

# KIC 005440852

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005440852-01	OBS	No	579.702060	361.666686	87.1	14.093	8.1	7.6	1.63	8361	1.69	4.58
005440852-02	OBS	No	380.140181	357.759978	111.3	12.349	8.3	8.2	1.63	8361	1.94	8.04
005440852-03	OBS	No	3.908345	133.515333	5.0	18.806	8.1	7.2	1.63	8361	0.37	3598.01
005440852-04	OBS	No	142.273970	227.289186	50.8	17.056	10.3	7.1	1.63	8361	1.29	29.82
005440852-05	OBS	No	566.704510	295.096016	74.9	6.960	8.3	8.7	1.63	8361	1.61	4.72
005440852-06	OBS	No	47.371713	133.285303	52.2	4.892	7.1	7.4	1.63	8361	1.27	129.23

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005440852-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—ALL_TRANS_CHASES—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
005440852-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE—LPP_DV—ALL_TRANS_CHASES—CENT_SATURATED
005440852-03	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_SATURATED
005440852-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_SATURATED
005440852-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—ALL_TRANS_CHASES—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
005440852-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_ALT—CENT_SATURATED

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

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

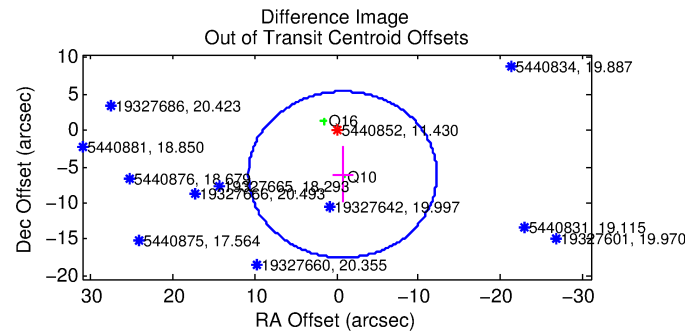
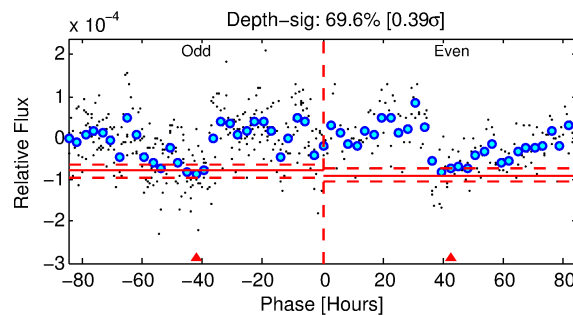
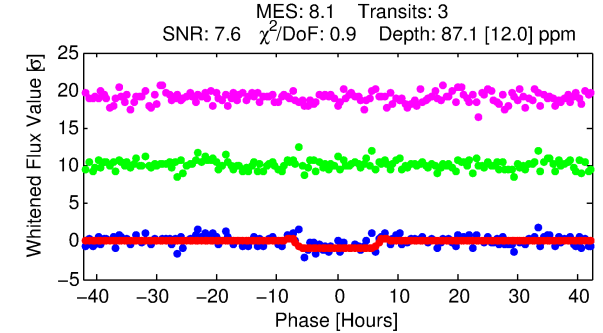
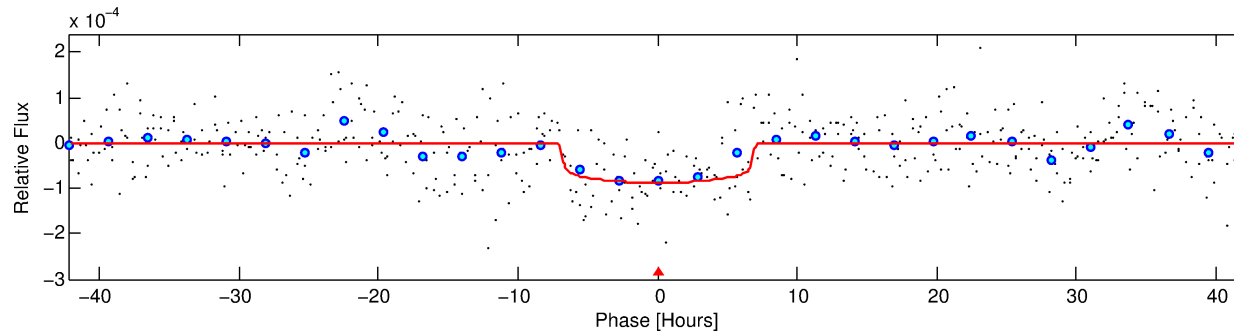
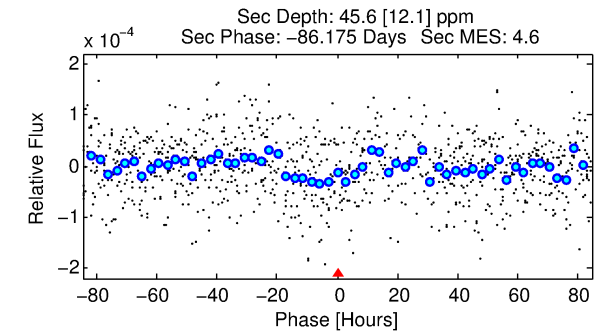
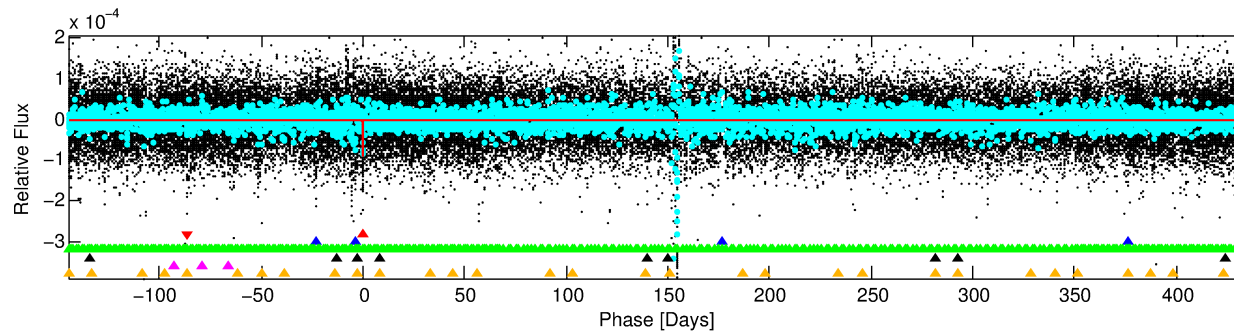
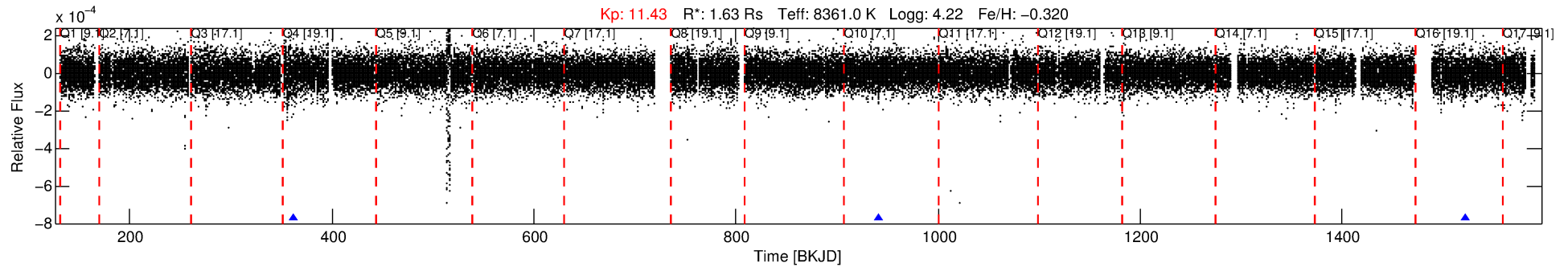
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 005440852-01

No Significant Match Found

# DV One-Page Summary

KIC: 5440852 Candidate: 1 of 6 Period: 579.702 d



## DV Fit Results:

Period = 579.70206 [0.01103] d  
Epoch = 361.6667 [0.0157] BKJD  
Rp/R\* = 0.0095 [0.0016]  
a/R\* = 188.85 [168.86]  
b = 0.81 [0.38]  
Seff = 4.58 [1.01]  
Teq = 373 [21] K  
Rp = 1.69 [0.42] Re  
a = 1.5933 [0.2417] AU  
Ag = 22443.78 [10702.78] [2.10σ]  
Teffp = 7060 [753] K [8.8σ]

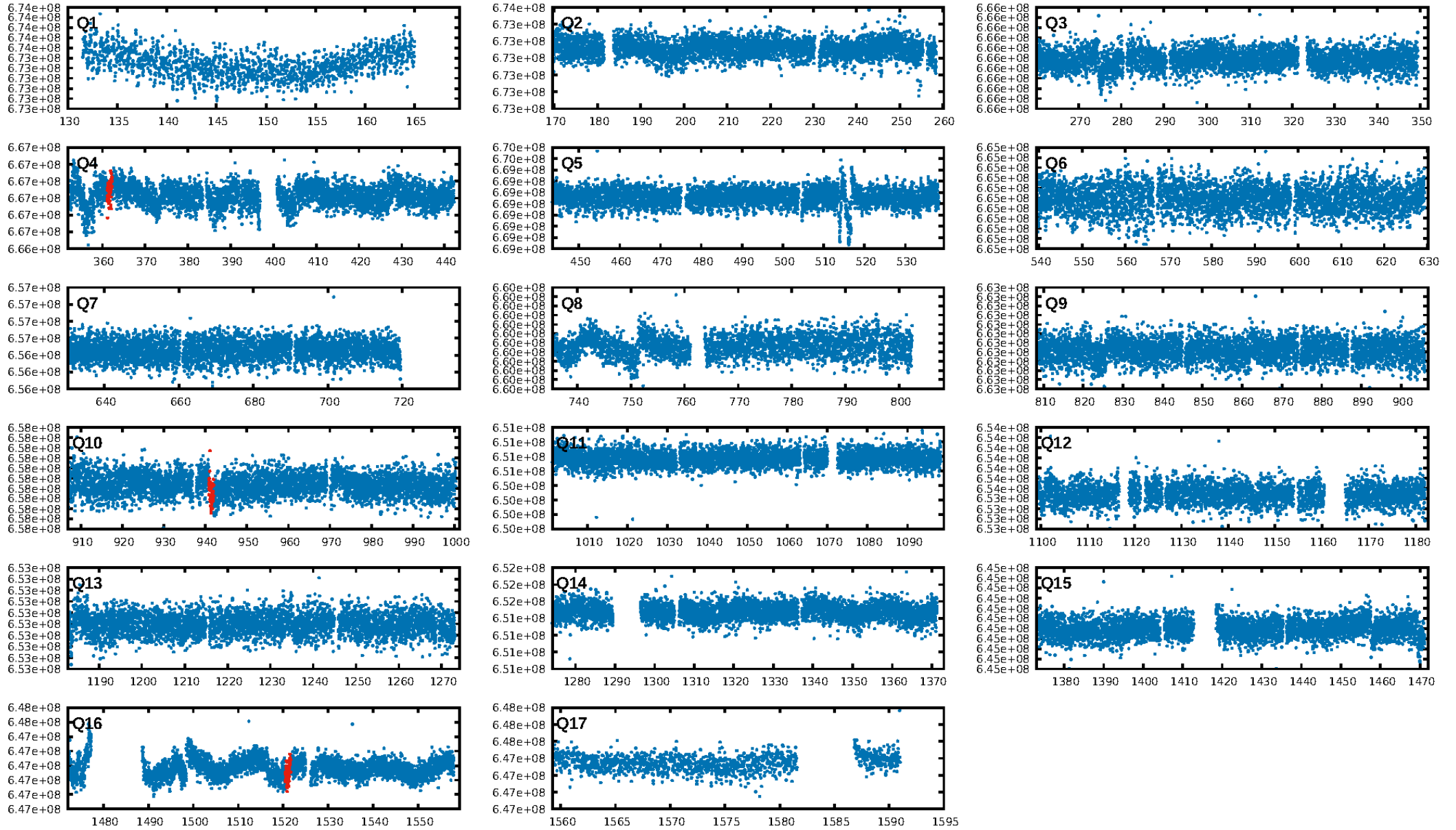
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [19.85σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 25.2%  
ModelChiSquareGof-sig: 99.5%  
**Bootstrap-pfa: 6.93e-09**  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 4.261  
**Centroid-sig: 0.0%**  
Centroid-so: 4.713 arcsec [2.90σ]  
OotOffset-rm: 6.144 arcsec [1.61σ]  
KicOffset-rm: 5.809 arcsec [2.60σ]  
OotOffset-st: 1/0/1/0 [2]  
KicOffset-st: 1/0/1/0 [2]  
DiffImageQuality-fgm: 1.00 [2/2]  
DiffImageOverlap-fno: 0.33 [1/3]

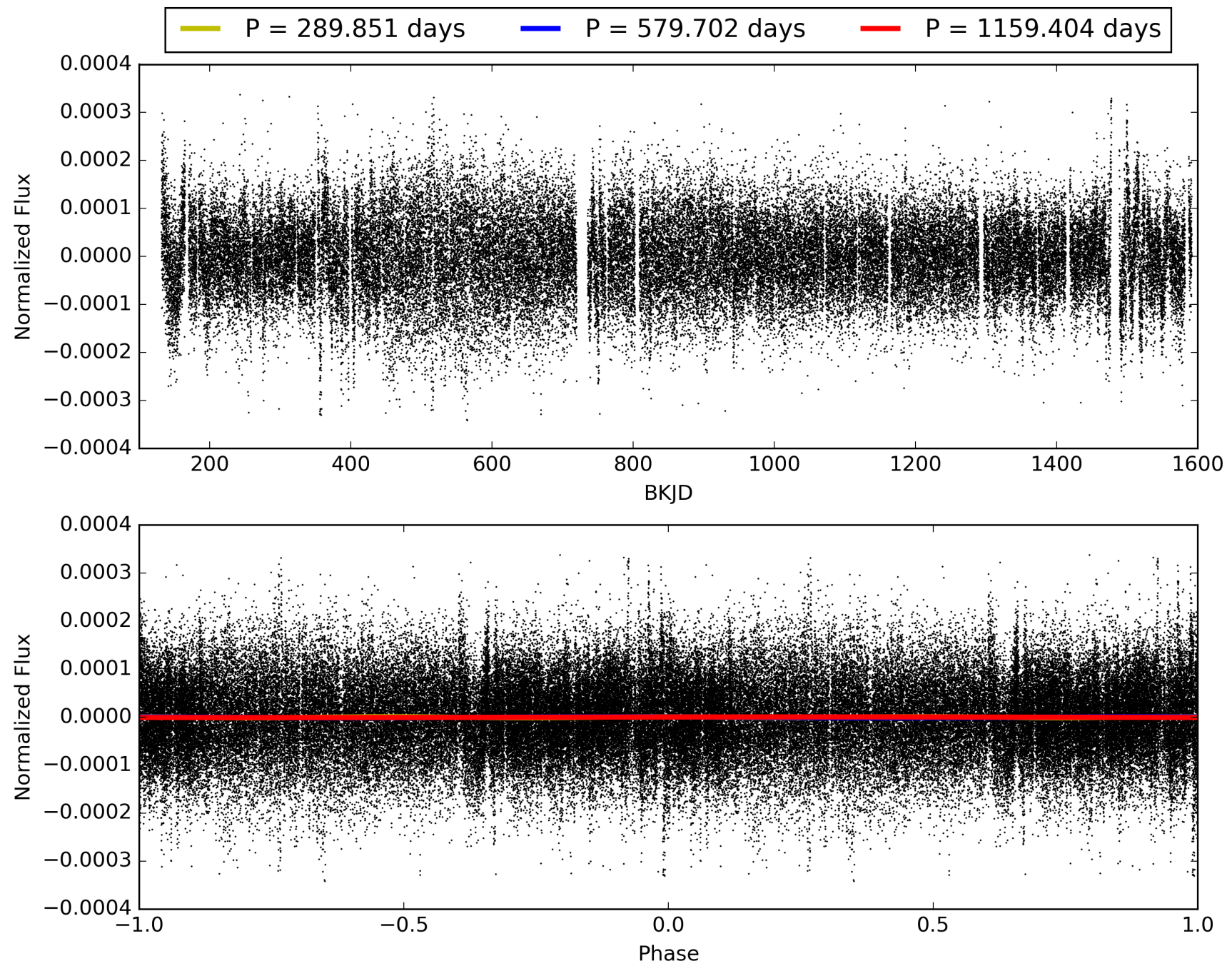
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 10:44:01 Z

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

# TCE 005440852-01, PDC Light Curves



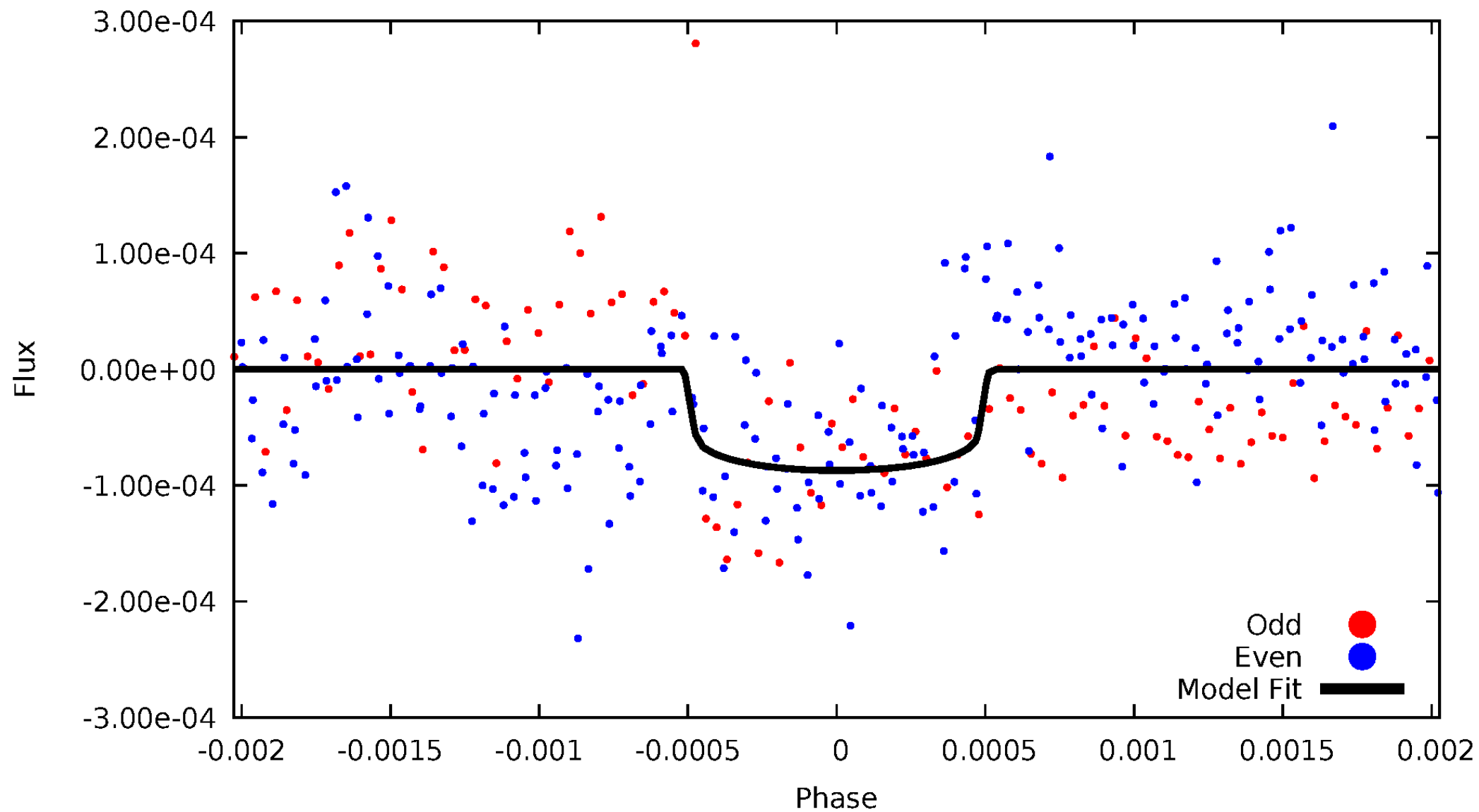
TCE 005440852-01





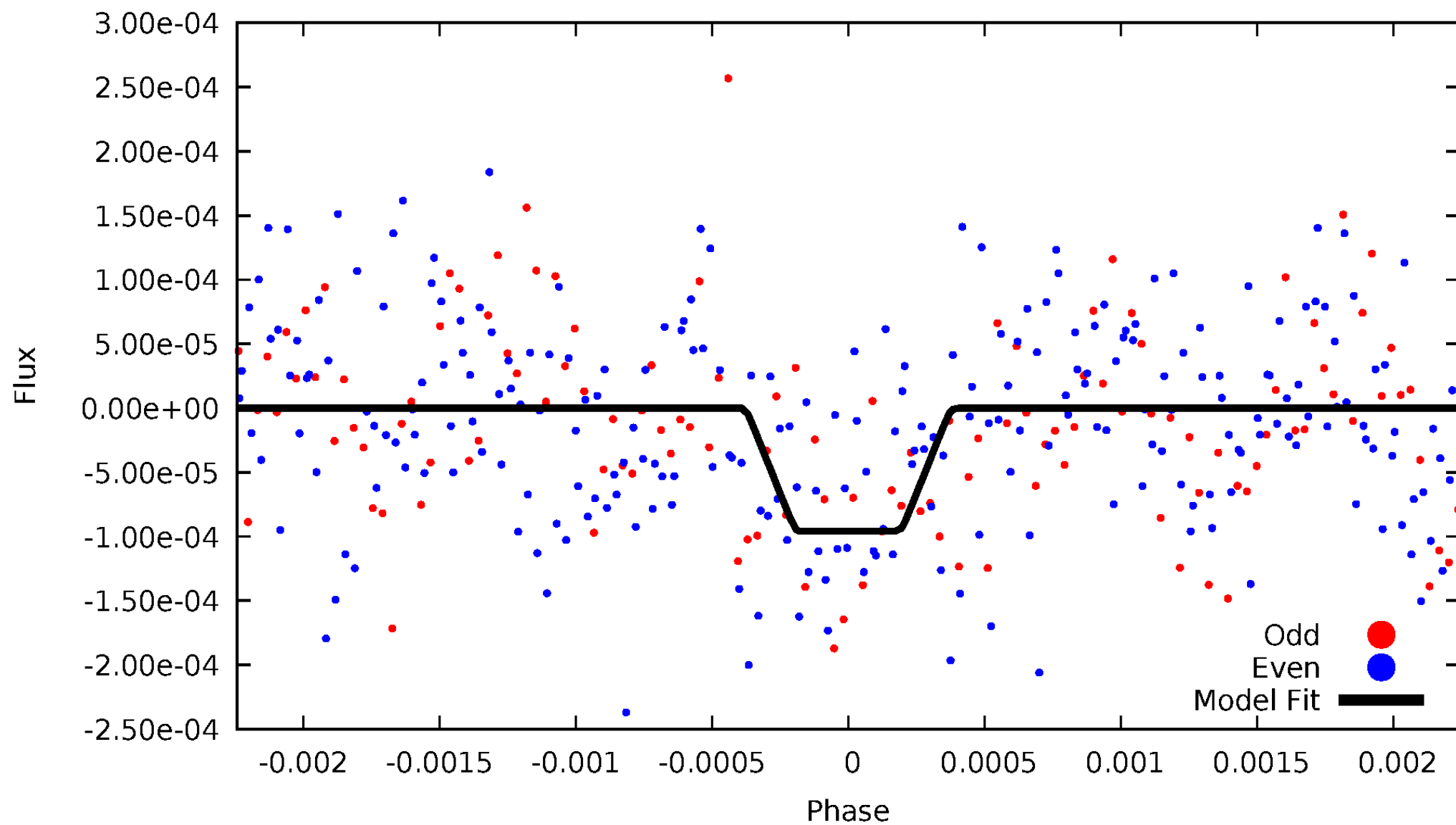
# DV Odd/Even

TCE 005440852-01



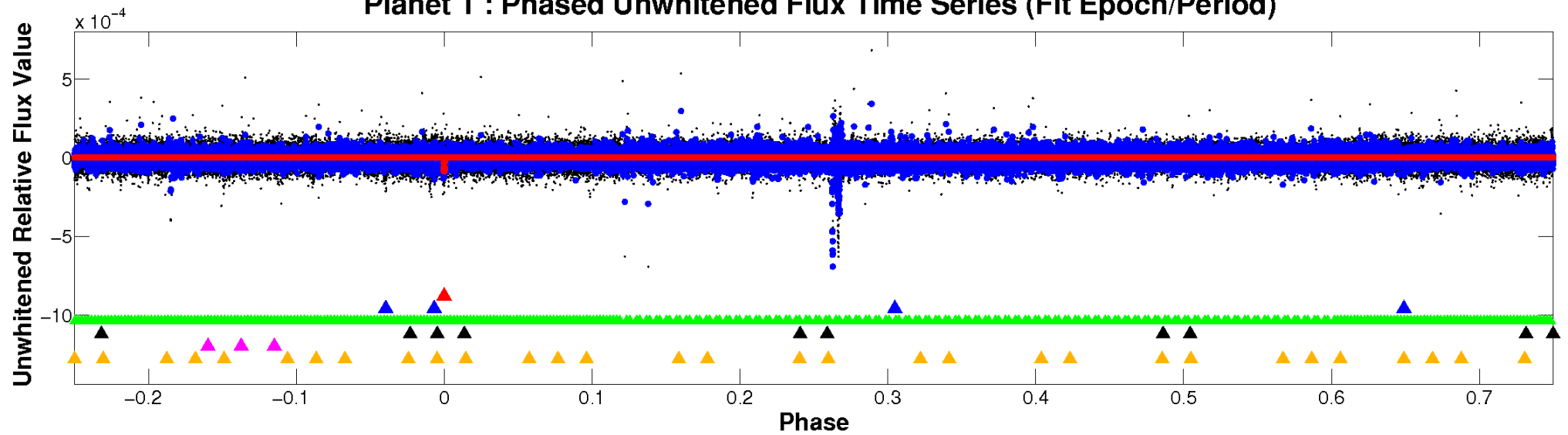
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TCE 005440852-01

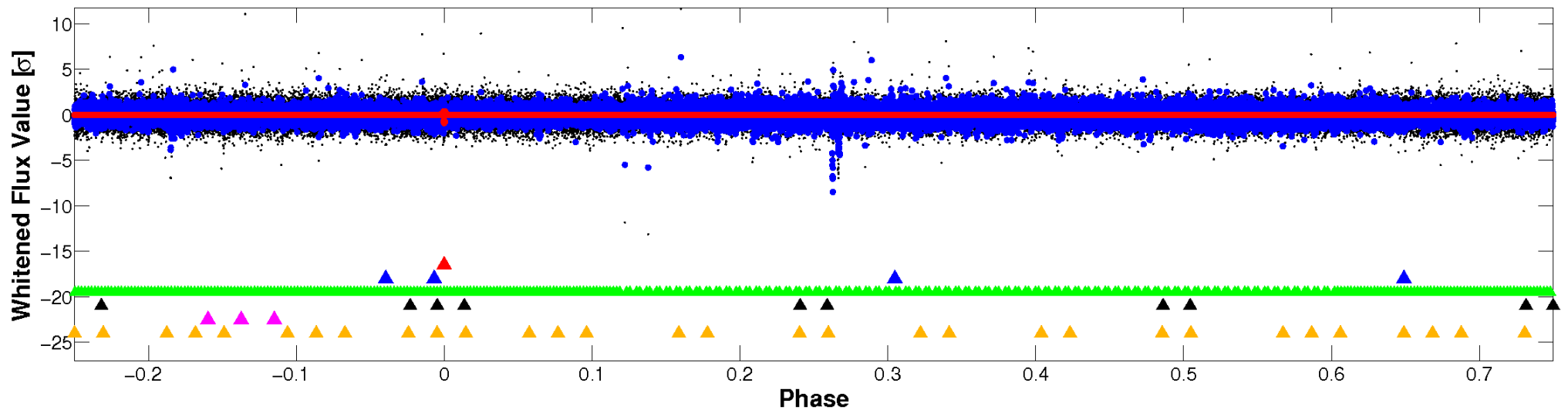


# Non-Whitened Vs. Whitened Light Curve

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

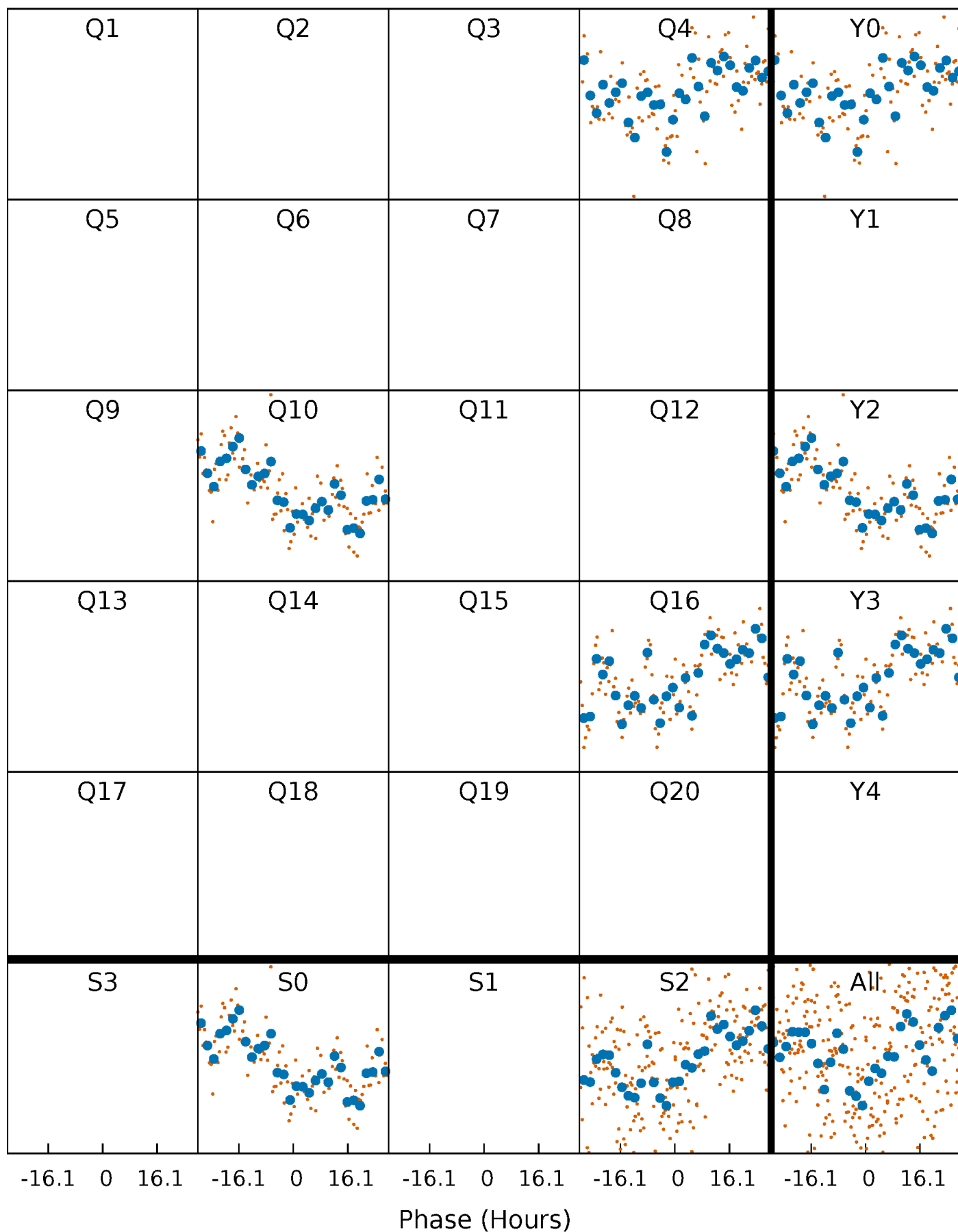


## Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

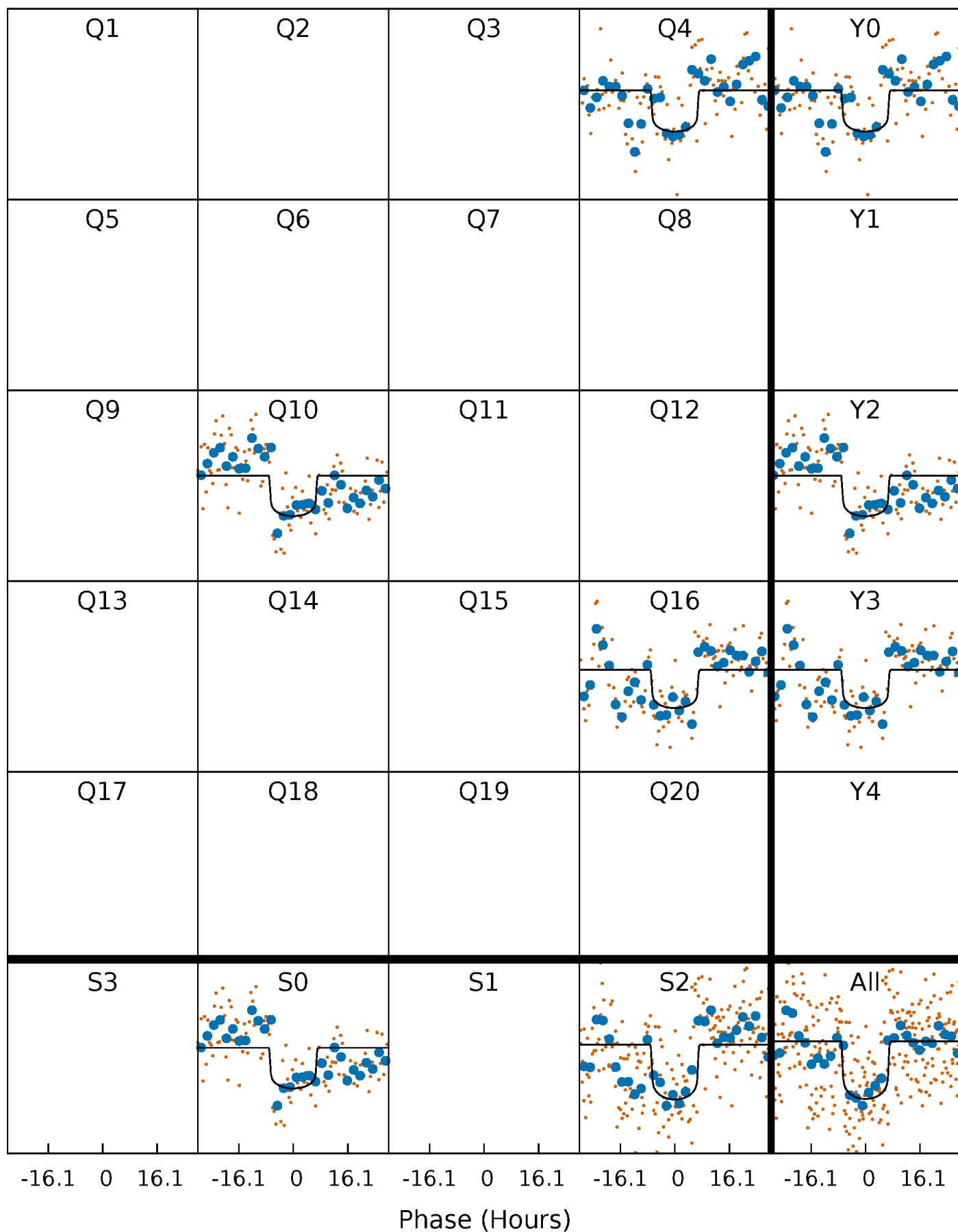
TCE 005440852-01 P=579.702060 Days  $T_0=361.666686$  (BKJD)





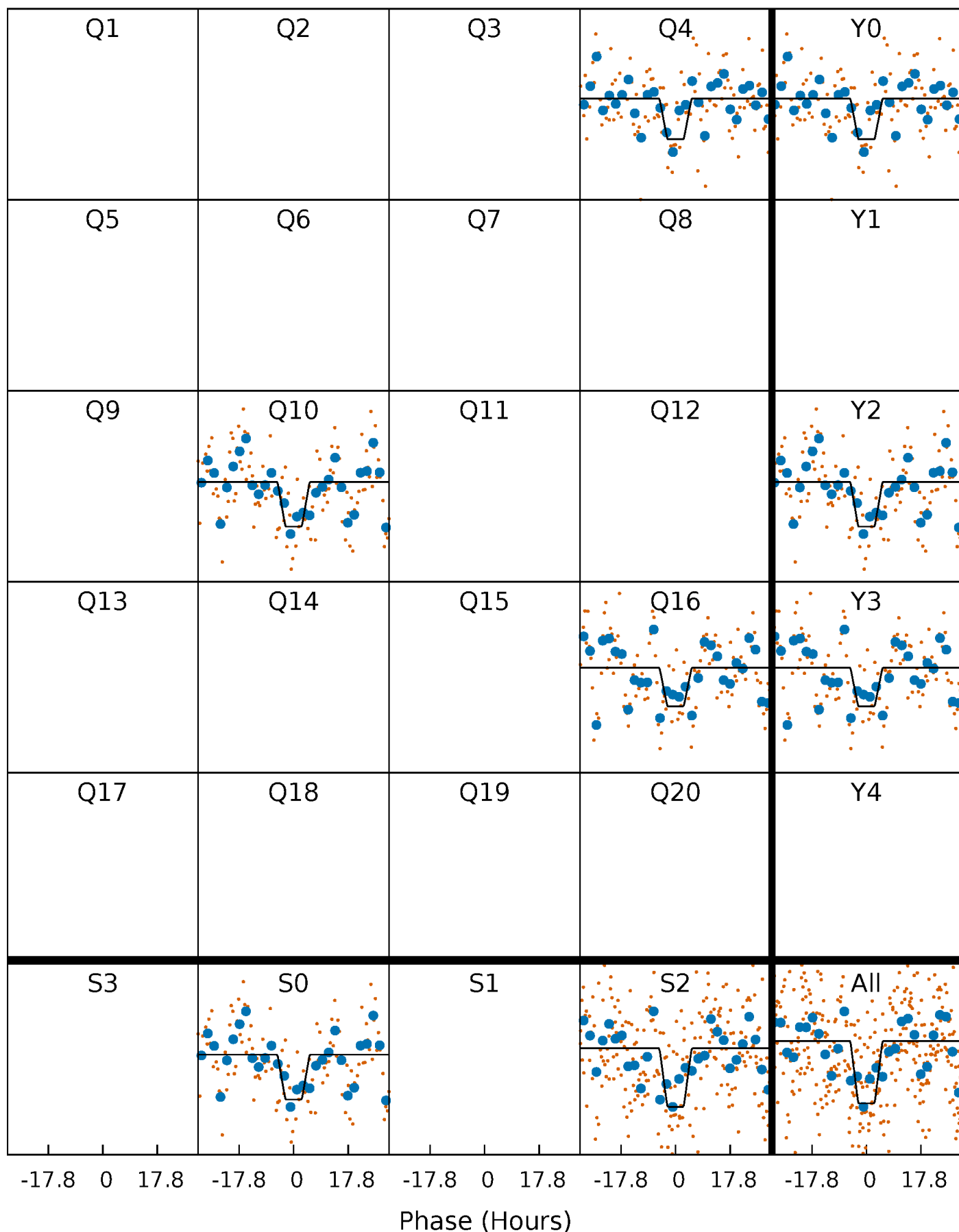
# DV Quarter-Phased Transit Curves

TCE 005440852-01 P=579.702060 Days  $T_0=361.666686$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

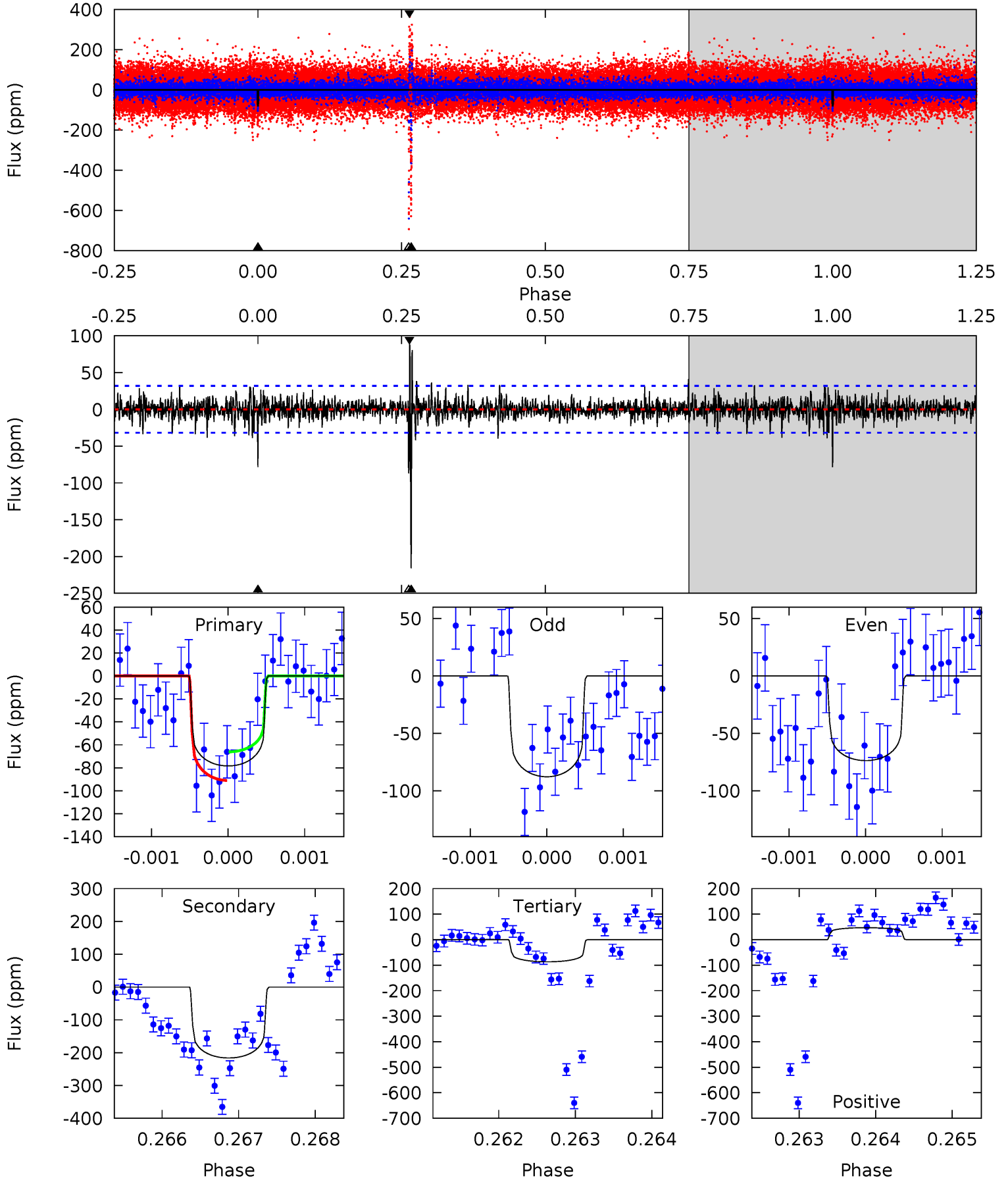
TCE 005440852-01 P=579.713720 Days  $T_0=361.635208$  (BKJD)



# DV Model-Shift Uniqueness Test

005440852-01,  $P = 579.702060$  Days,  $E = 361.666686$  Days

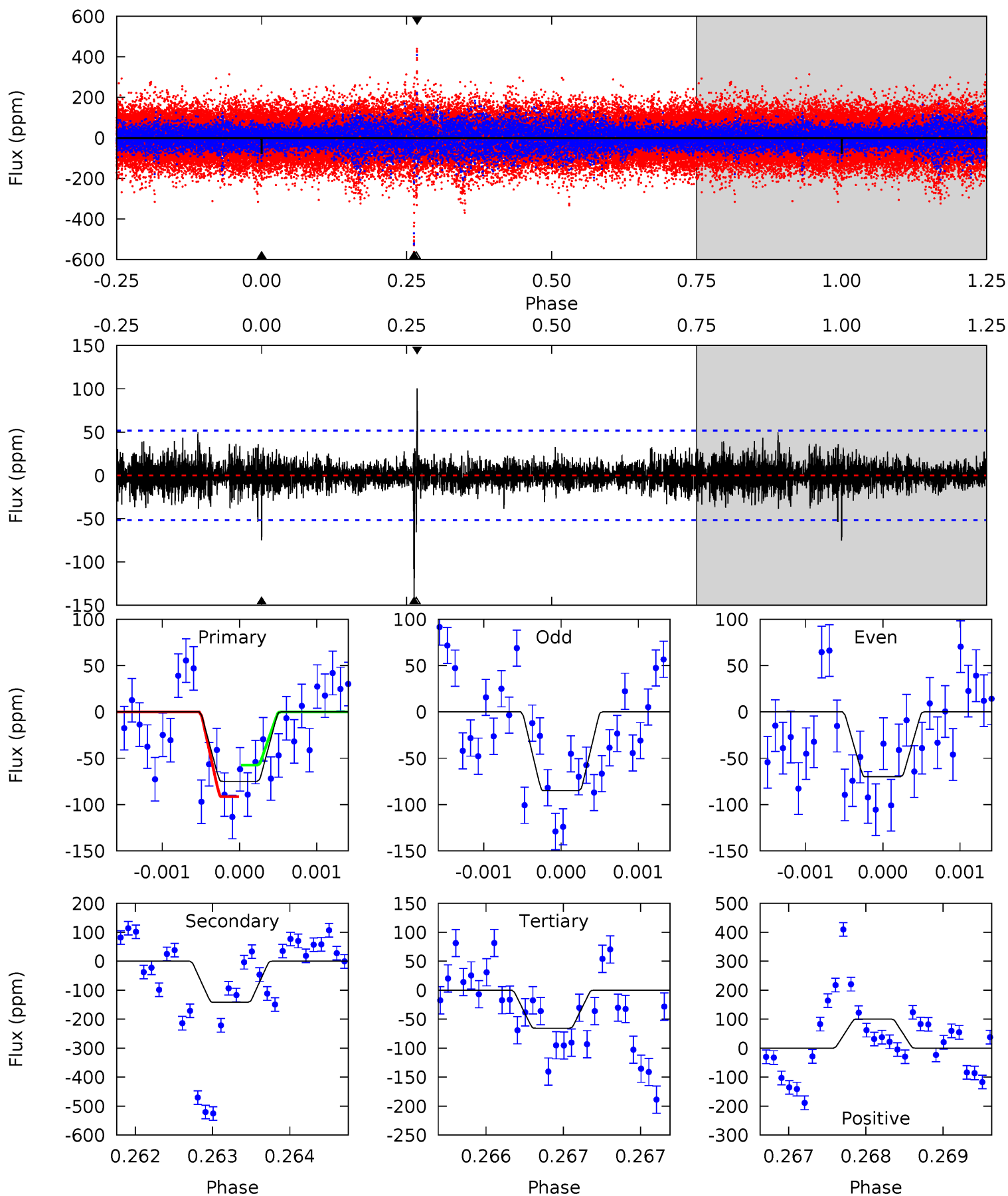
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
13.4	36.9	14.8	8.01	5.45	3.28	1.68	-1.43	5.37	22.1	28.9	1.14	0.96	0.30	2.12



# Alt Model-Shift Uniqueness Test

005440852-01, P = 579.713720 Days, E = 361.635208 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
7.98	15.1	6.97	10.7	5.50	3.37	1.18	1.01	-2.69	8.09	4.39	0.75	1.04	0.41	1.80





### Stellar Parameters For KIC 005440852

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$8361^{+75}_{-83}$	$4.219^{+0.063}_{-0.117}$	$-0.320^{+0.050}_{-0.200}$	$1.630^{+0.299}_{-0.149}$	$1.603^{+0.129}_{-0.108}$	$0.521^{+0.137}_{-0.182}$
	+1%/-1%	+1%/-3%	+16%/-62%	+18%/-9%	+8%/-7%	+26%/-35%
Source	SPE68	SPE68	SPE68	DSEP		

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

### Secondary Eclipse Parameters for KIC 005440852-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-216 \pm 6$	$1.73^{+0.33}_{-0.32}$	$524^{+24}_{-16}$	$11369^{+1824}_{-1276}$	$101181^{+47721}_{-30086}$
Alt.	$-142 \pm 9$	$1.77^{+0.32}_{-0.29}$	$523^{+21}_{-15}$	$9532^{+1287}_{-915}$	$62645^{+29139}_{-17232}$

$T_{max}$  = 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

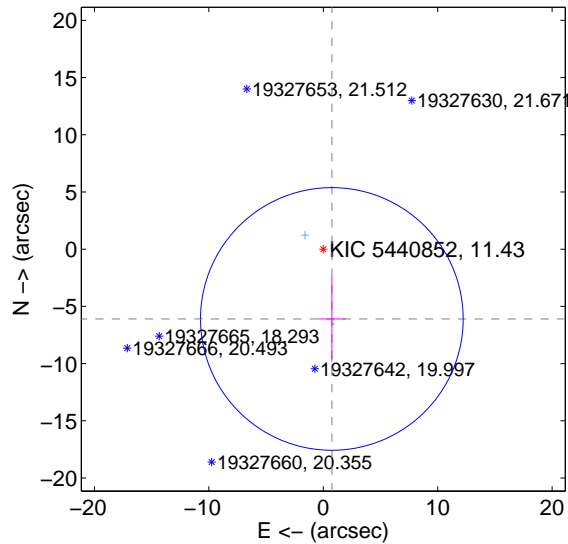
Supplemental centroid analysis for 005440852-01. **Kepler magnitude: 11.43.** Transit SNR 7.61

**There are 2 quarters with good PRF difference image offsets**

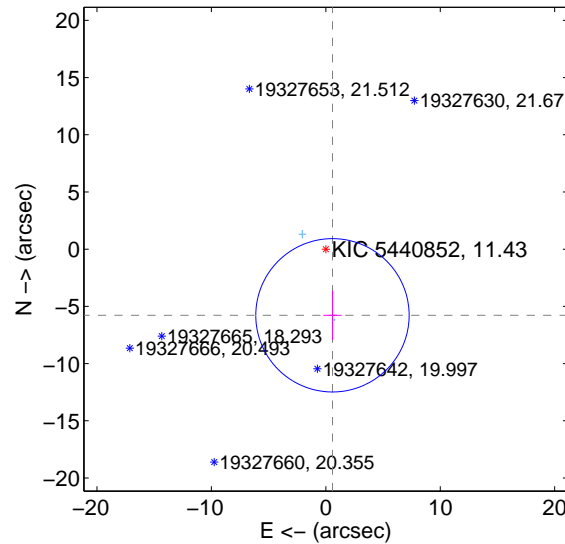
The direct PRF centroid is offset from the target star catalog position by about 0.47 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$6.144 \pm 3.825$	1.61	$-0.751 \pm 1.191$	$-6.098 \pm 3.708$
PRF-fit source offset from KIC position	$5.809 \pm 2.234$	2.60	$-0.581 \pm 0.810$	$-5.779 \pm 2.164$
photometric centroid source offset	$4.71 \pm 1.62$	2.90	$0.39 \pm 1.48$	$-4.70 \pm 1.63$

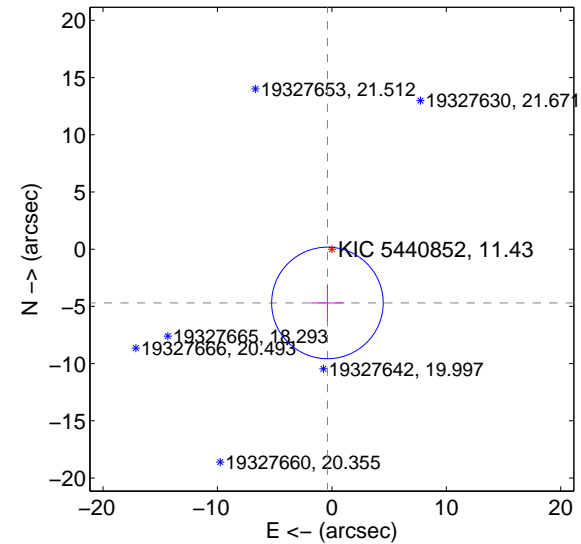
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

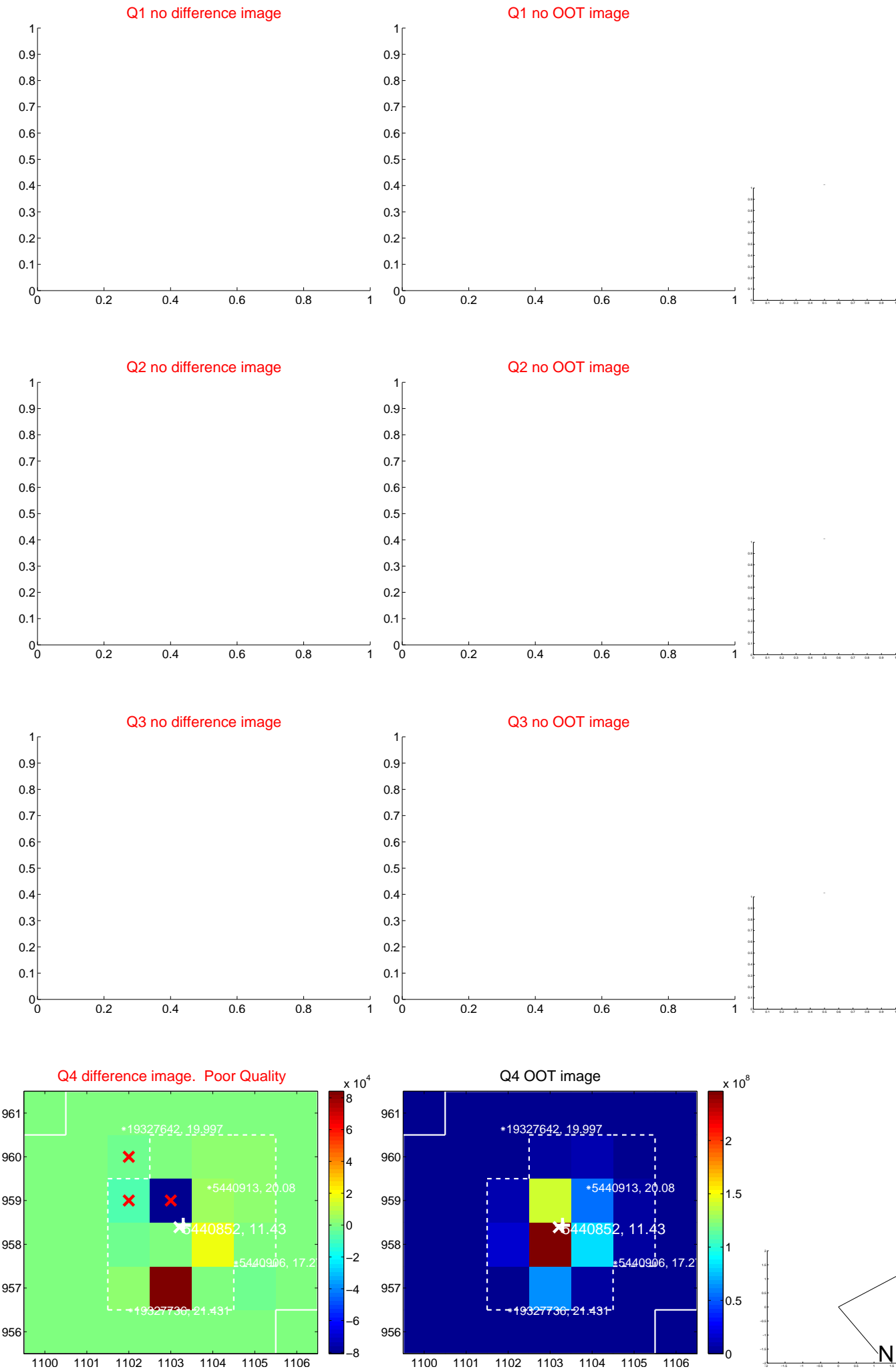


offset from photometric centroids



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.

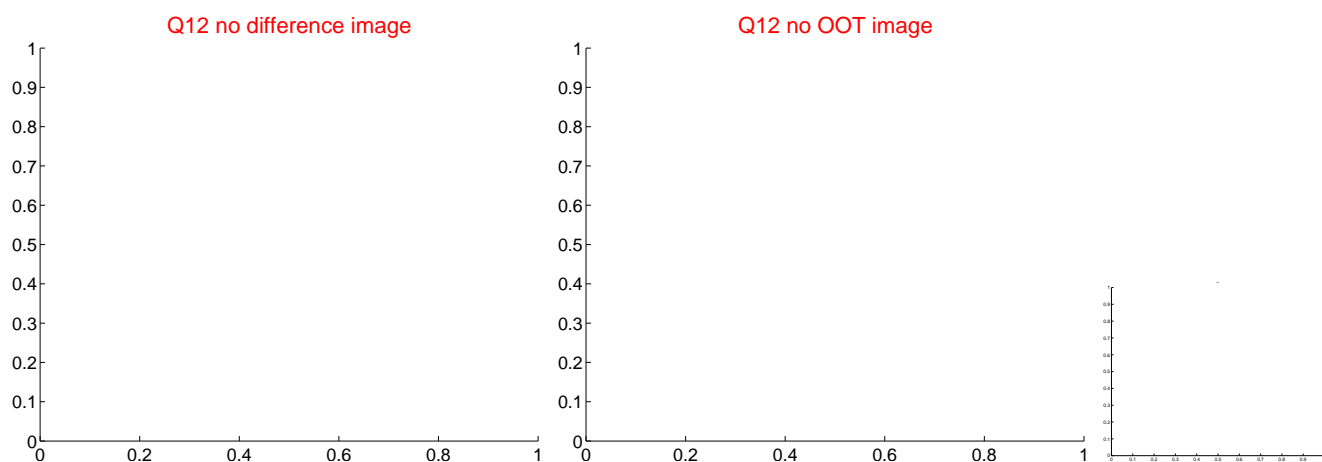
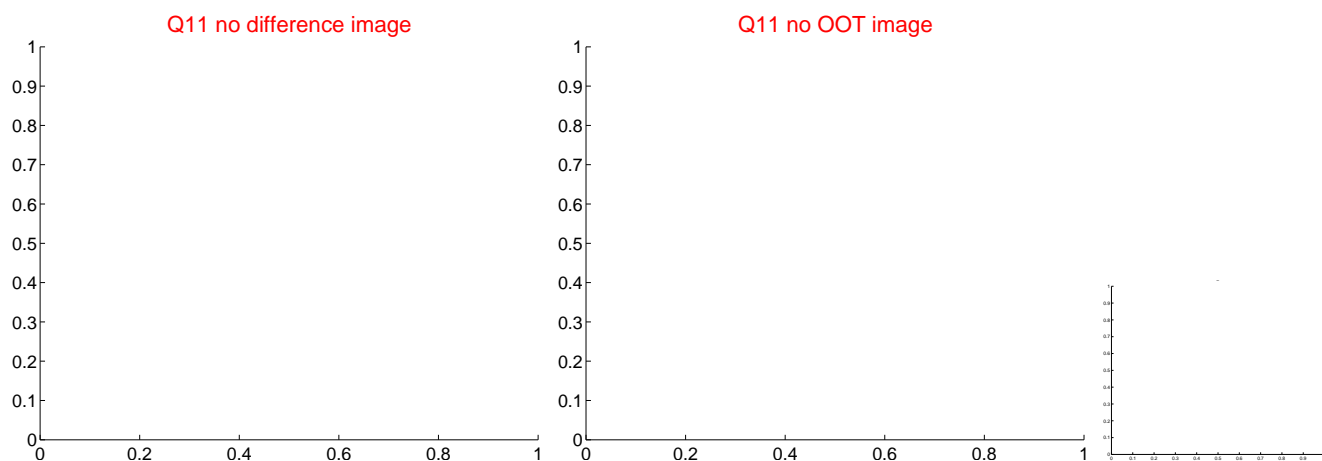
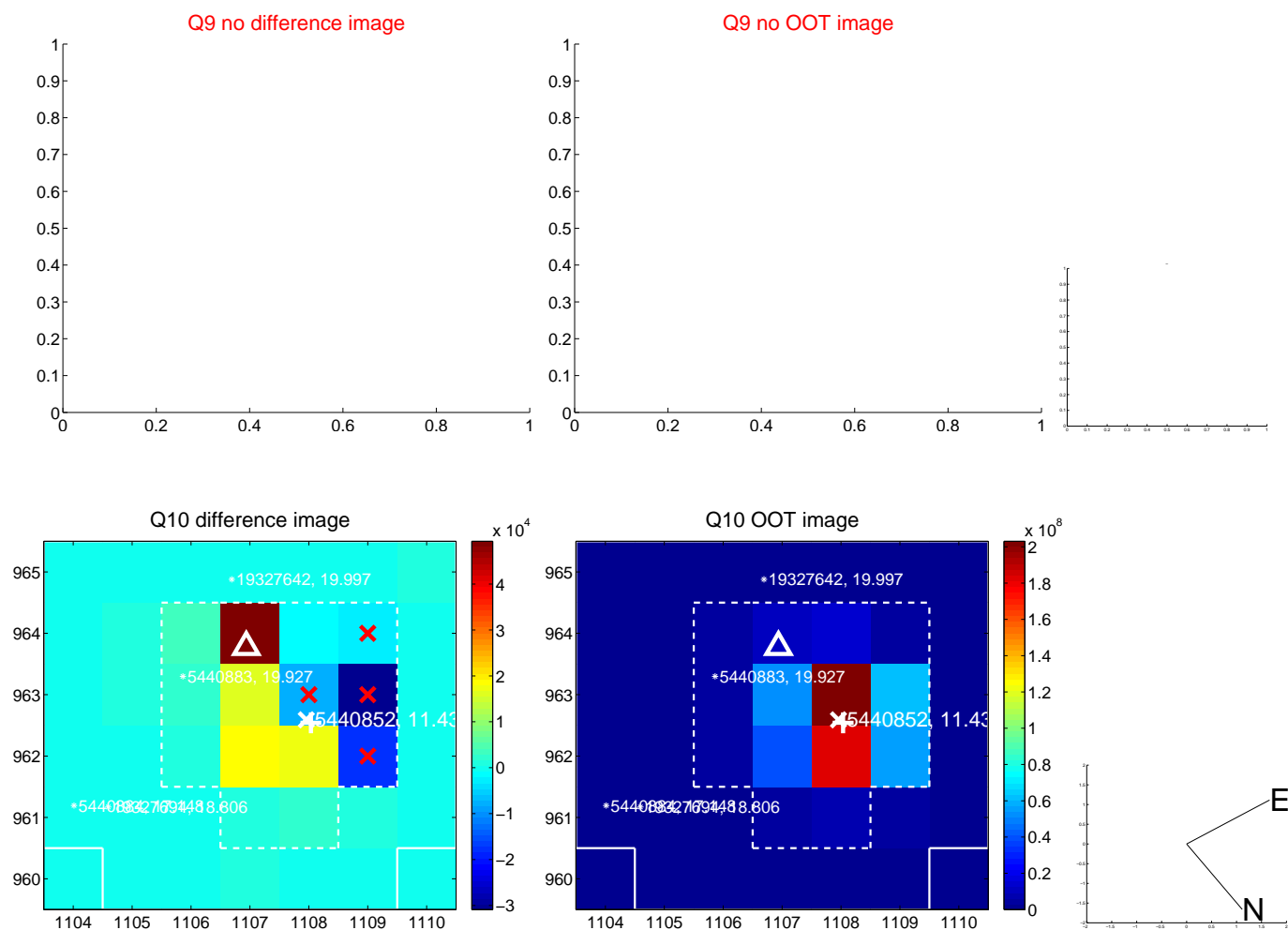


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

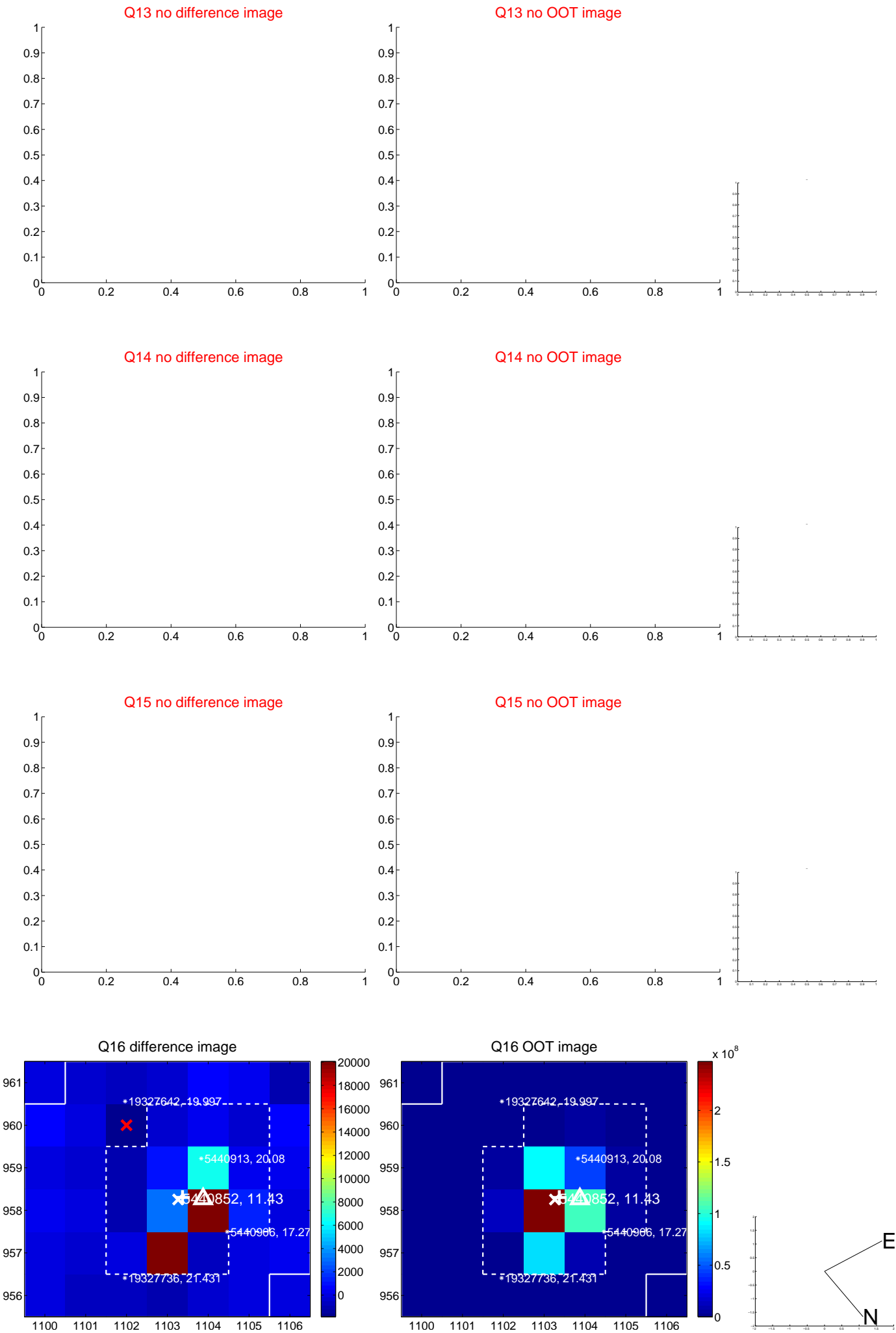




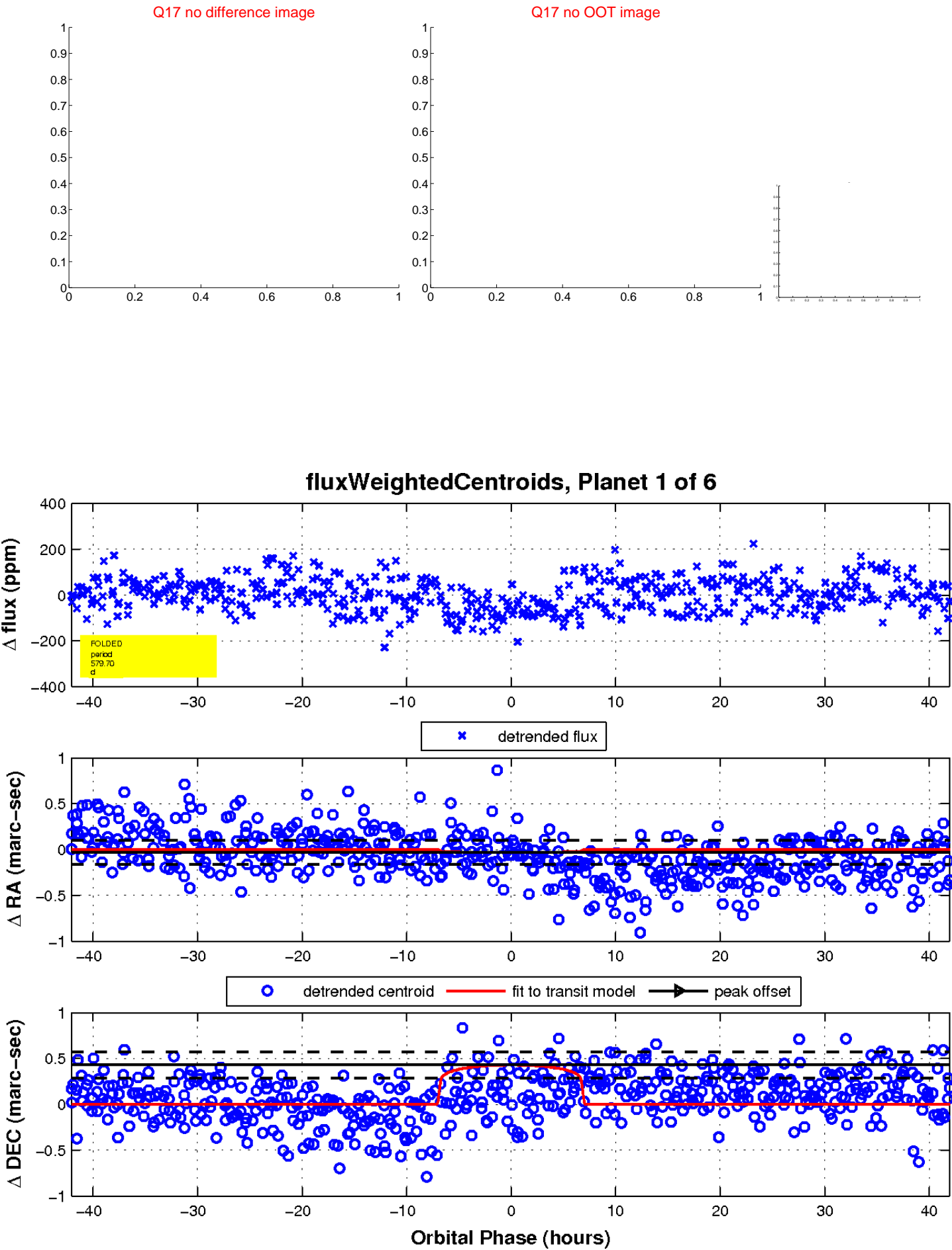
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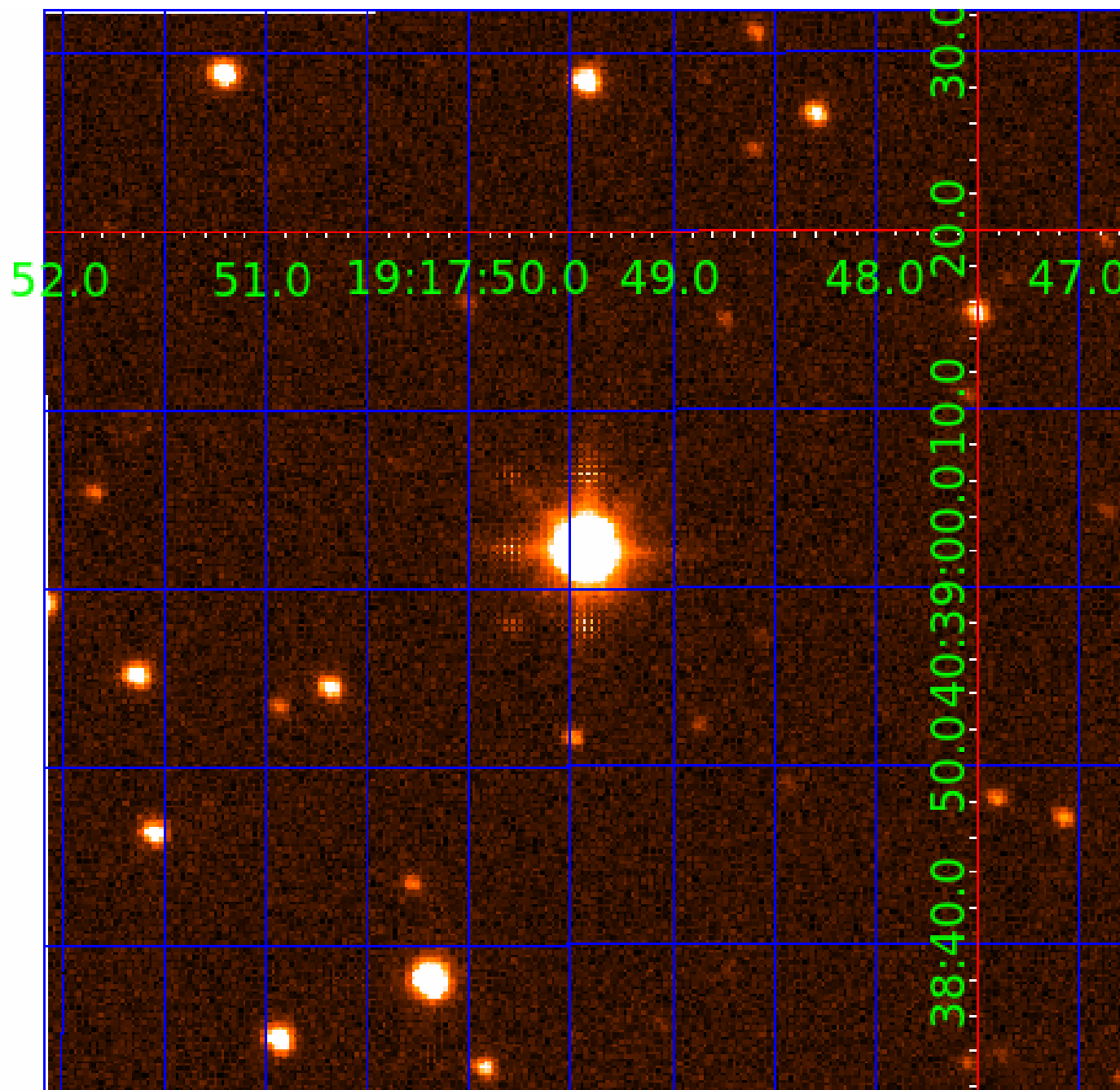


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 005440852

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005440852-01	OBS	No	579.702060	361.666686	87.1	14.093	8.1	7.6	1.63	8361	1.69	4.58
005440852-02	OBS	No	380.140181	357.759978	111.3	12.349	8.3	8.2	1.63	8361	1.94	8.04
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## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
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005440852-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE—LPP_DV—ALL_TRANS_CHASES—CENT_SATURATED
005440852-03	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_SATURATED
005440852-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_SATURATED
005440852-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—ALL_TRANS_CHASES—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
005440852-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_ALT—CENT_SATURATED

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

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

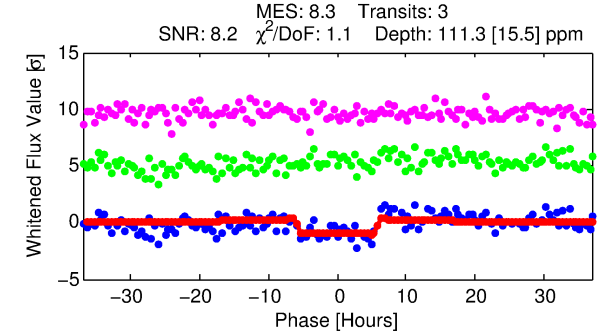
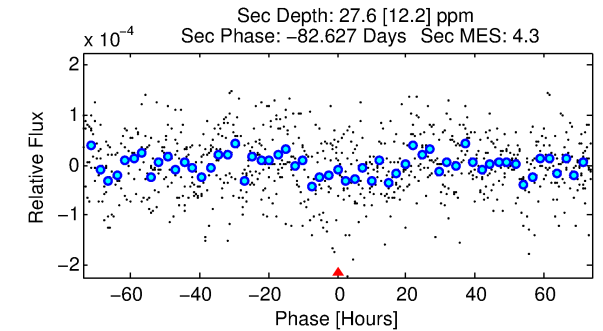
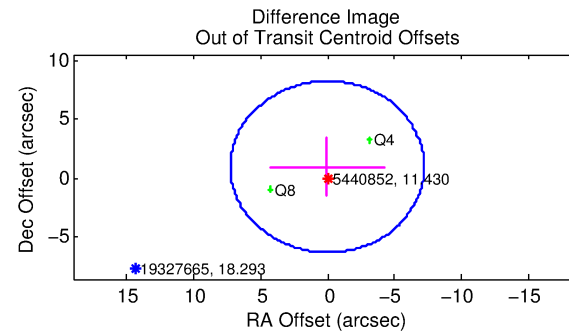
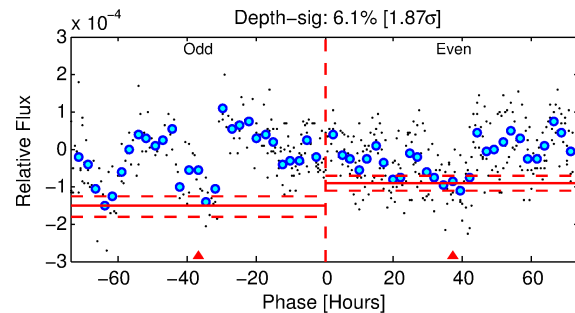
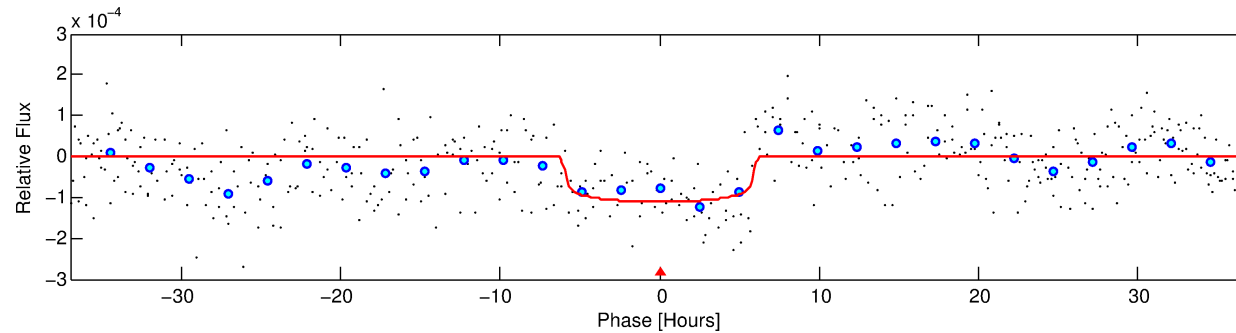
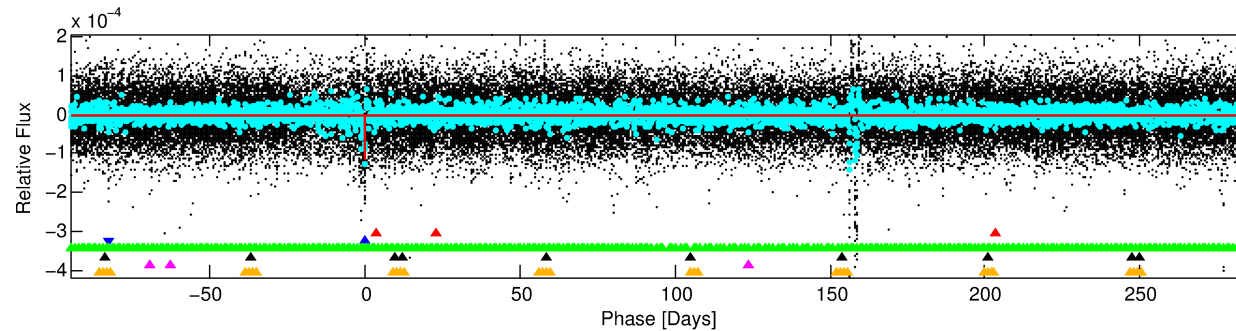
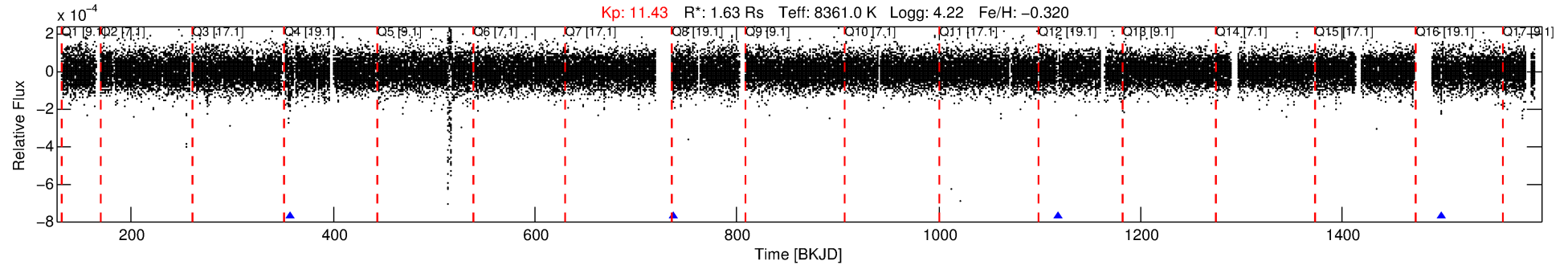
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 005440852-02

No Significant Match Found

# DV One-Page Summary

KIC: 5440852 Candidate: 2 of 6 Period: 380.140 d



## DV Fit Results:

Period = 380.14018 [0.00705] d  
Epoch = 357.7600 [0.0129] BKJD  
Rp/R\* = 0.0109 [0.0017]  
a/R\* = 126.61 [106.12]  
b = 0.86 [0.26]  
Seff = 8.04 [1.78]  
Teq = 429 [24] K  
Rp = 1.94 [0.47] Re  
a = 1.2026 [0.1825] AU  
Ag = 5821.00 [3403.53] [1.71σ]  
Teffp = 5799 [789] K [6.80σ]

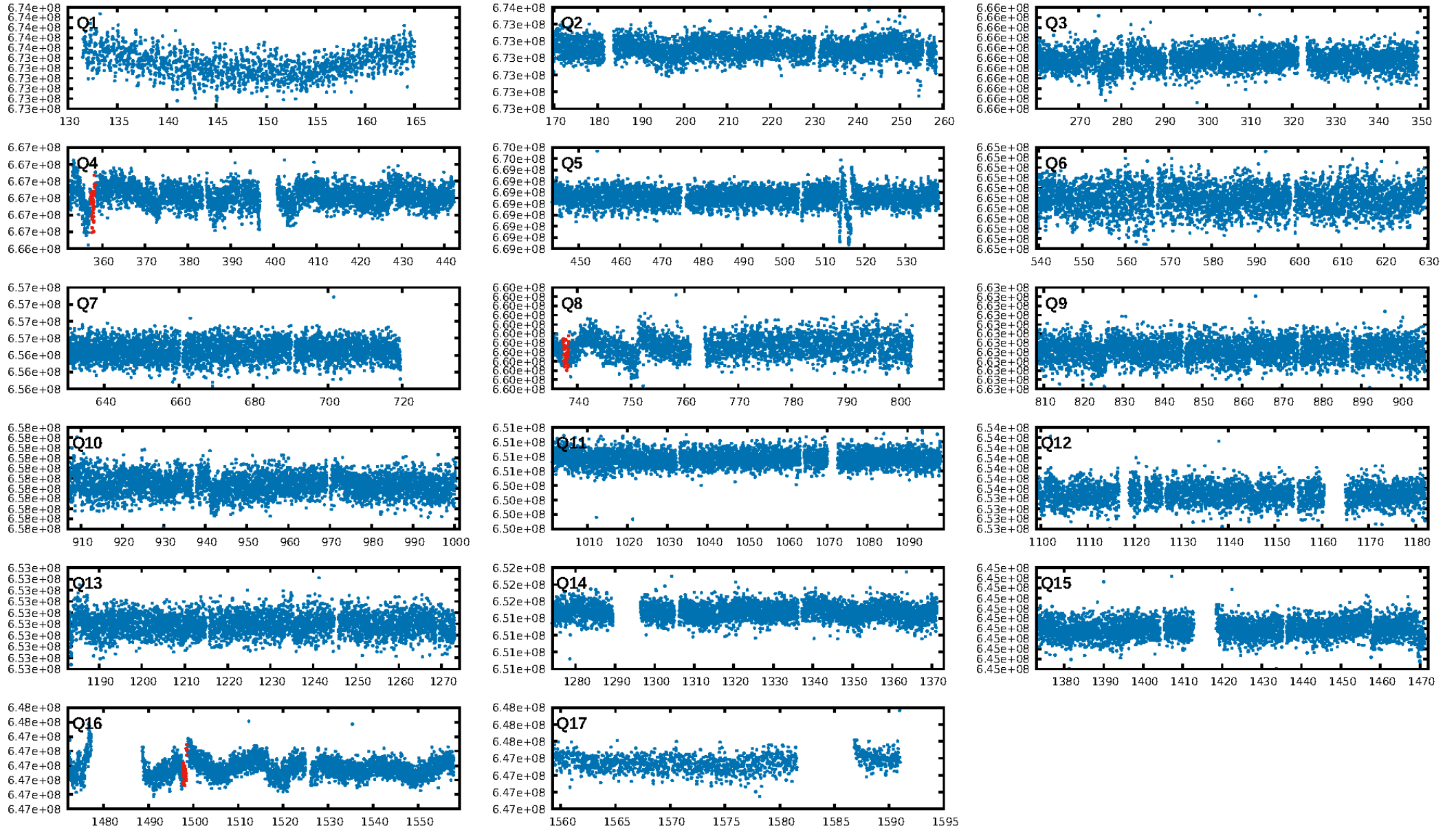
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [271.11σ]  
LongPeriod-sig: 100.0% [315.87σ]  
ModelChiSquare2-sig: 5.6%  
ModelChiSquareGof-sig: 99.0%  
**Bootstrap-pfa: 1.14e-09**  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -1.232  
**Centroid-sig: 0.3%**  
Centroid-so: 2.712 arcsec [2.17σ]  
OotOffset-rm: 0.987 arcsec [0.41σ]  
KicOffset-rm: 1.145 arcsec [0.42σ]  
OotOffset-st: 0/0/2/0 [2]  
KicOffset-st: 0/0/2/0 [2]  
DiffImageQuality-fgm: 0.50 [1/2]  
DiffImageOverlap-fno: 1.00 [2/2]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 10:44:10 Z

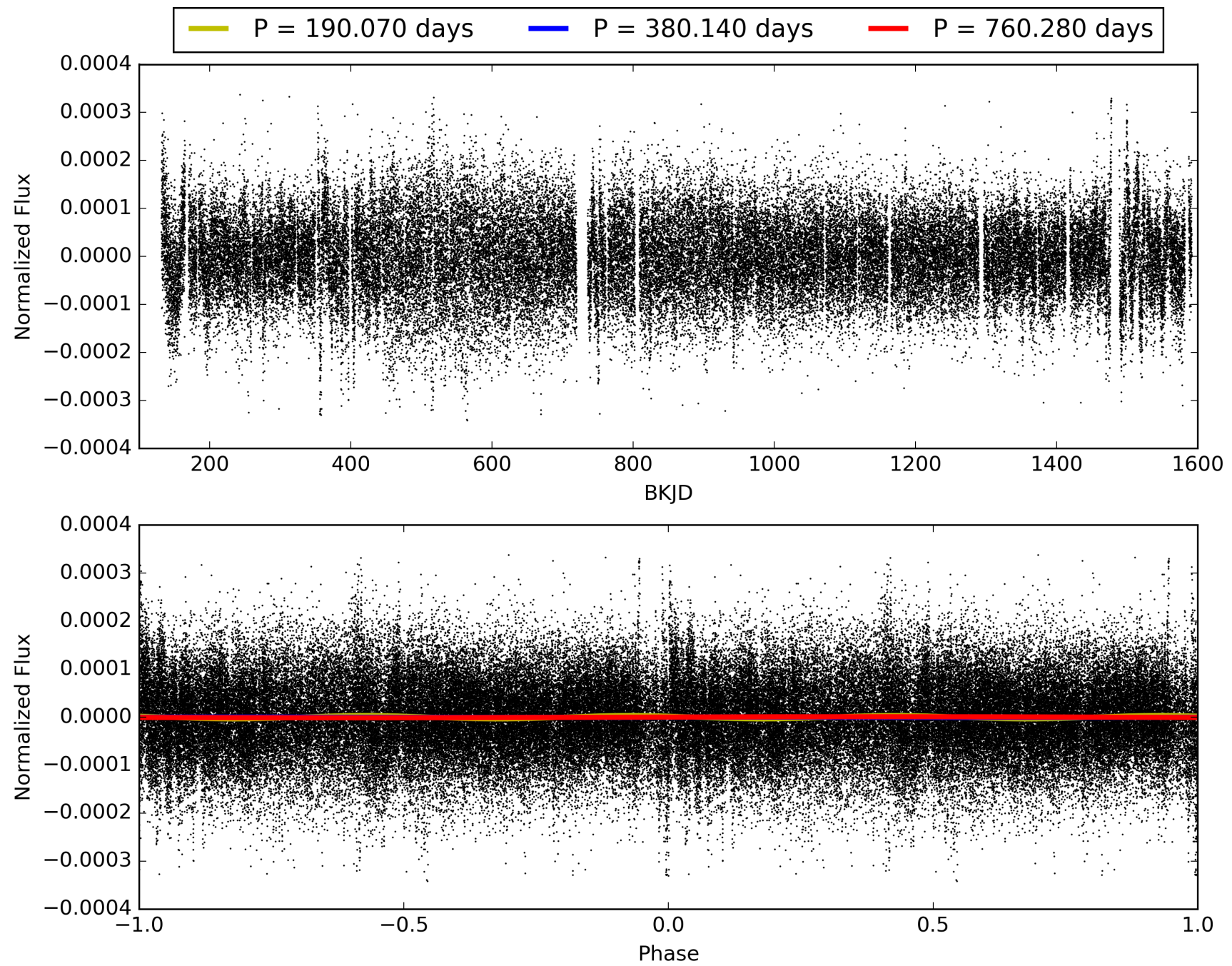
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 005440852-02, PDC Light Curves



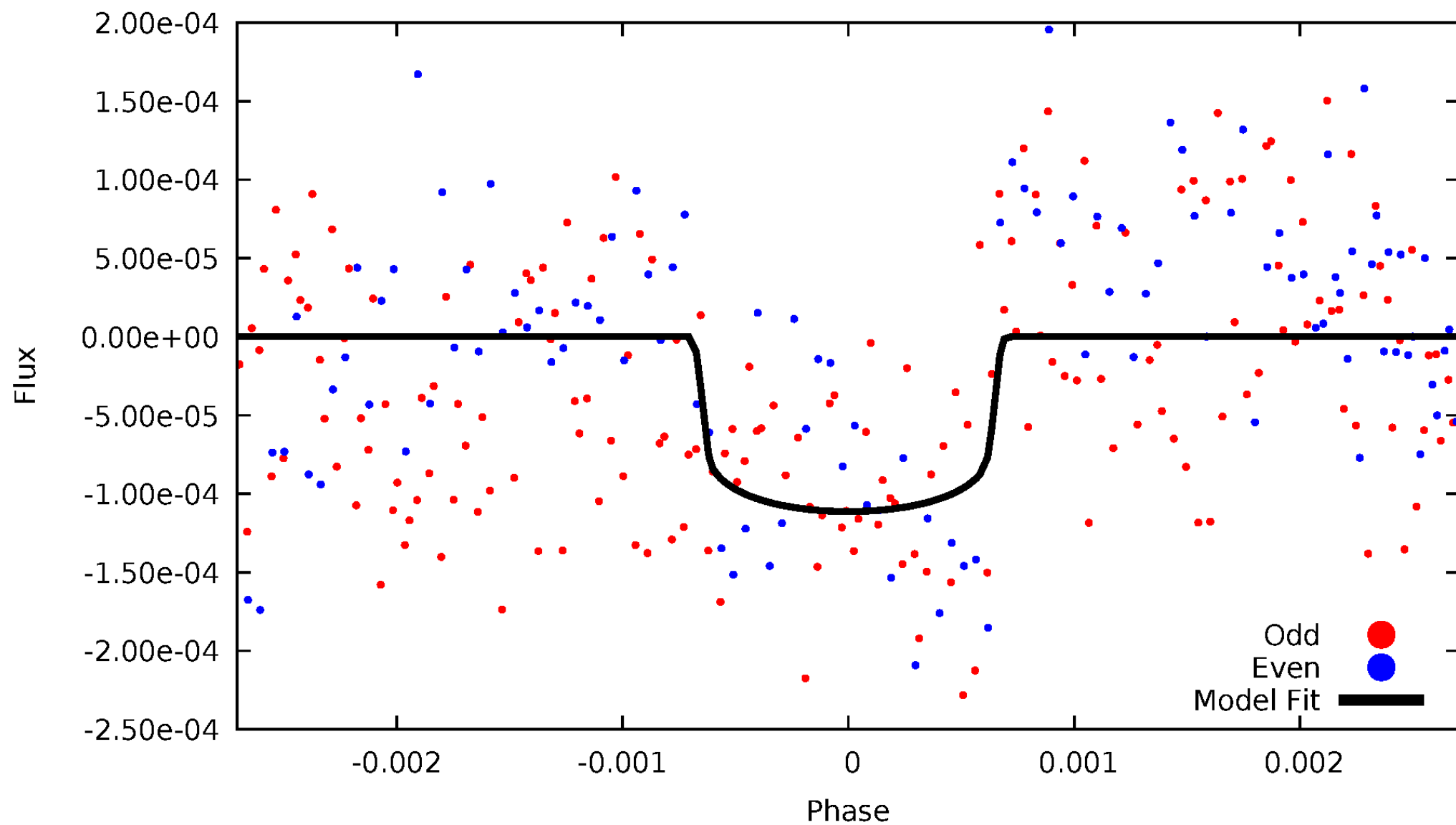


TCE 005440852-02



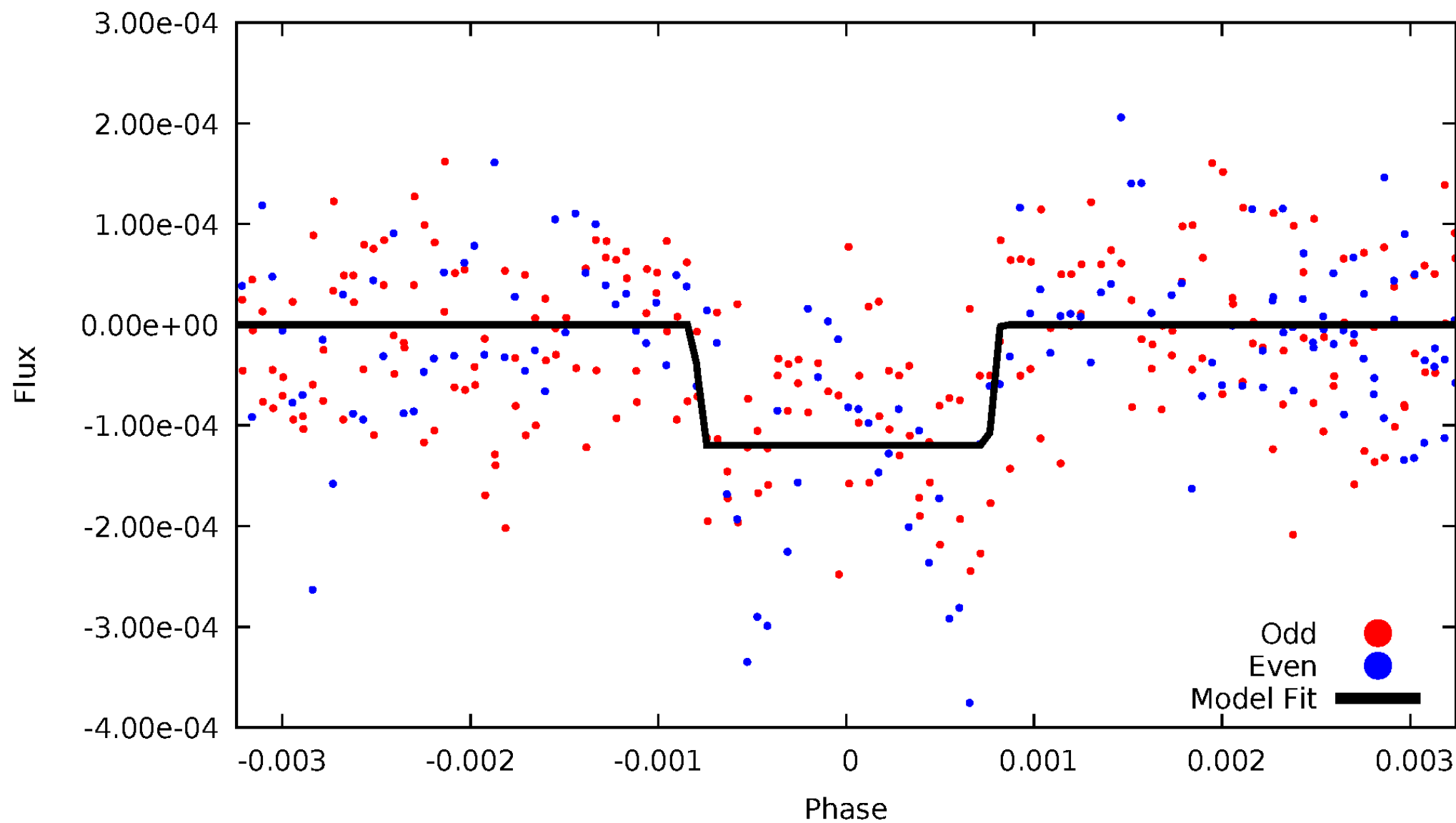
# DV Odd/Even

TCE 005440852-02



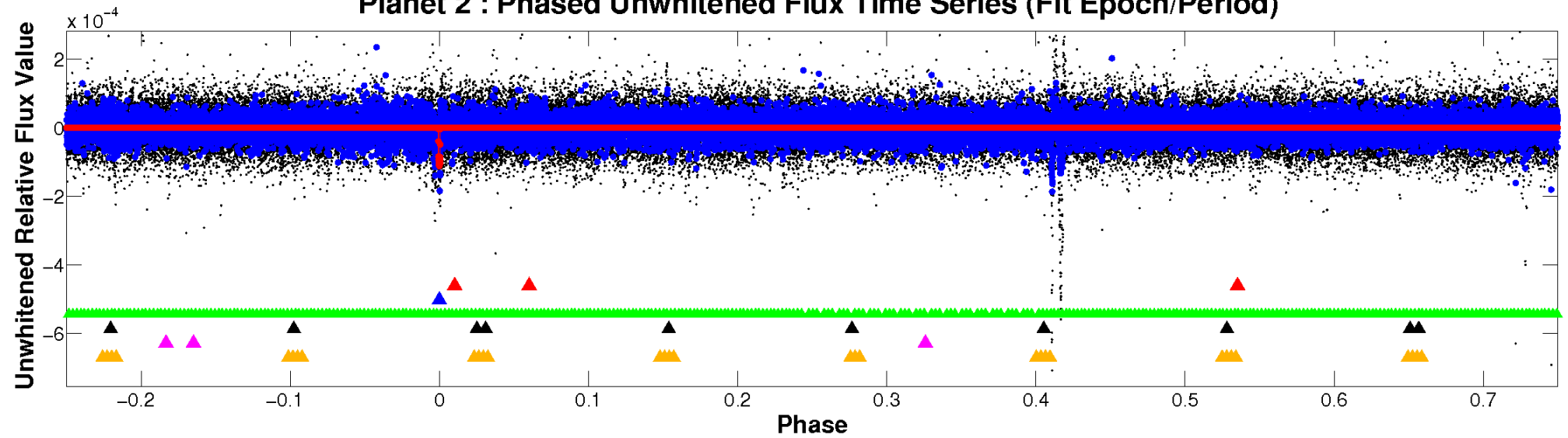
# ALT Odd/Even

TCE 005440852-02

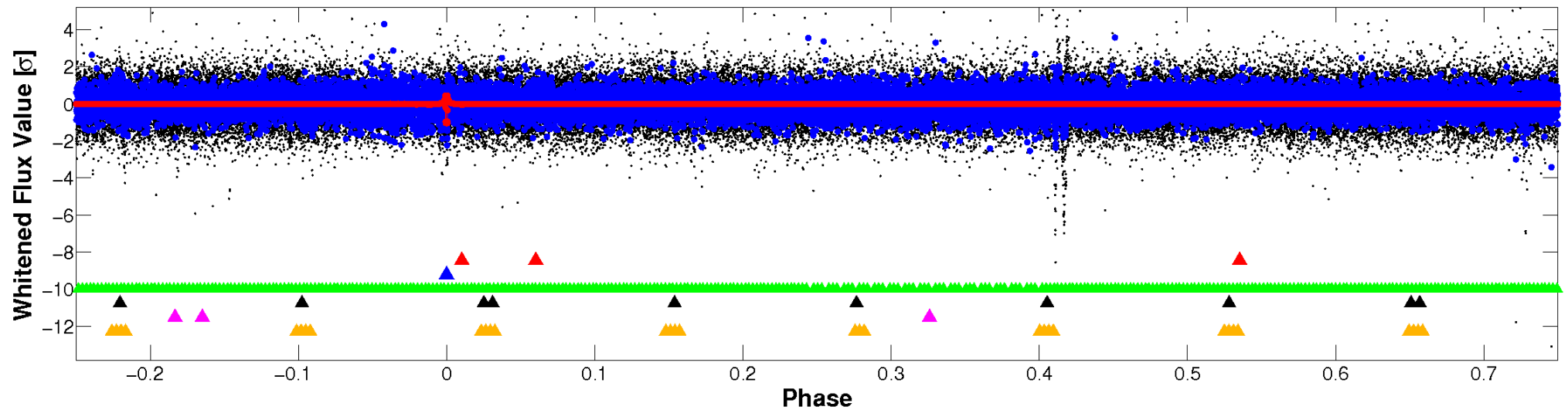


# Non-Whitened Vs. Whitened Light Curve

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

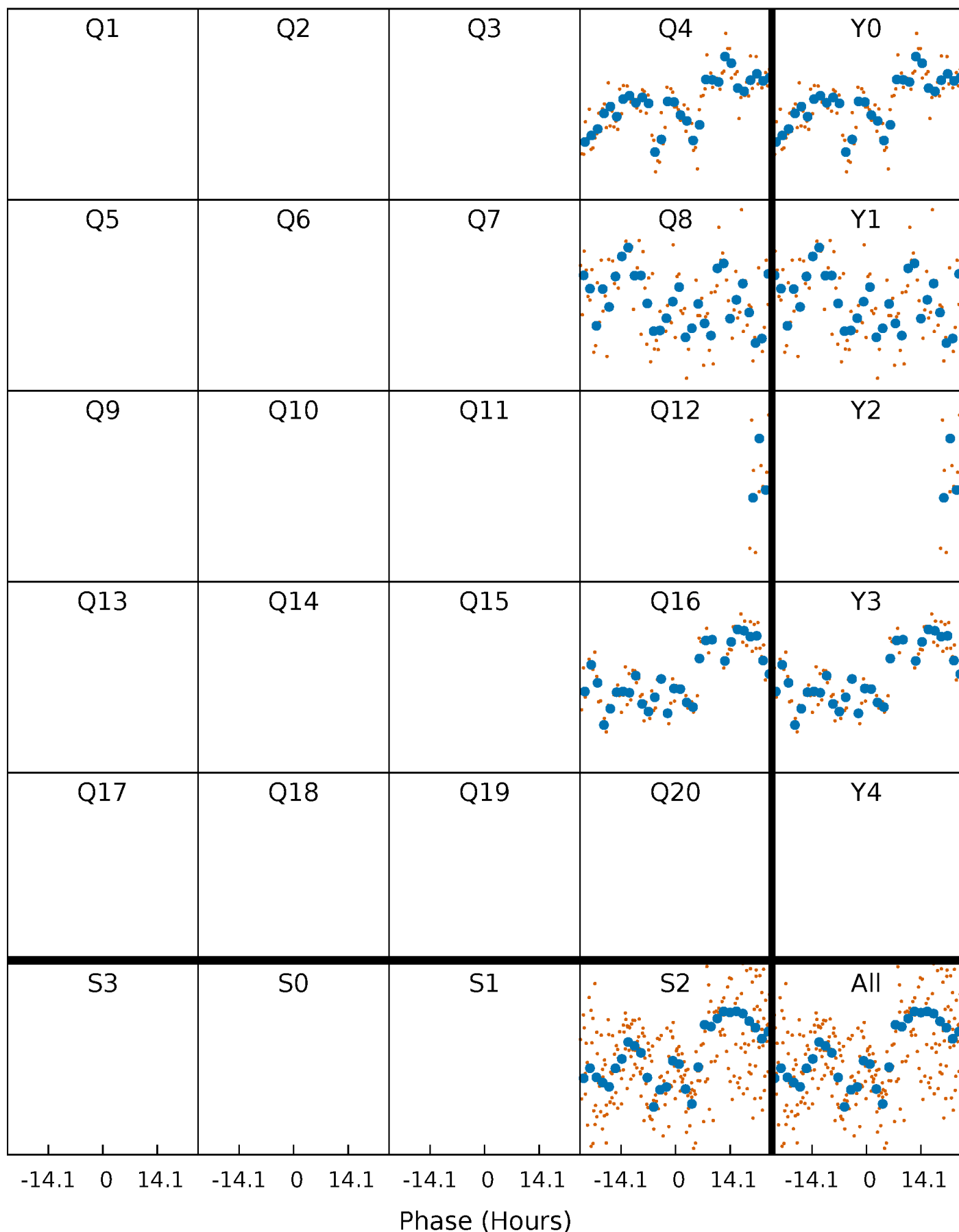


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



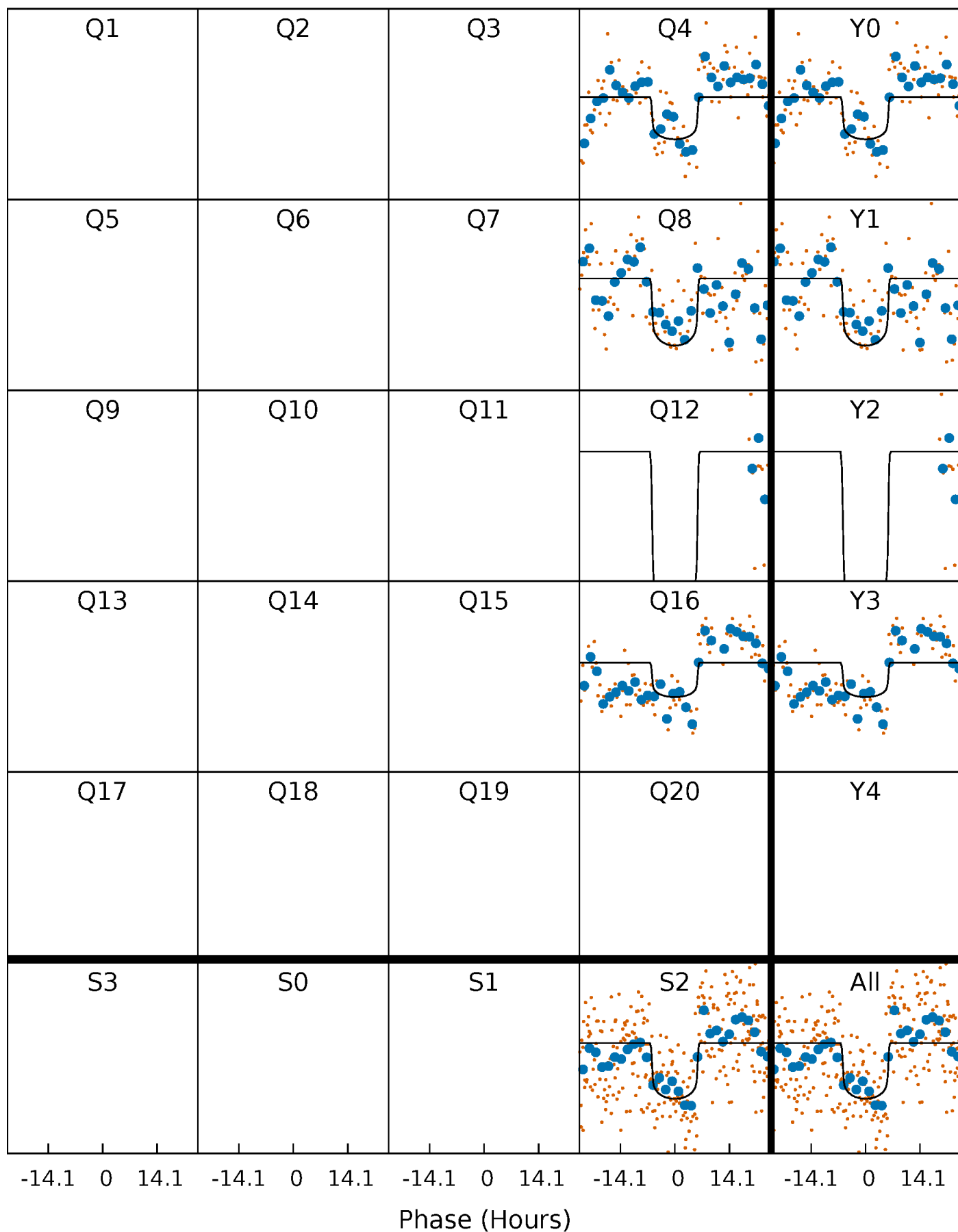
# PDC Quarter-Phased Transit Curves

TCE 005440852-02     $P=380.140181$  Days     $T_0=357.759978$  (BKJD)



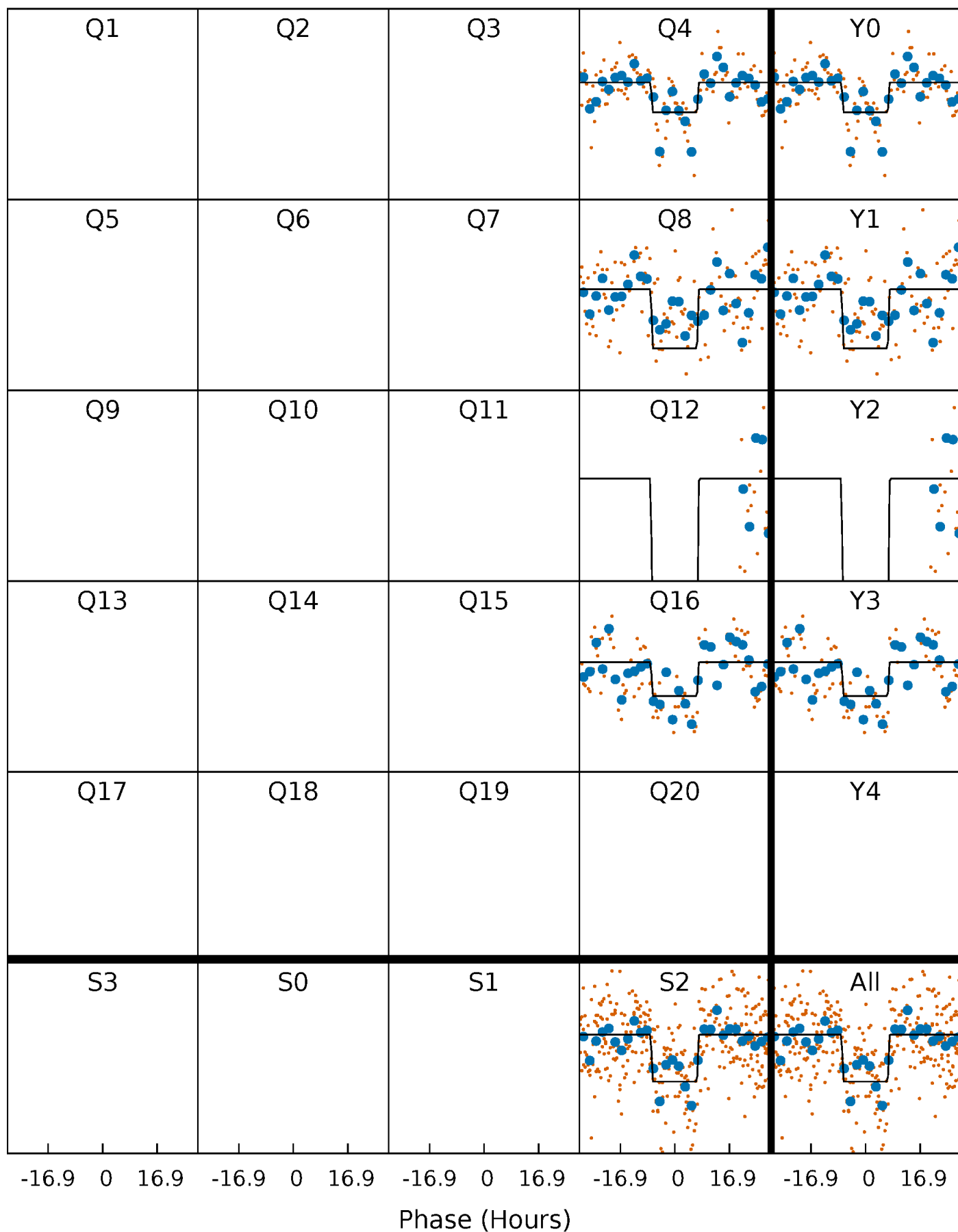
# DV Quarter-Phased Transit Curves

TCE 005440852-02 P=380.140181 Days  $T_0=357.759978$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

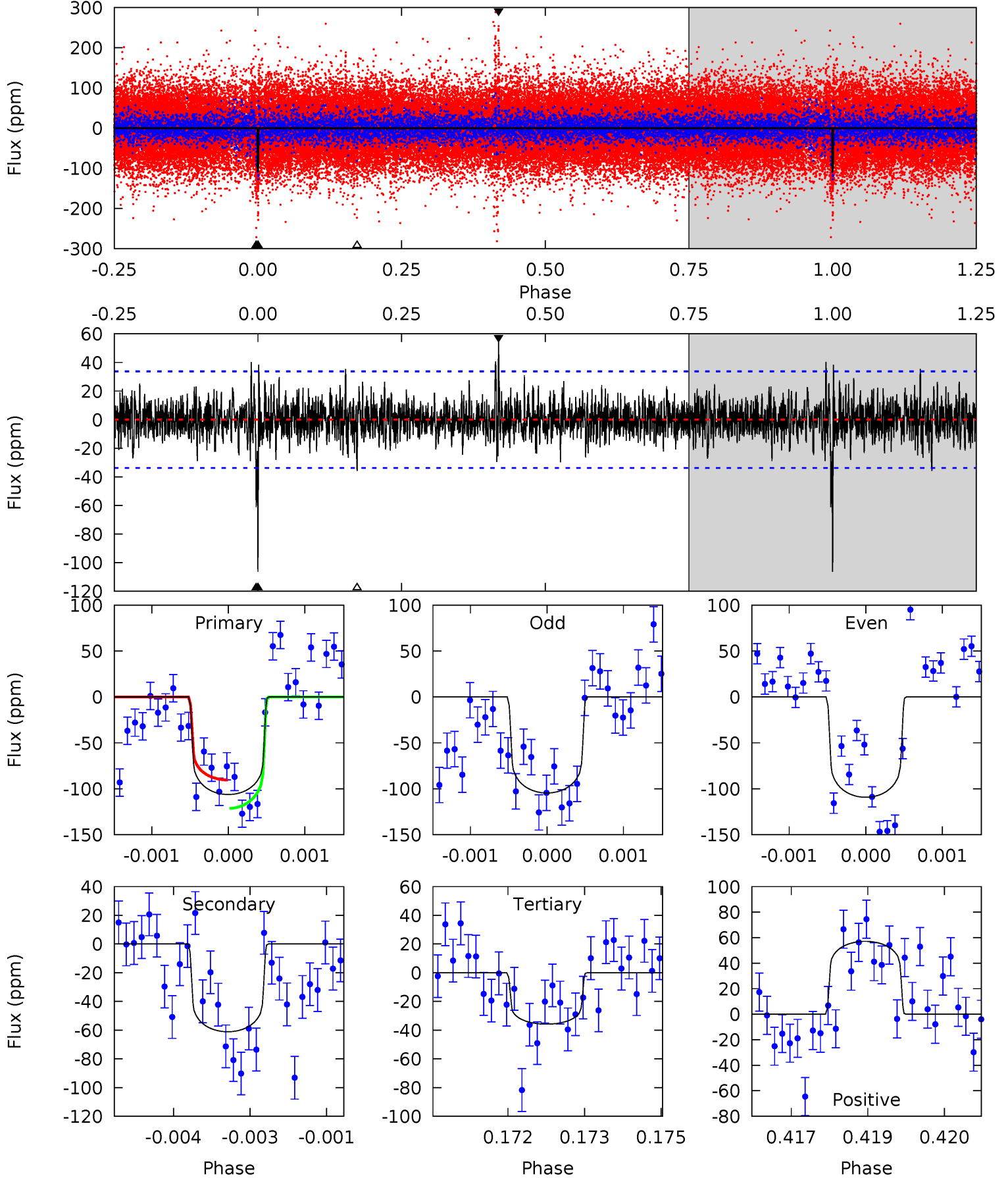
TCE 005440852-02     $P=380.125517$  Days     $T_0=357.746267$  (BKJD)



# DV Model-Shift Uniqueness Test

005440852-02, P = 380.140181 Days, E = 357.759978 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
17.0	9.77	5.72	9.13	5.40	3.20	1.46	11.3	7.86	4.05	0.64	0.35	0.99	0.35	2.47

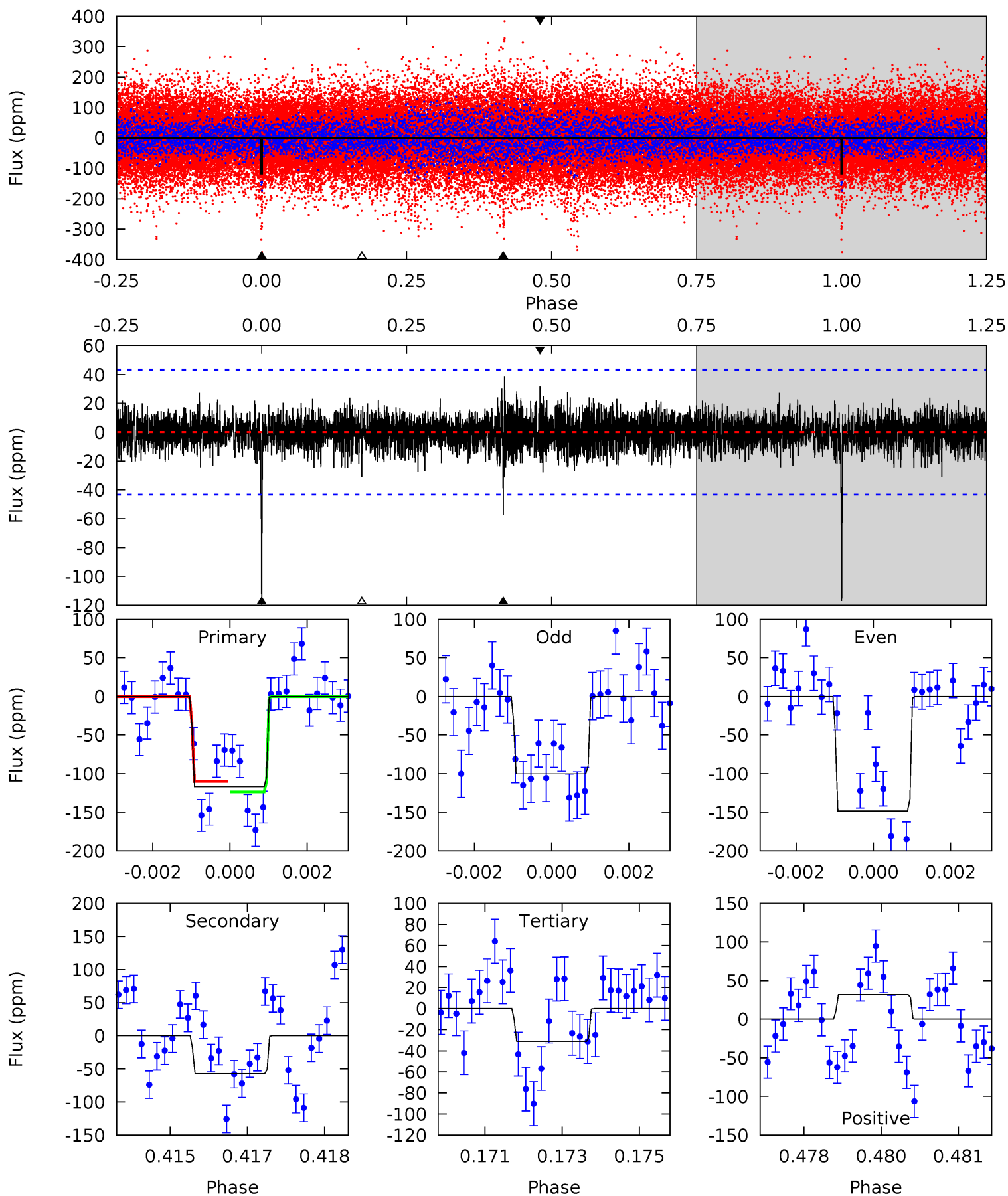




# Alt Model-Shift Uniqueness Test

005440852-02,  $P = 380.125517$  Days,  $E = 357.746267$  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
14.5	7.10	3.85	3.90	5.37	3.15	1.08	10.6	10.6	3.25	3.20	2.84	0.81	0.25	0.86



### Stellar Parameters For KIC 005440852

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$8361^{+75}_{-83}$	$4.219^{+0.063}_{-0.117}$	$-0.320^{+0.050}_{-0.200}$	$1.630^{+0.299}_{-0.149}$	$1.603^{+0.129}_{-0.108}$	$0.521^{+0.137}_{-0.182}$
	+1%/-1%	+1%/-3%	+16%/-62%	+18%/-9%	+8%/-7%	+26%/-35%
Source	SPE68	SPE68	SPE68	DSEP		

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

### Secondary Eclipse Parameters for KIC 005440852-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-61 \pm 6$	$1.98^{+0.35}_{-0.35}$	$601^{+27}_{-16}$	$6816^{+764}_{-515}$	$12251^{+6074}_{-3446}$
Alt.	$-57 \pm 8$	$1.96^{+0.38}_{-0.34}$	$603^{+26}_{-17}$	$6730^{+781}_{-542}$	$11685^{+5630}_{-3546}$

$T_{\text{max}}$  = 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

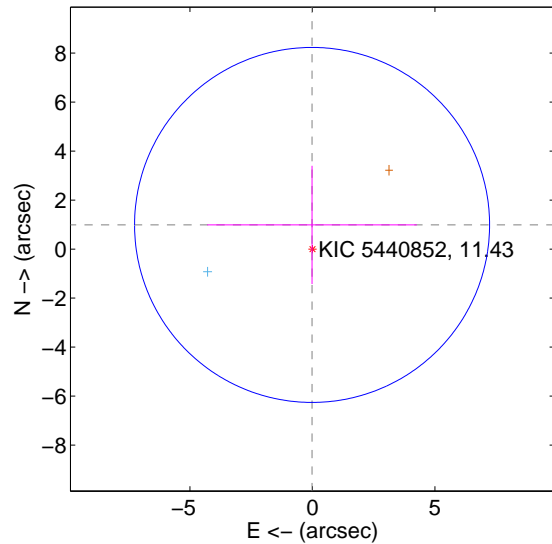
Supplemental centroid analysis for 005440852-02. **Kepler magnitude: 11.43.** Transit SNR 8.21

**There are 1 quarters with good PRF difference image offsets**

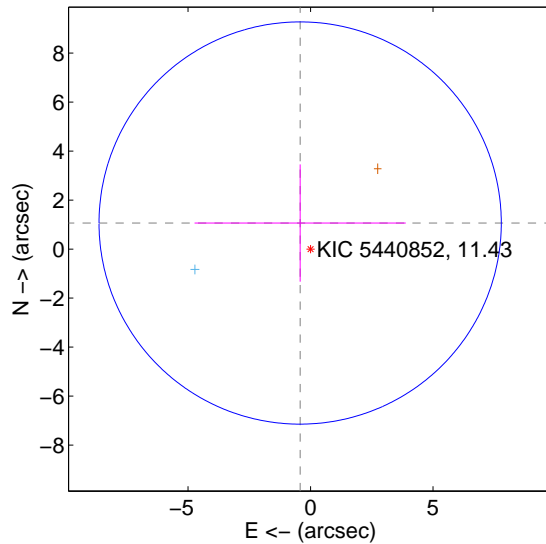
The direct PRF centroid is offset from the target star catalog position by about 0.45 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.987 \pm 2.415$	0.41	$0.015 \pm 4.277$	$0.986 \pm 2.414$
PRF-fit source offset from KIC position	$1.145 \pm 2.736$	0.42	$0.423 \pm 4.308$	$1.064 \pm 2.394$
photometric centroid source offset	$2.71 \pm 1.25$	2.17	$-1.76 \pm 1.31$	$2.06 \pm 1.20$

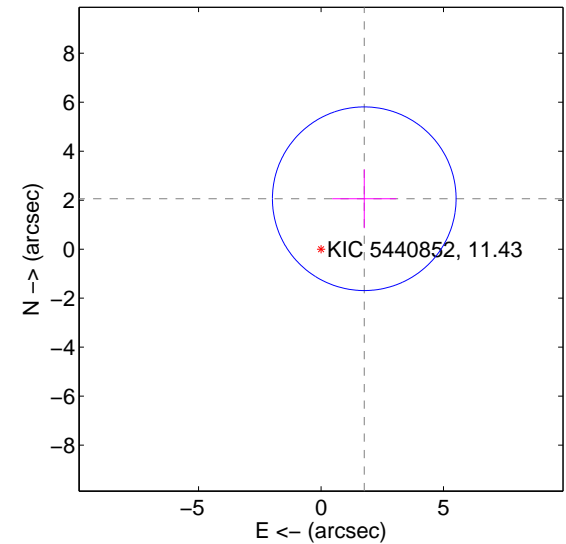
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

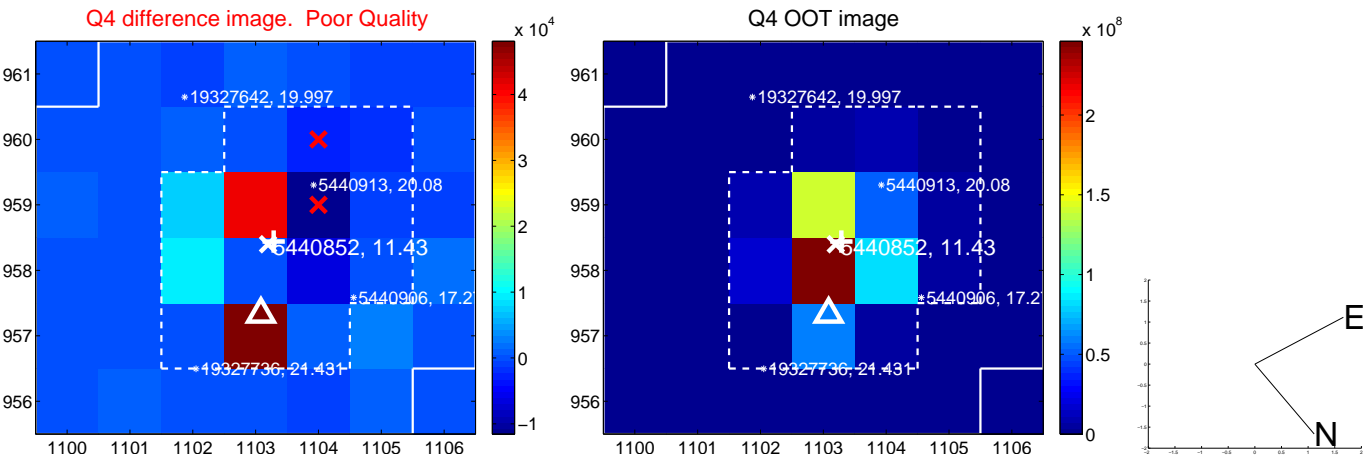


offset from photometric centroids

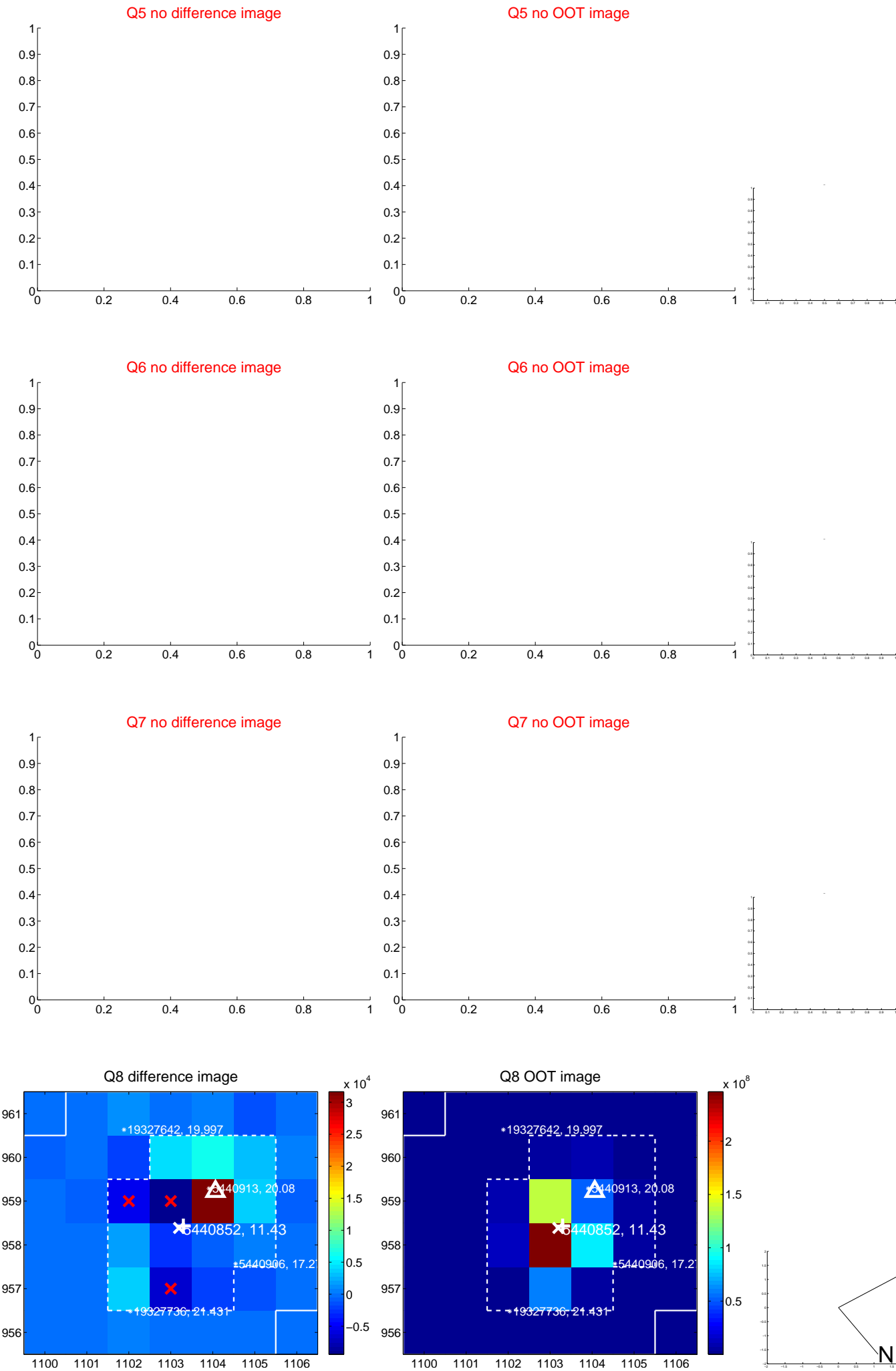


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



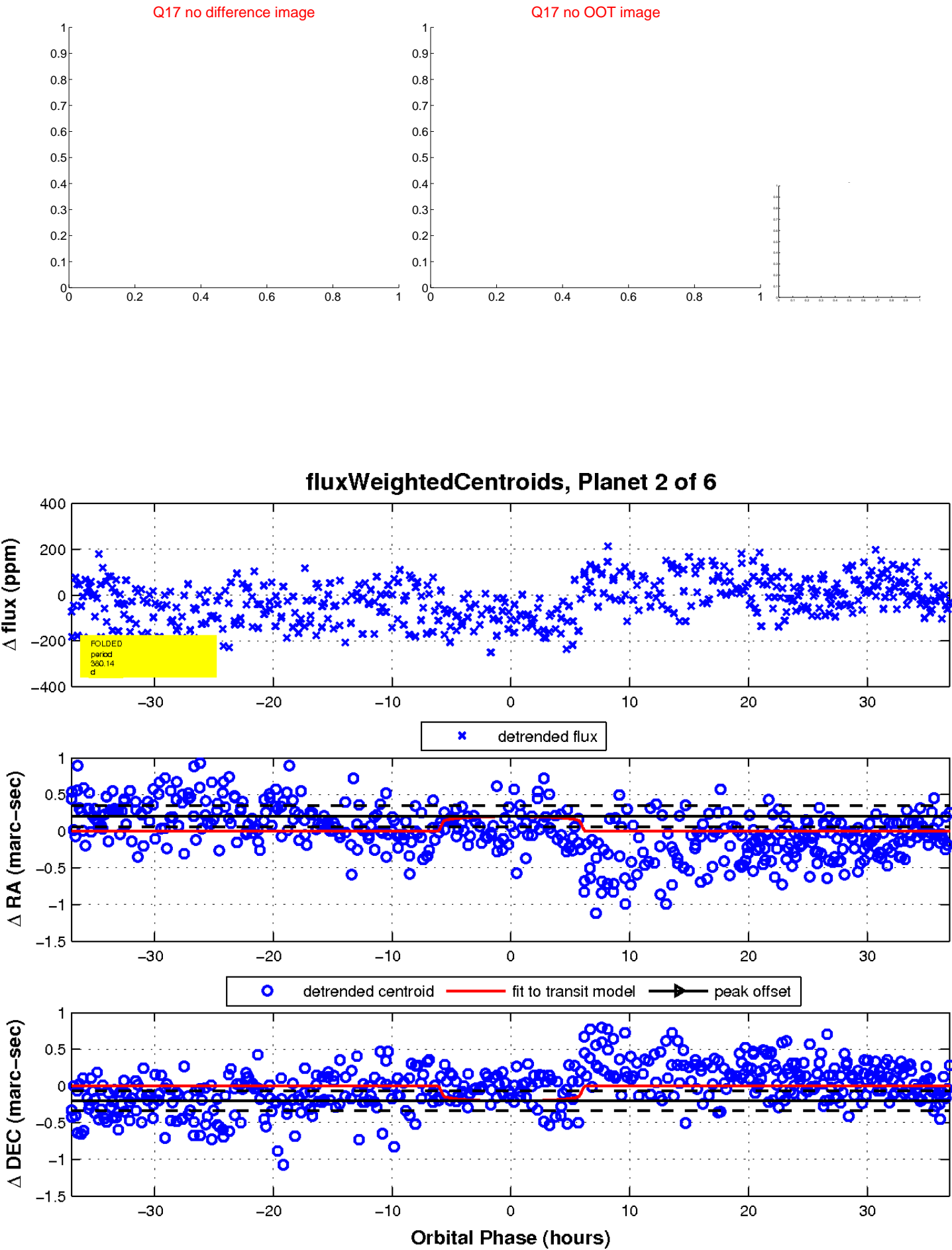
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



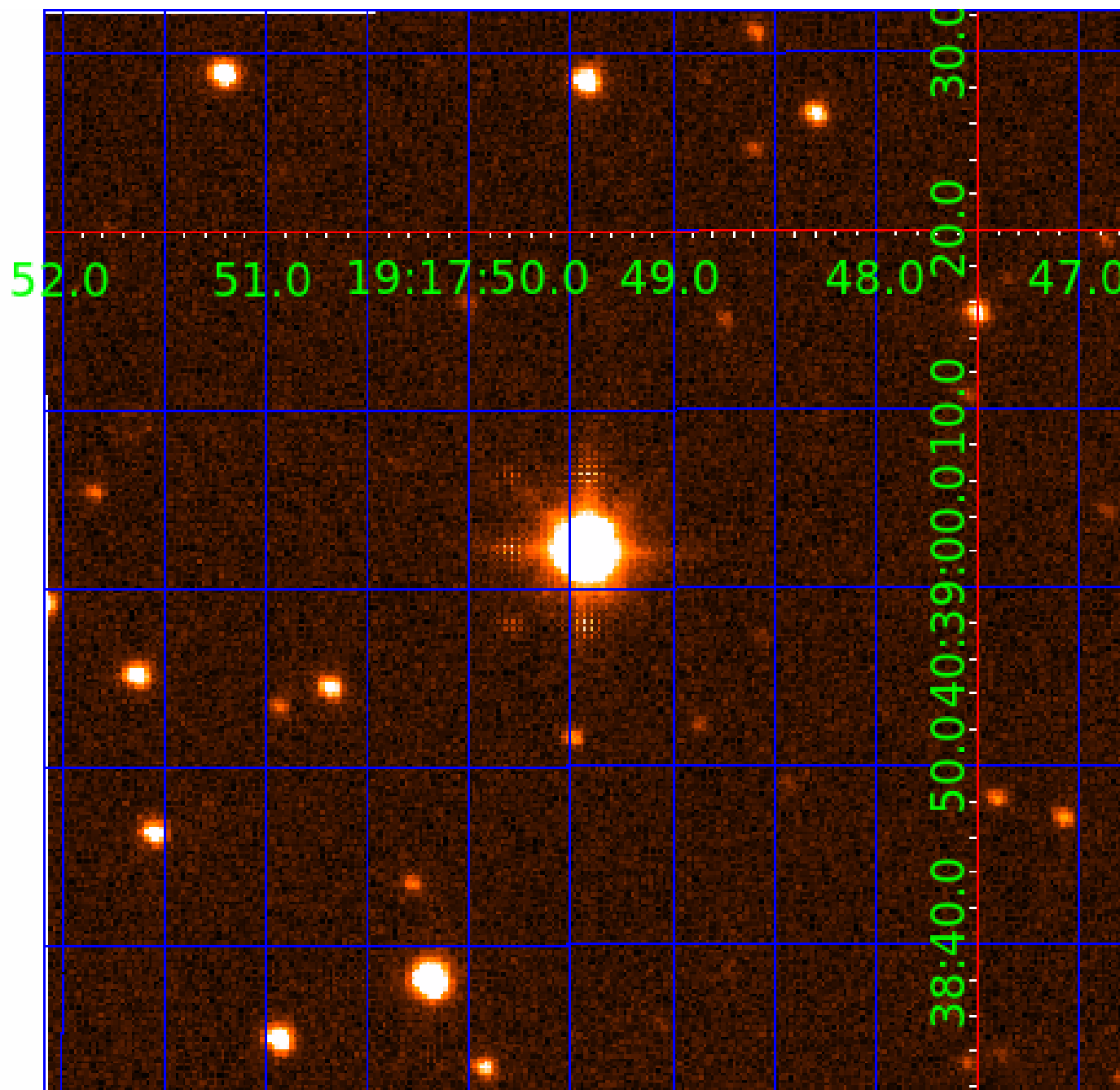
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image

Declination



# KIC 005440852

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005440852-01	OBS	No	579.702060	361.666686	87.1	14.093	8.1	7.6	1.63	8361	1.69	4.58
005440852-02	OBS	No	380.140181	357.759978	111.3	12.349	8.3	8.2	1.63	8361	1.94	8.04
005440852-03	OBS	No	3.908345	133.515333	5.0	18.806	8.1	7.2	1.63	8361	0.37	3598.01
005440852-04	OBS	No	142.273970	227.289186	50.8	17.056	10.3	7.1	1.63	8361	1.29	29.82
005440852-05	OBS	No	566.704510	295.096016	74.9	6.960	8.3	8.7	1.63	8361	1.61	4.72
005440852-06	OBS	No	47.371713	133.285303	52.2	4.892	7.1	7.4	1.63	8361	1.27	129.23

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005440852-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—ALL_TRANS_CHASES—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
005440852-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE—LPP_DV—ALL_TRANS_CHASES—CENT_SATURATED
005440852-03	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_SATURATED
005440852-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_SATURATED
005440852-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—ALL_TRANS_CHASES—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
005440852-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_ALT—CENT_SATURATED

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

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

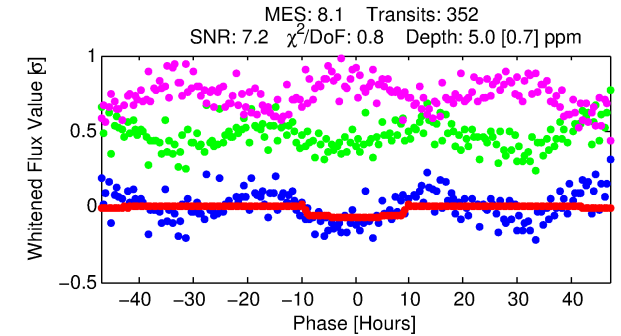
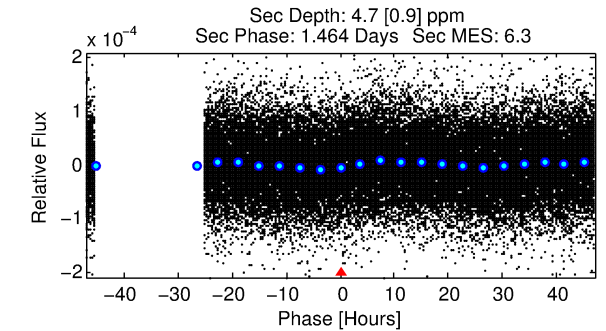
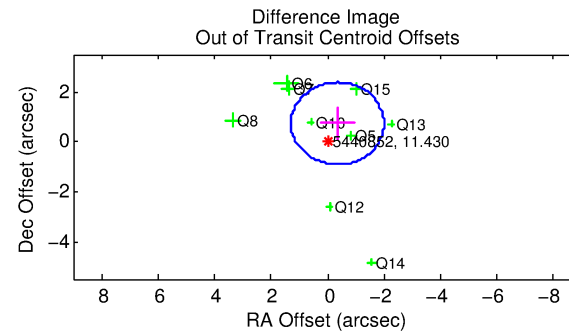
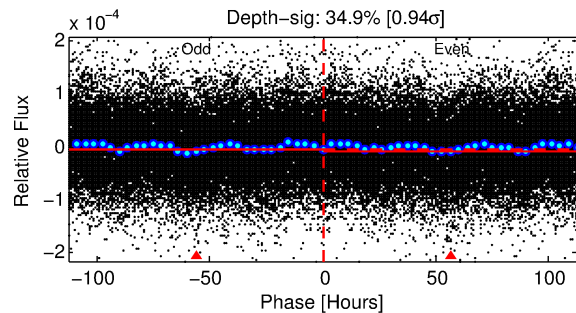
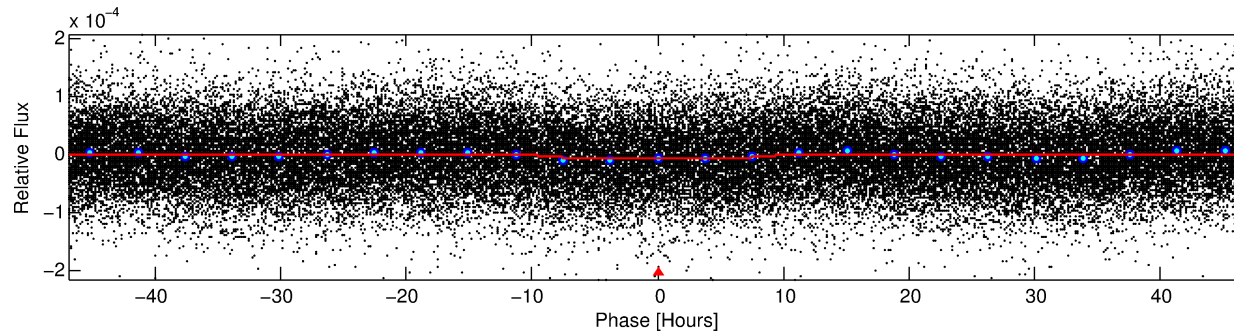
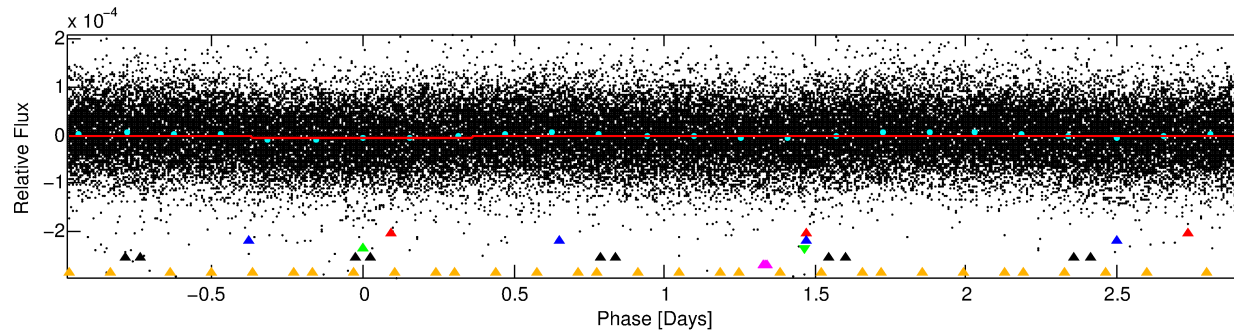
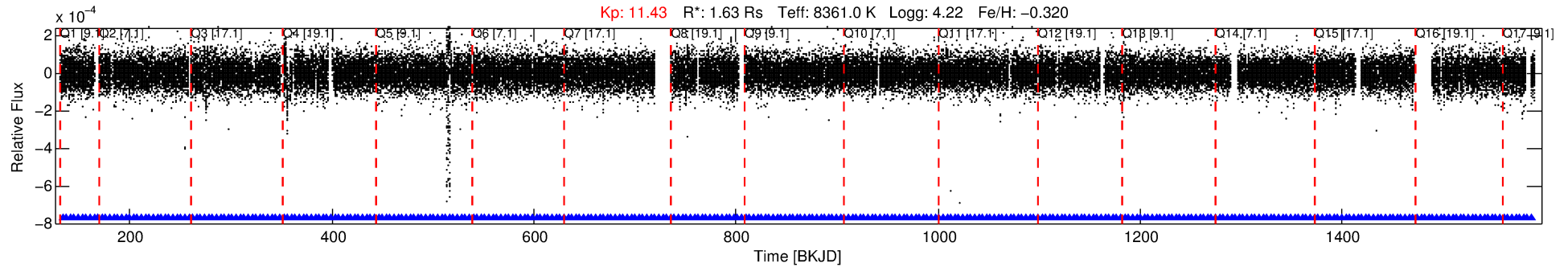
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 005440852-03

No Significant Match Found

# DV One-Page Summary

KIC: 5440852 Candidate: 3 of 6 Period: 3.908 d



## DV Fit Results:

Period = 3.90835 [0.00011] d  
Epoch = 133.5153 [0.0181] BKJD  
Rp/R\* = 0.0021 [0.0032]  
a/R\* = 1.70 [10.37]  
b = 0.01 [1368.06]  
Seff = 3598.01 [794.73]  
Teq = 1975 [109] K  
Rp = 0.37 [0.57] Re  
a = 0.0569 [0.0086] AU  
Ag = 61.58 [191.99] [0.32 $\sigma$ ]  
Teffp = 8554 [6651] K [0.99 $\sigma$ ]

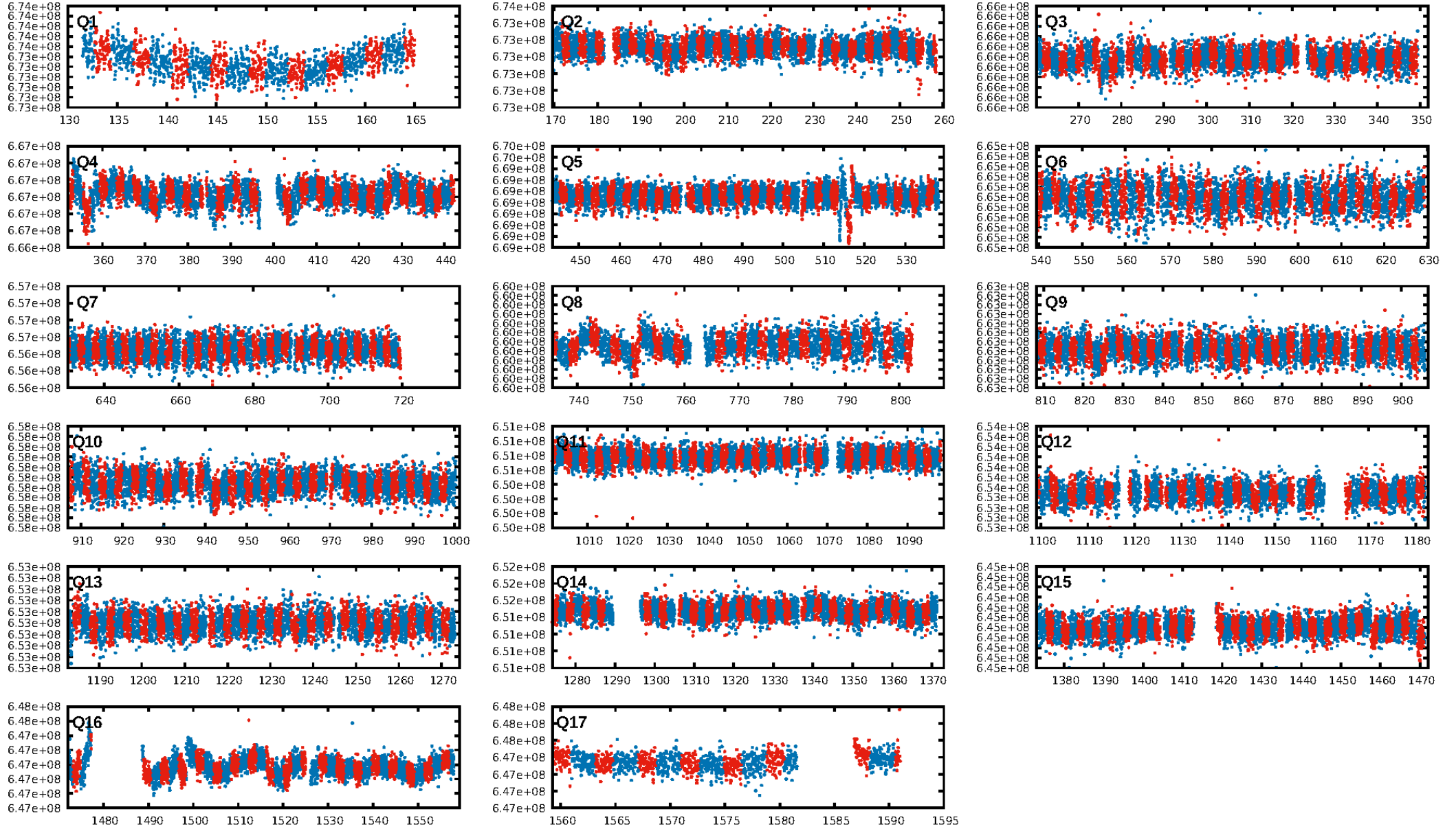
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [53.68 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 1.18e-14  
RollingBand-fgt: 1.00 [335/335]  
GhostDiagnostic-chr: N/A  
Centroid-sig: N/A  
Centroid-so: N/A  
OotOffset-rm: 0.806 arcsec [1.47 $\sigma$ ]  
KicOffset-rm: 0.875 arcsec [1.24 $\sigma$ ]  
OotOffset-st: 3/2/2/2 [9]  
KicOffset-st: 3/2/2/2 [9]  
DiffImageQuality-fgm: 0.78 [7/9]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 10:44:19 Z

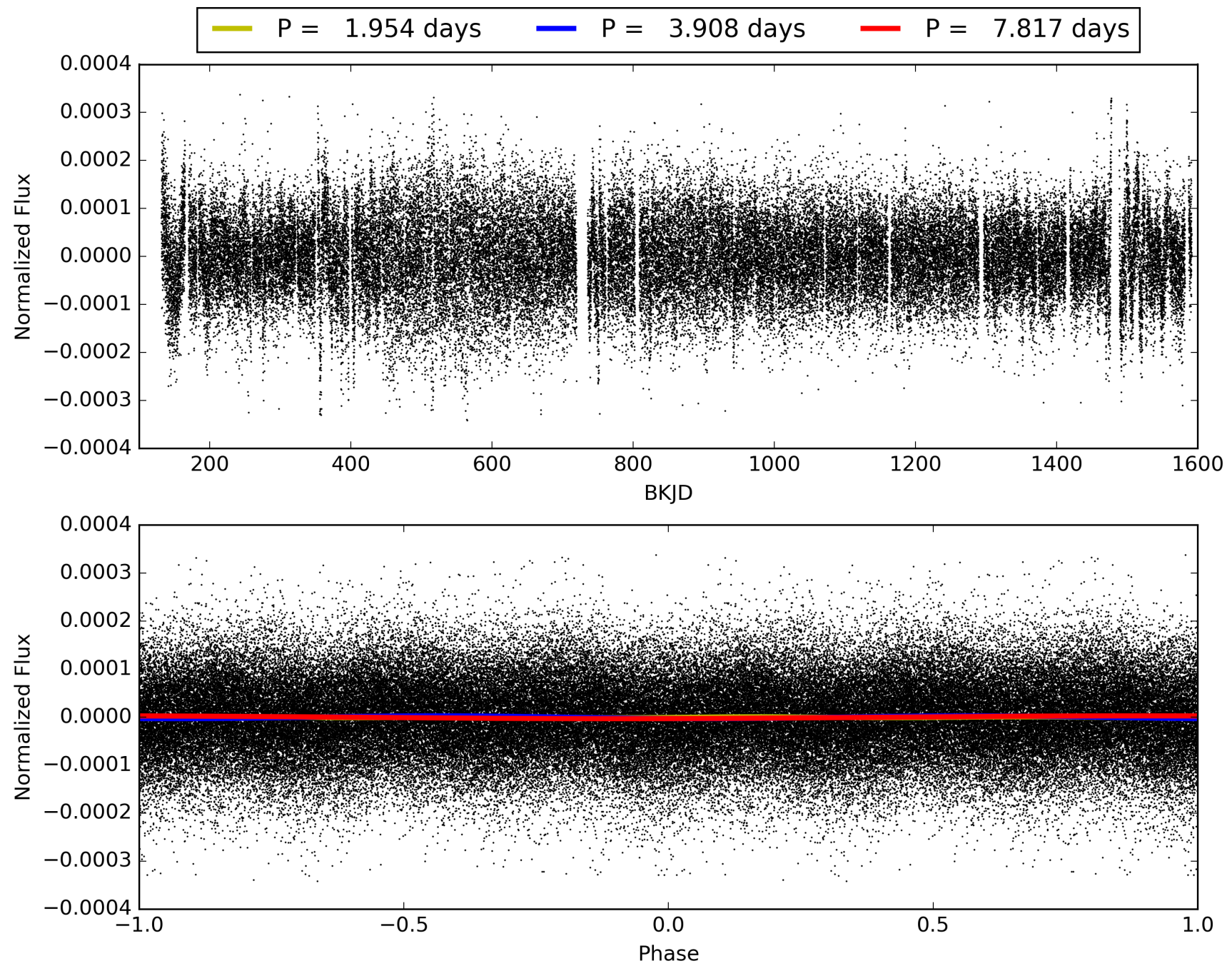
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 005440852-03, PDC Light Curves



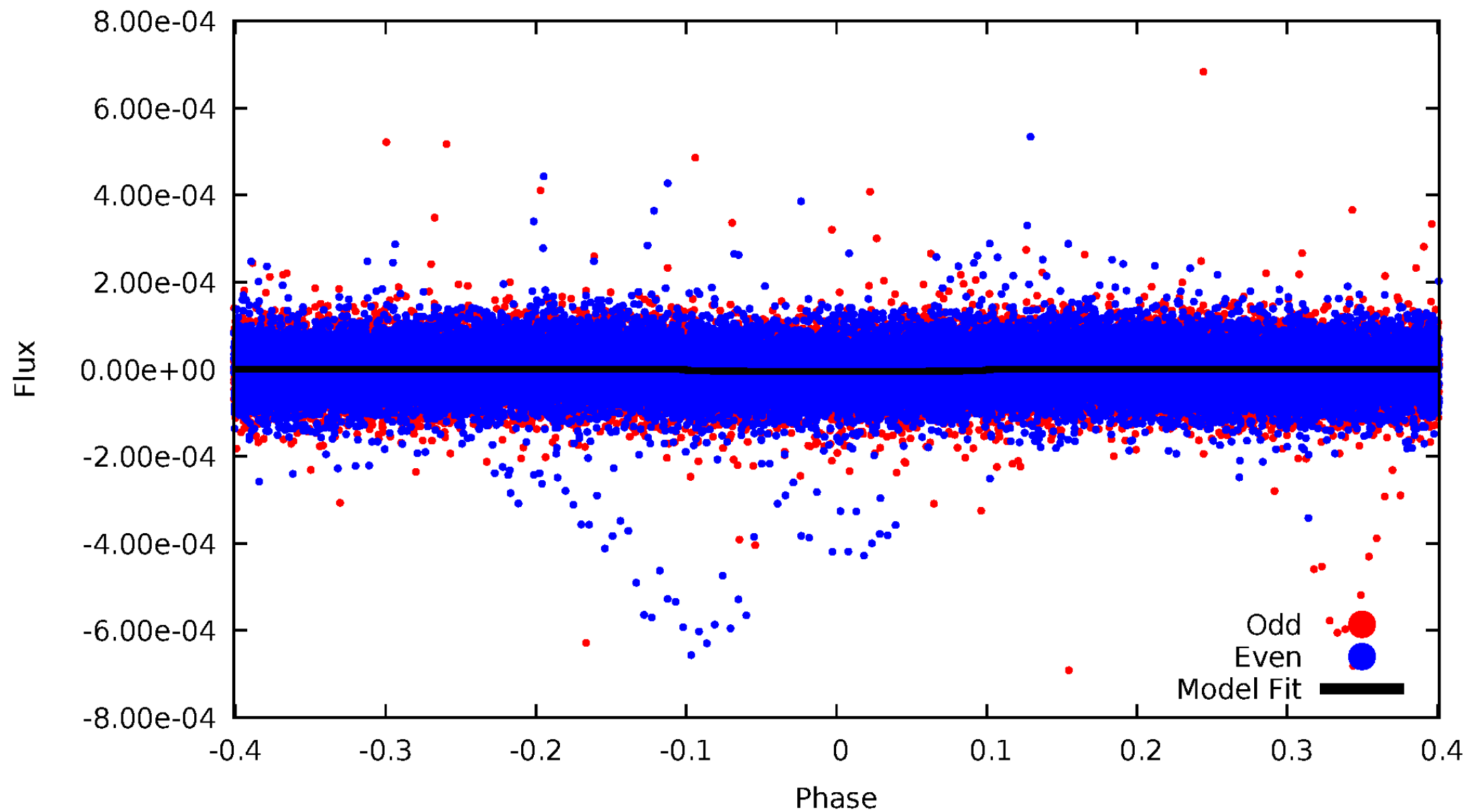


TCE 005440852-03



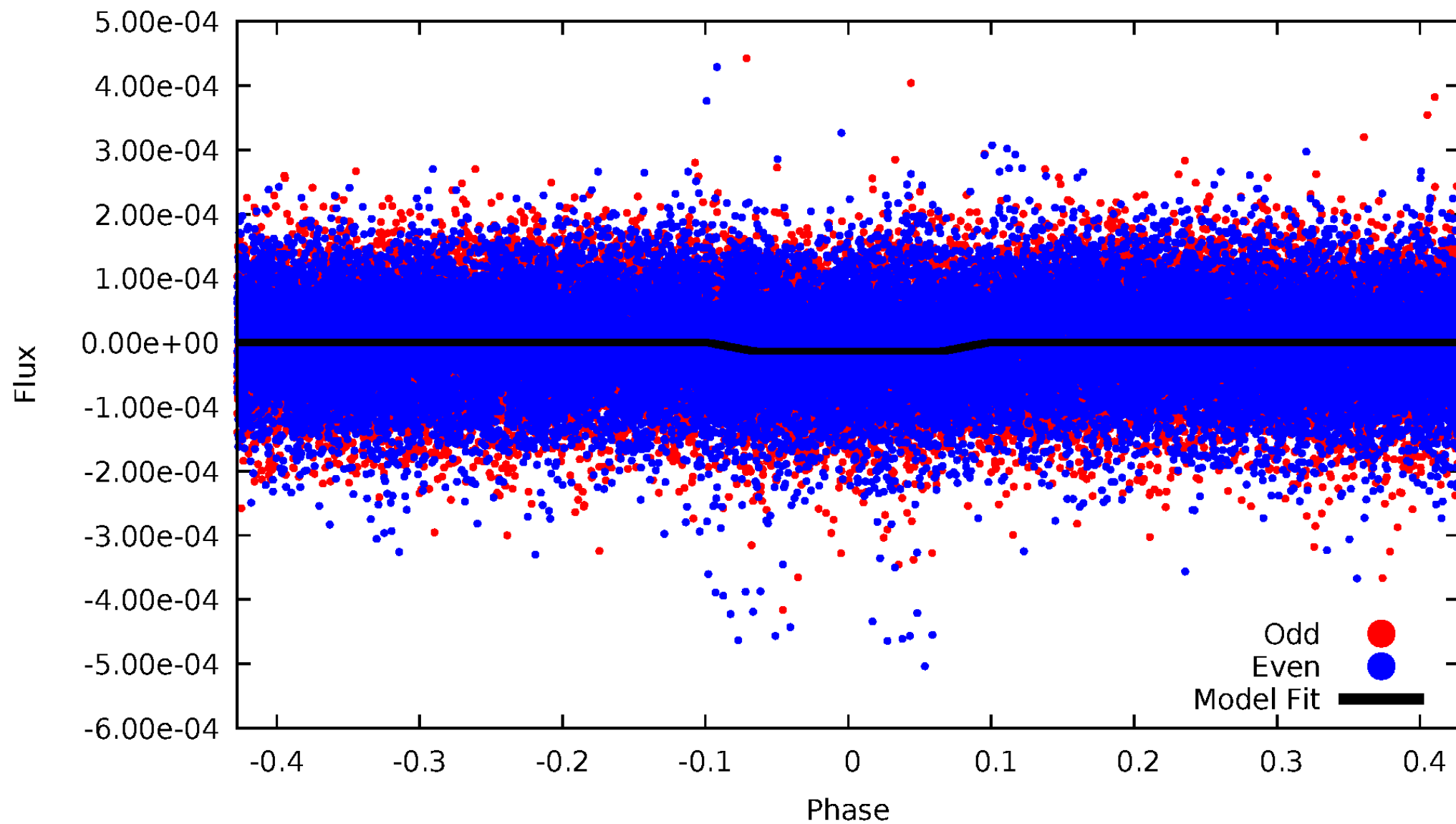
# DV Odd/Even

TCE 005440852-03



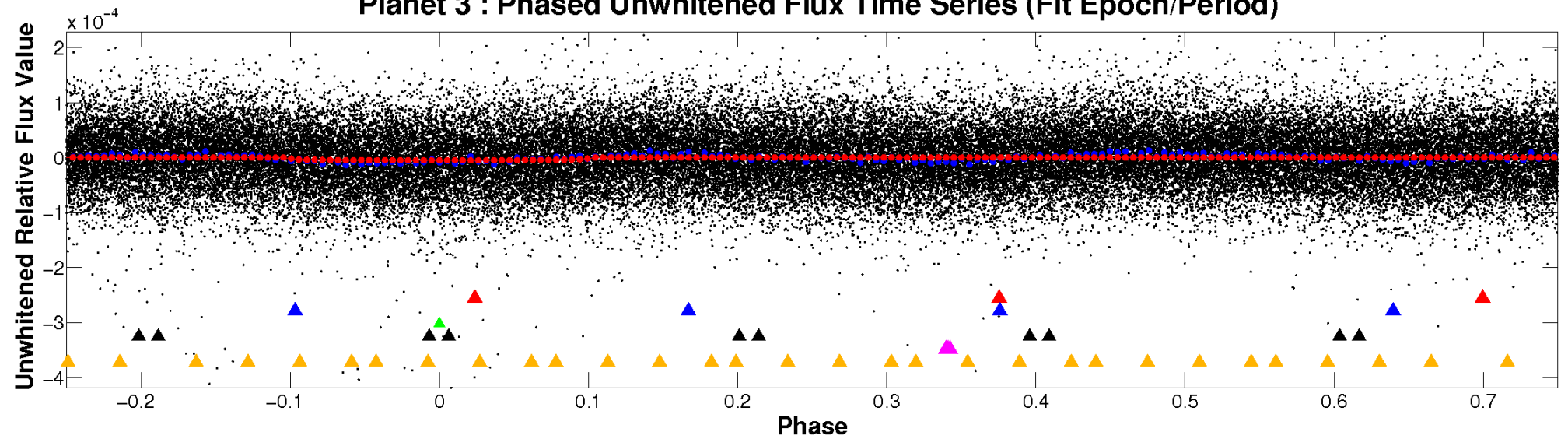
# ALT Odd/Even

TCE 005440852-03

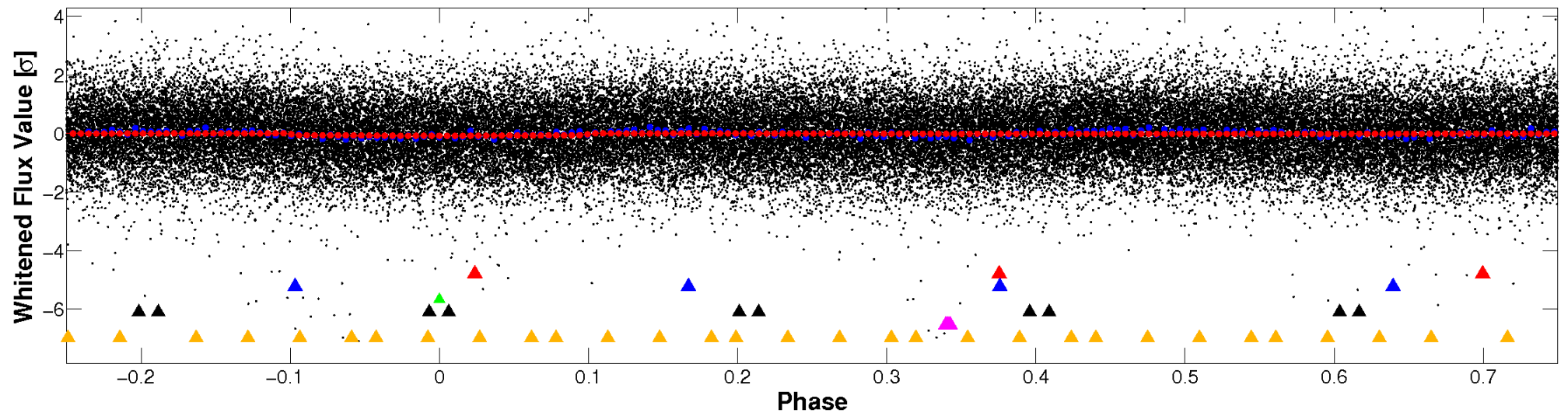


# Non-Whitened Vs. Whitened Light Curve

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



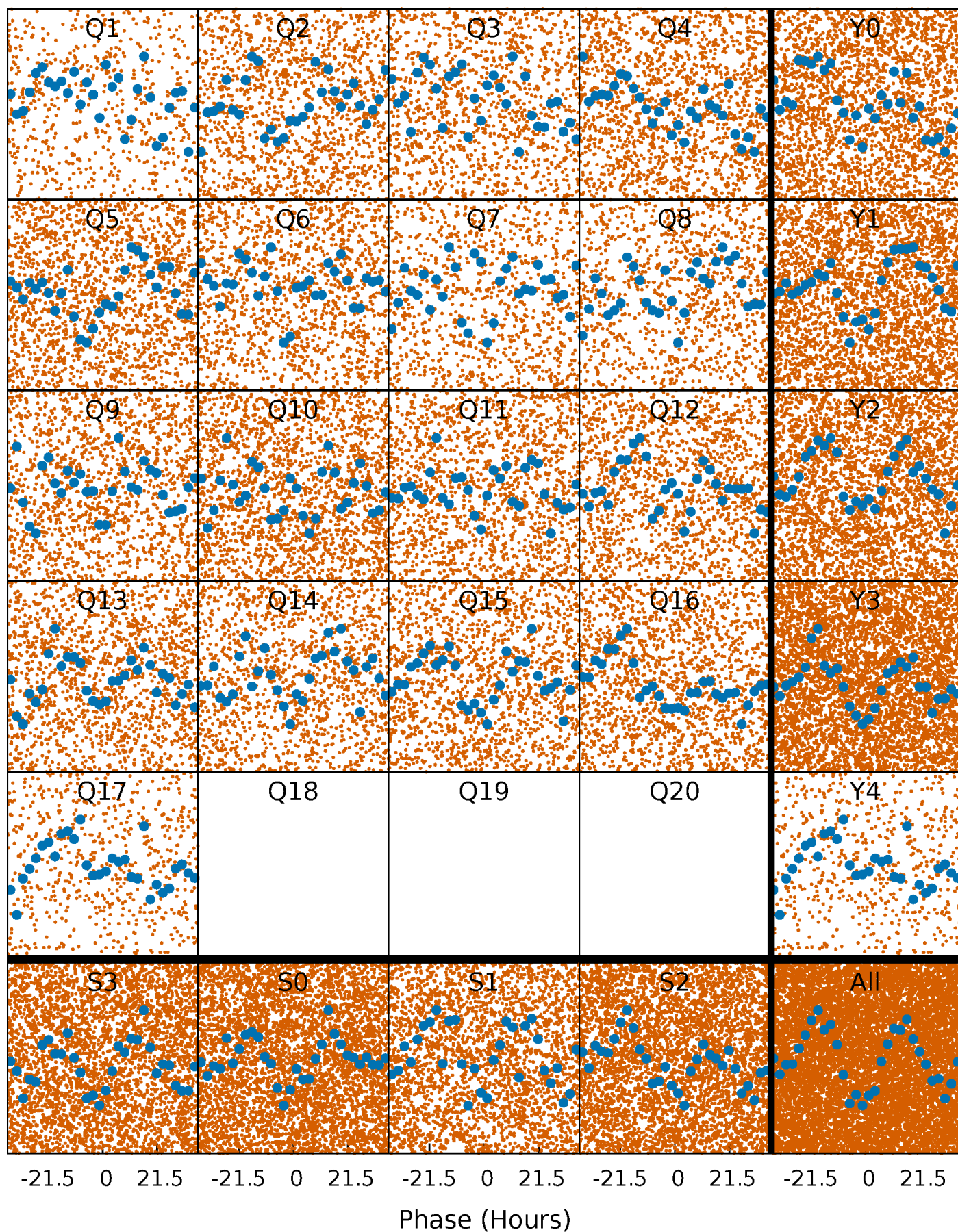
**Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)**





# PDC Quarter-Phased Transit Curves

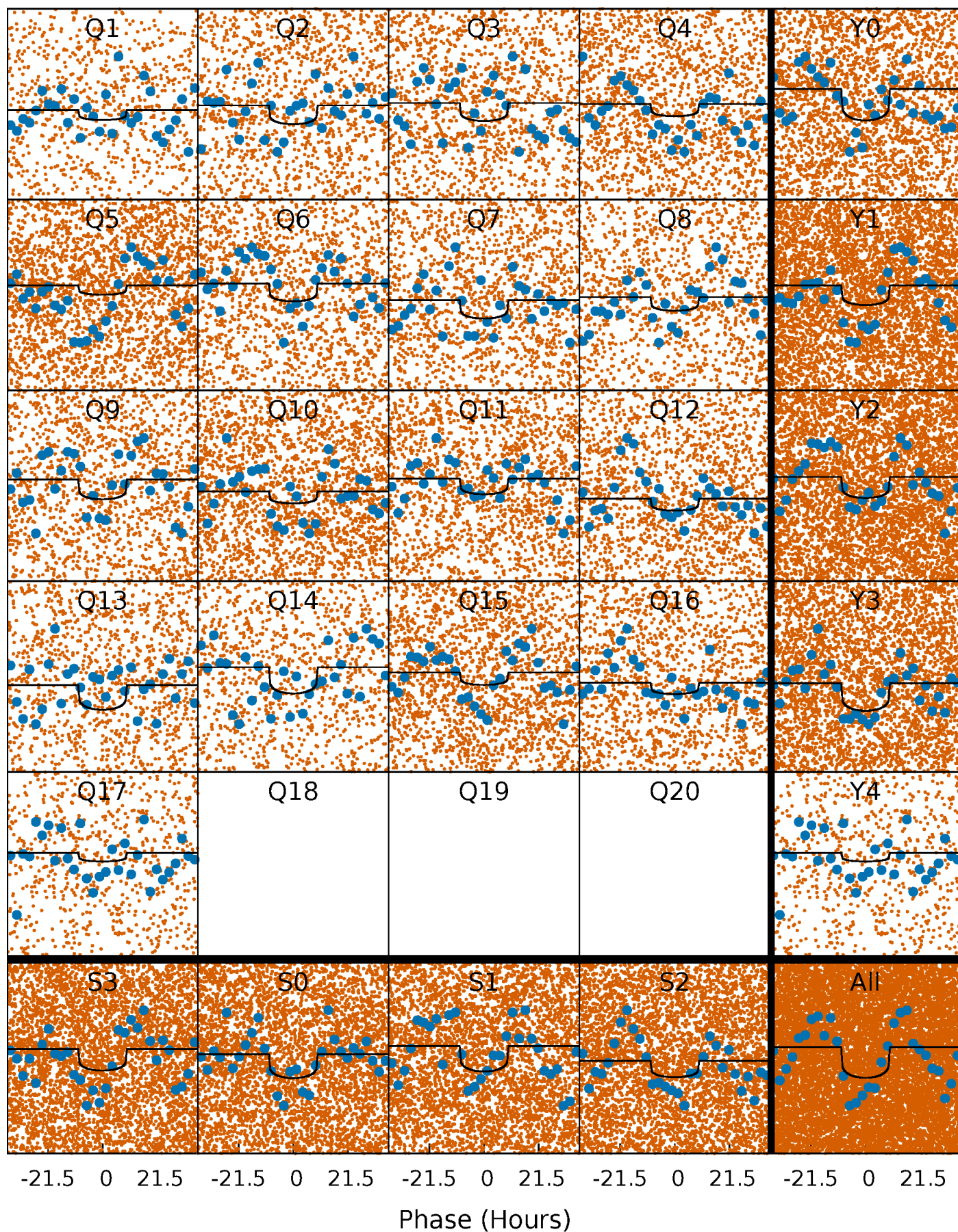
TCE 005440852-03 P= 3.908345 Days  $T_0=133.515333$  (BKJD)





# DV Quarter-Phased Transit Curves

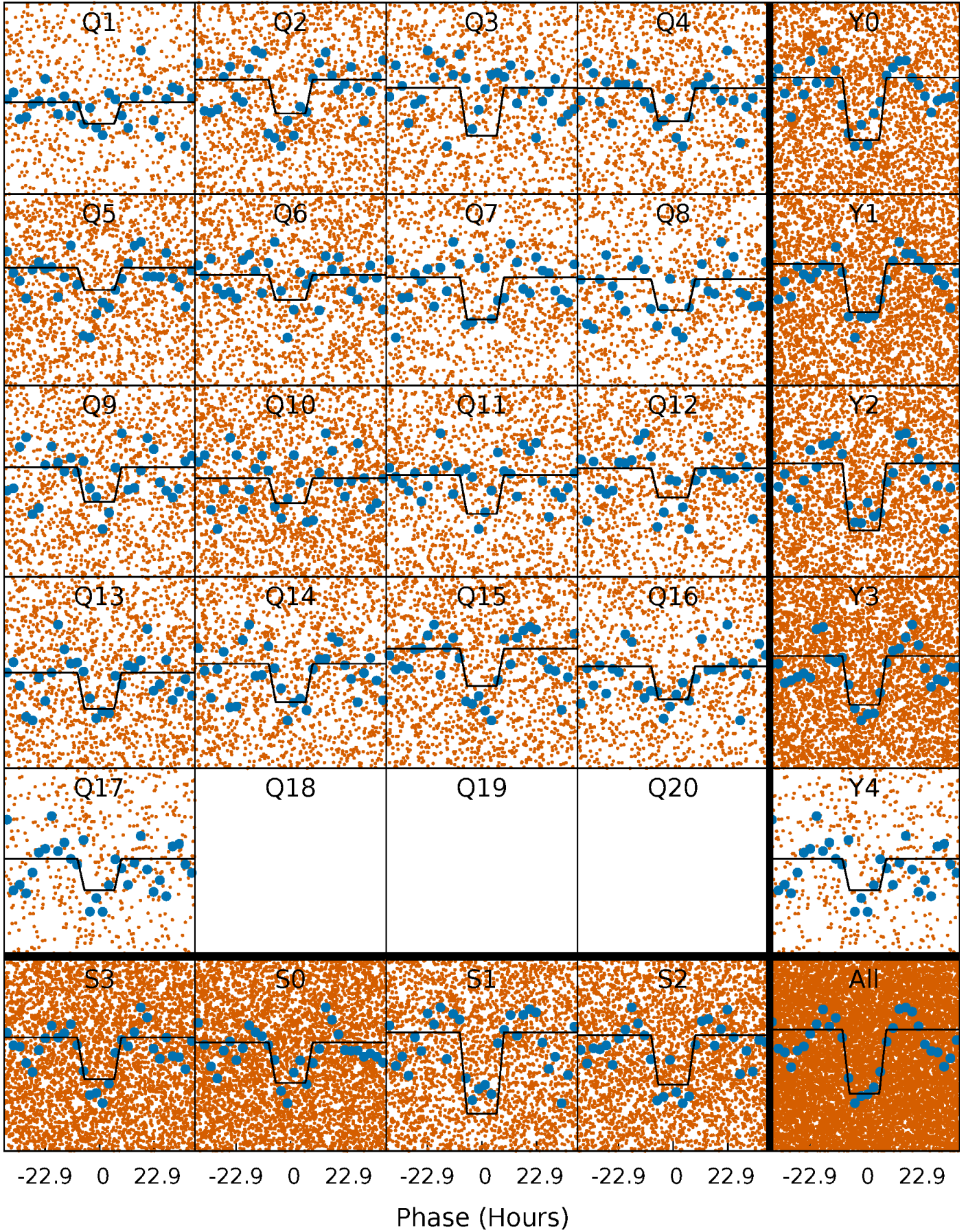
TCE 005440852-03 P= 3.908345 Days  $T_0=133.515333$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

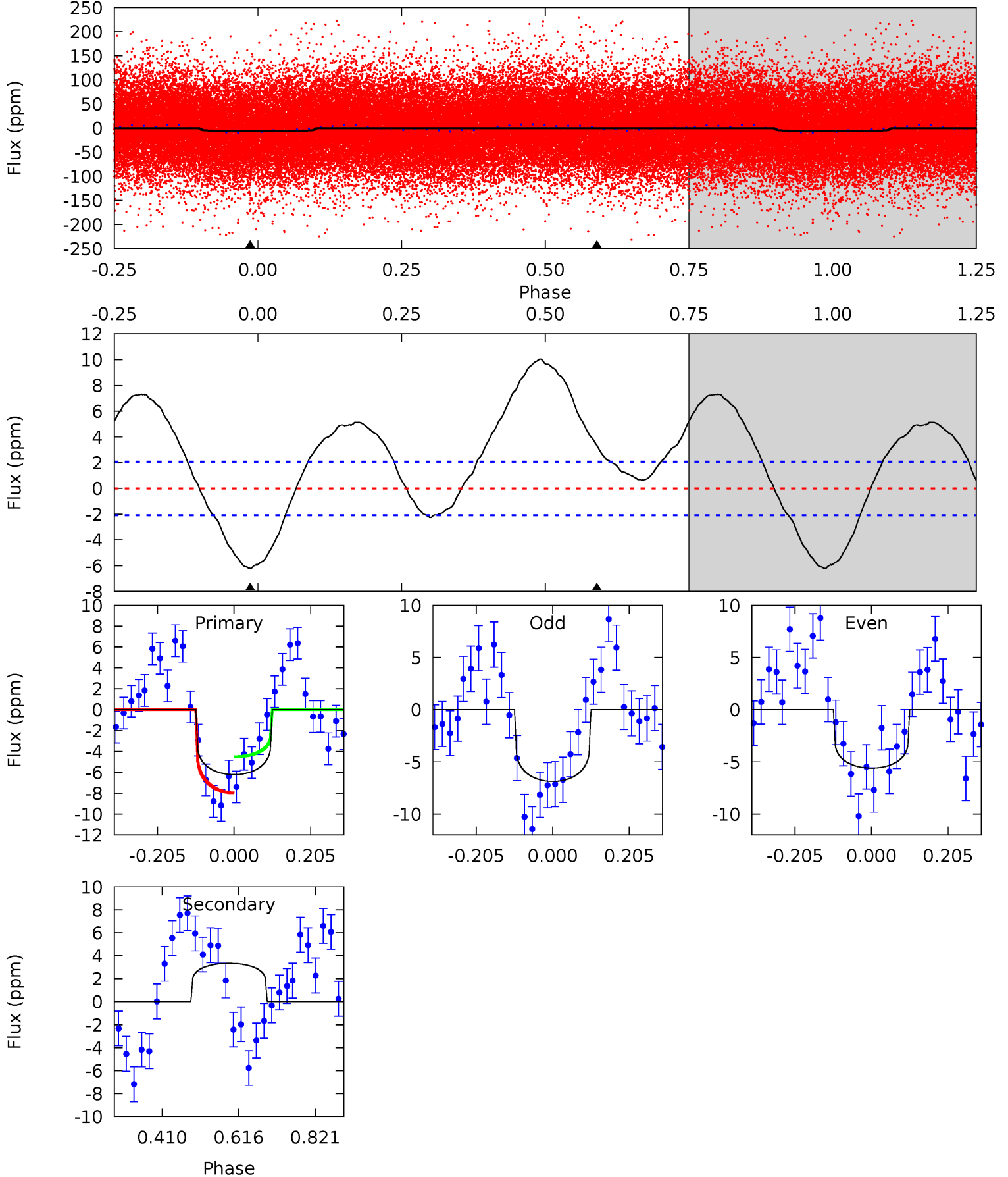
TCE 005440852-03 P= 3.908298 Days  $T_0=133.443573$  (BKJD)



# DV Model-Shift Uniqueness Test

005440852-03, P = 3.908345 Days, E = 129.606988 Days

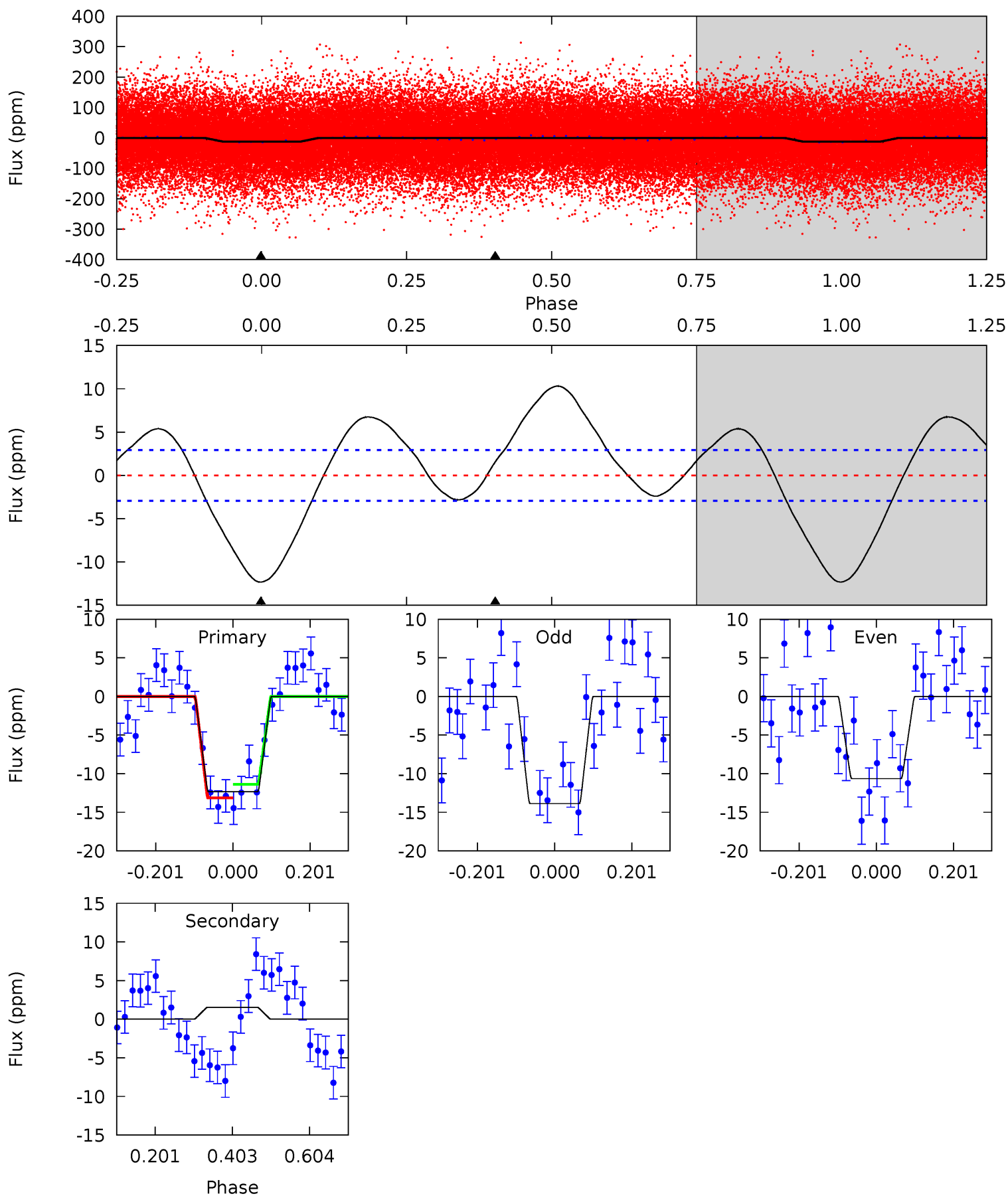
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
13.2	-7.11	0	0	4.41	1.27	4.61	13.2	13.2	-7.11	-7.11	1.36	1.31	0.62	3.67



# Alt Model-Shift Uniqueness Test

005440852-03, P = 3.908298 Days, E = 129.535275 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
18.6	-2.33	0	0	4.42	1.28	3.21	18.6	18.6	-2.33	-2.33	2.43	1.22	0.46	1.30



### Stellar Parameters For KIC 005440852

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$8361^{+75}_{-83}$	$4.219^{+0.063}_{-0.117}$	$-0.320^{+0.050}_{-0.200}$	$1.630^{+0.299}_{-0.149}$	$1.603^{+0.129}_{-0.108}$	$0.521^{+0.137}_{-0.182}$
	+1%/-1%	+1%/-3%	+16%/-62%	+18%/-9%	+8%/-7%	+26%/-35%
Source	SPE68	SPE68	SPE68	DSEP		

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

### Secondary Eclipse Parameters for KIC 005440852-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$3 \pm 0$	$0.56^{+0.49}_{-0.37}$	$2769^{+122}_{-76}$	$-6215^{+1489}_{-5998}$	$-18.999^{+13.727}_{-139.773}$
Alt.	$2 \pm 1$	$0.76^{+0.57}_{-0.46}$	$2779^{+116}_{-82}$	$-4555^{+827}_{-2299}$	$-4.488^{+3.233}_{-23.040}$

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

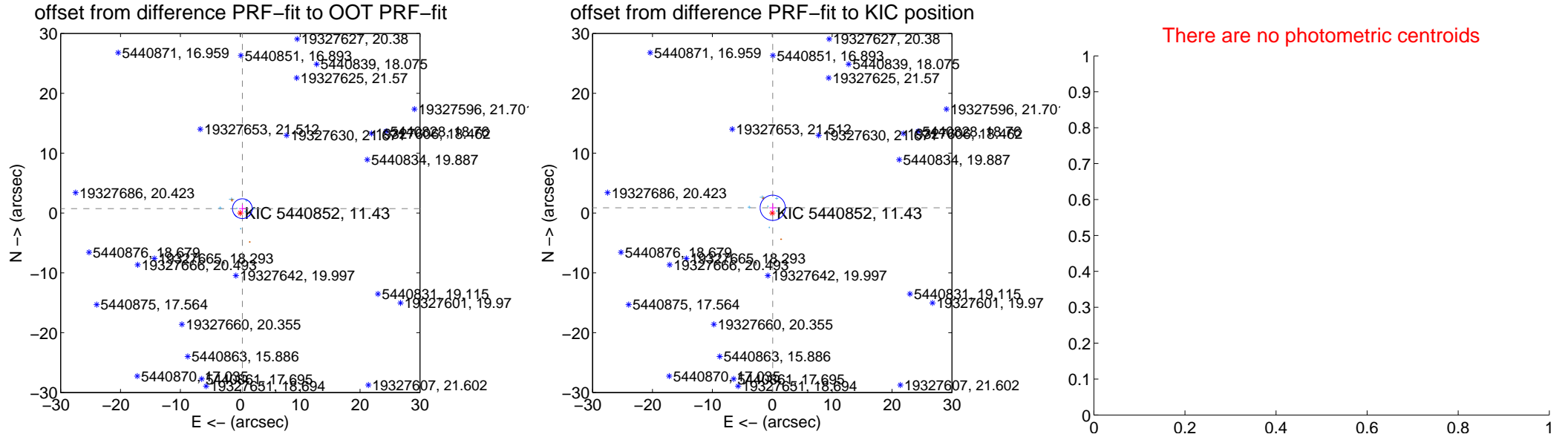
## DV Centroid Data

Supplemental centroid analysis for 005440852-03. **Kepler magnitude: 11.43.** Transit SNR 7.23

There are 7 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.47 arcsec

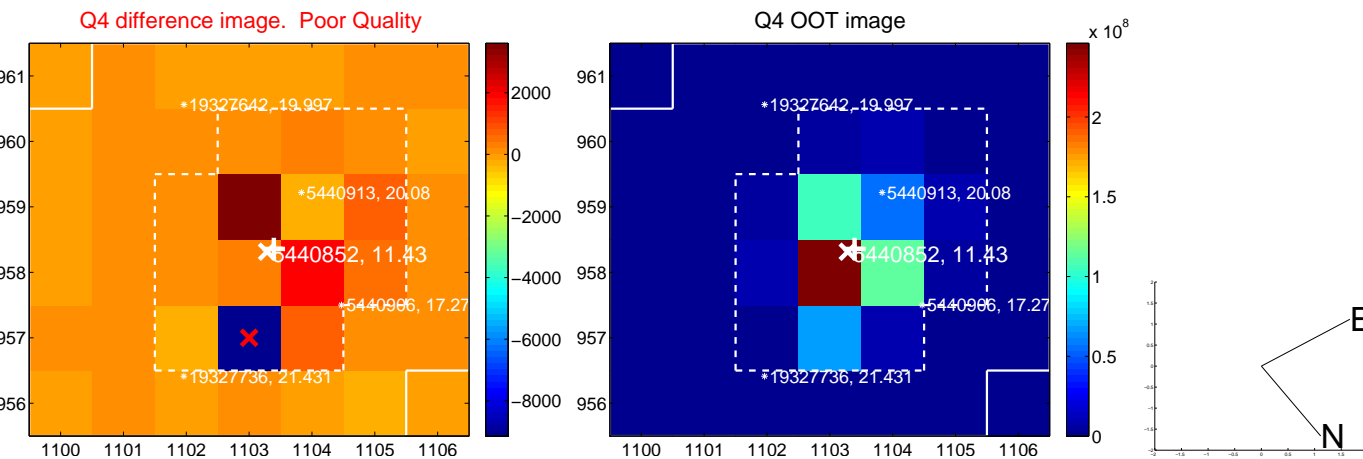
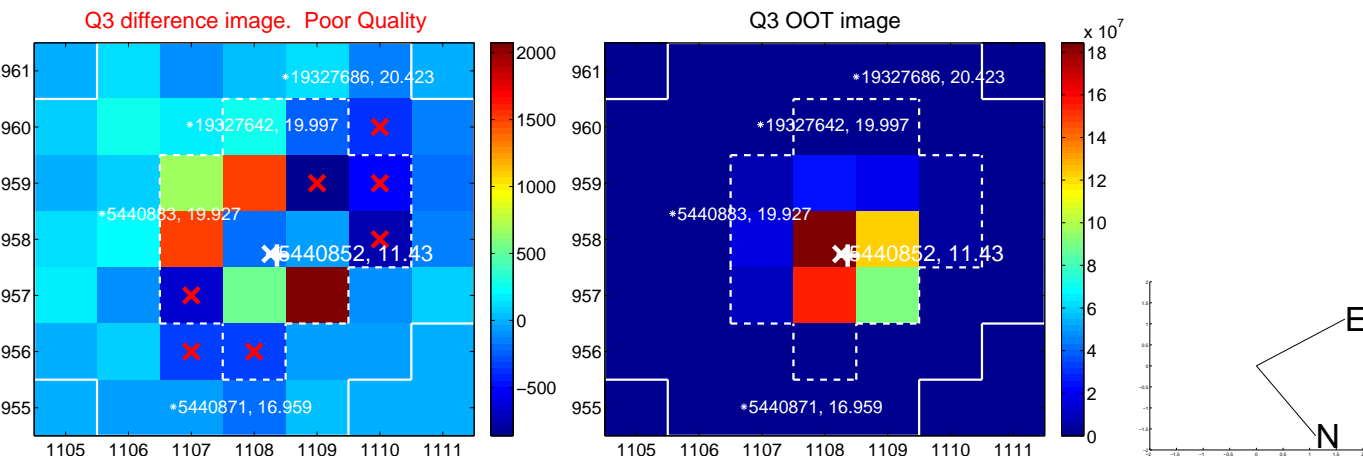
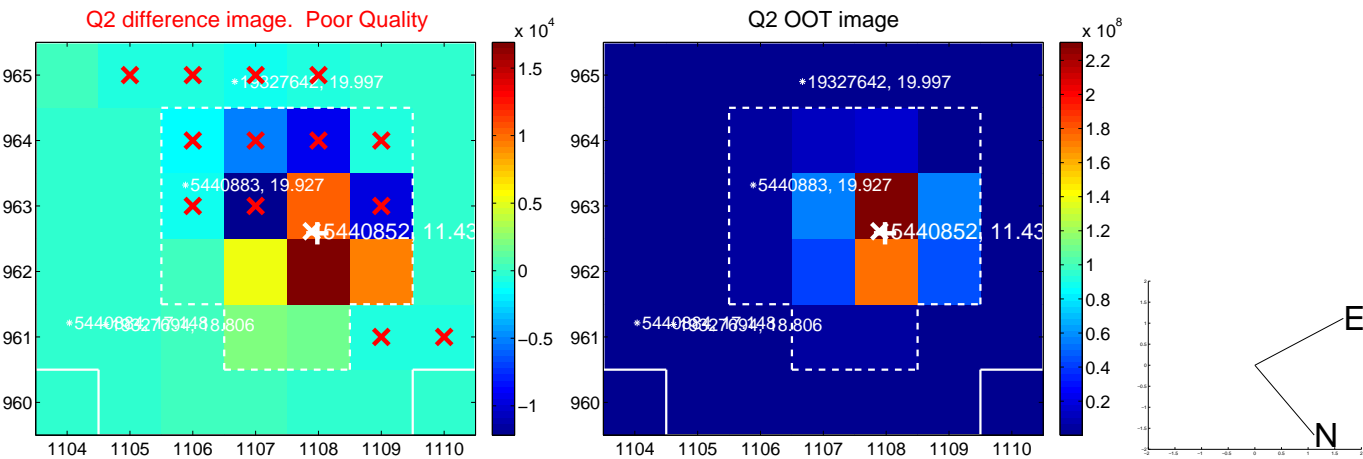
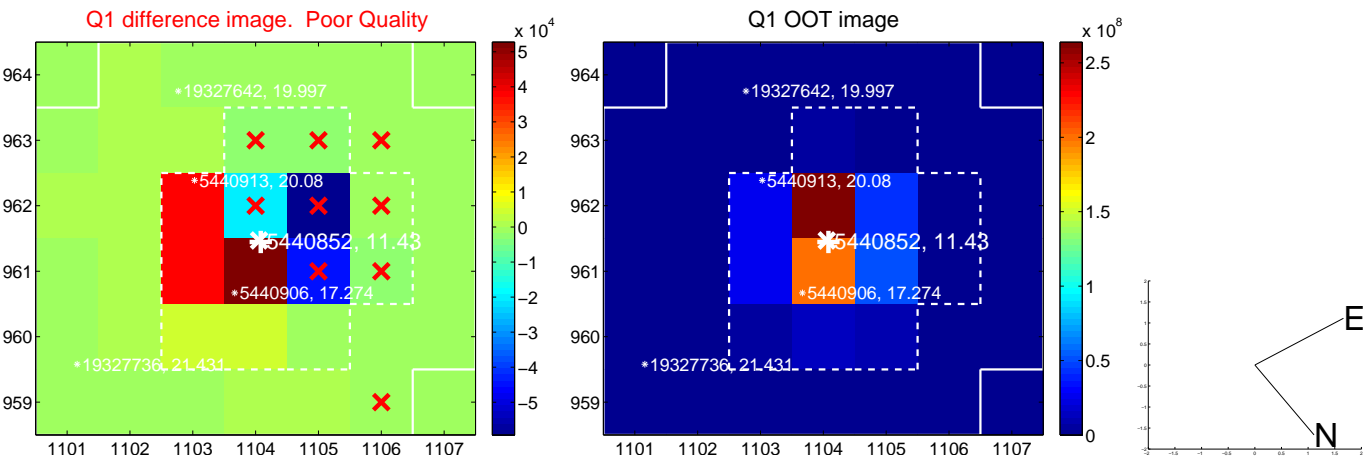
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.806 \pm 0.549$	1.47	$-0.347 \pm 0.580$	$0.728 \pm 0.655$
PRF-fit source offset from KIC position	$0.875 \pm 0.703$	1.24	$-0.080 \pm 0.566$	$0.871 \pm 0.720$
photometric centroid source offset	—	—	—	—



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

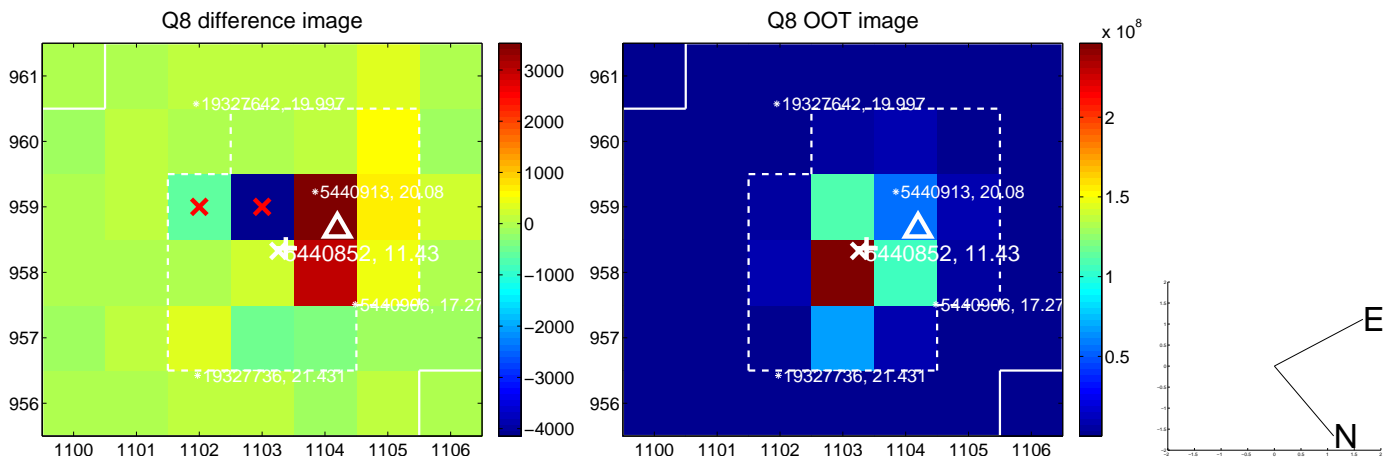
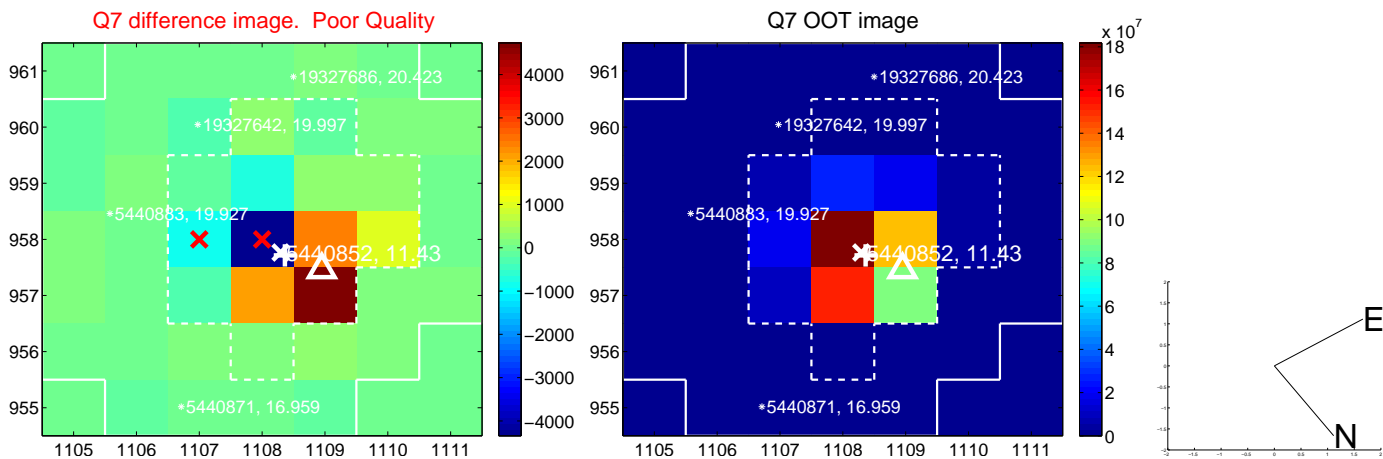
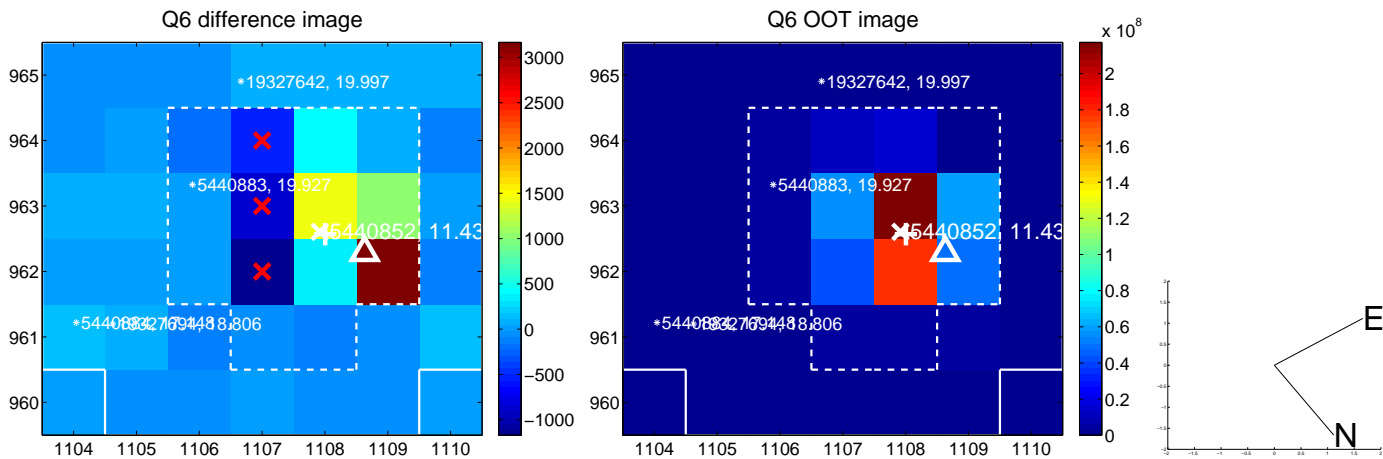
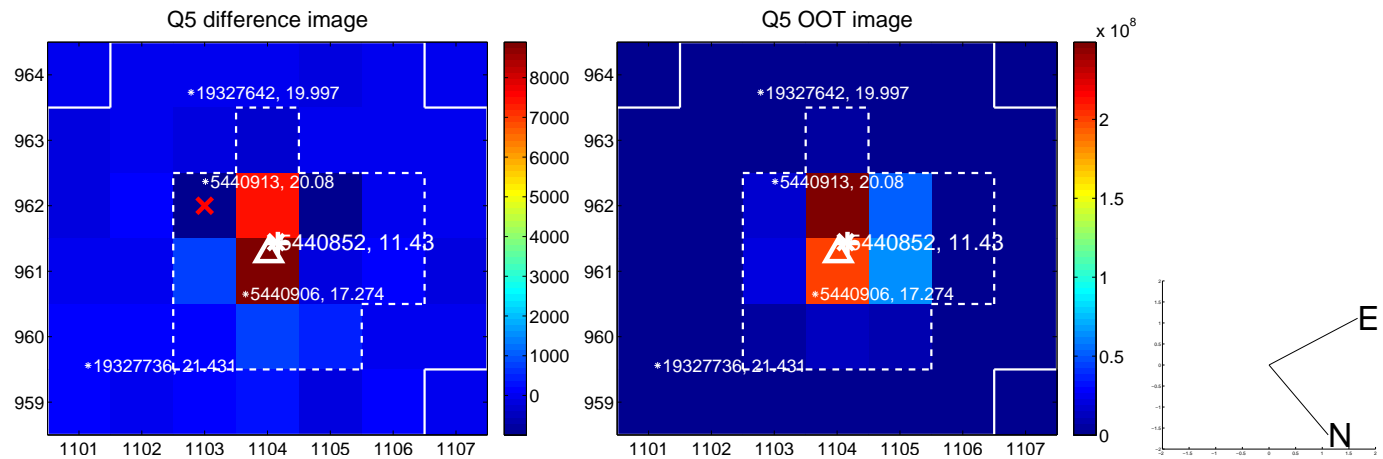


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

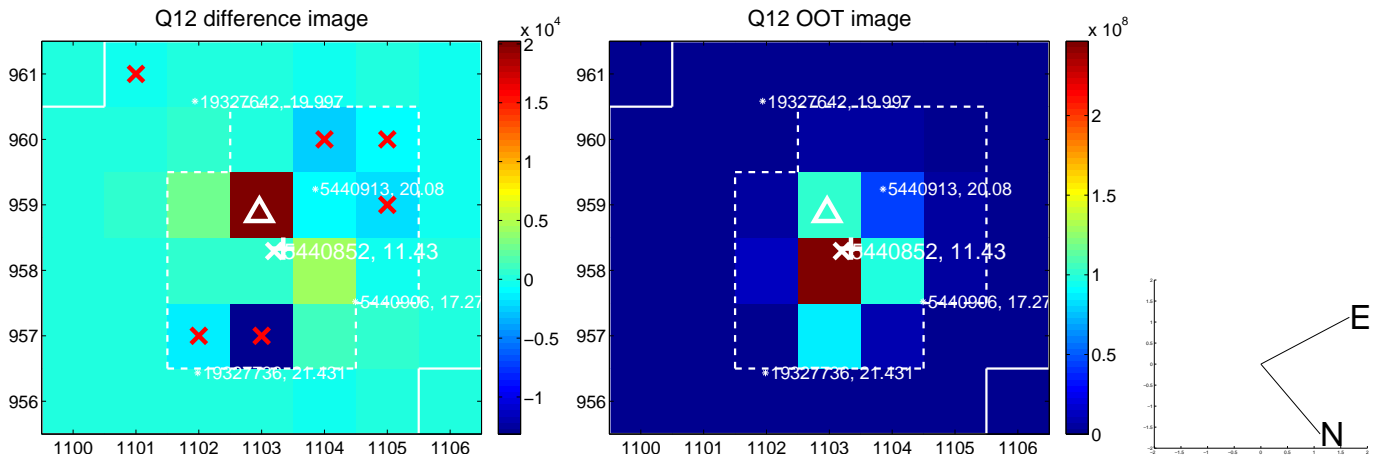
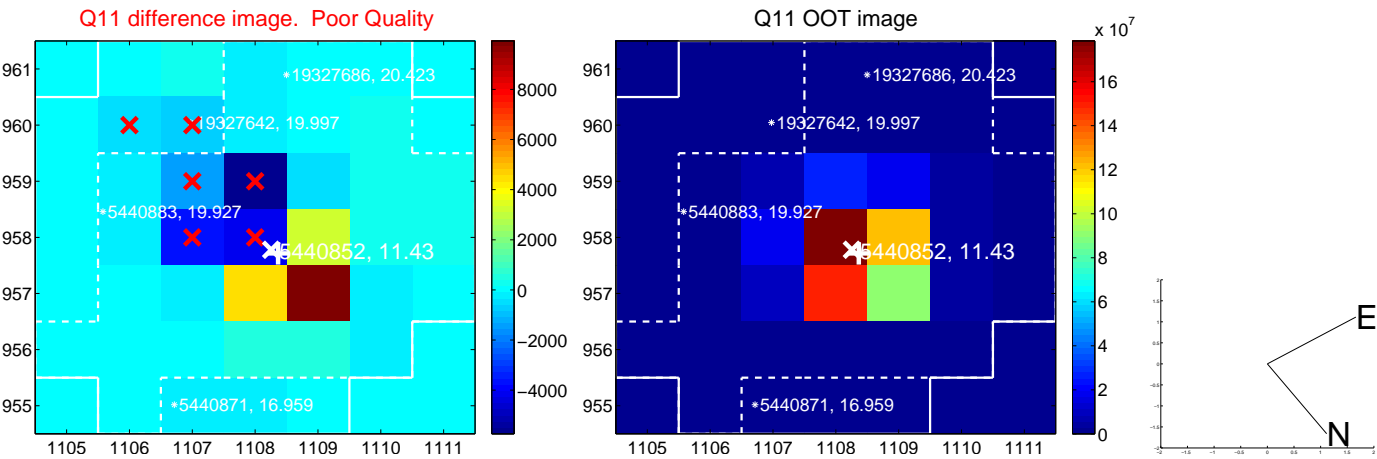
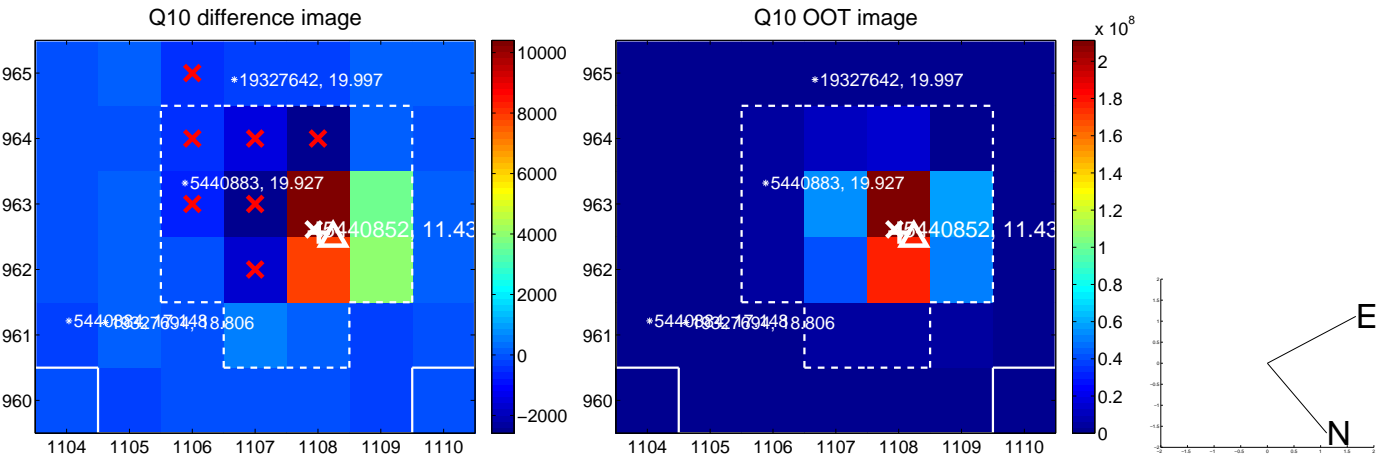
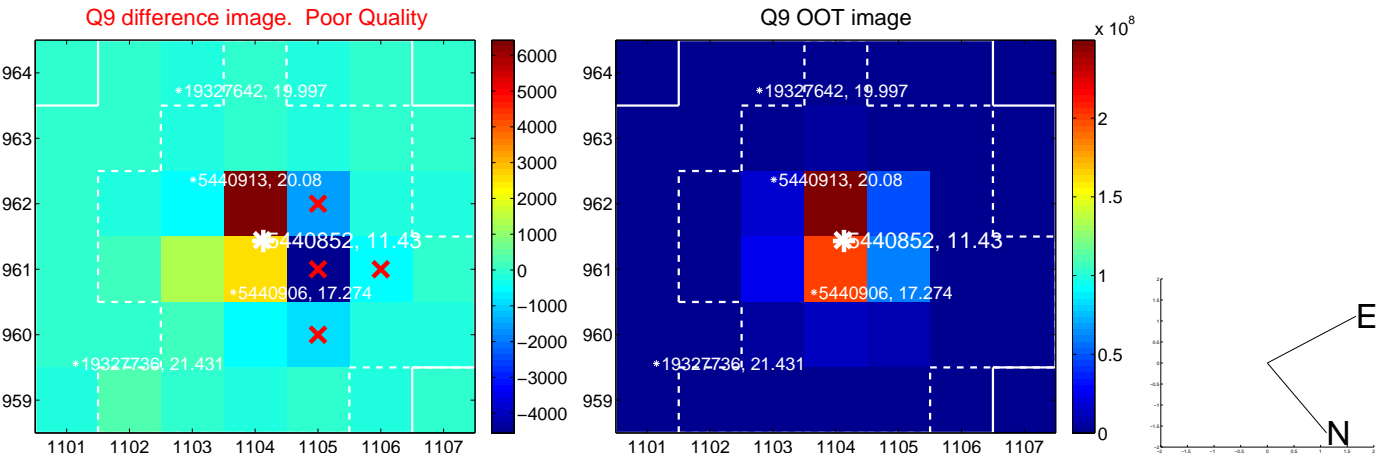




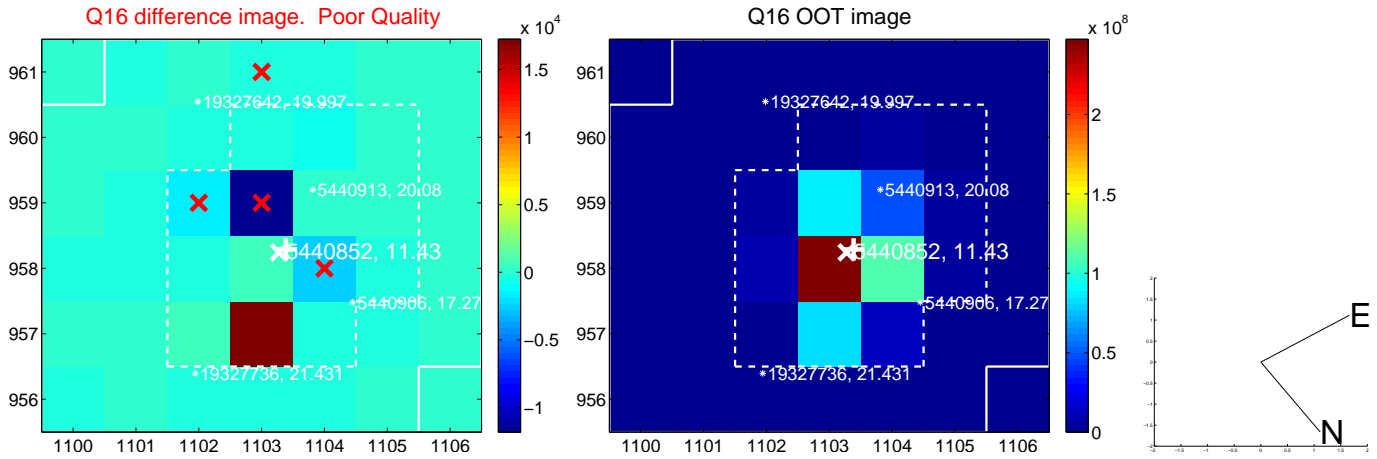
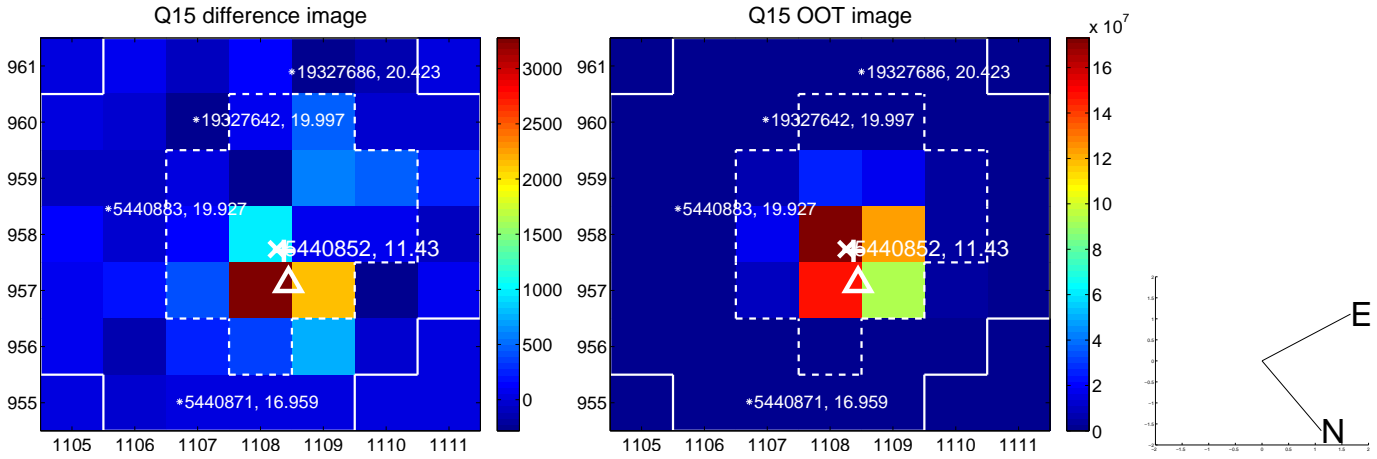
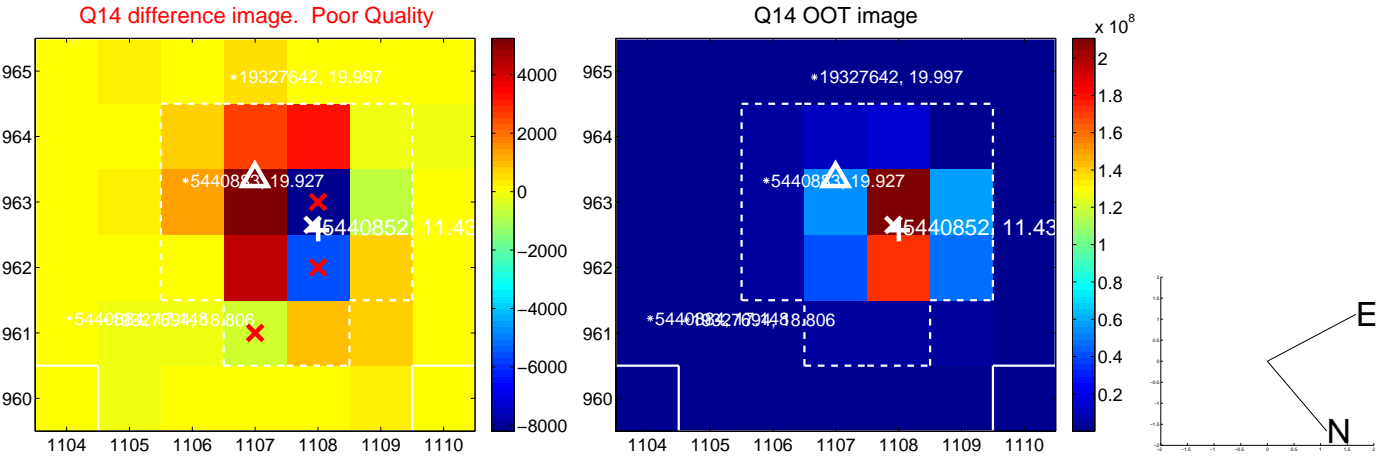
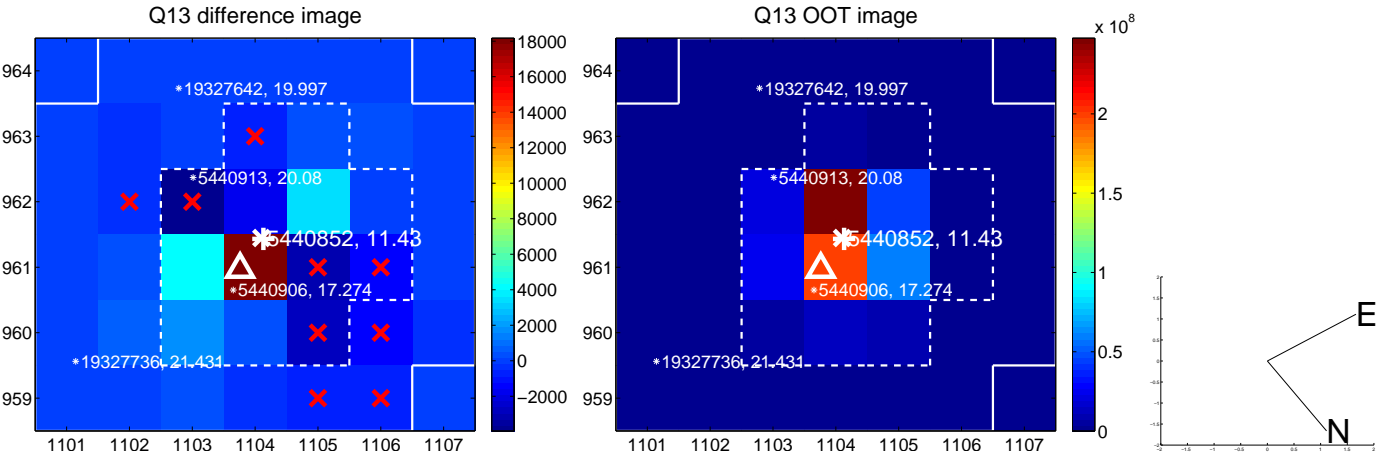
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



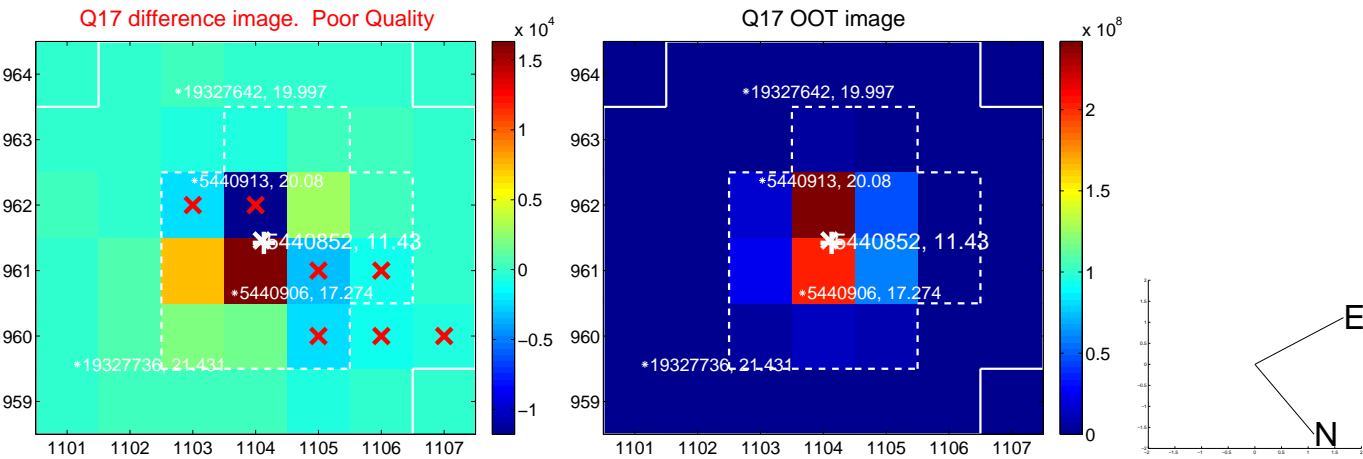
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



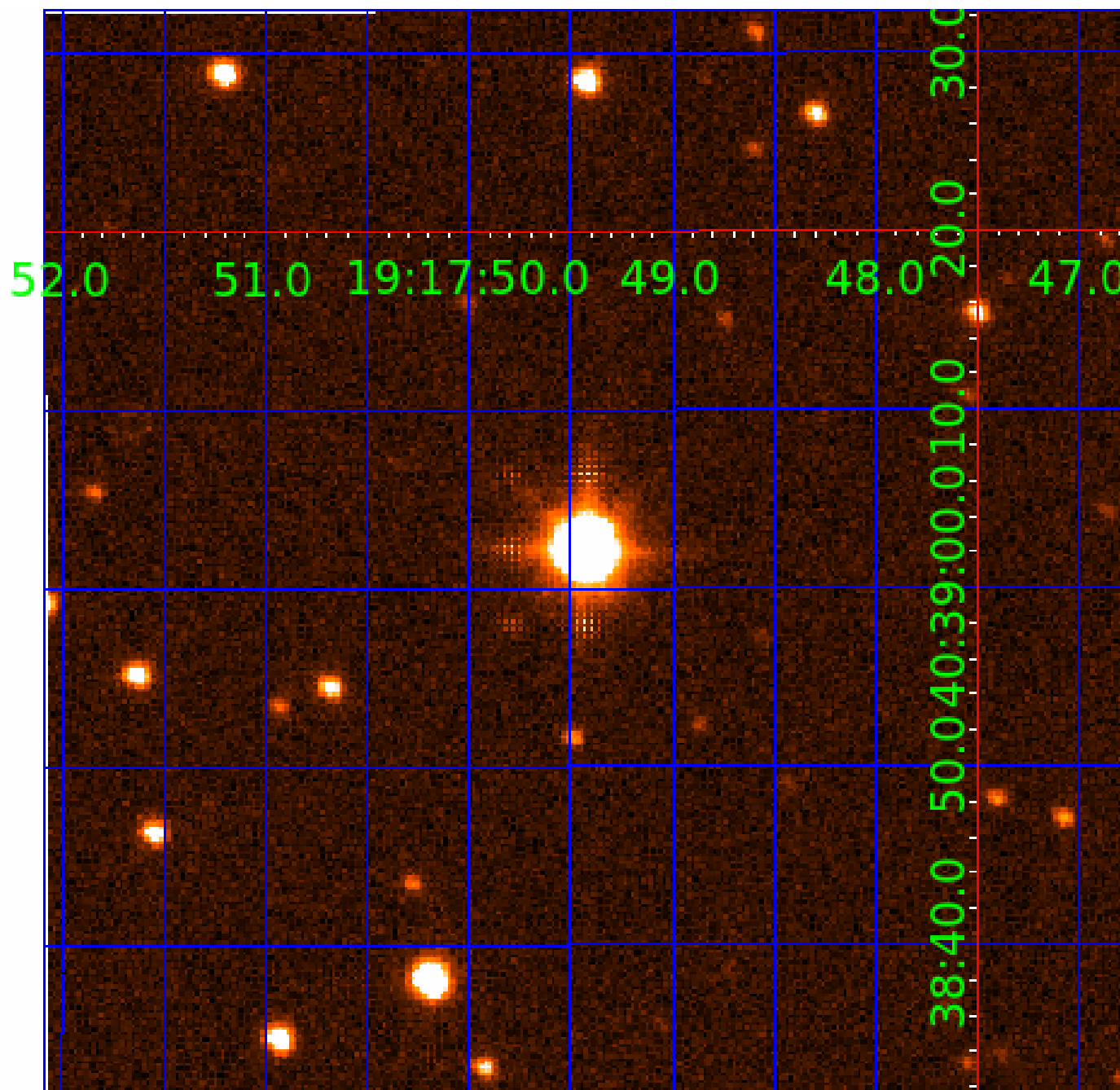
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



folded centroid time series figure for this object.

UKIRT Image

Declination



# KIC 005440852

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005440852-01	OBS	No	579.702060	361.666686	87.1	14.093	8.1	7.6	1.63	8361	1.69	4.58
005440852-02	OBS	No	380.140181	357.759978	111.3	12.349	8.3	8.2	1.63	8361	1.94	8.04
005440852-03	OBS	No	3.908345	133.515333	5.0	18.806	8.1	7.2	1.63	8361	0.37	3598.01
005440852-04	OBS	No	142.273970	227.289186	50.8	17.056	10.3	7.1	1.63	8361	1.29	29.82
005440852-05	OBS	No	566.704510	295.096016	74.9	6.960	8.3	8.7	1.63	8361	1.61	4.72
005440852-06	OBS	No	47.371713	133.285303	52.2	4.892	7.1	7.4	1.63	8361	1.27	129.23

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005440852-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—ALL_TRANS_CHASES—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
005440852-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE—LPP_DV—ALL_TRANS_CHASES—CENT_SATURATED
005440852-03	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_SATURATED
005440852-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_SATURATED
005440852-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—ALL_TRANS_CHASES—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
005440852-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_ALT—CENT_SATURATED

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

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

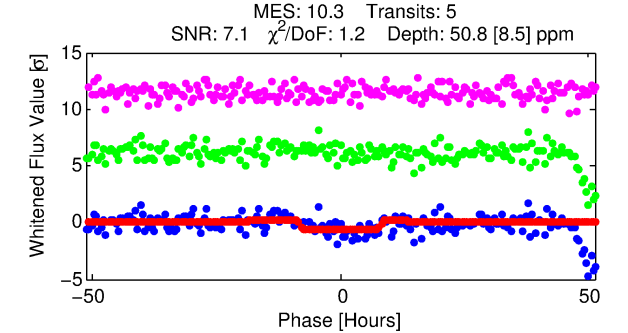
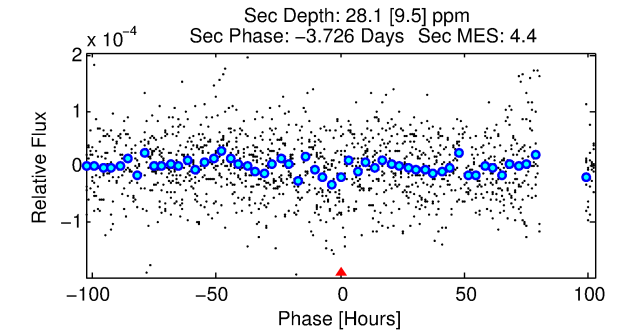
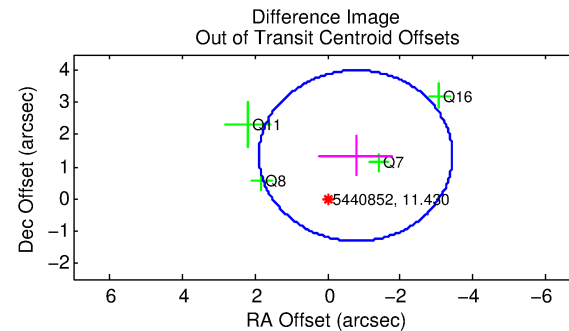
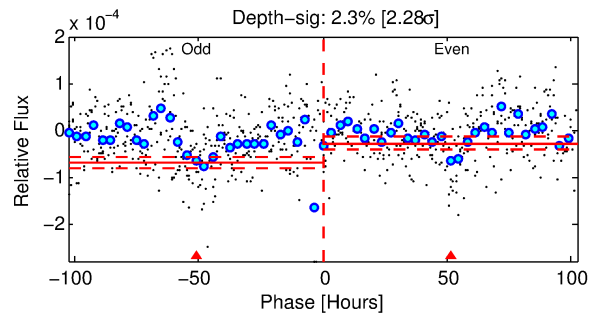
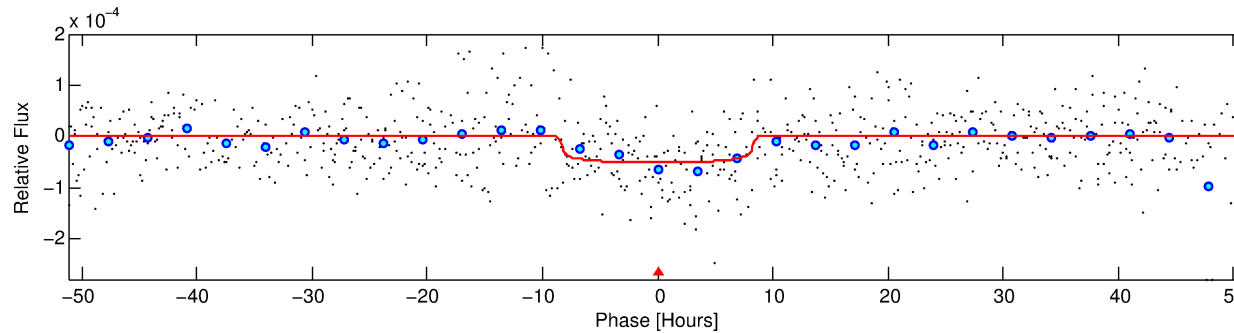
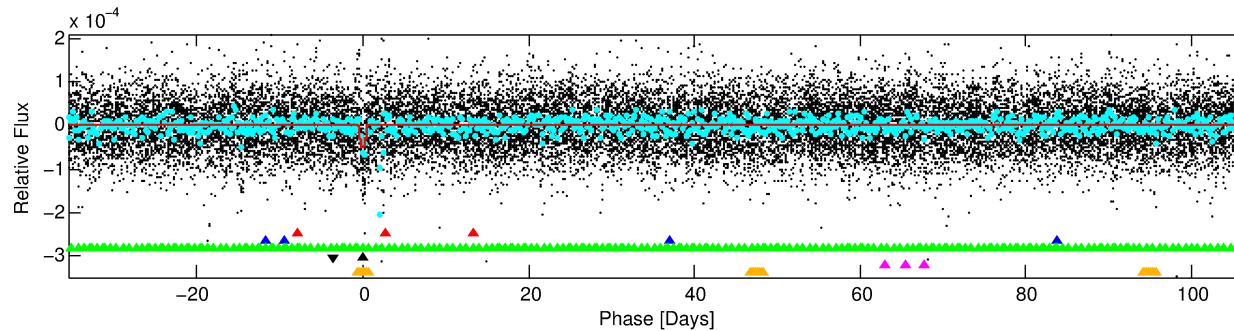
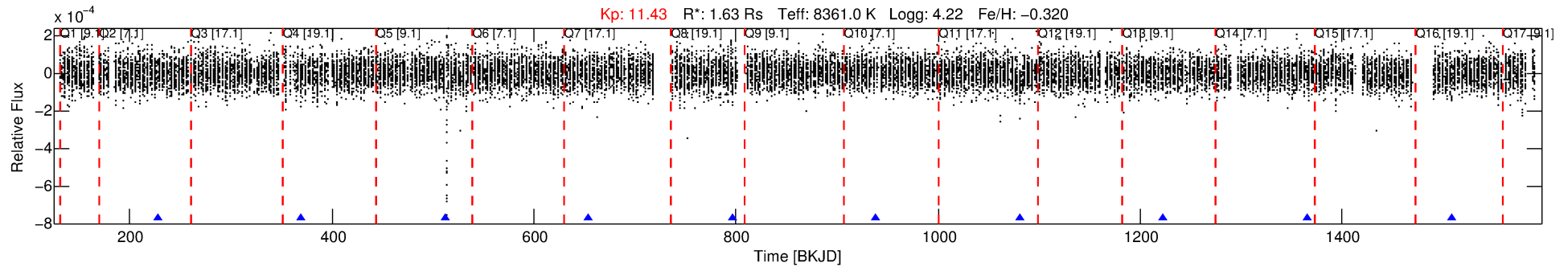
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 005440852-04

No Significant Match Found

# DV One-Page Summary

KIC: 5440852 Candidate: 4 of 6 Period: 142.274 d



## DV Fit Results:

Period = 142.27397 [0.00553] d  
Epoch = 227.2892 [0.0292] BKJD  
Rp/R\* = 0.0073 [0.0018]  
a/R\* = 36.57 [53.62]  
b = 0.83 [0.56]  
Seff = 29.82 [6.59]  
Teq = 596 [33] K  
Rp = 1.30 [0.40] Re  
a = 0.6246 [0.0948] AU  
Ag = 3592.95 [2321.76] [1.55 $\sigma$ ]  
Teffp = 7133 [1088] K [6.01 $\sigma$ ]

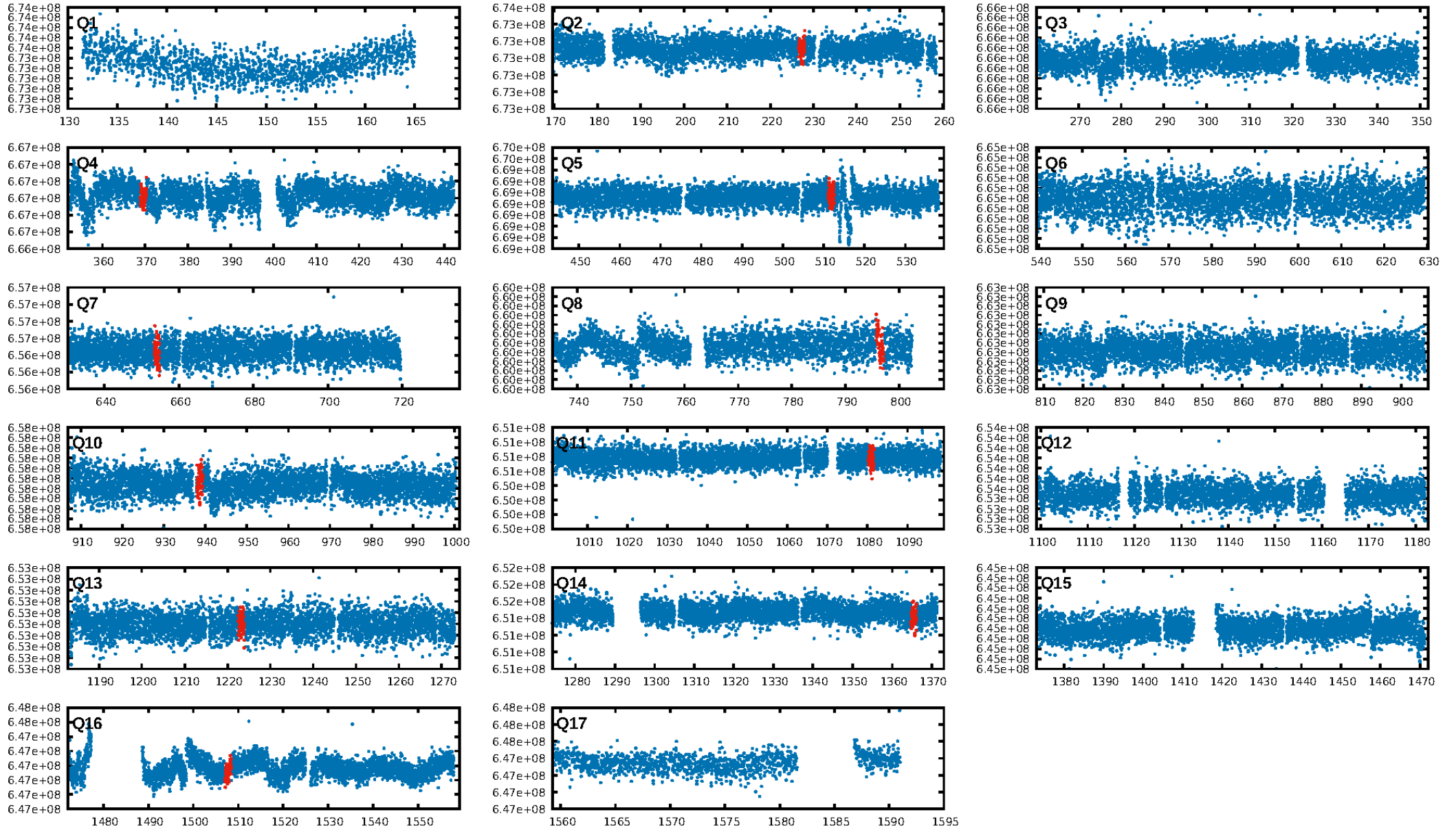
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [128.36 $\sigma$ ]  
LongPeriod-sig: 100.0% [271.11 $\sigma$ ]  
ModelChiSquare2-sig: 5.8%  
ModelChiSquareGof-sig: 94.0%  
Bootstrap-pfa: 4.98e-13  
RollingBand-fgt: 1.00 [5/5]  
**GhostDiagnostic-chr: 3.456**  
Centroid-sig: 89.6%  
Centroid-so: 0.511 arcsec [0.45 $\sigma$ ]  
OotOffset-rm: 1.548 arcsec [1.75 $\sigma$ ]  
KicOffset-rm: 1.676 arcsec [1.95 $\sigma$ ]  
OotOffset-st: 0/2/2/0 [4]  
KicOffset-st: 0/2/2/0 [4]  
DiffImageQuality-fgm: 0.75 [3/4]  
DiffImageOverlap-fno: 0.00 [0/9]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 10:44:30 Z

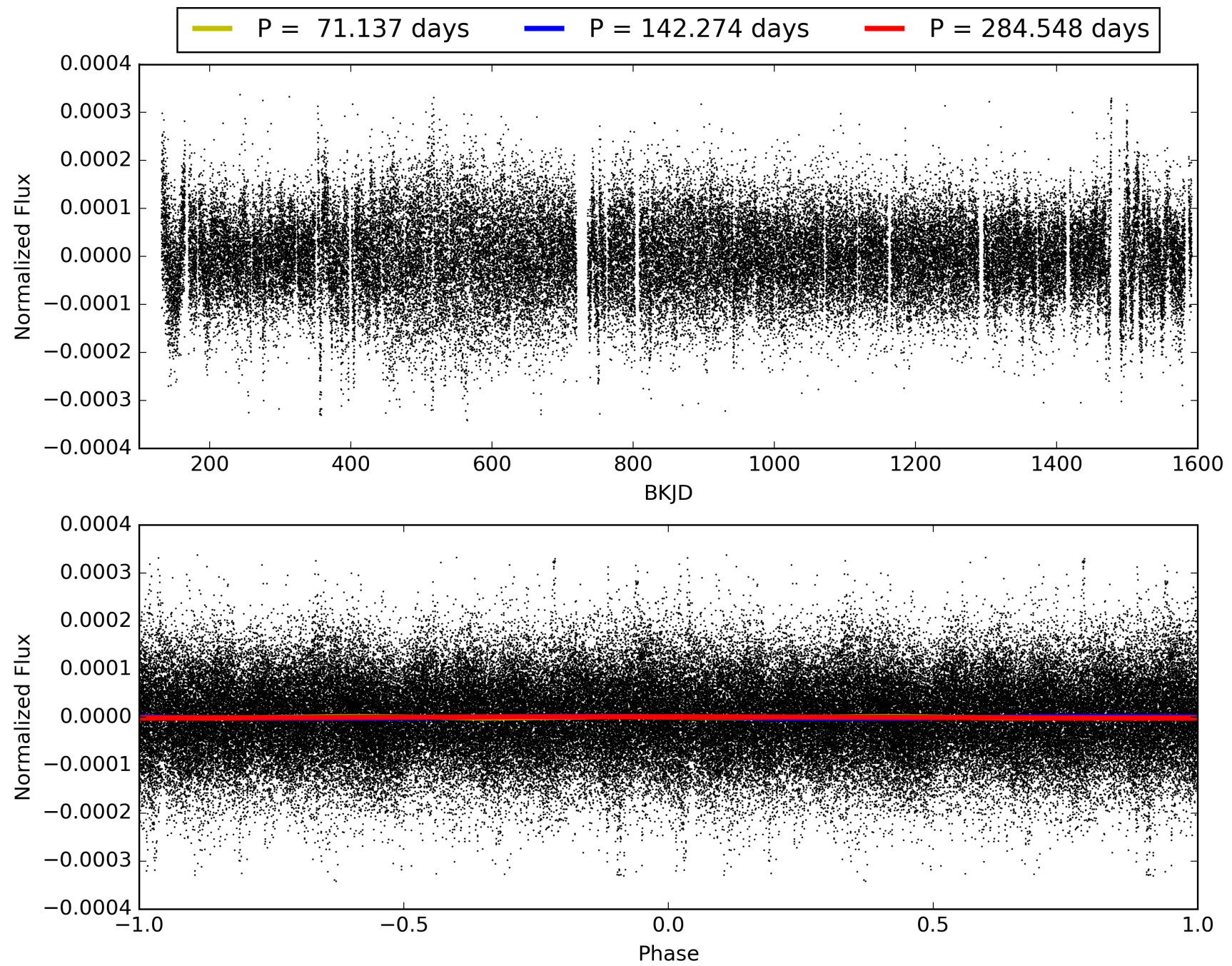
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 005440852-04, PDC Light Curves



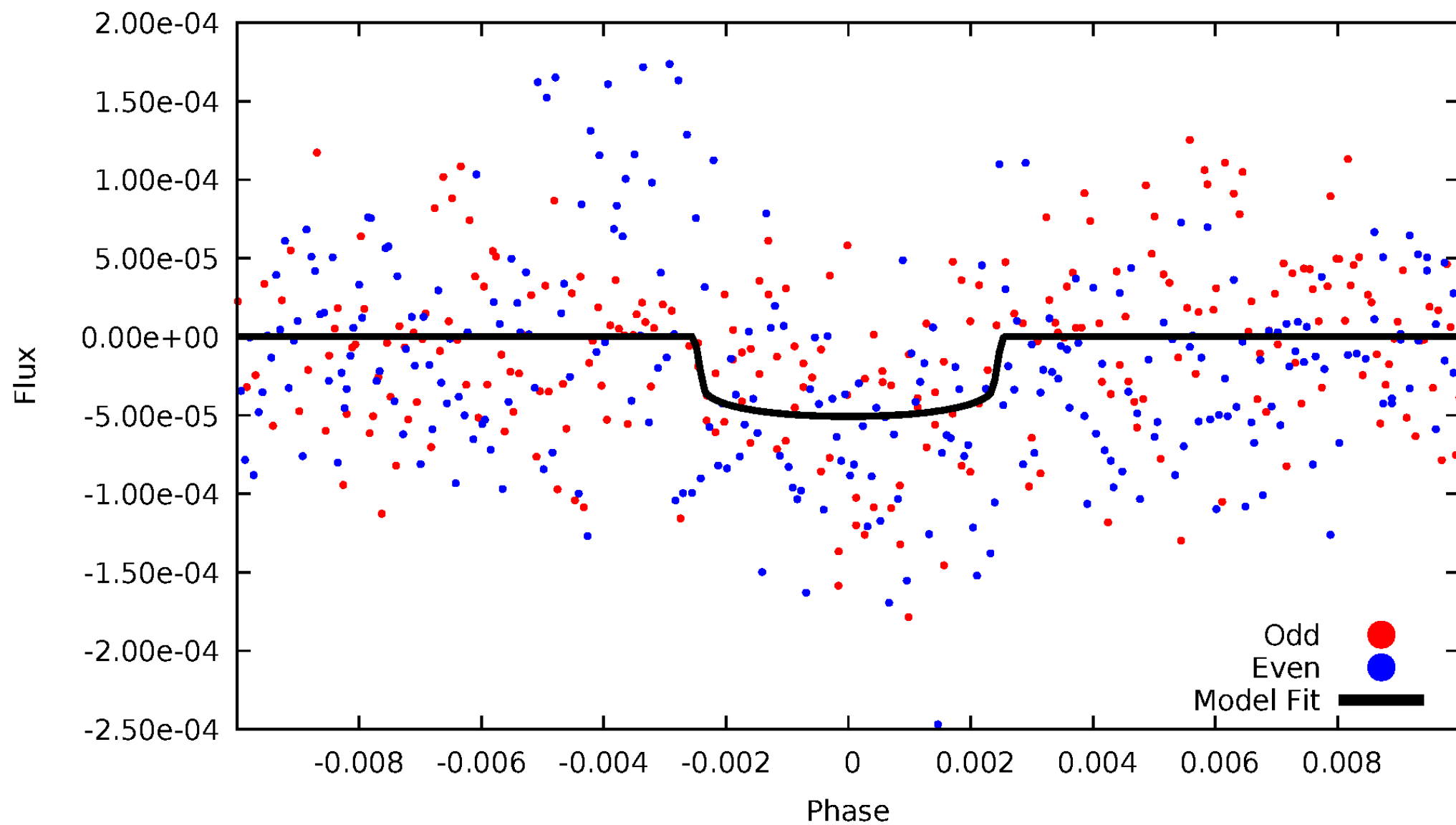


TCE 005440852-04



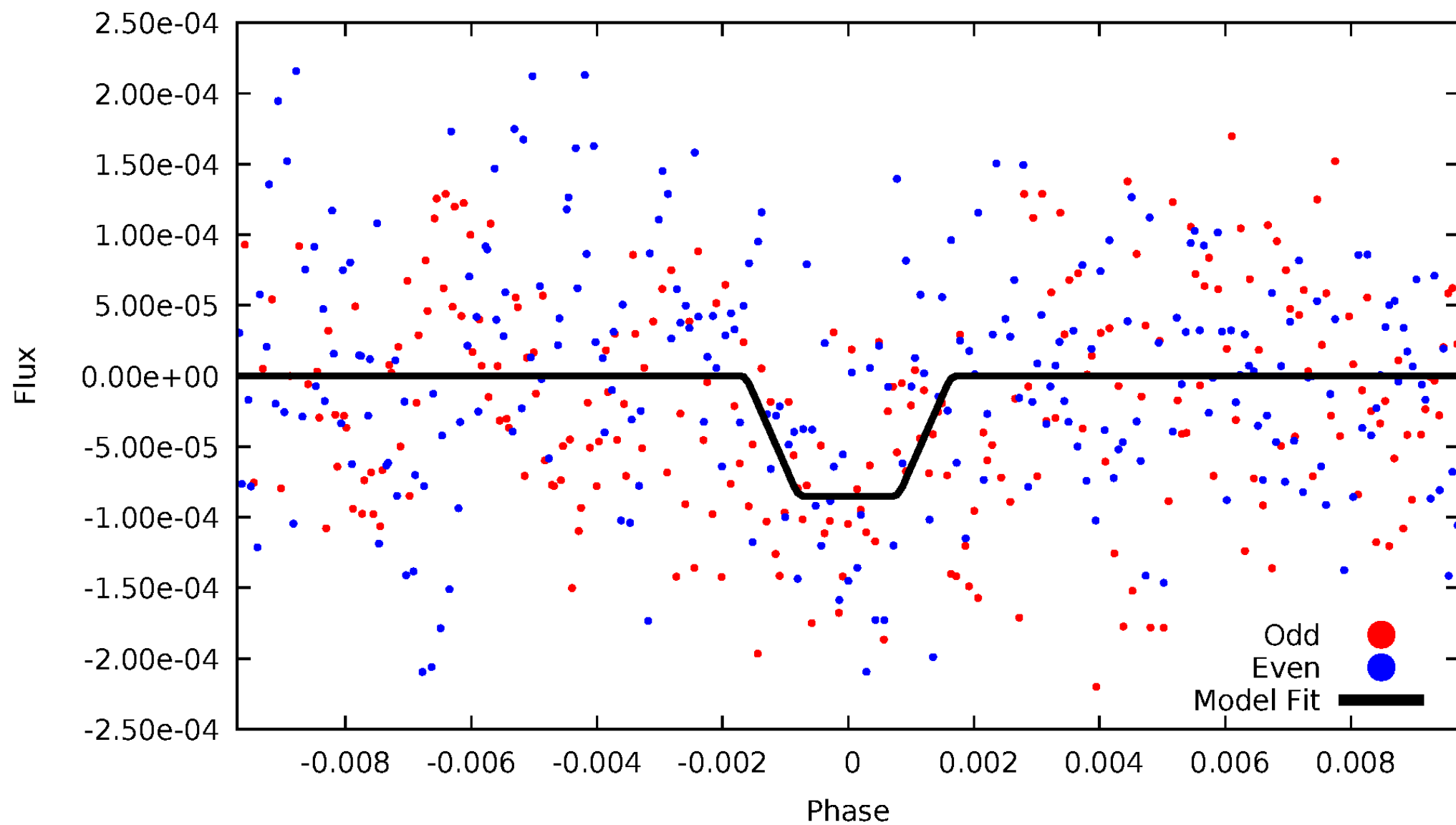
# DV Odd/Even

TCE 005440852-04



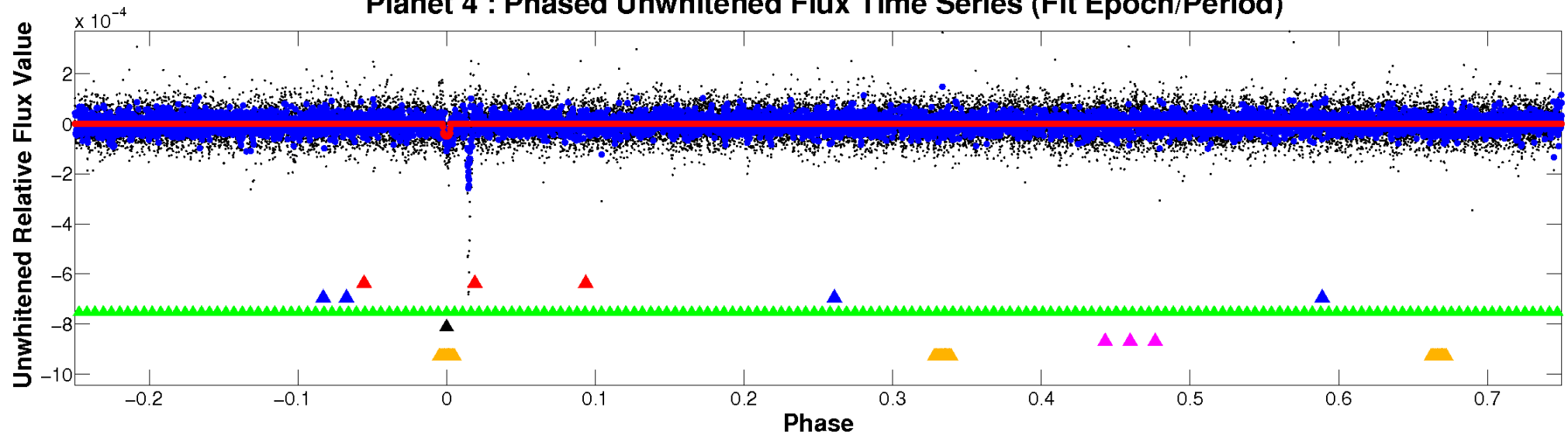
# ALT Odd/Even

TCE 005440852-04

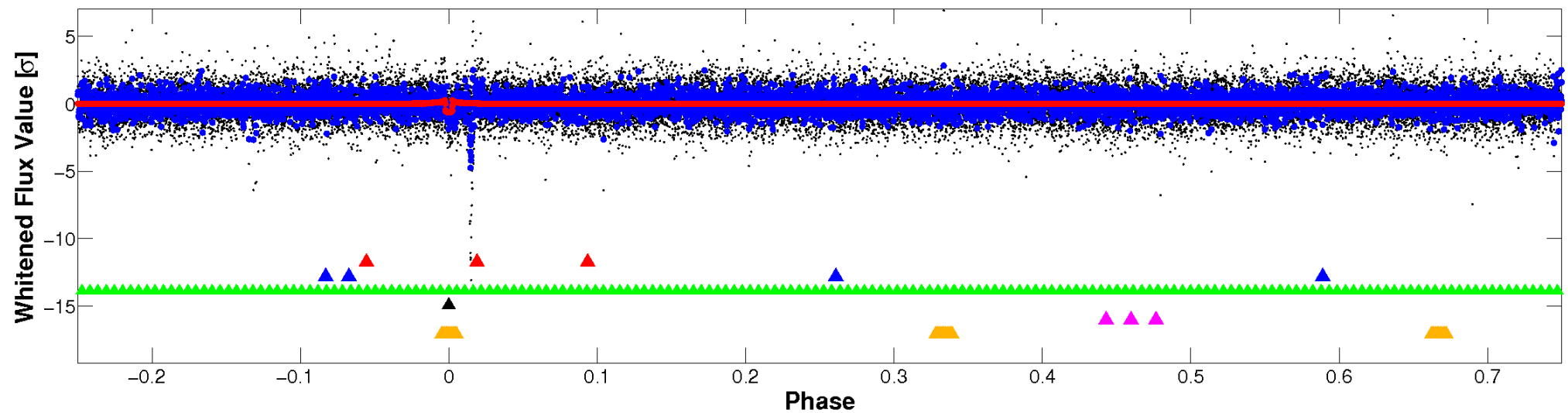


# Non-Whitened Vs. Whitened Light Curve

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

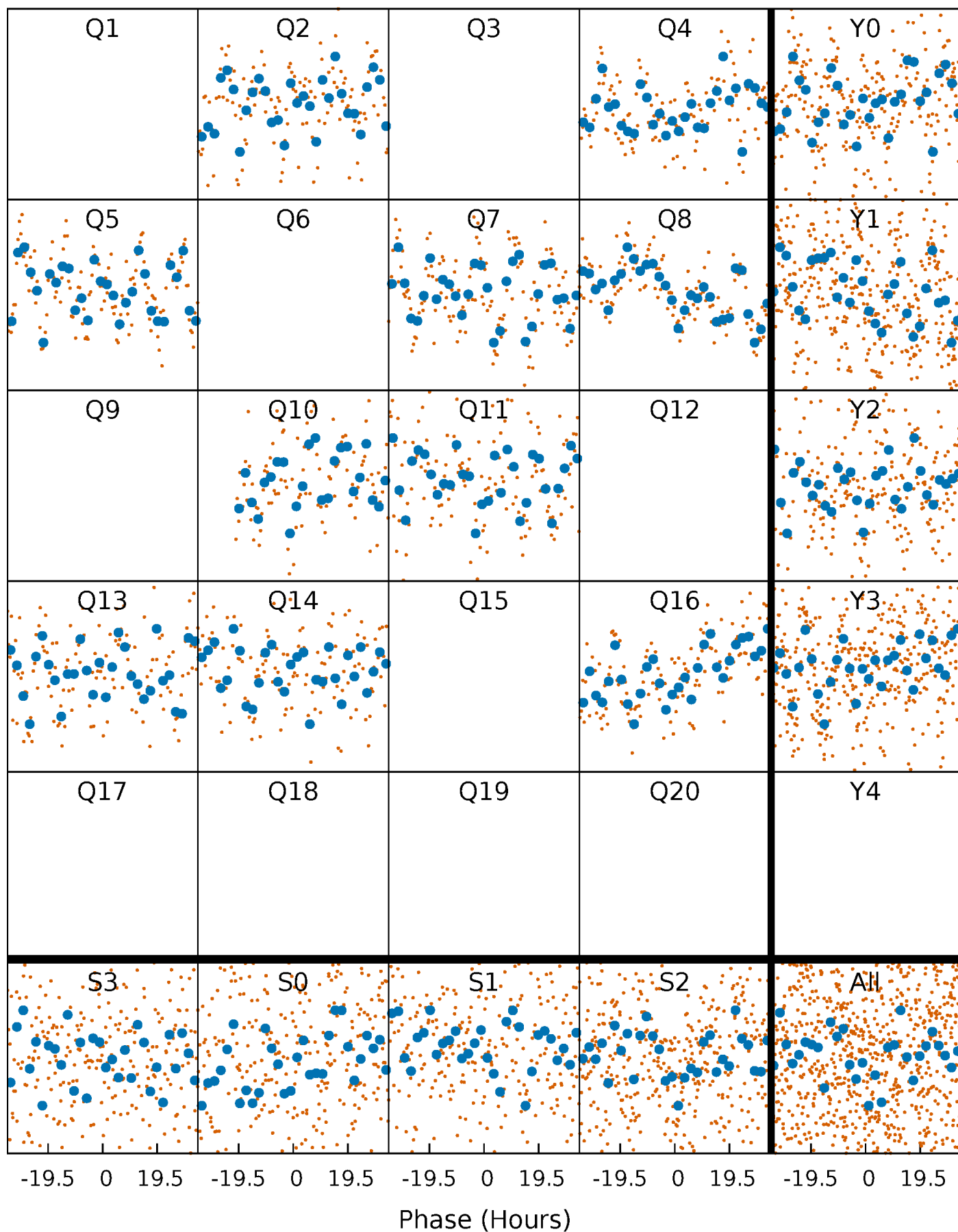


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



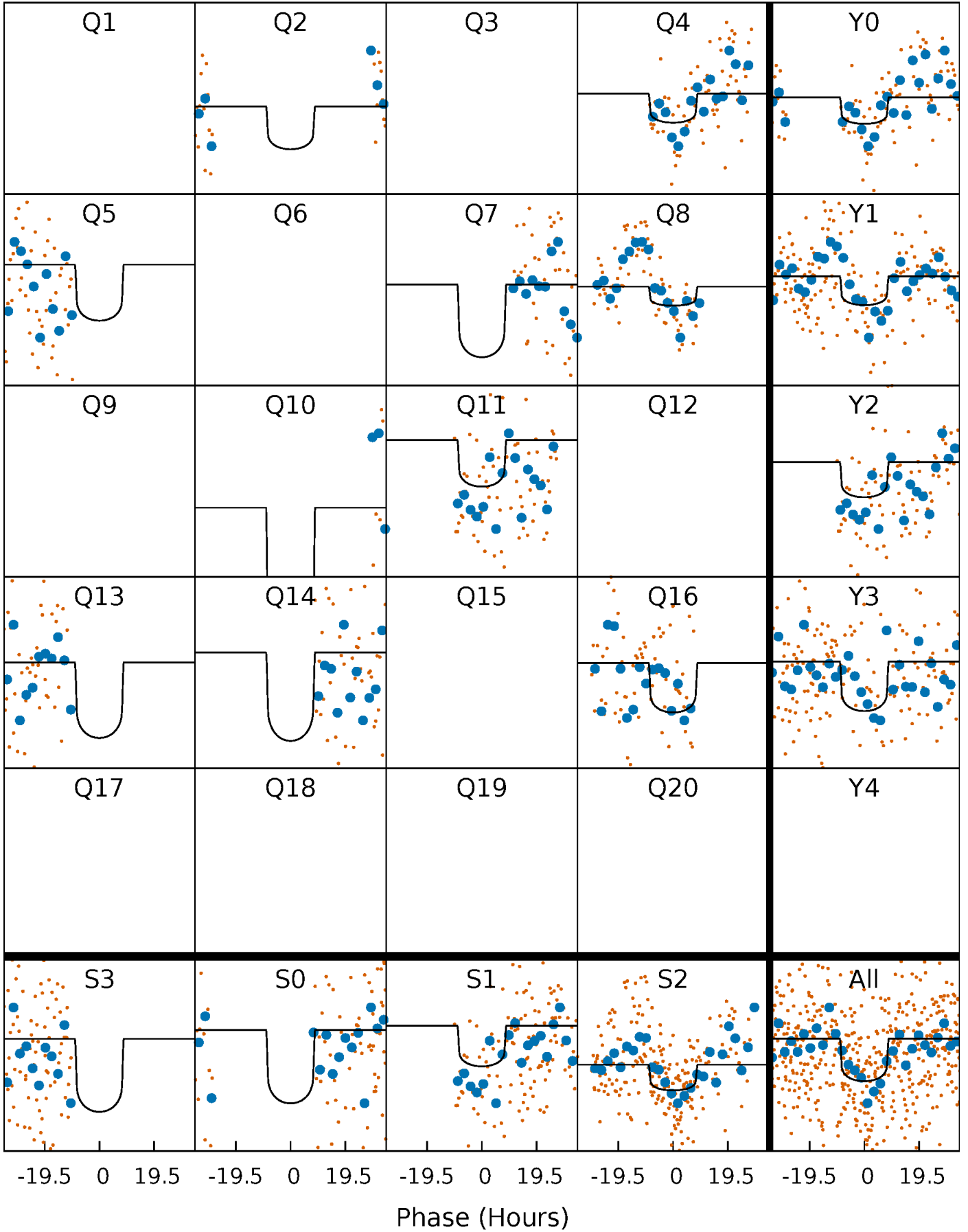
# PDC Quarter-Phased Transit Curves

TCE 005440852-04   P=142.273970 Days    $T_0=227.289186$  (BKJD)



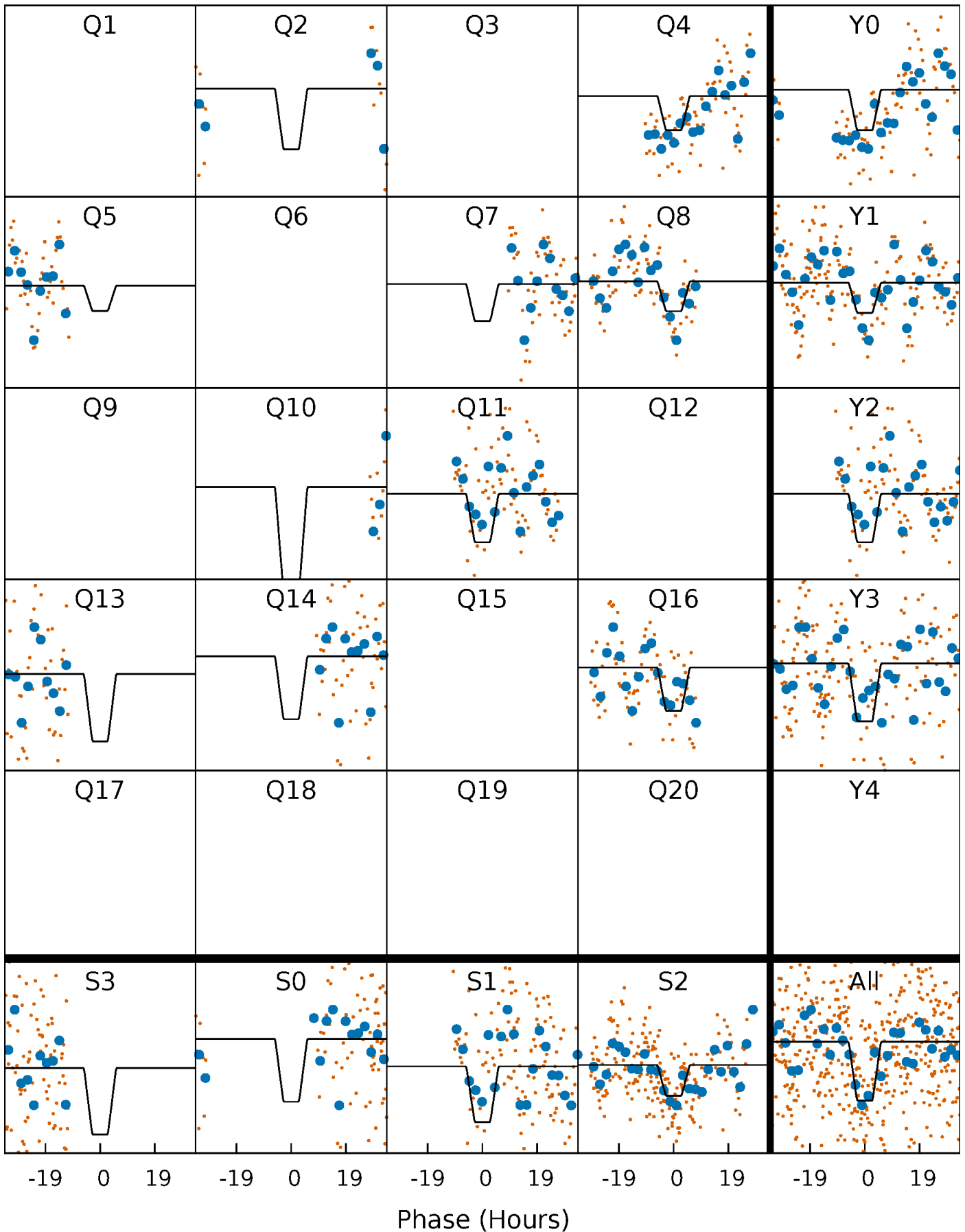
# DV Quarter-Phased Transit Curves

TCE 005440852-04   P=142.273970 Days    $T_0=227.289186$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 005440852-04     $P=142.265256$  Days     $T_0=227.357743$  (BKJD)

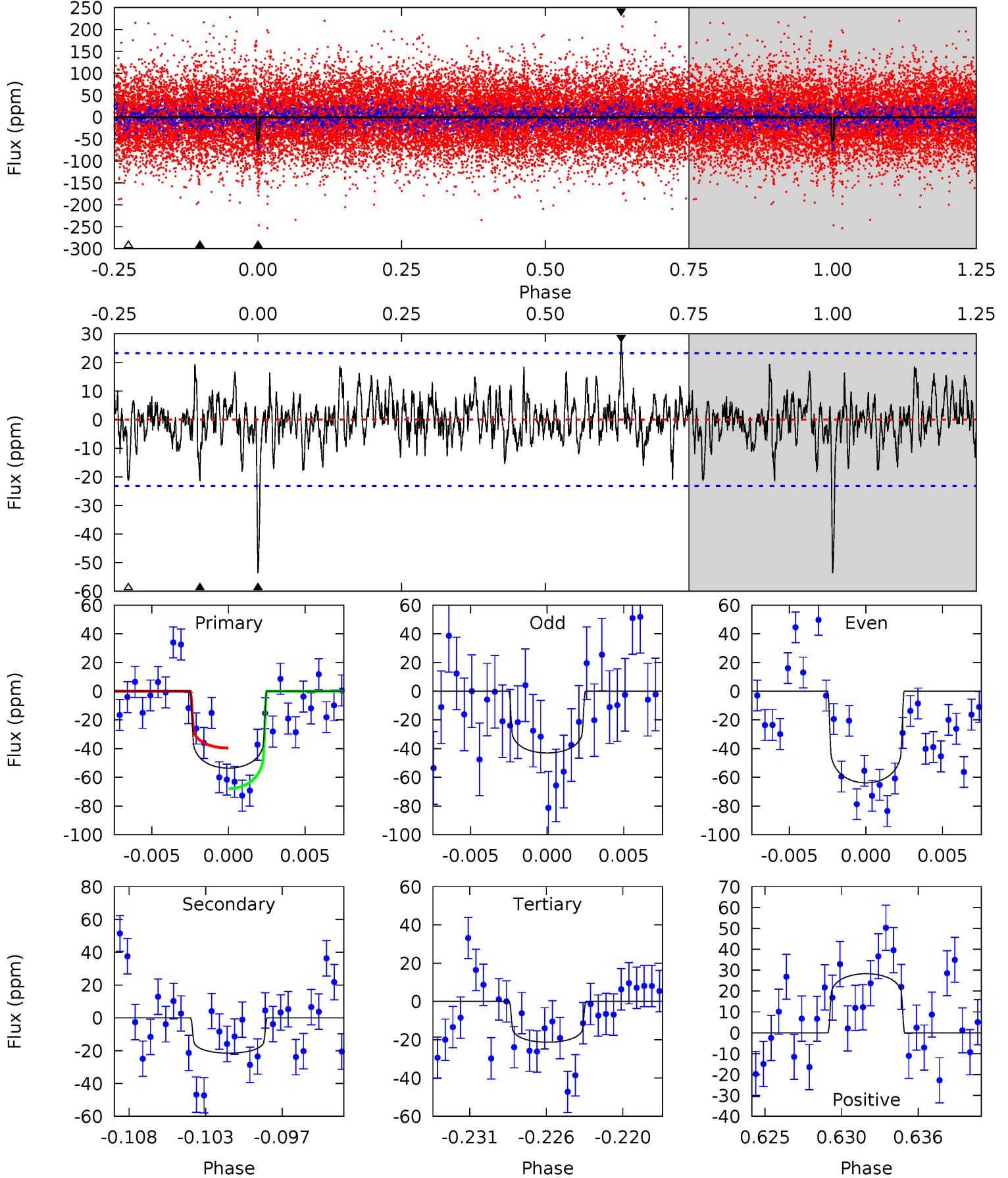




# DV Model-Shift Uniqueness Test

005440852-04, P = 142.273970 Days, E = 85.015216 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
11.9	4.78	4.73	6.28	5.15	2.80	1.42	7.18	5.63	0.05	-1.50	2.31	1.00	0.35	3.15

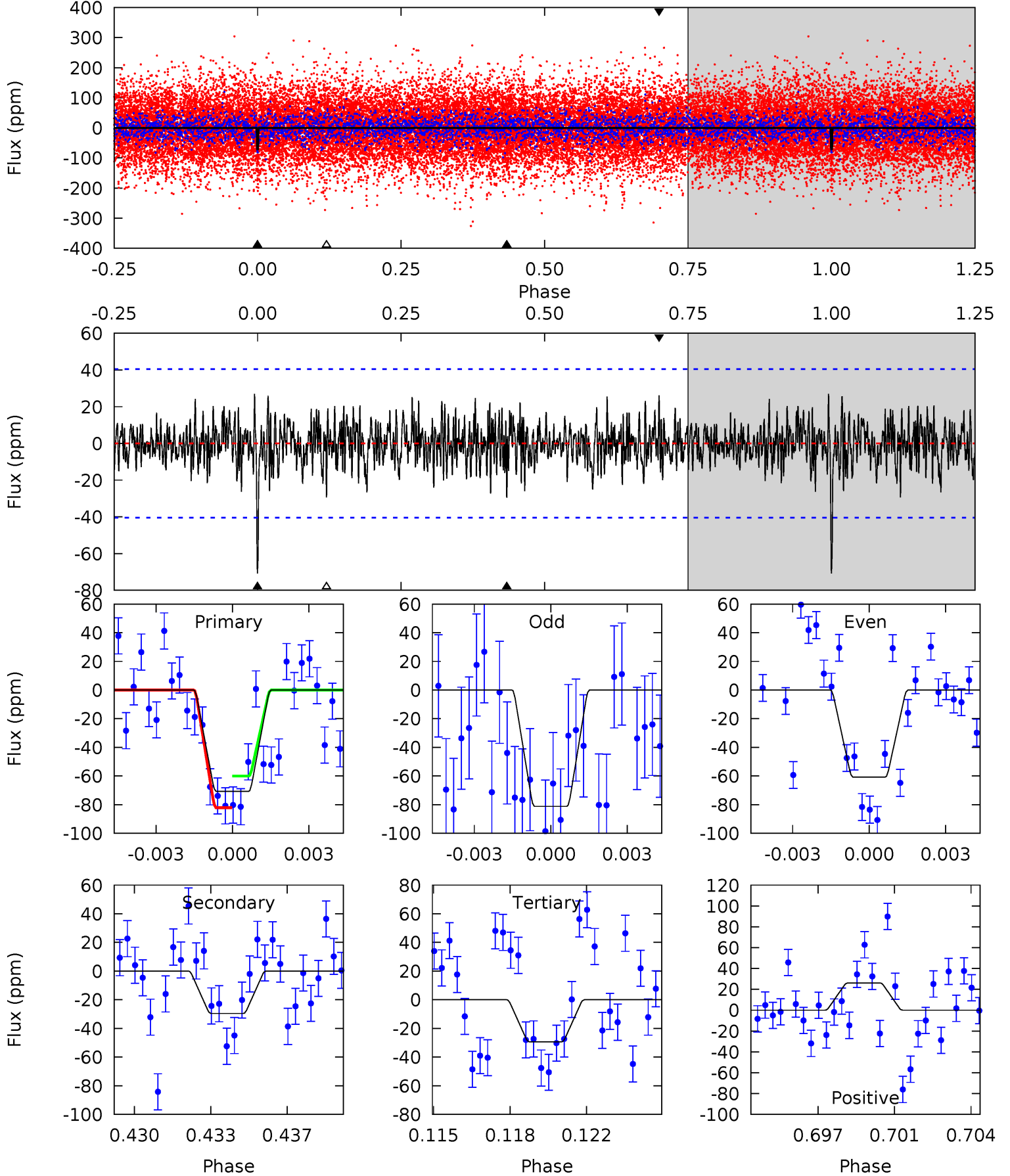




# Alt Model-Shift Uniqueness Test

005440852-04,  $P = 142.265256$  Days,  $E = 85.092487$  Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.15	3.82	3.79	3.37	5.23	2.93	1.16	5.36	5.78	0.03	0.44	1.33	0.88	0.28	1.43



### Stellar Parameters For KIC 005440852

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$8361^{+75}_{-83}$	$4.219^{+0.063}_{-0.117}$	$-0.320^{+0.050}_{-0.200}$	$1.630^{+0.299}_{-0.149}$	$1.603^{+0.129}_{-0.108}$	$0.521^{+0.137}_{-0.182}$
	+1%/-1%	+1%/-3%	+16%/-62%	+18%/-9%	+8%/-7%	+26%/-35%
Source	SPE68	SPE68	SPE68	DSEP		

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

### Secondary Eclipse Parameters for KIC 005440852-04 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-22 \pm 5$	$1.33^{+0.35}_{-0.33}$	$836^{+39}_{-24}$	$6399^{+1177}_{-718}$	$2596^{+2286}_{-1074}$
Alt.	$-30 \pm 8$	$1.68^{+0.38}_{-0.36}$	$835^{+38}_{-23}$	$6134^{+918}_{-640}$	$2231^{+1549}_{-881}$

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

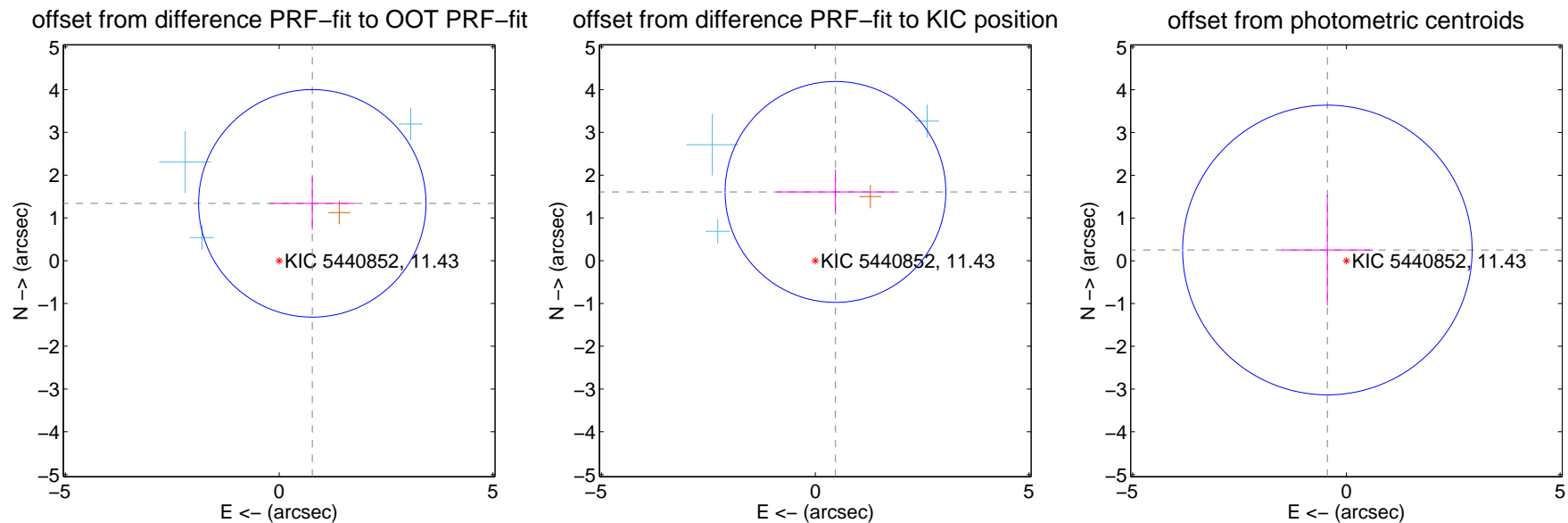
## DV Centroid Data

Supplemental centroid analysis for 005440852-04. **Kepler magnitude: 11.43.** Transit SNR 7.14

**There are 3 quarters with good PRF difference image offsets**

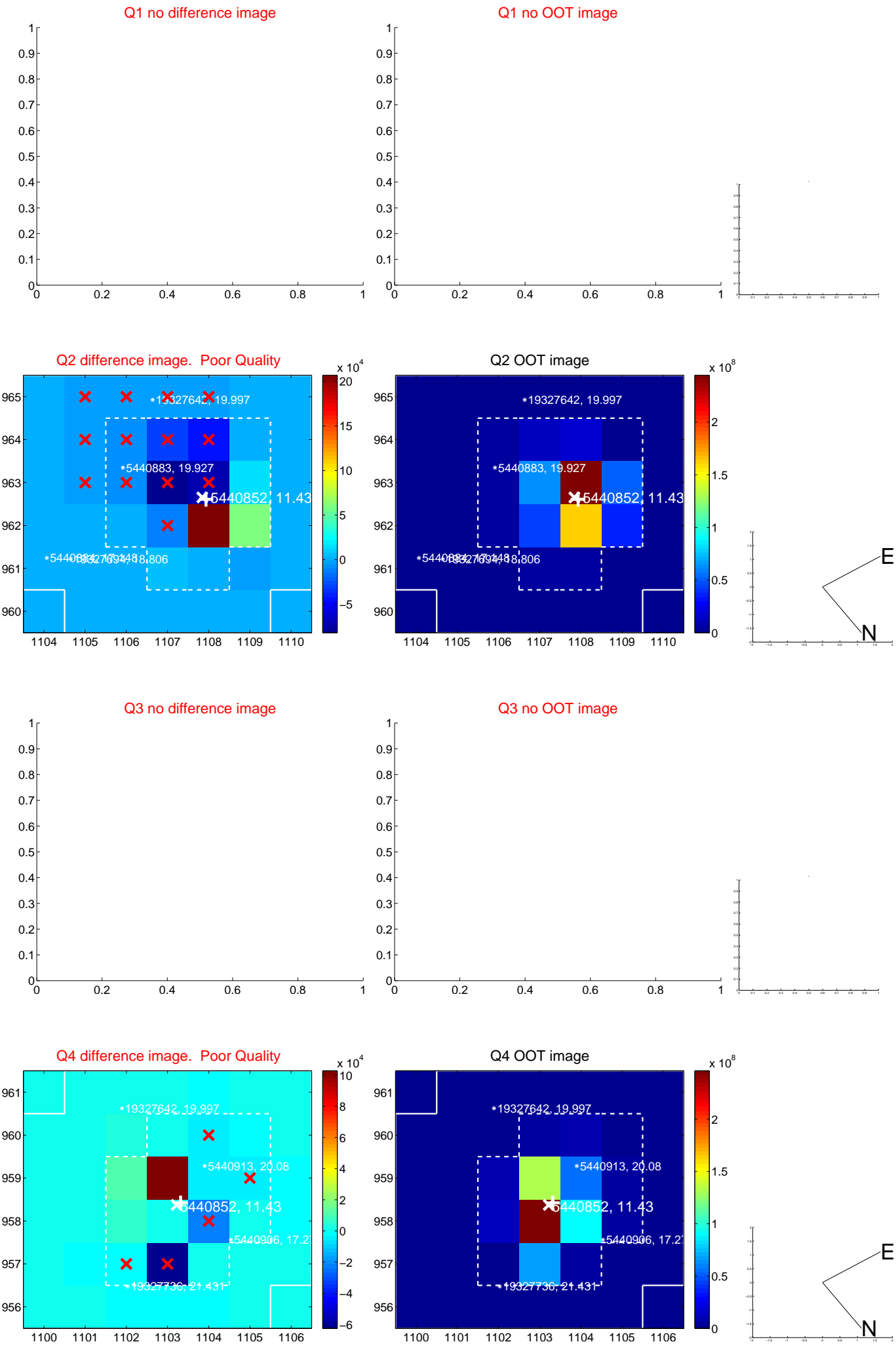
The direct PRF centroid is offset from the target star catalog position by about 0.46 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.548 \pm 0.887$	1.75	$-0.775 \pm 0.996$	$1.340 \pm 0.618$
PRF-fit source offset from KIC position	$1.676 \pm 0.861$	1.95	$-0.472 \pm 1.375$	$1.608 \pm 0.525$
photometric centroid source offset	$0.51 \pm 1.13$	0.45	$0.45 \pm 1.07$	$0.25 \pm 1.30$

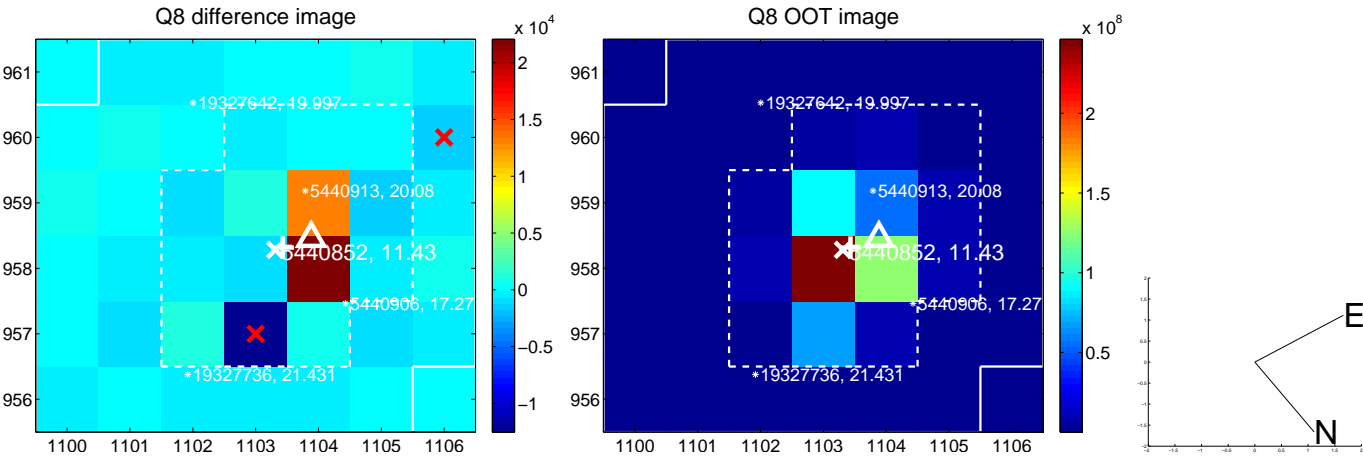
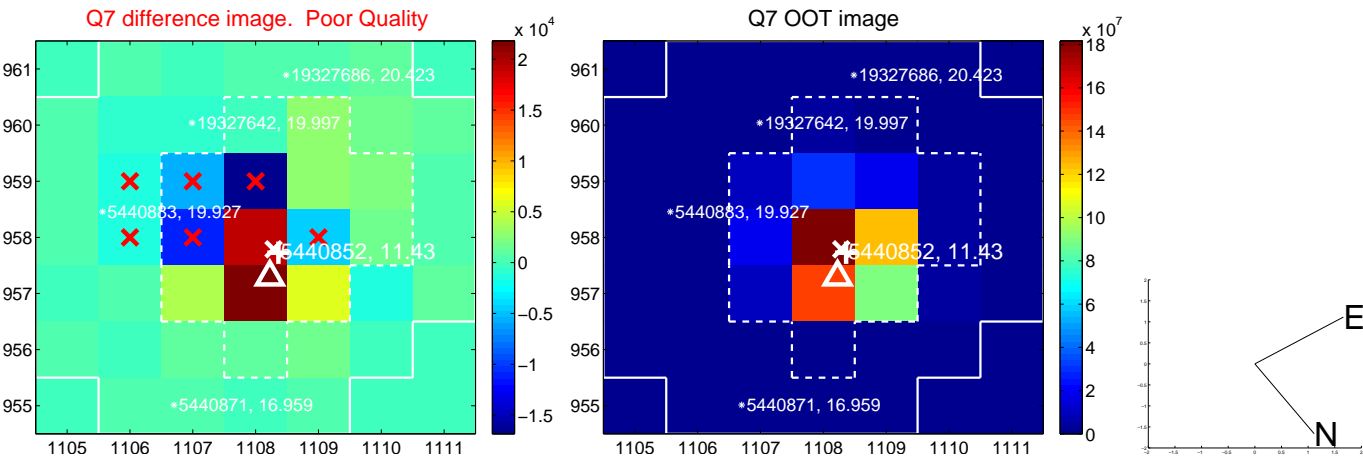
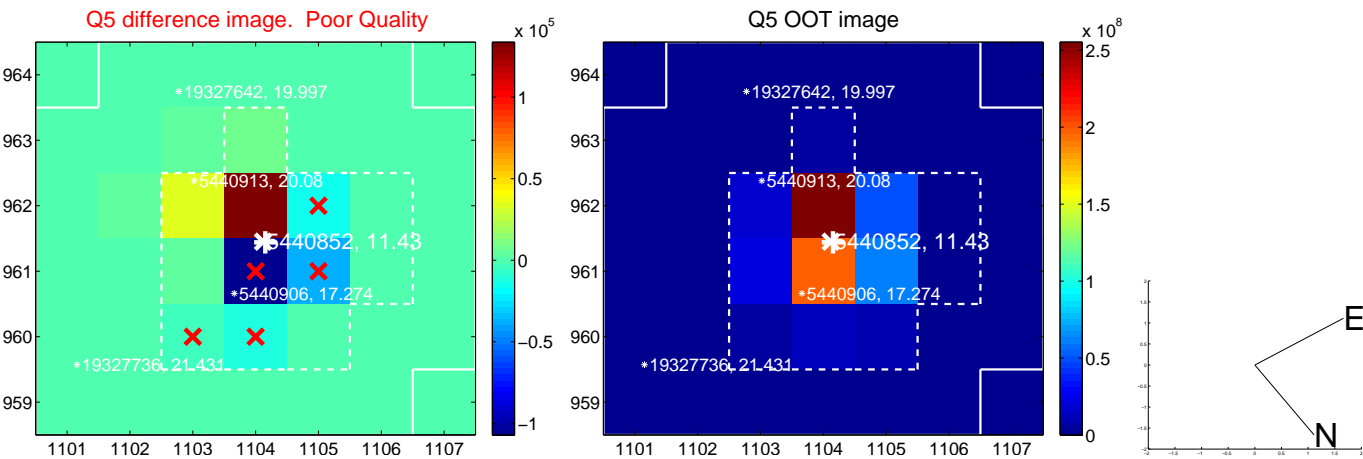


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

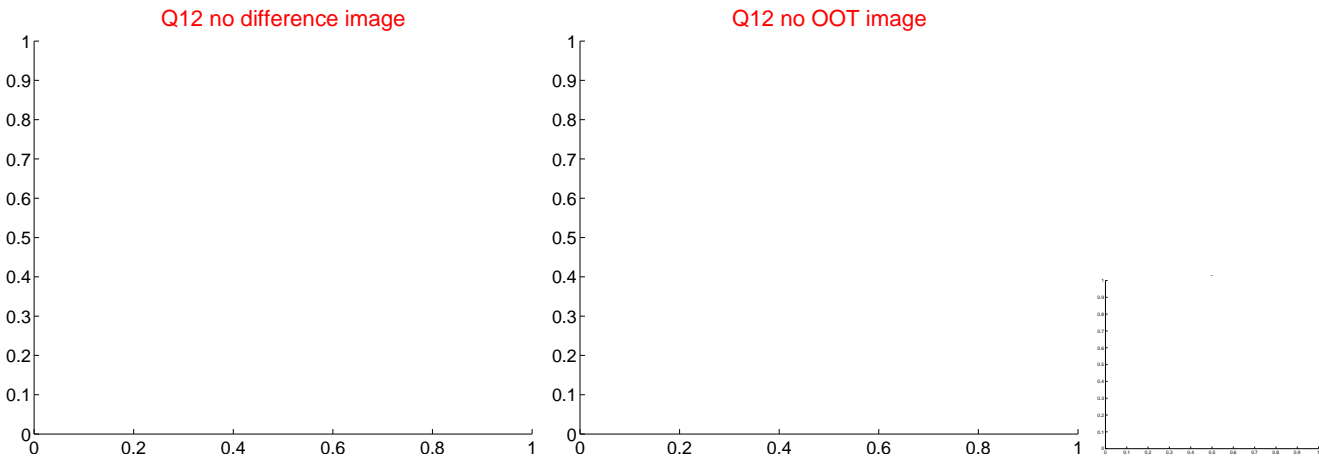
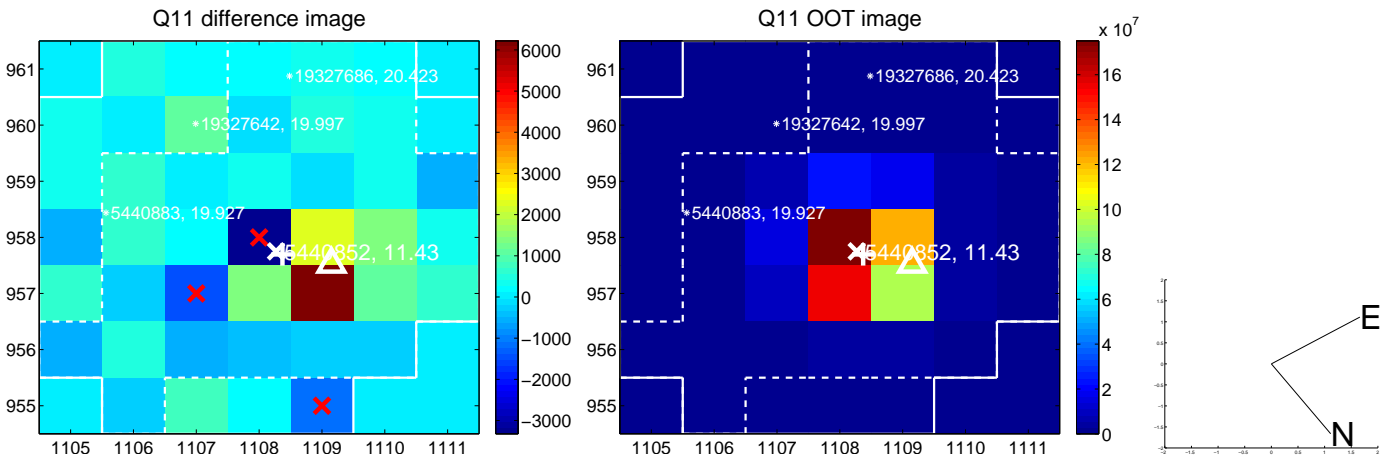
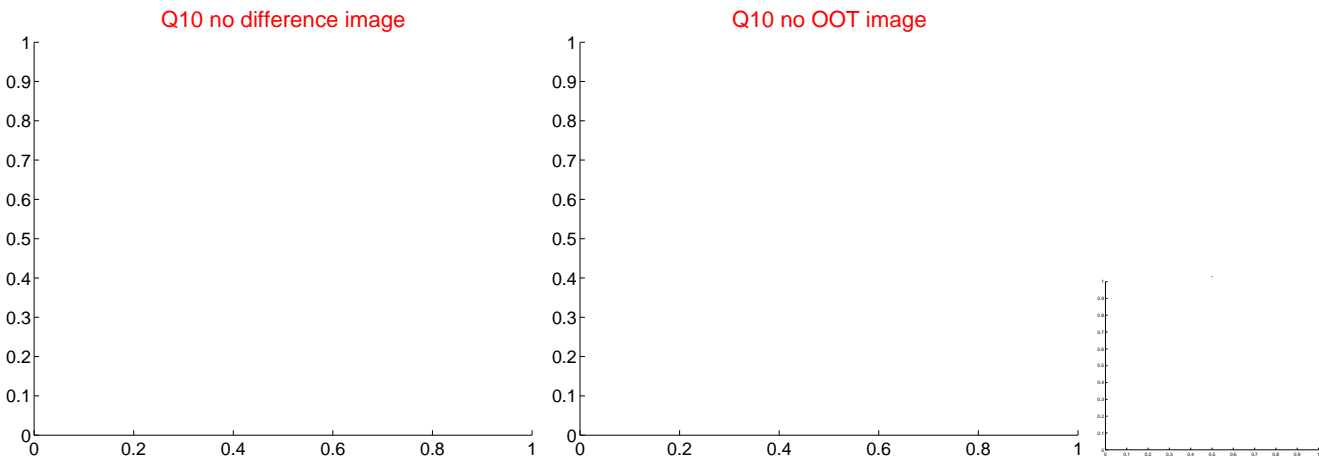
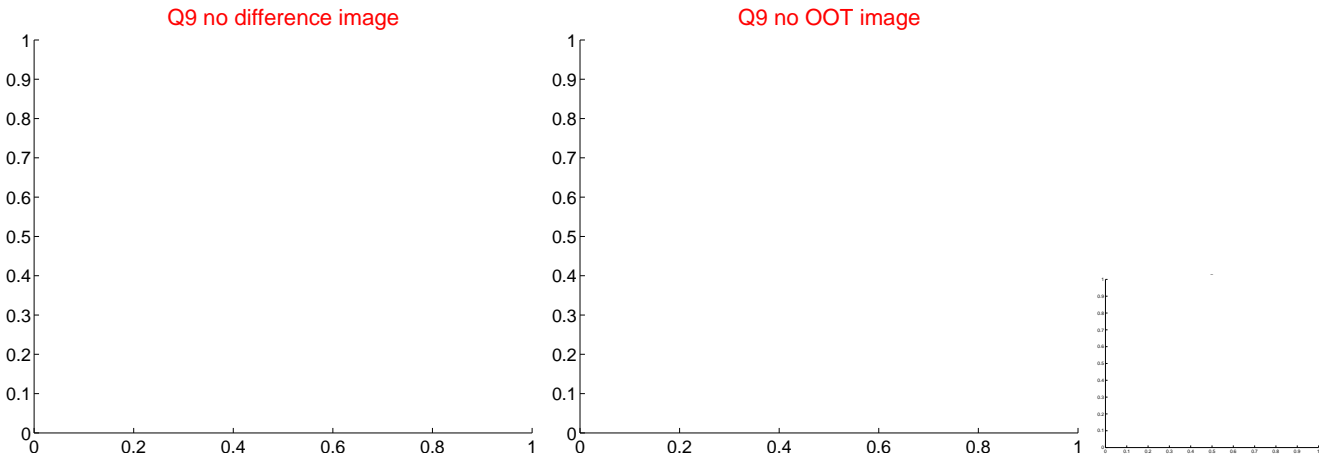
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



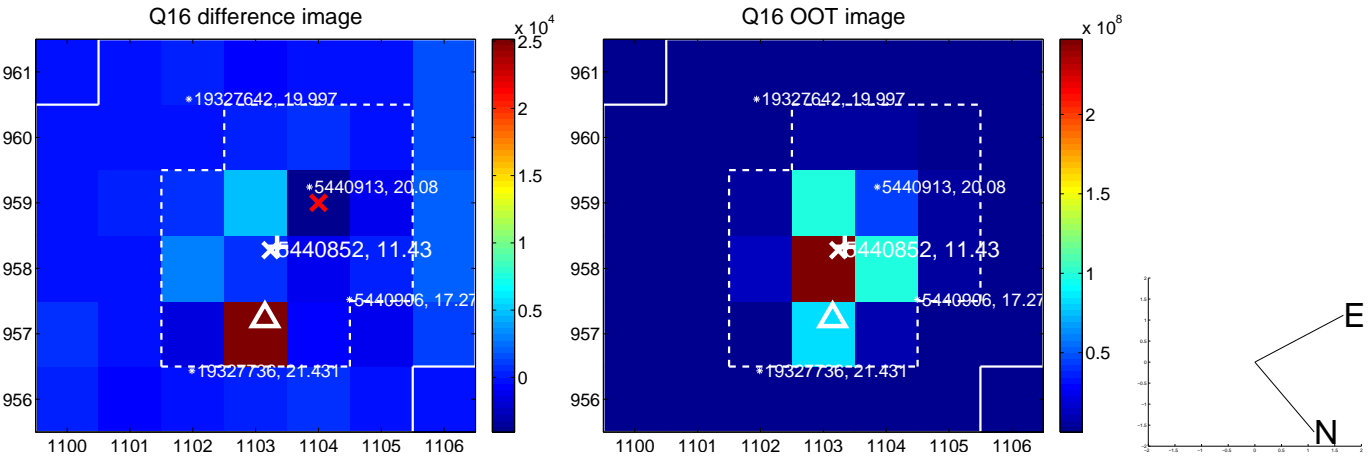
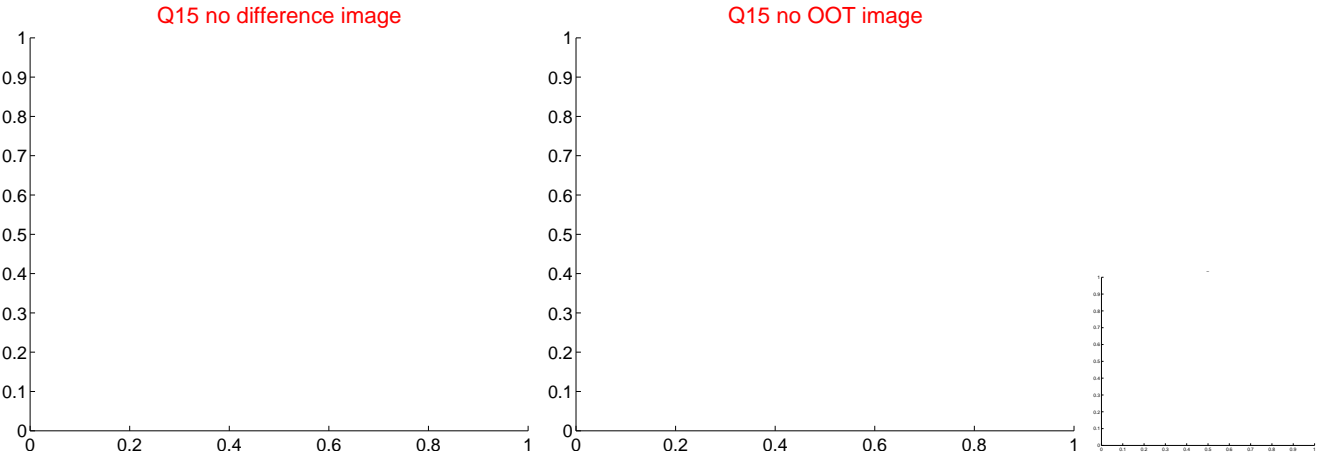
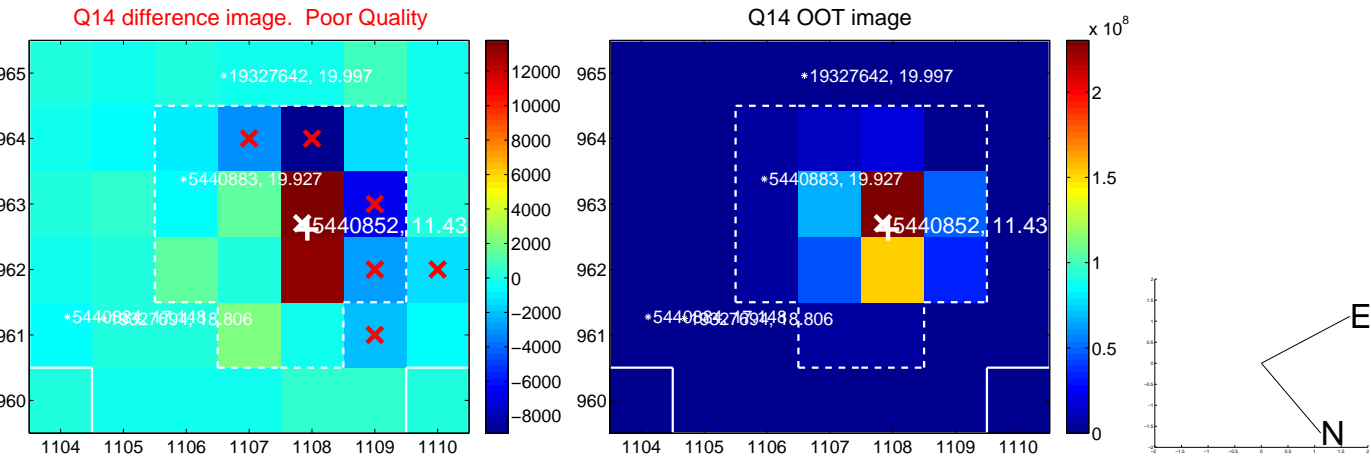
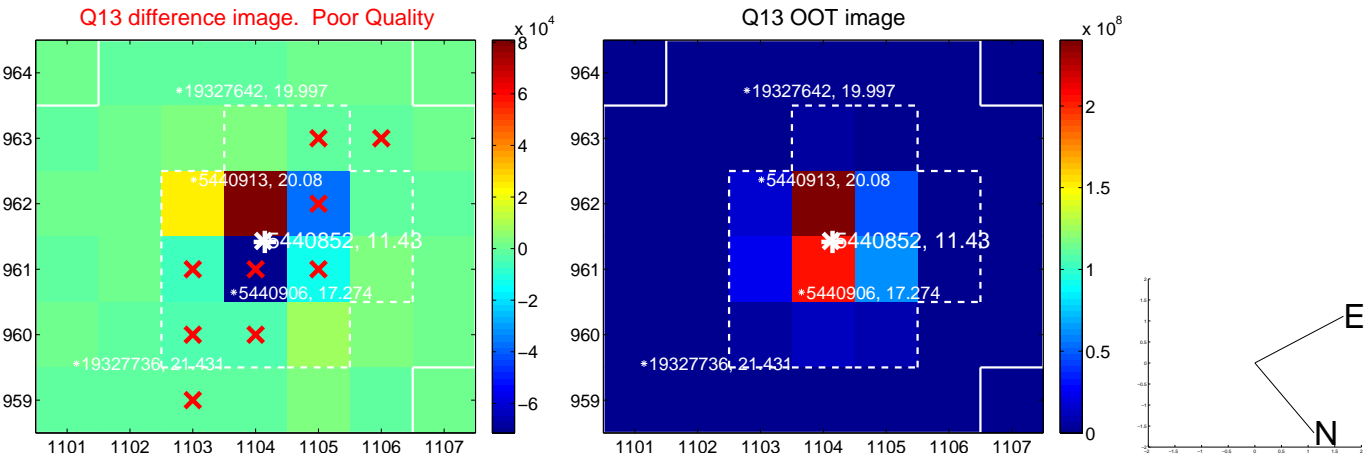
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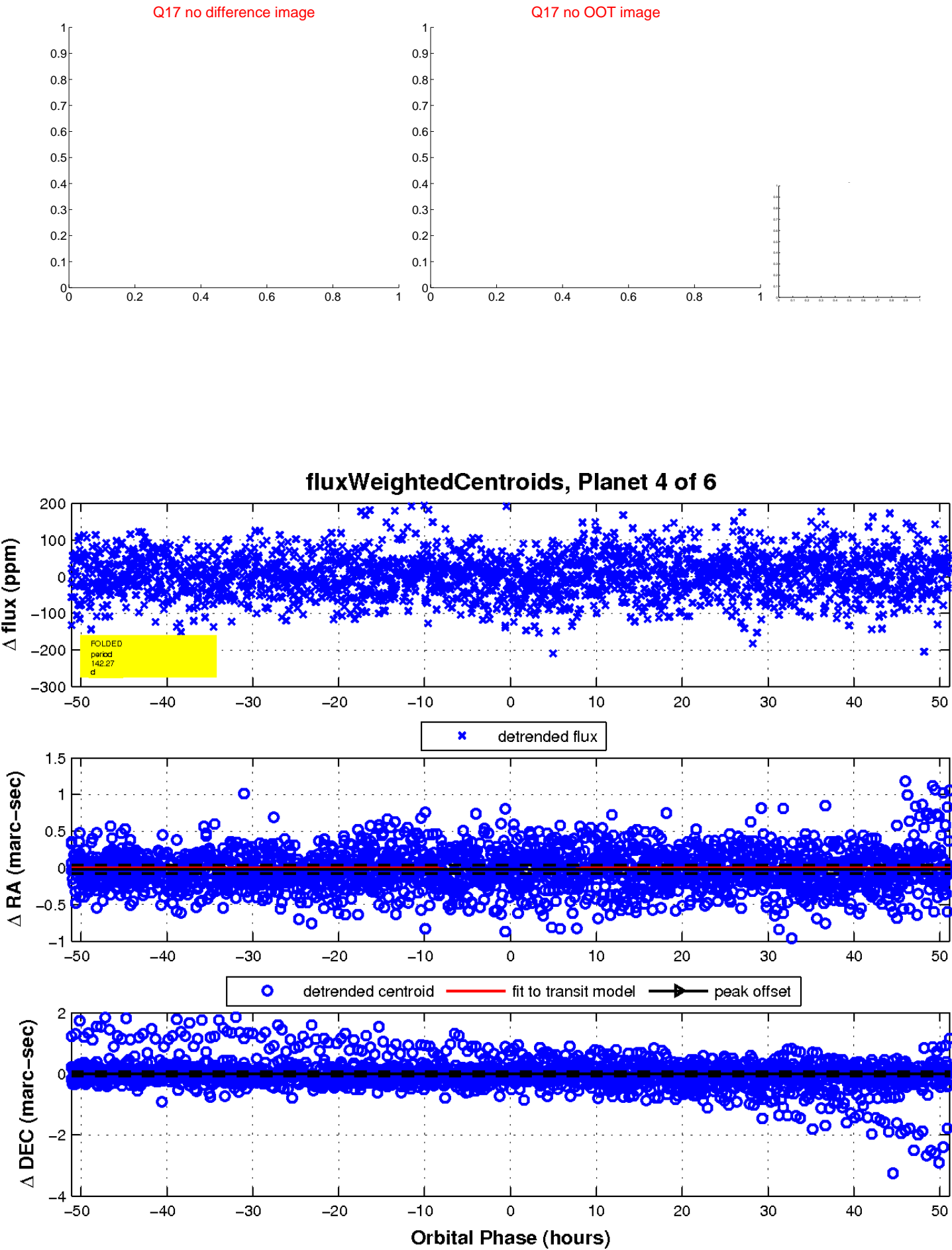
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



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



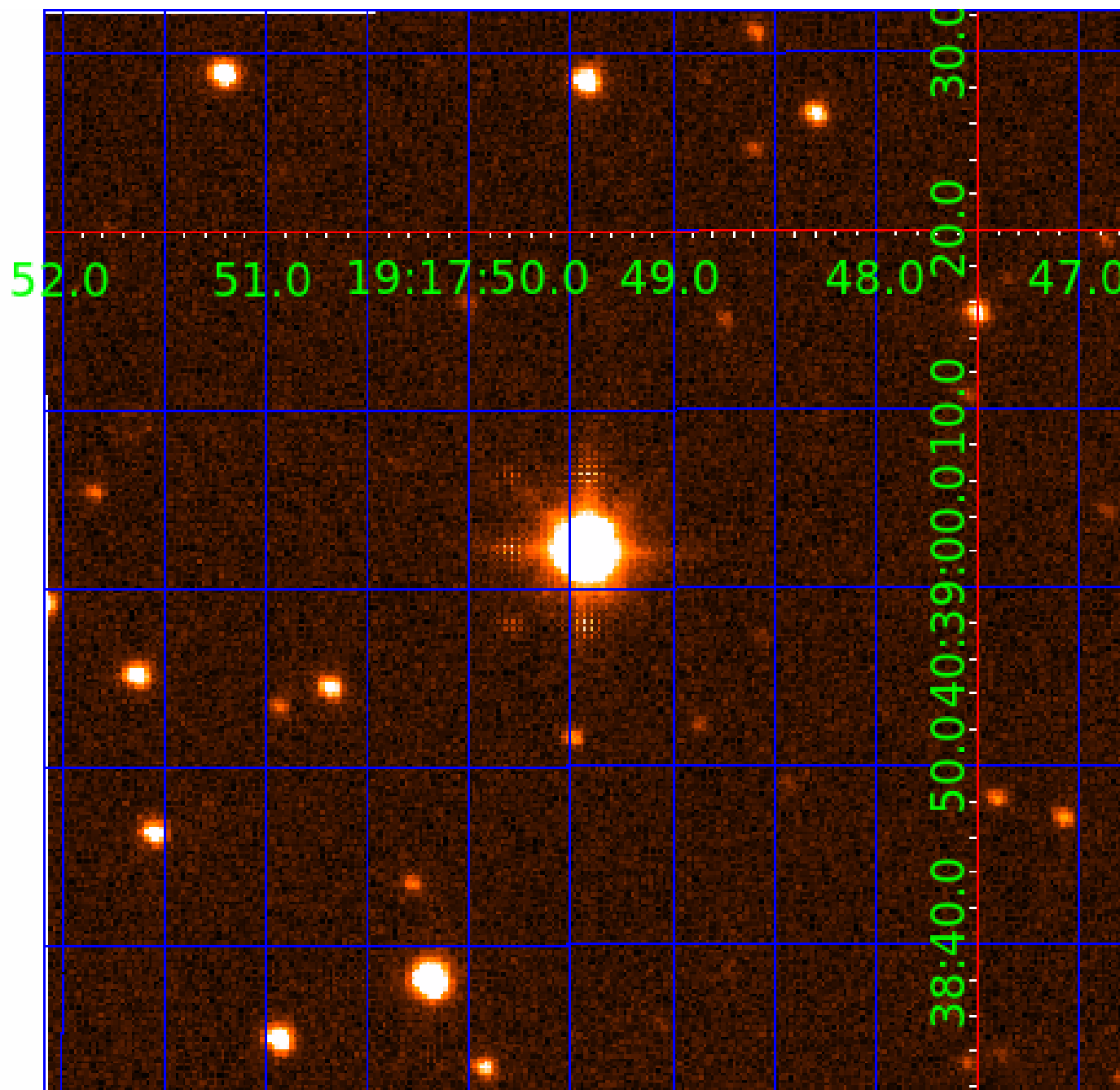
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image

Declination



# KIC 005440852

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005440852-01	OBS	No	579.702060	361.666686	87.1	14.093	8.1	7.6	1.63	8361	1.69	4.58
005440852-02	OBS	No	380.140181	357.759978	111.3	12.349	8.3	8.2	1.63	8361	1.94	8.04
005440852-03	OBS	No	3.908345	133.515333	5.0	18.806	8.1	7.2	1.63	8361	0.37	3598.01
005440852-04	OBS	No	142.273970	227.289186	50.8	17.056	10.3	7.1	1.63	8361	1.29	29.82
005440852-05	OBS	No	566.704510	295.096016	74.9	6.960	8.3	8.7	1.63	8361	1.61	4.72
005440852-06	OBS	No	47.371713	133.285303	52.2	4.892	7.1	7.4	1.63	8361	1.27	129.23

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005440852-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—ALL_TRANS_CHASES—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
005440852-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE—LPP_DV—ALL_TRANS_CHASES—CENT_SATURATED
005440852-03	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_SATURATED
005440852-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_SATURATED
005440852-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—ALL_TRANS_CHASES—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
005440852-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_ALT—CENT_SATURATED

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

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

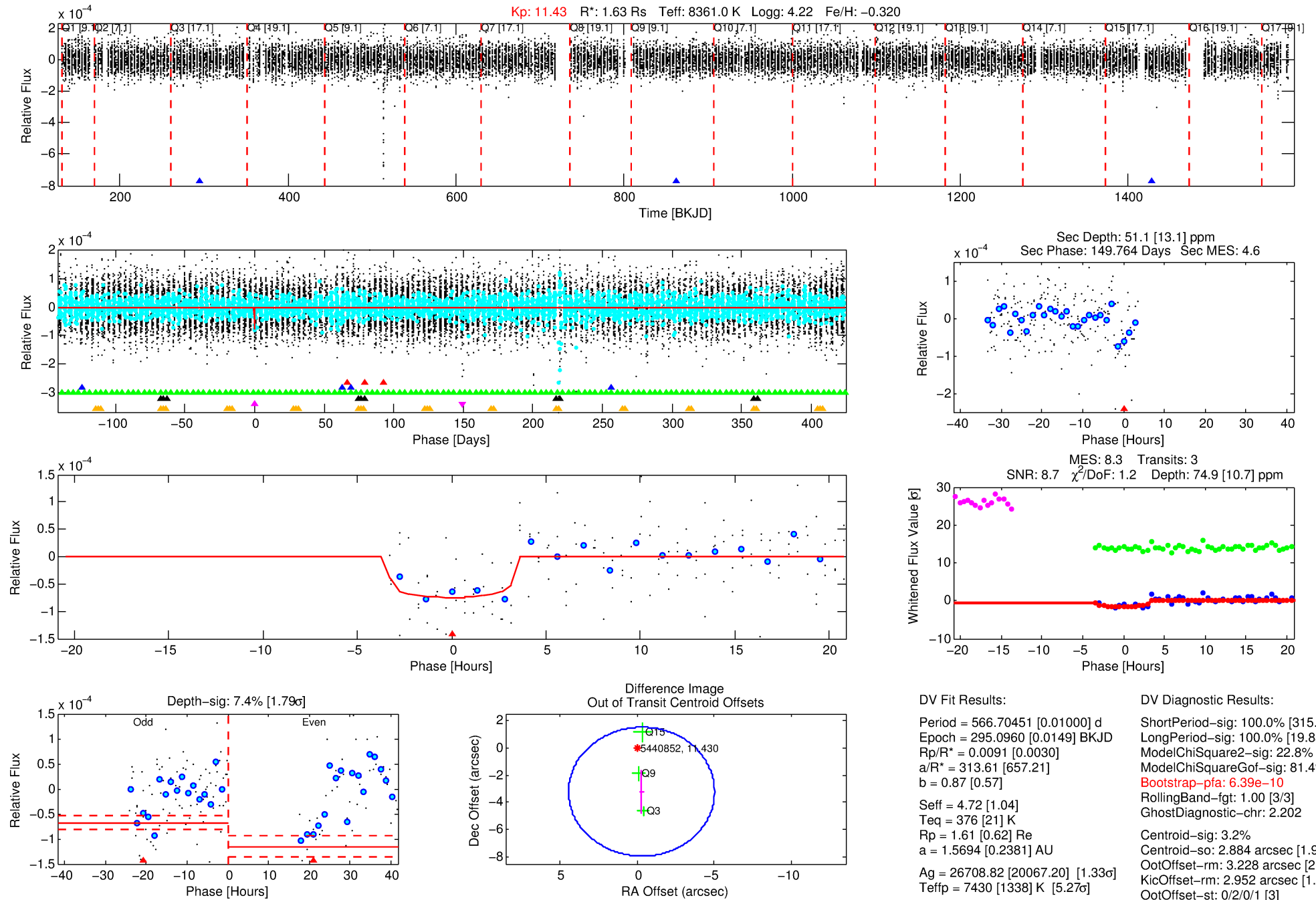
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 005440852-05

No Significant Match Found

# DV One-Page Summary

KIC: 5440852 Candidate: 5 of 6 Period: 566.705 d



## DV Fit Results:

Period = 566.70451 [0.01000] d  
Epoch = 295.0960 [0.0149] BKJD  
Rp/R\* = 0.0091 [0.0030]  
a/R\* = 313.61 [657.21]  
b = 0.87 [0.57]  
Seff = 4.72 [1.04]  
Teq = 376 [21] K  
Rp = 1.61 [0.62] Re  
a = 1.5694 [0.2381] AU  
Ag = 26708.82 [20067.20] [1.33 $\sigma$ ]  
Teff = 7430 [1338] K [5.27 $\sigma$ ]

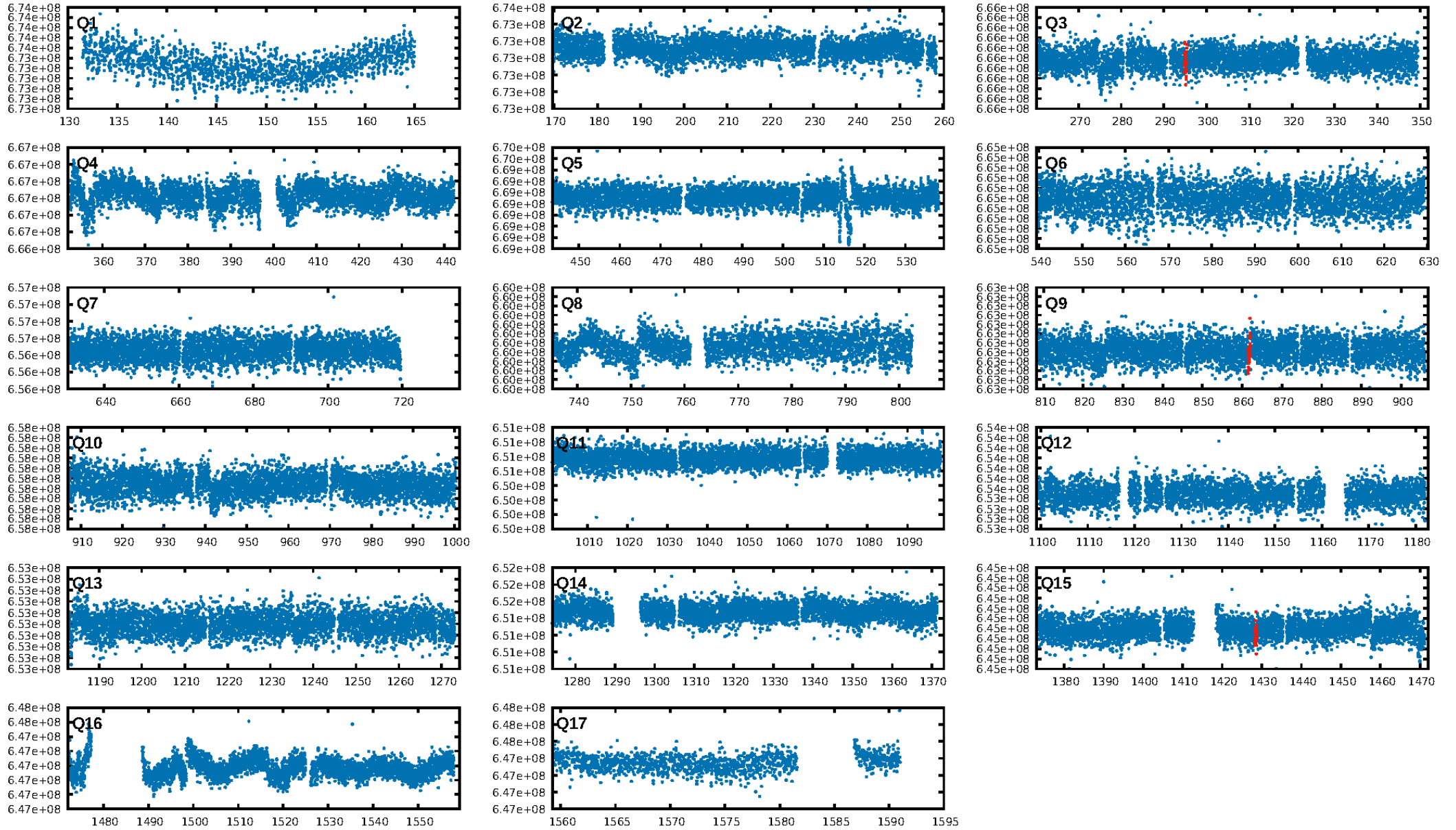
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [315.87 $\sigma$ ]  
LongPeriod-sig: 100.0% [19.85 $\sigma$ ]  
ModelChiSquare2-sig: 22.8%  
ModelChiSquareGof-sig: 81.4%  
**Bootstrap-pfa: 6.39e-10**  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 2.202  
Centroid-sig: 3.2%  
Centroid-so: 2.884 arcsec [1.90 $\sigma$ ]  
OotOffset-rm: 3.228 arcsec [2.05 $\sigma$ ]  
KicOffset-rm: 2.952 arcsec [1.58 $\sigma$ ]  
OotOffset-st: 0/2/0/1 [3]  
KicOffset-st: 0/2/0/1 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 1.00 [3/3]

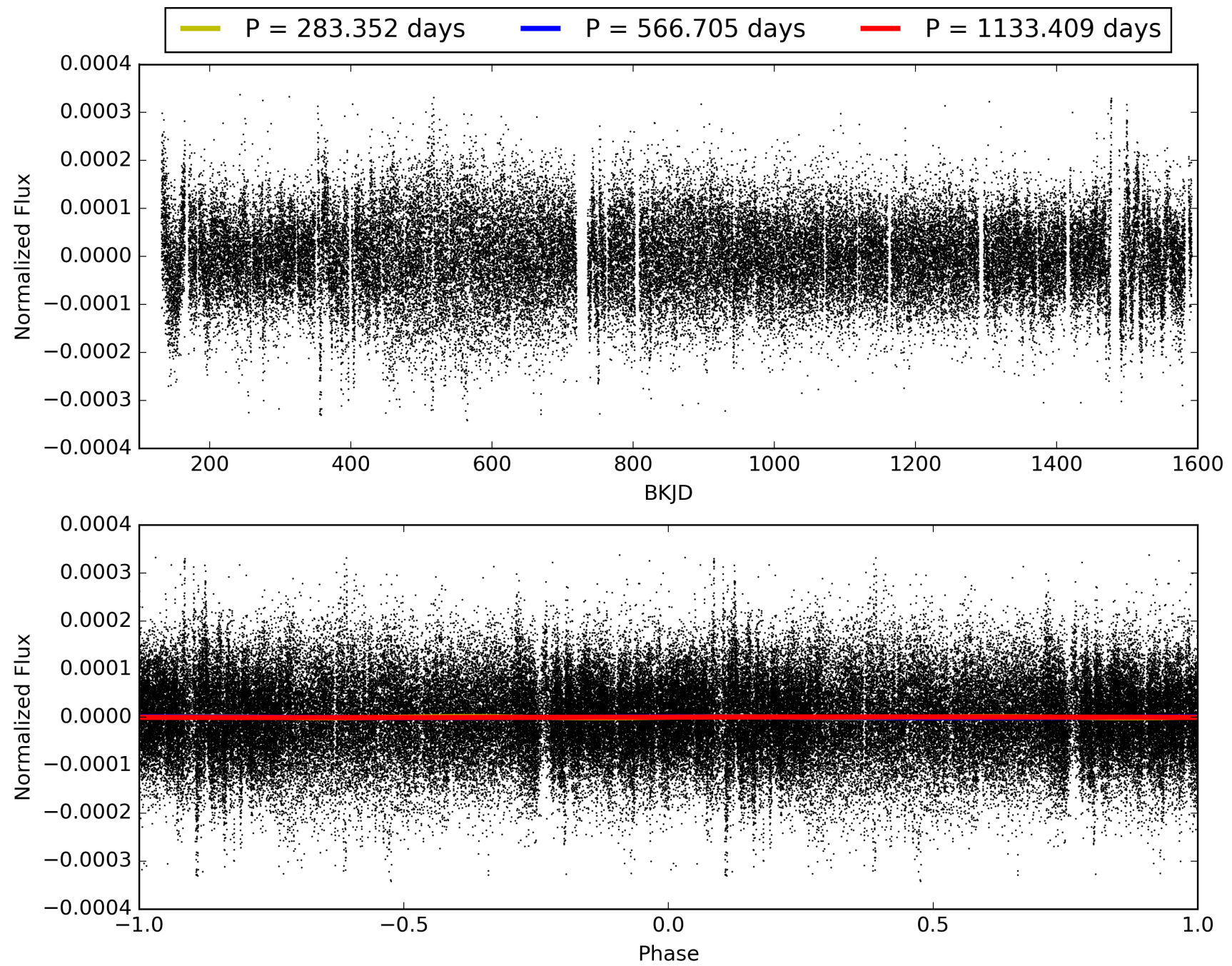
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 10:44:38 Z

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

# TCE 005440852-05, PDC Light Curves

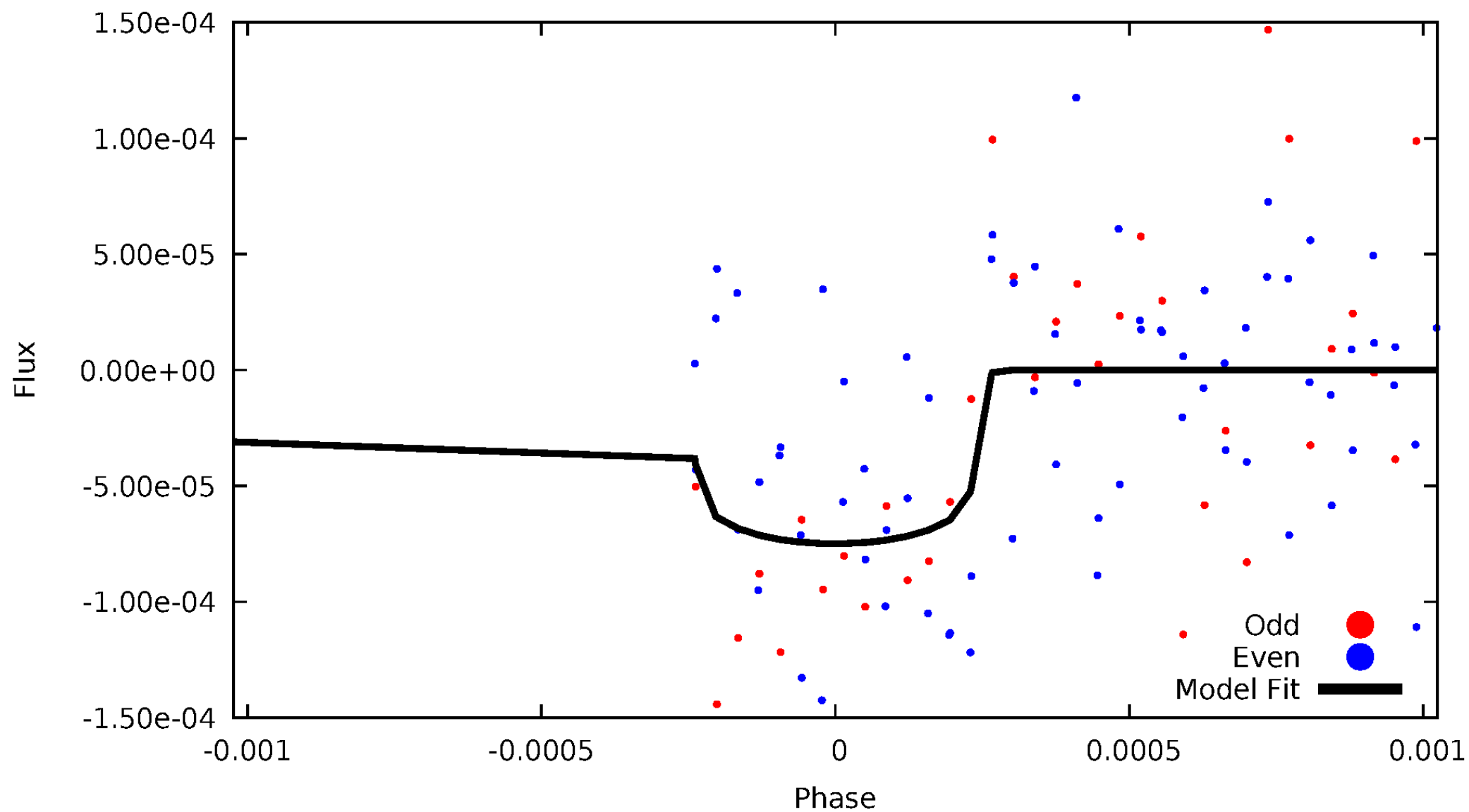


TCE 005440852-05



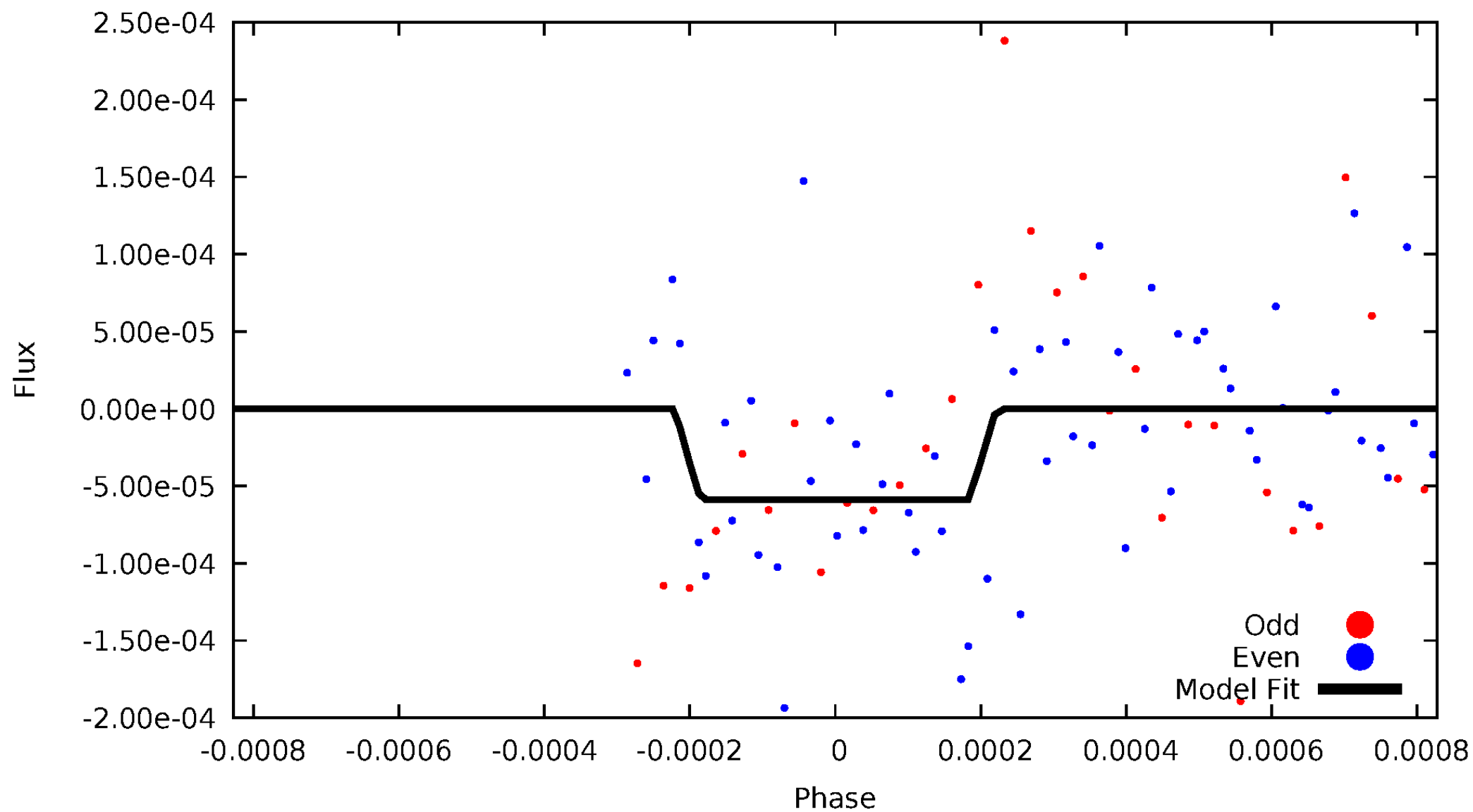
# DV Odd/Even

TCE 005440852-05



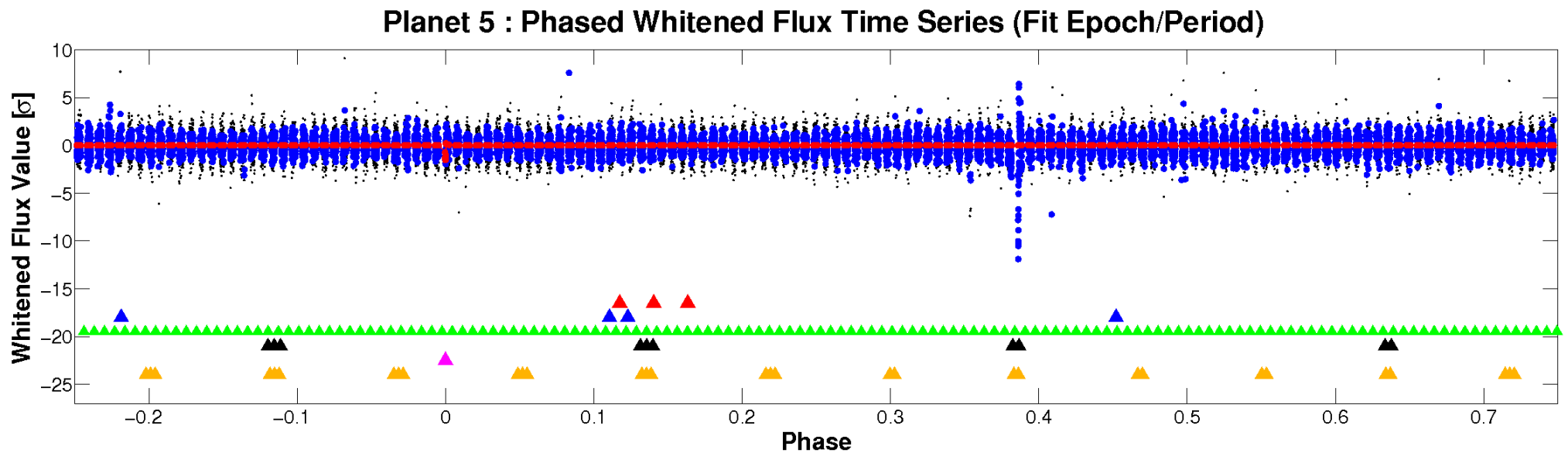
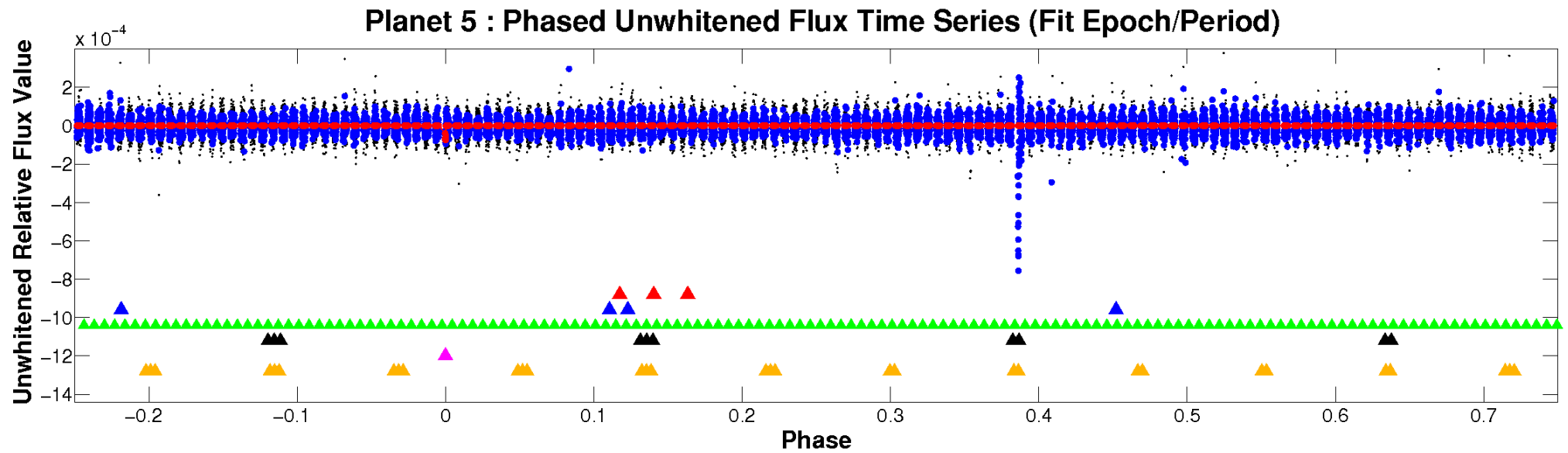
# ALT Odd/Even

TCE 005440852-05



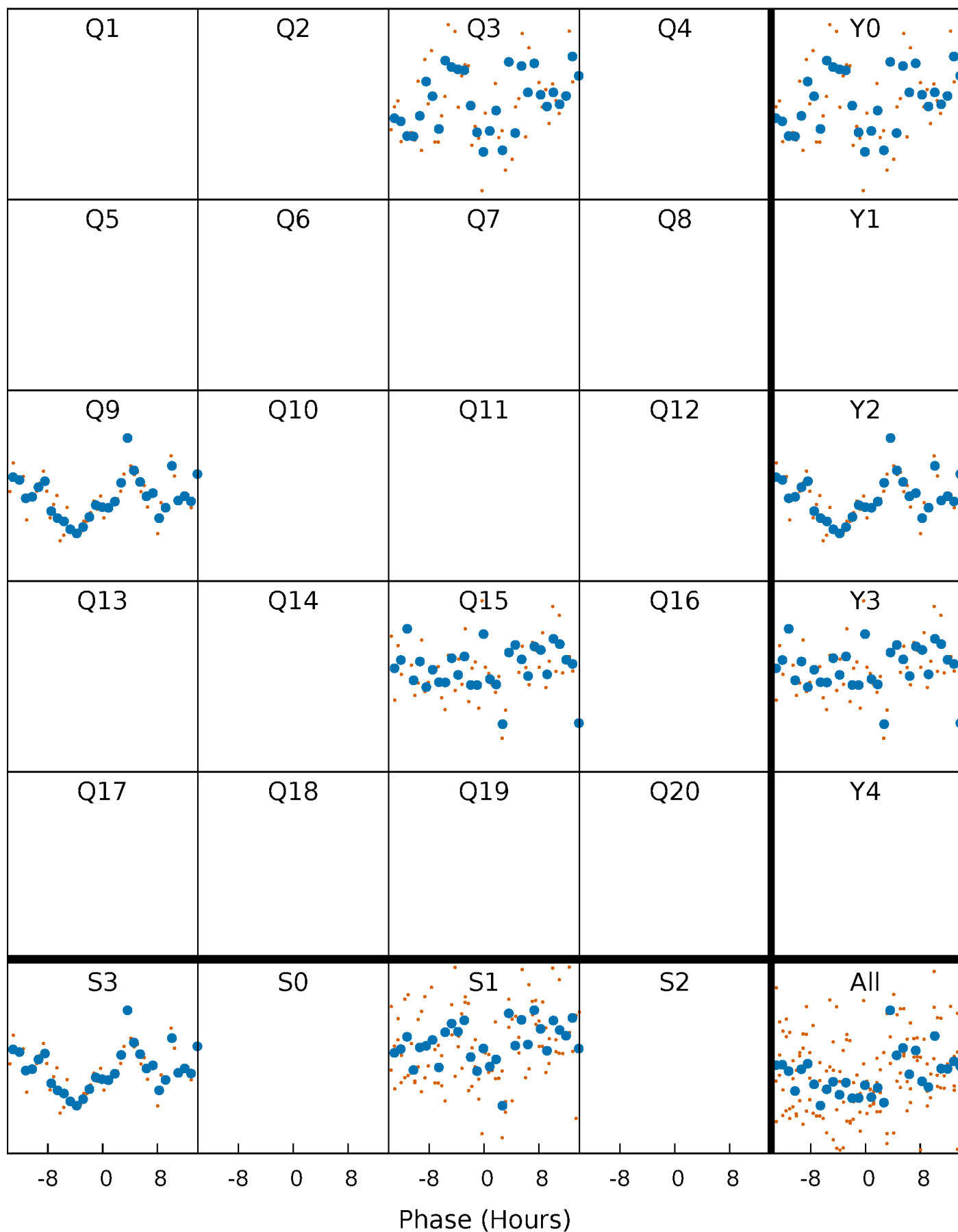


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

TCE 005440852-05    P=566.704510 Days     $T_0=295.096016$  (BKJD)



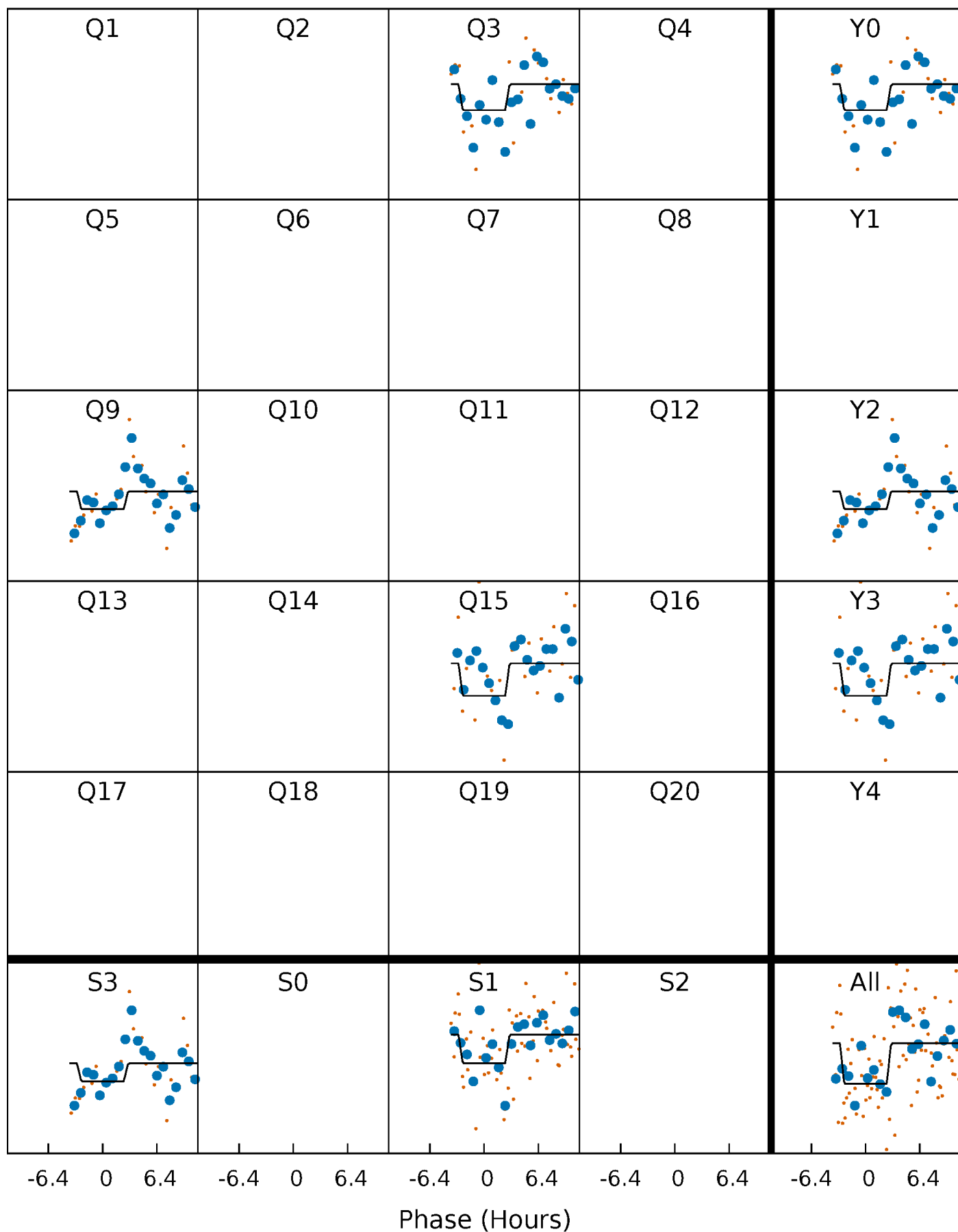
## DV Quarter-Phased Transit Curves

TCE 005440852-05    P=566.704510 Days     $T_0=295.096016$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

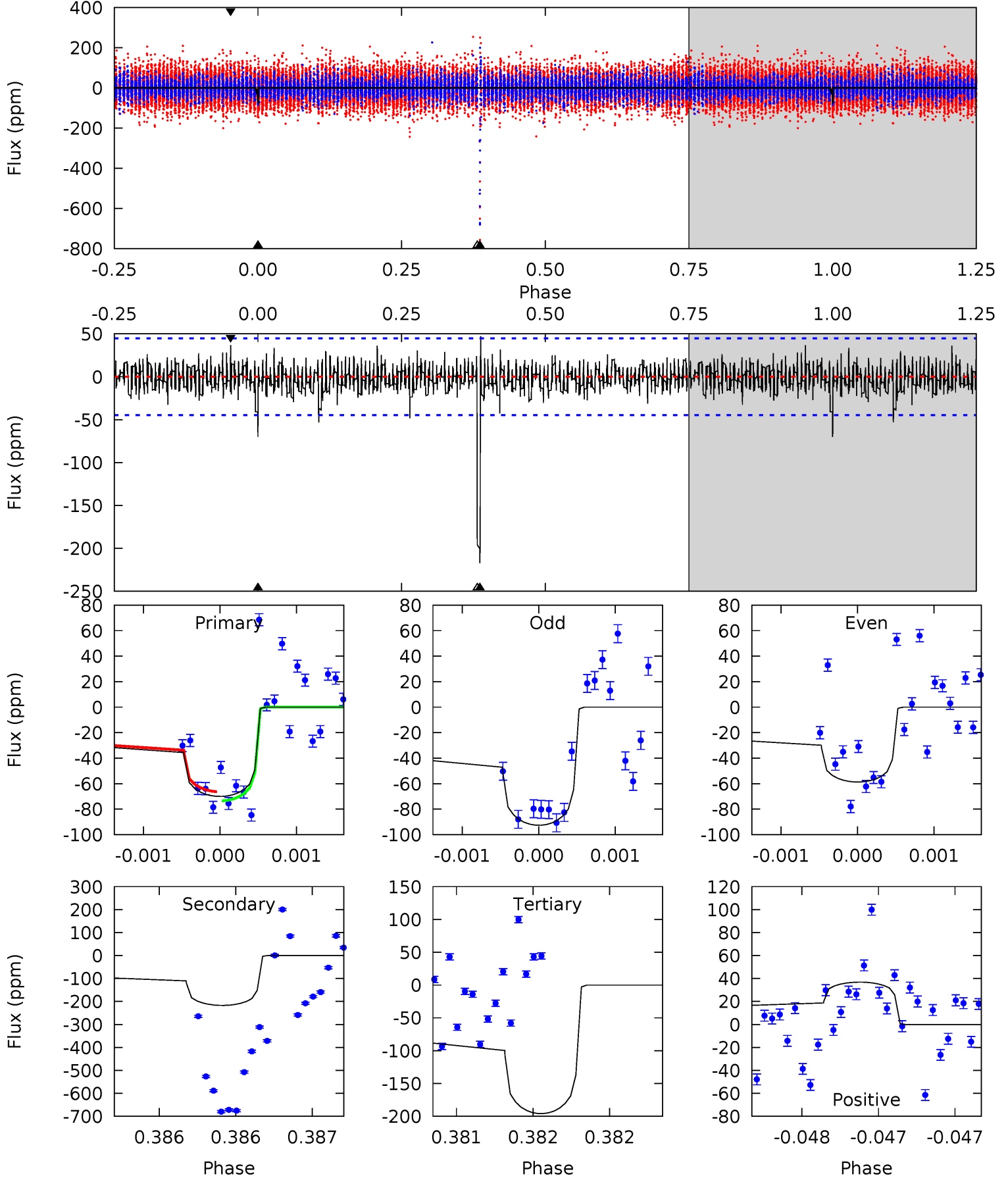
TCE 005440852-05     $P=566.697542$  Days     $T_0=295.122517$  (BKJD)



# DV Model-Shift Uniqueness Test

005440852-05, P = 566.704510 Days, E = 295.096016 Days

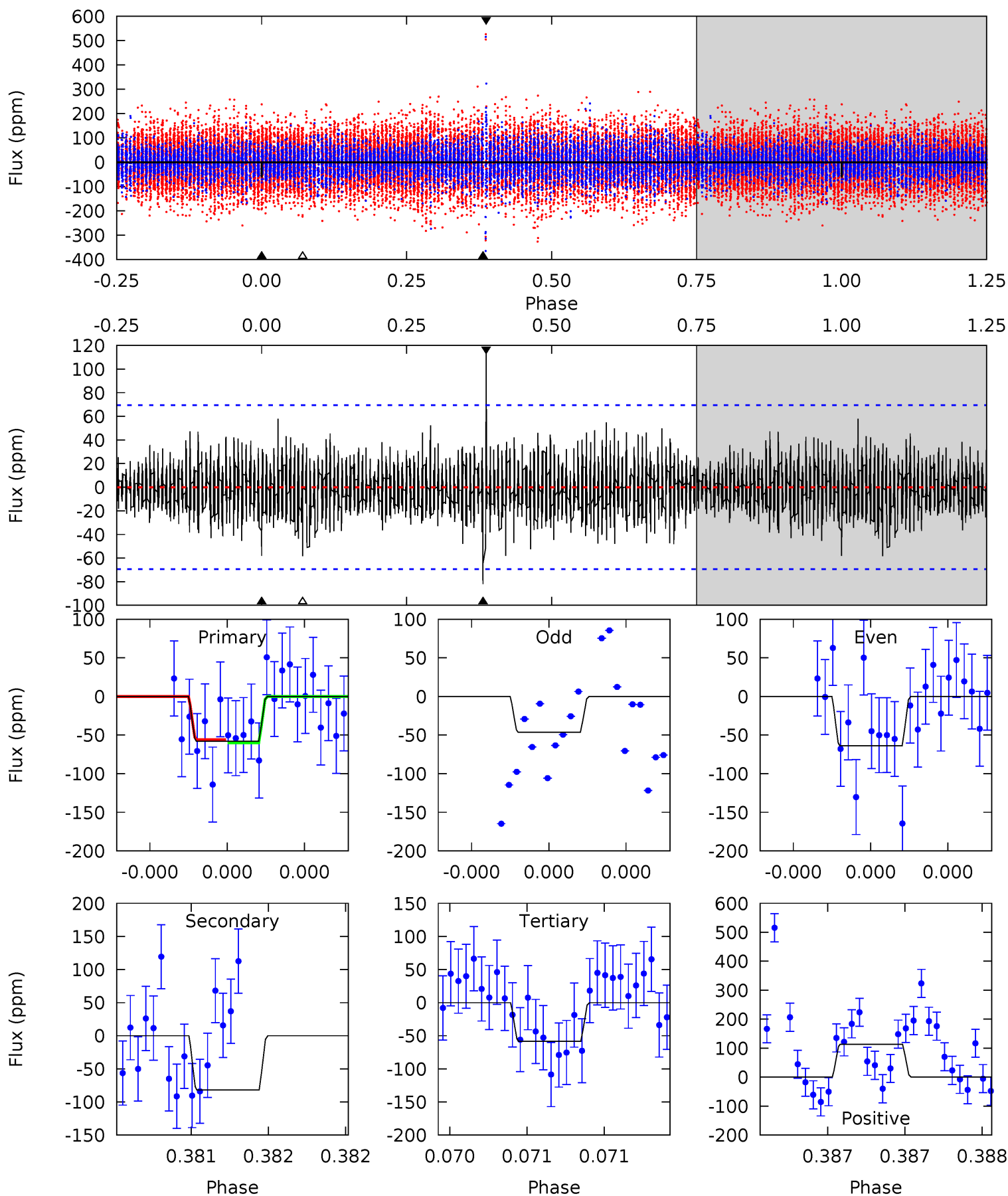
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.73	27.1	24.4	4.59	5.57	3.48	1.44	-15.7	4.14	2.65	22.5	2.01	1.06	0.18	0.44



# Alt Model-Shift Uniqueness Test

005440852-05, P = 566.697542 Days, E = 295.122517 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
4.69	6.60	4.69	9.15	5.59	3.51	1.37	-0.01	-4.46	1.91	-2.55	0.66	1.25	0.58	0.16



### Stellar Parameters For KIC 005440852

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$8361^{+75}_{-83}$	$4.219^{+0.063}_{-0.117}$	$-0.320^{+0.050}_{-0.200}$	$1.630^{+0.299}_{-0.149}$	$1.603^{+0.129}_{-0.108}$	$0.521^{+0.137}_{-0.182}$
	+1%/-1%	+1%/-3%	+16%/-62%	+18%/-9%	+8%/-7%	+26%/-35%
Source	SPE68	SPE68	SPE68	DSEP		

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

### Secondary Eclipse Parameters for KIC 005440852-05 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-217 \pm 8$	$1.68^{+0.51}_{-0.55}$	$527^{+22}_{-13}$	$11721^{+5040}_{-2222}$	$104406^{+123204}_{-42600}$
Alt.	$-82 \pm 12$	$1.35^{+0.61}_{-0.52}$	$527^{+22}_{-14}$	$9418^{+4566}_{-1908}$	$60686^{+105386}_{-32844}$

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



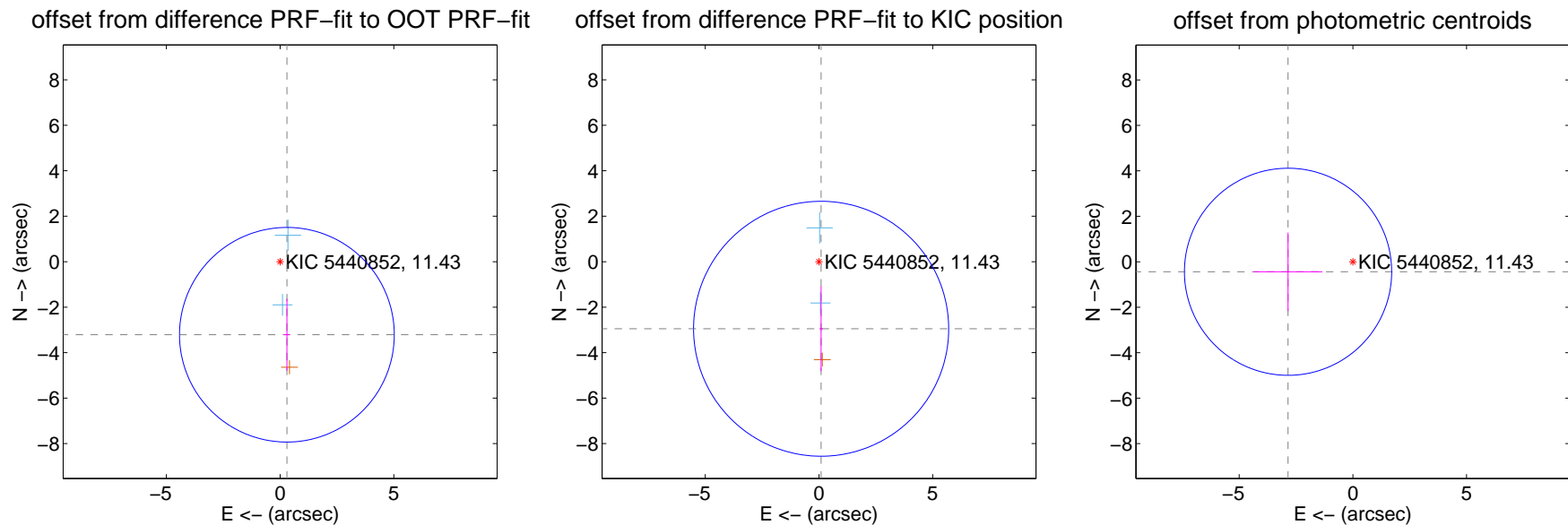
## DV Centroid Data

Supplemental centroid analysis for 005440852-05. **Kepler magnitude: 11.43.** Transit SNR 8.66

**There are 2 quarters with good PRF difference image offsets**

The direct PRF centroid is offset from the target star catalog position by about 0.45 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$3.228 \pm 1.574$	2.05	$-0.299 \pm 0.126$	$-3.214 \pm 1.581$
PRF-fit source offset from KIC position	$2.952 \pm 1.869$	1.58	$-0.094 \pm 0.077$	$-2.951 \pm 1.869$
photometric centroid source offset	$2.88 \pm 1.52$	1.90	$2.85 \pm 1.51$	$-0.44 \pm 1.72$



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



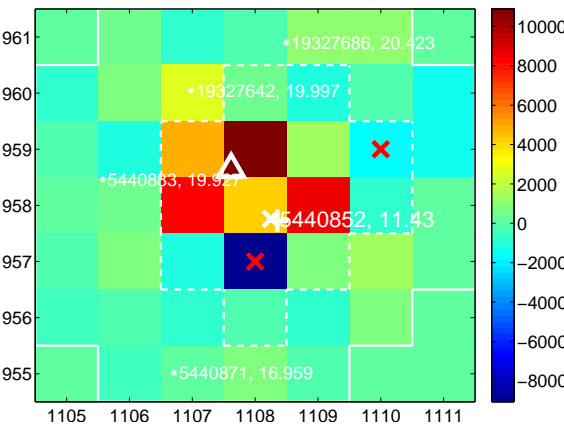
Q2 no difference image



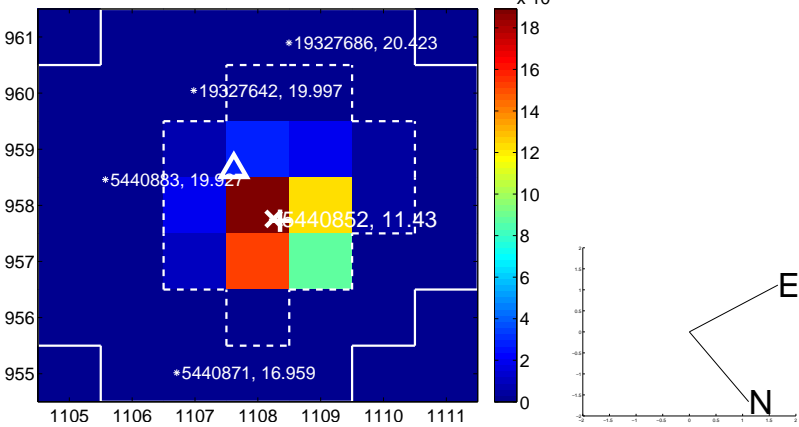
Q2 no OOT image



Q3 difference image. Poor Quality



Q3 OOT image



Q4 no difference image



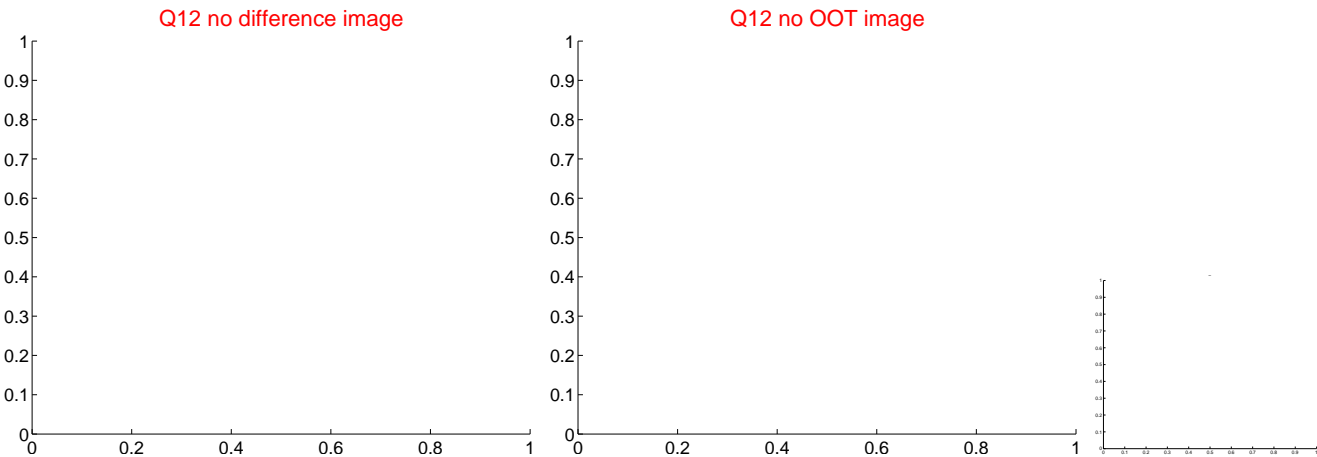
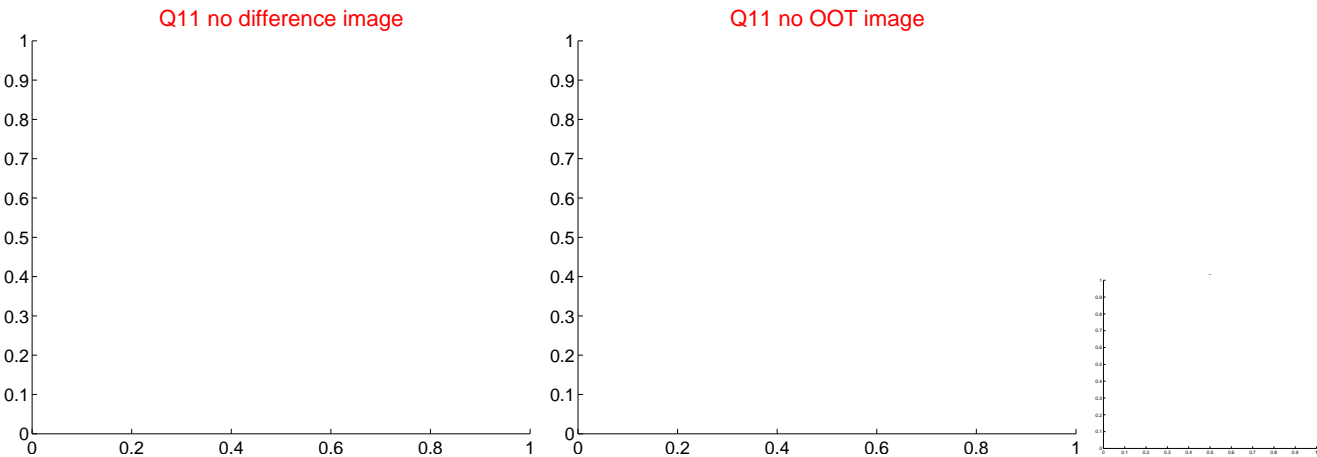
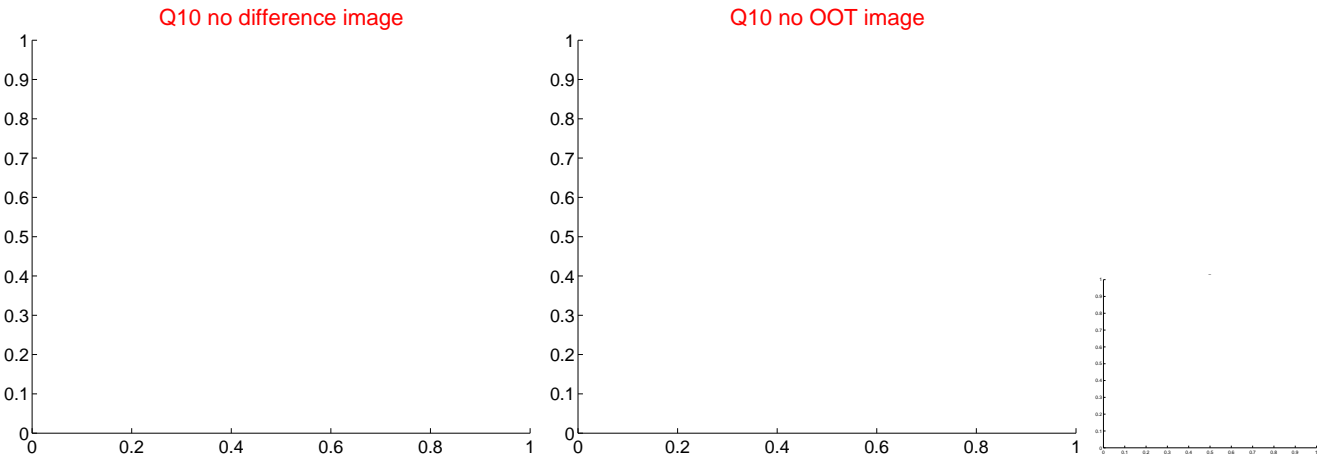
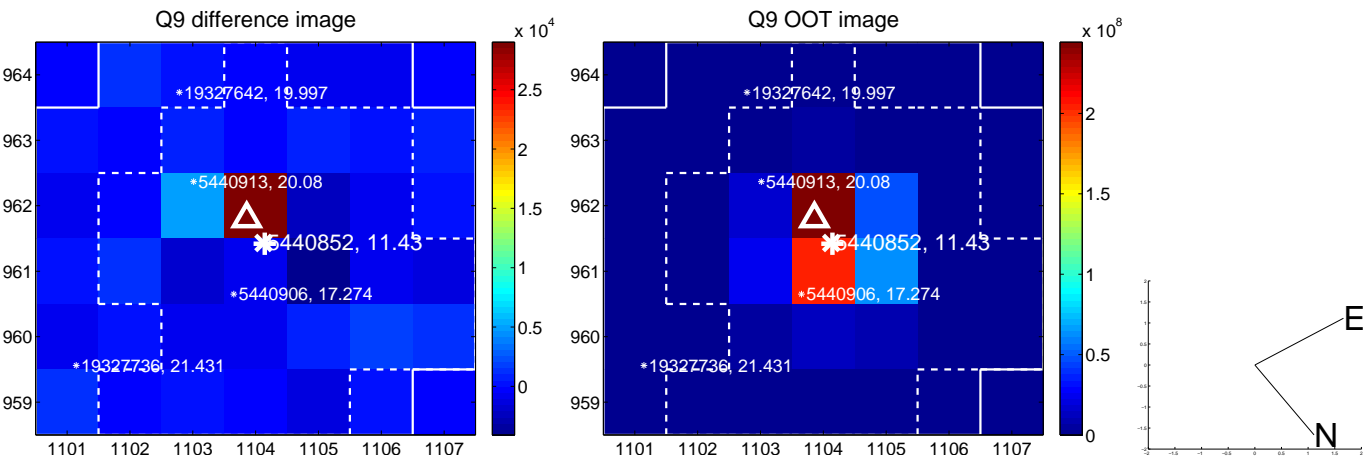
Q4 no OOT image



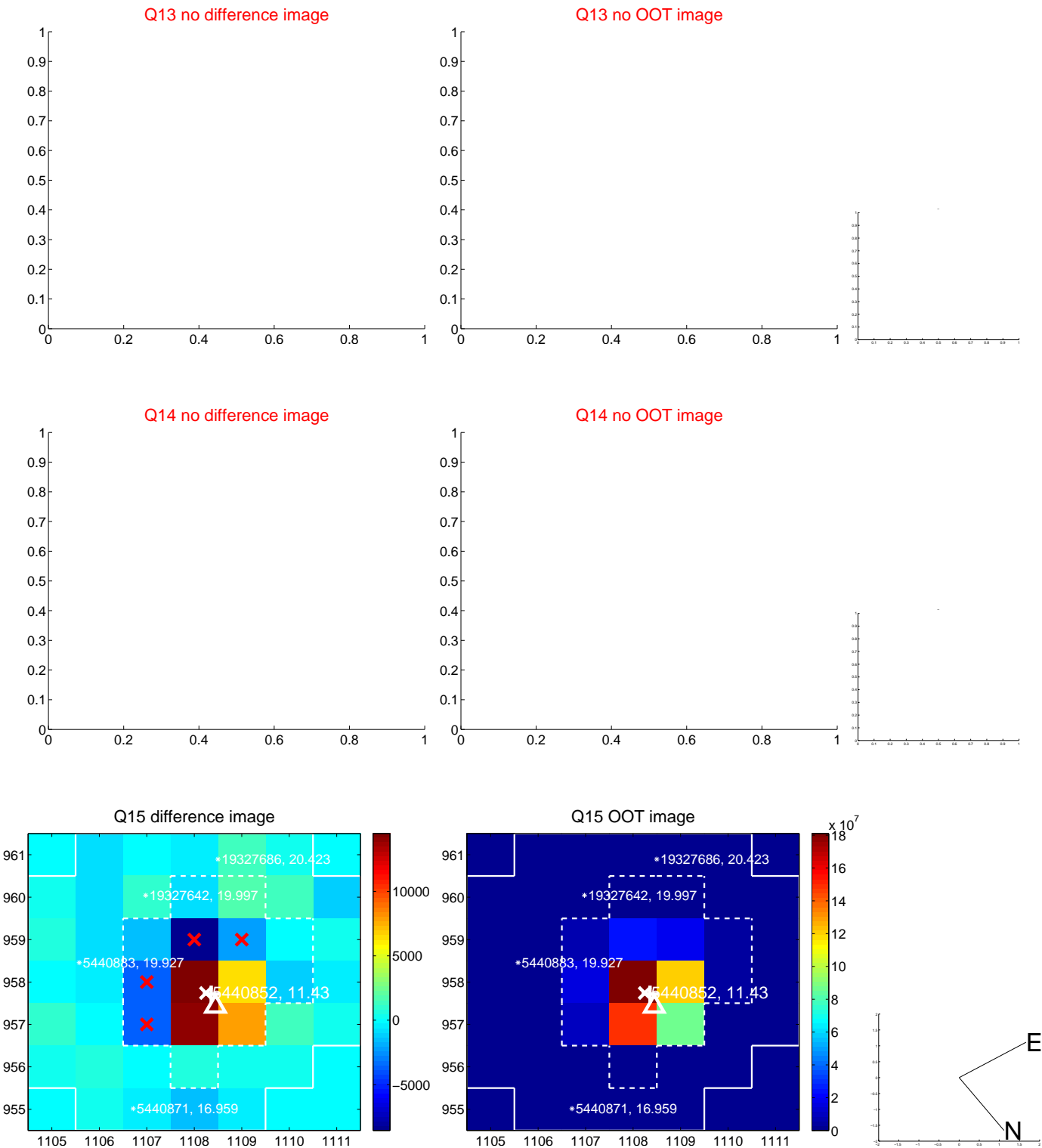
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



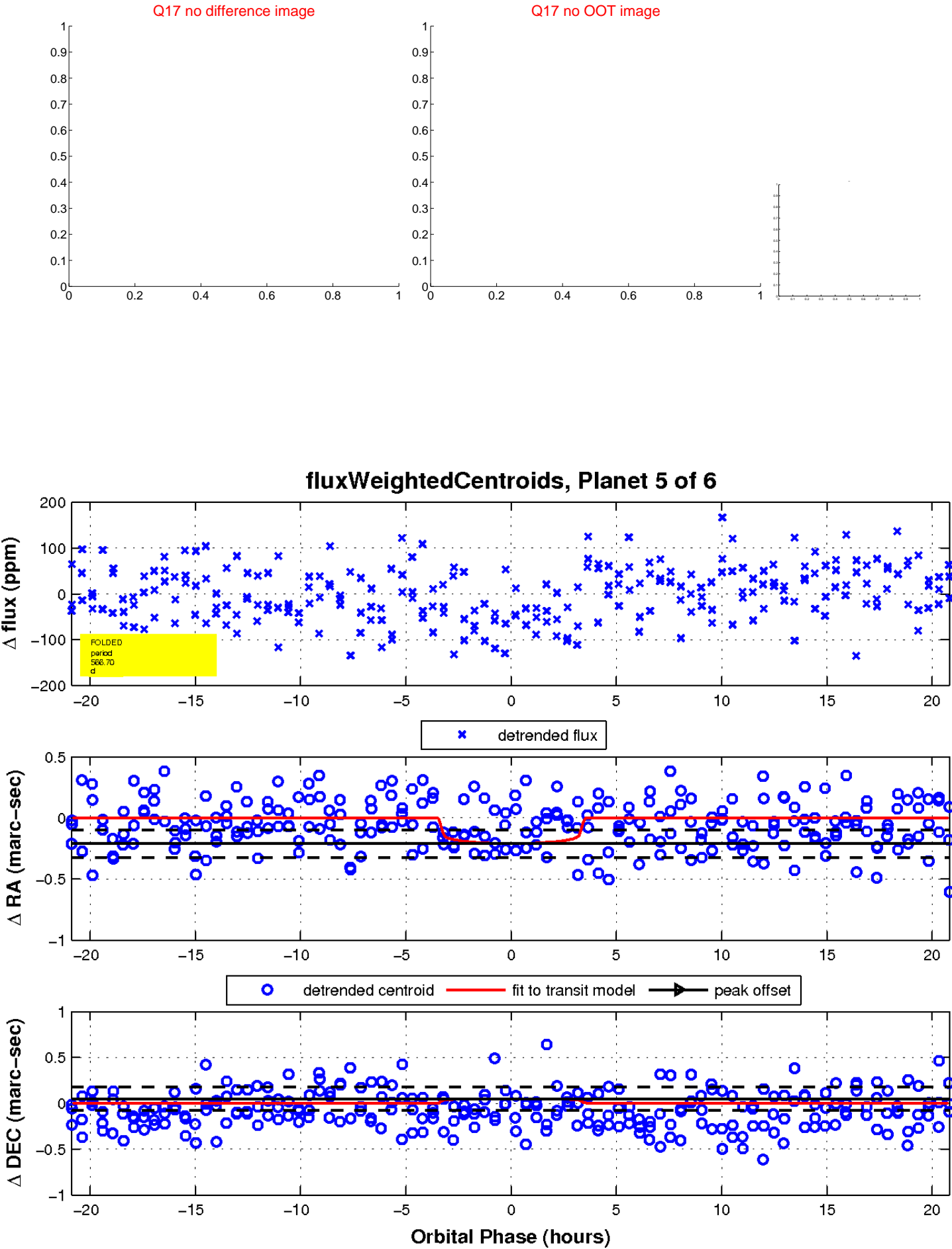
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

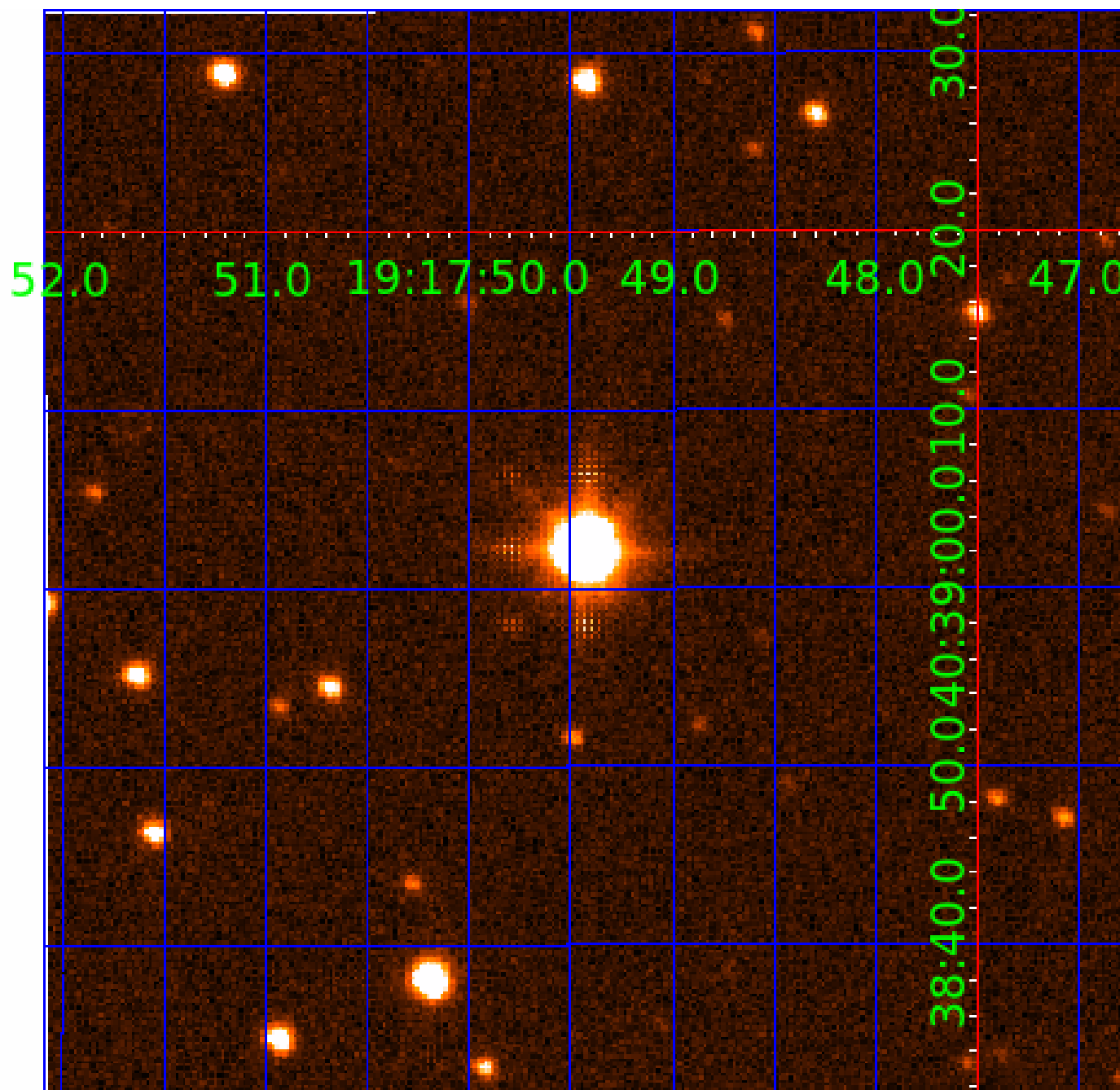


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 005440852

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005440852-01	OBS	No	579.702060	361.666686	87.1	14.093	8.1	7.6	1.63	8361	1.69	4.58
005440852-02	OBS	No	380.140181	357.759978	111.3	12.349	8.3	8.2	1.63	8361	1.94	8.04
005440852-03	OBS	No	3.908345	133.515333	5.0	18.806	8.1	7.2	1.63	8361	0.37	3598.01
005440852-04	OBS	No	142.273970	227.289186	50.8	17.056	10.3	7.1	1.63	8361	1.29	29.82
005440852-05	OBS	No	566.704510	295.096016	74.9	6.960	8.3	8.7	1.63	8361	1.61	4.72
005440852-06	OBS	No	47.371713	133.285303	52.2	4.892	7.1	7.4	1.63	8361	1.27	129.23

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005440852-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—ALL_TRANS_CHASES—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
005440852-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE—LPP_DV—ALL_TRANS_CHASES—CENT_SATURATED
005440852-03	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_SATURATED
005440852-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_SATURATED
005440852-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—ALL_TRANS_CHASES—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
005440852-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_ALT—CENT_SATURATED

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

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

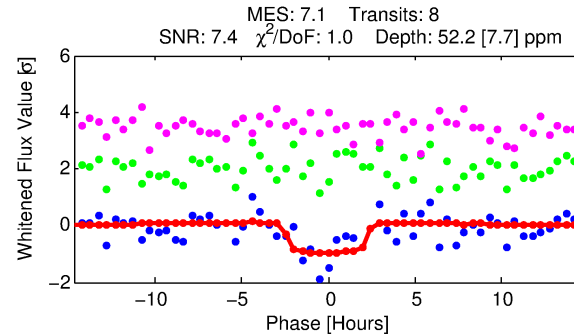
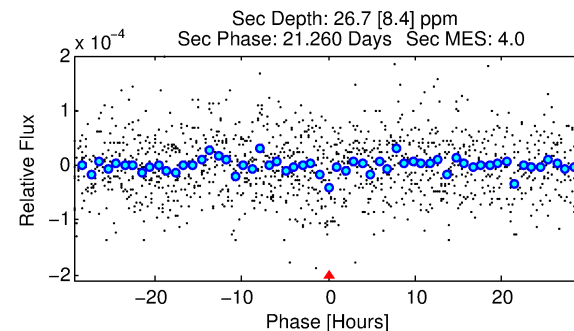
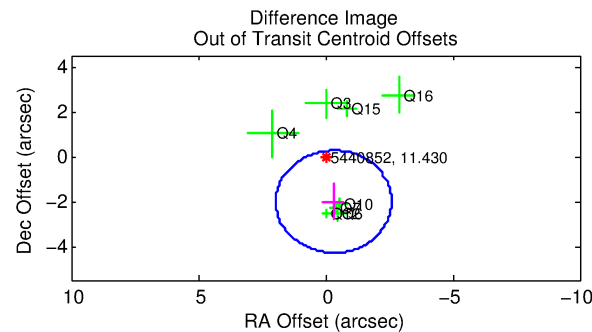
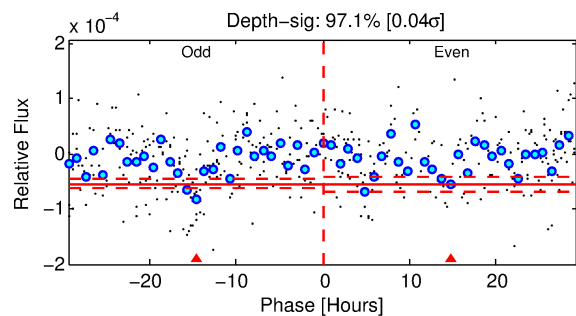
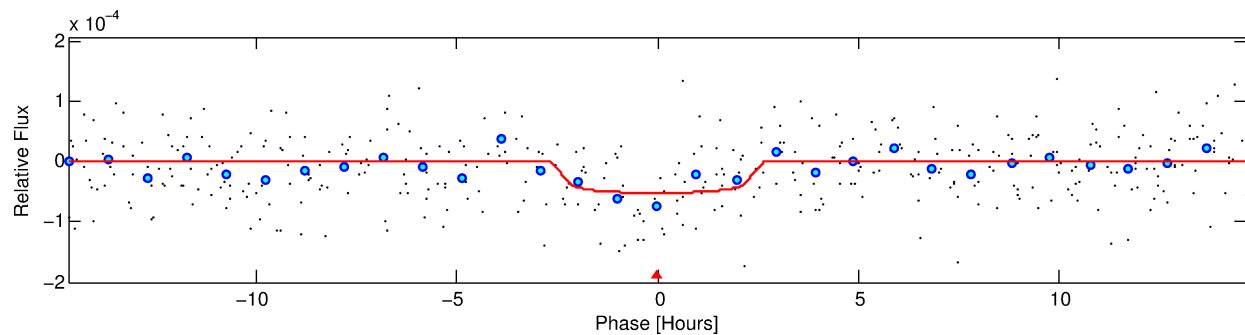
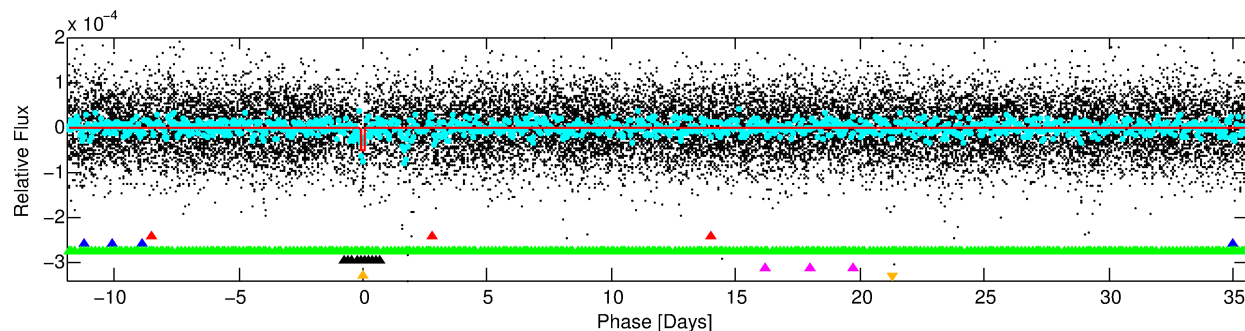
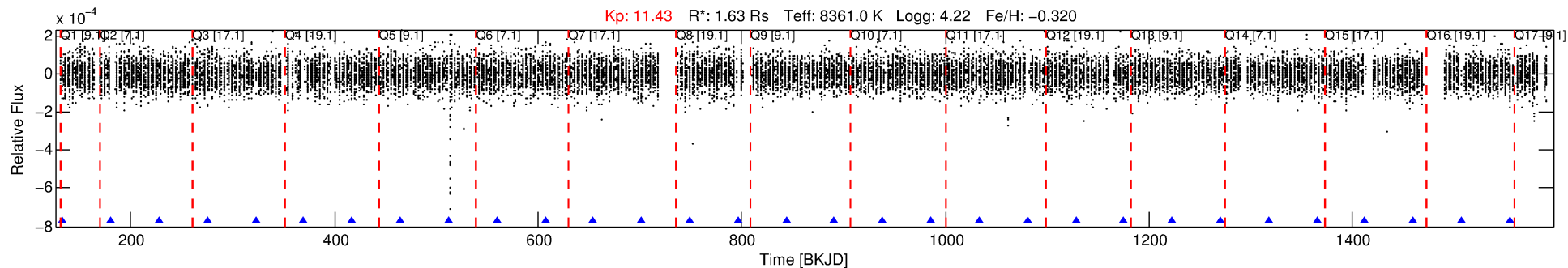
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 005440852-06

No Significant Match Found

# DV One-Page Summary

KIC: 5440852 Candidate: 6 of 6 Period: 47.372 d



## DV Fit Results:

Period = 47.37171 [0.00099] d  
Epoch = 133.2853 [0.0192] BKJD  
Rp/R\* = 0.0071 [0.0036]  
a/R\* = 52.48 [157.65]  
b = 0.71 [2.07]  
Seff = 129.23 [28.54]  
Teq = 860 [47] K  
Rp = 1.27 [0.67] Re  
a = 0.3000 [0.0455] AU  
Ag = 823.22 [881.41] [0.93 $\sigma$ ]  
Teffp = 7120 [1868] K [3.35 $\sigma$ ]

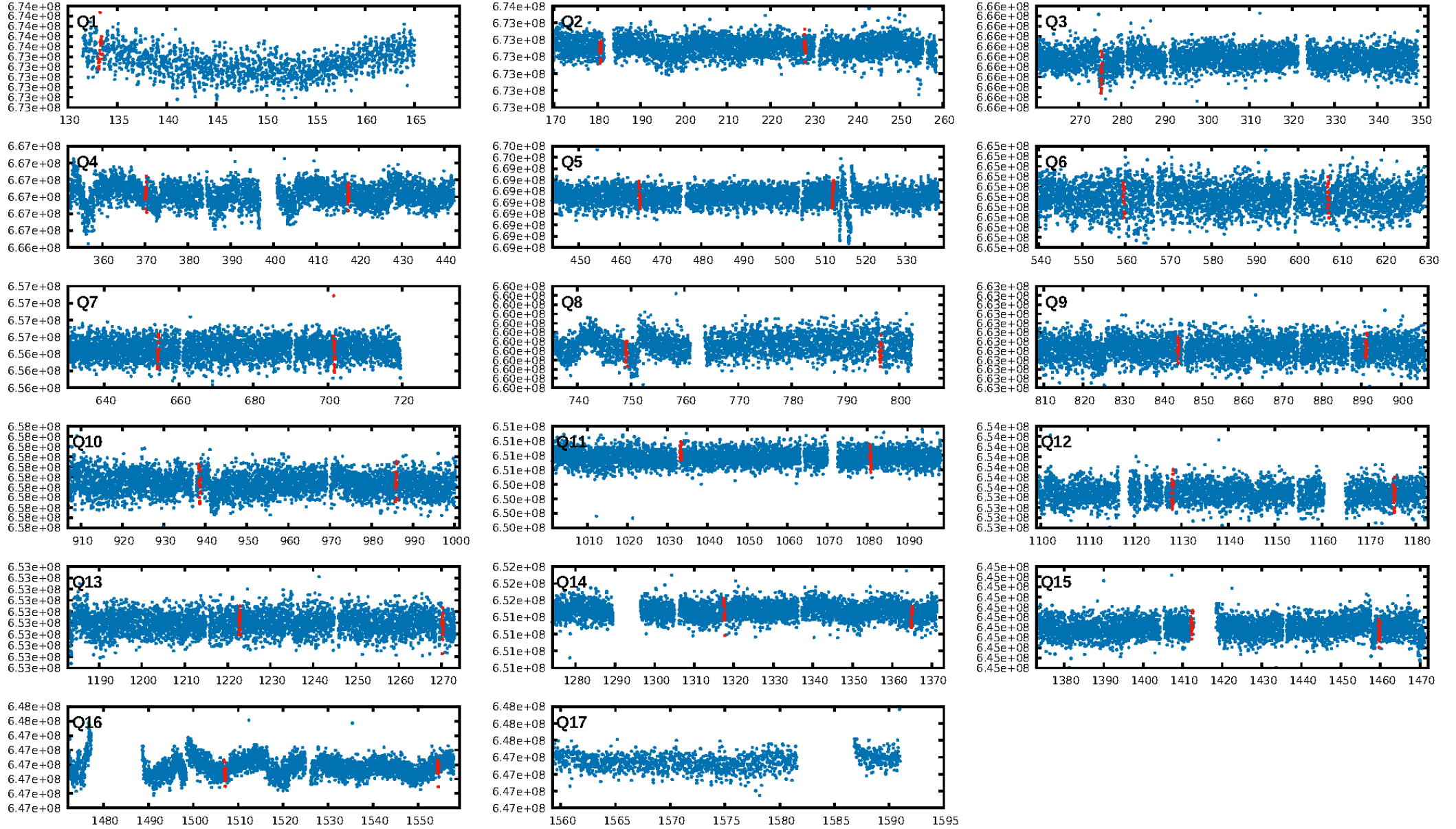
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [53.68 $\sigma$ ]  
LongPeriod-sig: 100.0% [128.36 $\sigma$ ]  
ModelChiSquare2-sig: 38.2%  
ModelChiSquareGof-sig: 99.2%  
**Bootstrap-pfa: 3.04e-09**  
RollingBand-fgt: 1.00 [8/8]  
GhostDiagnostic-chr: 2.475  
**Centroid-sig: 0.2%**  
Centroid-so: 2.093 arcsec [2.45 $\sigma$ ]  
OotOffset-rm: 2.040 arcsec [2.69 $\sigma$ ]  
KicOffset-rm: 1.737 arcsec [2.12 $\sigma$ ]  
OotOffset-st: 2/3/3/0 [8]  
KicOffset-st: 2/3/3/0 [8]  
DiffImageQuality-fgm: 0.75 [6/8]  
DiffImageOverlap-fno: 0.56 [9/16]

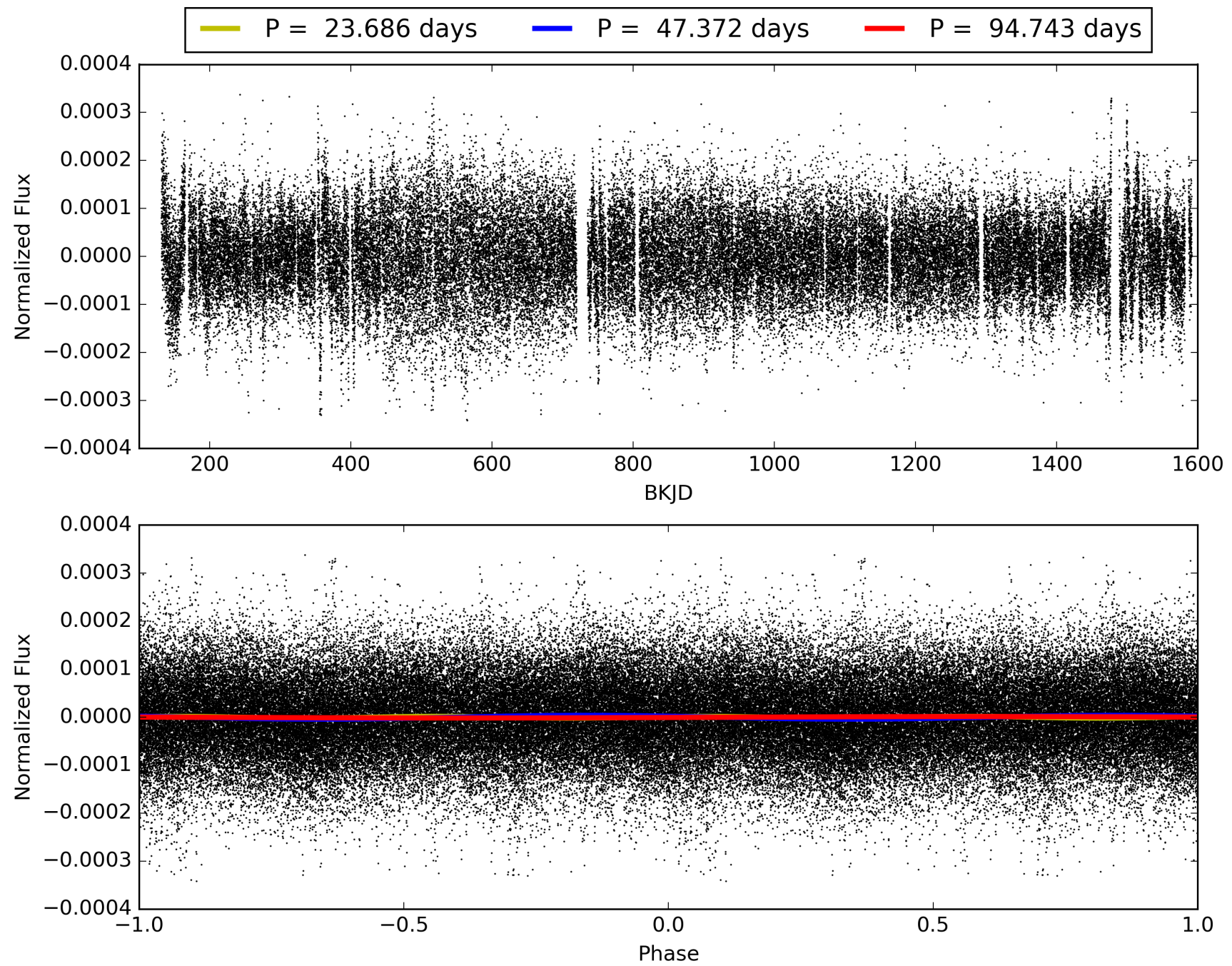
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 10:44:42 Z

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

# TCE 005440852-06, PDC Light Curves

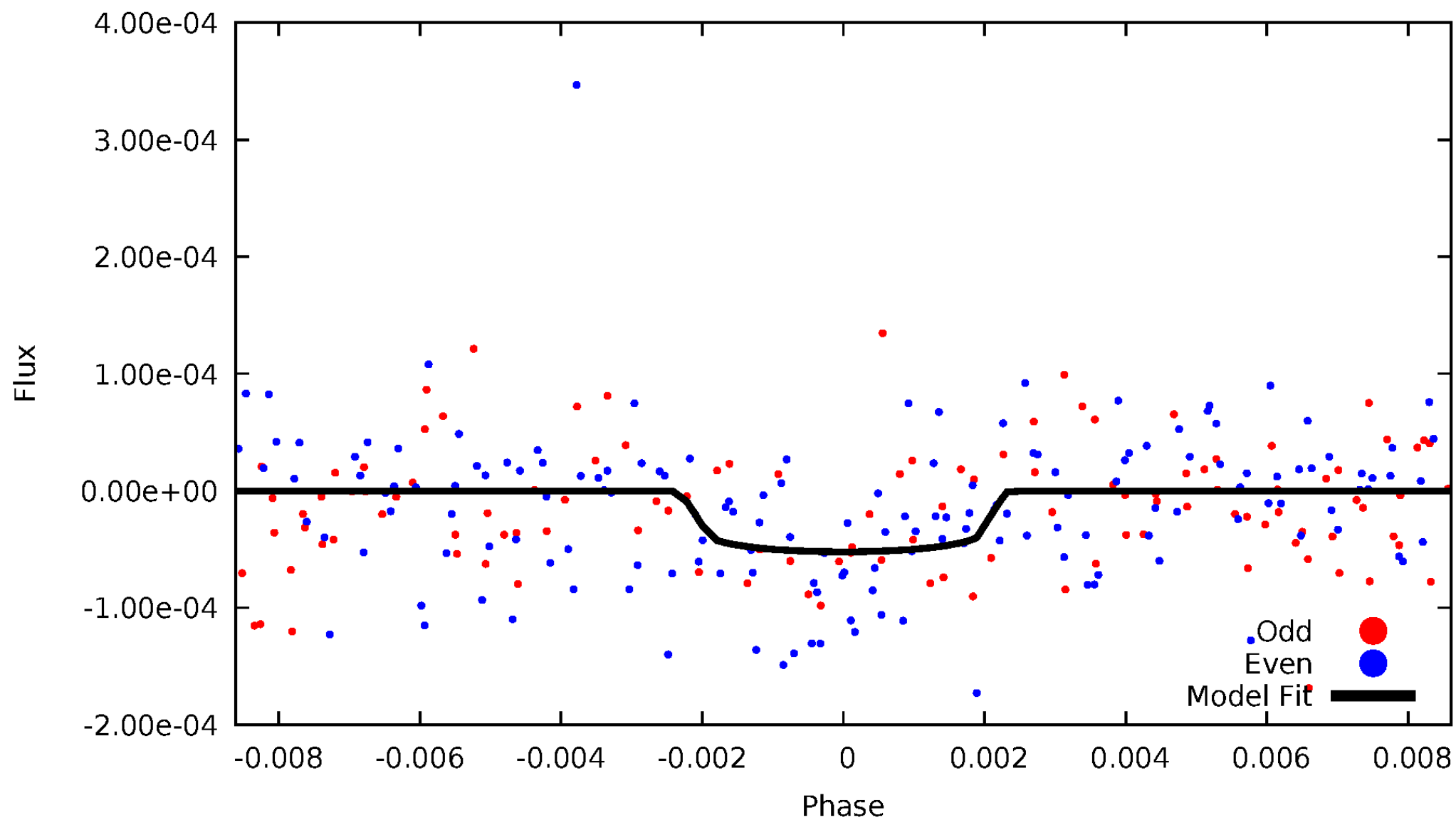


TCE 005440852-06



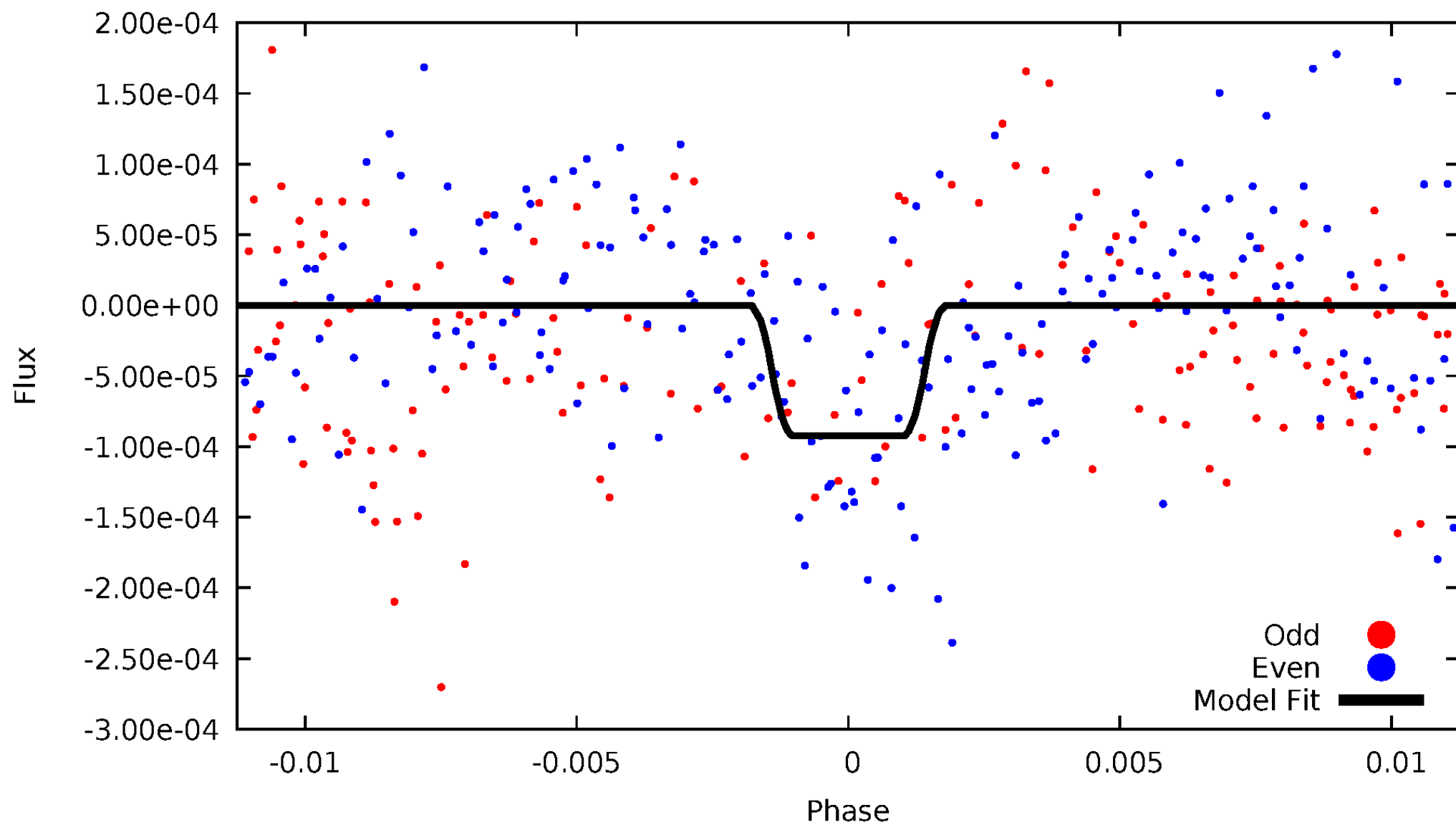
# DV Odd/Even

TCE 005440852-06



# ALT Odd/Even

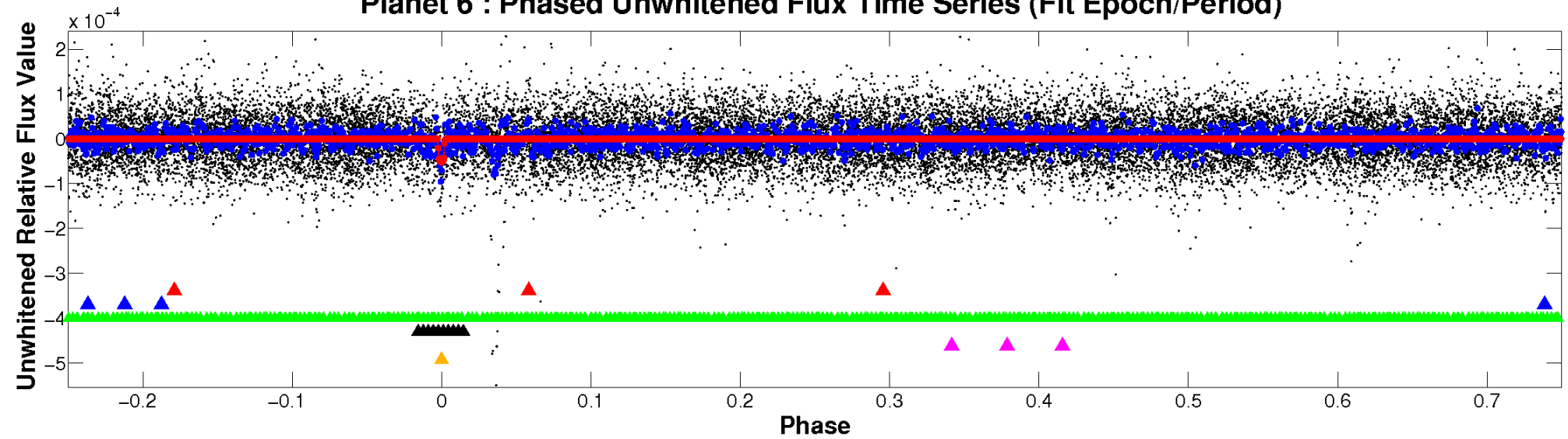
TCE 005440852-06



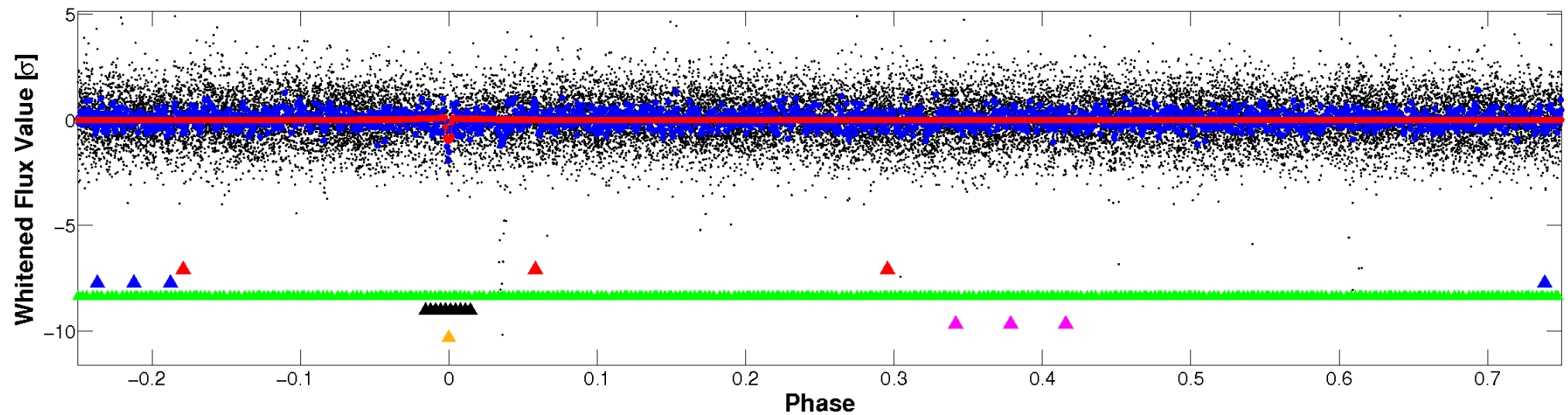


# Non-Whitened Vs. Whitened Light Curve

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



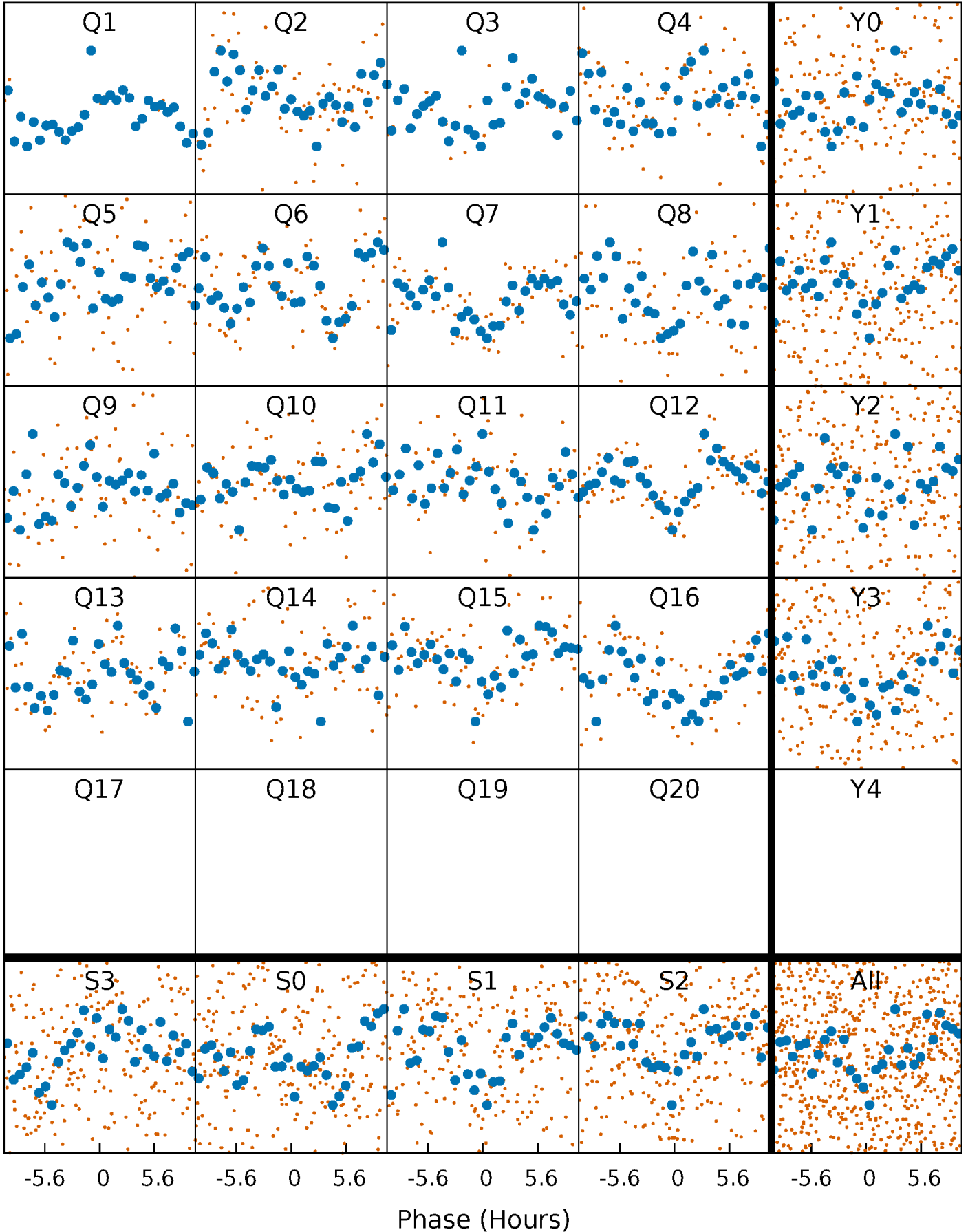
## Planet 6 : Phased Whitened Flux Time Series (Fit Epoch/Period)





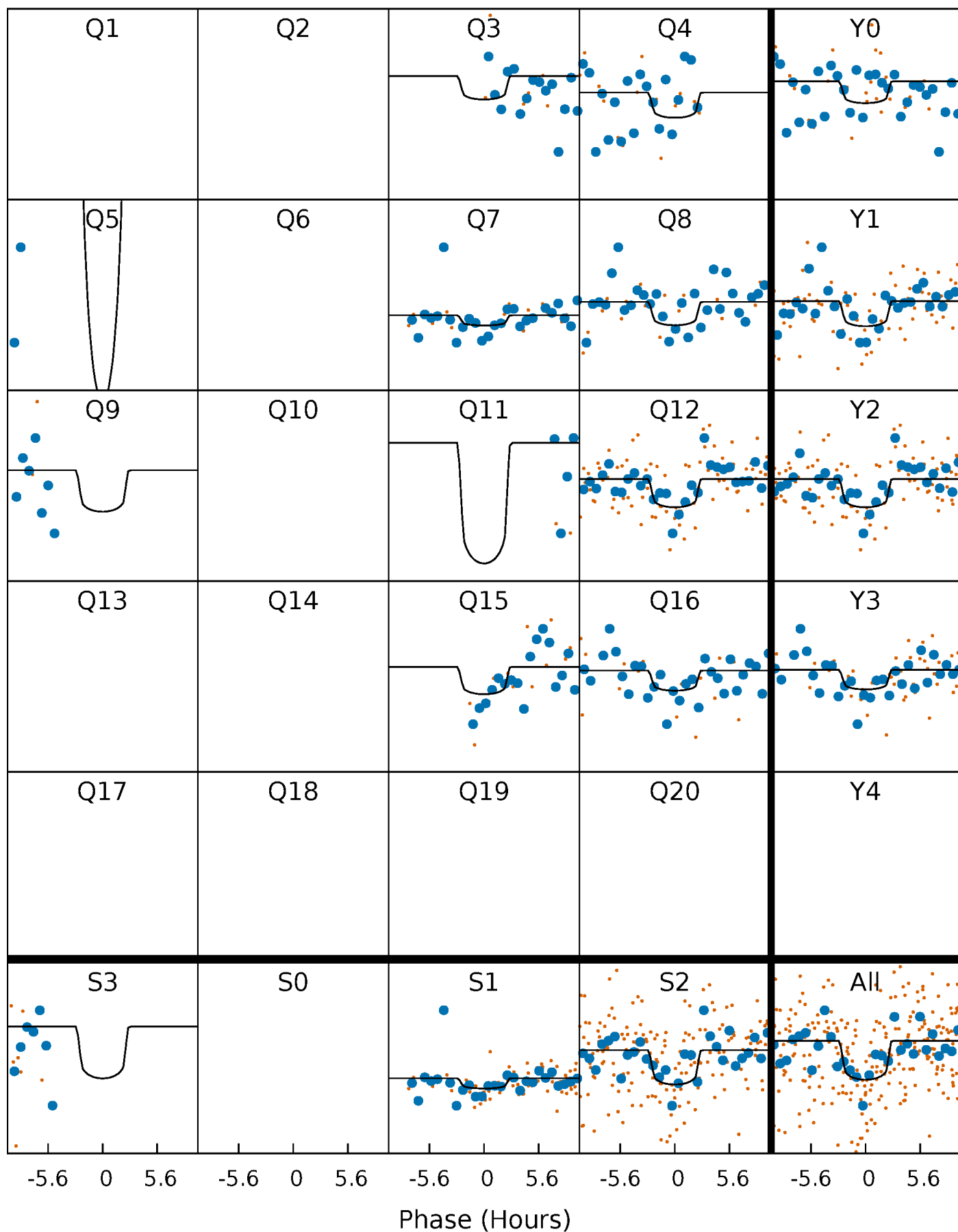
# PDC Quarter-Phased Transit Curves

TCE 005440852-06 P= 47.371713 Days  $T_0=133.285303$  (BKJD)



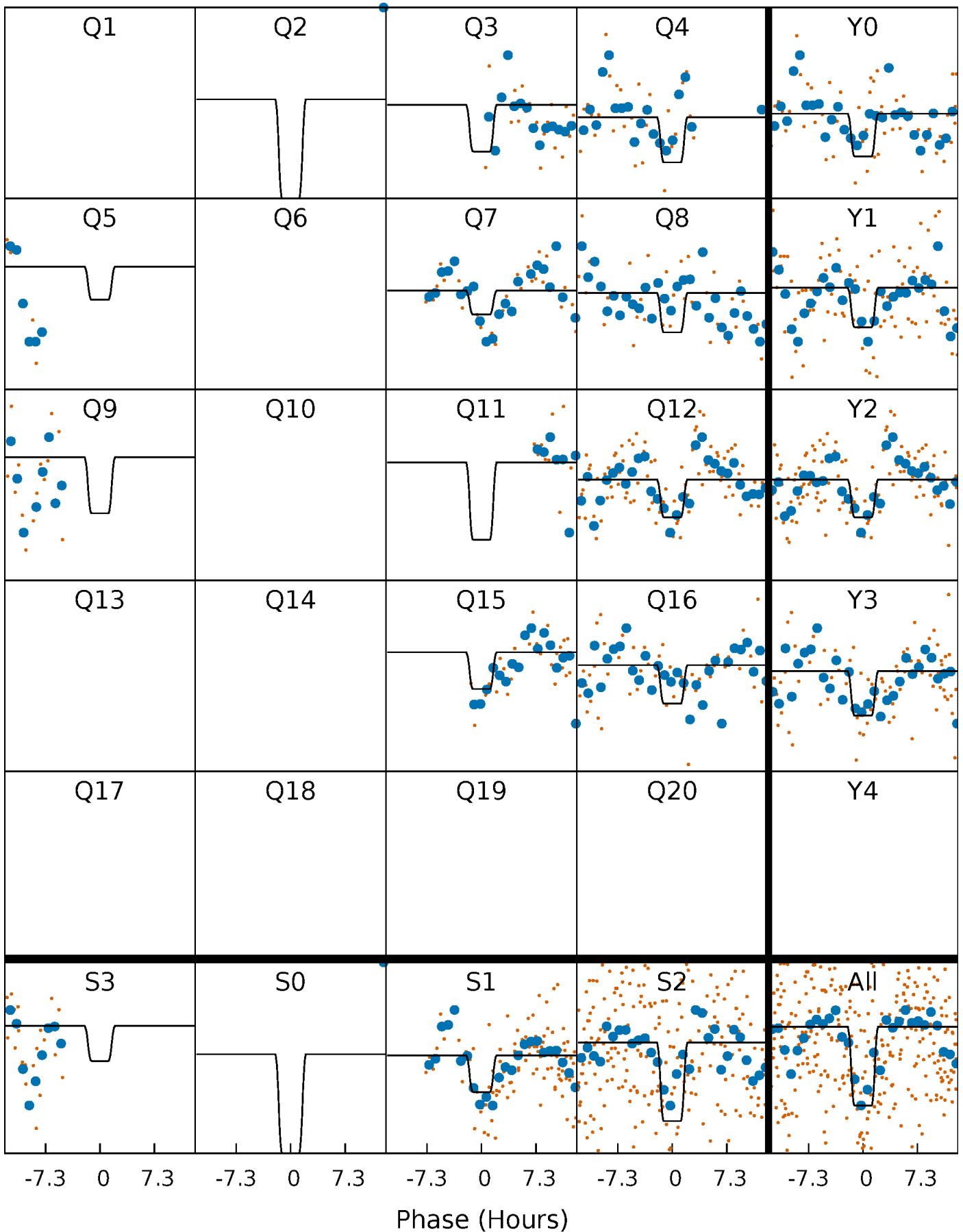
# DV Quarter-Phased Transit Curves

TCE 005440852-06     $P = 47.371713$  Days     $T_0 = 133.285303$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

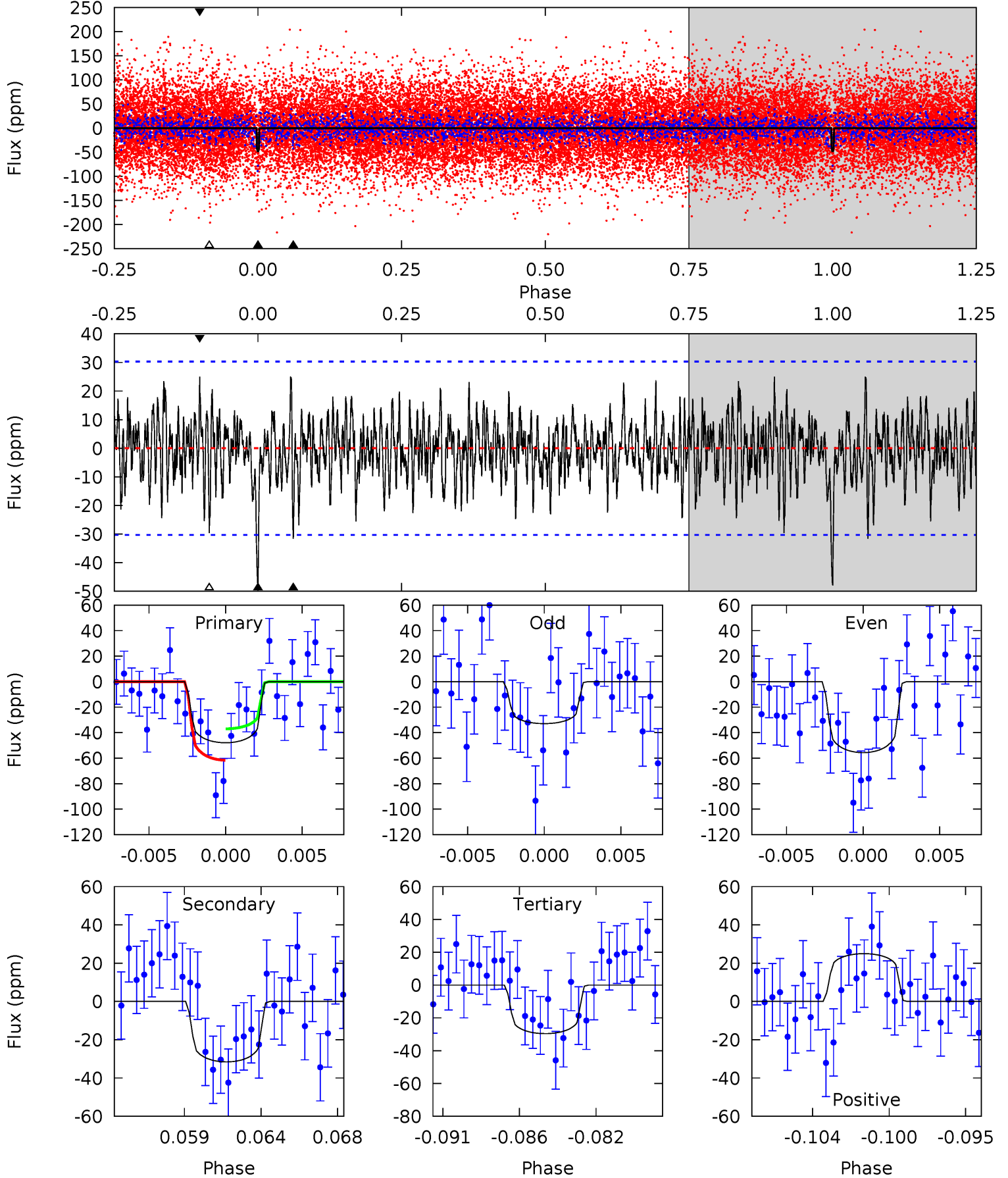
TCE 005440852-06   P= 47.372318 Days    $T_0=133.266012$  (BKJD)



# DV Model-Shift Uniqueness Test

005440852-06, P = 47.371713 Days, E = 85.913590 Days

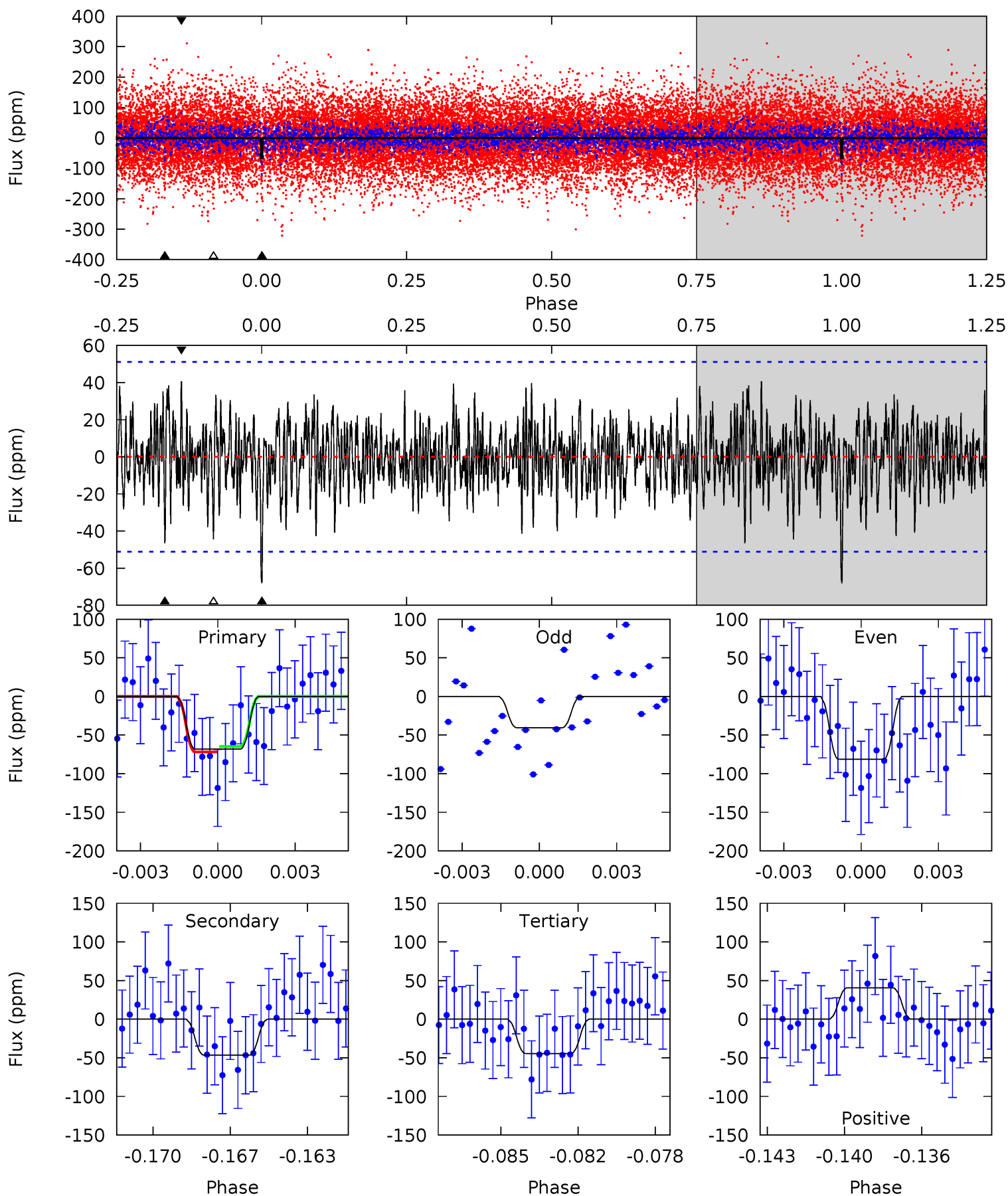
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.19	5.40	5.06	4.27	5.18	2.84	1.48	3.13	3.92	0.34	1.13	1.84	0.83	0.34	2.09



# Alt Model-Shift Uniqueness Test

005440852-06, P = 47.372318 Days, E = 85.893694 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.96	4.76	4.55	4.16	5.23	2.93	1.43	2.41	2.80	0.21	0.60	1.95	1.09	0.37	0.36



### Stellar Parameters For KIC 005440852

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$8361^{+75}_{-83}$	$4.219^{+0.063}_{-0.117}$	$-0.320^{+0.050}_{-0.200}$	$1.630^{+0.299}_{-0.149}$	$1.603^{+0.129}_{-0.108}$	$0.521^{+0.137}_{-0.182}$
	+1%/-1%	+1%/-3%	+16%/-62%	+18%/-9%	+8%/-7%	+26%/-35%
Source	SPE68	SPE68	SPE68	DSEP		

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

### Secondary Eclipse Parameters for KIC 005440852-06 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-32 \pm 6$	$1.27^{+0.70}_{-0.56}$	$1209^{+52}_{-36}$	$7208^{+3484}_{-1441}$	$914^{+2135}_{-525}$
Alt.	$-47 \pm 10$	$1.79^{+0.72}_{-0.68}$	$1207^{+51}_{-35}$	$6708^{+2371}_{-1068}$	$718^{+1222}_{-371}$

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

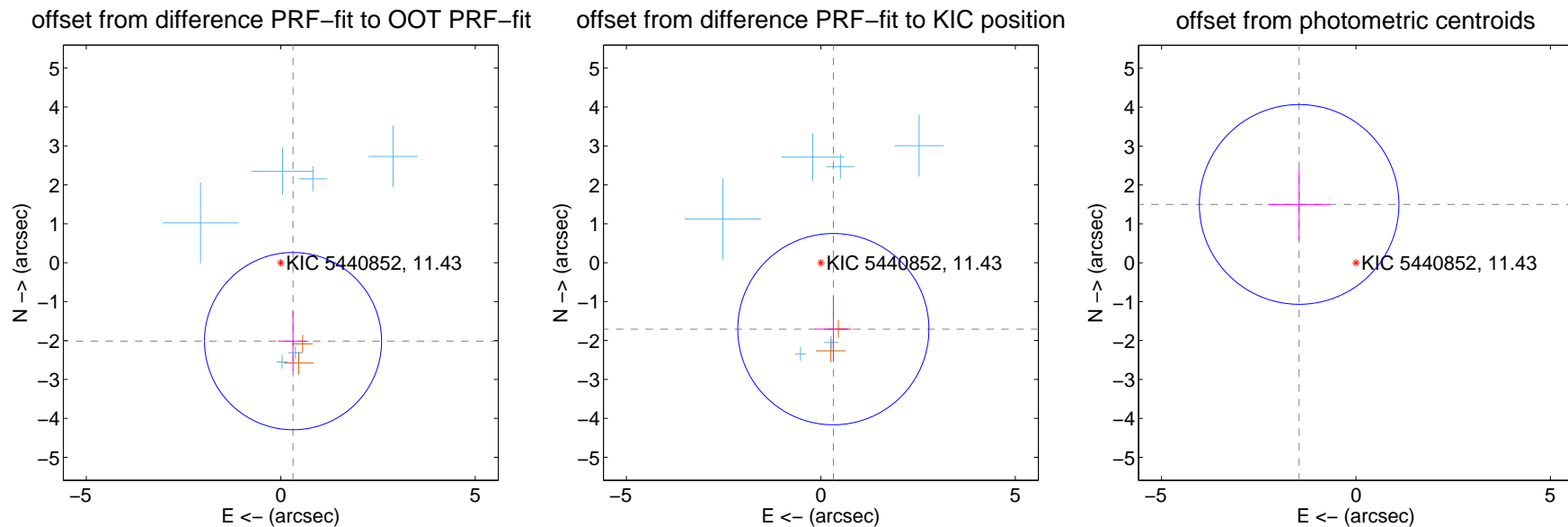
## DV Centroid Data

Supplemental centroid analysis for 005440852-06. **Kepler magnitude: 11.43.** Transit SNR 7.41

There are 6 quarters with good PRF difference image offsets

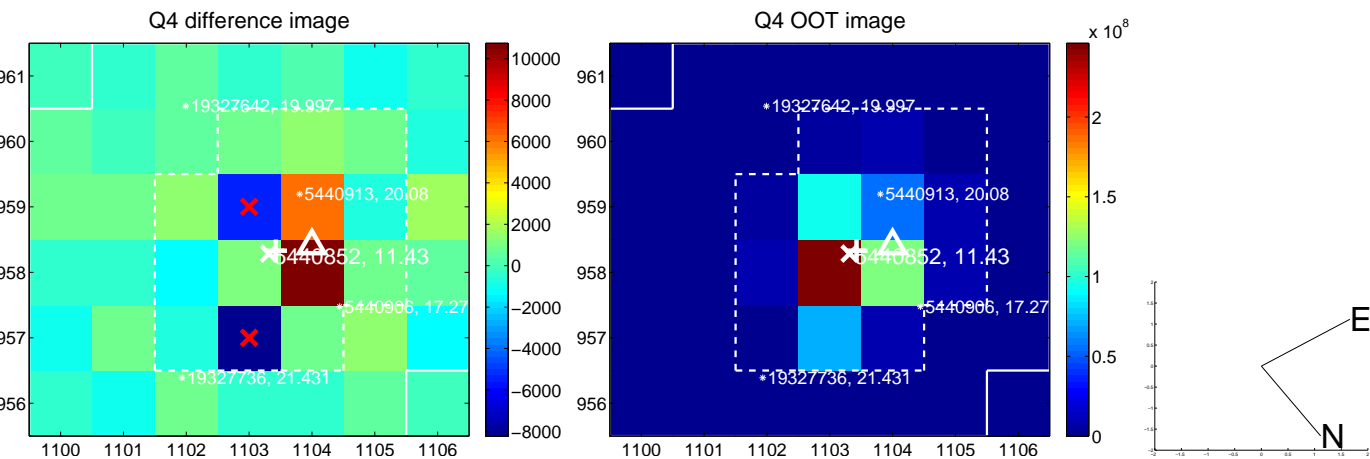
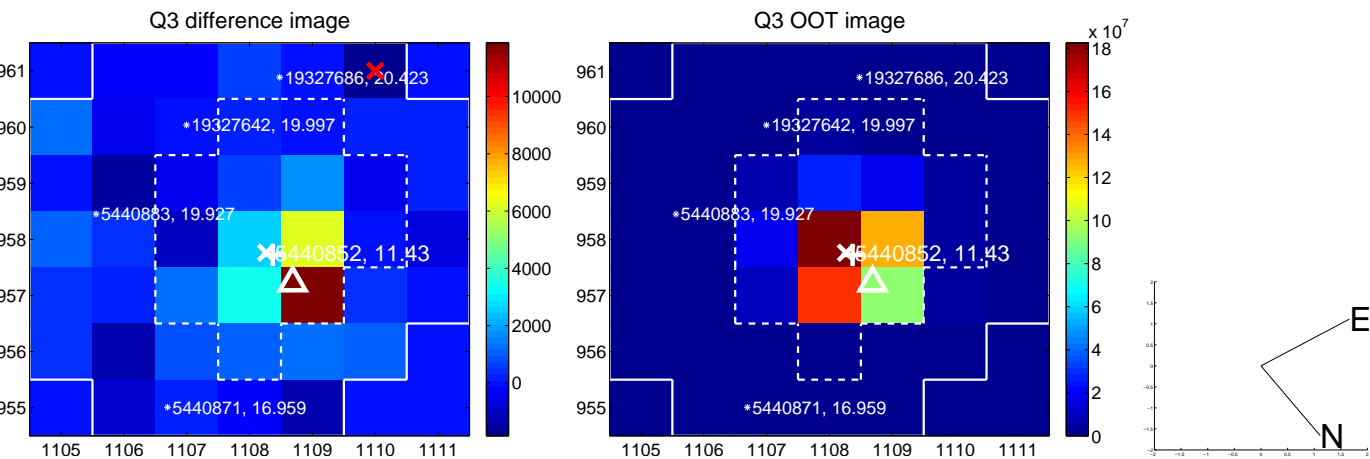
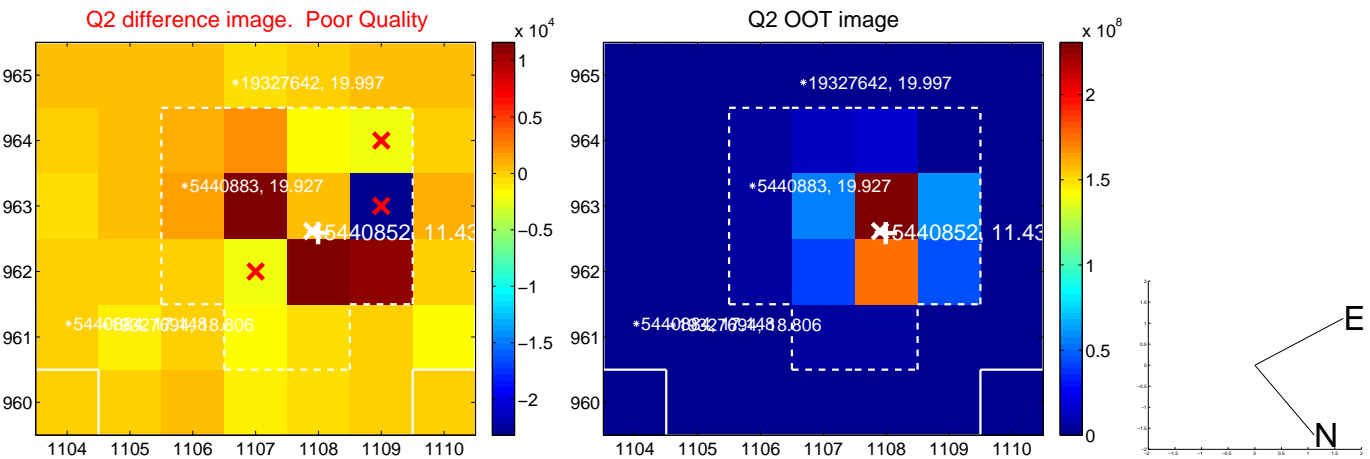
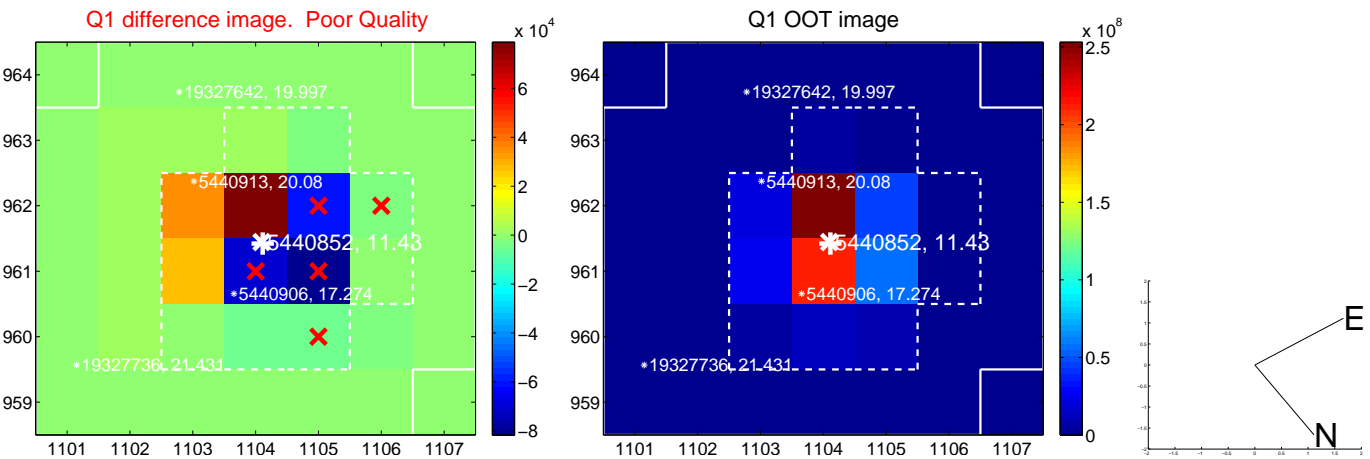
The direct PRF centroid is offset from the target star catalog position by about 0.45 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.040 \pm 0.759$	2.69	$-0.316 \pm 0.392$	$-2.015 \pm 0.766$
PRF-fit source offset from KIC position	$1.737 \pm 0.819$	2.12	$-0.321 \pm 0.471$	$-1.707 \pm 0.836$
photometric centroid source offset	$2.09 \pm 0.86$	2.45	$1.46 \pm 0.80$	$1.50 \pm 0.91$



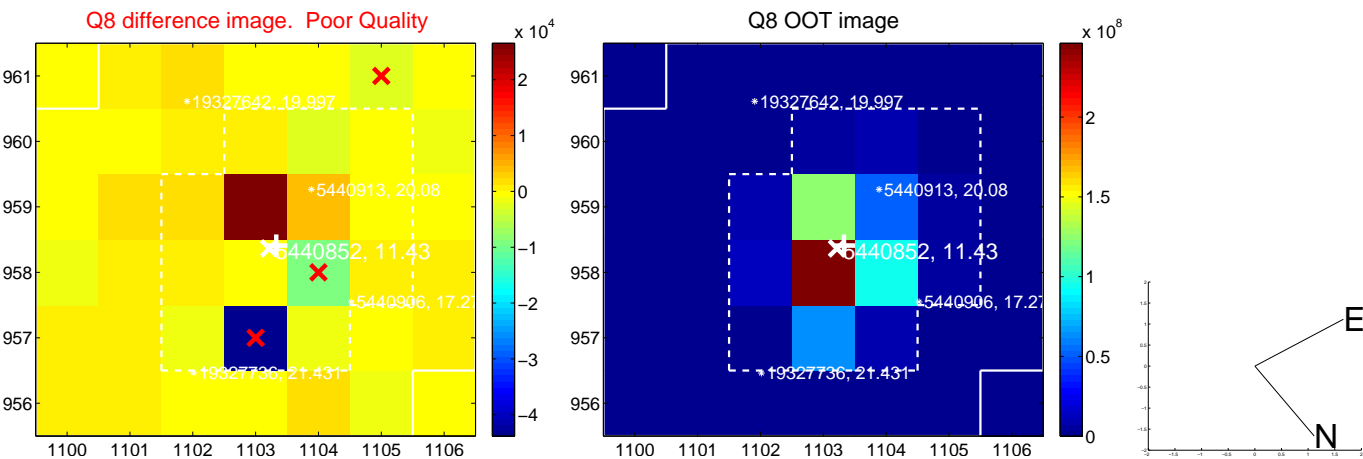
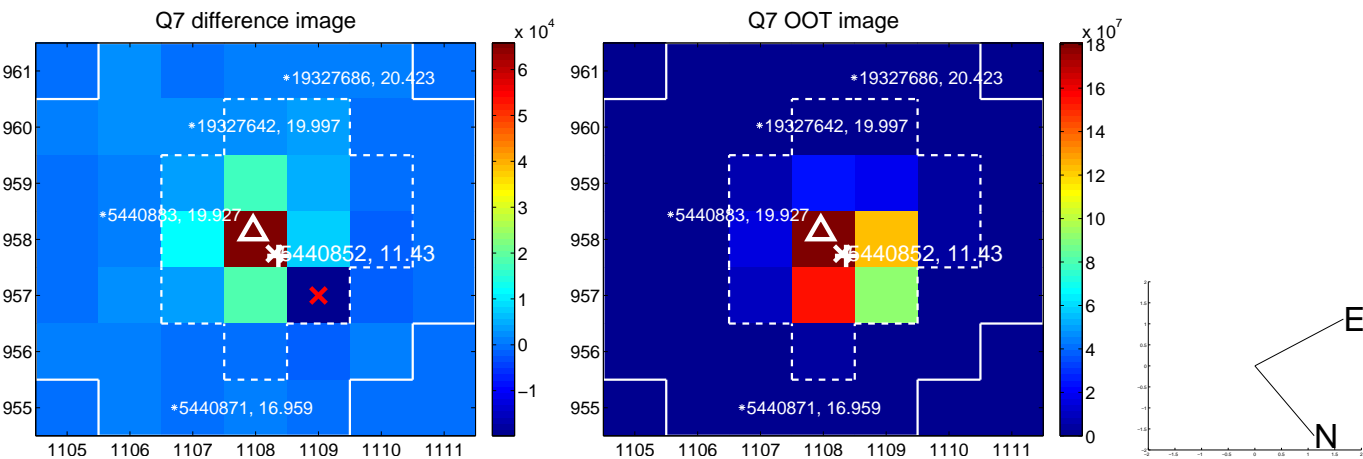
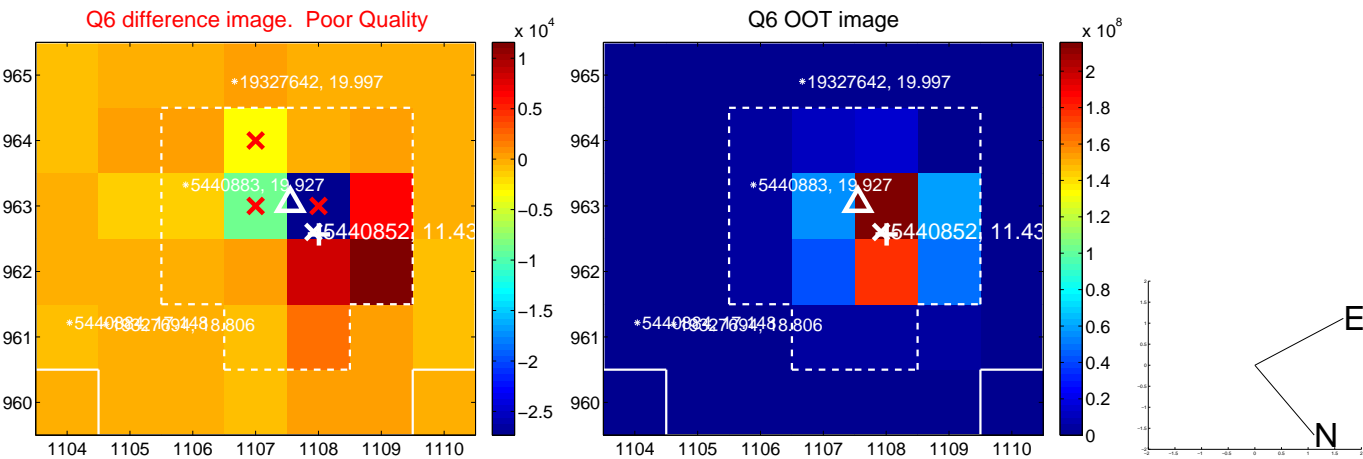
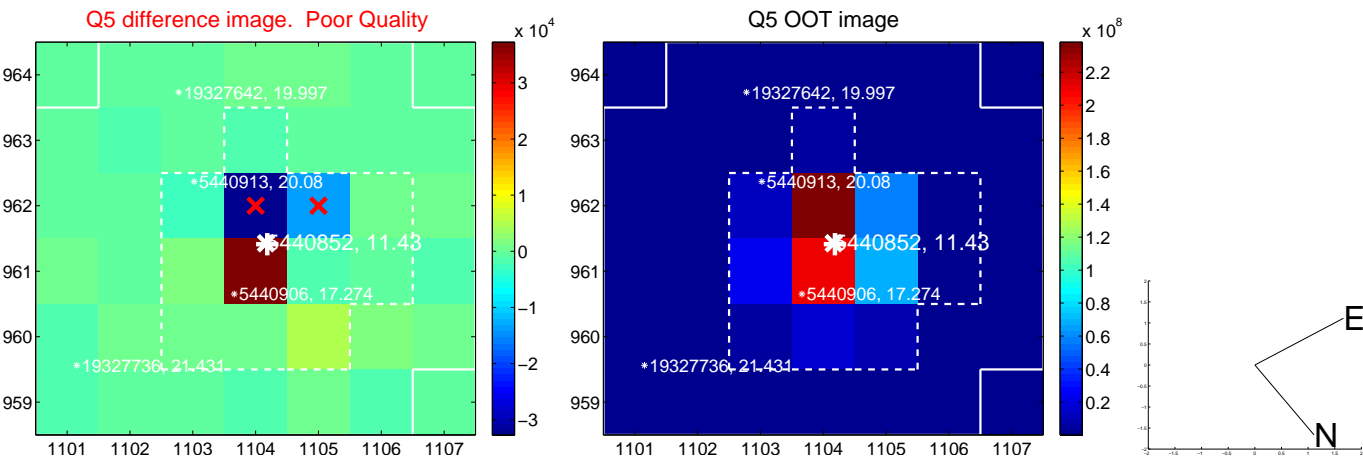
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

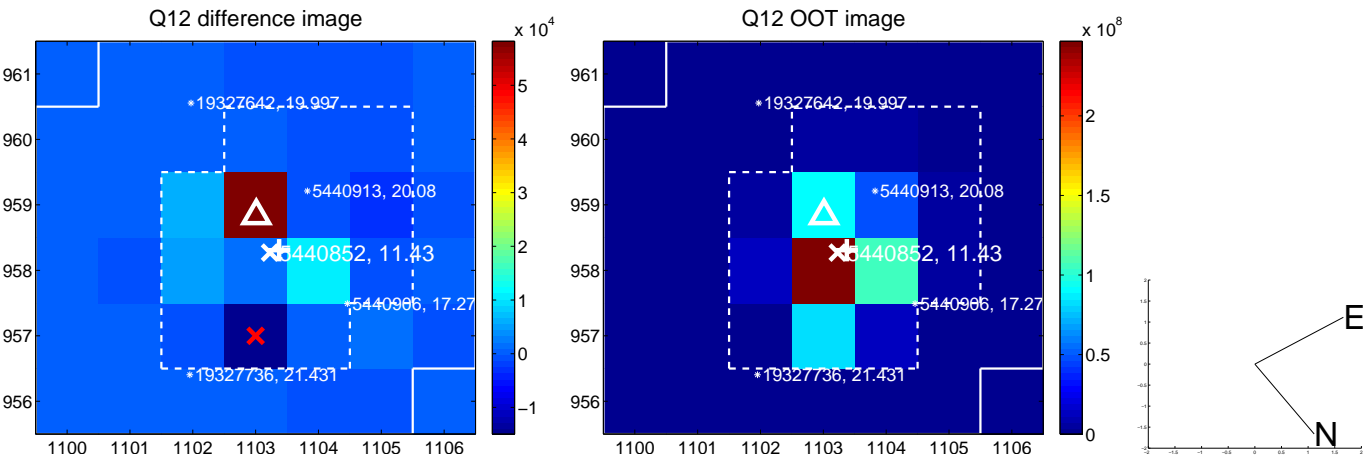
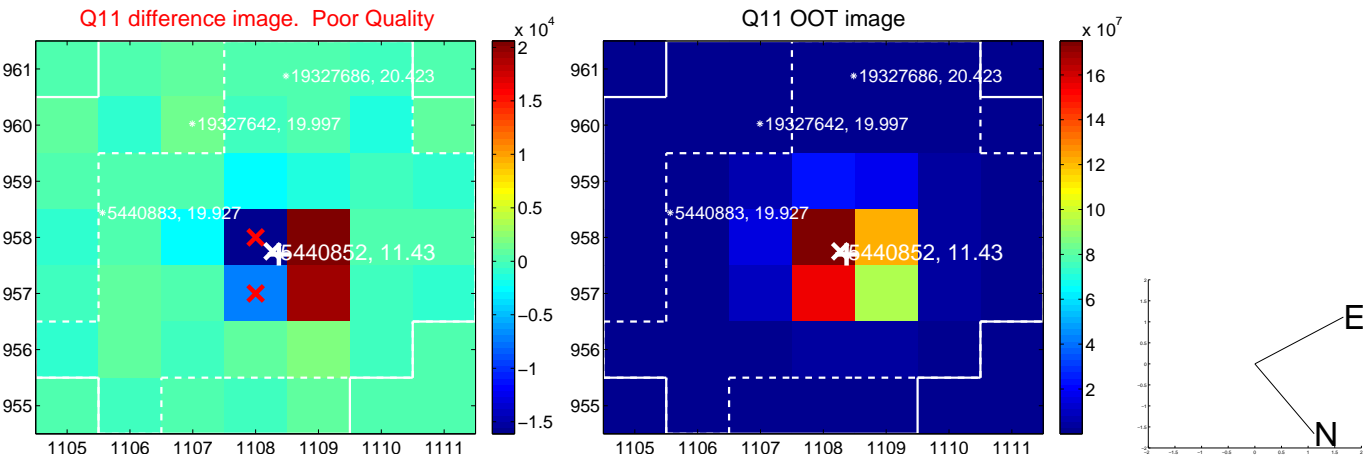
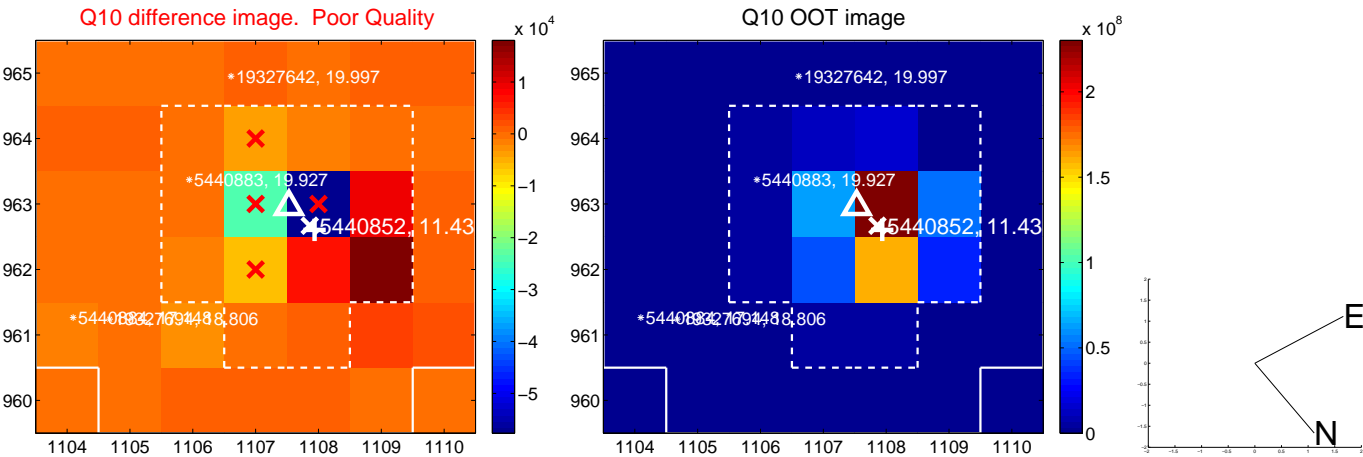
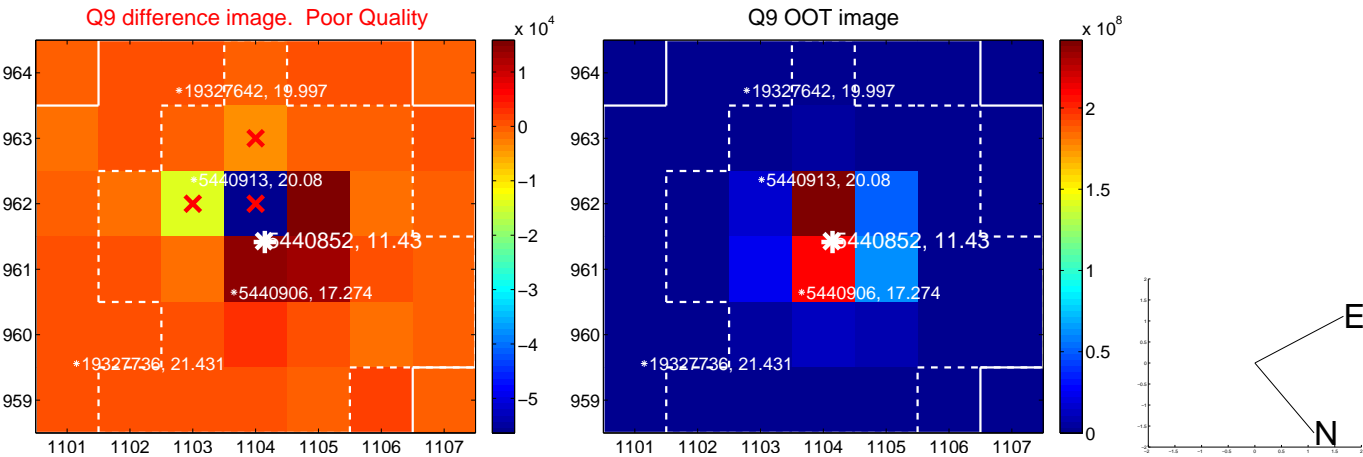




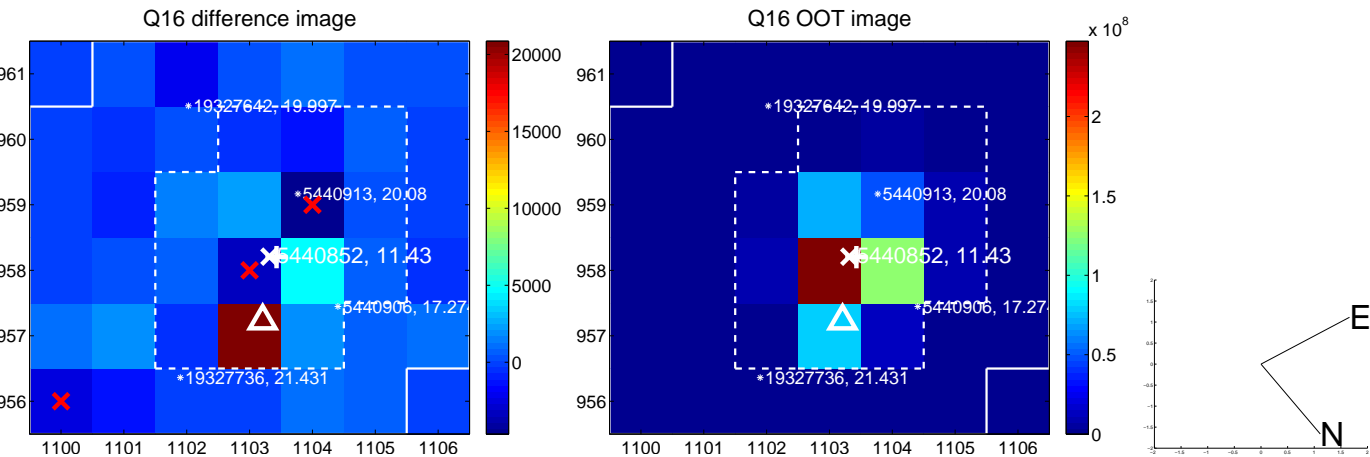
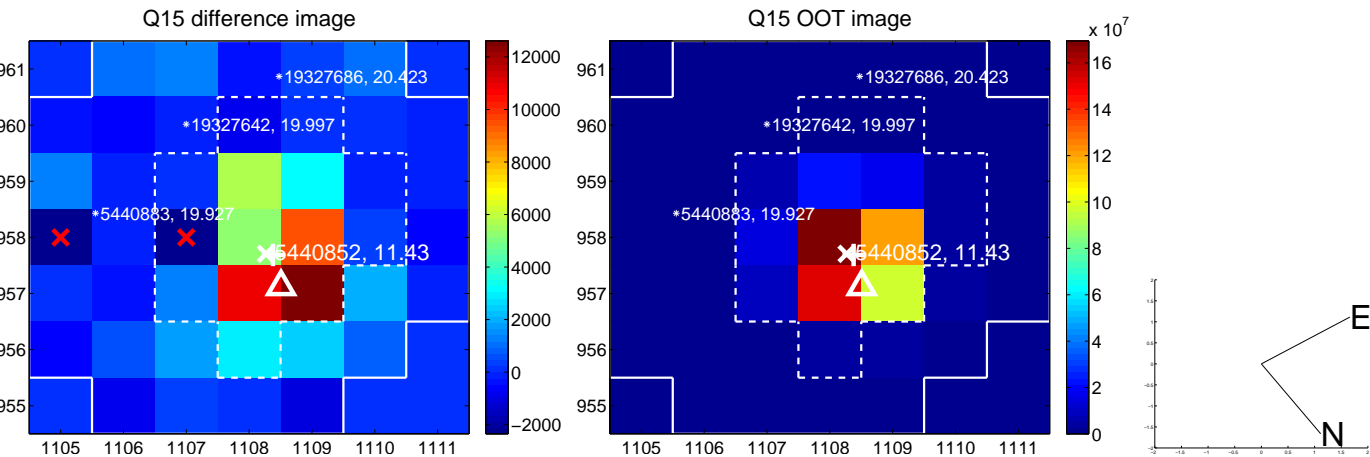
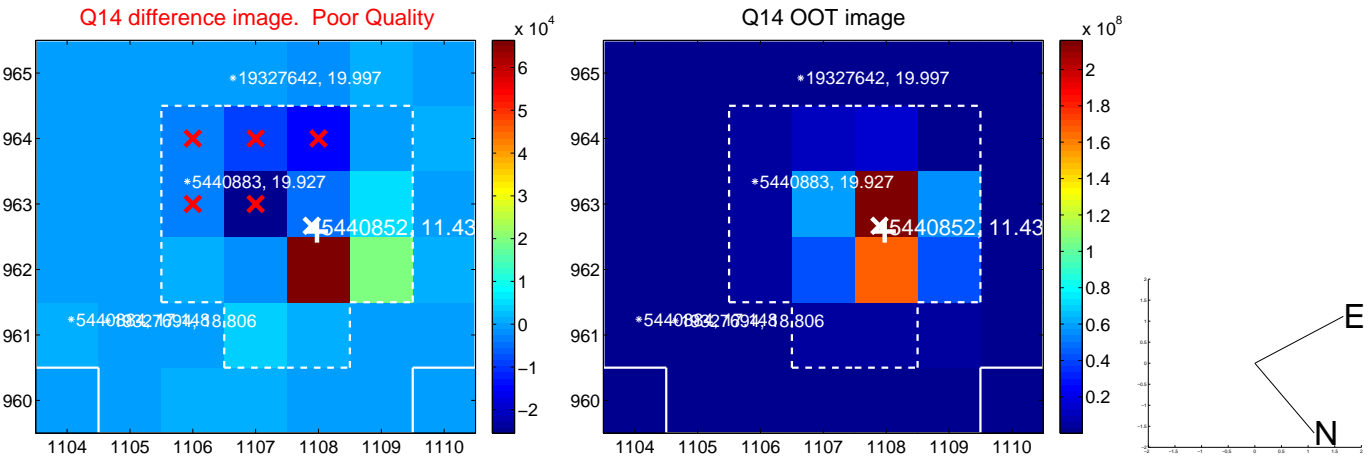
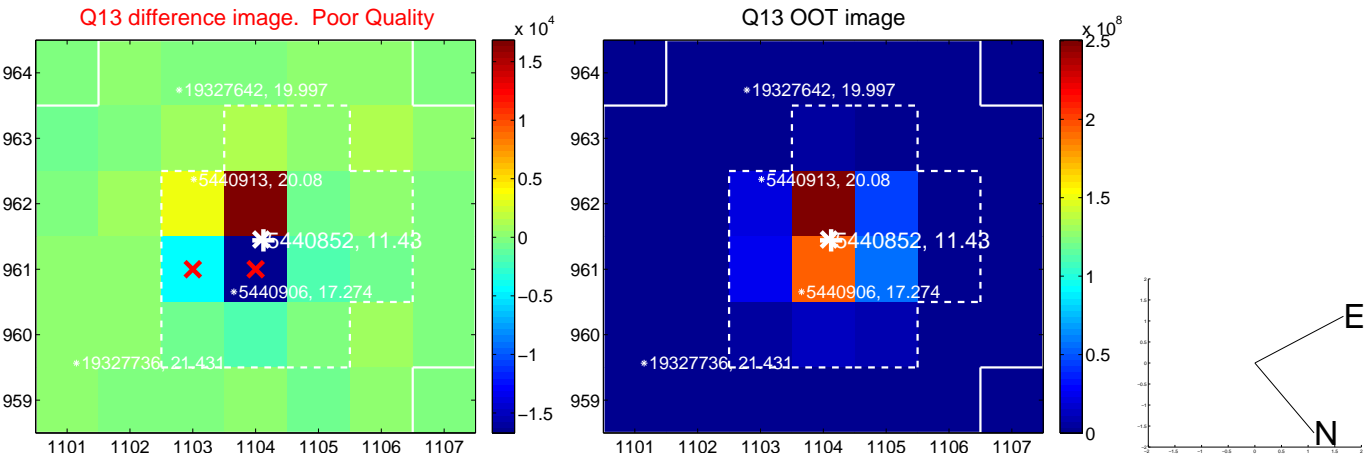
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



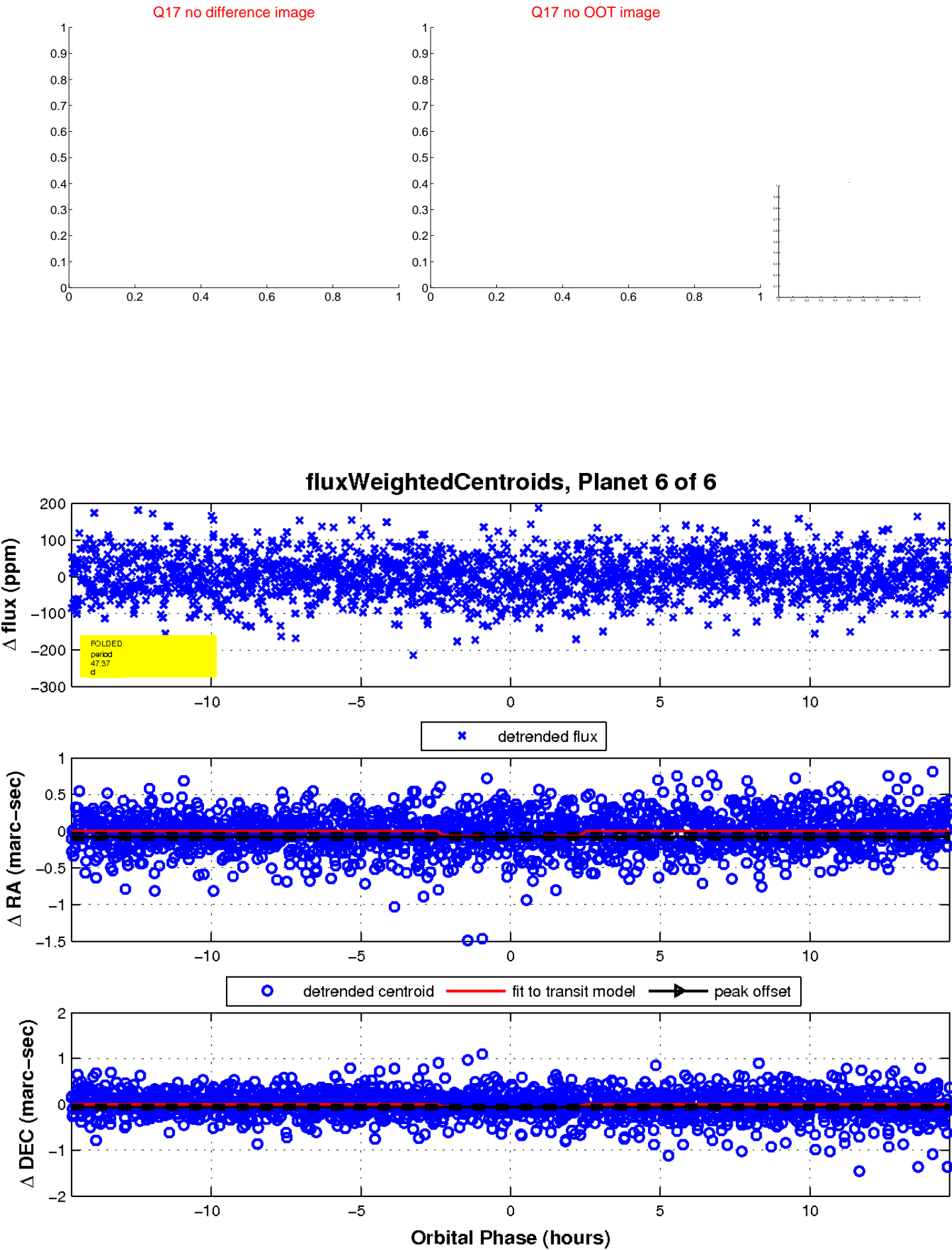
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white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination

