

# KIC 008509620

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008509620-01	OBS	No	0.745101	131.729106	74.2	4.516	8.7	5.5	0.81	5680	0.75	2801.23
008509620-02	OBS	No	127.517188	186.139147	2892.7	3.747	9.7	8.1	0.81	5680	5.39	2.95
008509620-03	OBS	No	82.359105	201.279960	1062.9	2.000	10.0	-1.0	0.81	5680	2.64	5.28

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008509620-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT
008509620-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS
008509620-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_NOFITS—HALO_GHOST

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

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

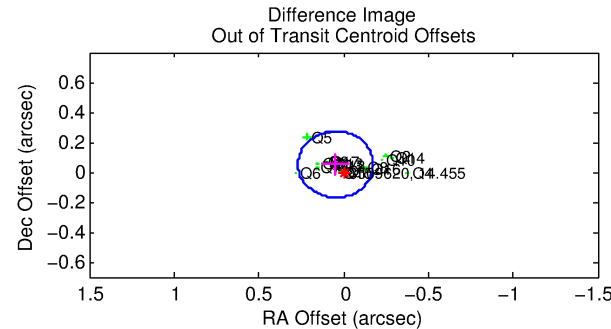
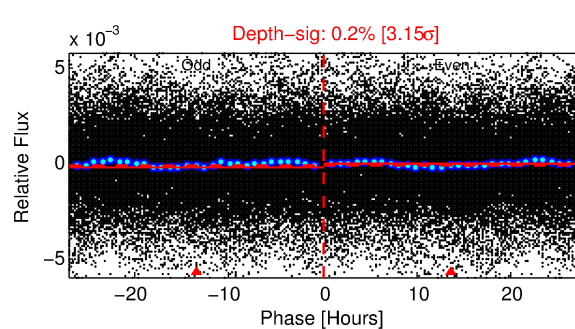
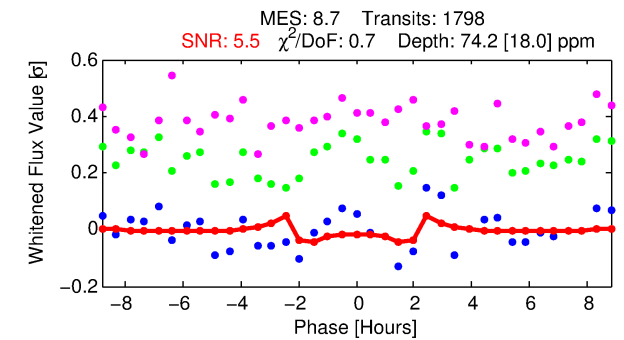
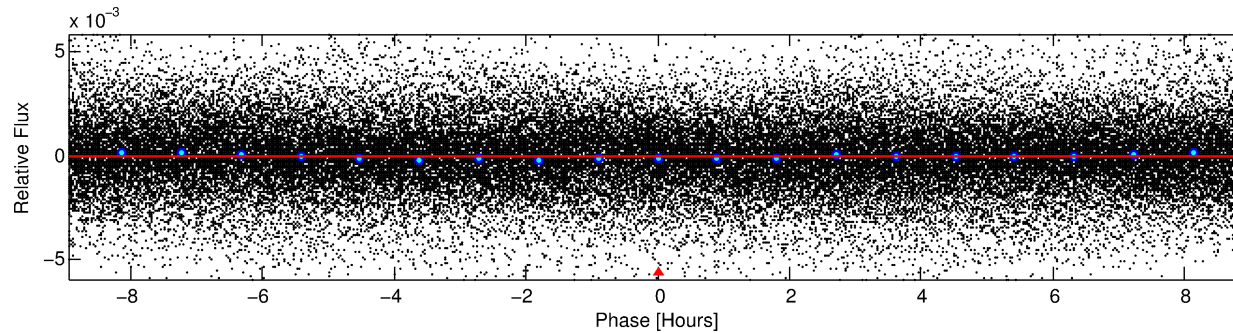
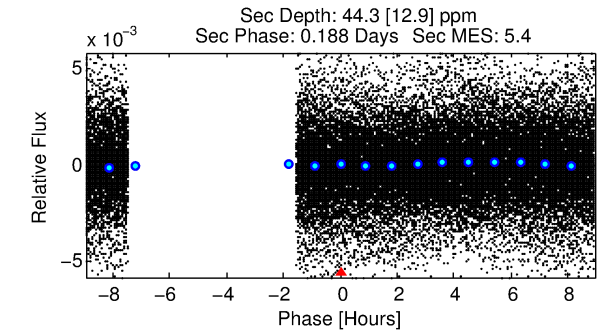
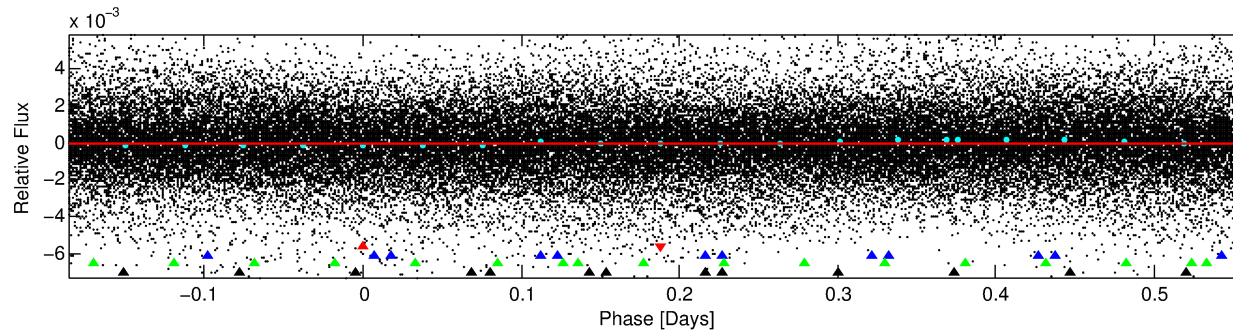
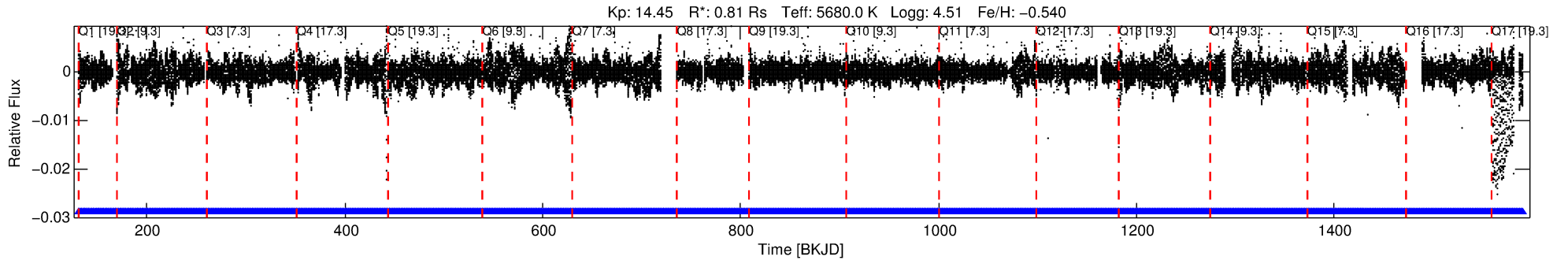
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008509620-01

No Significant Match Found

# DV One-Page Summary

KIC: 8509620 Candidate: 1 of 4 Period: 0.745 d



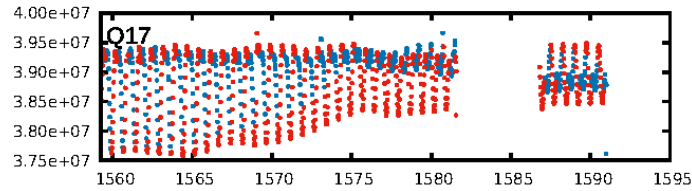
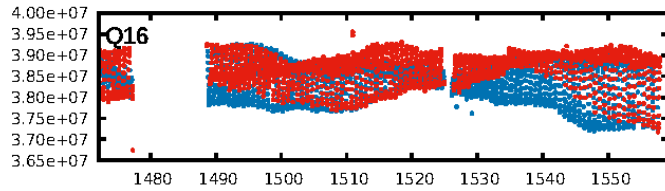
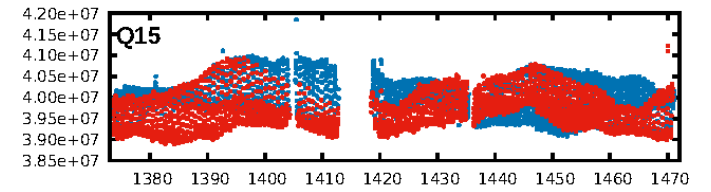
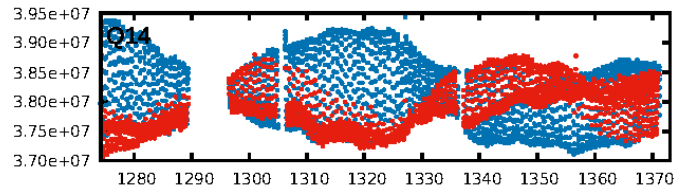
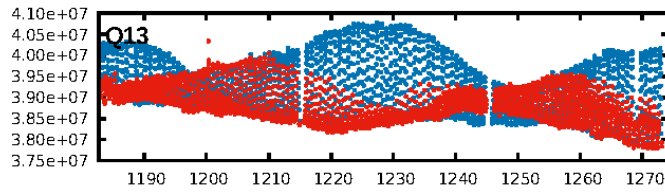
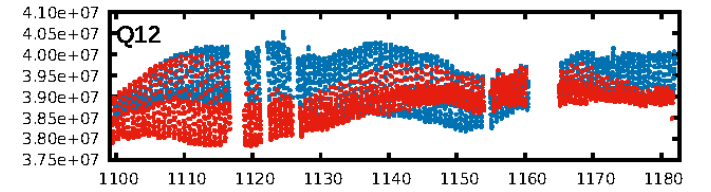
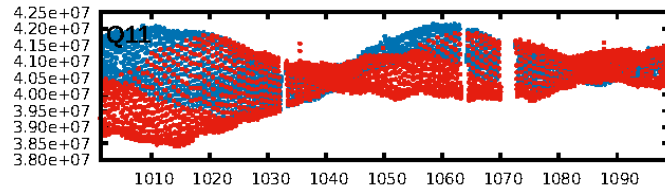
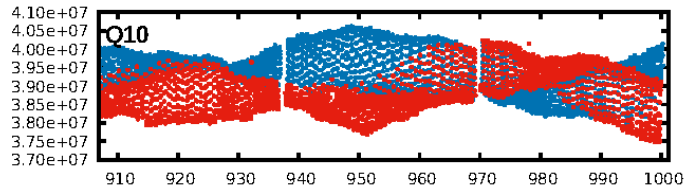
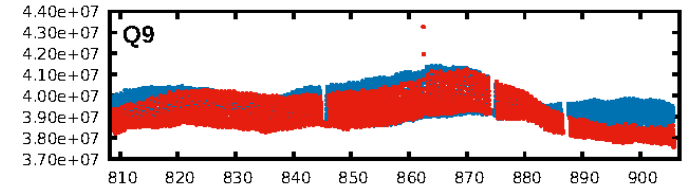
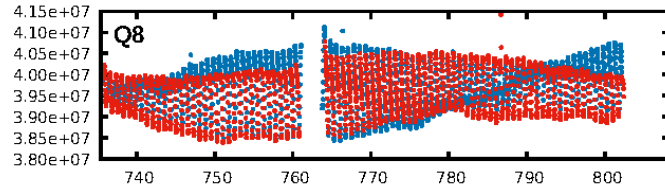
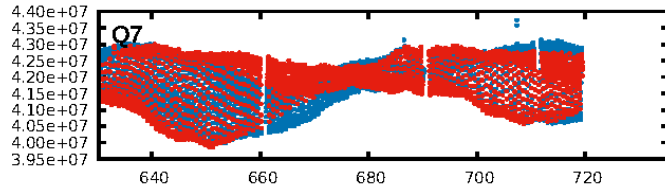
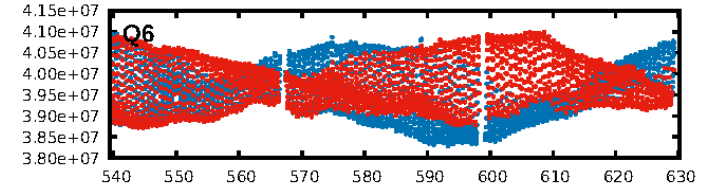
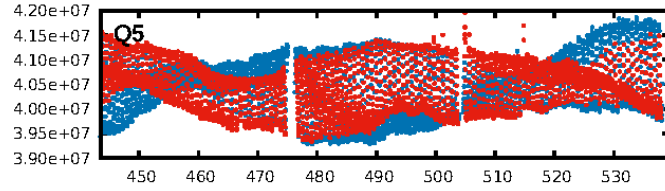
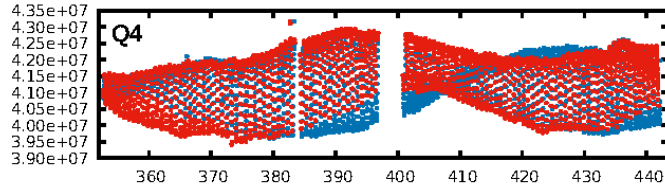
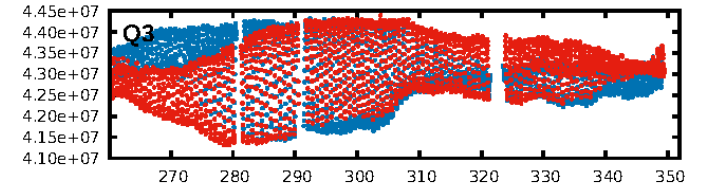
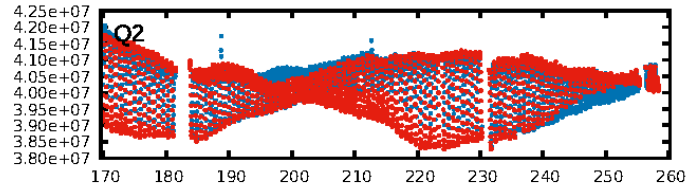
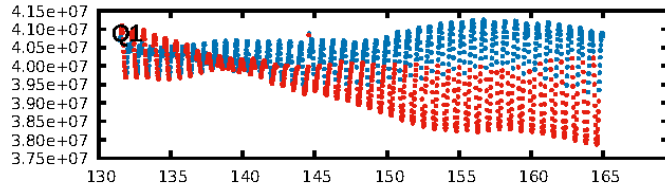
## DV Fit Results:

Period = 0.74510 [0.00002] d  
Epoch = 131.7291 [0.0024] BKJD  
Rp/R\* = 0.0084 [0.0039]  
a/R\* = 1.24 [0.96]  
b = 0.70 [1.67]  
Seff = 2801.23 [789.49]  
Teff = 1855 [131] K  
Rp = 0.75 [0.38] Re  
a = 0.0148 [0.0026] AU  
Ag = 9.60 [9.71] [0.89σ]  
Teffp = 5048 [1245] K [2.55σ]

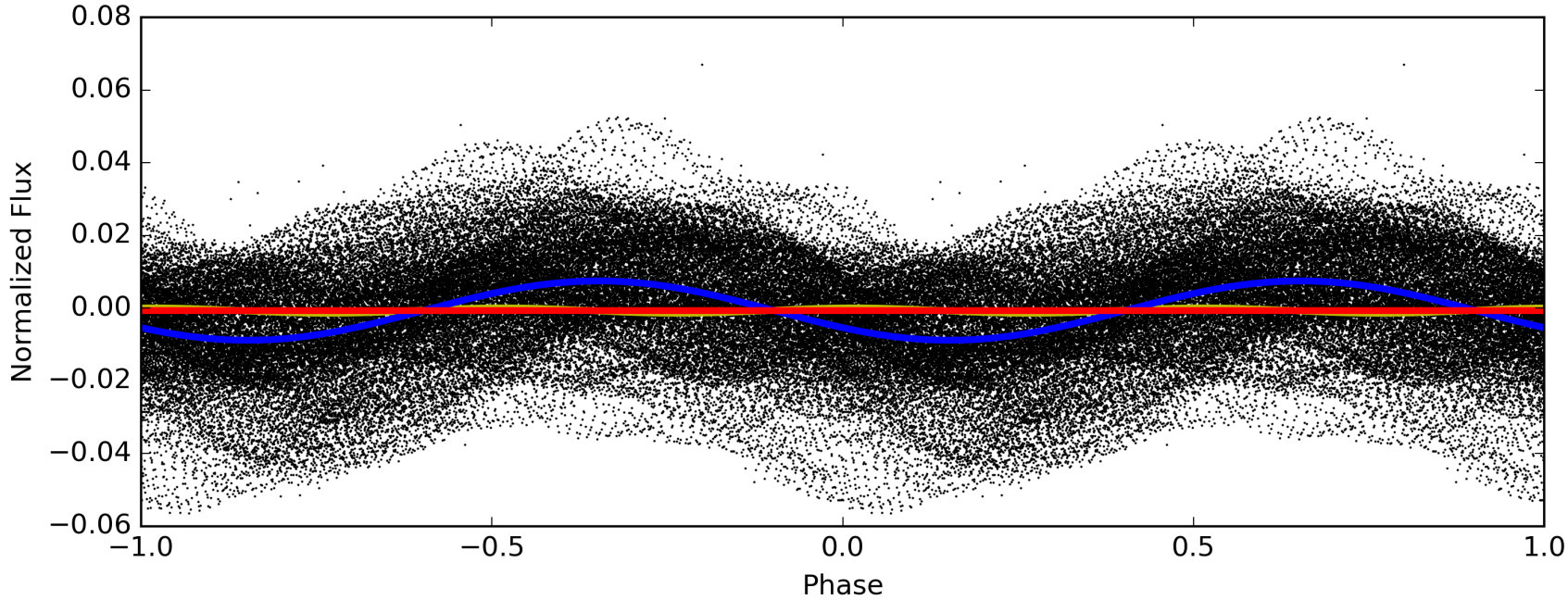
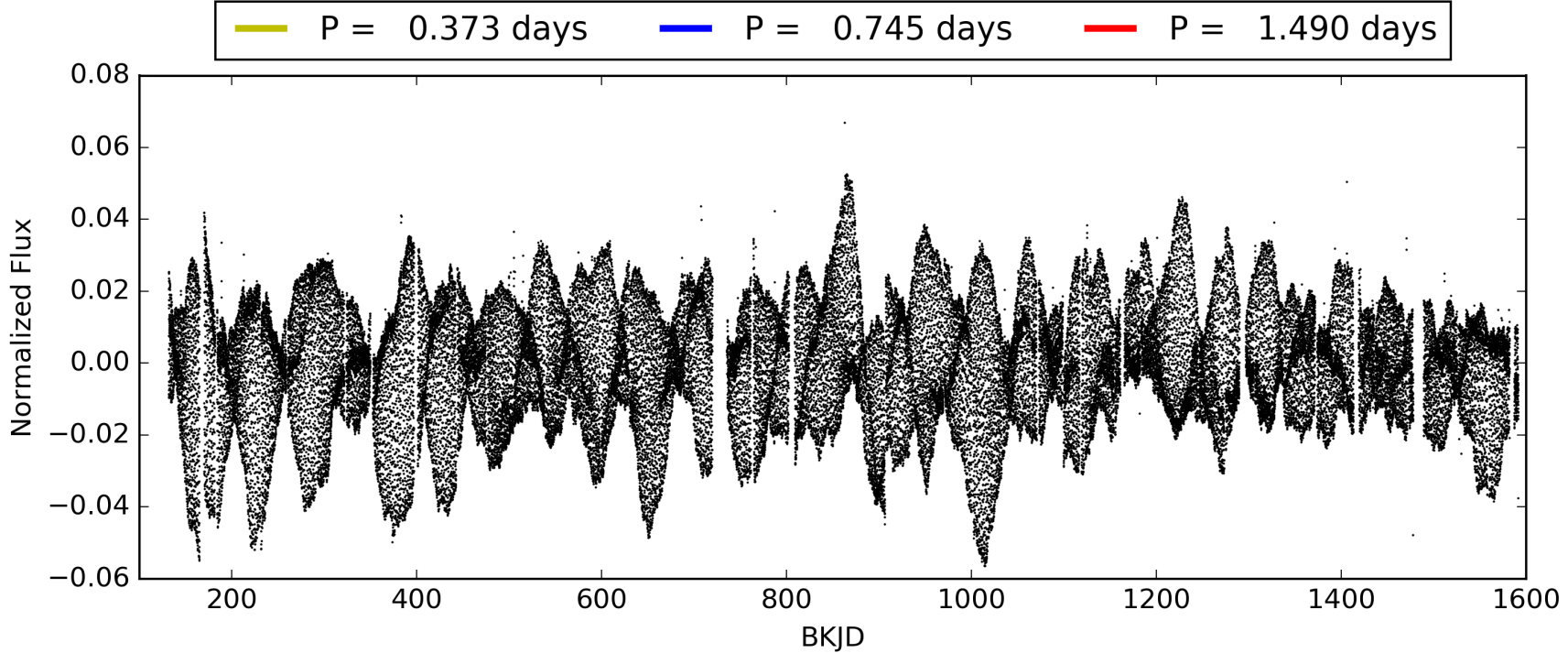
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [396.57σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 1.03e-13  
RollingBand-fgt: 1.00 [1717/1717]  
**GhostDiagnostic-chr: 0.8362**  
Centroid-sig: 0.0%  
Centroid-so: 1.171 arcsec [2.73σ]  
OotOffset-rm: 0.070 arcsec [0.95σ]  
KicOffset-rm: 0.127 arcsec [1.74σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.71 [12/17]  
DiffImageOverlap-fno: 1.00 [17/17]

# TCE 008509620-01, PDC Light Curves



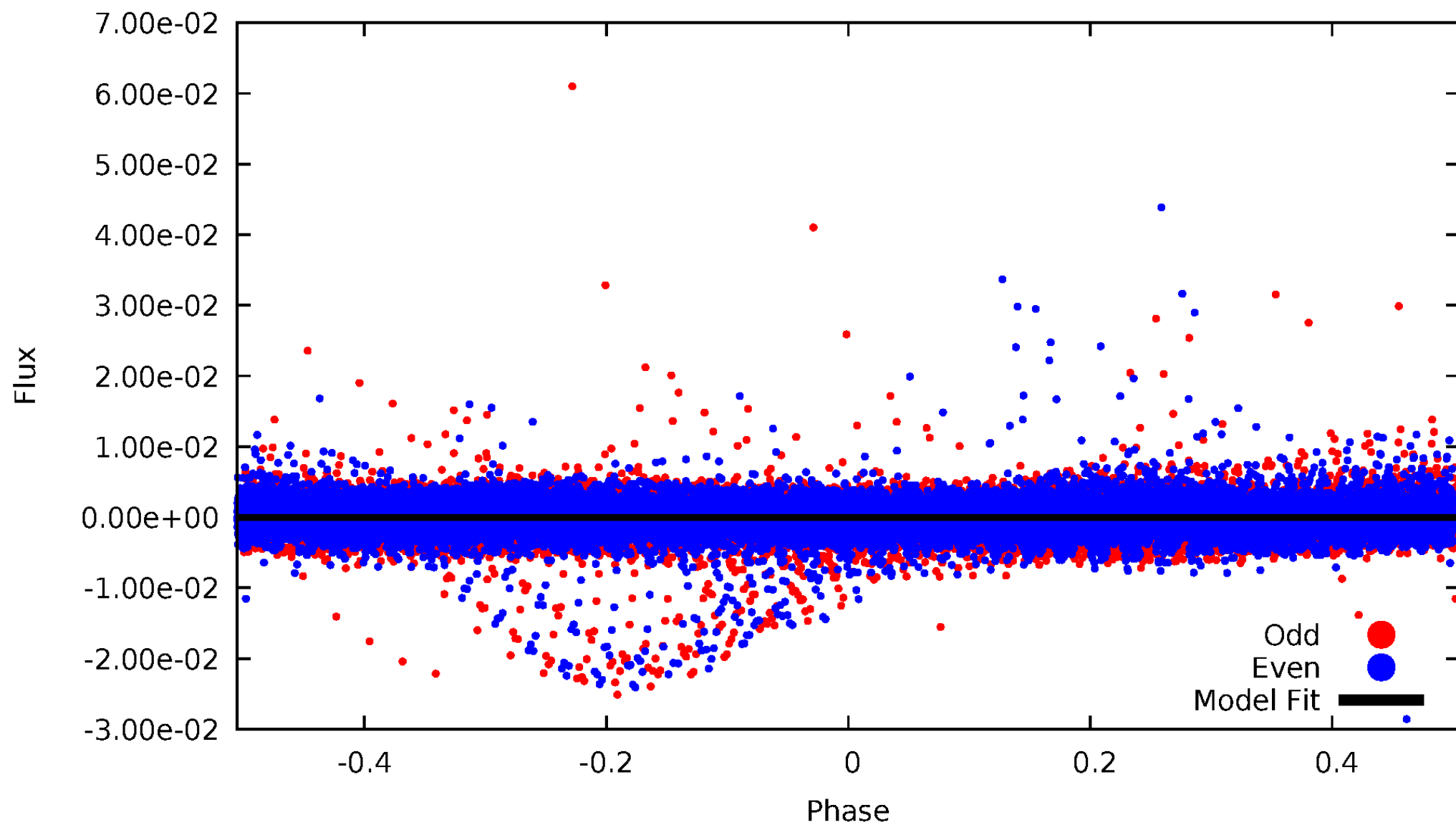
TCE 008509620-01





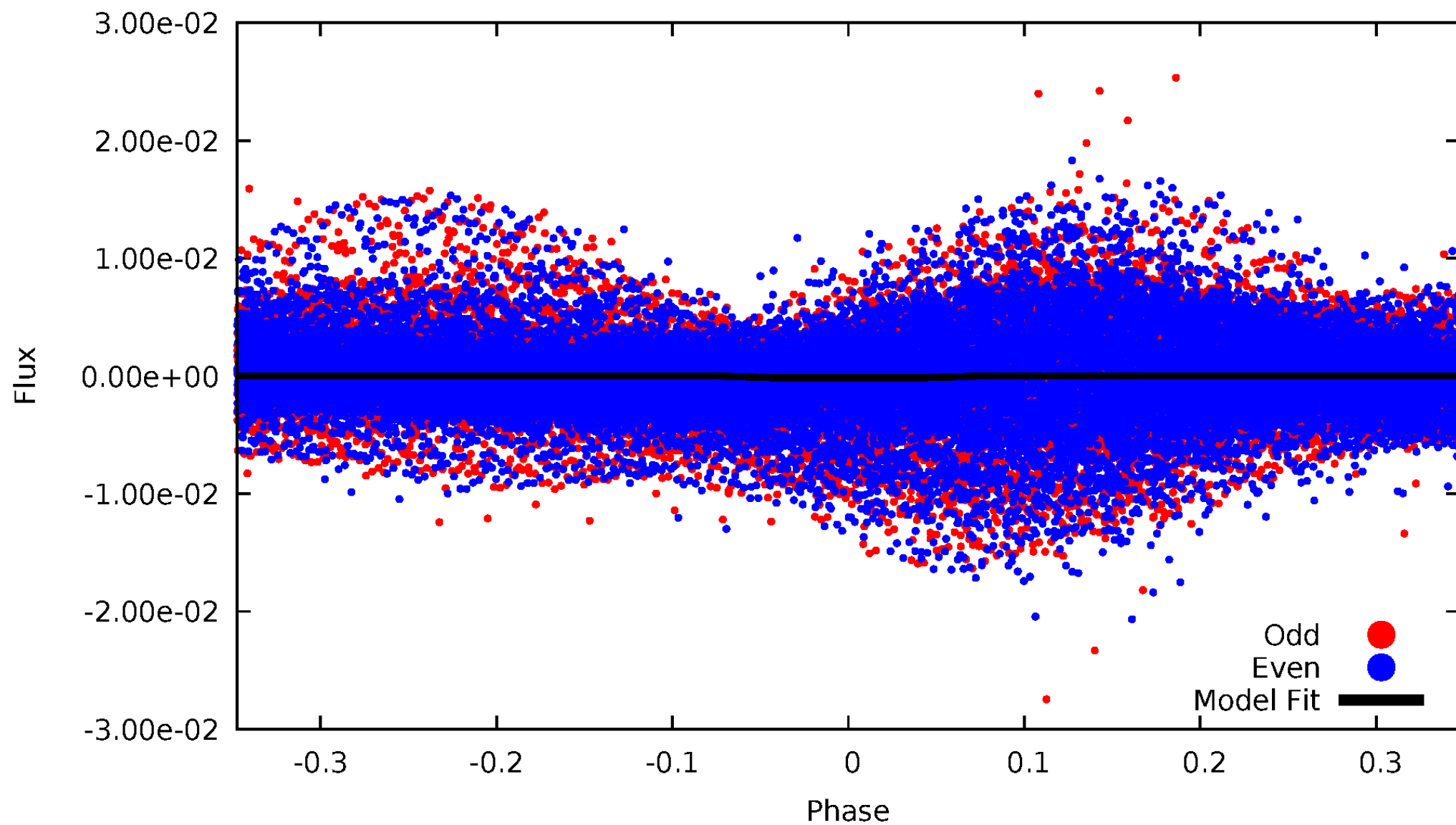
# DV Odd/Even

TCE 008509620-01

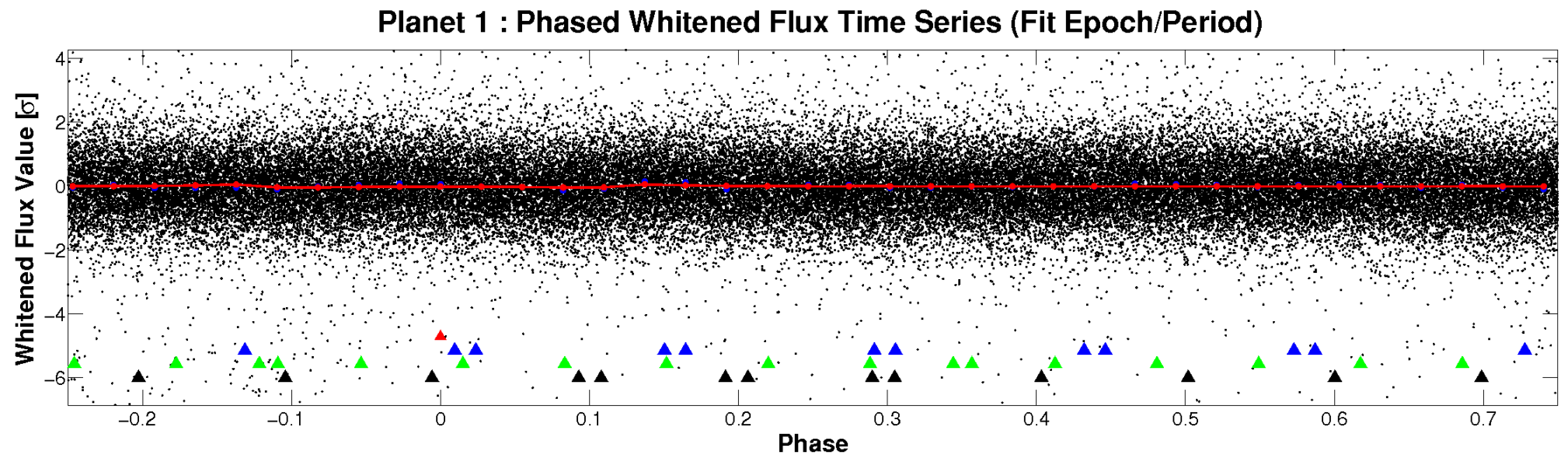
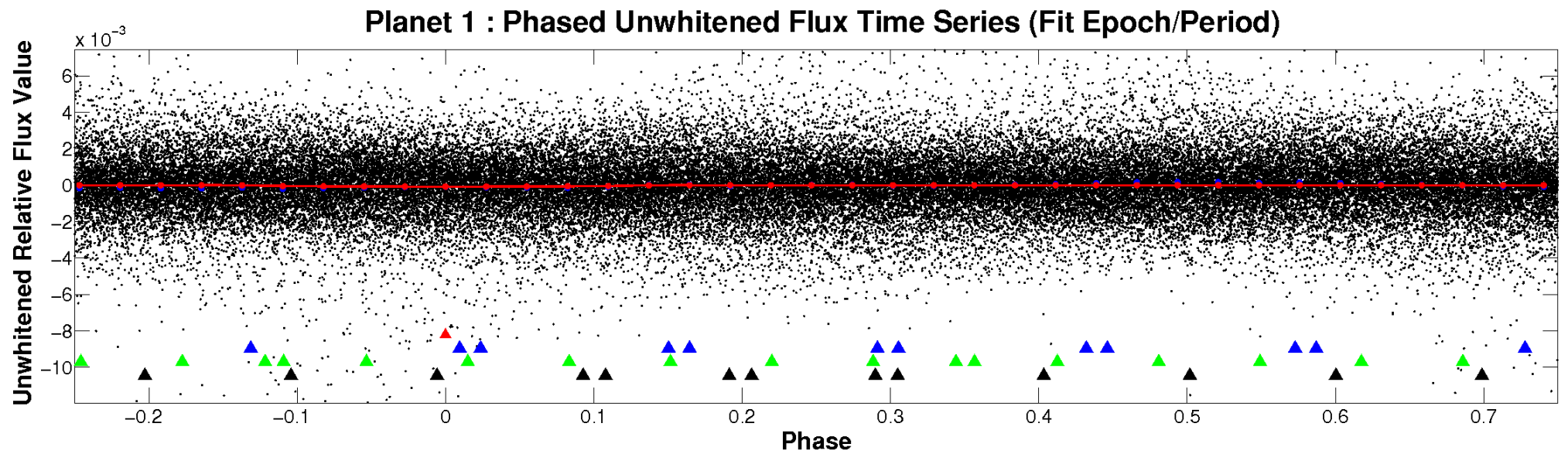


# ALT Odd/Even

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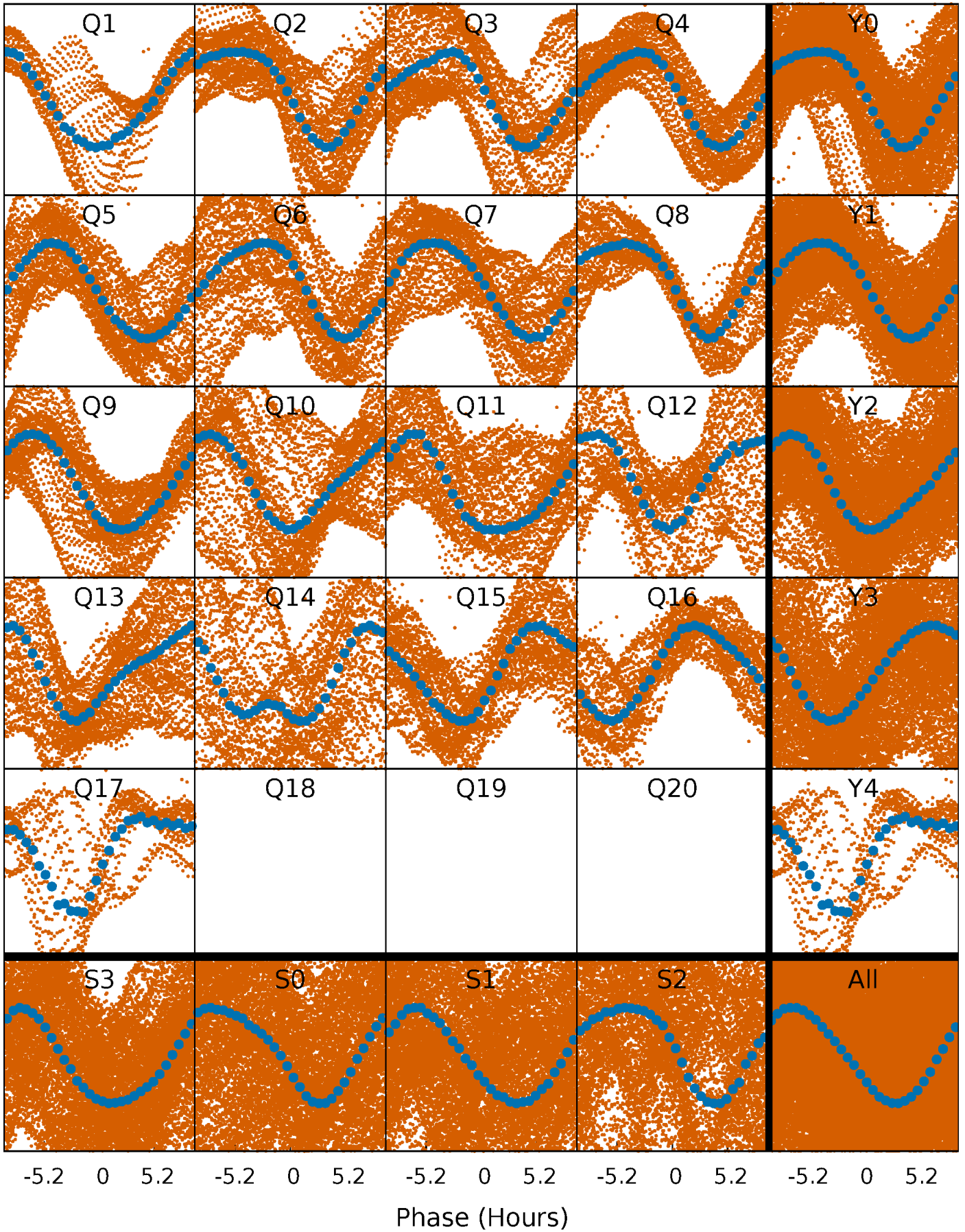


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

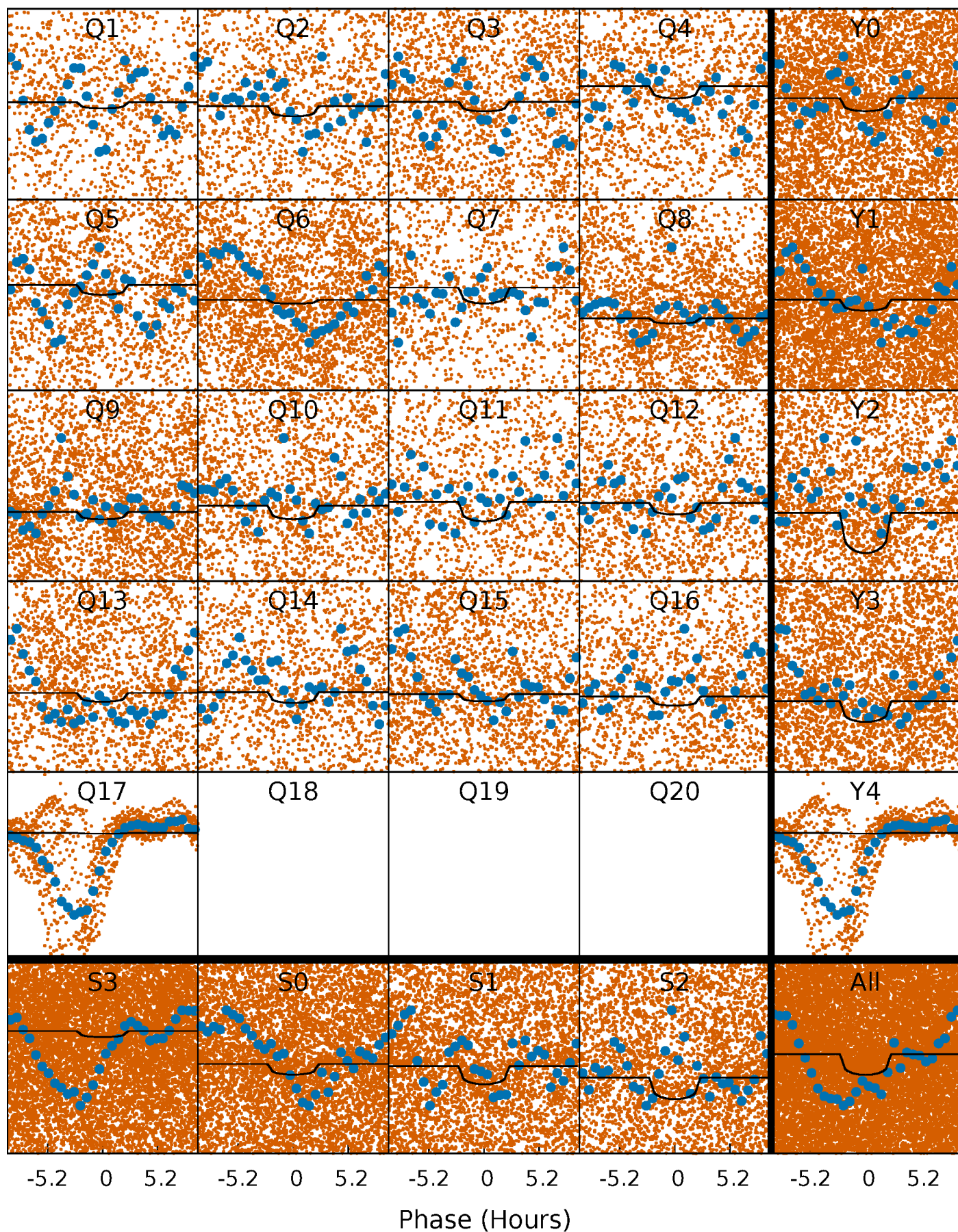
TCE 008509620-01 P= 0.745101 Days  $T_0=131.729106$  (BKJD)





# DV Quarter-Phased Transit Curves

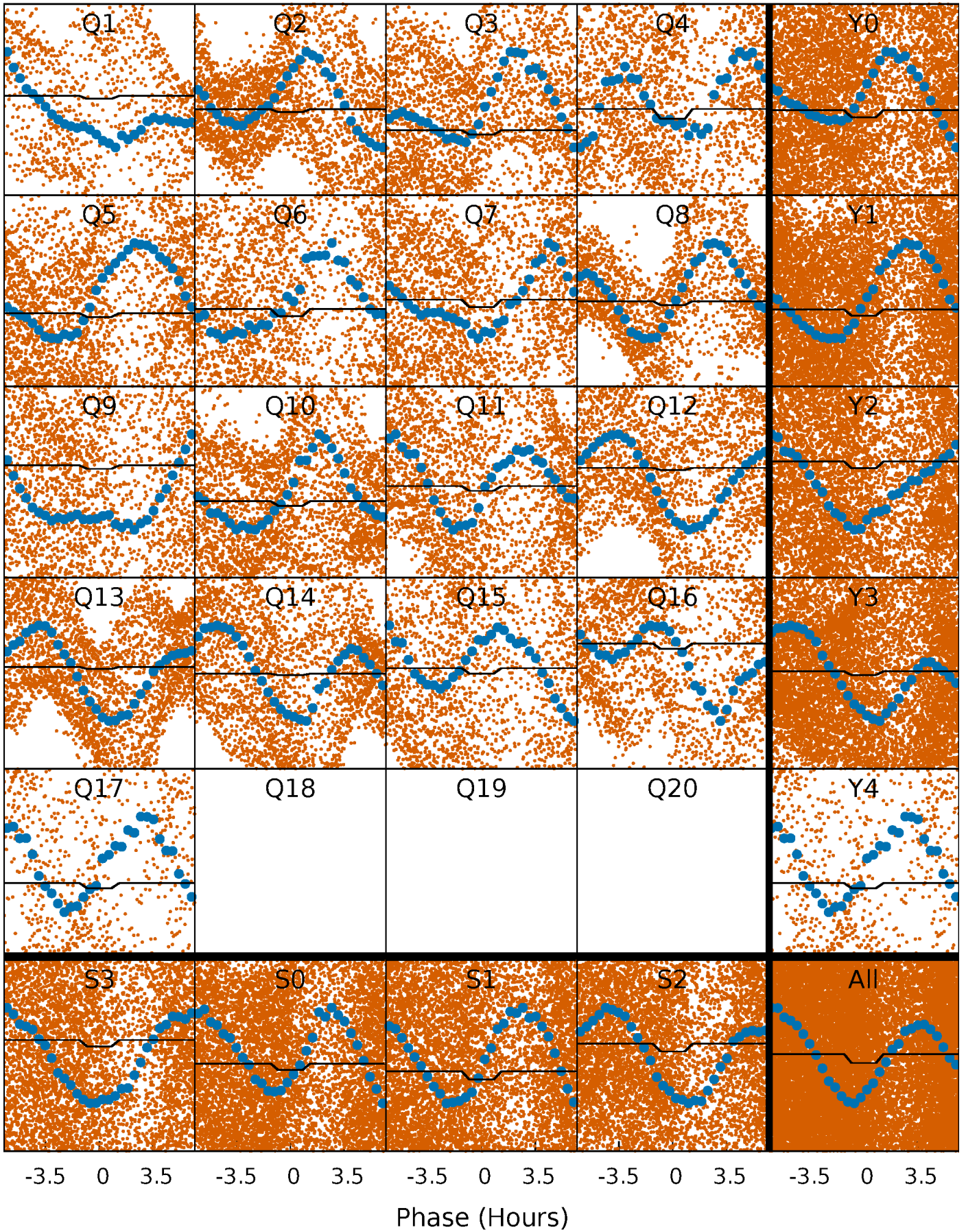
TCE 008509620-01 P= 0.745101 Days  $T_0=131.729106$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

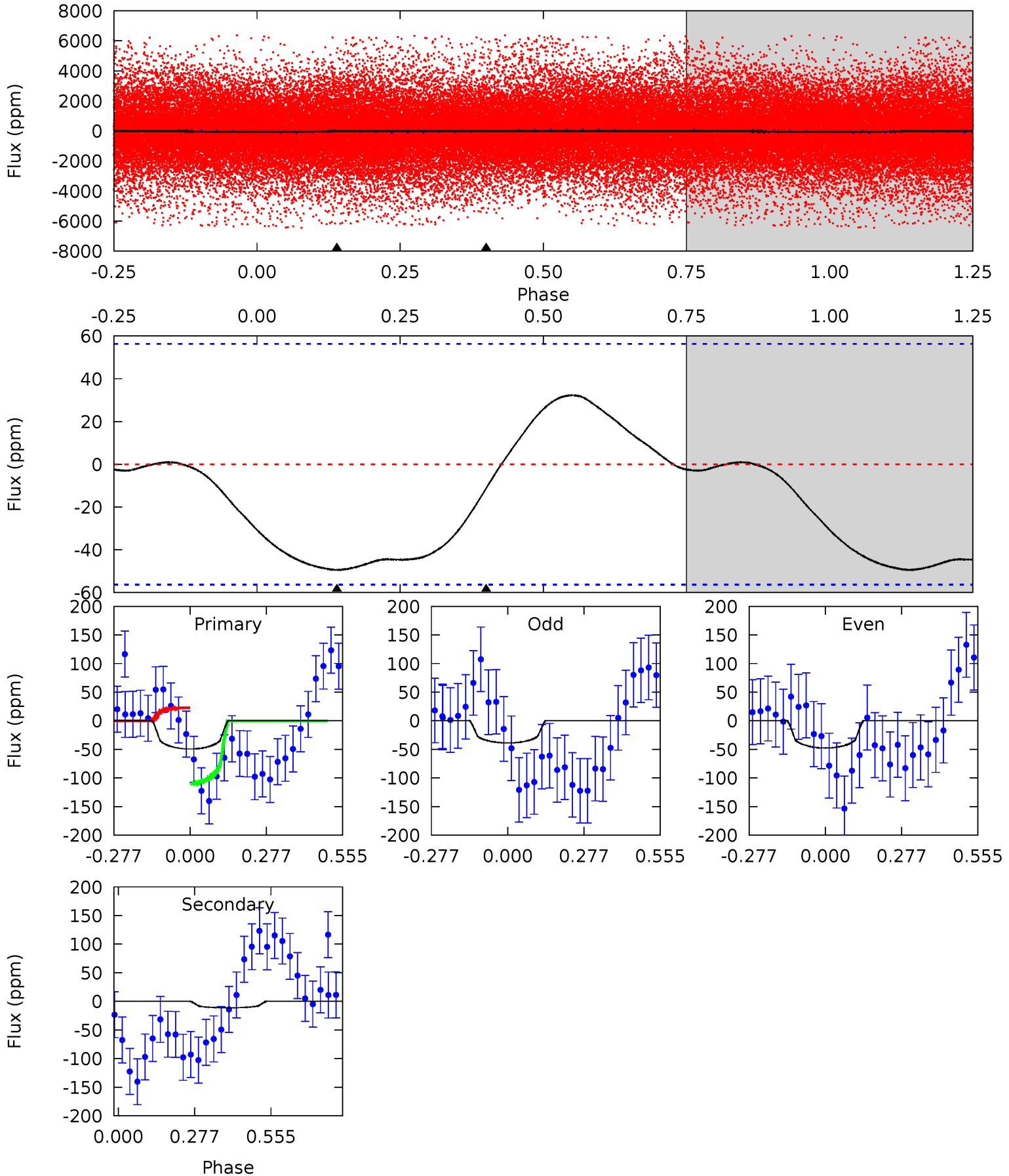
TCE 008509620-01   P= 0.744520 Days    $T_0=131.683828$  (BKJD)



# DV Model-Shift Uniqueness Test

008509620-01, P = 0.745101 Days, E = 130.984005 Days

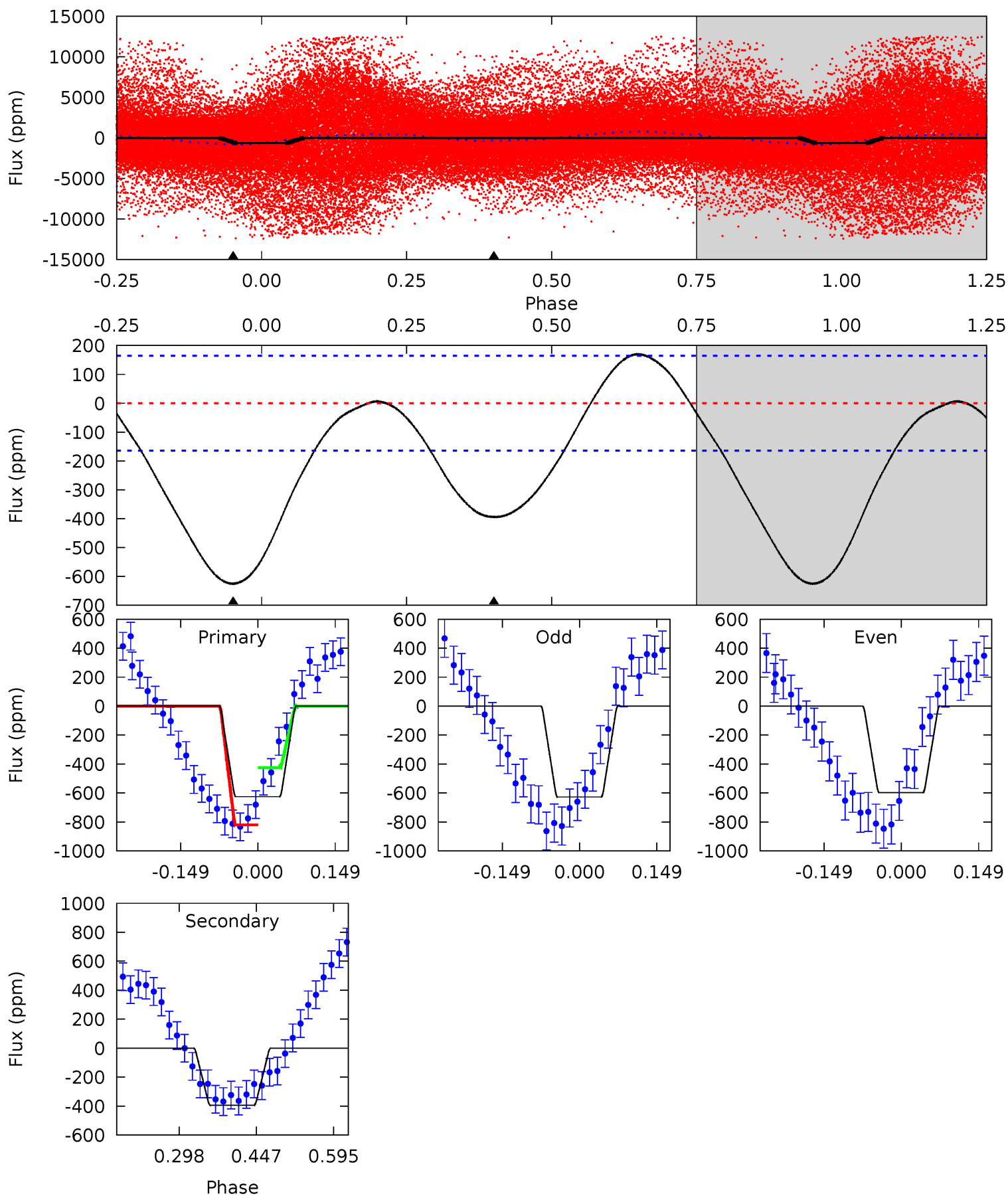
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
3.81	0.87	0	0	4.35	1.09	0.25	3.81	3.81	0.87	0.87	0.34	-233.4	0.39	3.41



# Alt Model-Shift Uniqueness Test

008509620-01, P = 0.744520 Days, E = 130.939308 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	10.7	0	0	4.48	1.44	2.56	17.0	17.0	10.7	10.7	0.41	2.34	0.21	6.01





### Stellar Parameters For KIC 008509620

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5680^{+170}_{-153}$	$4.511^{+0.092}_{-0.138}$	$-0.540^{+0.300}_{-0.300}$	$0.811^{+0.173}_{-0.093}$	$0.776^{+0.097}_{-0.056}$	$2.053^{+0.822}_{-0.819}$
	+3%/-3%	+2%/-3%	+56%/-56%	+21%/-11%	+12%/-7%	+40%/-40%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 008509620-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-11 \pm 13$	$0.75^{+0.37}_{-0.36}$	$2609^{+146}_{-122}$	$3787^{+1331}_{-6785}$	$2.295^{+7.401}_{-2.415}$
Alt.	$-394 \pm 37$	$1.11^{+0.37}_{-0.39}$	$2608^{+152}_{-126}$	$7282^{+2137}_{-996}$	$39^{+51}_{-17}$

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

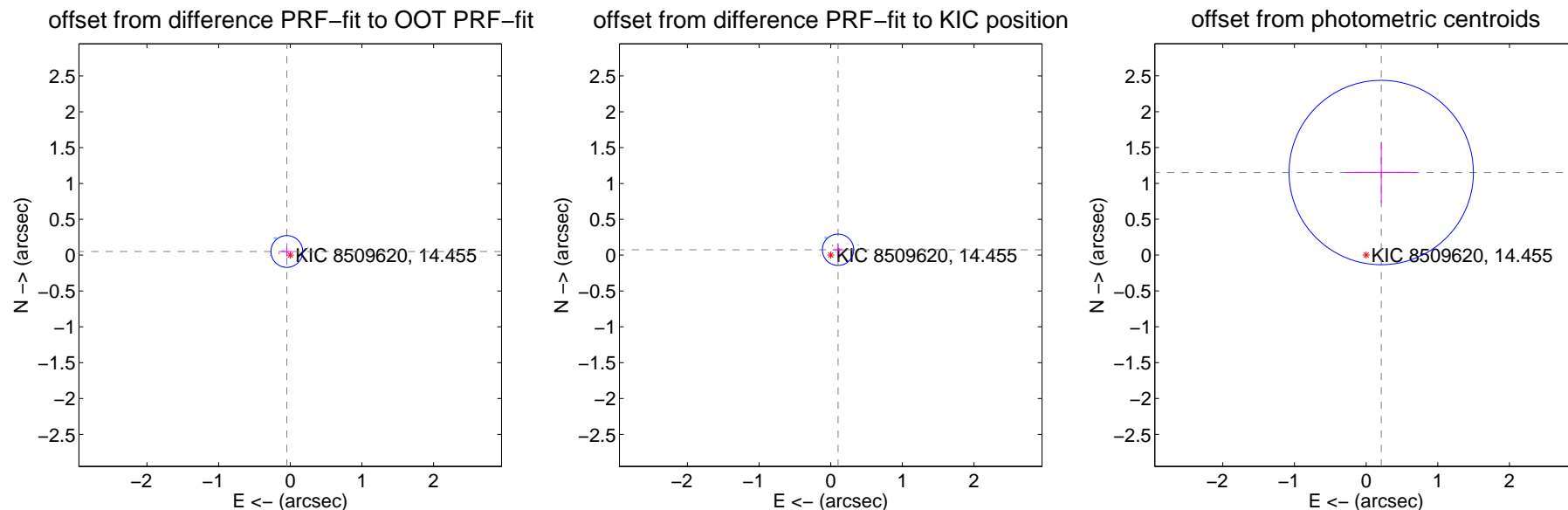
## DV Centroid Data

Supplemental centroid analysis for 008509620-01. Kepler magnitude: 14.46. Transit SNR 5.47

There are 12 quarters with good PRF difference image offsets

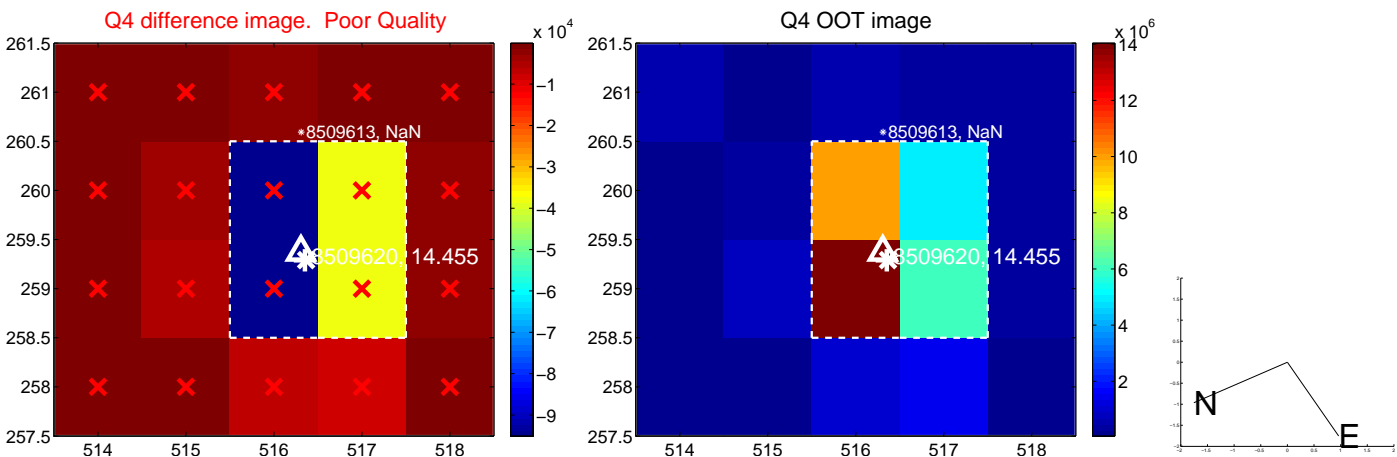
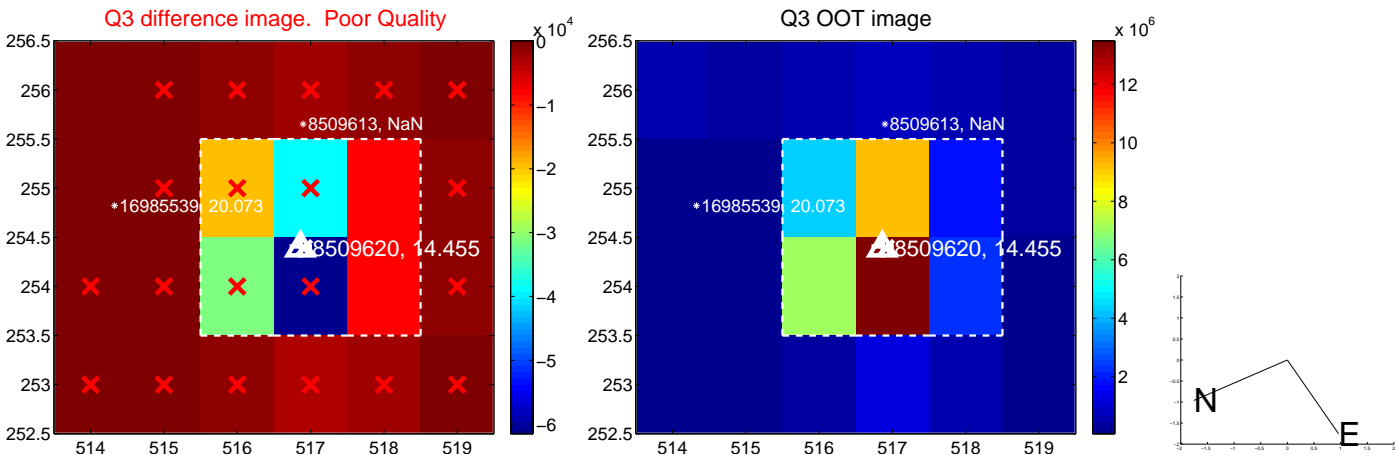
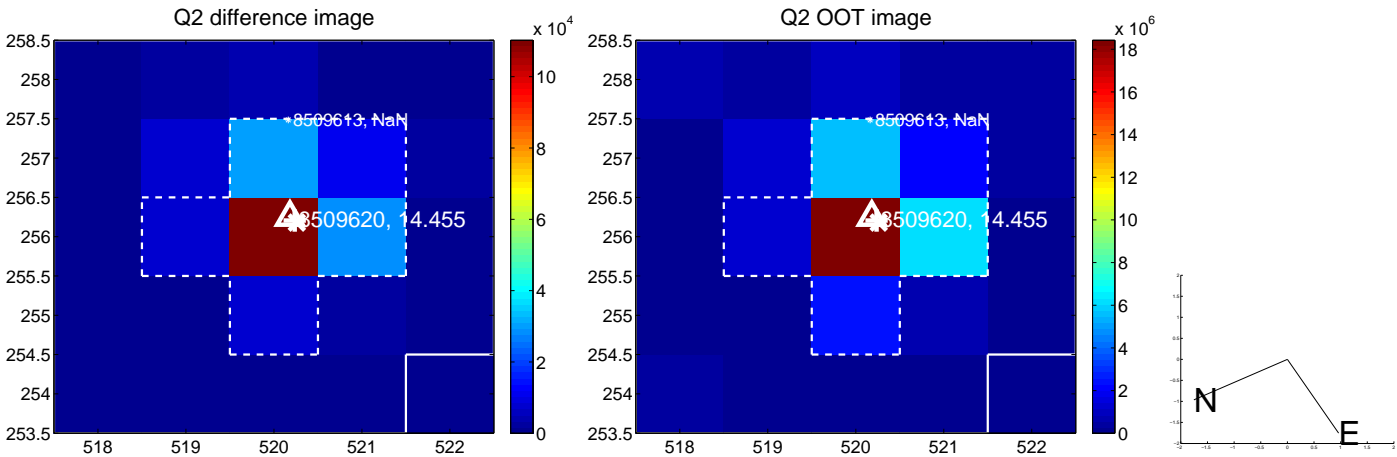
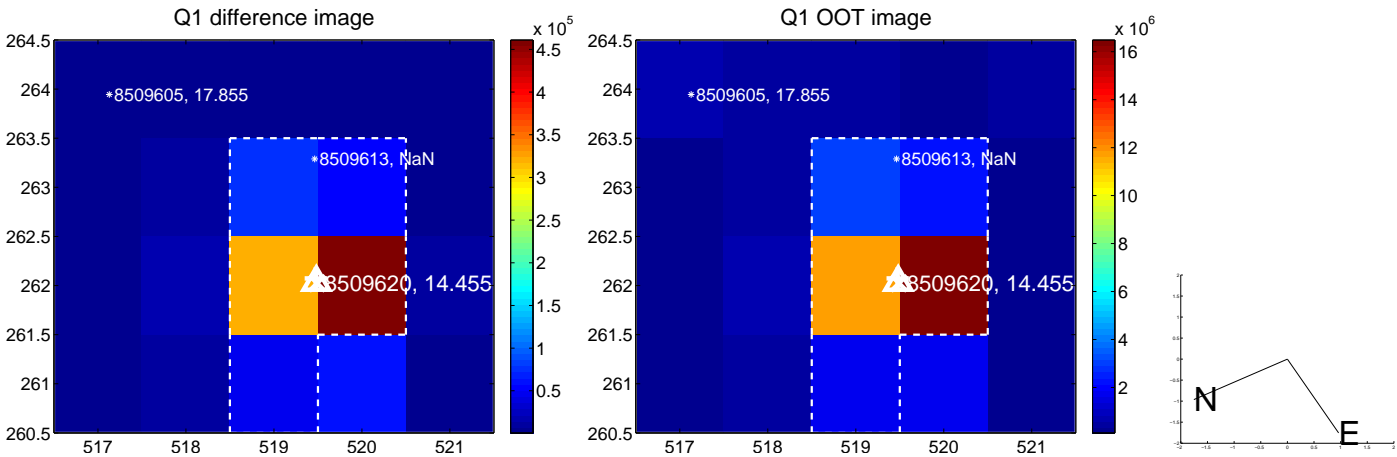
The direct PRF centroid is offset from the target star catalog position by about 0.18 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.070 \pm 0.074$	0.95	$0.048 \pm 0.080$	$0.051 \pm 0.068$
PRF-fit source offset from KIC position	$0.127 \pm 0.073$	1.74	$-0.102 \pm 0.075$	$0.075 \pm 0.068$
photometric centroid source offset	$1.17 \pm 0.43$	2.73	$-0.21 \pm 0.50$	$1.15 \pm 0.43$

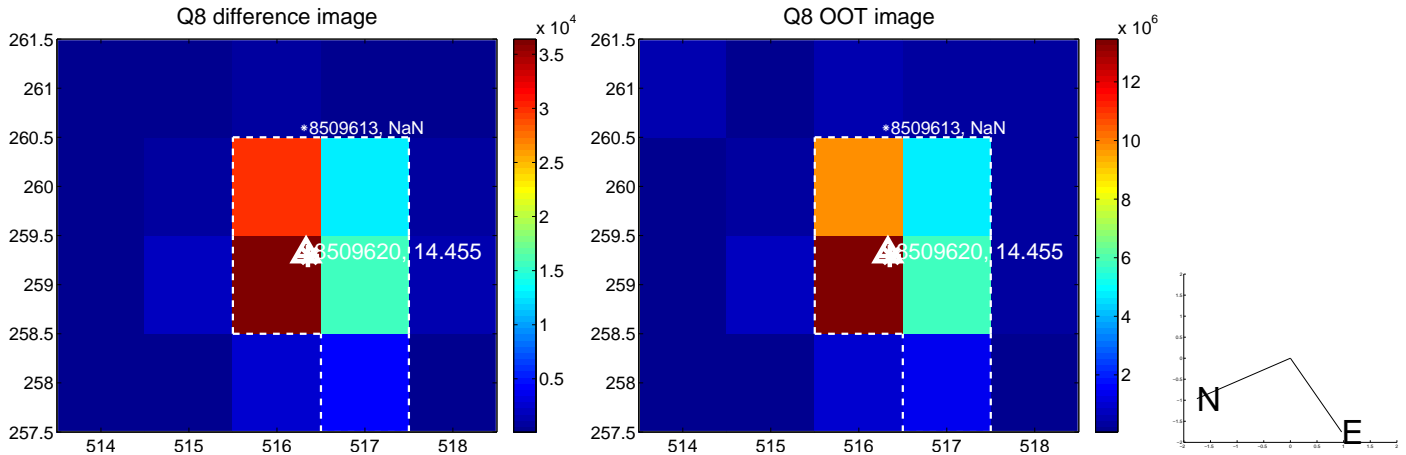
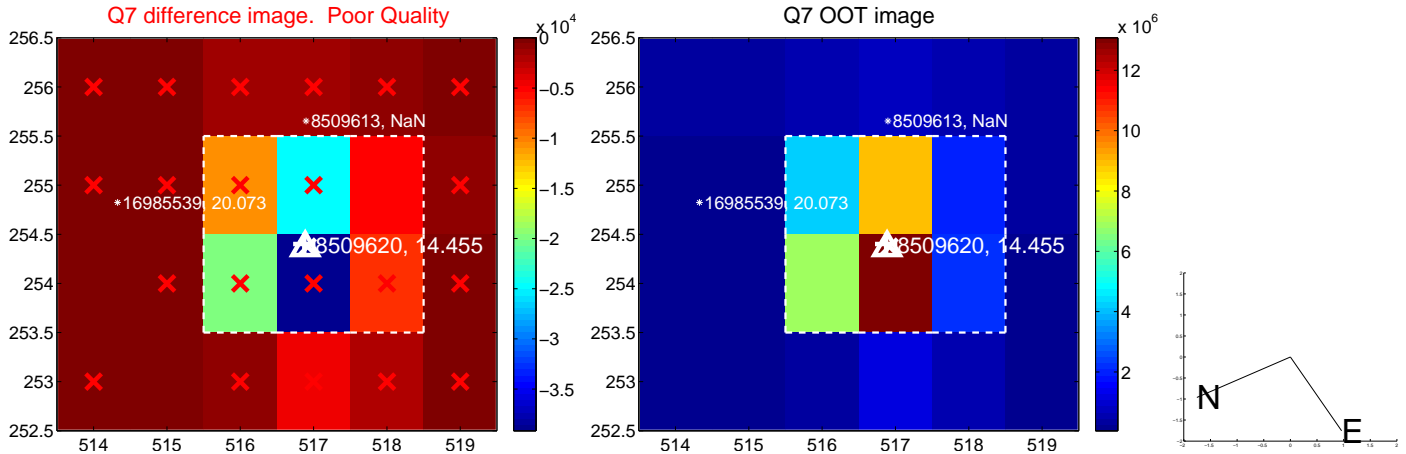
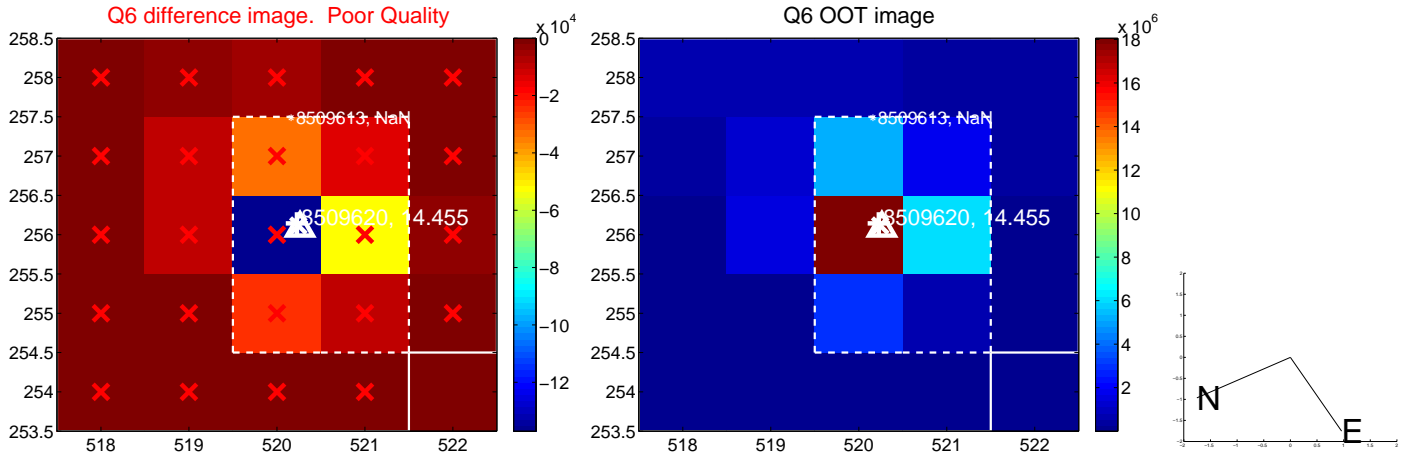
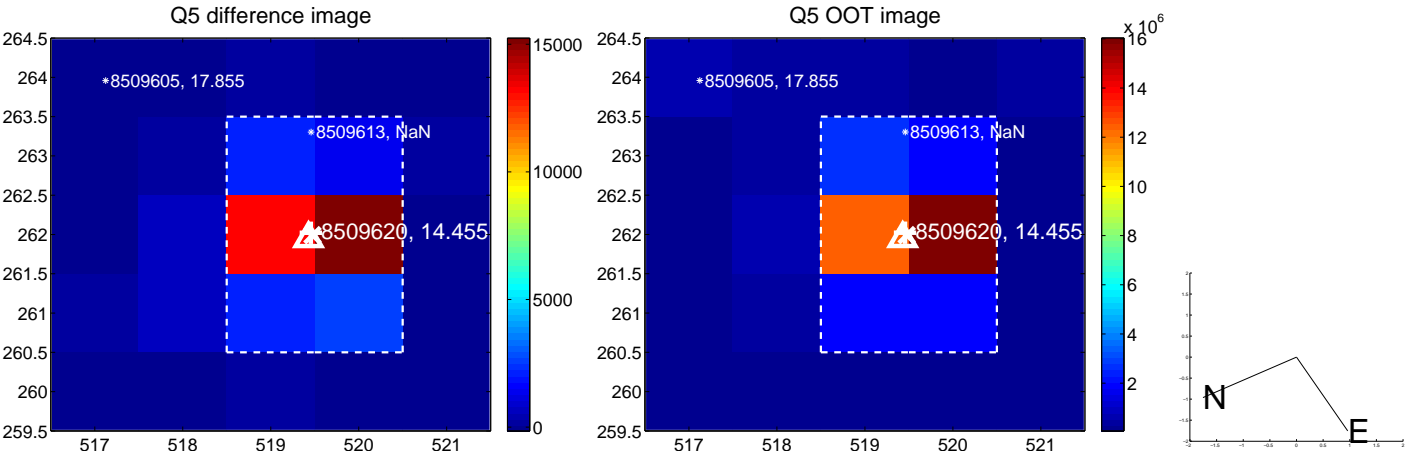


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

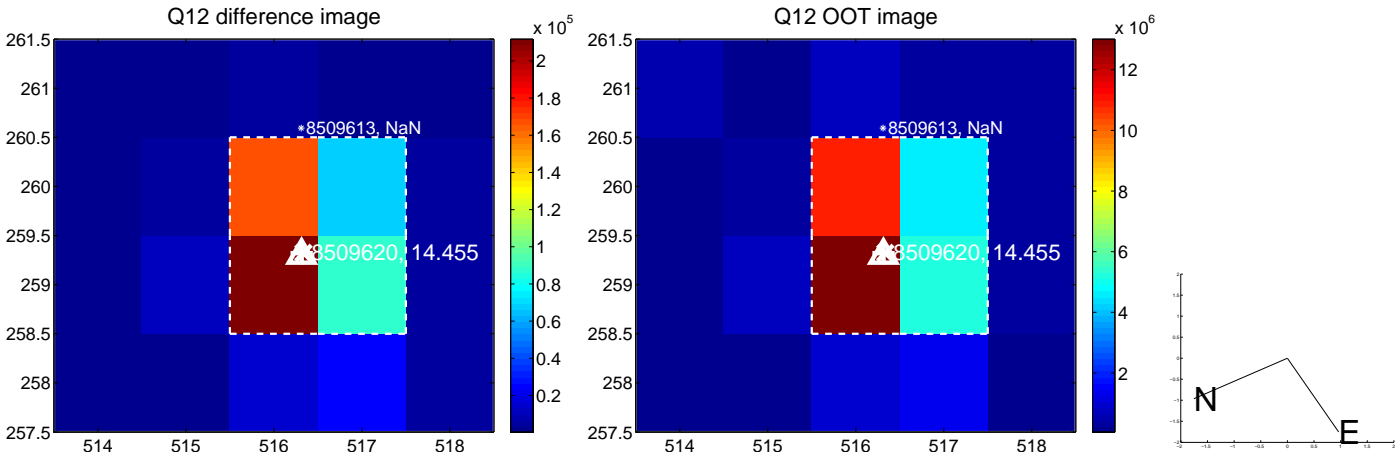
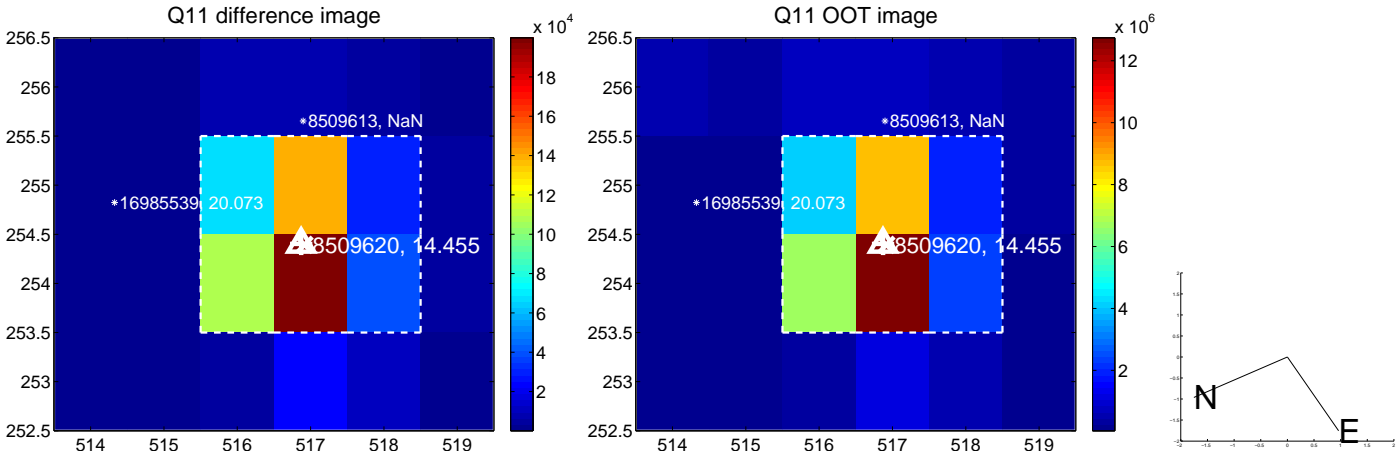
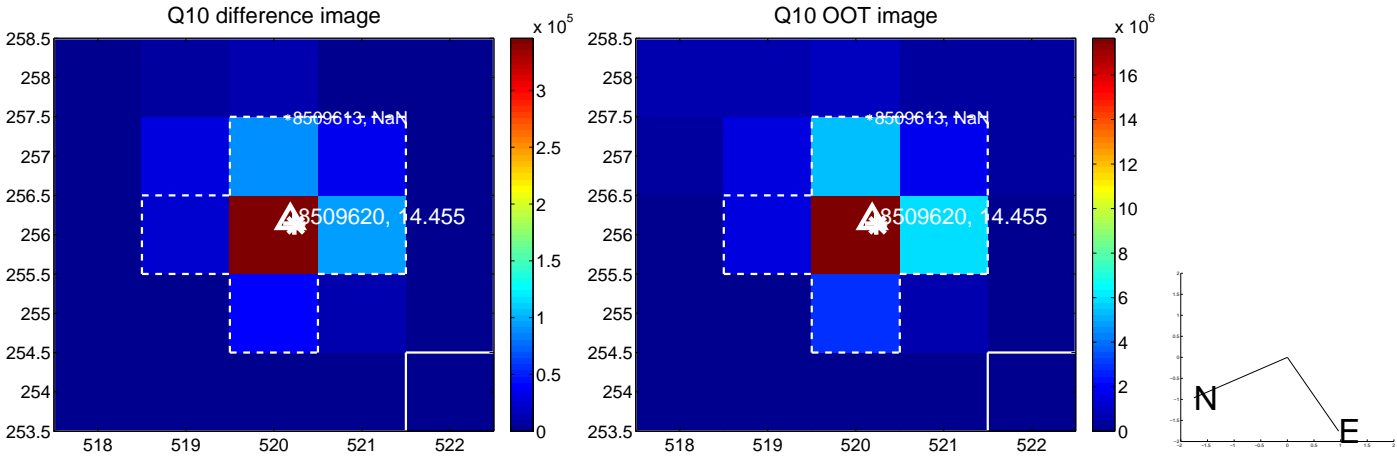
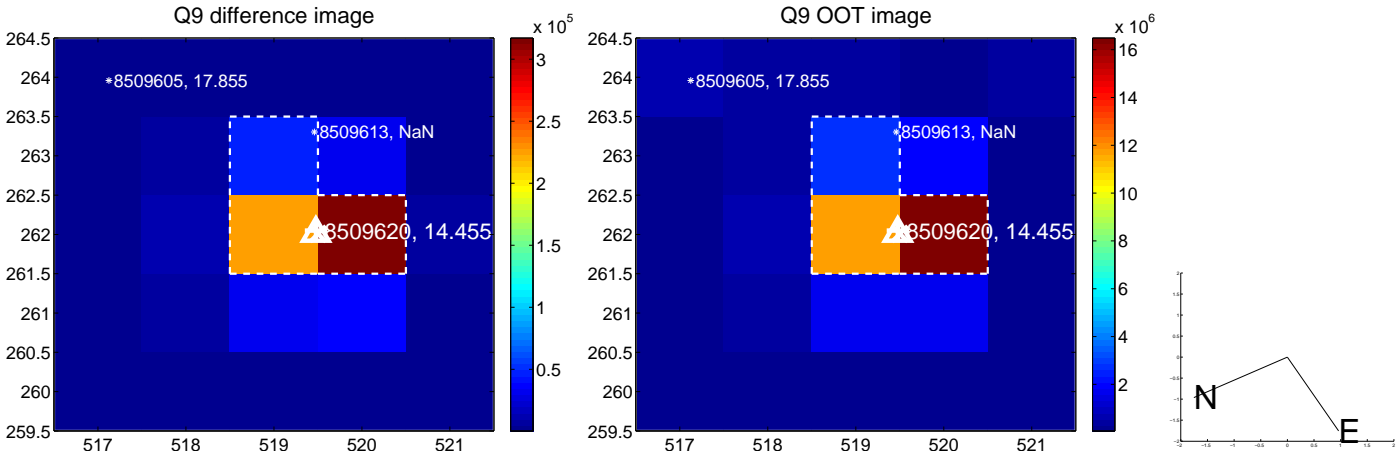


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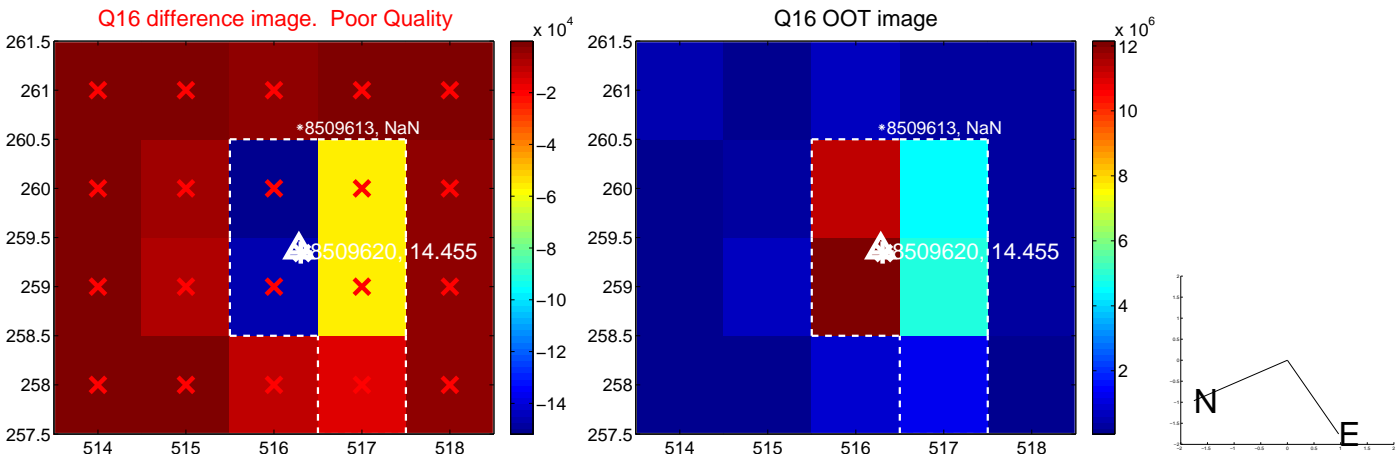
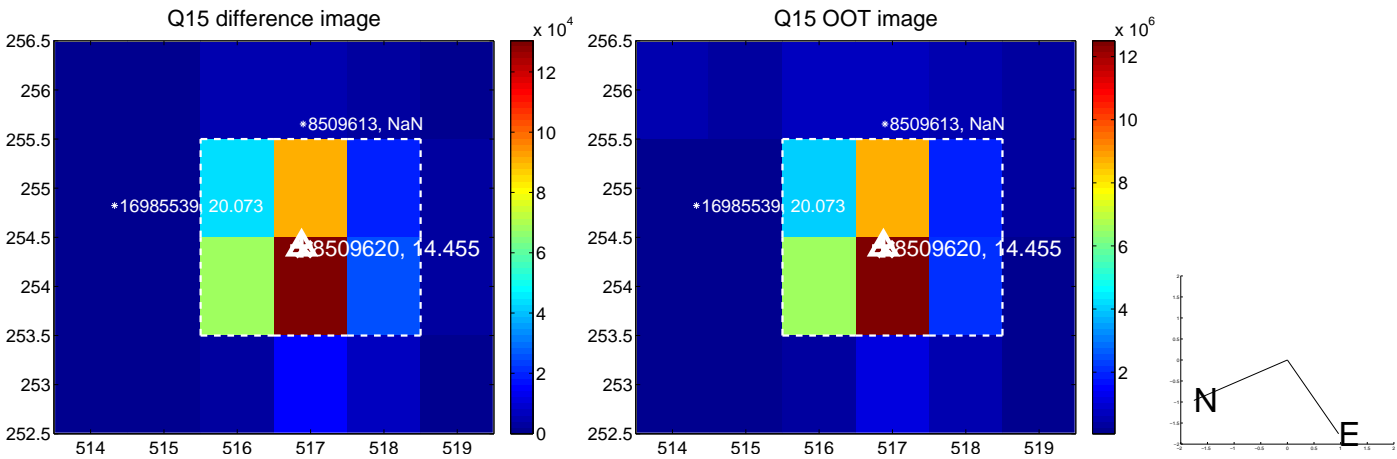
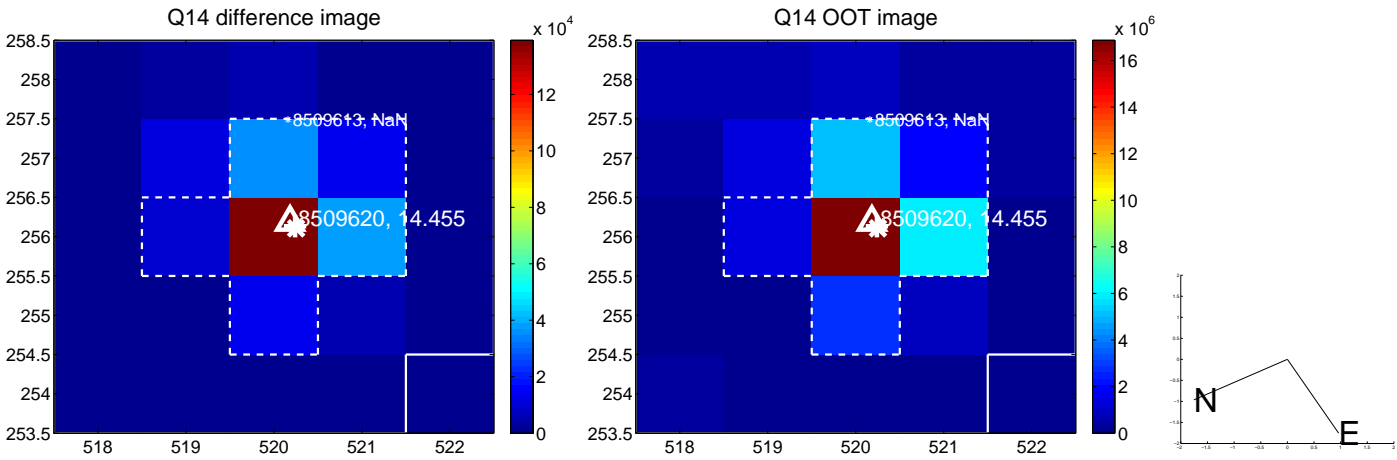
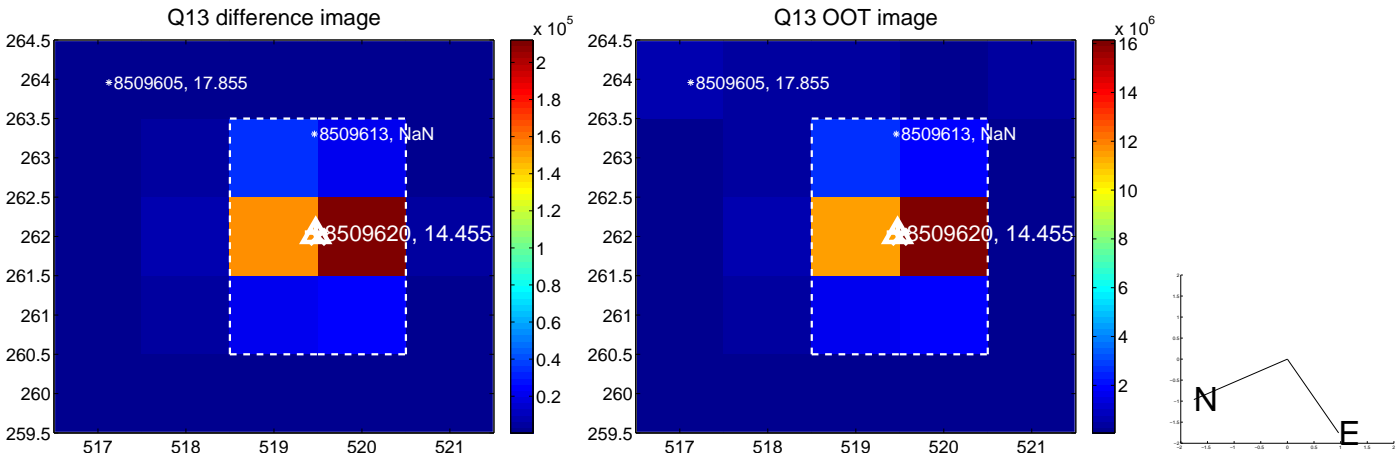




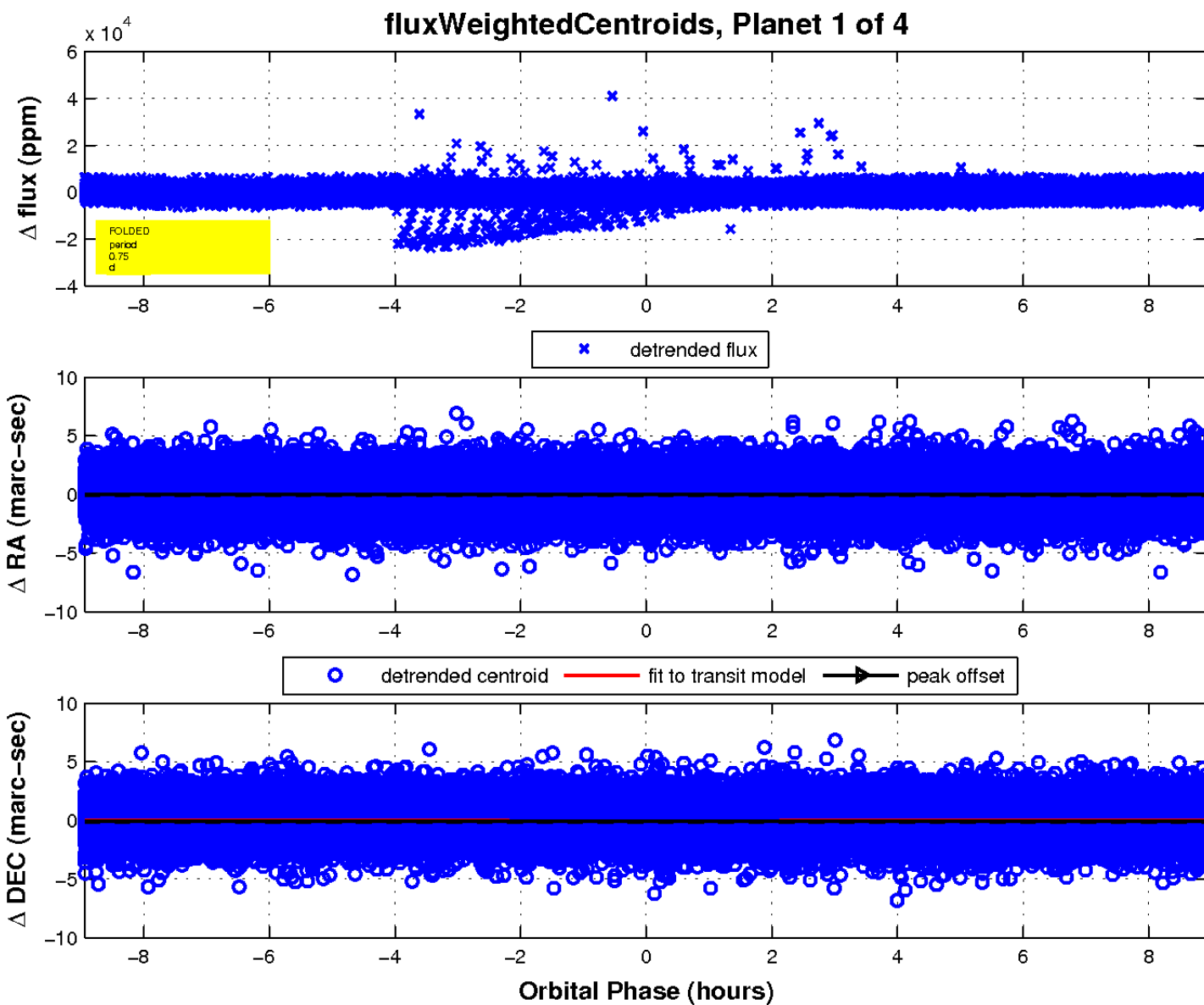
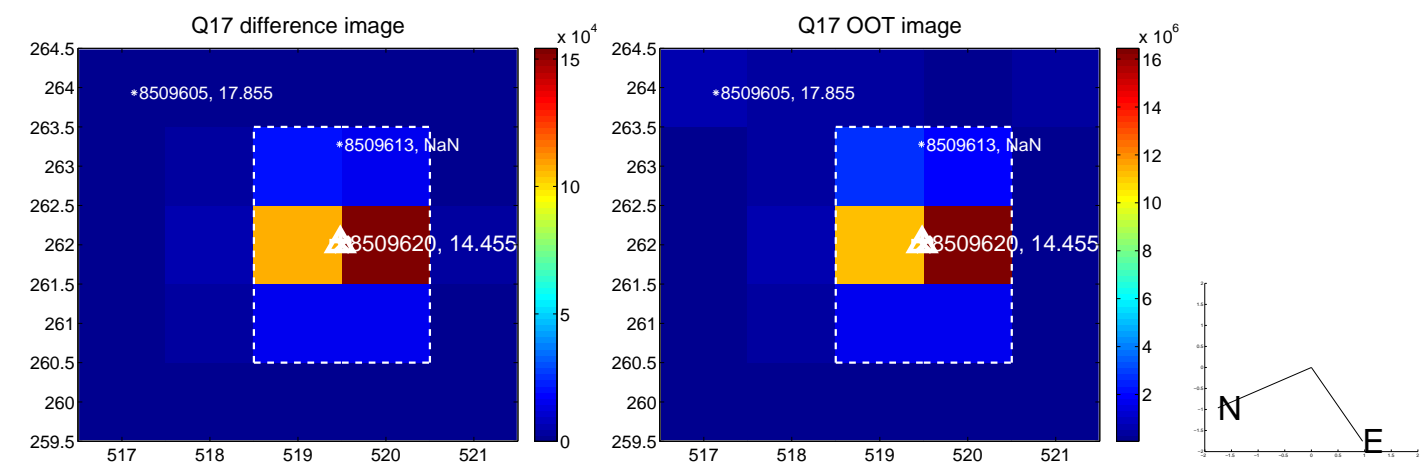
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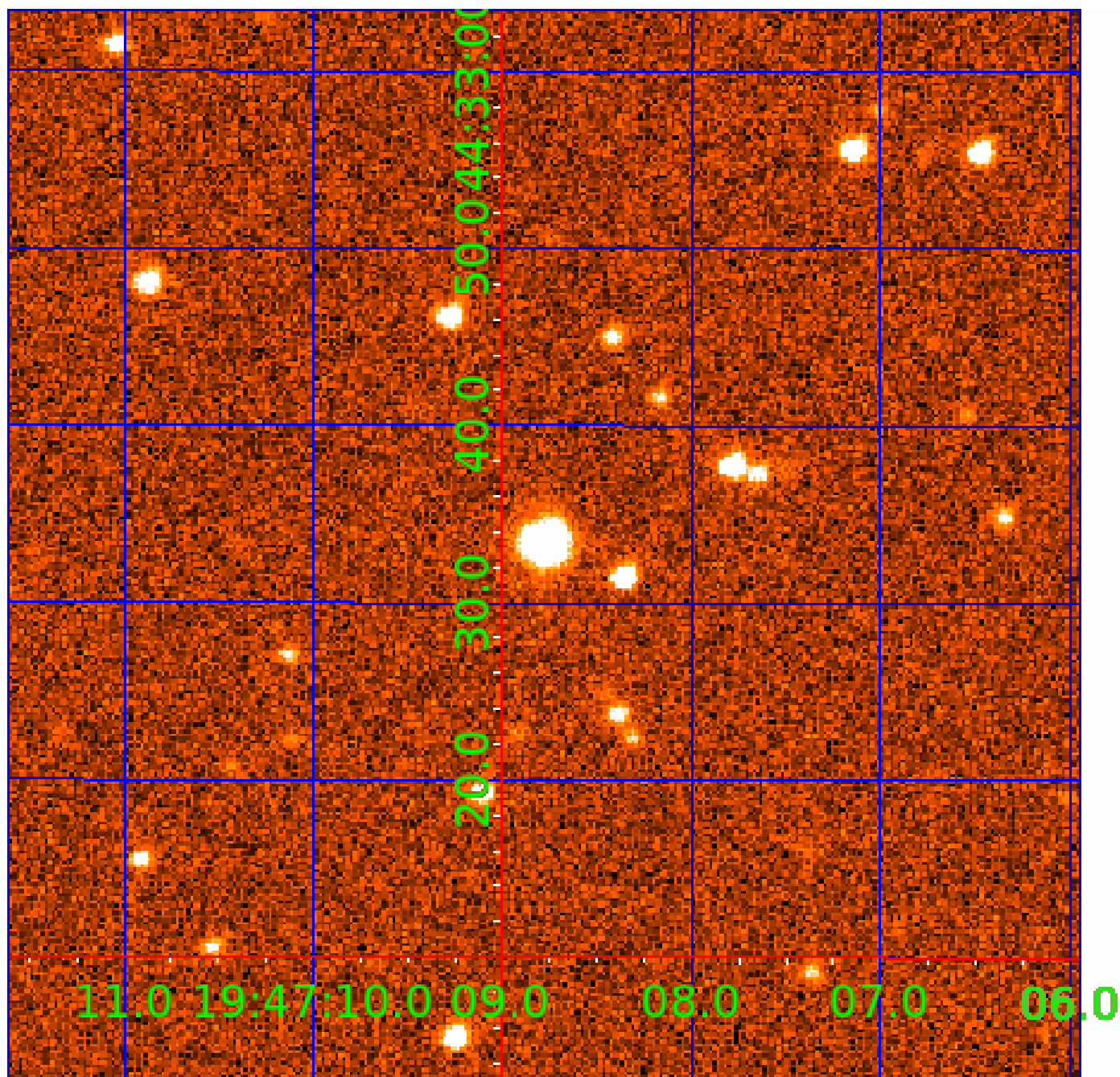


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UKIRT Image

Declination





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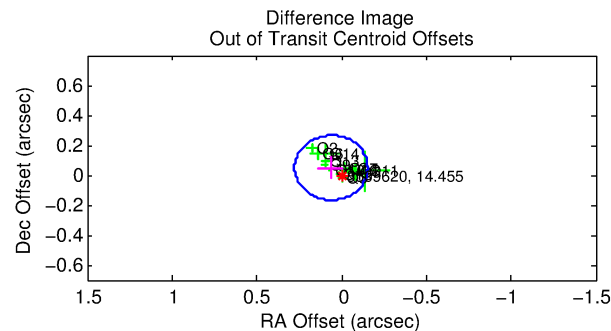
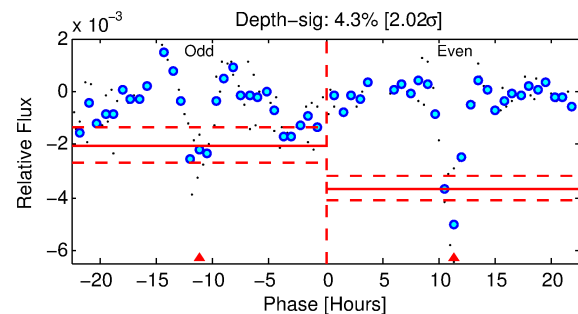
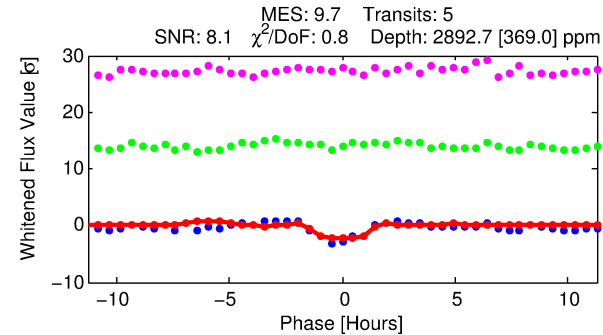
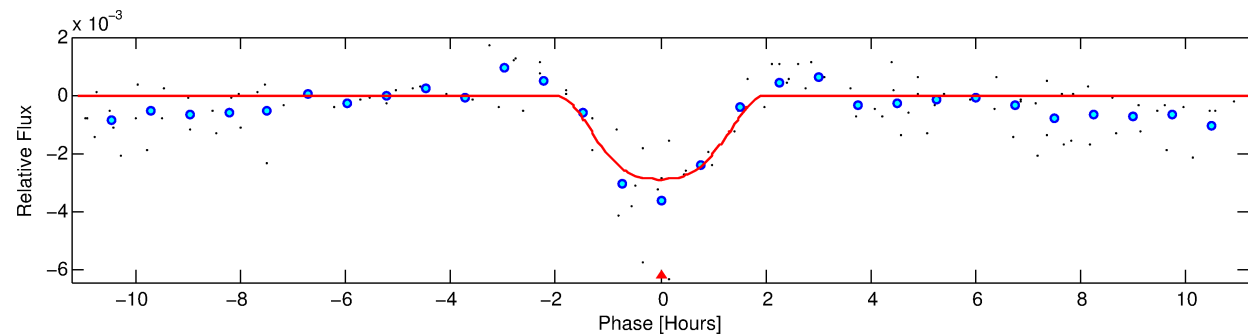
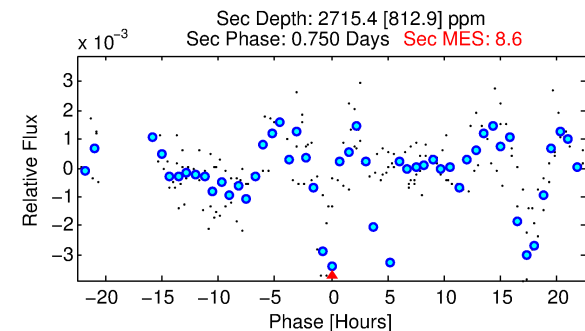
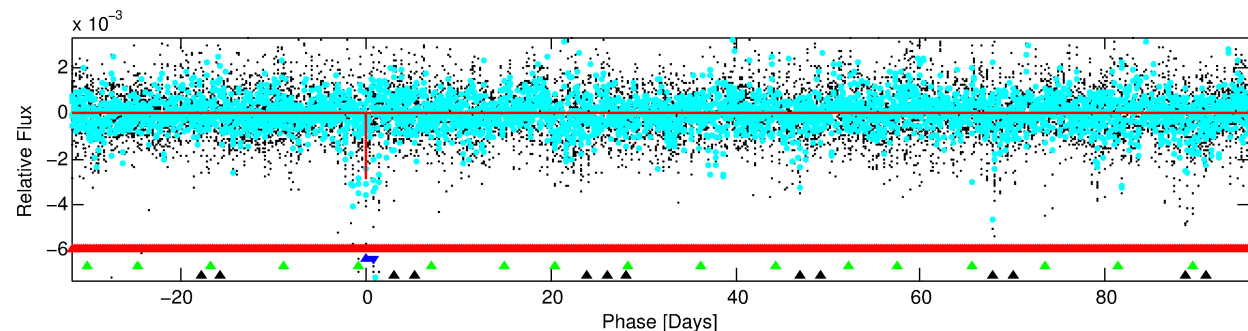
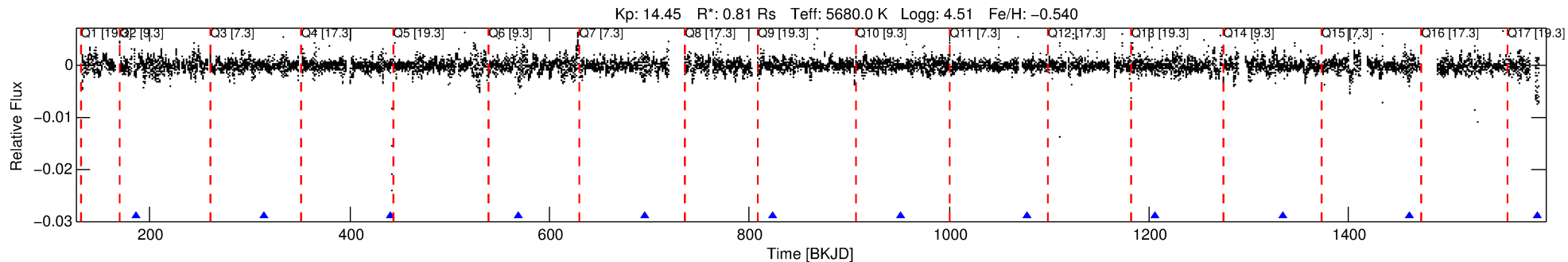
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 008509620-02

No Significant Match Found

# DV One-Page Summary

KIC: 8509620 Candidate: 2 of 4 Period: 127.517 d



## DV Fit Results:

Period = 127.51719 [0.00141] d  
Epoch = 186.1391 [0.0104] BKJD  
Rp/R\* = 0.0609 [0.0056]  
a/R\* = 131.89 [24.04]  
b = 0.93 [0.03]  
Seff = 2.95 [0.83]  
Teq = 334 [24] K  
Rp = 5.39 [1.25] Re  
a = 0.4561 [0.0809] AU  
Ag = 10689.71 [4637.82] [2.30σ]  
**Teffp = 5253 [487] K [10.09σ]**

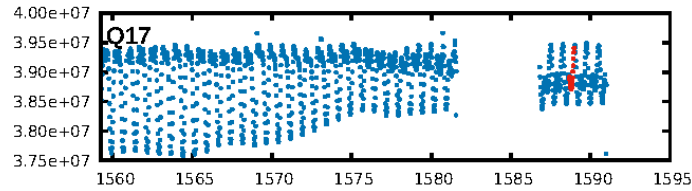
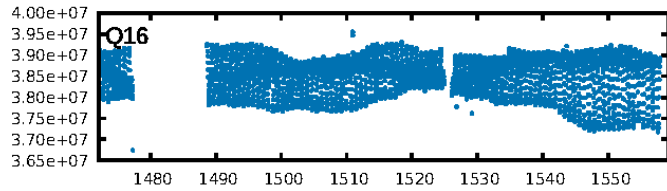
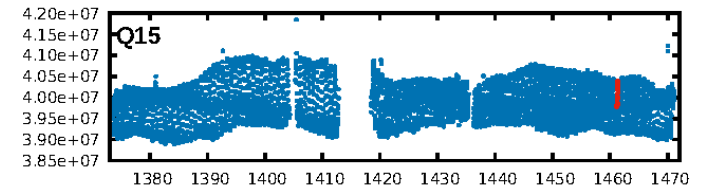
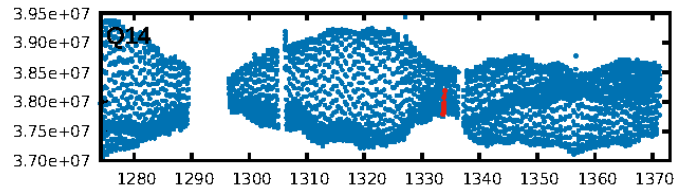
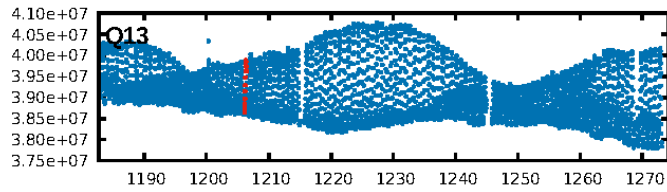
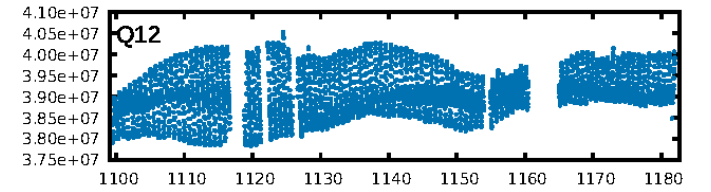
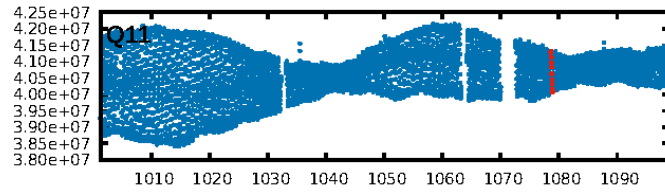
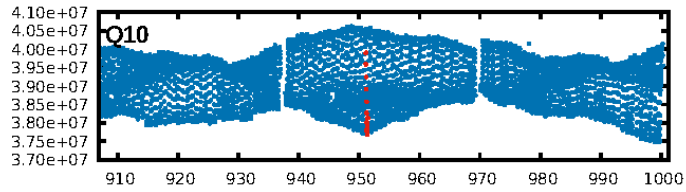
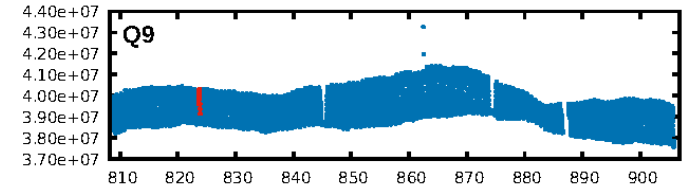
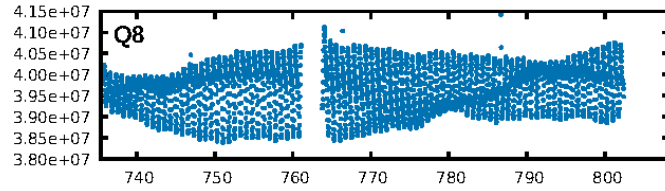
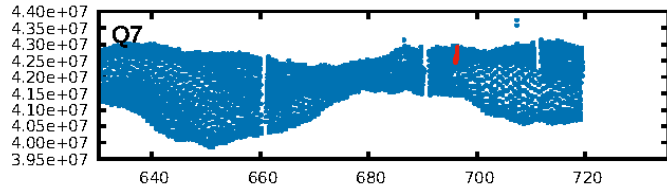
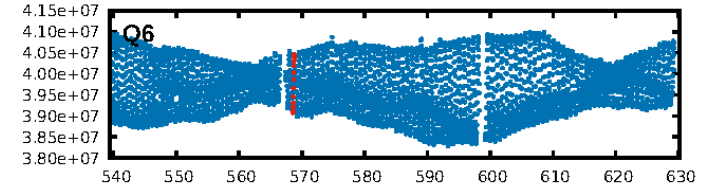
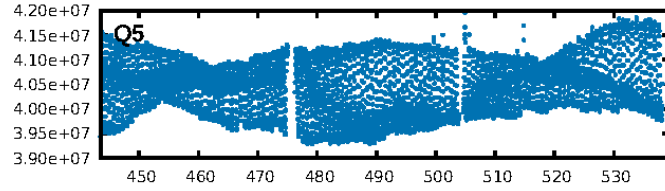
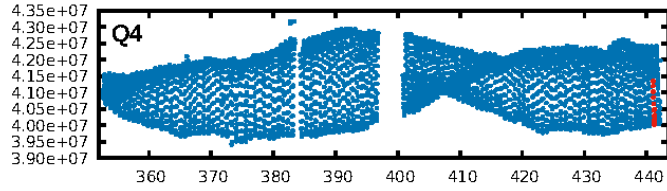
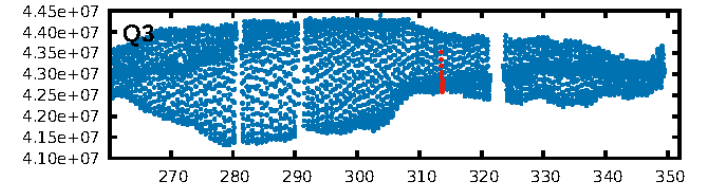
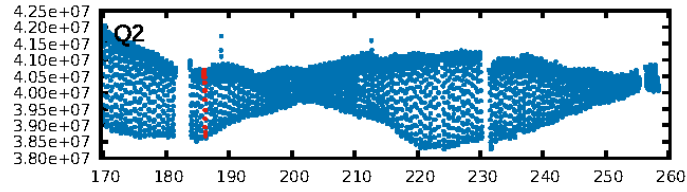
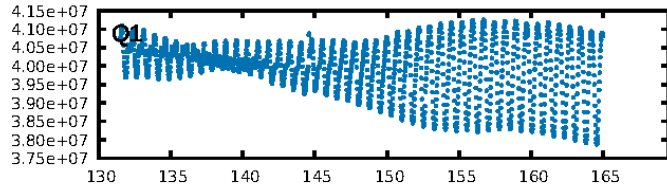
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [70.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 3.9%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 1.03e-07**  
RollingBand-fgt: 1.00 [4/4]  
**GhostDiagnostic-chr: 0.4193**  
Centroid-sig: 40.7%  
Centroid-so: 0.534 arcsec [2.53σ]  
OotOffset-rm: 0.079 arcsec [1.10σ]  
OotOffset-st: 4/4/1/3 [12]  
KicOffset-rm: 0.131 arcsec [1.90σ]  
KicOffset-st: 4/4/1/3 [12]  
DiffImageQuality-fgm: 0.50 [6/12]  
DiffImageOverlap-fno: 0.00 [0/12]

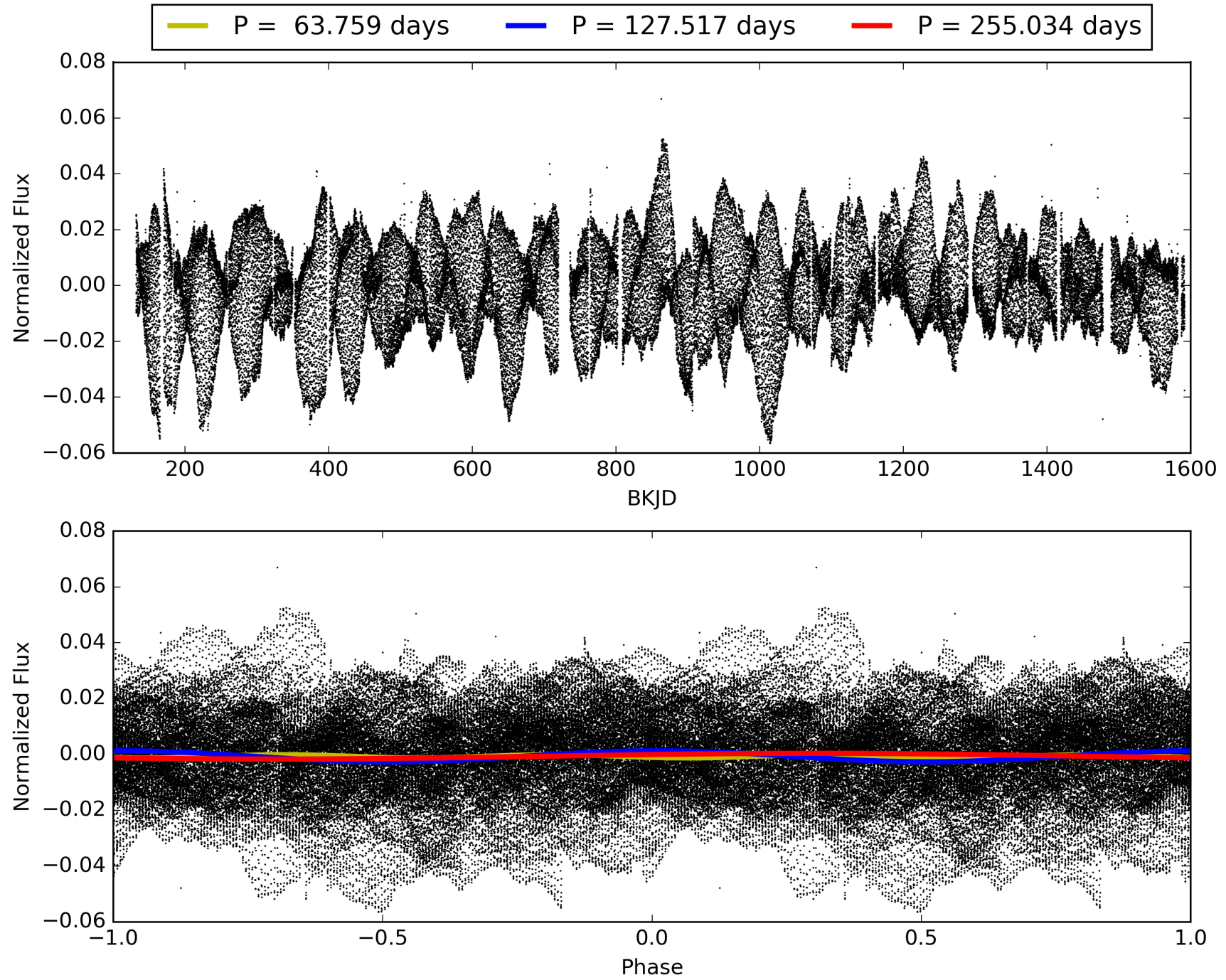
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 07:37:40 Z

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

# TCE 008509620-02, PDC Light Curves



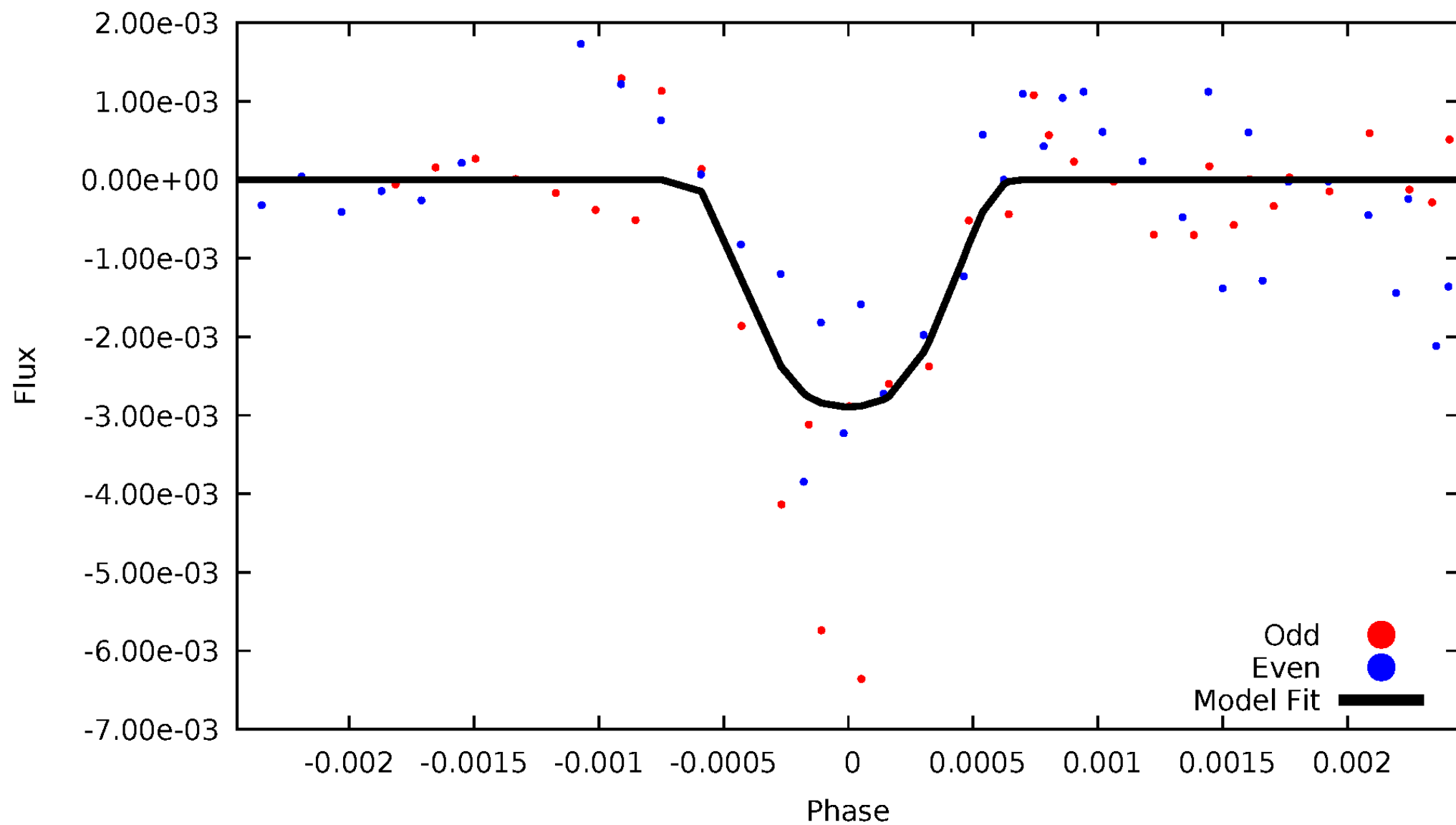
TCE 008509620-02





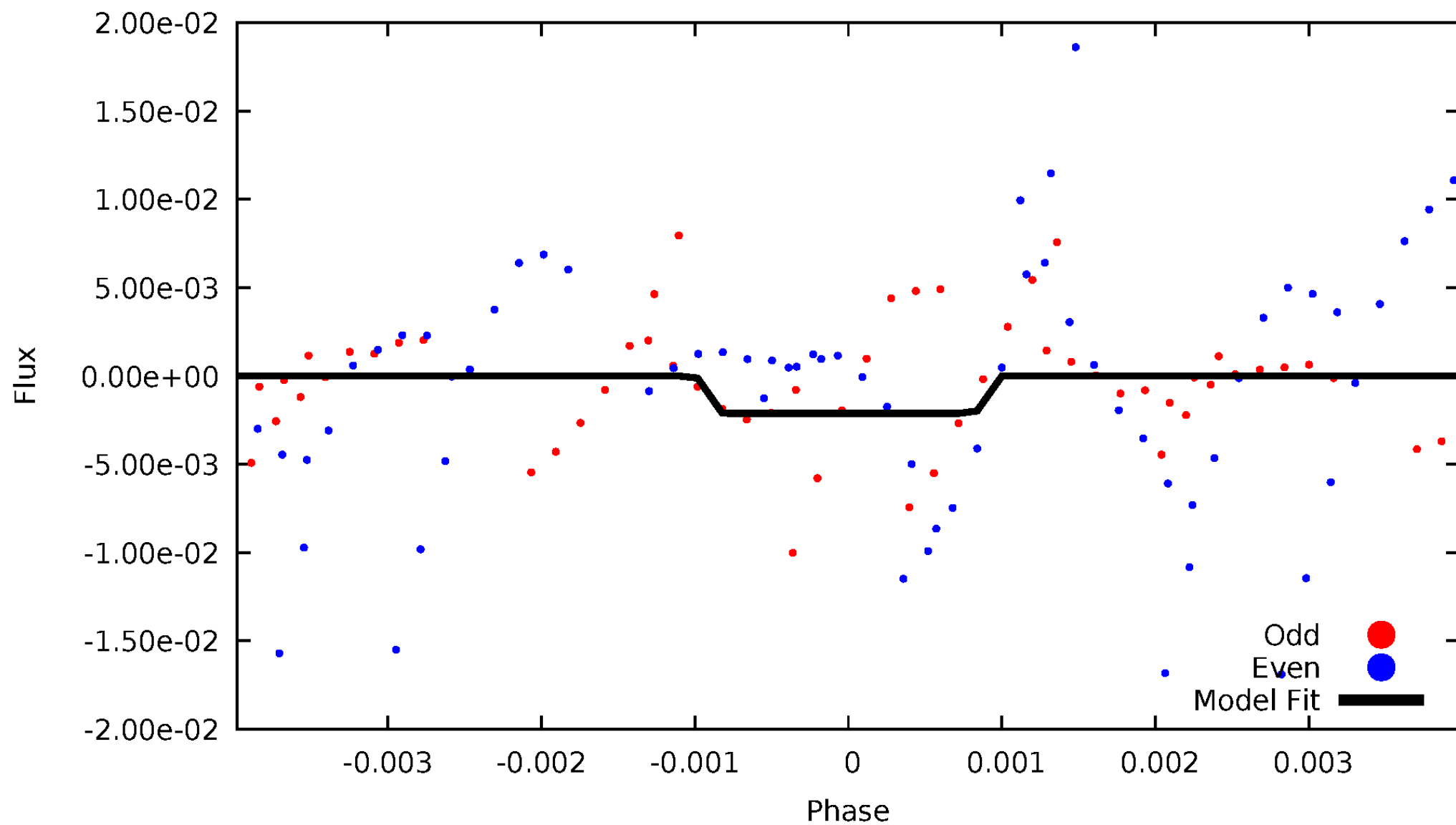
# DV Odd/Even

TCE 008509620-02



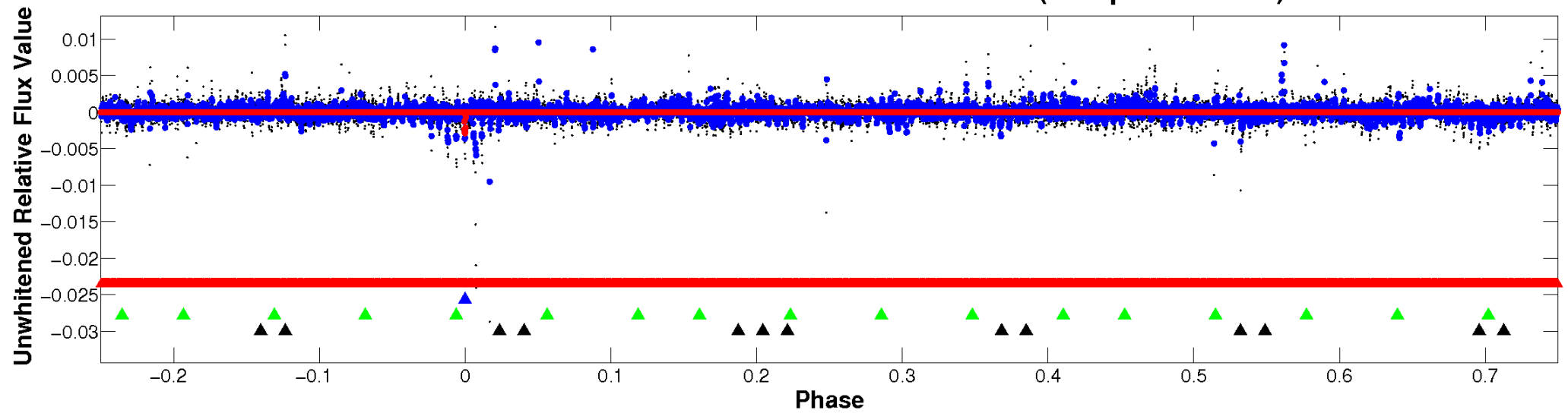
# ALT Odd/Even

TCE 008509620-02

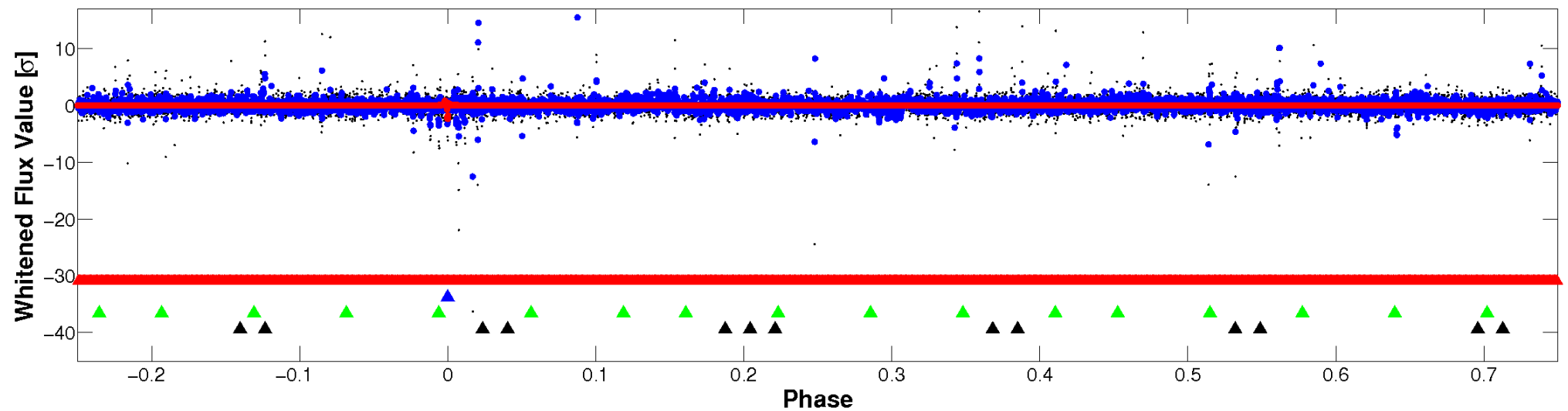


# Non-Whitened Vs. Whitened Light Curve

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

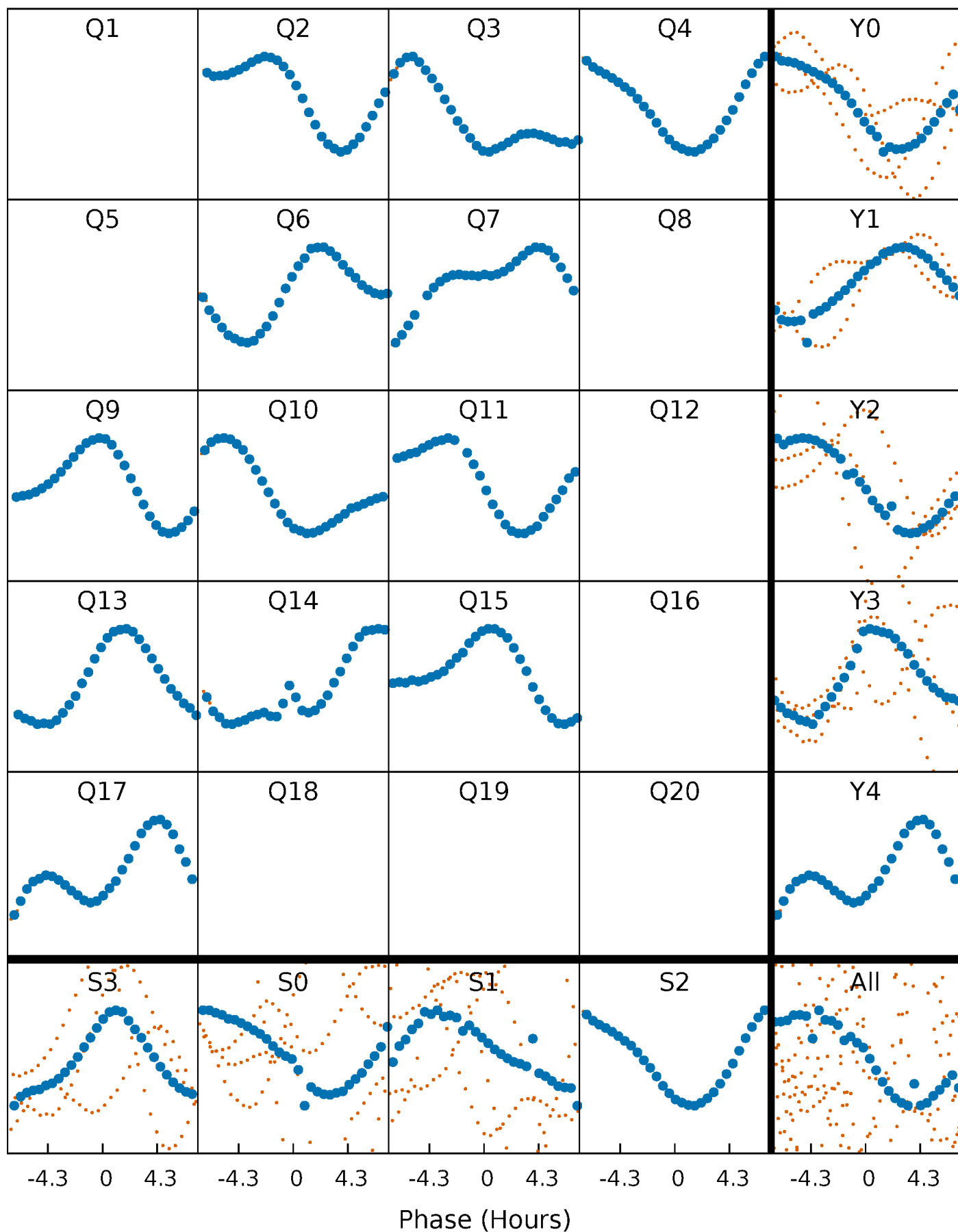


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



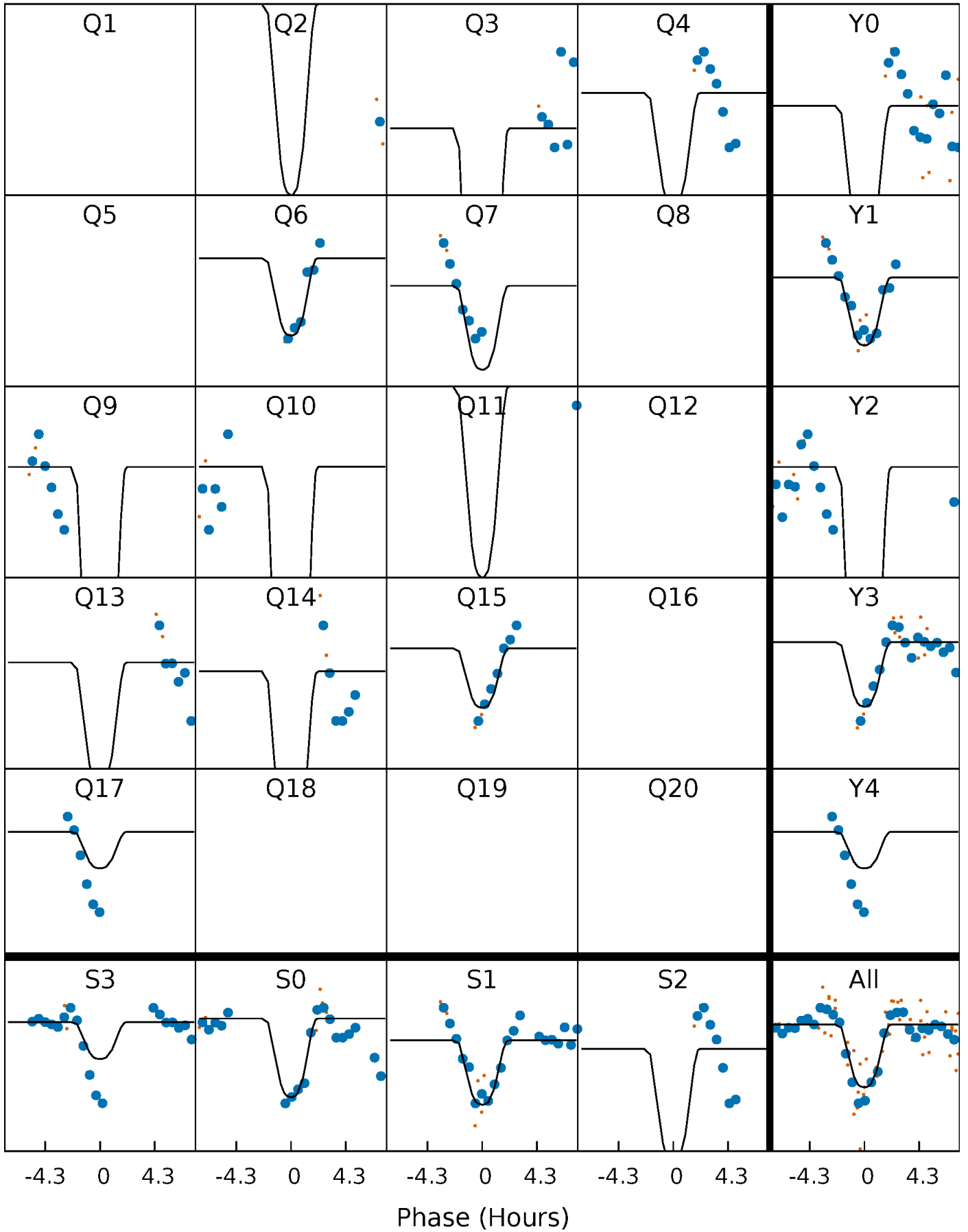
# PDC Quarter-Phased Transit Curves

TCE 008509620-02 P=127.517188 Days  $T_0=186.139147$  (BKJD)



# DV Quarter-Phased Transit Curves

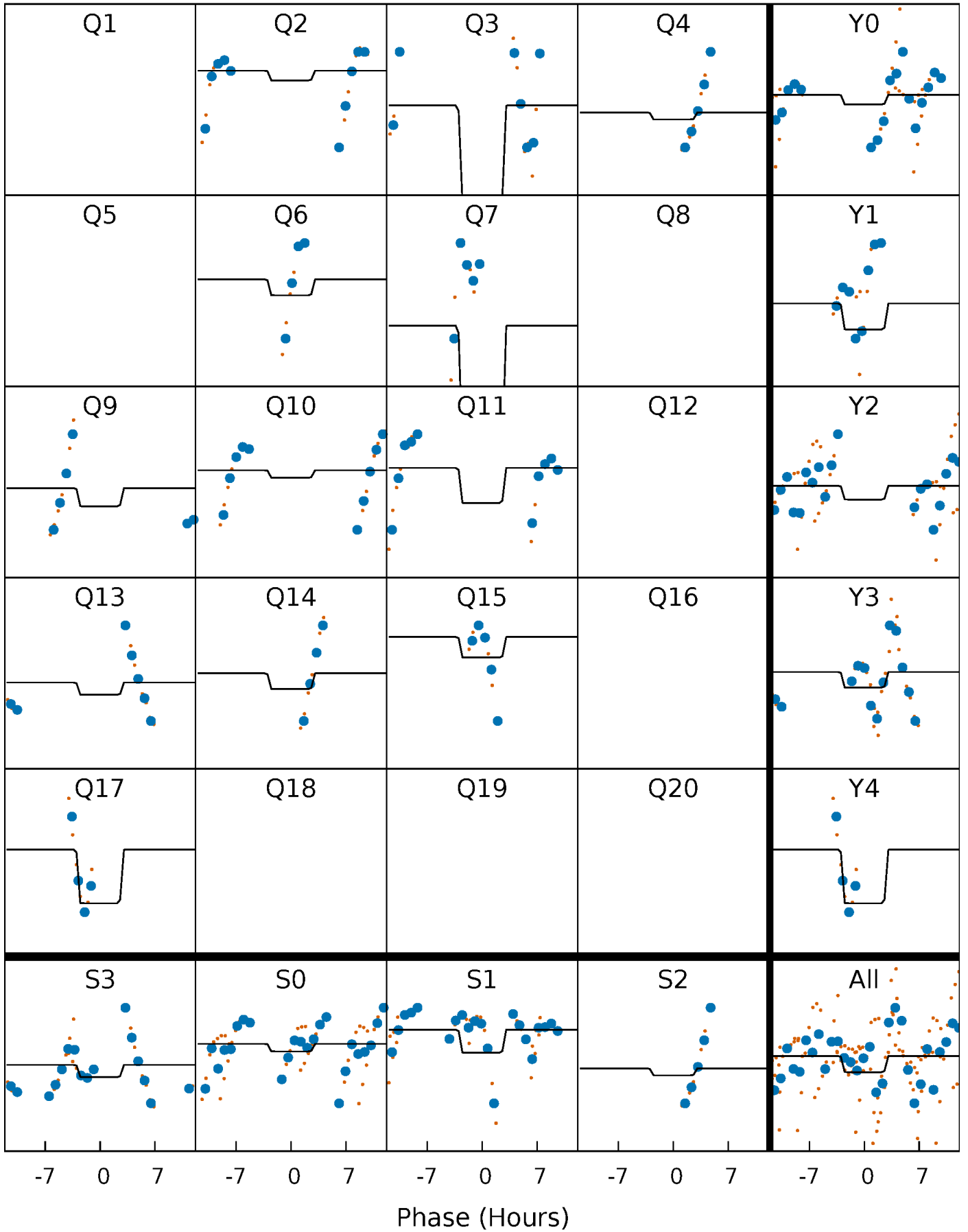
TCE 008509620-02 P=127.517188 Days  $T_0=186.139147$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

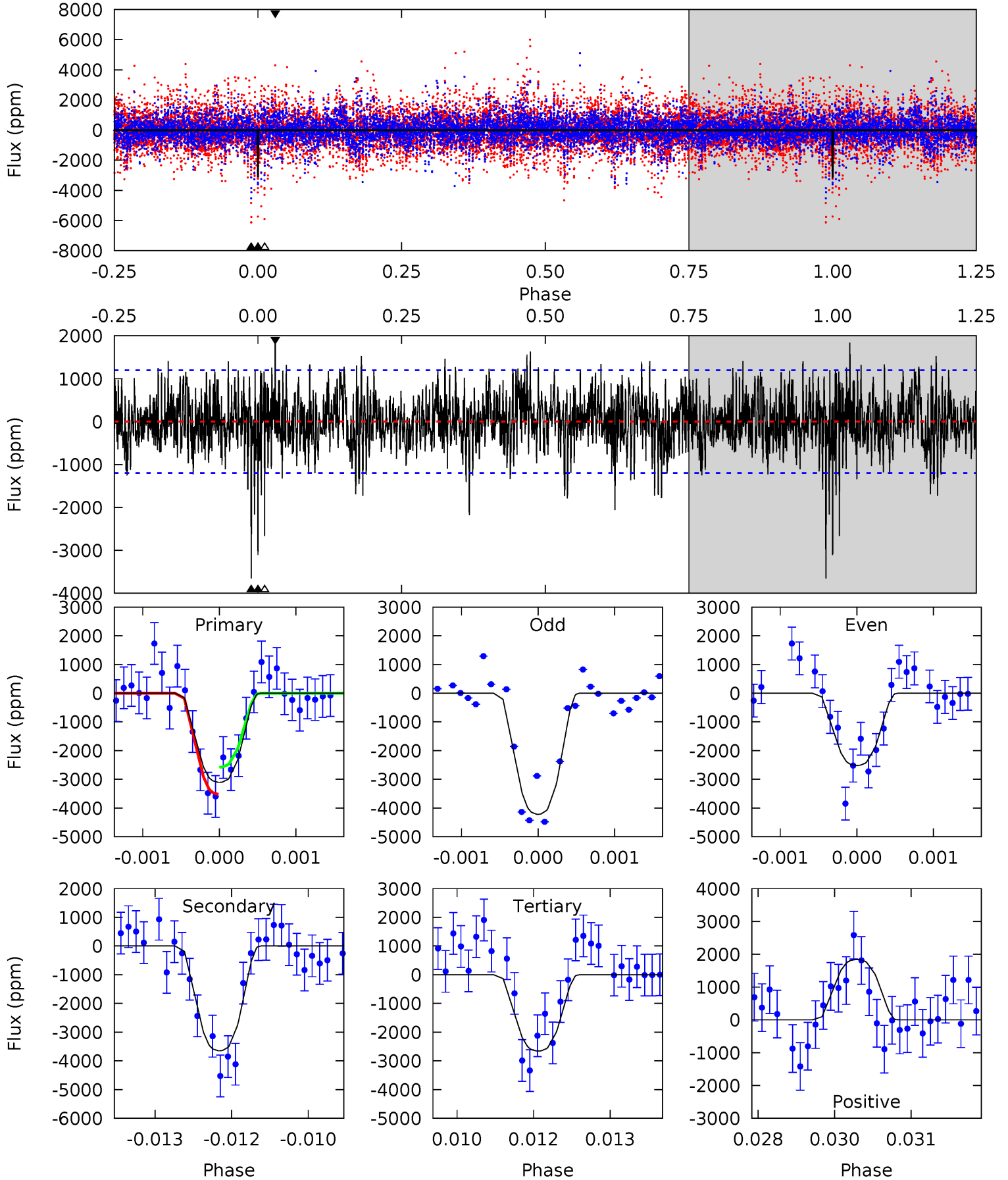
TCE 008509620-02 P=127.520226 Days  $T_0=186.155986$  (BKJD)



# DV Model-Shift Uniqueness Test

008509620-02,  $P = 127.517188$  Days,  $E = 58.621959$  Days

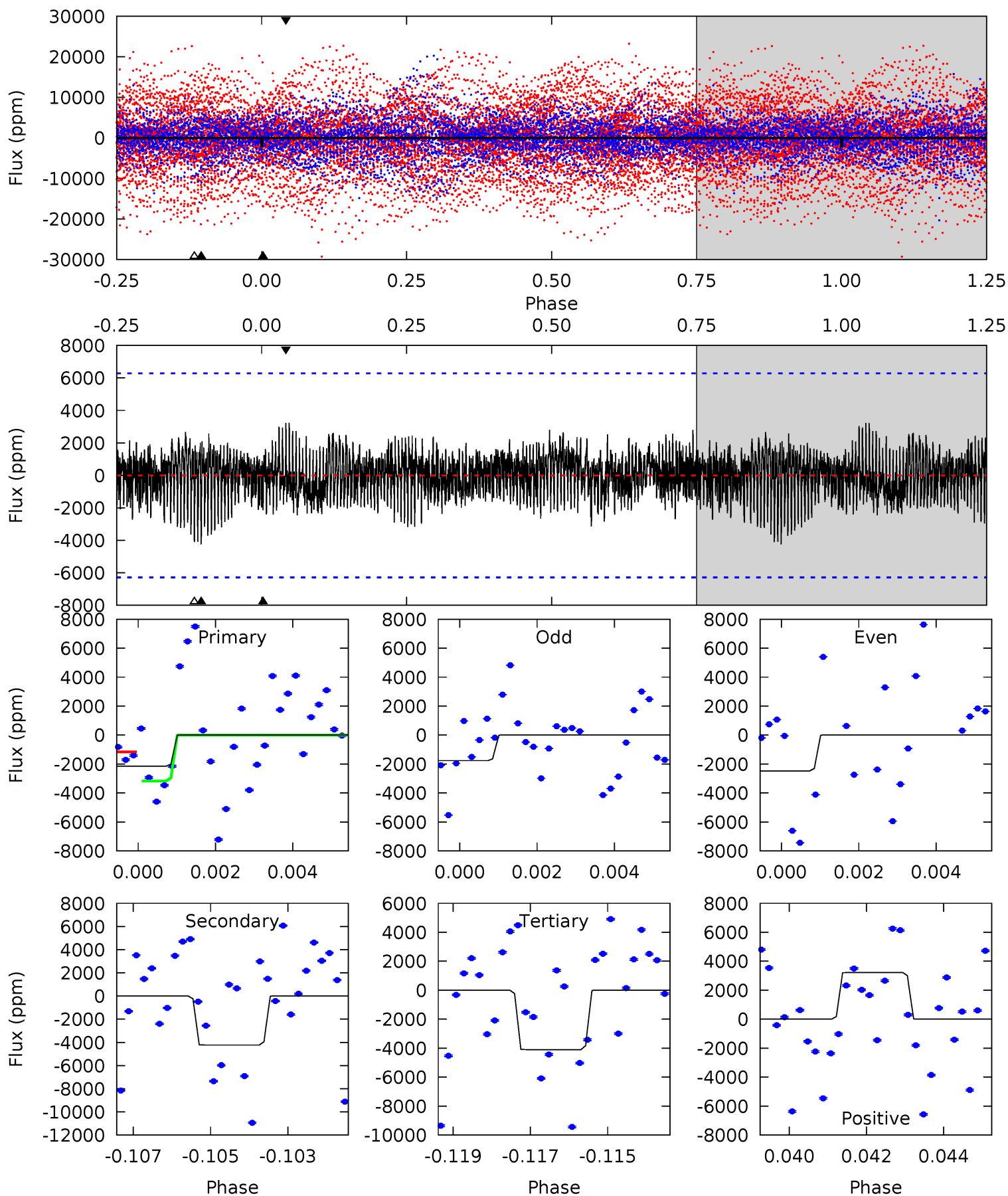
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
14.0	16.5	12.0	8.32	5.41	3.22	2.36	2.03	5.72	4.48	8.17	3.66	1.09	0.34	2.15



# Alt Model-Shift Uniqueness Test

008509620-02, P = 127.520226 Days, E = 58.635760 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
1.82	3.59	3.48	2.74	5.33	3.09	0.94	-1.66	-0.91	0.11	0.85	0.30	1.50	0.43	0.86



### Stellar Parameters For KIC 008509620

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5680^{+170}_{-153}$	$4.511^{+0.092}_{-0.138}$	$-0.540^{+0.300}_{-0.300}$	$0.811^{+0.173}_{-0.093}$	$0.776^{+0.097}_{-0.056}$	$2.053^{+0.822}_{-0.819}$
	+3%/-3%	+2%/-3%	+56%/-56%	+21%/-11%	+12%/-7%	+40%/-40%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 008509620-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-3650 \pm 221$	$5.45^{+0.83}_{-0.64}$	$471^{+25}_{-23}$	$5676^{+326}_{-277}$	$14159^{+4123}_{-3309}$
Alt.	$-4234 \pm 1179$	$4.12^{+0.68}_{-0.56}$	$470^{+27}_{-22}$	$6765^{+816}_{-697}$	$28155^{+15215}_{-9910}$

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

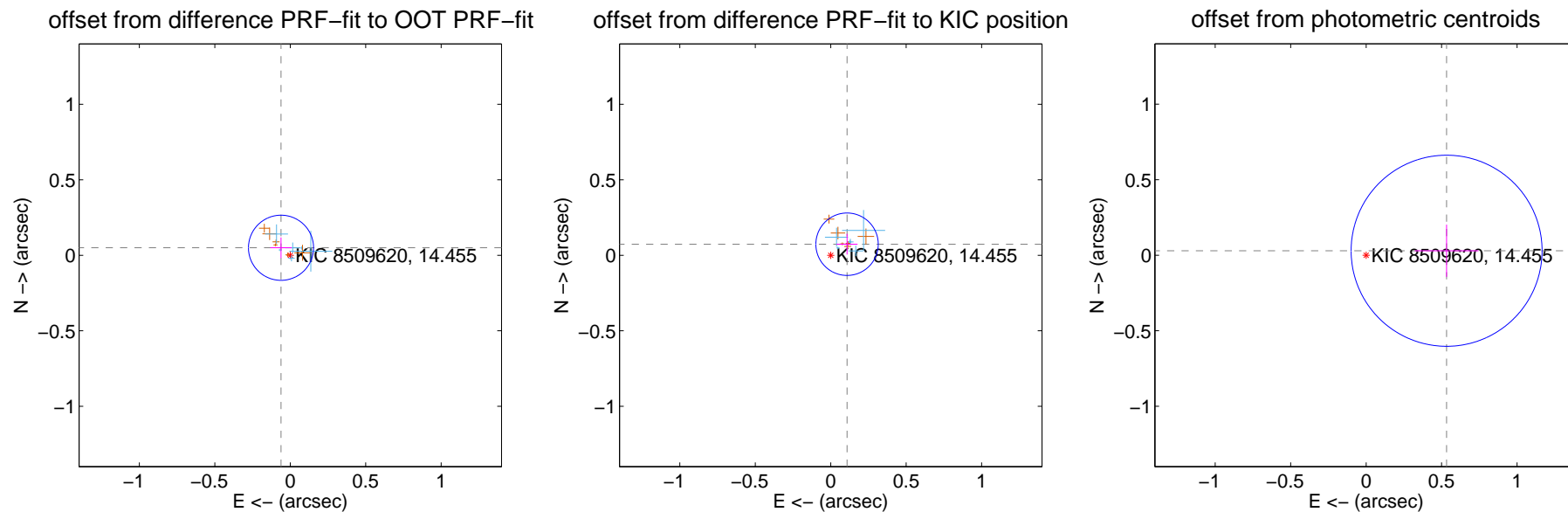
## DV Centroid Data

Supplemental centroid analysis for 008509620-02. Kepler magnitude: 14.46. Transit SNR 8.12

There are 6 quarters with good PRF difference image offsets

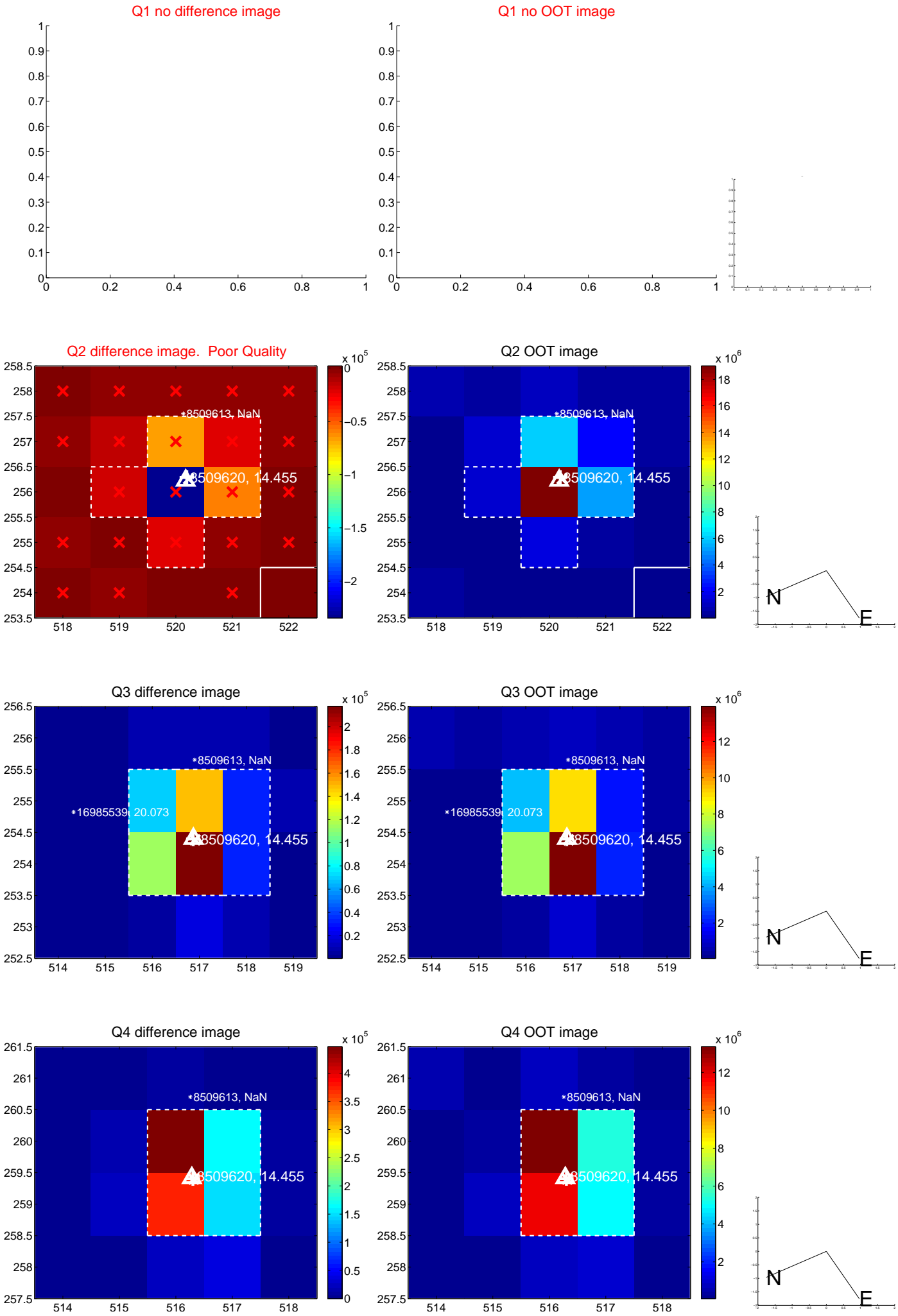
The direct PRF centroid is offset from the target star catalog position by about 0.15 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.079 \pm 0.072$	1.10	$0.061 \pm 0.071$	$0.050 \pm 0.068$
PRF-fit source offset from KIC position	$0.131 \pm 0.069$	1.90	$-0.108 \pm 0.070$	$0.073 \pm 0.069$
photometric centroid source offset	$0.53 \pm 0.21$	2.53	$-0.53 \pm 0.21$	$0.03 \pm 0.17$



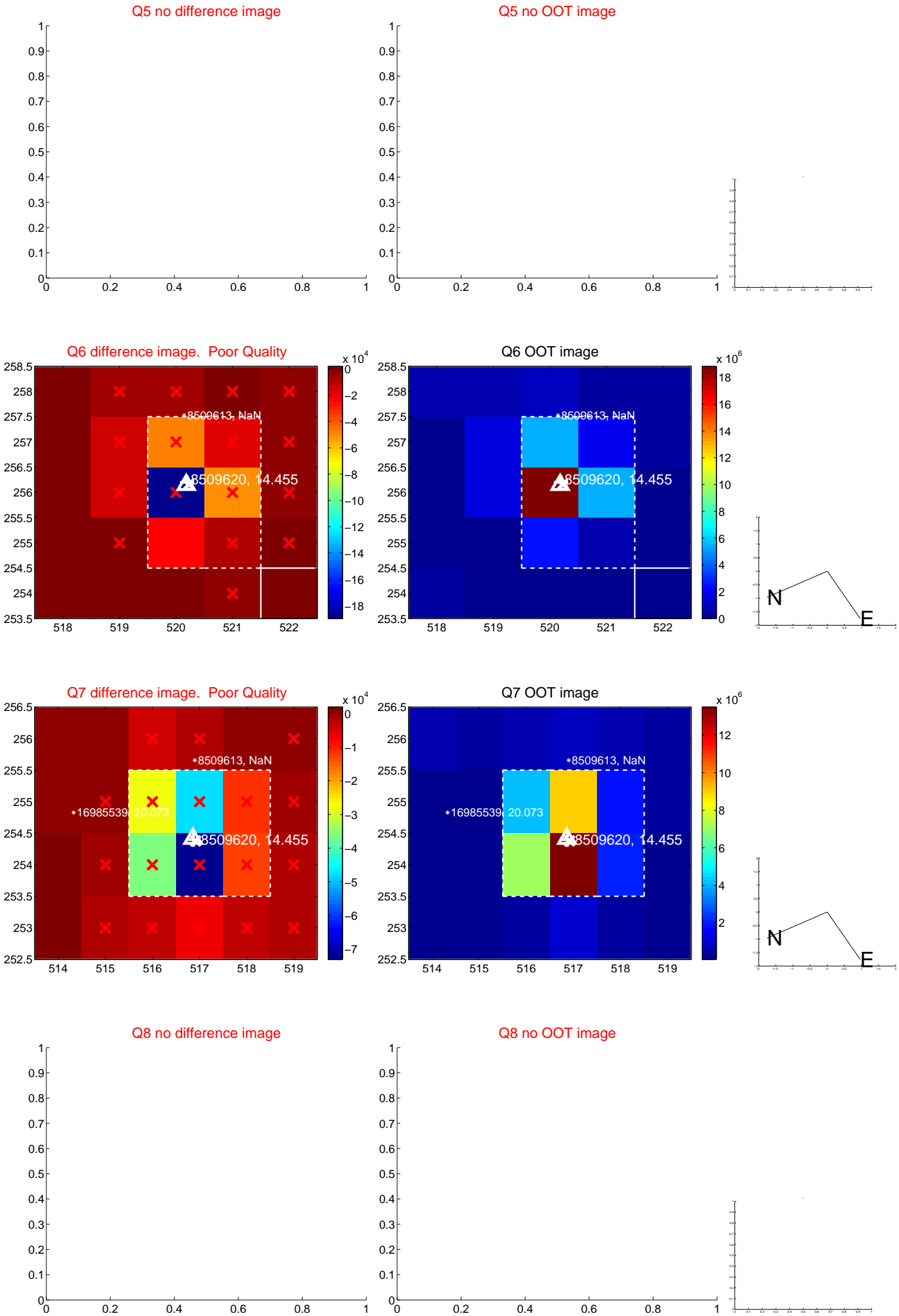
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

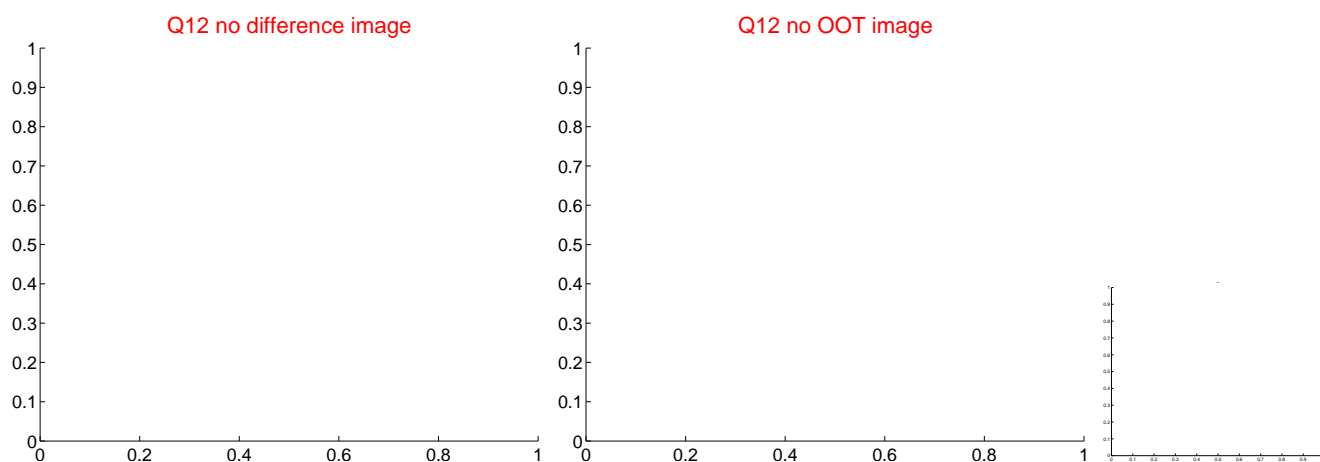
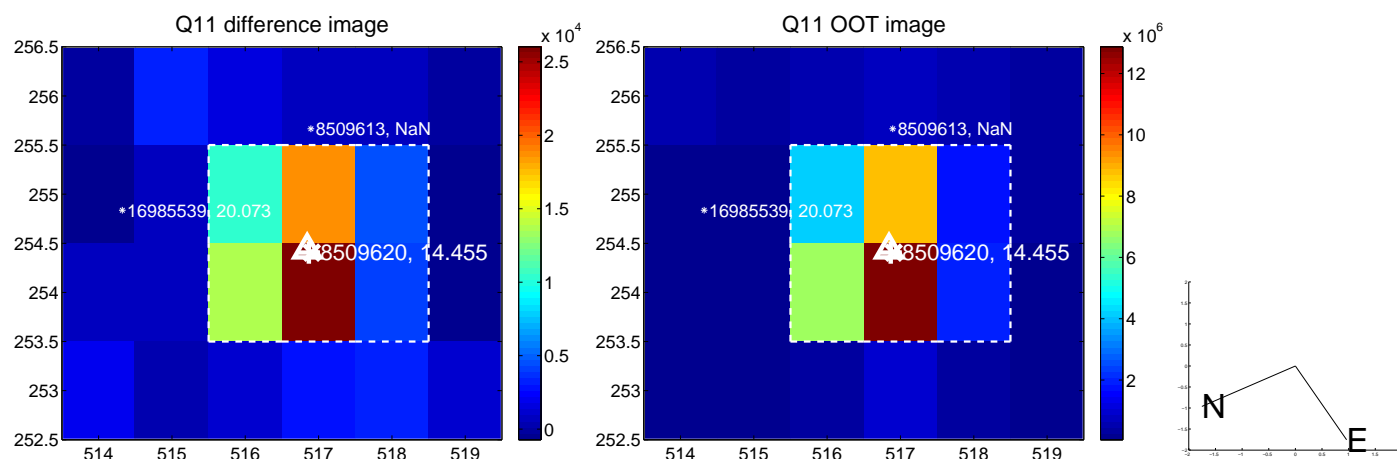
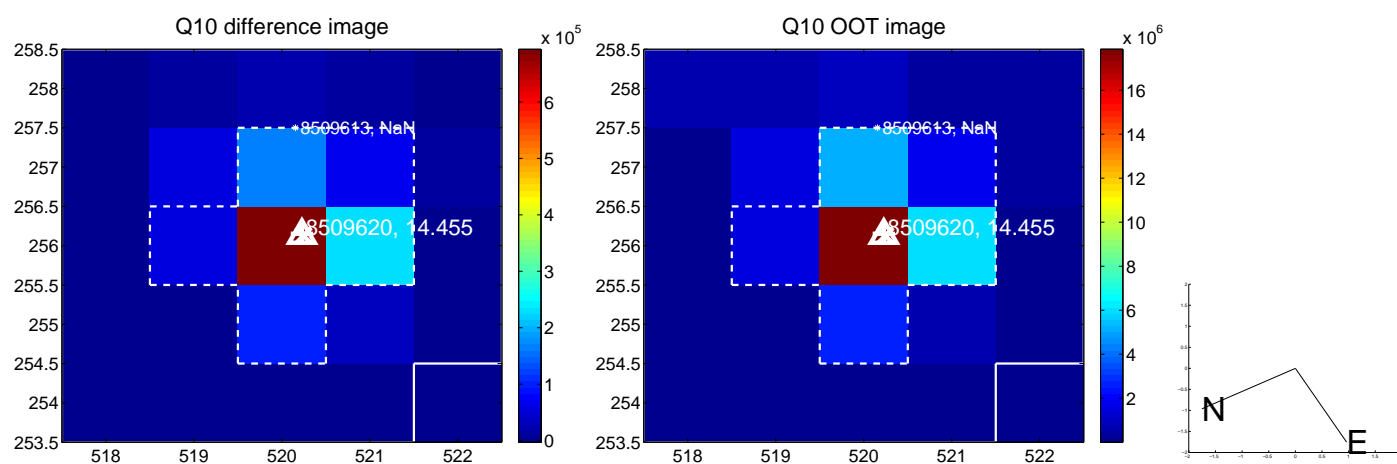
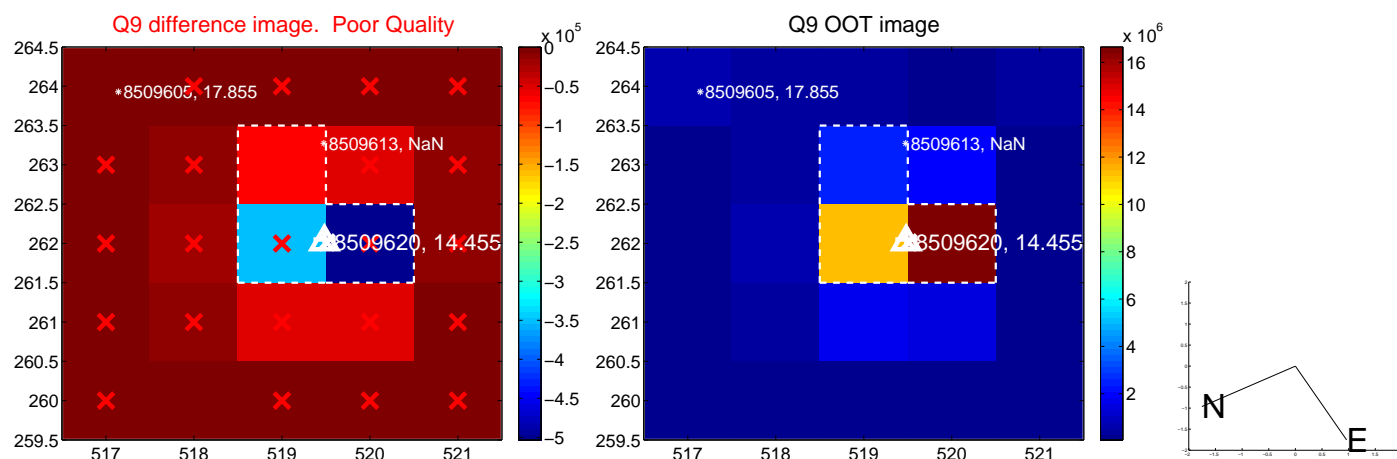




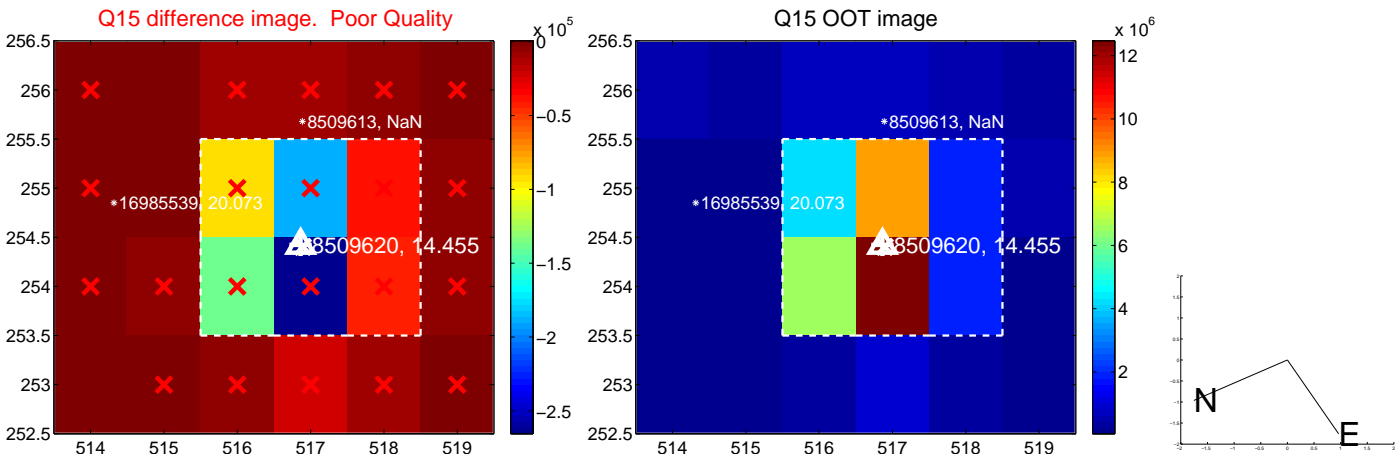
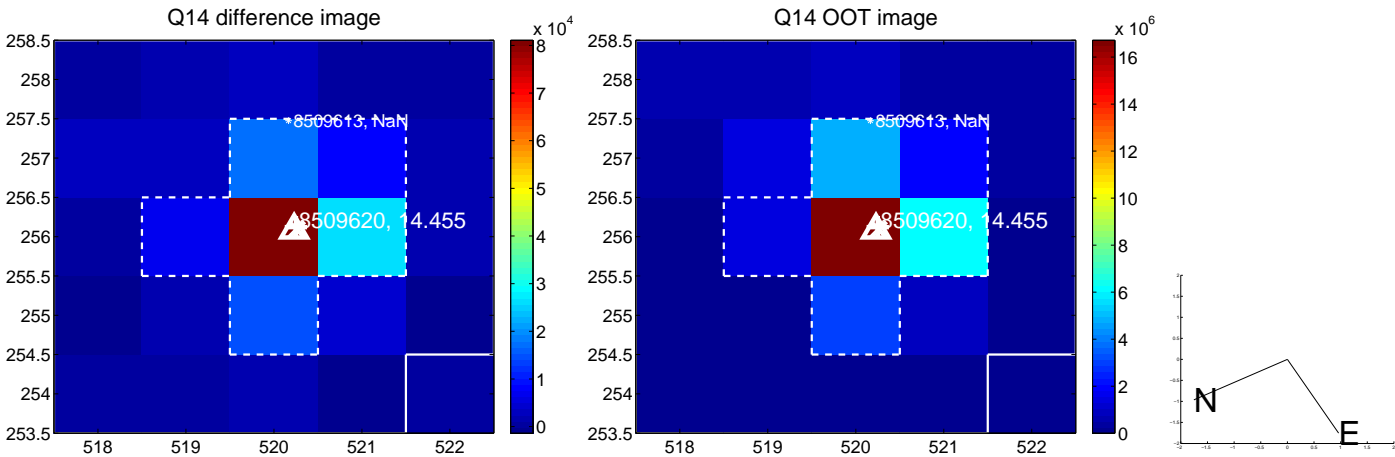
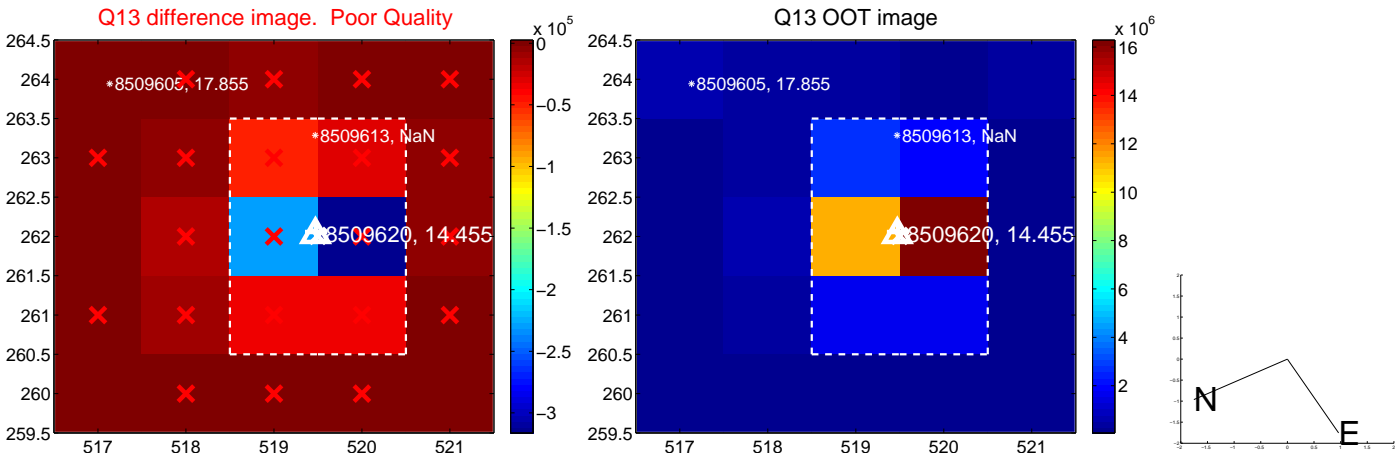
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



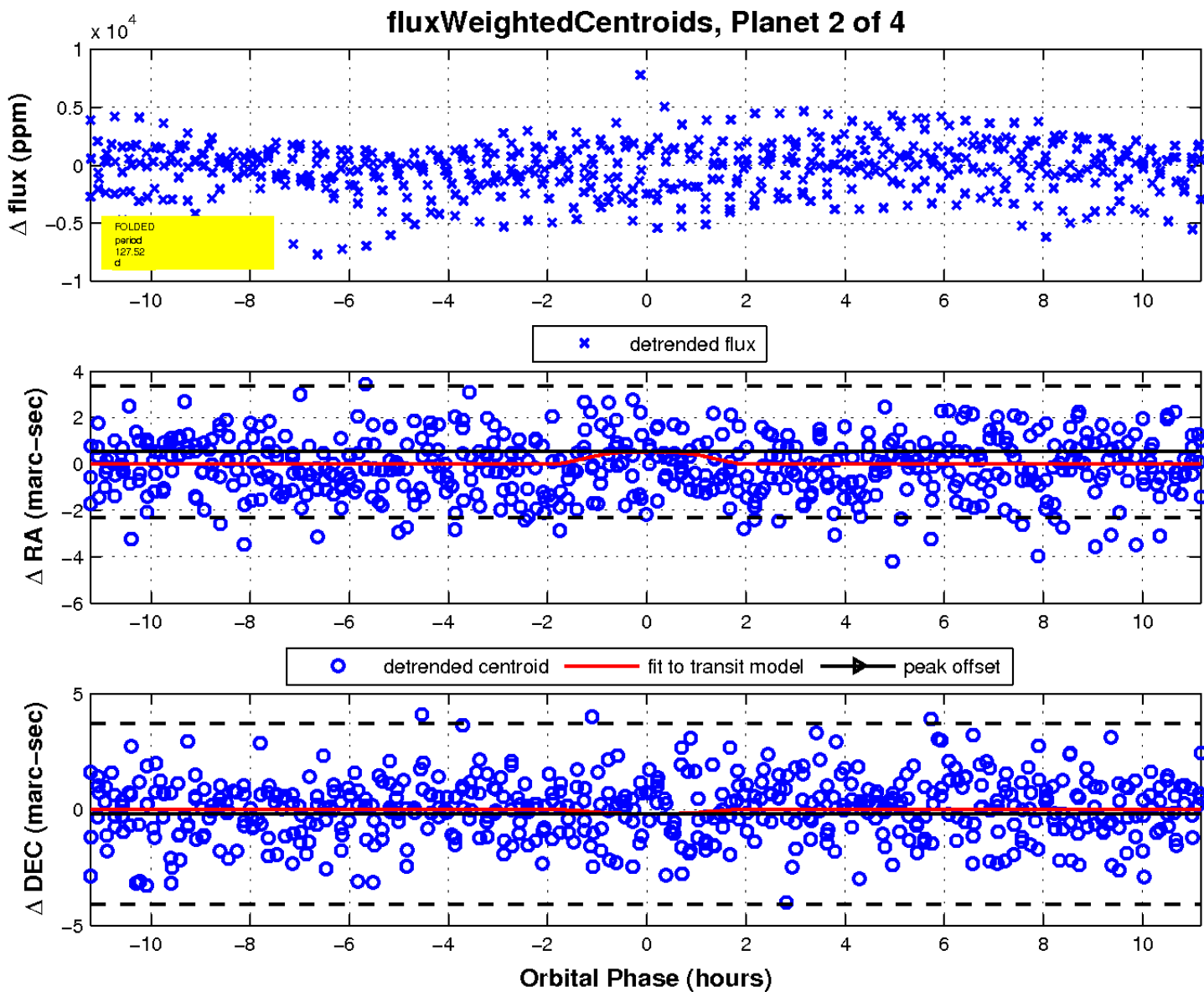
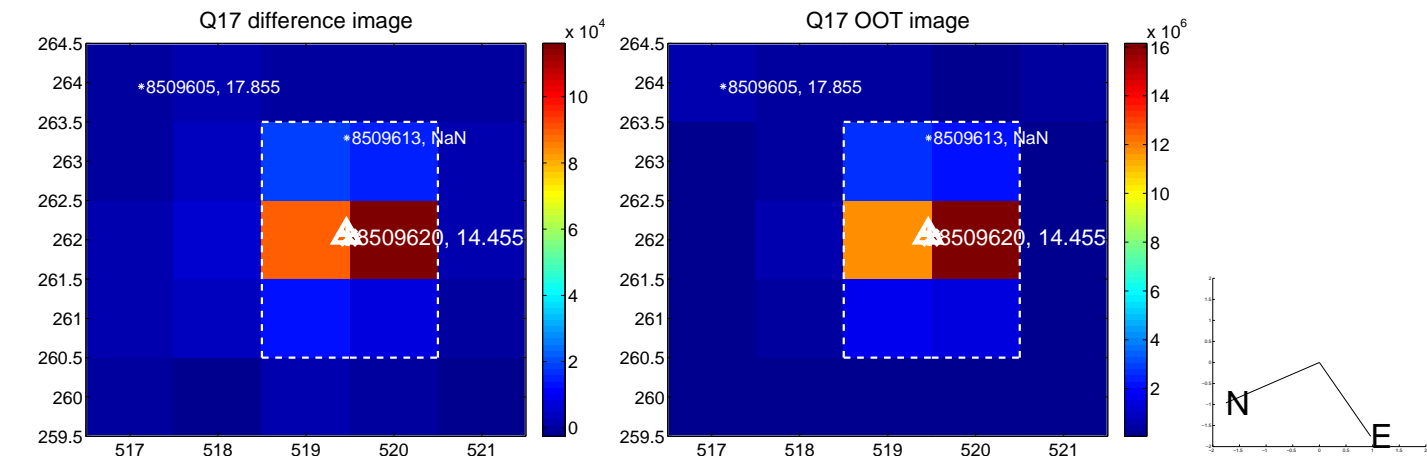
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

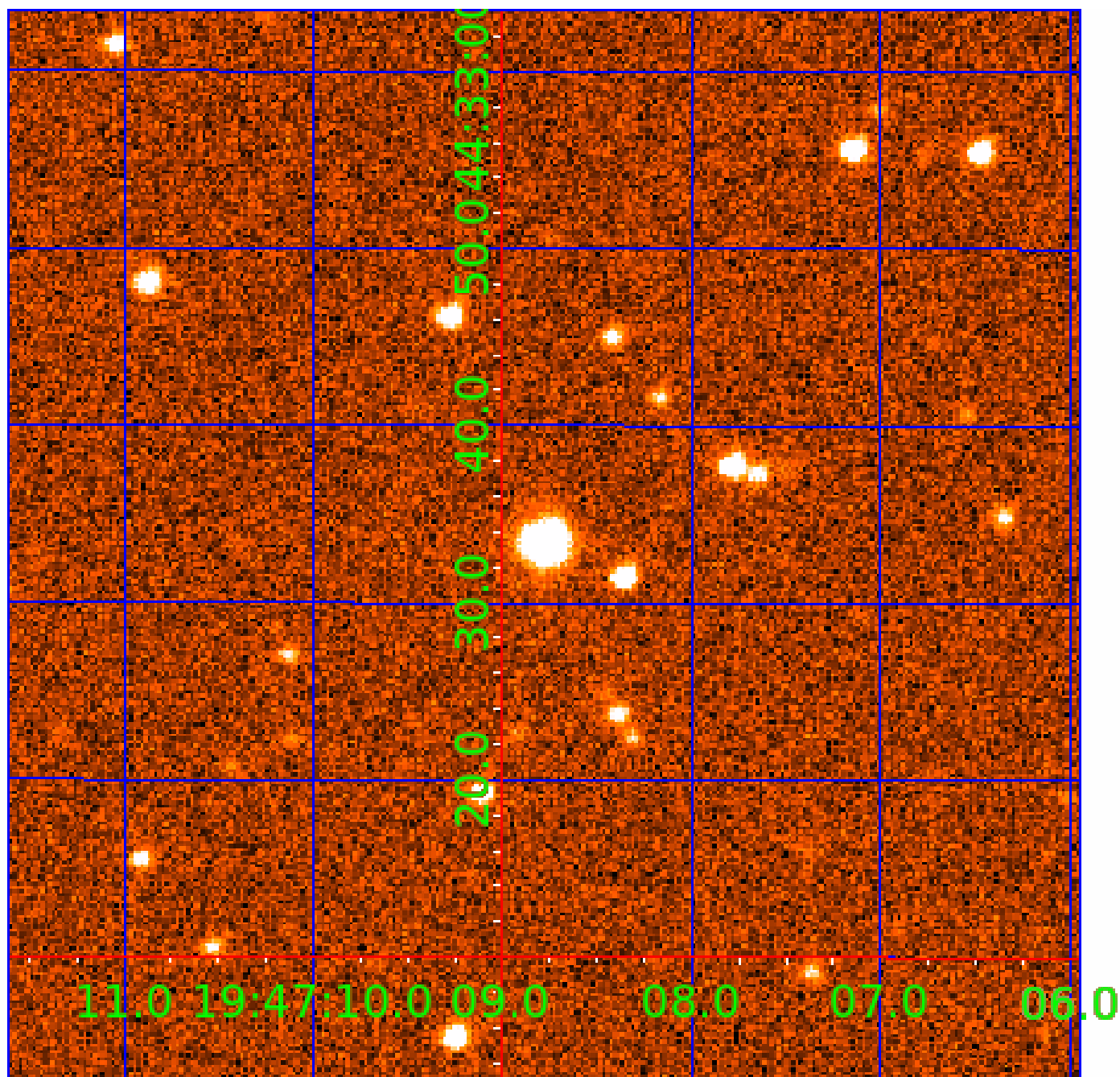


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 008509620

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008509620-01	OBS	No	0.745101	131.729106	74.2	4.516	8.7	5.5	0.81	5680	0.75	2801.23
008509620-02	OBS	No	127.517188	186.139147	2892.7	3.747	9.7	8.1	0.81	5680	5.39	2.95
008509620-03	OBS	No	82.359105	201.279960	1062.9	2.000	10.0	-1.0	0.81	5680	2.64	5.28

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008509620-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT
008509620-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT— INCONSISTENT_TRANS
008509620-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_NOFITS— HALO_GHOST

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

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

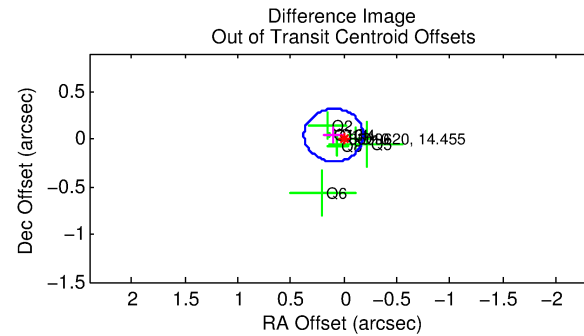
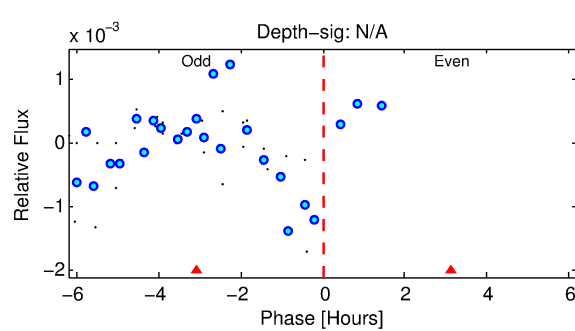
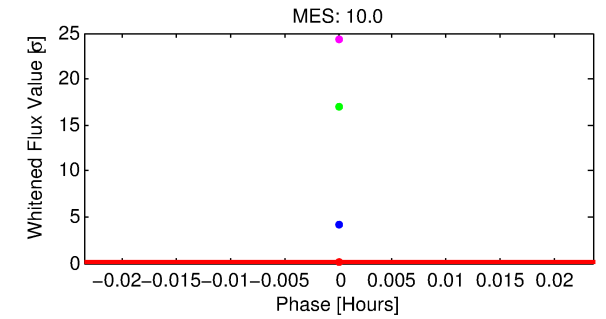
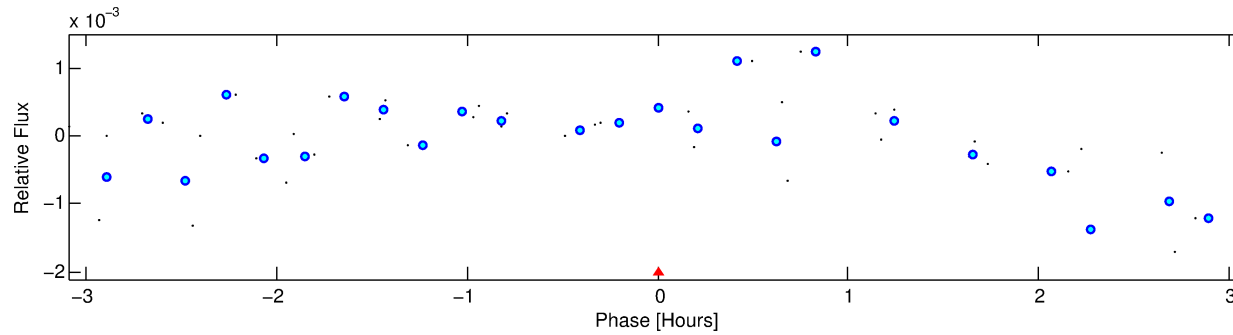
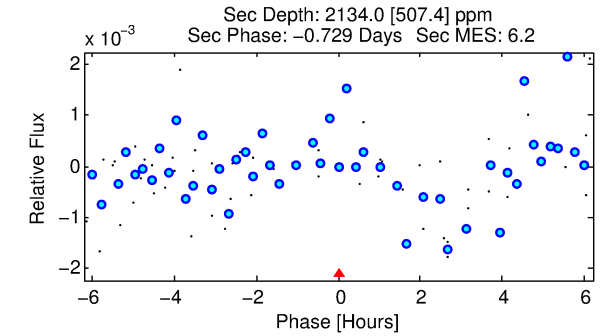
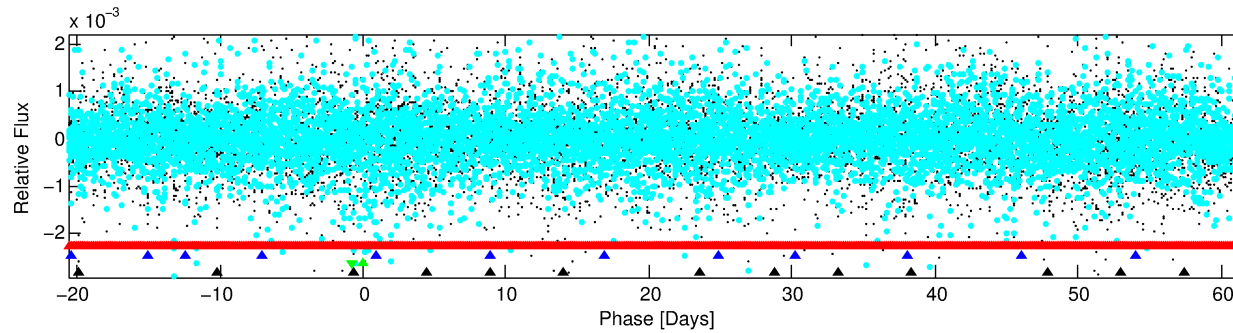
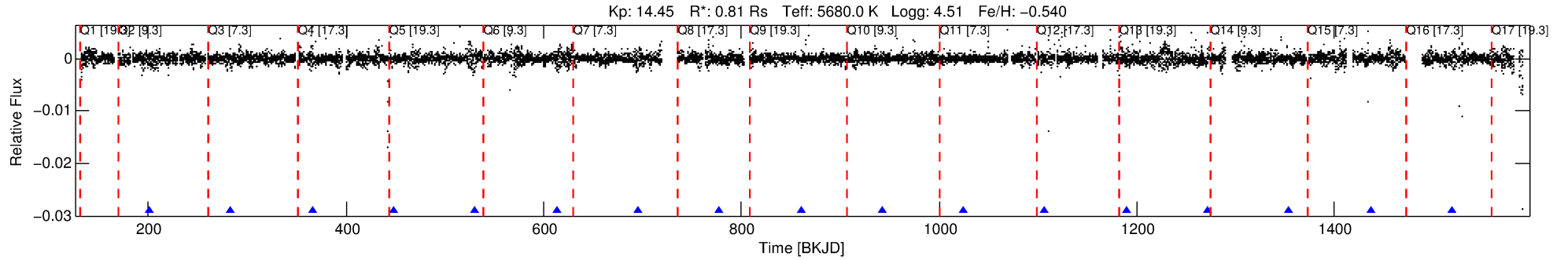
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008509620-03

No Significant Match Found

# DV One-Page Summary

KIC: 8509620 Candidate: 3 of 4 Period: 82.359 d



## TPS TCE Results:

Period = 82.35911 d  
Epoch = 201.2800 BKJD

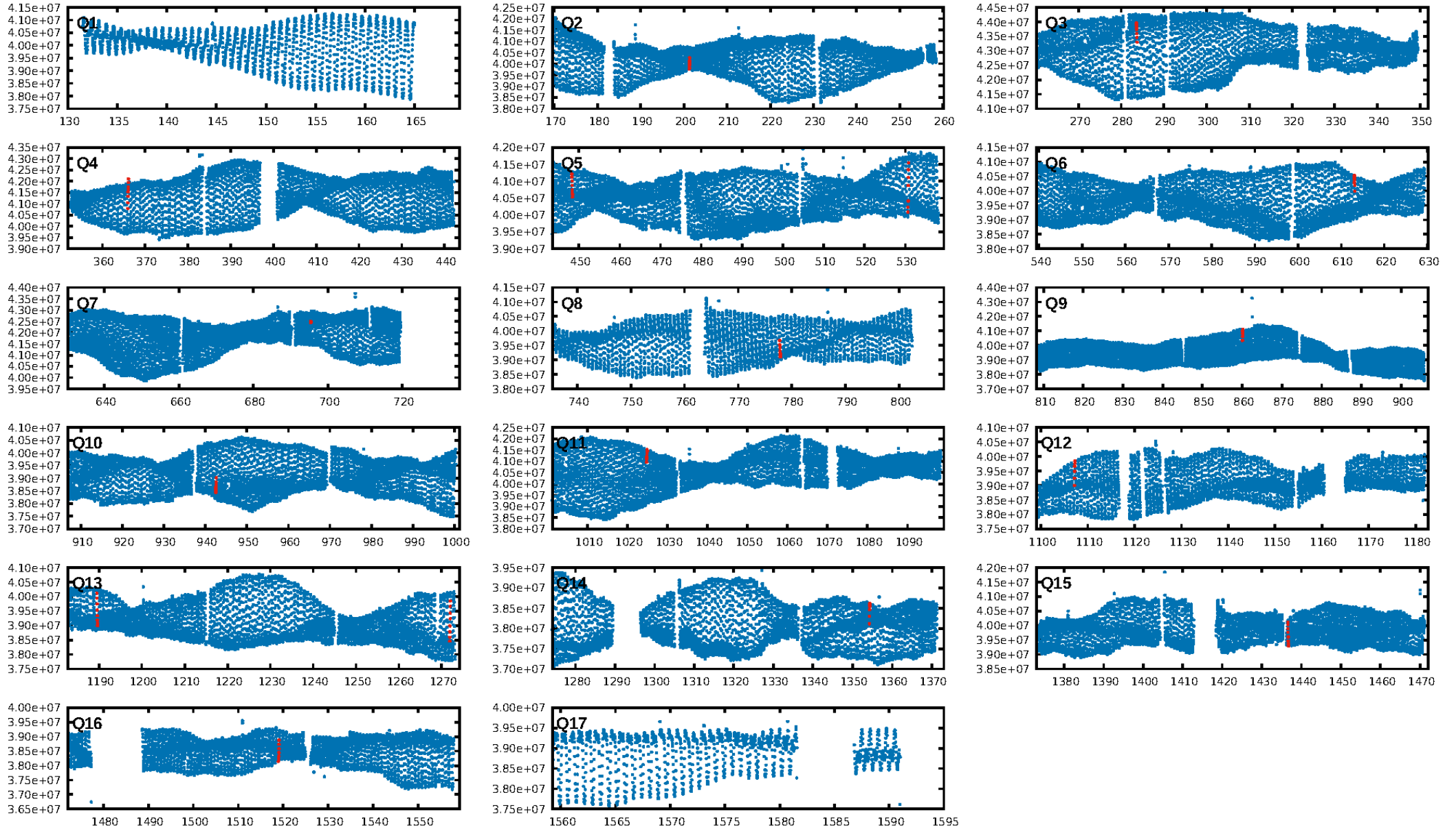
DV fit results are unavailable

## DV Diagnostic Results:

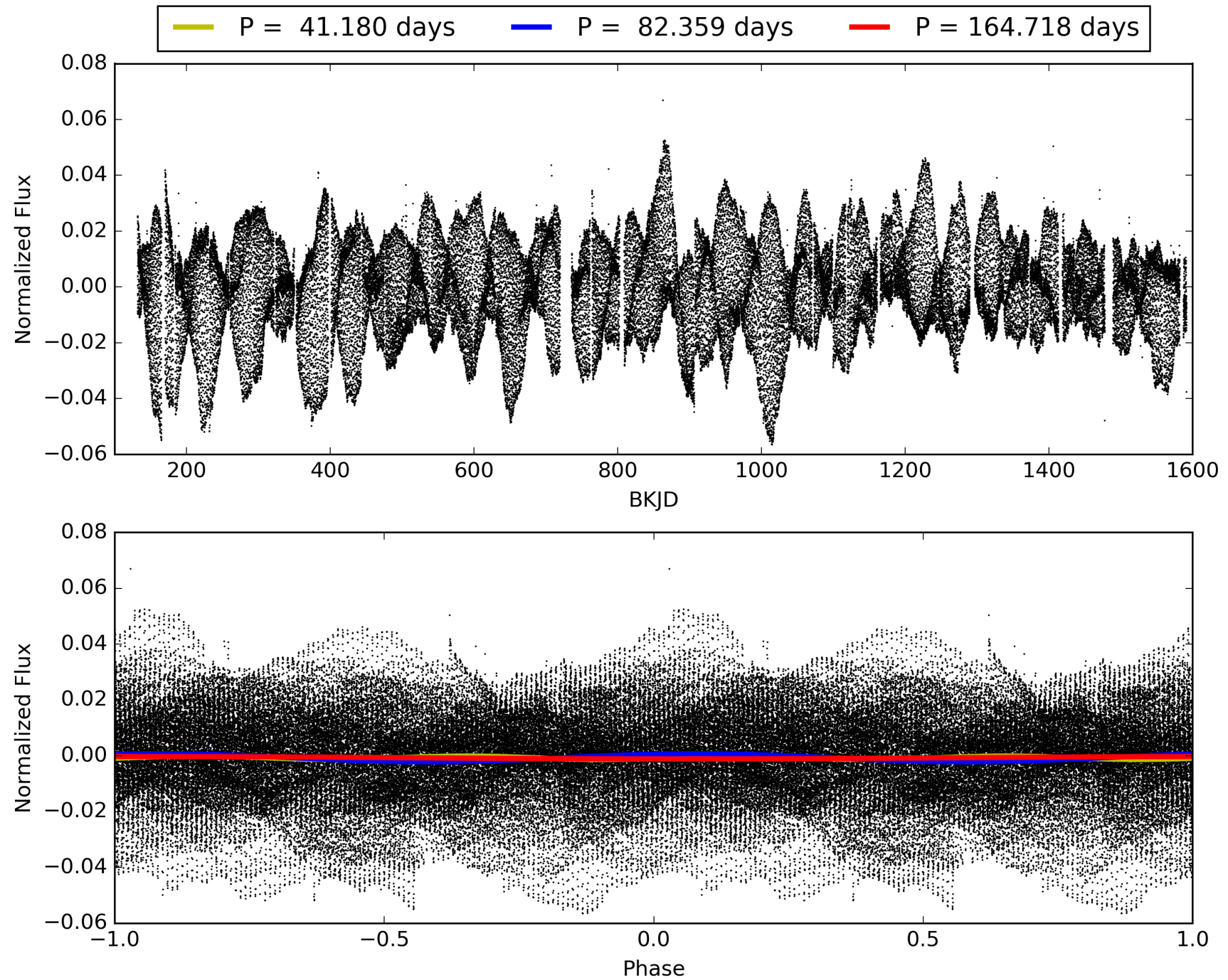
ShortPeriod-sig: 100.0% [396.57σ]  
LongPeriod-sig: 100.0% [90.64σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 2.76e-08  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: 0.1549

Centroid-sig: 47.6%  
Centroid-so: 4.490 arcsec [0.77σ]  
OotOffset-rm: 0.104 arcsec [1.13σ]  
KicOffset-rm: 0.078 arcsec [0.83σ]  
OotOffset-st: 4/0/2/2 [8]  
KicOffset-st: 4/0/2/2 [8]  
DiffImageQuality-fgm: 0.62 [5/8]  
DiffImageOverlap-fno: 0.00 [0/8]

# TCE 008509620-03, PDC Light Curves

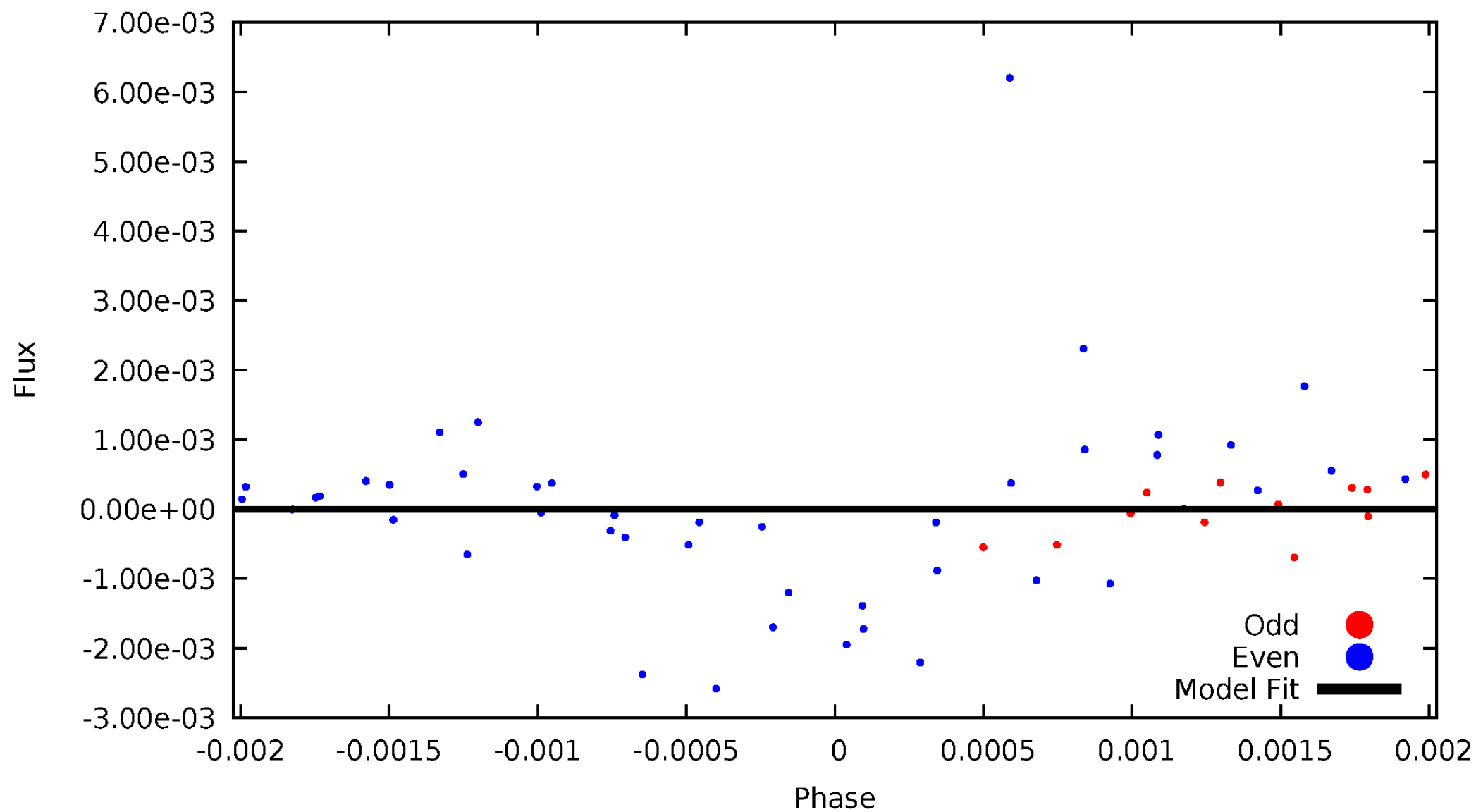


TCE 008509620-03



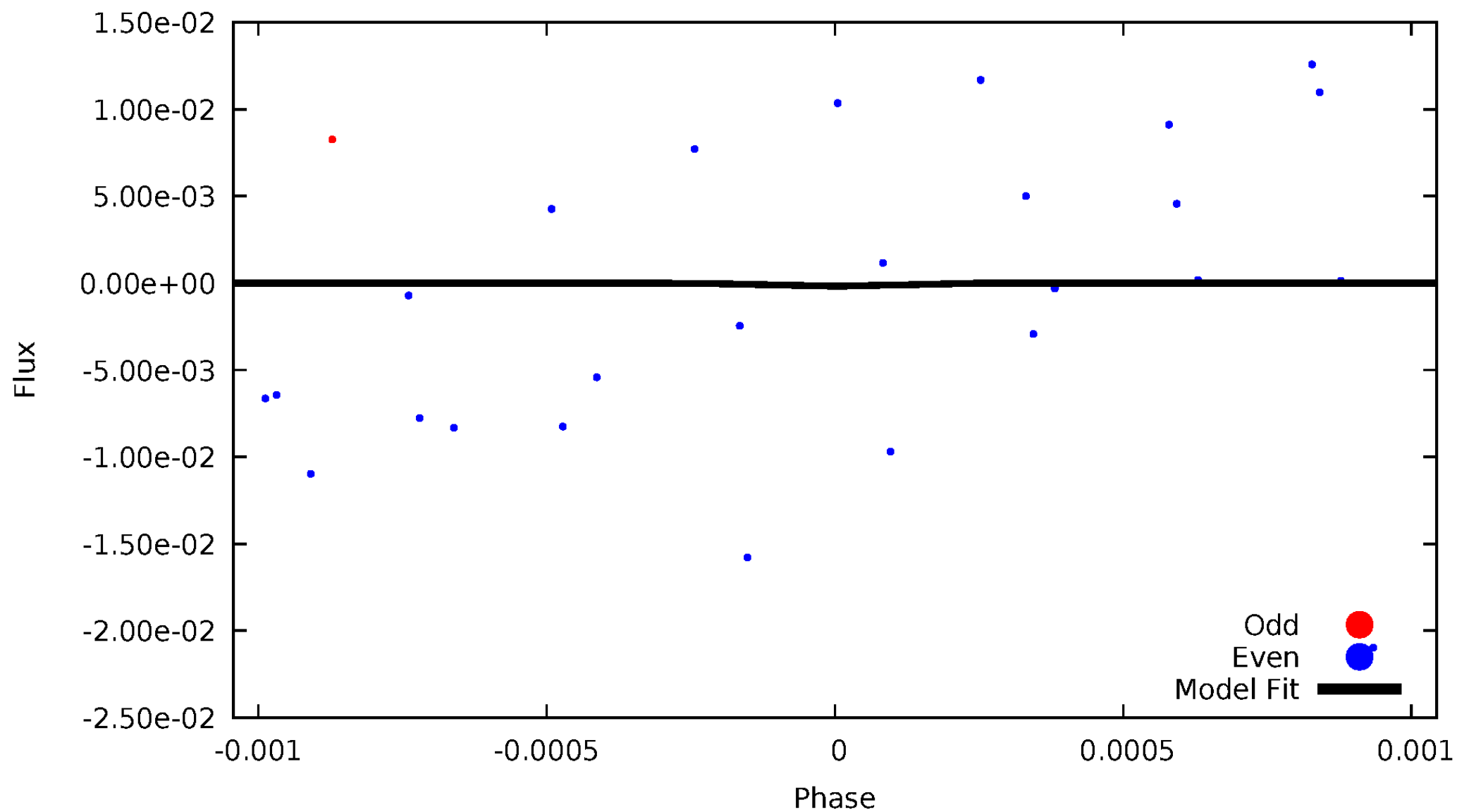
# DV Odd/Even

TCE 008509620-03



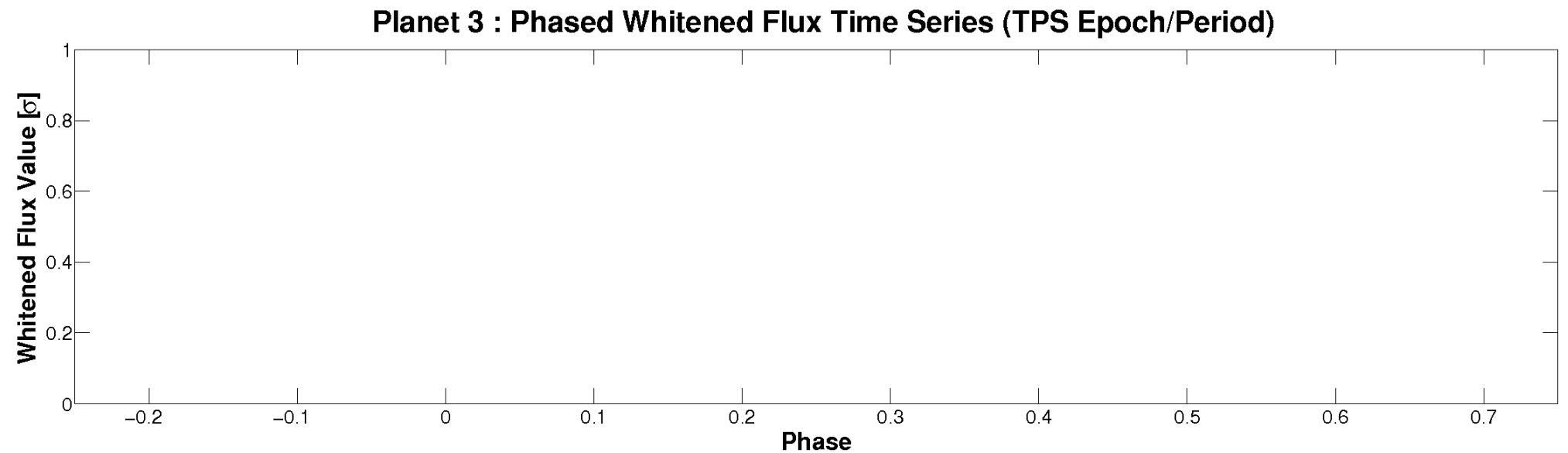
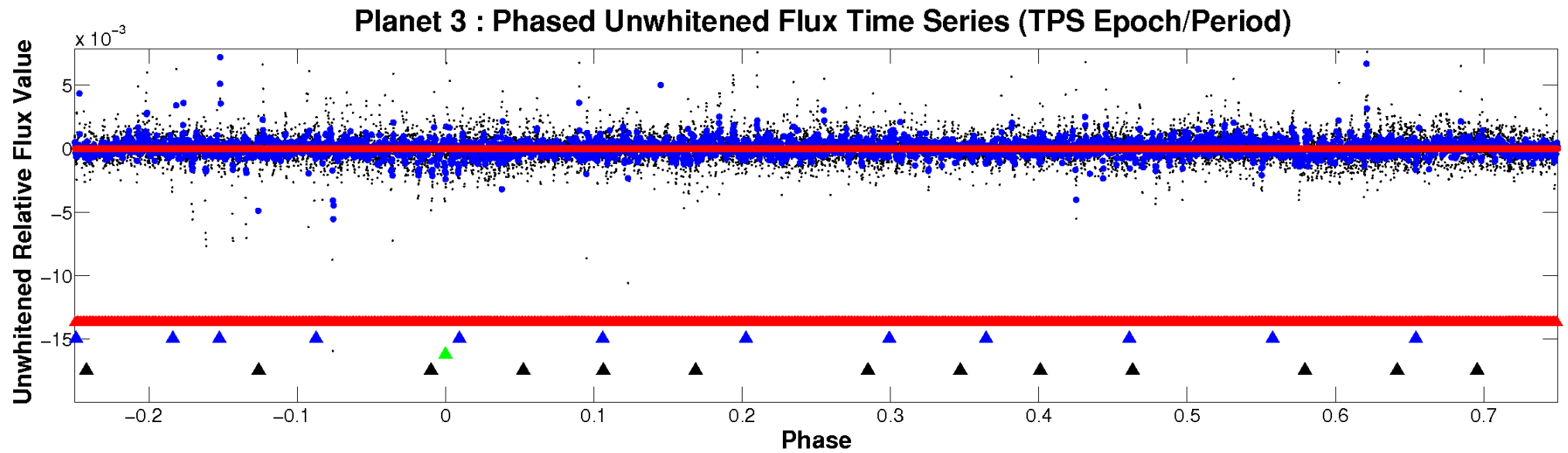
# ALT Odd/Even

TCE 008509620-03



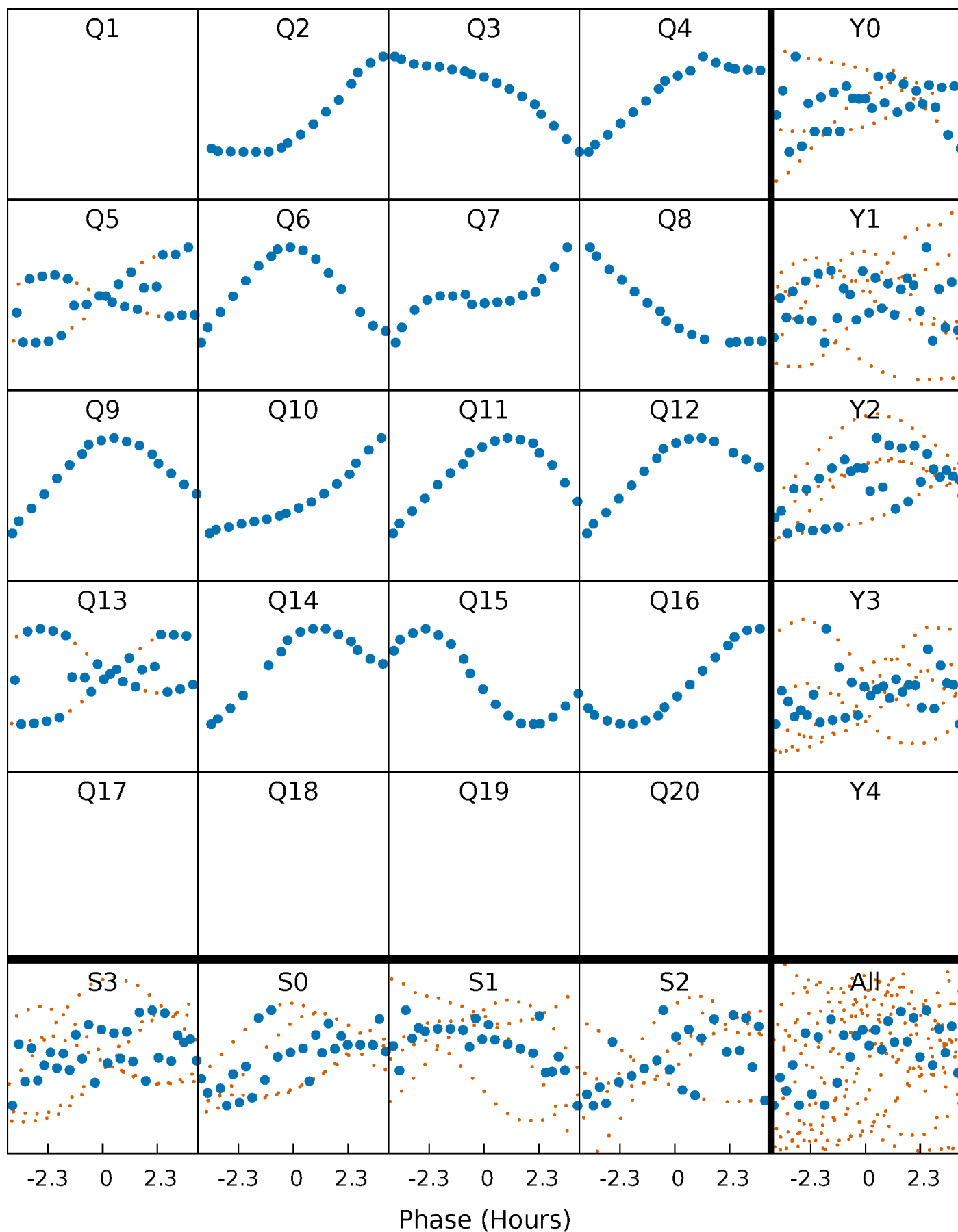


# Non-Whitened Vs. Whitened Light Curve



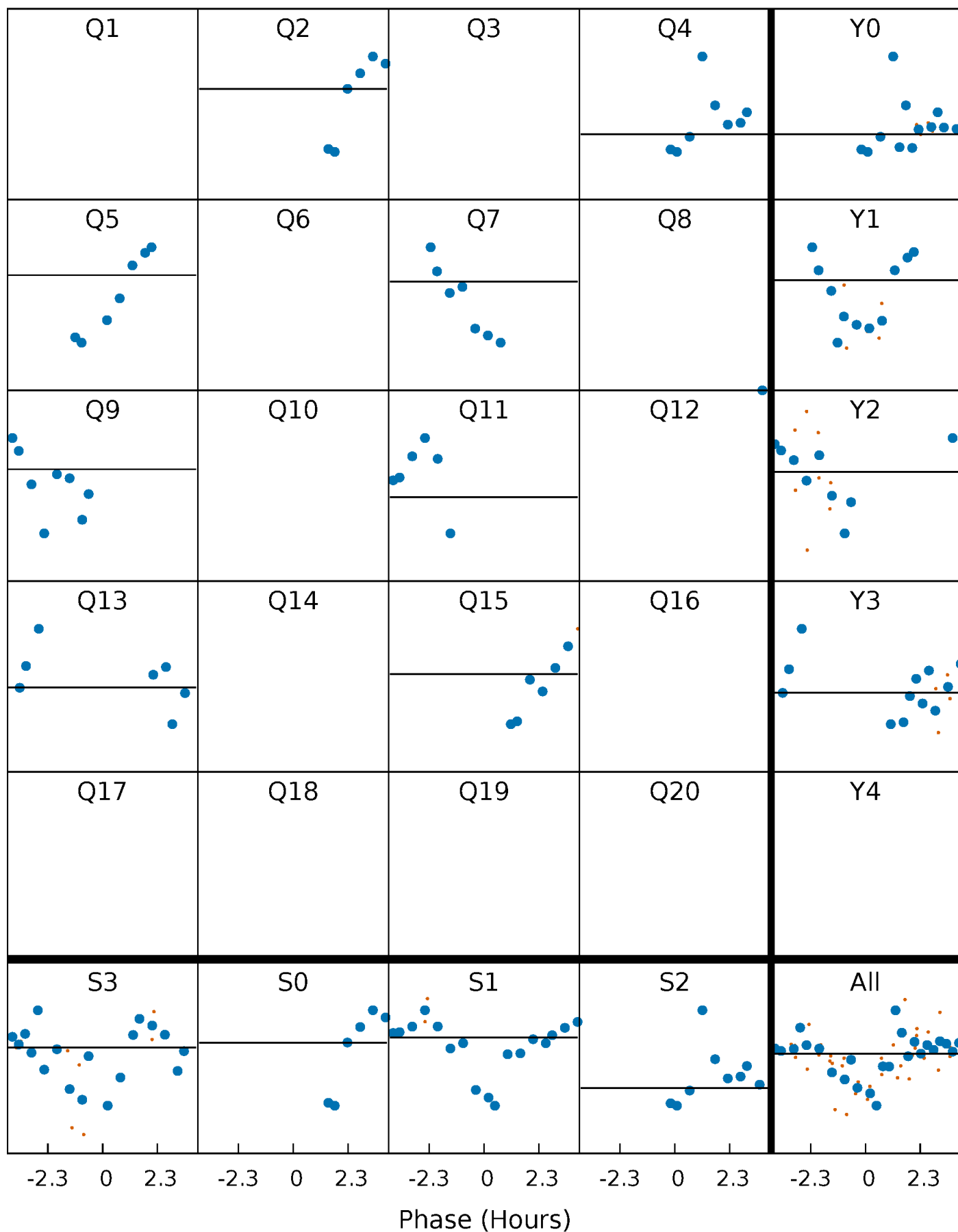
# PDC Quarter-Phased Transit Curves

TCE 008509620-03   P= 82.359105 Days    $T_0=201.279960$  (BKJD)



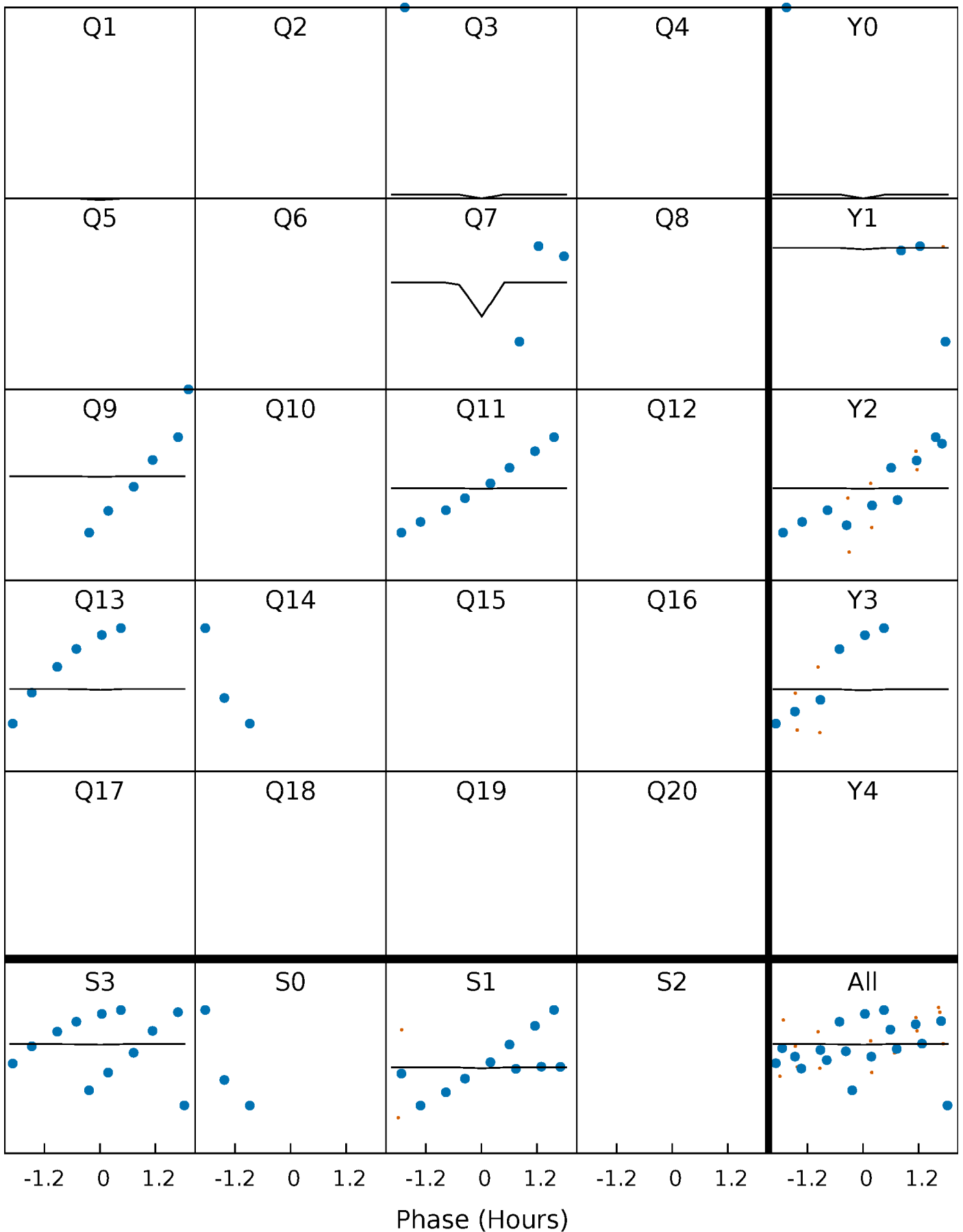
# DV Quarter-Phased Transit Curves

TCE 008509620-03 P= 82.359105 Days  $T_0=201.279960$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

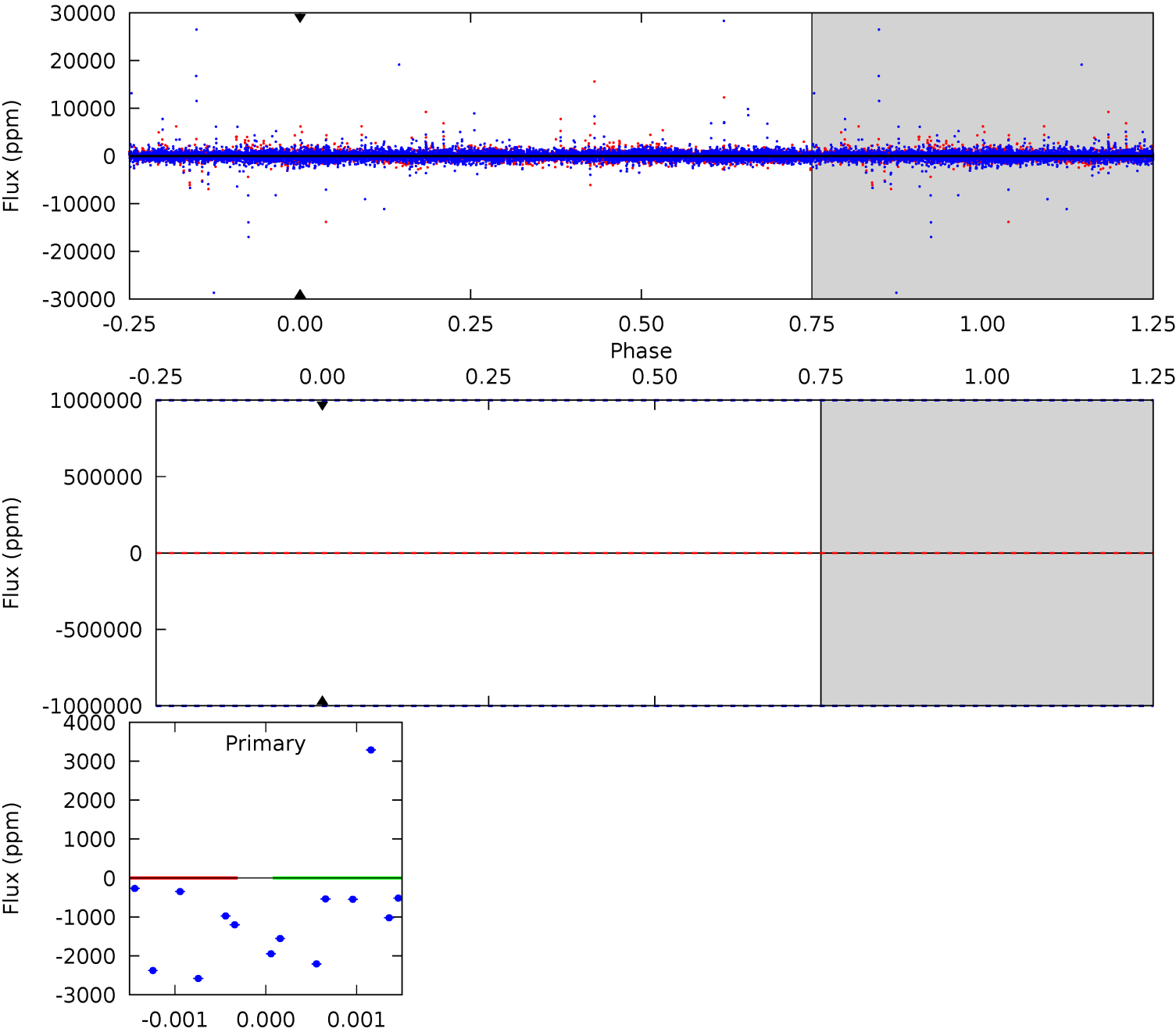
TCE 008509620-03 P= 82.359105 Days  $T_0=201.149667$  (BKJD)



# DV Model-Shift Uniqueness Test

008509620-03, P = 82.359105 Days, E = 118.920855 Days

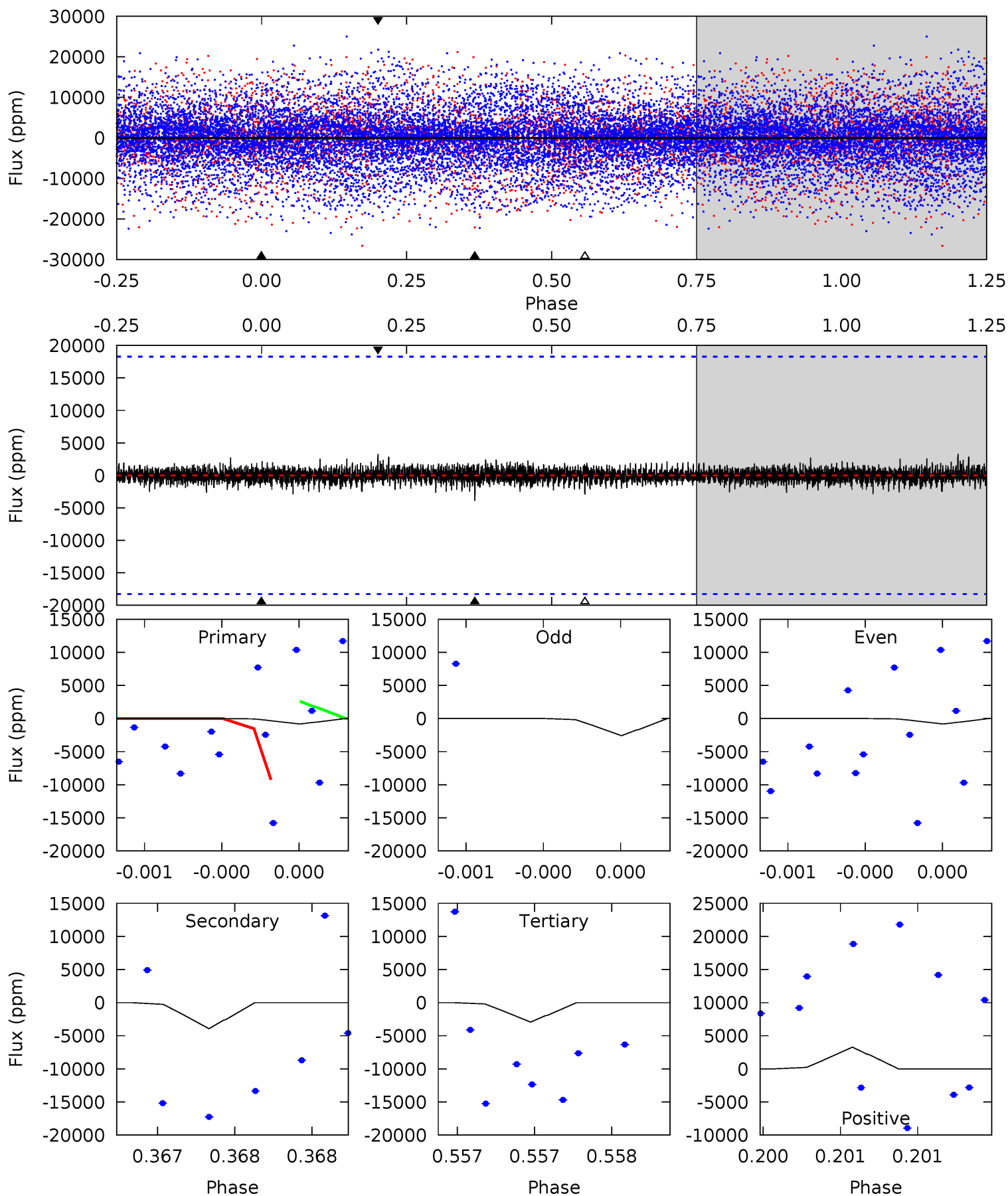
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



# Alt Model-Shift Uniqueness Test

008509620-03, P = 82.359105 Days, E = 118.790562 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
0.26	1.21	0.90	1.01	5.60	3.53	0.22	-0.65	-0.75	0.30	0.20	0.34	28.4	0.45	0.92





### Stellar Parameters For KIC 008509620

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5680^{+170}_{-153}$	$4.511^{+0.092}_{-0.138}$	$-0.540^{+0.300}_{-0.300}$	$0.811^{+0.173}_{-0.093}$	$0.776^{+0.097}_{-0.056}$	$2.053^{+0.822}_{-0.819}$
	+3%/-3%	+2%/-3%	+56%/-56%	+21%/-11%	+12%/-7%	+40%/-40%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 008509620-03 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$0 \pm 1000000$	$6.92^{+7.01}_{-4.66}$	$543^{+30}_{-26}$	$-3831^{+23820}_{-13594}$	$-974.638^{+256859.402}_{-188964.710}$
Alt.	$-3934 \pm 3261$	$6.67^{+6.78}_{-4.89}$	$544^{+32}_{-24}$	$5030^{+4588}_{-1832}$	$4554^{+43825}_{-4213}$

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

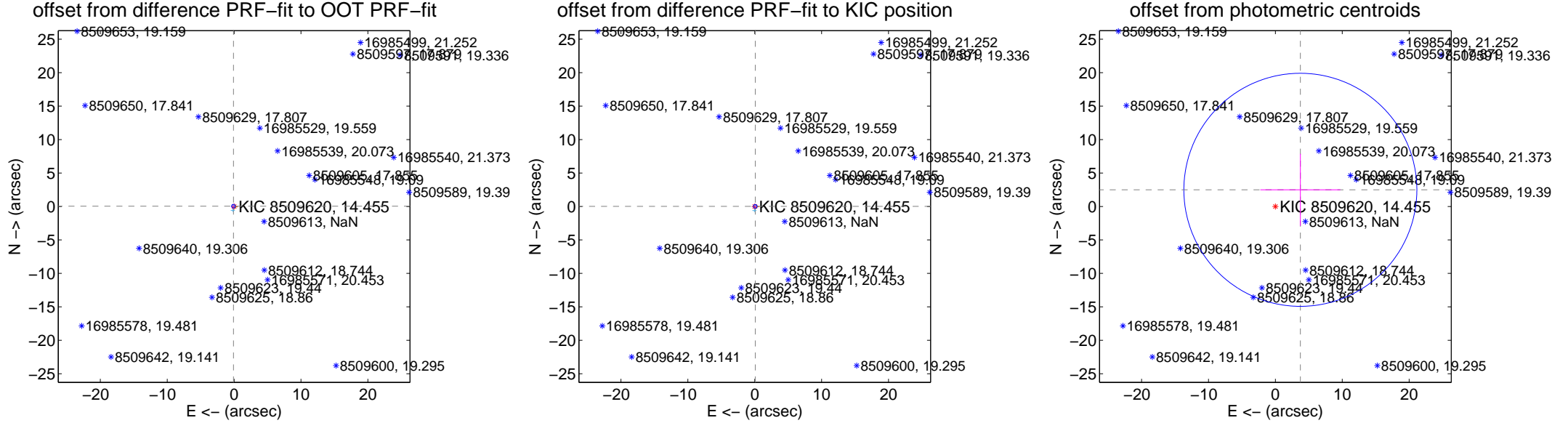
## DV Centroid Data

Supplemental centroid analysis for 008509620-03. Kepler magnitude: 14.46. Transit SNR -1.00

There are 5 quarters with good PRF difference image offsets

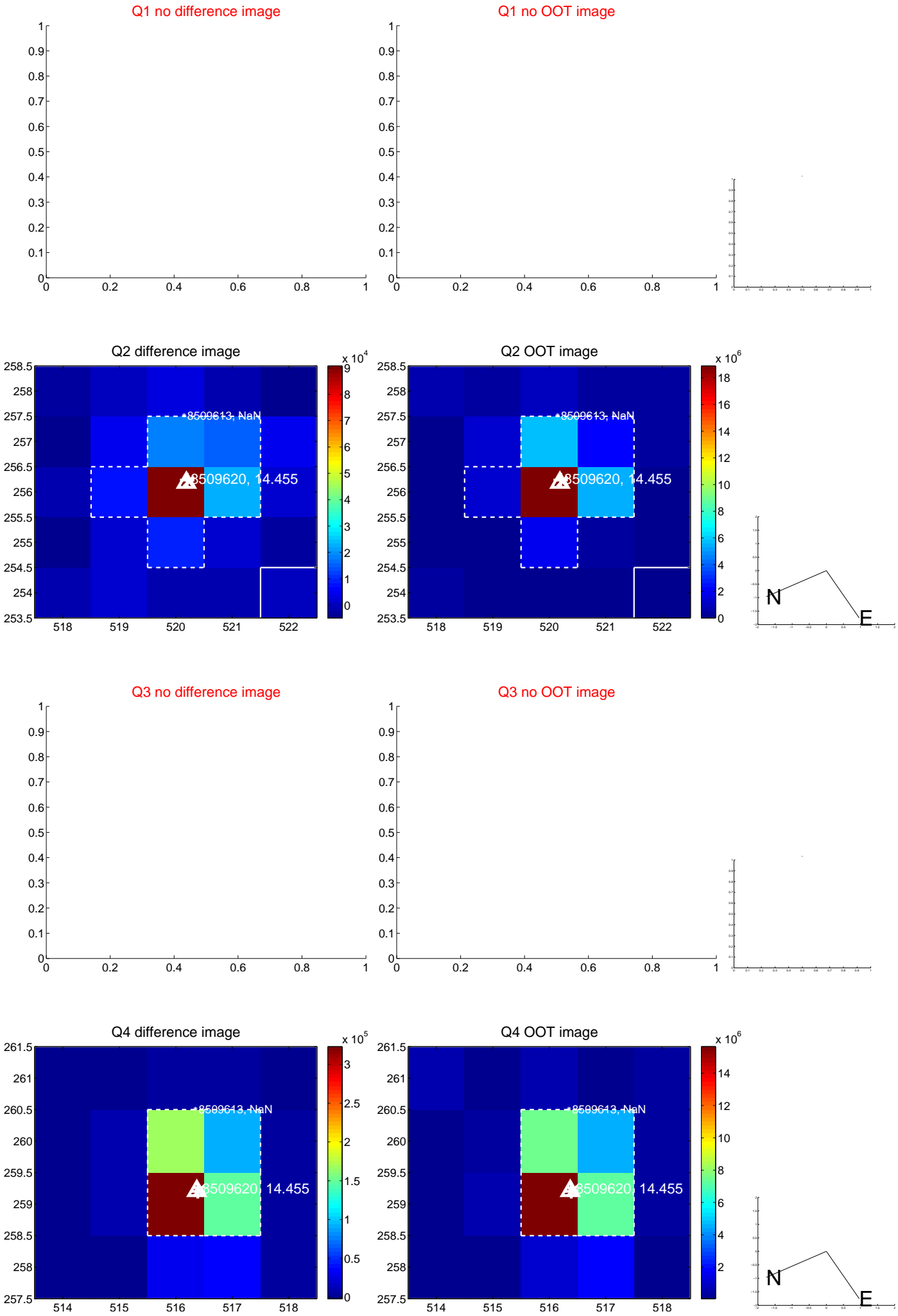
The direct PRF centroid is offset from the target star catalog position by about 0.14 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.104 \pm 0.092$	1.13	$0.095 \pm 0.094$	$0.043 \pm 0.083$
PRF-fit source offset from KIC position	$0.078 \pm 0.094$	0.83	$-0.077 \pm 0.094$	$0.014 \pm 0.083$
photometric centroid source offset	$4.49 \pm 5.80$	0.77	$-3.74 \pm 5.98$	$2.49 \pm 5.38$

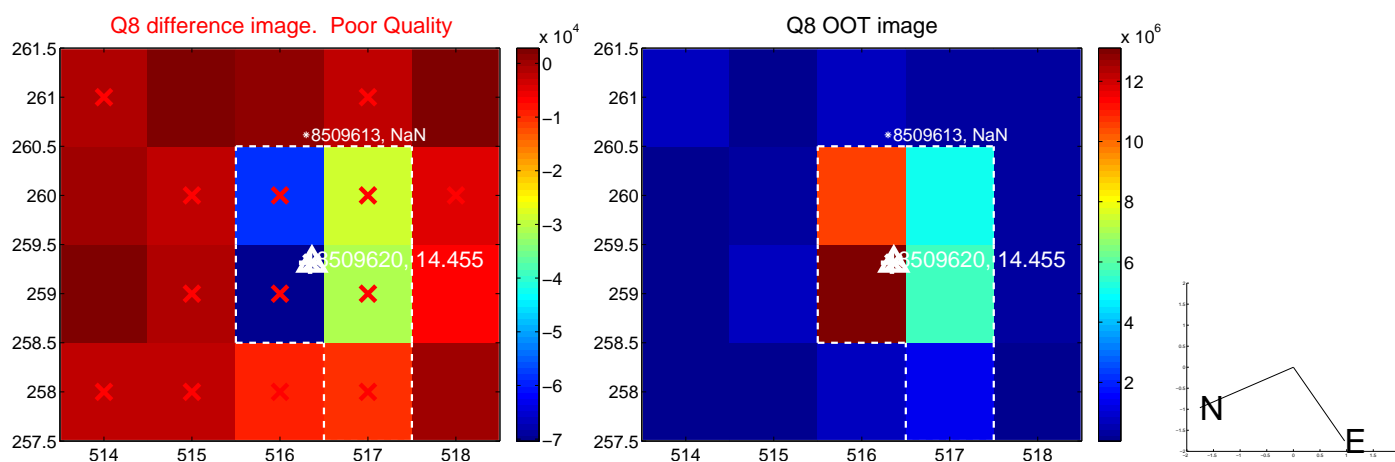
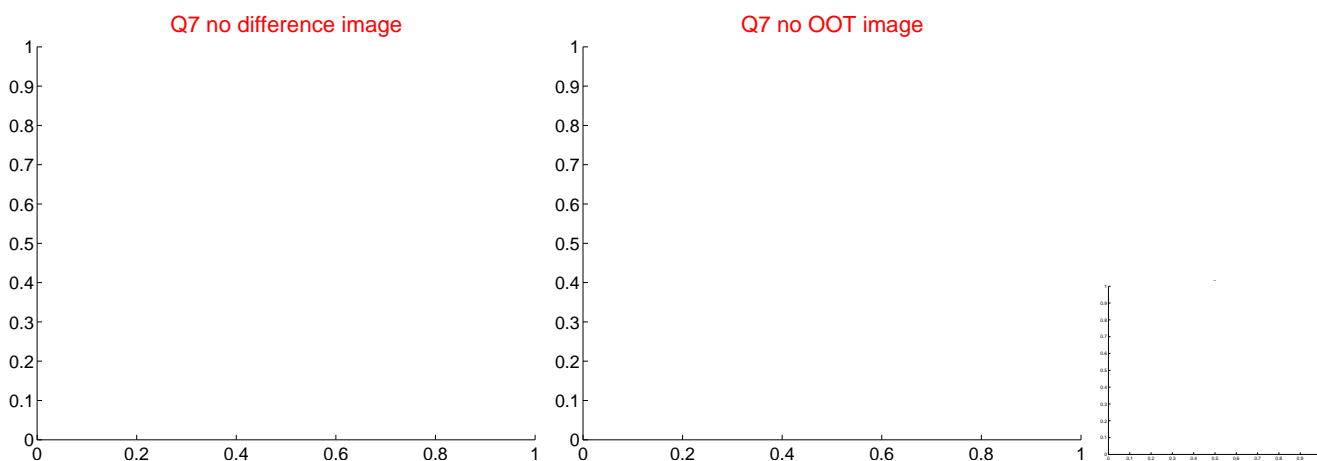
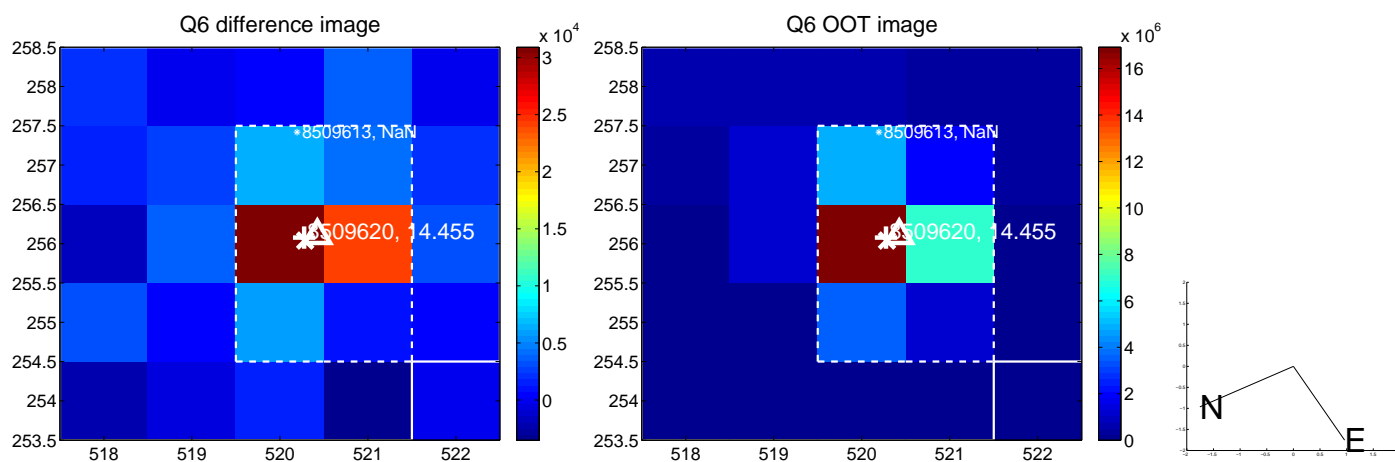
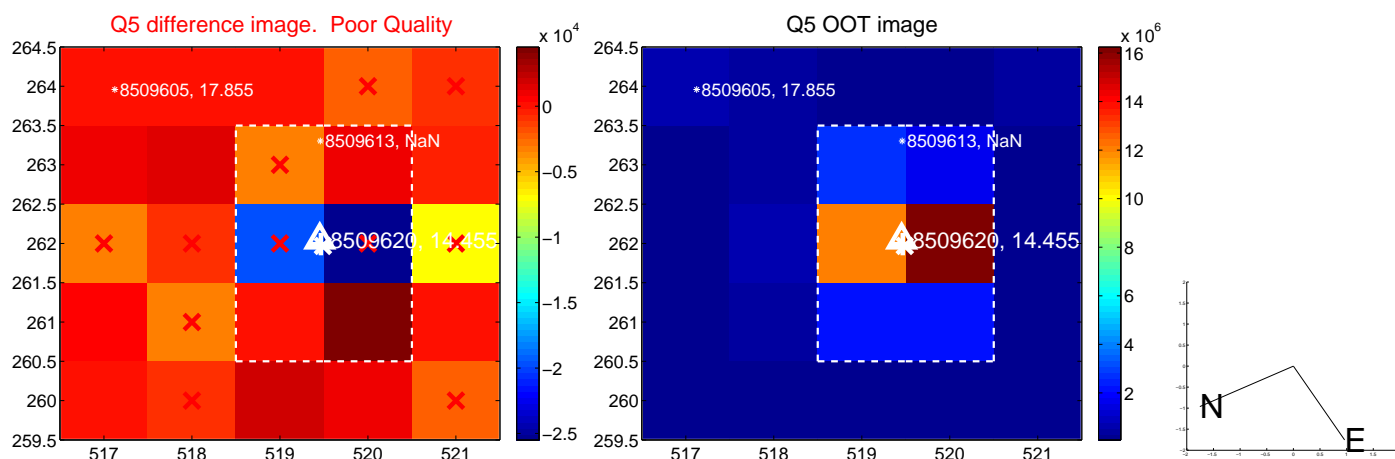


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

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



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.

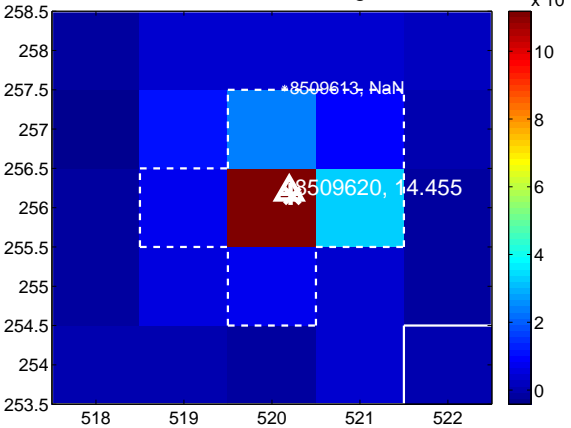
Q9 no difference image



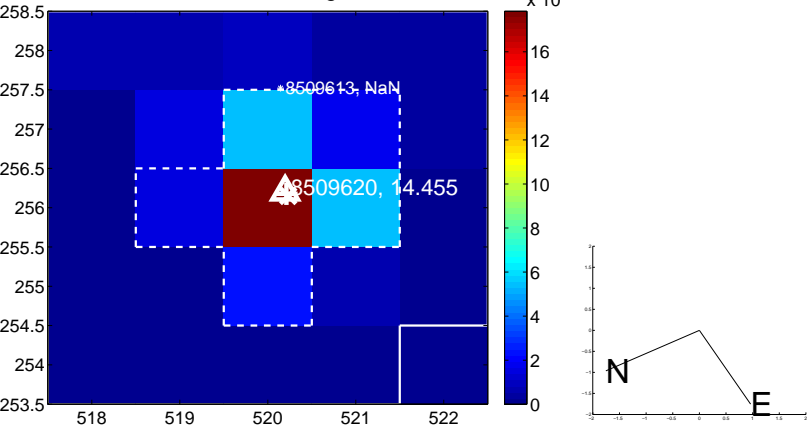
Q9 no OOT image



Q10 difference image



Q10 OOT image



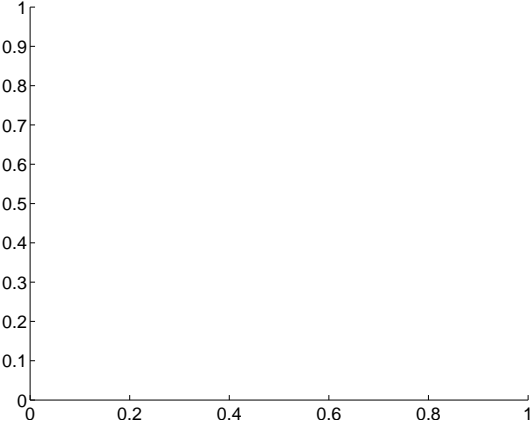
Q11 no difference image



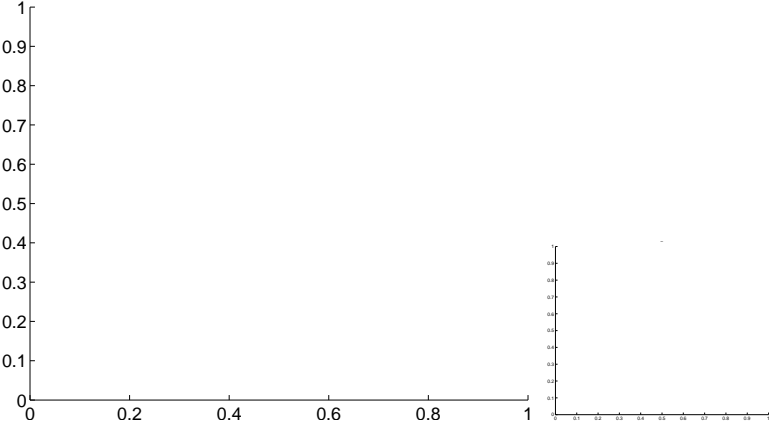
Q11 no OOT image



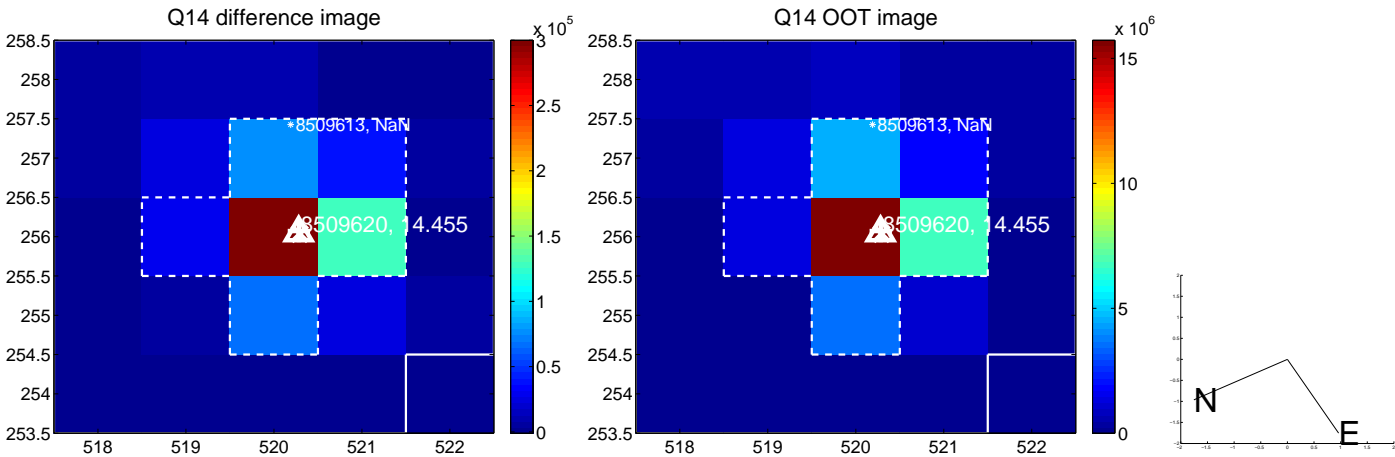
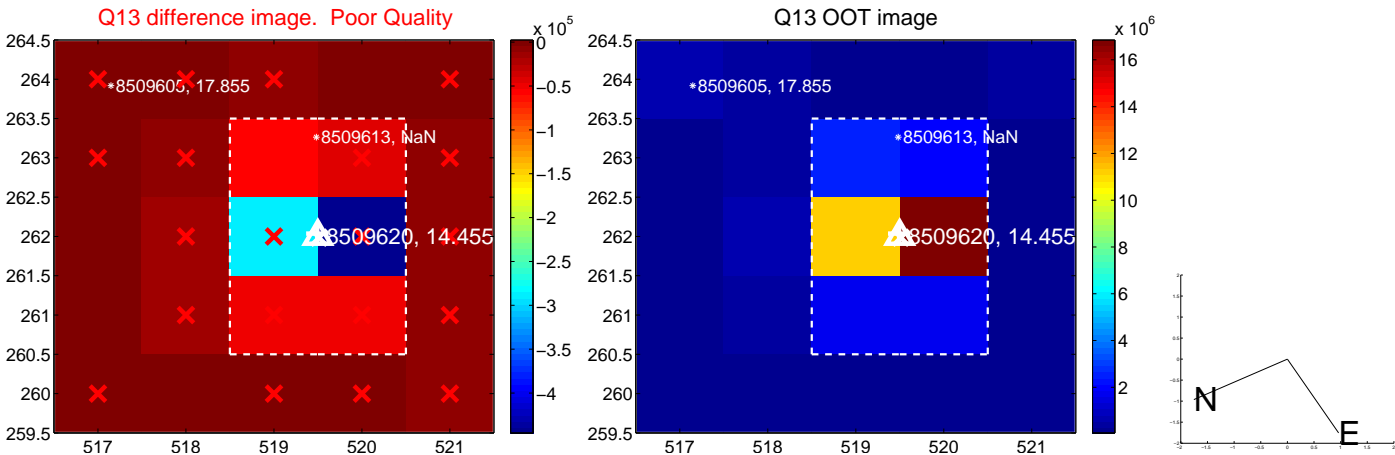
Q12 no difference image



Q12 no OOT image

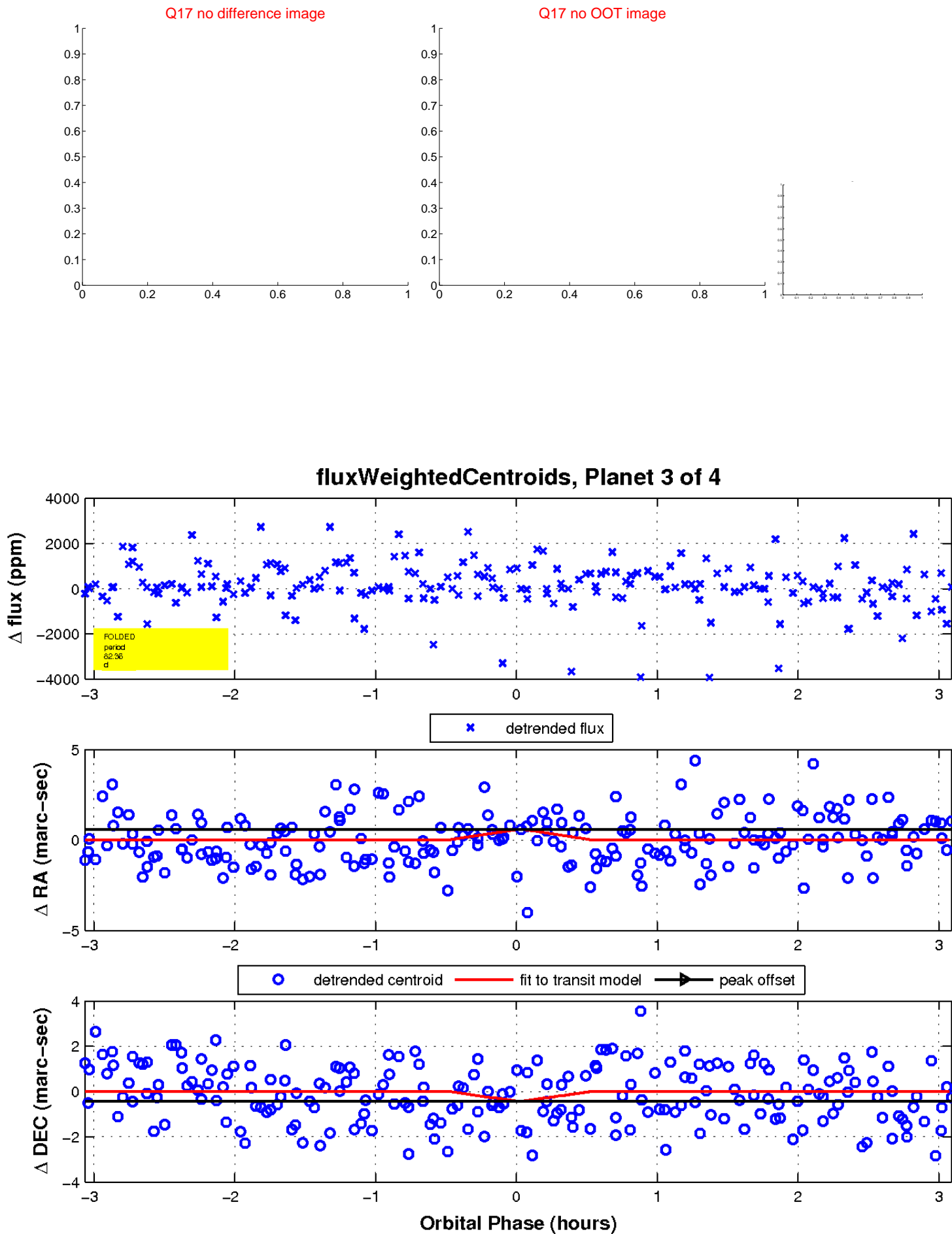


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





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



UKIRT Image

Declination

