

# KIC 005201756

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005201756-01	OBS	No	5.569486	134.666707	63.9	12.349	7.6	7.6	1.00	5780	0.94	264.35
005201756-02	OBS	No	1.045308	131.666099	29.4	6.675	8.1	7.8	1.00	5780	0.54	2460.07
005201756-03	OBS	No	33.301910	141.604759	203.9	5.738	15.2	5.4	1.00	5780	1.64	24.36
005201756-04	OBS	No	64.112235	165.463553	337.3	13.459	11.6	7.2	1.00	5780	2.00	10.17

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005201756-01	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—CENT_KIC_POS
005201756-02	OBS	FP	0.00	1	0	0	0	LPP_DV—CENT_KIC_POS
005201756-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_KIC_POS
005201756-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—CENT_KIC_POS

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

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

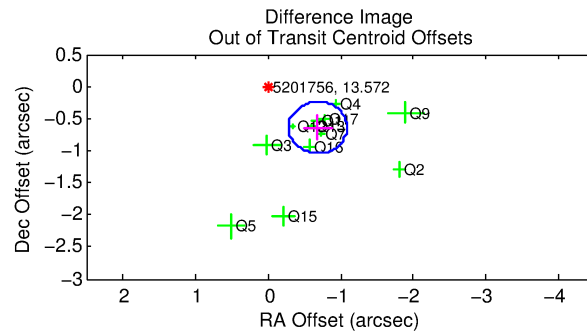
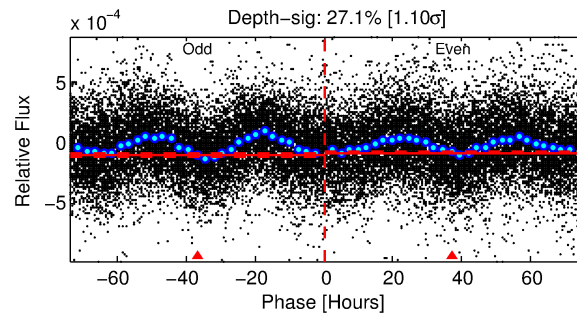
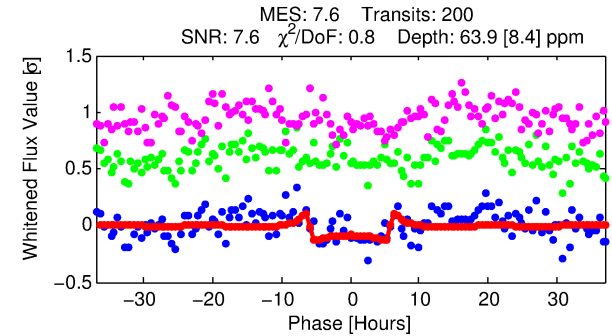
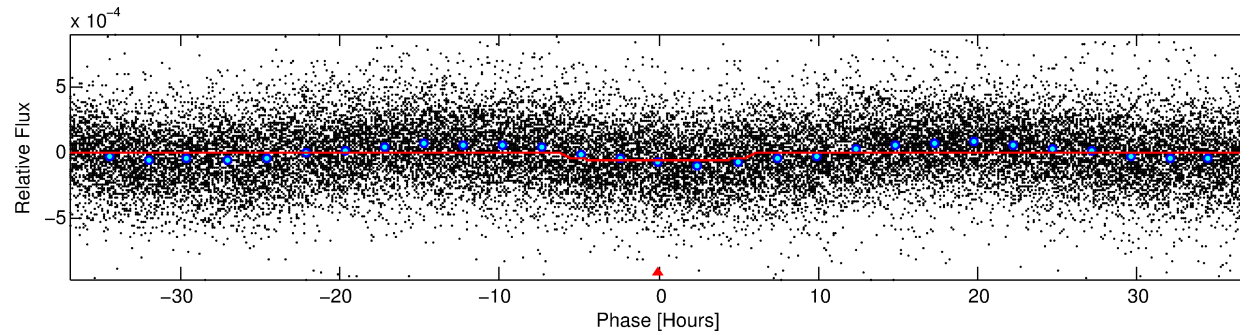
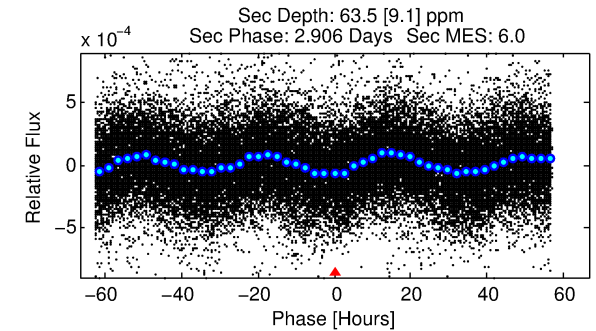
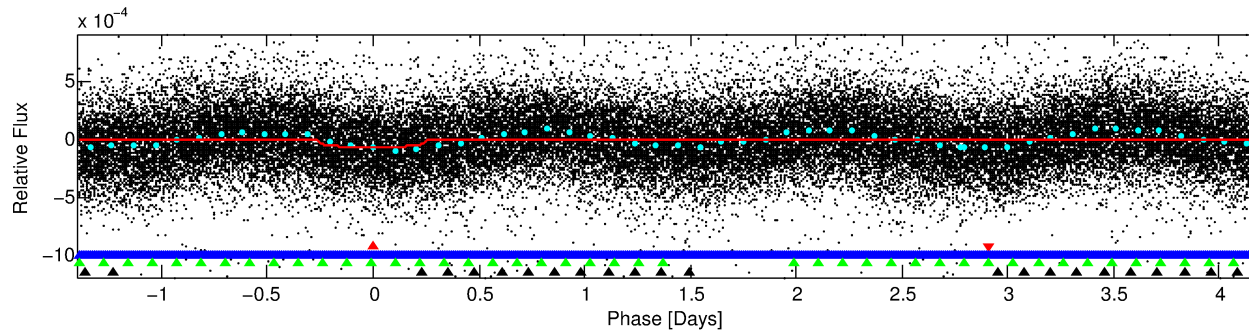
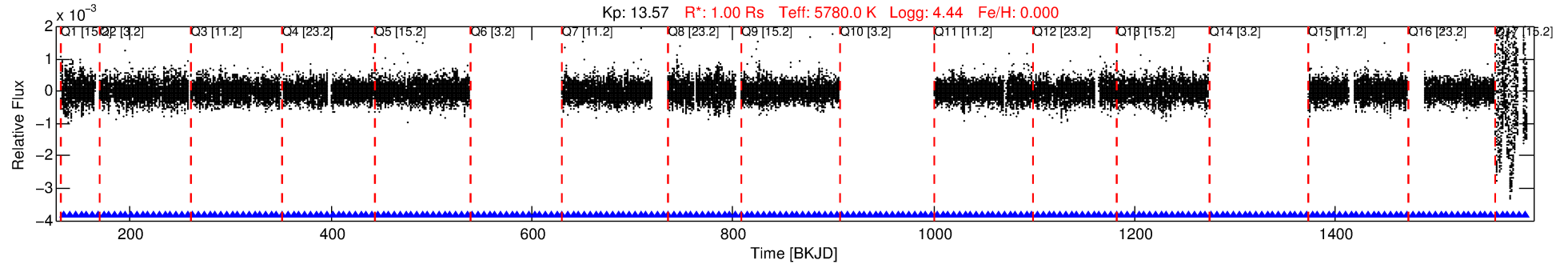
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 005201756-01

No Significant Match Found

# DV One-Page Summary

KIC: 5201756 Candidate: 1 of 4 Period: 5.569 d



## DV Fit Results:

Period = 5.56949 [0.00006] d  
Epoch = 134.6667 [0.0075] BKJD  
Rp/R\* = 0.0086 [0.0012]  
a/R\* = 1.88 [0.76]  
b = 0.89 [0.13]  
Seff = 264.35 [0.00]  
Teq = 1028 [0] K  
Rp = 0.94 [0.13] Re  
a = 0.0615 [0.0000] AU  
Ag = 149.33 [46.30] [3.20 sigma]  
Teffp = 5557 [431] K [10.52 sigma]

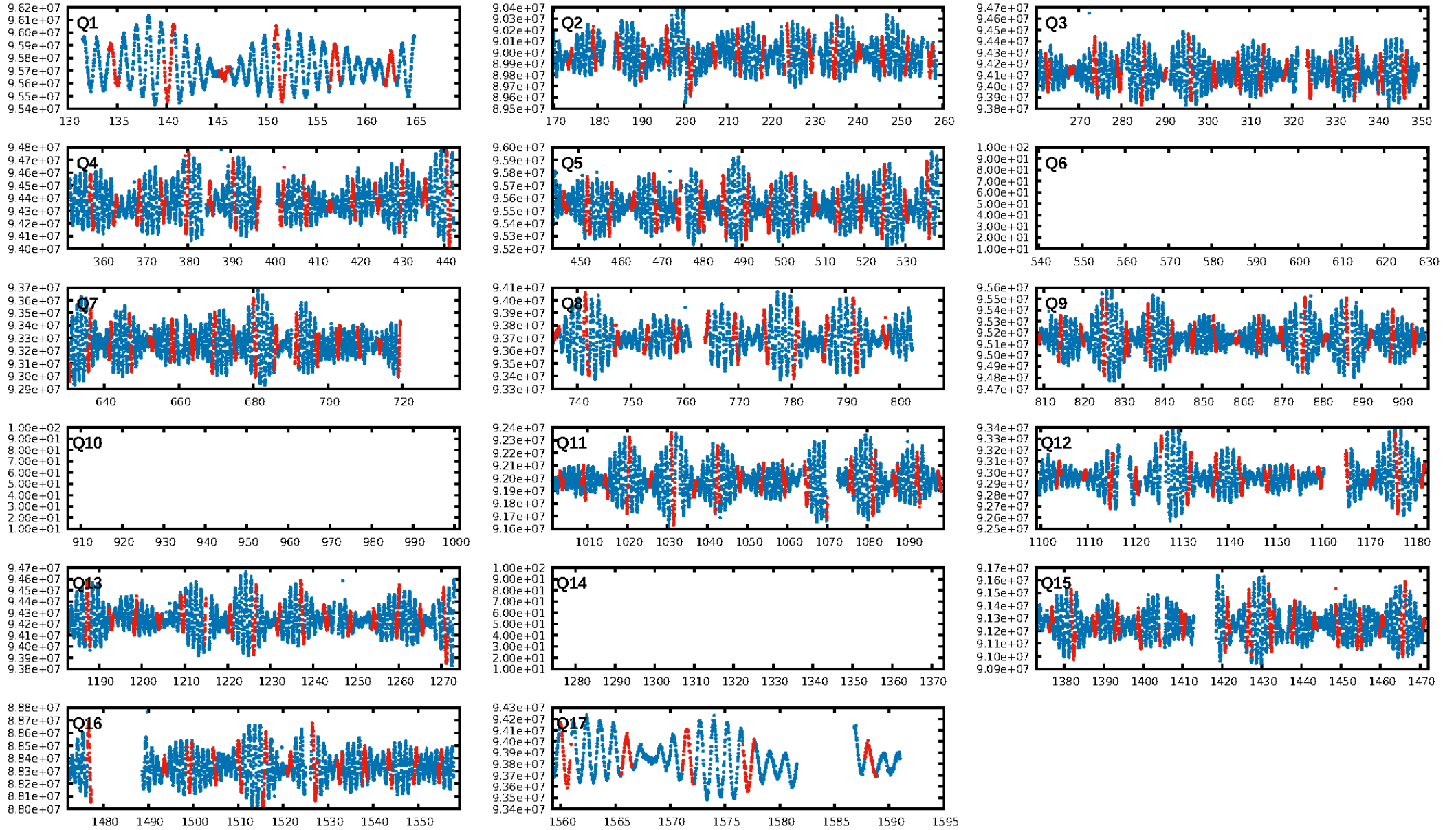
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [7.73 sigma]  
LongPeriod-sig: 100.0% [48.88 sigma]  
ModelChiSquare2-sig: 99.2%  
ModelChiSquareGoF-sig: 100.0%  
**Bootstrap-pfa: 7.40e-11**  
RollingBand-fgt: 1.00 [189/189]  
**GhostDiagnostic-chr: 0.6364**  
**Centroid-sig: 0.0%**  
Centroid-so: 1.786 arcsec [2.20 sigma]  
**OotOffset-rm: 0.938 arcsec [7.01 sigma]**  
KicOffset-rm: 0.425 arcsec [2.53 sigma]  
OotOffset-st: 1/4/3/4 [12]  
KicOffset-st: 1/4/3/4 [12]  
DiffImageQuality-fgm: 0.58 [7/12]  
DiffImageOverlap-fno: 0.00 [0/14]

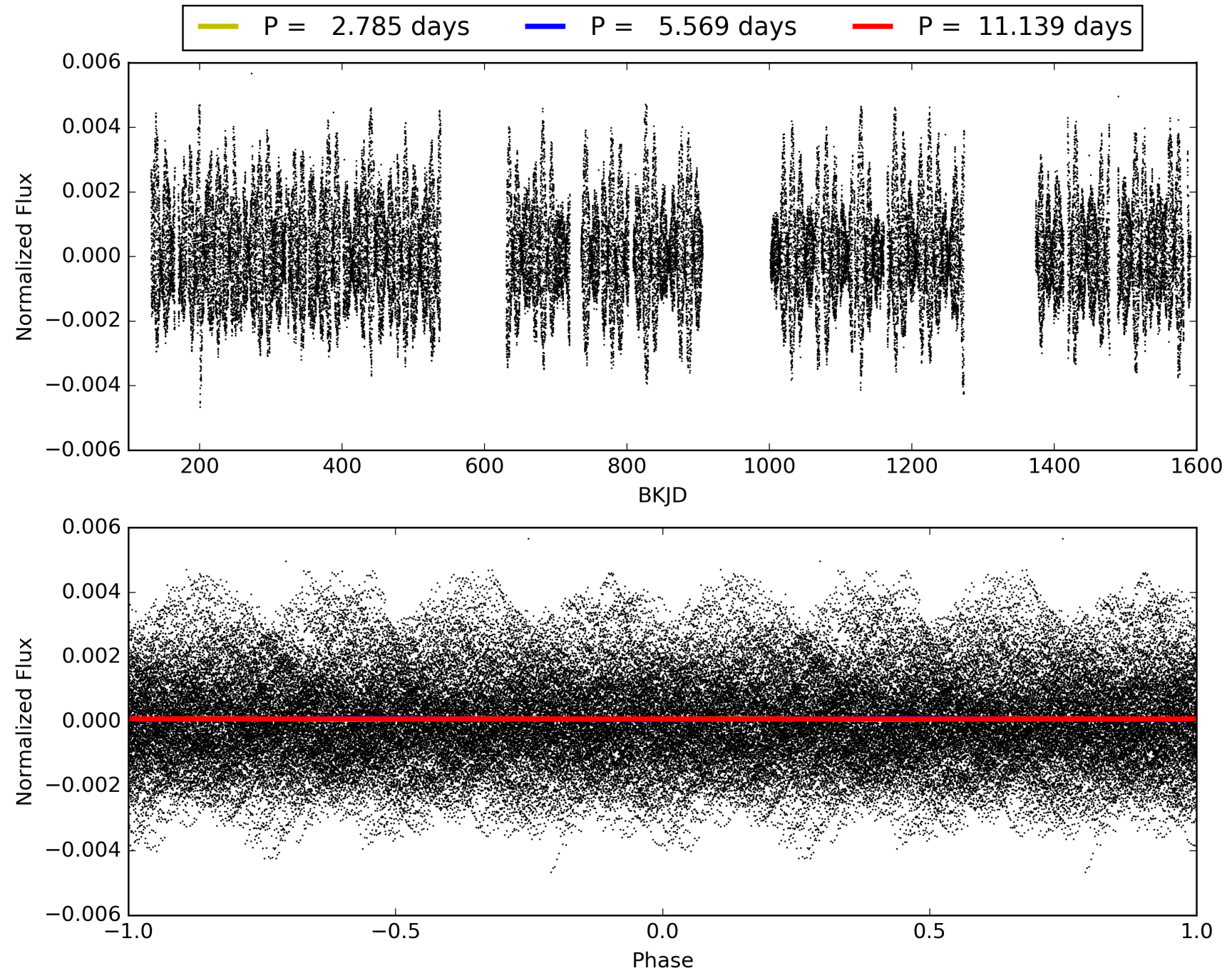
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 14:42:29 Z

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

# TCE 005201756-01, PDC Light Curves



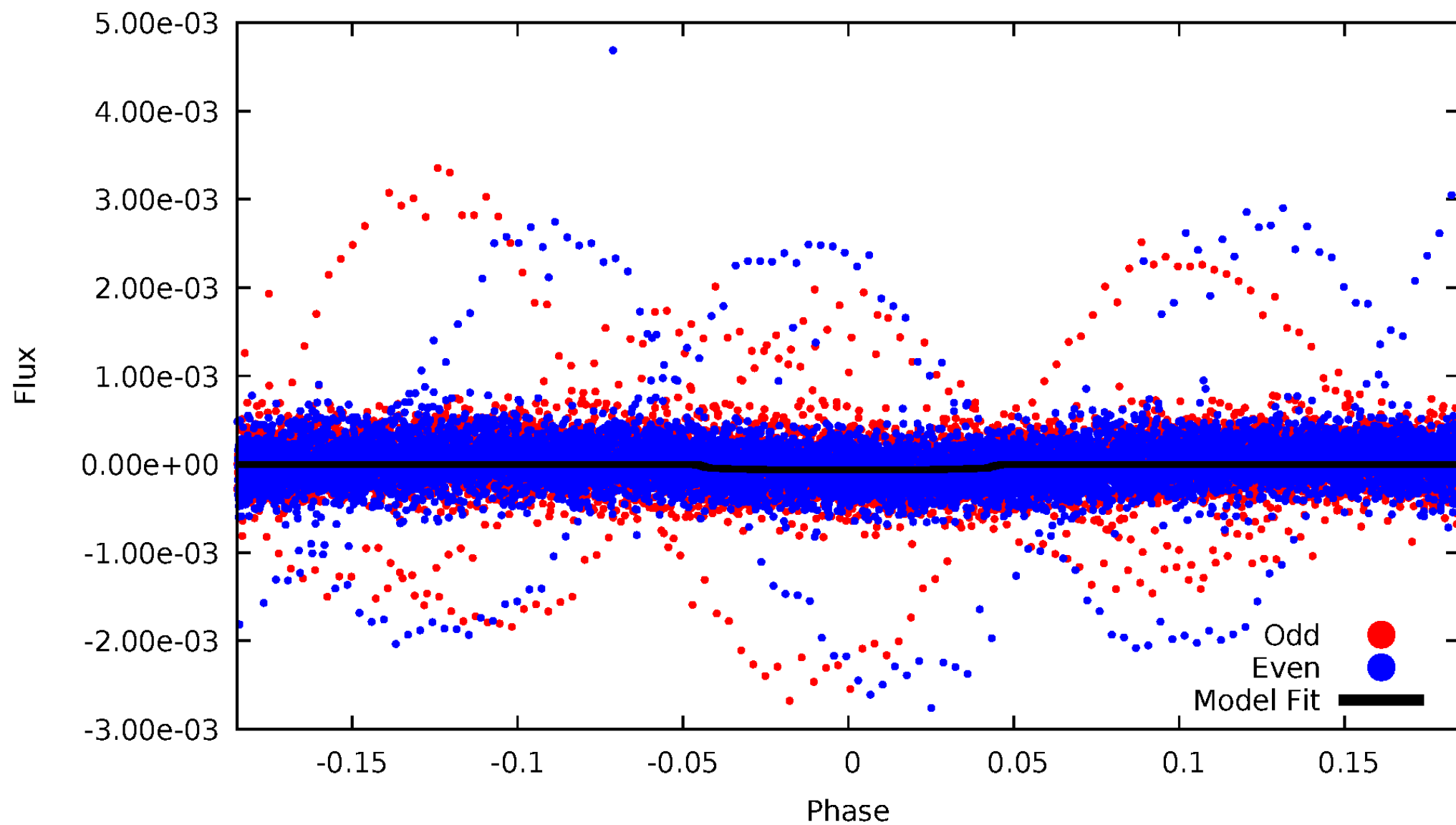
TCE 005201756-01





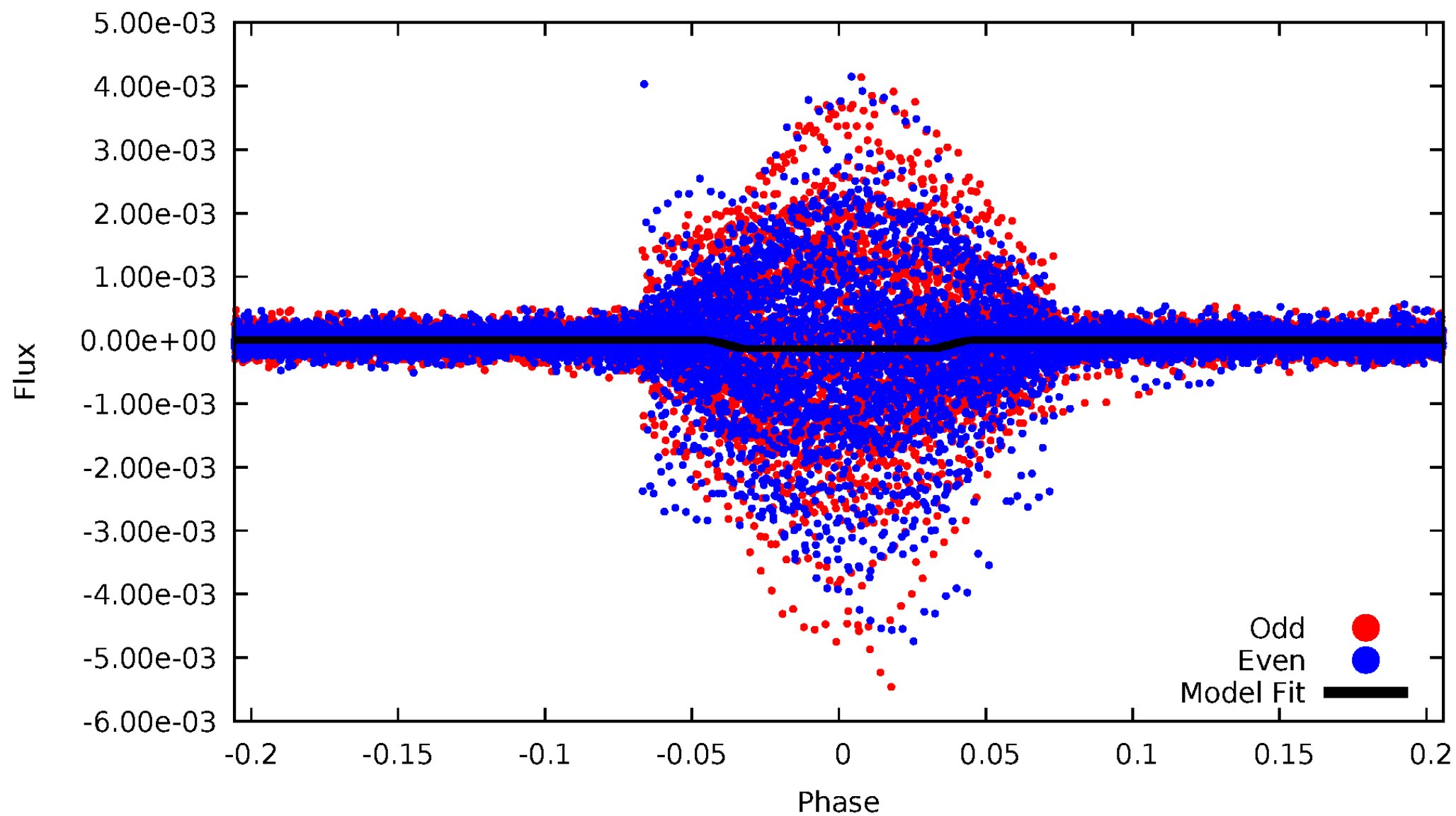
# DV Odd/Even

TCE 005201756-01



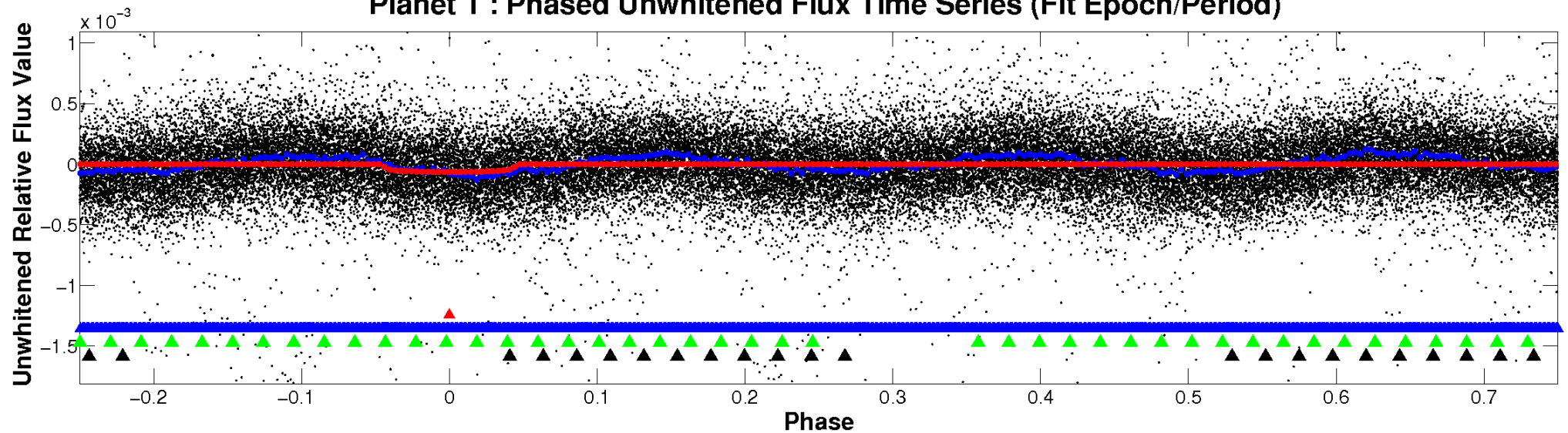
# ALT Odd/Even

TCE 005201756-01

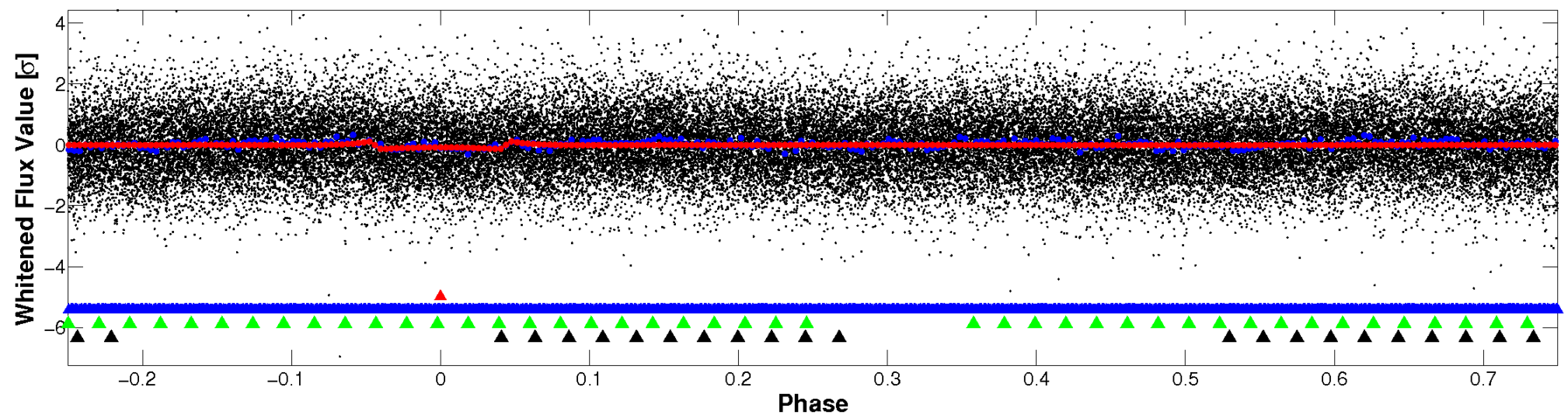


# Non-Whitened Vs. Whitened Light Curve

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

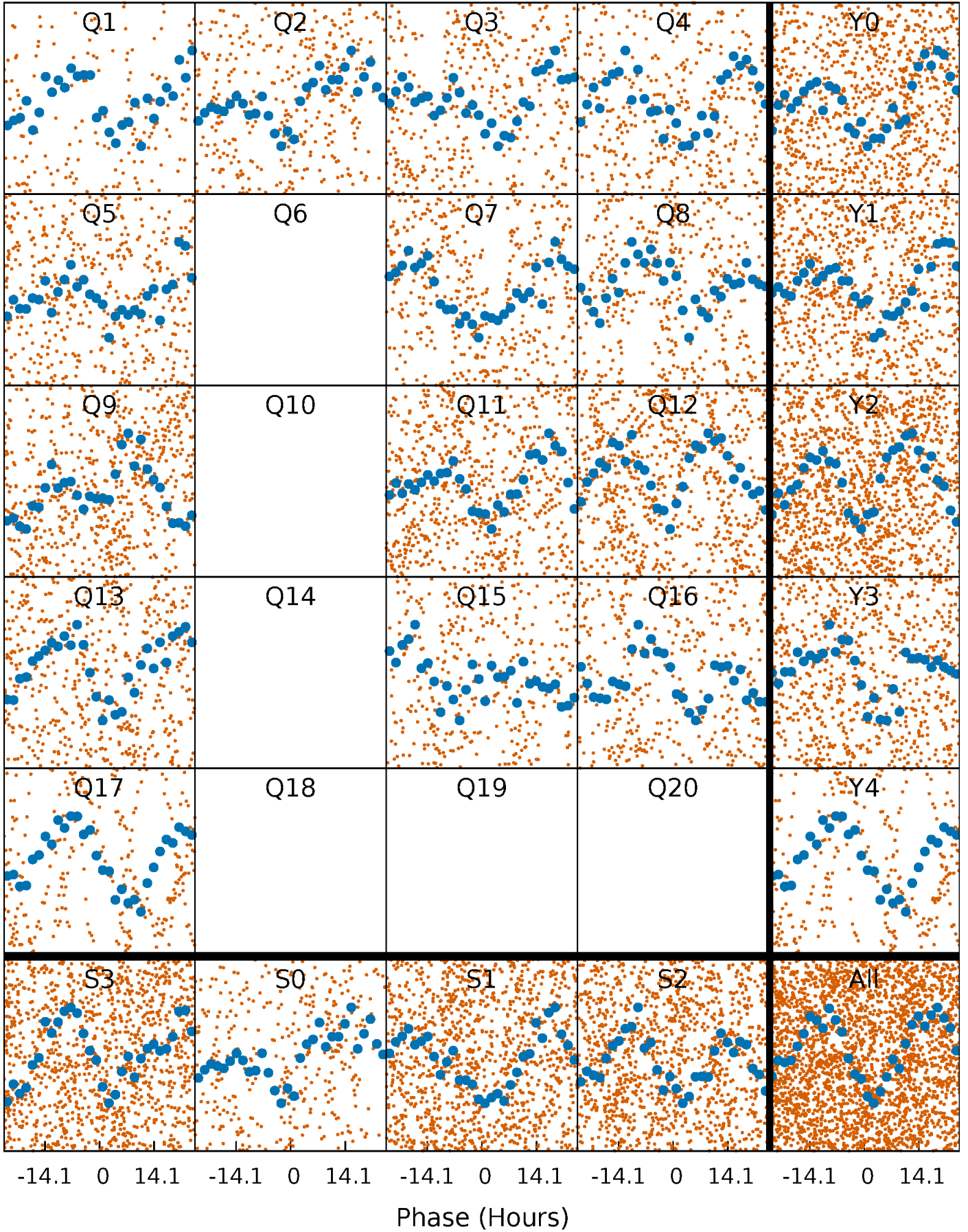


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

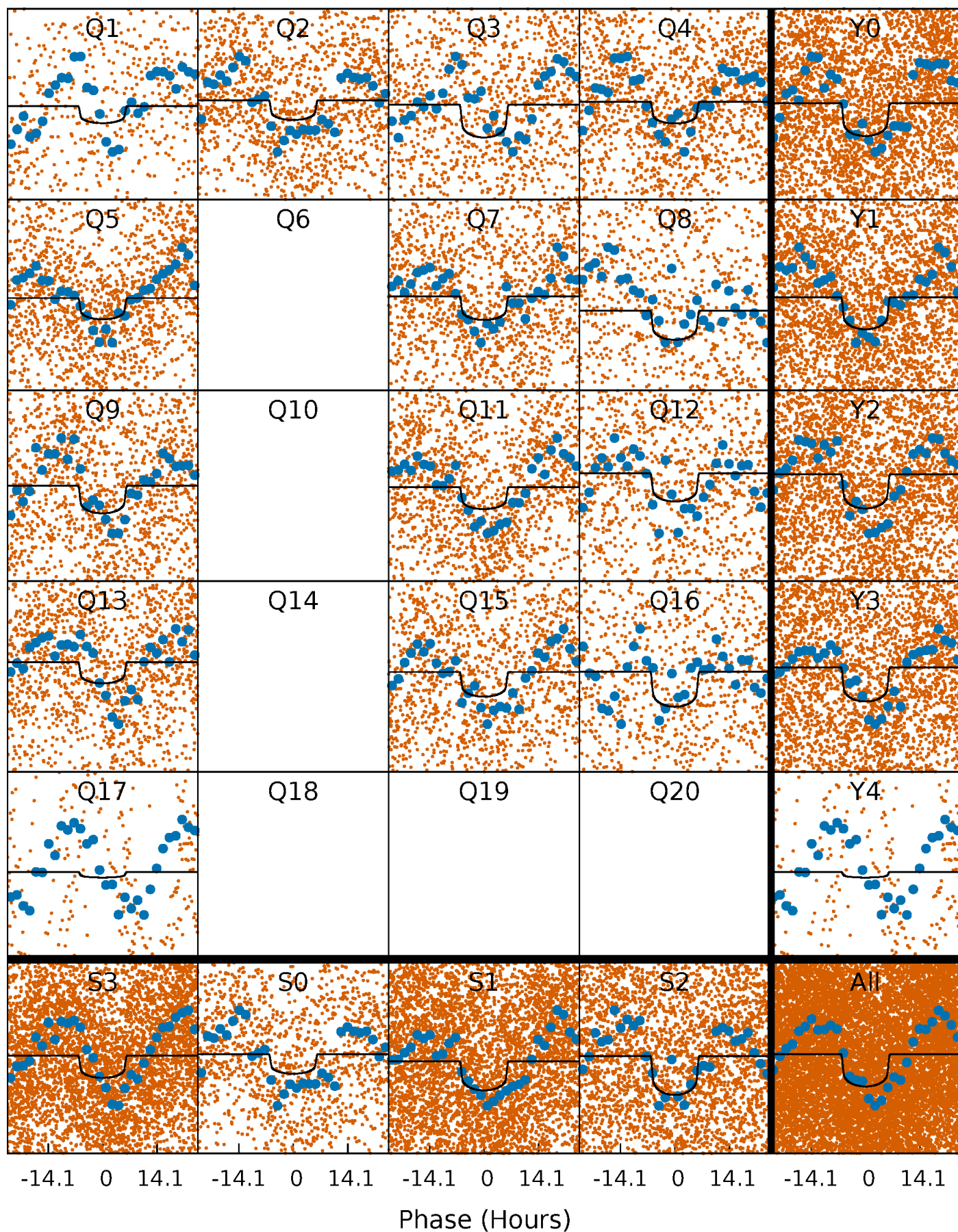
TCE 005201756-01 P= 5.569486 Days  $T_0=134.666707$  (BKJD)





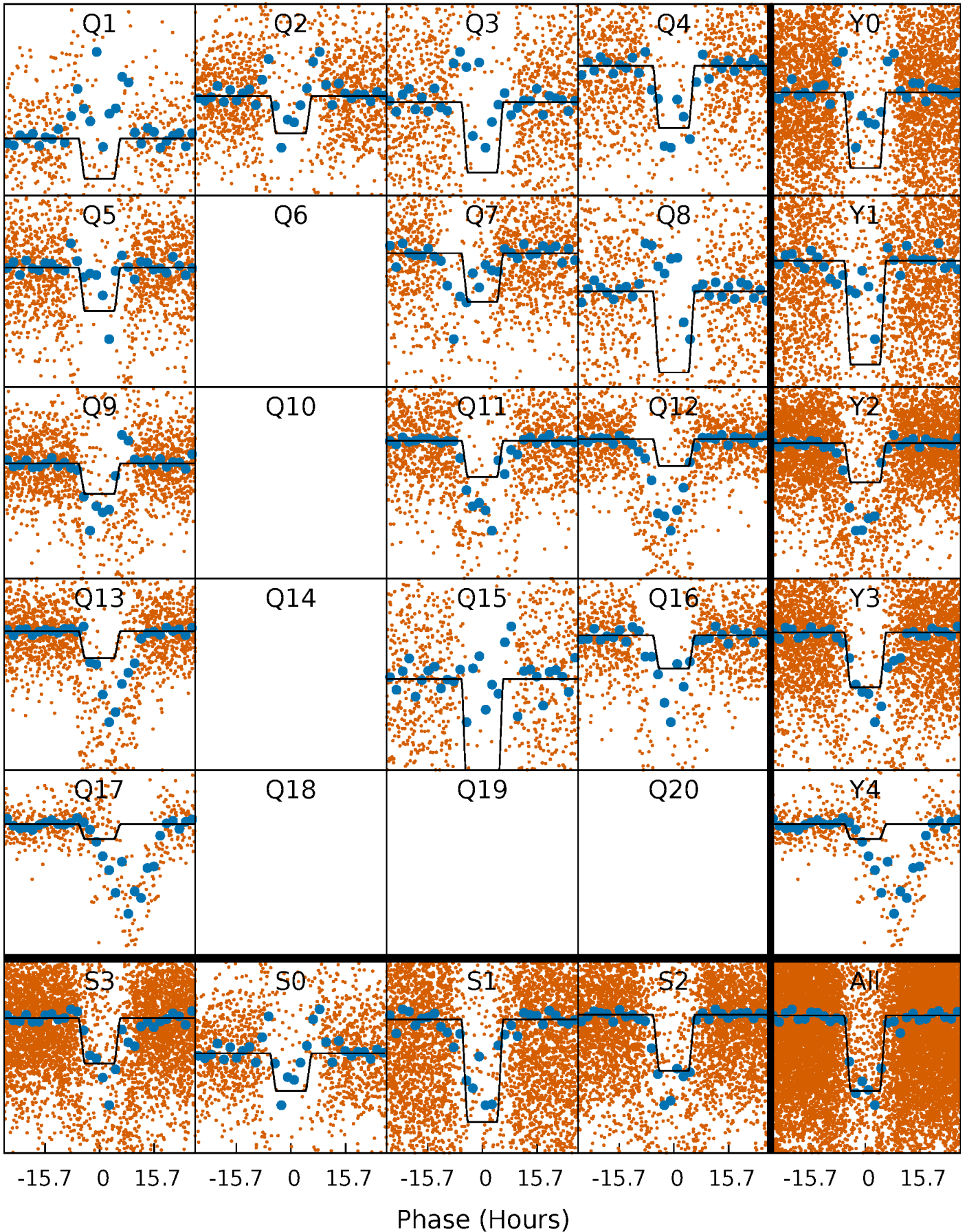
# DV Quarter-Phased Transit Curves

TCE 005201756-01 P= 5.569486 Days  $T_0=134.666707$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

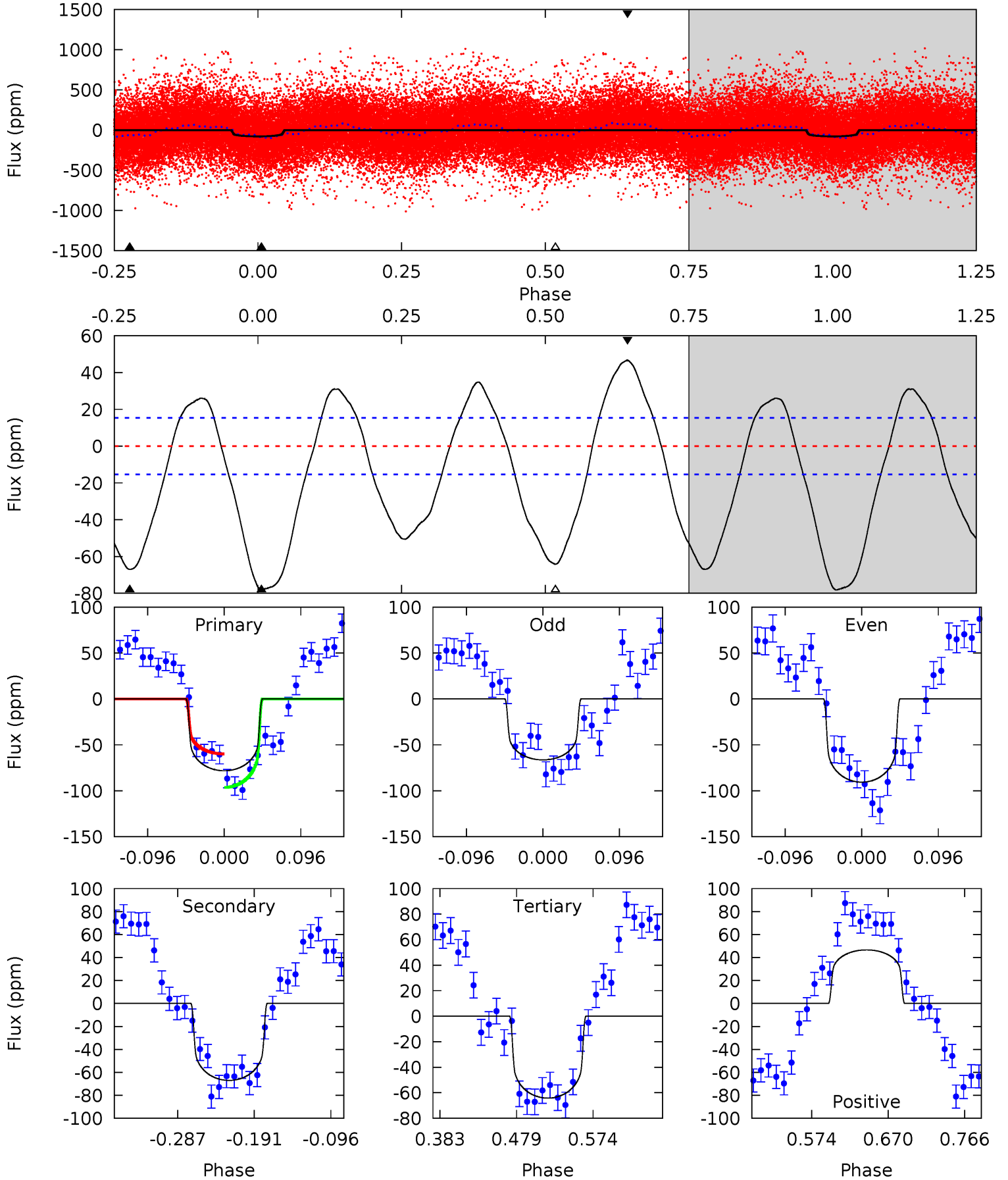
TCE 005201756-01 P= 5.569448 Days  $T_0=134.641100$  (BKJD)



# DV Model-Shift Uniqueness Test

005201756-01, P = 5.569486 Days, E = 129.097221 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
23.3	20.0	19.1	13.9	4.57	1.67	9.80	4.18	9.41	0.84	6.07	3.64	1.02	0.37	5.47

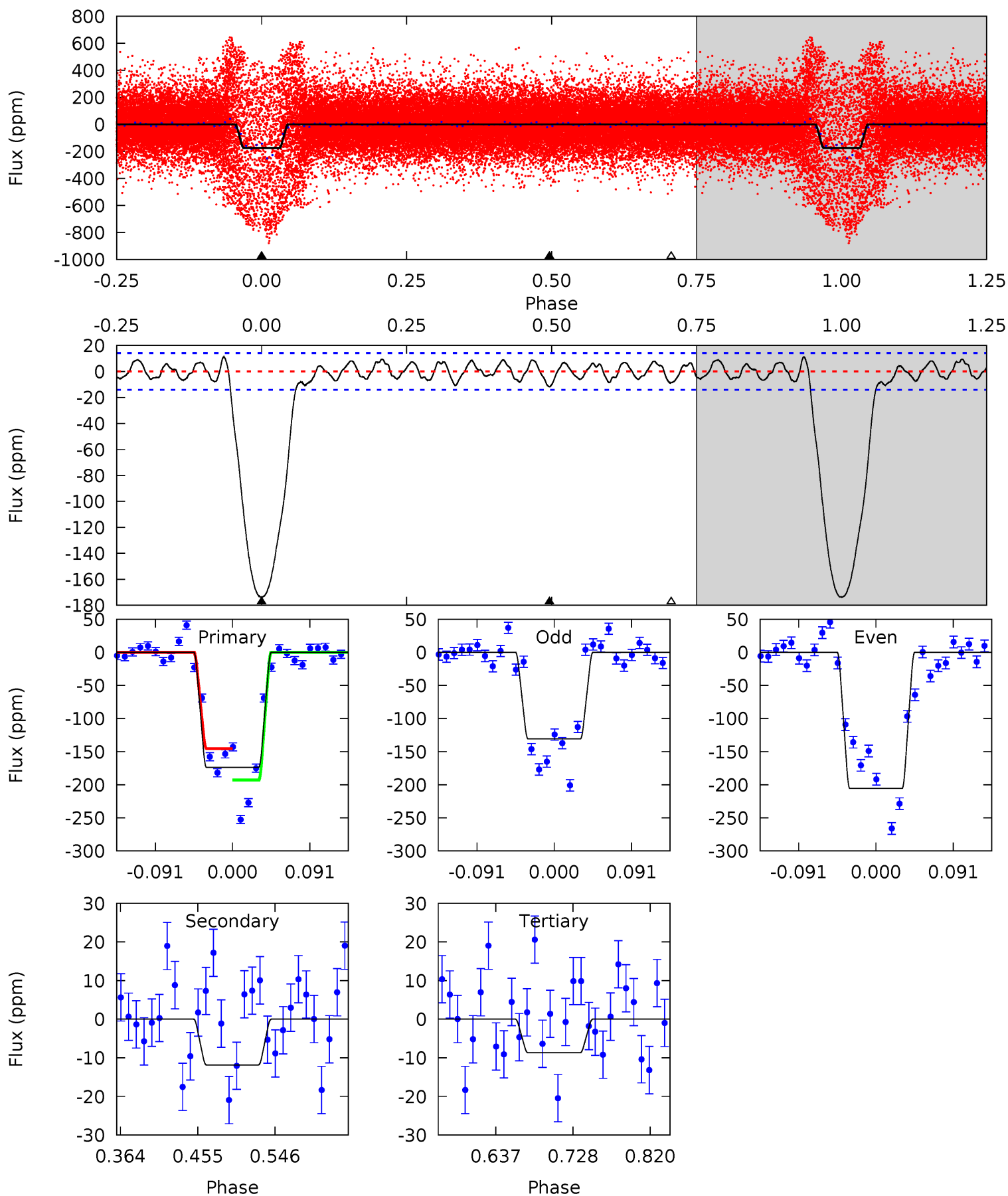




# Alt Model-Shift Uniqueness Test

005201756-01, P = 5.569448 Days, E = 129.071652 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
56.4	3.84	2.82	0	4.58	1.69	1.61	53.5	56.4	1.01	3.84	12.0	0.70	0.06	0





### Stellar Parameters For KIC 005201756

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5780^{+1}_{-1}$	$4.438^{+1.000}_{-1.000}$	$0.000^{+1.000}_{-1.000}$	$1.000^{+1.000}_{-1.000}$	$-1.000^{+1.000}_{-1.000}$	$-1.000^{+1.000}_{-1.000}$
	+0%/-0%	+23%/-23%	+inf%/-inf%	+100%/-100%	+100%/-100%	+100%/-100%
Source	Solar	Solar	Solar	Solar		

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

### Secondary Eclipse Parameters for KIC 005201756-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-67 \pm 3$	$0.94^{+0.16}_{-0.14}$	$1439^{+67}_{-66}$	$5649^{+474}_{-412}$	$156^{+63}_{-41}$
Alt.	$-12 \pm 3$	$1.28^{+0.16}_{-0.17}$	$1438^{+70}_{-70}$	$3563^{+215}_{-234}$	$15^{+6}_{-5}$

$T_{\text{max}}$  = 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

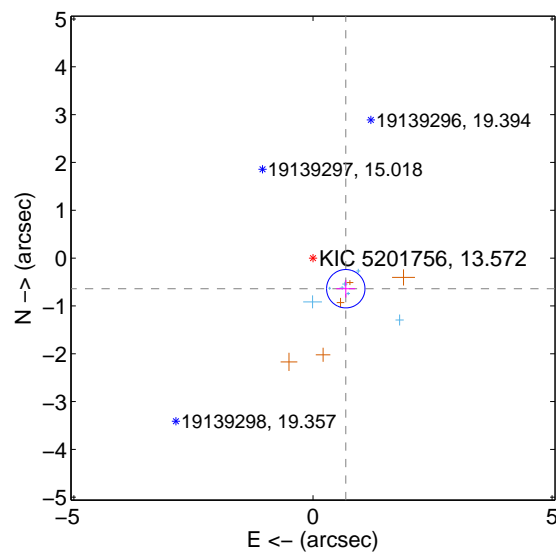
Supplemental centroid analysis for 005201756-01. Kepler magnitude: 13.57. Transit SNR 7.61

There are 7 quarters with good PRF difference image offsets

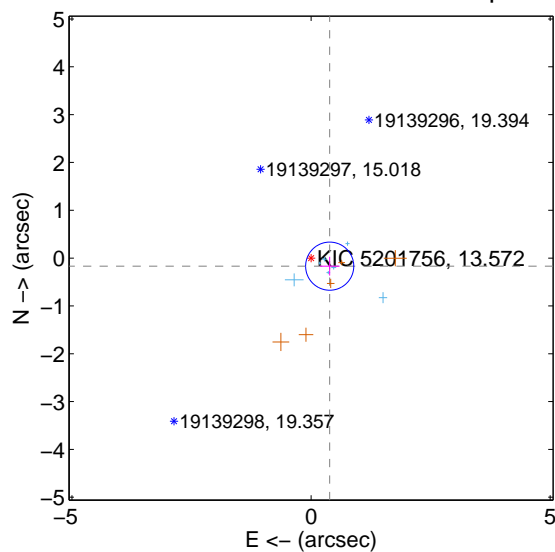
The direct PRF centroid is offset from the target star catalog position by about 0.44 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.938 \pm 0.134$	7.01	$-0.686 \pm 0.198$	$-0.640 \pm 0.185$
PRF-fit source offset from KIC position	$0.425 \pm 0.168$	2.53	$-0.390 \pm 0.207$	$-0.169 \pm 0.197$
photometric centroid source offset	$1.79 \pm 0.81$	2.20	$-0.05 \pm 0.79$	$-1.79 \pm 0.81$

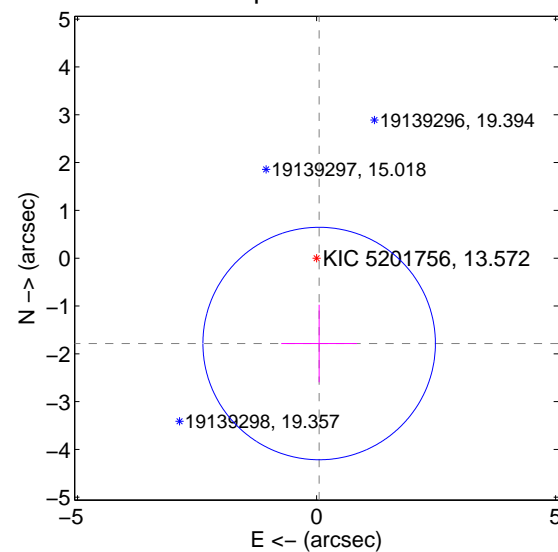
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

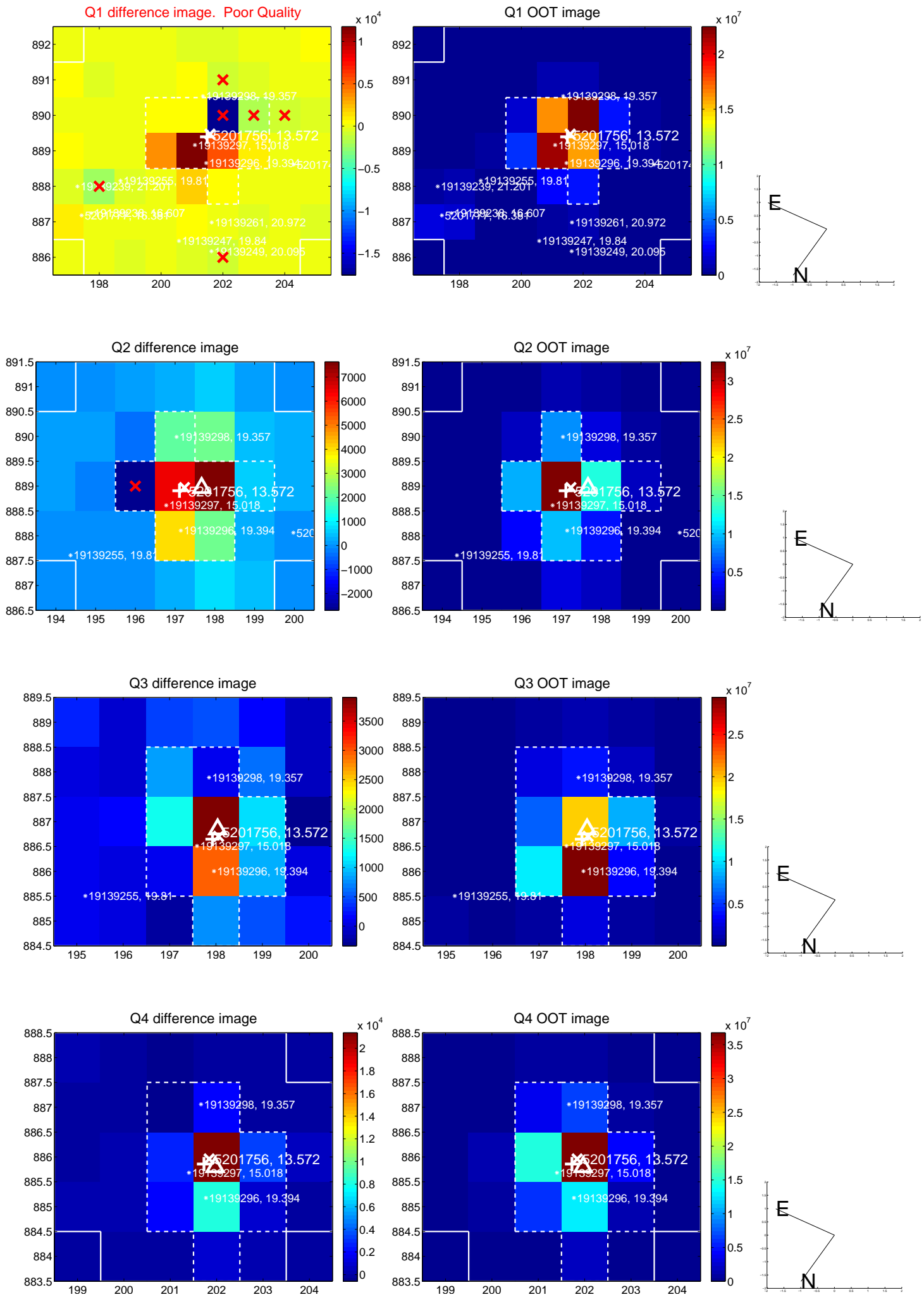


offset from photometric centroids

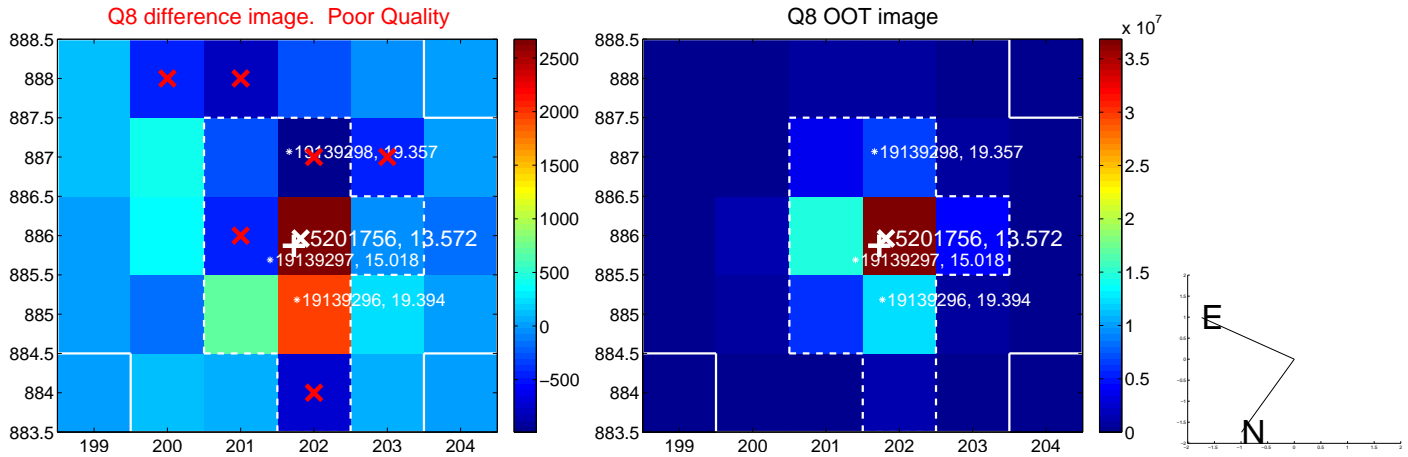
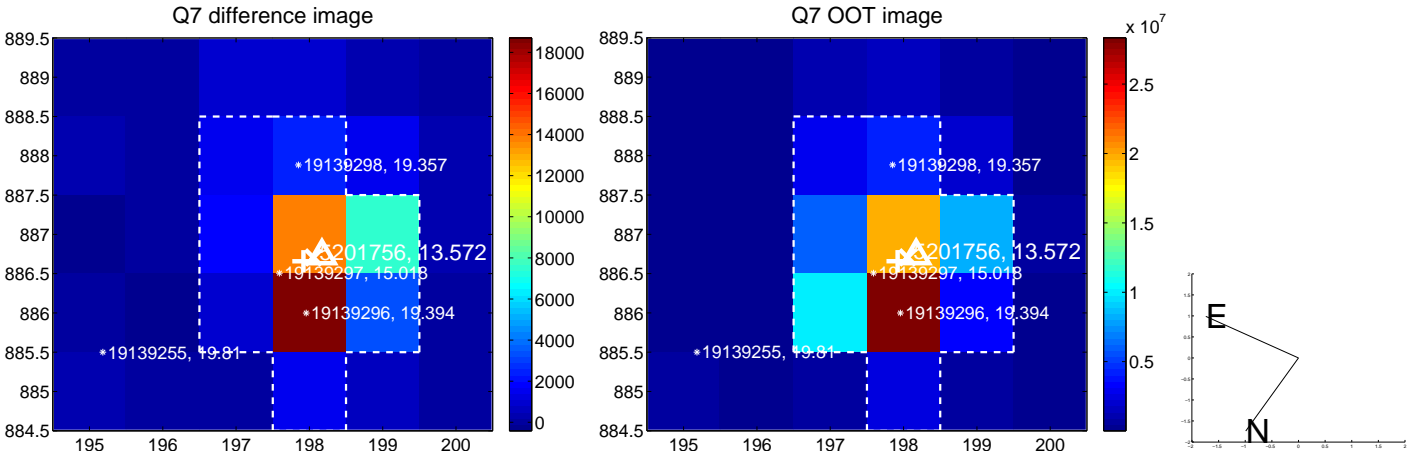
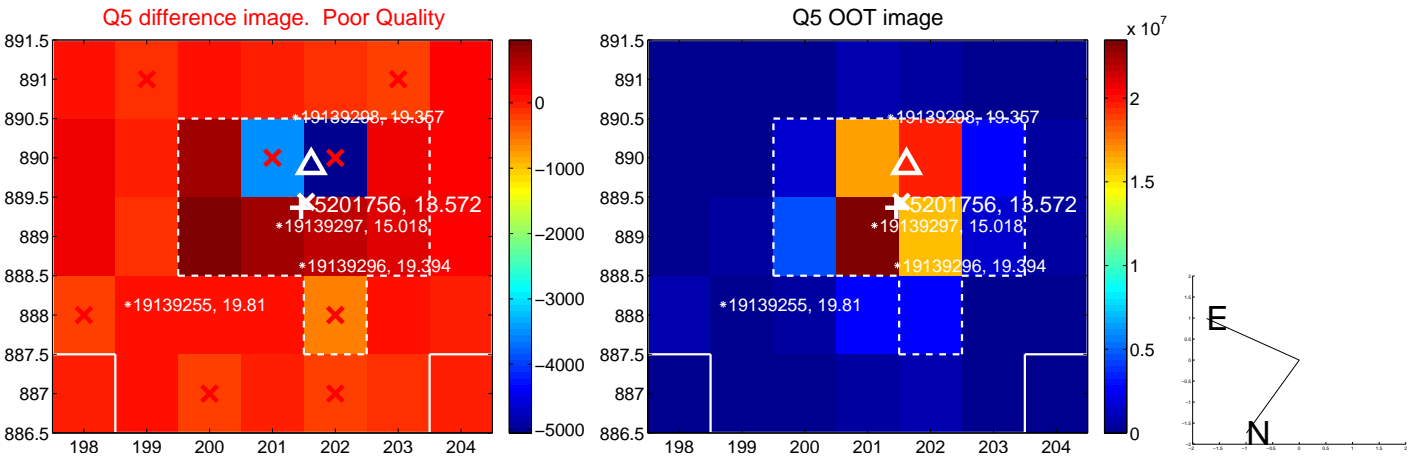


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

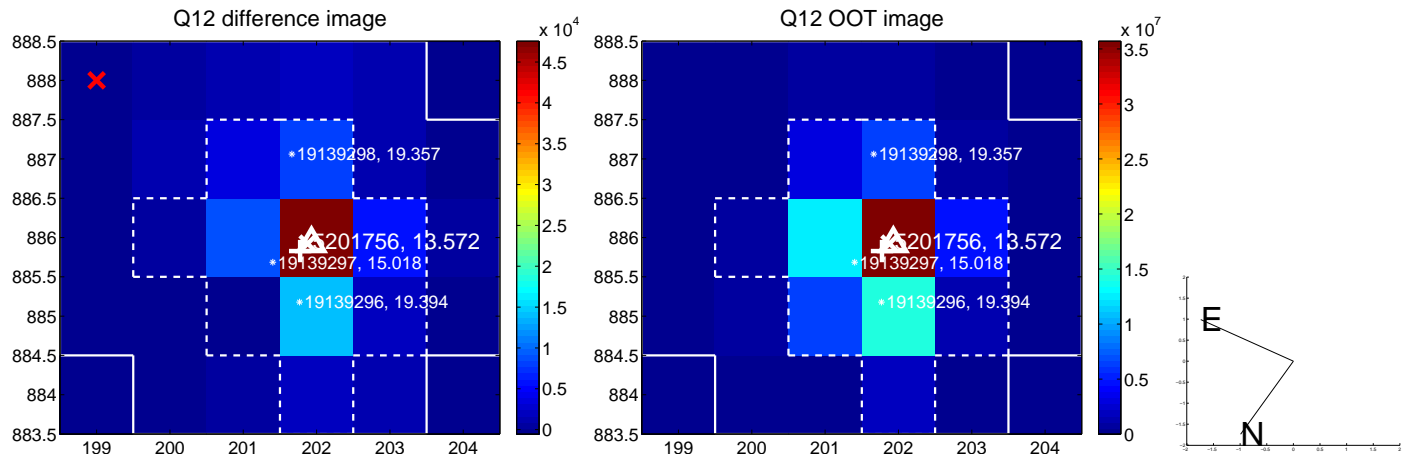
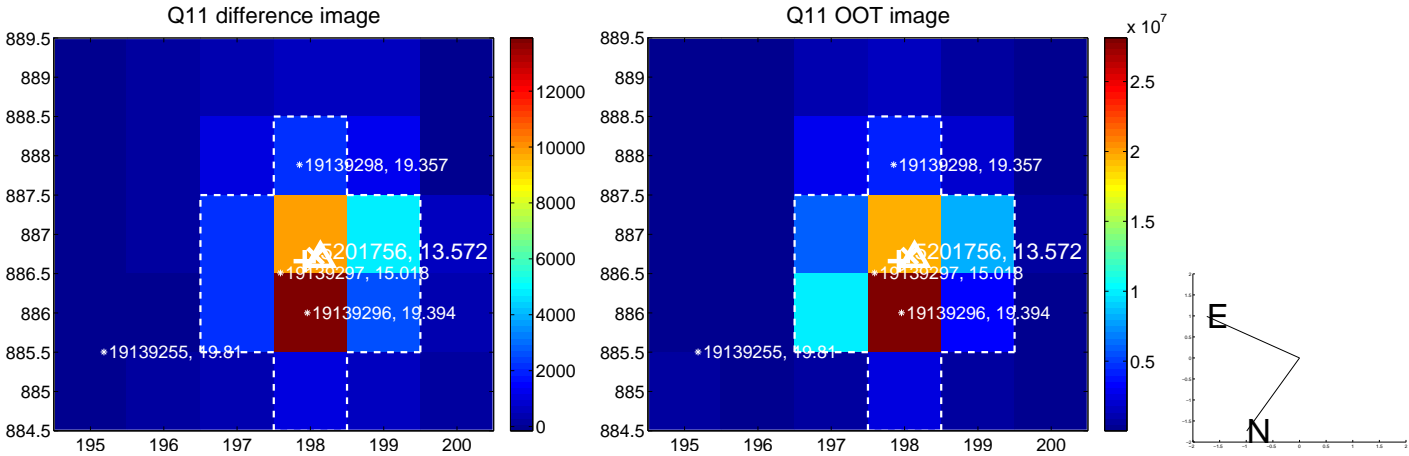
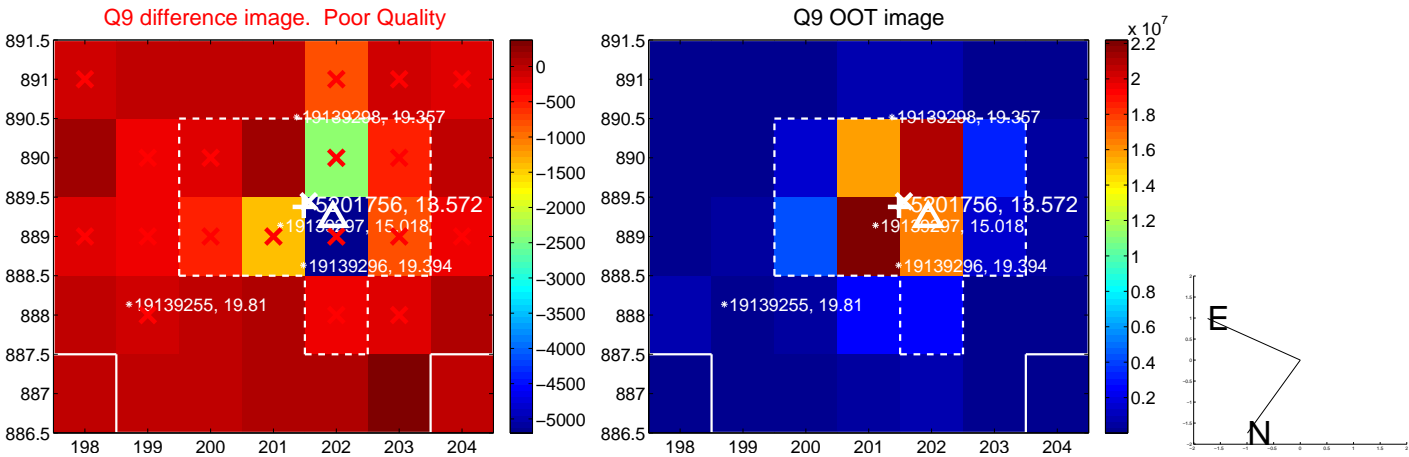


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

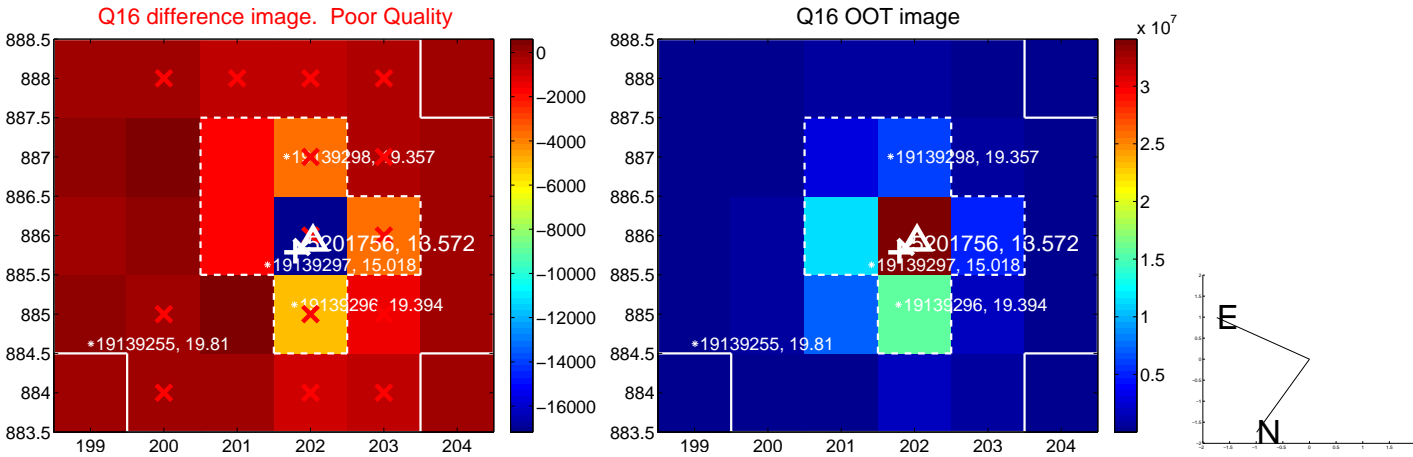
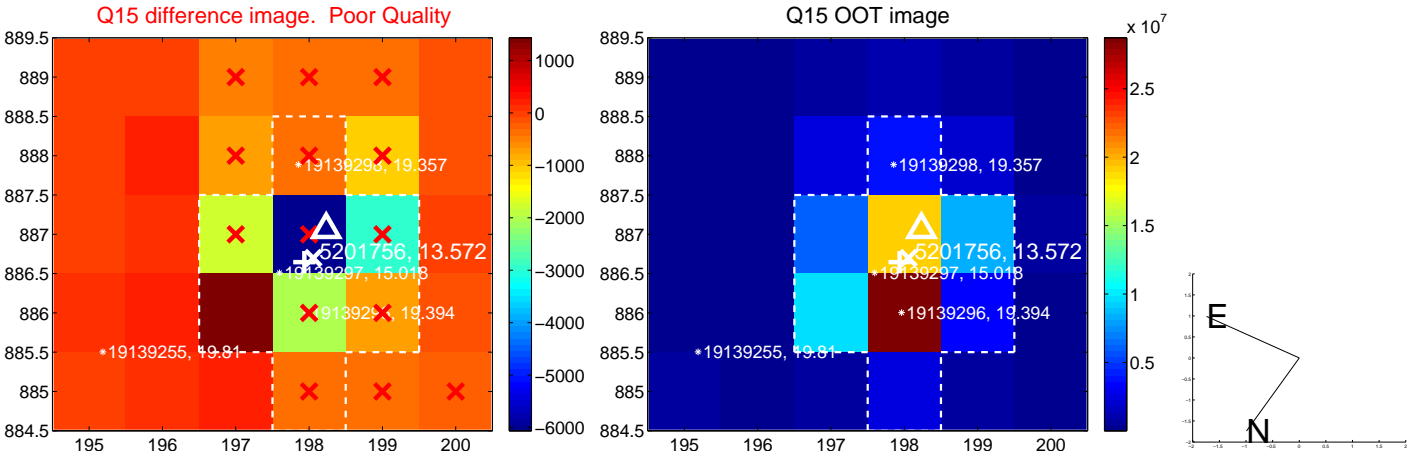
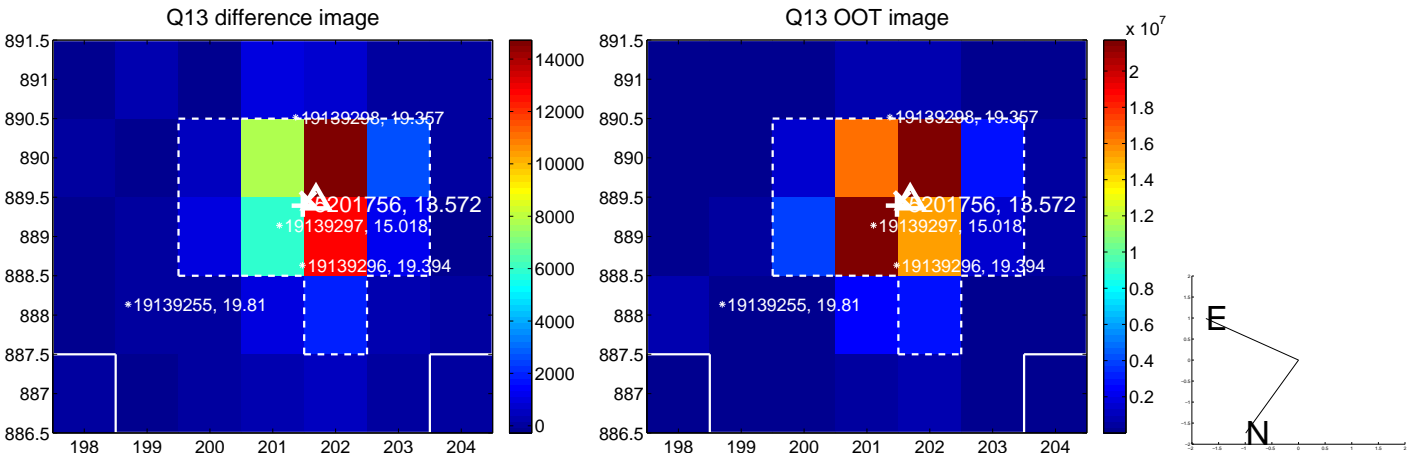




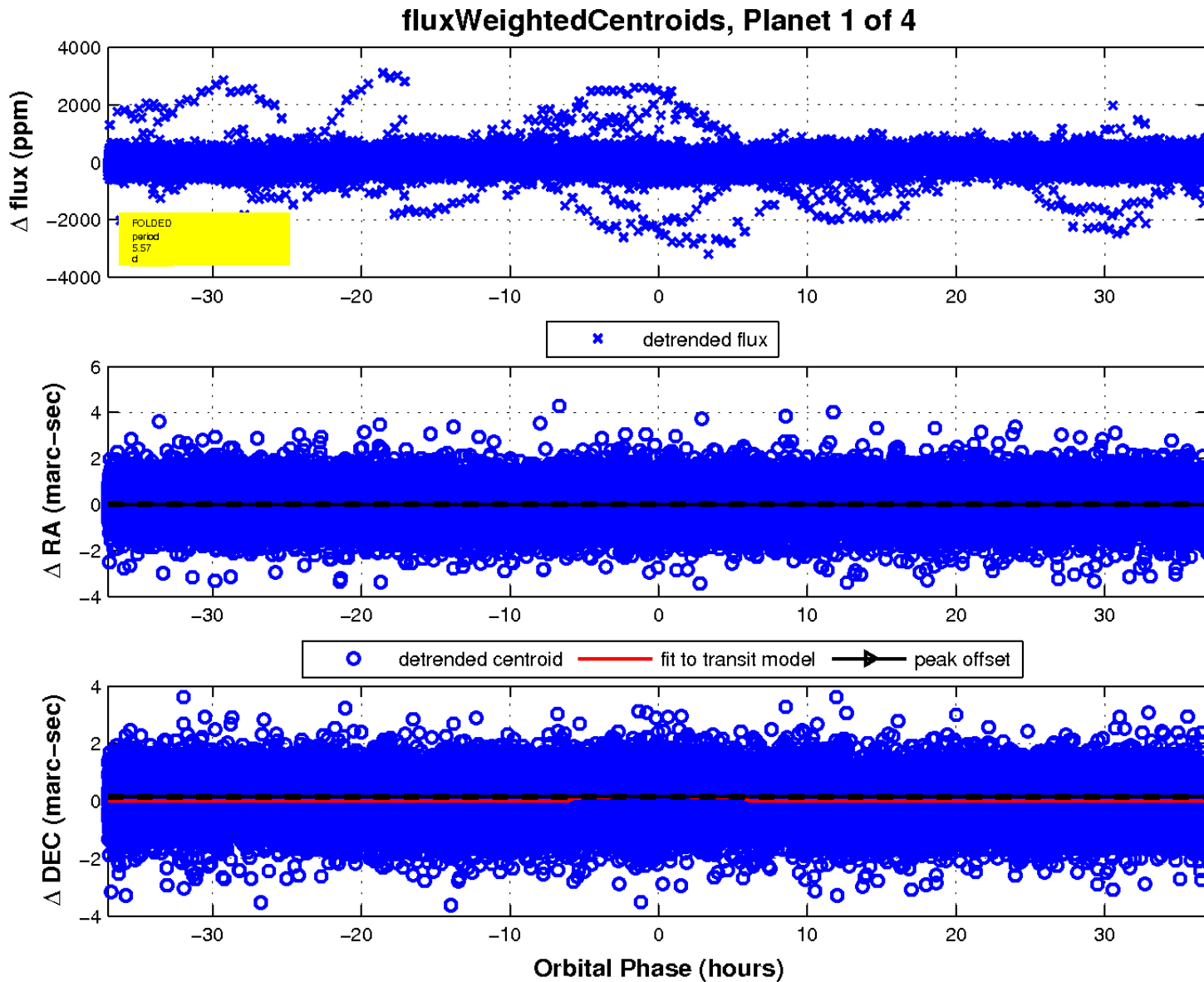
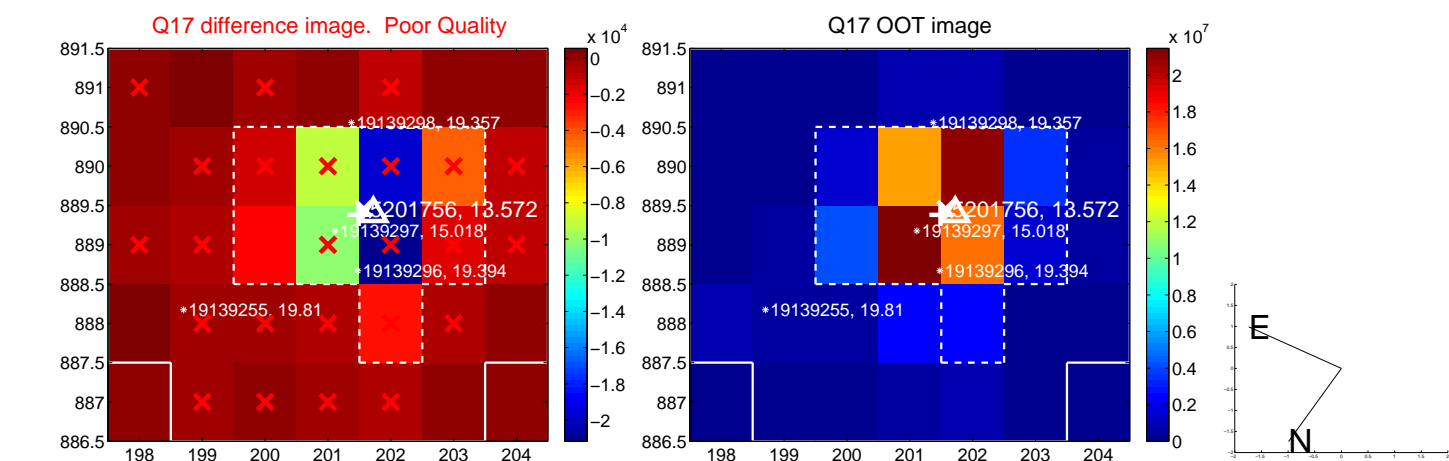
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

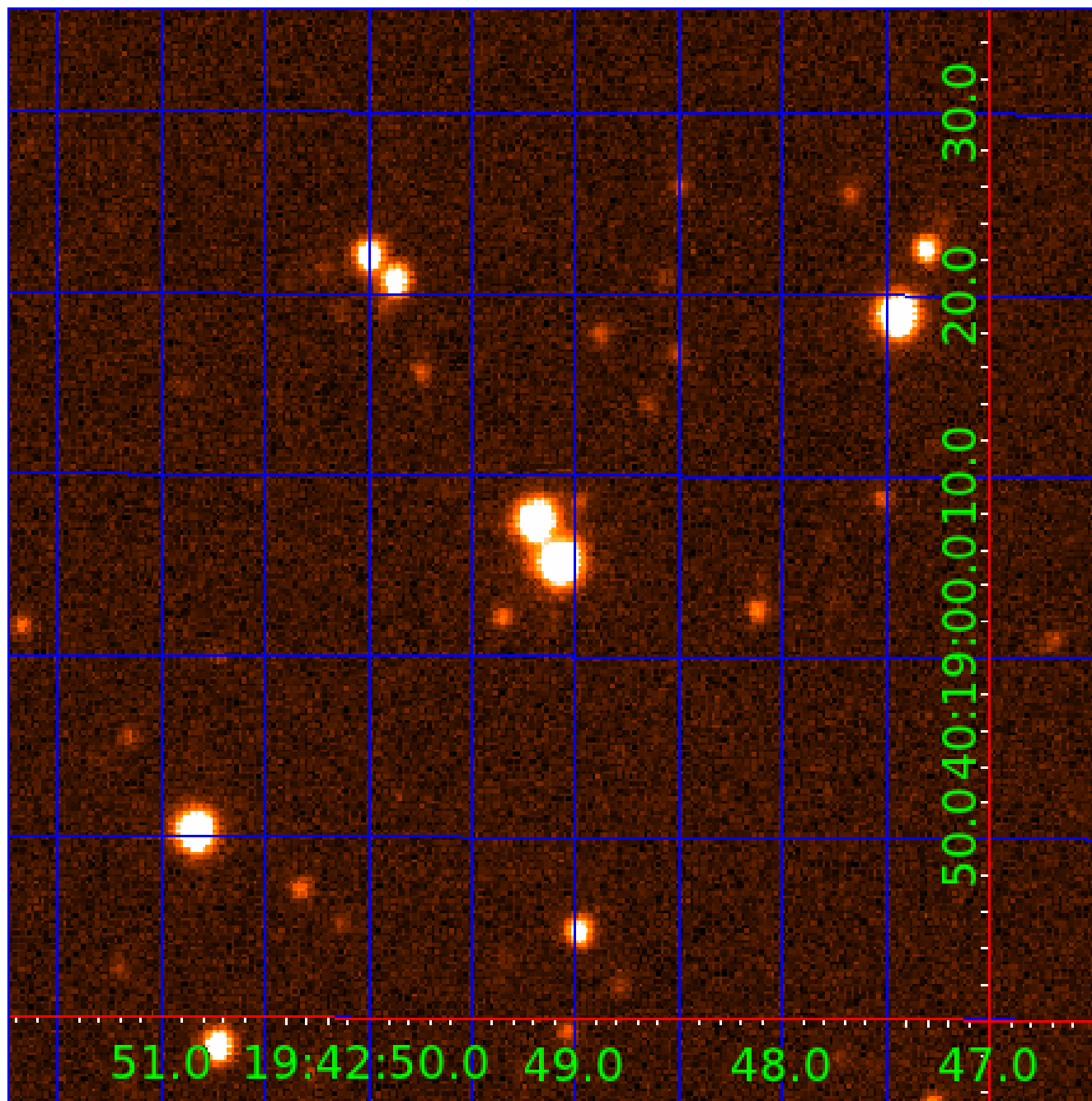


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 005201756

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005201756-01	OBS	No	5.569486	134.666707	63.9	12.349	7.6	7.6	1.00	5780	0.94	264.35
005201756-02	OBS	No	1.045308	131.666099	29.4	6.675	8.1	7.8	1.00	5780	0.54	2460.07
005201756-03	OBS	No	33.301910	141.604759	203.9	5.738	15.2	5.4	1.00	5780	1.64	24.36
005201756-04	OBS	No	64.112235	165.463553	337.3	13.459	11.6	7.2	1.00	5780	2.00	10.17

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005201756-01	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—CENT_KIC_POS
005201756-02	OBS	FP	0.00	1	0	0	0	LPP_DV—CENT_KIC_POS
005201756-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_KIC_POS
005201756-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—CENT_KIC_POS

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

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

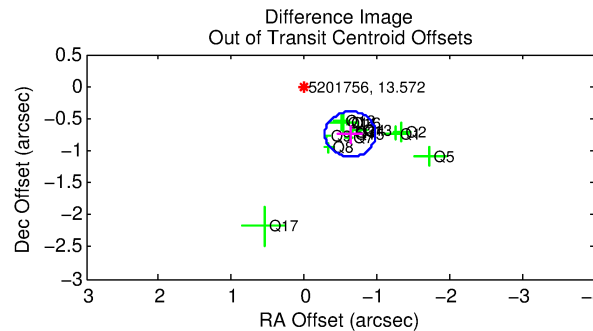
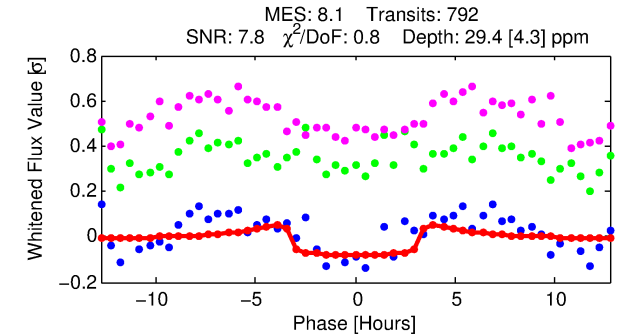
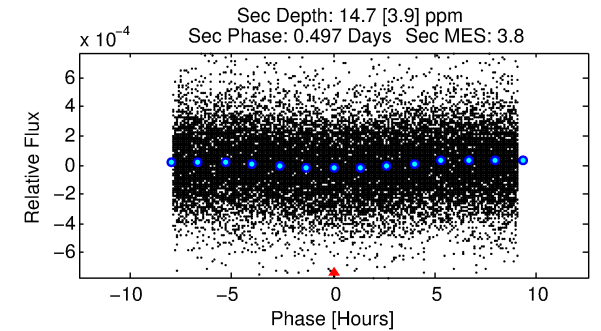
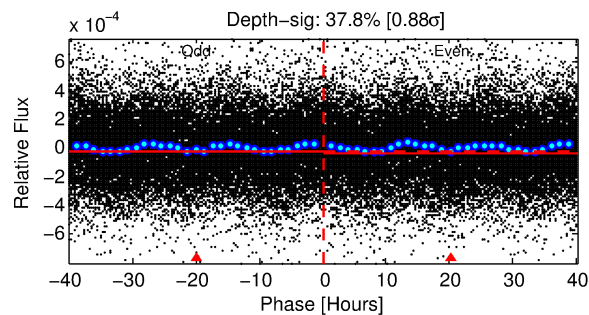
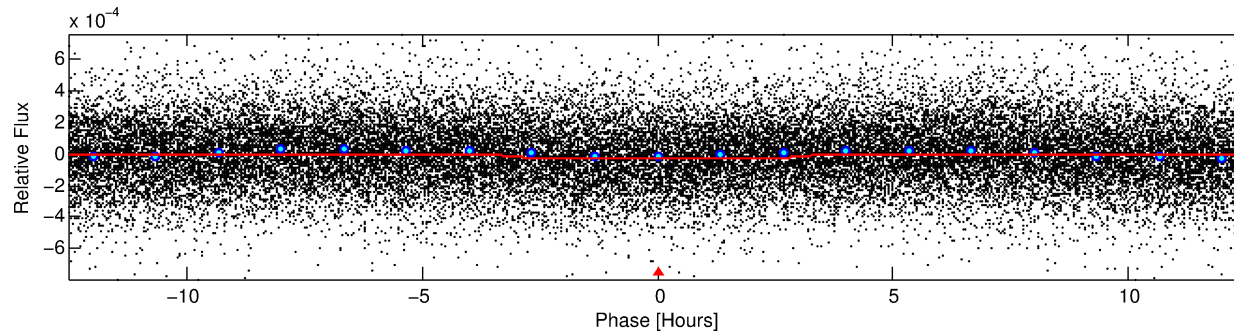
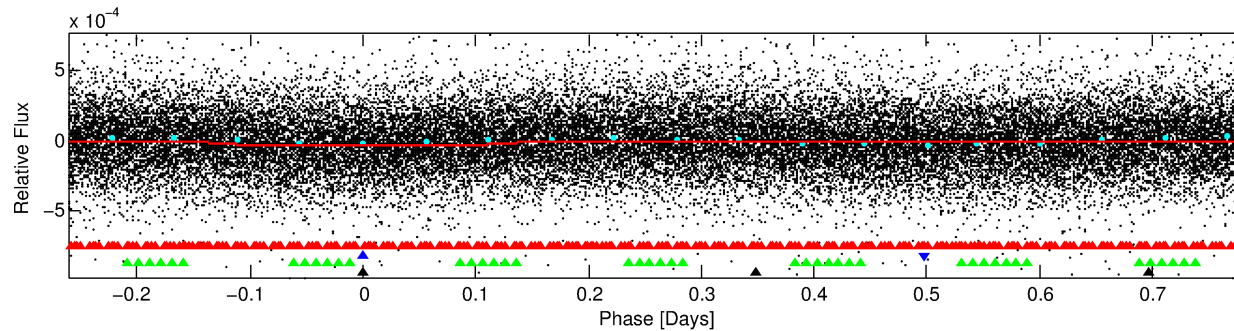
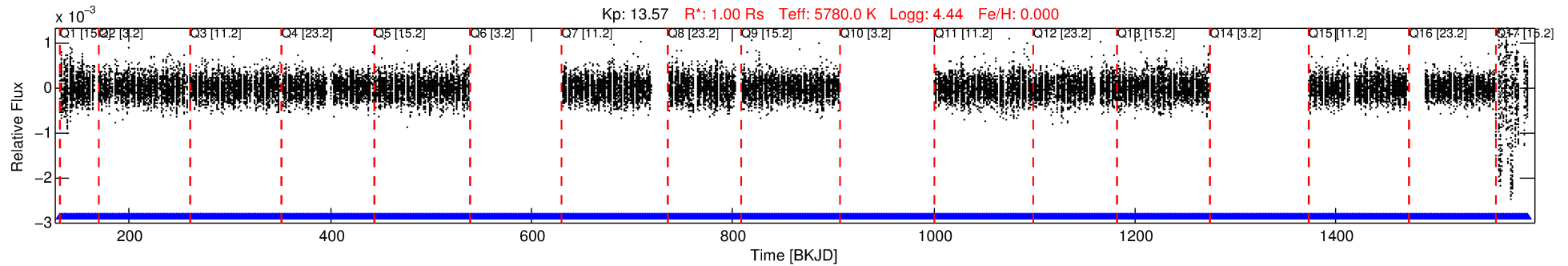
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 005201756-02

No Significant Match Found

# DV One-Page Summary

KIC: 5201756 Candidate: 2 of 4 Period: 1.045 d



## DV Fit Results:

Period = 1.04531 [0.00002] d  
Epoch = 131.6661 [0.0051] BKJD  
Rp/R\* = 0.0049 [0.0056]  
a/R\* = 1.35 [3.06]  
b = 0.04 [125.39]  
Seff = 2460.07 [0.05]  
Teff = 1796 [0] K  
Rp = 0.54 [0.61] Re  
a = 0.0202 [0.0000] AU  
Ag = 11.44 [26.09] [0.40 $\sigma$ ]  
Teffp = 5106 [2911] K [1.14 $\sigma$ ]

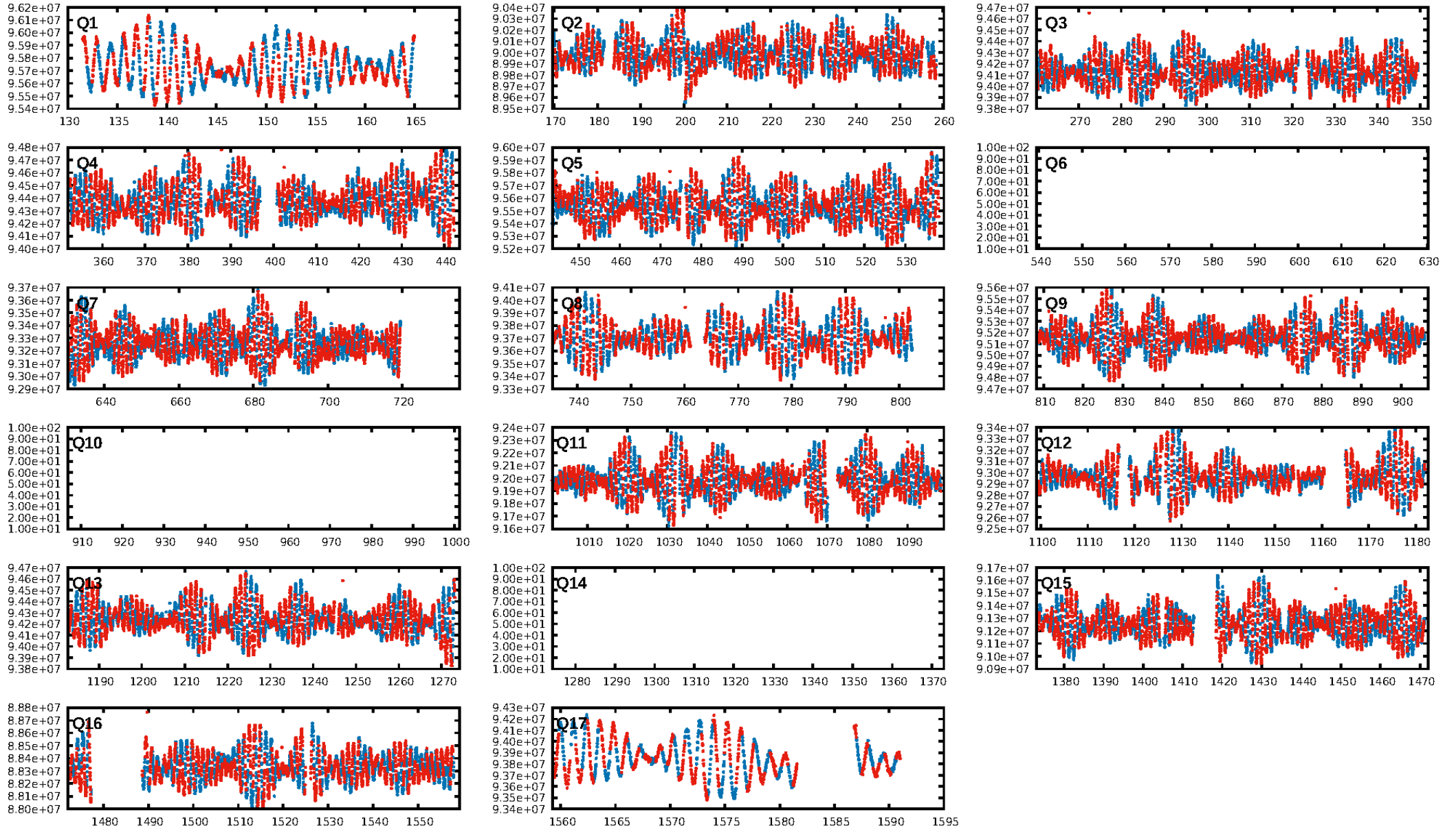
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [7.73 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 1.07e-06  
RollingBand-fgt: 1.00 [747/747]  
GhostDiagnostic-chr: 2.09  
Centroid-sig: 0.8%  
Centroid-so: 0.869 arcsec [1.07 $\sigma$ ]  
OotOffset-rm: 0.977 arcsec [8.37 $\sigma$ ]  
KicOffset-rm: 0.452 arcsec [3.99 $\sigma$ ]  
OotOffset-st: 1/4/4/5 [14]  
KicOffset-st: 1/4/4/5 [14]  
DiffImageQuality-fgm: 0.29 [4/14]  
DiffImageOverlap-fno: 1.00 [14/14]

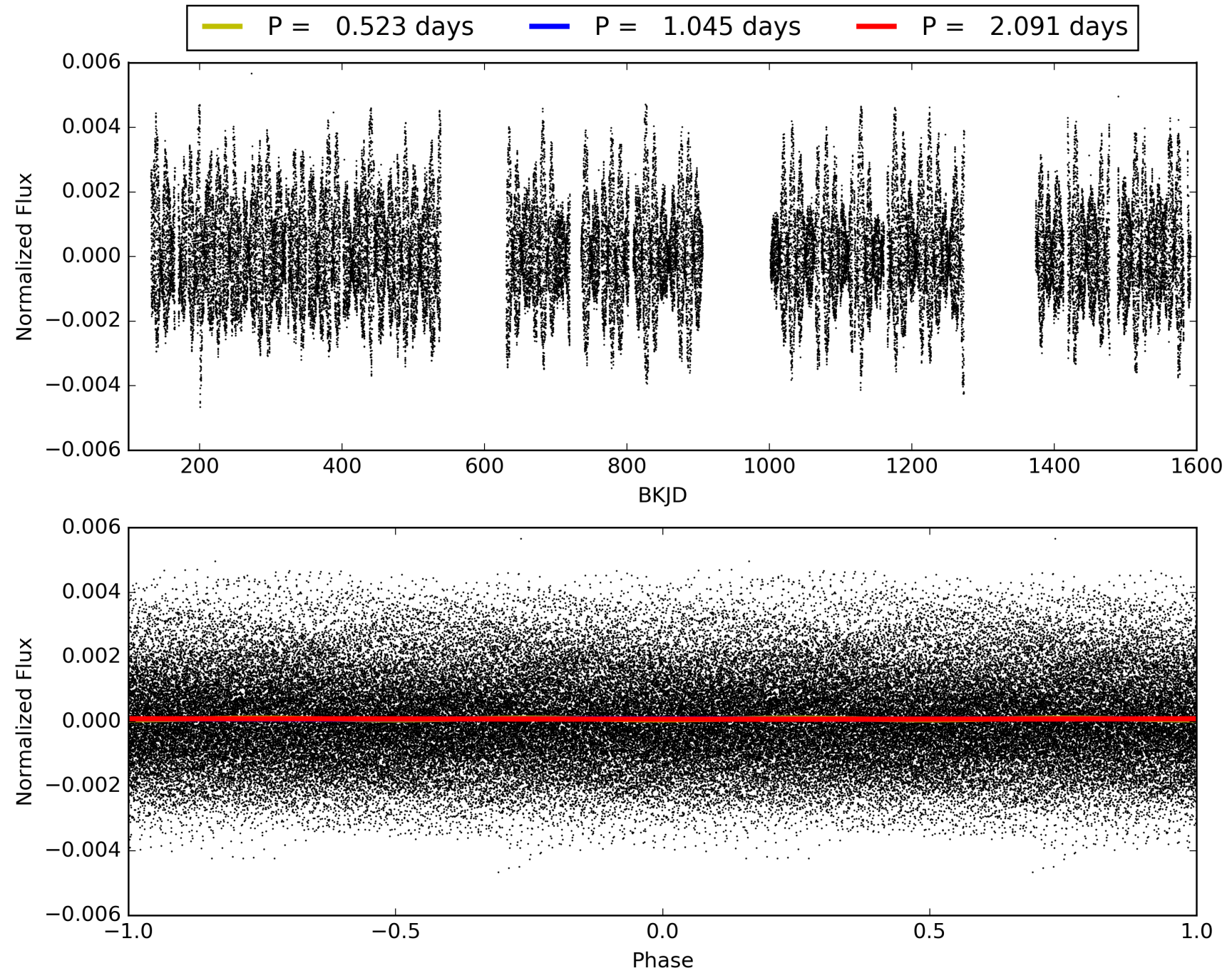
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 14:42:40 Z

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

# TCE 005201756-02, PDC Light Curves



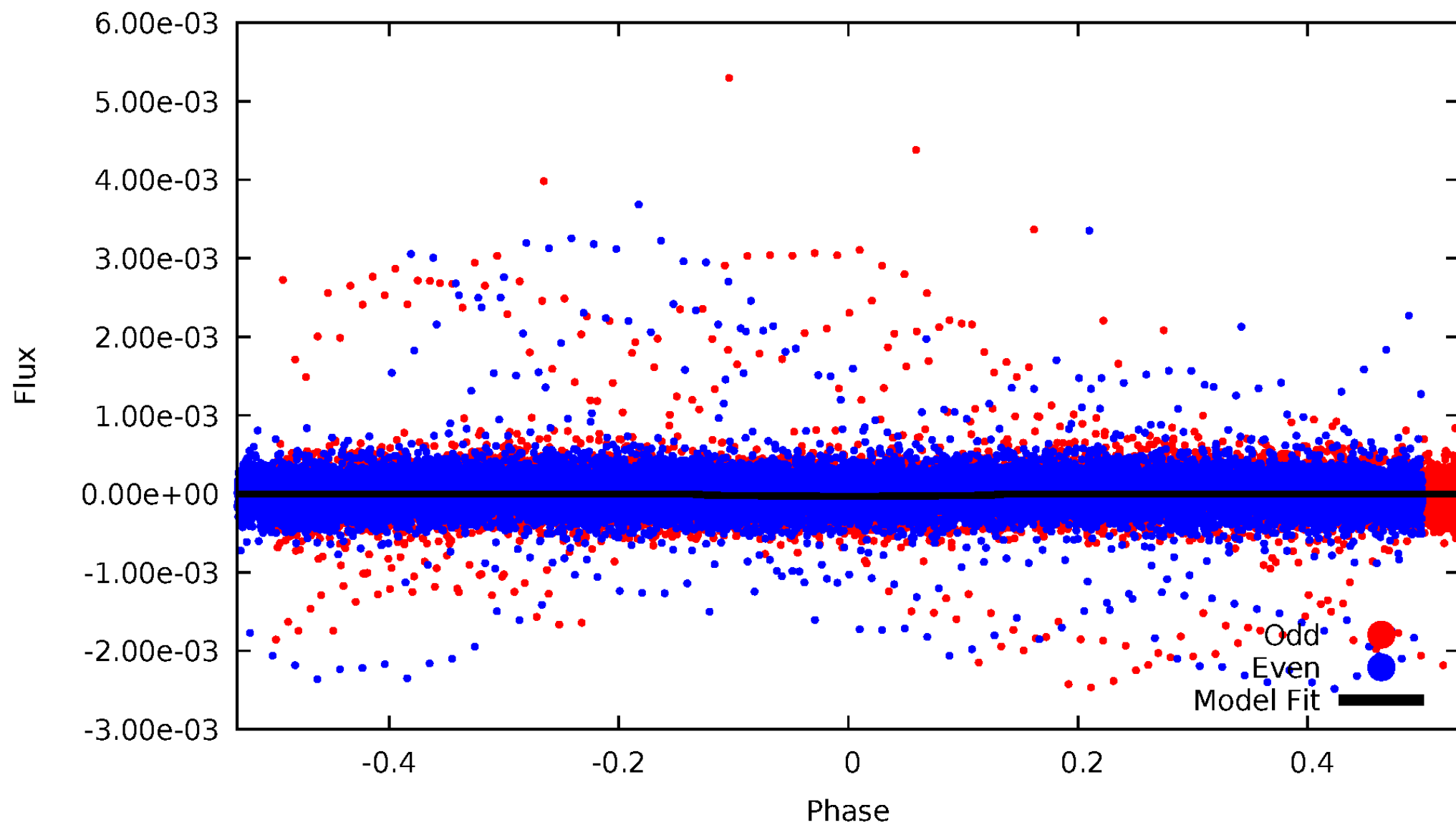
TCE 005201756-02





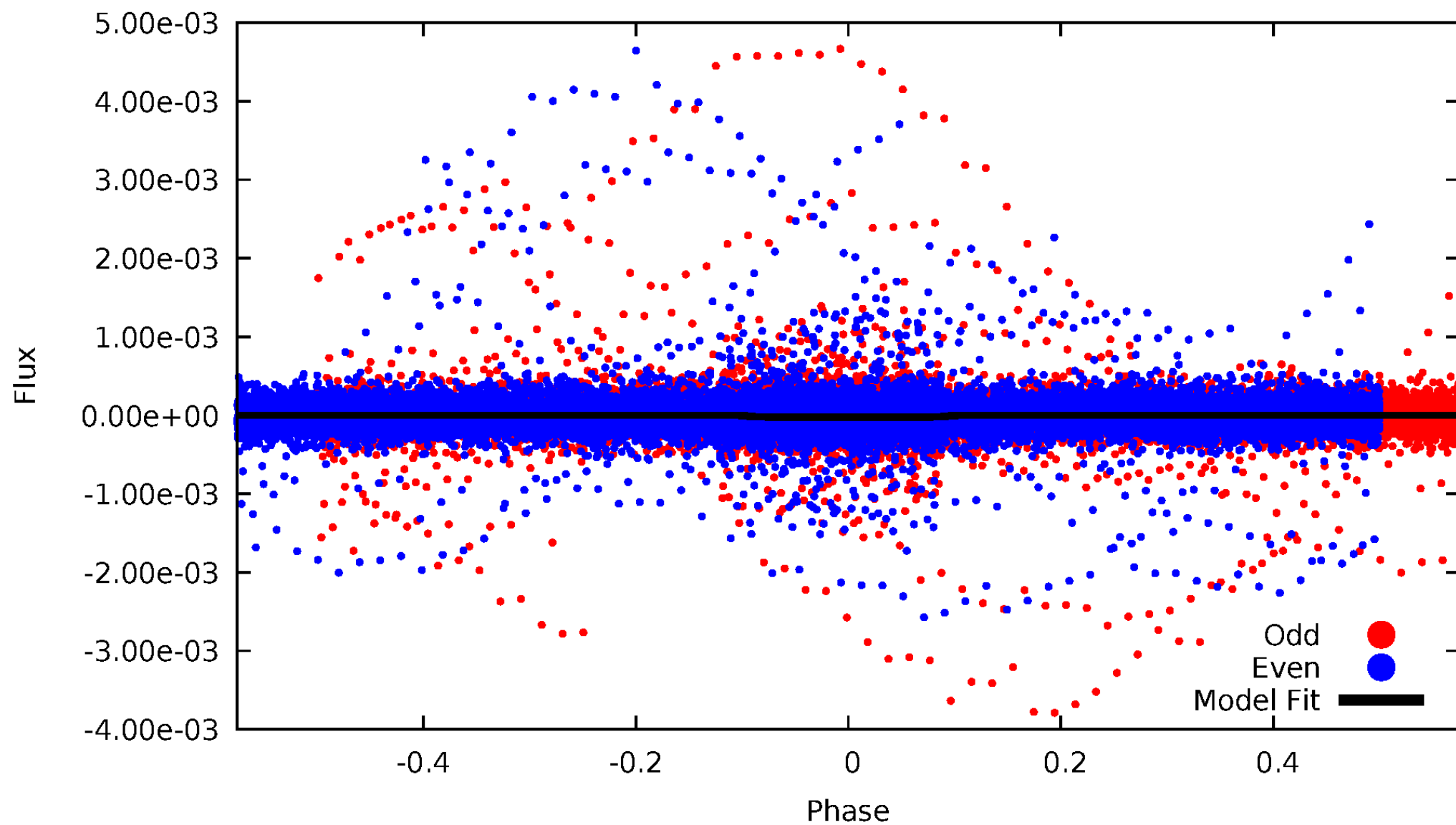
# DV Odd/Even

TCE 005201756-02



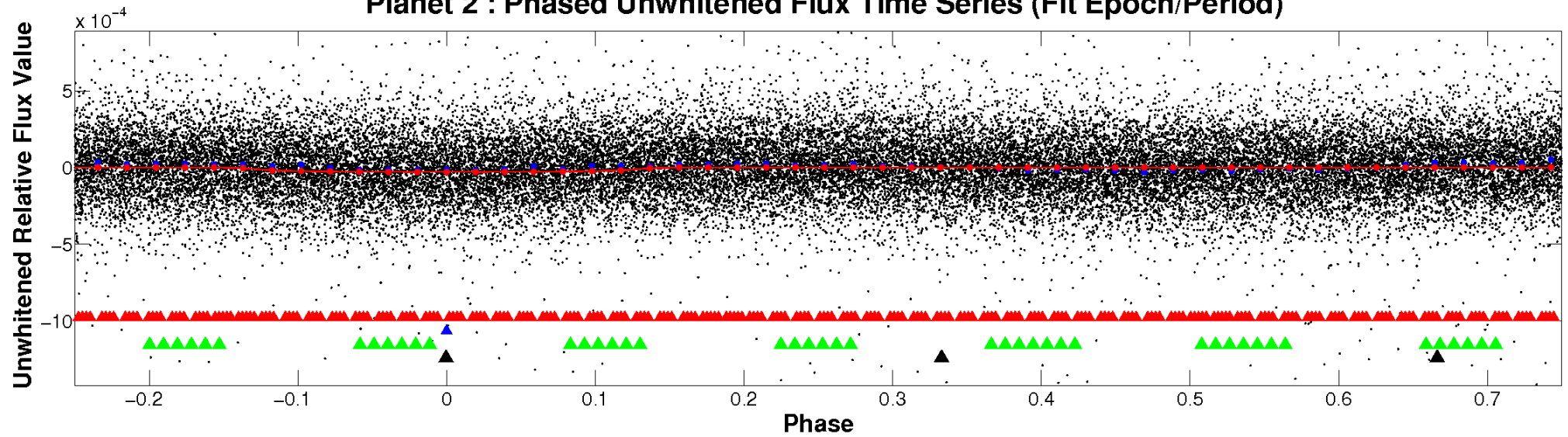
# ALT Odd/Even

TCE 005201756-02

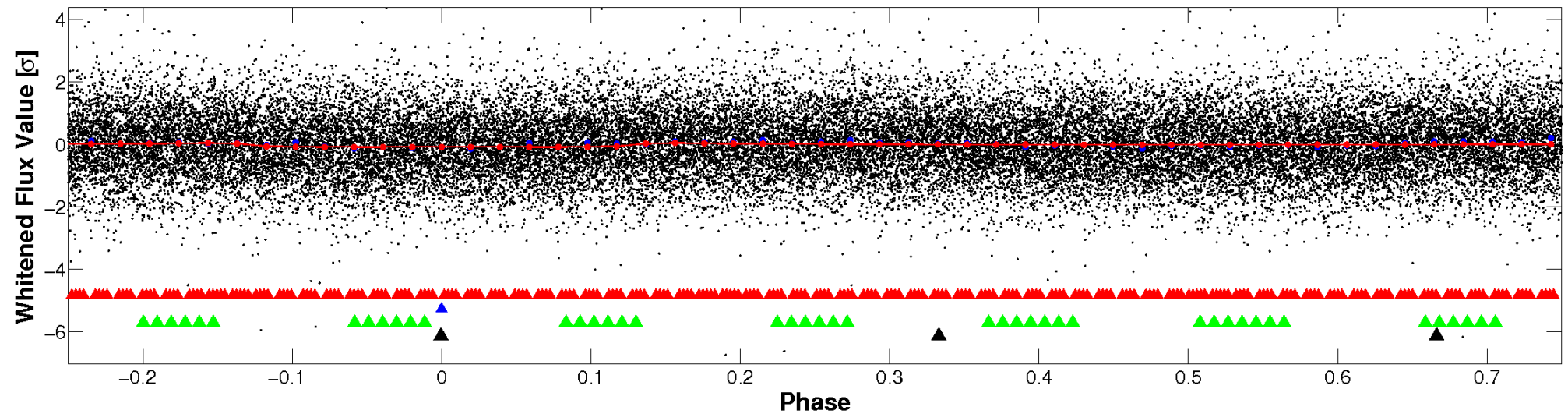


# Non-Whitened Vs. Whitened Light Curve

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



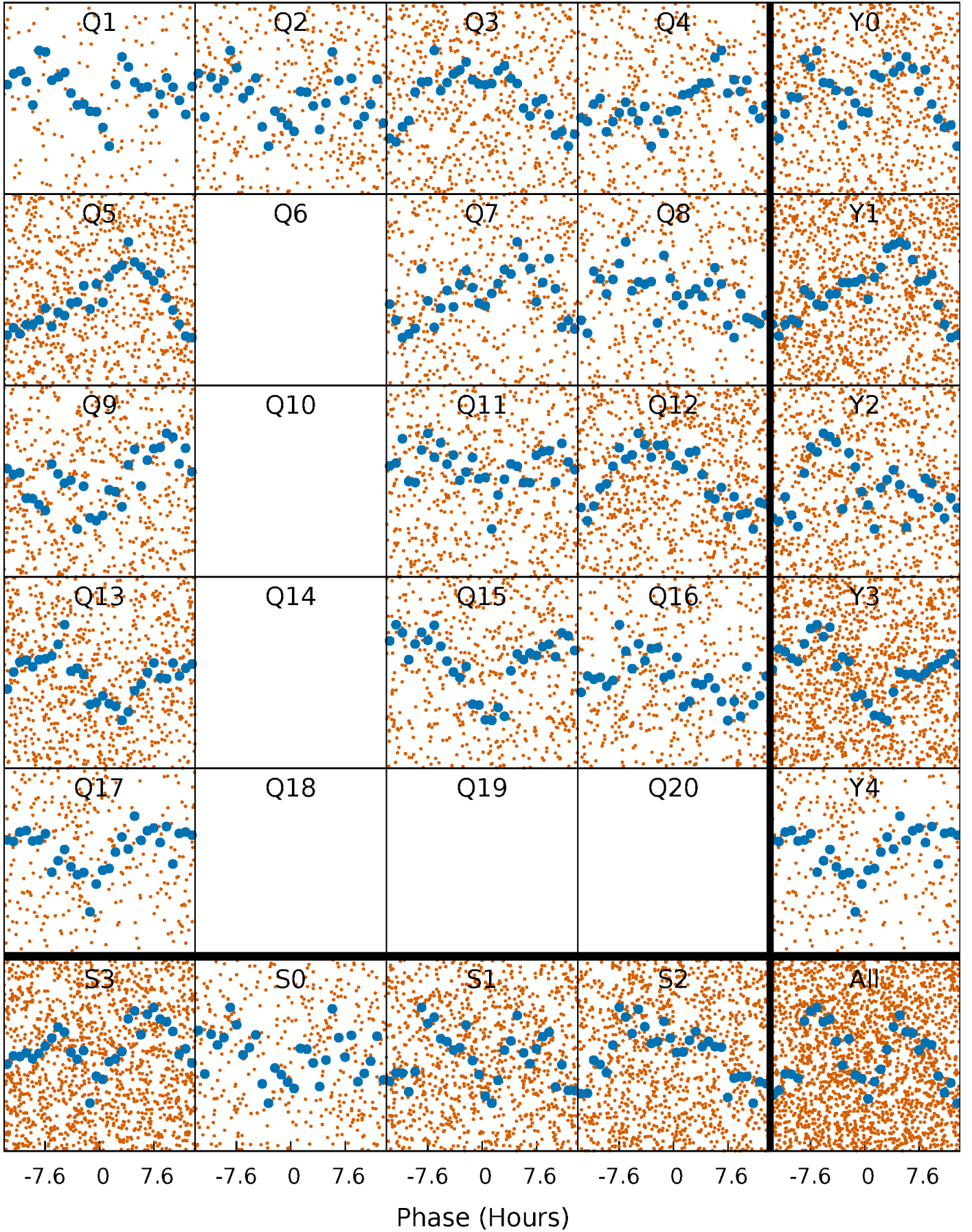
## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)





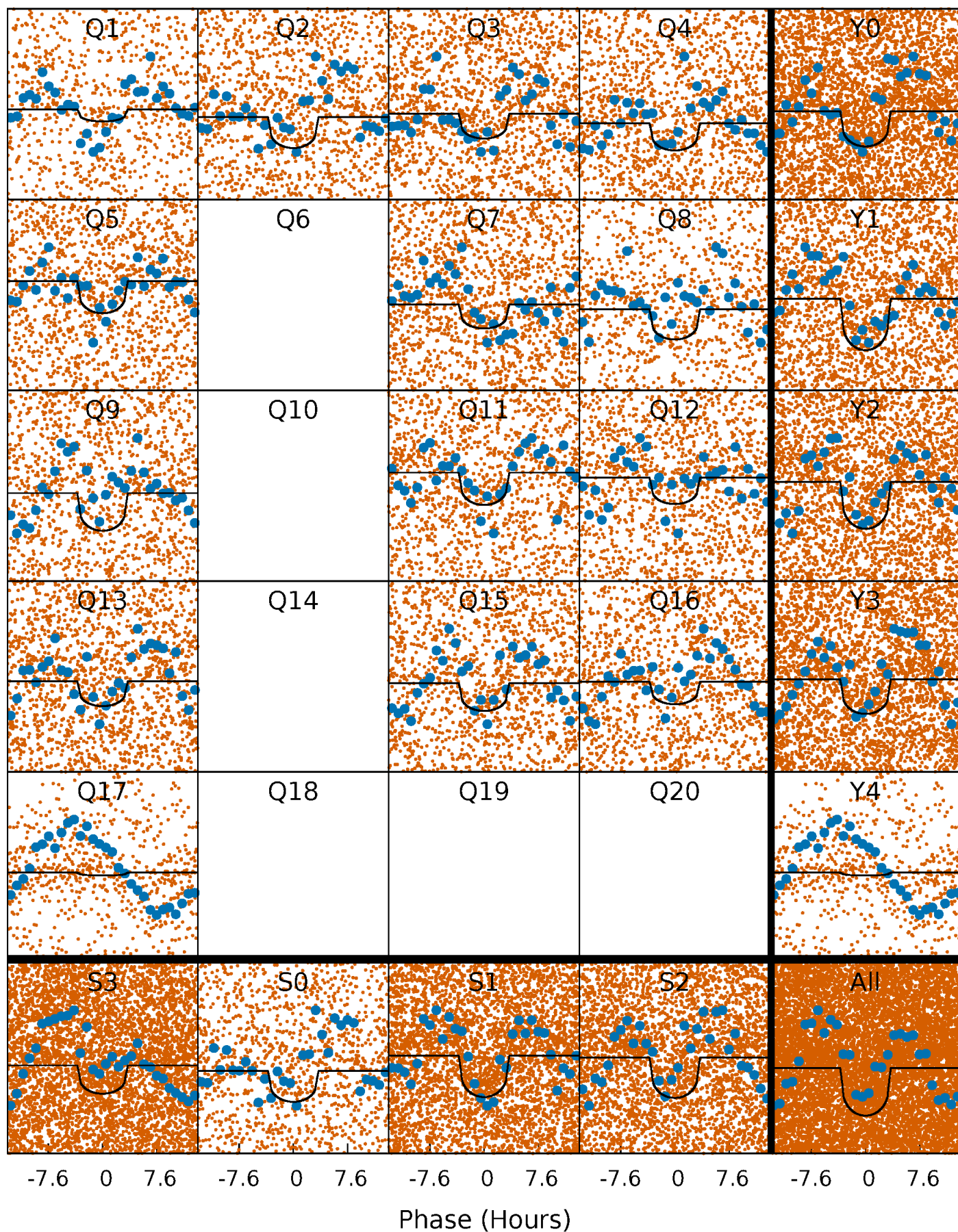
# PDC Quarter-Phased Transit Curves

TCE 005201756-02   P= 1.045308 Days    $T_0=131.666099$  (BKJD)



# DV Quarter-Phased Transit Curves

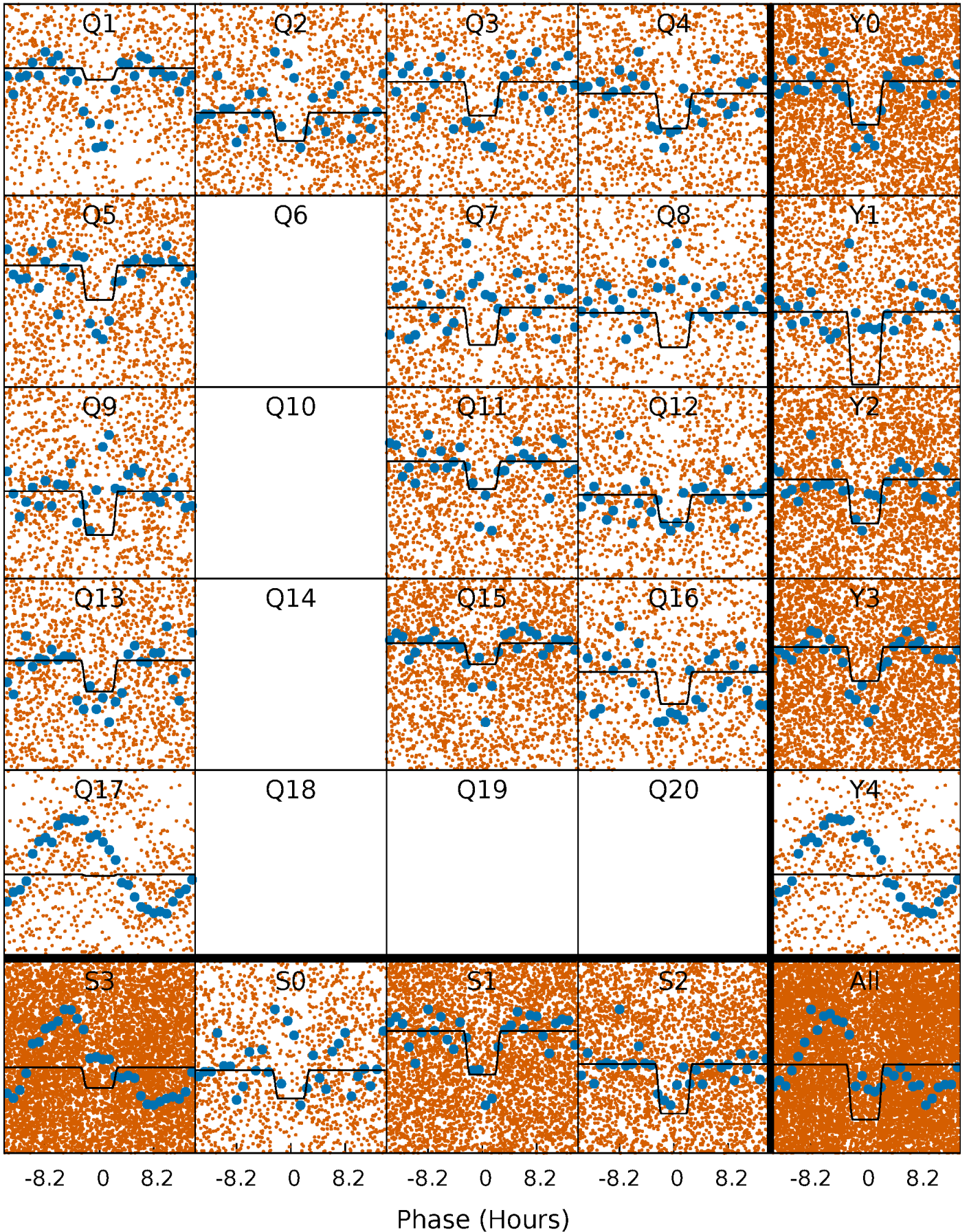
TCE 005201756-02 P= 1.045308 Days  $T_0=131.666099$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

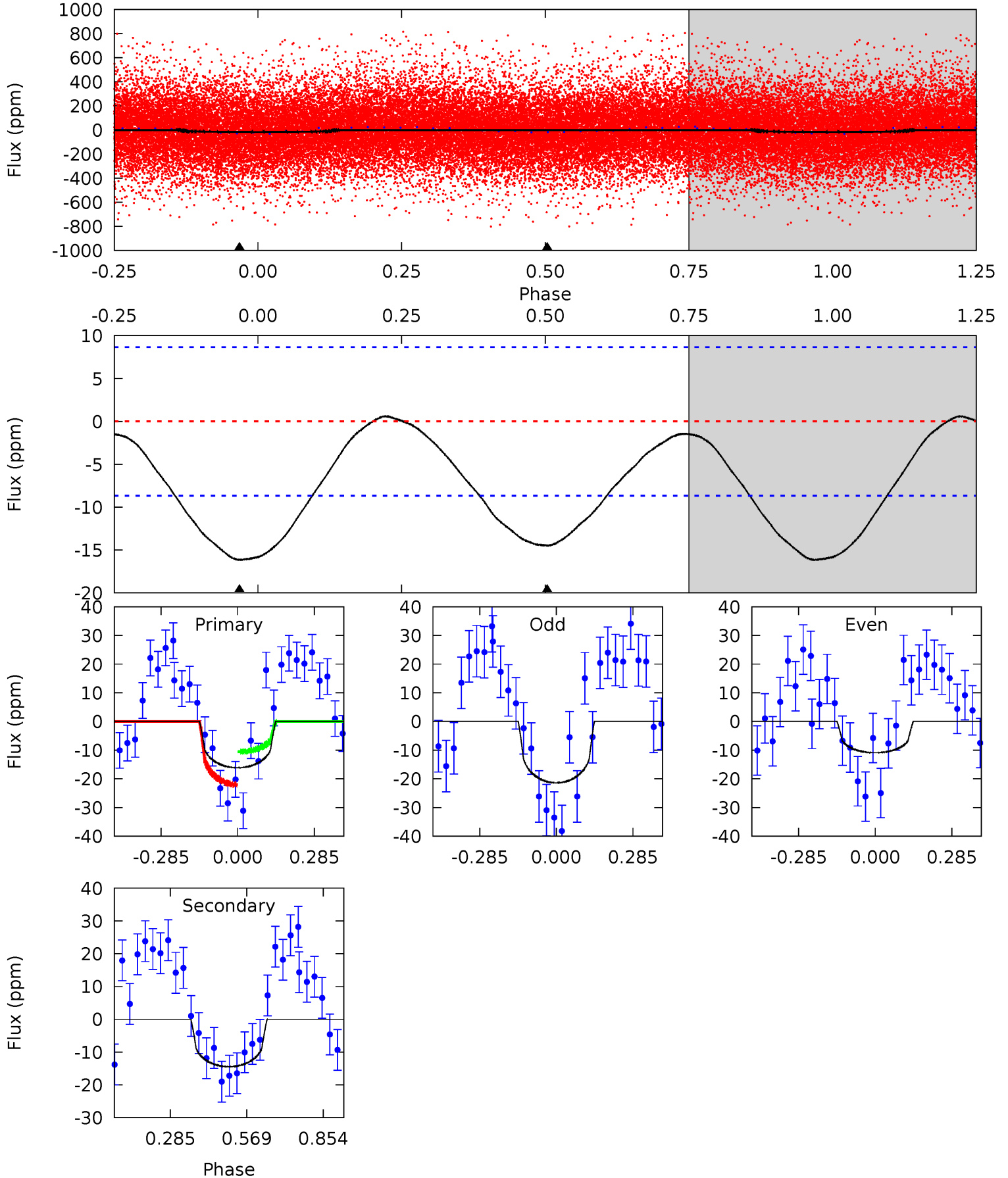
TCE 005201756-02 P= 1.045330 Days  $T_0=131.652627$  (BKJD)



# DV Model-Shift Uniqueness Test

005201756-02, P = 1.045308 Days, E = 130.620791 Days

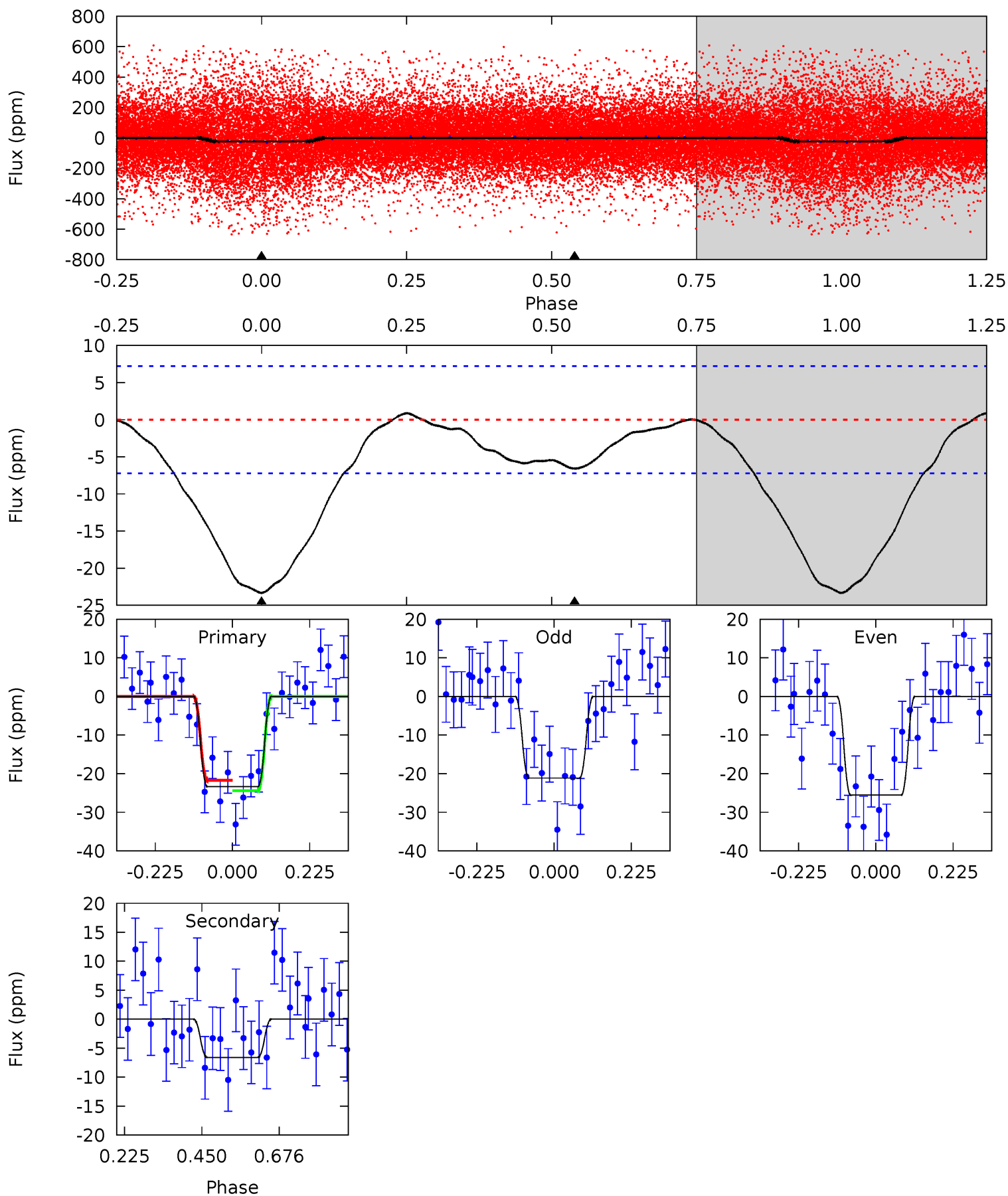
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.09	7.26	0	0	4.34	1.07	0.35	8.09	8.09	7.26	7.26	2.63	0.35	0.04	2.94



# Alt Model-Shift Uniqueness Test

005201756-02, P = 1.045330 Days, E = 130.607297 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
14.2	4.01	0	0	4.39	1.21	0.38	14.2	14.2	4.01	4.01	1.36	0.37	0.04	0.79



### Stellar Parameters For KIC 005201756

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5780^{+1}_{-1}$	$4.438^{+1.000}_{-1.000}$	$0.000^{+1.000}_{-1.000}$	$1.000^{+1.000}_{-1.000}$	$-1.000^{+1.000}_{-1.000}$	$-1.000^{+1.000}_{-1.000}$
	+0%/-0%	+23%/-23%	+inf%/-inf%	+100%/-100%	+100%/-100%	+100%/-100%
Source	Solar	Solar	Solar	Solar		

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

### Secondary Eclipse Parameters for KIC 005201756-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-14 \pm 2$	$0.70^{+0.52}_{-0.43}$	$2517^{+115}_{-126}$	$4587^{+2760}_{-937}$	$6.728^{+40.592}_{-4.626}$
Alt.	$-7 \pm 2$	$0.68^{+0.59}_{-0.42}$	$2515^{+119}_{-122}$	$3935^{+1947}_{-844}$	$3.175^{+18.334}_{-2.311}$

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



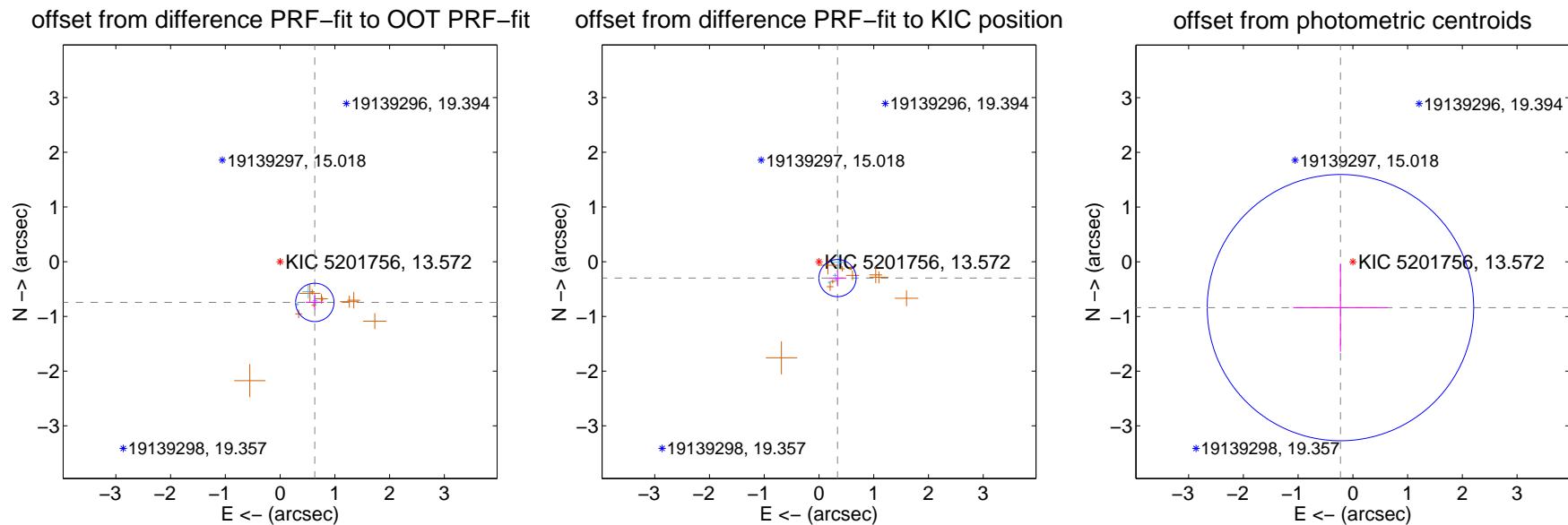
## DV Centroid Data

Supplemental centroid analysis for 005201756-02. Kepler magnitude: 13.57. Transit SNR 7.81

There are 4 quarters with good PRF difference image offsets

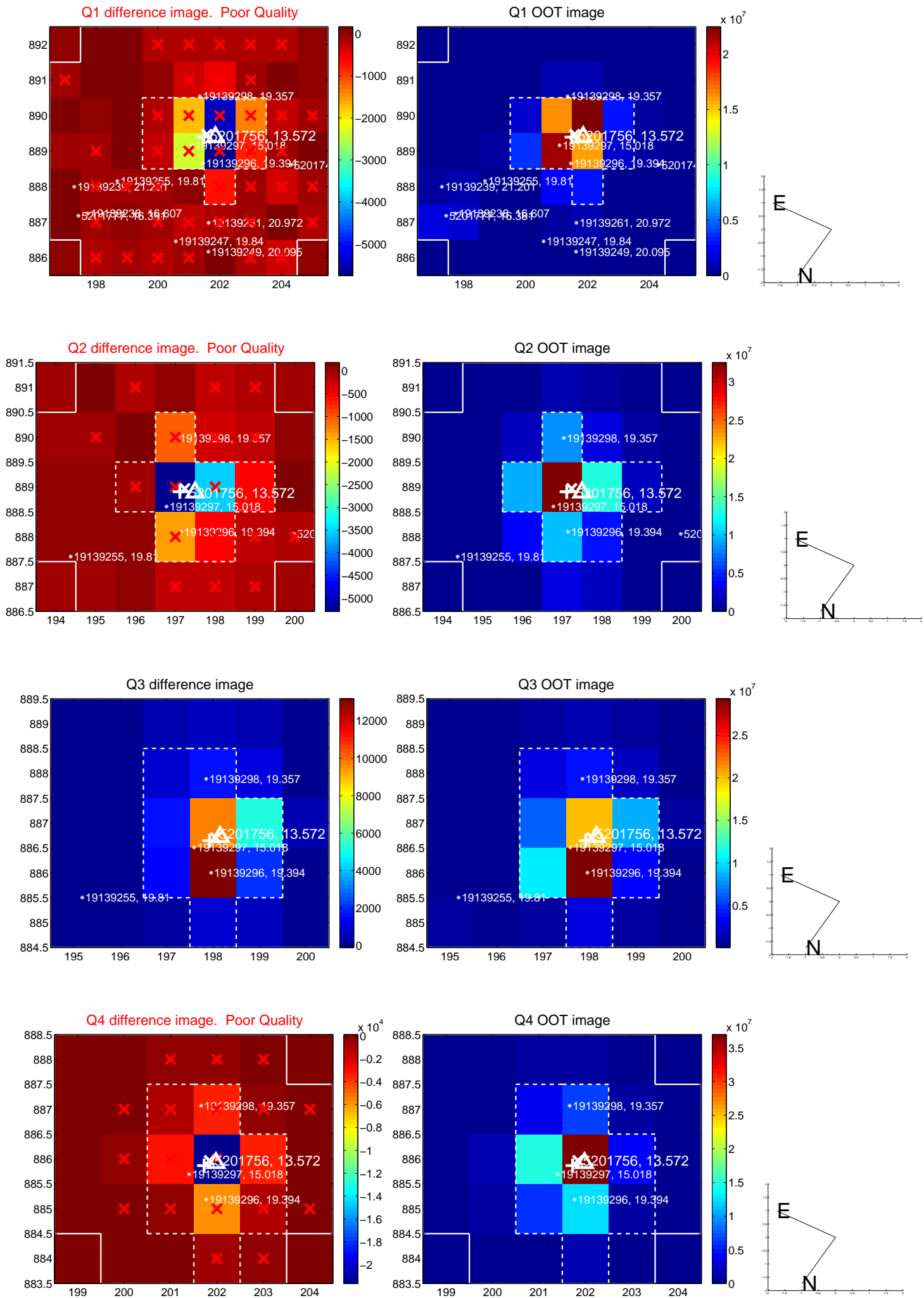
The direct PRF centroid is offset from the target star catalog position by about 0.44 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.977 \pm 0.117$	<b>8.37</b>	$-0.634 \pm 0.165$	$-0.744 \pm 0.129$
PRF-fit source offset from KIC position	$0.452 \pm 0.113$	<b>3.99</b>	$-0.338 \pm 0.160$	$-0.299 \pm 0.136$
photometric centroid source offset	$0.87 \pm 0.81$	1.07	$0.23 \pm 0.86$	$-0.84 \pm 0.81$

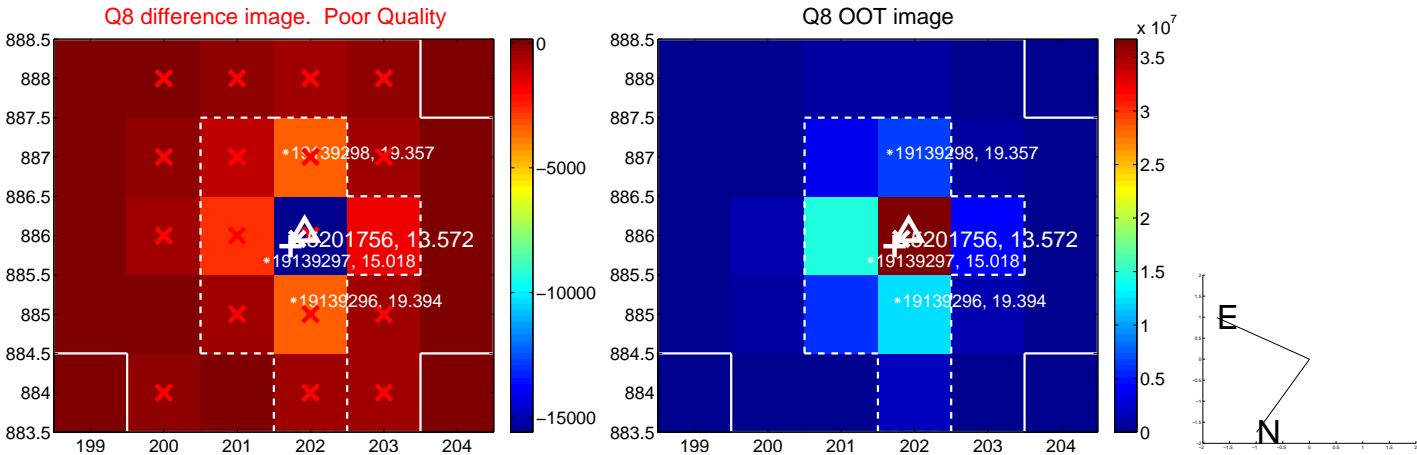
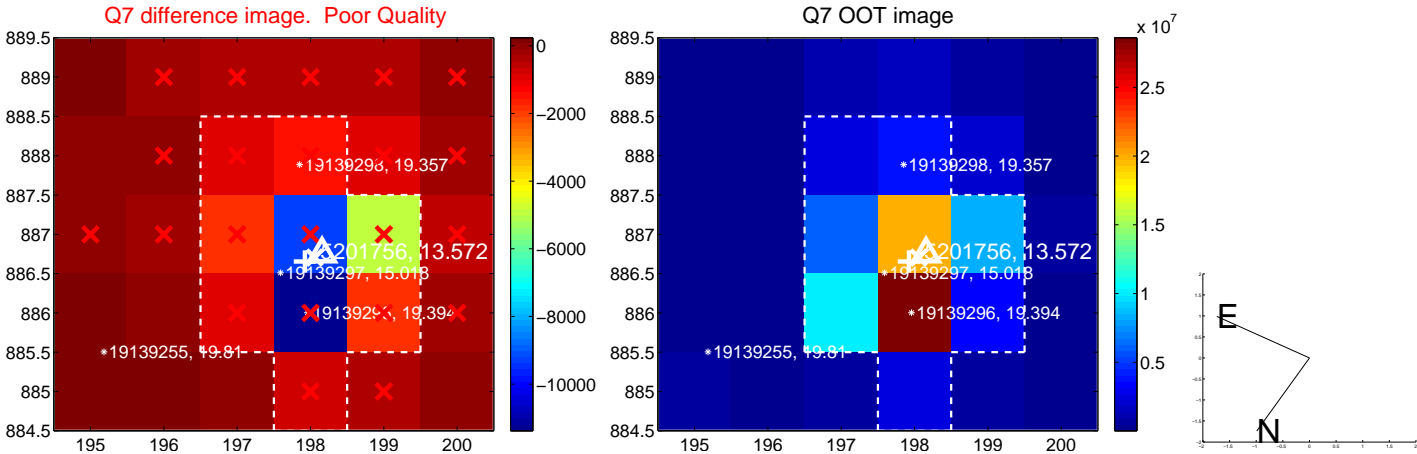
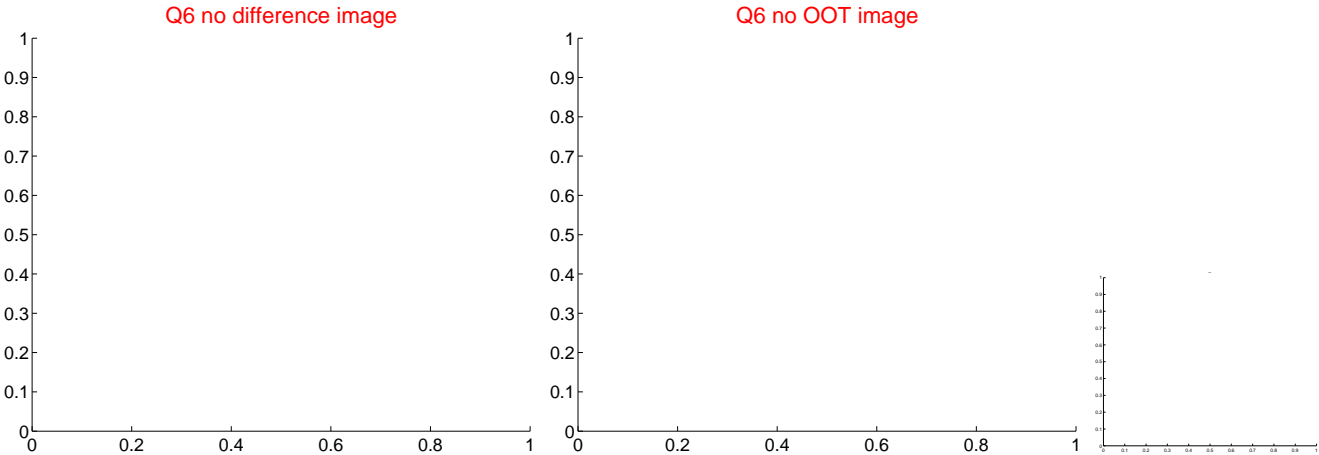
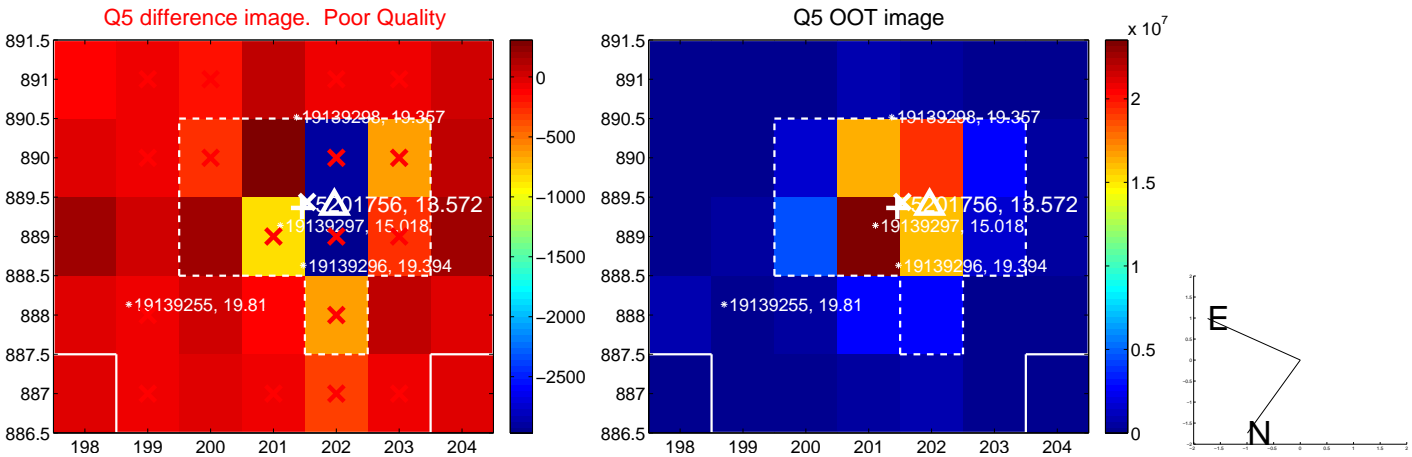


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

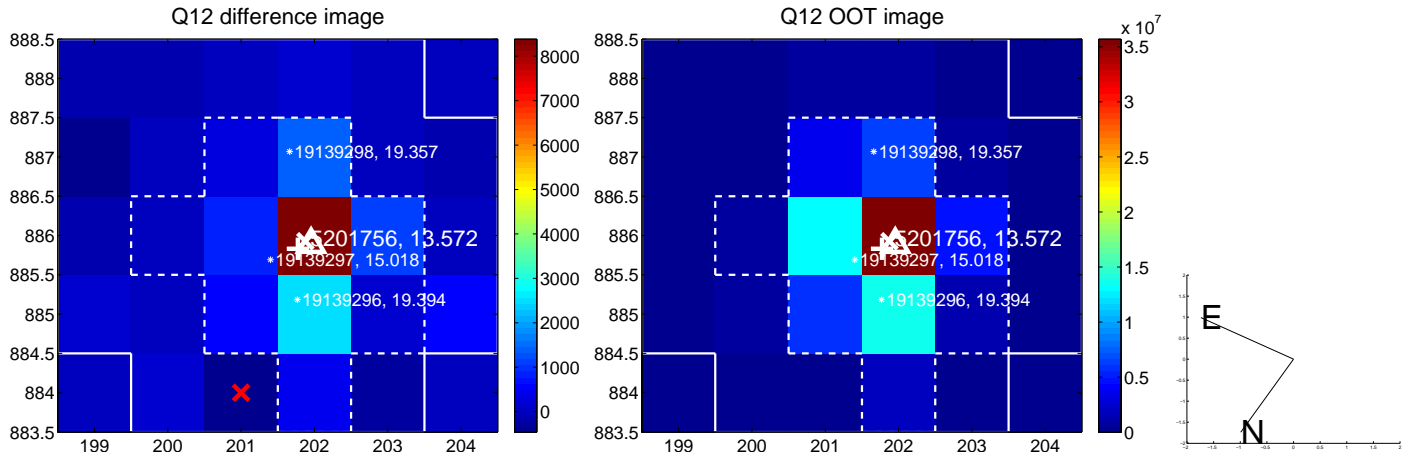
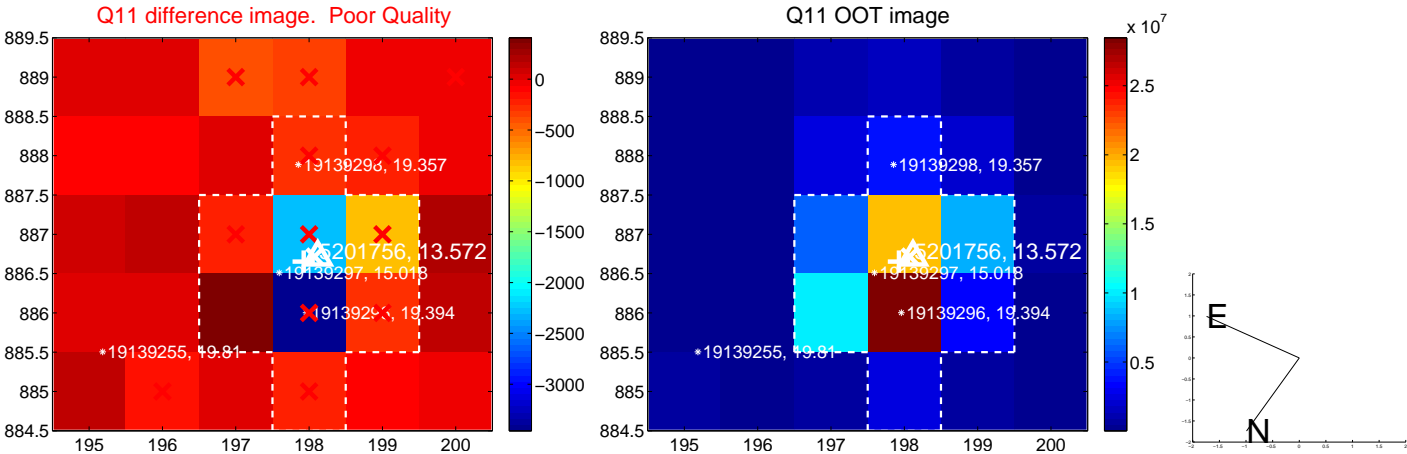
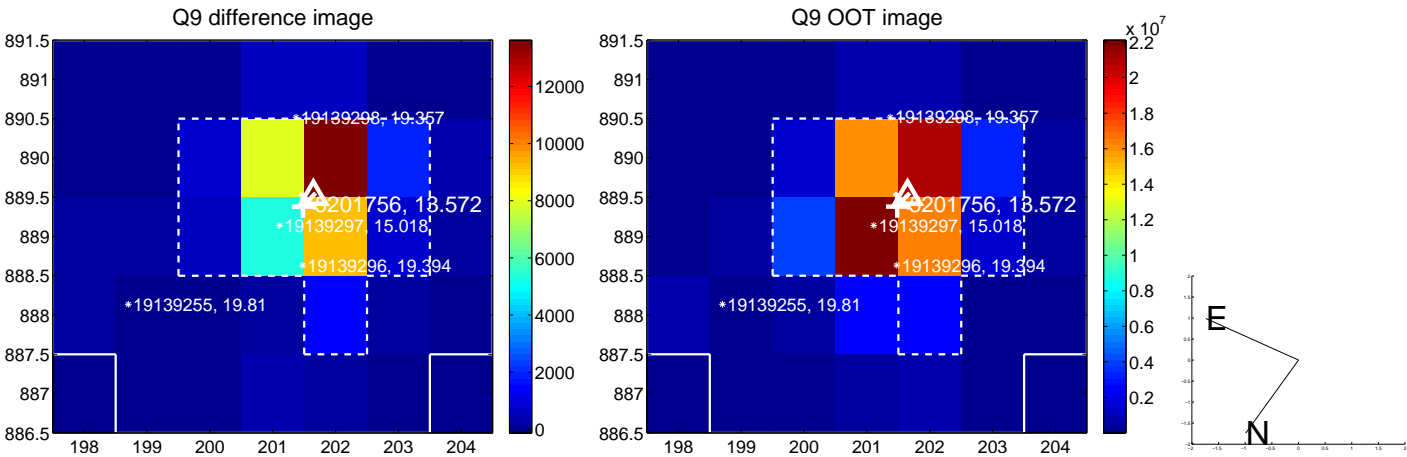
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



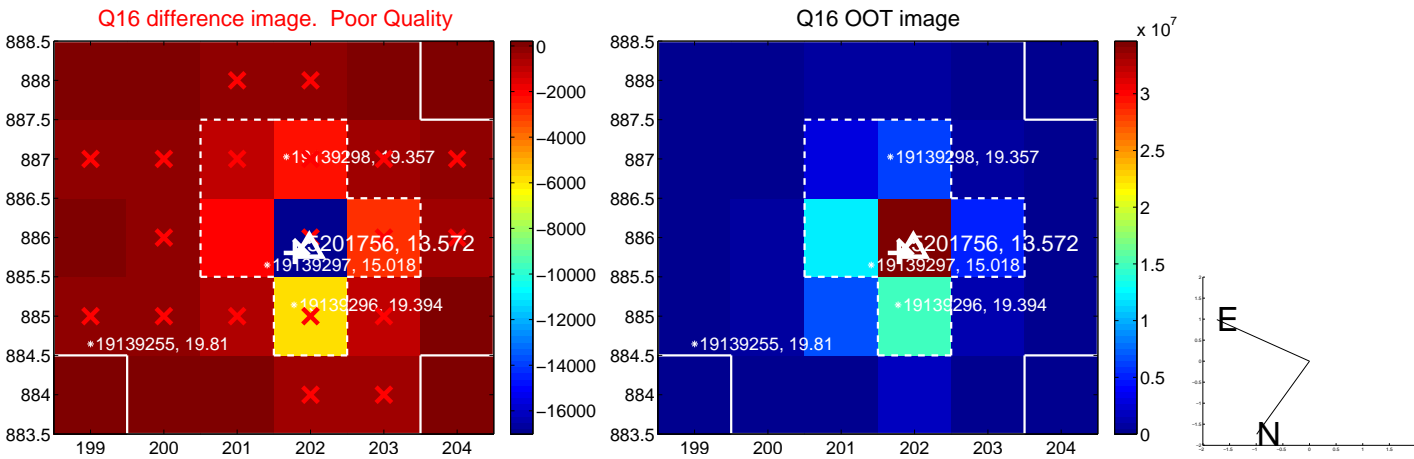
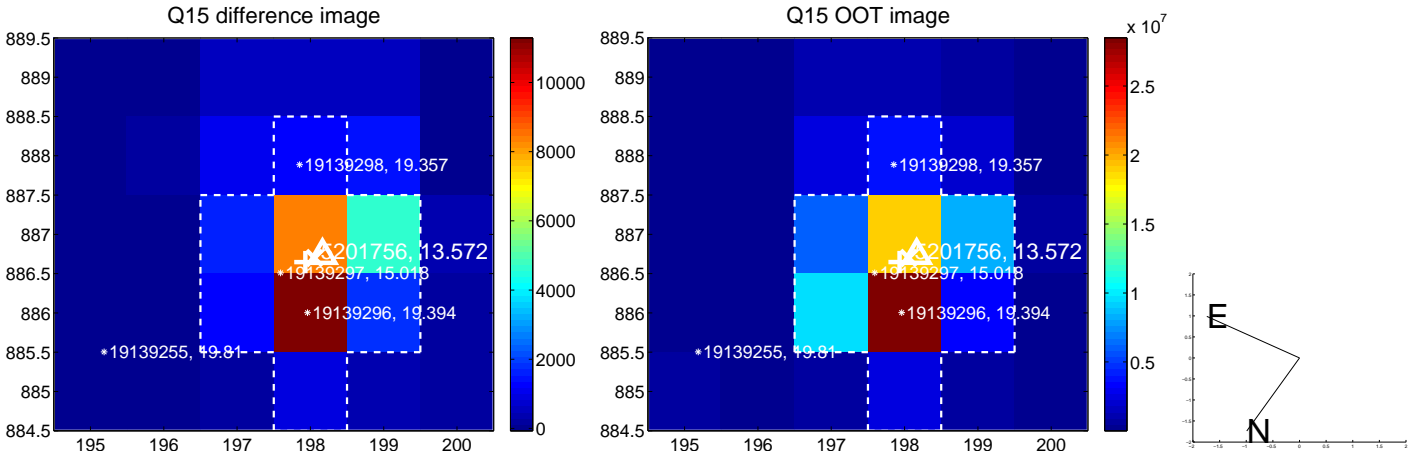
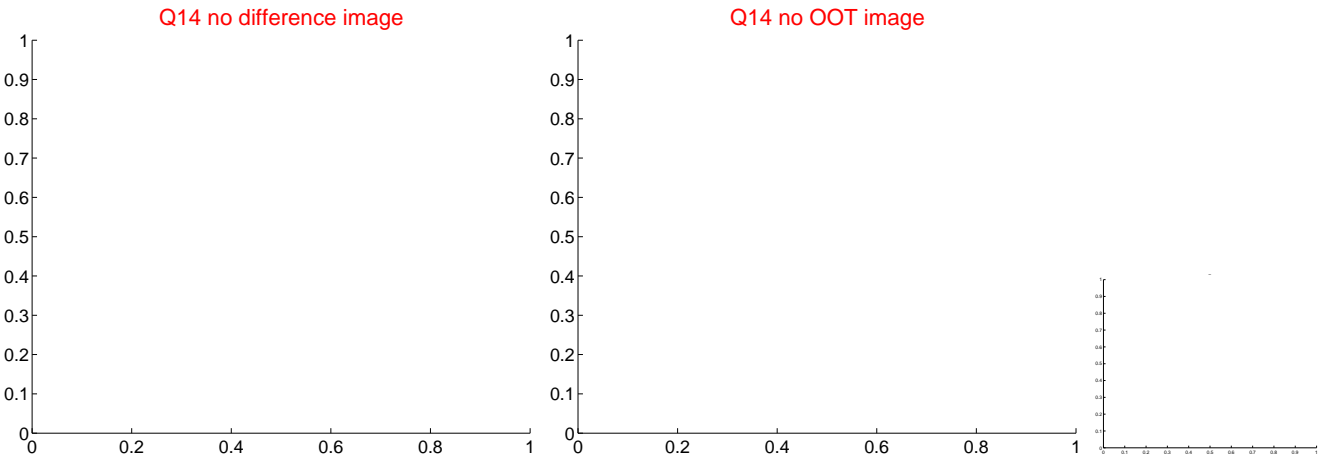
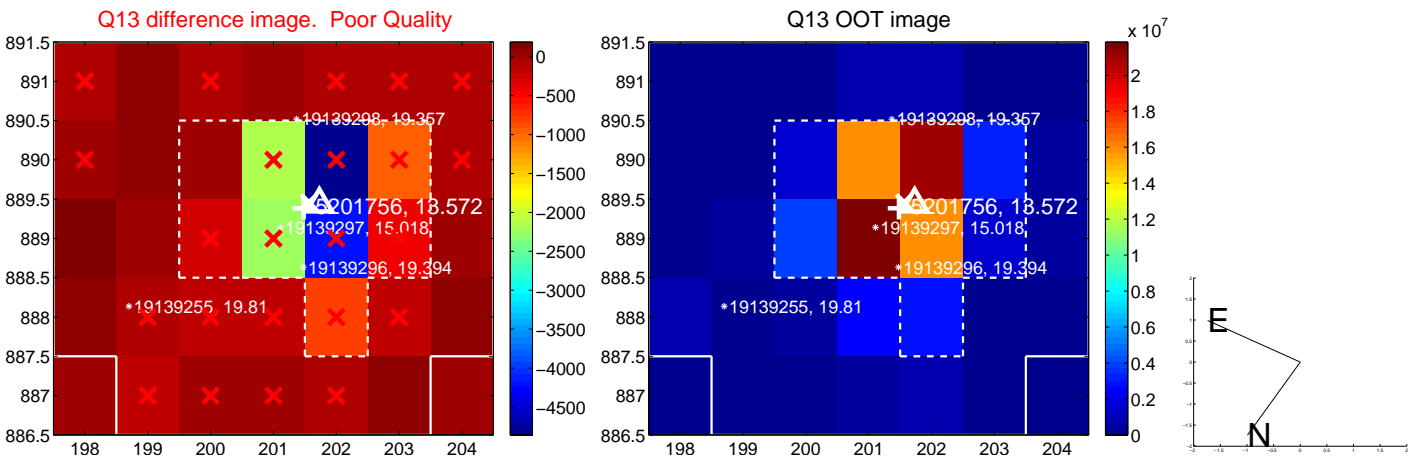
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



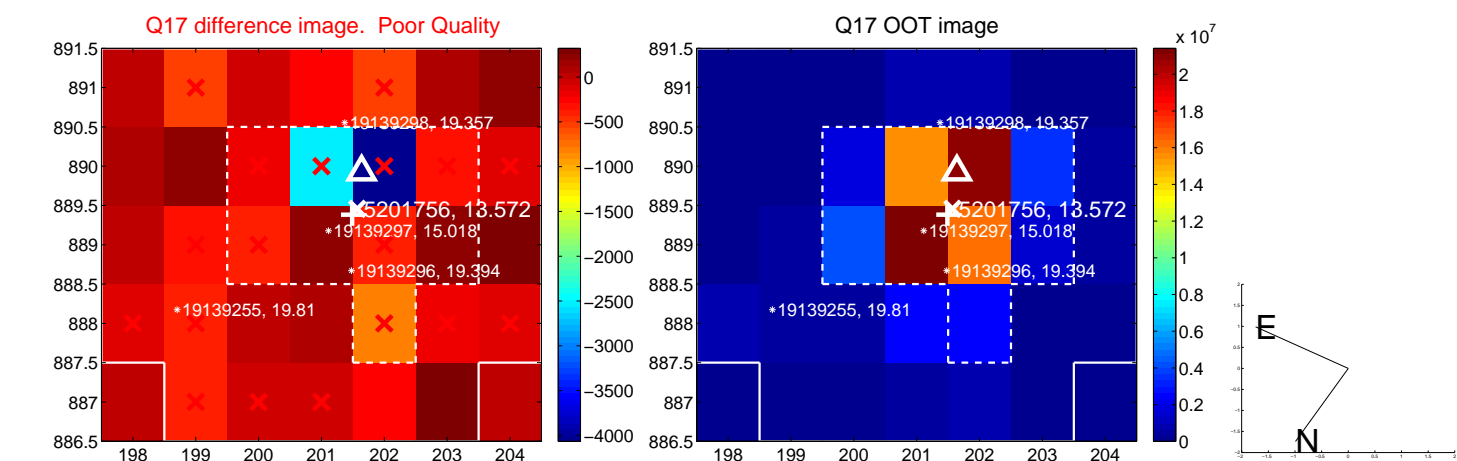
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



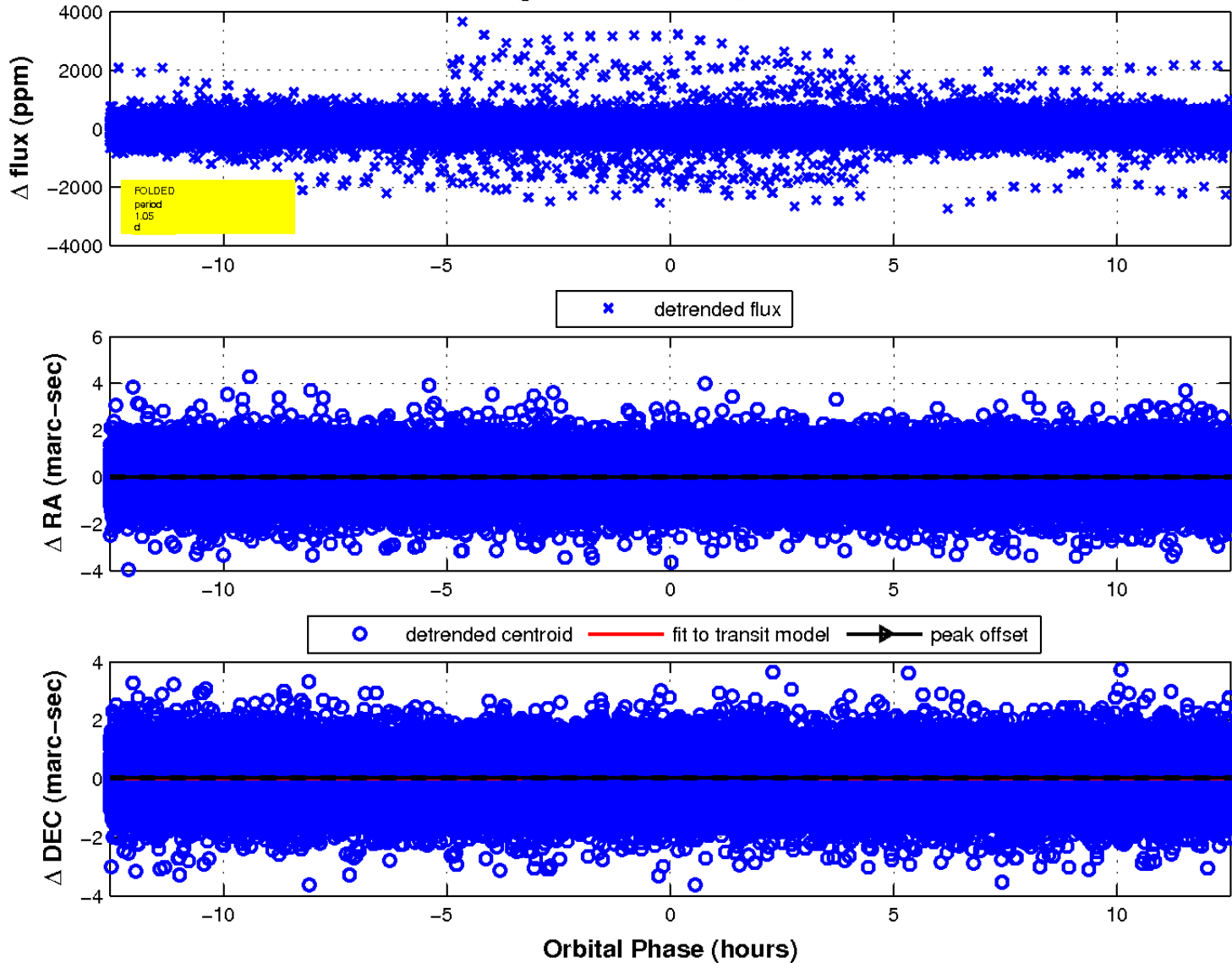
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



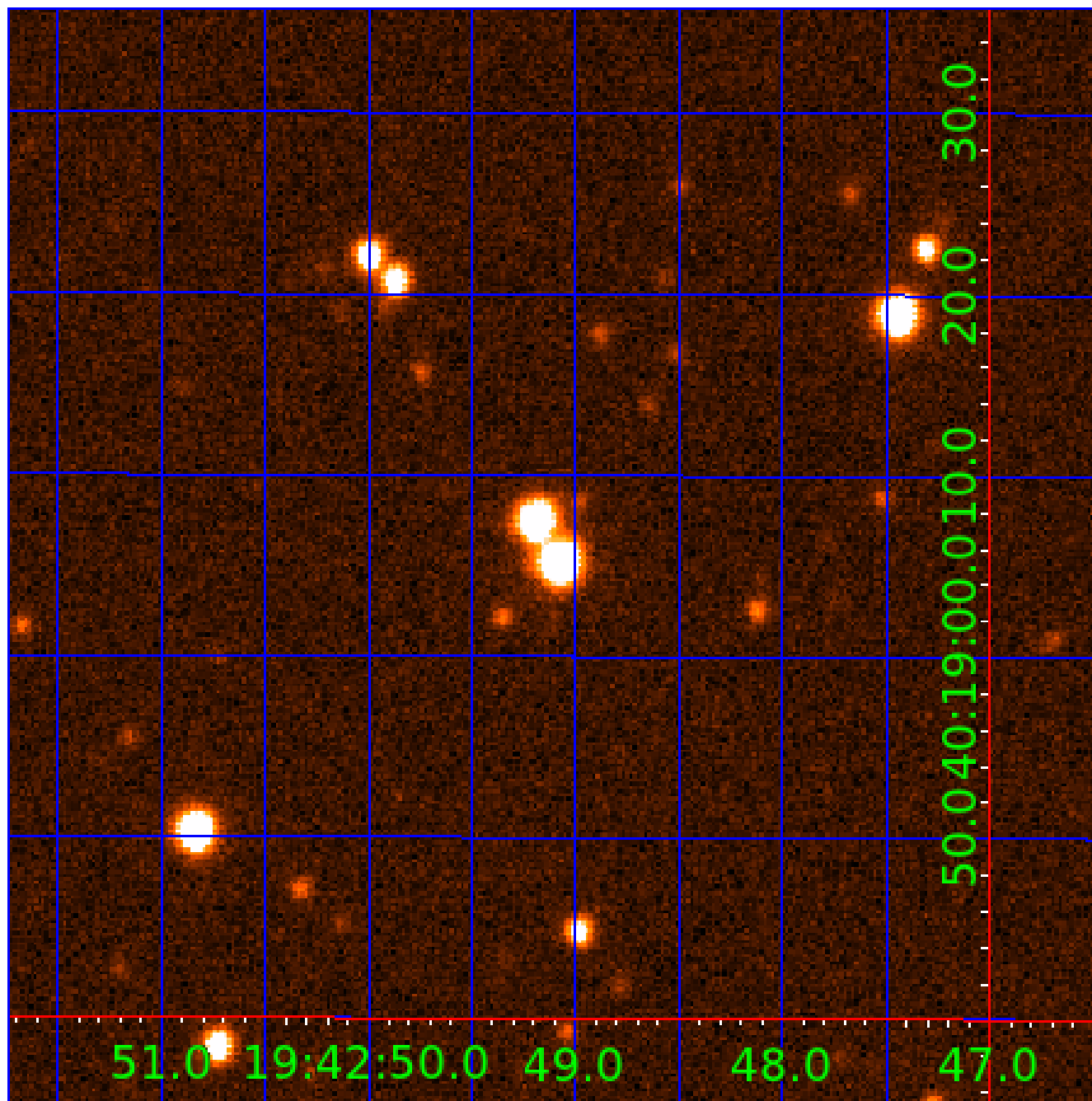
fluxWeightedCentroids, Planet 2 of 4





UKIRT Image

Declination



# KIC 005201756

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005201756-01	OBS	No	5.569486	134.666707	63.9	12.349	7.6	7.6	1.00	5780	0.94	264.35
005201756-02	OBS	No	1.045308	131.666099	29.4	6.675	8.1	7.8	1.00	5780	0.54	2460.07
005201756-03	OBS	No	33.301910	141.604759	203.9	5.738	15.2	5.4	1.00	5780	1.64	24.36
005201756-04	OBS	No	64.112235	165.463553	337.3	13.459	11.6	7.2	1.00	5780	2.00	10.17

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005201756-01	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—CENT_KIC_POS
005201756-02	OBS	FP	0.00	1	0	0	0	LPP_DV—CENT_KIC_POS
005201756-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_KIC_POS
005201756-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—CENT_KIC_POS

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

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

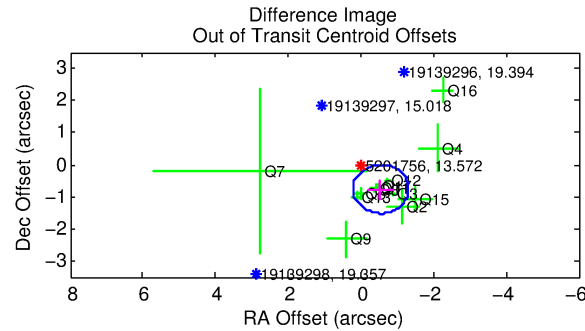
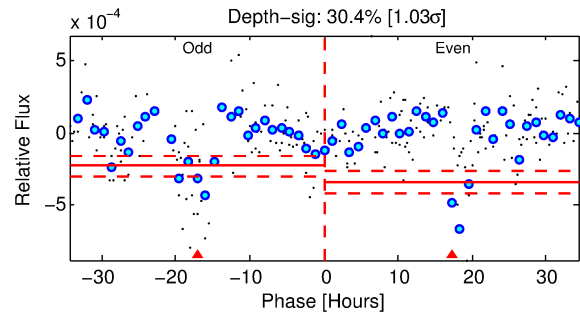
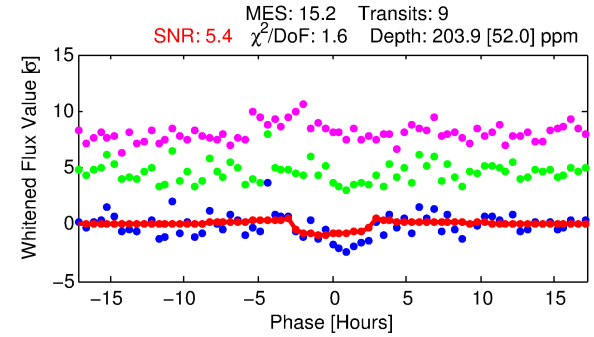
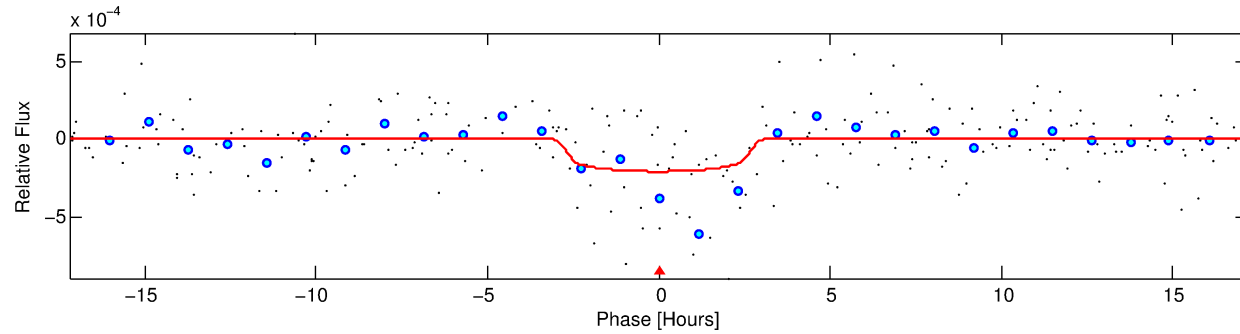
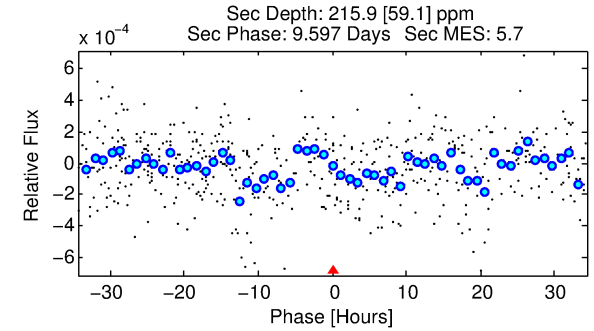
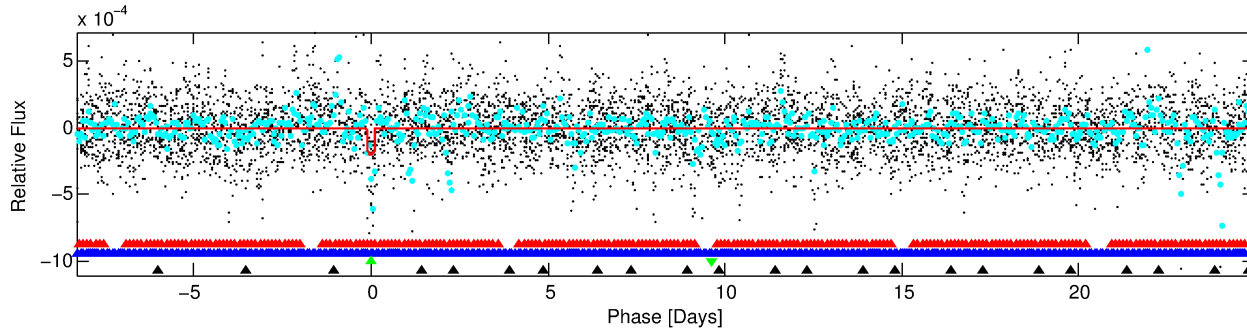
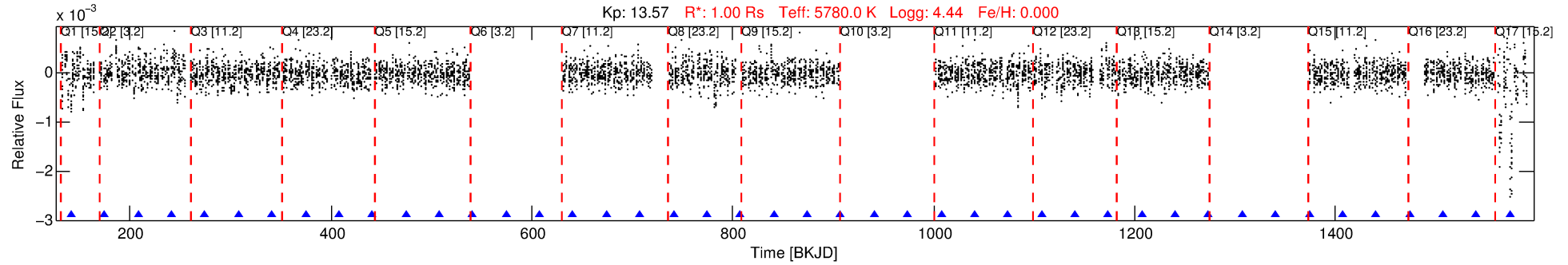
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 005201756-03

No Significant Match Found

# DV One-Page Summary

KIC: 5201756 Candidate: 3 of 4 Period: 33.302 d



## DV Fit Results:

Period = 33.30191 [0.00074] d  
Epoch = 141.6048 [0.0194] BKJD  
Rp/R\* = 0.0150 [0.0119]  
a/R\* = 23.97 [85.98]  
b = 0.86 [1.10]  
Seff = 24.36 [0.00]  
Teq = 566 [0] K  
Rp = 1.64 [1.30] Re  
a = 0.2026 [0.0000] AU  
Ag = 1810.24 [2916.13] [0.62σ]  
Teffp = 5713 [2301] K [2.24σ]

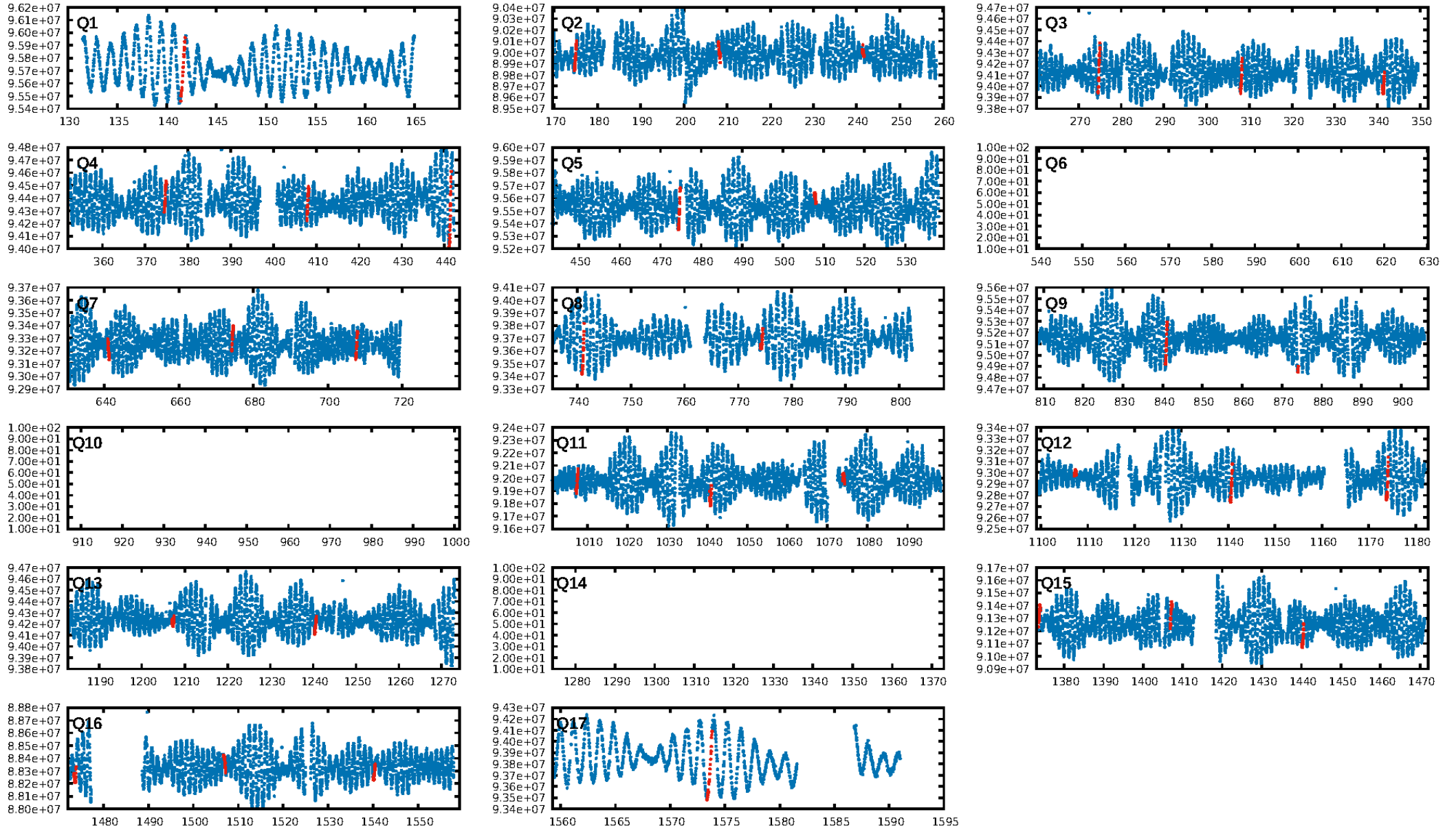
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [48.88σ]  
LongPeriod-sig: 100.0% [50.54σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 5.18e-32  
RollingBand-fgt: 1.00 [7/7]  
GhostDiagnostic-chr: -0.989  
Centroid-sig: 30.2%  
Centroid-so: 0.722 arcsec [0.92σ]  
OotOffset-rm: 0.936 arcsec [3.70σ]  
KicOffset-rm: 0.458 arcsec [1.75σ]  
OotOffset-st: 1/4/4/4 [13]  
KicOffset-st: 1/4/4/4 [13]  
DiffImageQuality-fgm: 0.69 [9/13]  
DiffImageOverlap-fno: 0.00 [0/14]

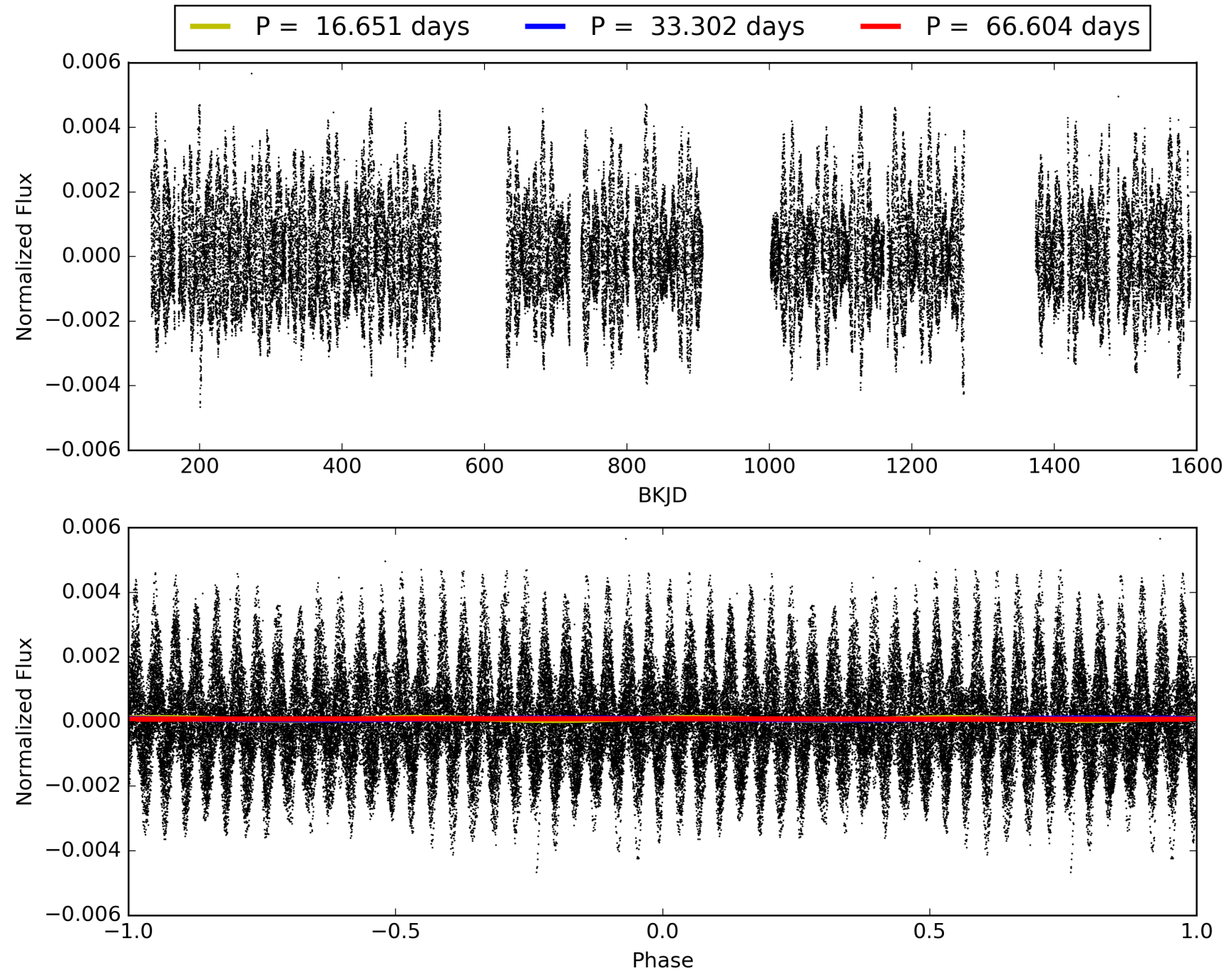
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 14:42:48 Z

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

# TCE 005201756-03, PDC Light Curves

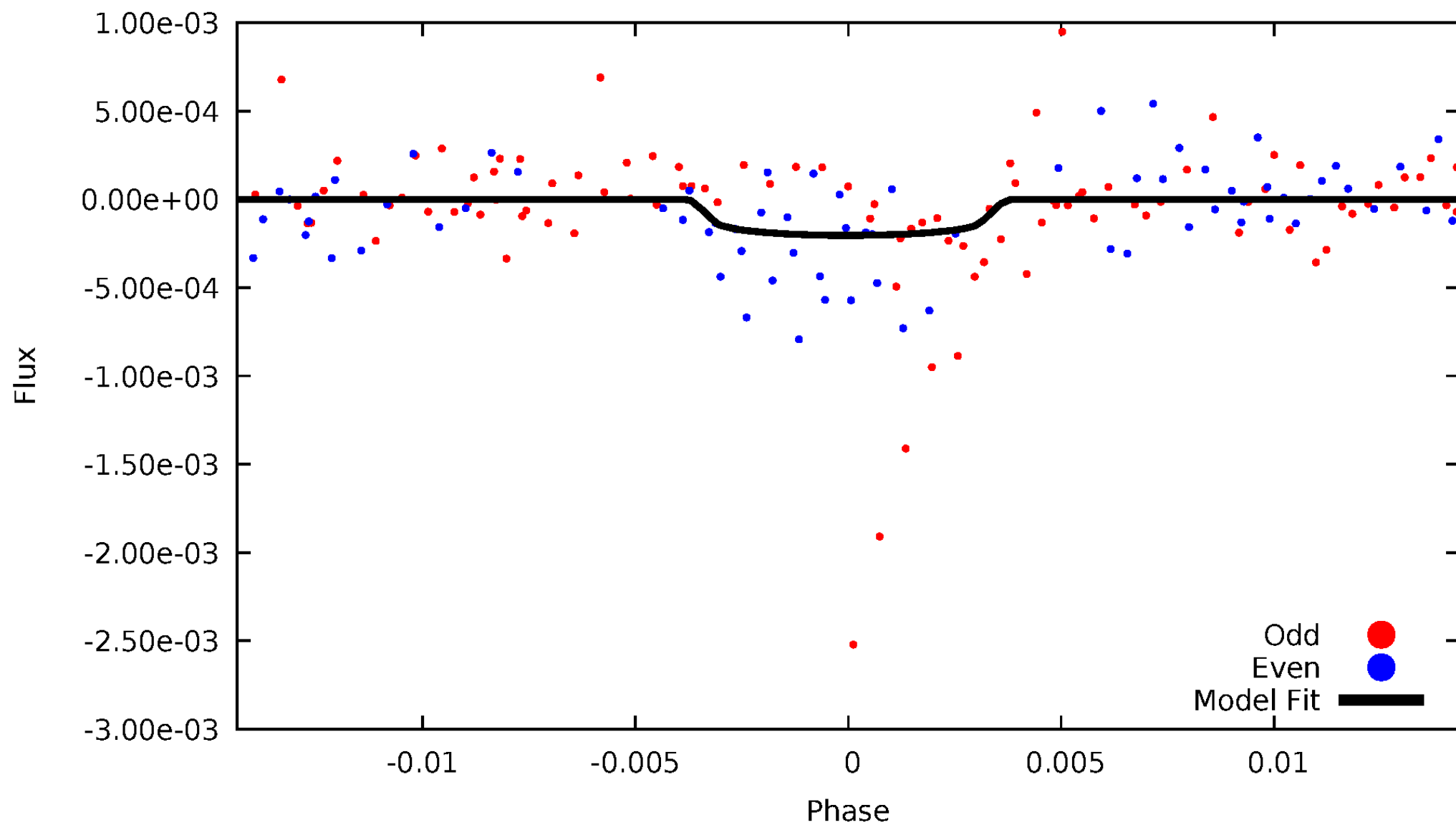


TCE 005201756-03



# DV Odd/Even

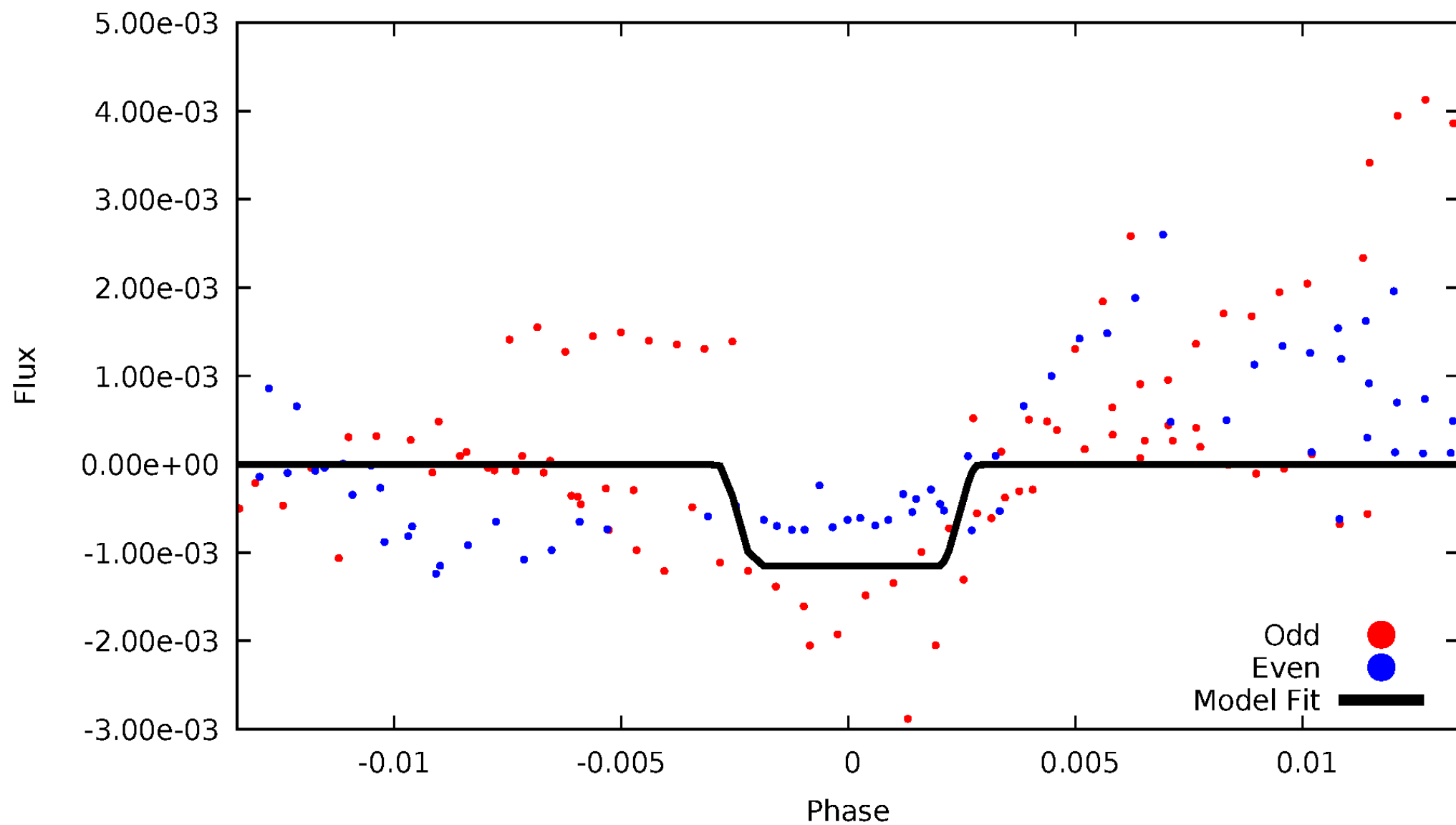
TCE 005201756-03



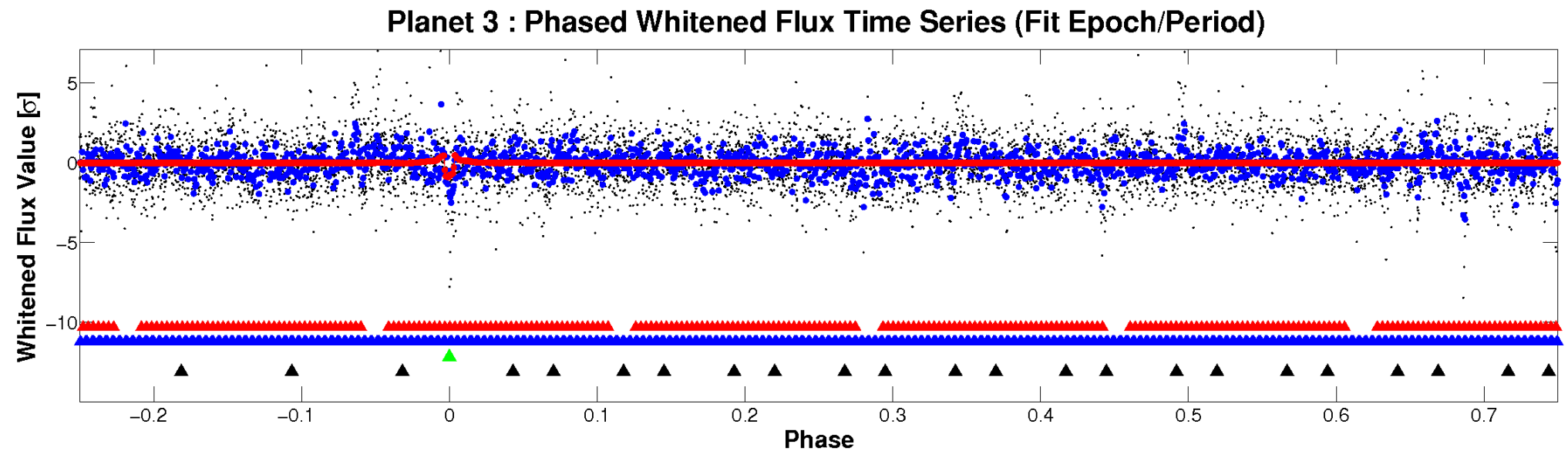
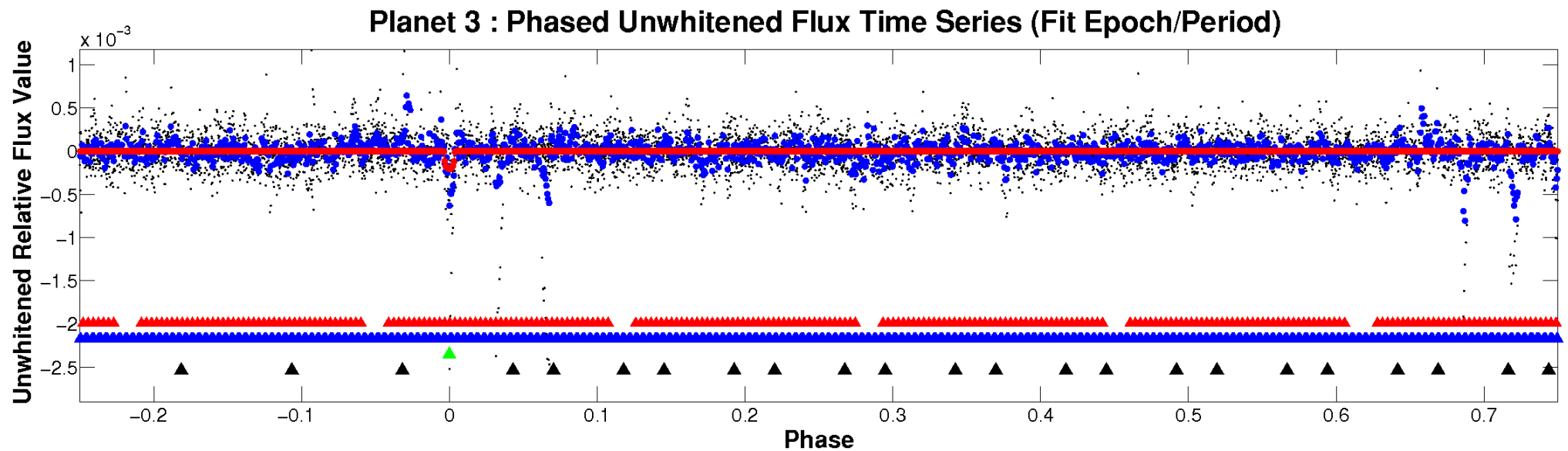


# ALT Odd/Even

TCE 005201756-03

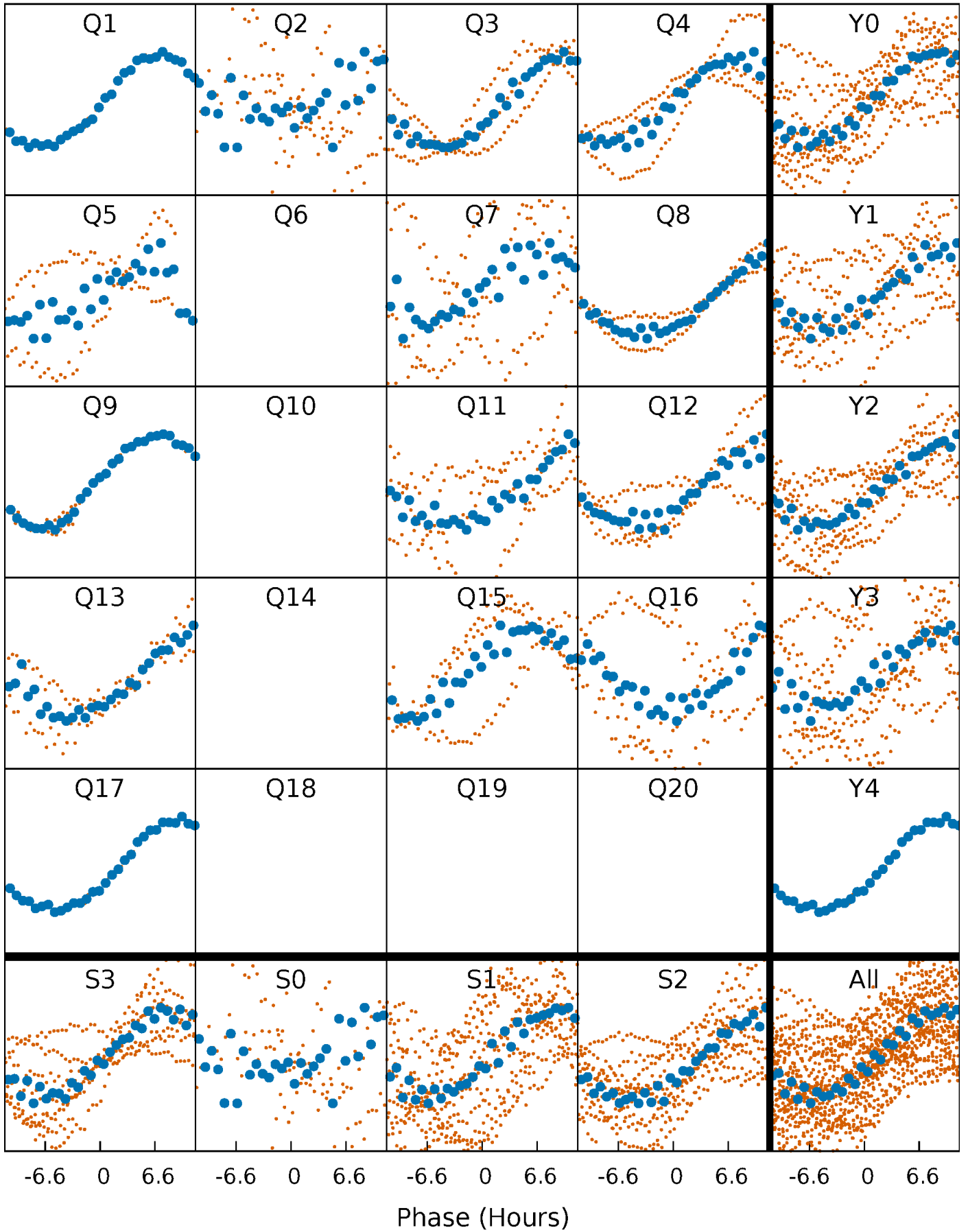


# Non-Whitened Vs. Whitened Light Curve



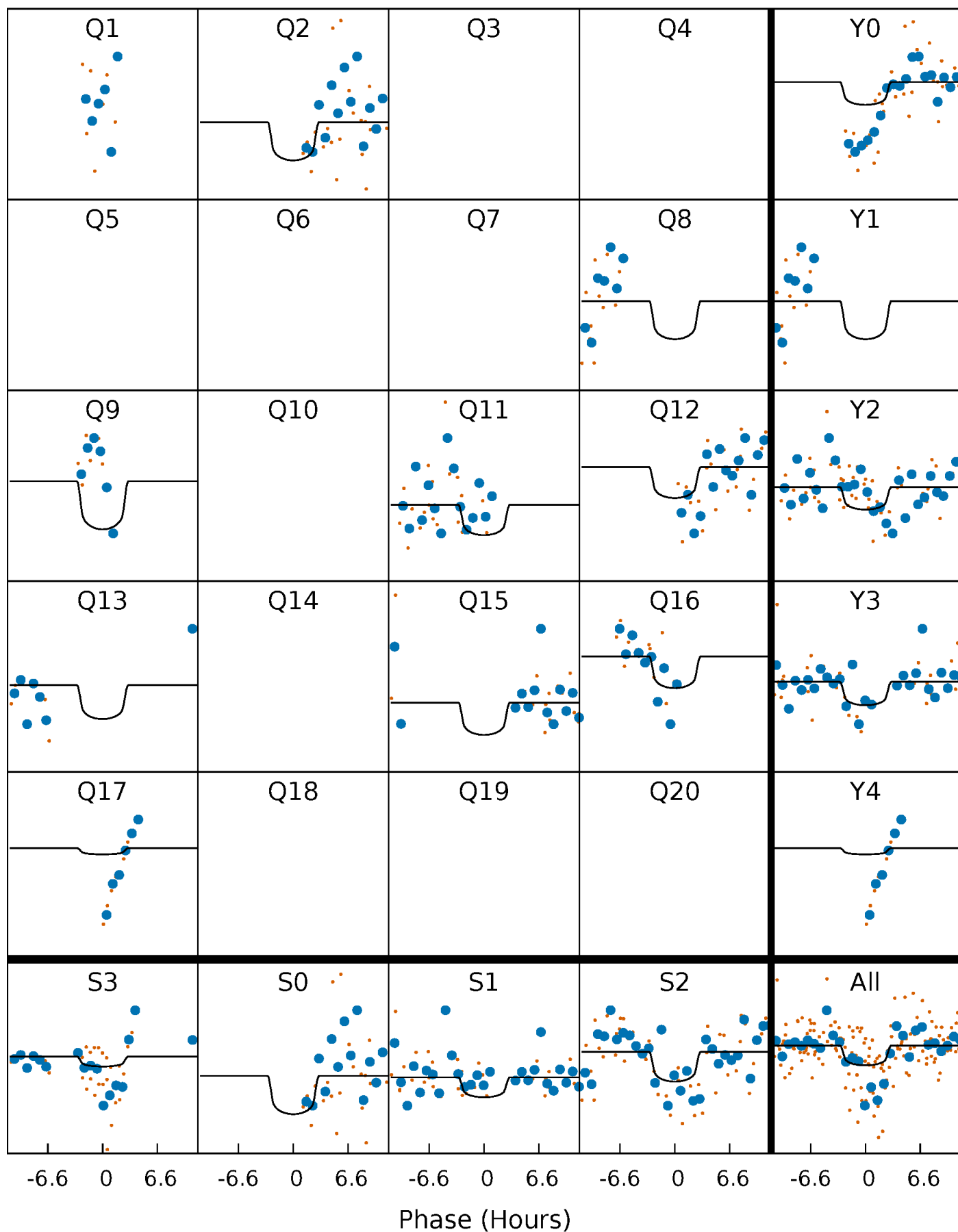
# PDC Quarter-Phased Transit Curves

TCE 005201756-03 P= 33.301910 Days  $T_0=141.604759$  (BKJD)



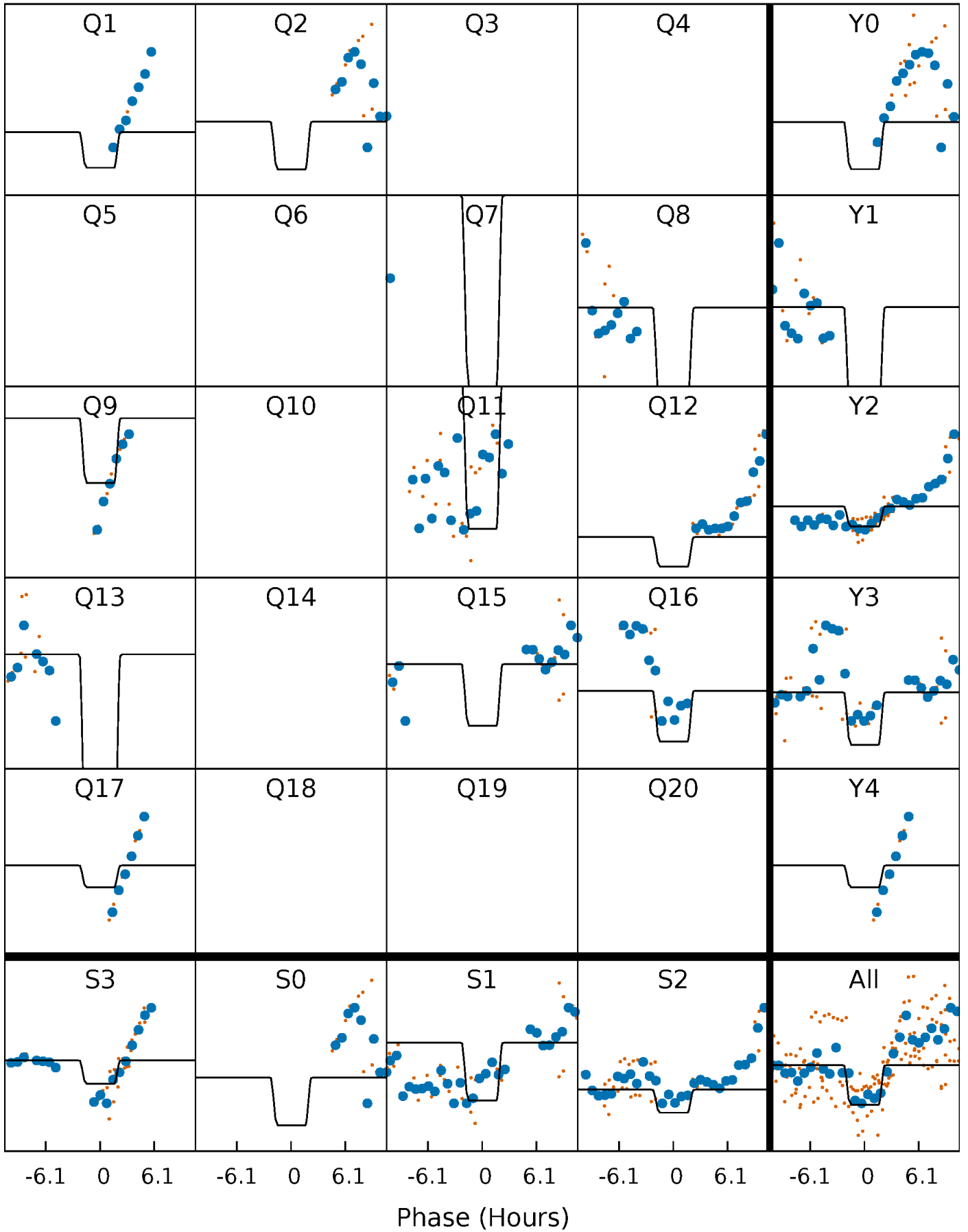
# DV Quarter-Phased Transit Curves

TCE 005201756-03 P= 33.301910 Days  $T_0=141.604759$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

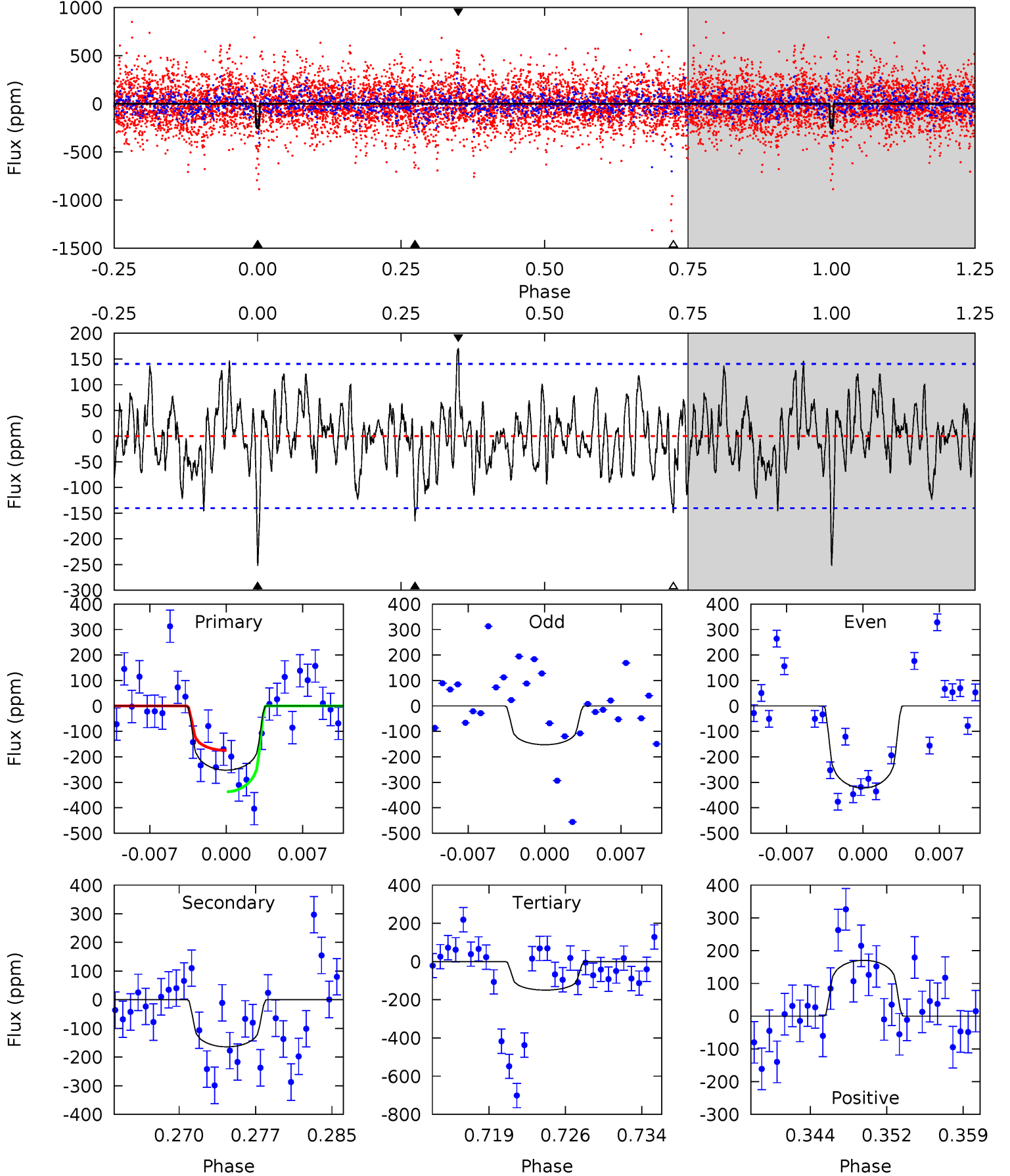
TCE 005201756-03 P= 33.304406 Days  $T_0=141.457880$  (BKJD)



# DV Model-Shift Uniqueness Test

005201756-03, P = 33.301910 Days, E = 108.302849 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
9.13	5.95	5.42	6.17	5.08	2.67	1.84	3.71	2.96	0.53	-0.22	3.08	1.91	0.40	2.97

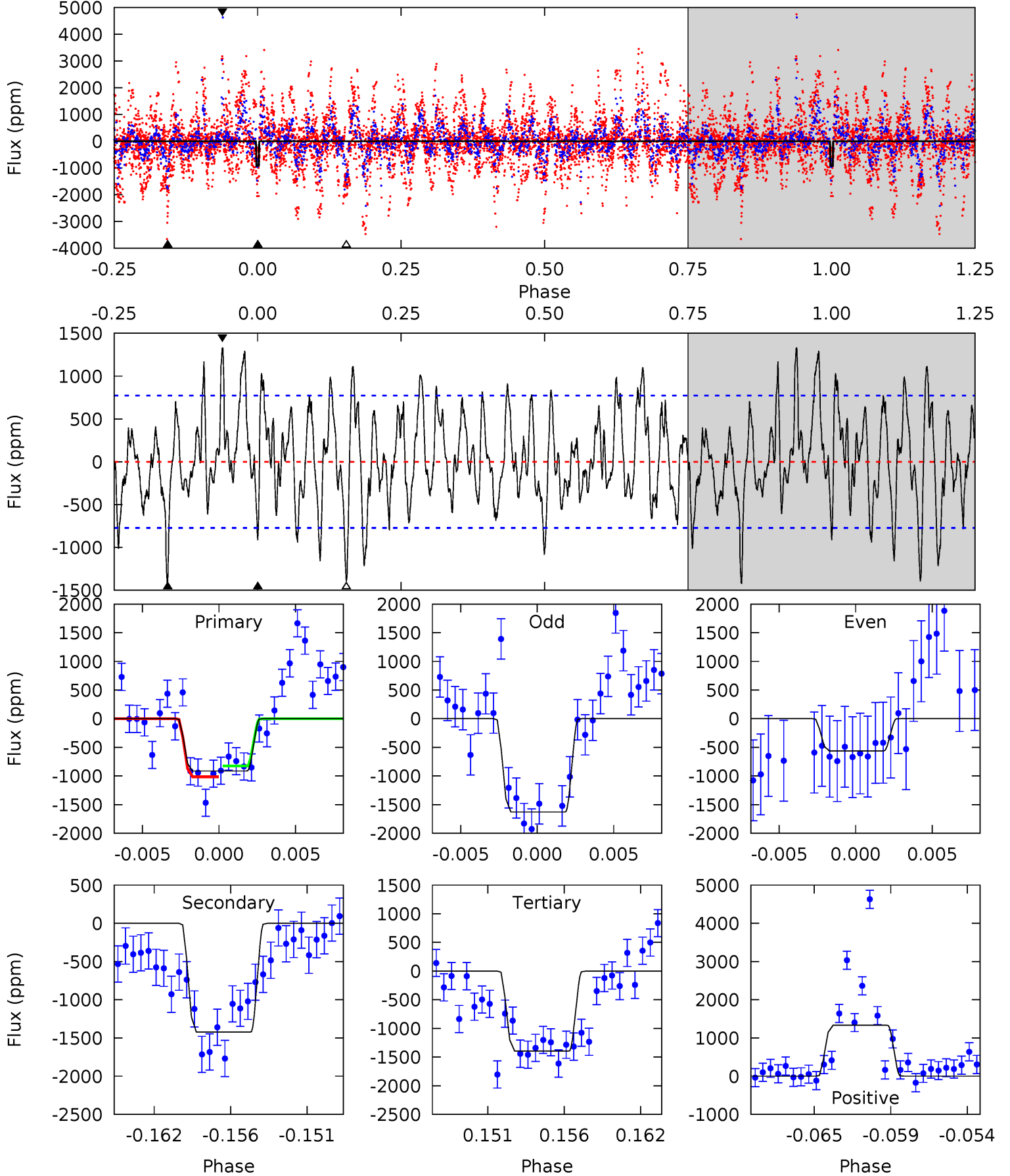




# Alt Model-Shift Uniqueness Test

005201756-03, P = 33.304406 Days, E = 108.153474 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
6.08	9.47	9.29	8.87	5.14	2.78	3.02	-3.21	-2.79	0.18	0.60	3.27	1.13	0.48	0.64



### Stellar Parameters For KIC 005201756

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5780^{+1}_{-1}$	$4.438^{+1.000}_{-1.000}$	$0.000^{+1.000}_{-1.000}$	$1.000^{+1.000}_{-1.000}$	$-1.000^{+1.000}_{-1.000}$	$-1.000^{+1.000}_{-1.000}$
	+0%/-0%	+23%/-23%	+inf%/-inf%	+100%/-100%	+100%/-100%	+100%/-100%
Source	Solar	Solar	Solar	Solar		

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

### Secondary Eclipse Parameters for KIC 005201756-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	-164±28	$1.82^{+1.21}_{-1.07}$	$792^{+39}_{-36}$	$5128^{+3087}_{-1000}$	$1136^{+5440}_{-741}$
Alt.	-1423±150	$3.78^{+1.41}_{-1.31}$	$795^{+36}_{-38}$	$6099^{+1510}_{-915}$	$2270^{+2955}_{-1049}$

$T_{max}$  = 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

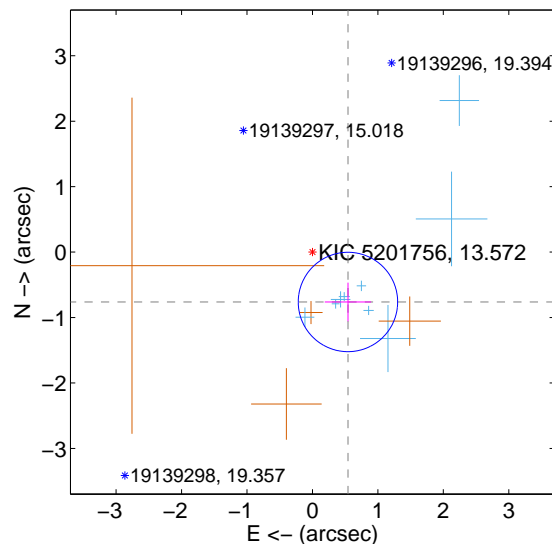
Supplemental centroid analysis for 005201756-03. Kepler magnitude: 13.57. Transit SNR 5.43

There are 9 quarters with good PRF difference image offsets

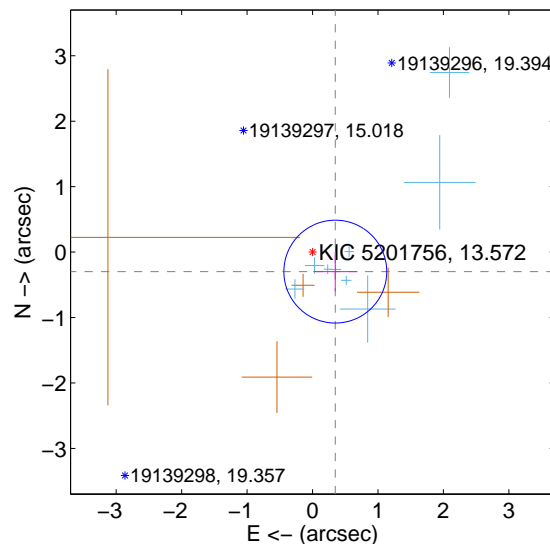
The direct PRF centroid is offset from the target star catalog position by about 0.44 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.936 \pm 0.253$	$3.70$	$-0.543 \pm 0.354$	$-0.762 \pm 0.295$
PRF-fit source offset from KIC position	$0.458 \pm 0.262$	$1.75$	$-0.348 \pm 0.337$	$-0.298 \pm 0.301$
photometric centroid source offset	$0.72 \pm 0.79$	$0.92$	$0.72 \pm 0.79$	$-0.02 \pm 0.78$

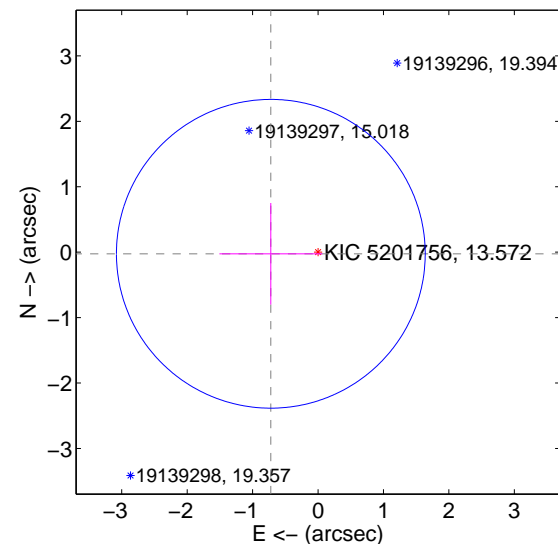
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

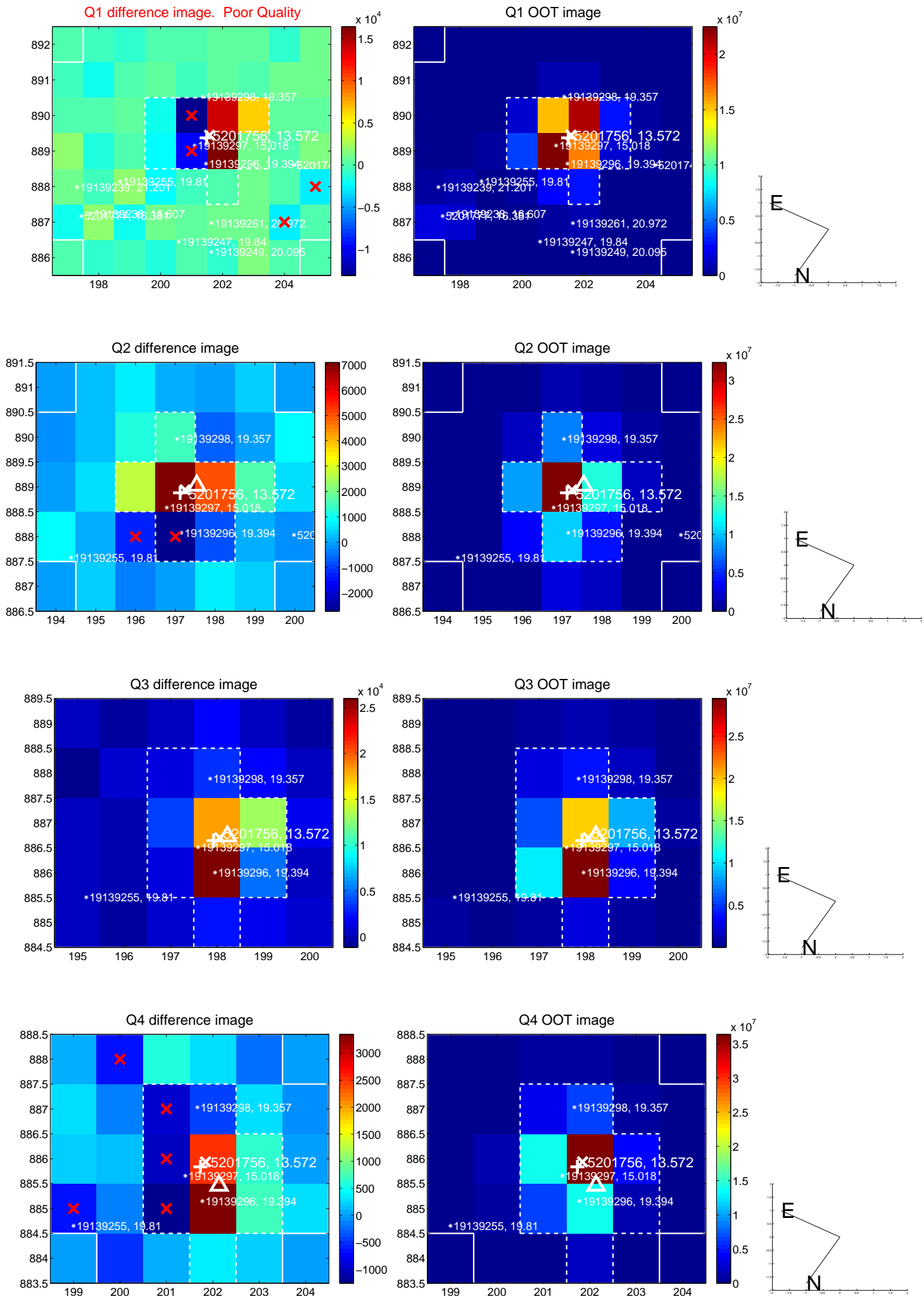


offset from photometric centroids

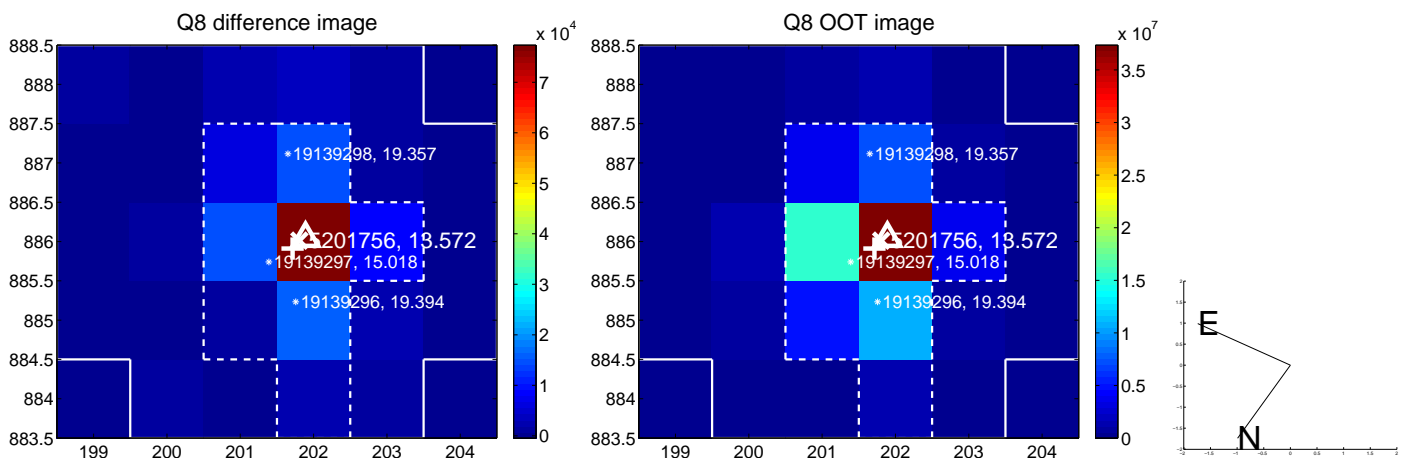
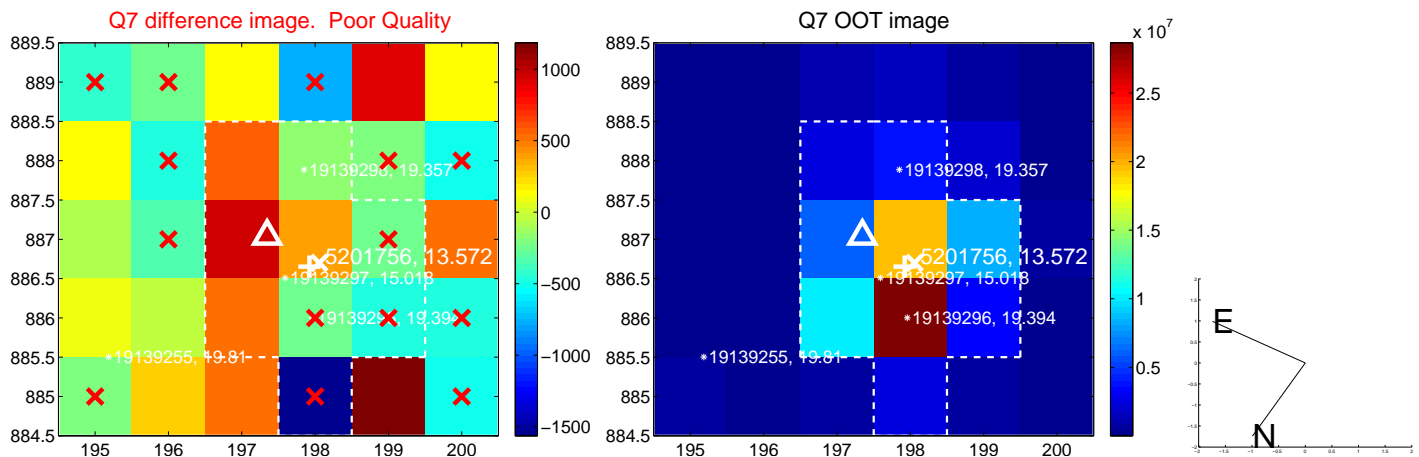
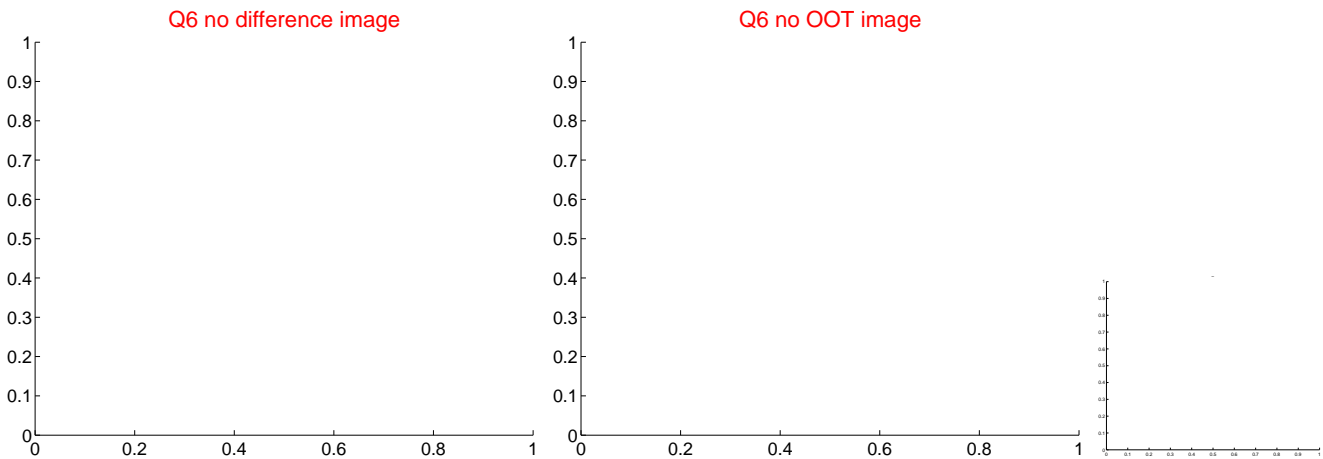
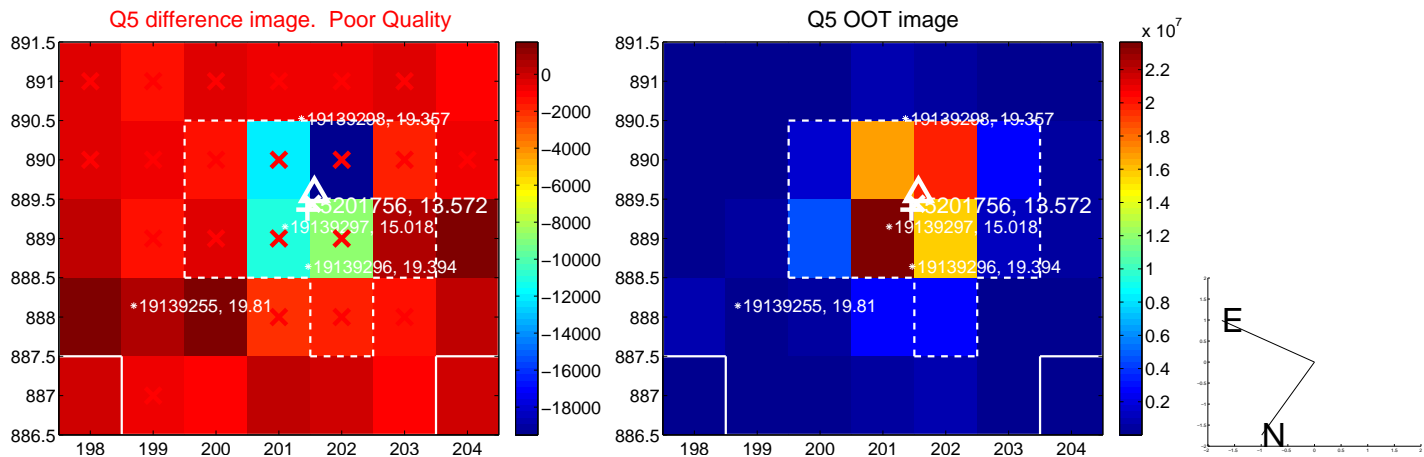


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

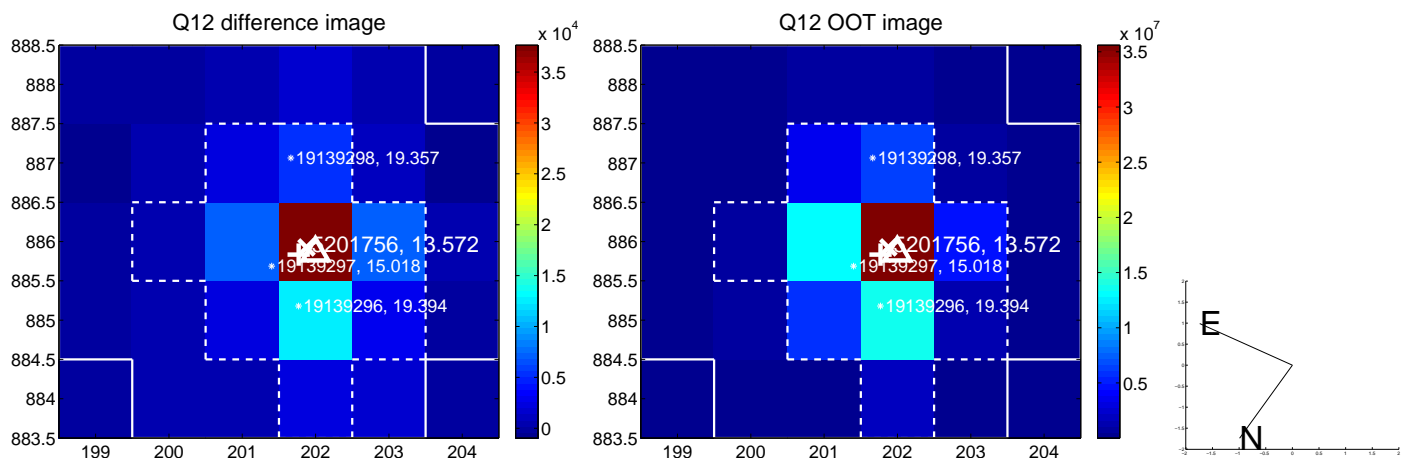
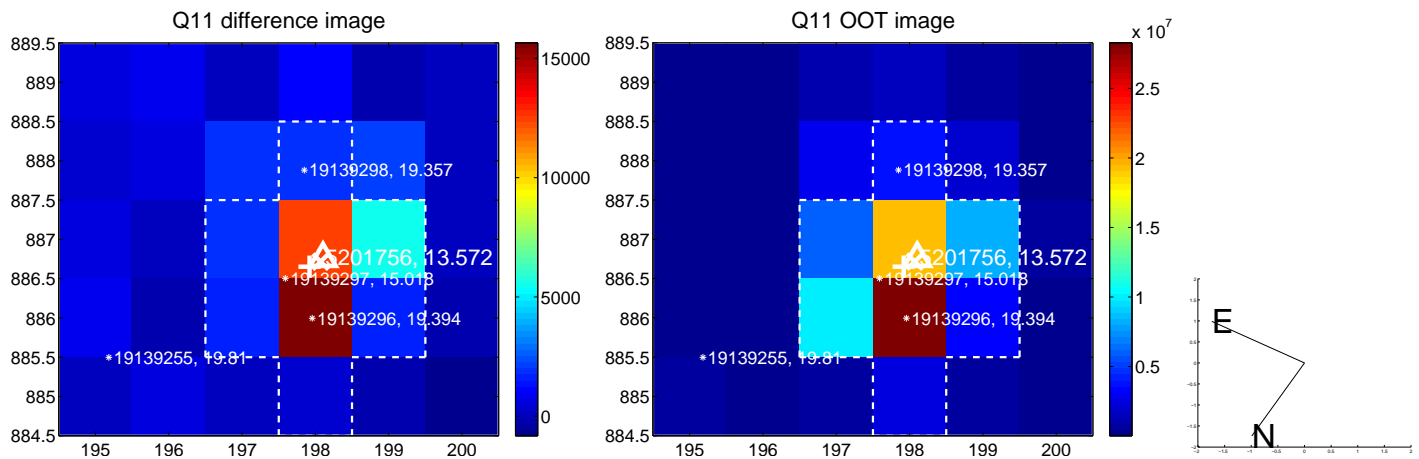
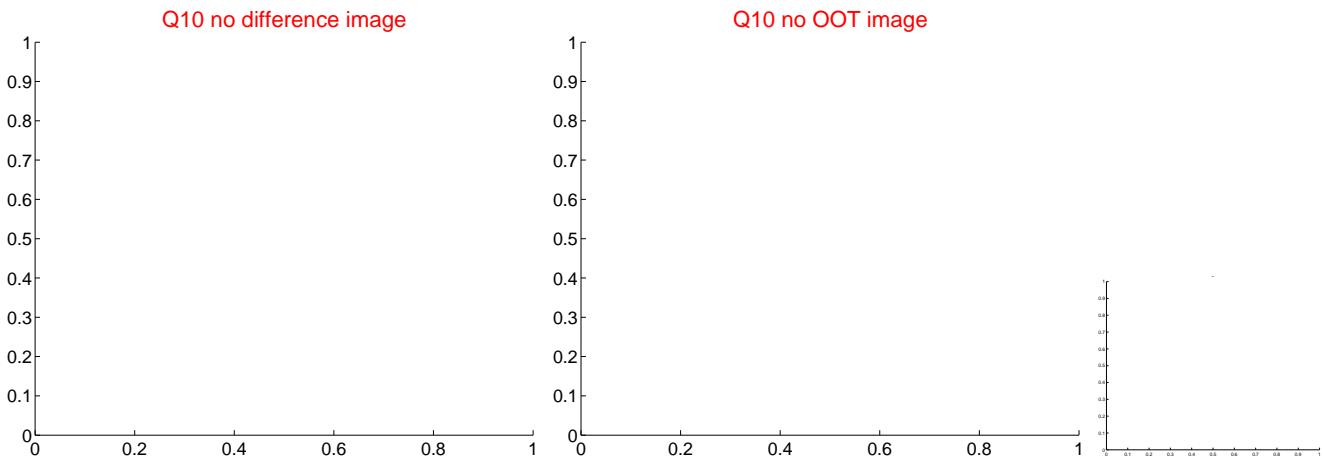
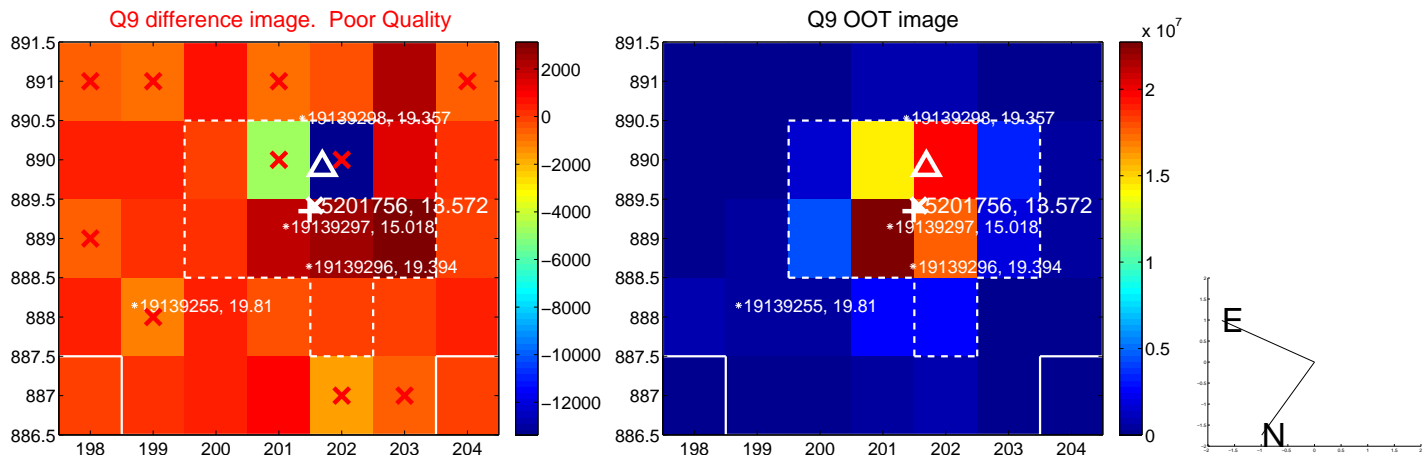


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

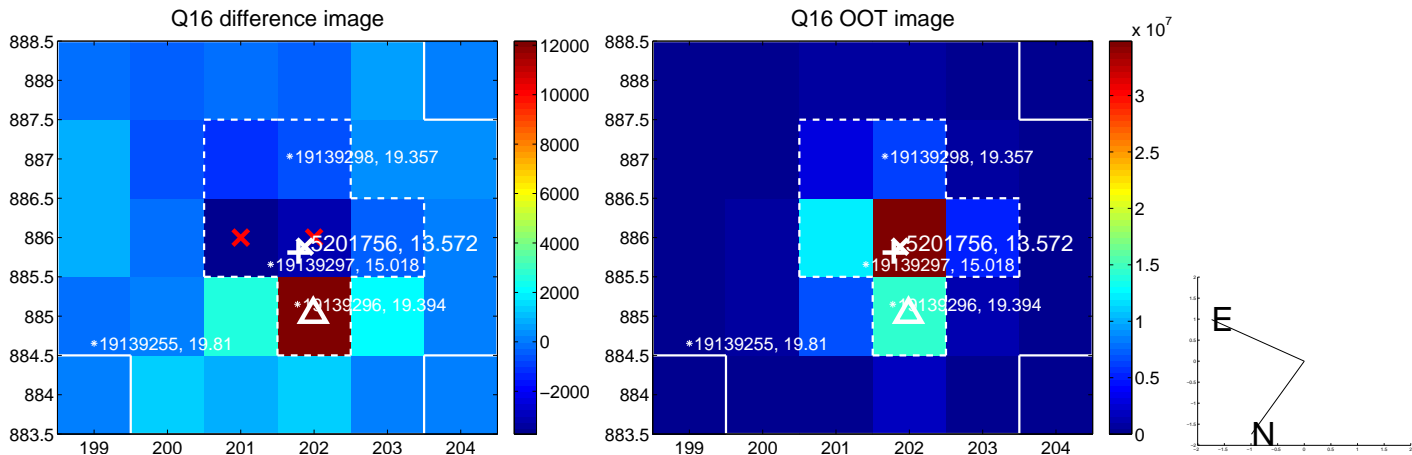
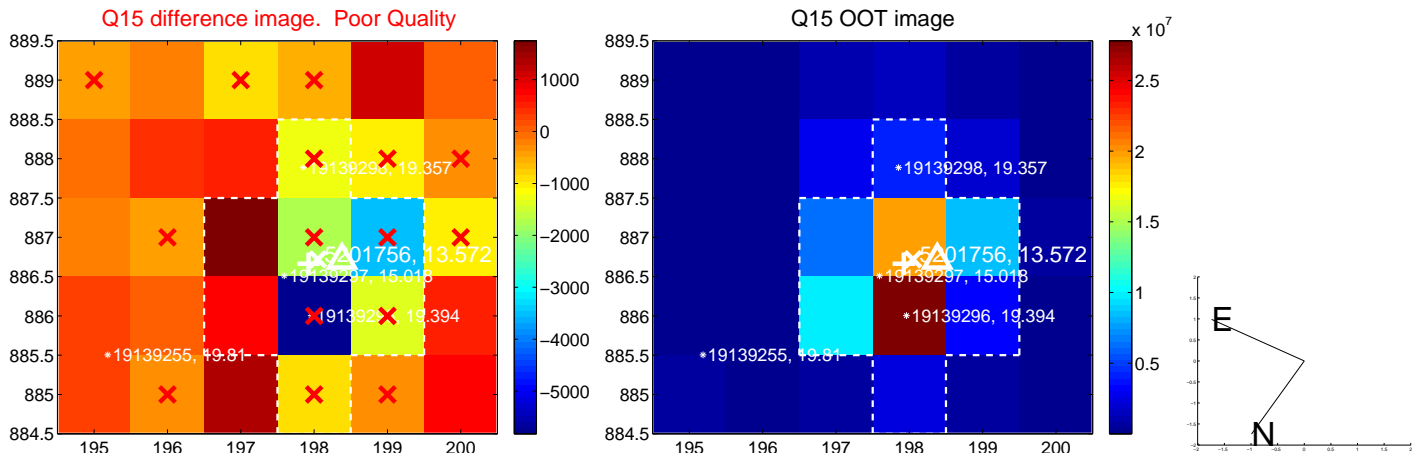
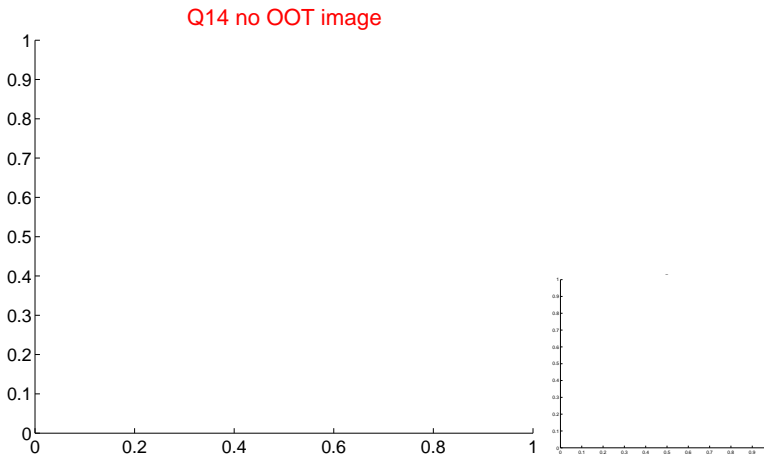
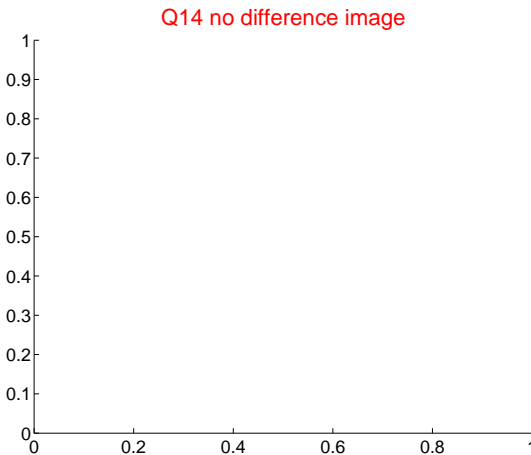
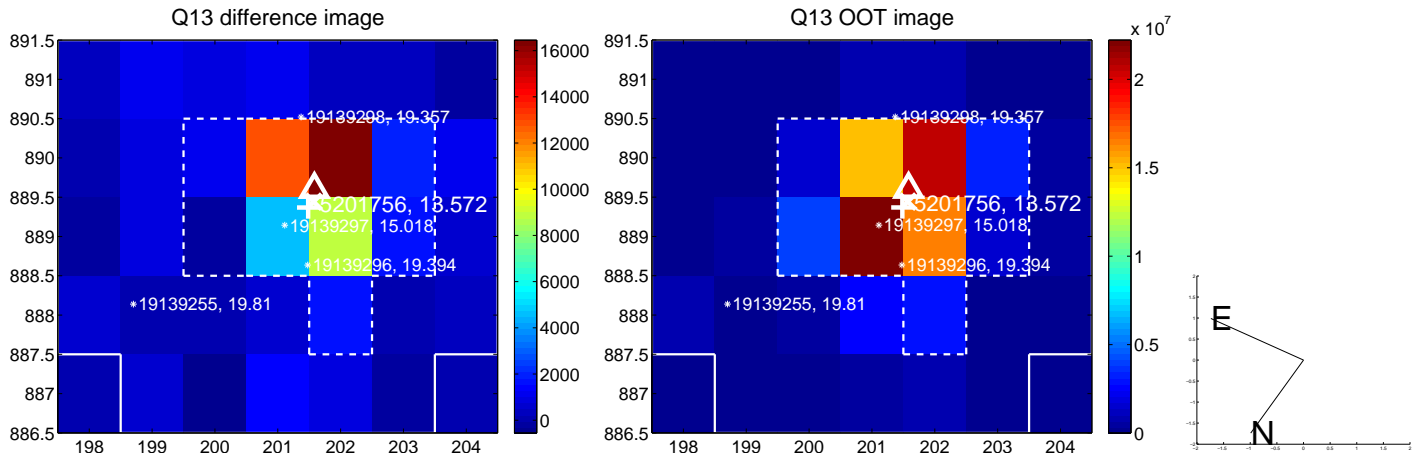




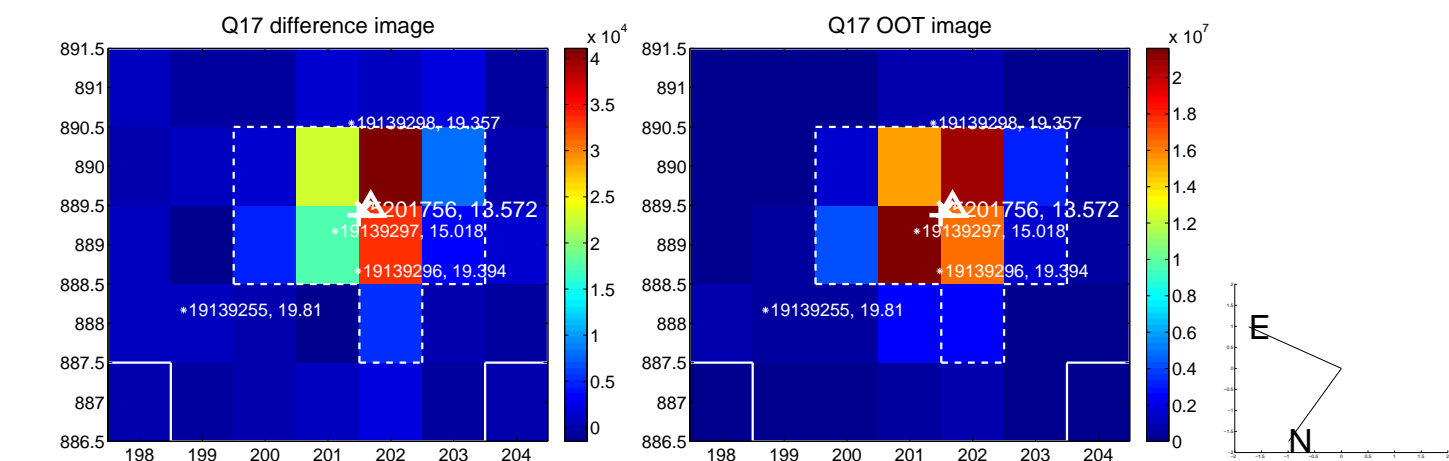
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



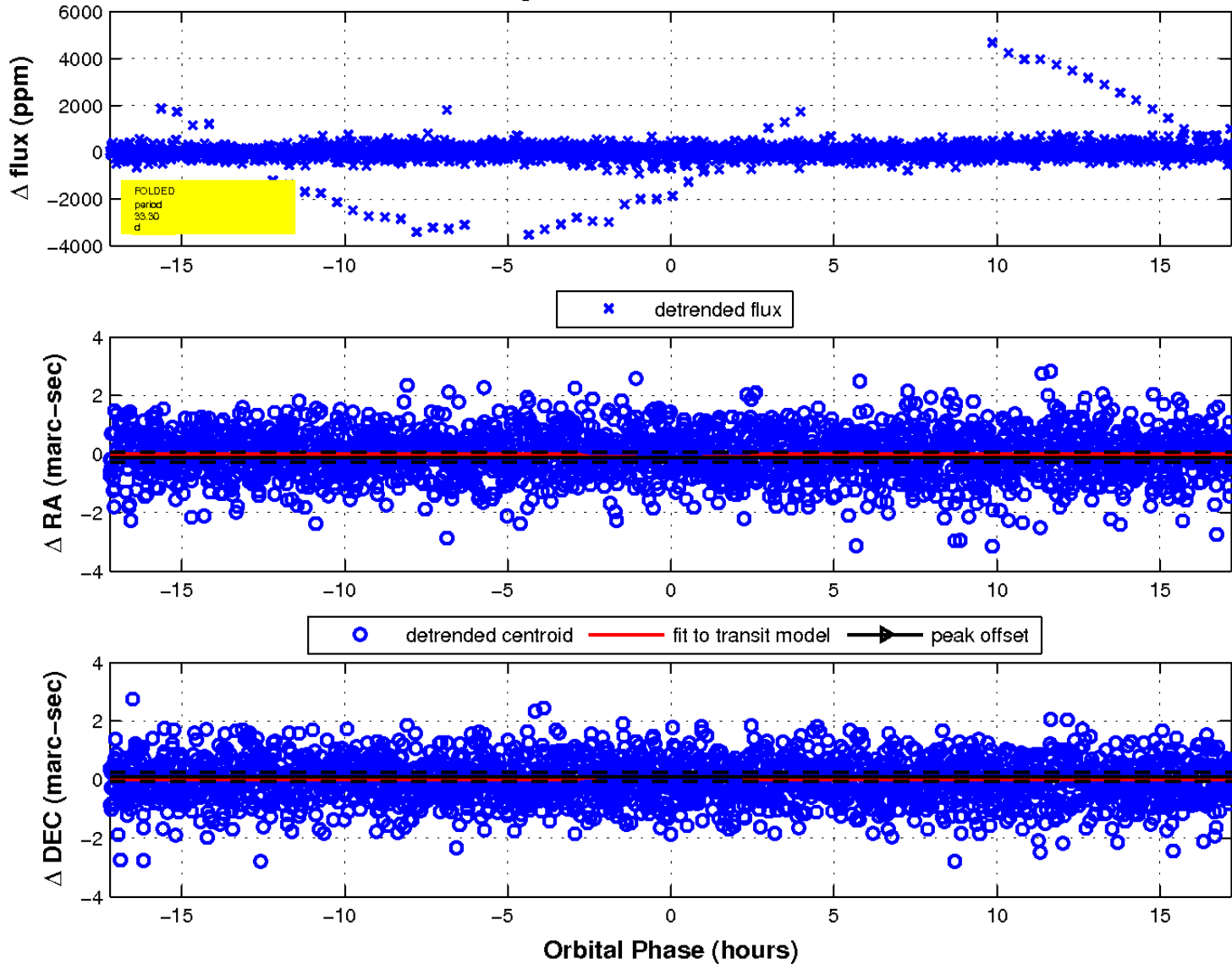
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

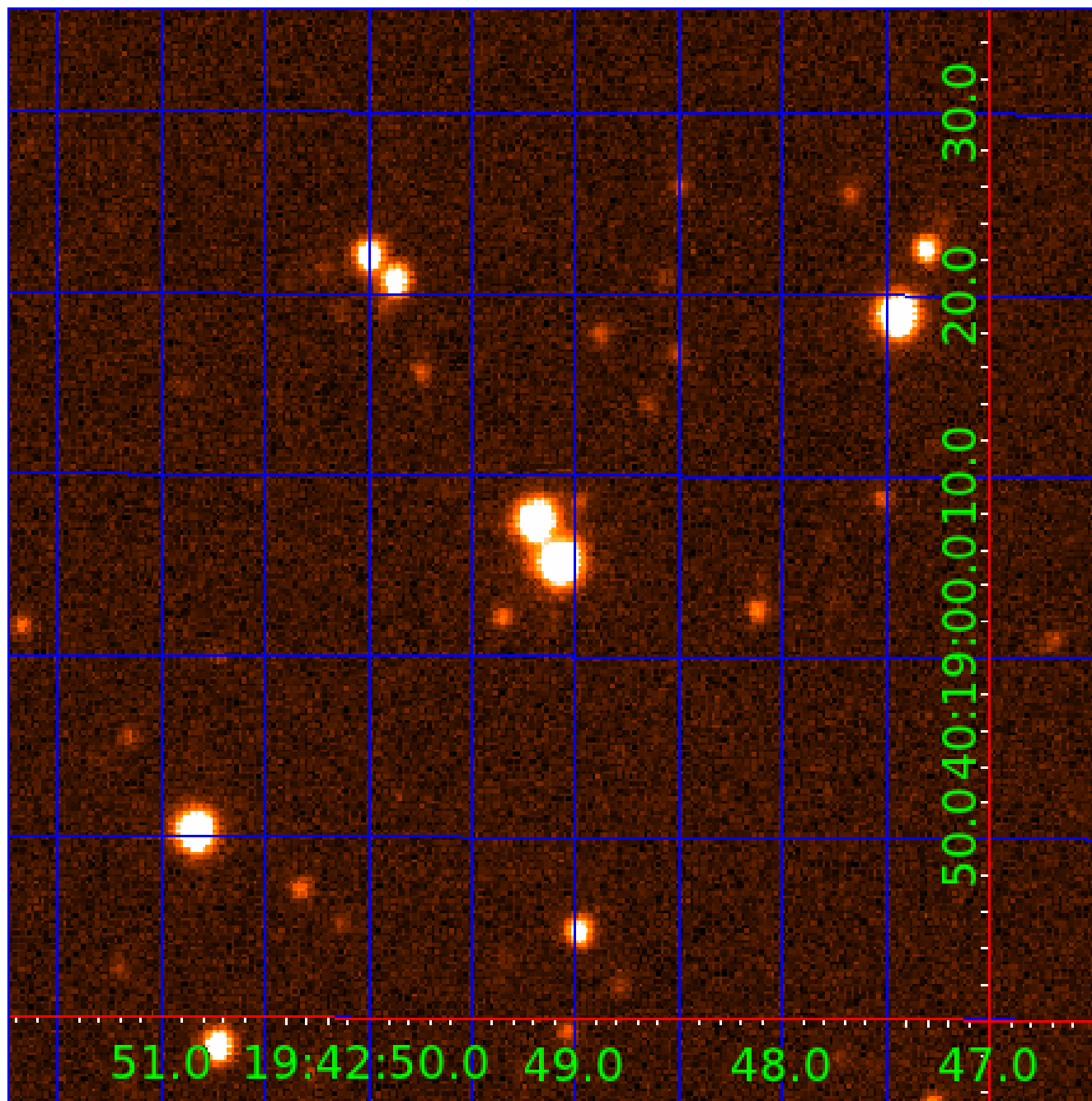


fluxWeightedCentroids, Planet 3 of 4



UKIRT Image

Declination



# KIC 005201756

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005201756-01	OBS	No	5.569486	134.666707	63.9	12.349	7.6	7.6	1.00	5780	0.94	264.35
005201756-02	OBS	No	1.045308	131.666099	29.4	6.675	8.1	7.8	1.00	5780	0.54	2460.07
005201756-03	OBS	No	33.301910	141.604759	203.9	5.738	15.2	5.4	1.00	5780	1.64	24.36
005201756-04	OBS	No	64.112235	165.463553	337.3	13.459	11.6	7.2	1.00	5780	2.00	10.17

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005201756-01	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—CENT_KIC_POS
005201756-02	OBS	FP	0.00	1	0	0	0	LPP_DV—CENT_KIC_POS
005201756-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_KIC_POS
005201756-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—CENT_KIC_POS

**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.

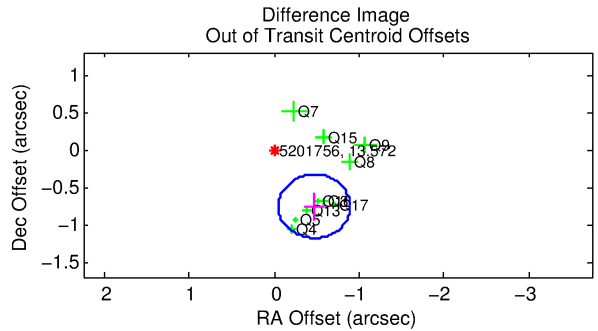
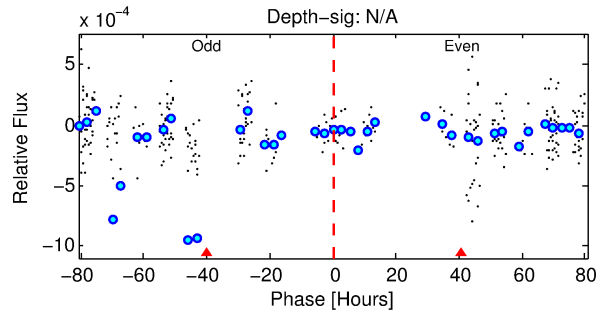
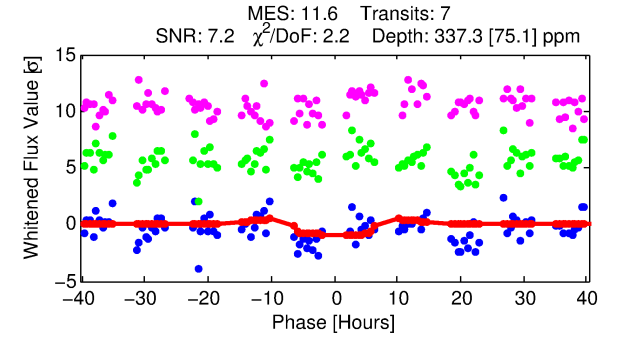
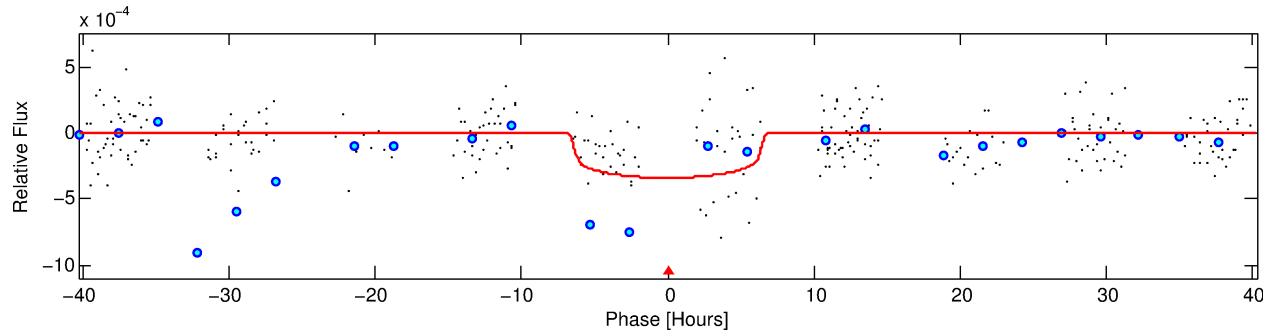
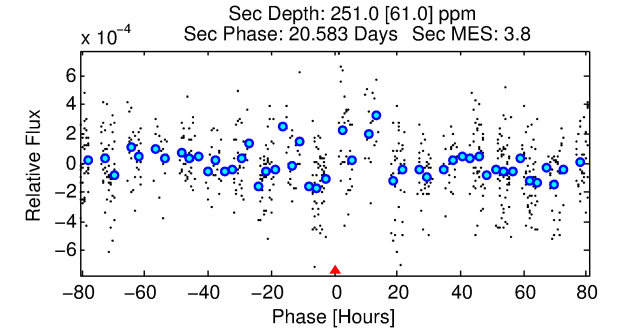
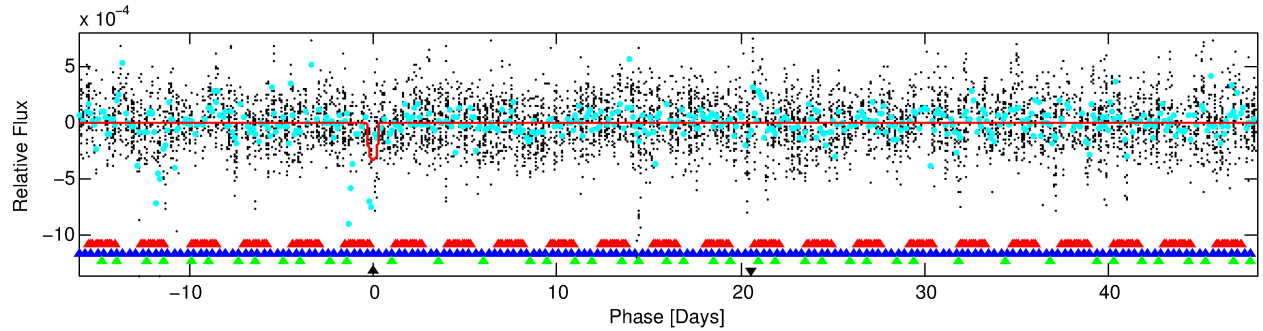
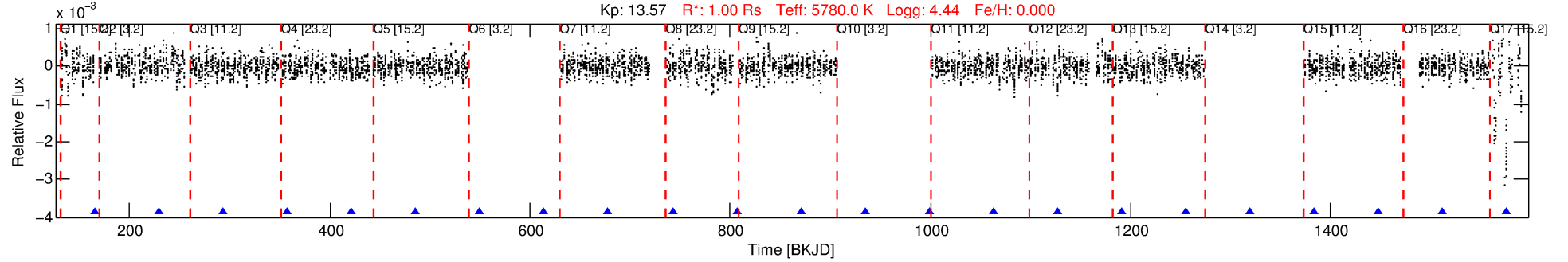
## Ephemeris Match Information For 005201756-04

No Significant Match Found



# DV One-Page Summary

KIC: 5201756 Candidate: 4 of 4 Period: 64.112 d



## DV Fit Results:

Period = 64.11224 [0.00170] d  
Epoch = 165.4636 [0.0262] BKJD  
Rp/R\* = 0.0183 [0.0114]  
a/R\* = 25.06 [71.19]  
b = 0.75 [1.64]  
Seff = 10.17 [0.00]  
Teq = 455 [0] K  
Rp = 1.99 [1.24] Re  
a = 0.3136 [0.0000] AU  
Ag = 3412.69 [4329.03] [0.79σ]  
Teffp = 5381 [1707] K [2.89σ]

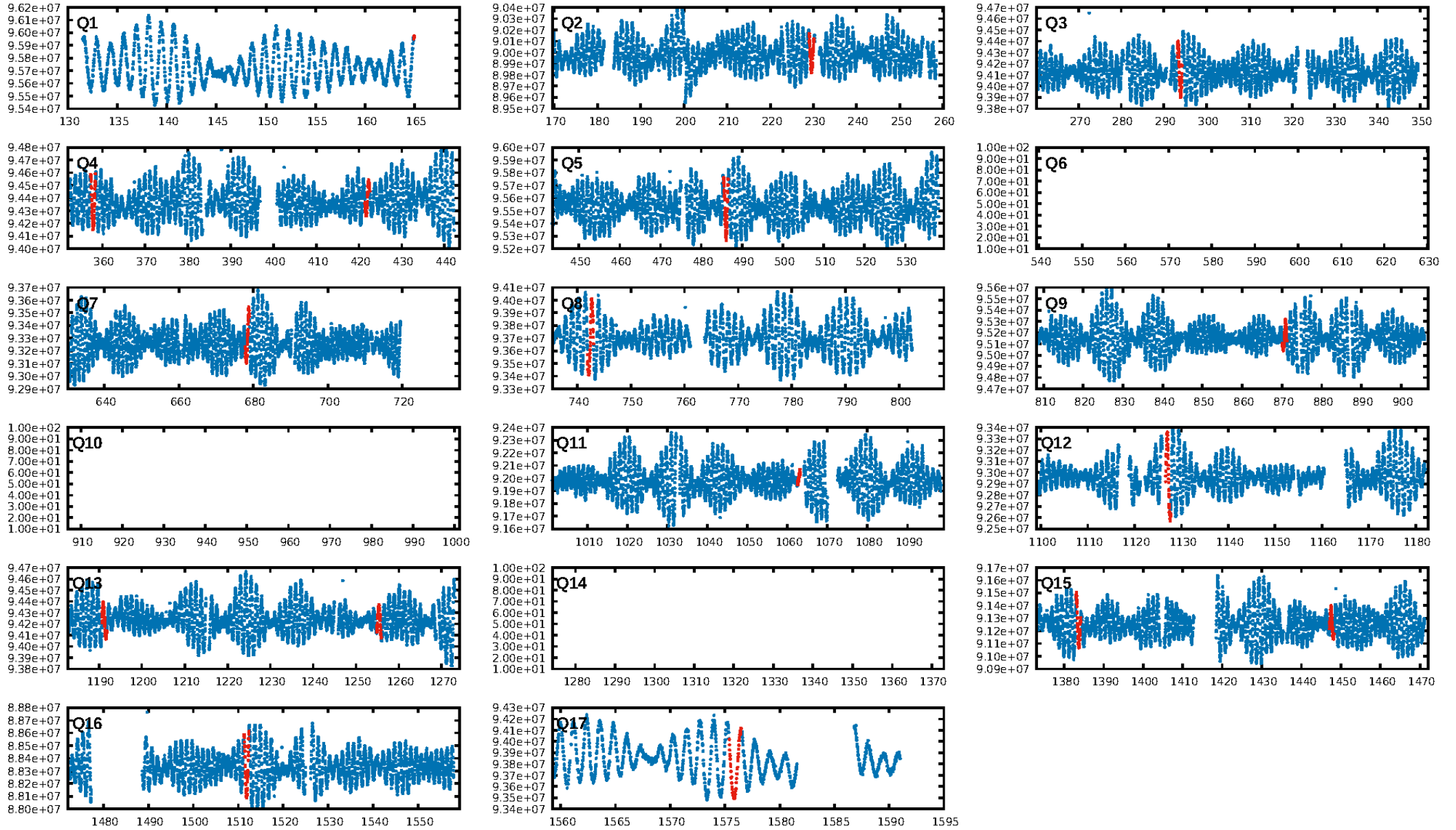
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [50.54σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 2.38e-17  
RollingBand-fgt: 1.00 [6/6]  
GhostDiagnostic-chr: 0.8337  
Centroid-sig: 76.4%  
Centroid-so: 0.289 arcsec [0.55σ]  
OotOffset-rm: 0.892 arcsec [6.30σ]  
KicOffset-rm: 0.432 arcsec [3.16σ]  
OotOffset-st: 0/3/3/4 [10]  
KicOffset-st: 0/3/3/4 [10]  
DiffImageQuality-fgm: 0.70 [7/10]  
DiffImageOverlap-fno: 0.00 [0/10]

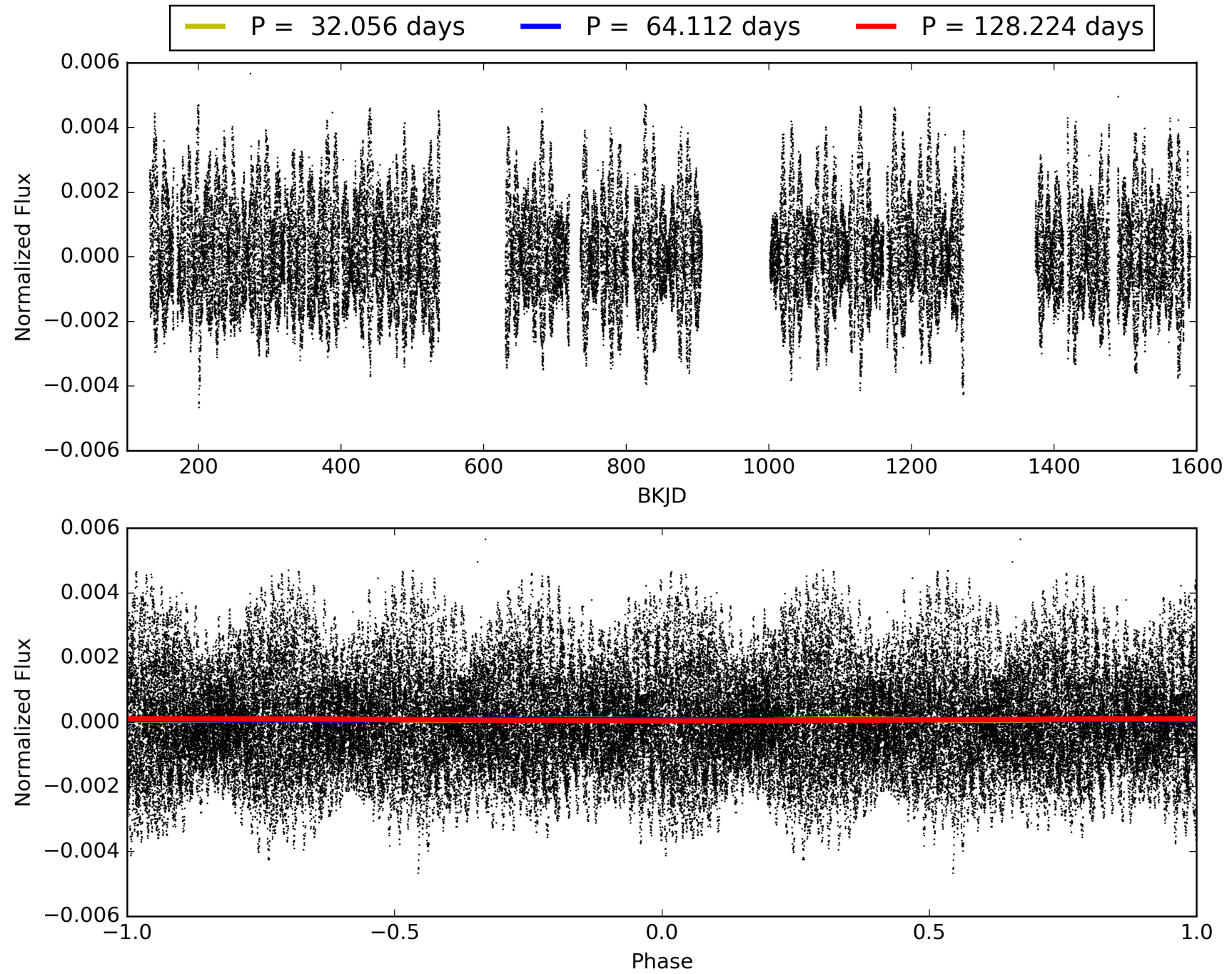
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 14:42:51 Z

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

# TCE 005201756-04, PDC Light Curves

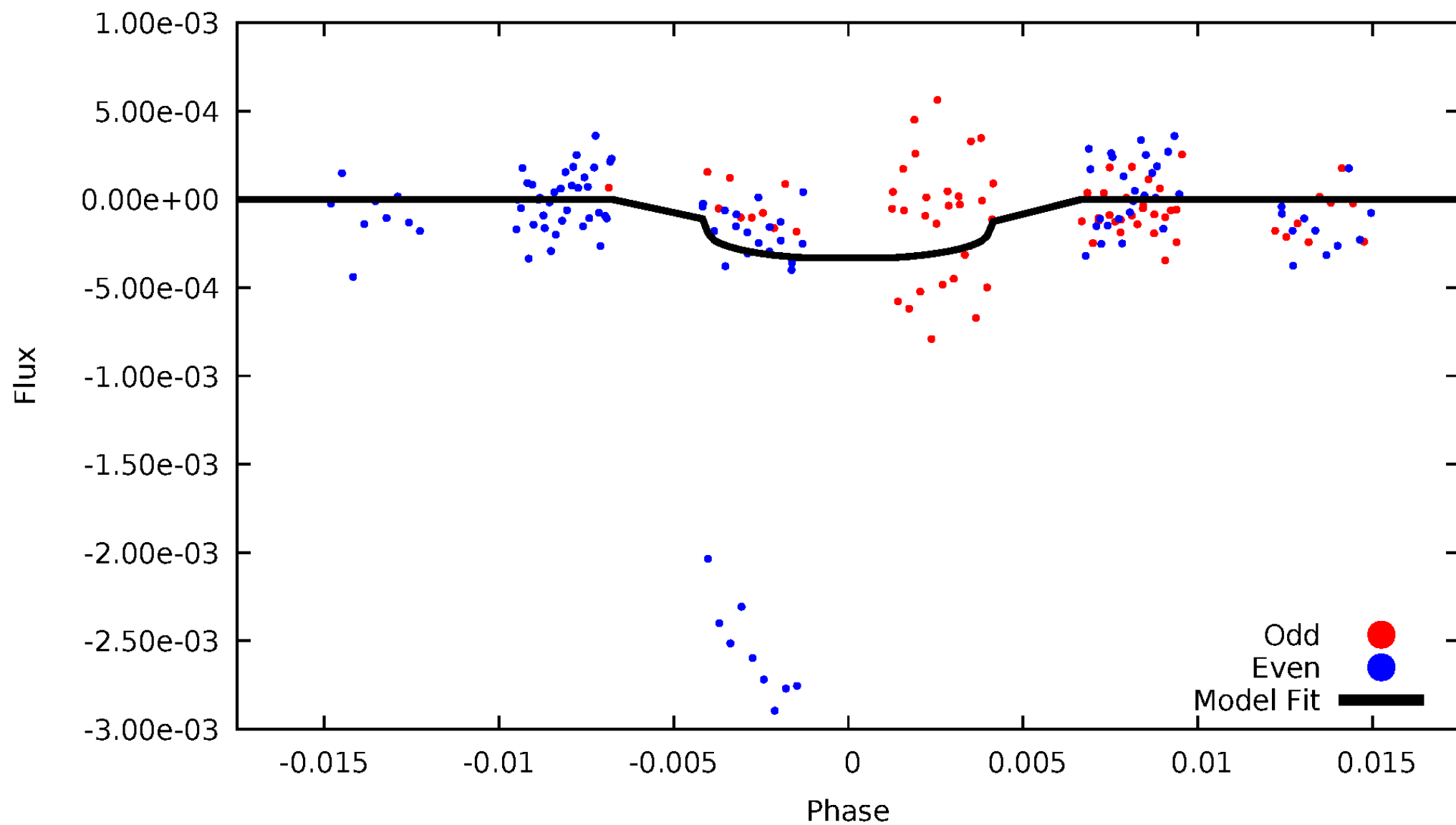


TCE 005201756-04



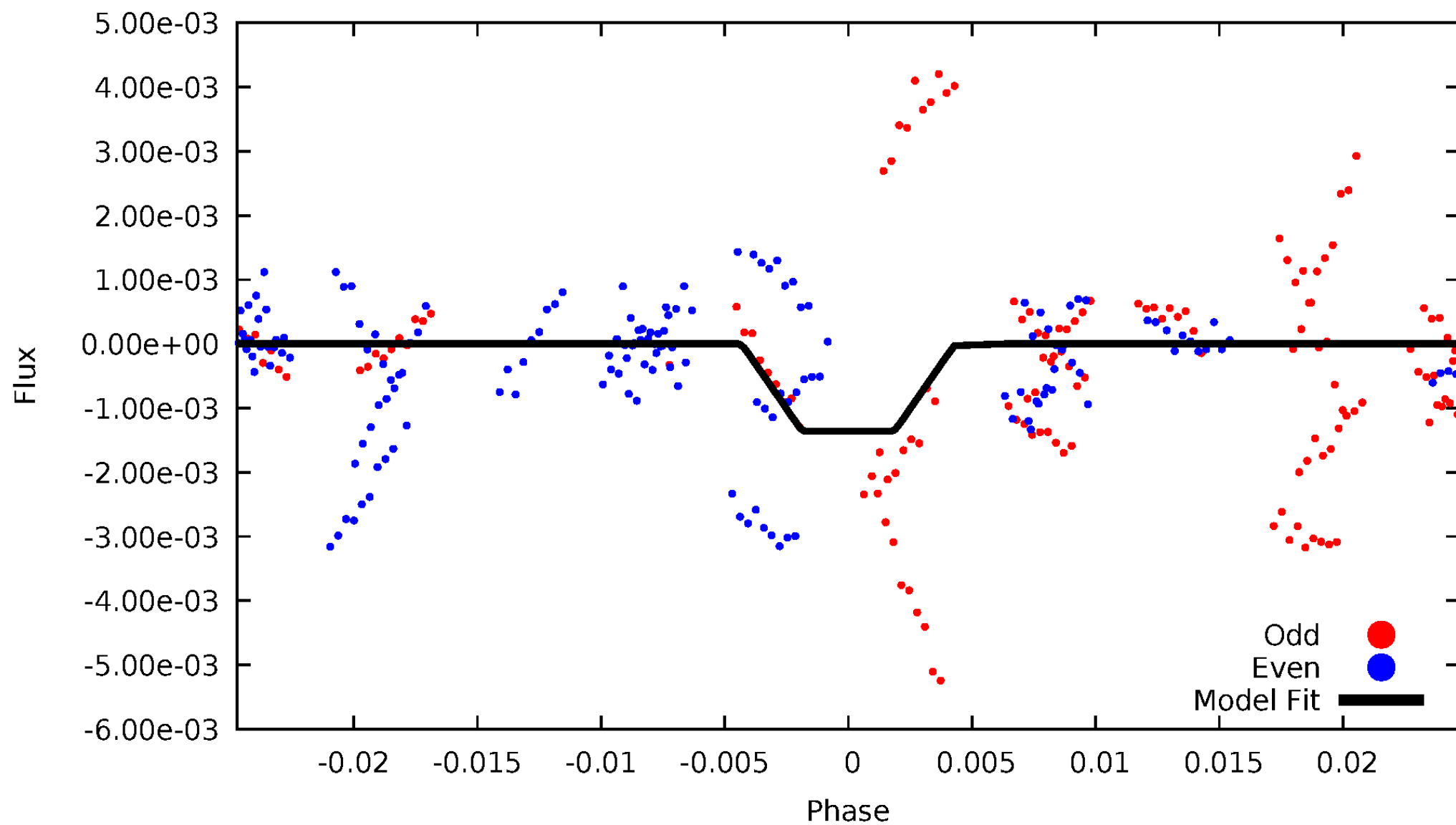
# DV Odd/Even

TCE 005201756-04



# ALT Odd/Even

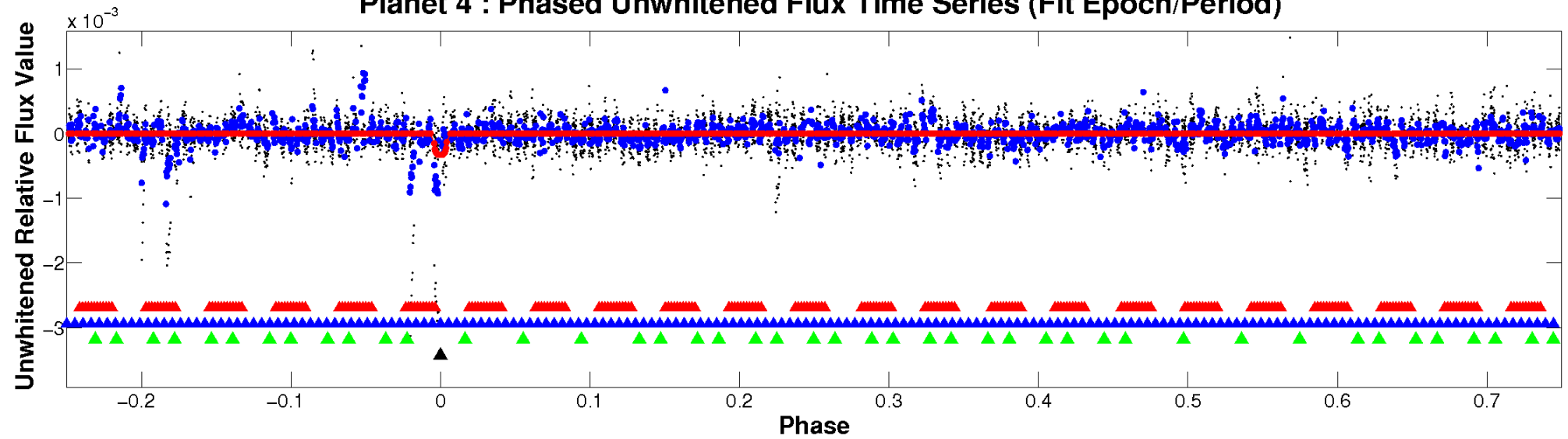
TCE 005201756-04



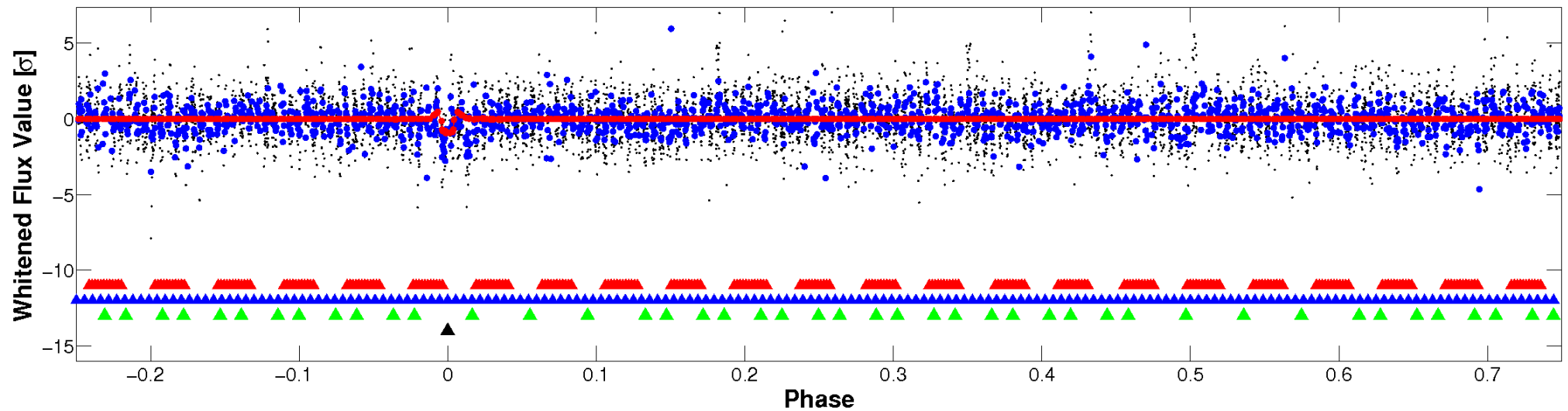


# Non-Whitened Vs. Whitened Light Curve

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

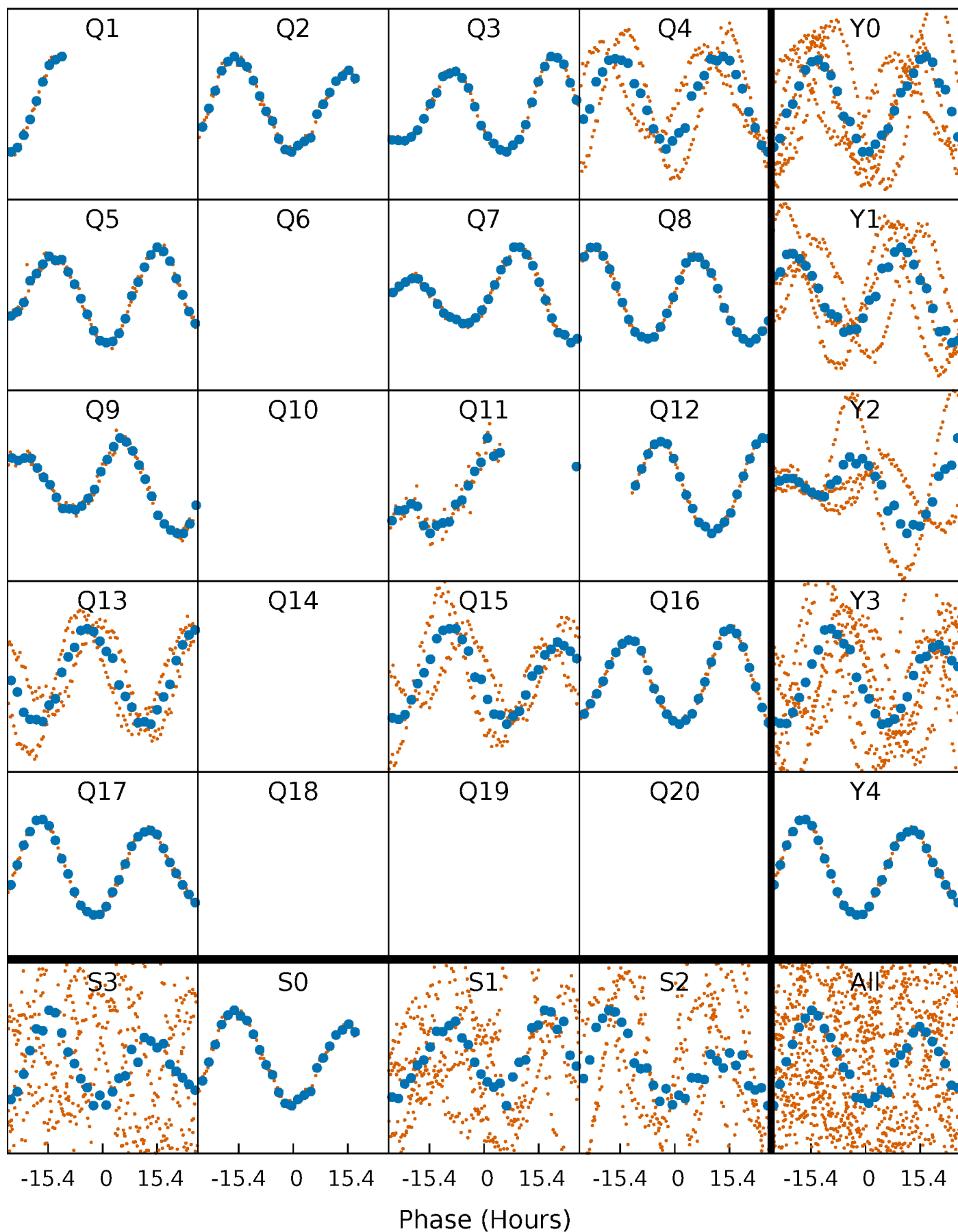


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



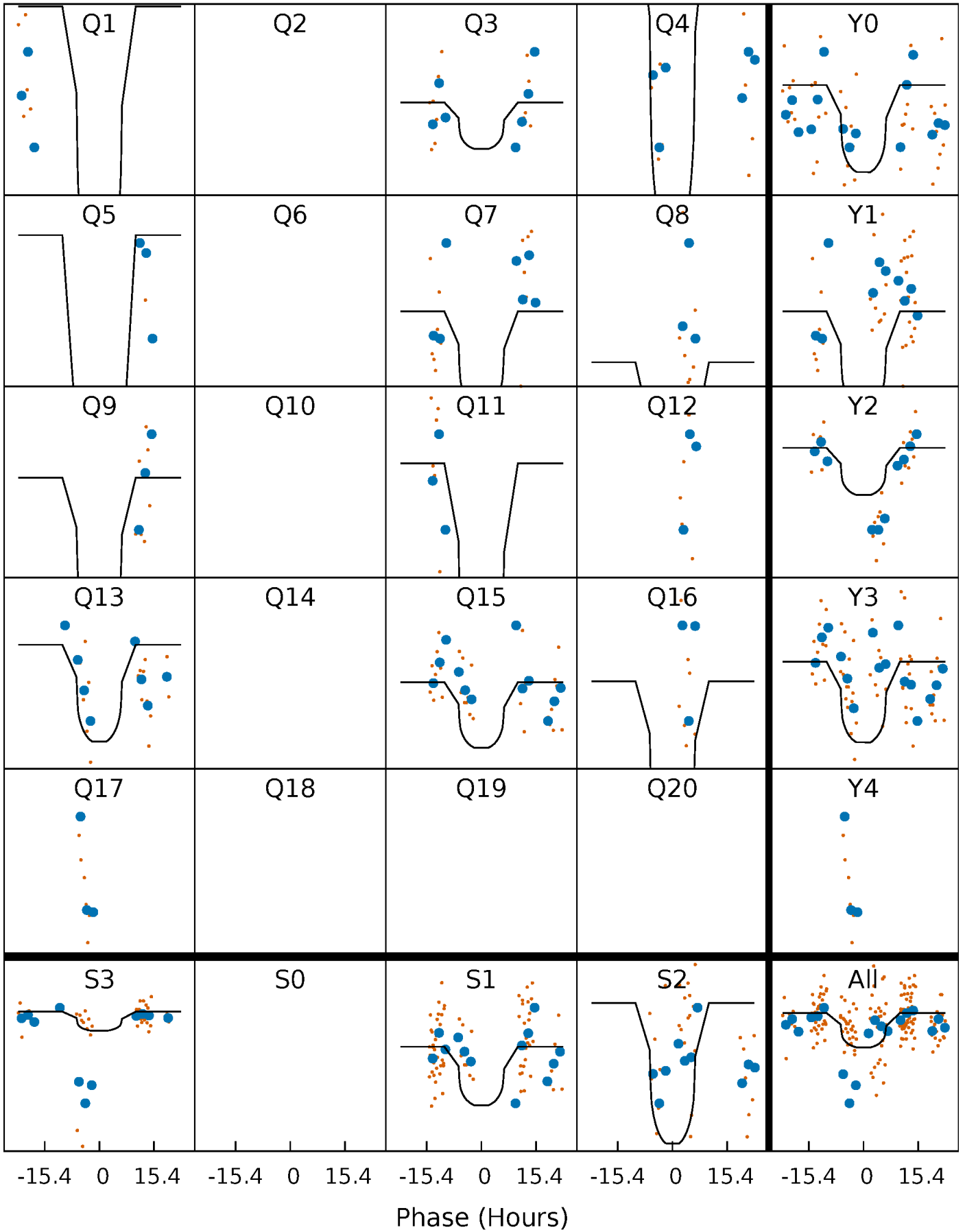
# PDC Quarter-Phased Transit Curves

TCE 005201756-04   P= 64.112235 Days    $T_0=165.463553$  (BKJD)



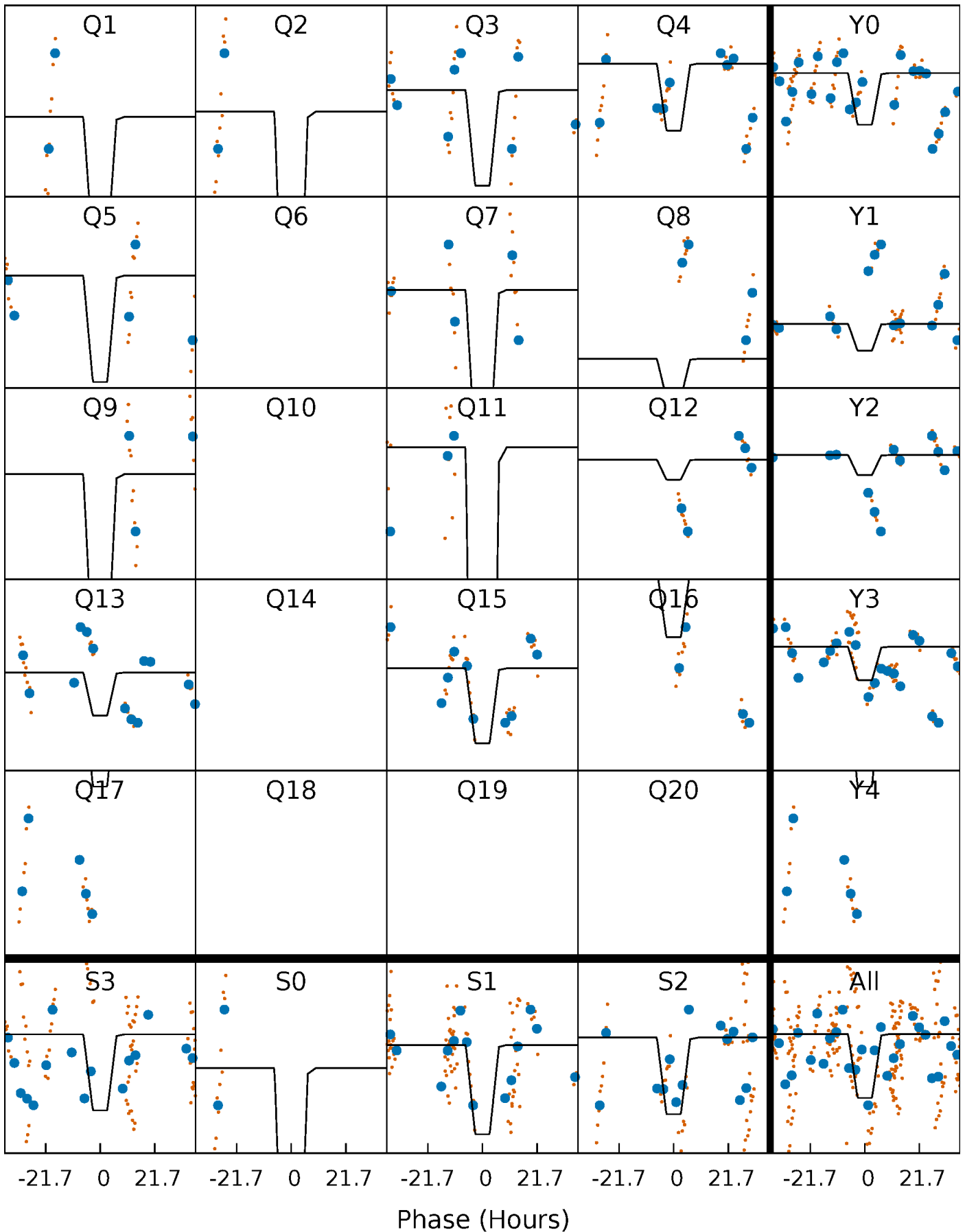
# DV Quarter-Phased Transit Curves

TCE 005201756-04     $P = 64.112235$  Days     $T_0 = 165.463553$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

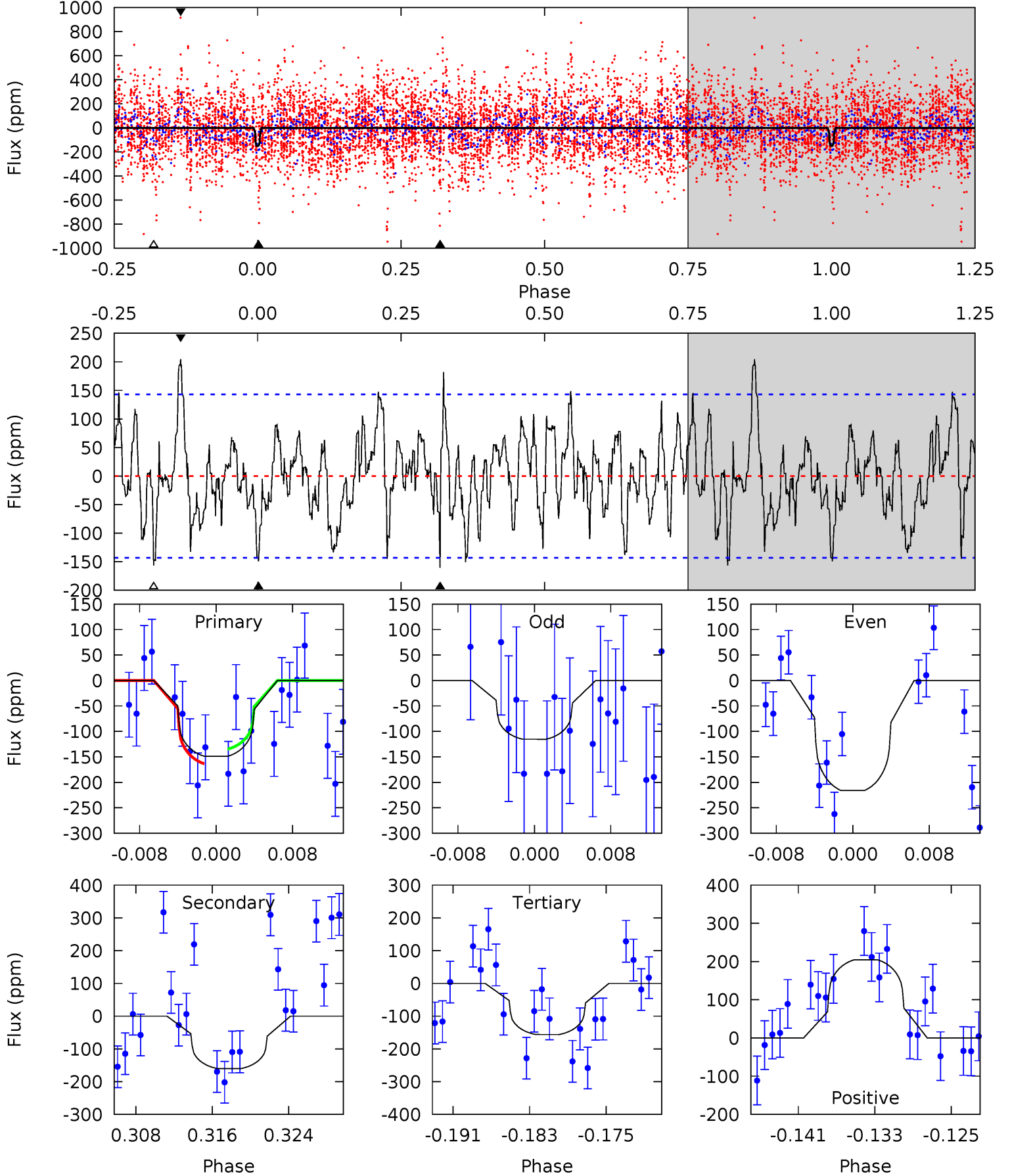
TCE 005201756-04 P= 64.116306 Days  $T_0=165.417597$  (BKJD)



# DV Model-Shift Uniqueness Test

005201756-04, P = 64.112235 Days, E = 101.351318 Days

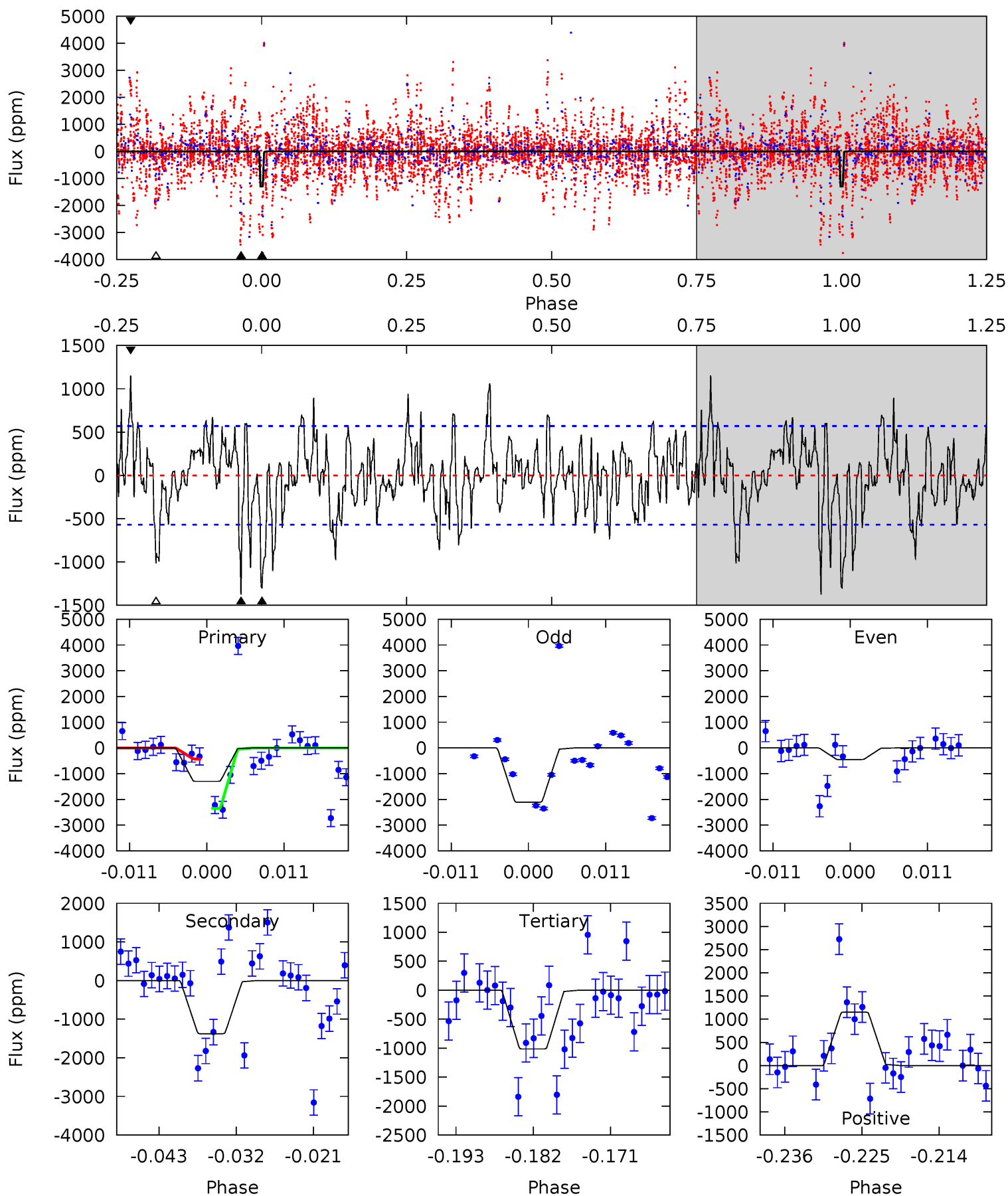
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.27	5.67	5.53	7.24	5.06	2.64	2.11	-0.26	-1.97	0.14	-1.57	1.50	2.72	0.56	0.51



# Alt Model-Shift Uniqueness Test

005201756-04, P = 64.116306 Days, E = 101.301291 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.4	12.1	8.93	10.1	5.01	2.55	3.04	2.50	1.29	3.20	1.99	6.81	0.92	0.46	8.02





### Stellar Parameters For KIC 005201756

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5780^{+1}_{-1}$	$4.438^{+1.000}_{-1.000}$	$0.000^{+1.000}_{-1.000}$	$1.000^{+1.000}_{-1.000}$	$-1.000^{+1.000}_{-1.000}$	$-1.000^{+1.000}_{-1.000}$
	+0%/-0%	+23%/-23%	+inf%/-inf%	+100%/-100%	+100%/-100%	+100%/-100%
Source	Solar	Solar	Solar	Solar		

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

### Secondary Eclipse Parameters for KIC 005201756-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-160 \pm 28$	$2.17^{+1.22}_{-1.11}$	$637^{+29}_{-31}$	$4706^{+2100}_{-725}$	$1855^{+6202}_{-1110}$
Alt.	$-1377 \pm 113$	$3.99^{+1.23}_{-1.23}$	$635^{+31}_{-31}$	$5805^{+1205}_{-712}$	$4712^{+5145}_{-2020}$

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

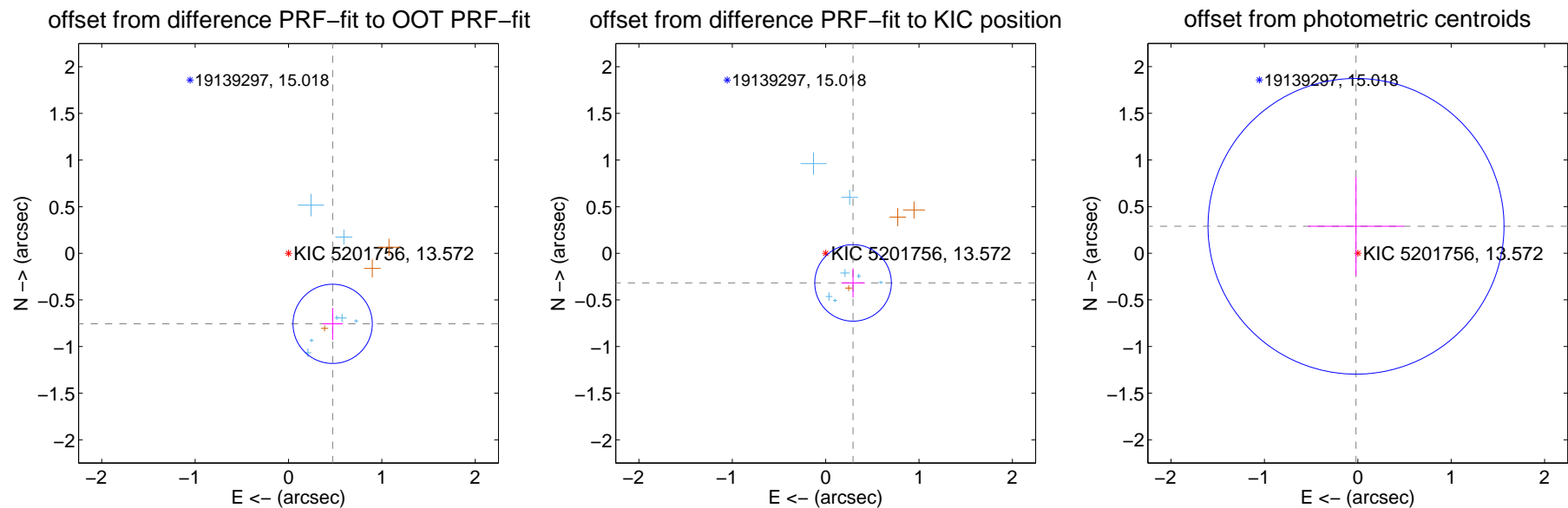
## DV Centroid Data

Supplemental centroid analysis for 005201756-04. Kepler magnitude: 13.57. Transit SNR 7.21

There are 7 quarters with good PRF difference image offsets

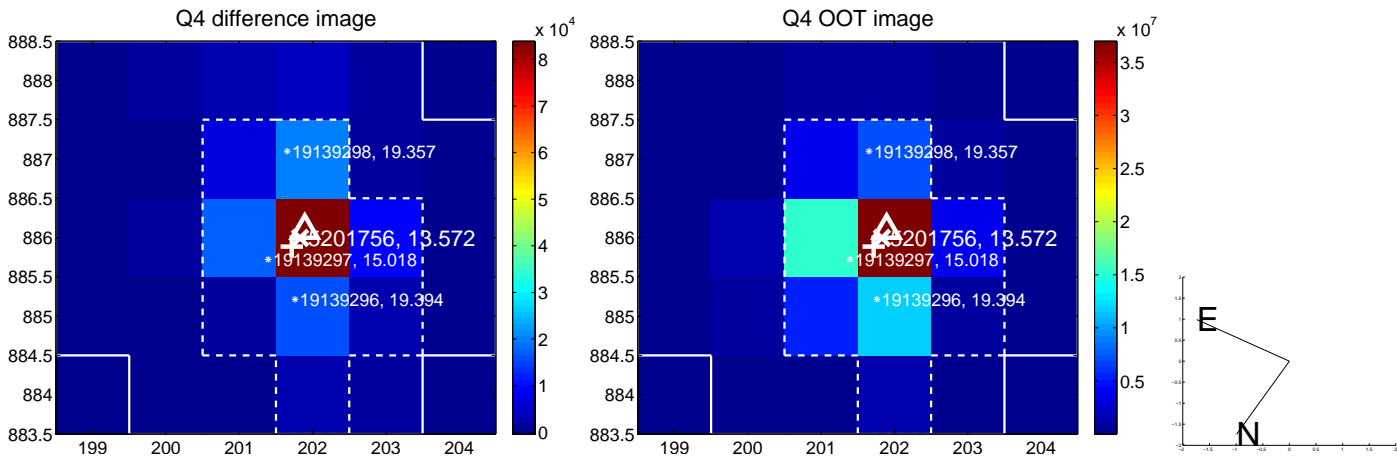
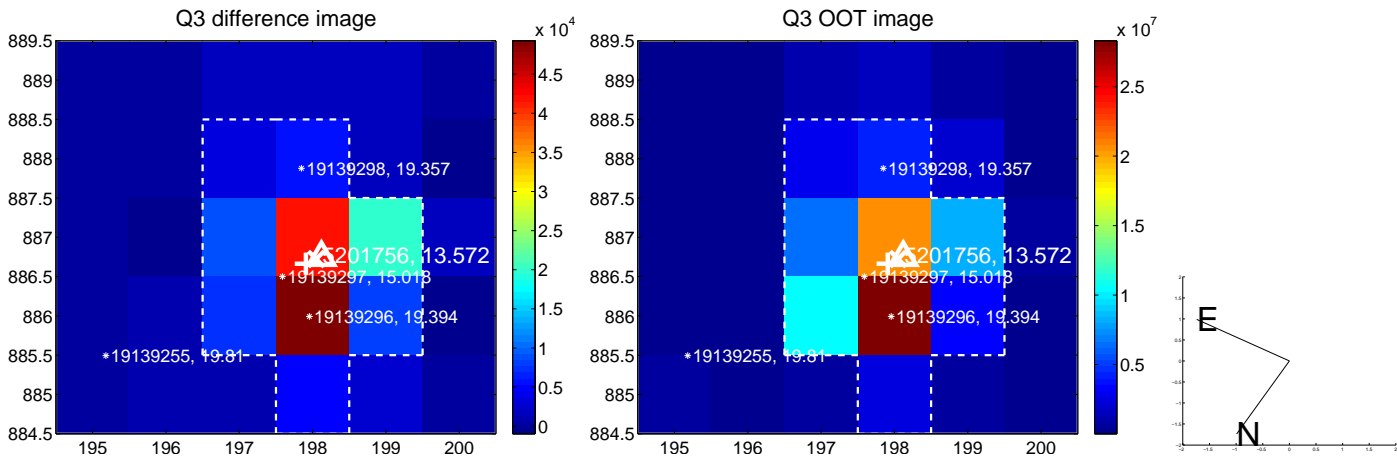
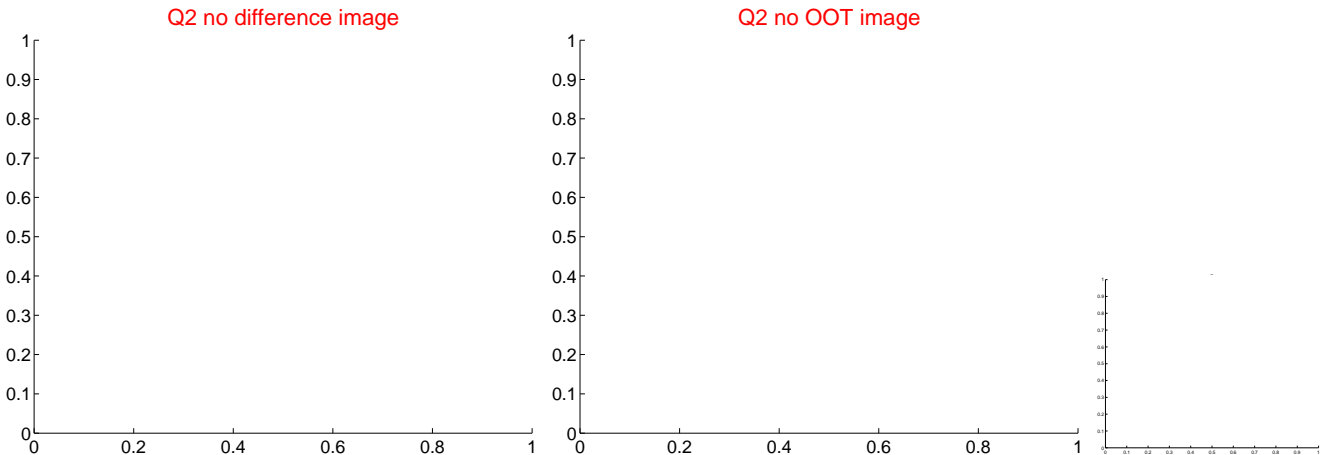
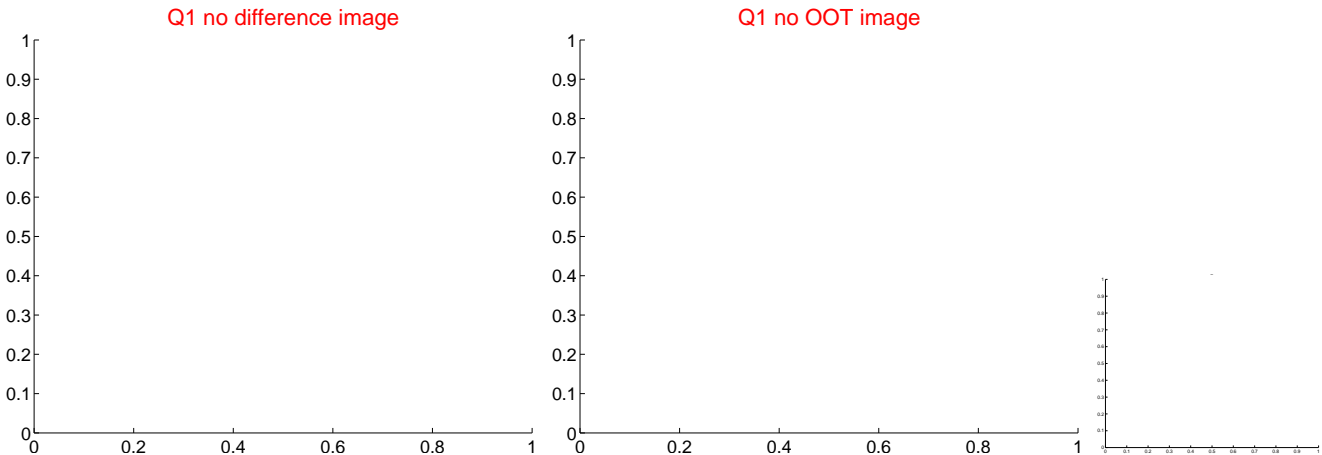
The direct PRF centroid is offset from the target star catalog position by about 0.43 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.892 \pm 0.142$	<b>6.30</b>	$-0.473 \pm 0.108$	$-0.756 \pm 0.171$
PRF-fit source offset from KIC position	$0.432 \pm 0.137$	<b>3.16</b>	$-0.294 \pm 0.125$	$-0.318 \pm 0.155$
photometric centroid source offset	$0.29 \pm 0.53$	0.55	$0.02 \pm 0.51$	$0.29 \pm 0.53$

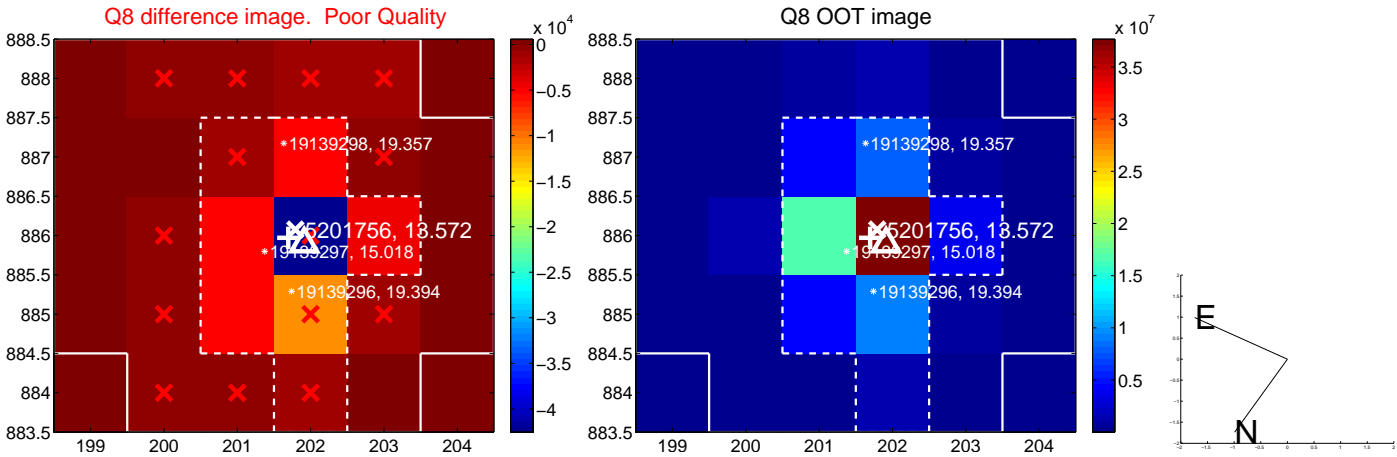
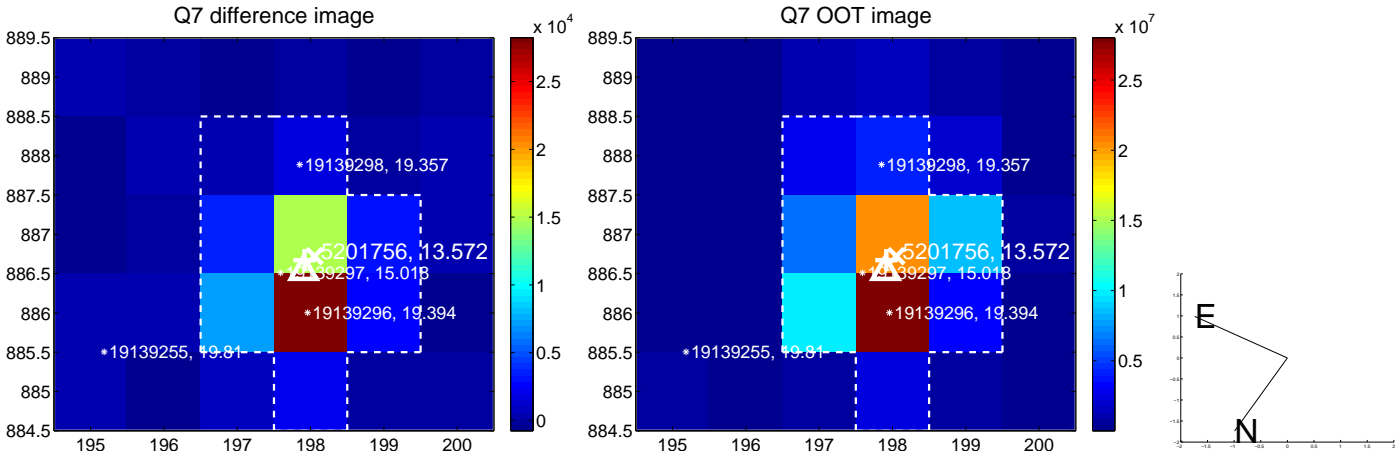
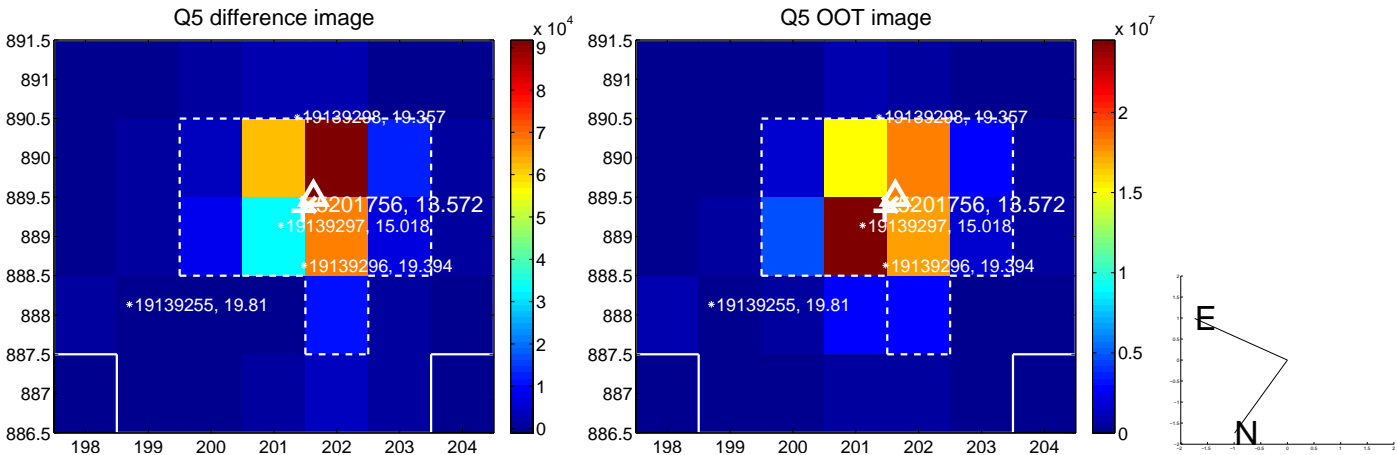


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

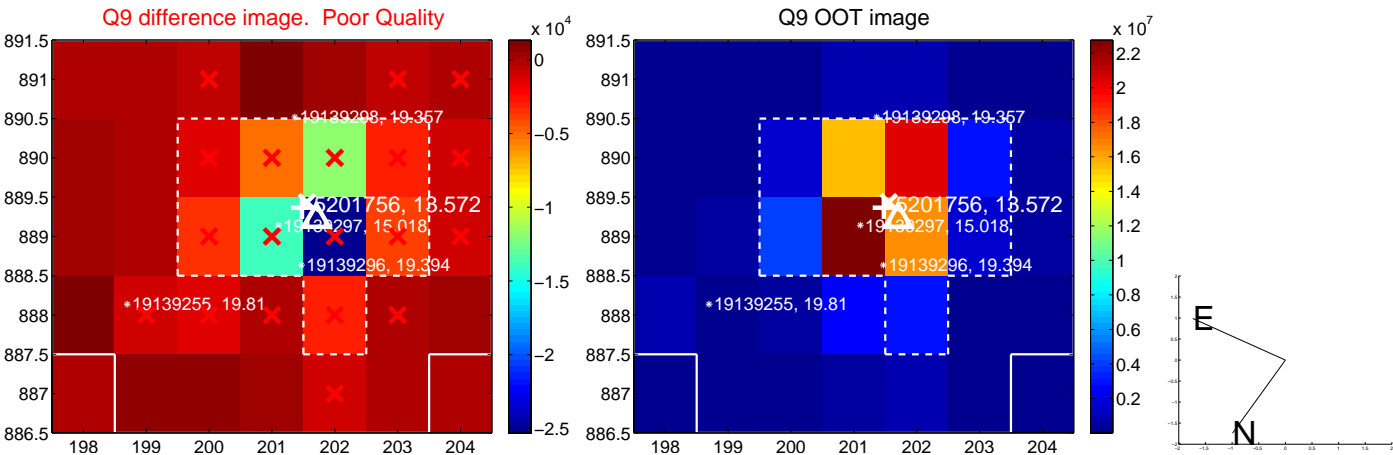
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



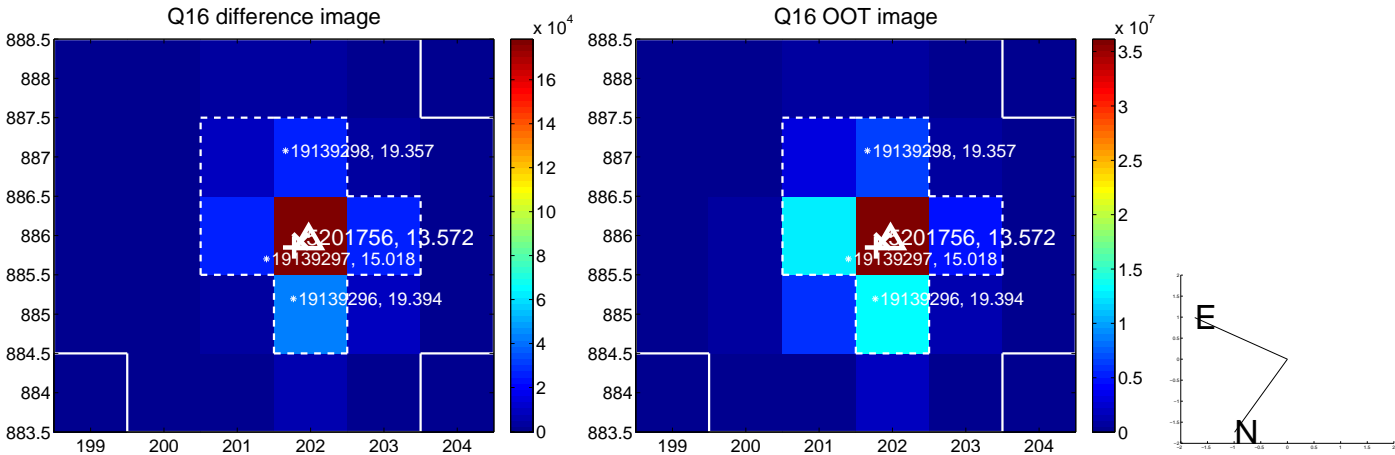
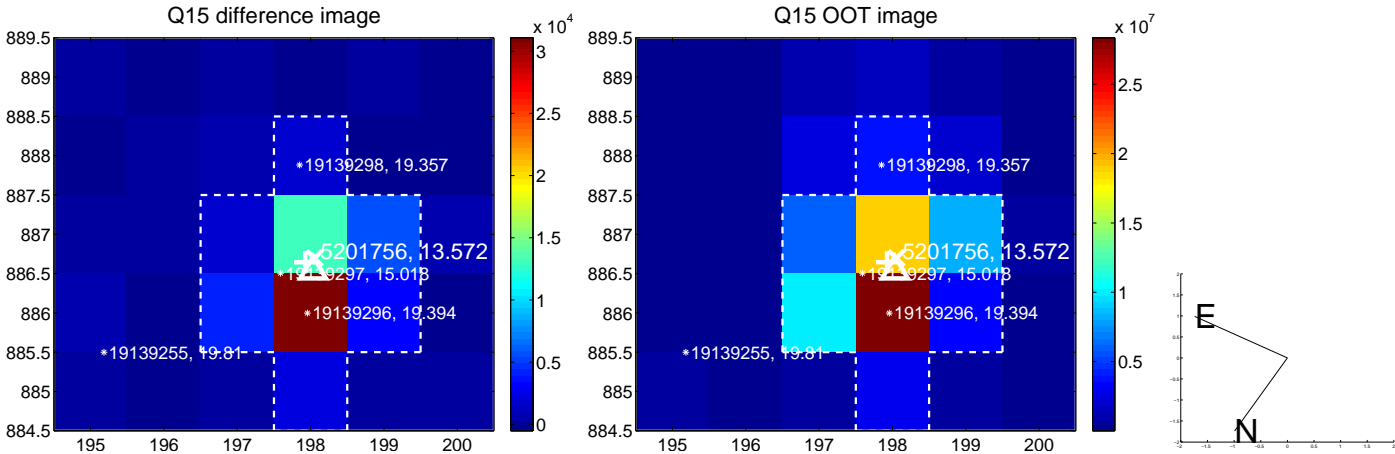
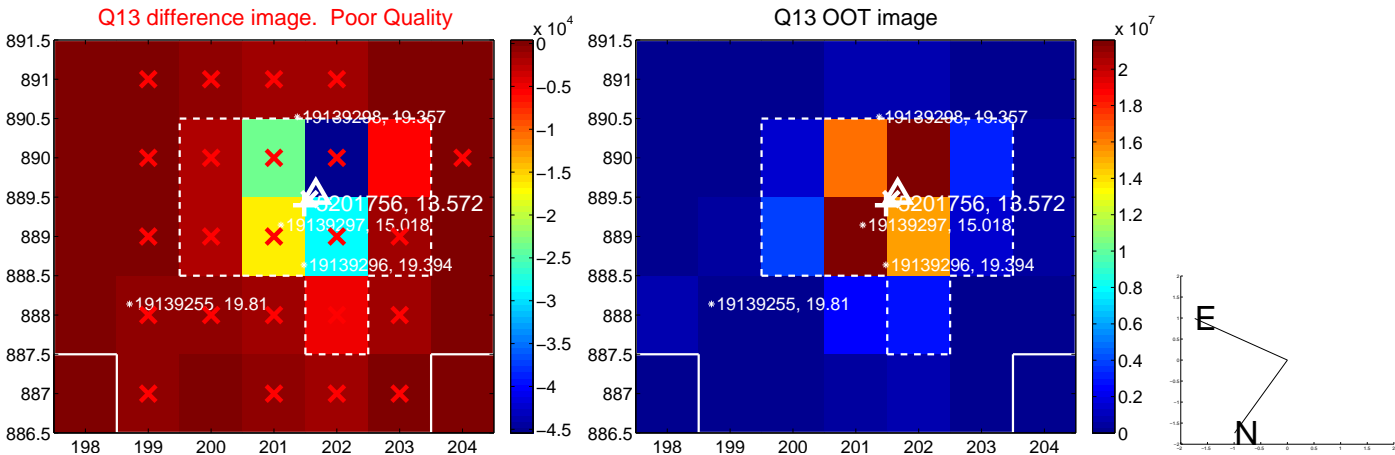
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

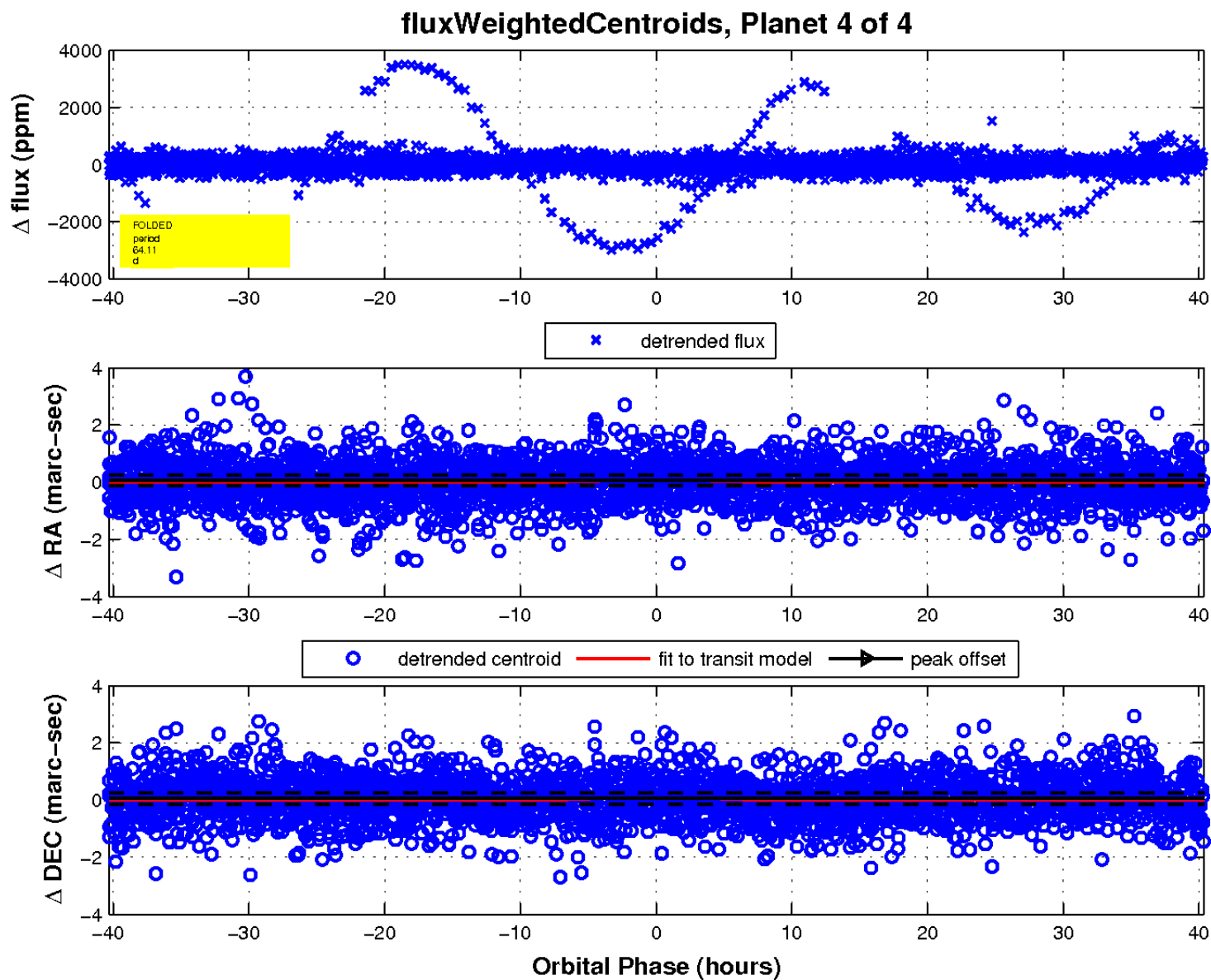
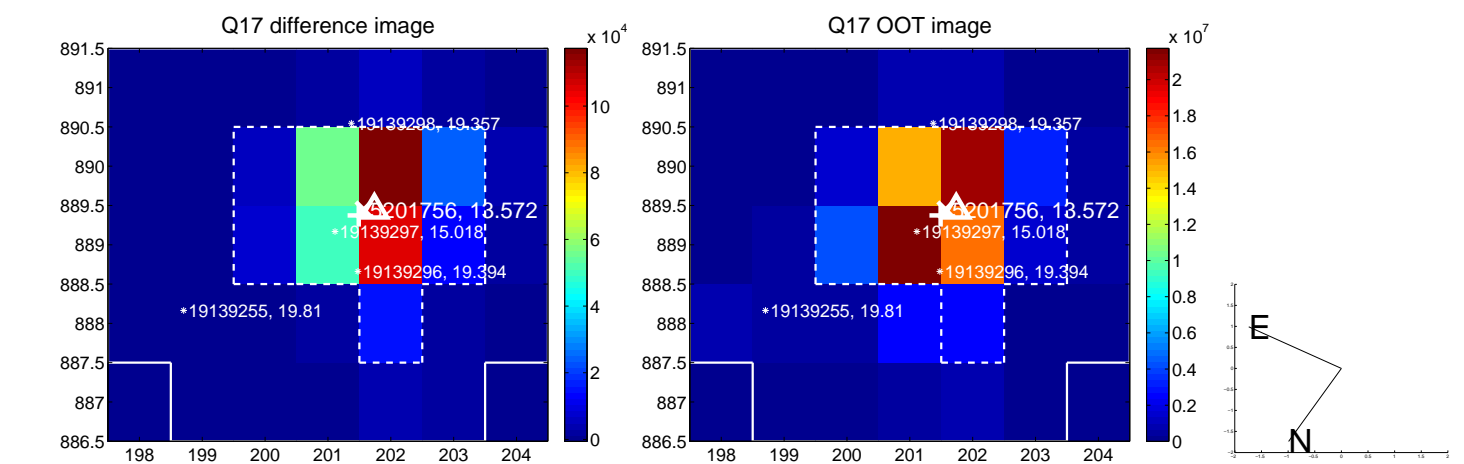


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





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



UKIRT Image

Declination

