

# KIC 006220470

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006220470-01	OBS	6677.01	8.144136	136.505373	88330.4	8.863	9778.4	7639.5	1.86	7605	56.52	1171.70
006220470-02	OBS	No	8.144137	131.628371	9748.9	7.601	1105.8	1002.7	1.86	7605	19.87	1171.70
006220470-03	OBS	No	8.144593	139.031876	108.3	12.791	10.2	11.5	1.86	7605	2.10	1171.62
006220470-05	OBS	No	8.144169	133.084378	119.7	15.000	10.1	-1.0	1.86	7605	2.07	1171.70

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006220470-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—MOD_ODDEVEN_ALT—HAS_SEC_TCE
006220470-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE
006220470-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—MOD_NONUNIQ_DV—SAME_NTL_PERIOD—CENT_FEW_DIFFS
006220470-05	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_NOFITS

**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.

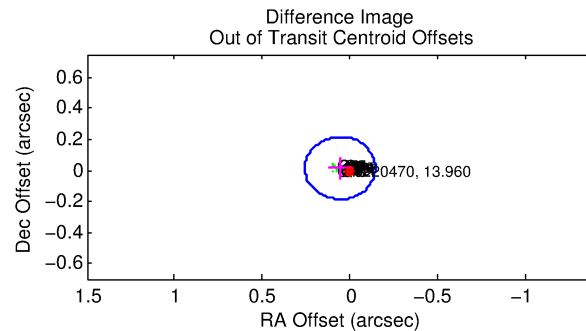
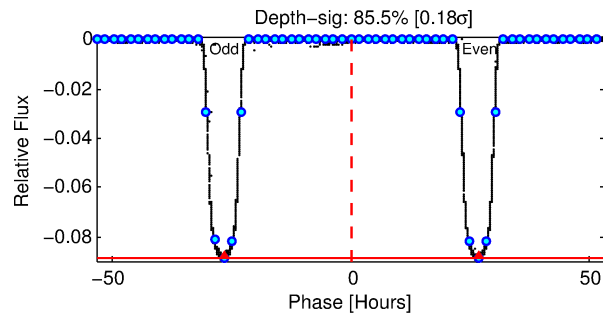
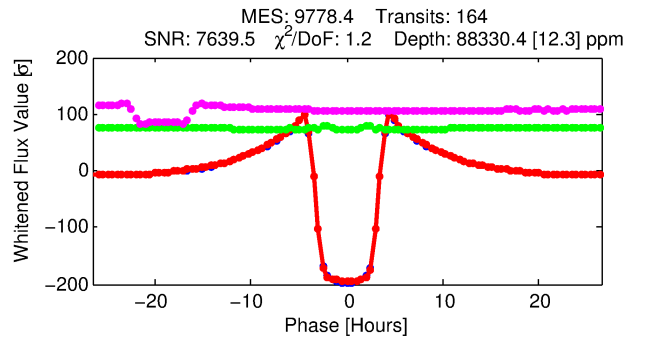
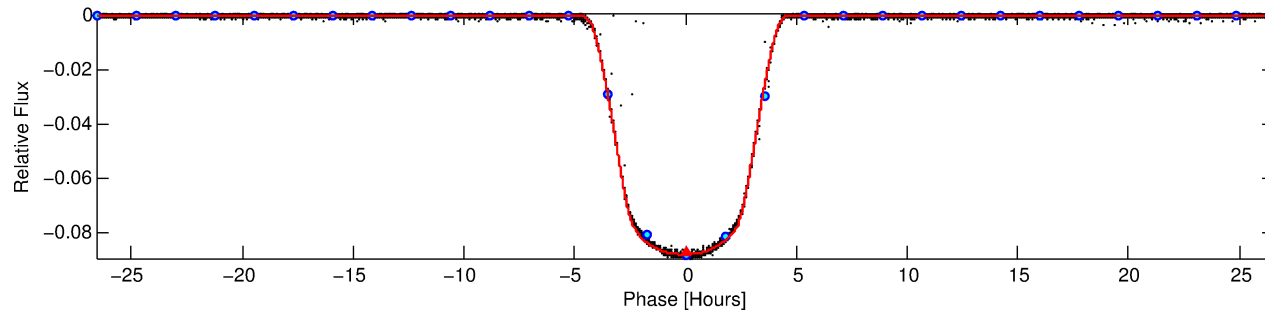
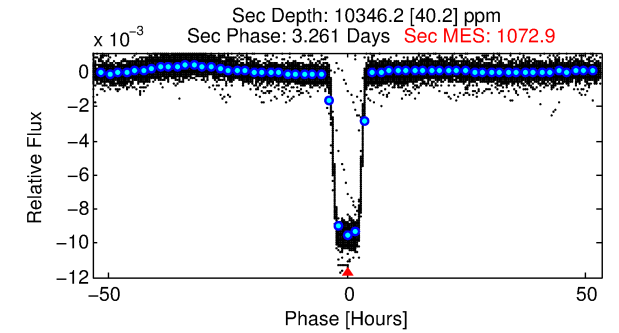
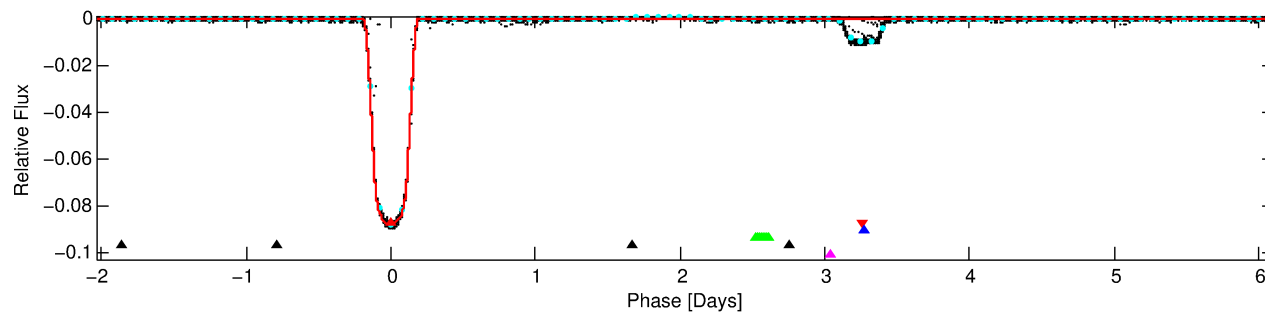
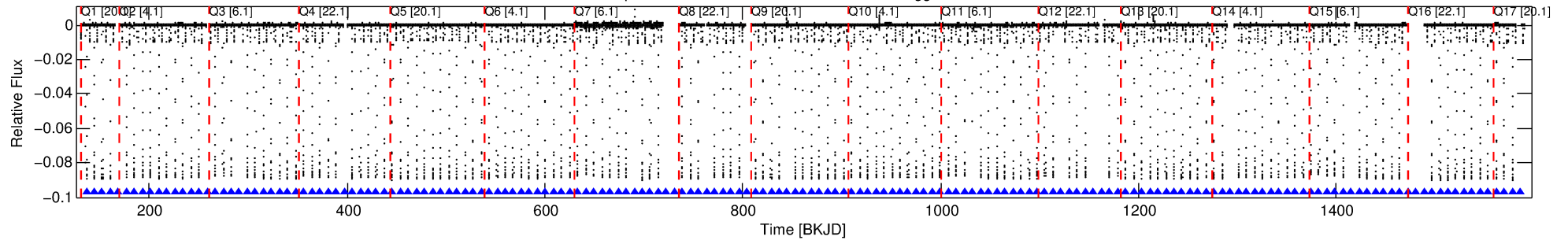
Ephemeris Match Information For 006220470-01

No Significant Match Found

# DV One-Page Summary

KIC: 6220470 Candidate: 1 of 5 Period: 8.144 d  
KOI: K06677.01 Corr: 0.998

Kp: 13.96 R\*: 1.86 Rs Teff: 7605.0 K Logg: 4.12 Fe/H: 0.040



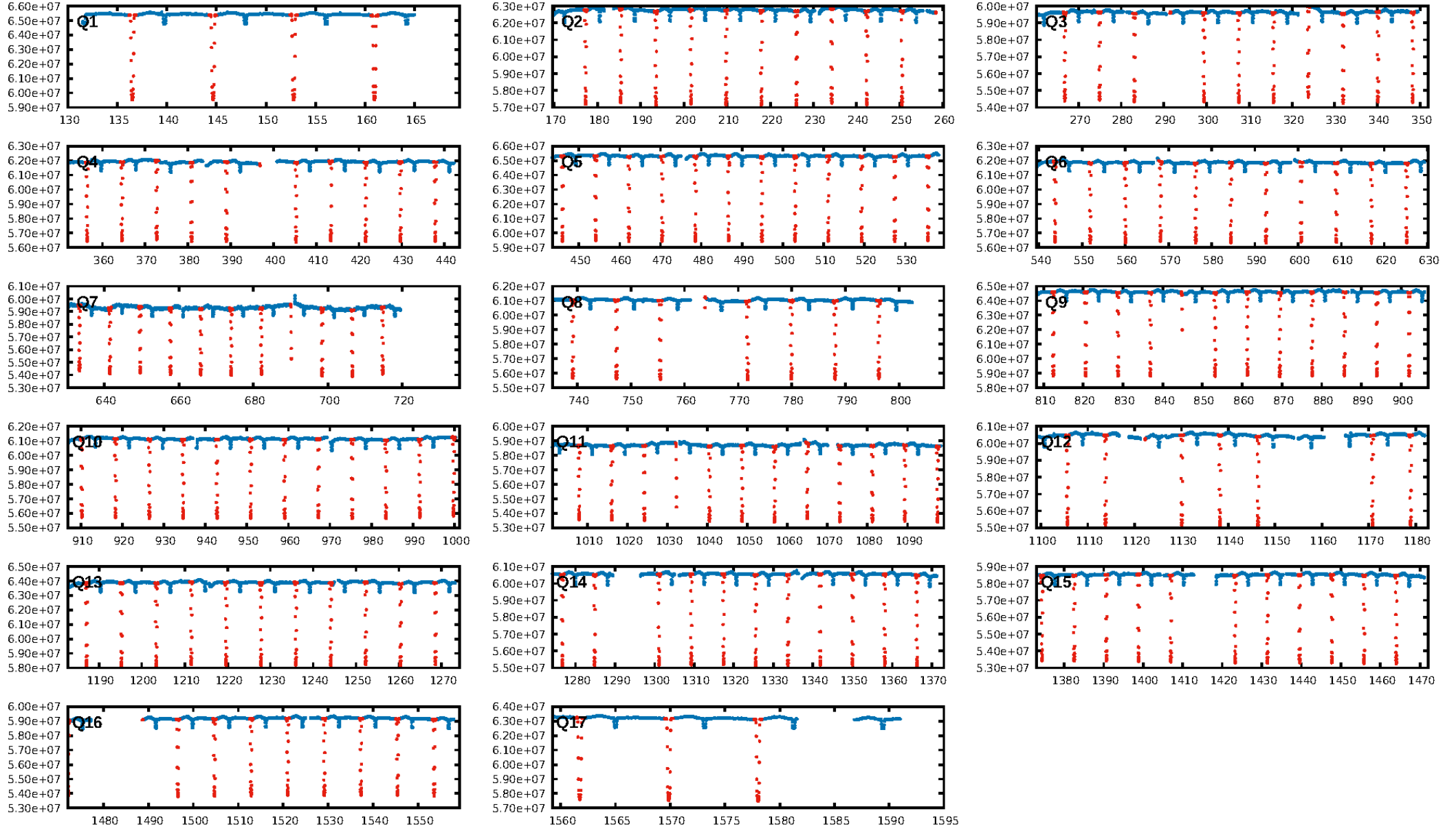
## DV Fit Results:

Period = 8.14414 [0.00000] d  
Epoch = 136.5054 [0.0000] BKJD  
Rp/R\* = 0.2782 [0.0000]  
a/R\* = 8.90 [0.00]  
b = 0.19 [0.00]  
Seff = 1171.70 [447.26]  
Teff = 1492 [142] K  
Rp = 56.52 [16.39] Re  
a = 0.0942 [0.0224] AU  
Ag = 15.80 [5.33] [2.78σ]  
Teffp = 4599 [206] K [12.42σ]

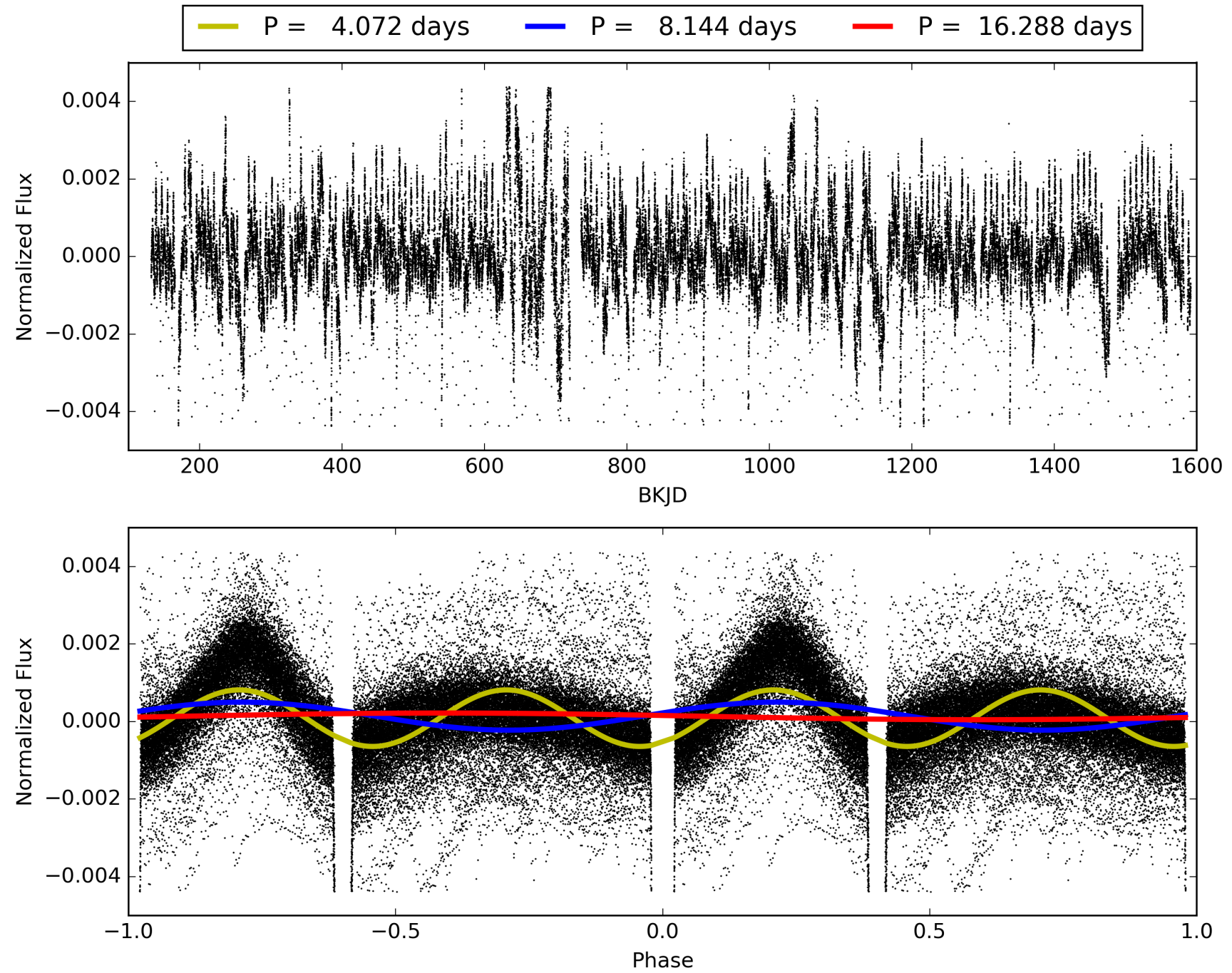
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 0.2%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [157/157]  
GhostDiagnostic-chr: 4.346  
Centroid-sig: N/A  
Centroid-so: 0.190 arcsec [191.89σ]  
OotOffset-rm: 0.059 arcsec [0.88σ]  
KicOffset-rm: 0.086 arcsec [1.26σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 1.00 [17/17]

# TCE 006220470-01, PDC Light Curves



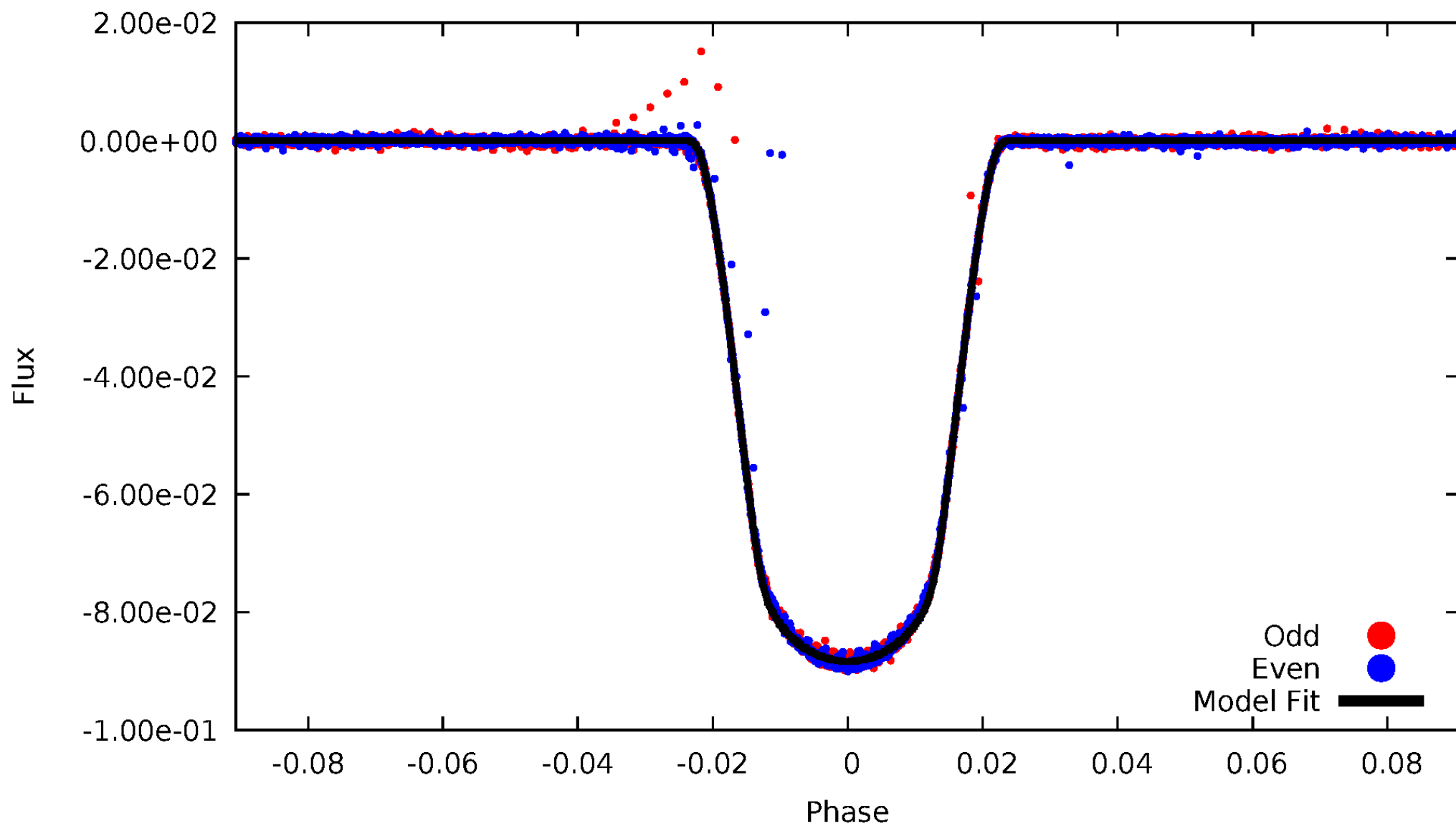
TCE 006220470-01





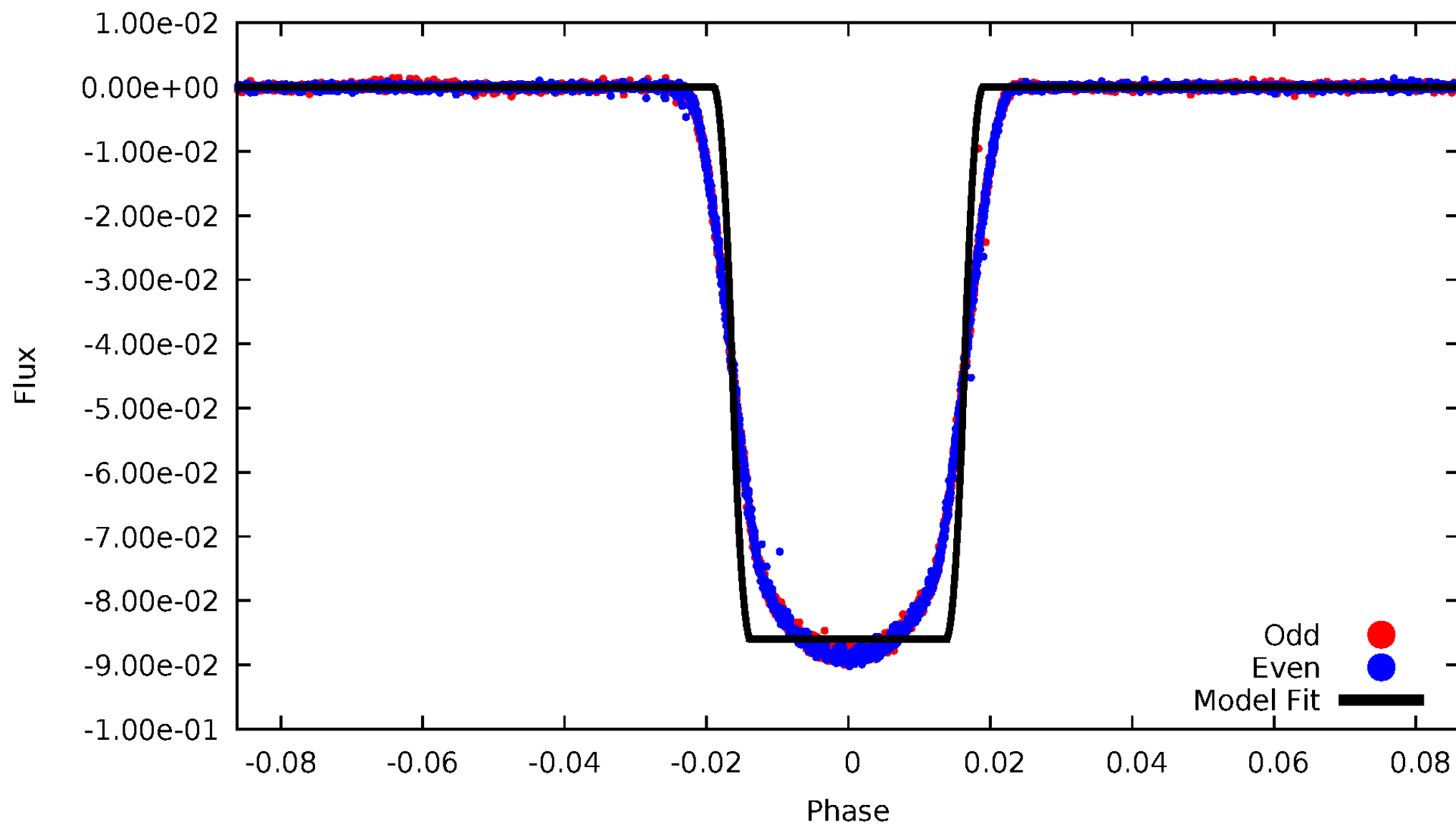
# DV Odd/Even

TCE 006220470-01



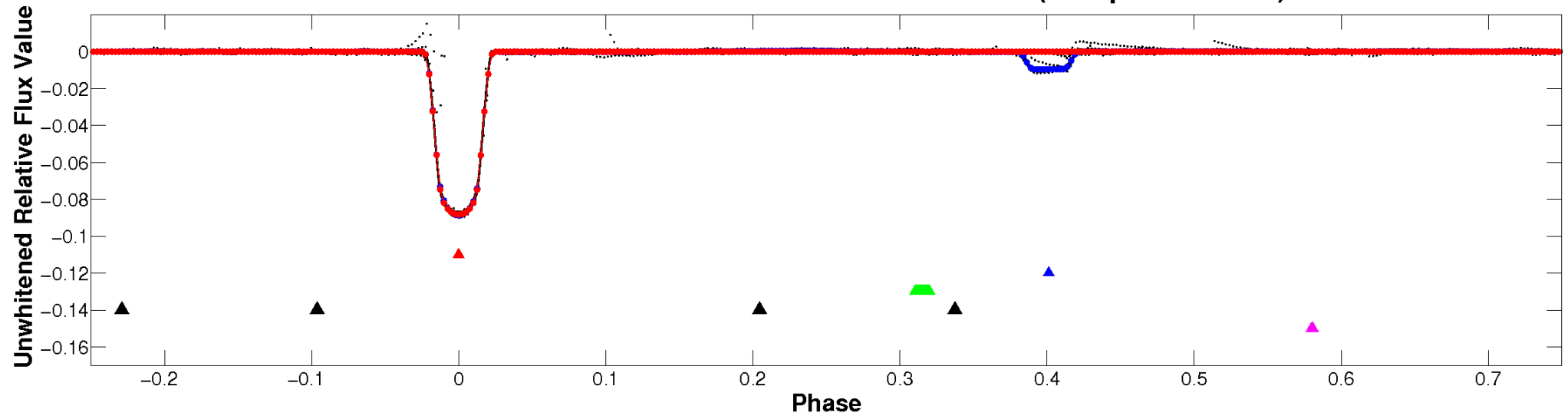
# ALT Odd/Even

TCE 006220470-01

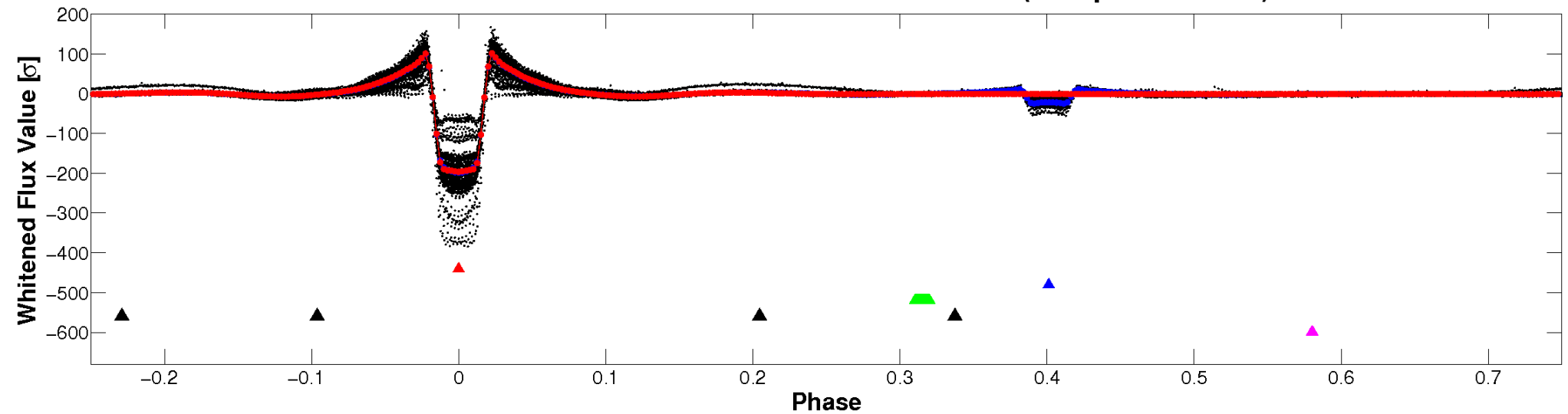


# Non-Whitened Vs. Whitened Light Curve

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

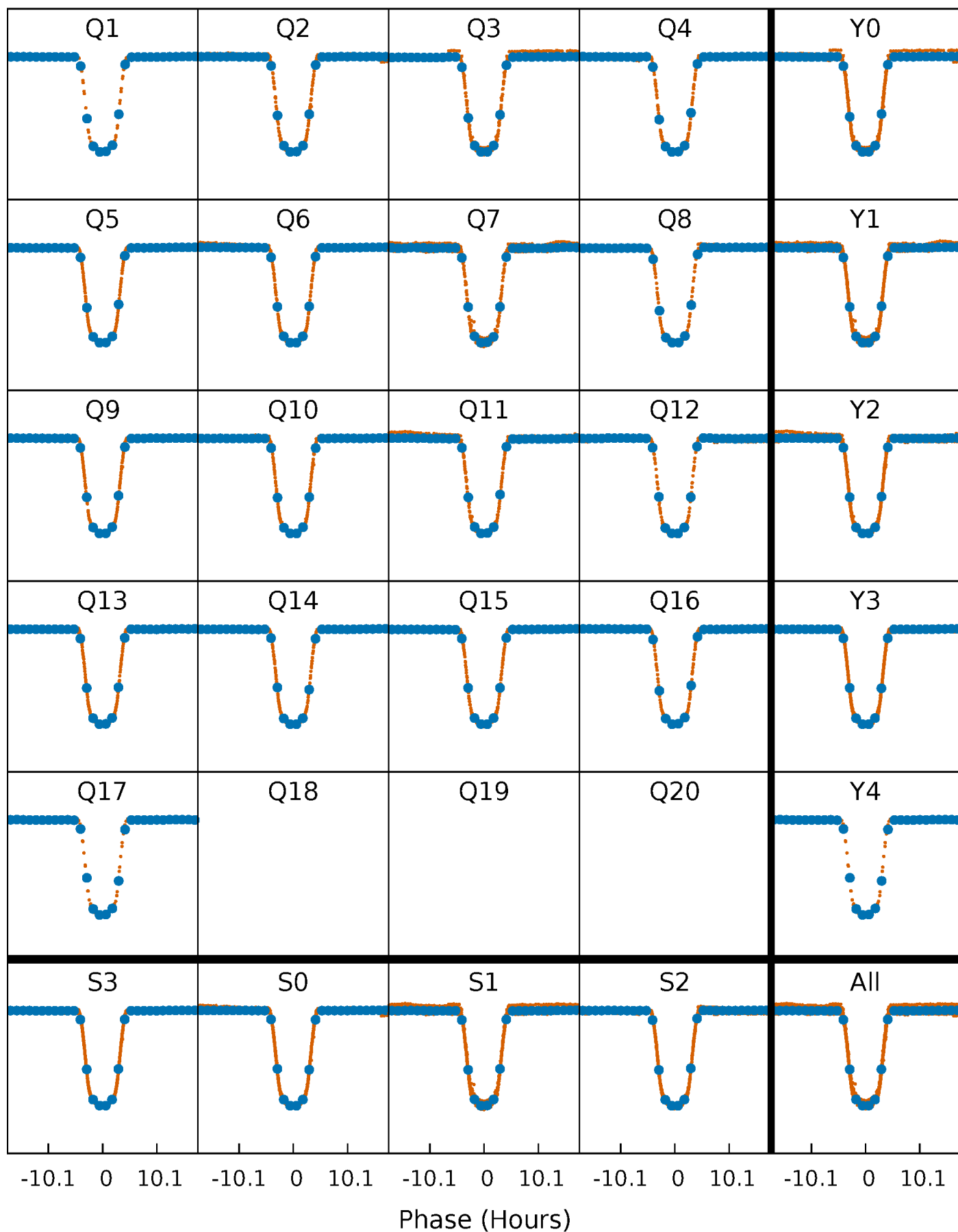


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



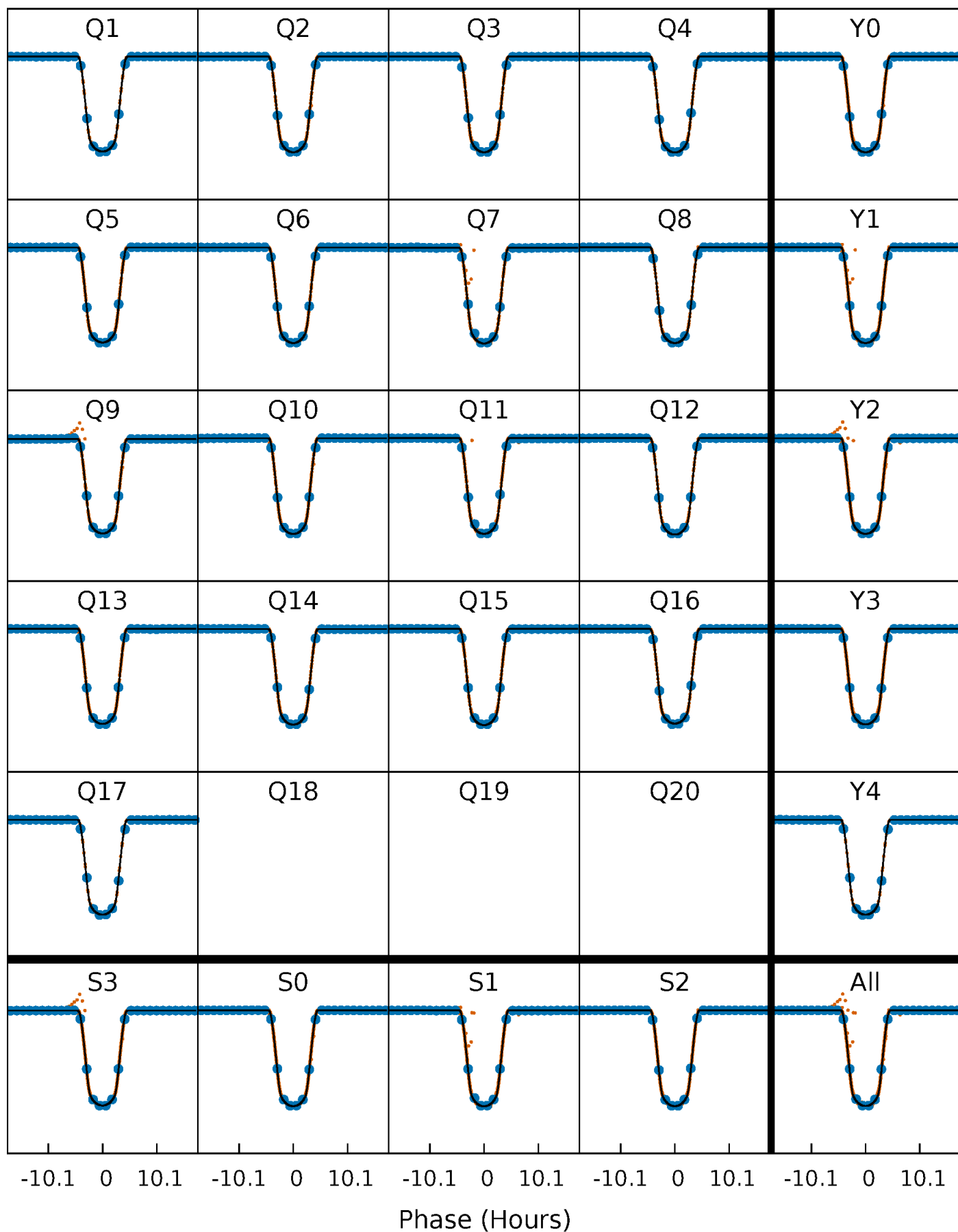
# PDC Quarter-Phased Transit Curves

TCE 006220470-01 P= 8.144136 Days  $T_0=136.505373$  (BKJD)



# DV Quarter-Phased Transit Curves

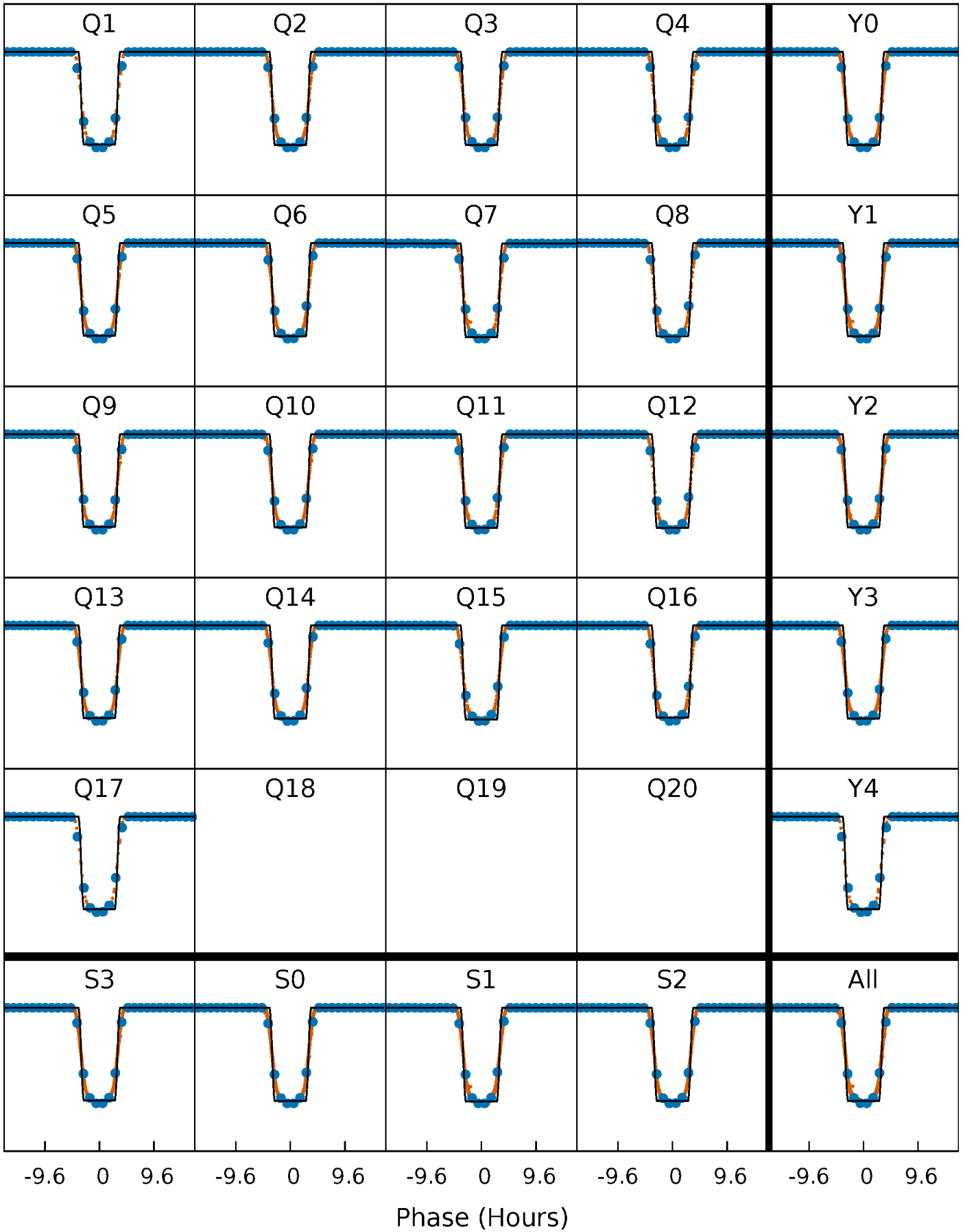
TCE 006220470-01 P= 8.144136 Days  $T_0=136.505373$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

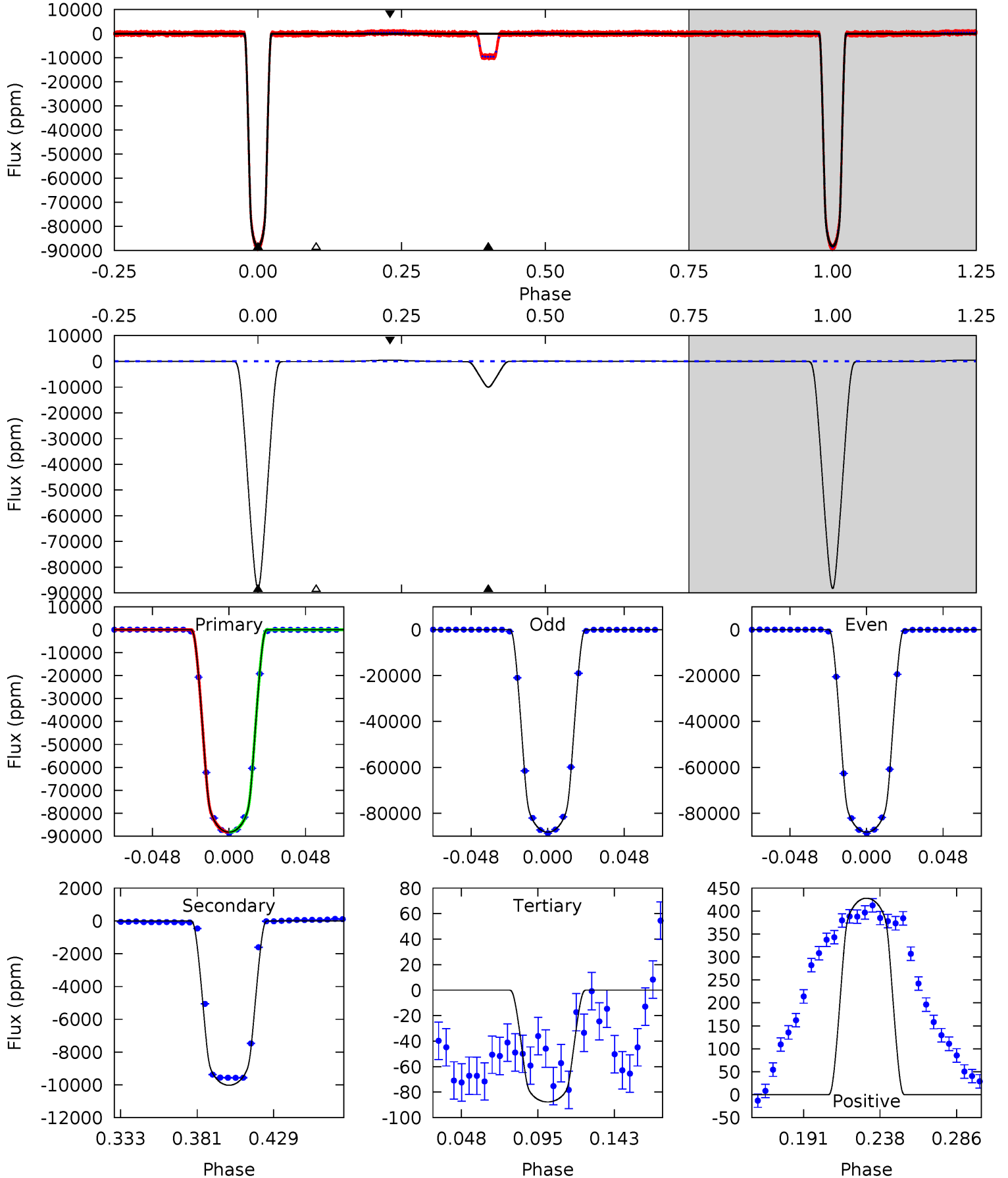
TCE 006220470-01   P= 8.144155 Days    $T_0=136.503604$  (BKJD)



# DV Model-Shift Uniqueness Test

006220470-01, P = 8.144136 Days, E = 128.361237 Days

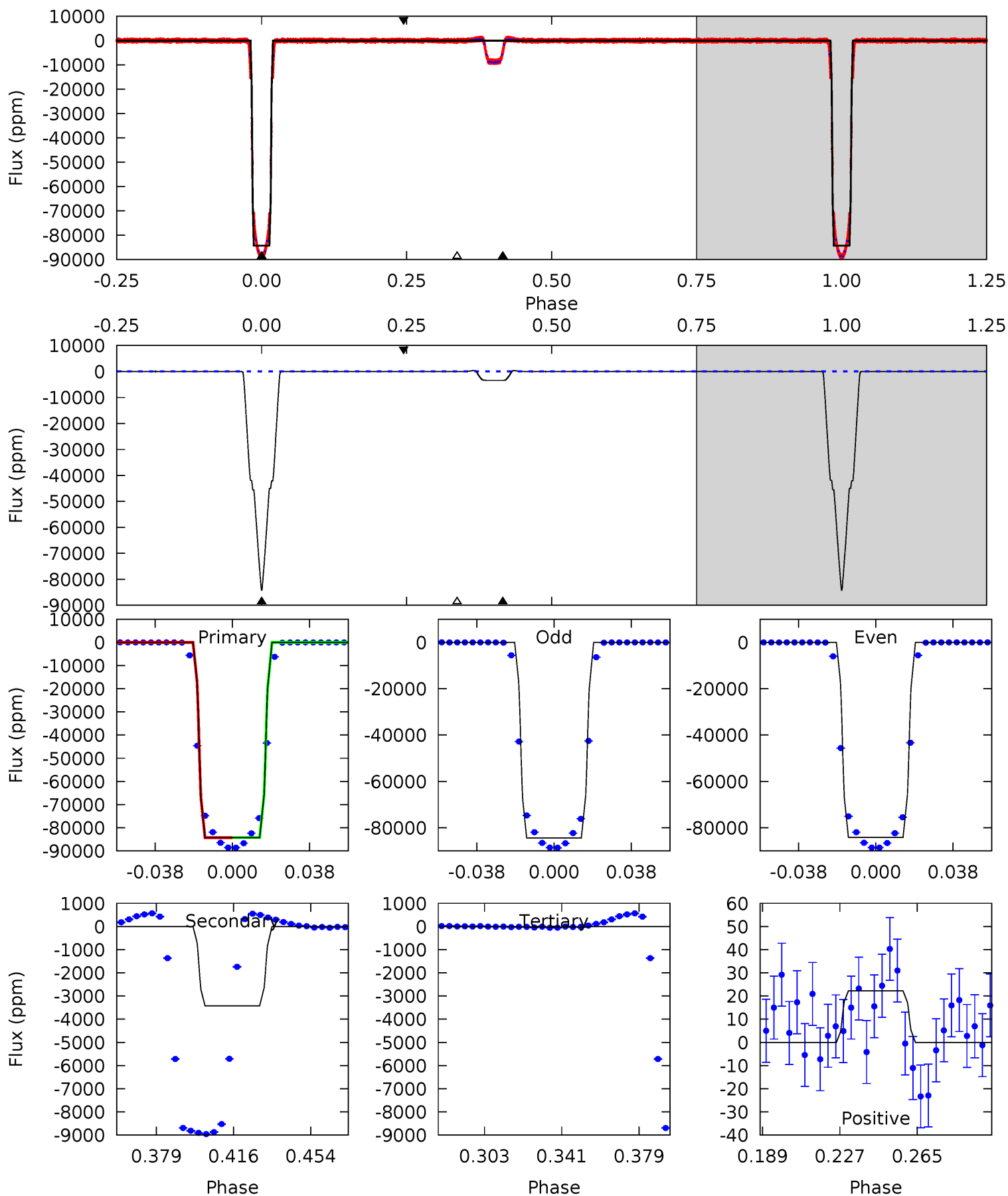
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
15984	1816	15.9	77.5	4.72	1.98	22.9	15968	15907	1800	1739	0.76	0.98	0.00	1.16



# Alt Model-Shift Uniqueness Test

006220470-01, P = 8.144155 Days, E = 128.359449 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
14750	598.8	5.66	3.89	4.76	2.08	24.3	14744	14746	593.1	594.9	26.0	1.00	0.00	0.35



### Stellar Parameters For KIC 006220470

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7605^{+209}_{-340}$	$4.123^{+0.120}_{-0.180}$	$0.040^{+0.200}_{-0.350}$	$1.862^{+0.540}_{-0.360}$	$1.677^{+0.212}_{-0.259}$	$0.366^{+0.243}_{-0.179}$
	+3%/-4%	+3%/-4%	+500%/-875%	+29%/-19%	+13%/-15%	+66%/-49%
Source	KIC0	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 006220470-01 / KOI 6677.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-10025 \pm 6$	$56.95^{+7.79}_{-6.07}$	$2084^{+158}_{-123}$	$4630^{+87}_{-136}$	$15^{+3}_{-3}$
Alt.	$-3421 \pm 6$	$60.18^{+9.19}_{-6.50}$	$2095^{+150}_{-145}$	$3696^{+60}_{-96}$	$4.568^{+0.979}_{-1.040}$

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

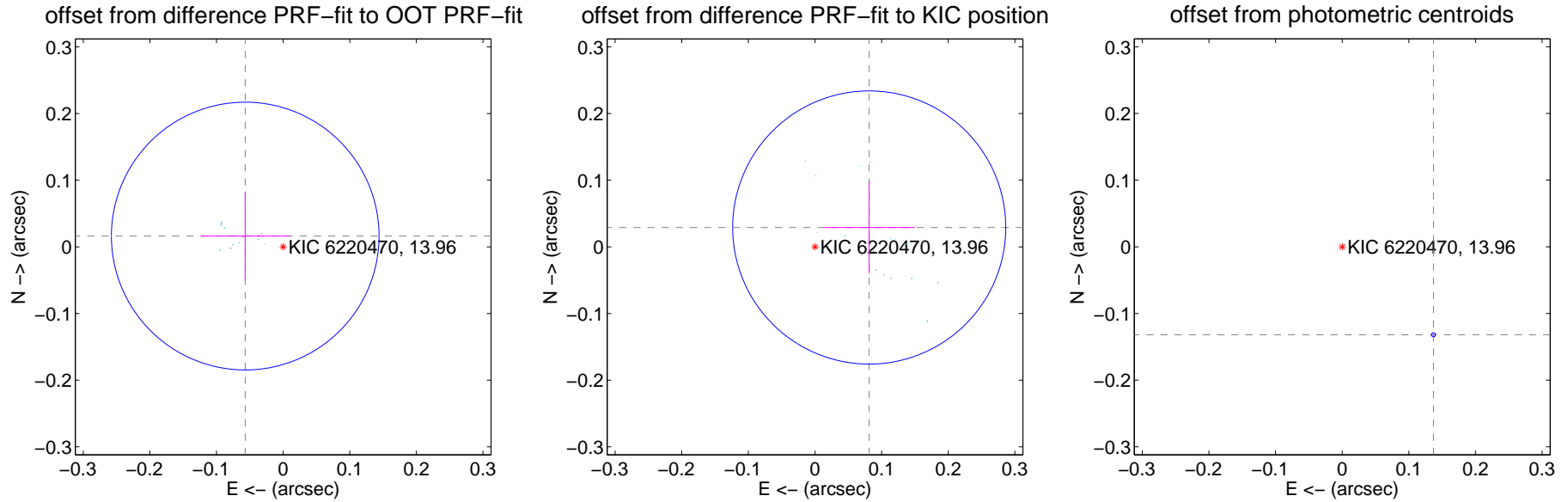
## DV Centroid Data

Supplemental centroid analysis for 006220470-01. Kepler magnitude: 13.96. Transit SNR 7639.49

There are 17 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.17 arcsec

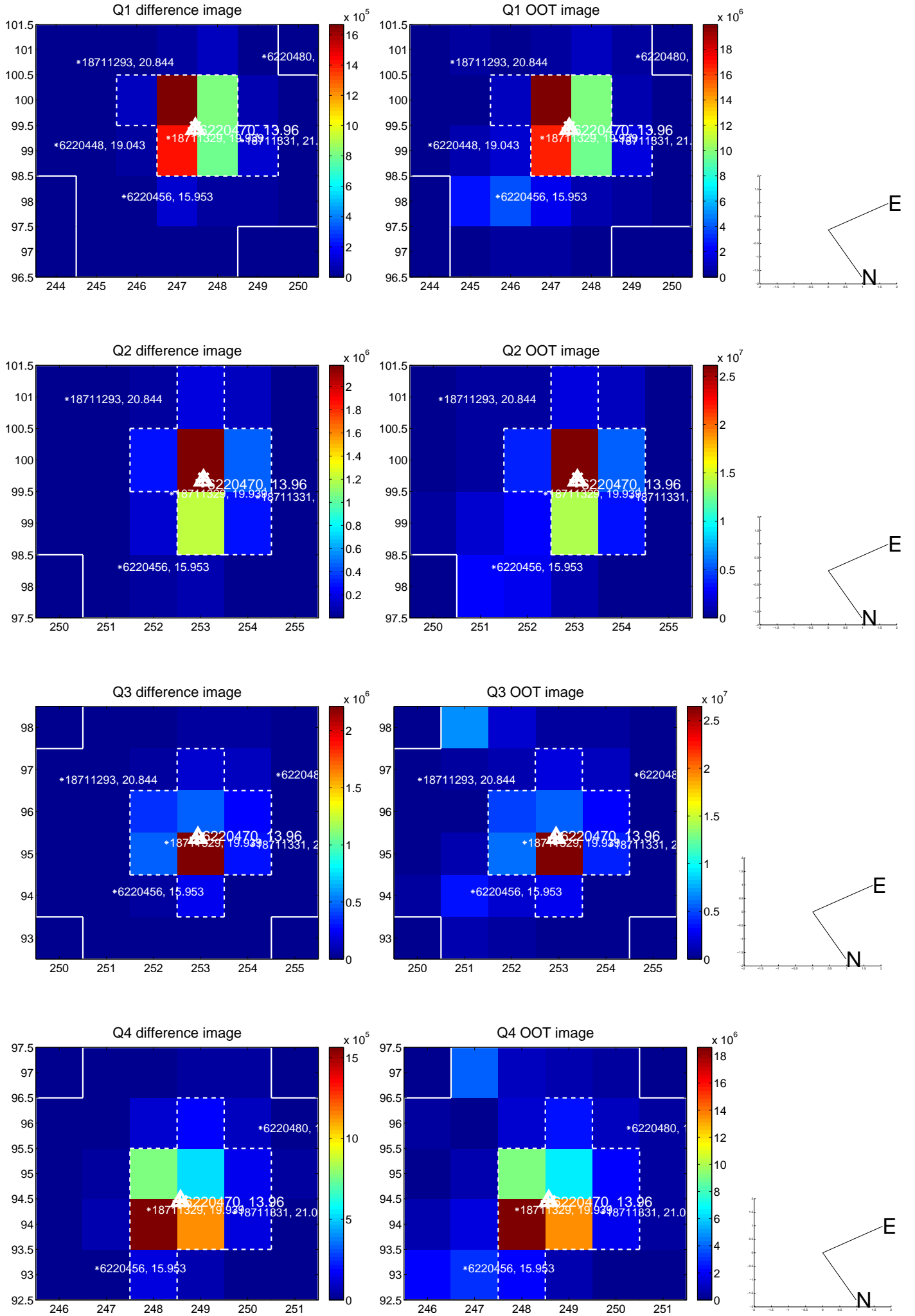
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.059 \pm 0.067$	0.88	$0.057 \pm 0.067$	$0.016 \pm 0.067$
PRF-fit source offset from KIC position	$0.086 \pm 0.068$	1.26	$-0.081 \pm 0.068$	$0.029 \pm 0.069$
photometric centroid source offset	$0.19 \pm 0.00$	191.89	$-0.14 \pm 0.00$	$-0.13 \pm 0.00$



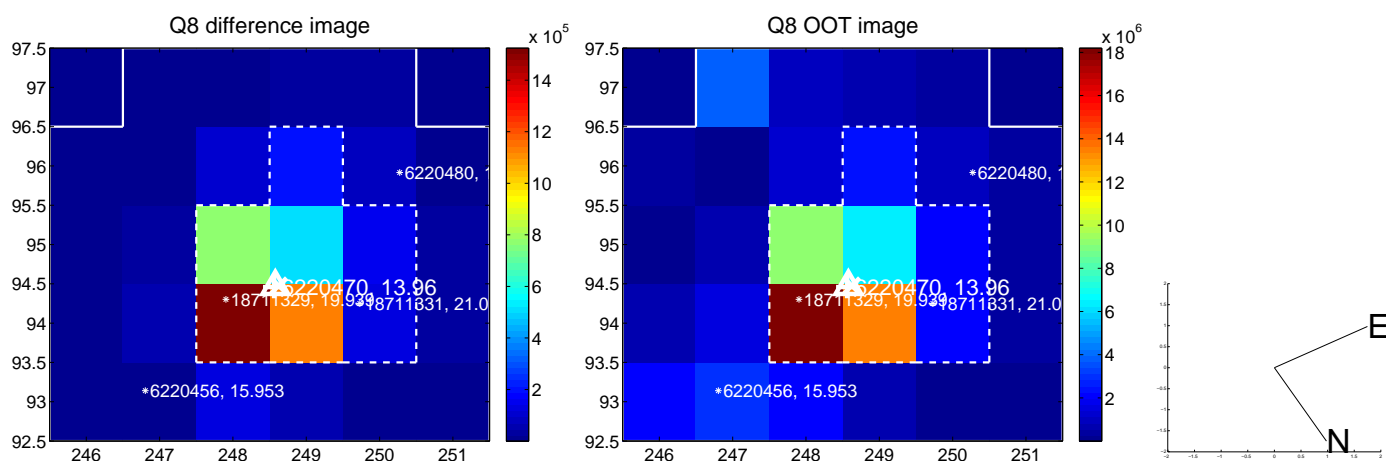
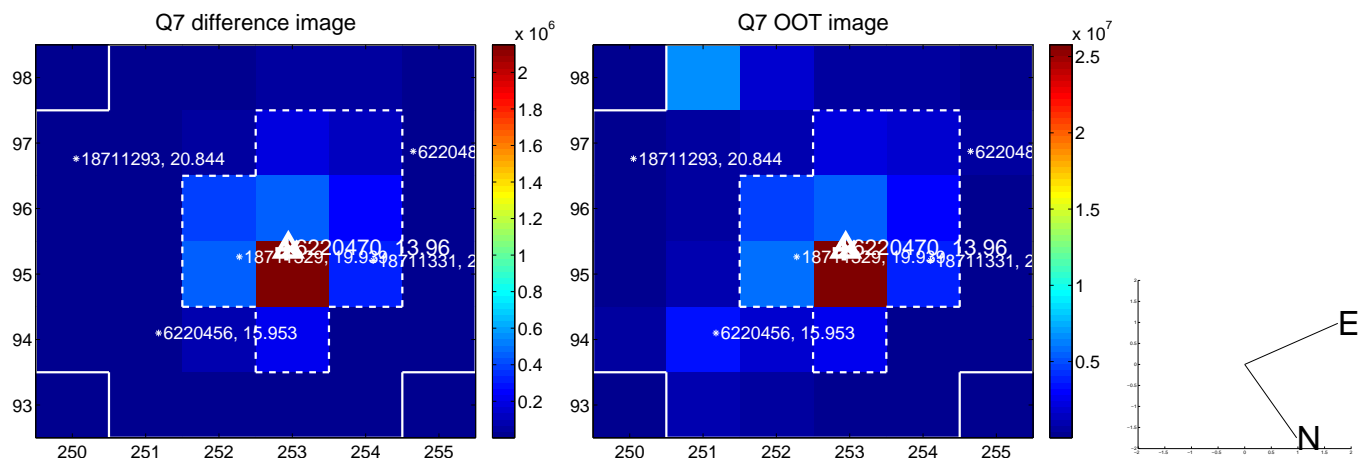
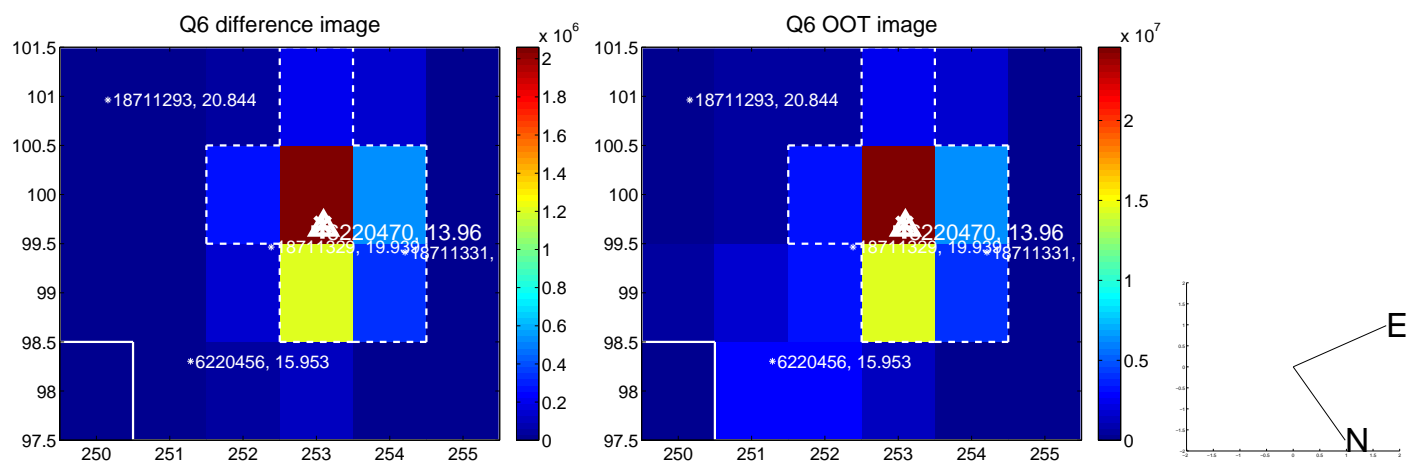
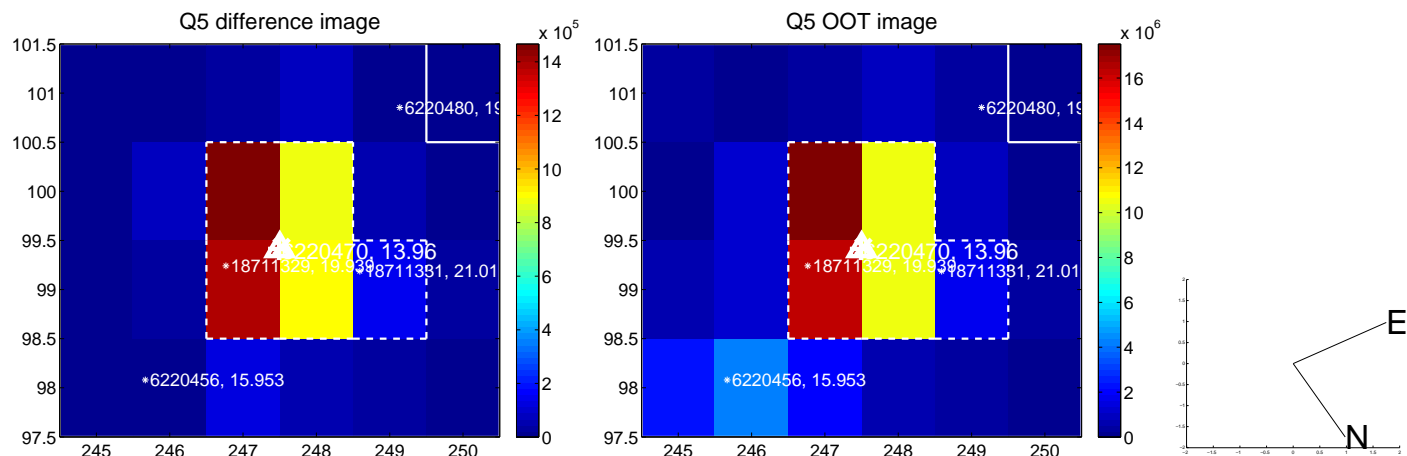
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



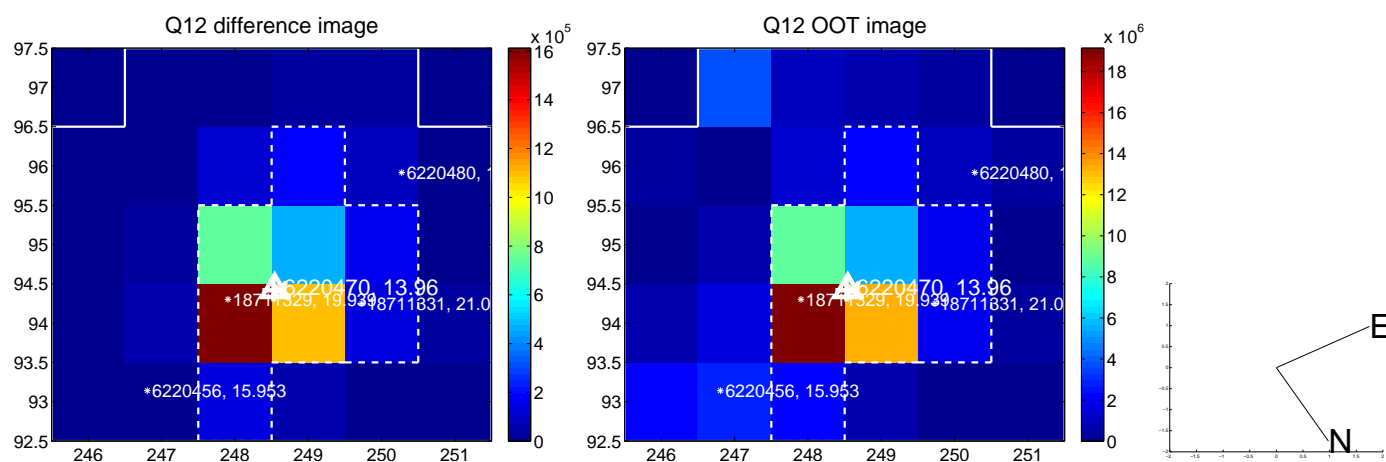
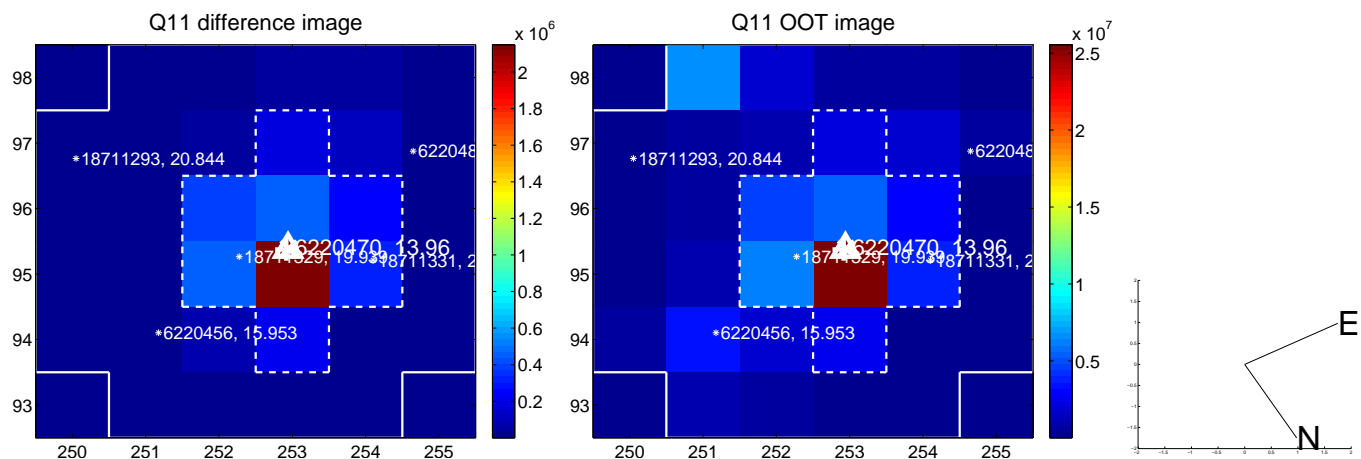
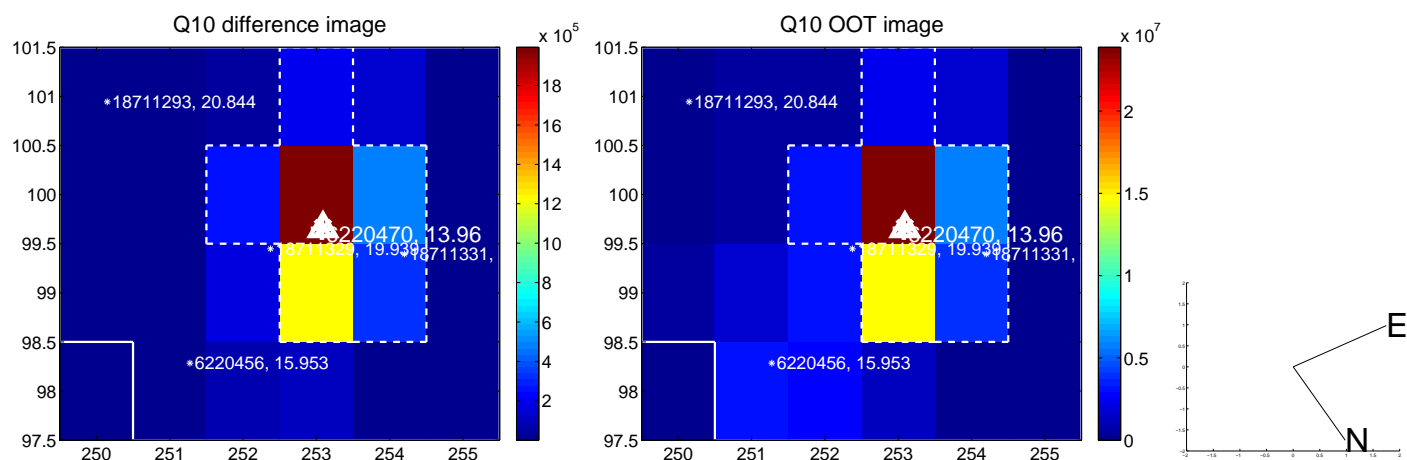
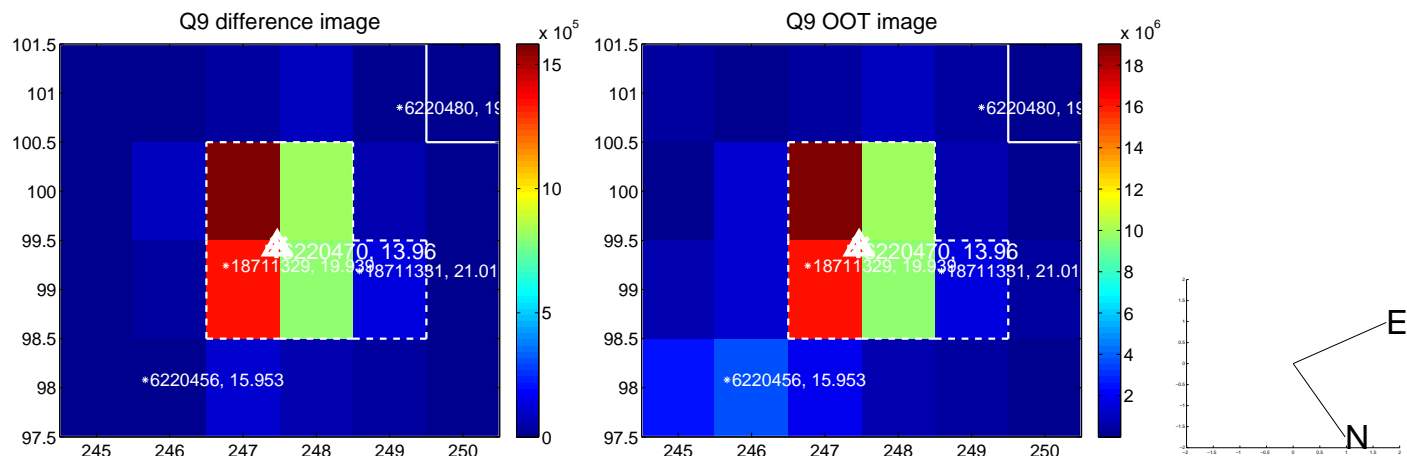
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



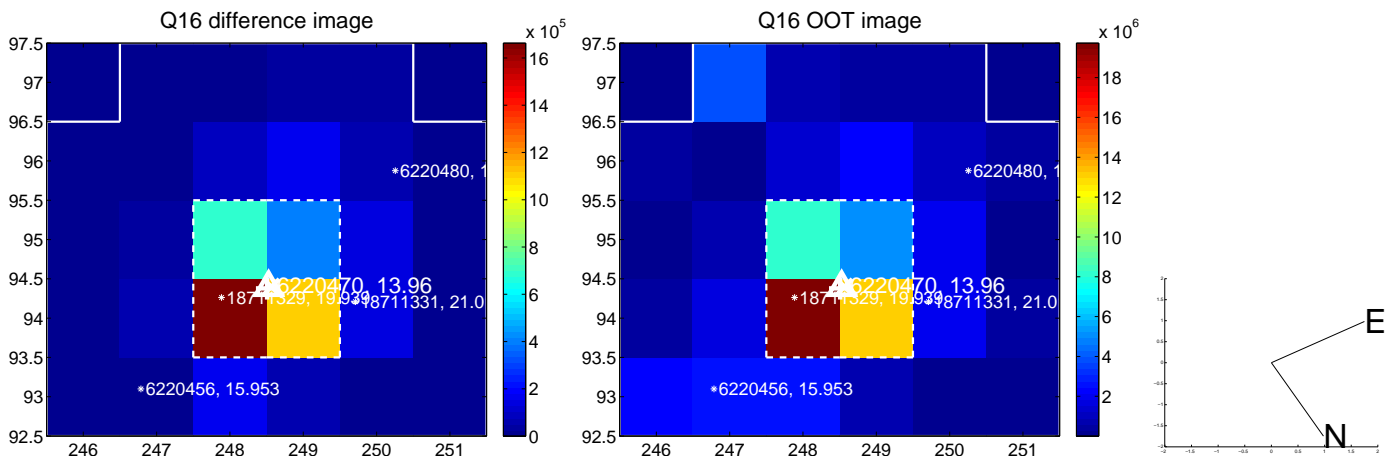
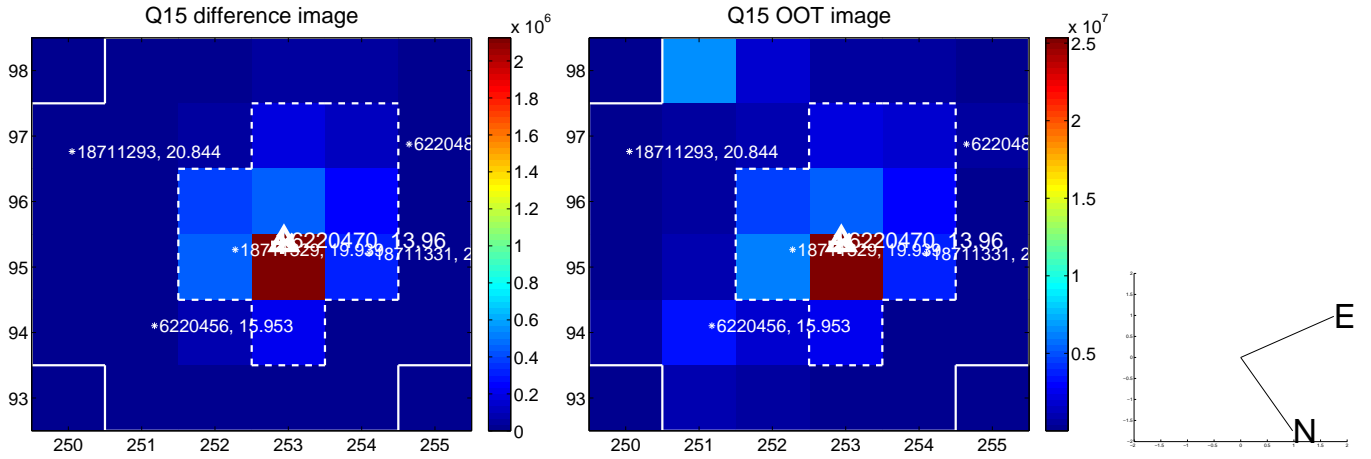
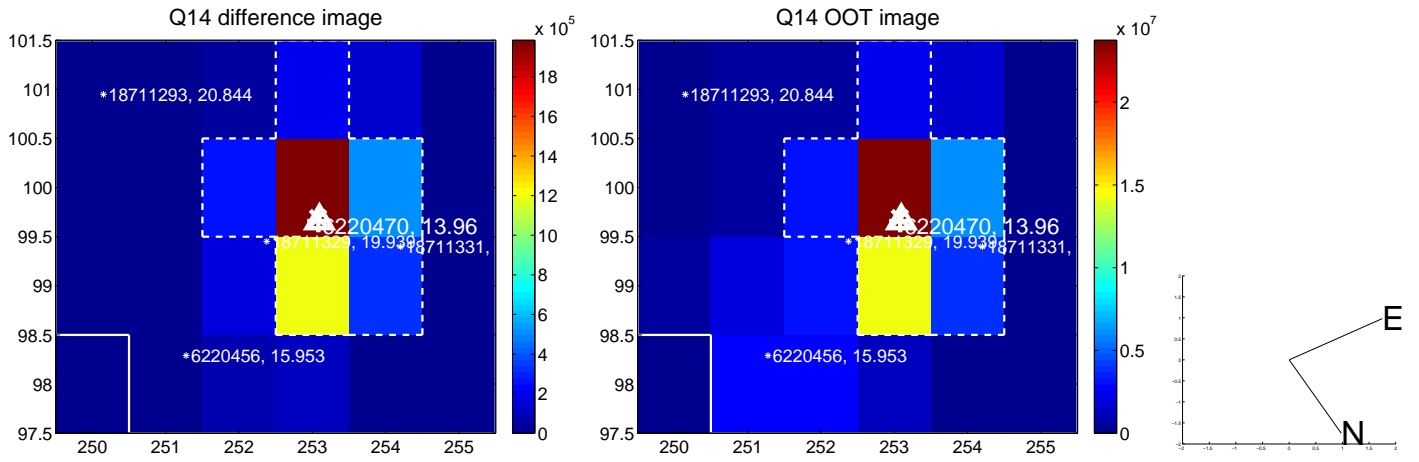
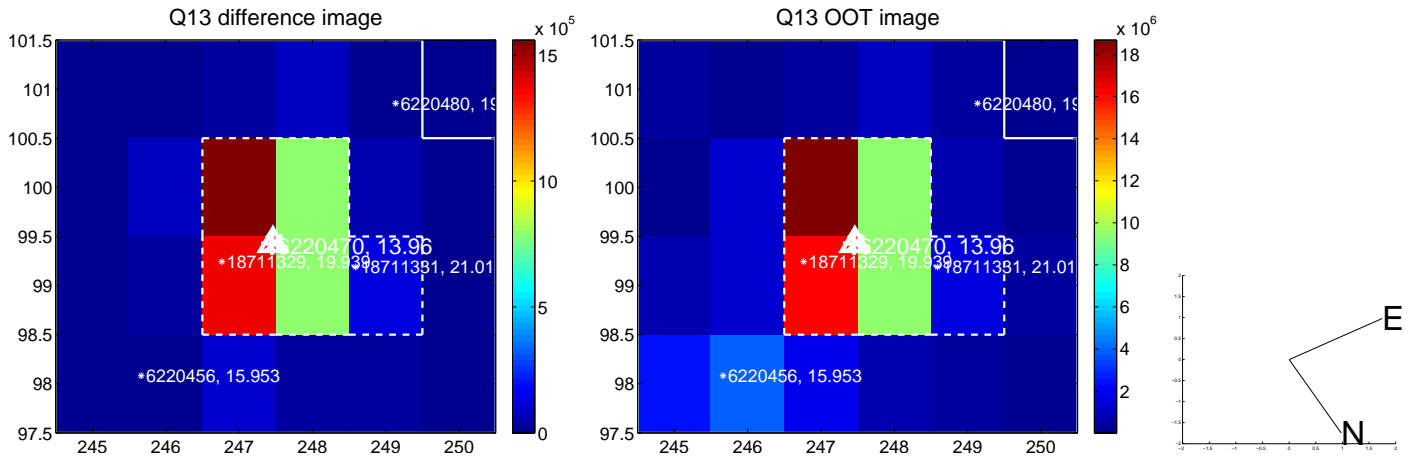
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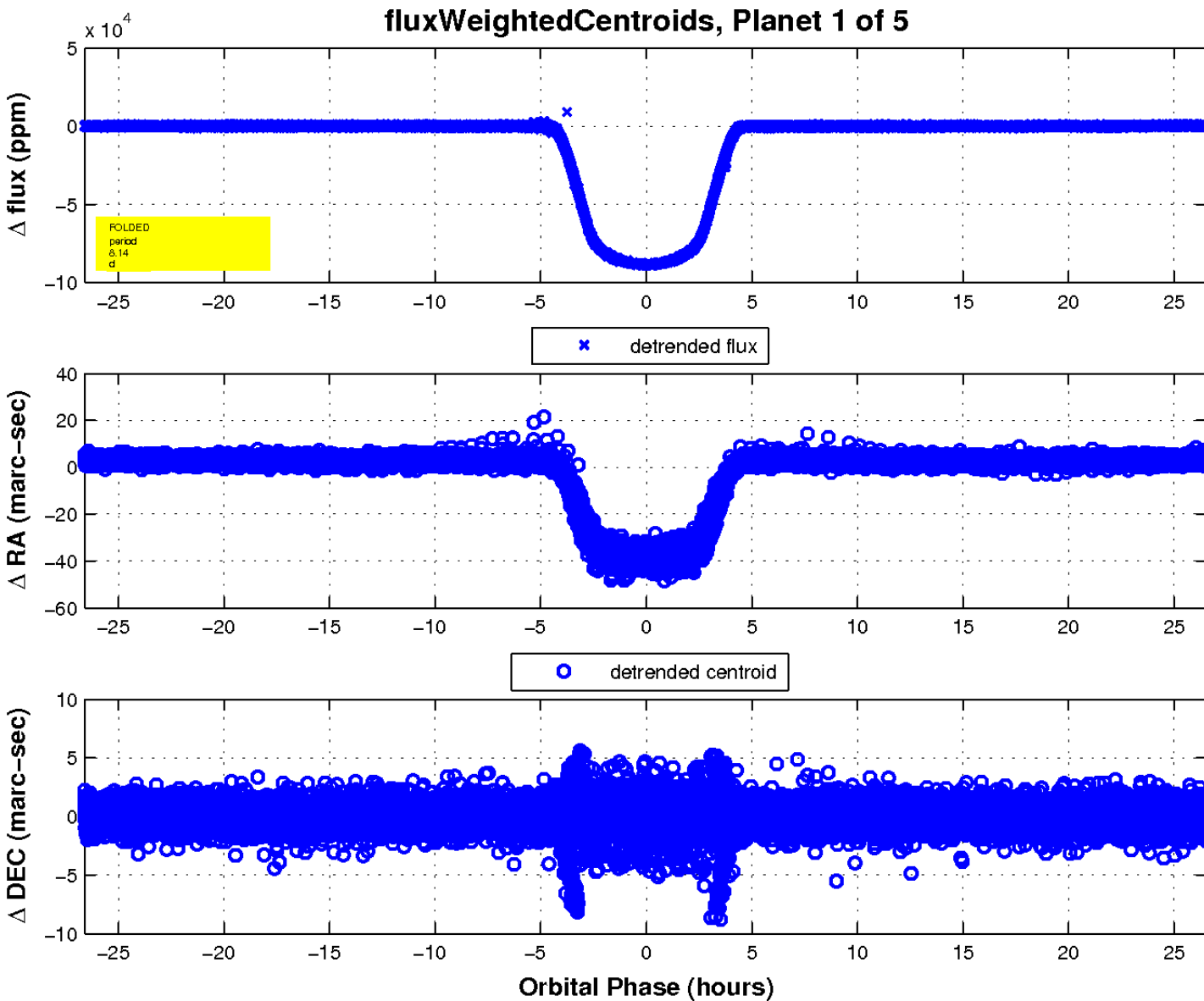
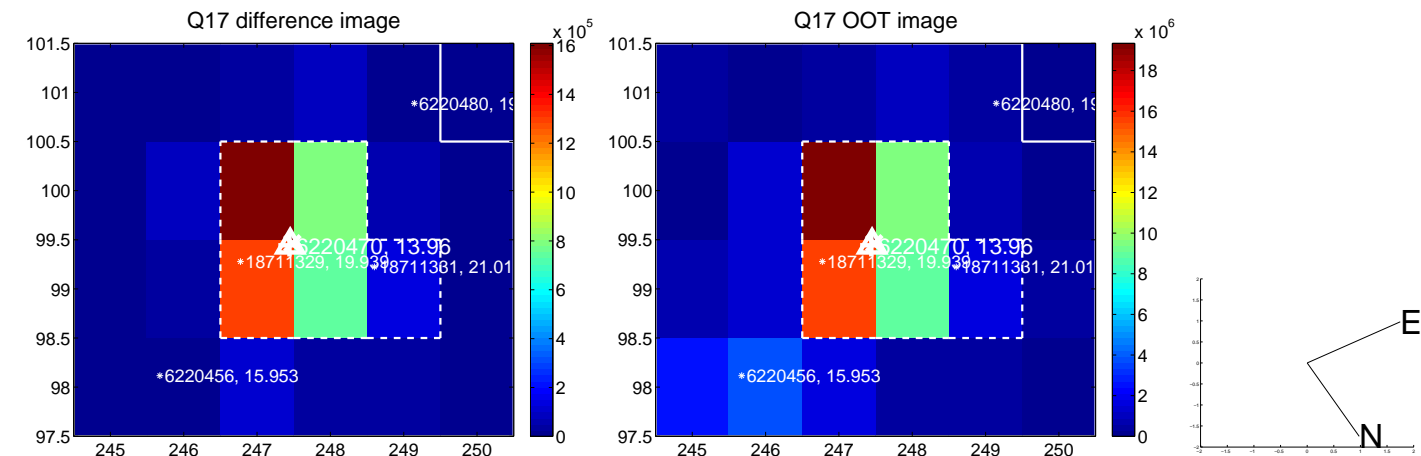
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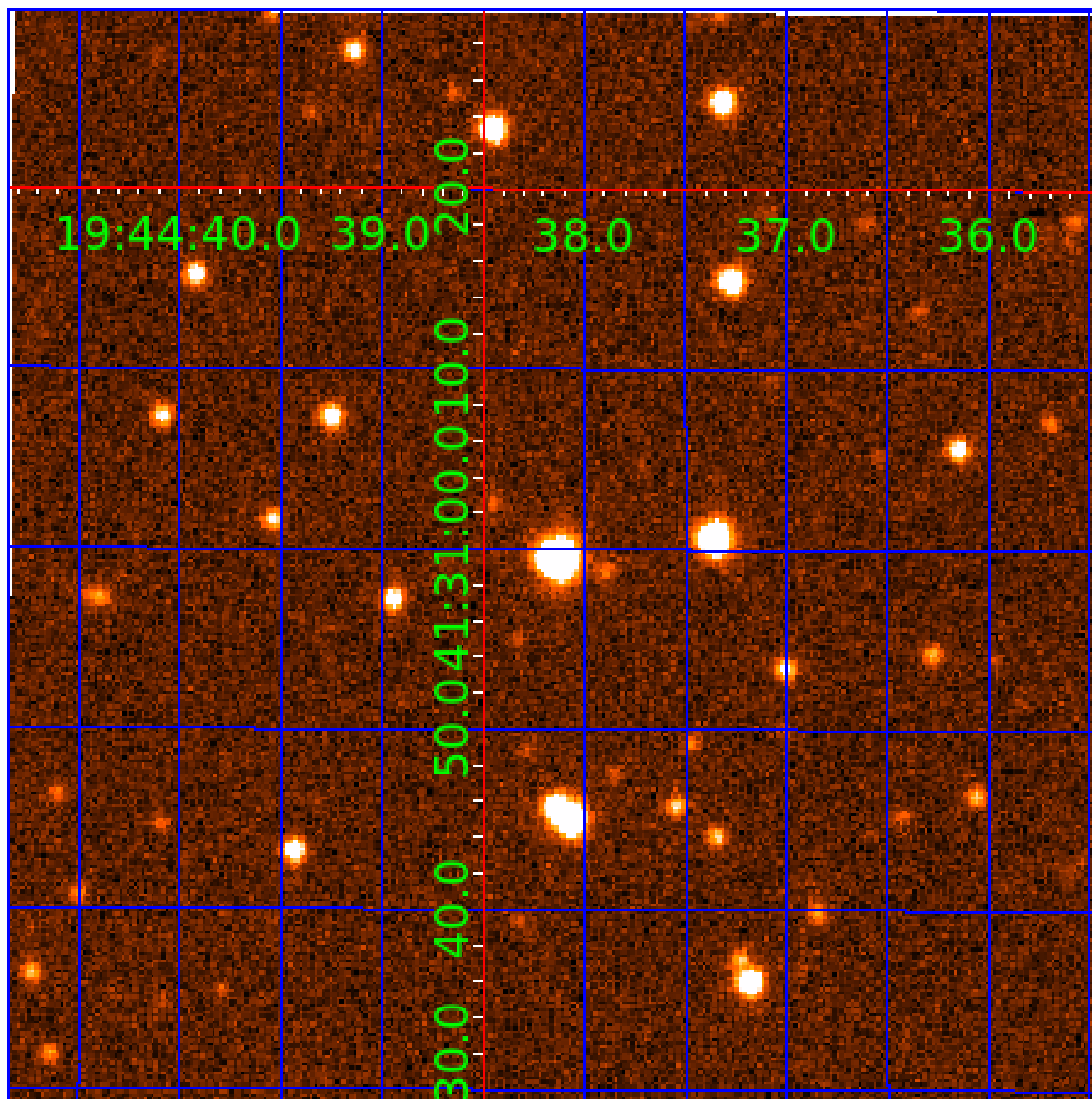
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image

Declination



# KIC 006220470

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
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## Robovetter Results

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006220470-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE
006220470-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—MOD_NONUNIQ_DV—SAME_NTL_PERIOD—CENT_FEW_DIFFS
006220470-05	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_NOFITS

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

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

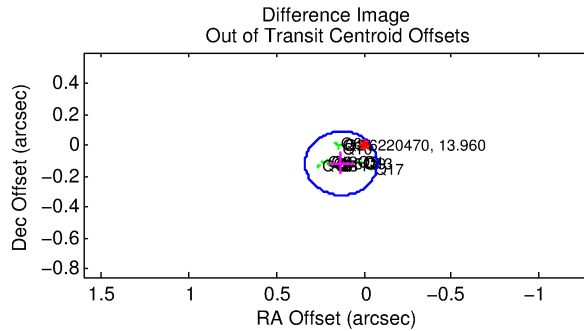
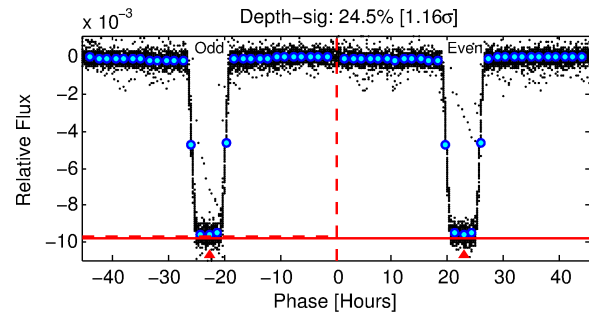
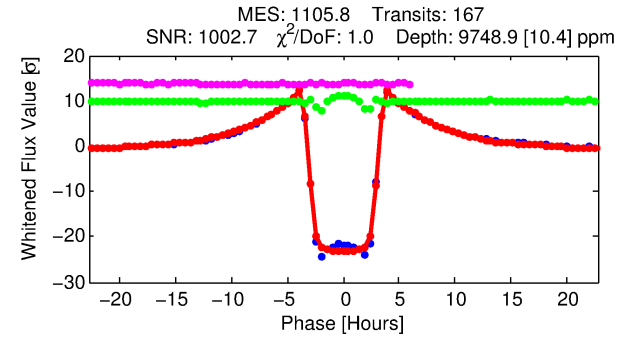
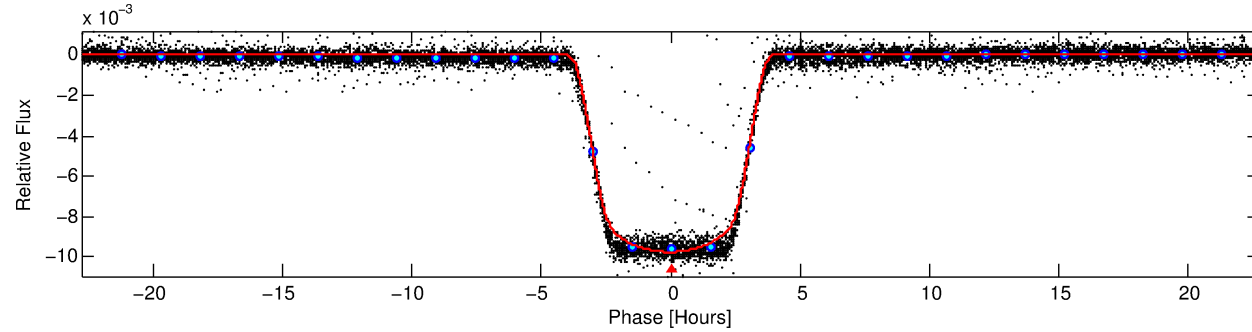
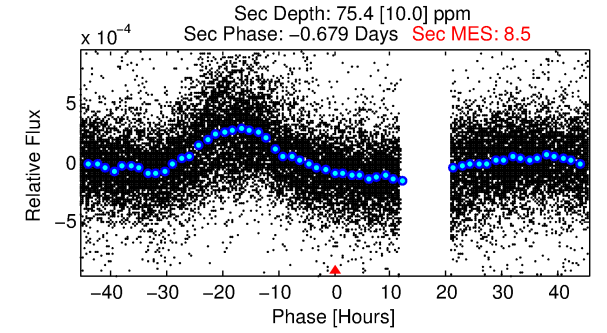
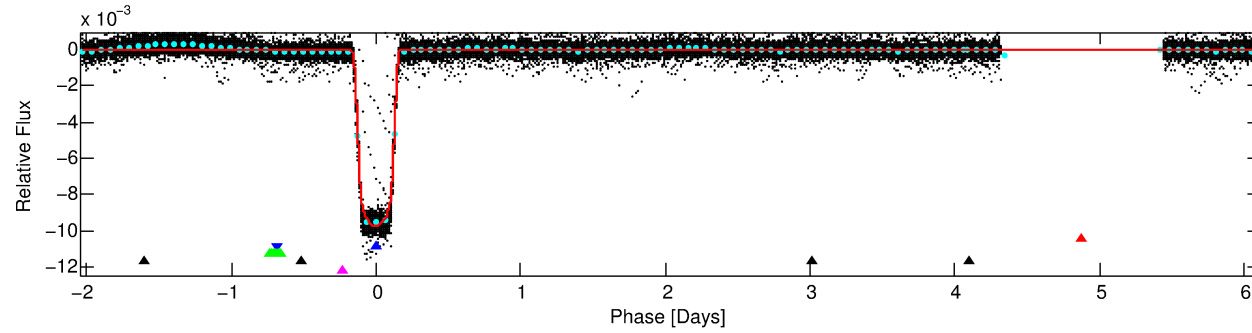
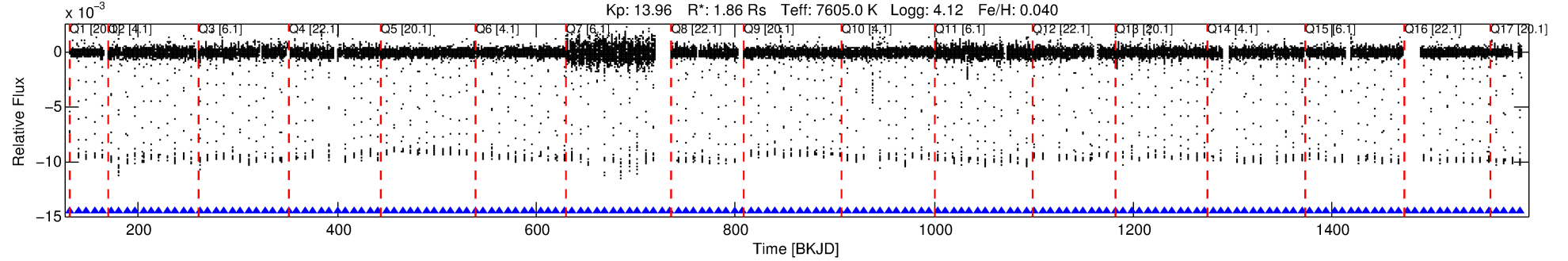
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 006220470-02

No Significant Match Found

# DV One-Page Summary

KIC: 6220470 Candidate: 2 of 5 Period: 8.144 d  
KOI: K06677 Corr: No Ephemeris Match



## DV Fit Results:

Period = 8.14414 [0.00000] d  
Epoch = 131.6284 [0.0001] BKJD  
Rp/R\* = 0.0978 [0.0001]  
a/R\* = 6.78 [0.02]  
b = 0.73 [0.00]  
Seff = 1171.70 [447.26]  
Teq = 1492 [142] K  
Rp = 19.87 [5.76] Re  
a = 0.0942 [0.0224] AU  
Ag = 0.93 [0.34] [-0.20 $\sigma$ ]  
Teffp = 2266 [126] K [4.07 $\sigma$ ]

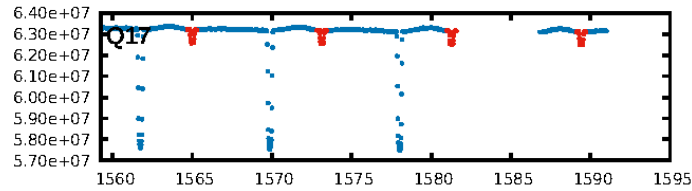
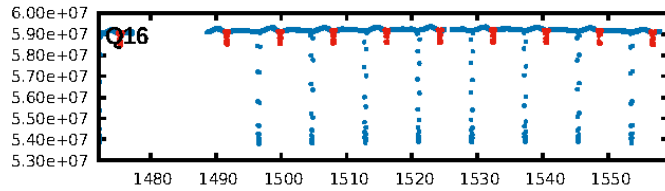
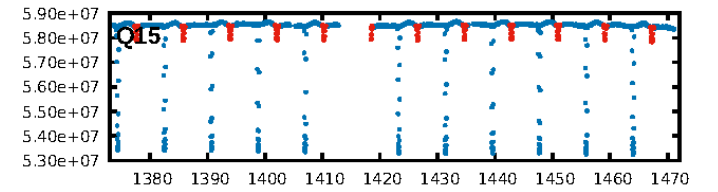
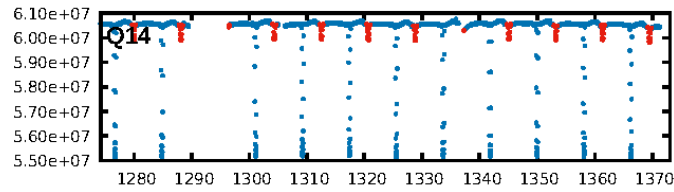
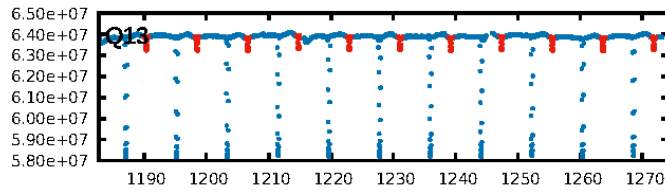
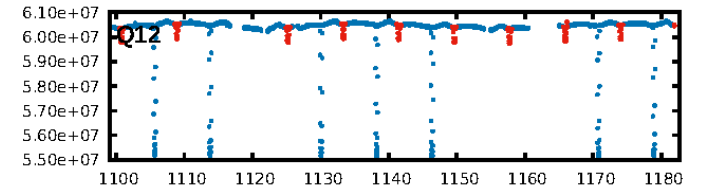
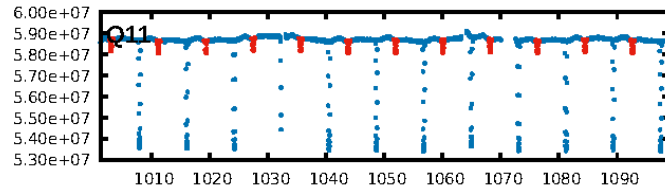
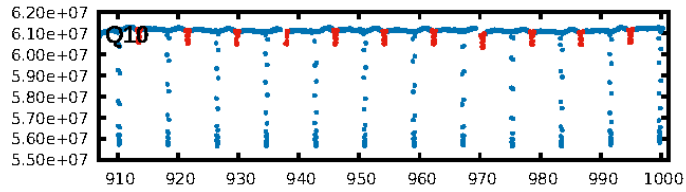
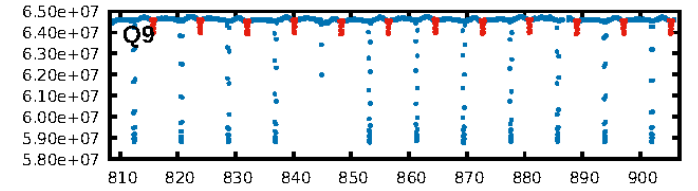
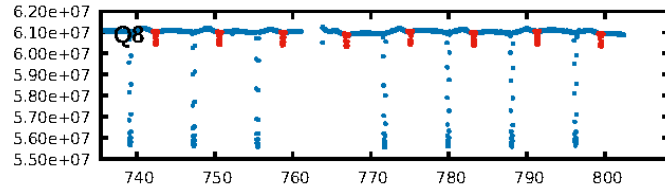
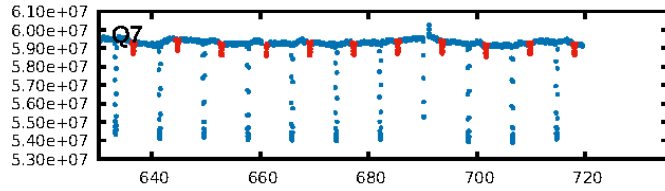
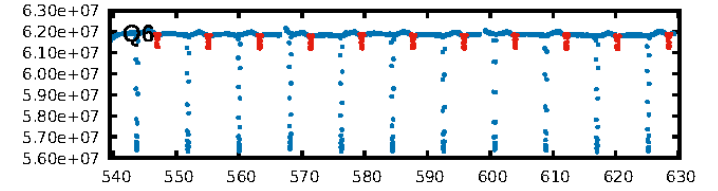
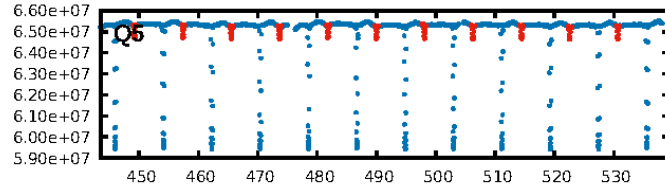
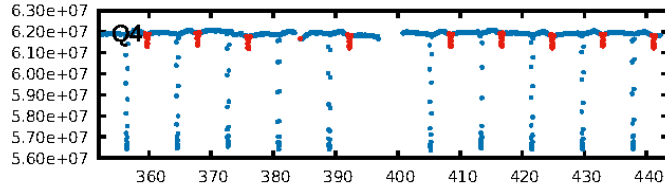
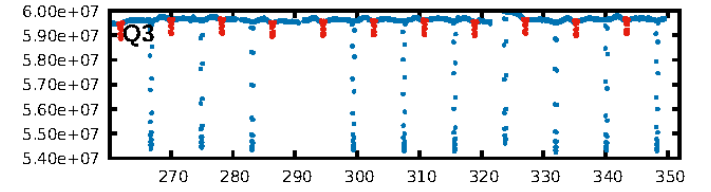
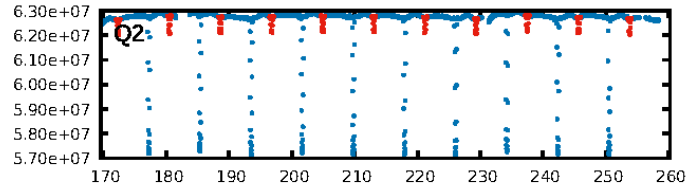
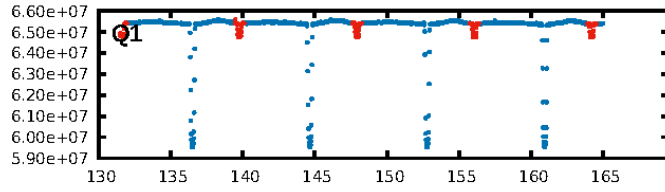
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00 $\sigma$ ]  
LongPeriod-sig: 0.0% [0.00 $\sigma$ ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 99.9%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [158/158]  
GhostDiagnostic-chr: 4.455  
Centroid-sig: N/A  
Centroid-so: 0.194 arcsec [23.86 $\sigma$ ]  
OotOffset-rm: 0.175 arcsec [2.55 $\sigma$ ]  
KicOffset-rm: 0.089 arcsec [1.23 $\sigma$ ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 0.00 [0/17]

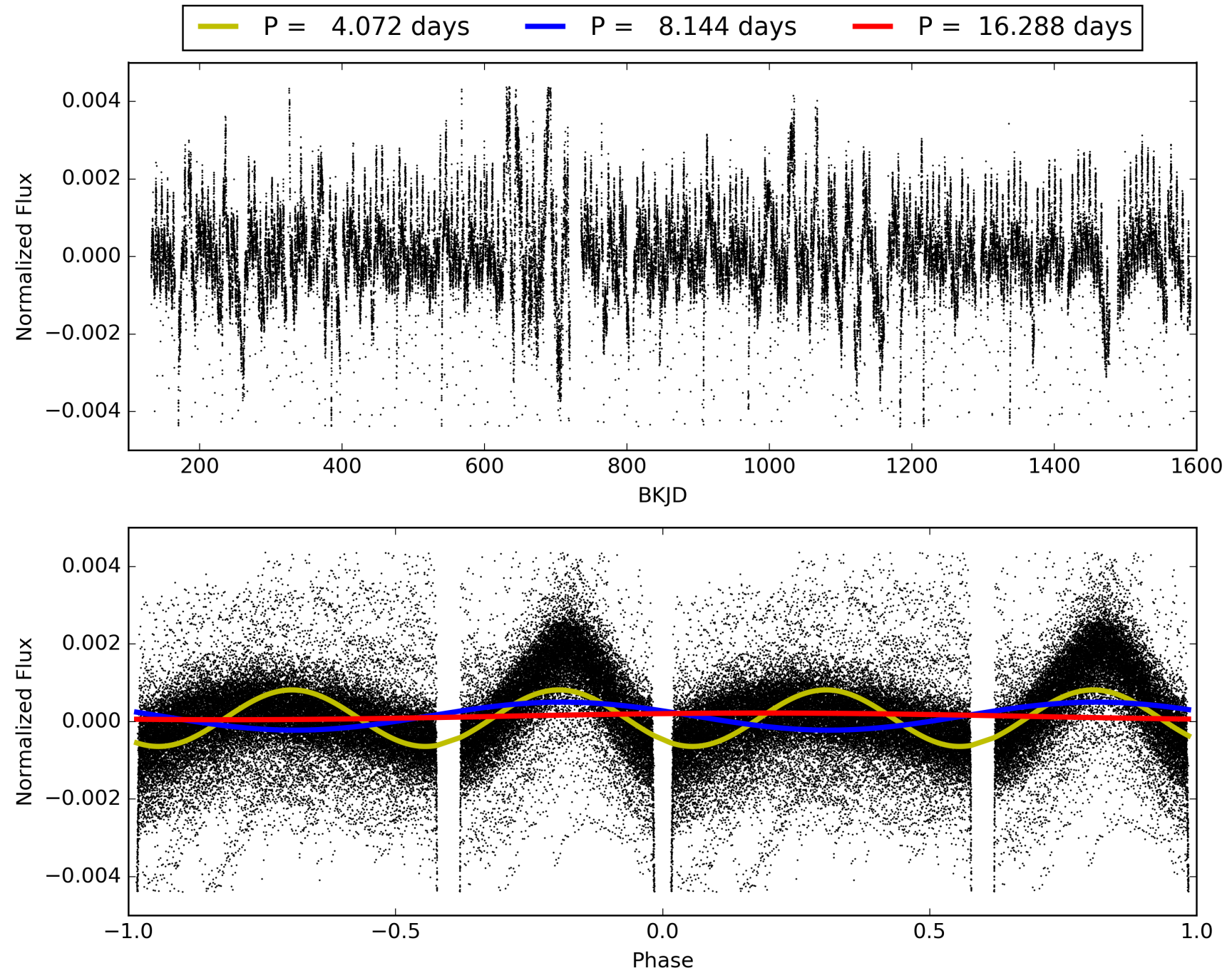
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 03-Feb-2016 08:44:30 Z

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

# TCE 006220470-02, PDC Light Curves



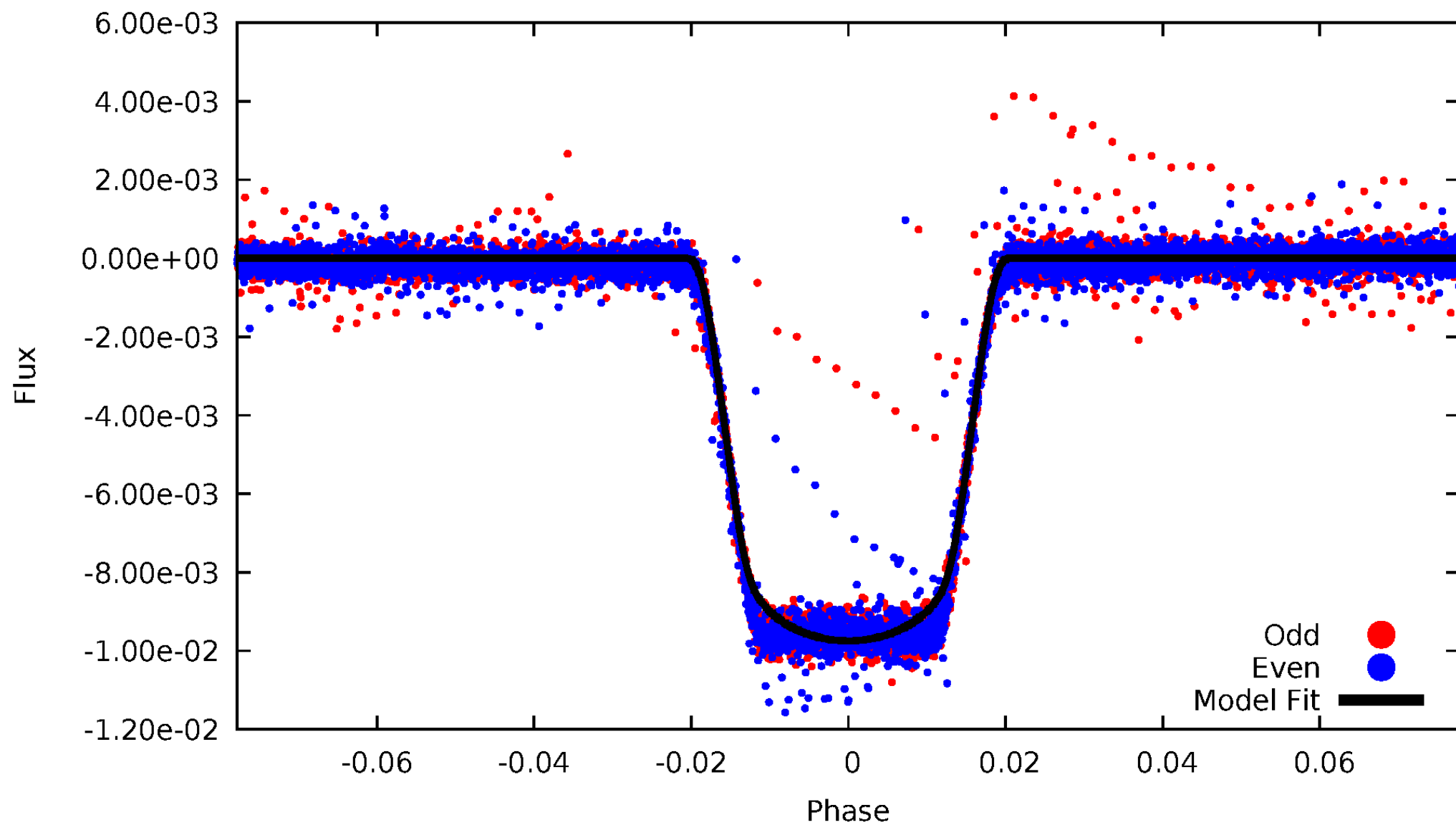
TCE 006220470-02





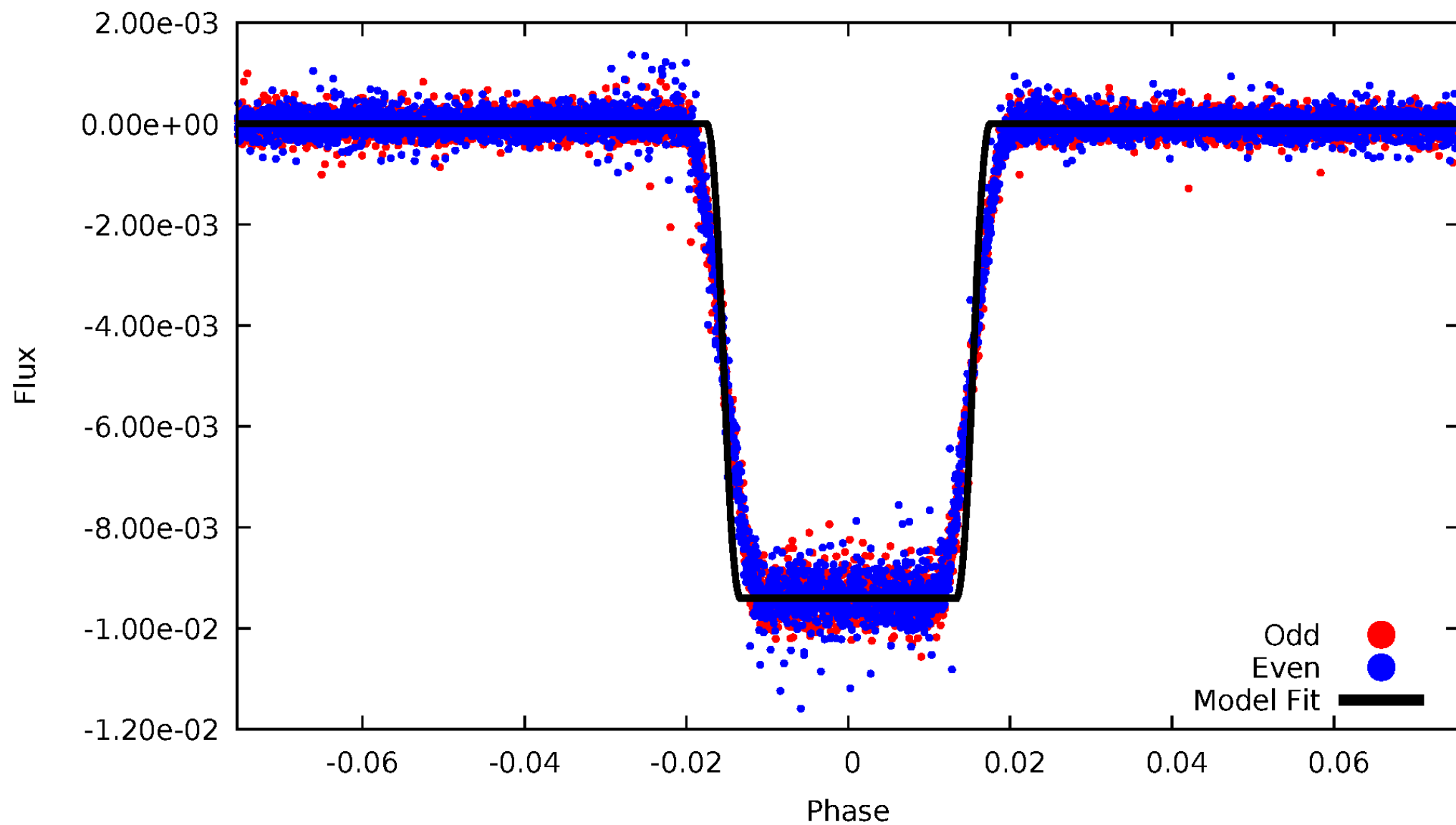
# DV Odd/Even

TCE 006220470-02



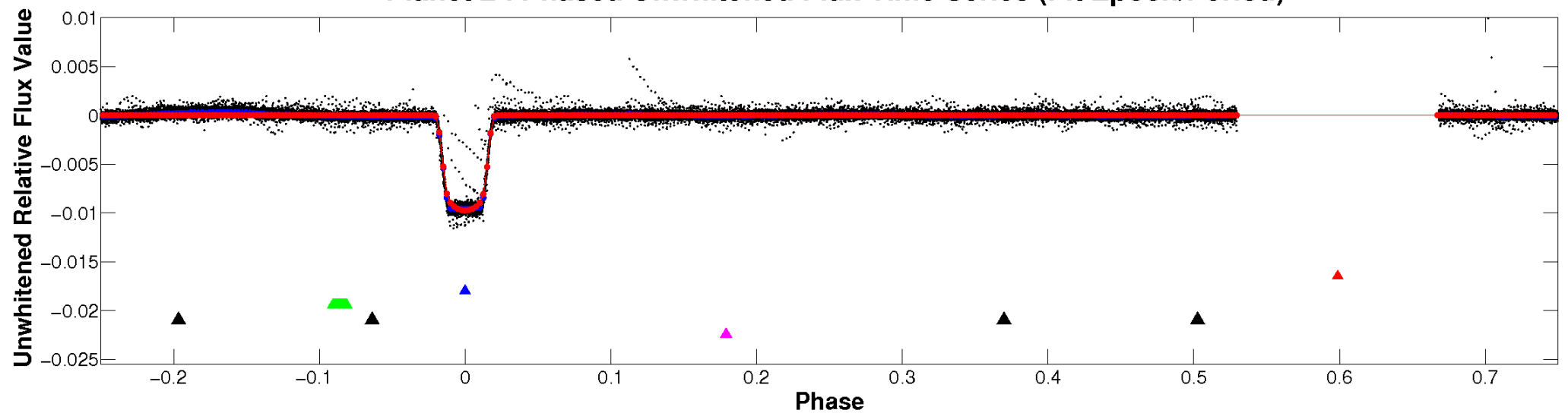
# ALT Odd/Even

TCE 006220470-02

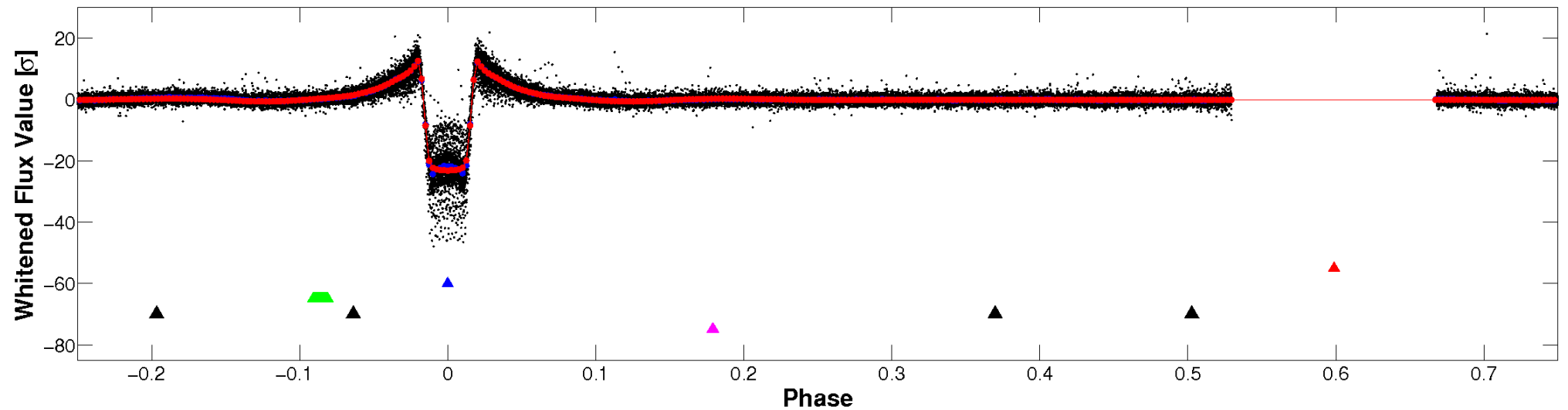


# Non-Whitened Vs. Whitened Light Curve

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

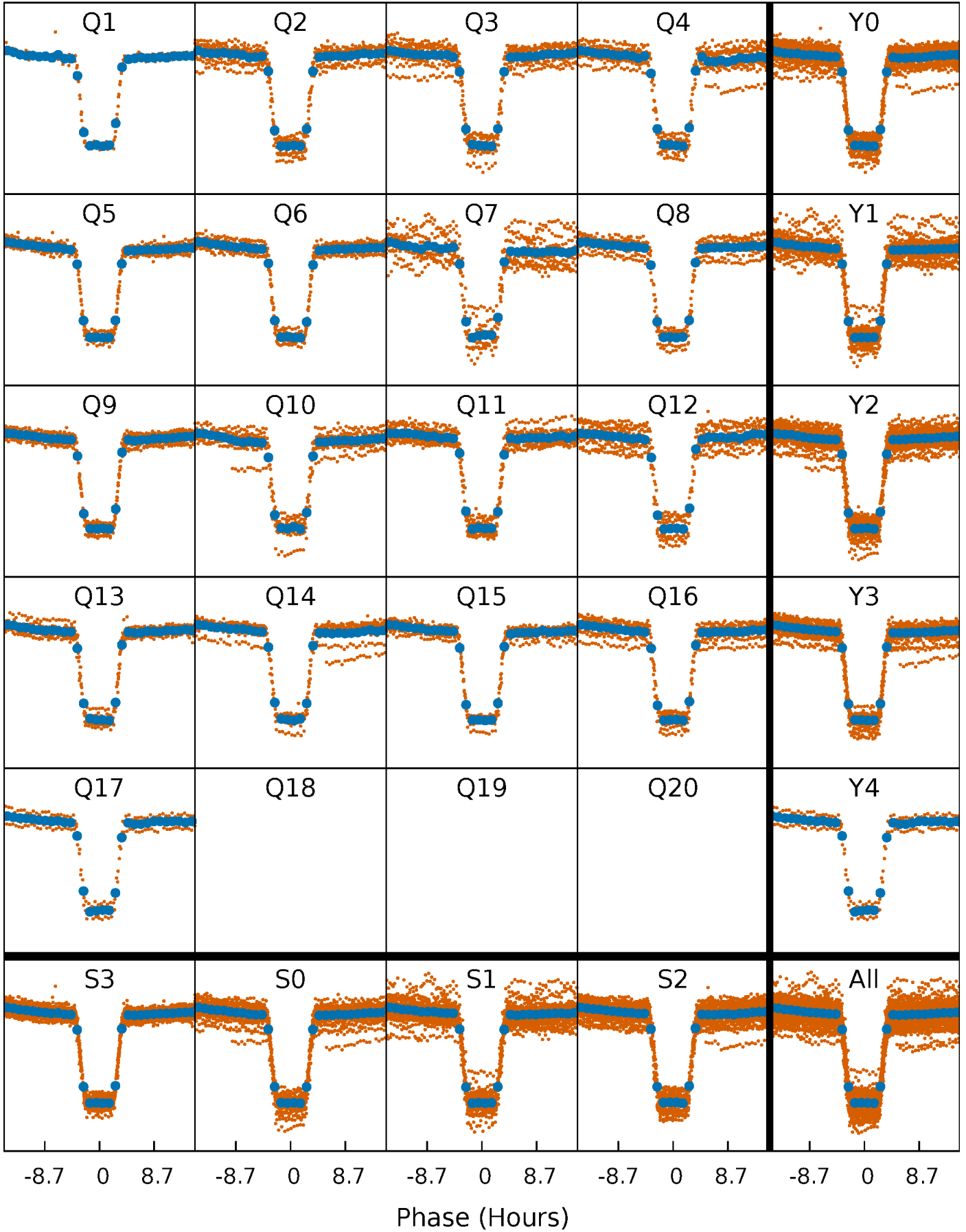


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



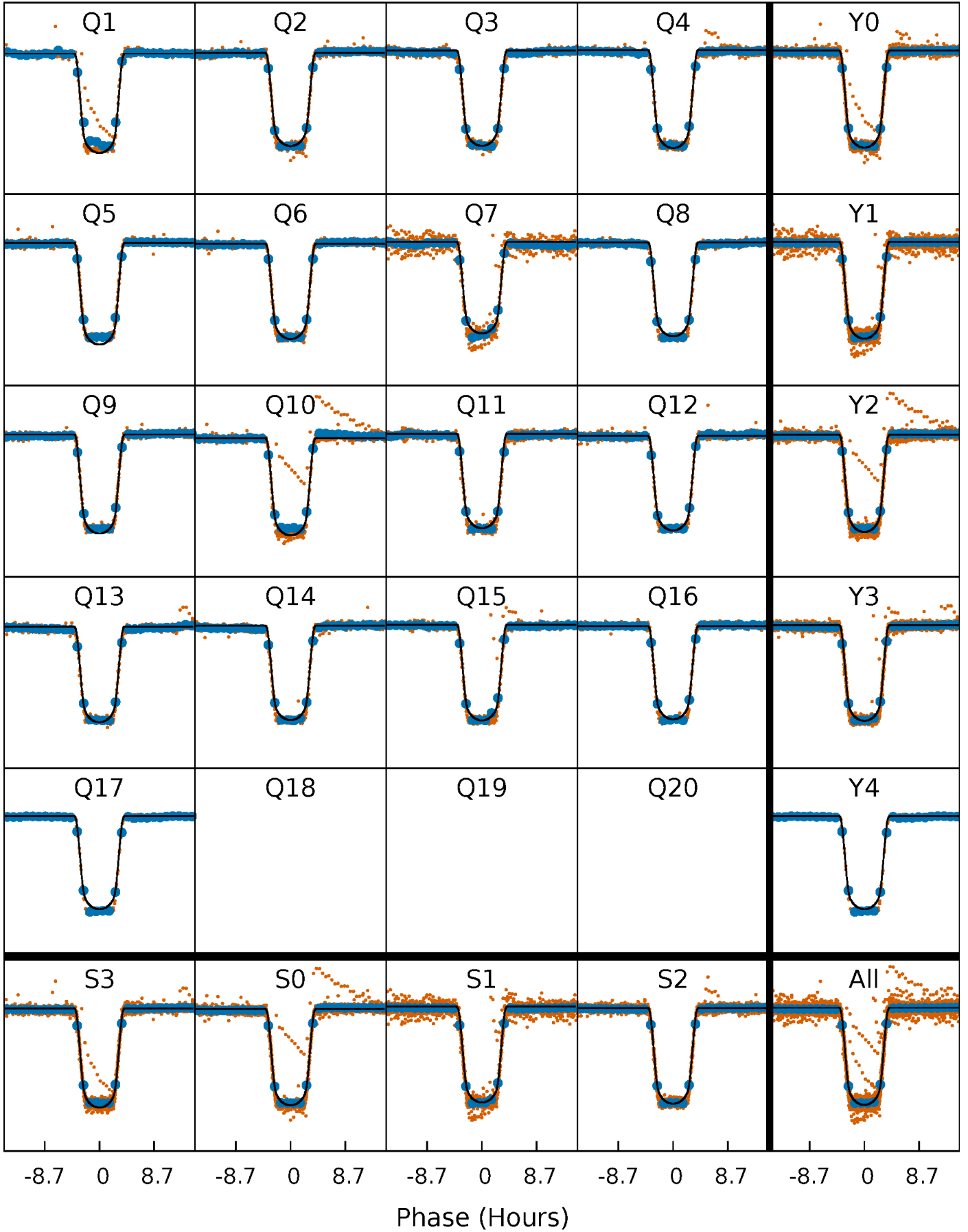
# PDC Quarter-Phased Transit Curves

TCE 006220470-02   P= 8.144137 Days    $T_0=131.628371$  (BKJD)



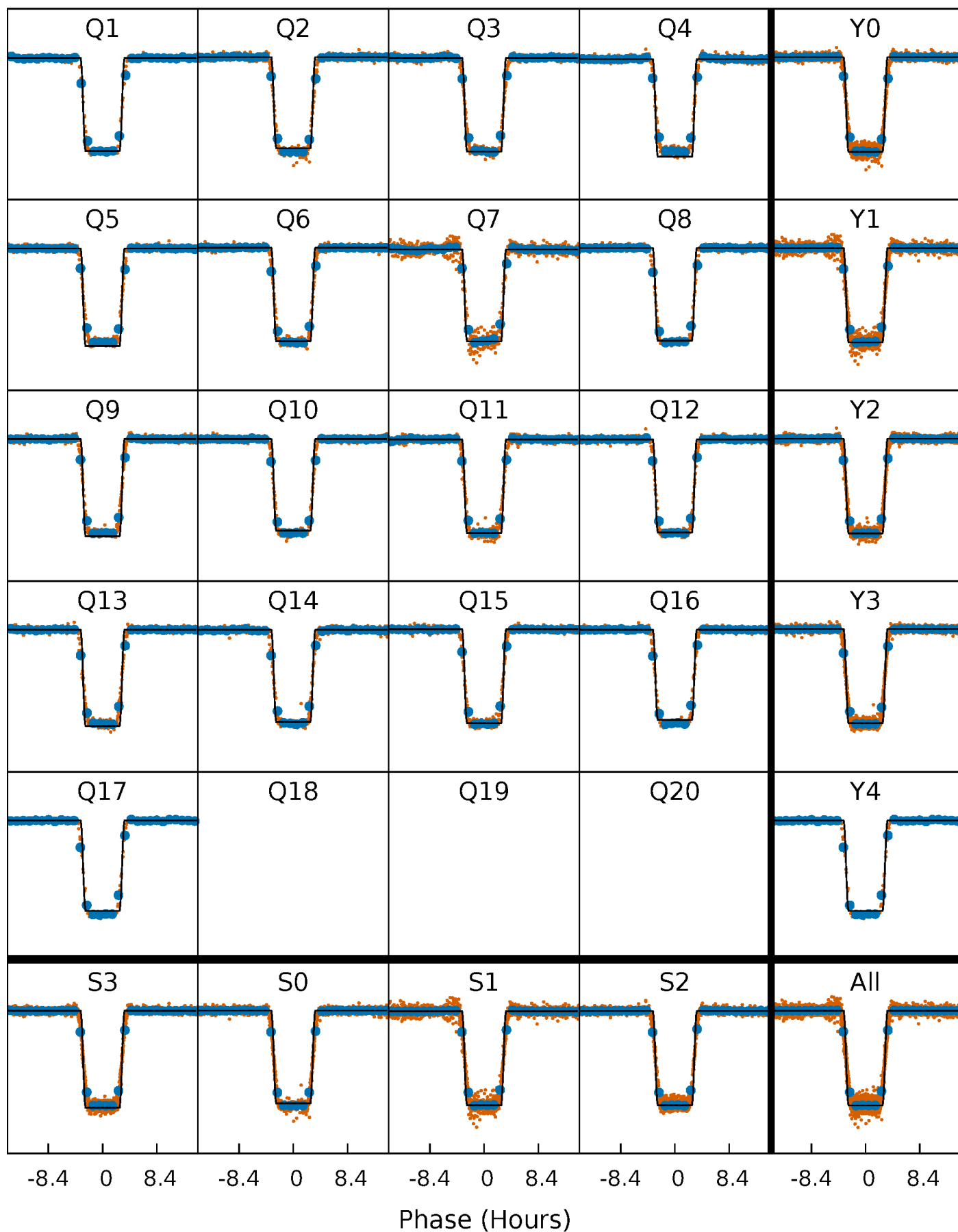
# DV Quarter-Phased Transit Curves

TCE 006220470-02 P= 8.144137 Days  $T_0=131.628371$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

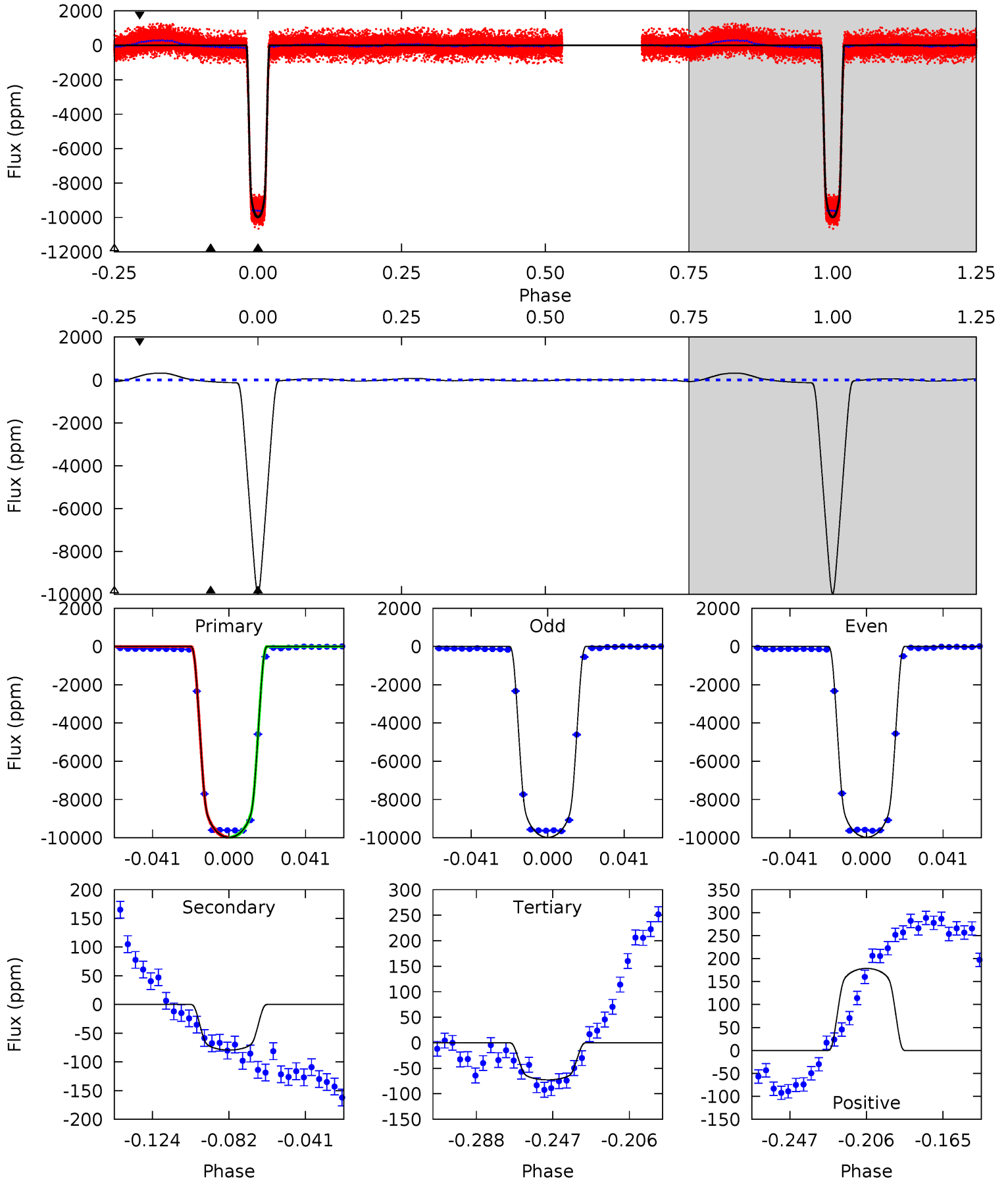
TCE 006220470-02   P= 8.144158 Days    $T_0=131.626414$  (BKJD)



# DV Model-Shift Uniqueness Test

006220470-02, P = 8.144137 Days, E = 123.484234 Days

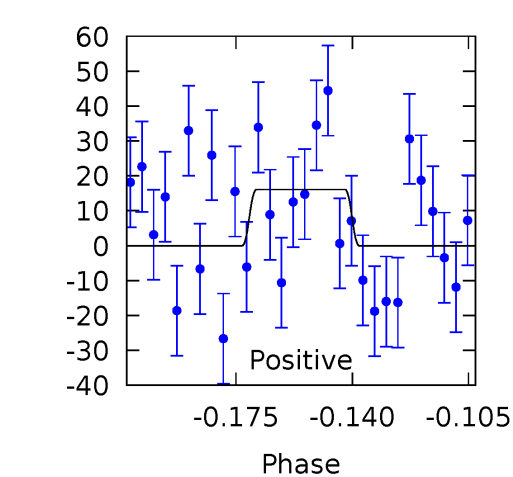
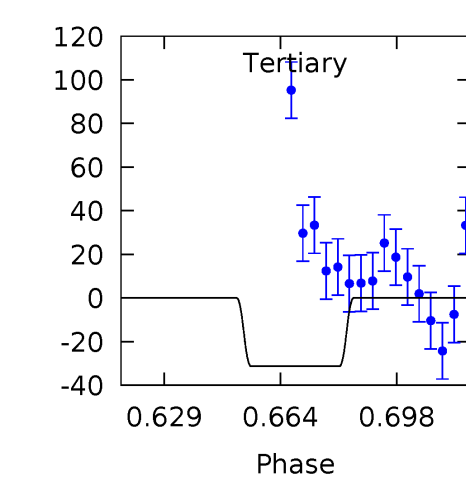
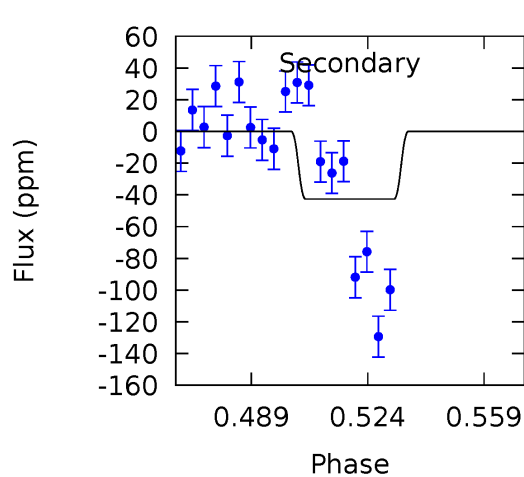
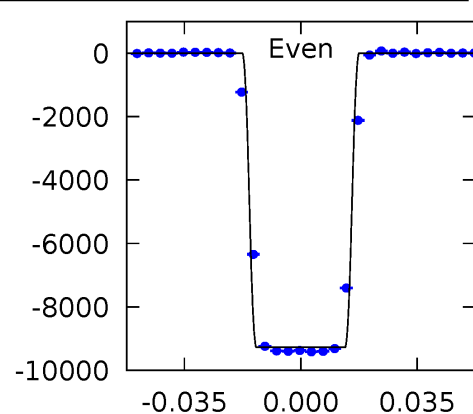
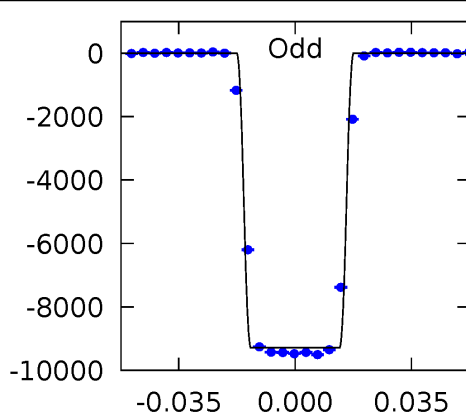
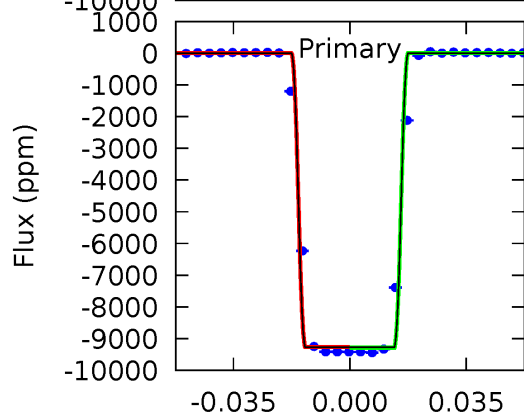
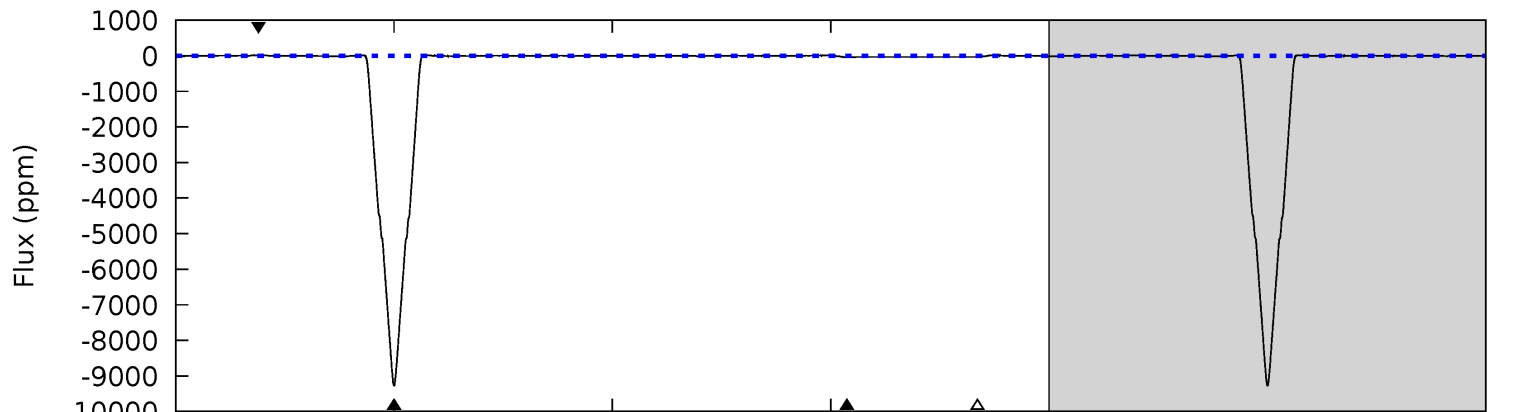
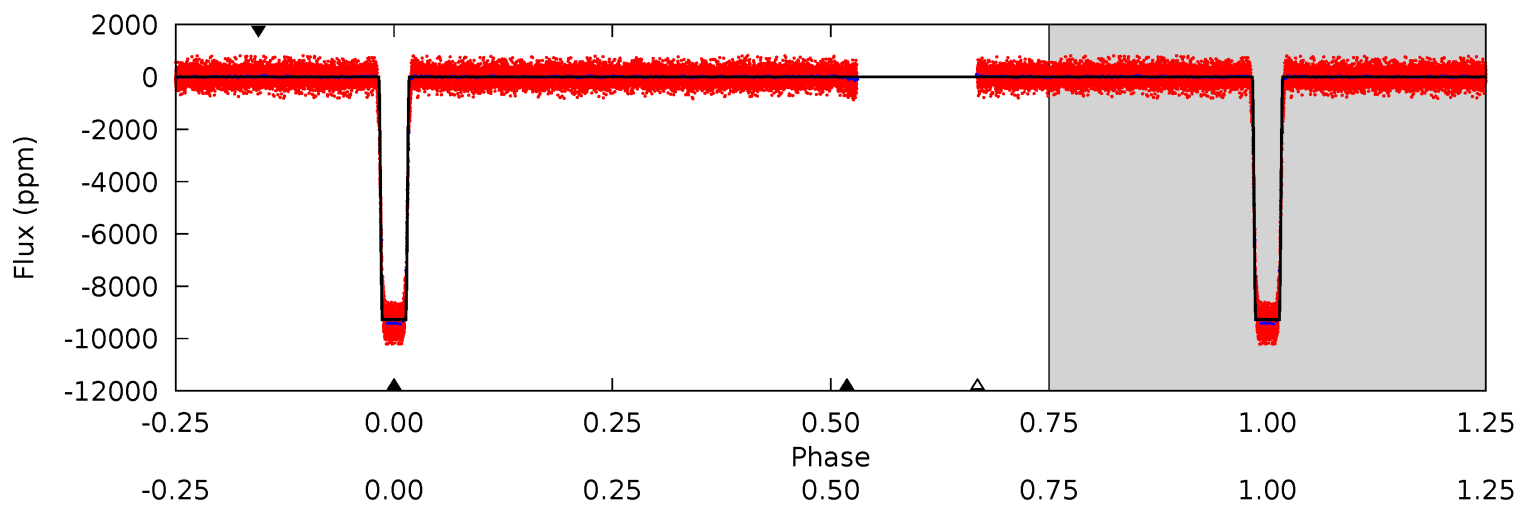
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
1946	15.5	14.2	34.8	4.75	2.04	18.0	1932	1911	1.31	-19.4	0.76	0.98	0.03	0.43



# Alt Model-Shift Uniqueness Test

006220470-02, P = 8.144158 Days, E = 123.482256 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
2080	9.57	7.01	3.61	4.78	2.11	1.34	2073	2076	2.56	5.96	2.09	1.00	0.00	2.43





### Stellar Parameters For KIC 006220470

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7605^{+209}_{-340}$	$4.123^{+0.120}_{-0.180}$	$0.040^{+0.200}_{-0.350}$	$1.862^{+0.540}_{-0.360}$	$1.677^{+0.212}_{-0.259}$	$0.366^{+0.243}_{-0.179}$
	+3%/-4%	+3%/-4%	+500%/-875%	+29%/-19%	+13%/-15%	+66%/-49%
Source	KIC0	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 006220470-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-79 \pm 5$	$20.09^{+2.97}_{-2.07}$	$2091^{+157}_{-129}$	$2786^{+60}_{-89}$	$0.937^{+0.227}_{-0.213}$
Alt.	$-43 \pm 4$	$19.85^{+3.13}_{-2.13}$	$2090^{+168}_{-135}$	$2429^{+102}_{-184}$	$0.523^{+0.129}_{-0.134}$

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

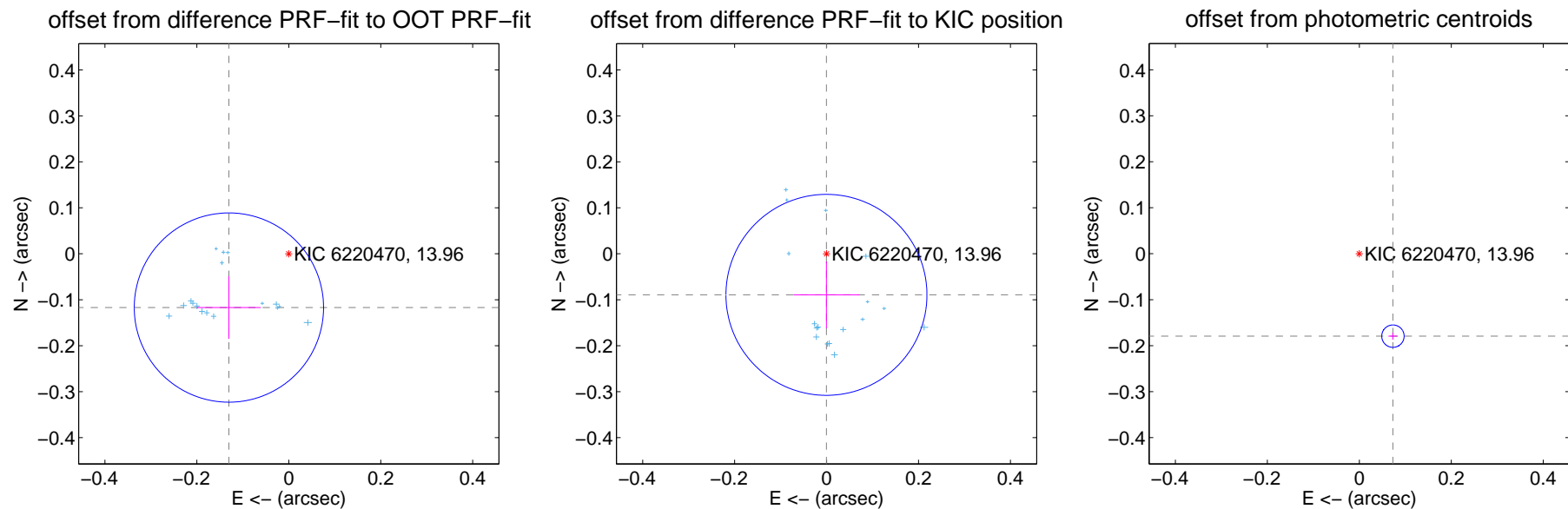
## DV Centroid Data

Supplemental centroid analysis for 006220470-02. Kepler magnitude: 13.96. Transit SNR 1002.73

There are 17 quarters with good PRF difference image offsets

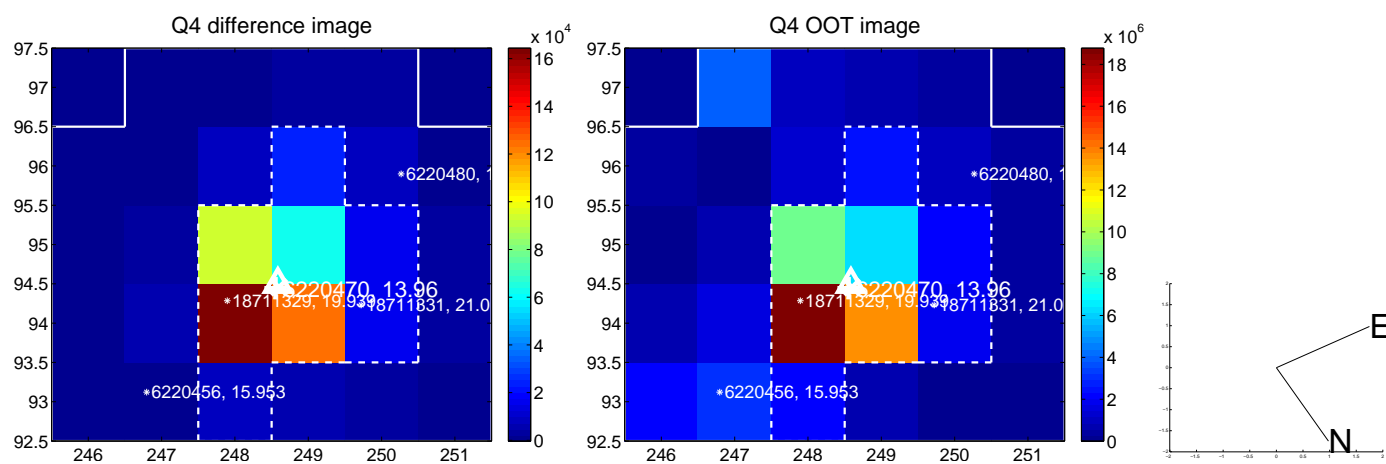
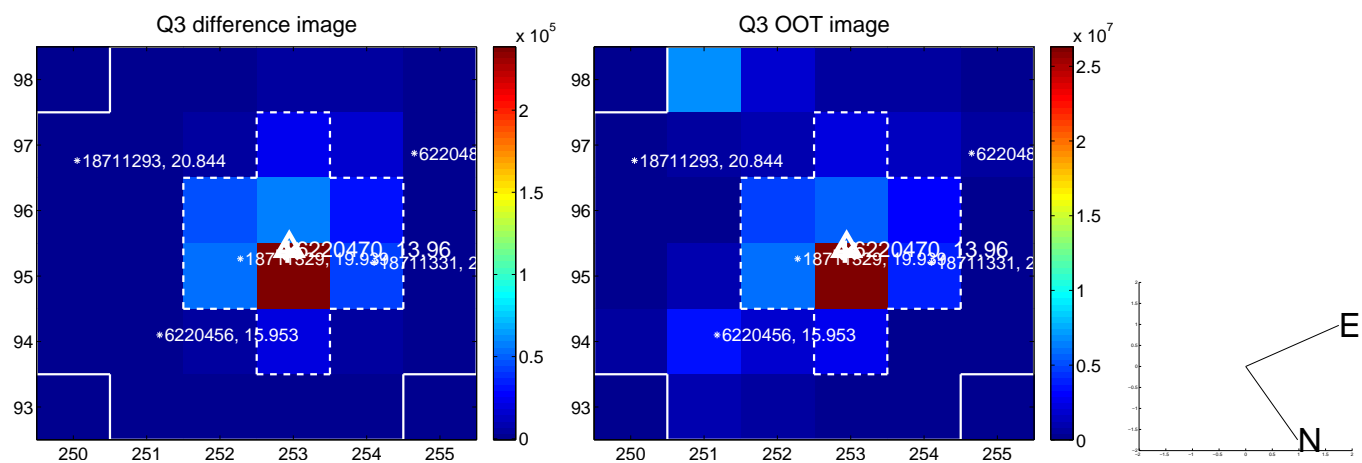
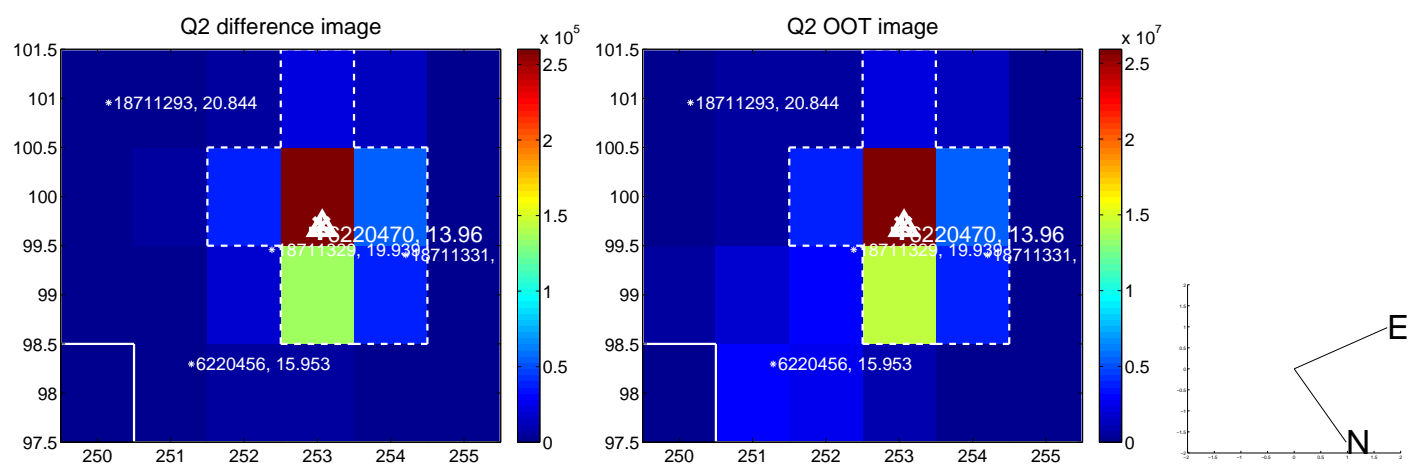
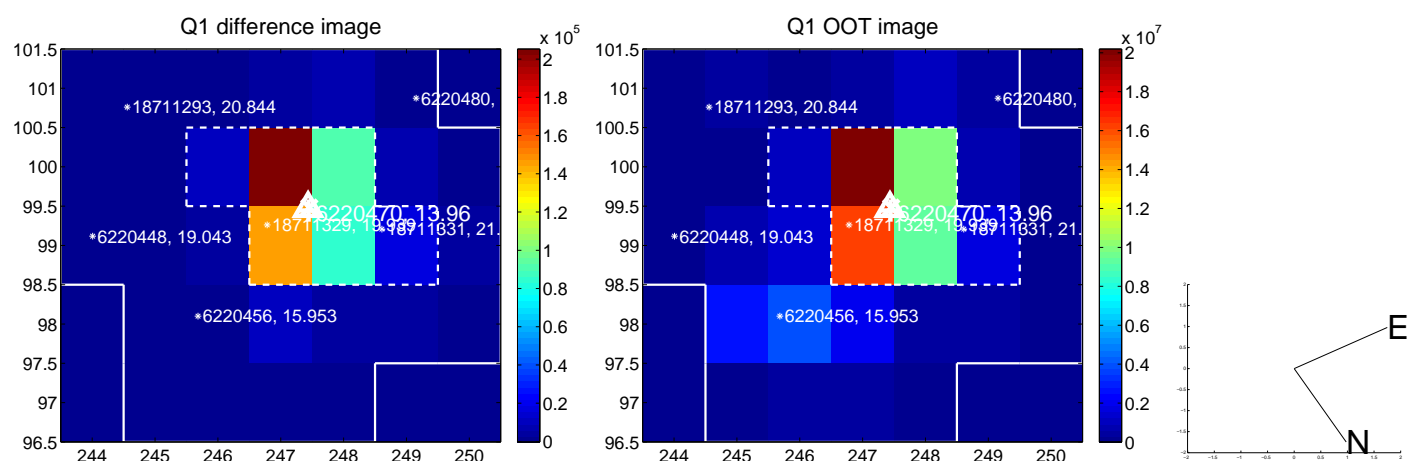
The direct PRF centroid is offset from the target star catalog position by about 0.17 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.175 \pm 0.069$	2.55	$0.130 \pm 0.069$	$-0.117 \pm 0.068$
PRF-fit source offset from KIC position	$0.089 \pm 0.073$	1.23	$0.000 \pm 0.072$	$-0.089 \pm 0.073$
photometric centroid source offset	$0.19 \pm 0.01$	23.86	$-0.07 \pm 0.01$	$-0.18 \pm 0.01$



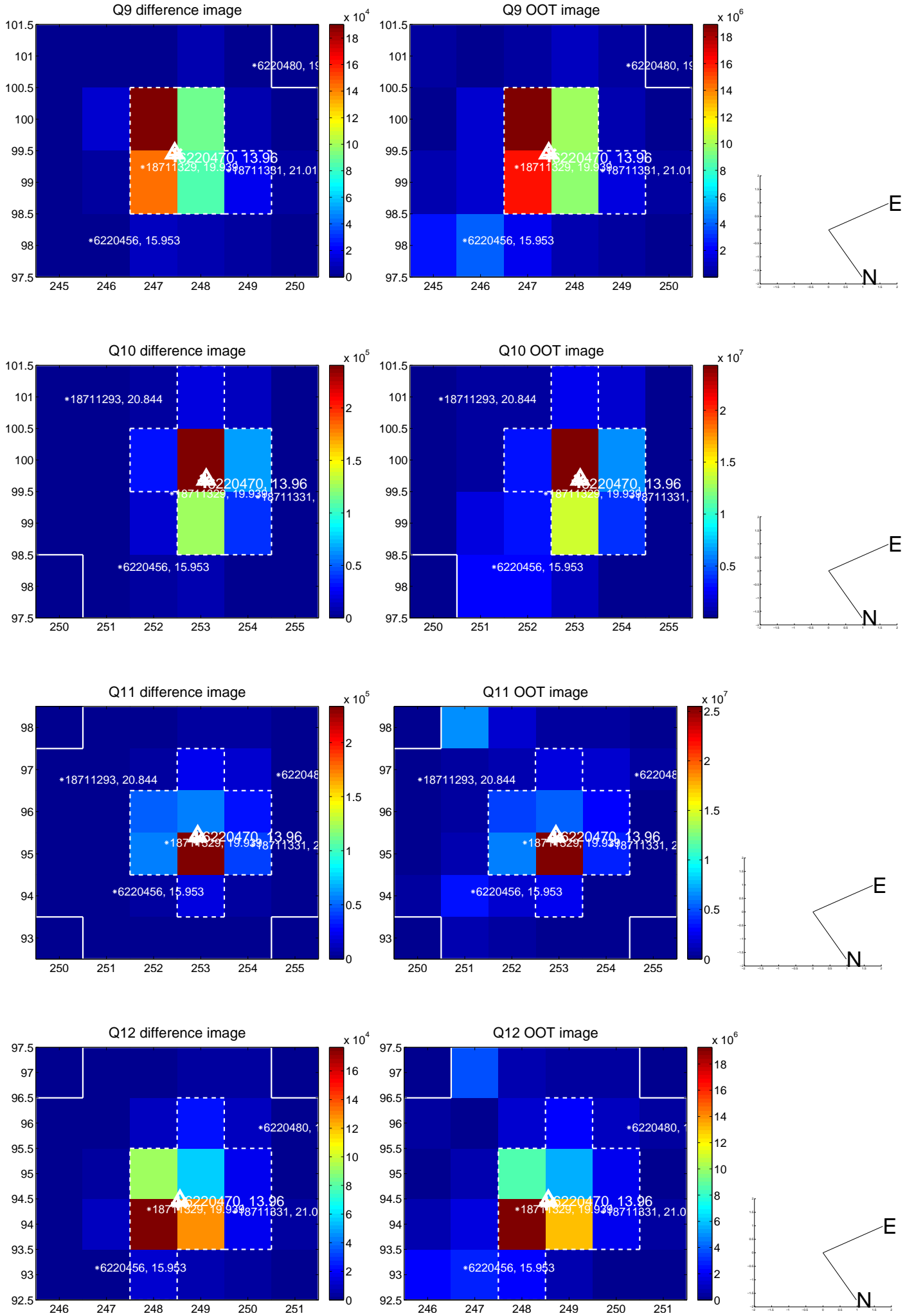
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

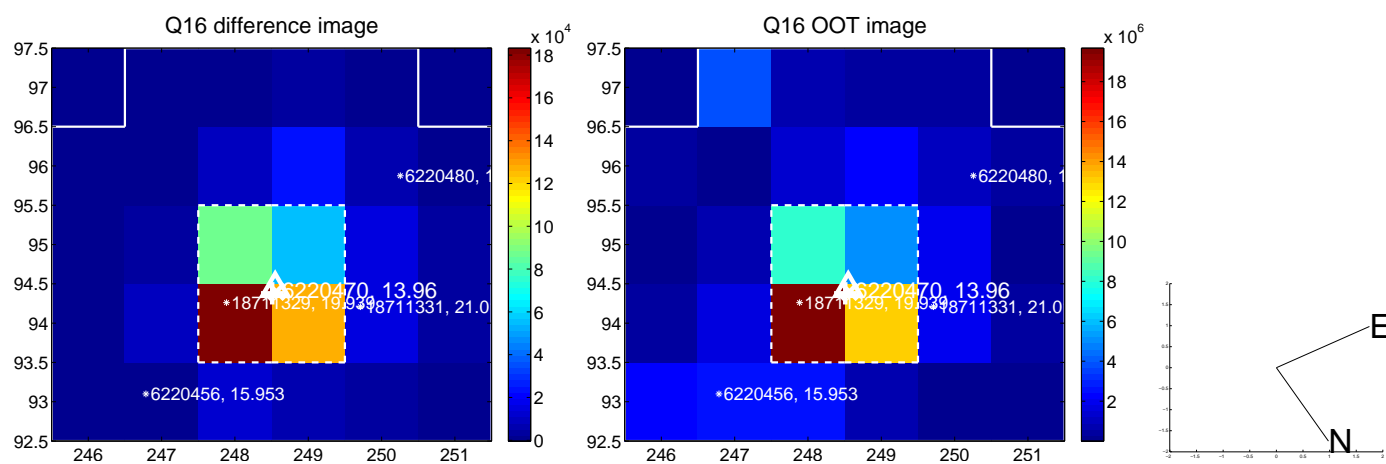
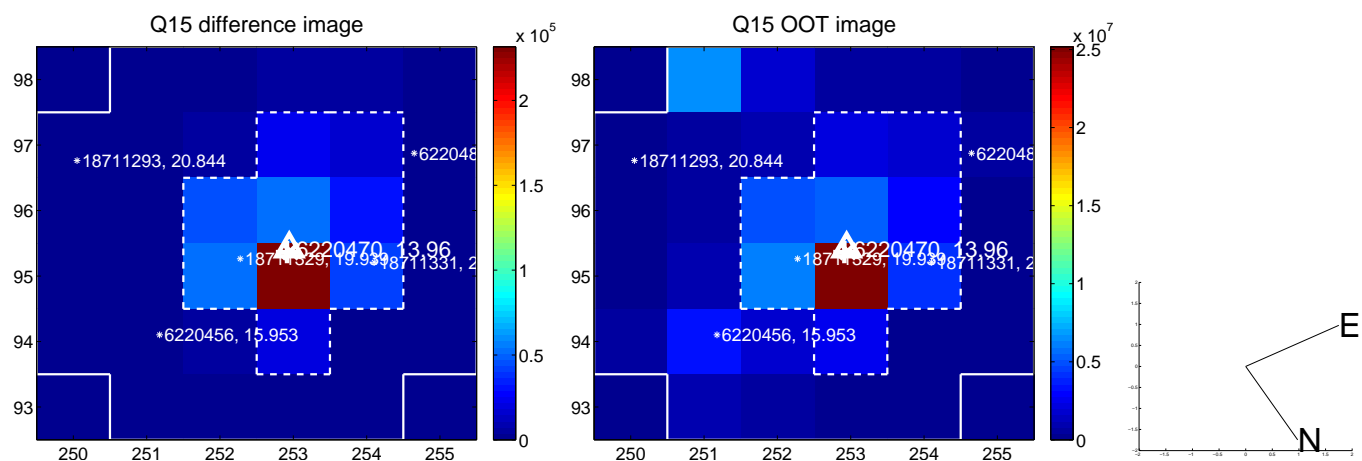
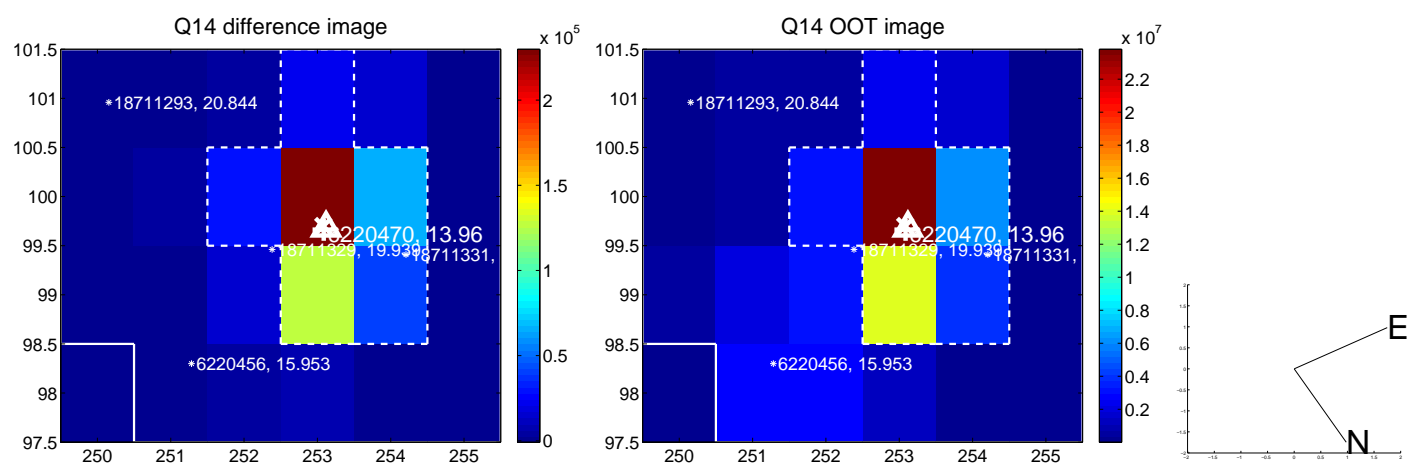
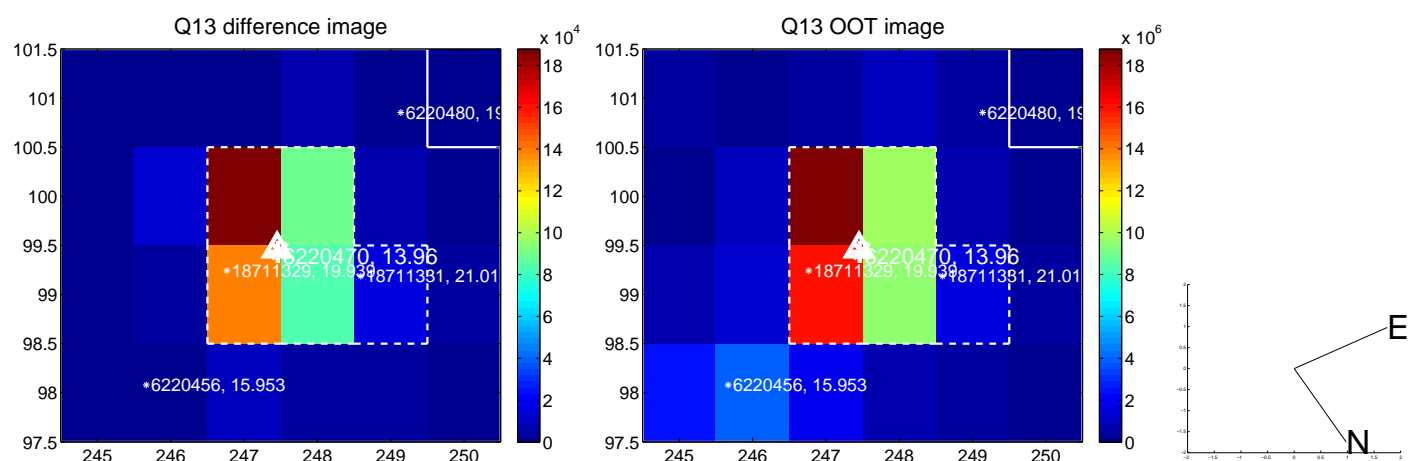




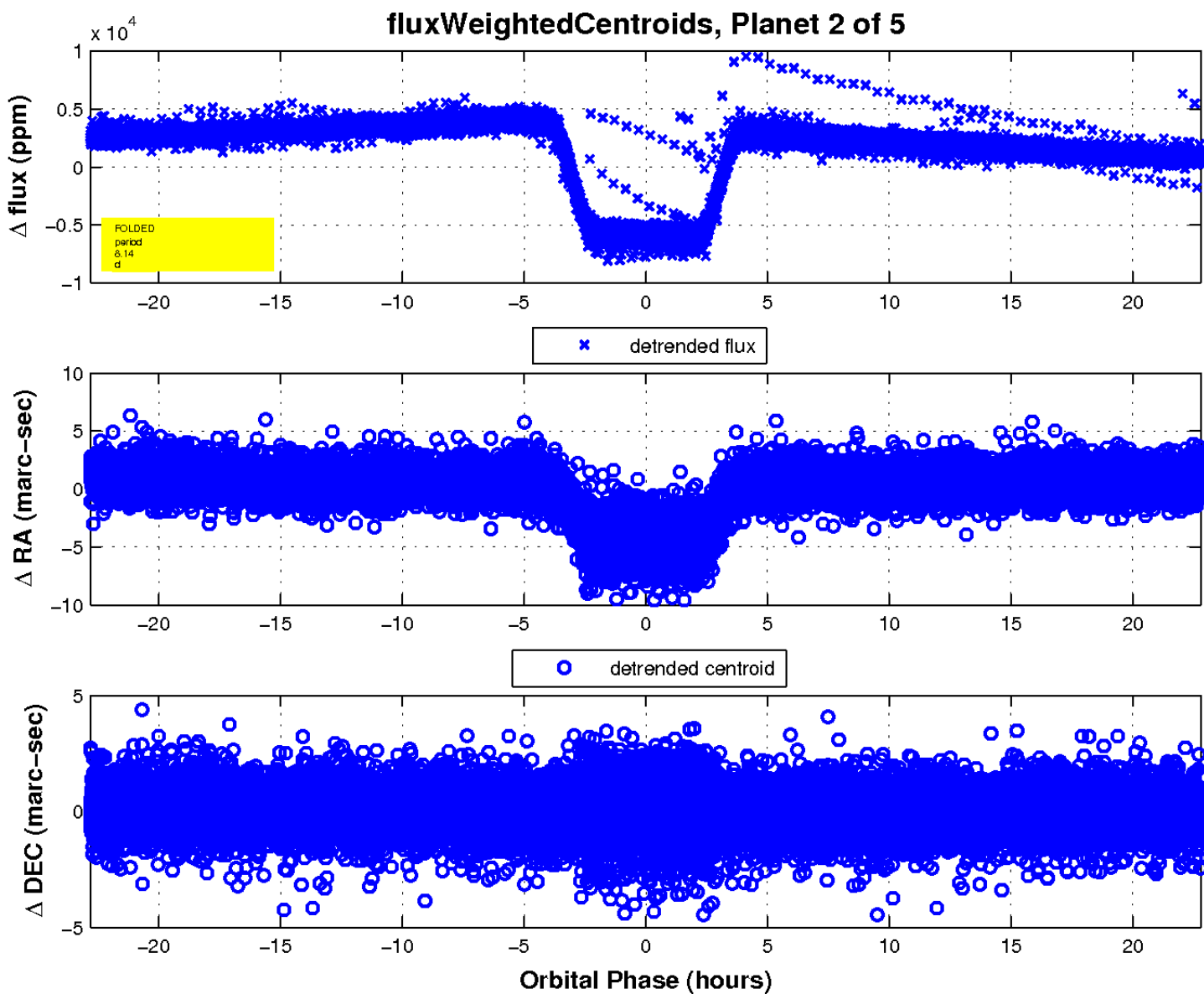
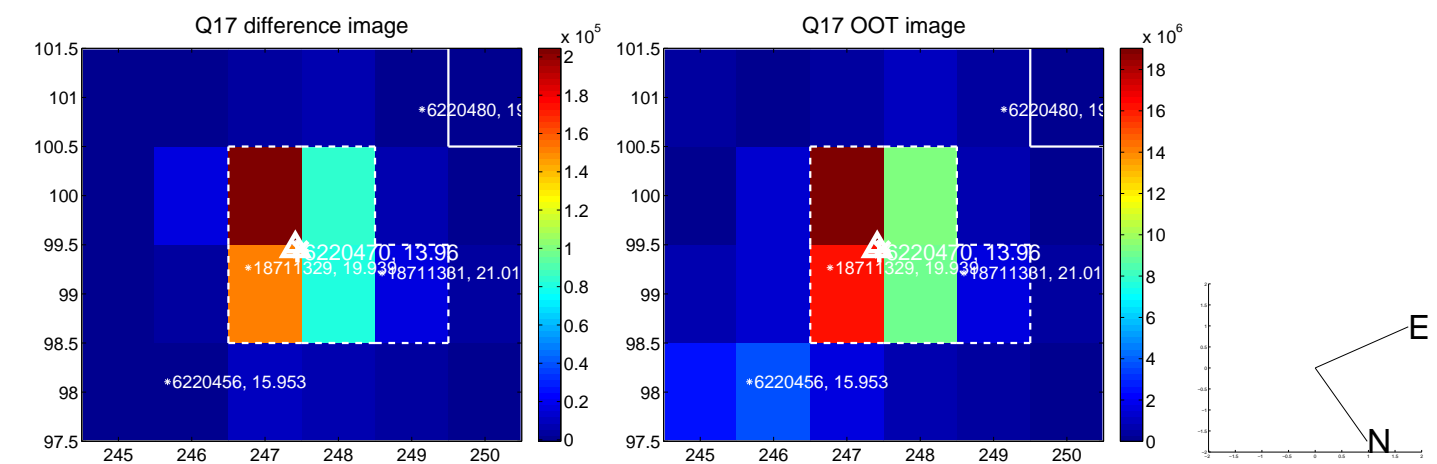
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

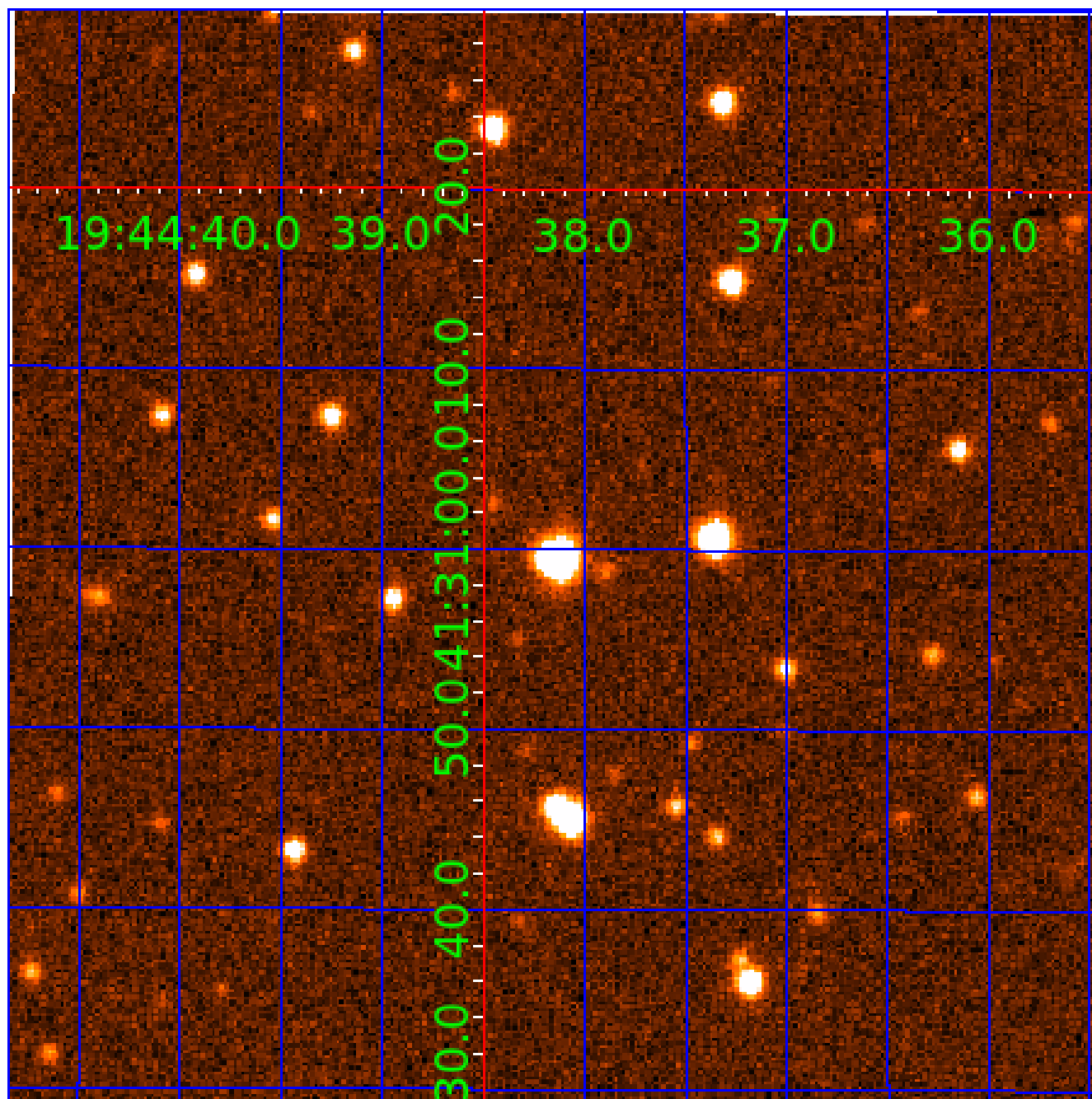


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 006220470

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006220470-01	OBS	6677.01	8.144136	136.505373	88330.4	8.863	9778.4	7639.5	1.86	7605	56.52	1171.70
006220470-02	OBS	No	8.144137	131.628371	9748.9	7.601	1105.8	1002.7	1.86	7605	19.87	1171.70
006220470-03	OBS	No	8.144593	139.031876	108.3	12.791	10.2	11.5	1.86	7605	2.10	1171.62
006220470-05	OBS	No	8.144169	133.084378	119.7	15.000	10.1	-1.0	1.86	7605	2.07	1171.70

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006220470-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—MOD_ODDEVEN_ALT—HAS_SEC_TCE
006220470-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE
006220470-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—MOD_NONUNIQ_DV—SAME_NTL_PERIOD—CENT_FEW_DIFFS
006220470-05	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_NOFITS

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

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

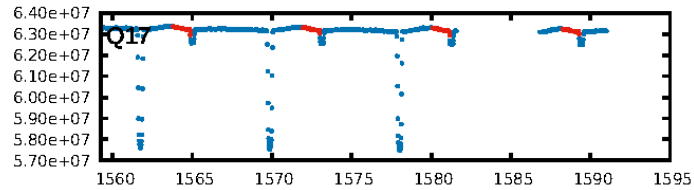
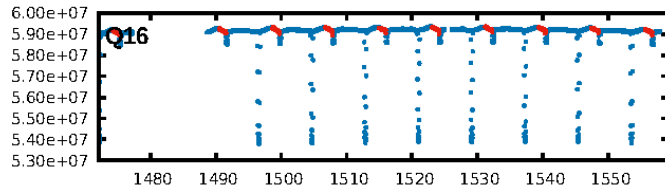
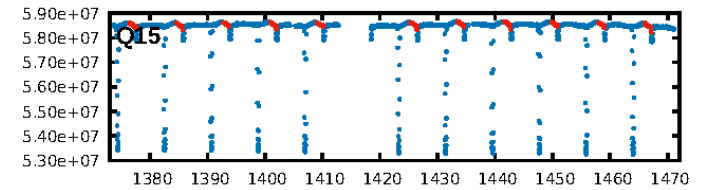
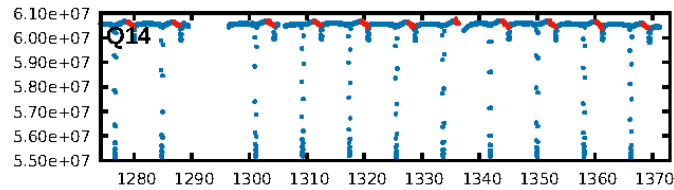
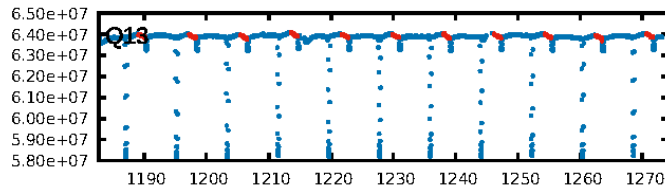
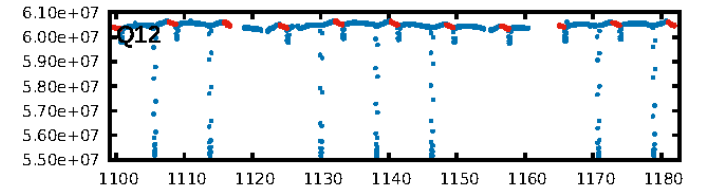
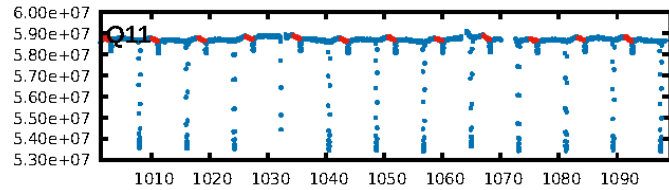
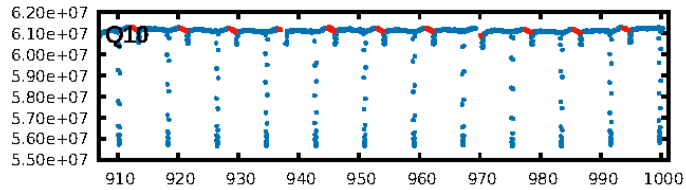
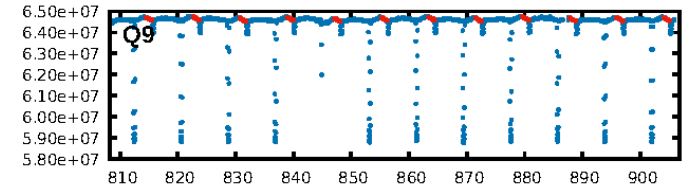
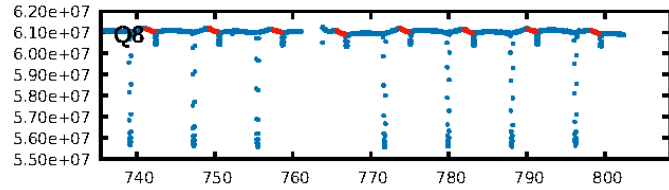
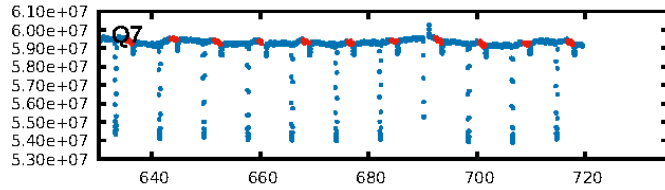
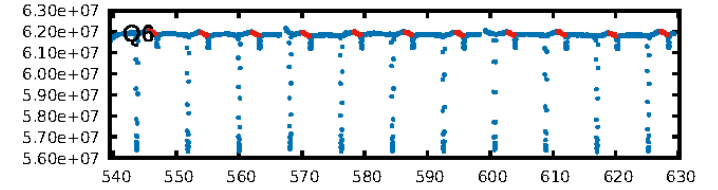
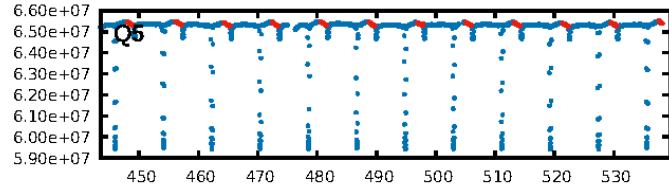
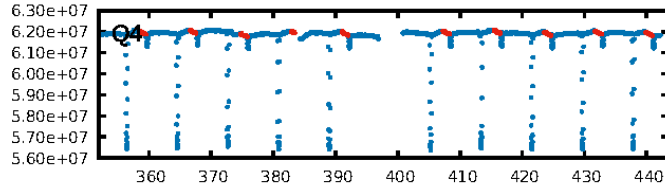
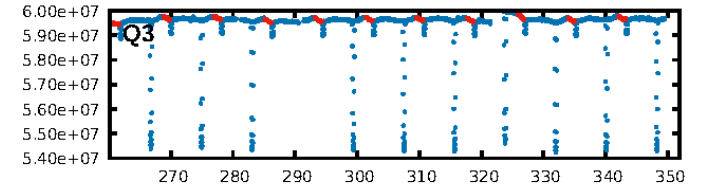
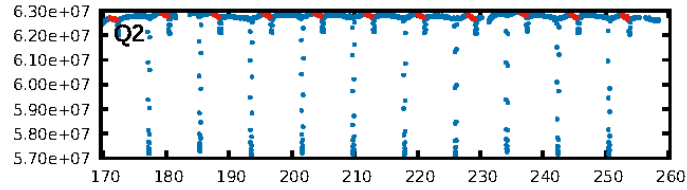
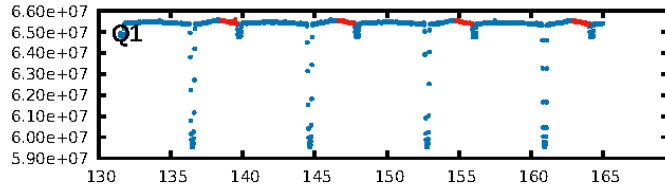
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 006220470-03

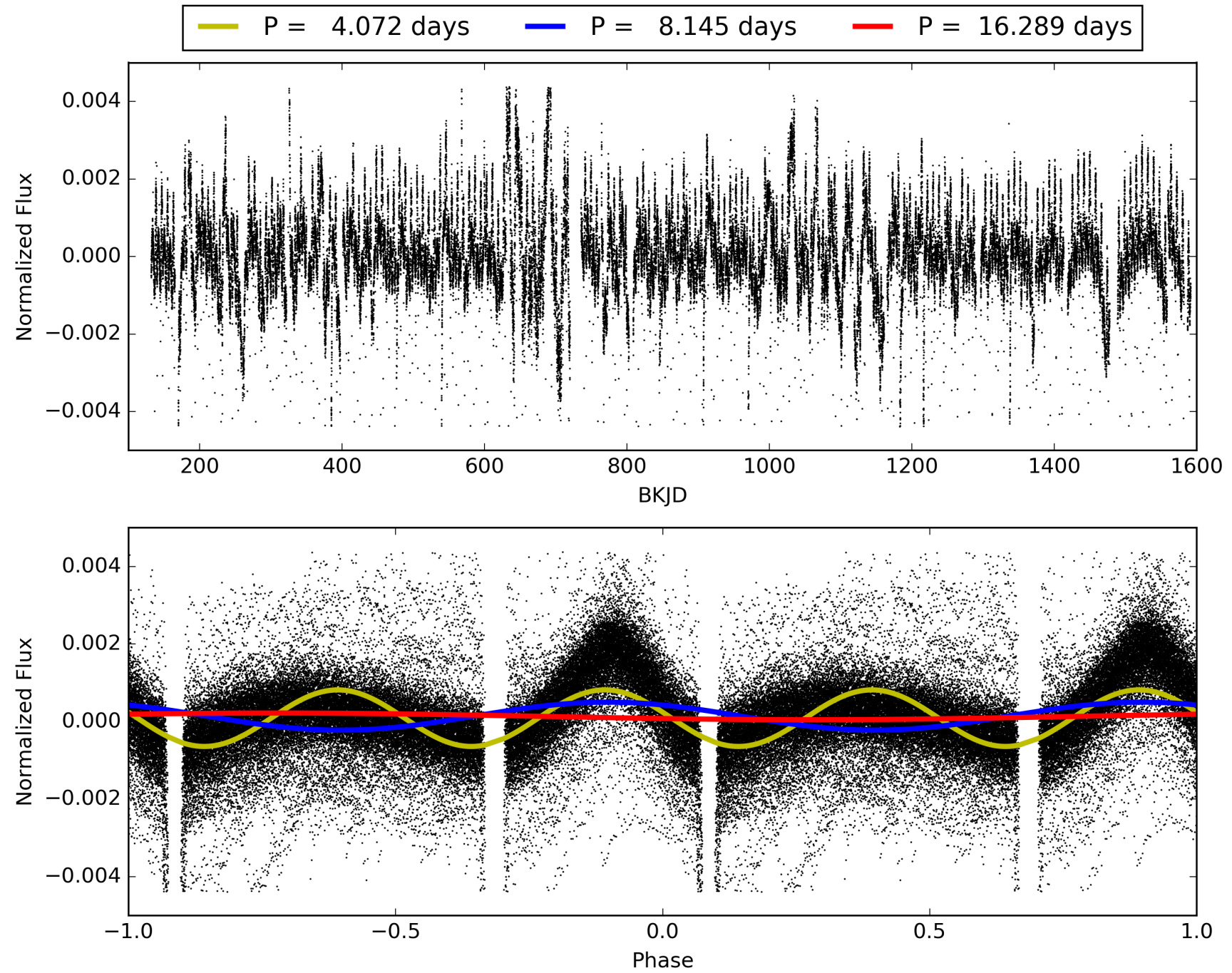
No Significant Match Found

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

## TCE 006220470-03, PDC Light Curves

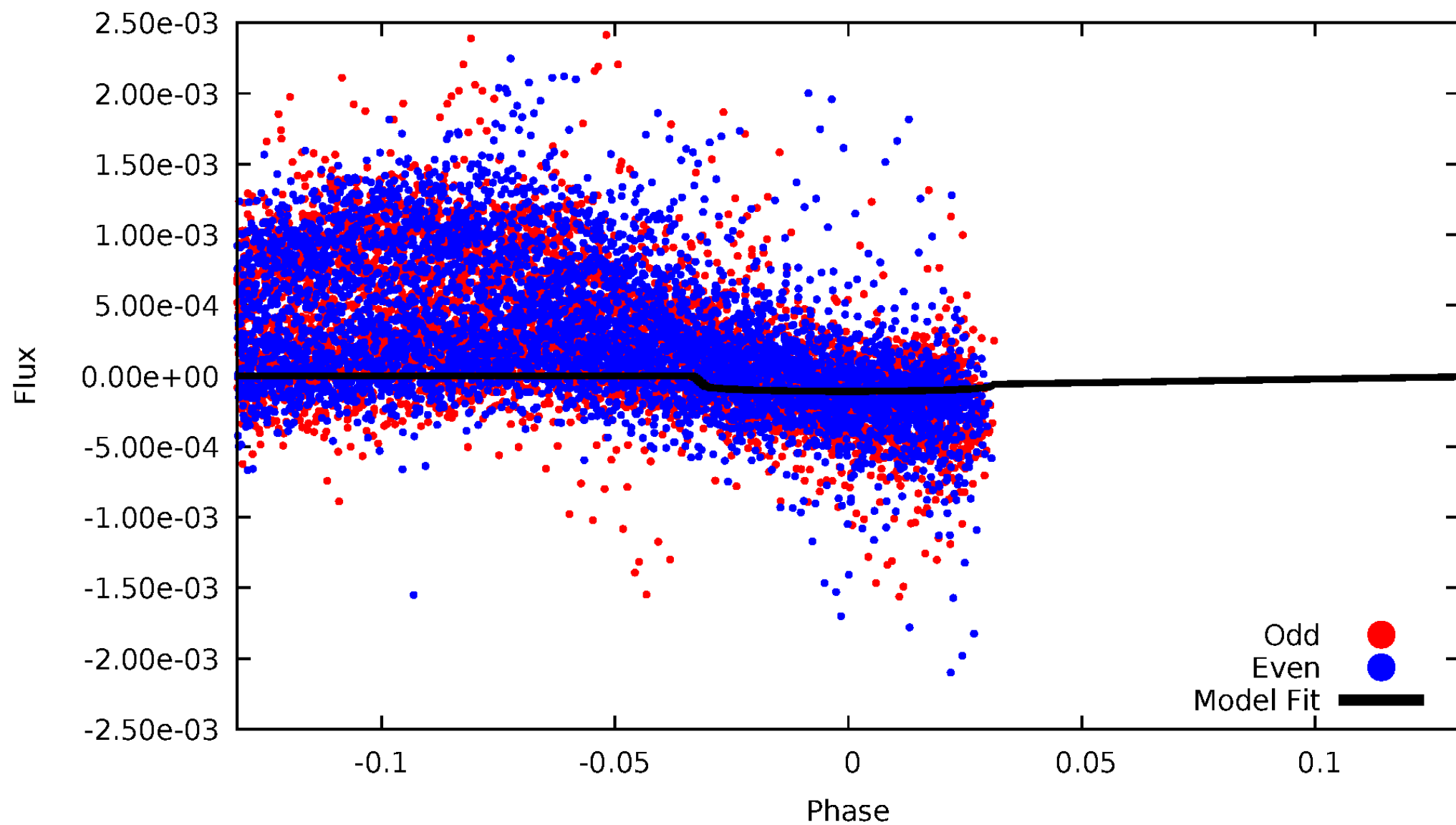


TCE 006220470-03



DV Odd/Even

TCE 006220470-03



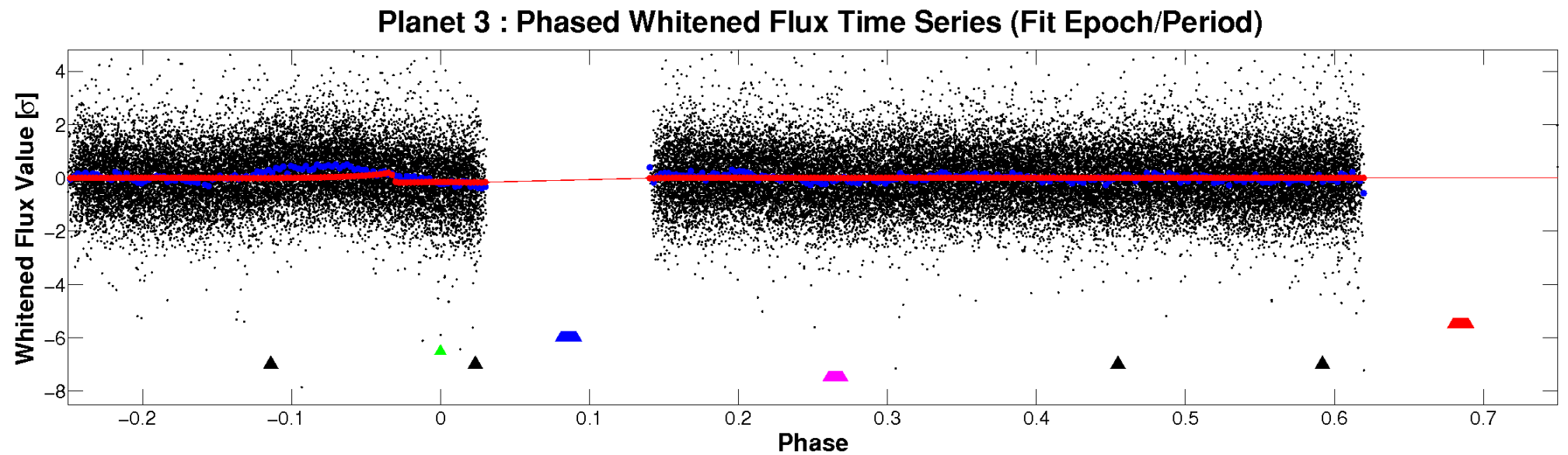
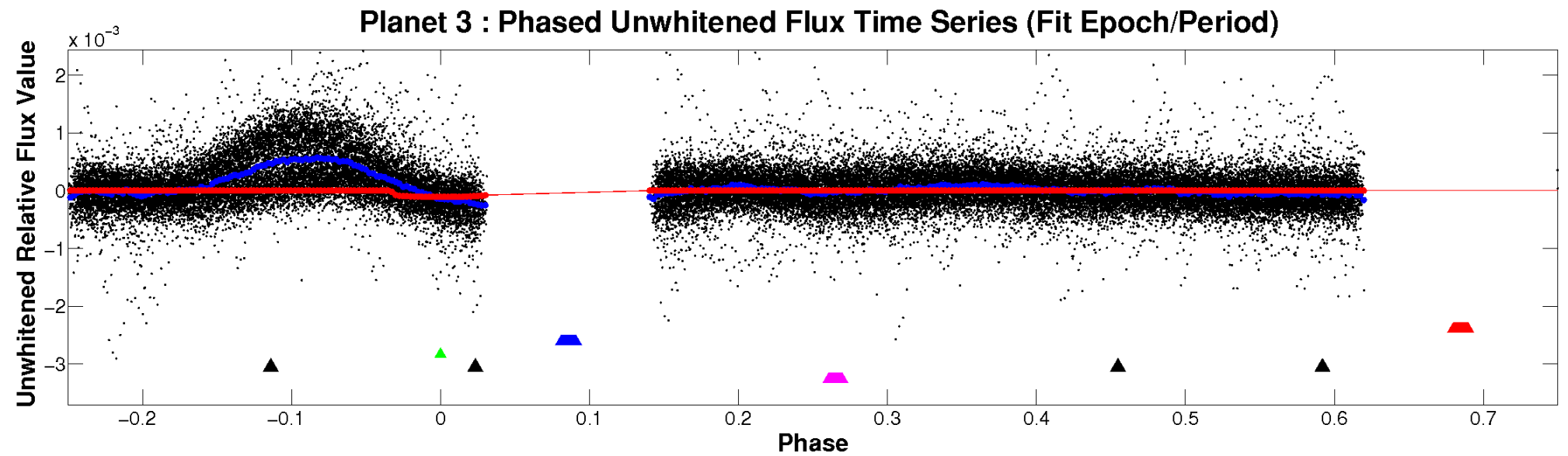


ALT Odd/Even

This plot does not exist for this TCE.



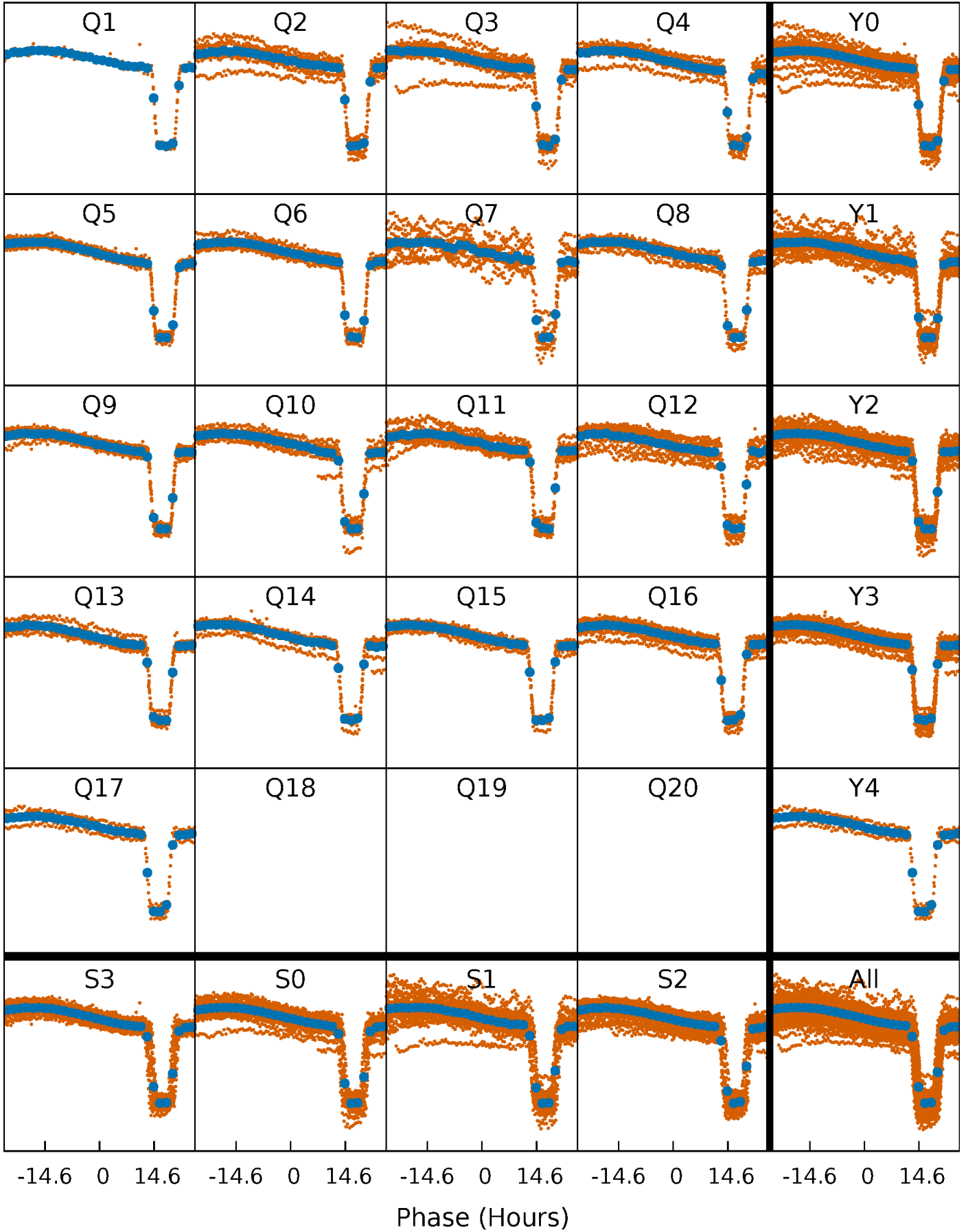
# Non-Whitened Vs. Whitened Light Curve





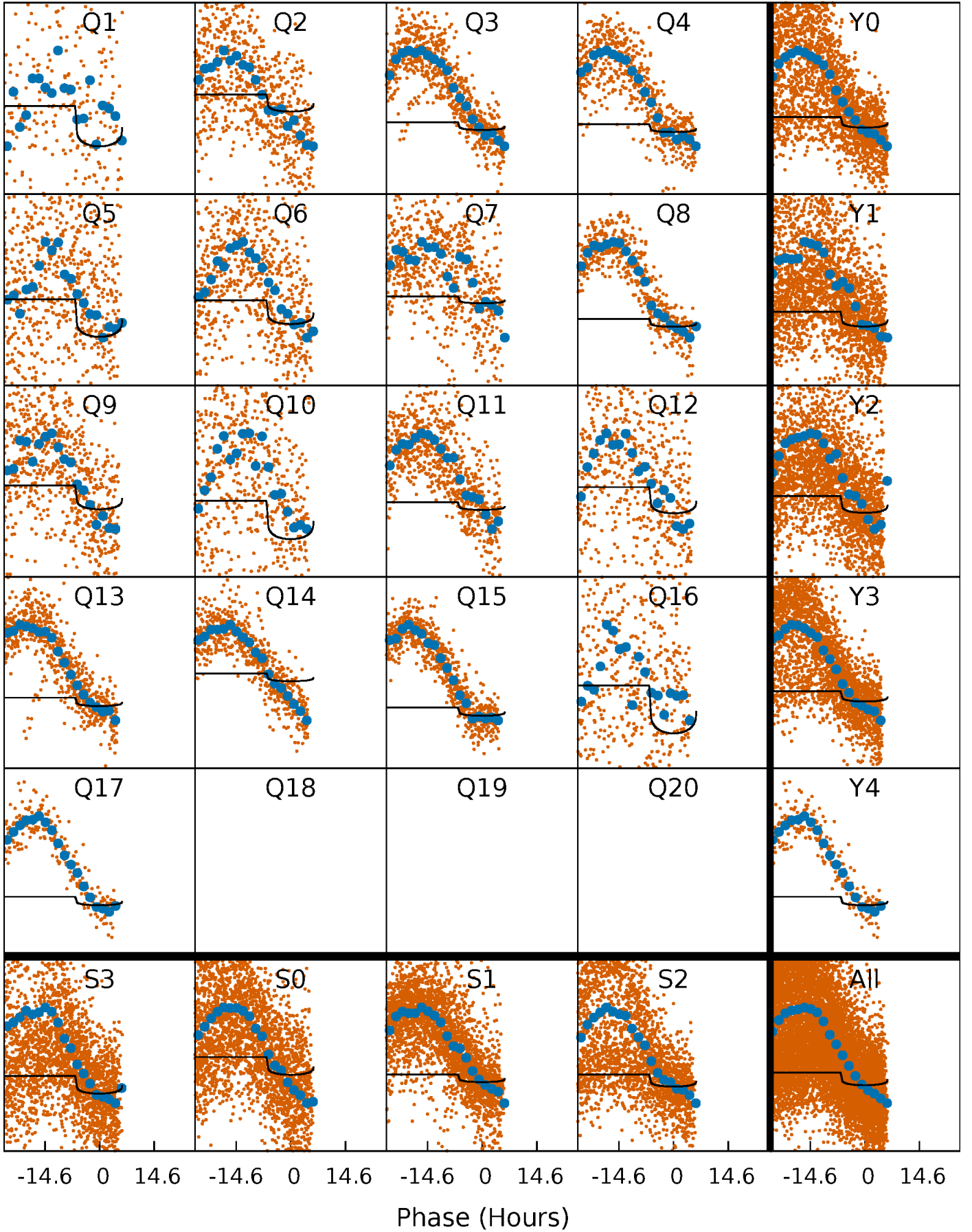
# PDC Quarter-Phased Transit Curves

TCE 006220470-03 P= 8.144593 Days  $T_0=139.031876$  (BKJD)



# DV Quarter-Phased Transit Curves

TCE 006220470-03   P= 8.144593 Days    $T_0=139.031876$  (BKJD)

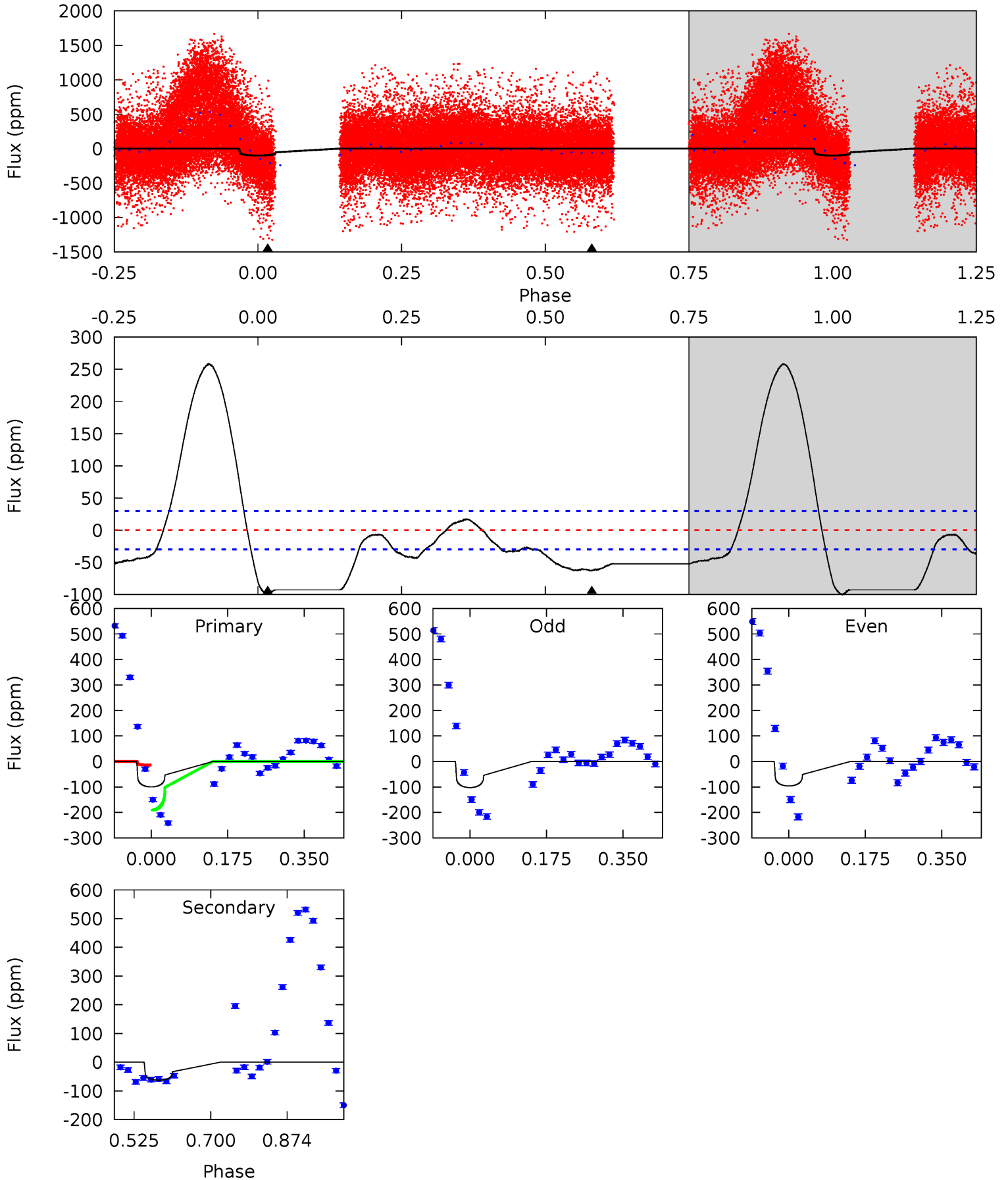


This plot does not exist for this TCE.

# DV Model-Shift Uniqueness Test

006220470-03, P = 8.144593 Days, E = 130.887283 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
14.8	9.32	0	0	4.45	1.36	15.8	14.8	14.8	9.32	9.32	0.46	1.07	0.72	13.0



## Alt Model-Shift Uniqueness Test

This plot does not exist for this TCE.

### Stellar Parameters For KIC 006220470

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7605^{+209}_{-340}$	$4.123^{+0.120}_{-0.180}$	$0.040^{+0.200}_{-0.350}$	$1.862^{+0.540}_{-0.360}$	$1.677^{+0.212}_{-0.259}$	$0.366^{+0.243}_{-0.179}$
	+3%/-4%	+3%/-4%	+500%/-875%	+29%/-19%	+13%/-15%	+66%/-49%
Source	KIC0	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 006220470-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-63 \pm 7$	$2.12^{+0.49}_{-0.44}$	$2088^{+154}_{-123}$	$6527^{+814}_{-611}$	$66^{+41}_{-22}$
Alt.	N/A	N/A	N/A	N/A	N/A

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

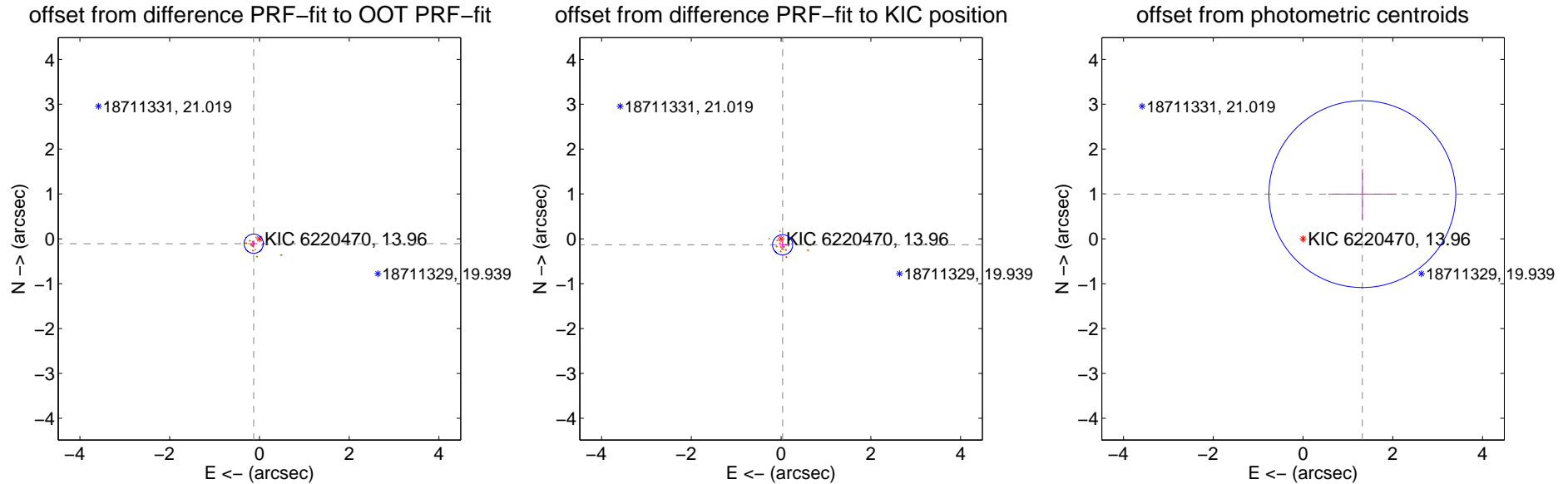
## DV Centroid Data

Supplemental centroid analysis for 006220470-03. Kepler magnitude: 13.96. Transit SNR 11.47

There are 0 quarters with good PRF difference image offsets

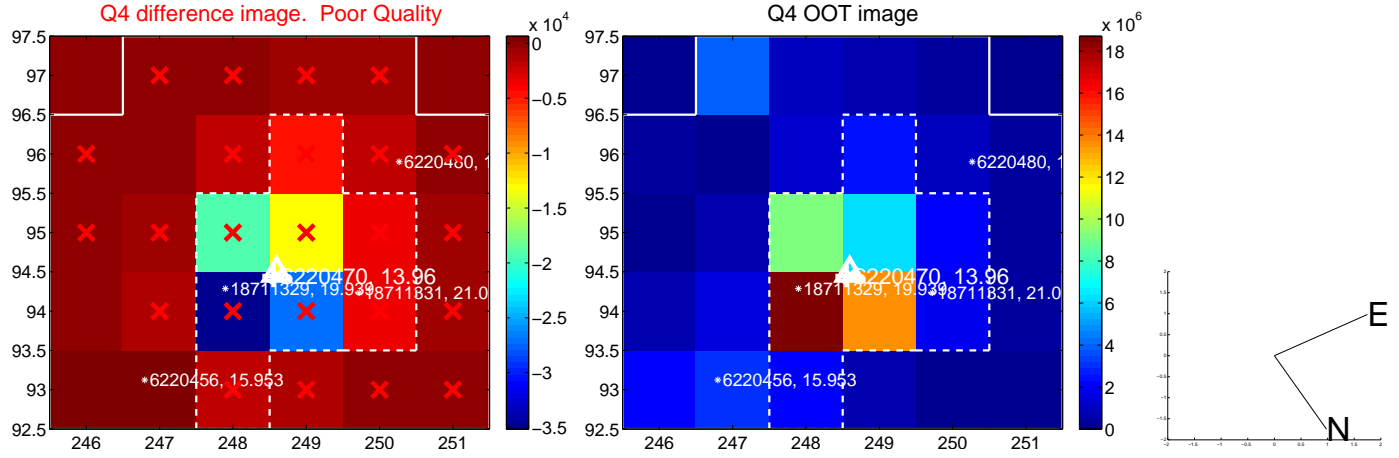
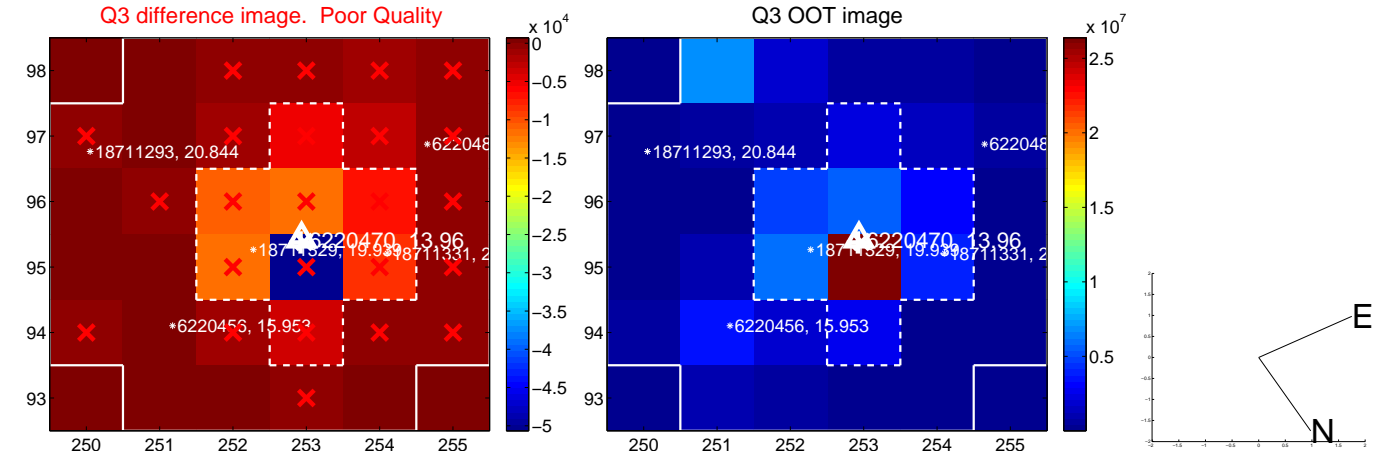
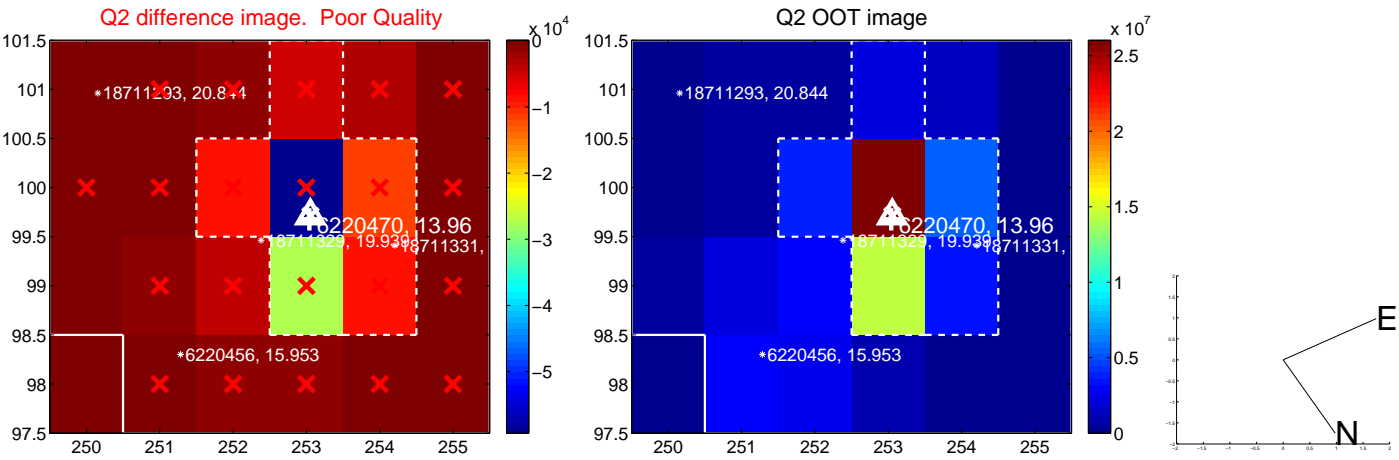
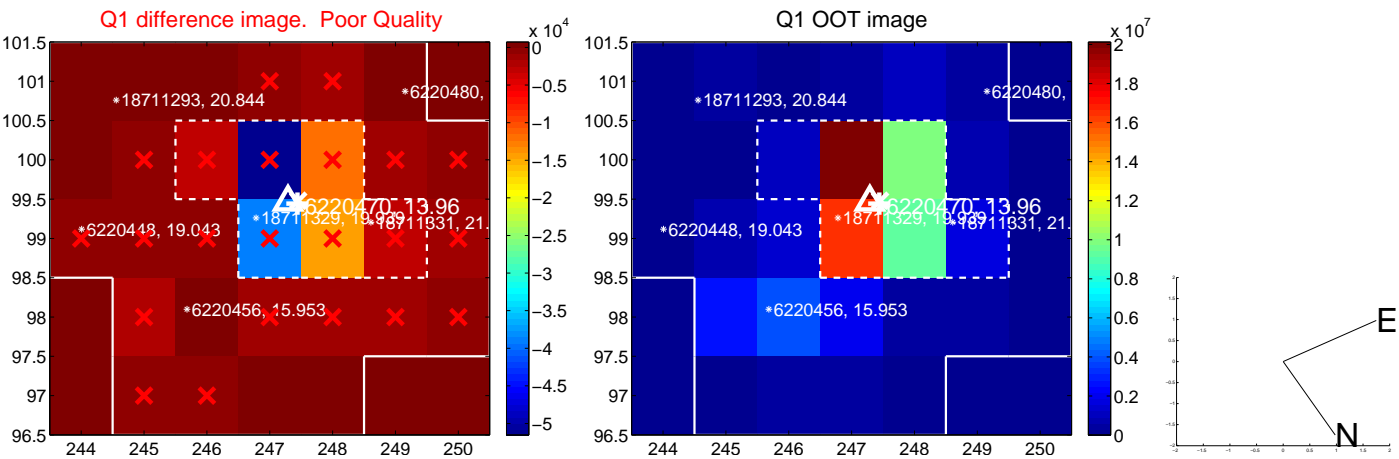
The direct PRF centroid is offset from the target star catalog position by about 0.17 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.168 \pm 0.072$	2.34	$0.128 \pm 0.078$	$-0.109 \pm 0.071$
PRF-fit source offset from KIC position	$0.138 \pm 0.075$	1.83	$-0.034 \pm 0.079$	$-0.133 \pm 0.073$
photometric centroid source offset	$1.66 \pm 0.69$	2.39	$-1.32 \pm 0.76$	$1.00 \pm 0.56$



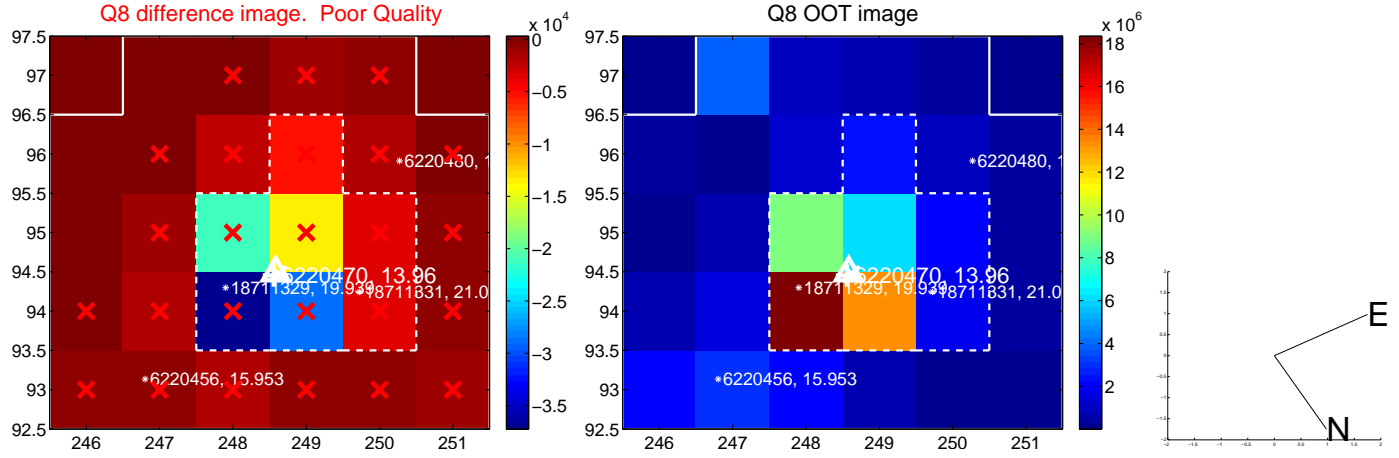
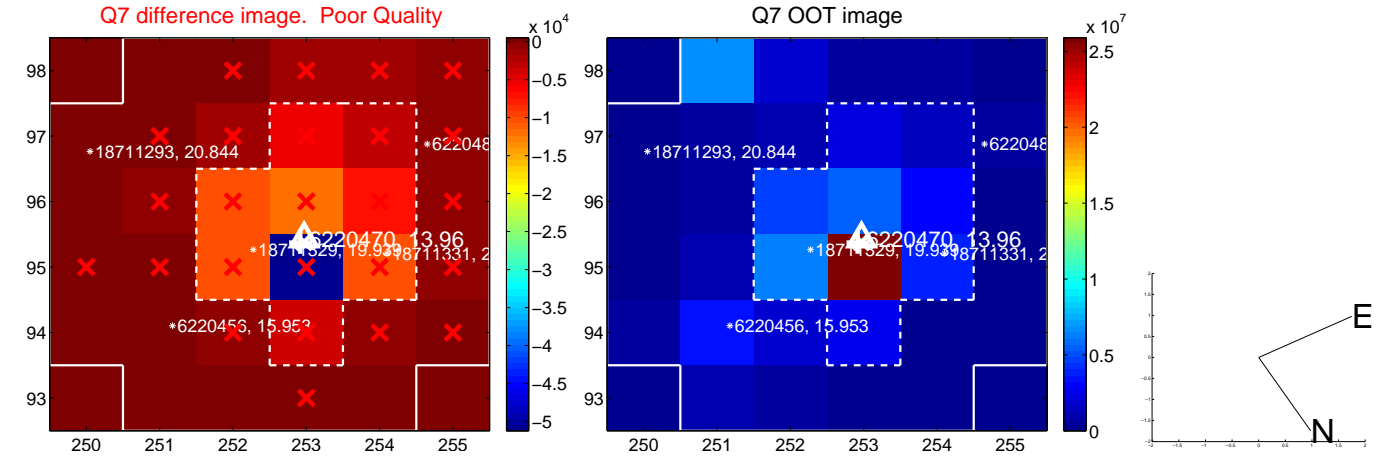
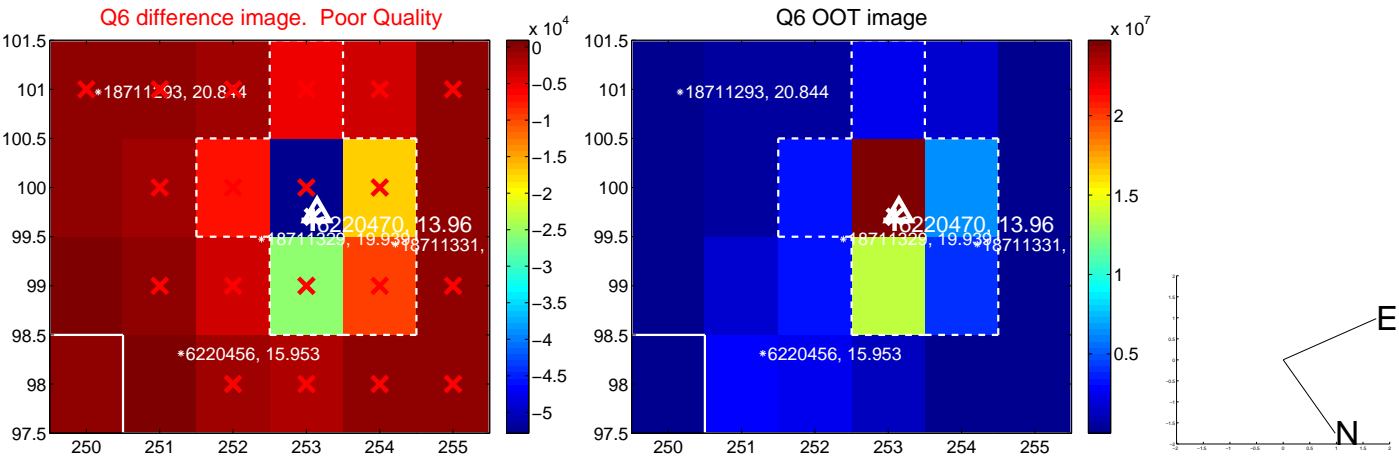
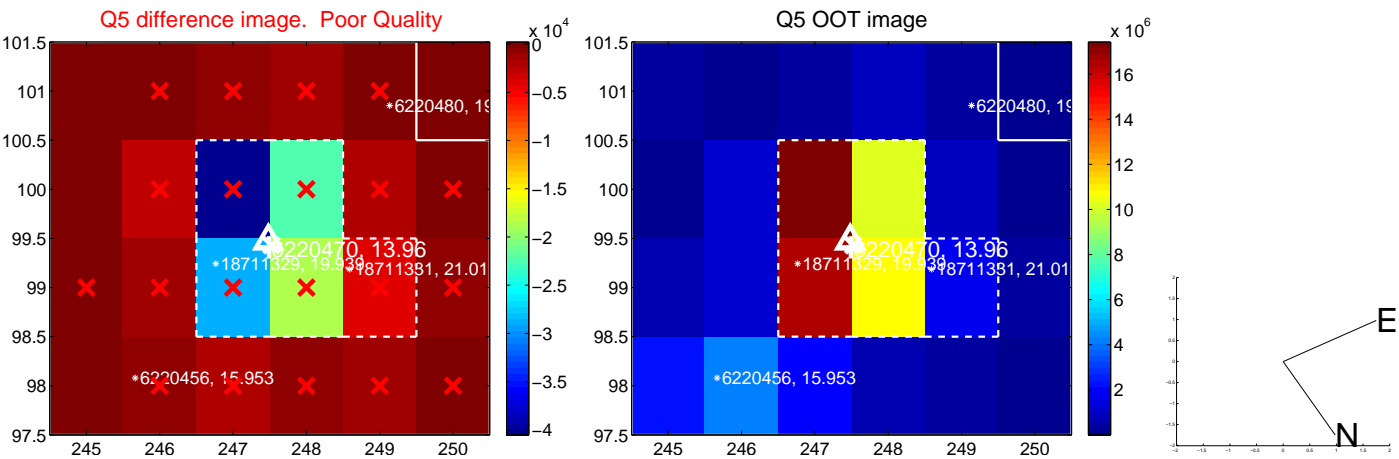
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

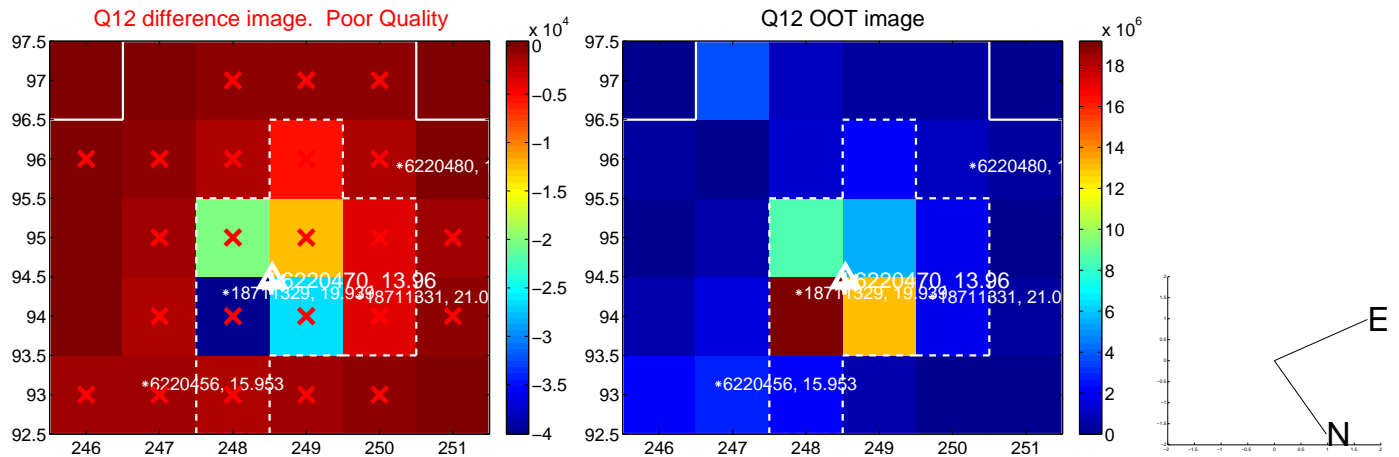
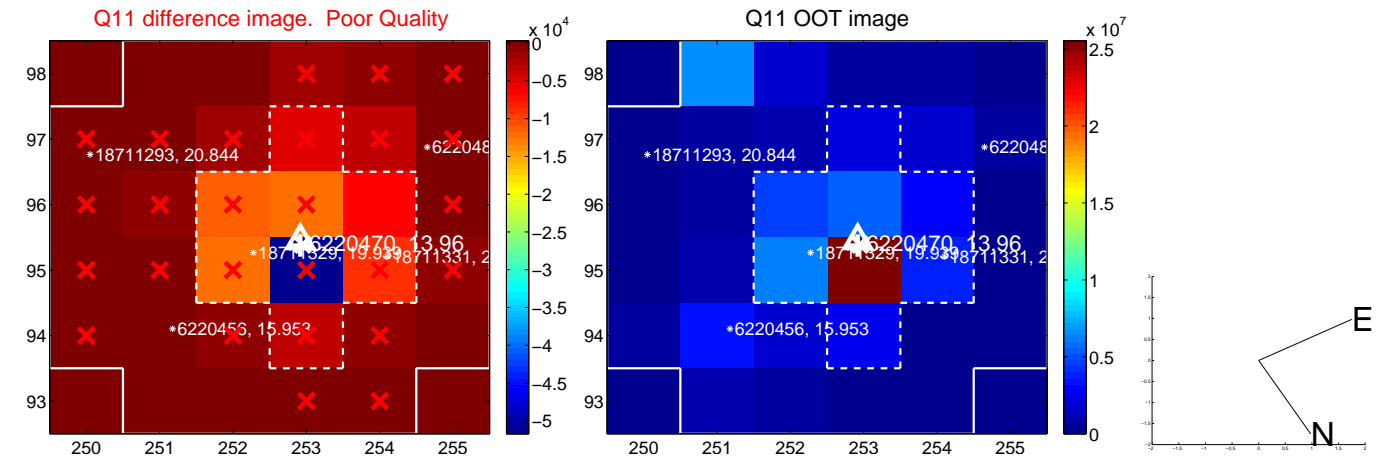
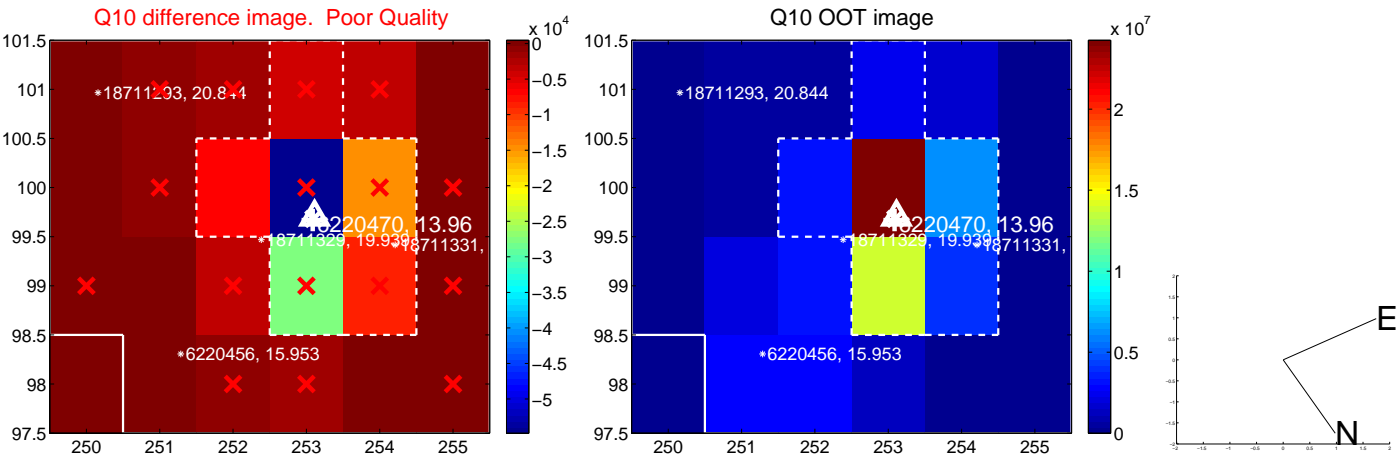
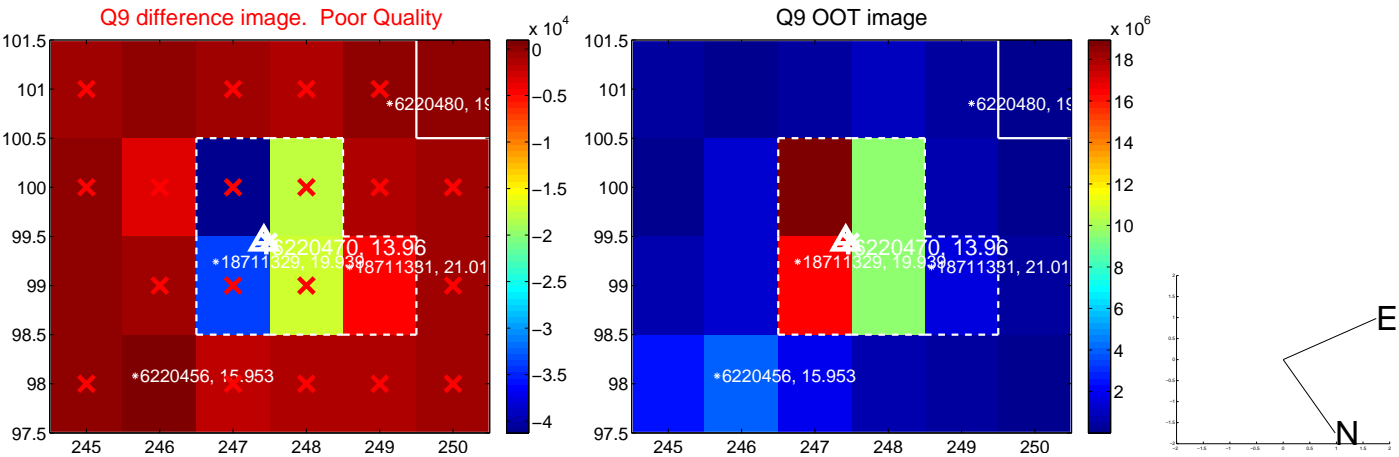




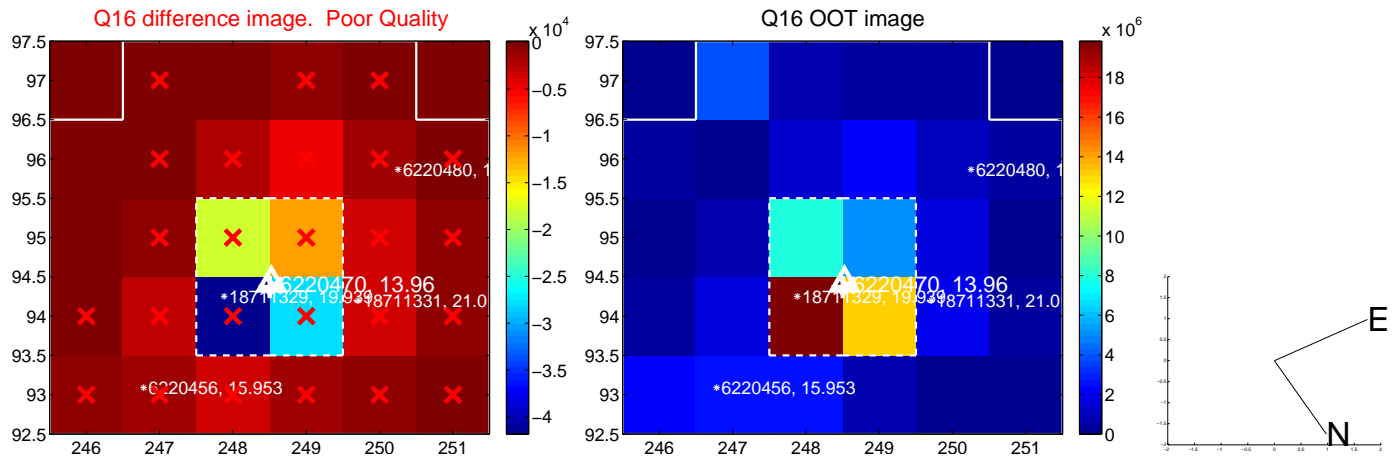
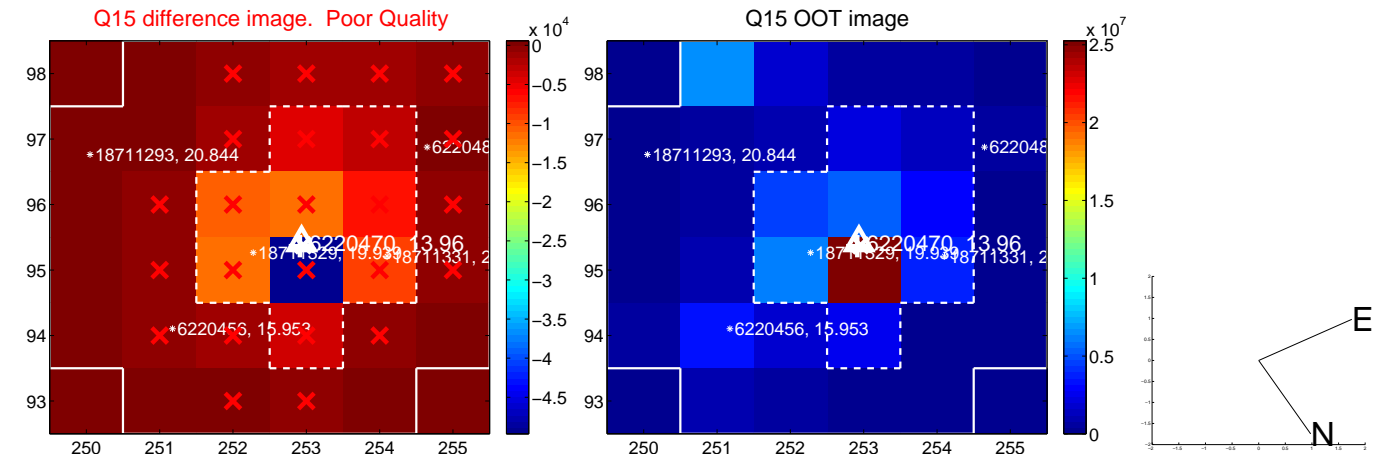
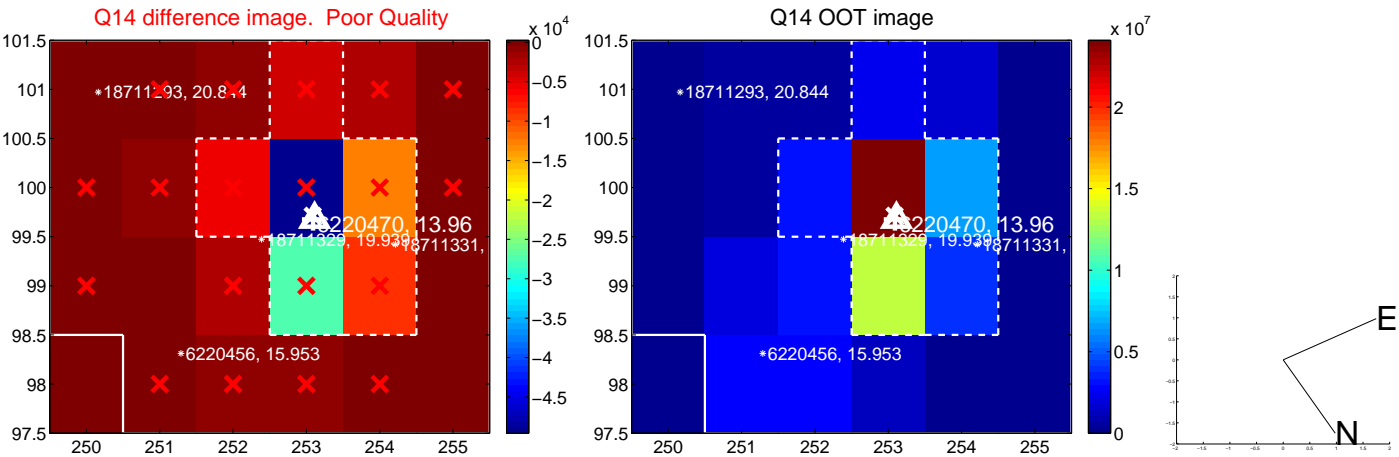
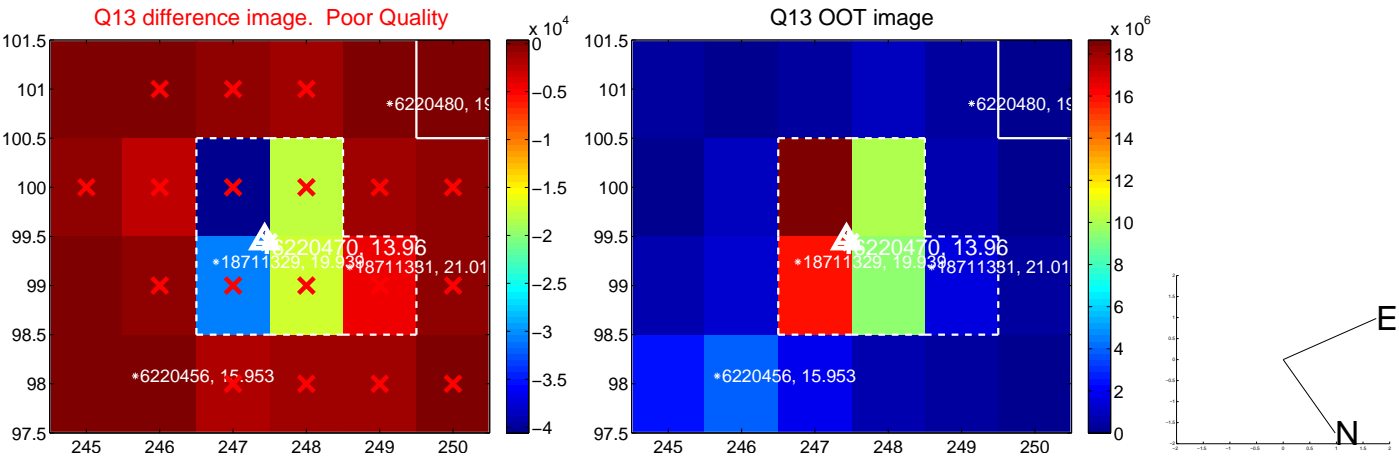
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



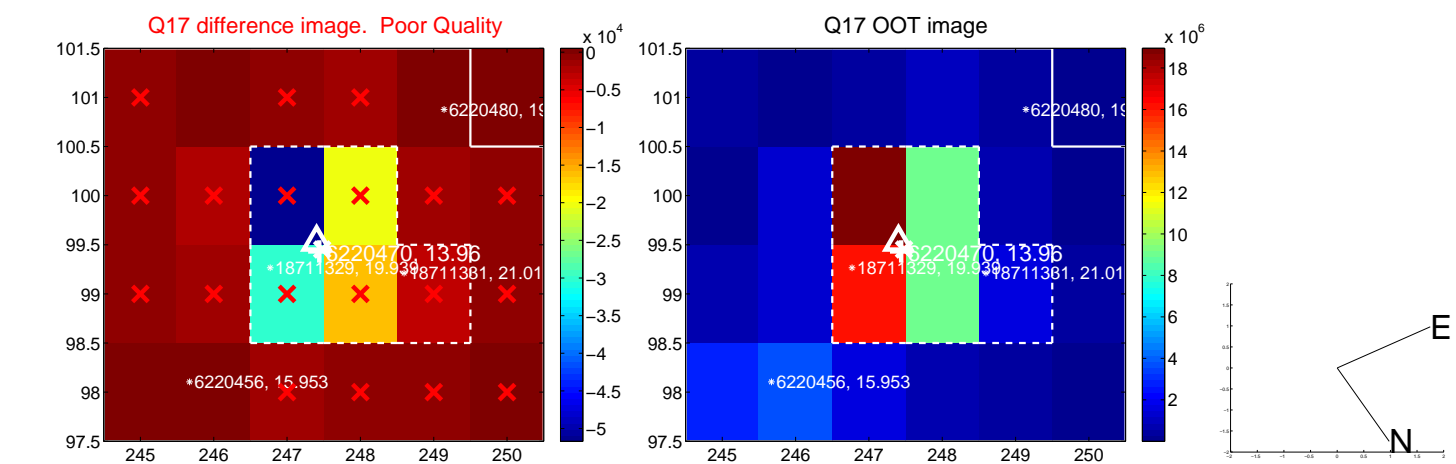
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



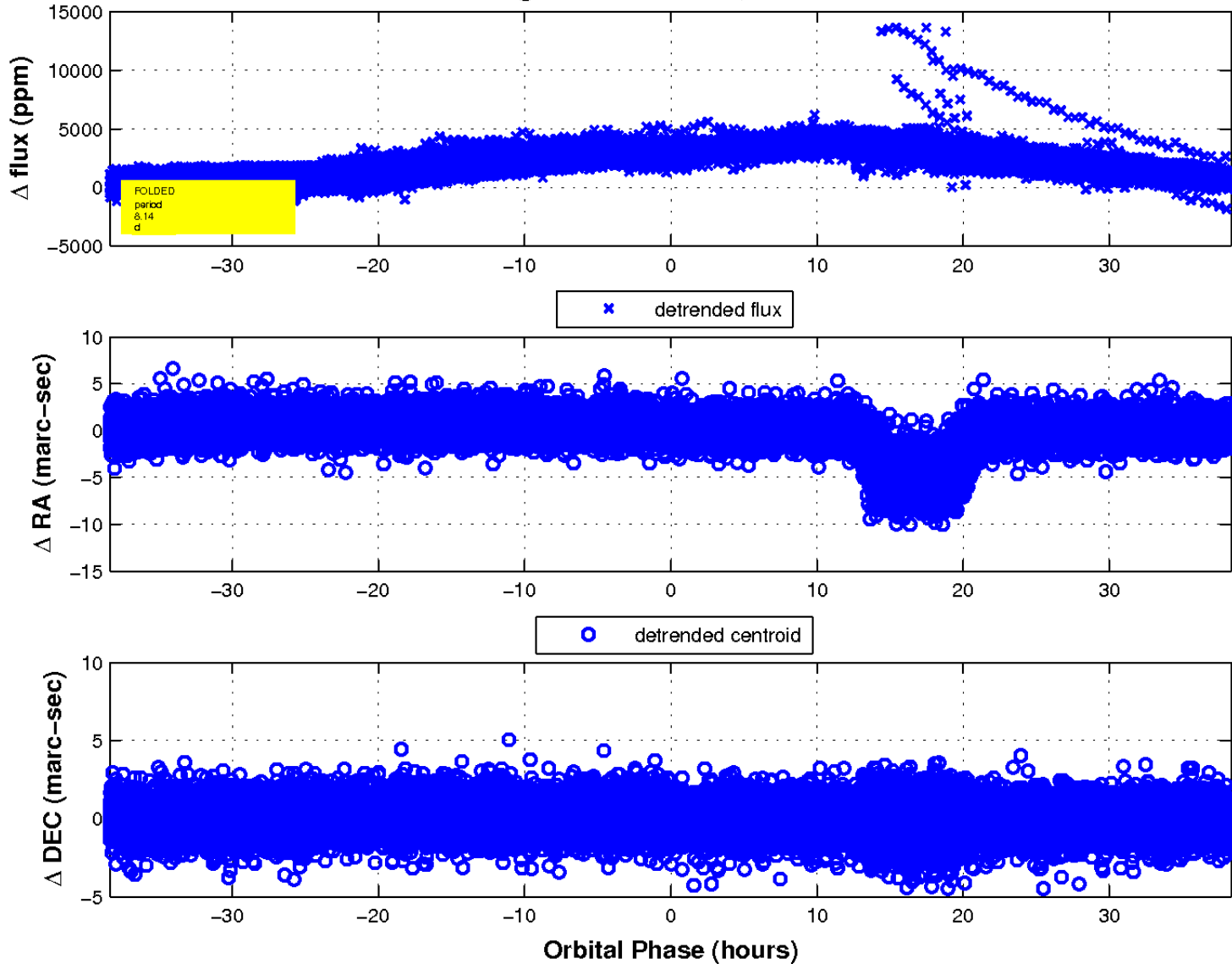
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

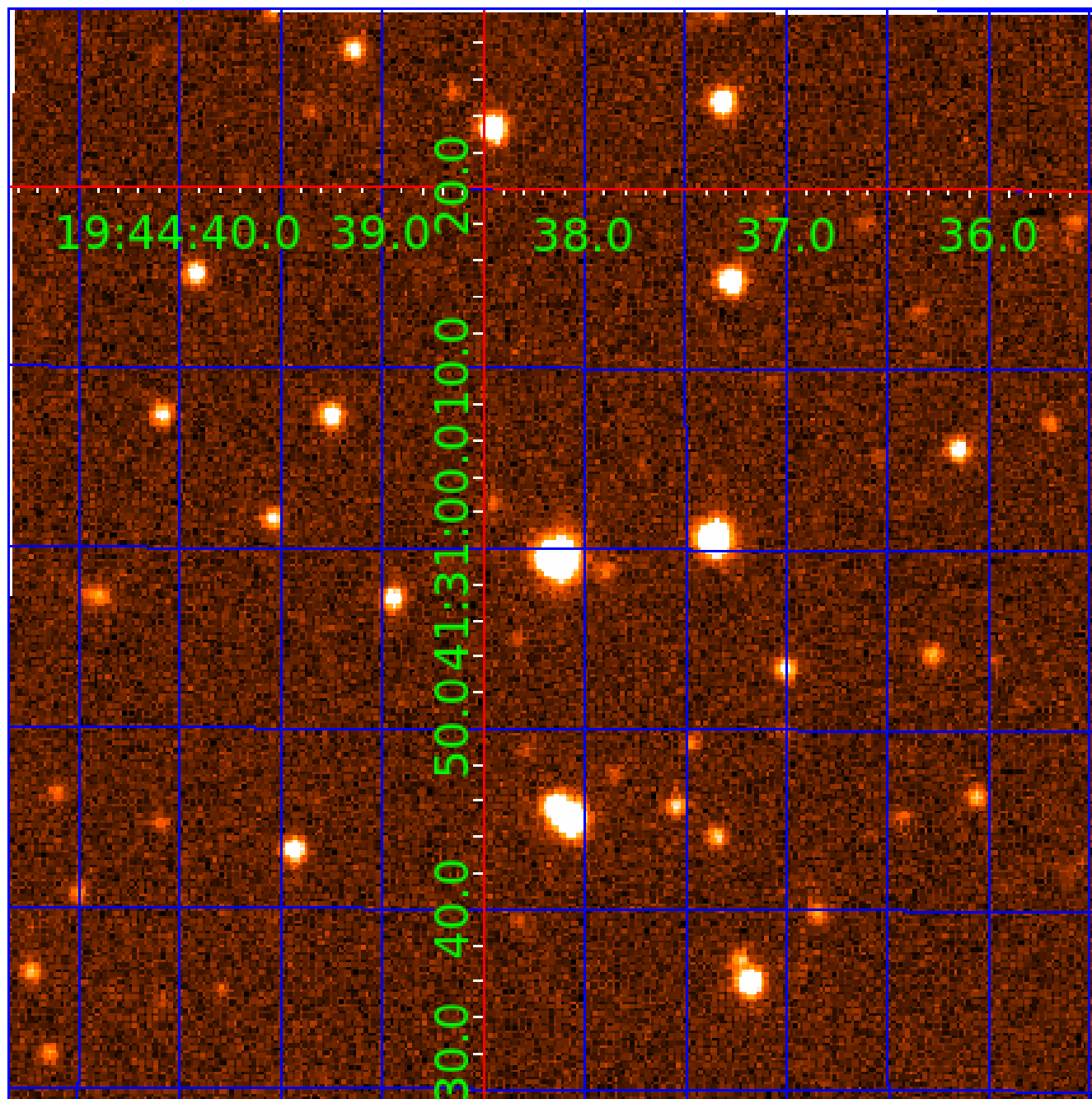


fluxWeightedCentroids, Planet 3 of 5



UKIRT Image

Declination



# KIC 006220470

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006220470-01	OBS	6677.01	8.144136	136.505373	88330.4	8.863	9778.4	7639.5	1.86	7605	56.52	1171.70
006220470-02	OBS	No	8.144137	131.628371	9748.9	7.601	1105.8	1002.7	1.86	7605	19.87	1171.70
006220470-03	OBS	No	8.144593	139.031876	108.3	12.791	10.2	11.5	1.86	7605	2.10	1171.62
006220470-05	OBS	No	8.144169	133.084378	119.7	15.000	10.1	-1.0	1.86	7605	2.07	1171.70

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006220470-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—MOD_ODDEVEN_ALT—HAS_SEC_TCE
006220470-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE
006220470-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—MOD_NONUNIQ_DV—SAME_NTL_PERIOD—CENT_FEW_DIFFS
006220470-05	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_NOFITS

**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.

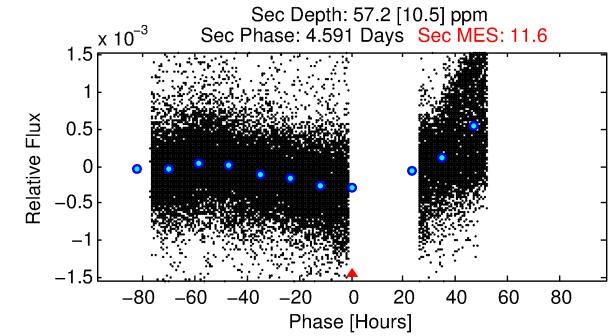
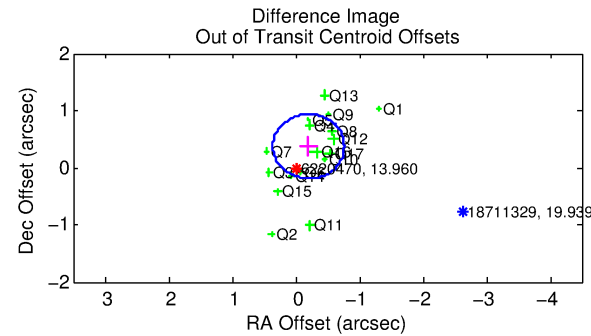
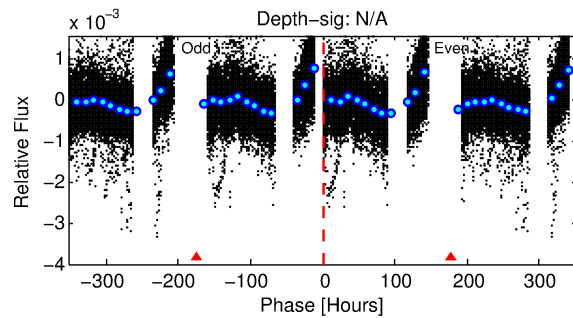
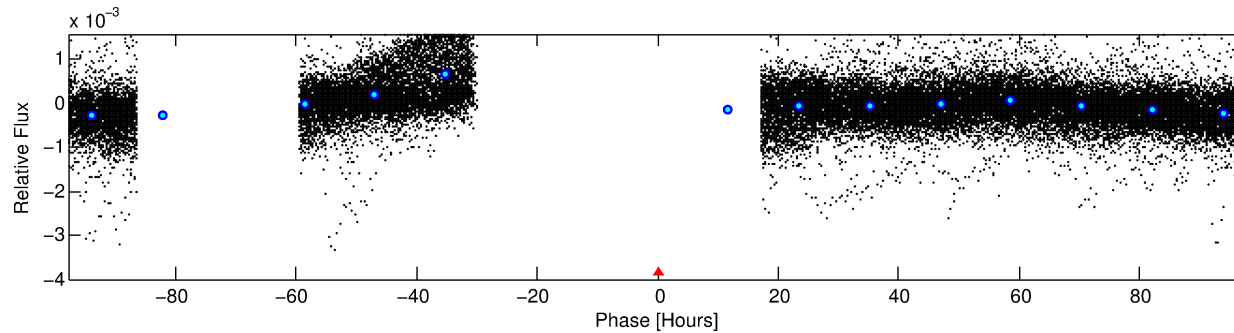
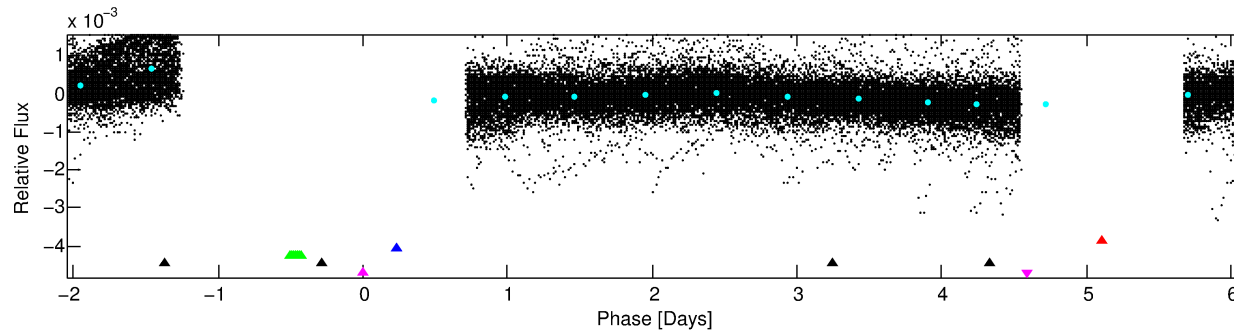
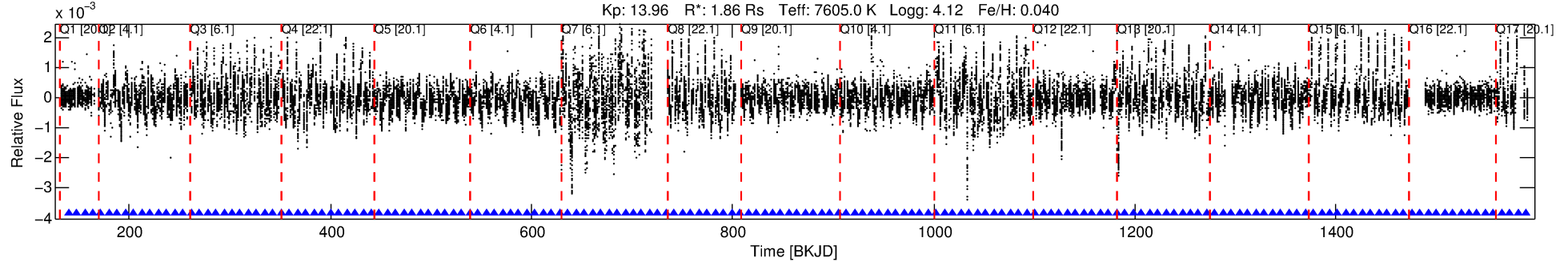
Ephemeris Match Information For 006220470-05

No Significant Match Found

# DV One-Page Summary

KIC: 6220470 Candidate: 5 of 5 Period: 8.144 d  
KOI: K06677 Corr: No Ephemeris Match

Kp: 13.96 R\*: 1.86 Rs Teff: 7605.0 K Logg: 4.12 Fe/H: 0.040



## TPS TCE Results:

Period = 8.14417 d  
Epoch = 133.0844 BKJD

DV fit results are unavailable

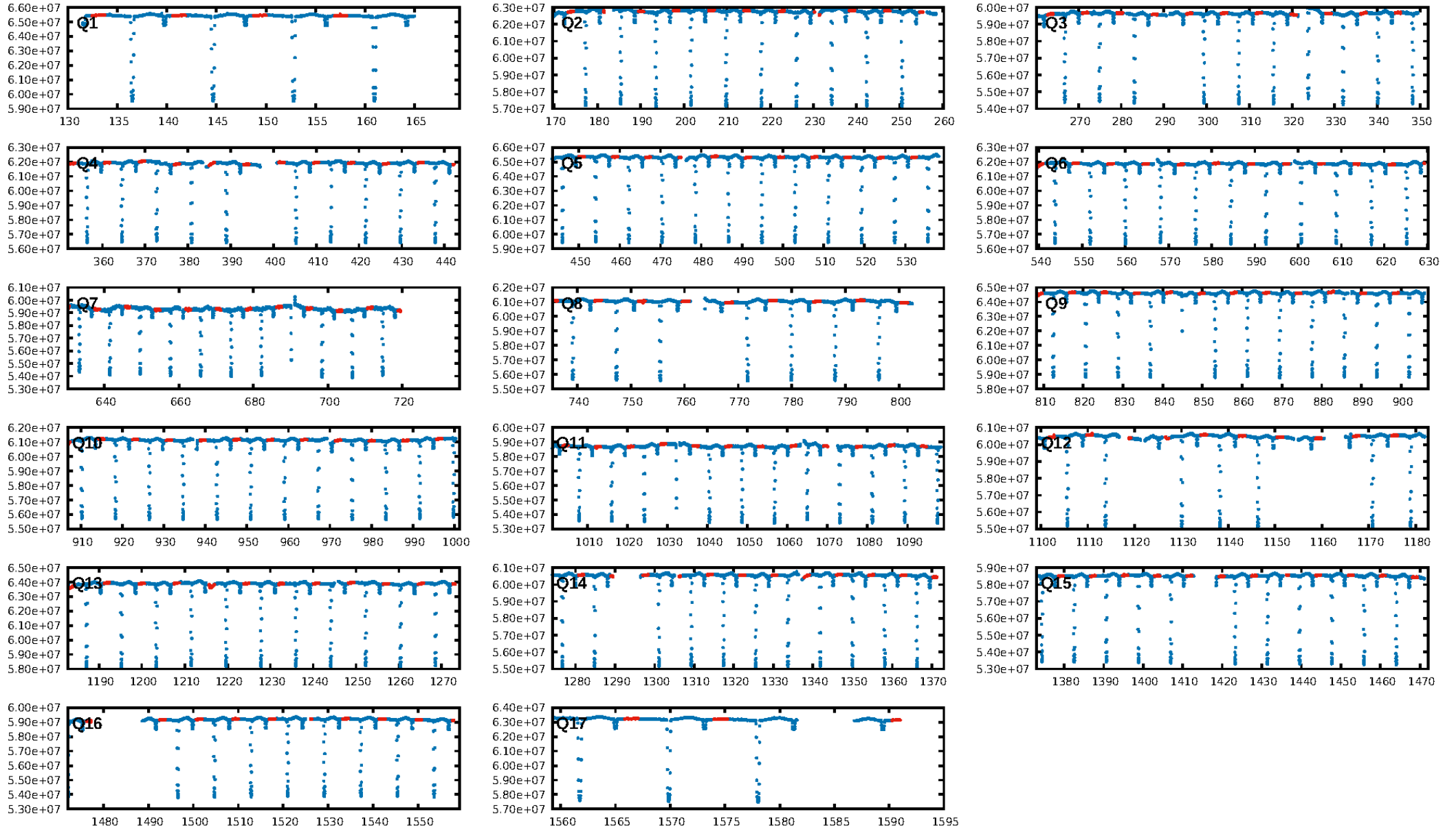
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [166/166]  
GhostDiagnostic-chr: 1.461  
Centroid-sig: N/A  
Centroid-so: 0.626 arcsec [35.74σ]  
OotOffset-rm: 0.426 arcsec [2.27σ]  
KicOffset-rm: 0.518 arcsec [2.95σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.00 [0/17]  
DiffImageOverlap-fno: 0.00 [0/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 03-Feb-2016 08:44:55 Z

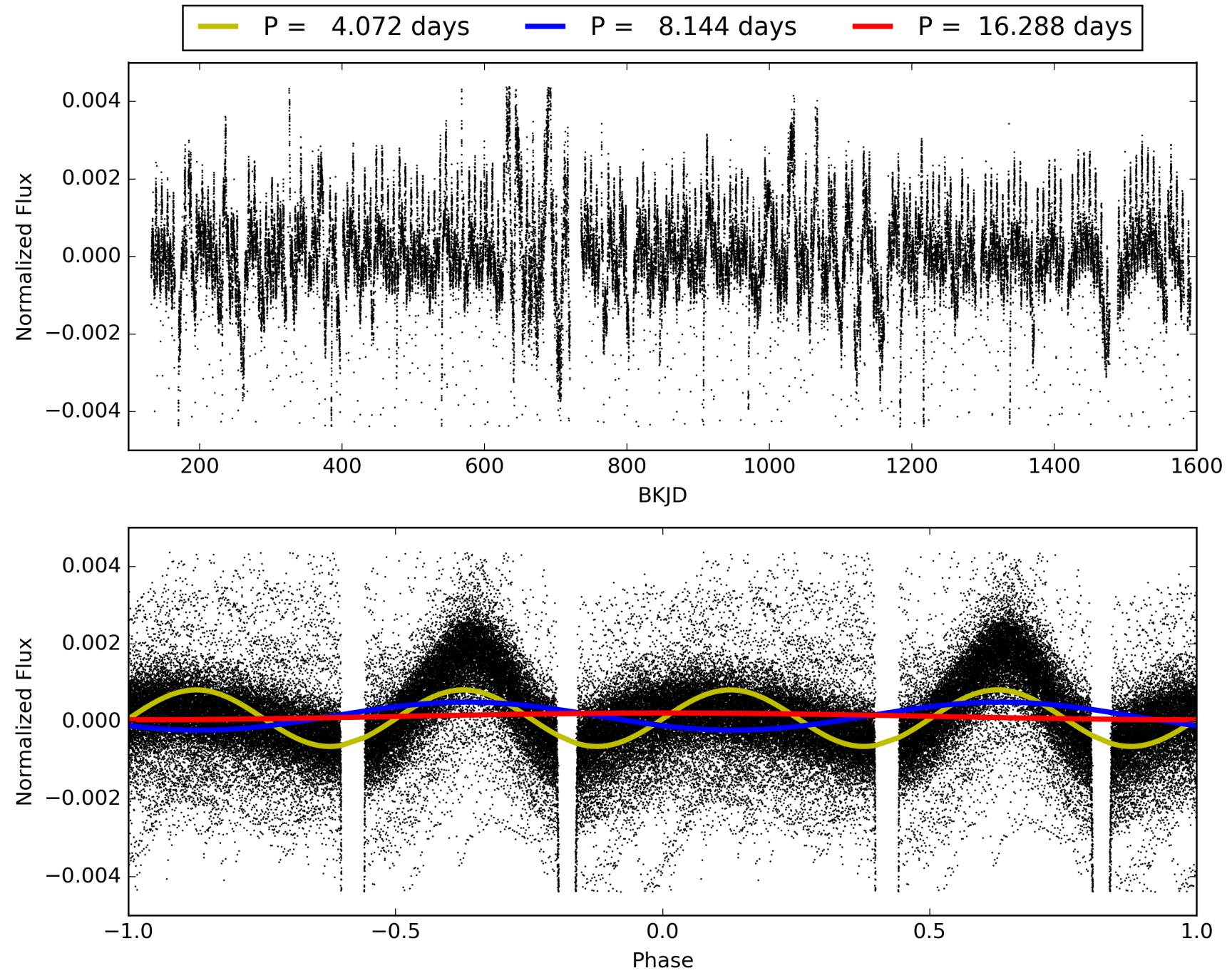
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 006220470-05, PDC Light Curves



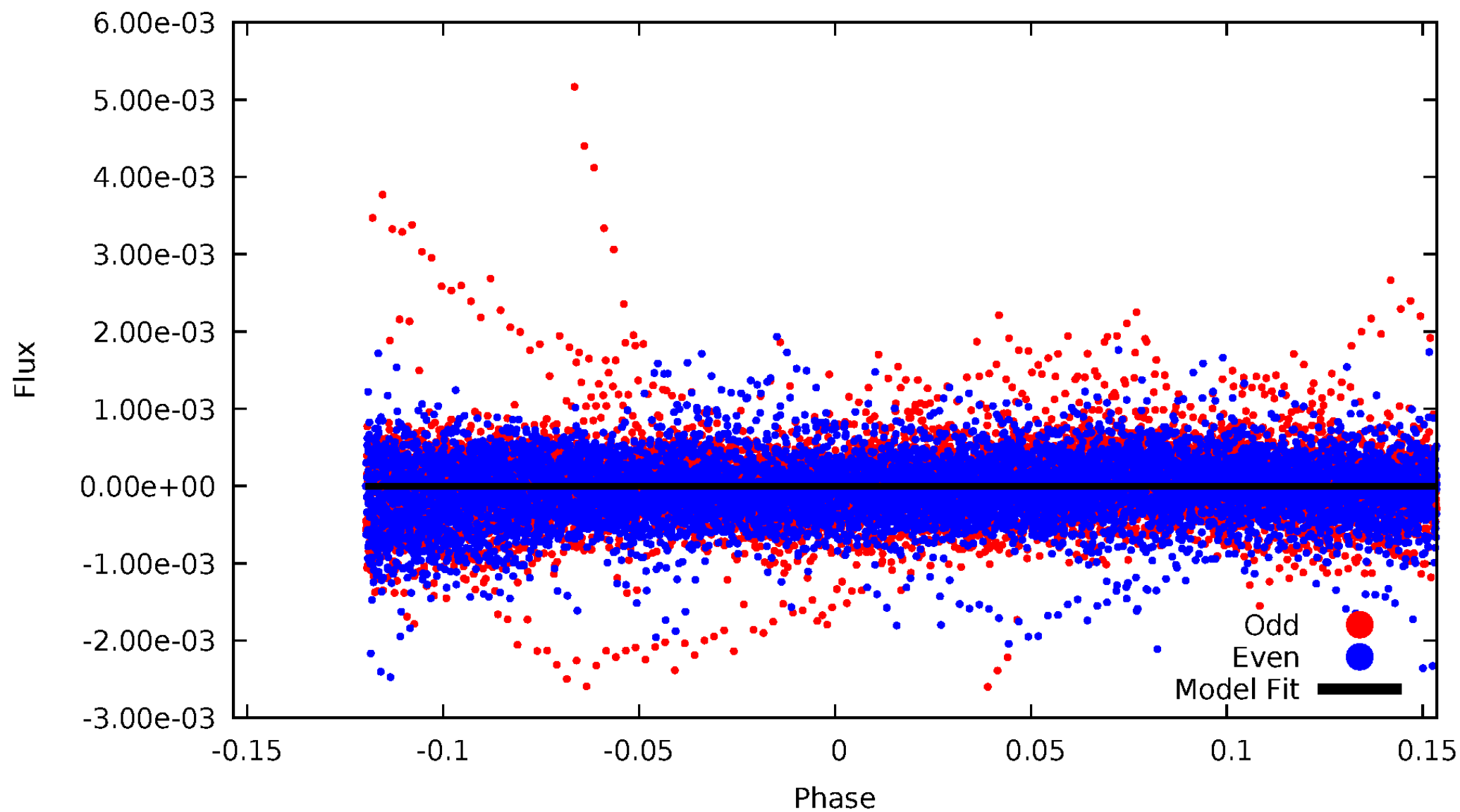


TCE 006220470-05



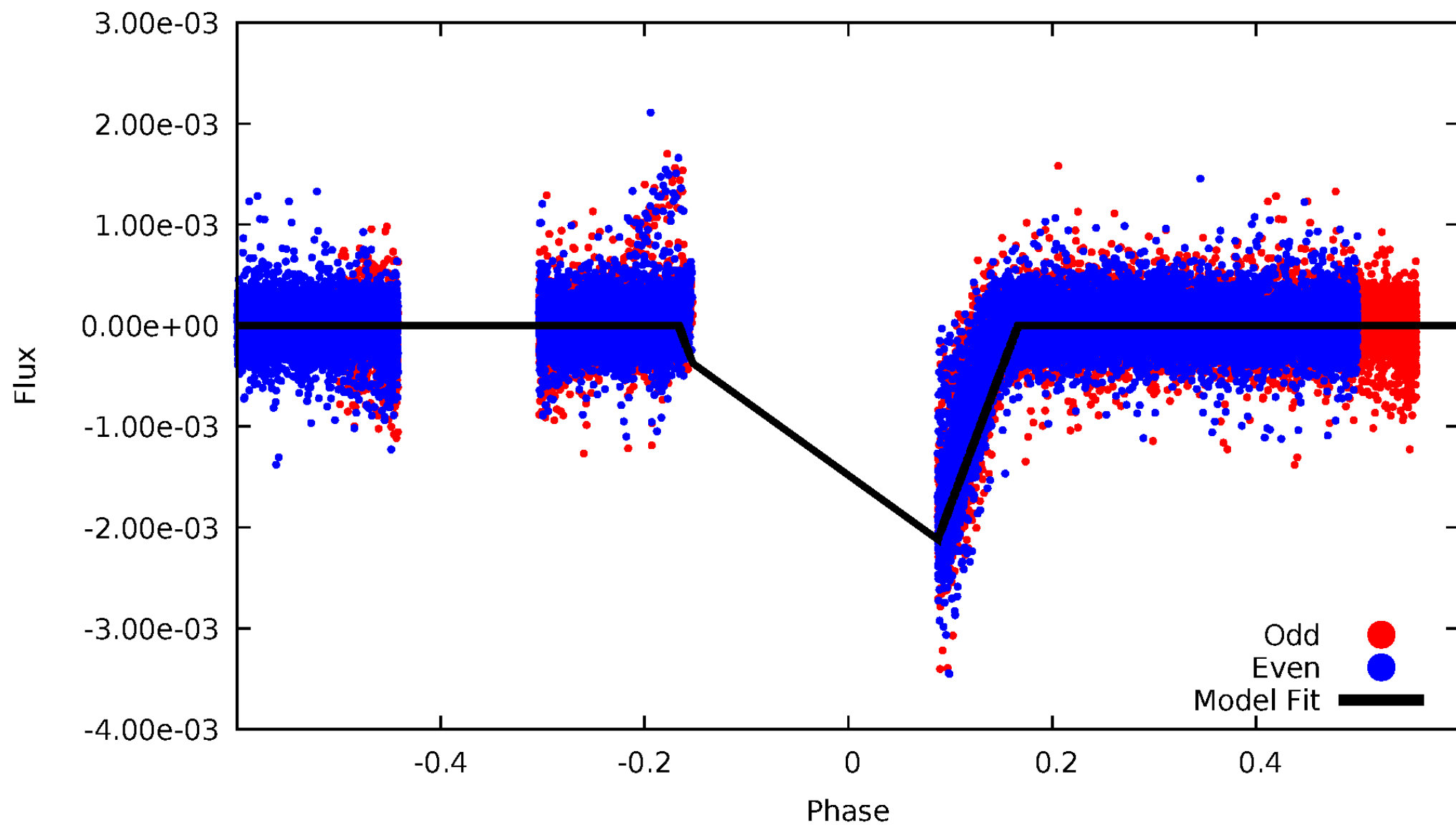
# DV Odd/Even

TCE 006220470-05



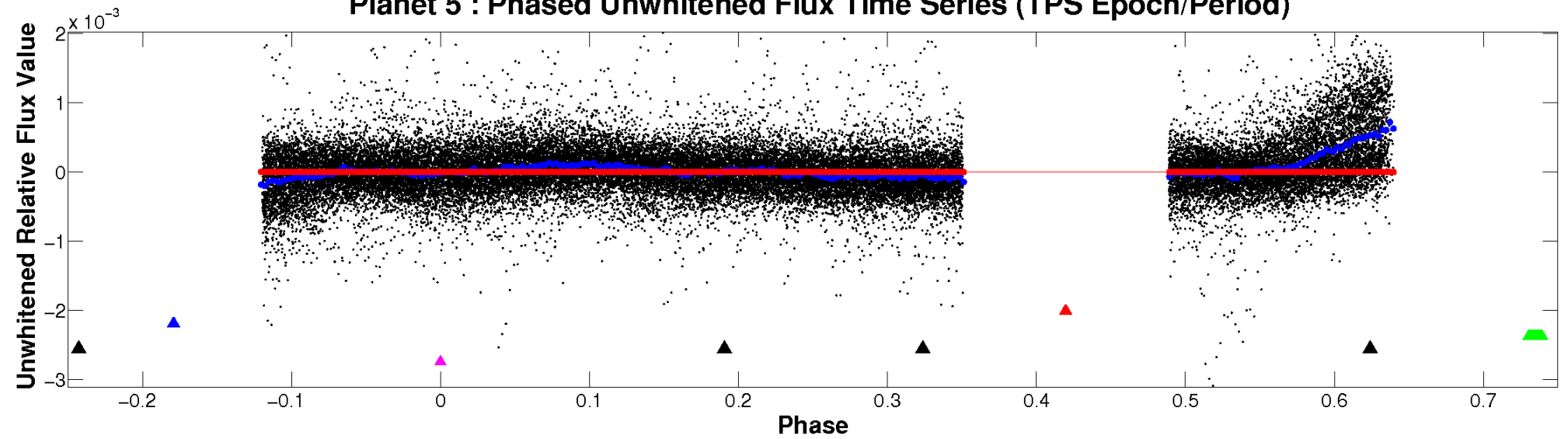
# ALT Odd/Even

TCE 006220470-05

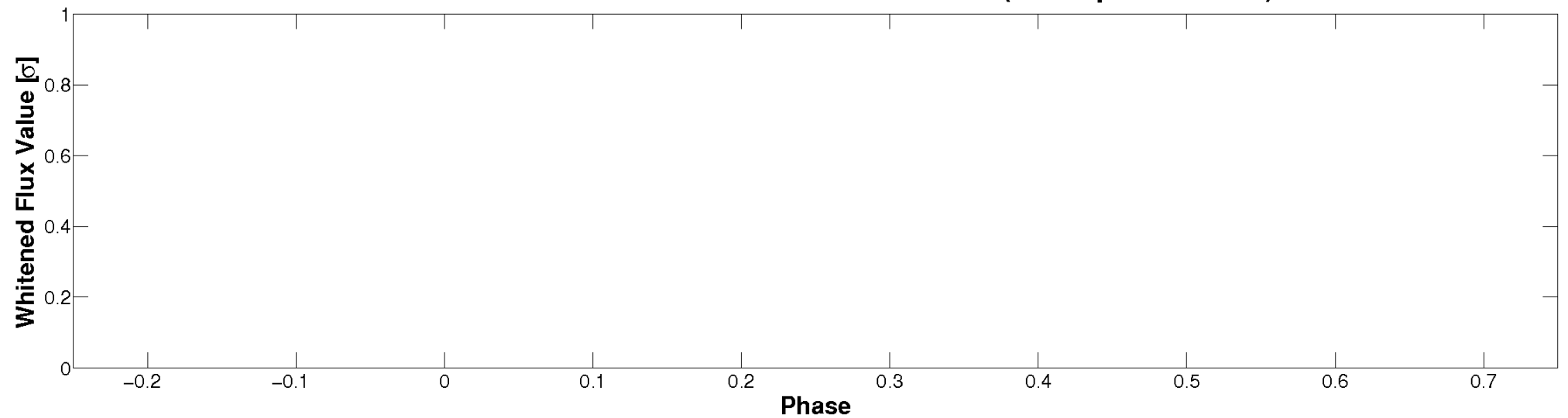


# Non-Whitened Vs. Whitened Light Curve

**Planet 5 : Phased Unwhitened Flux Time Series (TPS Epoch/Period)**

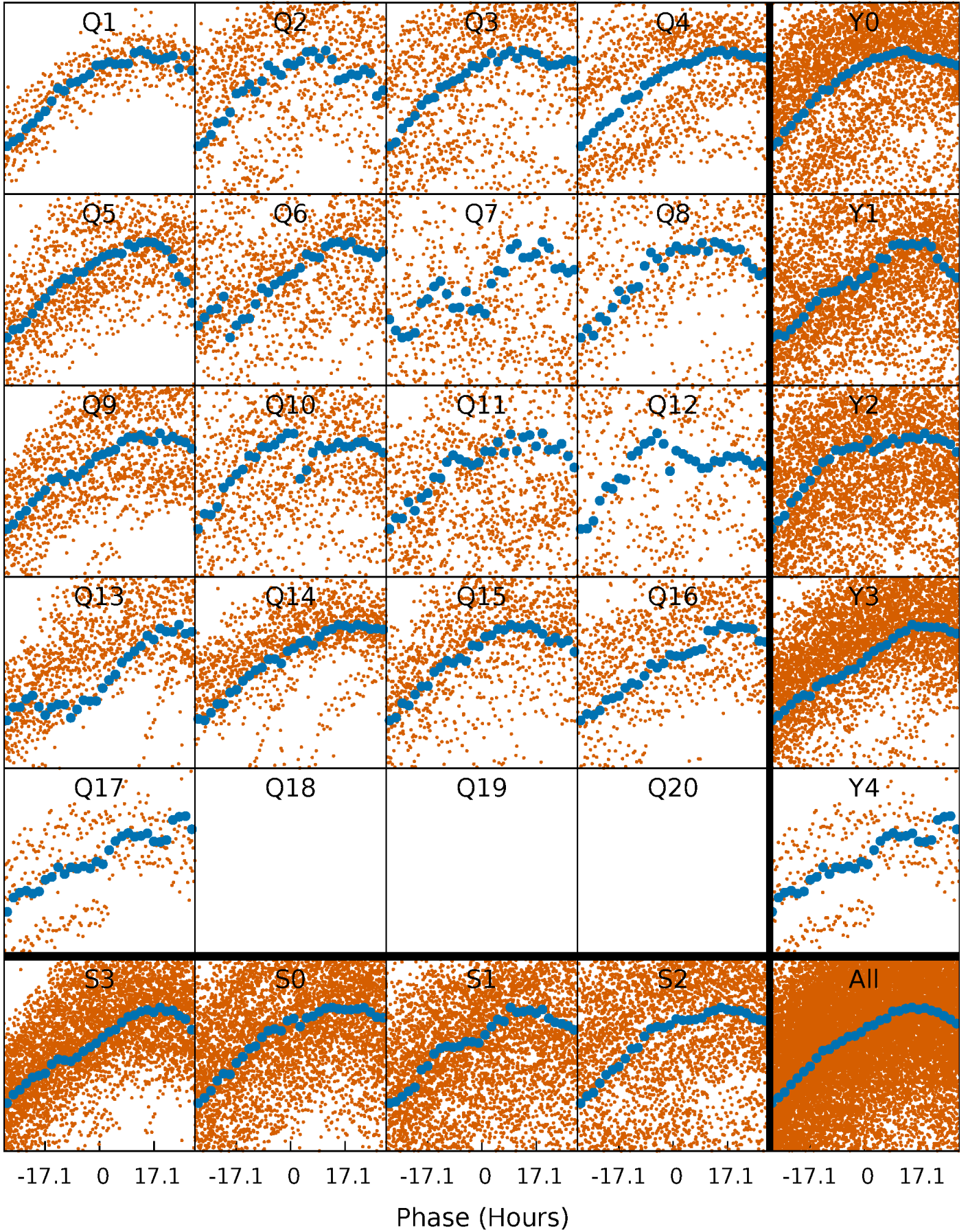


**Planet 5 : Phased Whitened Flux Time Series (TPS Epoch/Period)**



# PDC Quarter-Phased Transit Curves

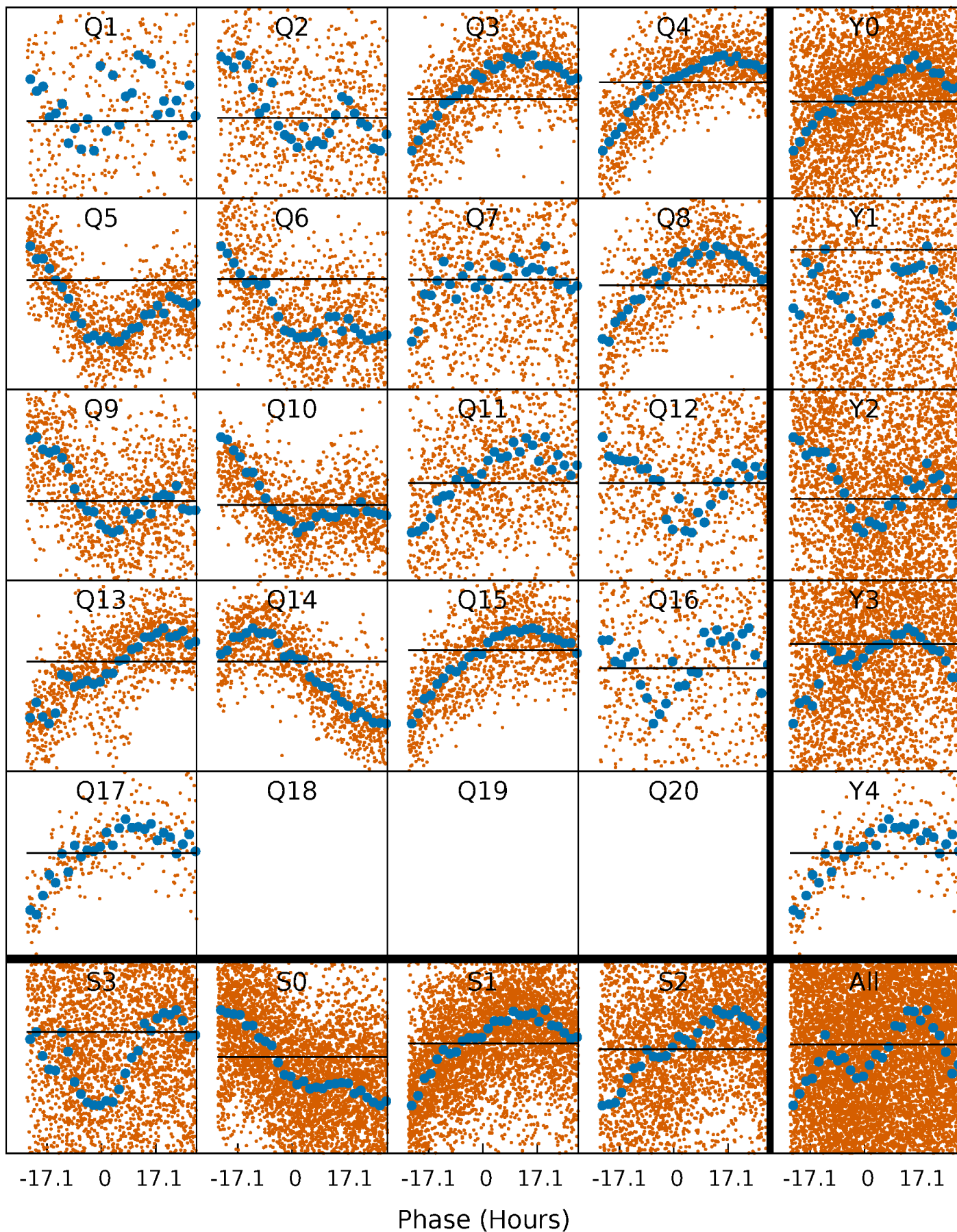
TCE 006220470-05   P= 8.144169 Days    $T_0=133.084378$  (BKJD)





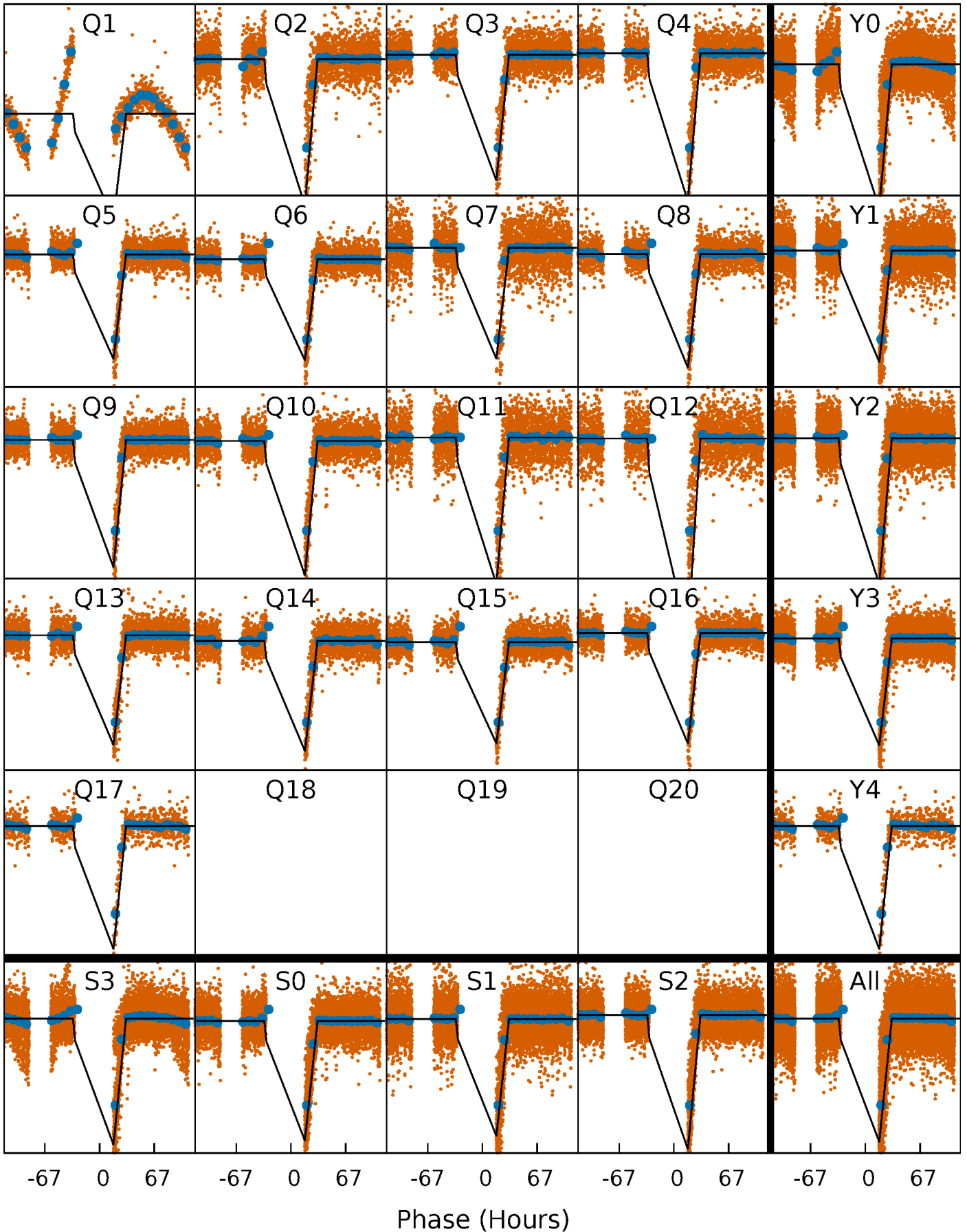
# DV Quarter-Phased Transit Curves

TCE 006220470-05     $P = 8.144169$  Days     $T_0 = 133.084378$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

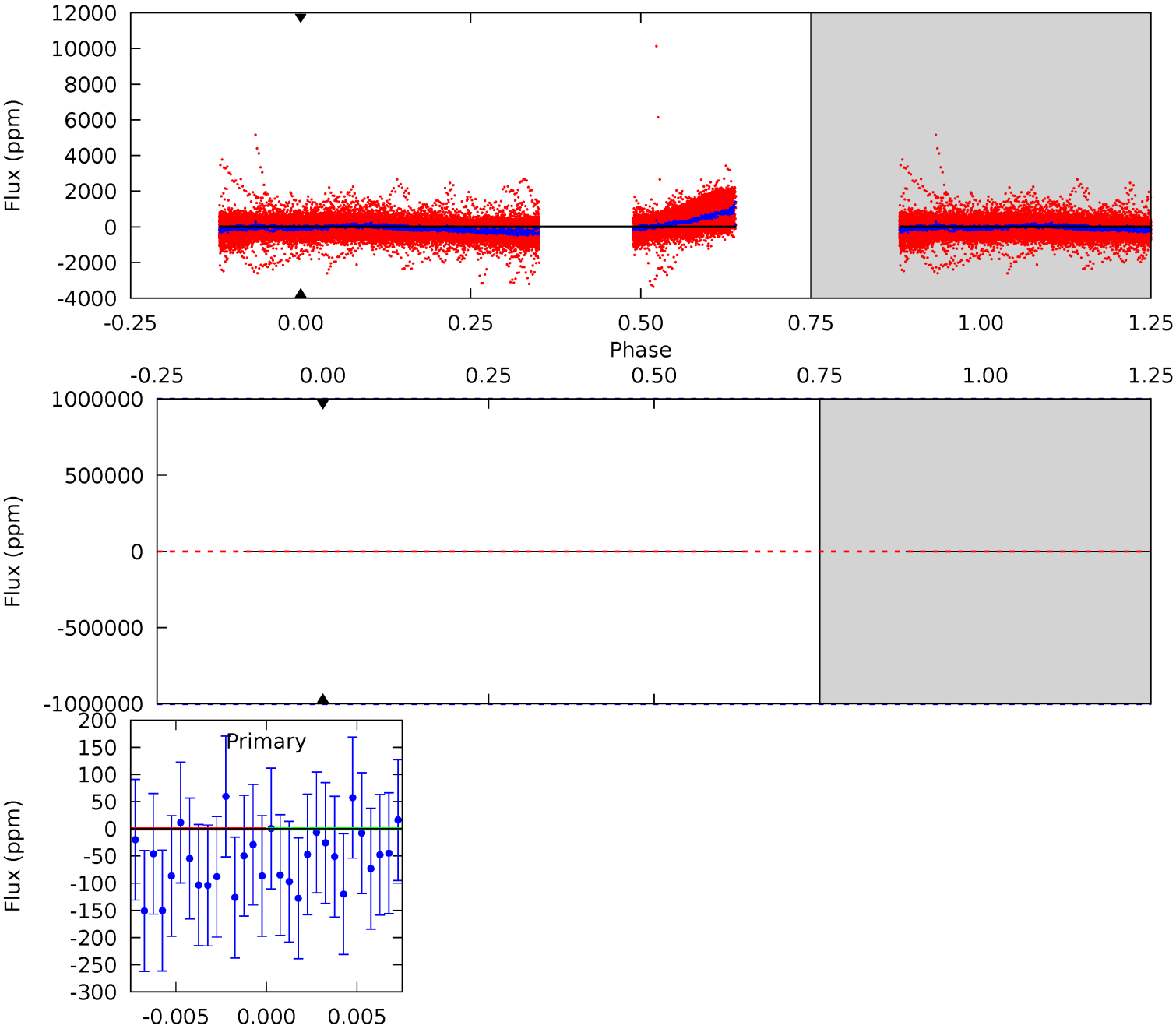
TCE 006220470-05     $P = 8.144169$  Days     $T_0 = 139.539381$  (BKJD)



# DV Model-Shift Uniqueness Test

006220470-05, P = 8.144169 Days, E = 124.940209 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

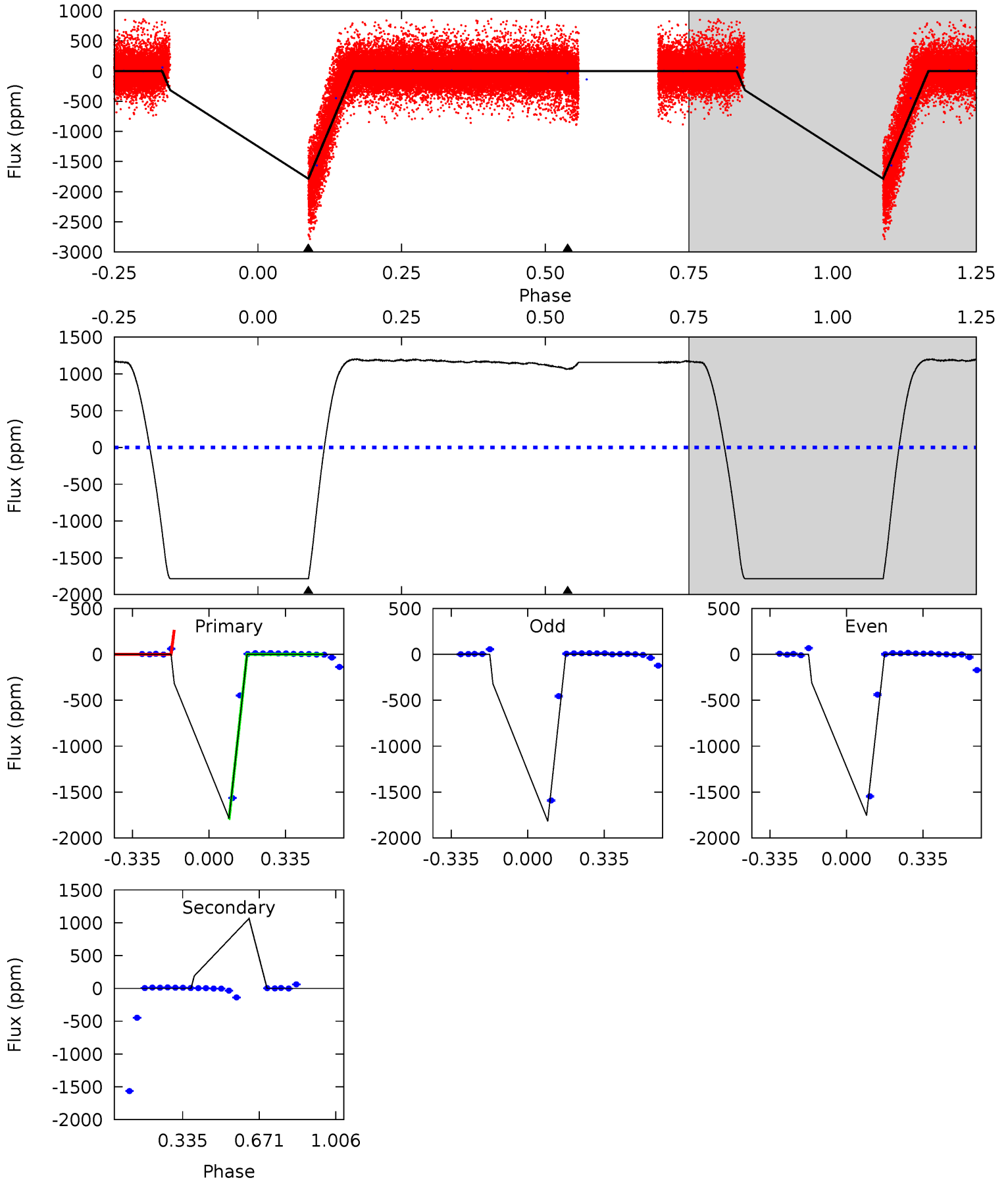




# Alt Model-Shift Uniqueness Test

006220470-05, P = 8.144169 Days, E = 131.395212 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
575.6	-343.5	0	0	4.30	0.96	269.7	575.6	575.6	-343.5	-343.5	10.7	0.88	0.40	166.7



### Stellar Parameters For KIC 006220470

	$T_{\text{eff}} (K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7605^{+209}_{-340}$	$4.123^{+0.120}_{-0.180}$	$0.040^{+0.200}_{-0.350}$	$1.862^{+0.540}_{-0.360}$	$1.677^{+0.212}_{-0.259}$	$0.366^{+0.243}_{-0.179}$
	+3%/-4%	+3%/-4%	+500%/-875%	+29%/-19%	+13%/-15%	+66%/-49%
Source	KIC0	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 006220470-05 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$0 \pm 1000000$	$15.23^{+15.44}_{-10.85}$	$2094^{+151}_{-133}$	$-3266^{+42231}_{-37043}$	$-1.738^{+3396.347}_{-3528.895}$
Alt.	$1065 \pm 3$	$20.79^{+17.07}_{-13.17}$	$2091^{+166}_{-122}$	$-4471^{+848}_{-2450}$	$-11.834^{+8.367}_{-78.079}$

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

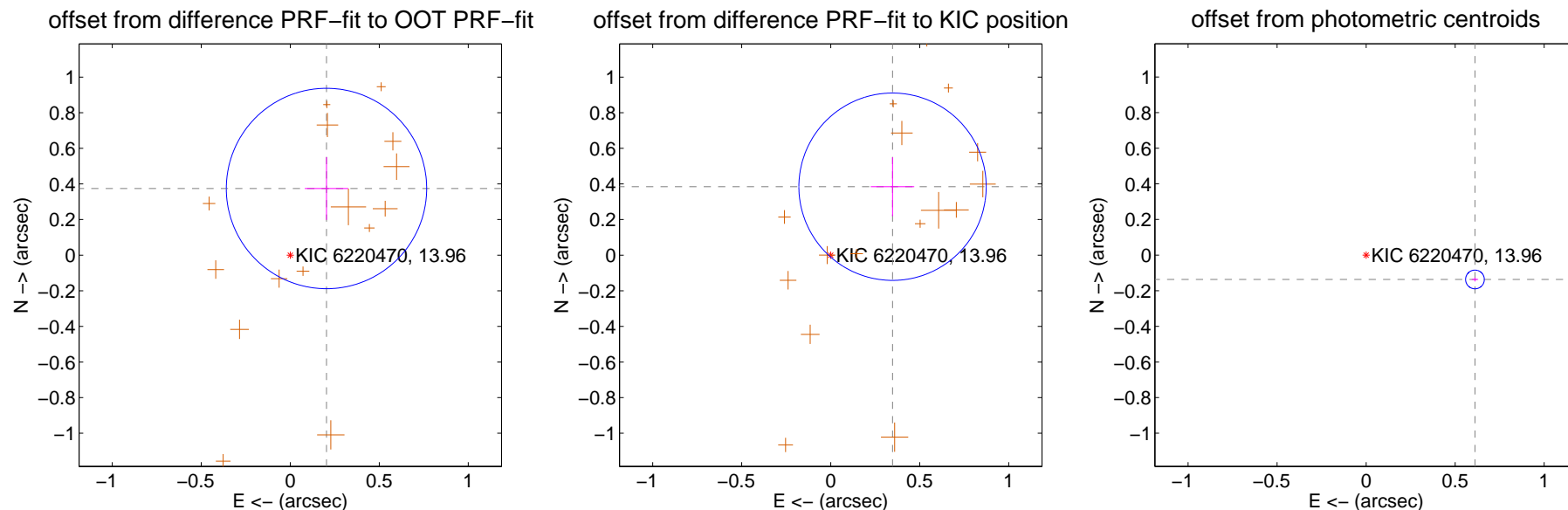
## DV Centroid Data

Supplemental centroid analysis for 006220470-05. Kepler magnitude: 13.96. Transit SNR -1.00

There are 0 quarters with good PRF difference image offsets

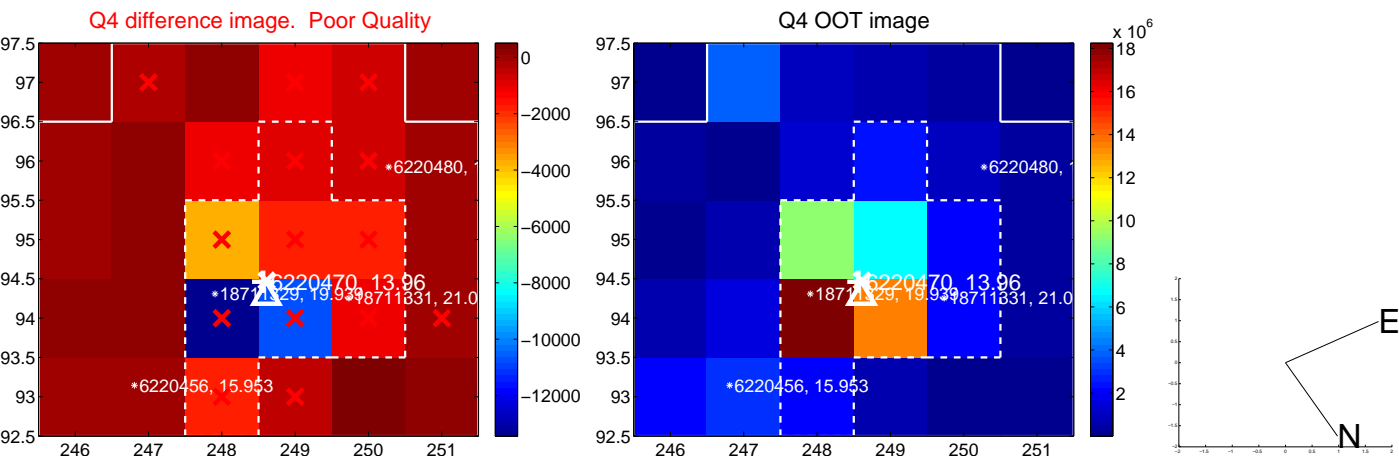
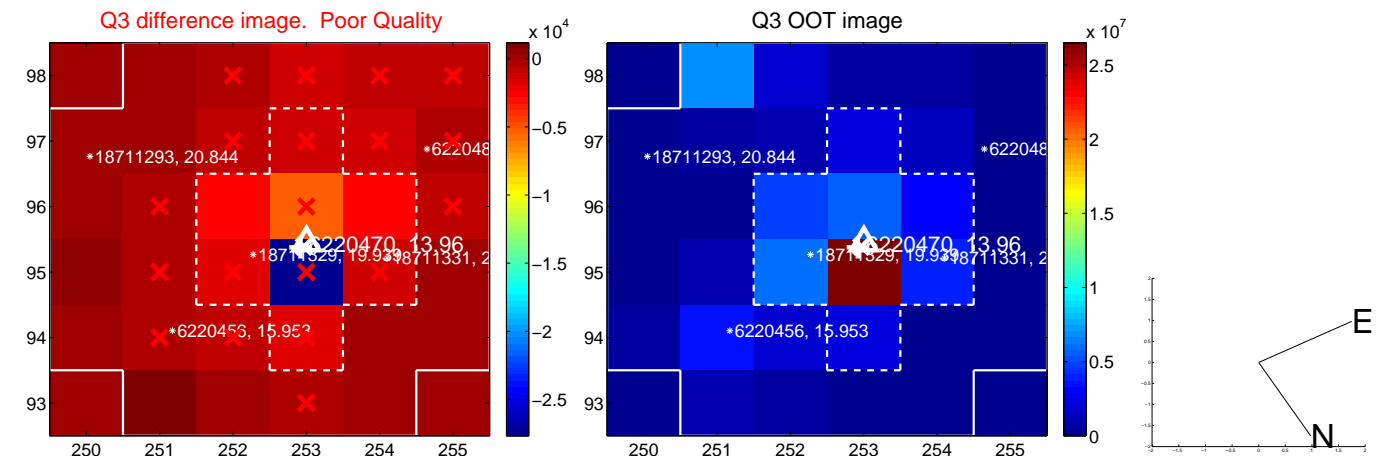
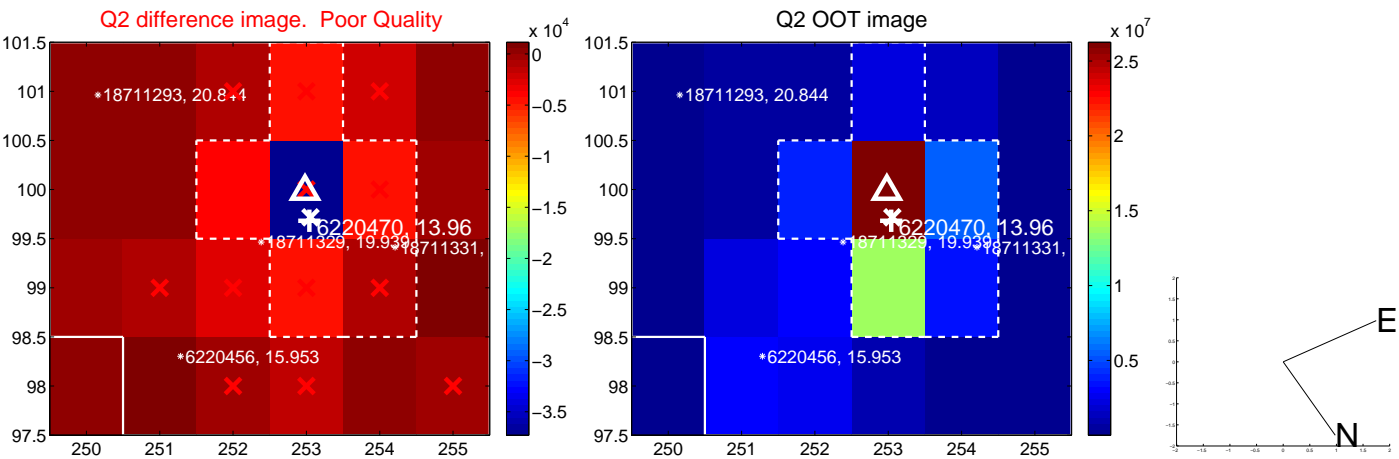
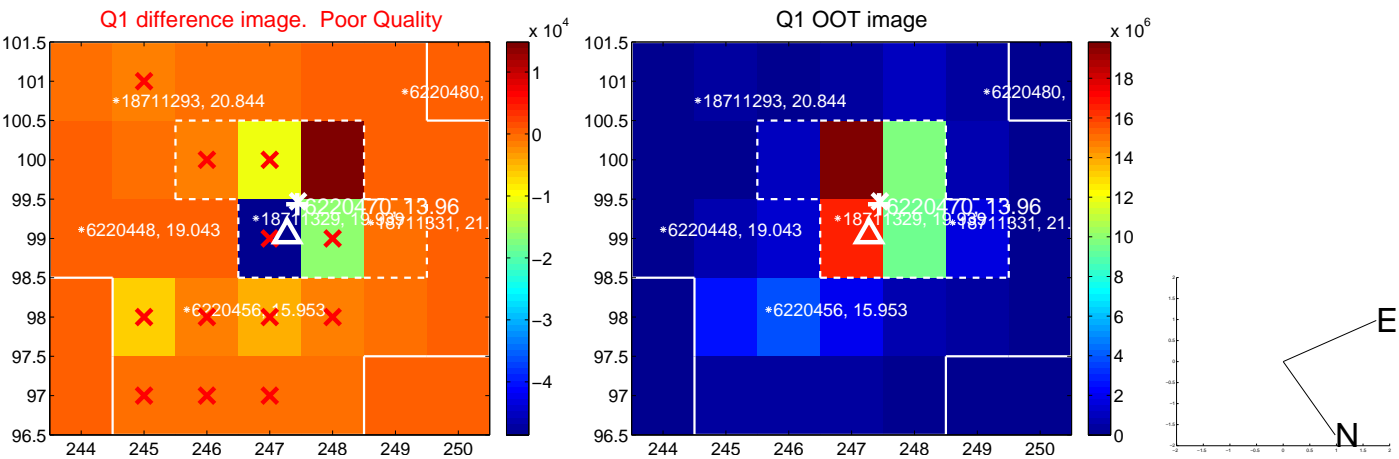
The direct PRF centroid is offset from the target star catalog position by about 0.17 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.426 \pm 0.188$	2.27	$-0.203 \pm 0.122$	$0.374 \pm 0.176$
PRF-fit source offset from KIC position	$0.518 \pm 0.175$	2.95	$-0.347 \pm 0.122$	$0.384 \pm 0.165$
photometric centroid source offset	$0.63 \pm 0.02$	35.74	$-0.61 \pm 0.02$	$-0.14 \pm 0.01$

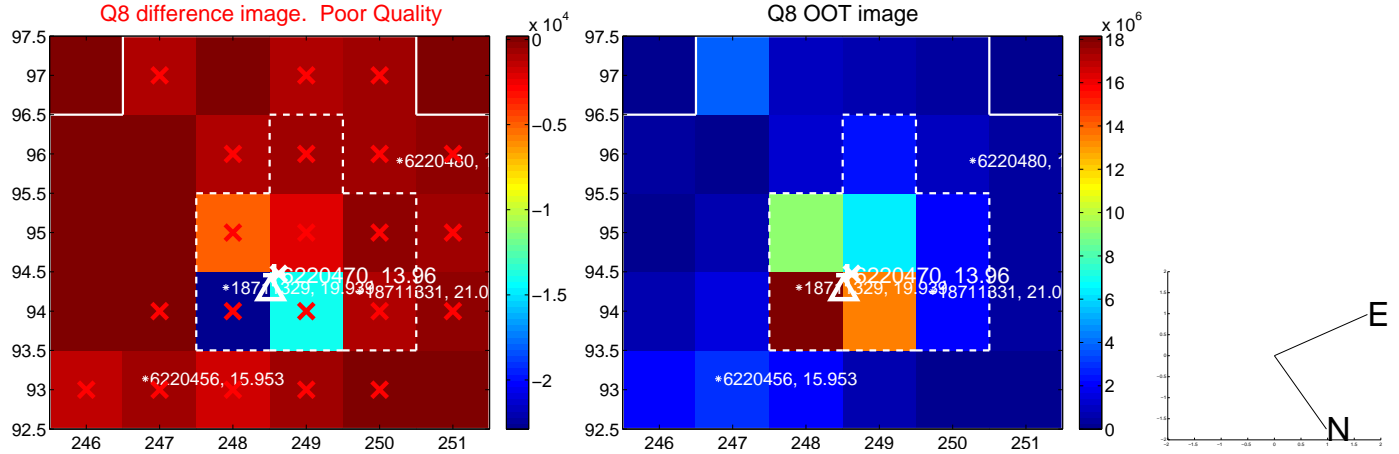
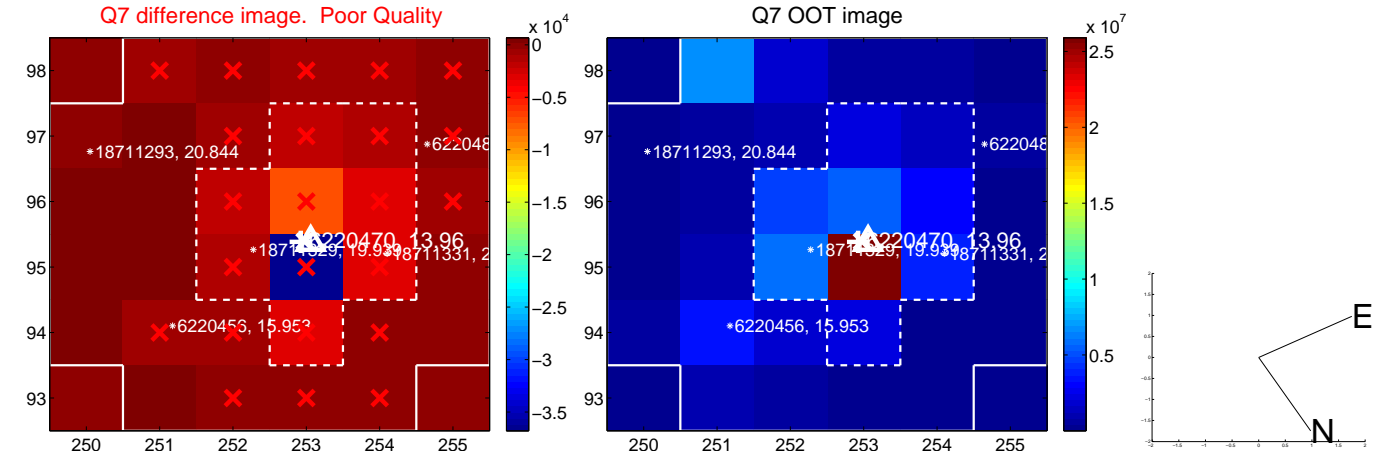
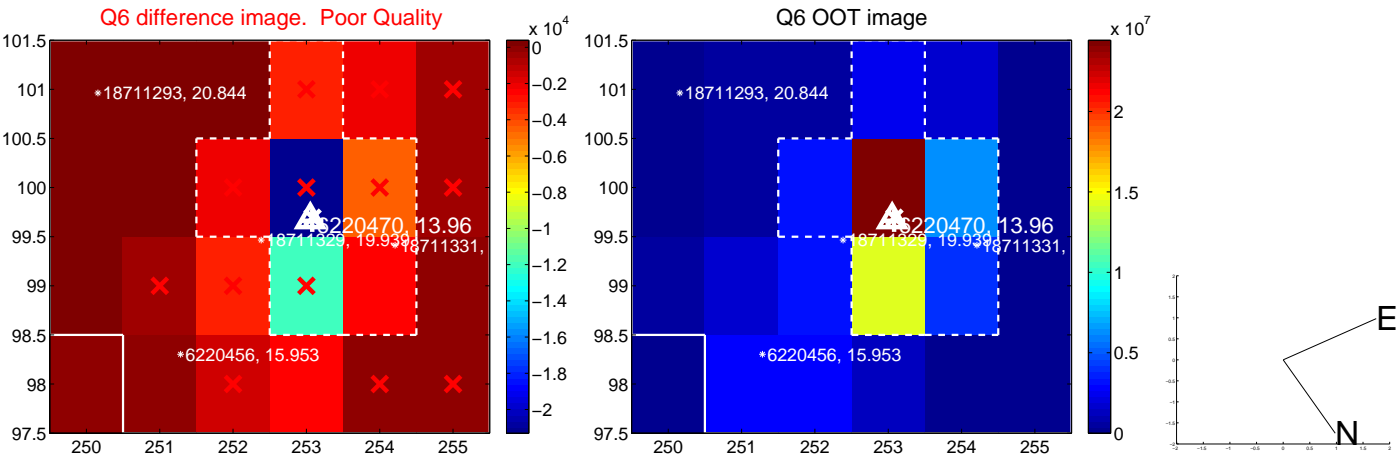
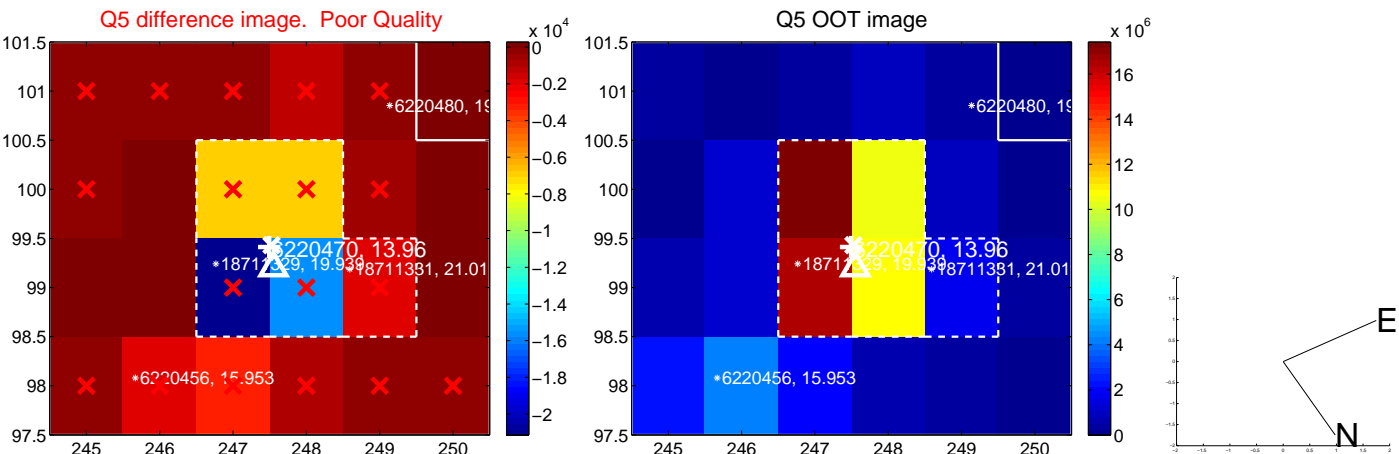


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

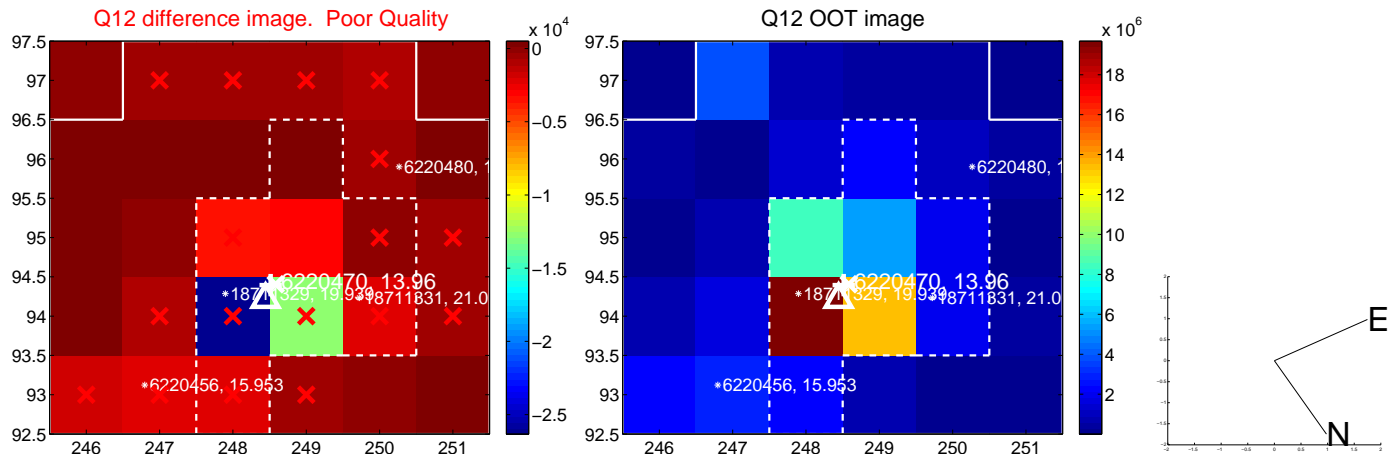
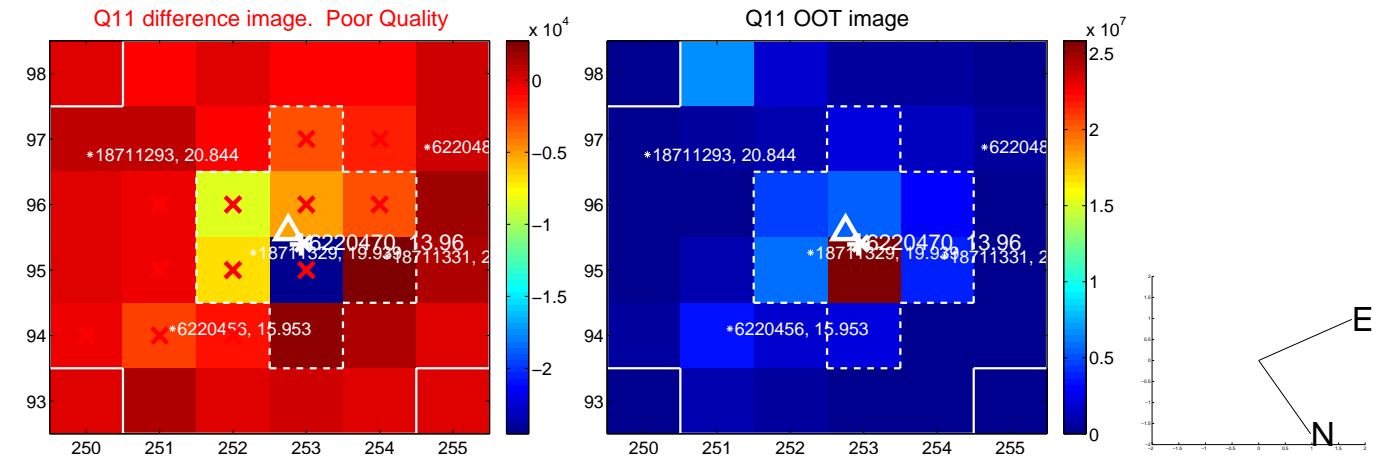
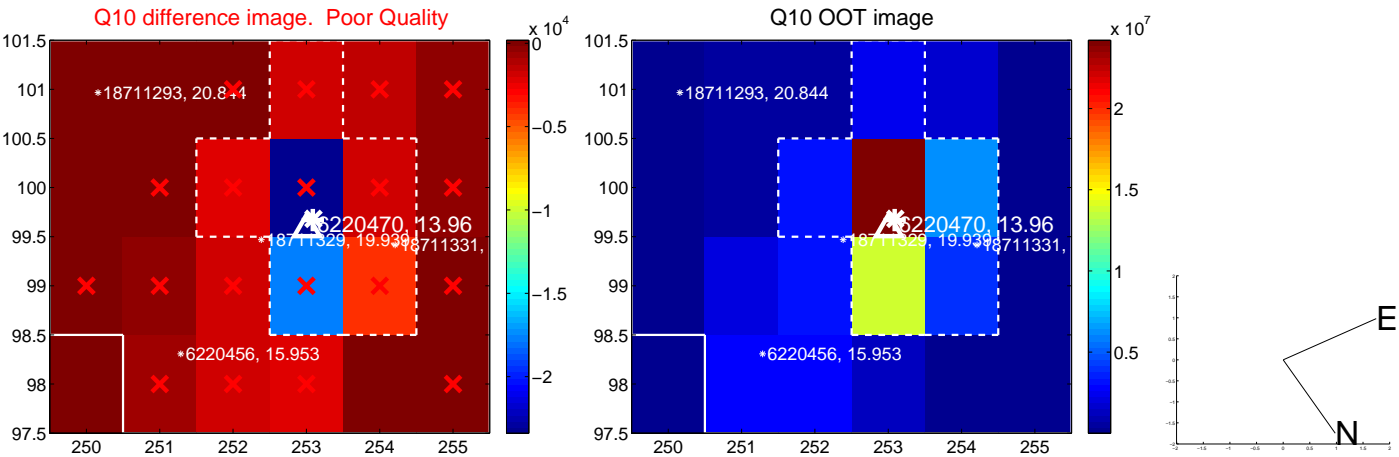
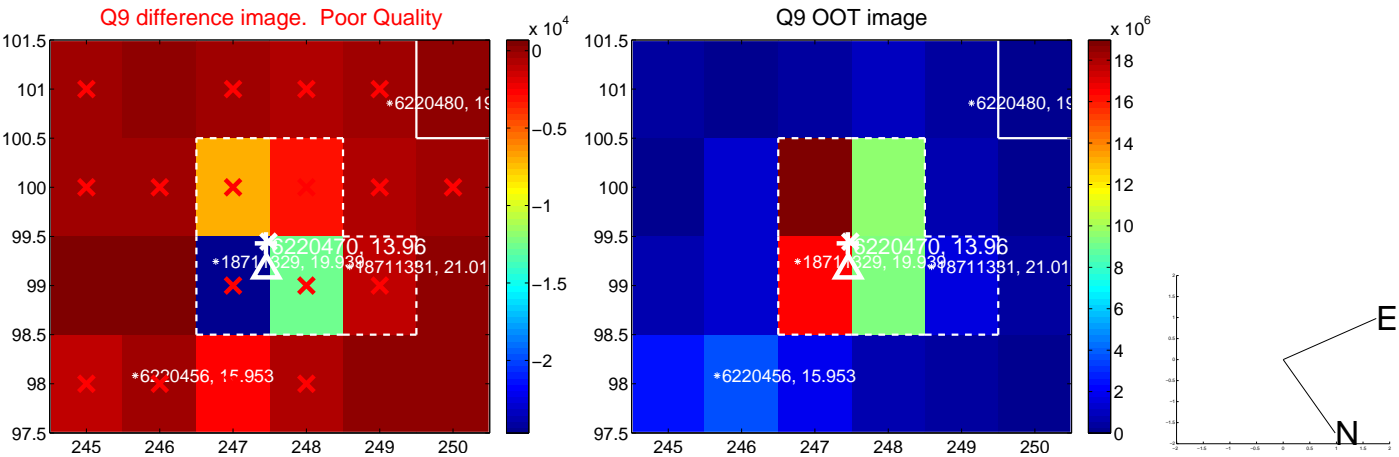
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



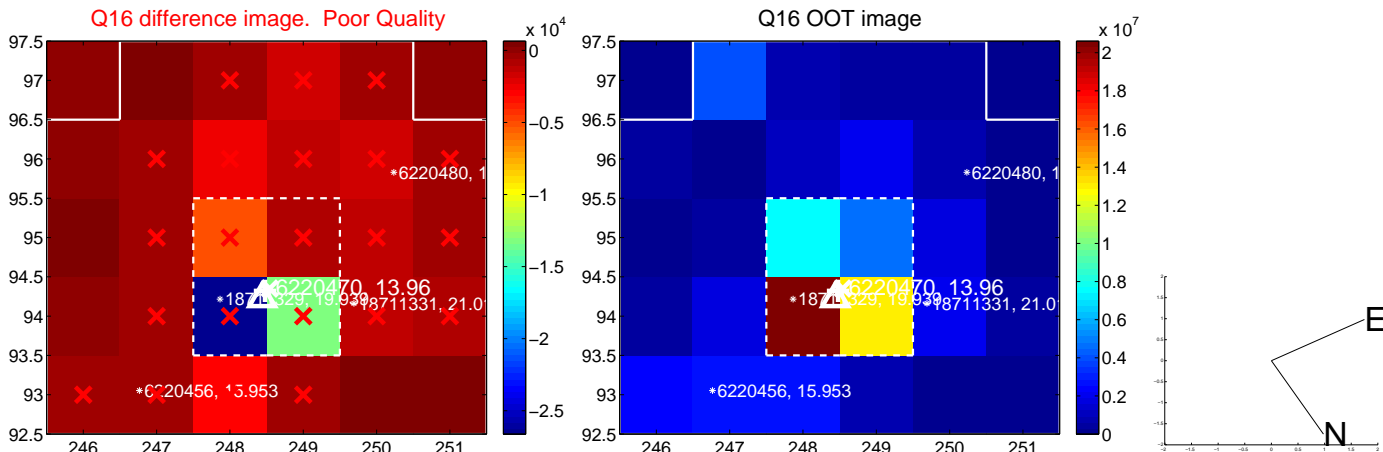
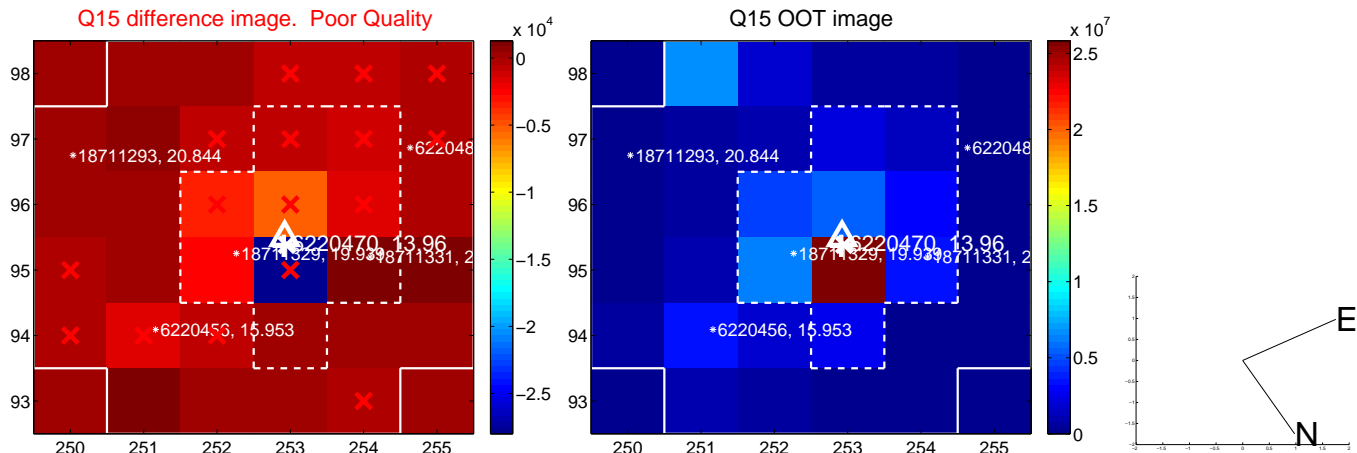
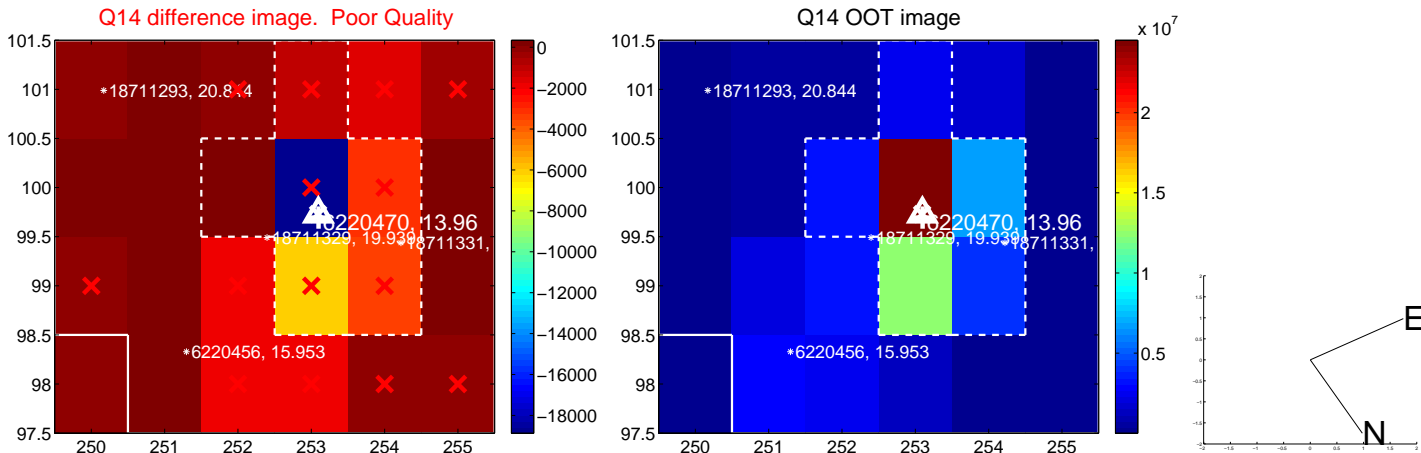
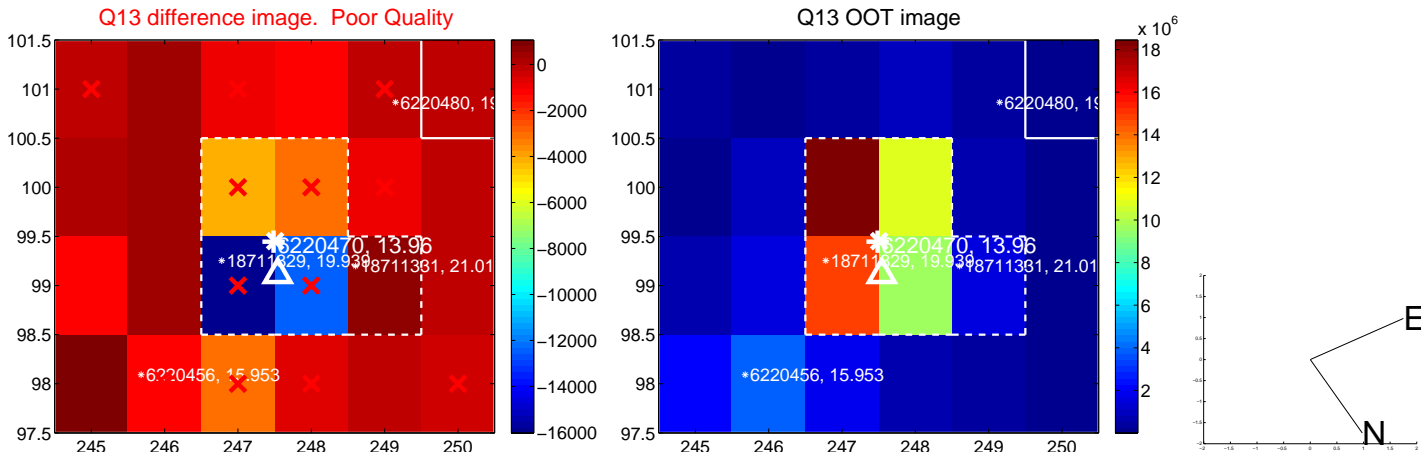
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



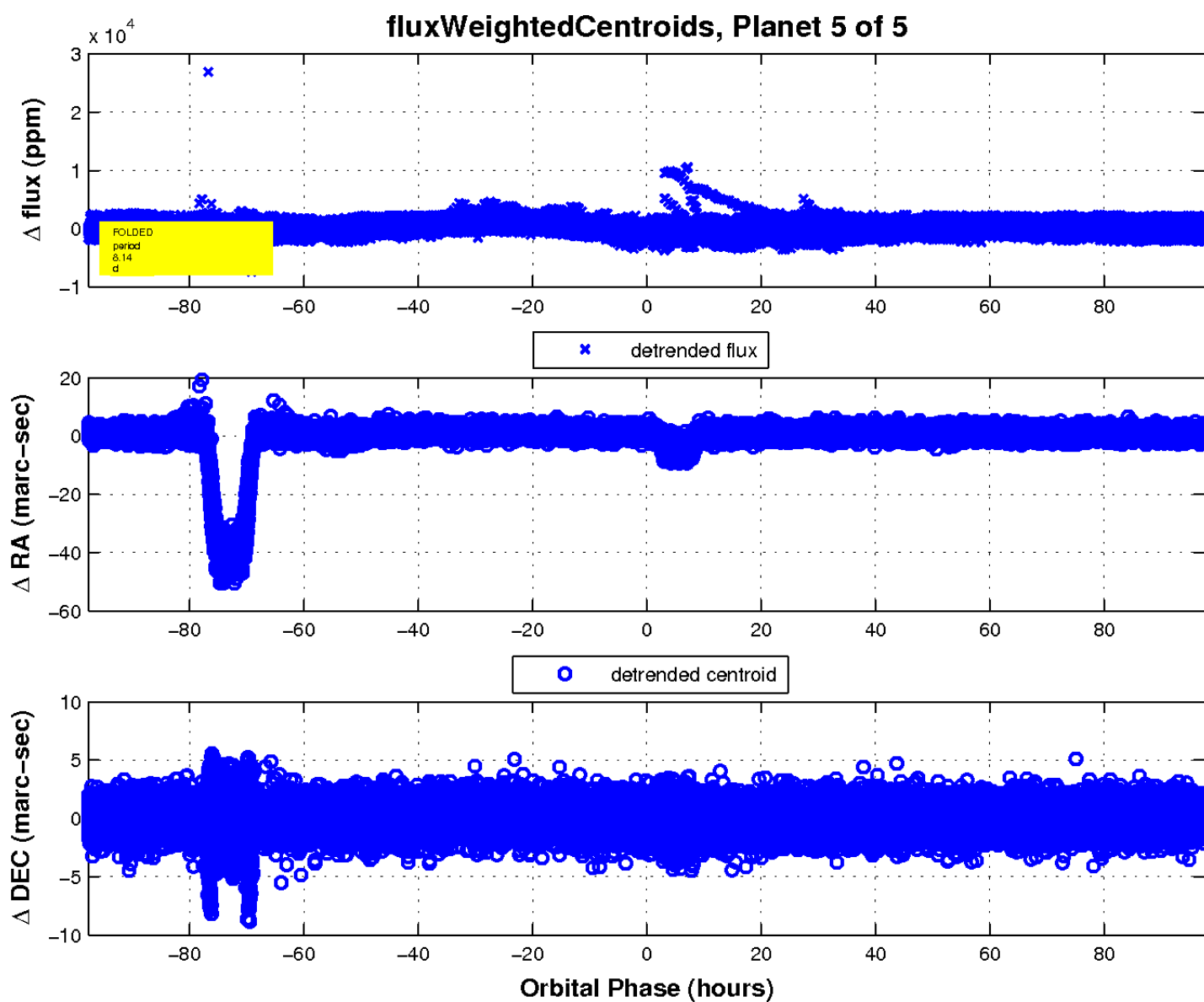
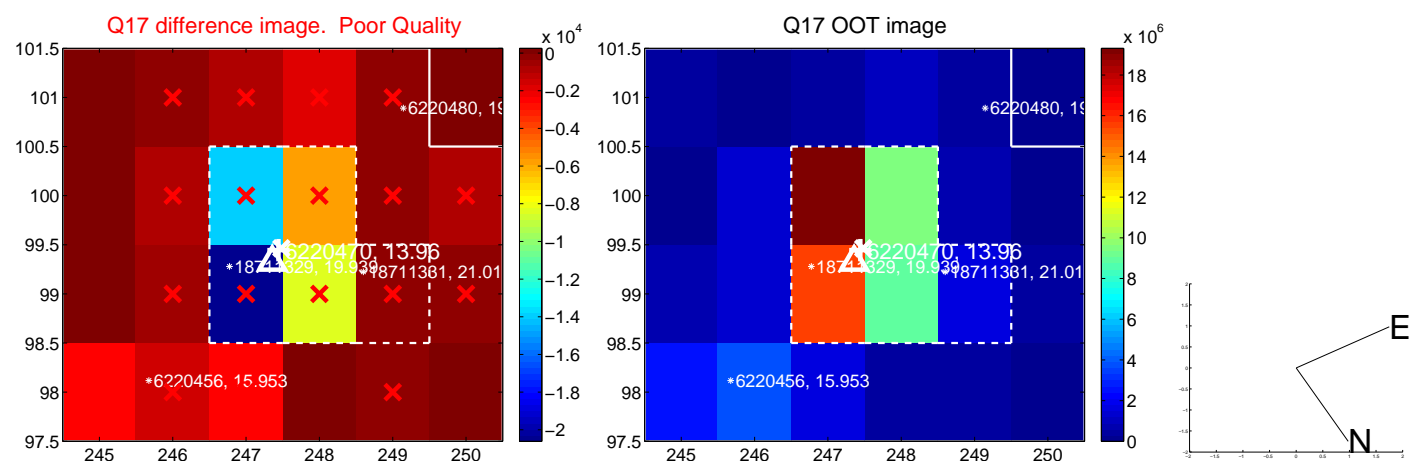
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

