

# KIC 008505670

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008505670-01	OBS	0912.01	10.848459	139.259584	1654.8	3.019	84.2	83.9	0.59	4201	2.50	14.69
008505670-02	OBS	0912.02	6.668327	137.440830	396.1	1.936	19.2	22.3	0.59	4201	1.32	28.10

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008505670-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
008505670-02	OBS	PC	1.00	0	0	0	0	NO_COMMENT

**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.

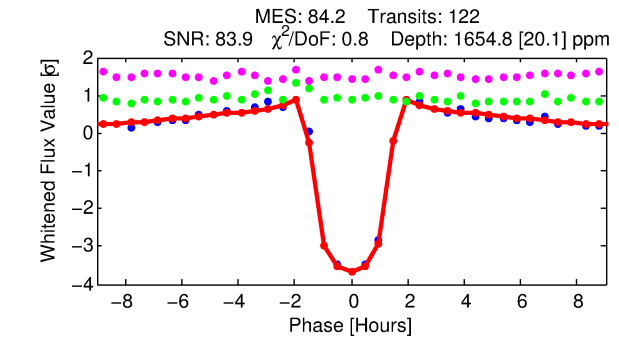
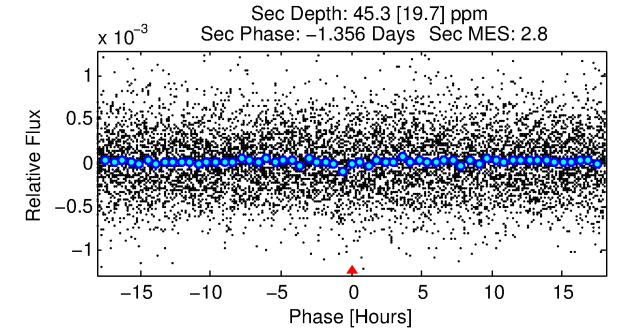
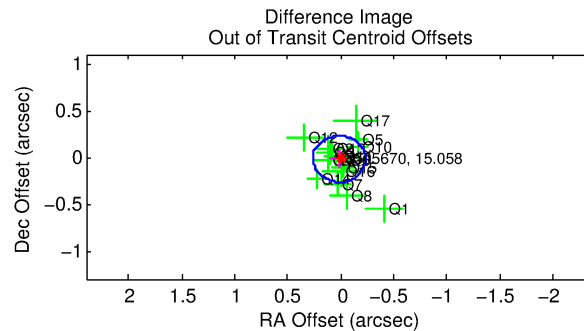
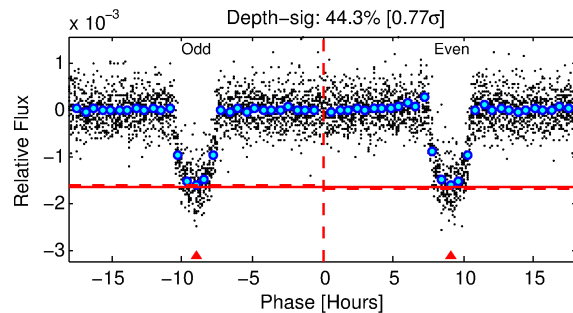
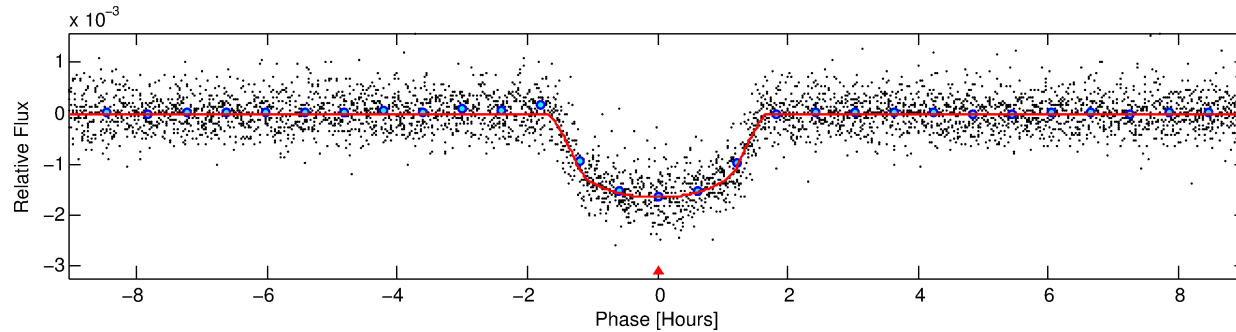
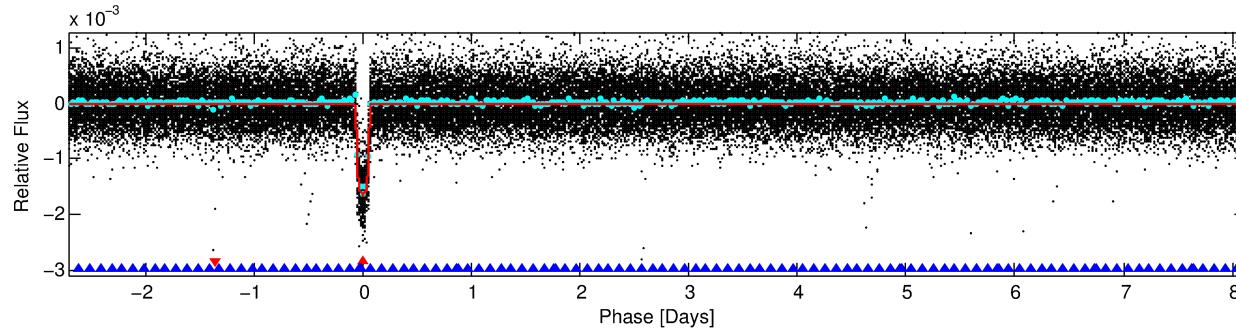
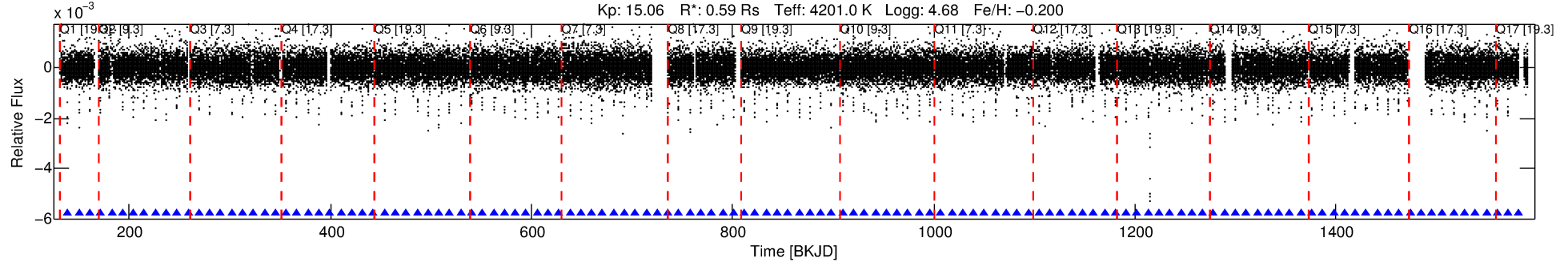
## Ephemeris Match Information For 008505670-01

No Significant Match Found

# DV One-Page Summary

KIC: 8505670 Candidate: 1 of 2 Period: 10.848 d  
KOI: K00912.01 Name: Kepler-252c Corr: 0.990

Kp: 15.06 R\*: 0.59 Rs Teff: 4201.0 K Logg: 4.68 Fe/H: -0.200



## DV Fit Results:

Period = 10.84846 [0.00001] d  
Epoch = 139.2596 [0.0007] BKJD  
Rp/R\* = 0.0387 [0.0049]  
a/R\* = 22.99 [10.15]  
b = 0.62 [0.46]  
Seff = 14.68 [9.83]  
Teq = 499 [83] K  
Rp = 2.50 [0.56] Re  
a = 0.0815 [0.0114] AU  
Ag = 26.49 [14.21] [1.79σ]  
Teffp = 1751 [358] K [3.41σ]

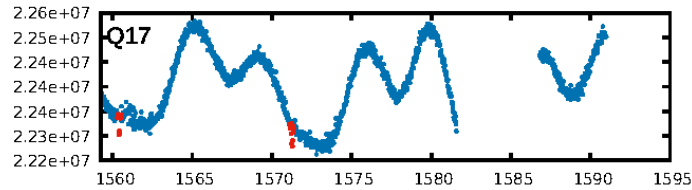
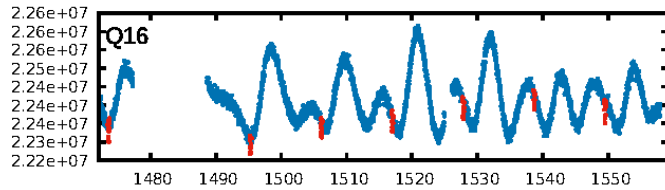
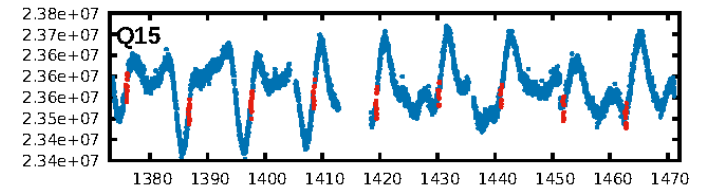
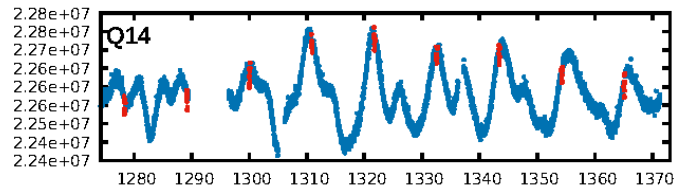
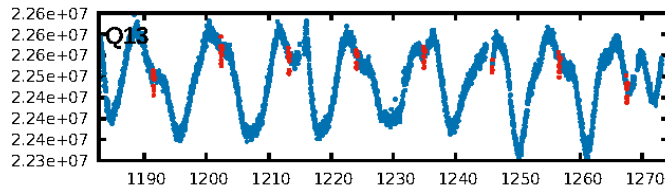
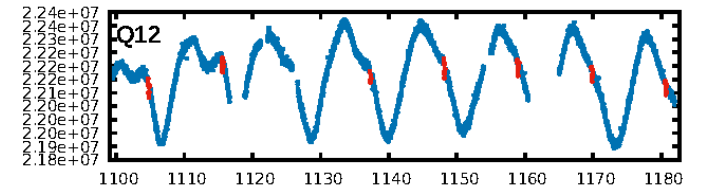
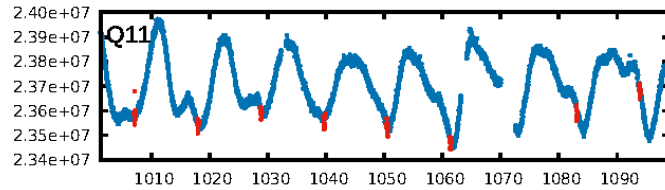
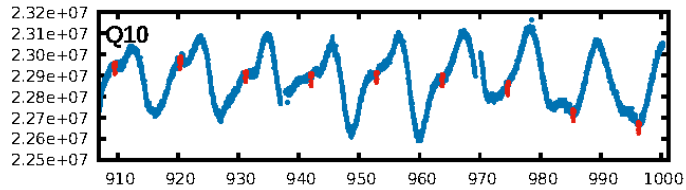
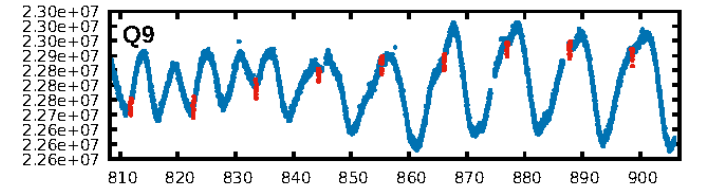
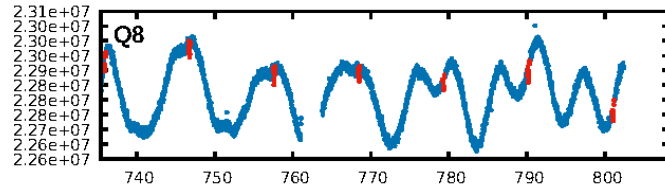
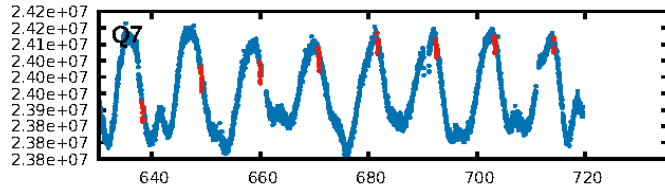
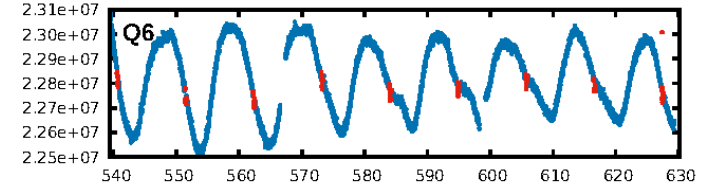
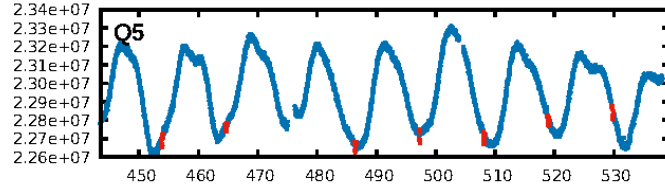
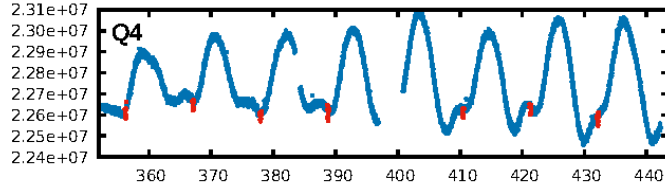
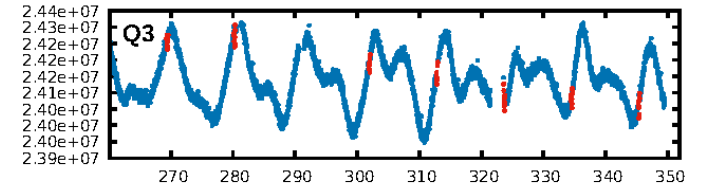
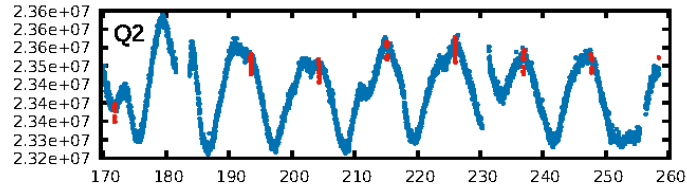
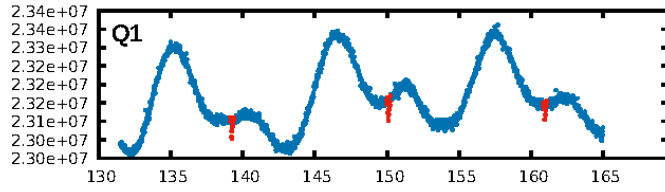
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [27.97σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 99.9%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [117/117]  
GhostDiagnostic-chr: 3.189  
Centroid-sig: 41.6%  
Centroid-so: 0.211 arcsec [1.76σ]  
OotOffset-rm: 0.022 arcsec [0.27σ]  
KicOffset-rm: 0.155 arcsec [1.80σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 0.94 [16/17]

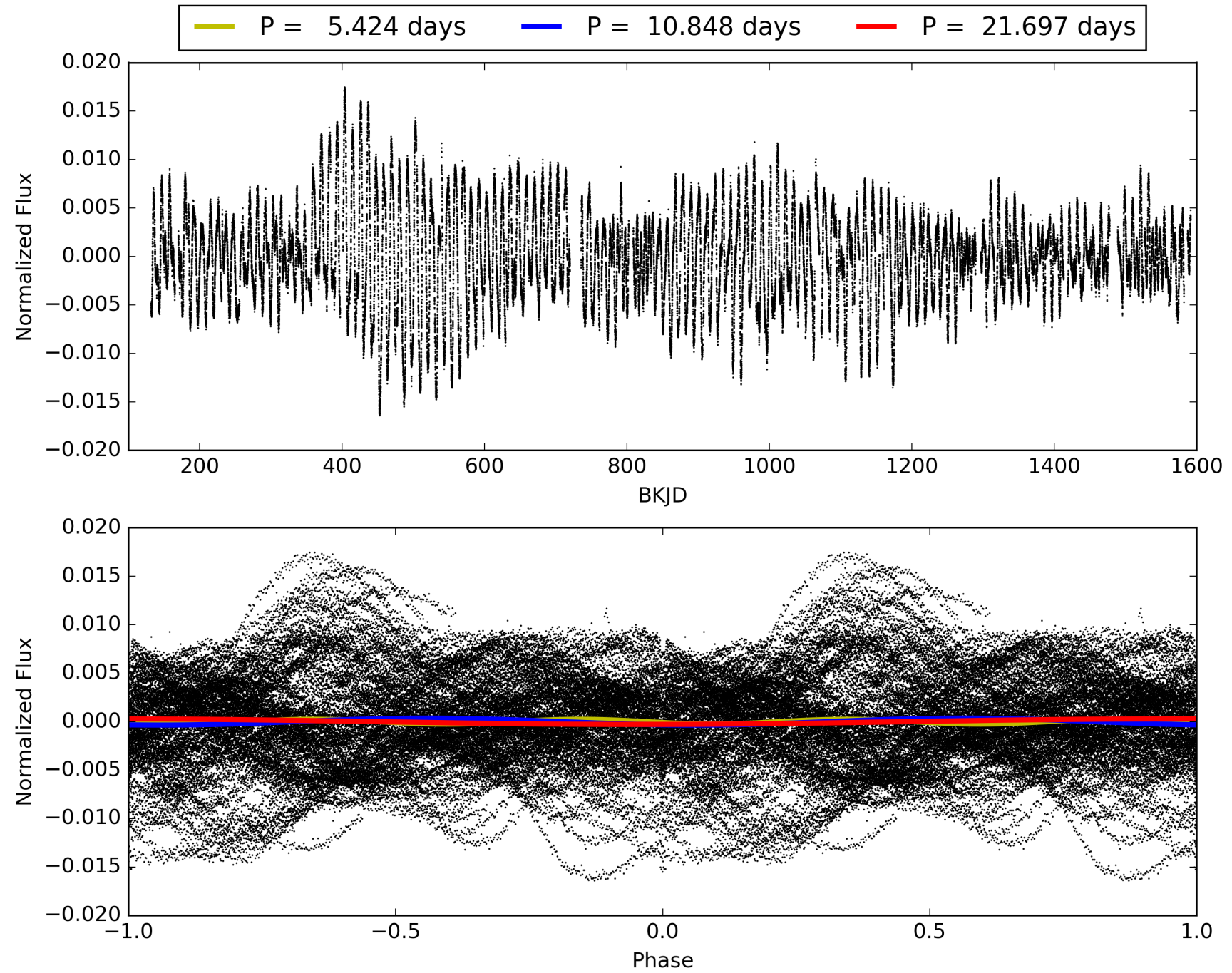
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 01:07:55 Z

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

# TCE 008505670-01, PDC Light Curves

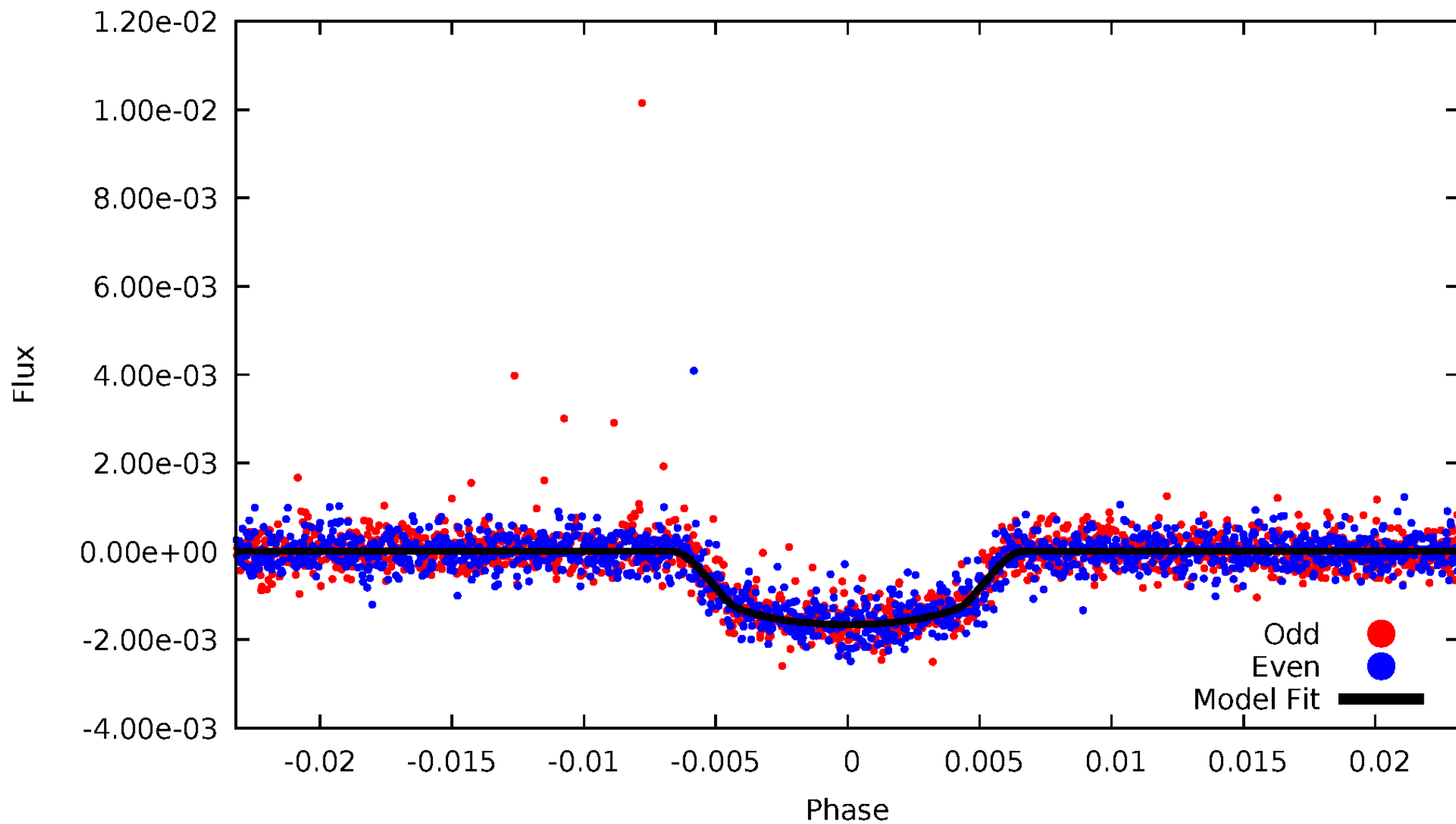


TCE 008505670-01



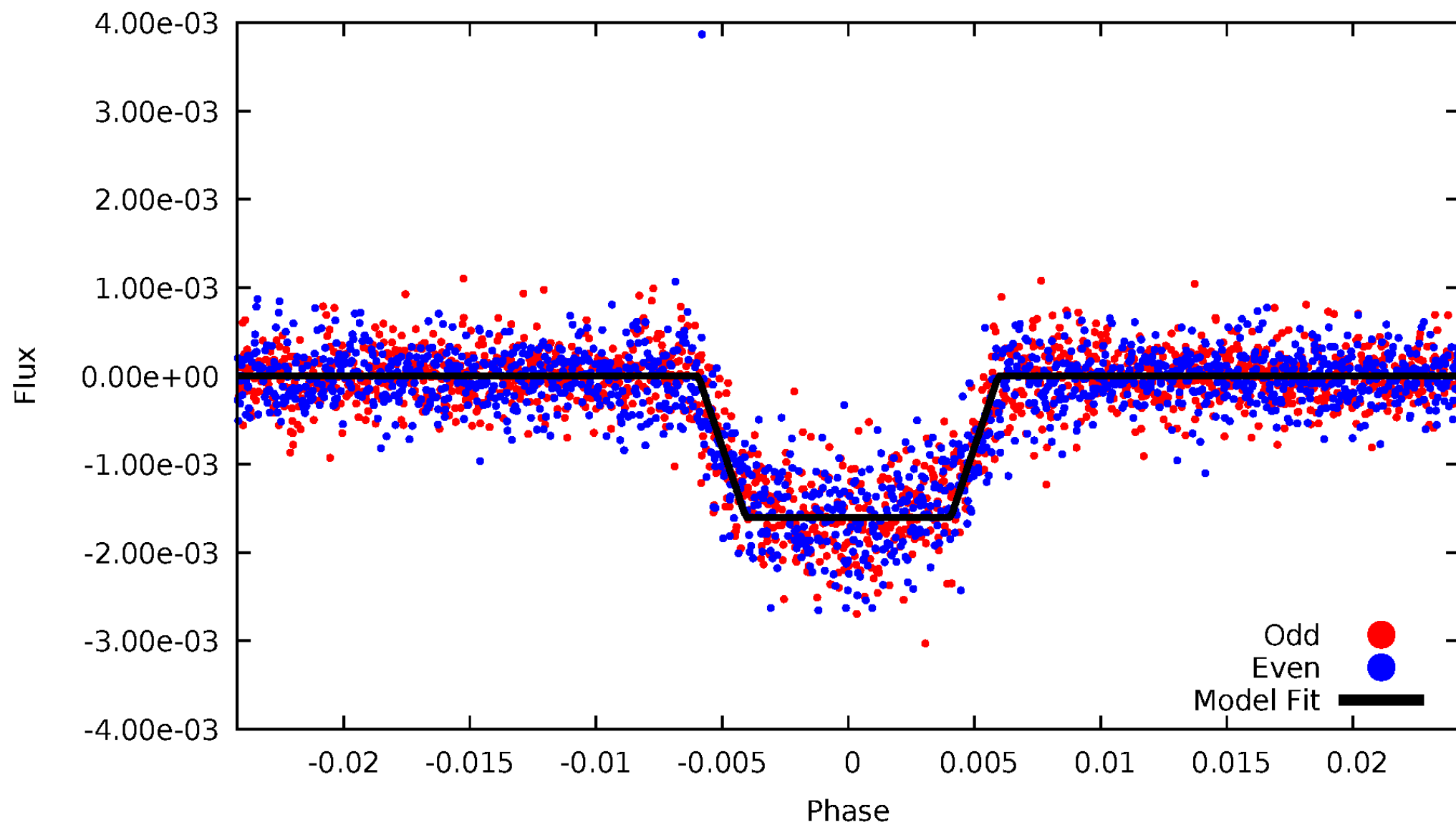
# DV Odd/Even

TCE 008505670-01



# ALT Odd/Even

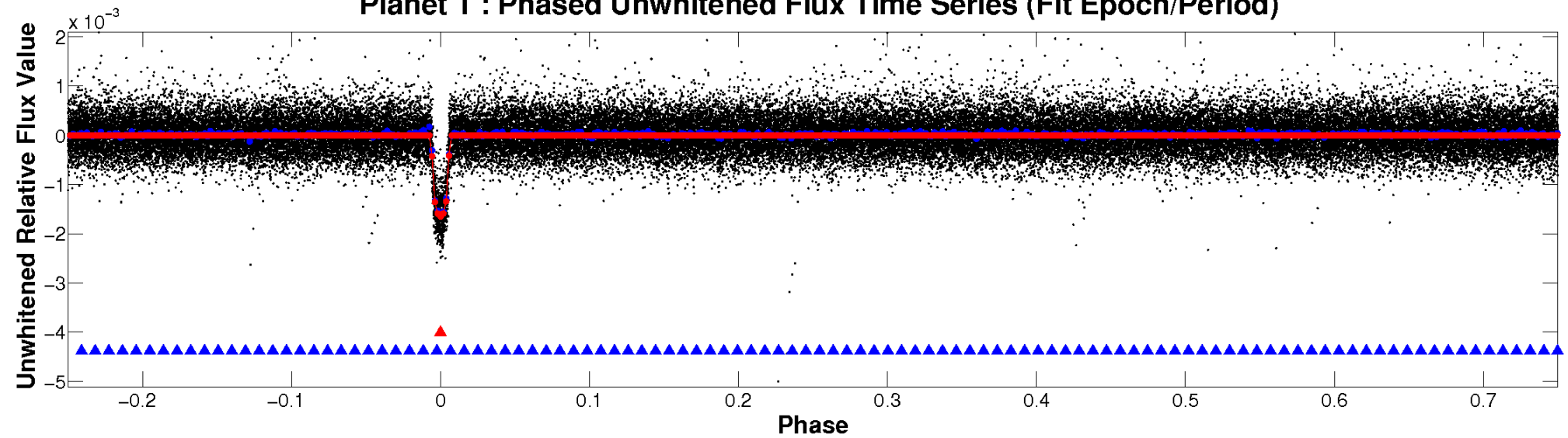
TCE 008505670-01



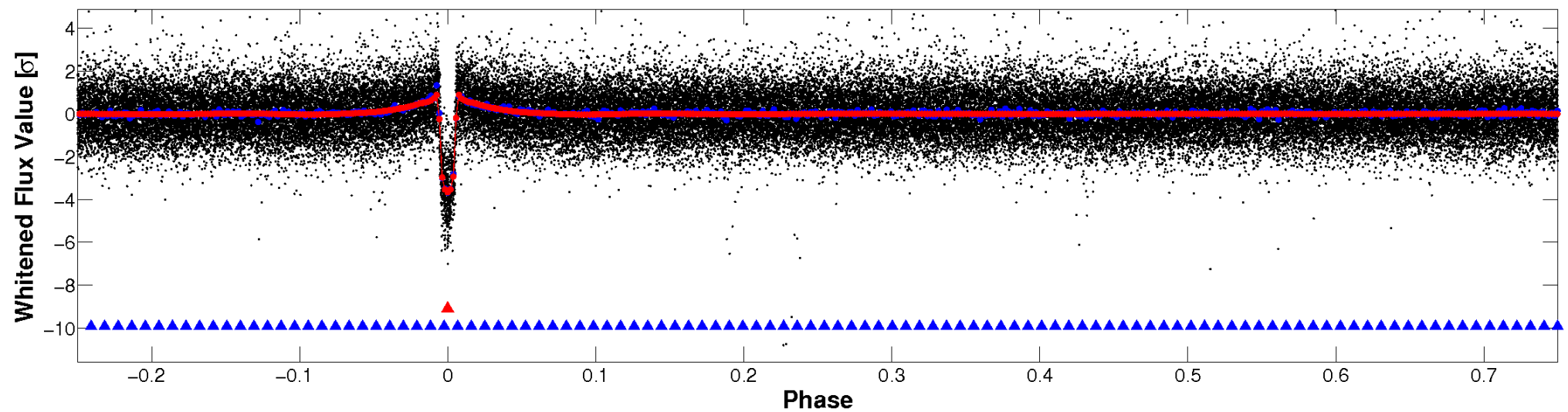


# Non-Whitened Vs. Whitened Light Curve

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

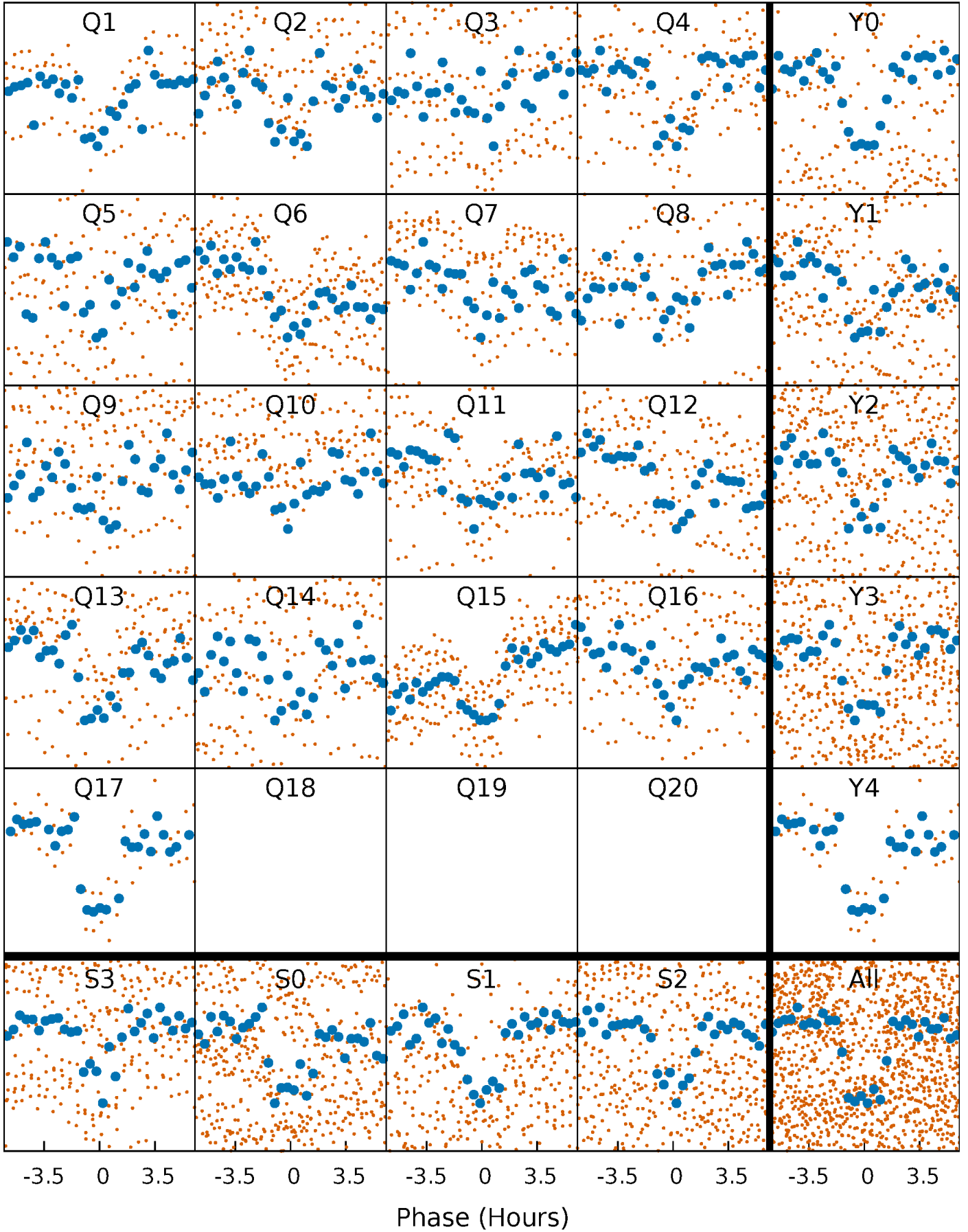


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

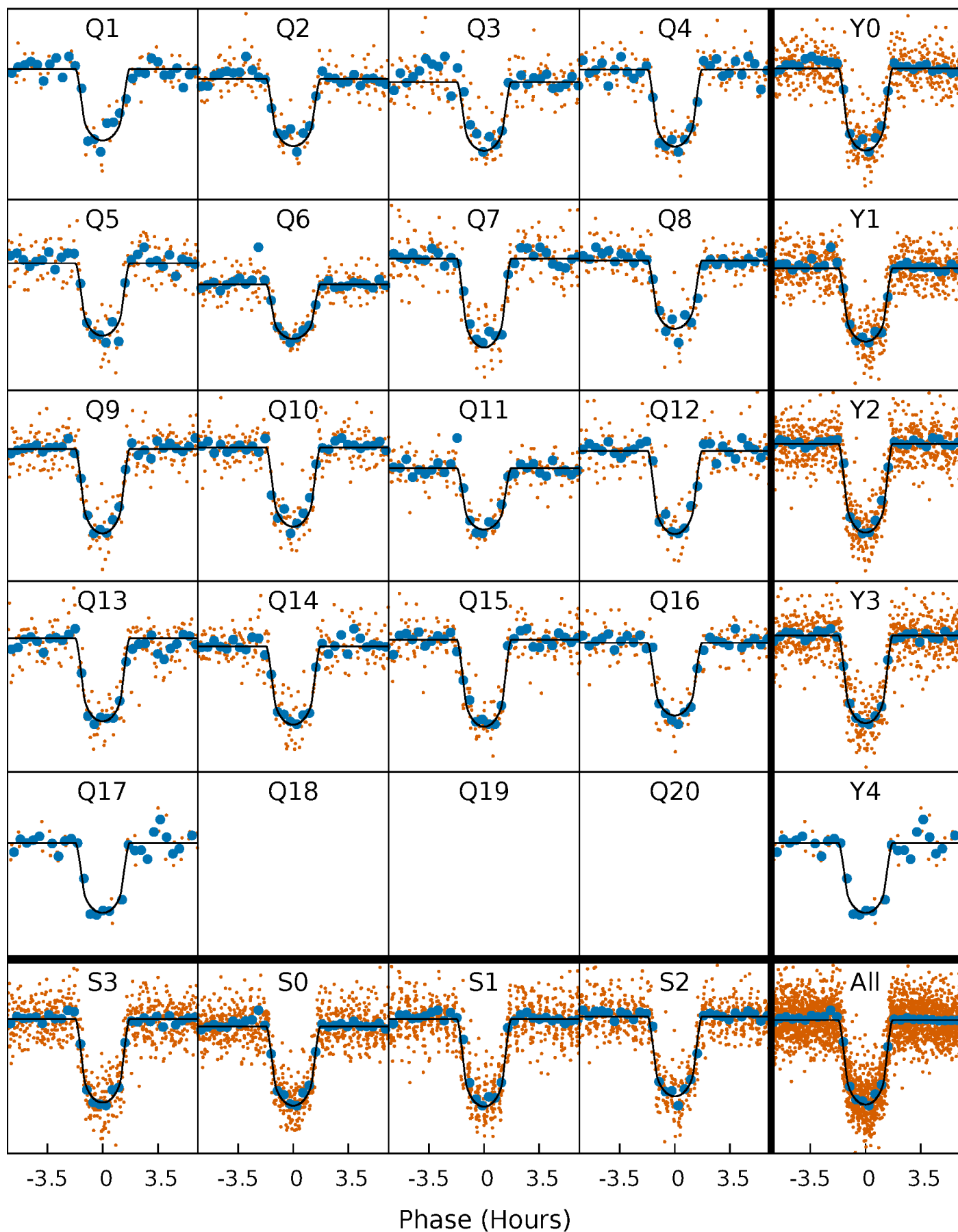
TCE 008505670-01 P= 10.848459 Days  $T_0=139.259584$  (BKJD)





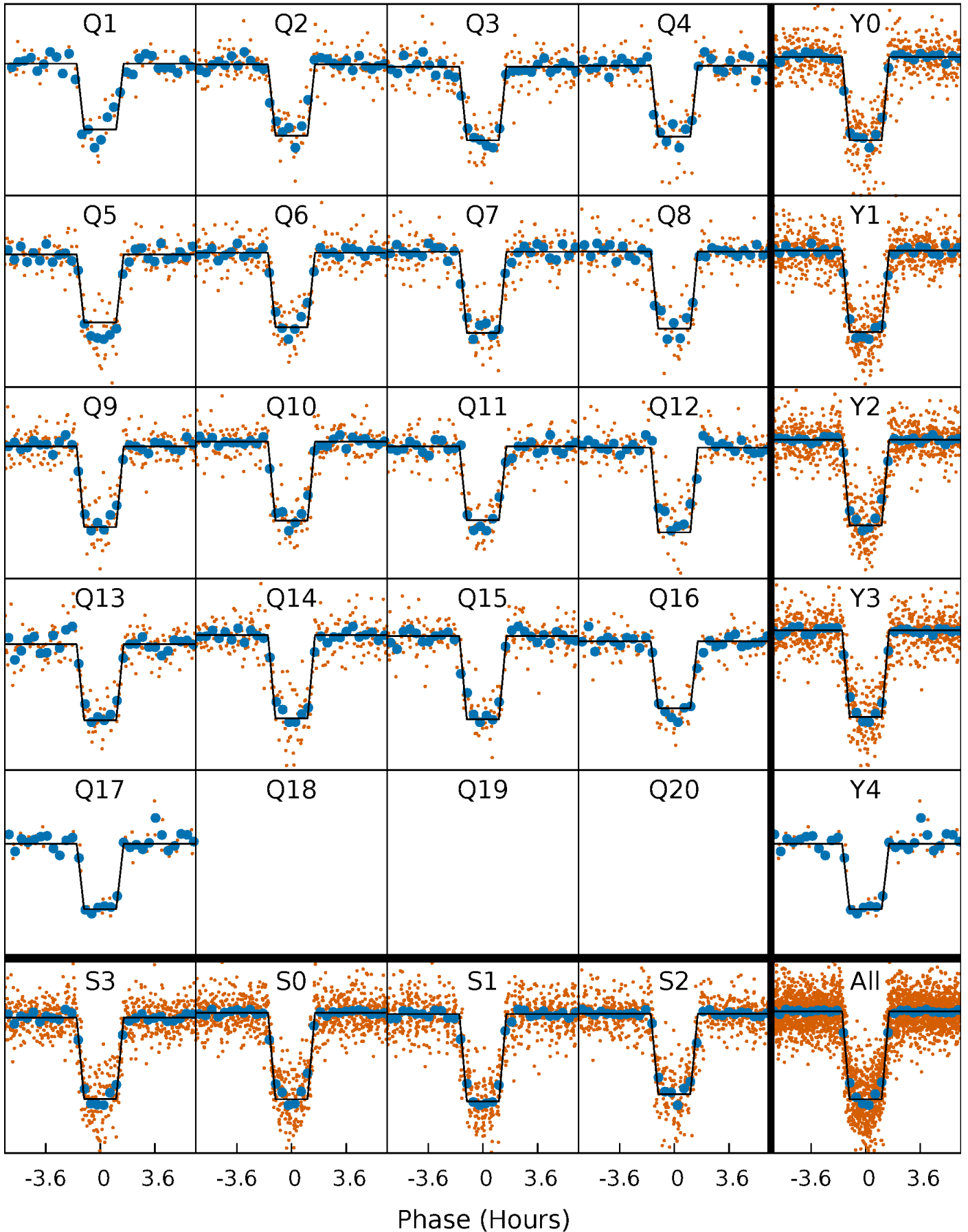
# DV Quarter-Phased Transit Curves

TCE 008505670-01 P= 10.848459 Days  $T_0=139.259584$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

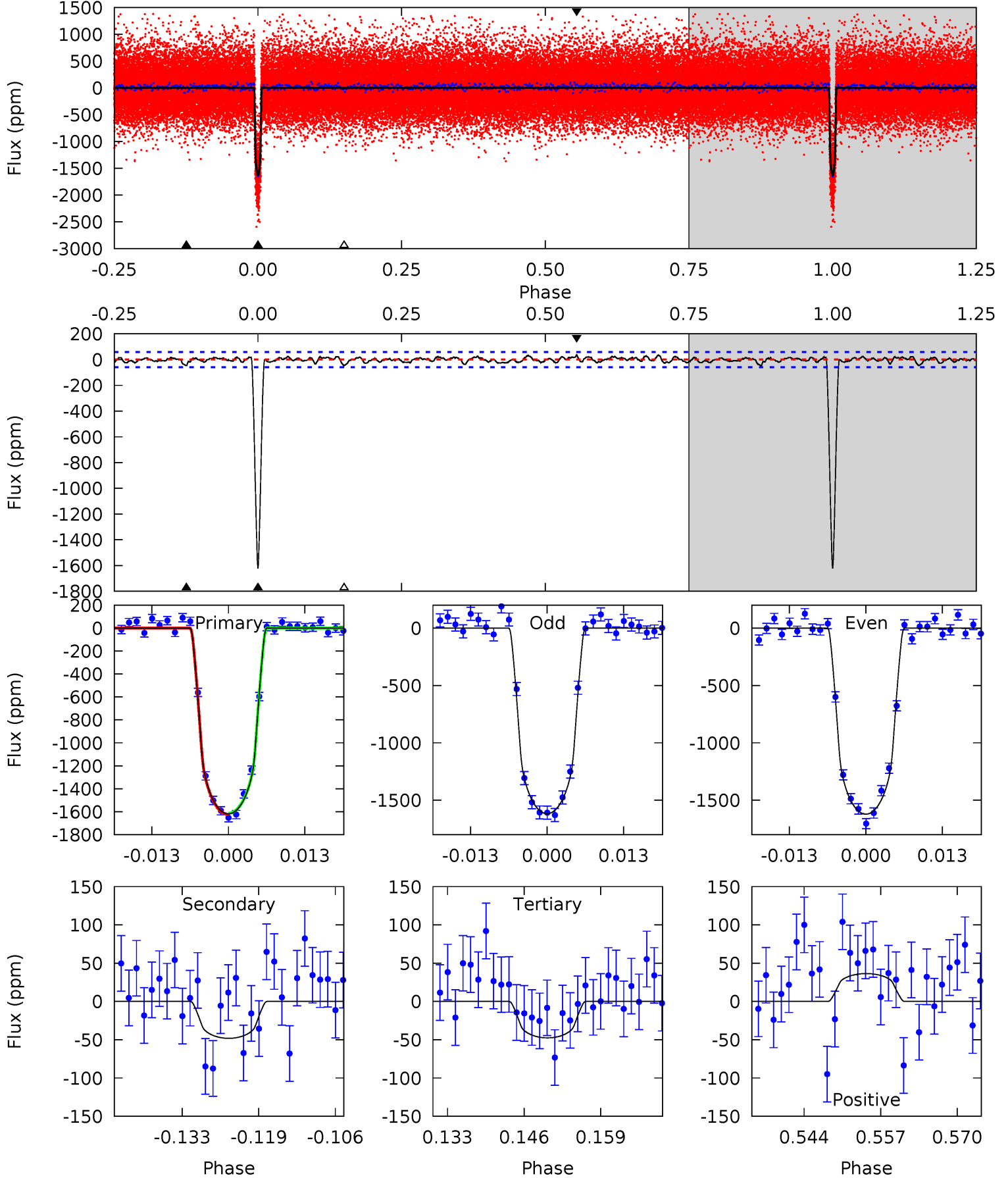
TCE 008505670-01 P= 10.848412 Days  $T_0=139.262997$  (BKJD)



# DV Model-Shift Uniqueness Test

008505670-01, P = 10.848459 Days, E = 128.411125 Days

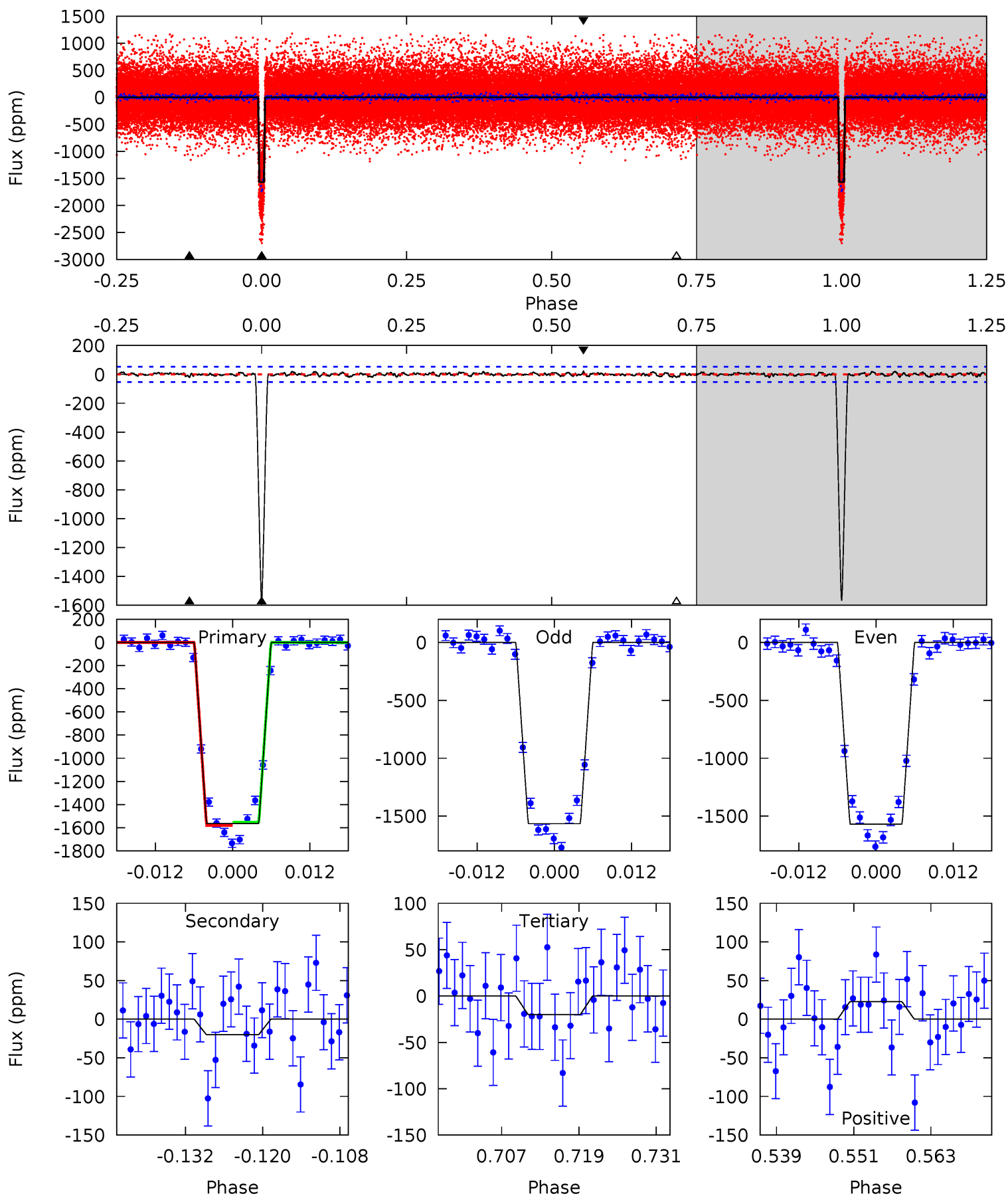
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
137.3	4.09	4.04	3.09	4.97	2.48	1.23	133.3	134.3	0.05	1.00	0.18	1.00	0.02	0.42



# Alt Model-Shift Uniqueness Test

008505670-01, P = 10.848412 Days, E = 128.414585 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
146.9	1.88	1.88	2.11	4.99	2.51	0.69	145.1	144.8	0.00	-0.23	0.14	1.02	0.01	1.23



### Stellar Parameters For KIC 008505670

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4201^{+676}_{-416}$	$4.682^{+0.088}_{-0.072}$	$-0.200^{+0.150}_{-0.100}$	$0.591^{+0.109}_{-0.109}$	$0.609^{+0.124}_{-0.101}$	$4.160^{+1.948}_{-1.126}$
	+16%/-10%	+2%/-2%	+75%/-50%	+18%/-18%	+20%/-17%	+47%/-27%
Source	SPE5	SPE5	SPE5	DSEP		

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

### Secondary Eclipse Parameters for KIC 008505670-01 / KOI 0912.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-48 \pm 12$	$2.50^{+0.40}_{-0.39}$	$700^{+108}_{-75}$	$2531^{+249}_{-220}$	$28^{+13}_{-9}$
Alt.	$-20 \pm 11$	$2.56^{+0.45}_{-0.39}$	$702^{+111}_{-76}$	$2246^{+252}_{-257}$	$11^{+8}_{-6}$

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

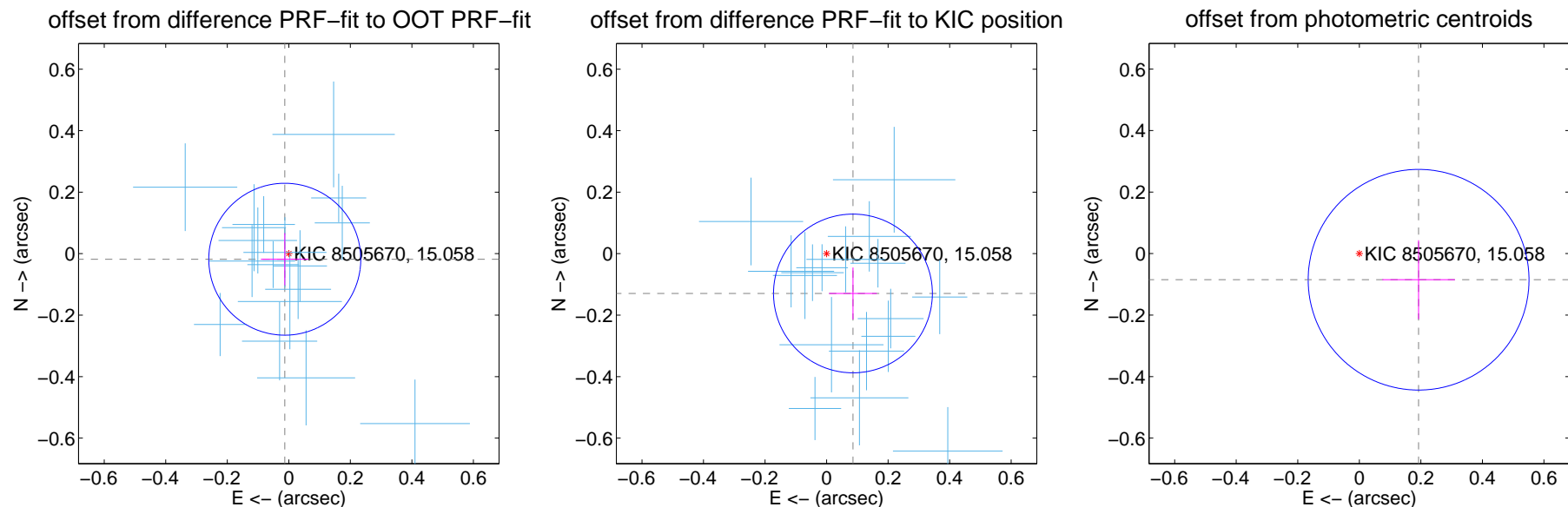
## DV Centroid Data

Supplemental centroid analysis for 008505670-01. Kepler magnitude: 15.06. Transit SNR 83.92

There are 17 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.16 arcsec

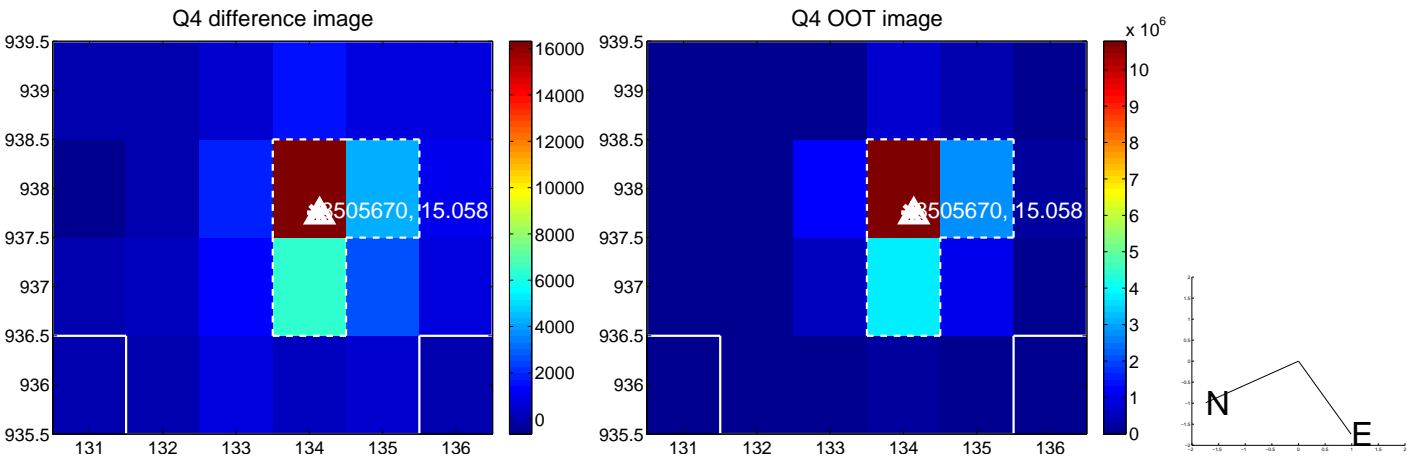
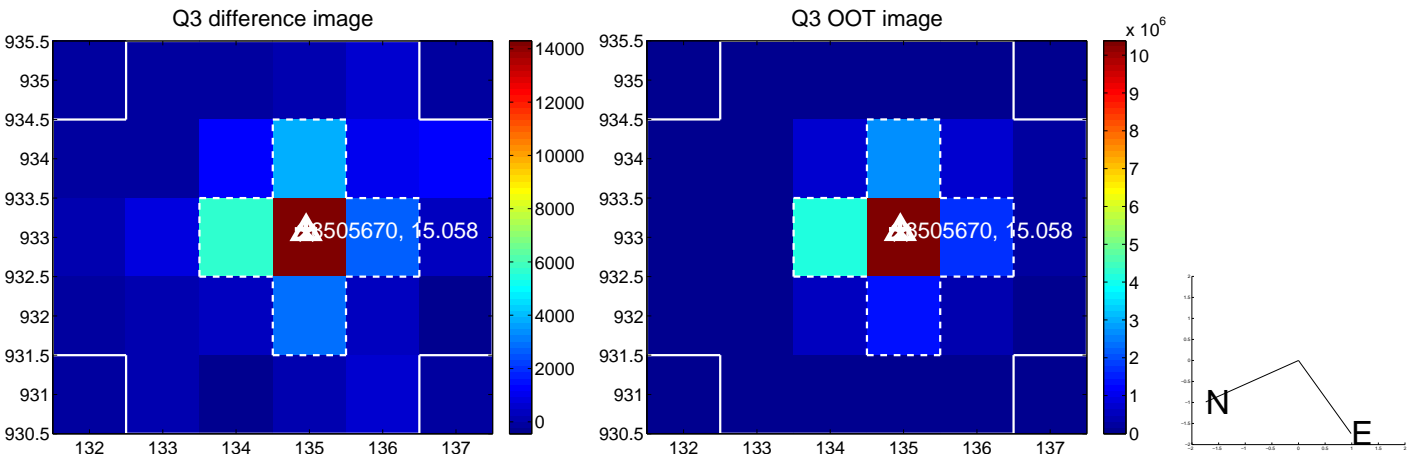
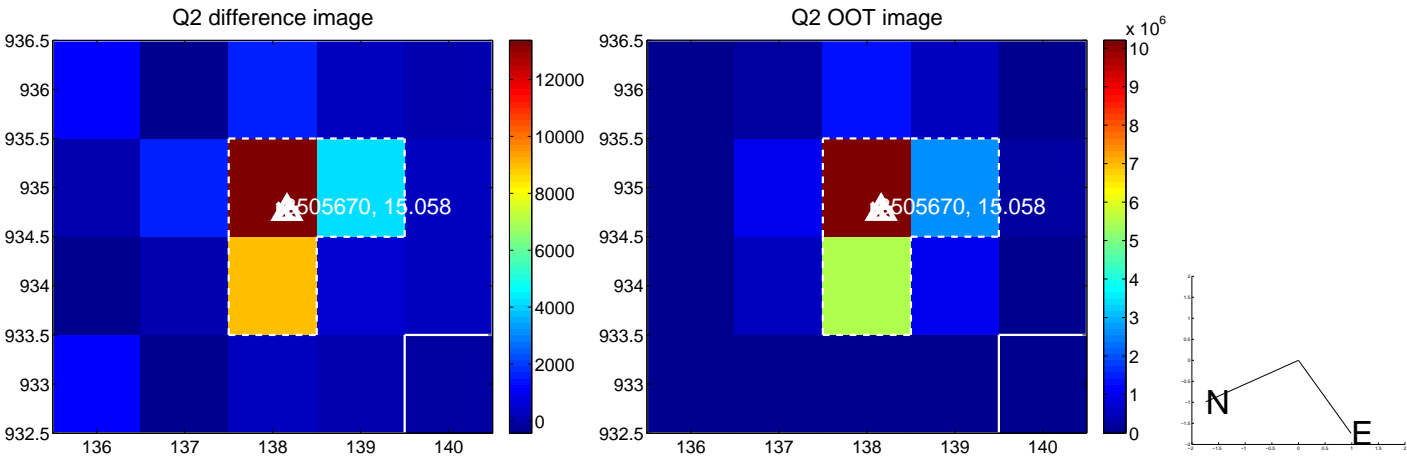
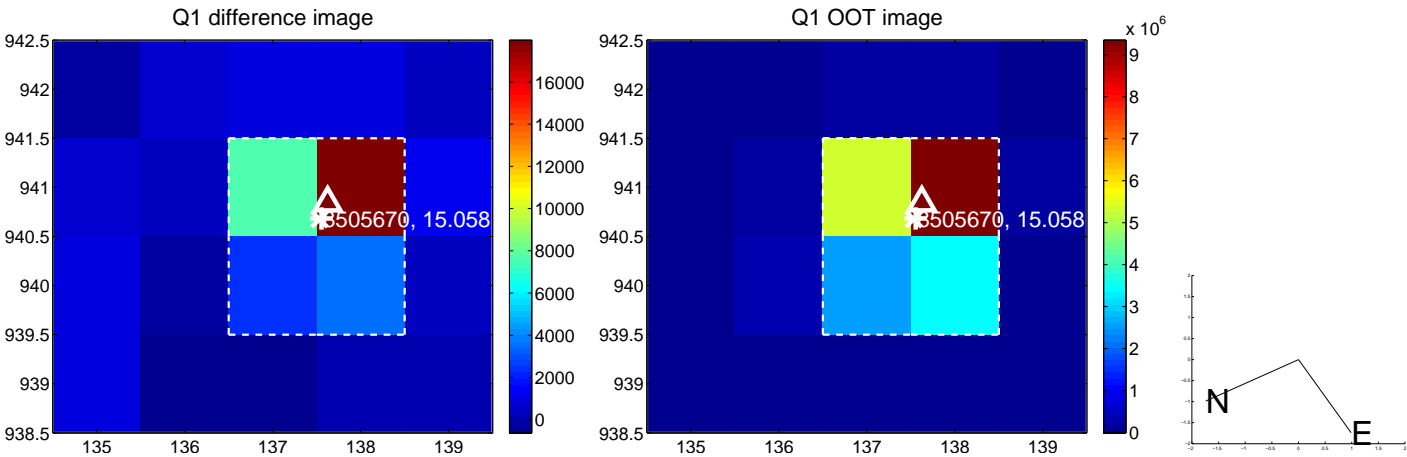
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.022 \pm 0.082$	0.27	$0.013 \pm 0.077$	$-0.018 \pm 0.085$
PRF-fit source offset from KIC position	$0.155 \pm 0.086$	1.80	$-0.086 \pm 0.078$	$-0.129 \pm 0.084$
photometric centroid source offset	$0.21 \pm 0.12$	1.76	$-0.19 \pm 0.12$	$-0.09 \pm 0.13$



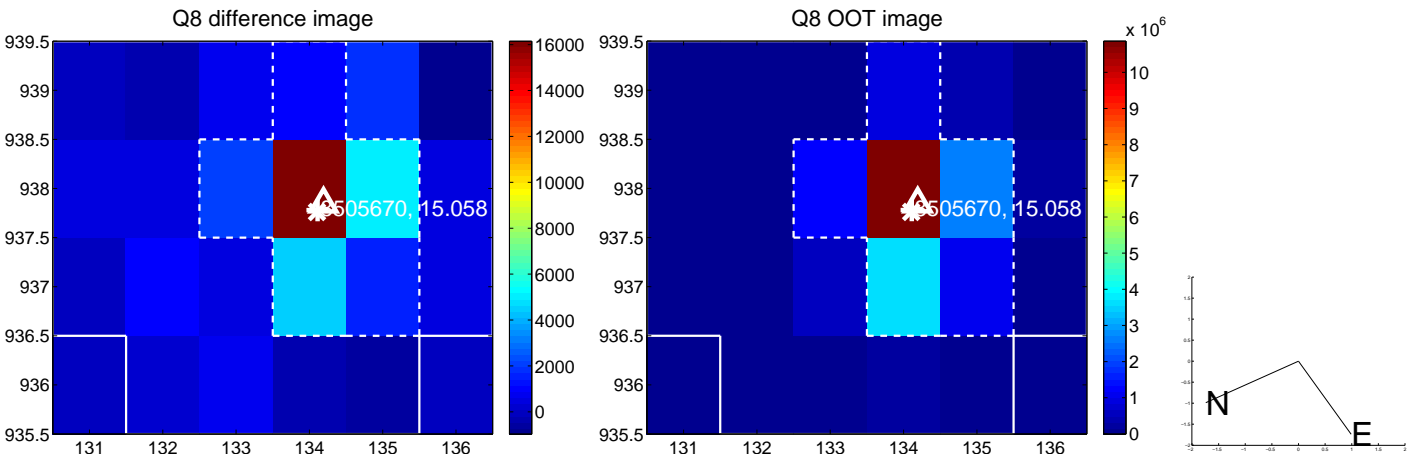
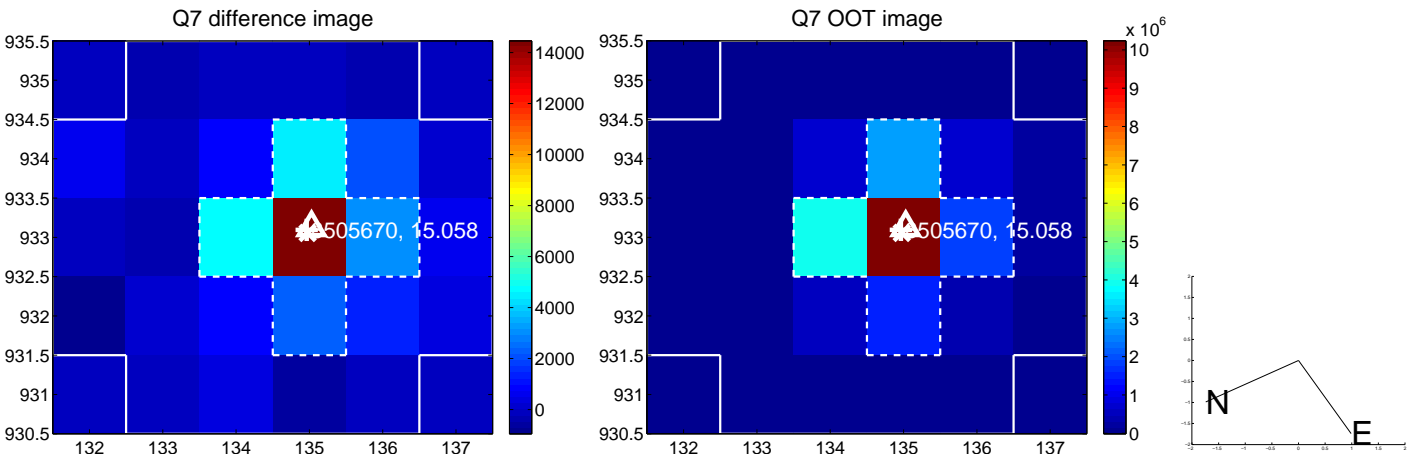
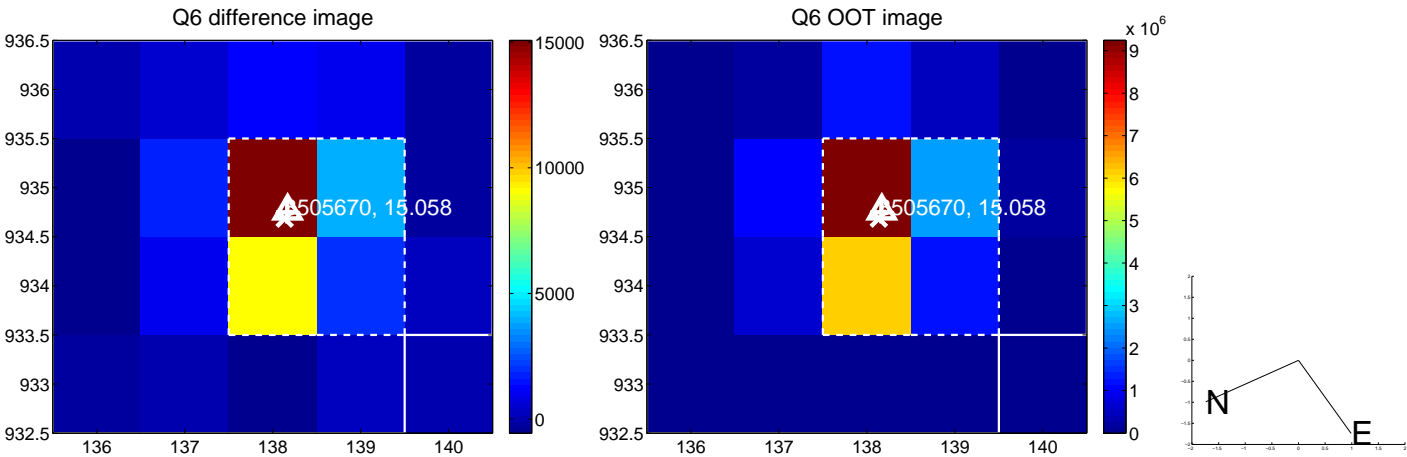
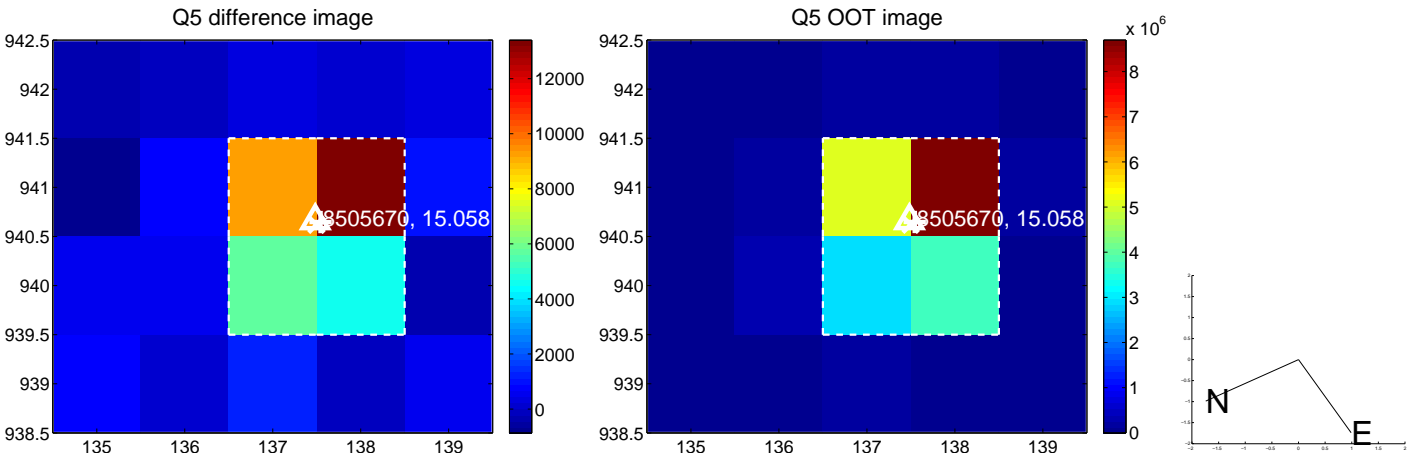
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



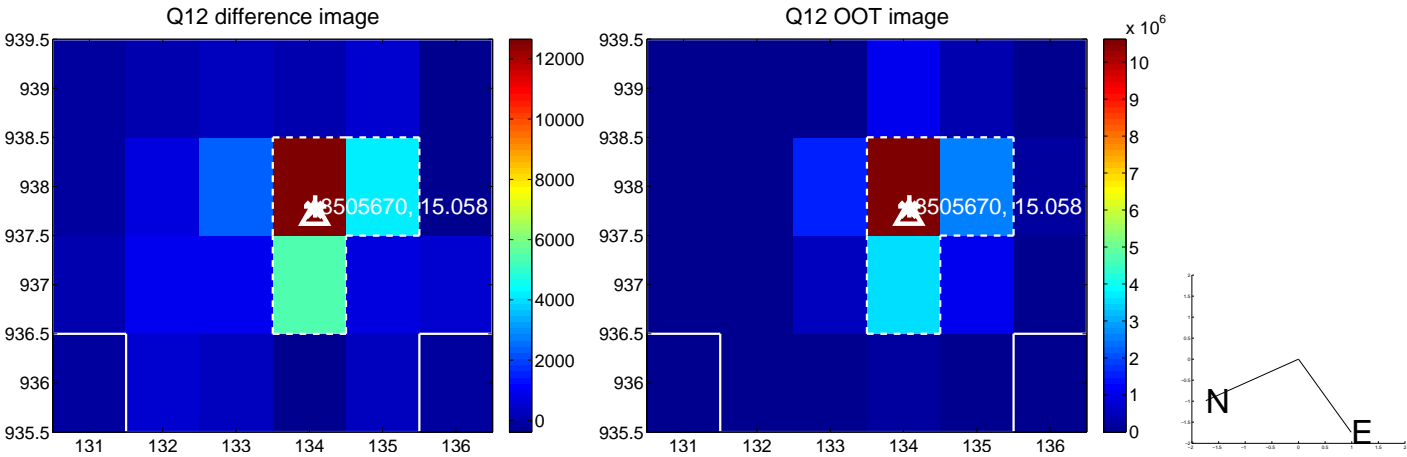
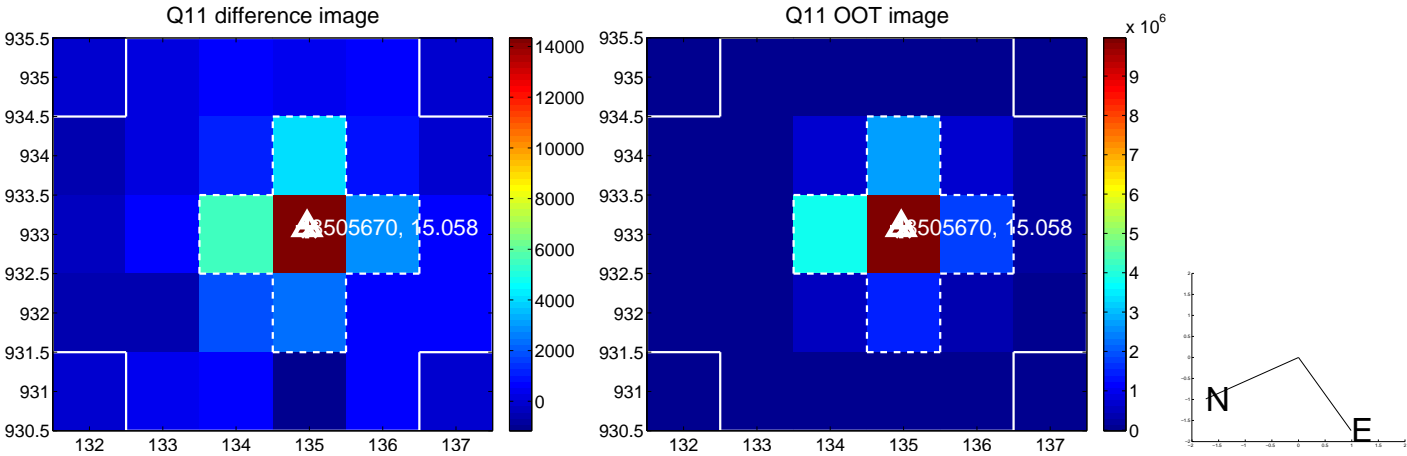
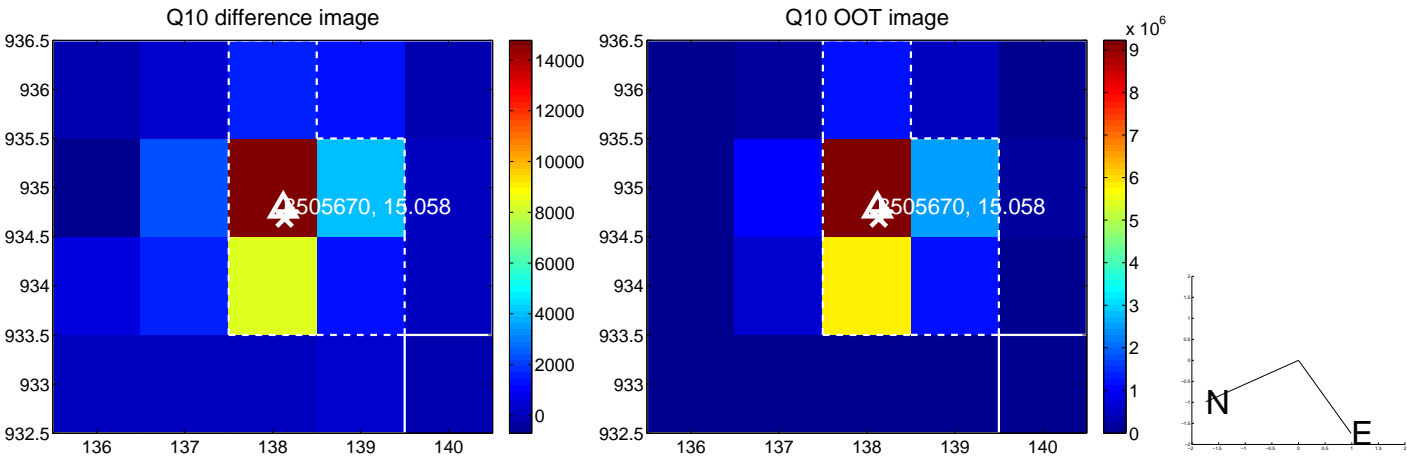
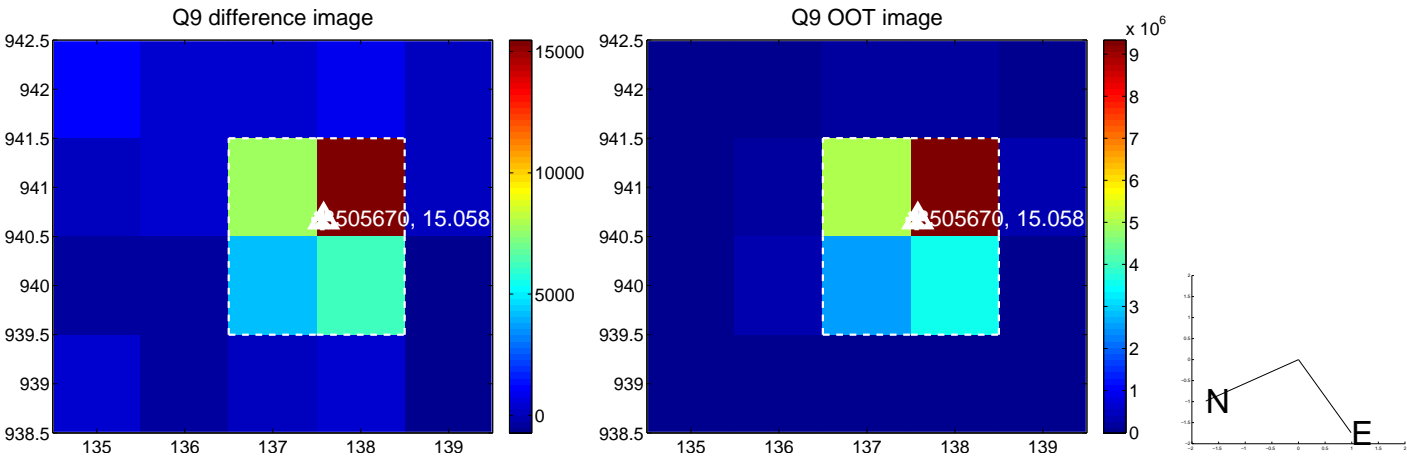
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



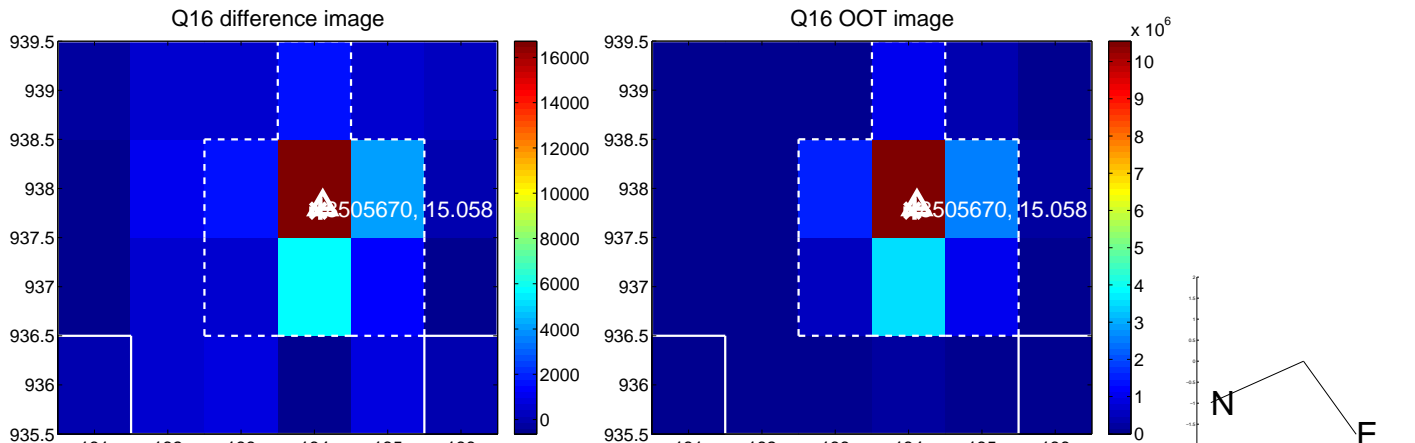
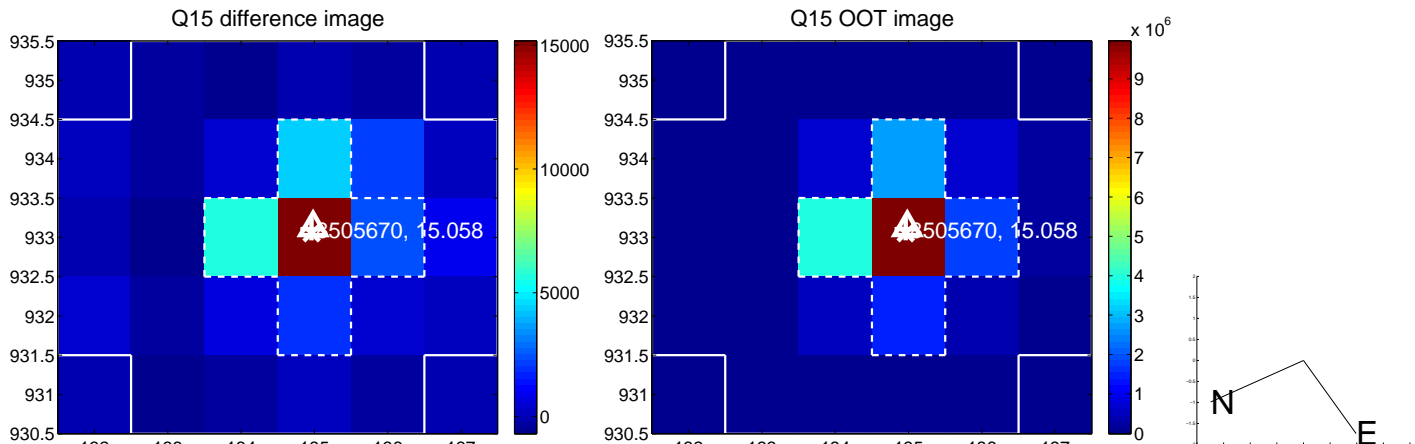
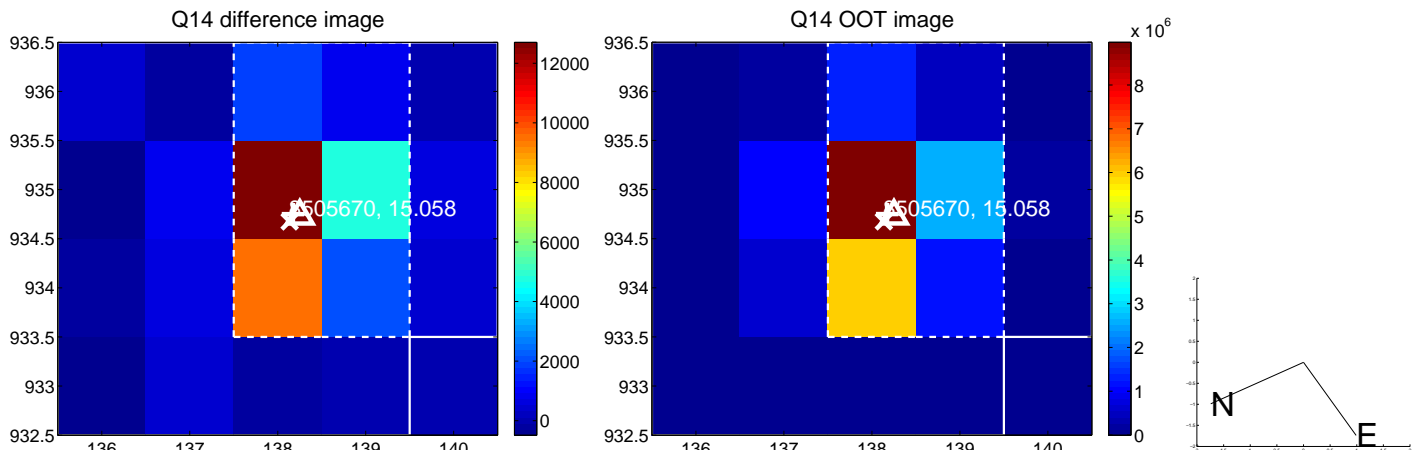
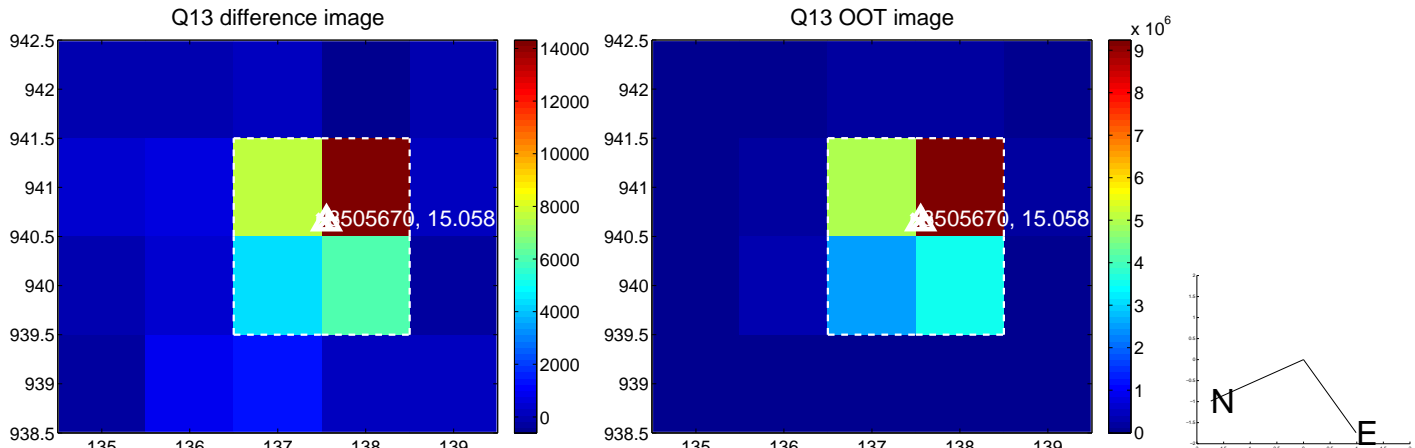
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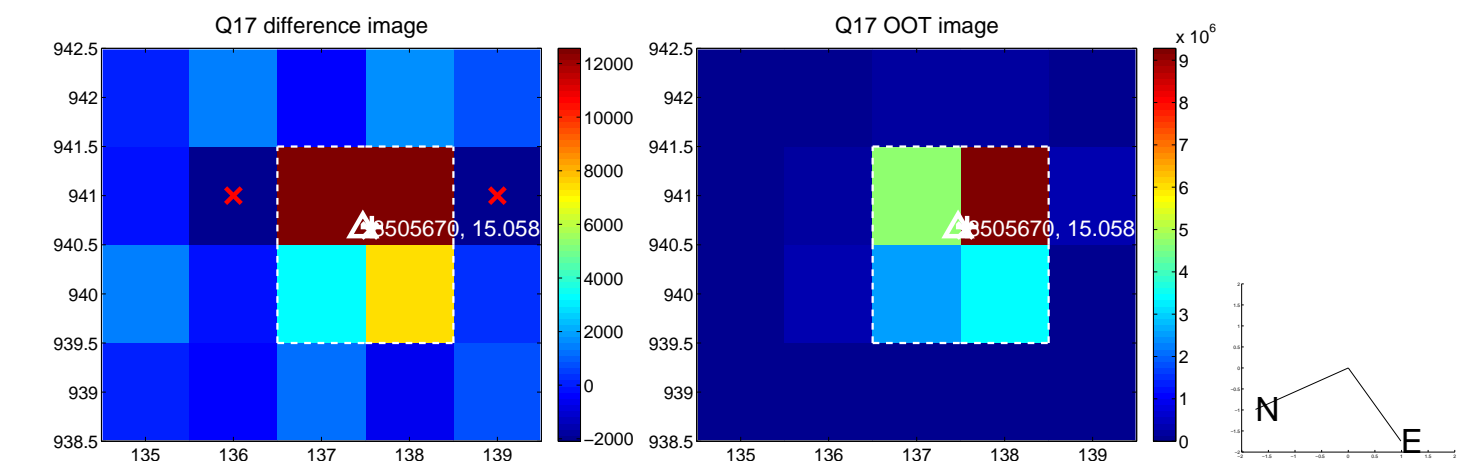
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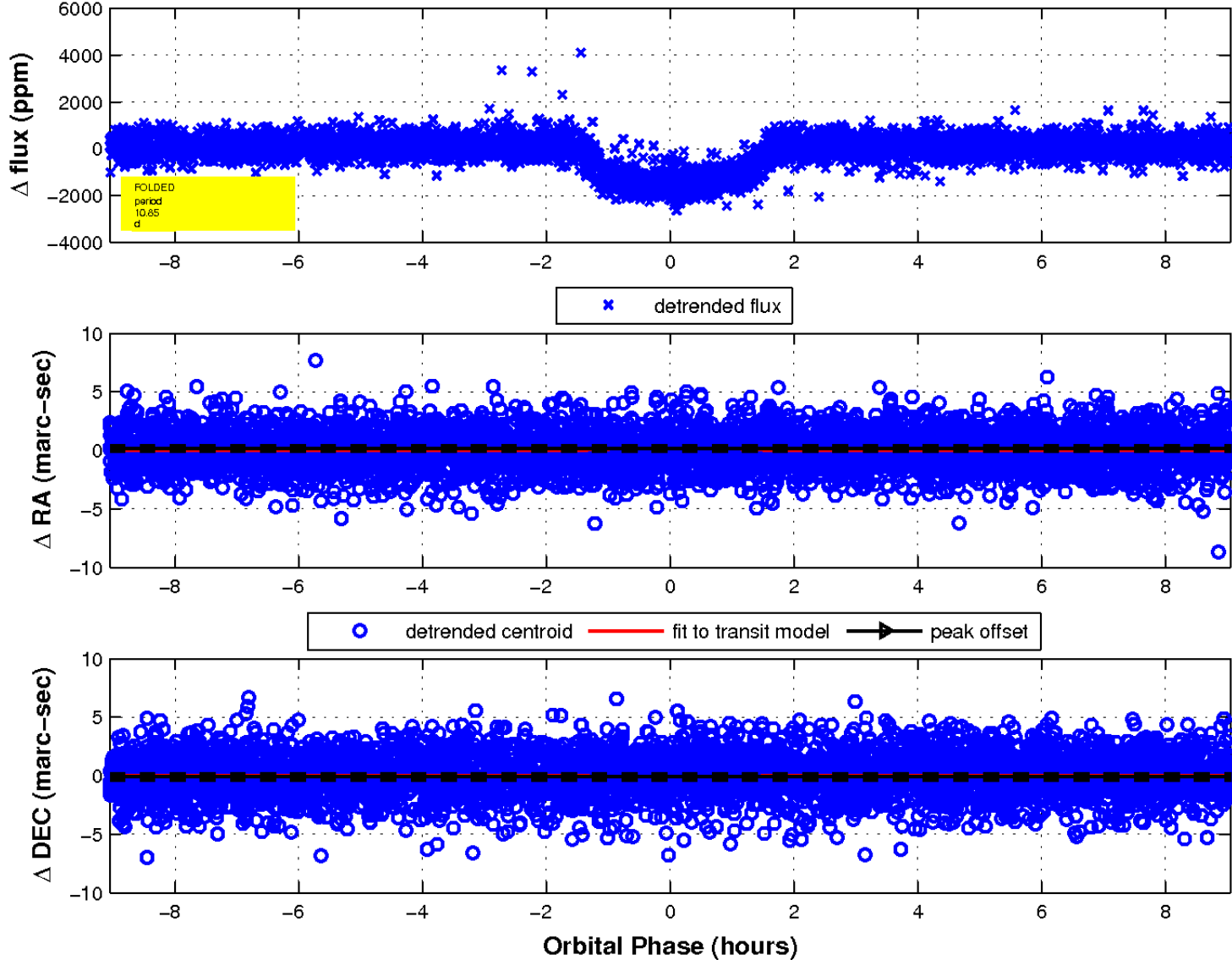
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white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

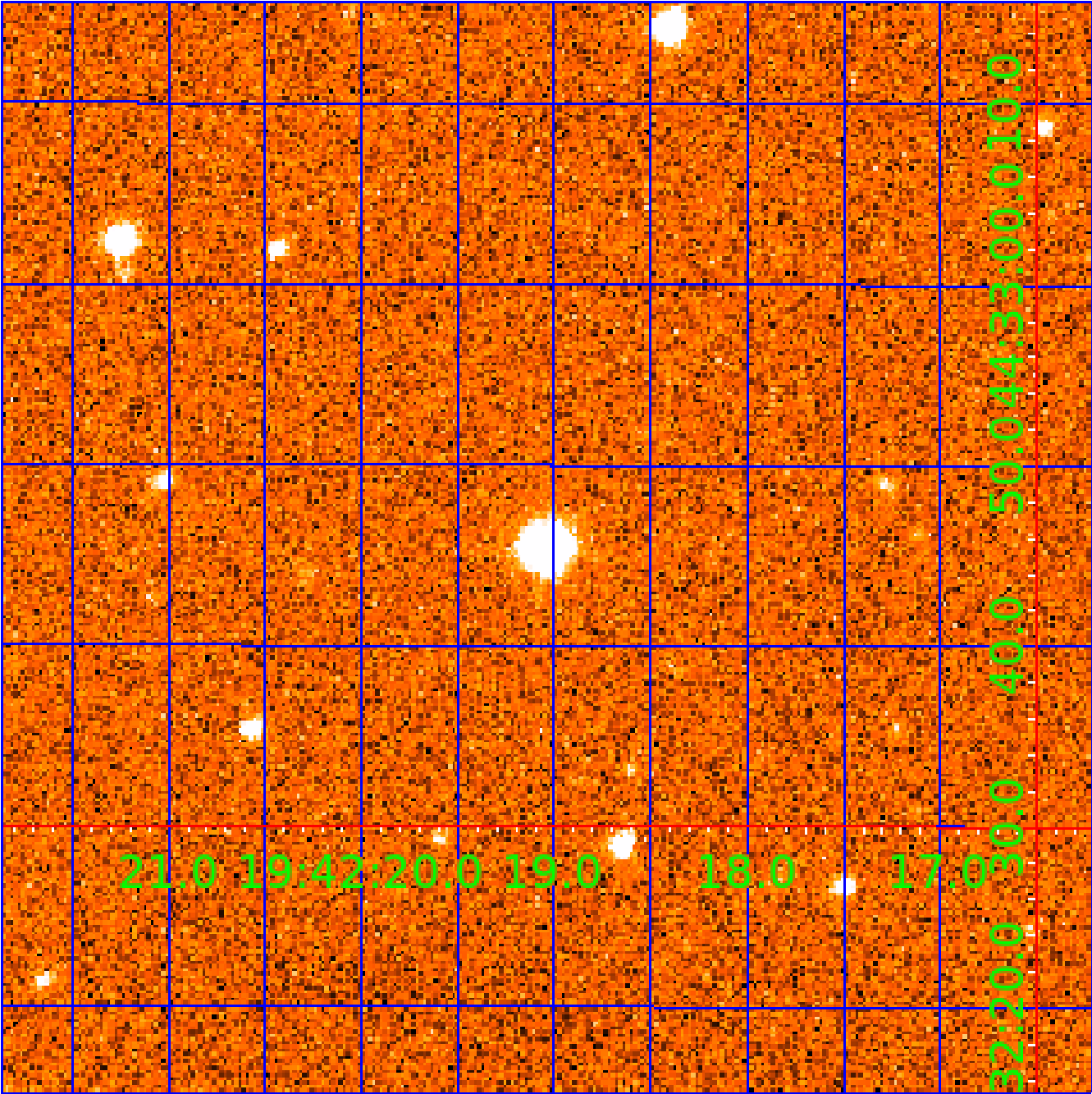


fluxWeightedCentroids, Planet 1 of 2



UKIRT Image

Declination





# KIC 008505670

## Q1-17 DR25 TCE Parameters

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## Robovetter Results

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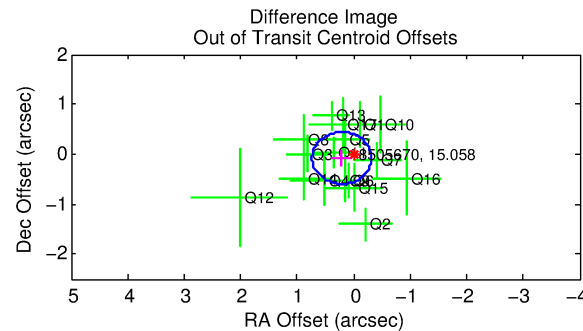
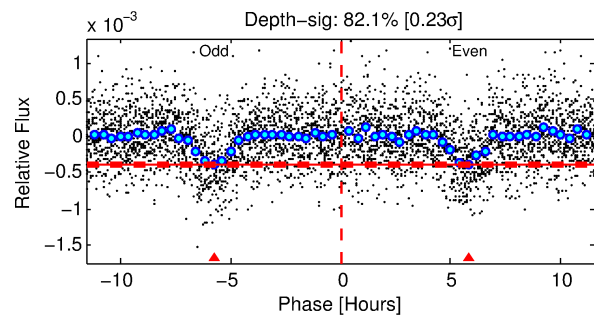
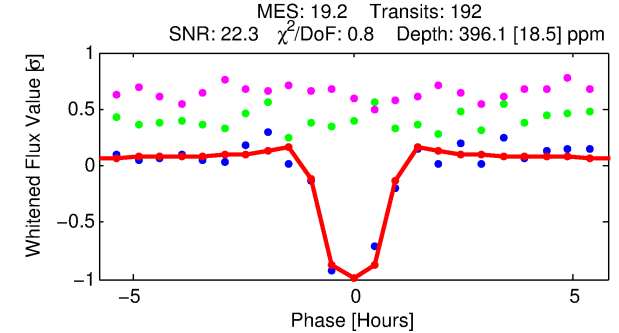
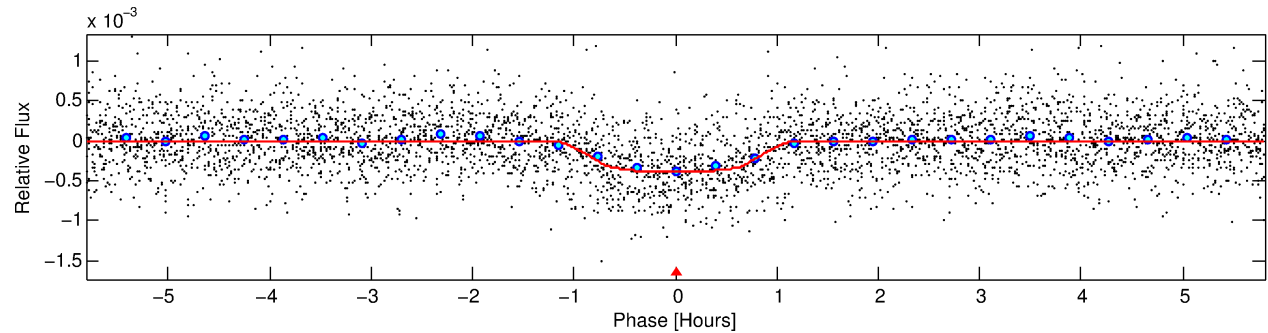
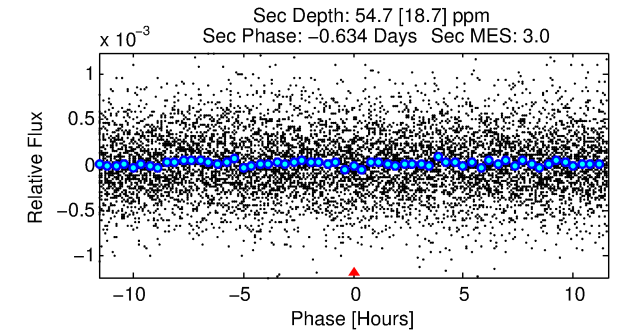
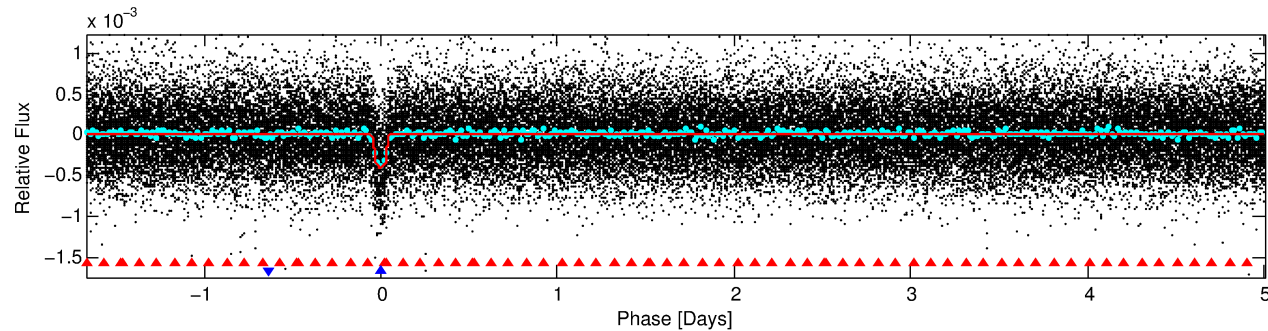
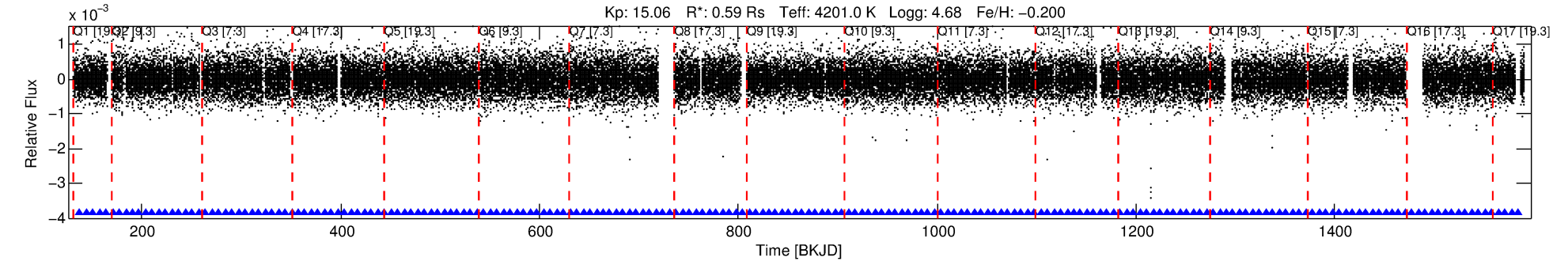
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008505670-02

No Significant Match Found

# DV One-Page Summary

KIC: 8505670 Candidate: 2 of 2 Period: 6.668 d  
KOI: K00912.02 Name: Kepler-252b Corr: 0.982



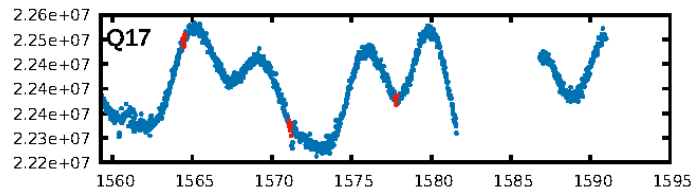
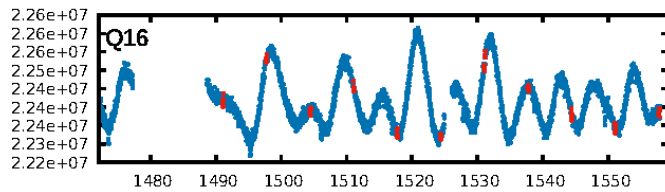
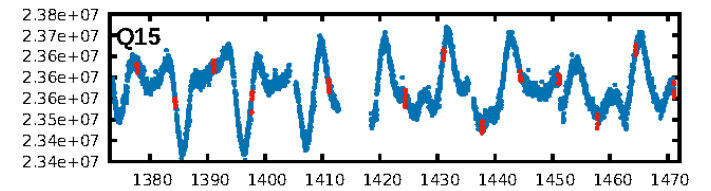
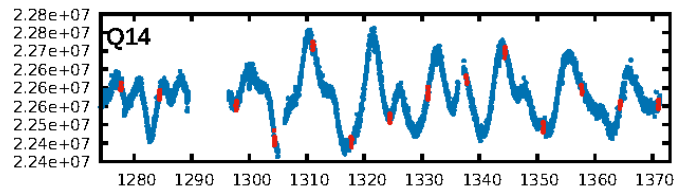
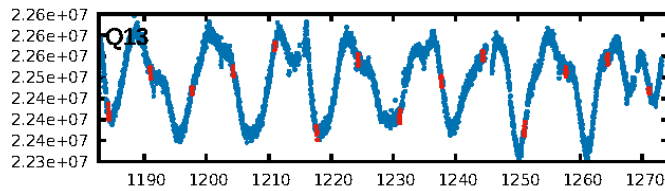
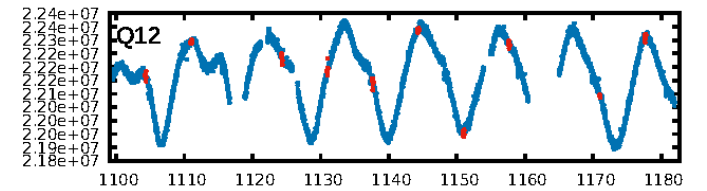
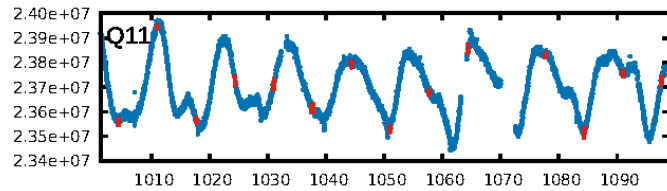
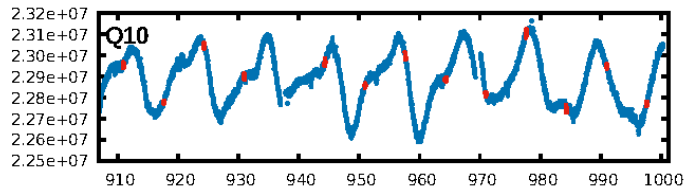
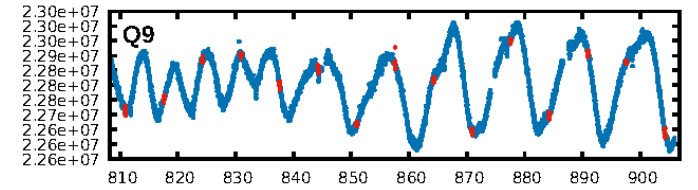
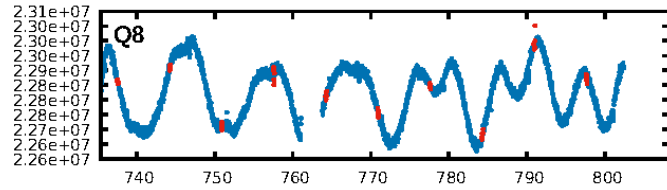
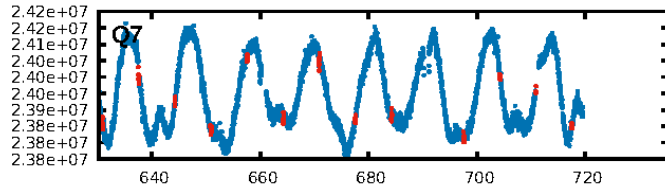
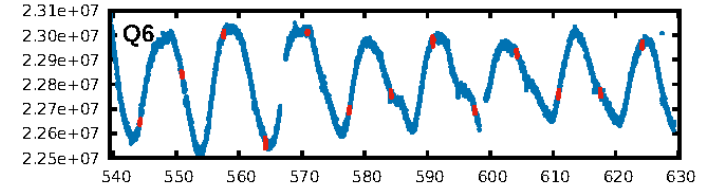
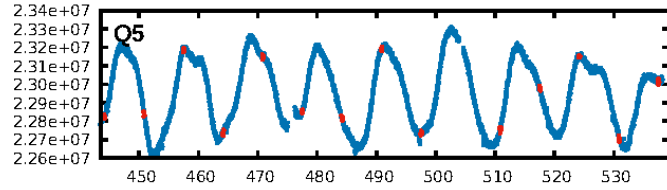
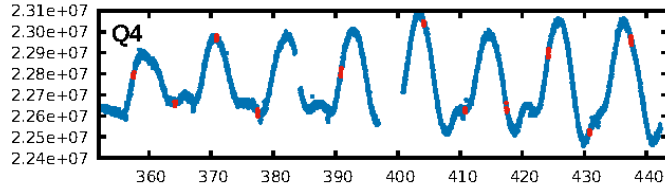
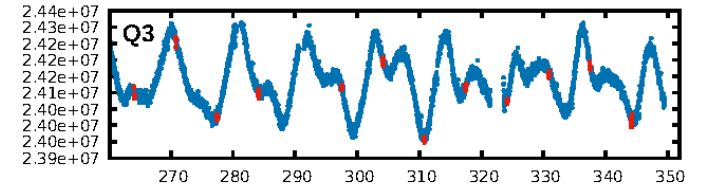
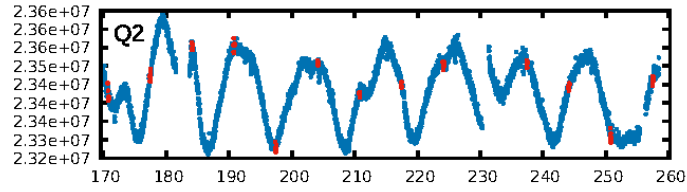
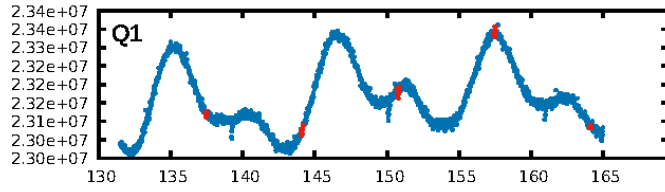
## DV Fit Results:

Period = 6.66833 [0.00002] d  
Epoch = 137.4408 [0.0017] BKJD  
Rp/R\* = 0.0204 [0.0110]  
a/R\* = 16.84 [33.74]  
b = 0.80 [0.95]  
Seff = 28.10 [18.80]  
Teff = 587 [98] K  
Rp = 1.32 [0.75] Re  
a = 0.0589 [0.0083] AU  
Ag = 60.22 [68.79] [0.86σ]  
Teffp = 2529 [821] K [2.35σ]

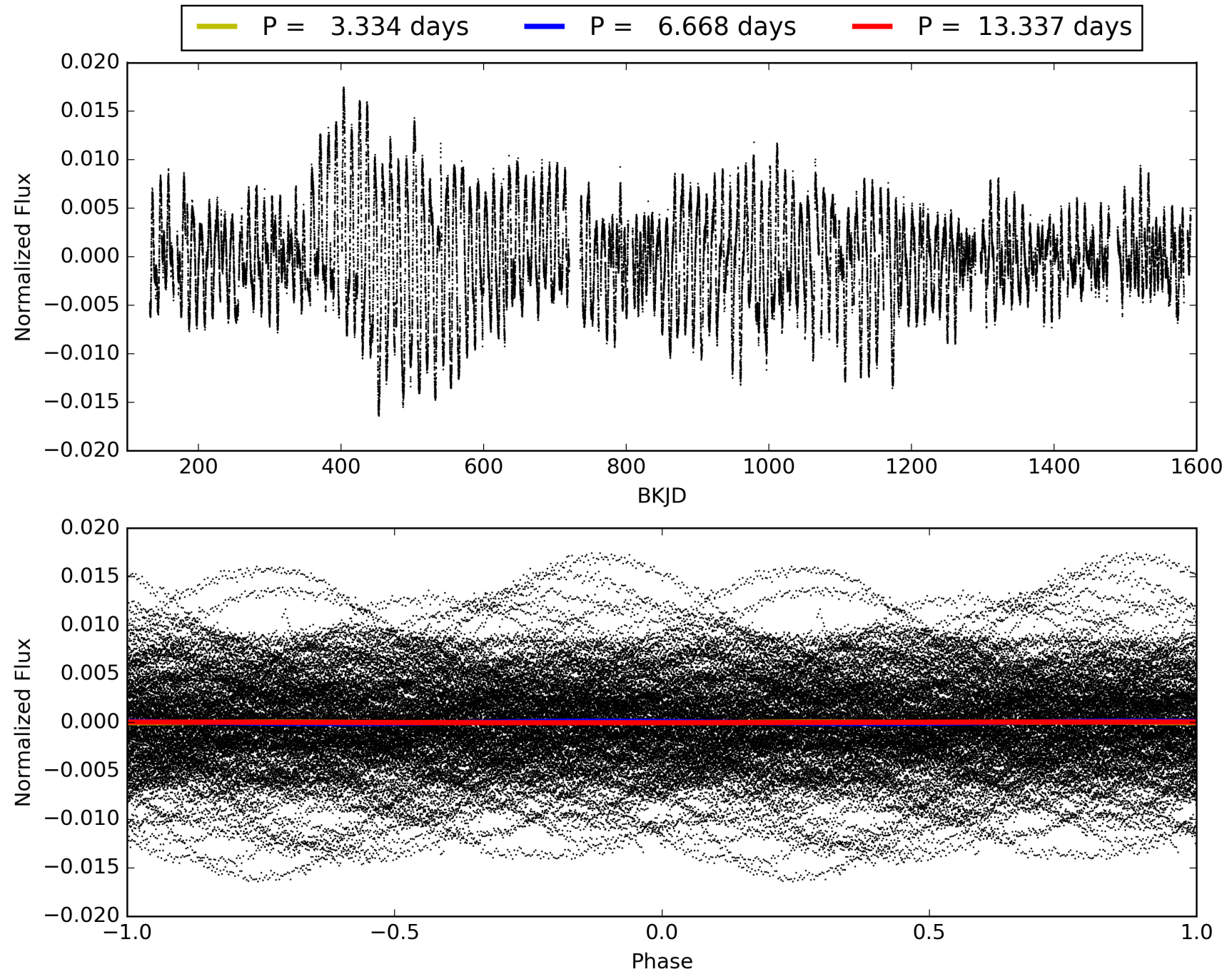
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [27.97σ]  
ModelChiSquare2-sig: 99.8%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 1.41e-77  
RollingBand-fgt: 1.00 [185/185]  
GhostDiagnostic-chr: 1.711  
Centroid-sig: 11.9%  
Centroid-so: 0.723 arcsec [1.42σ]  
OotOffset-rm: 0.227 arcsec [1.31σ]  
KicOffset-rm: 0.189 arcsec [1.06σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.94 [16/17]  
DiffImageOverlap-fno: 1.00 [17/17]

# TCE 008505670-02, PDC Light Curves

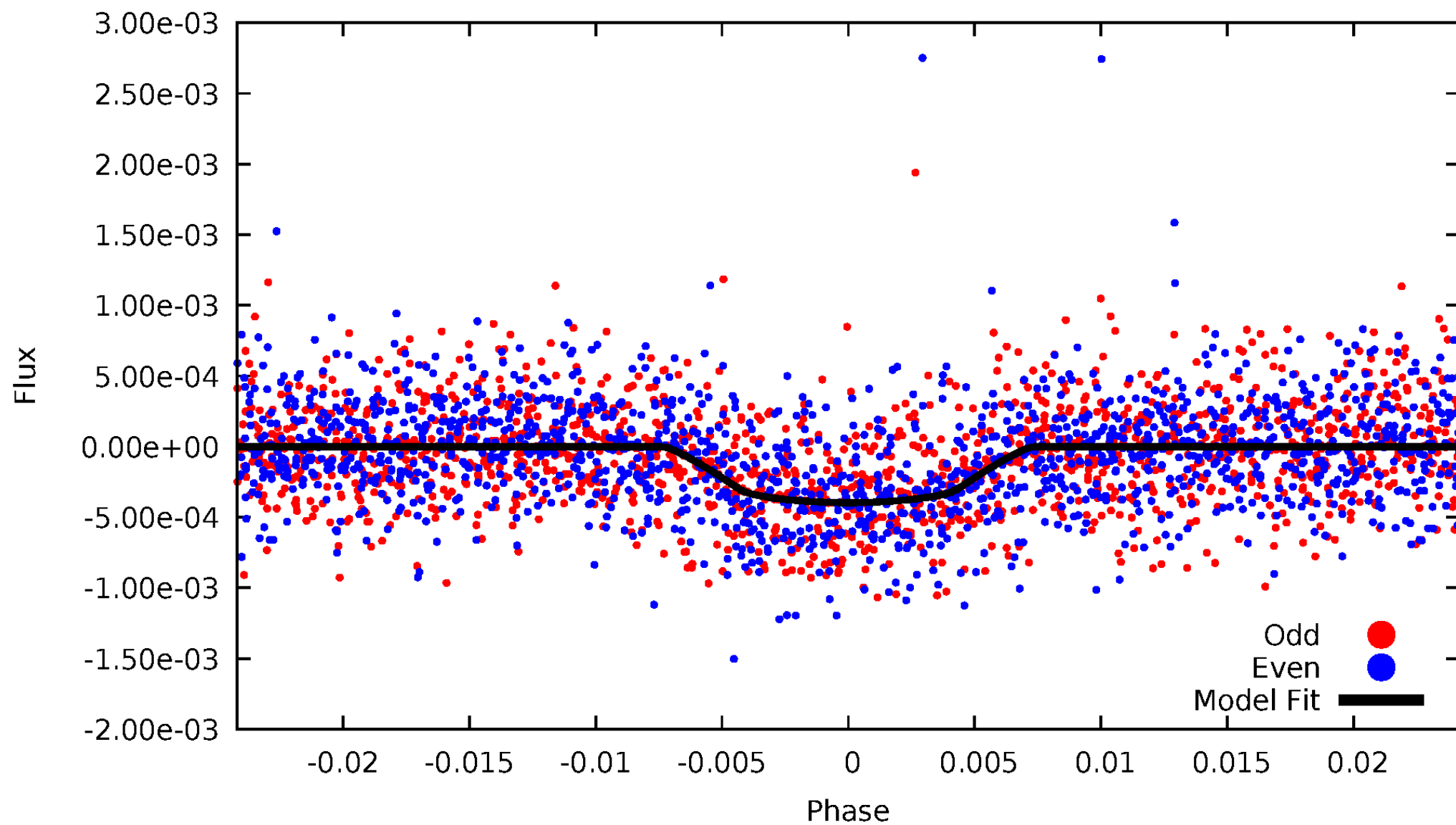


TCE 008505670-02



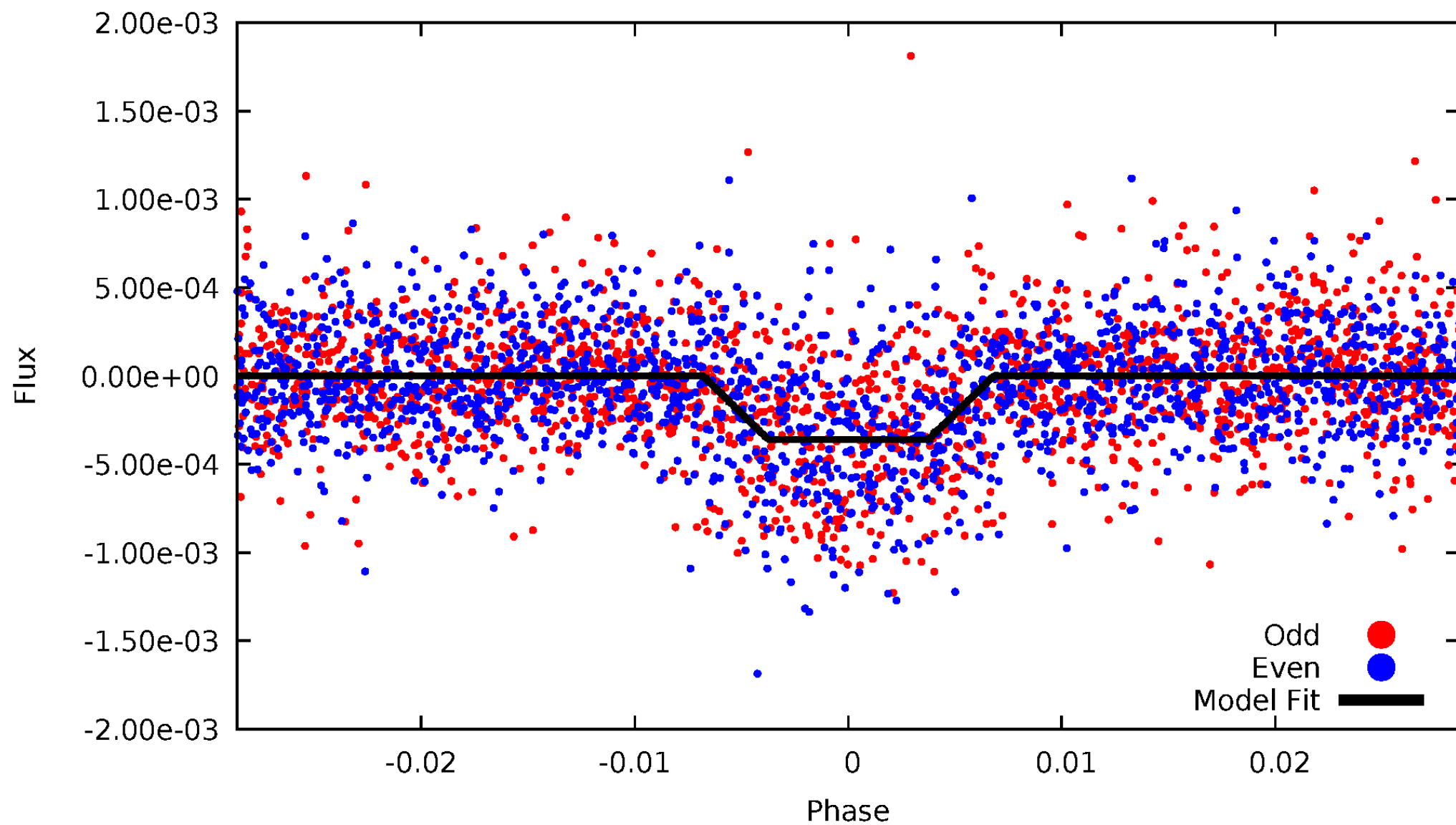
DV Odd/Even

TCE 008505670-02



# ALT Odd/Even

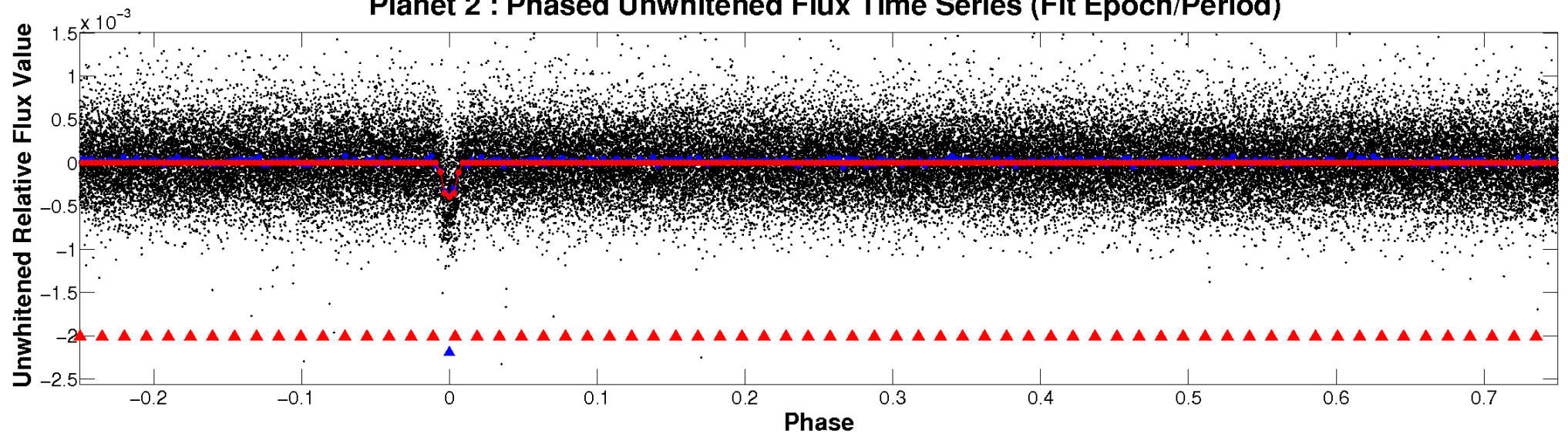
TCE 008505670-02



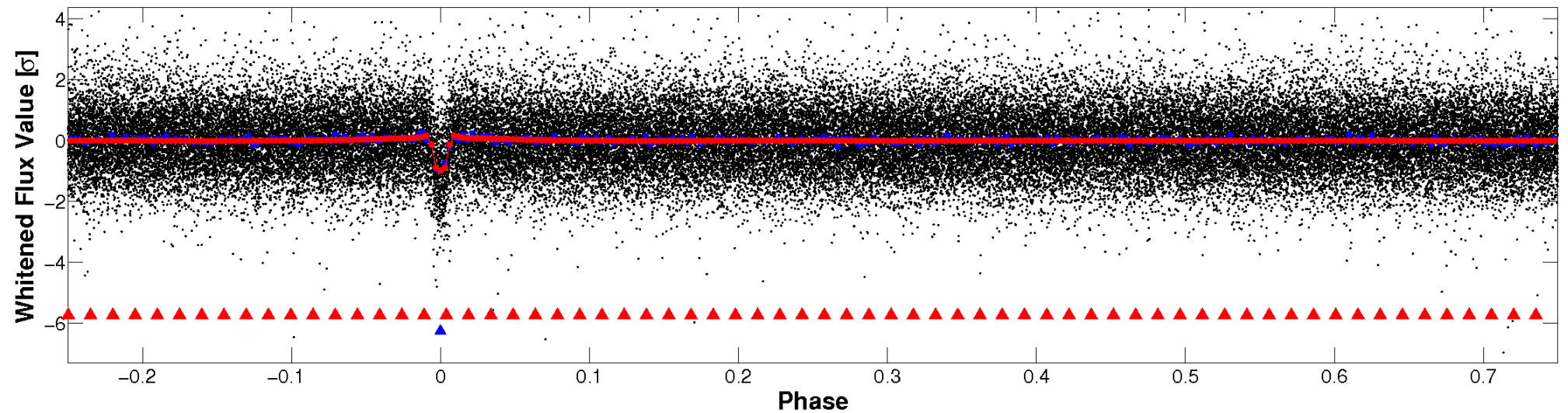


# Non-Whitened Vs. Whitened Light Curve

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

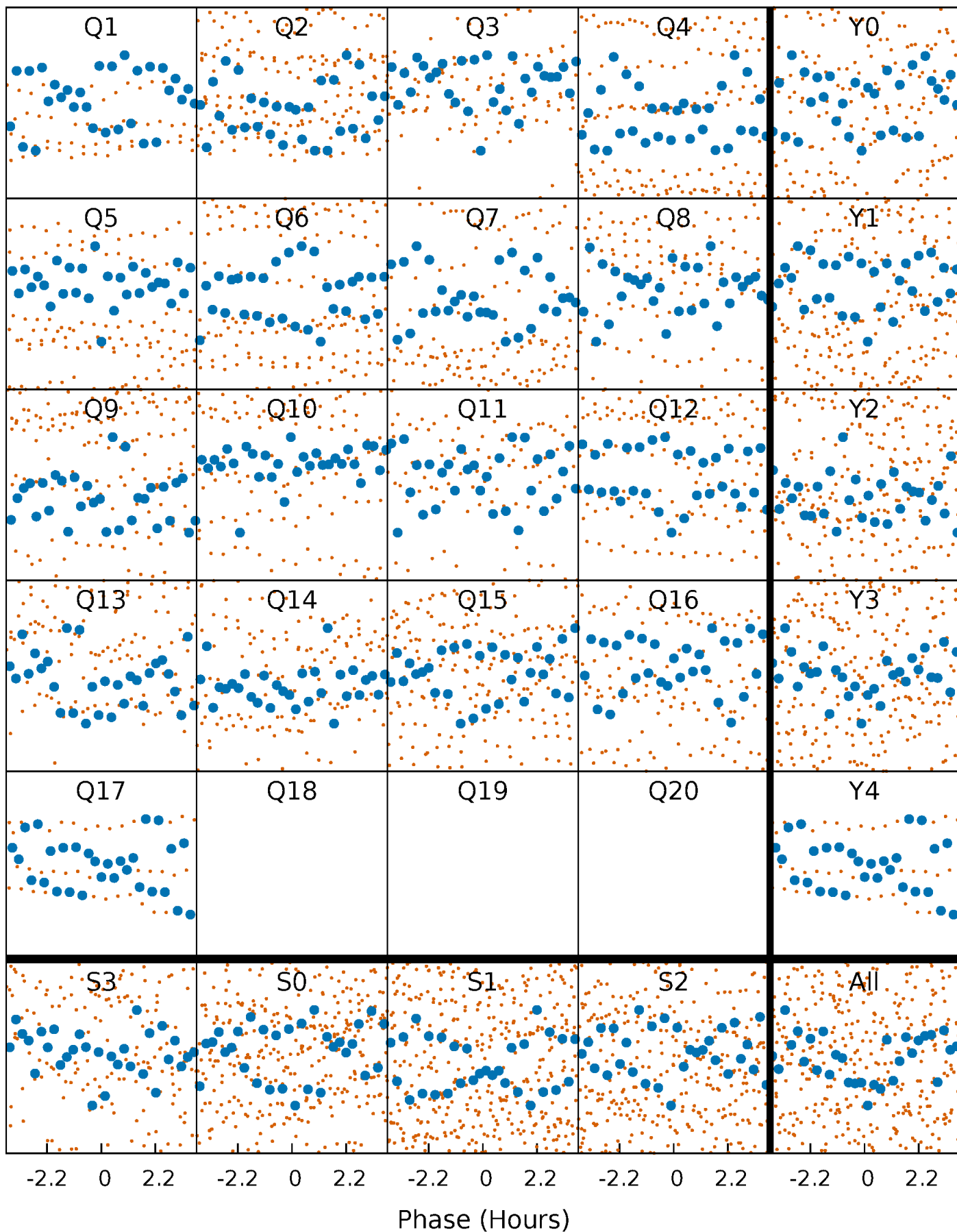


**Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



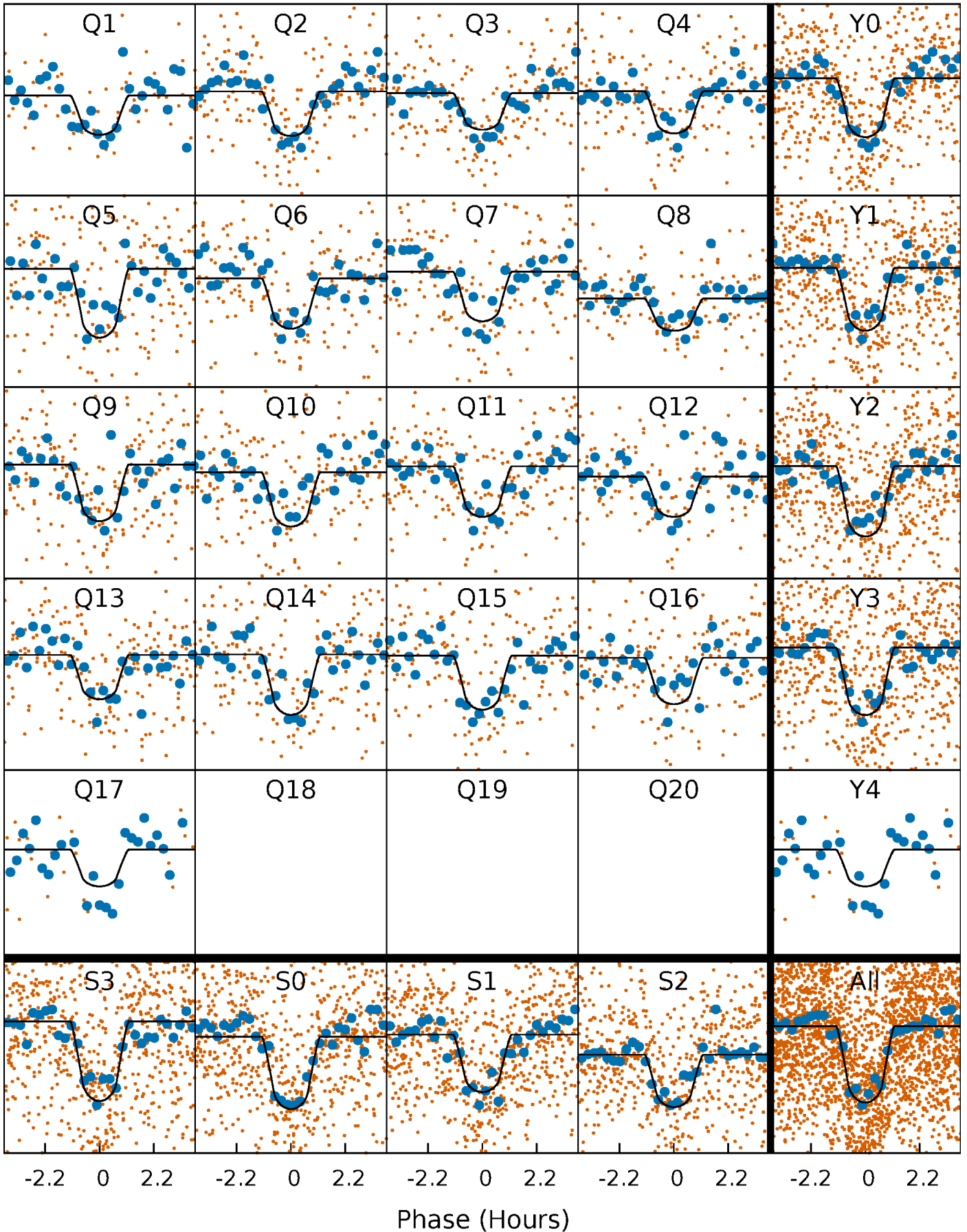
# PDC Quarter-Phased Transit Curves

TCE 008505670-02   P= 6.668327 Days    $T_0=137.440830$  (BKJD)



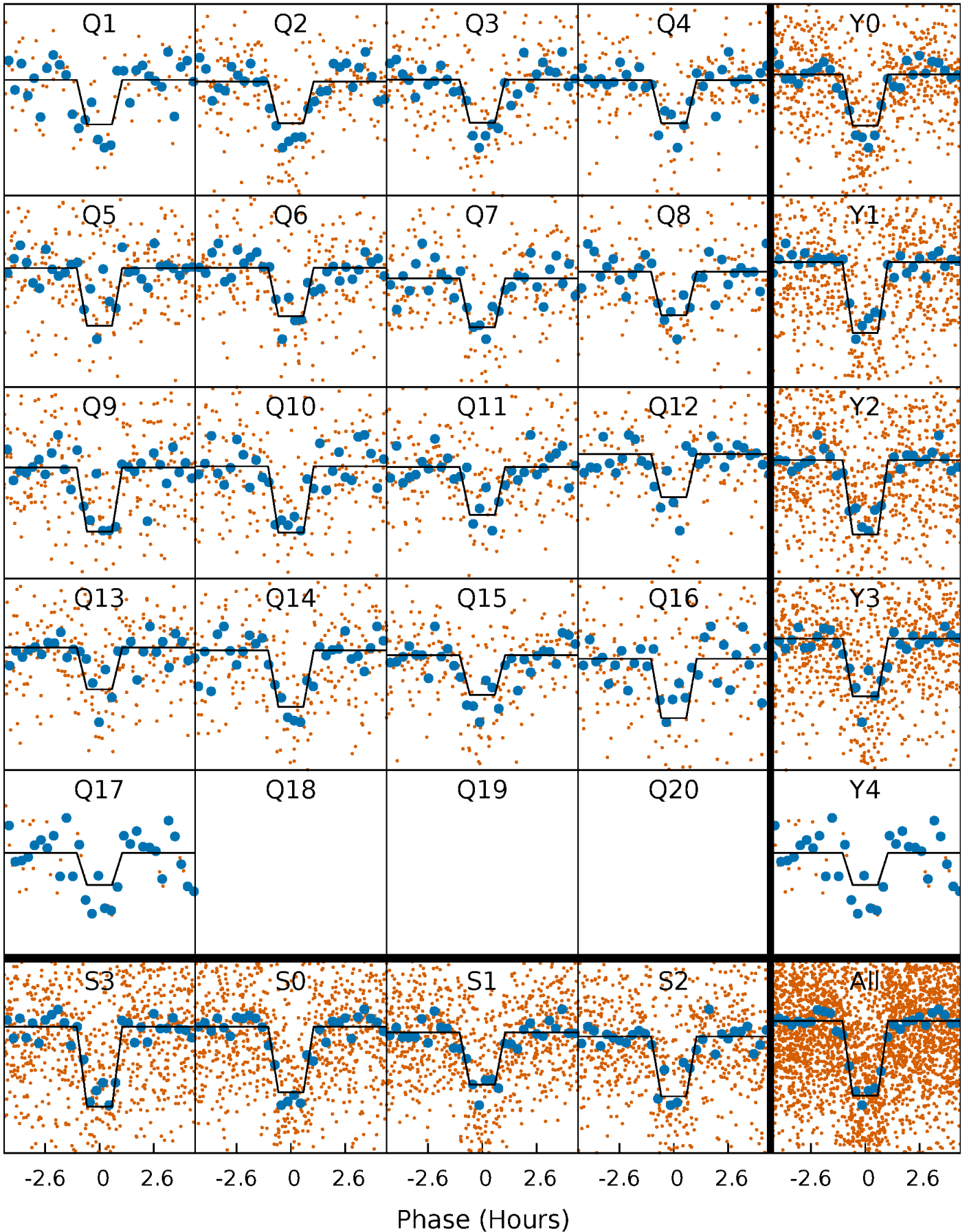
# DV Quarter-Phased Transit Curves

TCE 008505670-02   P= 6.668327 Days    $T_0=137.440830$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

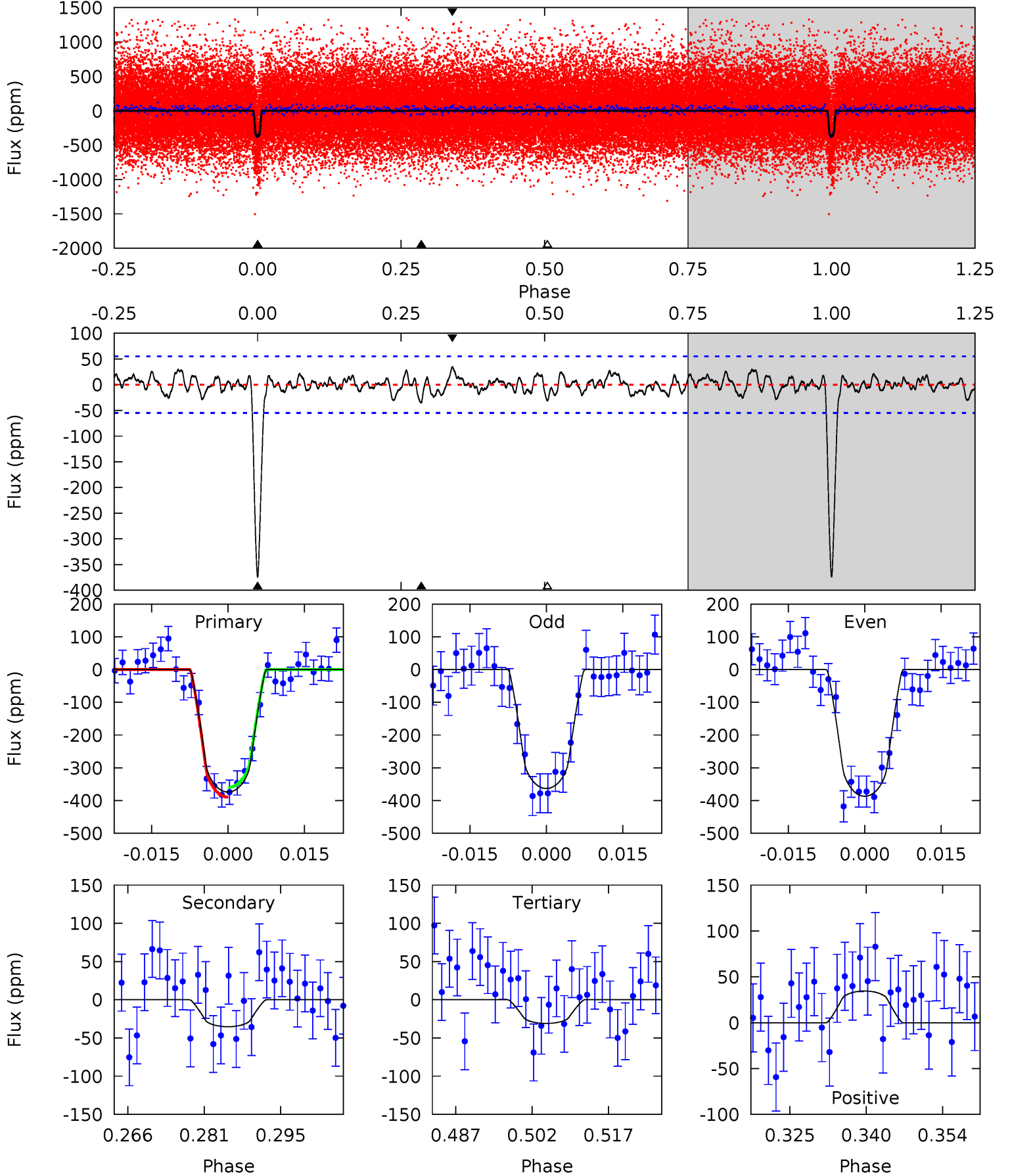
TCE 008505670-02 P= 6.668309 Days  $T_0=137.441719$  (BKJD)



# DV Model-Shift Uniqueness Test

008505670-02, P = 6.68327 Days, E = 130.772503 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
33.6	3.17	2.78	3.10	4.95	2.44	1.11	30.8	30.5	0.39	0.07	1.07	0.94	0.08	1.33

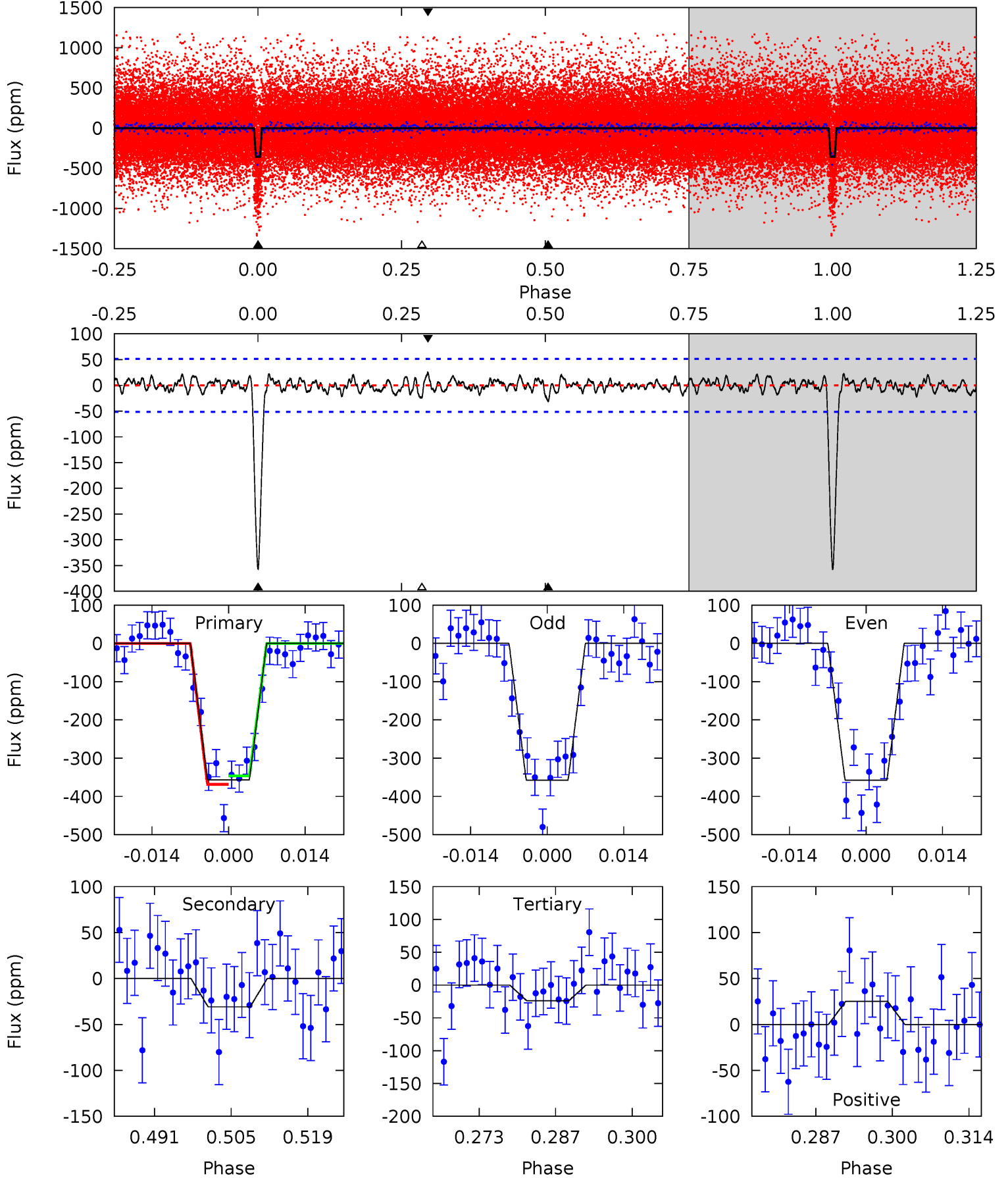




# Alt Model-Shift Uniqueness Test

008505670-02, P = 6.668309 Days, E = 130.773410 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
34.4	2.97	2.31	2.42	4.97	2.47	0.86	32.0	31.9	0.66	0.55	0.00	0.91	0.07	1.06



### Stellar Parameters For KIC 008505670

	$T_{\text{eff}} (K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4201^{+676}_{-416}$	$4.682^{+0.088}_{-0.072}$	$-0.200^{+0.150}_{-0.100}$	$0.591^{+0.109}_{-0.109}$	$0.609^{+0.124}_{-0.101}$	$4.160^{+1.948}_{-1.126}$
	+16%/-10%	+2%/-2%	+75%/-50%	+18%/-18%	+20%/-17%	+47%/-27%
Source	SPE5	SPE5	SPE5	DSEP		

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

### Secondary Eclipse Parameters for KIC 008505670-02 / KOI 0912.02

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-35 \pm 11$	$1.32^{+0.75}_{-0.68}$	$821^{+127}_{-89}$	$2894^{+753}_{-442}$	$37^{+122}_{-22}$
Alt.	$-31 \pm 10$	$1.28^{+0.69}_{-0.66}$	$823^{+131}_{-87}$	$2864^{+787}_{-417}$	$37^{+110}_{-23}$

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



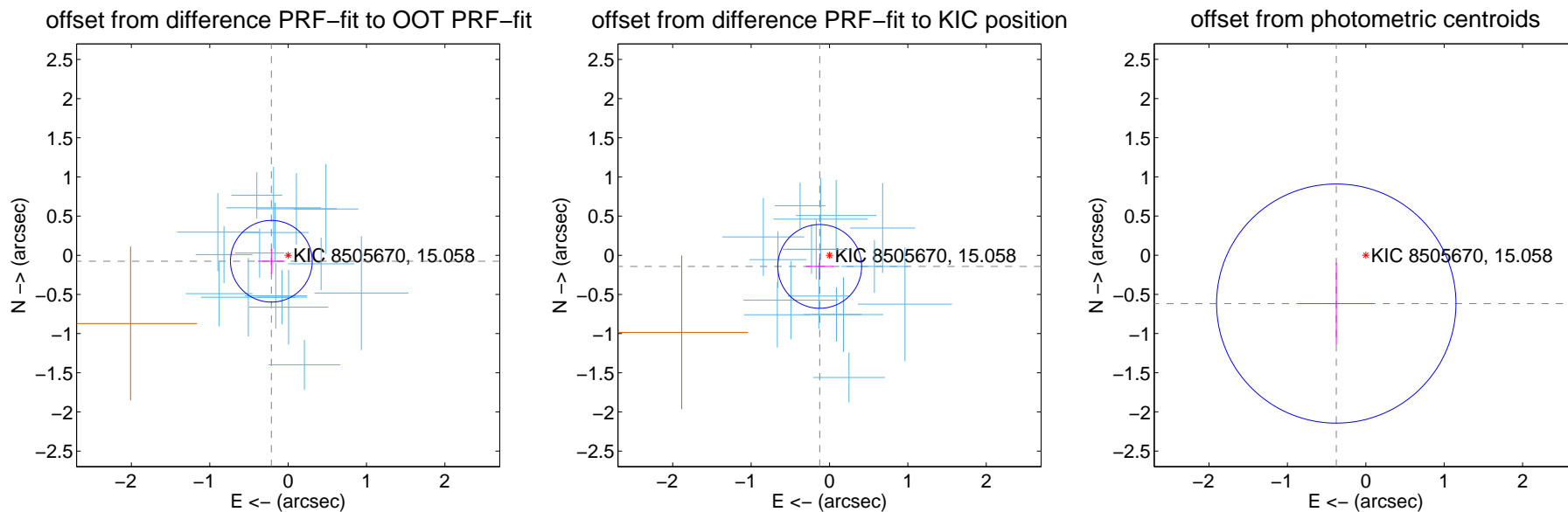
## DV Centroid Data

Supplemental centroid analysis for 008505670-02. Kepler magnitude: 15.06. Transit SNR 22.32

There are 16 quarters with good PRF difference image offsets

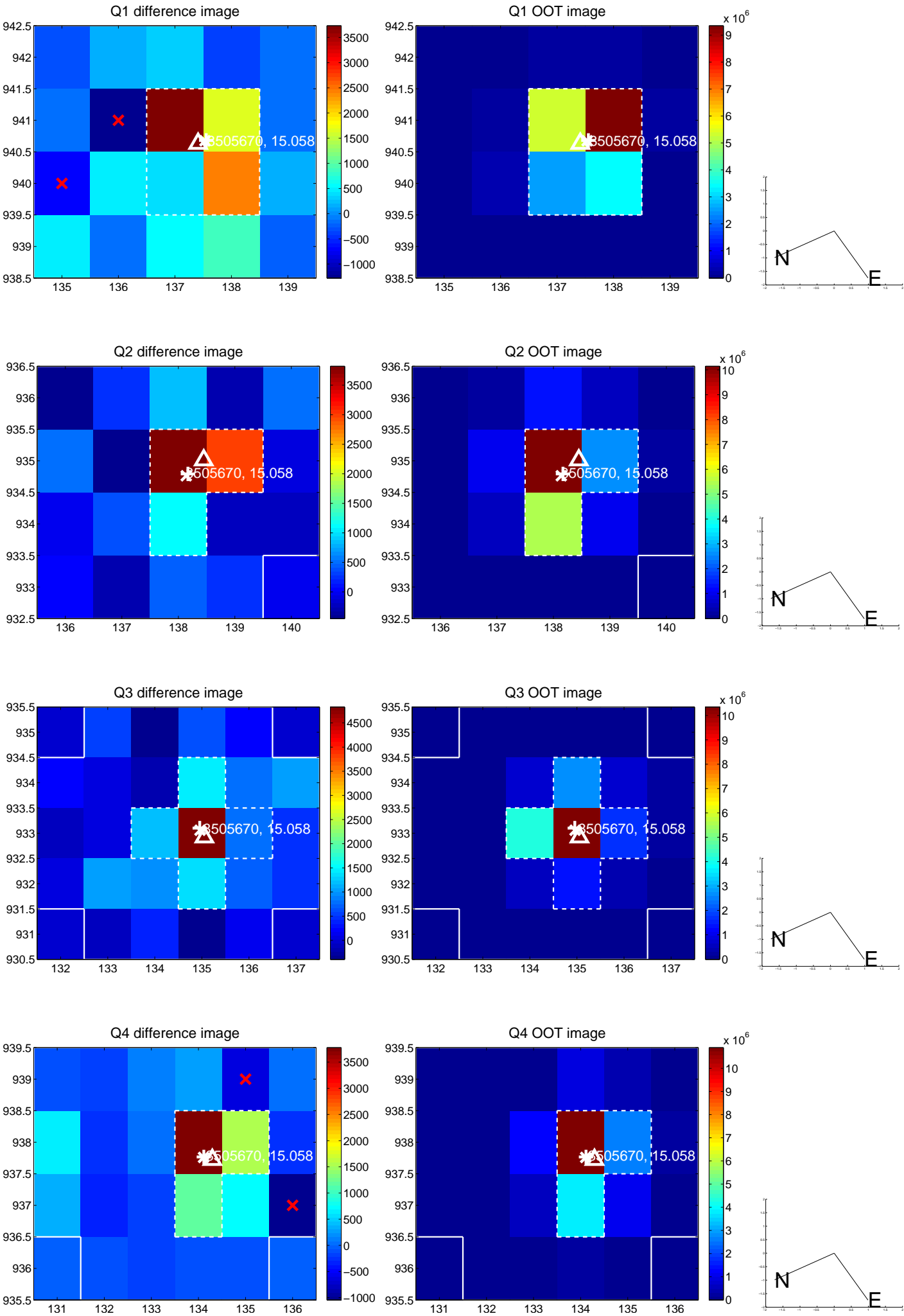
The direct PRF centroid is offset from the target star catalog position by about 0.16 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.227 \pm 0.174$	1.31	$0.214 \pm 0.170$	$-0.076 \pm 0.158$
PRF-fit source offset from KIC position	$0.189 \pm 0.178$	1.06	$0.125 \pm 0.175$	$-0.142 \pm 0.166$
photometric centroid source offset	$0.72 \pm 0.51$	1.42	$0.38 \pm 0.48$	$-0.62 \pm 0.52$

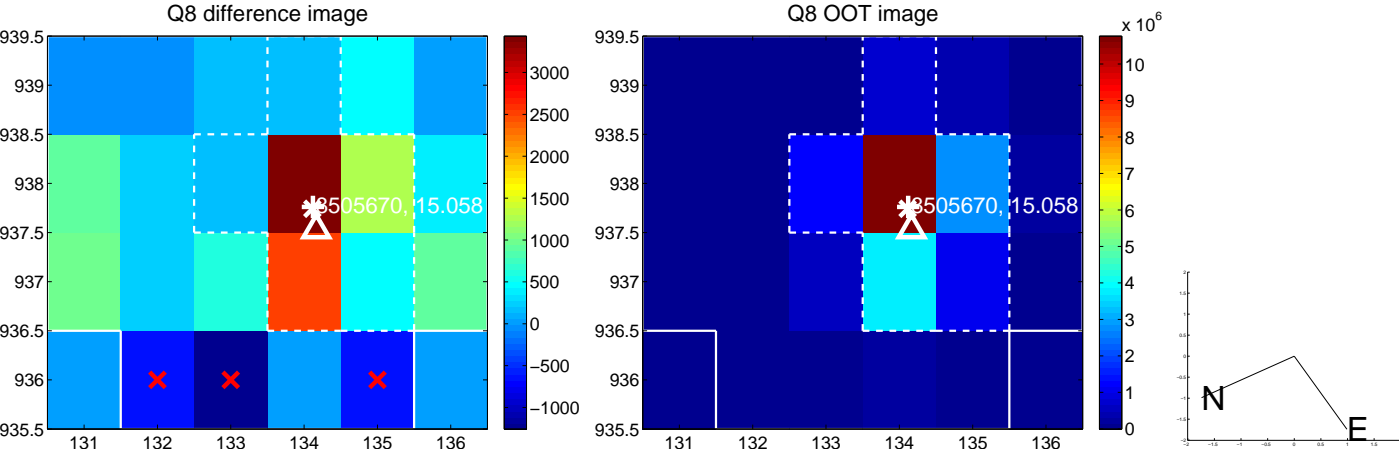
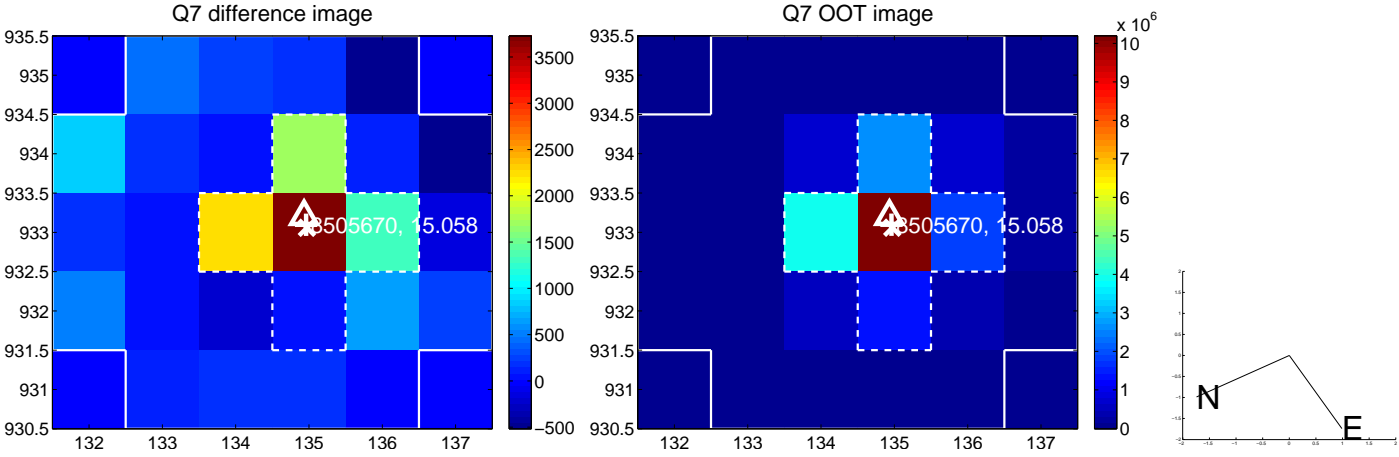
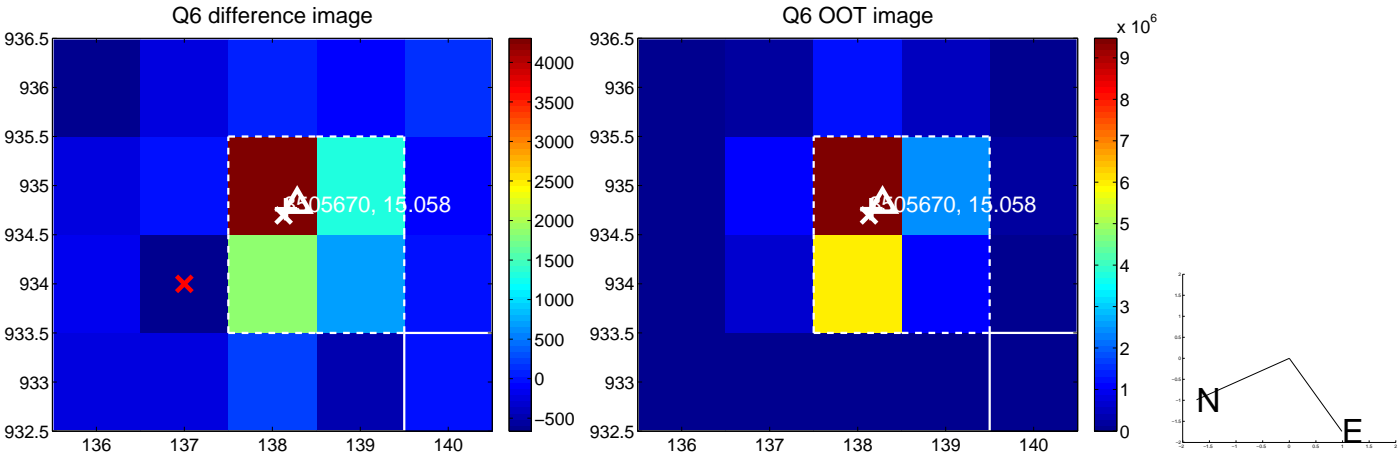
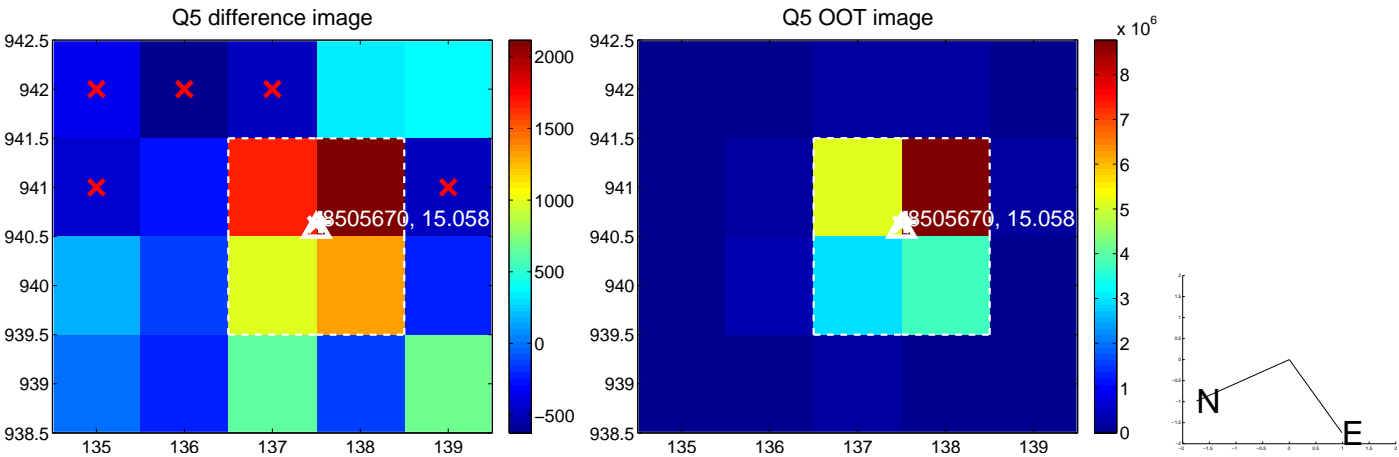


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

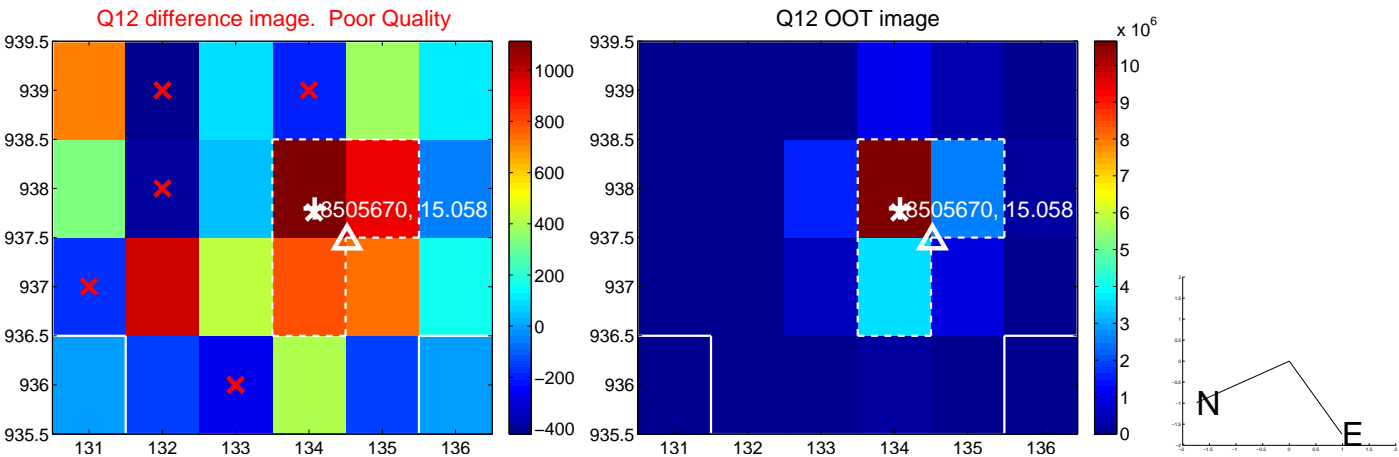
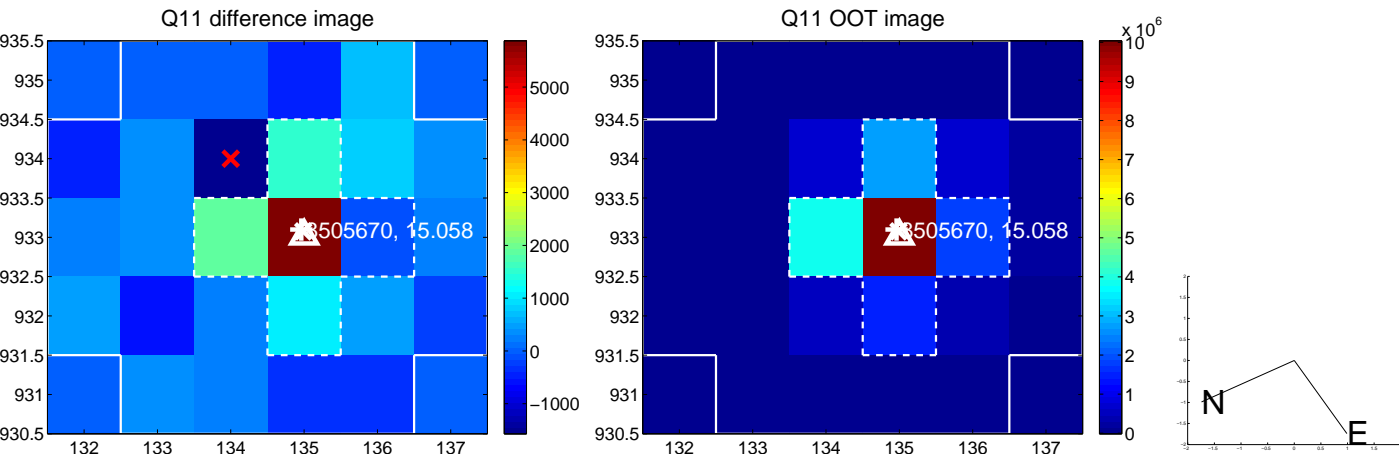
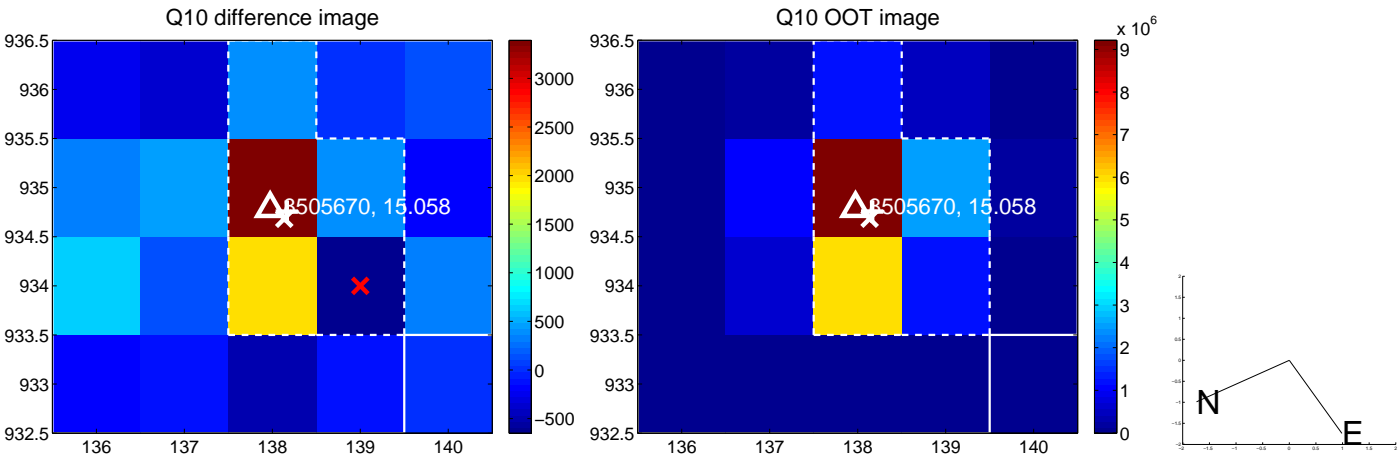
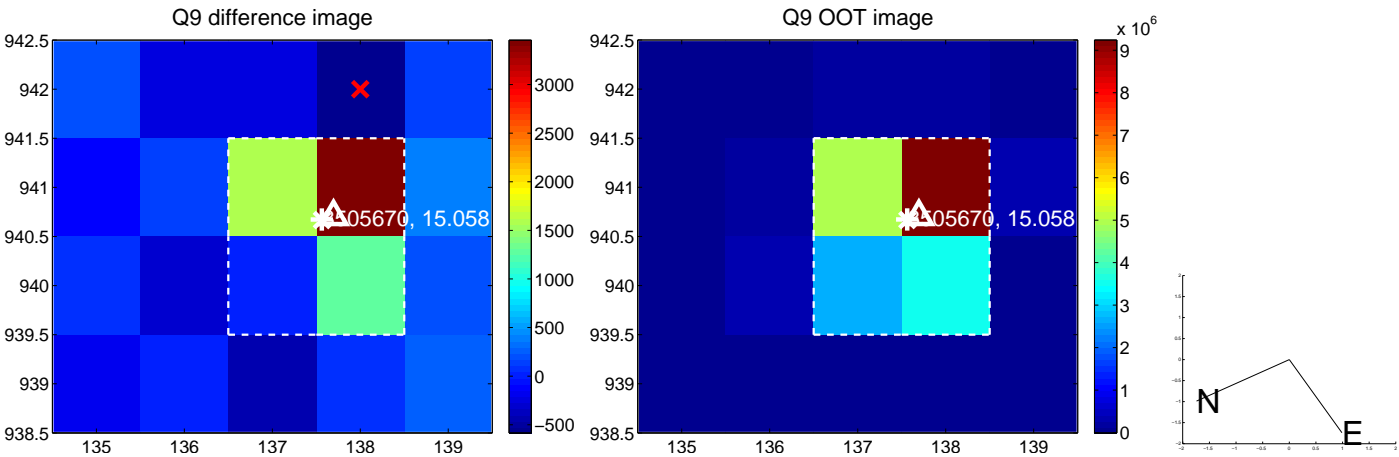
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



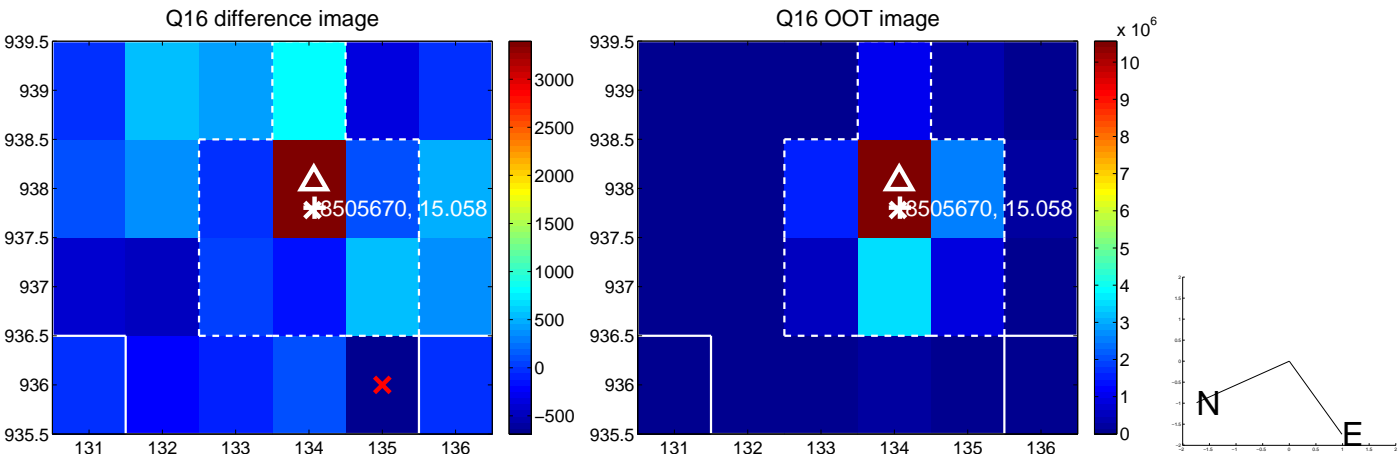
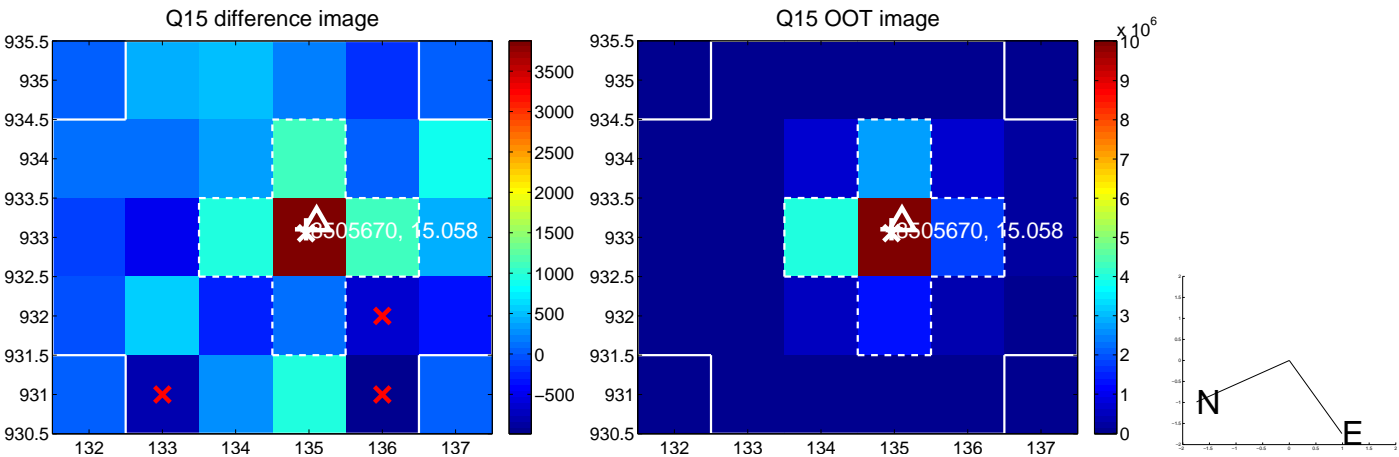
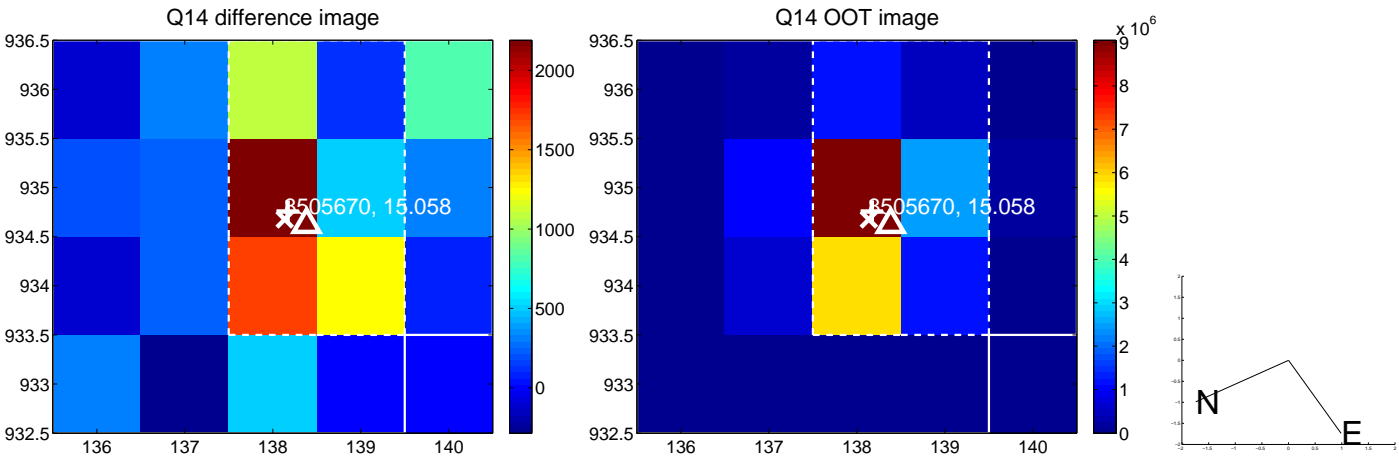
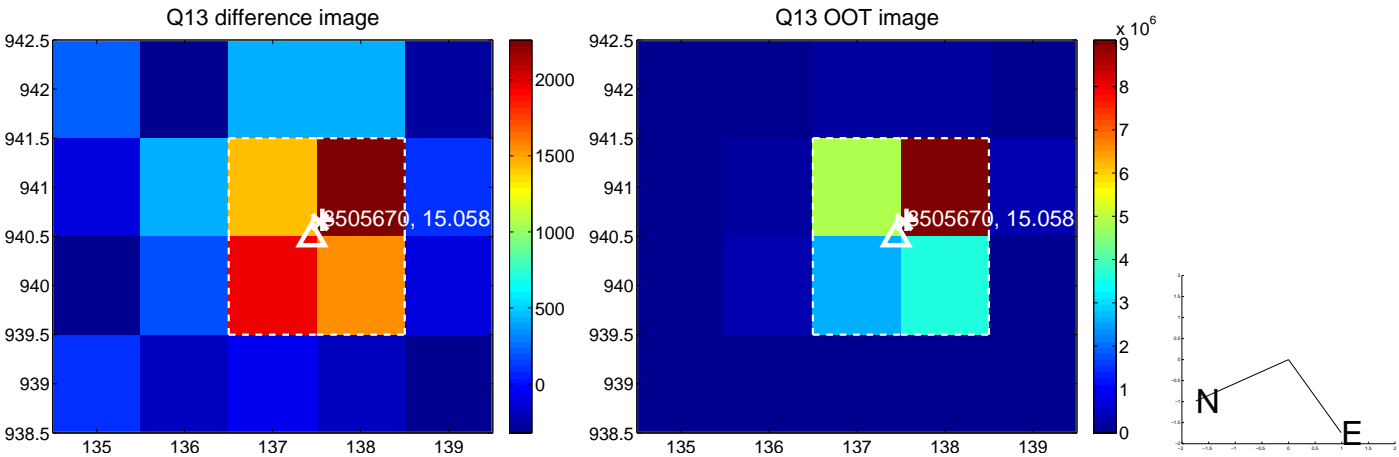
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



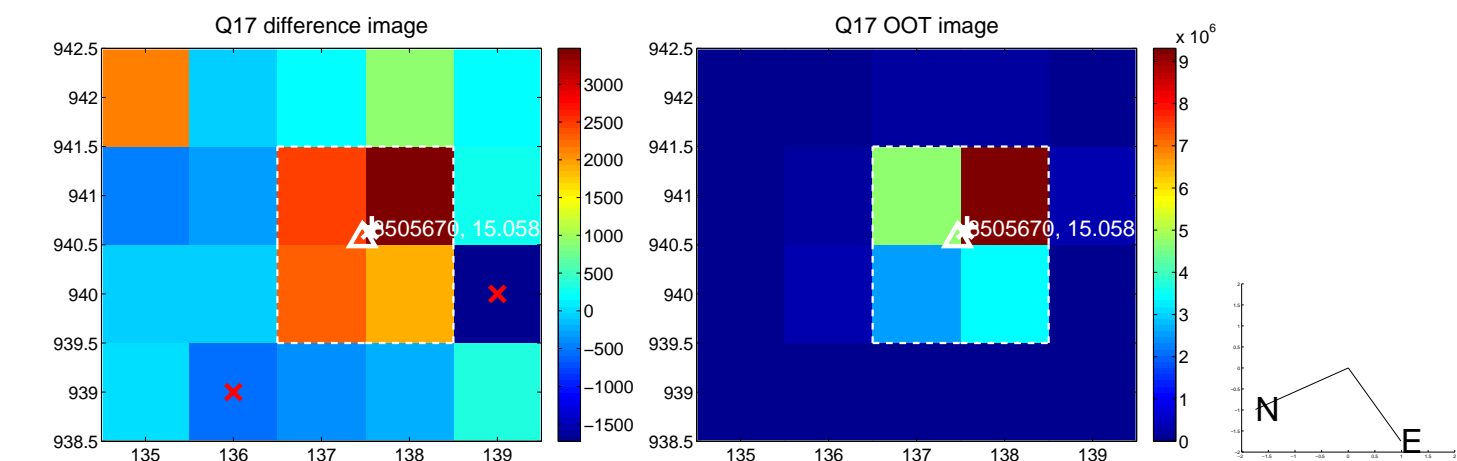
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



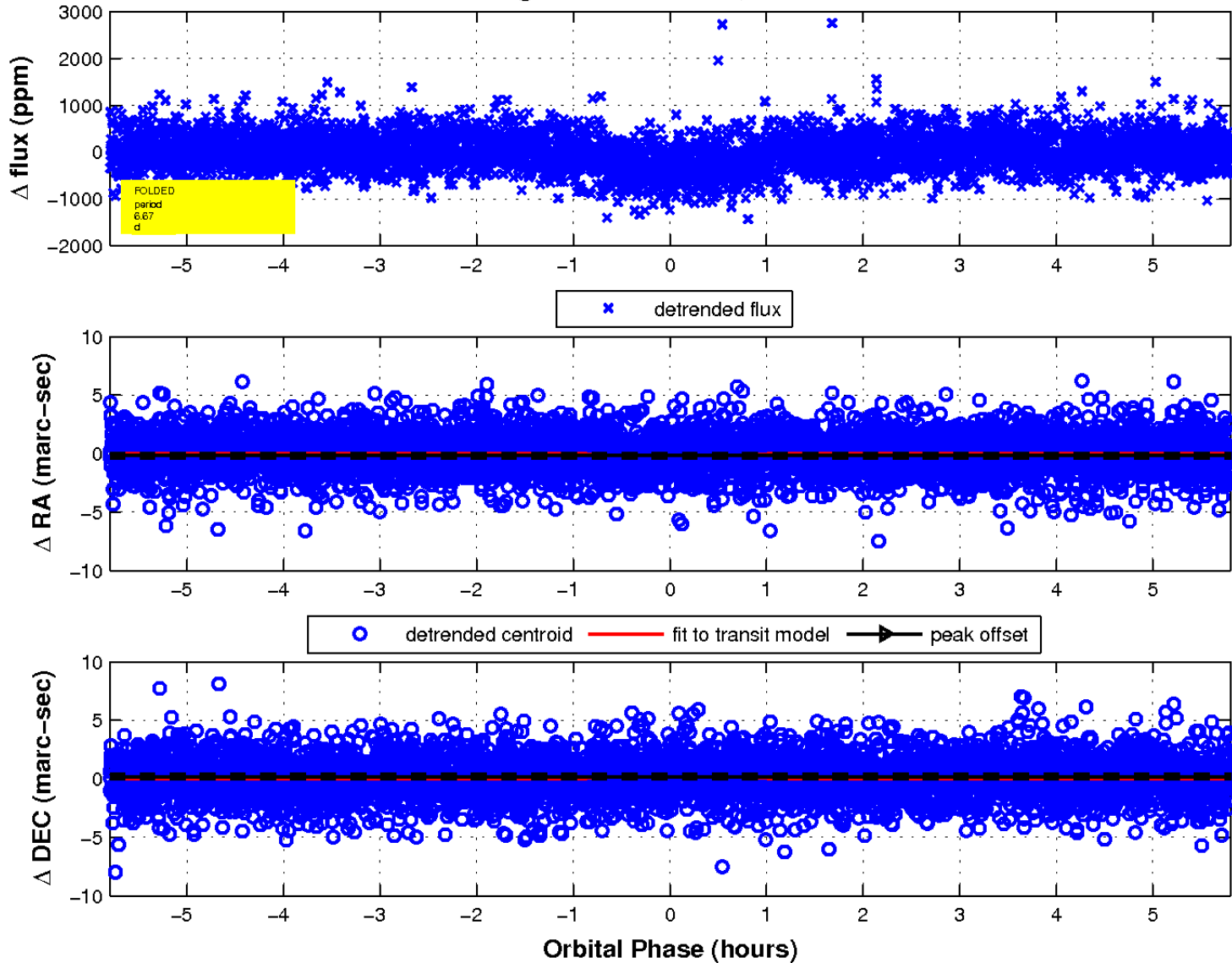
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

Declination

