

# KIC 002581457

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
002581457-01	OBS	No	2.617463	132.095243	47.1	6.765	7.9	8.6	1.25	6455	0.98	1635.82
002581457-02	OBS	No	231.391280	157.499535	166.5	45.792	11.0	4.7	1.25	6455	1.74	4.15

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
002581457-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_KIC_POS
002581457-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS

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

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

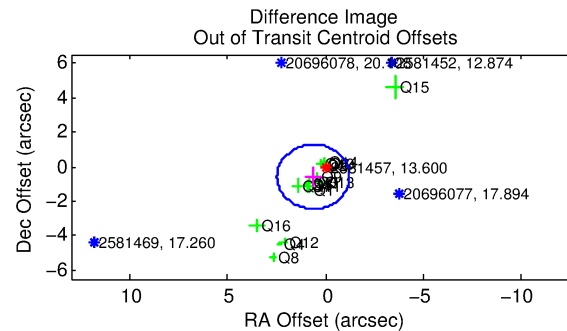
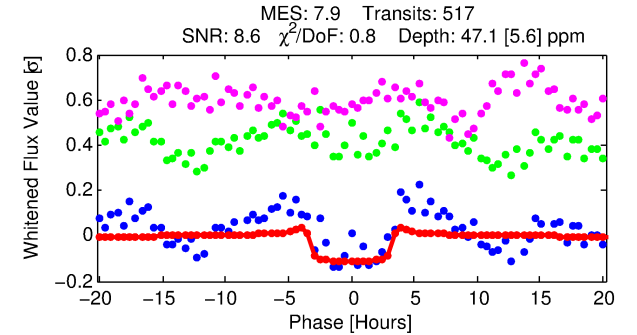
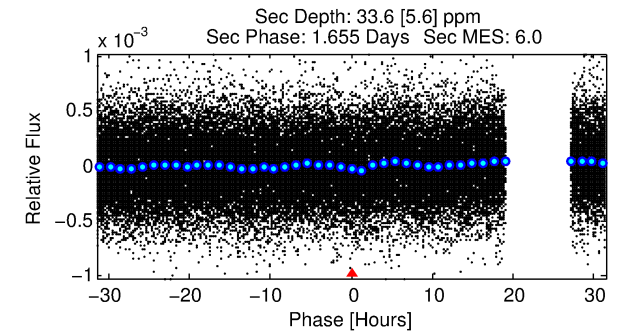
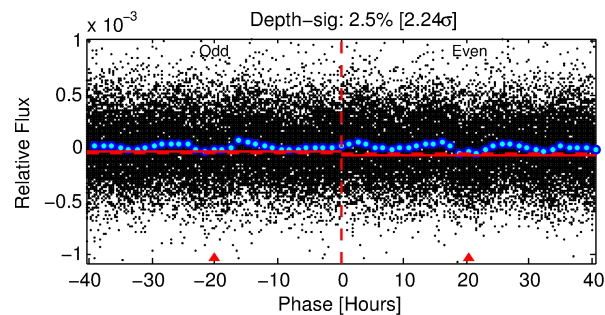
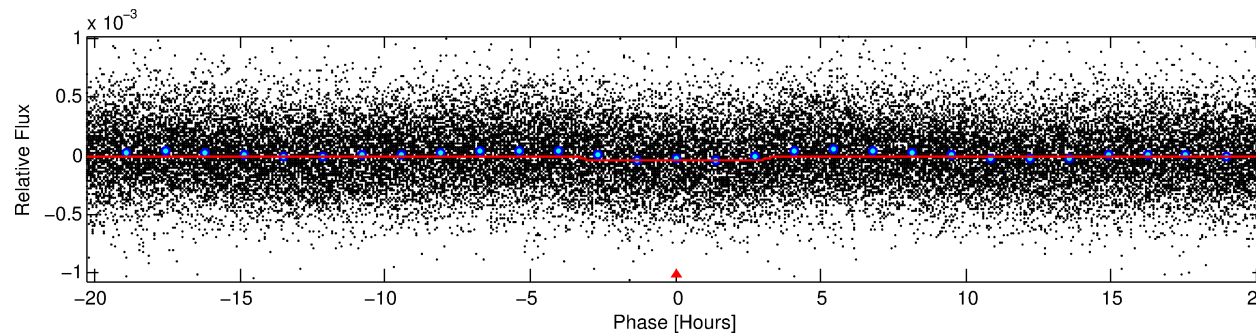
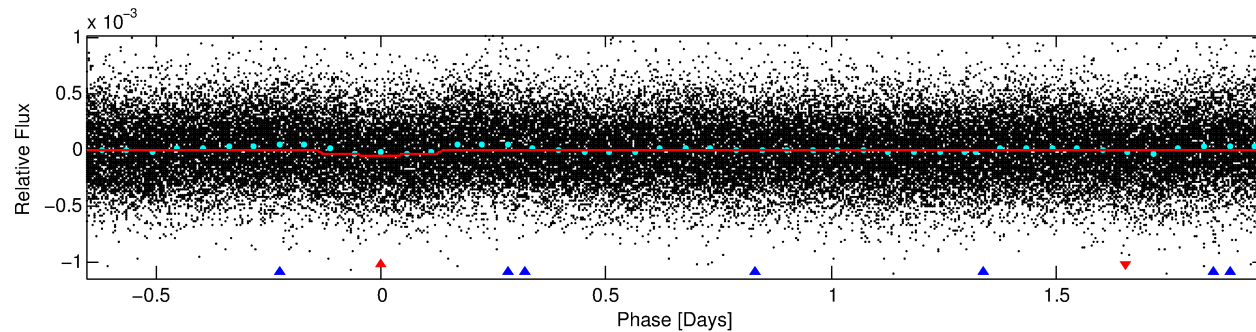
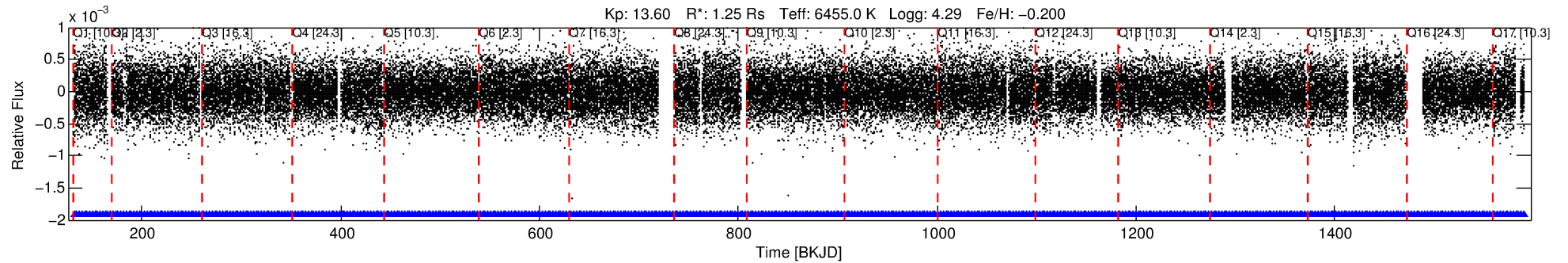
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 002581457-01

No Significant Match Found

# DV One-Page Summary

KIC: 2581457 Candidate: 1 of 2 Period: 2.617 d



## DV Fit Results:

Period = 2.61746 [0.00003] d  
Epoch = 132.0952 [0.0059] BKJD  
Rp/R\* = 0.0072 [0.0023]  
a/R\* = 1.79 [2.23]  
b = 0.86 [0.54]  
Seff = 1635.82 [634.39]  
Teff = 1622 [157] K  
Rp = 0.98 [0.44] Re  
a = 0.0387 [0.0098] AU  
Ag = 28.74 [22.04] [1.26σ]  
Teffp = 5805 [992] K [4.17σ]

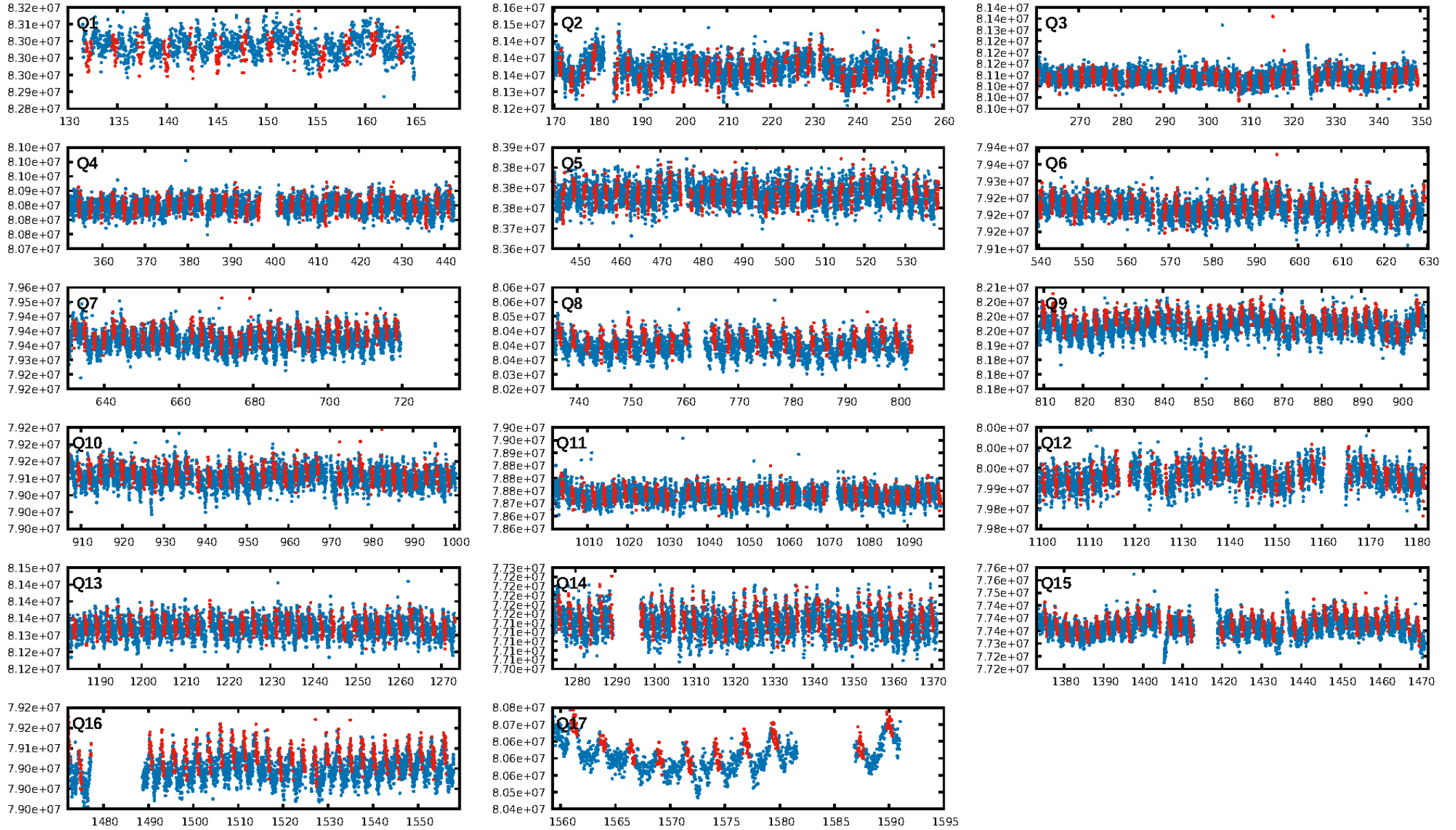
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [118.62σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 2.82e-13  
RollingBand-fgt: 1.00 [494/494]  
GhostDiagnostic-chr: 4.793  
Centroid-sig: 0.0%  
Centroid-so: 0.605 arcsec [1.03σ]  
OotOffset-rm: 0.861 arcsec [1.39σ]  
KicOffset-rm: 0.150 arcsec [0.47σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.88 [15/17]  
DiffImageOverlap-fno: 1.00 [17/17]

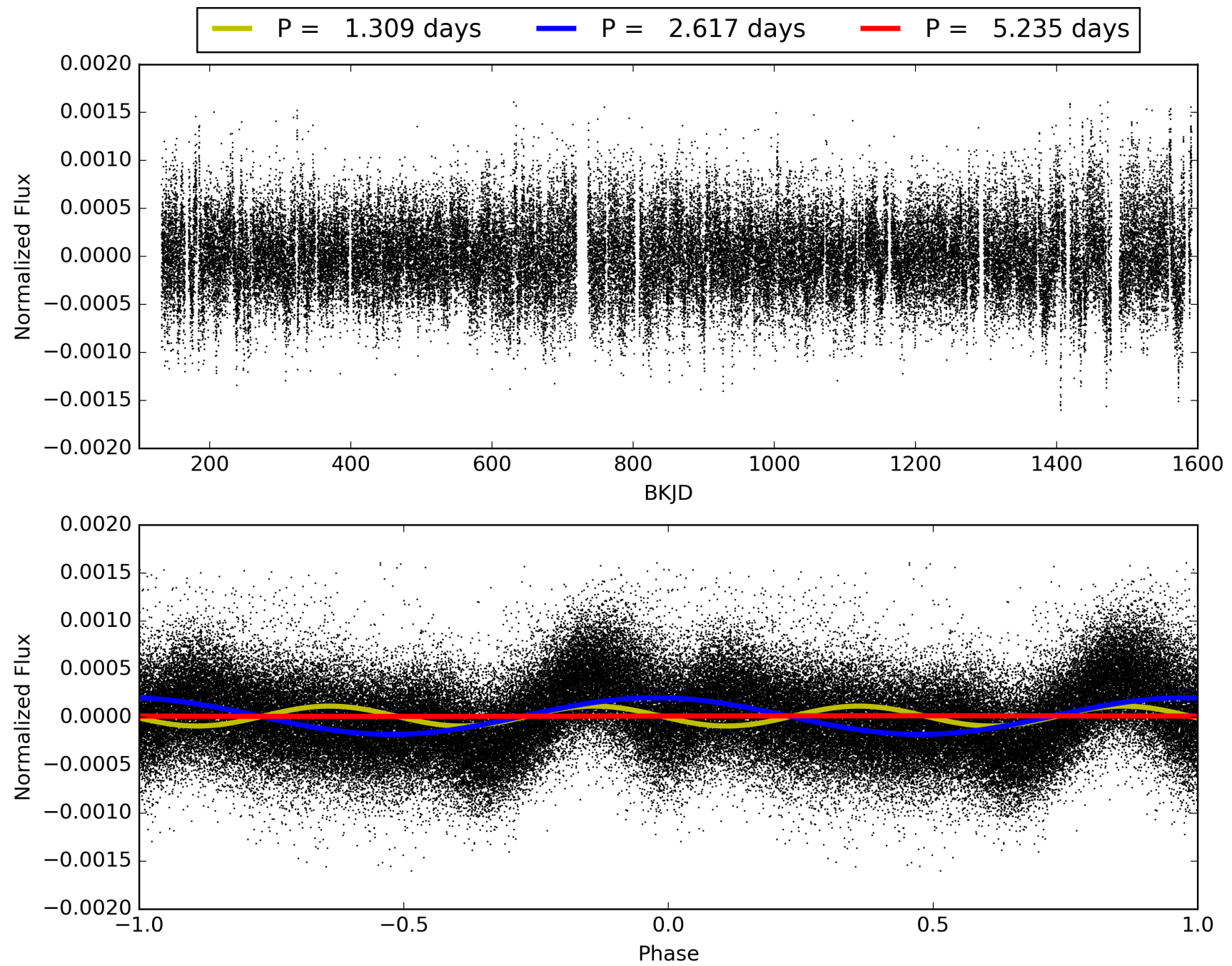
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 01:25:42 Z

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

# TCE 002581457-01, PDC Light Curves



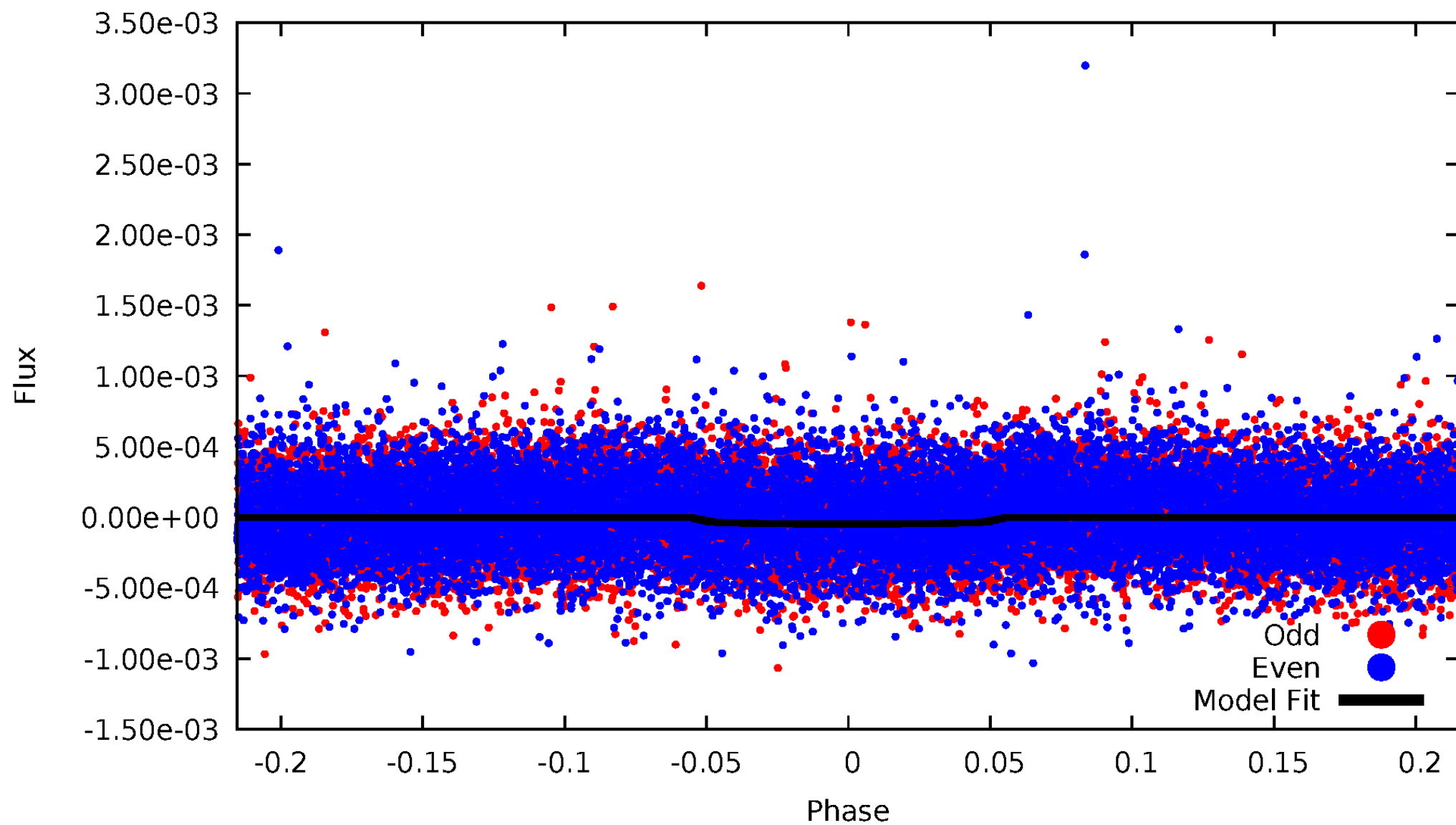
TCE 002581457-01





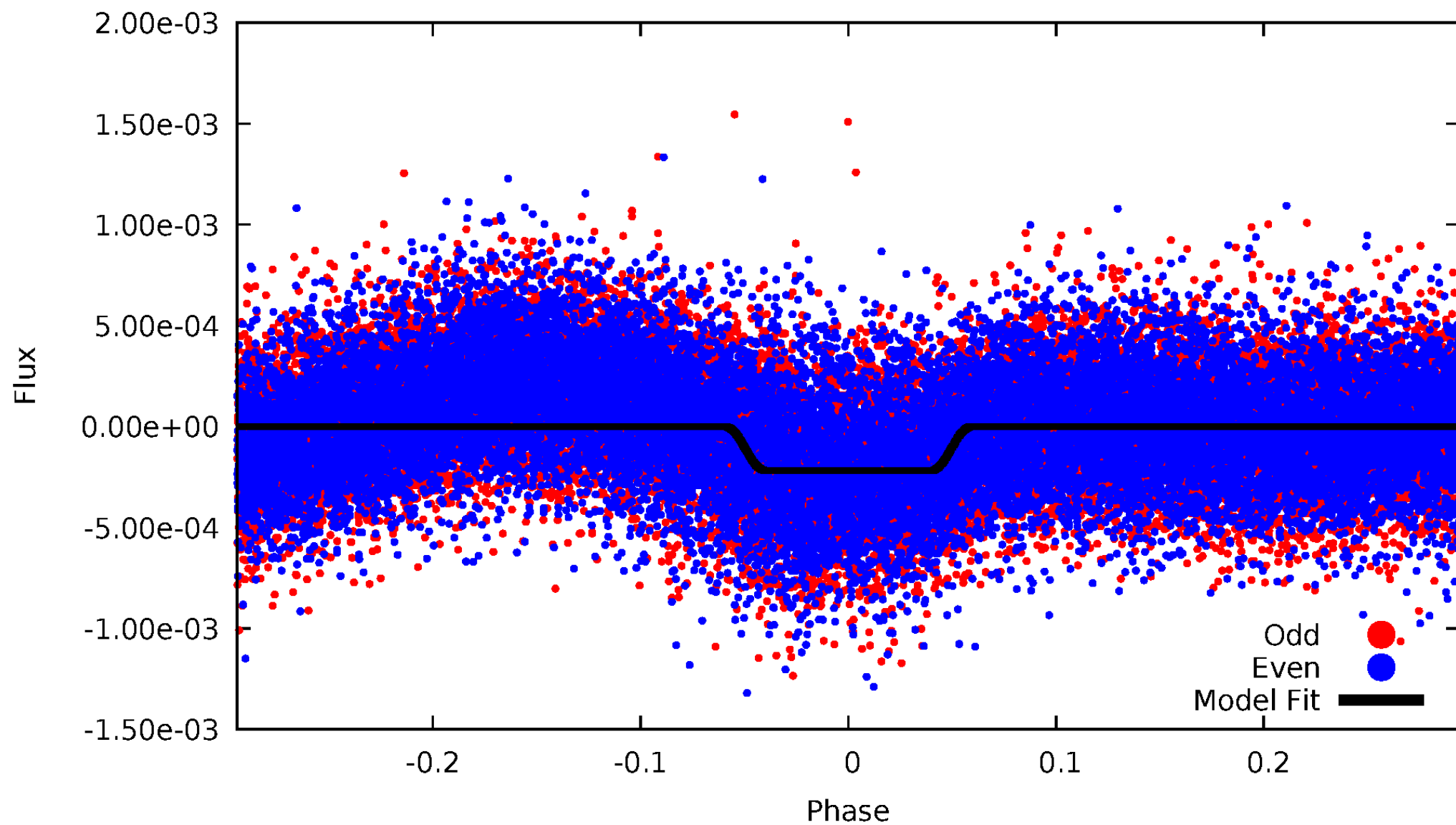
# DV Odd/Even

TCE 002581457-01

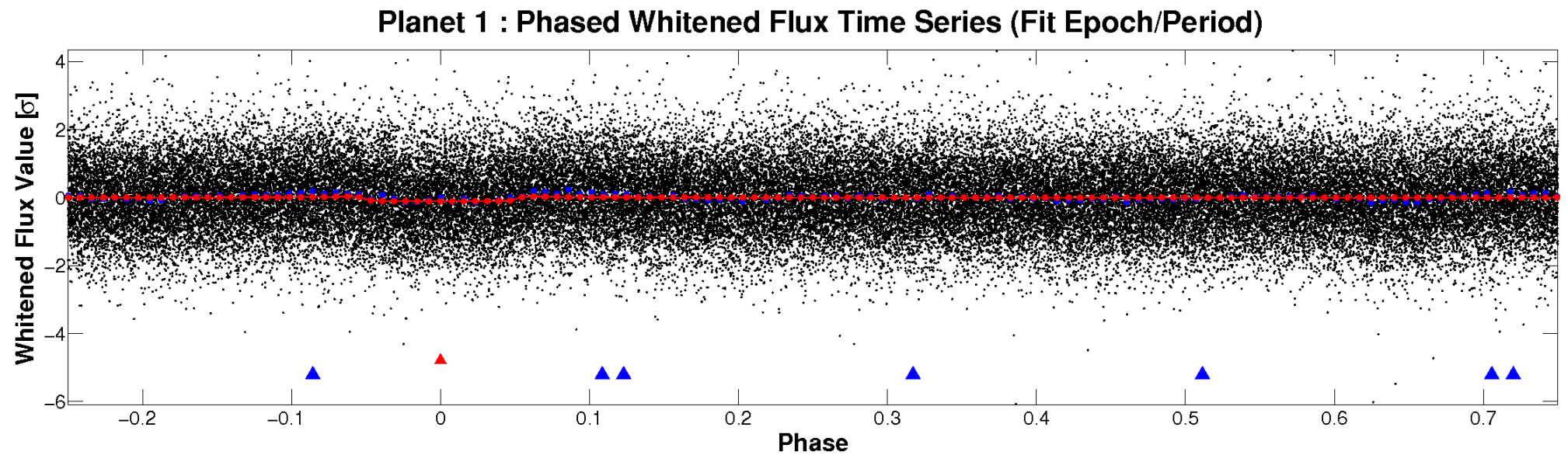
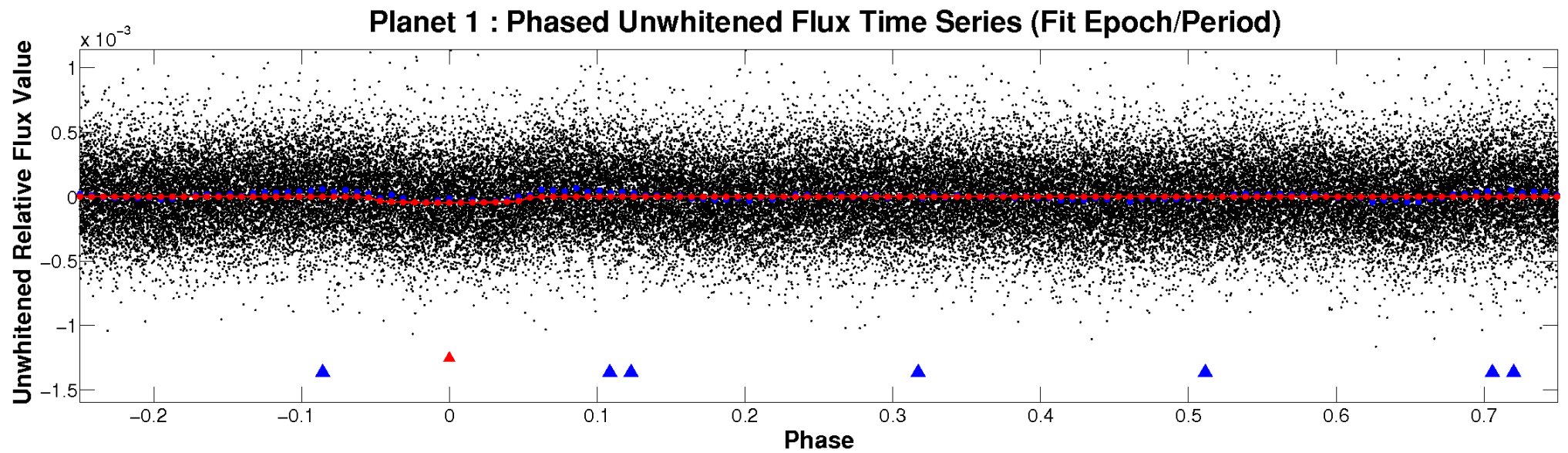


# ALT Odd/Even

TCE 002581457-01

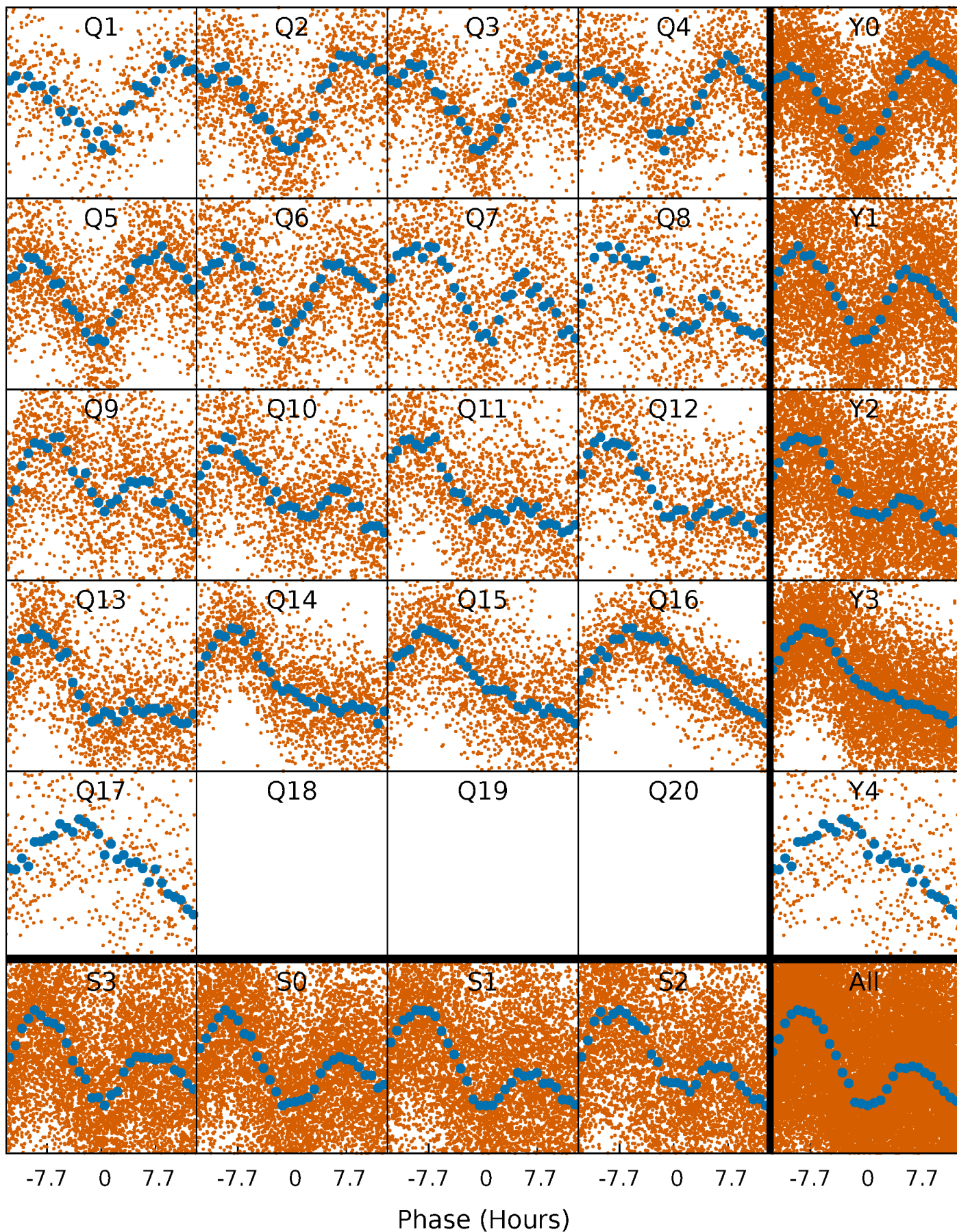


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

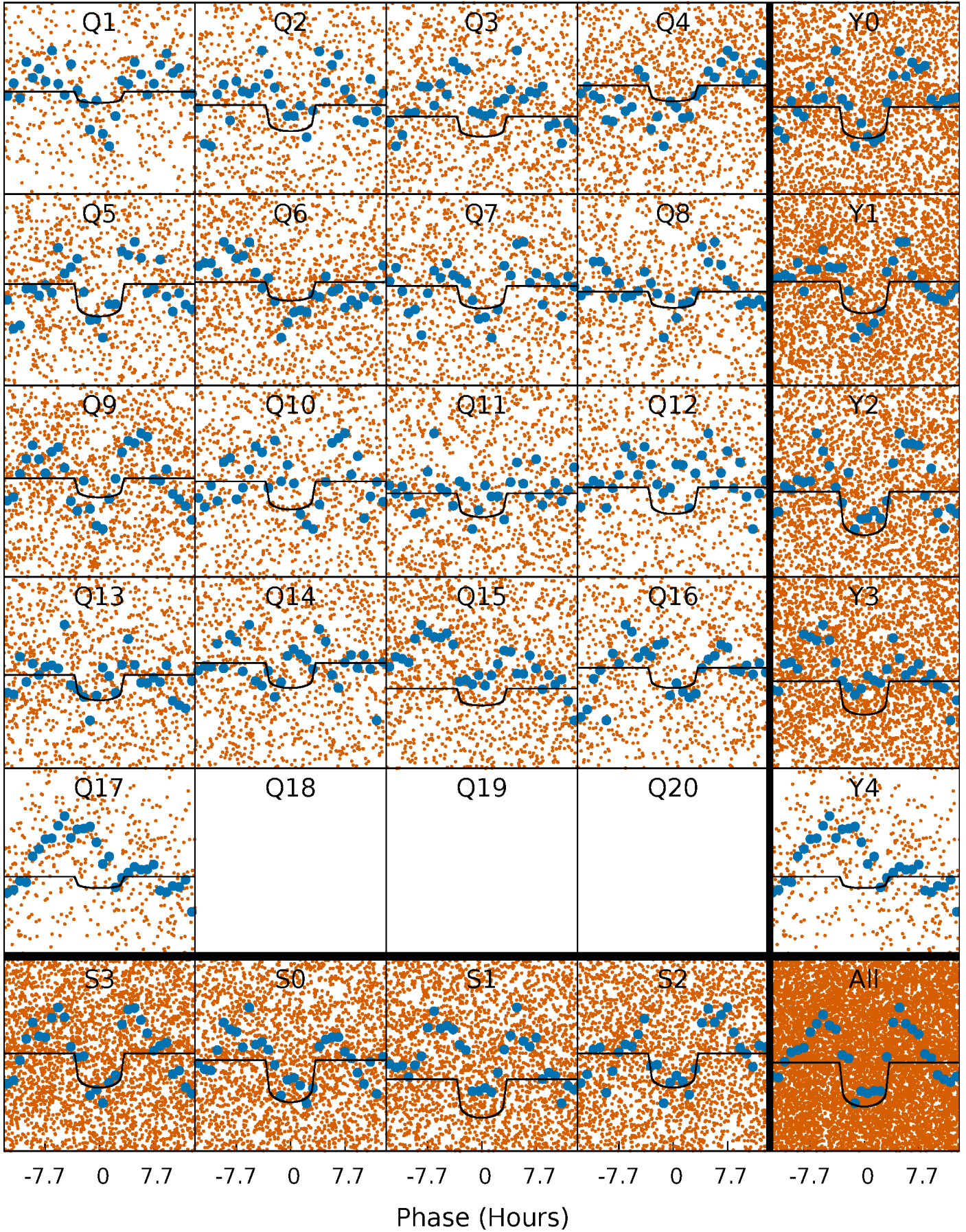
TCE 002581457-01 P= 2.617463 Days  $T_0=132.095243$  (BKJD)





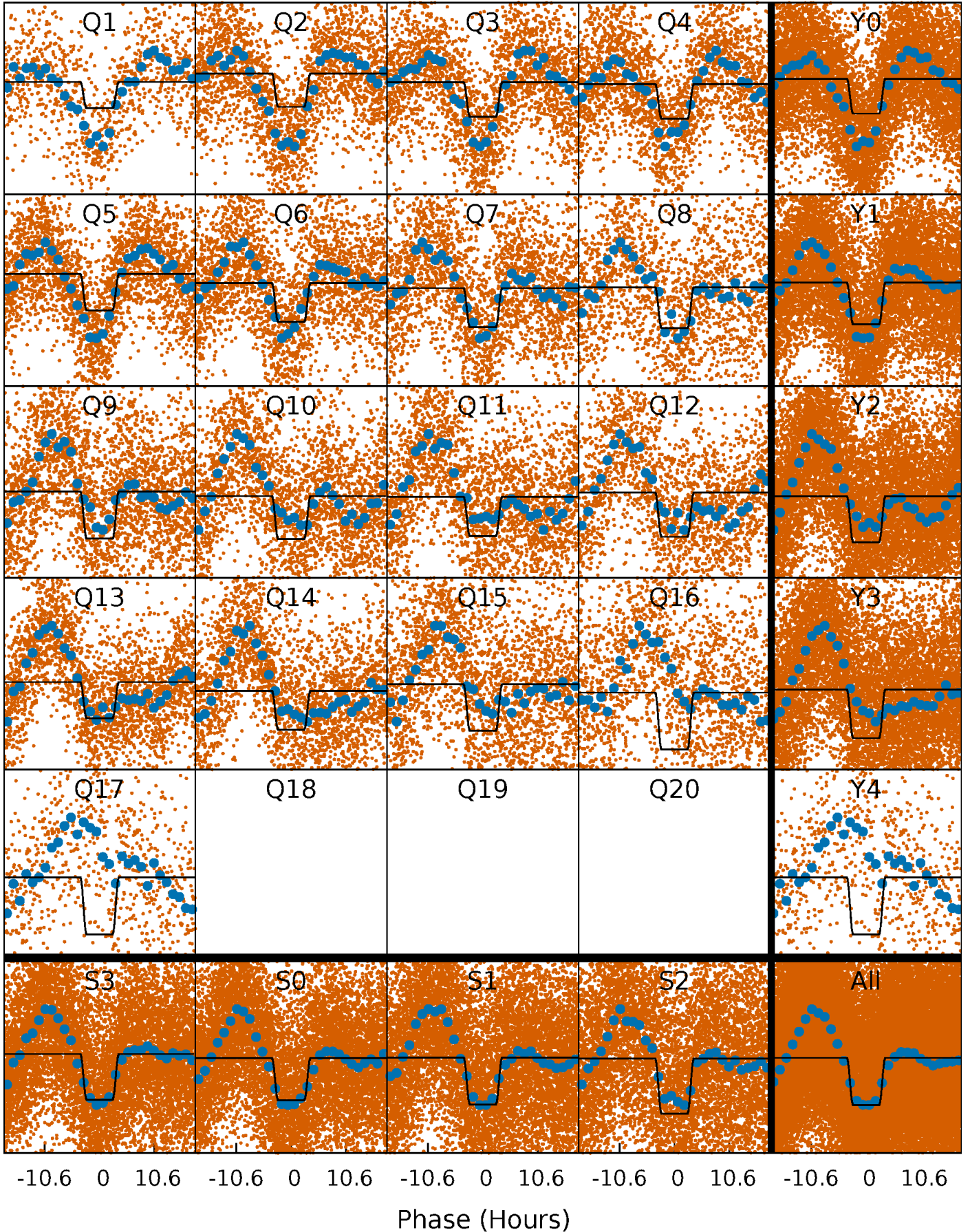
# DV Quarter-Phased Transit Curves

TCE 002581457-01 P= 2.617463 Days  $T_0=132.095243$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 002581457-01 P= 2.617447 Days  $T_0=132.106583$  (BKJD)

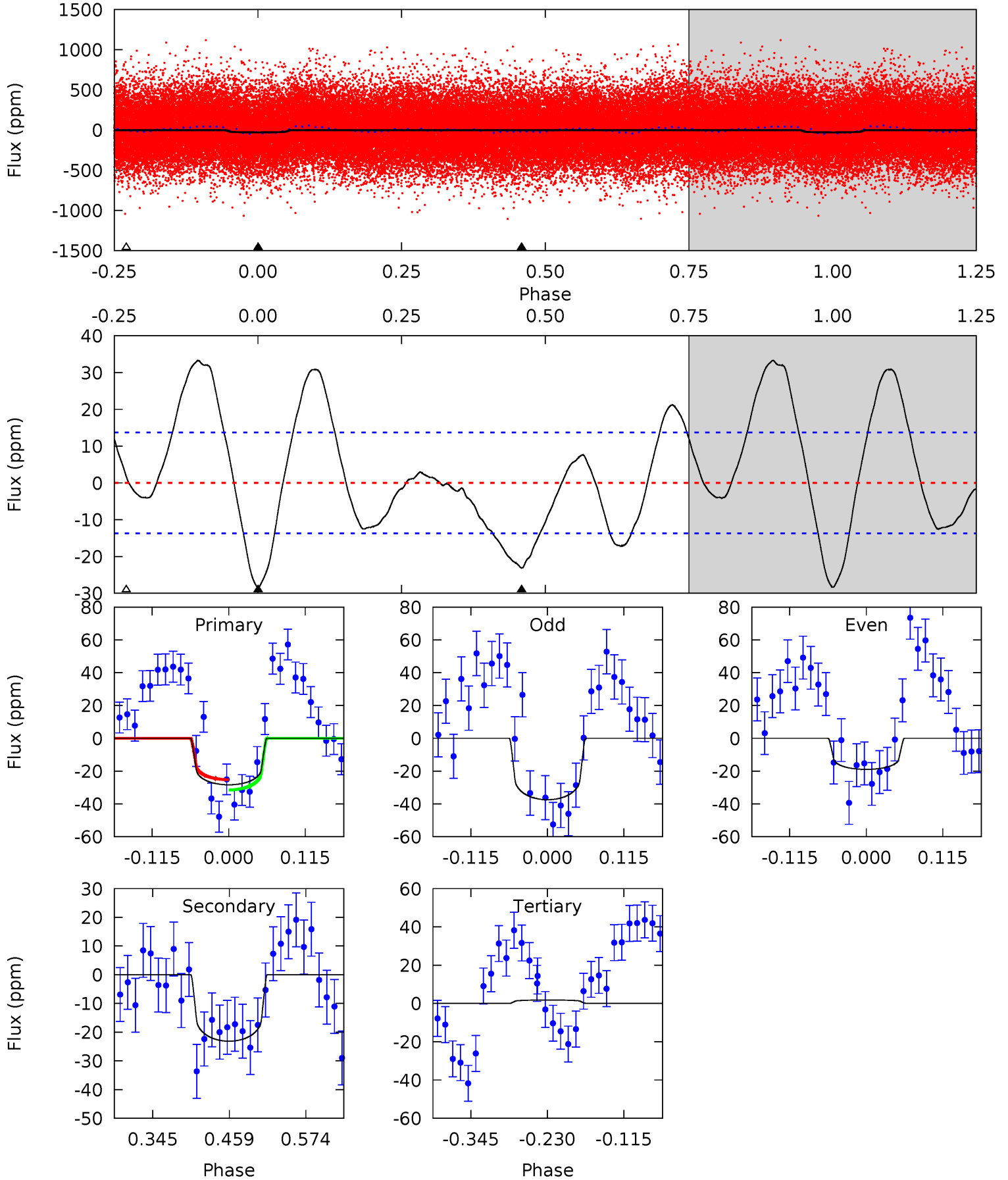




# DV Model-Shift Uniqueness Test

002581457-01, P = 2.617463 Days, E = 129.477780 Days

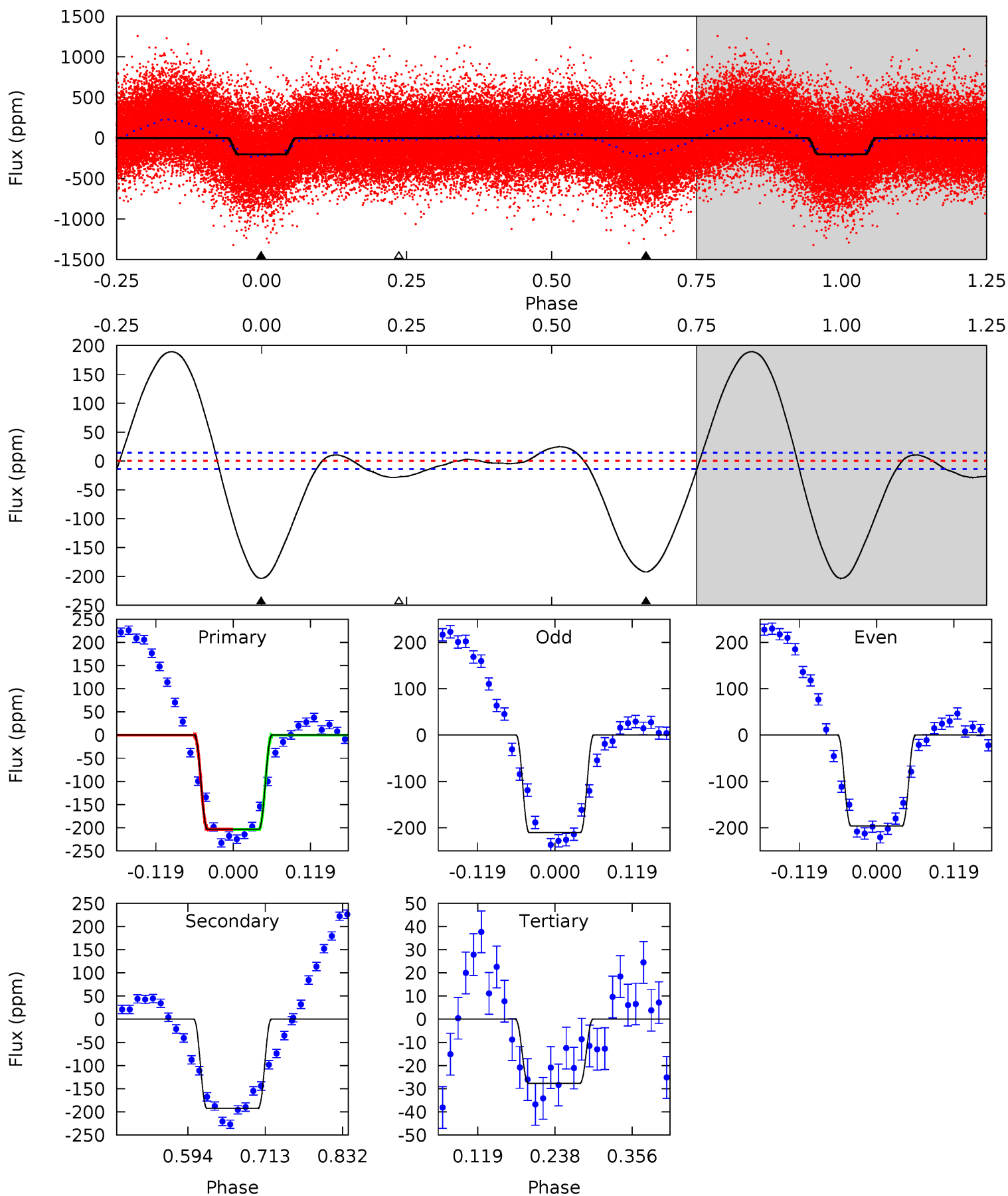
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.38	7.65	-0.59	0	4.54	1.58	3.80	9.97	9.38	8.24	7.65	3.06	1.12	0.54	1.04



# Alt Model-Shift Uniqueness Test

002581457-01, P = 2.617447 Days, E = 129.489136 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
65.1	61.6	8.88	0	4.53	1.56	21.4	56.2	65.1	52.7	61.6	2.27	1.04	0.48	0.08





### Stellar Parameters For KIC 002581457

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6455^{+162}_{-194}$	$4.293^{+0.108}_{-0.201}$	$-0.200^{+0.250}_{-0.300}$	$1.255^{+0.380}_{-0.205}$	$1.128^{+0.177}_{-0.145}$	$0.804^{+0.463}_{-0.395}$
	+3%/-3%	+3%/-5%	+125%/-150%	+30%/-16%	+16%/-13%	+58%/-49%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 002581457-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-23 \pm 3$	$1.02^{+0.36}_{-0.33}$	$2292^{+167}_{-129}$	$5279^{+1124}_{-609}$	$18^{+22}_{-8}$
Alt.	$-192 \pm 3$	$2.07^{+0.47}_{-0.39}$	$2291^{+164}_{-129}$	$6235^{+589}_{-500}$	$37^{+18}_{-12}$

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

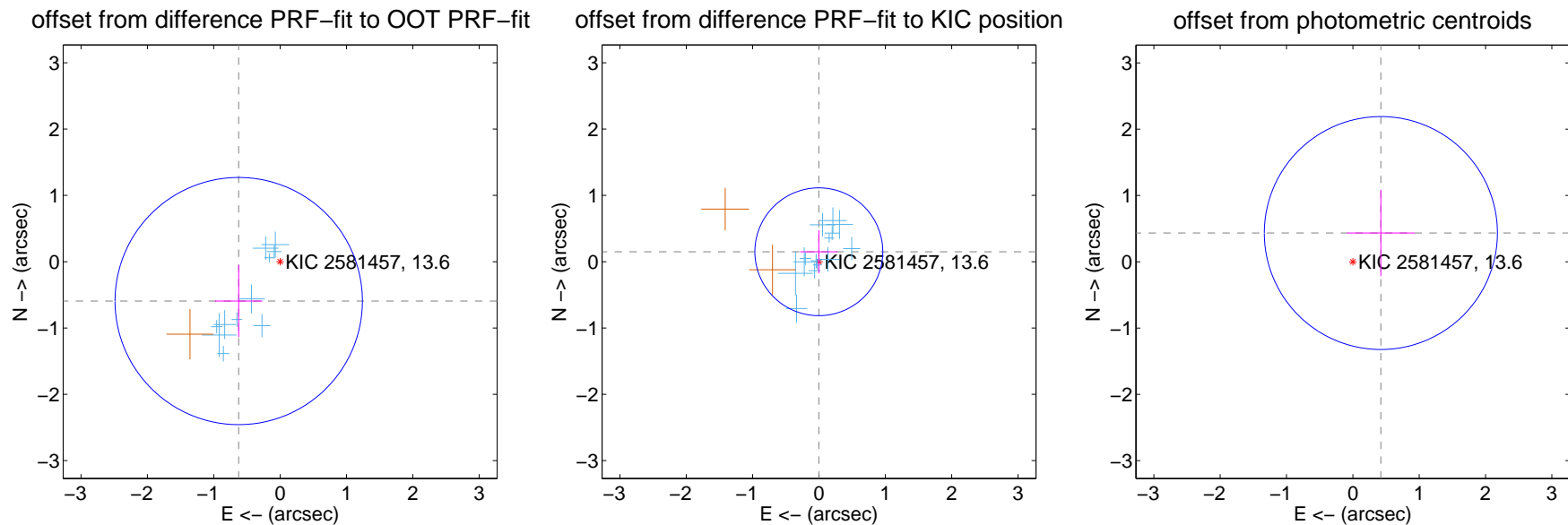
## DV Centroid Data

Supplemental centroid analysis for 002581457-01. Kepler magnitude: 13.60. Transit SNR 8.57

There are 15 quarters with good PRF difference image offsets

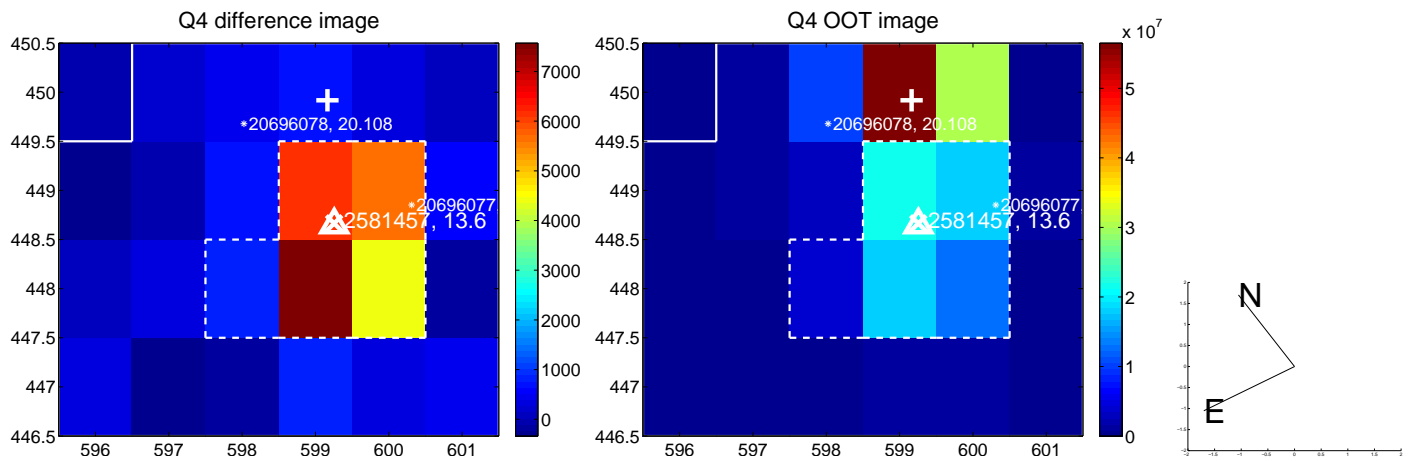
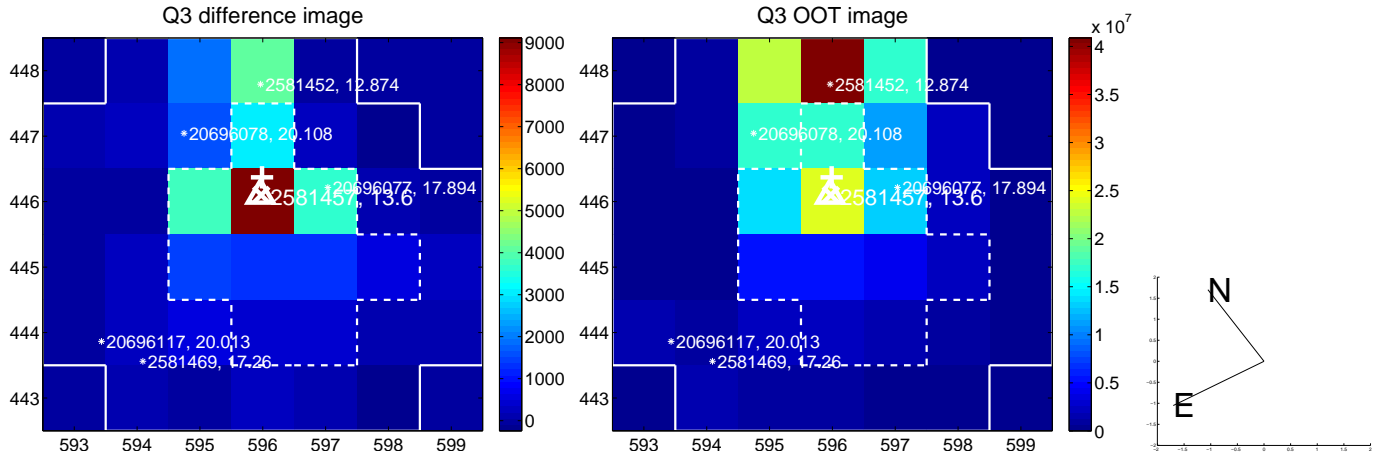
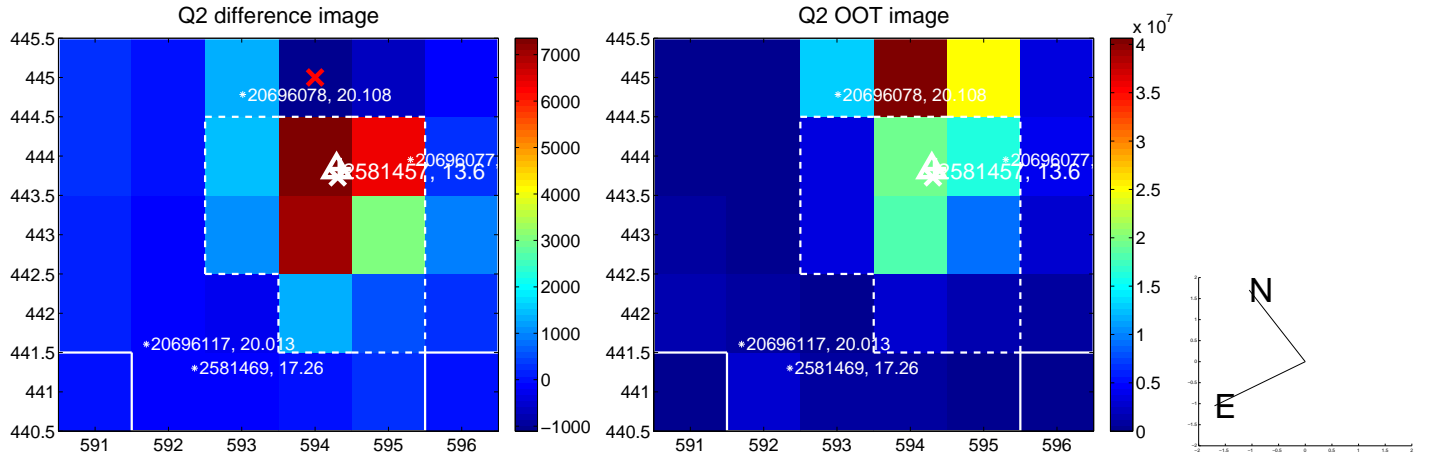
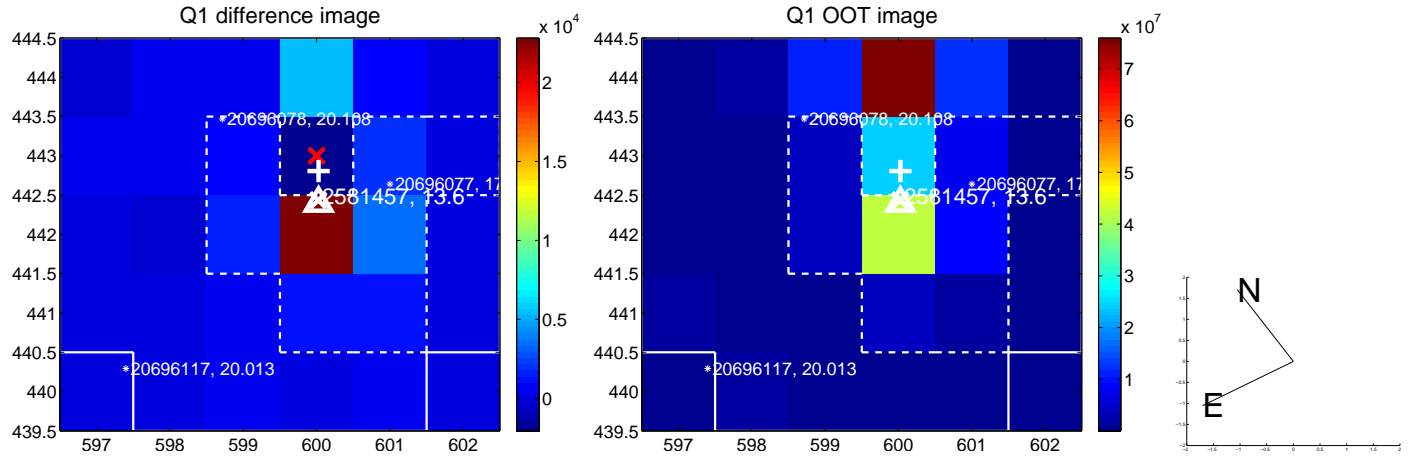
The direct PRF centroid is offset from the target star catalog position by about 1.17 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.861 \pm 0.621$	1.39	$0.624 \pm 0.359$	$-0.594 \pm 0.544$
PRF-fit source offset from KIC position	$0.150 \pm 0.321$	0.47	$0.002 \pm 0.281$	$0.150 \pm 0.325$
photometric centroid source offset	$0.61 \pm 0.59$	1.03	$-0.42 \pm 0.51$	$0.43 \pm 0.65$

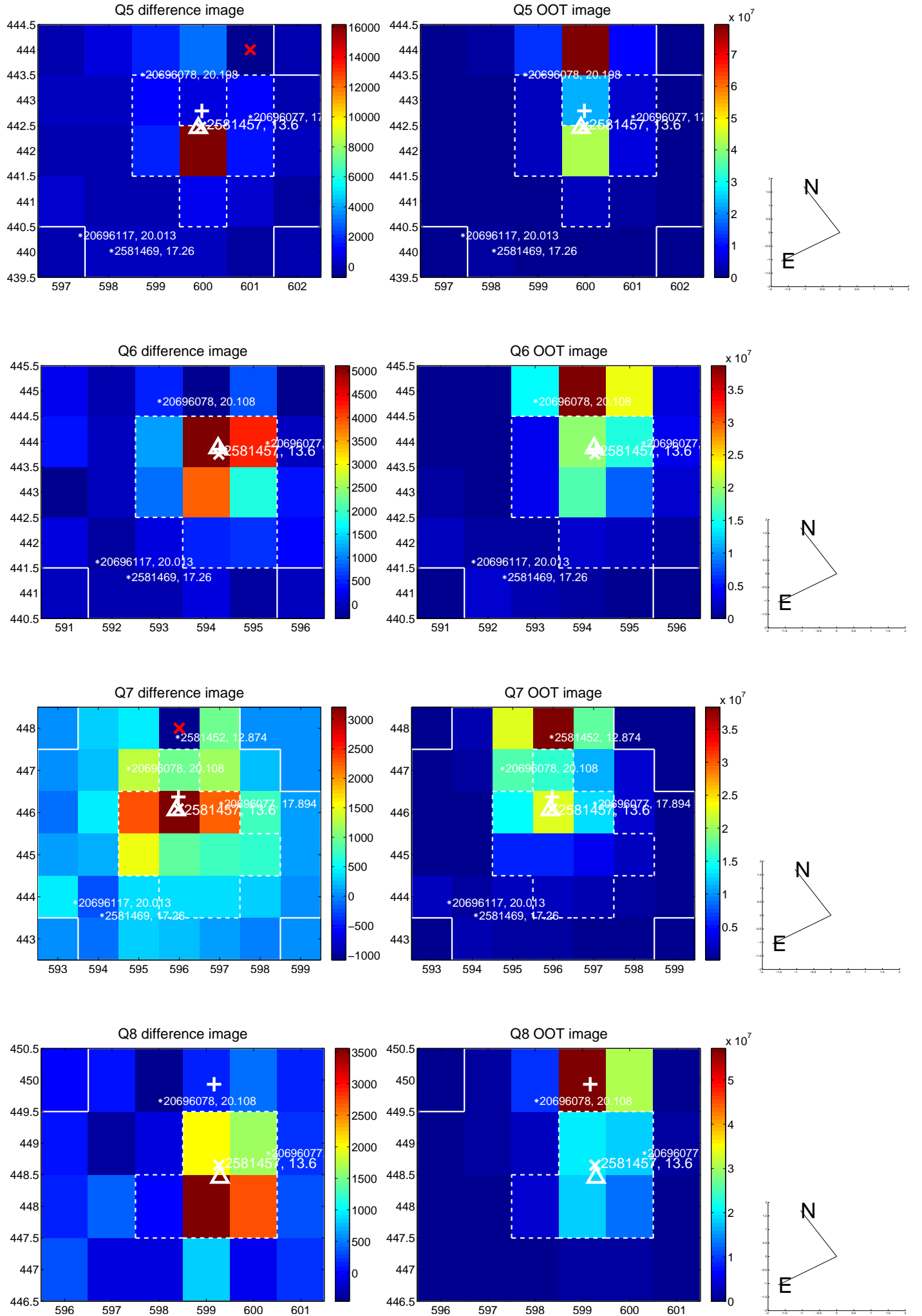


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

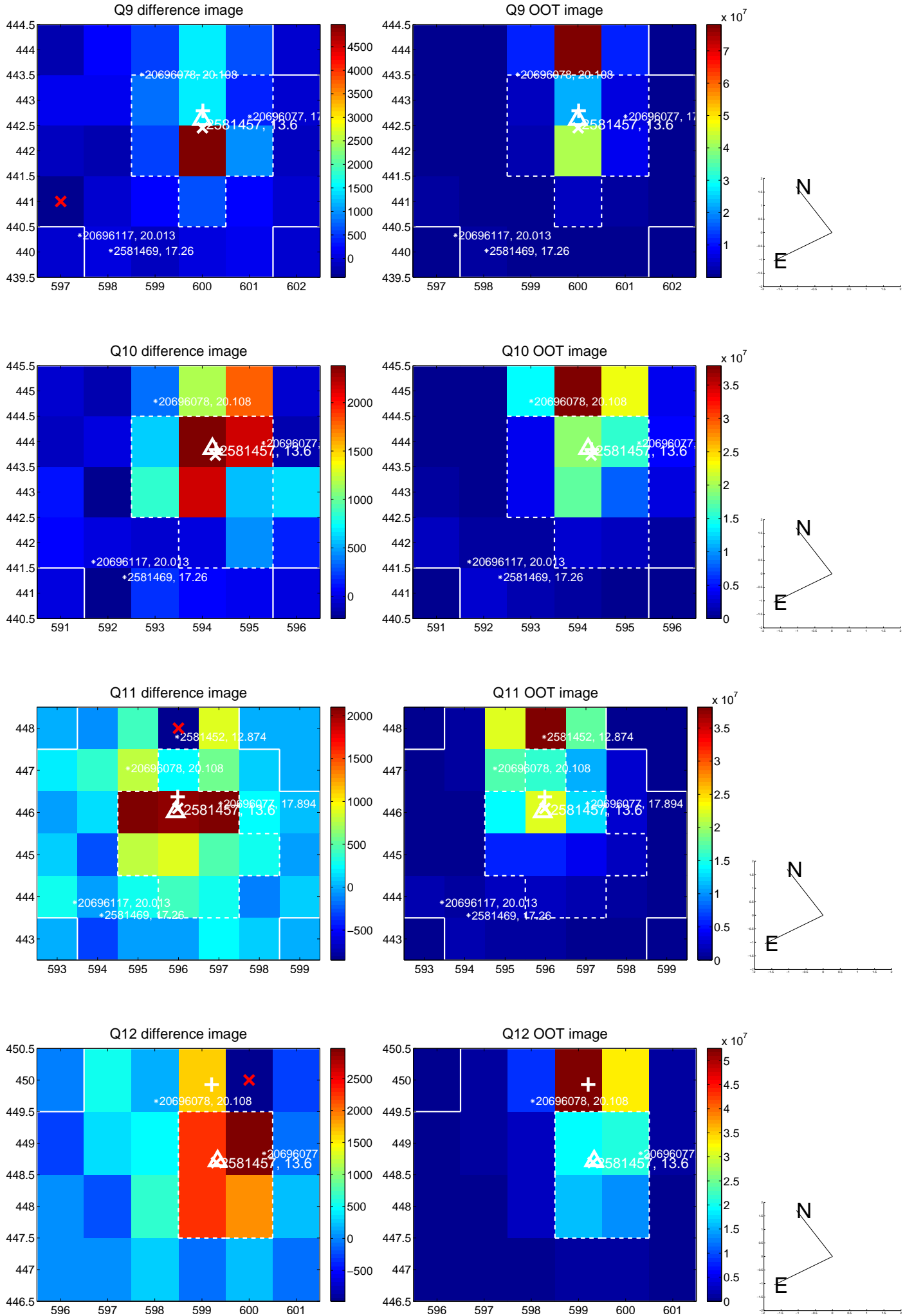


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

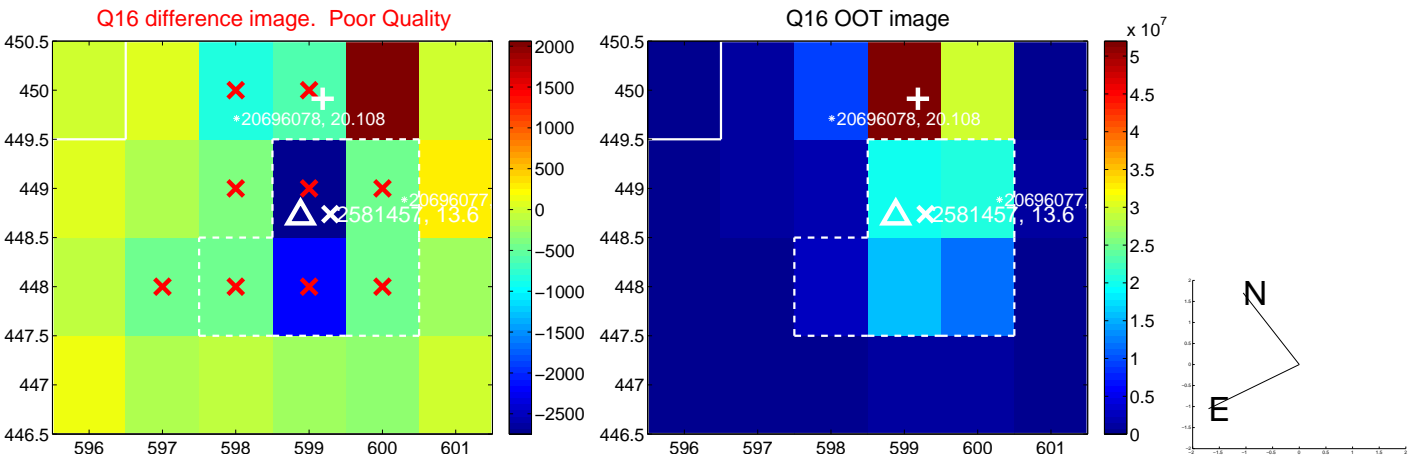
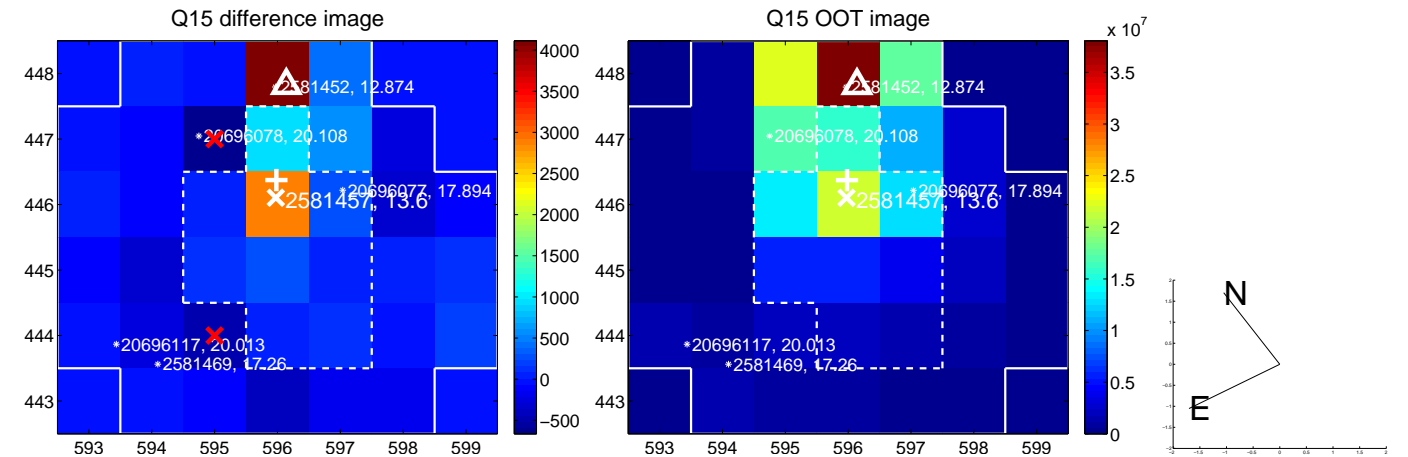
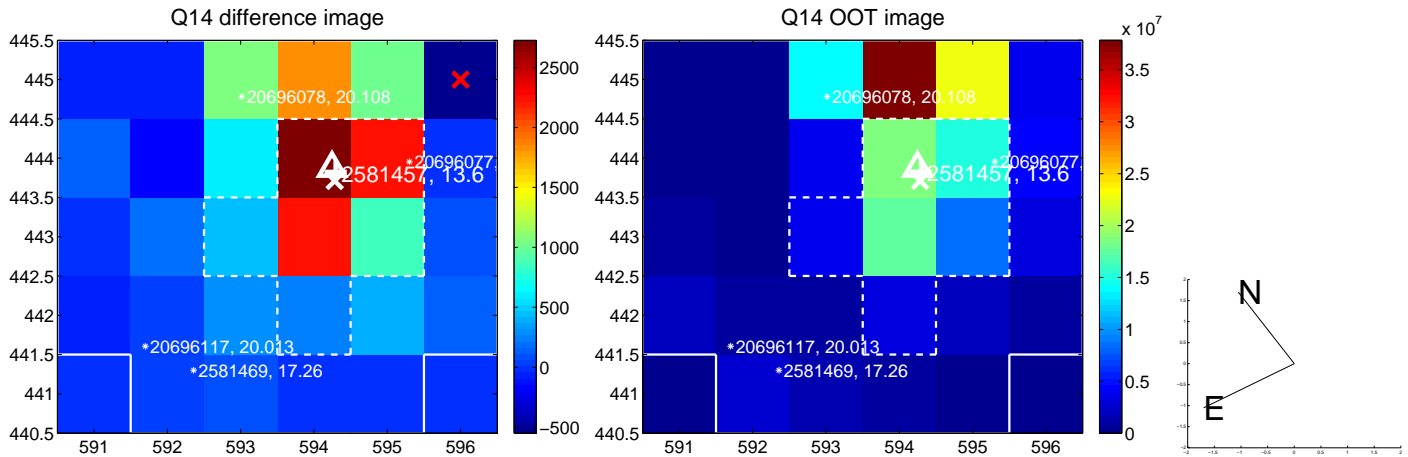
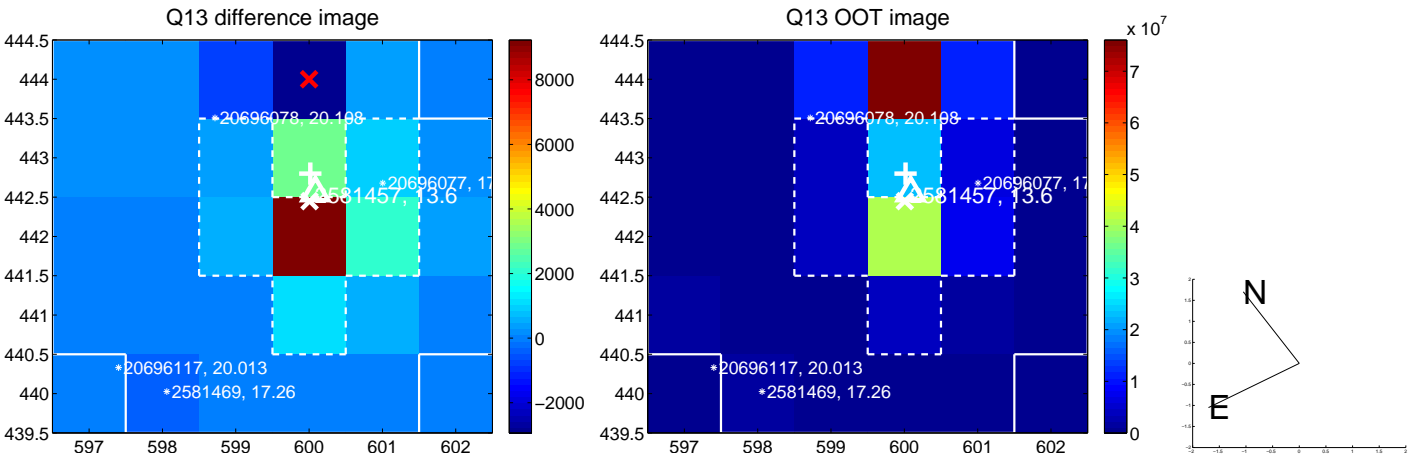




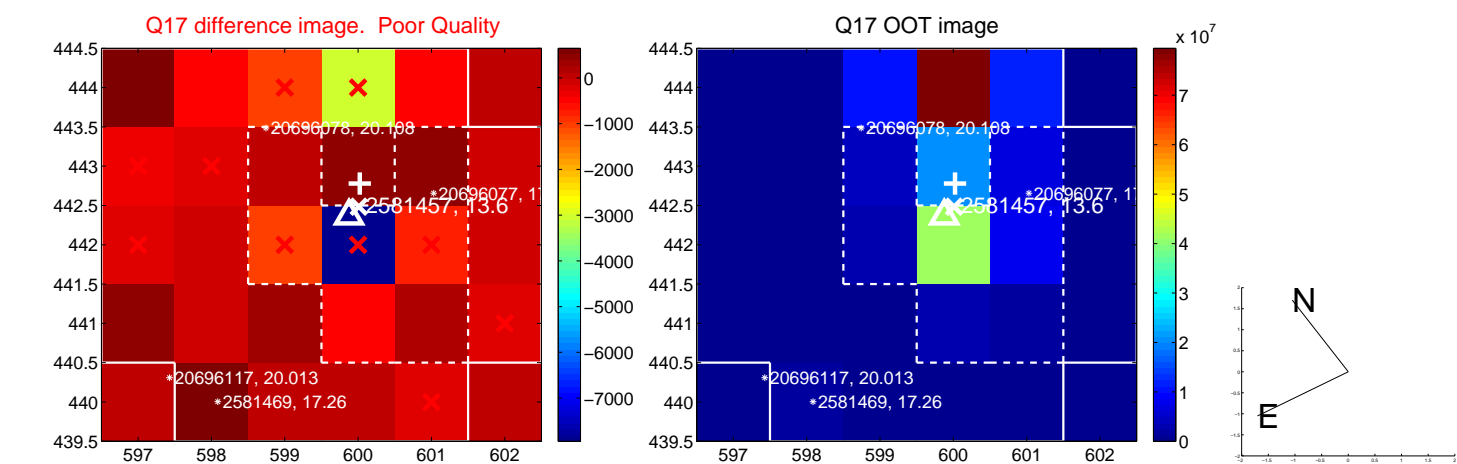
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



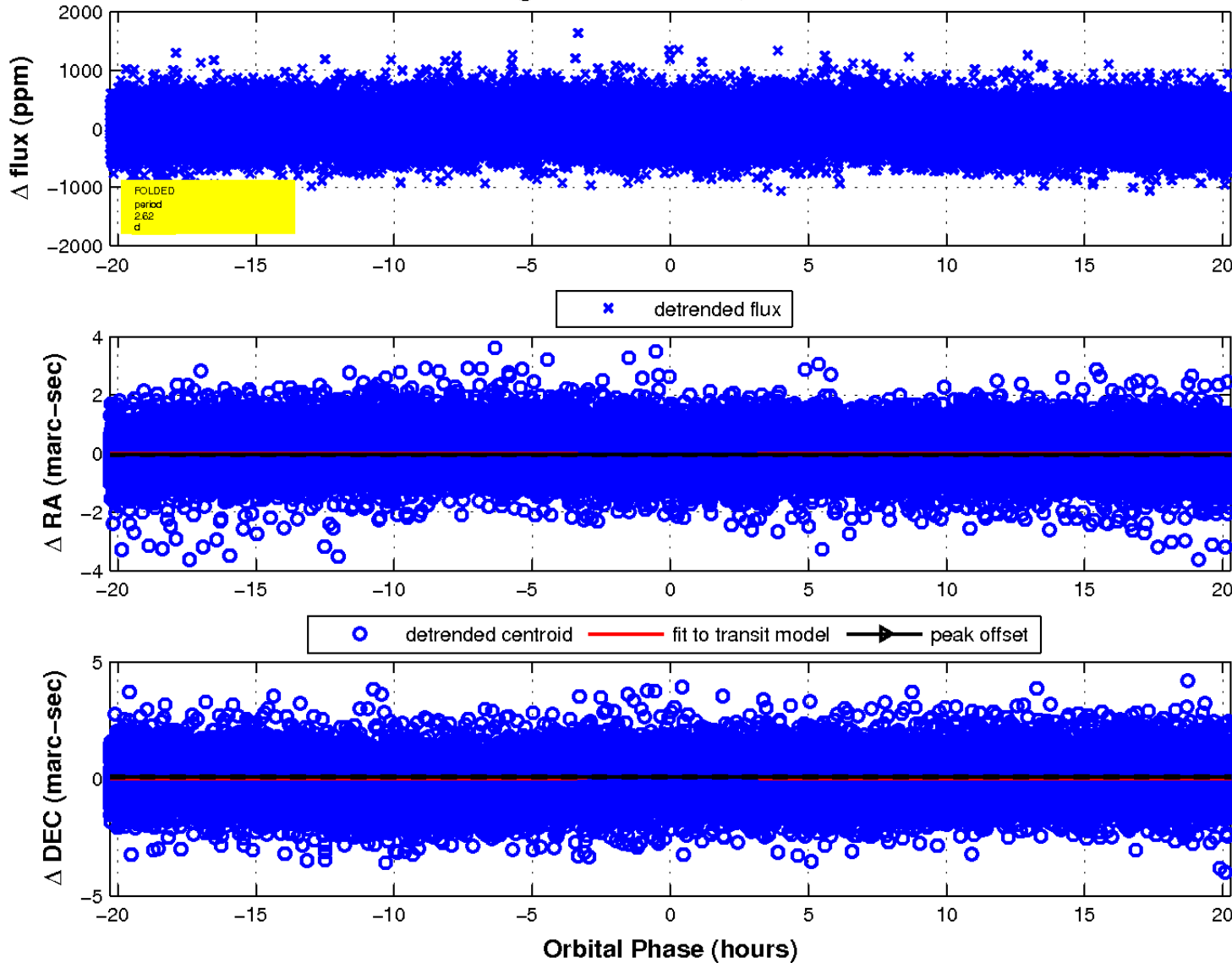
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

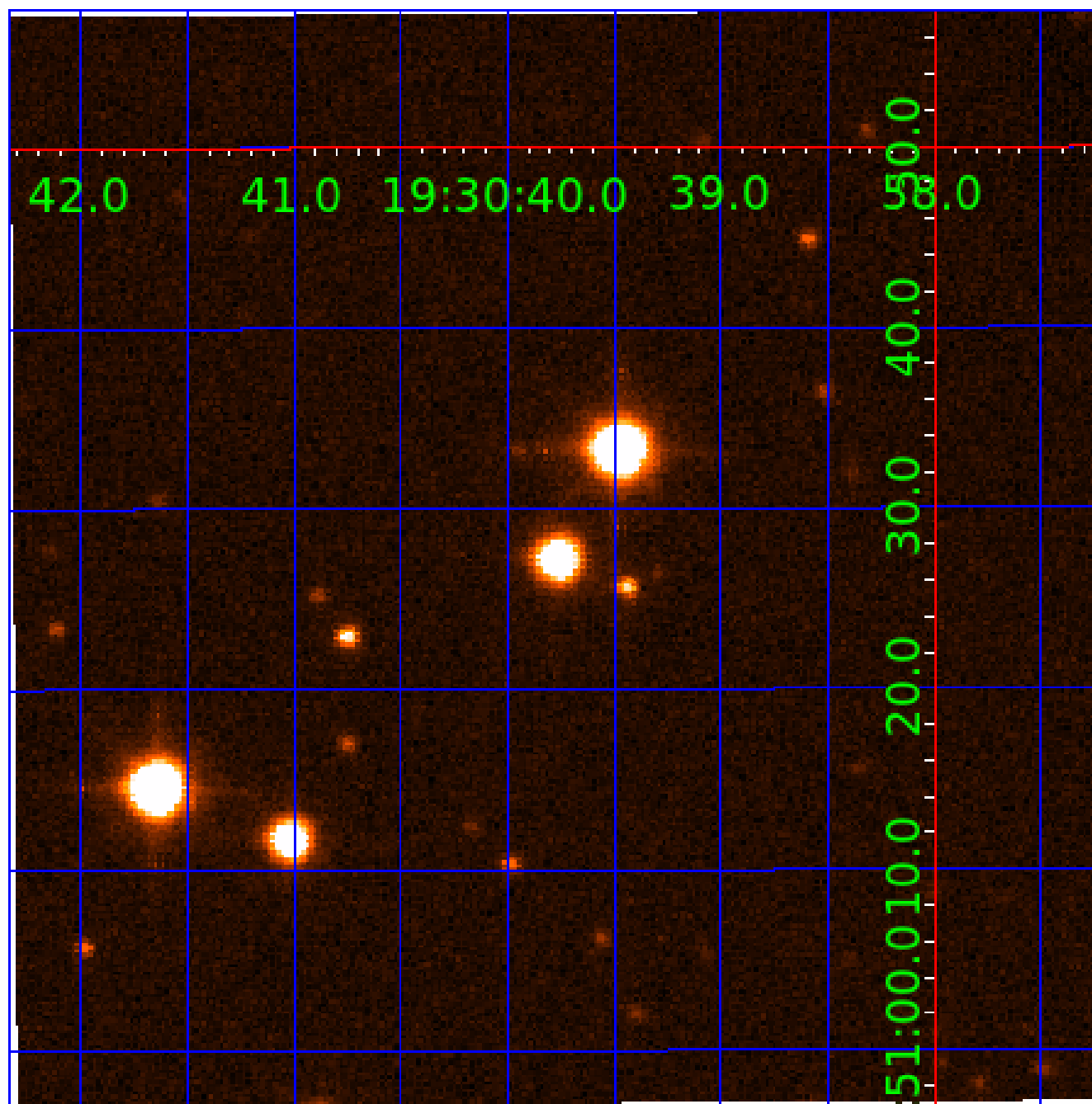


fluxWeightedCentroids, Planet 1 of 2



UKIRT Image

Declination





# KIC 002581457

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
002581457-01	OBS	No	2.617463	132.095243	47.1	6.765	7.9	8.6	1.25	6455	0.98	1635.82
002581457-02	OBS	No	231.391280	157.499535	166.5	45.792	11.0	4.7	1.25	6455	1.74	4.15

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
002581457-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_KIC_POS
002581457-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS

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

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

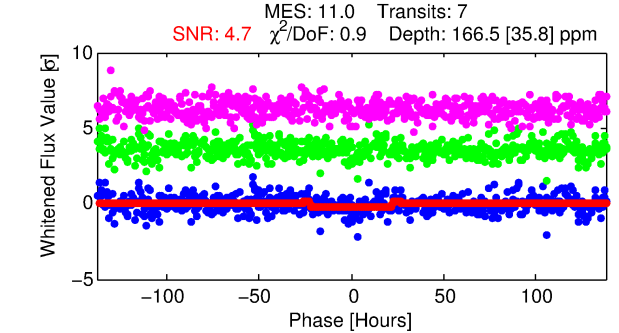
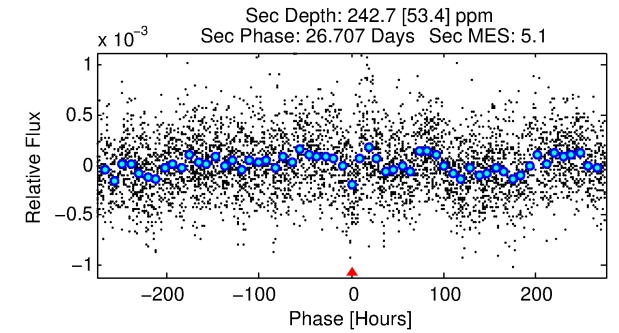
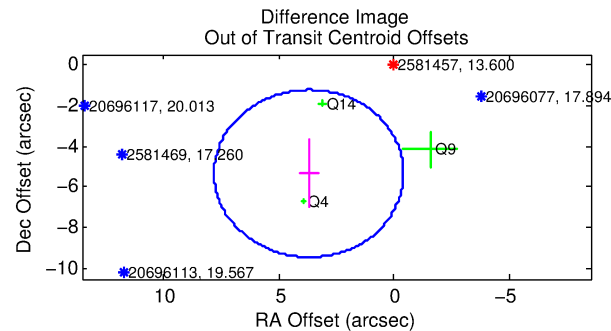
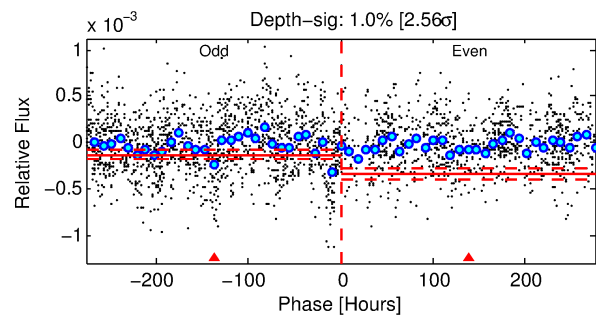
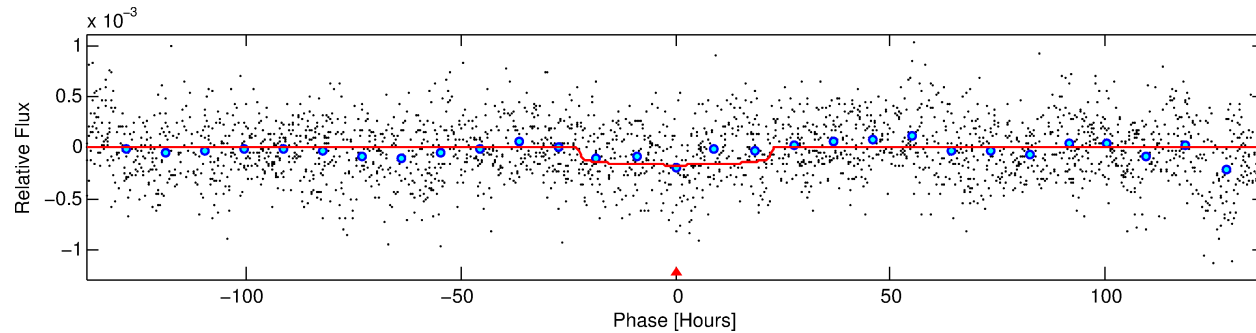
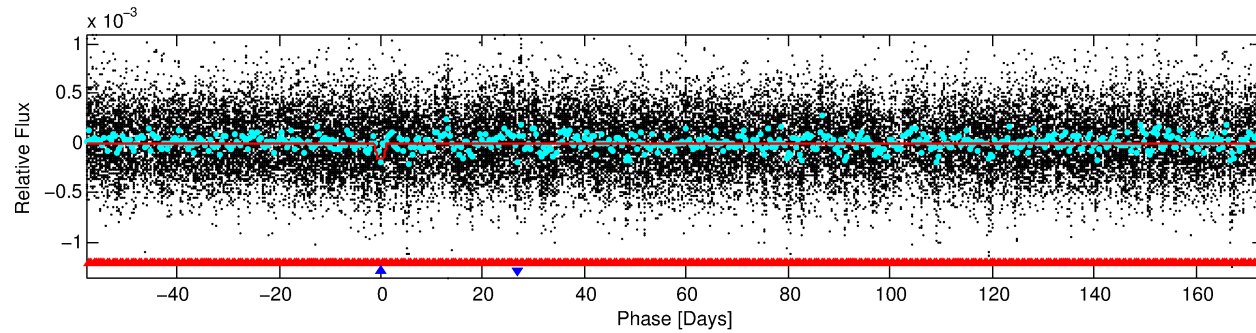
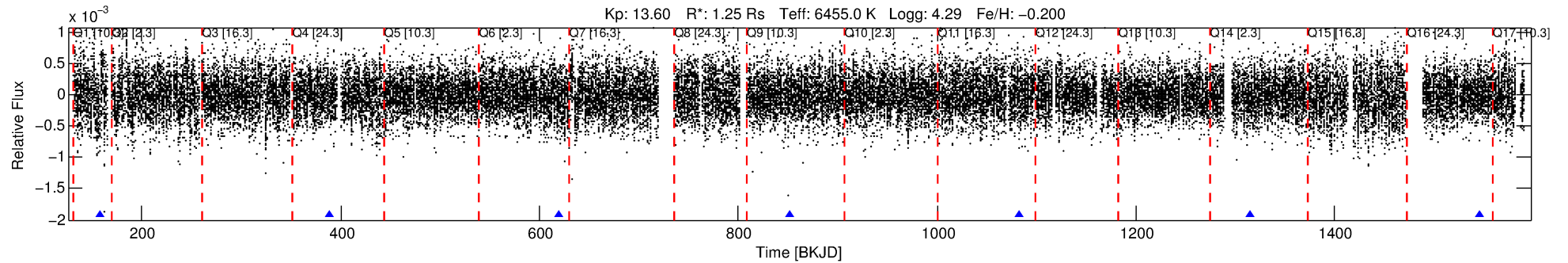
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 002581457-02

No Significant Match Found

# DV One-Page Summary

KIC: 2581457 Candidate: 2 of 2 Period: 231.391 d



## DV Fit Results:

Period = 231.39128 [0.01344] d  
Epoch = 157.4995 [0.0530] BKJD  
Rp/R\* = 0.0127 [0.0025]  
a/R\* = 28.08 [24.43]  
b = 0.70 [0.62]  
Seff = 4.15 [1.61]  
Teq = 364 [35] K  
Rp = 1.73 [0.63] Re  
a = 0.7680 [0.1951] AU  
Ag = 26177.94 [15290.25] [1.71σ]  
Teffp = 7159 [839] K [8.09σ]

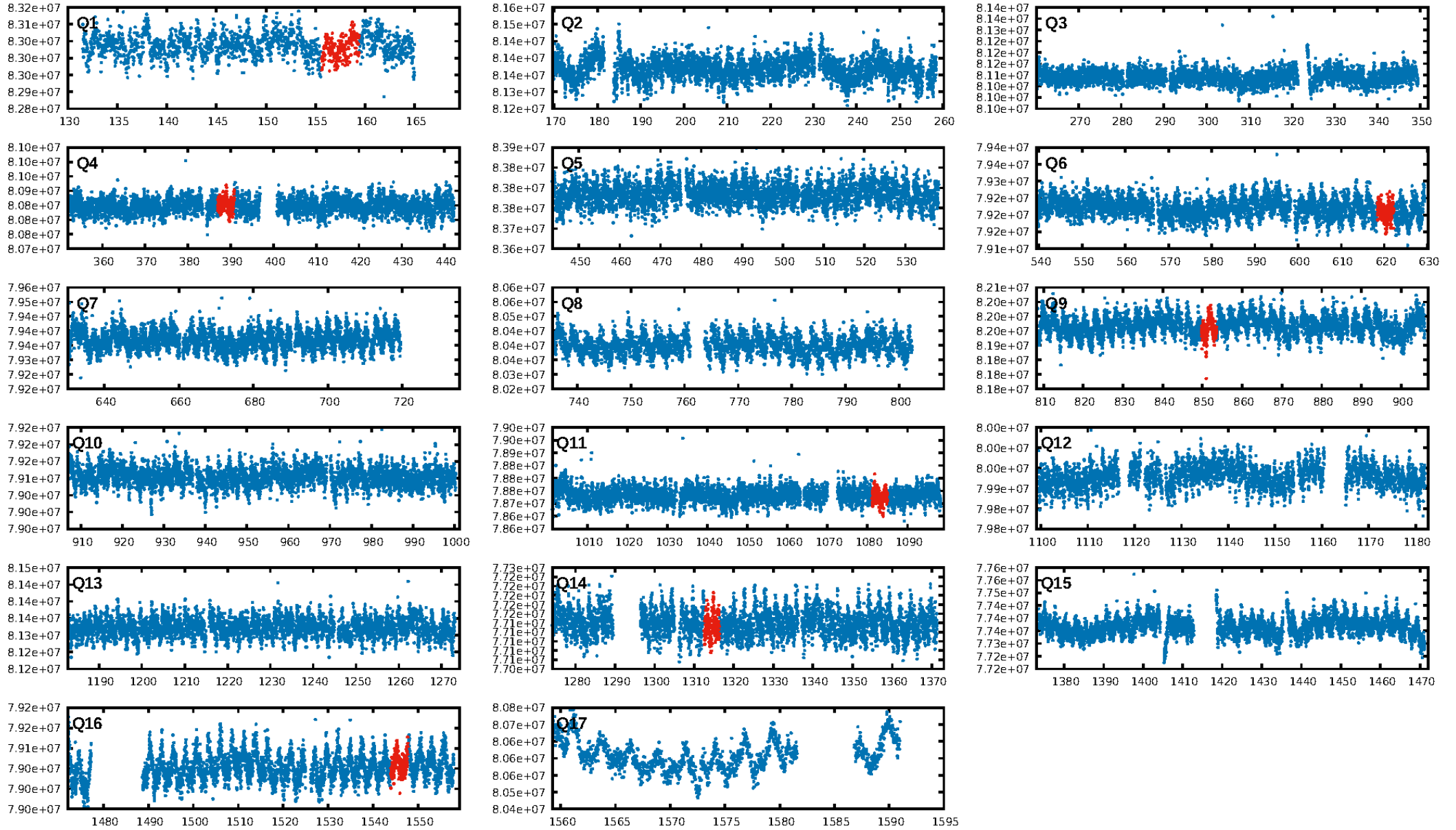
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [118.62σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.1%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 2.75e-19  
RollingBand-fgt: 1.00 [6/6]  
GhostDiagnostic-chr: -2.869  
Centroid-sig: 27.9%  
Centroid-so: 3.016 arcsec [4.43σ]  
OotOffset-rm: 6.490 arcsec [4.75σ]  
KicOffset-rm: 2.605 arcsec [5.28σ]  
OotOffset-st: 1/0/1/1 [3]  
KicOffset-st: 1/0/1/1 [3]  
DiffImageQuality-fgm: 0.00 [0/3]  
DiffImageOverlap-fno: 0.00 [0/5]

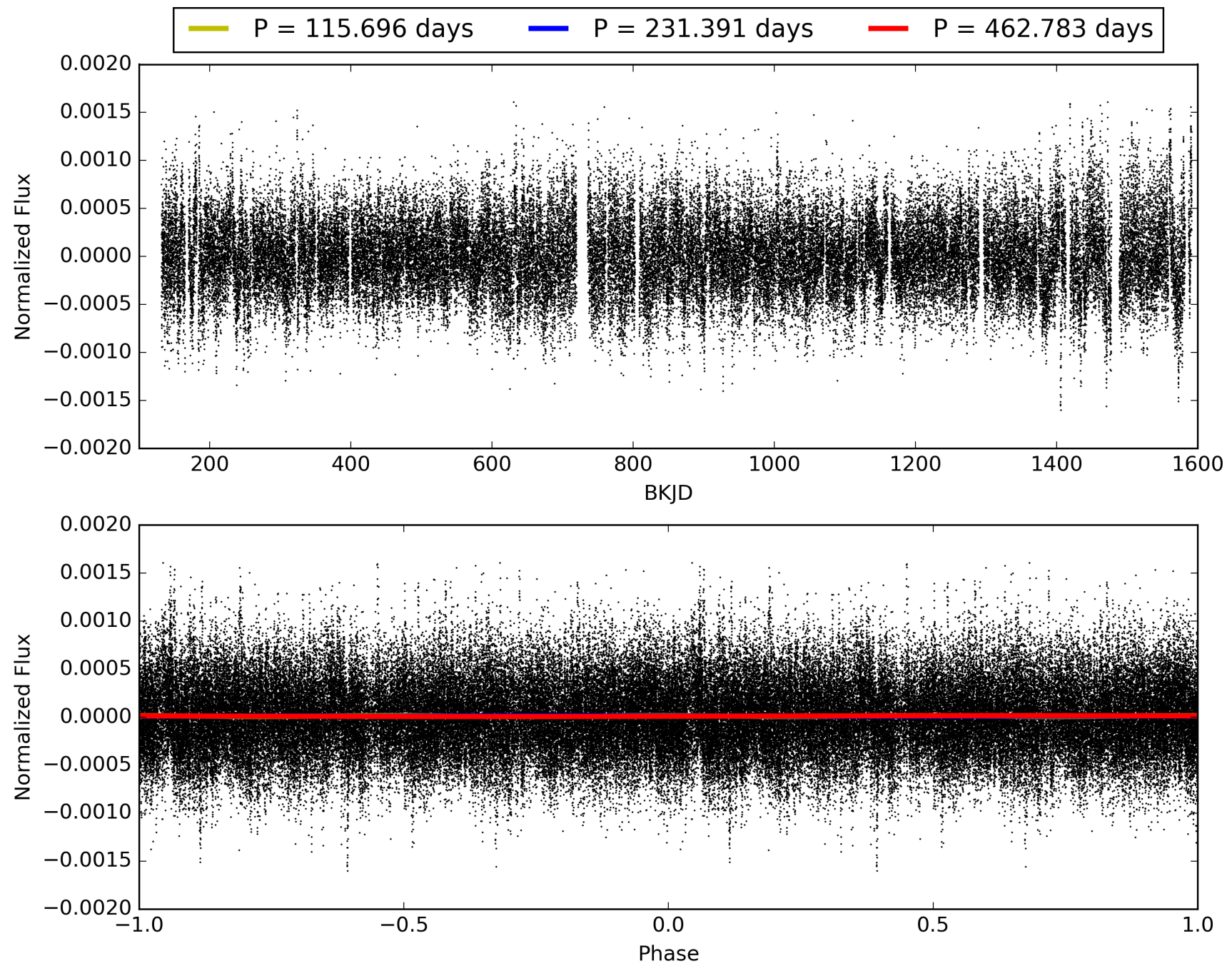
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 01:25:53 Z

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

# TCE 002581457-02, PDC Light Curves



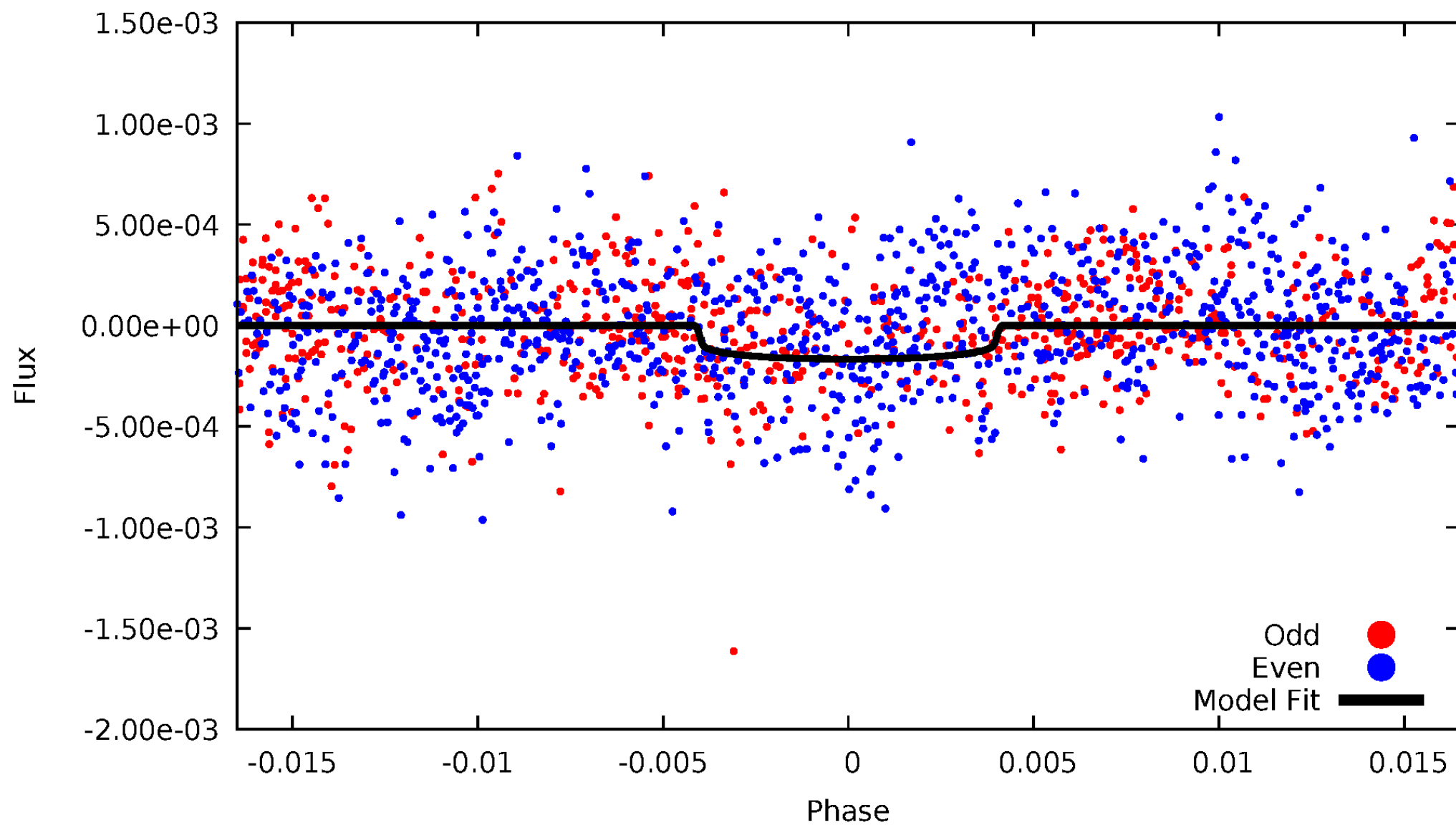
TCE 002581457-02





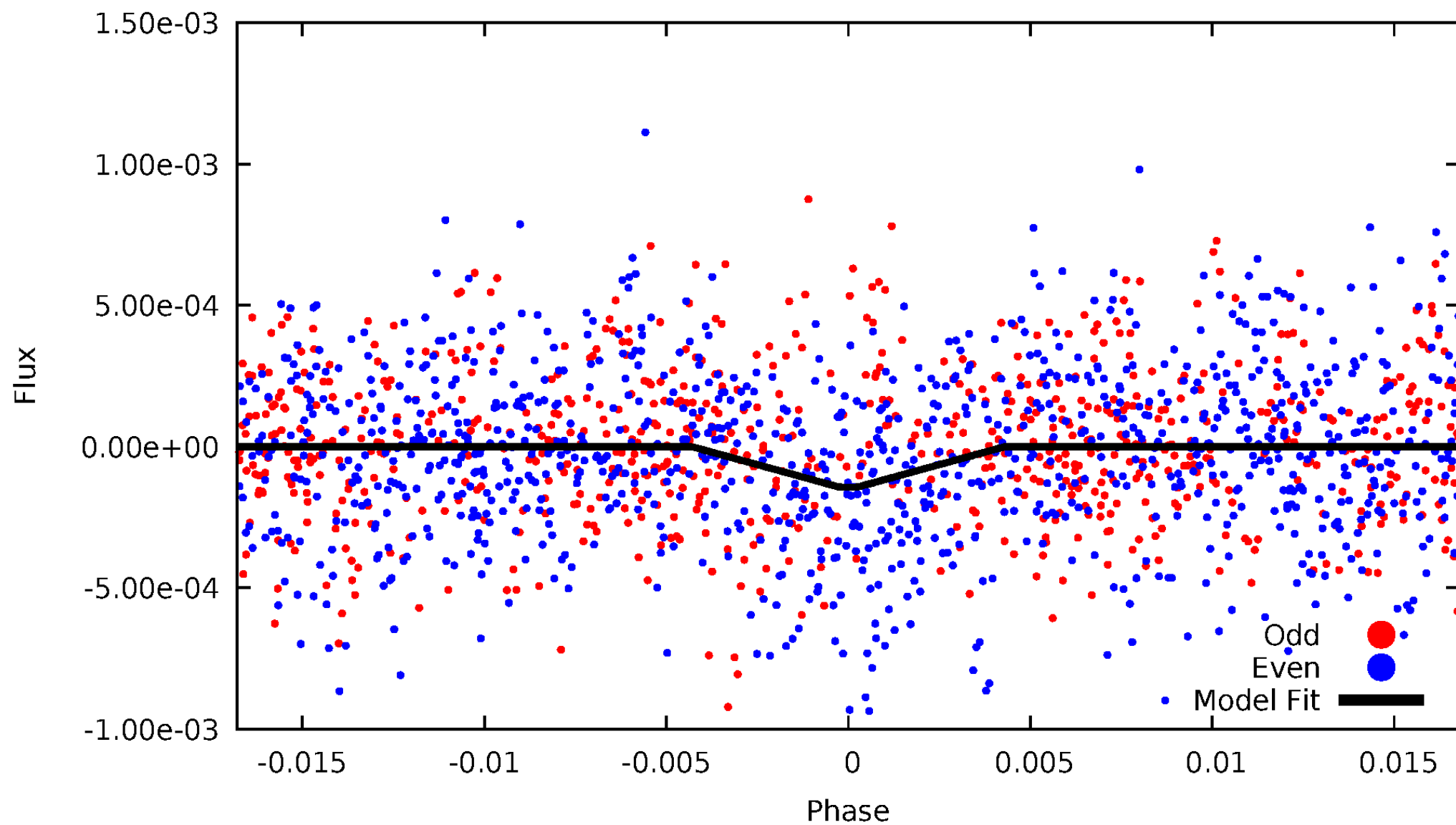
# DV Odd/Even

TCE 002581457-02



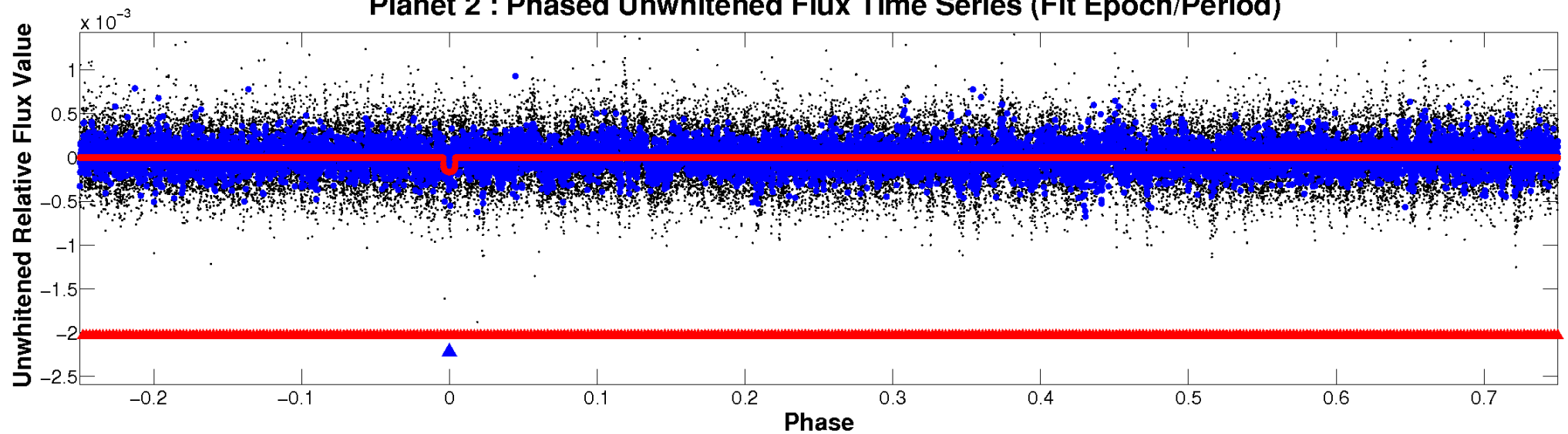
# ALT Odd/Even

TCE 002581457-02

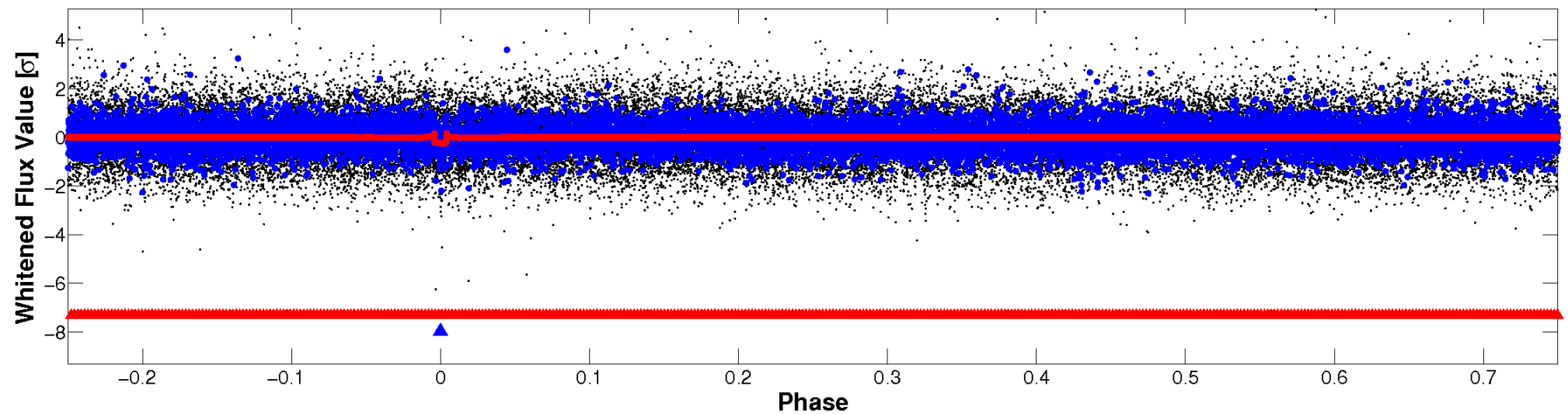


# Non-Whitened Vs. Whitened Light Curve

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

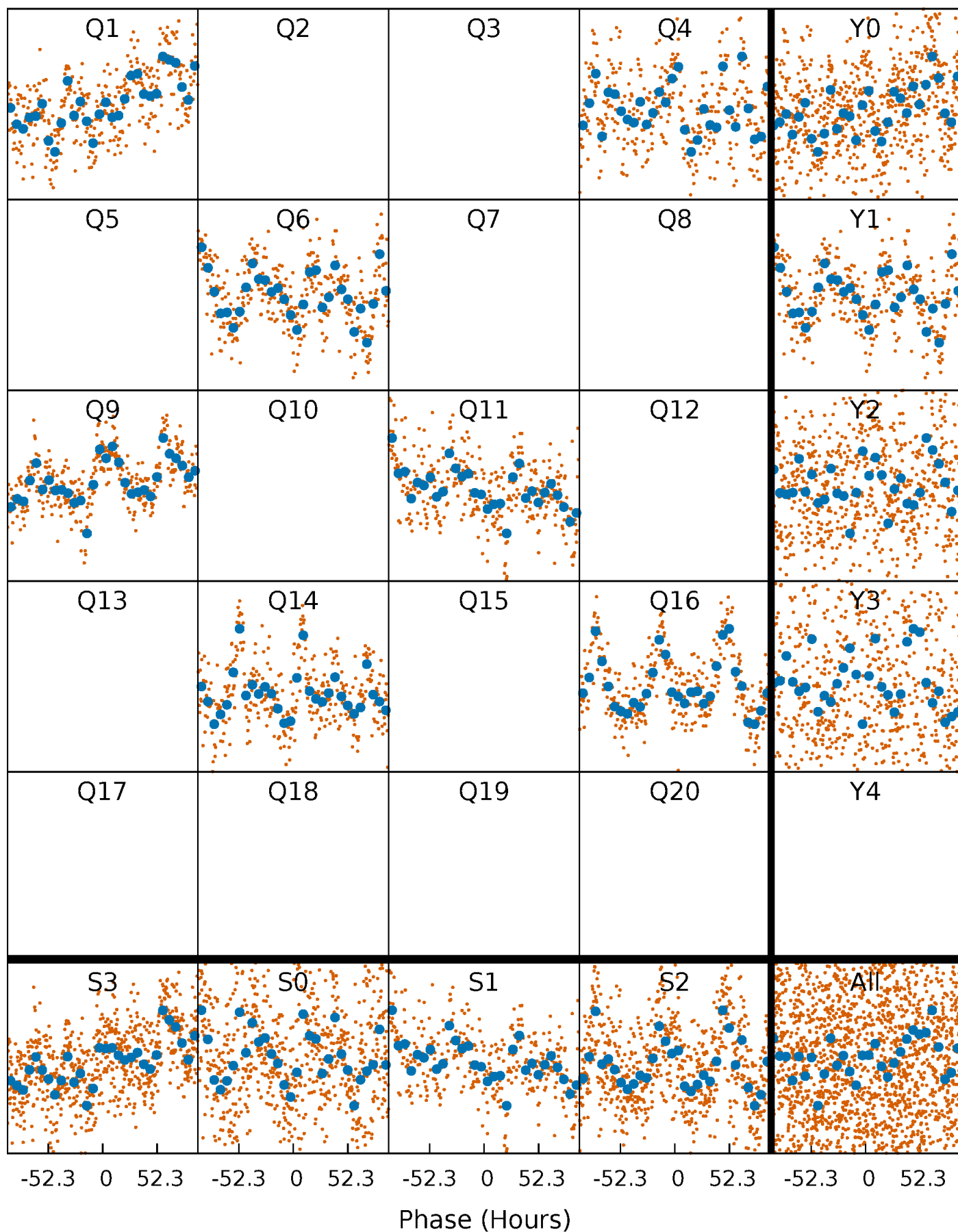


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



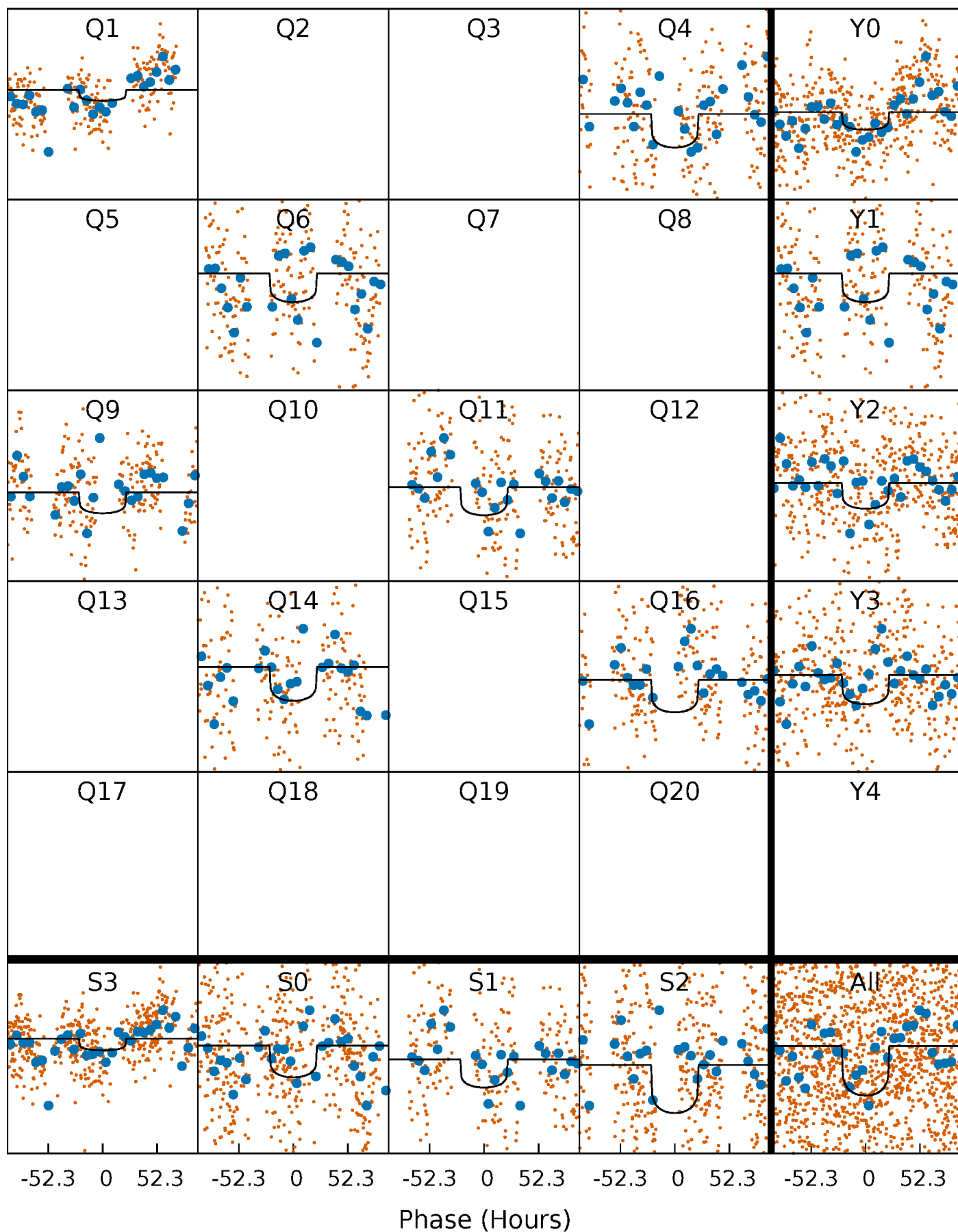
# PDC Quarter-Phased Transit Curves

TCE 002581457-02 P=231.391280 Days  $T_0=157.499536$  (BKJD)



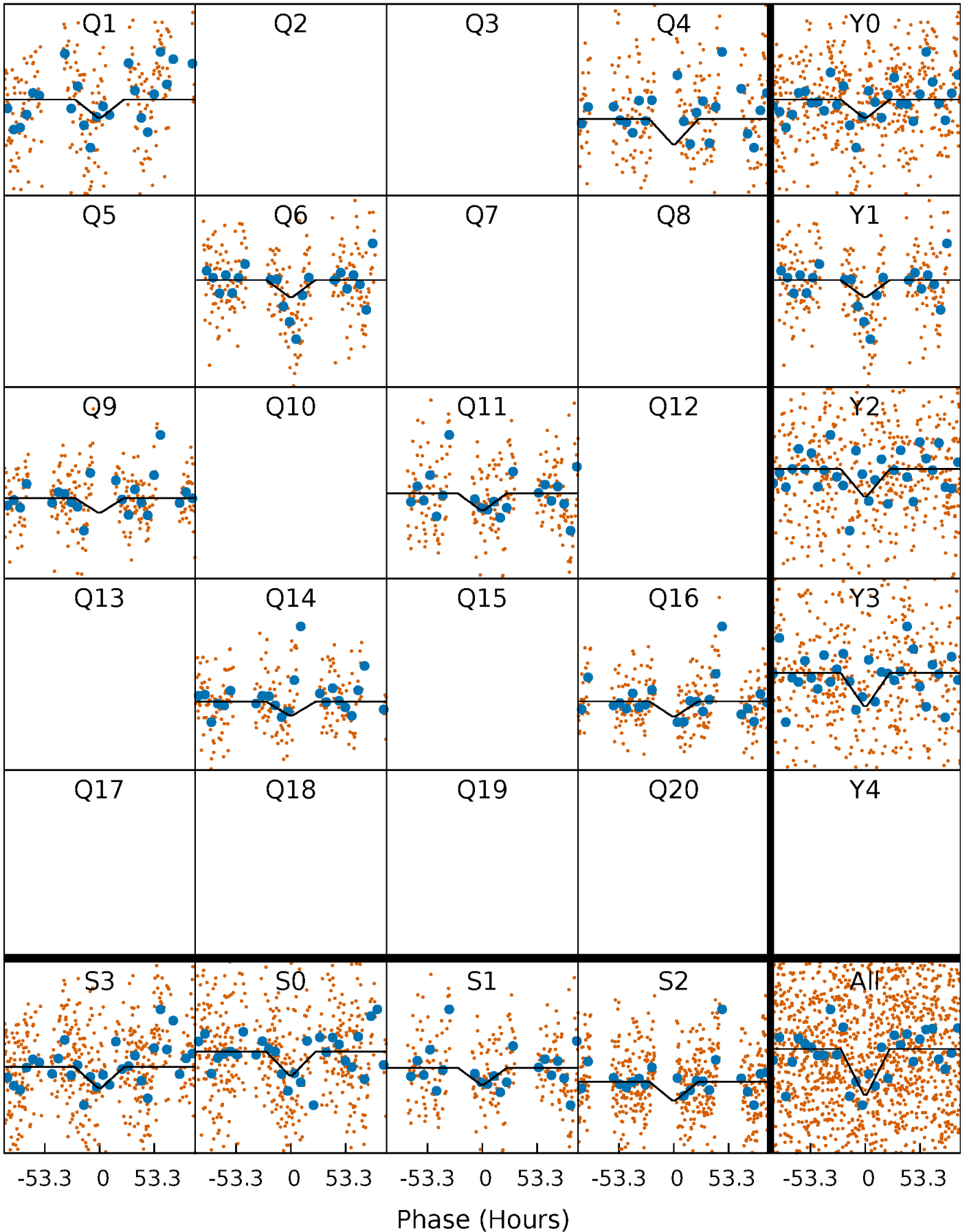
# DV Quarter-Phased Transit Curves

TCE 002581457-02     $P=231.391280$  Days     $T_0=157.499536$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 002581457-02   P=231.382822 Days    $T_0=157.553604$  (BKJD)

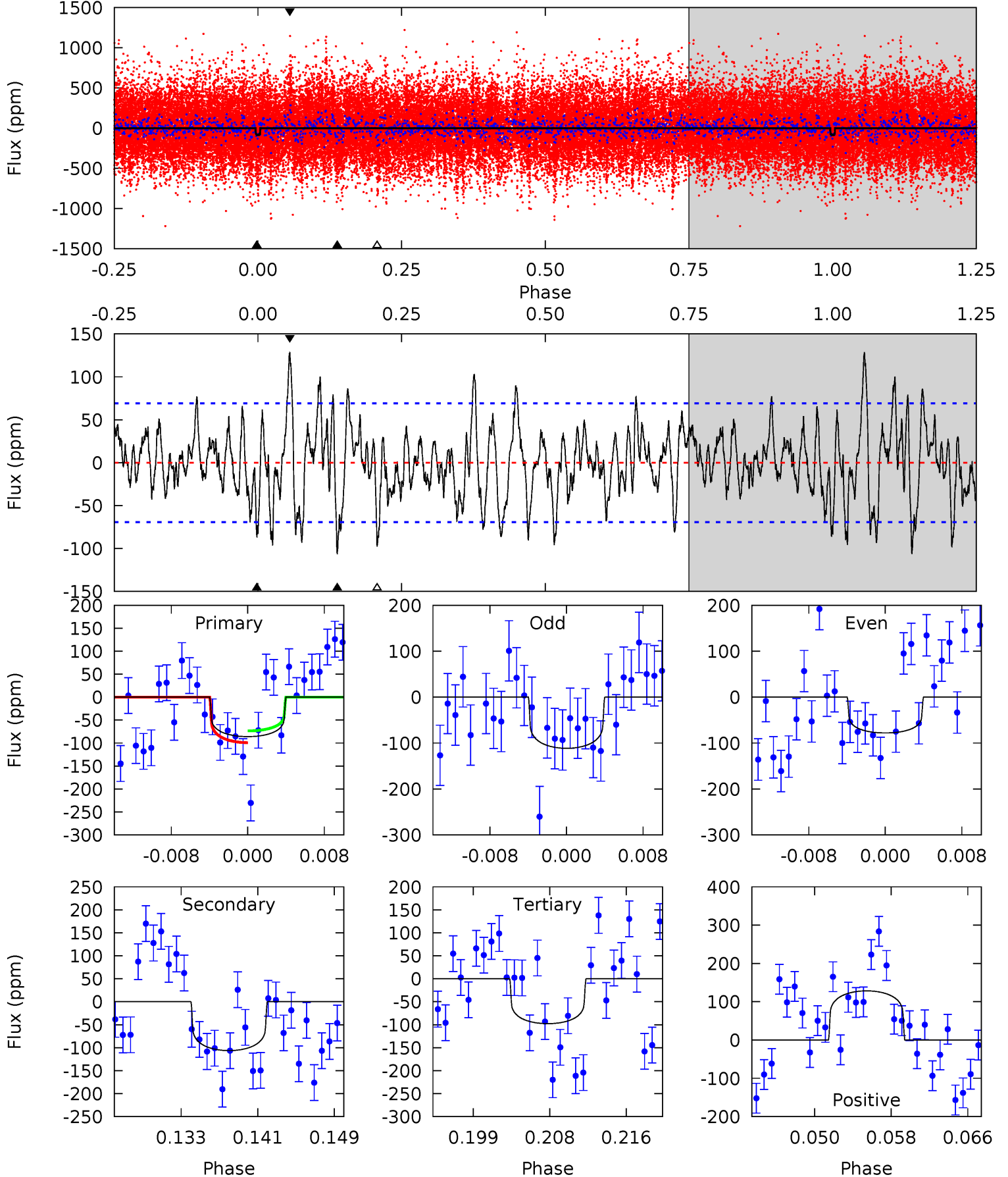




# DV Model-Shift Uniqueness Test

002581457-02, P = 231.391280 Days, E = 157.499536 Days

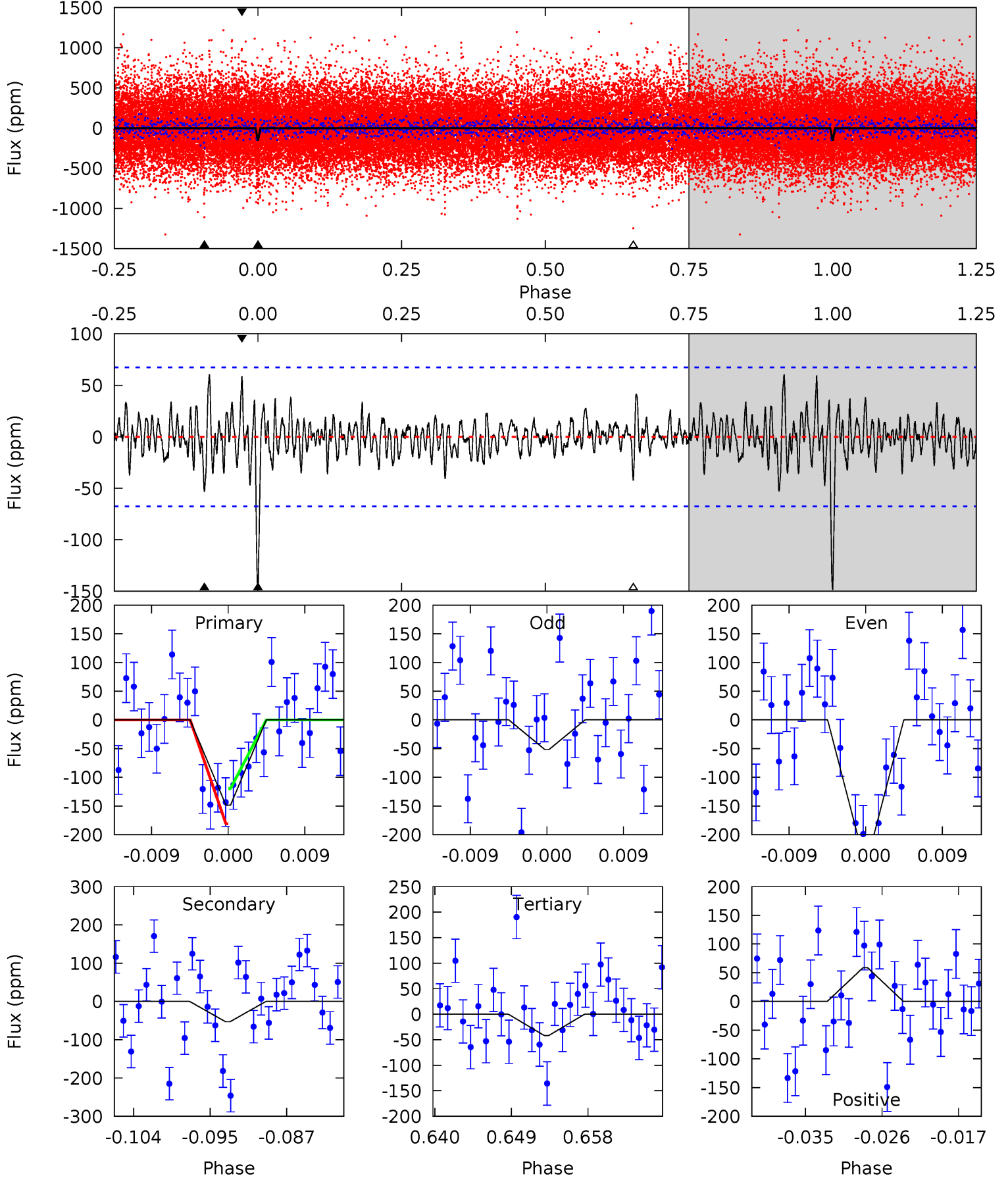
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.29	7.78	7.15	9.39	5.06	2.64	2.65	-0.86	-3.10	0.63	-1.61	1.19	0.79	0.55	0.94



# Alt Model-Shift Uniqueness Test

002581457-02, P = 231.382822 Days, E = 157.553604 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
11.1	3.96	3.12	4.40	5.05	2.63	1.06	8.00	6.72	0.84	-0.44	6.86	0.66	0.29	2.29



### Stellar Parameters For KIC 002581457

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6455^{+162}_{-194}$	$4.293^{+0.108}_{-0.201}$	$-0.200^{+0.250}_{-0.300}$	$1.255^{+0.380}_{-0.205}$	$1.128^{+0.177}_{-0.145}$	$0.804^{+0.463}_{-0.395}$
	+3%/-3%	+3%/-5%	+125%/-150%	+30%/-16%	+16%/-13%	+58%/-49%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 002581457-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-106 \pm 14$	$1.82^{+0.43}_{-0.43}$	$516^{+40}_{-30}$	$5791^{+712}_{-516}$	$10413^{+7401}_{-3740}$
Alt.	$-53 \pm 13$	$1.66^{+0.44}_{-0.39}$	$512^{+38}_{-28}$	$5083^{+679}_{-483}$	$5984^{+4755}_{-2468}$

$T_{max}$  = 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

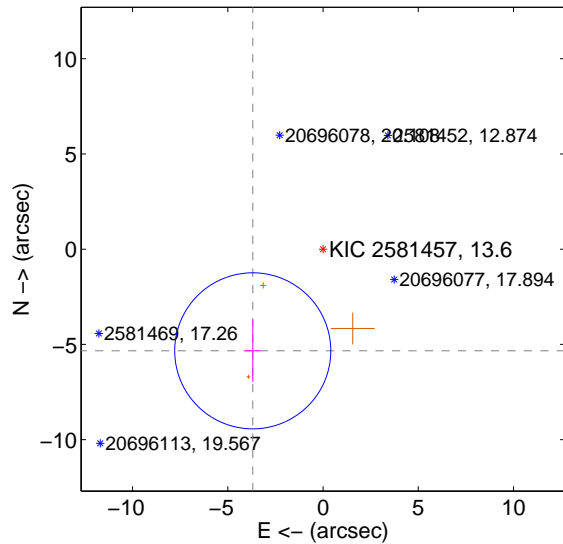
Supplemental centroid analysis for 002581457-02. Kepler magnitude: 13.60. Transit SNR 4.70

There are 0 quarters with good PRF difference image offsets

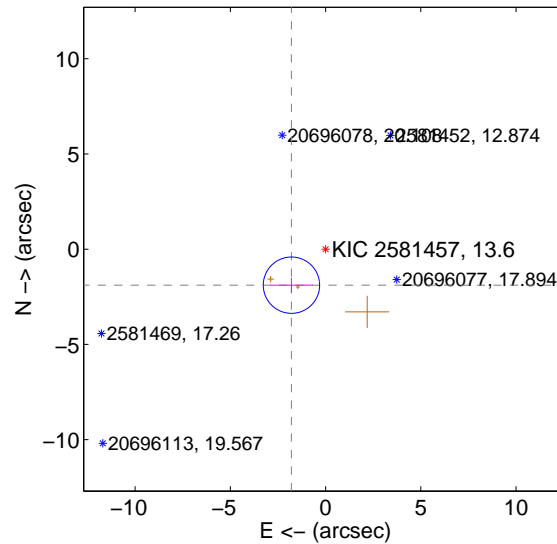
The direct PRF centroid is offset from the target star catalog position by about 0.42 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$6.490 \pm 1.366$	4.75	$3.691 \pm 0.406$	$-5.338 \pm 1.637$
PRF-fit source offset from KIC position	$2.605 \pm 0.493$	5.28	$1.792 \pm 1.121$	$-1.891 \pm 0.394$
photometric centroid source offset	$3.02 \pm 0.68$	4.43	$-1.43 \pm 0.59$	$2.65 \pm 0.71$

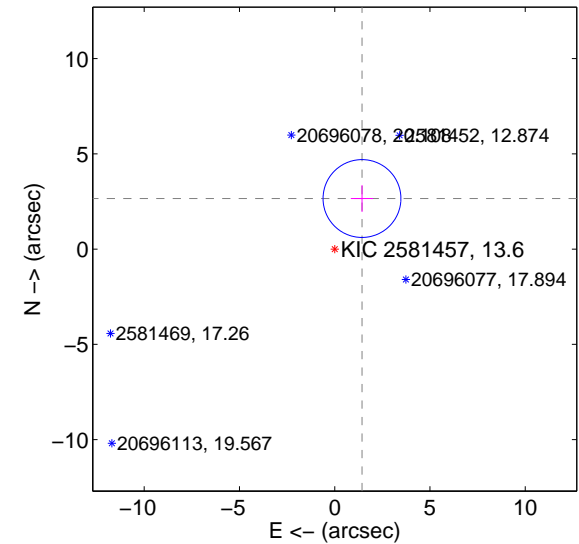
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

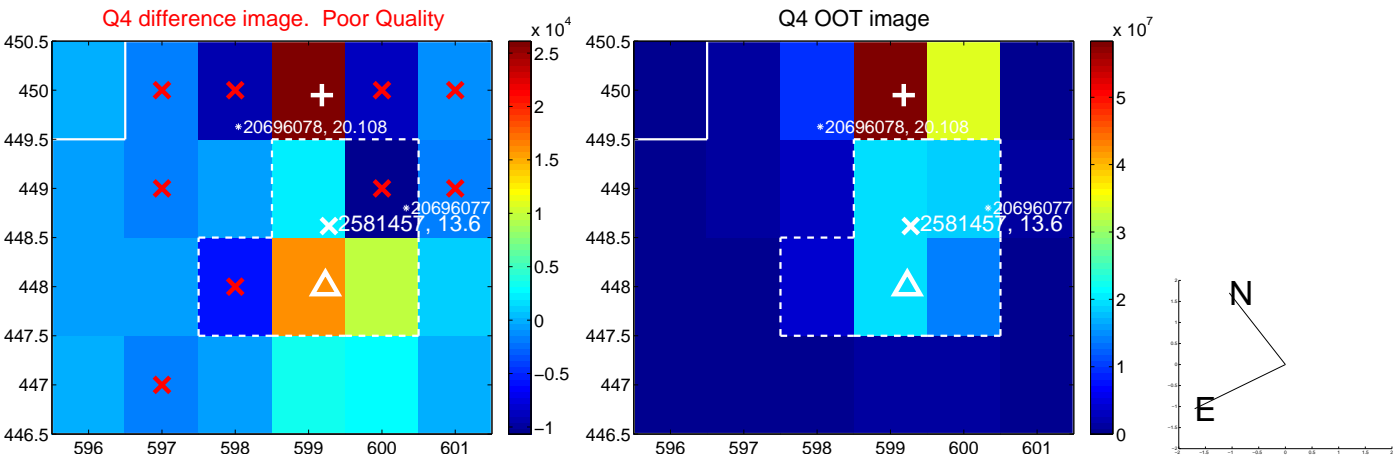
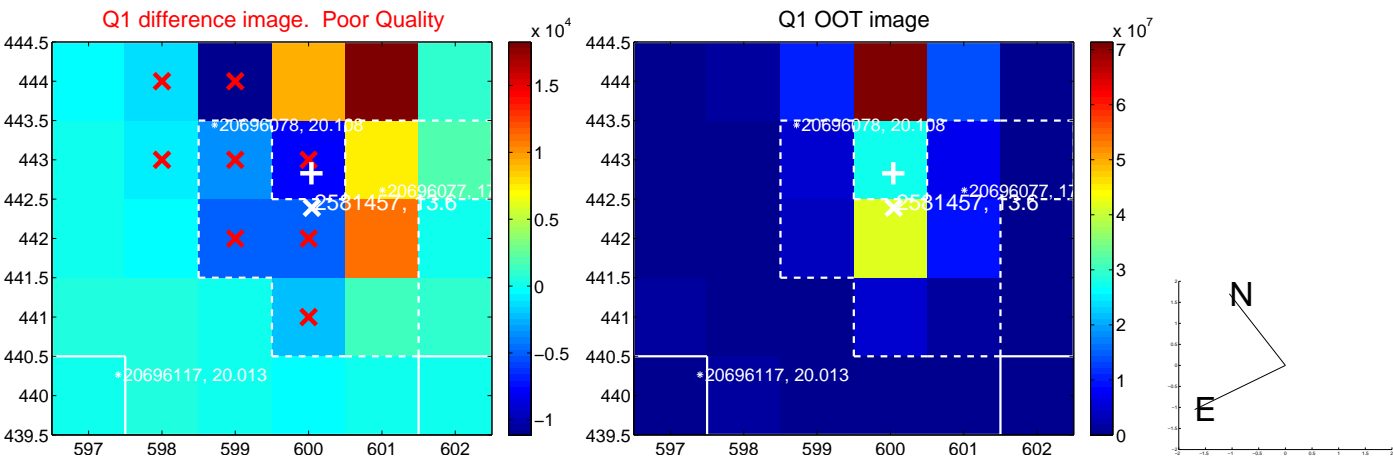


offset from photometric centroids

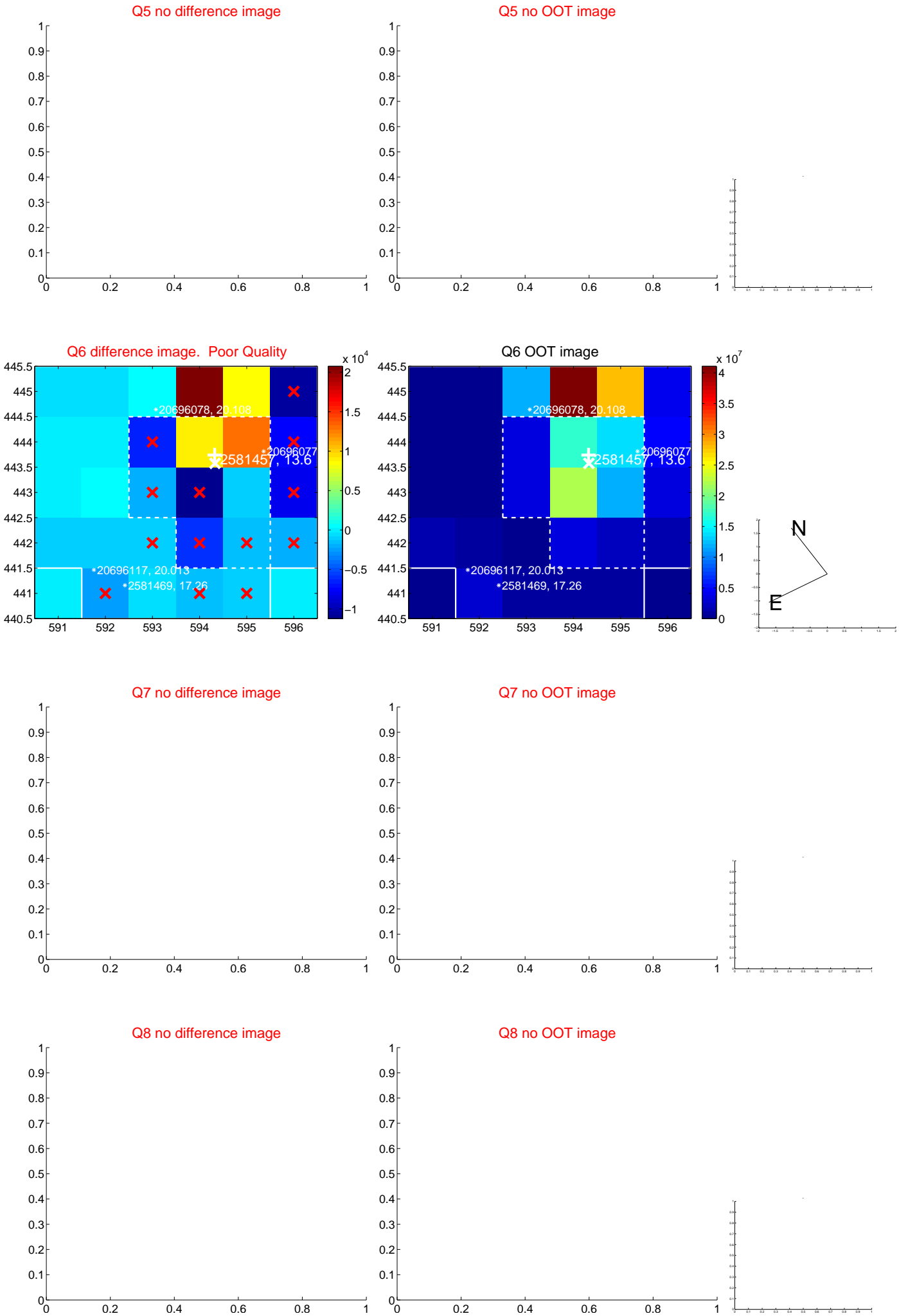


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

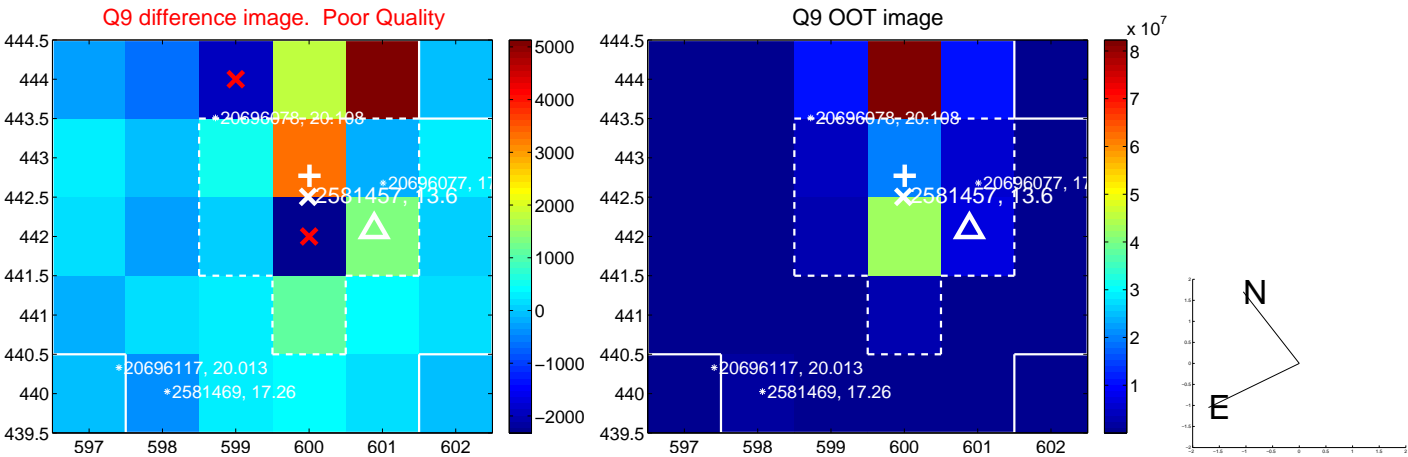


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

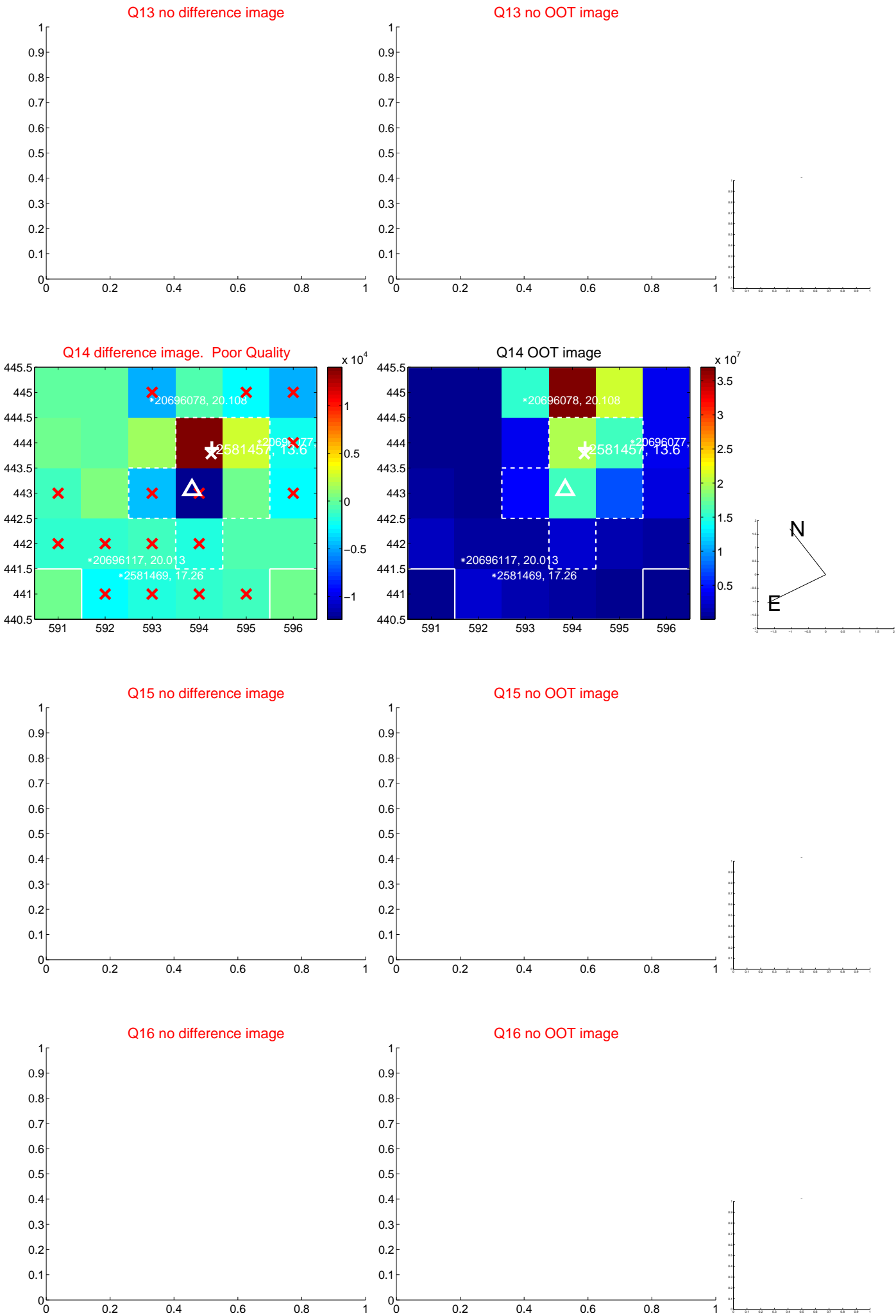




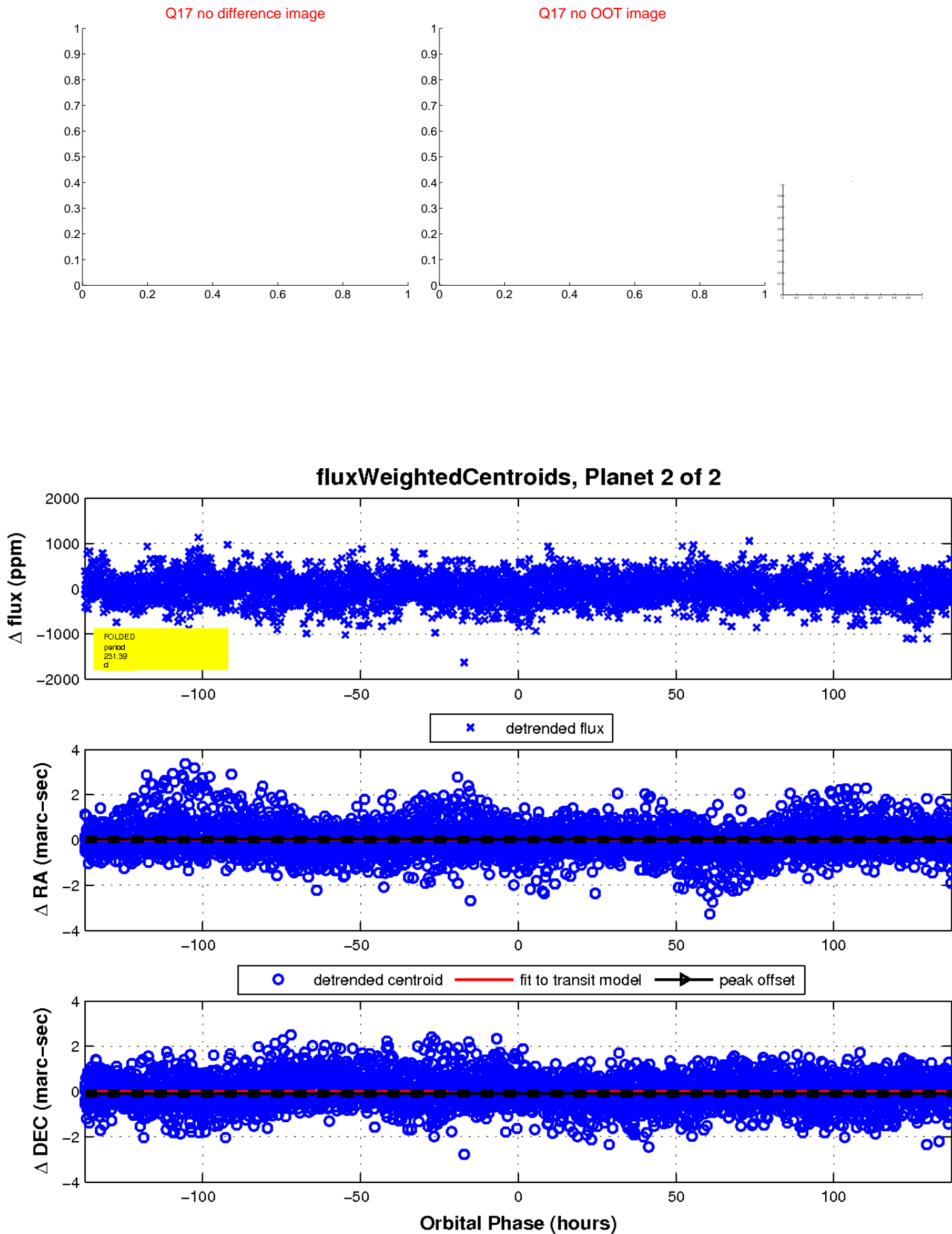
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image

Declination

