

# KIC 007115530

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007115530-01	OBS	No	0.566734	131.886676	27.8	3.885	11.8	7.1	0.70	5238	0.40	2175.81
007115530-02	OBS	No	56.403997	167.035657	669.1	3.974	8.1	9.0	0.70	5238	2.04	4.72

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007115530-01	OBS	FP	0.00	1	0	0	1	LPP_DV—EPHEM_MATCH
007115530-02	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—CENT_FEW_DIFFS—HALO_GHOST

**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.

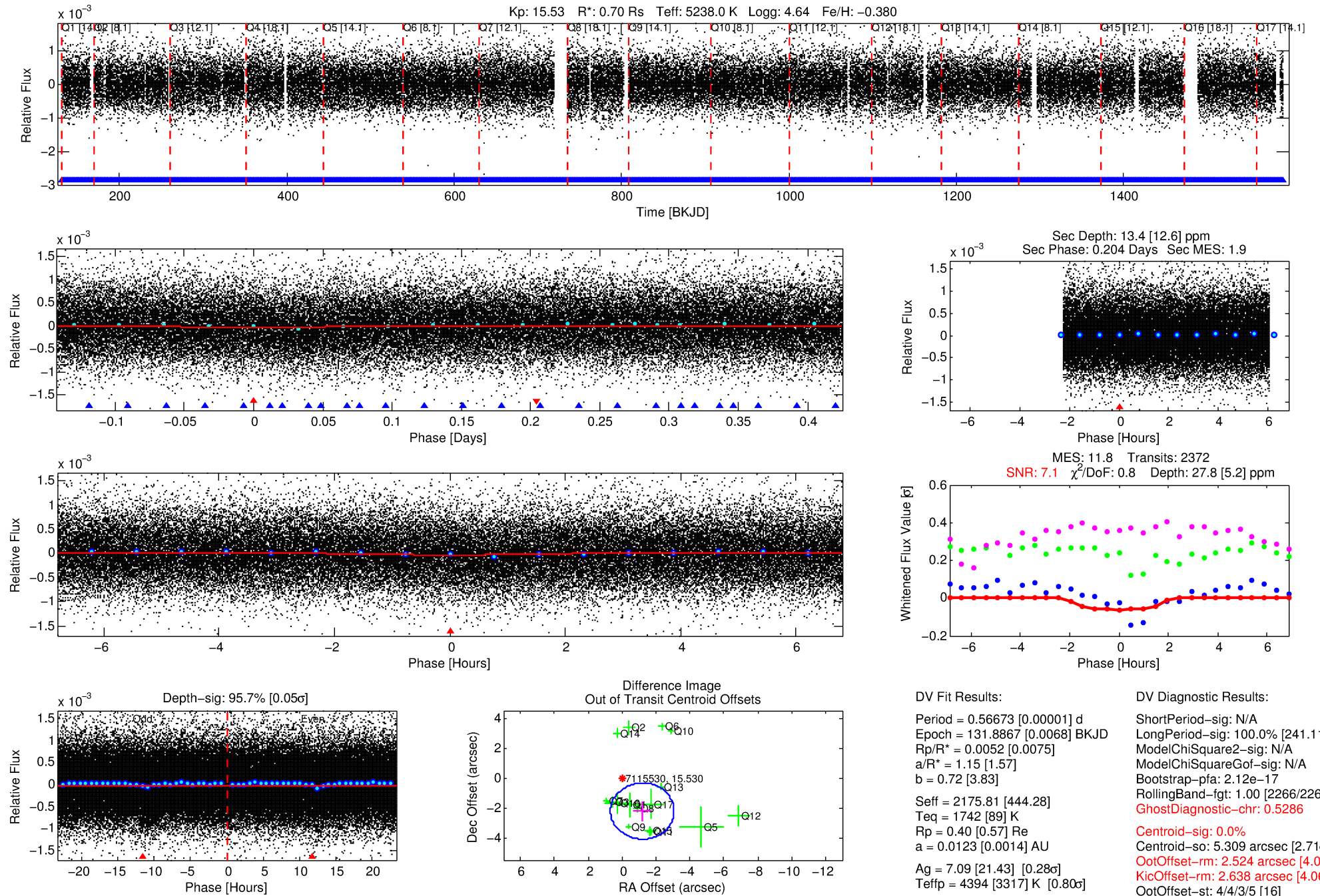
## Ephemeris Match Information For 007115530-01

TCE (1)	KIC	Parent (2)	Parent KIC	P <sub>1</sub> :P <sub>2</sub>	Dist ( $''$ )	$\Delta$ Row	$\Delta$ Col	m <sub>2</sub>	m <sub>1</sub>	D <sub>2</sub> /D <sub>1</sub>	Mechanism	Flag	$\sigma_P$	$\sigma_T$
007115530-01	7115530	RR-Lyr-pri	7198959	1:1	927.5	16	-233	7.86	15.53	22261.00	Direct-PRF	0	2.76	19.85

**Notes:** P<sub>1</sub>:P<sub>2</sub> is the period ratio. Dist is the distance in arcseconds.  $\Delta$ Row and  $\Delta$ Col are the number of pixels apart in row and column. m<sub>2</sub> and m<sub>1</sub> are the magnitudes of the parent and child. D<sub>2</sub>/D<sub>1</sub> is the parent's transit depth divided by the child's.  $\sigma_P$  and  $\sigma_T$  are the significance of the match in period and epoch. For a match to be considered significant  $\sigma_P < 5.0$  and  $\sigma_T < 5.0$ . Matches which have  $\sigma_P$  and  $\sigma_T$  very close to this cutoff should receive extra scrutiny, especially if the period ratio is very large.

# DV One-Page Summary

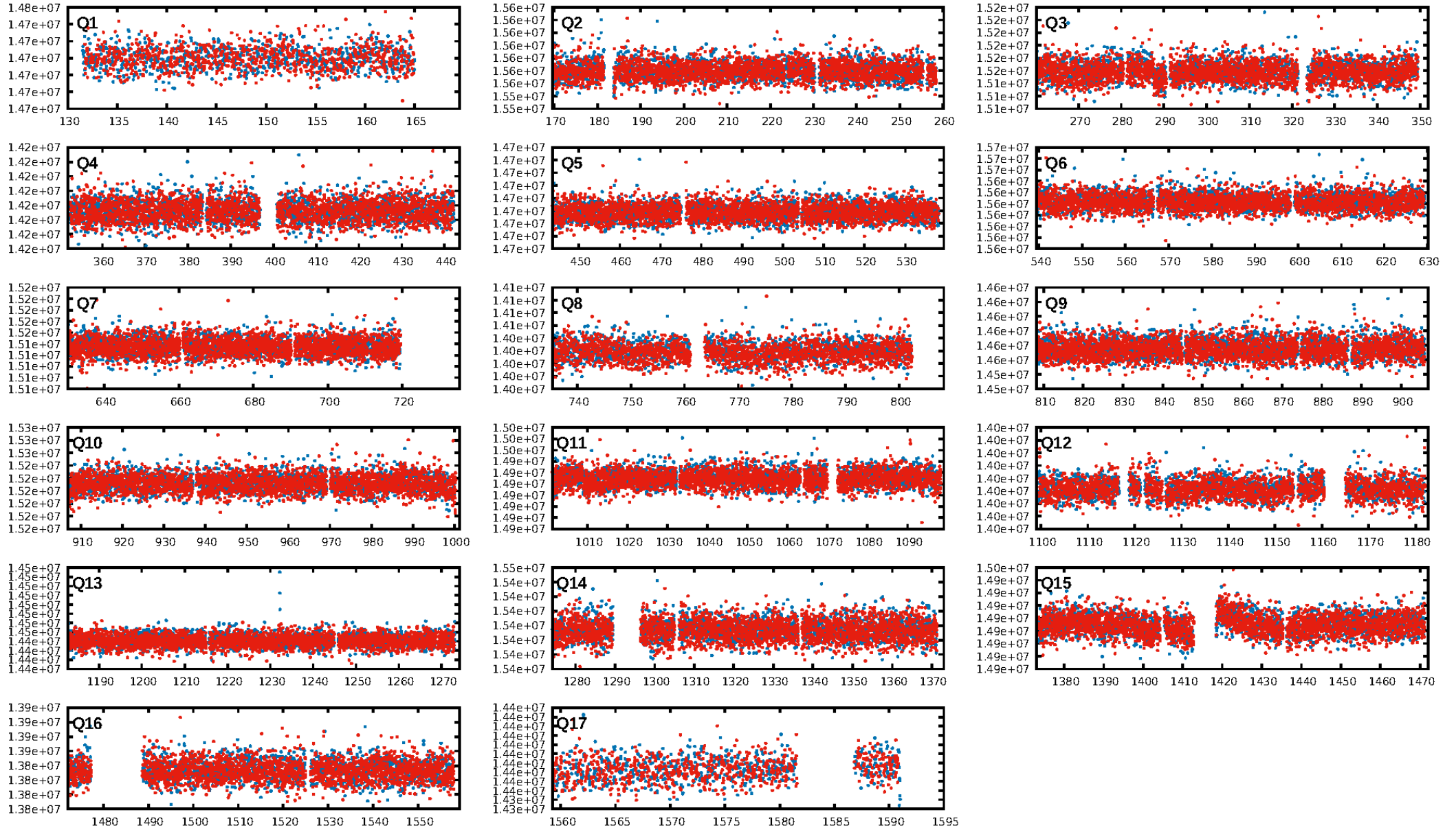
KIC: 7115530 Candidate: 1 of 2 Period: 0.567 d



Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 12:38:34 Z

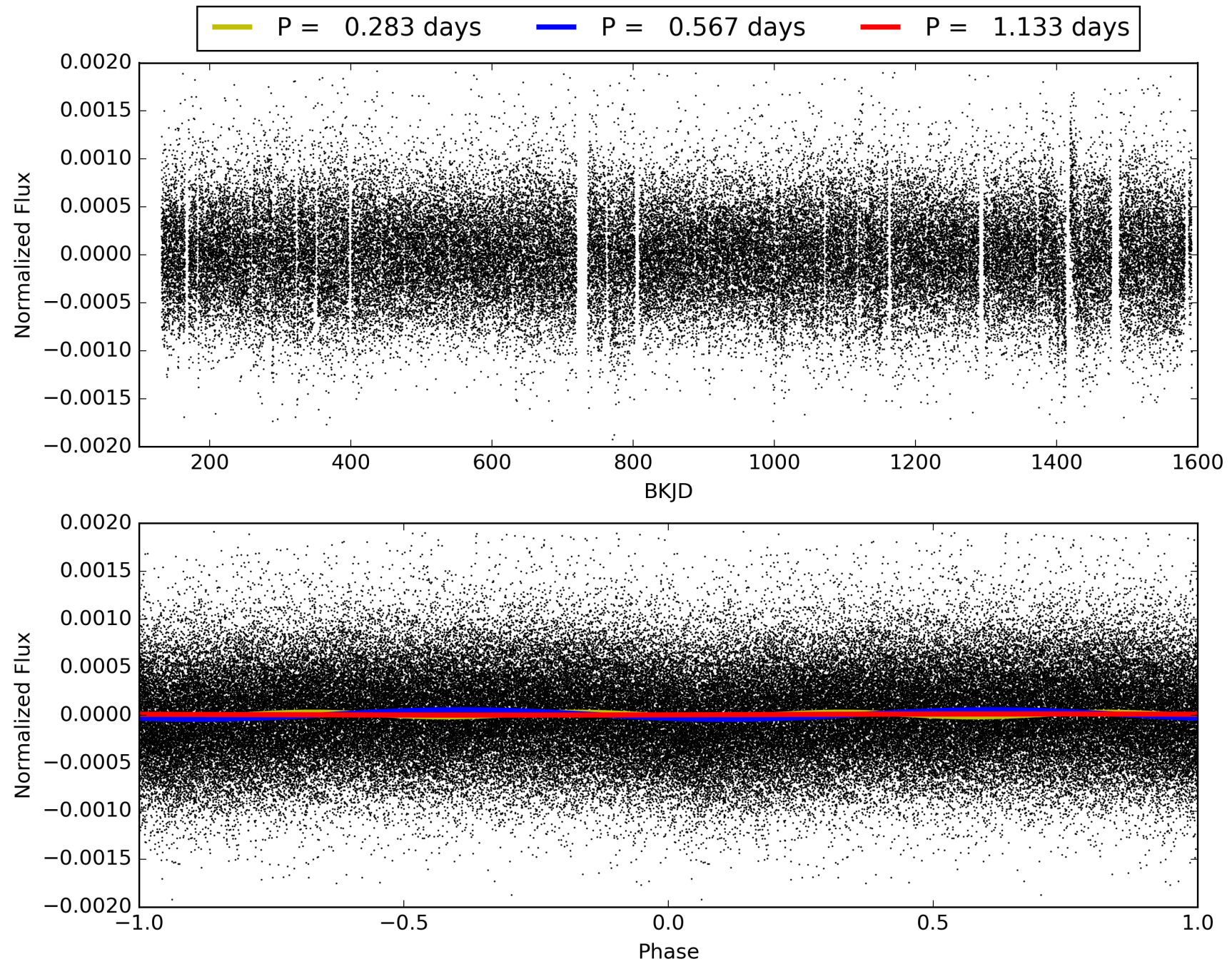
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 007115530-01, PDC Light Curves



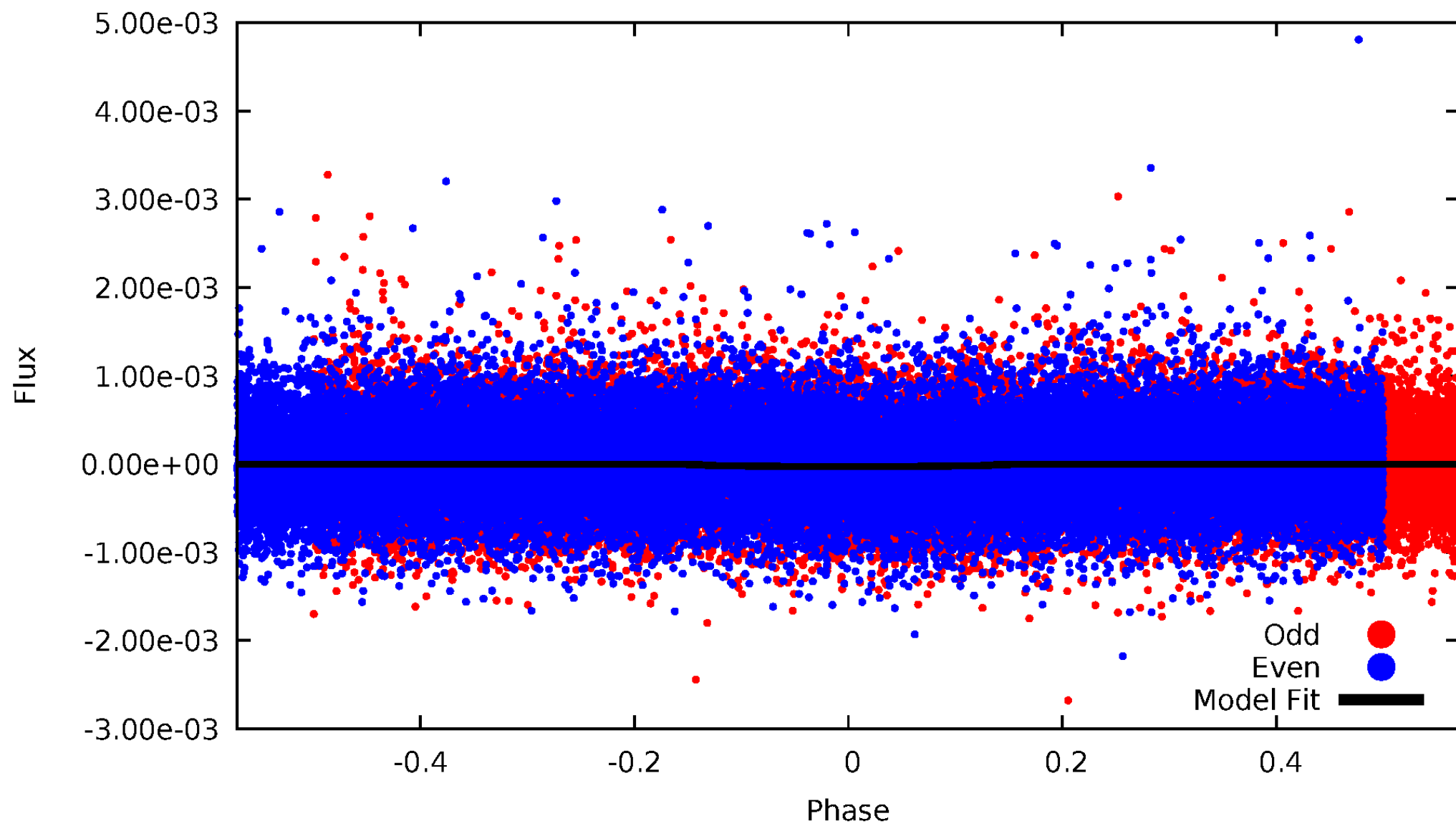


TCE 007115530-01



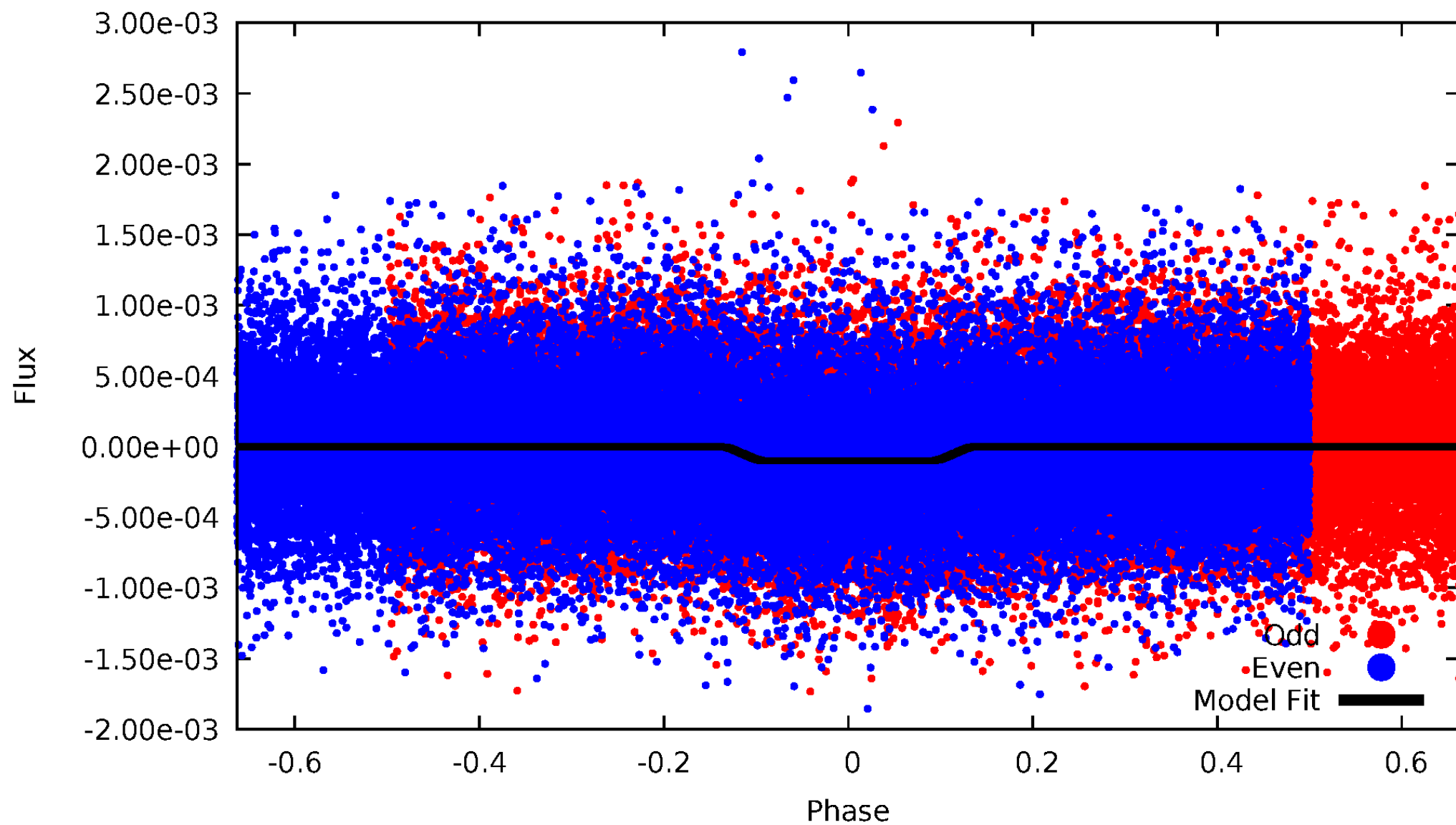
# DV Odd/Even

TCE 007115530-01



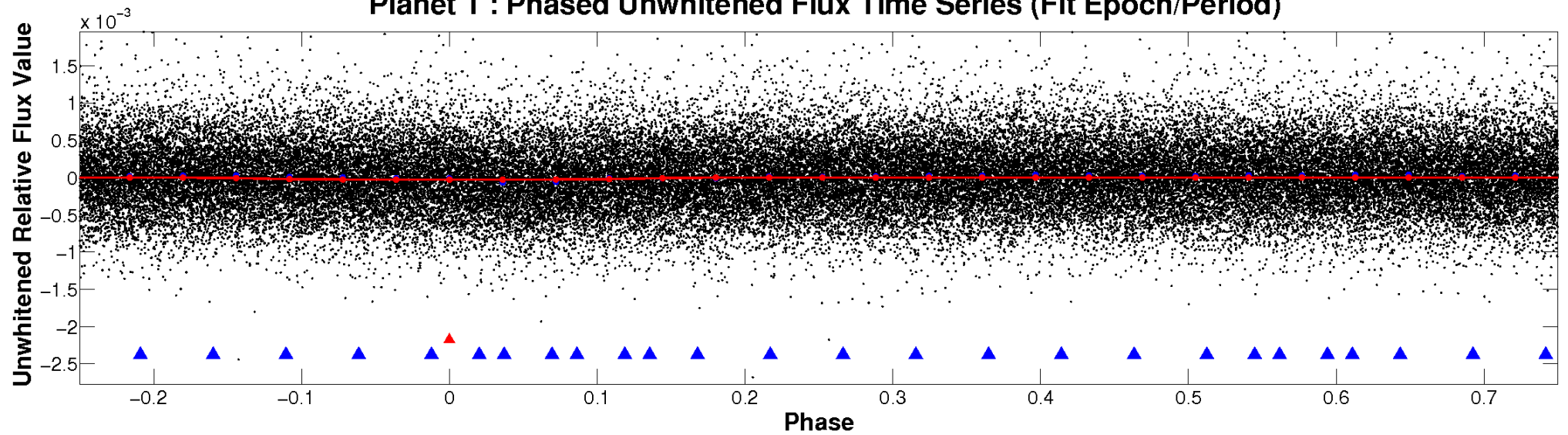
# ALT Odd/Even

TCE 007115530-01

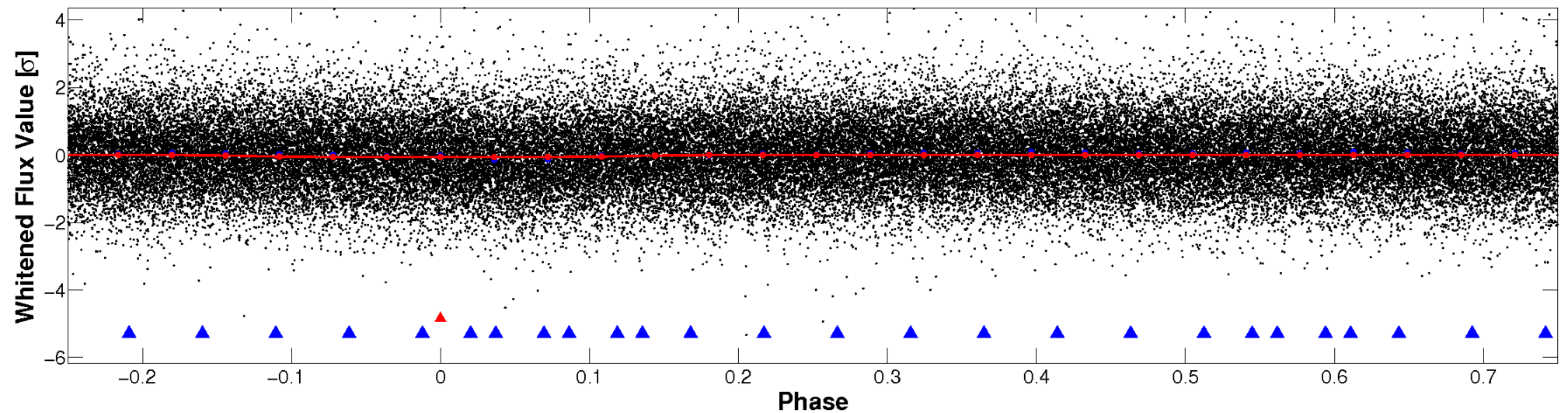


# Non-Whitened Vs. Whitened Light Curve

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



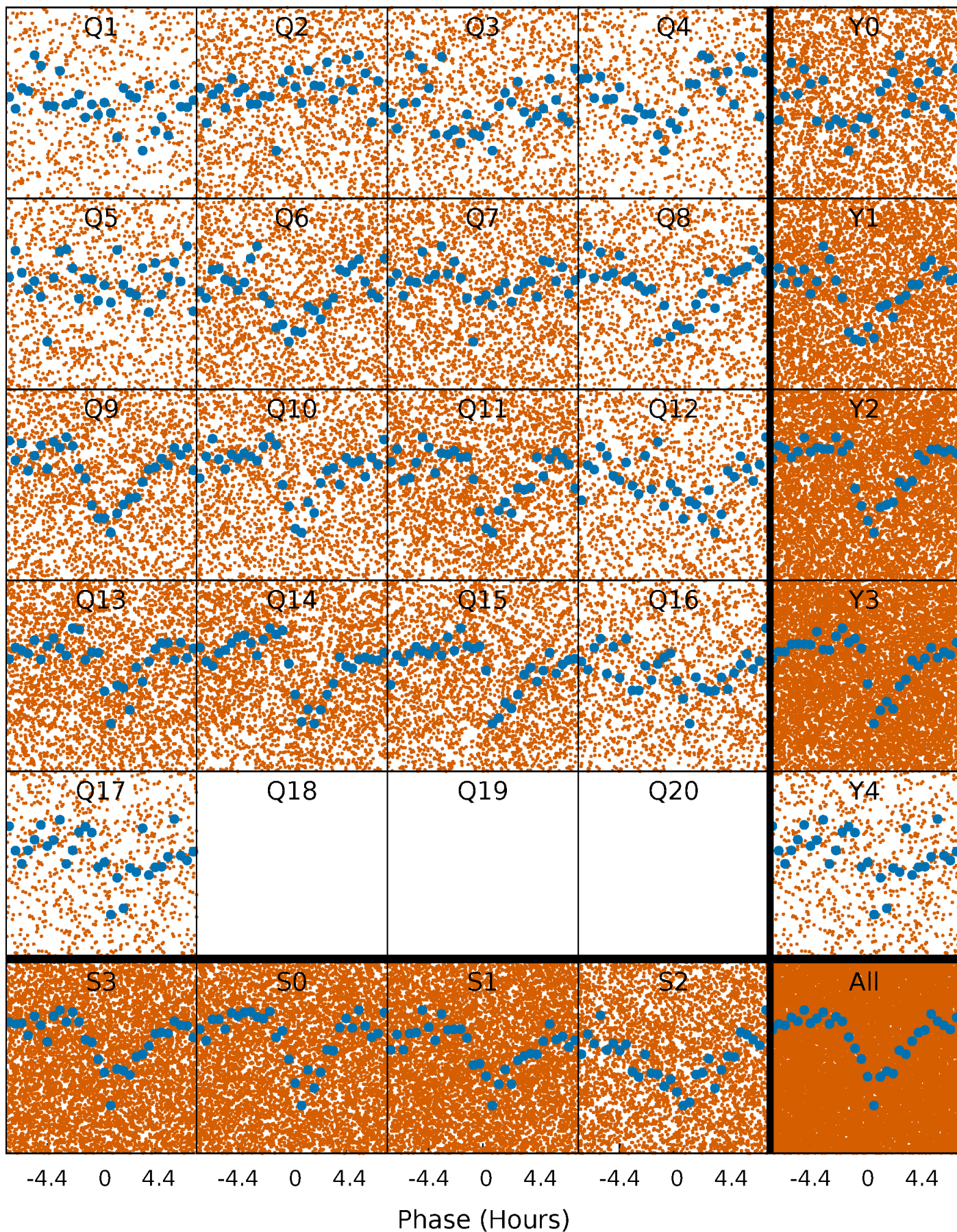
**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**





# PDC Quarter-Phased Transit Curves

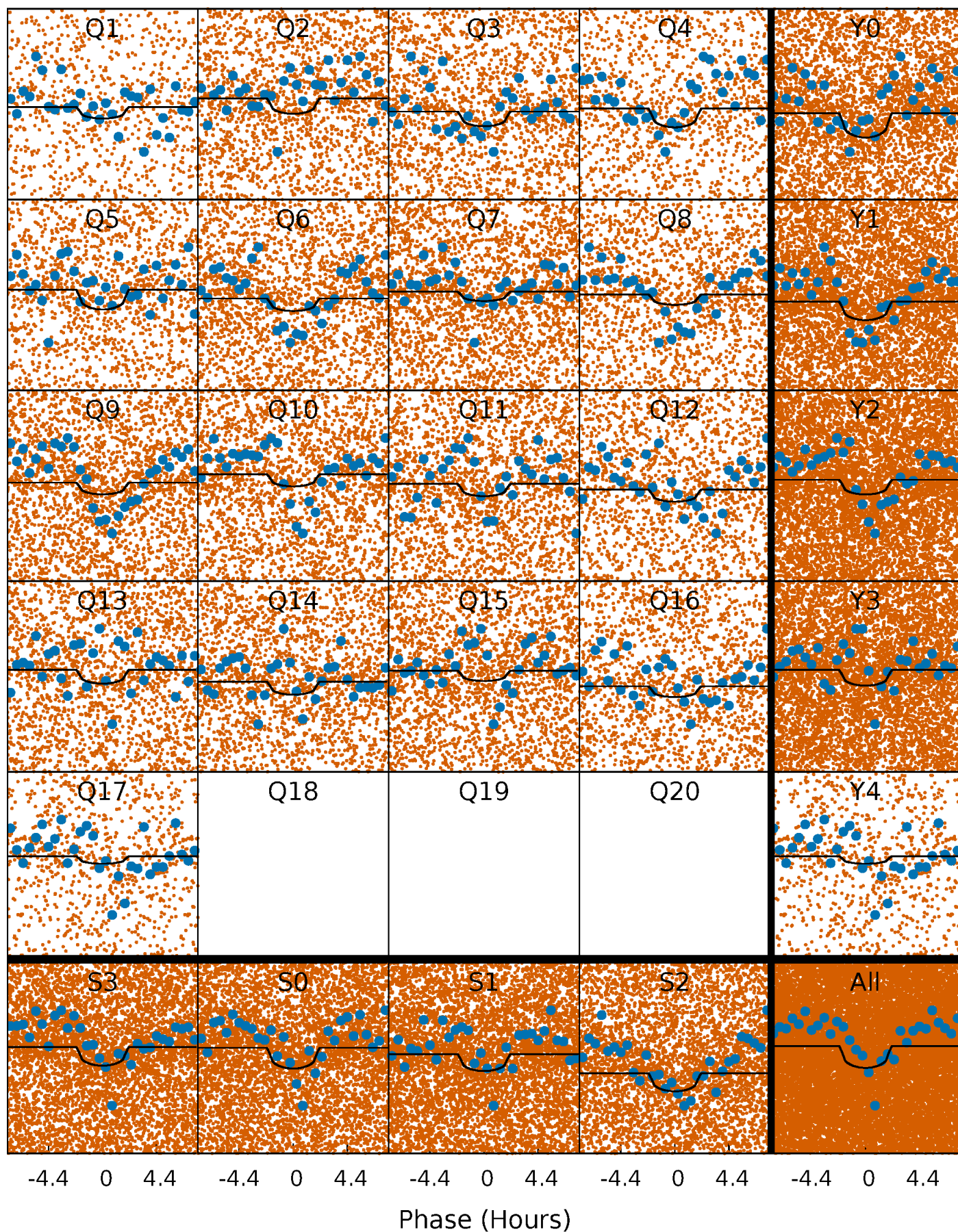
TCE 007115530-01 P= 0.566734 Days  $T_0=131.886676$  (BKJD)





# DV Quarter-Phased Transit Curves

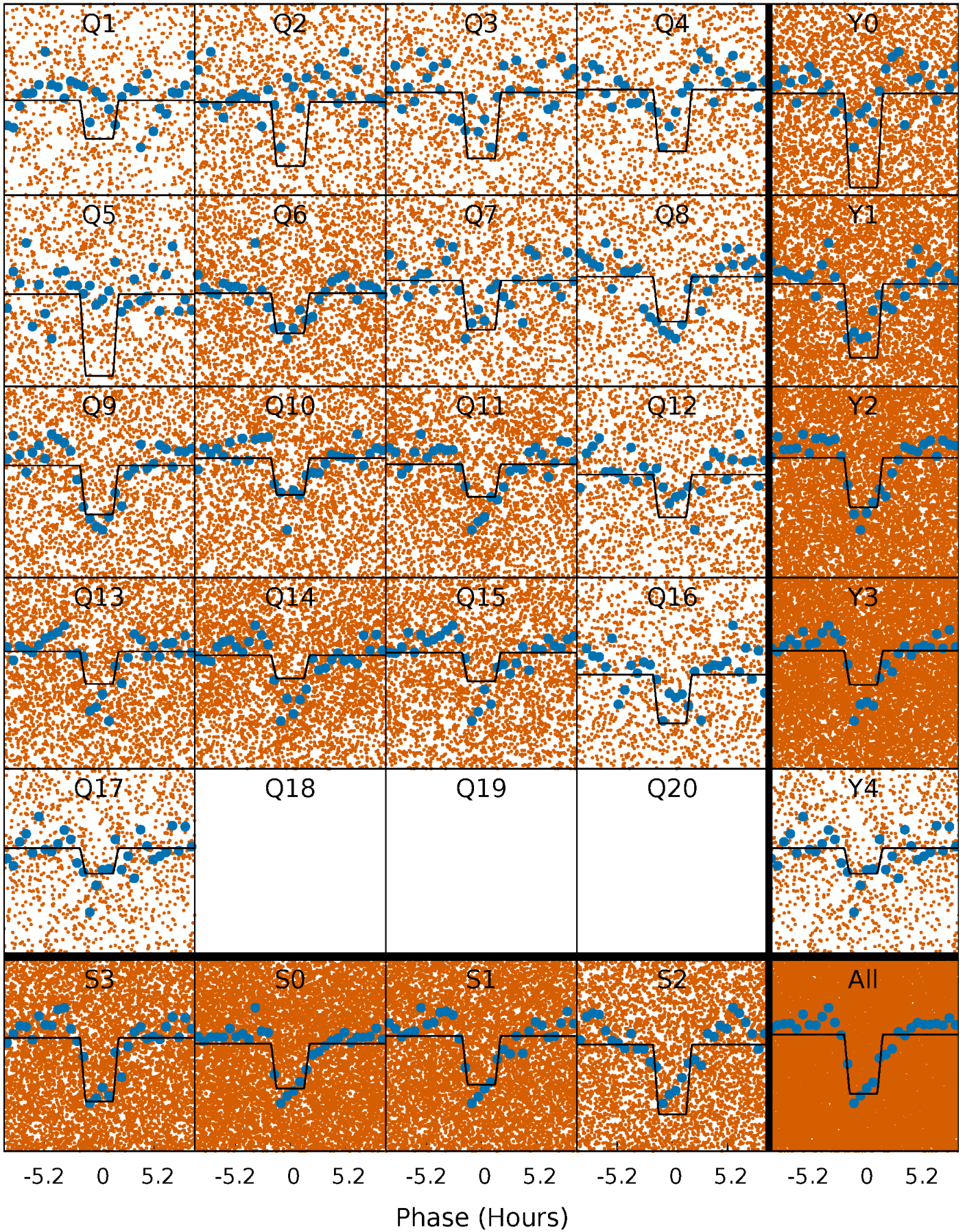
TCE 007115530-01 P= 0.566734 Days  $T_0=131.886676$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

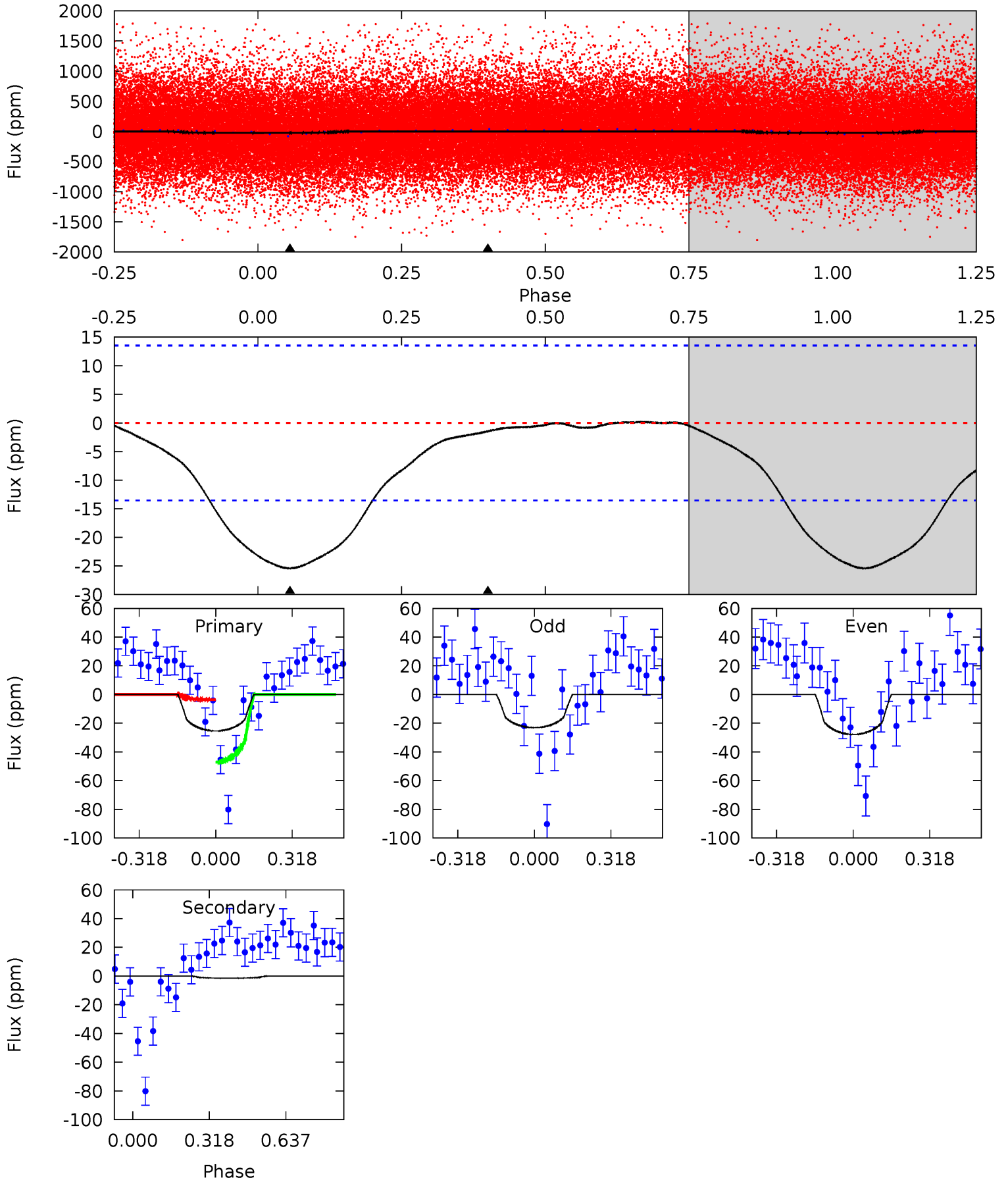
TCE 007115530-01 P= 0.566775 Days  $T_0=131.863530$  (BKJD)



# DV Model-Shift Uniqueness Test

007115530-01, P = 0.566734 Days, E = 131.319942 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
8.10	0.47	0	0	4.32	1.00	0.17	8.10	8.10	0.47	0.47	0.75	1.02	0.01	7.04

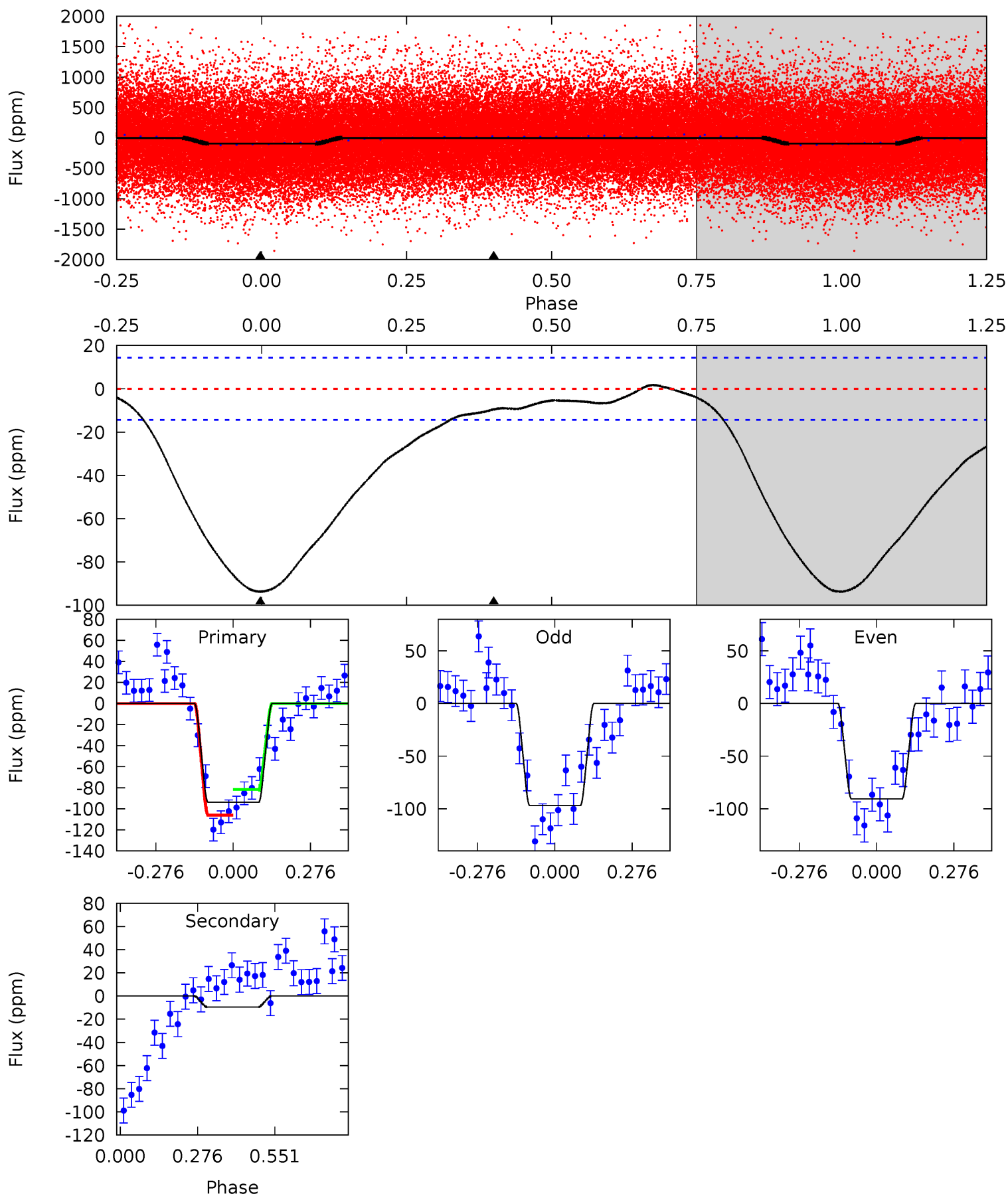




# Alt Model-Shift Uniqueness Test

007115530-01, P = 0.566775 Days, E = 131.296755 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
28.4	2.89	0	0	4.35	1.09	0.50	28.4	28.4	2.89	2.89	0.96	1.01	0.02	3.60



### Stellar Parameters For KIC 007115530

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5238^{+157}_{-141}$	$4.637^{+0.030}_{-0.090}$	$-0.380^{+0.300}_{-0.300}$	$0.698^{+0.095}_{-0.055}$	$0.777^{+0.075}_{-0.083}$	$3.221^{+0.475}_{-0.883}$
	+3%/-3%	+1%/-2%	+79%/-79%	+14%/-8%	+10%/-11%	+15%/-27%
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 007115530-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-1 \pm 3$	$0.57^{+0.49}_{-0.38}$	$2464^{+101}_{-89}$	$-2179^{+5990}_{-901}$	$0.257^{+2.553}_{-0.605}$
Alt.	$-10 \pm 3$	$0.87^{+0.60}_{-0.48}$	$2468^{+97}_{-81}$	$3123^{+1105}_{-1127}$	$1.011^{+4.035}_{-0.687}$

$T_{max}$  = 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

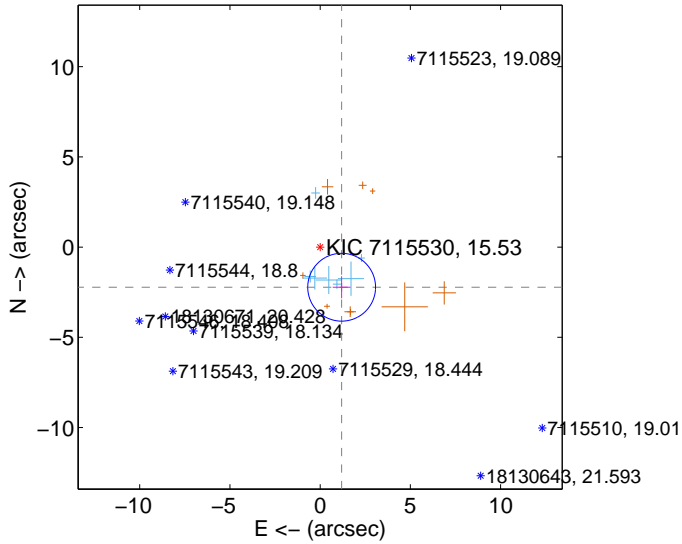
Supplemental centroid analysis for 007115530-01. Kepler magnitude: 15.53. Transit SNR 7.10

There are 7 quarters with good PRF difference image offsets

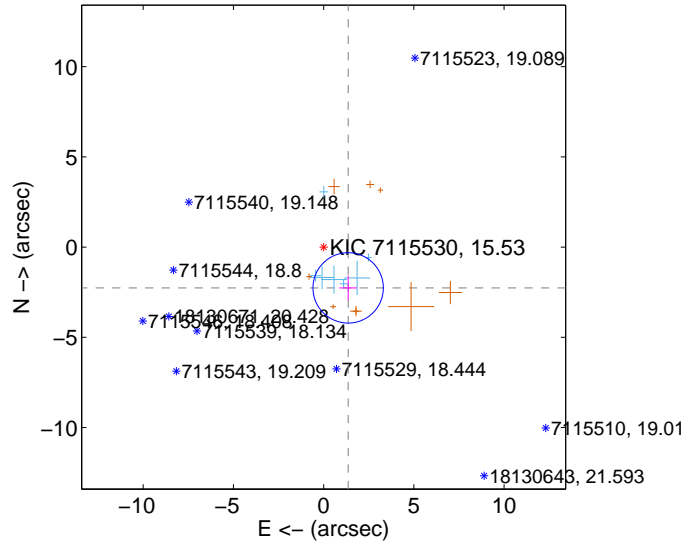
The direct PRF centroid is offset from the target star catalog position by about 0.15 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.524 \pm 0.627$	4.03	$-1.192 \pm 0.495$	$-2.225 \pm 0.612$
PRF-fit source offset from KIC position	$2.638 \pm 0.650$	4.06	$-1.359 \pm 0.492$	$-2.261 \pm 0.677$
photometric centroid source offset	$5.31 \pm 1.96$	2.71	$-3.75 \pm 1.97$	$3.76 \pm 1.95$

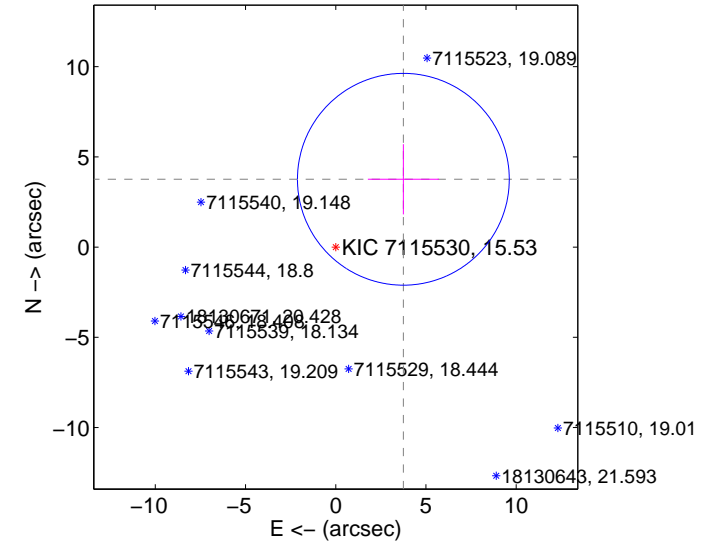
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



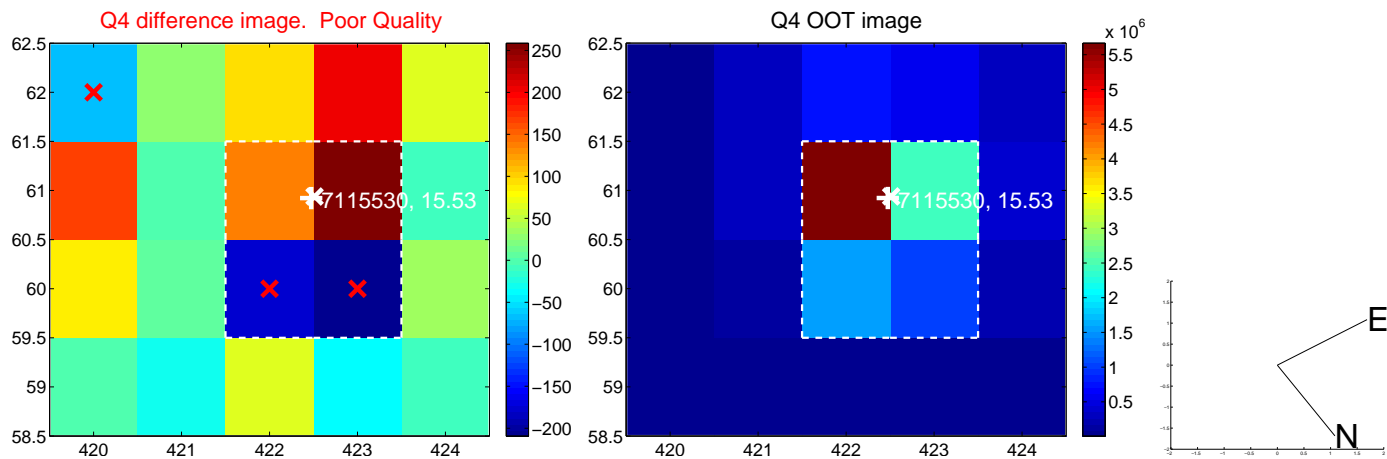
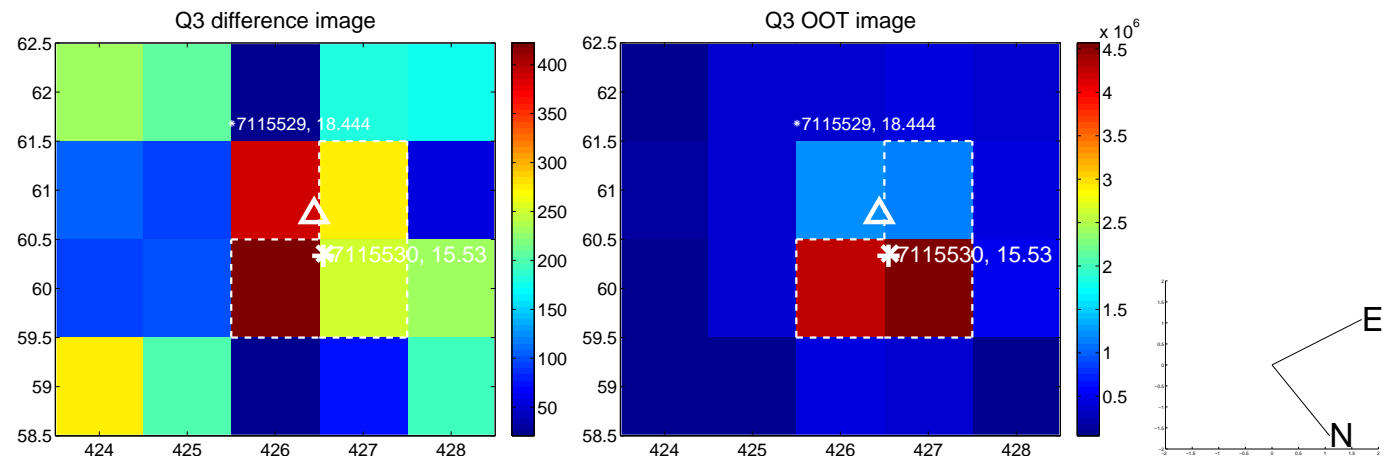
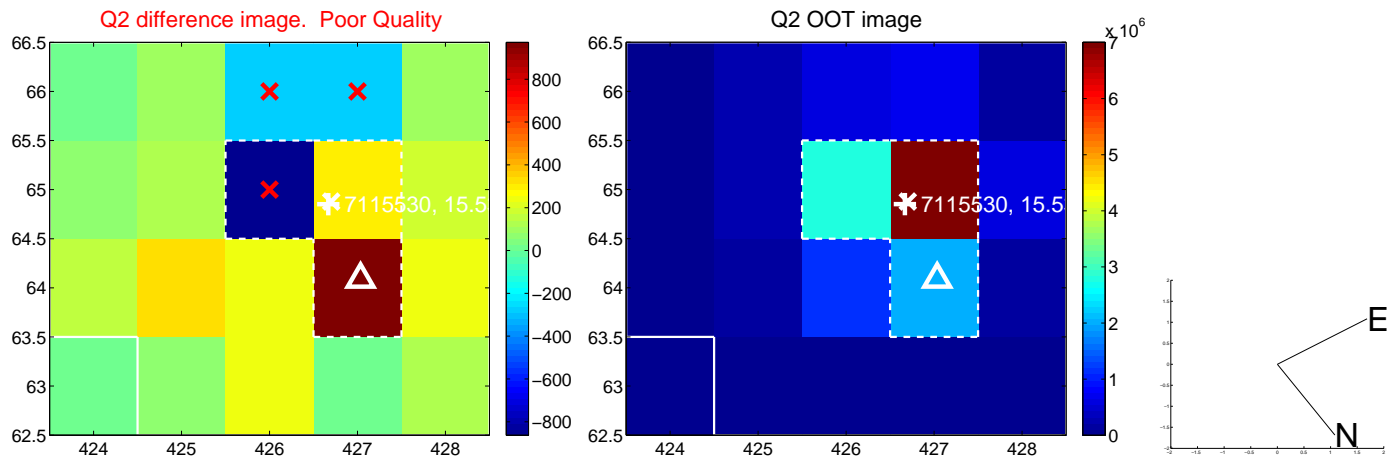
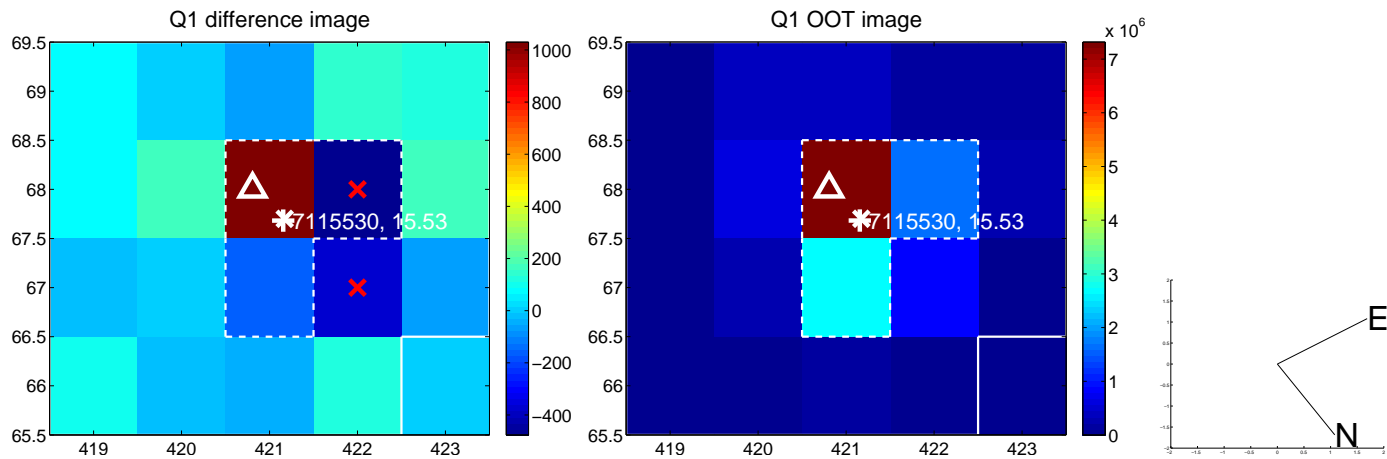
offset from photometric centroids



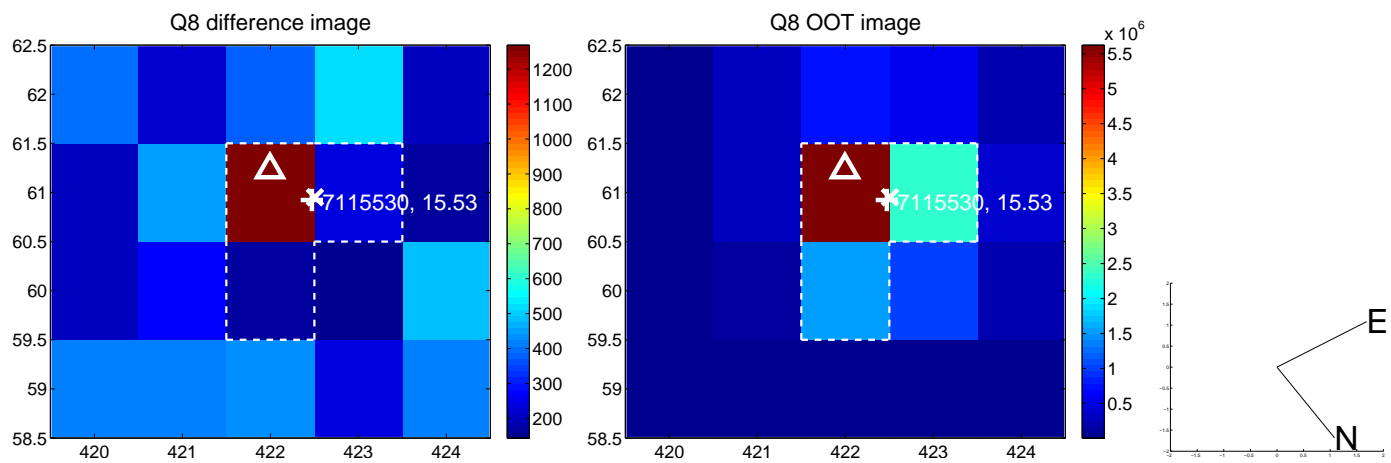
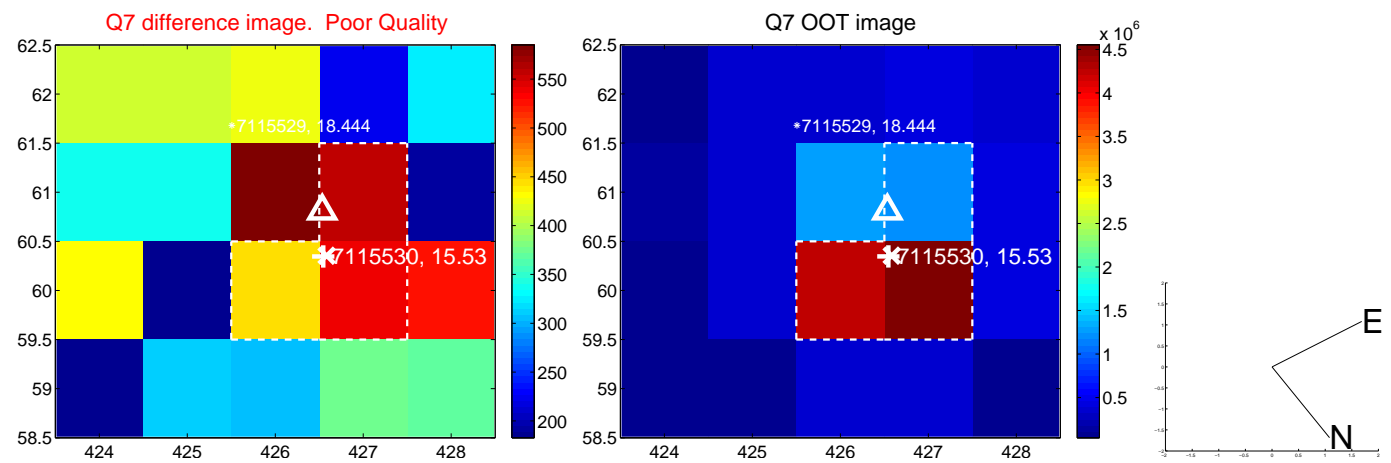
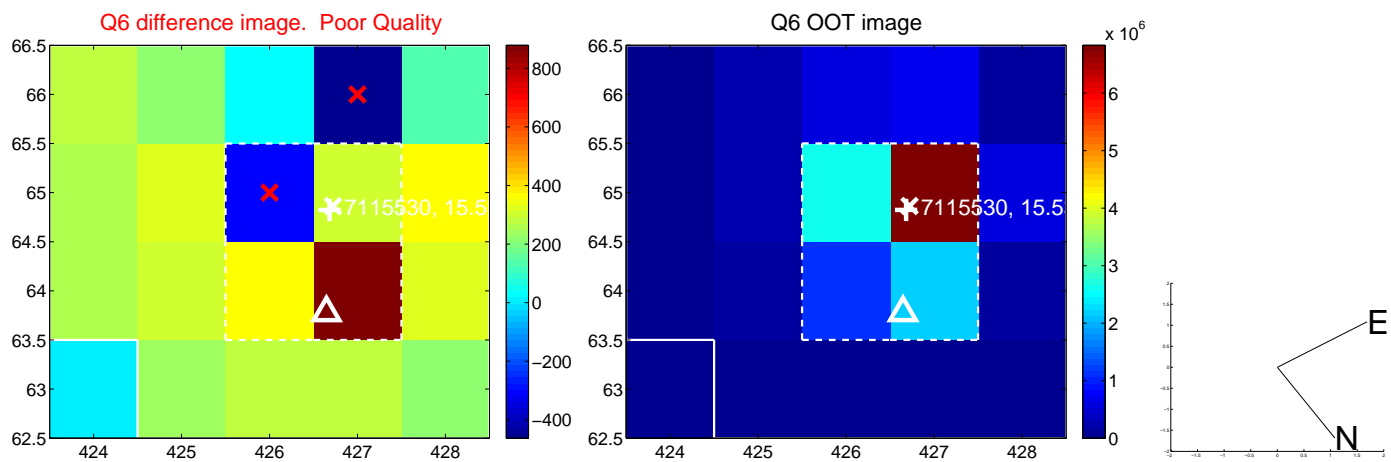
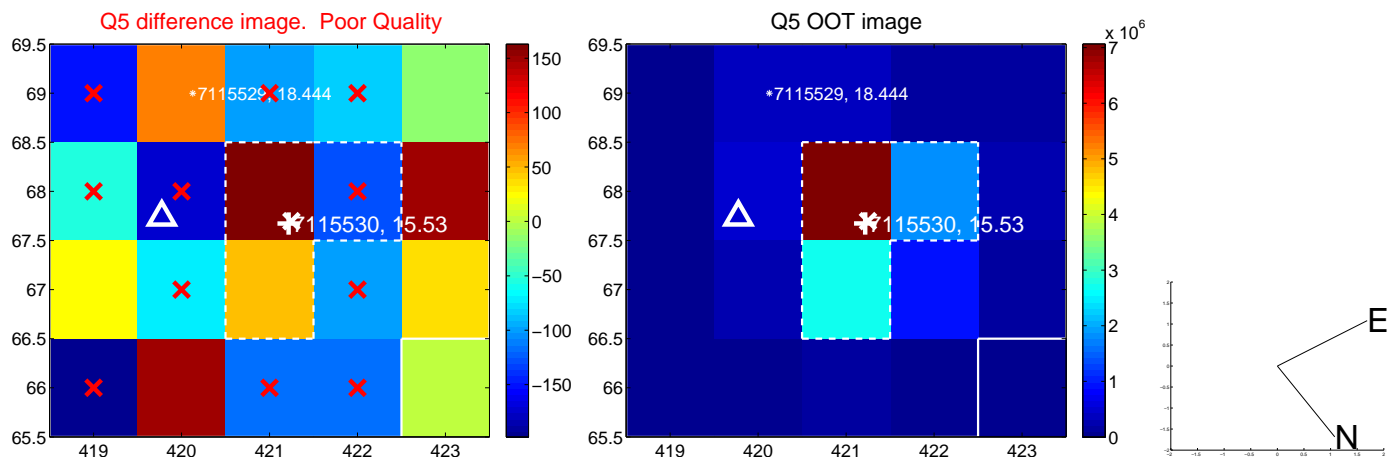
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



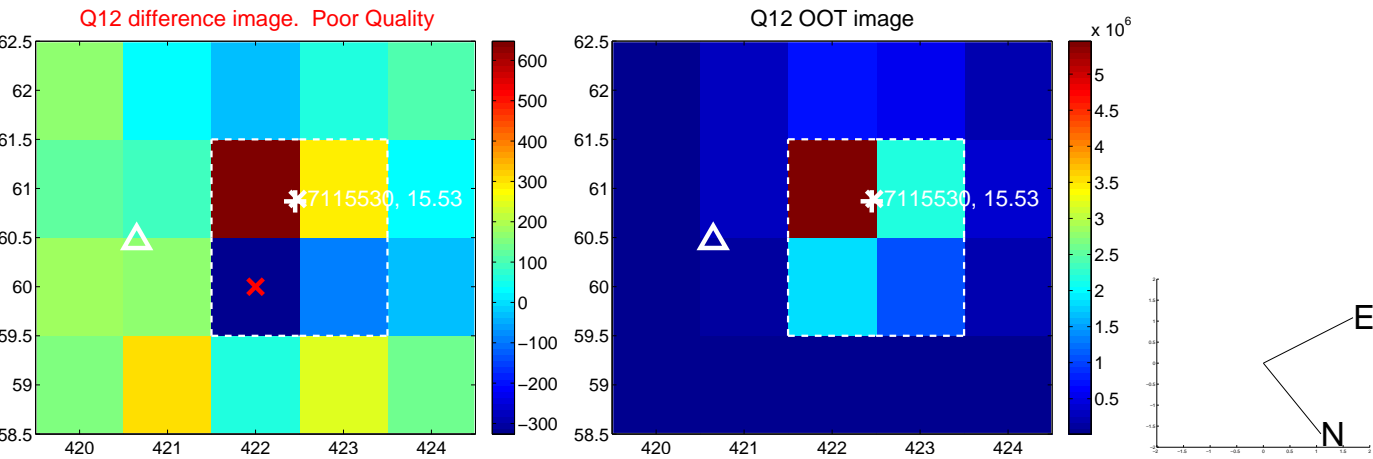
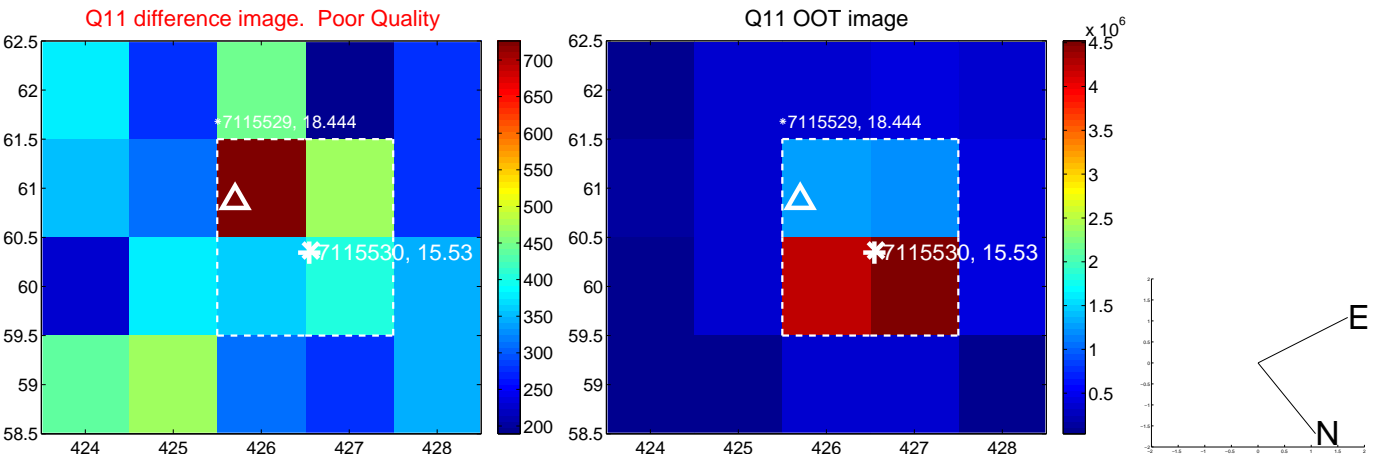
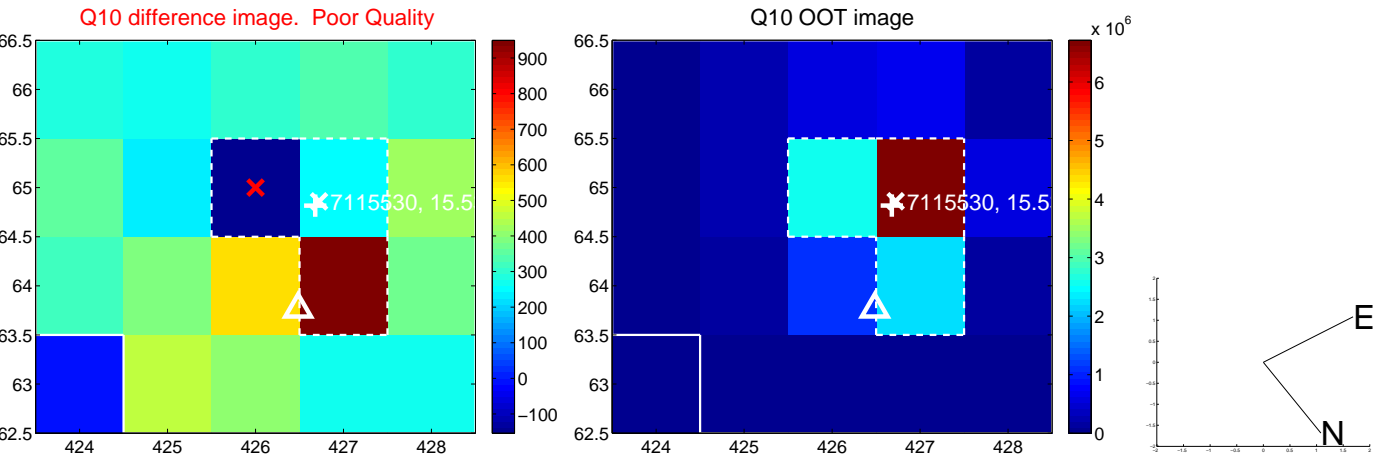
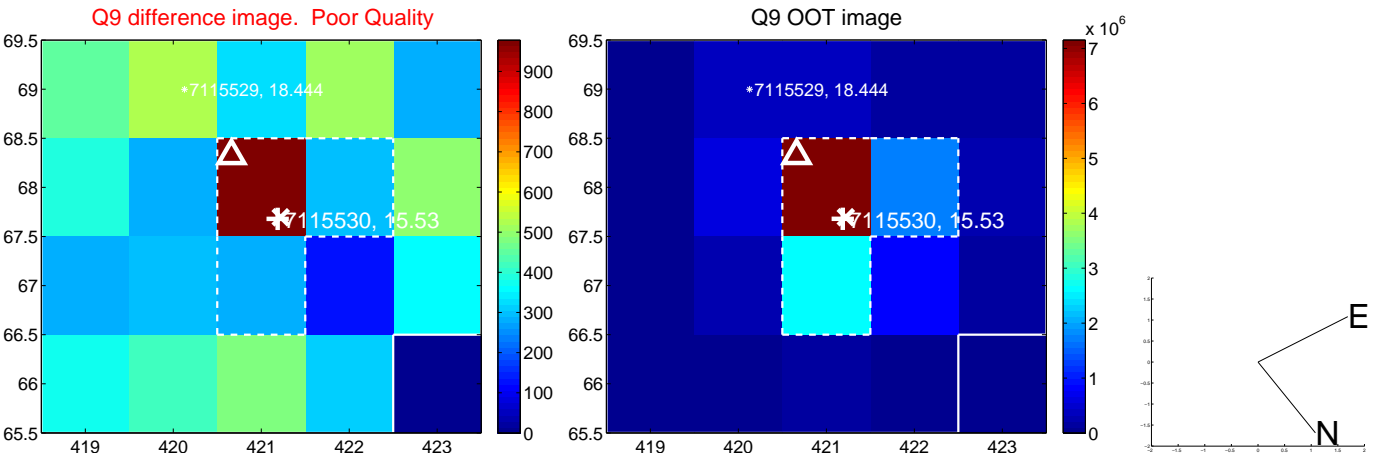
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

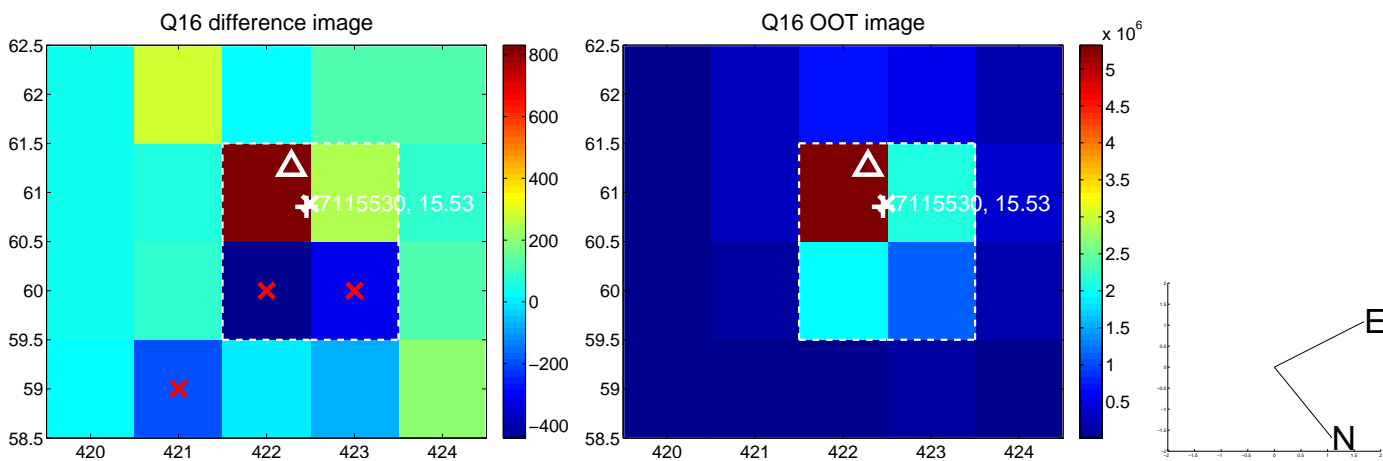
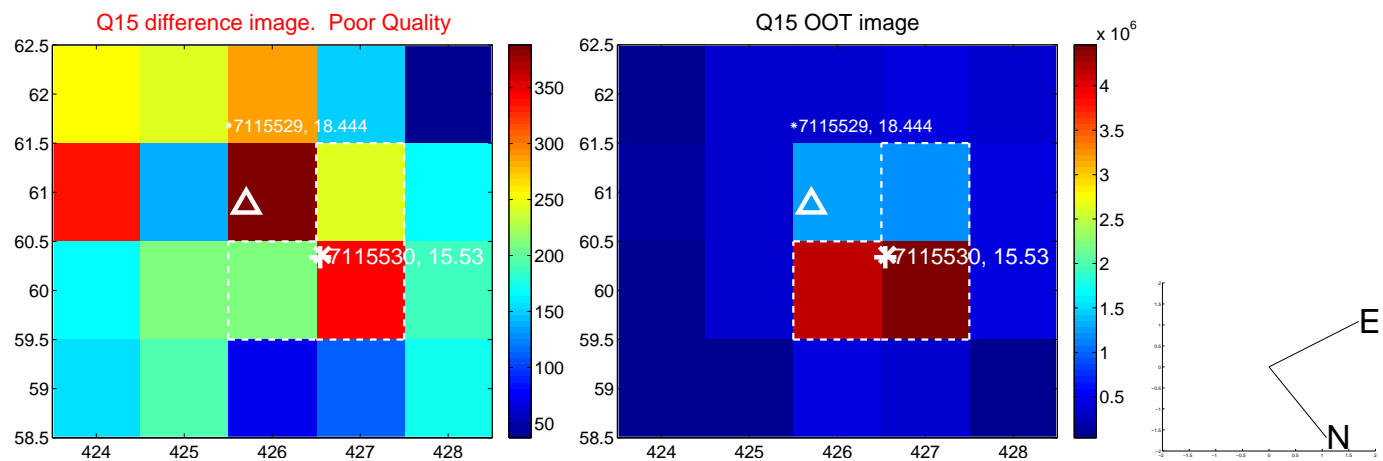
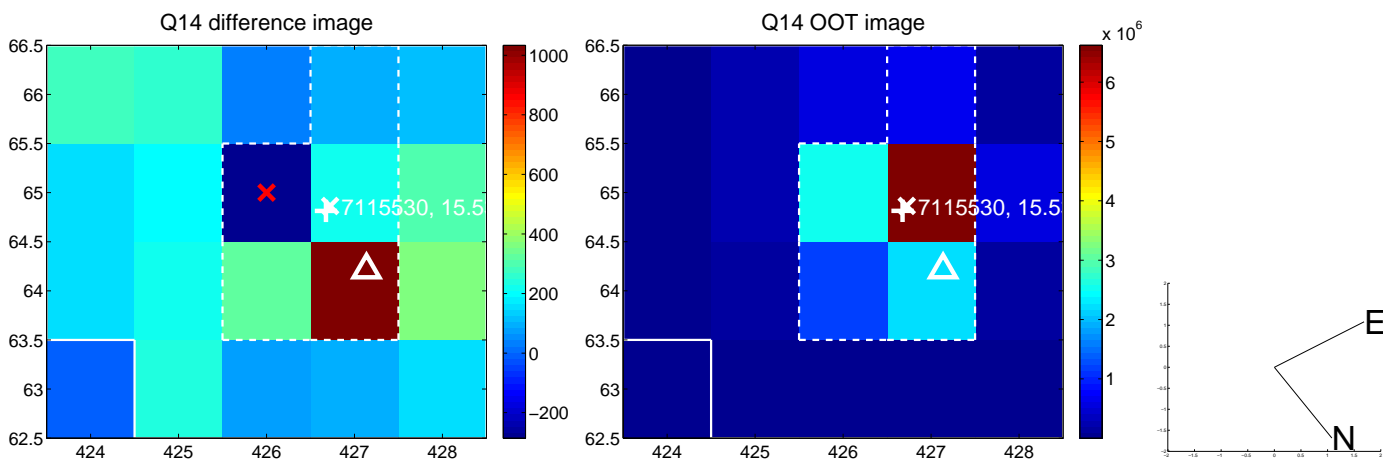
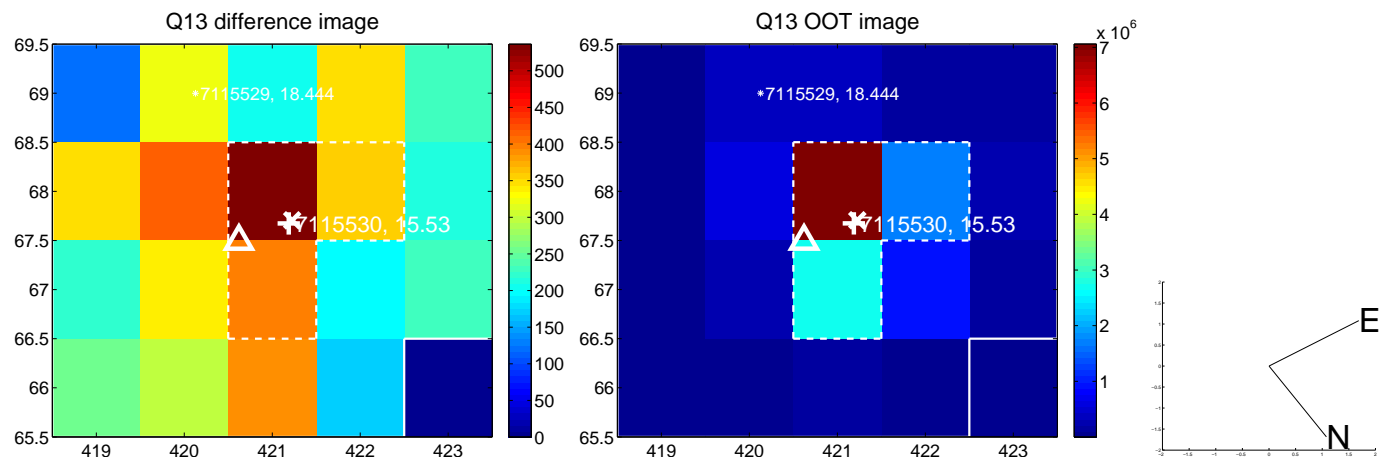


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

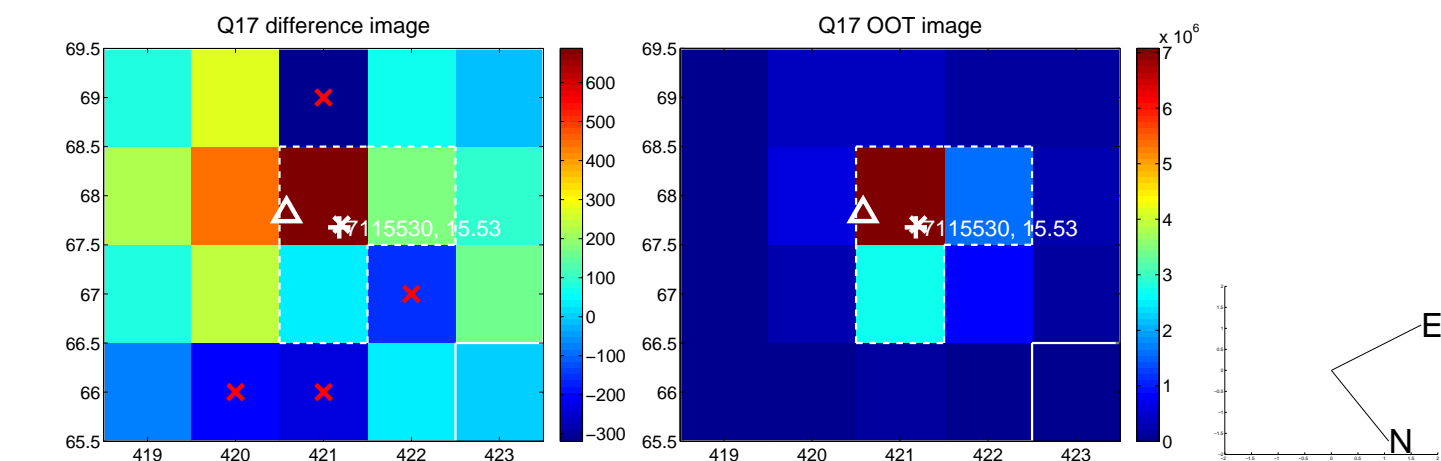




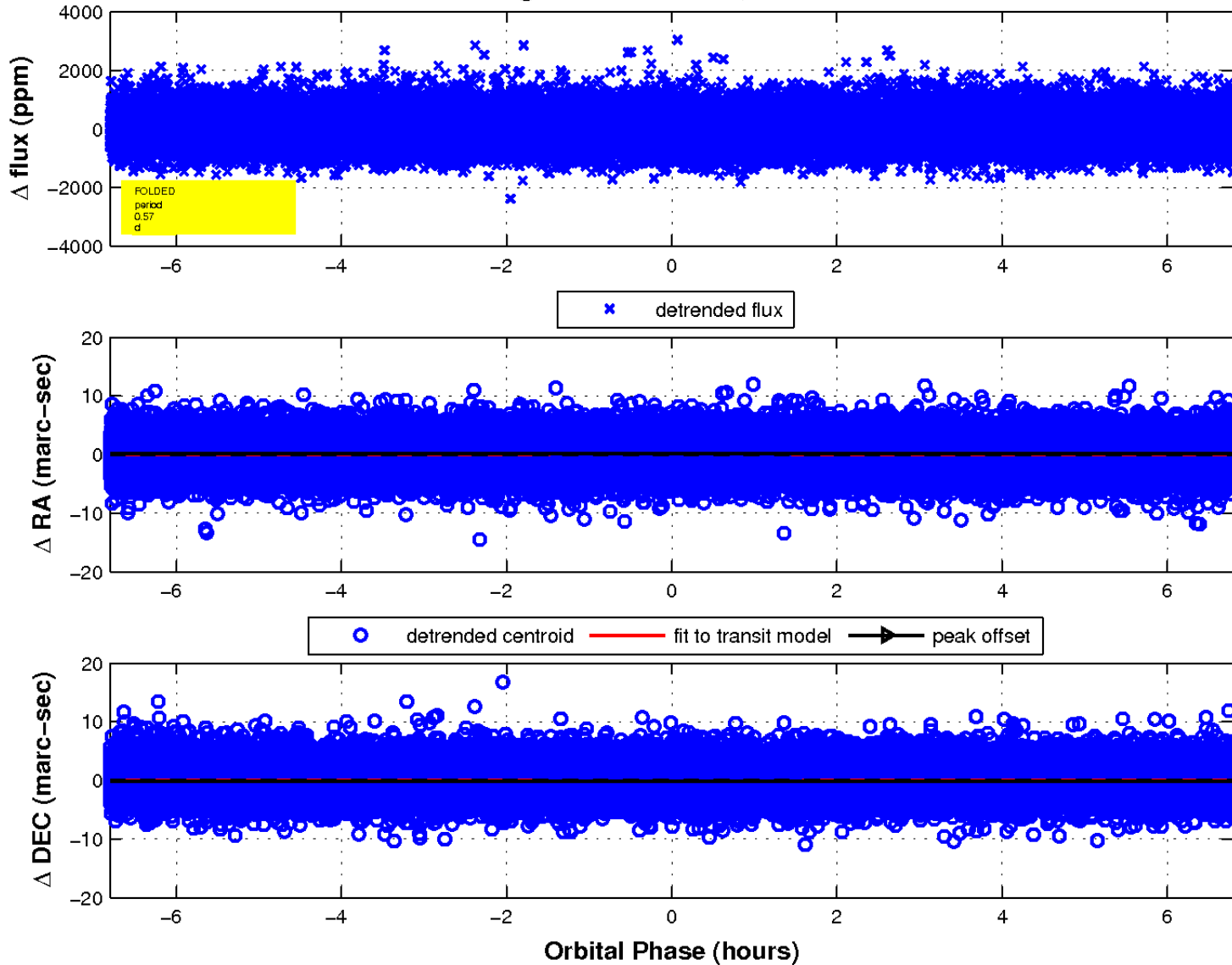
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



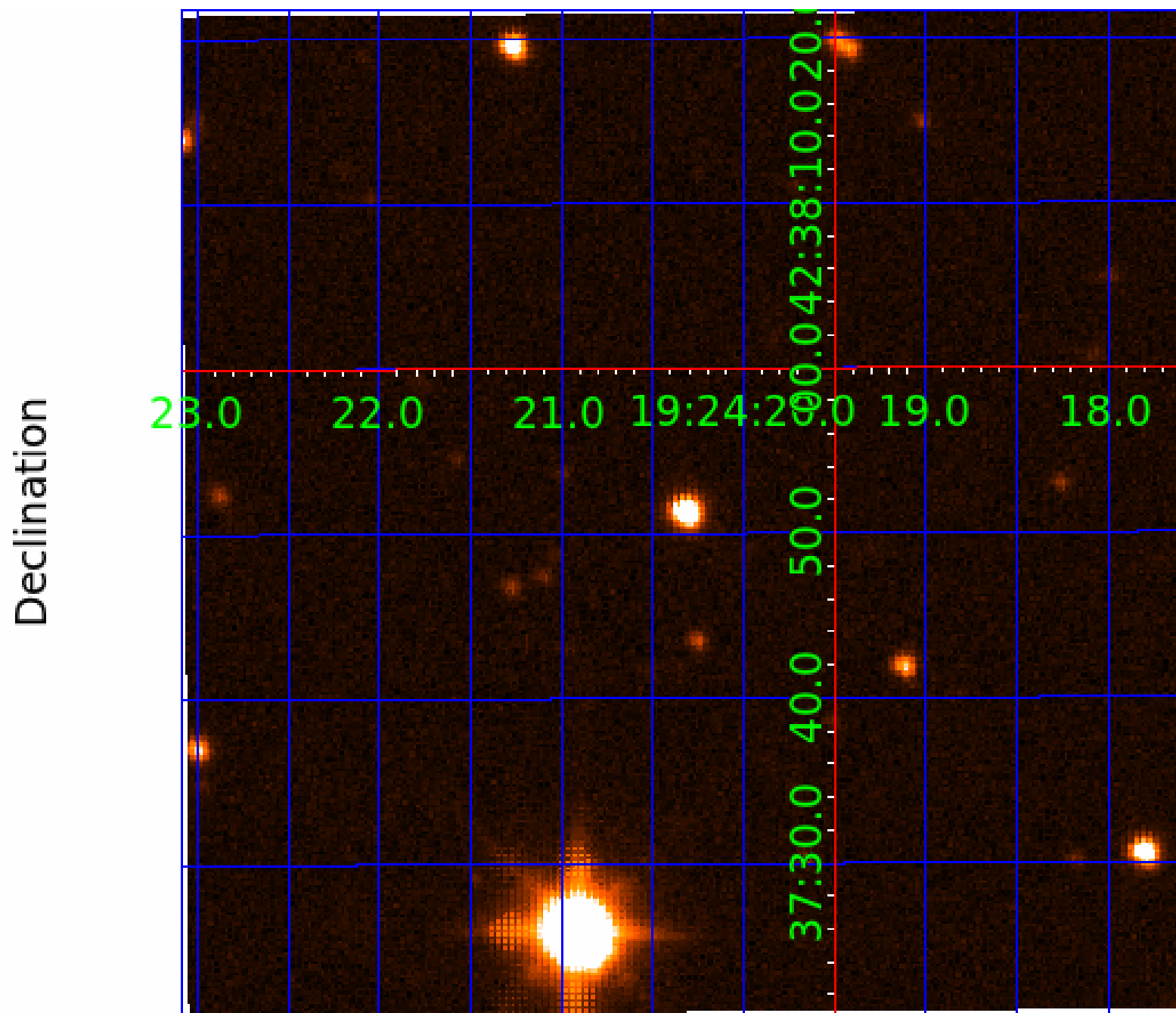
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



fluxWeightedCentroids, Planet 1 of 2



UKIRT Image





# KIC 007115530

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007115530-01	OBS	No	0.566734	131.886676	27.8	3.885	11.8	7.1	0.70	5238	0.40	2175.81
007115530-02	OBS	No	56.403997	167.035657	669.1	3.974	8.1	9.0	0.70	5238	2.04	4.72

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007115530-01	OBS	FP	0.00	1	0	0	1	LPP_DV—EPHEM_MATCH
007115530-02	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—CENT_FEW_DIFFS—HALO_GHOST

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

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

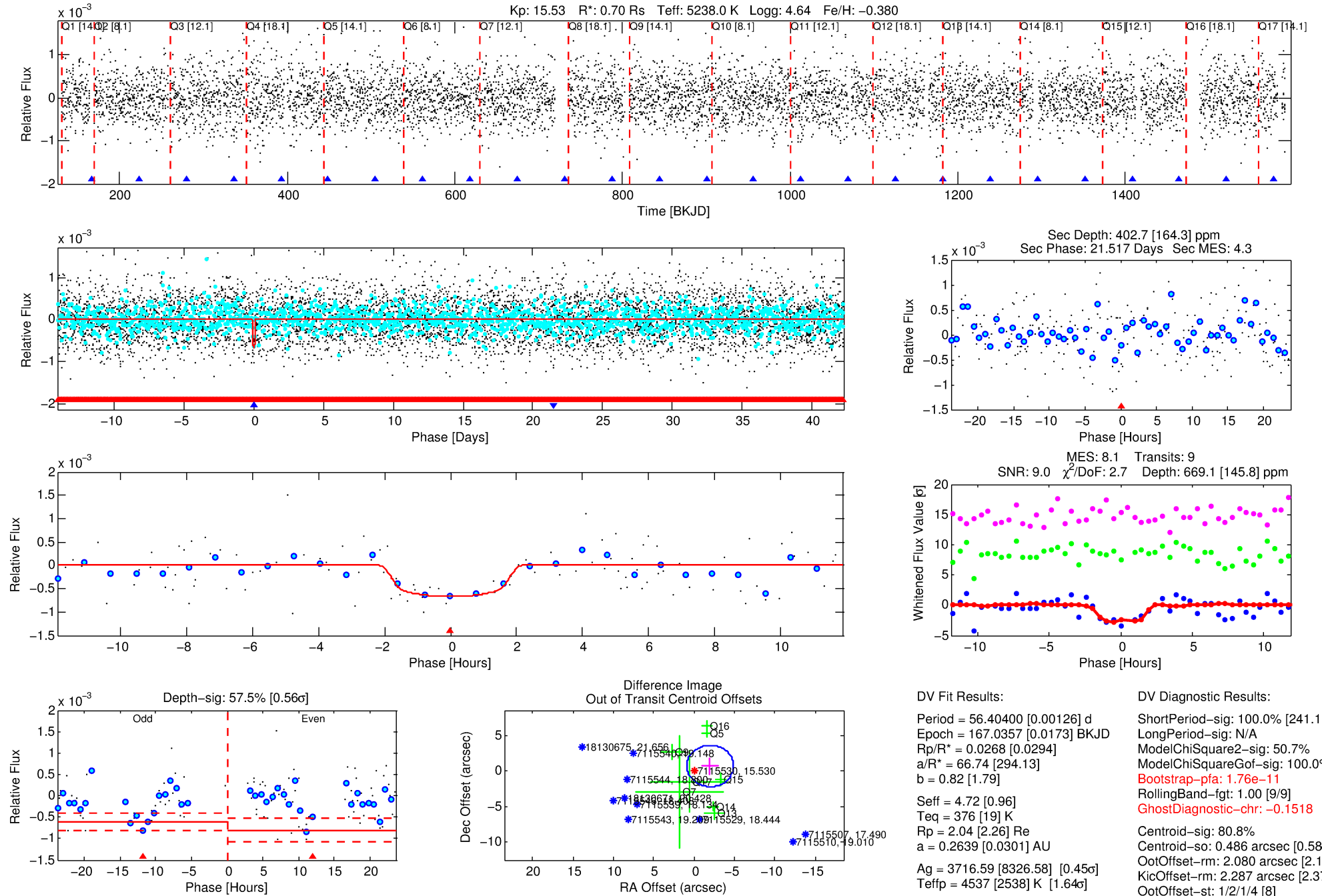
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 007115530-02

No Significant Match Found

# DV One-Page Summary

KIC: 7115530 Candidate: 2 of 2 Period: 56.404 d



## DV Fit Results:

Period = 56.40400 [0.00126] d  
Epoch = 167.0357 [0.0173] BKJD  
Rp/R\* = 0.0268 [0.0294]  
a/R\* = 66.74 [294.13]  
b = 0.82 [1.79]  
Seff = 4.72 [0.96]  
Teff = 376 [19] K  
Rp = 2.04 [2.26] Re  
a = 0.2639 [0.0301] AU  
Ag = 3716.59 [8326.58] [0.45 $\sigma$ ]  
Teffp = 4537 [2538] K [1.64 $\sigma$ ]

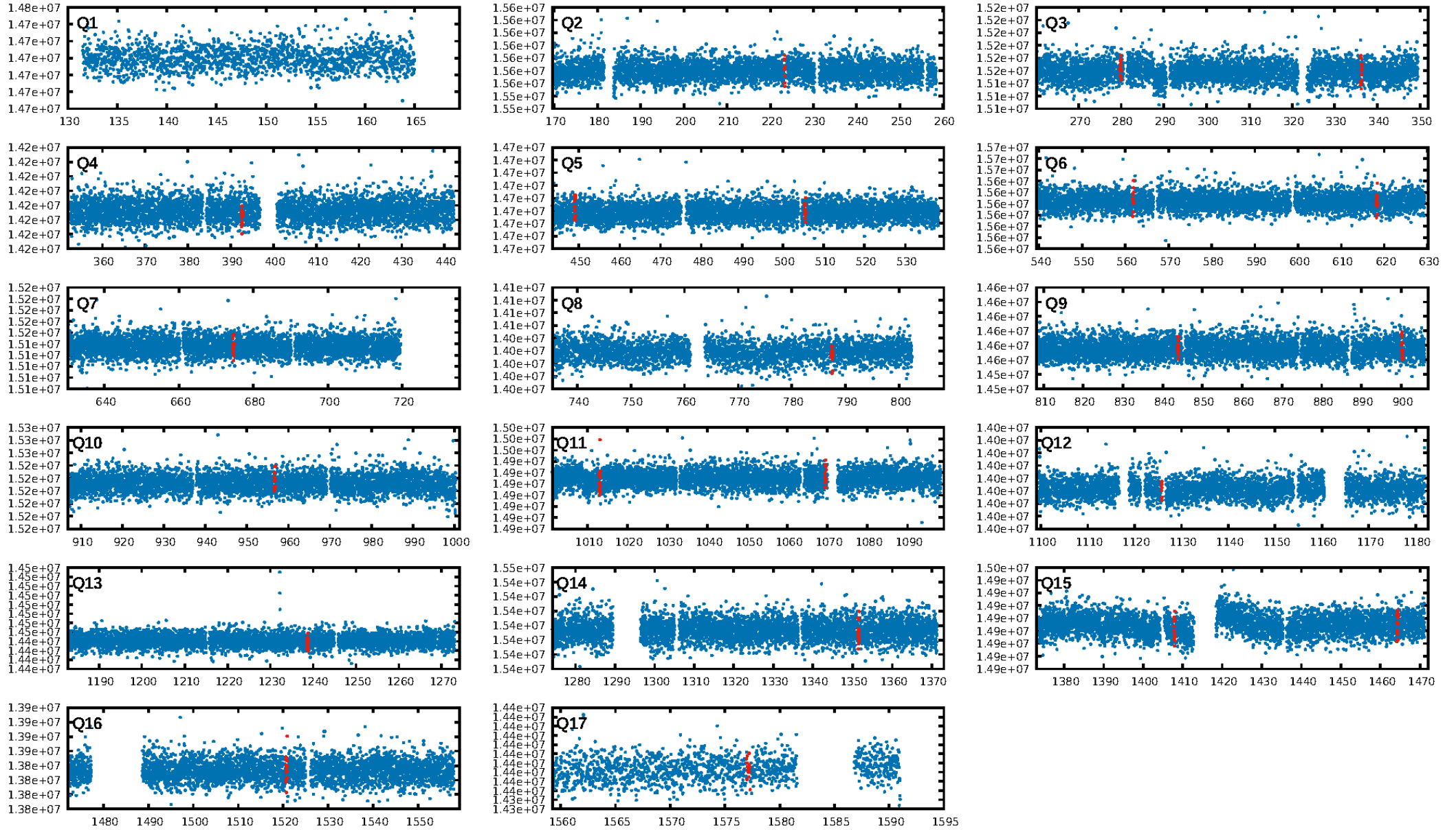
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [241.11 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 50.7%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 1.76e-11**  
RollingBand-fgt: 1.00 [9/9]  
**GhostDiagnostic-chr: -0.1518**  
Centroid-sig: 80.8%  
Centroid-so: 0.486 arcsec [0.58 $\sigma$ ]  
OotOffset-rm: 2.080 arcsec [2.15 $\sigma$ ]  
KicOffset-rm: 2.287 arcsec [2.37 $\sigma$ ]  
OotOffset-st: 1/2/1/4 [8]  
KicOffset-st: 1/2/1/4 [8]  
DiffImageQuality-fgm: 0.12 [1/8]  
DiffImageOverlap-fno: 0.00 [0/14]

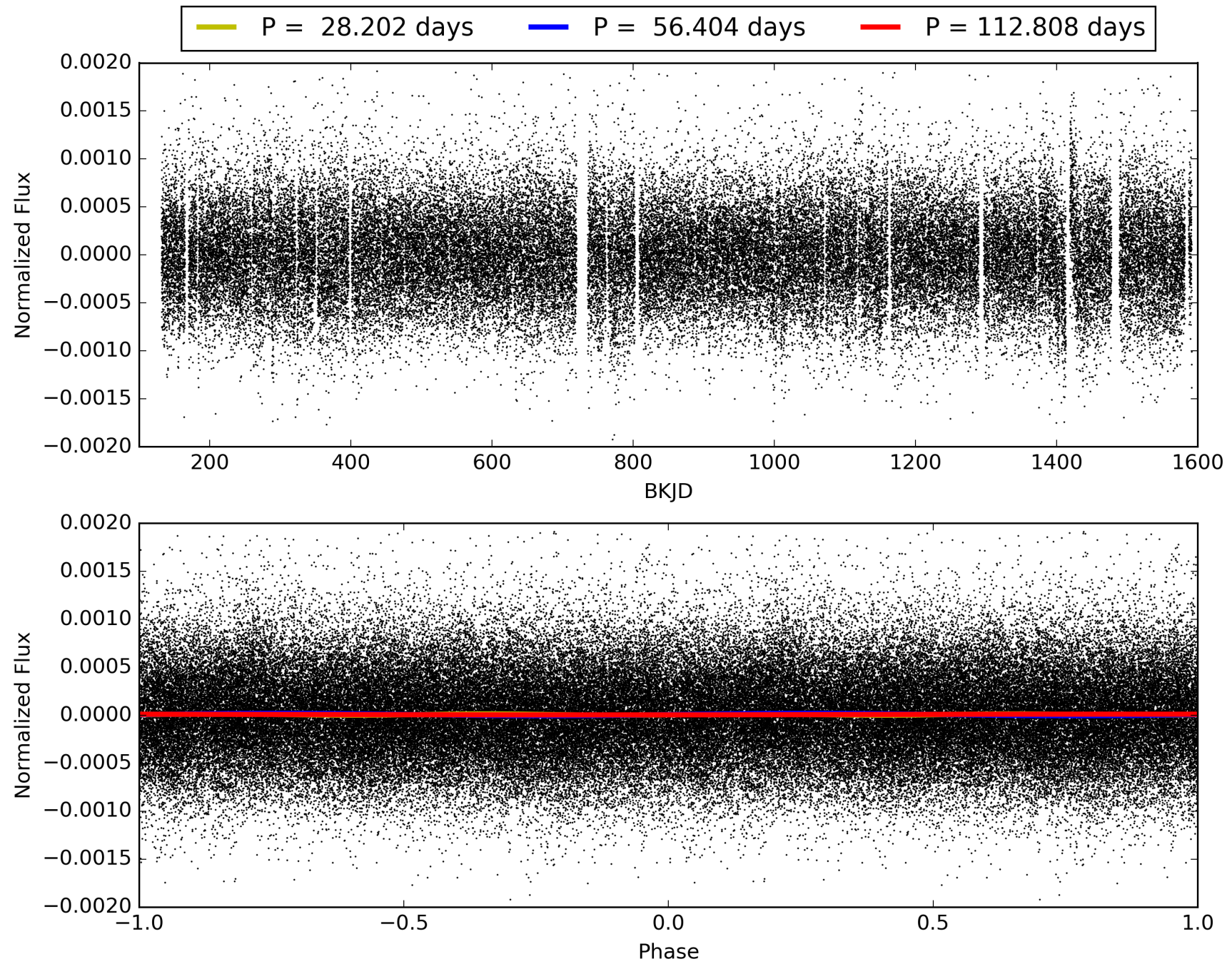
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 12:38:45 Z

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

# TCE 007115530-02, PDC Light Curves

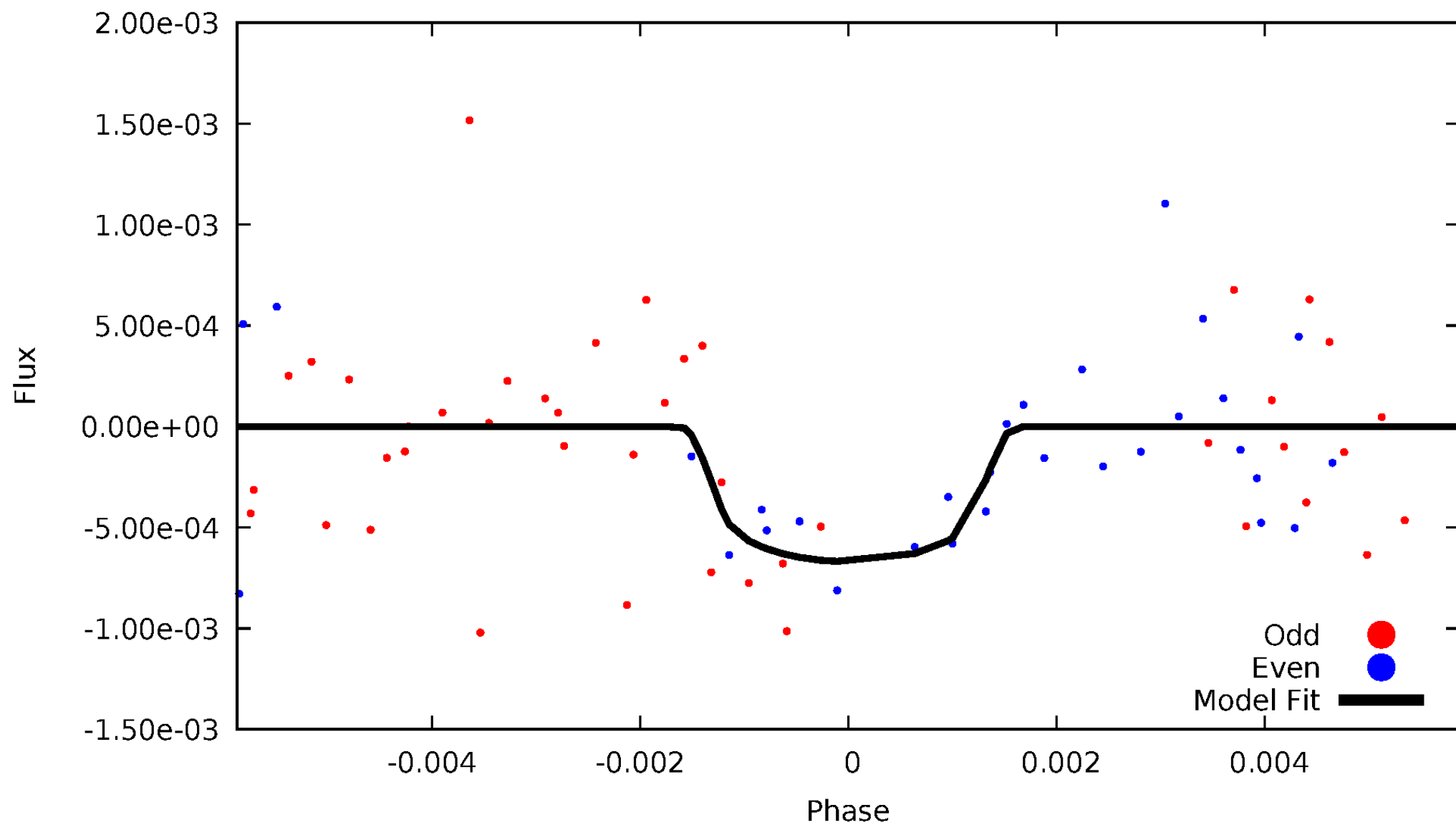


TCE 007115530-02



# DV Odd/Even

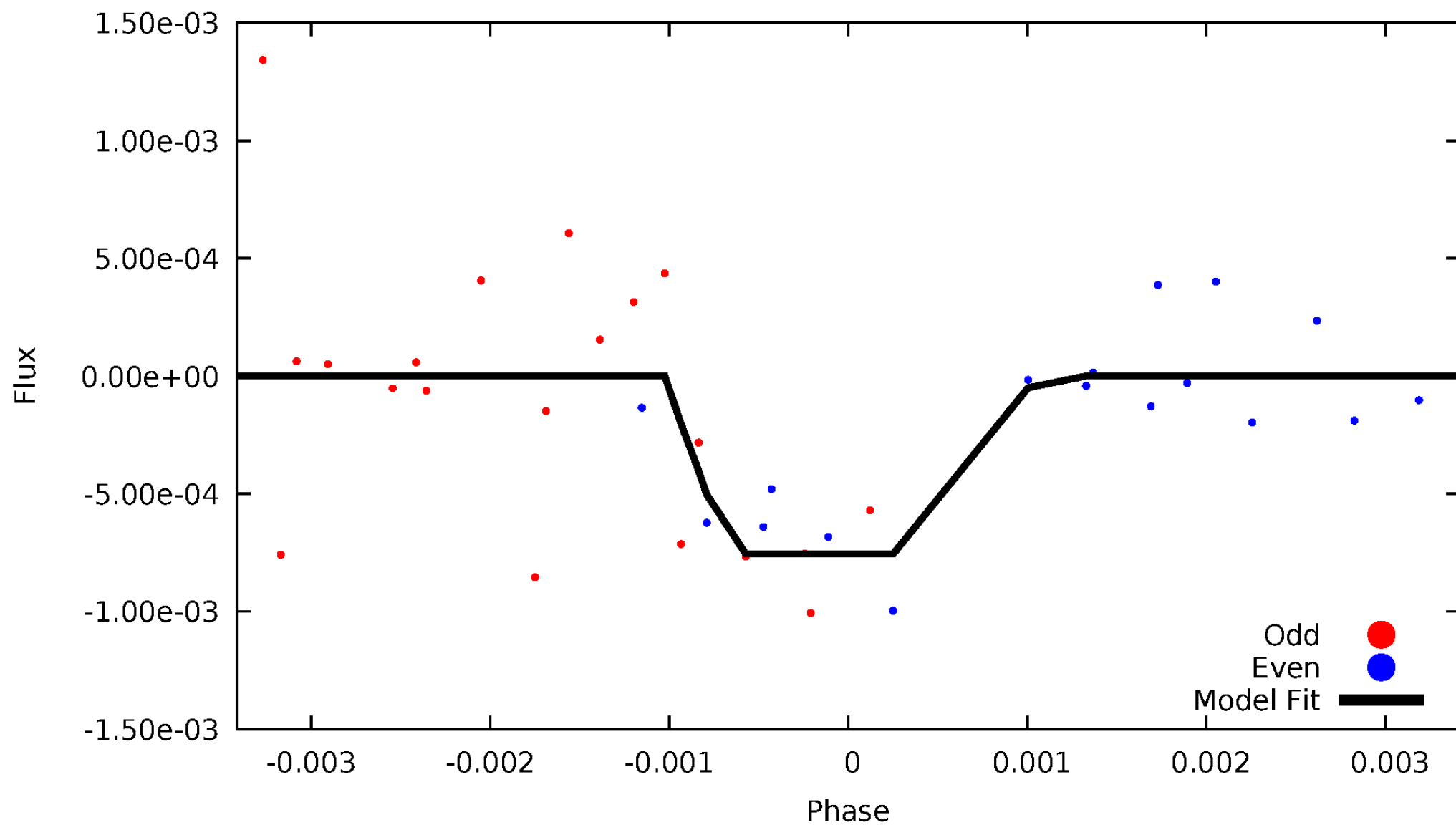
TCE 007115530-02





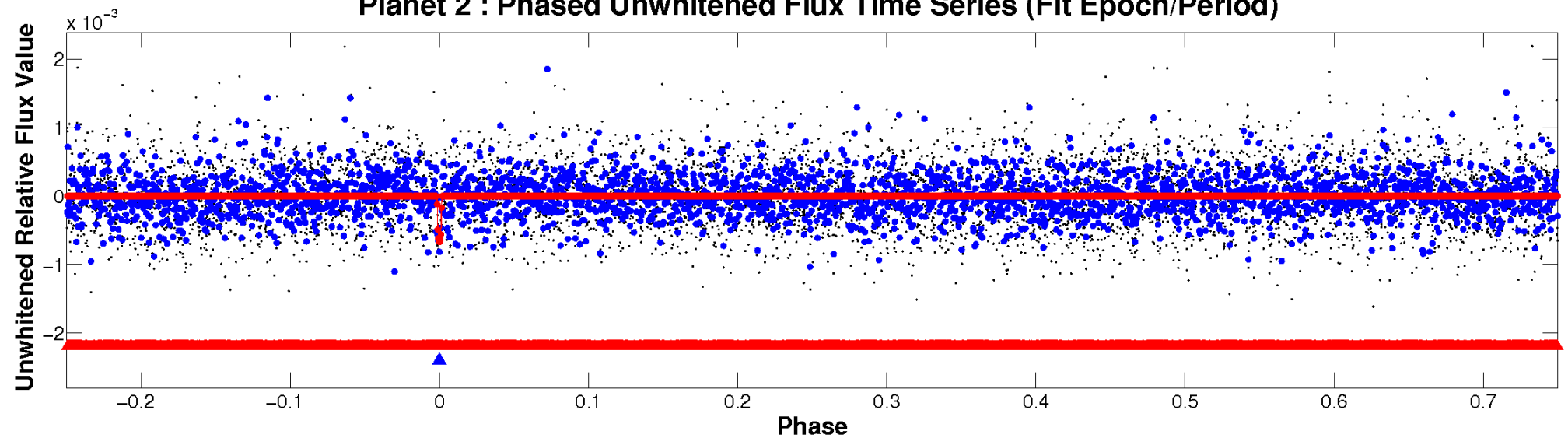
# ALT Odd/Even

TCE 007115530-02

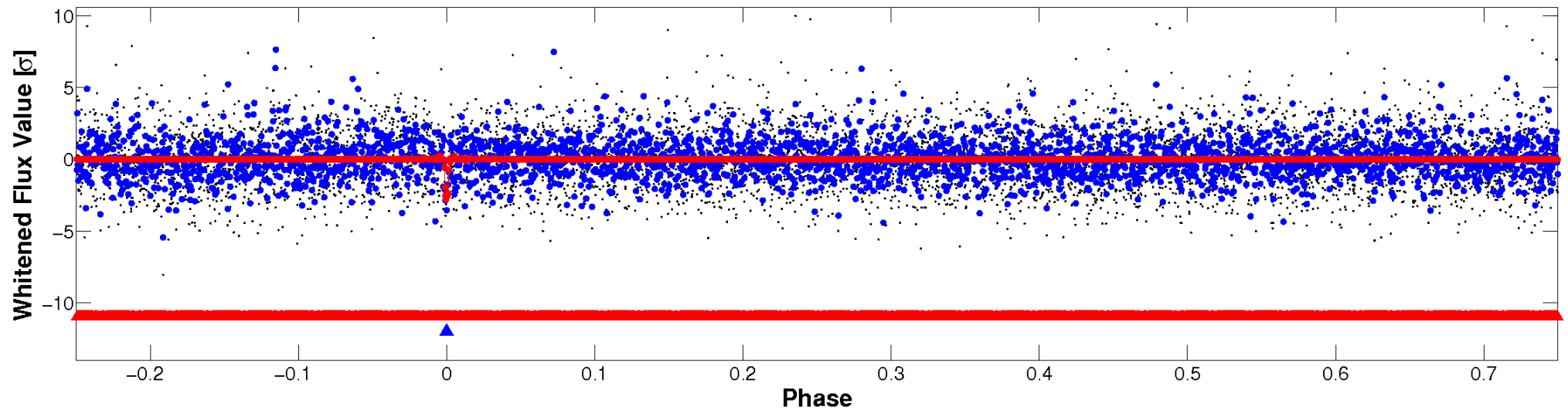


# Non-Whitened Vs. Whitened Light Curve

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

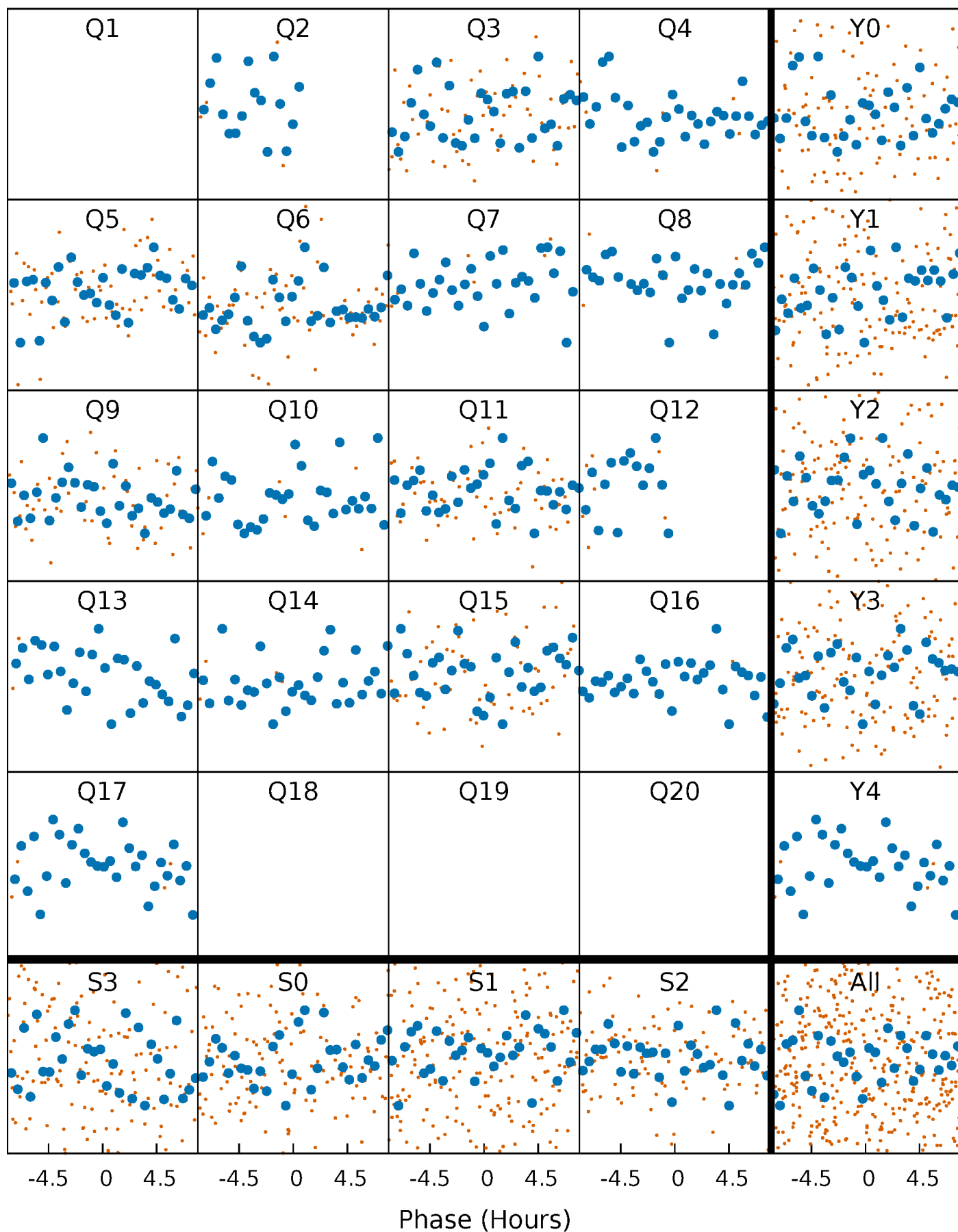


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



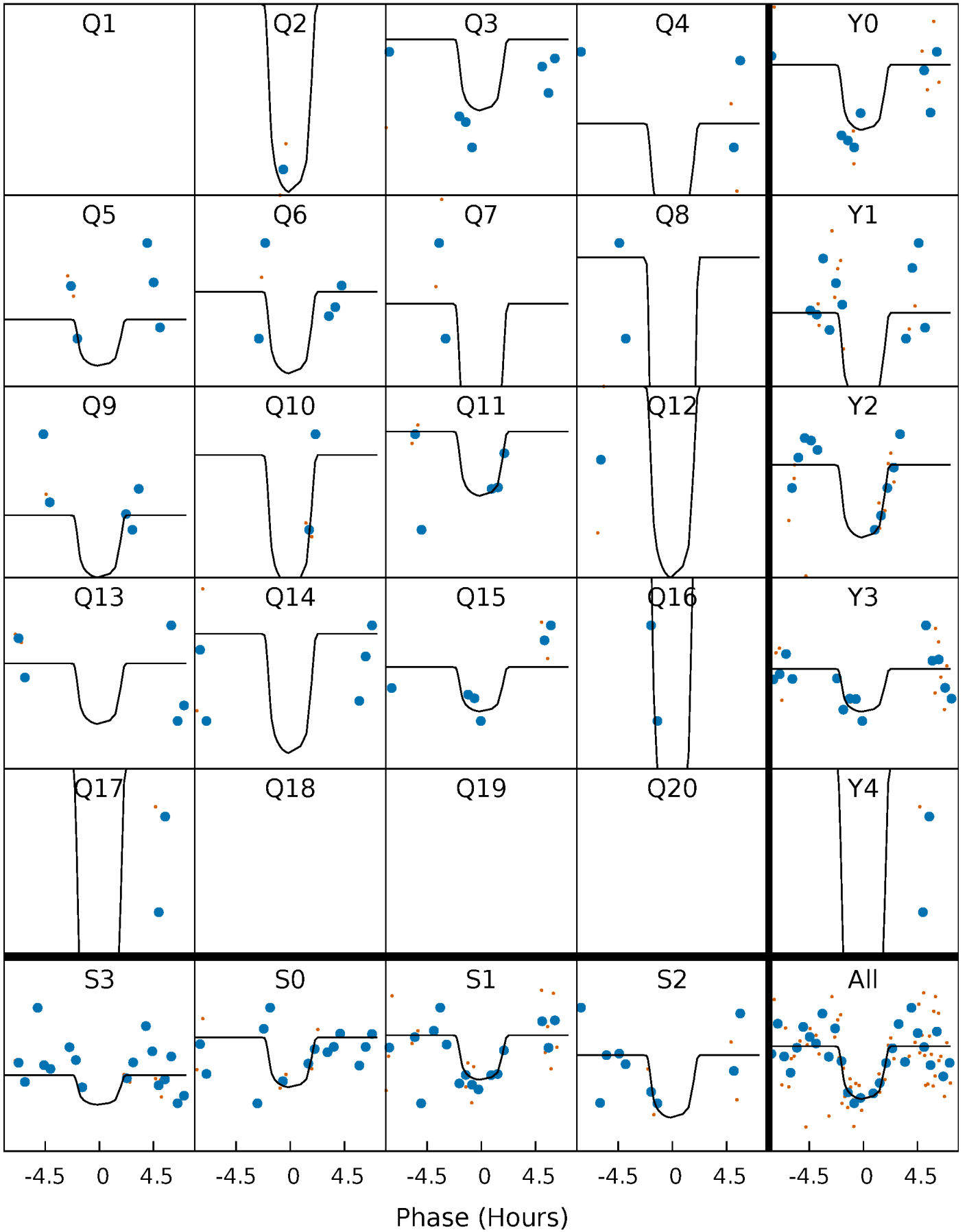
# PDC Quarter-Phased Transit Curves

TCE 007115530-02 P= 56.403997 Days  $T_0=167.035657$  (BKJD)



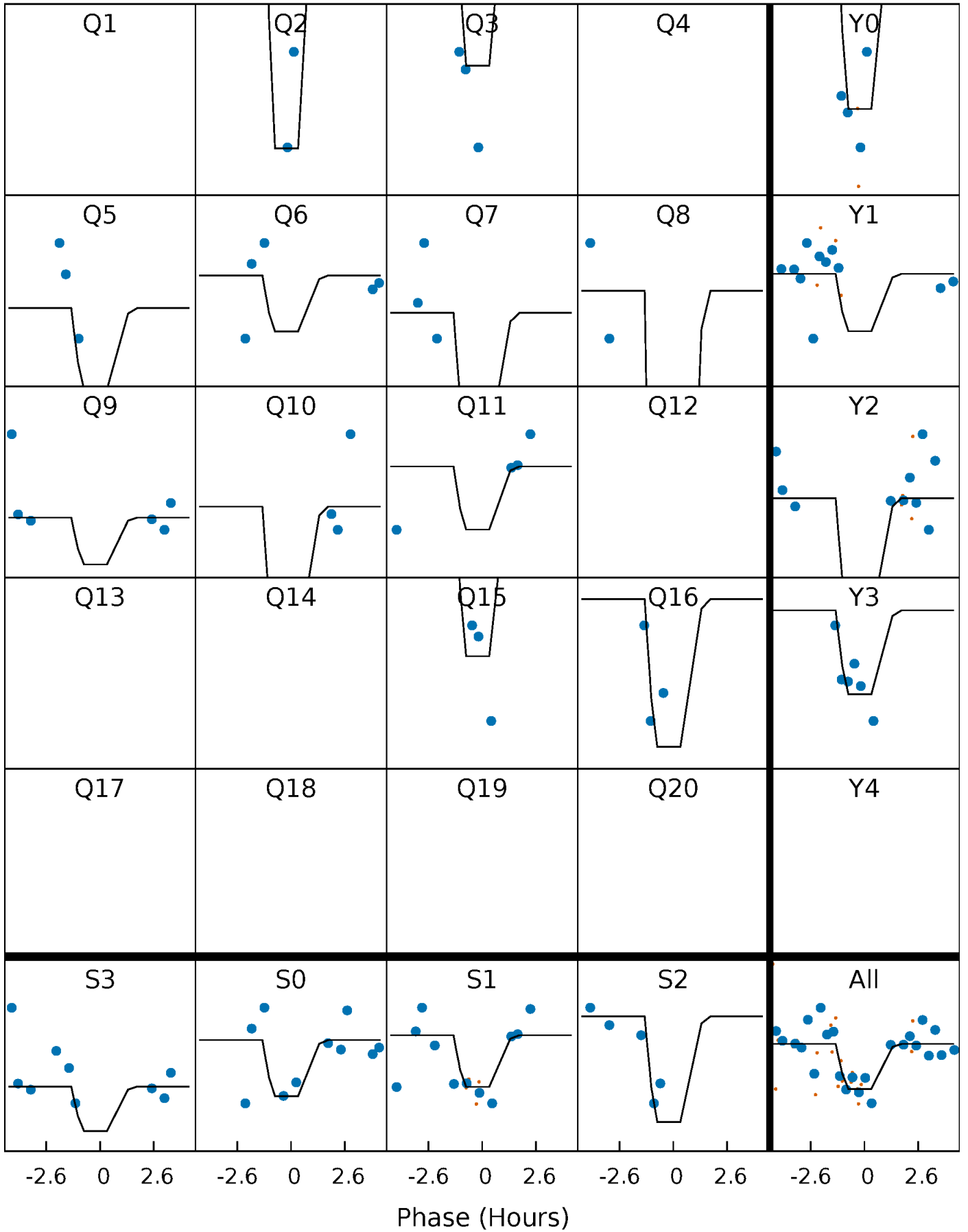
# DV Quarter-Phased Transit Curves

TCE 007115530-02 P= 56.403997 Days  $T_0=167.035657$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 007115530-02 P= 56.404070 Days  $T_0=167.013865$  (BKJD)

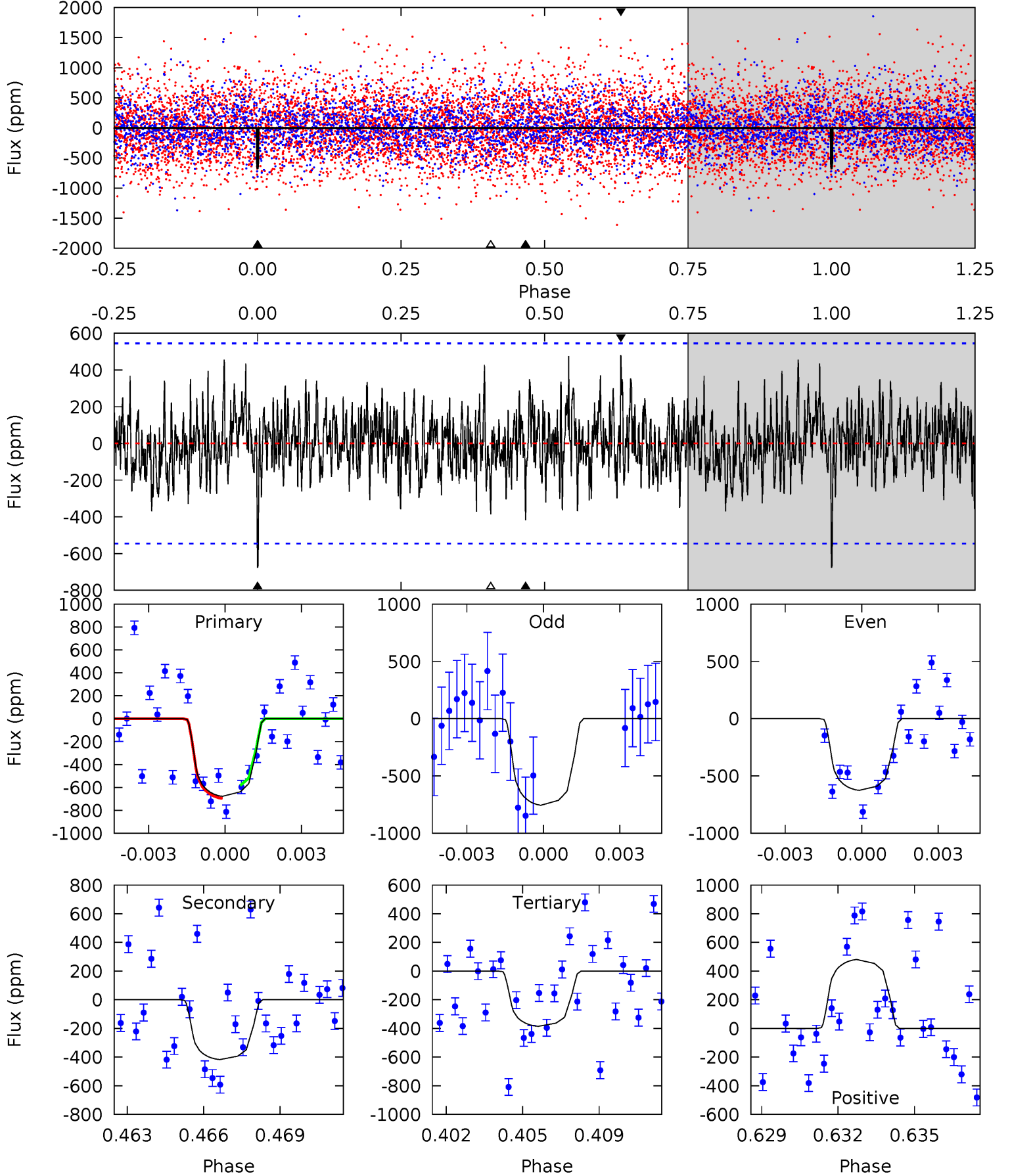




# DV Model-Shift Uniqueness Test

007115530-02, P = 56.403997 Days, E = 110.631660 Days

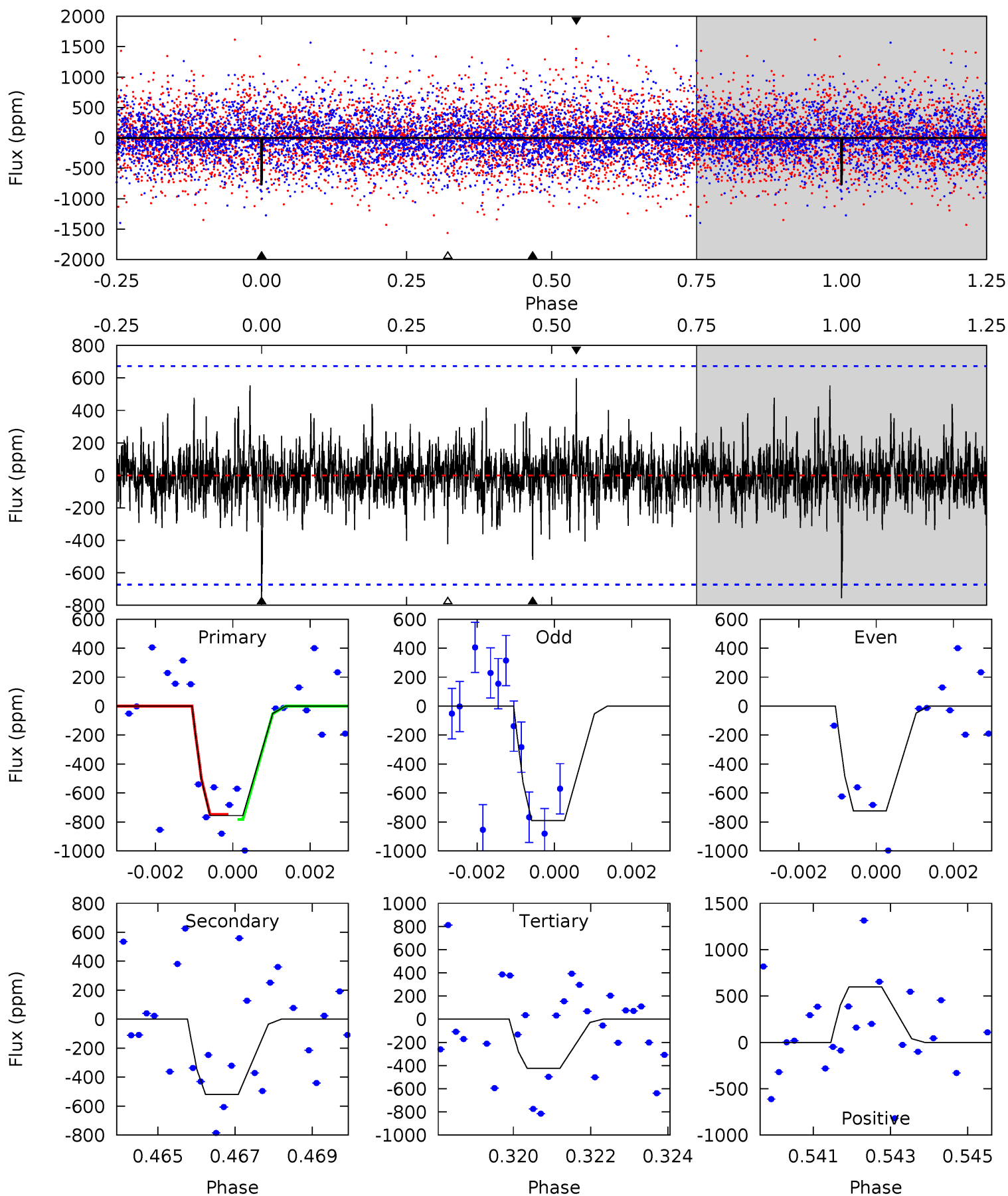
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.52	4.02	3.71	4.63	5.24	2.95	1.32	2.81	1.89	0.31	-0.61	0.61	1.09	0.42	0.51



# Alt Model-Shift Uniqueness Test

007115530-02, P = 56.404070 Days, E = 110.609795 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
5.99	4.11	3.35	4.74	5.33	3.10	0.95	2.64	1.26	0.76	-0.62	0.26	1.05	0.44	0.11



### Stellar Parameters For KIC 007115530

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5238^{+157}_{-141}$	$4.637^{+0.030}_{-0.090}$	$-0.380^{+0.300}_{-0.300}$	$0.698^{+0.095}_{-0.055}$	$0.777^{+0.075}_{-0.083}$	$3.221^{+0.475}_{-0.883}$
	+3%/-3%	+1%/-2%	+79%/-79%	+14%/-8%	+10%/-11%	+15%/-27%
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 007115530-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-418 \pm 104$	$2.68^{+1.99}_{-1.68}$	$533^{+20}_{-18}$	$4274^{+2519}_{-814}$	$2214^{+15120}_{-1507}$
Alt.	$-519 \pm 126$	$2.63^{+2.16}_{-1.61}$	$533^{+20}_{-18}$	$4425^{+2559}_{-810}$	$2739^{+16791}_{-1883}$

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

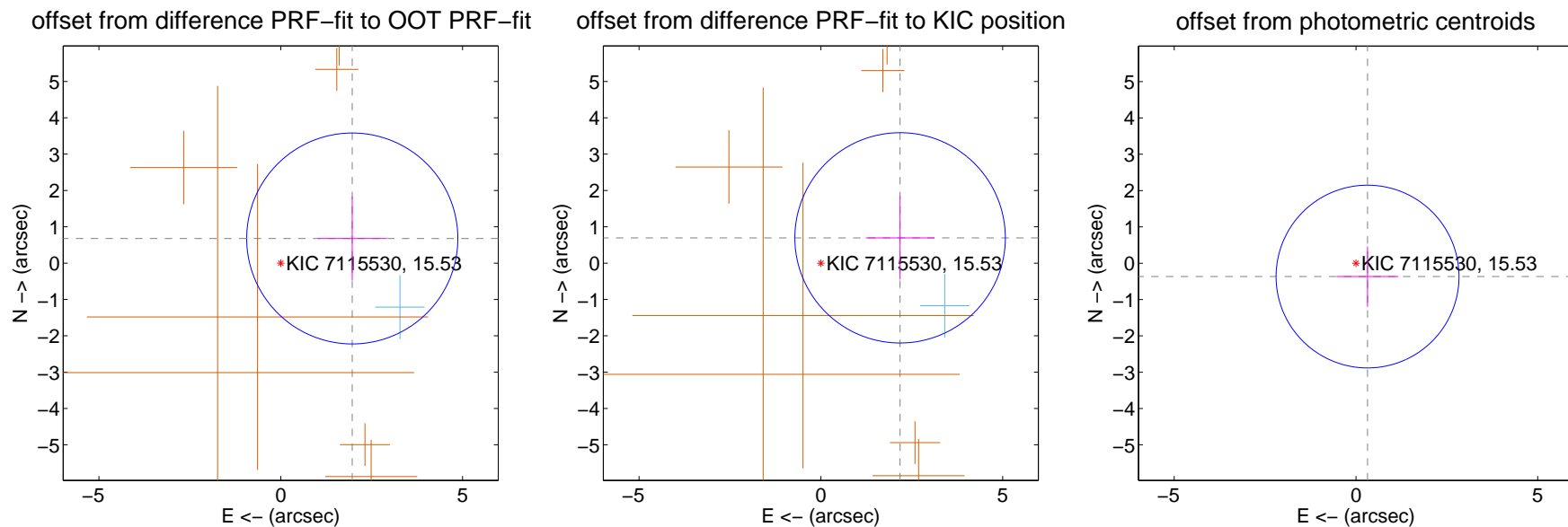
## DV Centroid Data

Supplemental centroid analysis for 007115530-02. Kepler magnitude: 15.53. Transit SNR 8.99

There are 1 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.15 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.080 \pm 0.968$	2.15	$-1.967 \pm 0.944$	$0.679 \pm 1.148$
PRF-fit source offset from KIC position	$2.287 \pm 0.965$	2.37	$-2.179 \pm 0.944$	$0.696 \pm 1.148$
photometric centroid source offset	$0.49 \pm 0.84$	0.58	$-0.32 \pm 0.85$	$-0.37 \pm 0.83$



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.

Q1 no difference image



Q1 no OOT image



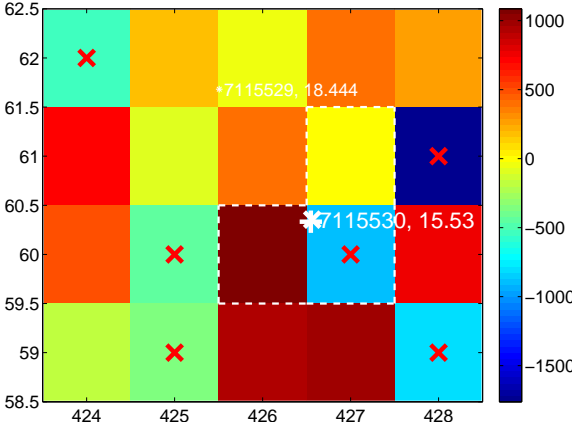
Q2 no difference image



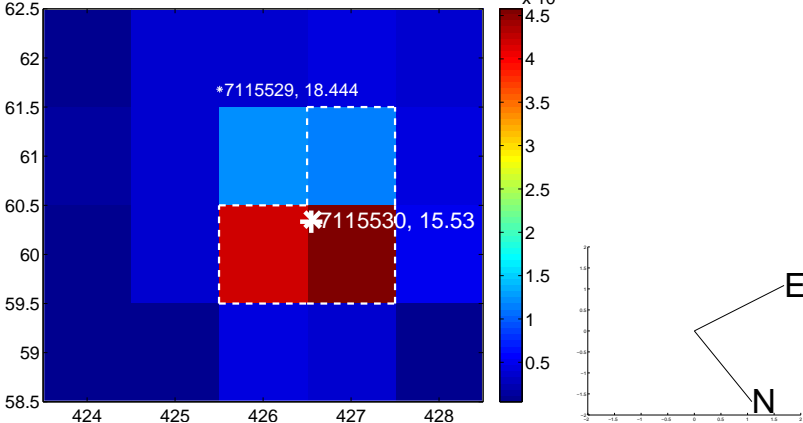
Q2 no OOT image



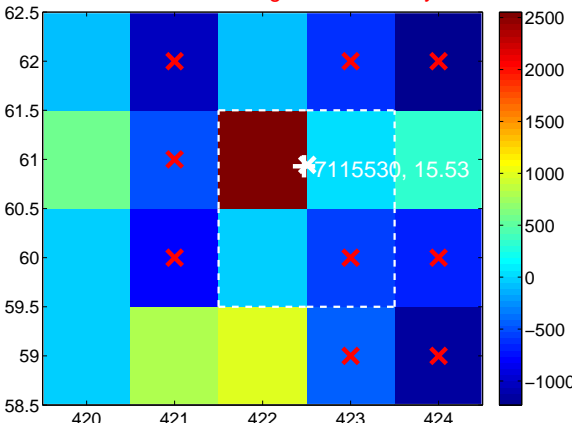
Q3 difference image. Poor Quality



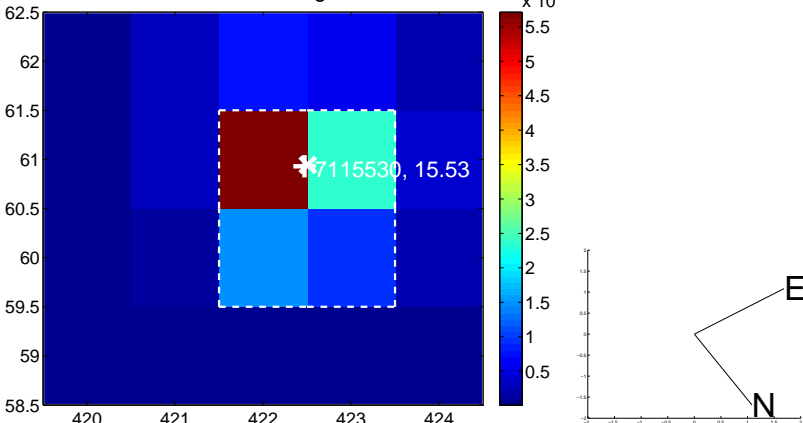
Q3 OOT image



Q4 difference image. Poor Quality

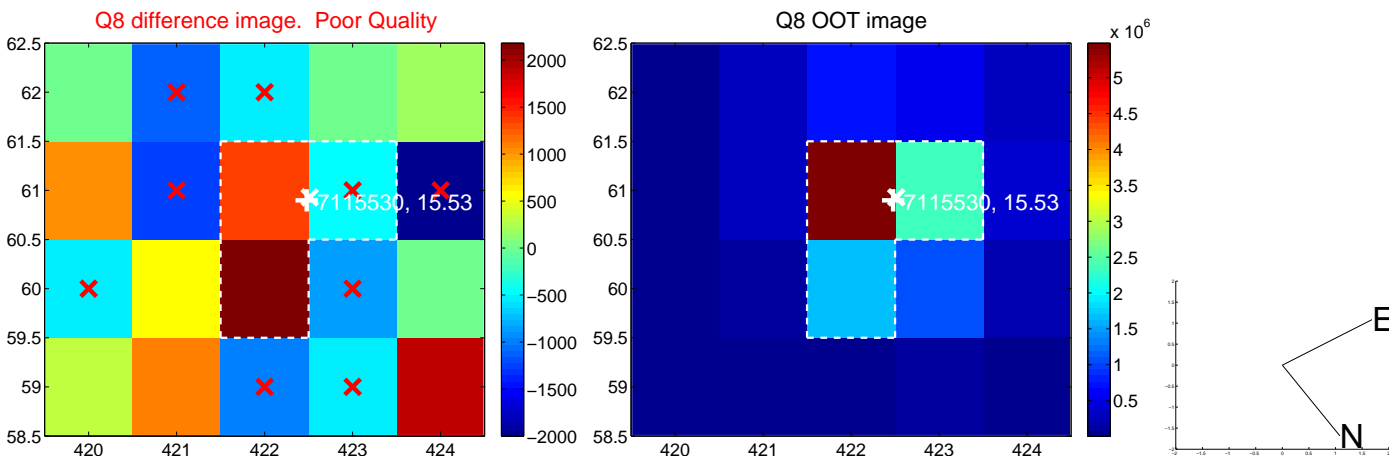
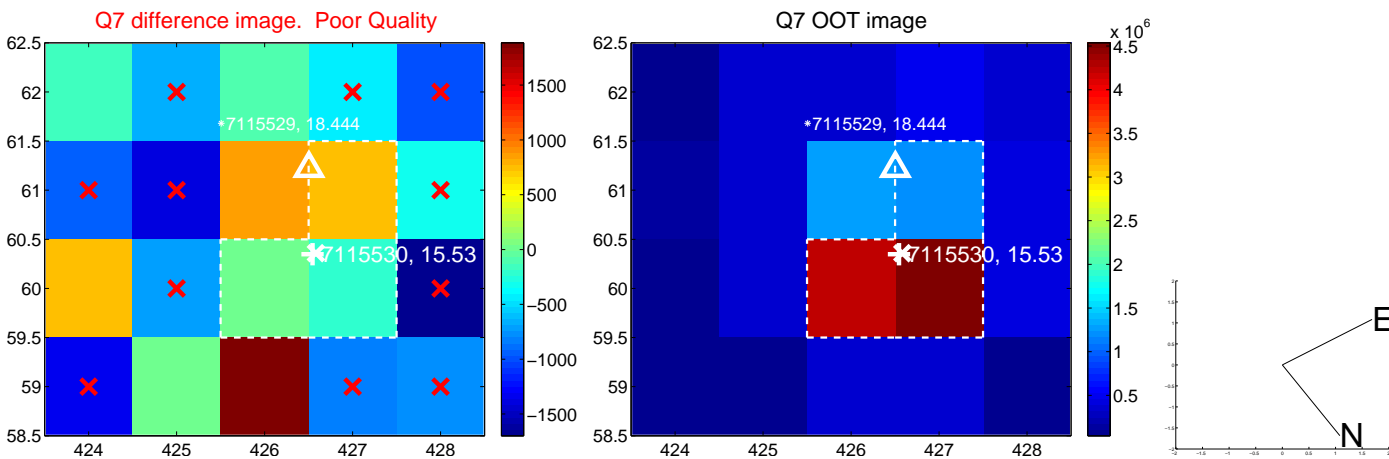
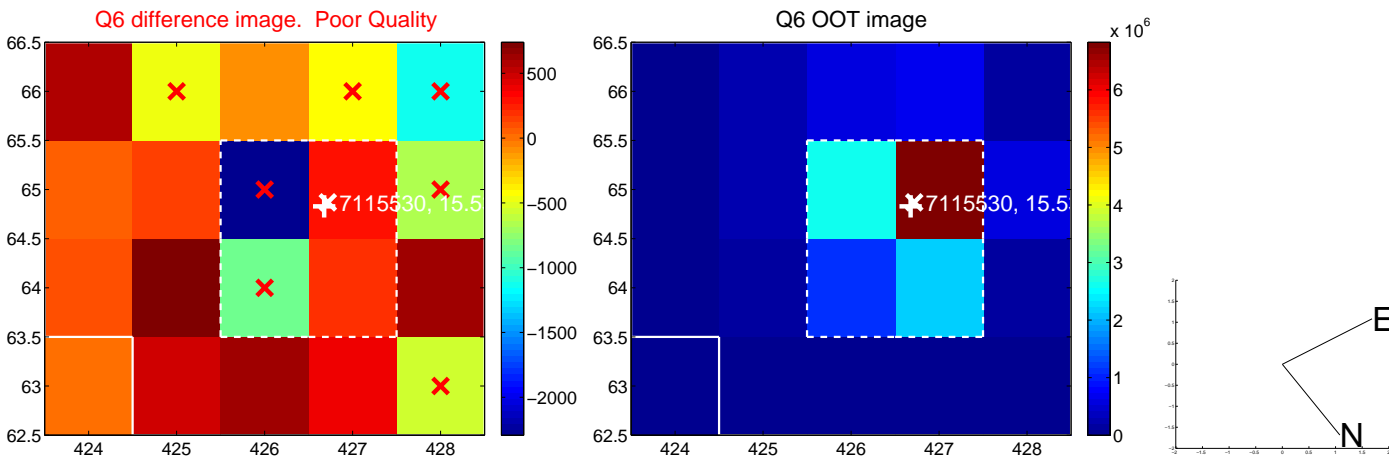
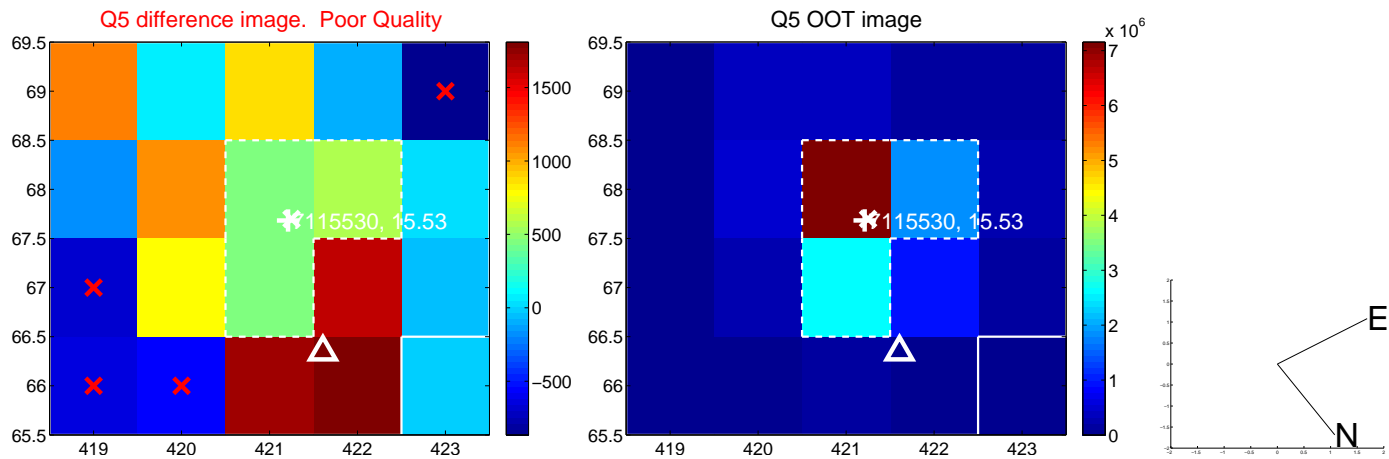


Q4 OOT image

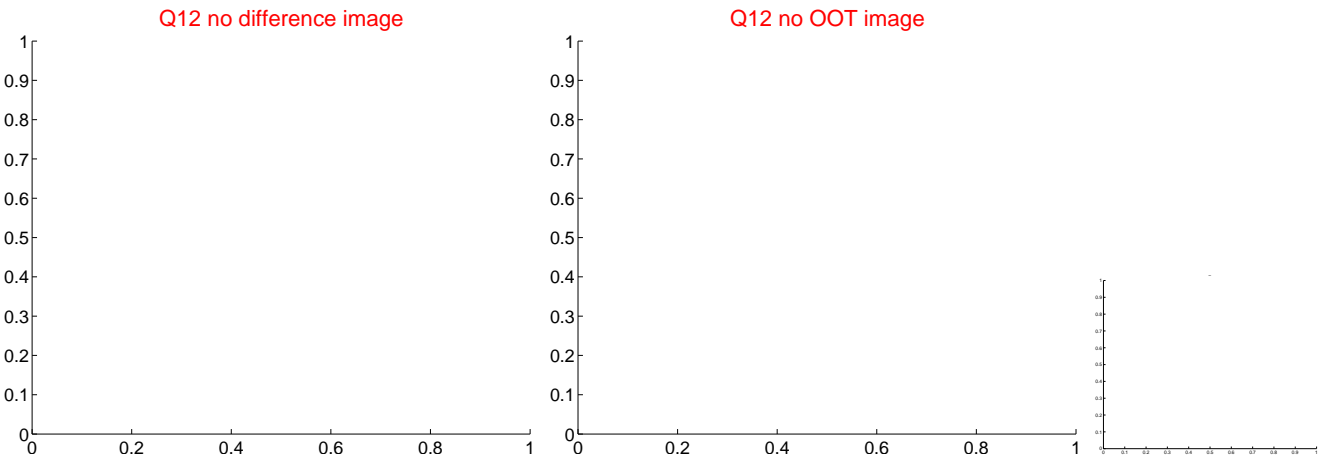
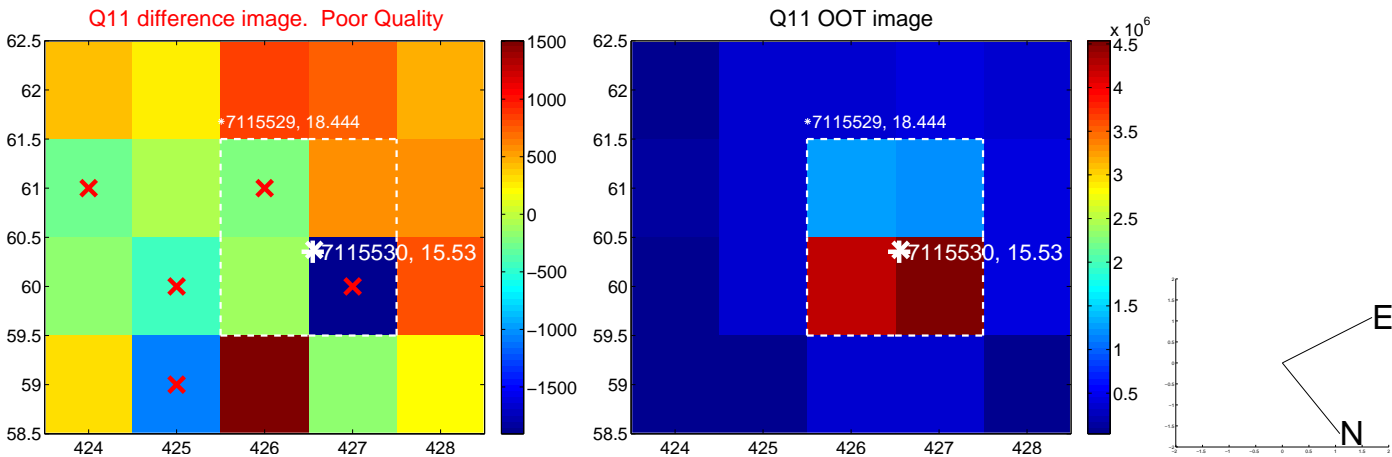
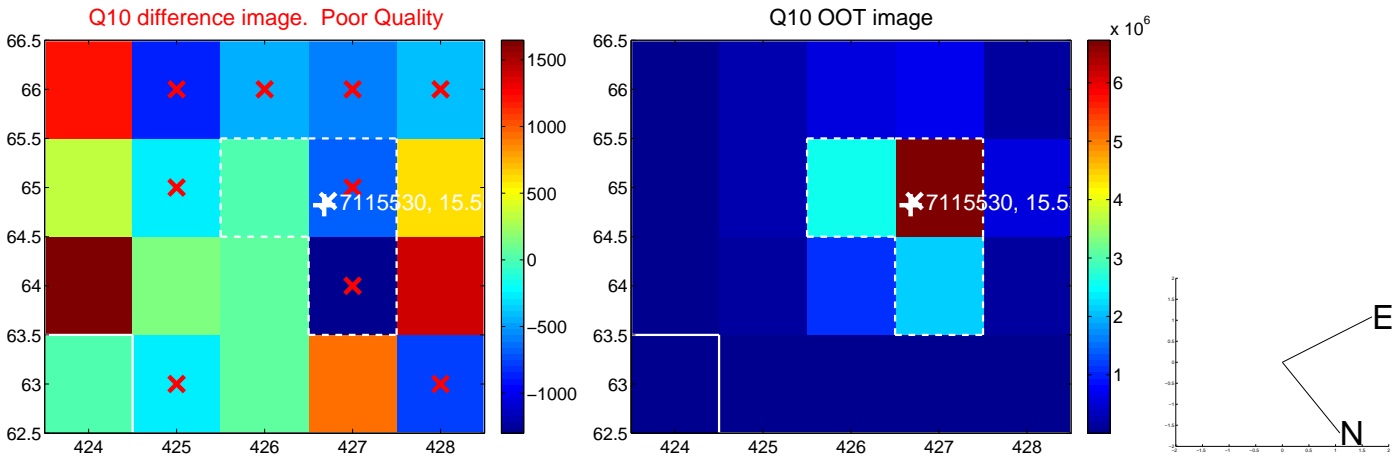
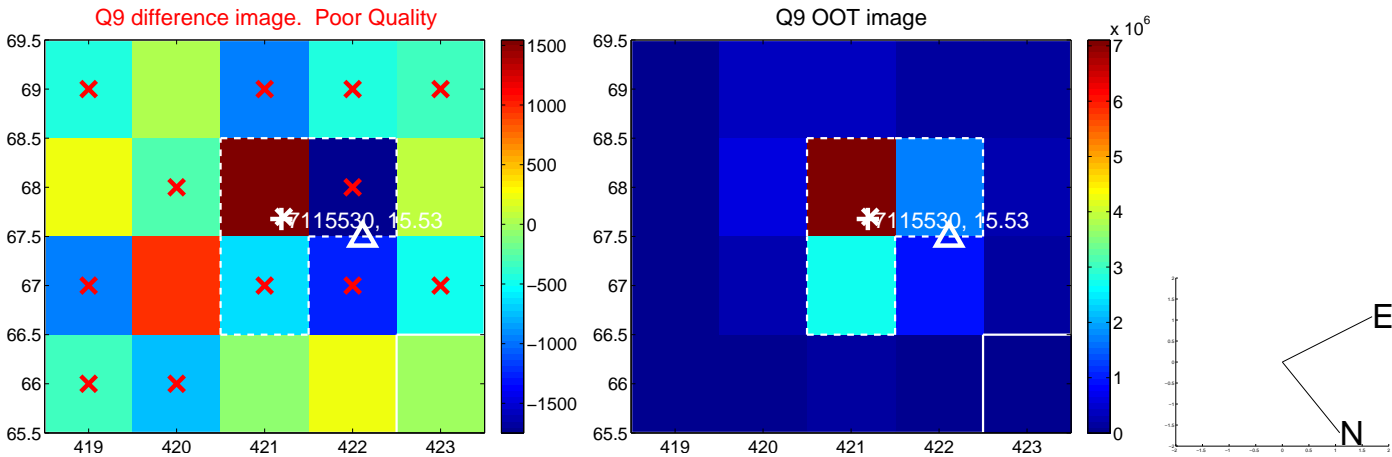




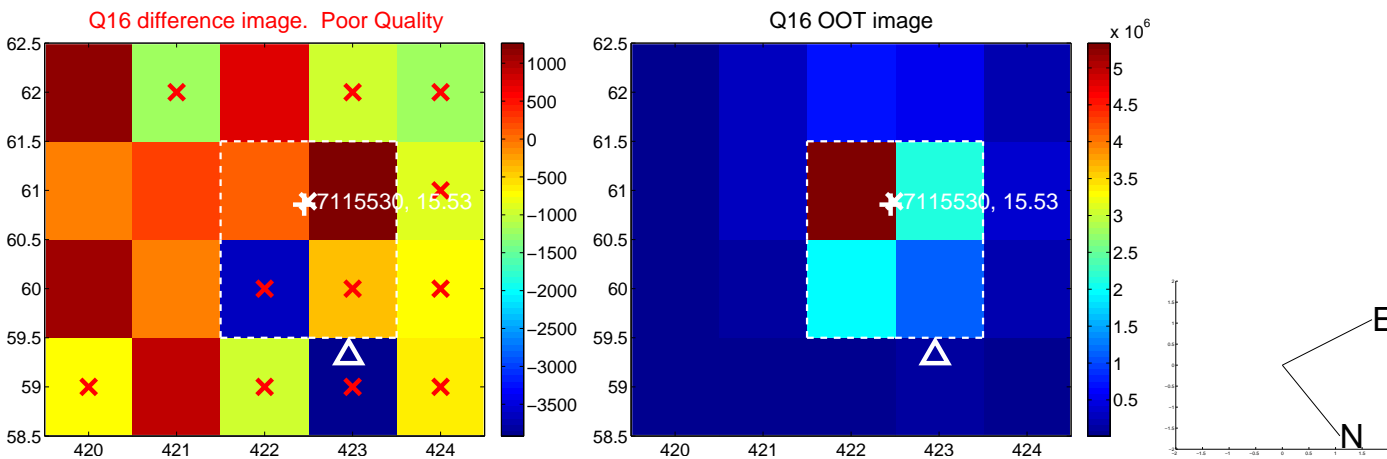
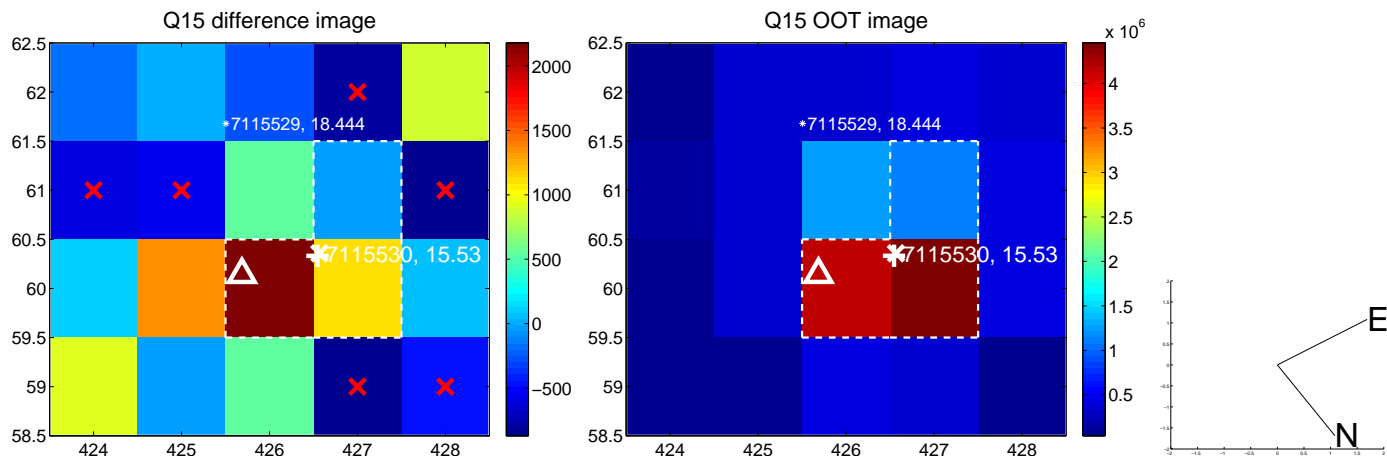
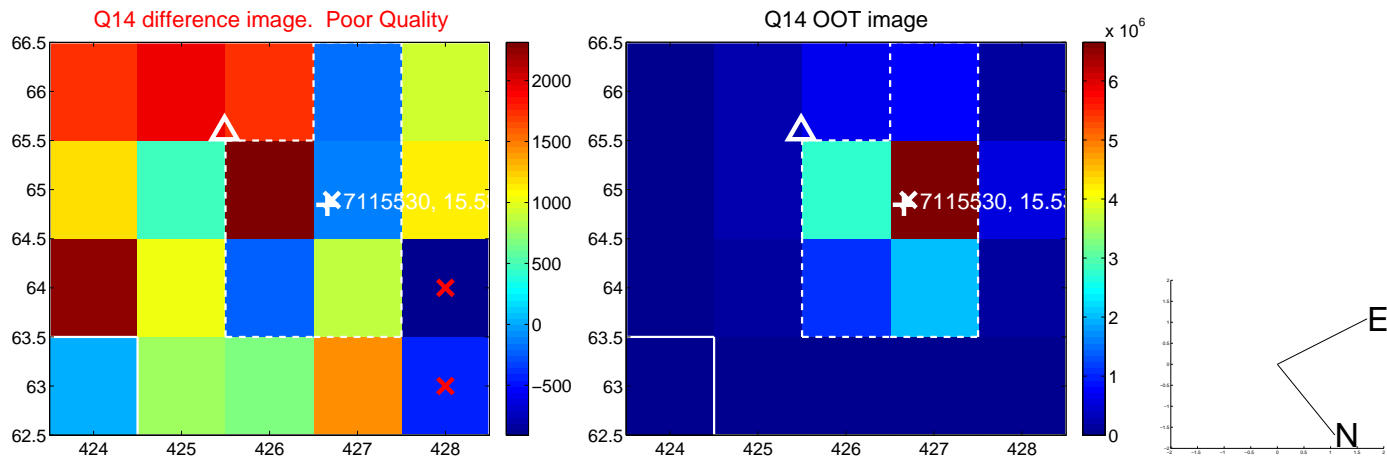
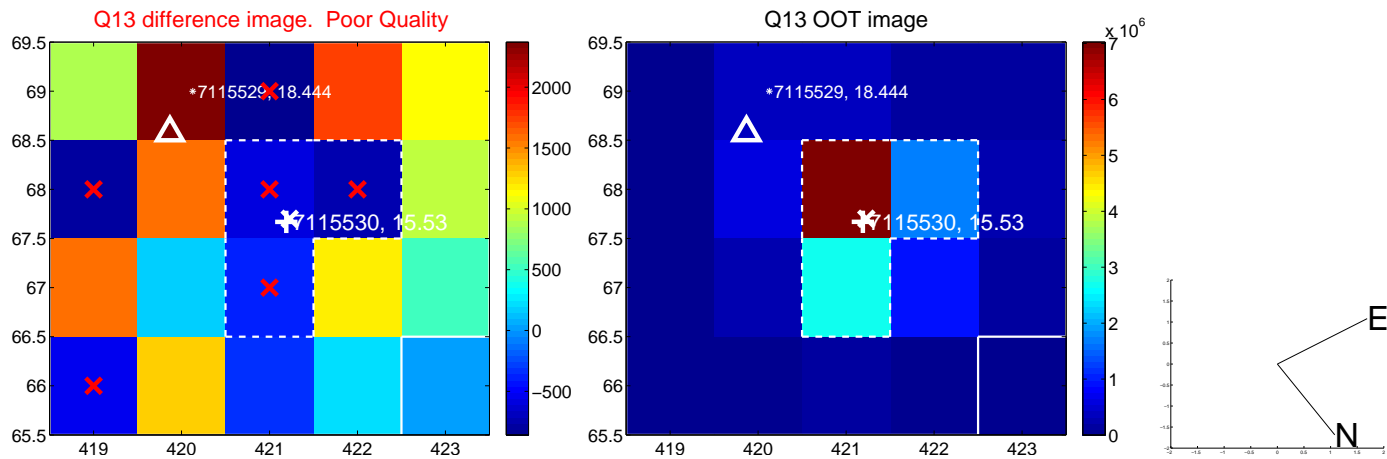
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



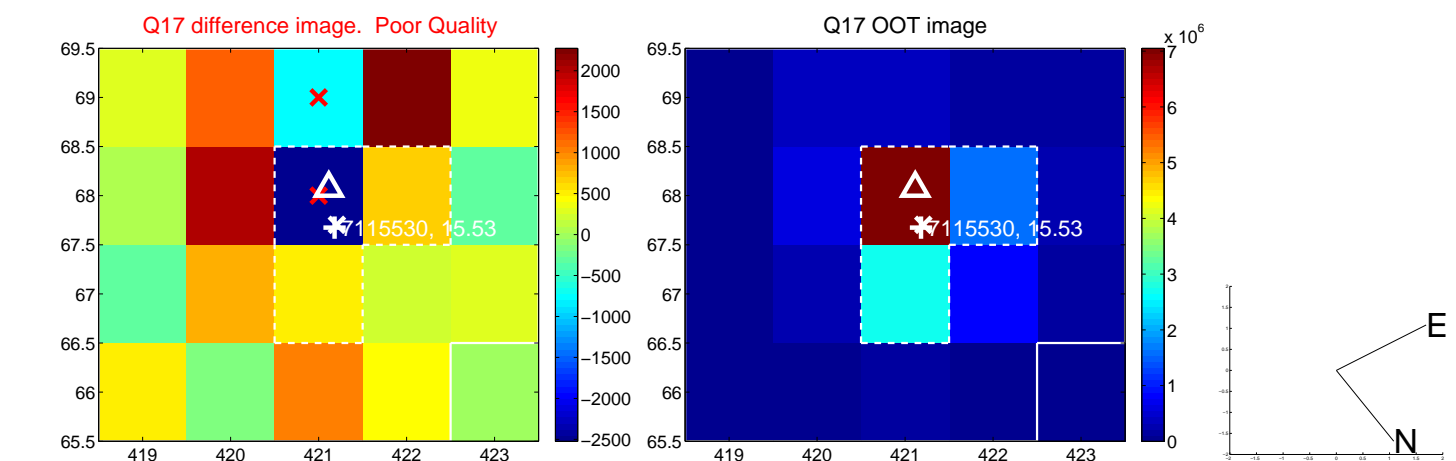
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



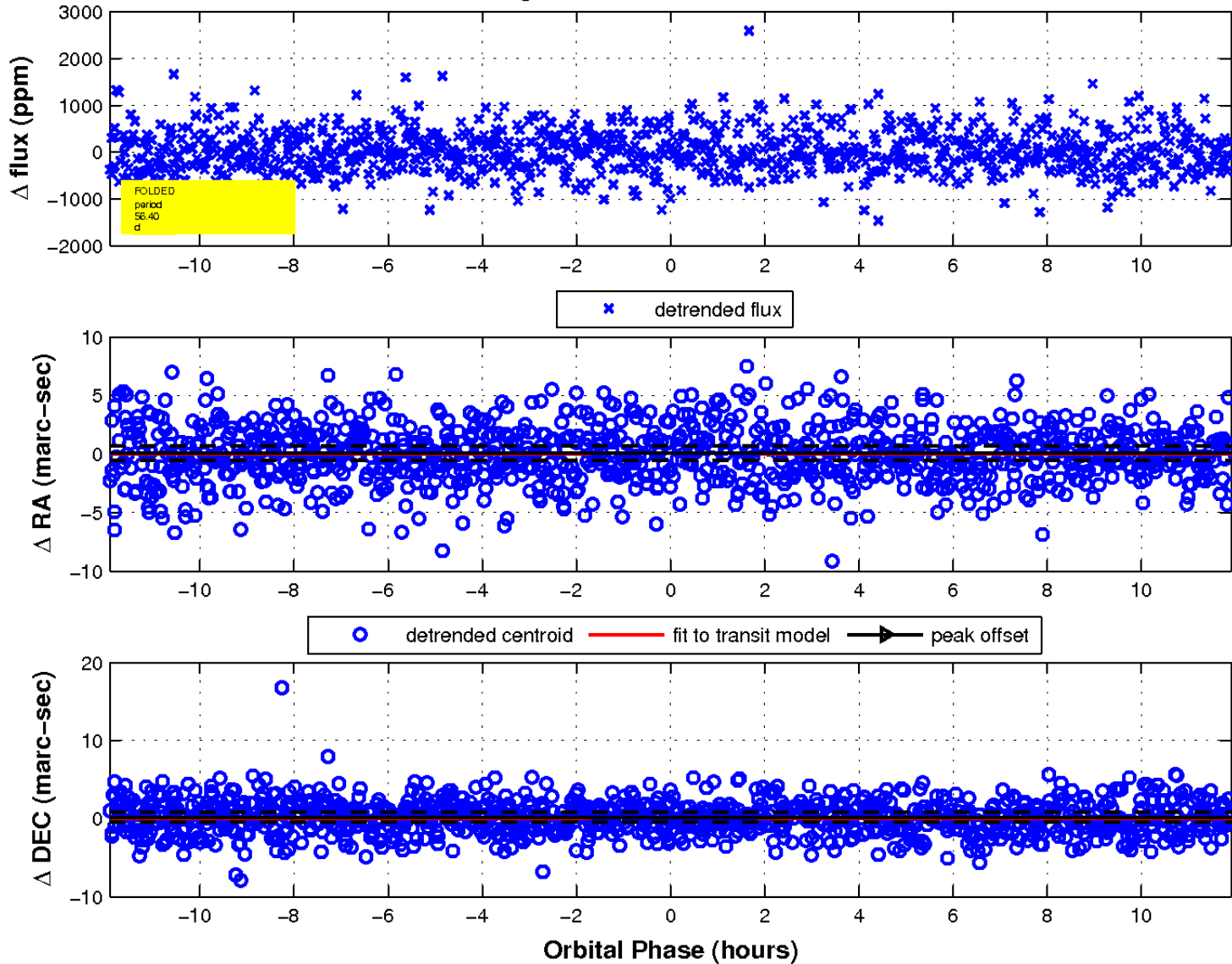
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

