

# KIC 005821056

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005821056-01	OBS	No	1.553336	132.592207	116.1	9.941	9.8	5.7	0.97	6609	1.18	2270.51
005821056-02	OBS	No	64.887269	142.785231	2259.4	7.026	7.6	7.7	0.97	6609	5.06	15.66

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005821056-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT
005821056-02	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

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

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

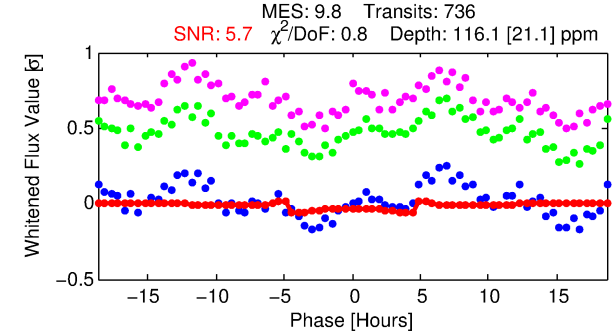
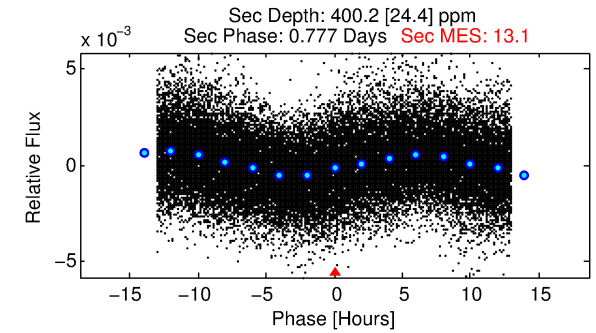
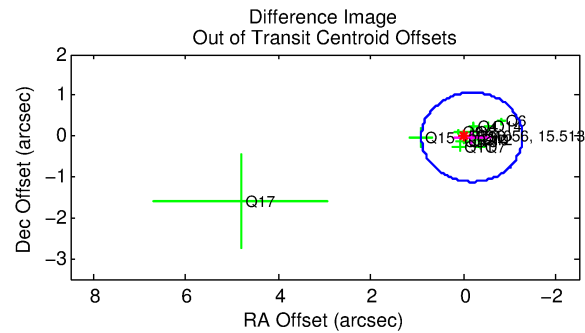
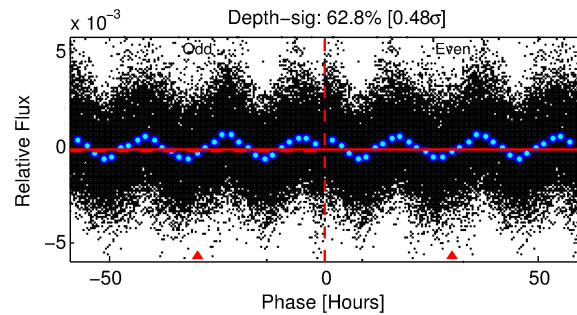
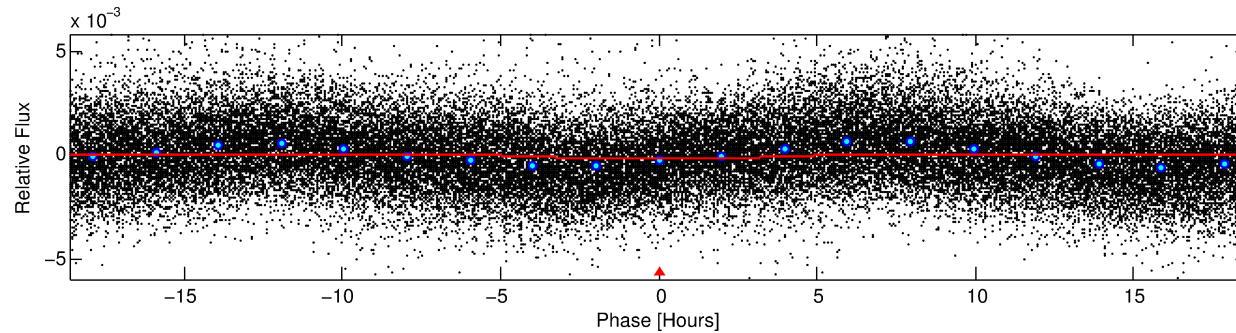
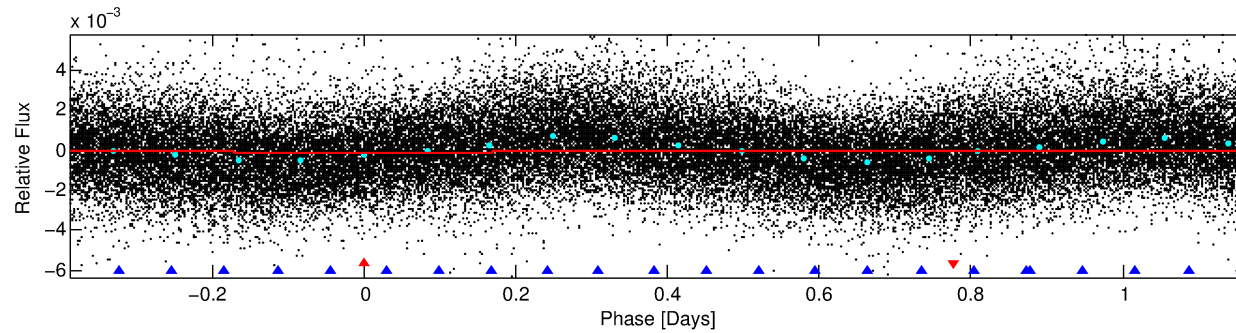
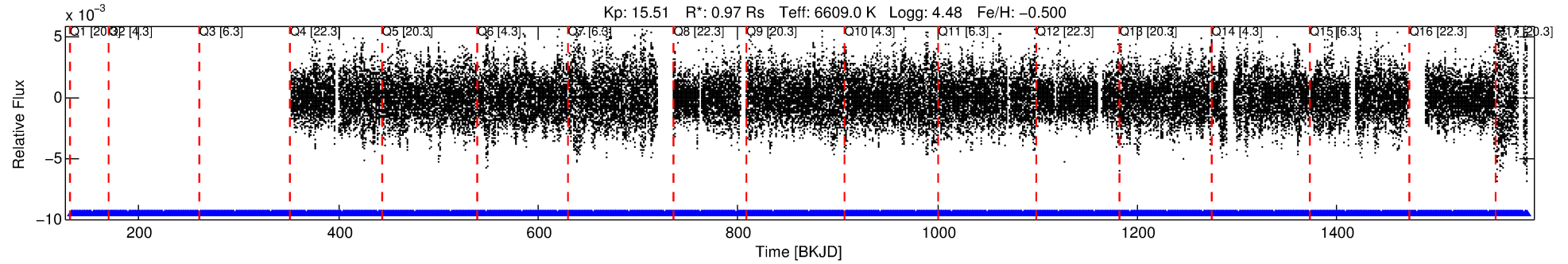
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 005821056-01

No Significant Match Found

# DV One-Page Summary

KIC: 5821056 Candidate: 1 of 2 Period: 1.553 d



## DV Fit Results:

Period = 1.55334 [0.00002] d  
Epoch = 132.5922 [0.0059] BKJD  
Rp/R\* = 0.0111 [0.0024]  
a/R\* = 1.13 [0.29]  
b = 0.83 [0.42]  
Seff = 2270.51 [928.63]  
Teq = 1760 [180] K  
Rp = 1.17 [0.44] Re  
a = 0.0267 [0.0069] AU  
Ag = 113.98 [66.16] [1.71 $\sigma$ ]  
Teffp = 8892 [1034] K [6.79 $\sigma$ ]

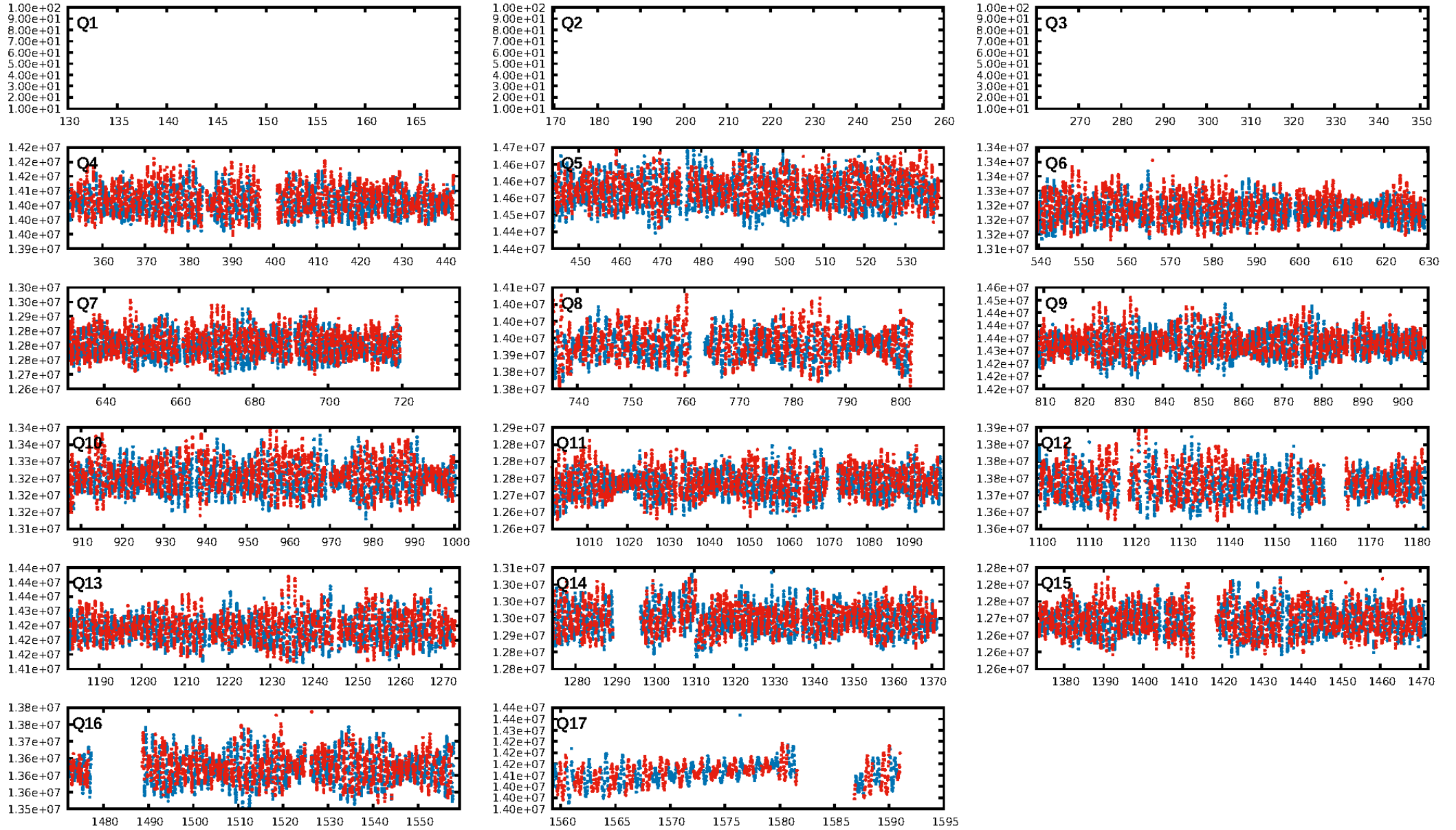
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [124.86 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 1.57e-14  
RollingBand-fgt: 1.00 [719/719]  
GhostDiagnostic-chr: 0.9885  
Centroid-sig: 0.2%  
Centroid-so: 1.255 arcsec [1.50 $\sigma$ ]  
OotOffset-rm: 0.186 arcsec [0.51 $\sigma$ ]  
KicOffset-rm: 0.129 arcsec [0.32 $\sigma$ ]  
OotOffset-st: 3/3/4/4 [14]  
KicOffset-st: 3/3/4/4 [14]  
DiffImageQuality-fgm: 0.93 [13/14]  
DiffImageOverlap-fno: 1.00 [14/14]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 20:08:21 Z

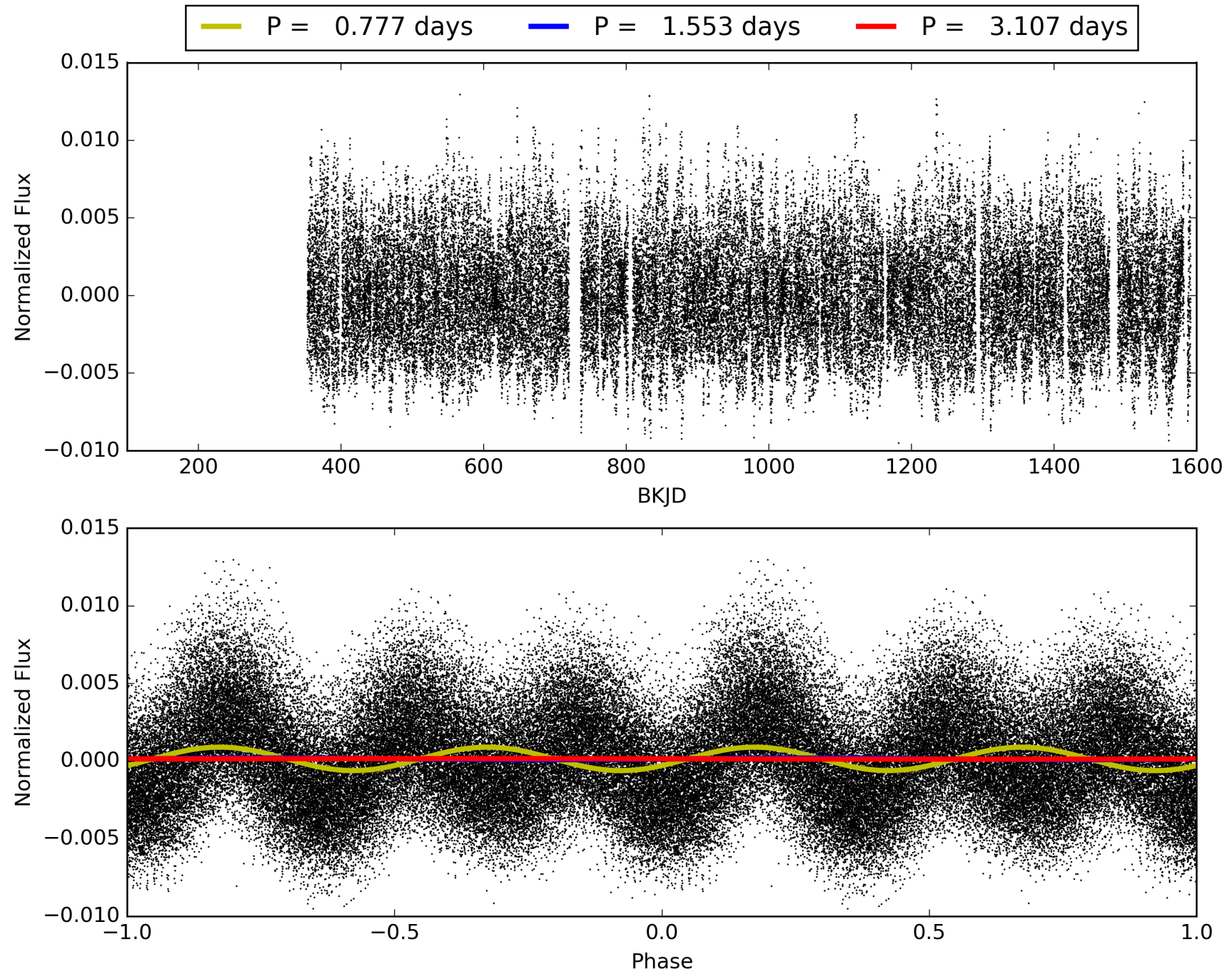
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 005821056-01, PDC Light Curves



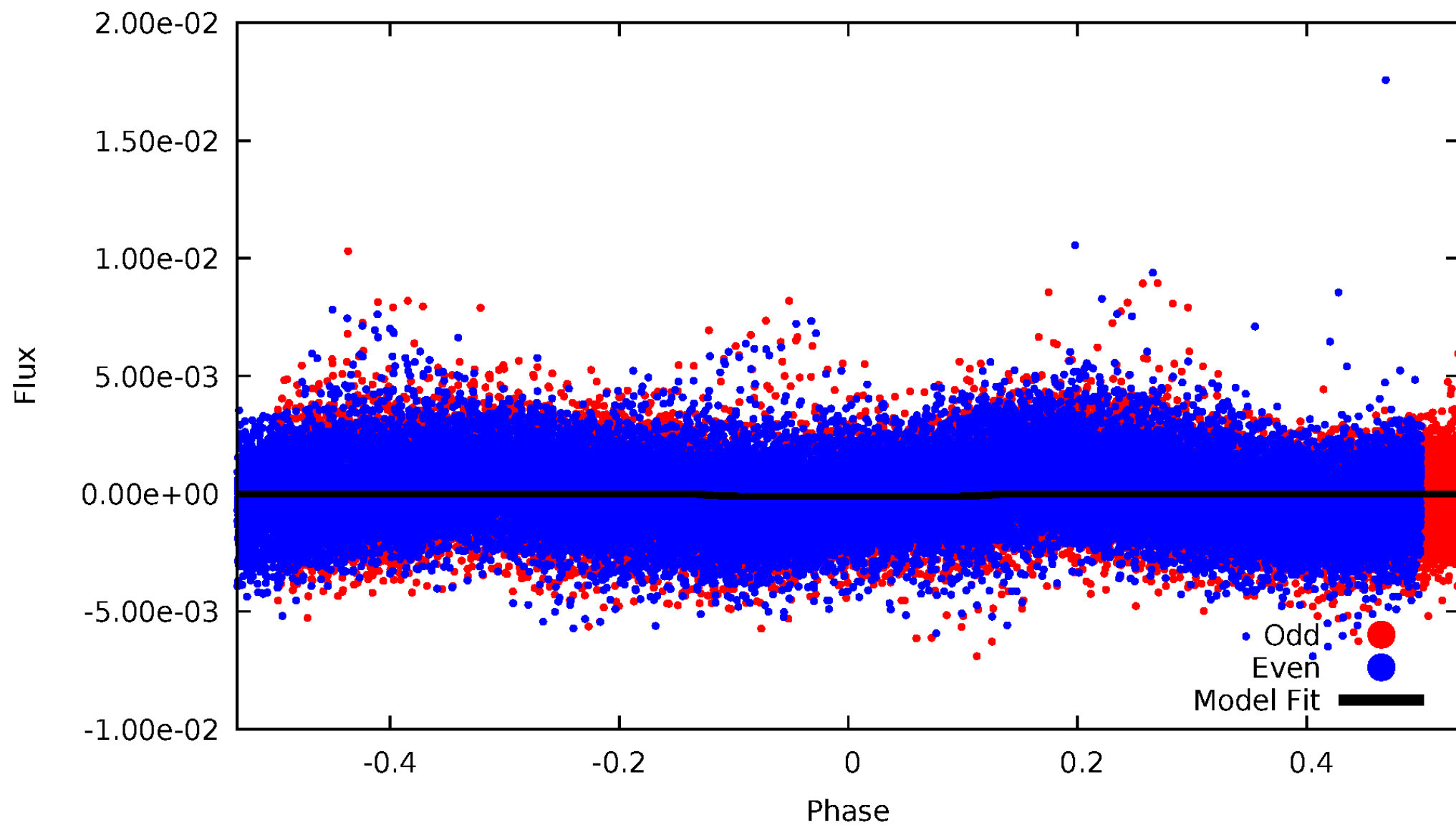


TCE 005821056-01



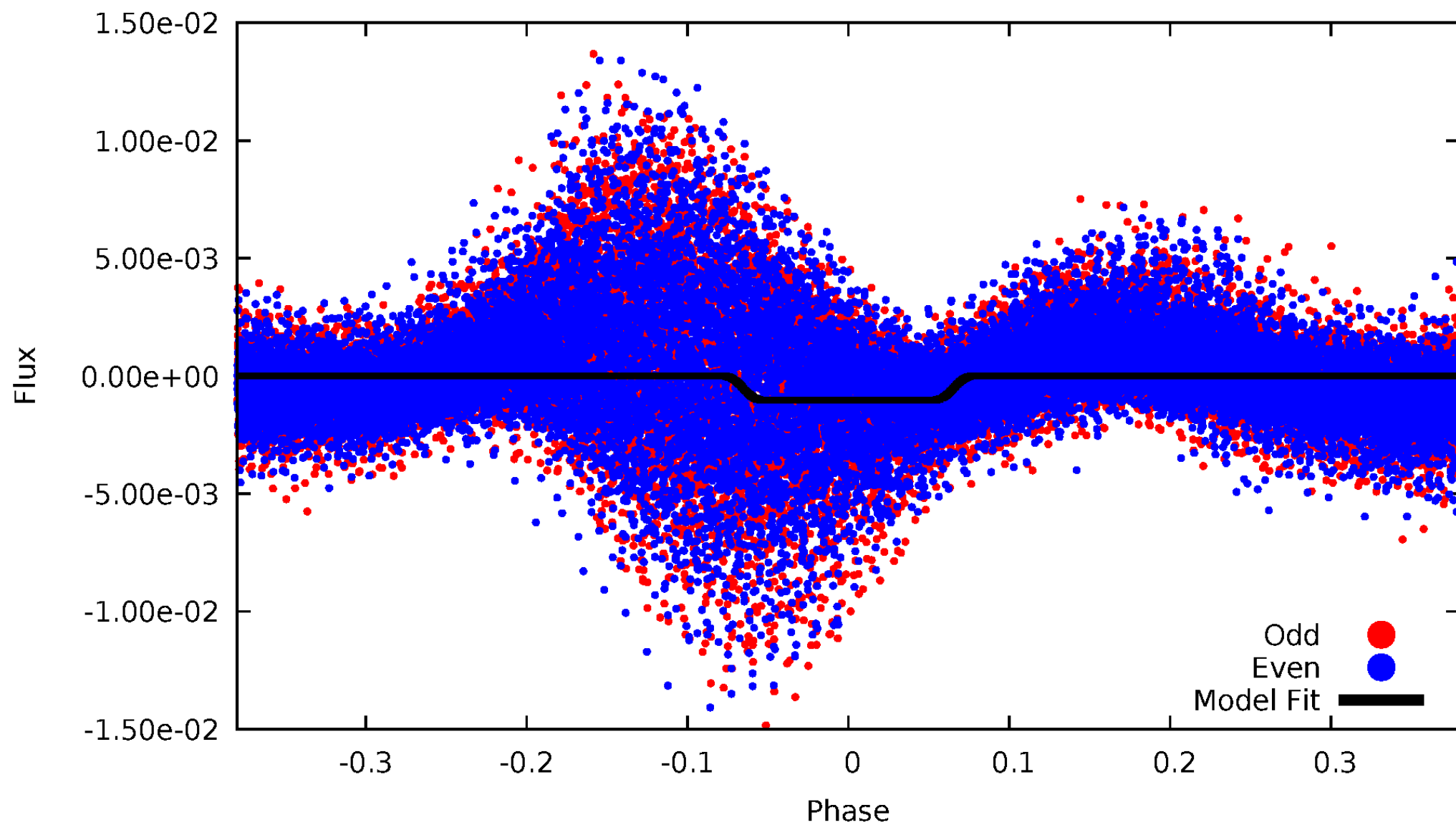
# DV Odd/Even

TCE 005821056-01



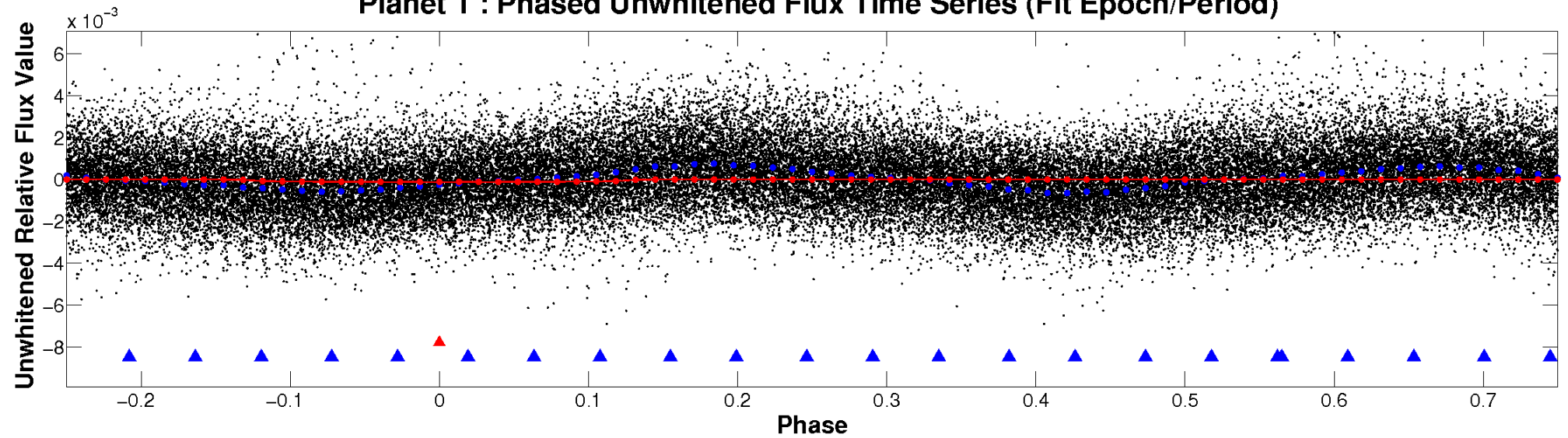
# ALT Odd/Even

TCE 005821056-01

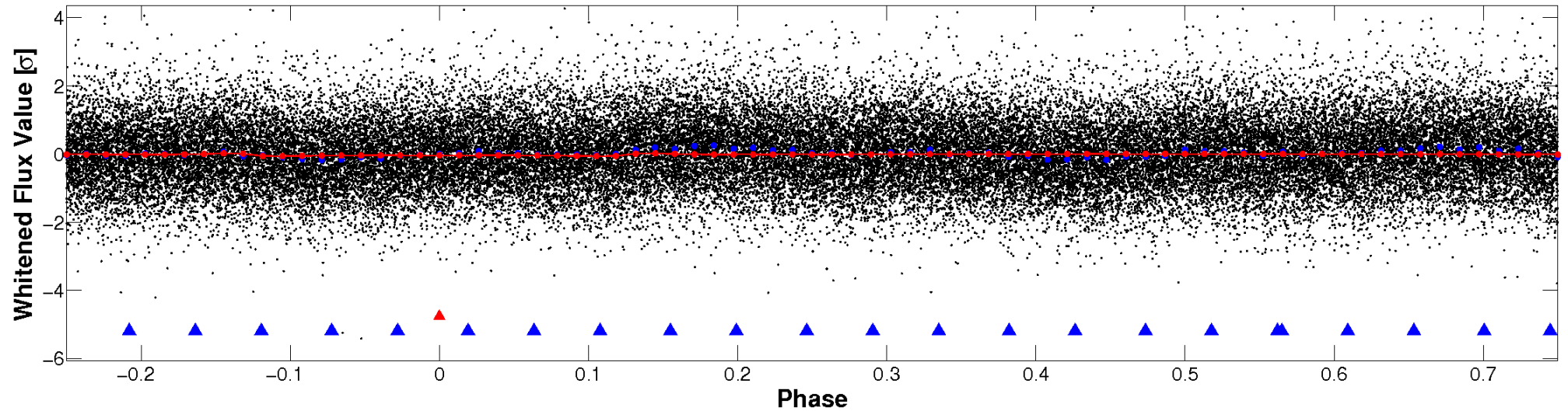


# Non-Whitened Vs. Whitened Light Curve

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



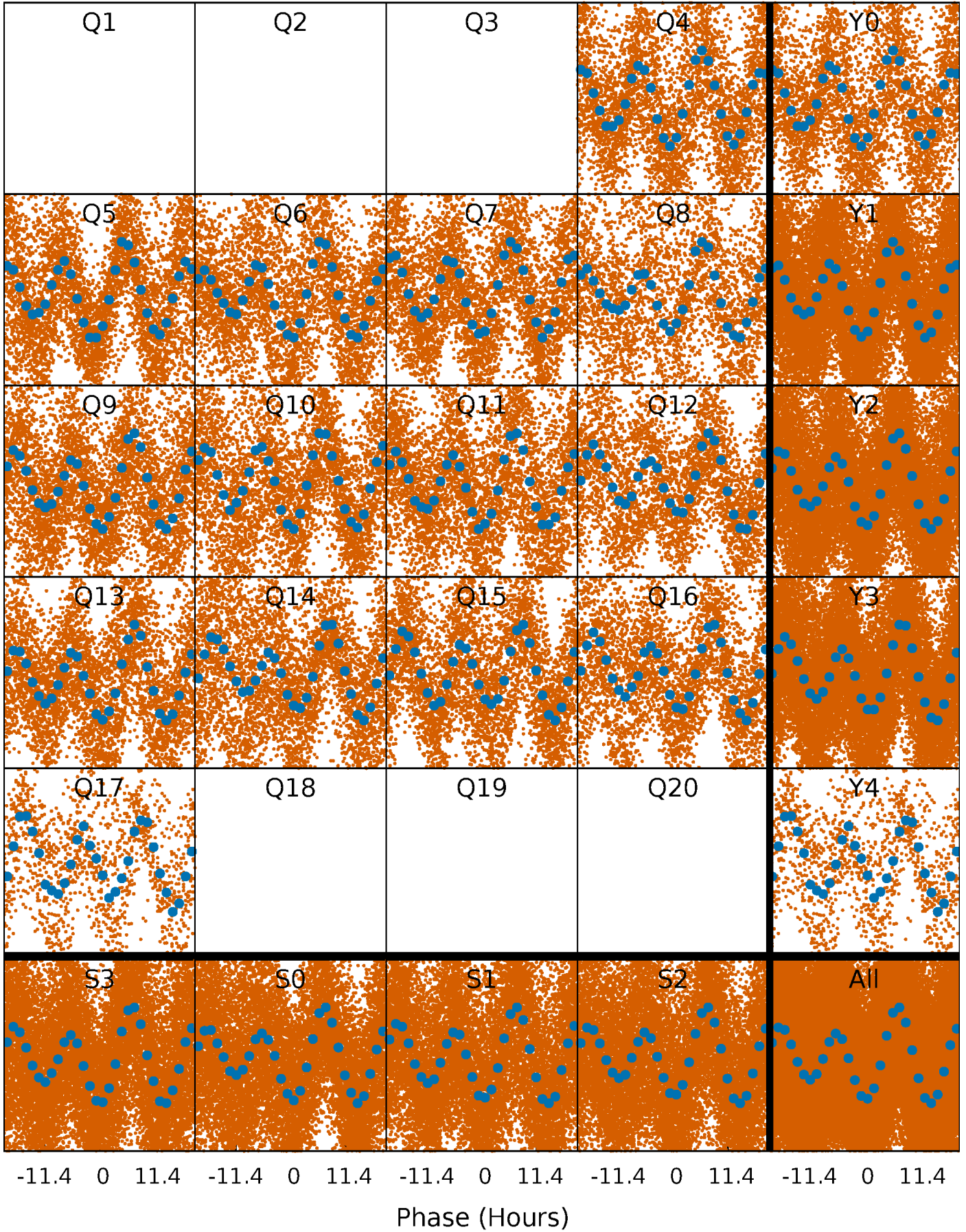
**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**





# PDC Quarter-Phased Transit Curves

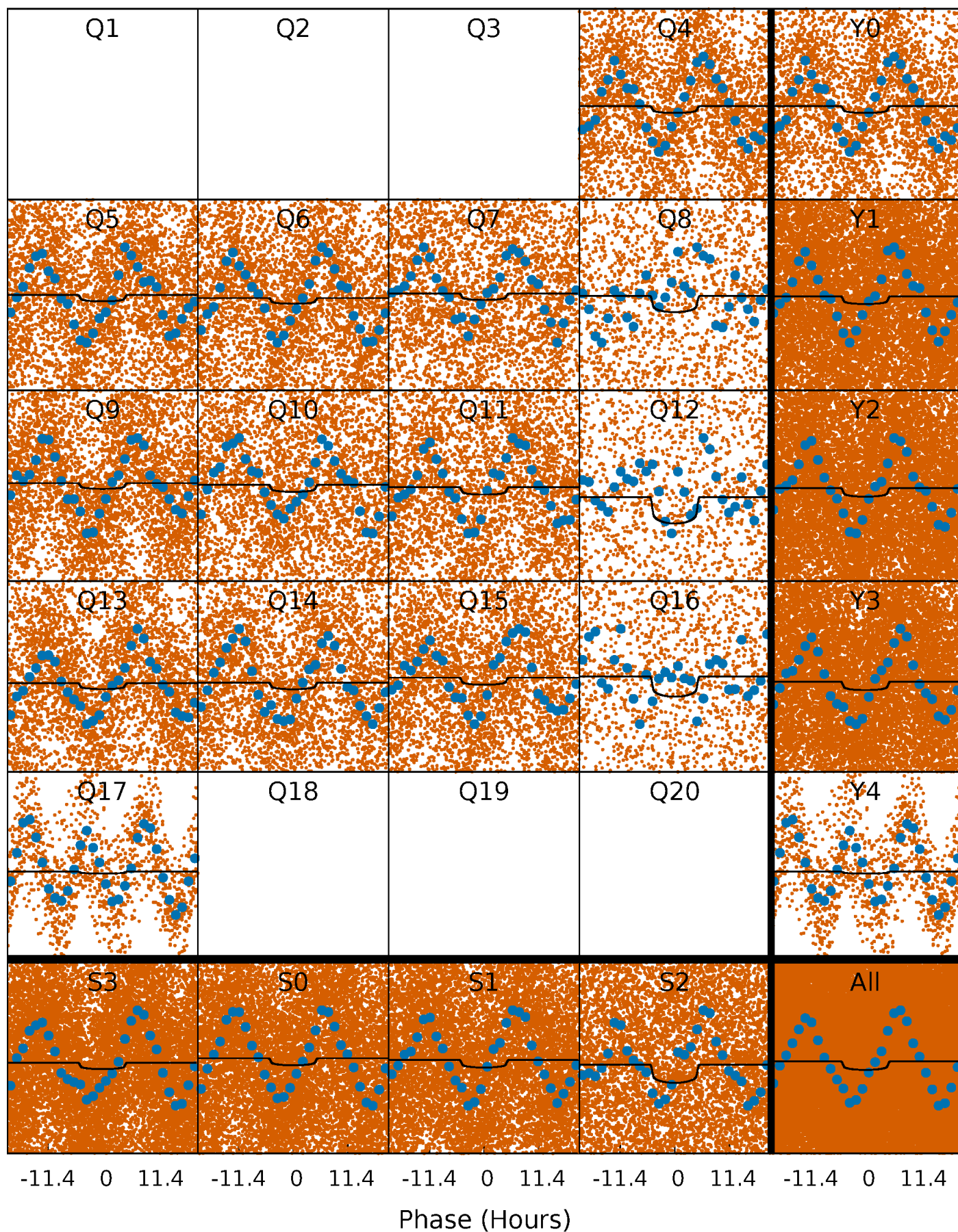
TCE 005821056-01 P= 1.553336 Days  $T_0=132.592207$  (BKJD)





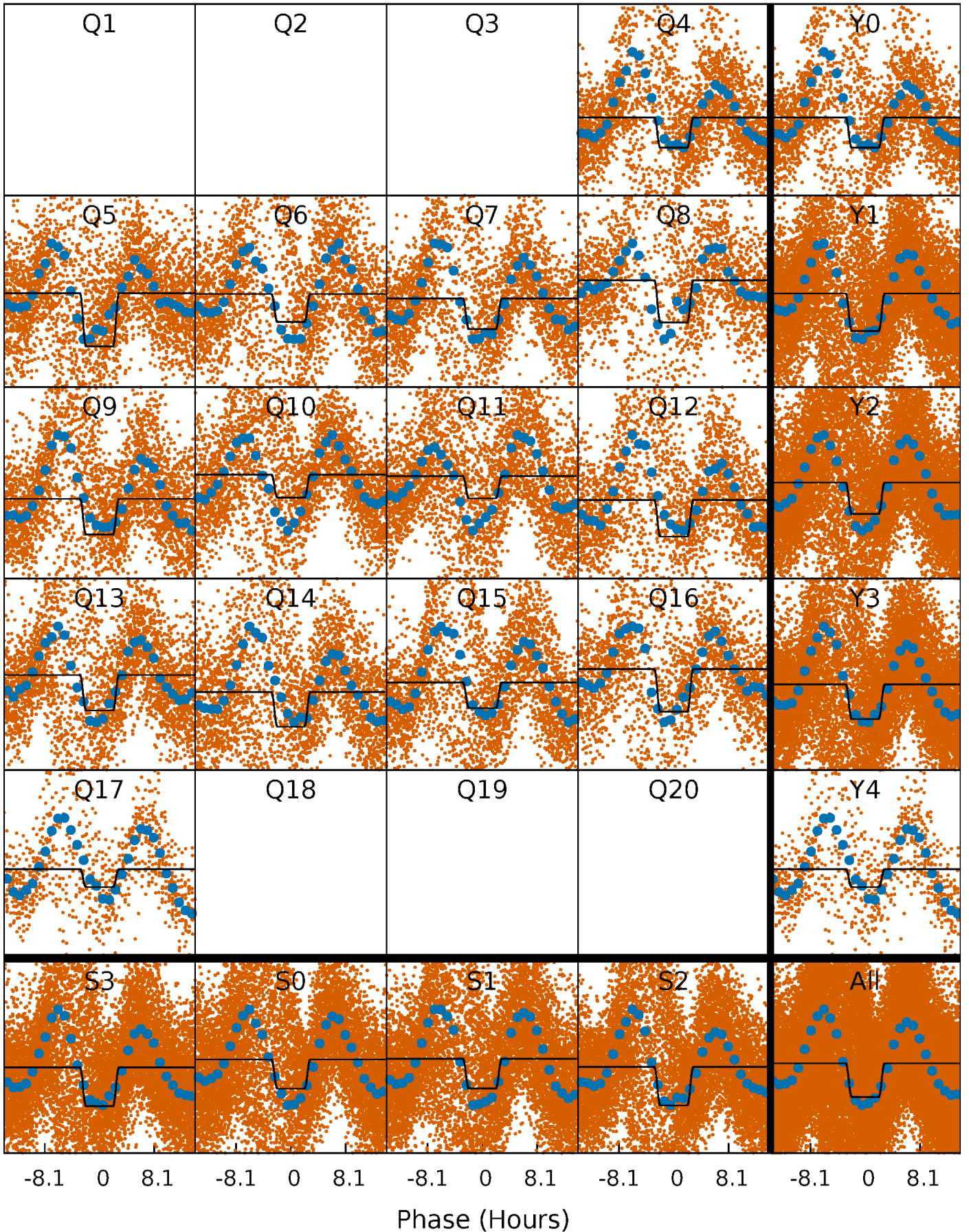
# DV Quarter-Phased Transit Curves

TCE 005821056-01 P= 1.553336 Days  $T_0=132.592207$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

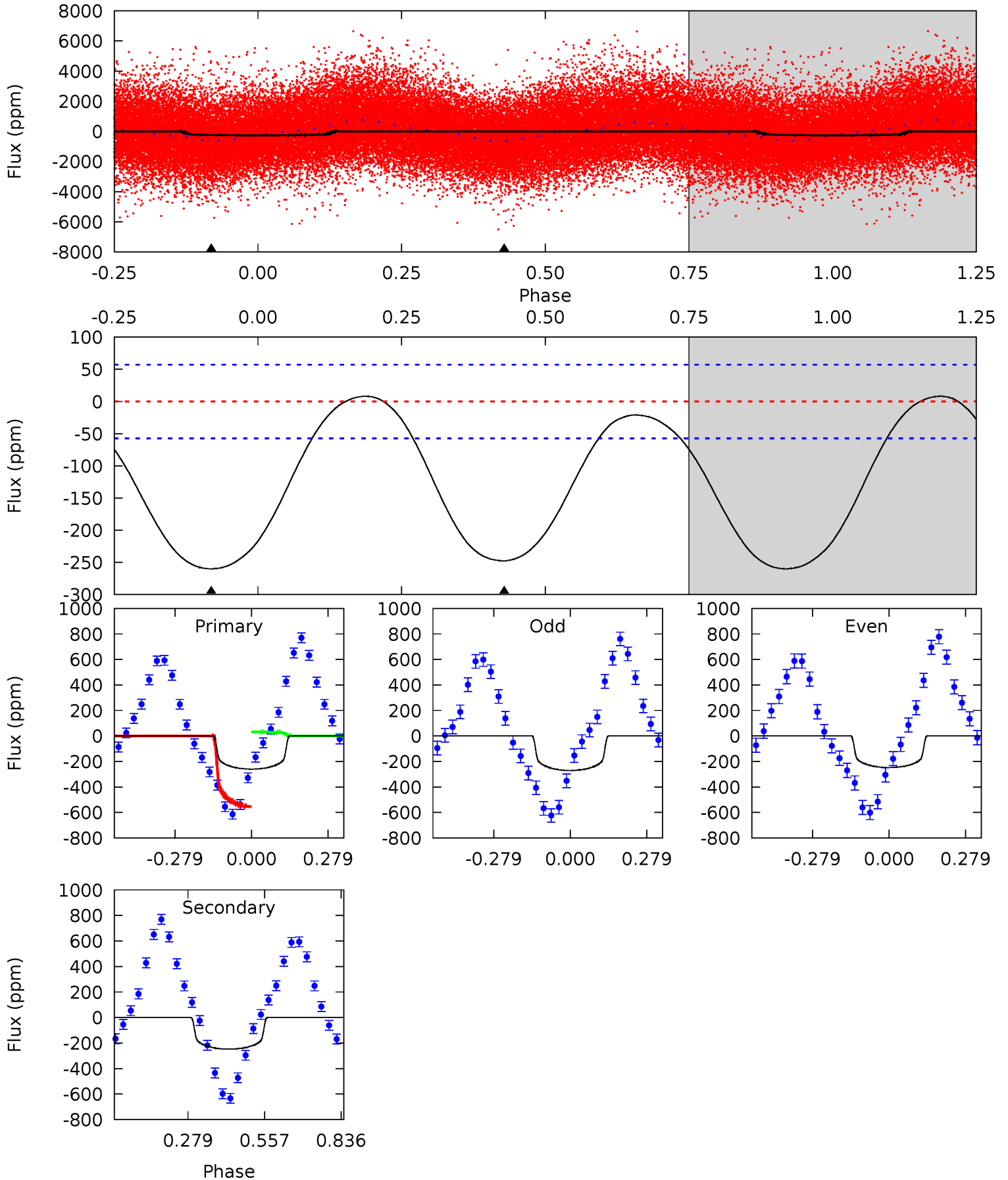
TCE 005821056-01 P= 1.553498 Days  $T_0=132.537173$  (BKJD)



# DV Model-Shift Uniqueness Test

005821056-01, P = 1.553336 Days, E = 132.592207 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
19.7	18.8	0	0	4.34	1.08	1.07	19.7	19.7	18.8	18.8	0.88	0.91	0.03	22.1

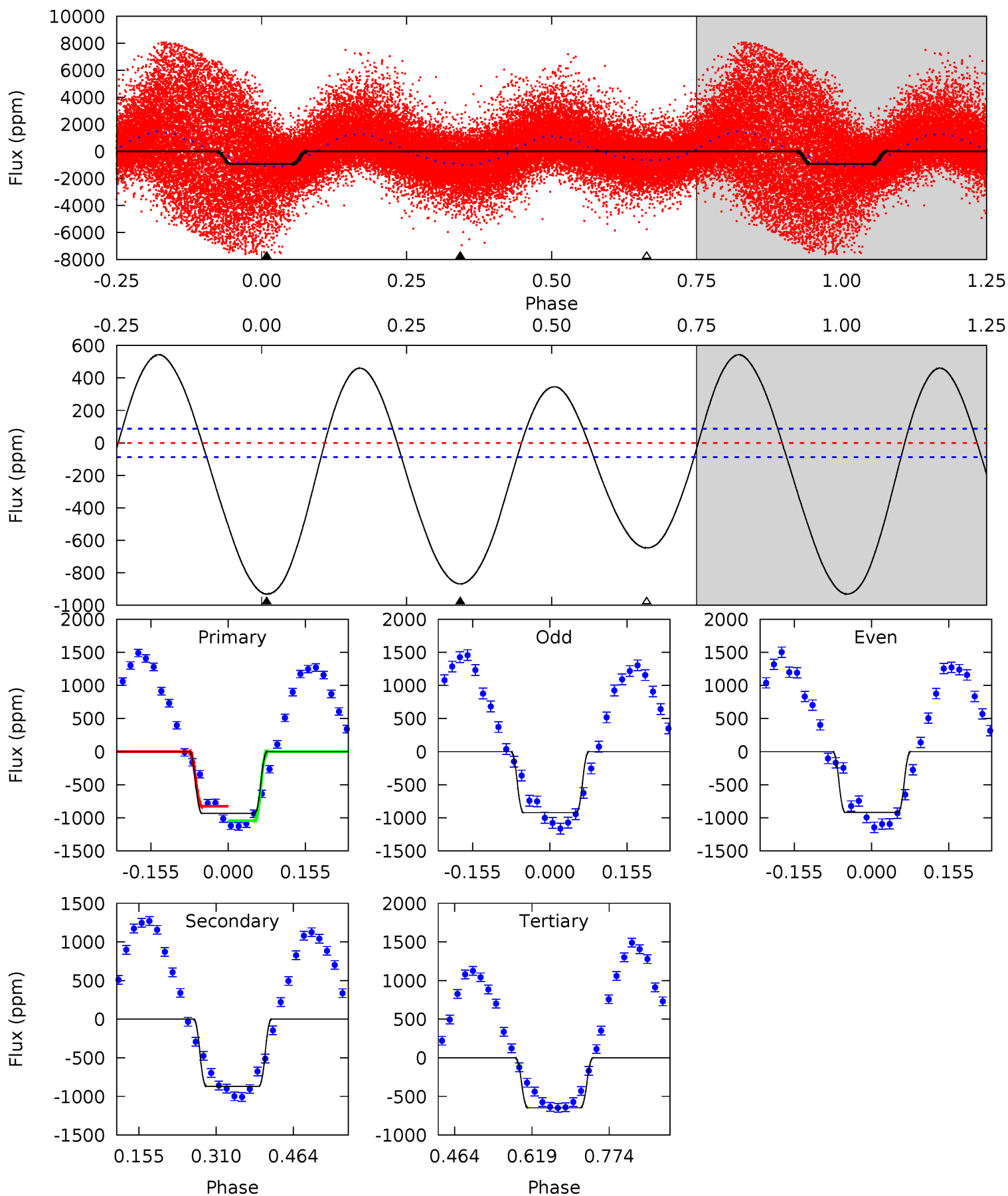




# Alt Model-Shift Uniqueness Test

005821056-01, P = 1.553498 Days, E = 132.537173 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
47.6	44.4	33.1	0	4.47	1.42	21.4	14.5	47.6	11.3	44.4	0.08	1.50	0.37	5.61





### Stellar Parameters For KIC 005821056

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6609^{+184}_{-253}$	$4.484^{+0.052}_{-0.208}$	$-0.500^{+0.250}_{-0.350}$	$0.974^{+0.299}_{-0.100}$	$1.073^{+0.135}_{-0.148}$	$1.638^{+0.347}_{-0.886}$
	+3%/-4%	+1%/-5%	+50%/-70%	+31%/-10%	+13%/-14%	+21%/-54%
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 005821056-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-247 \pm 13$	$1.24^{+0.34}_{-0.28}$	$2515^{+179}_{-128}$	$8042^{+1529}_{-926}$	$62^{+39}_{-23}$
Alt.	$-869 \pm 20$	$3.57^{+0.62}_{-0.45}$	$2516^{+182}_{-130}$	$6288^{+344}_{-294}$	$26^{+7}_{-7}$

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

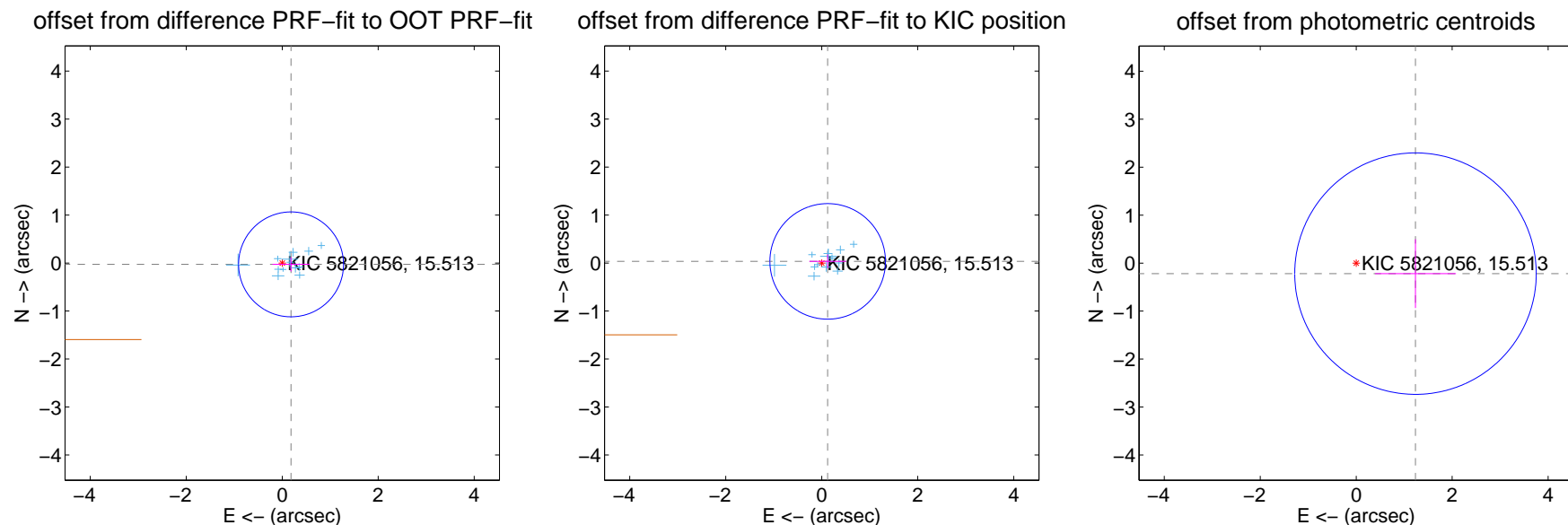
## DV Centroid Data

Supplemental centroid analysis for 005821056-01. Kepler magnitude: 15.51. Transit SNR 5.74

There are 13 quarters with good PRF difference image offsets

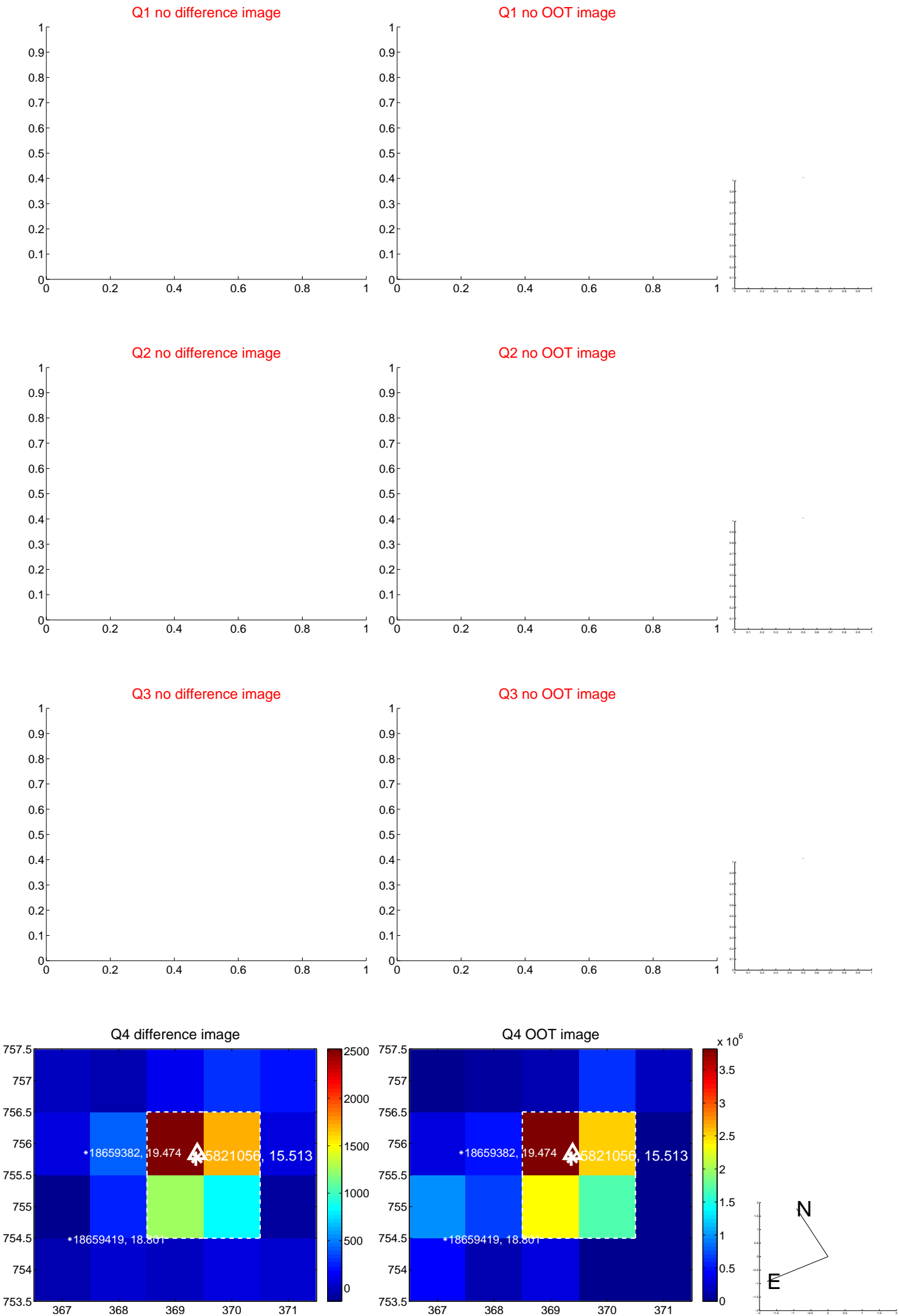
The direct PRF centroid is offset from the target star catalog position by about 0.12 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.186 \pm 0.364$	0.51	$-0.184 \pm 0.386$	$-0.028 \pm 0.147$
PRF-fit source offset from KIC position	$0.129 \pm 0.401$	0.32	$-0.124 \pm 0.383$	$0.035 \pm 0.144$
photometric centroid source offset	$1.26 \pm 0.84$	1.50	$-1.24 \pm 0.84$	$-0.22 \pm 0.72$

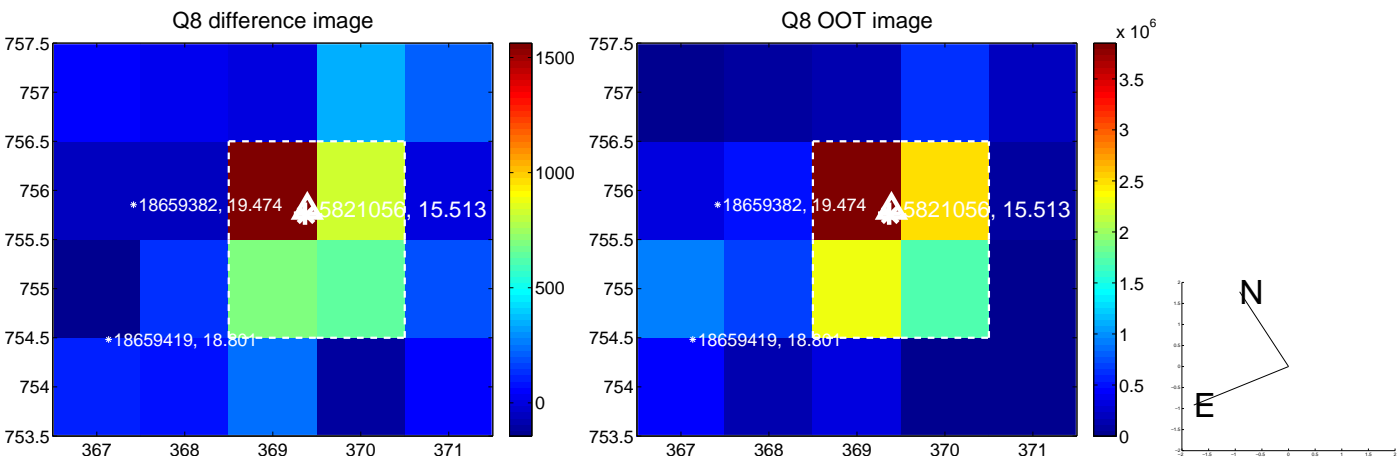
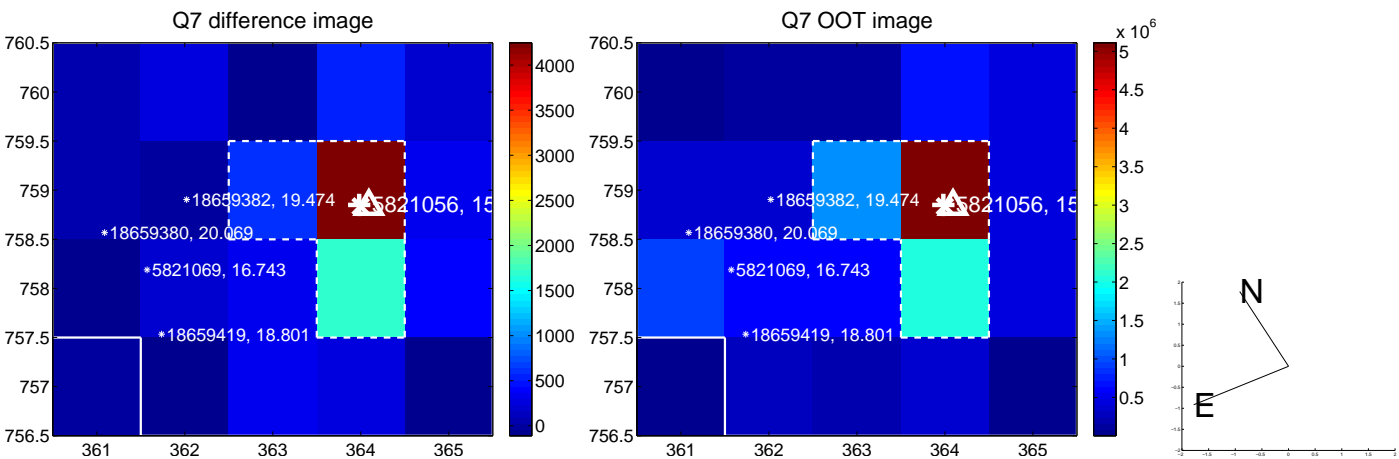
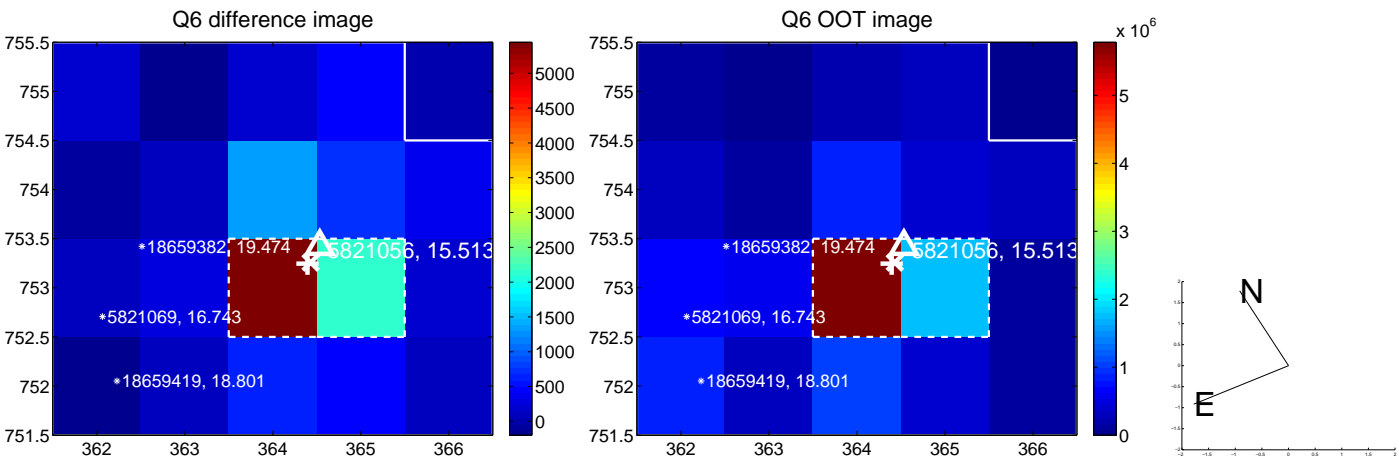
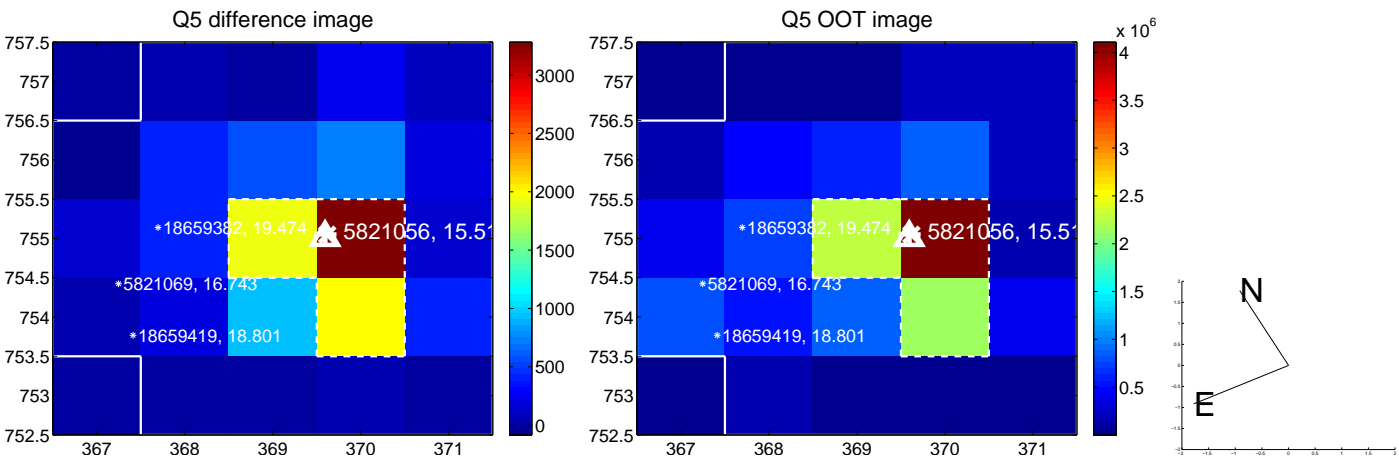


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

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

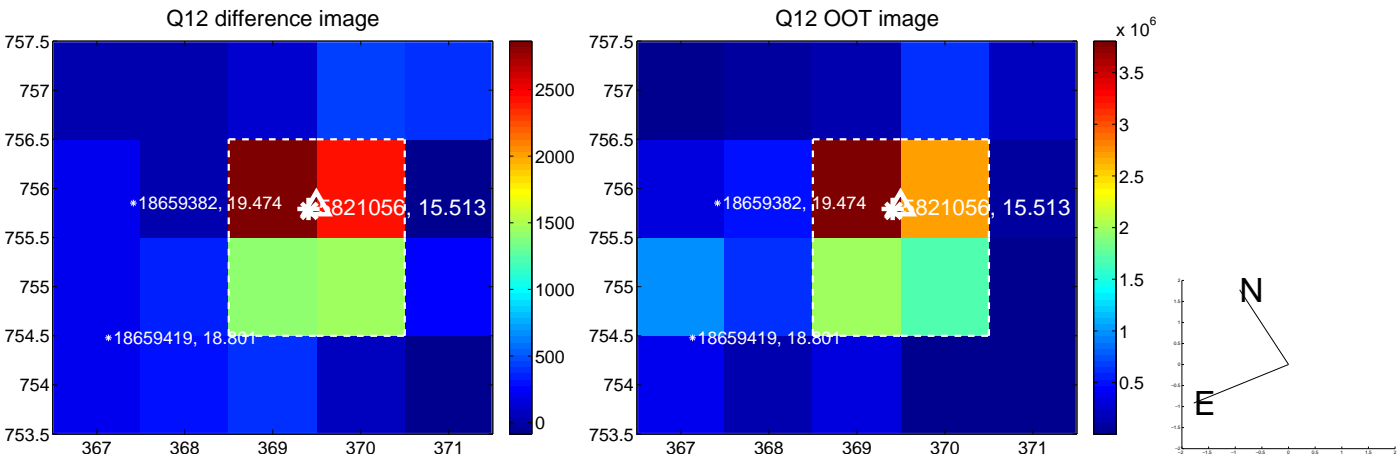
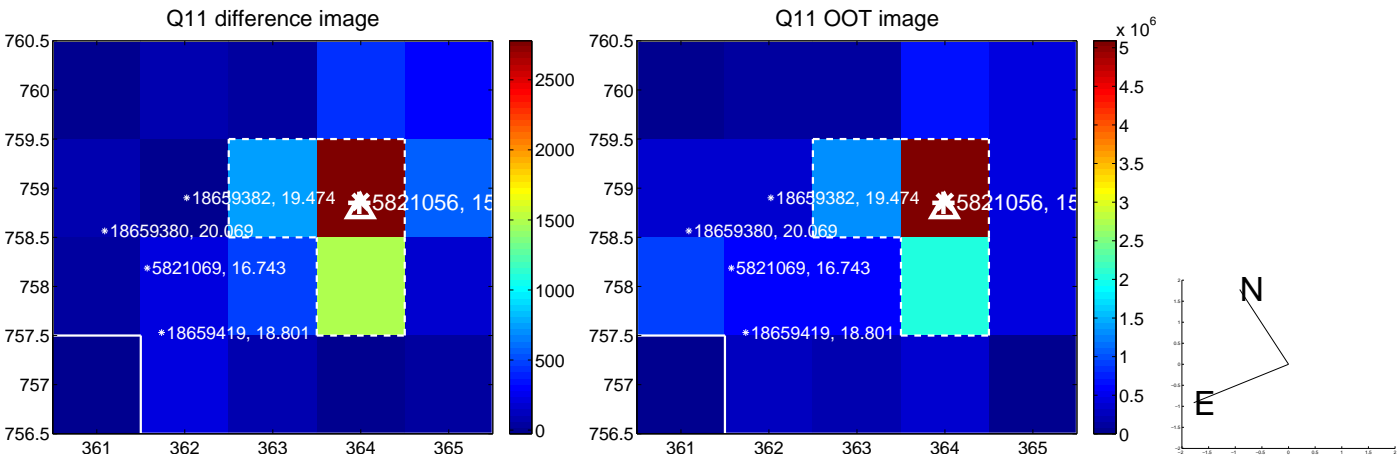
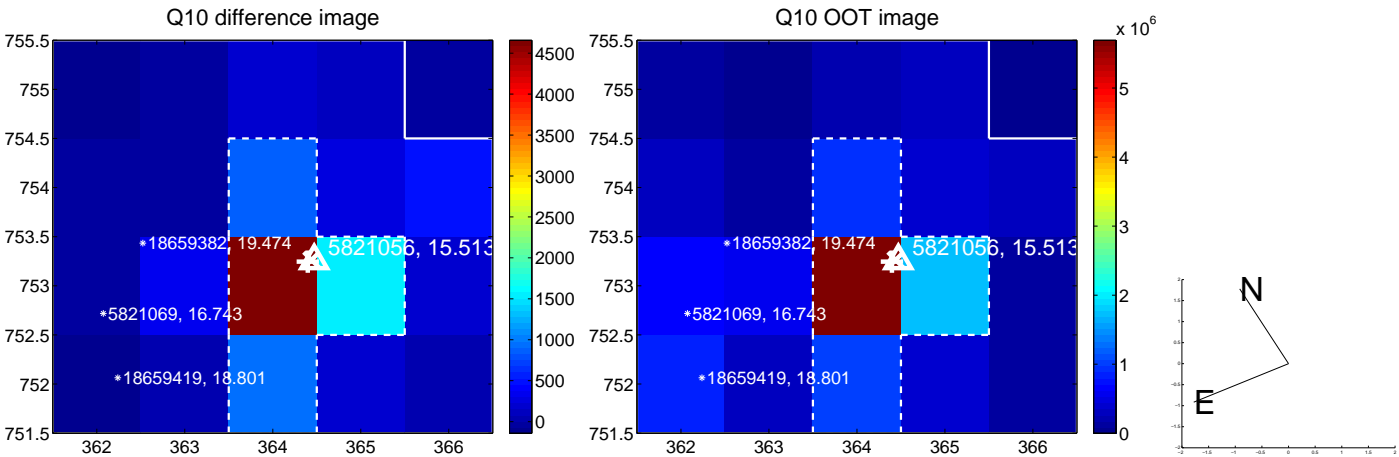
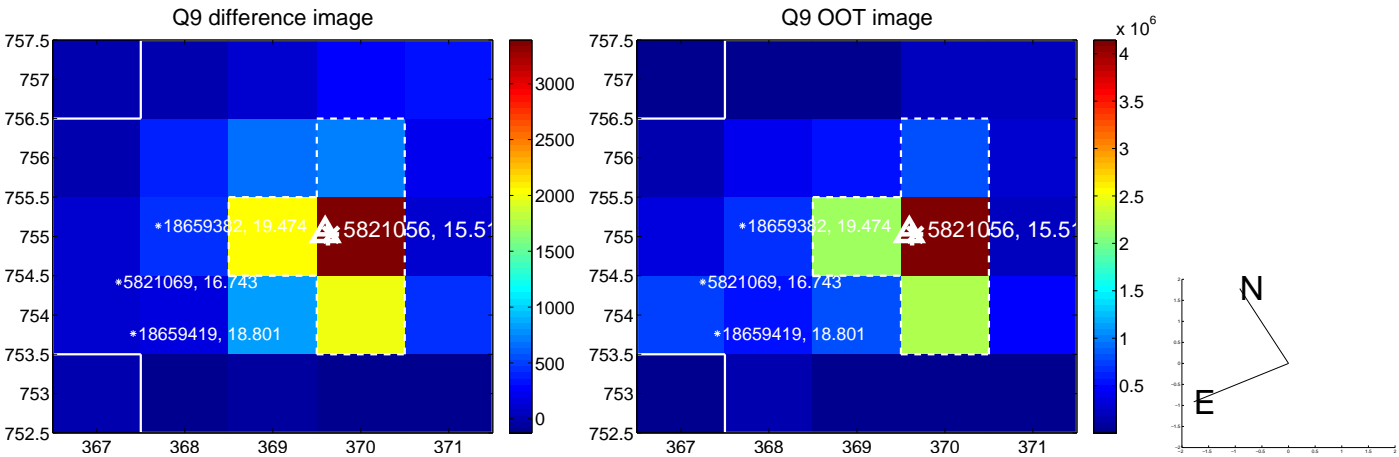


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

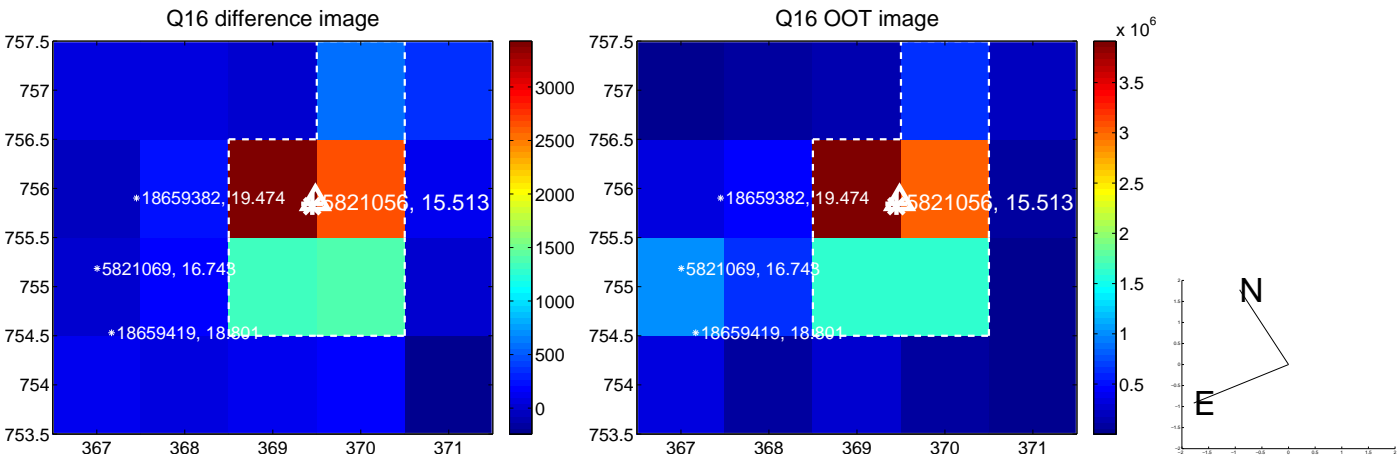
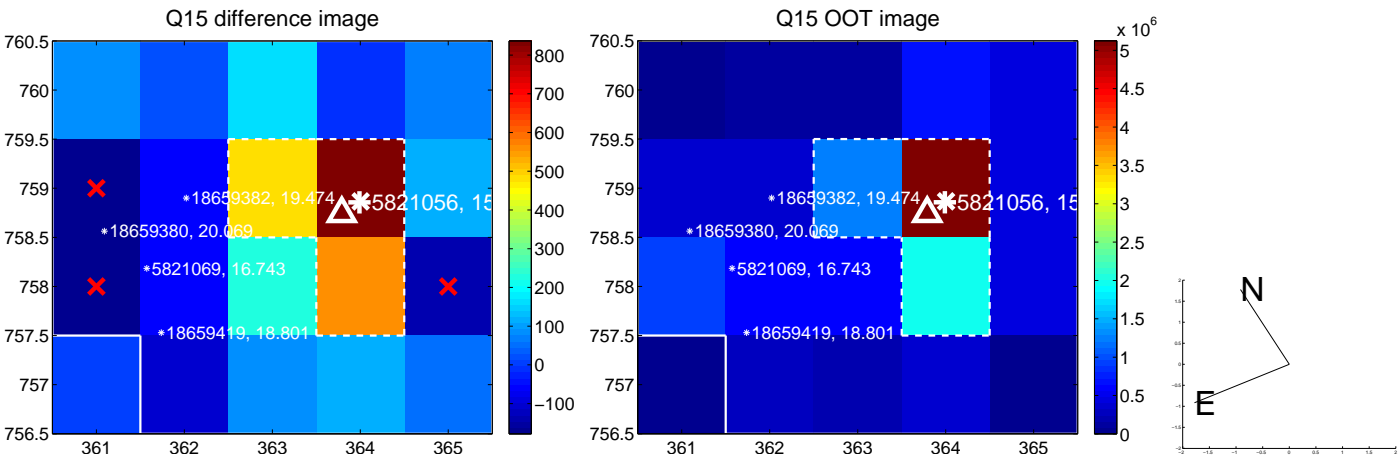
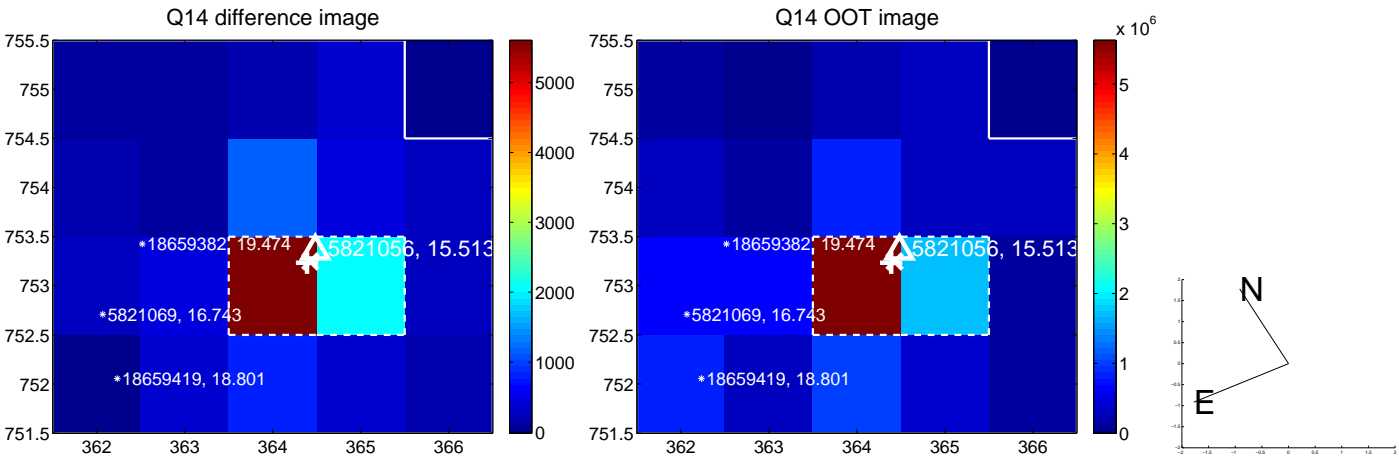
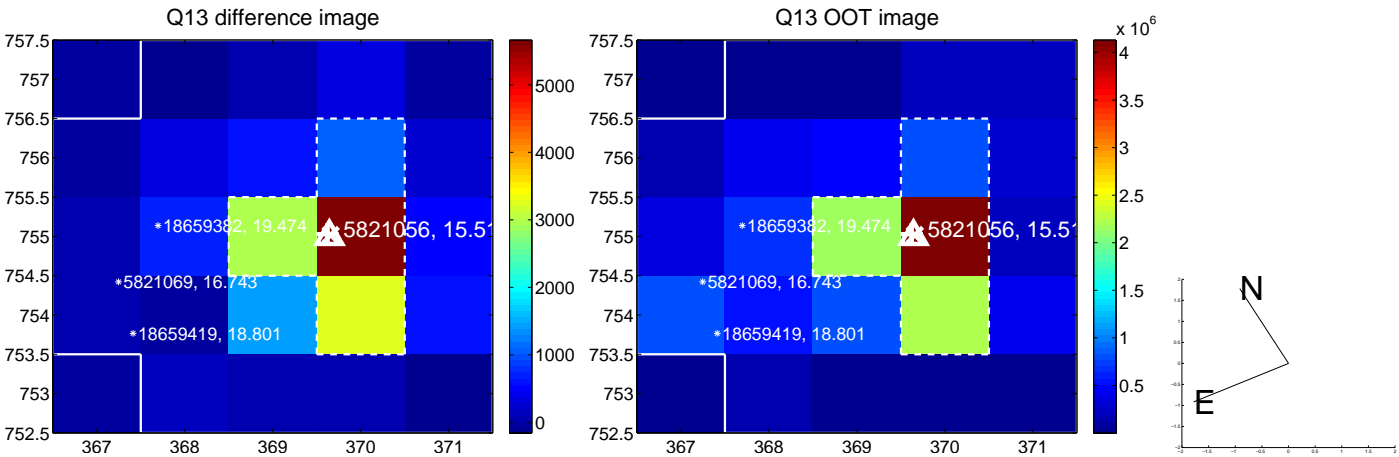




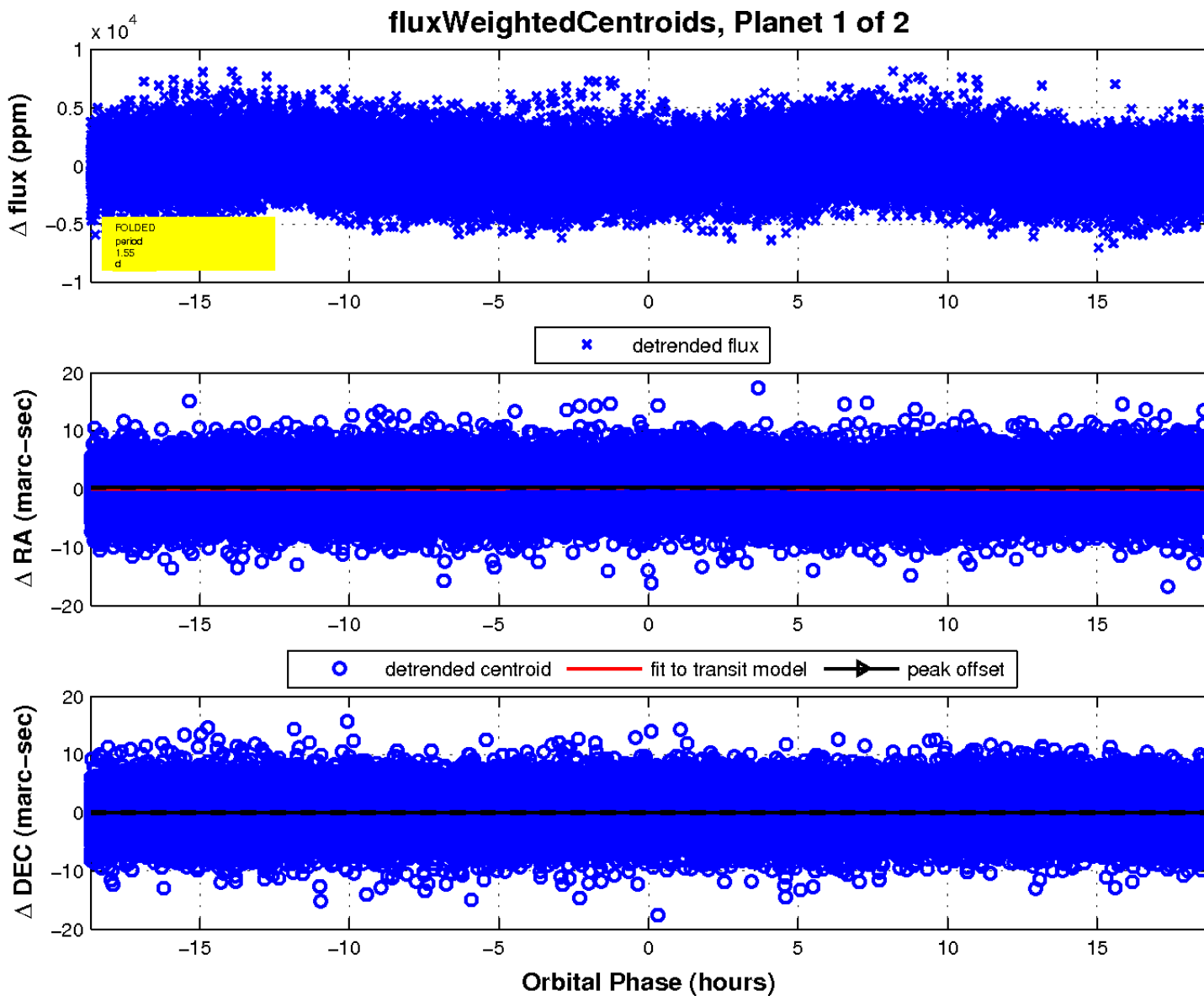
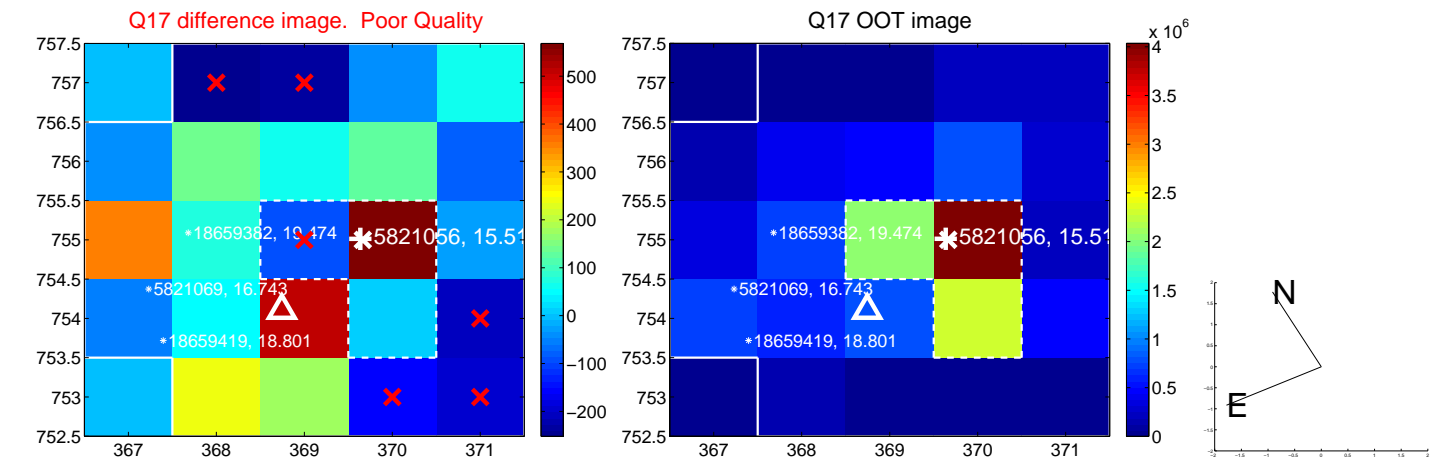
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



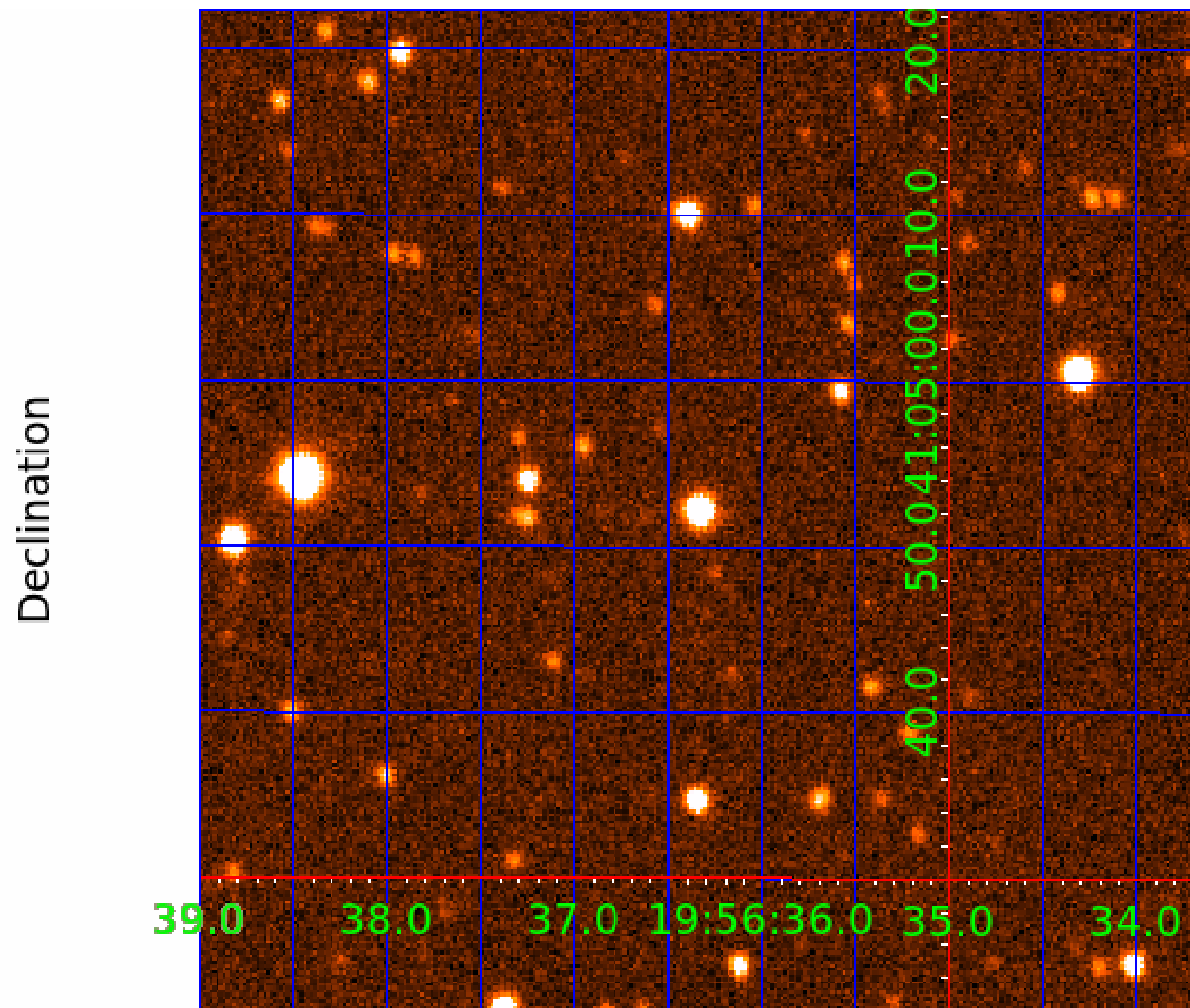
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image





# KIC 005821056

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005821056-01	OBS	No	1.553336	132.592207	116.1	9.941	9.8	5.7	0.97	6609	1.18	2270.51
005821056-02	OBS	No	64.887269	142.785231	2259.4	7.026	7.6	7.7	0.97	6609	5.06	15.66

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005821056-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT
005821056-02	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

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

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

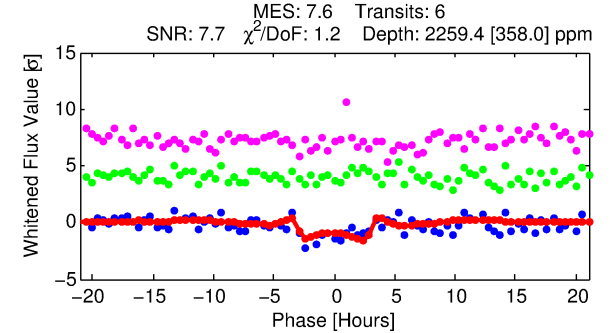
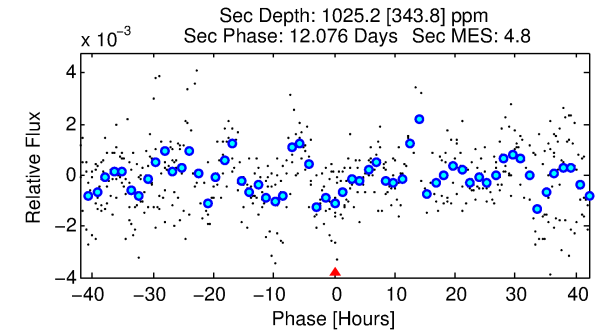
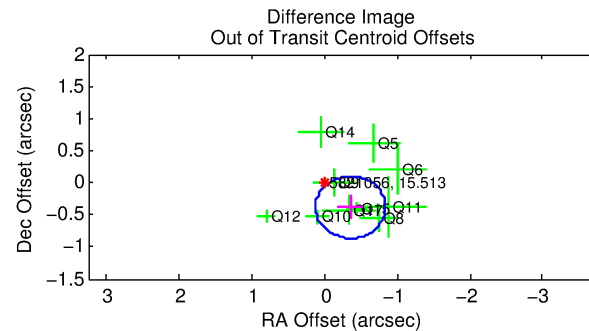
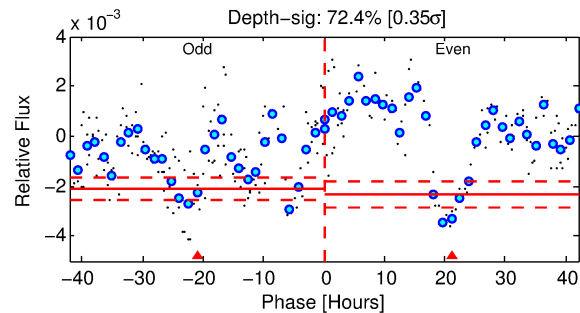
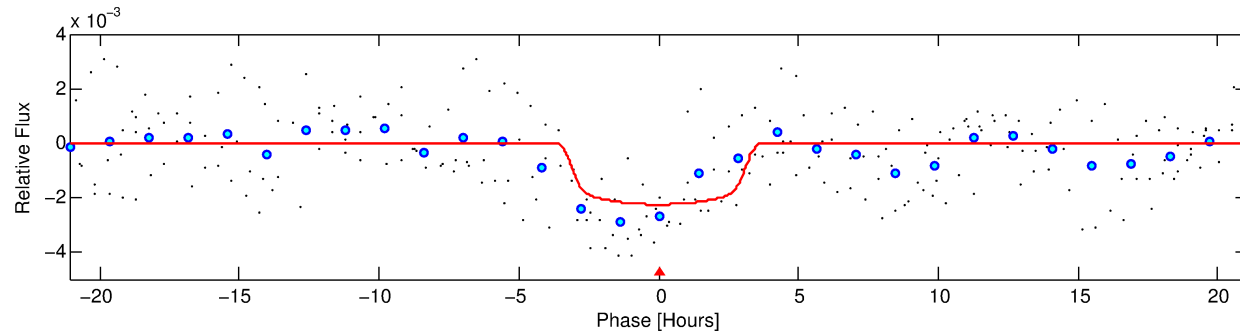
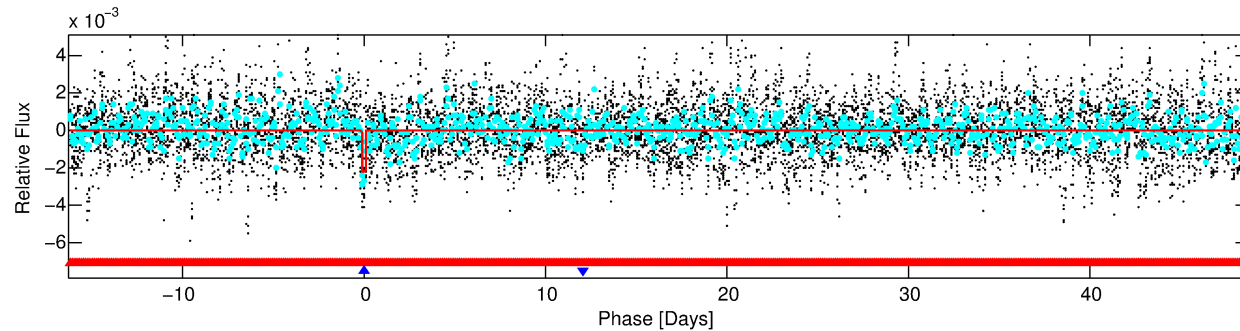
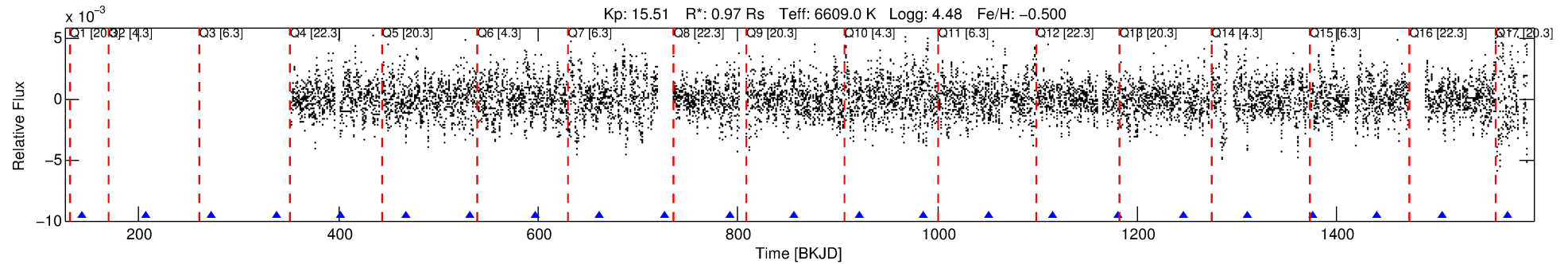
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 005821056-02

No Significant Match Found

# DV One-Page Summary

KIC: 5821056 Candidate: 2 of 2 Period: 64.887 d



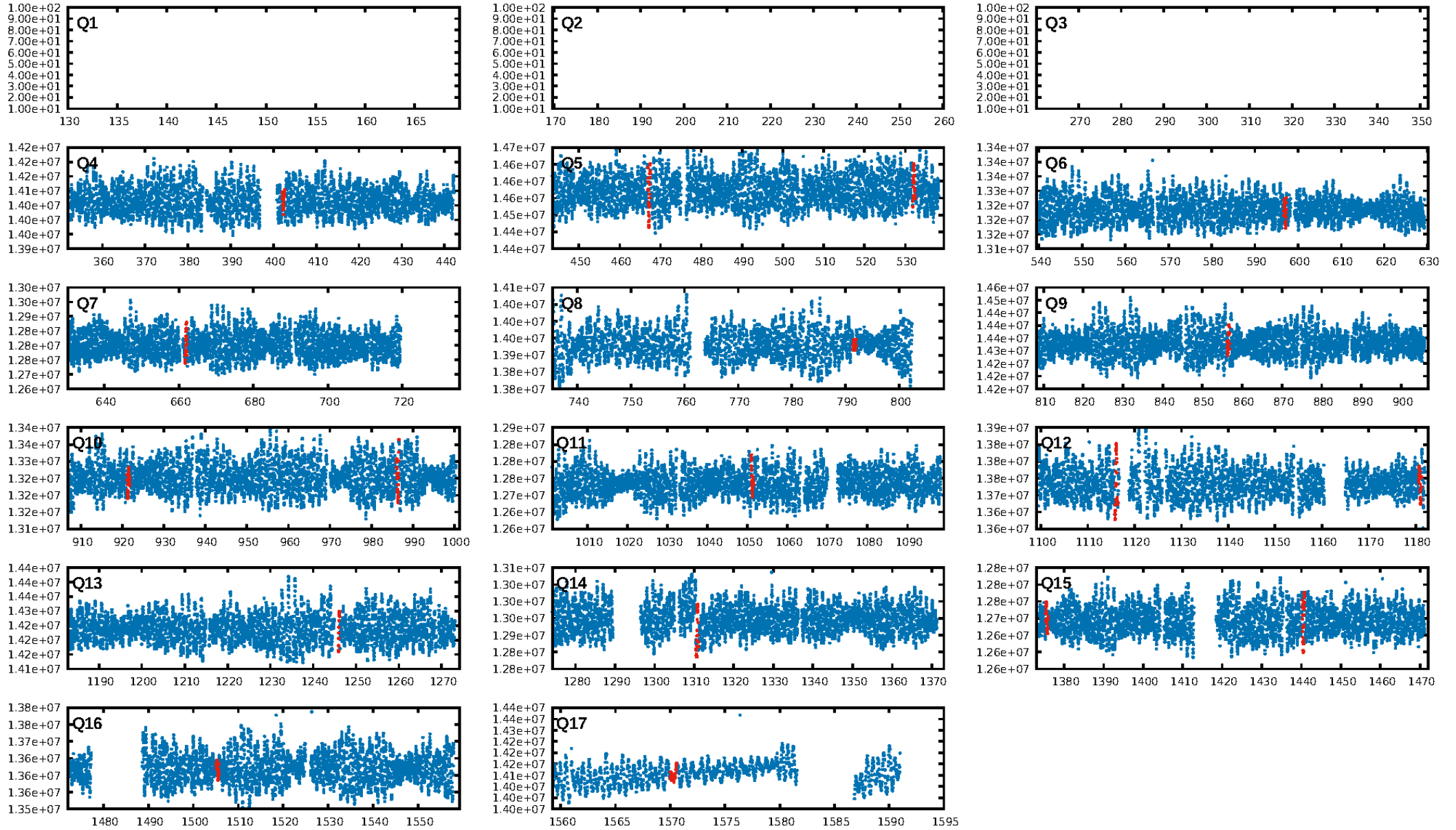
## DV Fit Results:

Period = 64.88727 [0.00105] d  
Epoch = 142.7852 [0.0152] BKJD  
Rp/R\* = 0.0476 [0.0070]  
a/R\* = 50.15 [31.87]  
b = 0.77 [0.33]  
Seff = 15.67 [6.41]  
Teq = 507 [52] K  
Rp = 5.06 [1.72] Re  
a = 0.3217 [0.0835] AU  
Ag = 2282.46 [1334.74] [1.71 $\sigma$ ]  
Teffp = 5421 [638] K [7.68 $\sigma$ ]

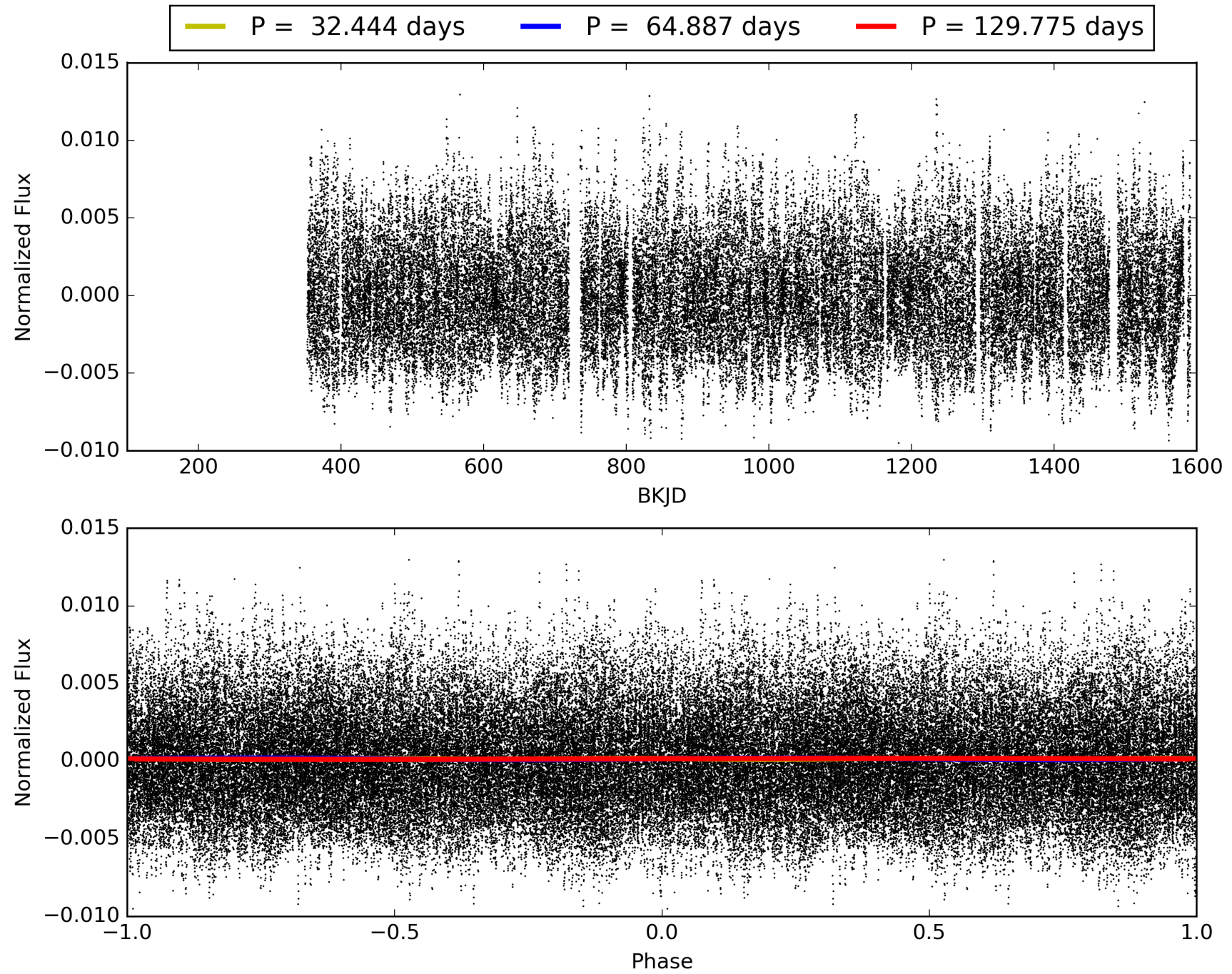
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [124.86 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 24.3%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 2.91e-09**  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: 1.169  
Centroid-sig: 73.6%  
Centroid-so: 0.948 arcsec [2.65 $\sigma$ ]  
**OotOffset-rm: 0.524 arcsec [3.26 $\sigma$ ]**  
KicOffset-rm: 0.441 arcsec [2.71 $\sigma$ ]  
OotOffset-st: 3/2/2/3 [10]  
KicOffset-st: 3/2/2/3 [10]  
DiffImageQuality-fgm: 0.70 [7/10]  
DiffImageOverlap-fno: 0.00 [0/11]

# TCE 005821056-02, PDC Light Curves

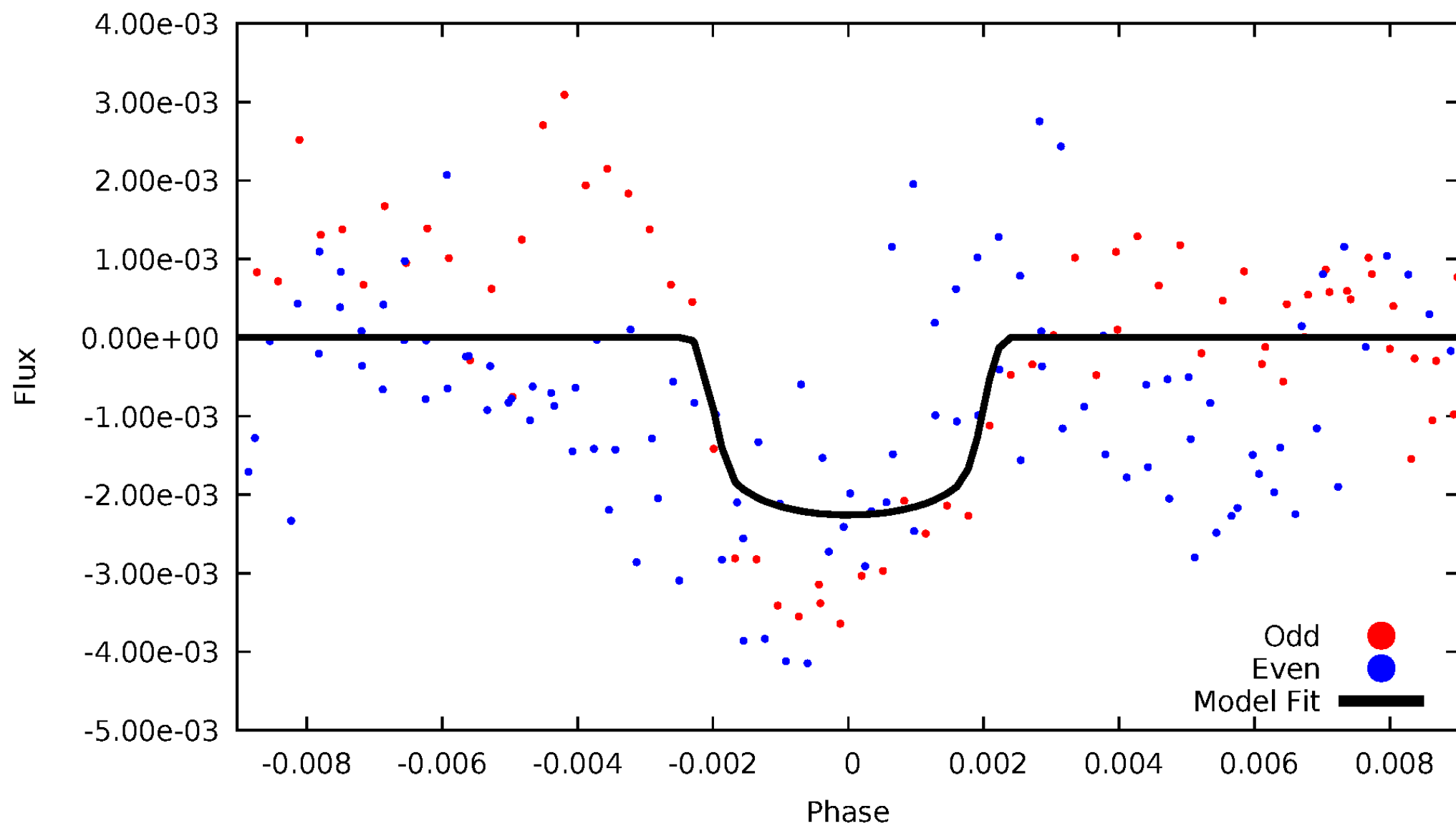


# TCE 005821056-02



# DV Odd/Even

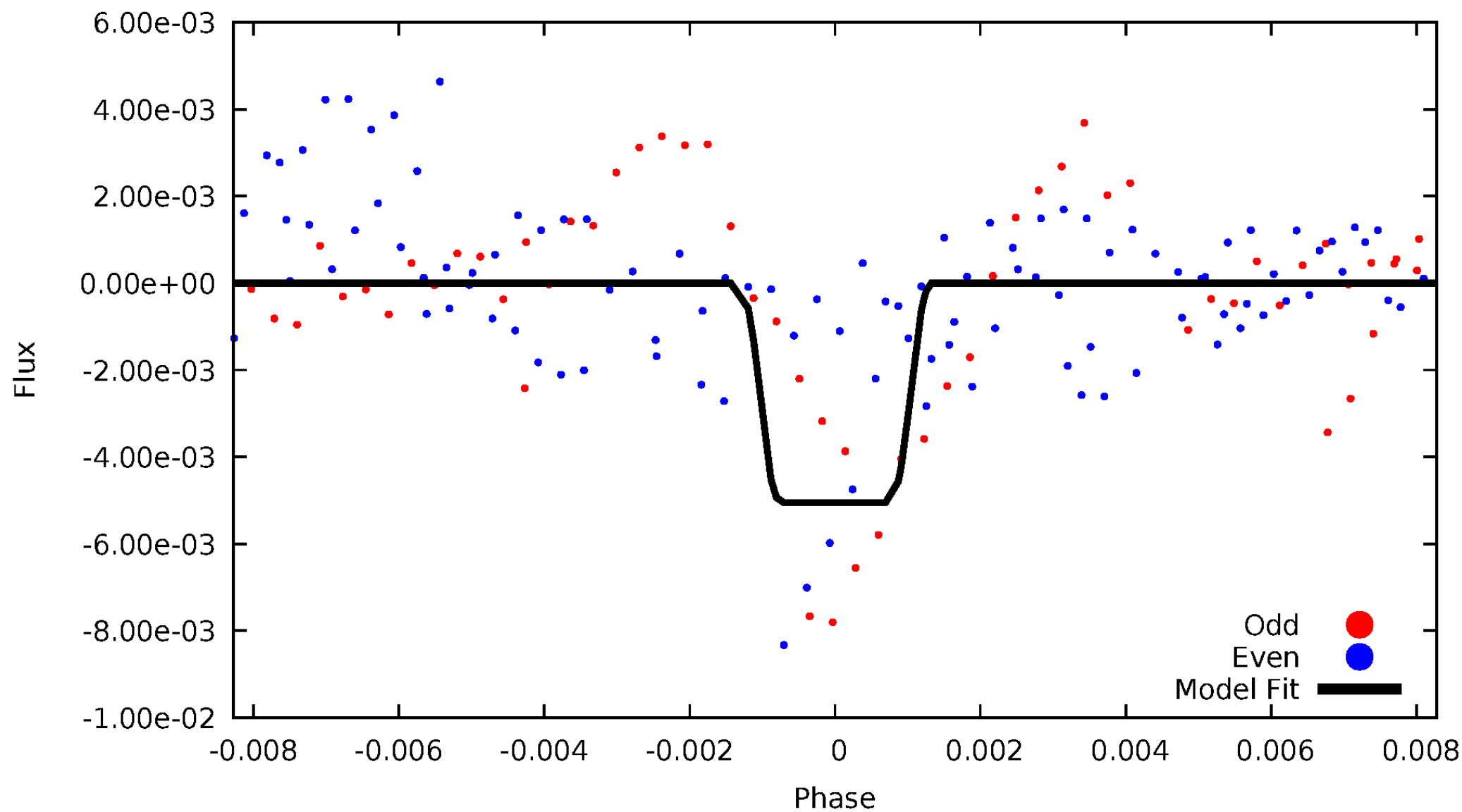
TCE 005821056-02





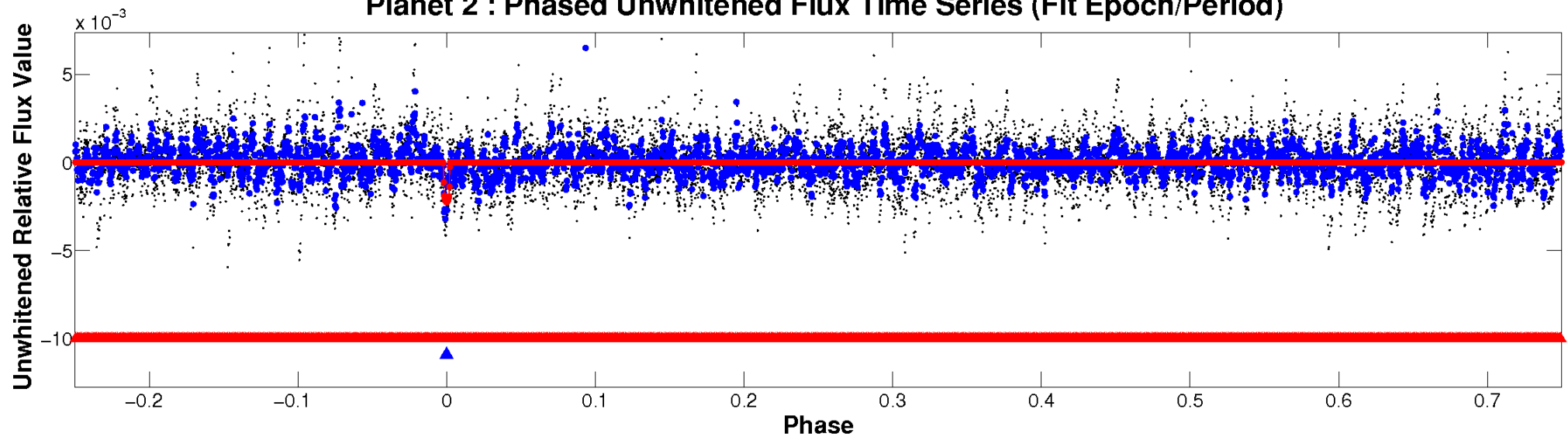
# ALT Odd/Even

TCE 005821056-02

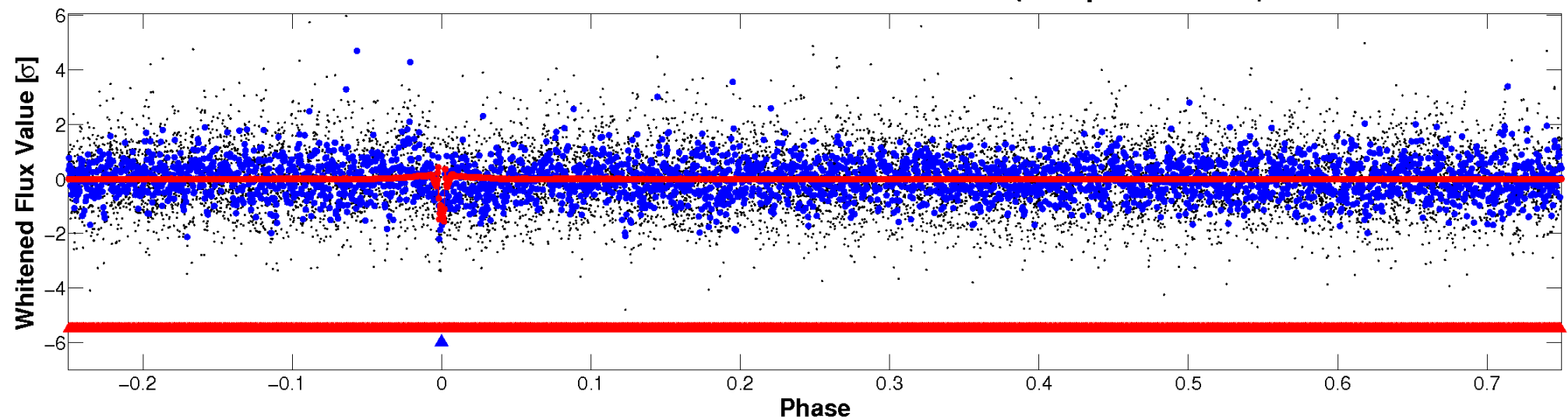


# Non-Whitened Vs. Whitened Light Curve

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

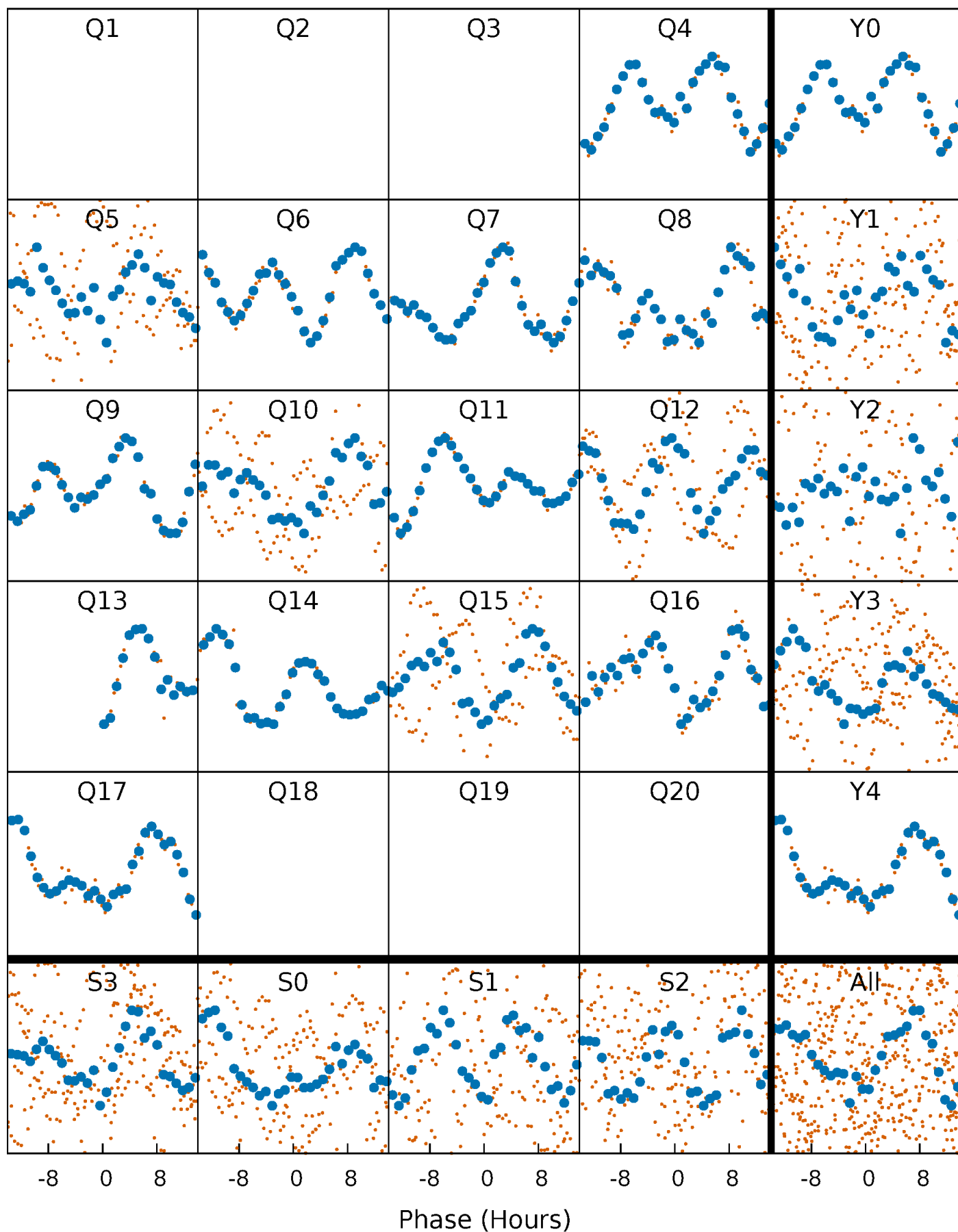


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



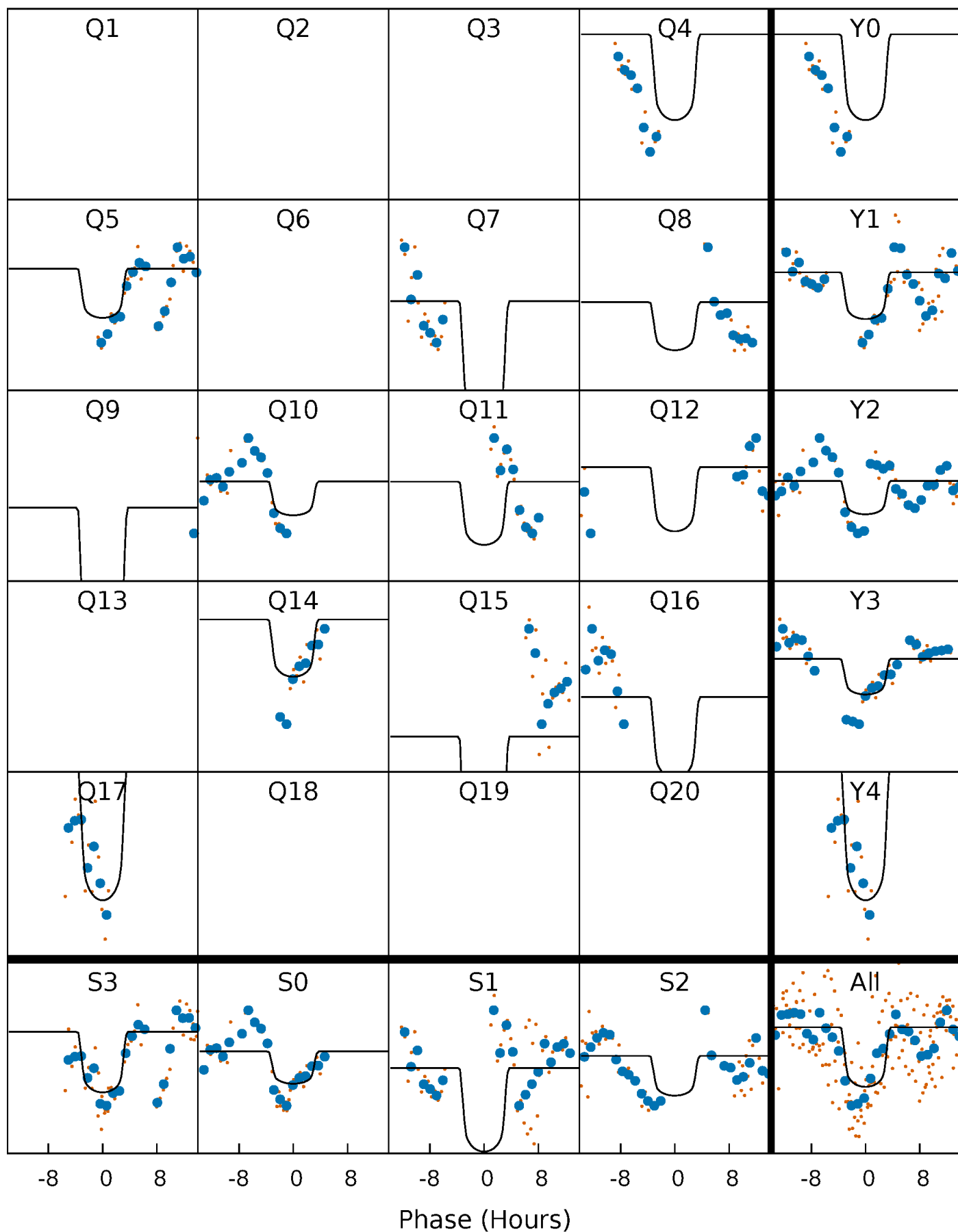
# PDC Quarter-Phased Transit Curves

TCE 005821056-02   P= 64.887269 Days    $T_0=142.785231$  (BKJD)



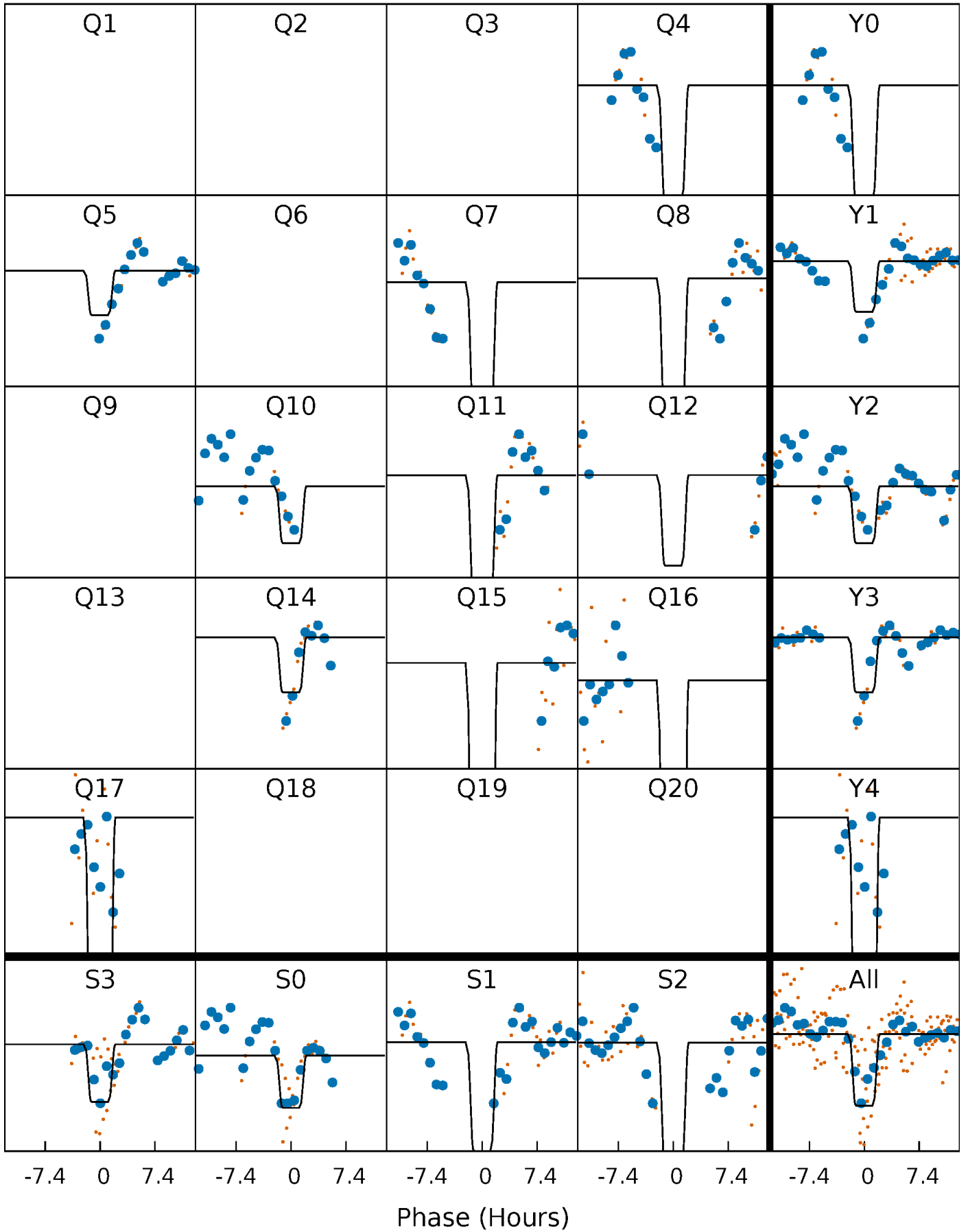
# DV Quarter-Phased Transit Curves

TCE 005821056-02   P= 64.887269 Days    $T_0=142.785231$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 005821056-02     $P = 64.883478$  Days     $T_0 = 142.798619$  (BKJD)

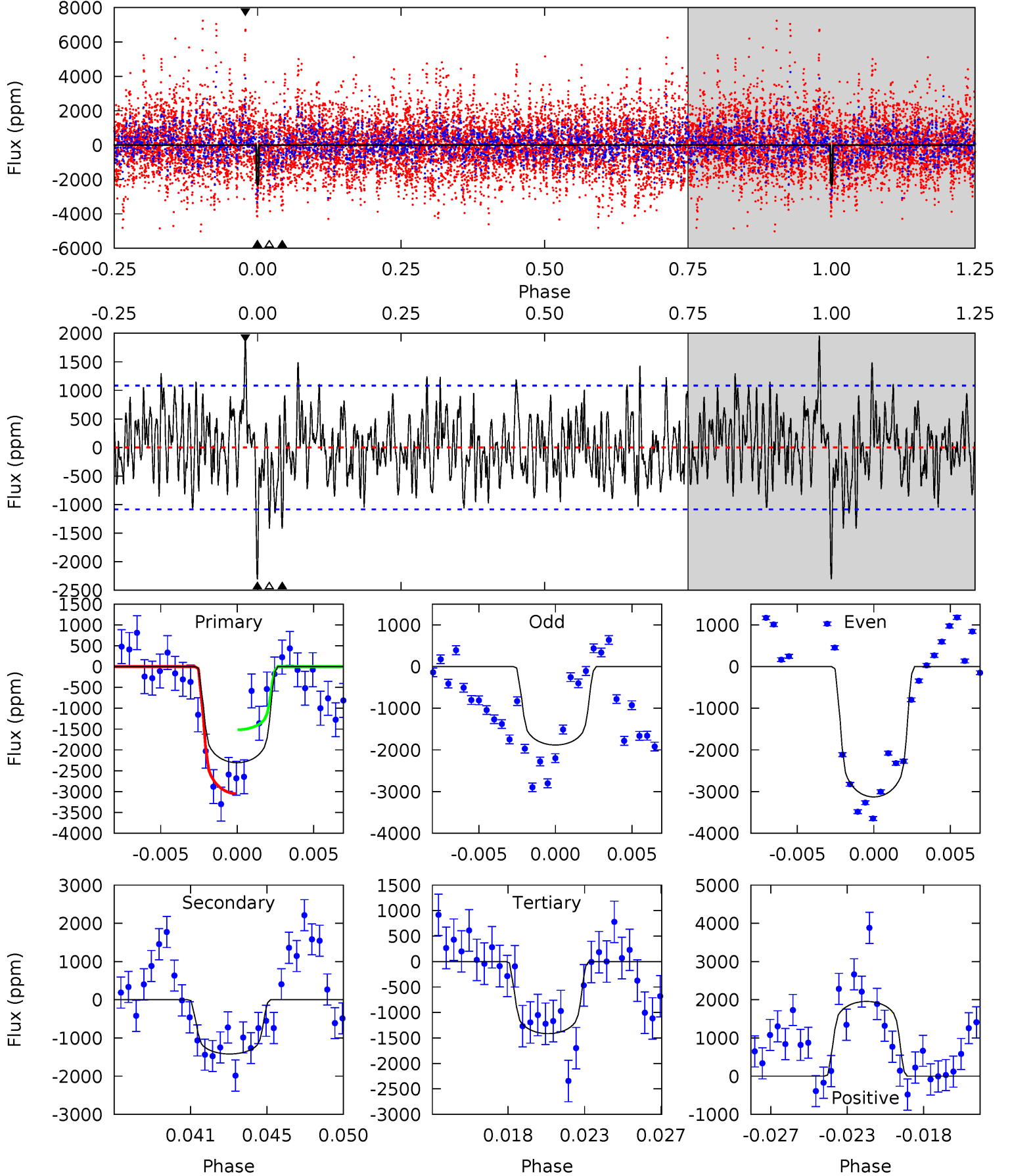




# DV Model-Shift Uniqueness Test

005821056-02, P = 64.887269 Days, E = 142.785231 Days

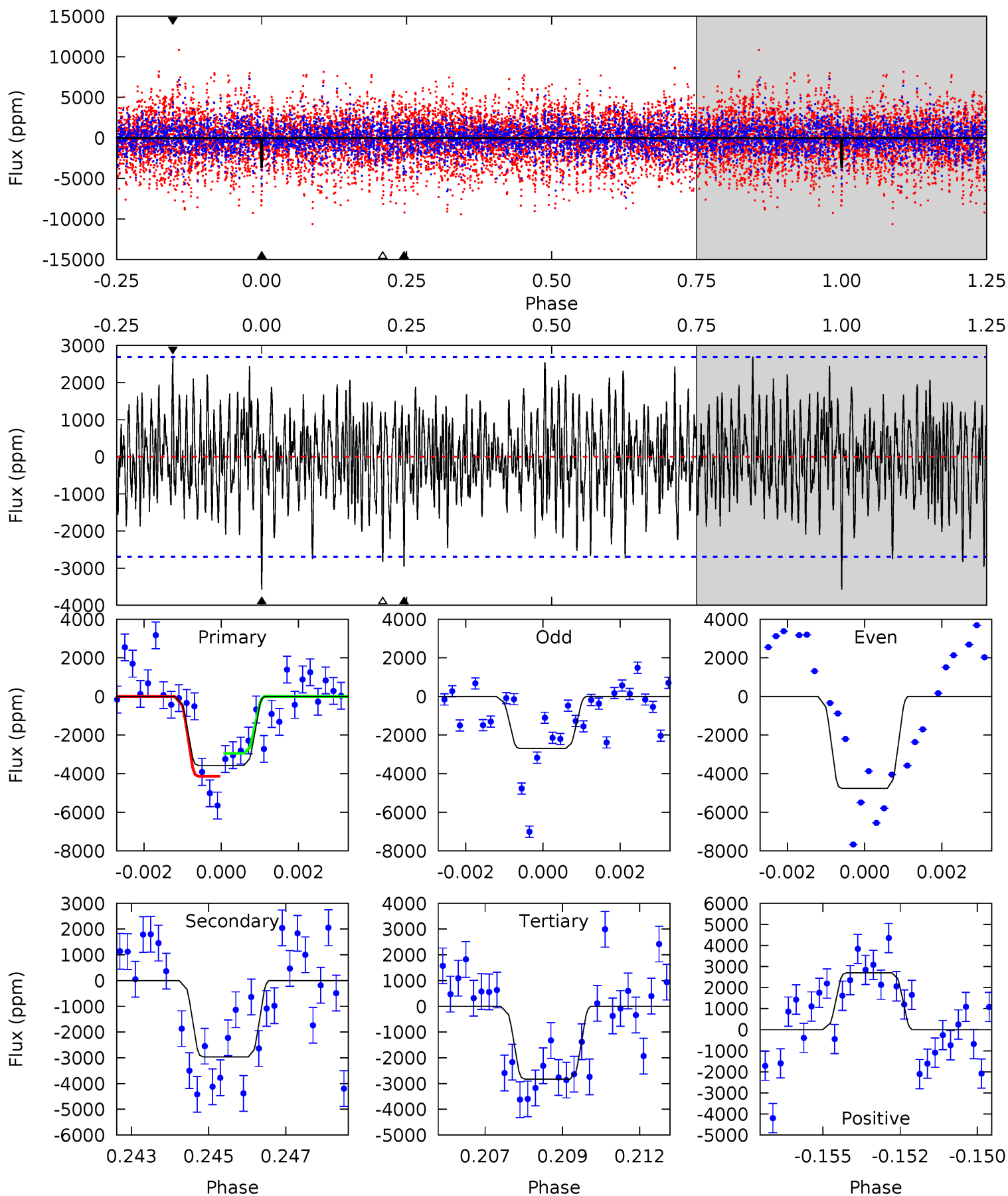
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.0	6.78	6.76	9.35	5.18	2.84	2.30	4.25	1.67	0.02	-2.57	2.87	0.79	0.46	3.66



# Alt Model-Shift Uniqueness Test

005821056-02, P = 64.883478 Days, E = 142.798619 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
7.02	5.83	5.56	5.31	5.30	3.04	1.75	1.47	1.72	0.28	0.53	2.00	0.99	0.43	1.16



### Stellar Parameters For KIC 005821056

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6609^{+184}_{-253}$	$4.484^{+0.052}_{-0.208}$	$-0.500^{+0.250}_{-0.350}$	$0.974^{+0.299}_{-0.100}$	$1.073^{+0.135}_{-0.148}$	$1.638^{+0.347}_{-0.886}$
	+3%/-4%	+1%/-5%	+50%/-70%	+31%/-10%	+13%/-14%	+21%/-54%
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 005821056-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-1419 \pm 209$	$5.28^{+1.23}_{-0.96}$	$724^{+50}_{-38}$	$5872^{+561}_{-490}$	$2839^{+1408}_{-973}$
Alt.	$-2965 \pm 508$	$7.89^{+1.43}_{-1.03}$	$722^{+54}_{-37}$	$5752^{+405}_{-350}$	$2661^{+980}_{-797}$

$T_{\text{max}}$  = 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

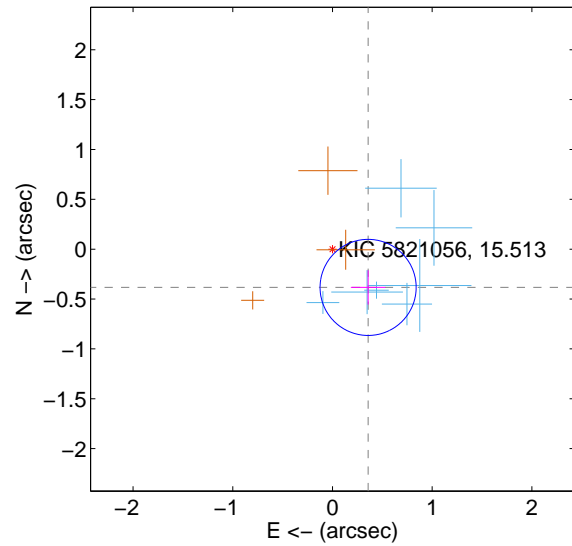
Supplemental centroid analysis for 005821056-02. Kepler magnitude: 15.51. Transit SNR 7.67

There are 7 quarters with good PRF difference image offsets

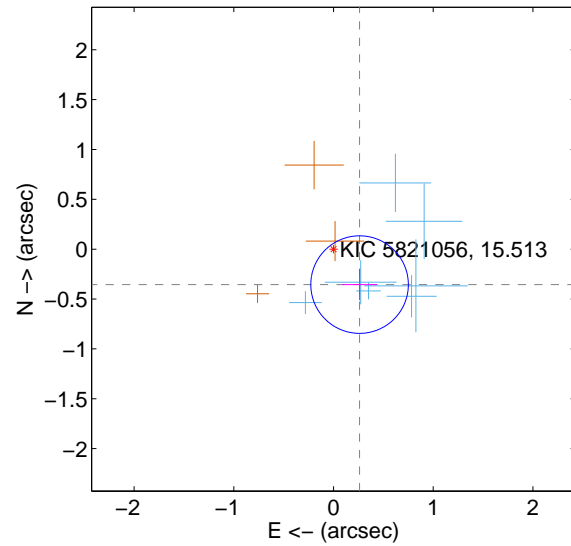
The direct PRF centroid is offset from the target star catalog position by about 0.12 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.524 \pm 0.161$	<b>3.26</b>	$-0.357 \pm 0.173$	$-0.383 \pm 0.172$
PRF-fit source offset from KIC position	$0.441 \pm 0.163$	2.71	$-0.261 \pm 0.174$	$-0.355 \pm 0.157$
photometric centroid source offset	$0.95 \pm 0.36$	2.65	$0.93 \pm 0.36$	$-0.21 \pm 0.29$

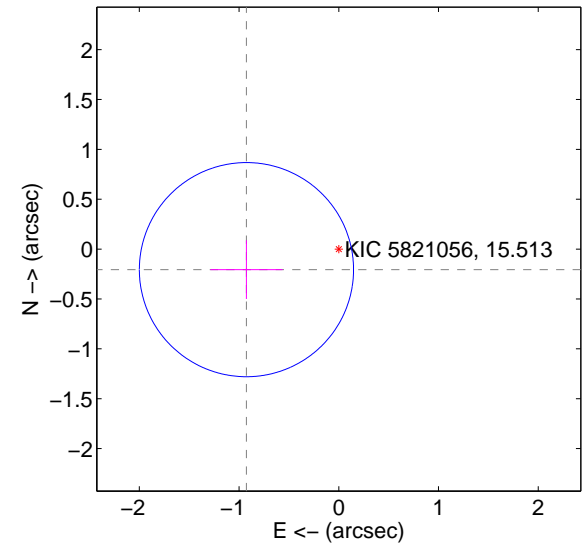
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

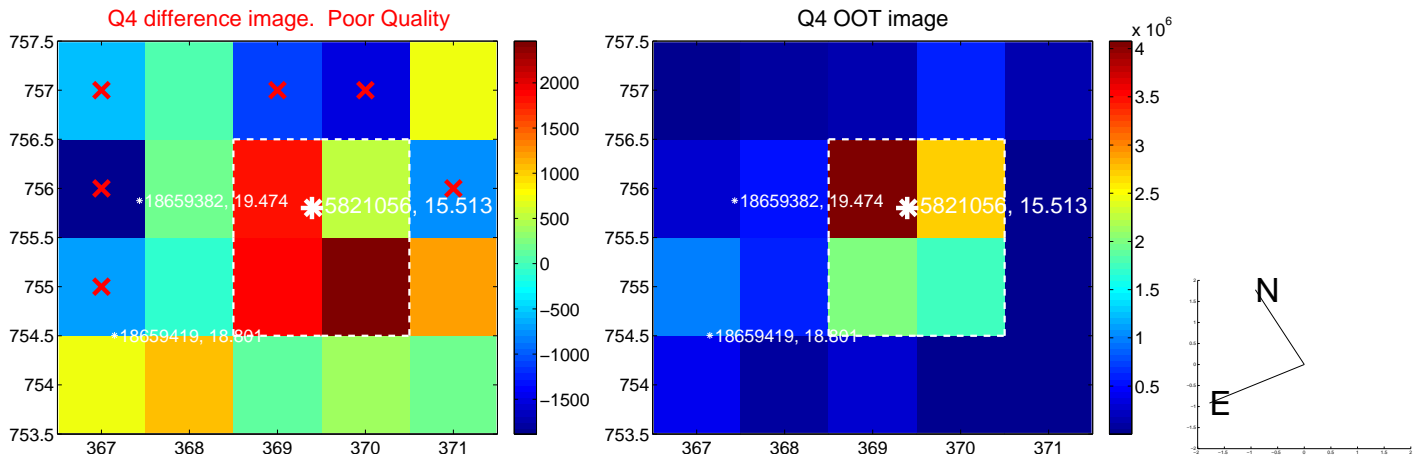
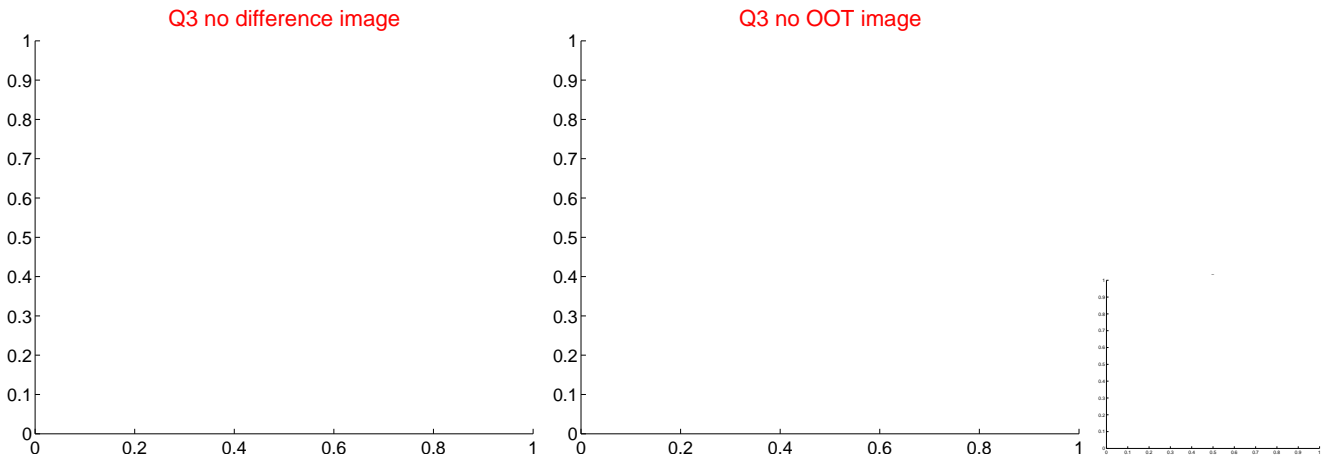
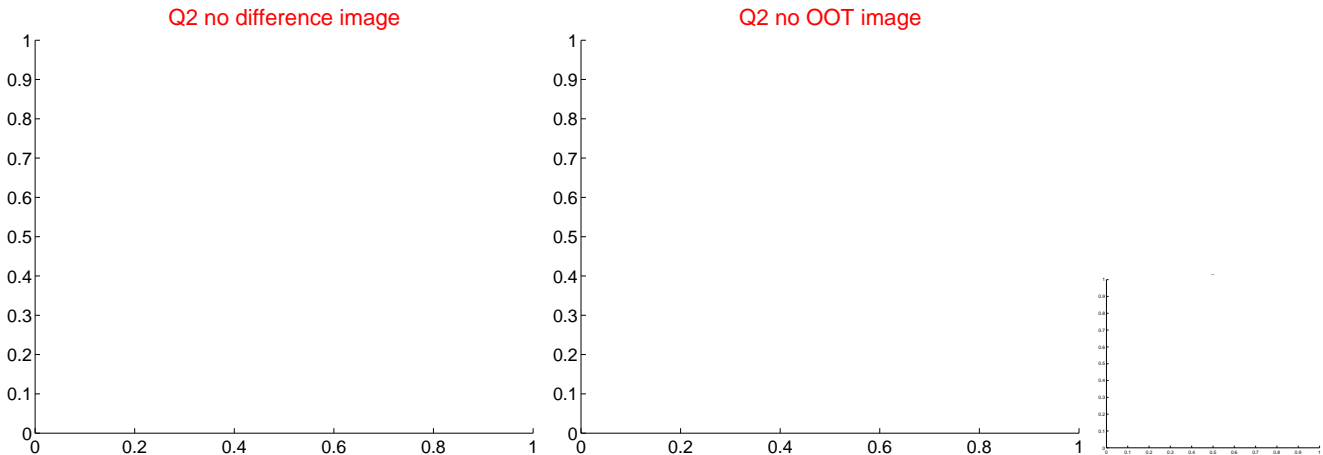
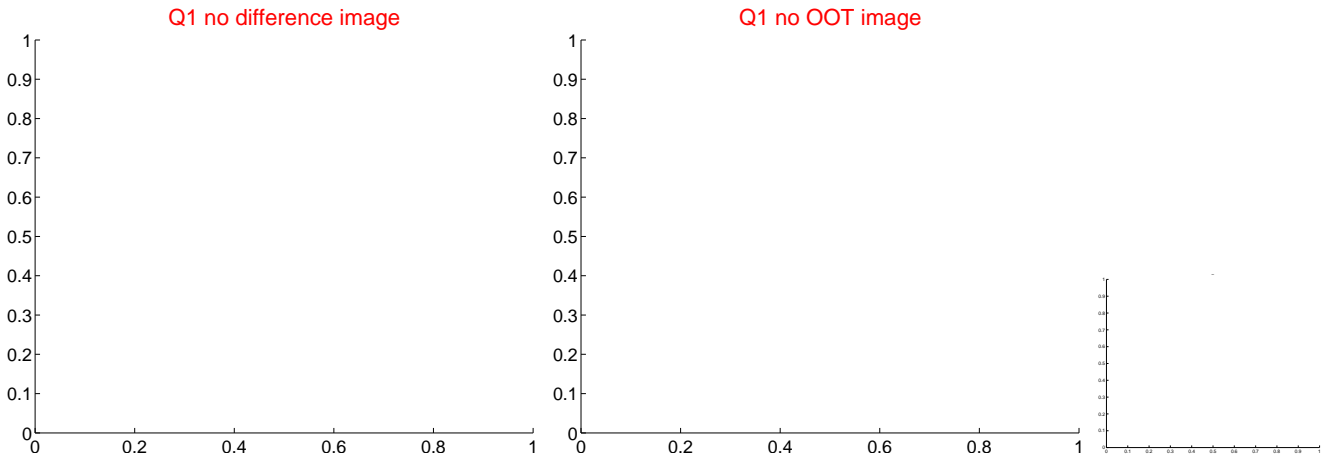


offset from photometric centroids



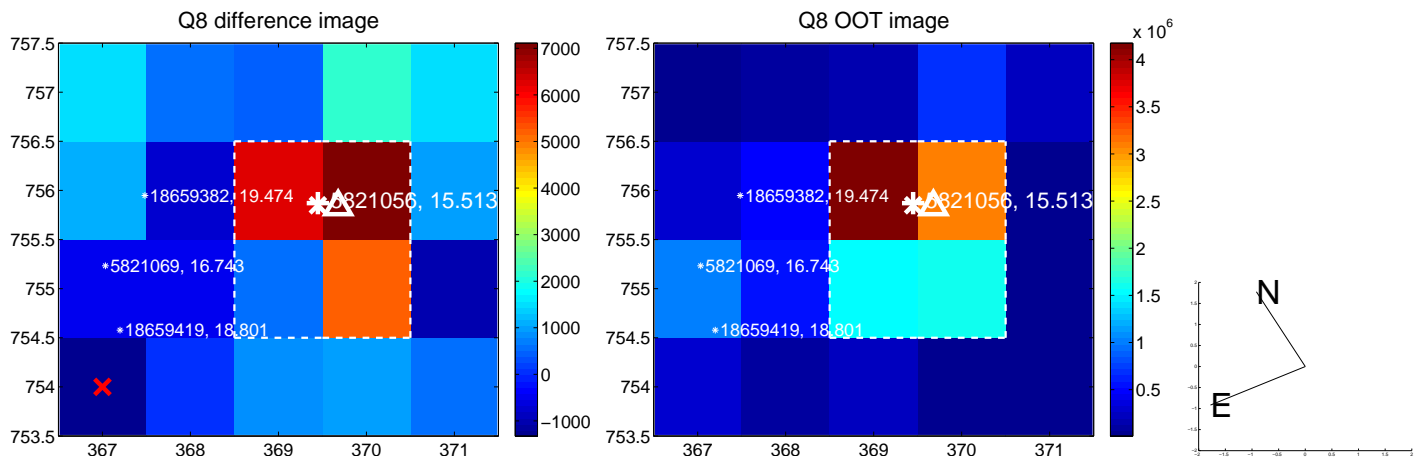
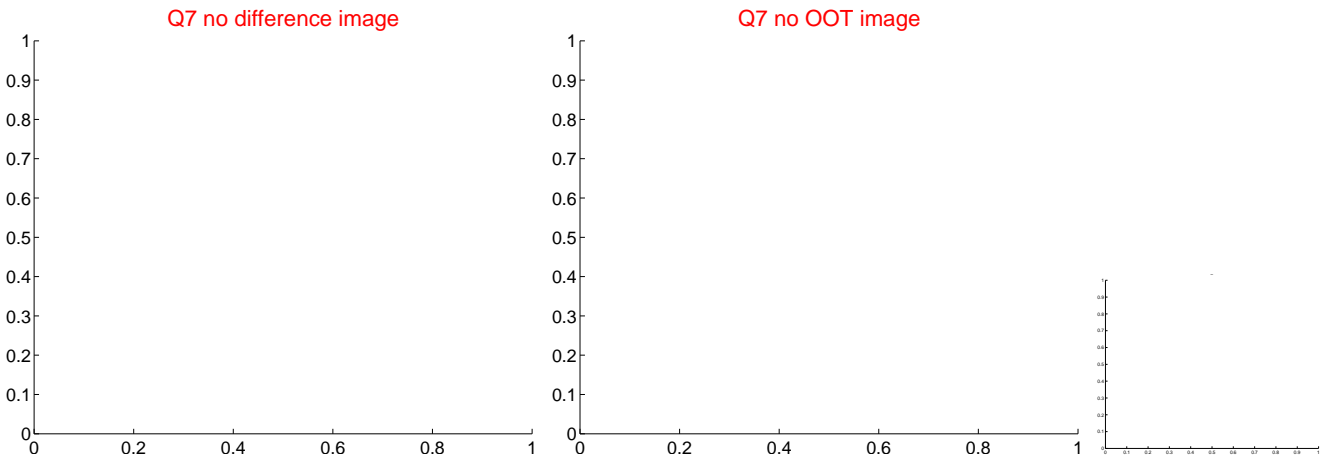
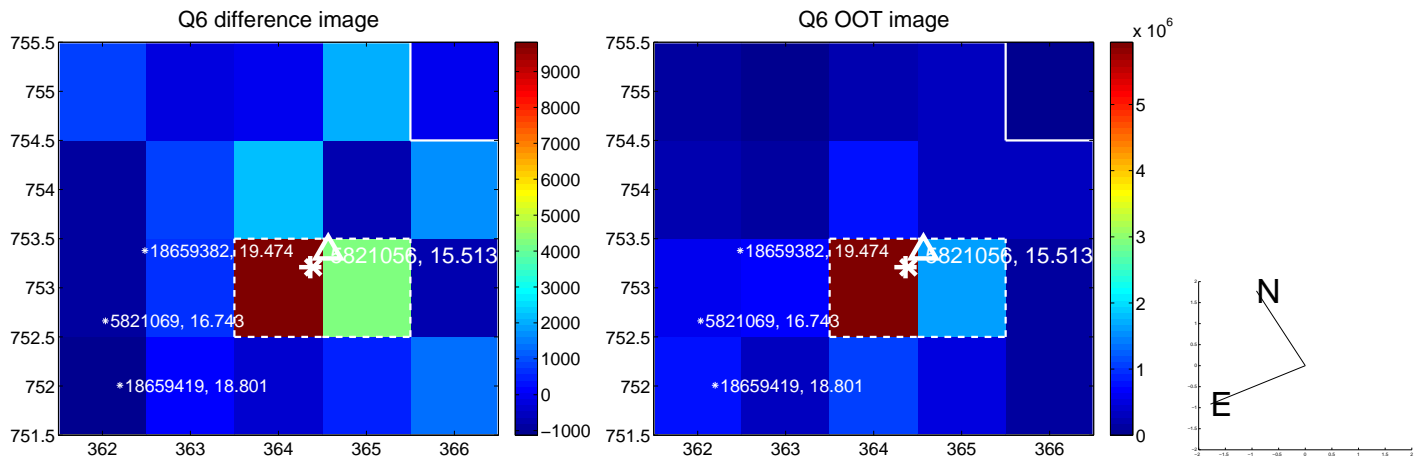
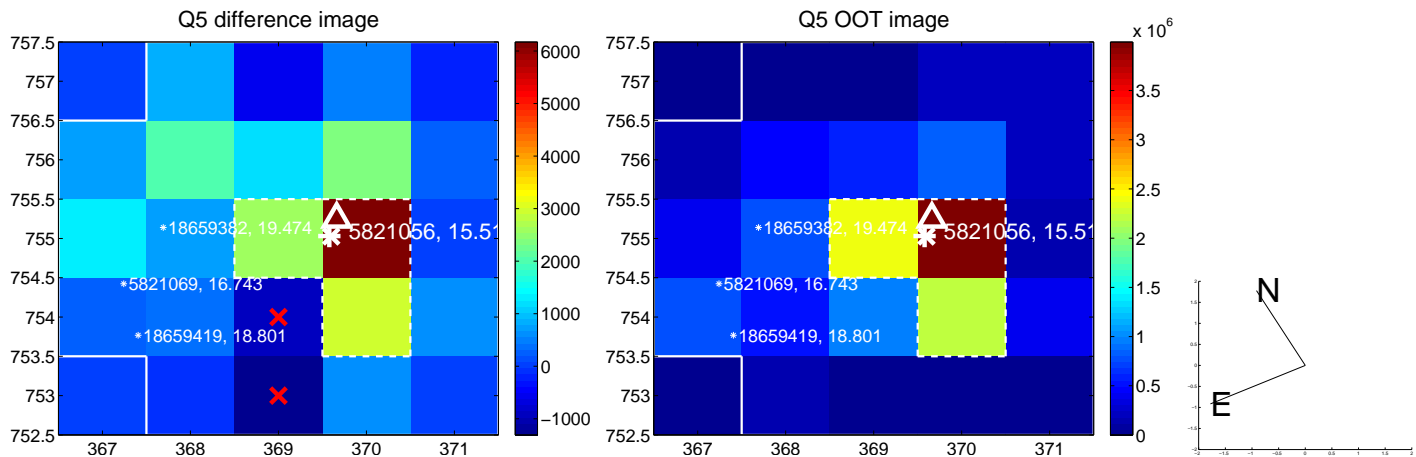
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



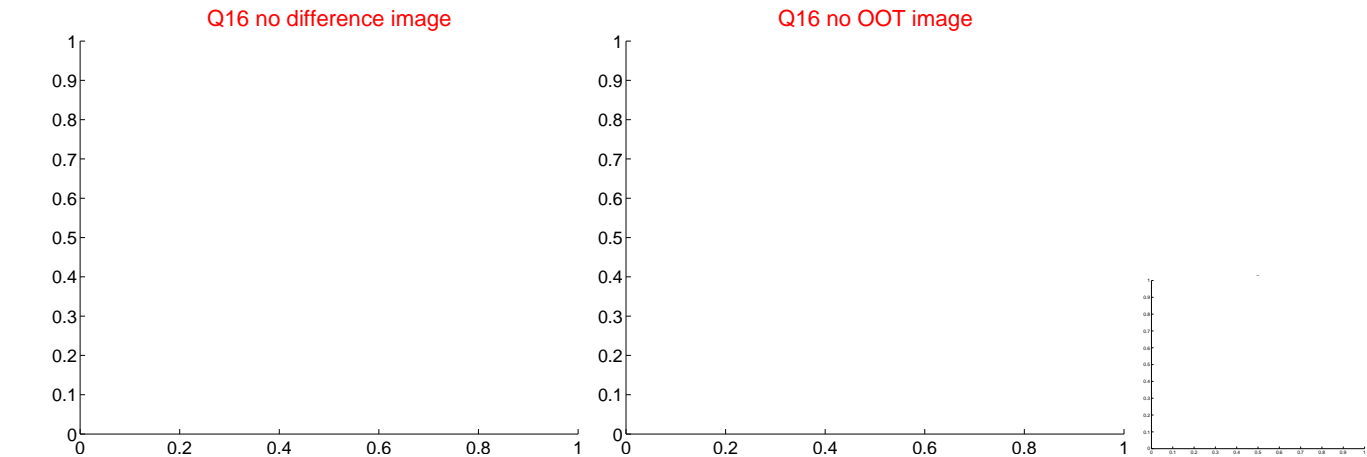
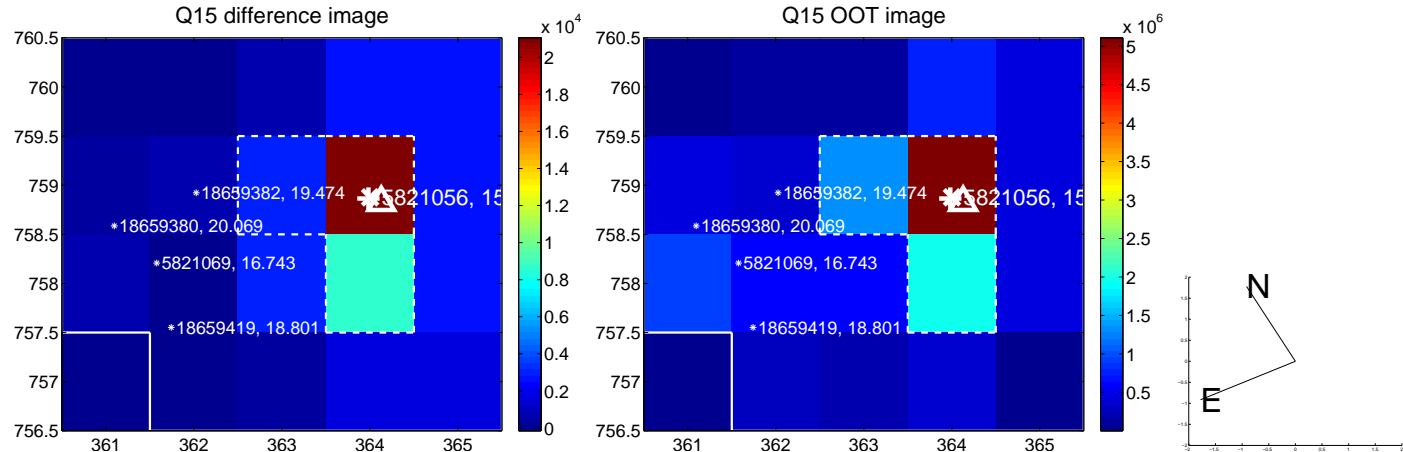
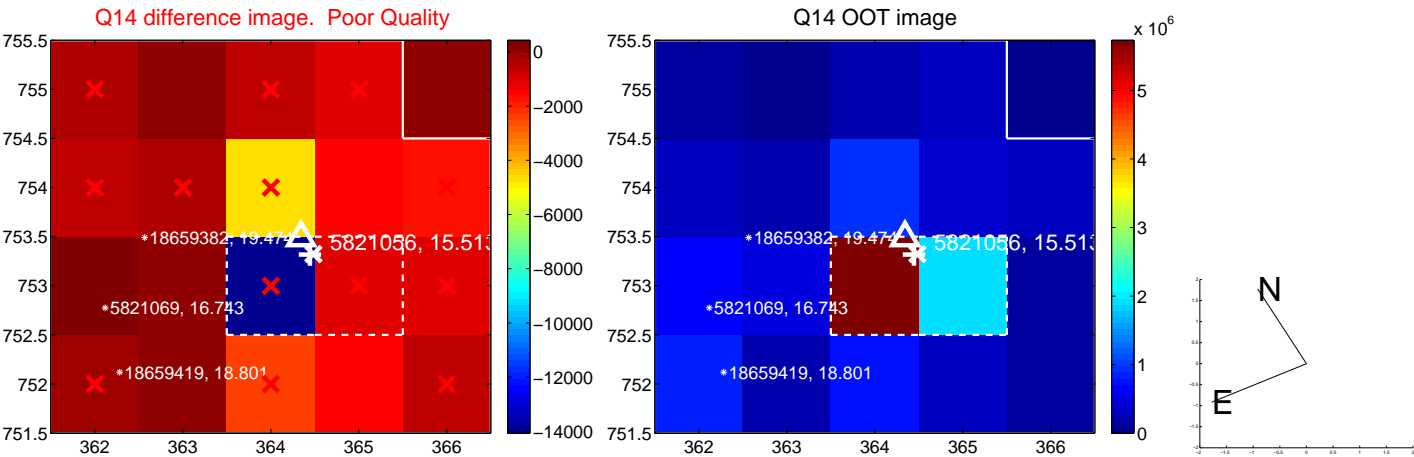
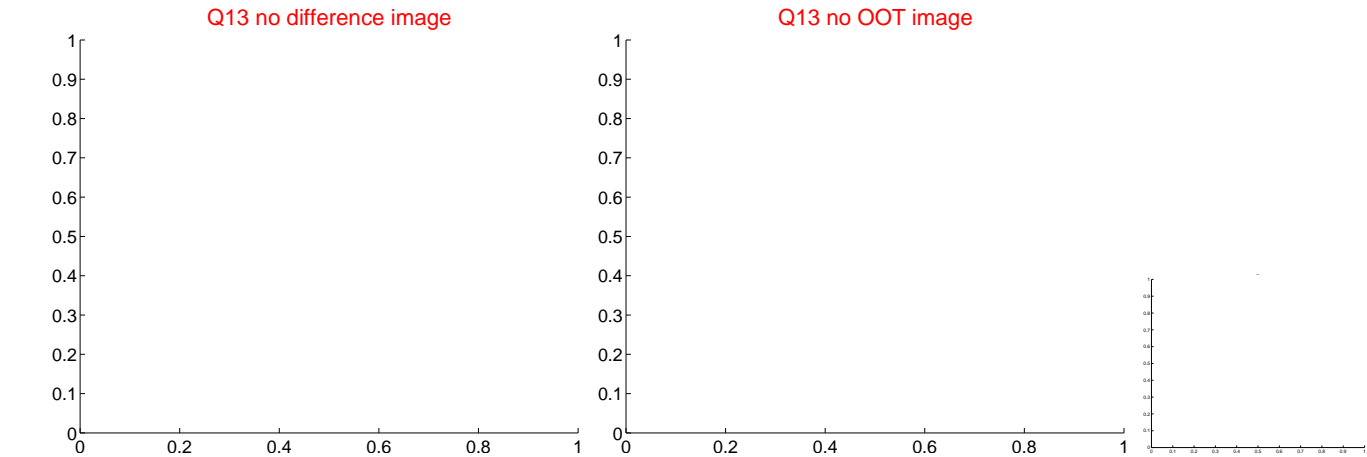


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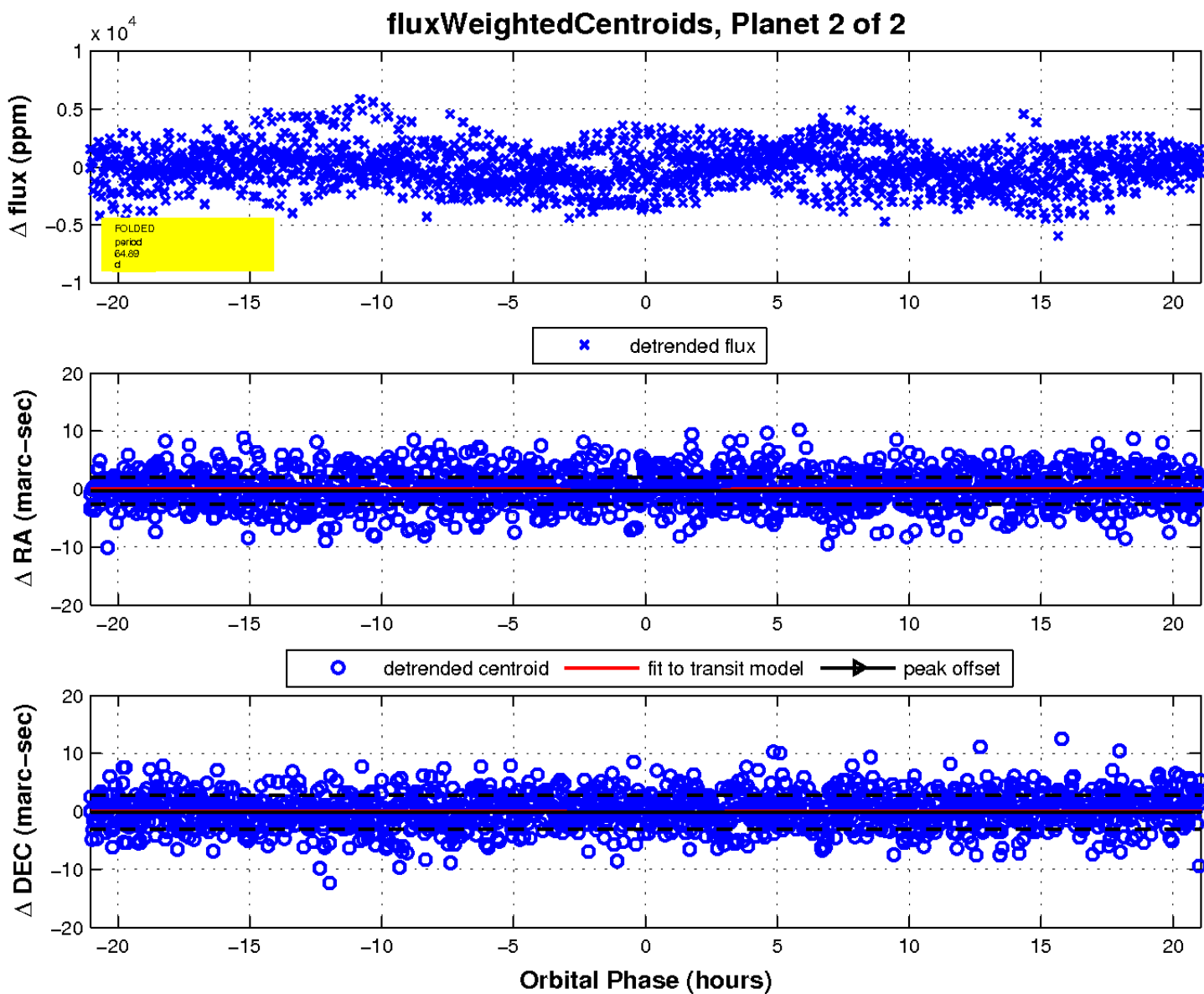
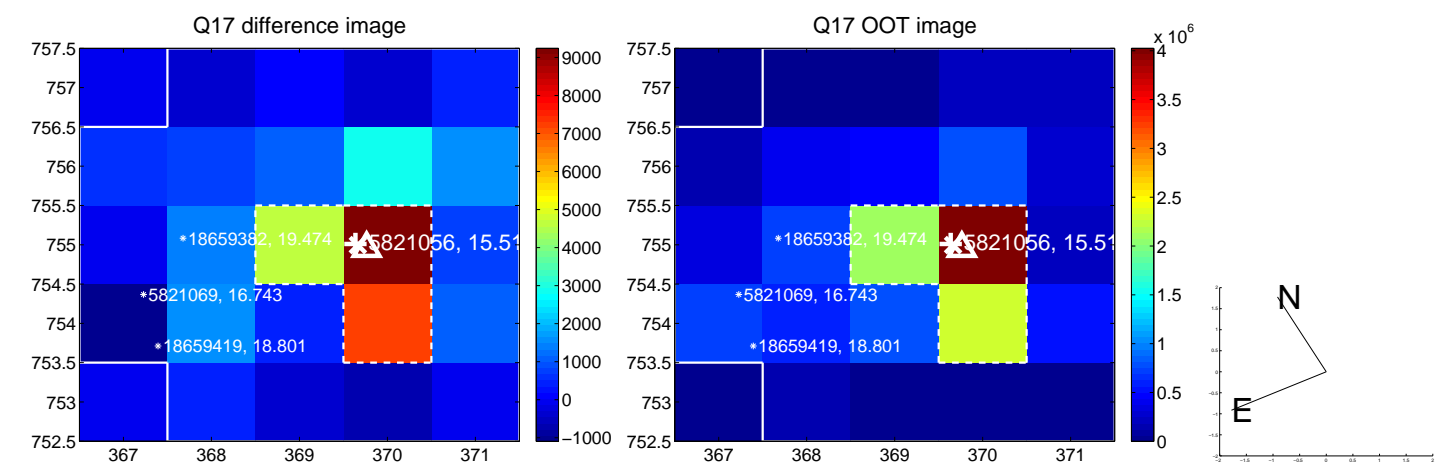




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UKIRT Image

