

# KIC 004557777

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004557777-01	OBS	No	1.873514	131.780356	13.2	1.931	8.7	5.5	3.02	6985	1.24	15246.41
004557777-02	OBS	No	0.749524	132.204364	2.4	4.061	7.7	1.8	3.02	6985	0.50	51720.55
004557777-03	OBS	No	83.736266	165.215381	52.1	11.889	8.1	2.9	3.02	6985	2.54	96.12
004557777-04	OBS	No	60.443129	149.653217	86.1	13.470	8.0	5.5	3.02	6985	3.07	148.45
004557777-05	OBS	No	80.512246	208.208197	119.1	2.469	8.4	5.8	3.02	6985	3.66	101.29

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004557777-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA_TRACKER—SWEET_NTL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004557777-02	OBS	FP	0.00	1	0	0	0	LPP_DV
004557777-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004557777-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004557777-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

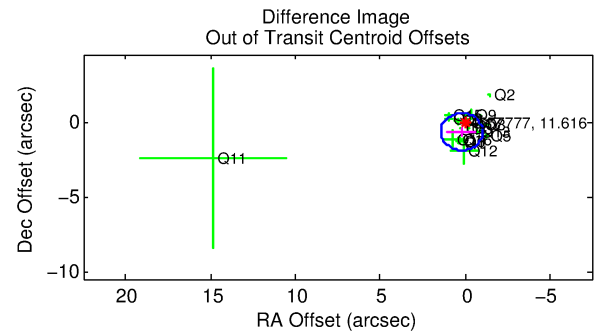
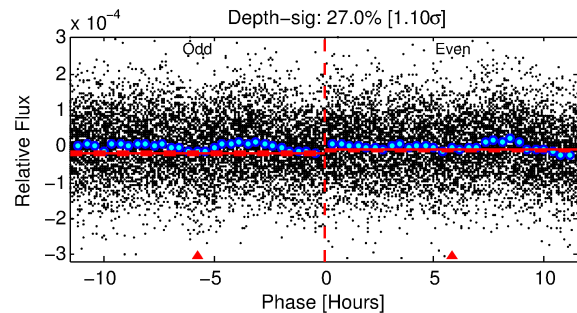
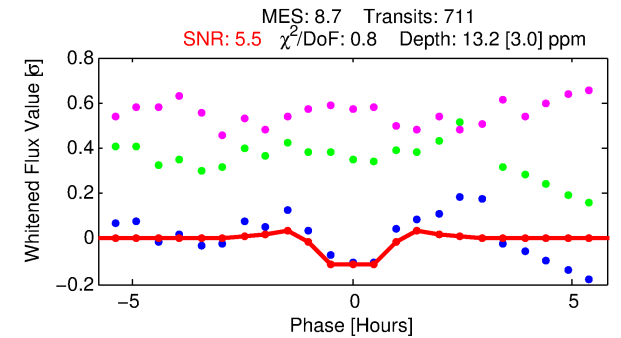
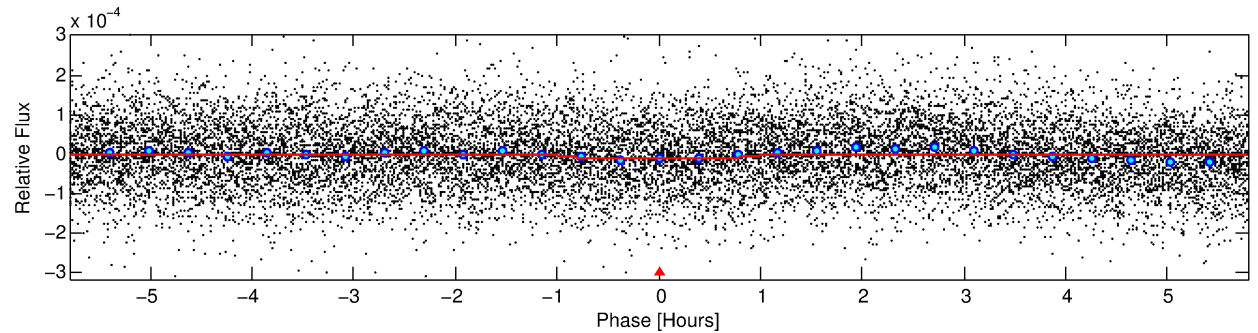
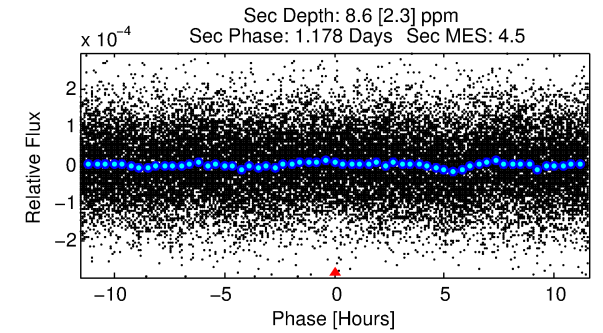
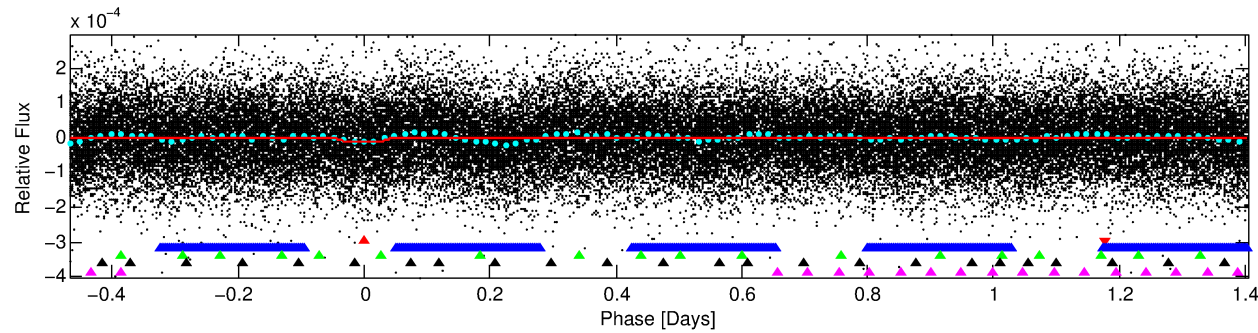
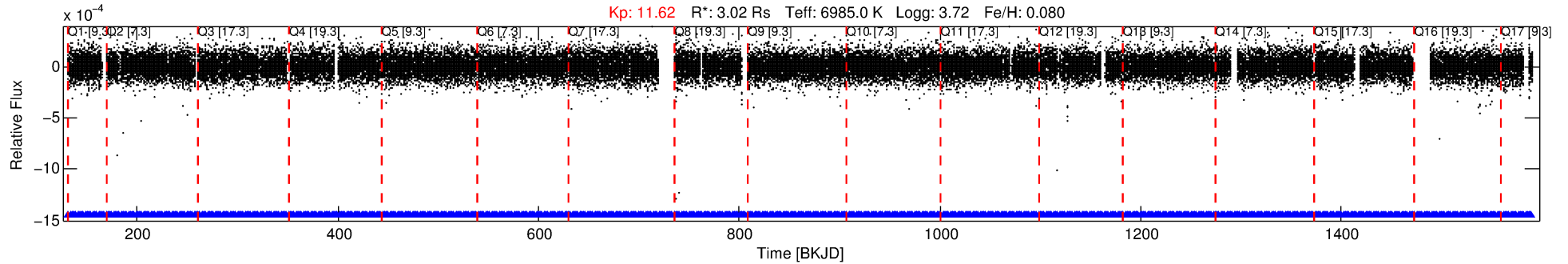
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 004557777-01

No Significant Match Found

# DV One-Page Summary

KIC: 4557777 Candidate: 1 of 5 Period: 1.874 d



## DV Fit Results:

Period = 1.87351 [0.00002] d  
Epoch = 131.7804 [0.0038] BKJD  
Rp/R\* = 0.0038 [0.0008]  
a/R\* = 4.03 [3.92]  
b = 0.85 [0.33]  
Seff = 15246.41 [7976.96]  
Teff = 2833 [371] K  
Rp = 1.24 [0.49] Re  
a = 0.0358 [0.0114] AU  
Ag = 3.92 [2.76] [1.06σ]  
Teffp = 6164 [779] K [3.86σ]

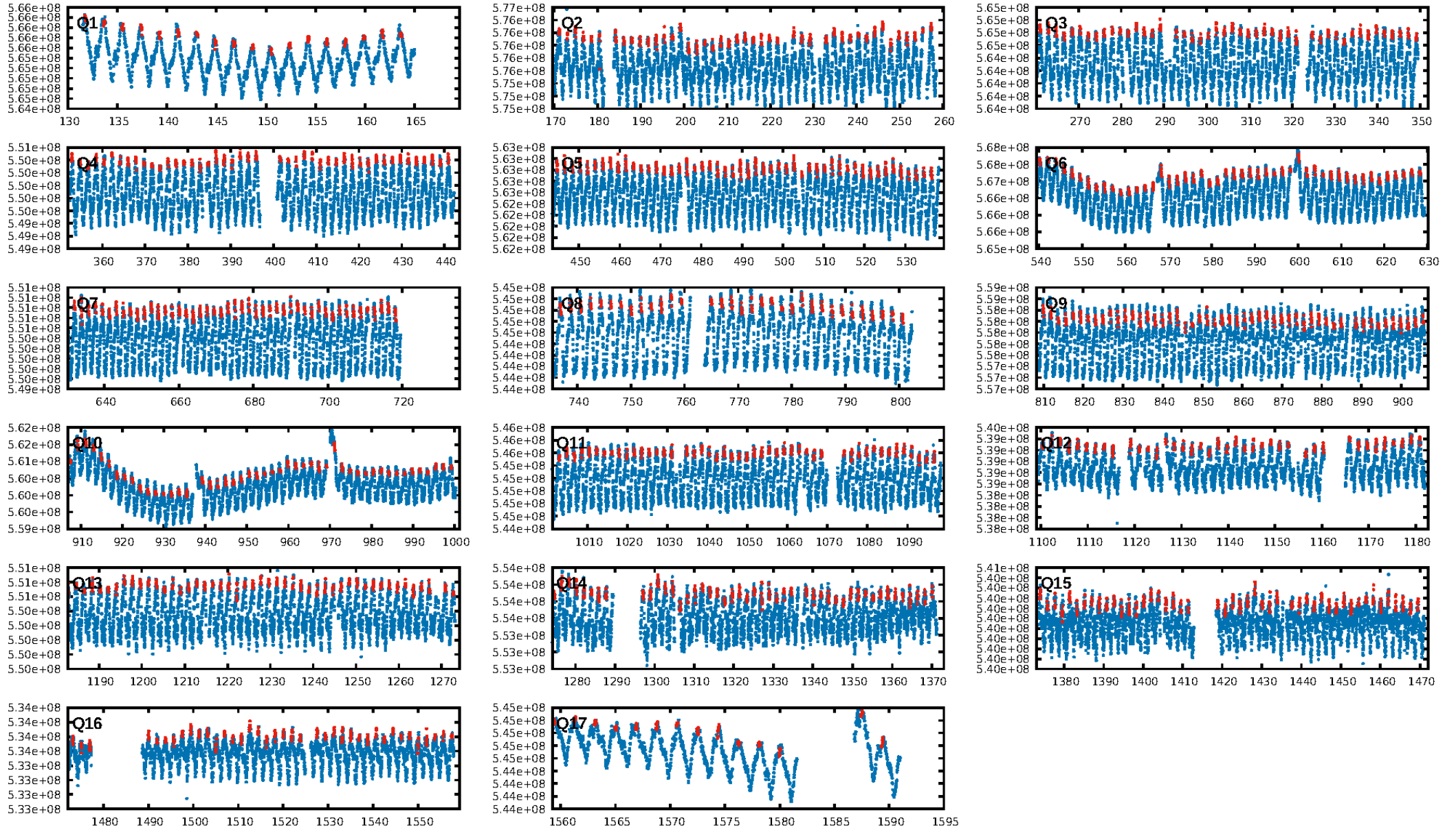
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [6.00σ]  
LongPeriod-sig: 100.0% [103.30σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 2.15e-09  
RollingBand-fgt: 1.00 [679/679]  
GhostDiagnostic-chr: 0.5234  
Centroid-sig: 61.3%  
Centroid-so: 0.918 arcsec [0.83σ]  
OotOffset-rm: 0.695 arcsec [1.69σ]  
KicOffset-rm: 0.748 arcsec [2.04σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.18 [3/17]  
DiffImageOverlap-fno: 0.00 [0/17]

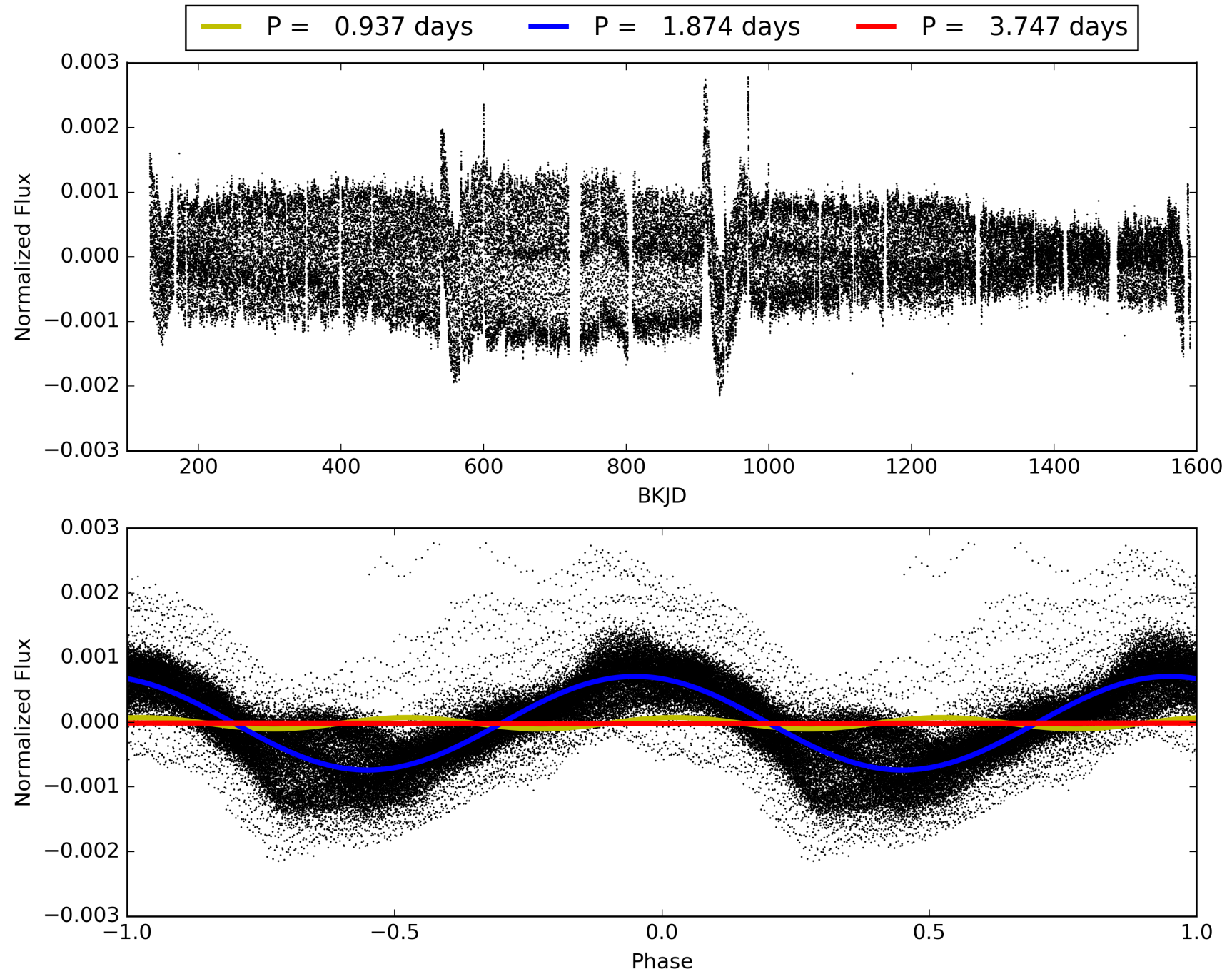
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 20:25:38 Z

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

# TCE 004557777-01, PDC Light Curves



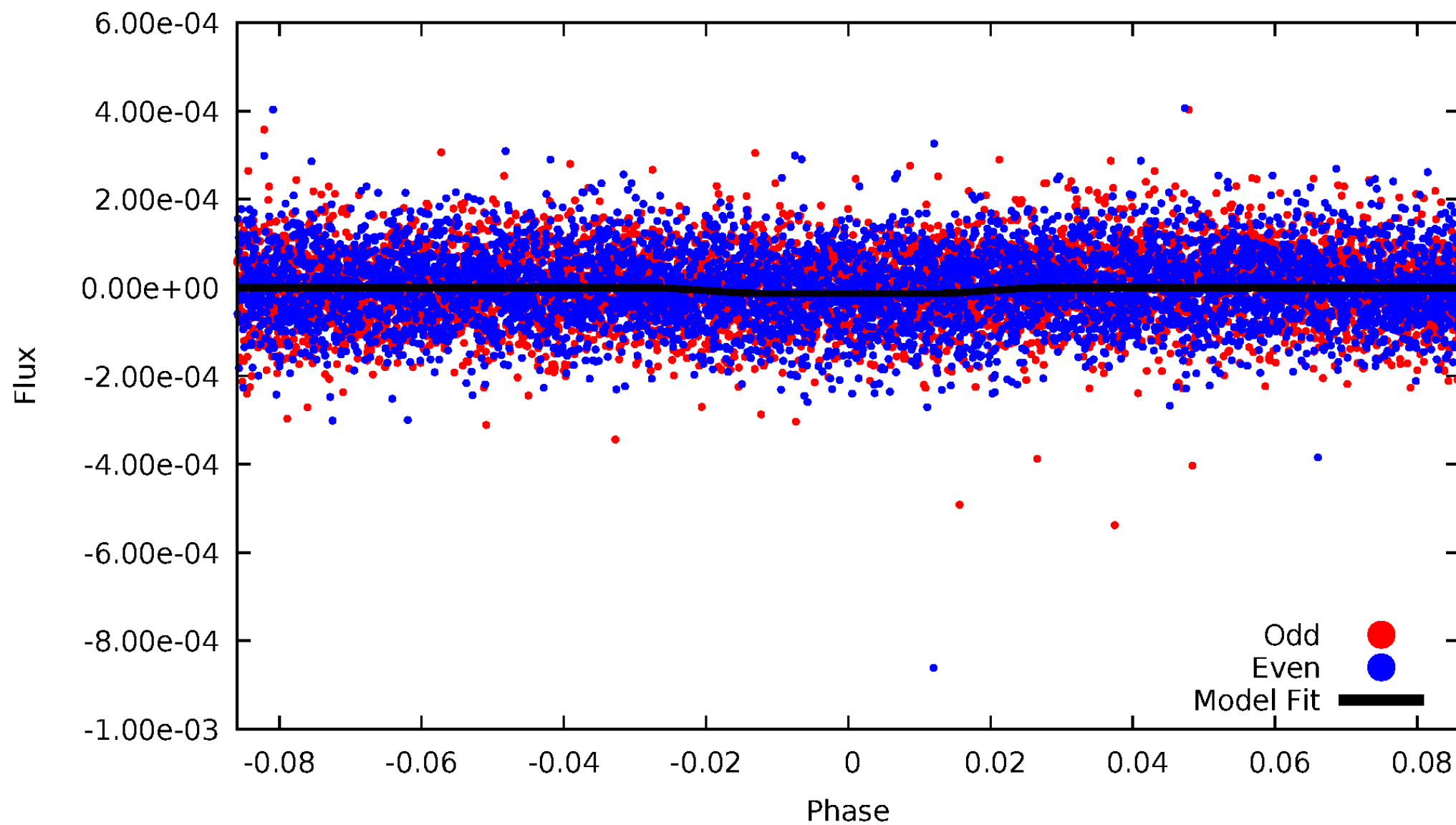
TCE 004557777-01





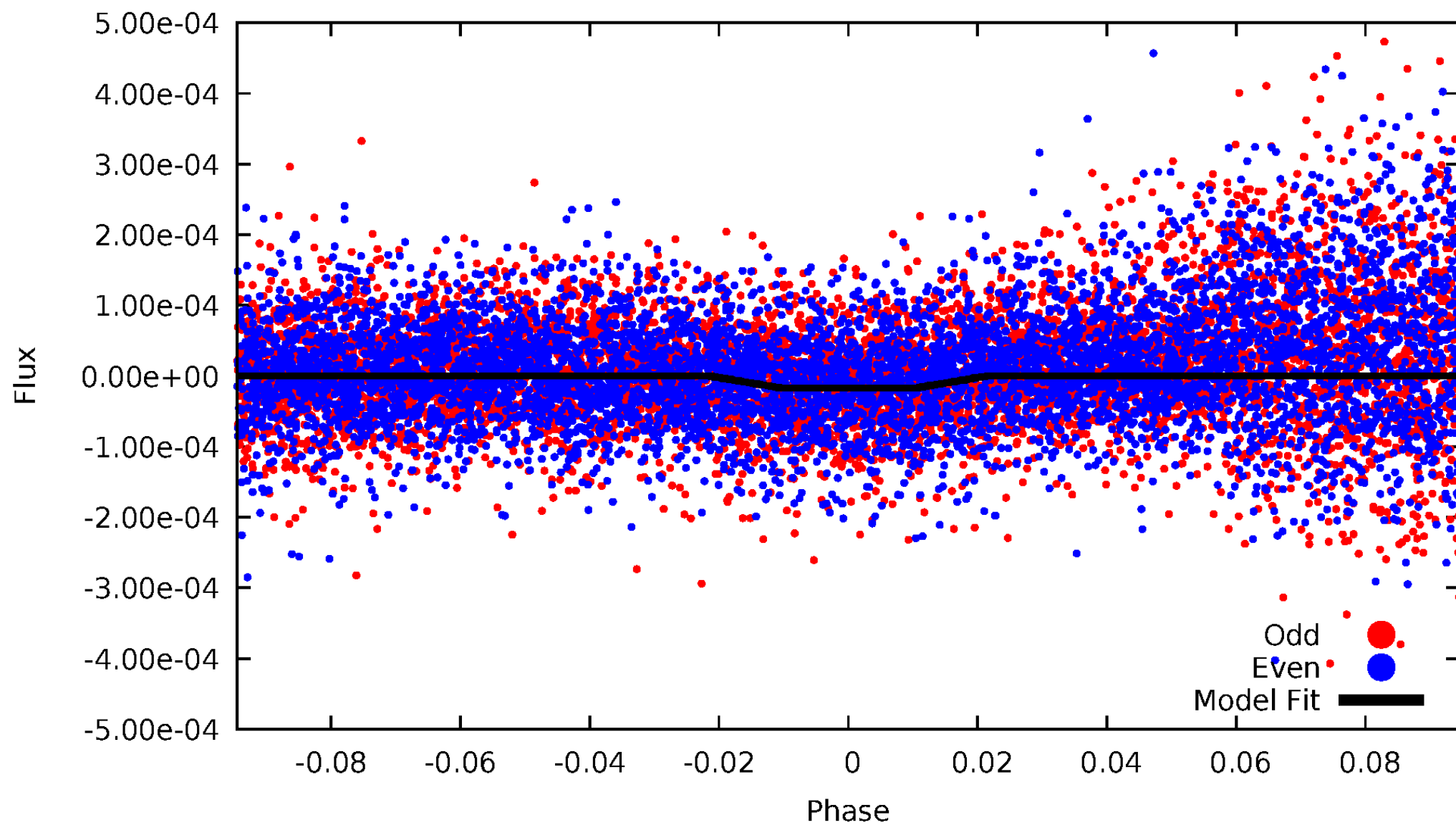
# DV Odd/Even

TCE 004557777-01



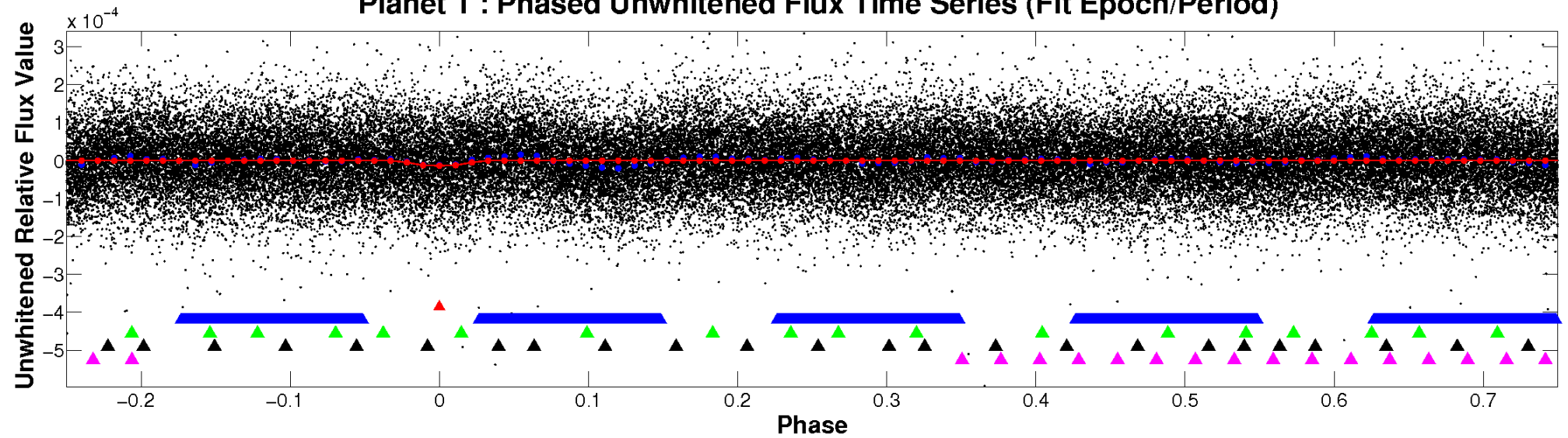
# ALT Odd/Even

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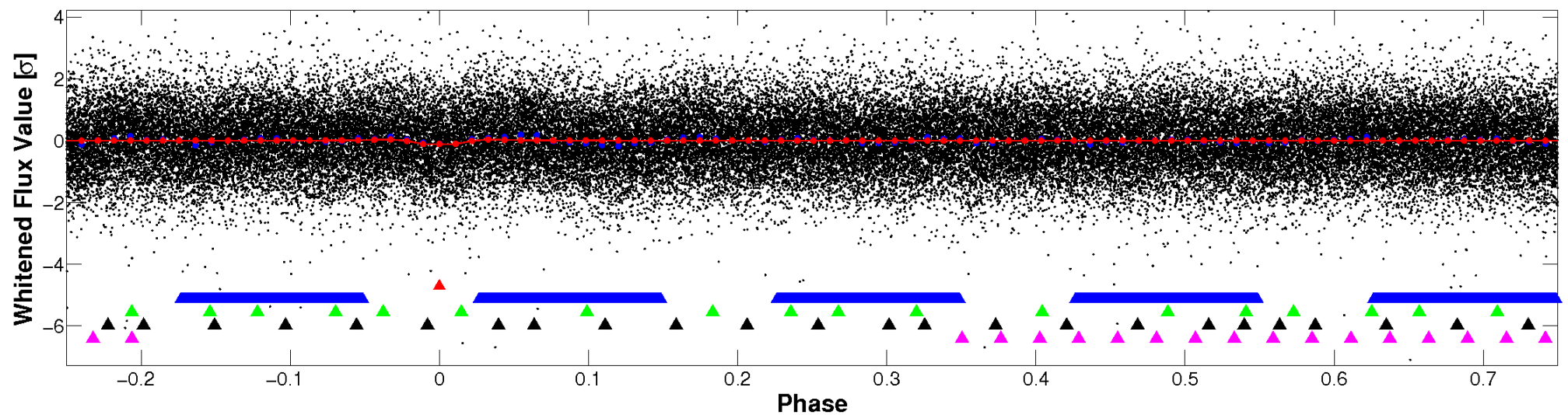


# Non-Whitened Vs. Whitened Light Curve

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

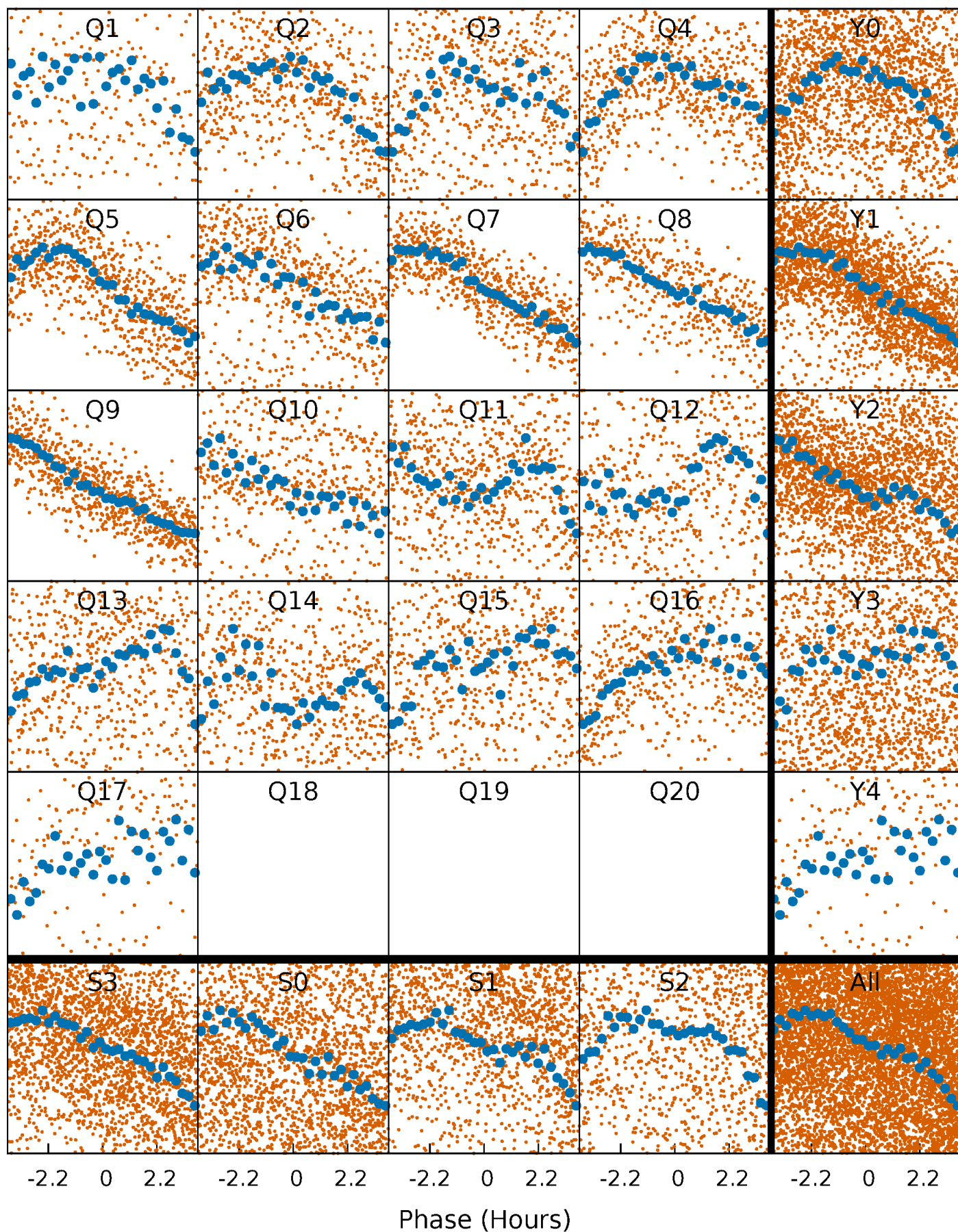


## Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

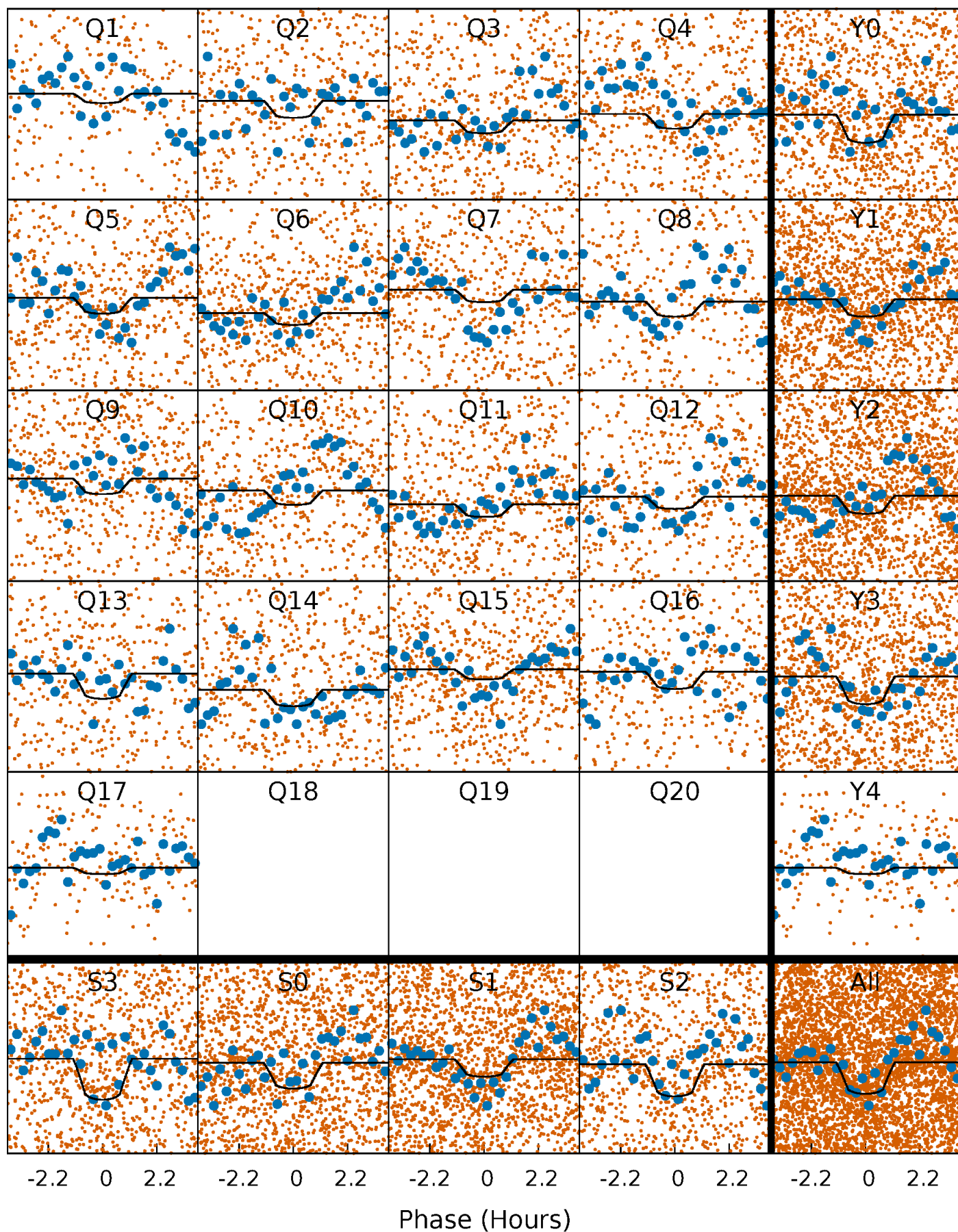
TCE 004557777-01 P= 1.873514 Days  $T_0=131.780356$  (BKJD)





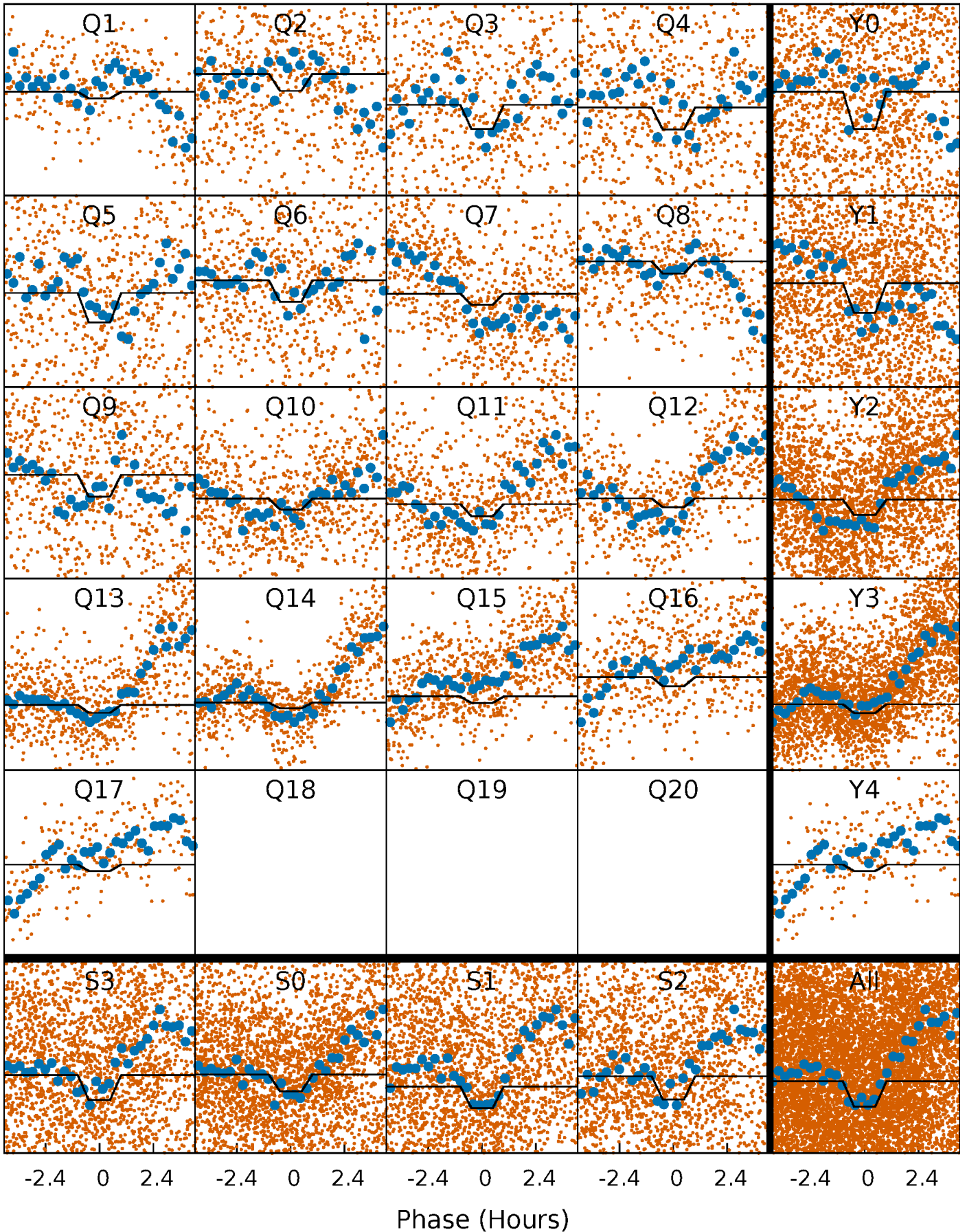
# DV Quarter-Phased Transit Curves

TCE 004557777-01 P= 1.873514 Days  $T_0=131.780356$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

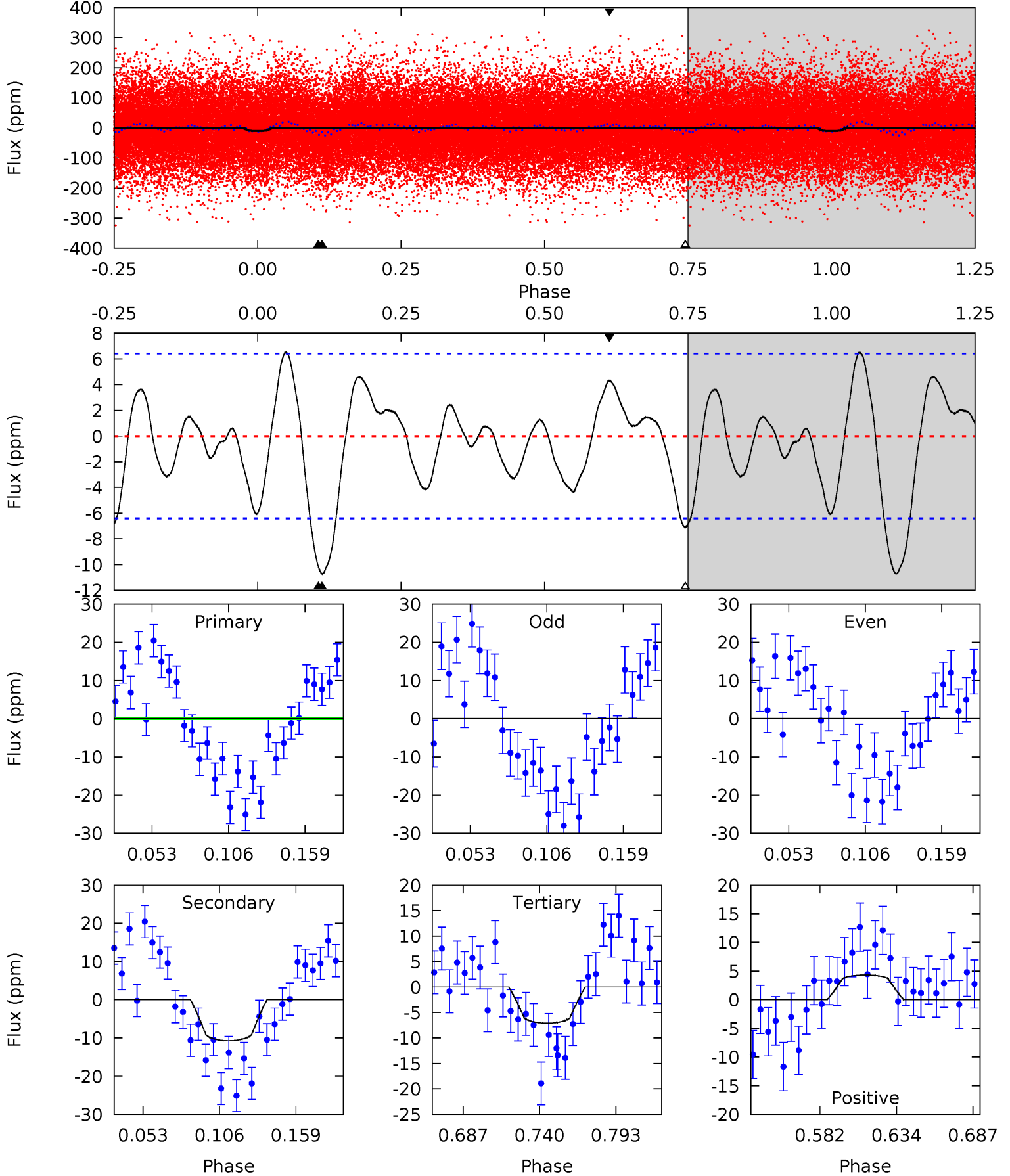
TCE 004557777-01 P= 1.873509 Days  $T_0=131.784299$  (BKJD)



# DV Model-Shift Uniqueness Test

004557777-01, P = 1.873514 Days, E = 129.906842 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
7.44	7.86	5.20	3.17	4.70	1.94	2.02	2.24	4.28	2.66	4.69	1.28	1.27	0.38	0.13

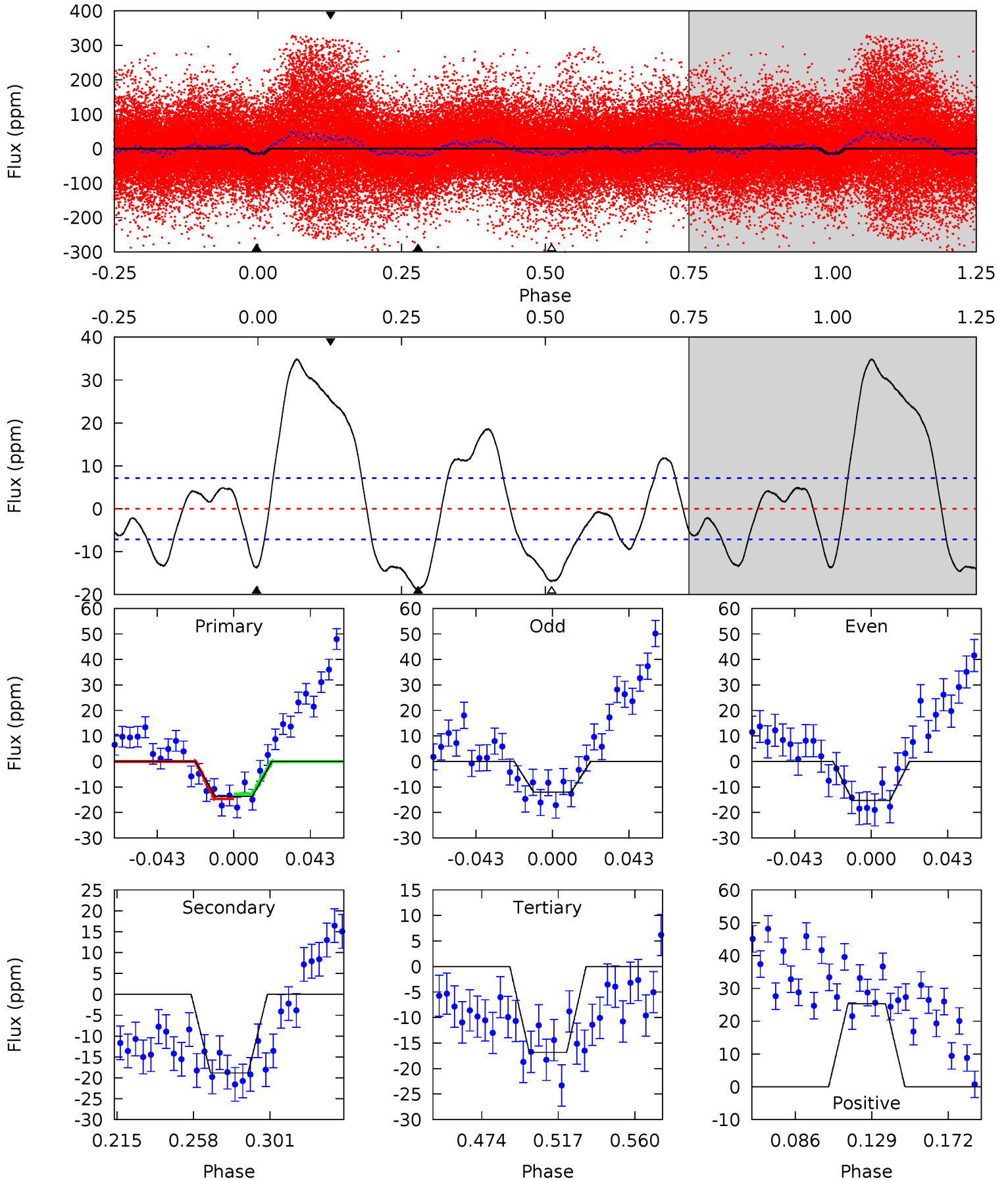




# Alt Model-Shift Uniqueness Test

004557777-01, P = 1.873509 Days, E = 129.910790 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.09	12.5	11.2	16.8	4.74	2.02	8.94	-2.10	-7.76	1.34	-4.32	1.09	0.95	0.65	0.61





### Stellar Parameters For KIC 004557777

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6985^{+175}_{-228}$	$3.717^{+0.296}_{-0.092}$	$0.080^{+0.250}_{-0.300}$	$3.025^{+0.436}_{-1.017}$	$1.738^{+0.213}_{-0.260}$	$0.088^{+0.168}_{-0.027}$
	+3%/-3%	+8%/-2%	+312%/-375%	+14%/-34%	+12%/-15%	+190%/-30%
Source	PHO1	FLK73	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 004557777-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-11 \pm 1$	$1.21^{+0.29}_{-0.34}$	$3879^{+229}_{-317}$	$6325^{+921}_{-599}$	$5.320^{+4.487}_{-1.932}$
Alt.	$-19 \pm 2$	$1.28^{+0.34}_{-0.30}$	$3901^{+210}_{-332}$	$7103^{+1088}_{-749}$	$8.081^{+5.670}_{-3.049}$

$T_{\text{max}}$  = 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

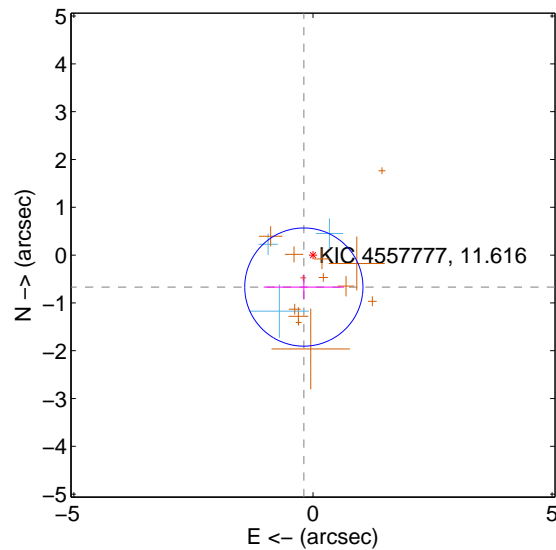
Supplemental centroid analysis for 004557777-01. **Kepler magnitude: 11.62.** Transit SNR 5.46

**There are 3 quarters with good PRF difference image offsets**

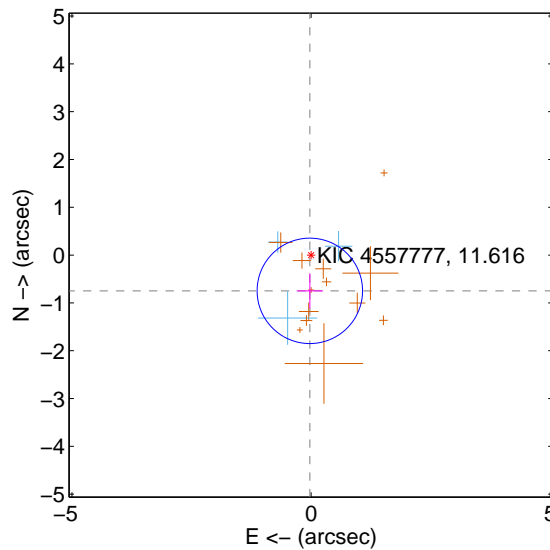
The direct PRF centroid is offset from the target star catalog position by about 0.22 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.695 \pm 0.412$	1.69	$0.191 \pm 0.841$	$-0.669 \pm 0.254$
PRF-fit source offset from KIC position	$0.748 \pm 0.367$	2.04	$0.026 \pm 0.273$	$-0.748 \pm 0.368$
photometric centroid source offset	$0.92 \pm 1.10$	0.83	$-0.79 \pm 1.09$	$-0.46 \pm 1.14$

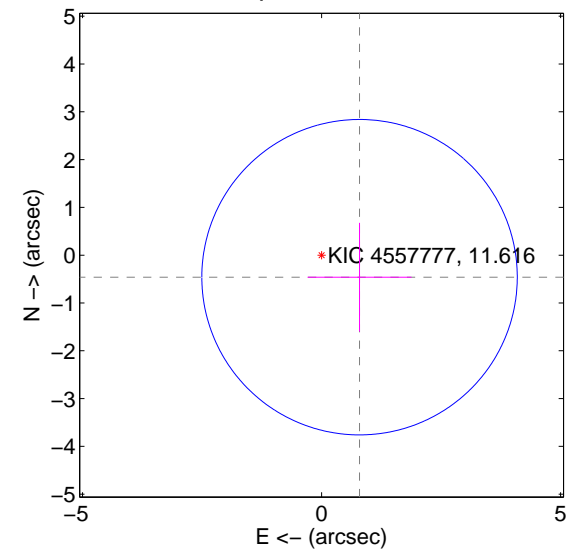
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

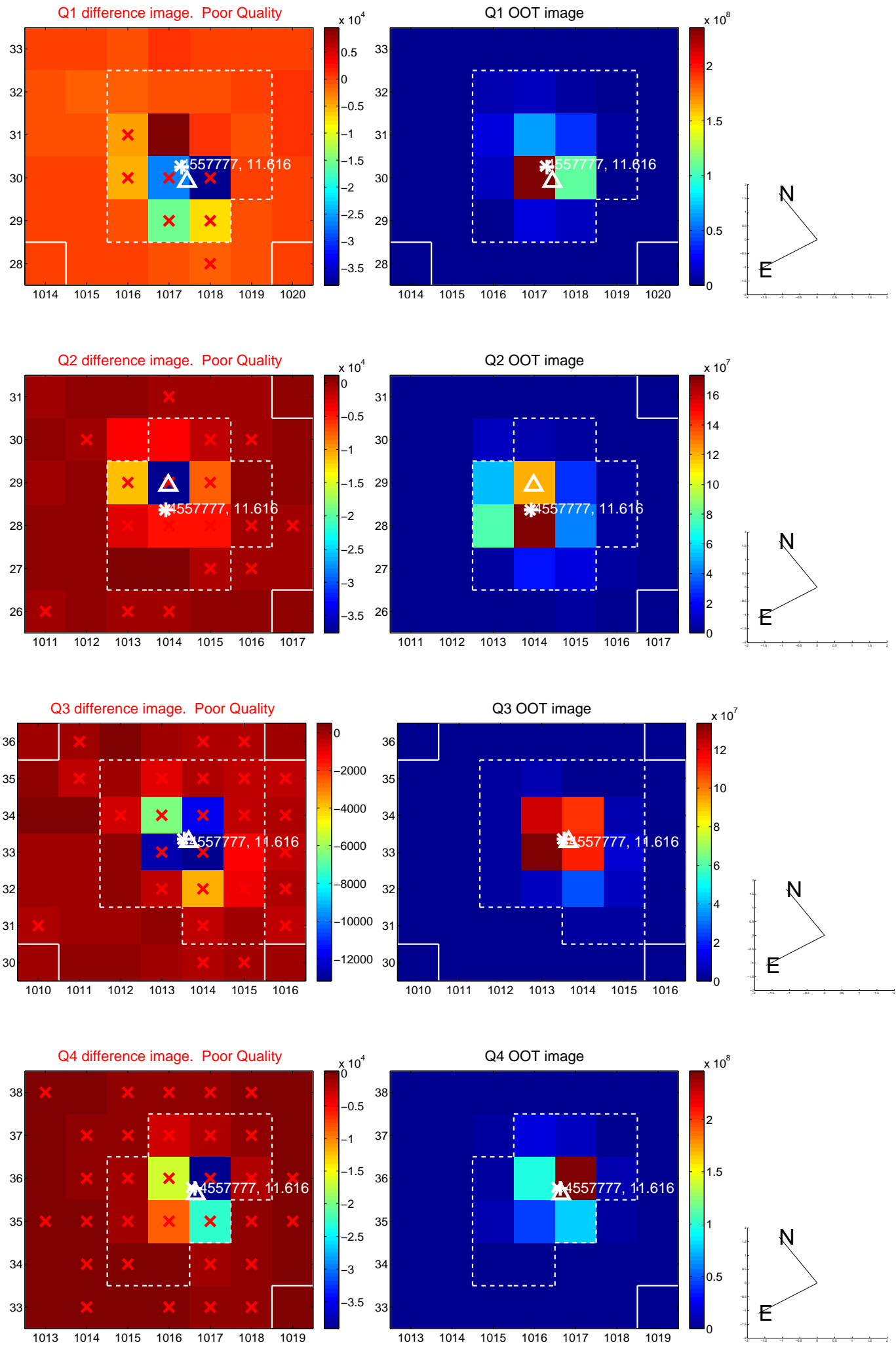


offset from photometric centroids

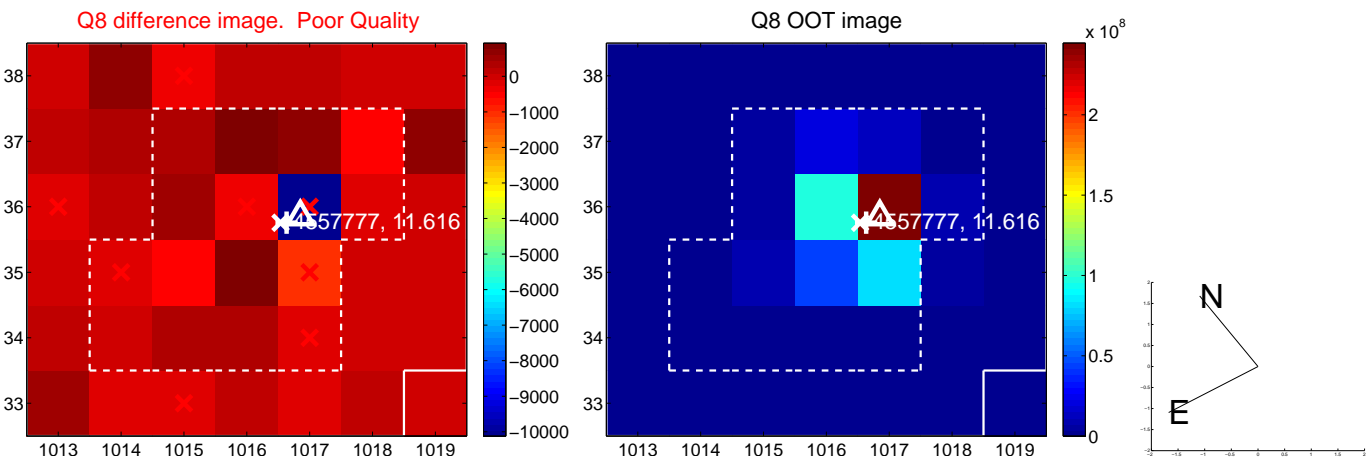
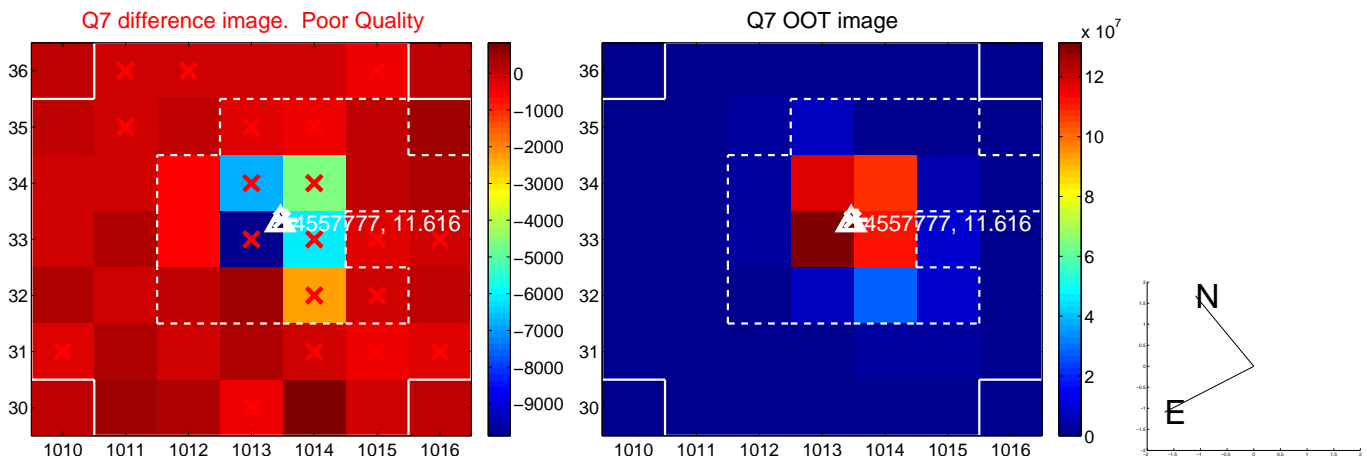
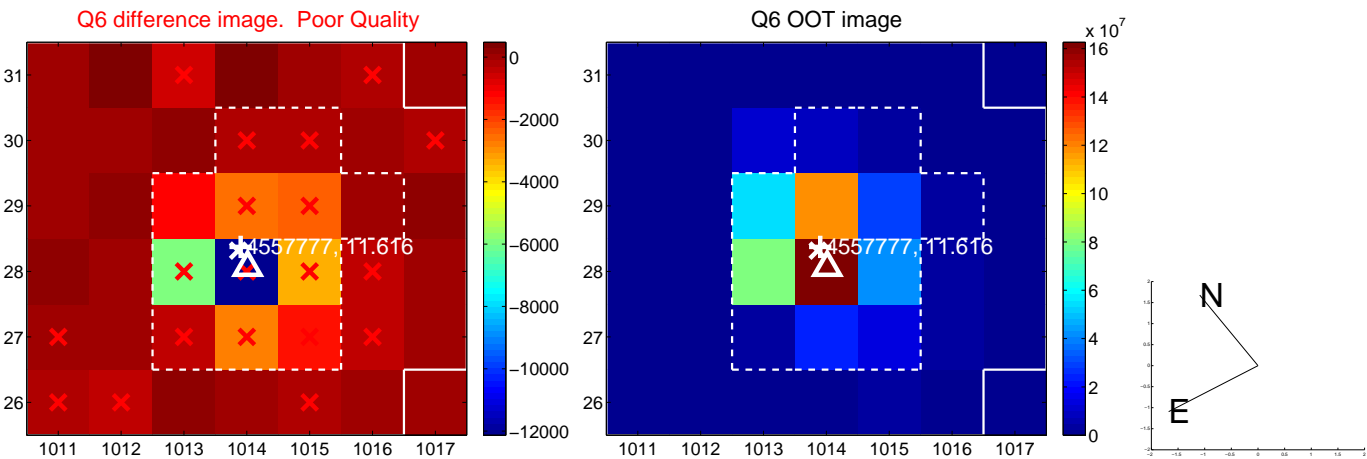
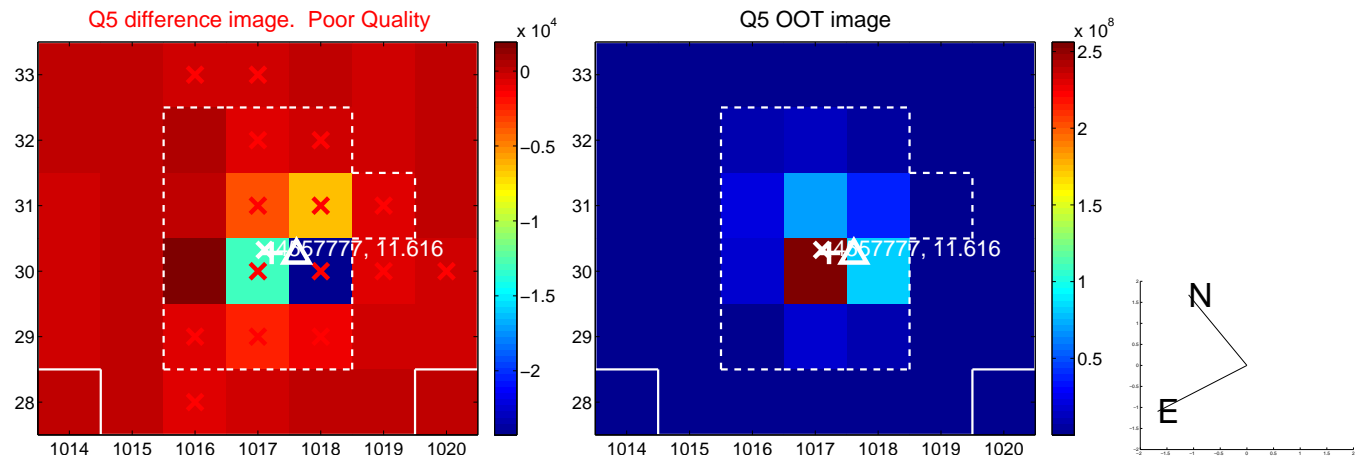


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

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

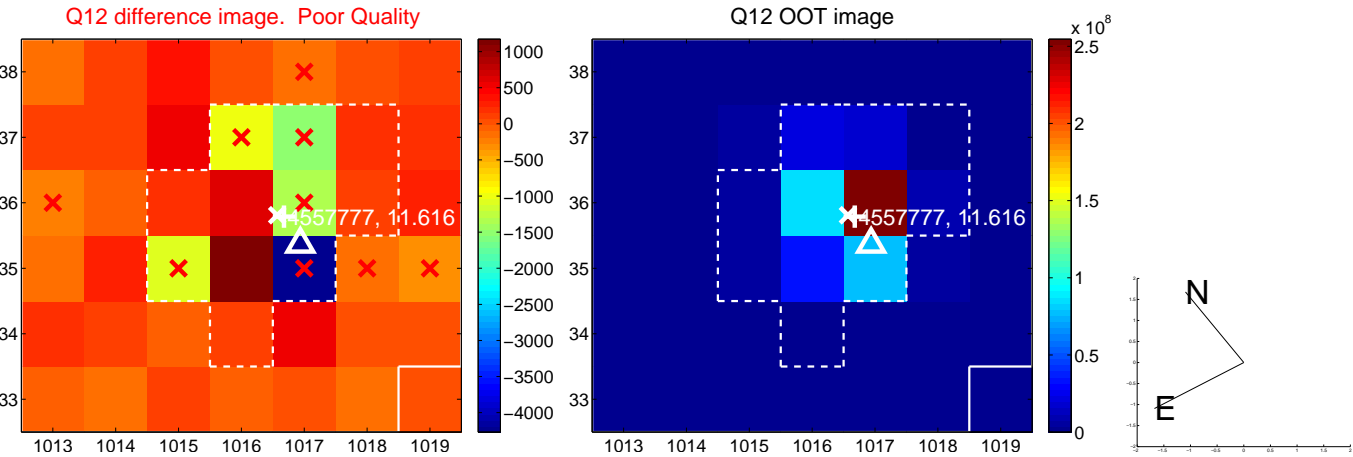
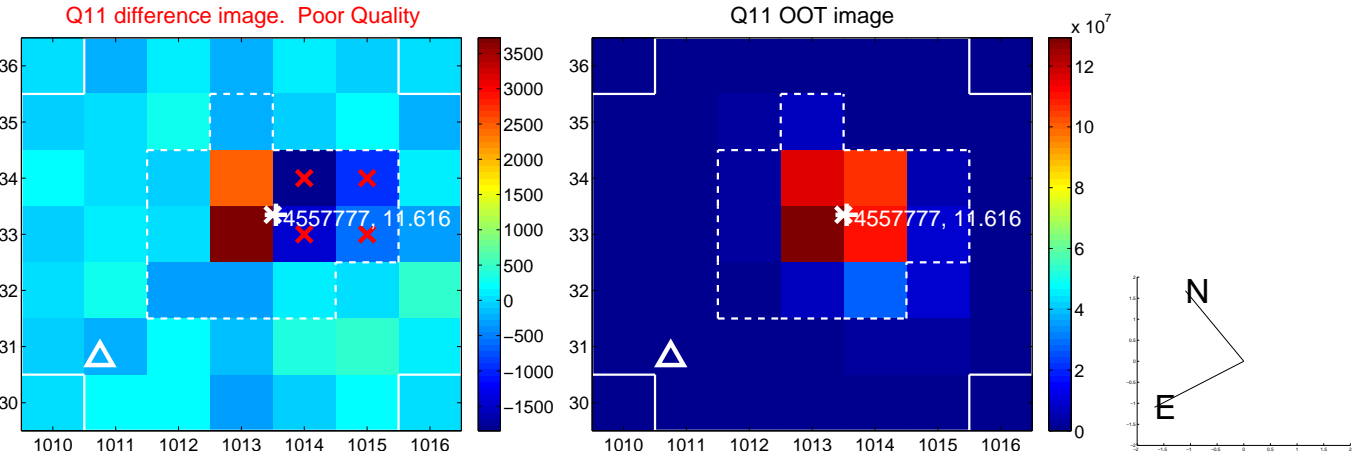
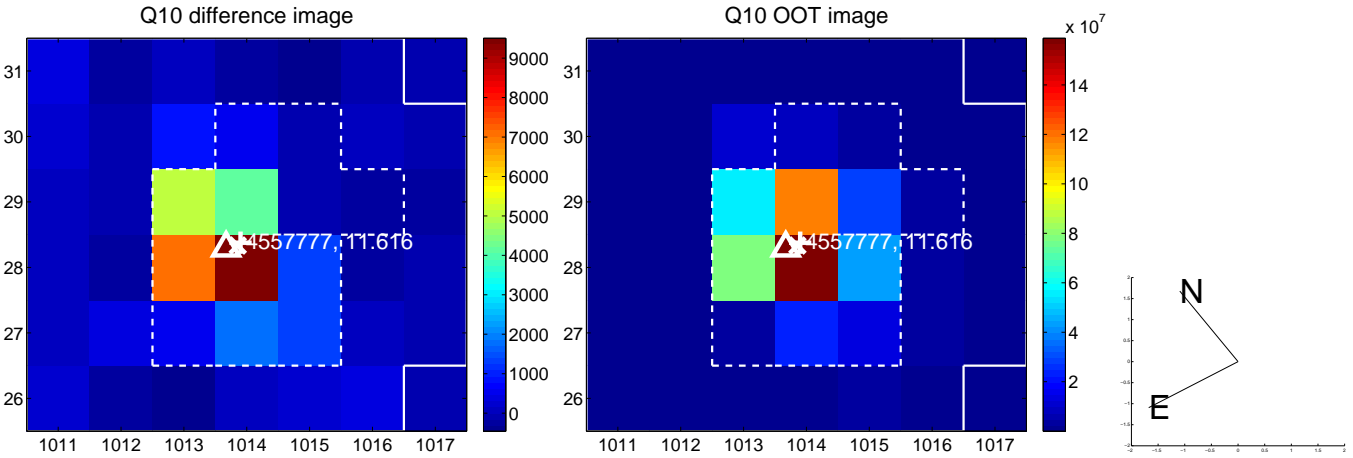
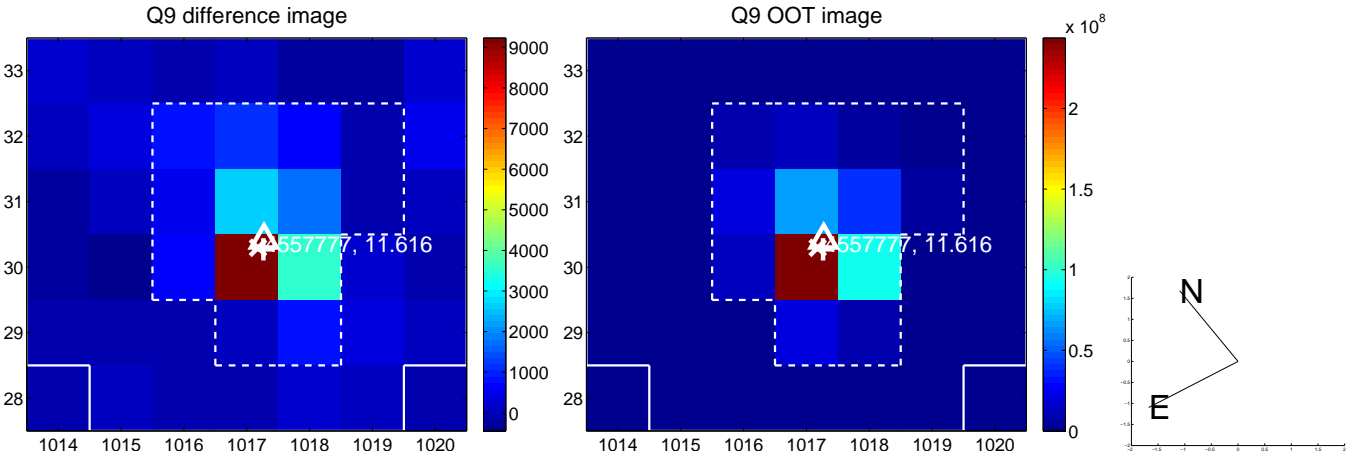


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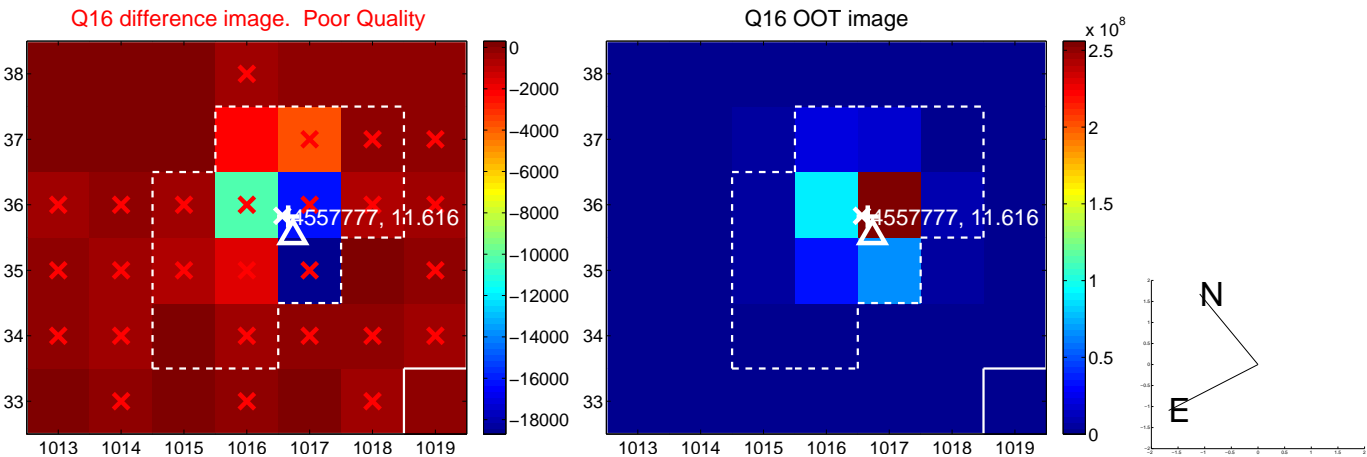
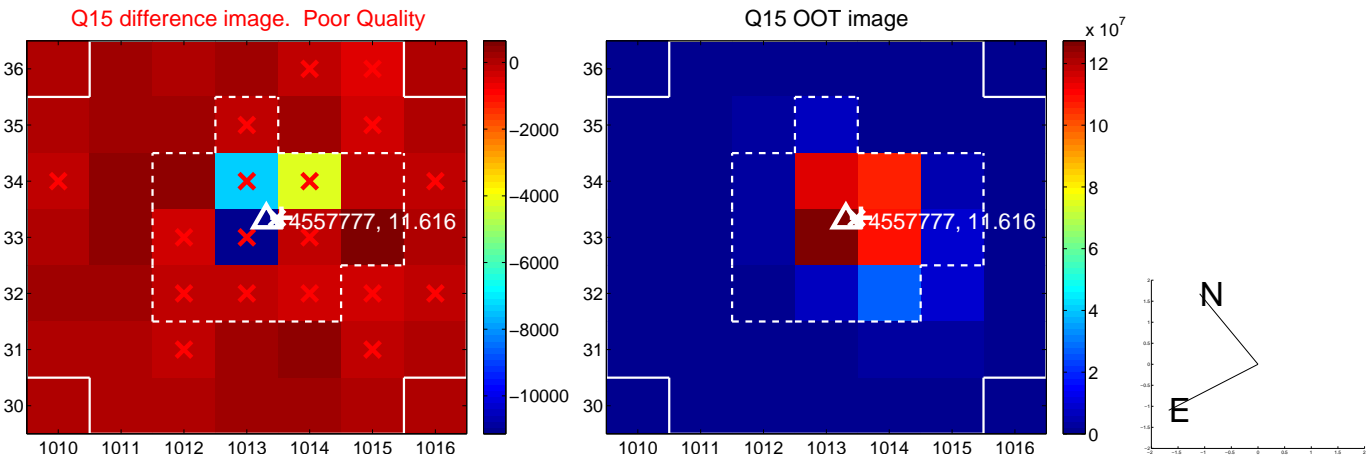
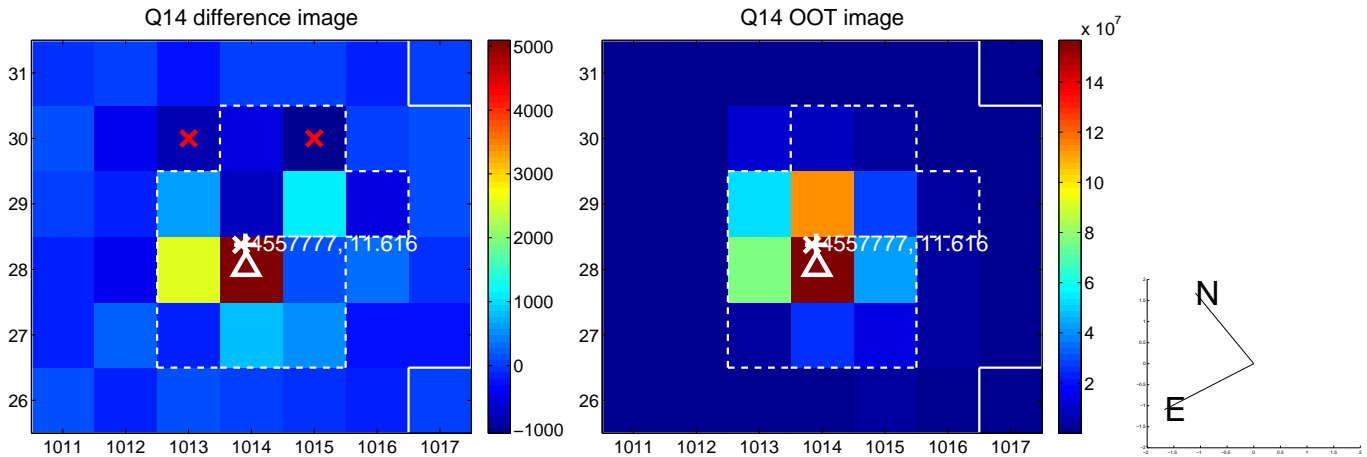
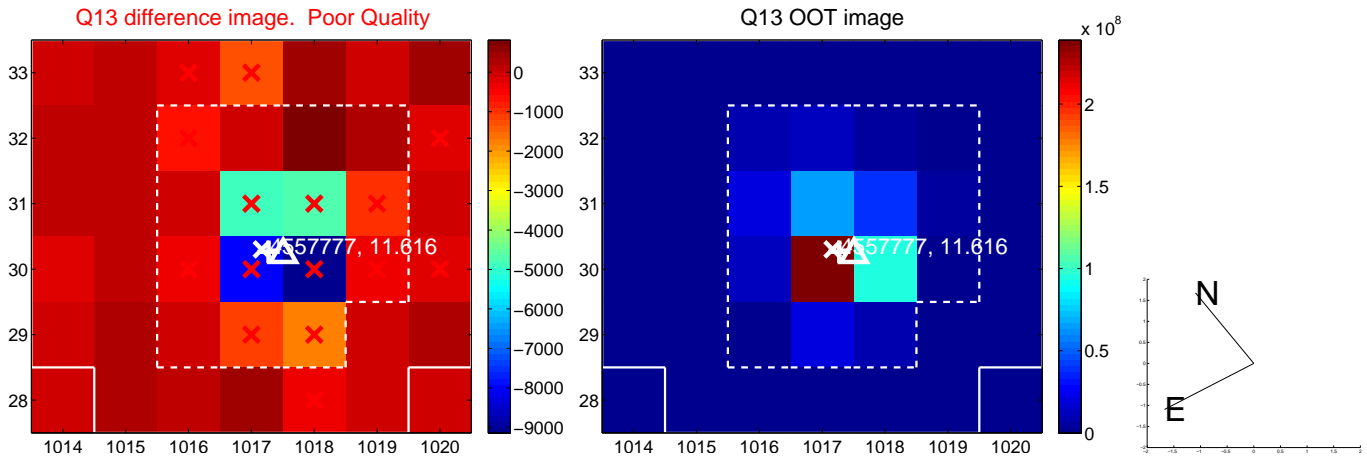




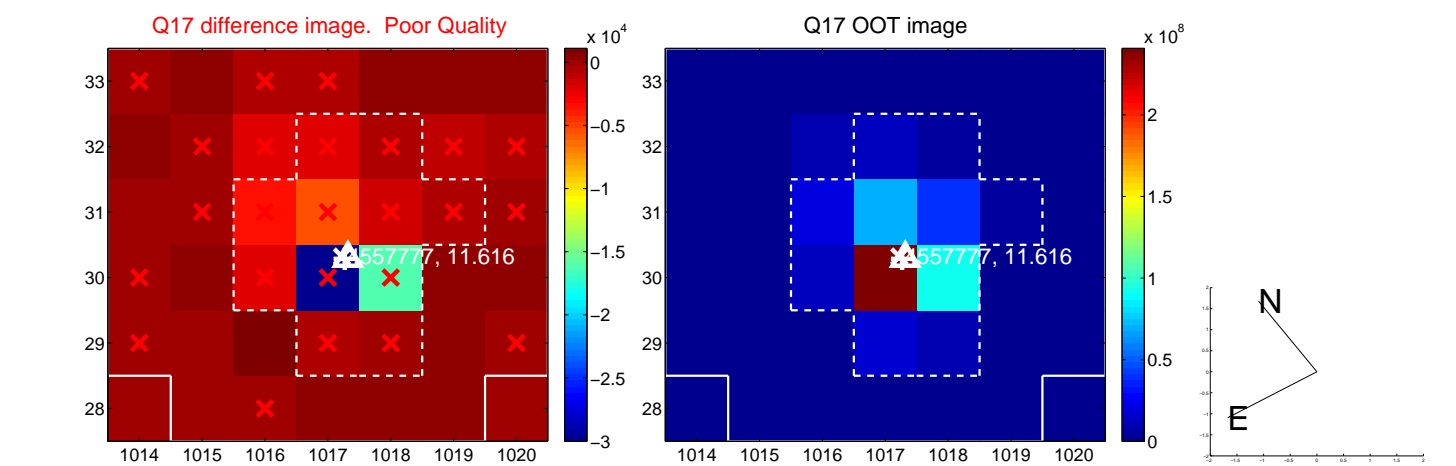
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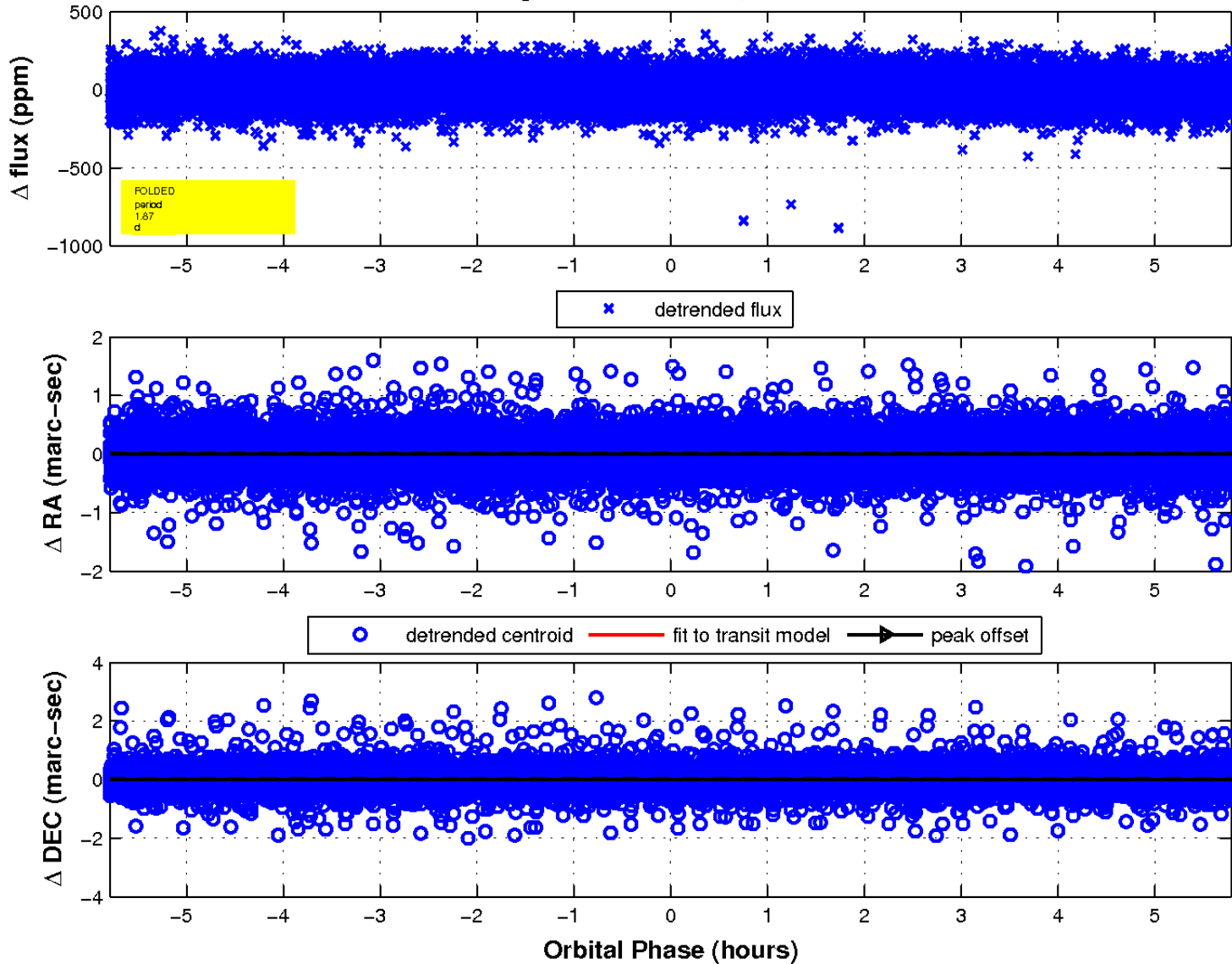
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

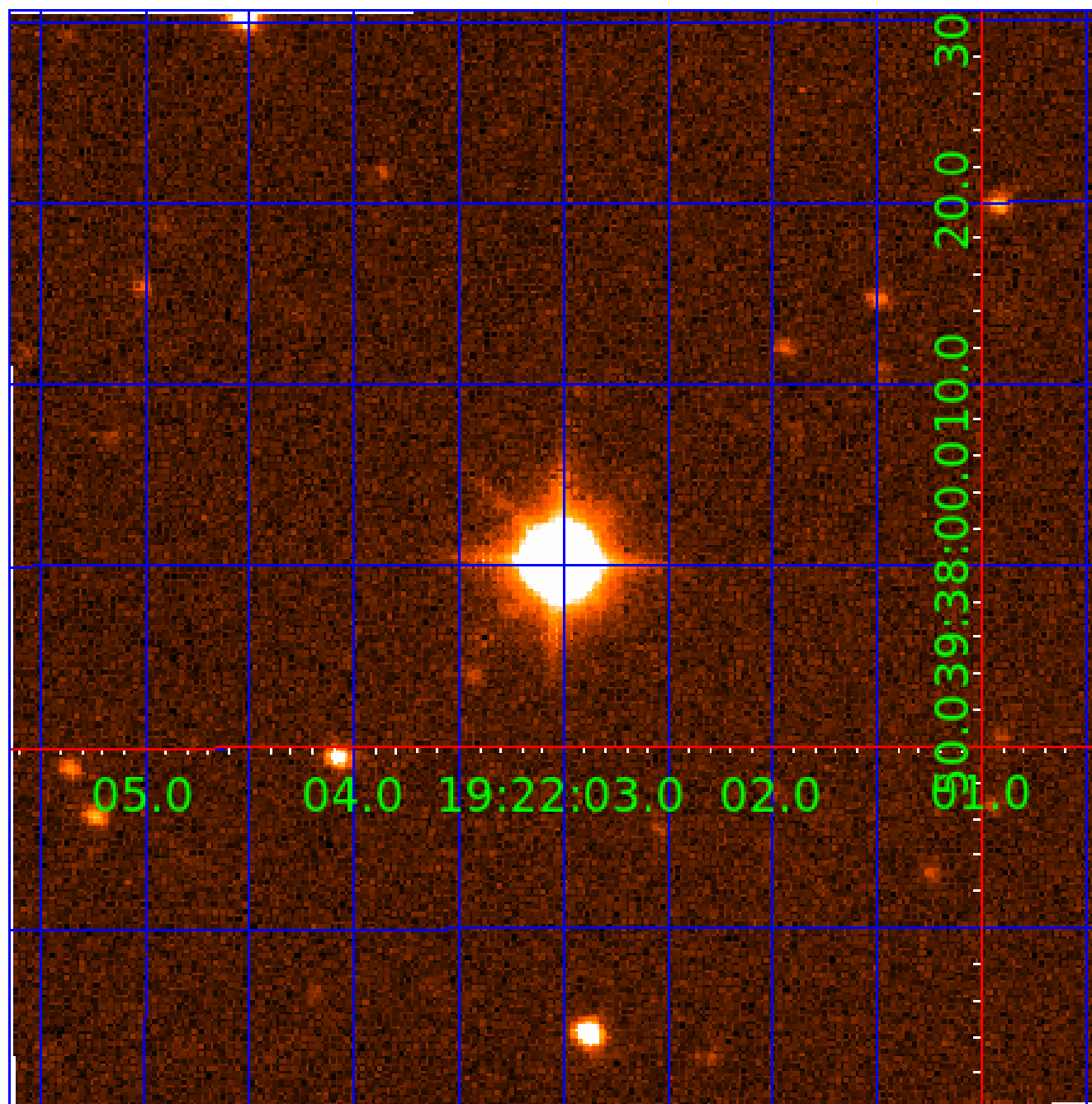


fluxWeightedCentroids, Planet 1 of 5



UKIRT Image

Declination





# KIC 004557777

## Q1-17 DR25 TCE Parameters

TCE	Run Type	KOI?	Period (Days)	Epoch (BKJD)	Depth (ppm)	Duration (Hours)	MES	SNR	$R_{\star}$ ( $R_{\odot}$ )	$T_{\star}$ (K)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
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004557777-02	OBS	No	0.749524	132.204364	2.4	4.061	7.7	1.8	3.02	6985	0.50	51720.55
004557777-03	OBS	No	83.736266	165.215381	52.1	11.889	8.1	2.9	3.02	6985	2.54	96.12
004557777-04	OBS	No	60.443129	149.653217	86.1	13.470	8.0	5.5	3.02	6985	3.07	148.45
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## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004557777-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA_TRACKER—SWEET_NTL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004557777-02	OBS	FP	0.00	1	0	0	0	LPP_DV
004557777-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004557777-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004557777-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

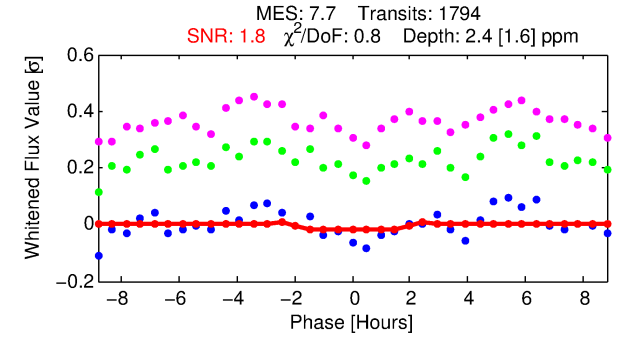
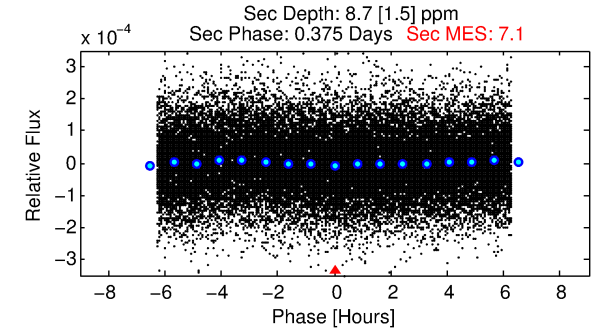
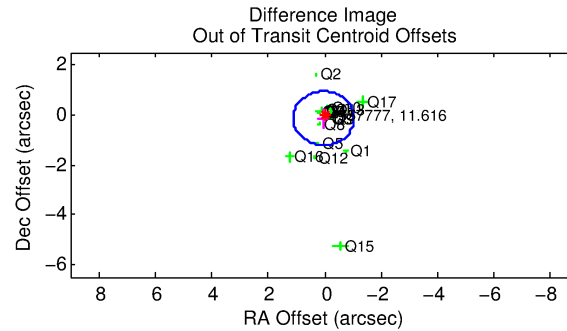
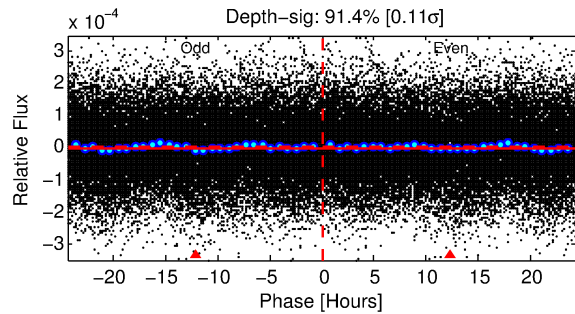
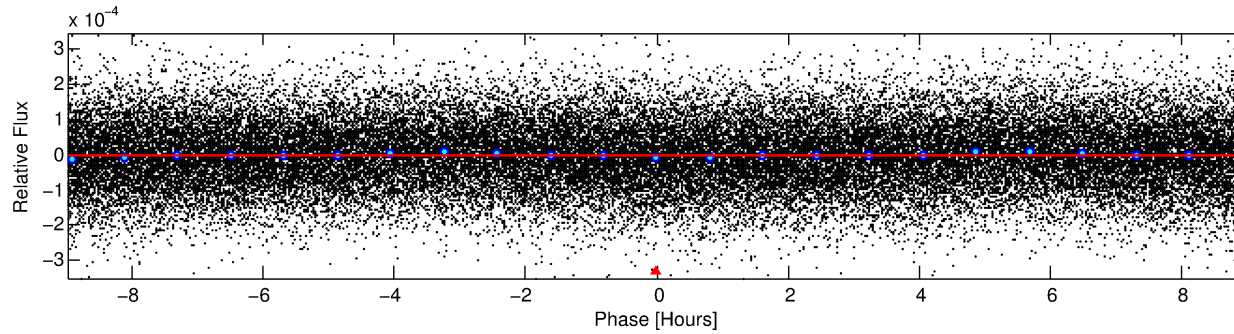
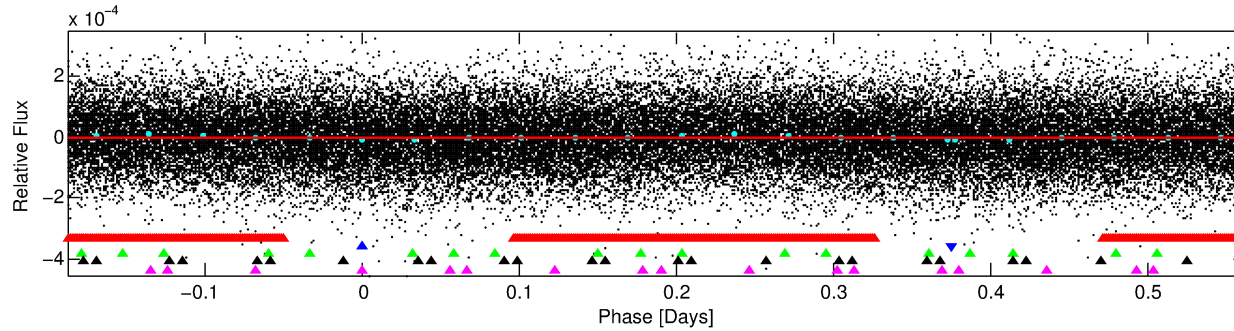
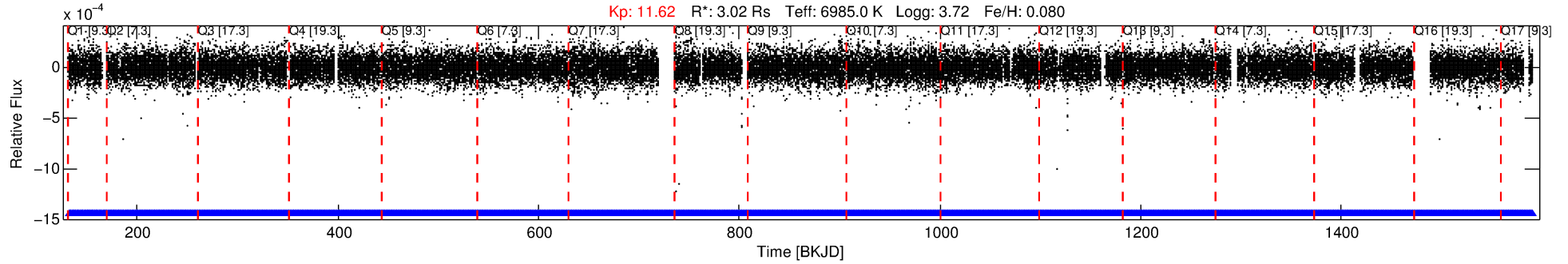
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 004557777-02

No Significant Match Found

# DV One-Page Summary

KIC: 4557777 Candidate: 2 of 5 Period: 0.750 d



## DV Fit Results:

Period = 0.74952 [0.00006] d  
Epoch = 132.2044 [0.0153] BKJD  
Rp/R\* = 0.0015 [0.0007]  
a/R\* = 1.31 [1.07]  
b = 0.69 [1.48]  
Seff = 51720.55 [27060.32]  
Teq = 3845 [503] K  
Rp = 0.50 [0.29] Re  
a = 0.0194 [0.0062] AU  
Ag = 7.20 [7.83] [0.79 $\sigma$ ]  
Teffp = 9739 [2366] K [2.44 $\sigma$ ]

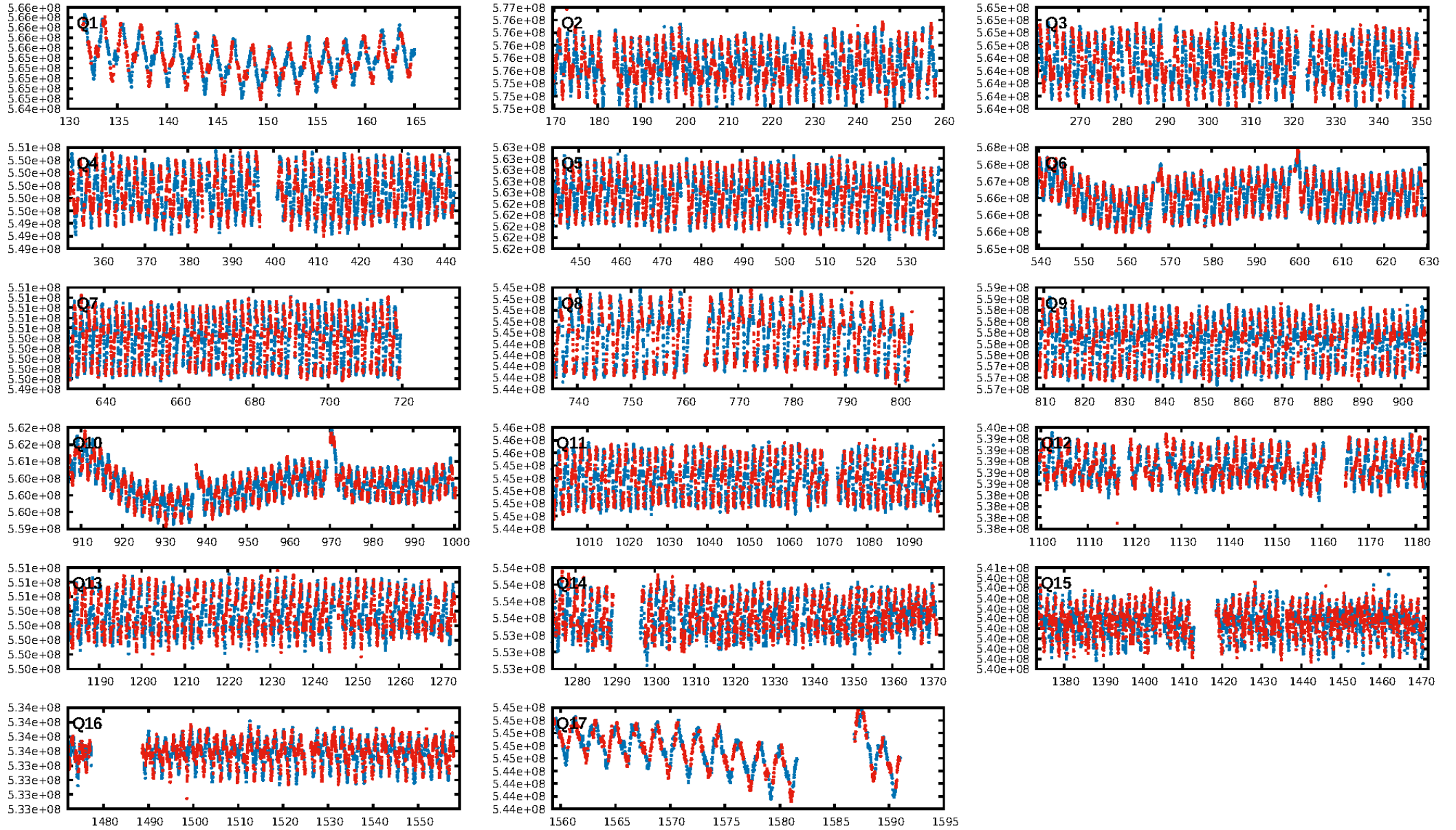
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [6.00 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 2.92e-09  
RollingBand-fgt: 1.00 [1715/1715]  
GhostDiagnostic-chr: N/A  
Centroid-sig: N/A  
Centroid-so: N/A  
OotOffset-rm: 0.146 arcsec [0.41 $\sigma$ ]  
KicOffset-rm: 0.310 arcsec [0.84 $\sigma$ ]  
OotOffset-st: 3/4/4/5 [16]  
KicOffset-st: 3/4/4/5 [16]  
DiffImageQuality-fgm: 0.94 [15/16]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 20:25:49 Z

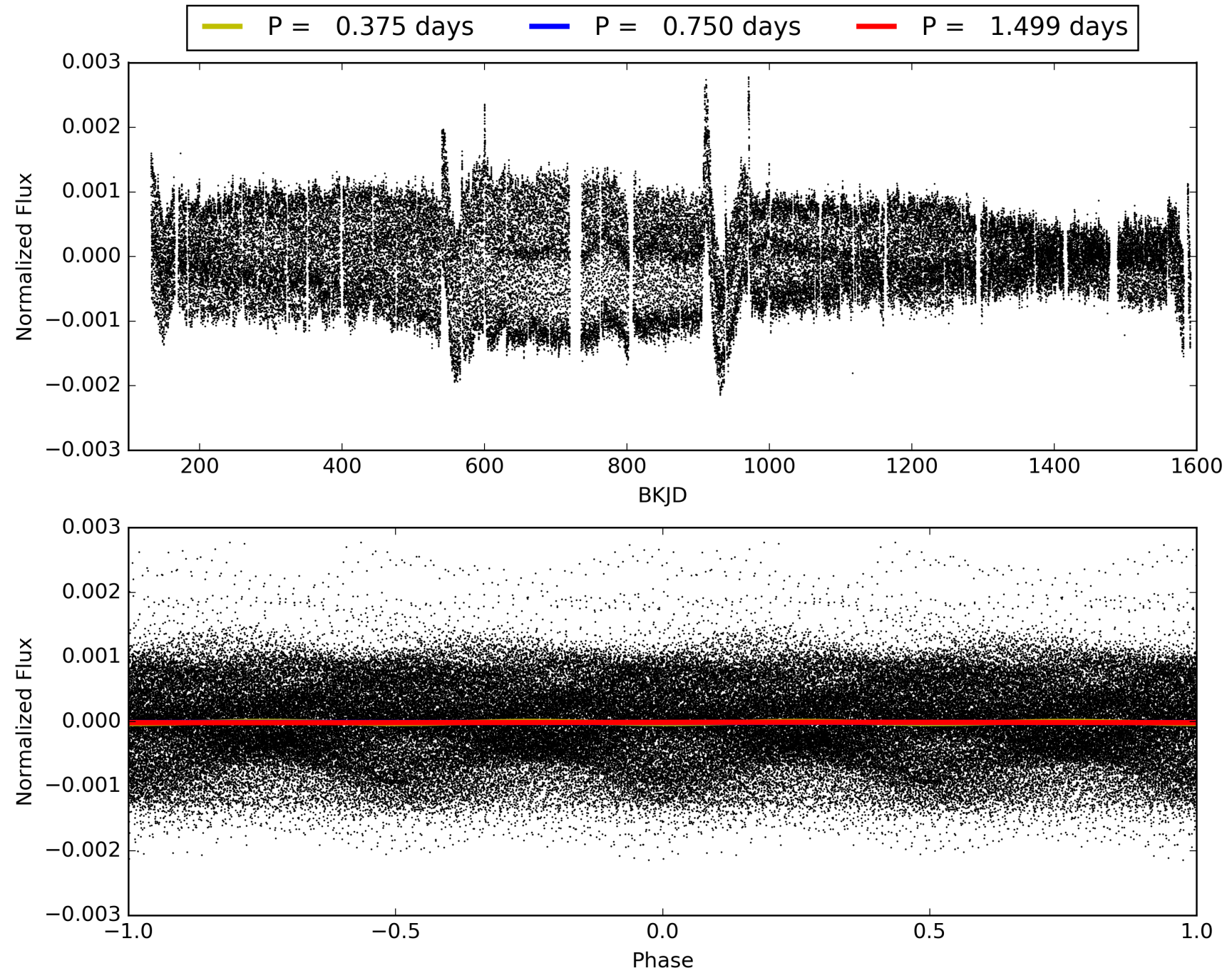
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 004557777-02, PDC Light Curves



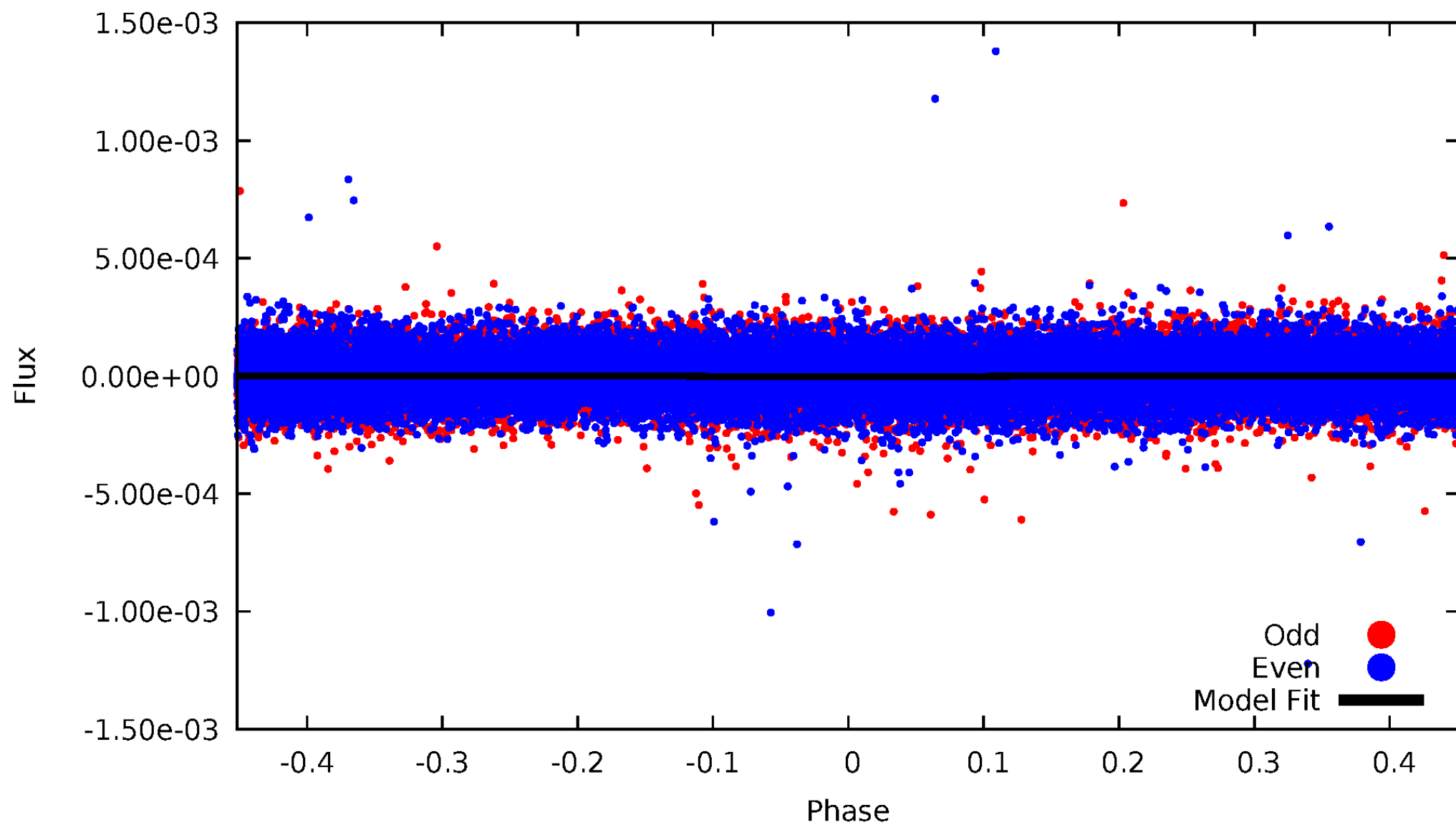


TCE 004557777-02



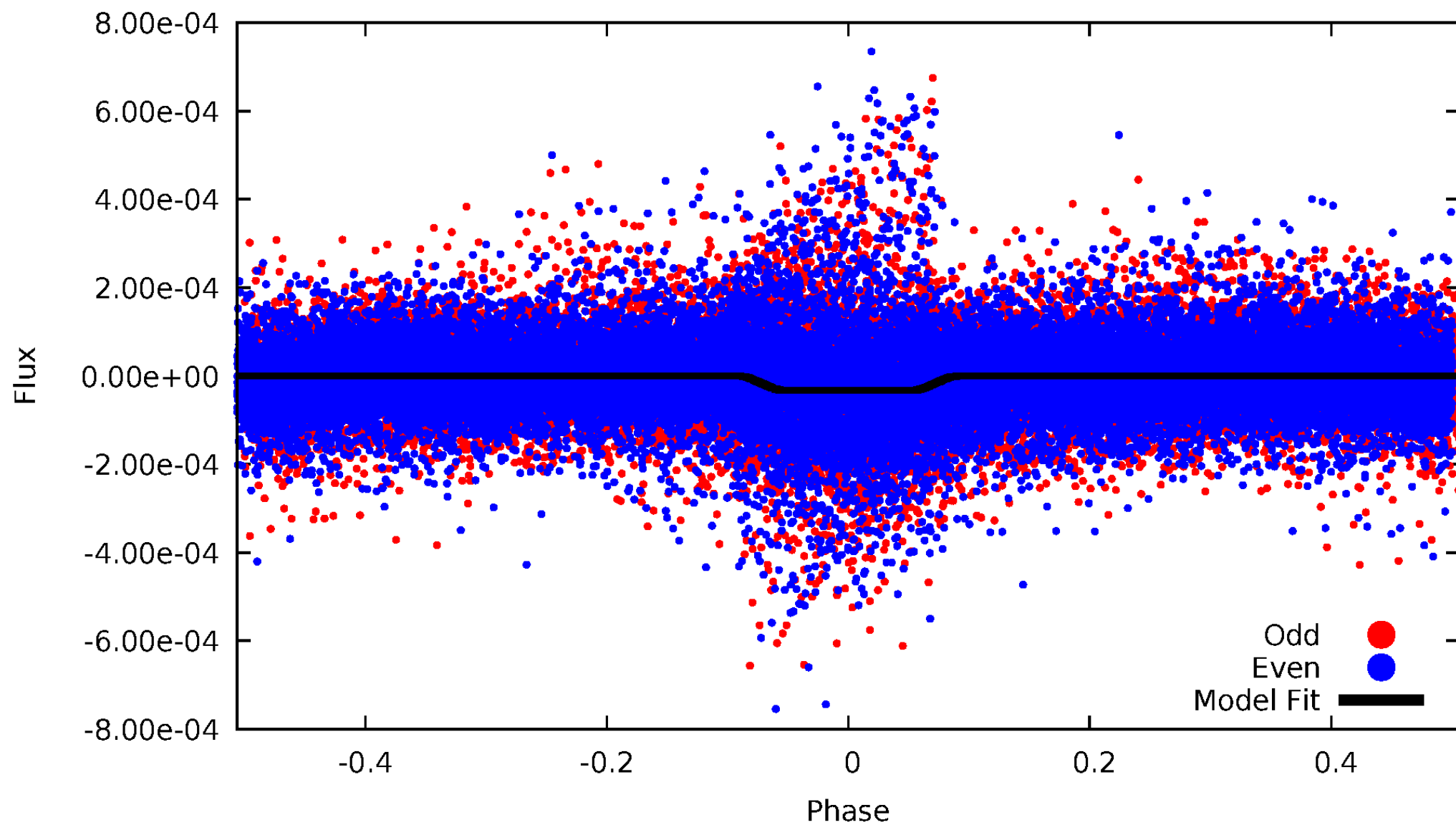
# DV Odd/Even

TCE 004557777-02



# ALT Odd/Even

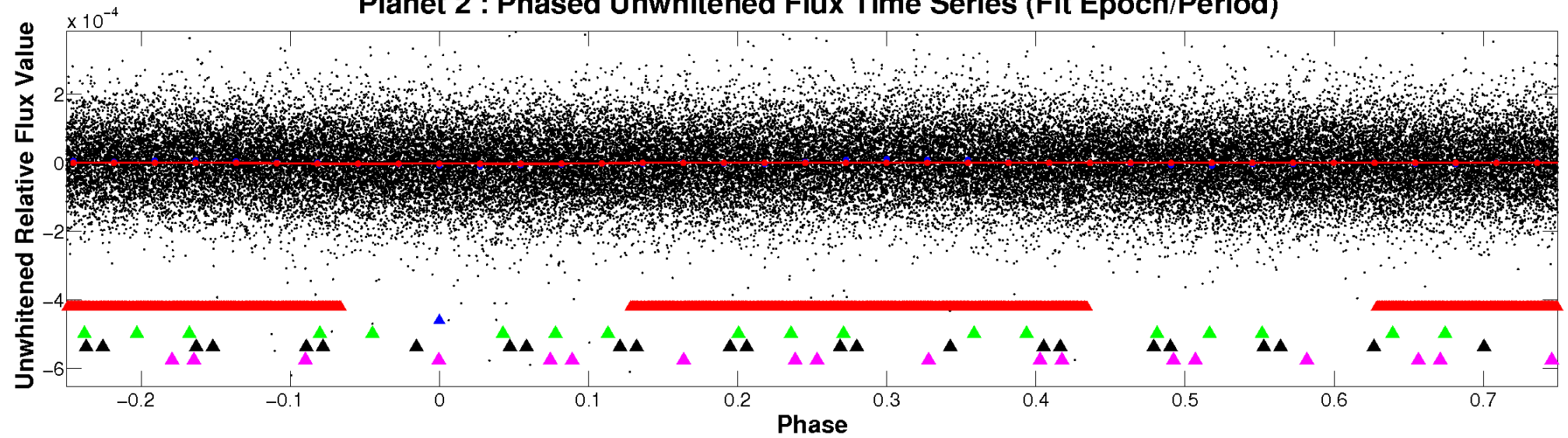
TCE 004557777-02



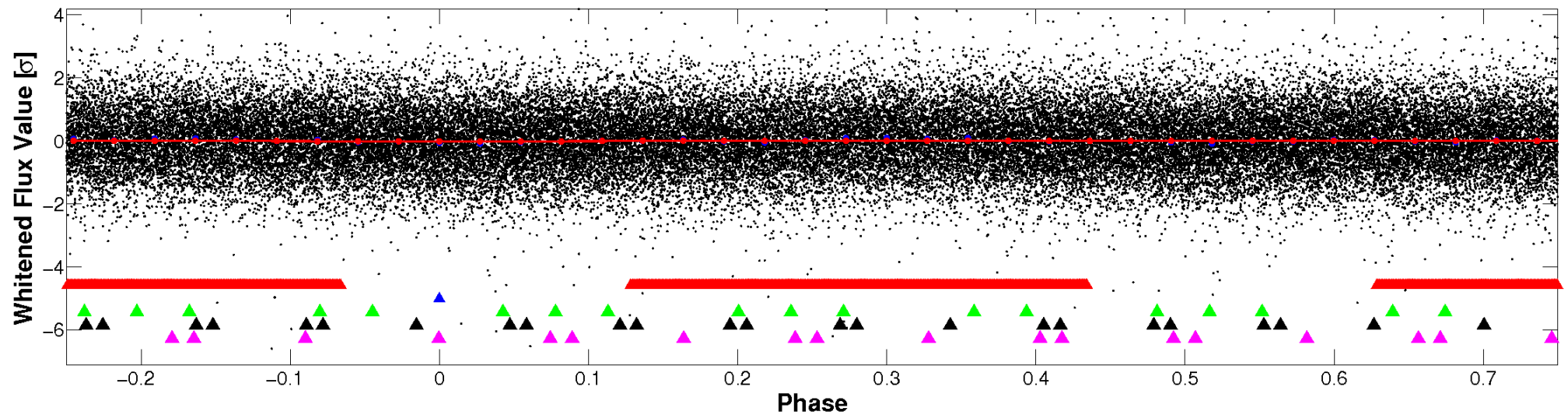


# Non-Whitened Vs. Whitened Light Curve

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

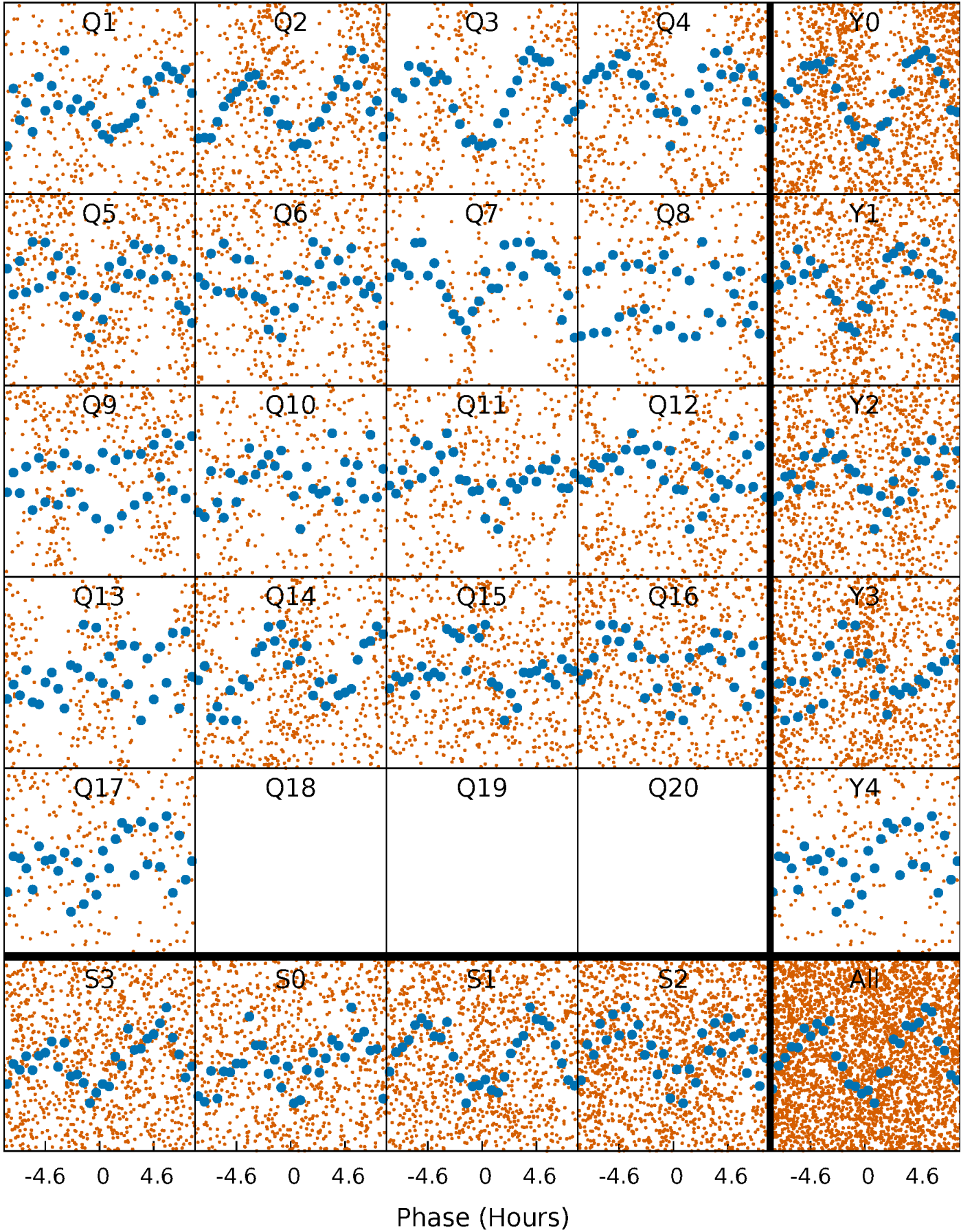


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

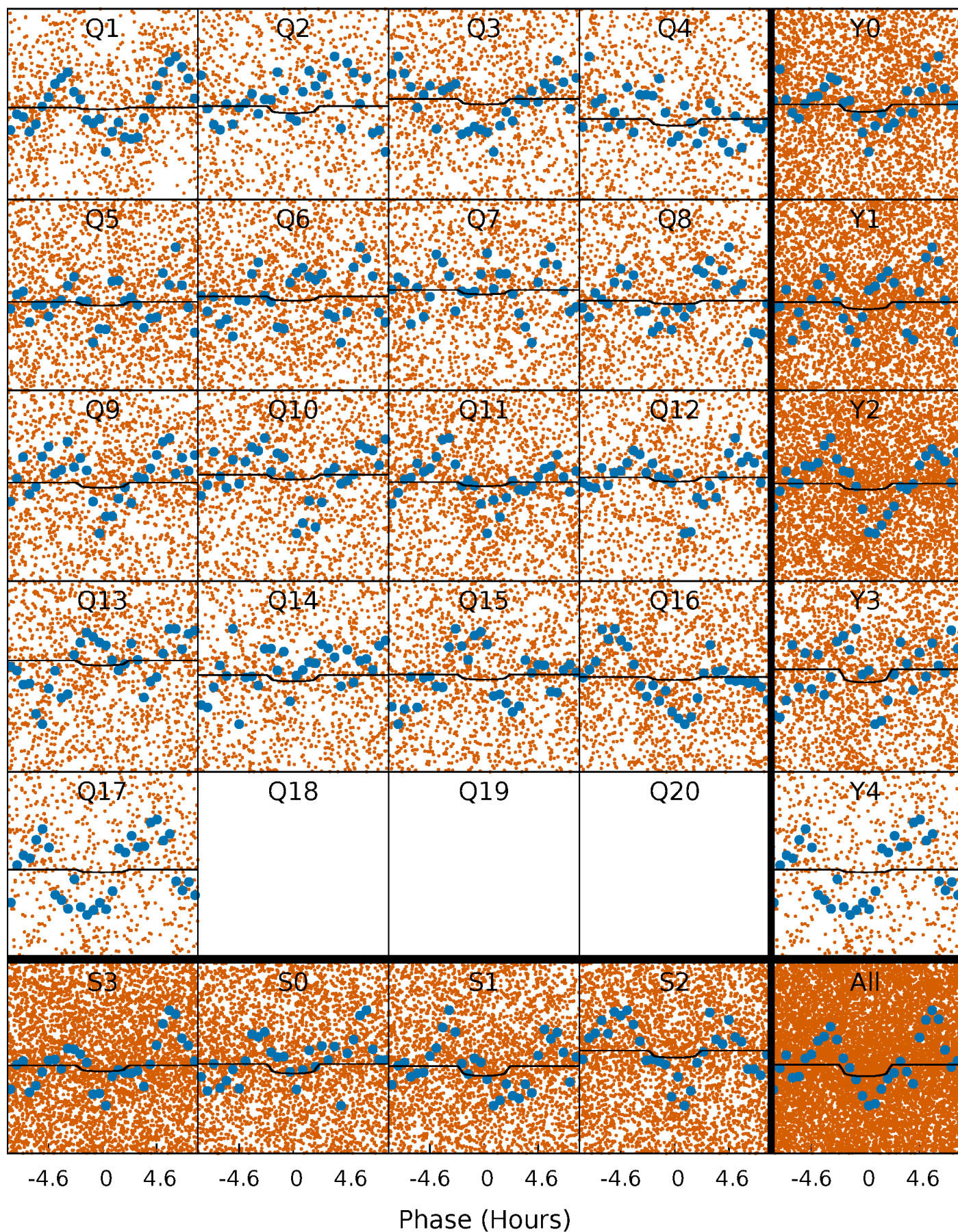
TCE 004557777-02   P= 0.749524 Days    $T_0=132.204364$  (BKJD)





# DV Quarter-Phased Transit Curves

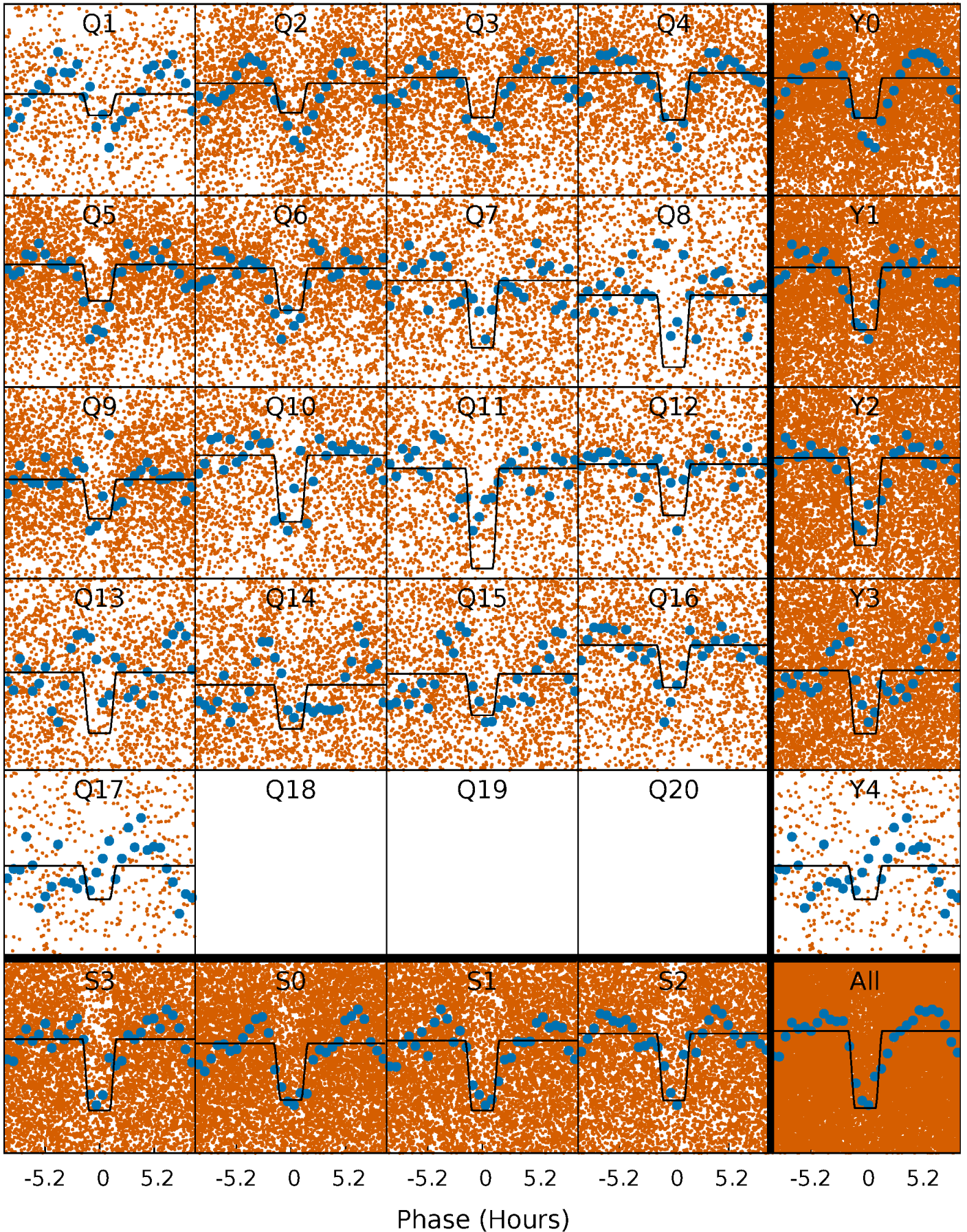
TCE 004557777-02 P= 0.749524 Days  $T_0=132.204364$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

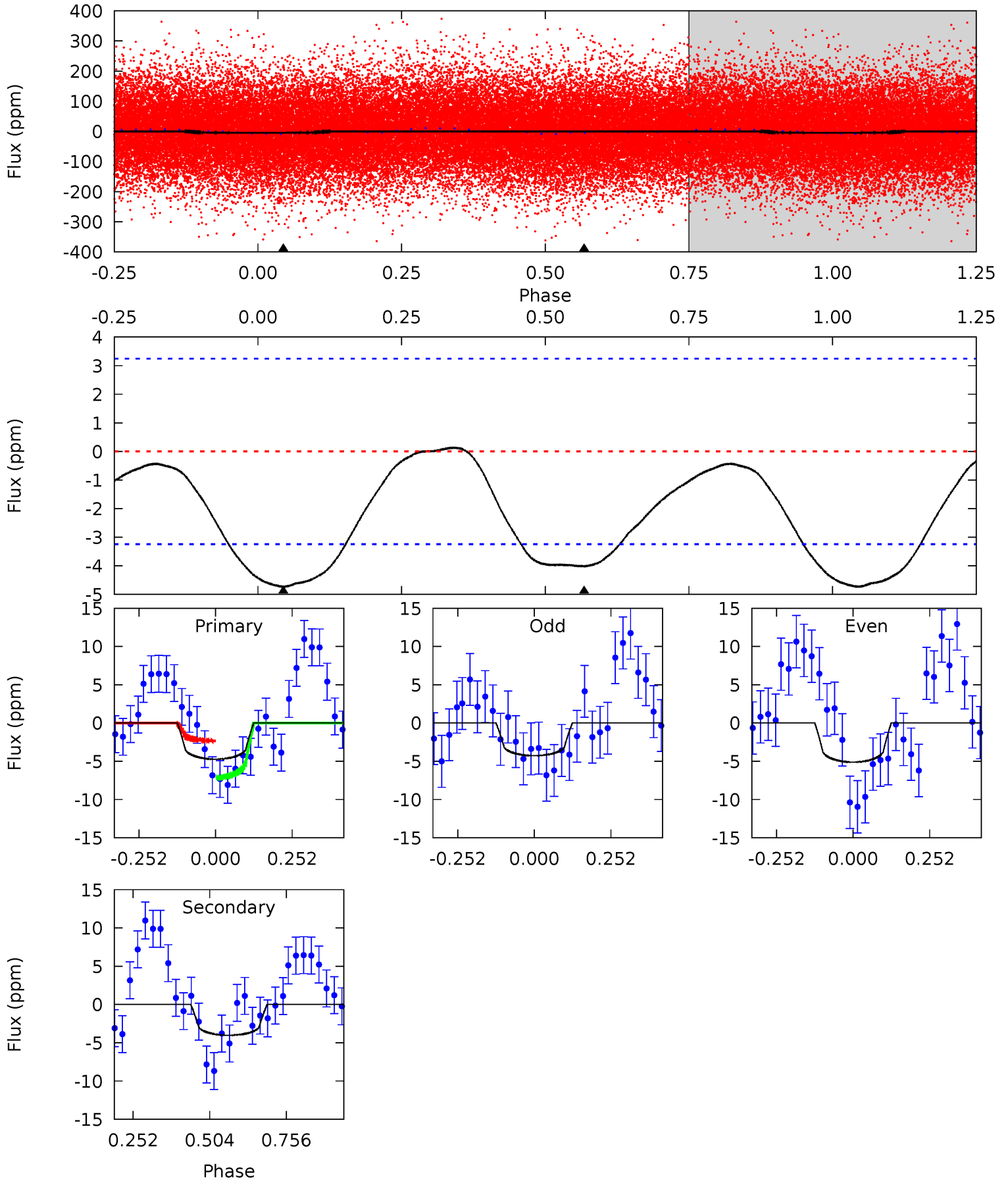
TCE 00455777-02   P= 0.749572 Days    $T_0=132.174983$  (BKJD)



# DV Model-Shift Uniqueness Test

004557777-02, P = 0.749524 Days, E = 131.454840 Days

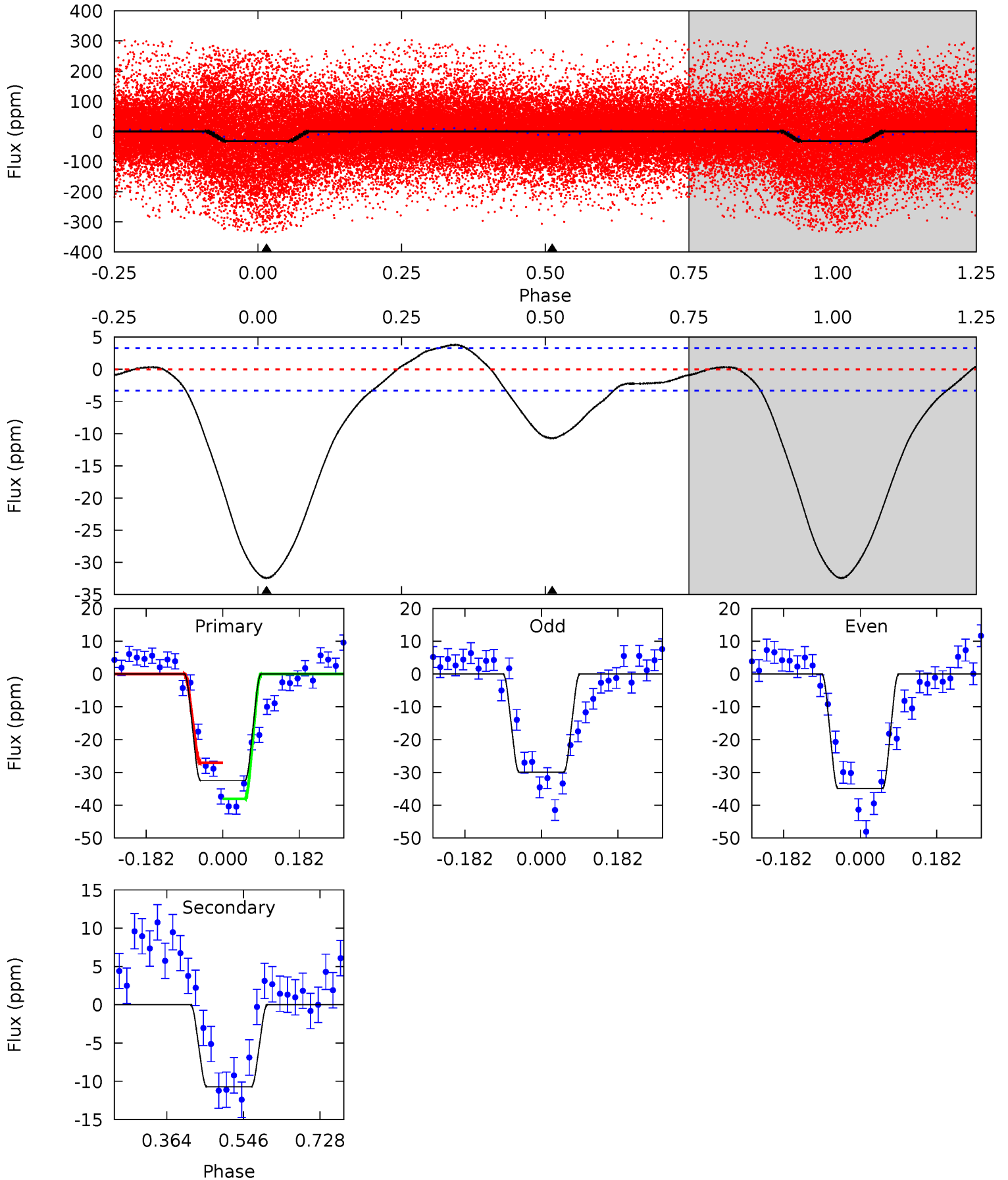
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.37	5.41	0	0	4.37	1.15	0.33	6.37	6.37	5.41	5.41	0.58	1.28	0.03	3.22



# Alt Model-Shift Uniqueness Test

004557777-02, P = 0.749572 Days, E = 131.425411 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
43.5	14.4	0	0	4.44	1.33	2.41	43.5	43.5	14.4	14.4	3.35	0.83	0.10	7.43



### Stellar Parameters For KIC 004557777

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6985^{+175}_{-228}$	$3.717^{+0.296}_{-0.092}$	$0.080^{+0.250}_{-0.300}$	$3.025^{+0.436}_{-1.017}$	$1.738^{+0.213}_{-0.260}$	$0.088^{+0.168}_{-0.027}$
	+3%/-3%	+8%/-2%	+312%/-375%	+14%/-34%	+12%/-15%	+190%/-30%
Source	PHO1	FLK73	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 004557777-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-4 \pm 1$	$0.46^{+0.25}_{-0.21}$	$5252^{+320}_{-439}$	$8132^{+5075}_{-1984}$	$4.011^{+10.019}_{-2.385}$
Alt.	$-11 \pm 1$	$1.82^{+0.36}_{-0.37}$	$5324^{+282}_{-437}$	$4682^{+516}_{-519}$	$0.681^{+0.358}_{-0.199}$

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



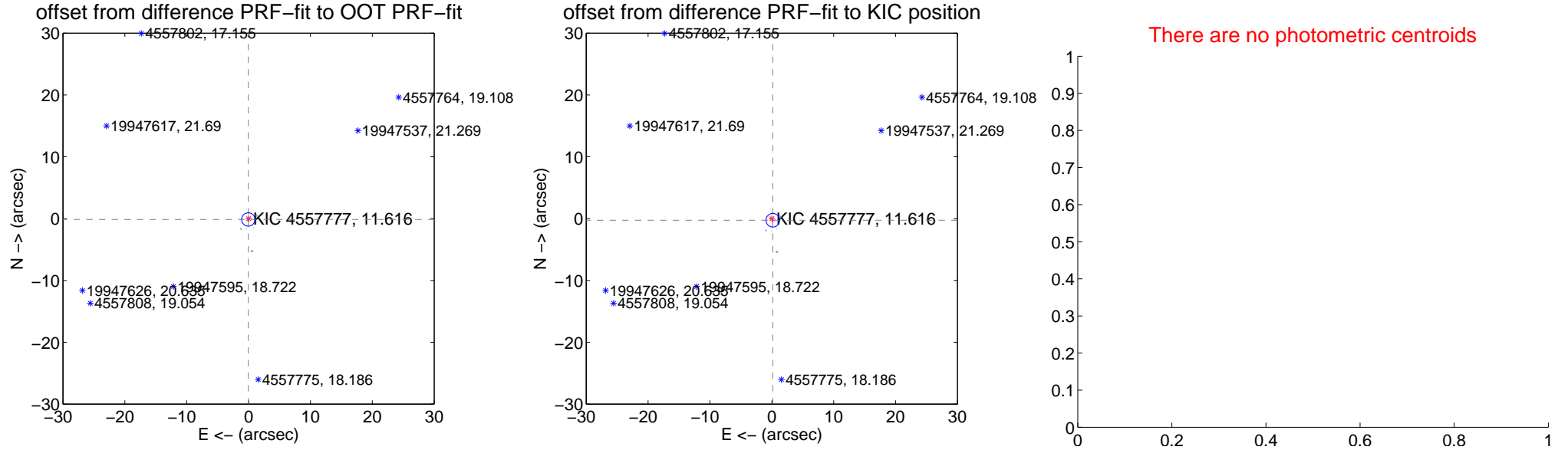
## DV Centroid Data

Supplemental centroid analysis for 004557777-02. **Kepler magnitude: 11.62.** Transit SNR 1.76

There are 15 quarters with good PRF difference image offsets

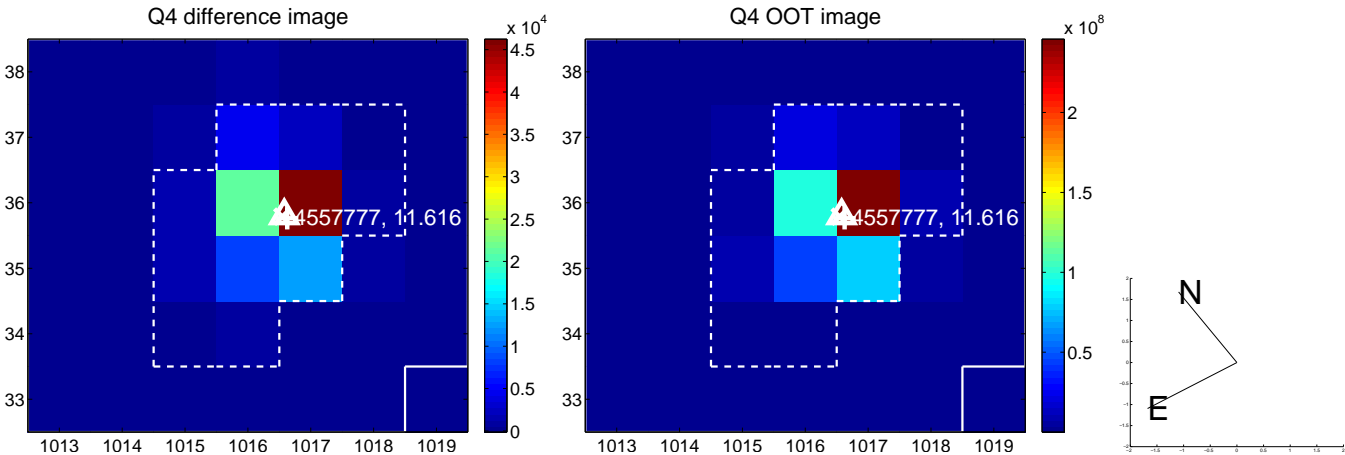
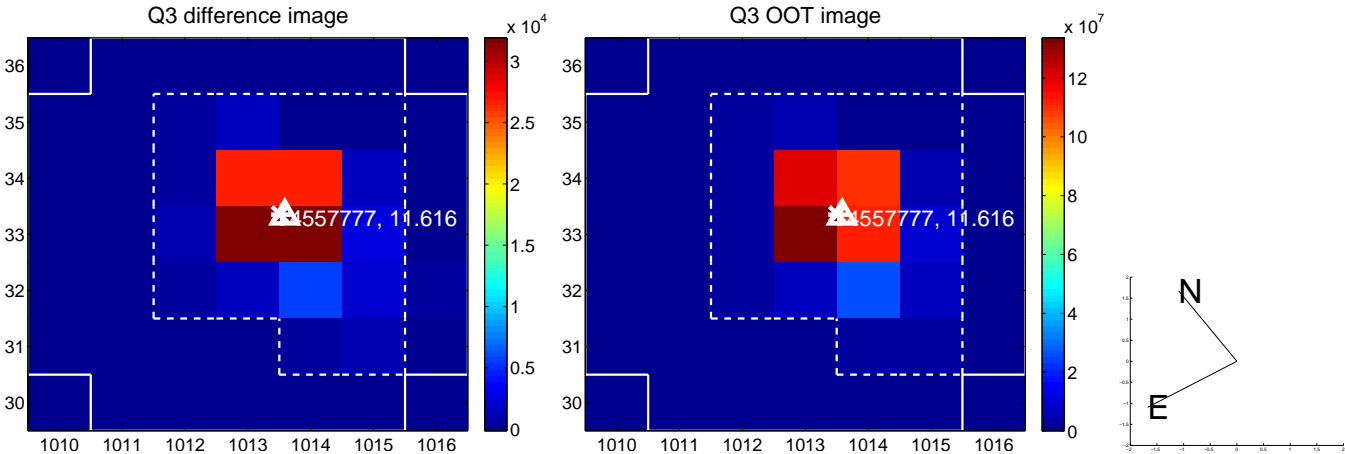
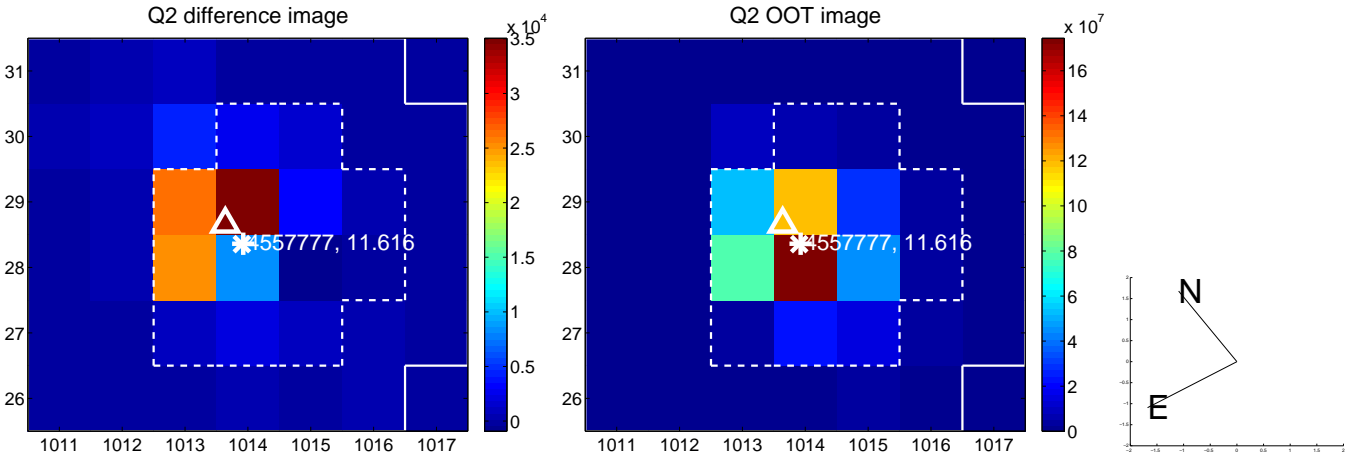
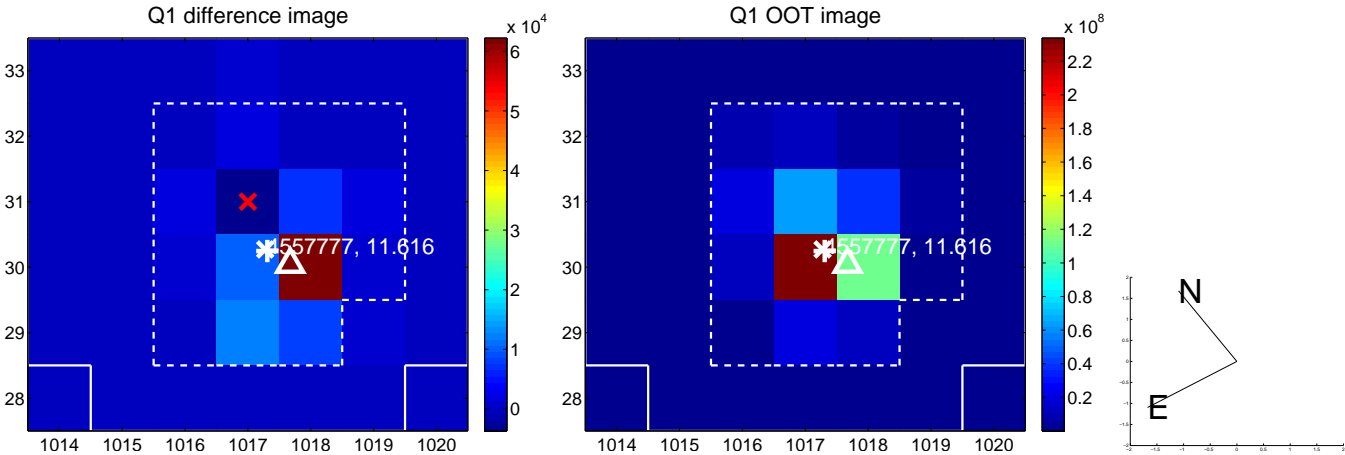
The direct PRF centroid is offset from the target star catalog position by about 0.22 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.146 \pm 0.359$	0.41	$0.043 \pm 0.158$	$-0.140 \pm 0.373$
PRF-fit source offset from KIC position	$0.310 \pm 0.367$	0.84	$-0.162 \pm 0.143$	$-0.264 \pm 0.414$
photometric centroid source offset	—	—	—	—

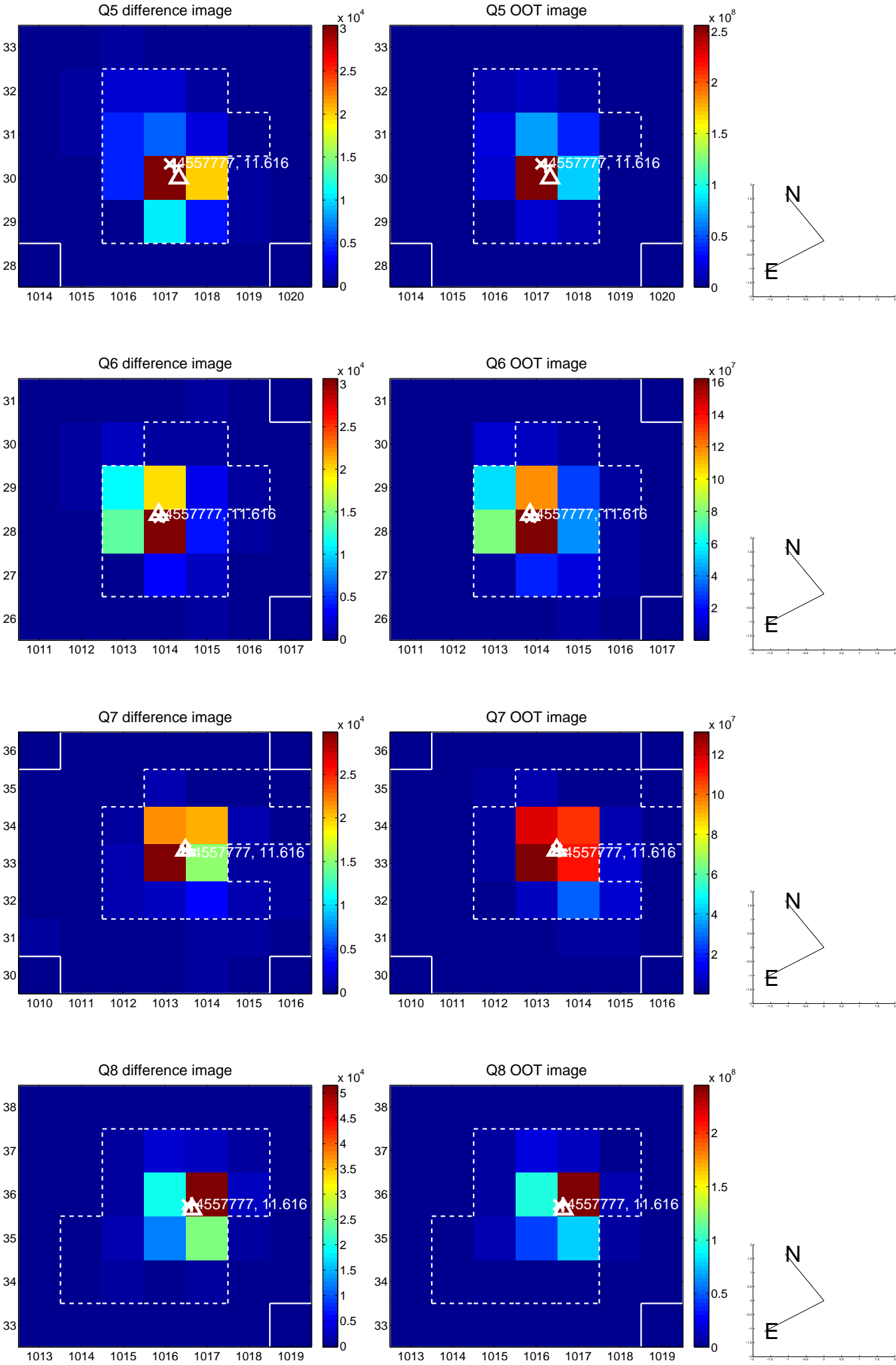


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

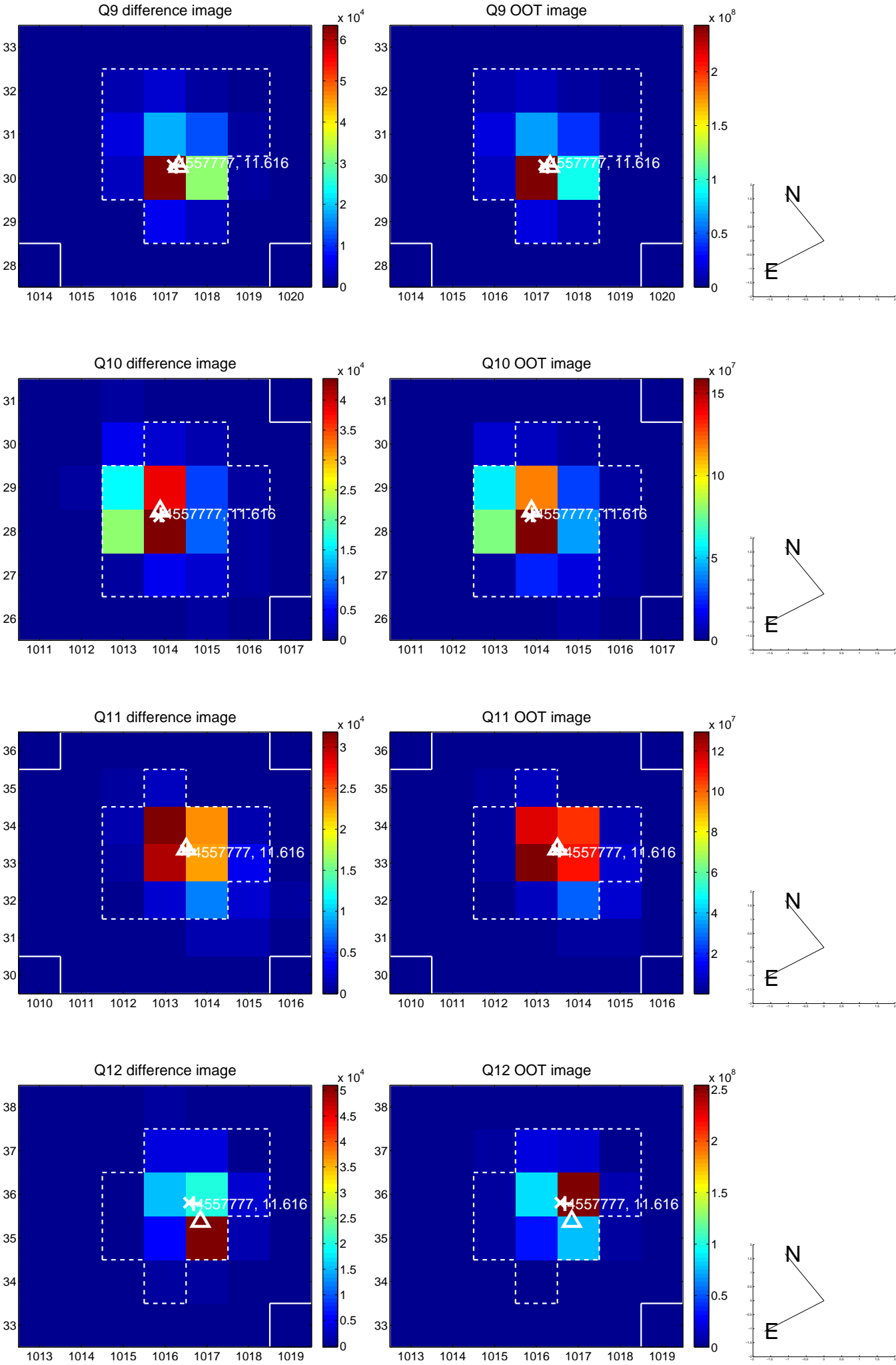
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



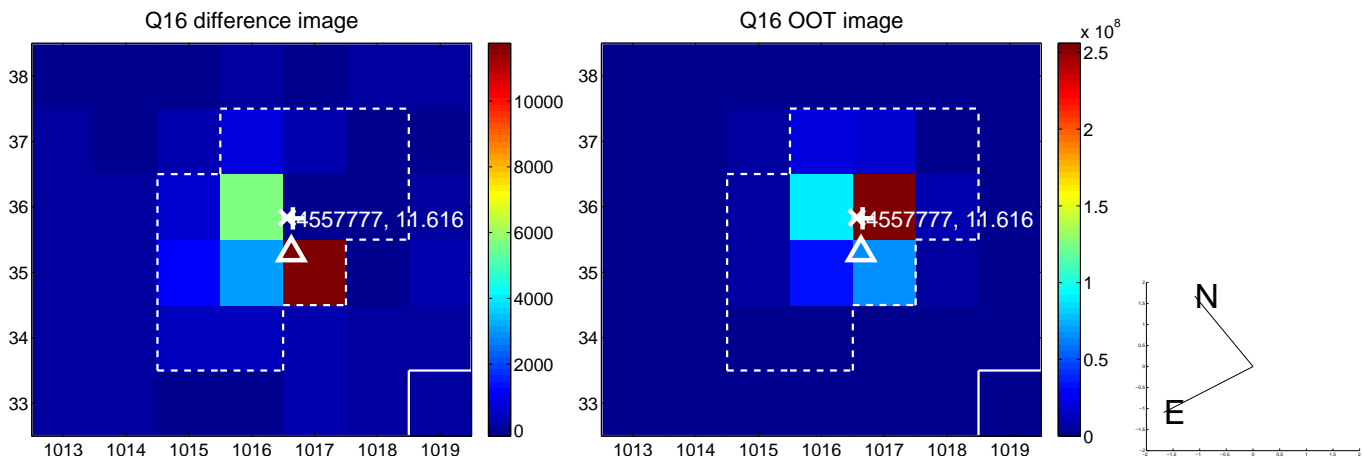
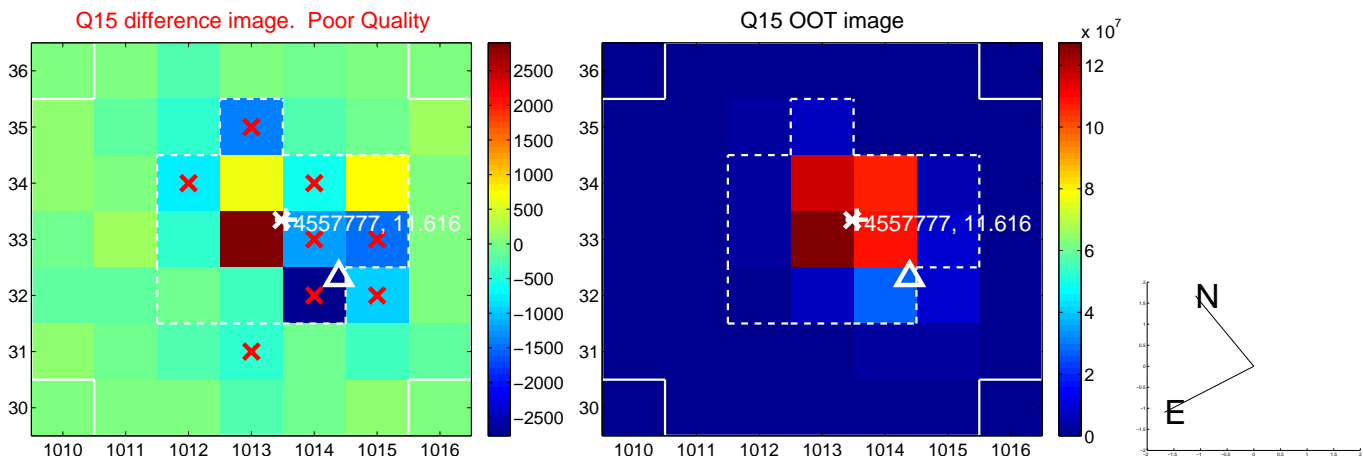
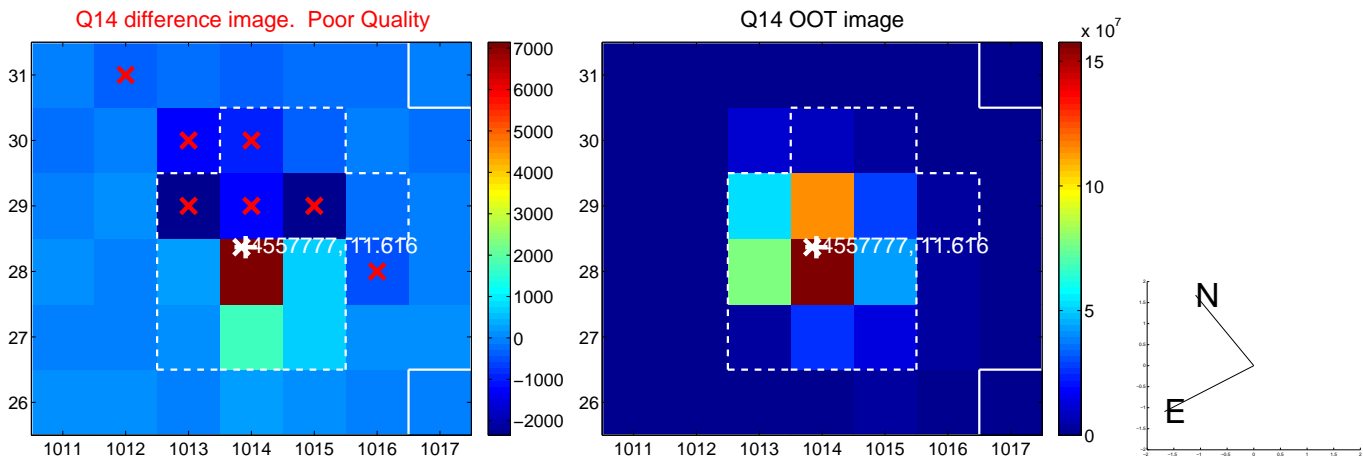
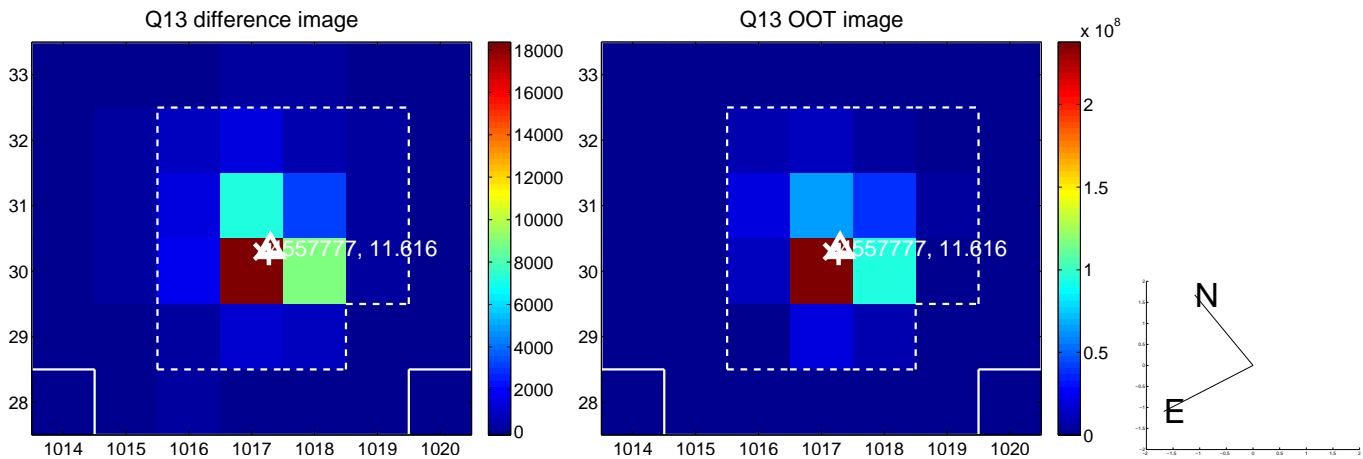
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



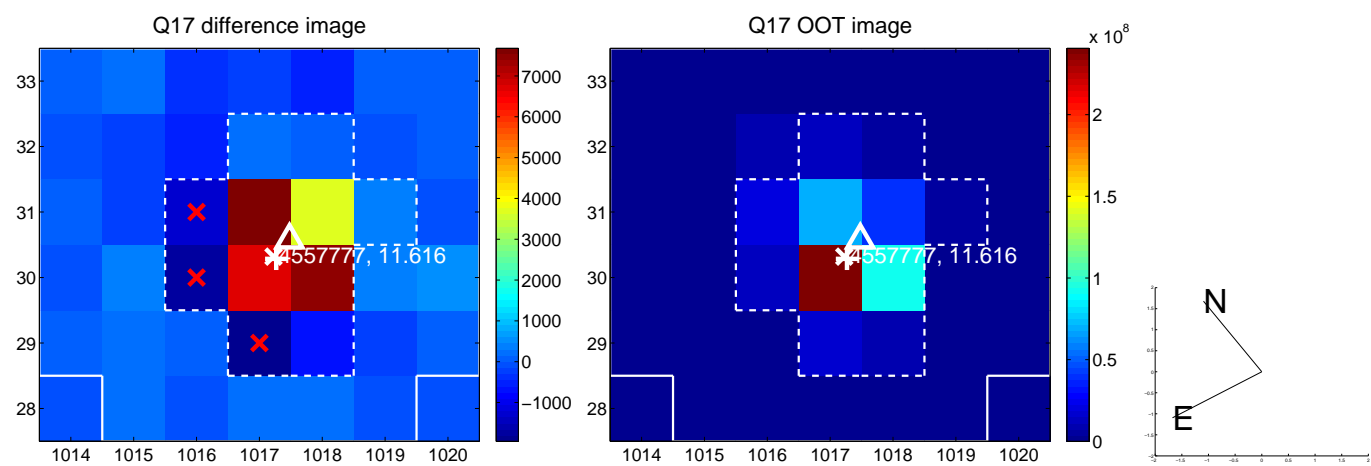
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



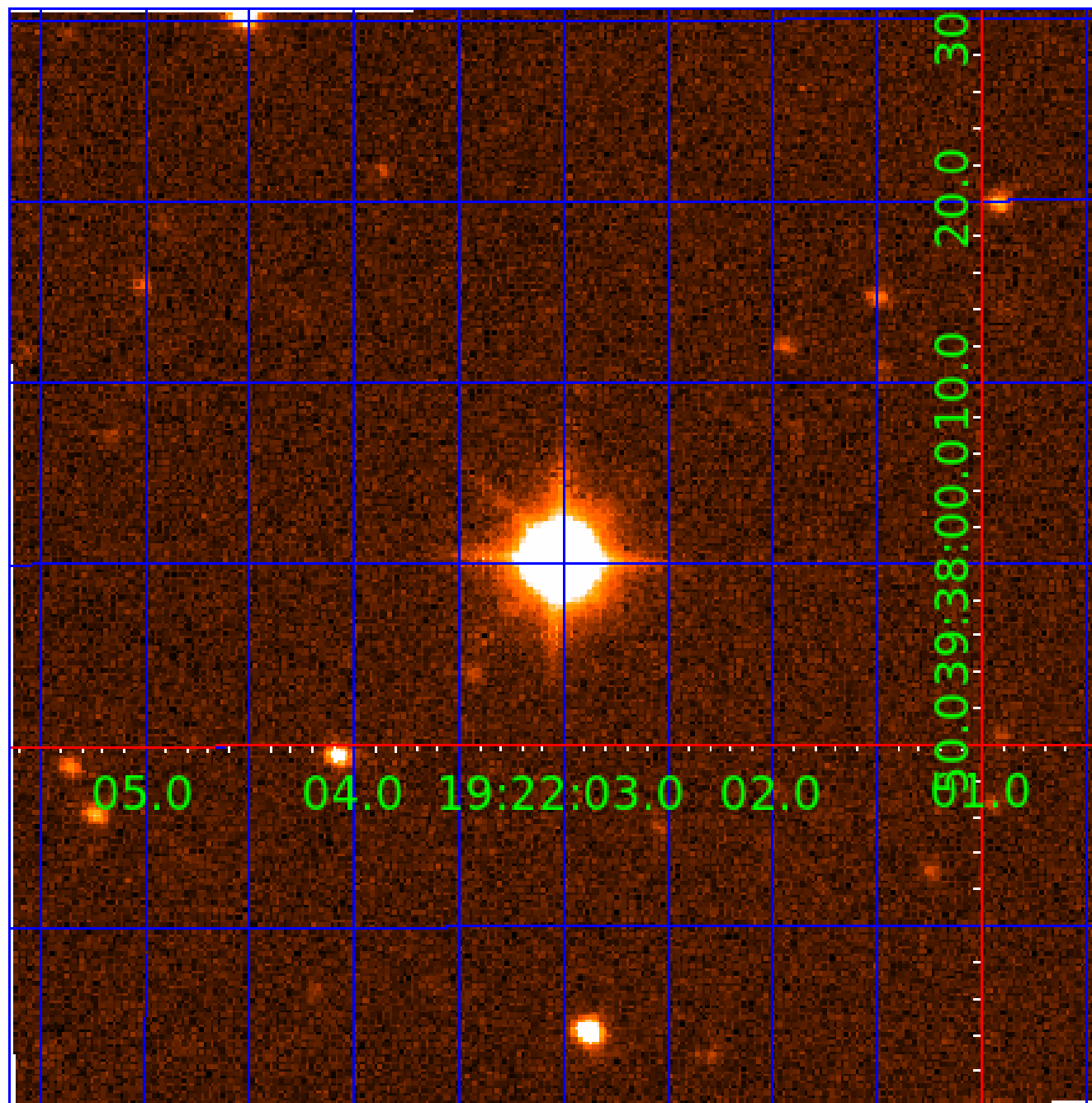
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



folded centroid time series figure for this object.

UKIRT Image

Declination





# KIC 004557777

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004557777-01	OBS	No	1.873514	131.780356	13.2	1.931	8.7	5.5	3.02	6985	1.24	15246.41
004557777-02	OBS	No	0.749524	132.204364	2.4	4.061	7.7	1.8	3.02	6985	0.50	51720.55
004557777-03	OBS	No	83.736266	165.215381	52.1	11.889	8.1	2.9	3.02	6985	2.54	96.12
004557777-04	OBS	No	60.443129	149.653217	86.1	13.470	8.0	5.5	3.02	6985	3.07	148.45
004557777-05	OBS	No	80.512246	208.208197	119.1	2.469	8.4	5.8	3.02	6985	3.66	101.29

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004557777-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA_TRACKER—SWEET_NTL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004557777-02	OBS	FP	0.00	1	0	0	0	LPP_DV
004557777-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004557777-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004557777-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

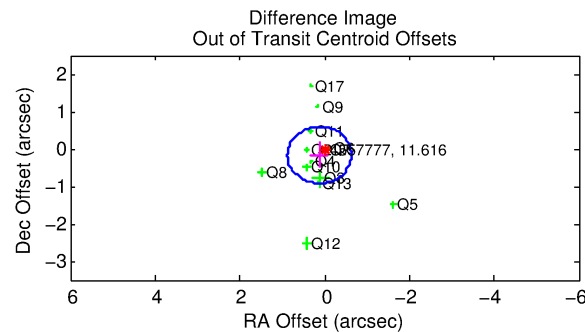
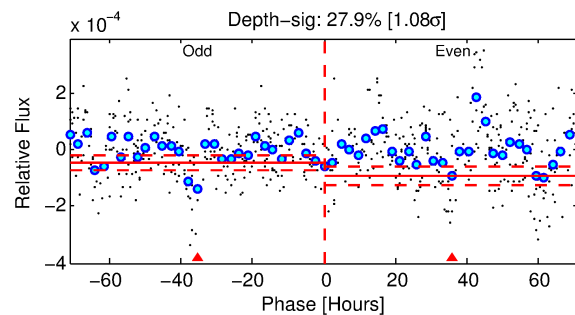
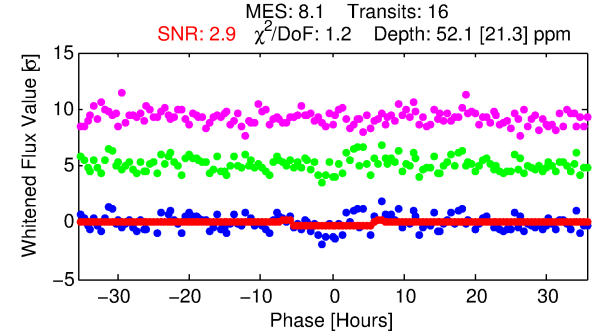
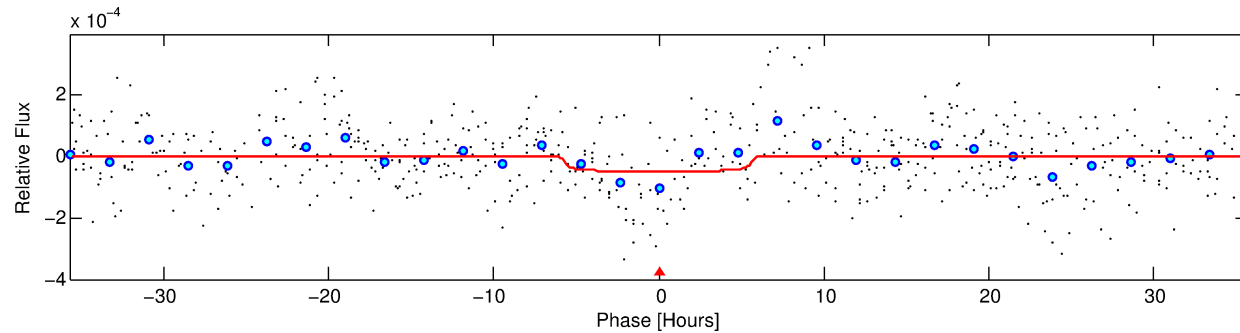
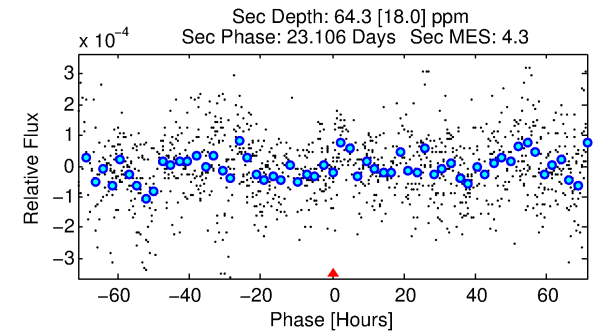
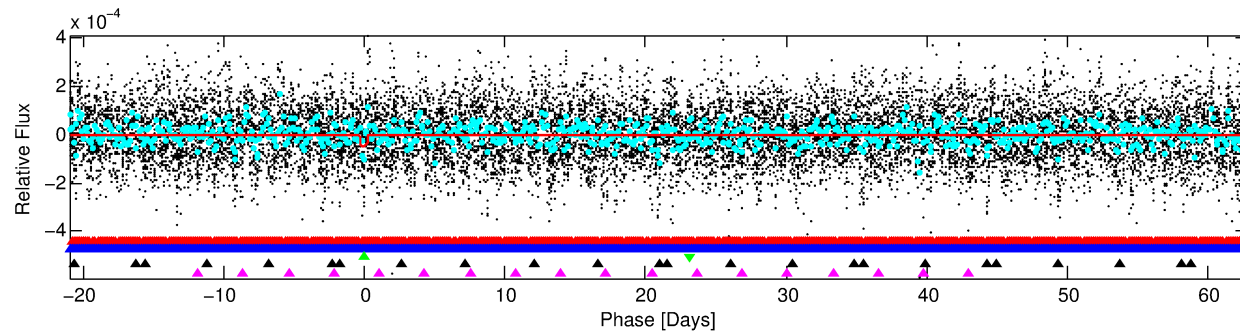
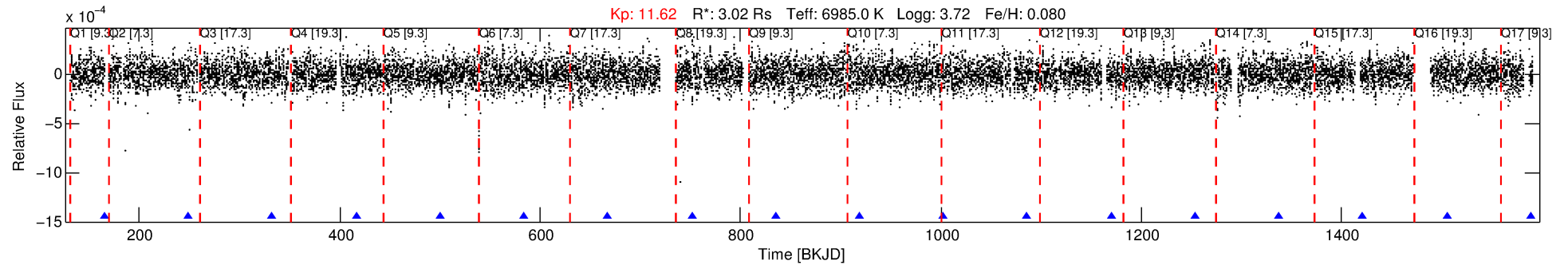
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 004557777-03

No Significant Match Found

# DV One-Page Summary

KIC: 4557777 Candidate: 3 of 5 Period: 83.736 d



## DV Fit Results:

Period = 83.73627 [0.00470] d  
Epoch = 165.2154 [0.0498] BKJD  
Rp/R\* = 0.0077 [0.0029]  
a/R\* = 24.12 [44.08]  
b = 0.90 [0.38]  
Seff = 96.12 [50.29]  
Teff = 798 [104] K  
Rp = 2.54 [1.29] Re  
a = 0.4506 [0.1438] AU  
Ag = 1111.93 [1064.46] [1.04σ]  
Teffp = 7128 [1466] K [4.31σ]

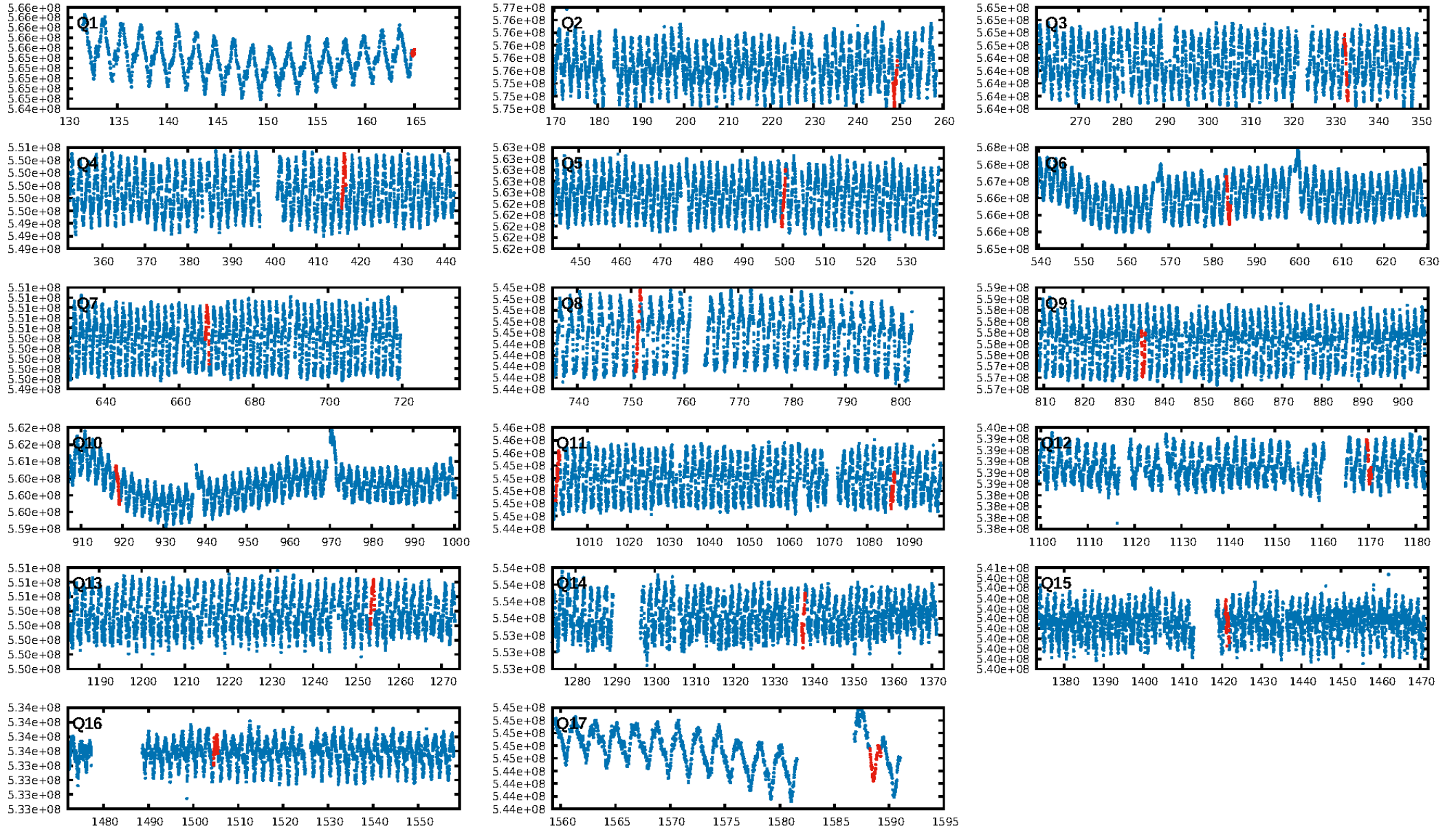
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [6.37σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.7%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 1.61e-08  
RollingBand-fgt: 1.00 [15/15]  
GhostDiagnostic-chr: 1.426  
Centroid-sig: 24.3%  
Centroid-so: 0.891 arcsec [0.80σ]  
OotOffset-rm: 0.208 arcsec [0.82σ]  
KicOffset-rm: 0.160 arcsec [0.53σ]  
OotOffset-st: 3/3/3/4 [13]  
KicOffset-st: 3/3/3/4 [13]  
DiffImageQuality-fgm: 0.62 [8/13]  
DiffImageOverlap-fno: 0.00 [0/14]

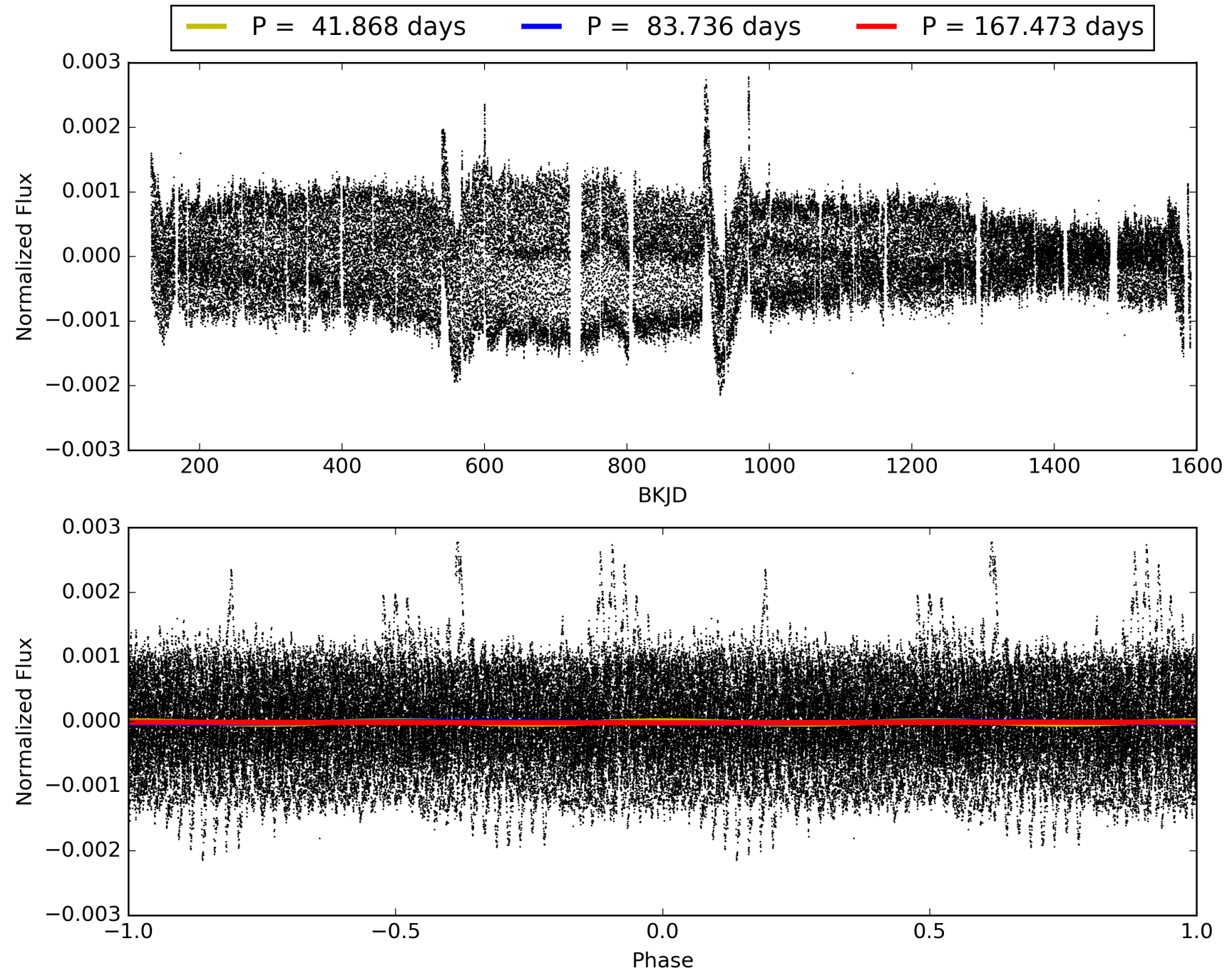
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 20:25:59 Z

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

# TCE 004557777-03, PDC Light Curves

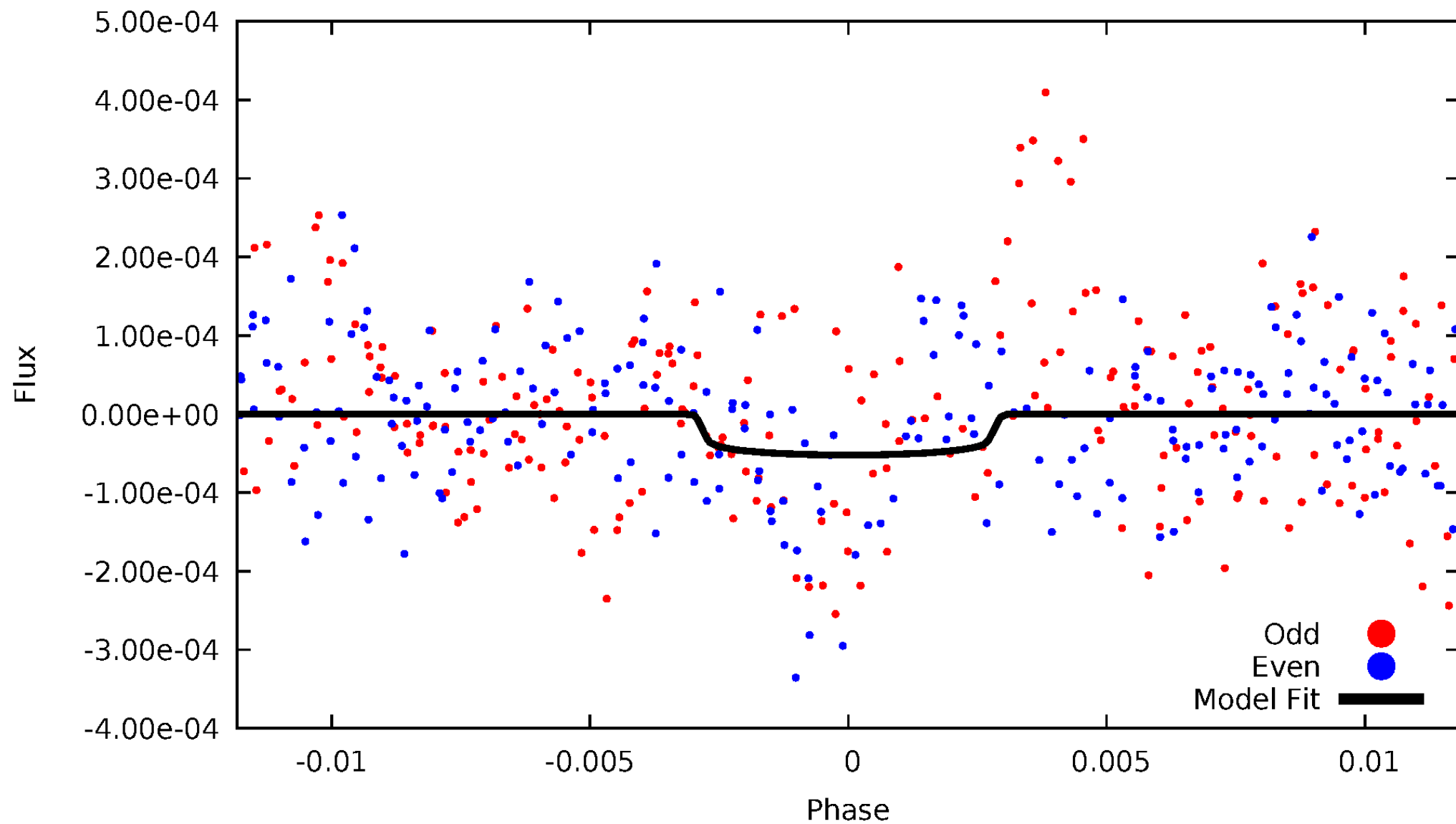


TCE 004557777-03



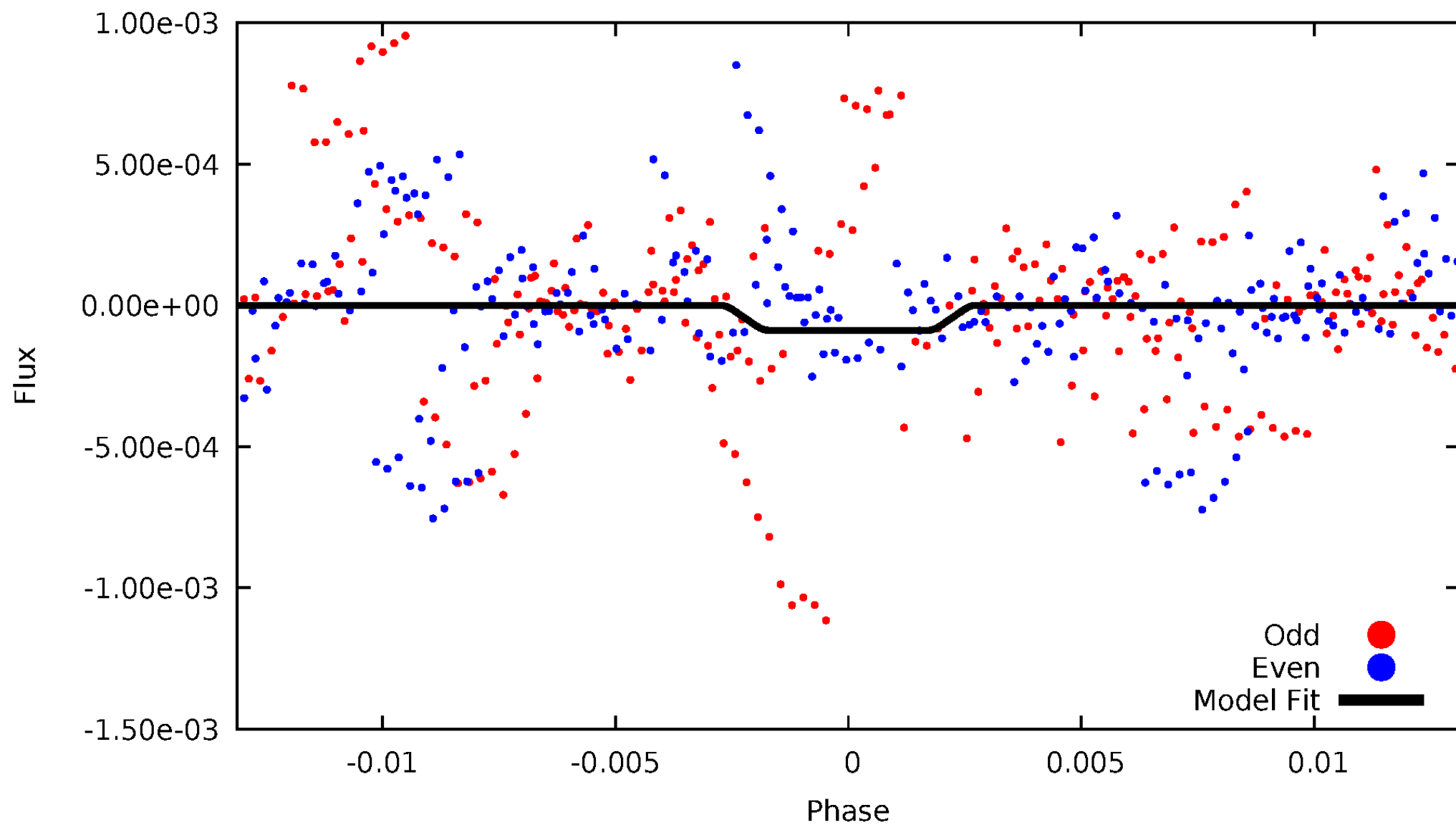
# DV Odd/Even

TCE 004557777-03



# ALT Odd/Even

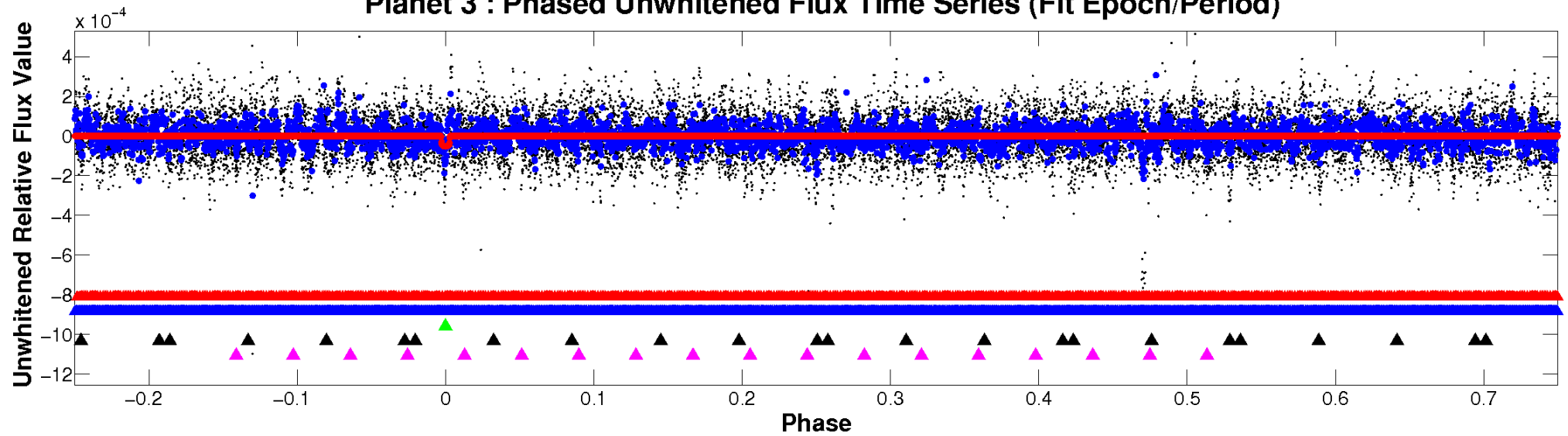
TCE 004557777-03



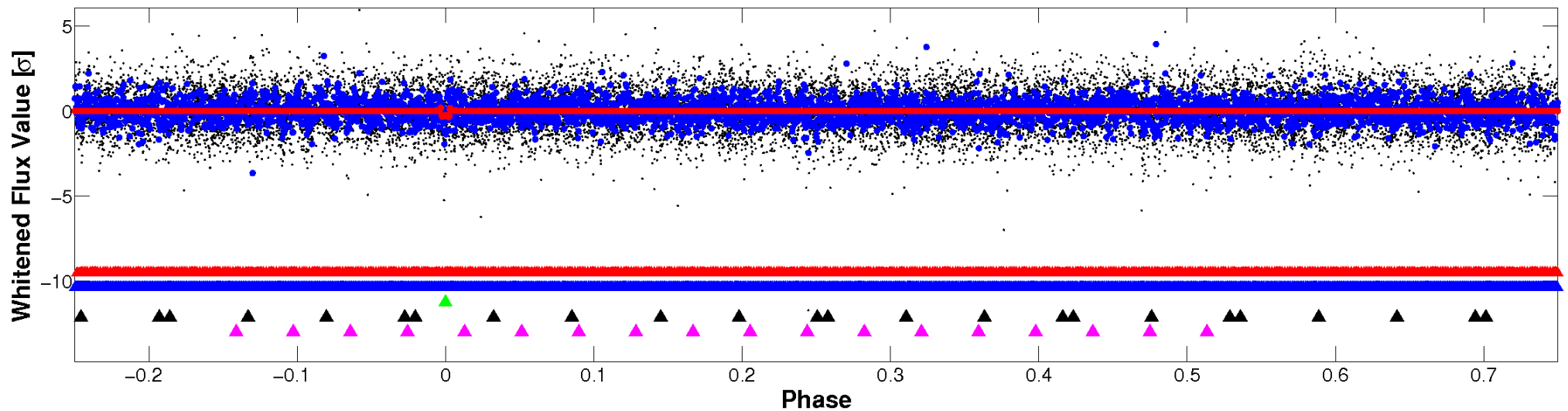


# Non-Whitened Vs. Whitened Light Curve

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

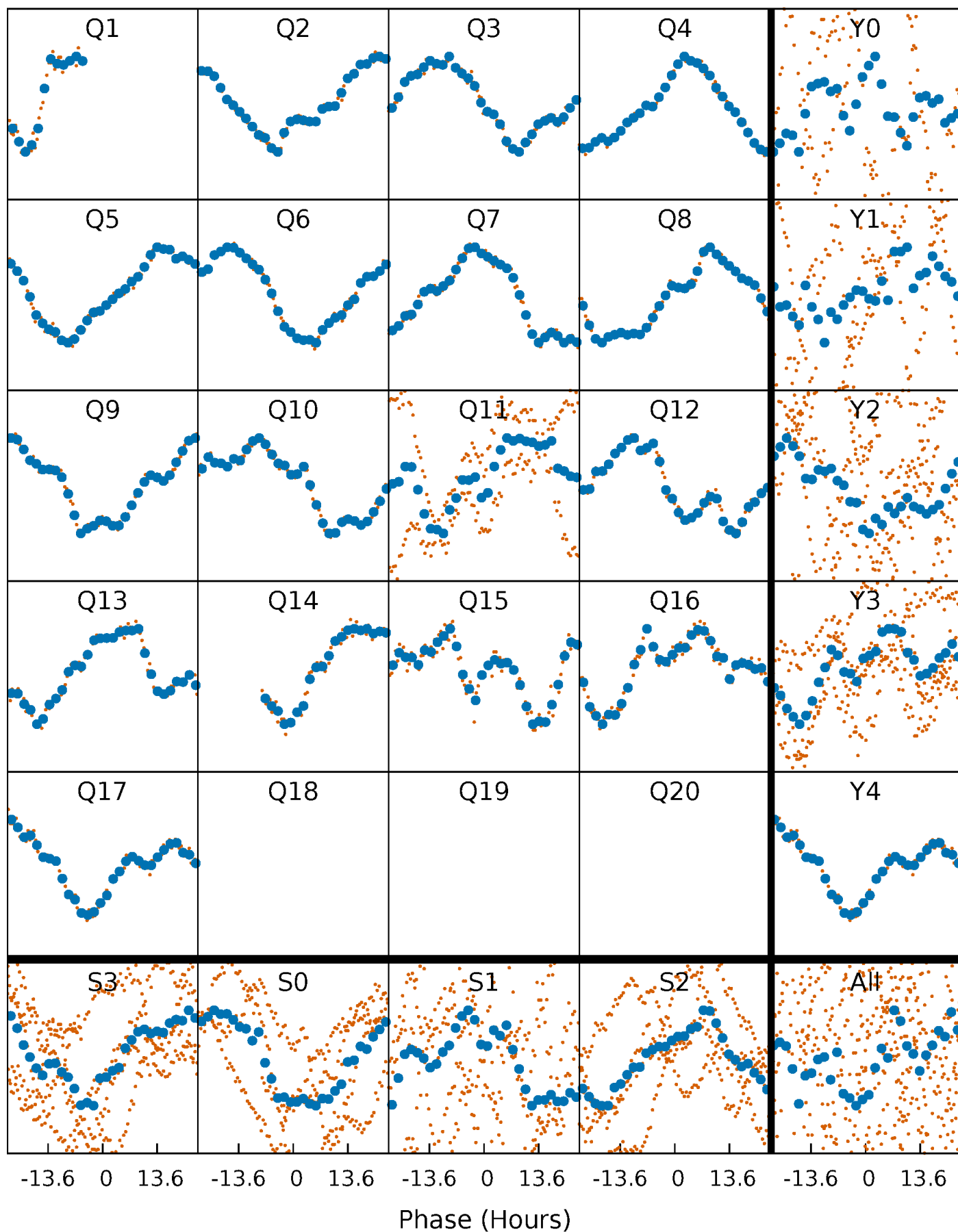


## Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



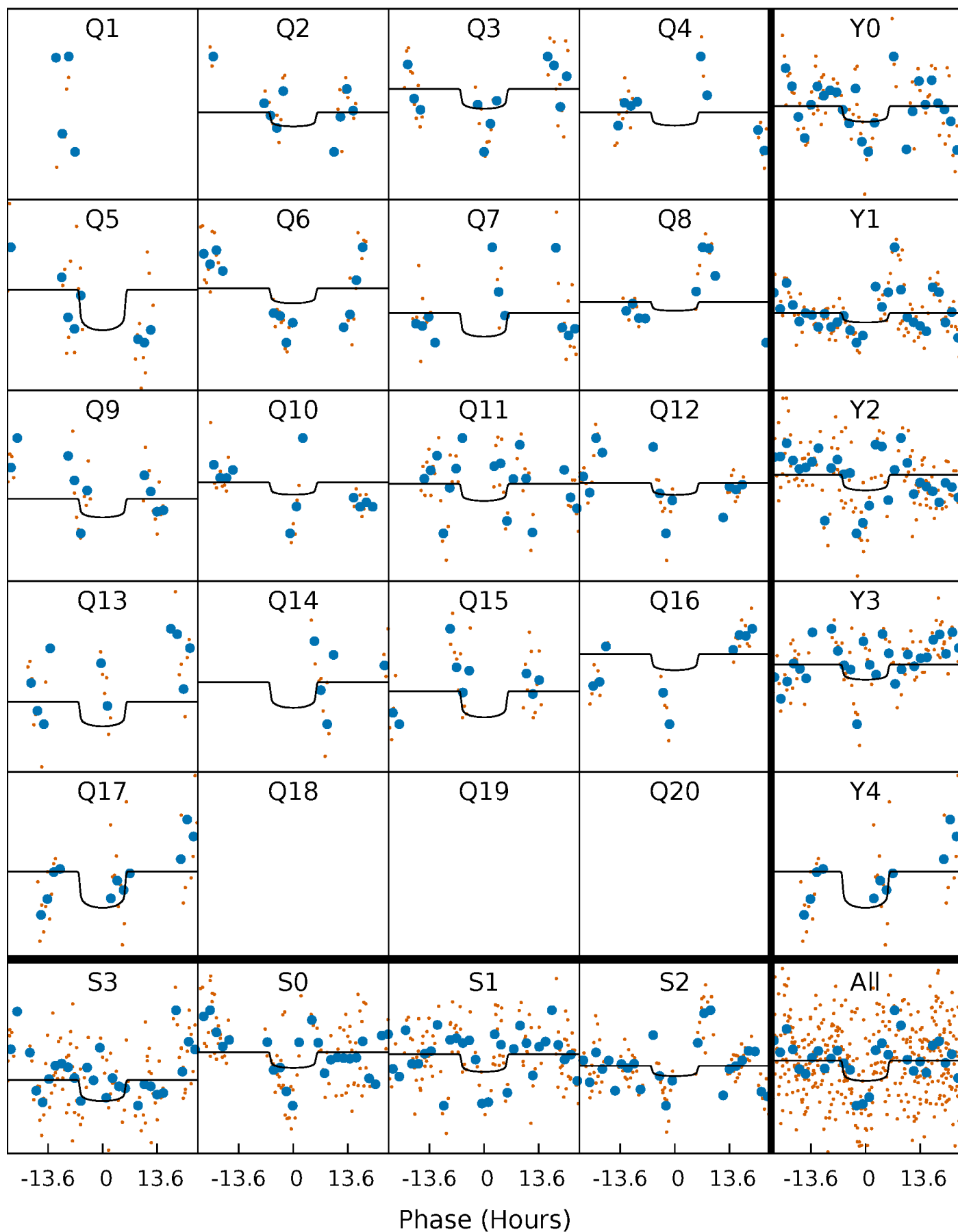
# PDC Quarter-Phased Transit Curves

TCE 004557777-03 P= 83.736266 Days  $T_0=165.215381$  (BKJD)



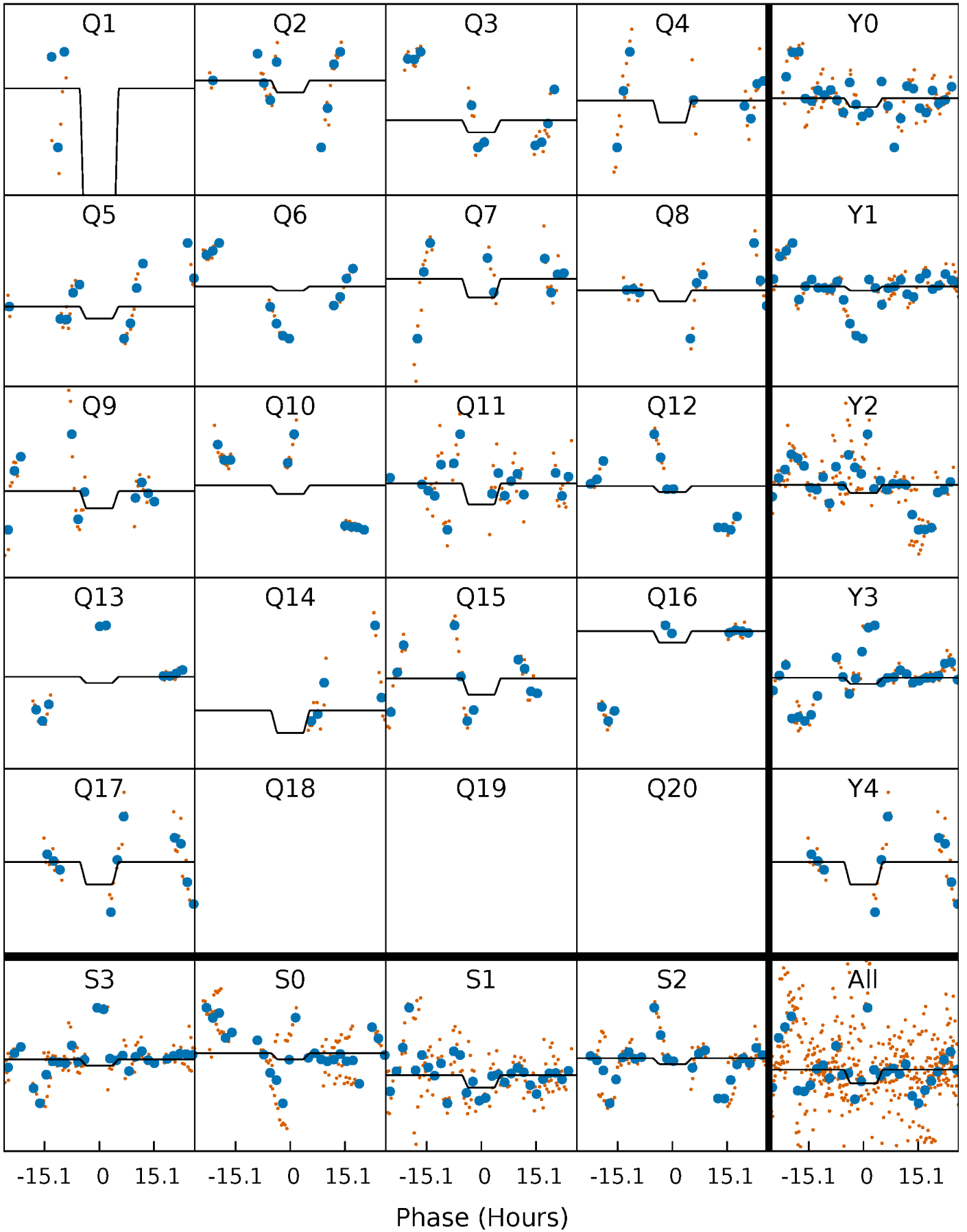
# DV Quarter-Phased Transit Curves

TCE 004557777-03 P= 83.736266 Days  $T_0=165.215381$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

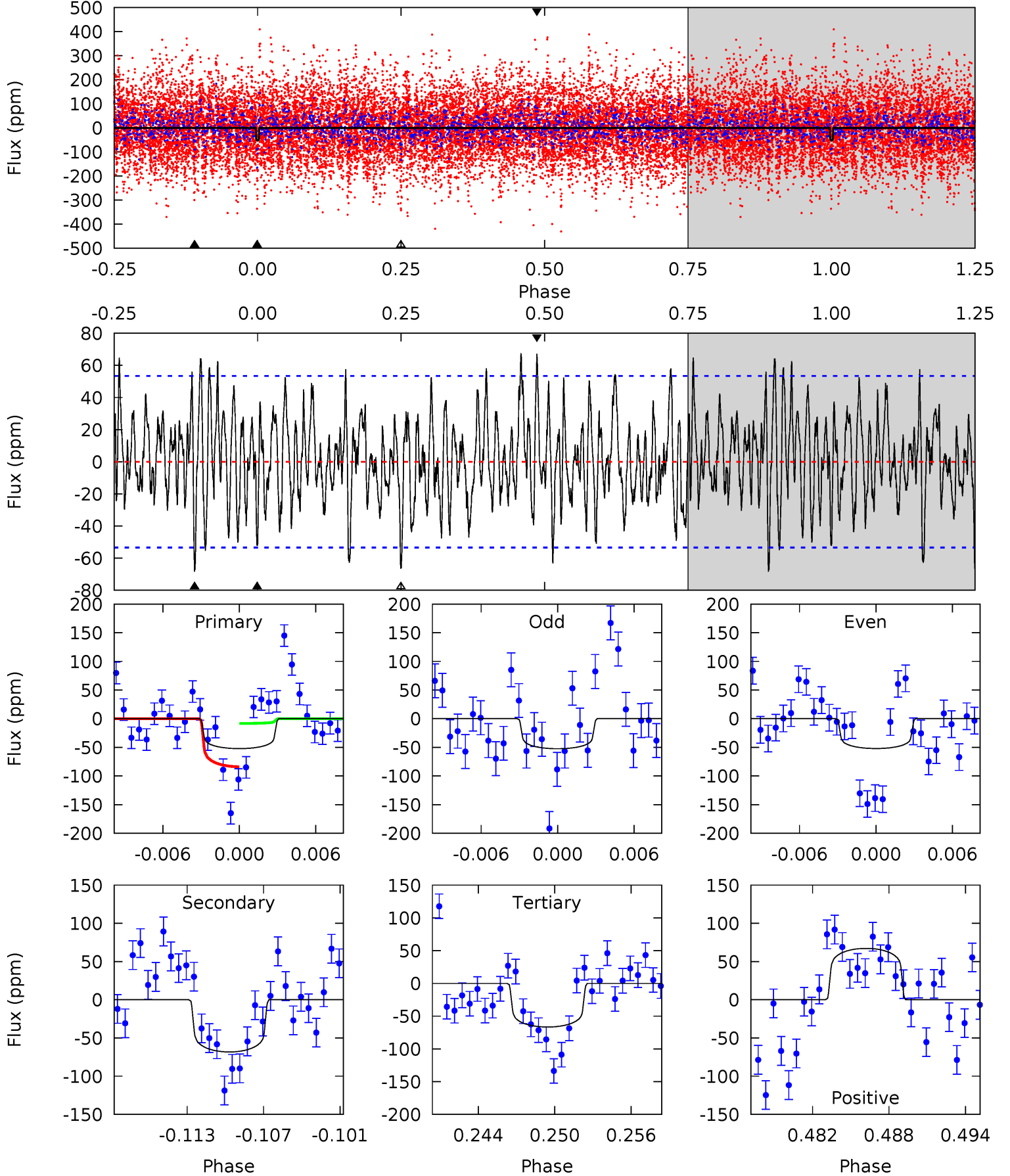
TCE 004557777-03 P= 83.730016 Days  $T_0=165.284164$  (BKJD)



# DV Model-Shift Uniqueness Test

004557777-03, P = 83.736266 Days, E = 81.479115 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.01	6.55	6.38	6.44	5.12	2.75	2.32	-1.37	-1.43	0.16	0.10	0.02	1.99	0.50	3.57

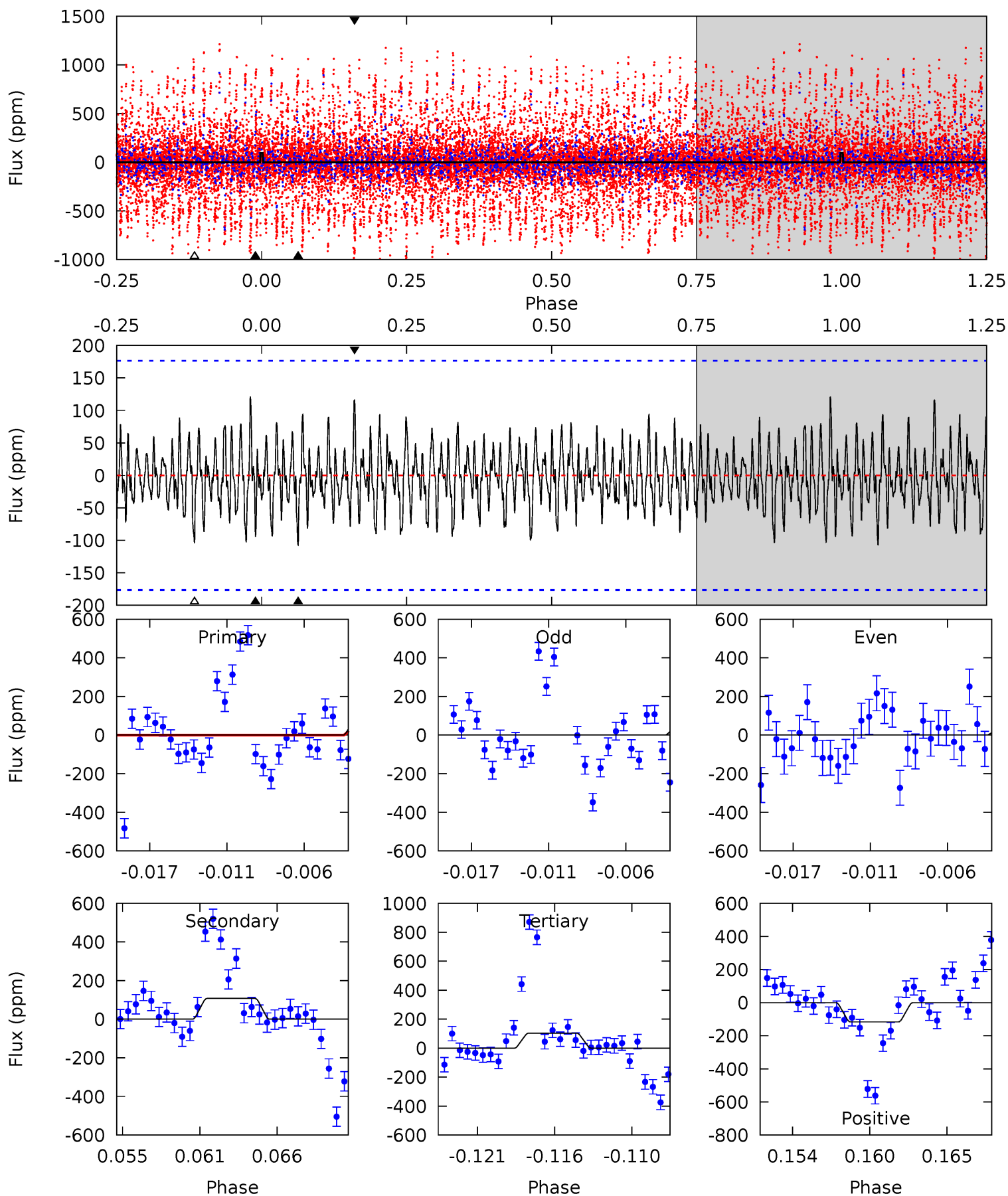




# Alt Model-Shift Uniqueness Test

004557777-03, P = 83.730016 Days, E = 81.554148 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
2.75	3.13	3.01	3.39	5.14	2.78	1.13	-0.26	-0.64	0.12	-0.26	0.27	-42.1	0.53	1.43



### Stellar Parameters For KIC 004557777

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6985^{+175}_{-228}$	$3.717^{+0.296}_{-0.092}$	$0.080^{+0.250}_{-0.300}$	$3.025^{+0.436}_{-1.017}$	$1.738^{+0.213}_{-0.260}$	$0.088^{+0.168}_{-0.027}$
	+3%/-3%	+8%/-2%	+312%/-375%	+14%/-34%	+12%/-15%	+190%/-30%
Source	PHO1	FLK73	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 004557777-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-68 \pm 10$	$2.38^{+1.09}_{-0.96}$	$1095^{+63}_{-94}$	$7256^{+2703}_{-1274}$	$1339^{+2431}_{-719}$
Alt.	$-108 \pm 34$	$2.90^{+1.07}_{-1.05}$	$1093^{+64}_{-101}$	$7349^{+2084}_{-1232}$	$1397^{+1920}_{-737}$

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

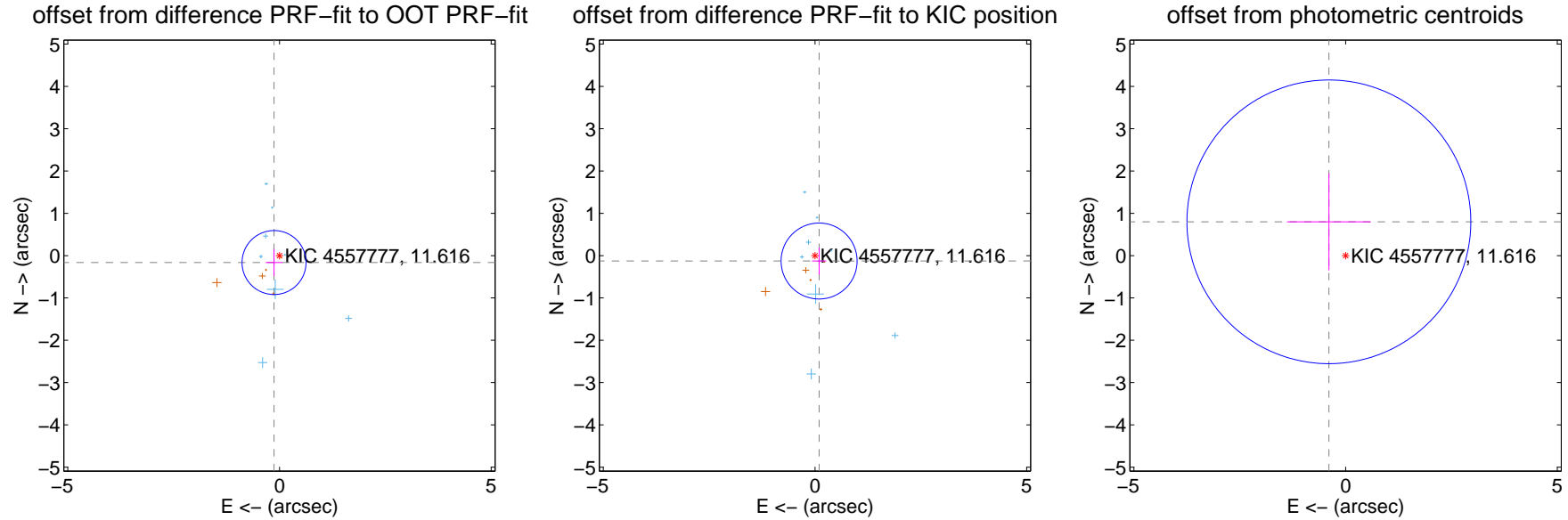
## DV Centroid Data

Supplemental centroid analysis for 004557777-03. **Kepler magnitude: 11.62.** Transit SNR 2.95

There are 8 quarters with good PRF difference image offsets

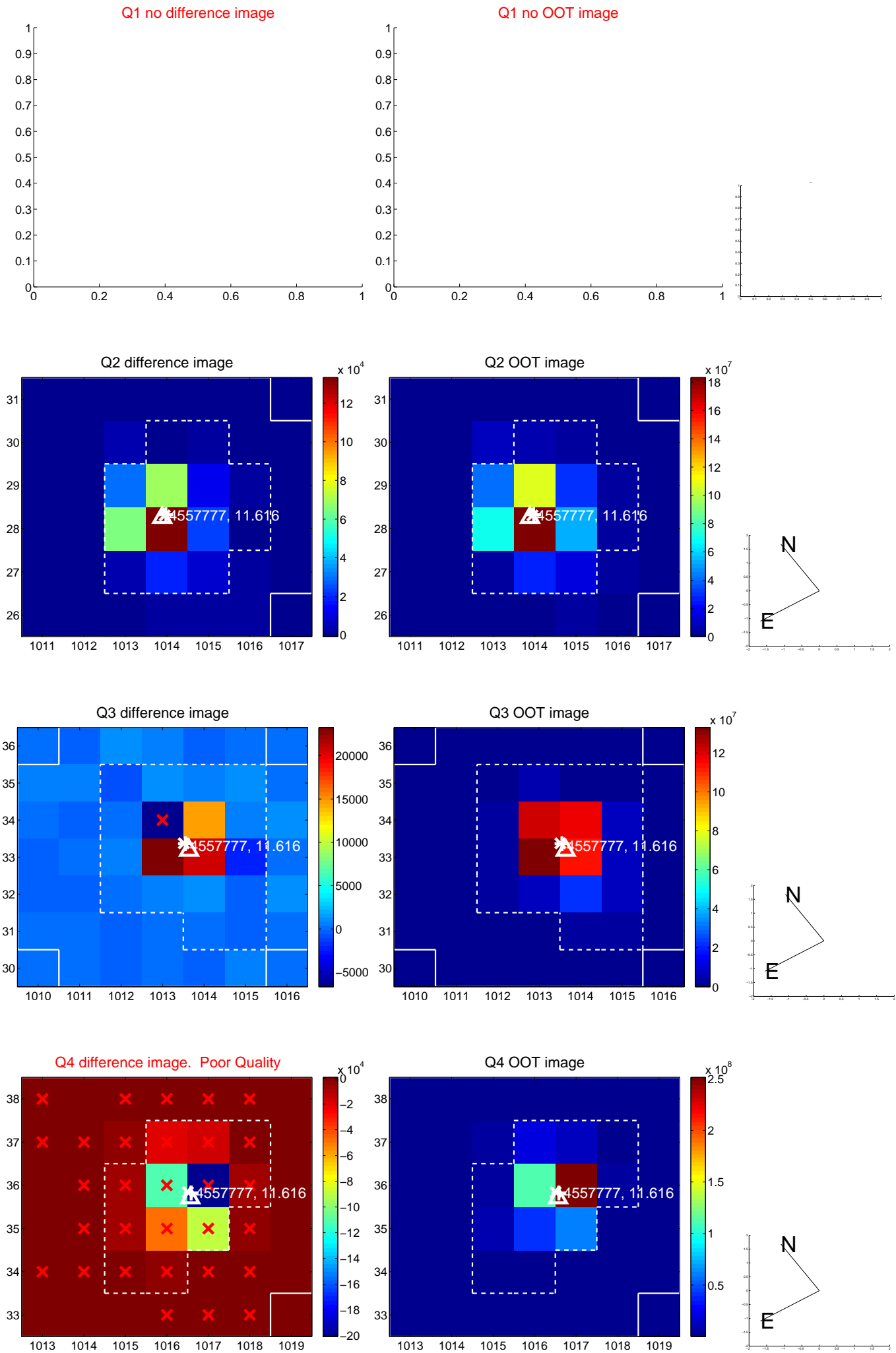
The direct PRF centroid is offset from the target star catalog position by about 0.21 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.208 \pm 0.252$	0.82	$0.128 \pm 0.199$	$-0.163 \pm 0.318$
PRF-fit source offset from KIC position	$0.160 \pm 0.299$	0.53	$-0.097 \pm 0.168$	$-0.127 \pm 0.320$
photometric centroid source offset	$0.89 \pm 1.12$	0.80	$0.40 \pm 0.99$	$0.80 \pm 1.15$

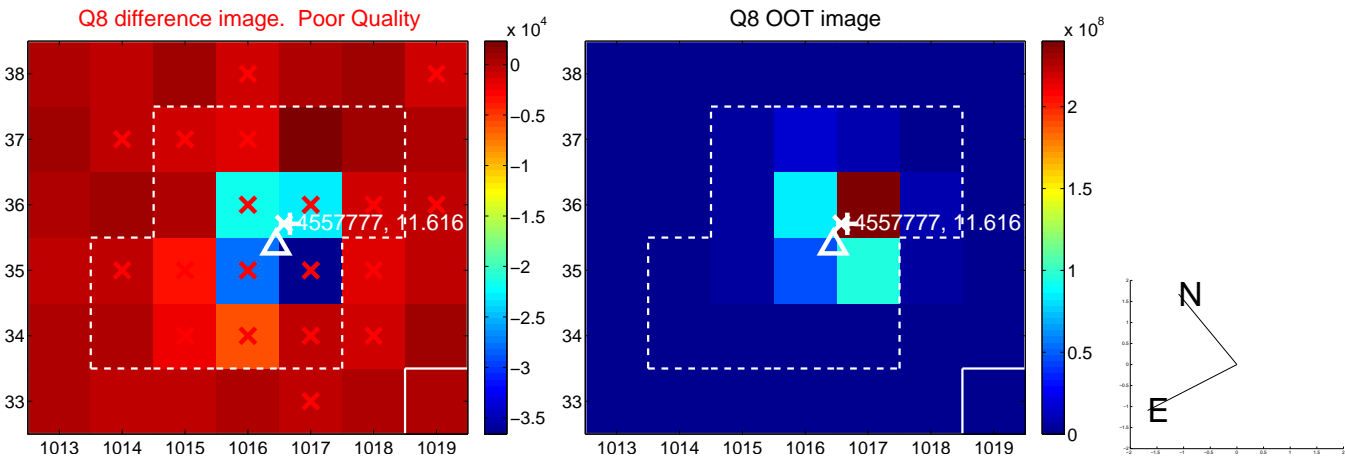
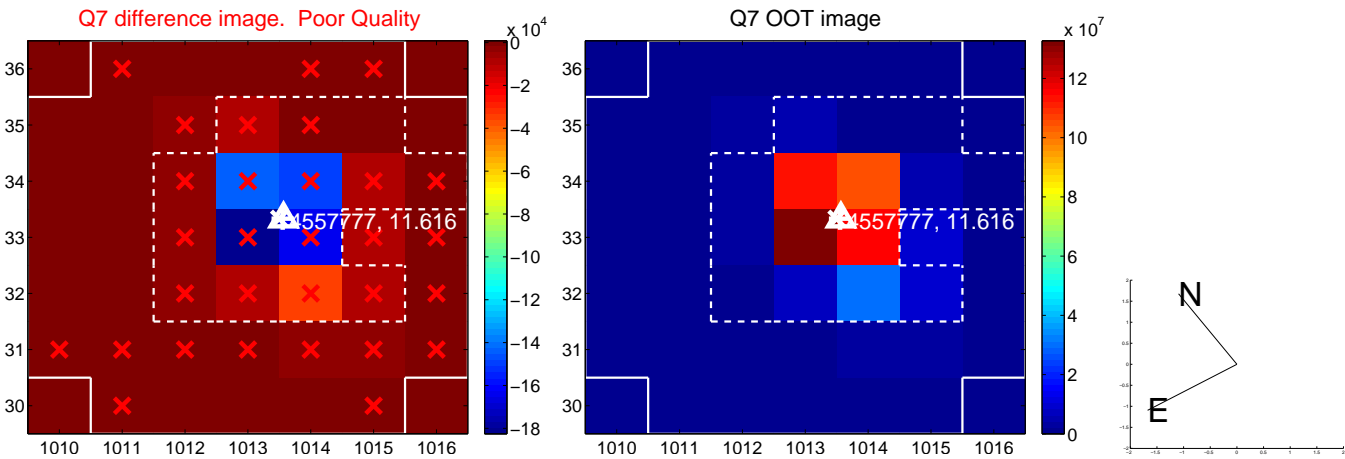
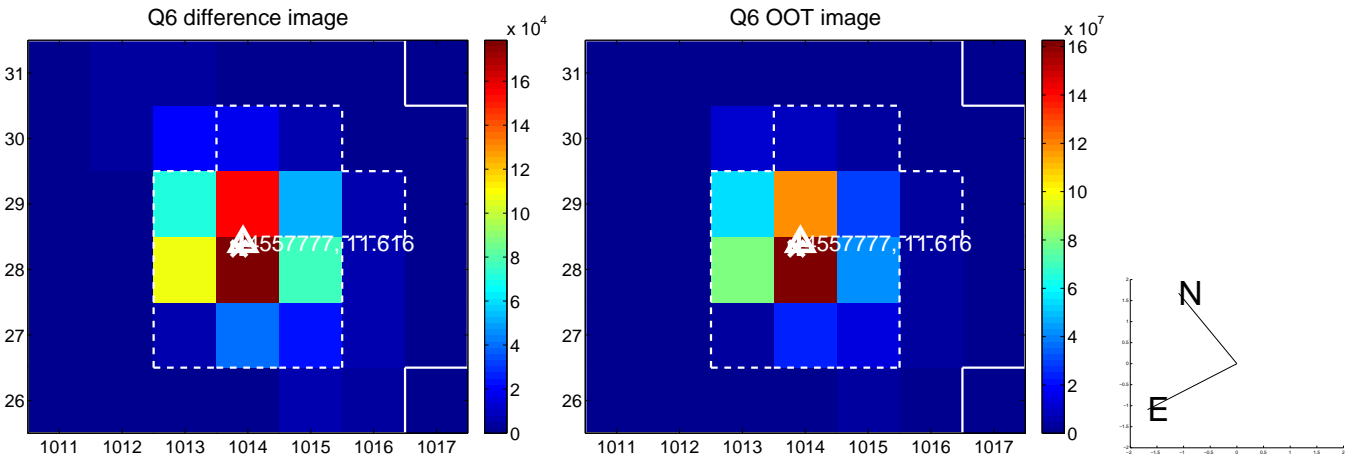
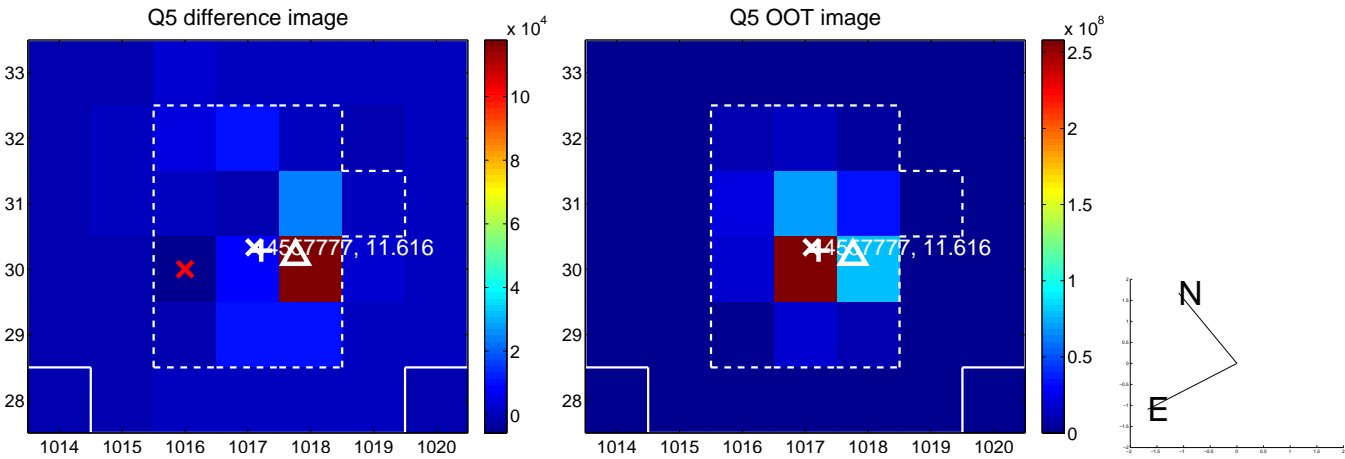


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

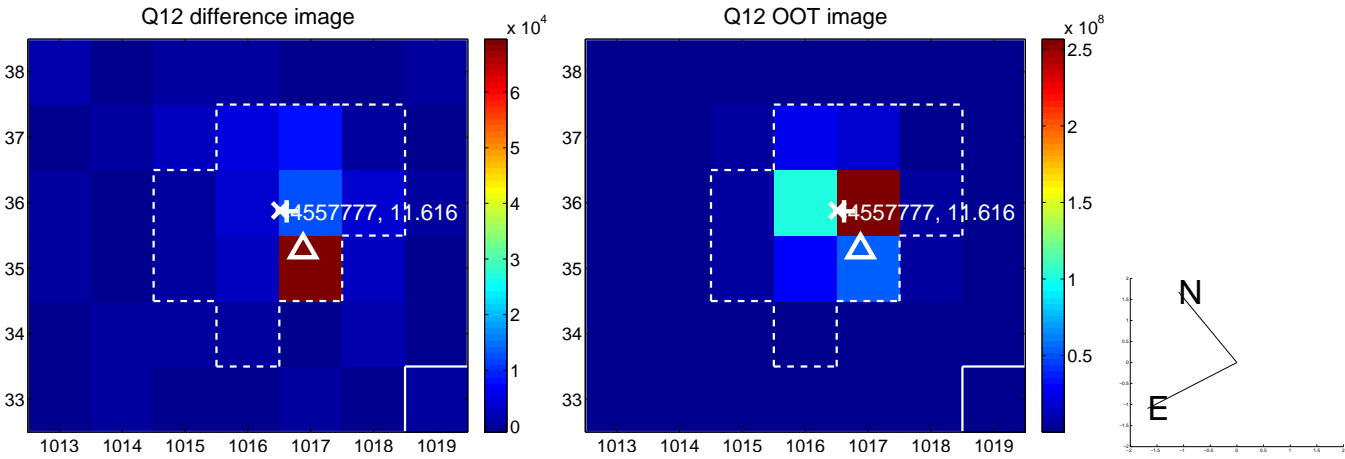
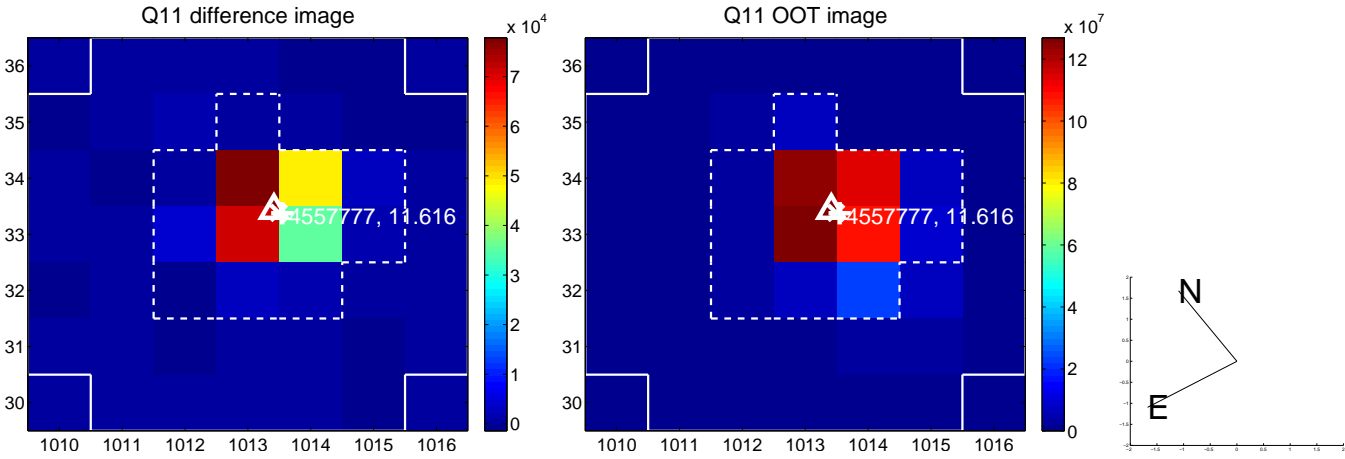
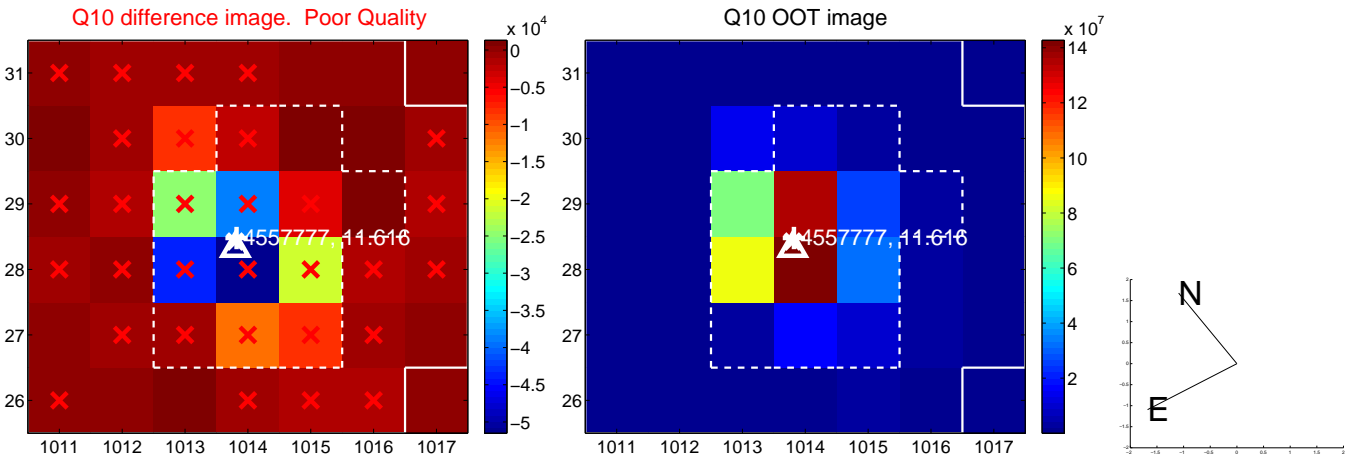
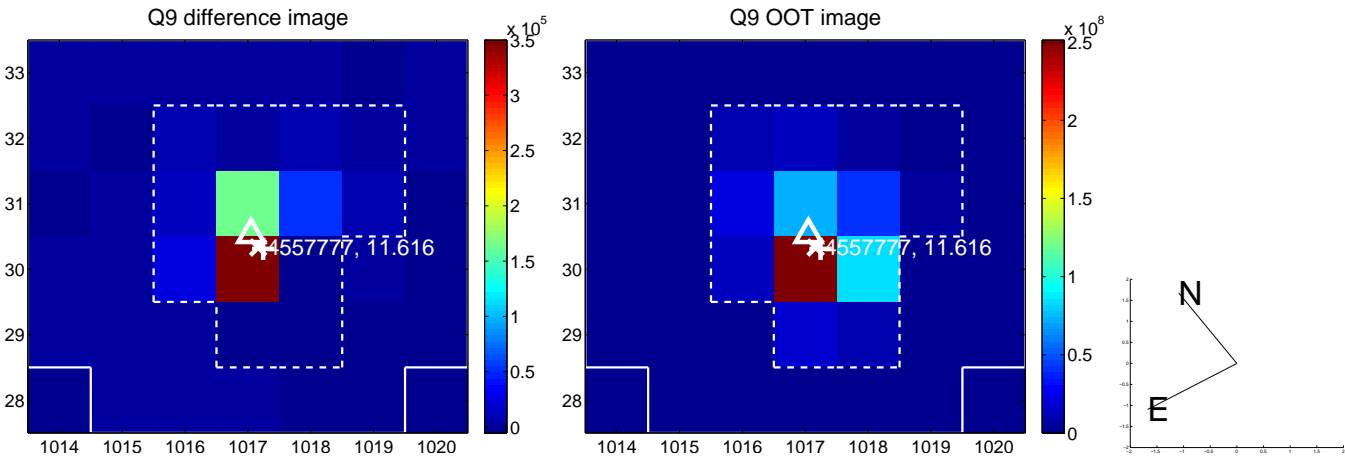
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

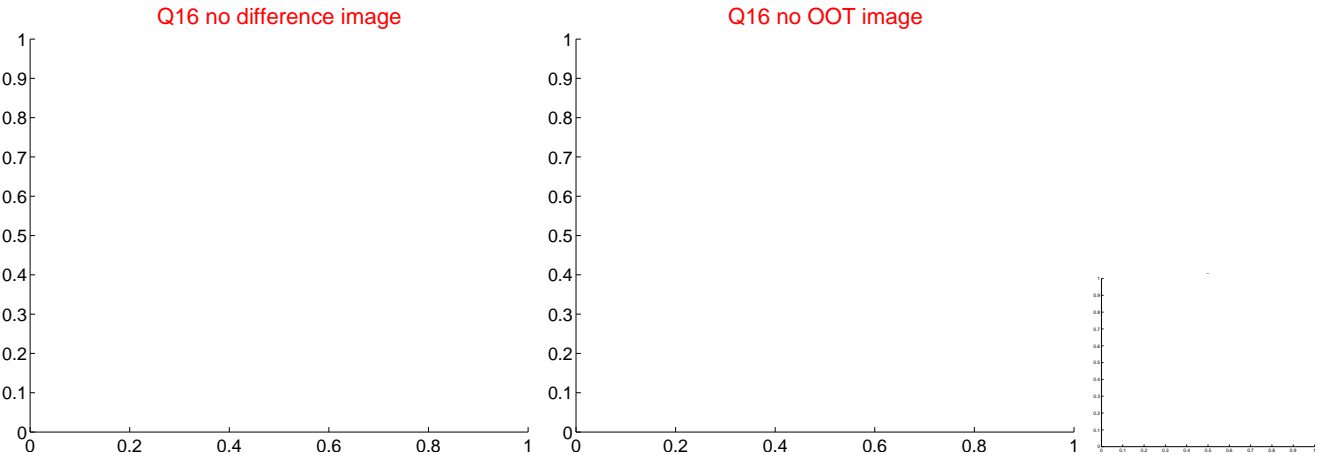
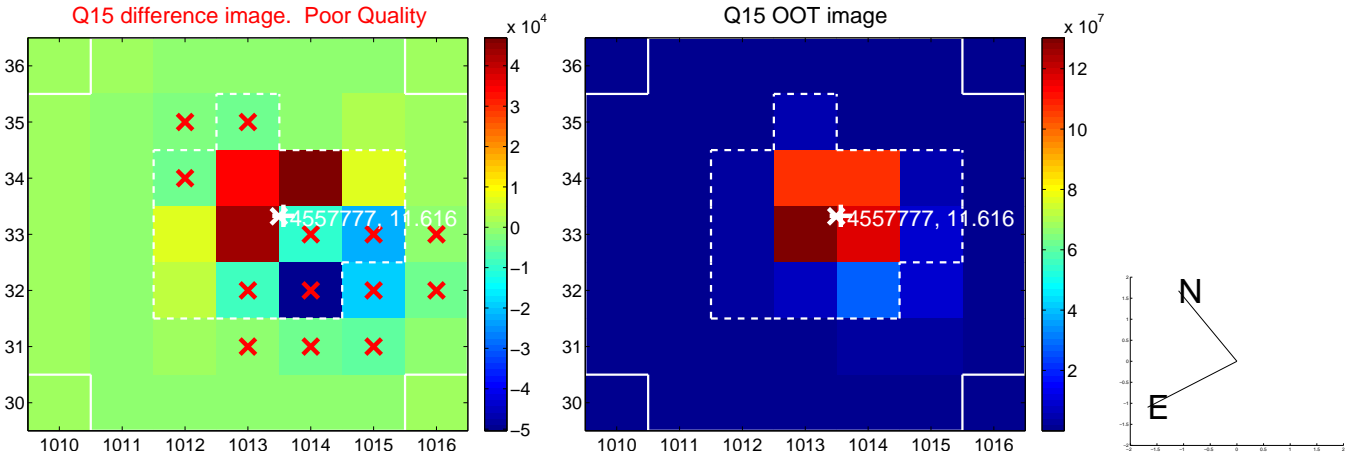
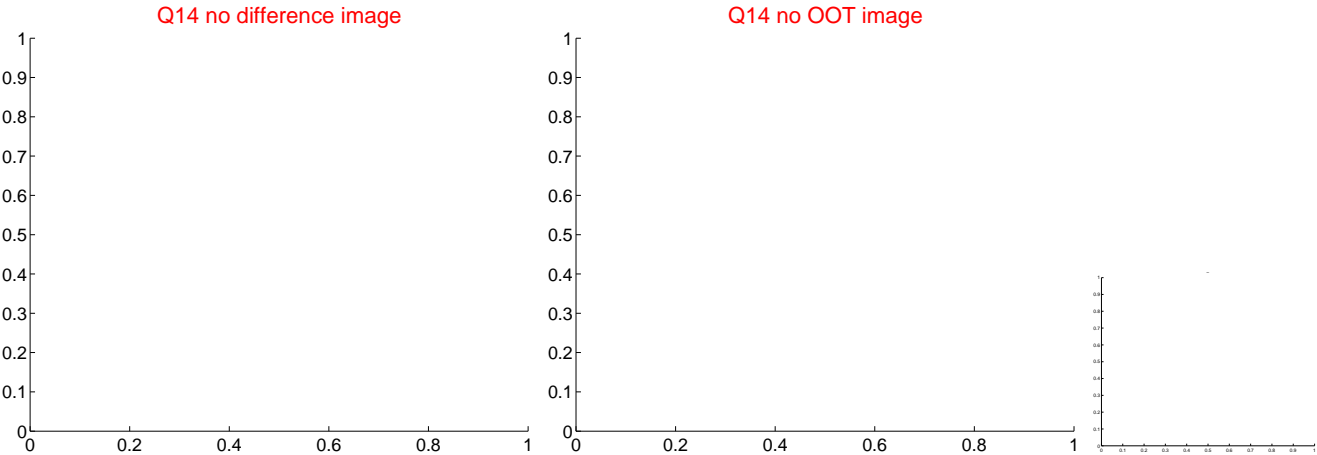
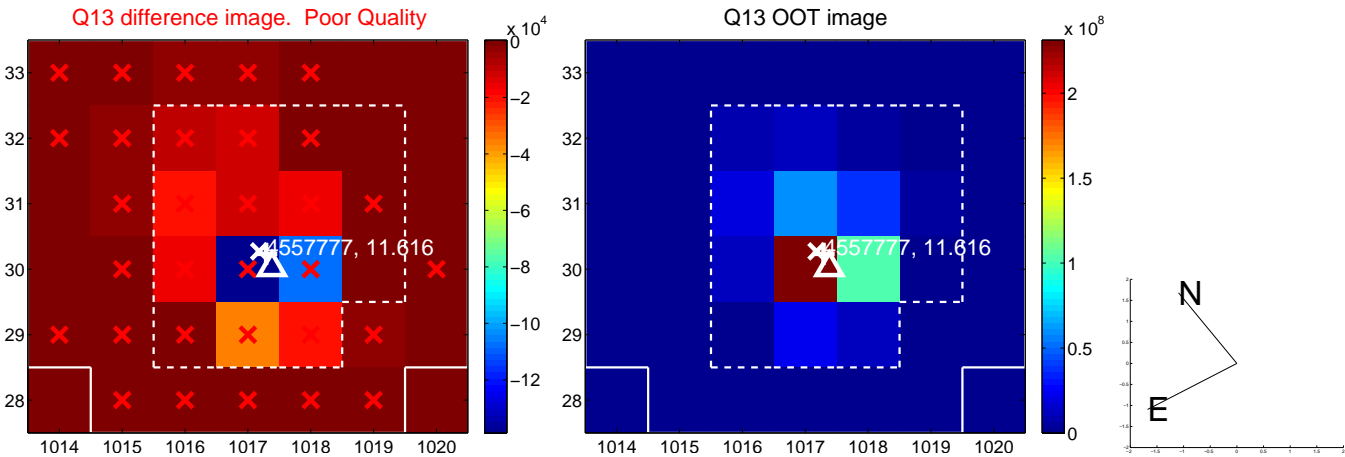


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

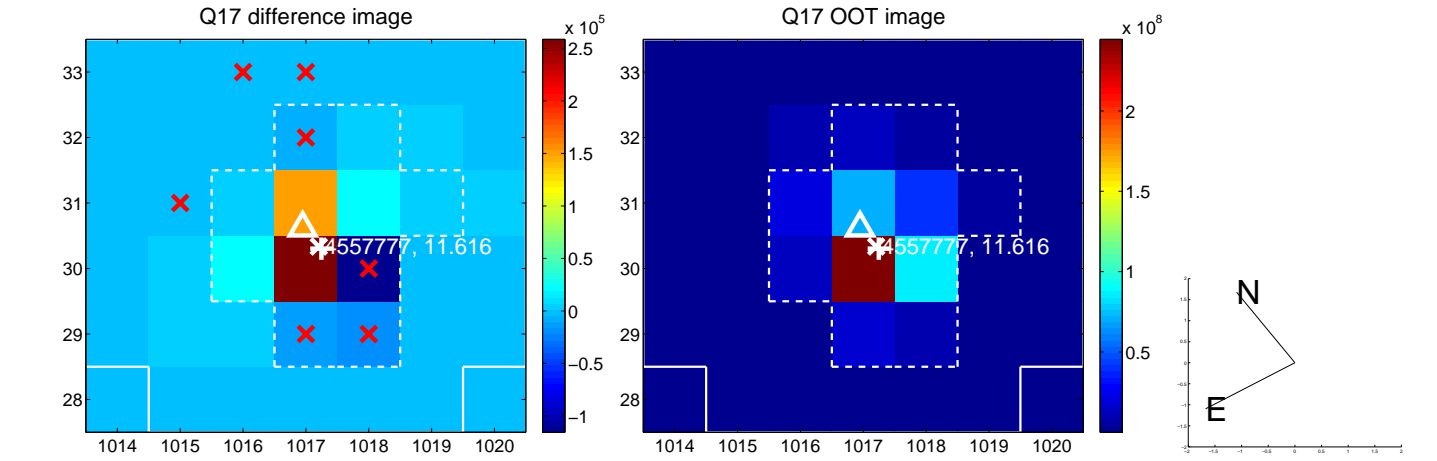




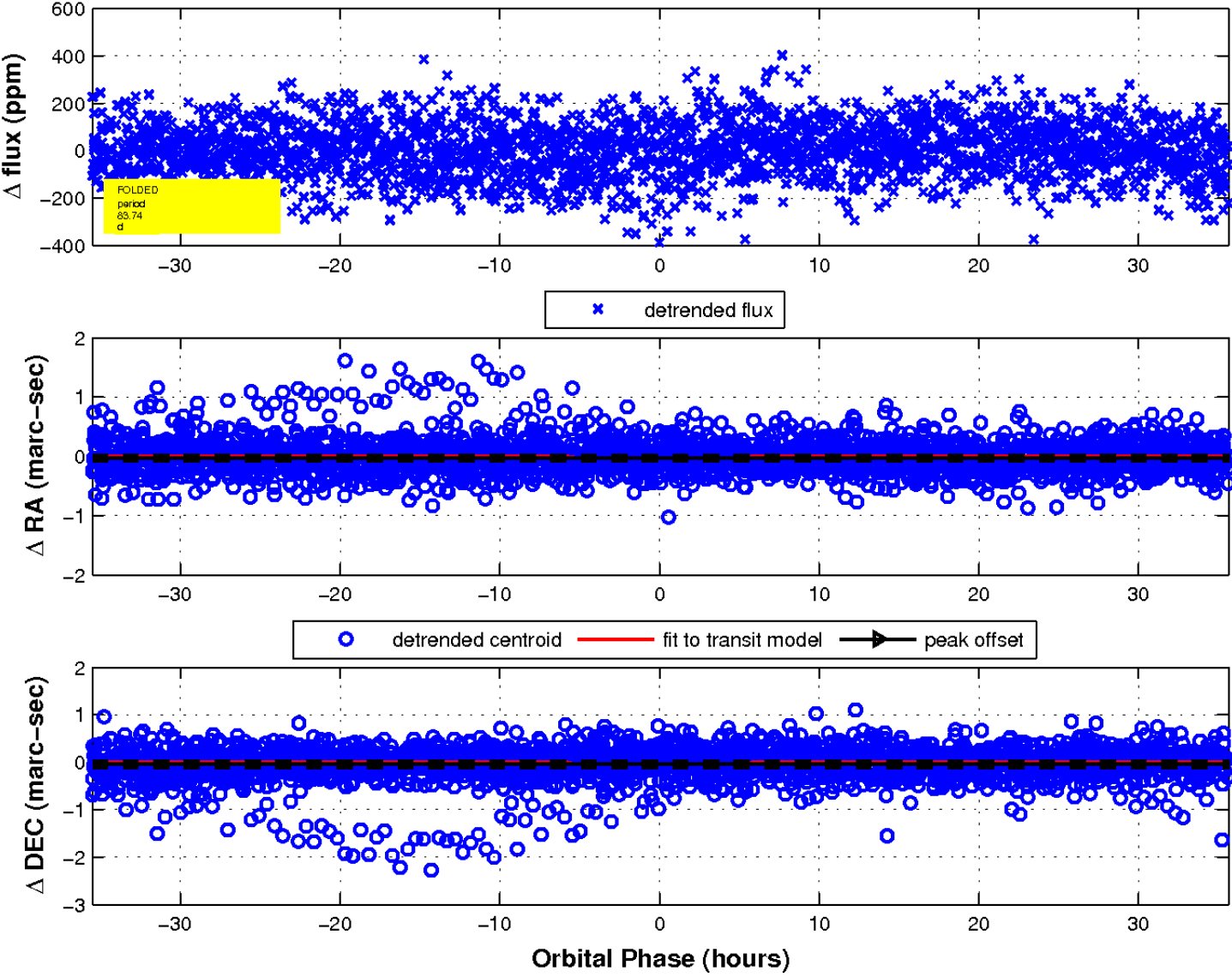
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

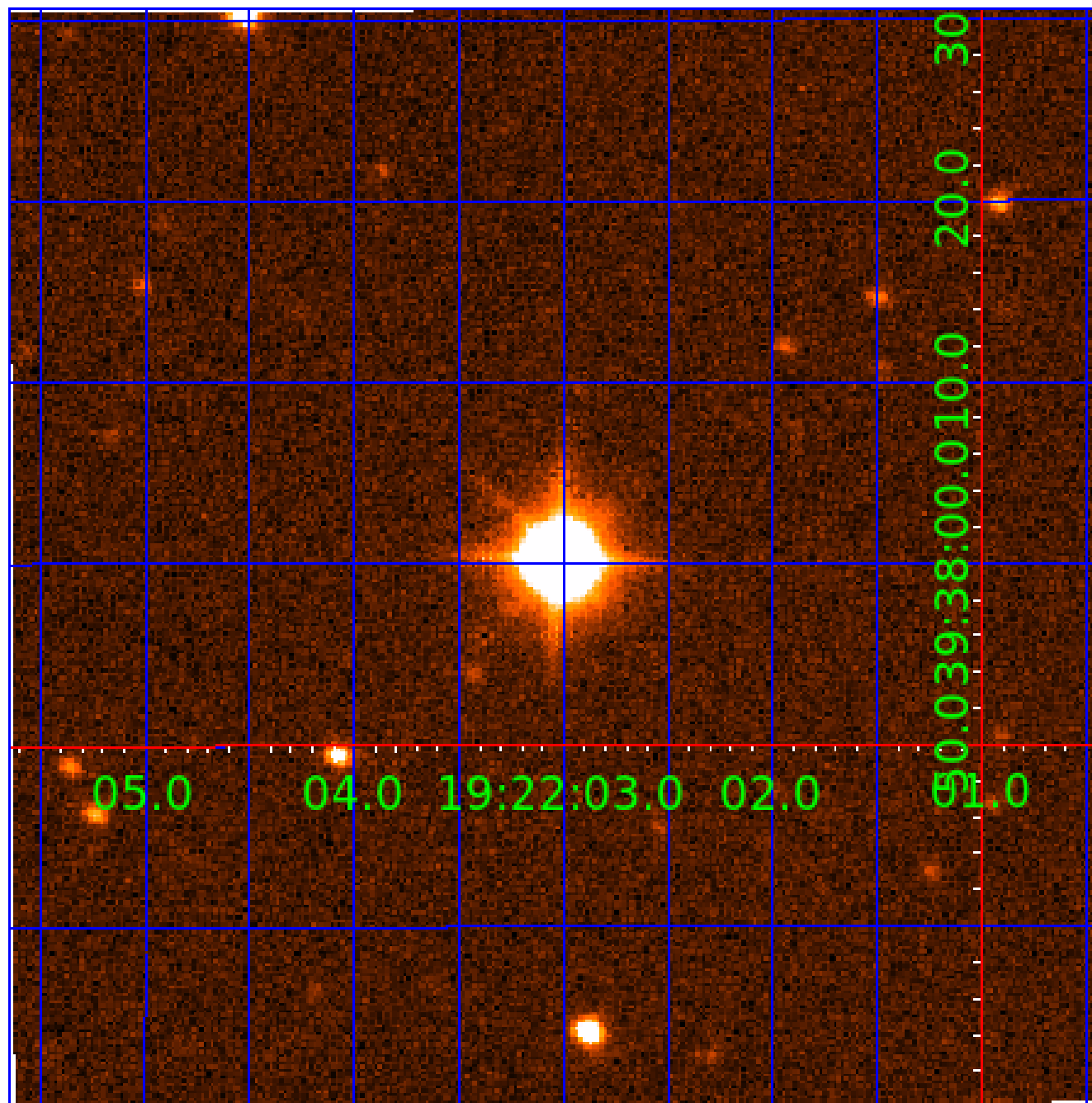


fluxWeightedCentroids, Planet 3 of 5



UKIRT Image

Declination



# KIC 004557777

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004557777-01	OBS	No	1.873514	131.780356	13.2	1.931	8.7	5.5	3.02	6985	1.24	15246.41
004557777-02	OBS	No	0.749524	132.204364	2.4	4.061	7.7	1.8	3.02	6985	0.50	51720.55
004557777-03	OBS	No	83.736266	165.215381	52.1	11.889	8.1	2.9	3.02	6985	2.54	96.12
004557777-04	OBS	No	60.443129	149.653217	86.1	13.470	8.0	5.5	3.02	6985	3.07	148.45
004557777-05	OBS	No	80.512246	208.208197	119.1	2.469	8.4	5.8	3.02	6985	3.66	101.29

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004557777-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA_TRACKER—SWEET_NTL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004557777-02	OBS	FP	0.00	1	0	0	0	LPP_DV
004557777-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004557777-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004557777-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

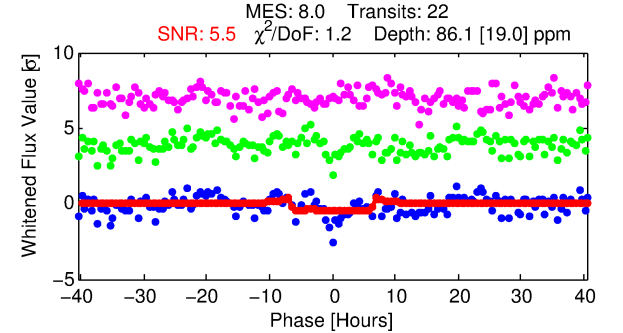
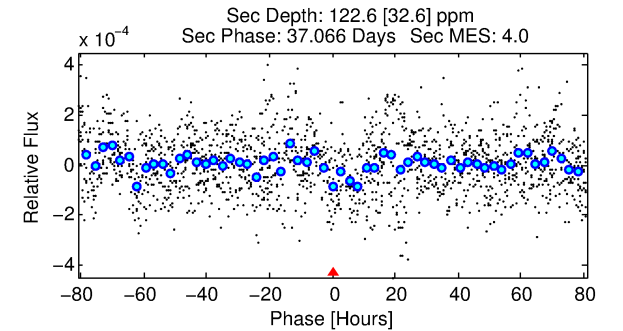
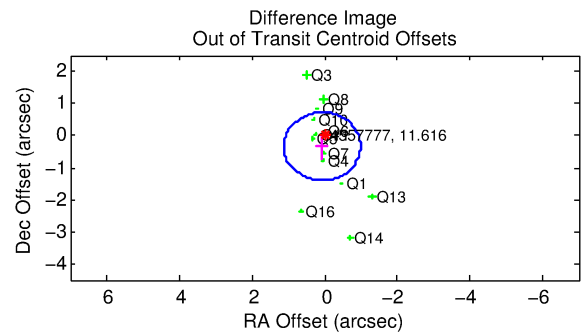
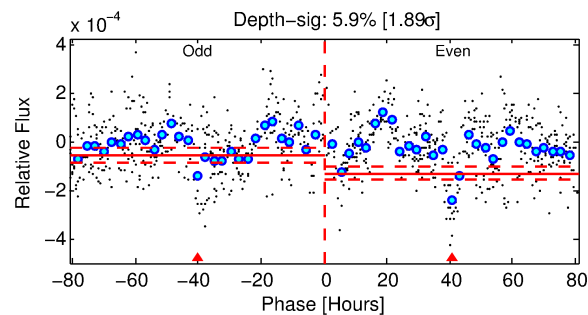
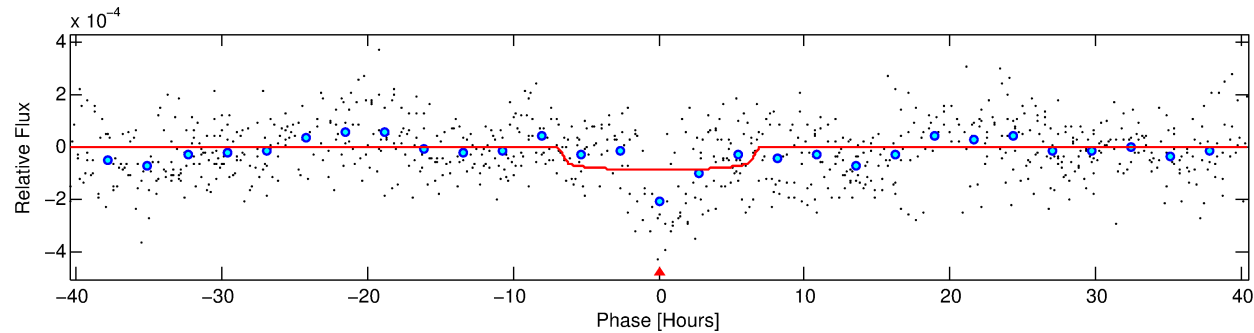
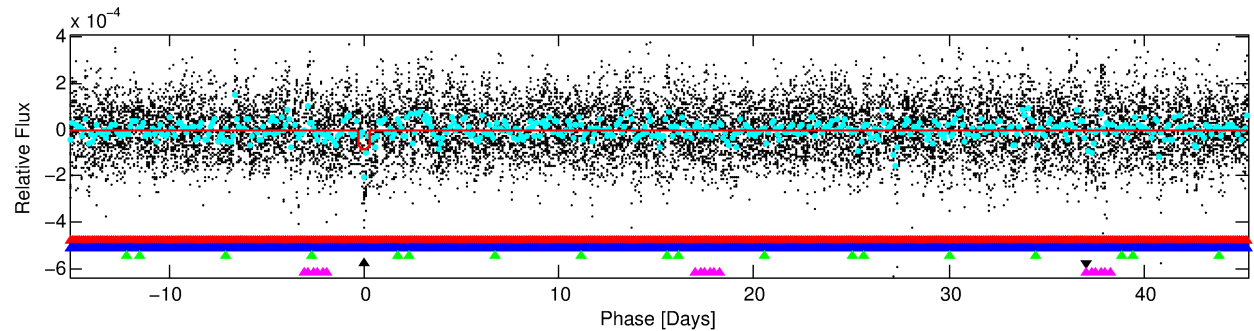
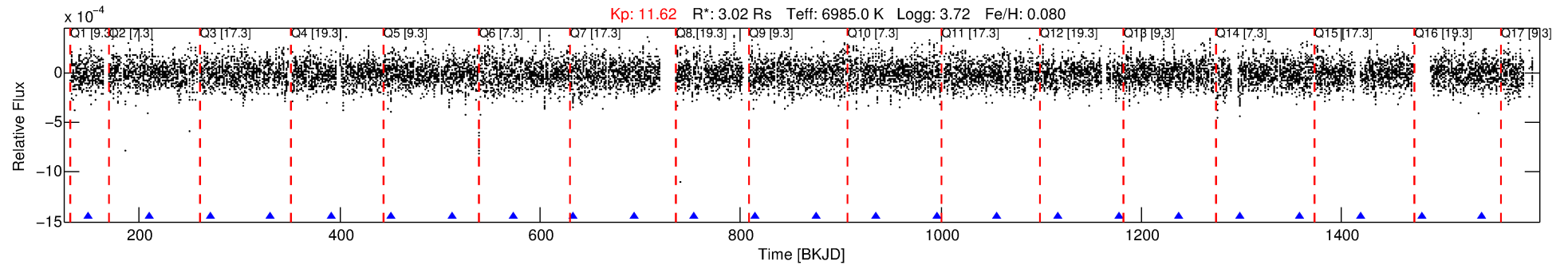
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 004557777-04

No Significant Match Found

# DV One-Page Summary

KIC: 4557777 Candidate: 4 of 5 Period: 60.443 d



## DV Fit Results:

Period = 60.44313 [0.00112] d  
Epoch = 149.6532 [0.0162] BKJD  
Rp/R\* = 0.0093 [0.0025]  
a/R\* = 22.05 [30.24]  
b = 0.78 [0.70]  
Seff = 148.45 [77.67]  
Teq = 890 [116] K  
Rp = 3.07 [1.32] Re  
a = 0.3626 [0.1157] AU  
Ag = 939.56 [737.68] [1.27 $\sigma$ ]  
Teffp = 7619 [1169] K [5.73 $\sigma$ ]

## DV Diagnostic Results:

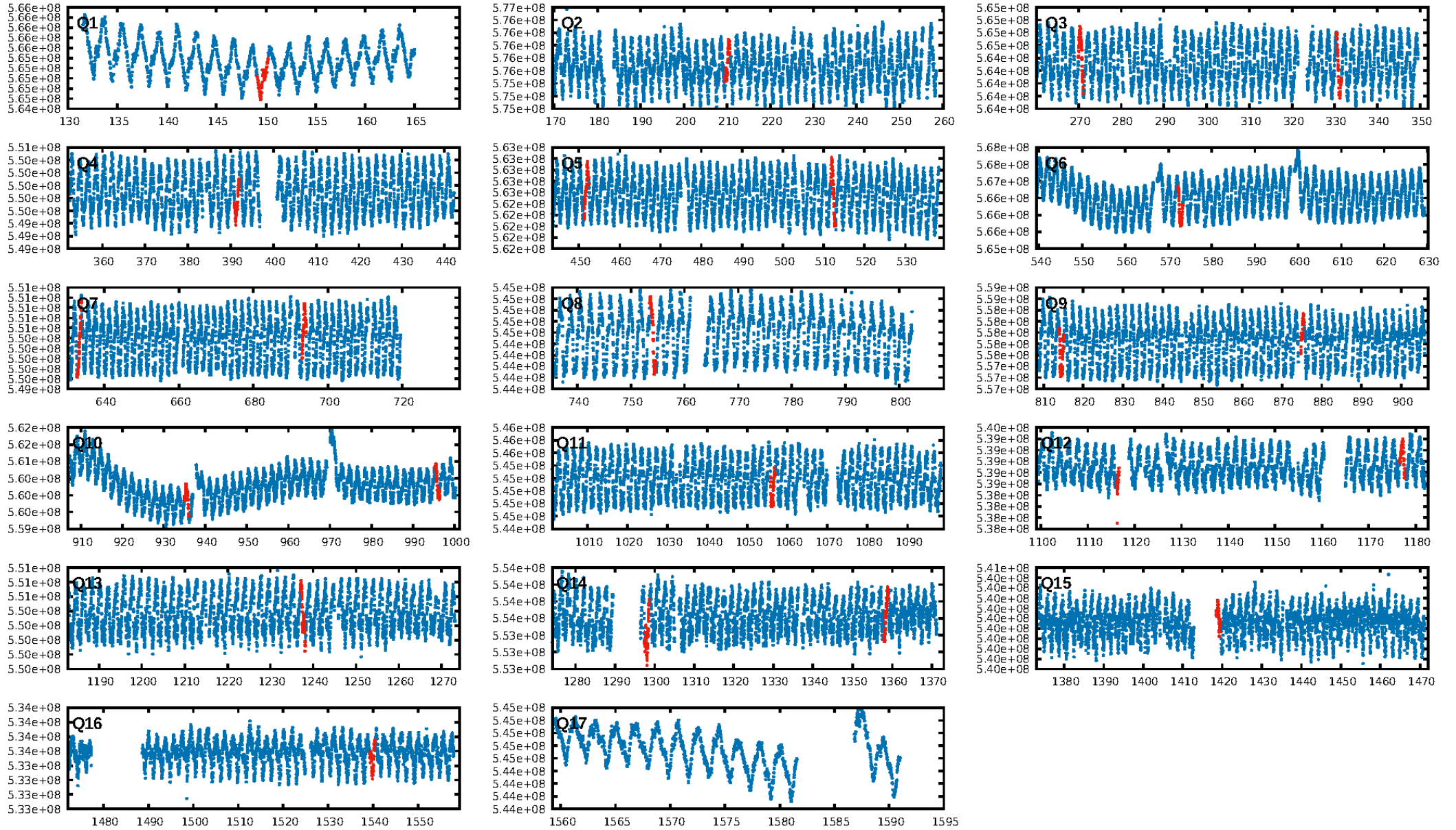
ShortPeriod-sig: 100.0% [103.30 $\sigma$ ]  
LongPeriod-sig: 100.0% [35.17 $\sigma$ ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 3.00e-10  
RollingBand-fgt: 1.00 [21/21]  
GhostDiagnostic-chr: -0.8704  
Centroid-sig: 59.7%  
Centroid-so: 0.314 arcsec [0.53 $\sigma$ ]  
OotOffset-rm: 0.345 arcsec [0.98 $\sigma$ ]  
KicOffset-rm: 0.499 arcsec [1.21 $\sigma$ ]  
OotOffset-st: 3/3/3/4 [13]  
KicOffset-st: 3/3/3/4 [13]  
DiffImageQuality-fgm: 0.62 [8/13]  
DiffImageOverlap-fno: 0.00 [0/14]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 20:26:03 Z

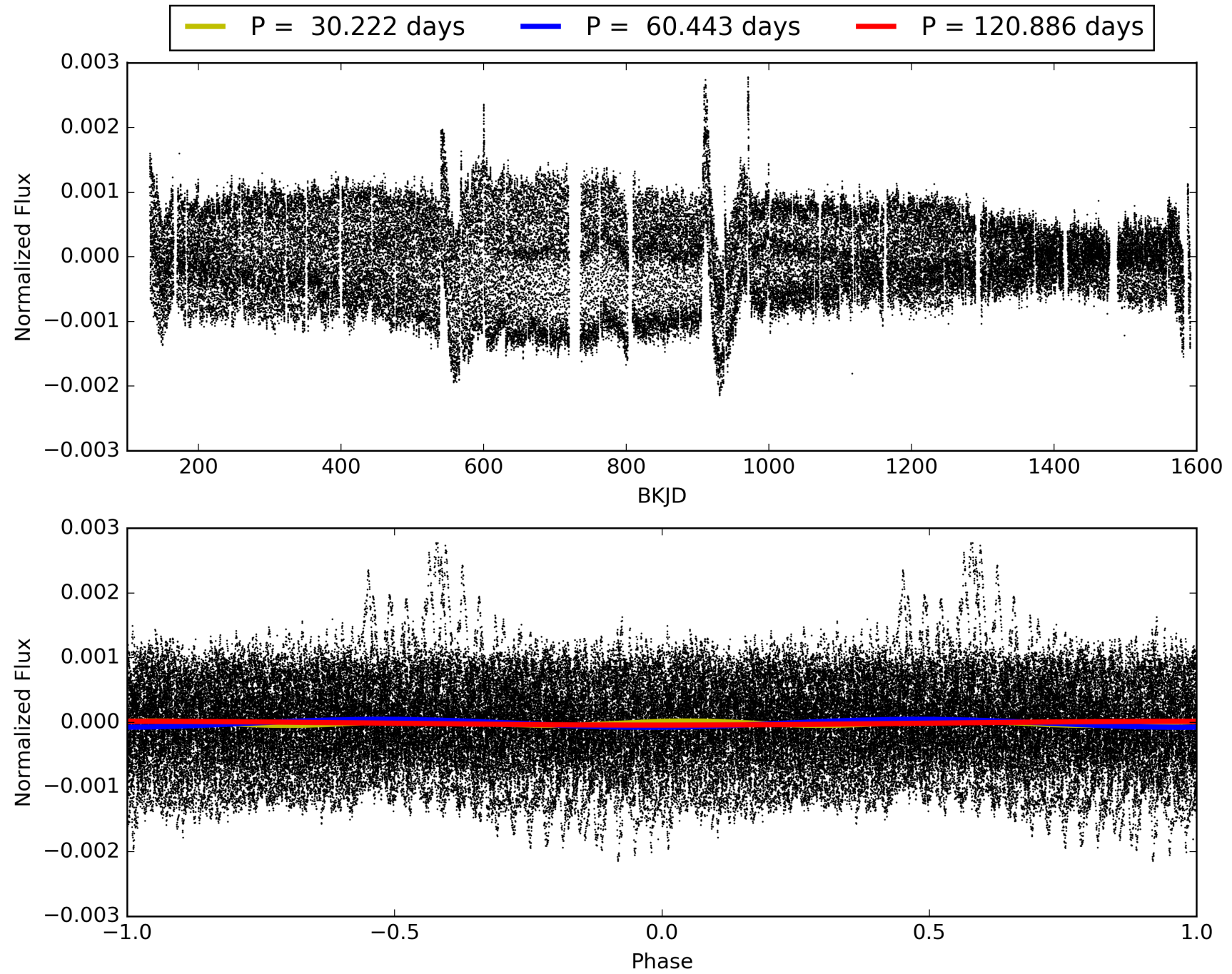
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 004557777-04, PDC Light Curves

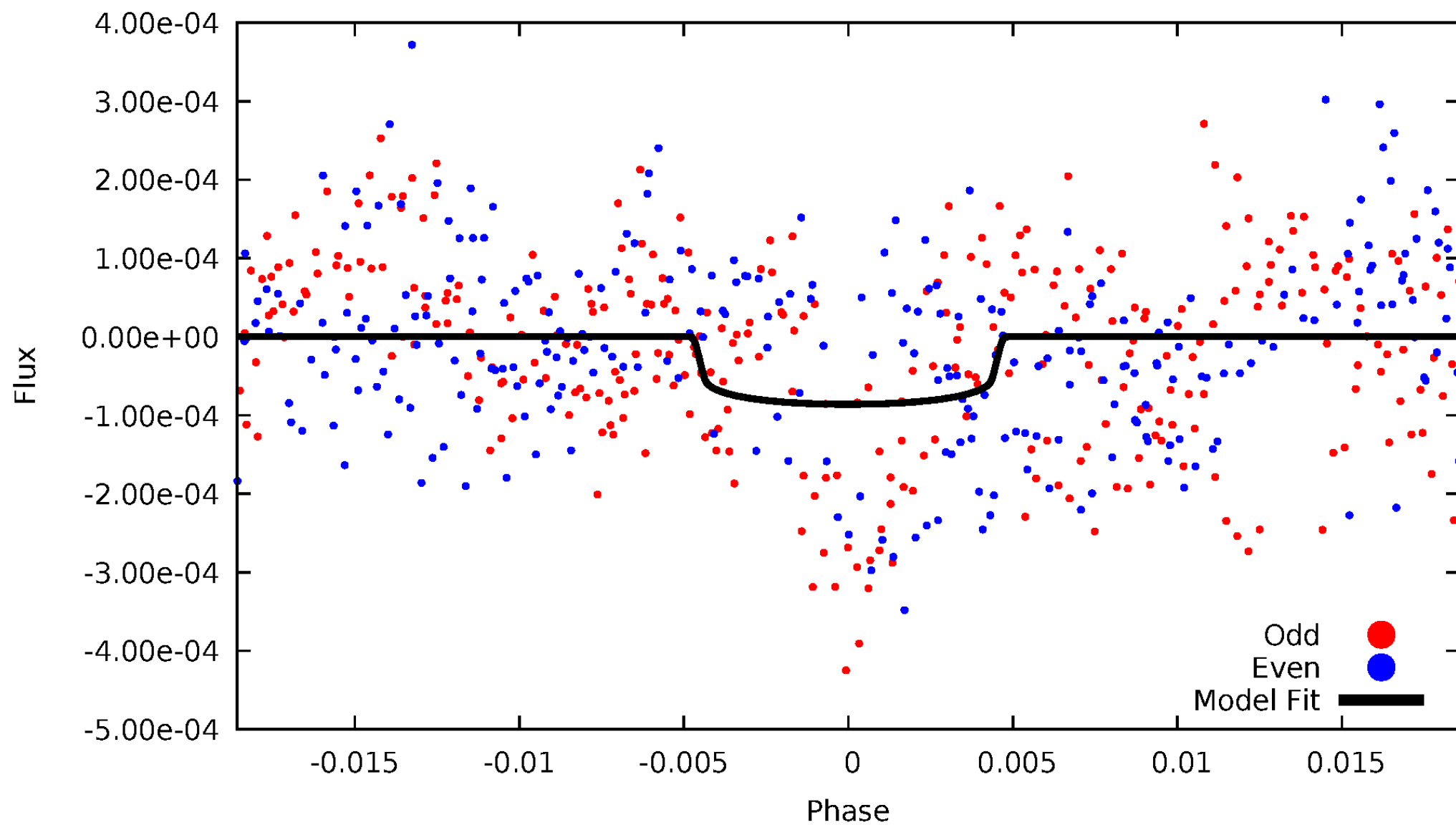


TCE 004557777-04



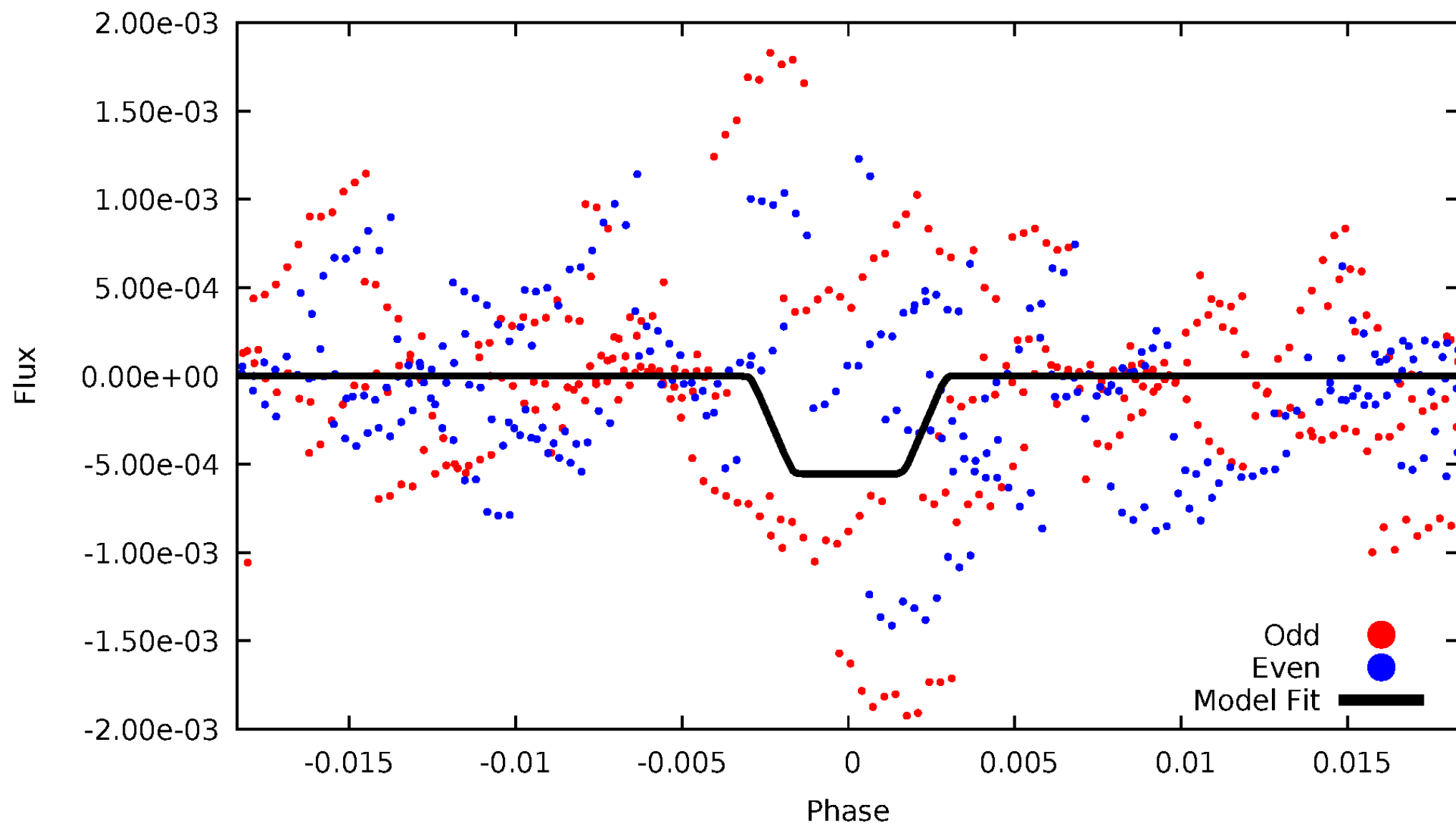
# DV Odd/Even

TCE 004557777-04



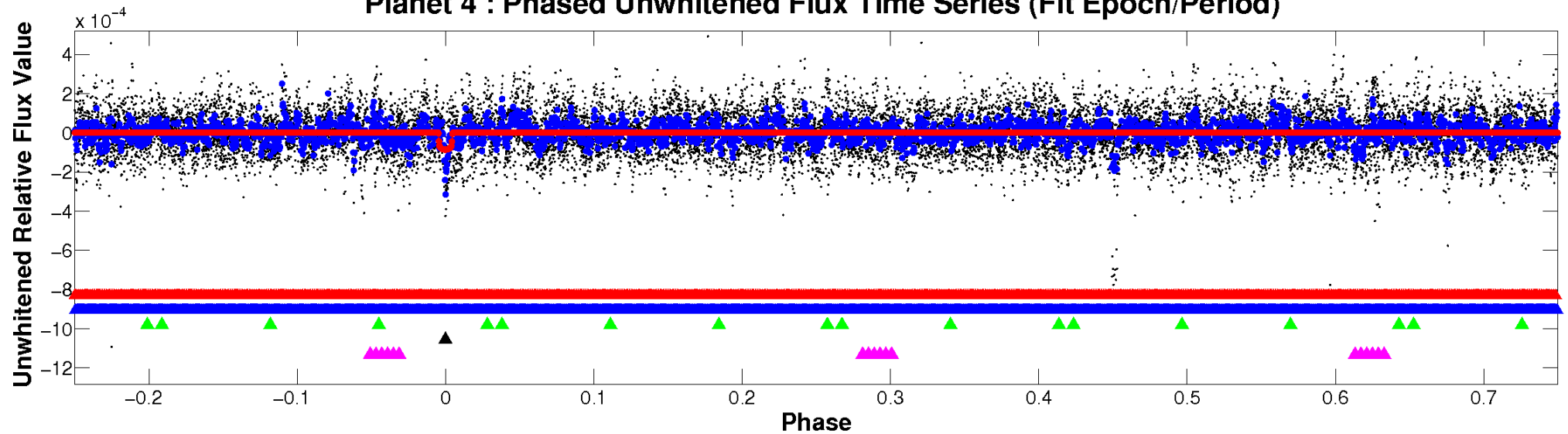
# ALT Odd/Even

TCE 004557777-04

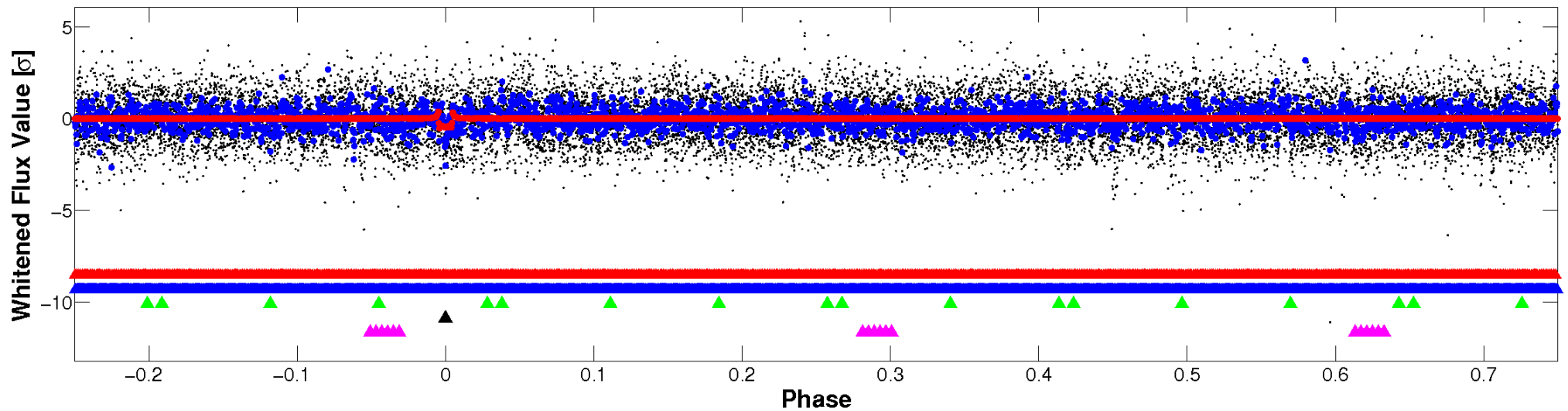


# Non-Whitened Vs. Whitened Light Curve

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



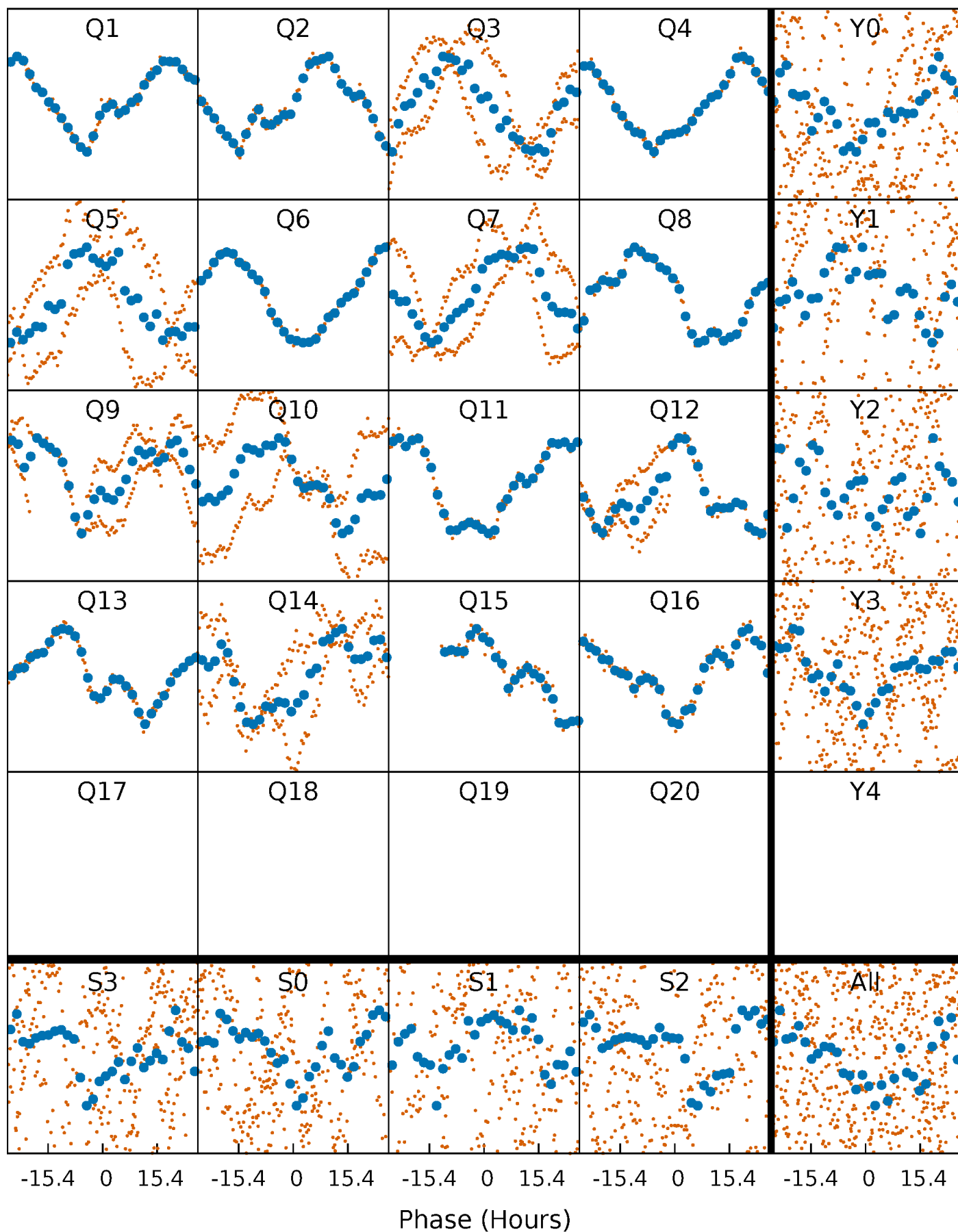
## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)





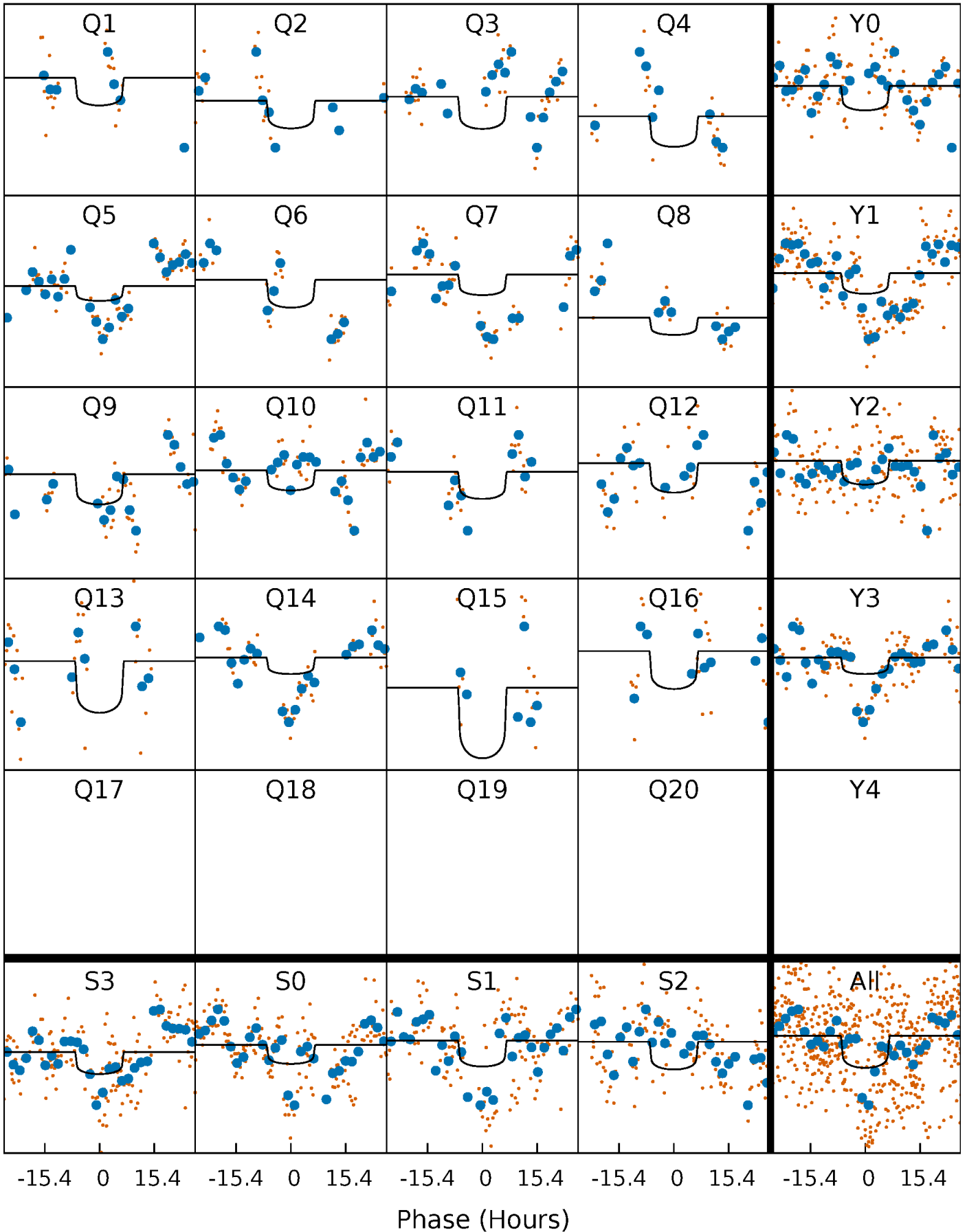
# PDC Quarter-Phased Transit Curves

TCE 004557777-04 P= 60.443129 Days  $T_0=149.653217$  (BKJD)



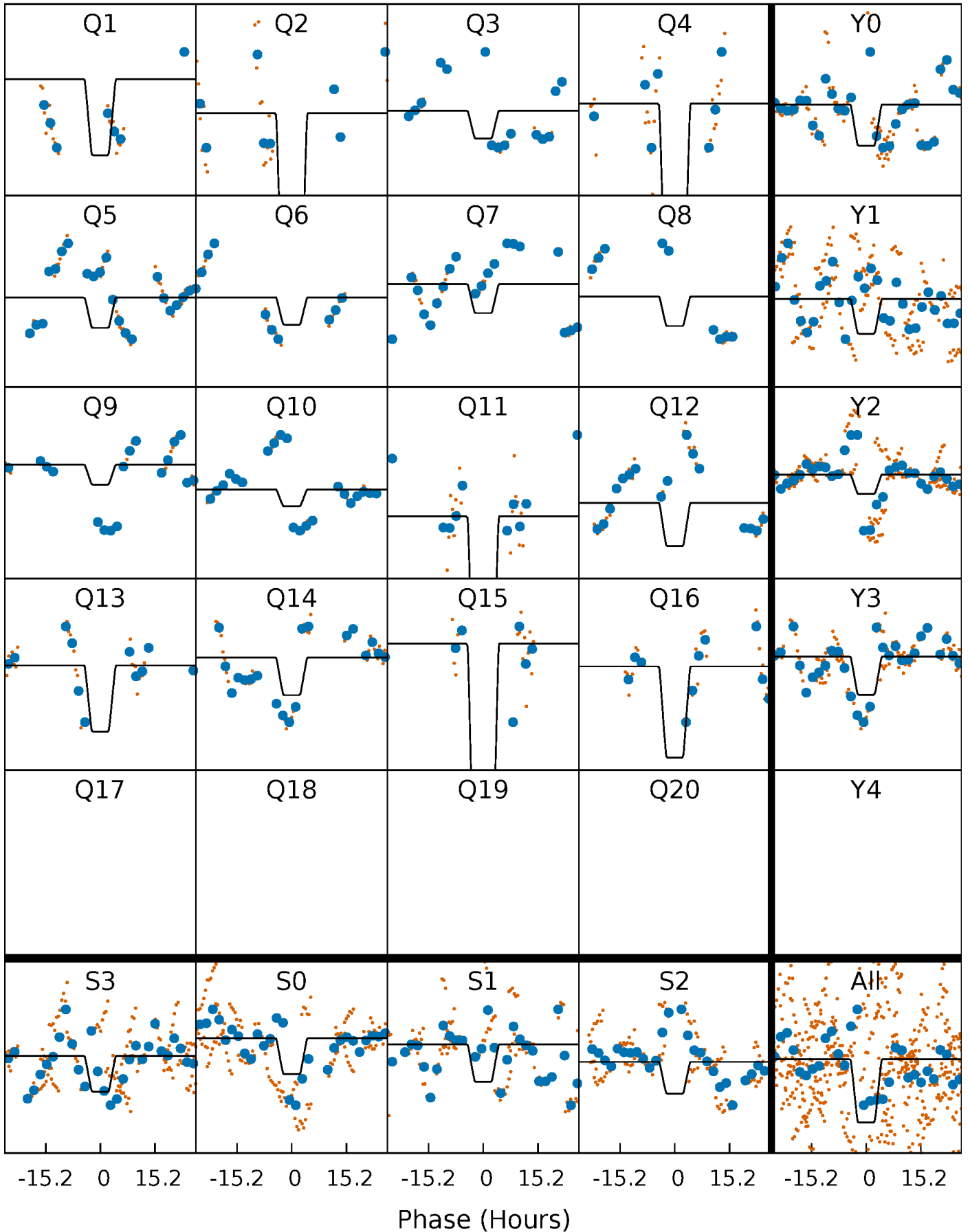
# DV Quarter-Phased Transit Curves

TCE 004557777-04     $P = 60.443129$  Days     $T_0 = 149.653217$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

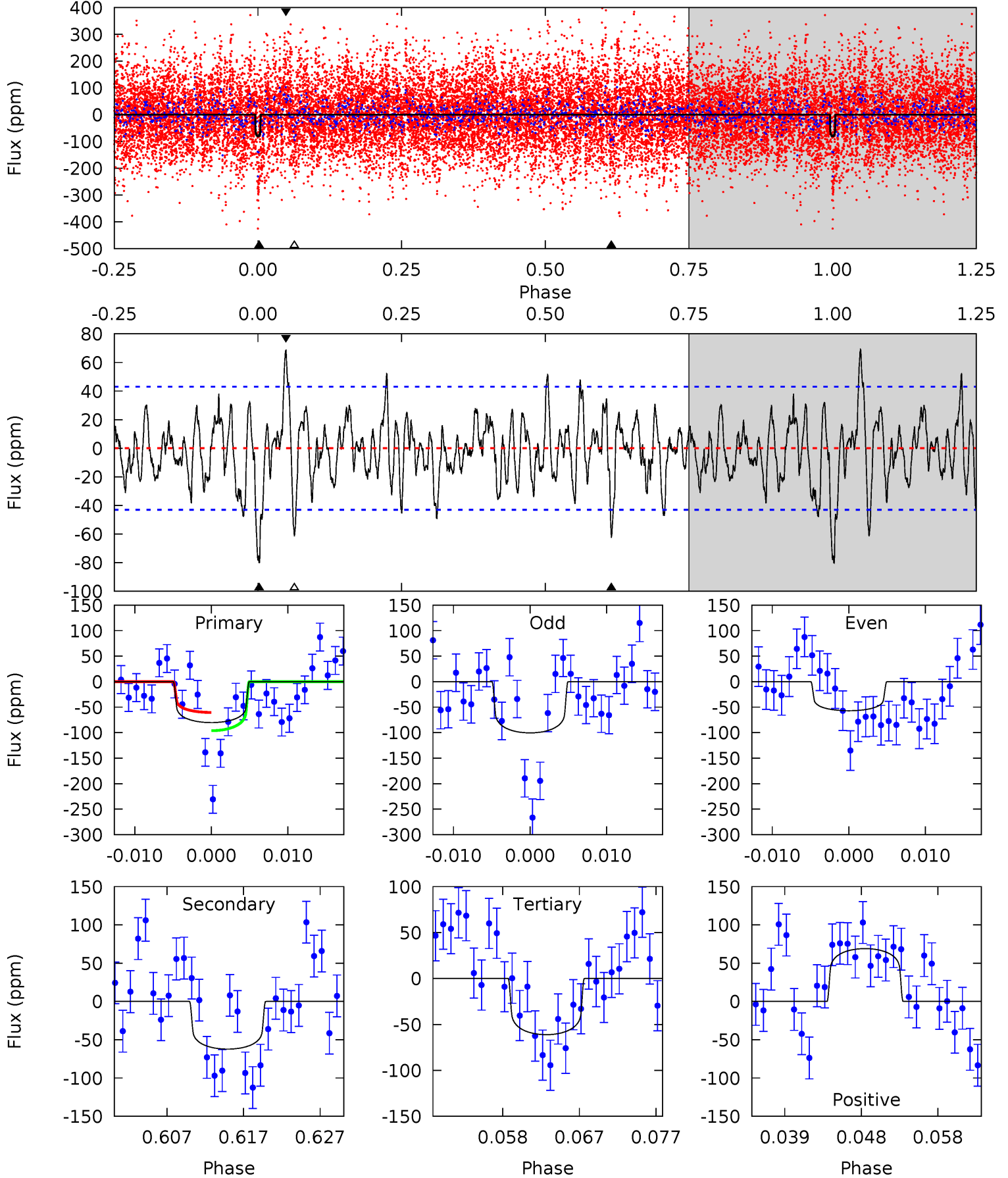
TCE 004557777-04     $P = 60.446188$  Days     $T_0 = 149.652269$  (BKJD)



# DV Model-Shift Uniqueness Test

004557777-04, P = 60.443129 Days, E = 89.210088 Days

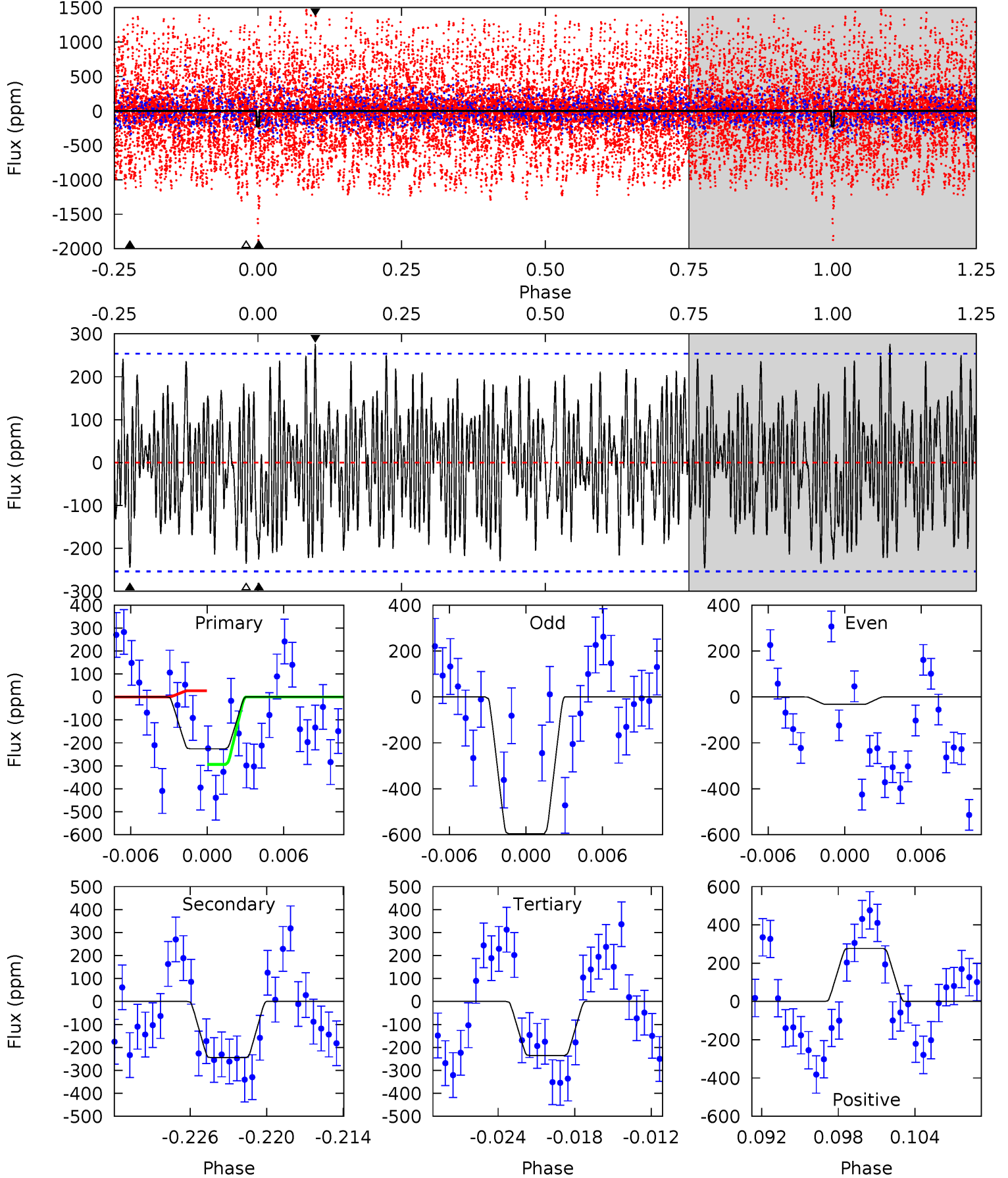
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.39	7.28	7.15	8.07	5.03	2.59	2.21	2.24	1.31	0.13	-0.79	2.53	3.79	0.46	2.07



# Alt Model-Shift Uniqueness Test

004557777-04, P = 60.446188 Days, E = 89.206081 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
4.56	4.94	4.75	5.58	5.12	2.74	2.04	-0.19	-1.02	0.19	-0.64	5.73	-3.72	0.53	2.58



### Stellar Parameters For KIC 004557777

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6985^{+175}_{-228}$	$3.717^{+0.296}_{-0.092}$	$0.080^{+0.250}_{-0.300}$	$3.025^{+0.436}_{-1.017}$	$1.738^{+0.213}_{-0.260}$	$0.088^{+0.168}_{-0.027}$
	+3%/-3%	+8%/-2%	+312%/-375%	+14%/-34%	+12%/-15%	+190%/-30%
Source	PHO1	FLK73	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 004557777-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-62 \pm 9$	$2.85^{+0.97}_{-0.83}$	$1217^{+70}_{-95}$	$6379^{+1277}_{-731}$	$549^{+587}_{-239}$
Alt.	$-245 \pm 50$	$7.47^{+1.22}_{-1.38}$	$1224^{+66}_{-104}$	$5650^{+433}_{-380}$	$318^{+163}_{-98}$

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



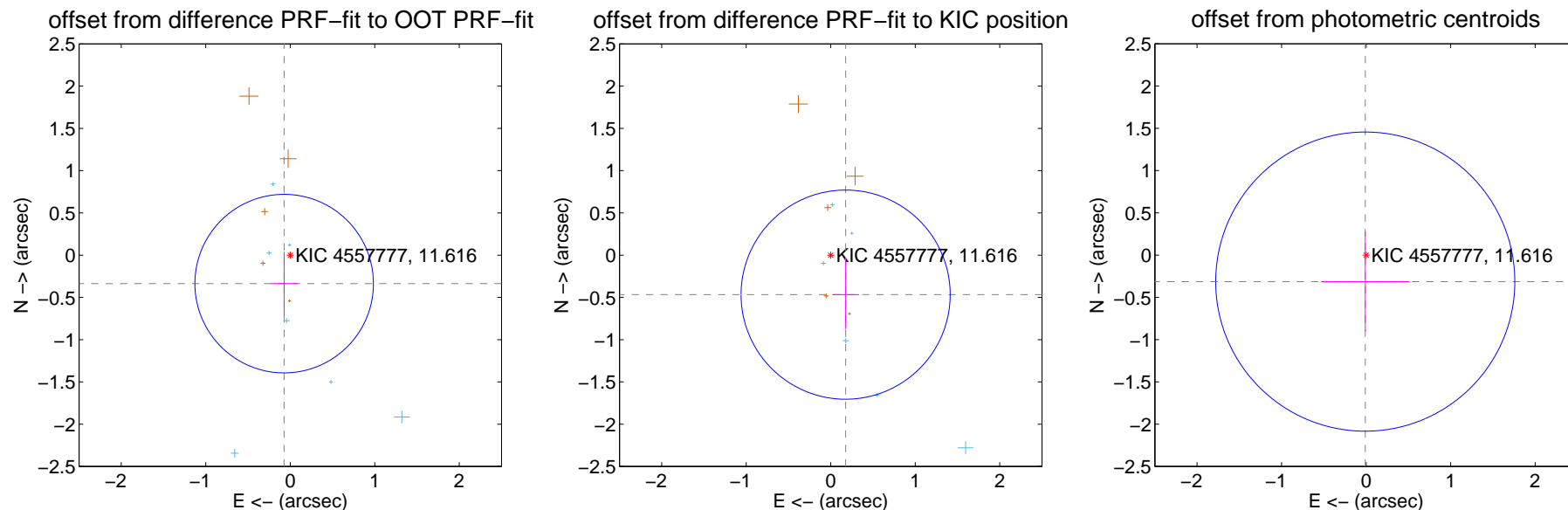
## DV Centroid Data

Supplemental centroid analysis for 004557777-04. **Kepler magnitude: 11.62.** Transit SNR 5.50

There are 8 quarters with good PRF difference image offsets

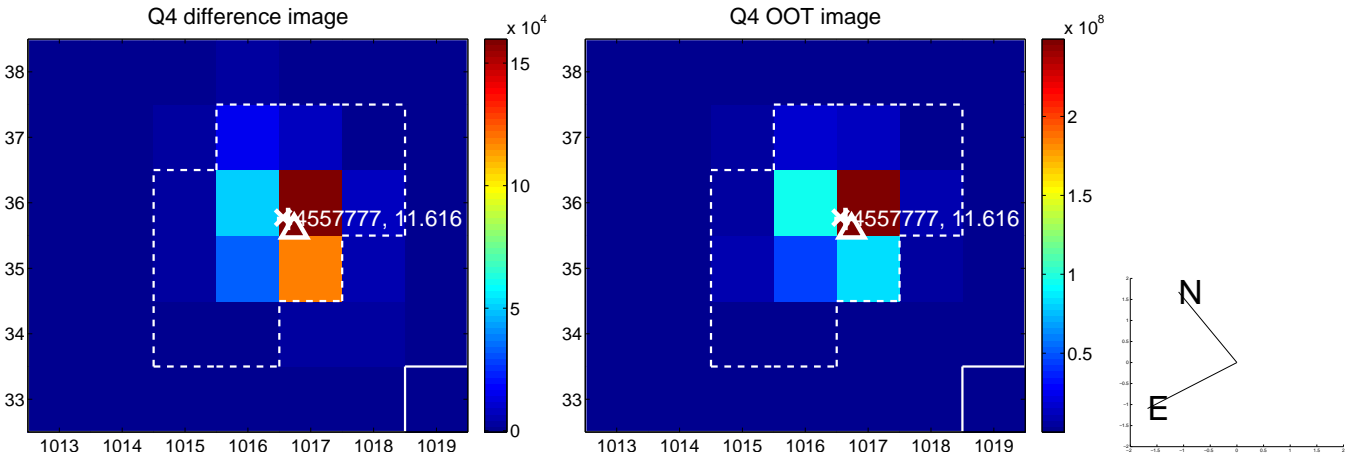
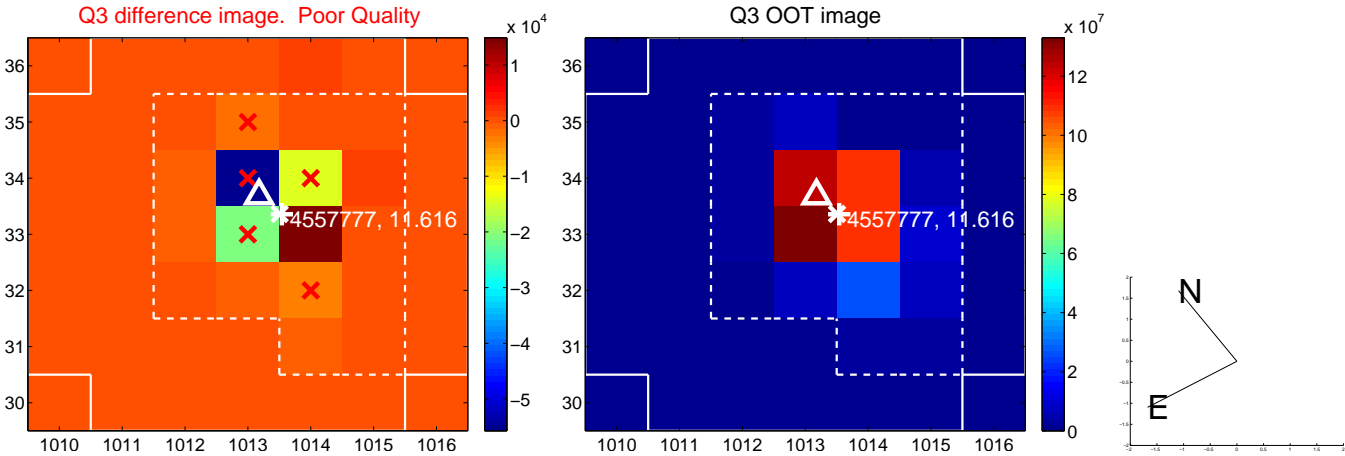
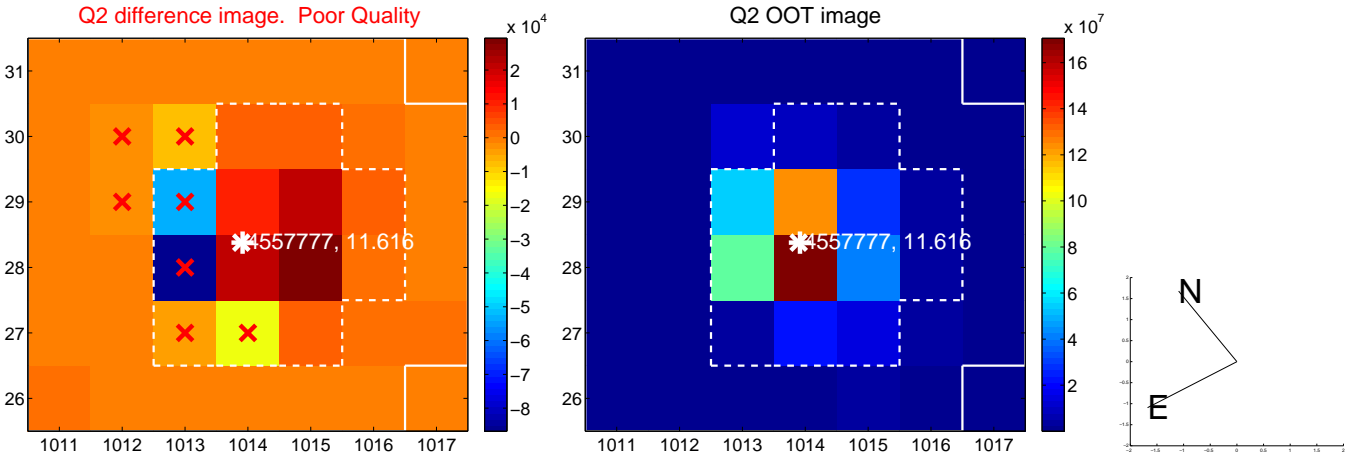
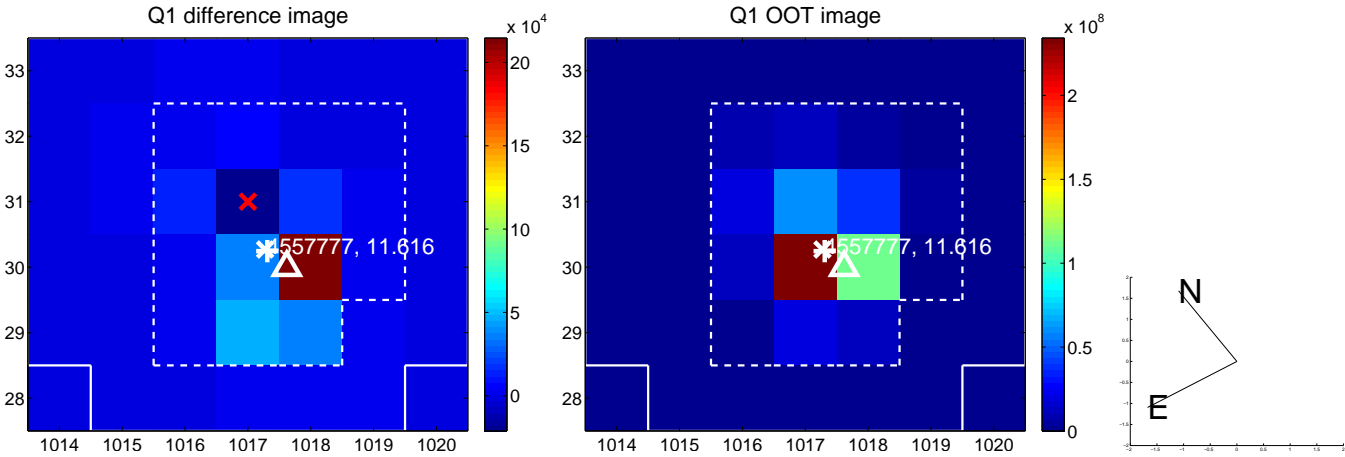
The direct PRF centroid is offset from the target star catalog position by about 0.37 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.345 \pm 0.352$	0.98	$0.072 \pm 0.159$	$-0.337 \pm 0.376$
PRF-fit source offset from KIC position	$0.499 \pm 0.413$	1.21	$-0.177 \pm 0.160$	$-0.467 \pm 0.406$
photometric centroid source offset	$0.31 \pm 0.59$	0.53	$0.01 \pm 0.52$	$-0.31 \pm 0.59$

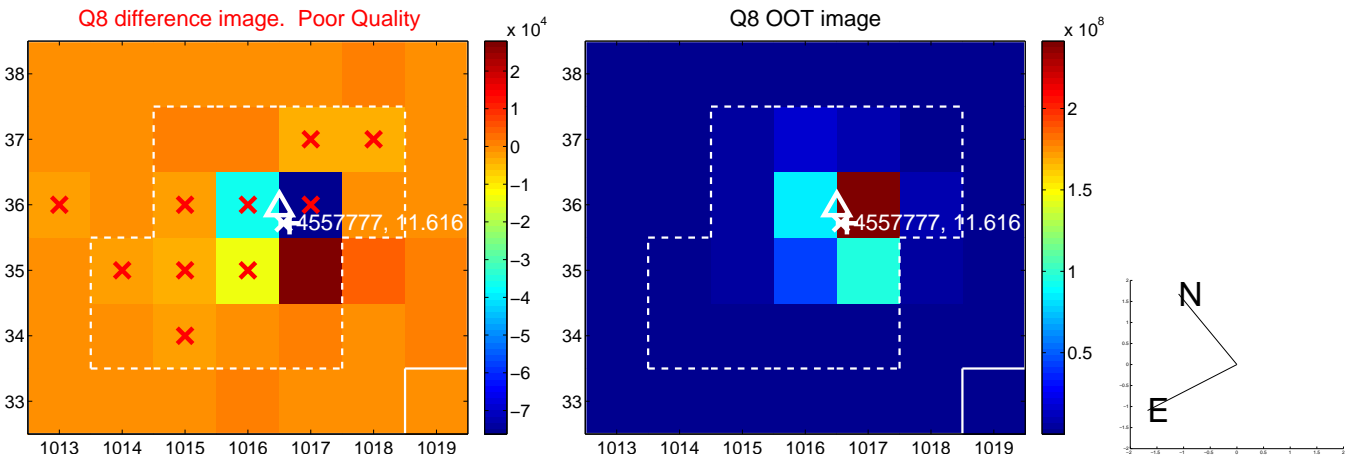
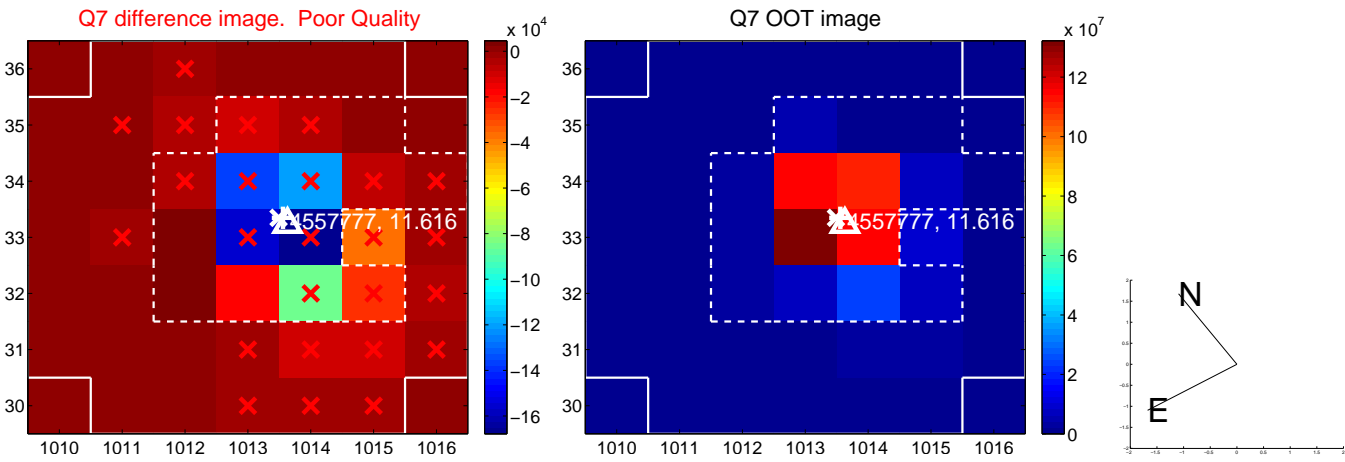
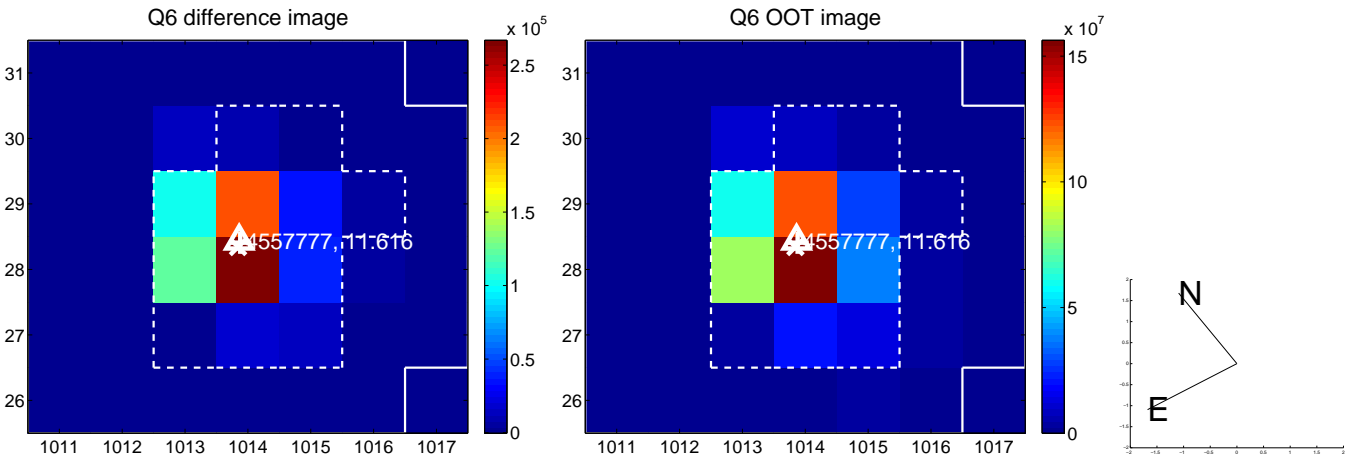
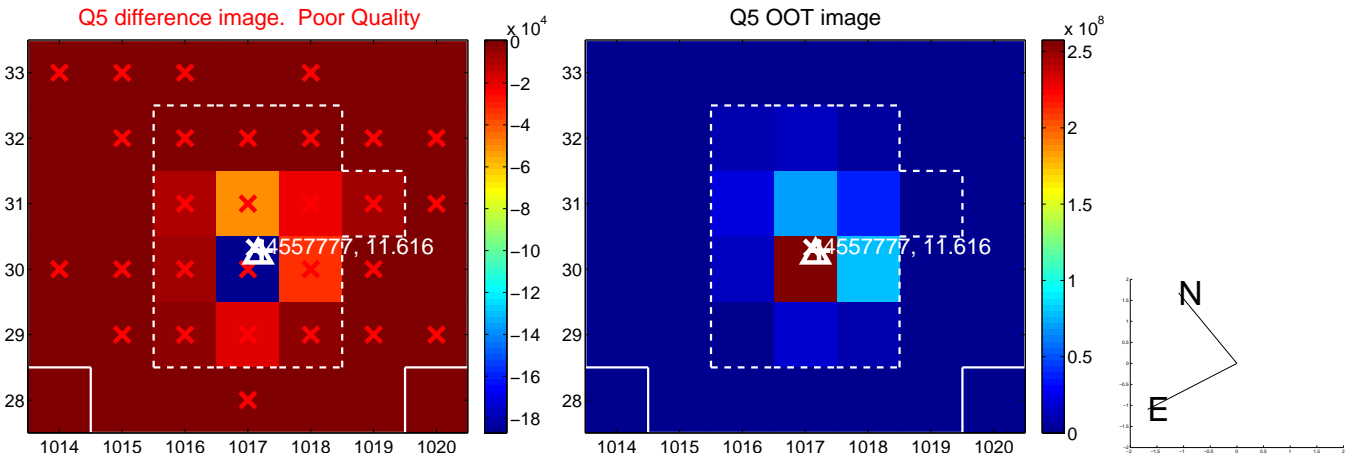


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

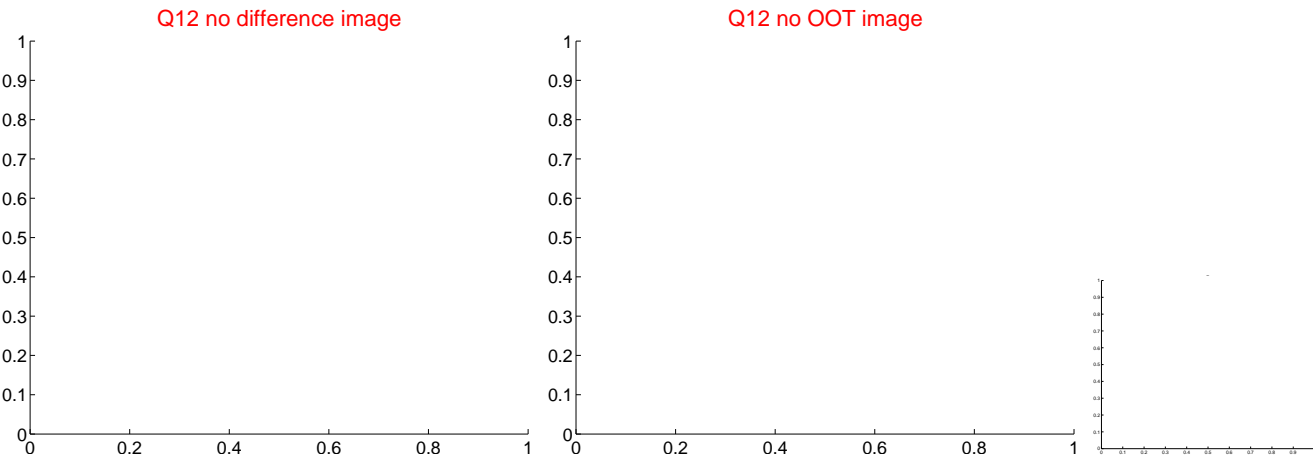
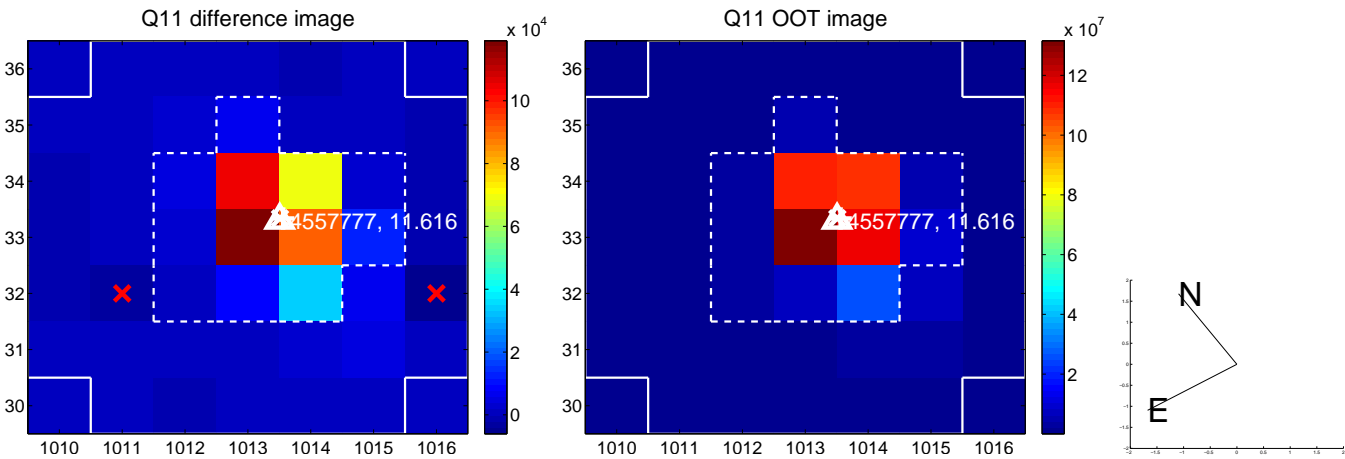
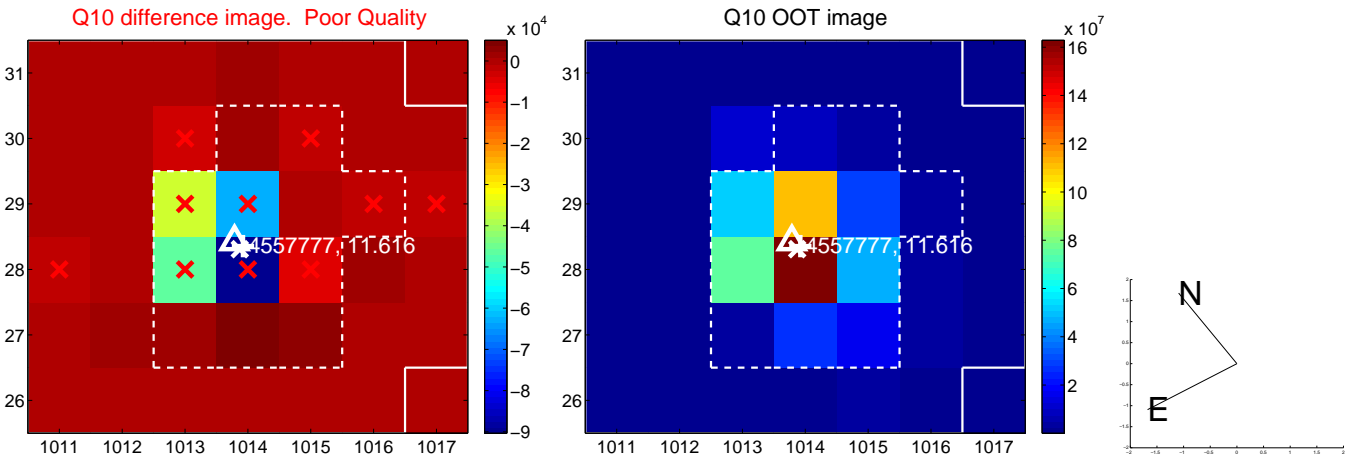
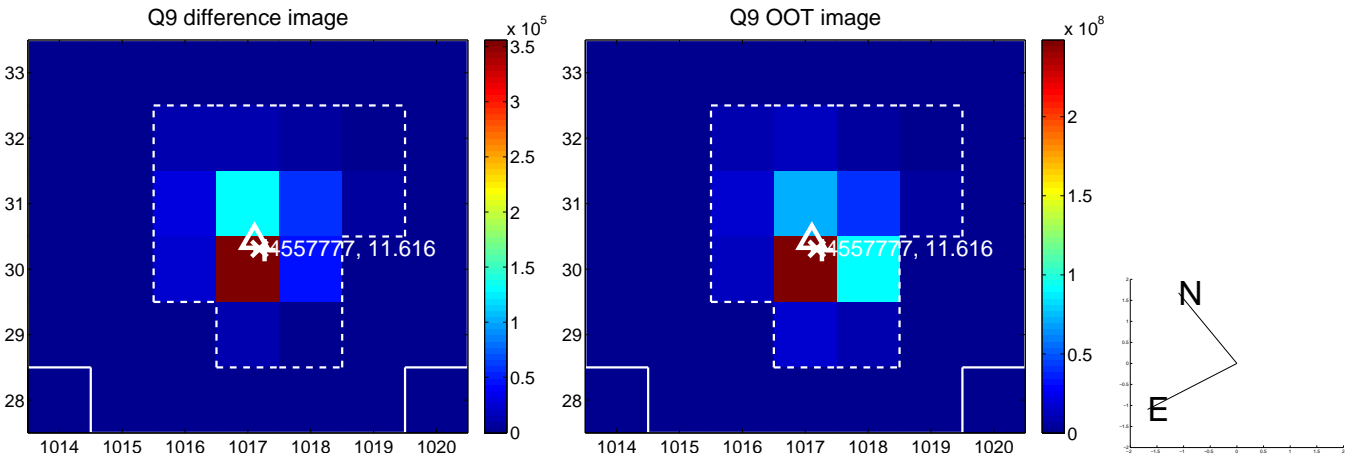
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



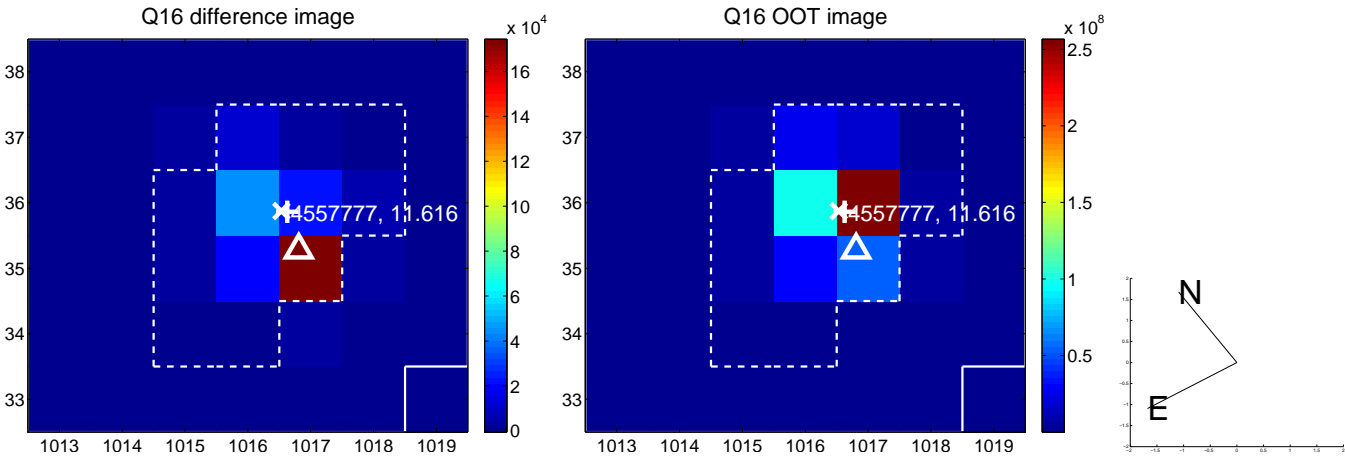
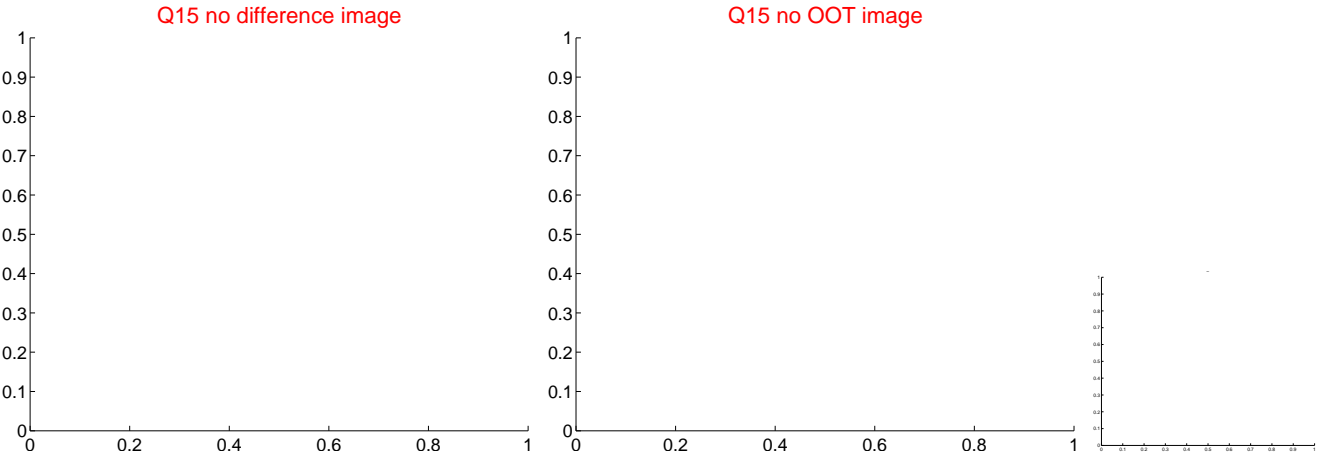
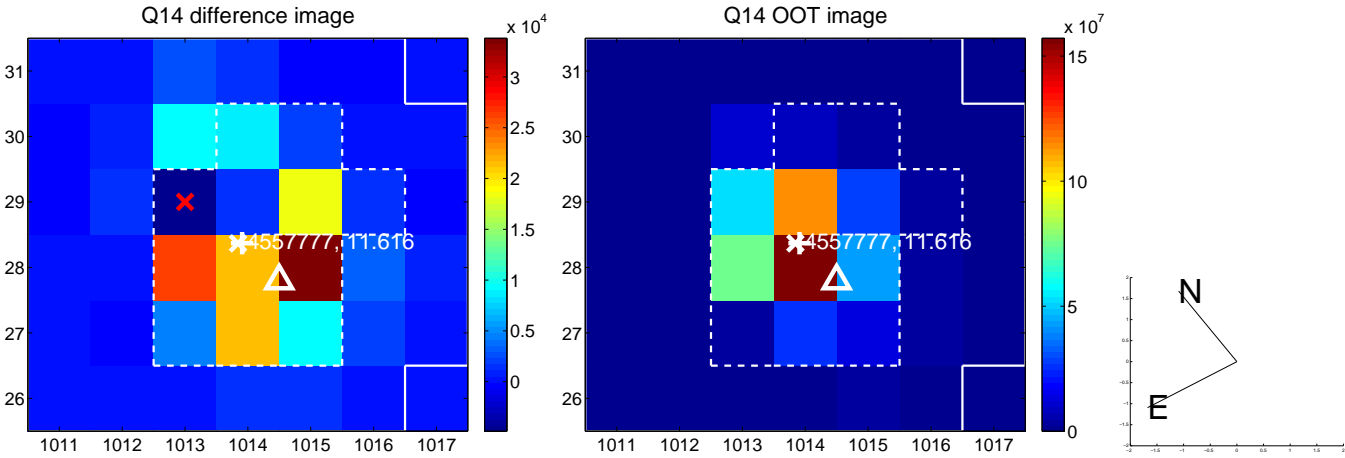
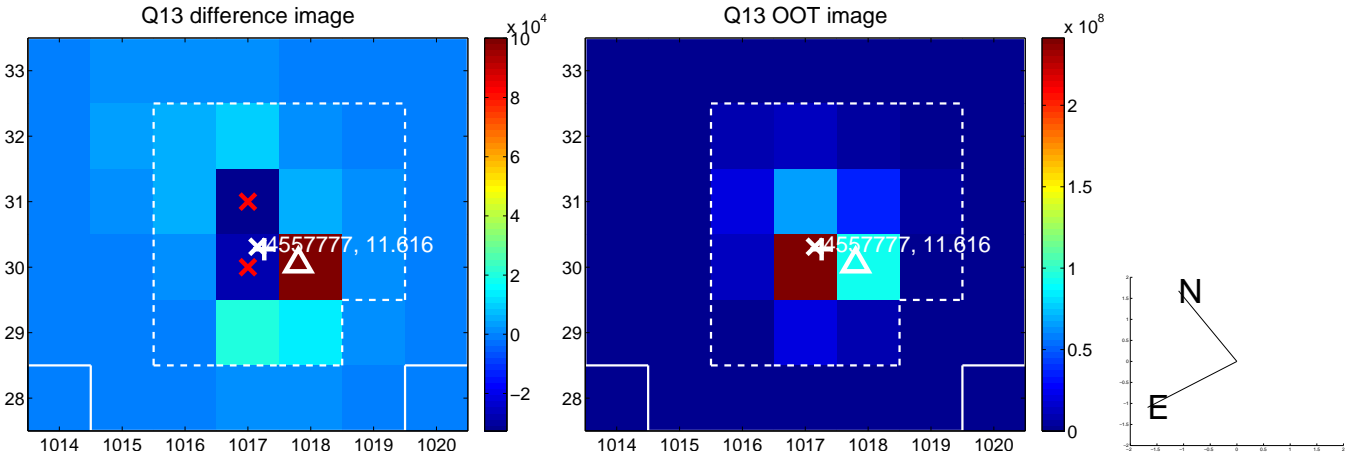
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



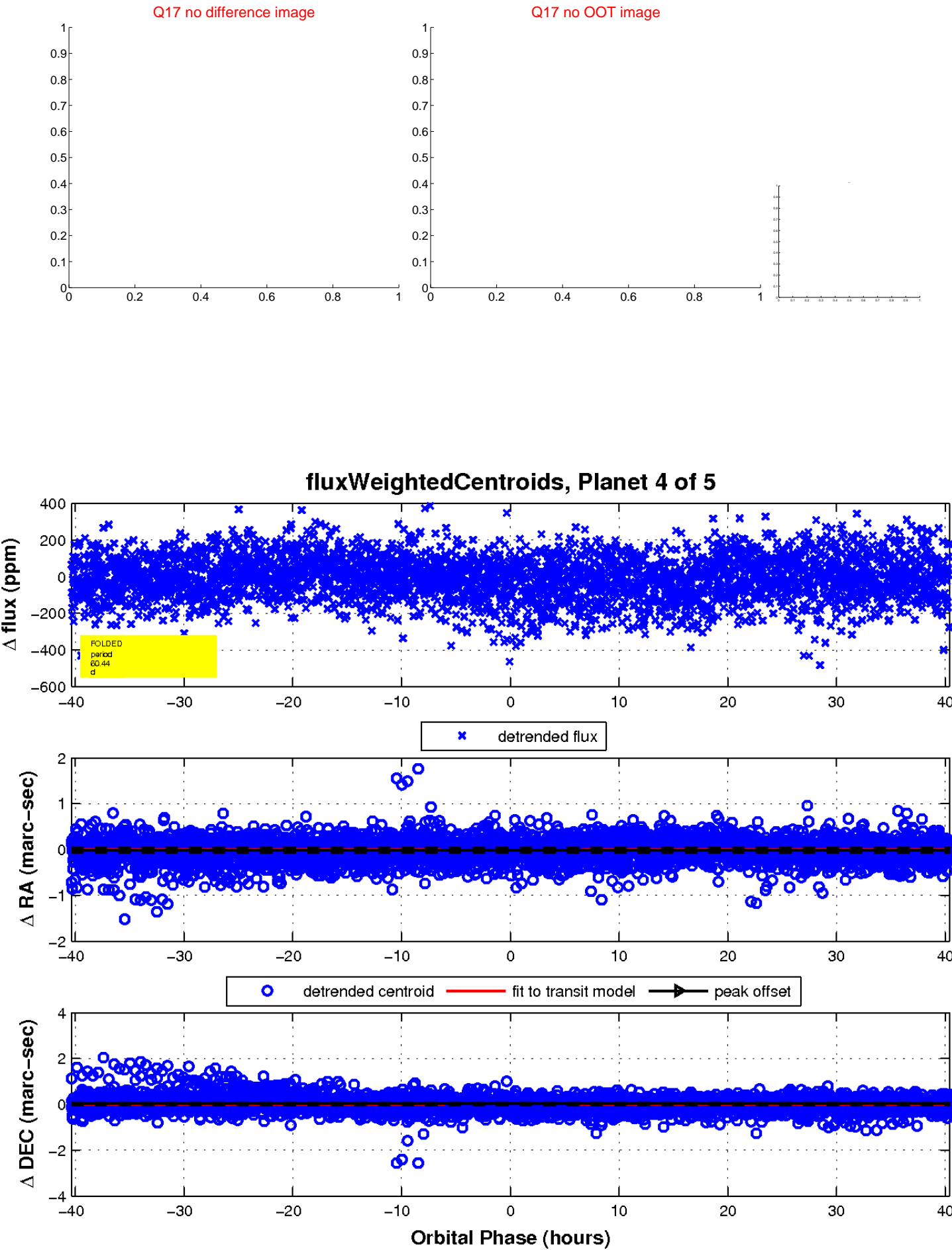
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



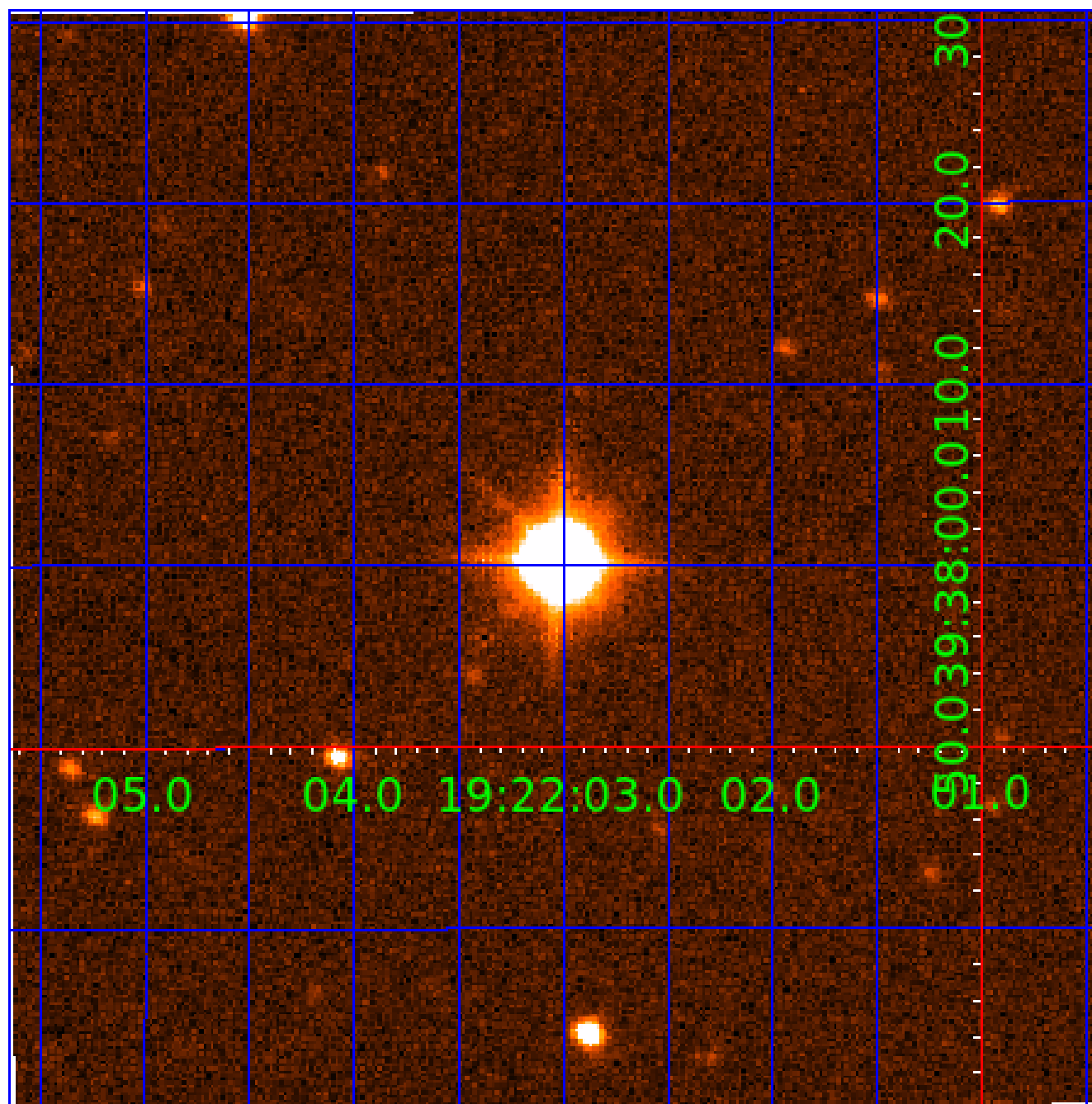
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image

Declination



# KIC 004557777

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004557777-01	OBS	No	1.873514	131.780356	13.2	1.931	8.7	5.5	3.02	6985	1.24	15246.41
004557777-02	OBS	No	0.749524	132.204364	2.4	4.061	7.7	1.8	3.02	6985	0.50	51720.55
004557777-03	OBS	No	83.736266	165.215381	52.1	11.889	8.1	2.9	3.02	6985	2.54	96.12
004557777-04	OBS	No	60.443129	149.653217	86.1	13.470	8.0	5.5	3.02	6985	3.07	148.45
004557777-05	OBS	No	80.512246	208.208197	119.1	2.469	8.4	5.8	3.02	6985	3.66	101.29

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004557777-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA_TRACKER—SWEET_NTL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004557777-02	OBS	FP	0.00	1	0	0	0	LPP_DV
004557777-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004557777-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004557777-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

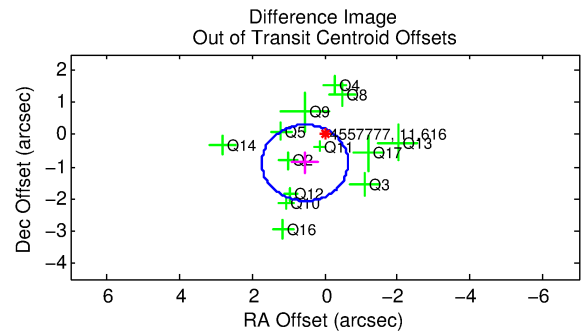
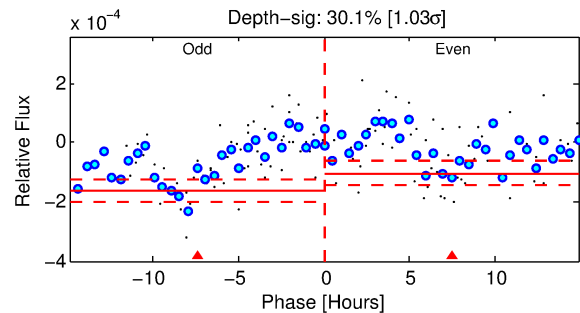
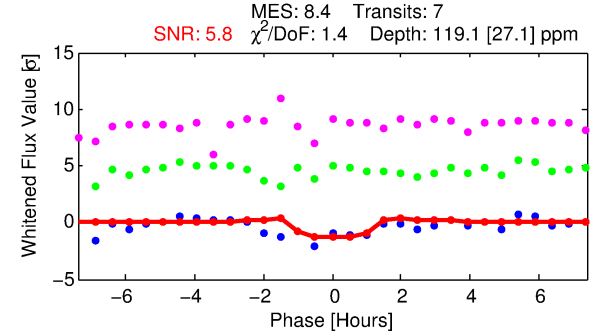
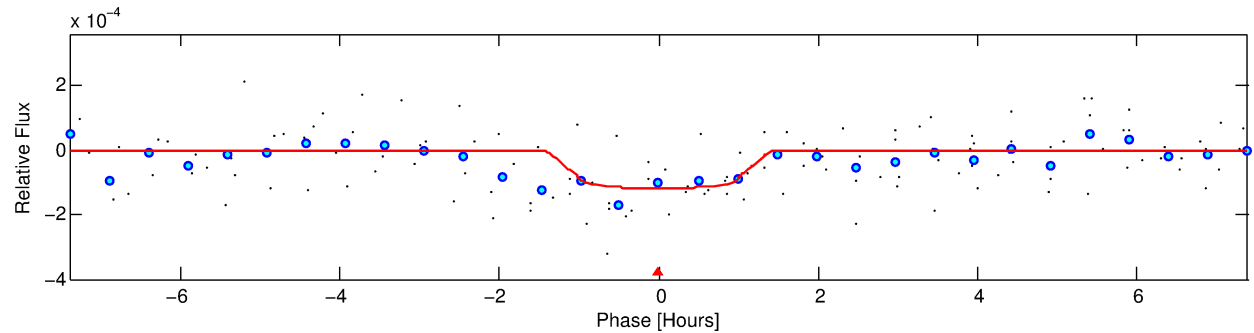
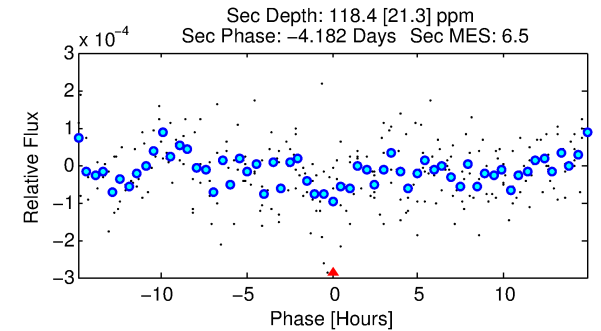
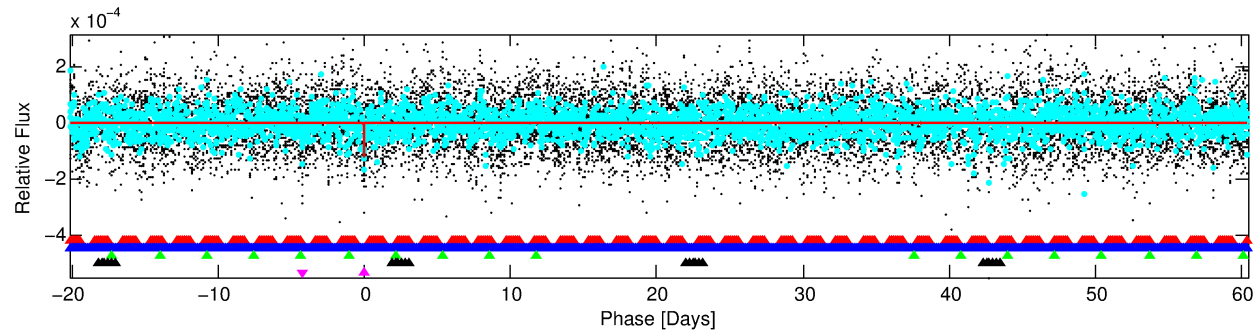
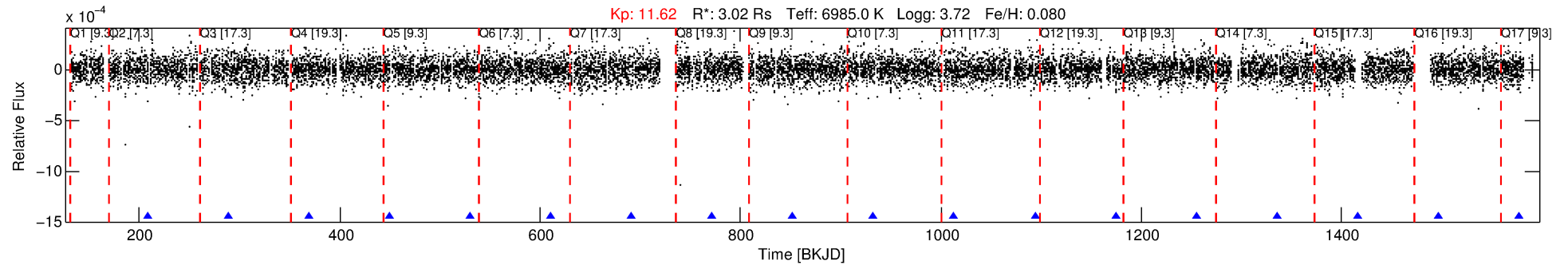
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 004557777-05

No Significant Match Found

# DV One-Page Summary

KIC: 4557777 Candidate: 5 of 5 Period: 80.512 d



## DV Fit Results:

Period = 80.51225 [0.00120] d  
Epoch = 208.2082 [0.0130] BKJD  
Rp/R\* = 0.0111 [0.0117]  
a/R\* = 150.47 [970.33]  
b = 0.81 [2.72]  
Seff = 101.29 [52.99]  
Teq = 809 [106] K  
Rp = 3.66 [4.04] Re  
a = 0.4390 [0.1401] AU  
Ag = 937.39 [2037.17] [0.46σ]  
Teffp = 6920 [3663] K [1.67σ]

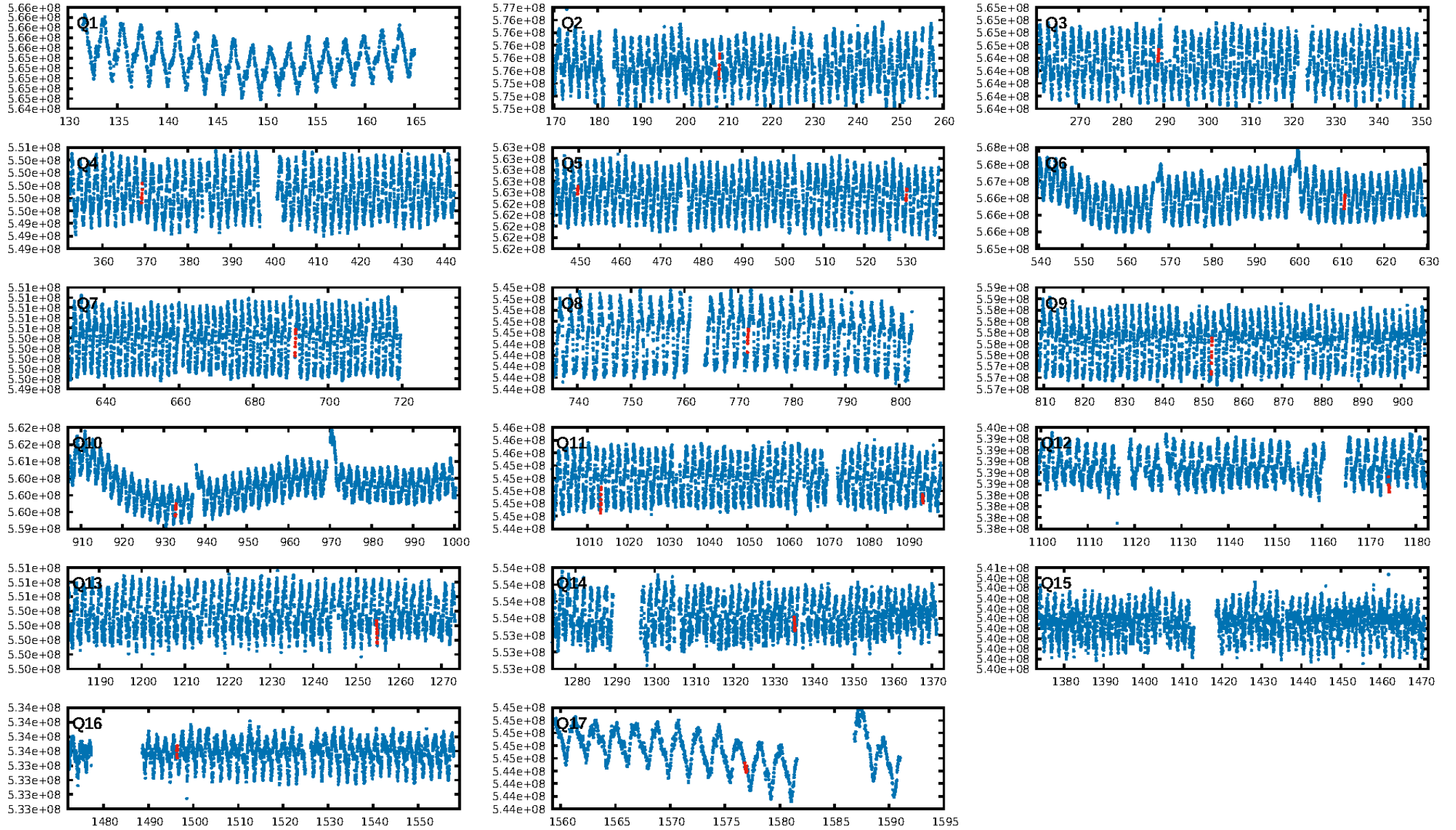
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [35.17σ]  
LongPeriod-sig: 100.0% [6.37σ]  
ModelChiSquare2-sig: 6.8%  
ModelChiSquareGof-sig: 98.7%  
**Bootstrap-pfa: 5.90e-09**  
RollingBand-fgt: 1.00 [6/6]  
GhostDiagnostic-chr: 2.407  
Centroid-sig: 0.7%  
Centroid-so: 1.201 arcsec [1.62σ]  
OotOffset-rm: 1.036 arcsec [2.62σ]  
KicOffset-rm: 1.041 arcsec [2.72σ]  
OotOffset-st: 3/2/4/4 [13]  
KicOffset-st: 3/2/4/4 [13]  
DiffImageQuality-fgm: 0.69 [9/13]  
DiffImageOverlap-fno: 0.14 [2/14]

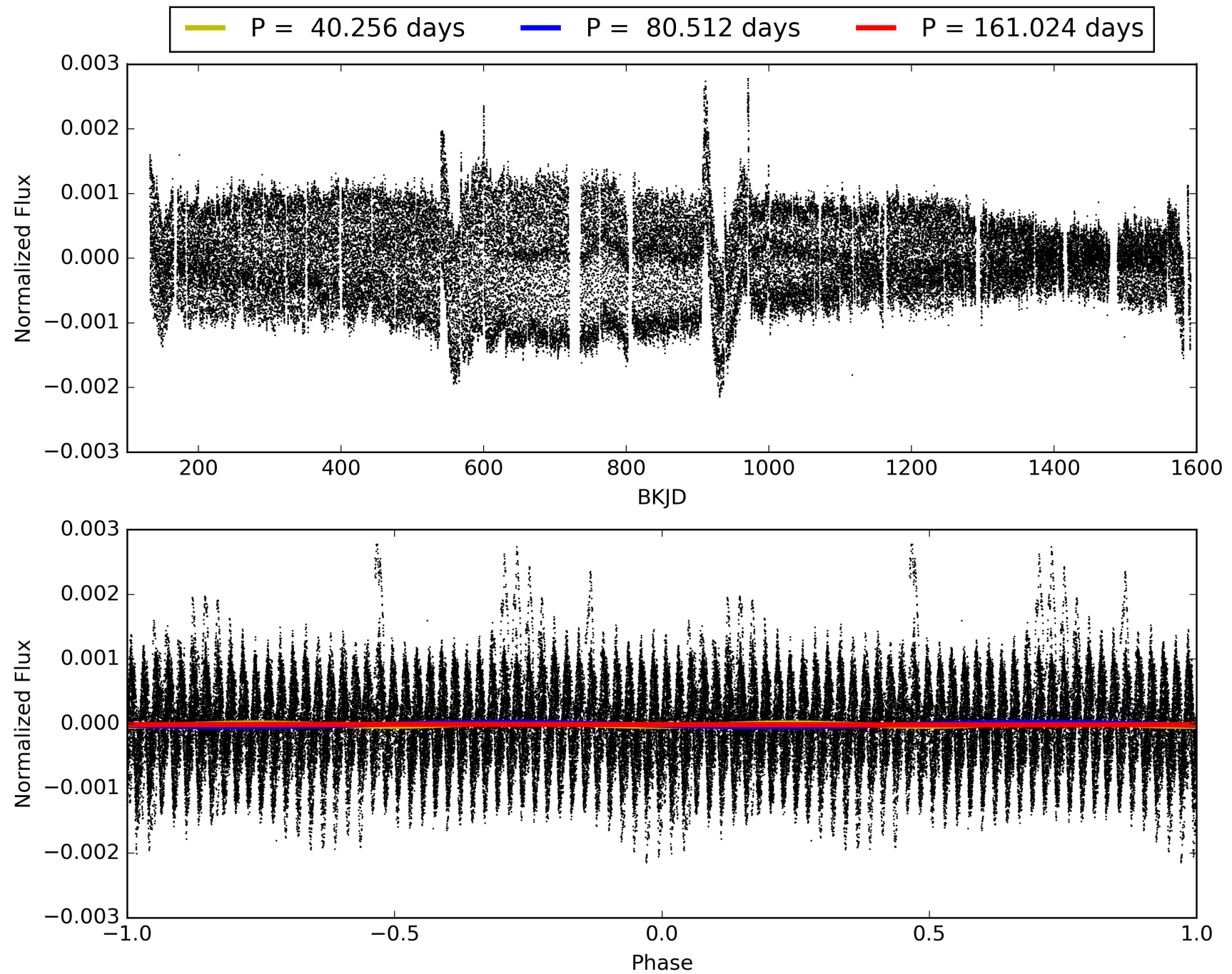
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 20:26:08 Z

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

# TCE 004557777-05, PDC Light Curves

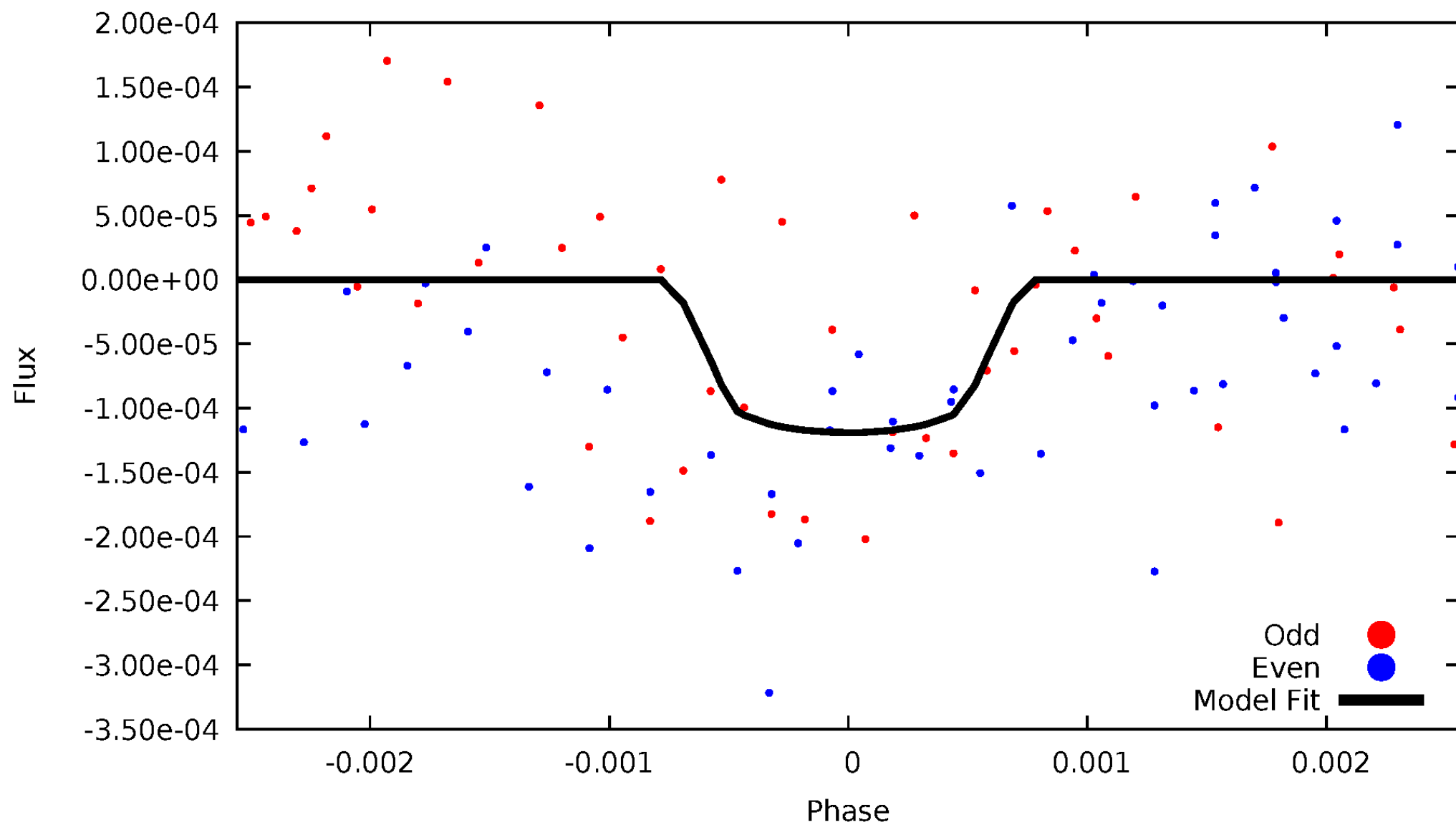


TCE 004557777-05



# DV Odd/Even

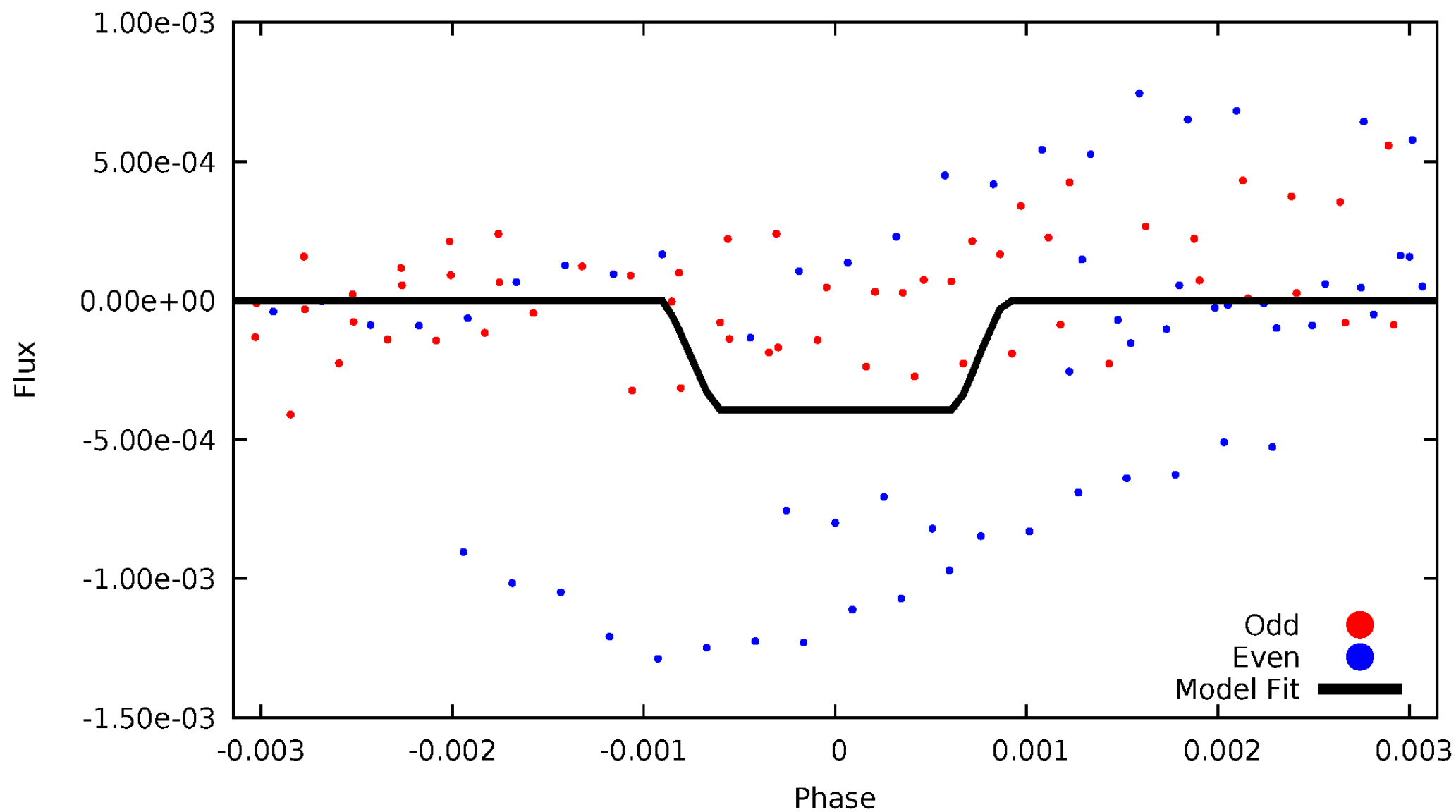
TCE 004557777-05





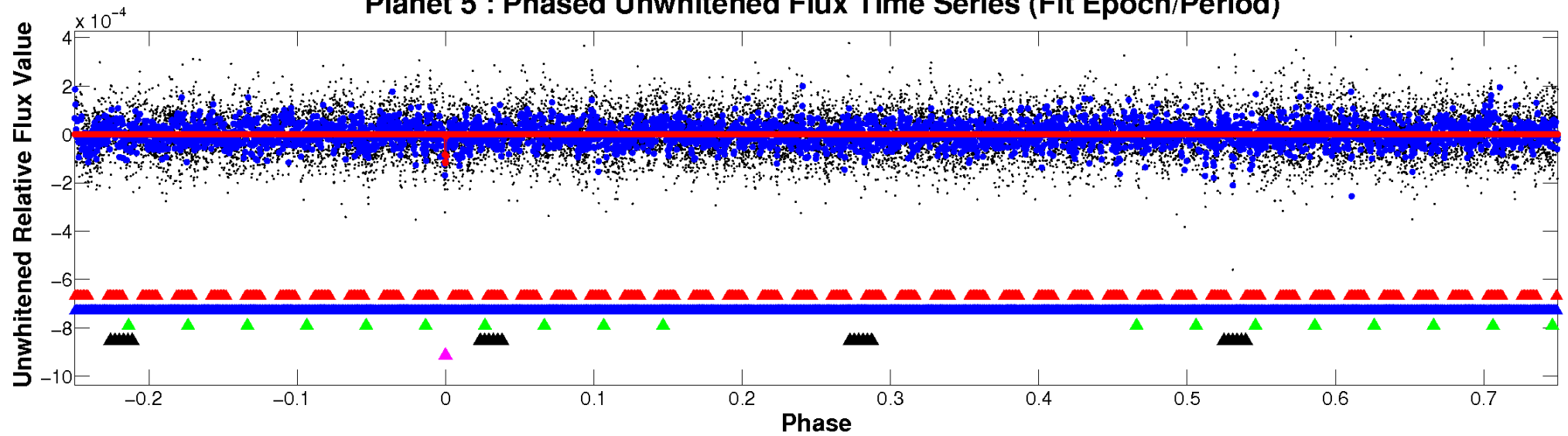
# ALT Odd/Even

TCE 004557777-05

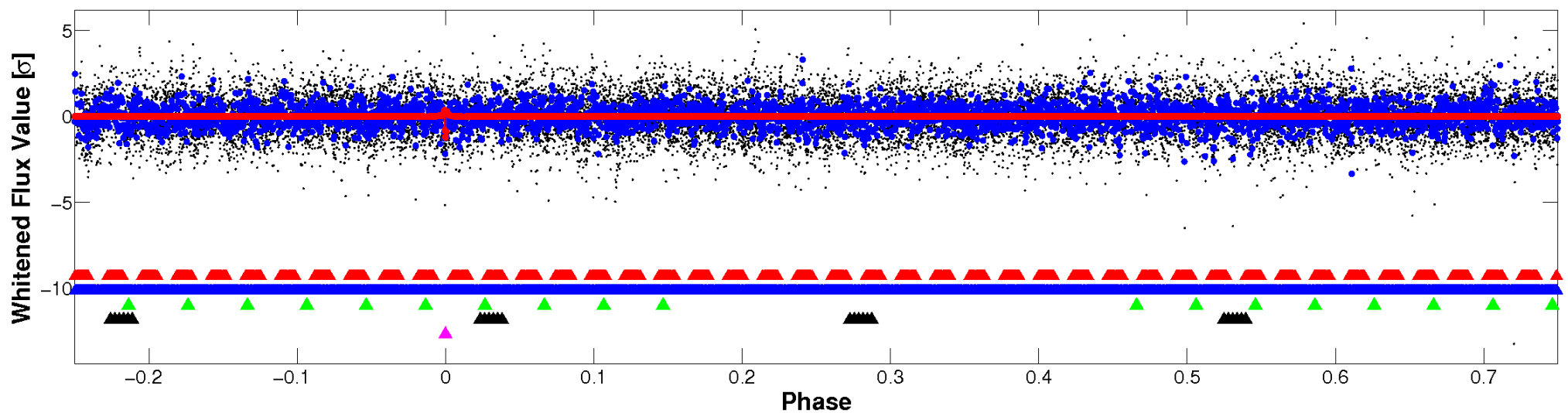


# Non-Whitened Vs. Whitened Light Curve

## Planet 5 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

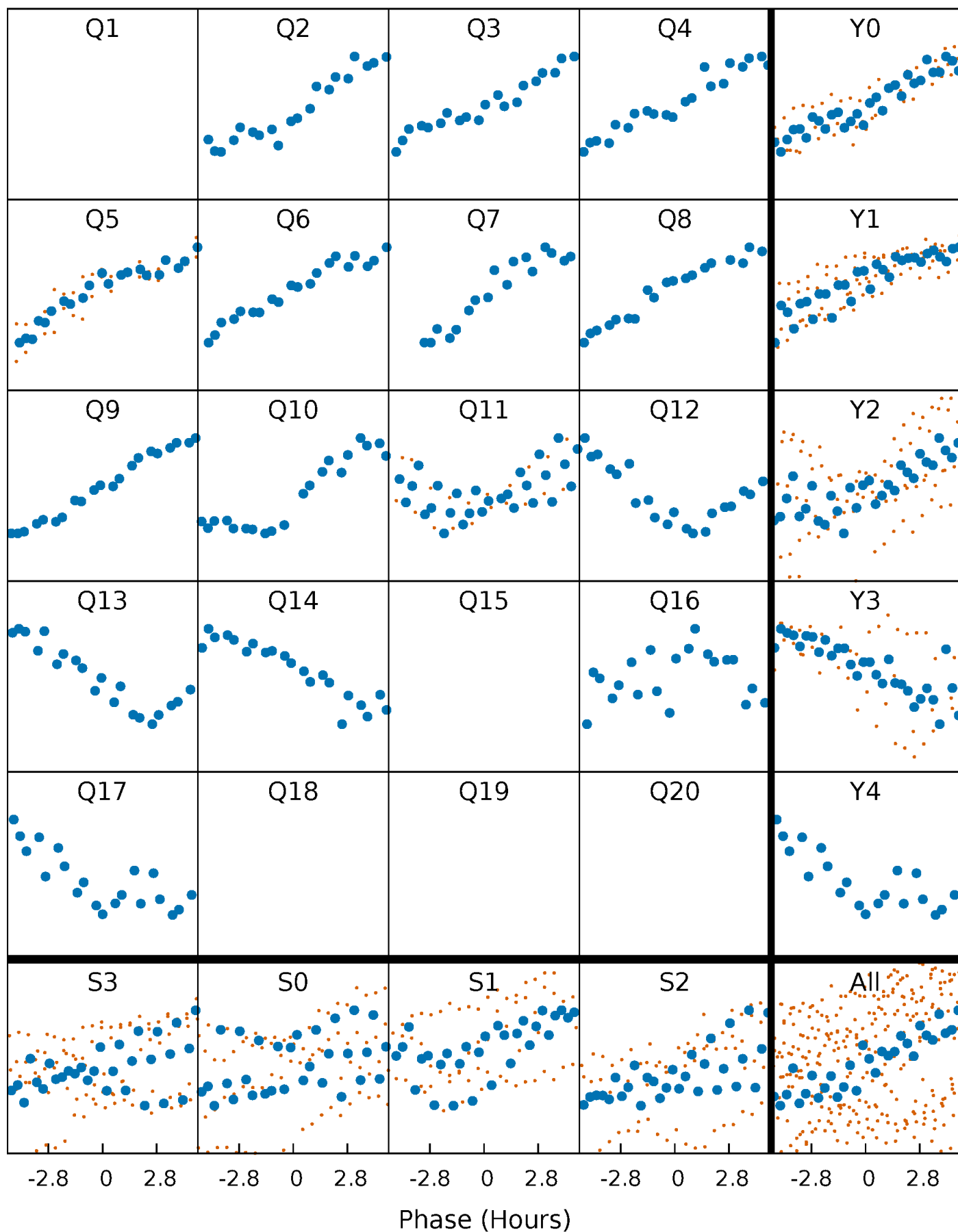


## Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)



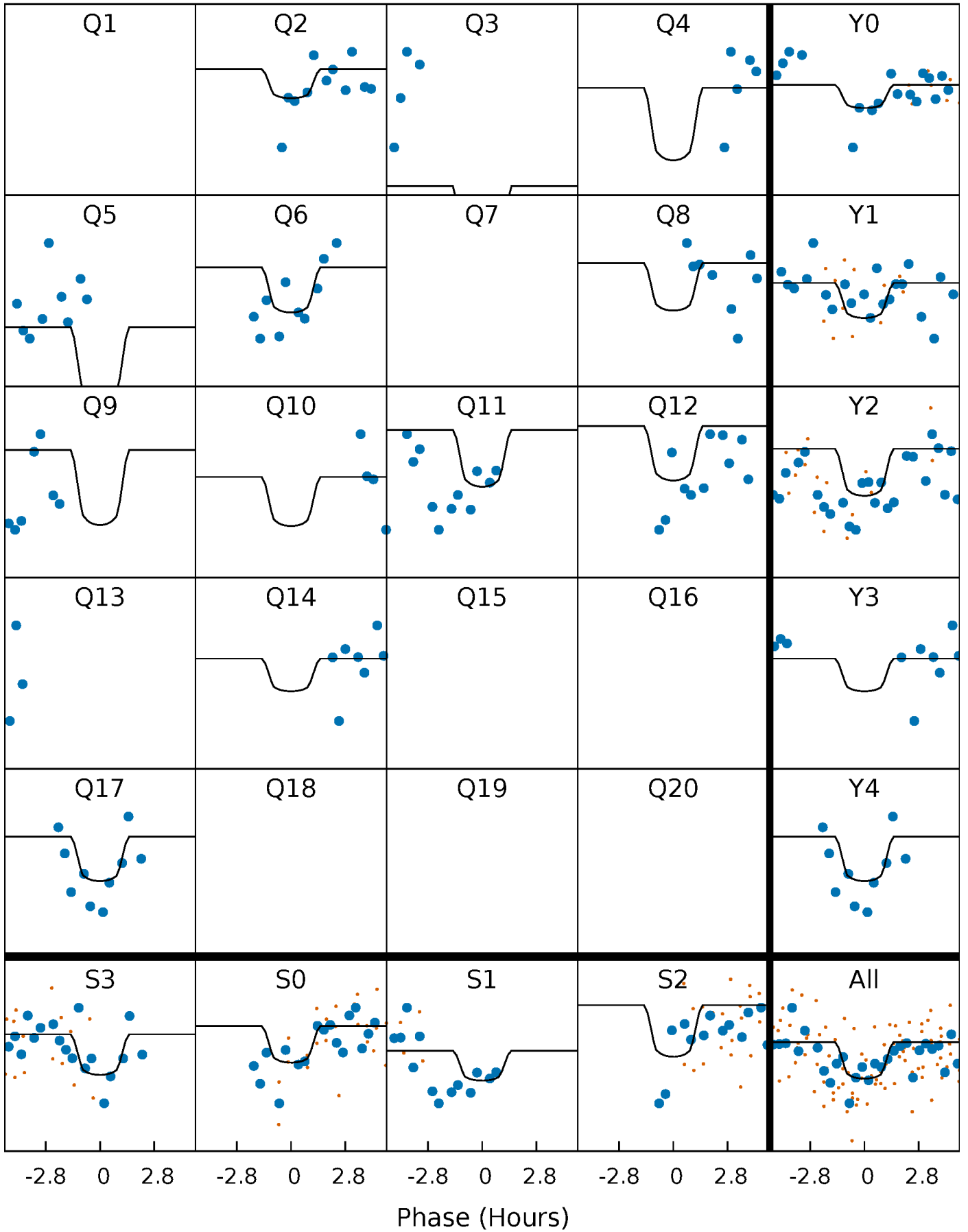
# PDC Quarter-Phased Transit Curves

TCE 004557777-05   P= 80.512246 Days    $T_0=208.208197$  (BKJD)



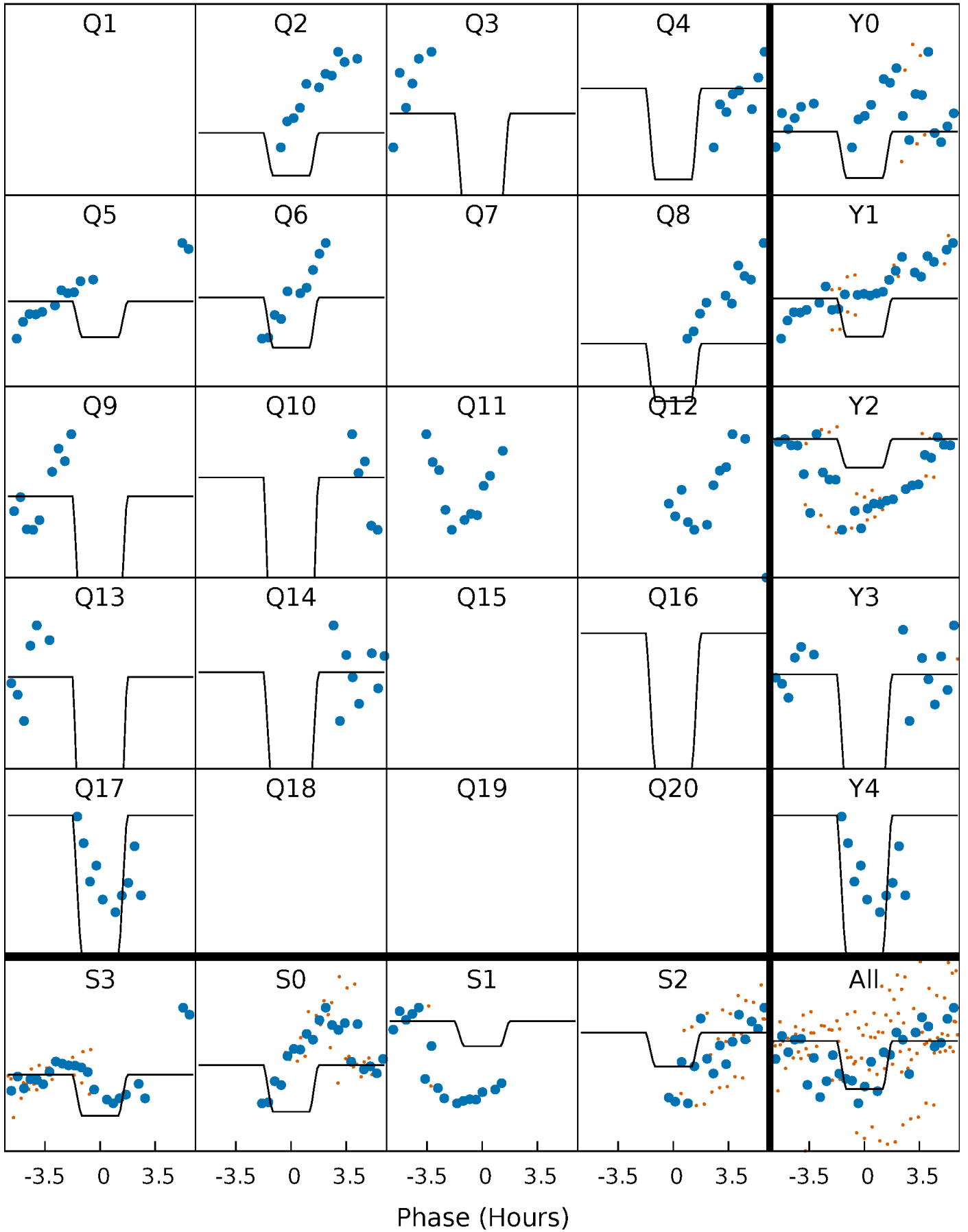
# DV Quarter-Phased Transit Curves

TCE 004557777-05     $P = 80.512246$  Days     $T_0 = 208.208197$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

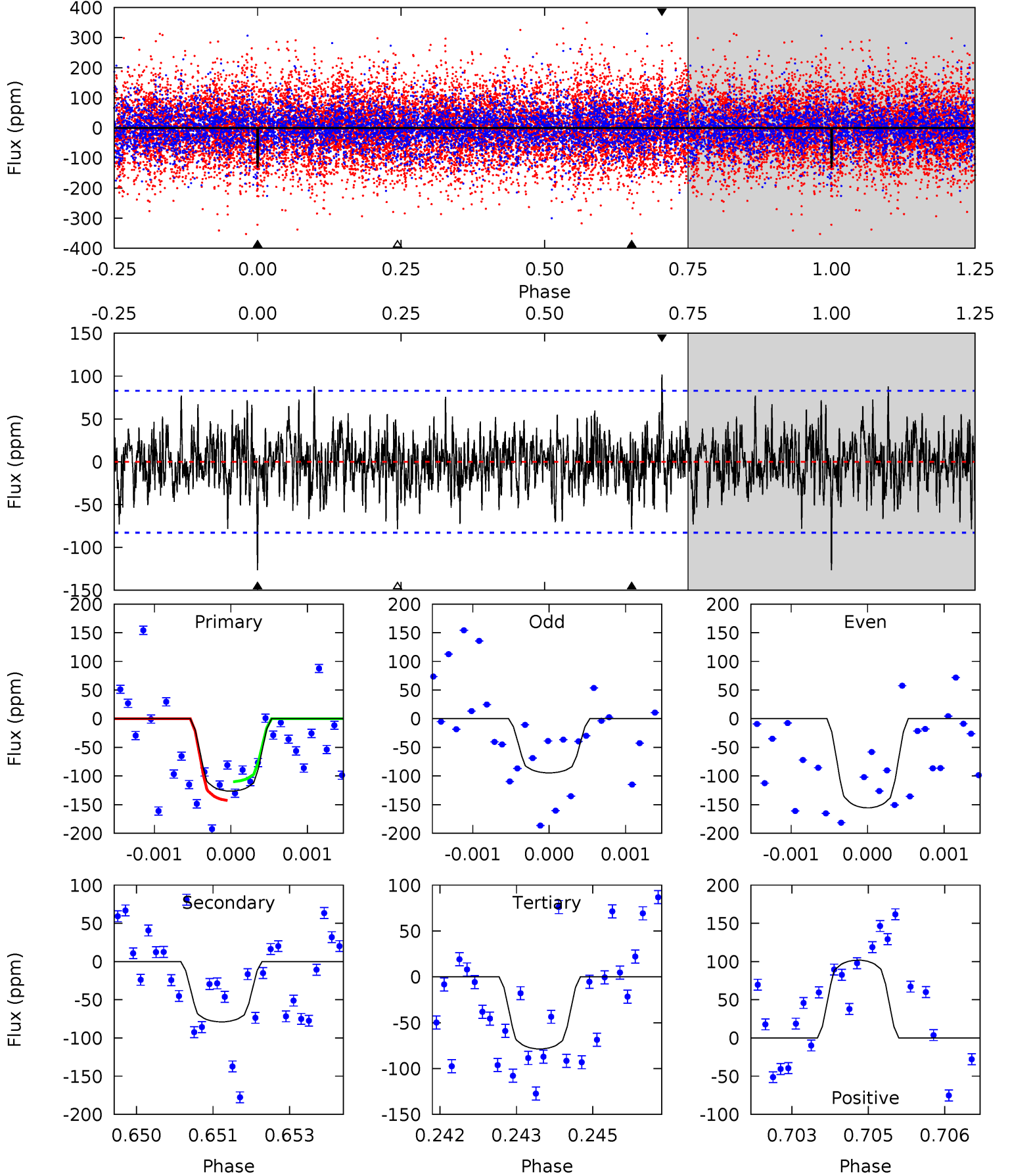
TCE 004557777-05     $P = 80.510091$  Days     $T_0 = 208.217132$  (BKJD)



# DV Model-Shift Uniqueness Test

004557777-05, P = 80.512246 Days, E = 127.695951 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
8.22	5.13	5.11	6.62	5.38	3.18	1.57	3.11	1.60	0.02	-1.49	1.98	0.74	0.45	1.06

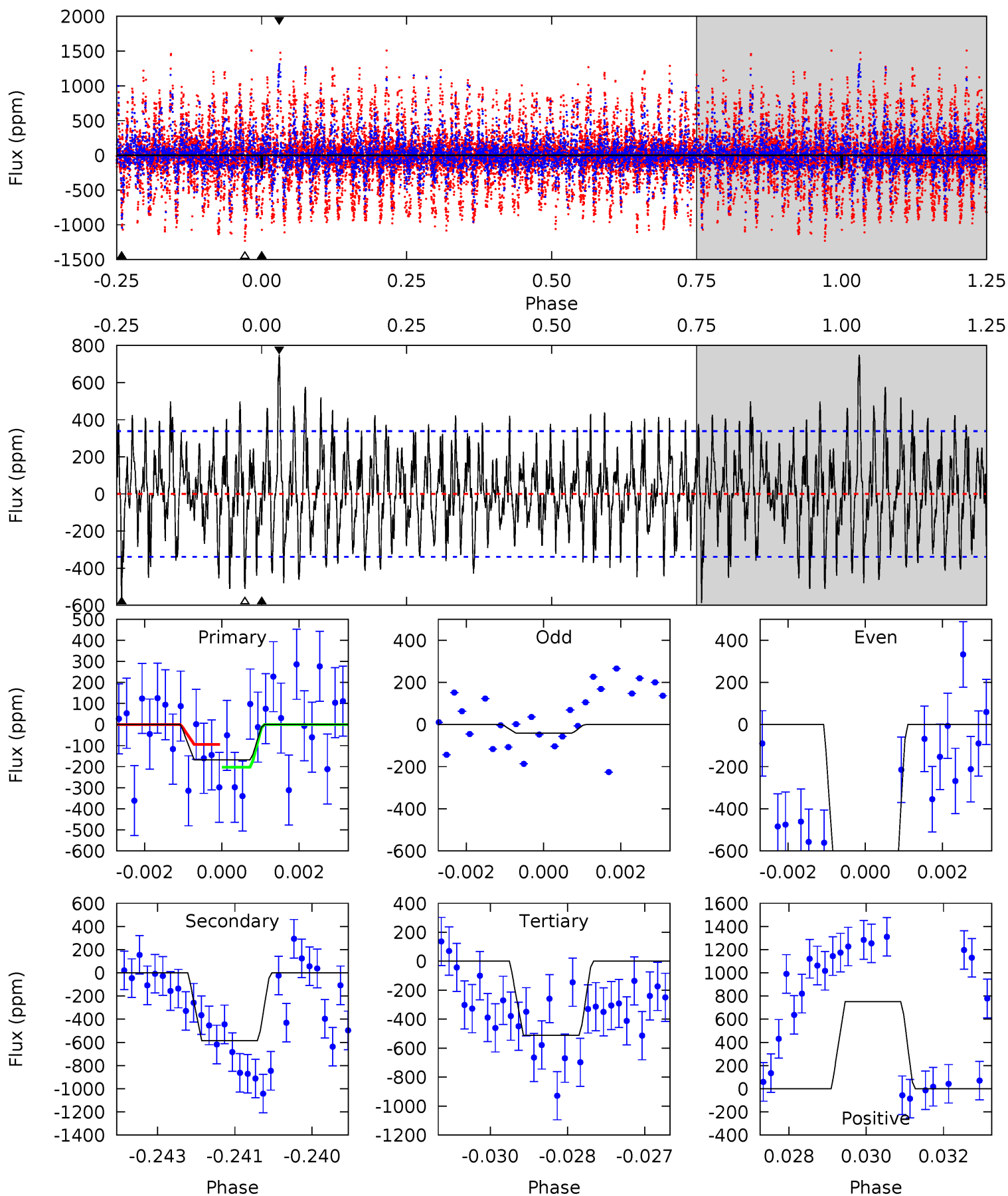




# Alt Model-Shift Uniqueness Test

004557777-05, P = 80.510091 Days, E = 127.707041 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
2.65	9.27	8.10	11.9	5.36	3.14	2.86	-5.44	-9.21	1.18	-2.59	6.83	12.8	0.56	0.85



### Stellar Parameters For KIC 004557777

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6985^{+175}_{-228}$	$3.717^{+0.296}_{-0.092}$	$0.080^{+0.250}_{-0.300}$	$3.025^{+0.436}_{-1.017}$	$1.738^{+0.213}_{-0.260}$	$0.088^{+0.168}_{-0.027}$
	+3%/-3%	+8%/-2%	+312%/-375%	+14%/-34%	+12%/-15%	+190%/-30%
Source	PHO1	FLK73	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 004557777-05 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-79 \pm 15$	$4.30^{+3.27}_{-2.64}$	$1112^{+65}_{-98}$	$5528^{+4041}_{-1106}$	$451^{+2561}_{-307}$
Alt.	$-586 \pm 63$	$6.17^{+4.02}_{-3.21}$	$1109^{+66}_{-92}$	$7773^{+5664}_{-1752}$	$1646^{+5461}_{-1030}$

$T_{\text{max}}$  = 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

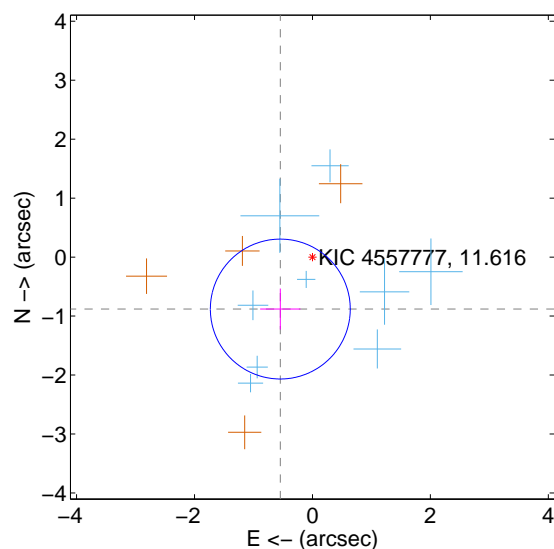
Supplemental centroid analysis for 004557777-05. **Kepler magnitude: 11.62.** Transit SNR 5.78

There are 9 quarters with good PRF difference image offsets

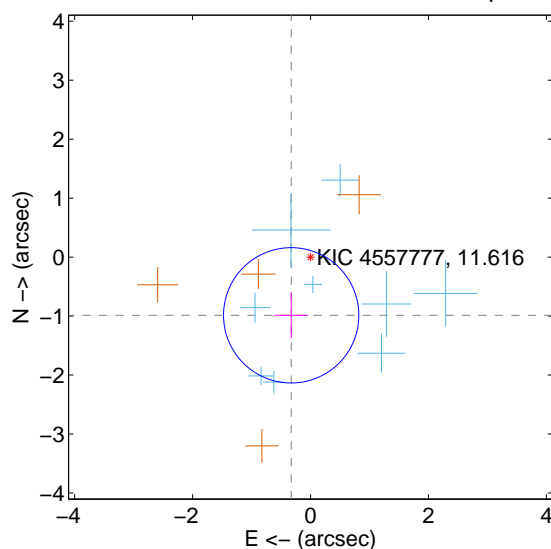
The direct PRF centroid is offset from the target star catalog position by about 0.21 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.036 \pm 0.395$	2.62	$0.545 \pm 0.343$	$-0.881 \pm 0.347$
PRF-fit source offset from KIC position	$1.041 \pm 0.382$	2.72	$0.328 \pm 0.287$	$-0.988 \pm 0.392$
photometric centroid source offset	$1.20 \pm 0.74$	1.62	$0.47 \pm 0.72$	$1.11 \pm 0.74$

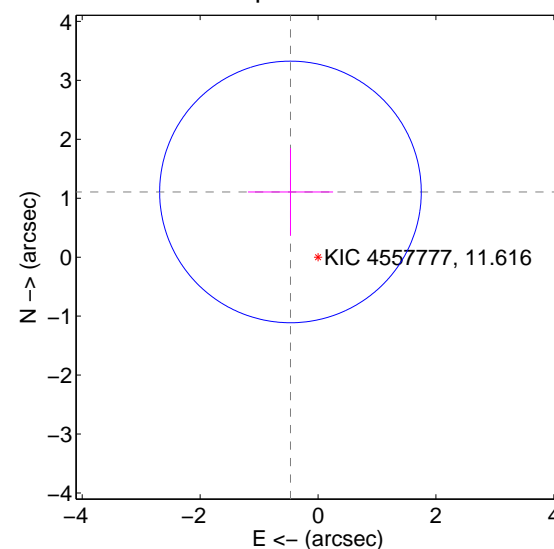
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

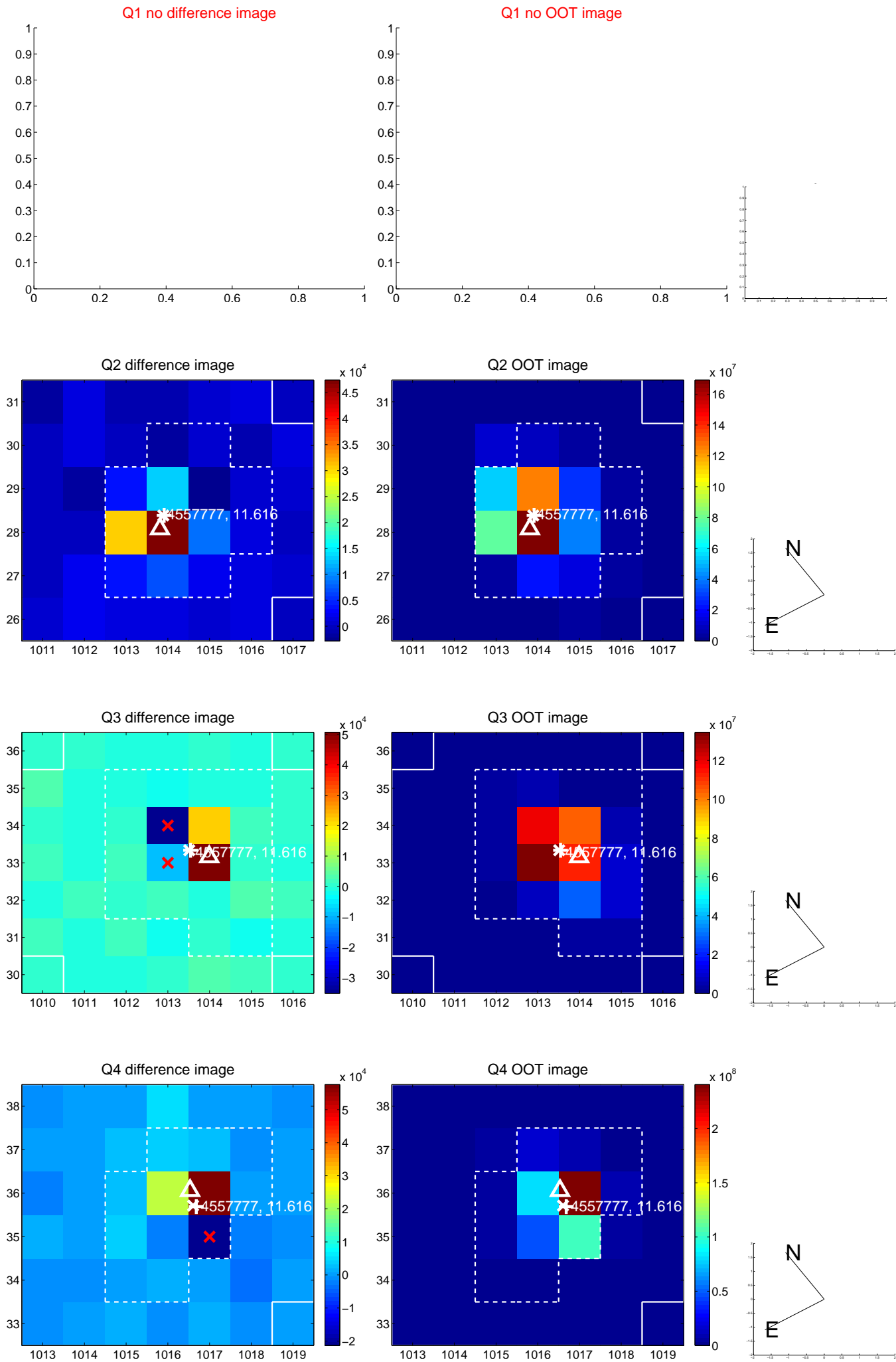


offset from photometric centroids

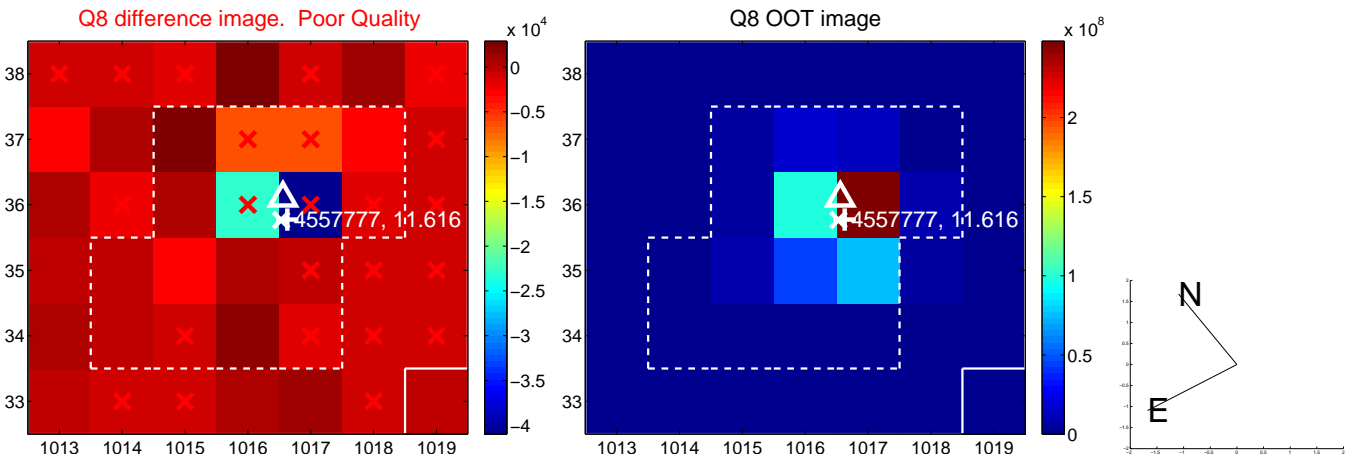
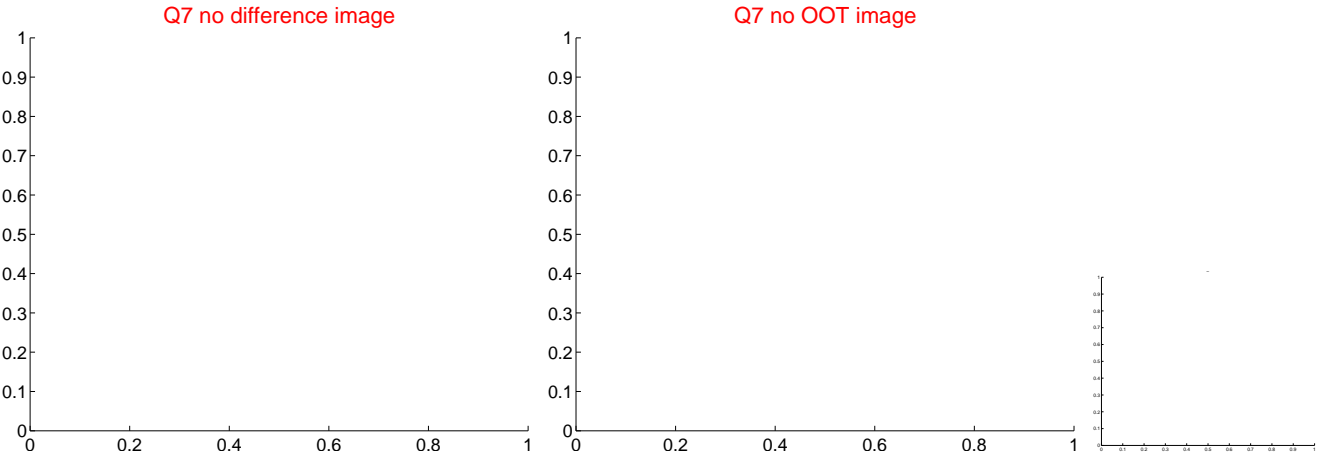
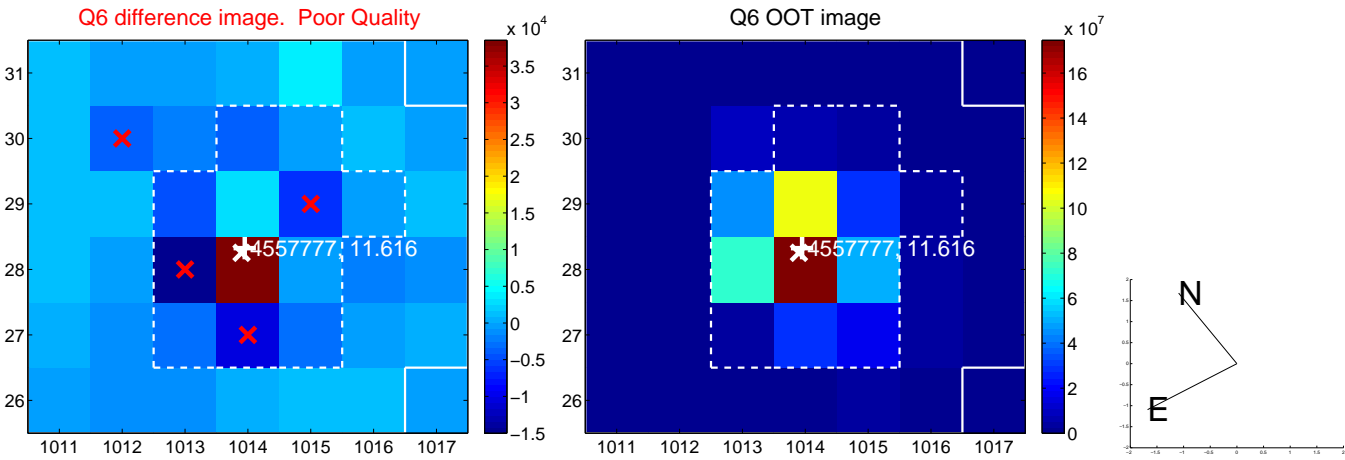
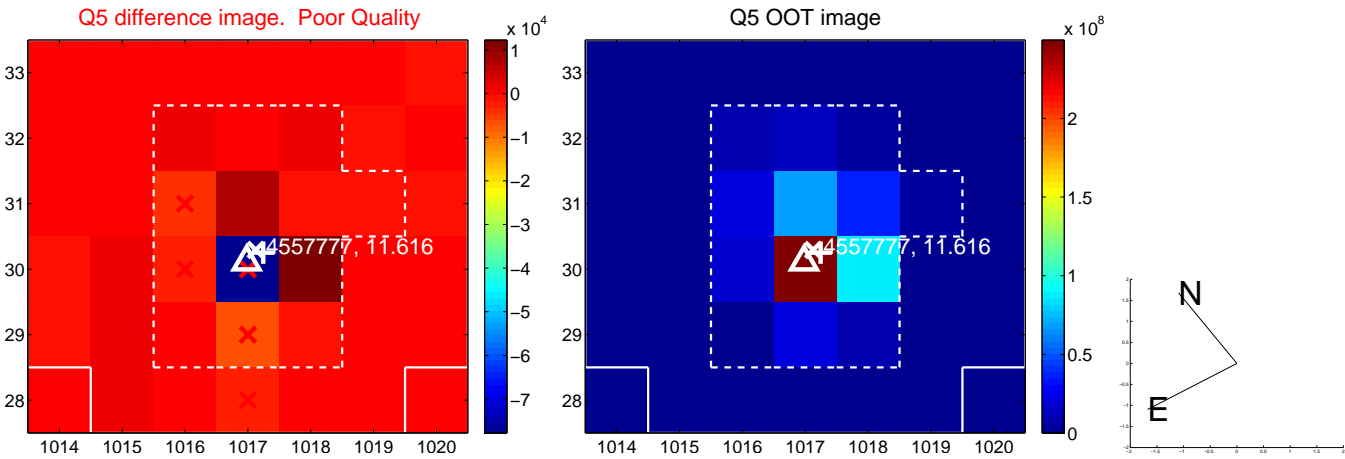


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

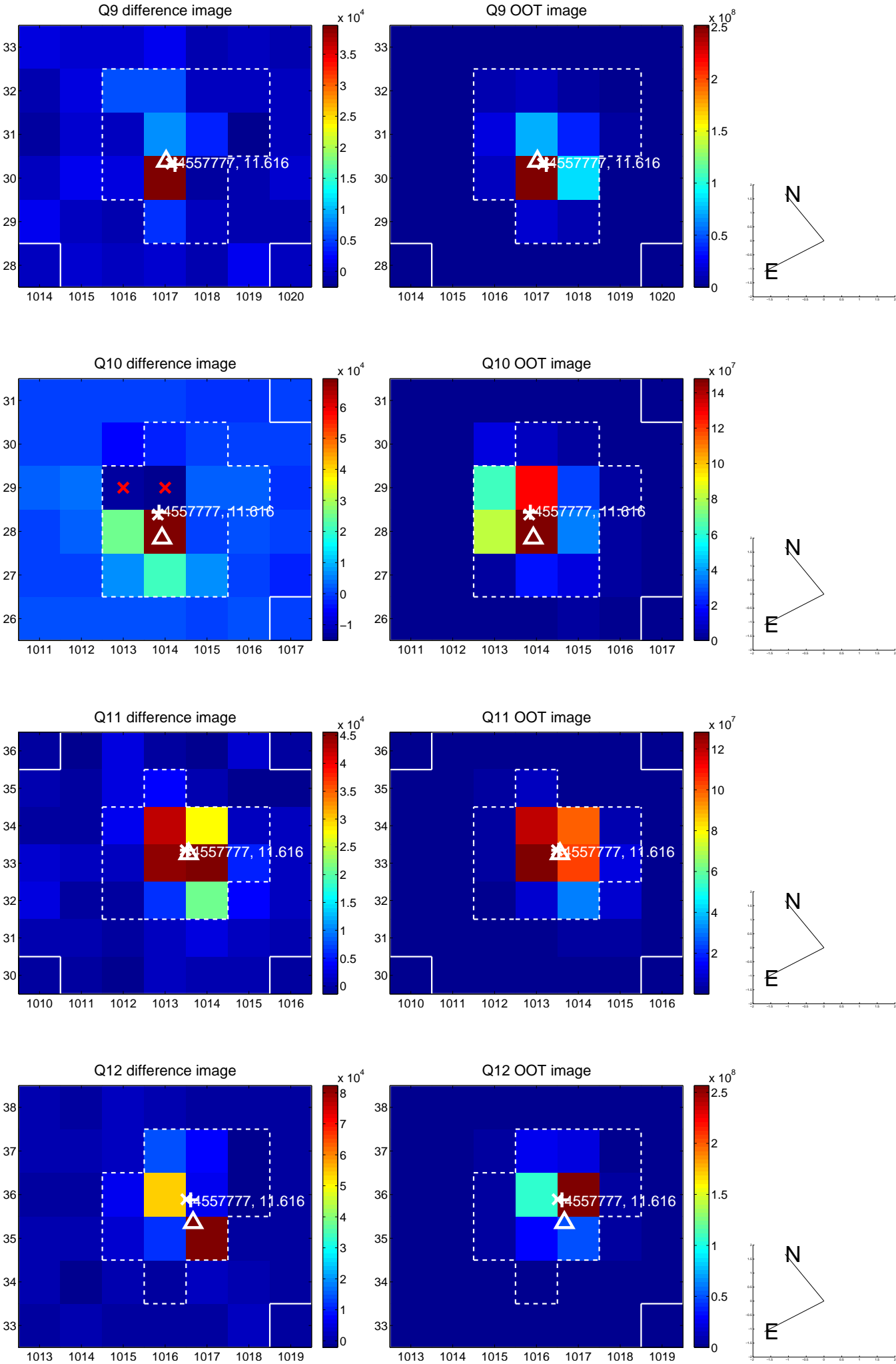
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



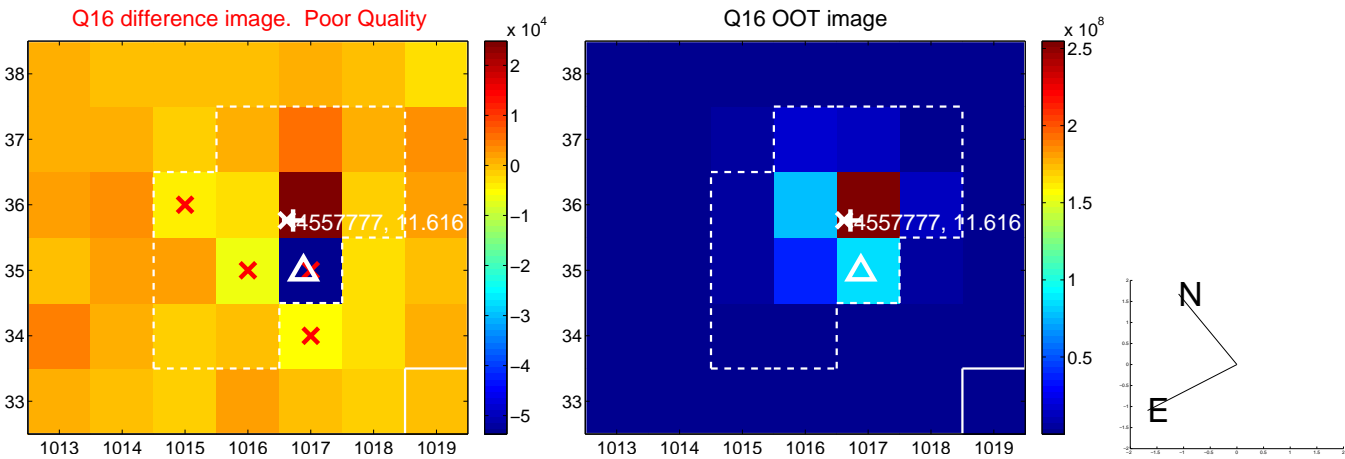
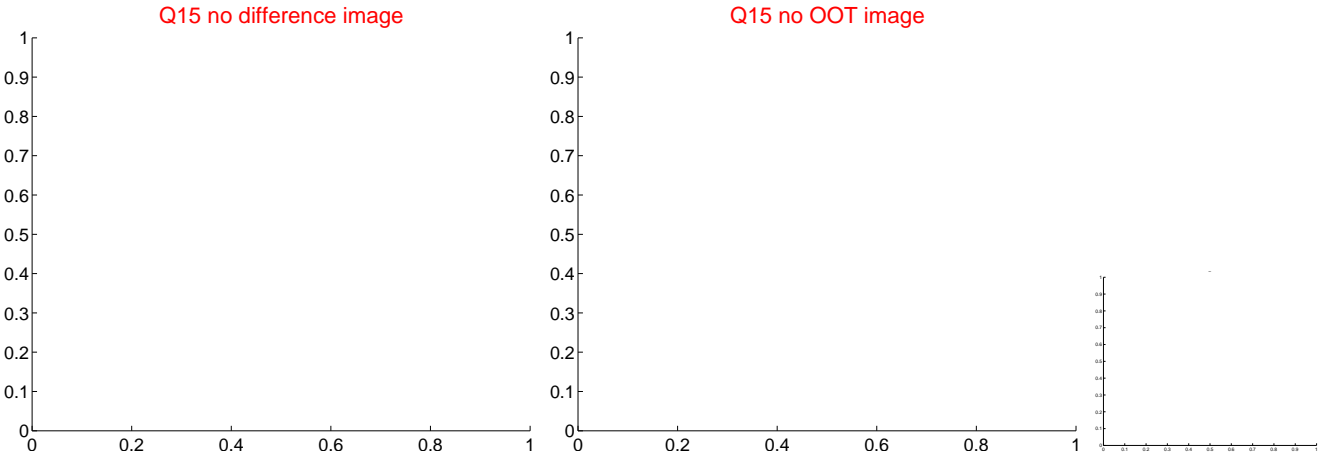
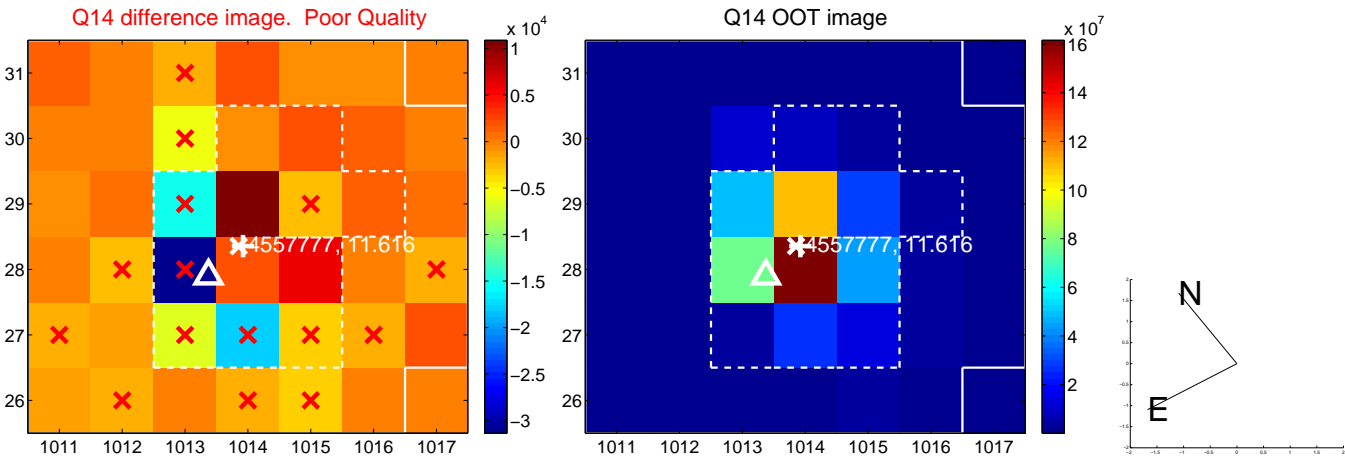
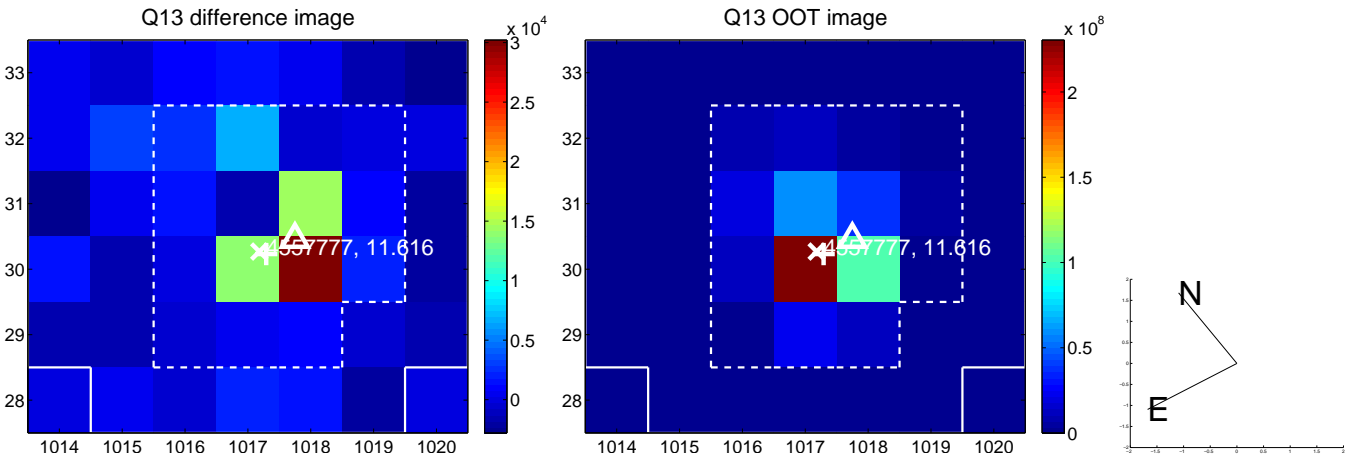
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

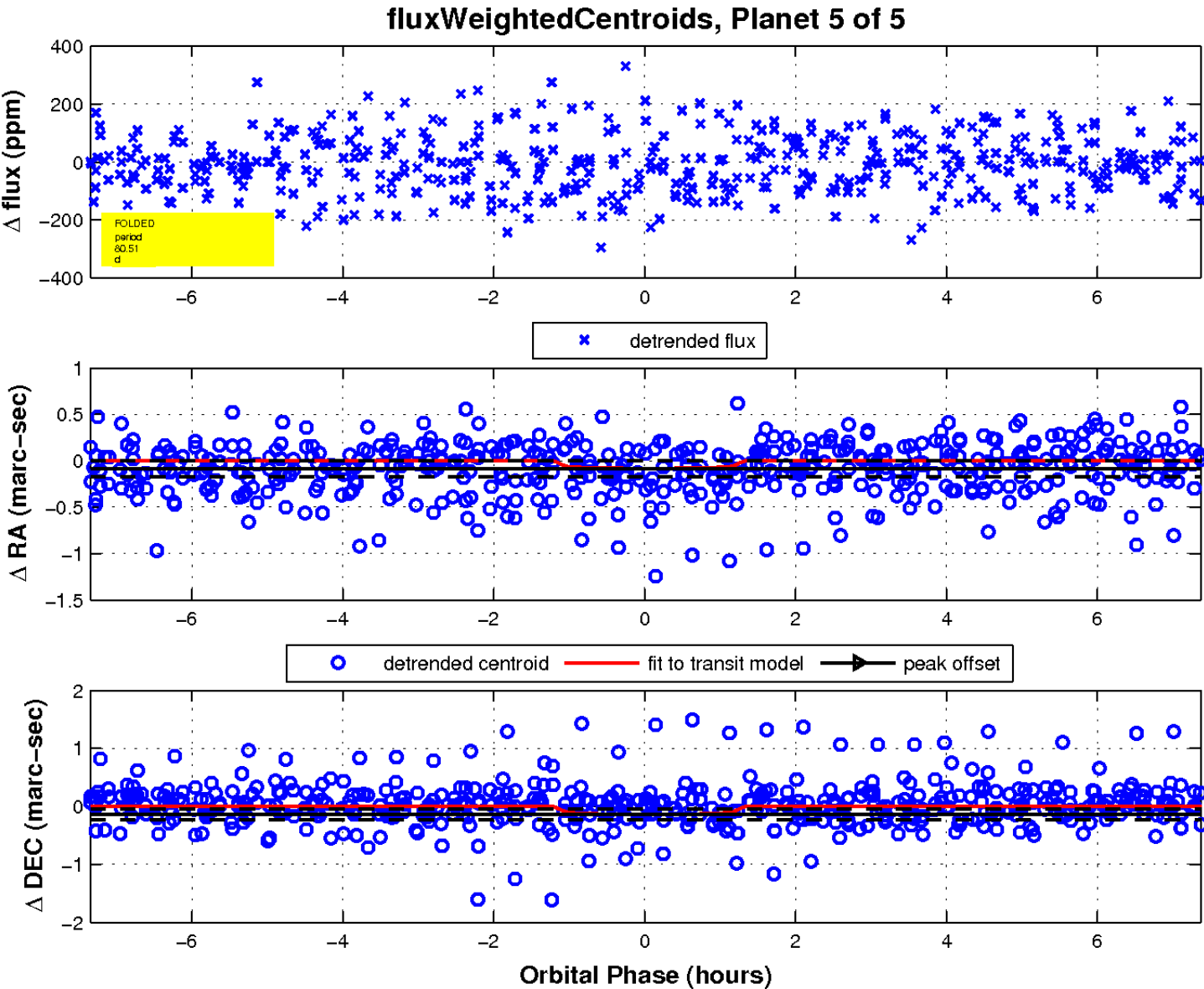
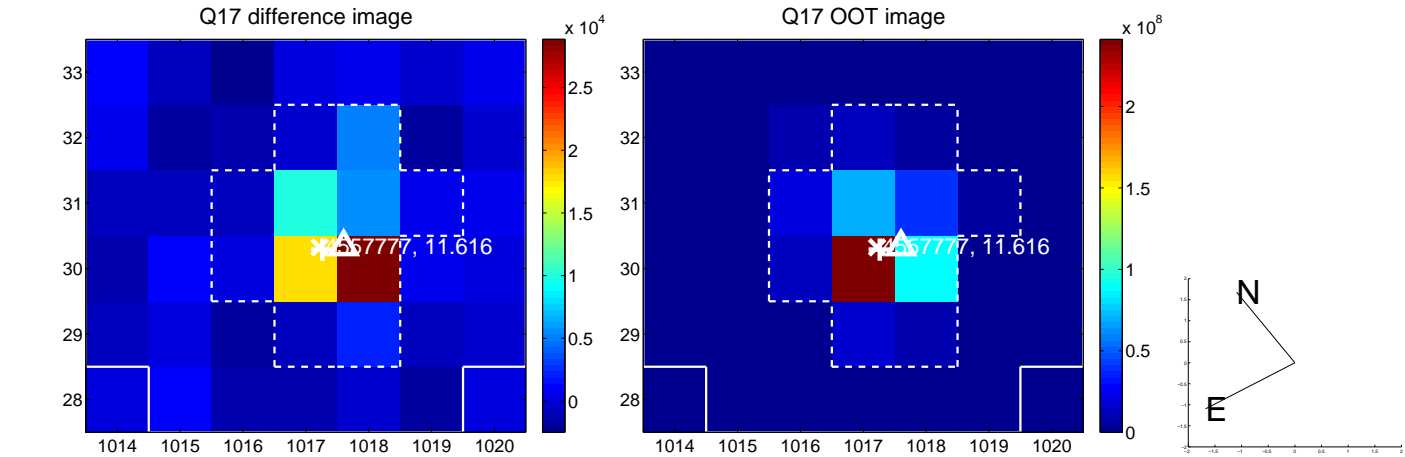


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





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



UKIRT Image

Declination

