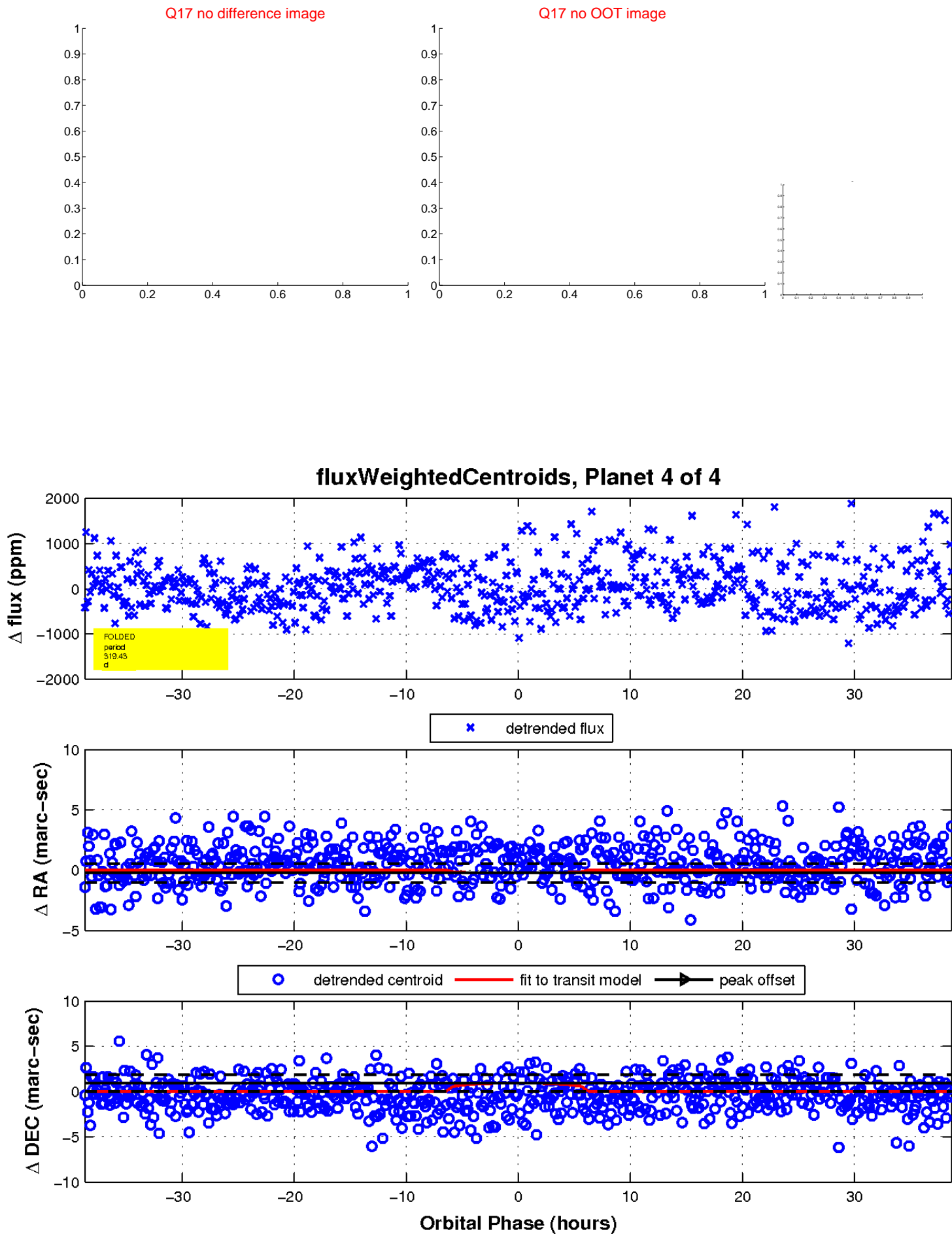
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



white ×: 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

Declination

