

# KIC 010788451

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010788451-01	OBS	No	0.538273	131.691499	66.7	1.513	10.6	8.1	2.80	8951	2.46	171949.68
010788451-02	OBS	No	0.855111	132.040944	107.8	7.751	9.1	14.8	2.80	8951	3.26	92763.16

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010788451-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_SATURATED
010788451-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—CENT_SATURATED

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

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

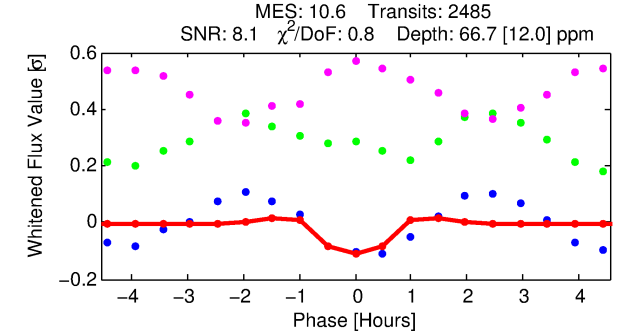
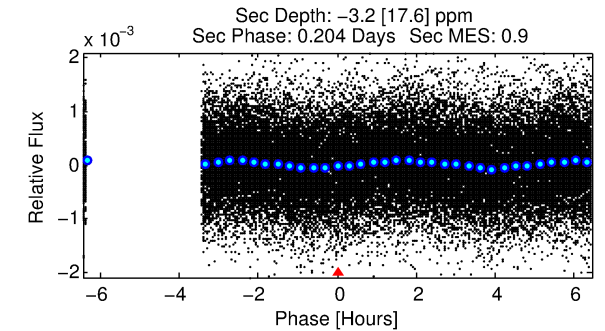
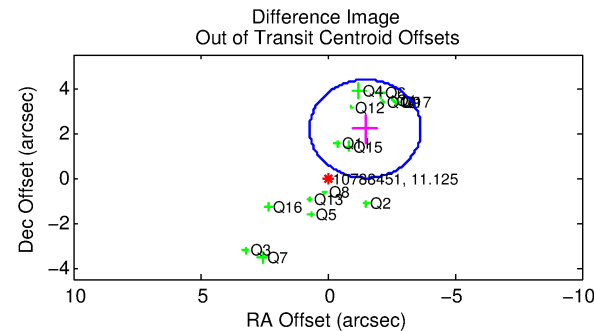
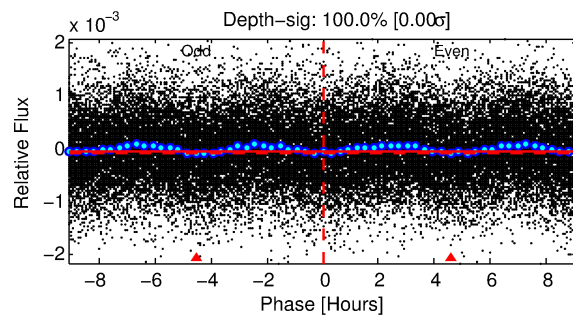
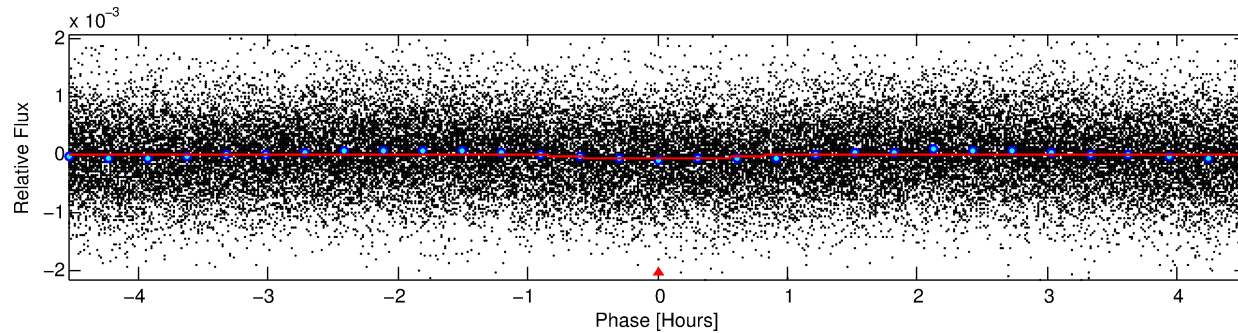
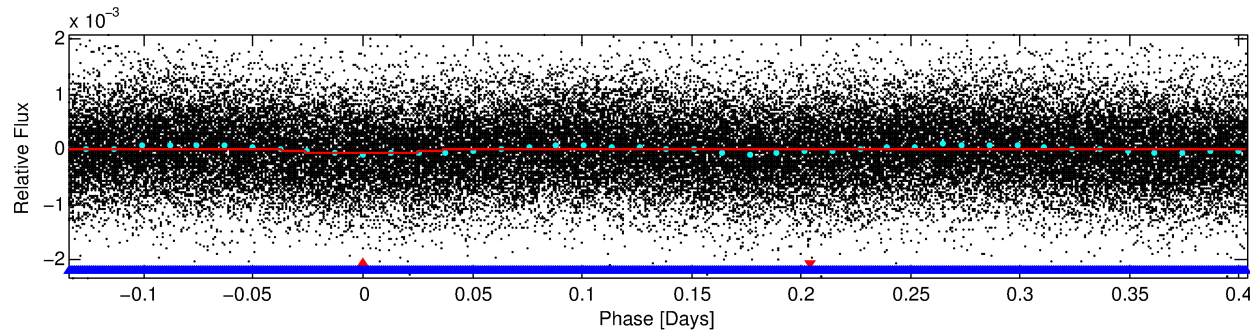
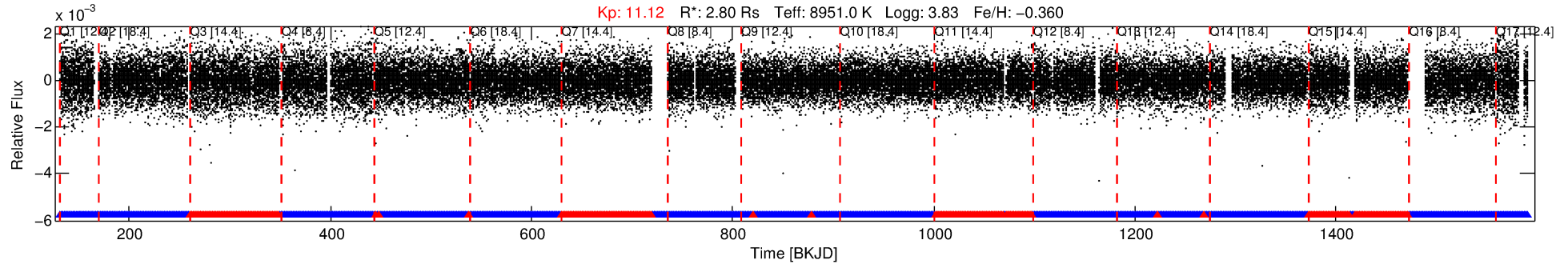
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010788451-01

No Significant Match Found

# DV One-Page Summary

KIC: 10788451 Candidate: 1 of 2 Period: 0.538 d



## DV Fit Results:

Period = 0.53827 [0.00002] d  
Epoch = 131.6915 [0.0025] BKJD  
Rp/R\* = 0.0081 [0.0025]  
a/R\* = 2.13 [3.31]  
b = 0.70 [1.46]  
Seff = 171949.68 [115740.26]  
Teq = 5193 [874] K  
Rp = 2.46 [1.28] Re  
a = 0.0162 [0.0065] AU  
Ag = N/A  
Teffp = N/A

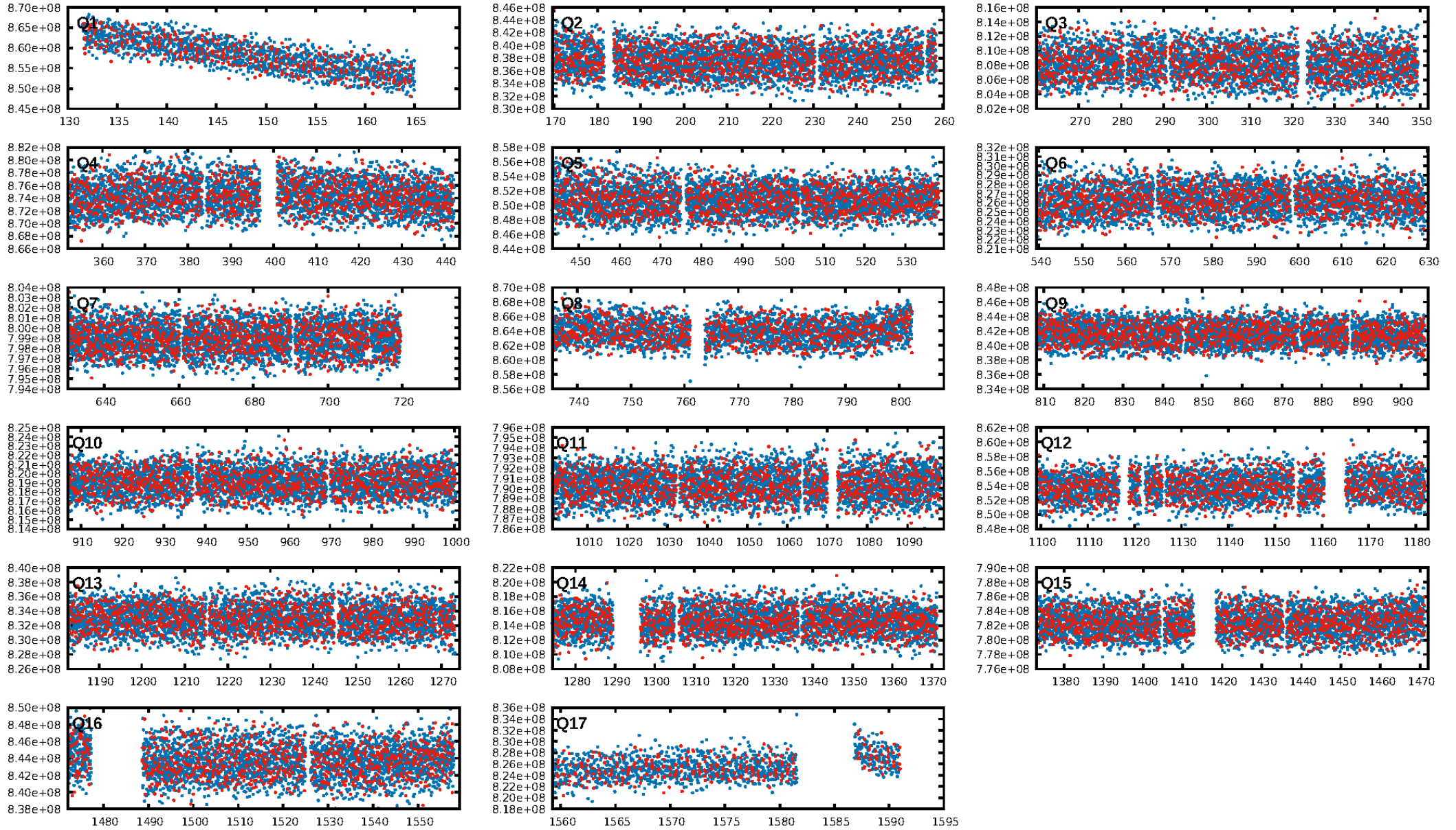
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 66.4% [0.96 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 0.73 [1732/2374]  
GhostDiagnostic-chr: 1.744  
Centroid-sig: 0.2%  
Centroid-so: 0.507 arcsec [2.16 $\sigma$ ]  
OotOffset-rm: 2.639 arcsec [3.62 $\sigma$ ]  
KicOffset-rm: 1.976 arcsec [3.08 $\sigma$ ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.35 [6/17]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 23:18:24 Z

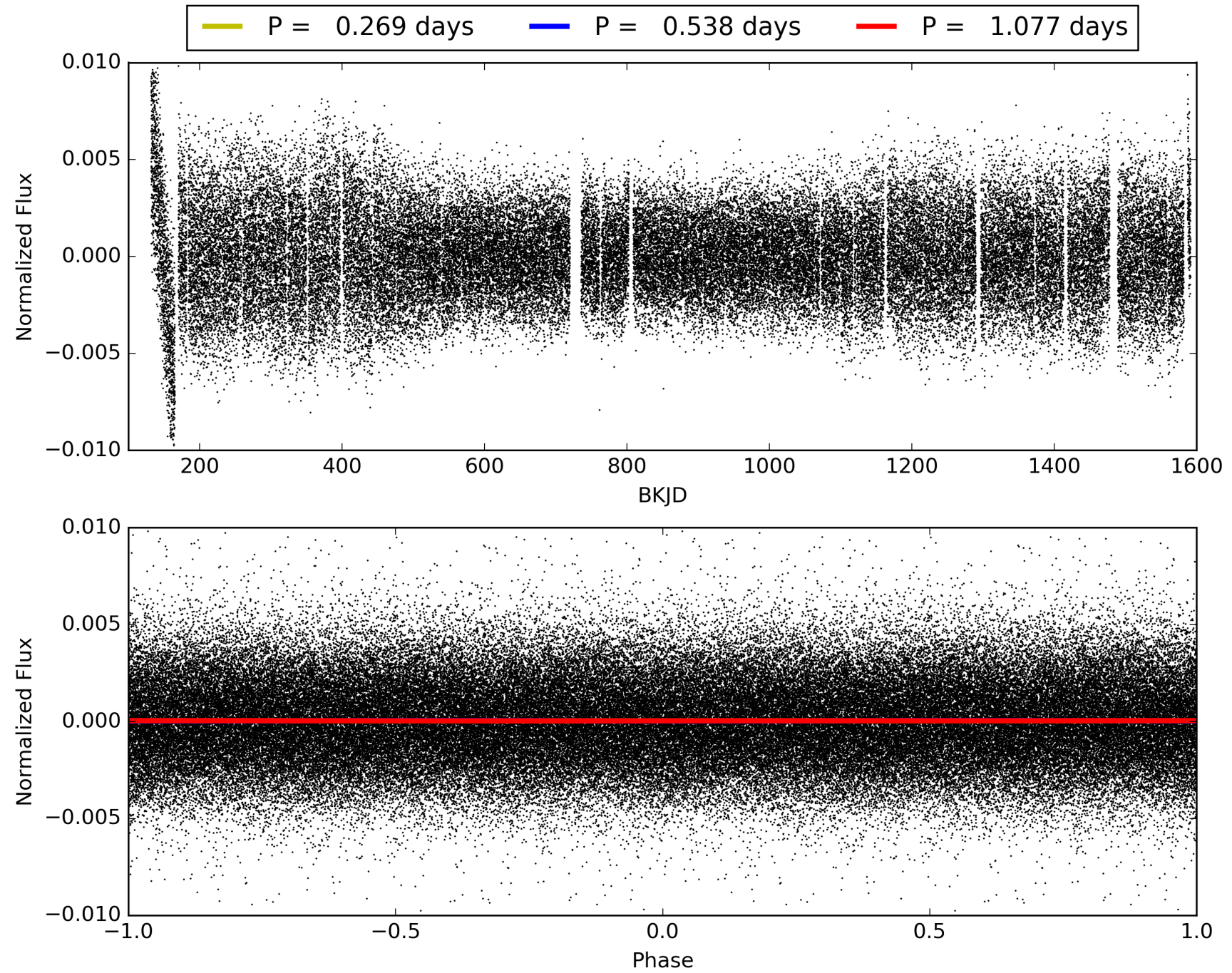
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 010788451-01, PDC Light Curves



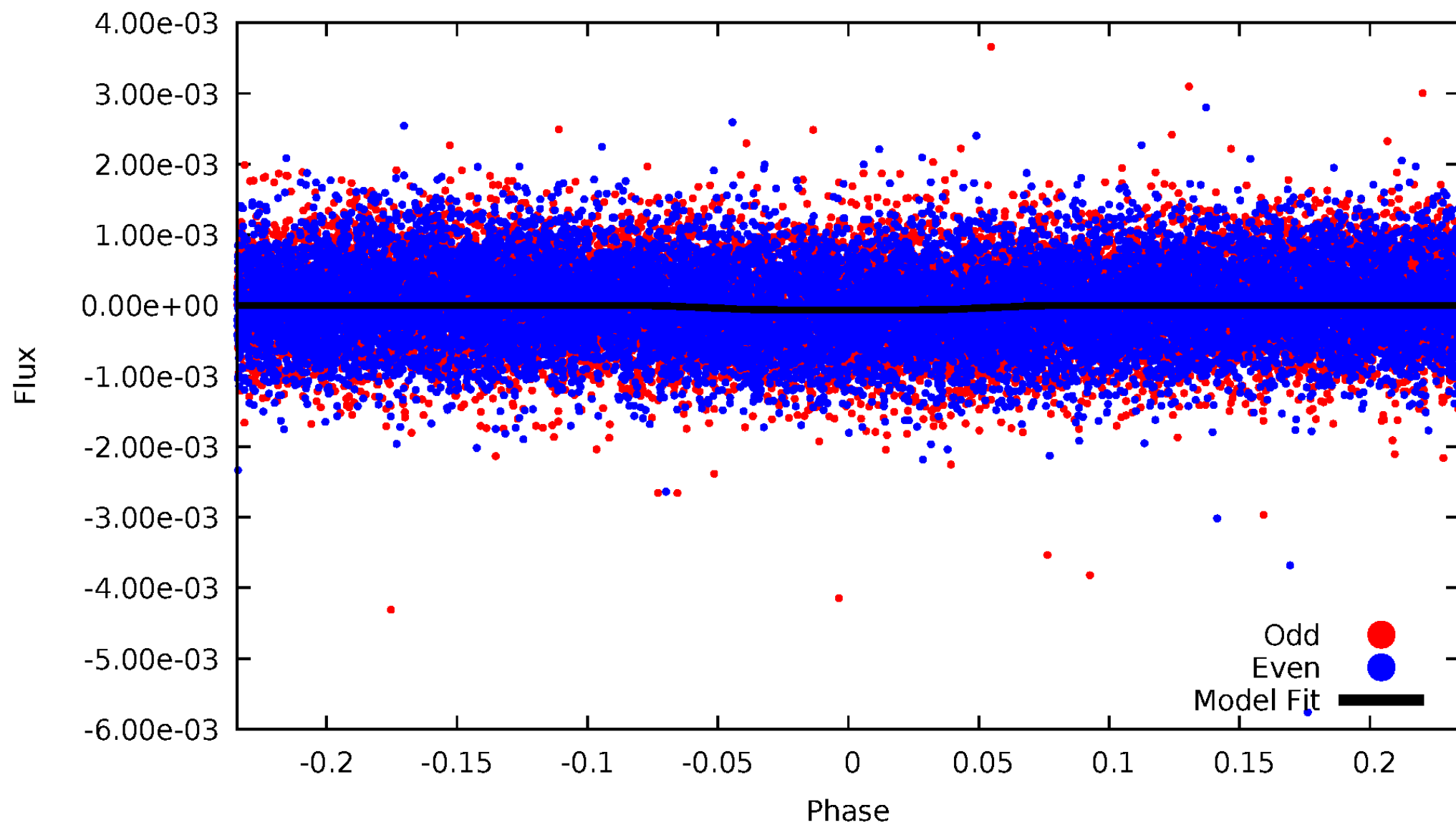


TCE 010788451-01



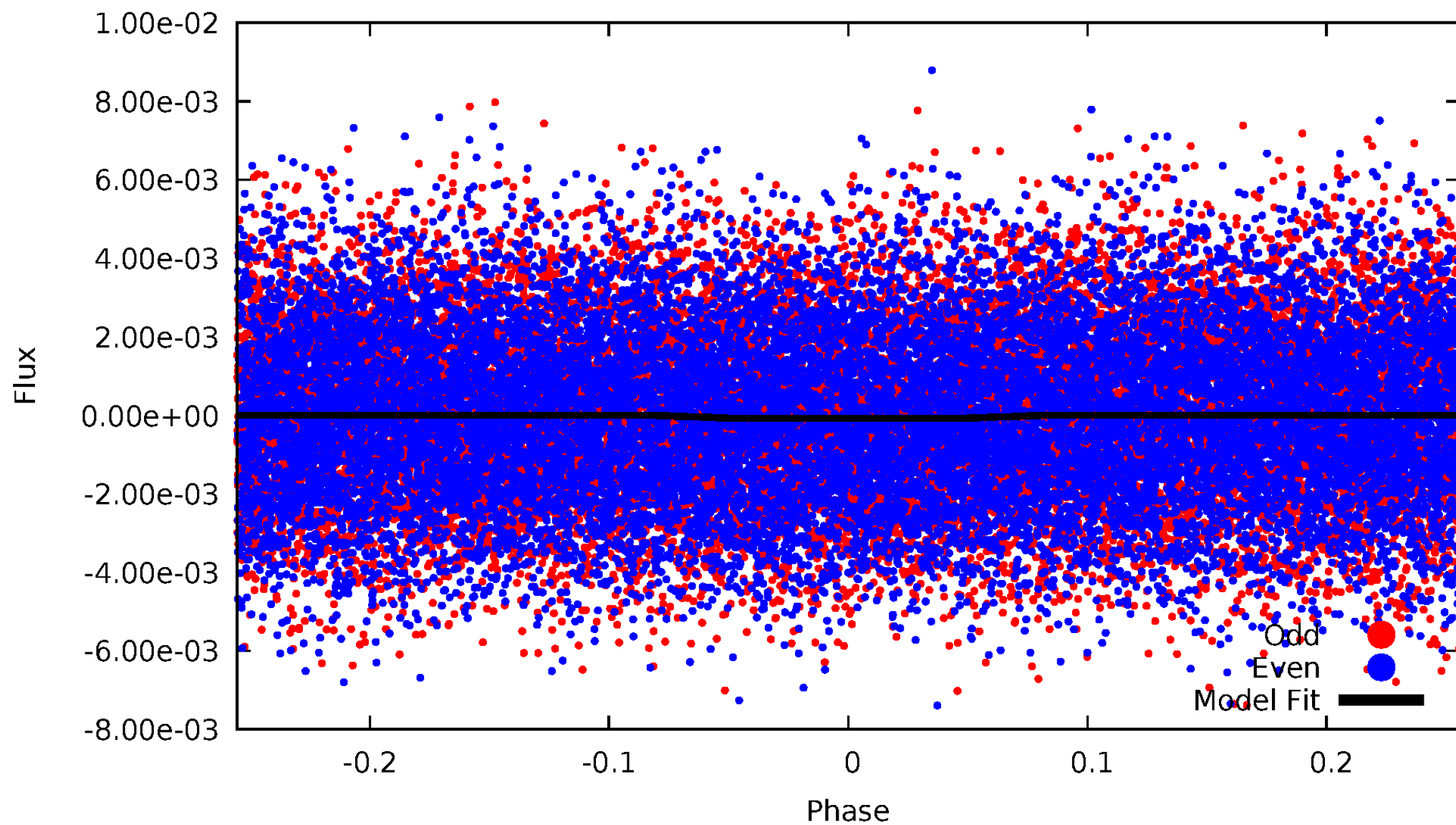
# DV Odd/Even

TCE 010788451-01



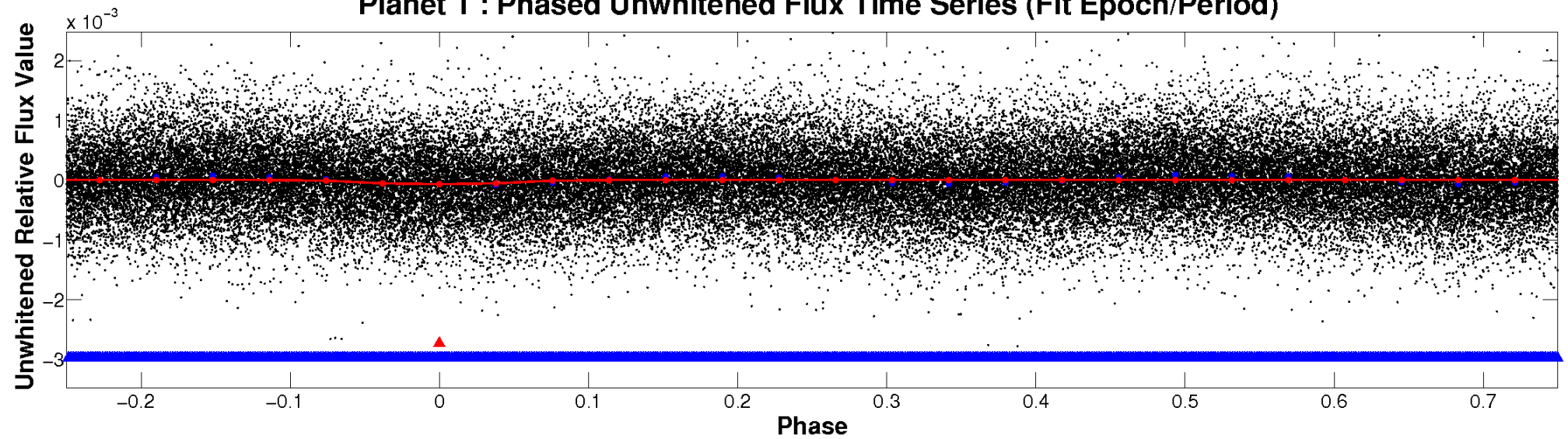
# ALT Odd/Even

TCE 010788451-01

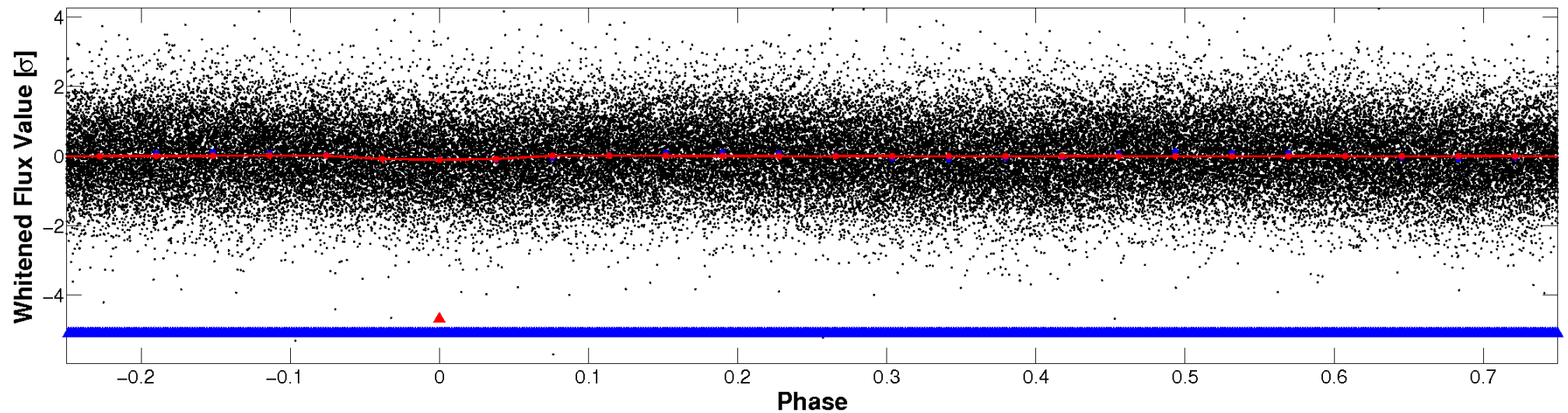


# Non-Whitened Vs. Whitened Light Curve

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



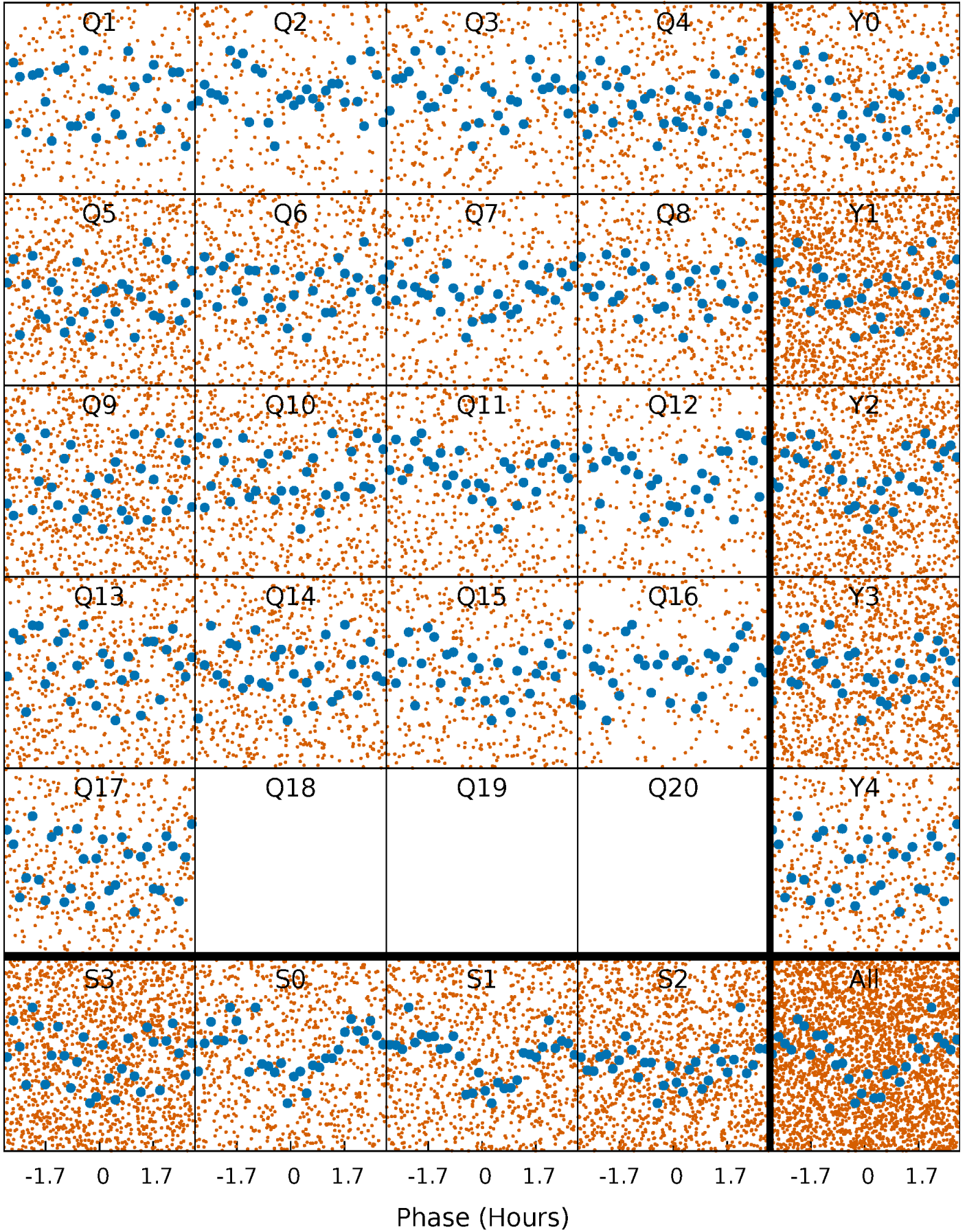
**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**





# PDC Quarter-Phased Transit Curves

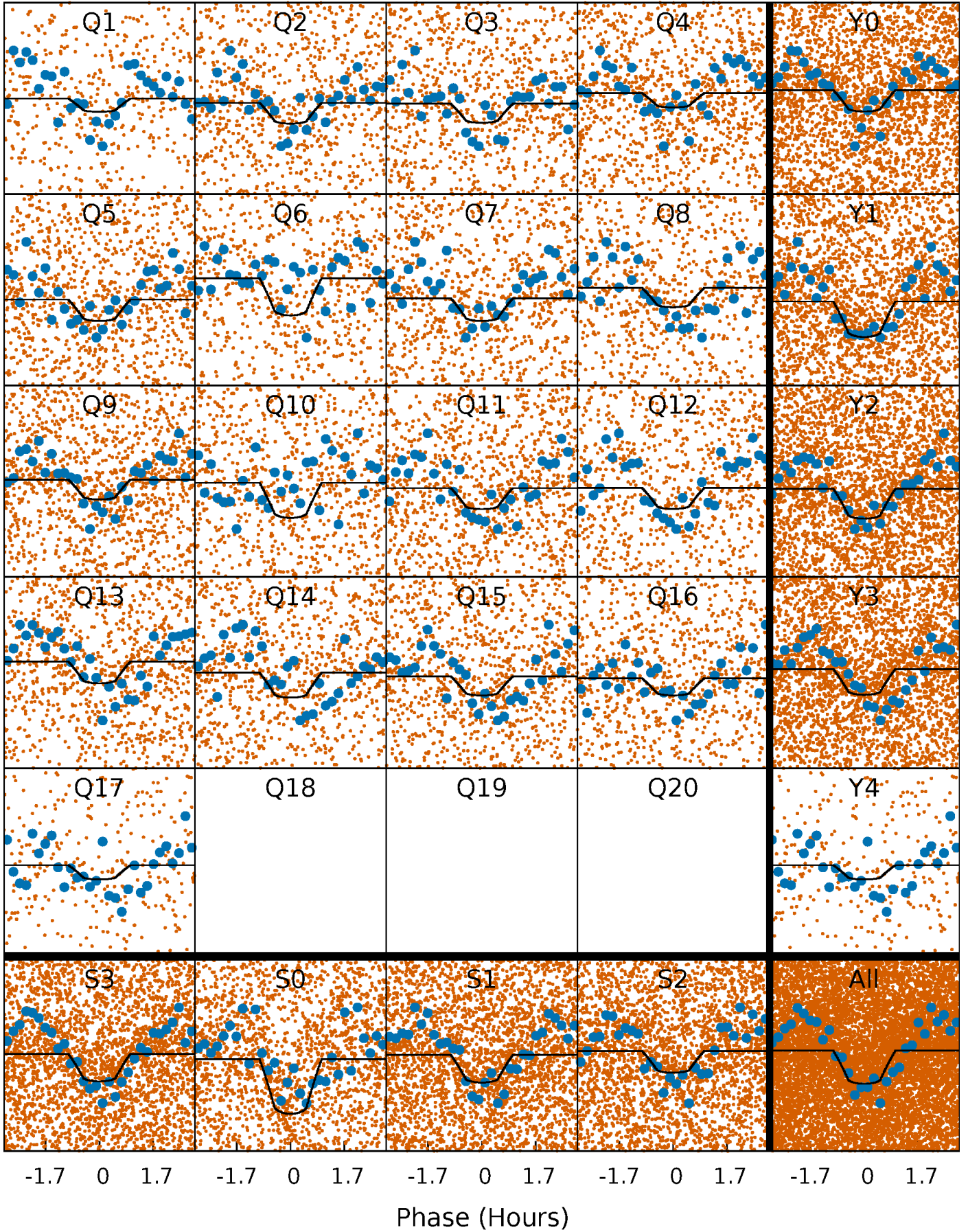
TCE 010788451-01 P= 0.538273 Days  $T_0=131.691498$  (BKJD)





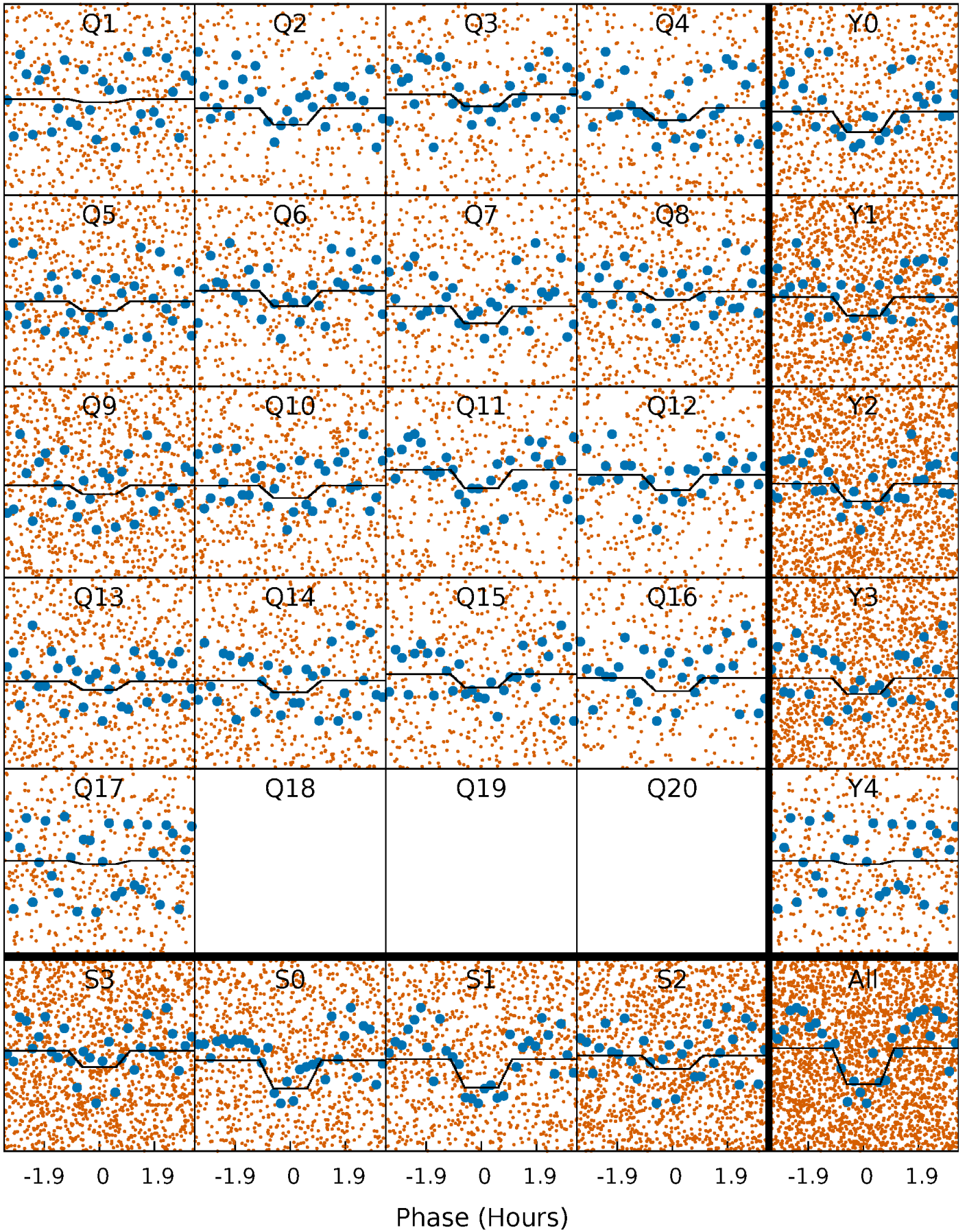
# DV Quarter-Phased Transit Curves

TCE 010788451-01 P= 0.538273 Days  $T_0=131.691498$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

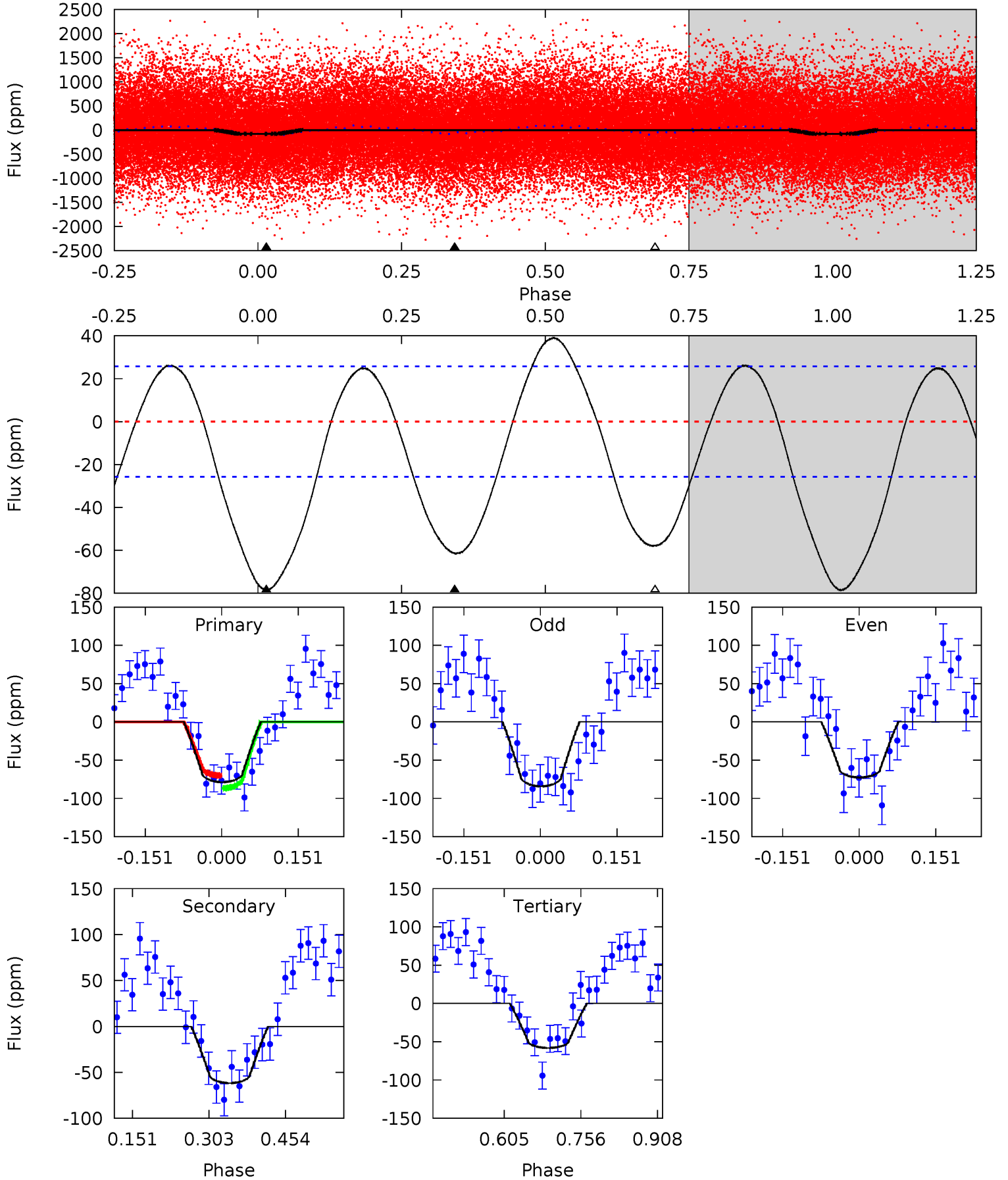
TCE 010788451-01 P= 0.538281 Days  $T_0=131.691775$  (BKJD)



# DV Model-Shift Uniqueness Test

010788451-01, P = 0.538273 Days, E = 131.153225 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
13.7	10.7	10.1	0	4.48	1.43	5.80	3.59	13.7	0.63	10.7	1.01	1.01	0.33	1.45

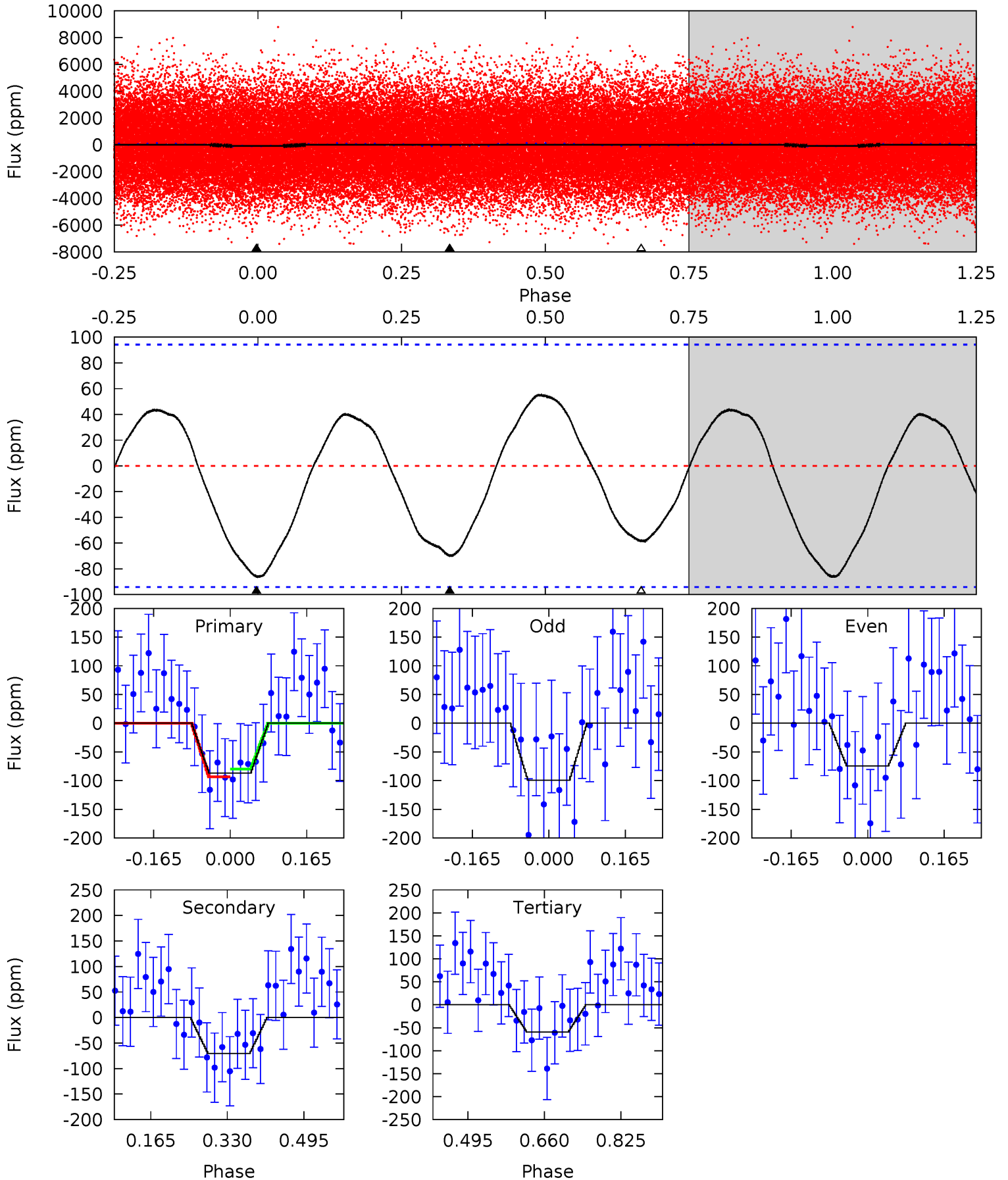




# Alt Model-Shift Uniqueness Test

010788451-01, P = 0.538281 Days, E = 131.153494 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
4.11	3.35	2.81	0	4.46	1.39	1.81	1.31	4.11	0.54	3.35	0.59	0.98	0.39	0.32





### Stellar Parameters For KIC 010788451

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$8951^{+282}_{-408}$	$3.834^{+0.382}_{-0.127}$	$-0.360^{+0.550}_{-0.300}$	$2.796^{+0.771}_{-1.156}$	$1.949^{+0.457}_{-0.374}$	$0.126^{+0.417}_{-0.048}$
	+3%/-5%	+10%/-3%	+153%/-83%	+28%/-41%	+23%/-19%	+332%/-38%
Source	KIC0	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 010788451-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-62 \pm 6$	$2.29^{+0.96}_{-0.73}$	$7031^{+580}_{-772}$	$8152^{+2718}_{-1633}$	$1.723^{+2.025}_{-0.842}$
Alt.	$-71 \pm 21$	$2.63^{+0.96}_{-0.86}$	$7045^{+587}_{-803}$	$7841^{+2428}_{-1627}$	$1.493^{+1.946}_{-0.738}$

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

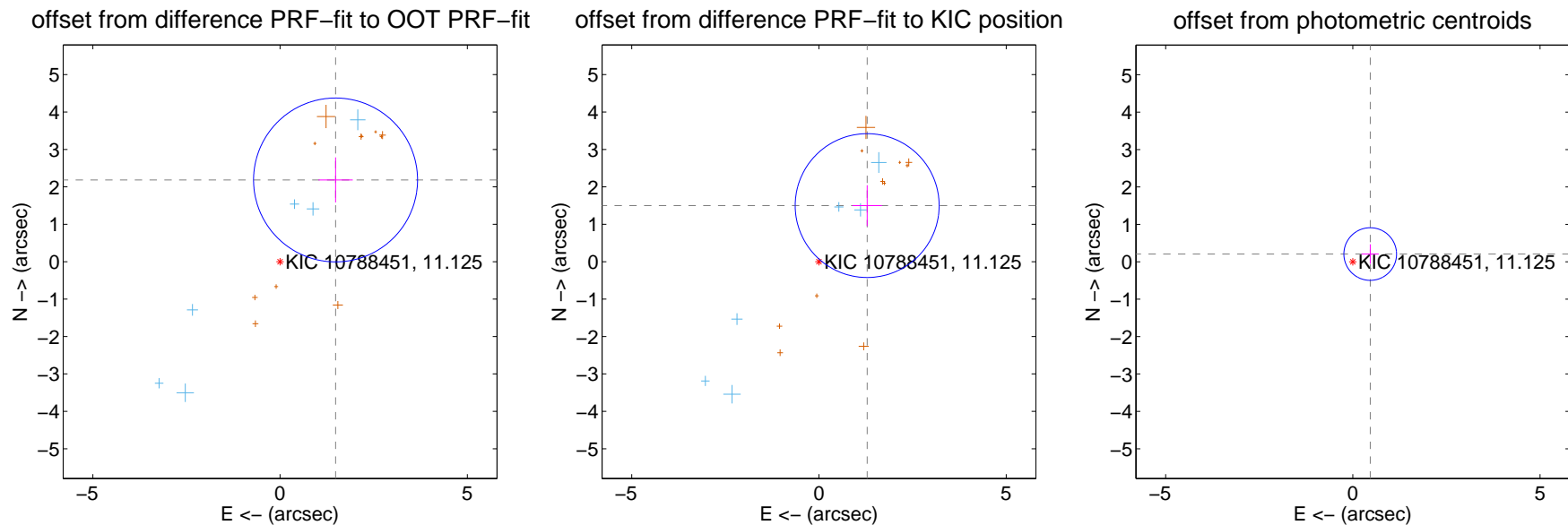
## DV Centroid Data

Supplemental centroid analysis for 010788451-01. **Kepler magnitude: 11.12.** Transit SNR 8.13

There are 6 quarters with good PRF difference image offsets

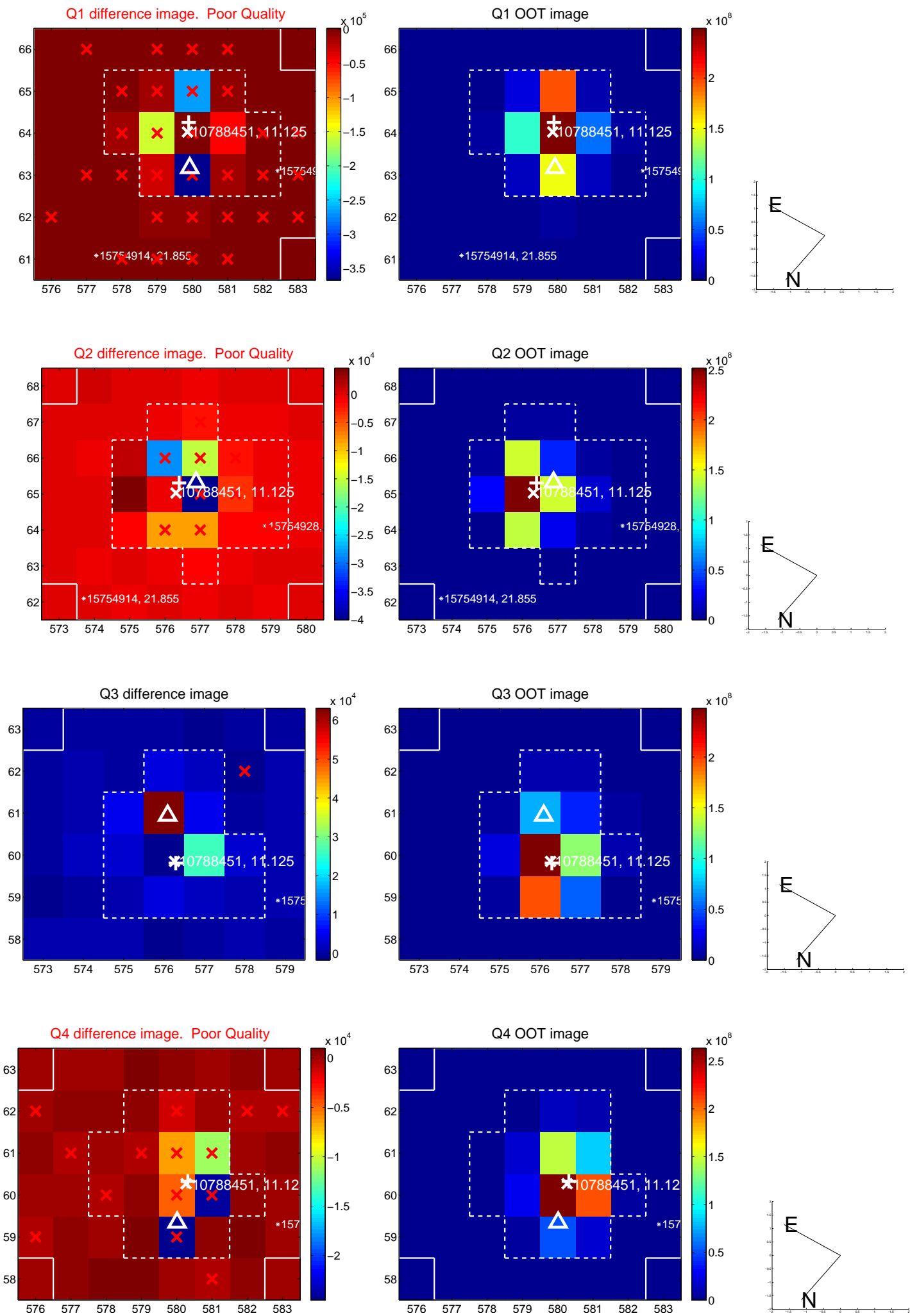
The direct PRF centroid is offset from the target star catalog position by about 0.80 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b><math>2.639 \pm 0.730</math></b>	<b>3.62</b>	$-1.481 \pm 0.458$	$2.185 \pm 0.602$
PRF-fit source offset from KIC position	<b><math>1.976 \pm 0.641</math></b>	<b>3.08</b>	$-1.287 \pm 0.392$	$1.500 \pm 0.546$
photometric centroid source offset	$0.51 \pm 0.23$	2.16	$-0.46 \pm 0.23$	$0.21 \pm 0.26$

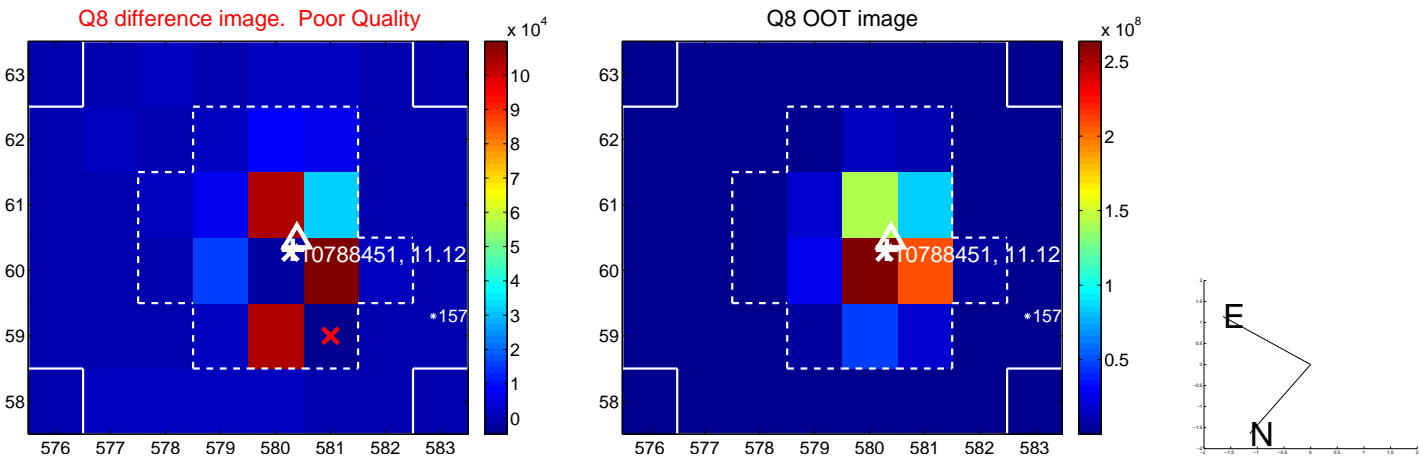
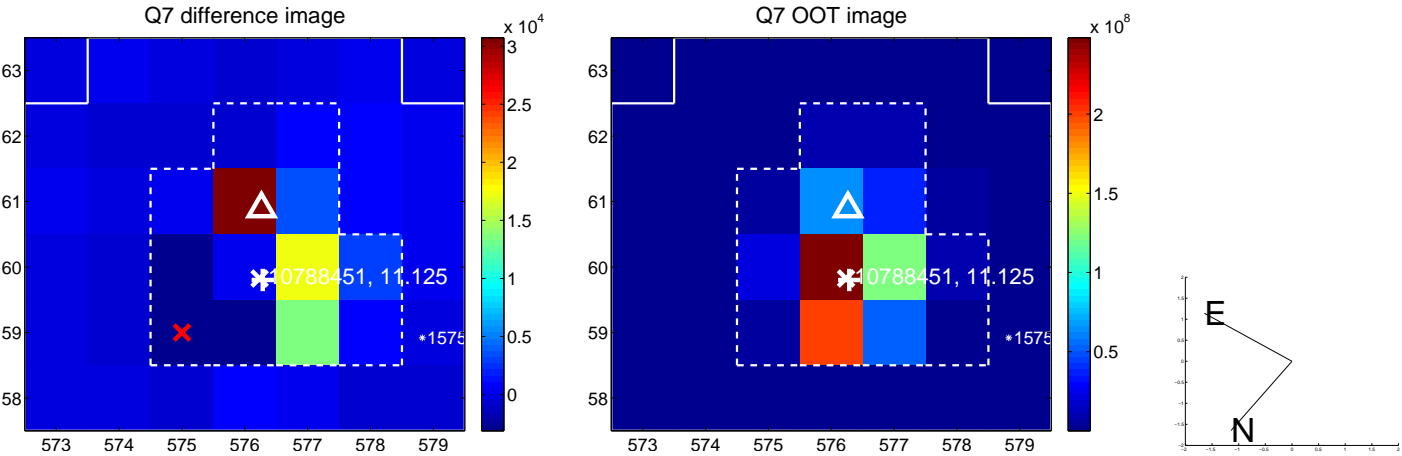
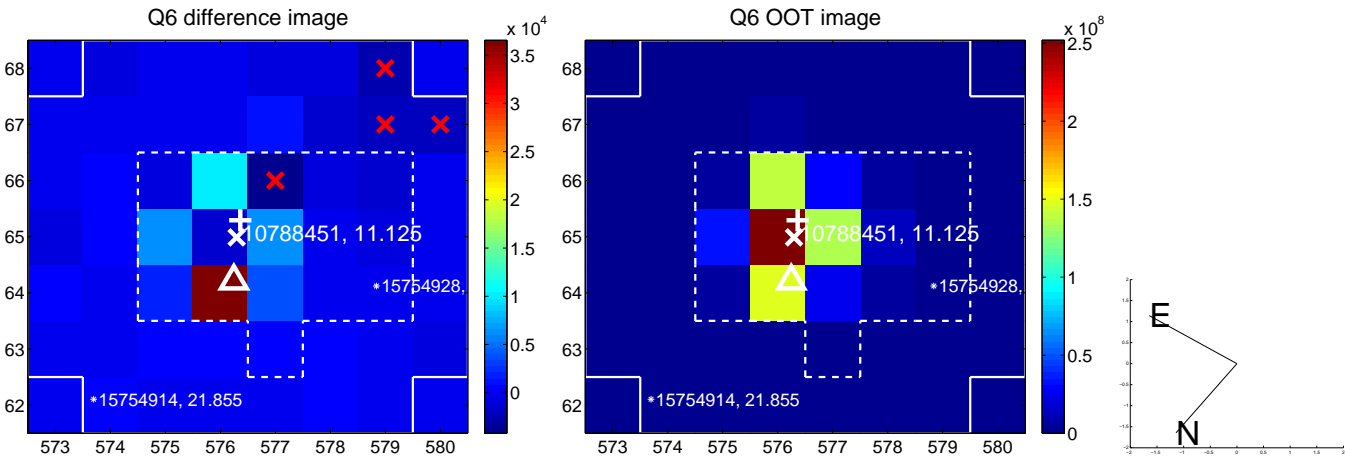
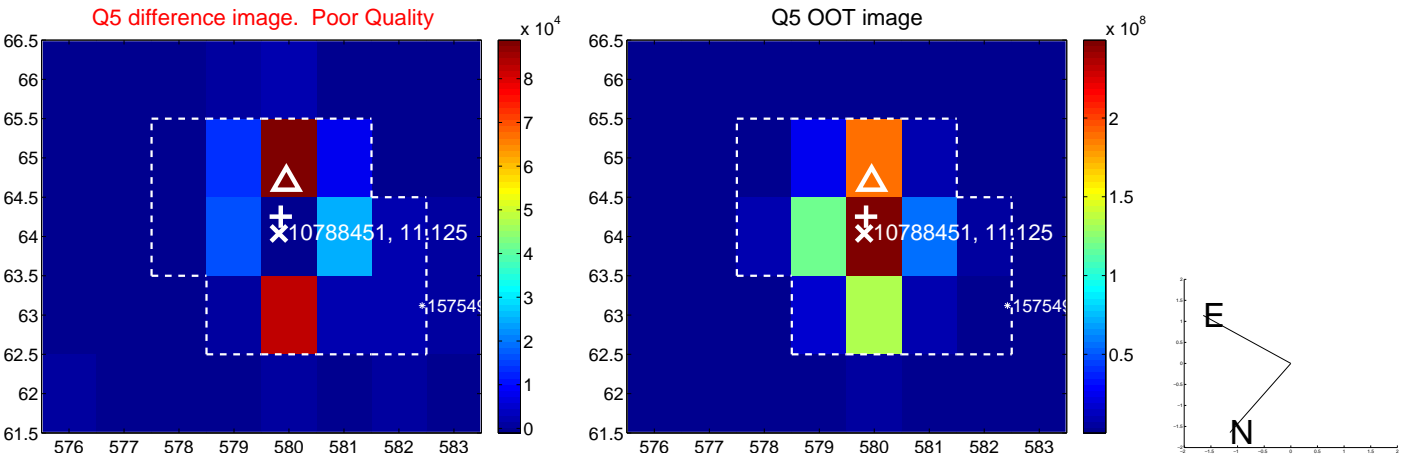


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

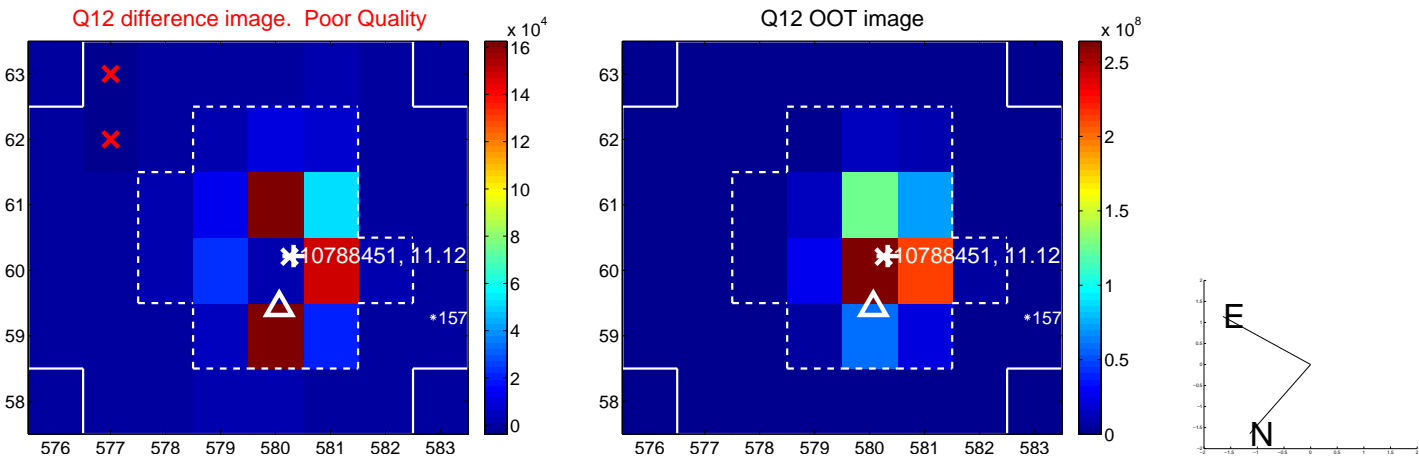
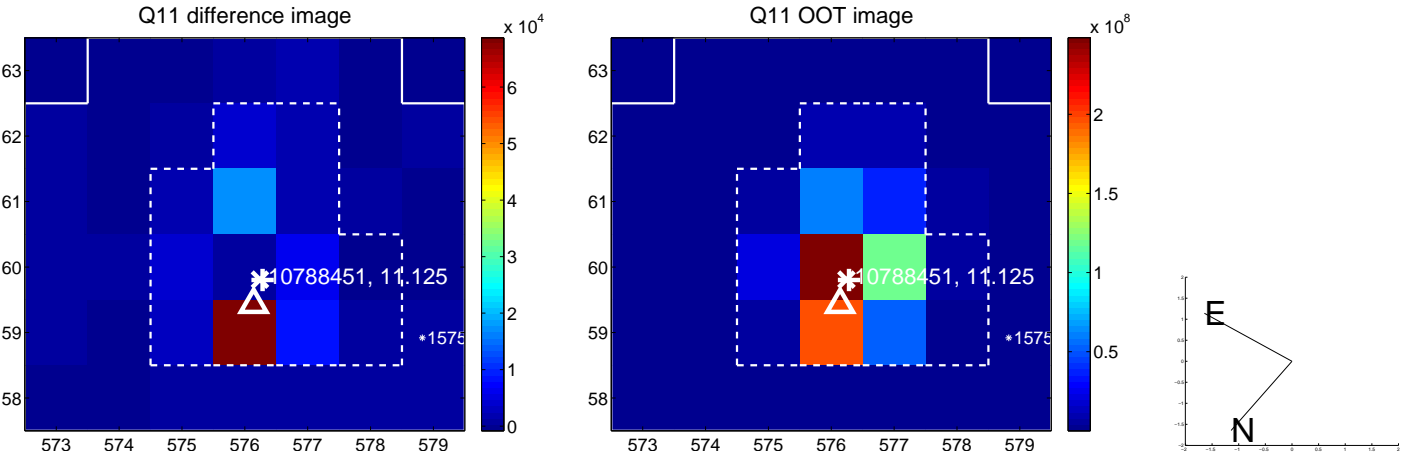
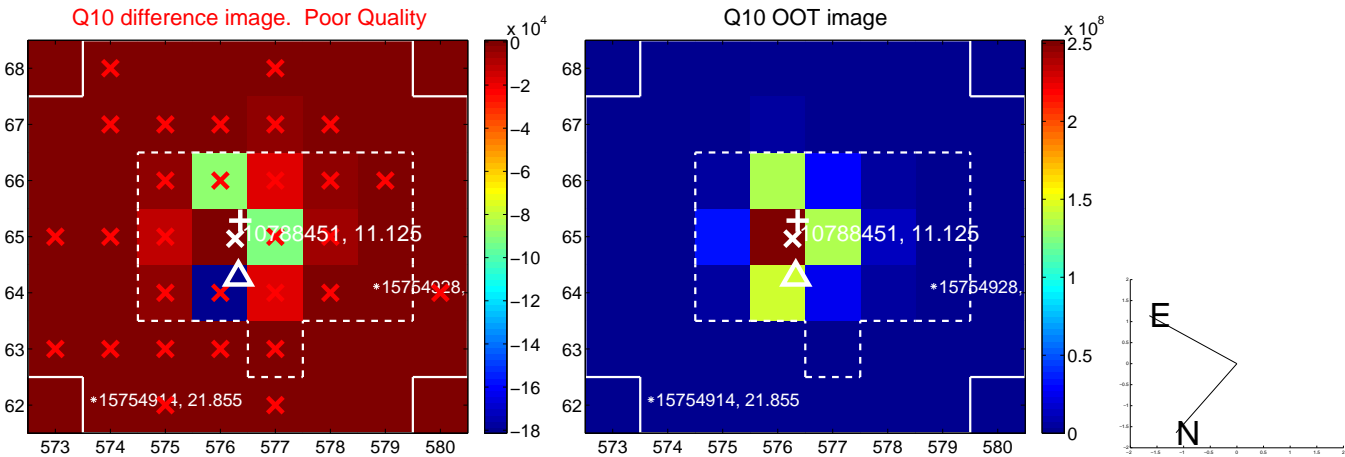
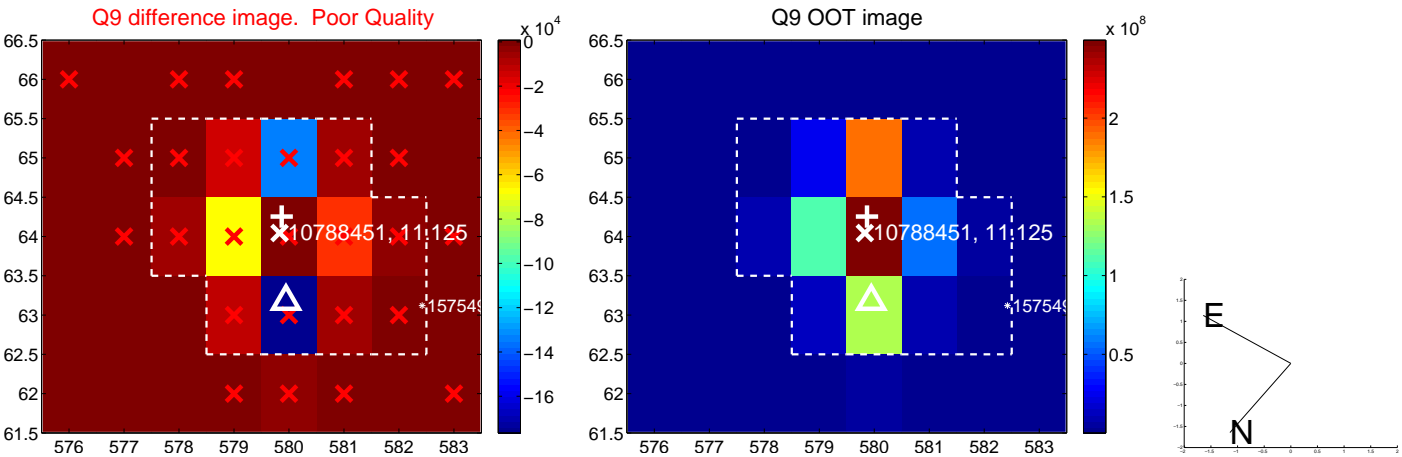


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

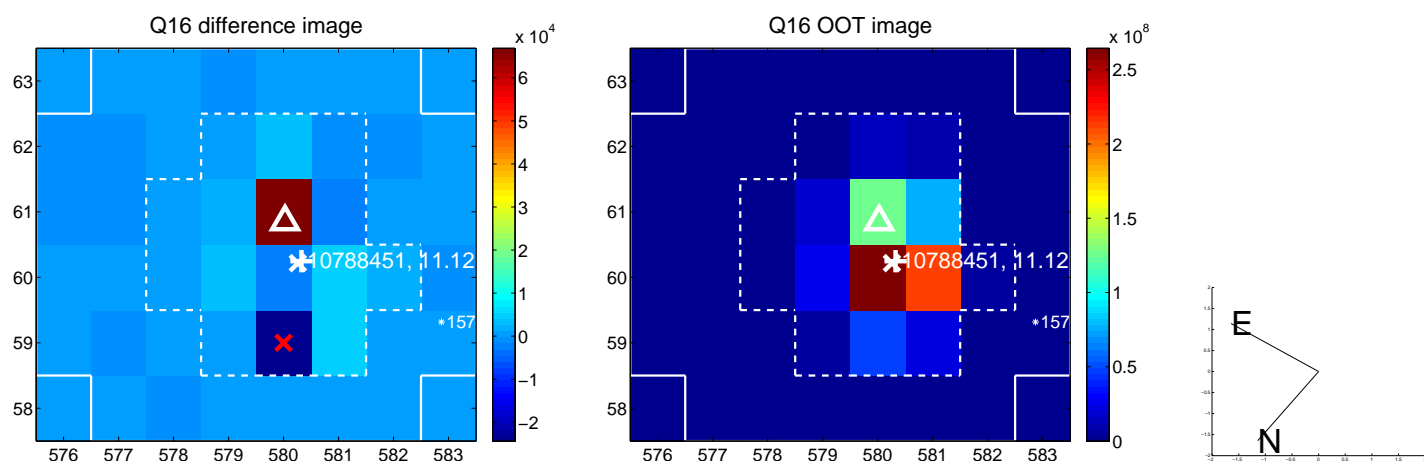
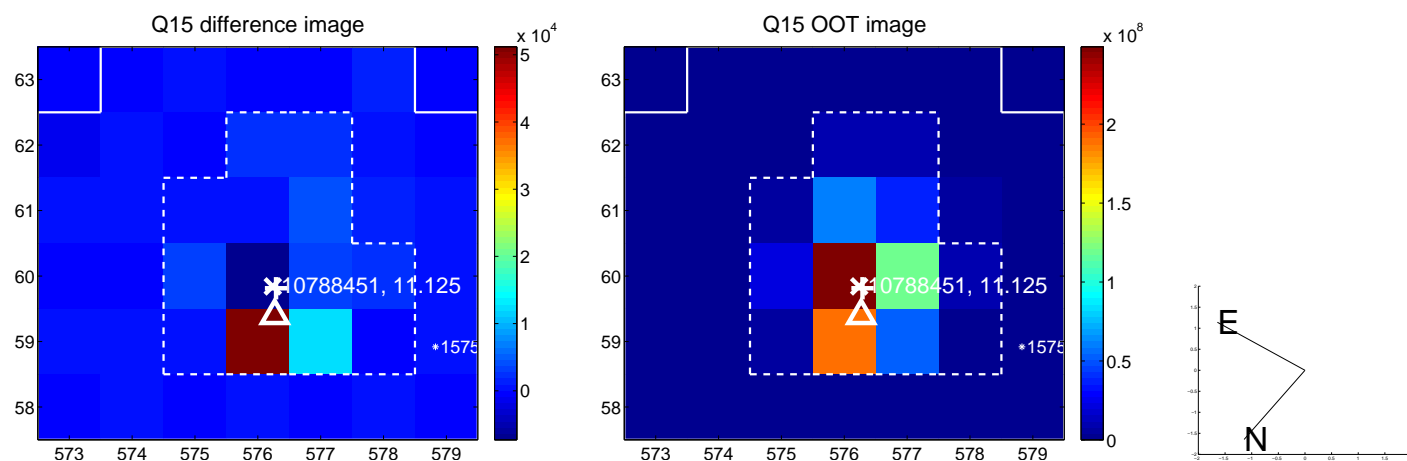
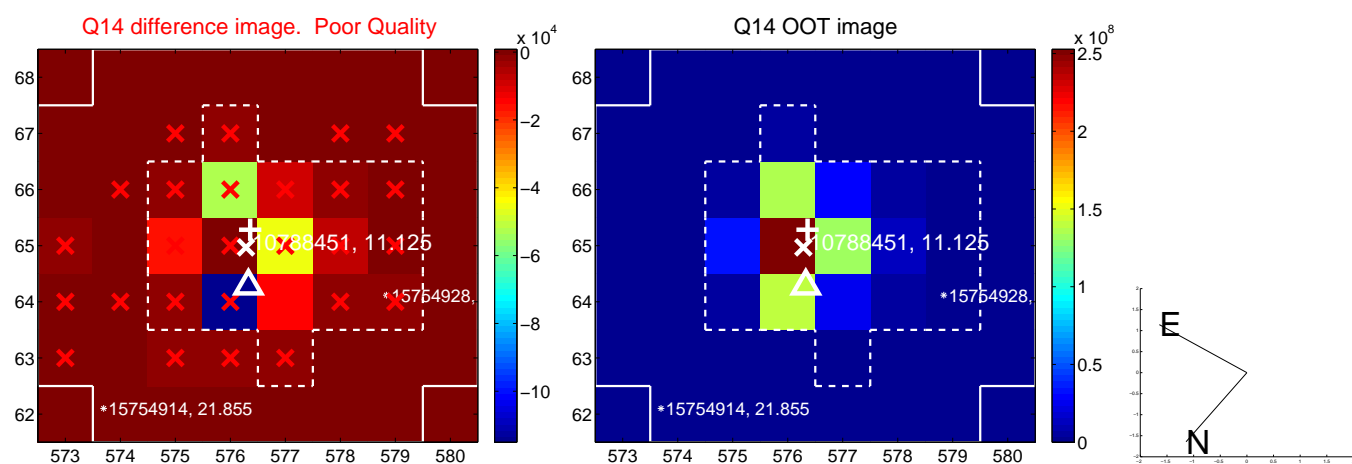
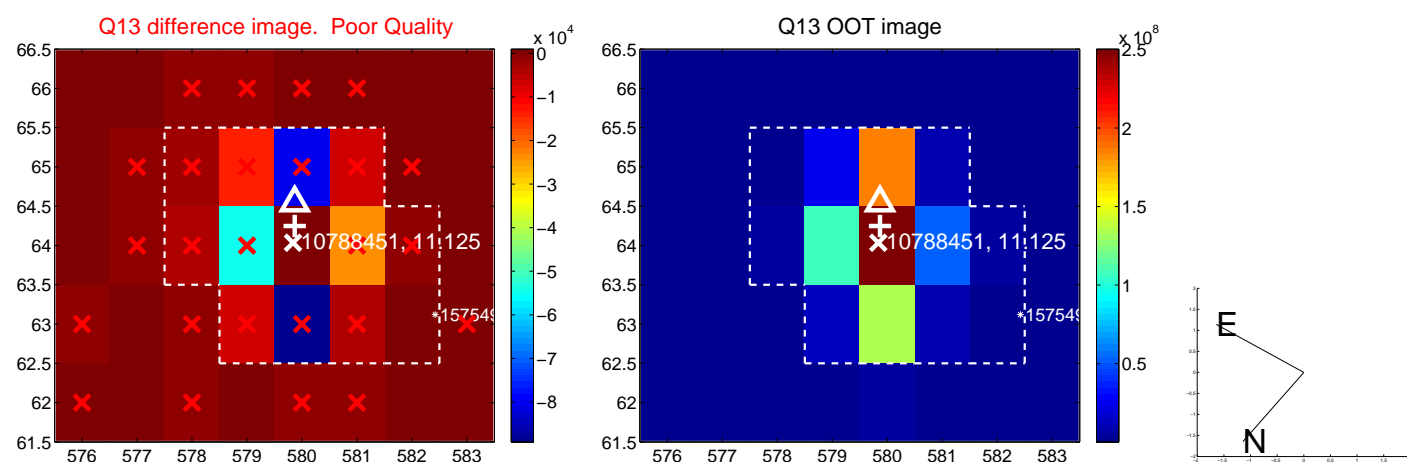




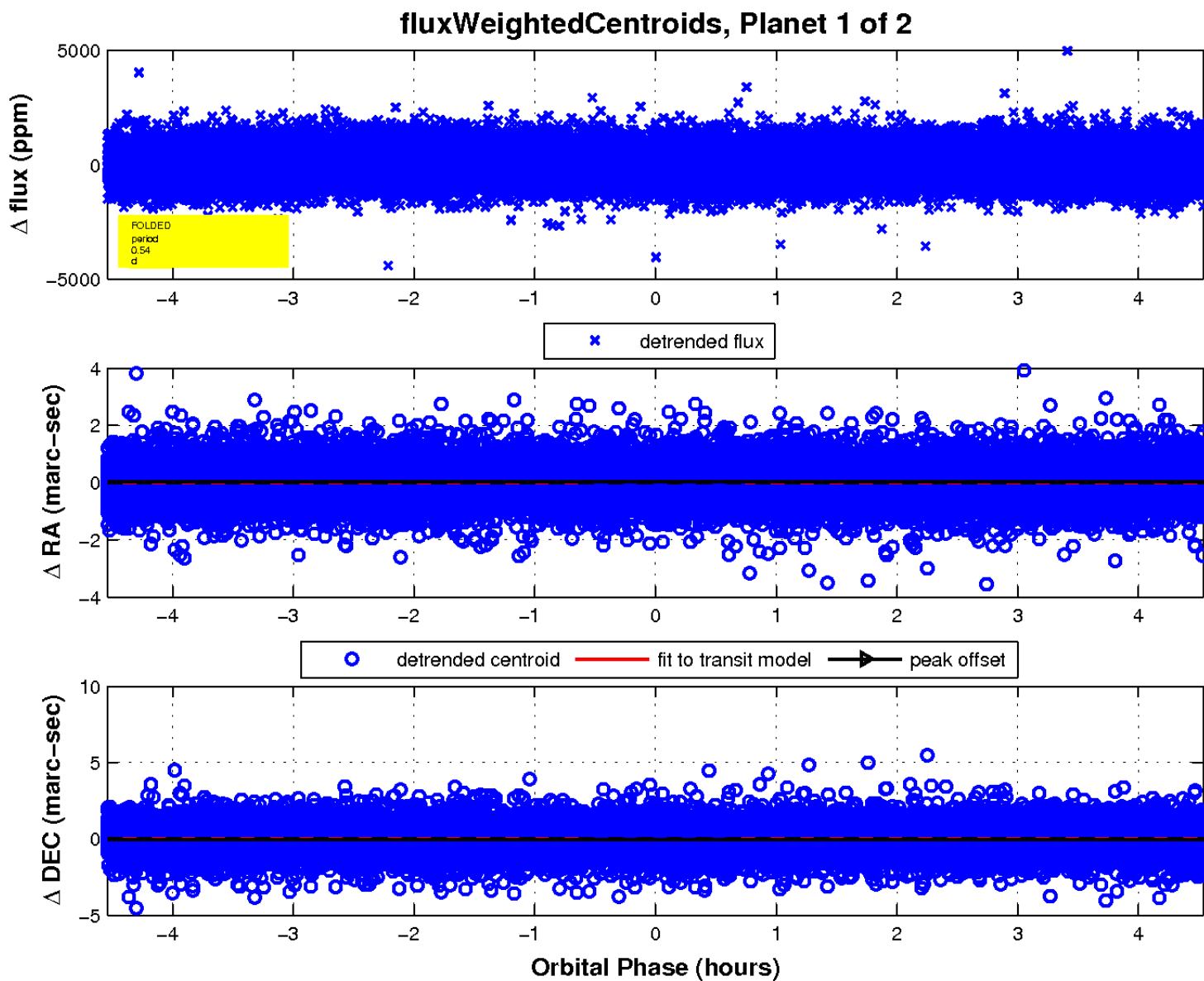
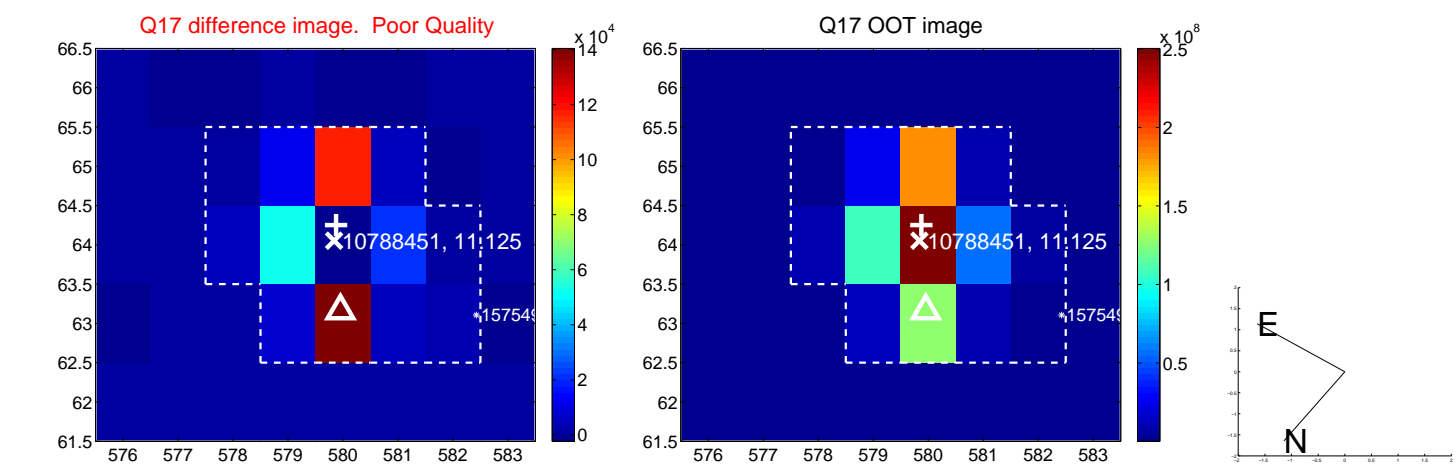
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

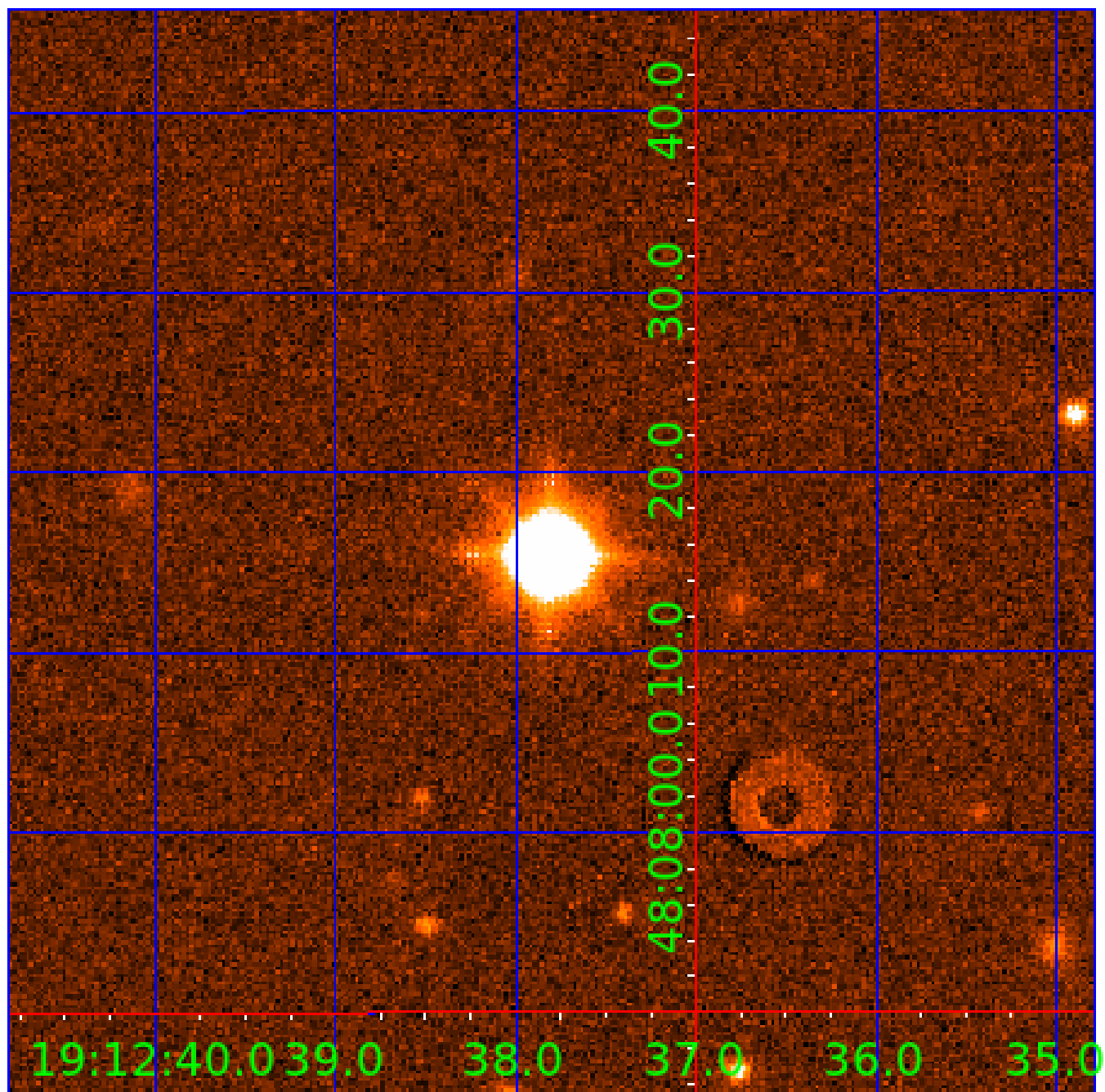


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\Delta$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 010788451

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010788451-01	OBS	No	0.538273	131.691499	66.7	1.513	10.6	8.1	2.80	8951	2.46	171949.68
010788451-02	OBS	No	0.855111	132.040944	107.8	7.751	9.1	14.8	2.80	8951	3.26	92763.16

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010788451-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_SATURATED
010788451-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—CENT_SATURATED

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

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

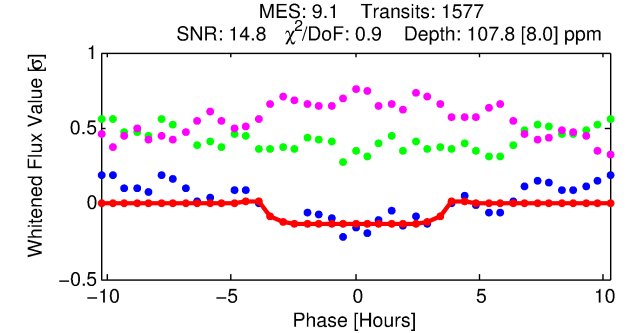
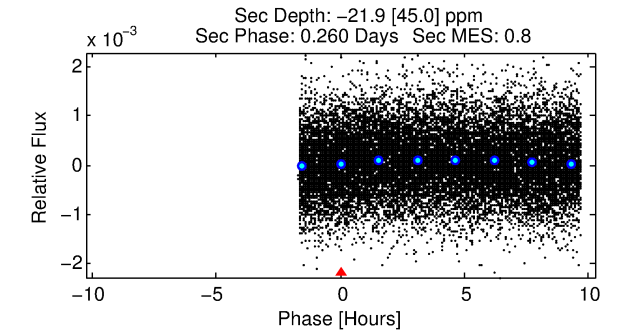
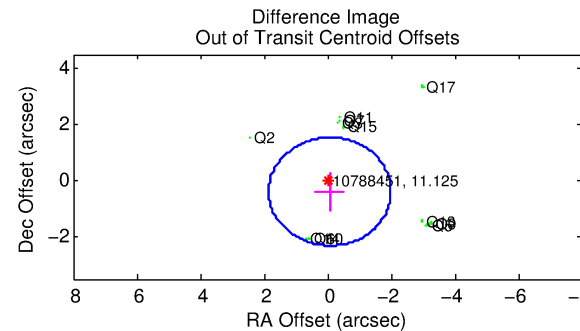
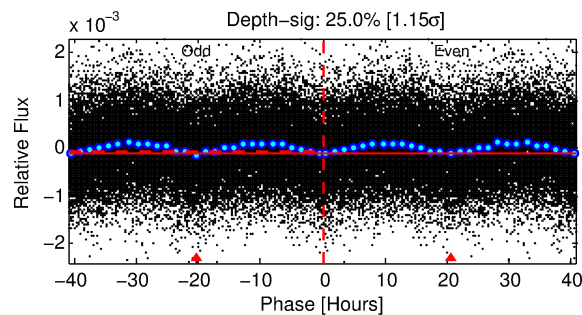
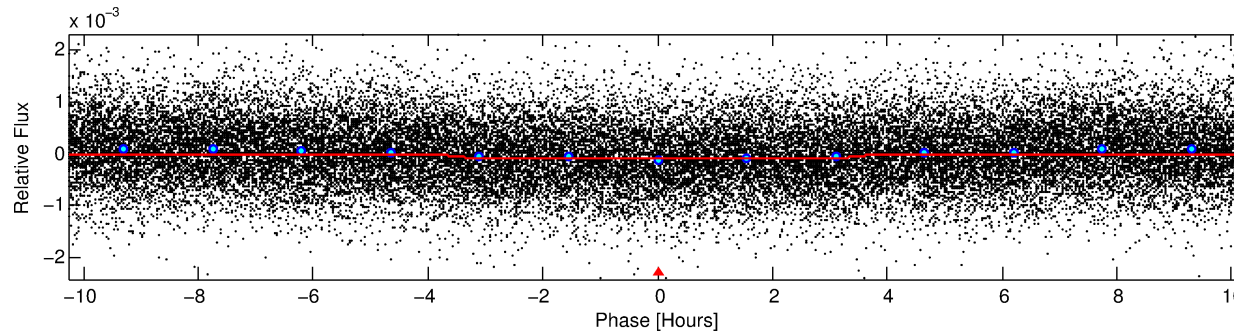
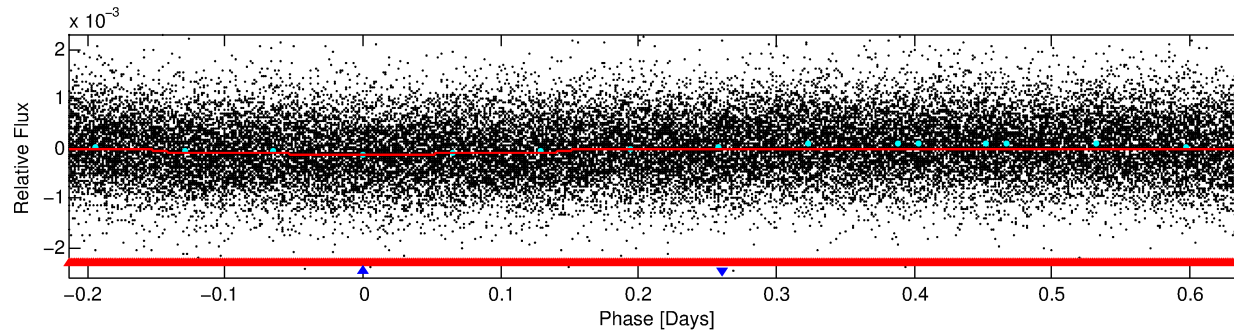
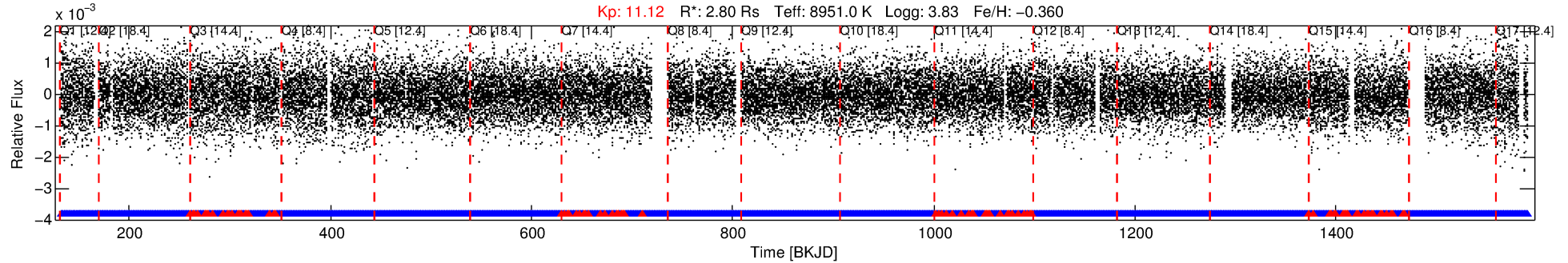
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010788451-02

No Significant Match Found

# DV One-Page Summary

KIC: 10788451 Candidate: 2 of 2 Period: 0.855 d



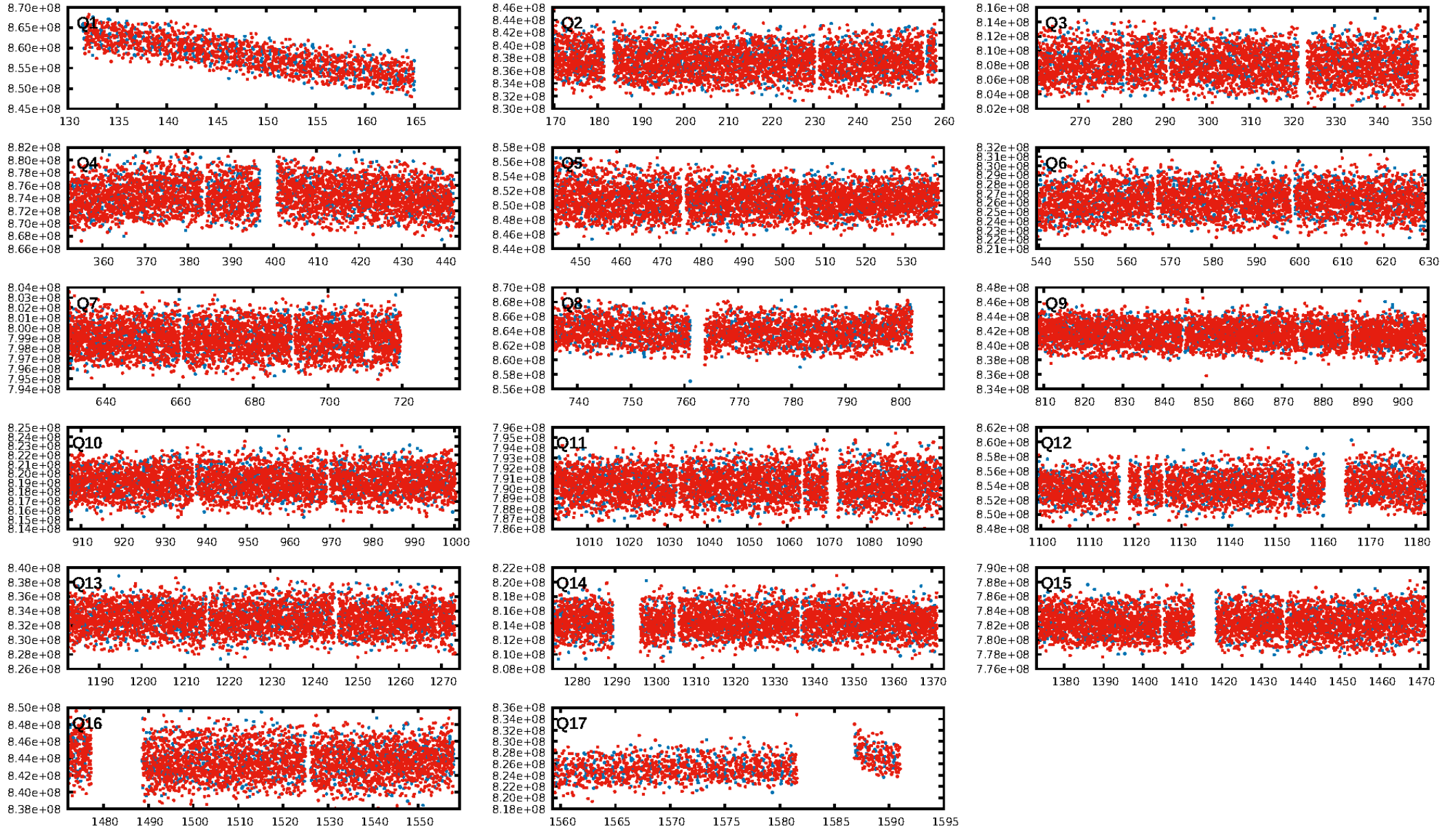
## DV Fit Results:

Period = 0.85511 [0.00001] d  
Epoch = 132.0409 [0.0041] BKJD  
Rp/R\* = 0.0107 [0.0013]  
a/R\* = 1.03 [0.05]  
b = 0.85 [0.27]  
Seff = 92763.16 [62439.39]  
Teq = 4450 [749] K  
Rp = 3.26 [1.40] Re  
a = 0.0220 [0.0089] AU  
Ag = N/A  
Teffp = N/A

## DV Diagnostic Results:

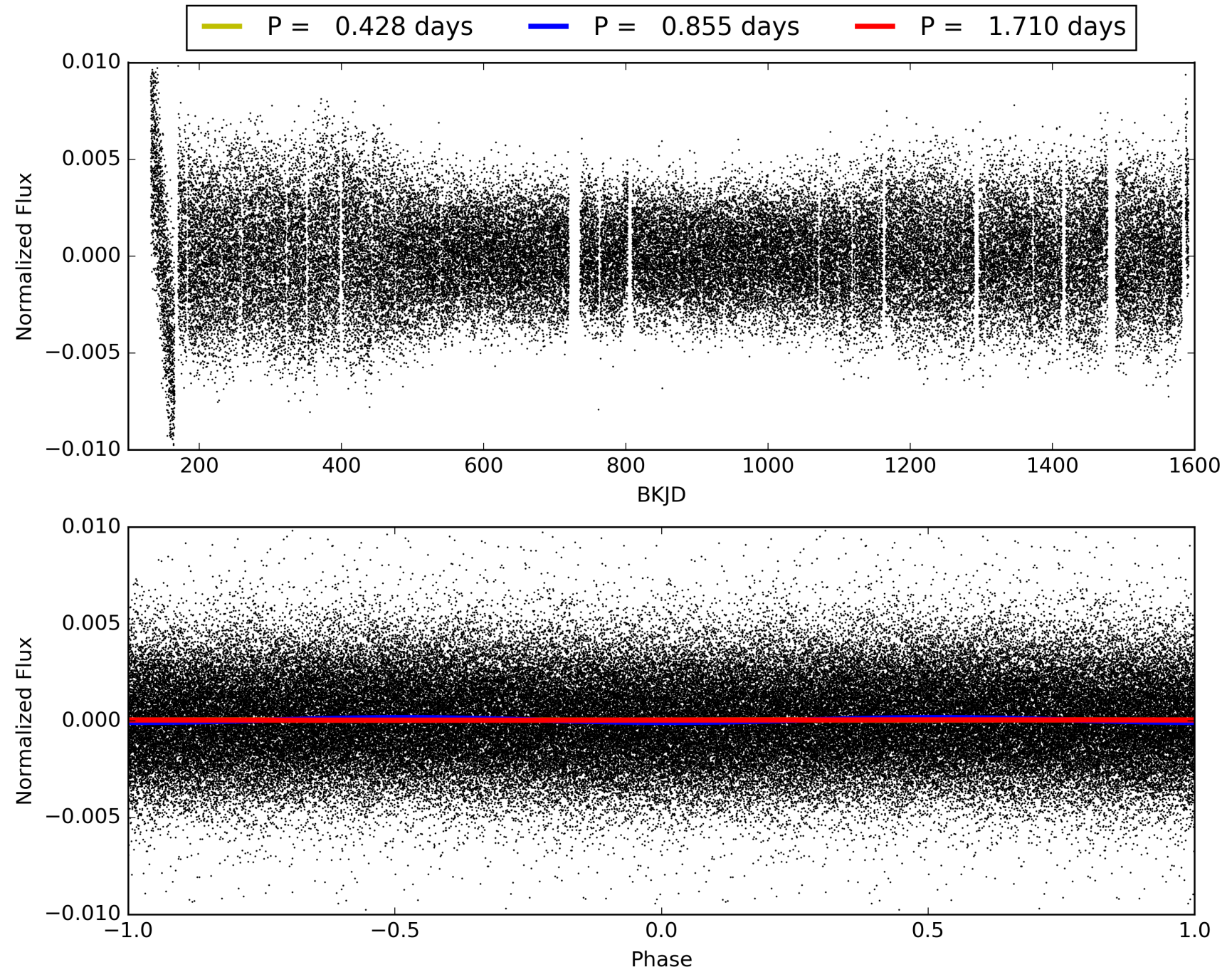
ShortPeriod-sig: 66.4% [0.96 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 0.93 [1408/1506]  
GhostDiagnostic-chr: 2.014  
Centroid-sig: 0.0%  
Centroid-so: 0.408 arcsec [4.13 $\sigma$ ]  
OotOffset-rm: 0.395 arcsec [0.62 $\sigma$ ]  
KicOffset-rm: 1.186 arcsec [1.49 $\sigma$ ]  
OotOffset-st: 4/4/0/4 [12]  
KicOffset-st: 4/4/0/4 [12]  
DiffImageQuality-fgm: 0.67 [8/12]  
DiffImageOverlap-fno: 0.00 [0/17]

# TCE 010788451-02, PDC Light Curves





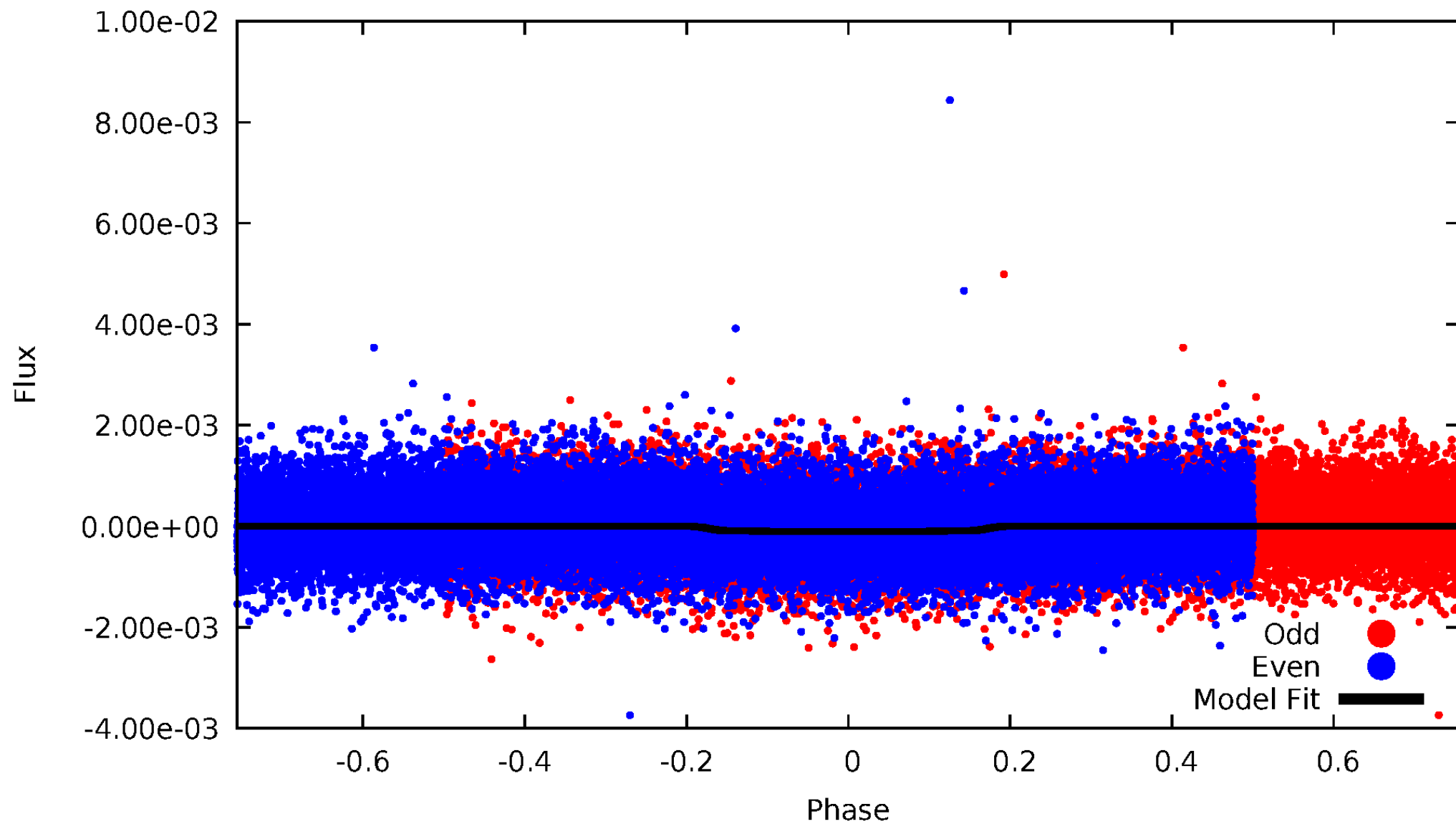
# TCE 010788451-02





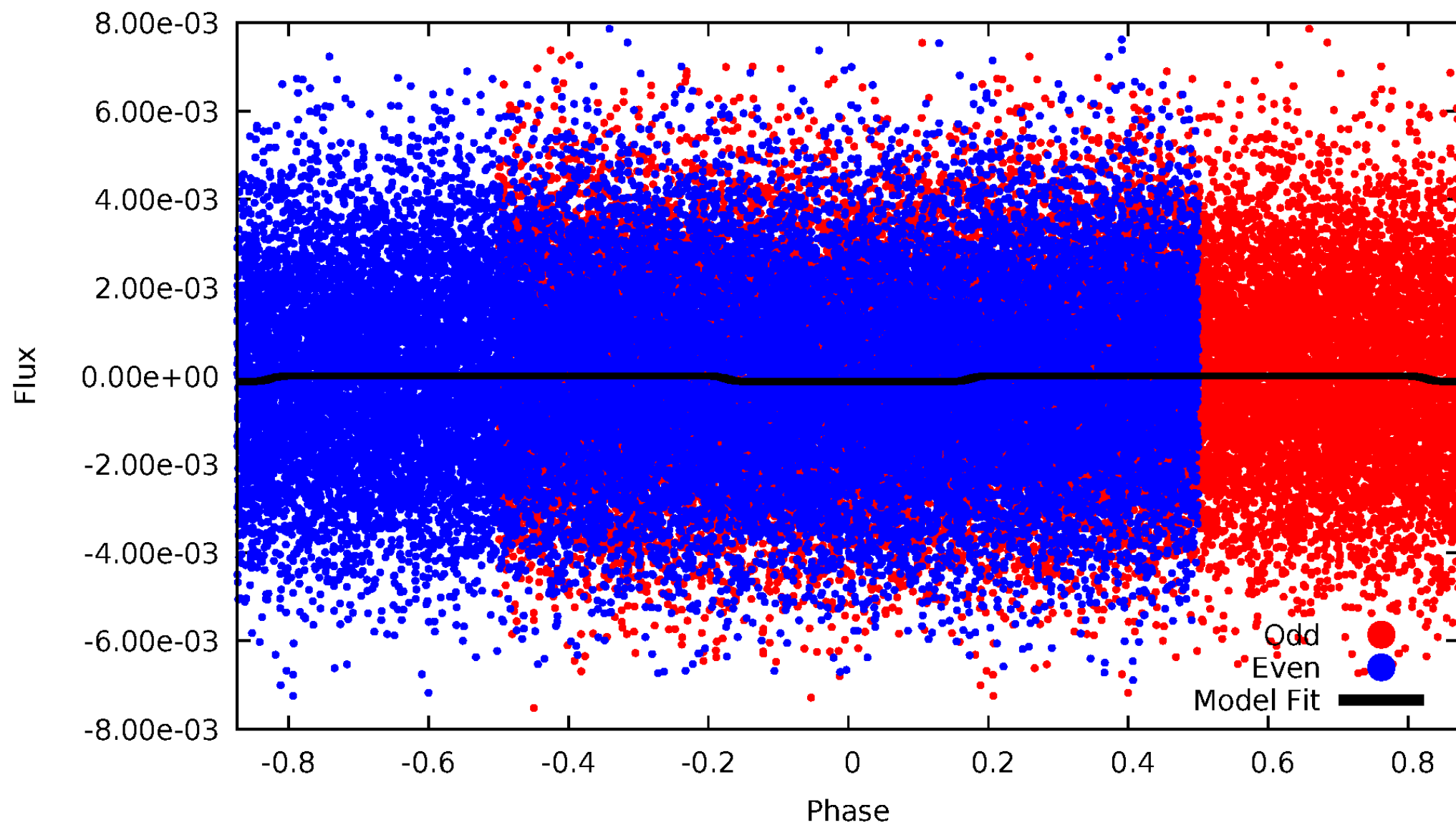
# DV Odd/Even

TCE 010788451-02



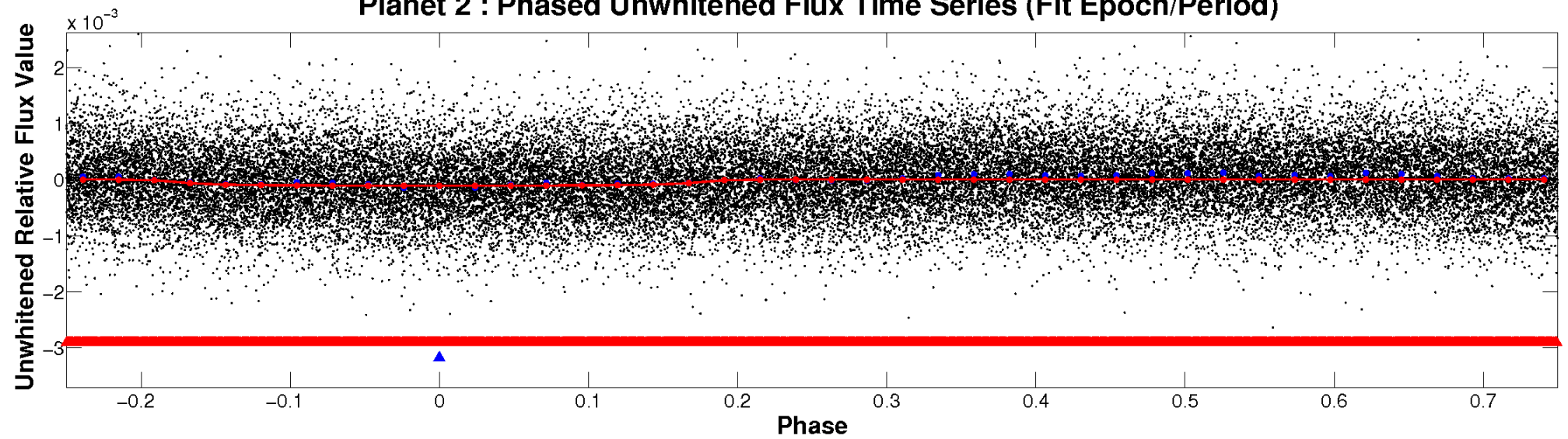
# ALT Odd/Even

TCE 010788451-02

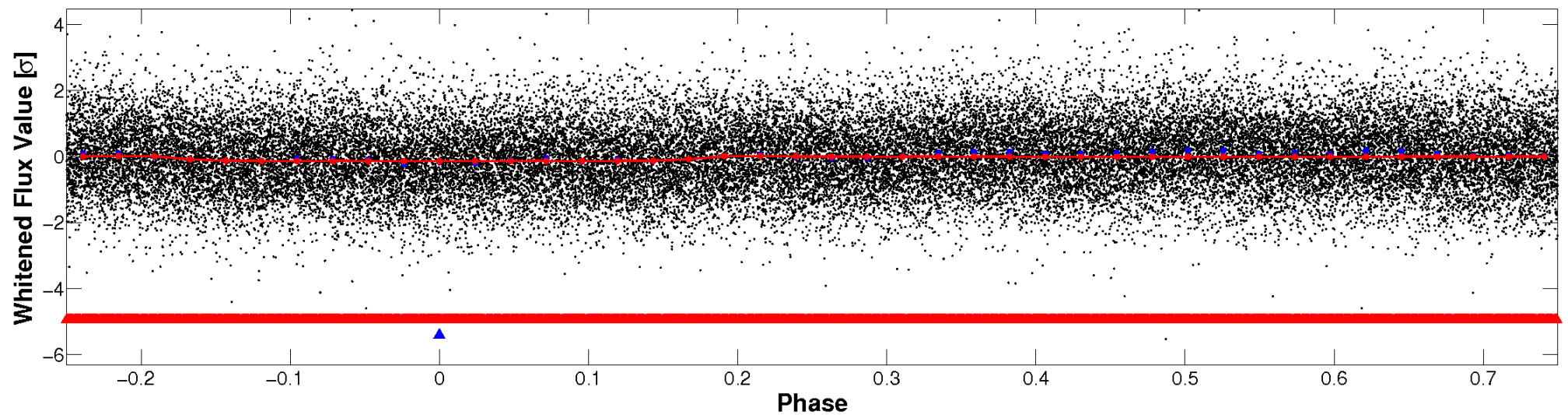


# Non-Whitened Vs. Whitened Light Curve

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

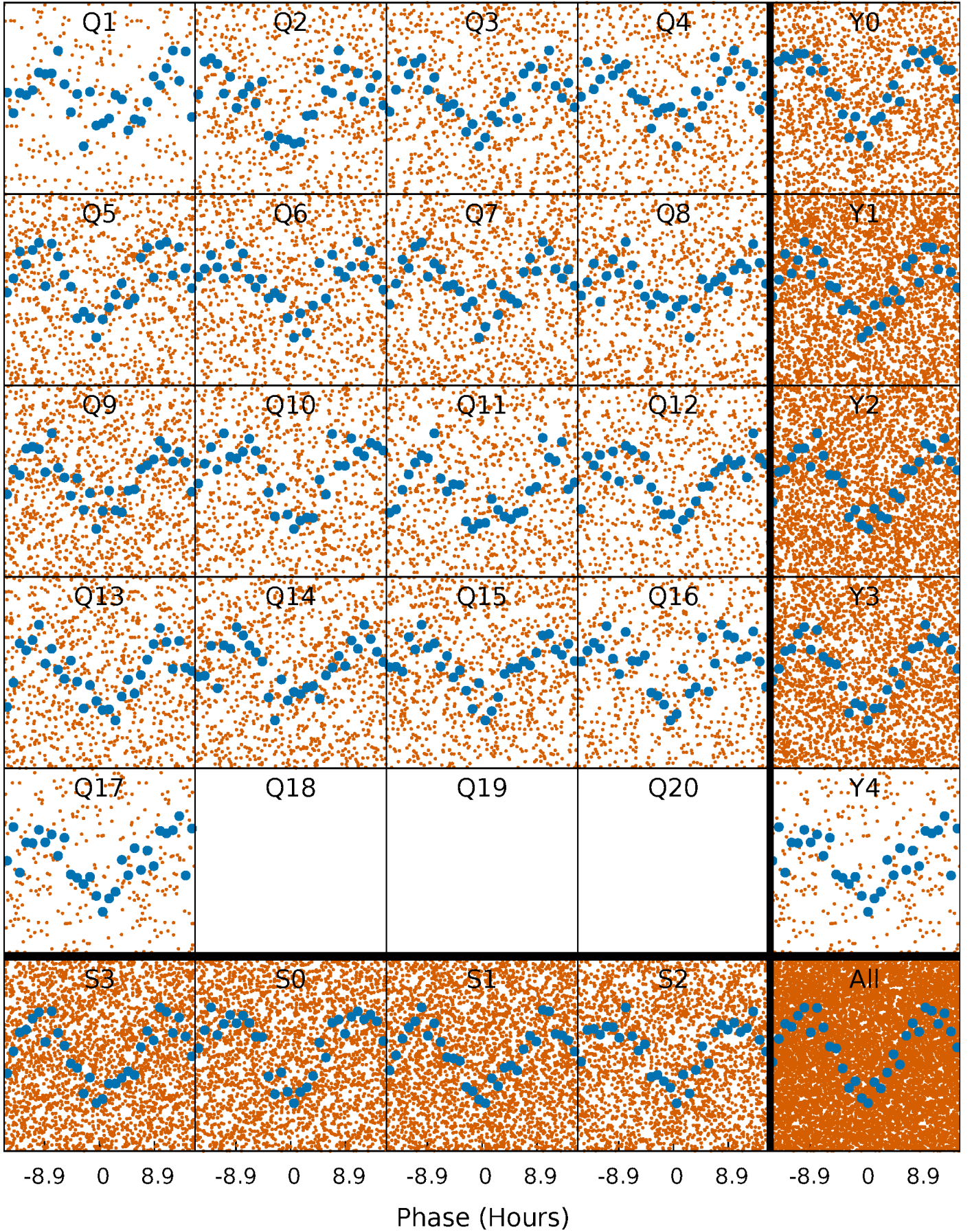


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

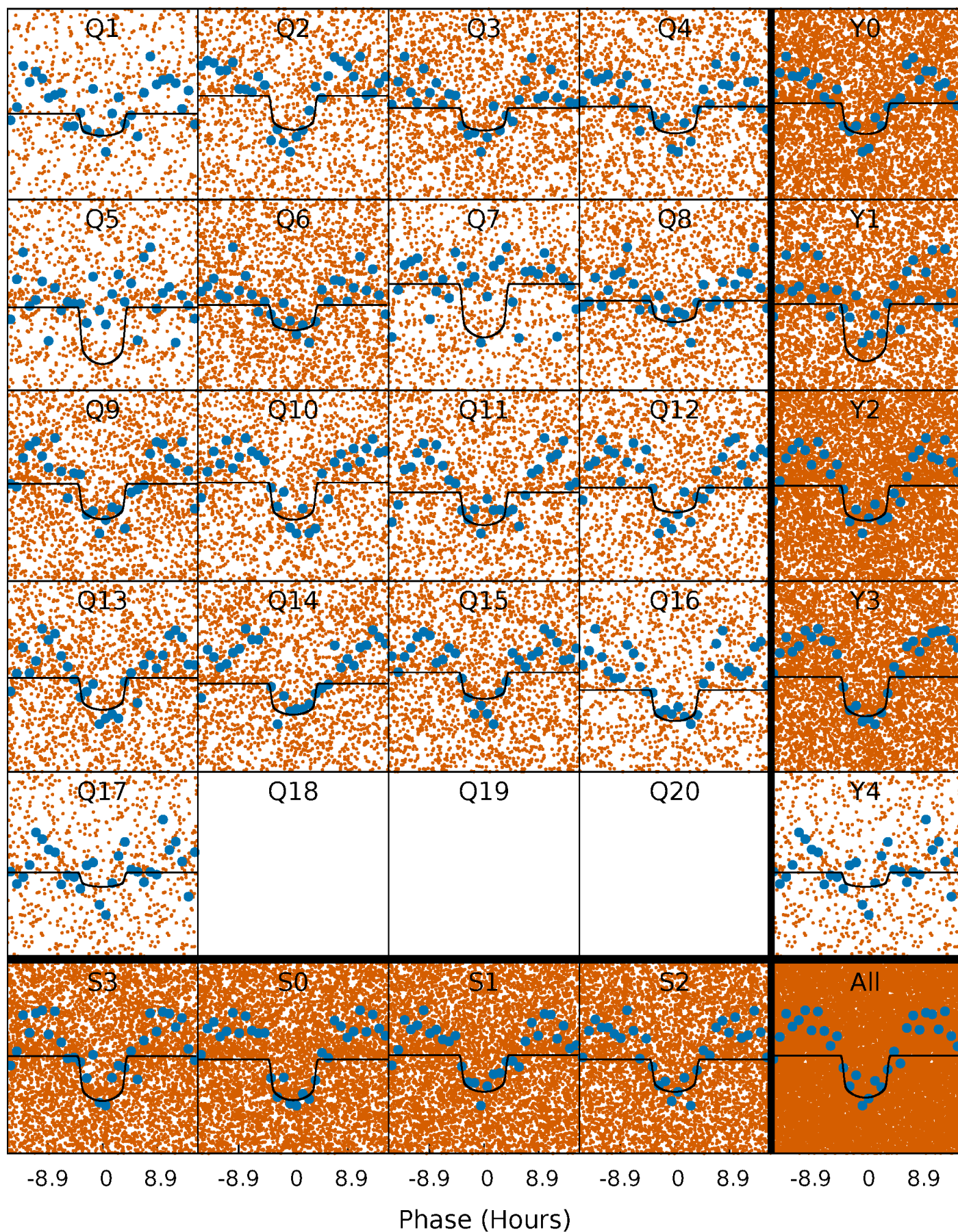
TCE 010788451-02   P= 0.855111 Days    $T_0=132.040944$  (BKJD)





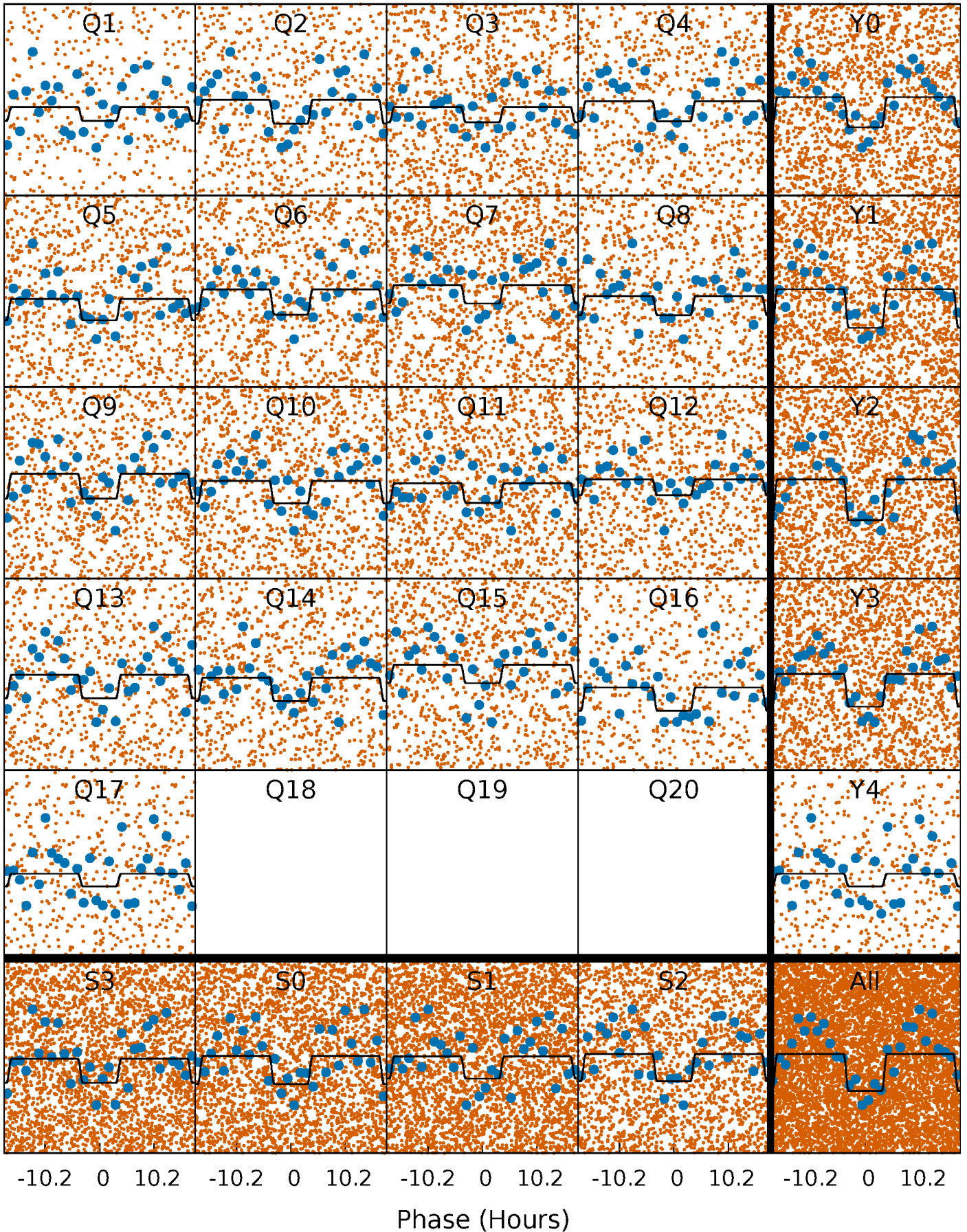
# DV Quarter-Phased Transit Curves

TCE 010788451-02 P= 0.855111 Days  $T_0=132.040944$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 010788451-02     $P = 0.855094$  Days     $T_0 = 132.056853$  (BKJD)

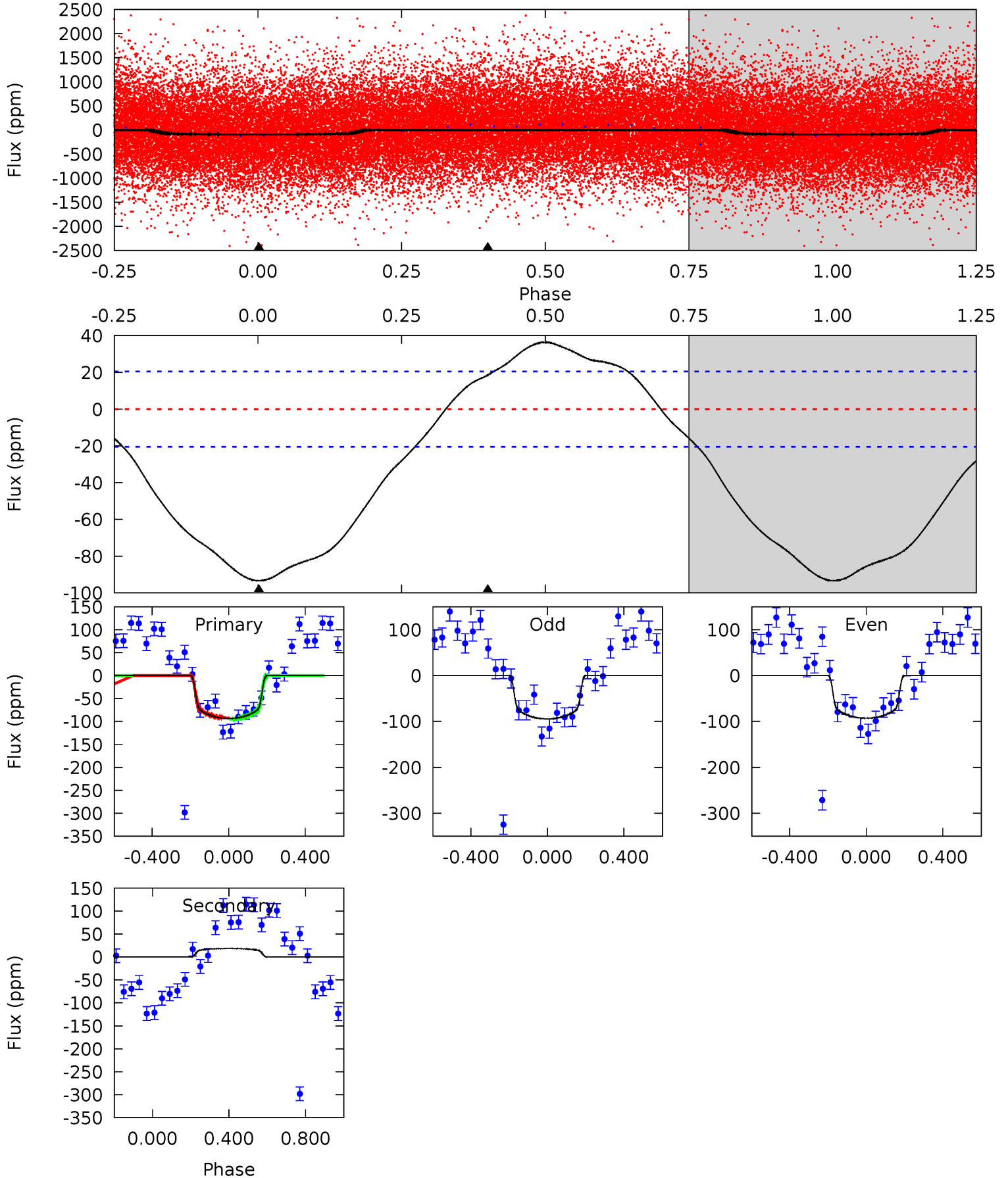




# DV Model-Shift Uniqueness Test

010788451-02, P = 0.855111 Days, E = 131.185833 Days

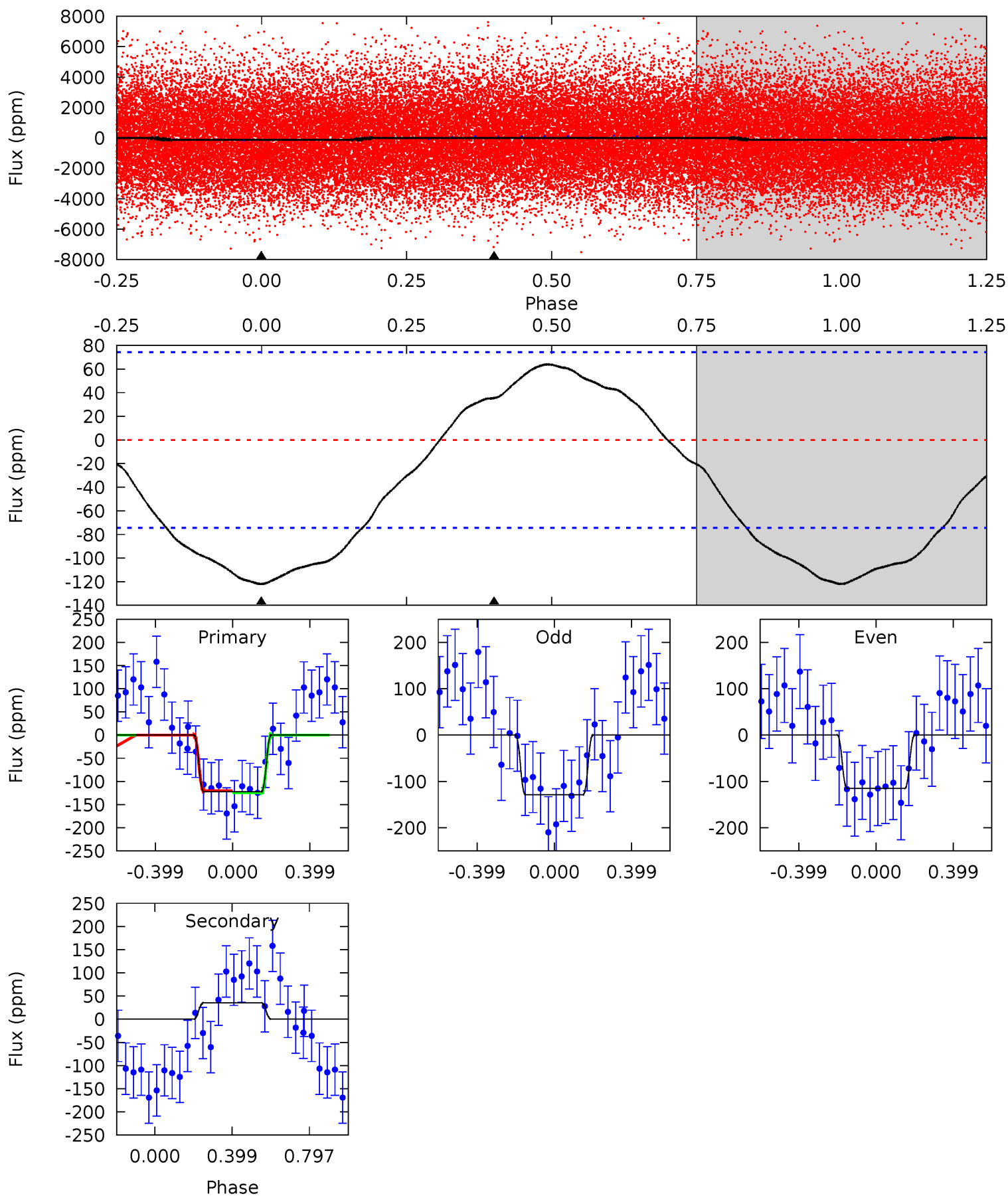
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
19.5	-3.87	0	0	4.26	0.84	2.22	19.5	19.5	-3.87	-3.87	0.16	0.92	0.28	0.25



# Alt Model-Shift Uniqueness Test

010788451-02, P = 0.855094 Days, E = 131.201759 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
7.00	-2.03	0	0	4.27	0.84	0.86	7.00	7.00	-2.03	-2.03	0.39	1.07	0.34	0.13



### Stellar Parameters For KIC 010788451

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$8951^{+282}_{-408}$	$3.834^{+0.382}_{-0.127}$	$-0.360^{+0.550}_{-0.300}$	$2.796^{+0.771}_{-1.156}$	$1.949^{+0.457}_{-0.374}$	$0.126^{+0.417}_{-0.048}$
	+3%/-5%	+10%/-3%	+153%/-83%	+28%/-41%	+23%/-19%	+332%/-38%
Source	KIC0	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 010788451-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$19 \pm 5$	$3.13^{+0.76}_{-0.71}$	$6026^{+497}_{-671}$	$-6006^{+423}_{-471}$	$-0.514^{+0.201}_{-0.393}$
Alt.	$35 \pm 17$	$3.21^{+0.76}_{-0.76}$	$6043^{+494}_{-687}$	$-6668^{+761}_{-779}$	$-0.931^{+0.512}_{-0.823}$

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

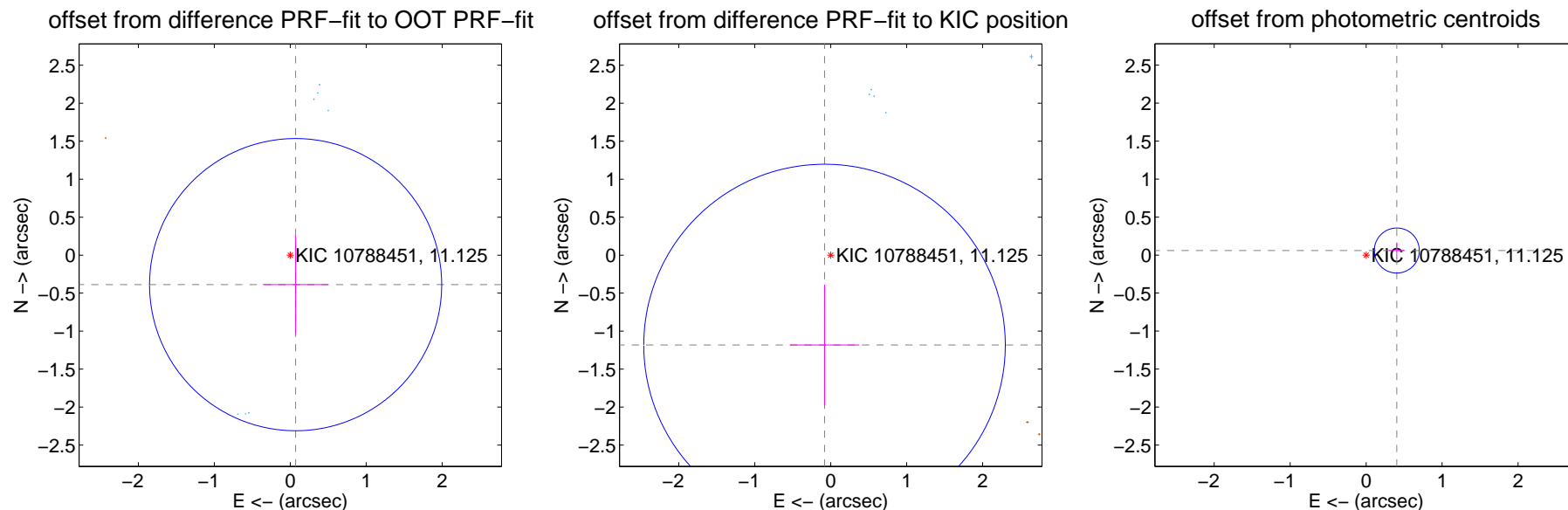
## DV Centroid Data

Supplemental centroid analysis for 010788451-02. **Kepler magnitude: 11.12**. Transit SNR 14.82

There are 8 quarters with good PRF difference image offsets

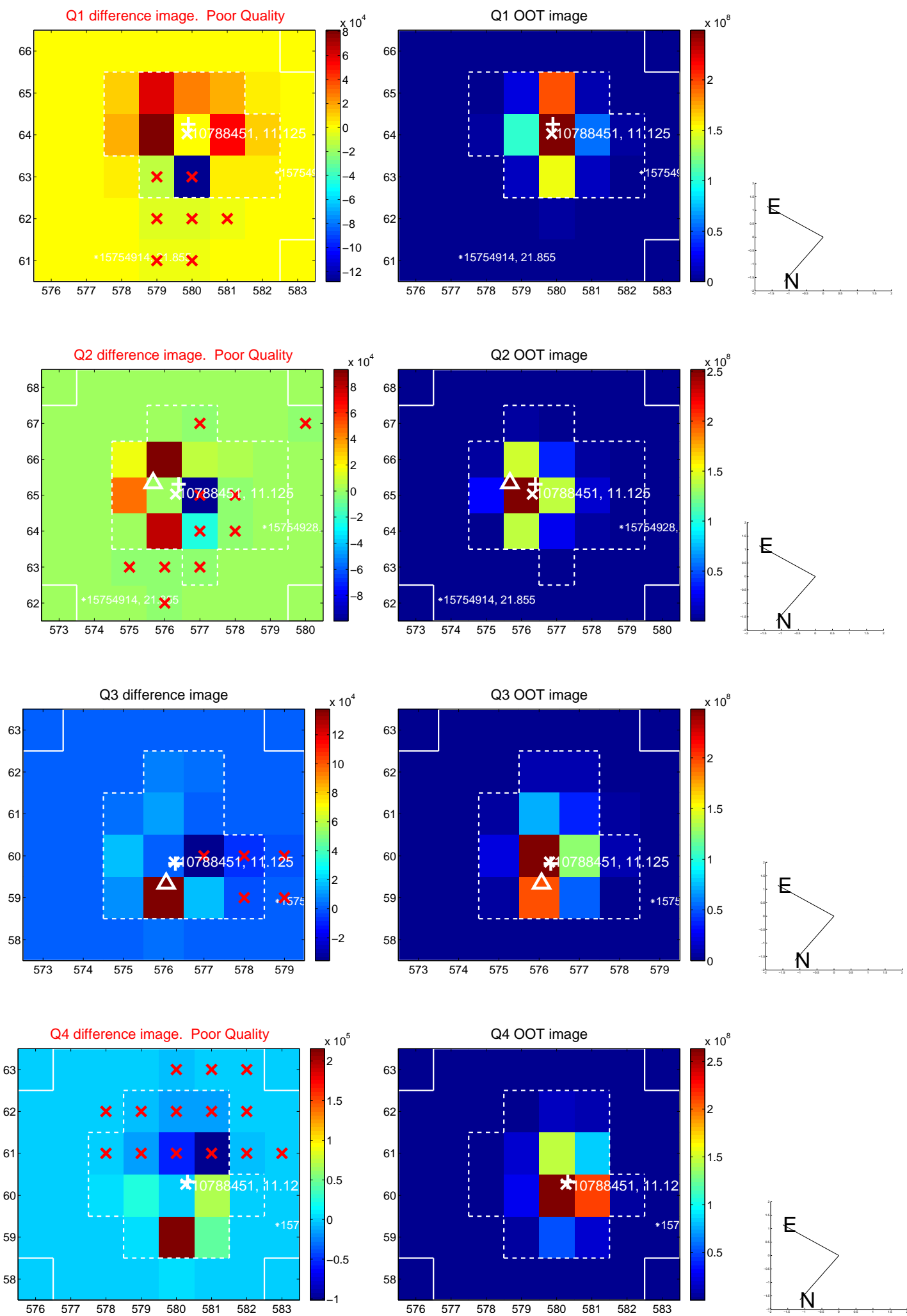
The direct PRF centroid is offset from the target star catalog position by about 0.81 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.395 \pm 0.641$	0.62	$-0.070 \pm 0.431$	$-0.388 \pm 0.647$
PRF-fit source offset from KIC position	$1.186 \pm 0.793$	1.49	$0.082 \pm 0.457$	$-1.183 \pm 0.795$
photometric centroid source offset	<b><math>0.41 \pm 0.10</math></b>	<b>4.13</b>	$-0.40 \pm 0.10$	$0.06 \pm 0.11$

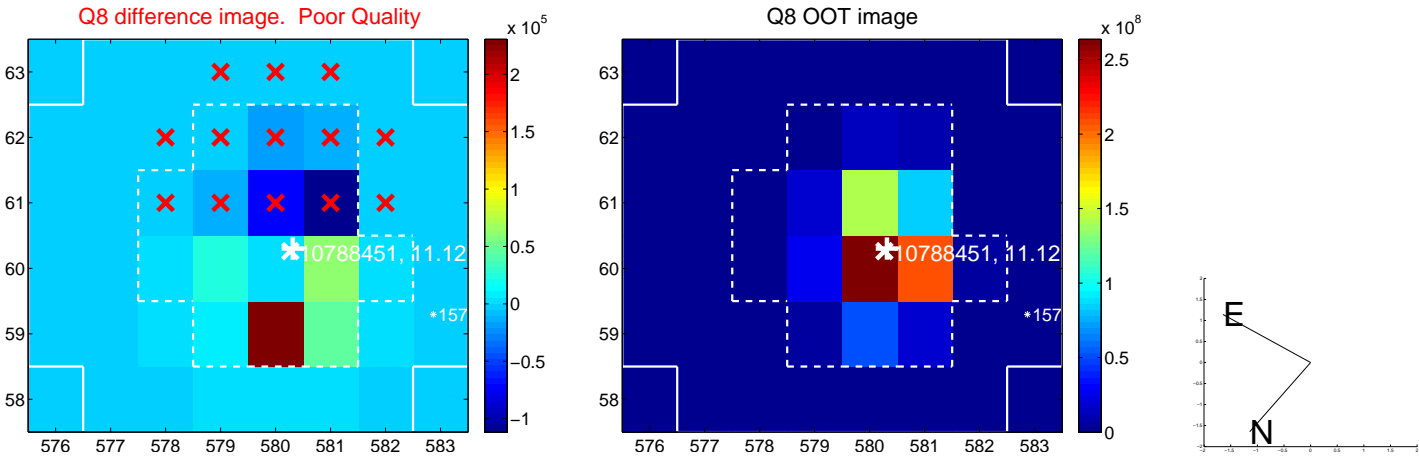
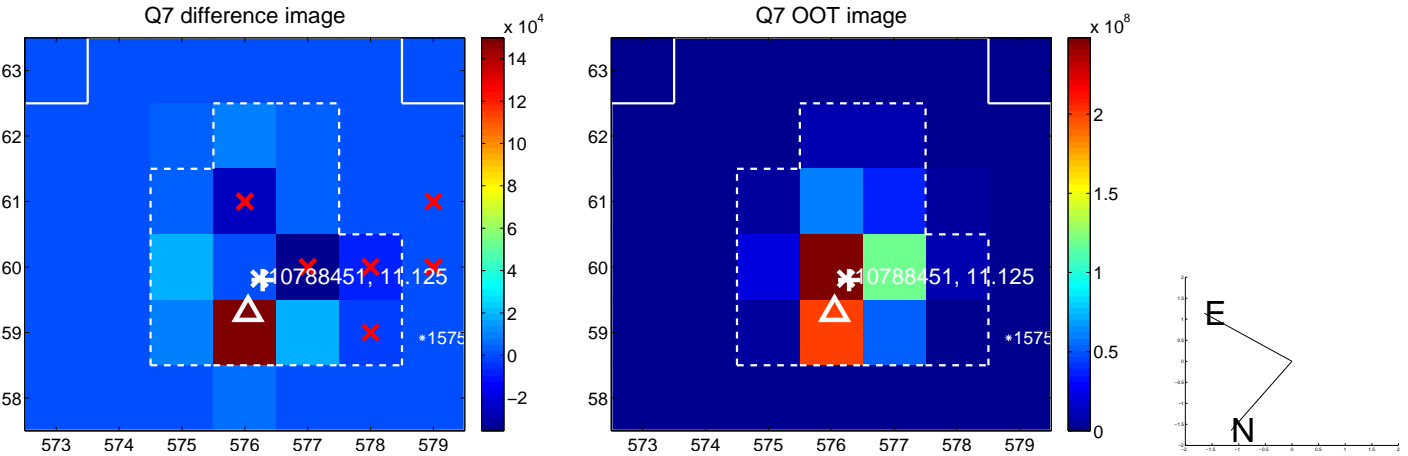
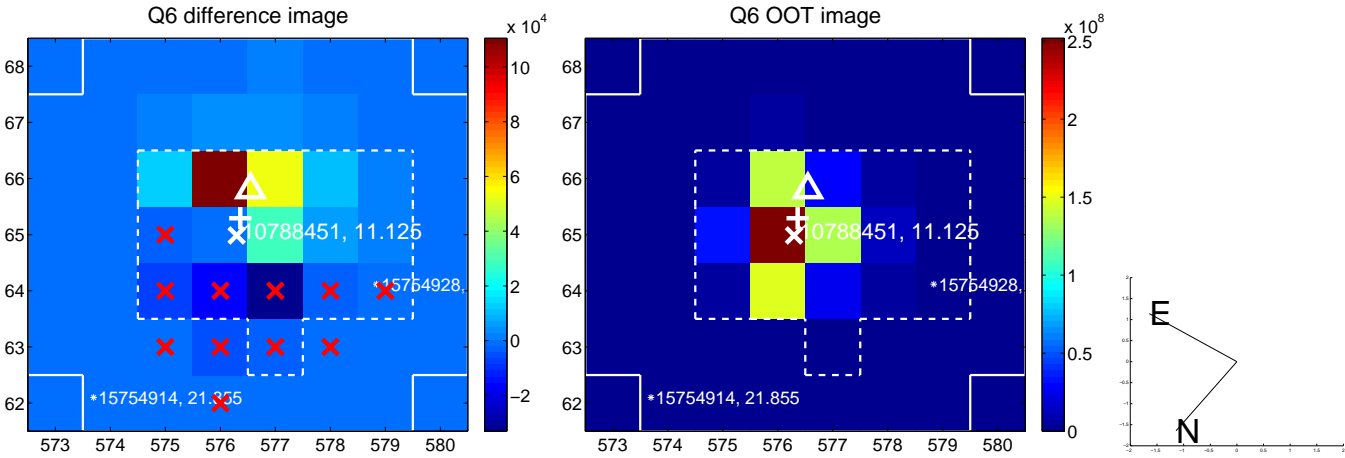
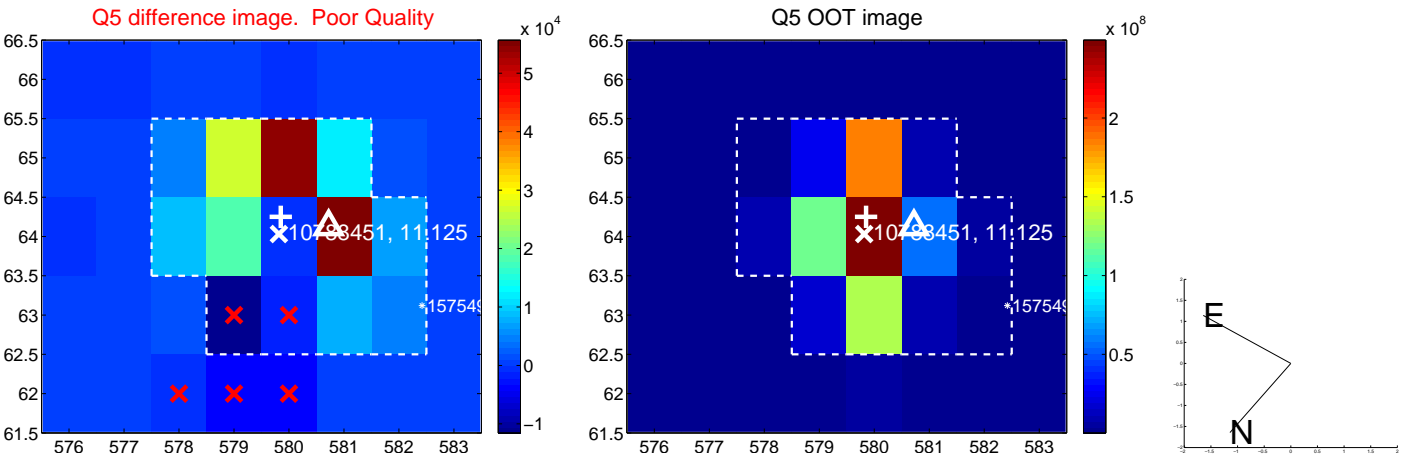


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

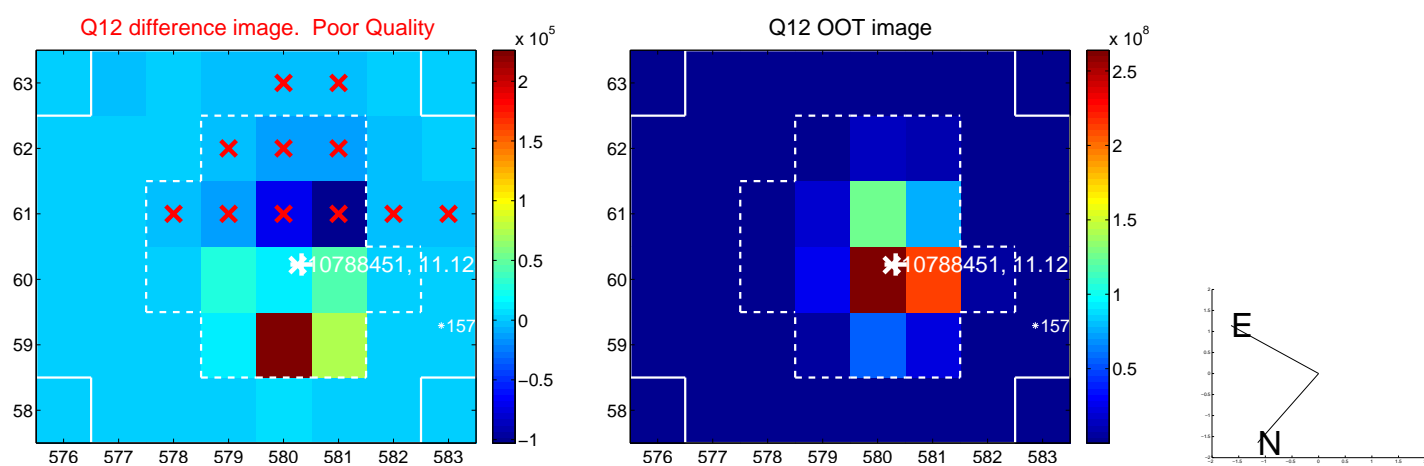
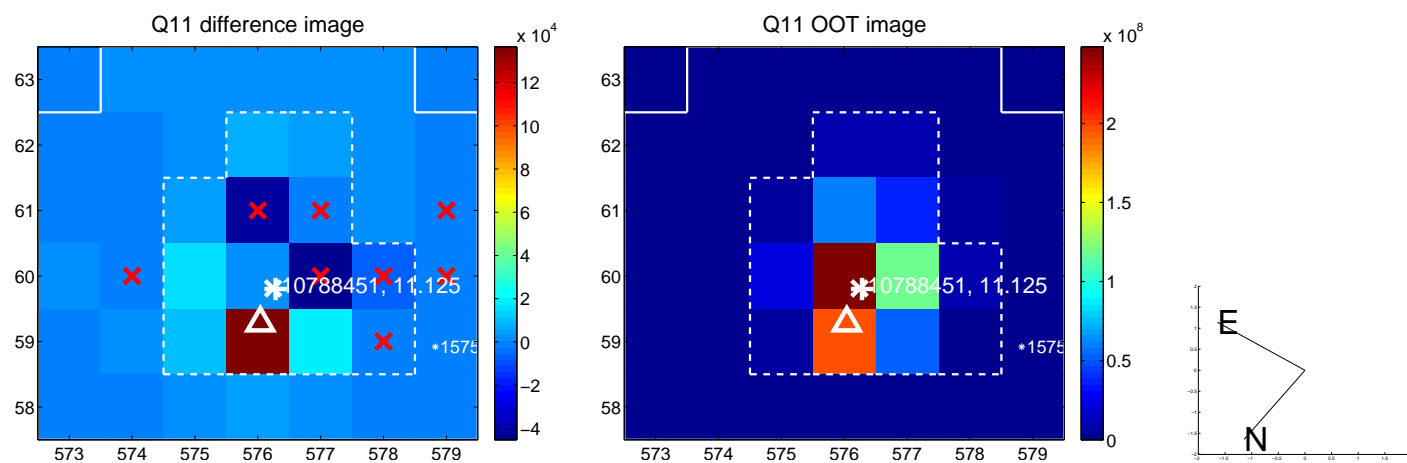
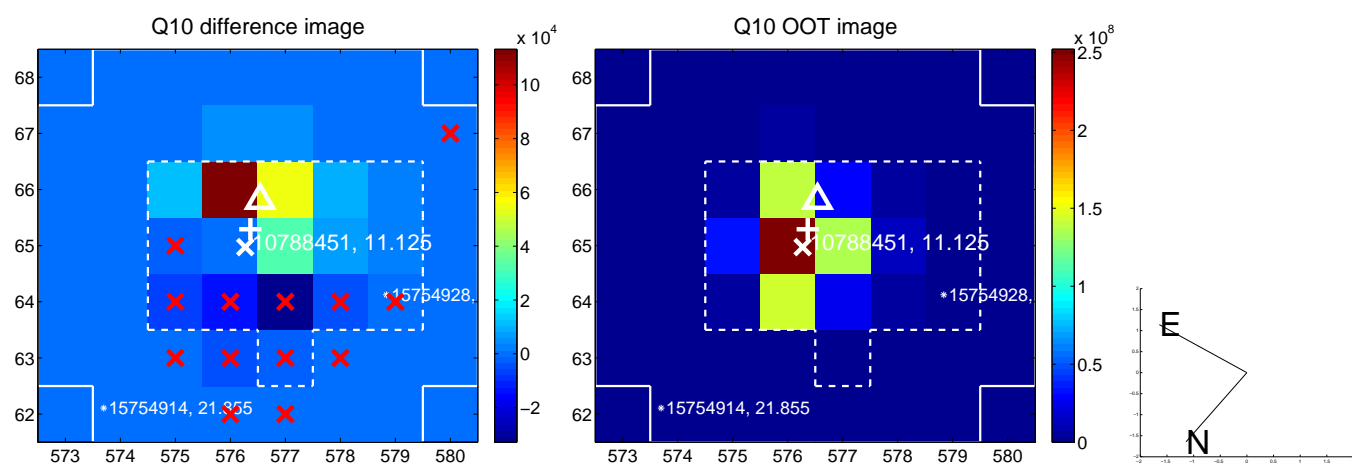
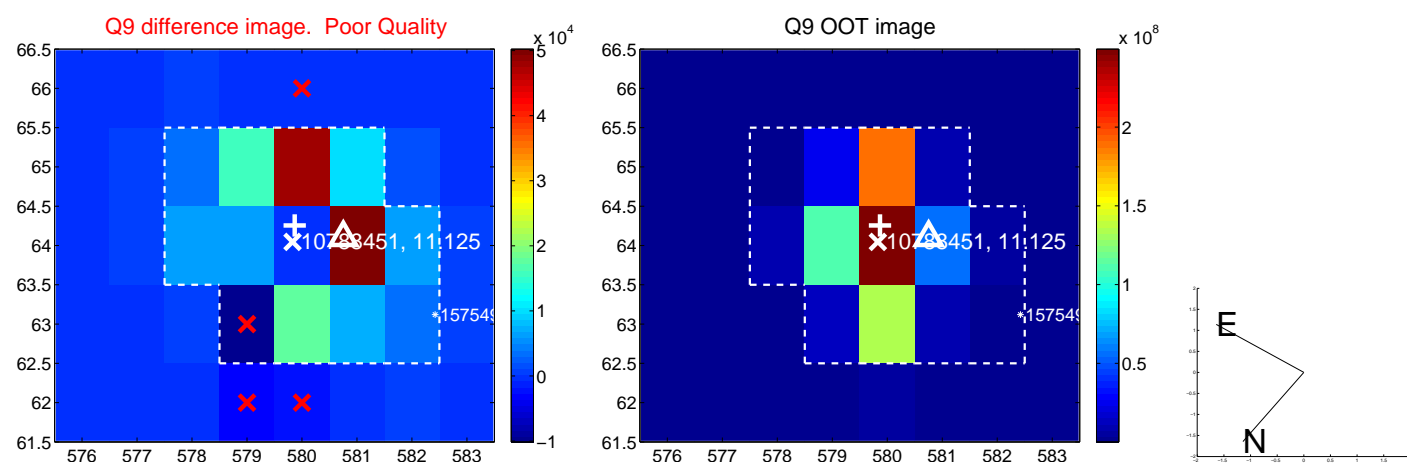


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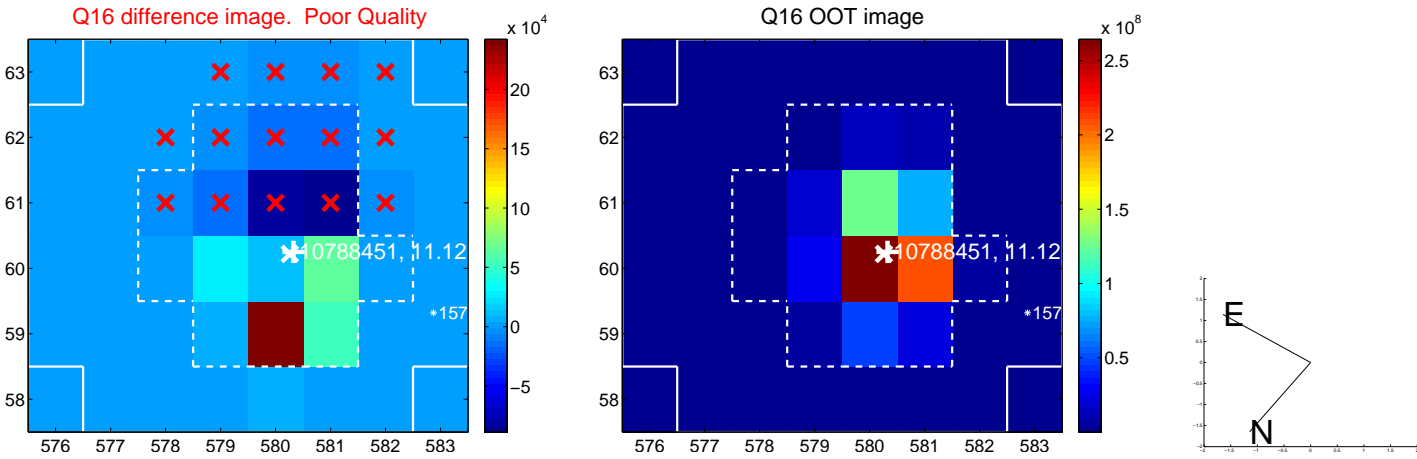
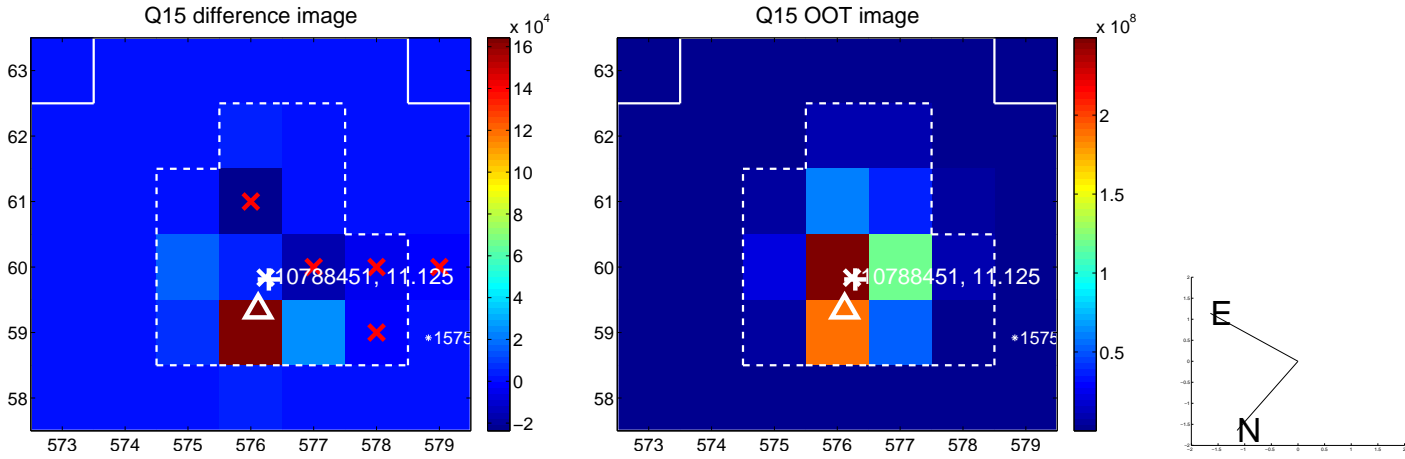
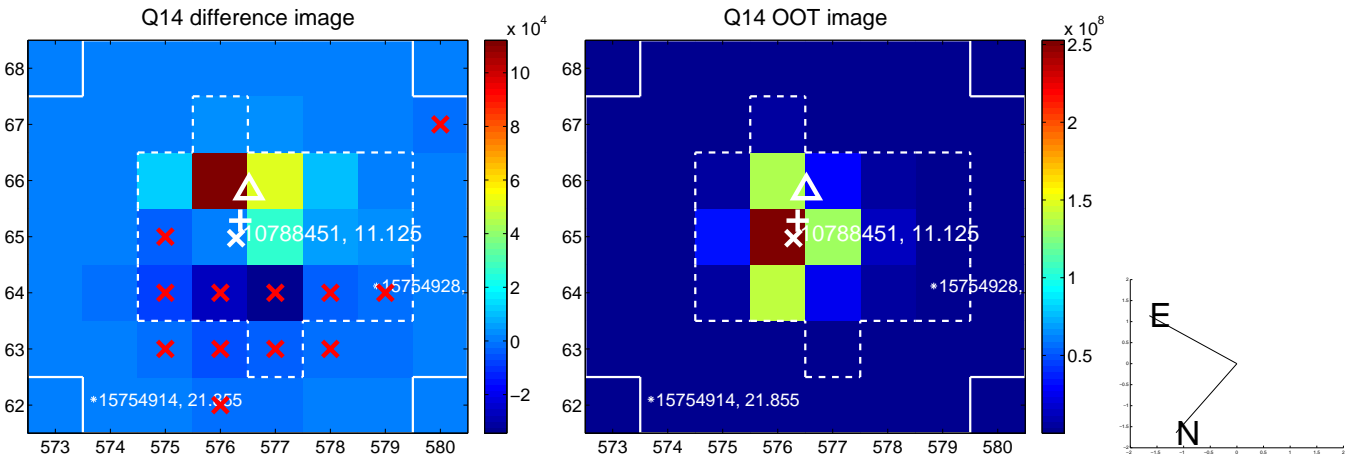
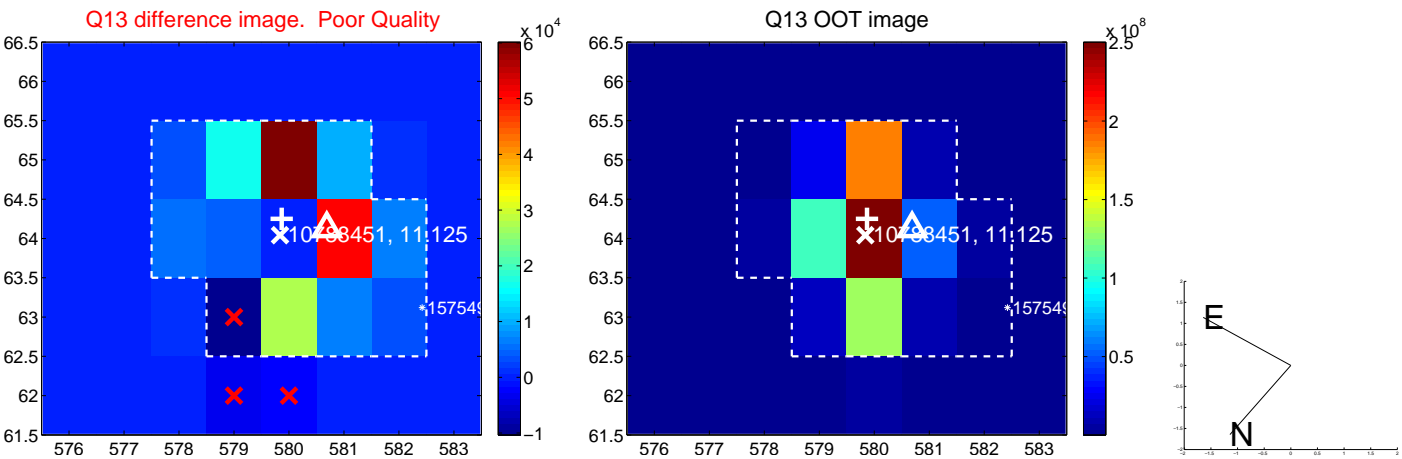




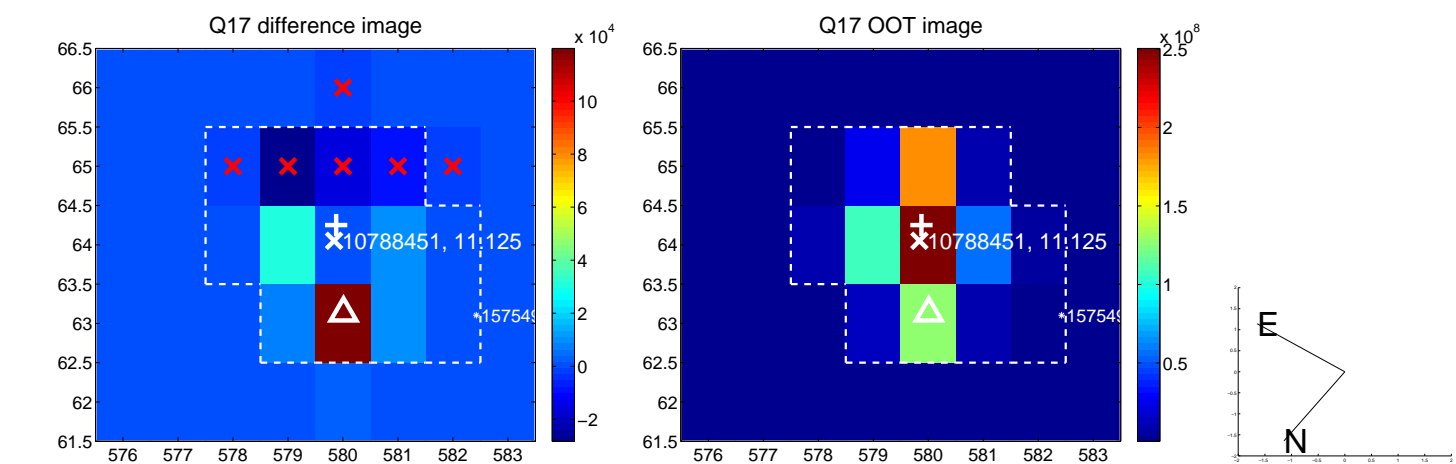
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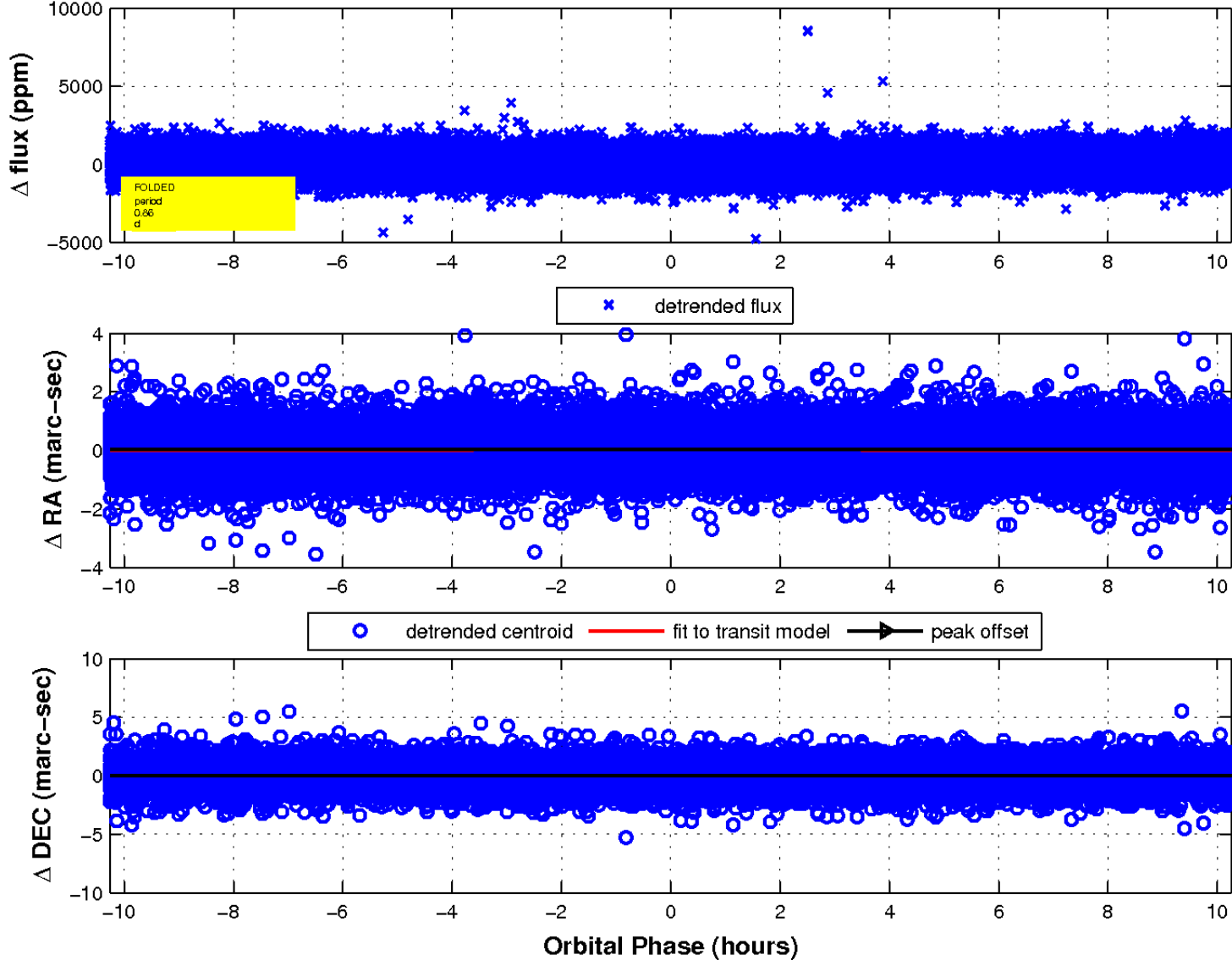
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



### fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

Declination

