

# KIC 008374396

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008374396-01	OBS	No	7.215300	135.090580	69.0	15.320	17.9	20.5	2.12	8982	3.40	2978.61
008374396-02	OBS	No	7.215496	132.695614	41.5	11.113	18.5	17.4	2.12	8982	1.48	2978.51
008374396-03	OBS	No	7.216365	138.104223	50.6	15.000	11.1	-1.0	2.12	8982	1.54	2978.03
008374396-04	OBS	No	68.226168	165.552207	83.6	4.916	9.2	5.0	2.12	8982	2.30	148.97

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008374396-01	OBS	FP	0.00	1	0	0	0	LPP_DV
008374396-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_POS_ALT—SAME_NTL_PERIOD
008374396-03	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_NOFITS
008374396-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_MEAS

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

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

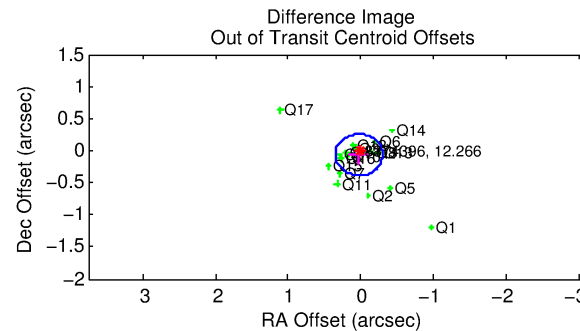
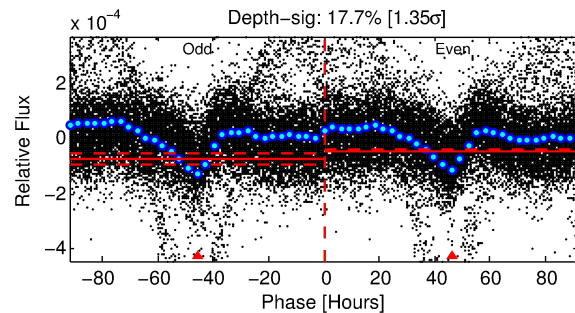
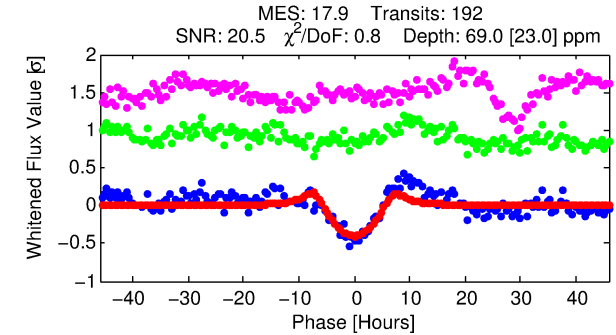
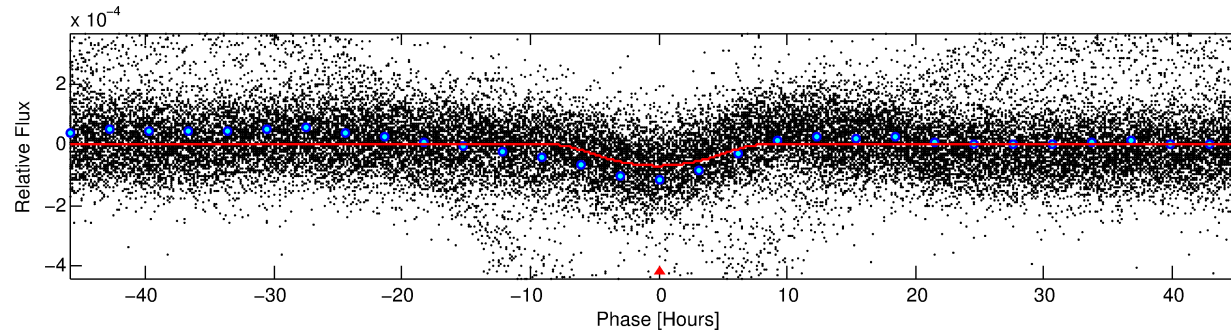
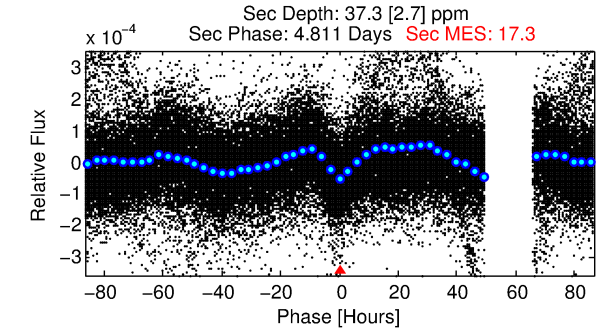
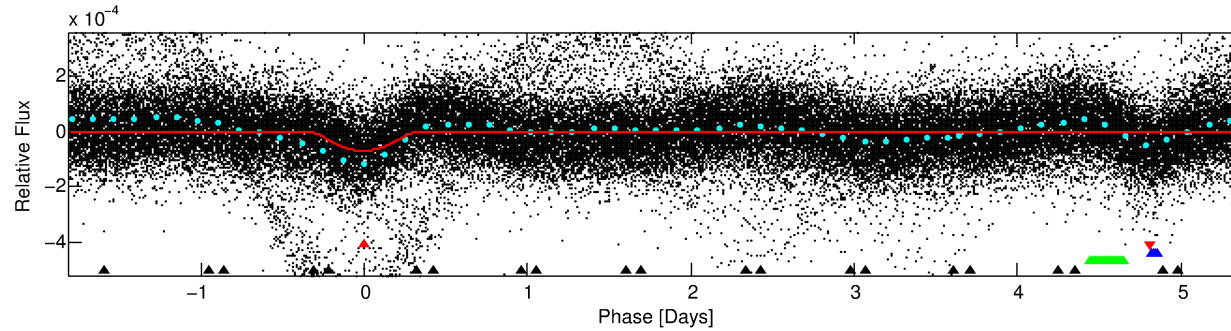
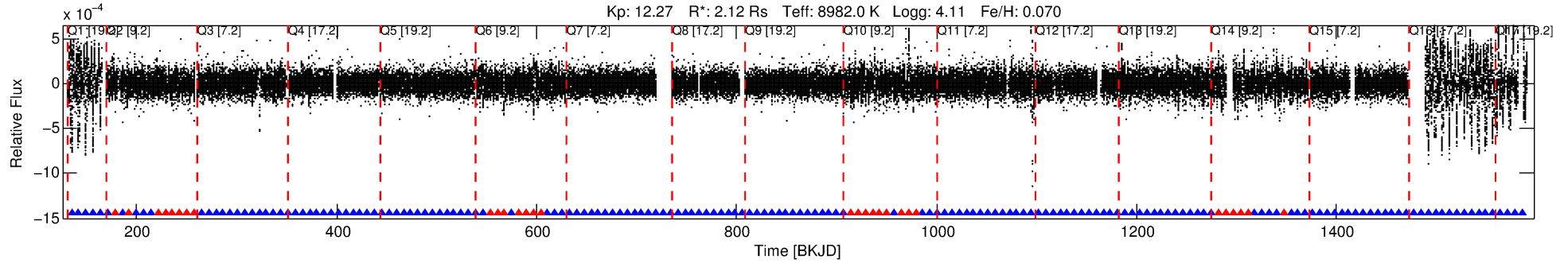
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008374396-01

No Significant Match Found

# DV One-Page Summary

KIC: 8374396 Candidate: 1 of 4 Period: 7.215 d



## DV Fit Results:

Period = 7.21530 [0.00011] d  
Epoch = 135.0906 [0.0123] BKJD  
Rp/R\* = 0.0147 [0.0119]  
a/R\* = 1.18 [0.06]  
b = 1.00 [0.01]  
Seff = 2978.61 [1140.83]  
Teq = 1884 [180] K  
Rp = 3.40 [2.94] Re  
a = 0.0939 [0.0229] AU  
Ag = 15.67 [25.94] [0.57σ]  
Teffp = 5795 [2365] K [1.65σ]

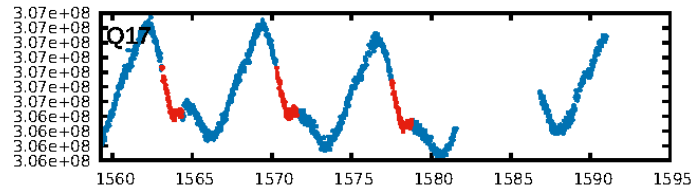
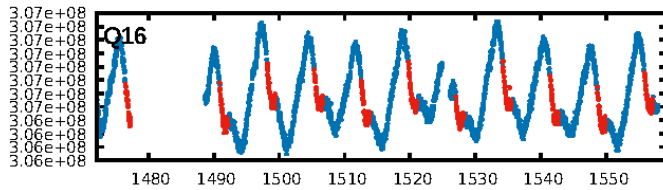
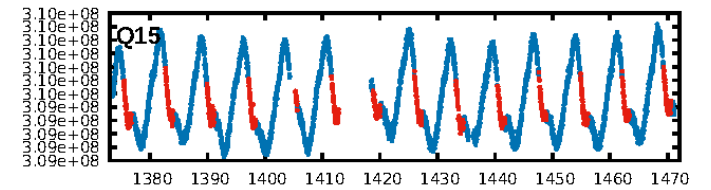
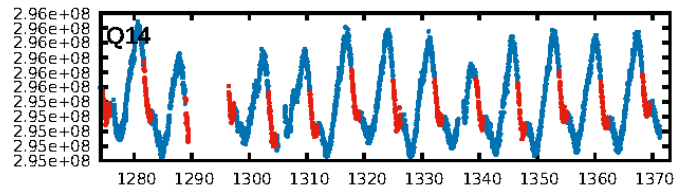
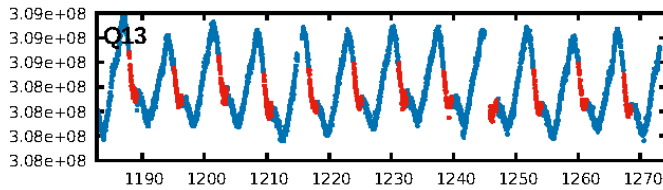
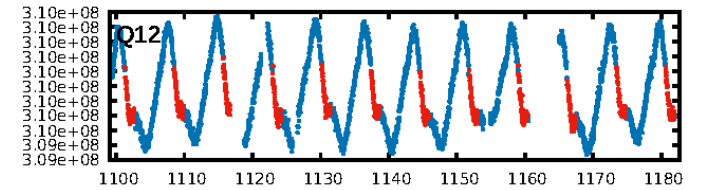
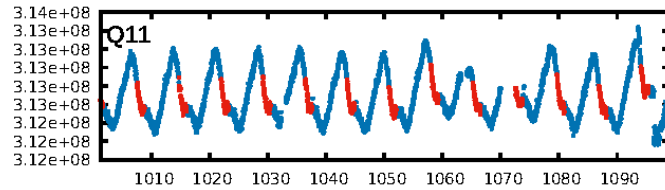
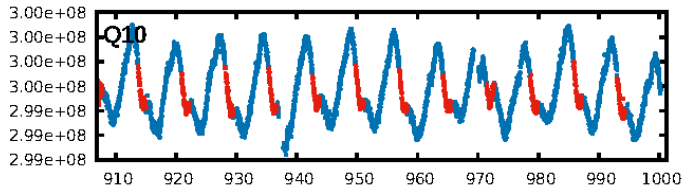
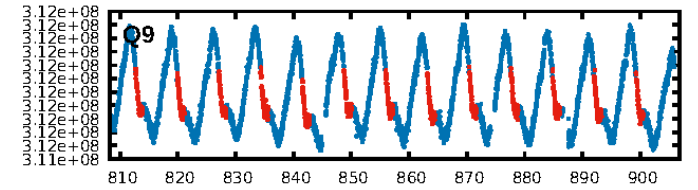
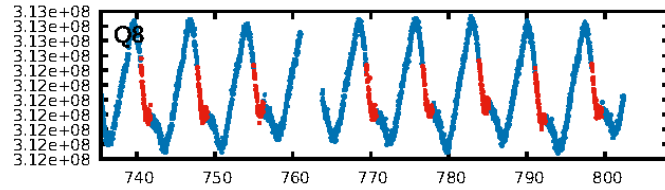
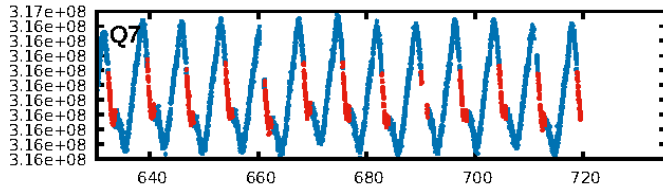
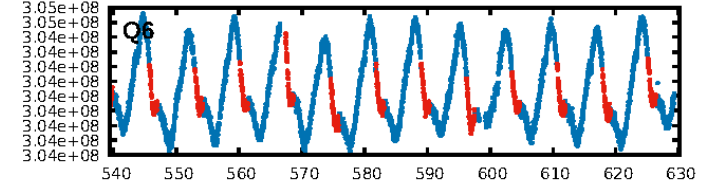
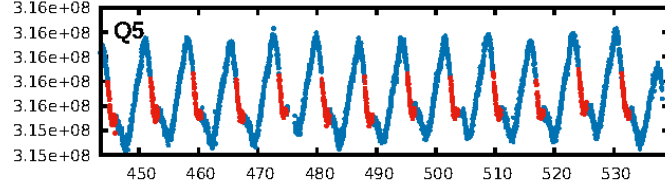
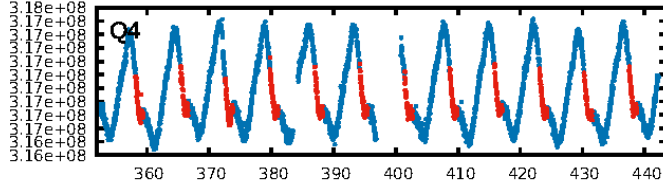
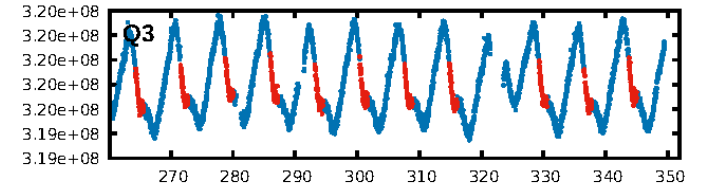
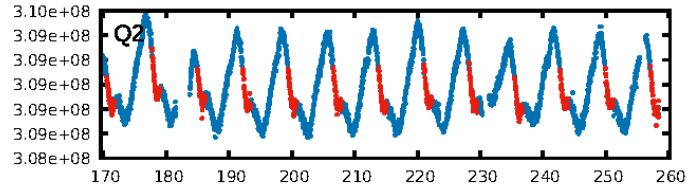
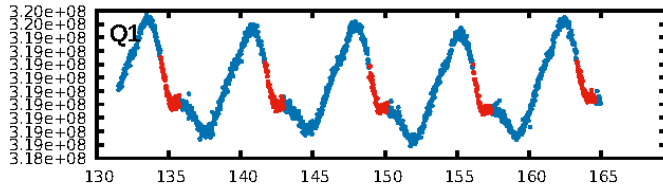
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: 99.9%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 3.88e-43  
RollingBand-fgt: 0.84 [154/184]  
GhostDiagnostic-chr: 3.733  
Centroid-sig: 0.0%  
Centroid-so: 0.864 arcsec [1.91σ]  
OotOffset-rm: 0.070 arcsec [0.66σ]  
KicOffset-rm: 0.168 arcsec [1.28σ]  
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]

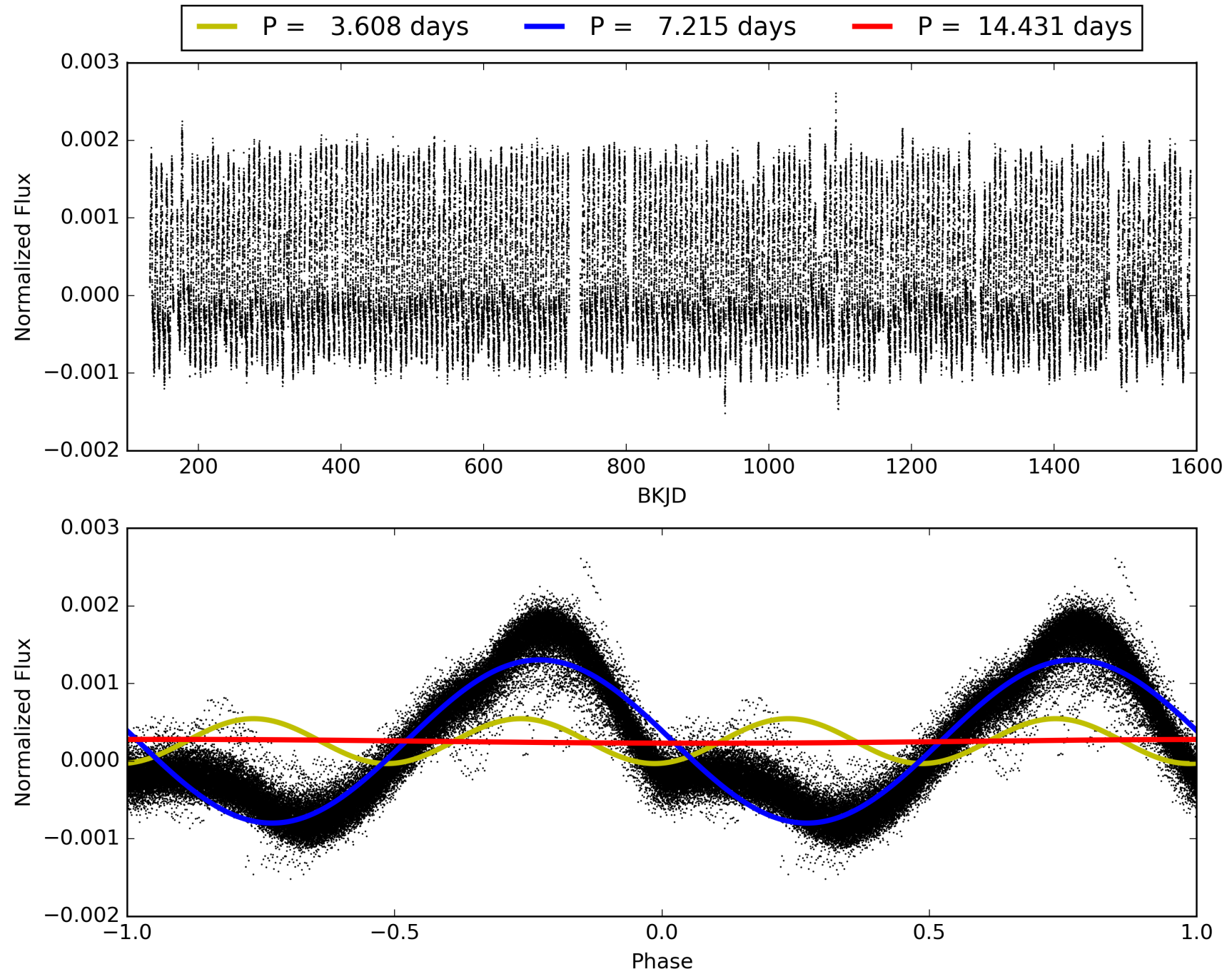
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This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 008374396-01, PDC Light Curves



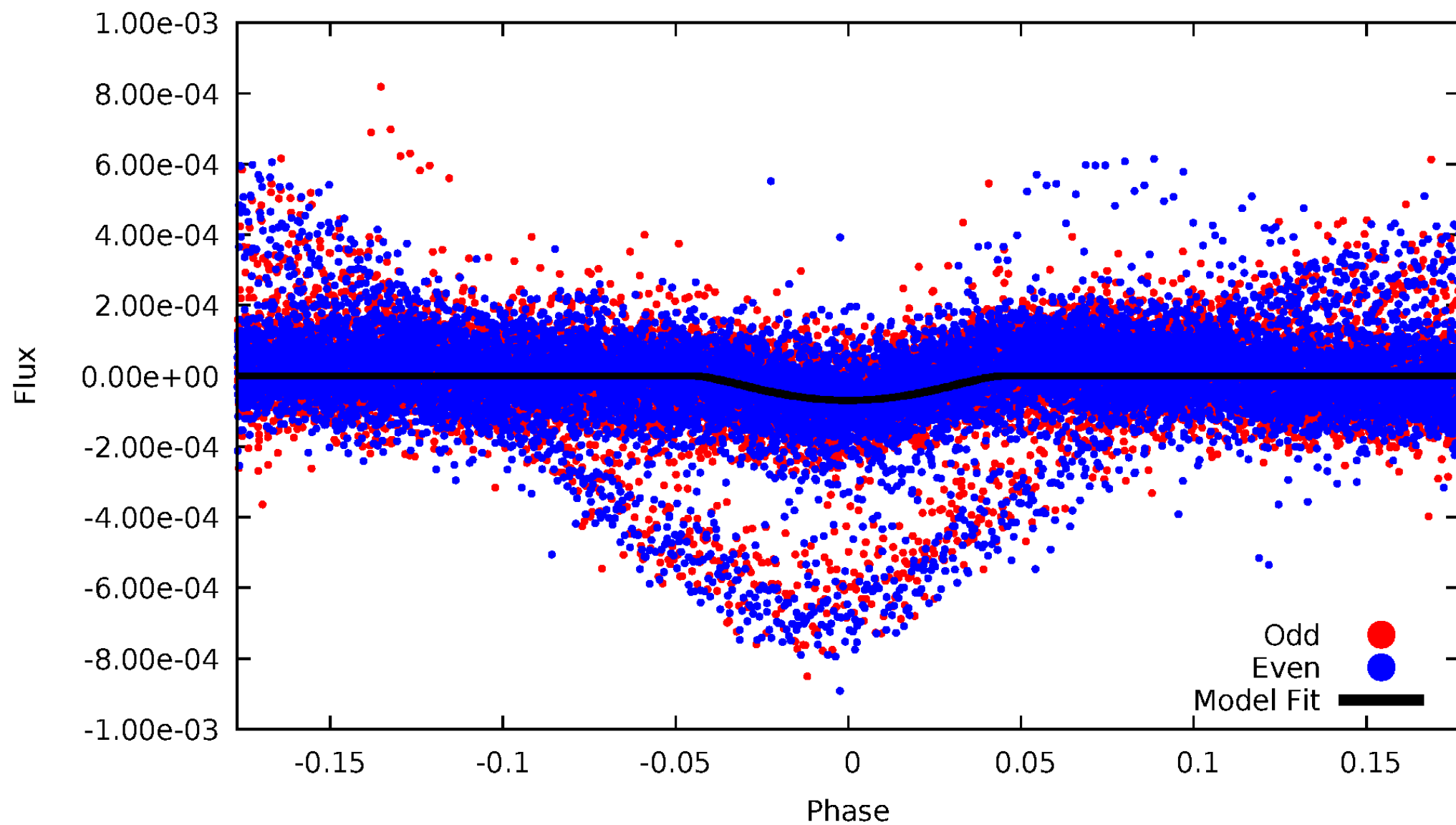
TCE 008374396-01





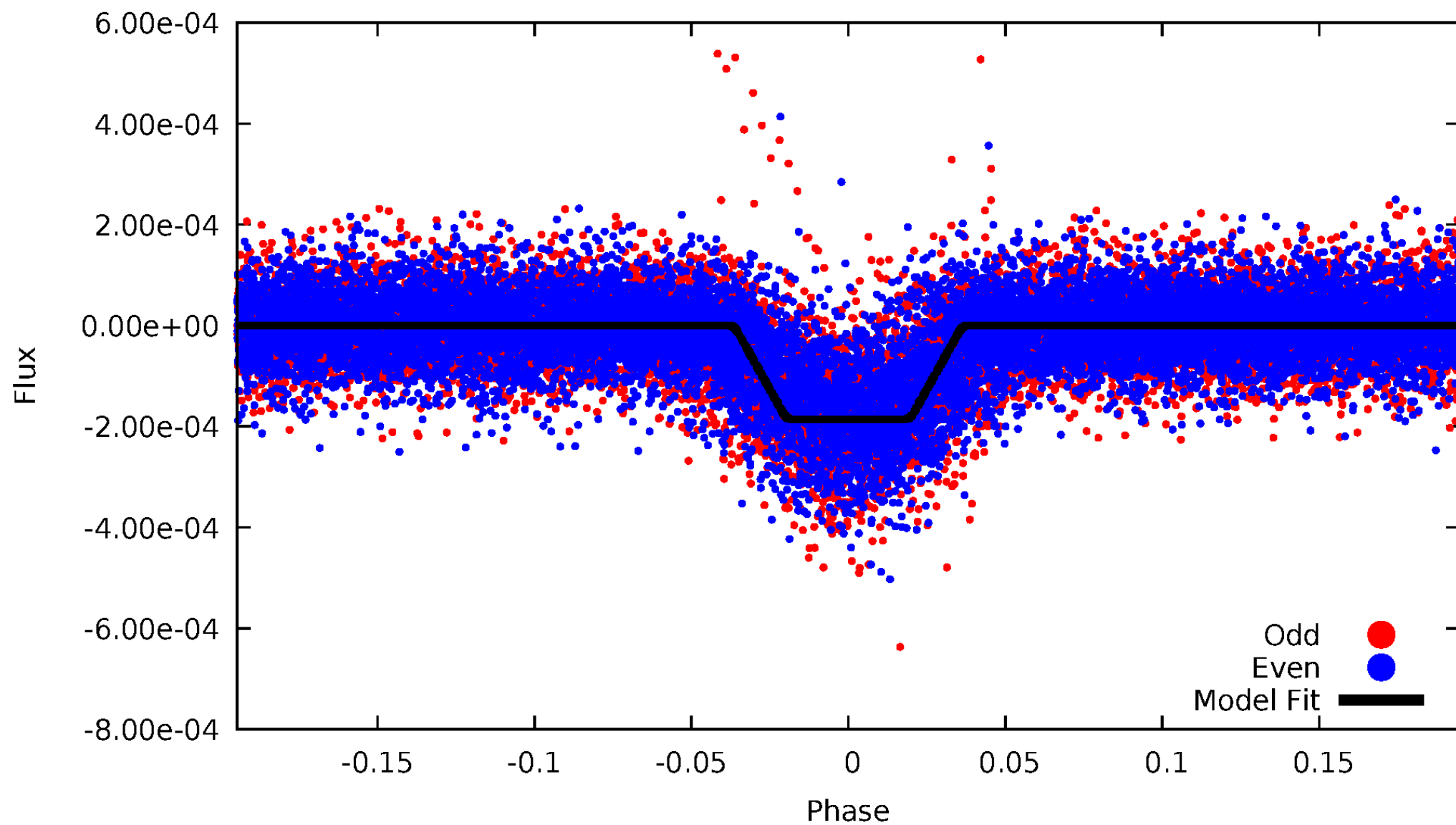
# DV Odd/Even

TCE 008374396-01



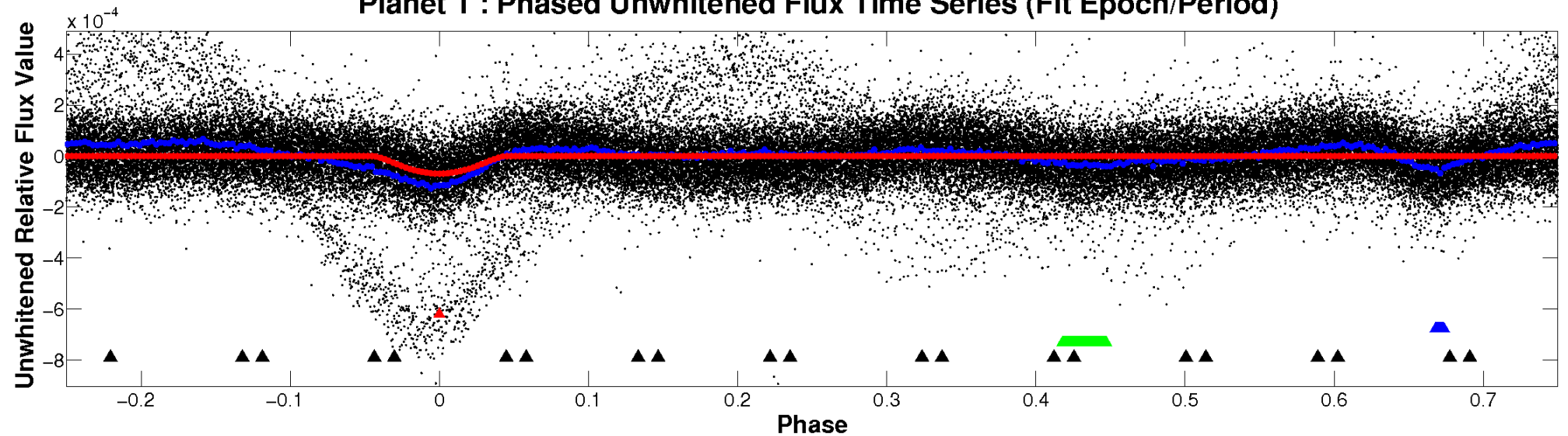
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TCE 008374396-01

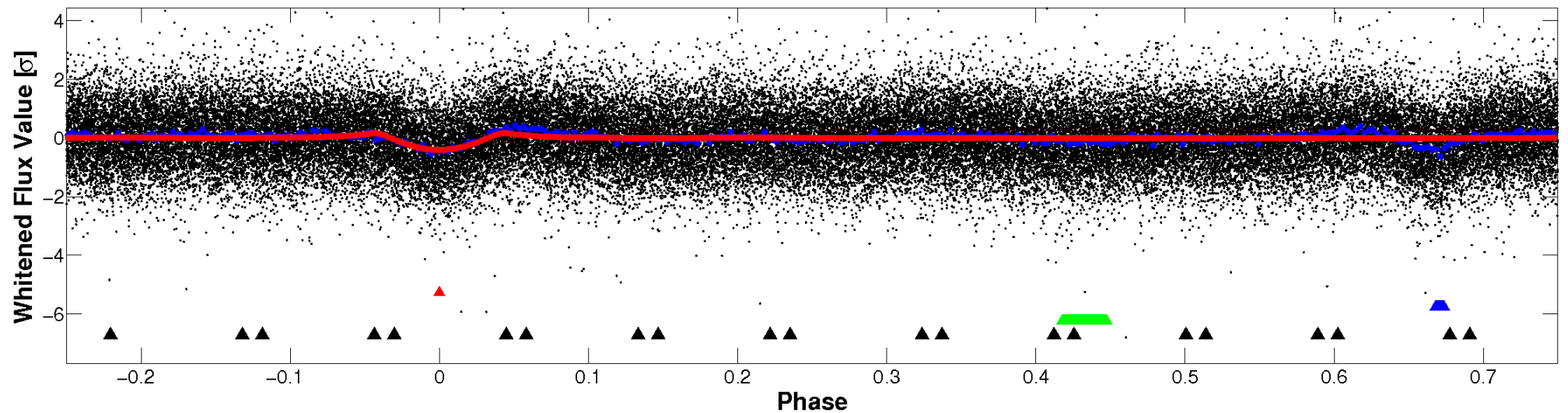


# Non-Whitened Vs. Whitened Light Curve

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

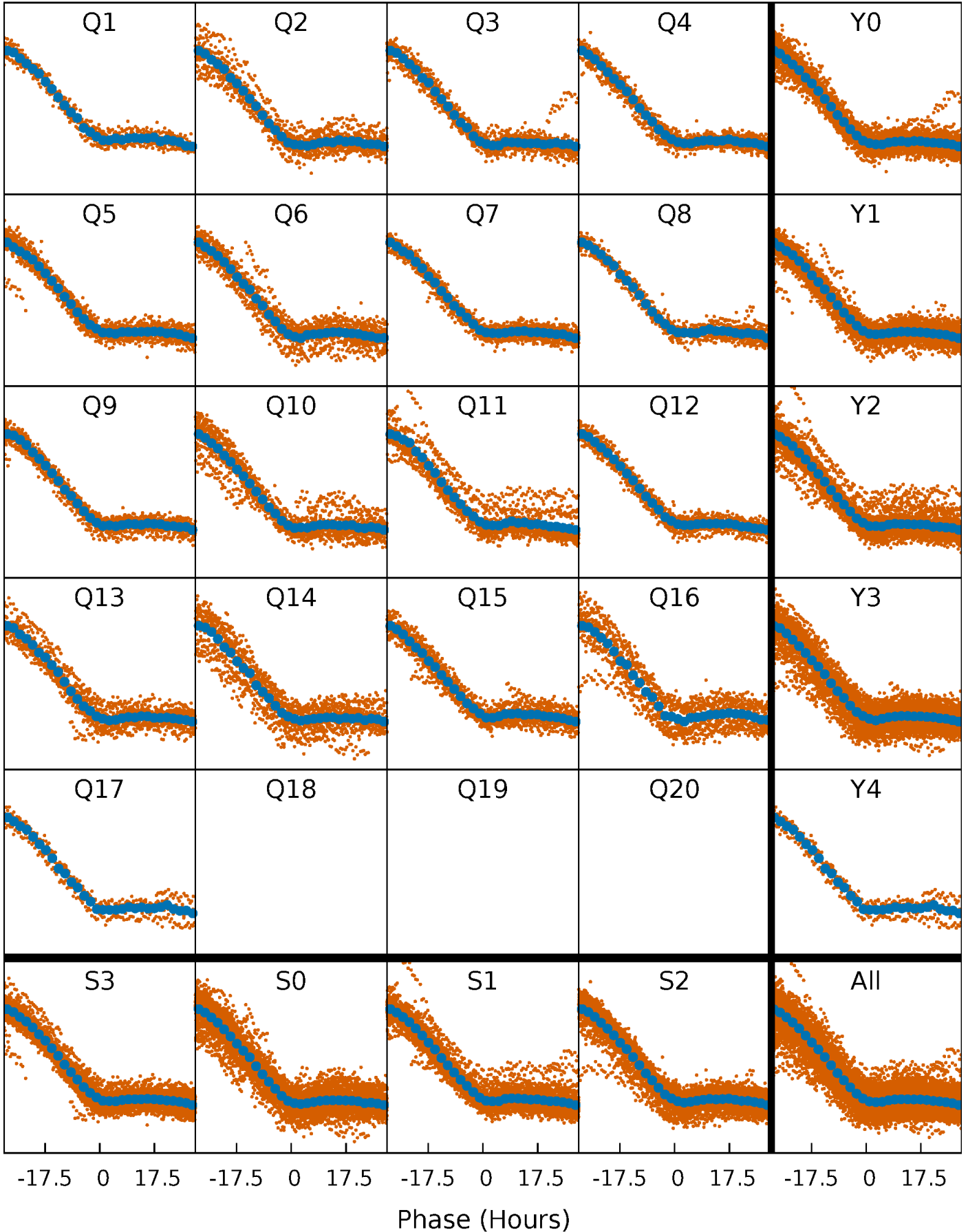


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

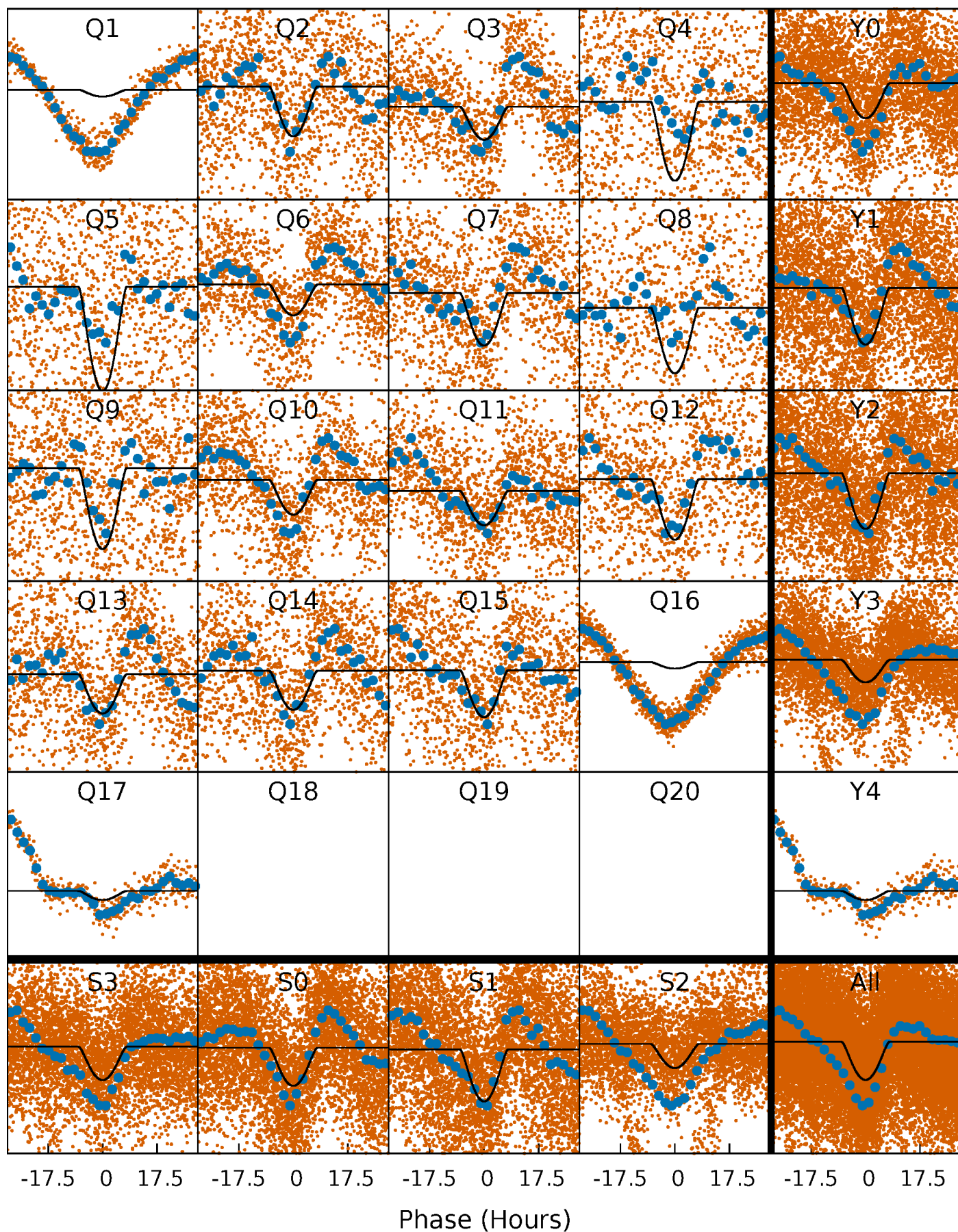
TCE 008374396-01   P= 7.215300 Days    $T_0=135.090580$  (BKJD)





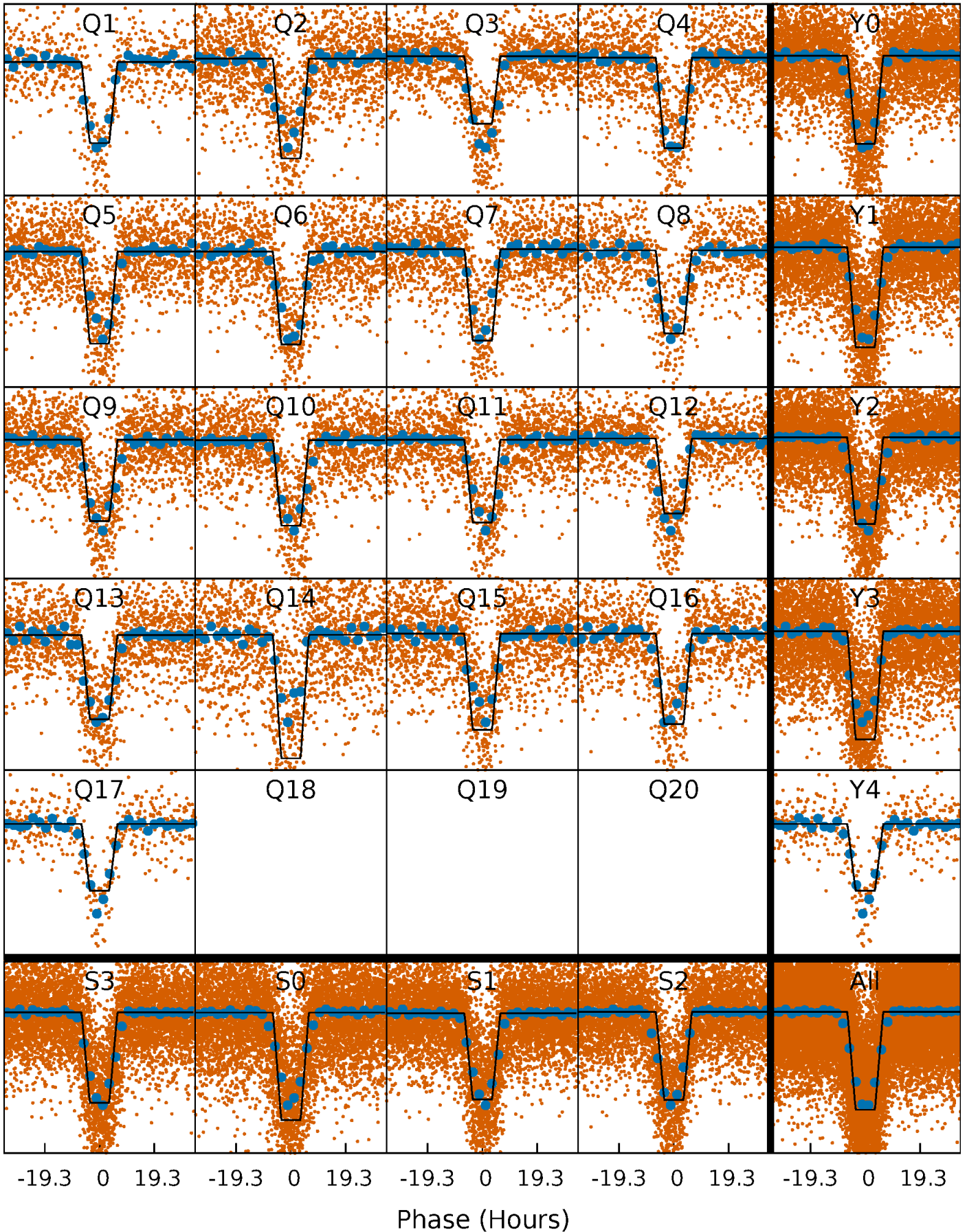
# DV Quarter-Phased Transit Curves

TCE 008374396-01 P= 7.215300 Days  $T_0=135.090580$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

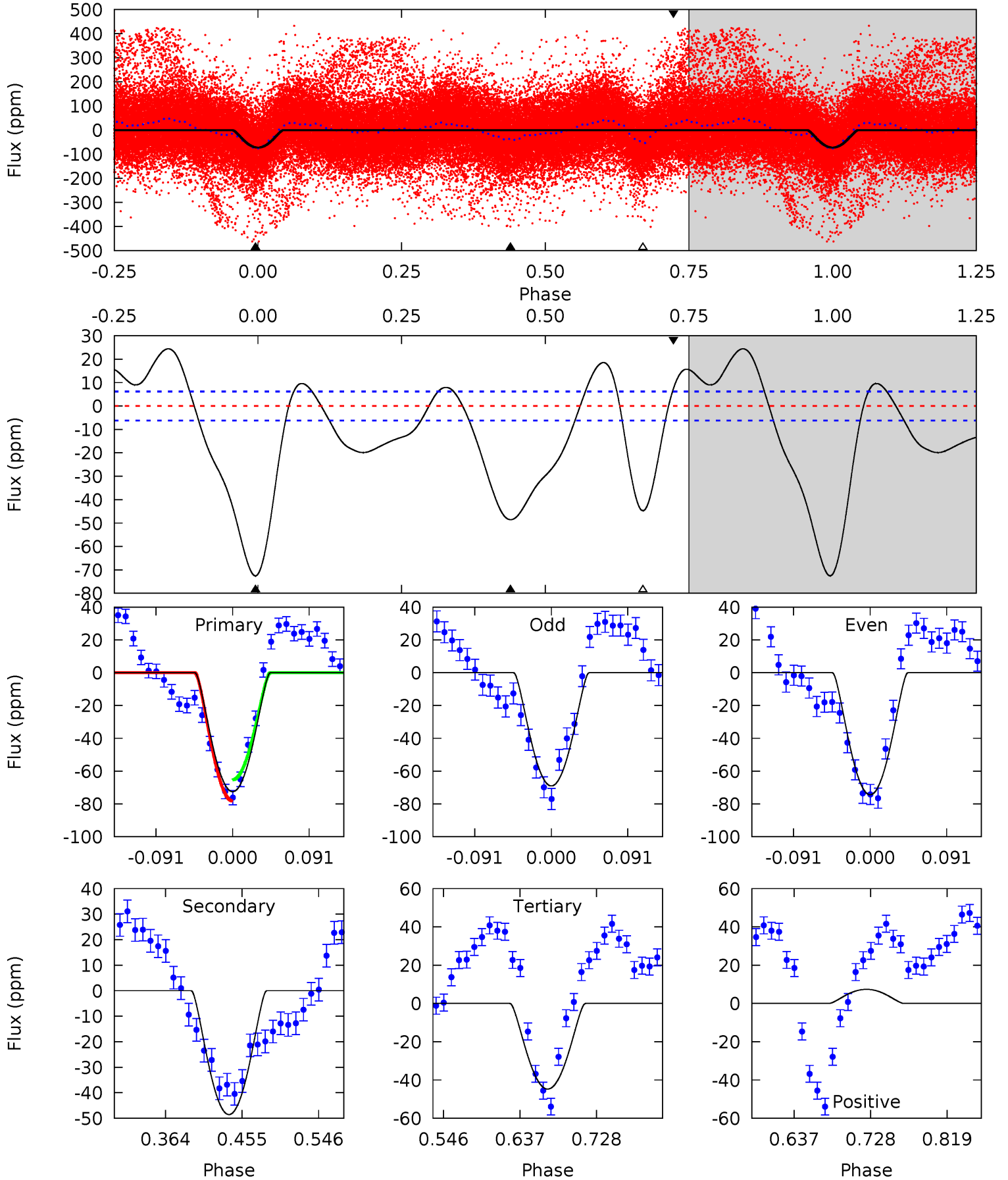
TCE 008374396-01 P= 7.215387 Days  $T_0=135.077319$  (BKJD)



# DV Model-Shift Uniqueness Test

008374396-01, P = 7.215300 Days, E = 127.875280 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
53.5	35.8	33.0	5.44	4.58	1.69	12.2	20.5	48.1	2.82	30.4	2.03	1.81	0.25	4.80

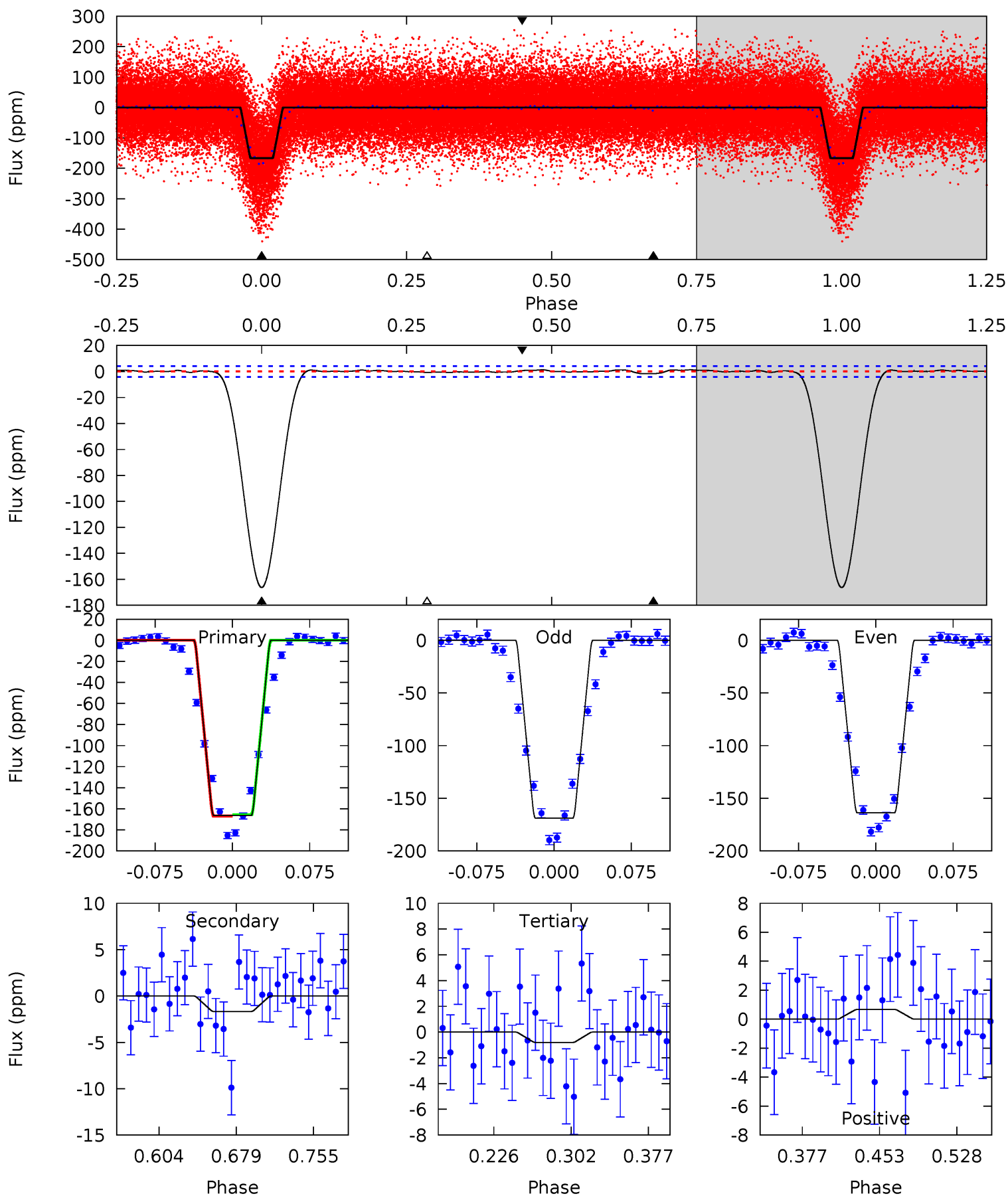




# Alt Model-Shift Uniqueness Test

008374396-01, P = 7.215387 Days, E = 127.861932 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
184.6	1.85	0.89	0.74	4.62	1.78	0.57	183.7	183.9	0.96	1.11	2.79	1.03	0.01	0.68





### Stellar Parameters For KIC 008374396

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$8982^{+249}_{-427}$	$4.111^{+0.124}_{-0.170}$	$0.070^{+0.200}_{-0.650}$	$2.123^{+0.656}_{-0.477}$	$2.122^{+0.393}_{-0.524}$	$0.312^{+0.237}_{-0.156}$
	+3%/-5%	+3%/-4%	+286%/-929%	+31%/-22%	+19%/-25%	+76%/-50%
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 008374396-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-49 \pm 1$	$3.65^{+2.72}_{-2.14}$	$2633^{+210}_{-182}$	$5642^{+3895}_{-1162}$	$17^{+84}_{-11}$
Alt.	$-2 \pm 1$	$3.71^{+2.65}_{-2.28}$	$2639^{+189}_{-174}$	$2664^{+1396}_{-5272}$	$0.510^{+2.900}_{-0.381}$

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

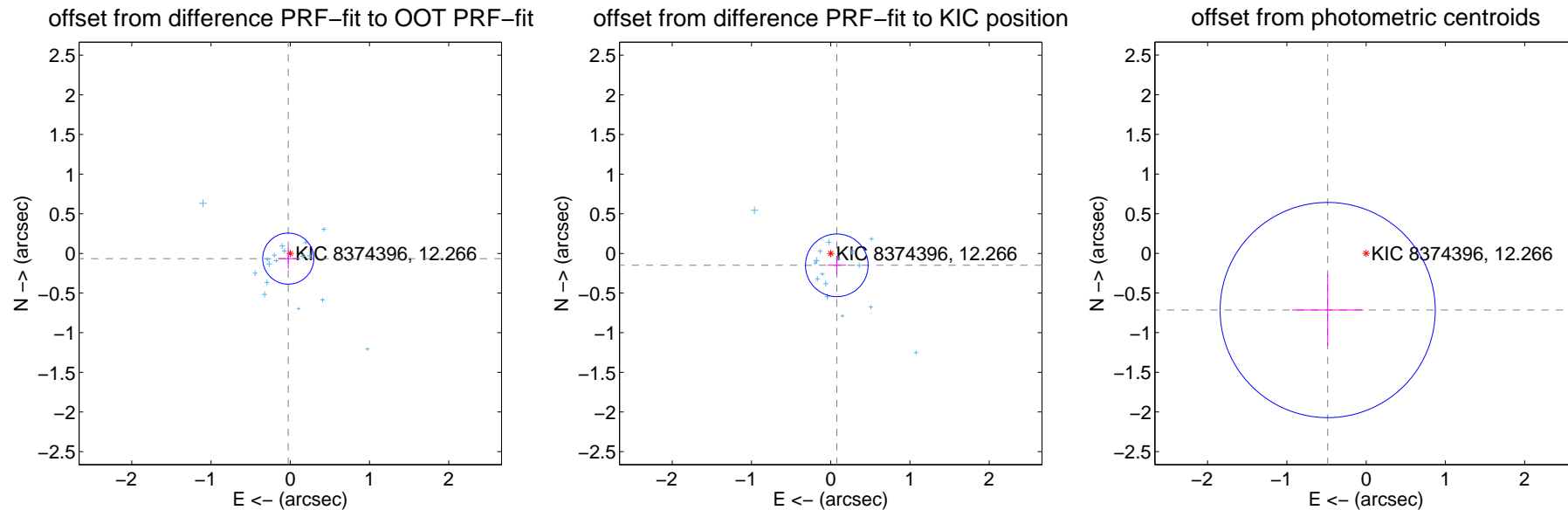
## DV Centroid Data

Supplemental centroid analysis for 008374396-01. Kepler magnitude: 12.27. Transit SNR 20.52

There are 17 quarters with good PRF difference image offsets

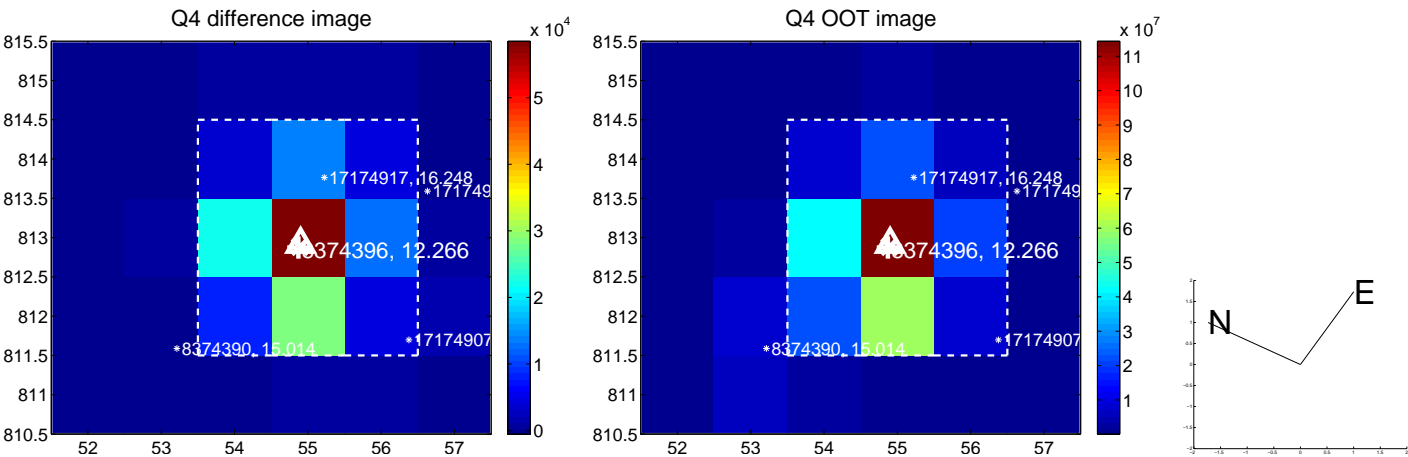
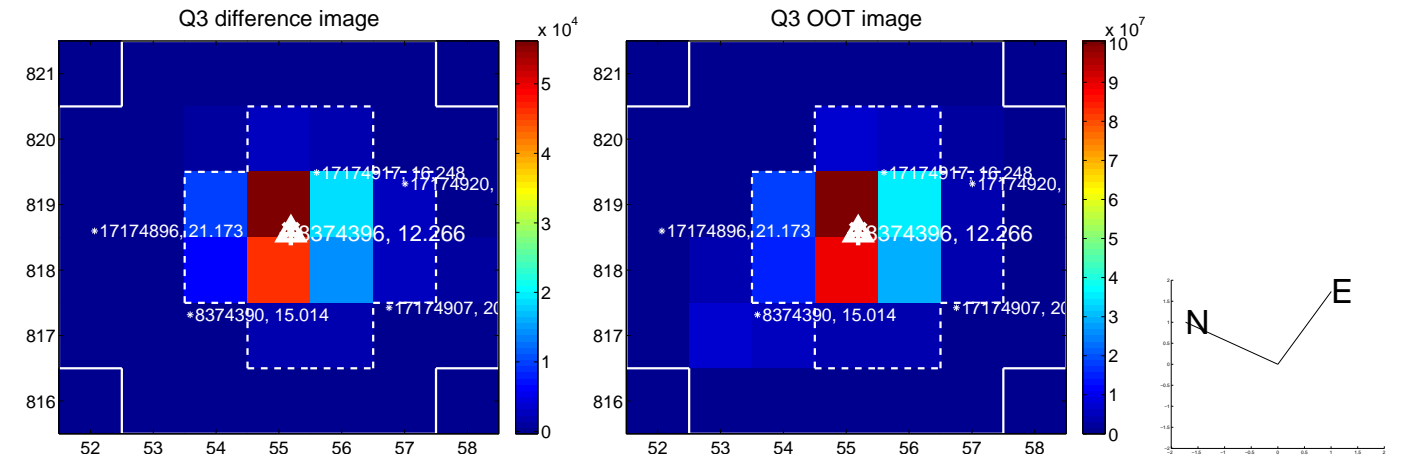
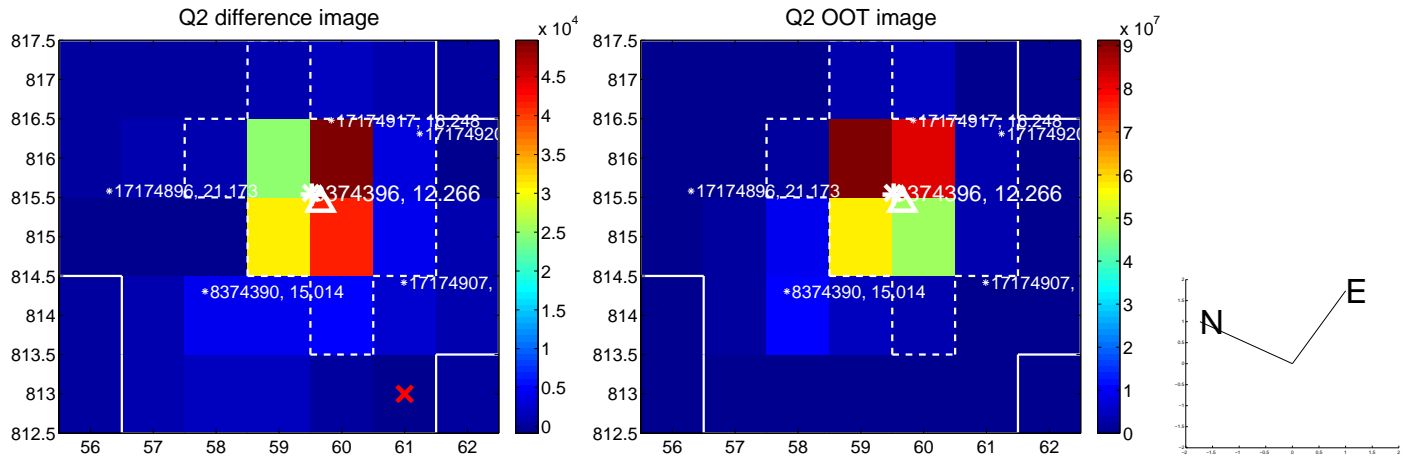
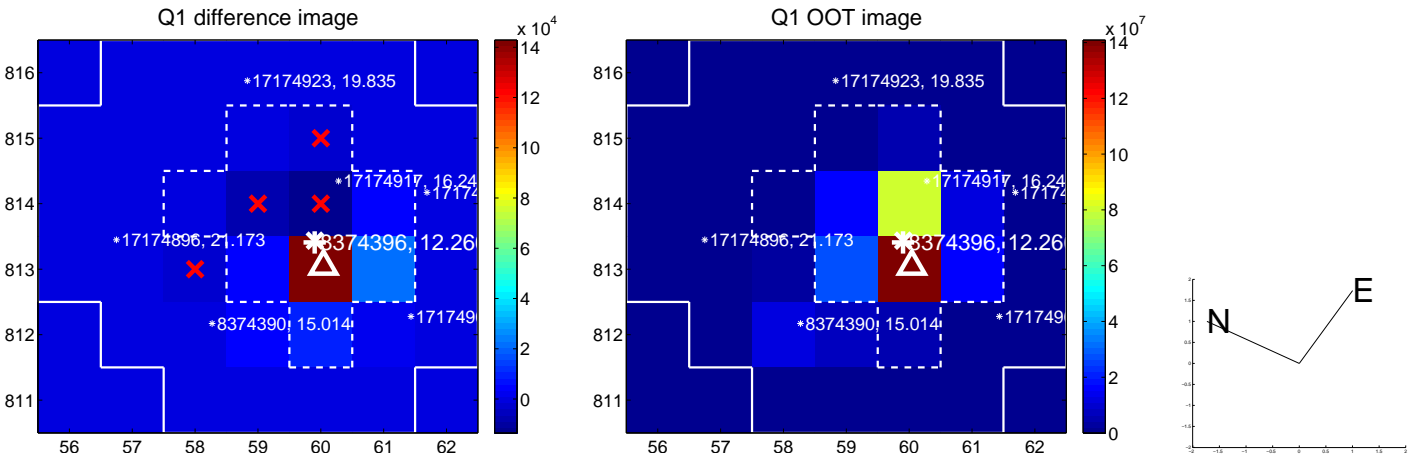
The direct PRF centroid is offset from the target star catalog position by about 0.17 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.070 \pm 0.107$	0.66	$0.025 \pm 0.126$	$-0.066 \pm 0.127$
PRF-fit source offset from KIC position	$0.168 \pm 0.132$	1.28	$-0.077 \pm 0.116$	$-0.150 \pm 0.114$
photometric centroid source offset	$0.86 \pm 0.45$	1.91	$0.49 \pm 0.45$	$-0.72 \pm 0.45$

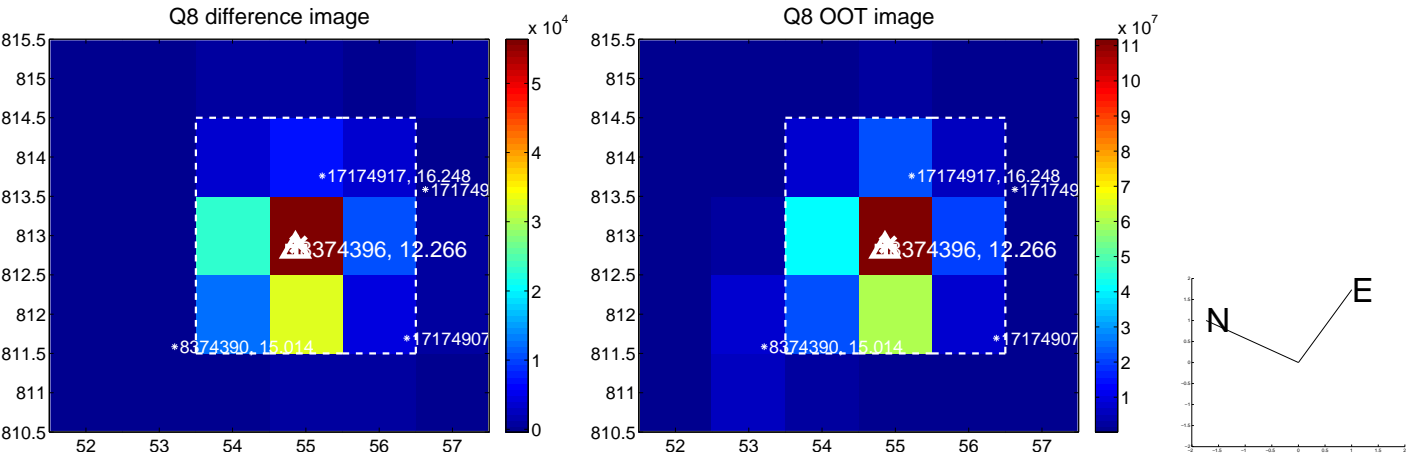
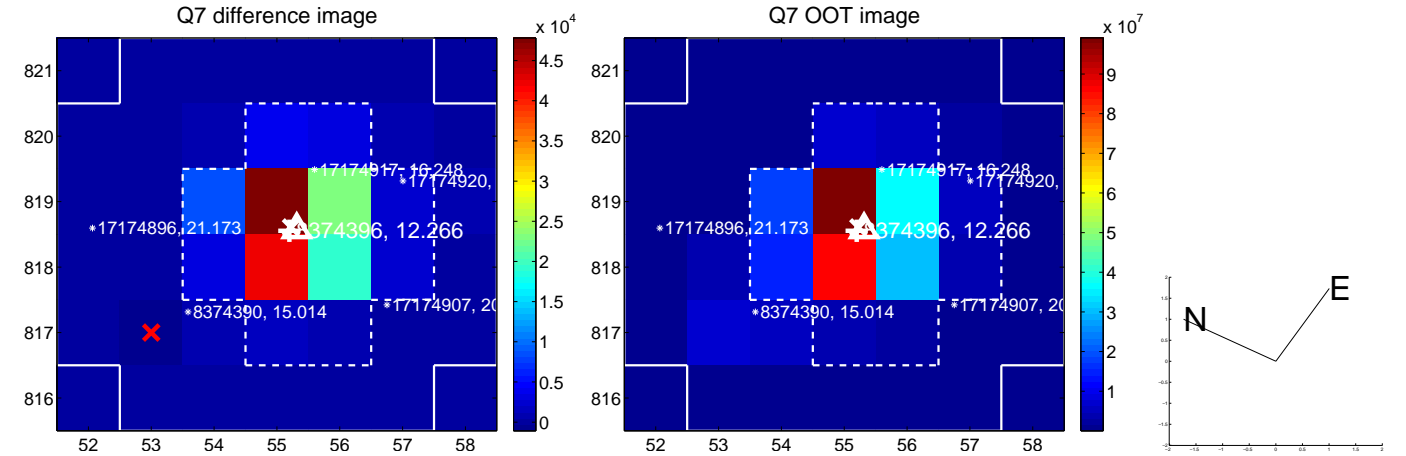
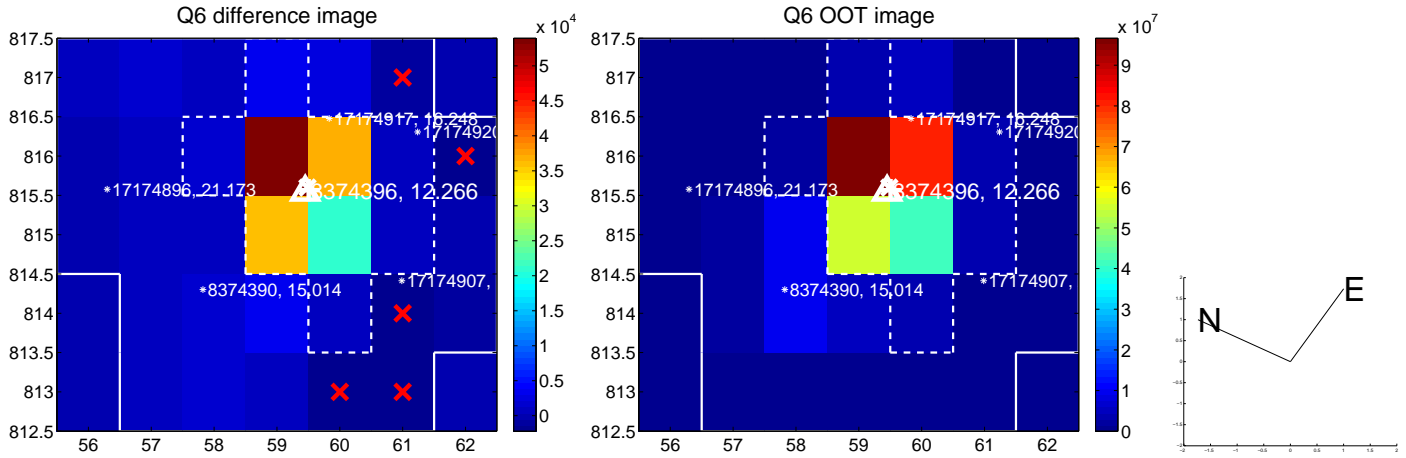
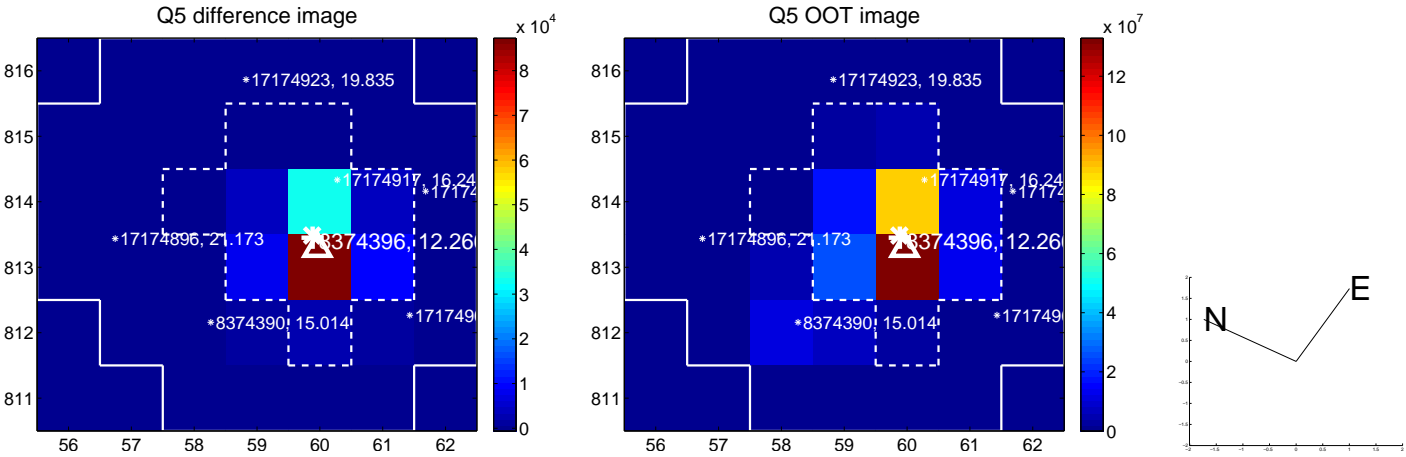


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

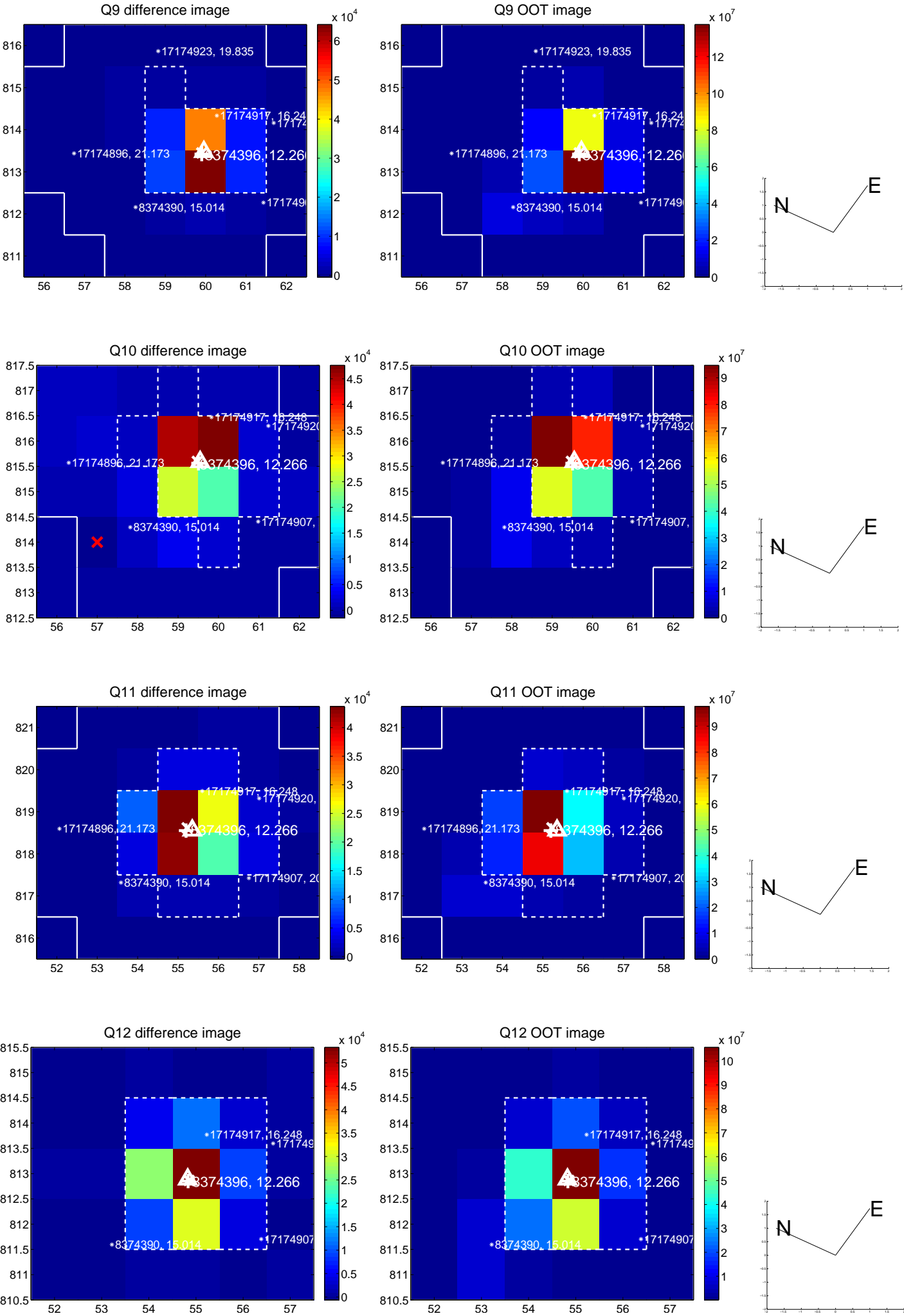


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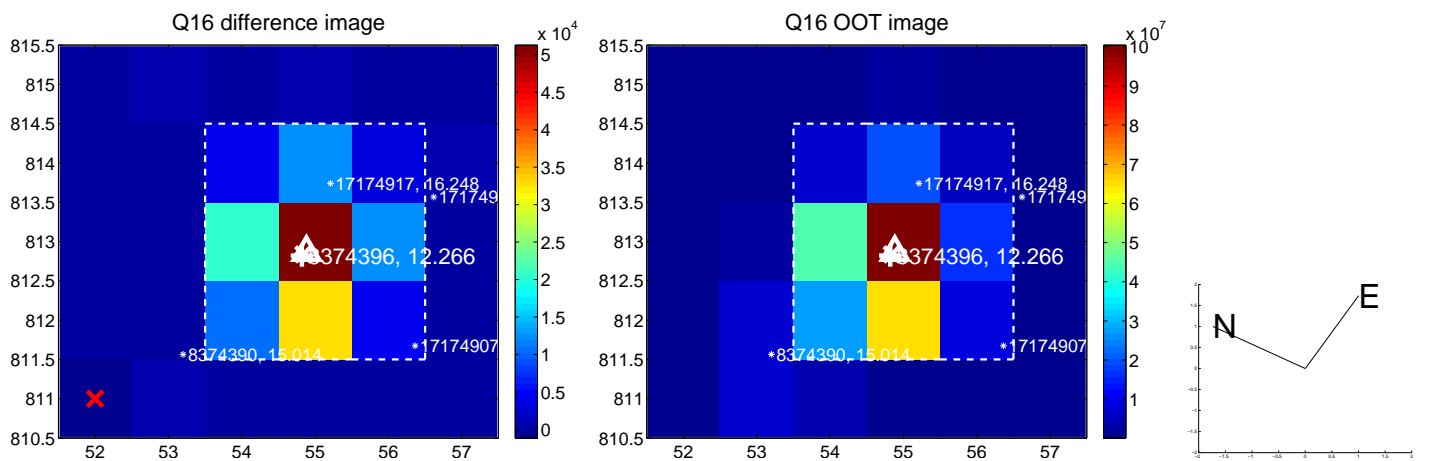
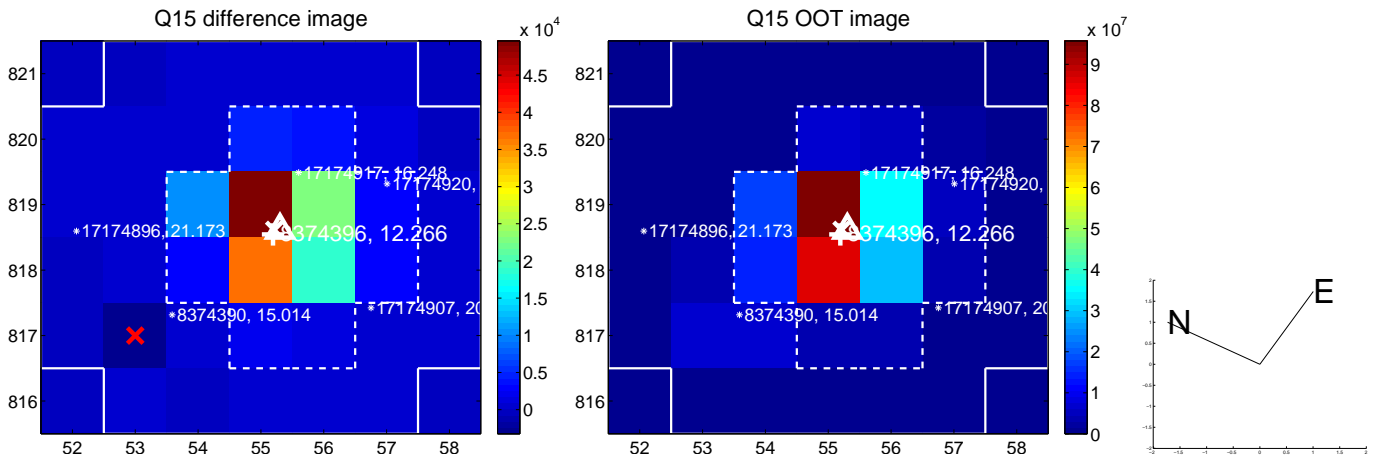
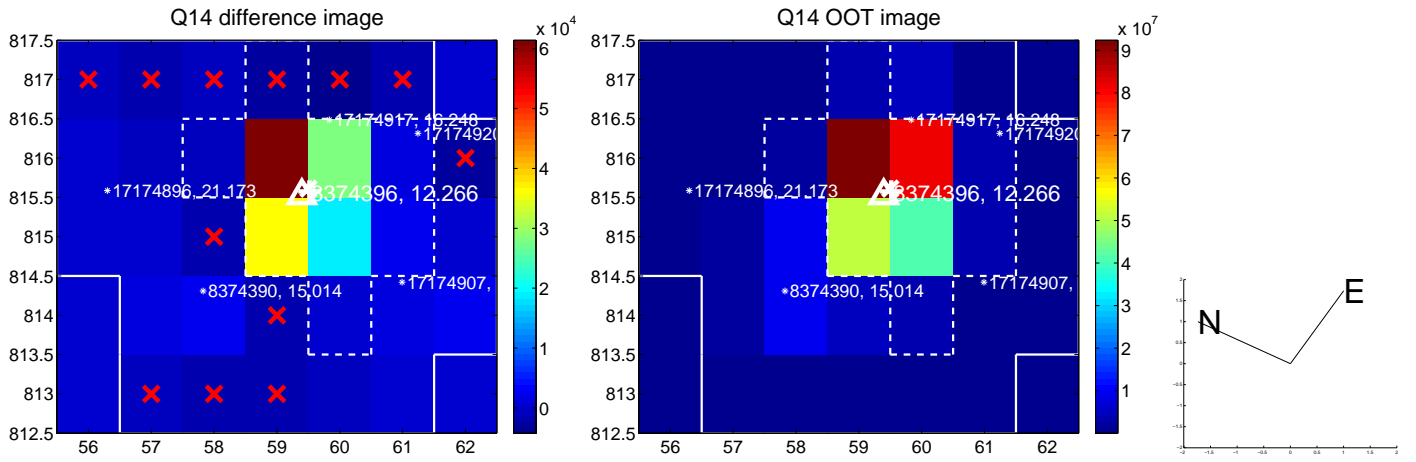
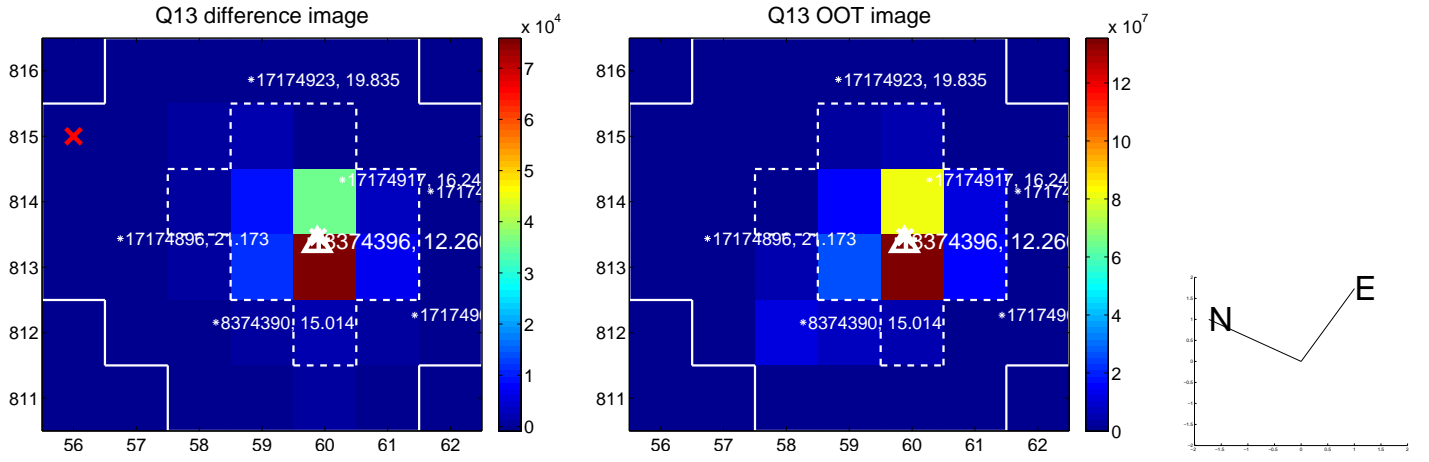




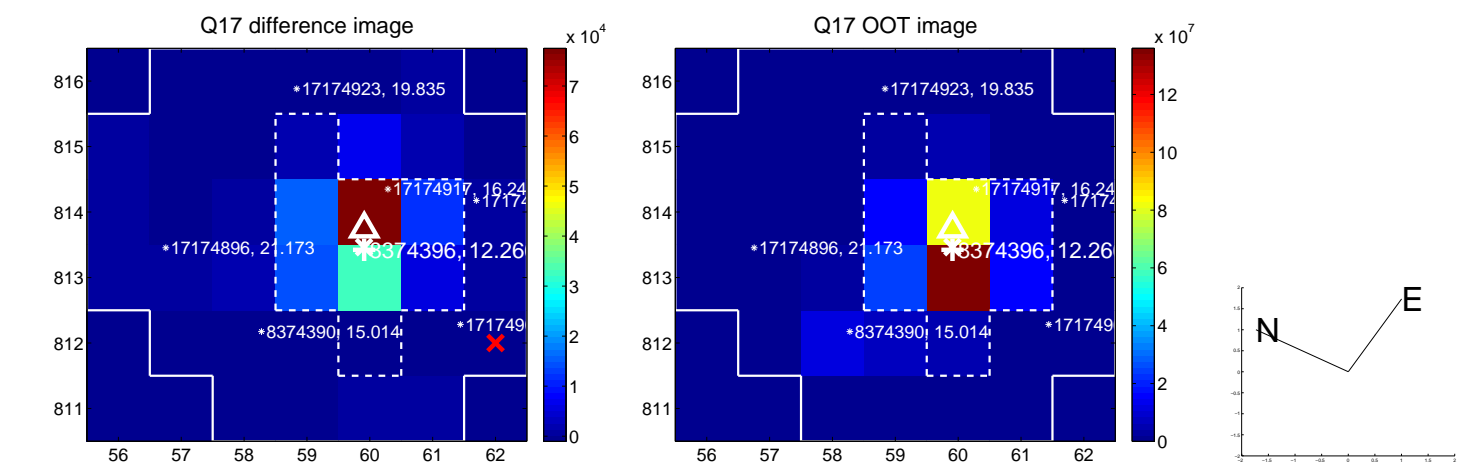
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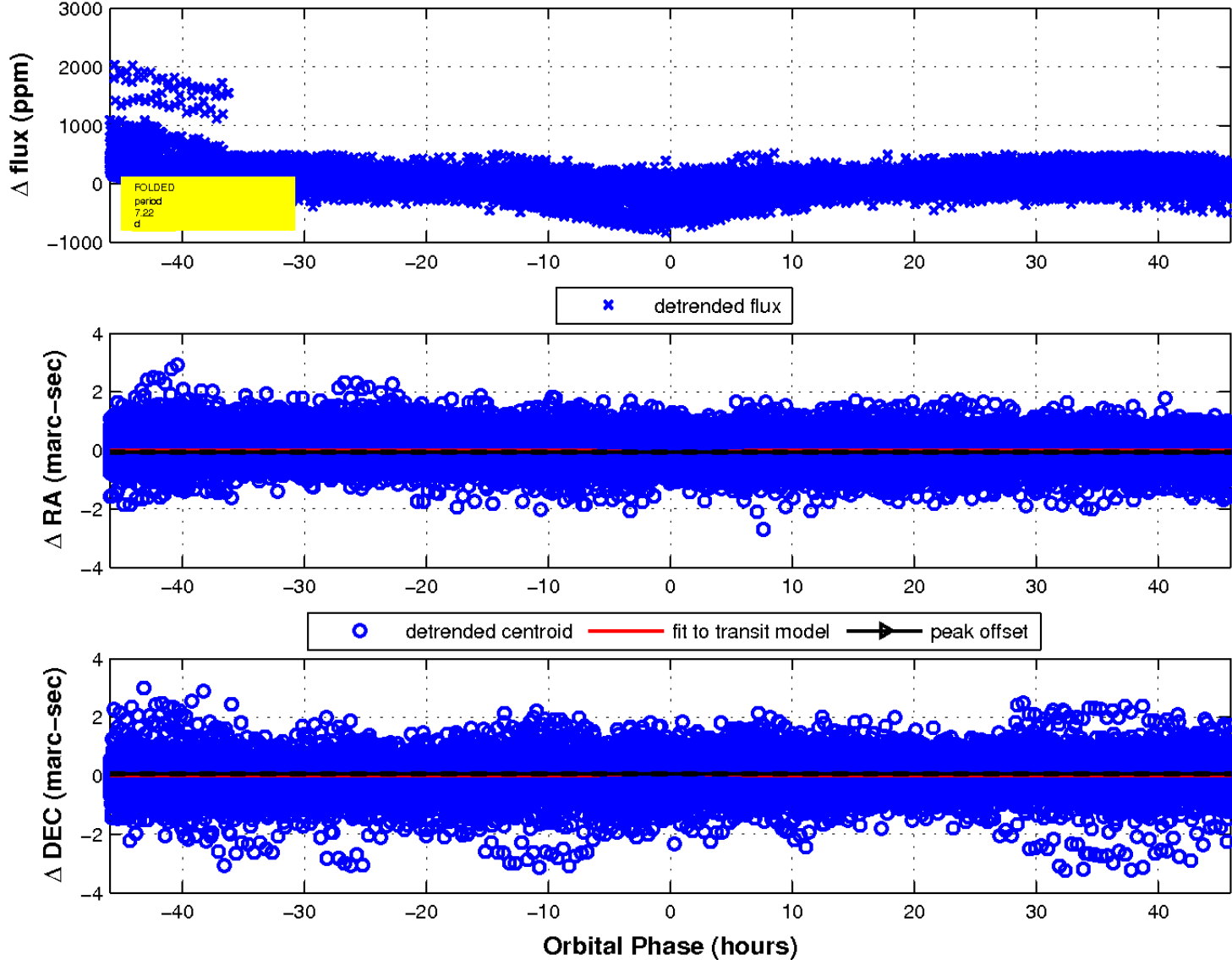
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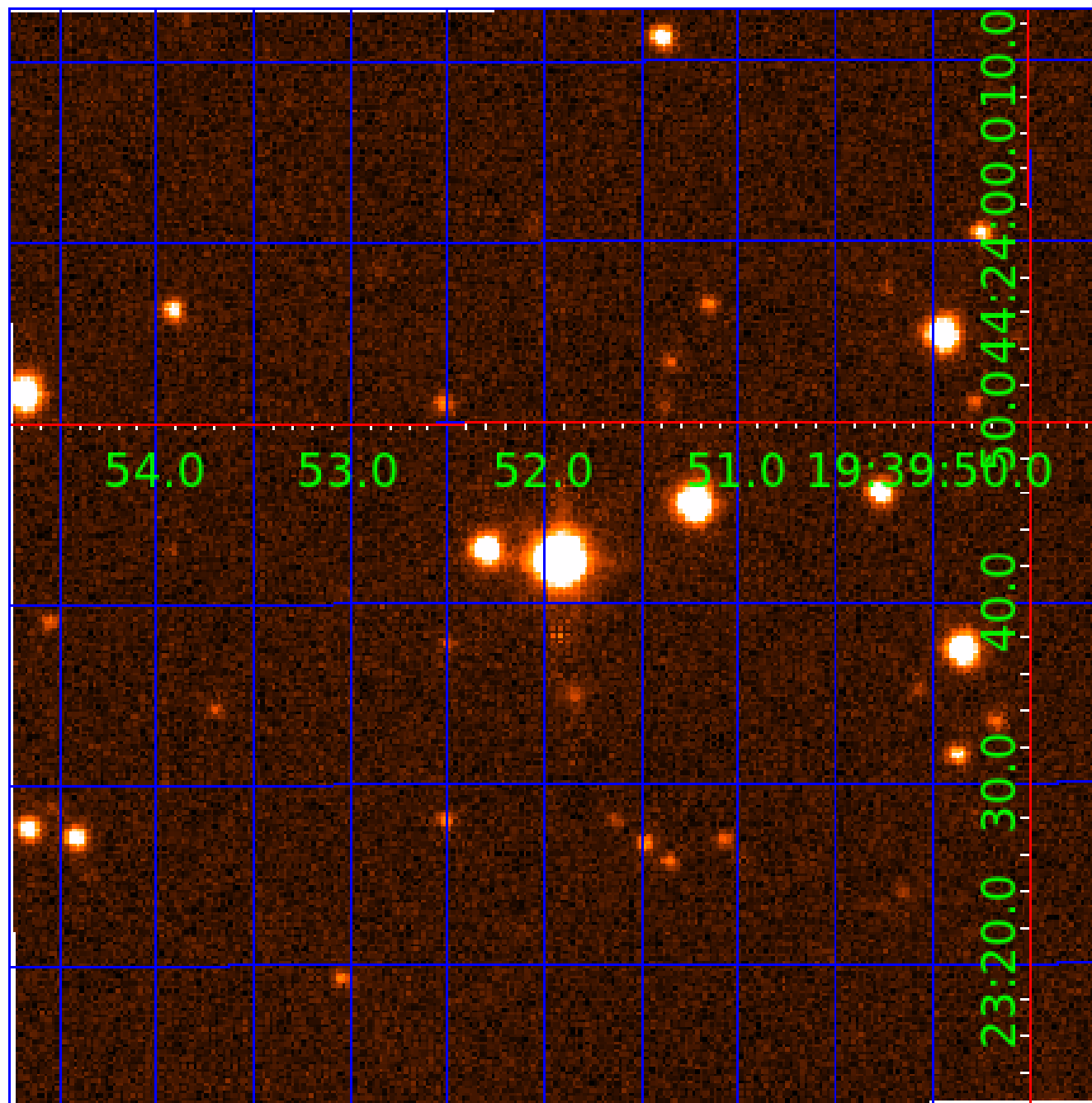


### fluxWeightedCentroids, Planet 1 of 4



UKIRT Image

Declination





# KIC 008374396

## Q1-17 DR25 TCE Parameters

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008374396-03	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_NOFITS
008374396-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_MEAS

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

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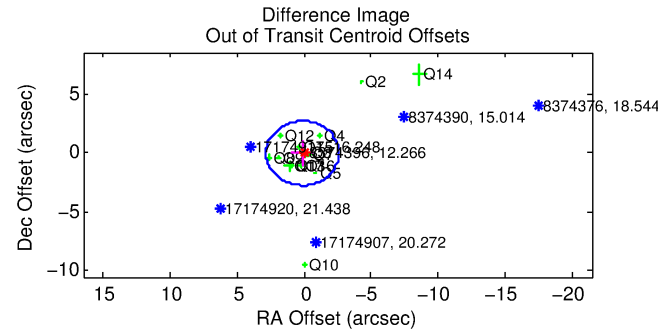
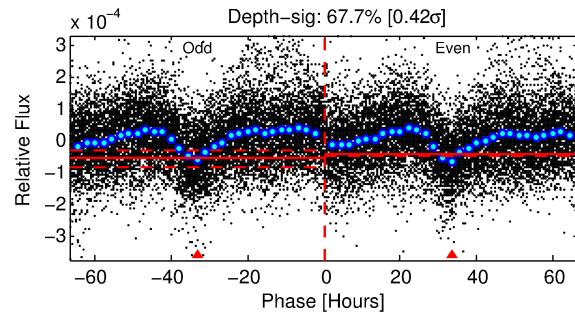
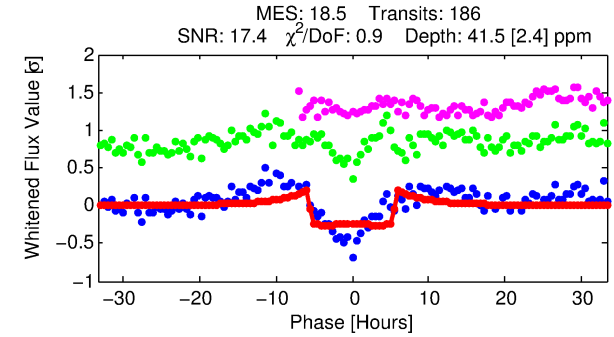
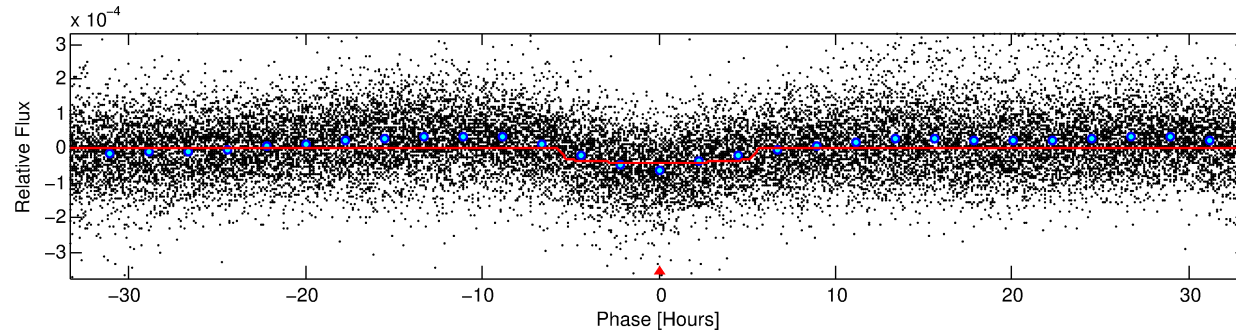
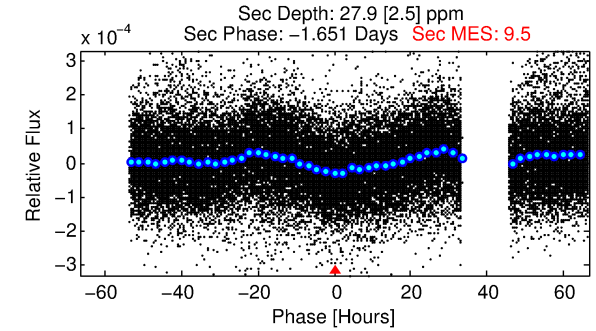
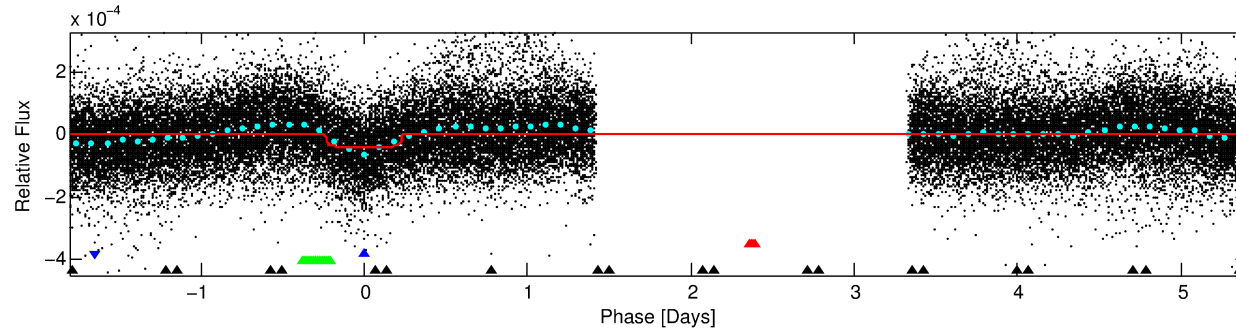
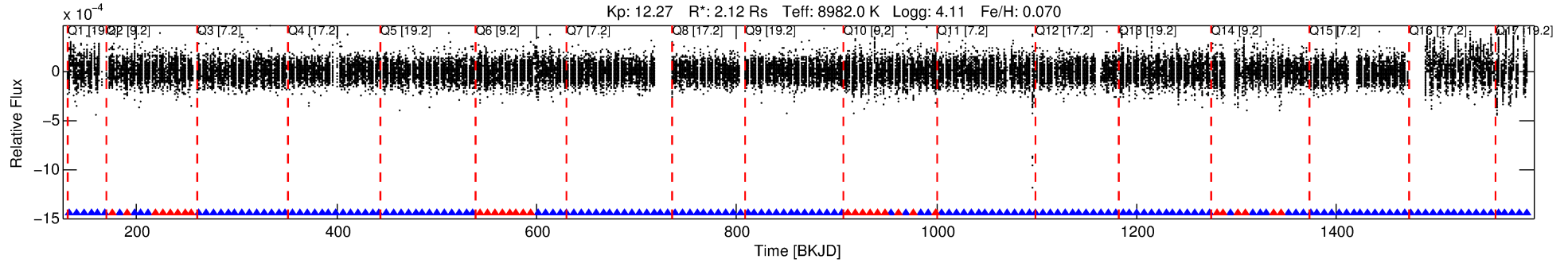
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008374396-02

No Significant Match Found

# DV One-Page Summary

KIC: 8374396 Candidate: 2 of 4 Period: 7.215 d



## DV Fit Results:

Period = 7.21550 [0.00004] d  
Epoch = 132.6956 [0.0045] BKJD  
Rp/R\* = 0.0064 [0.0006]  
a/R\* = 3.46 [1.83]  
b = 0.75 [0.35]  
Seff = 2978.50 [1140.79]  
Teq = 1884 [180] K  
Rp = 1.48 [0.48] Re  
a = 0.0939 [0.0229] AU  
Ag = 61.66 [24.01] [2.53σ]  
Teffp = 8162 [567] K [10.55σ]

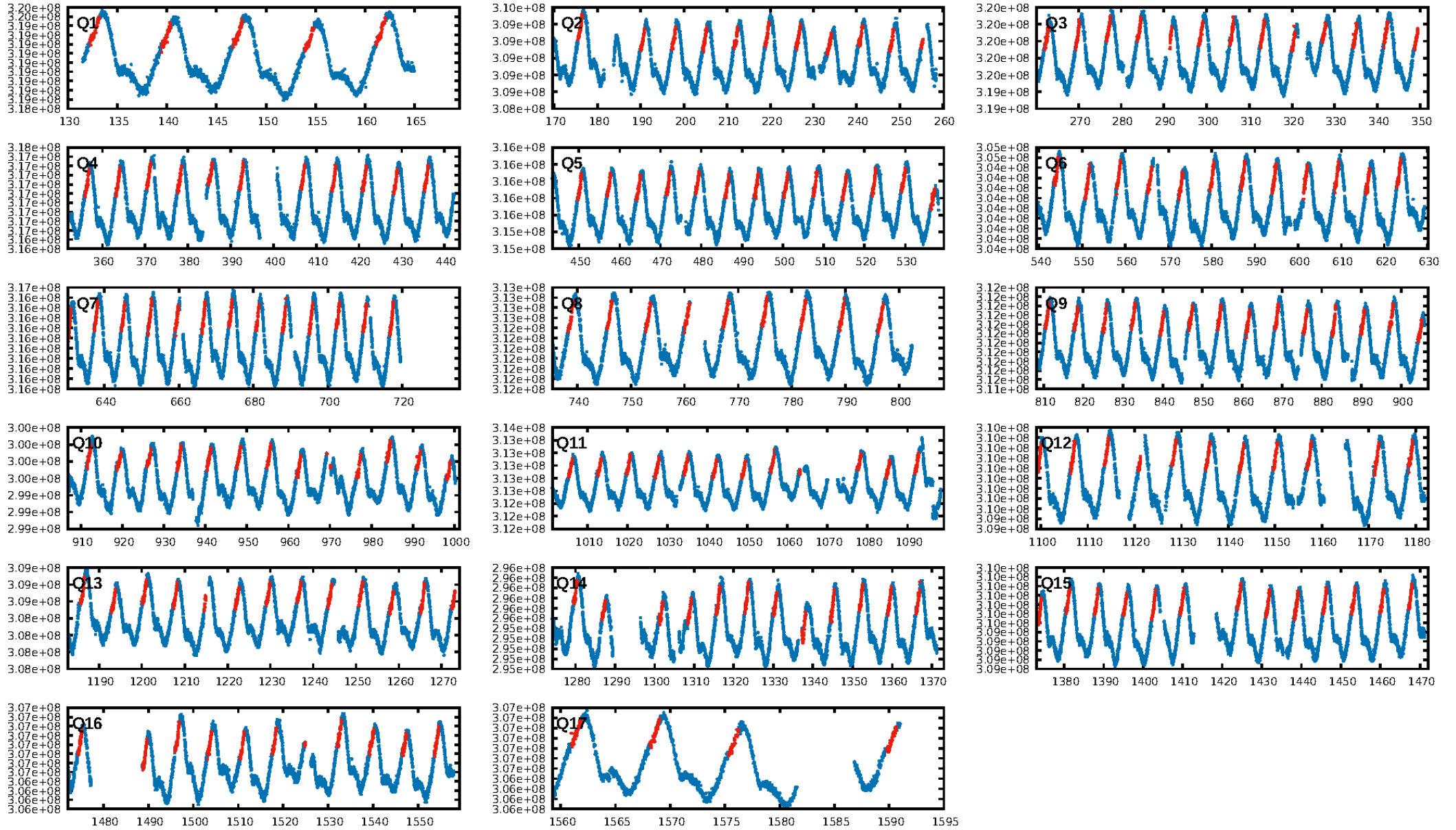
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: 0.1% [0.00σ]  
ModelChiSquare2-sig: 99.9%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 5.99e-46  
RollingBand-fgt: 0.82 [146/177]  
GhostDiagnostic-chr: 2.337  
Centroid-sig: 8.4%  
Centroid-so: 0.506 arcsec [0.75σ]  
OotOffset-rm: 0.135 arcsec [0.15σ]  
KicOffset-rm: 0.062 arcsec [0.06σ]  
OotOffset-st: 3/3/4/4 [14]  
KicOffset-st: 3/3/4/4 [14]  
DiffImageQuality-fgm: 0.71 [10/14]  
DiffImageOverlap-fno: 0.00 [0/17]

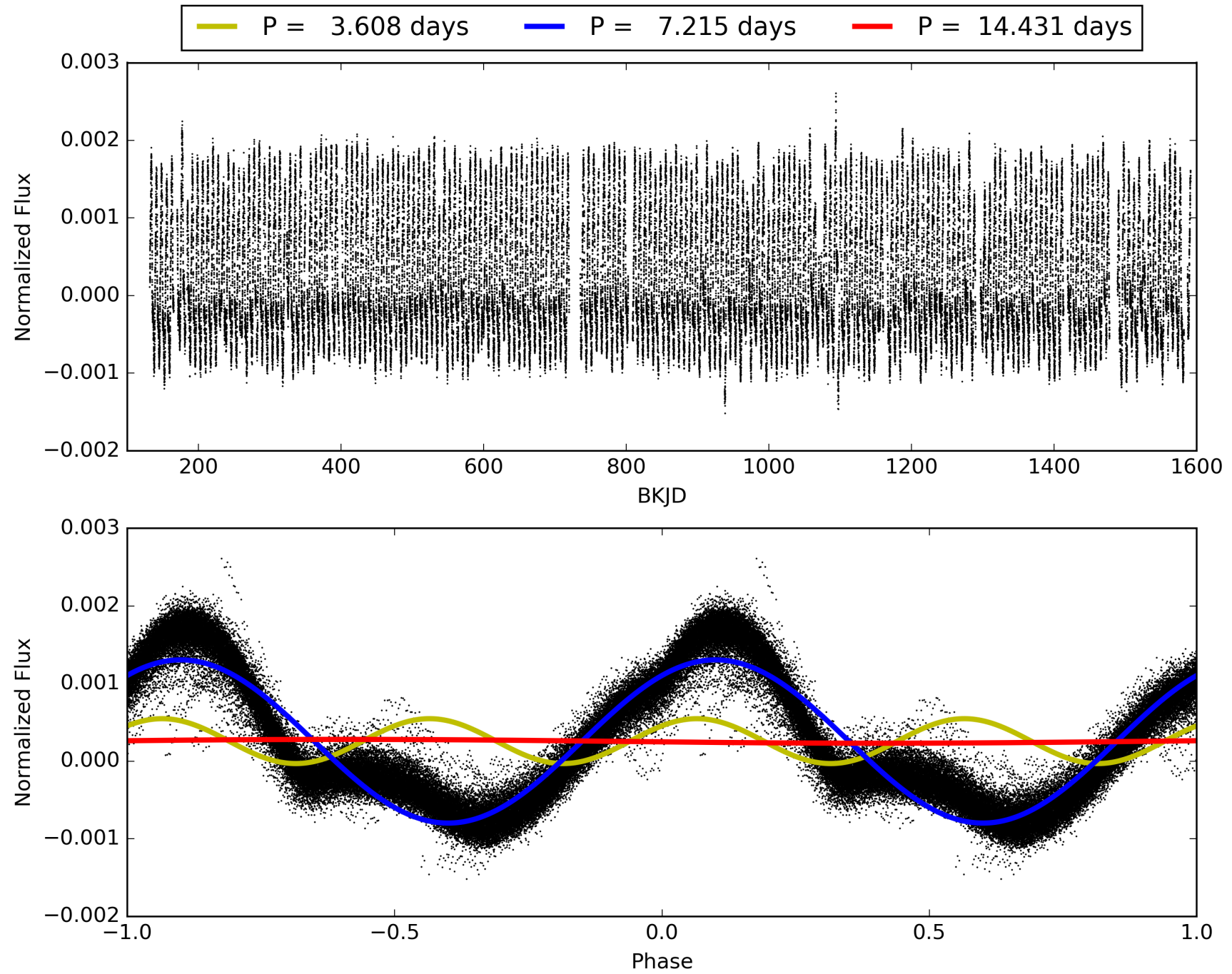
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 13:30:20 Z

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

# TCE 008374396-02, PDC Light Curves

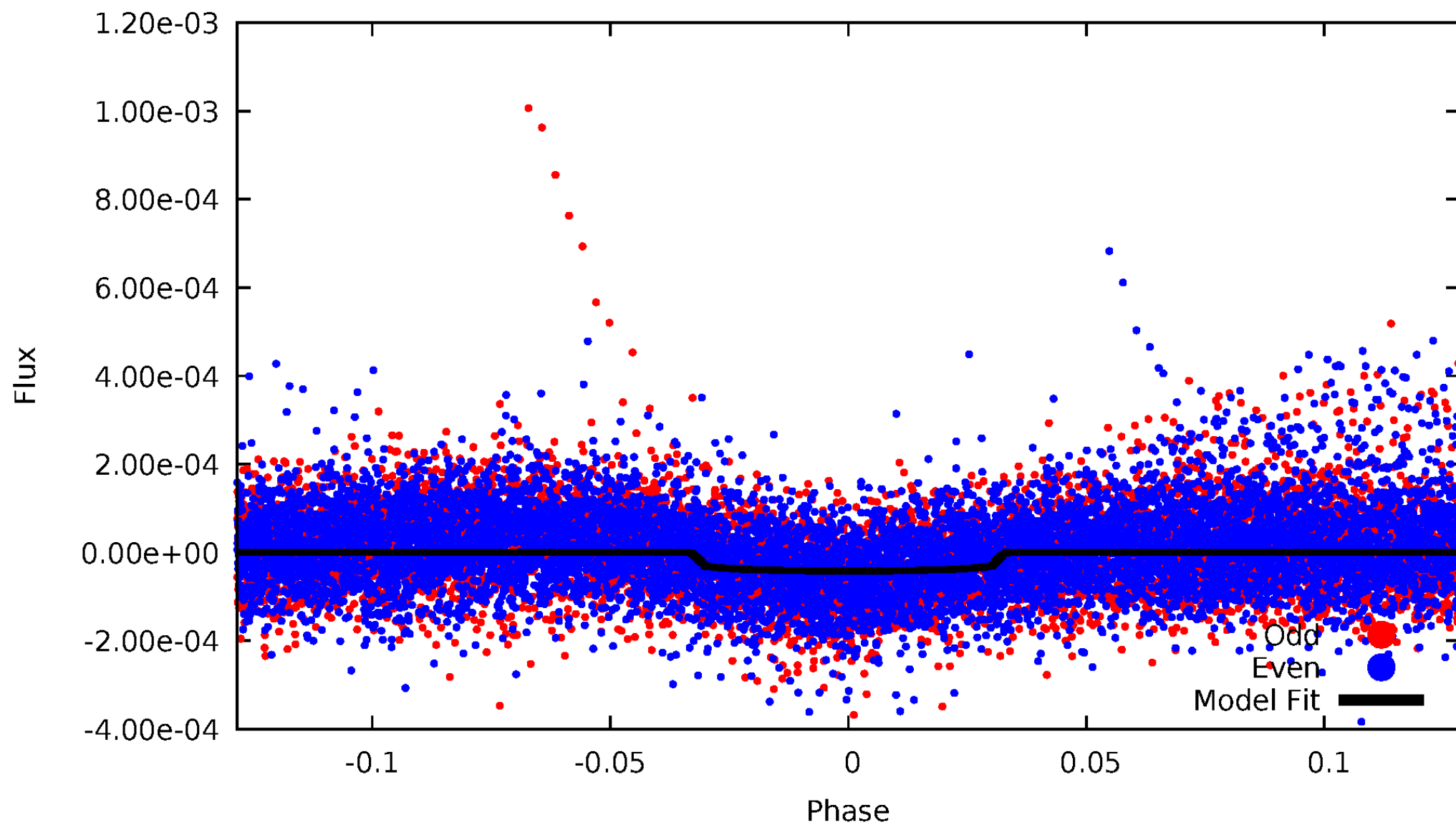


TCE 008374396-02



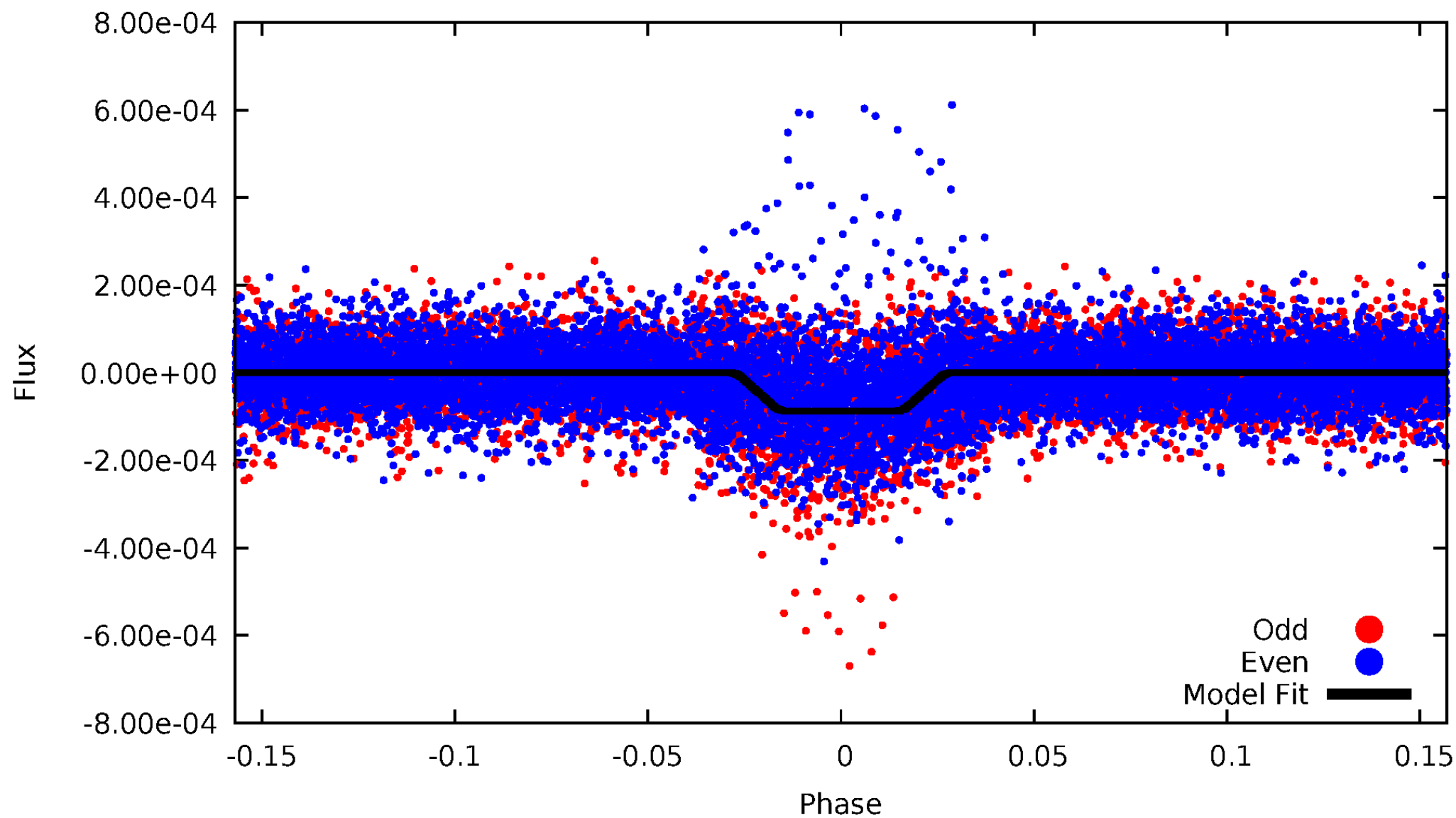
# DV Odd/Even

TCE 008374396-02



# ALT Odd/Even

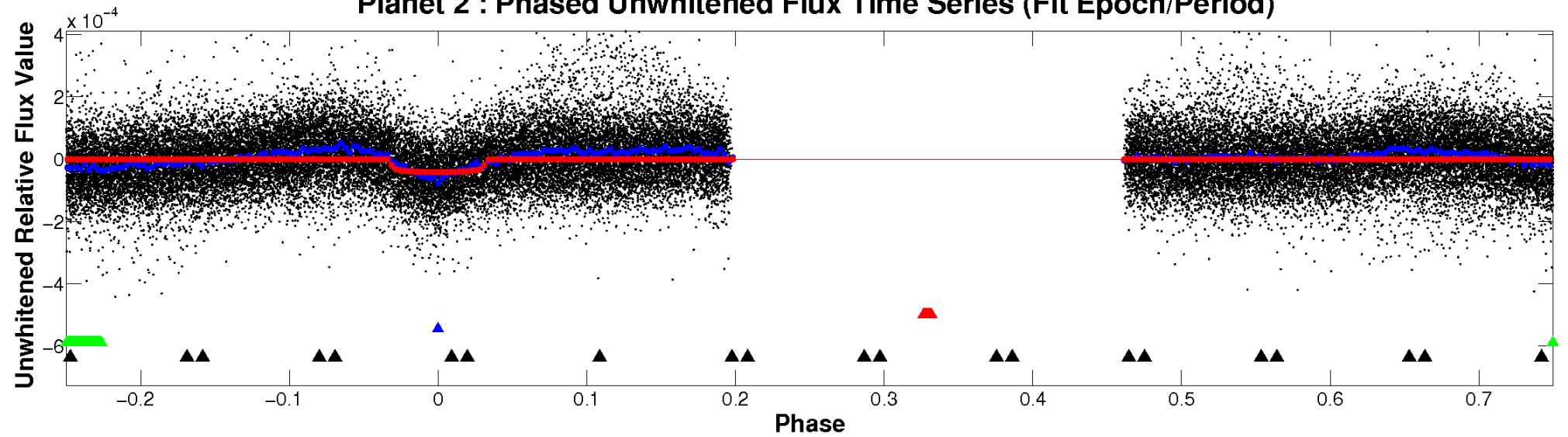
TCE 008374396-02



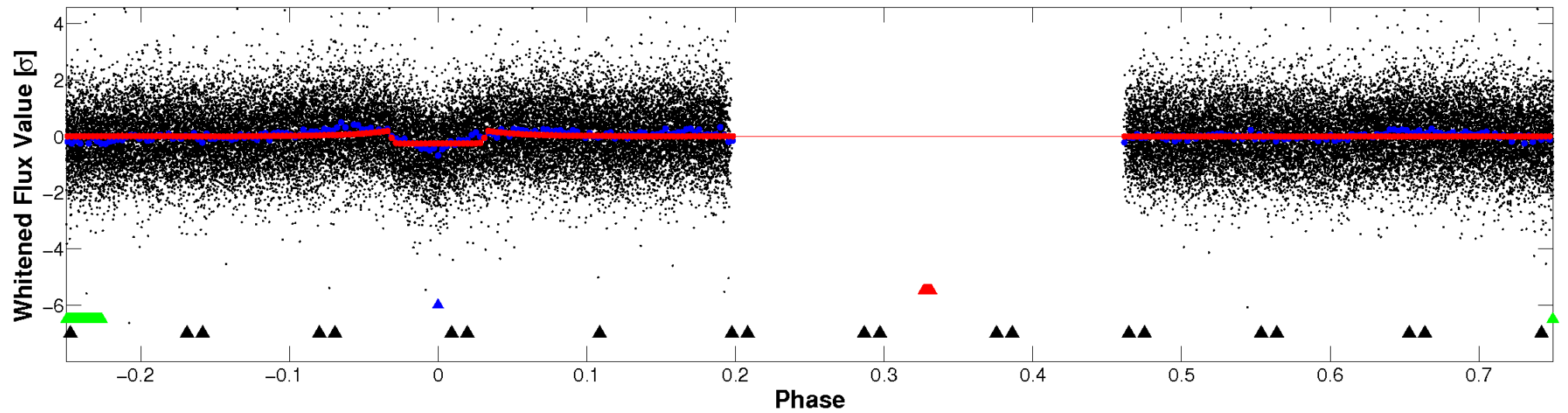


# Non-Whitened Vs. Whitened Light Curve

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



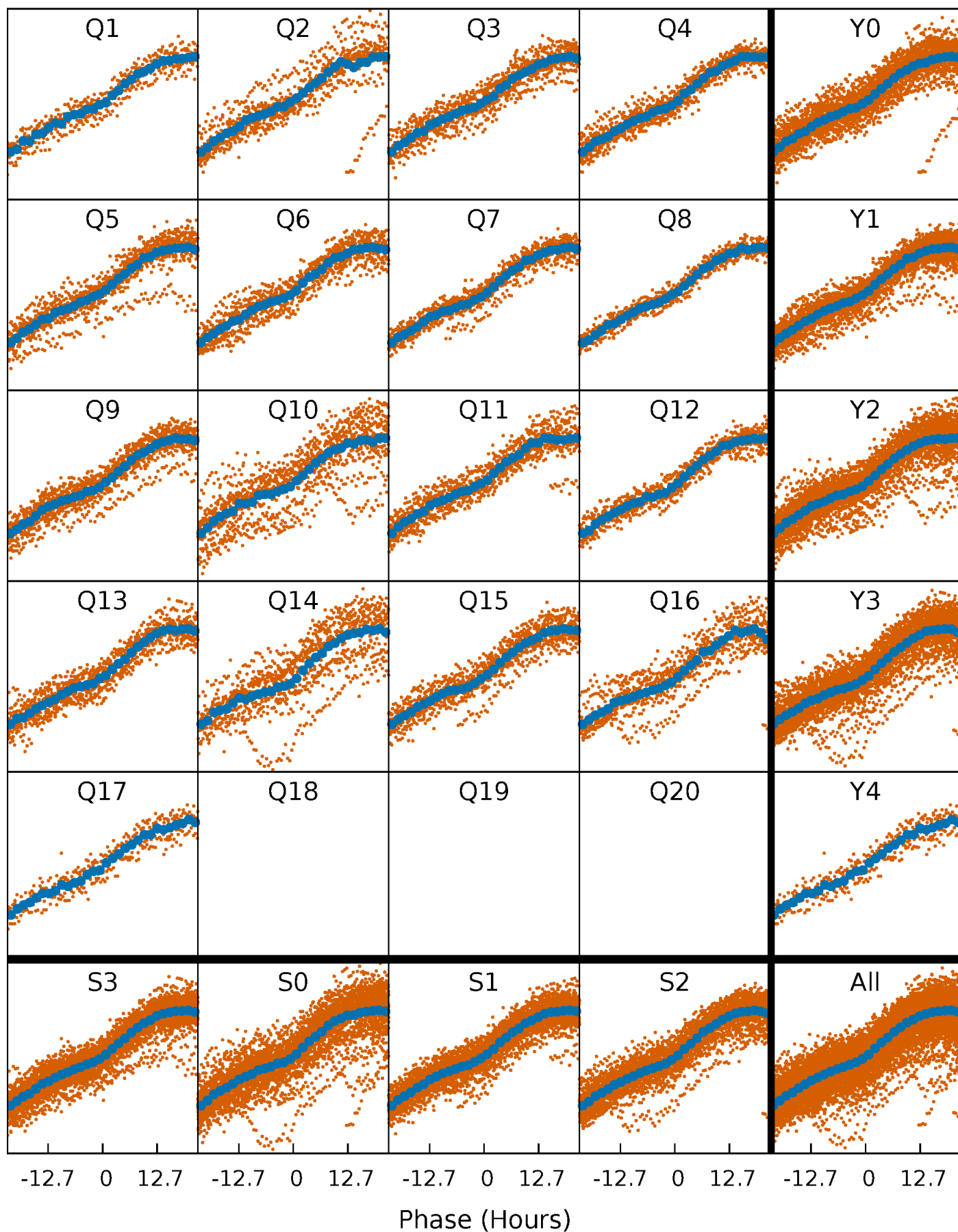
## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)





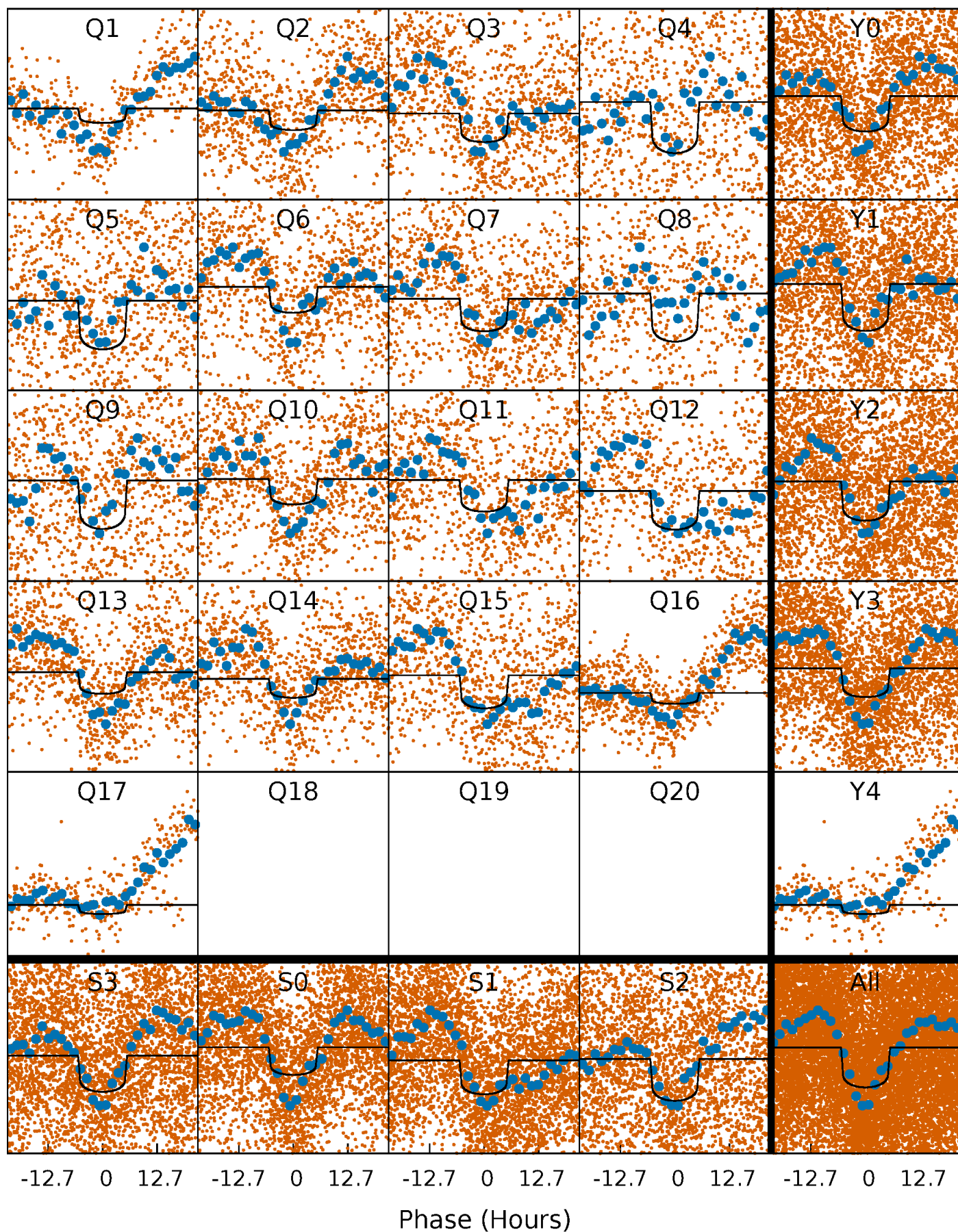
# PDC Quarter-Phased Transit Curves

TCE 008374396-02   P= 7.215496 Days    $T_0=132.695614$  (BKJD)



# DV Quarter-Phased Transit Curves

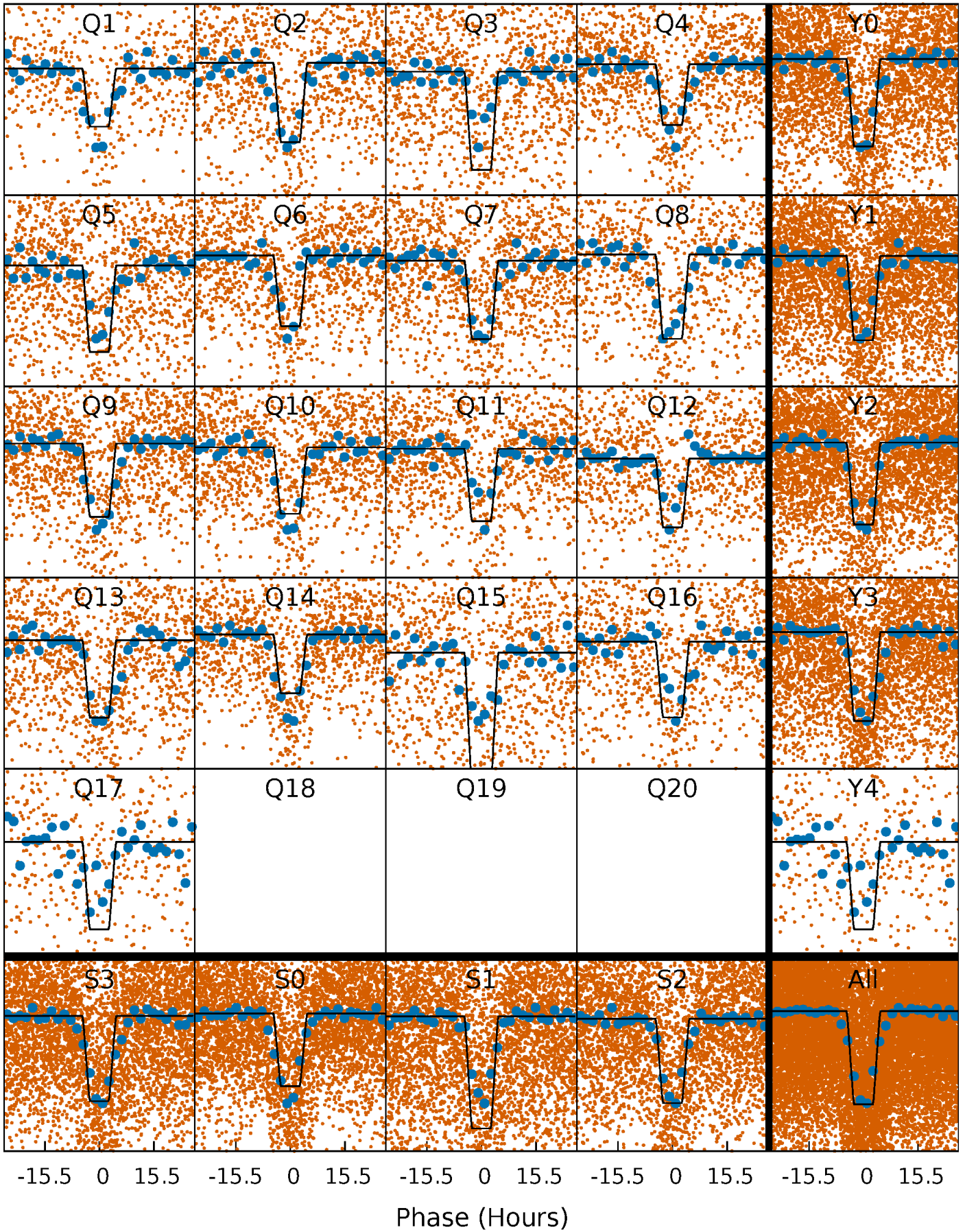
TCE 008374396-02   P= 7.215496 Days    $T_0=132.695614$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

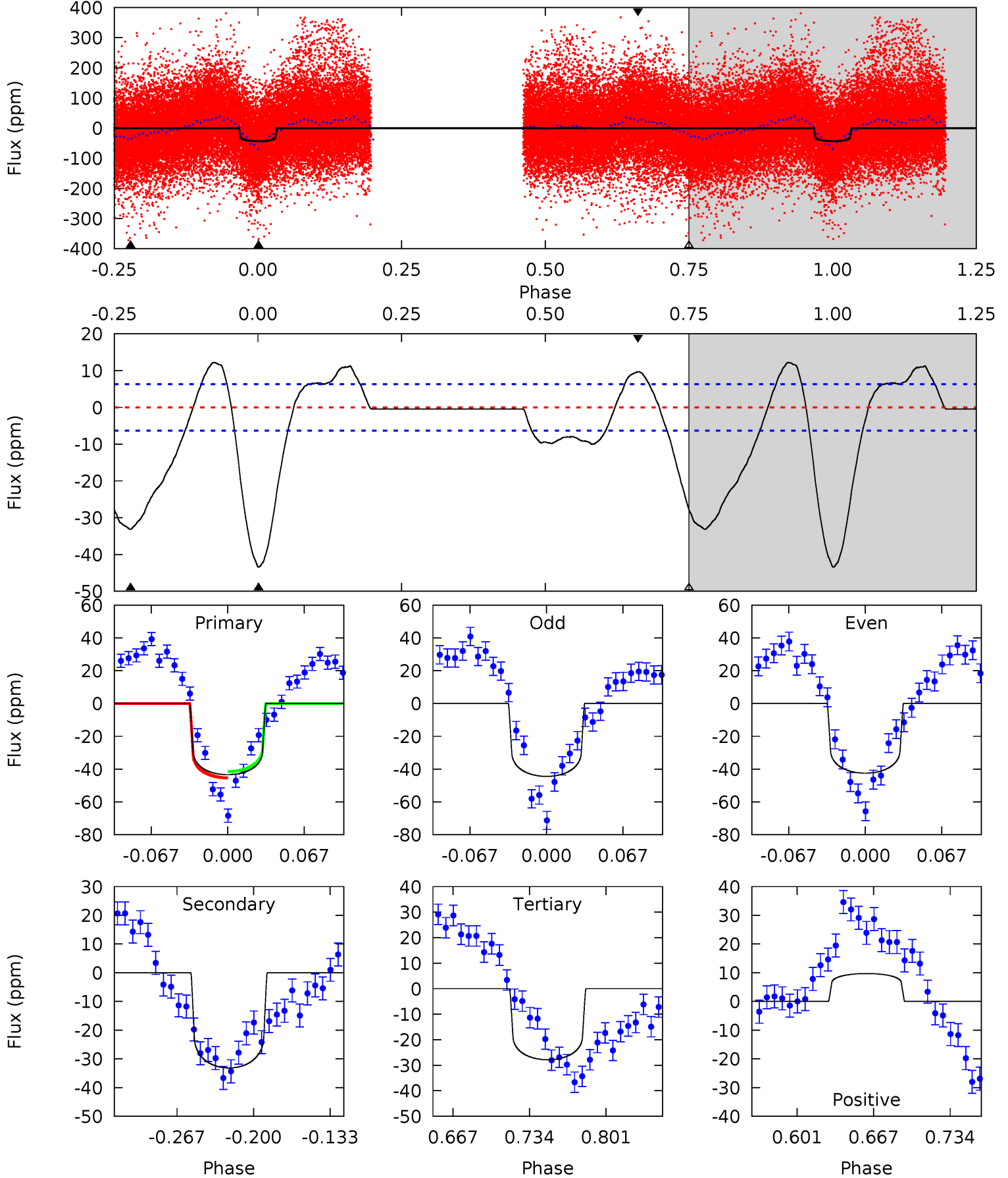
TCE 008374396-02     $P = 7.215300$  Days     $T_0 = 132.677836$  (BKJD)



# DV Model-Shift Uniqueness Test

008374396-02, P = 7.215496 Days, E = 125.480118 Days

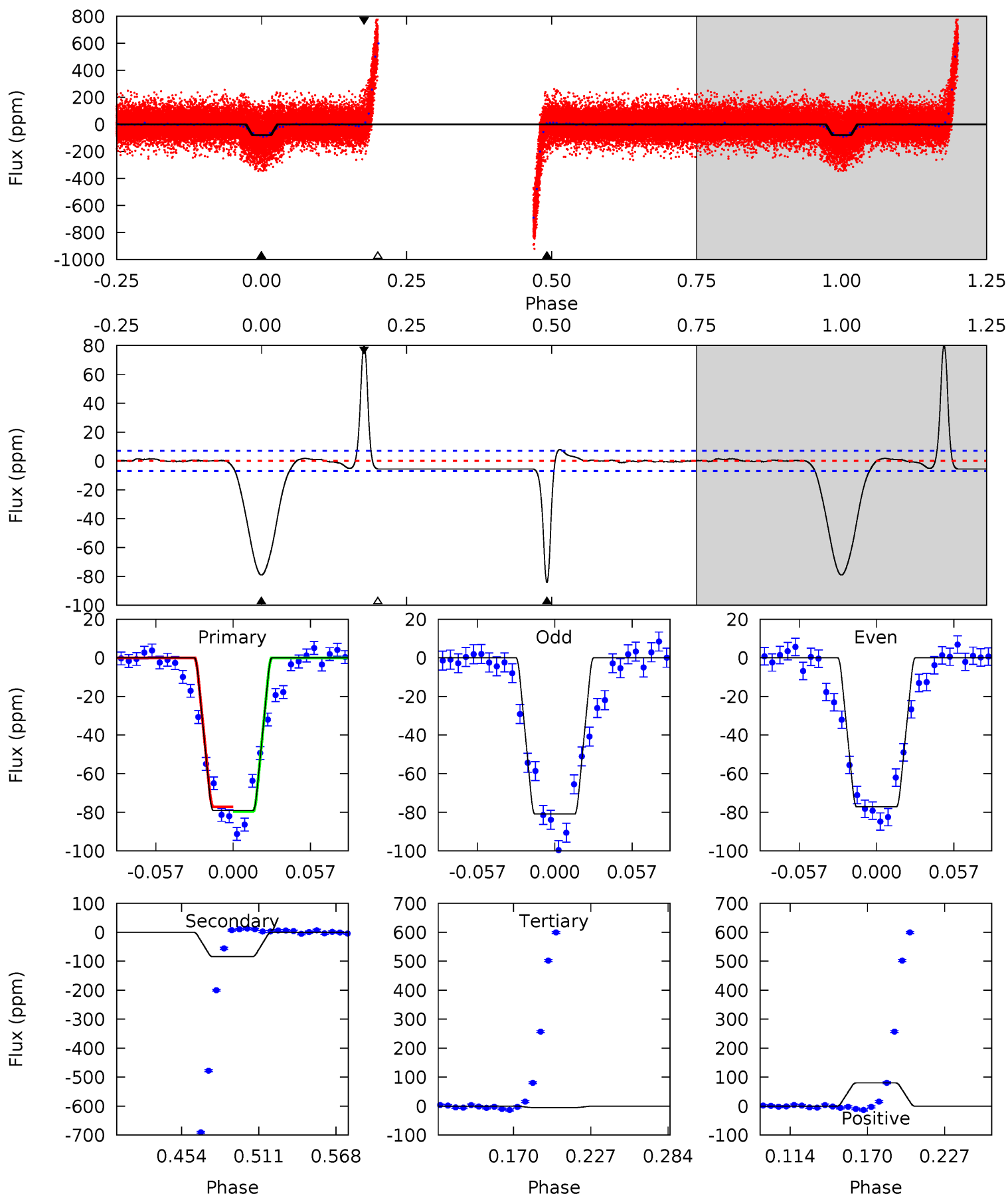
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
32.0	24.4	20.5	7.15	4.65	1.83	6.74	11.5	24.8	3.92	17.3	0.73	1.03	0.22	1.40



# Alt Model-Shift Uniqueness Test

008374396-02, P = 7.215300 Days, E = 125.462536 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
53.1	56.5	3.74	53.6	4.68	1.90	7.29	49.3	-0.57	52.8	2.91	1.28	0.96	0.49	0.62





### Stellar Parameters For KIC 008374396

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$8982^{+249}_{-427}$	$4.111^{+0.124}_{-0.170}$	$0.070^{+0.200}_{-0.650}$	$2.123^{+0.656}_{-0.477}$	$2.122^{+0.393}_{-0.524}$	$0.312^{+0.237}_{-0.156}$
	+3%/-5%	+3%/-4%	+286%/-929%	+31%/-22%	+19%/-25%	+76%/-50%
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 008374396-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-33 \pm 1$	$1.49^{+0.28}_{-0.22}$	$2629^{+188}_{-170}$	$8313^{+602}_{-554}$	$72^{+24}_{-20}$
Alt.	$-84 \pm 1$	$2.16^{+0.37}_{-0.32}$	$2626^{+184}_{-177}$	$8823^{+484}_{-518}$	$86^{+25}_{-21}$

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

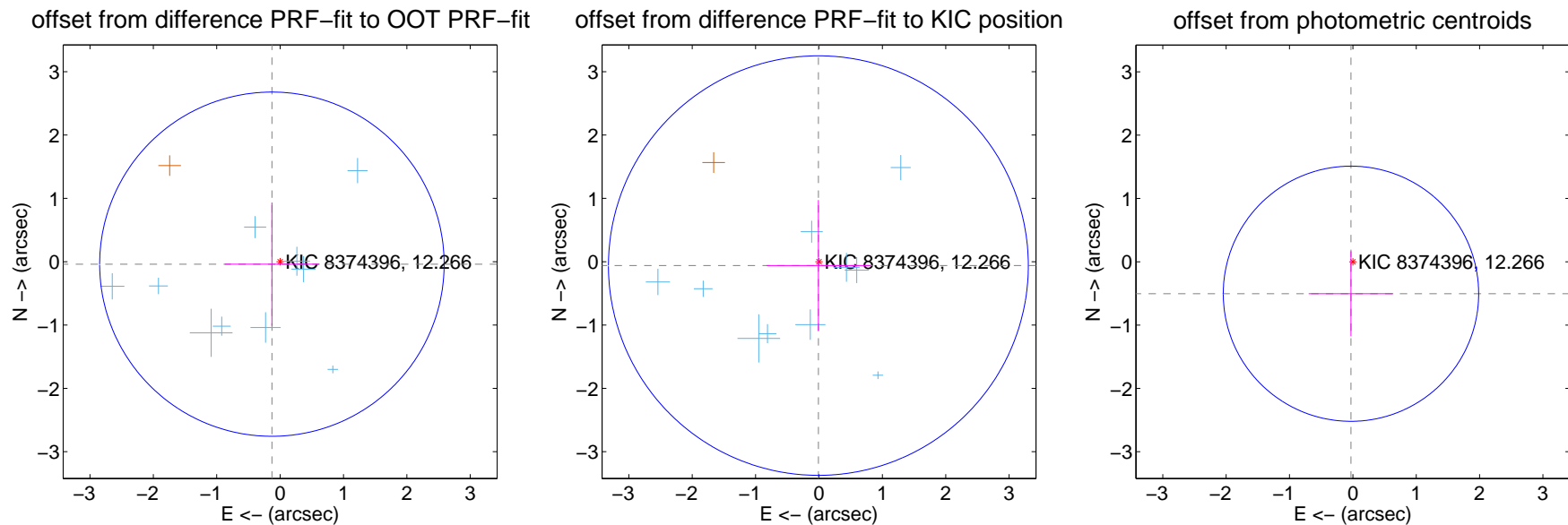
## DV Centroid Data

Supplemental centroid analysis for 008374396-02. Kepler magnitude: 12.27. Transit SNR 17.40

There are 10 quarters with good PRF difference image offsets

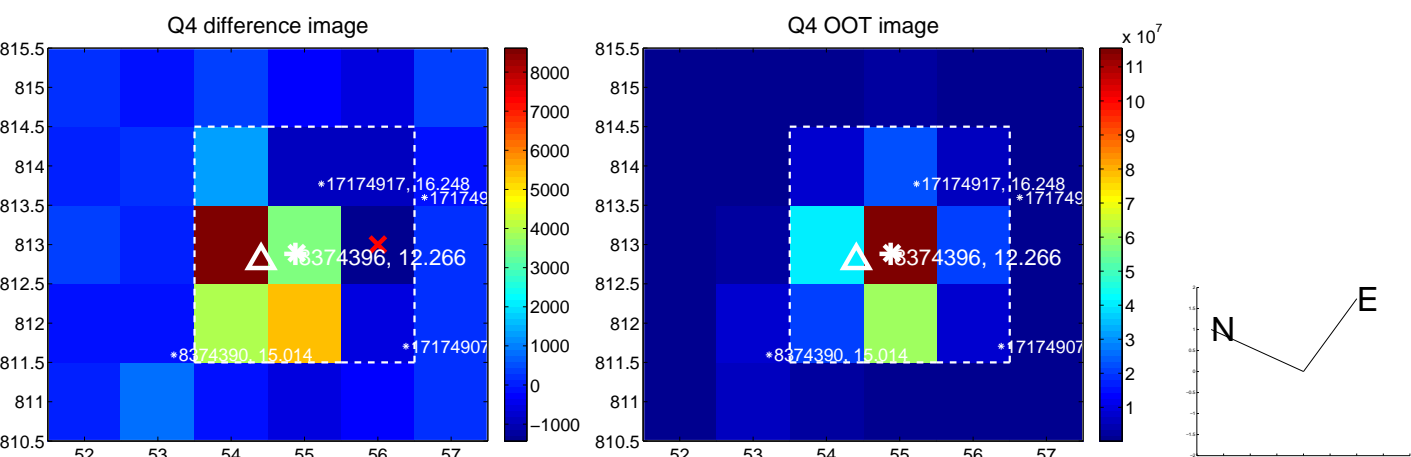
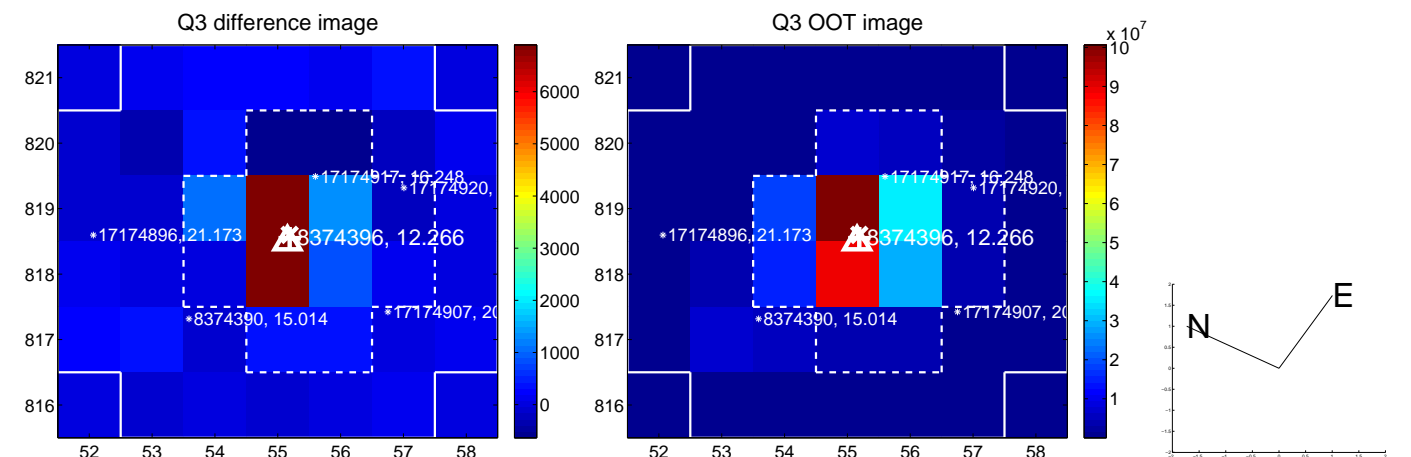
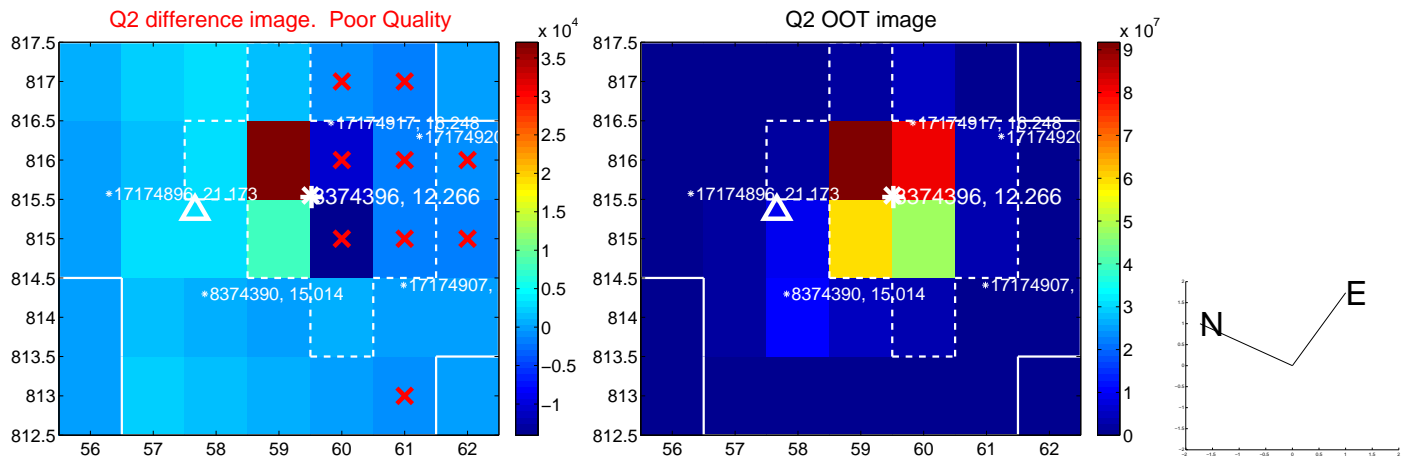
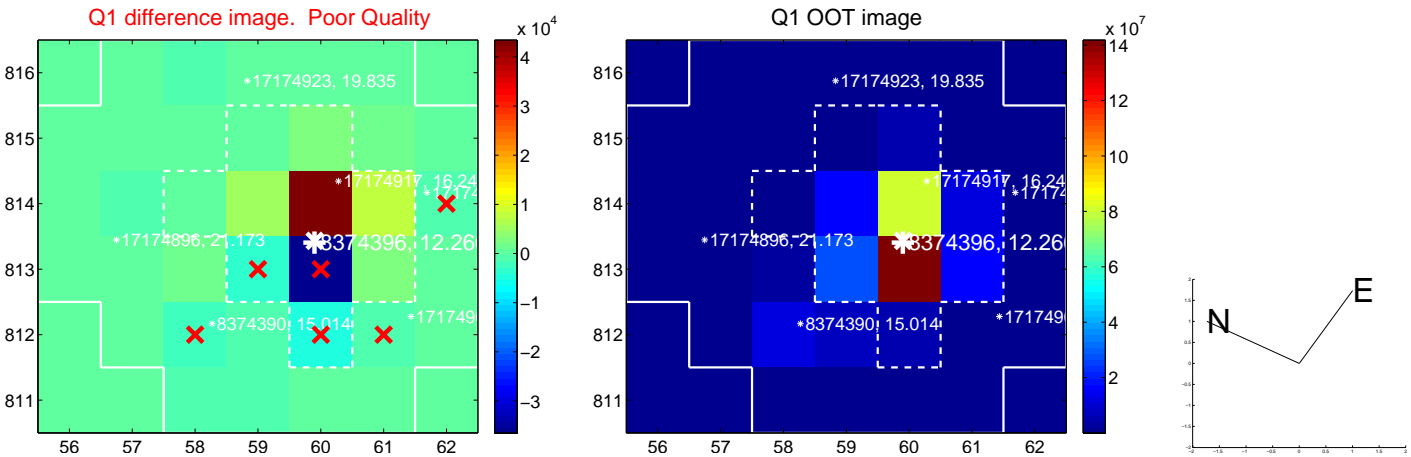
The direct PRF centroid is offset from the target star catalog position by about 0.16 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.135 \pm 0.906$	0.15	$0.129 \pm 0.745$	$-0.039 \pm 0.973$
PRF-fit source offset from KIC position	$0.062 \pm 1.104$	0.06	$0.009 \pm 0.816$	$-0.061 \pm 1.034$
photometric centroid source offset	$0.51 \pm 0.67$	0.75	$0.03 \pm 0.67$	$-0.51 \pm 0.67$

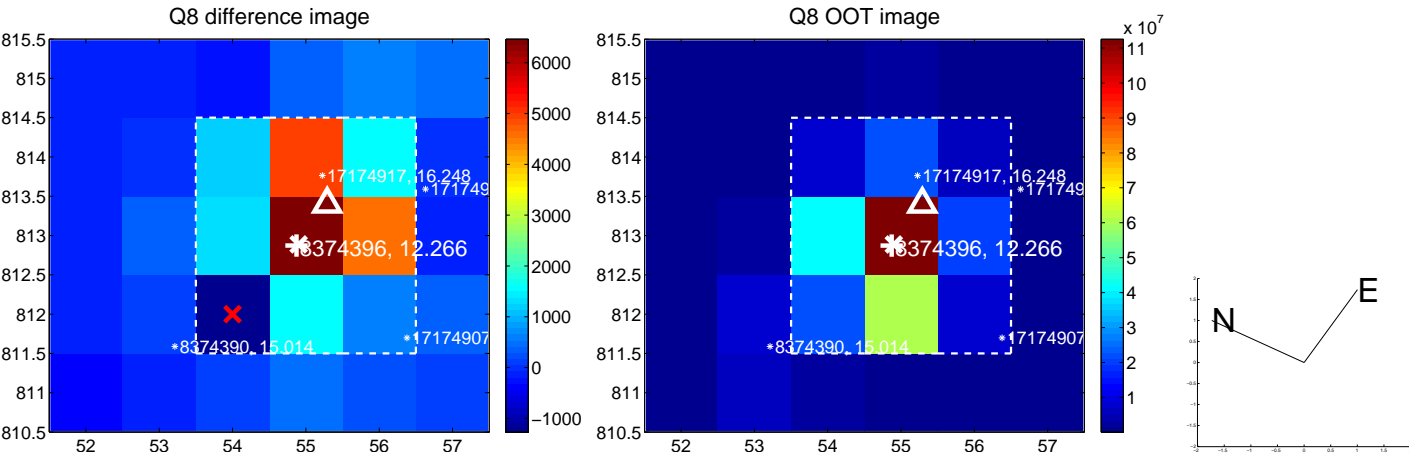
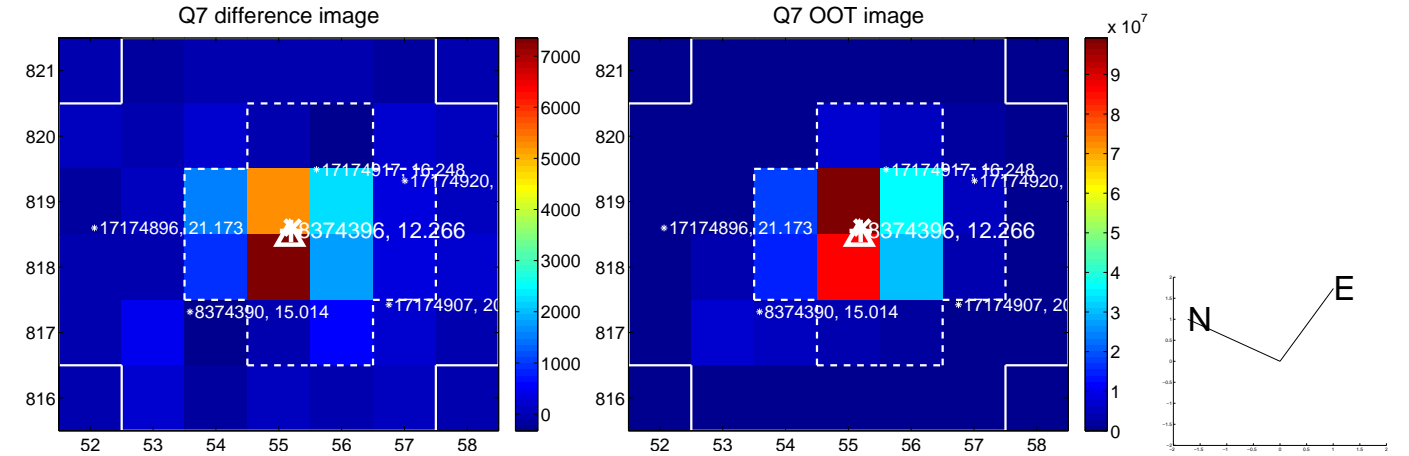
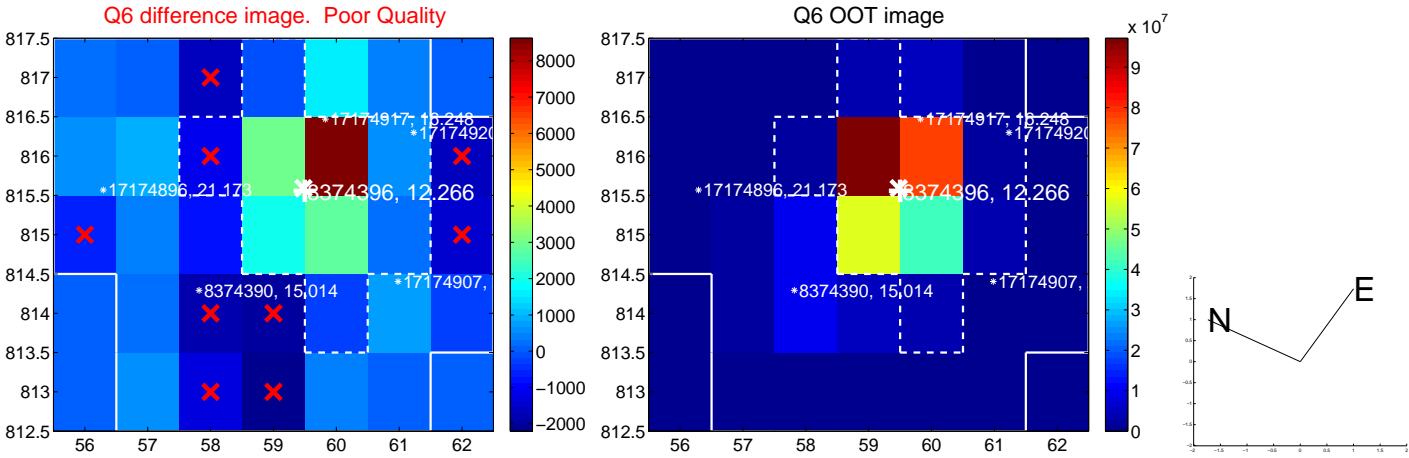
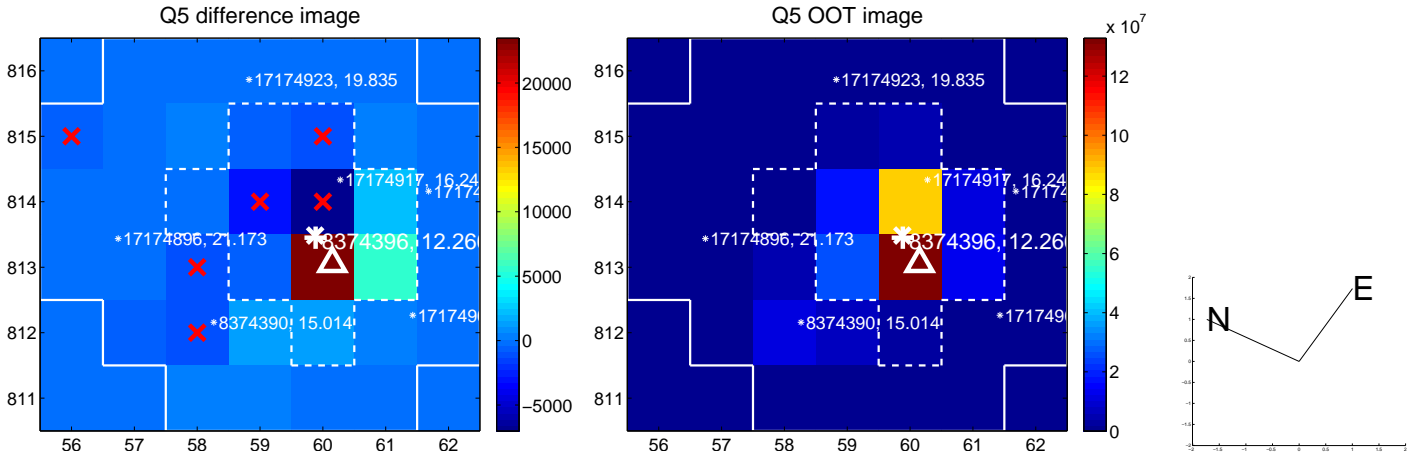


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

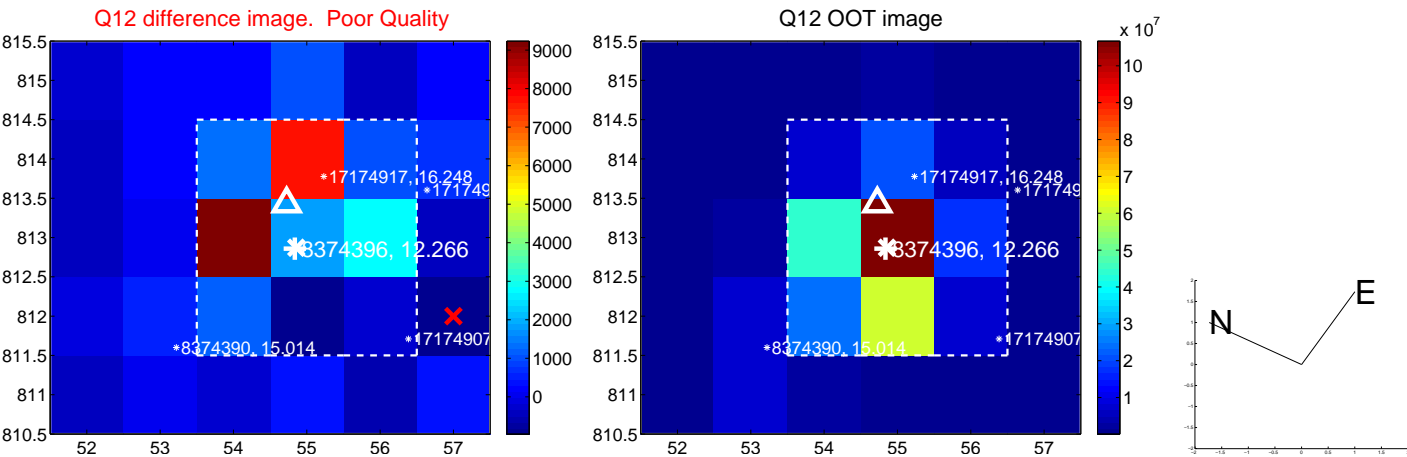
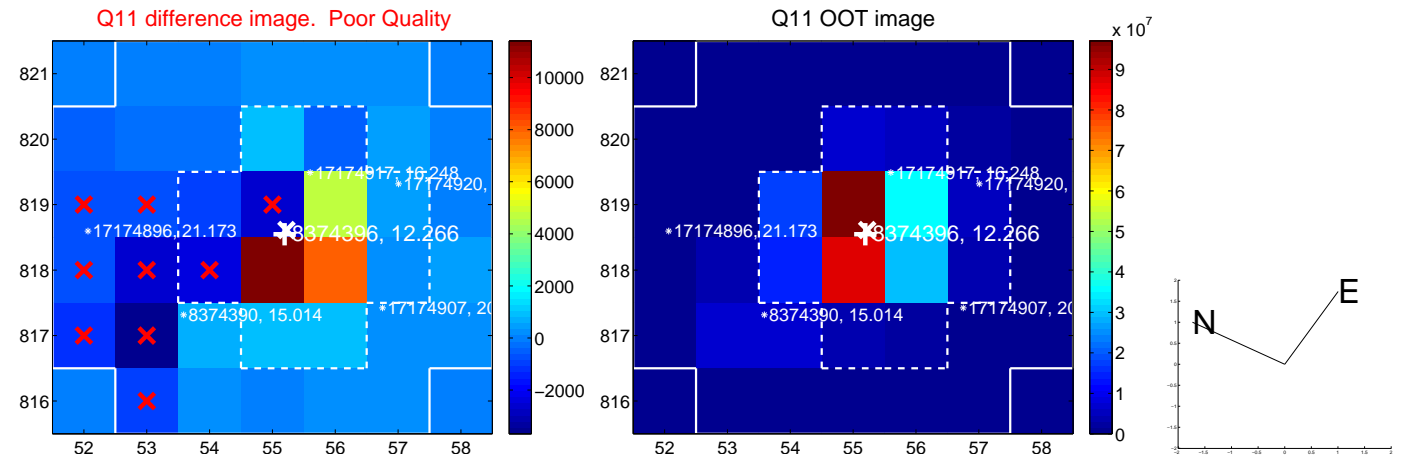
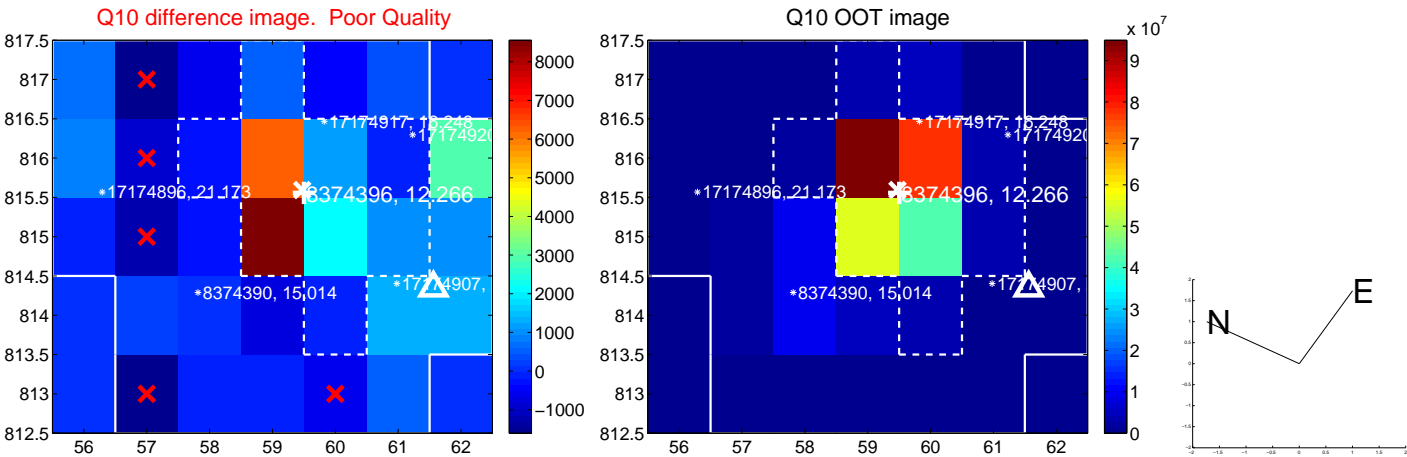
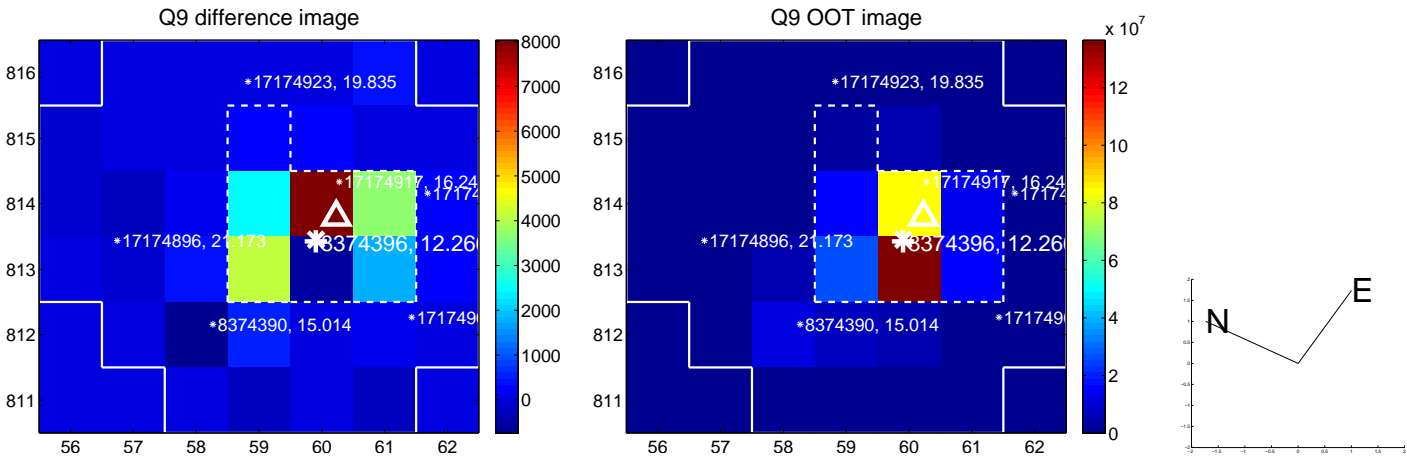
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



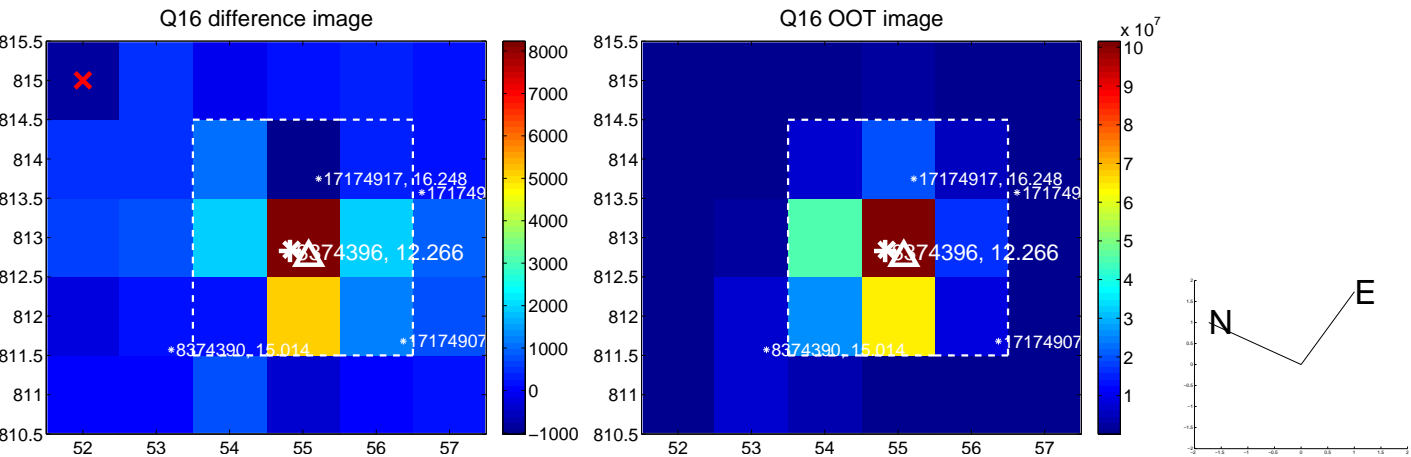
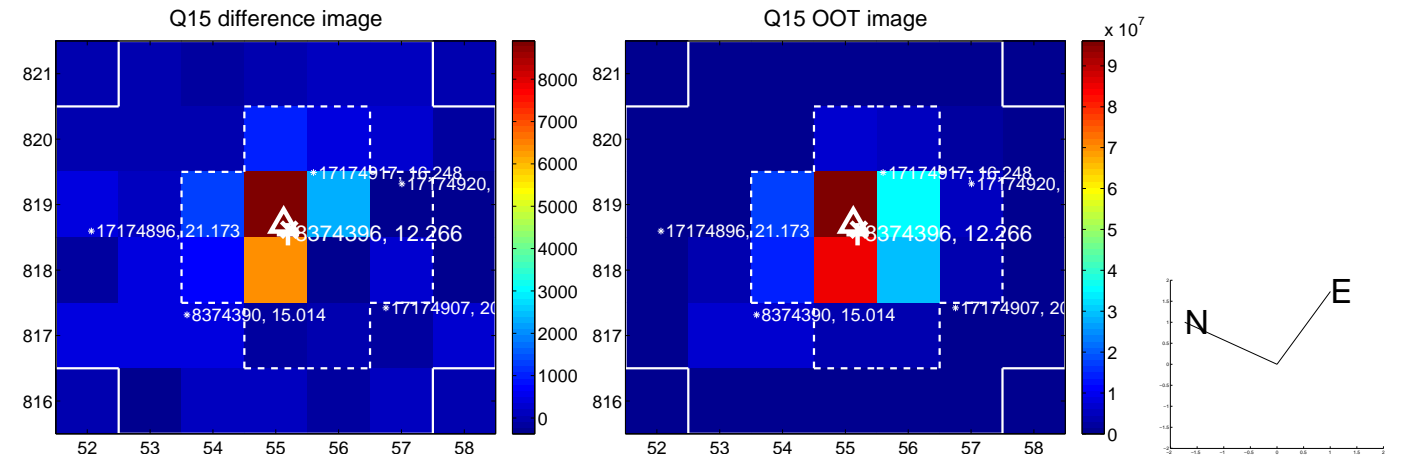
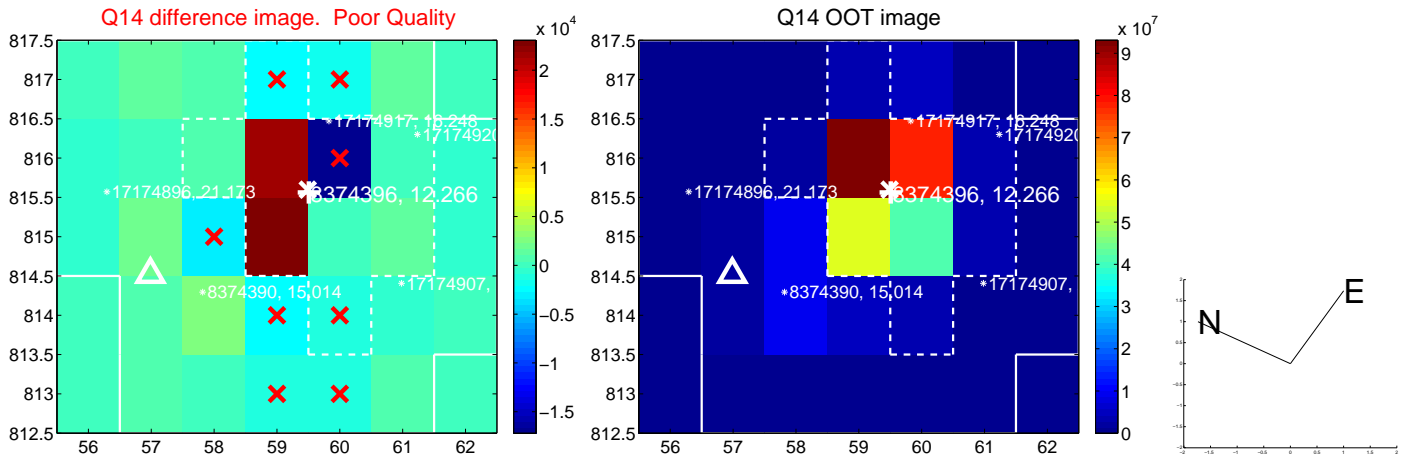
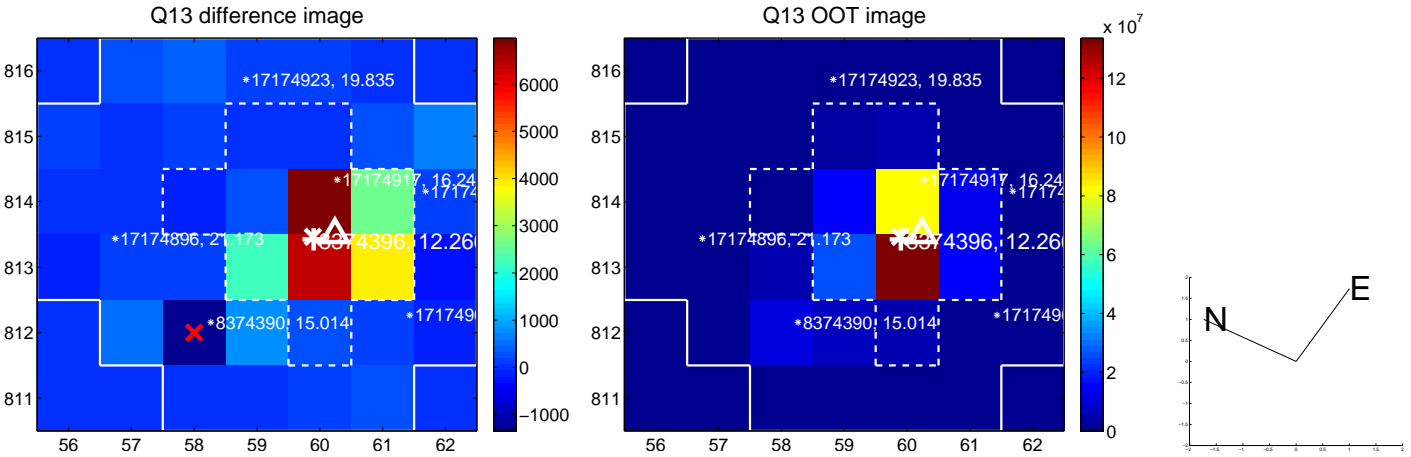
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

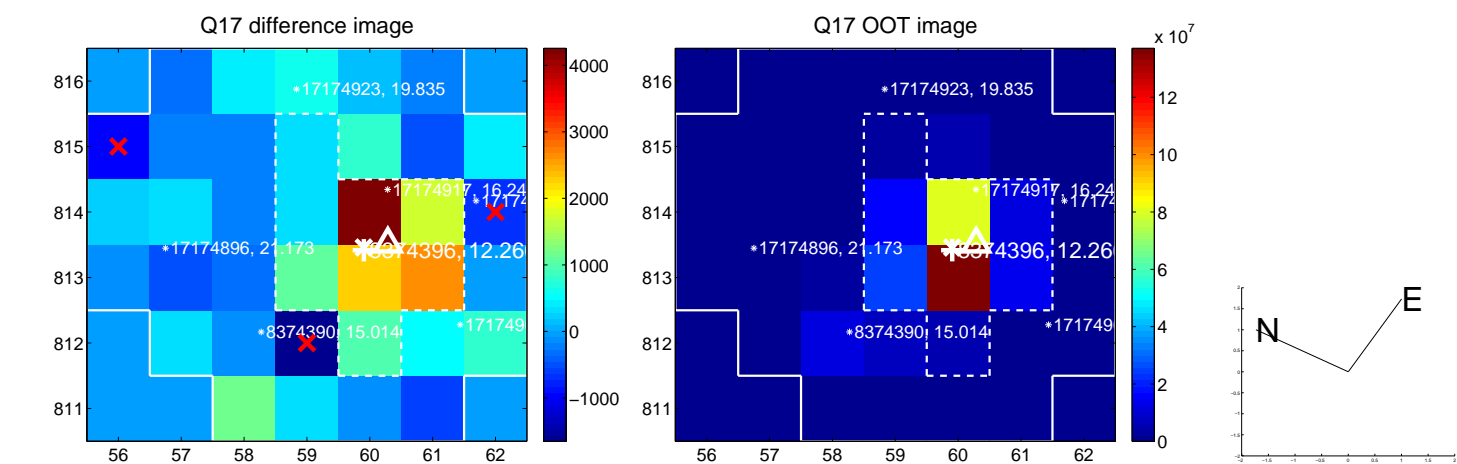


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

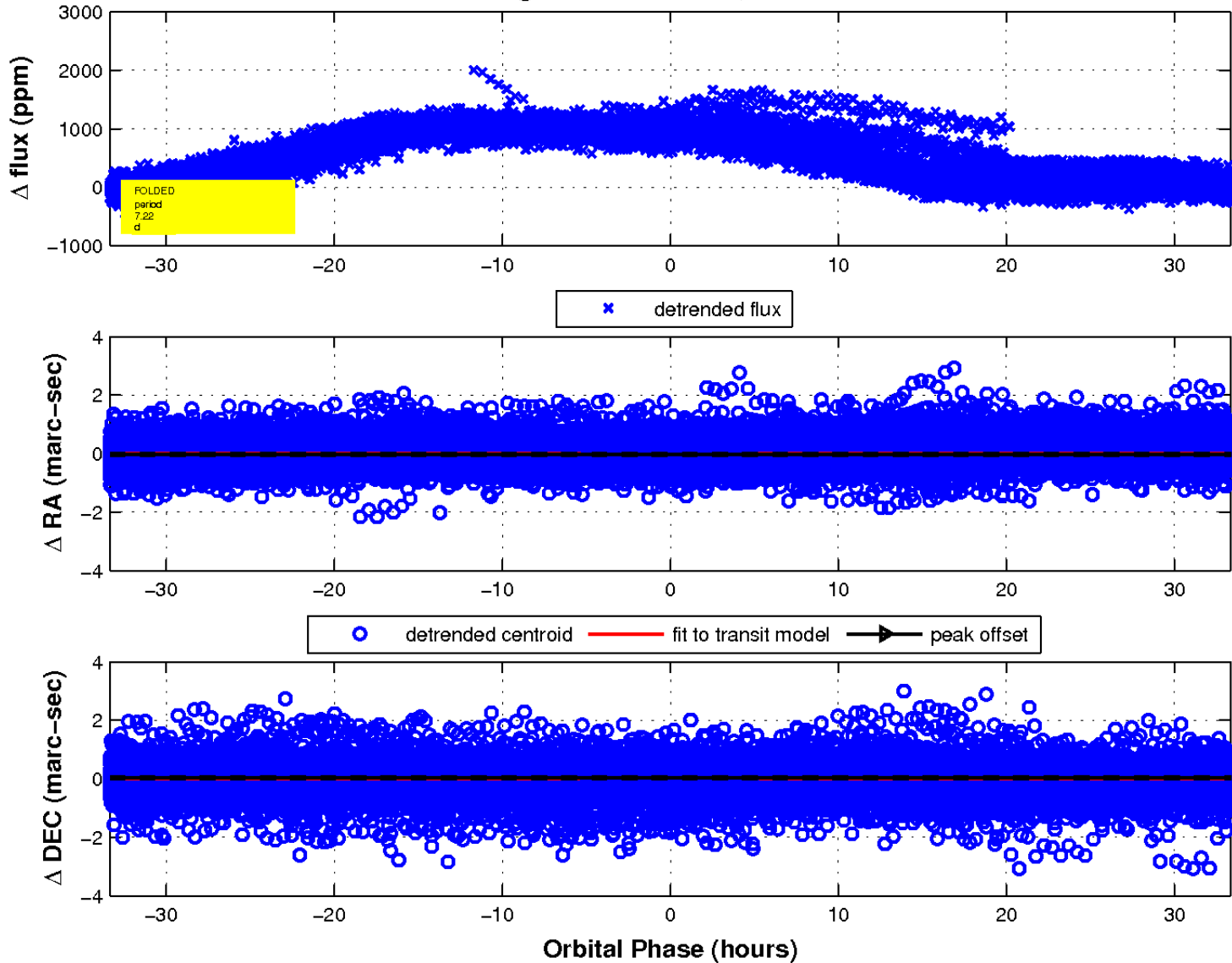




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

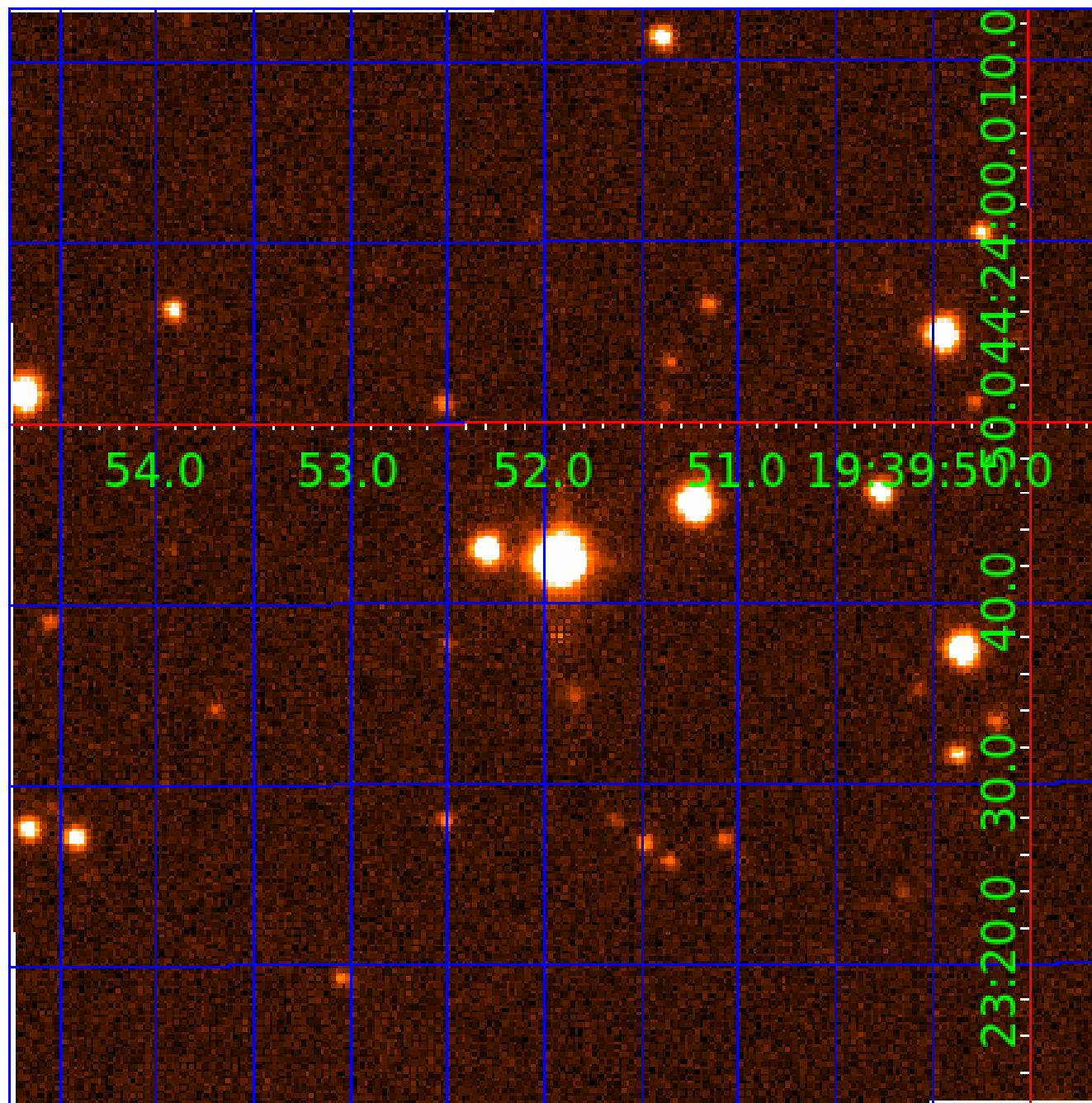


fluxWeightedCentroids, Planet 2 of 4



UKIRT Image

Declination



# KIC 008374396

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008374396-01	OBS	No	7.215300	135.090580	69.0	15.320	17.9	20.5	2.12	8982	3.40	2978.61
008374396-02	OBS	No	7.215496	132.695614	41.5	11.113	18.5	17.4	2.12	8982	1.48	2978.51
008374396-03	OBS	No	7.216365	138.104223	50.6	15.000	11.1	-1.0	2.12	8982	1.54	2978.03
008374396-04	OBS	No	68.226168	165.552207	83.6	4.916	9.2	5.0	2.12	8982	2.30	148.97

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008374396-01	OBS	FP	0.00	1	0	0	0	LPP_DV
008374396-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_POS_ALT—SAME_NTL_PERIOD
008374396-03	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_NOFITS
008374396-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_MEAS

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

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

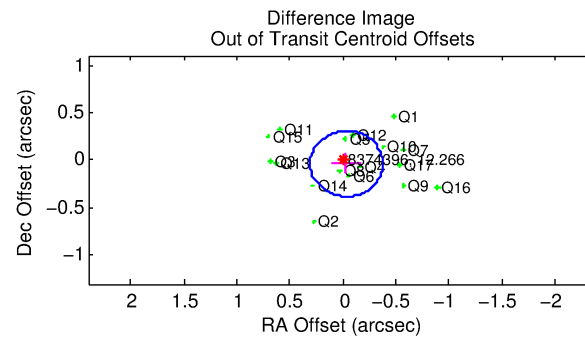
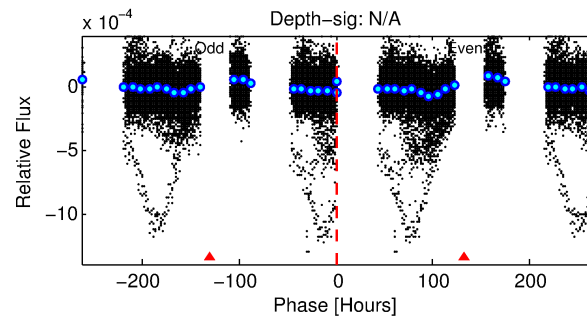
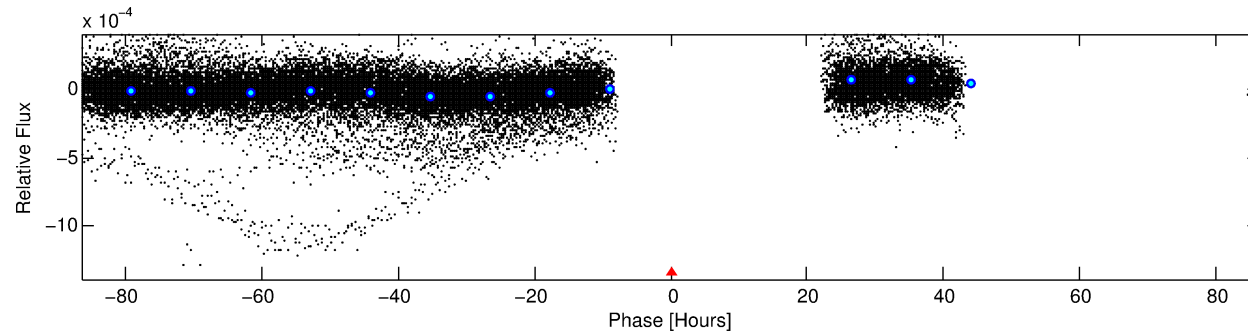
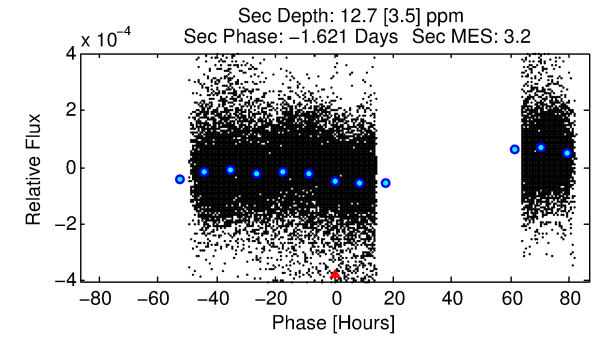
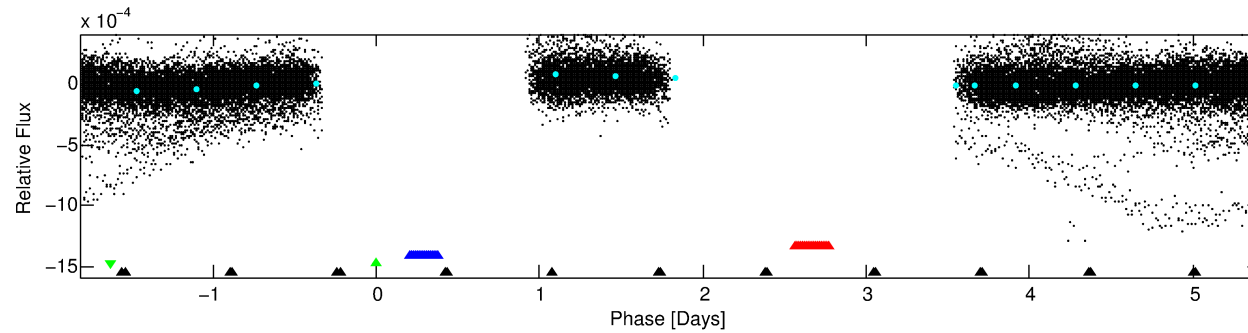
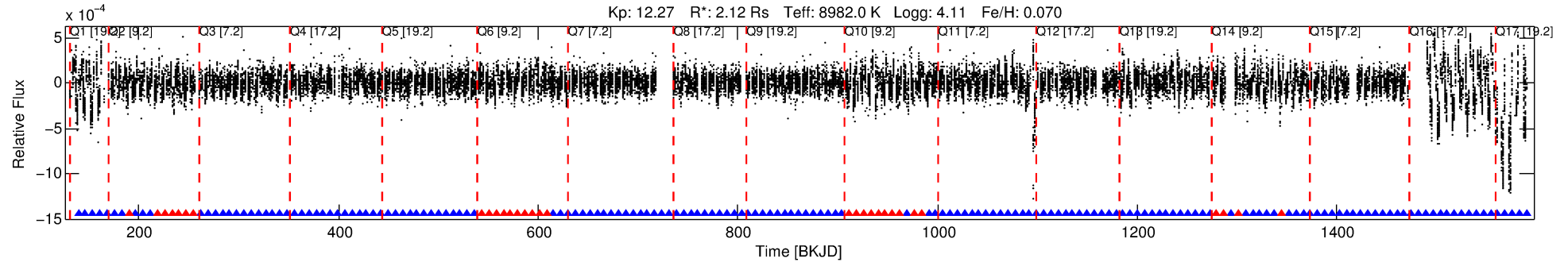
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008374396-03

No Significant Match Found

# DV One-Page Summary

KIC: 8374396 Candidate: 3 of 4 Period: 7.216 d



## TPS TCE Results:

Period = 7.21637 d  
Epoch = 138.1042 BKJD

DV fit results are unavailable

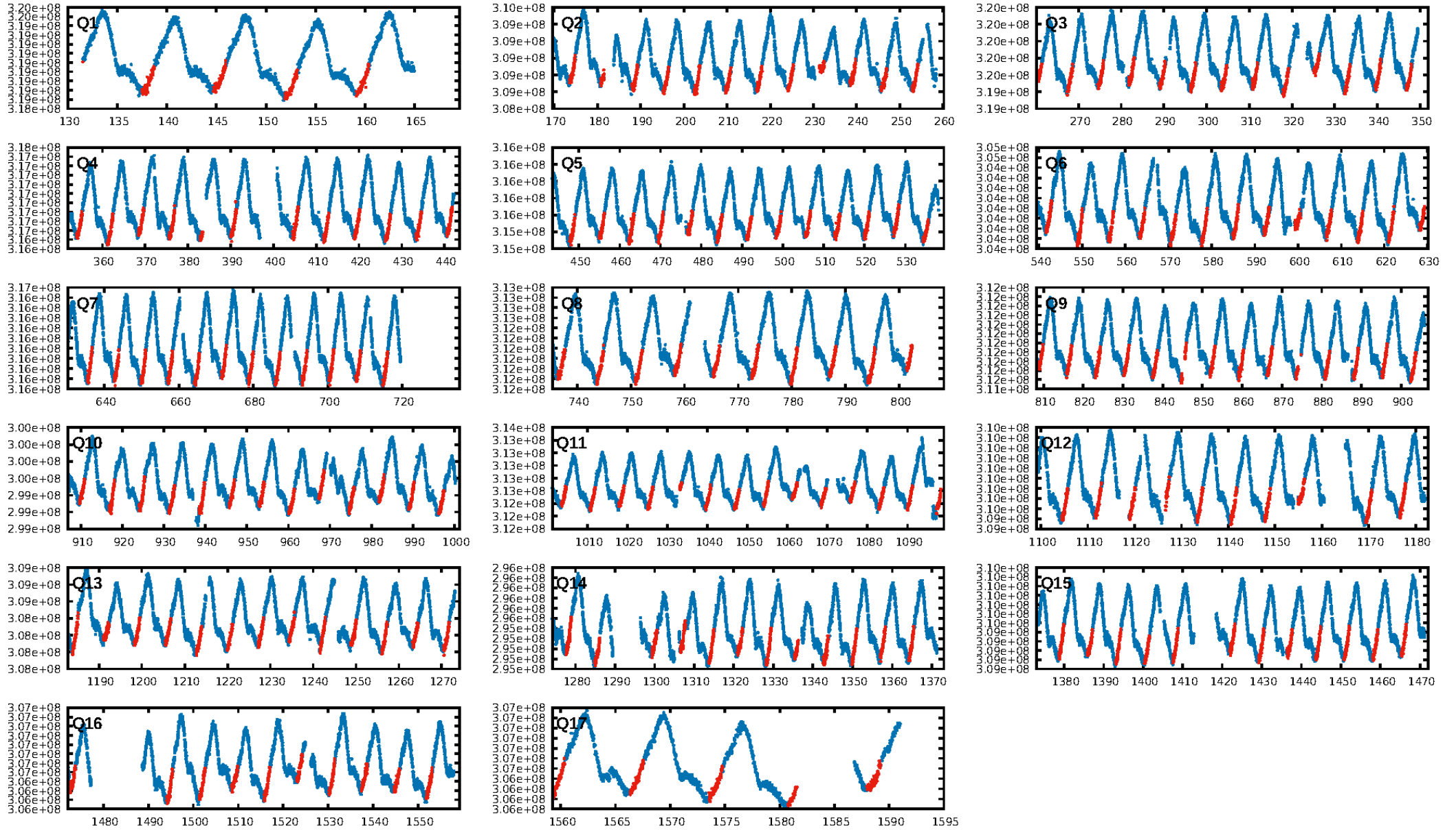
## DV Diagnostic Results:

ShortPeriod-sig: 0.1% [0.00σ]  
LongPeriod-sig: 100.0% [92.76σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 1.16e-18  
RollingBand-fgt: 0.83 [147/178]  
GhostDiagnostic-chr: 52.58  
Centroid-sig: 0.0%  
Centroid-so: 0.613 arcsec [25.86σ]  
OotOffset-rm: 0.051 arcsec [0.45σ]  
KicOffset-rm: 0.187 arcsec [1.61σ]  
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]

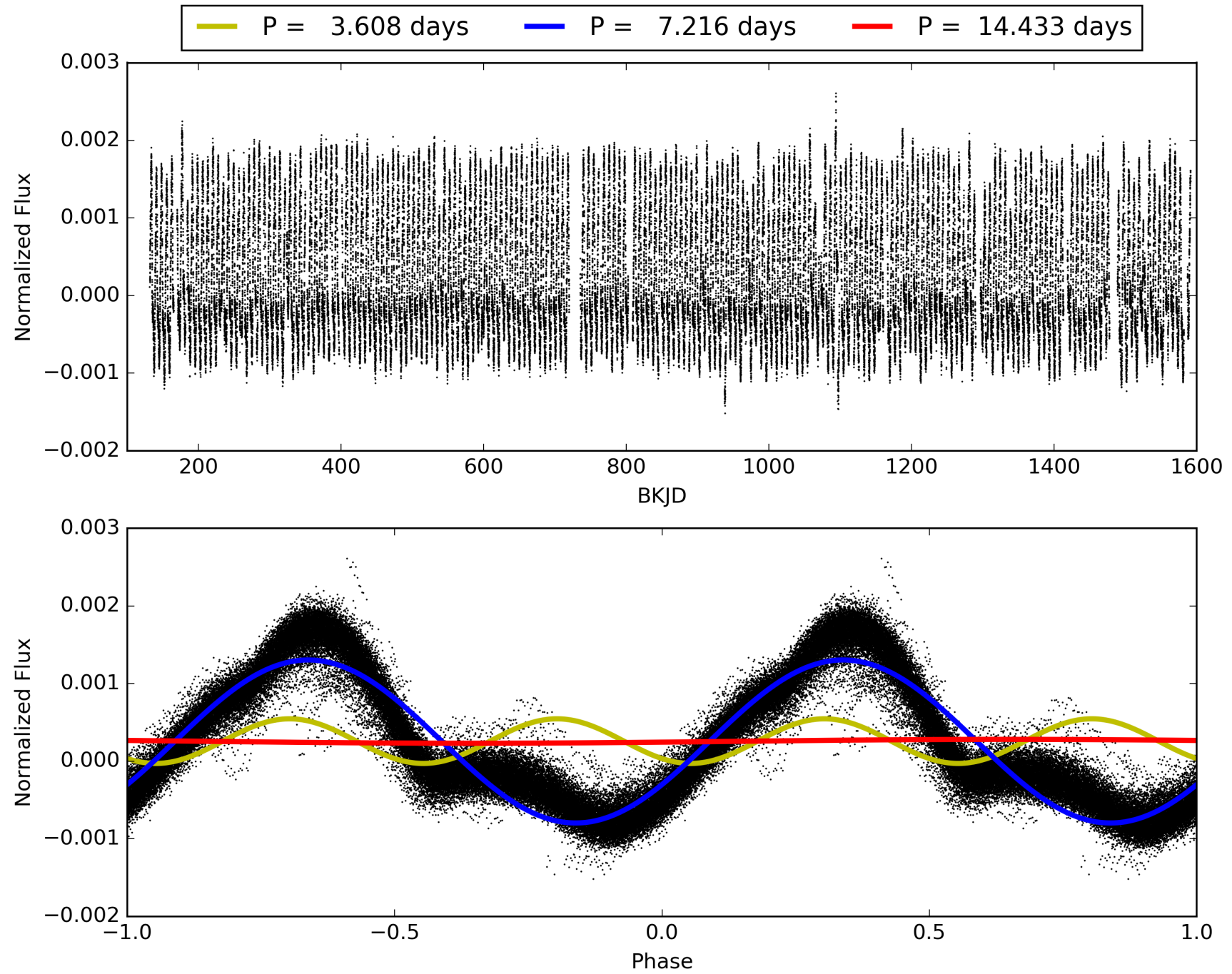
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 13:30:32 Z

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

# TCE 008374396-03, PDC Light Curves



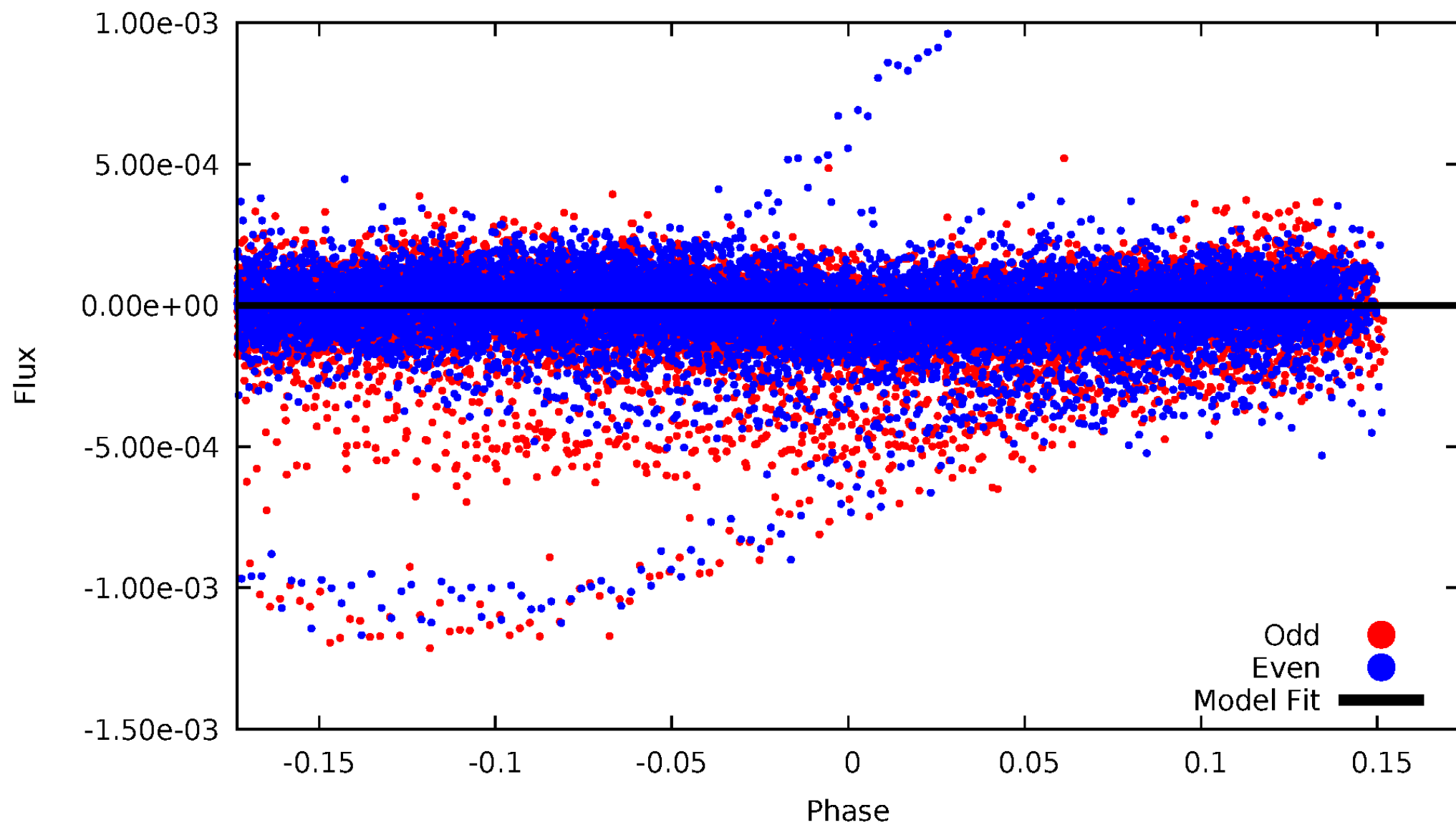
TCE 008374396-03





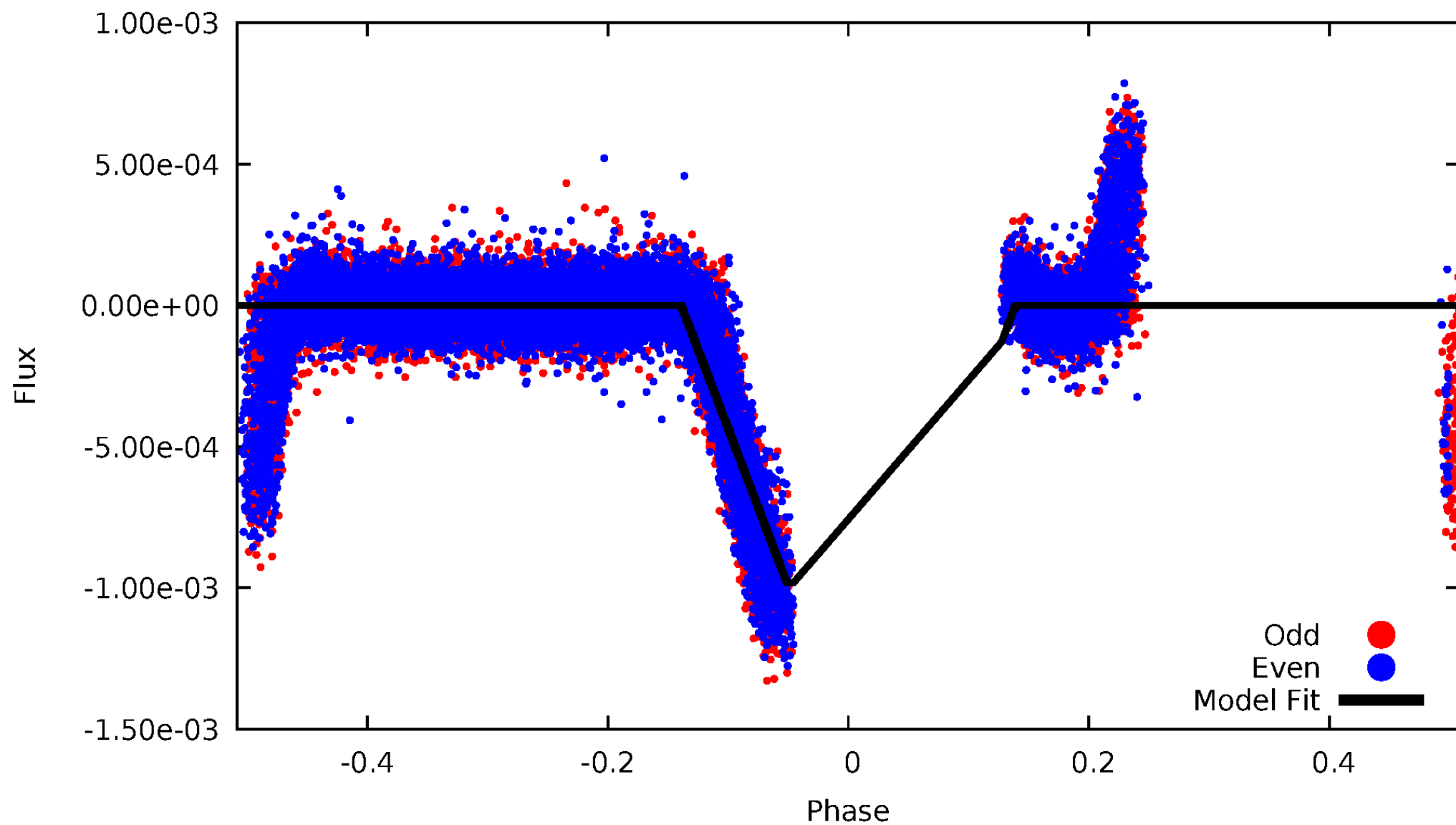
# DV Odd/Even

TCE 008374396-03



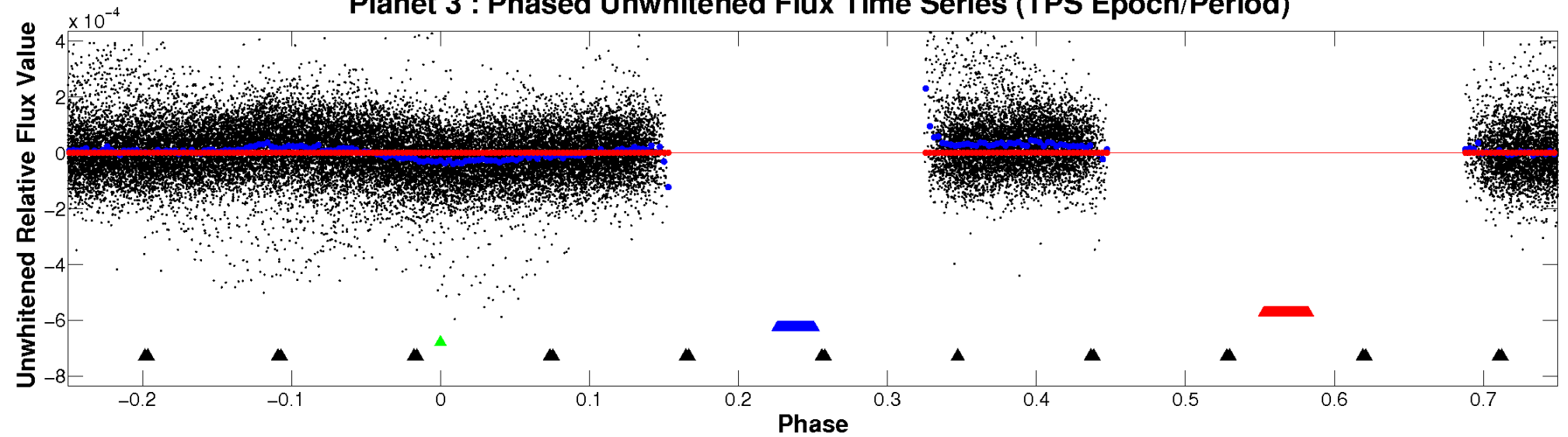
# ALT Odd/Even

TCE 008374396-03



# Non-Whitened Vs. Whitened Light Curve

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

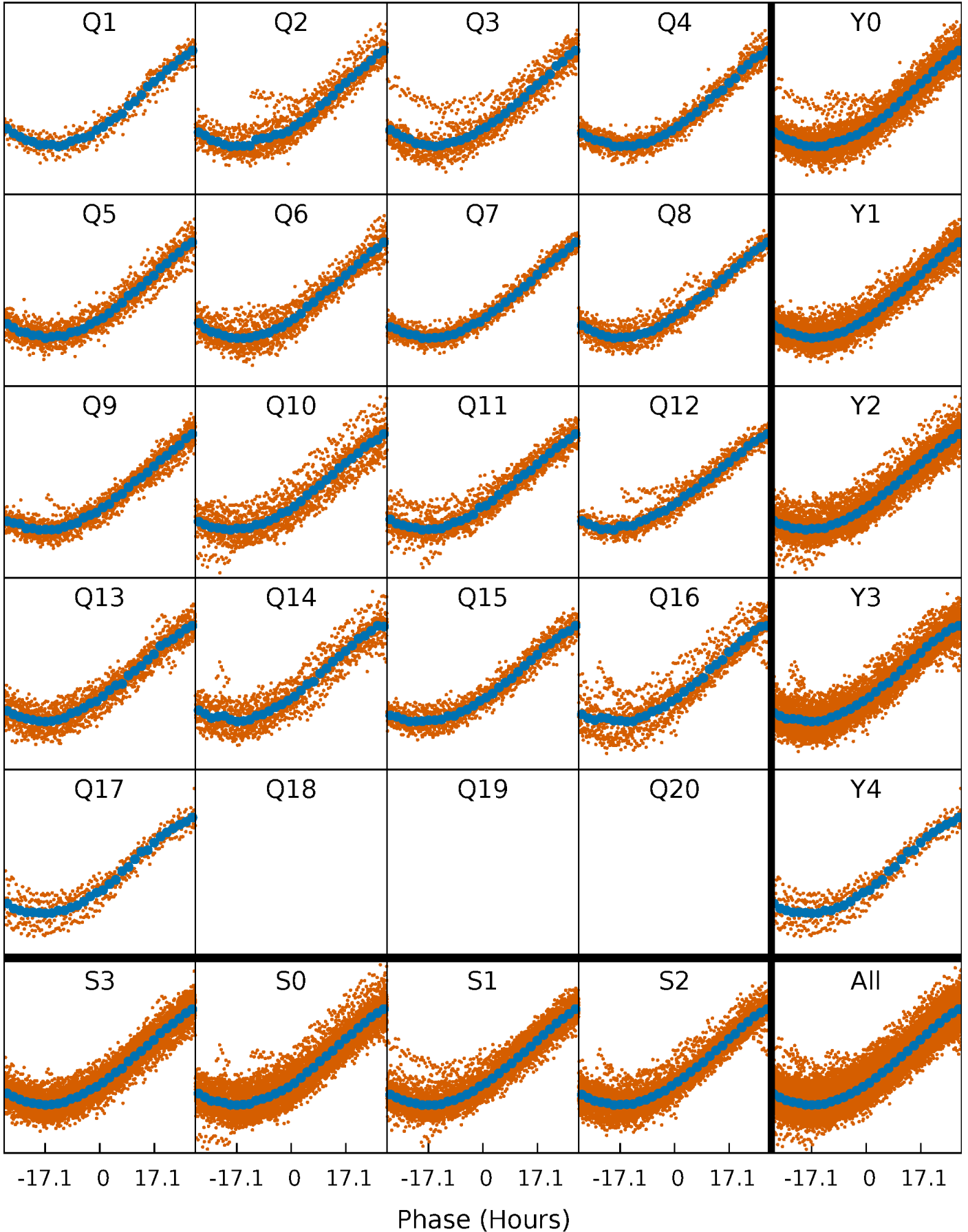


**Planet 3 : Phased Whitened Flux Time Series (TPS Epoch/Period)**



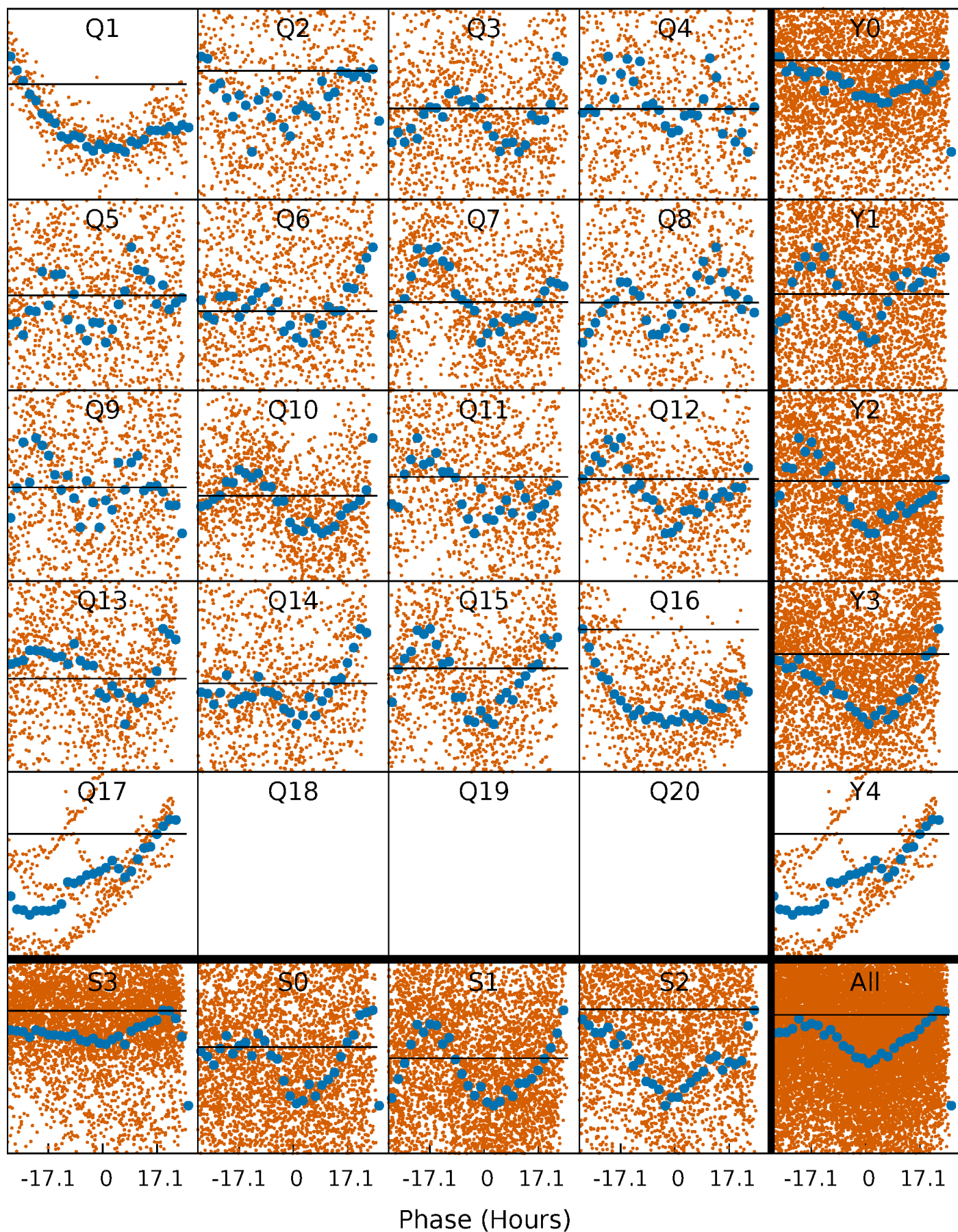
# PDC Quarter-Phased Transit Curves

TCE 008374396-03   P= 7.216365 Days    $T_0=138.104222$  (BKJD)



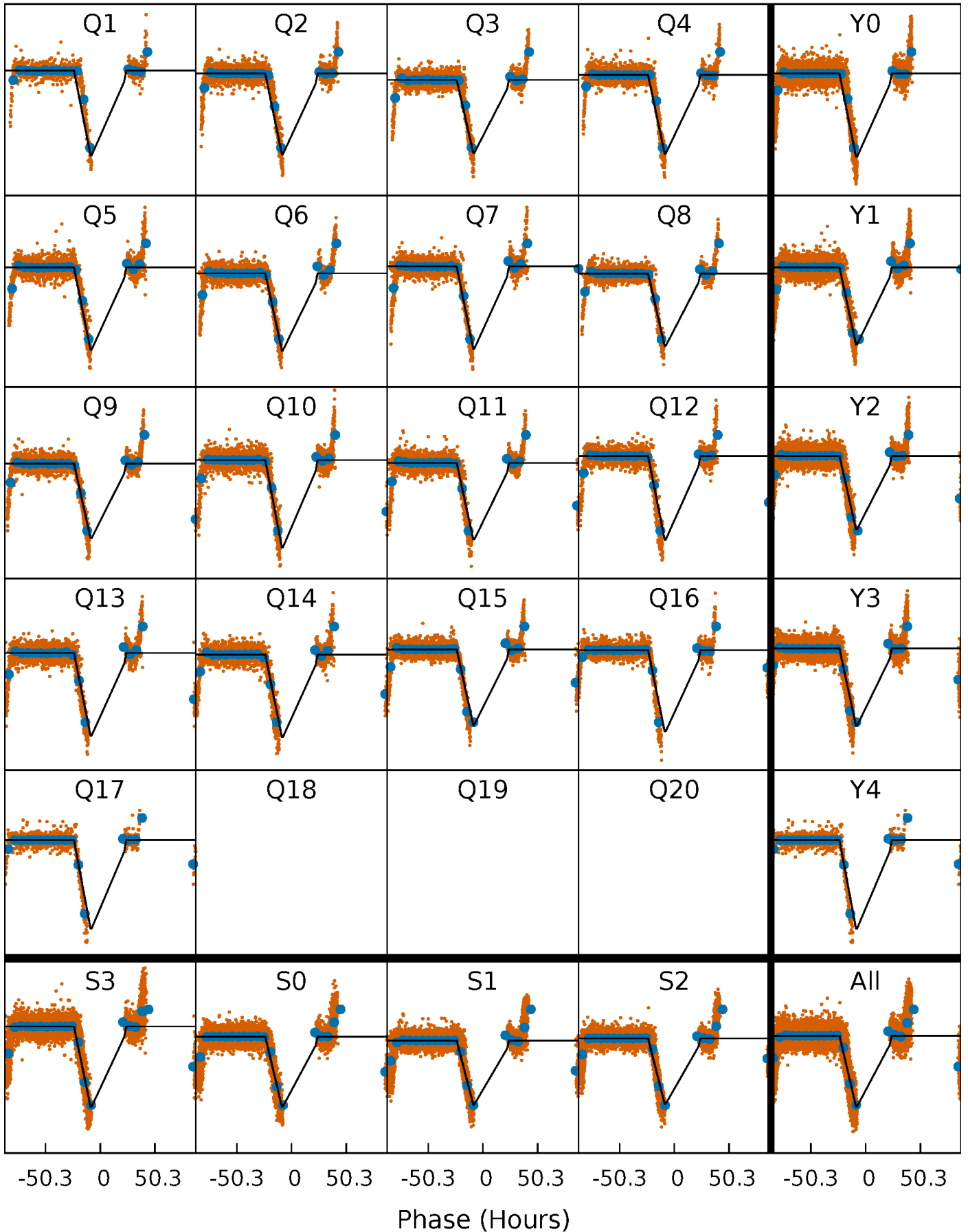
# DV Quarter-Phased Transit Curves

TCE 008374396-03   P= 7.216365 Days    $T_0=138.104222$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 008374396-03 P= 7.216365 Days  $T_0=139.529557$  (BKJD)

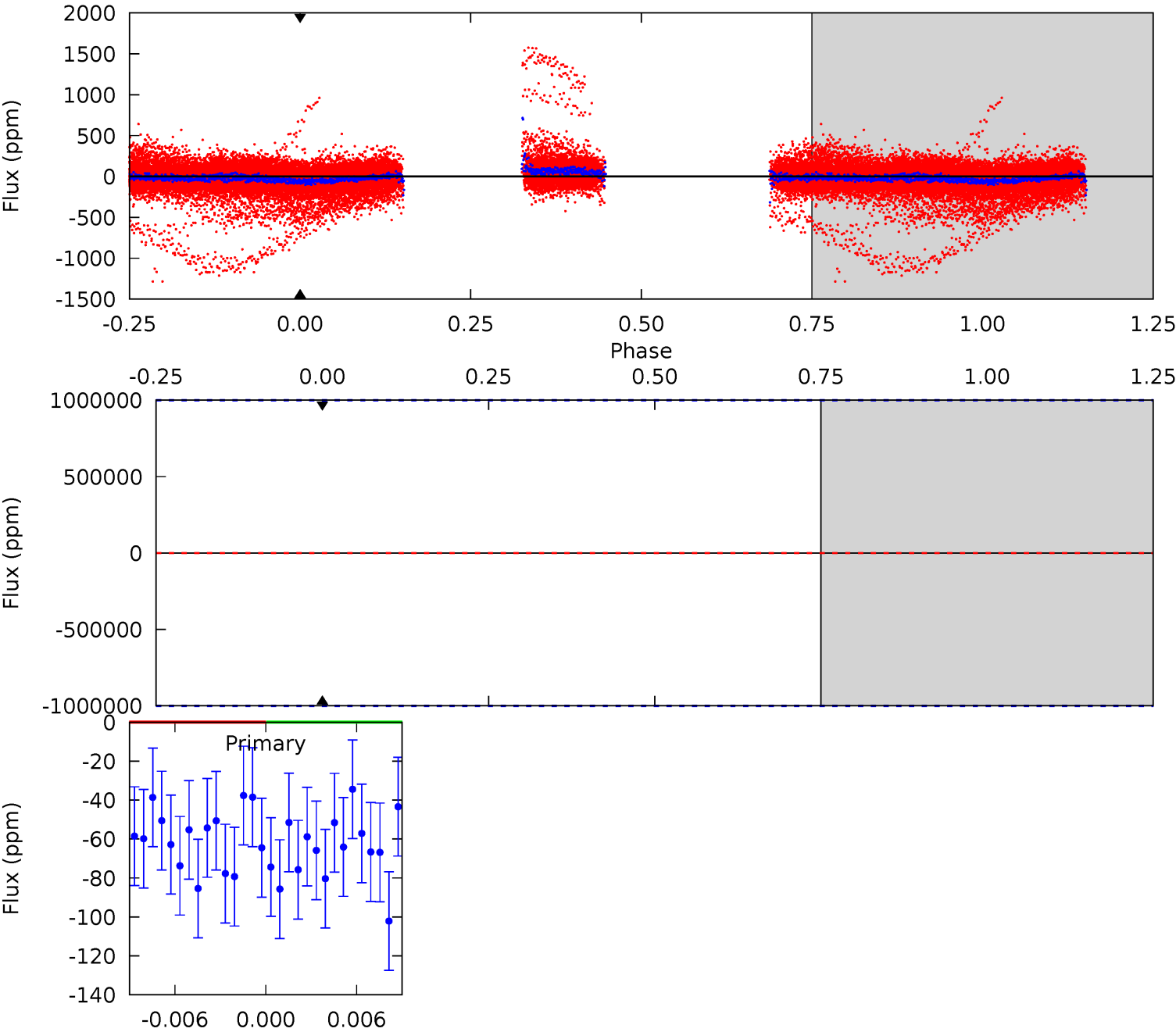




DV Model-Shift Uniqueness Test

008374396-03, P = 7.216365 Days, E = 130.887857 Days

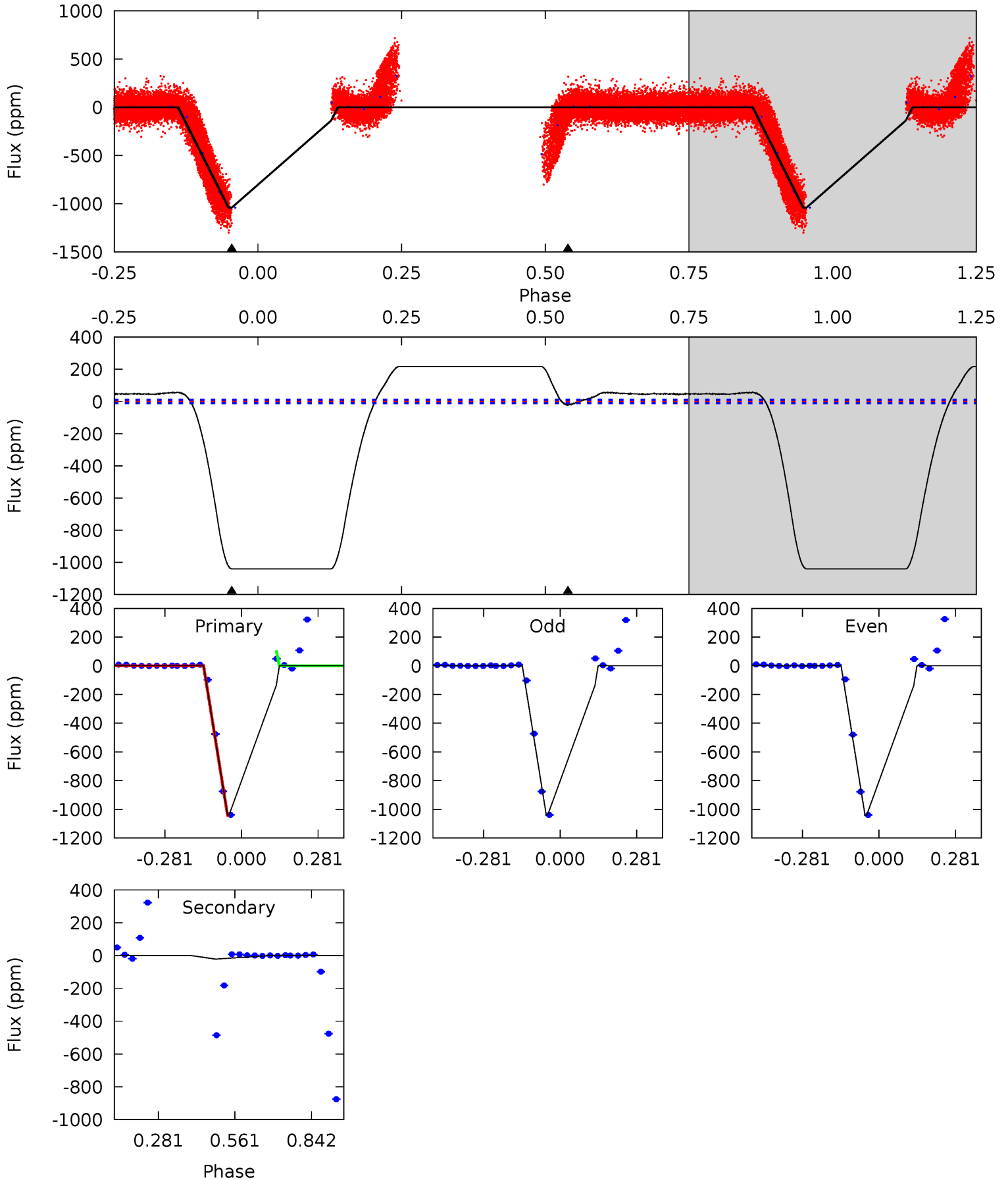
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



# Alt Model-Shift Uniqueness Test

008374396-03, P = 7.216365 Days, E = 125.096827 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
410.0	8.39	0	0	4.34	1.08	52.7	410.0	410.0	8.39	8.39	0.75	0.92	0.17	173.3



### Stellar Parameters For KIC 008374396

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$8982^{+249}_{-427}$	$4.111^{+0.124}_{-0.170}$	$0.070^{+0.200}_{-0.650}$	$2.123^{+0.656}_{-0.477}$	$2.122^{+0.393}_{-0.524}$	$0.312^{+0.237}_{-0.156}$
	+3%/-5%	+3%/-4%	+286%/-929%	+31%/-22%	+19%/-25%	+76%/-50%
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 008374396-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$0 \pm 1000000$	$16.08^{+18.04}_{-11.13}$	$2637^{+193}_{-187}$	$6614^{+74199}_{-64145}$	$29^{+3728}_{-2689}$
Alt.	$-21 \pm 3$	$19.41^{+18.73}_{-13.45}$	$2639^{+187}_{-171}$	$-2157^{+6028}_{-552}$	$0.263^{+2.550}_{-0.193}$

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

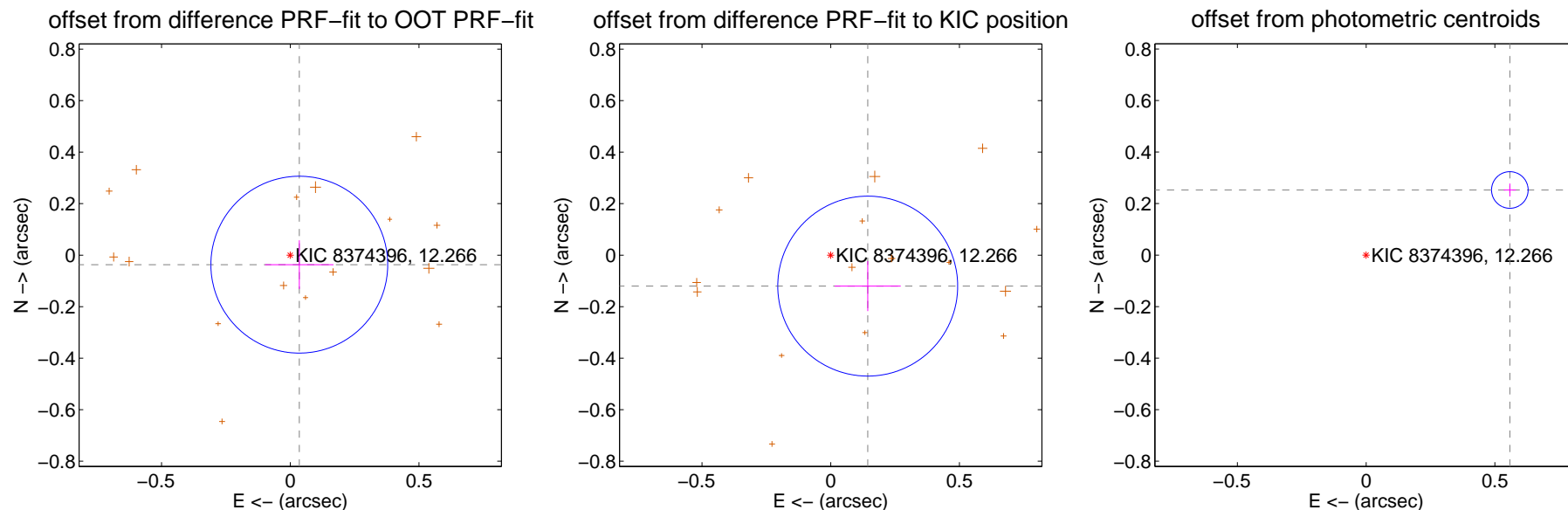
## DV Centroid Data

Supplemental centroid analysis for 008374396-03. Kepler magnitude: 12.27. Transit SNR -1.00

There are 0 quarters with good PRF difference image offsets

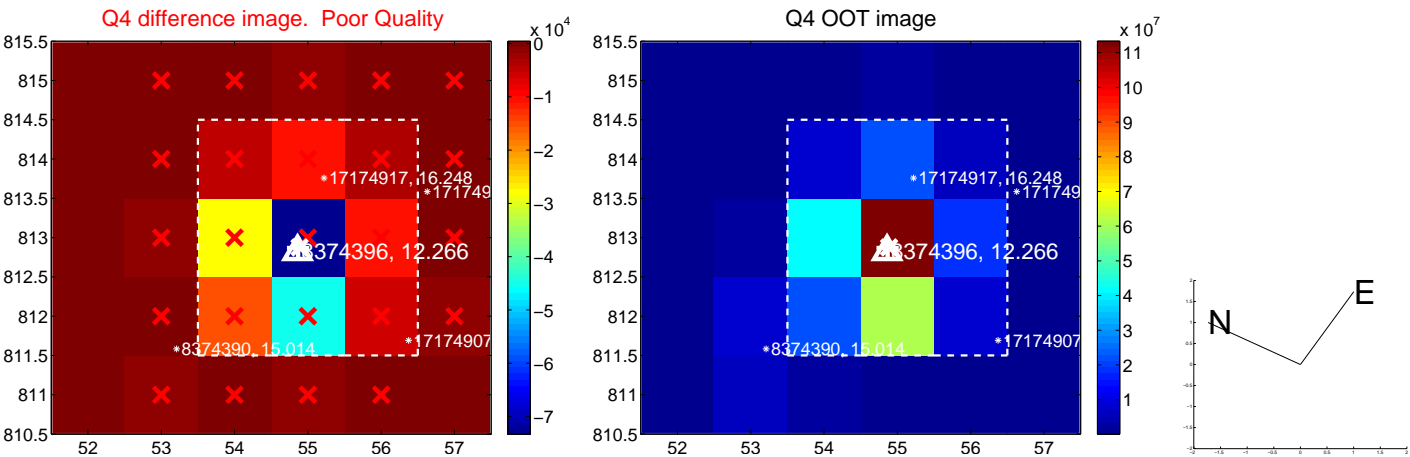
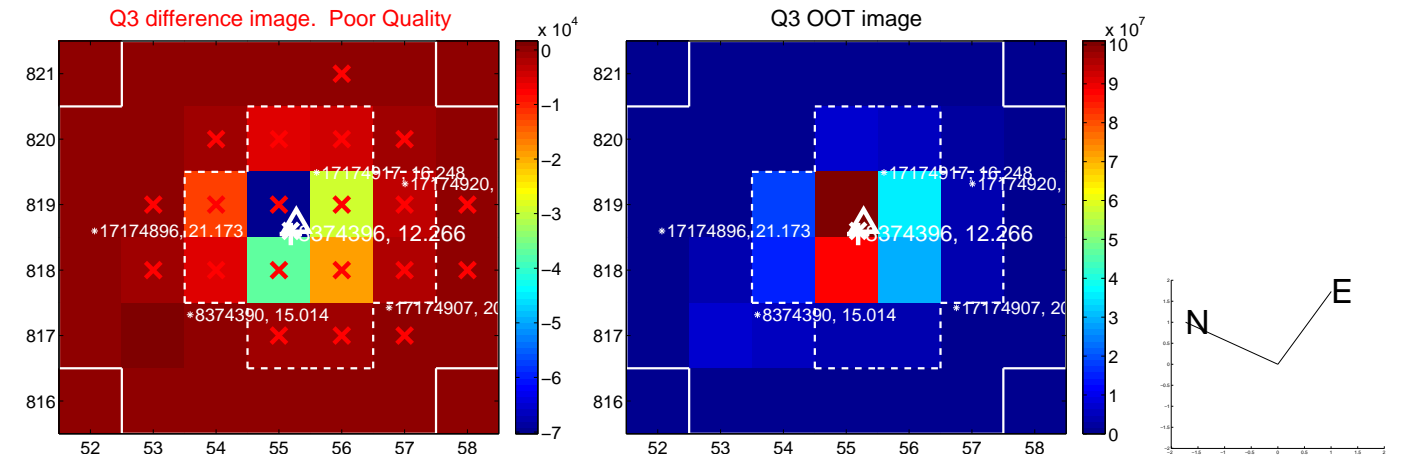
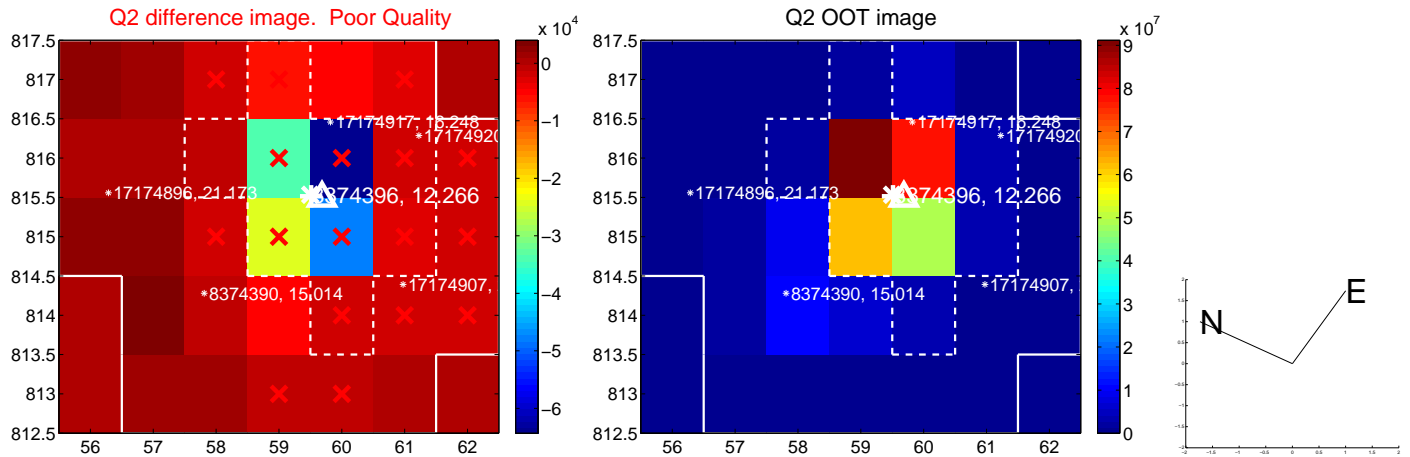
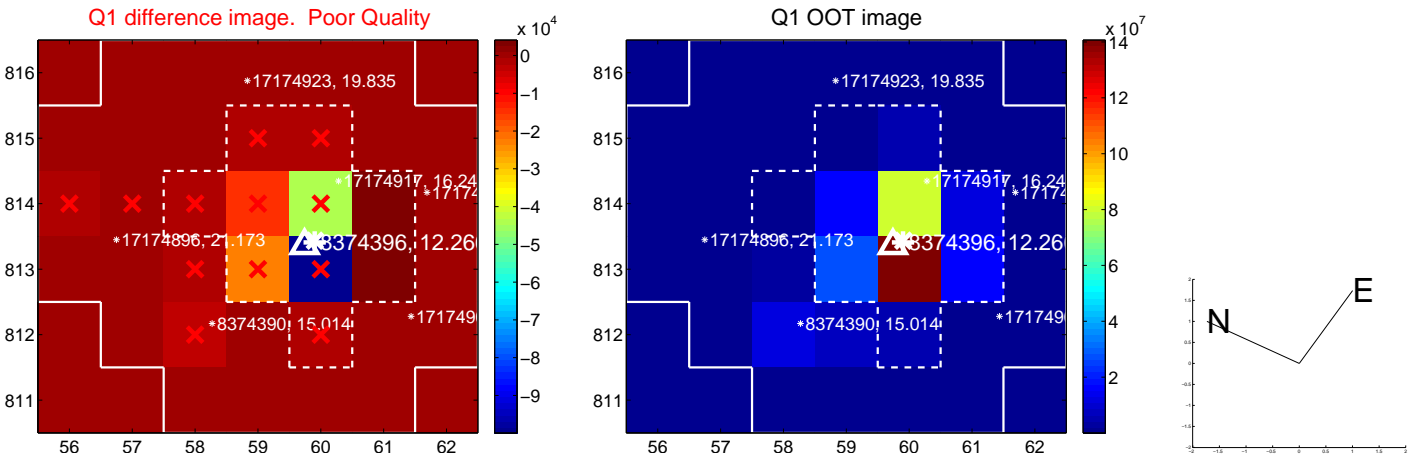
The direct PRF centroid is offset from the target star catalog position by about 0.17 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.051 \pm 0.114$	0.45	$-0.035 \pm 0.133$	$-0.037 \pm 0.095$
PRF-fit source offset from KIC position	$0.187 \pm 0.116$	1.61	$-0.144 \pm 0.128$	$-0.120 \pm 0.097$
photometric centroid source offset	$0.61 \pm 0.02$	25.86	$-0.56 \pm 0.02$	$0.25 \pm 0.03$

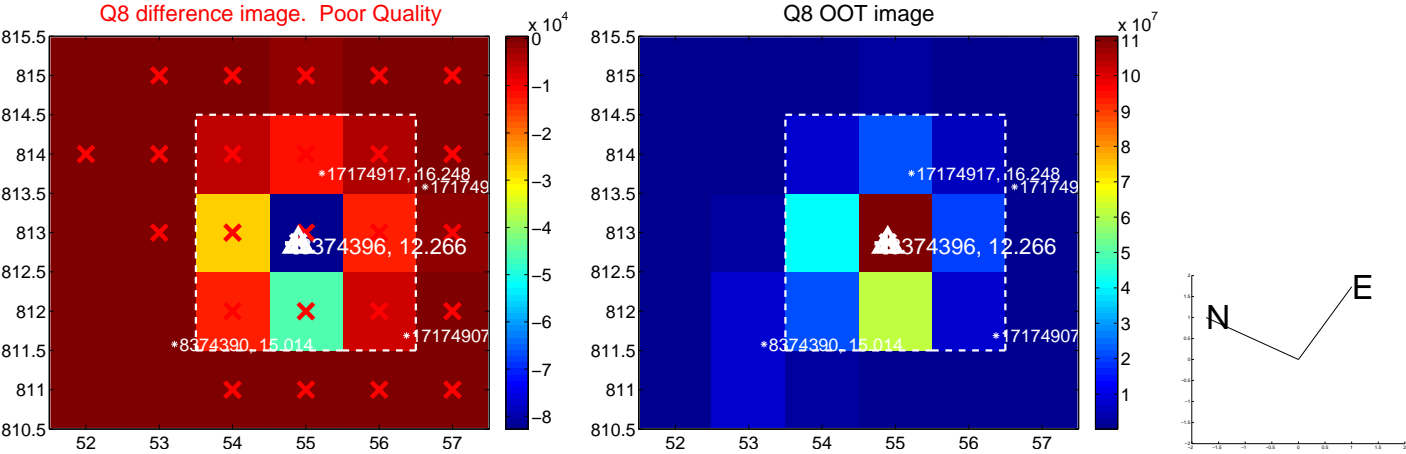
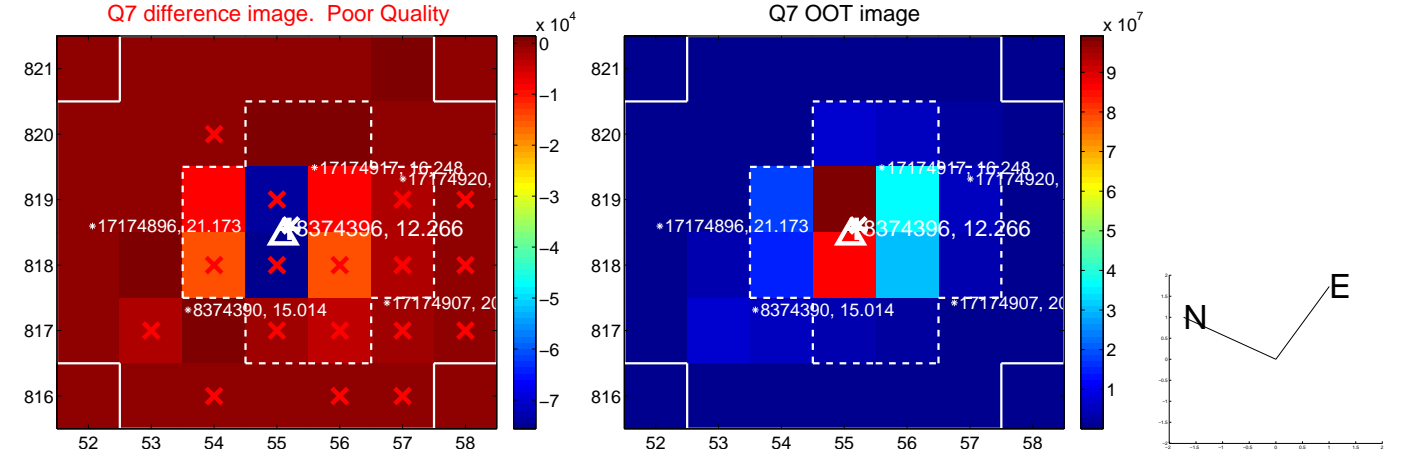
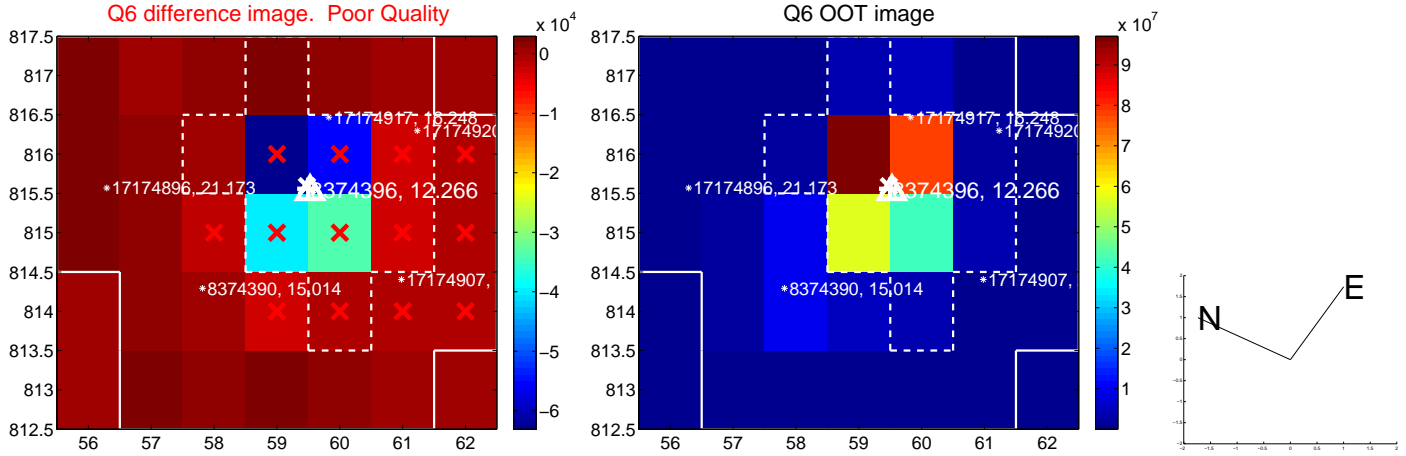
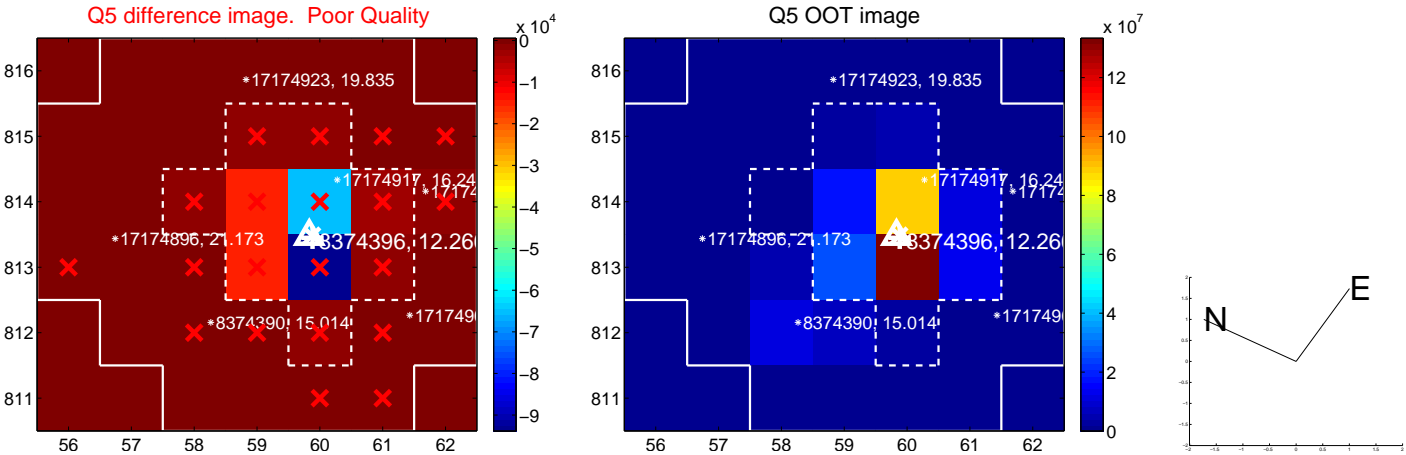


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

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

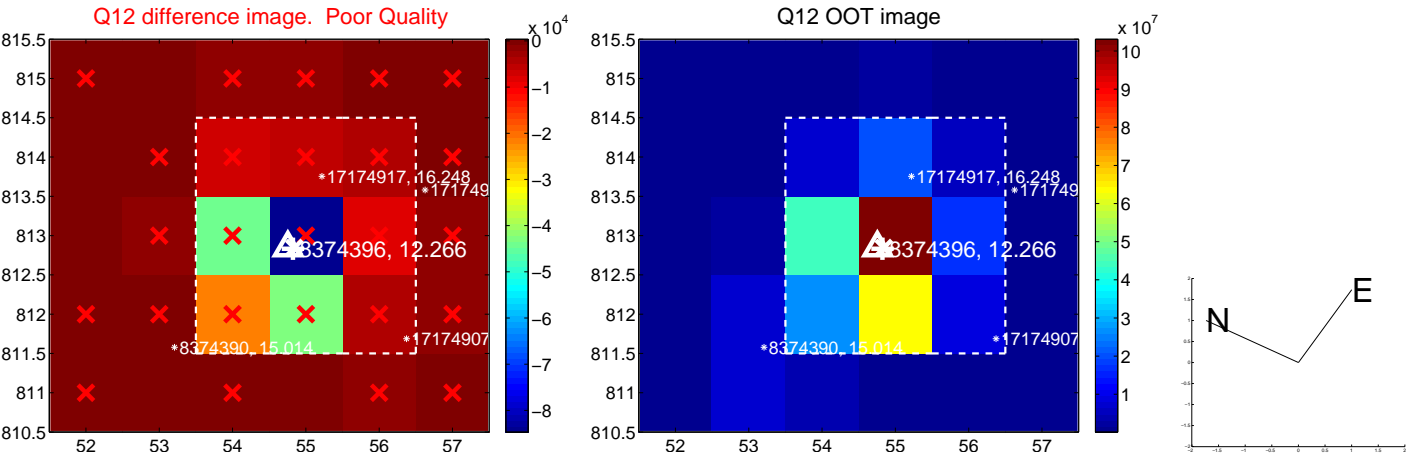
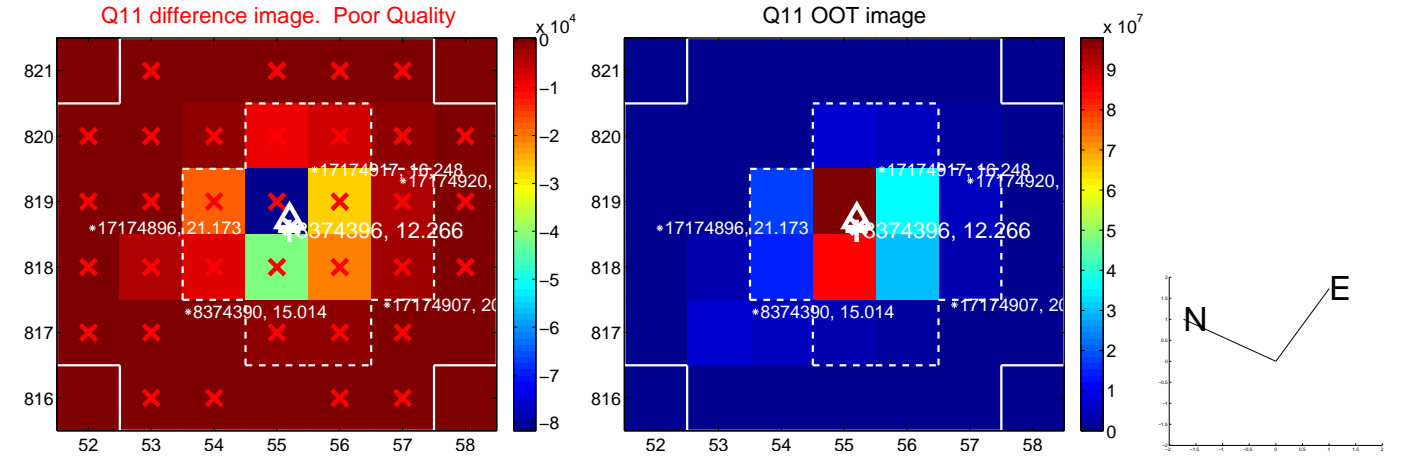
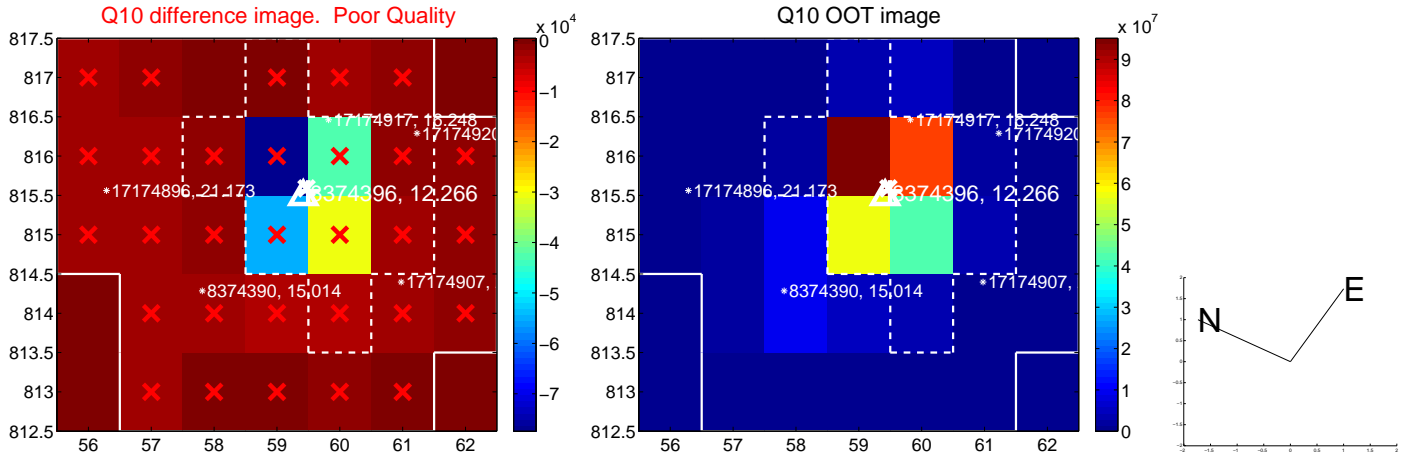
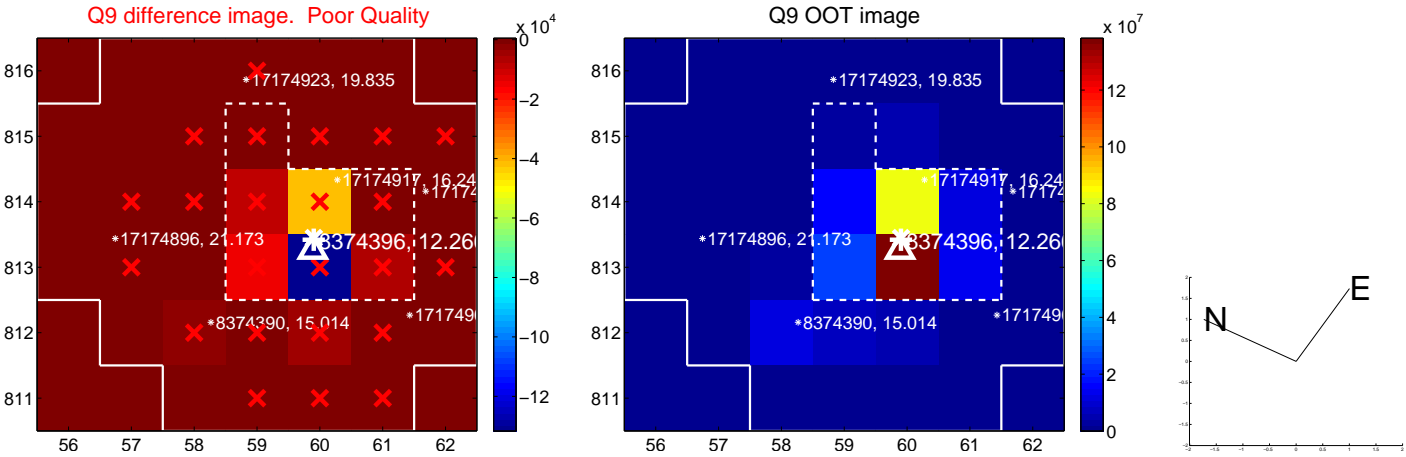


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

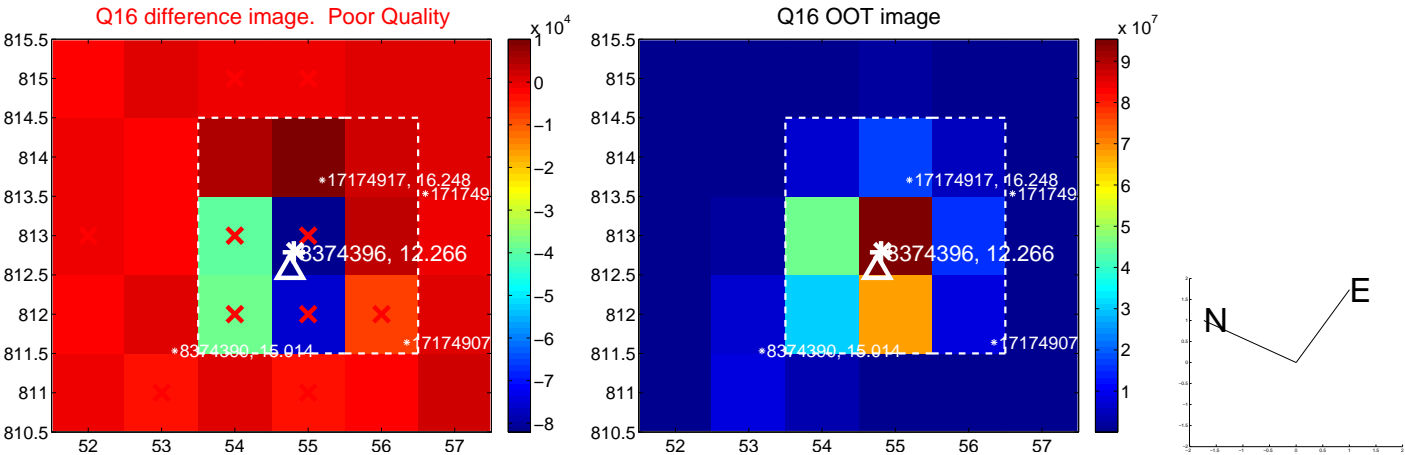
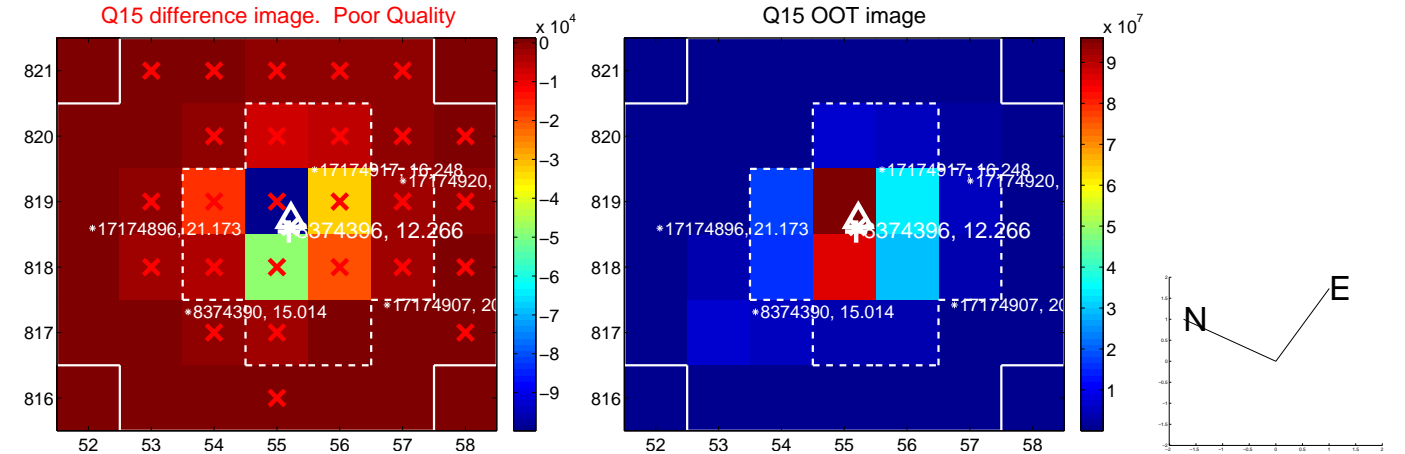
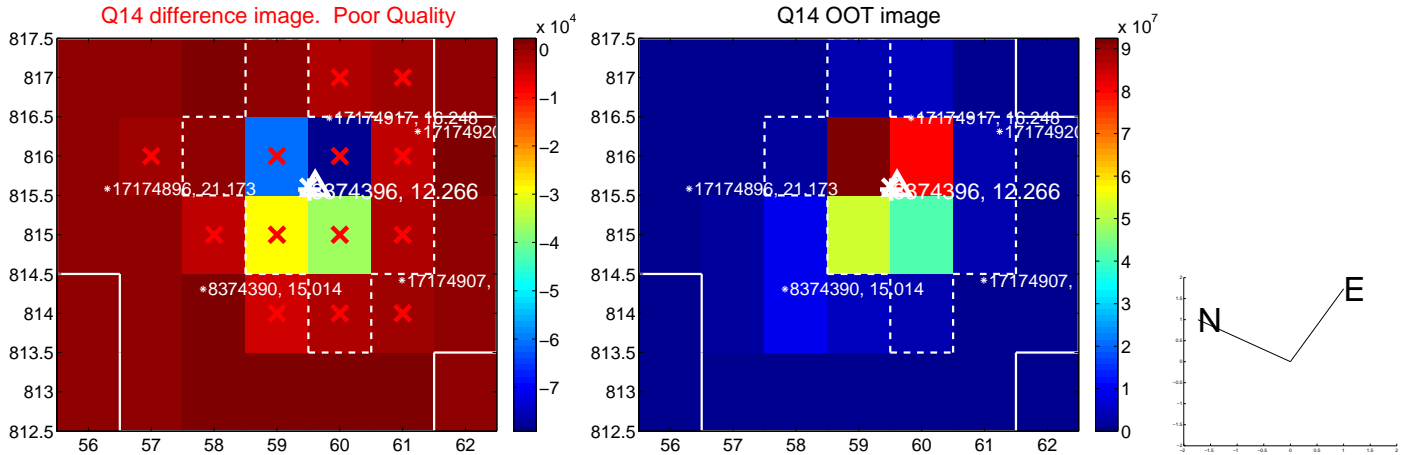
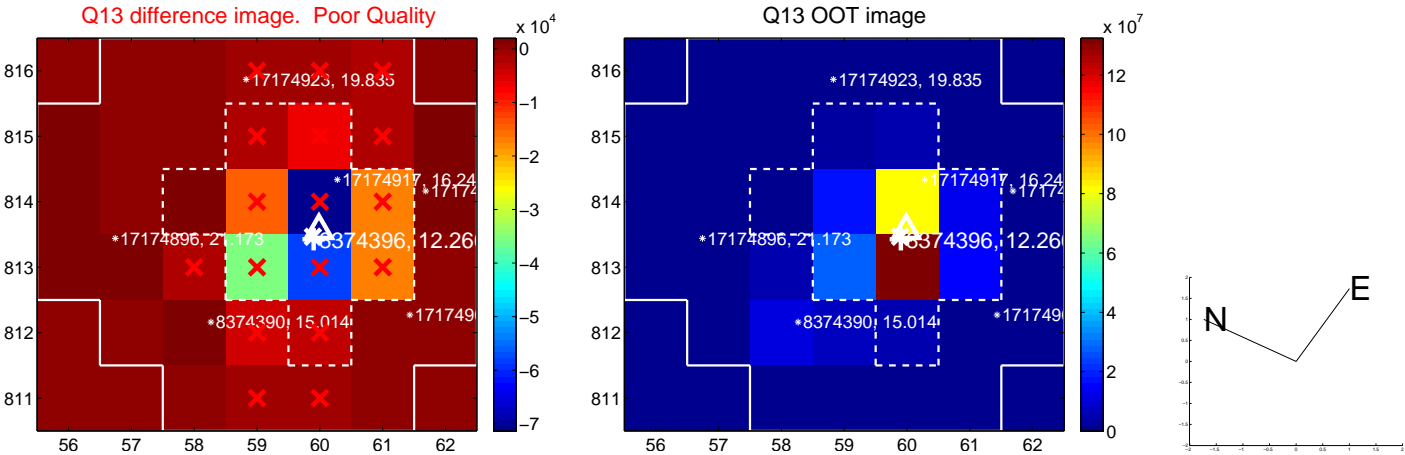




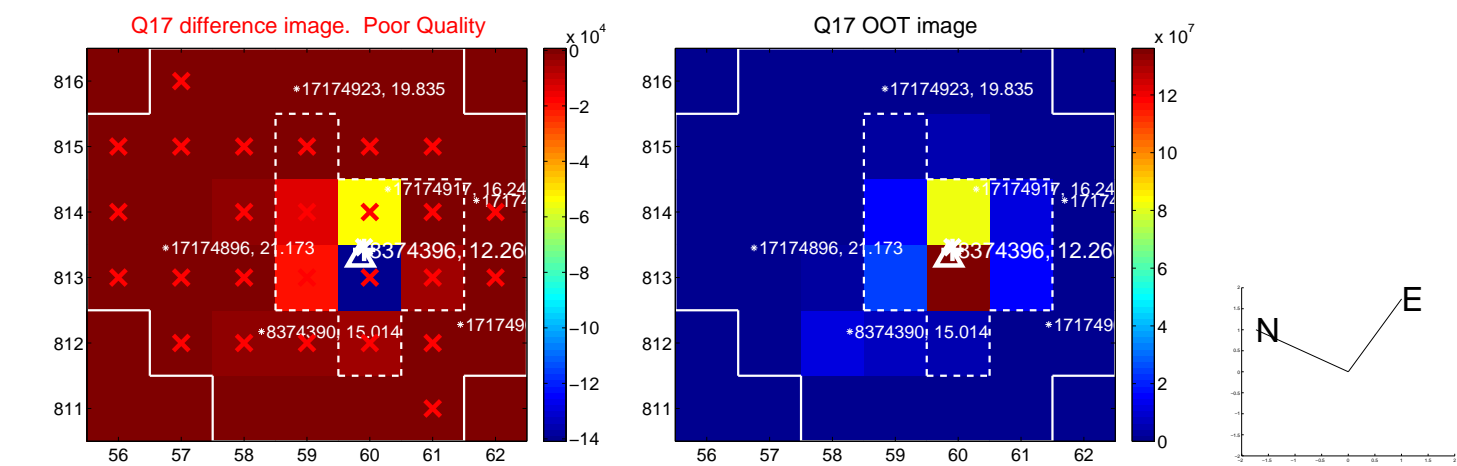
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



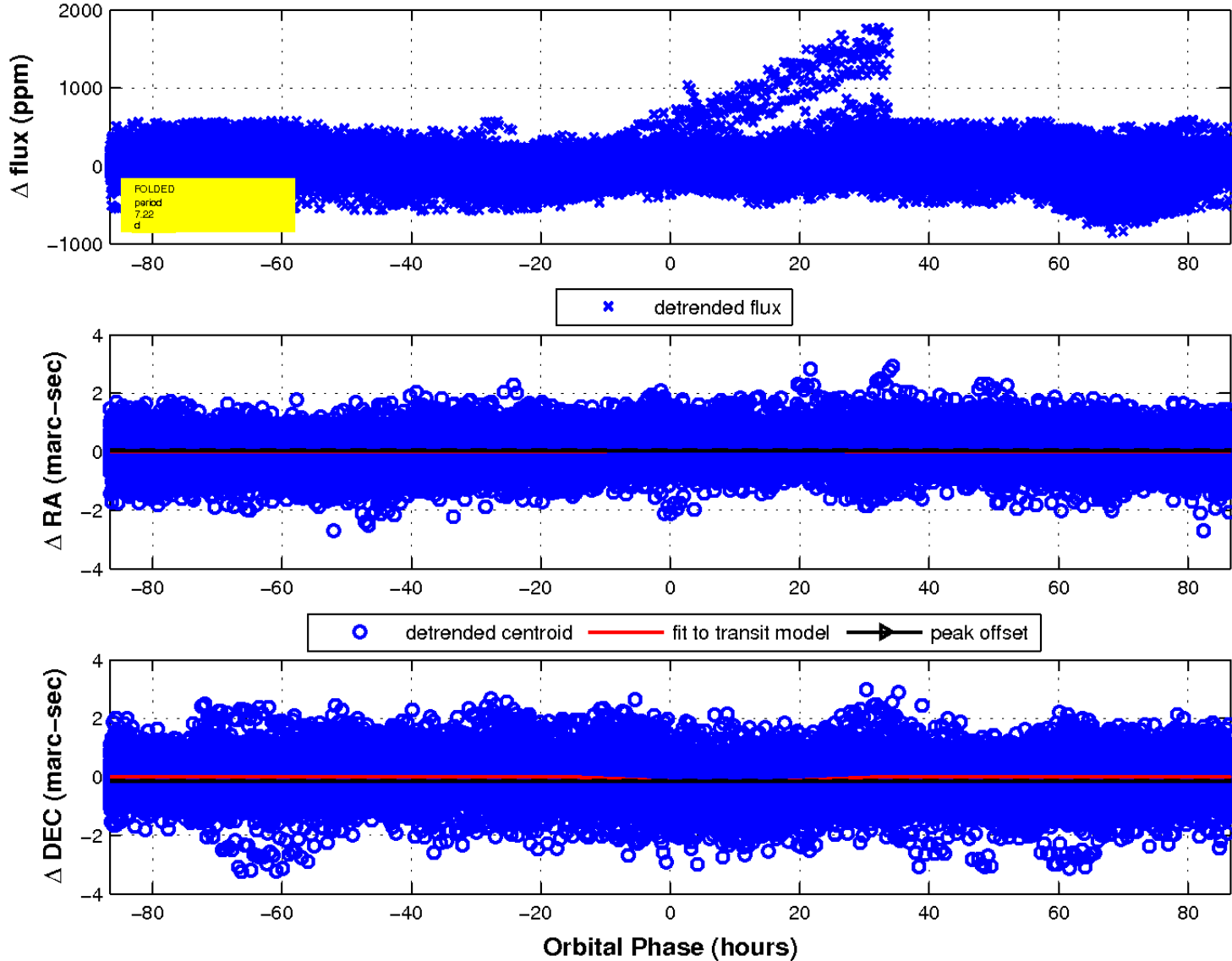
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

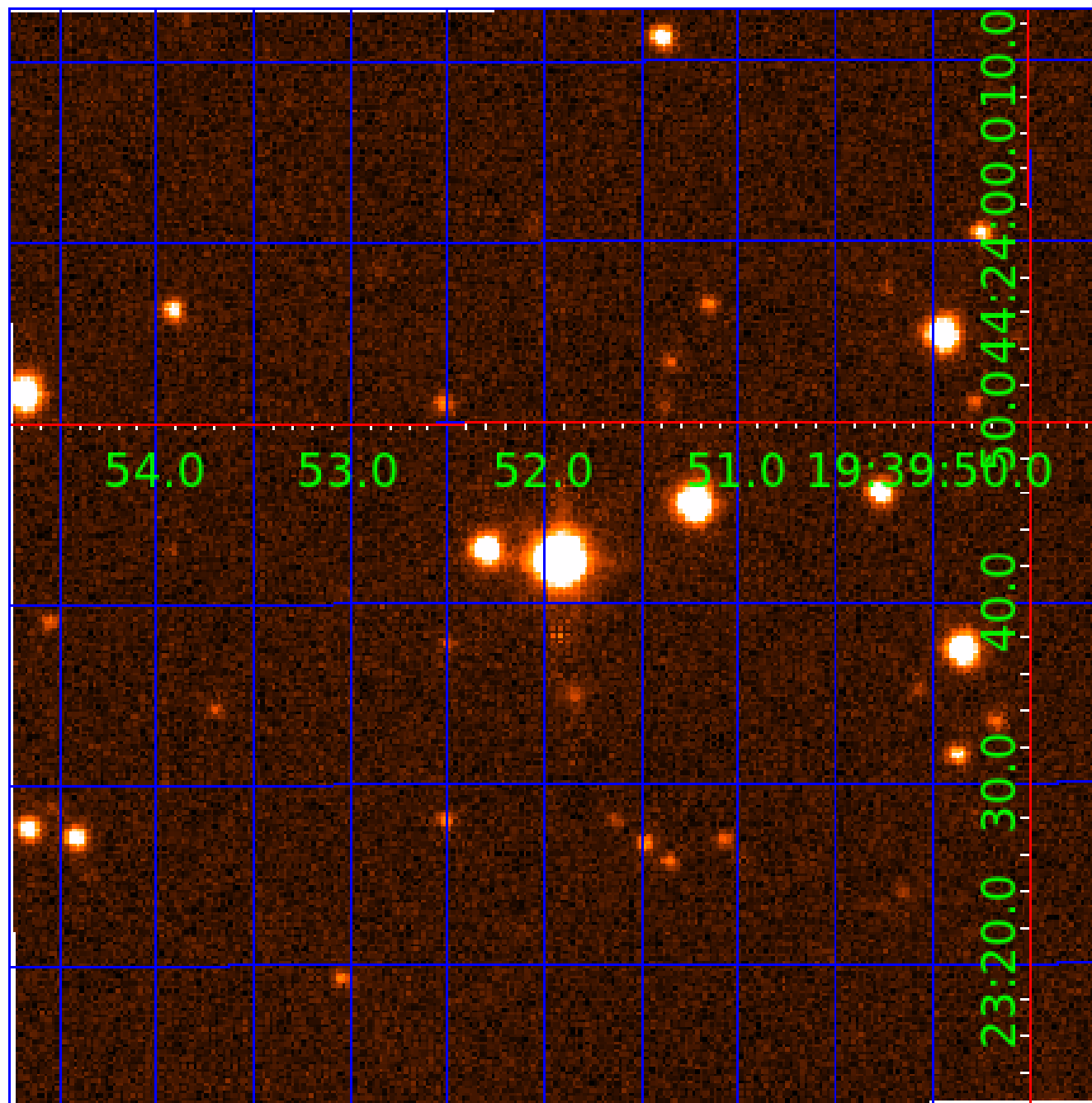


fluxWeightedCentroids, Planet 3 of 4



UKIRT Image

Declination



# KIC 008374396

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008374396-01	OBS	No	7.215300	135.090580	69.0	15.320	17.9	20.5	2.12	8982	3.40	2978.61
008374396-02	OBS	No	7.215496	132.695614	41.5	11.113	18.5	17.4	2.12	8982	1.48	2978.51
008374396-03	OBS	No	7.216365	138.104223	50.6	15.000	11.1	-1.0	2.12	8982	1.54	2978.03
008374396-04	OBS	No	68.226168	165.552207	83.6	4.916	9.2	5.0	2.12	8982	2.30	148.97

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008374396-01	OBS	FP	0.00	1	0	0	0	LPP_DV
008374396-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_POS_ALT—SAME_NTL_PERIOD
008374396-03	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_NOFITS
008374396-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_MEAS

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

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

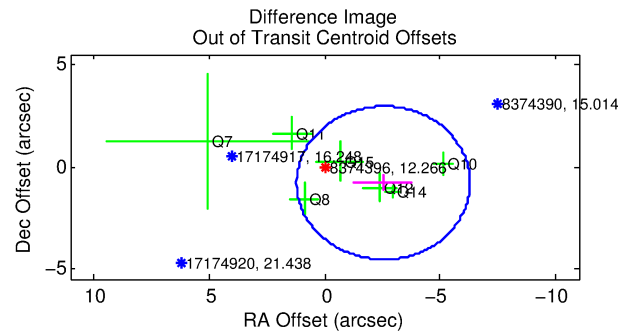
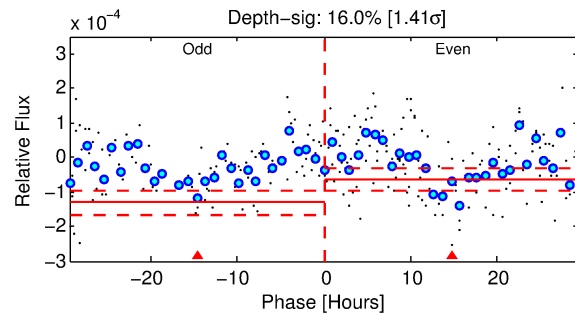
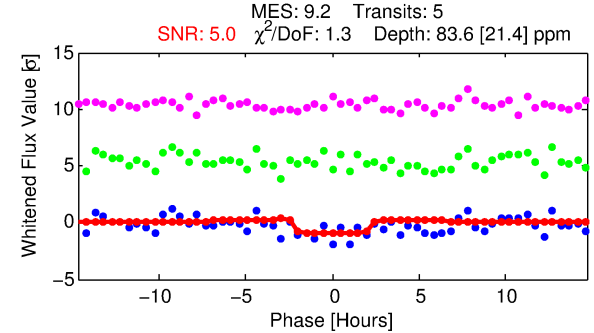
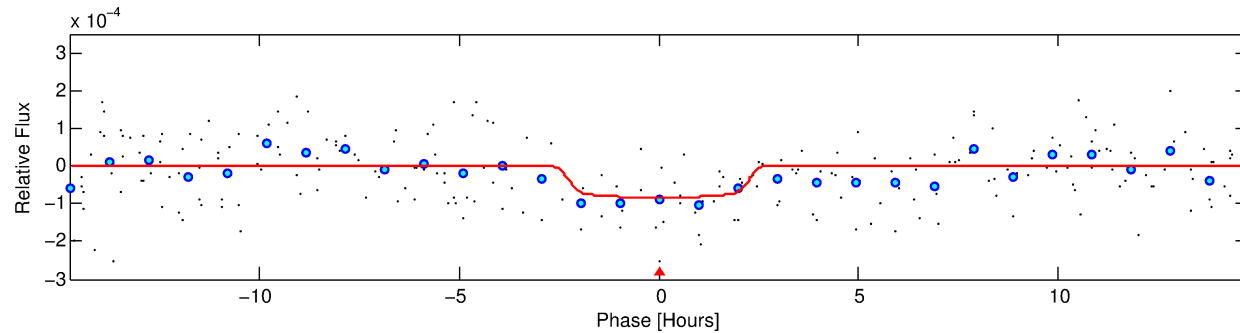
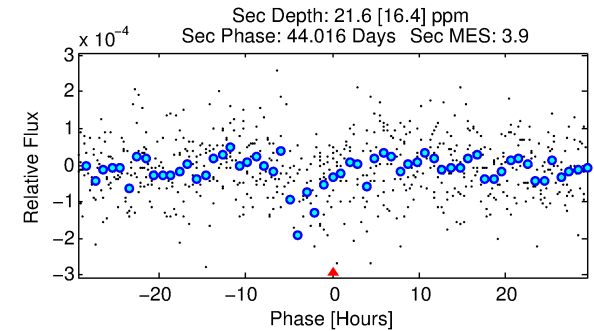
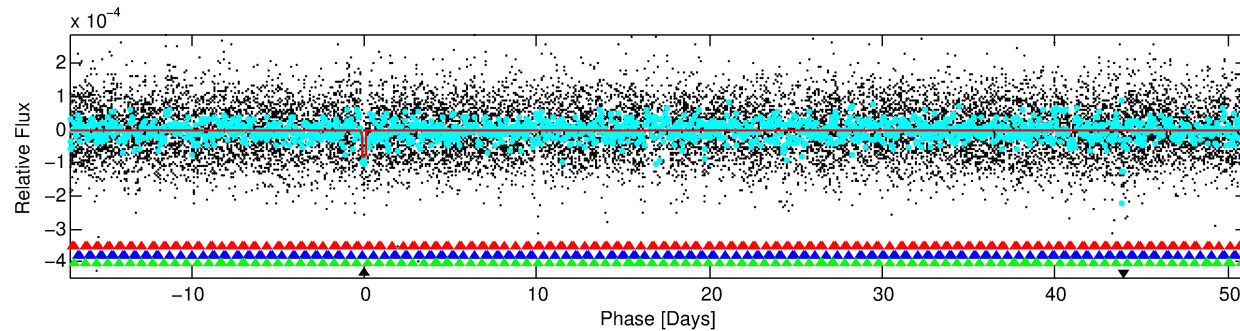
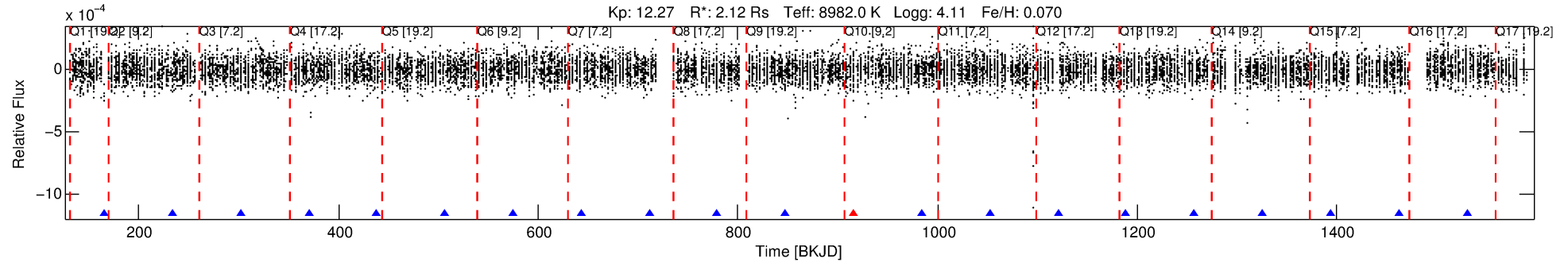
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008374396-04

No Significant Match Found

# DV One-Page Summary

KIC: 8374396 Candidate: 4 of 4 Period: 68.226 d



## DV Fit Results:

Period = 68.22617 [0.00402] d  
Epoch = 165.5522 [0.0444] BKJD  
Rp/R\* = 0.0099 [0.0040]  
a/R\* = 40.47 [111.01]  
b = 0.94 [0.37]  
Seff = 148.97 [57.05]  
Teq = 891 [85] K  
Rp = 2.30 [1.16] Re  
a = 0.4200 [0.1024] AU  
Ag = 395.65 [455.29] [0.87σ]  
Teffp = 6143 [1717] K [3.06σ]

## DV Diagnostic Results:

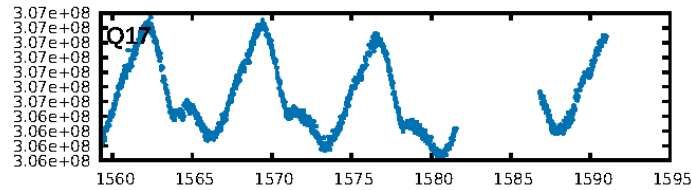
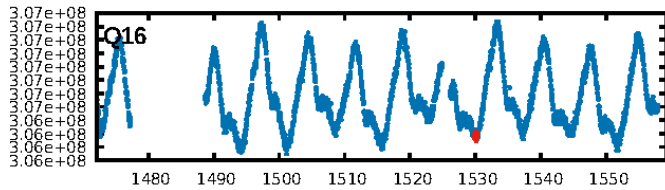
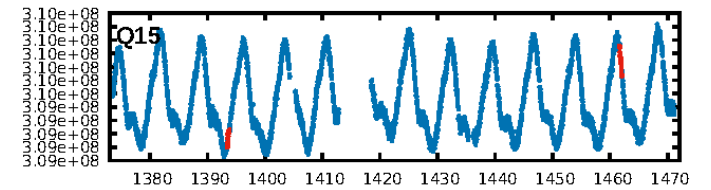
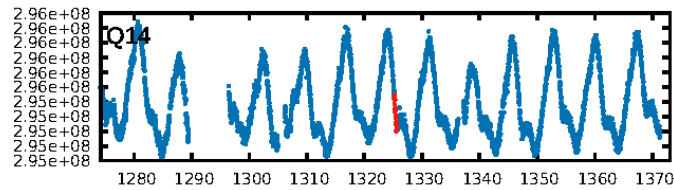
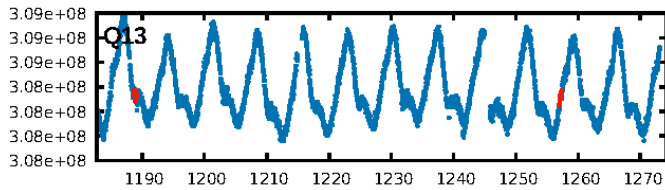
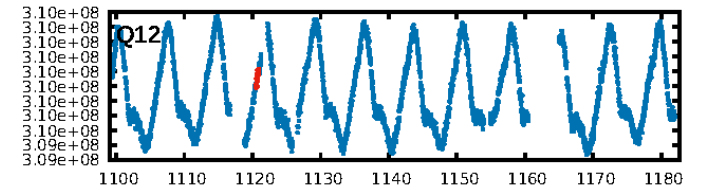
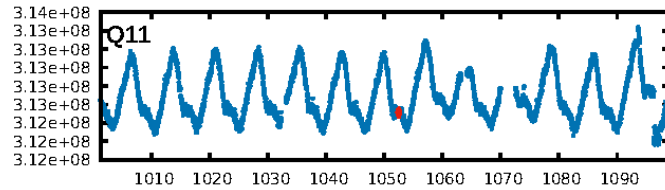
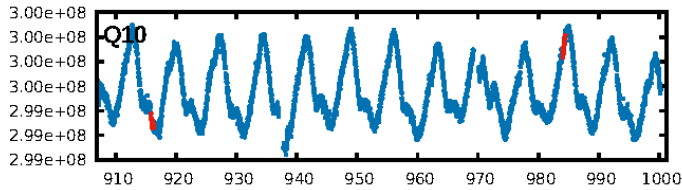
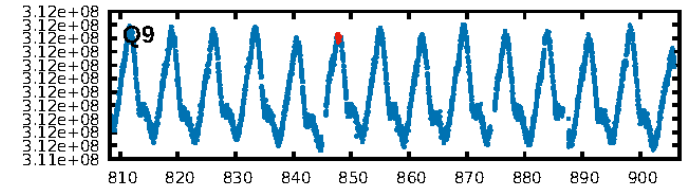
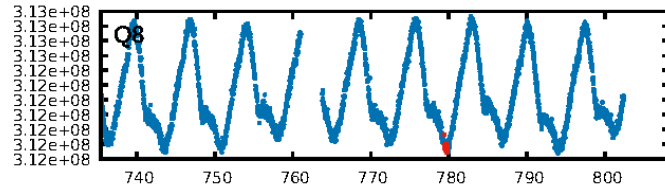
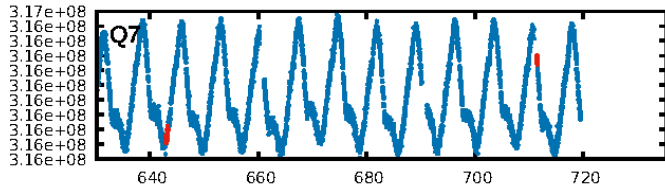
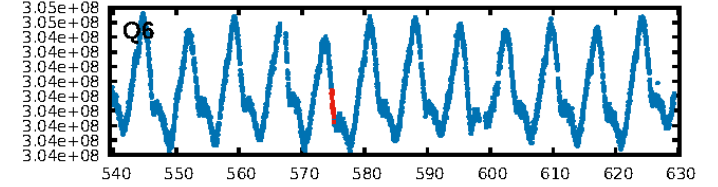
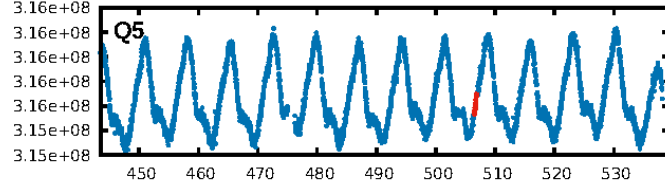
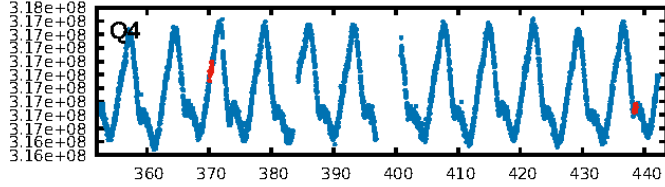
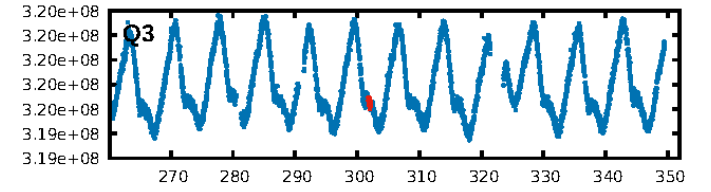
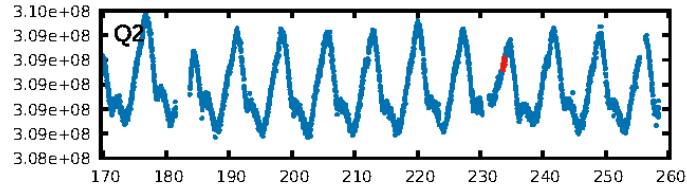
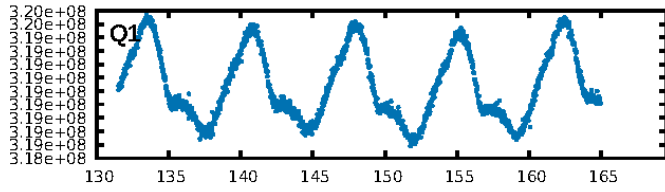
ShortPeriod-sig: 100.0% [92.76σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 22.8%  
ModelChiSquareGof-sig: 99.3%  
Bootstrap-pfa: 2.68e-10  
RollingBand-fgt: 0.80 [4/5]  
GhostDiagnostic-chr: -2.479  
Centroid-sig: 0.0%  
Centroid-so: 2.568 arcsec [2.27σ]  
OotOffset-rm: 2.659 arcsec [2.13σ]  
KicOffset-rm: 2.768 arcsec [2.35σ]  
OotOffset-st: 2/3/2/0 [7]  
KicOffset-st: 2/3/2/0 [7]  
DiffImageQuality-fgm: 0.29 [2/7]  
DiffImageOverlap-fno: 0.47 [7/15]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 13:30:39 Z

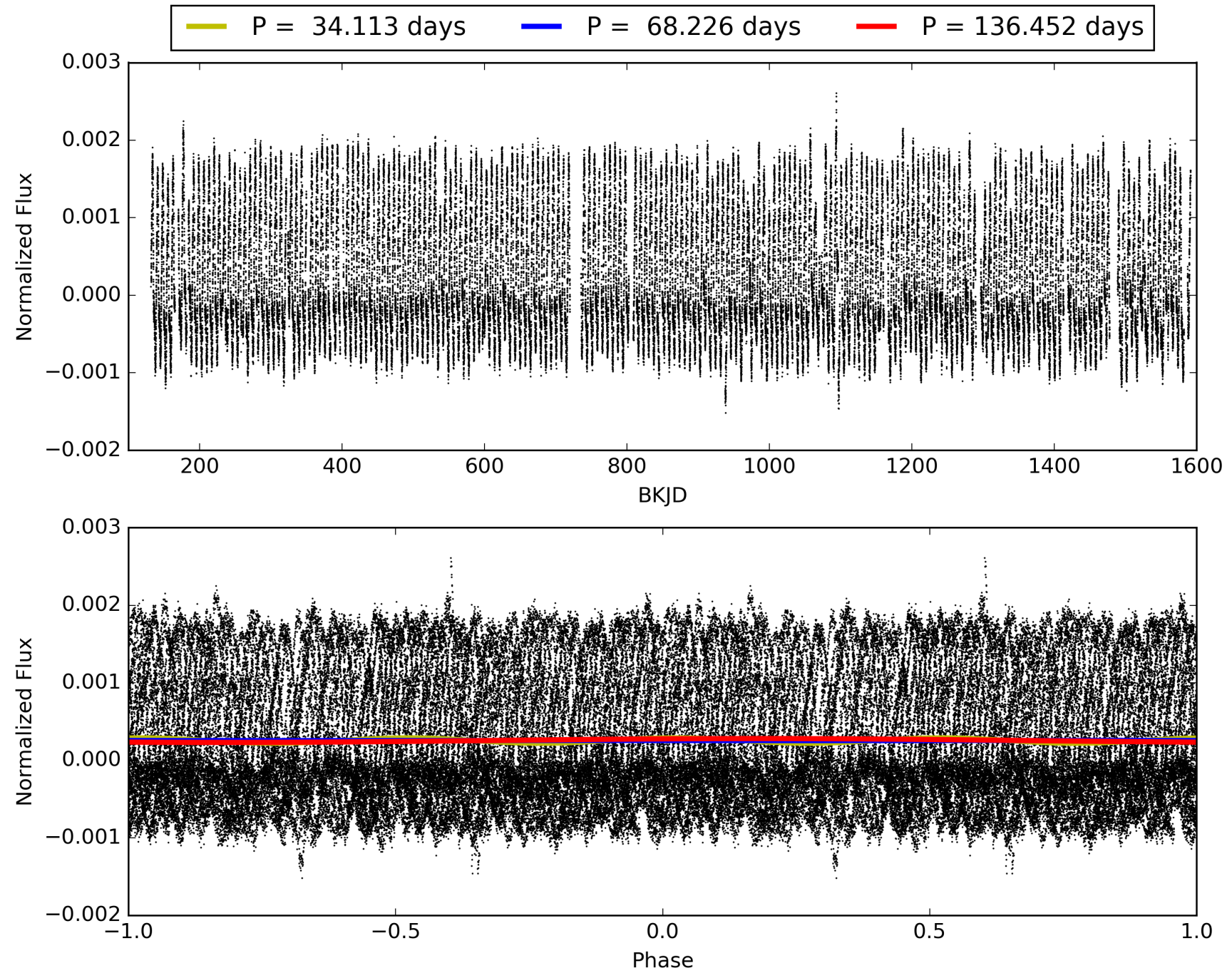
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 008374396-04, PDC Light Curves

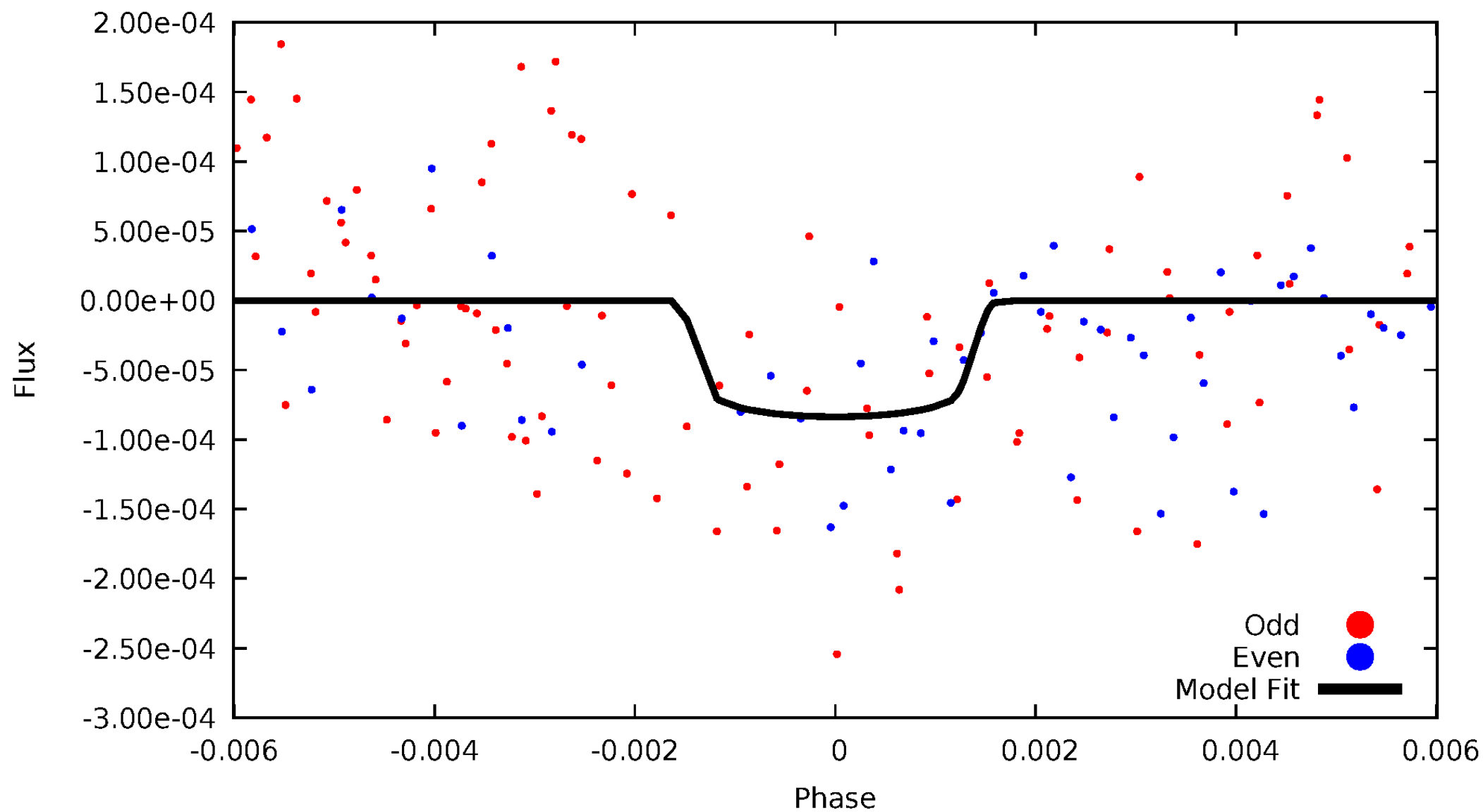


# TCE 008374396-04



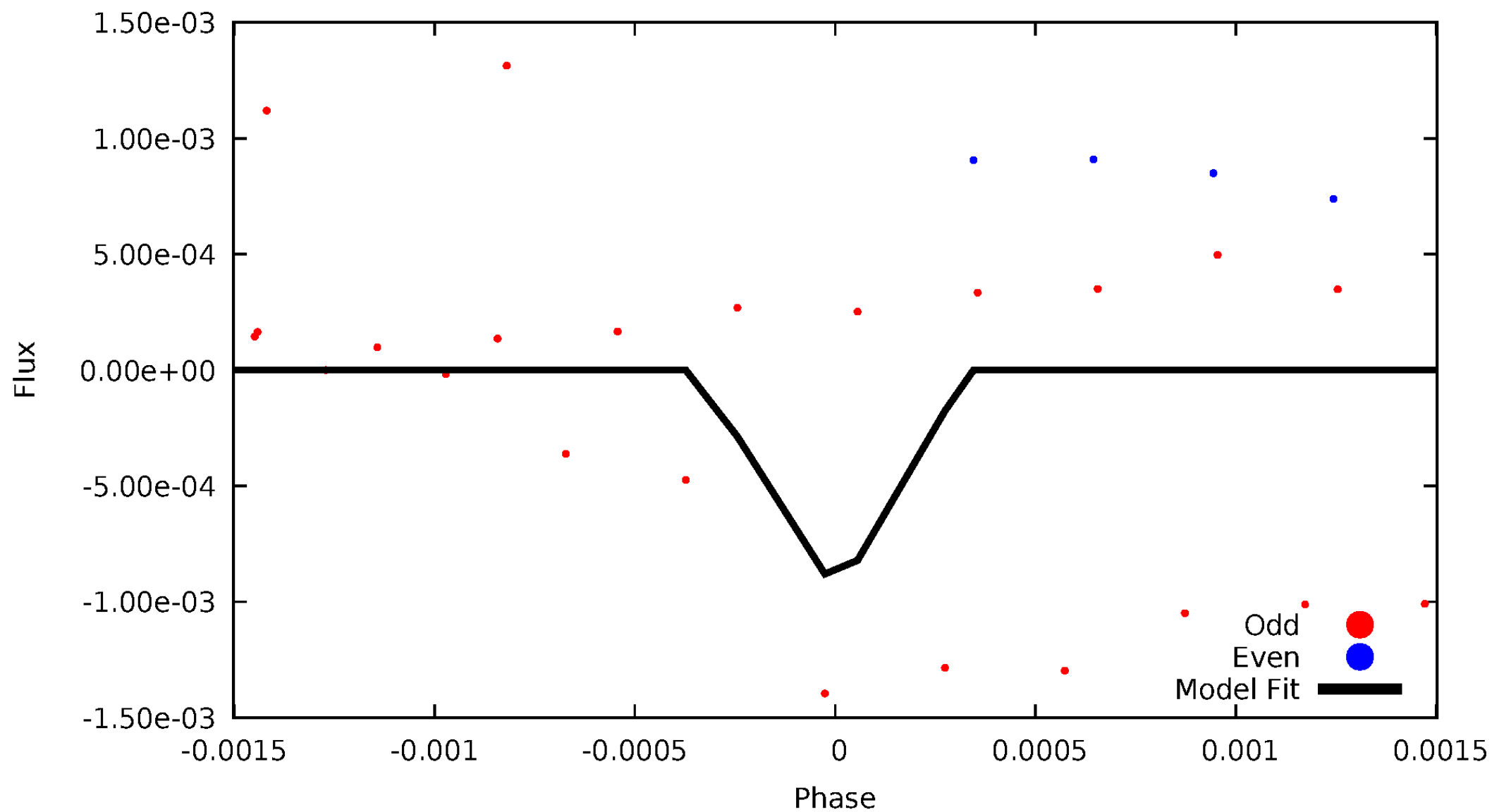
# DV Odd/Even

TCE 008374396-04



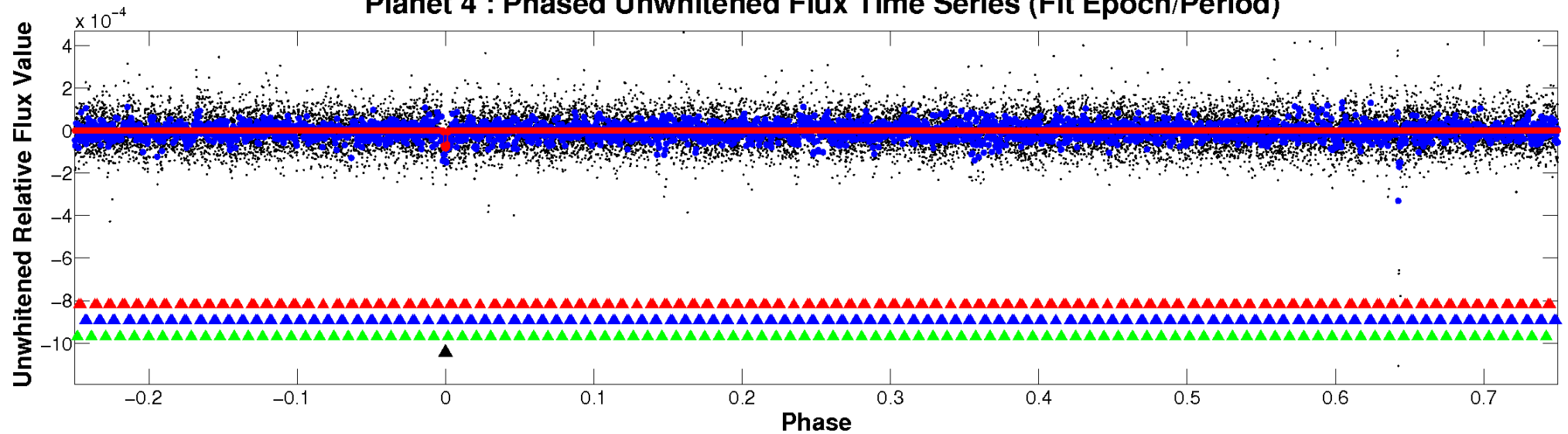
# ALT Odd/Even

TCE 008374396-04

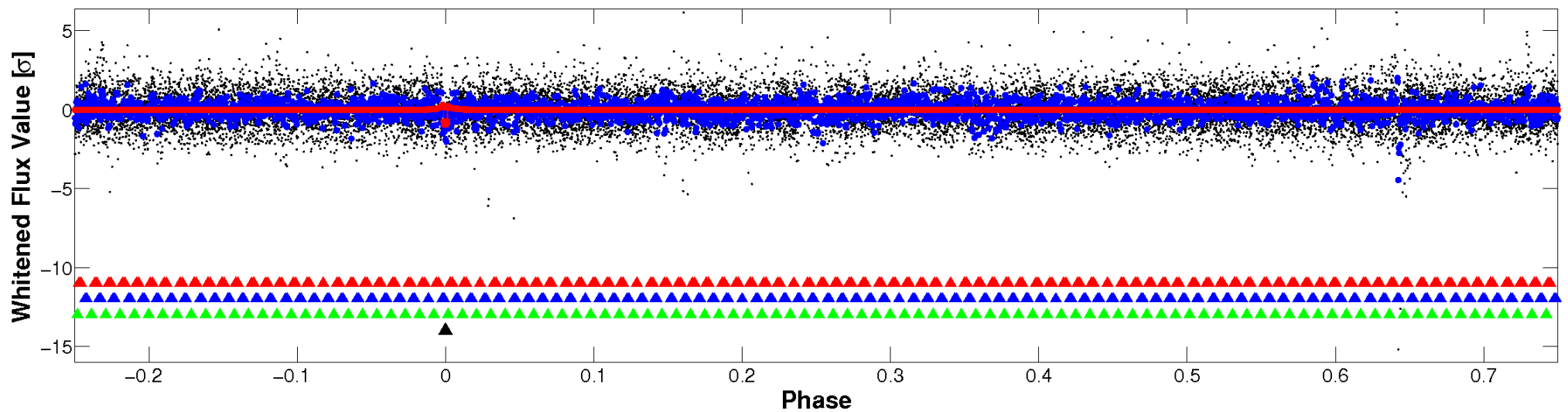


# Non-Whitened Vs. Whitened Light Curve

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

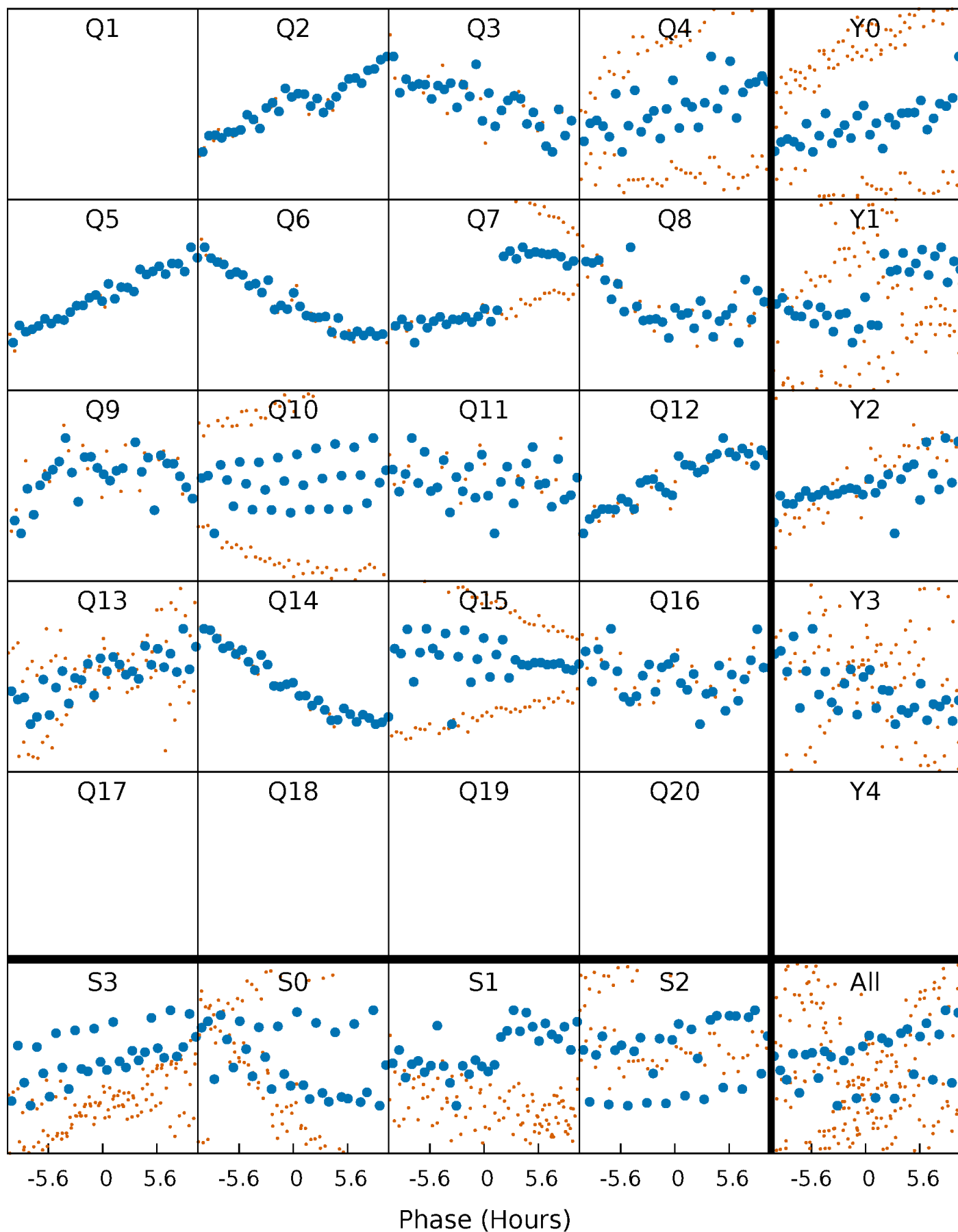


Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

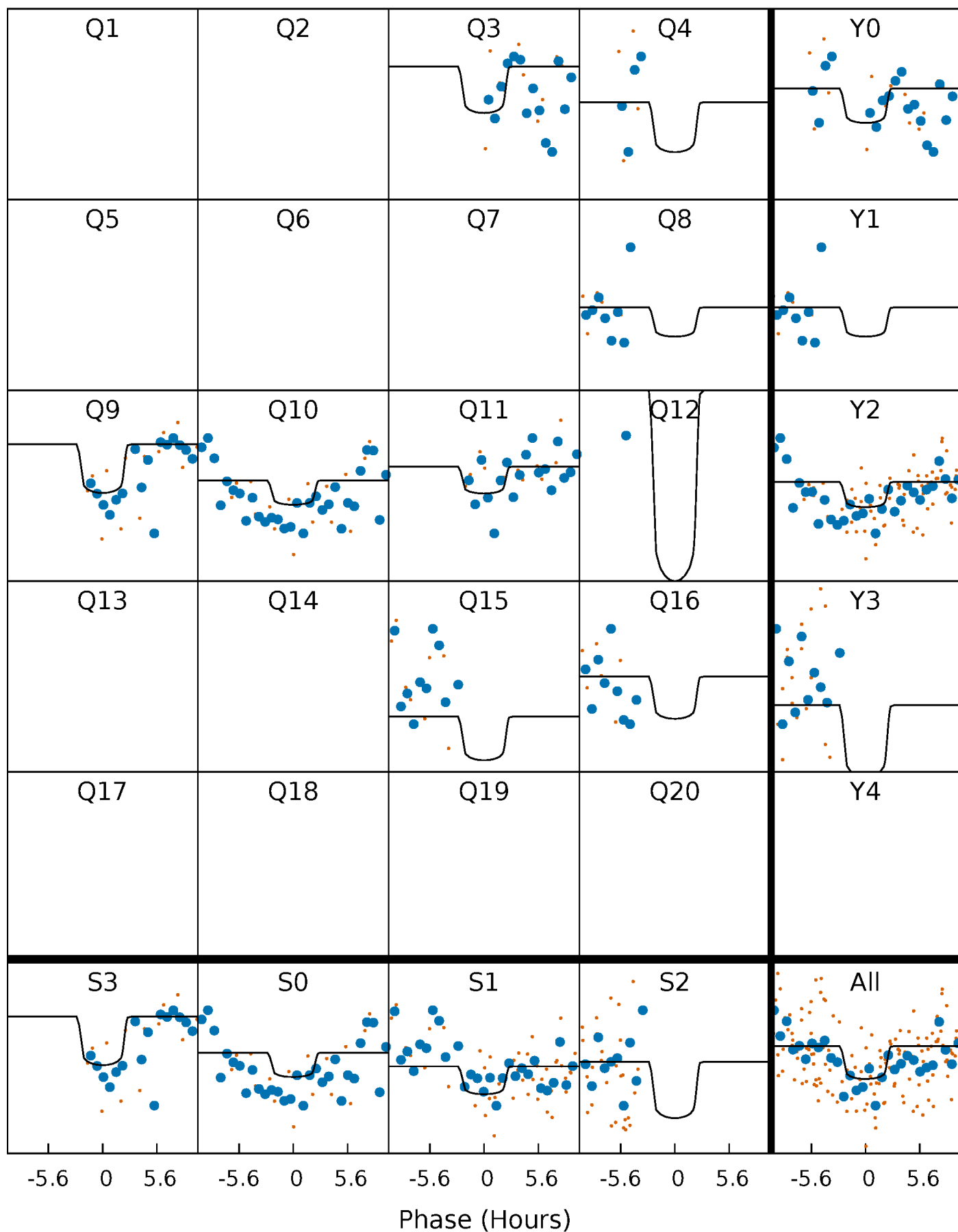
TCE 008374396-04 P= 68.226168 Days  $T_0=165.552207$  (BKJD)





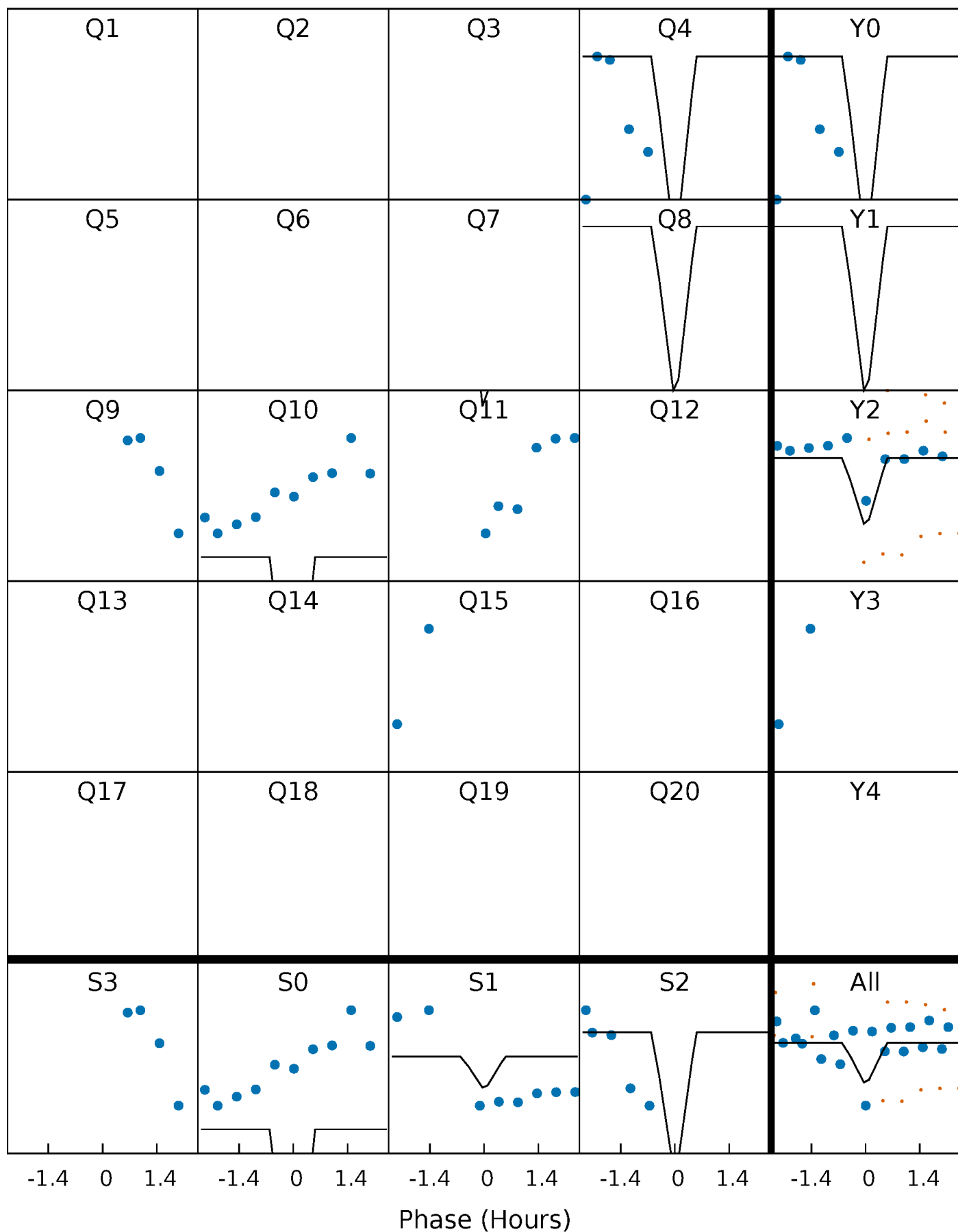
# DV Quarter-Phased Transit Curves

TCE 008374396-04 P= 68.226168 Days  $T_0=165.552207$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

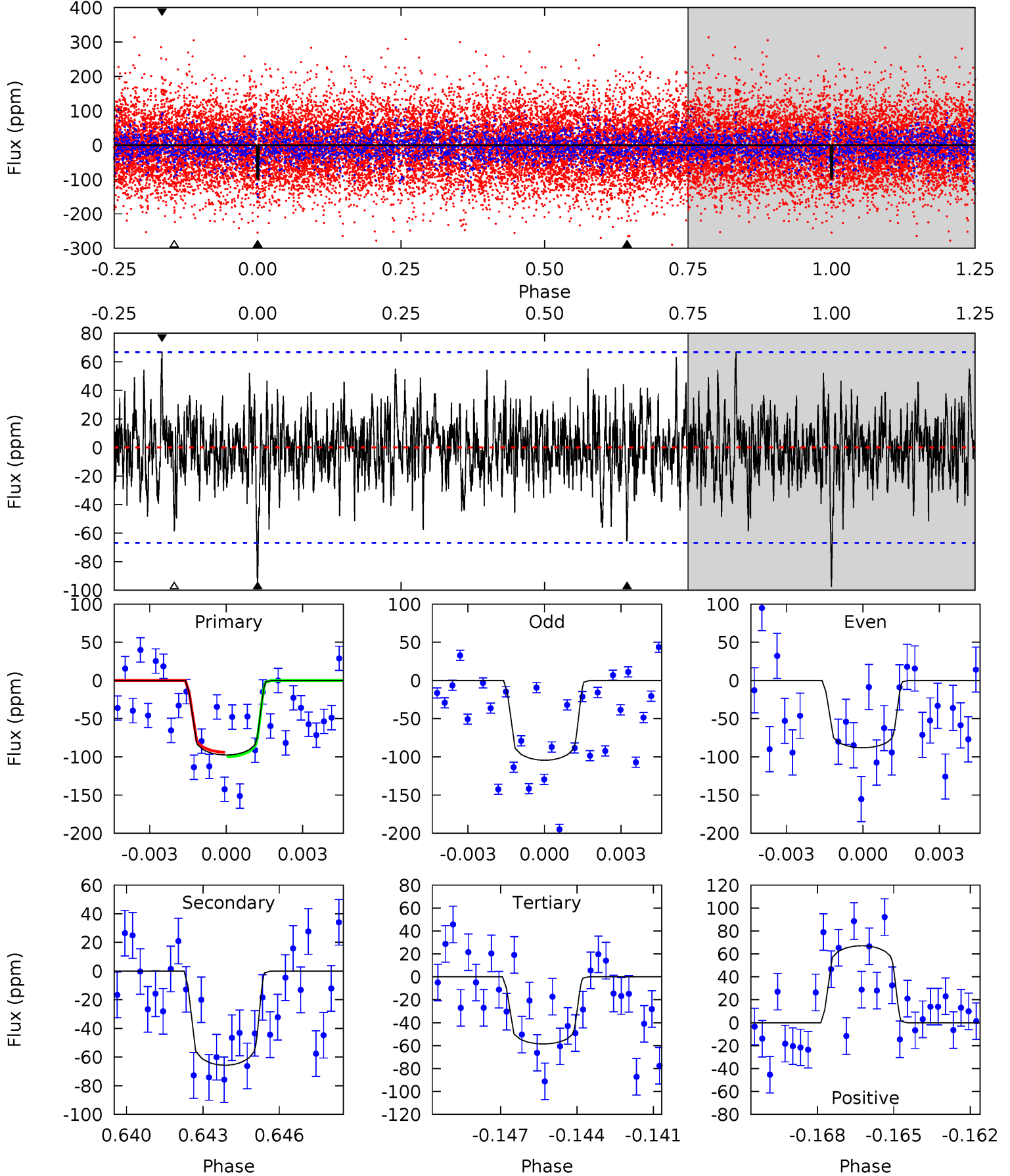
TCE 008374396-04 P= 68.229742 Days  $T_0=165.428508$  (BKJD)



# DV Model-Shift Uniqueness Test

008374396-04, P = 68.226168 Days, E = 97.326039 Days

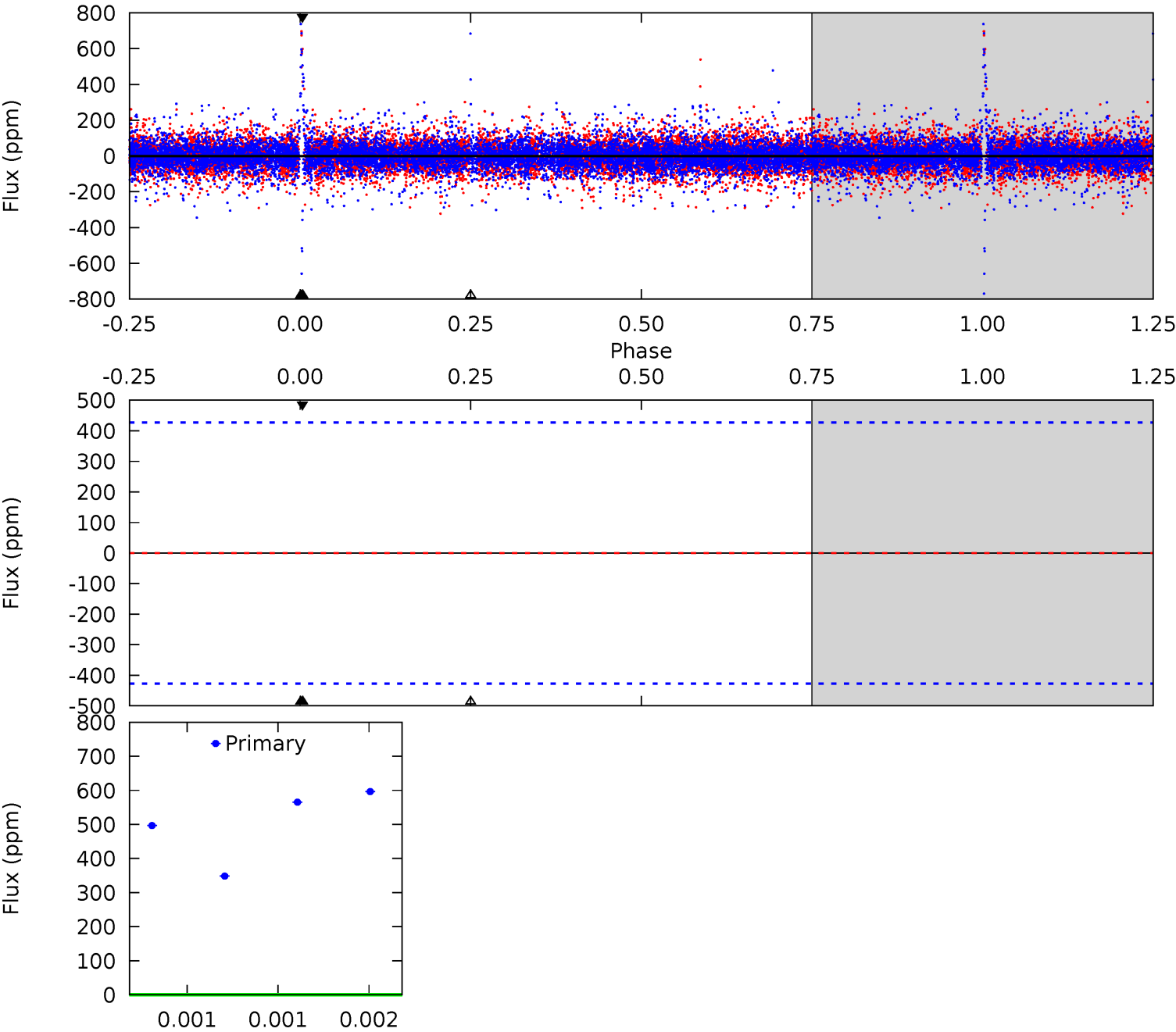
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.66	5.16	4.60	5.27	5.25	2.96	1.41	3.06	2.39	0.56	-0.11	0.64	1.11	0.41	0.22



Alt Model-Shift Uniqueness Test

008374396-04, P = 68.229742 Days, E = 97.198766 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
3.32	5.28	5.21	11.5	5.63	3.56	1.03	-1.88	-8.16	0.07	-6.20	0	1.00	0.79	0



### Stellar Parameters For KIC 008374396

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$8982^{+249}_{-427}$	$4.111^{+0.124}_{-0.170}$	$0.070^{+0.200}_{-0.650}$	$2.123^{+0.656}_{-0.477}$	$2.122^{+0.393}_{-0.524}$	$0.312^{+0.237}_{-0.156}$
	+3%/-5%	+3%/-4%	+286%/-929%	+31%/-22%	+19%/-25%	+76%/-50%
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 008374396-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-66 \pm 13$	$2.39^{+1.00}_{-0.92}$	$1246^{+101}_{-80}$	$7699^{+2828}_{-1307}$	$1102^{+1764}_{-565}$
Alt.	$-0 \pm 76$	$7.05^{+1.53}_{-1.33}$	$1254^{+96}_{-82}$	$-3061^{+7740}_{-1775}$	$-9.595^{+147.679}_{-150.401}$

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

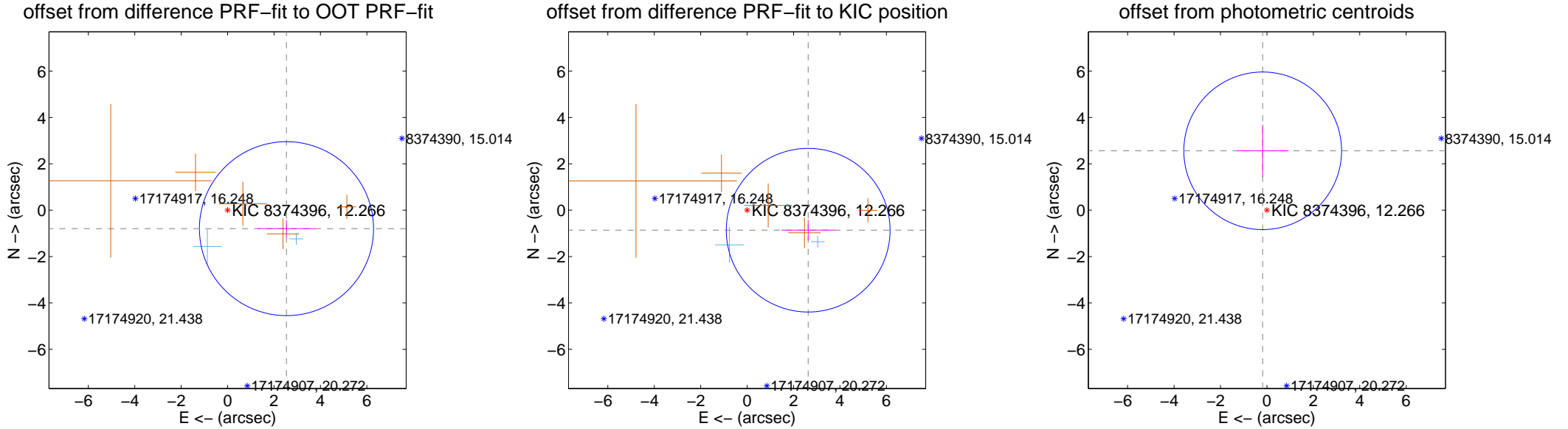
## DV Centroid Data

Supplemental centroid analysis for 008374396-04. Kepler magnitude: 12.27. Transit SNR 5.04

There are 2 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.26 arcsec

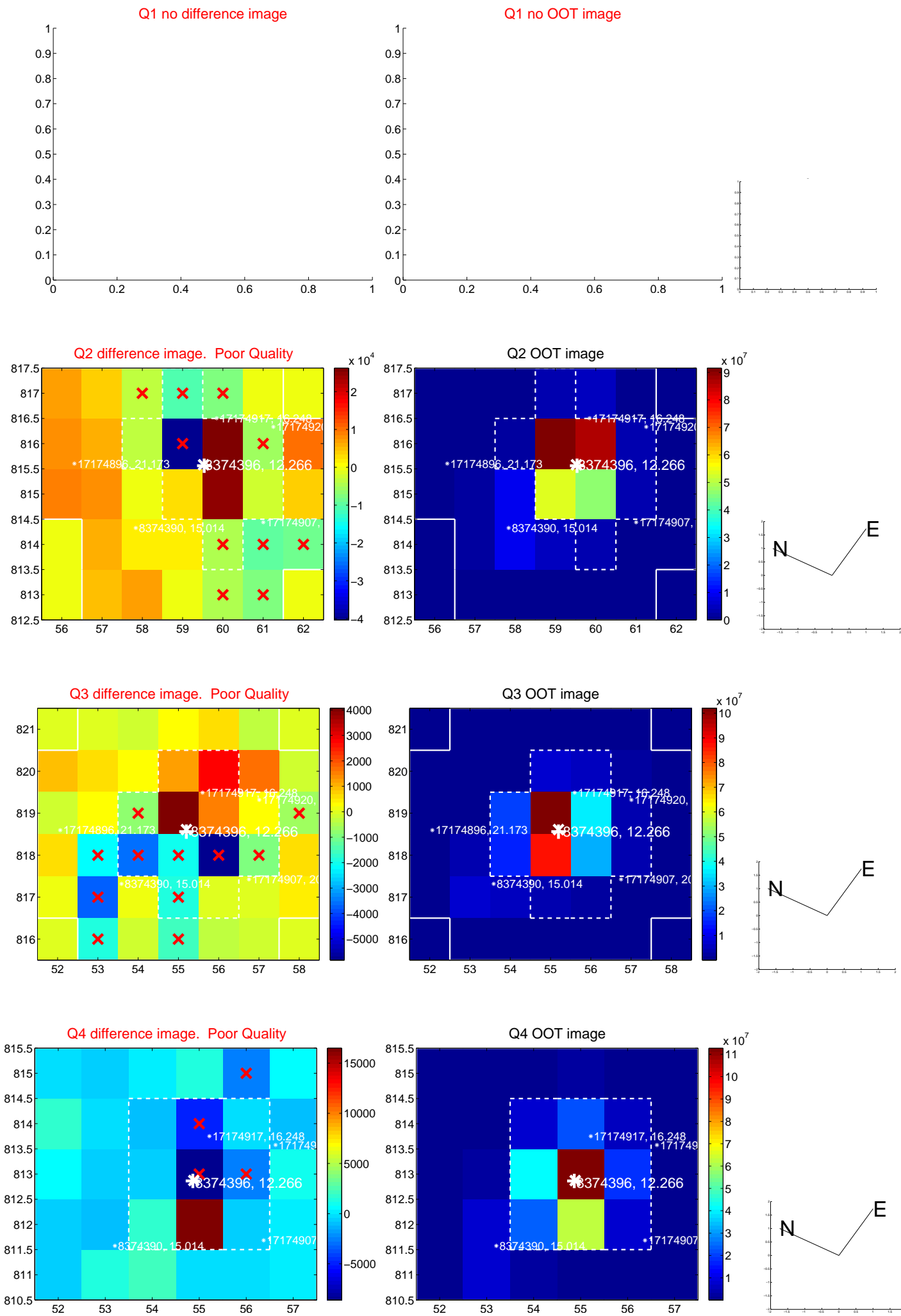
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.659 \pm 1.250$	2.13	$-2.537 \pm 1.256$	$-0.796 \pm 0.376$
PRF-fit source offset from KIC position	$2.768 \pm 1.176$	2.35	$-2.630 \pm 1.154$	$-0.862 \pm 0.446$
photometric centroid source offset	$2.57 \pm 1.13$	2.27	$0.18 \pm 1.11$	$2.56 \pm 1.13$



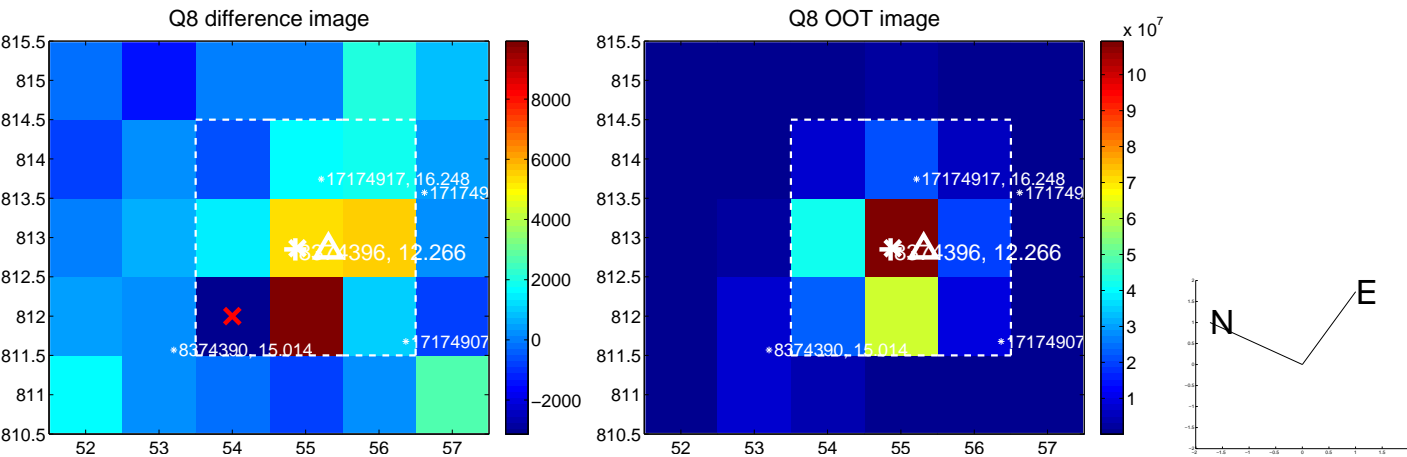
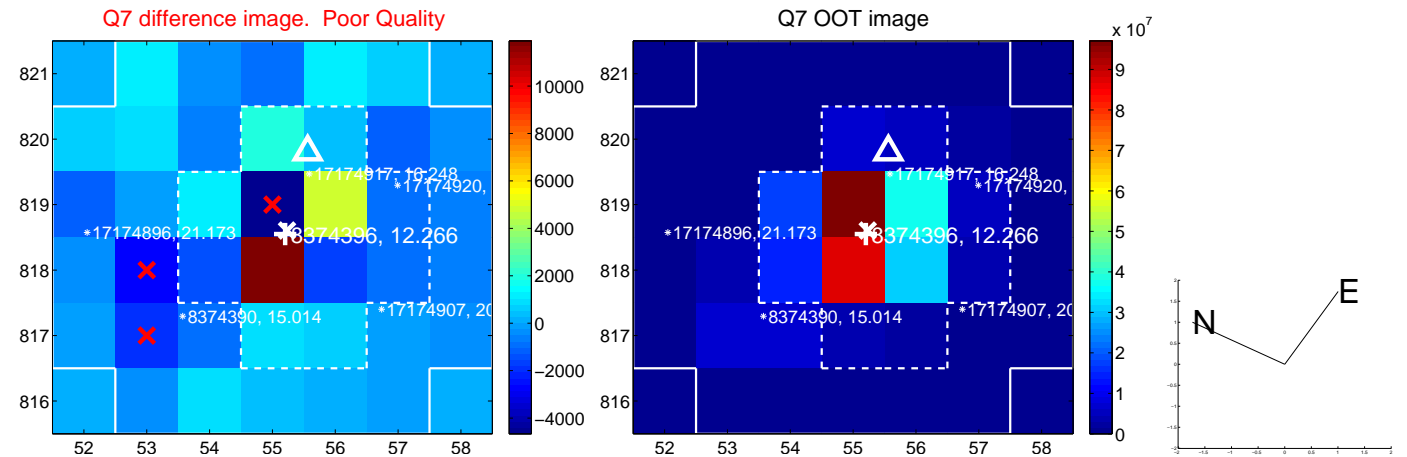
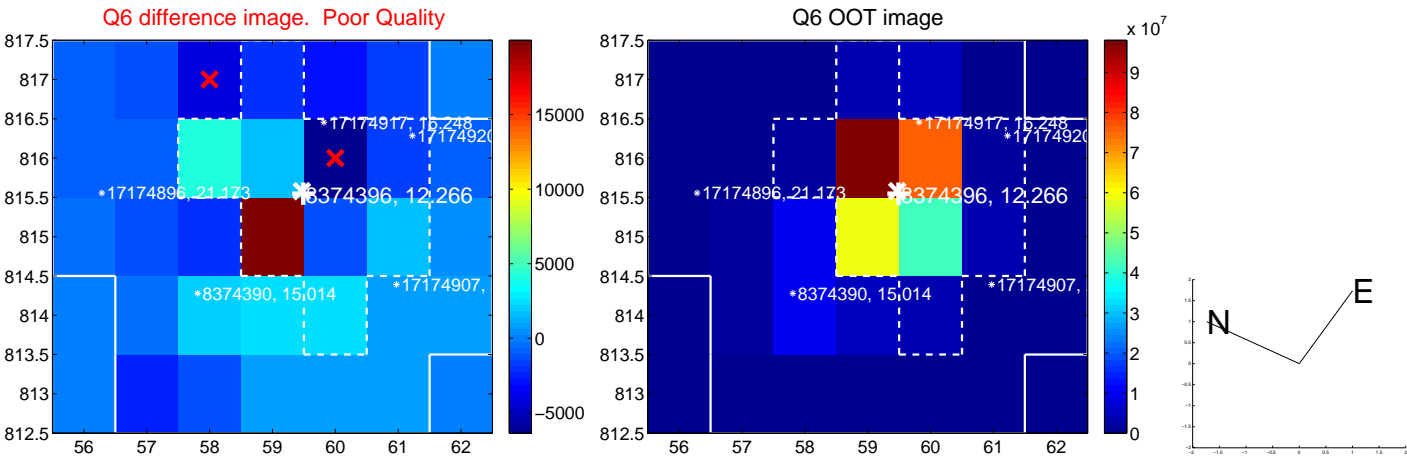
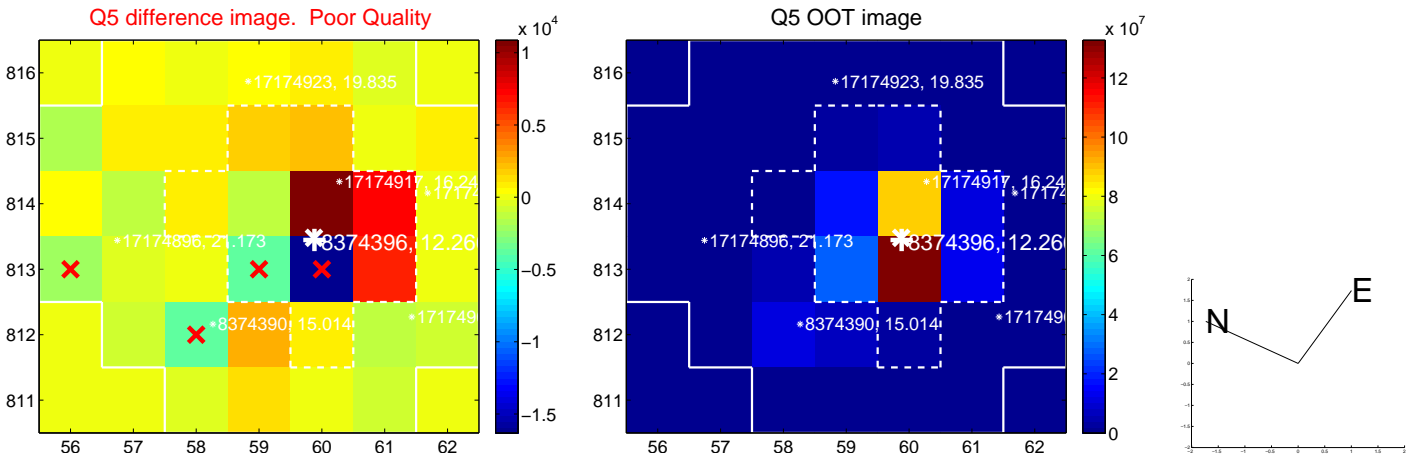
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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



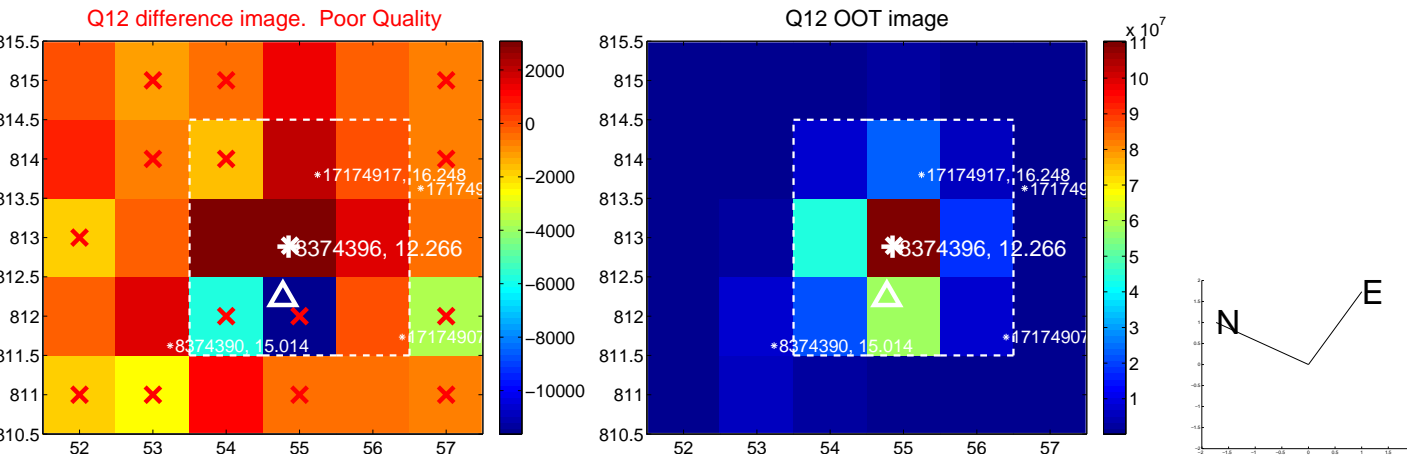
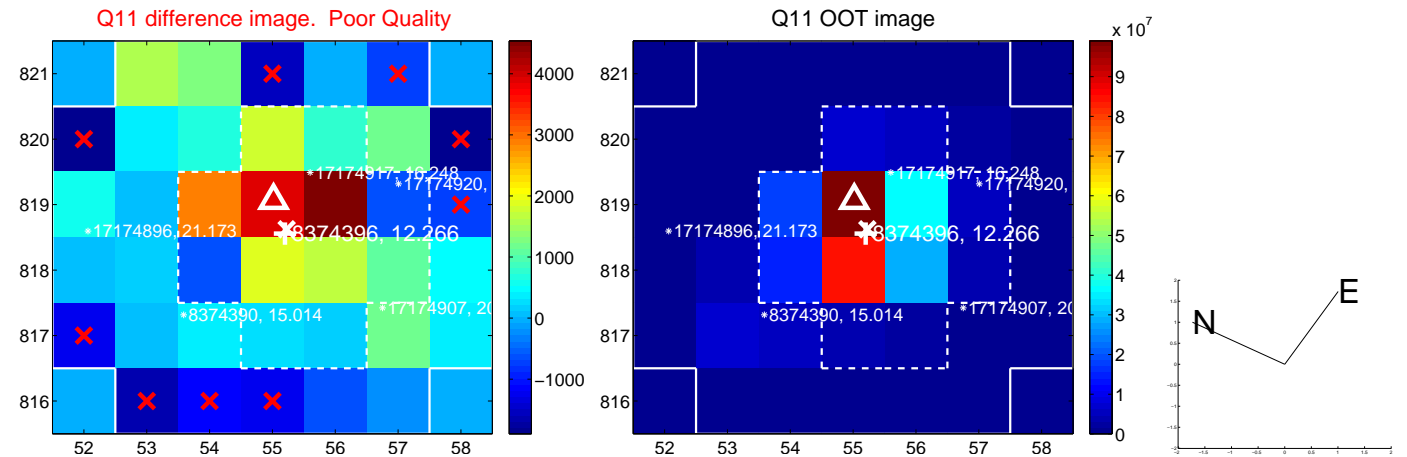
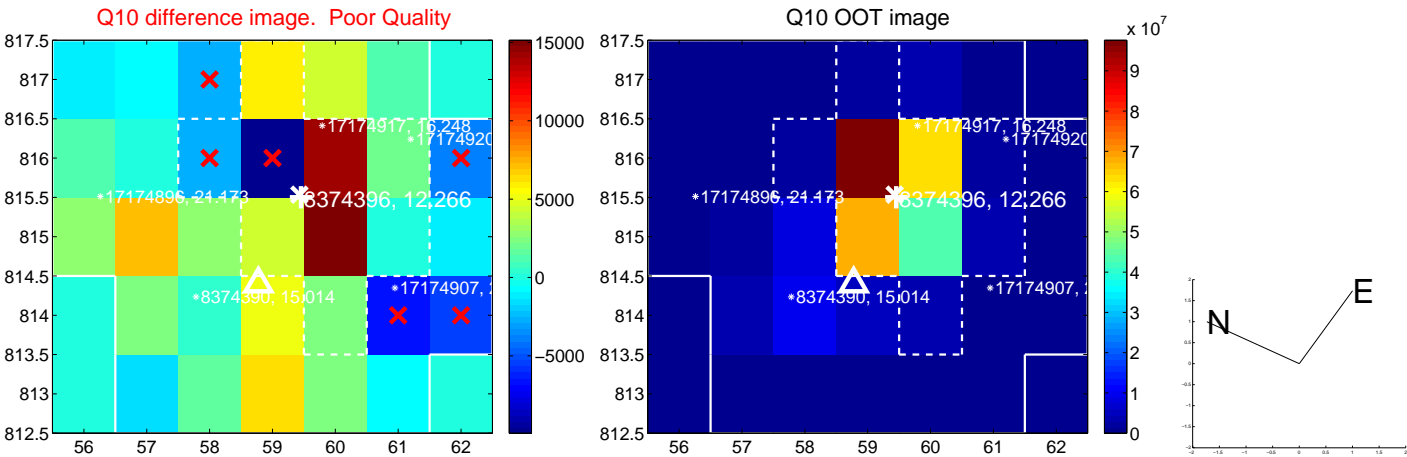
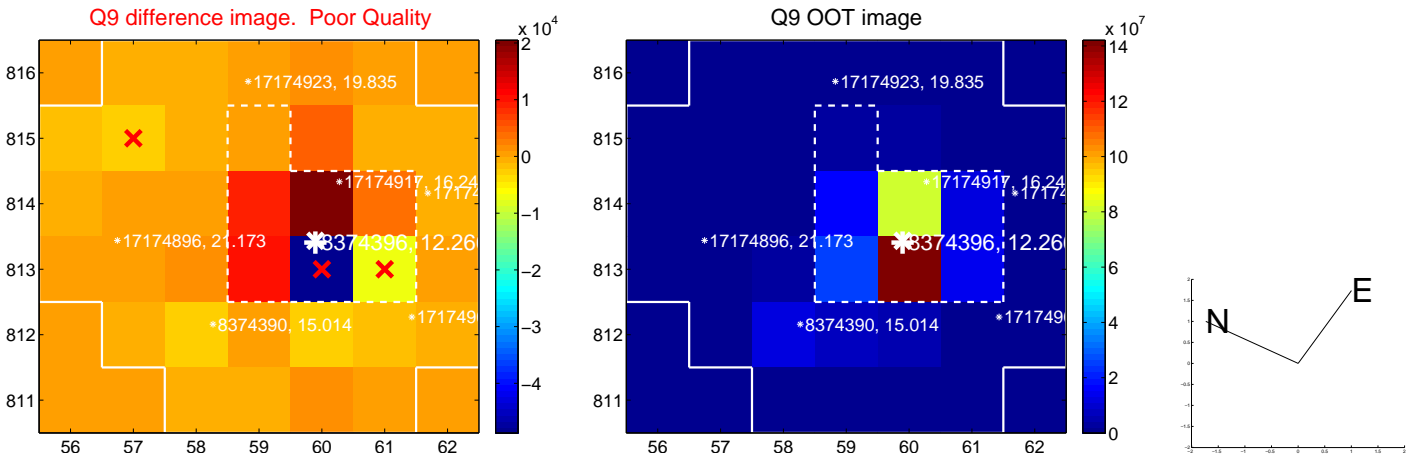
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



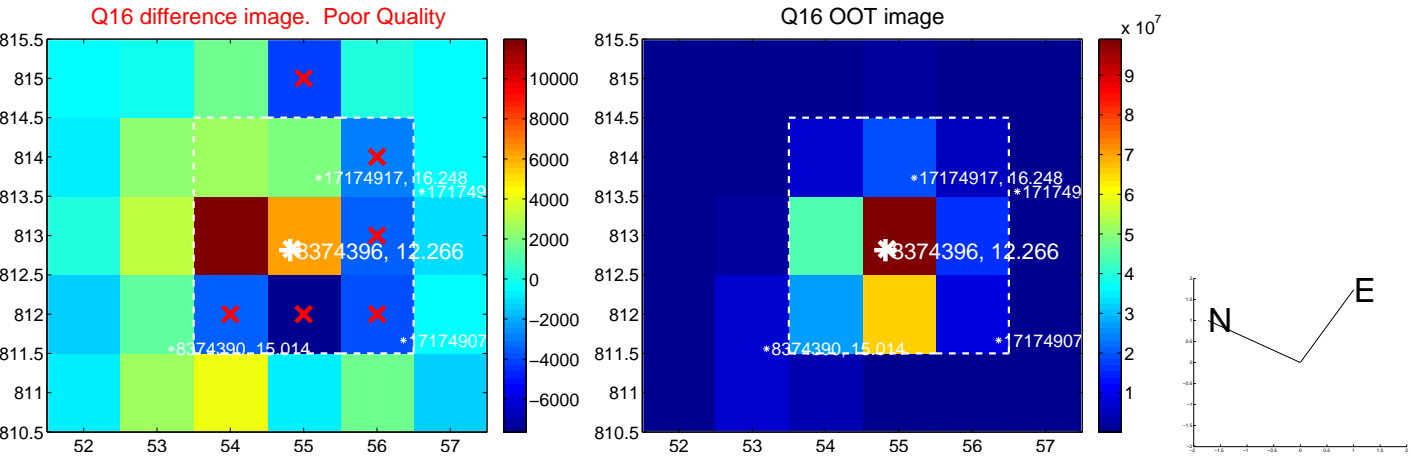
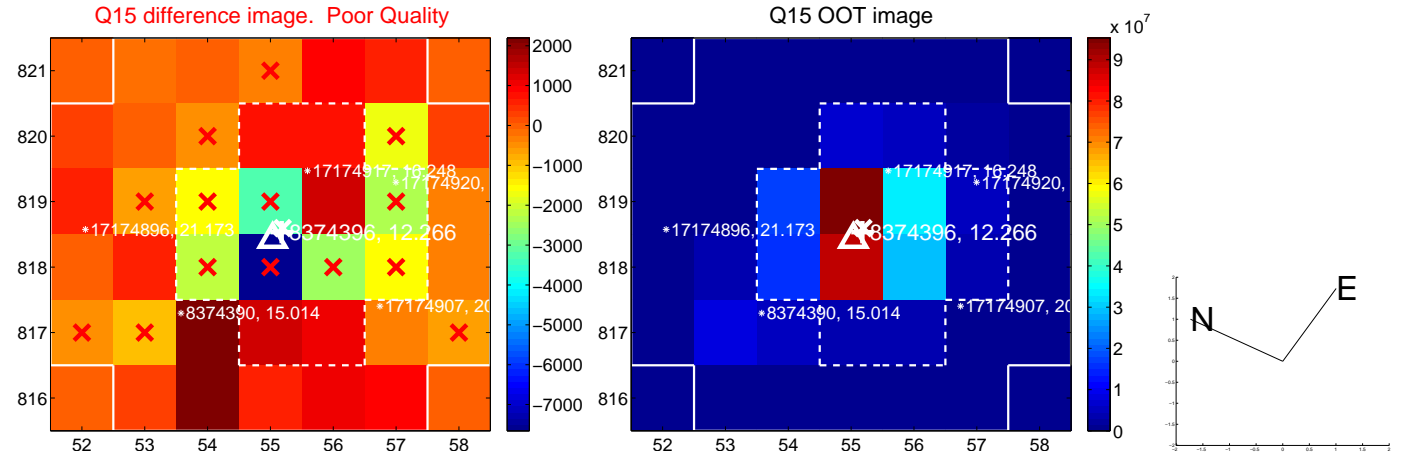
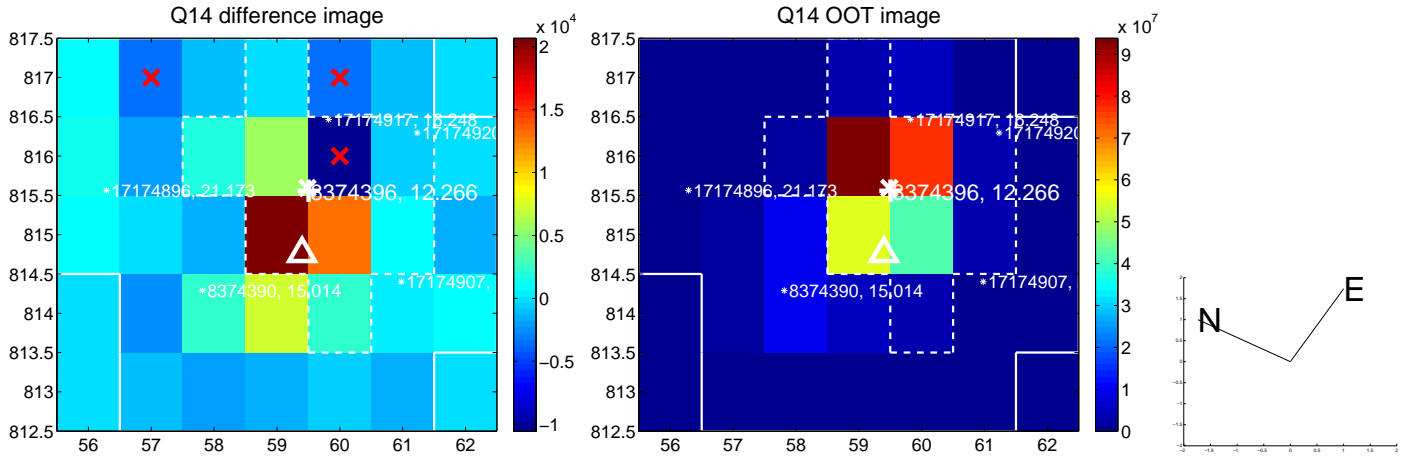
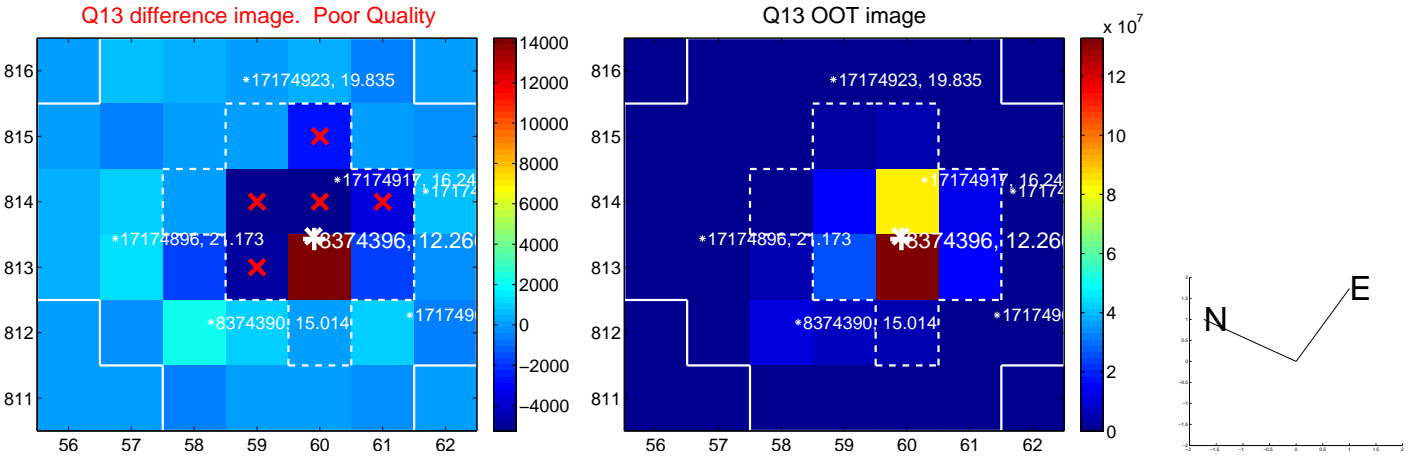
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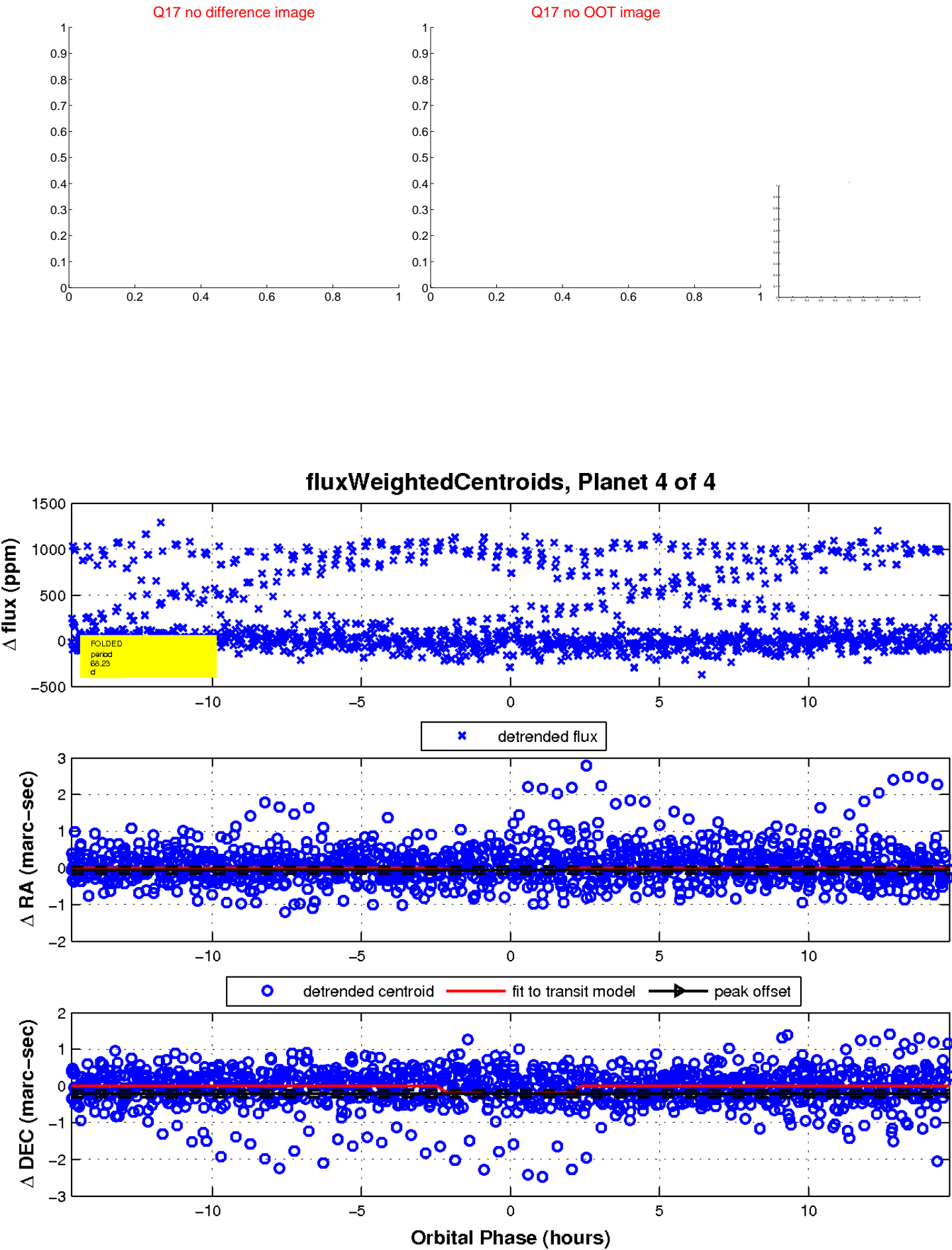
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UKIRT Image

Declination

