

# KIC 009774357

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009774357-01	OBS	No	6.891238	133.701789	52.0	20.090	10.2	10.0	1.75	7633	1.46	1376.59
009774357-02	OBS	No	6.891534	131.571534	60.1	18.396	11.7	11.2	1.75	7633	1.56	1376.51
009774357-03	OBS	No	6.889639	135.871956	41.7	19.498	7.4	8.7	1.75	7633	1.32	1377.01

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009774357-01	OBS	FP	0.00	1	0	0	0	LPP_DV
009774357-02	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD
009774357-03	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—SAME_NTL_PERIOD

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

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

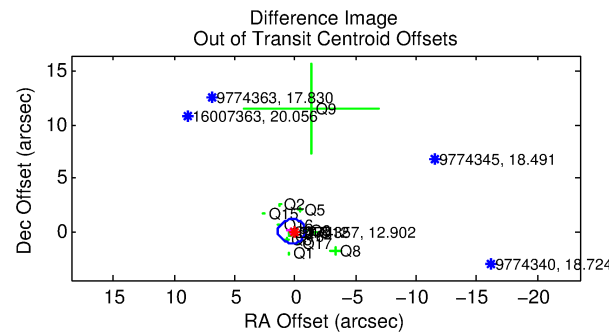
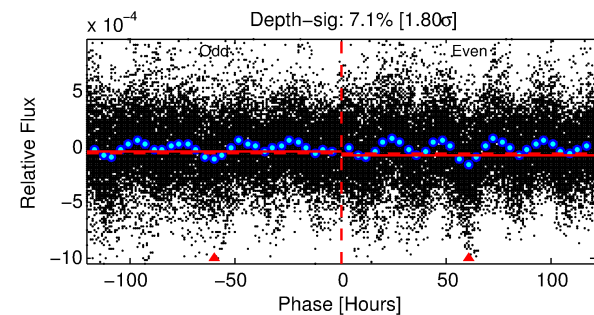
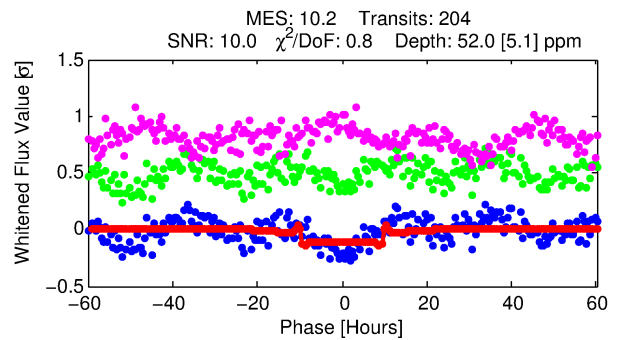
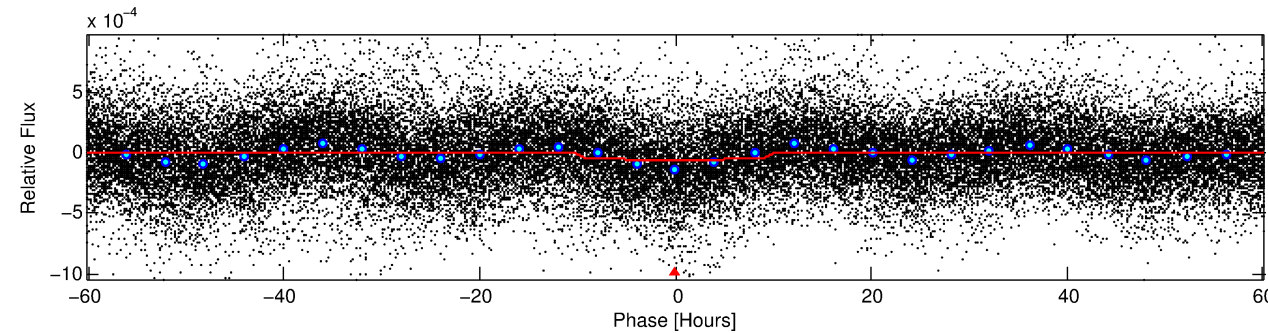
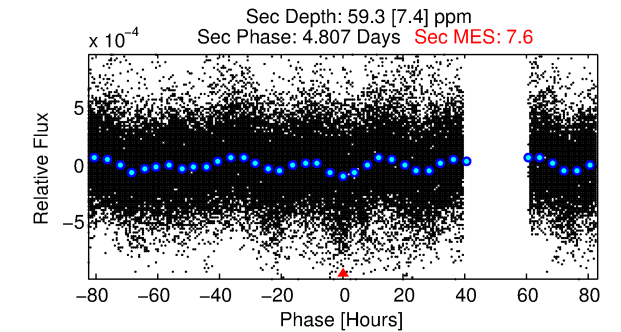
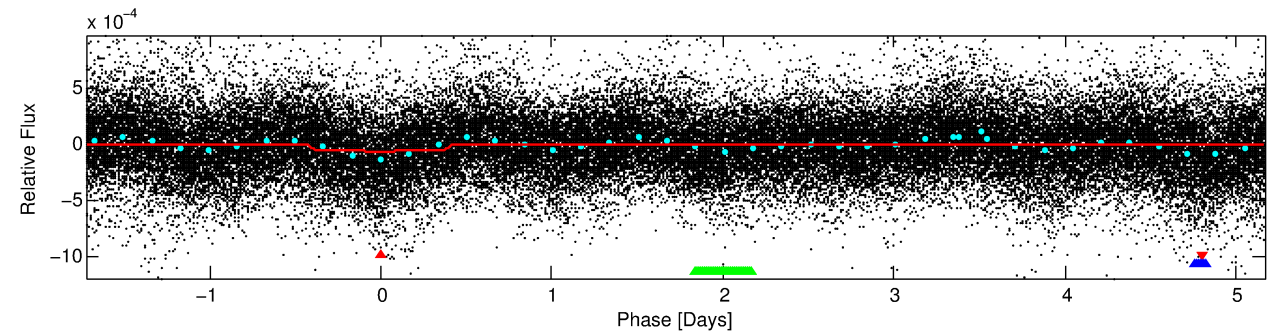
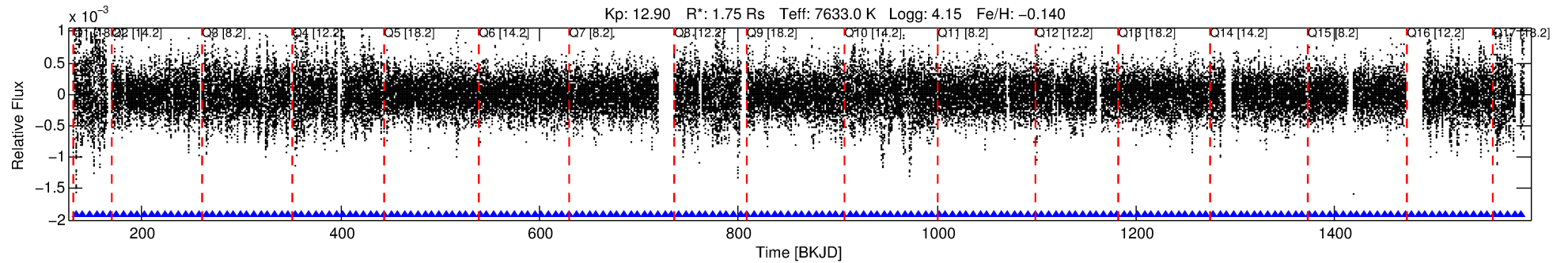
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 009774357-01

No Significant Match Found

# DV One-Page Summary

KIC: 9774357 Candidate: 1 of 3 Period: 6.891 d



## DV Fit Results:

Period = 6.89124 [0.00010] d  
Epoch = 133.7018 [0.0107] BKJD  
Rp/R\* = 0.0077 [0.0005]  
a/R\* = 1.53 [0.25]  
b = 0.89 [0.06]  
Seff = 1376.59 [533.10]  
Teq = 1553 [150] K  
Rp = 1.46 [0.46] Re  
a = 0.0823 [0.0204] AU  
Ag = 103.34 [40.95] [2.50σ]  
**Teffp = 7657 [476] K [12.2σ]**

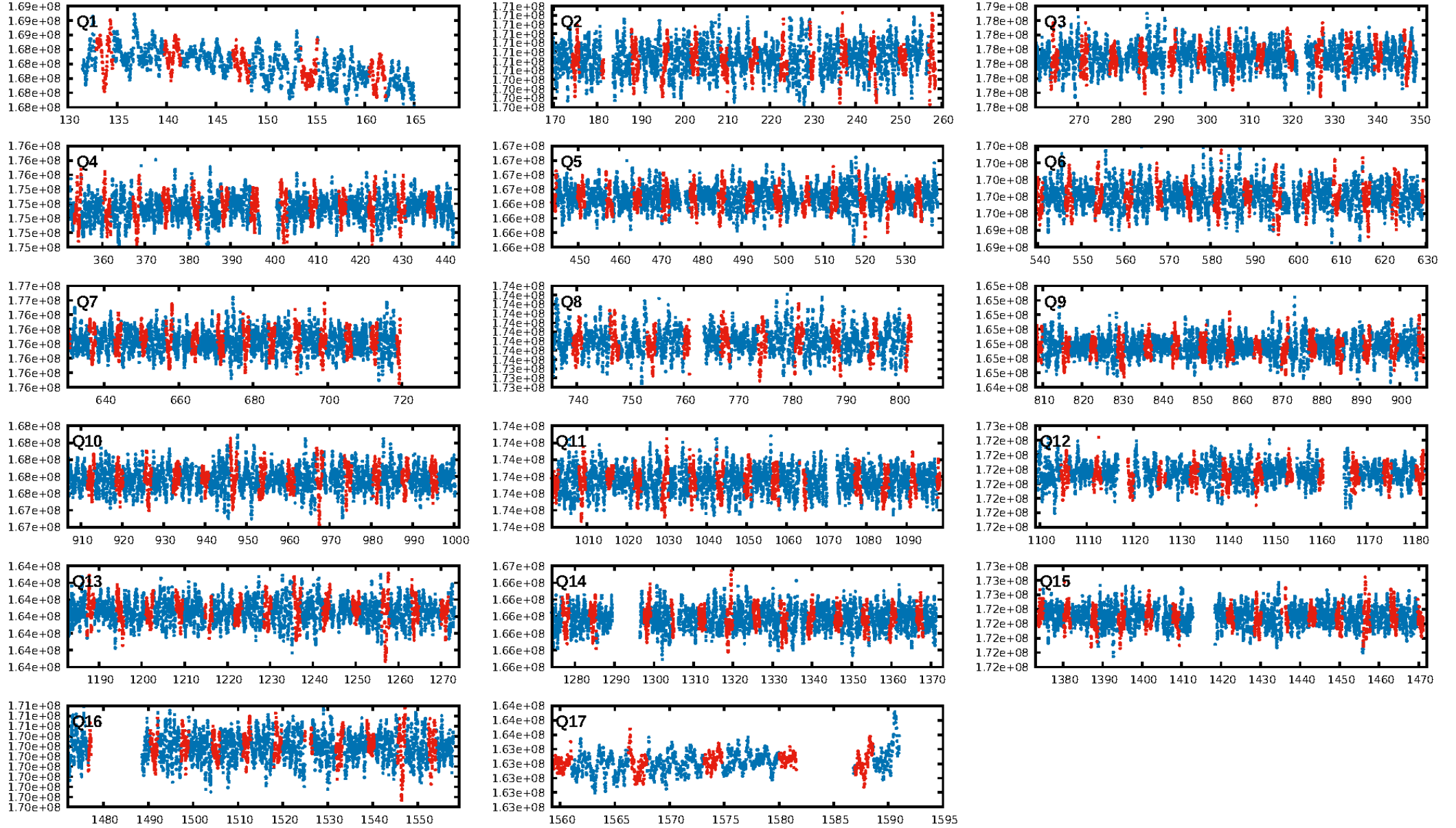
## DV Diagnostic Results:

**ShortPeriod-sig: 0.1% [0.00σ]**  
**LongPeriod-sig: 0.0% [0.00σ]**  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [194/194]  
GhostDiagnostic-chr: 5.127  
Centroid-sig: 7.3%  
Centroid-so: 0.606 arcsec [1.27σ]  
OotOffset-rm: 0.297 arcsec [0.79σ]  
KicOffset-rm: 0.284 arcsec [0.75σ]  
OotOffset-st: 3/3/4/5 [15]  
KicOffset-st: 3/3/4/5 [15]  
DiffImageQuality-fgm: 0.60 [9/15]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 22:00:38 Z

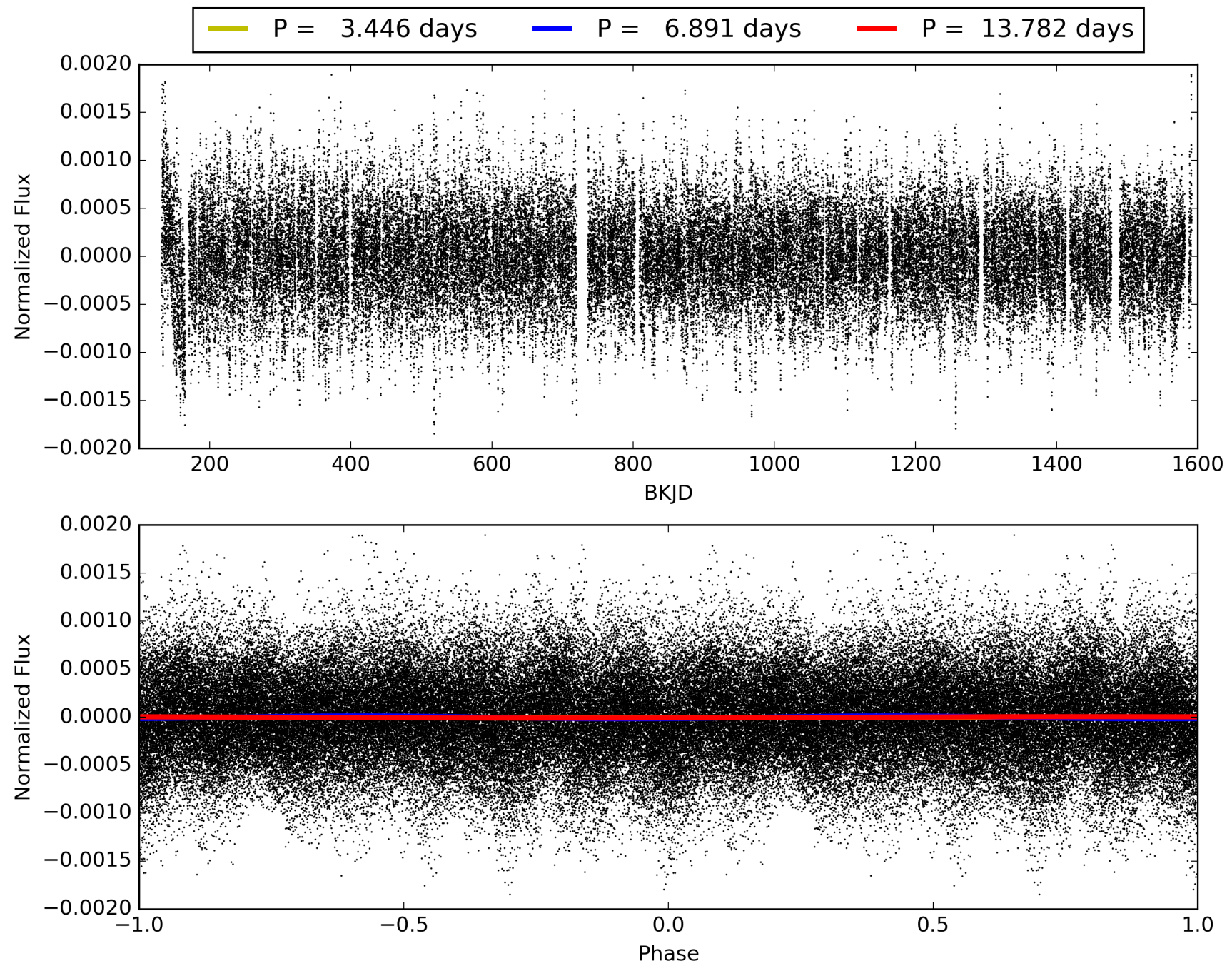
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 009774357-01, PDC Light Curves





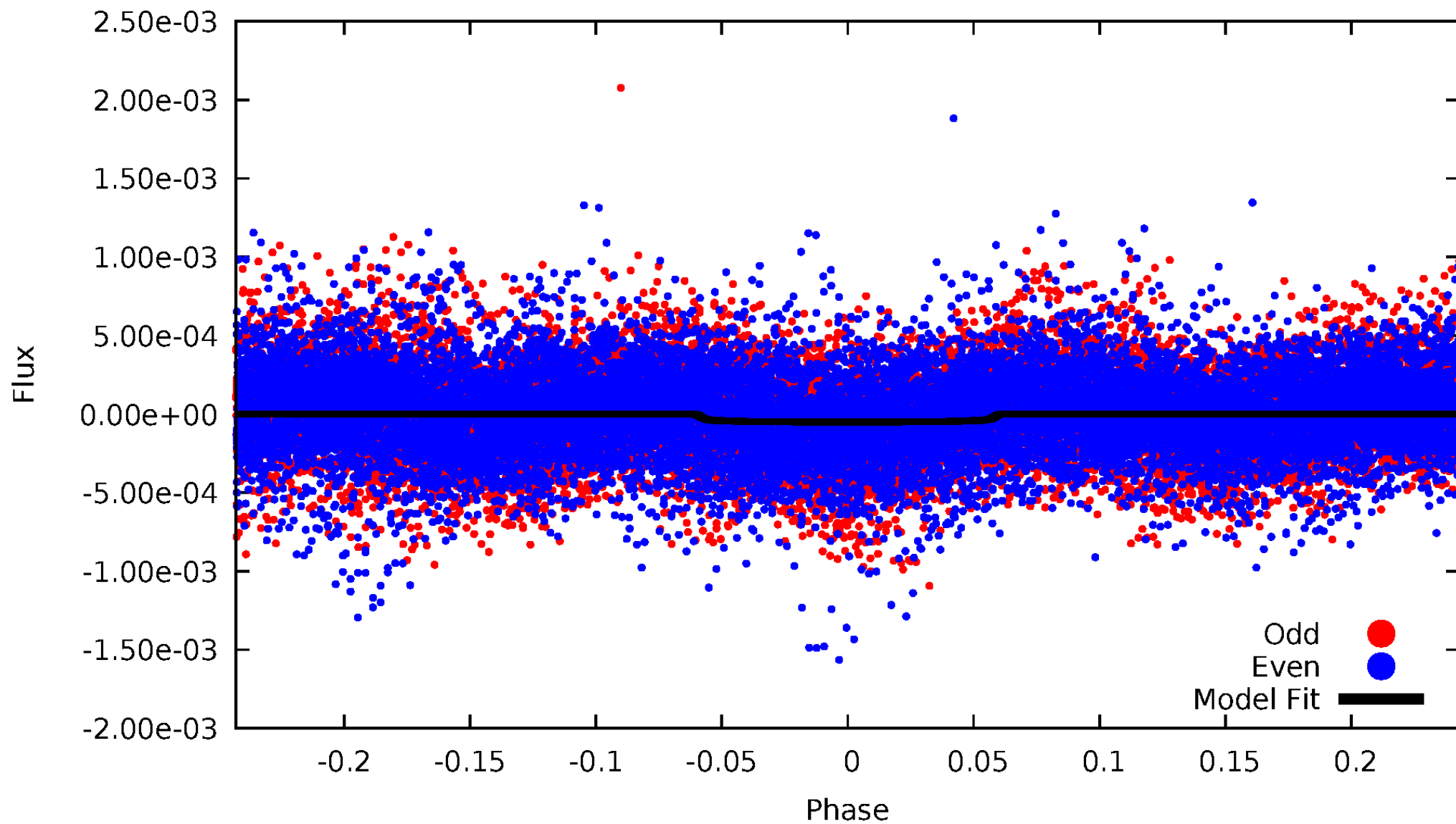
TCE 009774357-01





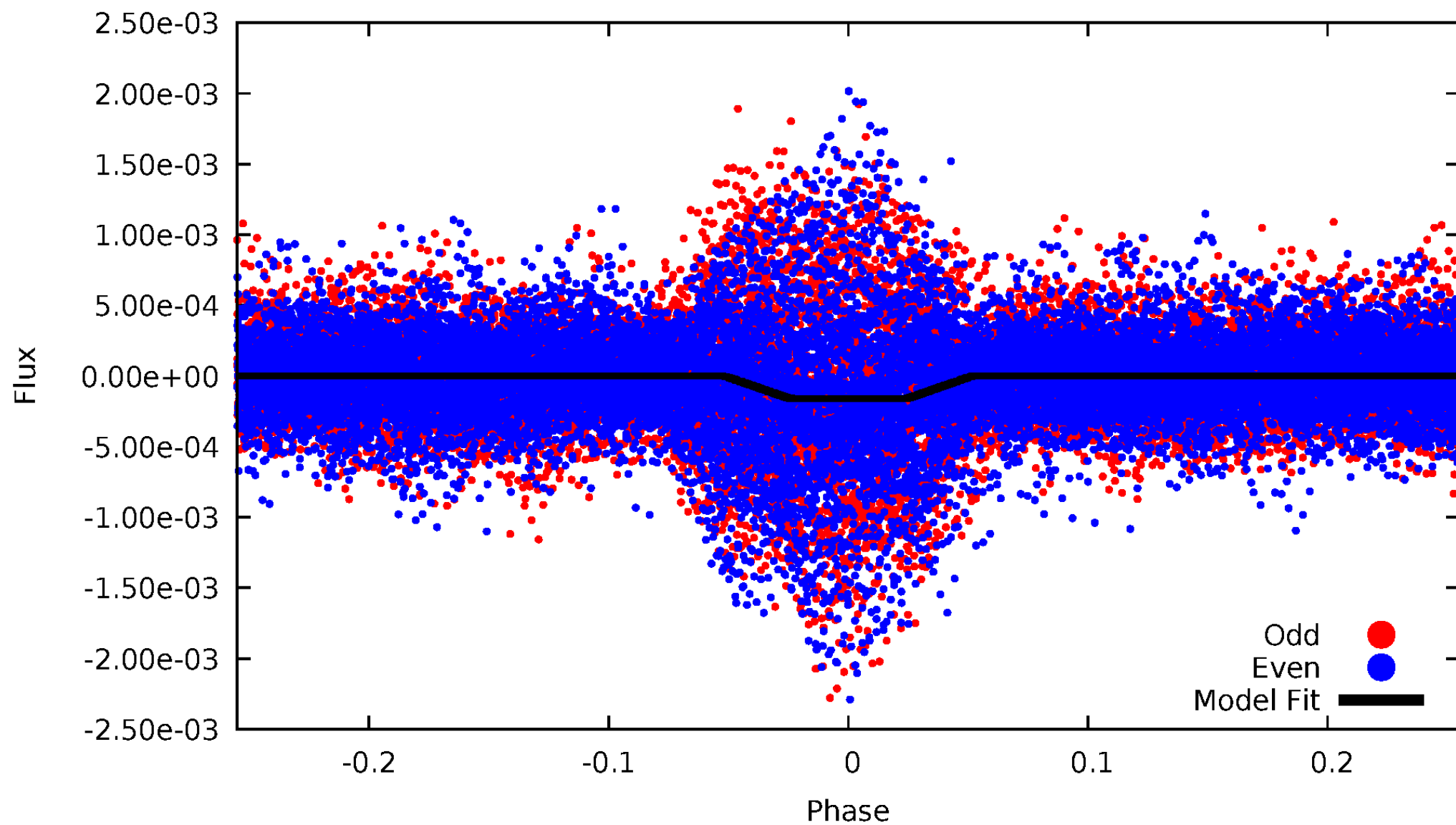
# DV Odd/Even

TCE 009774357-01

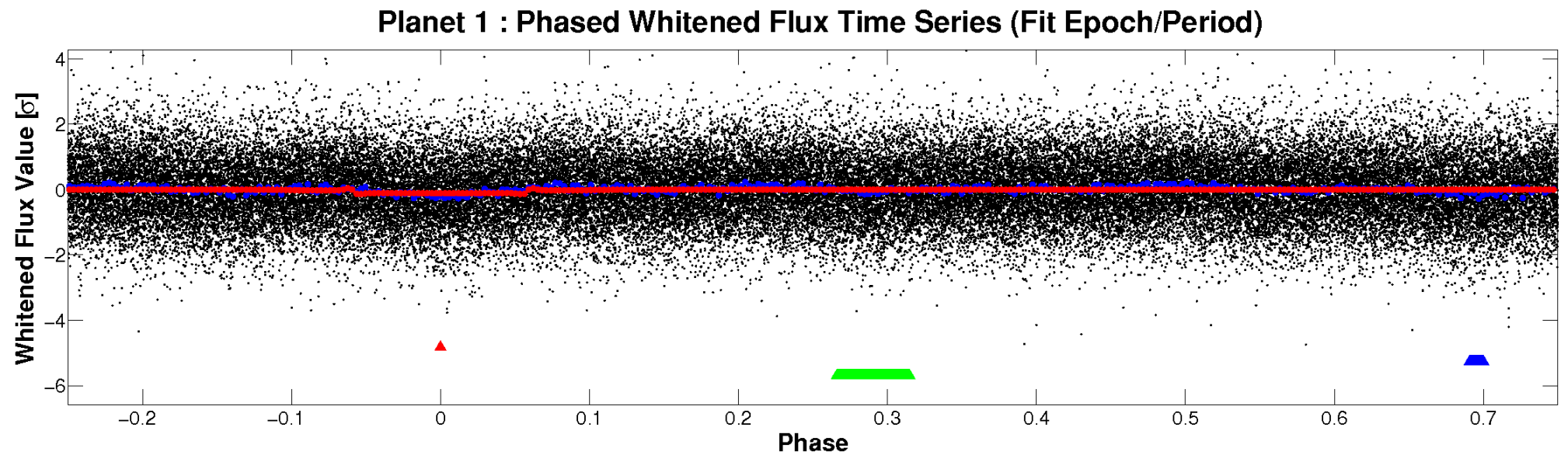
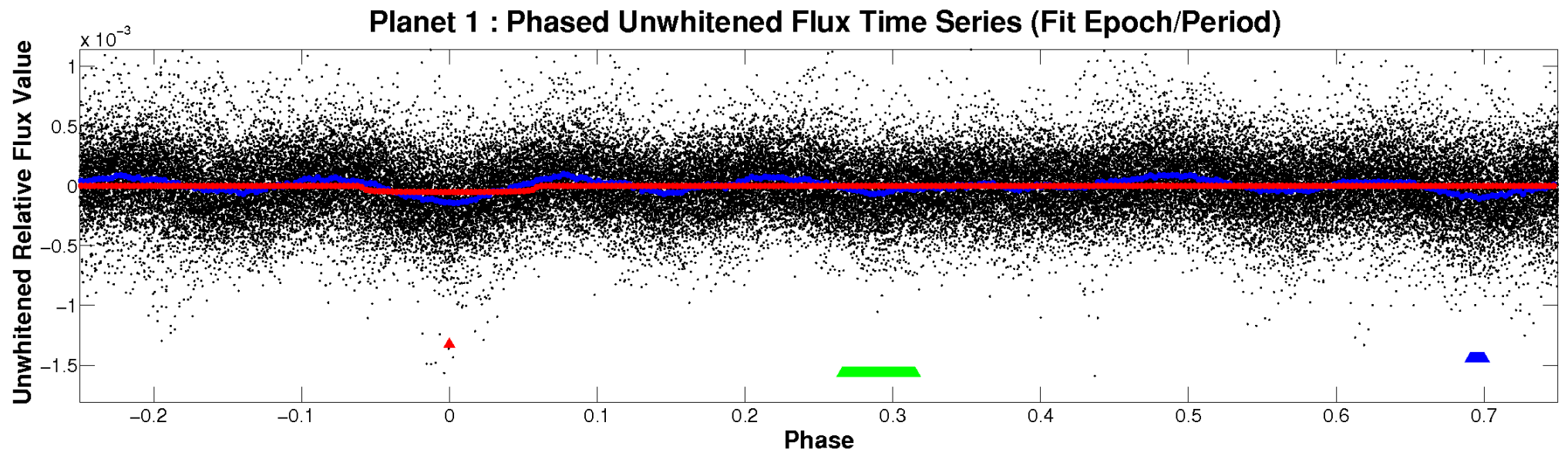


# ALT Odd/Even

TCE 009774357-01



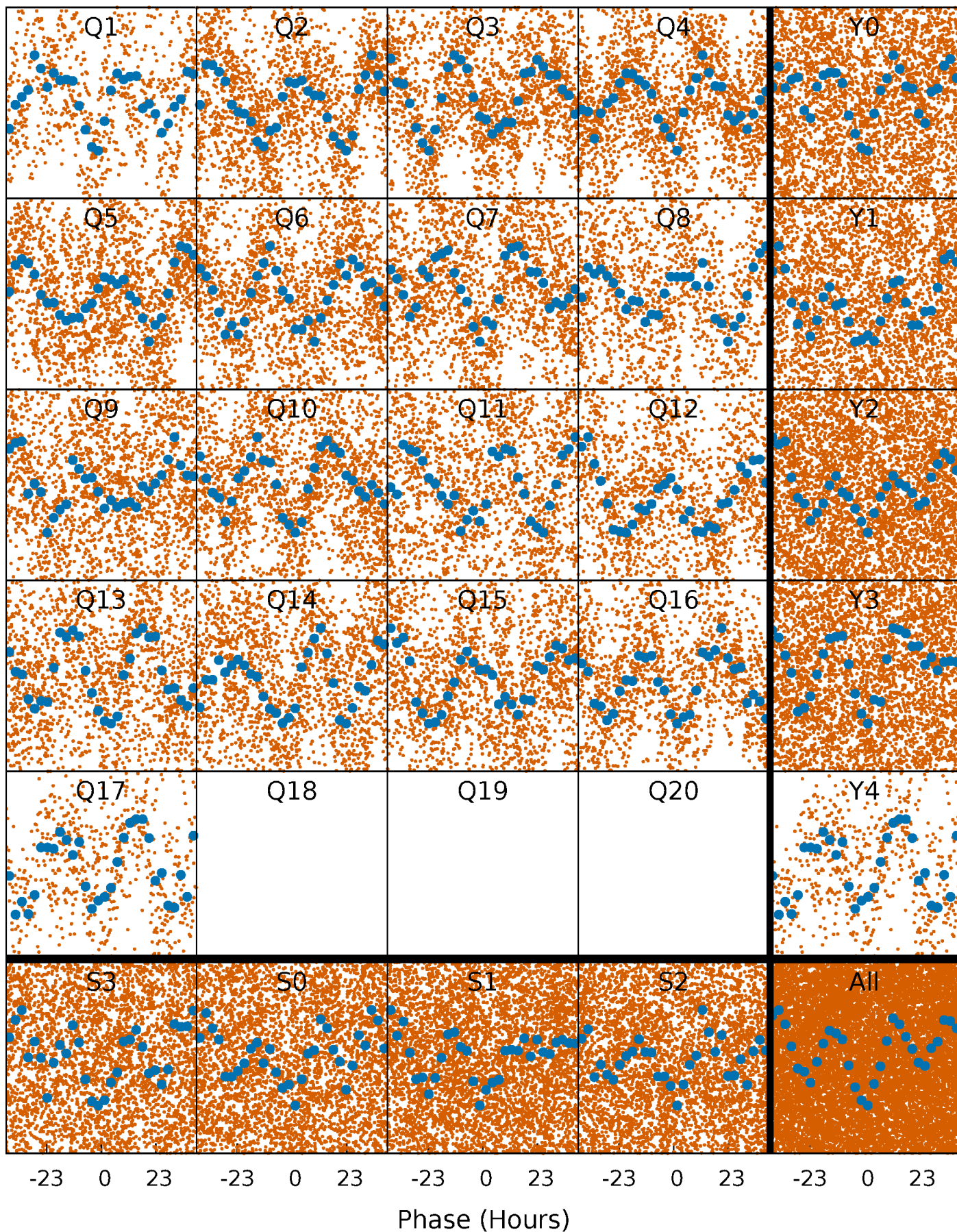
# Non-Whitened Vs. Whitened Light Curve





# PDC Quarter-Phased Transit Curves

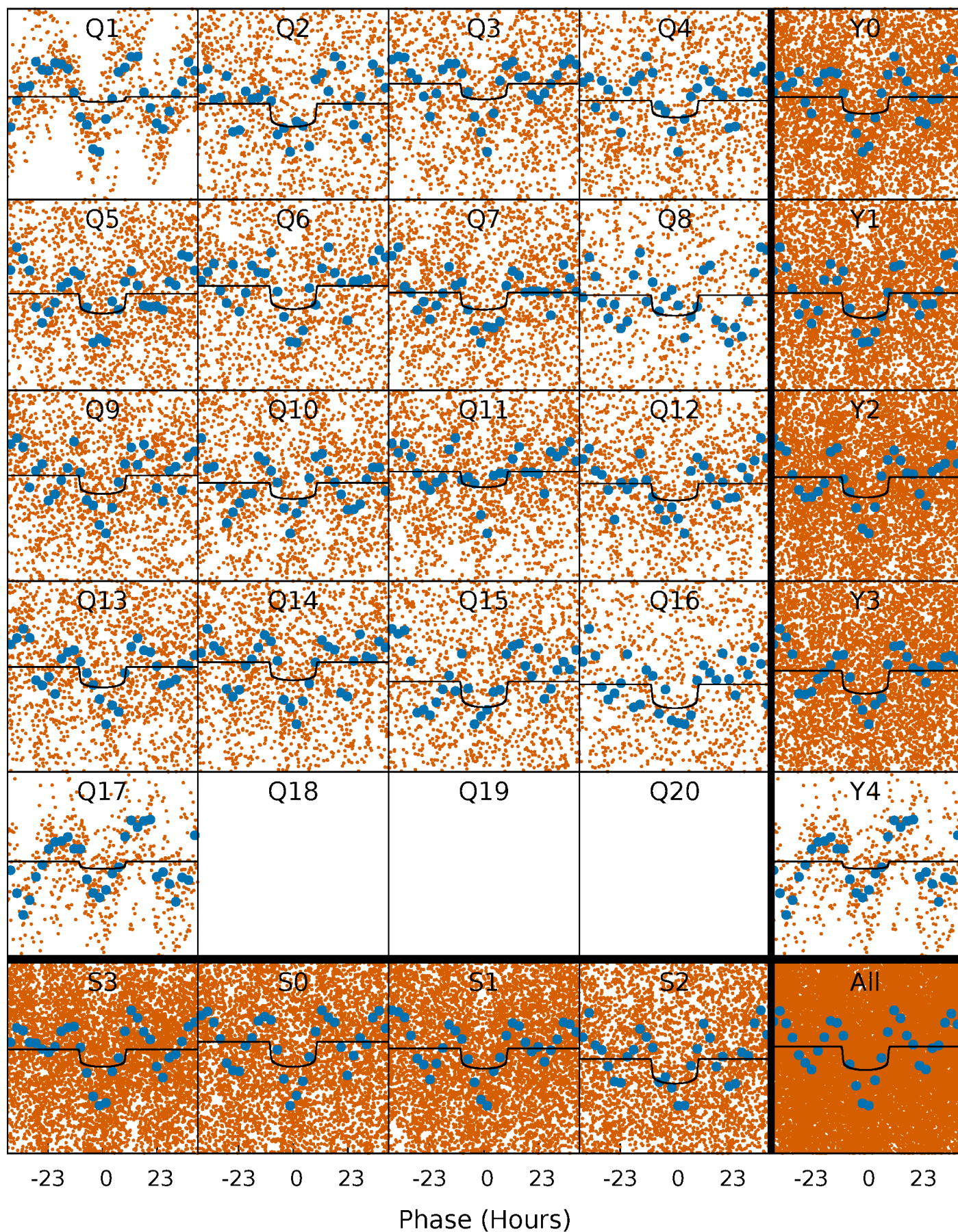
TCE 009774357-01 P= 6.891238 Days  $T_0=133.701789$  (BKJD)





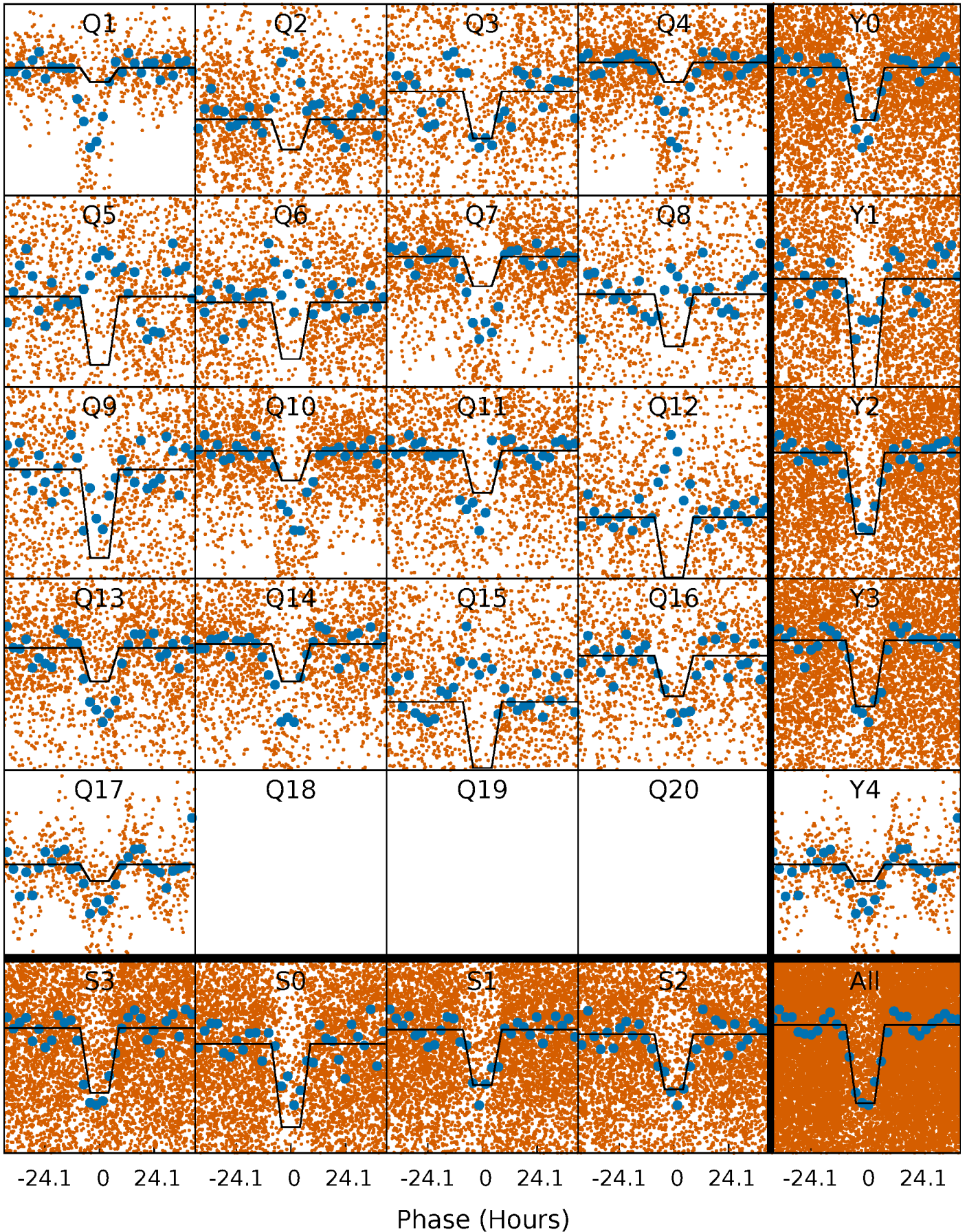
# DV Quarter-Phased Transit Curves

TCE 009774357-01 P= 6.891238 Days  $T_0=133.701789$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 009774357-01 P= 6.891139 Days  $T_0=133.710519$  (BKJD)

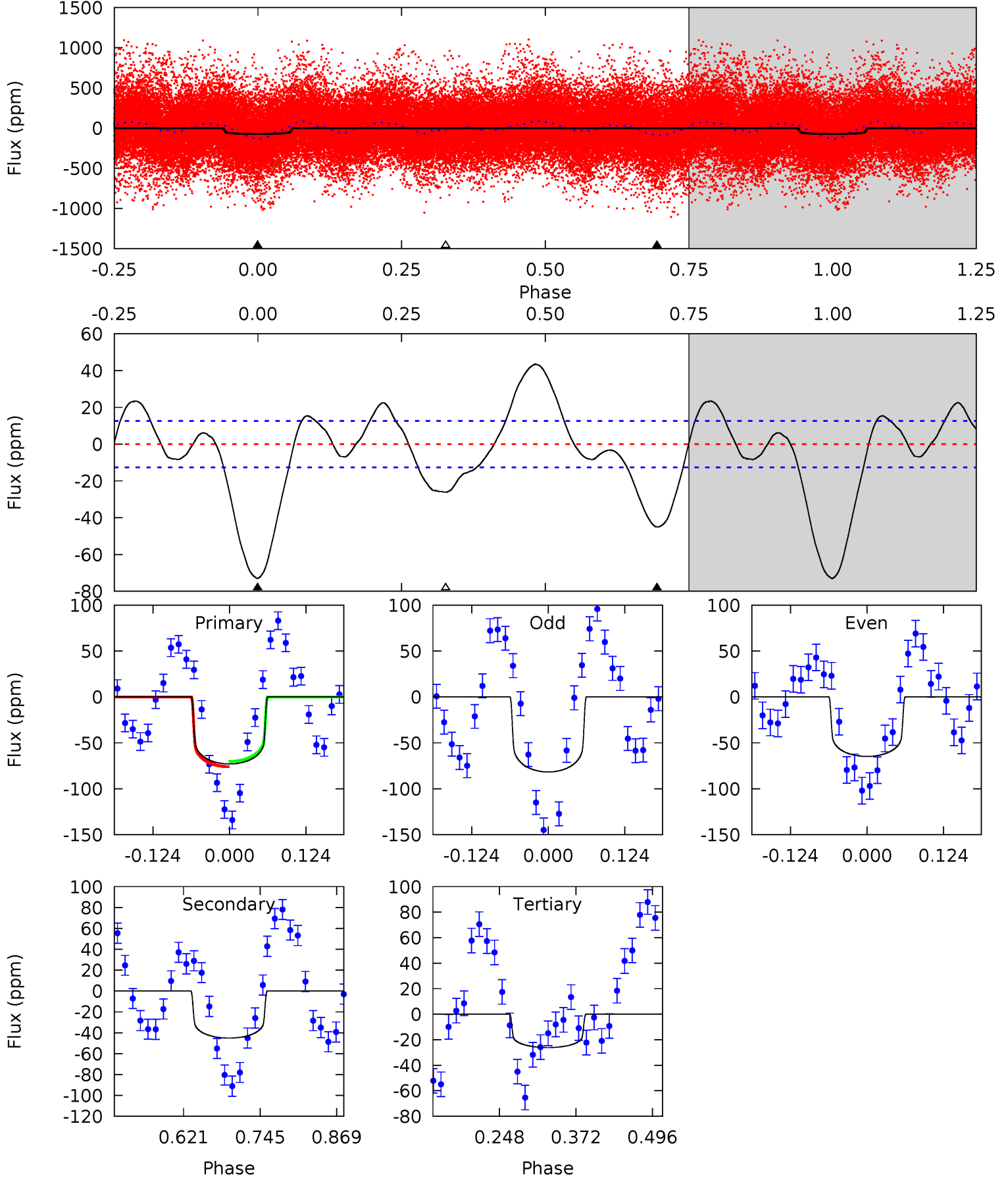




# DV Model-Shift Uniqueness Test

009774357-01, P = 6.891238 Days, E = 126.810551 Days

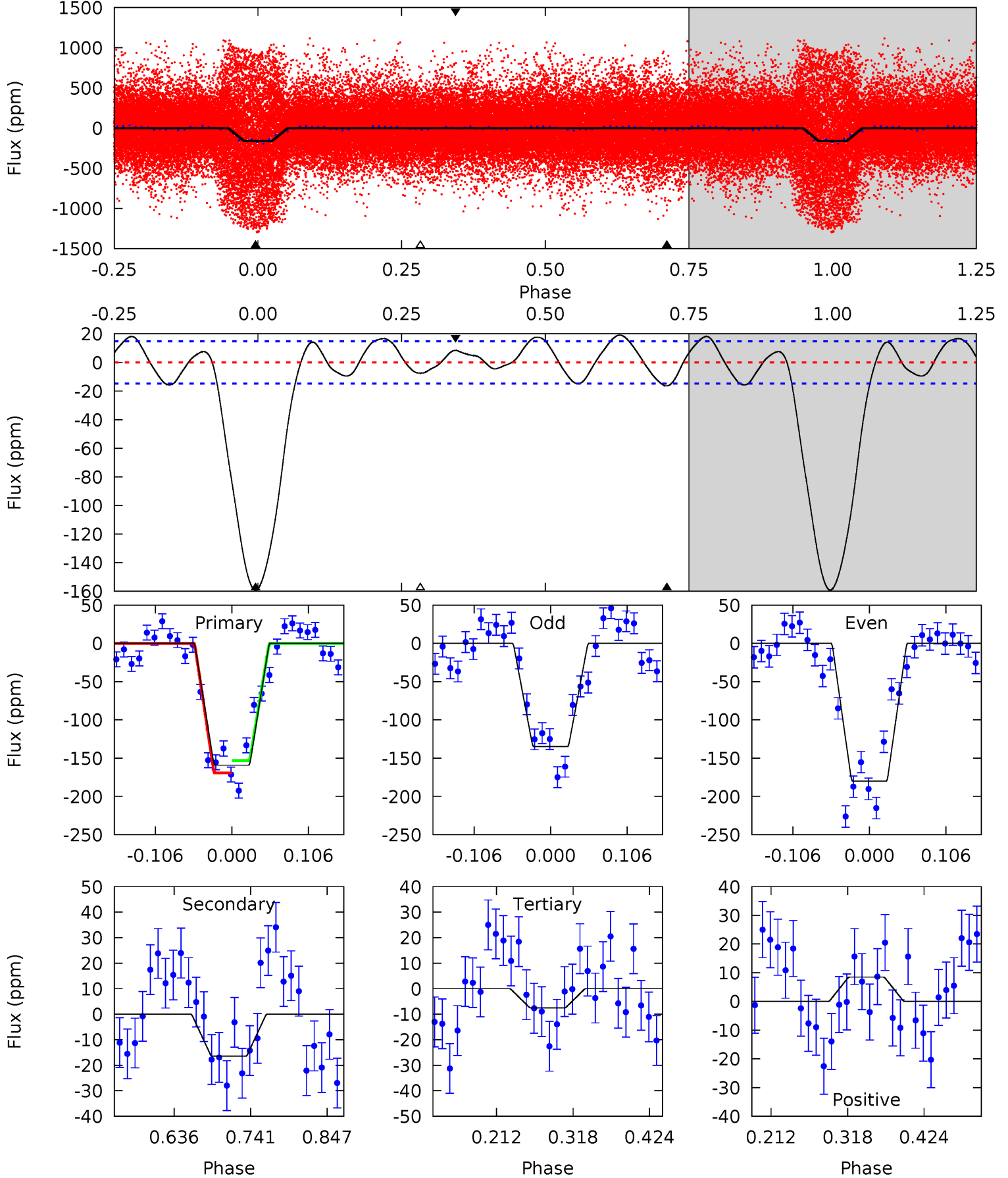
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
26.0	16.1	9.33	0	4.52	1.54	6.73	16.7	26.0	6.76	16.1	3.02	1.06	0.37	1.03



# Alt Model-Shift Uniqueness Test

009774357-01, P = 6.891139 Days, E = 126.819380 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
48.9	5.04	2.31	2.61	4.55	1.62	2.77	46.6	46.3	2.73	2.43	6.82	1.16	0.11	2.43



### Stellar Parameters For KIC 009774357

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7633^{+211}_{-316}$	$4.146^{+0.124}_{-0.186}$	$-0.140^{+0.200}_{-0.350}$	$1.751^{+0.532}_{-0.354}$	$1.564^{+0.197}_{-0.241}$	$0.410^{+0.300}_{-0.200}$
	+3%/-4%	+3%/-4%	+143%/-250%	+30%/-20%	+13%/-15%	+73%/-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 009774357-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-45 \pm 3$	$1.48^{+0.24}_{-0.18}$	$2179^{+175}_{-136}$	$7038^{+387}_{-384}$	$76^{+21}_{-20}$
Alt.	$-16 \pm 3$	$2.42^{+0.41}_{-0.28}$	$2181^{+169}_{-134}$	$4400^{+214}_{-206}$	$9.990^{+3.537}_{-2.973}$

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



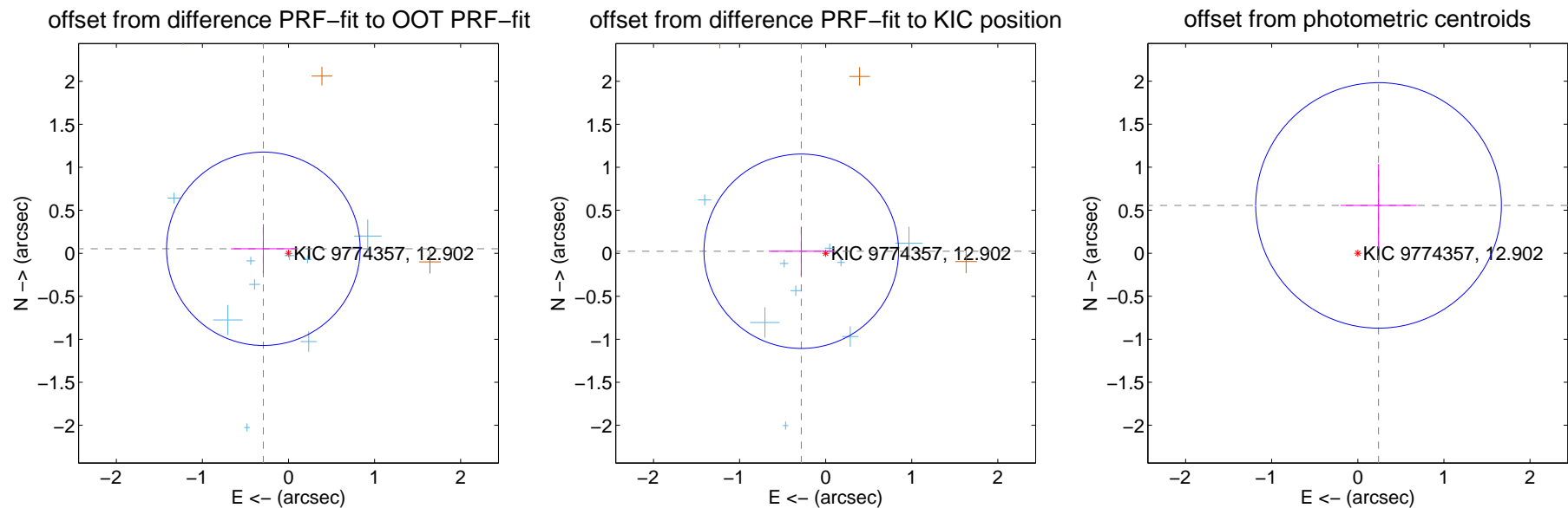
## DV Centroid Data

Supplemental centroid analysis for 009774357-01. Kepler magnitude: 12.90. Transit SNR 10.02

There are 9 quarters with good PRF difference image offsets

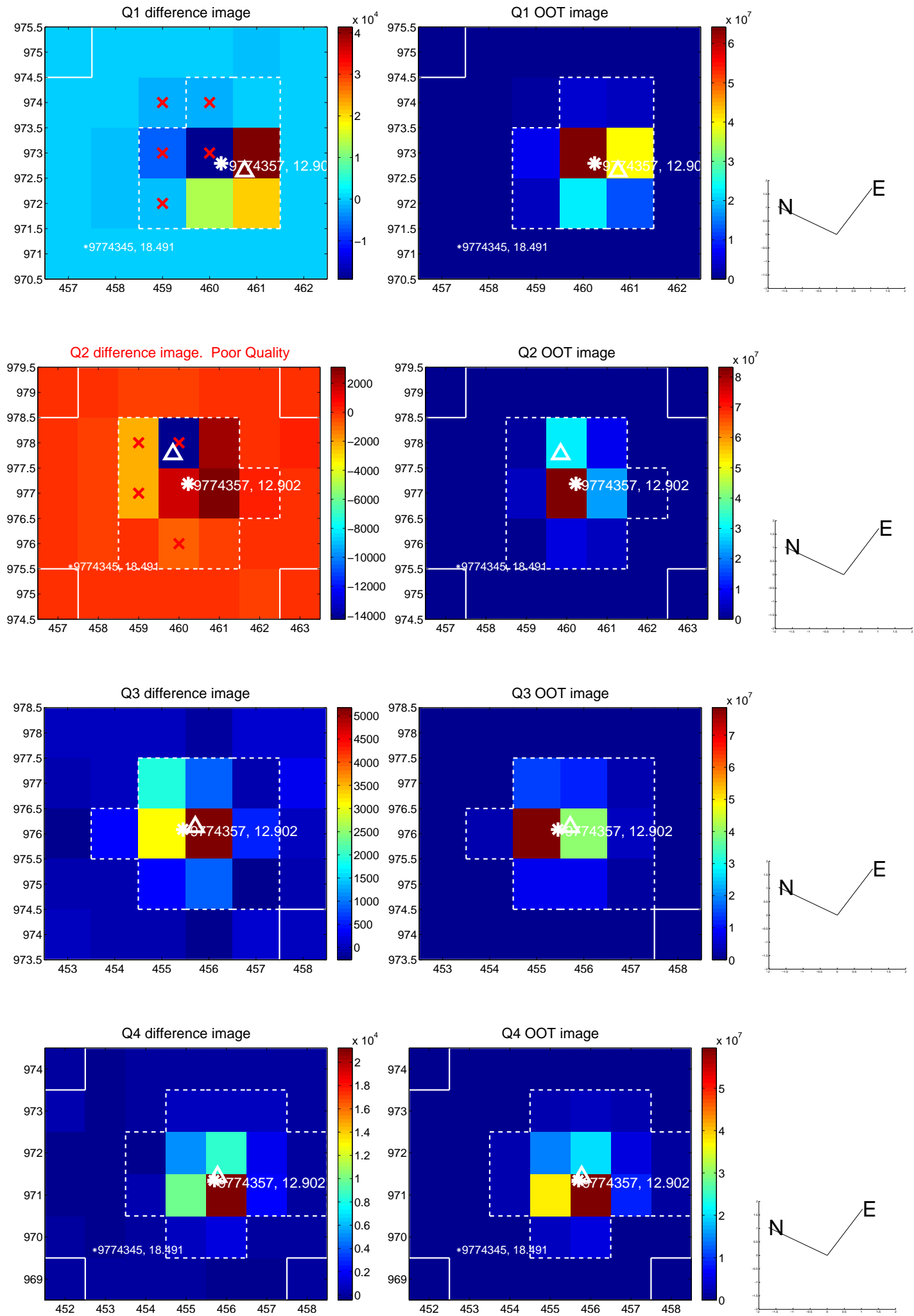
The direct PRF centroid is offset from the target star catalog position by about 0.08 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.297 \pm 0.375$	0.79	$0.292 \pm 0.377$	$0.052 \pm 0.286$
PRF-fit source offset from KIC position	$0.284 \pm 0.377$	0.75	$0.283 \pm 0.377$	$0.024 \pm 0.286$
photometric centroid source offset	$0.61 \pm 0.48$	1.27	$-0.24 \pm 0.44$	$0.56 \pm 0.48$

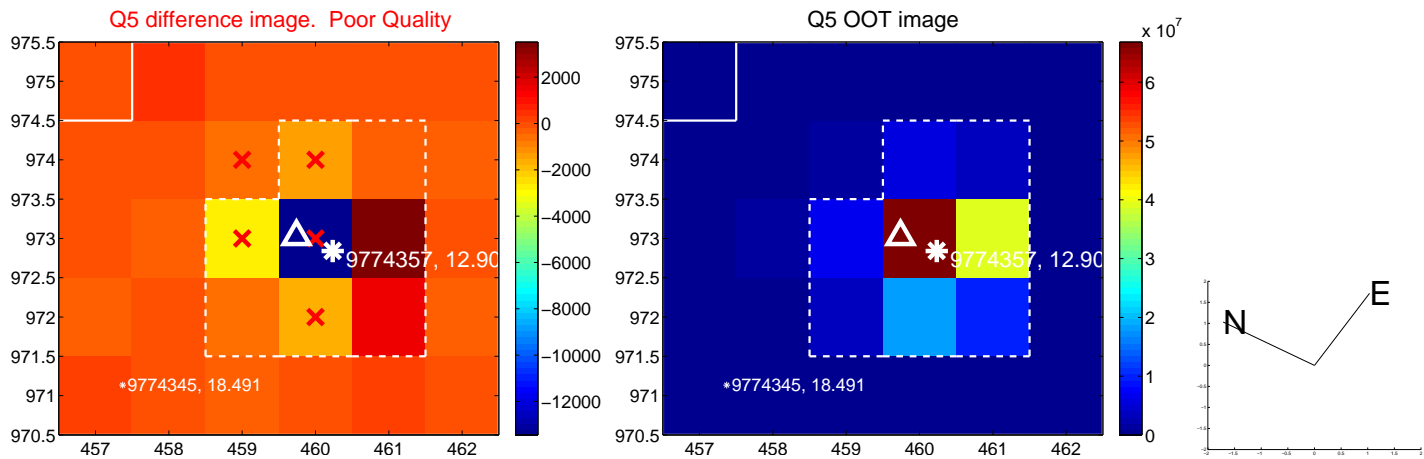


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

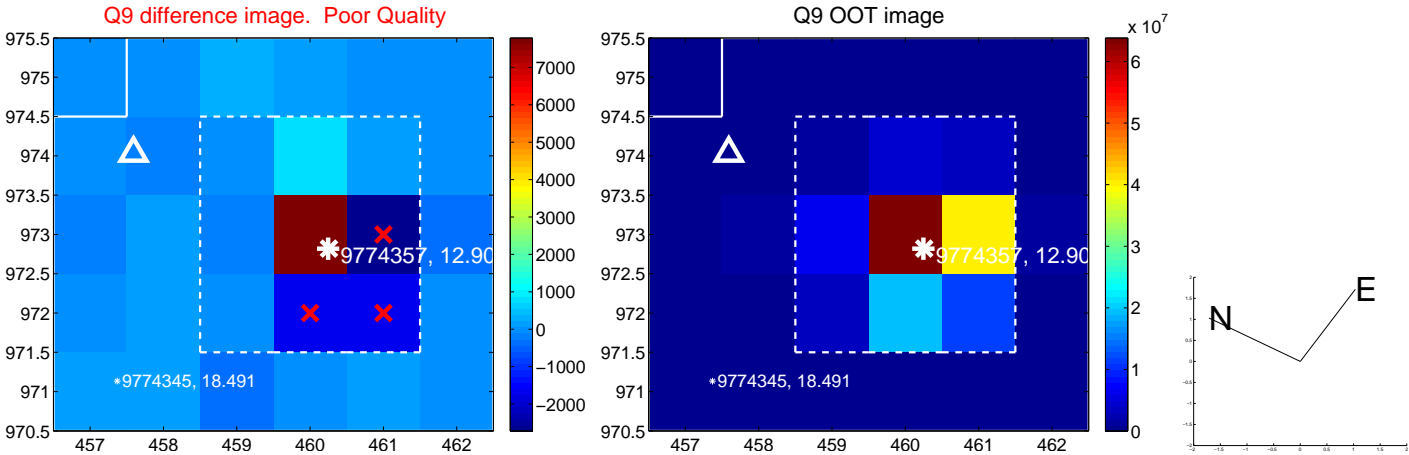


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

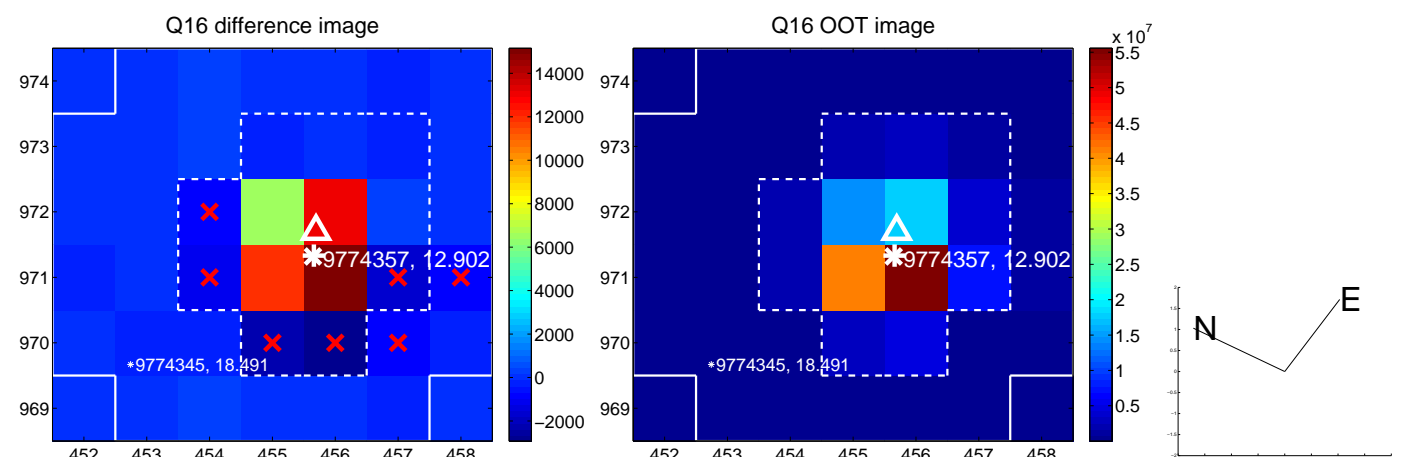
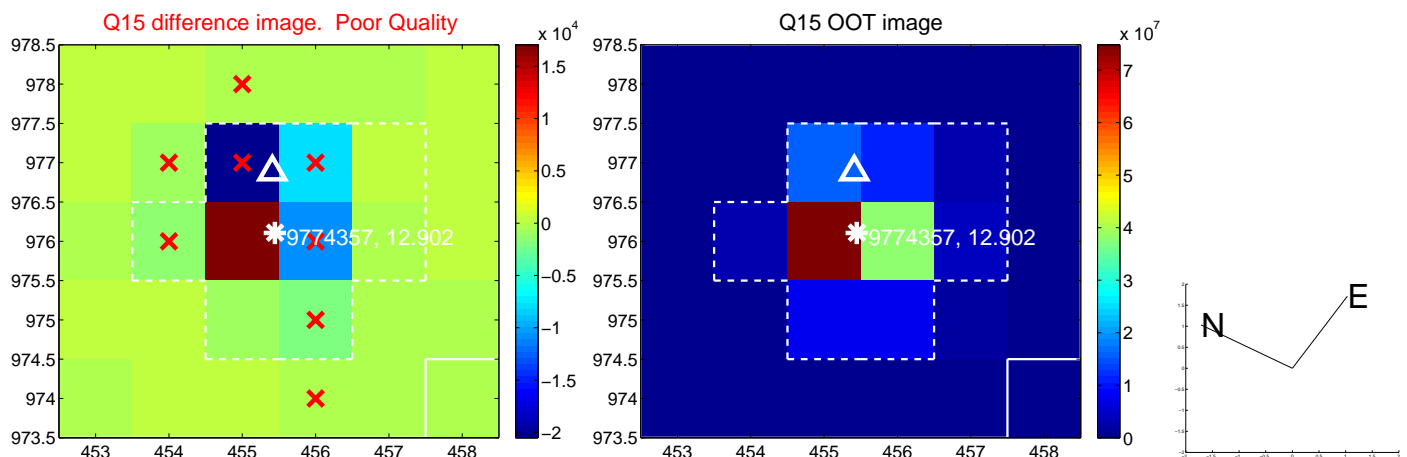
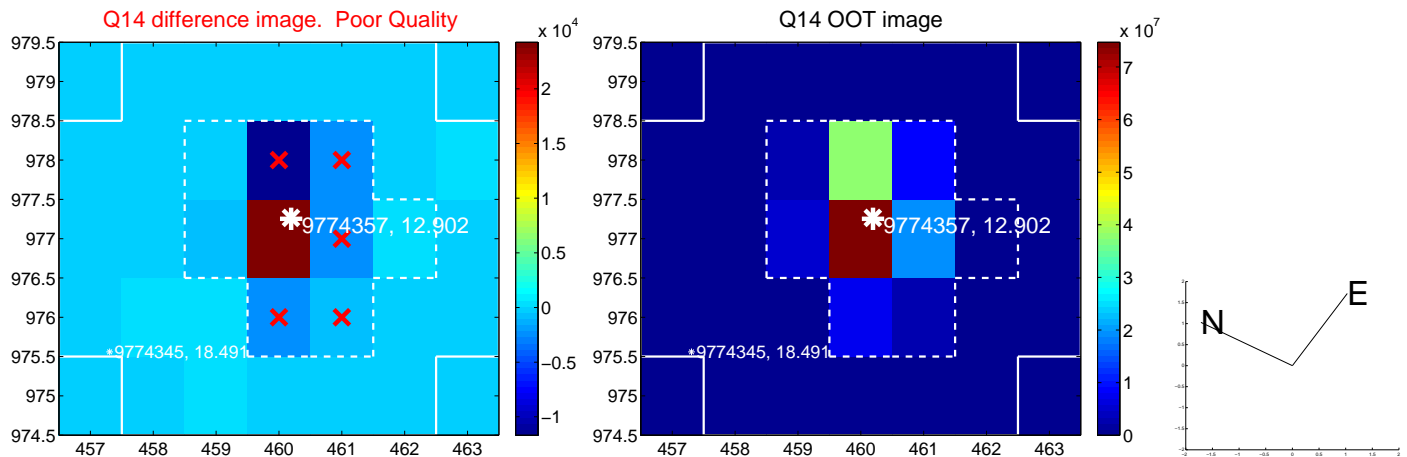
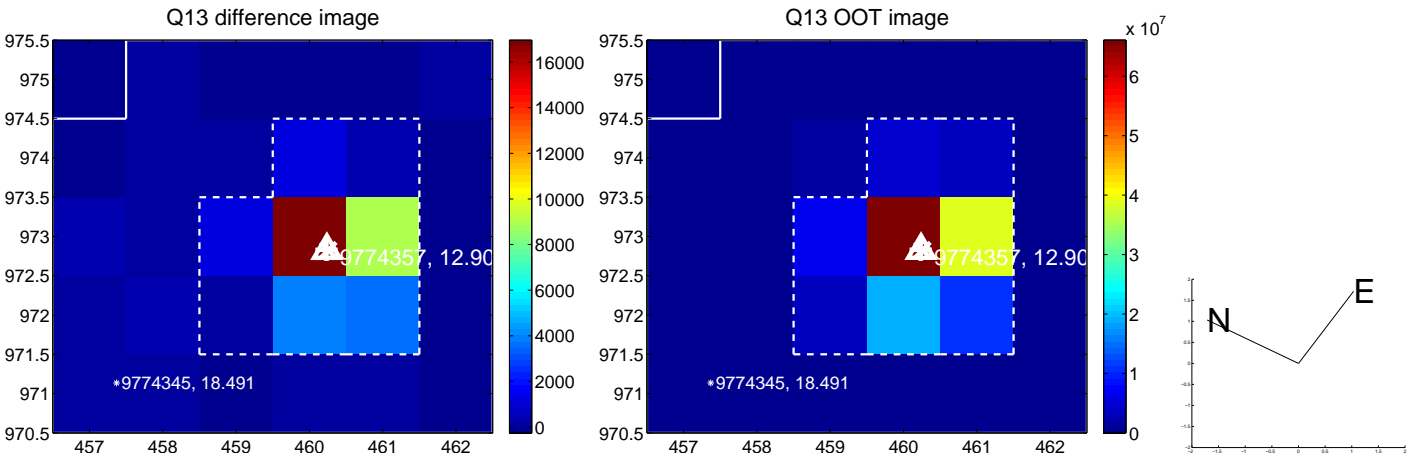




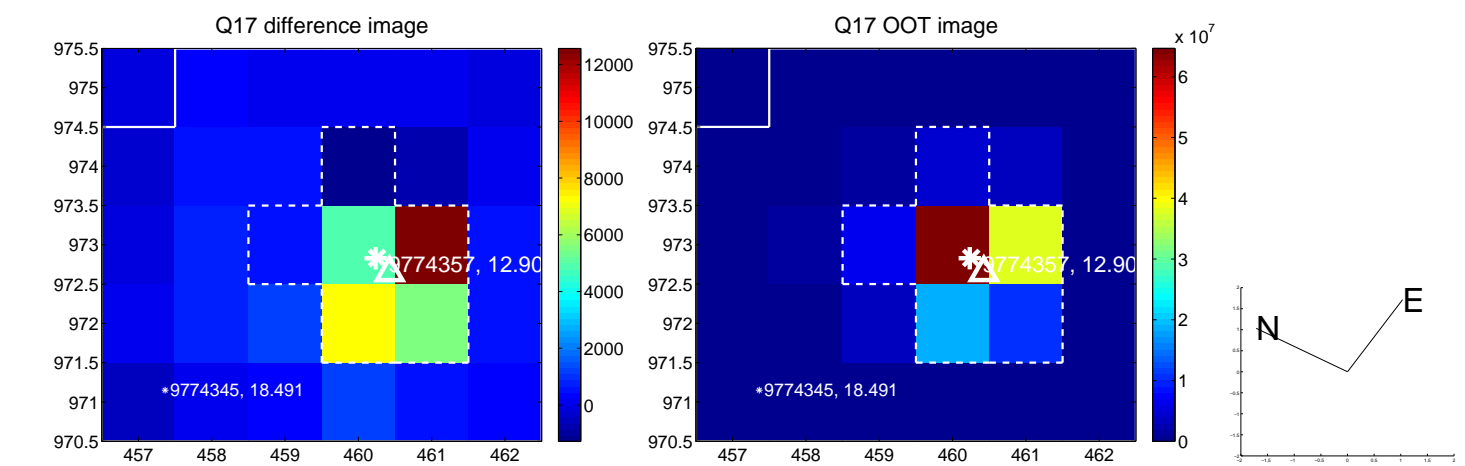
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



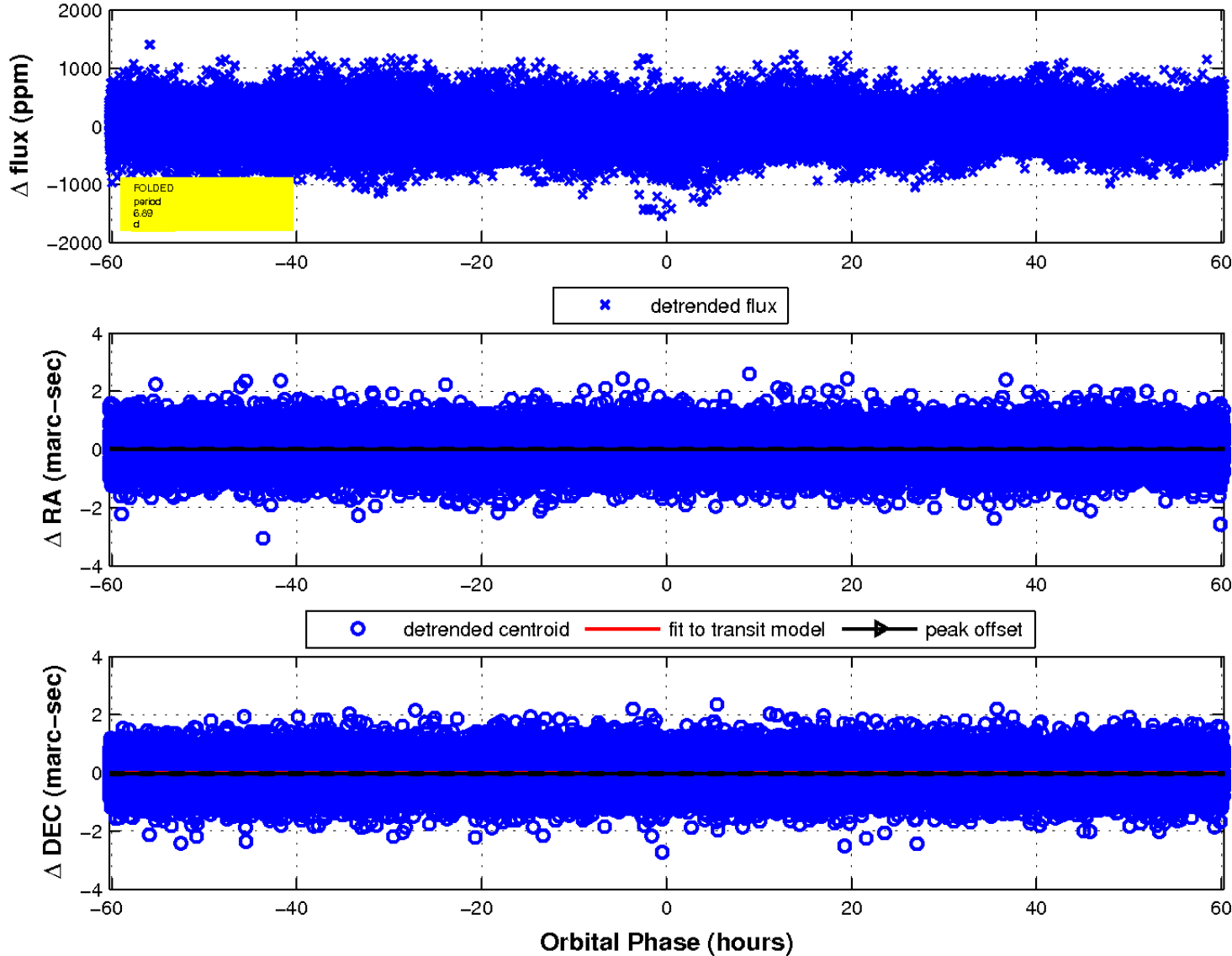
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



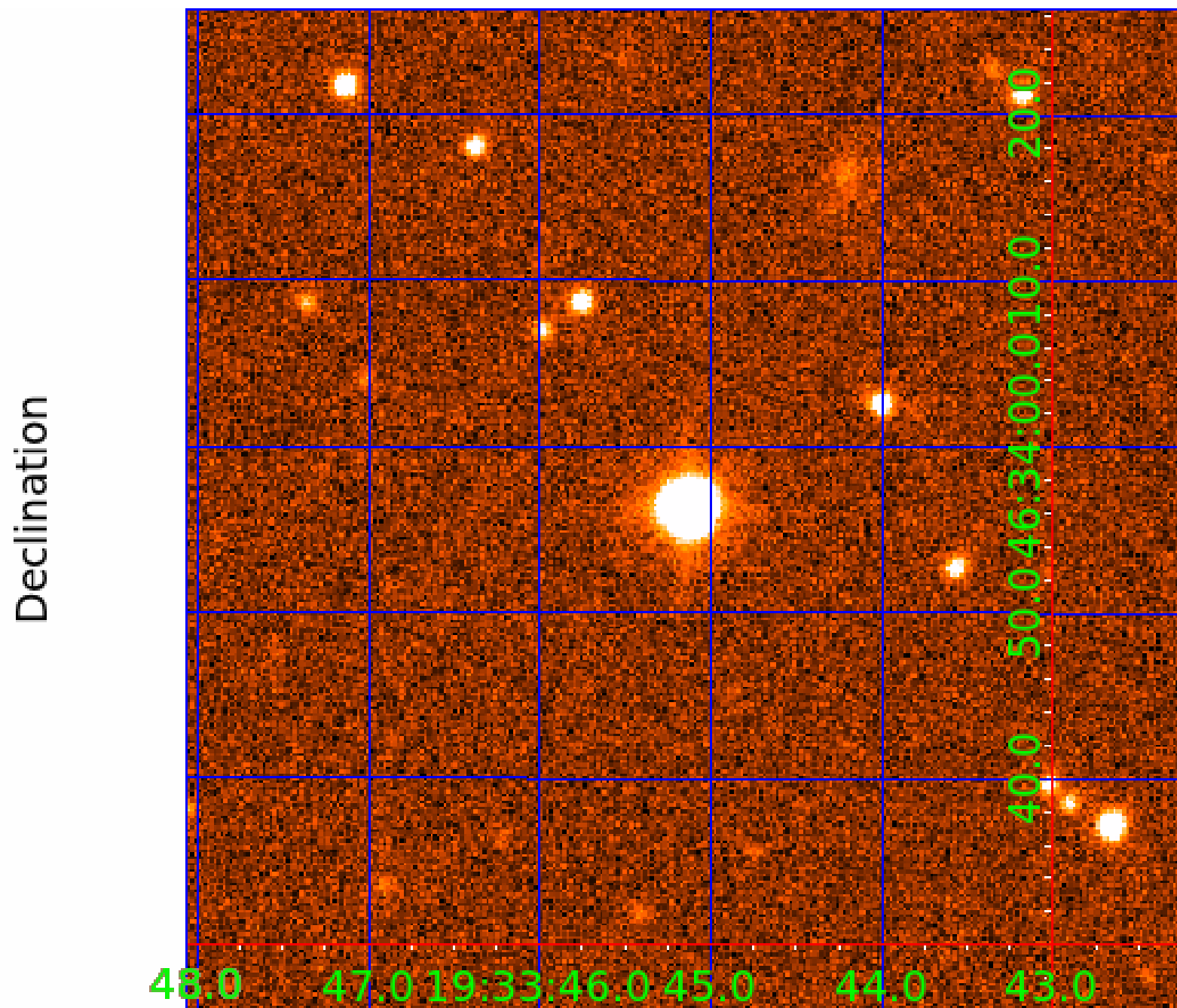
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



fluxWeightedCentroids, Planet 1 of 3



UKIRT Image





# KIC 009774357

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009774357-01	OBS	No	6.891238	133.701789	52.0	20.090	10.2	10.0	1.75	7633	1.46	1376.59
009774357-02	OBS	No	6.891534	131.571534	60.1	18.396	11.7	11.2	1.75	7633	1.56	1376.51
009774357-03	OBS	No	6.889639	135.871956	41.7	19.498	7.4	8.7	1.75	7633	1.32	1377.01

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009774357-01	OBS	FP	0.00	1	0	0	0	LPP_DV
009774357-02	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD
009774357-03	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—SAME_NTL_PERIOD

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

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

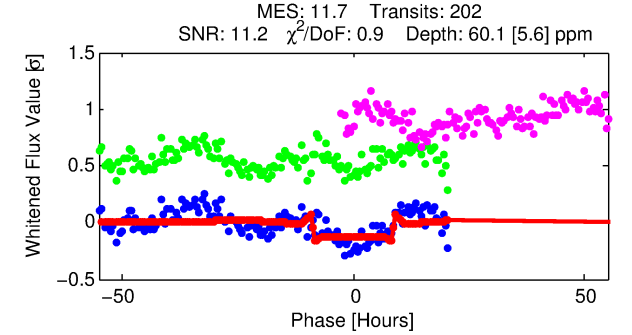
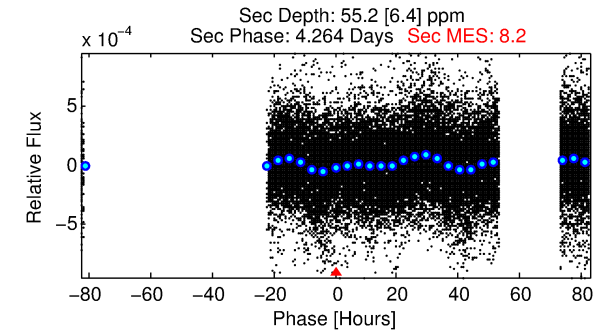
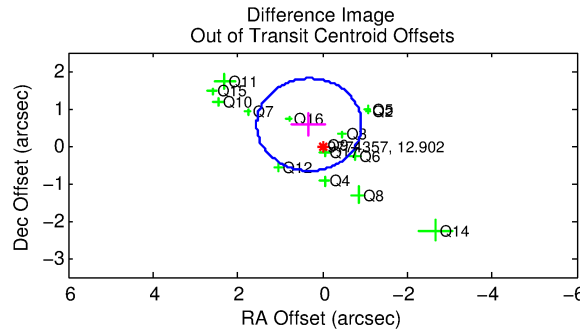
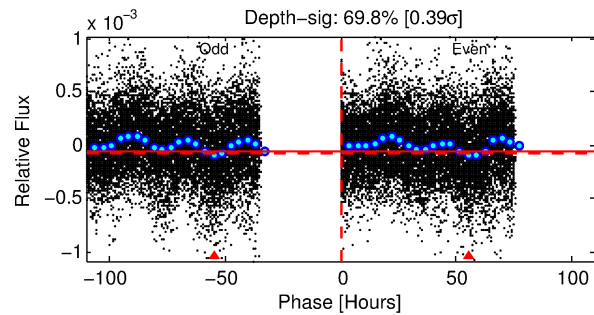
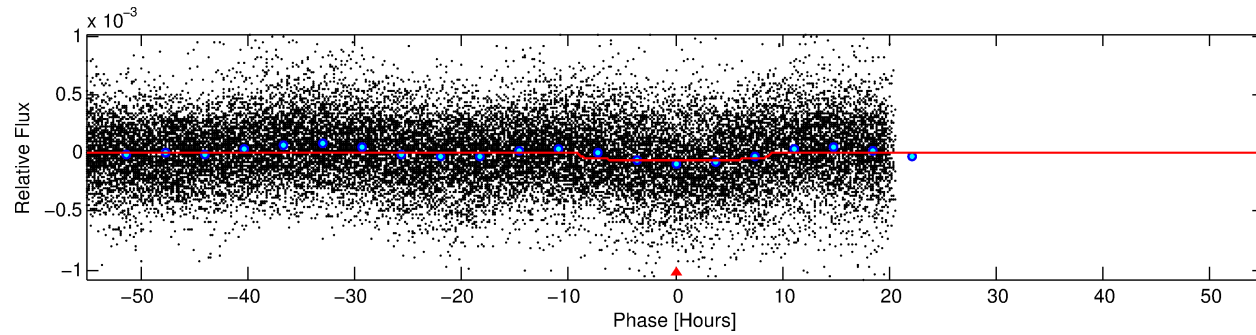
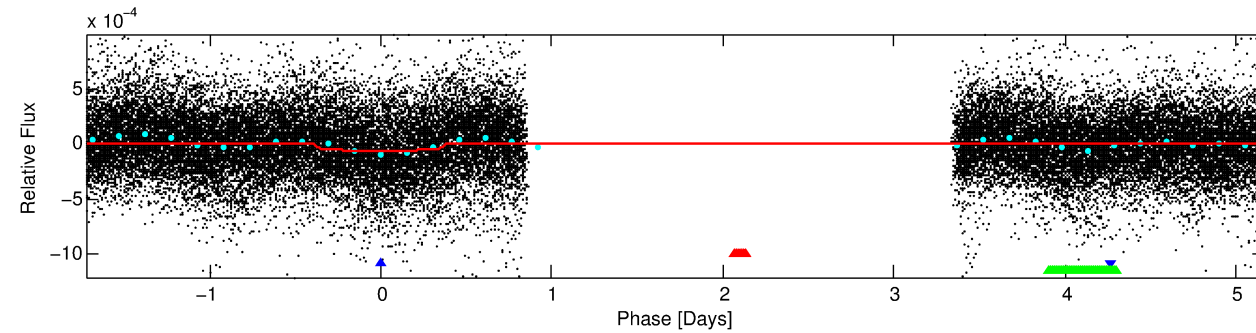
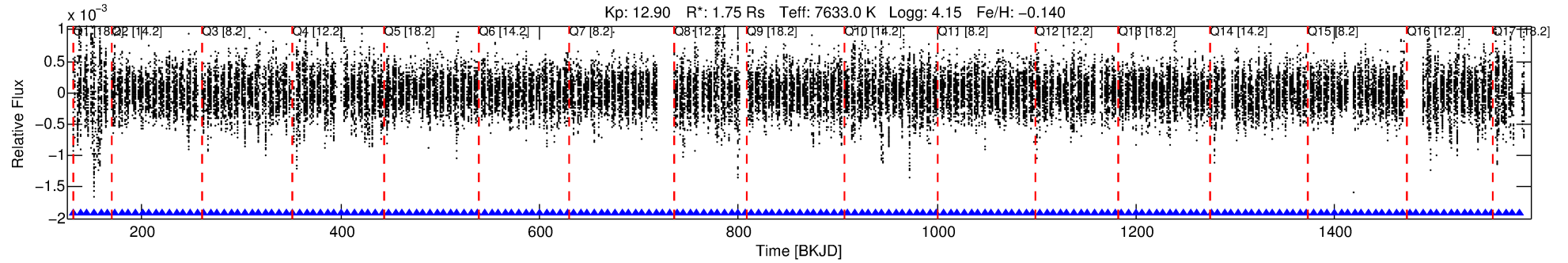
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009774357-02

No Significant Match Found

# DV One-Page Summary

KIC: 9774357 Candidate: 2 of 3 Period: 6.892 d



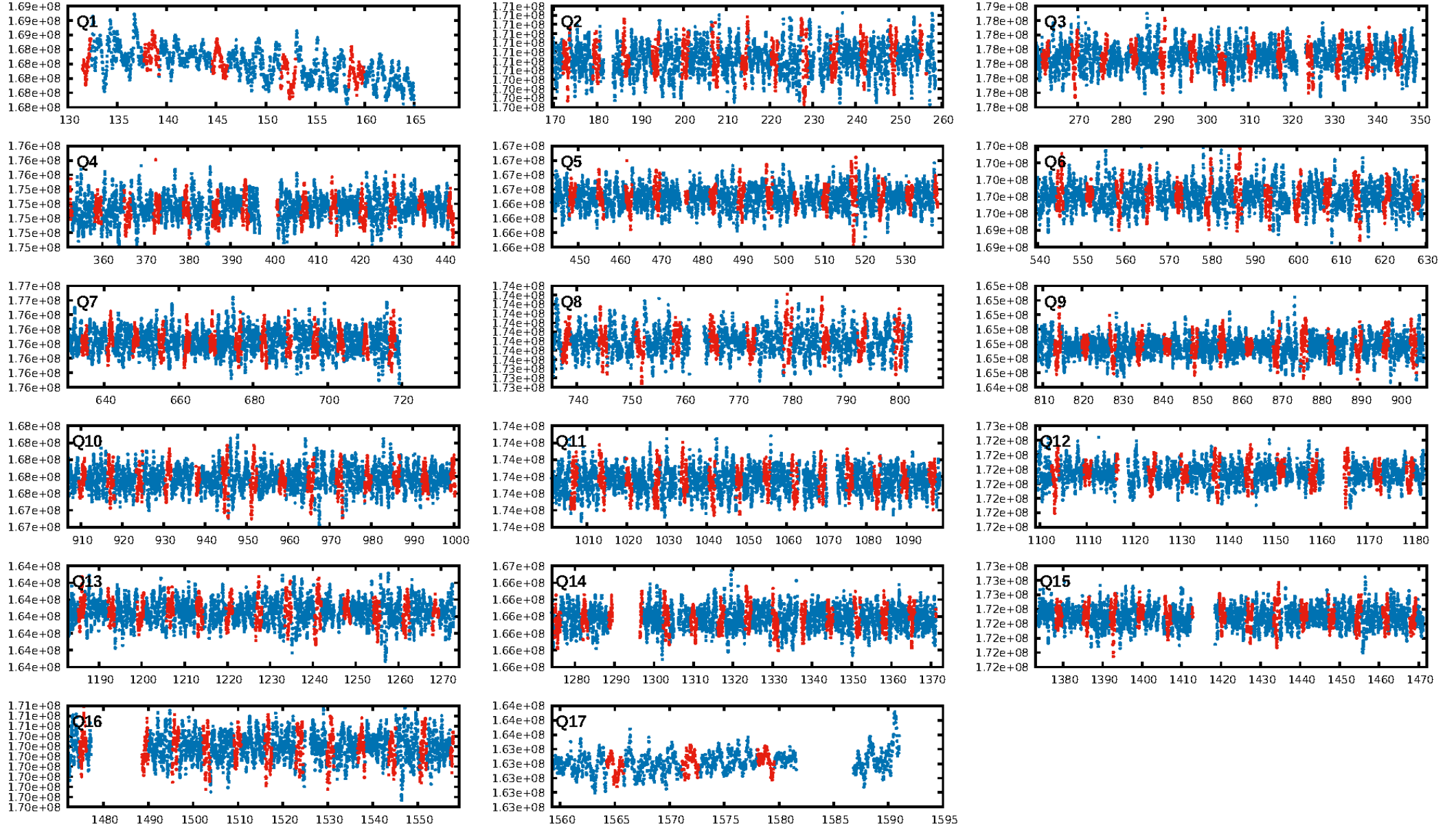
## DV Fit Results:

Period = 6.89153 [0.00009] d  
Epoch = 131.5715 [0.0096] BKJD  
Rp/R\* = 0.0082 [0.0006]  
a/R\* = 1.65 [0.31]  
b = 0.89 [0.07]  
Seff = 1376.51 [533.07]  
Teff = 1553 [150] K  
Rp = 1.57 [0.49] Re  
a = 0.0823 [0.0204] AU  
Ag = 83.96 [33.10] [2.51 $\sigma$ ]  
Teffp = 7269 [446] K [12.14 $\sigma$ ]

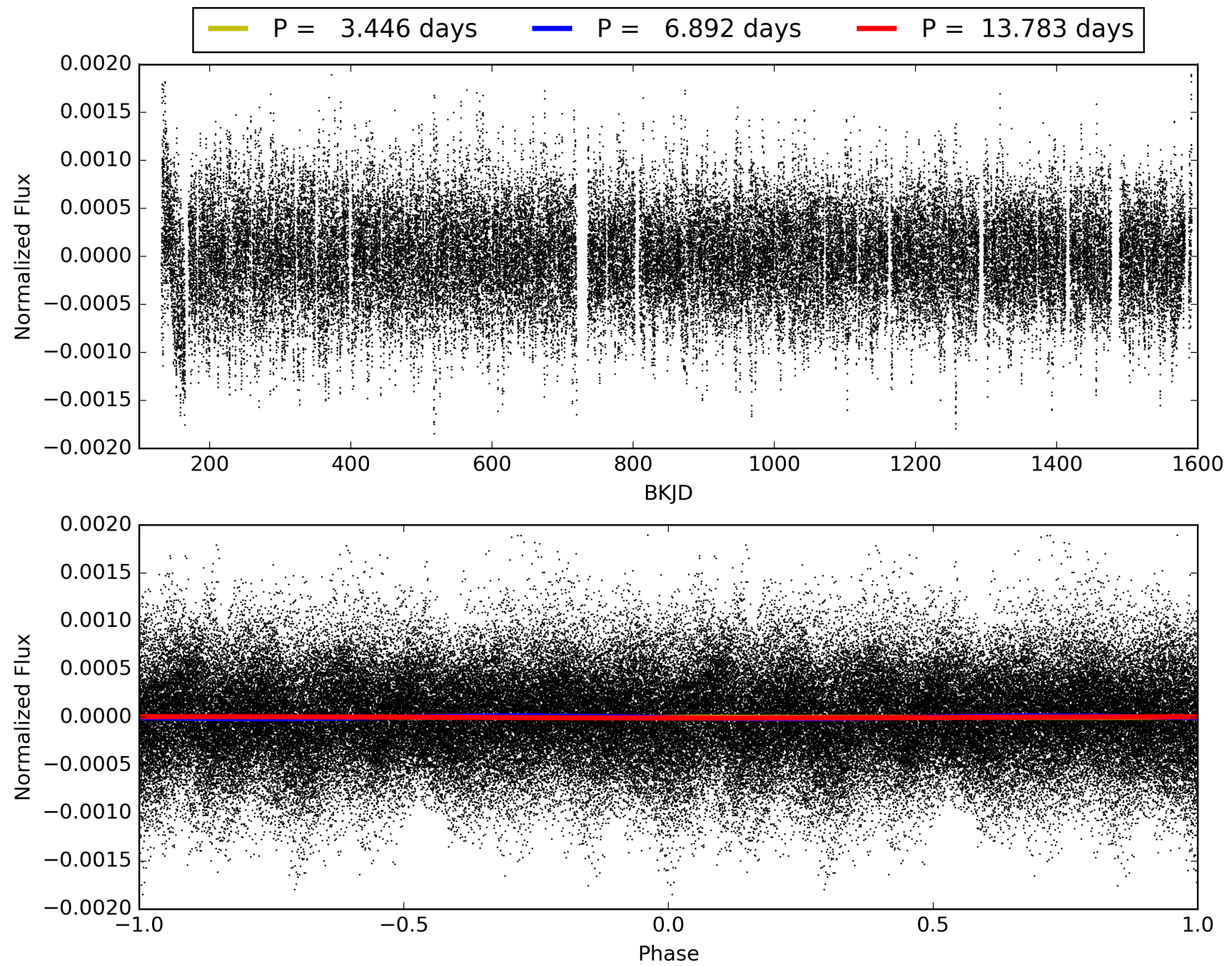
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [194/194]  
GhostDiagnostic-chr: 16.56  
Centroid-sig: 0.0%  
Centroid-so: 1.742 arcsec [4.13 $\sigma$ ]  
OotOffset-rm: 0.650 arcsec [1.58 $\sigma$ ]  
KicOffset-rm: 0.631 arcsec [1.52 $\sigma$ ]  
OotOffset-st: 4/4/4/3 [15]  
KicOffset-st: 4/4/4/3 [15]  
DiffImageQuality-fgm: 0.53 [8/15]  
DiffImageOverlap-fno: 1.00 [17/17]

# TCE 009774357-02, PDC Light Curves



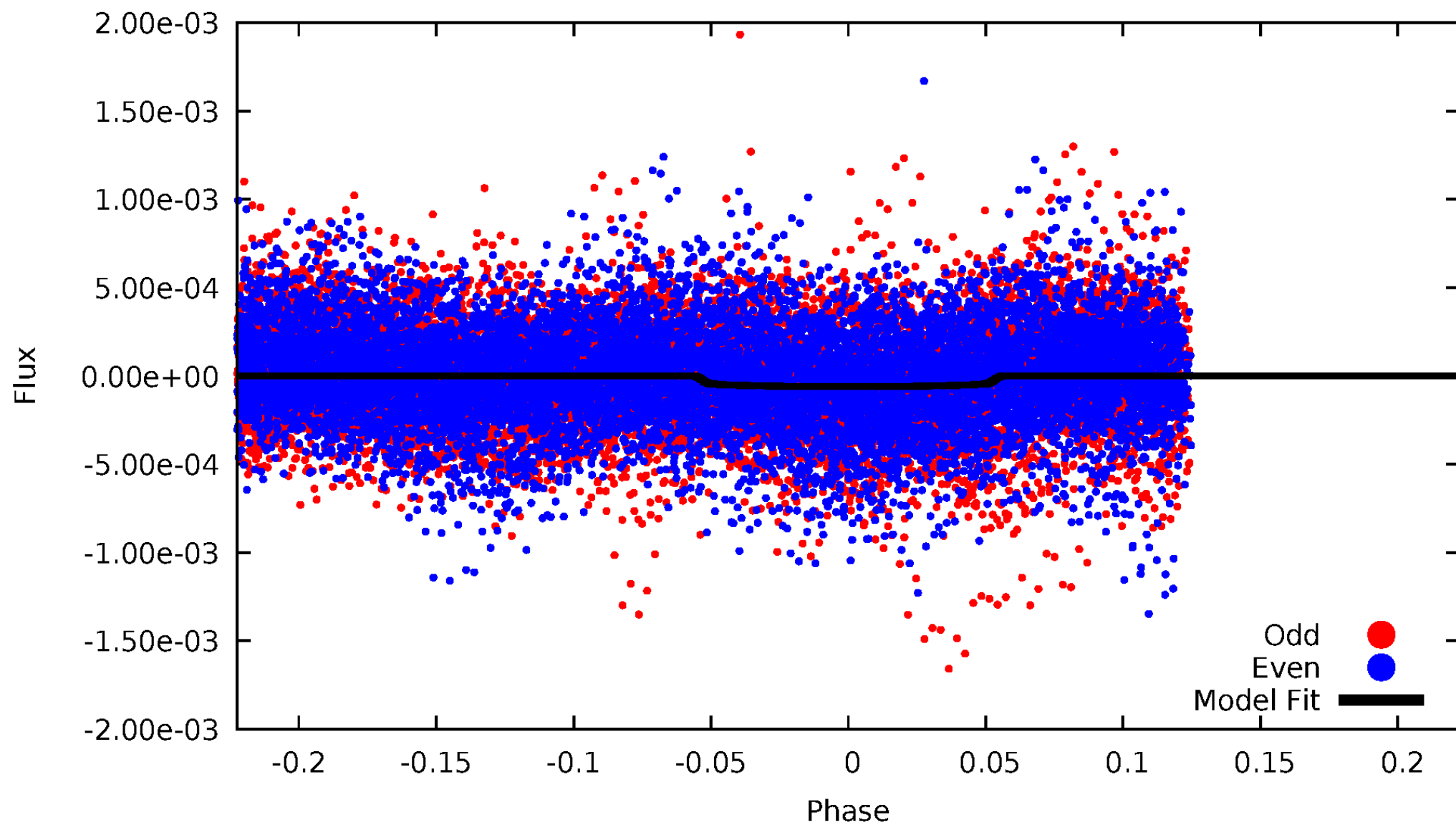
TCE 009774357-02





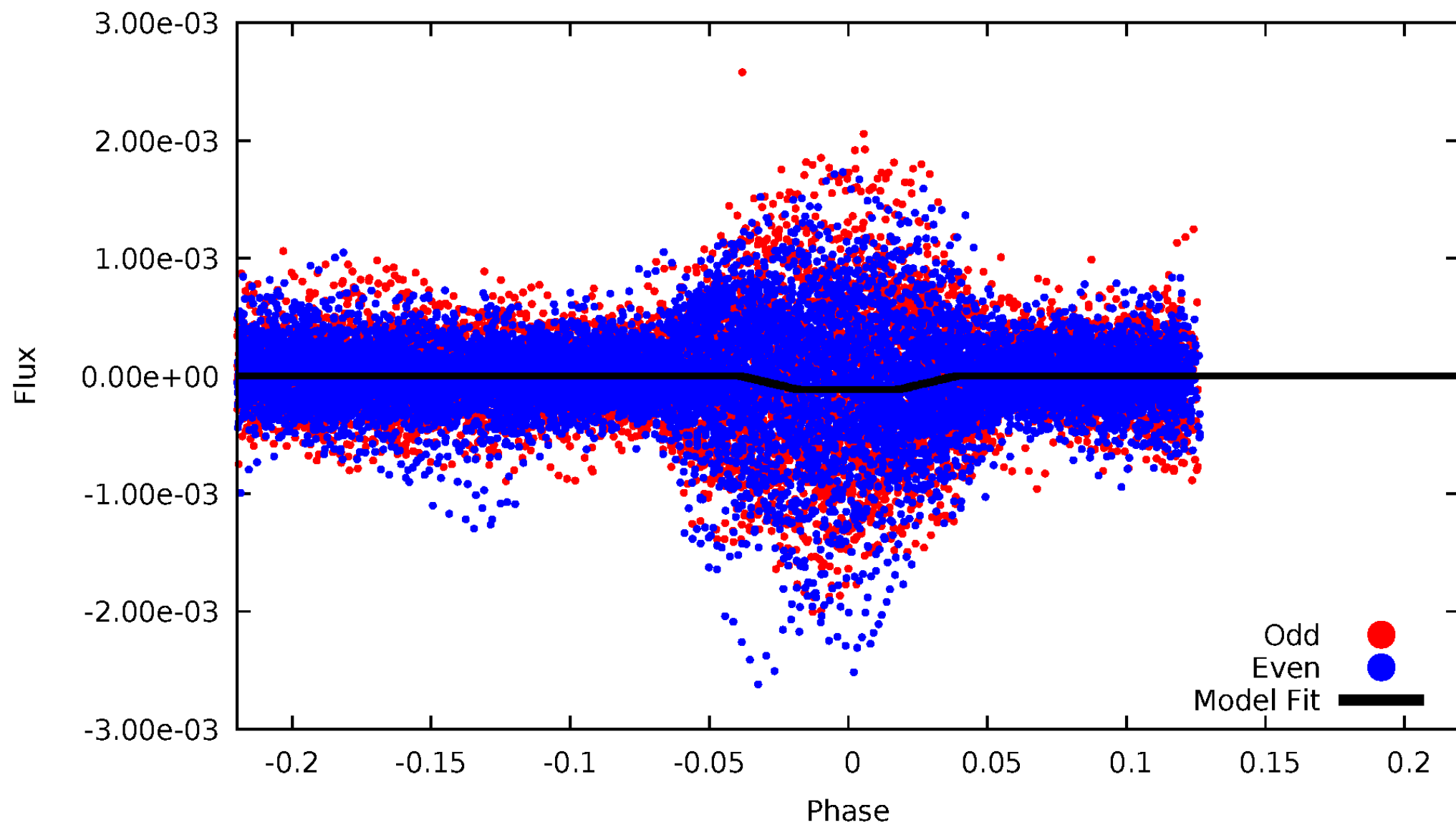
# DV Odd/Even

TCE 009774357-02



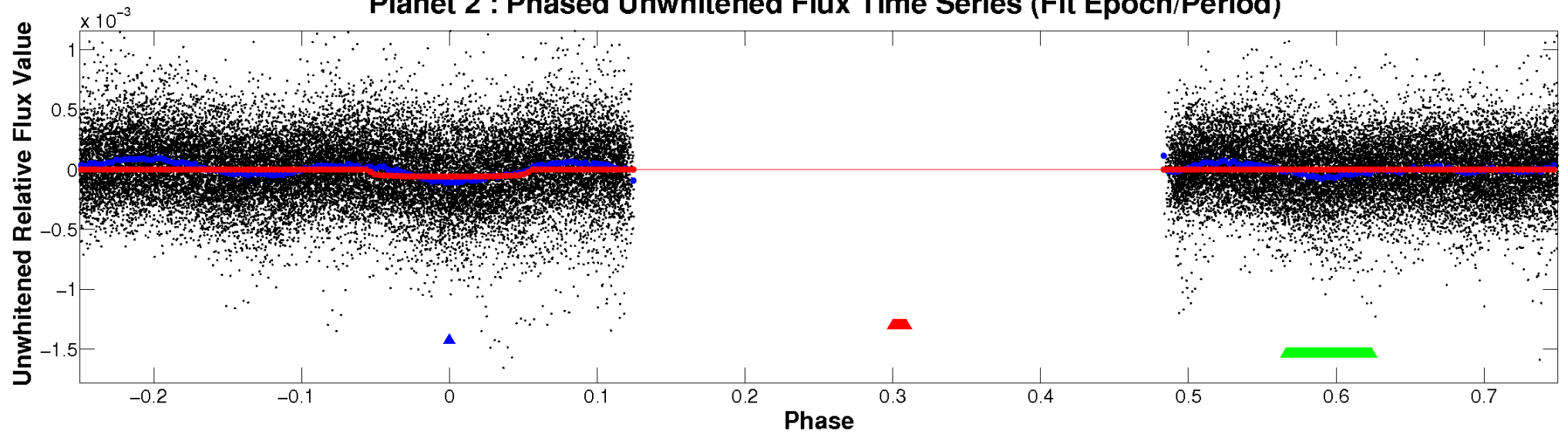
# ALT Odd/Even

TCE 009774357-02

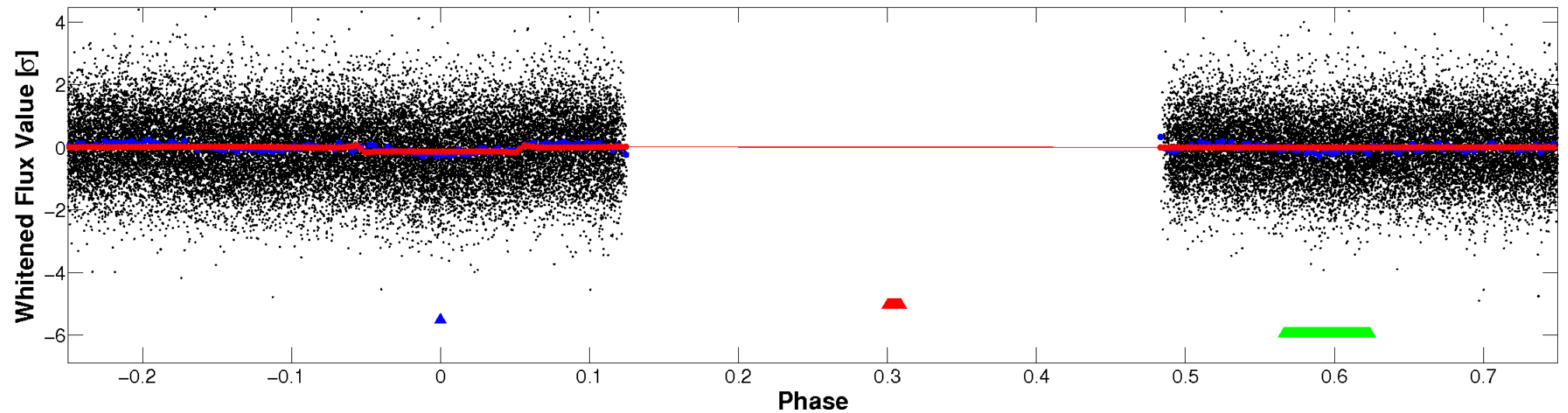


# Non-Whitened Vs. Whitened Light Curve

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

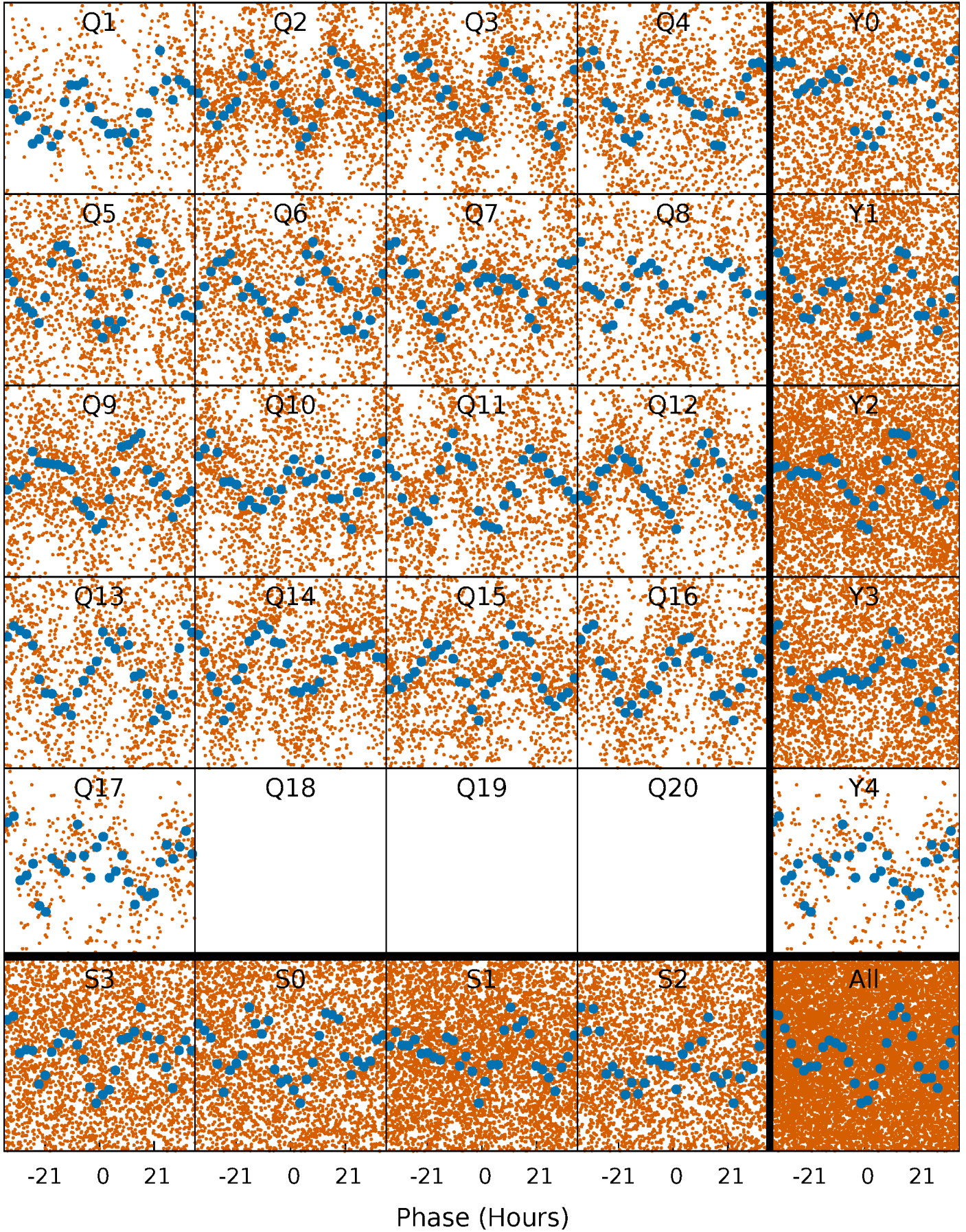


**Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

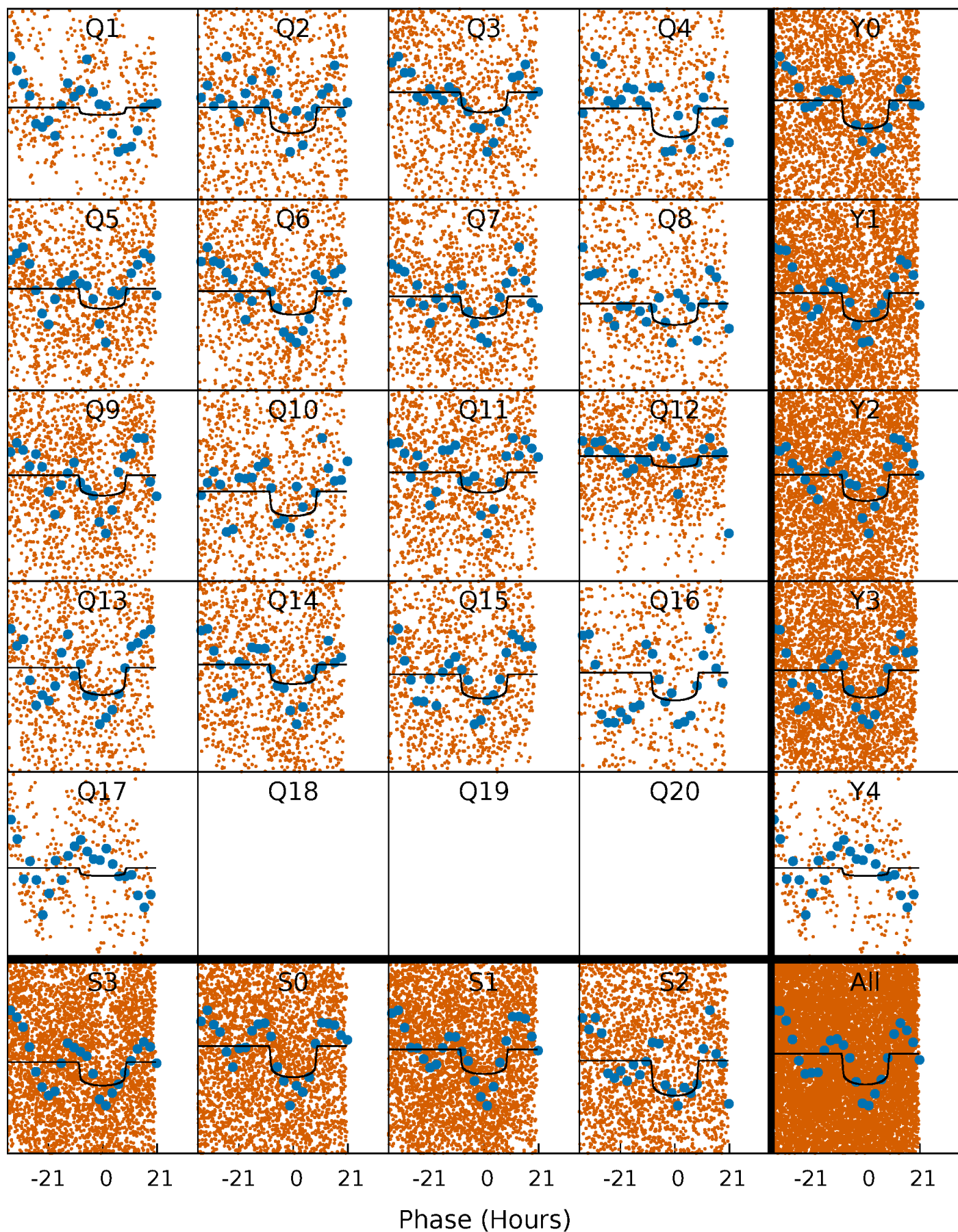
TCE 009774357-02   P= 6.891534 Days    $T_0=131.571534$  (BKJD)





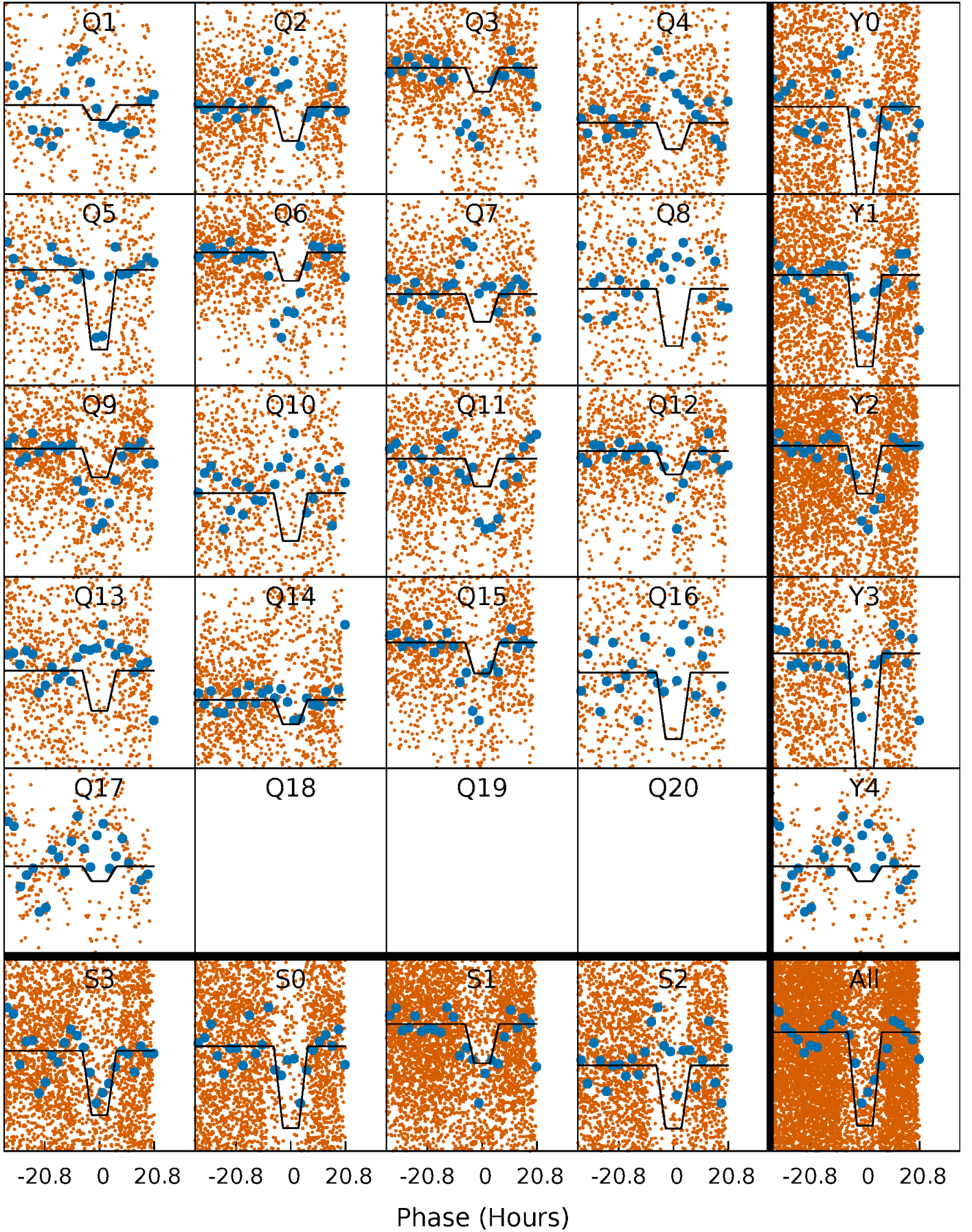
# DV Quarter-Phased Transit Curves

TCE 009774357-02   P= 6.891534 Days    $T_0=131.571534$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

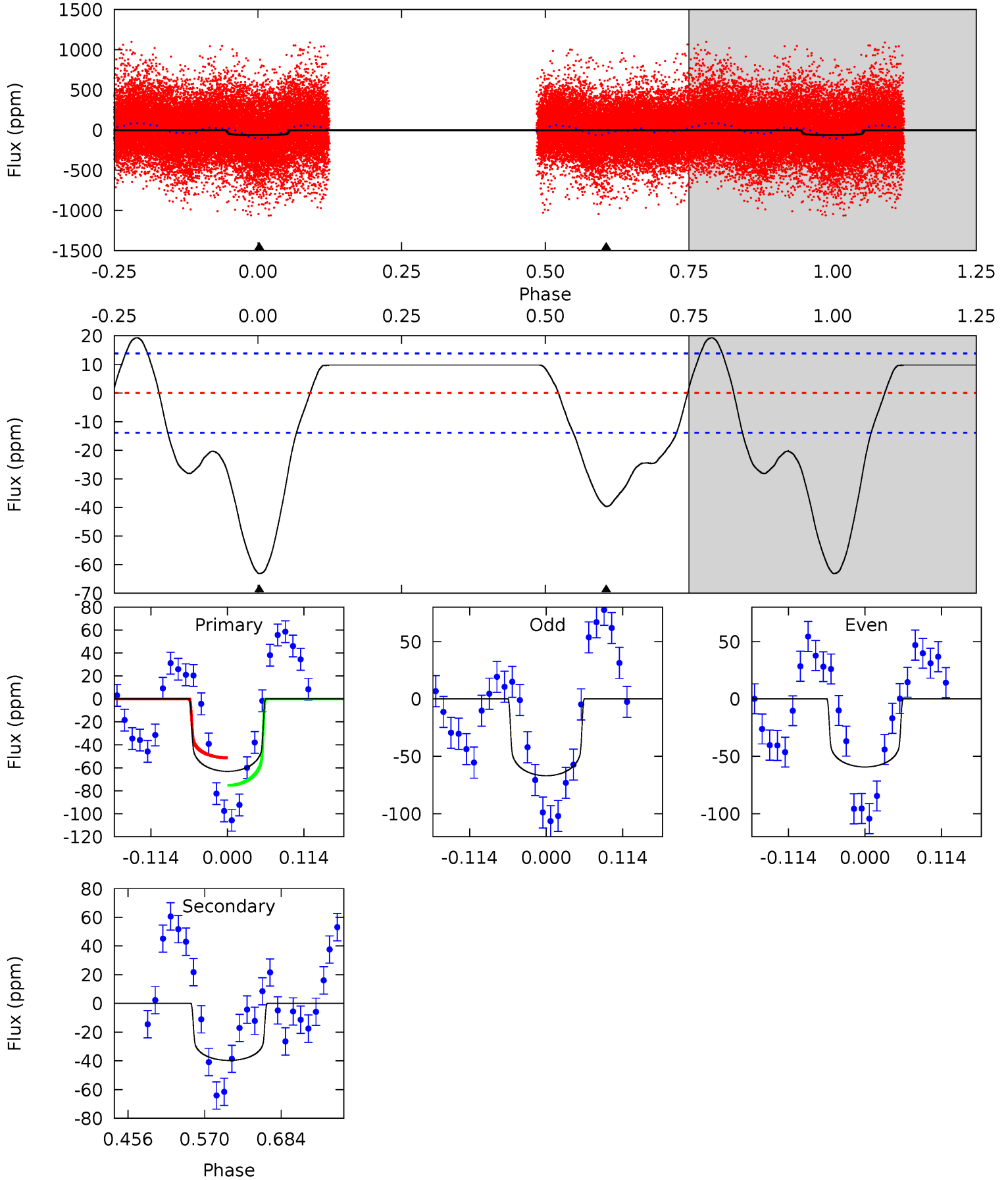
TCE 009774357-02   P= 6.891595 Days    $T_0=131.560419$  (BKJD)



# DV Model-Shift Uniqueness Test

009774357-02, P = 6.891534 Days, E = 124.680000 Days

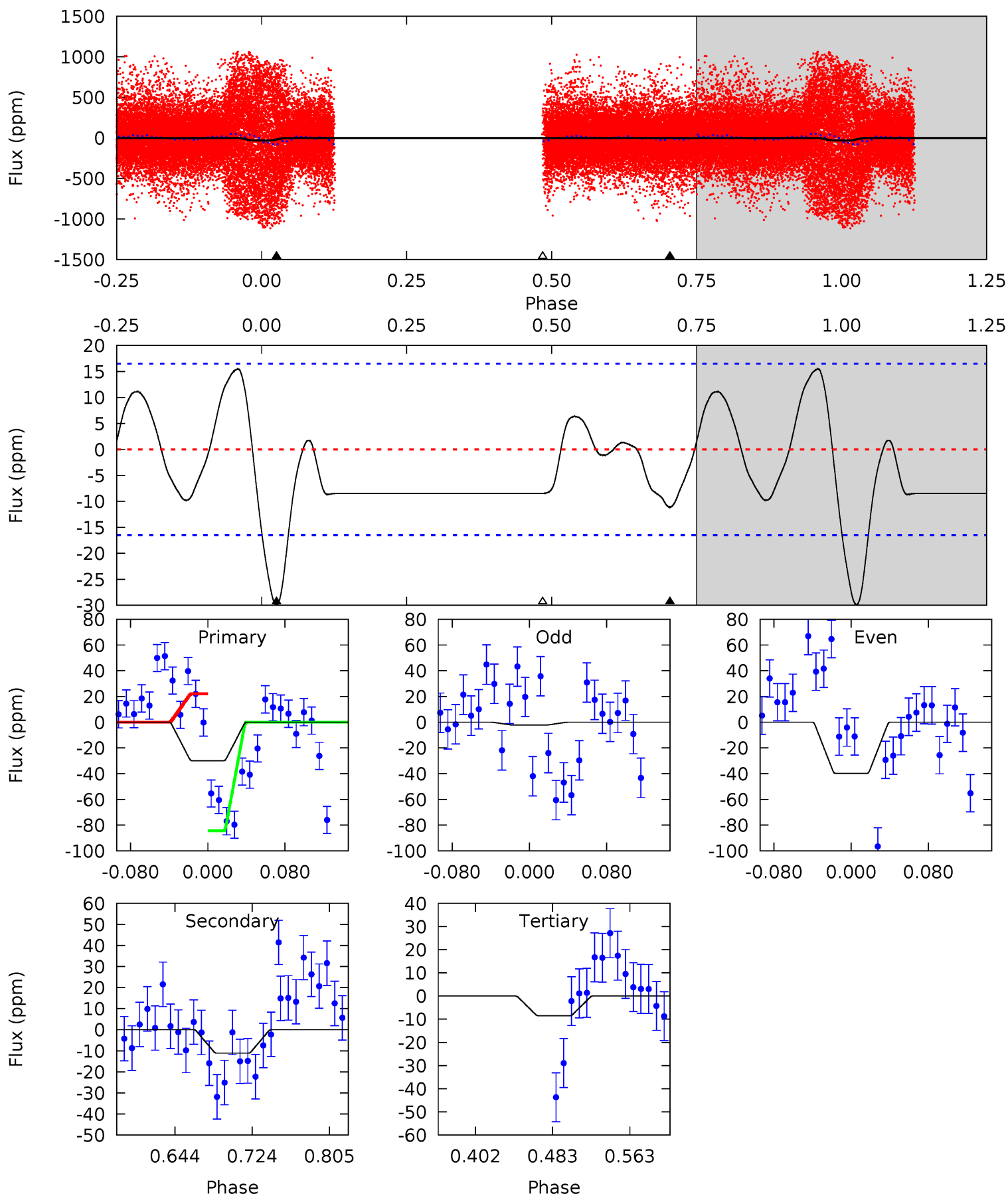
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
20.6	13.0	0	0	4.54	1.58	5.30	20.6	20.6	13.0	13.0	1.26	1.01	0.23	3.78



# Alt Model-Shift Uniqueness Test

009774357-02, P = 6.891595 Days, E = 124.668824 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.36	3.11	2.37	0	4.61	1.75	1.81	5.99	8.36	0.74	3.11	5.21	-11.1	0.34	8.66





### Stellar Parameters For KIC 009774357

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7633^{+211}_{-316}$	$4.146^{+0.124}_{-0.186}$	$-0.140^{+0.200}_{-0.350}$	$1.751^{+0.532}_{-0.354}$	$1.564^{+0.197}_{-0.241}$	$0.410^{+0.300}_{-0.200}$
	+3%/-4%	+3%/-4%	+143%/-250%	+30%/-20%	+13%/-15%	+73%/-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 009774357-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-40 \pm 3$	$1.58^{+0.27}_{-0.20}$	$2178^{+162}_{-131}$	$6547^{+355}_{-330}$	$58^{+17}_{-15}$
Alt.	$-11 \pm 4$	$2.08^{+0.34}_{-0.27}$	$2187^{+157}_{-136}$	$4379^{+270}_{-347}$	$9.529^{+4.243}_{-3.653}$

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



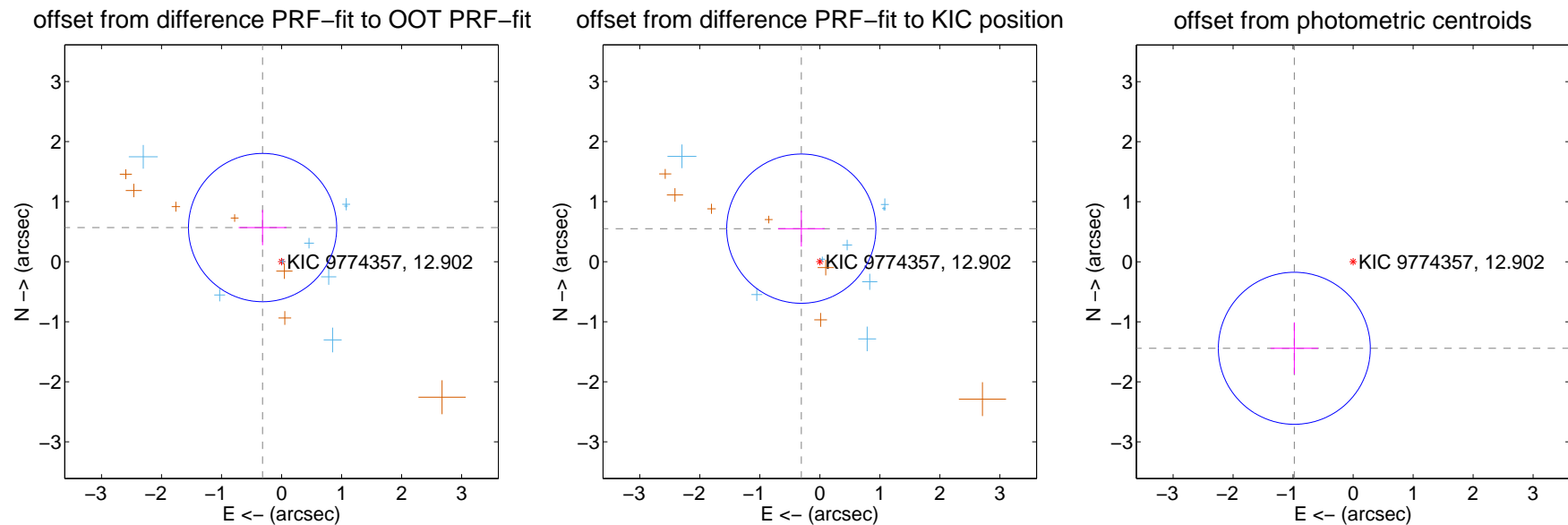
## DV Centroid Data

Supplemental centroid analysis for 009774357-02. Kepler magnitude: 12.90. Transit SNR 11.18

There are 8 quarters with good PRF difference image offsets

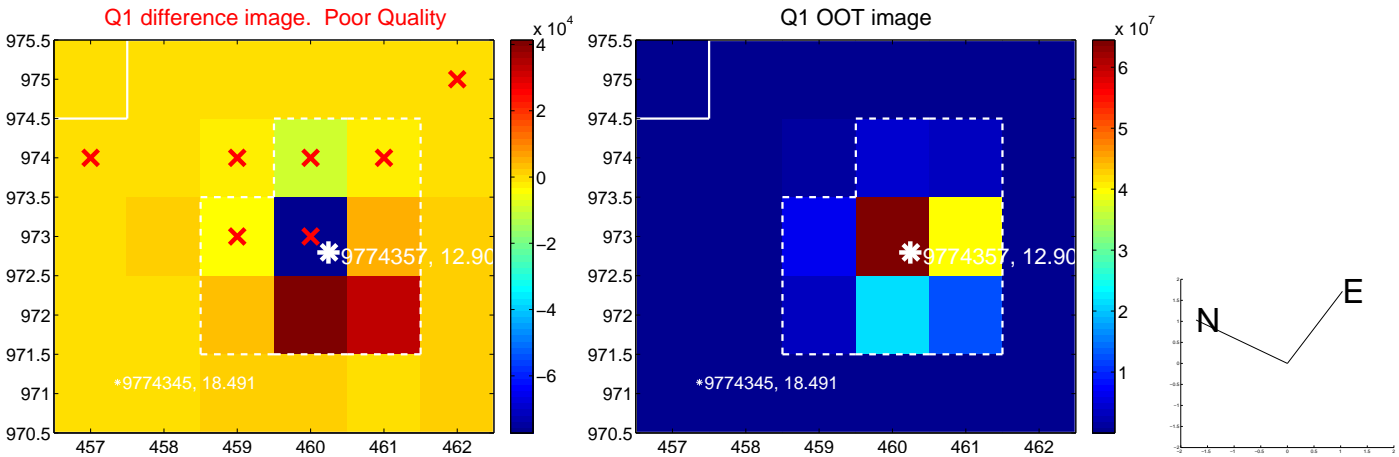
The direct PRF centroid is offset from the target star catalog position by about 0.08 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.650 \pm 0.412$	1.58	$0.316 \pm 0.399$	$0.568 \pm 0.294$
PRF-fit source offset from KIC position	$0.631 \pm 0.414$	1.52	$0.309 \pm 0.388$	$0.550 \pm 0.298$
photometric centroid source offset	$1.74 \pm 0.42$	4.13	$0.98 \pm 0.40$	$-1.44 \pm 0.43$

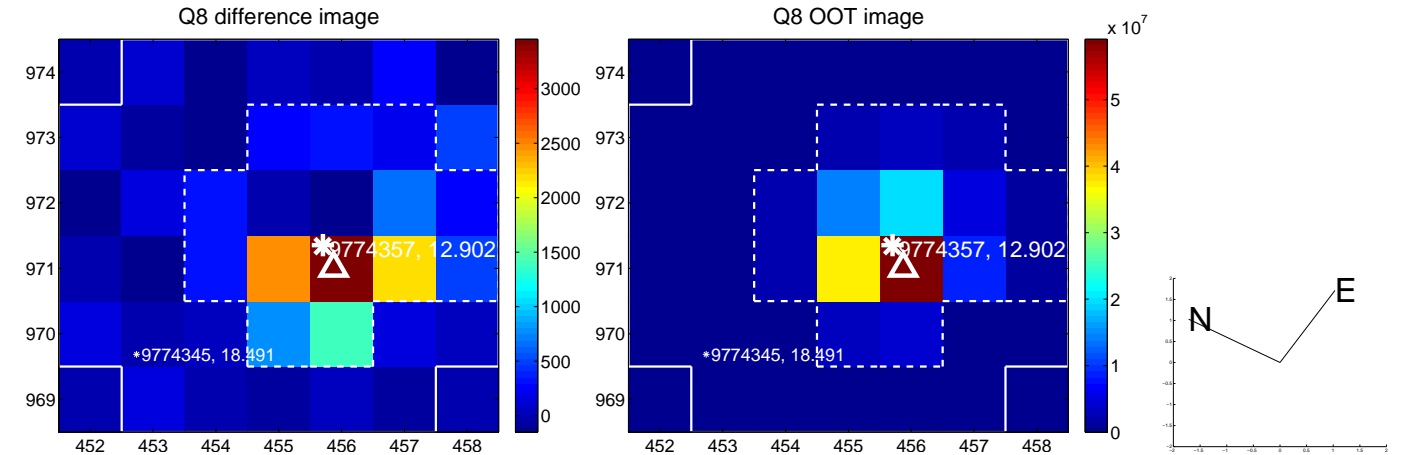
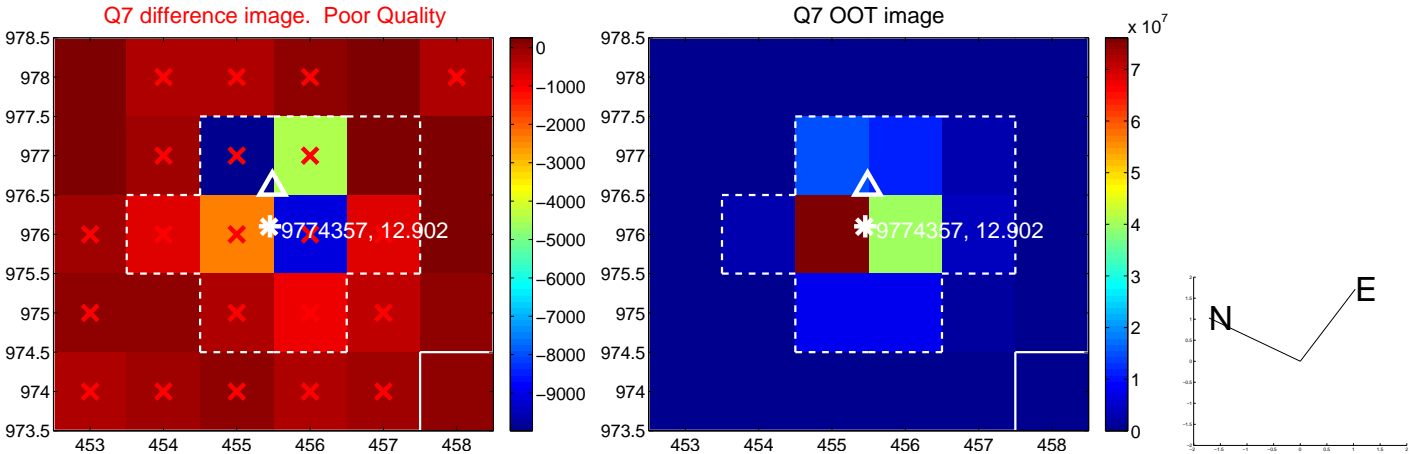
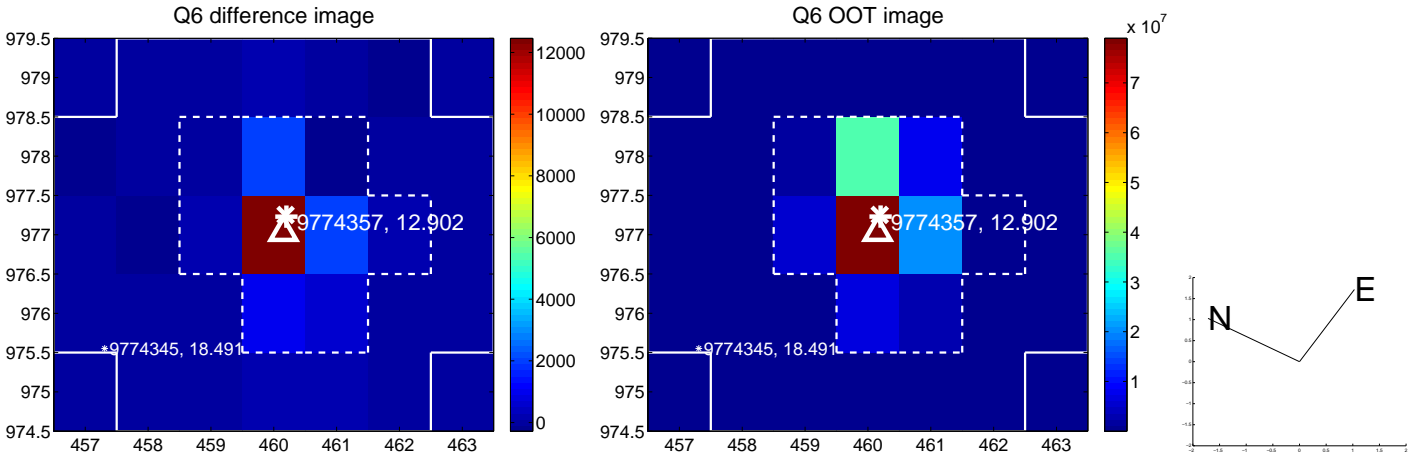
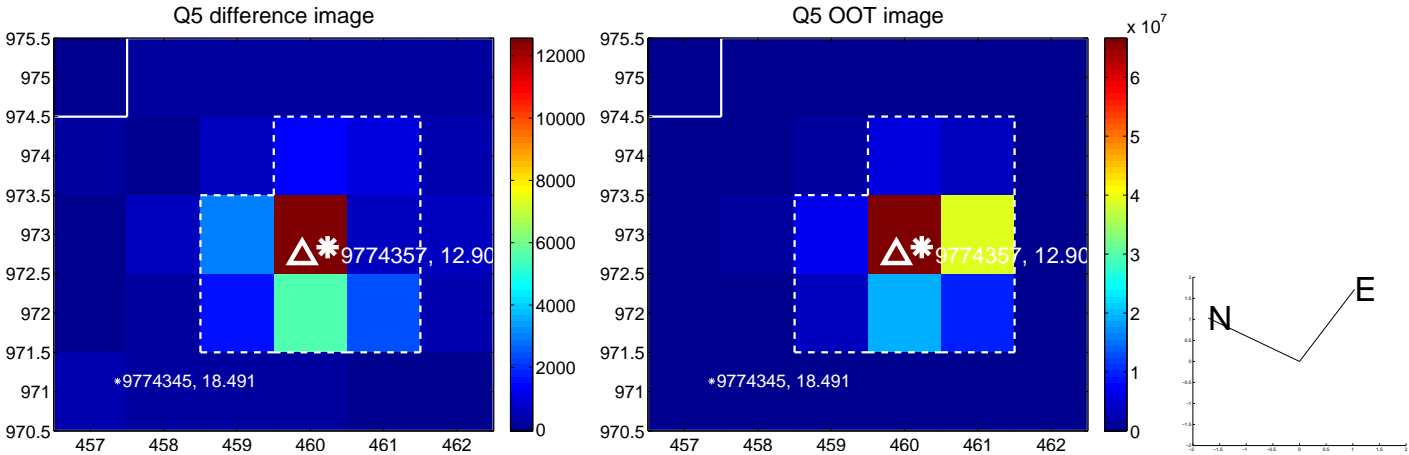


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

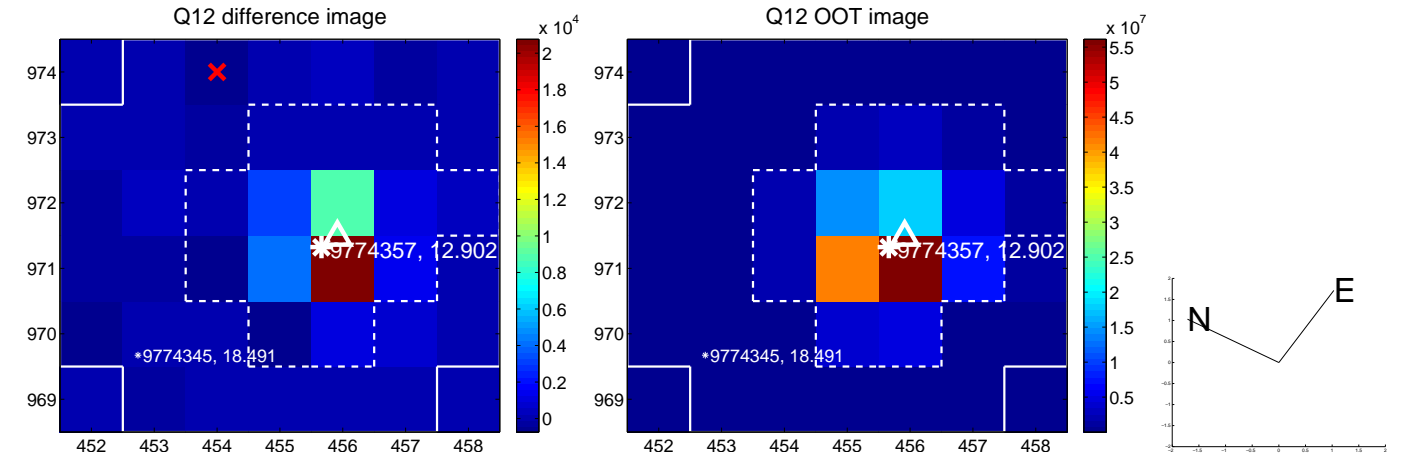
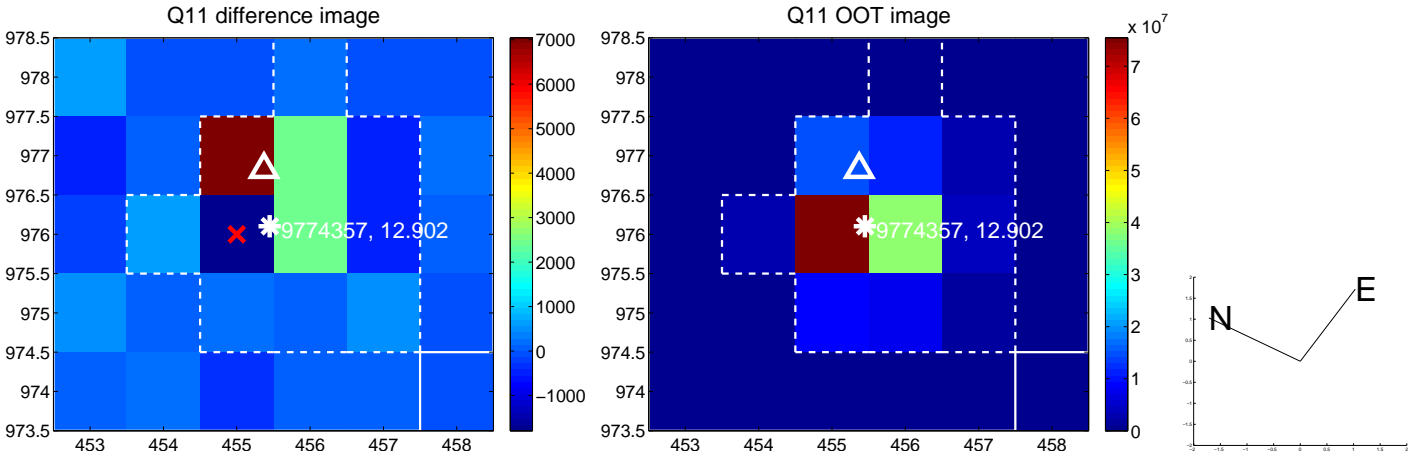
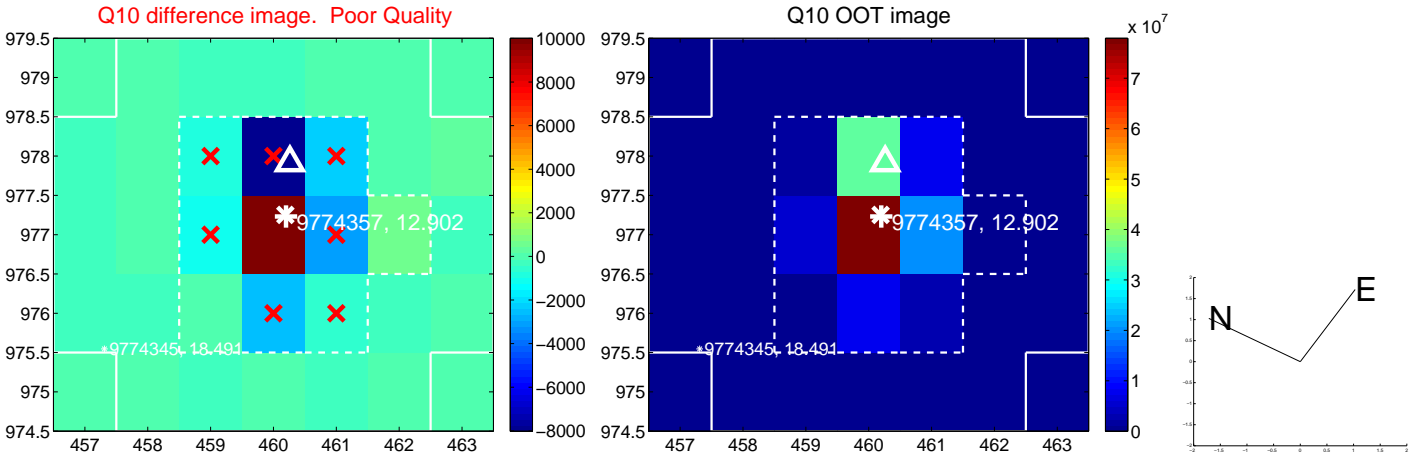
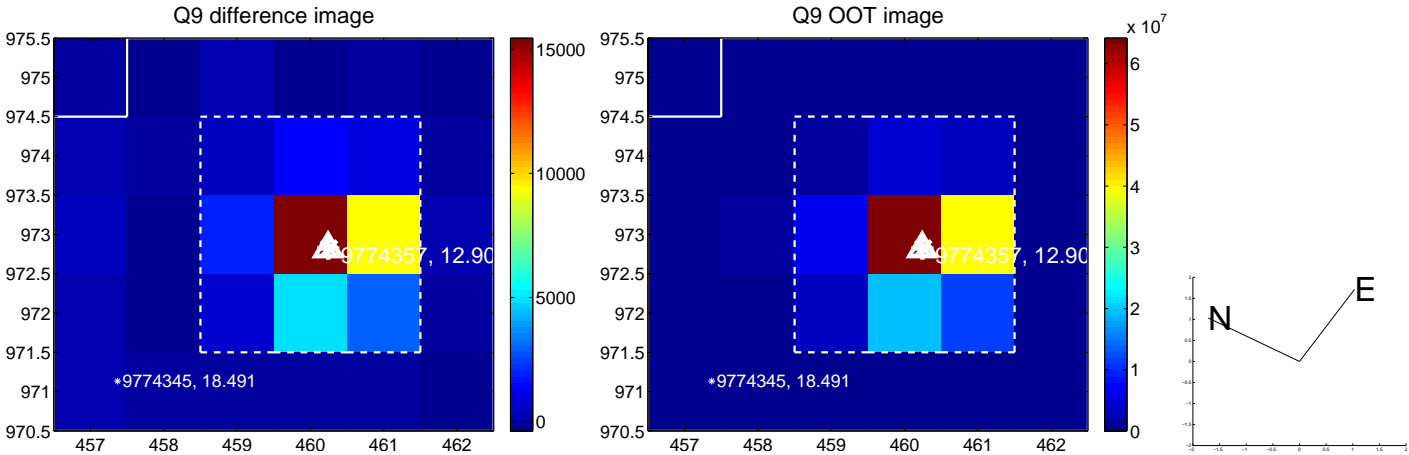
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



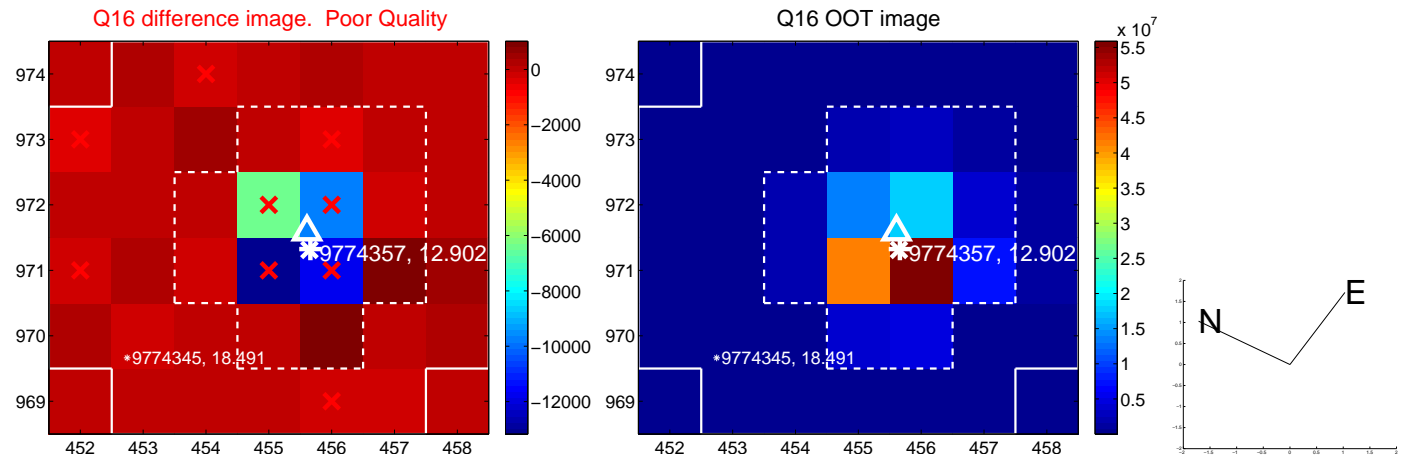
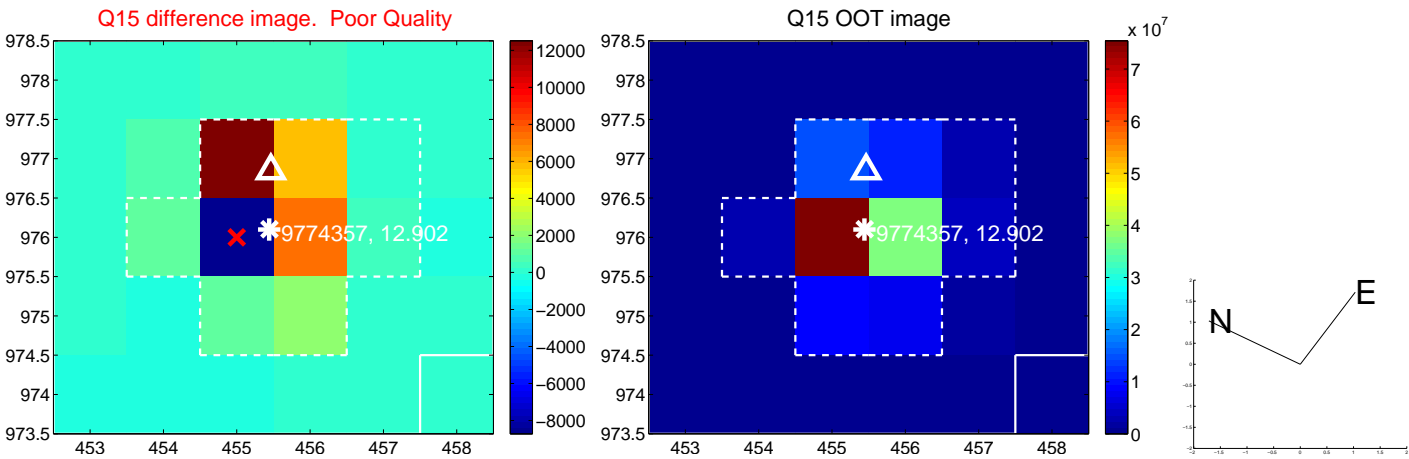
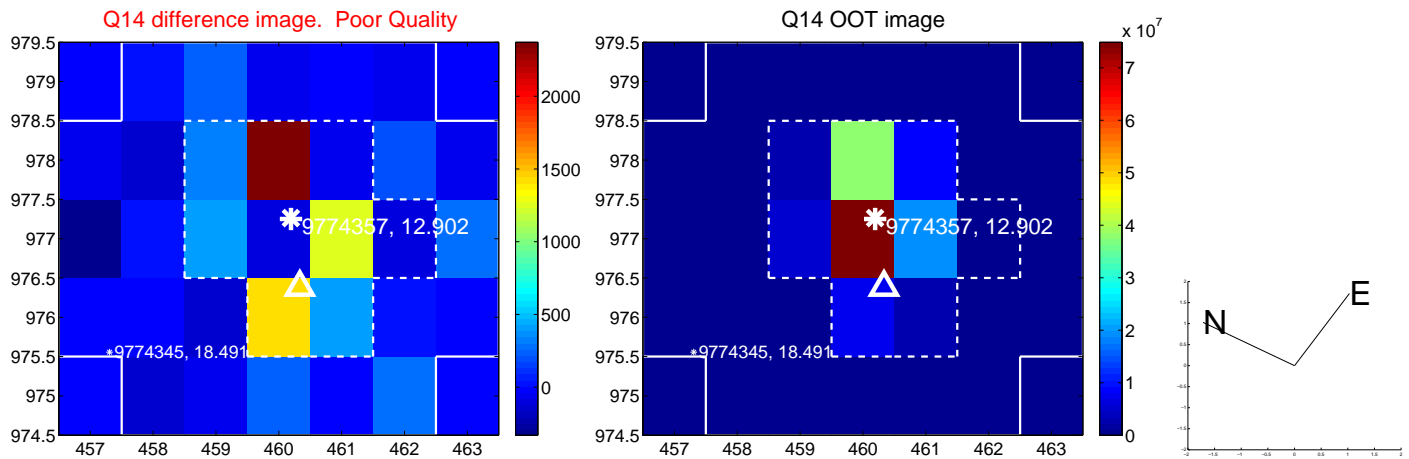
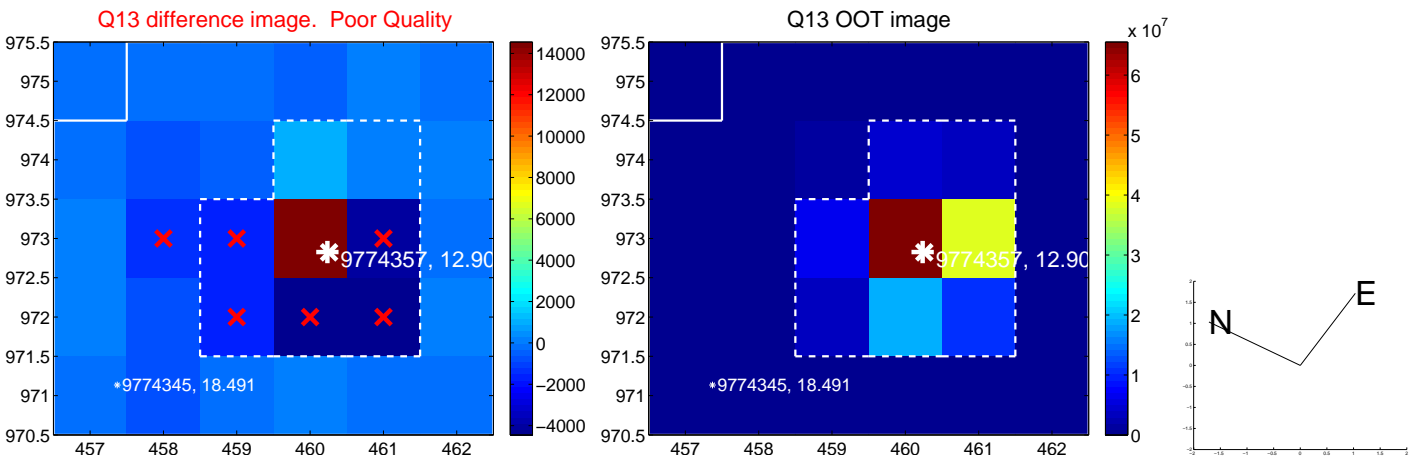
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

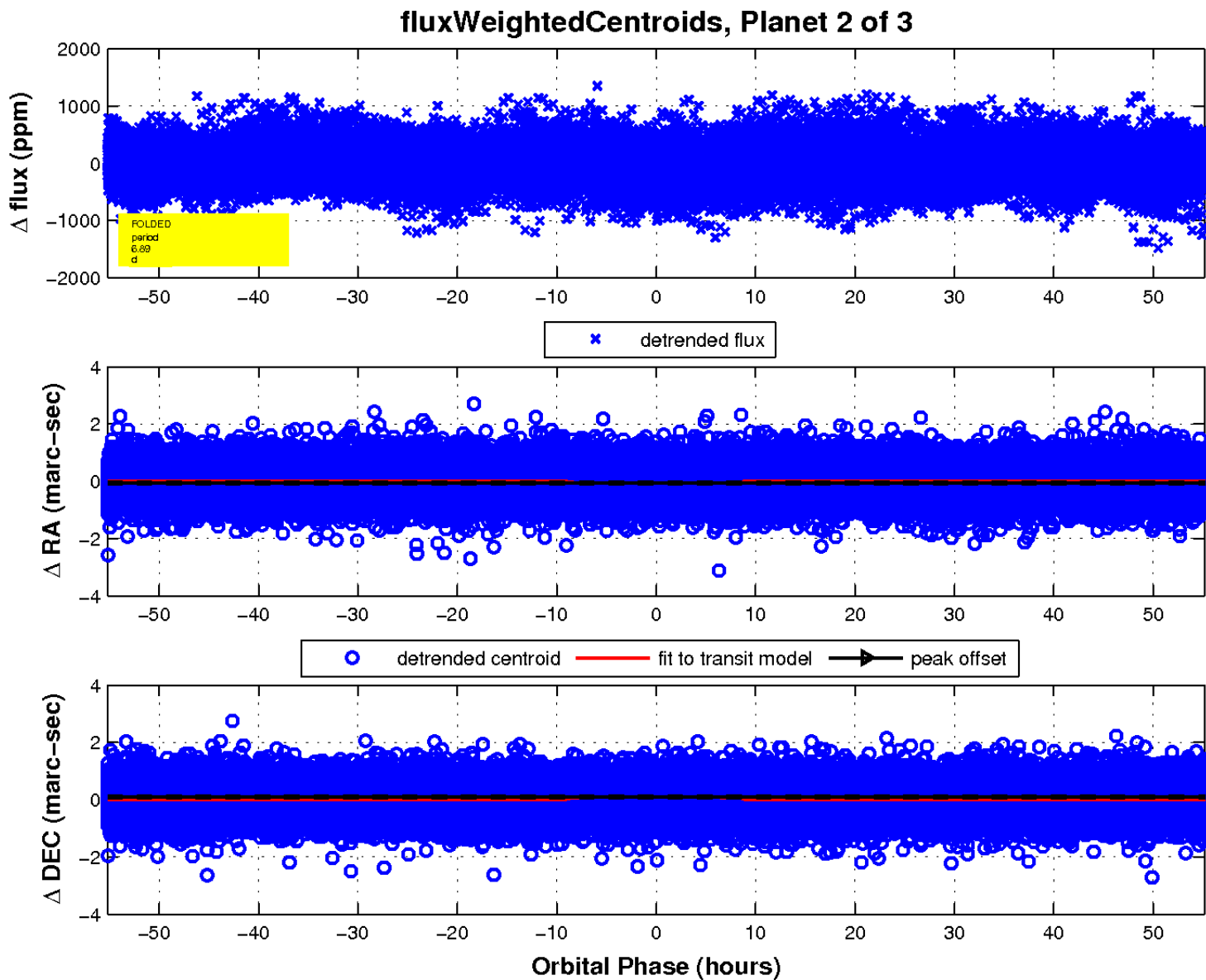
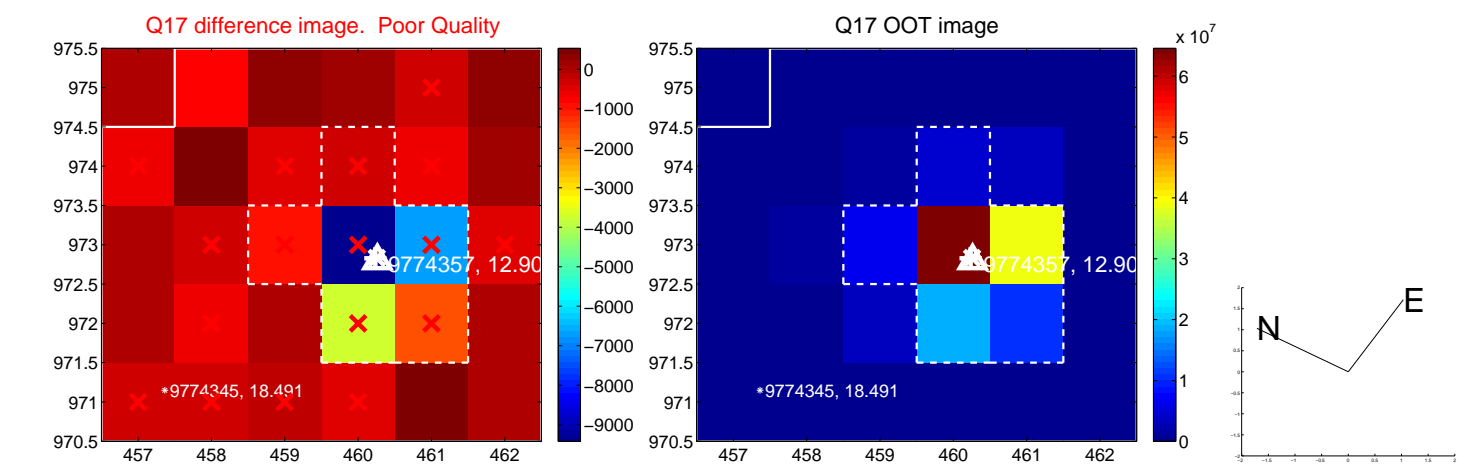


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

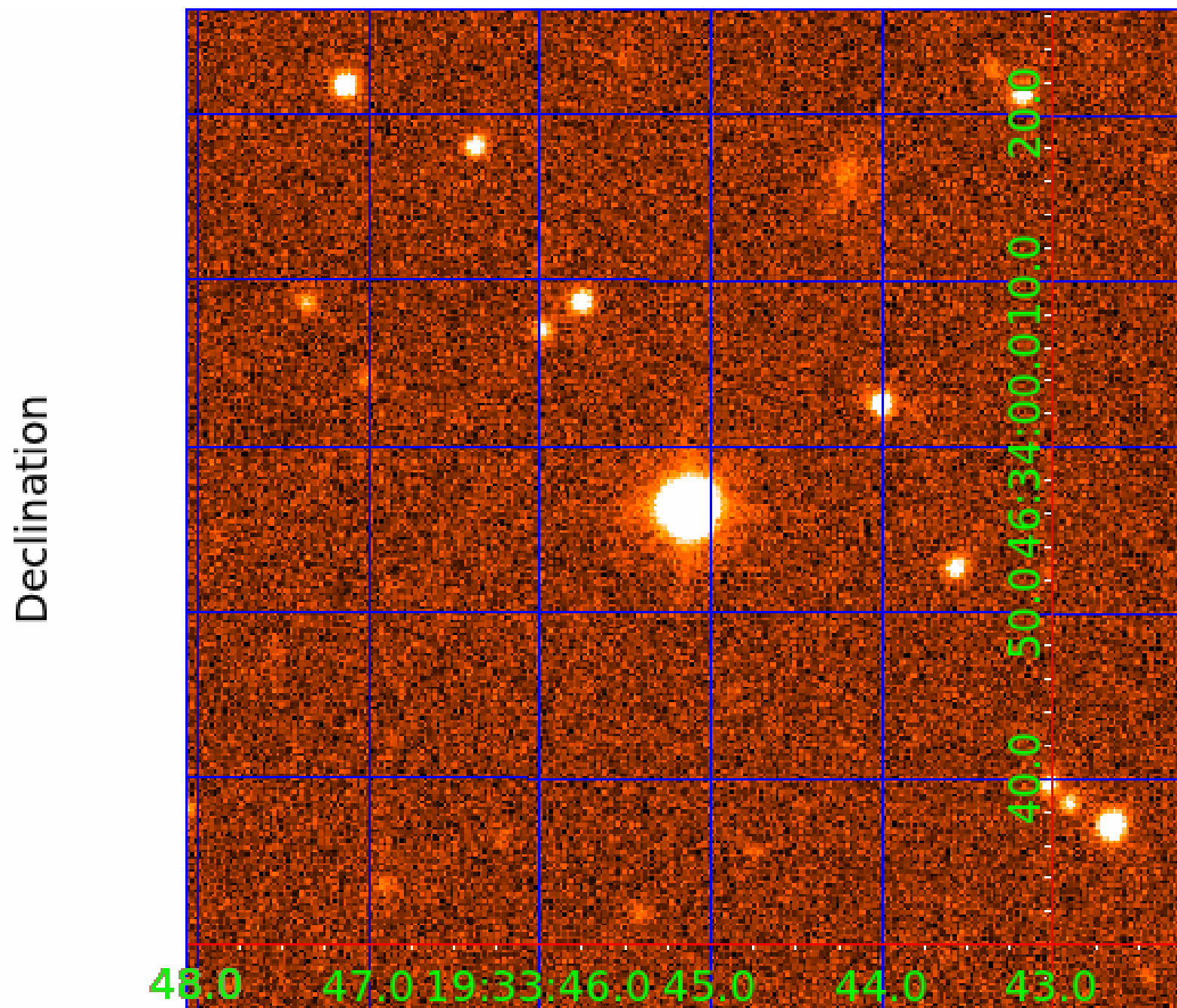




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image



# KIC 009774357

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009774357-01	OBS	No	6.891238	133.701789	52.0	20.090	10.2	10.0	1.75	7633	1.46	1376.59
009774357-02	OBS	No	6.891534	131.571534	60.1	18.396	11.7	11.2	1.75	7633	1.56	1376.51
009774357-03	OBS	No	6.889639	135.871956	41.7	19.498	7.4	8.7	1.75	7633	1.32	1377.01

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009774357-01	OBS	FP	0.00	1	0	0	0	LPP_DV
009774357-02	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD
009774357-03	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—SAME_NTL_PERIOD

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

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

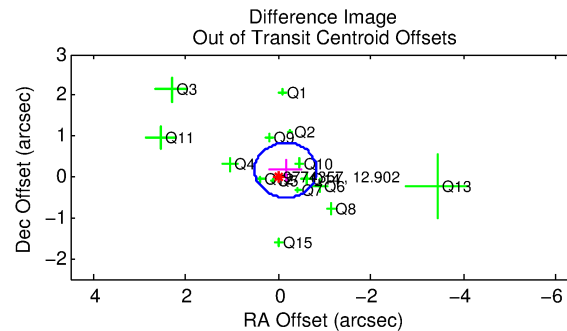
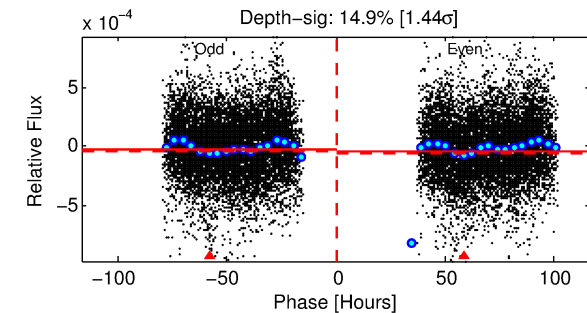
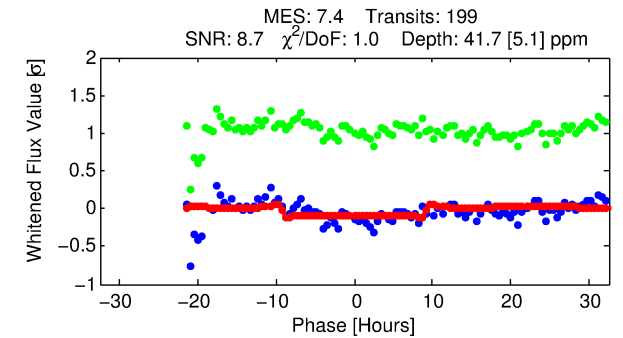
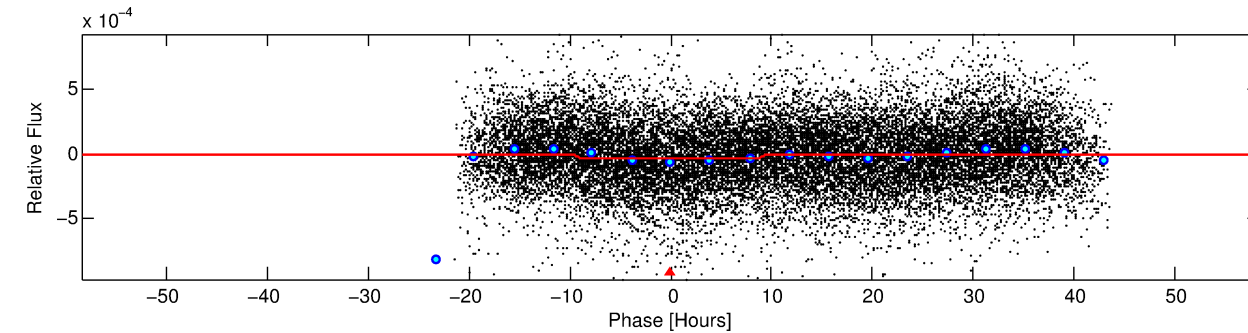
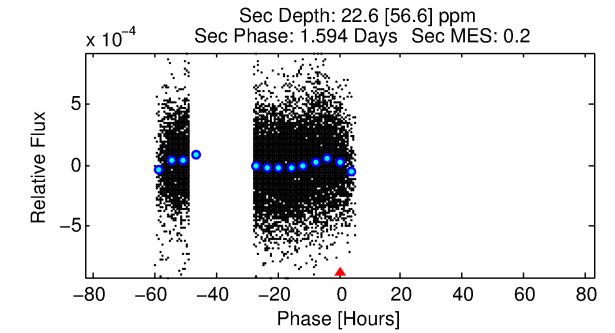
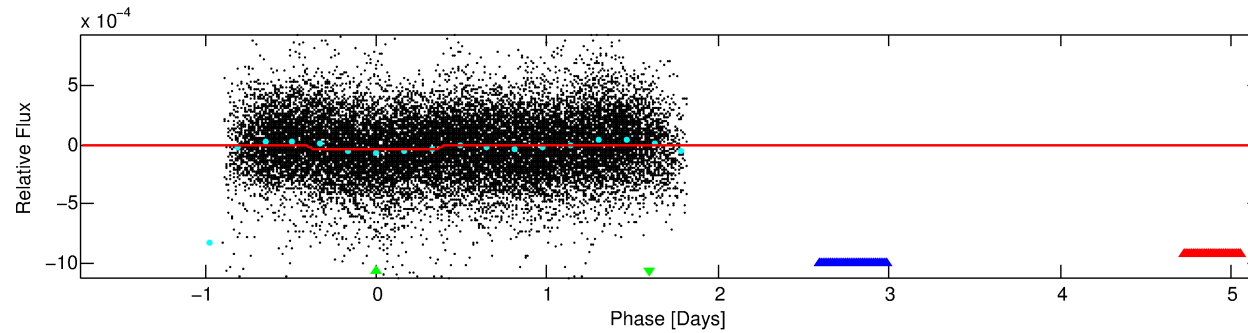
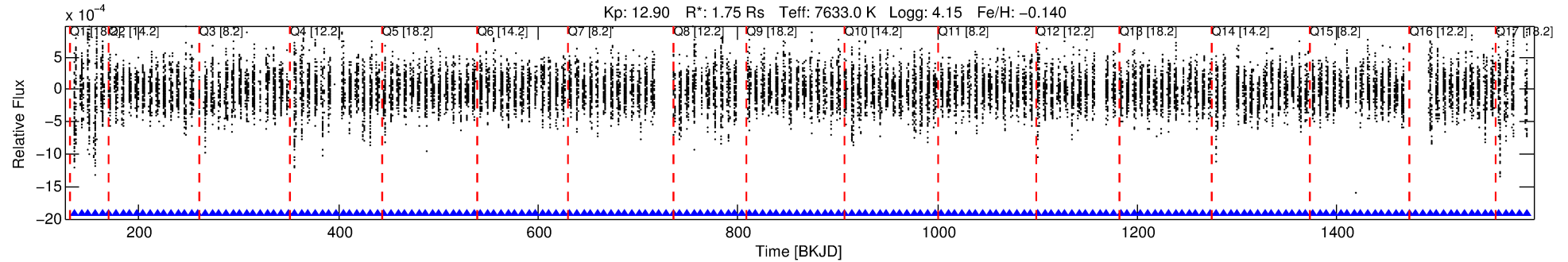
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 009774357-03

No Significant Match Found

# DV One-Page Summary

KIC: 9774357 Candidate: 3 of 3 Period: 6.890 d



## DV Fit Results:

Period = 6.88964 [0.00013] d  
Epoch = 135.8720 [0.0145] BKJD  
Rp/R\* = 0.0069 [0.0006]  
a/R\* = 1.51 [0.33]  
b = 0.91 [0.08]  
Seff = 1377.01 [533.26]  
Teq = 1553 [150] K  
Rp = 1.32 [0.42] Re  
a = 0.0823 [0.0204] AU  
Ag = 48.16 [122.17] [0.39σ]  
Teffp = 6327 [3983] K [1.20σ]

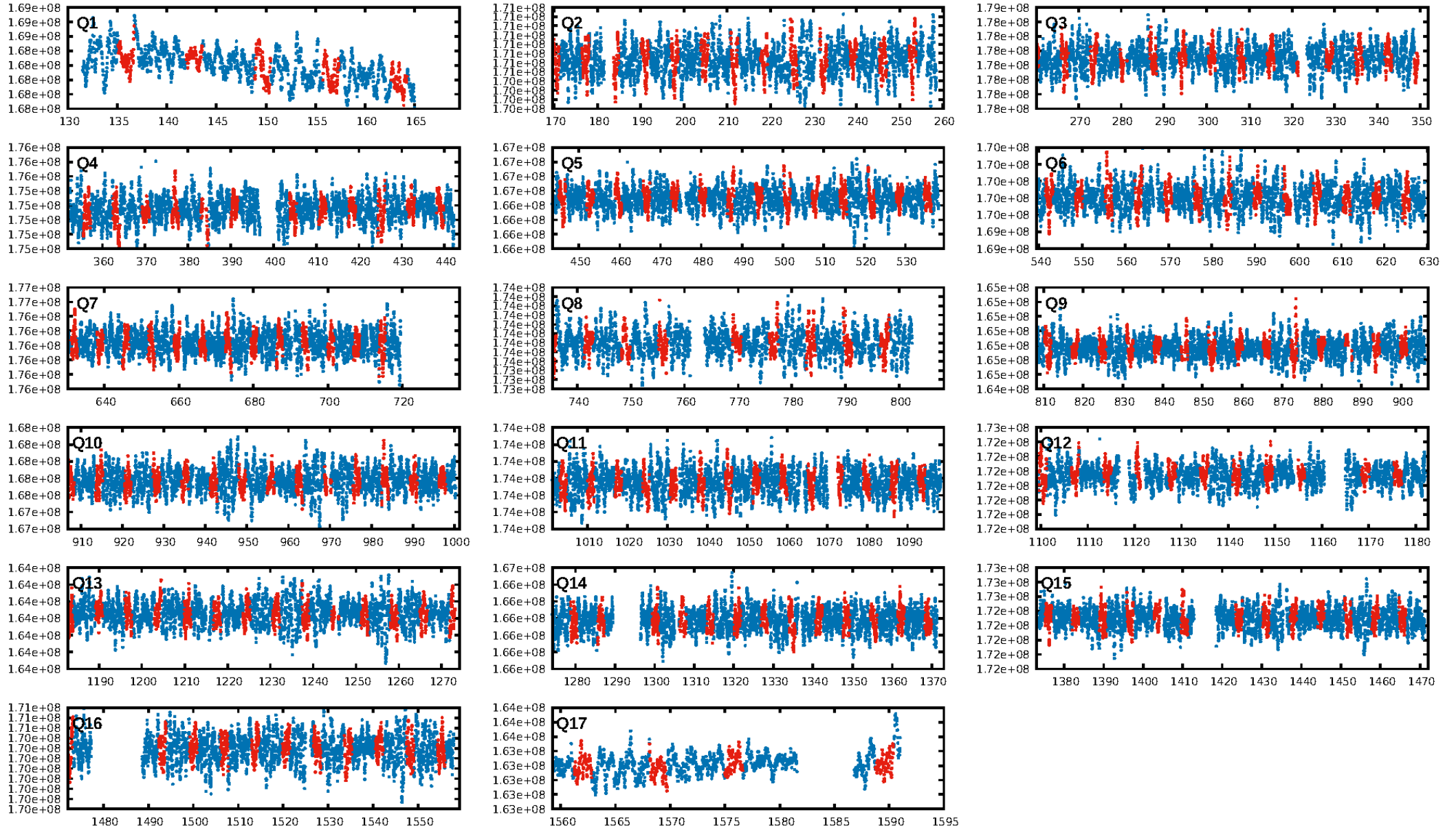
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.1% [0.00σ]  
ModelChiSquare2-sig: 55.3%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [190/190]  
GhostDiagnostic-chr: 2.074  
Centroid-sig: 2.1%  
Centroid-so: 1.123 arcsec [1.98σ]  
OotOffset-rm: 0.224 arcsec [1.00σ]  
OotOffset-st: 4/4/3/4 [15]  
KicOffset-rm: 0.217 arcsec [0.95σ]  
KicOffset-st: 4/4/3/4 [15]  
DiffImageQuality-fgm: 0.53 [8/15]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 22:00:58 Z

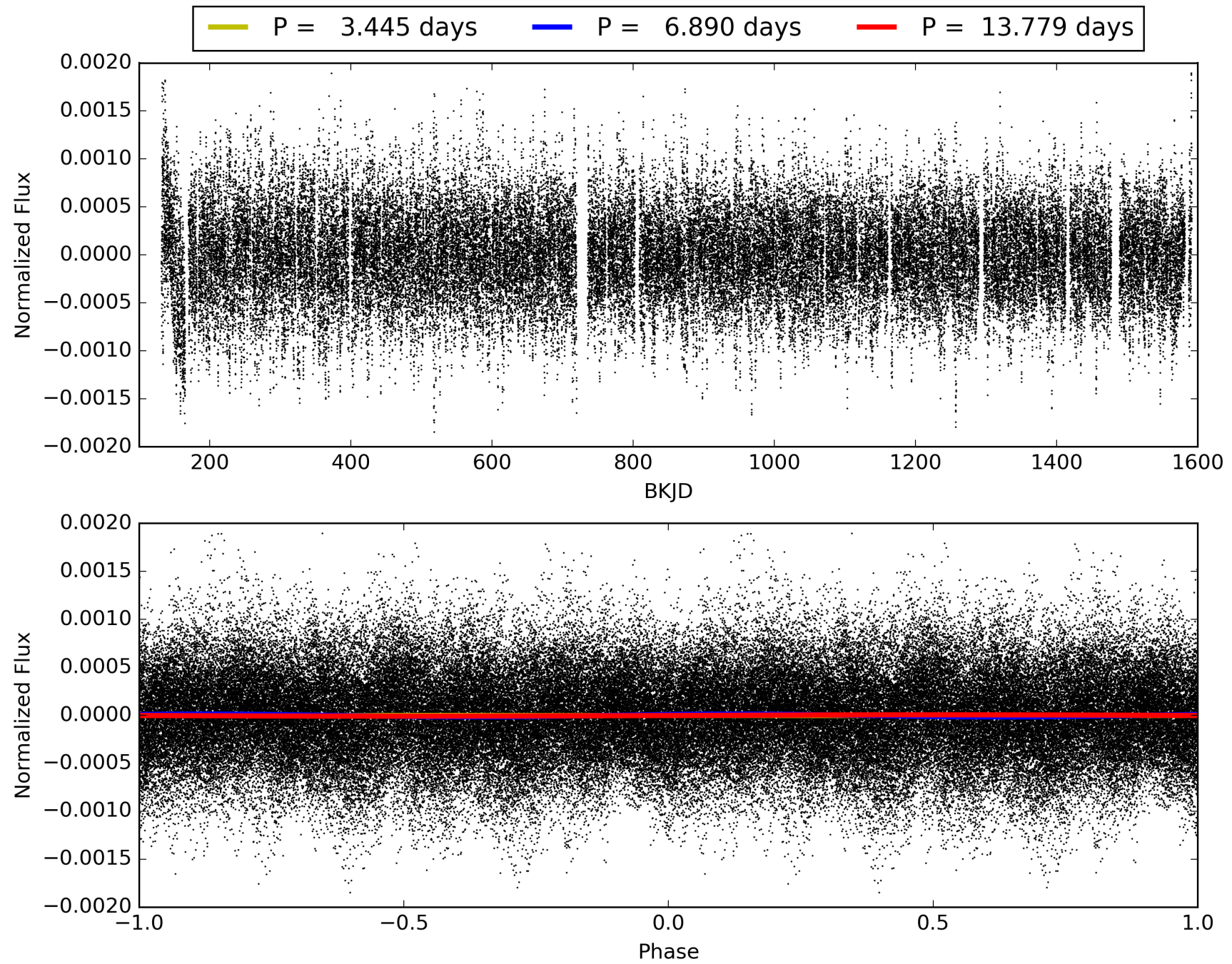
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 009774357-03, PDC Light Curves



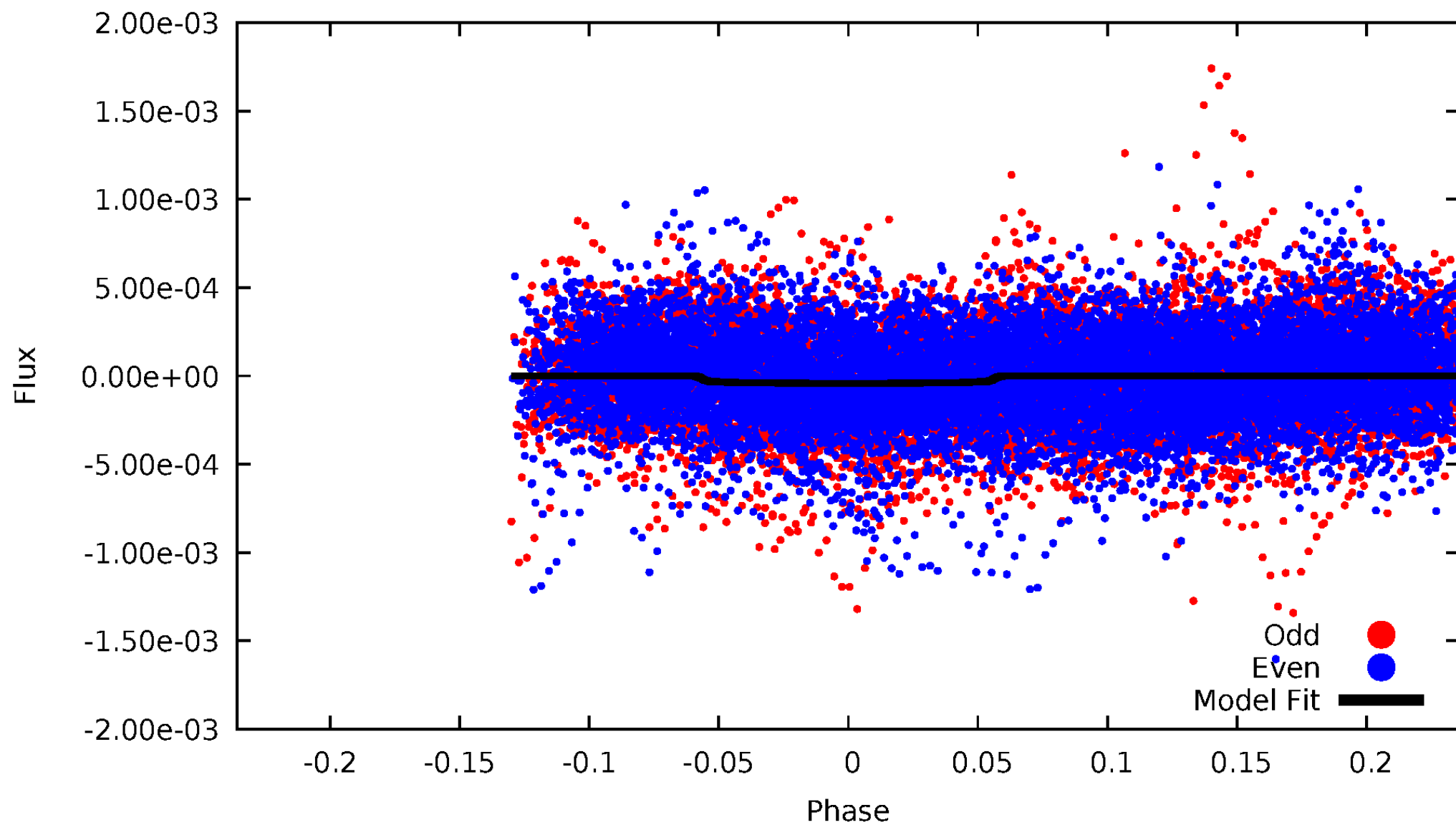


TCE 009774357-03



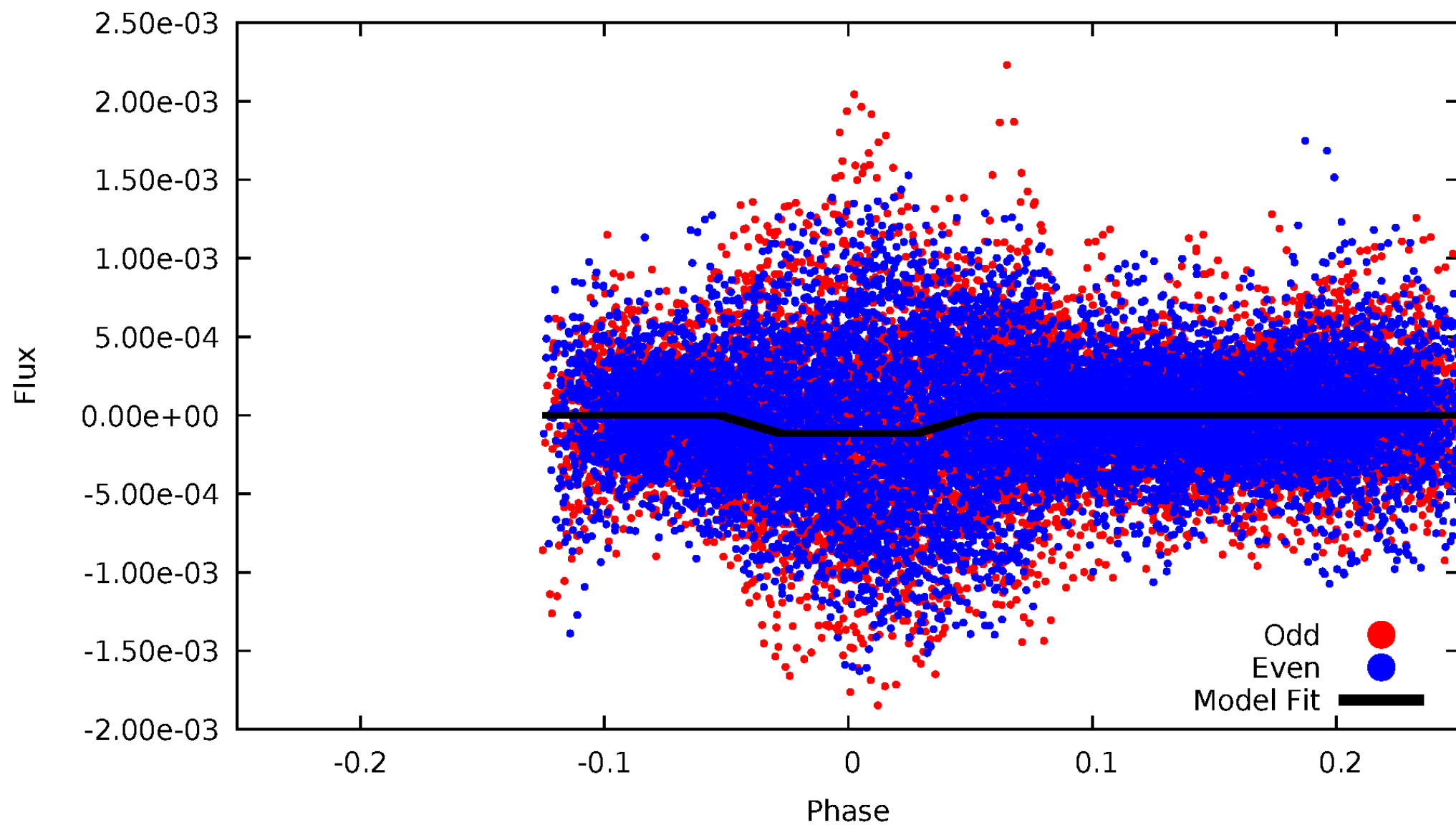
# DV Odd/Even

TCE 009774357-03



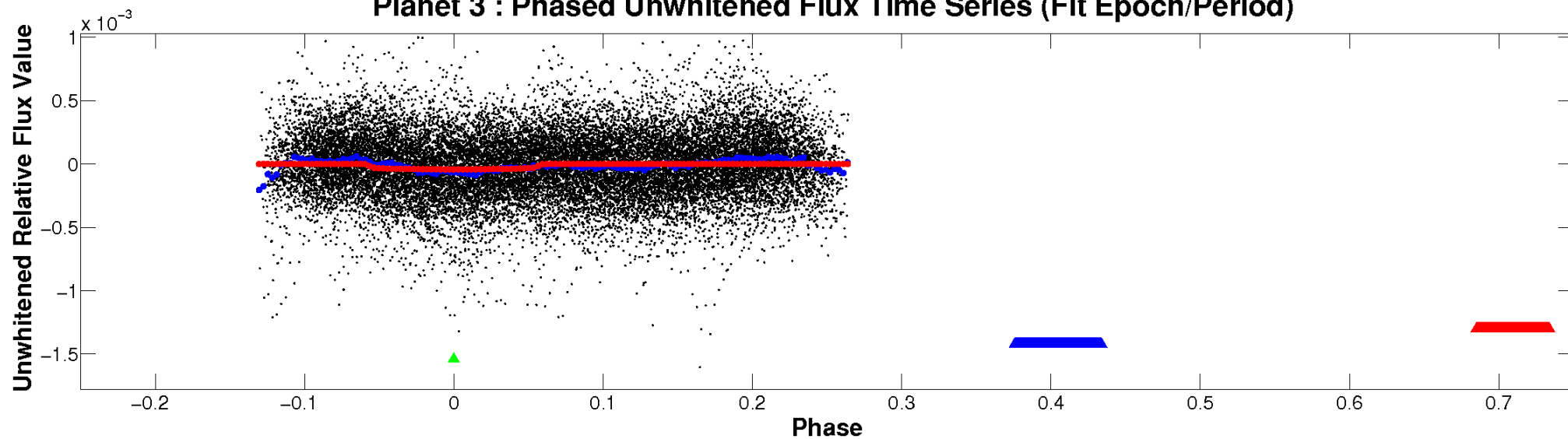
# ALT Odd/Even

TCE 009774357-03

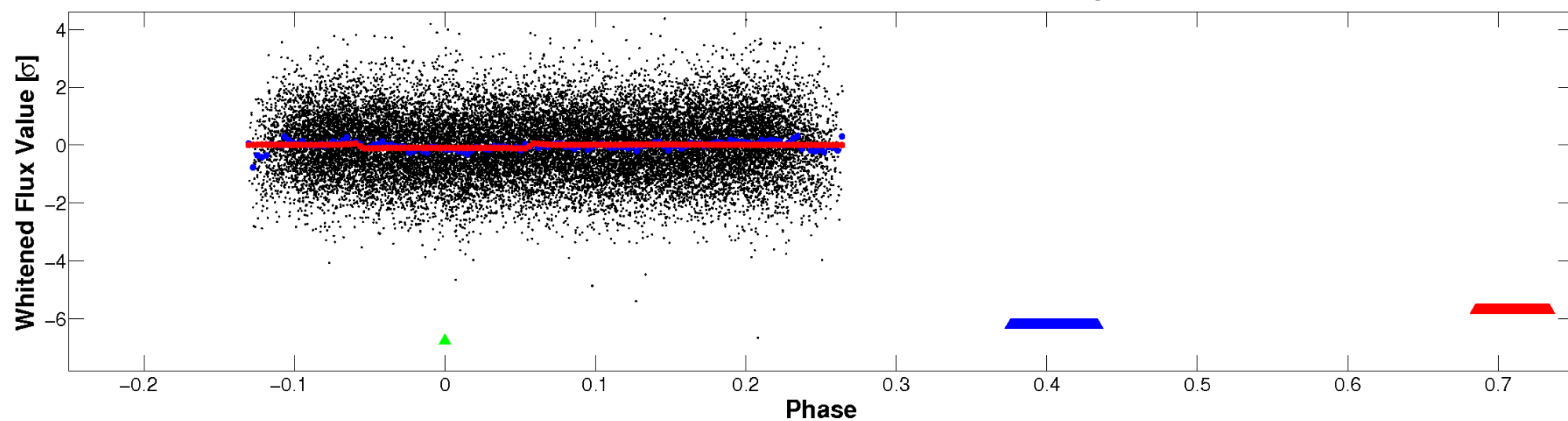


# Non-Whitened Vs. Whitened Light Curve

## Planet 3 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)



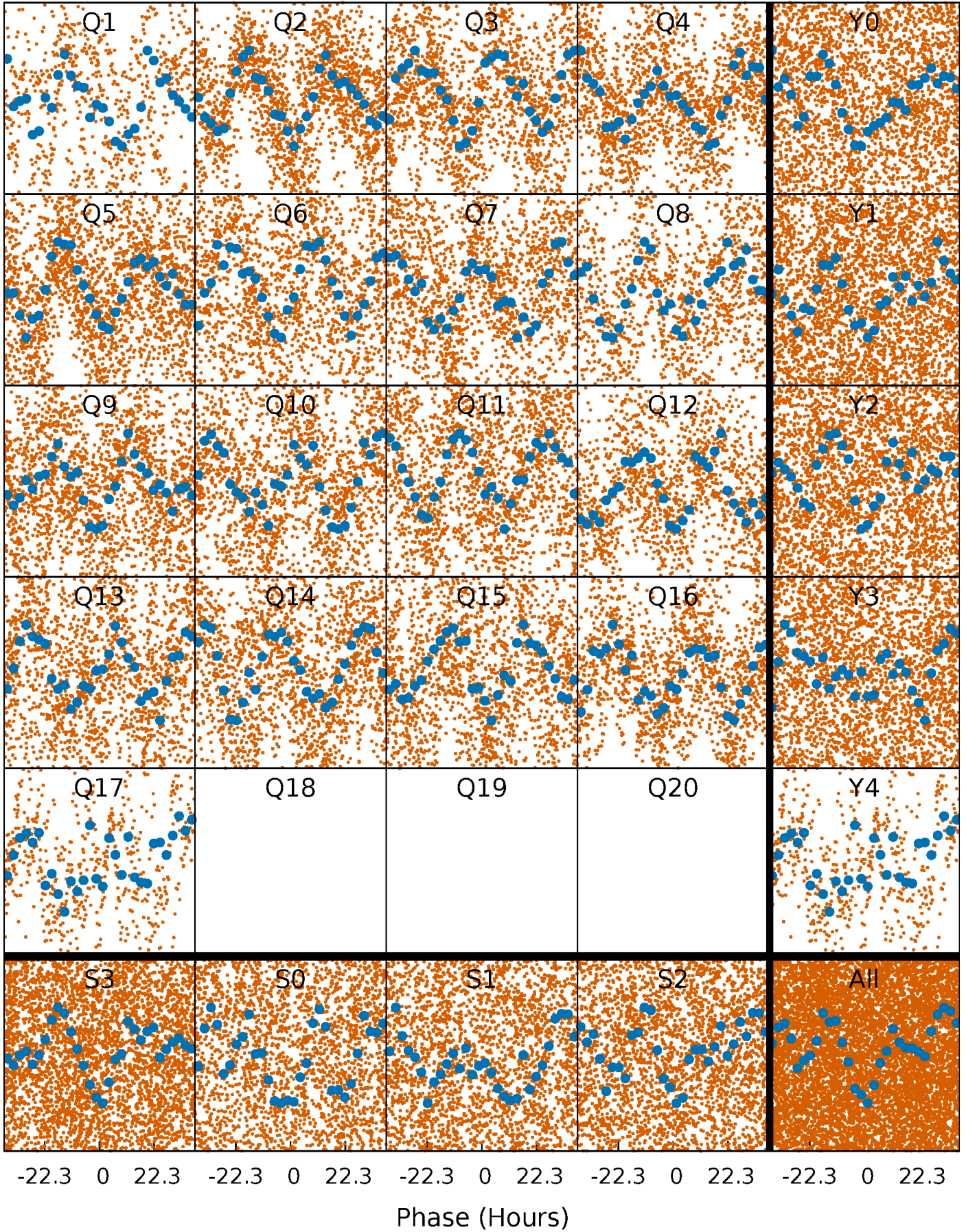
## Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)





# PDC Quarter-Phased Transit Curves

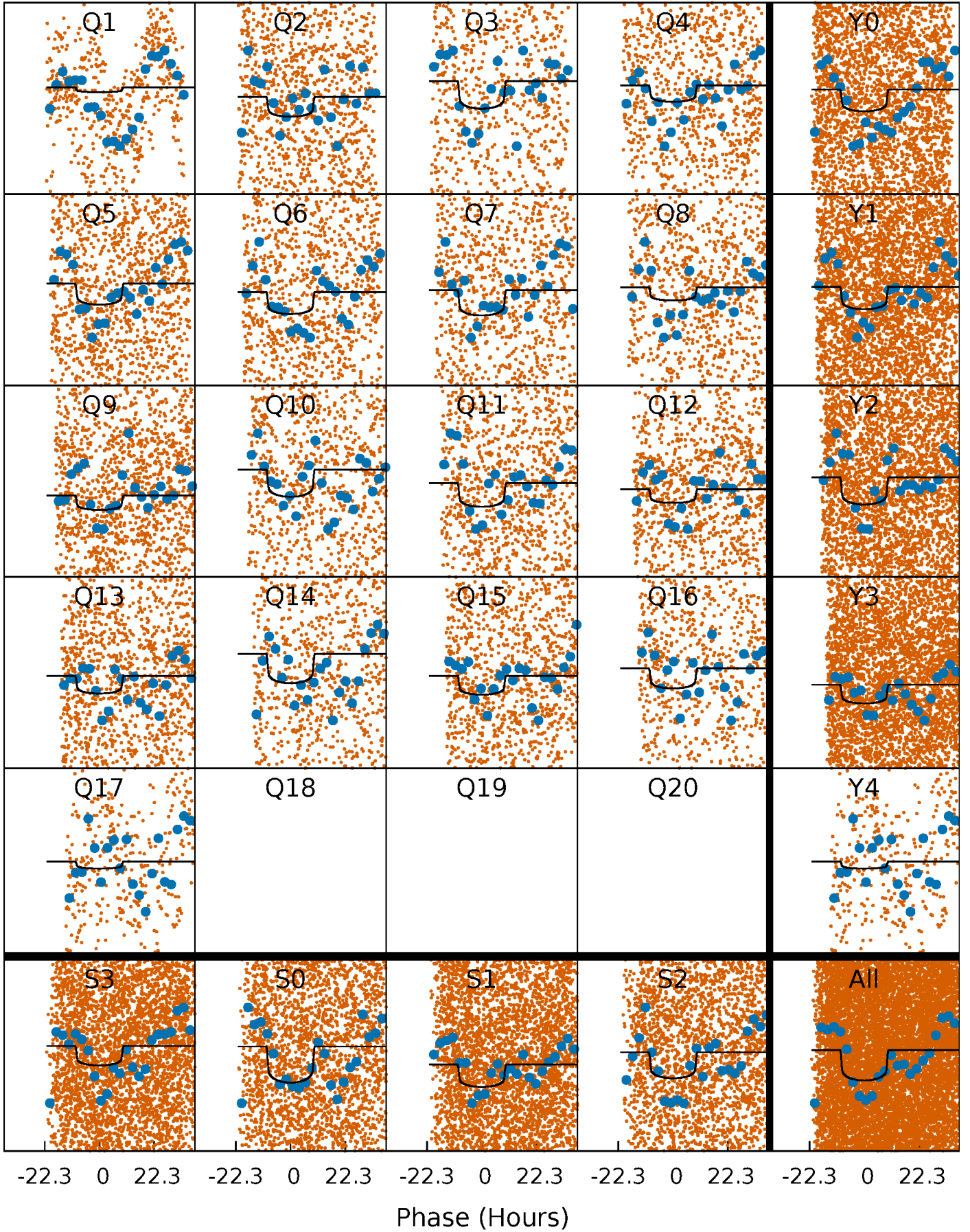
TCE 009774357-03 P= 6.889639 Days  $T_0=135.871956$  (BKJD)





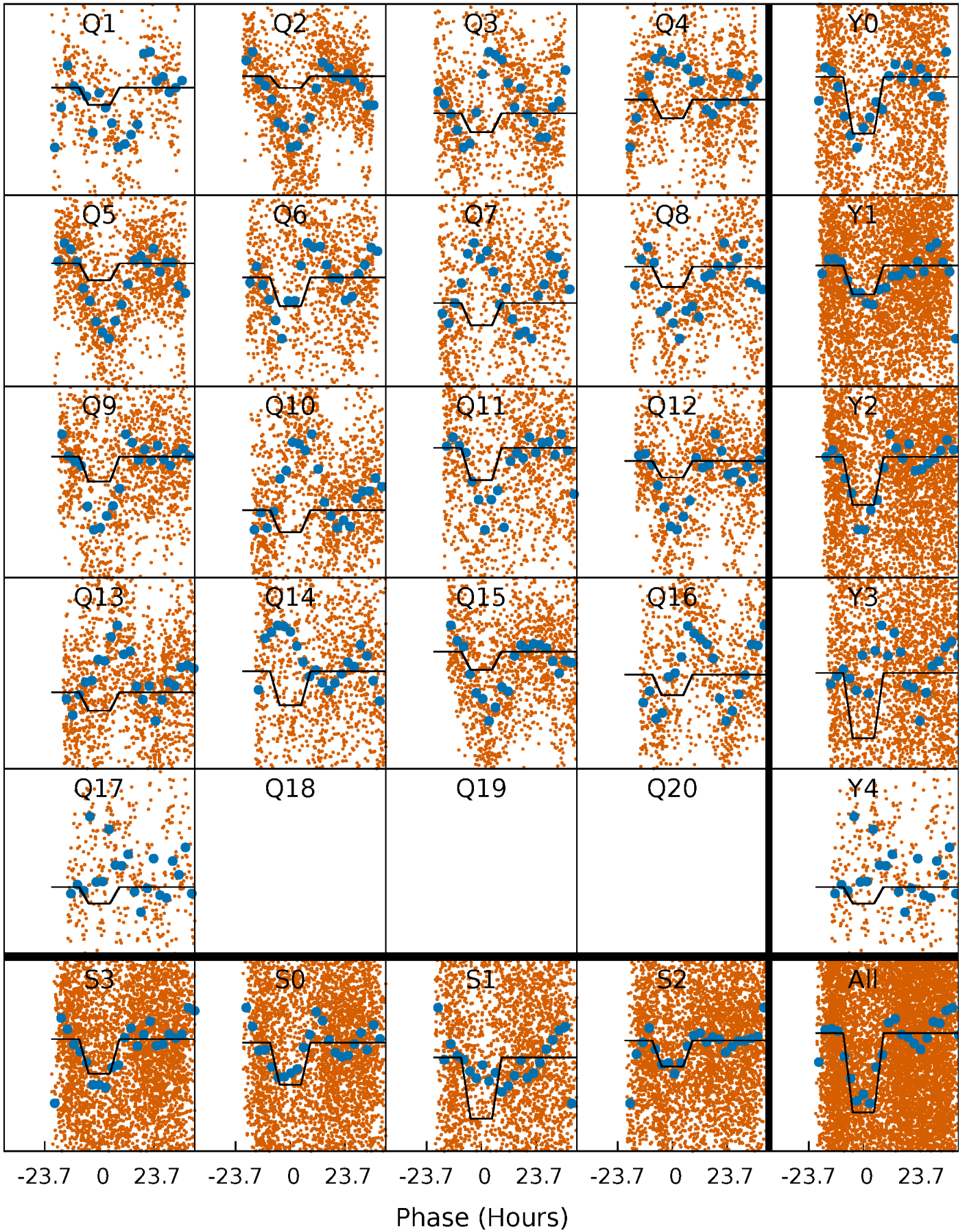
# DV Quarter-Phased Transit Curves

TCE 009774357-03     $P = 6.889639$  Days     $T_0 = 135.871956$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

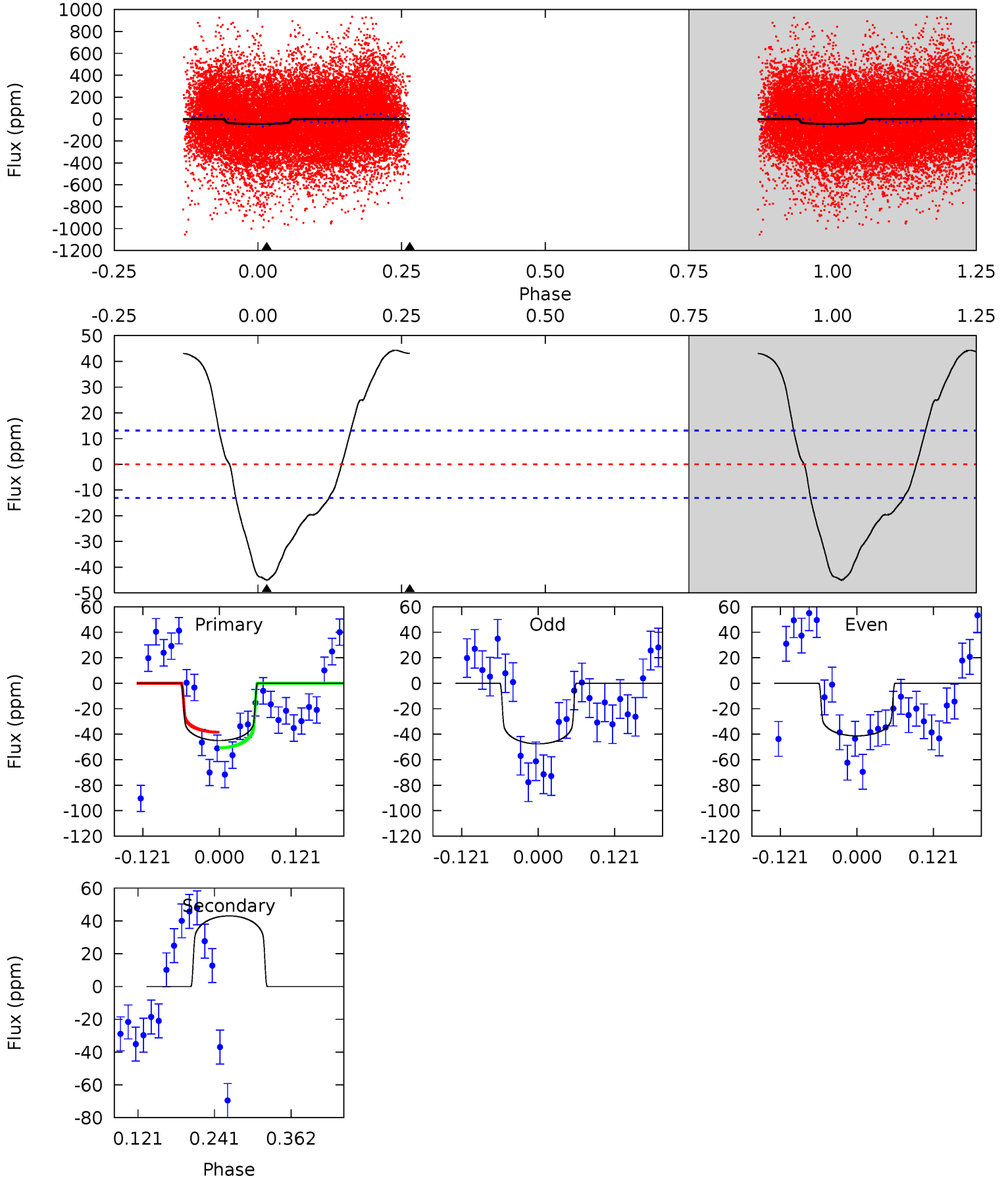
TCE 009774357-03   P= 6.889815 Days    $T_0=135.838835$  (BKJD)



# DV Model-Shift Uniqueness Test

009774357-03, P = 6.889639 Days, E = 128.982317 Days

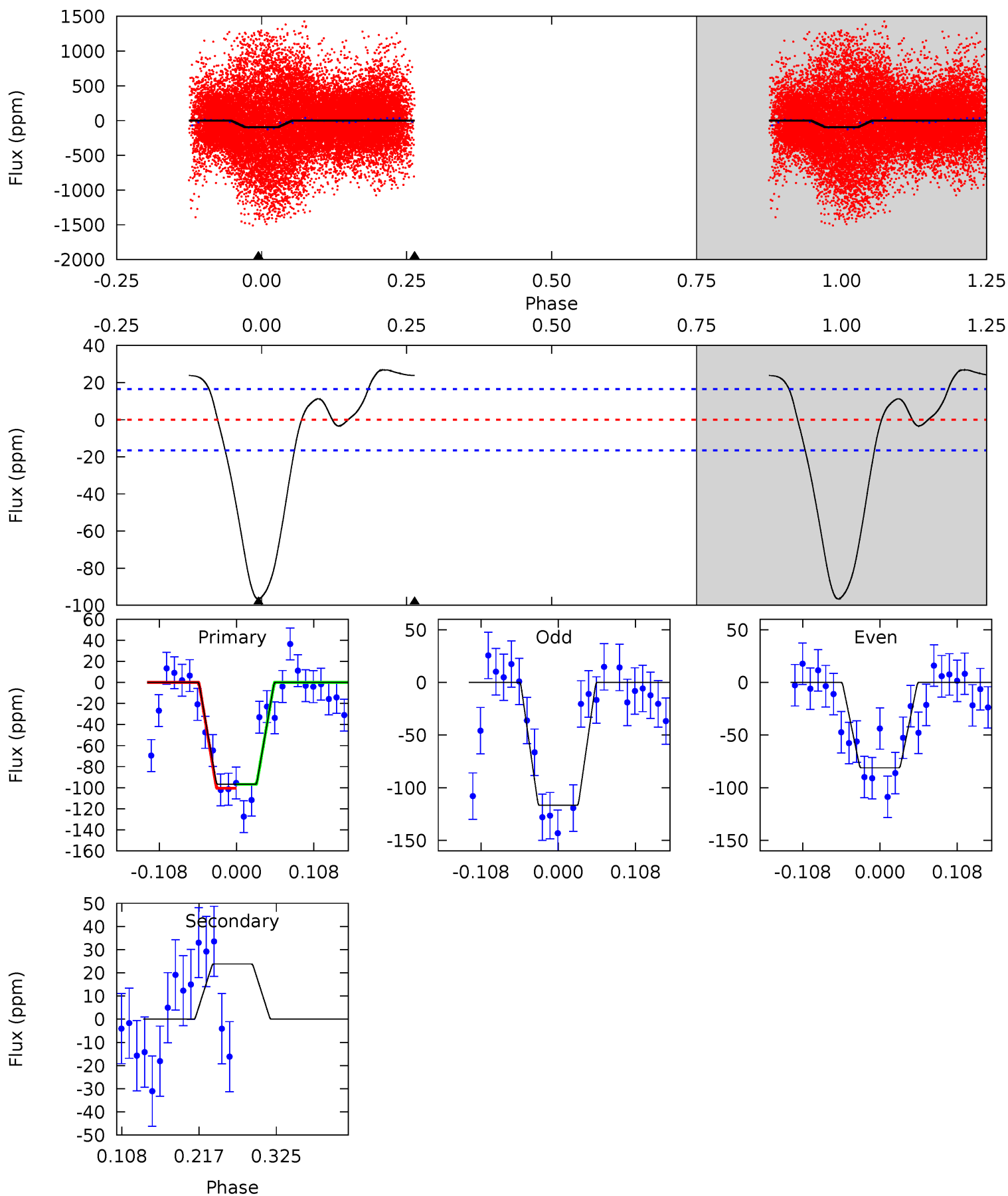
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
15.5	-14.9	0	0	4.53	1.55	7.52	15.5	15.5	-14.9	-14.9	1.07	1.48	0.50	2.15



# Alt Model-Shift Uniqueness Test

009774357-03, P = 6.889815 Days, E = 128.949020 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
26.6	-6.56	0	0	4.55	1.61	1.59	26.6	26.6	-6.56	-6.56	4.88	0.73	0.22	0.37





### Stellar Parameters For KIC 009774357

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7633^{+211}_{-316}$	$4.146^{+0.124}_{-0.186}$	$-0.140^{+0.200}_{-0.350}$	$1.751^{+0.532}_{-0.354}$	$1.564^{+0.197}_{-0.241}$	$0.410^{+0.300}_{-0.200}$
	+3%/-4%	+3%/-4%	+143%/-250%	+30%/-20%	+13%/-15%	+73%/-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 009774357-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$43 \pm 3$	$1.33^{+0.26}_{-0.19}$	$2184^{+168}_{-137}$	$-7393^{+459}_{-506}$	$-88.851^{+25.449}_{-30.726}$
Alt.	$24 \pm 4$	$2.06^{+0.37}_{-0.25}$	$2177^{+177}_{-120}$	$-5130^{+249}_{-252}$	$-20.039^{+5.658}_{-7.287}$

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



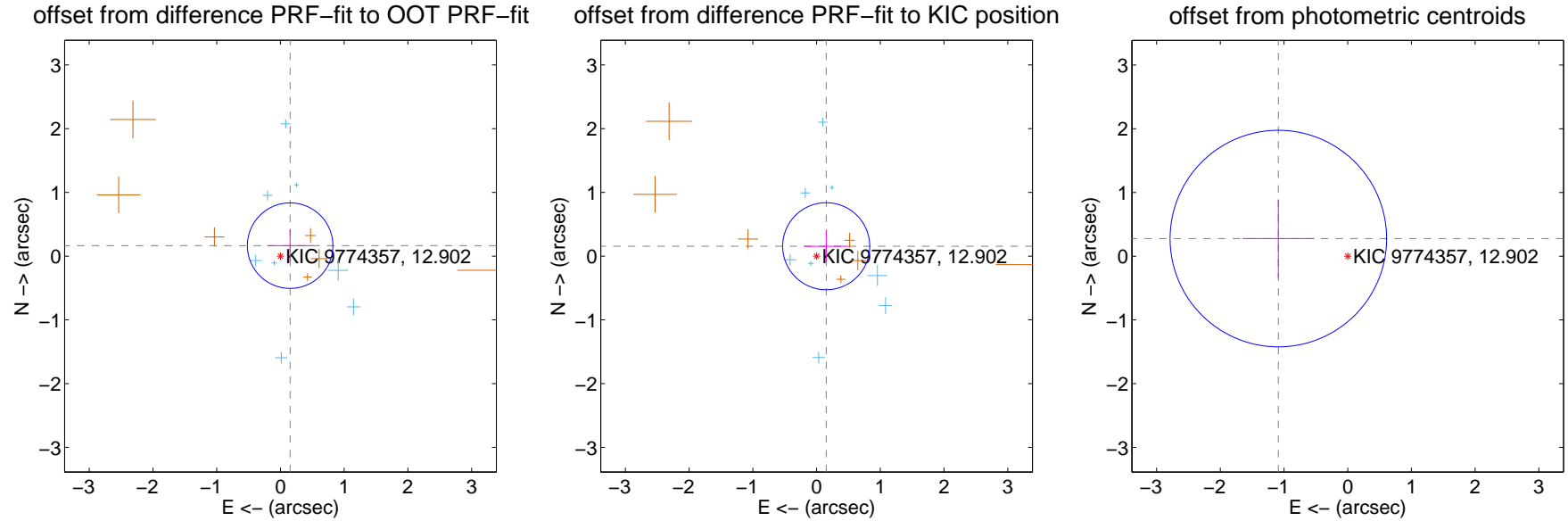
## DV Centroid Data

Supplemental centroid analysis for 009774357-03. Kepler magnitude: 12.90. Transit SNR 8.68

There are 8 quarters with good PRF difference image offsets

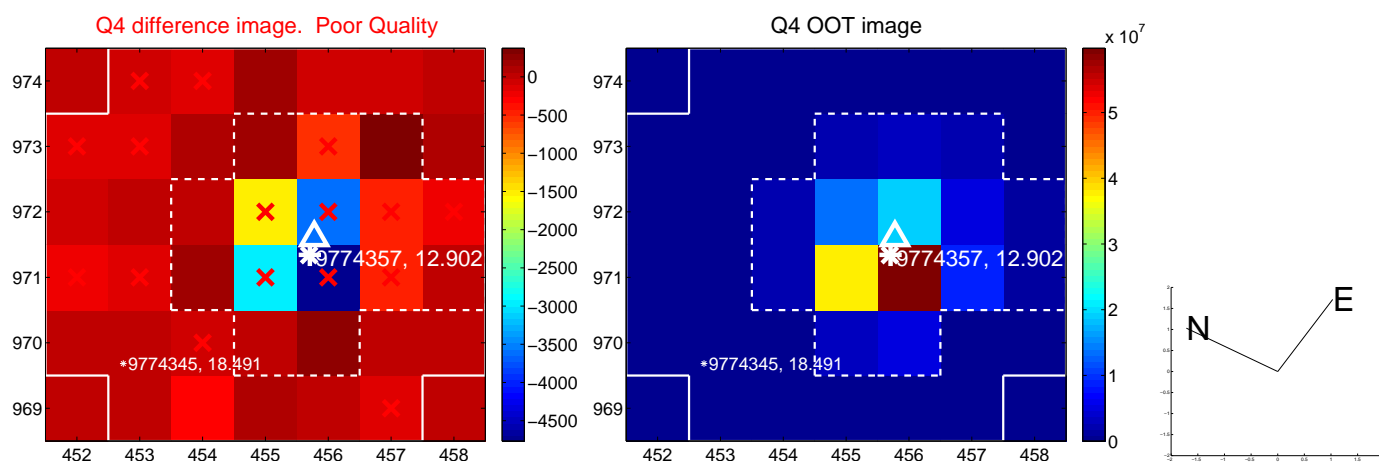
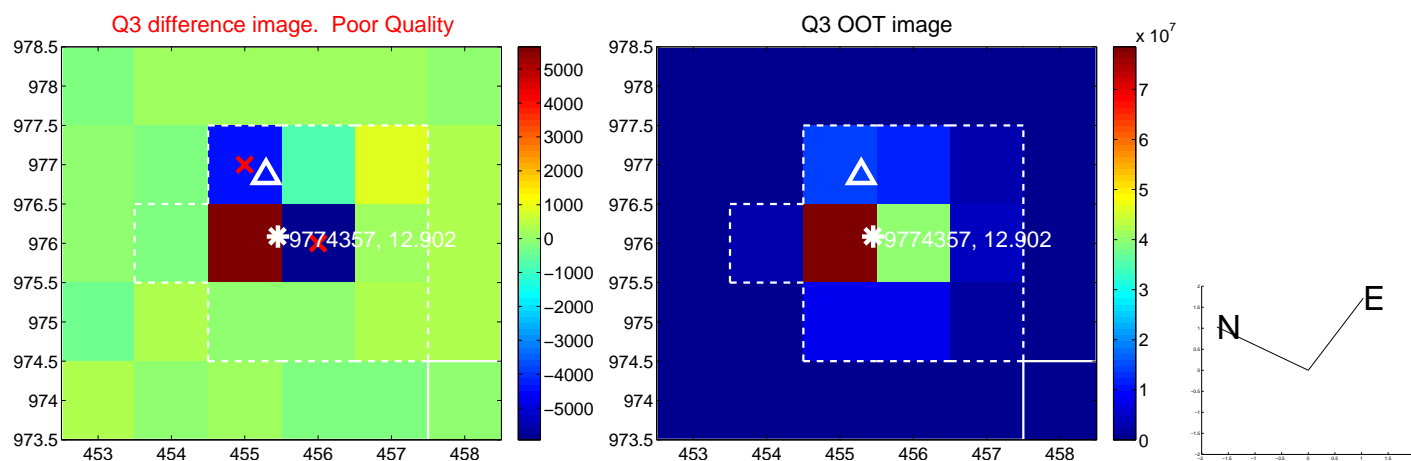
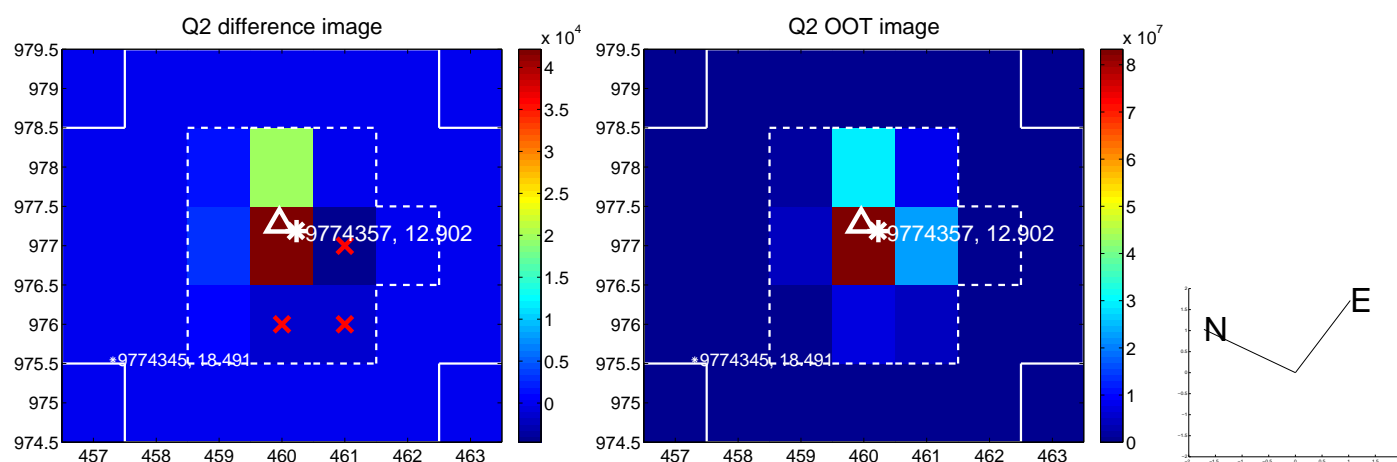
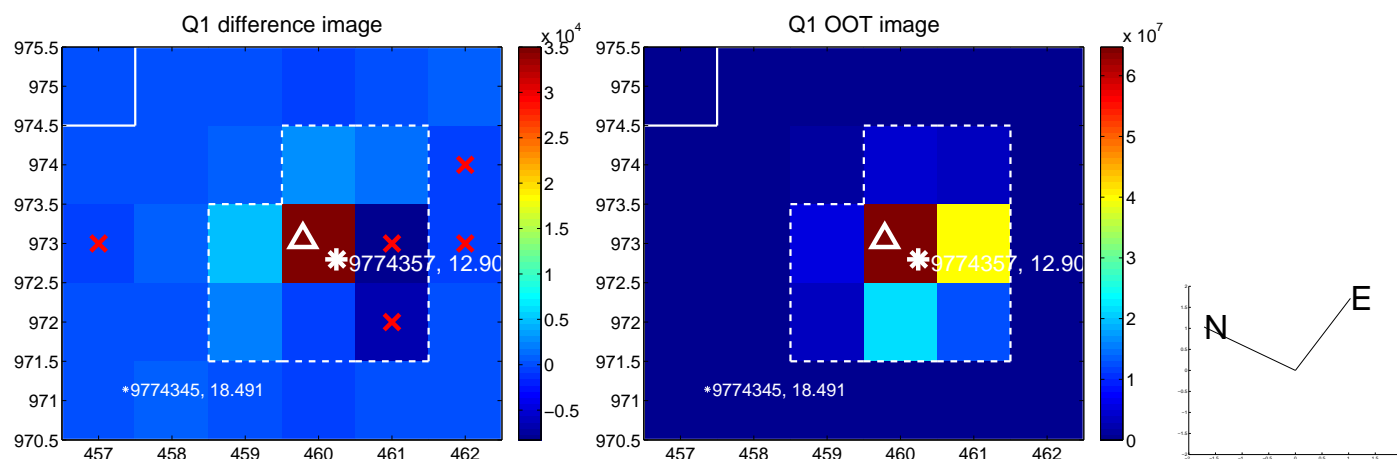
The direct PRF centroid is offset from the target star catalog position by about 0.02 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.224 \pm 0.224$	1.00	$-0.152 \pm 0.360$	$0.165 \pm 0.262$
PRF-fit source offset from KIC position	$0.217 \pm 0.228$	0.95	$-0.151 \pm 0.352$	$0.155 \pm 0.246$
photometric centroid source offset	$1.12 \pm 0.57$	1.98	$1.09 \pm 0.56$	$0.28 \pm 0.61$

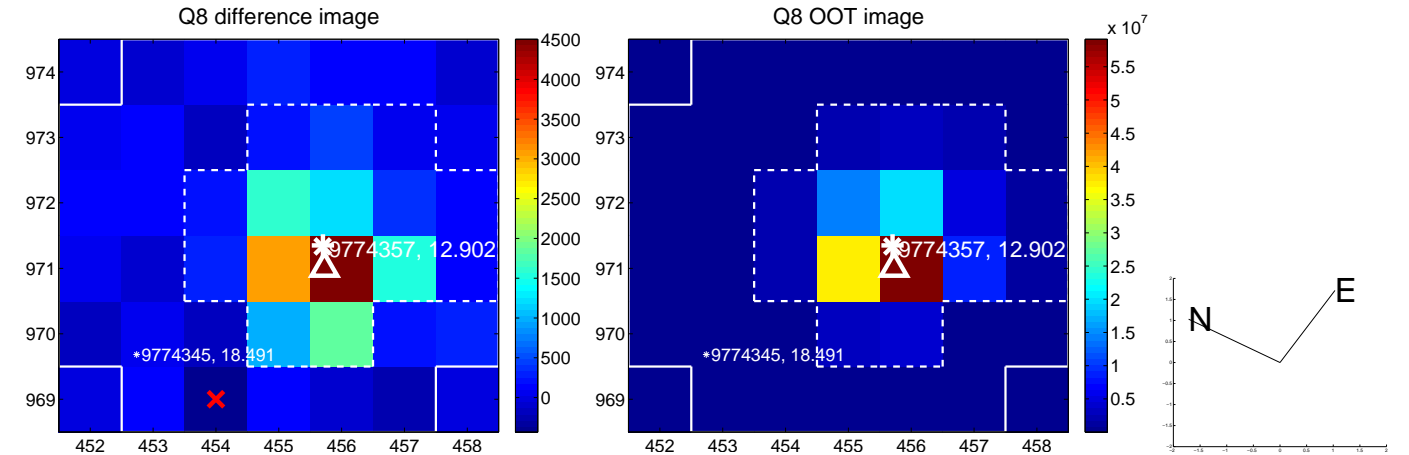
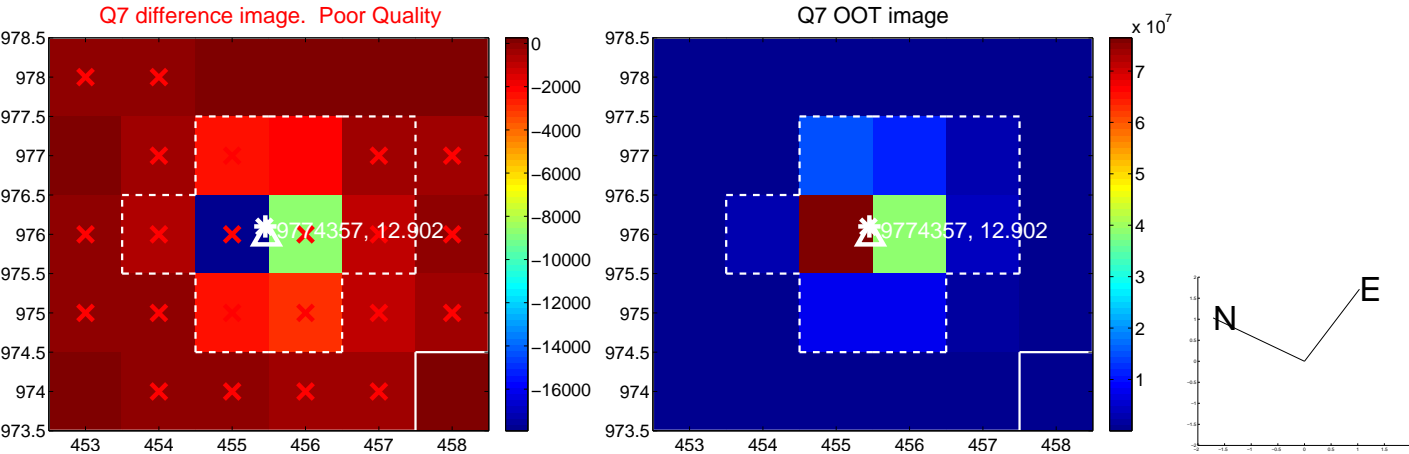
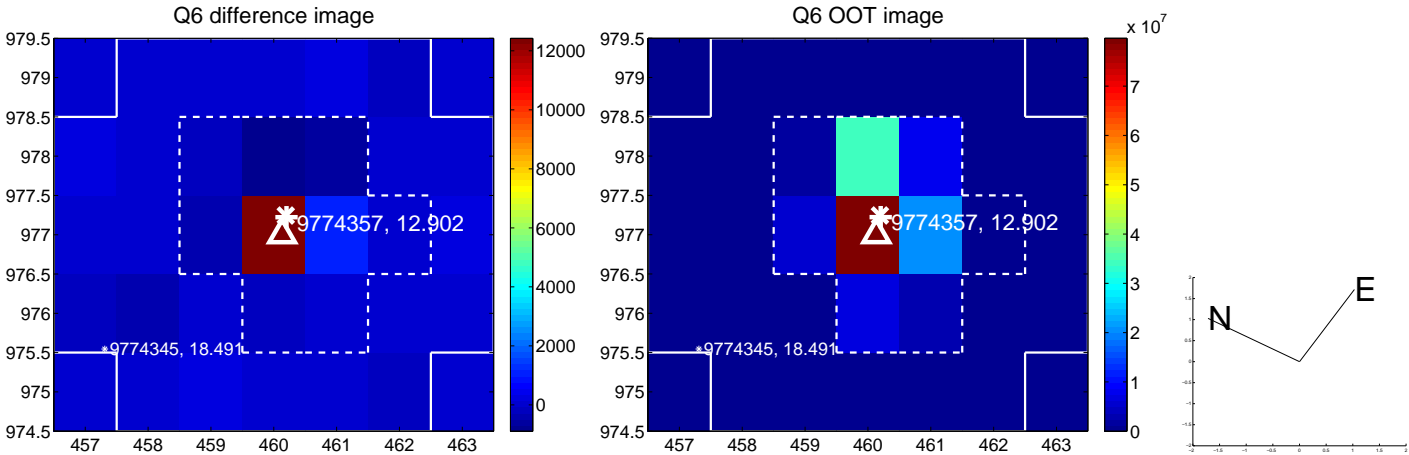
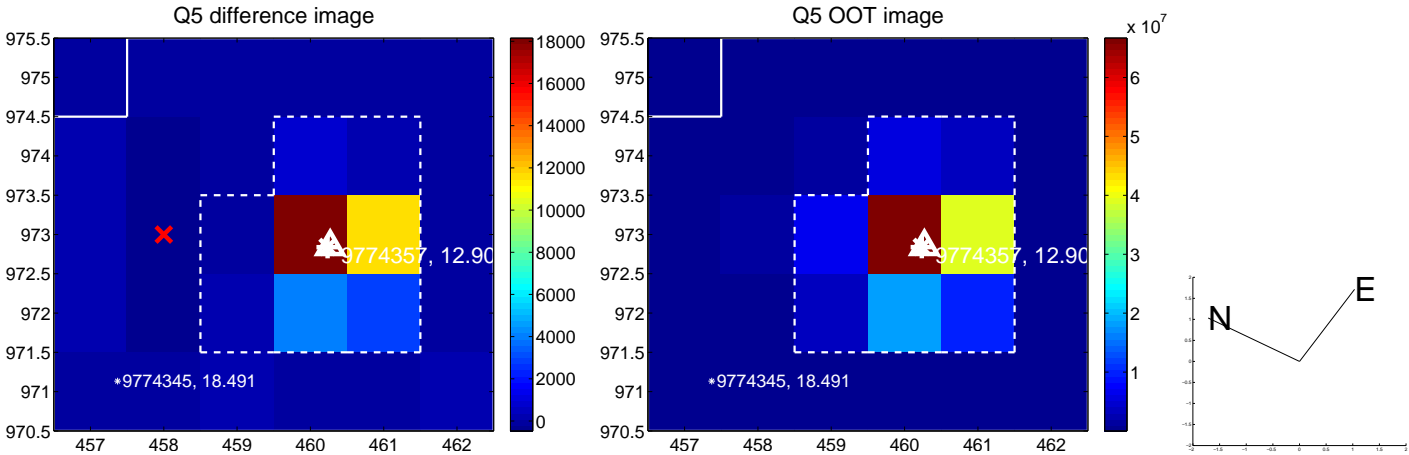


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

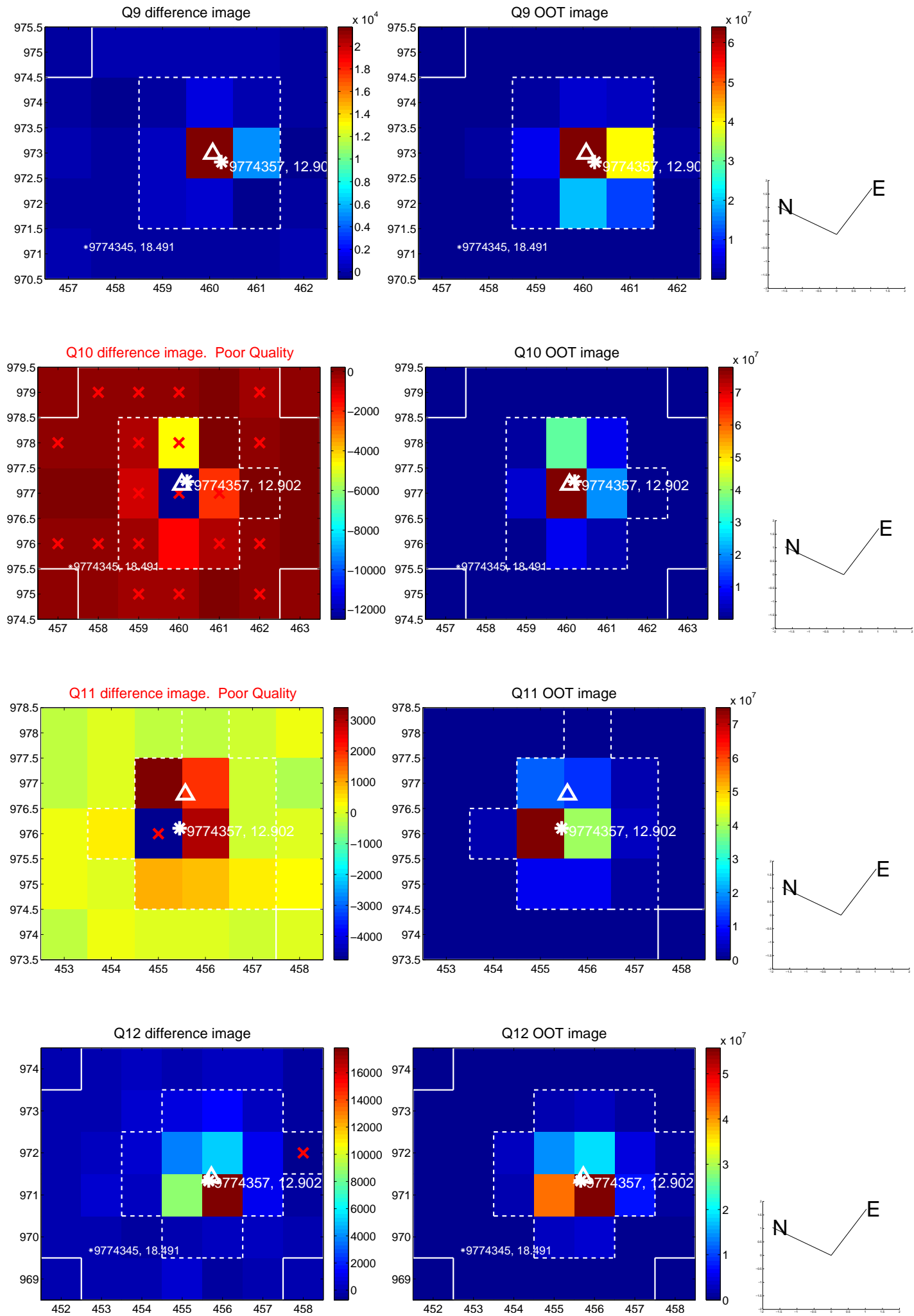
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



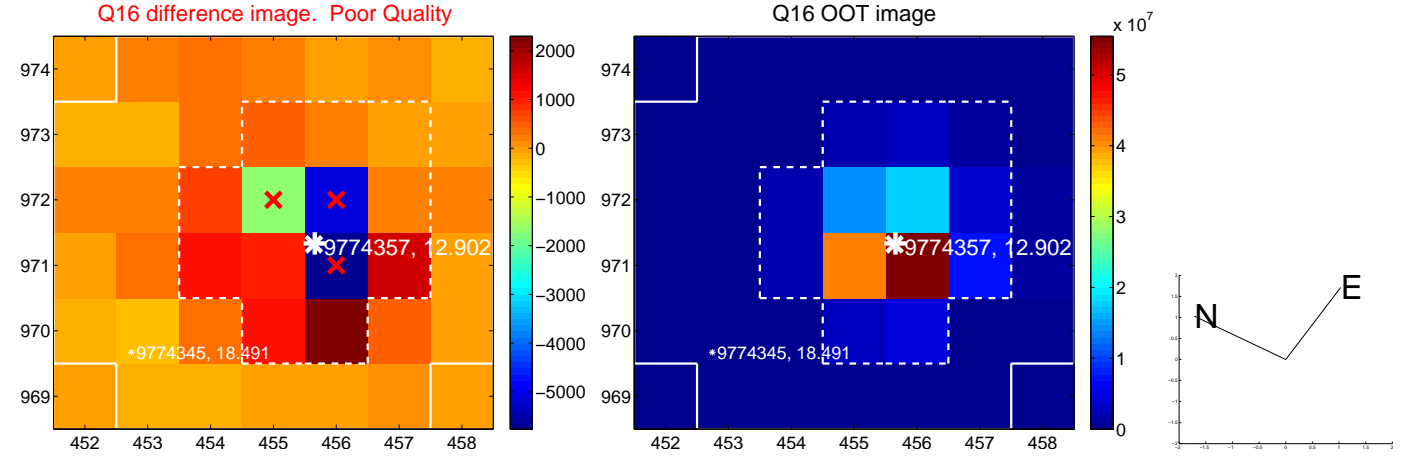
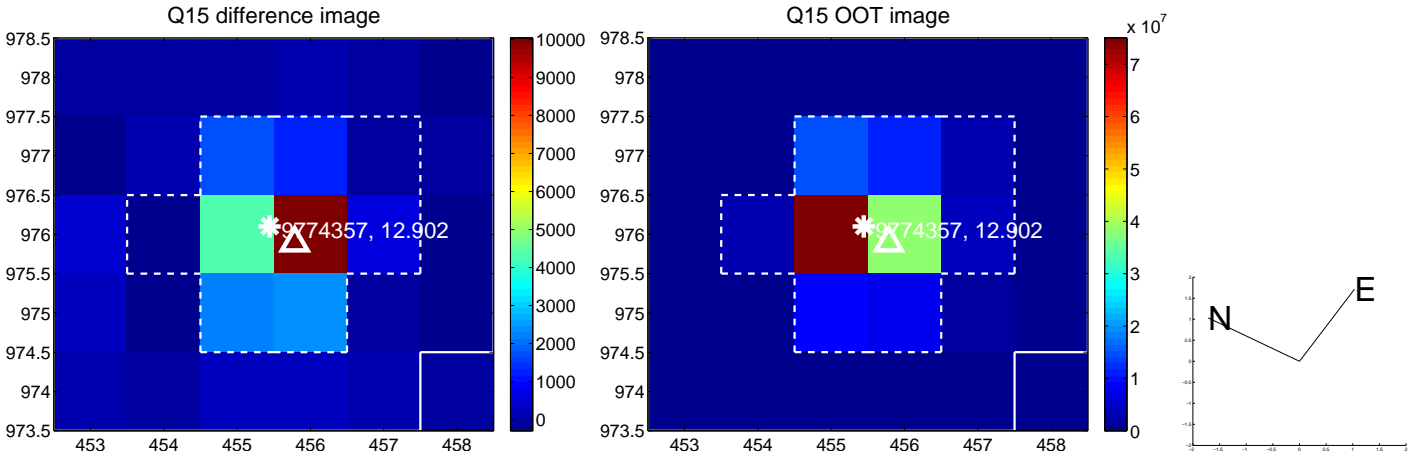
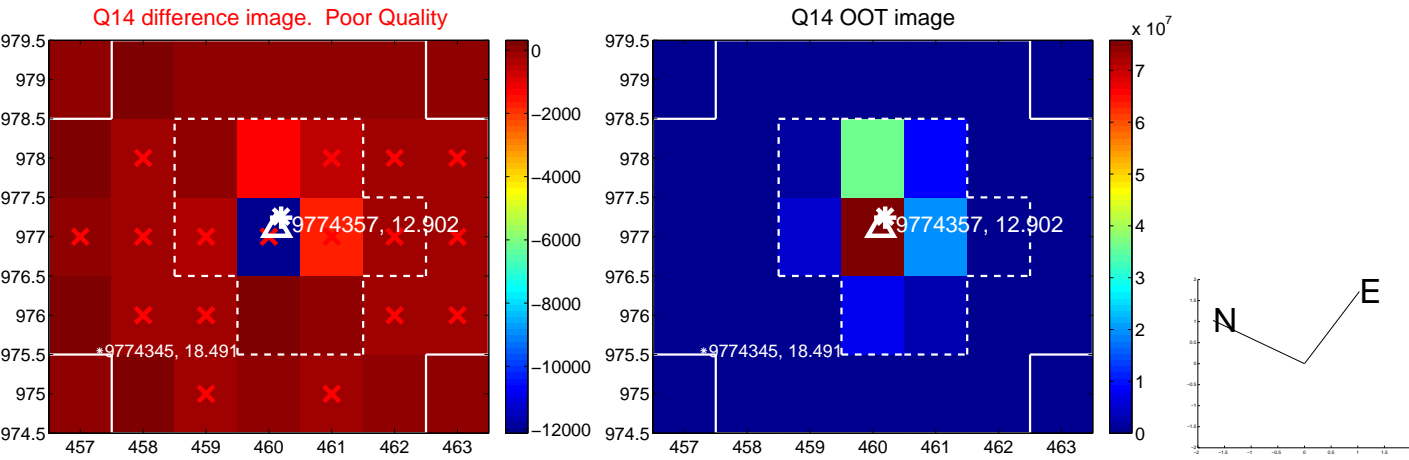
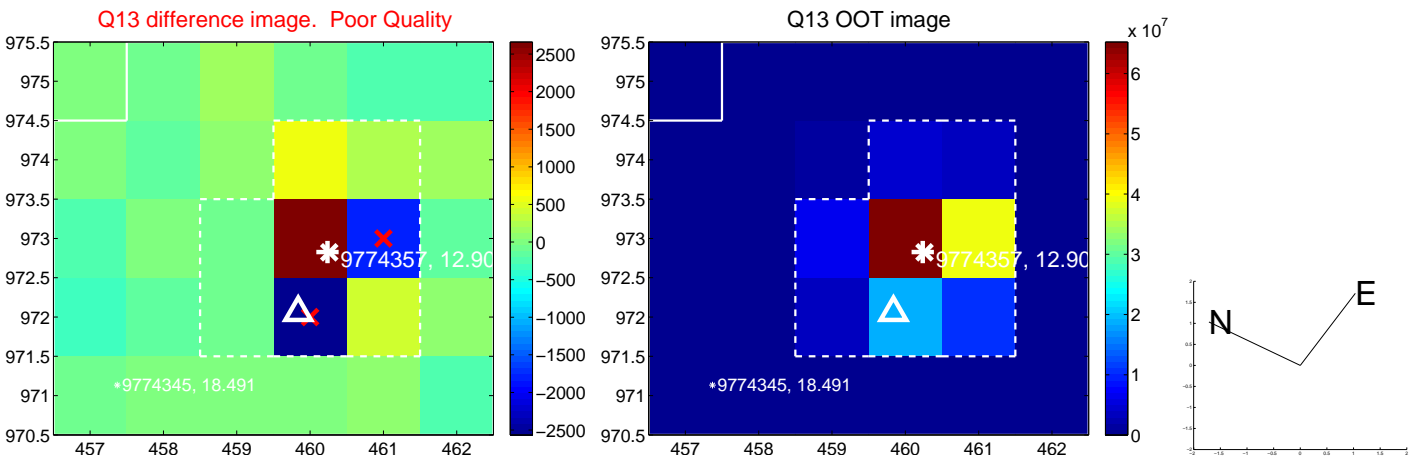
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

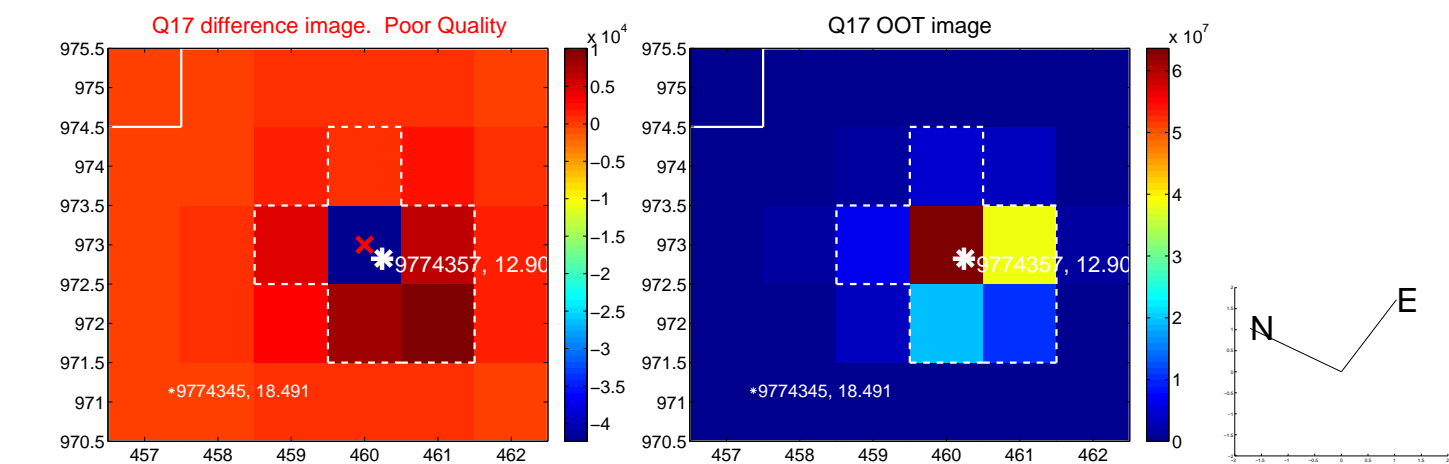


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

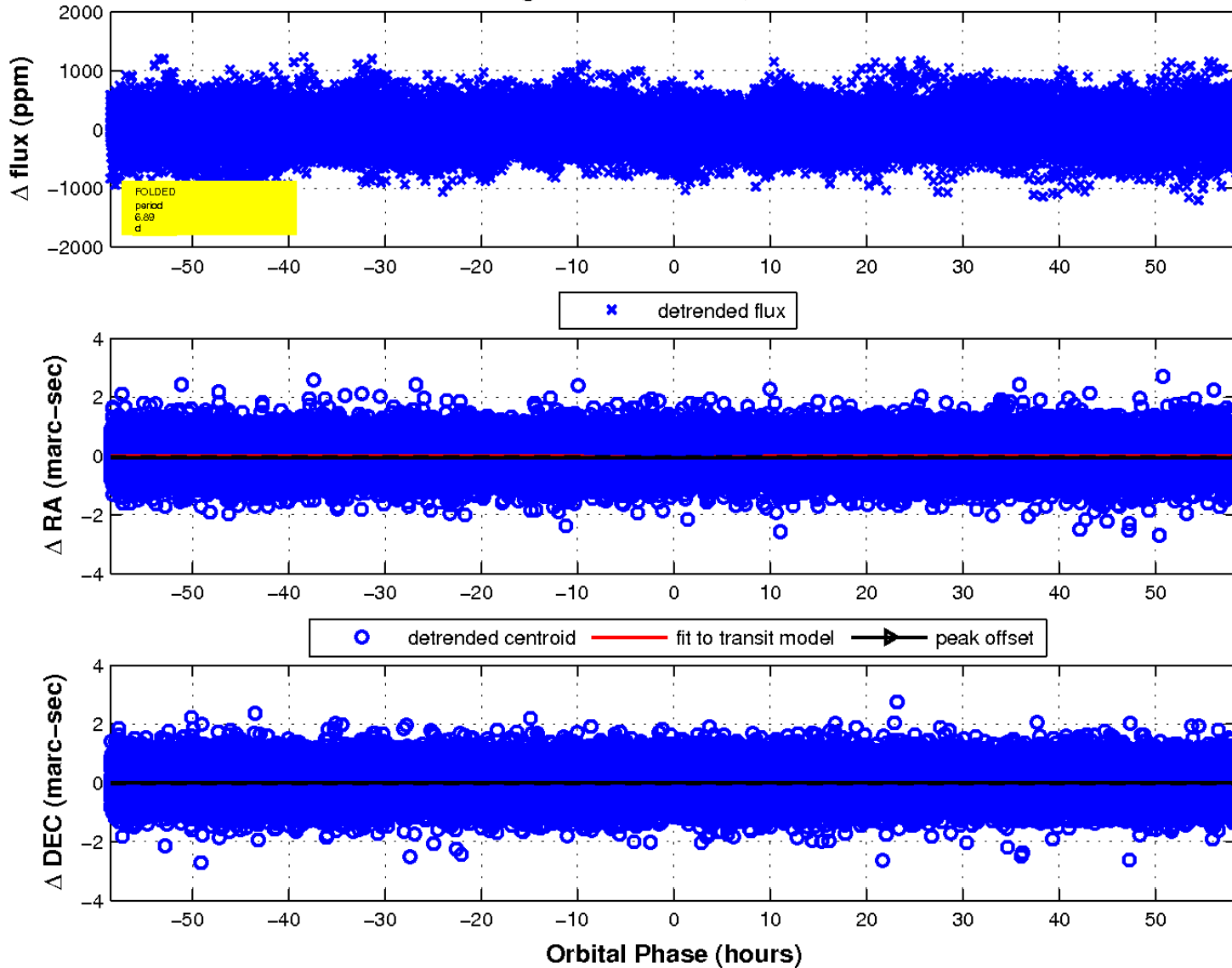




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



fluxWeightedCentroids, Planet 3 of 3



UKIRT Image

