

# KIC 007916140

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007916140-01	OBS	No	1.532918	132.025157	116.4	6.755	7.9	9.4	0.76	4944	0.83	560.14
007916140-02	OBS	No	119.828930	216.226989	1032.9	16.409	11.9	5.1	0.76	4944	2.44	1.68
007916140-03	OBS	No	173.880601	257.501795	1171.8	13.209	7.3	4.9	0.76	4944	2.73	1.02
007916140-04	OBS	No	132.440521	223.824721	479.3	2.565	7.8	2.2	0.76	4944	1.66	1.47
007916140-05	OBS	No	132.423177	222.756419	487.8	2.231	8.0	1.9	0.76	4944	2.01	1.47
007916140-06	OBS	No	132.427963	223.136063	1547.1	12.867	12.2	7.9	0.76	4944	2.91	1.47

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007916140-01	OBS	FP	0.00	1	0	0	0	LPP_DV
007916140-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—INCONSISTENT_TRANS
007916140-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
007916140-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
007916140-05	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_SKYE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—SAME_NTL_PERIOD—CENT_FEW_DIFFS—HALO_GHOST
007916140-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—SAME_NTL_PERIOD—CENT_FEW_MEAS

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

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

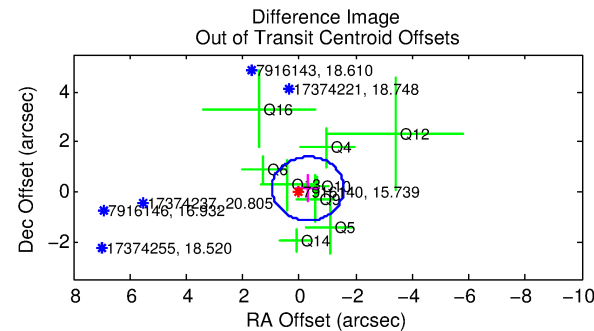
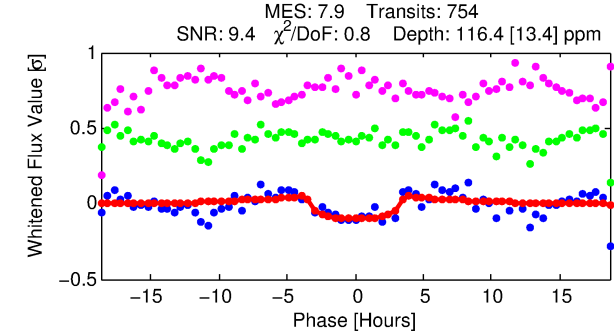
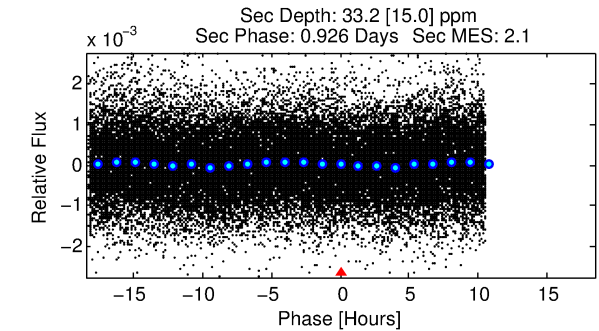
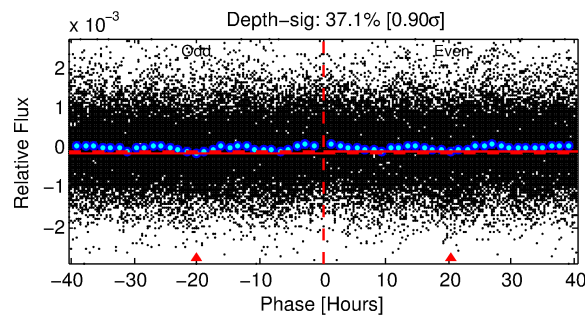
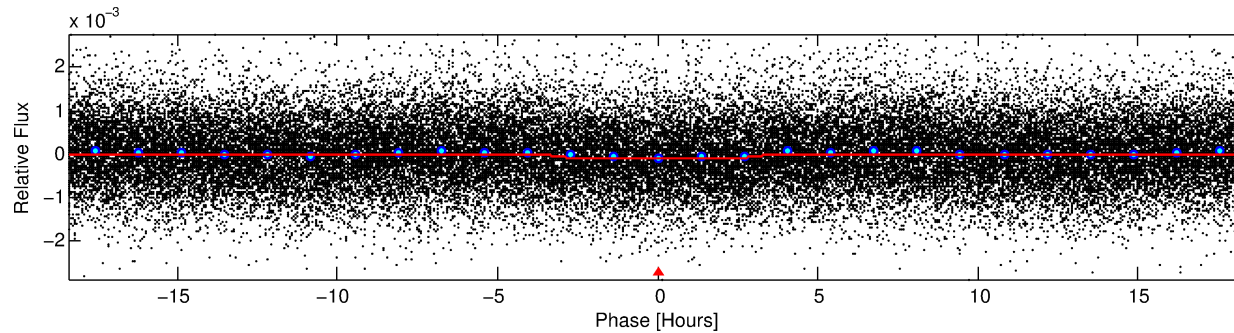
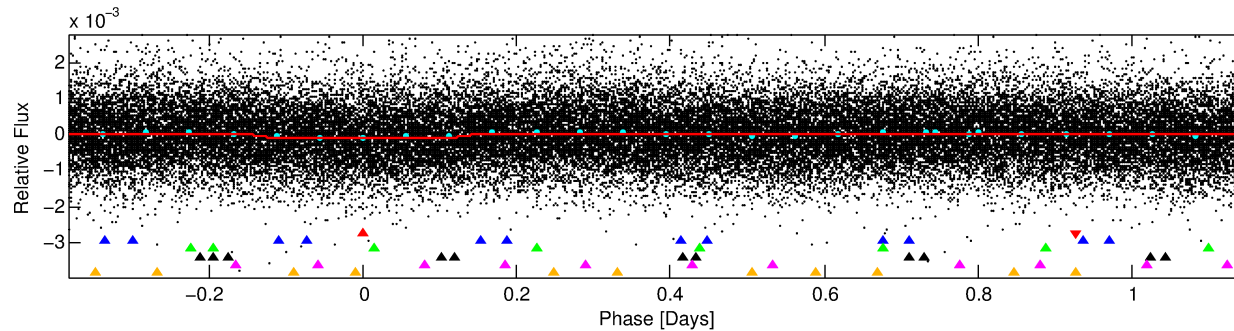
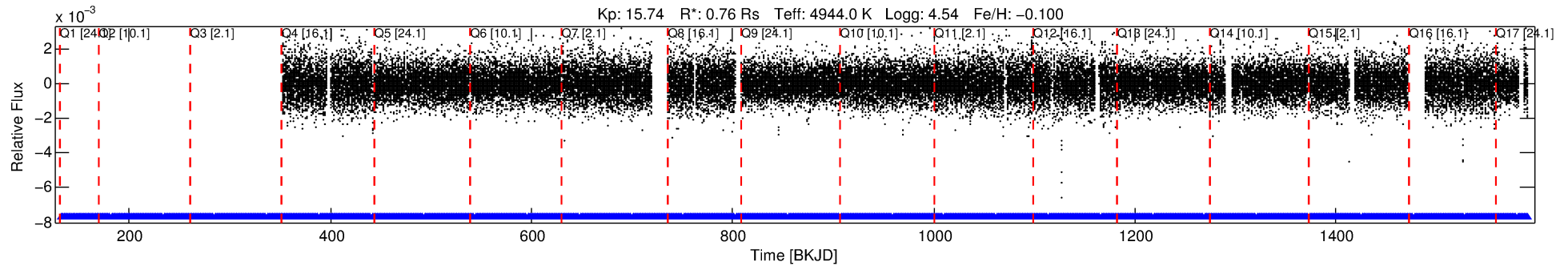
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 007916140-01

No Significant Match Found

# DV One-Page Summary

KIC: 7916140 Candidate: 1 of 6 Period: 1.533 d



## DV Fit Results:

Period = 1.53292 [0.00002] d  
Epoch = 132.0252 [0.0062] BKJD  
 $R_p/R^*$  = 0.0100 [0.0085]  
 $a/R^*$  = 1.66 [3.00]  
 $b$  = 0.54 [3.84]  
 $\text{Seff}$  = 560.14 [108.21]  
 $T_{\text{eq}}$  = 1241 [60] K  
 $R_p$  = 0.83 [0.70]  $R_e$   
 $a$  = 0.0234 [0.0021] AU  
 $A_g$  = 14.53 [25.41] [0.53 $\sigma$ ]  
 $T_{\text{eff}}$  = 3745 [1638] K [1.53 $\sigma$ ]

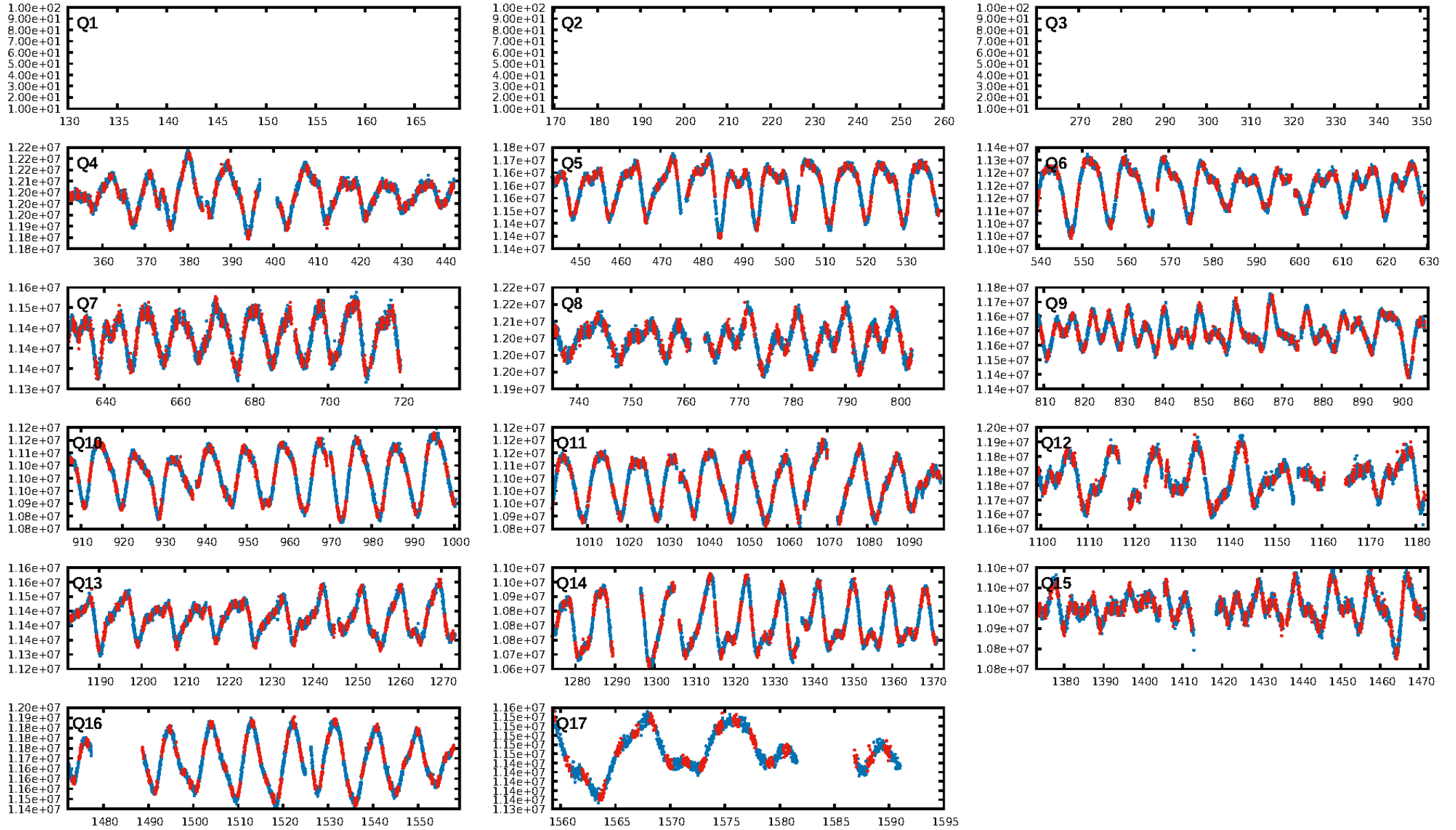
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [159.99 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 9.23e-15  
RollingBand-fgt: 1.00 [736/736]  
GhostDiagnostic-chr: 6.262  
Centroid-sig: 62.3%  
Centroid-so: 0.930 arcsec [1.07 $\sigma$ ]  
OotOffset-rm: 0.325 arcsec [0.77 $\sigma$ ]  
KicOffset-rm: 0.335 arcsec [0.75 $\sigma$ ]  
OotOffset-st: 3/0/3/3 [9]  
KicOffset-st: 3/0/3/3 [9]  
DiffImageQuality-fgm: 0.56 [5/9]  
DiffImageOverlap-fno: 1.00 [14/14]

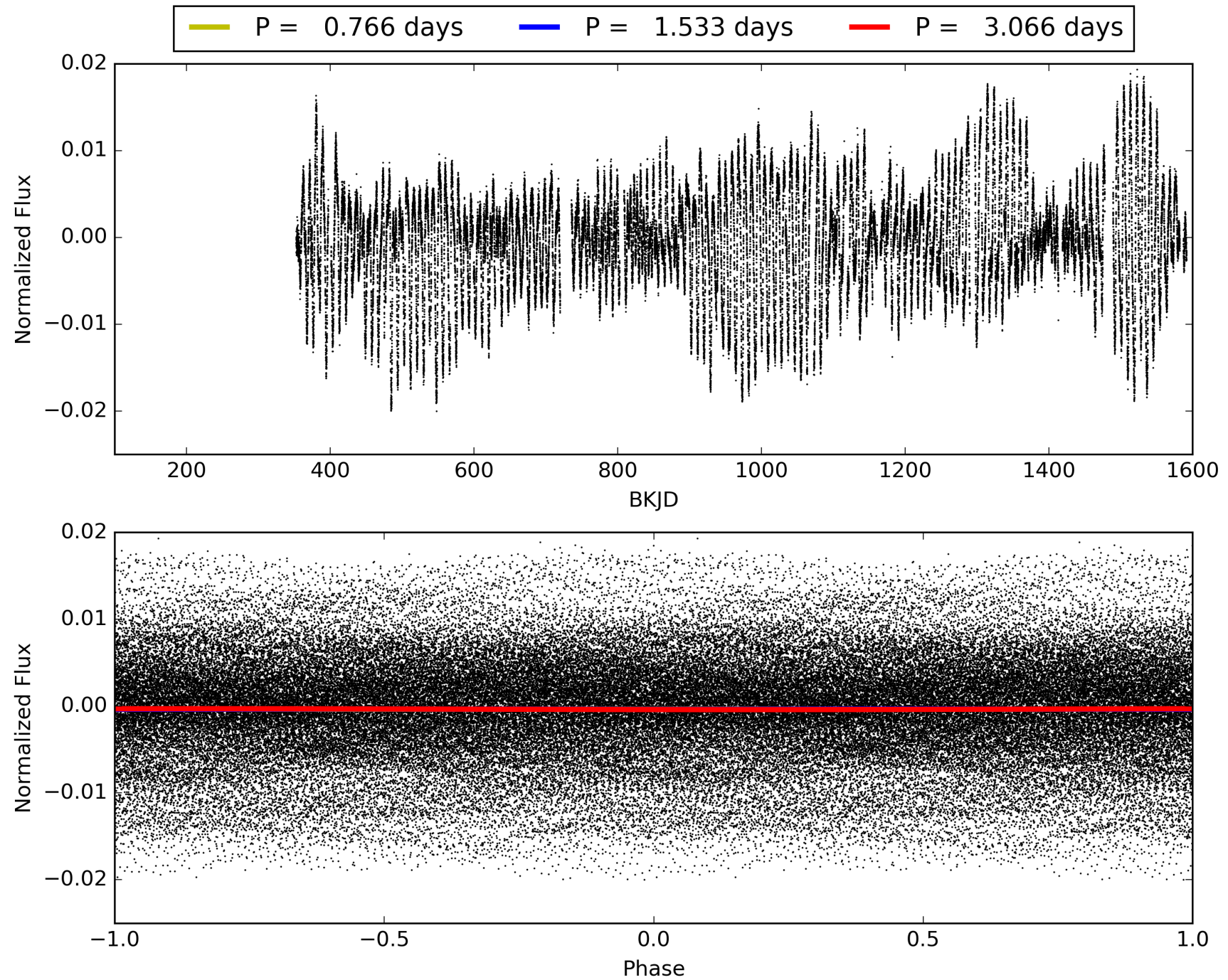
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 05:17:03 Z

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

# TCE 007916140-01, PDC Light Curves



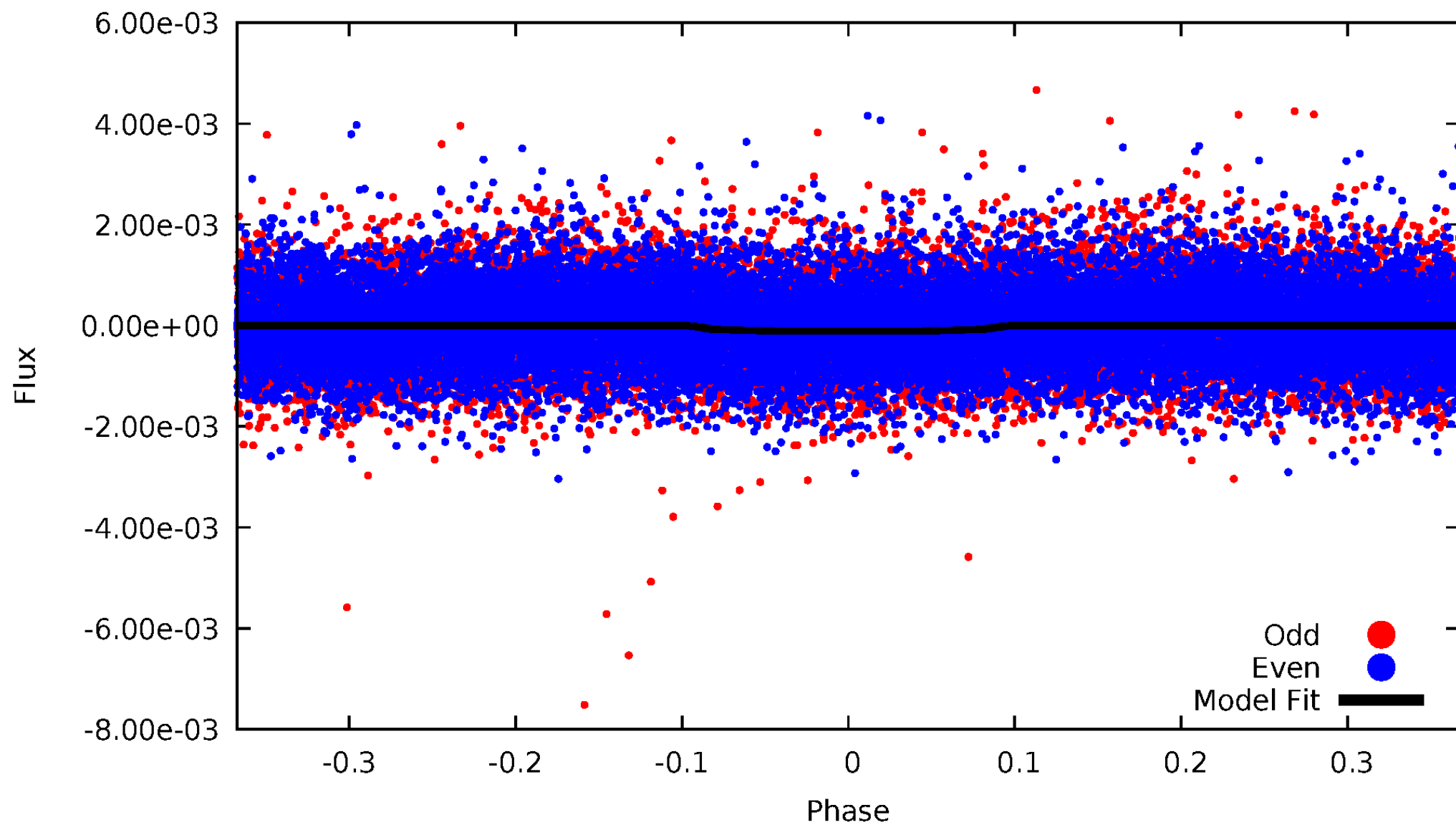
TCE 007916140-01





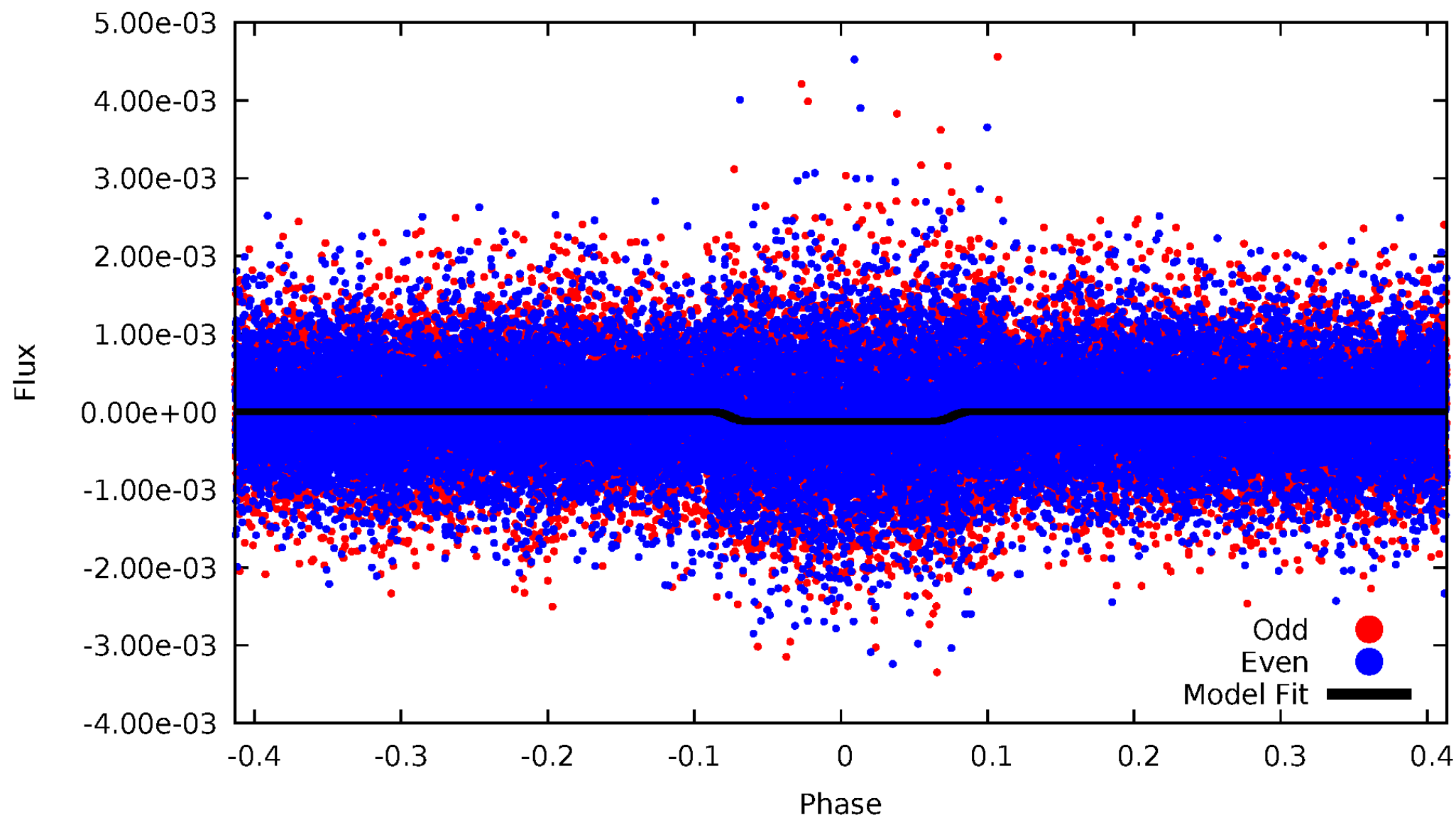
# DV Odd/Even

TCE 007916140-01



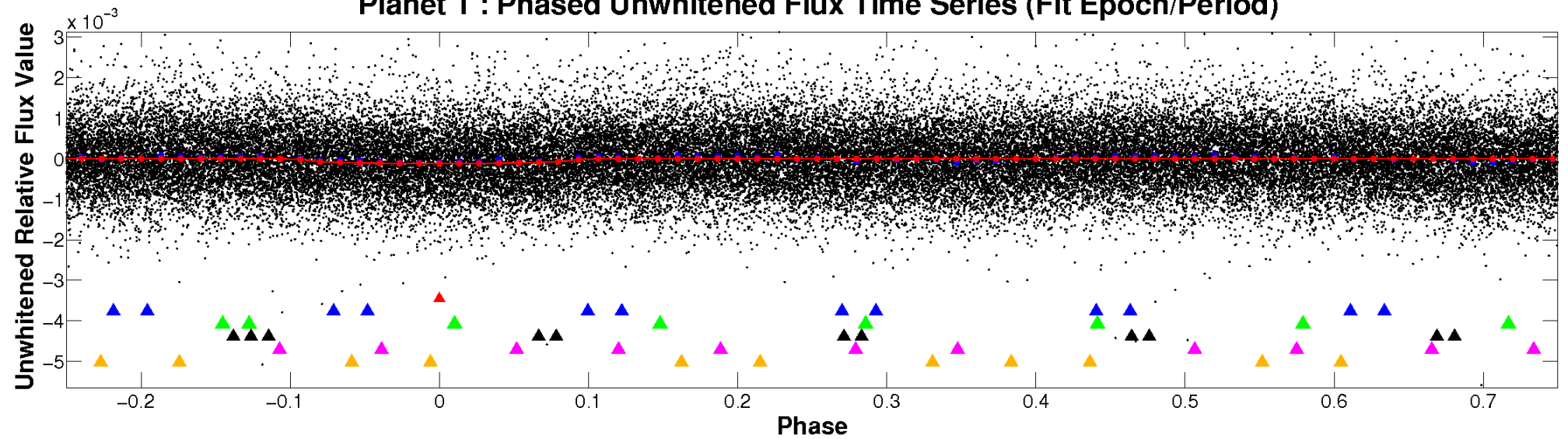
# ALT Odd/Even

TCE 007916140-01

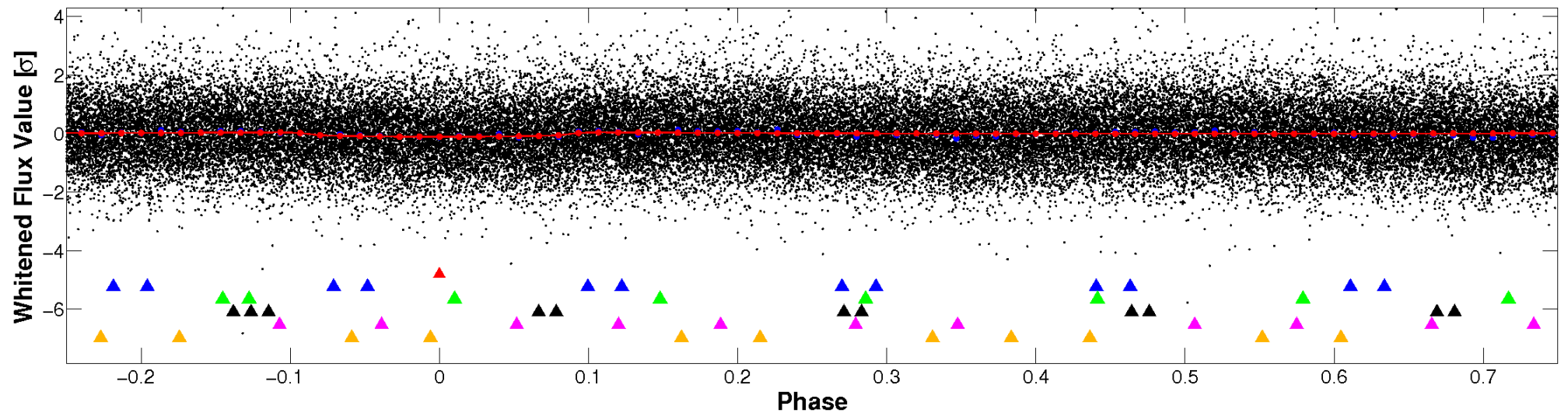


# Non-Whitened Vs. Whitened Light Curve

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

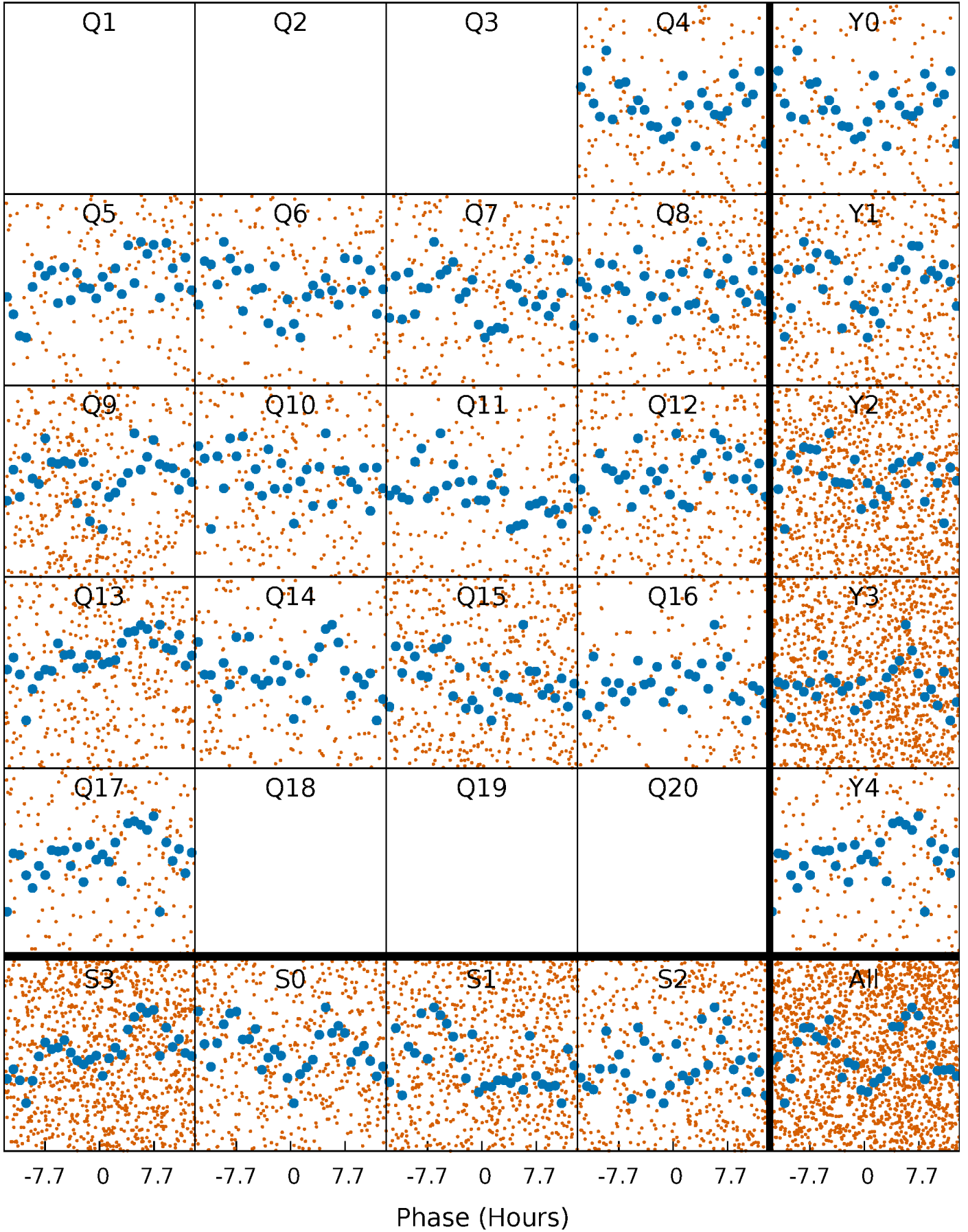


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

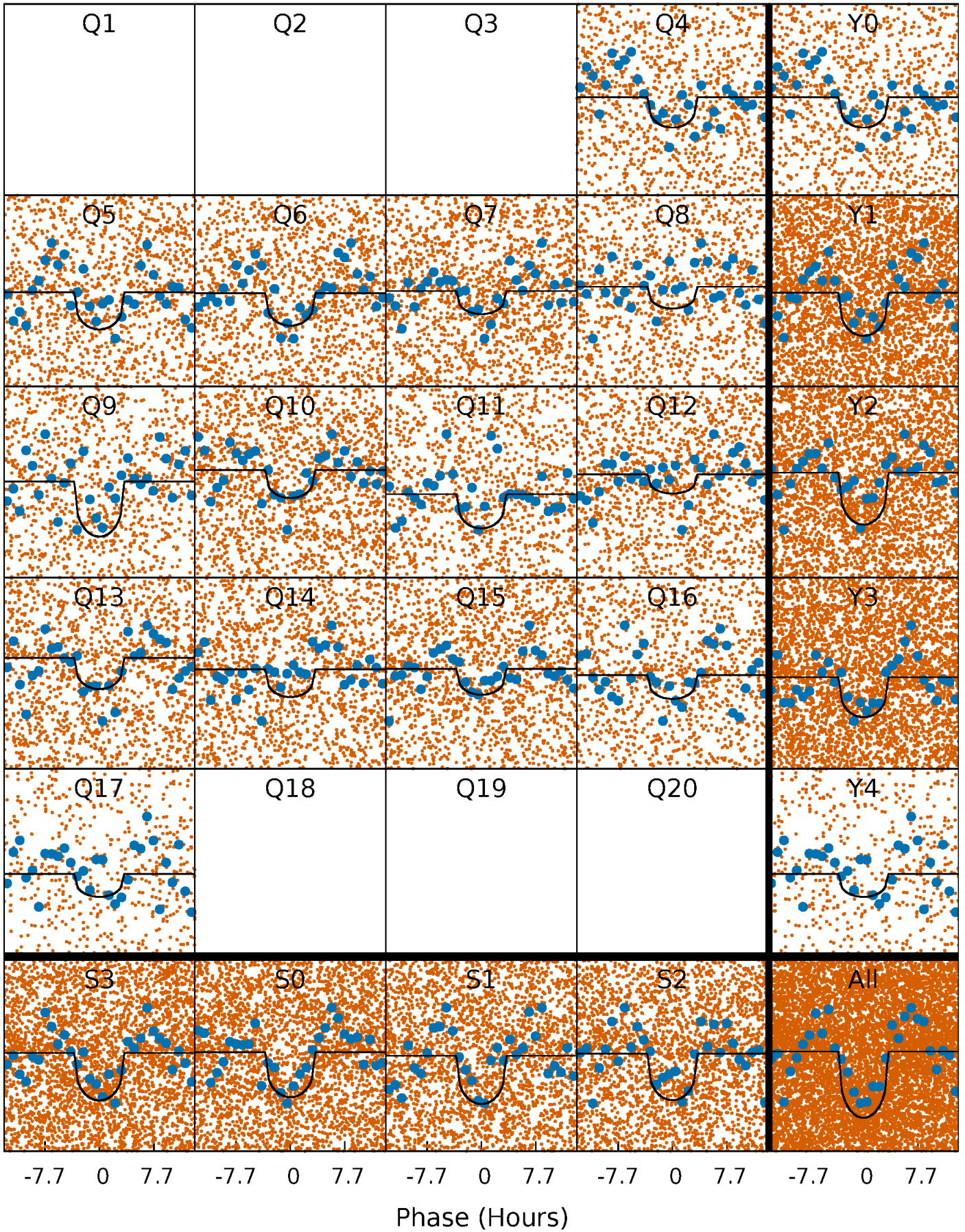
TCE 007916140-01   P= 1.532918 Days    $T_0=132.025157$  (BKJD)





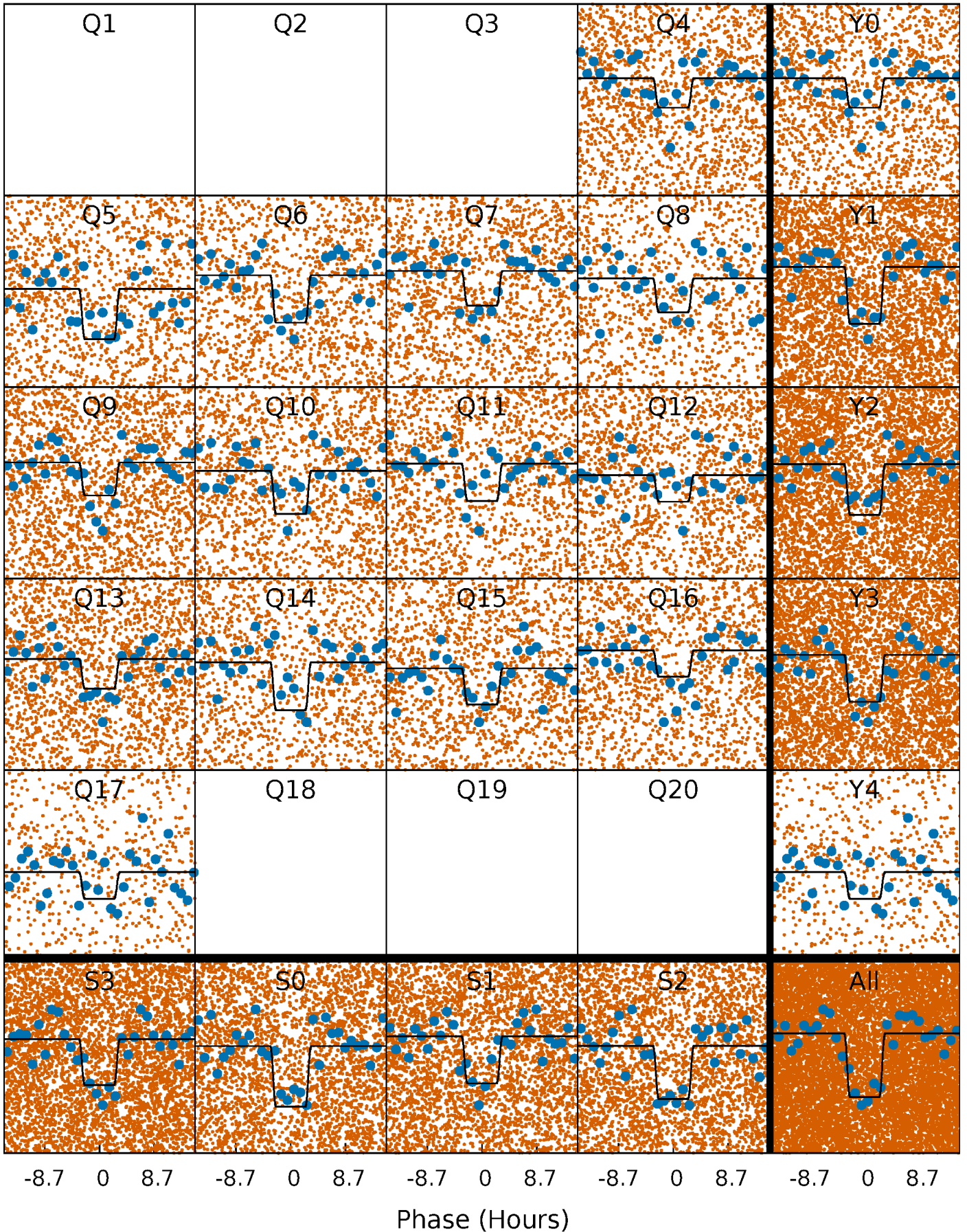
# DV Quarter-Phased Transit Curves

TCE 007916140-01 P= 1.532918 Days  $T_0=132.025157$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 007916140-01 P= 1.532930 Days  $T_0=132.026264$  (BKJD)

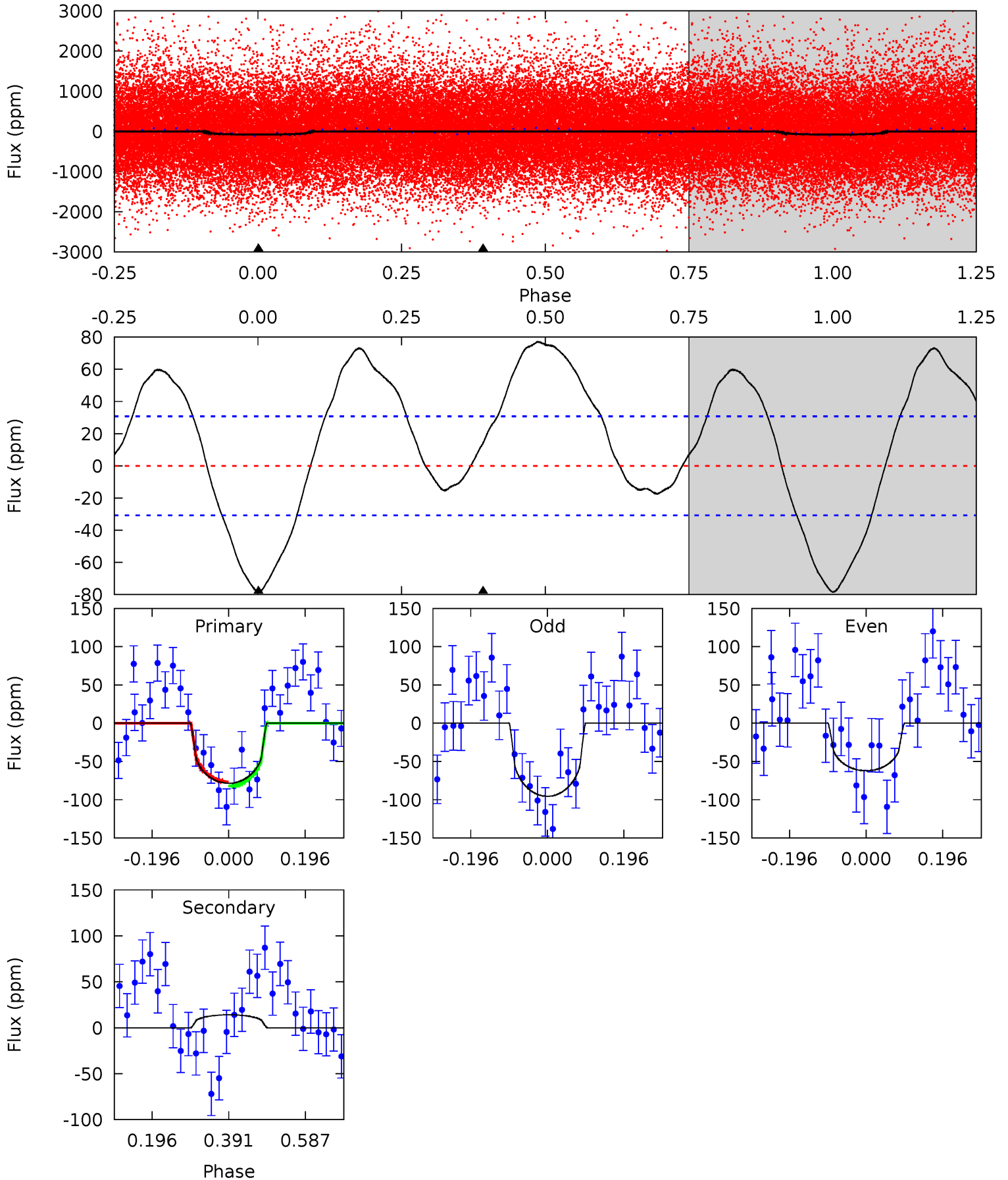




# DV Model-Shift Uniqueness Test

007916140-01, P = 1.532918 Days, E = 132.025157 Days

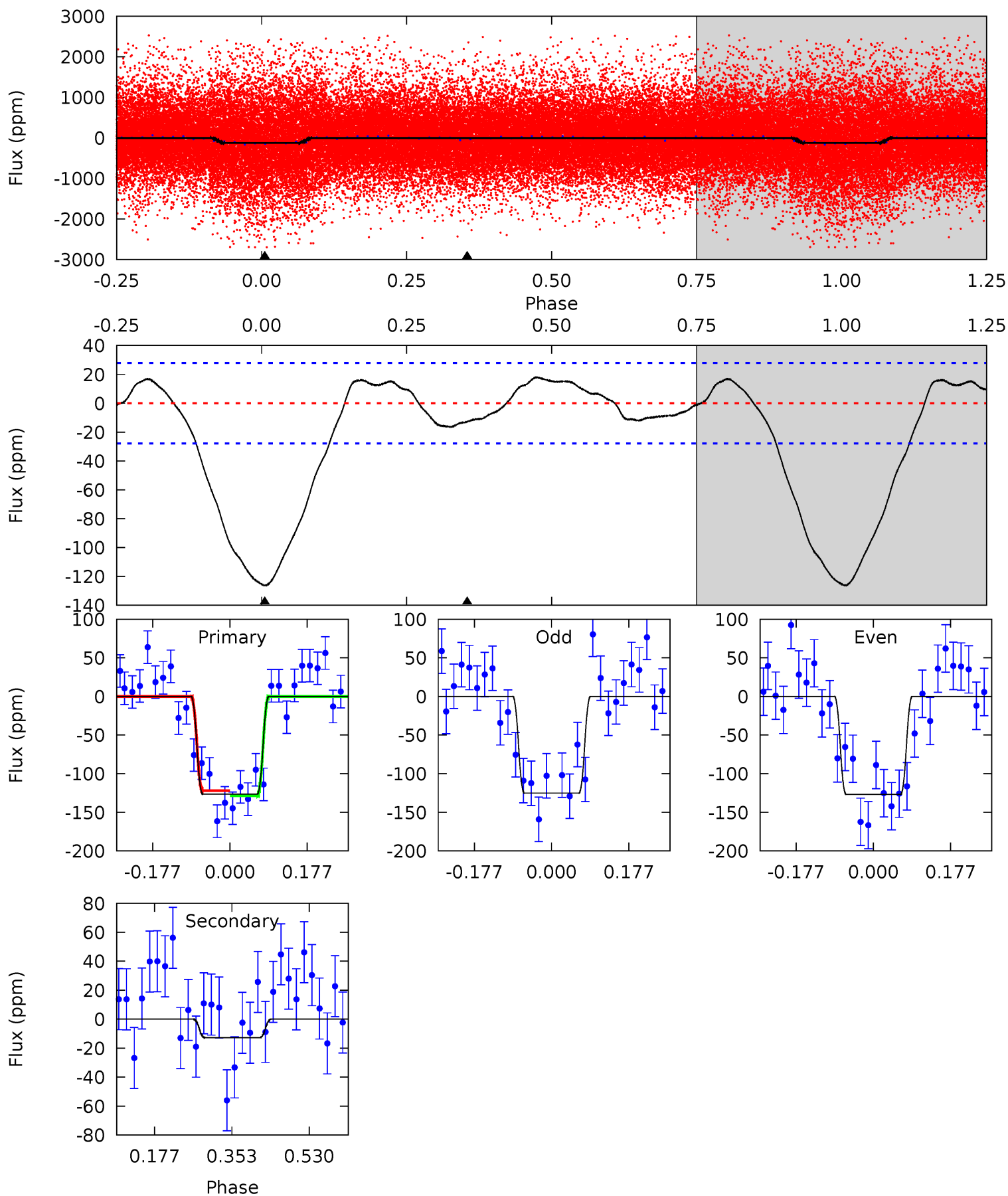
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.3	-2.03	0	0	4.42	1.29	2.92	11.3	11.3	-2.03	-2.03	2.39	0.82	0.50	0.37



# Alt Model-Shift Uniqueness Test

007916140-01, P = 1.532930 Days, E = 132.026264 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
20.1	2.04	0	0	4.44	1.35	1.51	20.1	20.1	2.04	2.04	0.13	1.06	0.12	0.54





### Stellar Parameters For KIC 007916140

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4944^{+176}_{-176}$	$4.542^{+0.072}_{-0.048}$	$-0.100^{+0.300}_{-0.300}$	$0.758^{+0.071}_{-0.079}$	$0.731^{+0.093}_{-0.057}$	$2.359^{+0.749}_{-0.396}$
	+4%/-4%	+2%/-1%	+300%/-300%	+9%/-10%	+13%/-8%	+32%/-17%
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 007916140-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$14 \pm 7$	$0.91^{+0.67}_{-0.54}$	$1726^{+77}_{-78}$	$-3338^{+501}_{-1310}$	$-4.682^{+3.350}_{-28.849}$
Alt.	$-13 \pm 6$	$1.00^{+0.65}_{-0.54}$	$1728^{+64}_{-77}$	$3159^{+1058}_{-534}$	$3.726^{+16.377}_{-2.549}$

$T_{\text{max}}$  = 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

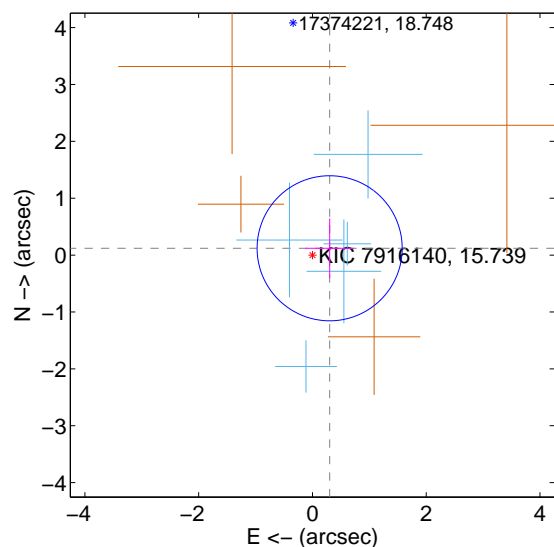
Supplemental centroid analysis for 007916140-01. Kepler magnitude: 15.74. Transit SNR 9.41

There are 5 quarters with good PRF difference image offsets

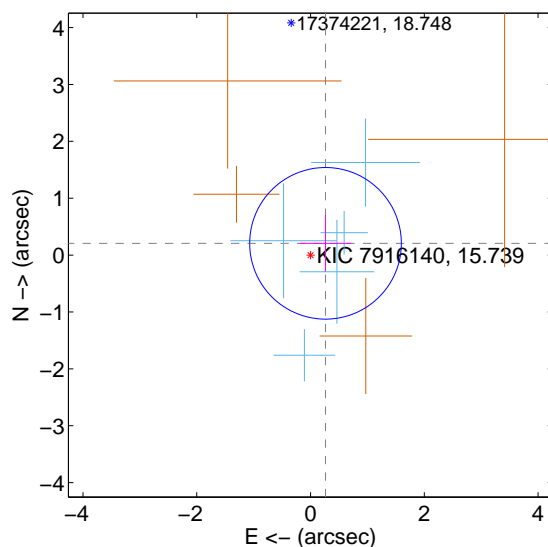
The direct PRF centroid is offset from the target star catalog position by about 0.26 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.325 \pm 0.425$	0.77	$-0.302 \pm 0.424$	$0.120 \pm 0.522$
PRF-fit source offset from KIC position	$0.335 \pm 0.444$	0.75	$-0.264 \pm 0.452$	$0.207 \pm 0.498$
photometric centroid source offset	$0.93 \pm 0.87$	1.07	$0.90 \pm 0.87$	$-0.22 \pm 0.89$

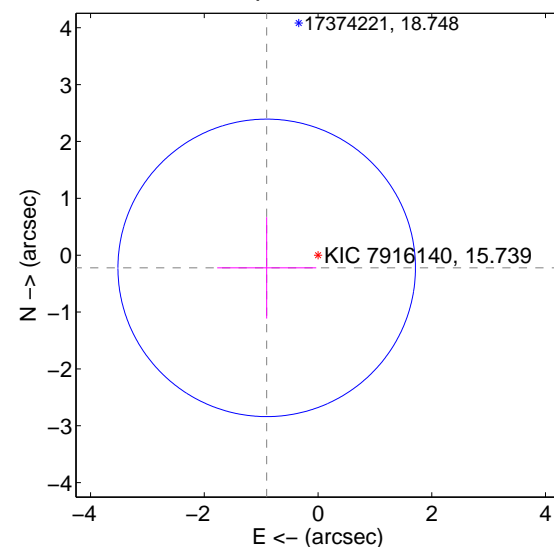
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

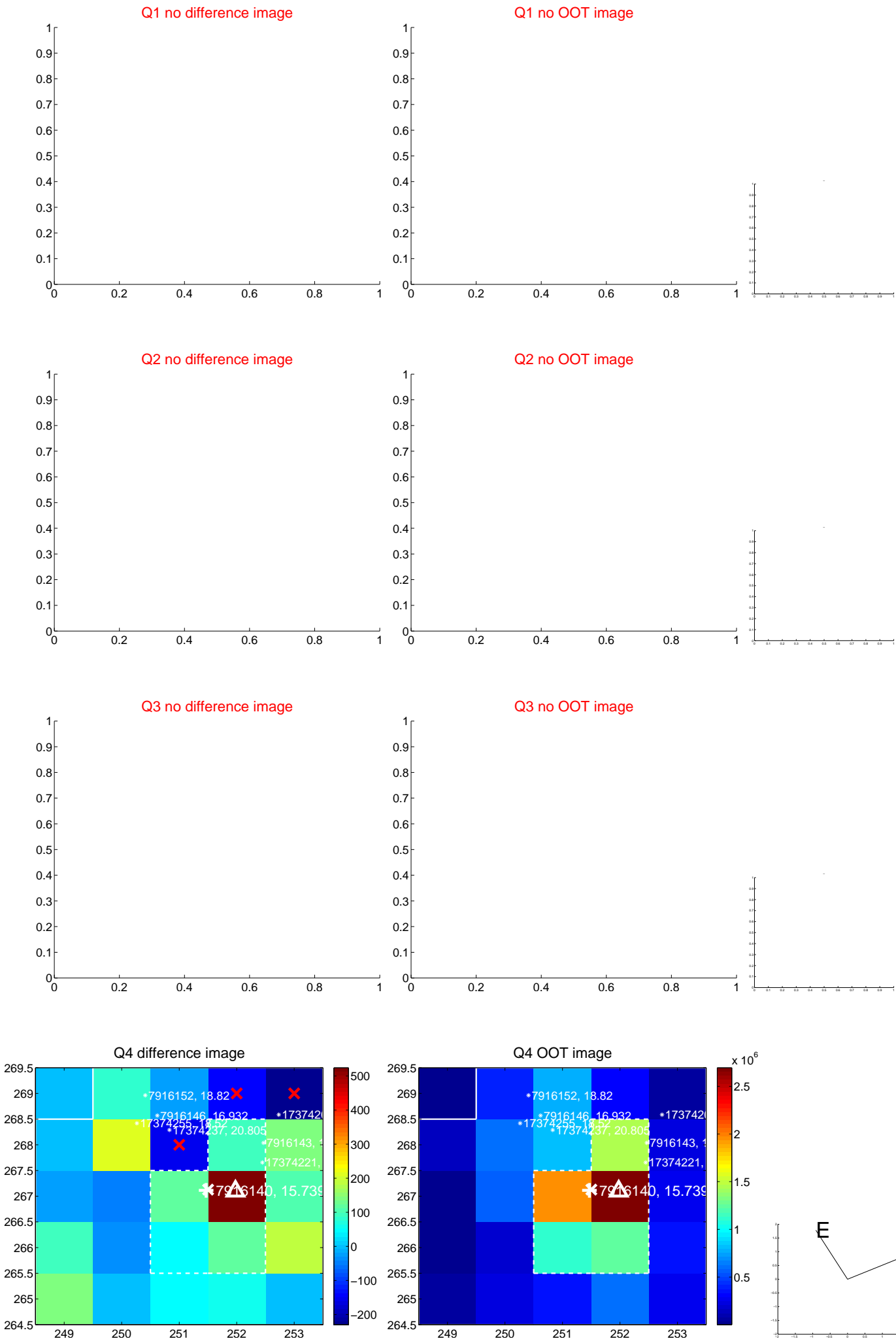


offset from photometric centroids

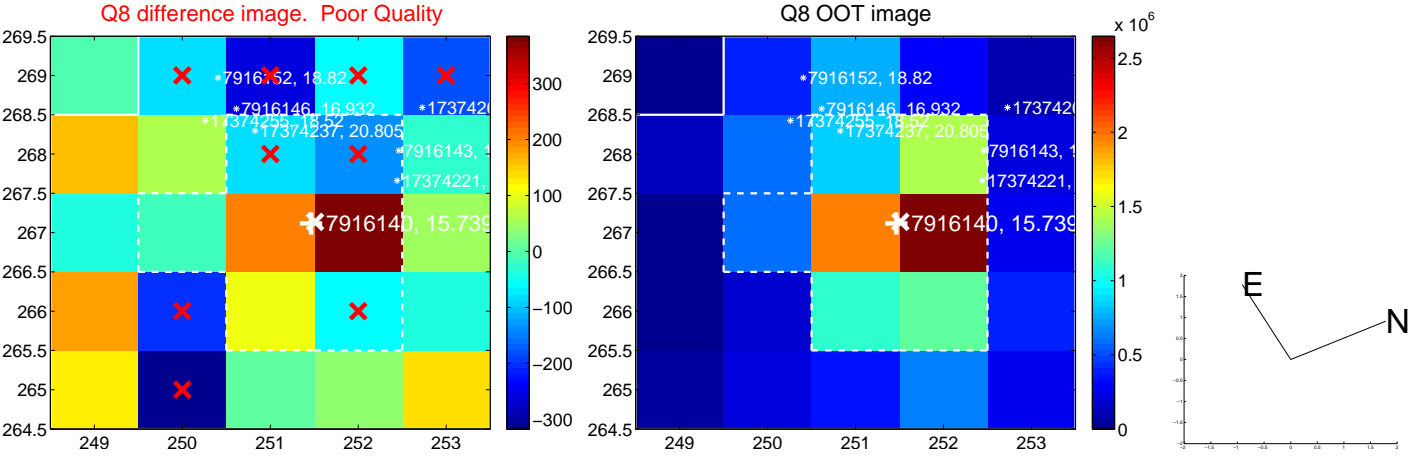
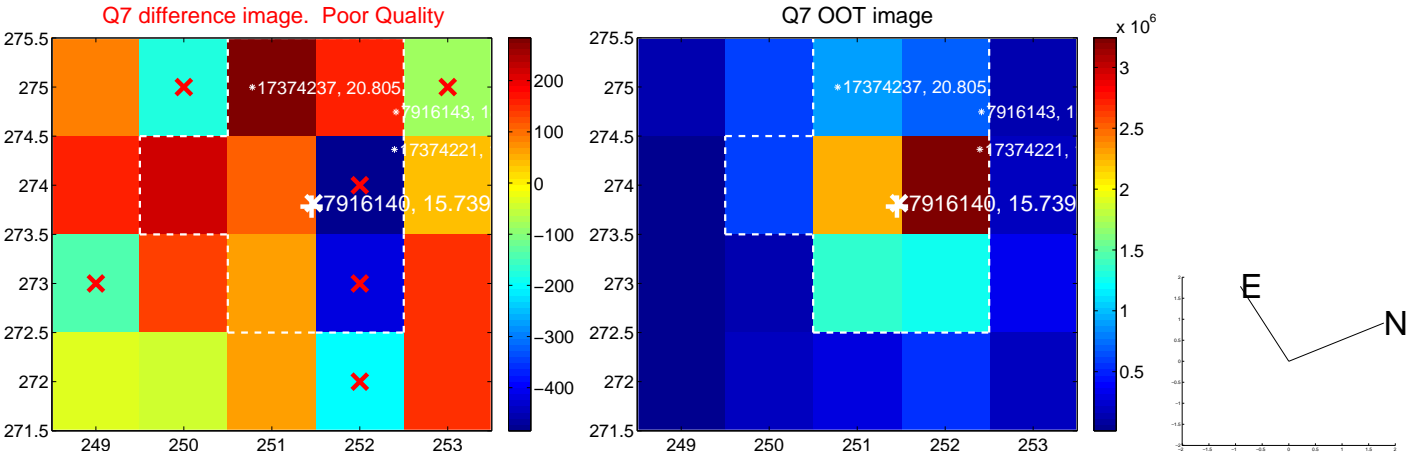
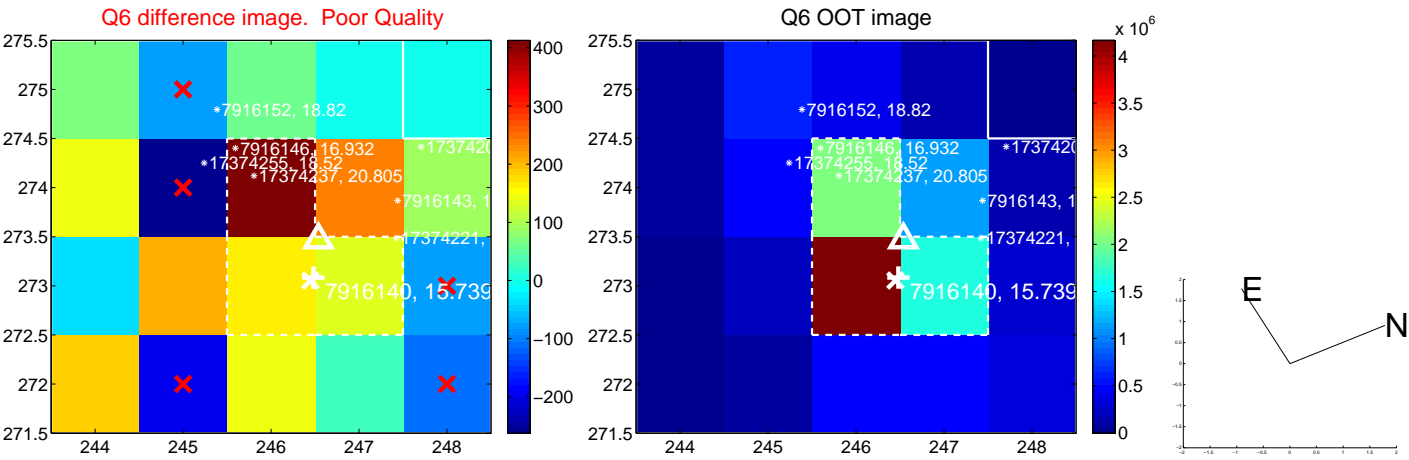
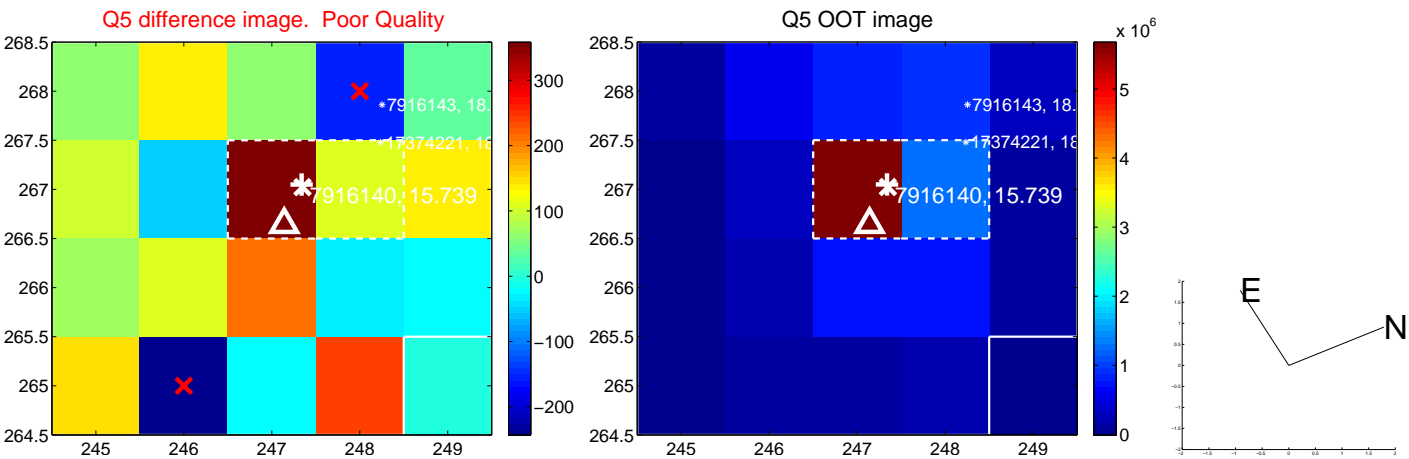


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: 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 ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.

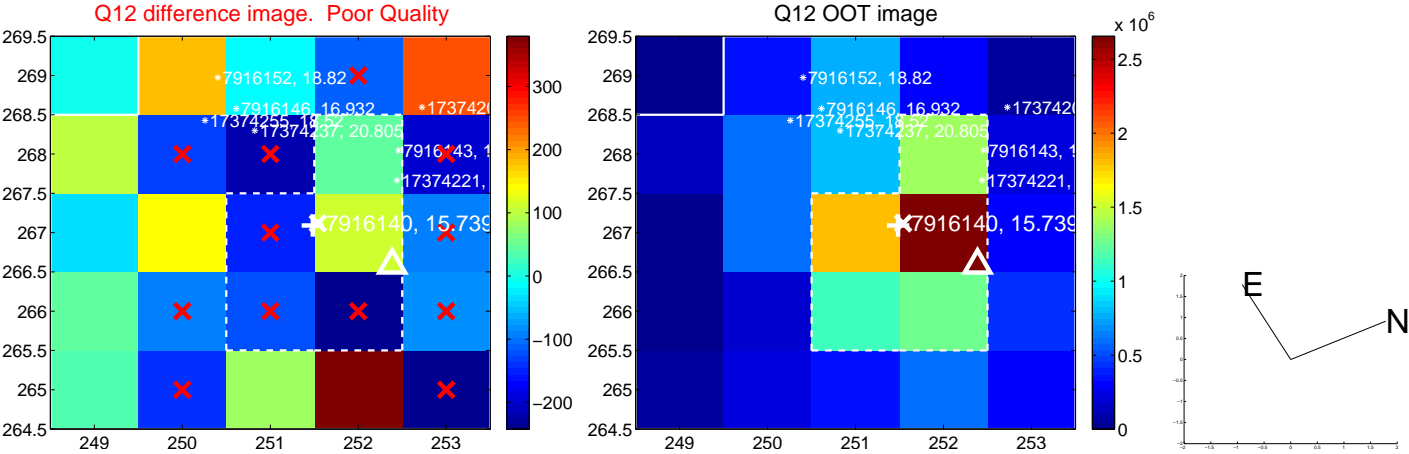
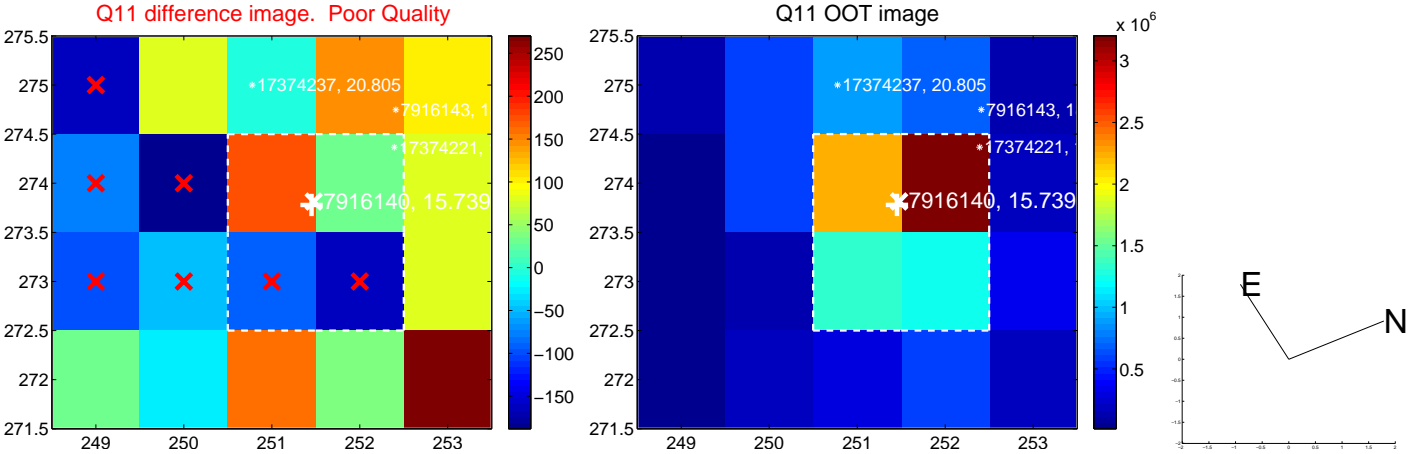
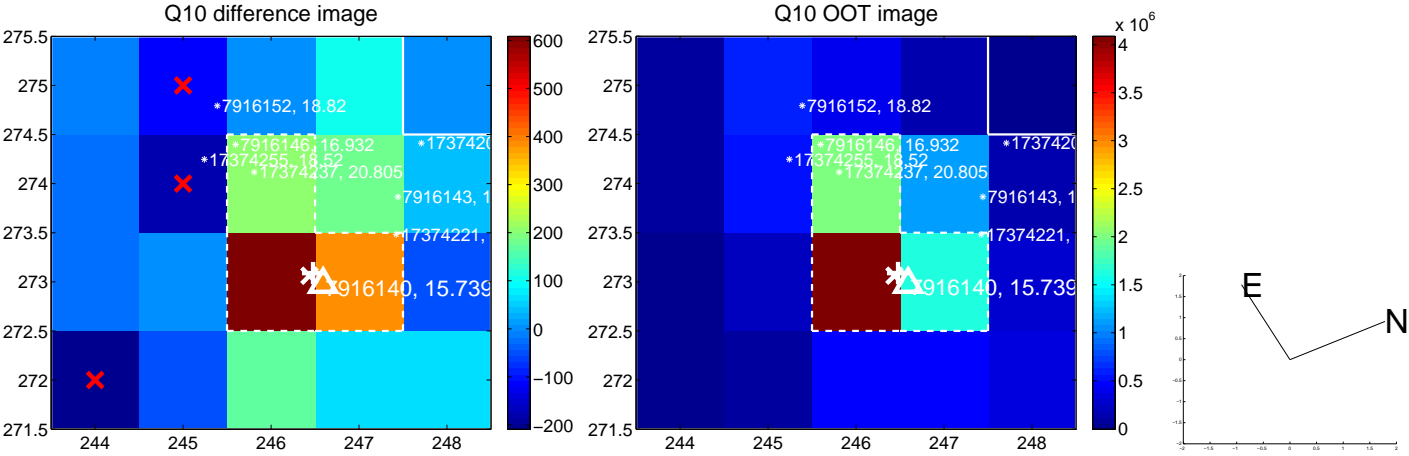
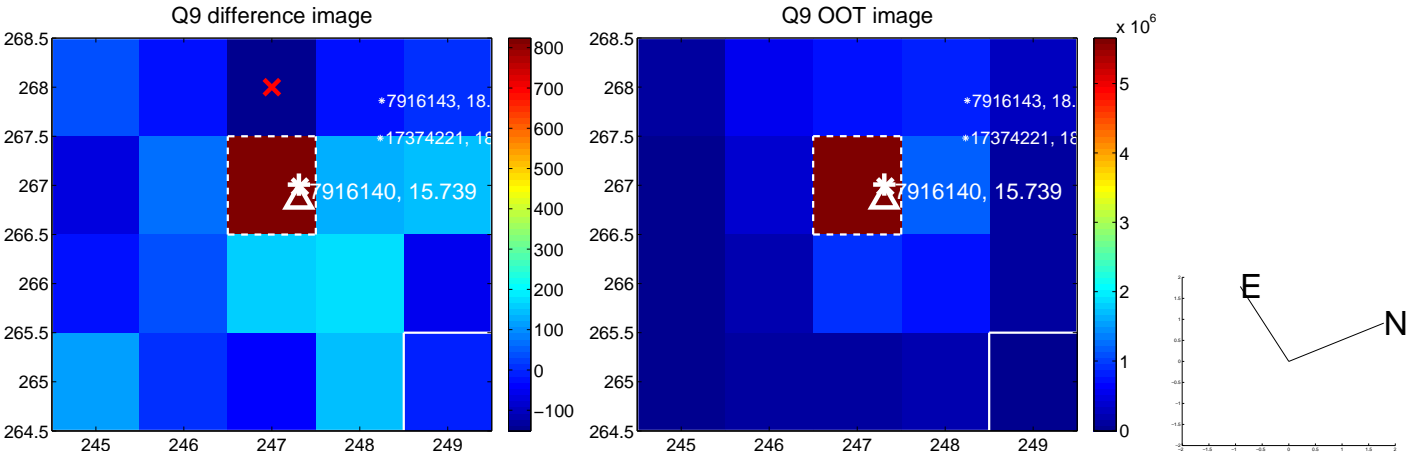


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

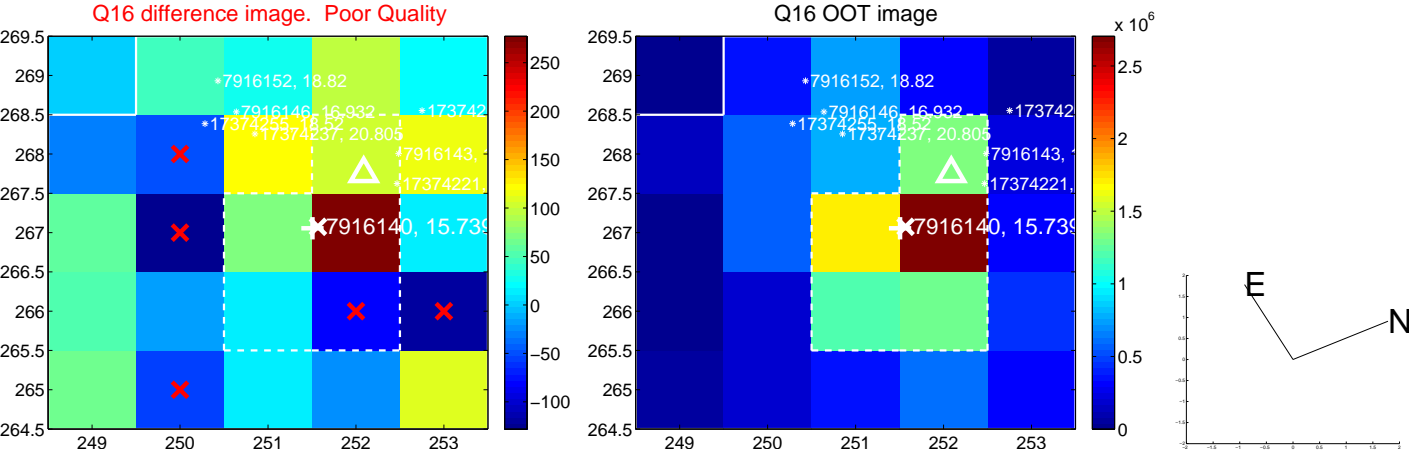
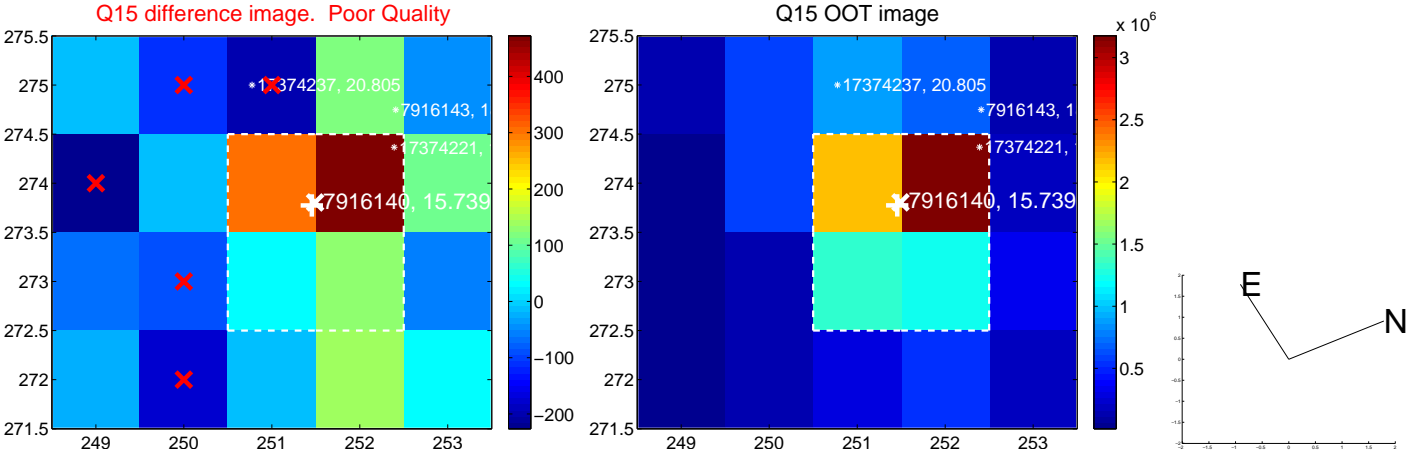
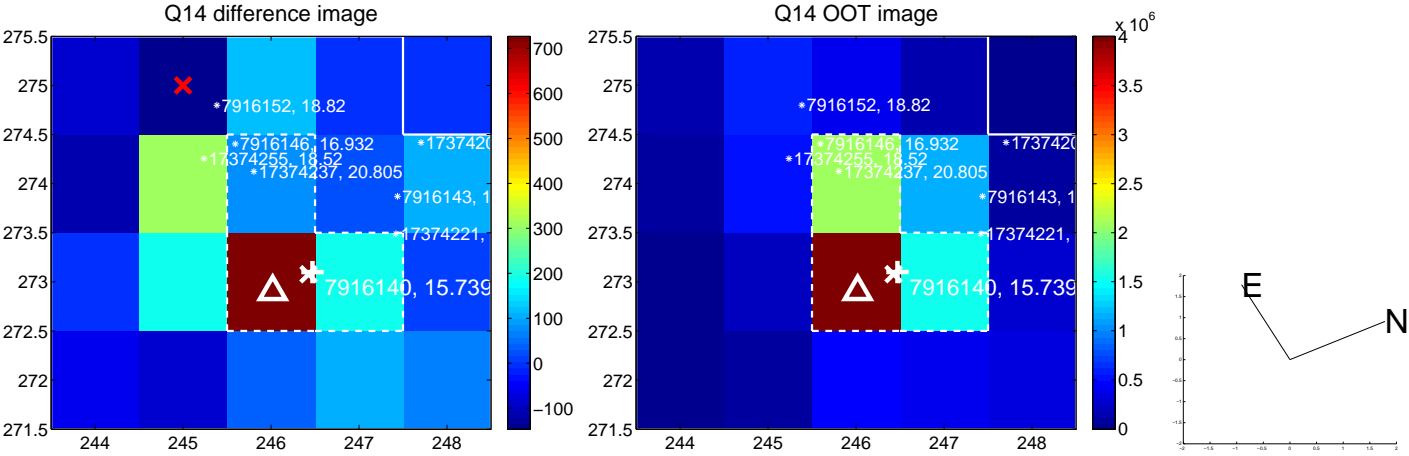
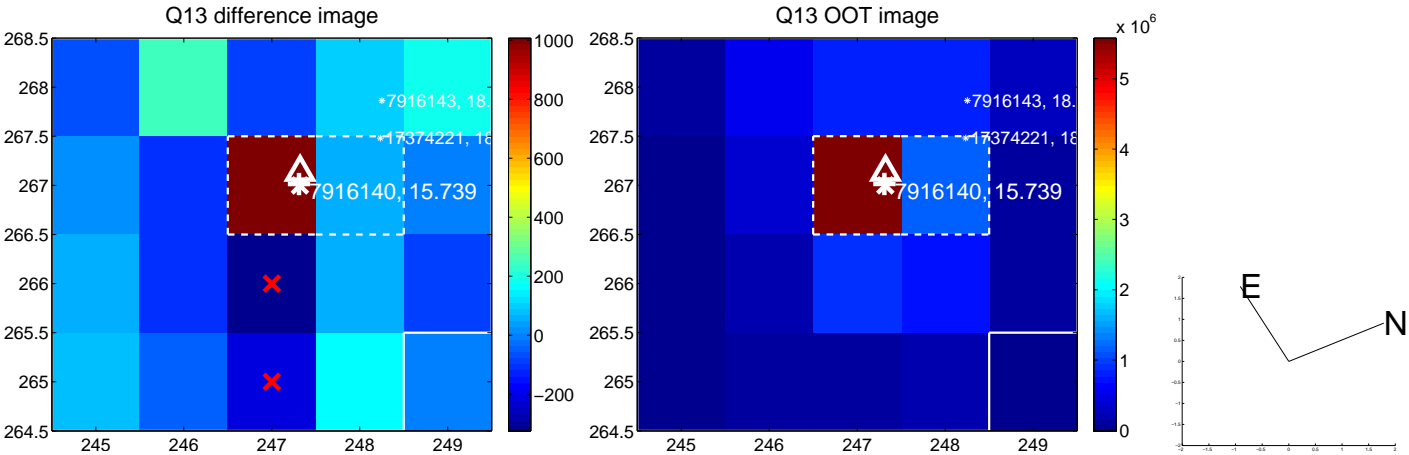




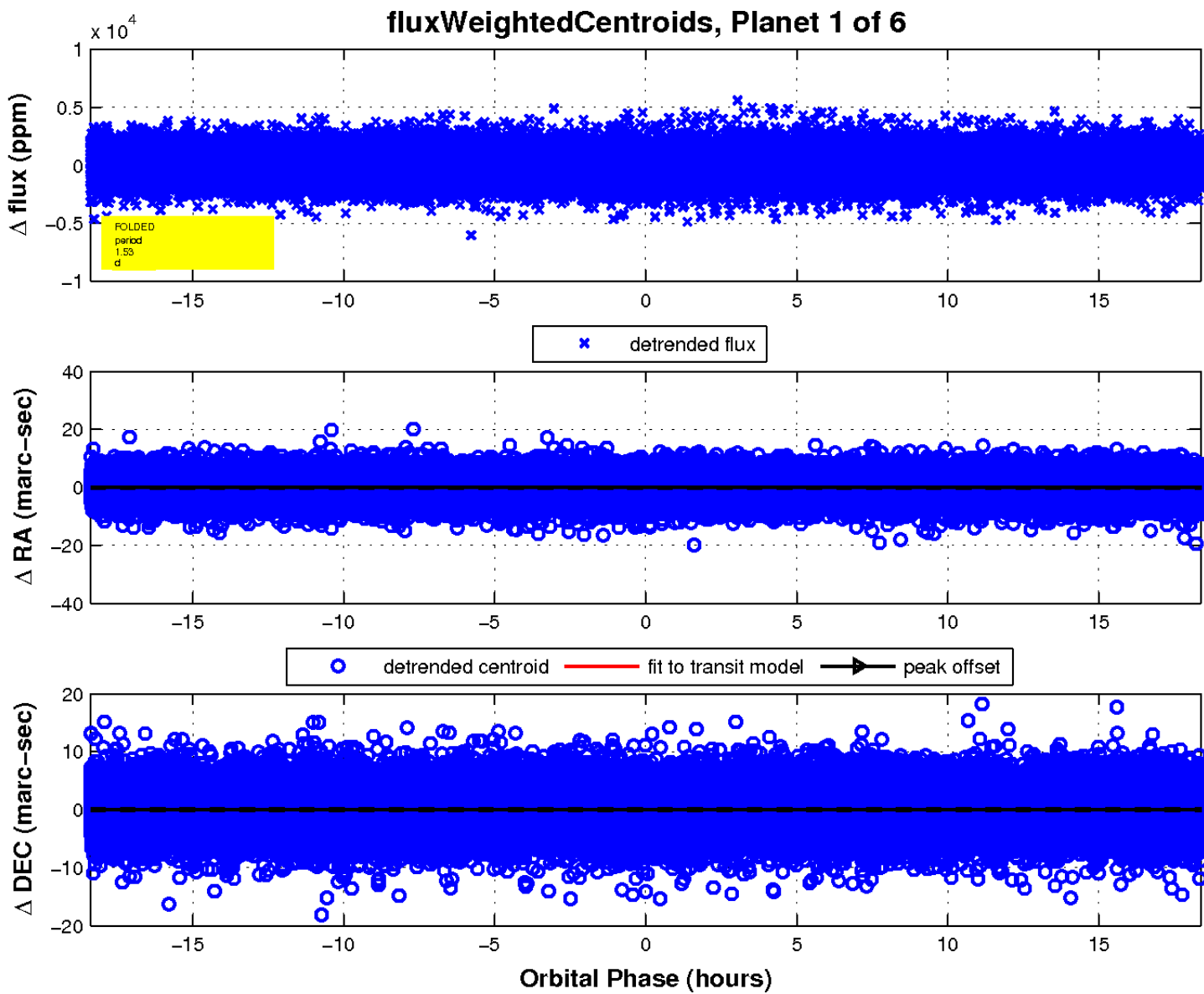
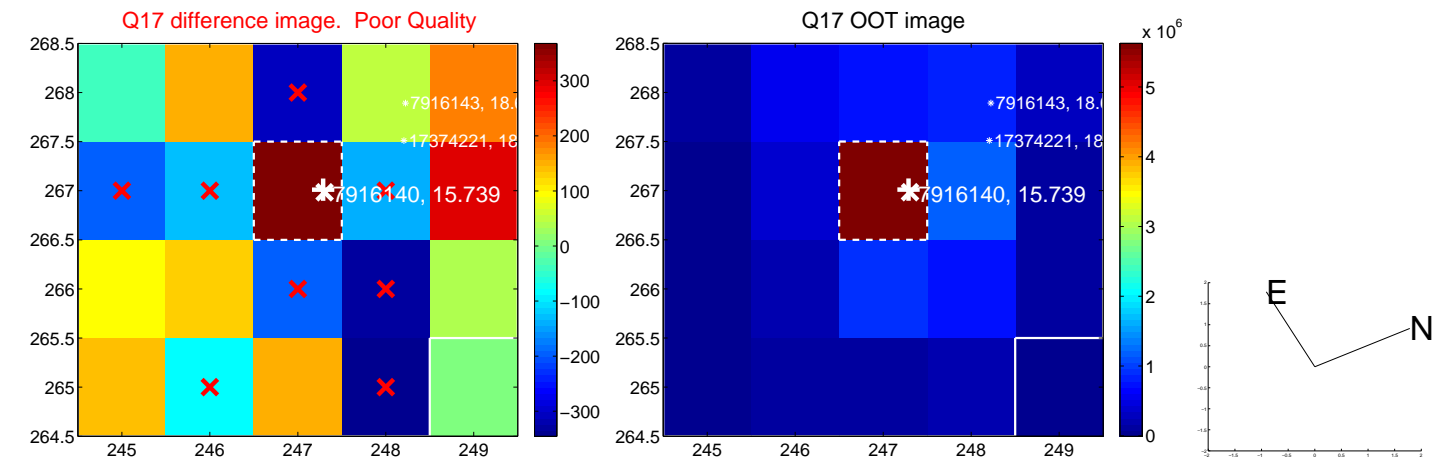
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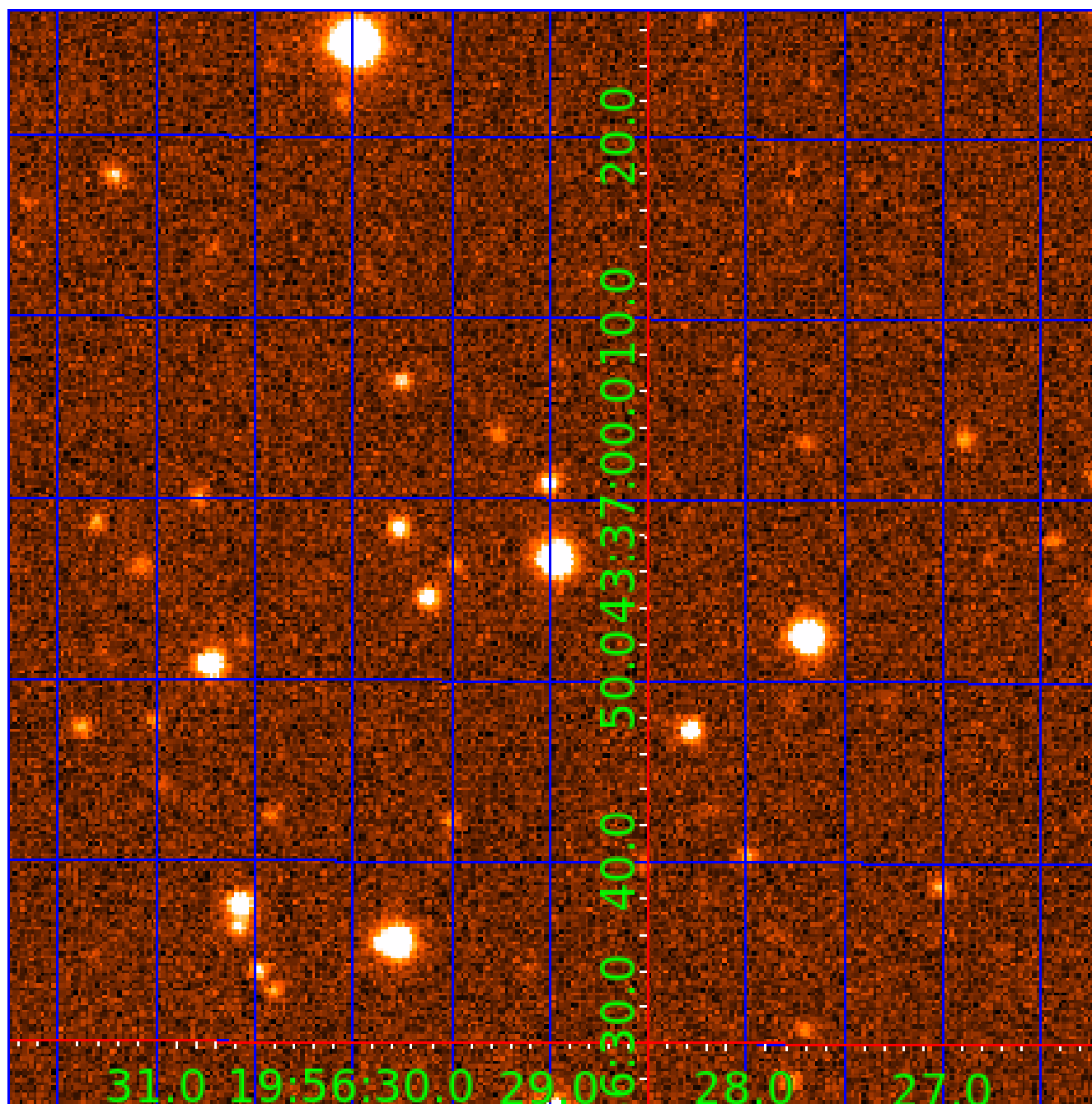


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UKIRT Image

Declination





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007916140-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
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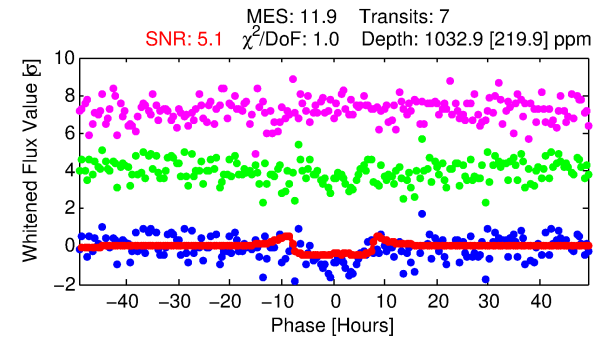
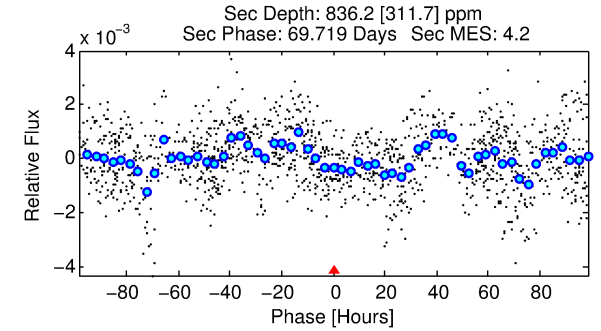
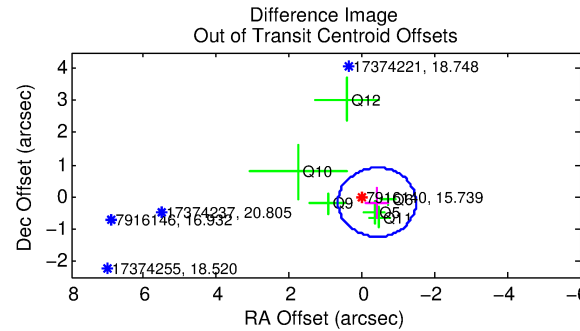
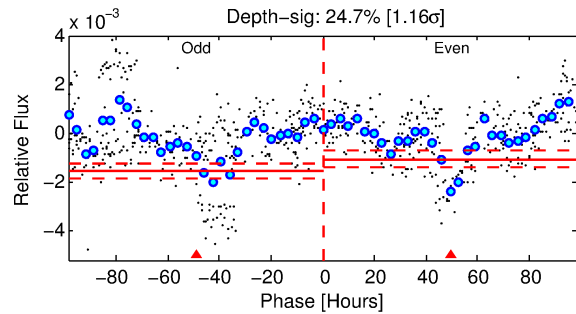
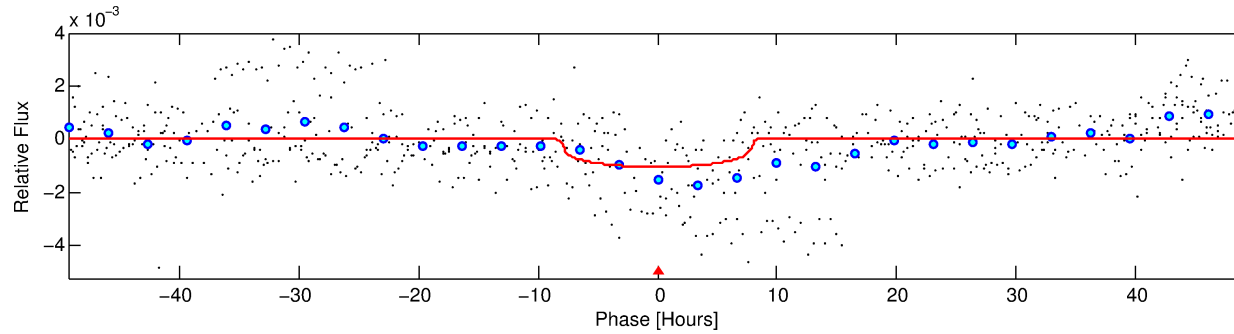
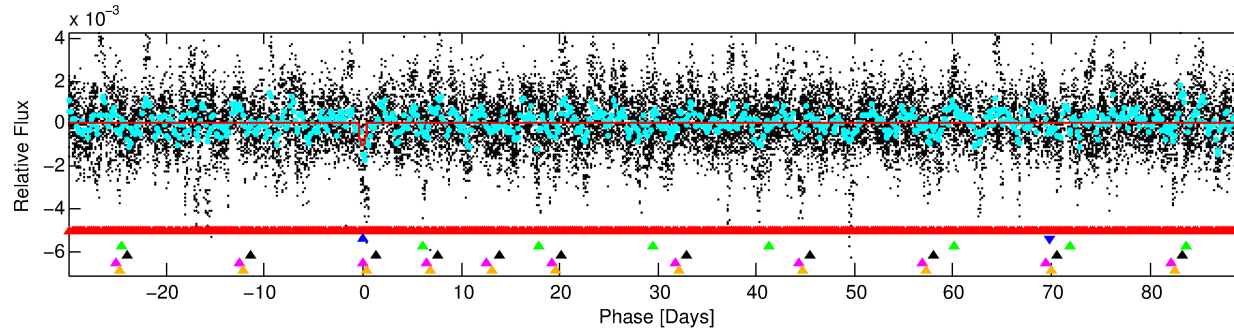
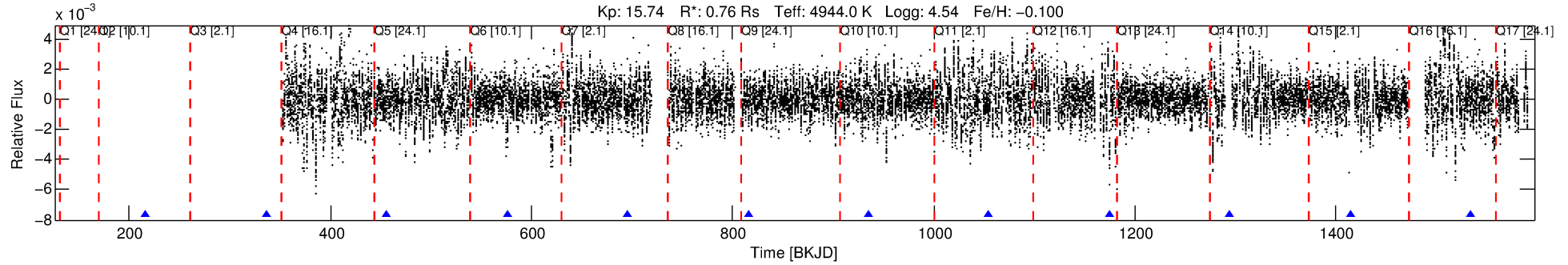
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 007916140-02

No Significant Match Found

# DV One-Page Summary

KIC: 7916140 Candidate: 2 of 6 Period: 119.829 d



## DV Fit Results:

Period = 119.82893 [0.00524] d  
Epoch = 216.2270 [0.0303] BKJD  
Rp/R\* = 0.0295 [0.0172]  
a/R\* = 50.95 [97.95]  
b = 0.48 [3.17]  
Seff = 1.68 [0.32]  
Teq = 290 [14] K  
Rp = 2.44 [1.44] Re  
a = 0.4284 [0.0380] AU  
Ag = 14139.66 [17368.35] [0.81 $\sigma$ ]  
Teffp = 4891 [1504] K [3.06 $\sigma$ ]

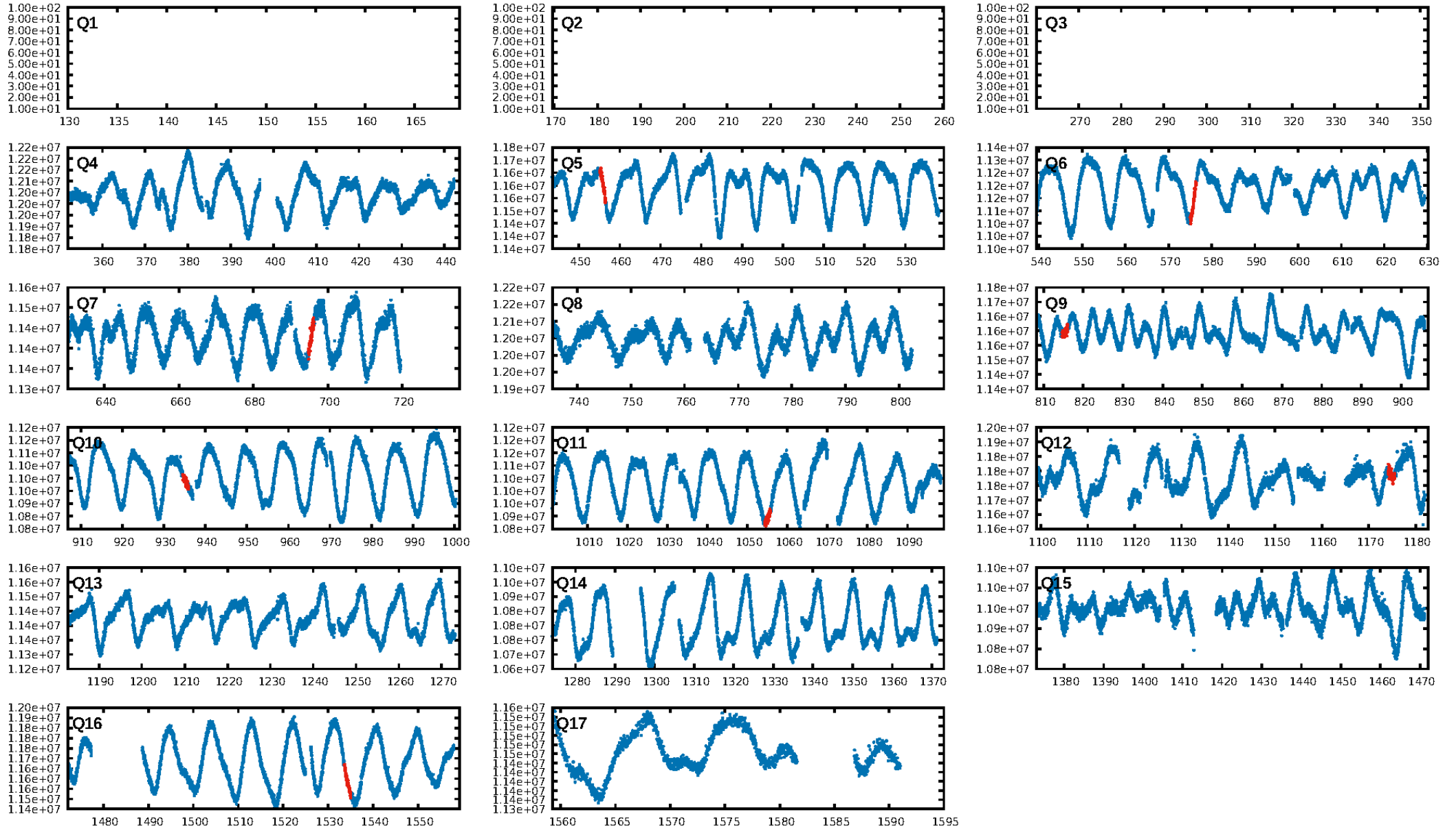
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [159.99 $\sigma$ ]  
LongPeriod-sig: 100.0% [18.25 $\sigma$ ]  
ModelChiSquare2-sig: 3.6%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 1.22e-16  
RollingBand-fgt: 1.00 [7/7]  
**GhostDiagnostic-chr: -1.255**  
Centroid-sig: 0.7%  
Centroid-so: 1.390 arcsec [1.96 $\sigma$ ]  
OotOffset-rm: 0.447 arcsec [1.25 $\sigma$ ]  
OotOffset-st: 2/1/1/2 [6]  
KicOffset-rm: 0.362 arcsec [0.82 $\sigma$ ]  
KicOffset-st: 2/1/1/2 [6]  
DiffImageQuality-fgm: 0.50 [3/6]  
DiffImageOverlap-fno: 0.00 [0/7]

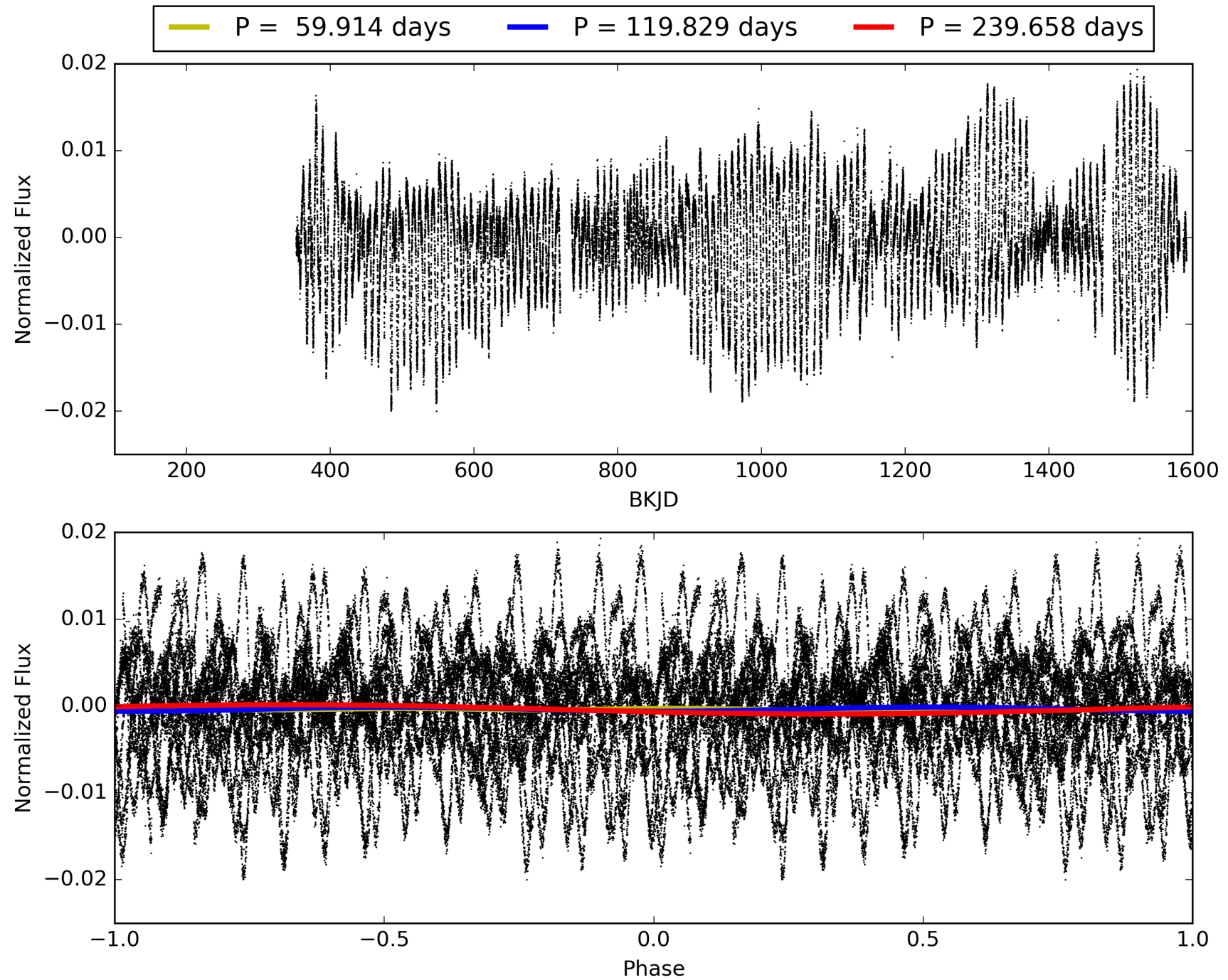
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 05:17:13 Z

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

# TCE 007916140-02, PDC Light Curves

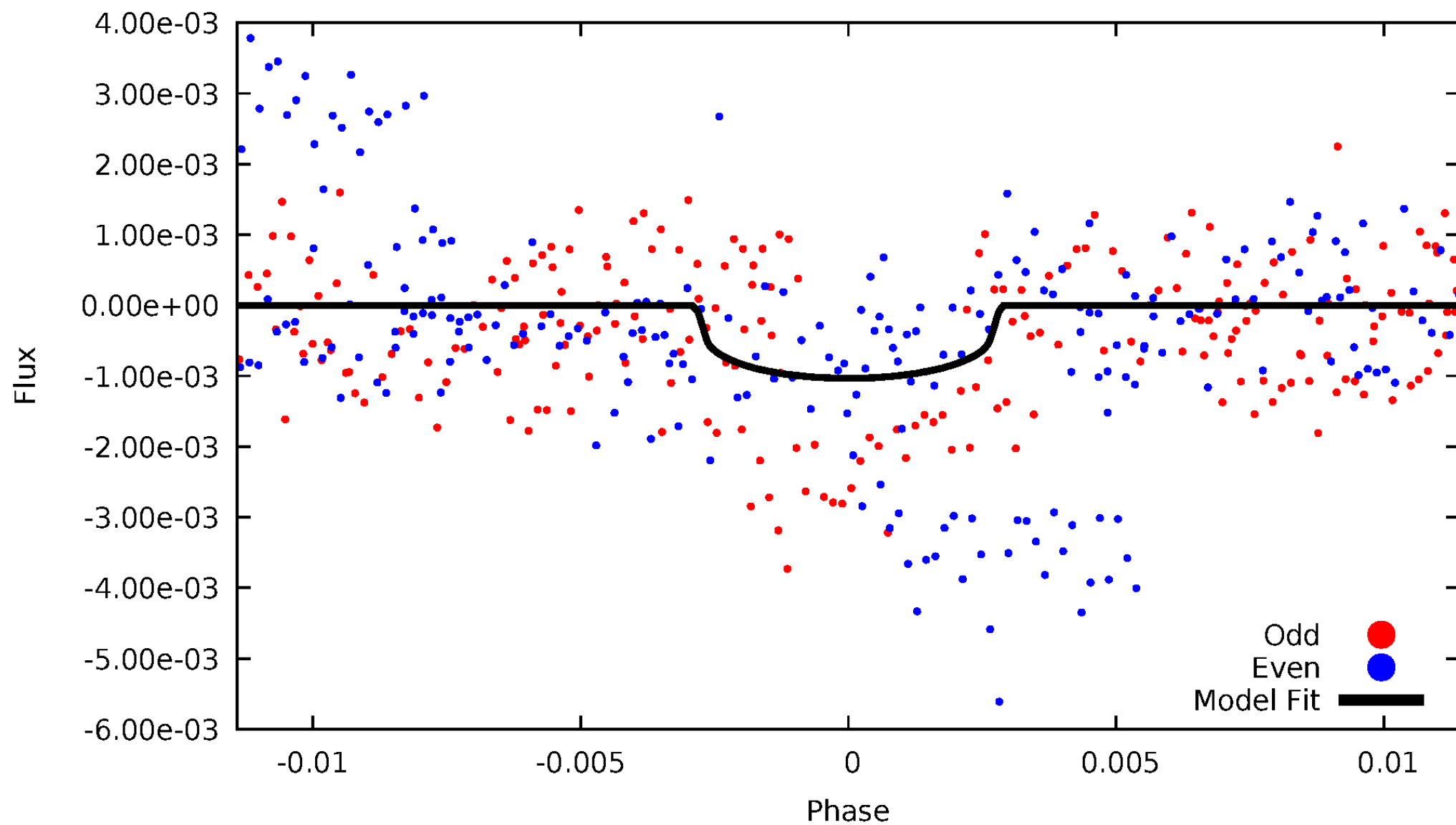


# TCE 007916140-02



# DV Odd/Even

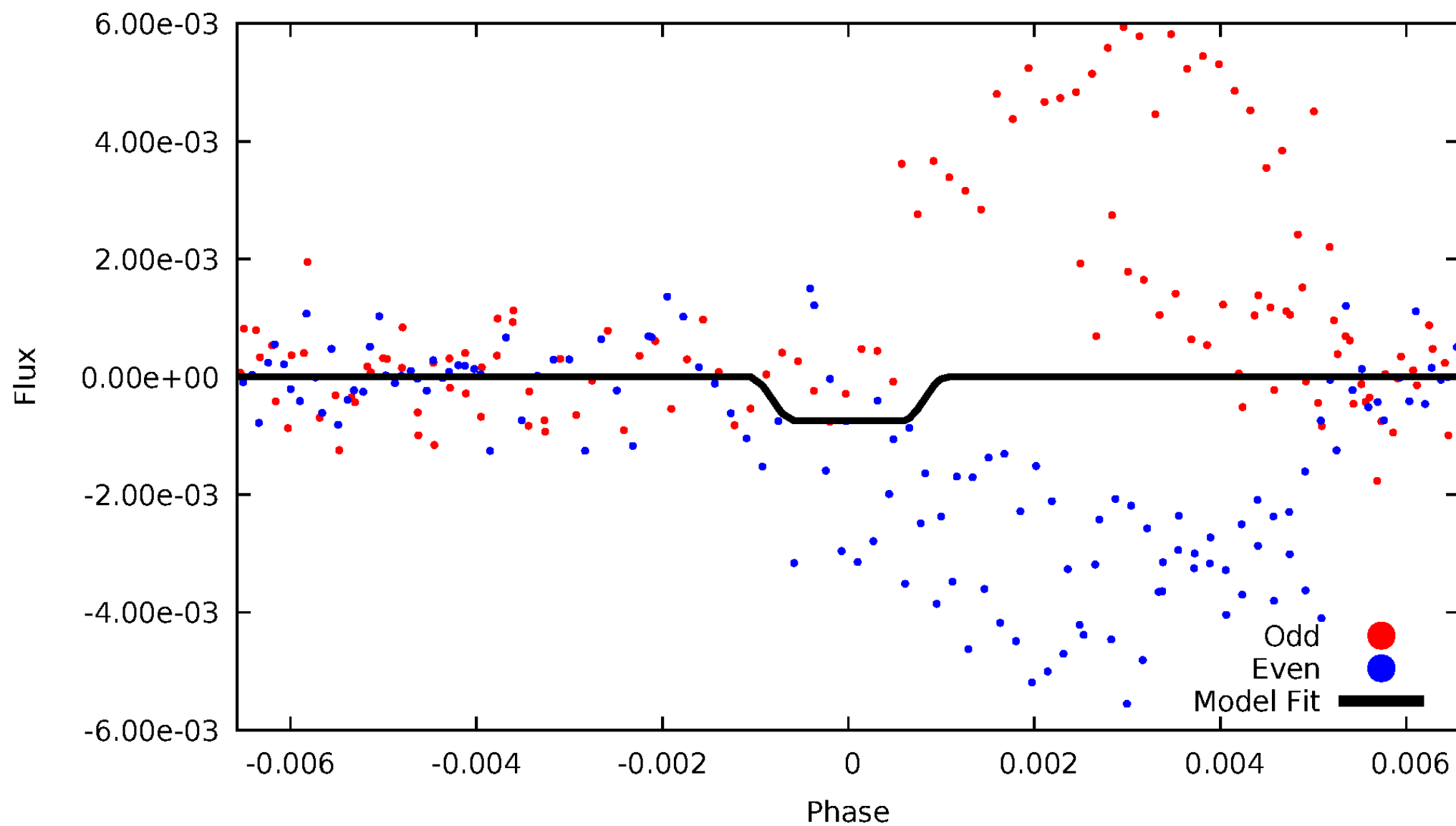
TCE 007916140-02





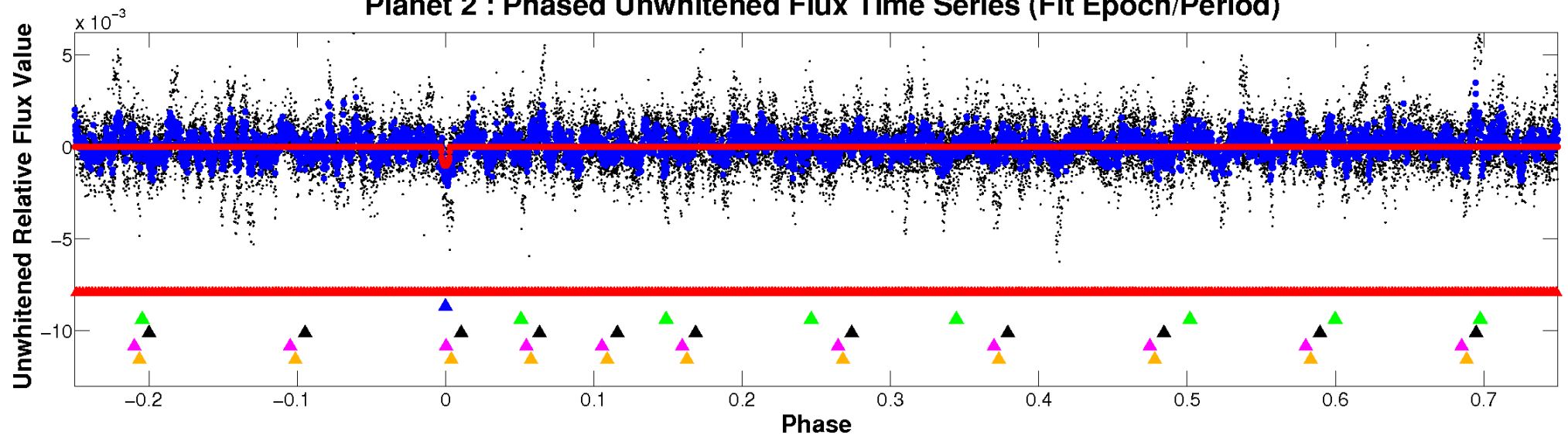
# ALT Odd/Even

TCE 007916140-02

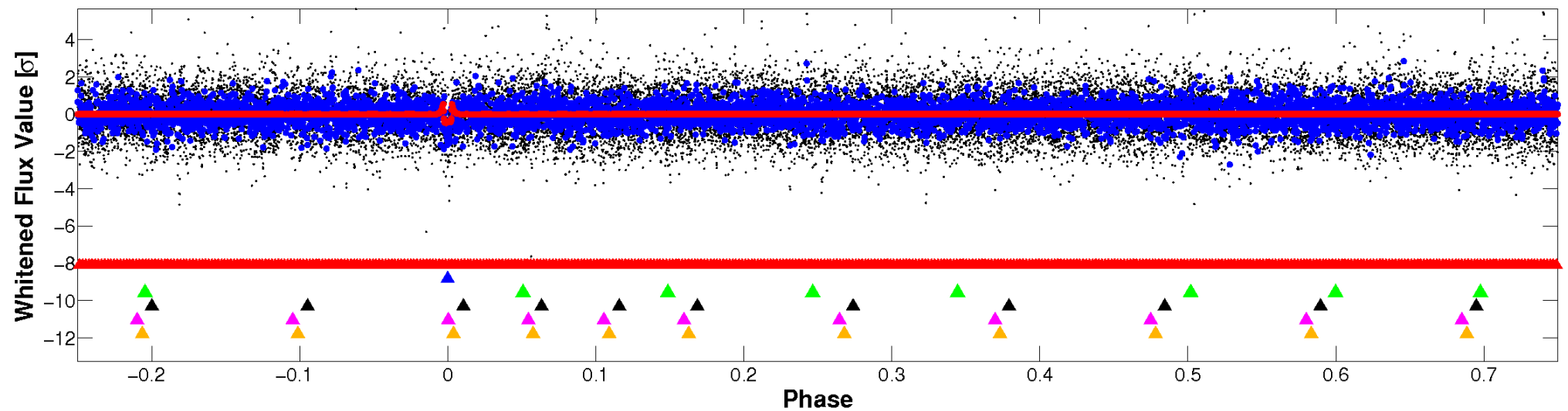


# Non-Whitened Vs. Whitened Light Curve

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

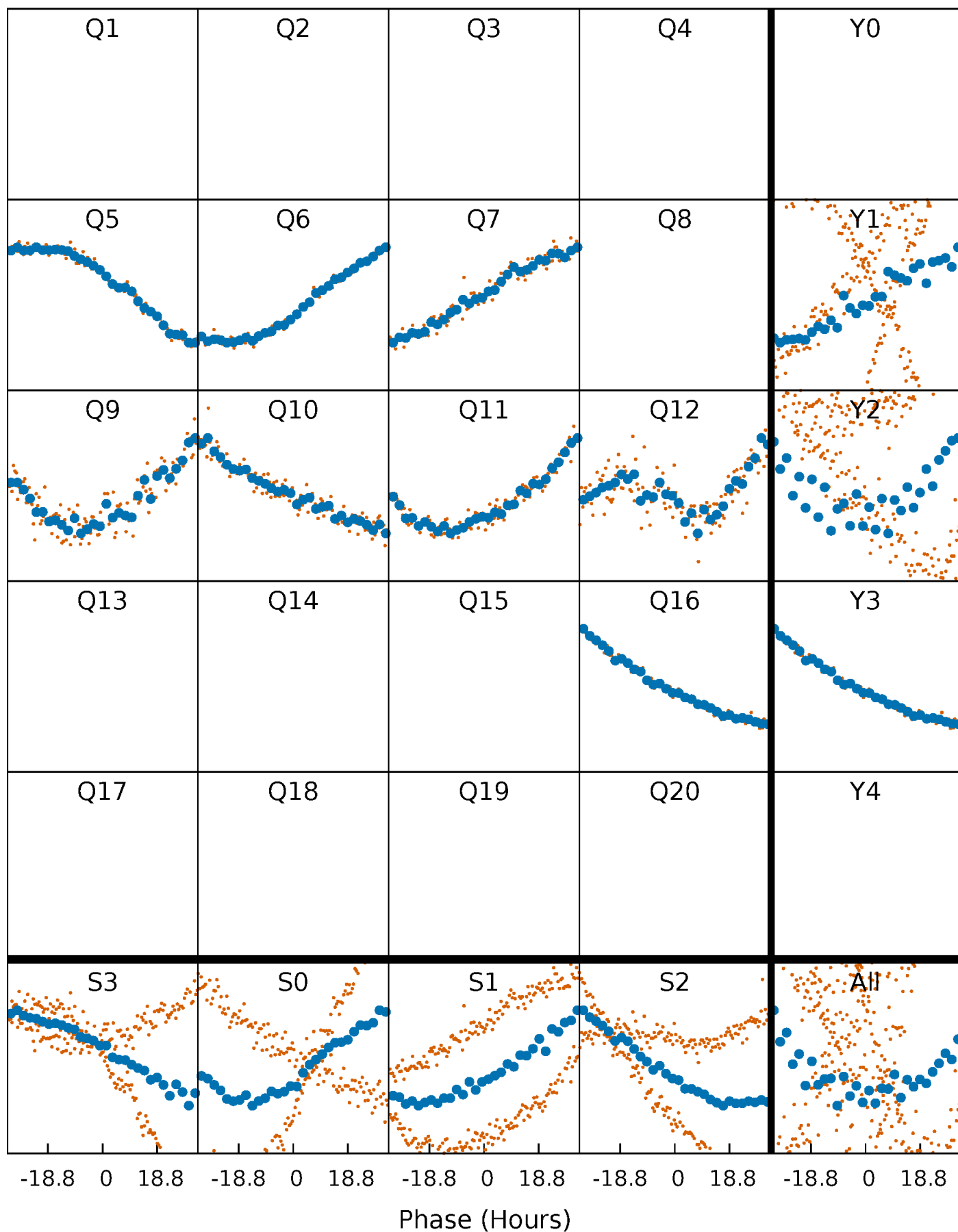


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



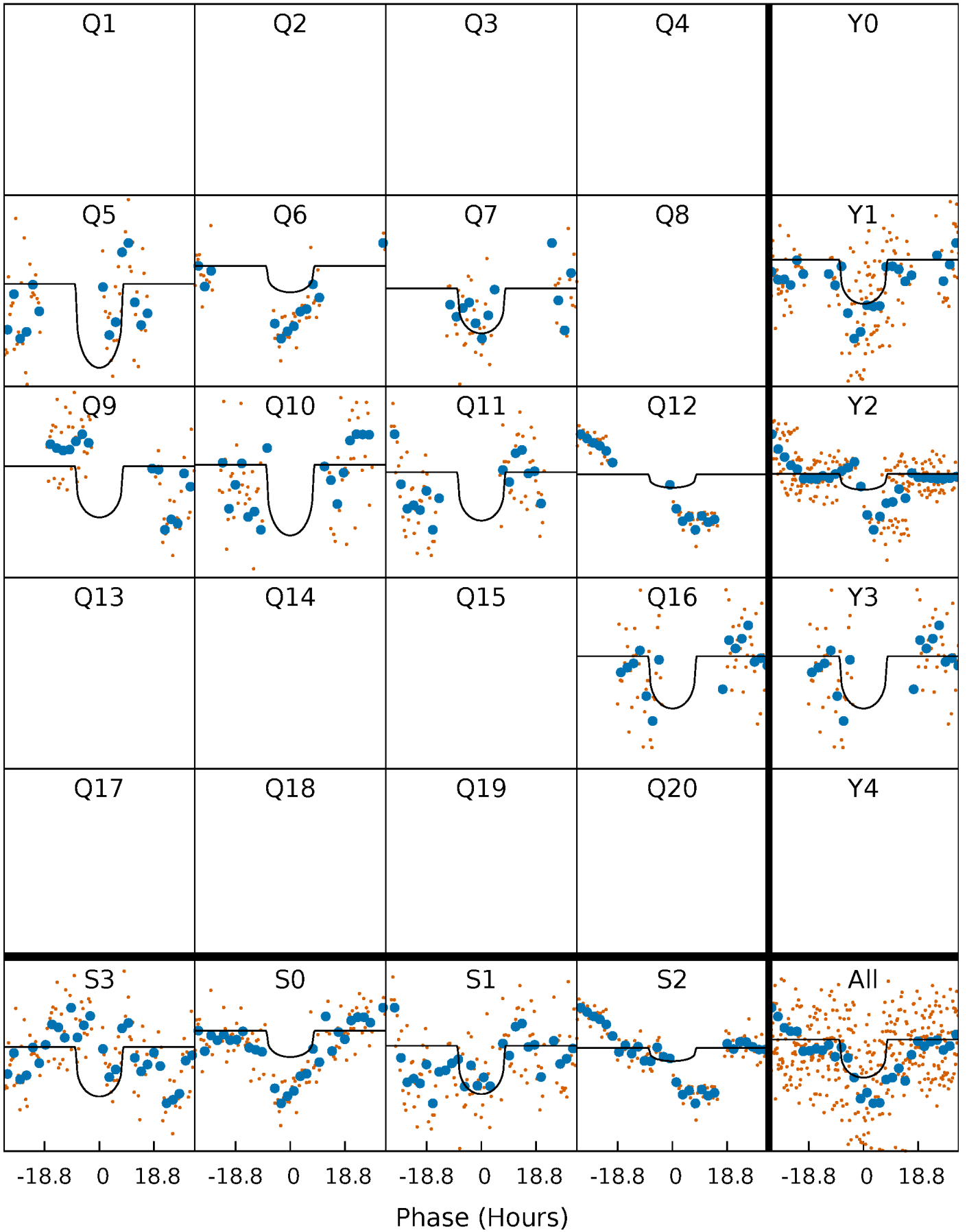
# PDC Quarter-Phased Transit Curves

TCE 007916140-02 P=119.828930 Days  $T_0=216.226990$  (BKJD)



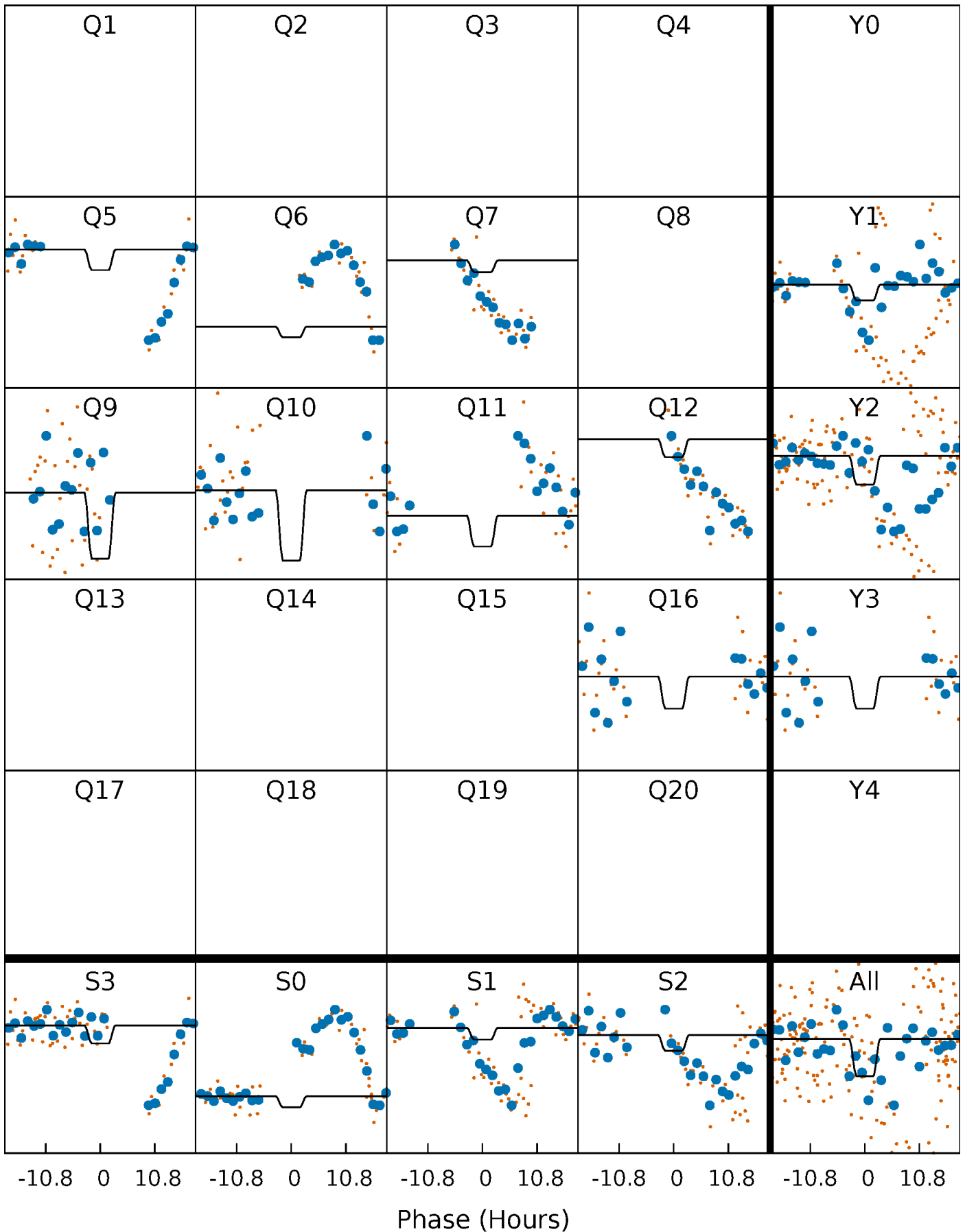
# DV Quarter-Phased Transit Curves

TCE 007916140-02 P=119.828930 Days  $T_0=216.226990$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 007916140-02 P=119.897319 Days  $T_0=215.714257$  (BKJD)

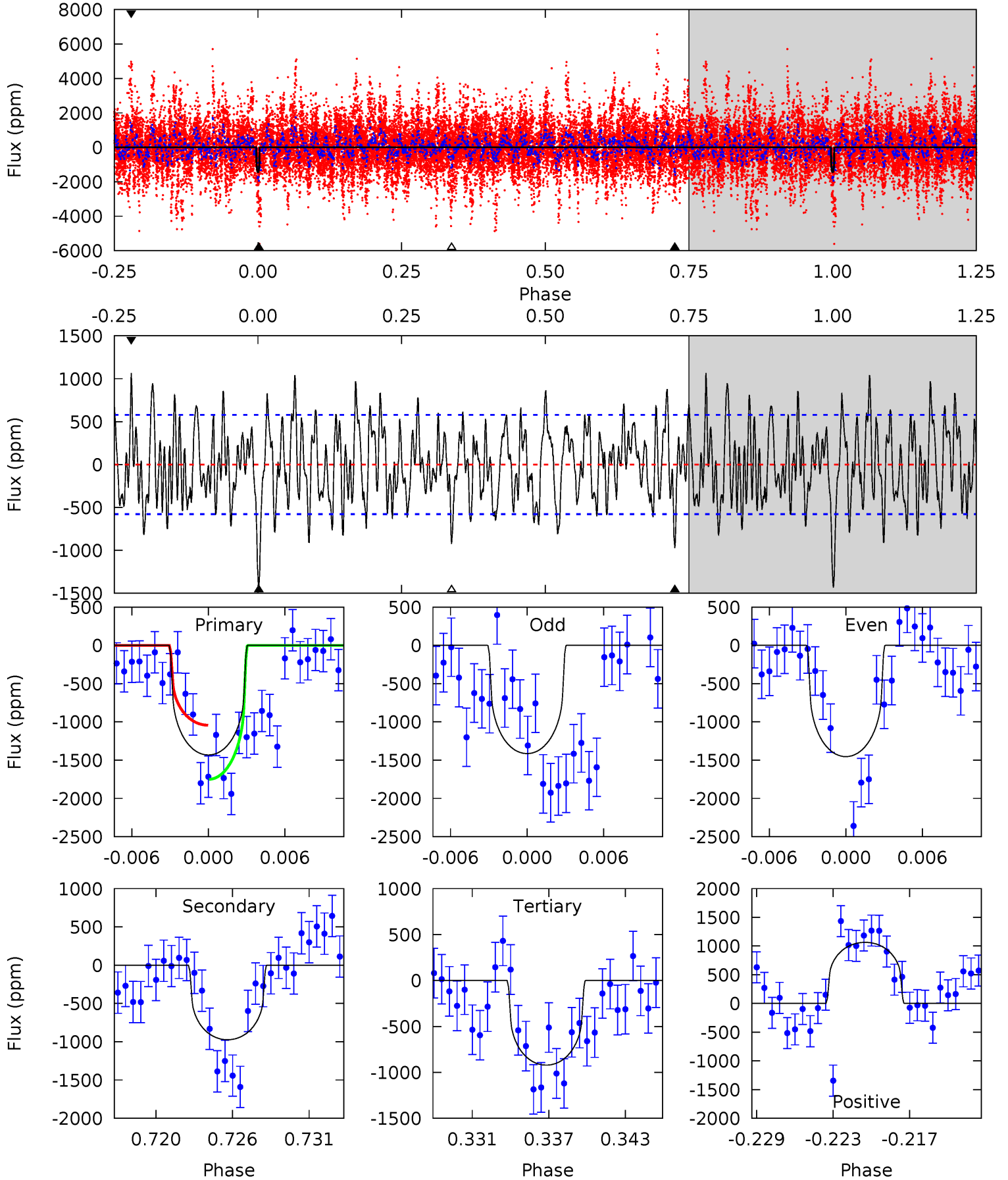




# DV Model-Shift Uniqueness Test

007916140-02, P = 119.828930 Days, E = 216.226990 Days

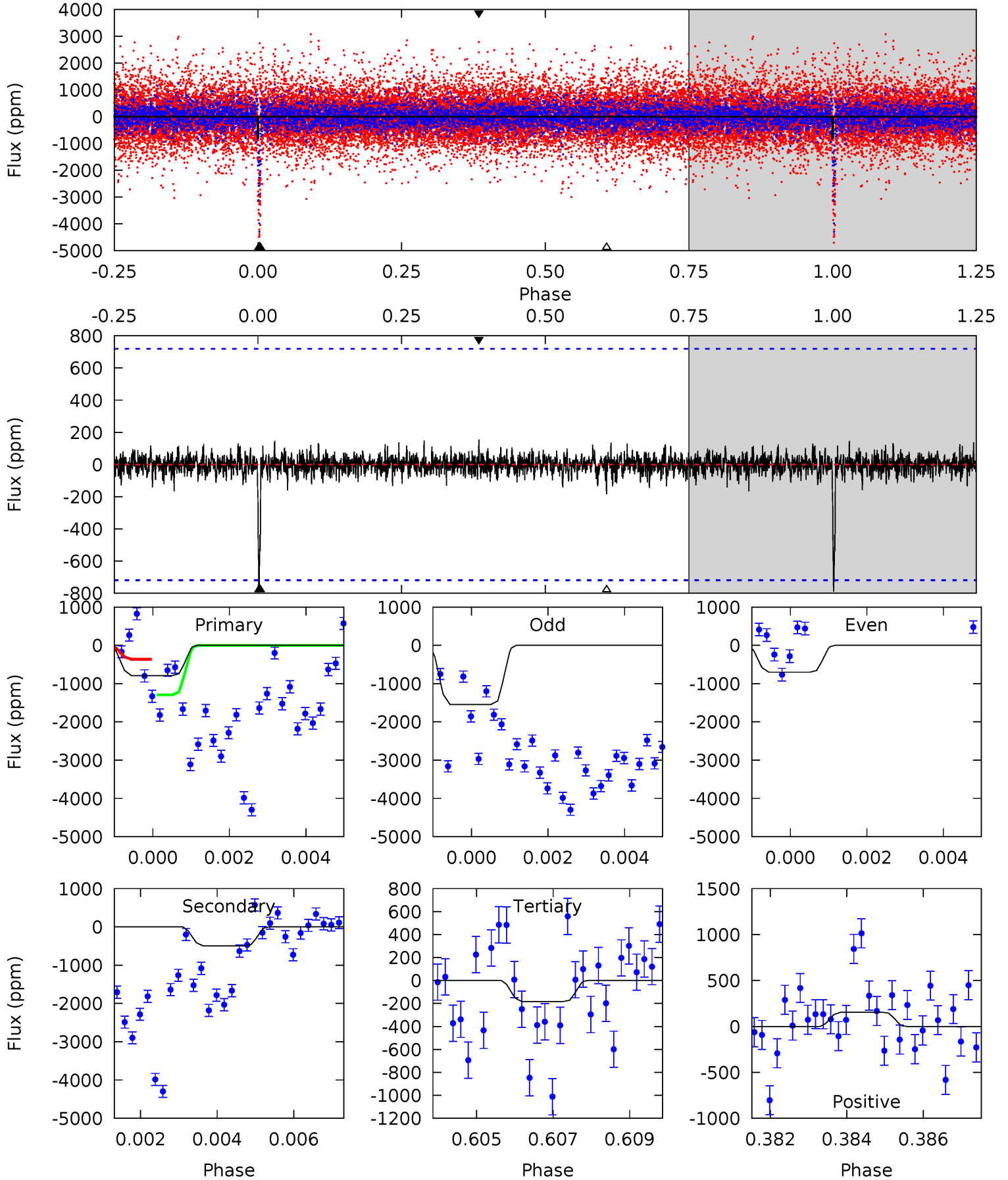
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.7	8.65	8.18	9.46	5.13	2.76	3.33	4.54	3.27	0.47	-0.80	0.17	1.63	0.43	3.13



# Alt Model-Shift Uniqueness Test

007916140-02, P = 119.897319 Days, E = 215.714257 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
5.85	3.68	1.36	1.15	5.33	3.10	0.31	4.48	4.70	2.32	2.54	3.26	-1.54	0.16	3.48



### Stellar Parameters For KIC 007916140

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4944^{+176}_{-176}$	$4.542^{+0.072}_{-0.048}$	$-0.100^{+0.300}_{-0.300}$	$0.758^{+0.071}_{-0.079}$	$0.731^{+0.093}_{-0.057}$	$2.359^{+0.749}_{-0.396}$
	+4%/-4%	+2%/-1%	+300%/-300%	+9%/-10%	+13%/-8%	+32%/-17%
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 007916140-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-974 \pm 113$	$2.58^{+1.47}_{-1.31}$	$405^{+16}_{-17}$	$4948^{+1958}_{-767}$	$14642^{+48515}_{-8243}$
Alt.	$-497 \pm 135$	$2.39^{+1.34}_{-1.29}$	$404^{+16}_{-18}$	$4410^{+1829}_{-674}$	$8762^{+32436}_{-5401}$

$T_{\text{max}}$  = 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

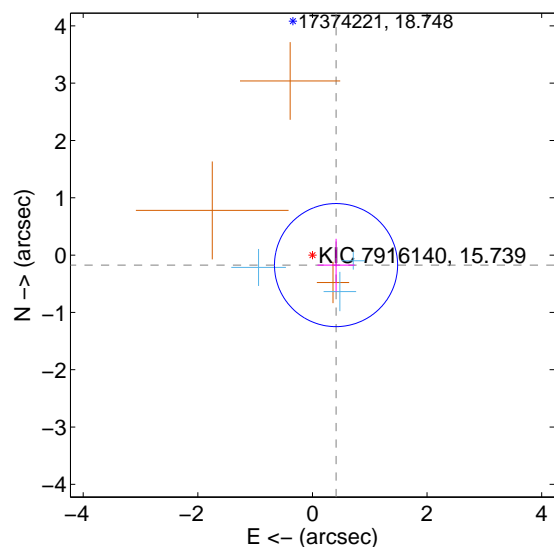
Supplemental centroid analysis for 007916140-02. Kepler magnitude: 15.74. Transit SNR 5.13

There are 3 quarters with good PRF difference image offsets

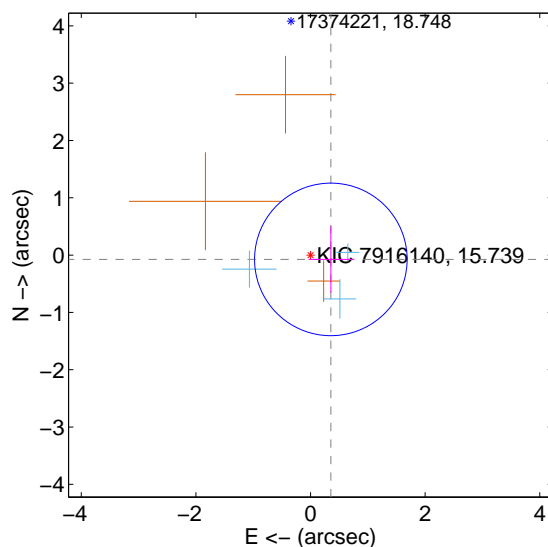
The direct PRF centroid is offset from the target star catalog position by about 0.24 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.447 \pm 0.358$	1.25	$-0.412 \pm 0.325$	$-0.174 \pm 0.459$
PRF-fit source offset from KIC position	$0.362 \pm 0.444$	0.82	$-0.354 \pm 0.390$	$-0.075 \pm 0.578$
photometric centroid source offset	$1.39 \pm 0.71$	1.96	$-0.69 \pm 0.73$	$-1.20 \pm 0.70$

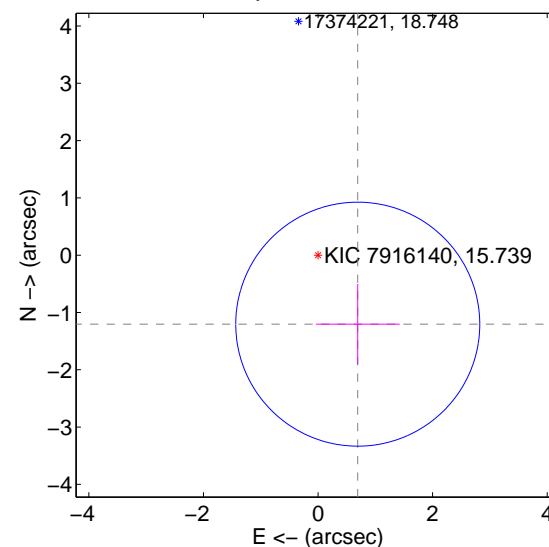
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



offset from photometric centroids



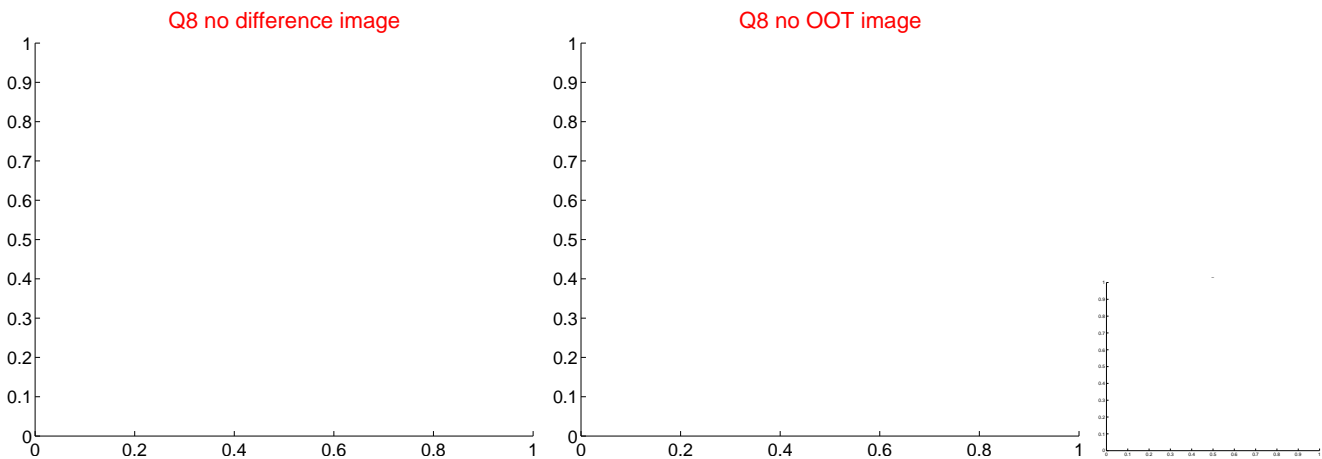
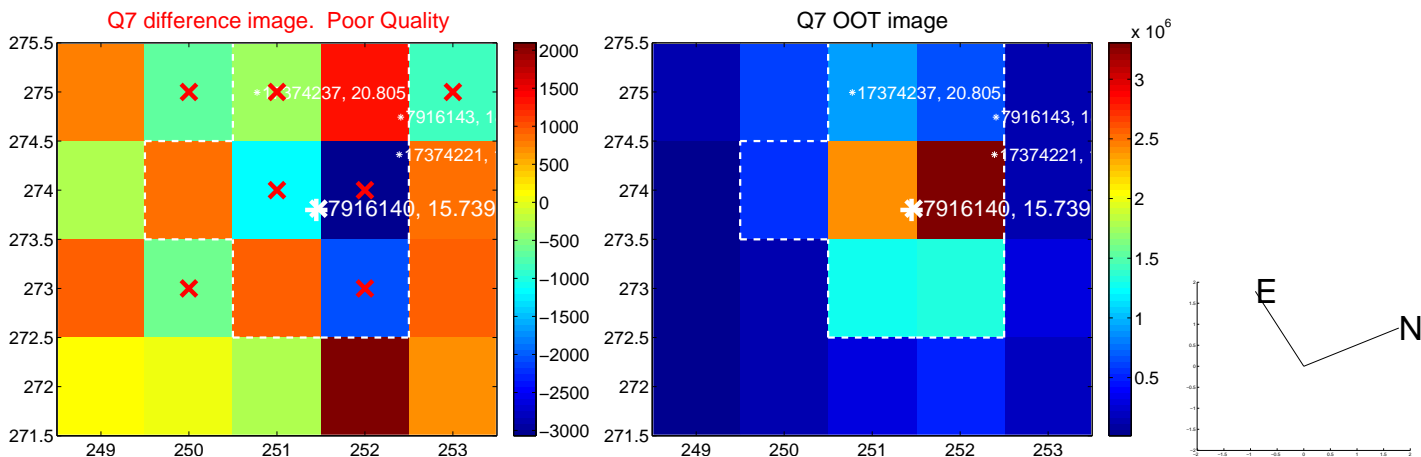
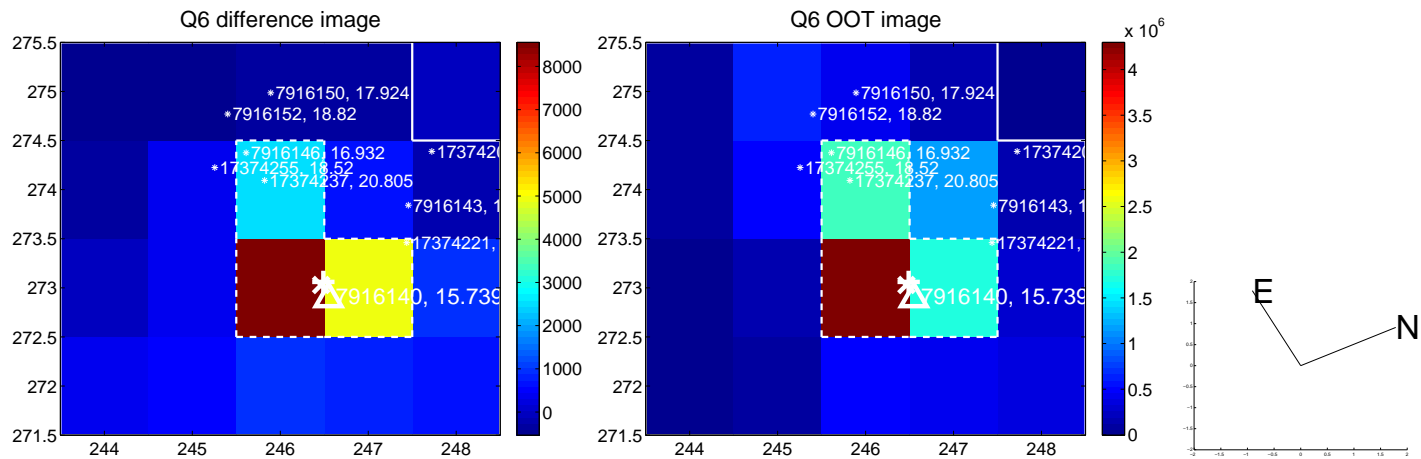
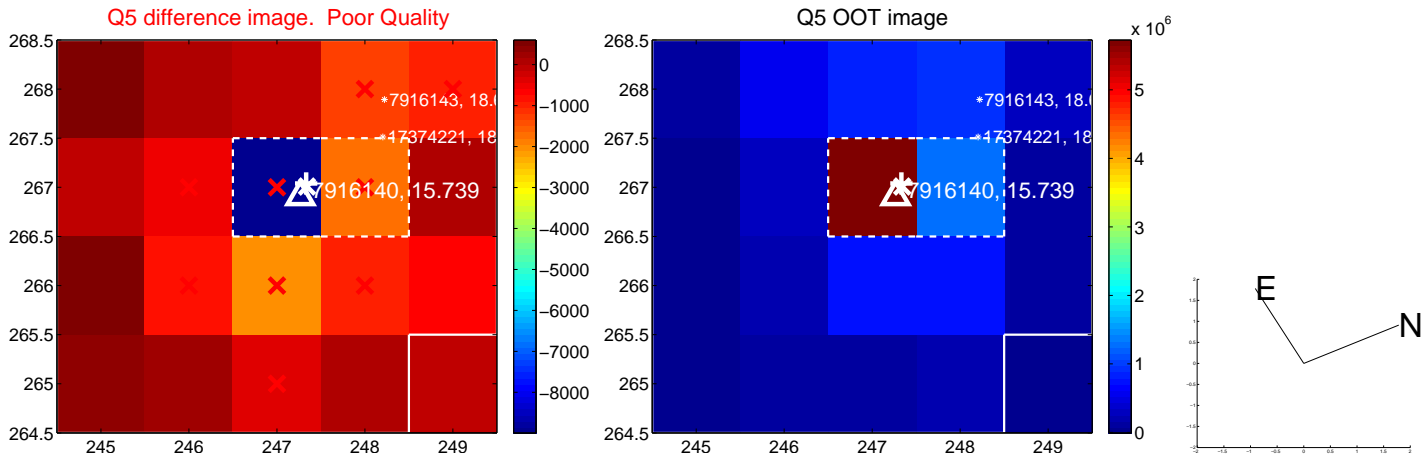
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

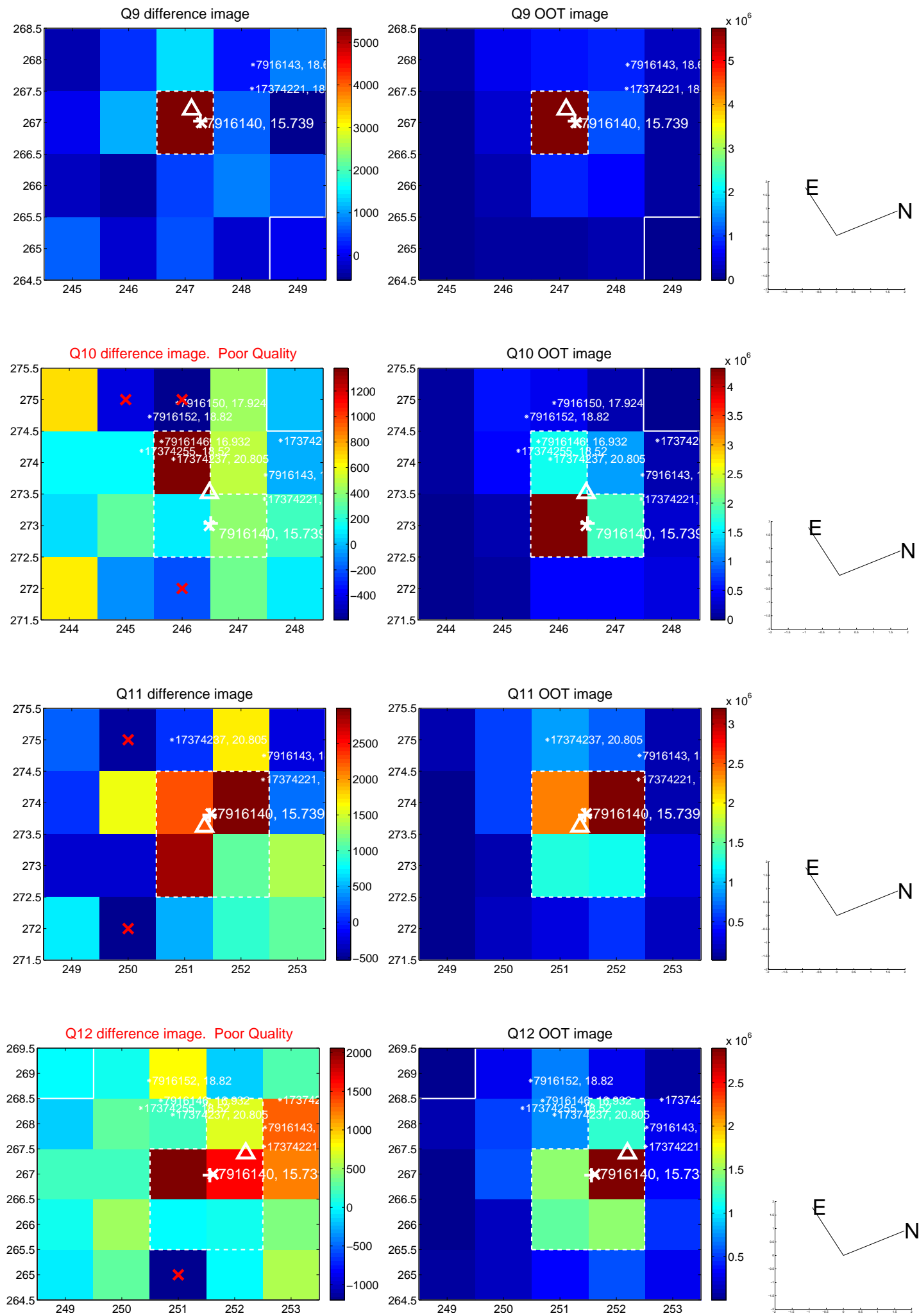




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



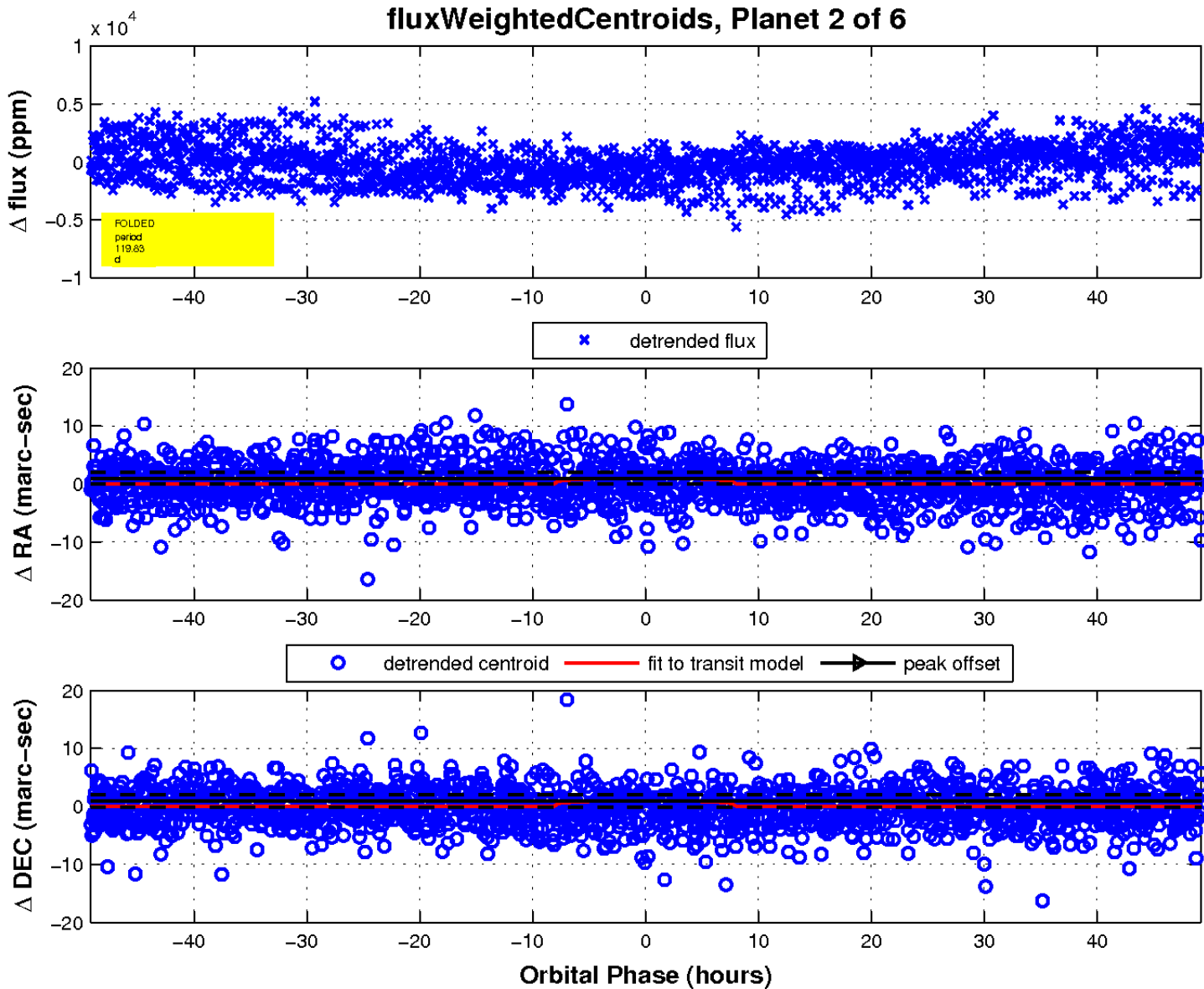
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

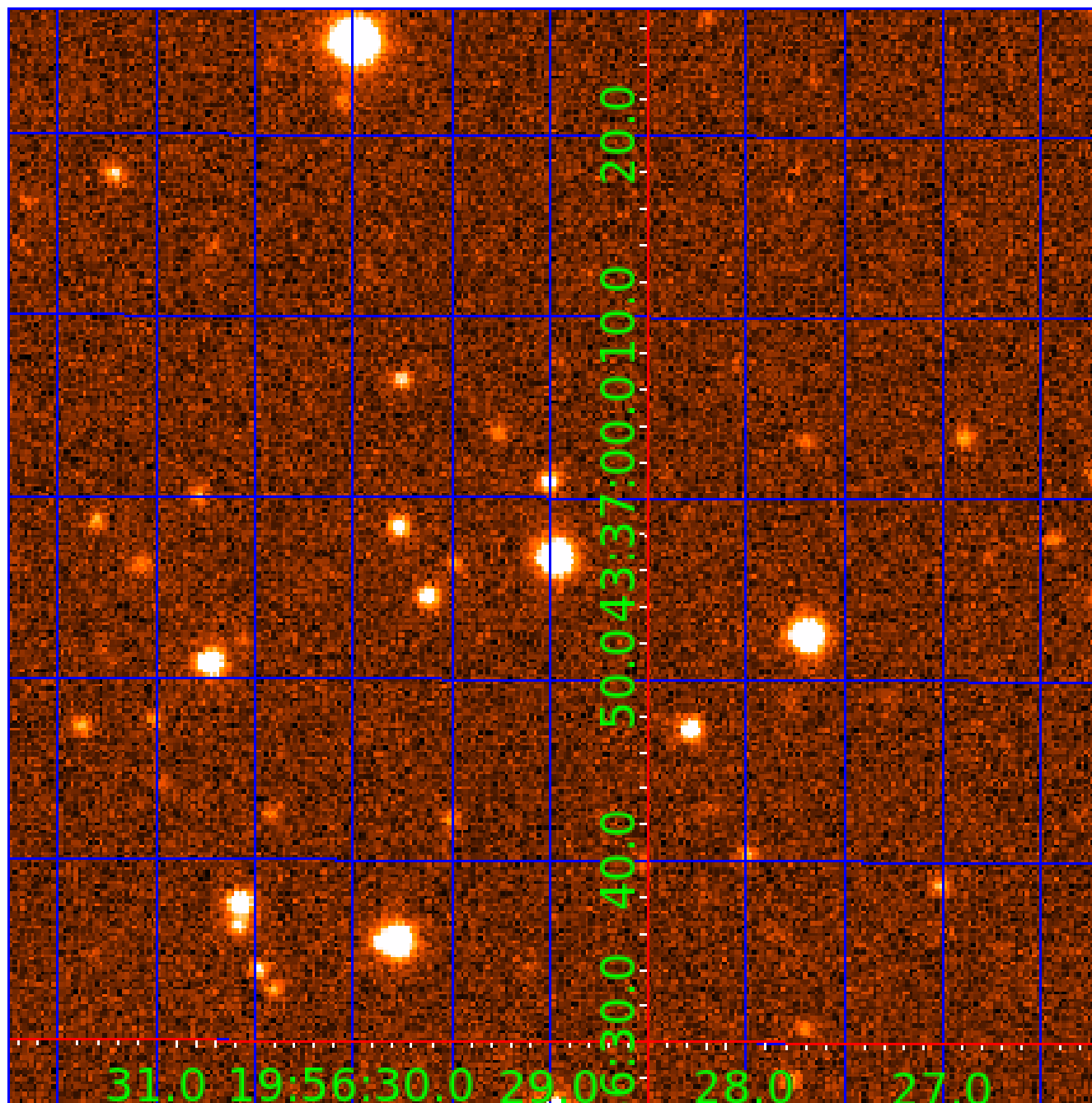
Q17 no difference image

Q17 no OOT image



UKIRT Image

Declination





# KIC 007916140

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007916140-01	OBS	No	1.532918	132.025157	116.4	6.755	7.9	9.4	0.76	4944	0.83	560.14
007916140-02	OBS	No	119.828930	216.226989	1032.9	16.409	11.9	5.1	0.76	4944	2.44	1.68
007916140-03	OBS	No	173.880601	257.501795	1171.8	13.209	7.3	4.9	0.76	4944	2.73	1.02
007916140-04	OBS	No	132.440521	223.824721	479.3	2.565	7.8	2.2	0.76	4944	1.66	1.47
007916140-05	OBS	No	132.423177	222.756419	487.8	2.231	8.0	1.9	0.76	4944	2.01	1.47
007916140-06	OBS	No	132.427963	223.136063	1547.1	12.867	12.2	7.9	0.76	4944	2.91	1.47

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007916140-01	OBS	FP	0.00	1	0	0	0	LPP_DV
007916140-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—INCONSISTENT_TRANS
007916140-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
007916140-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
007916140-05	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_SKYE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—SAME_NTL_PERIOD—CENT_FEW_DIFFS—HALO_GHOST
007916140-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—SAME_NTL_PERIOD—CENT_FEW_MEAS

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

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

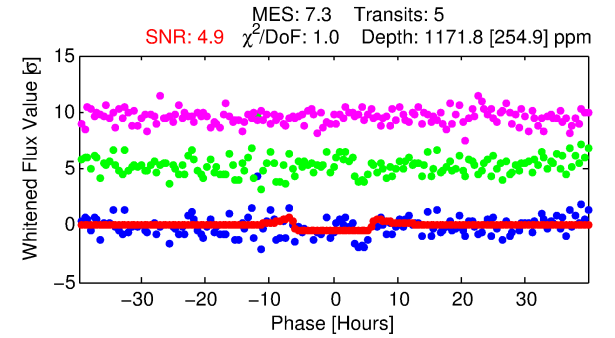
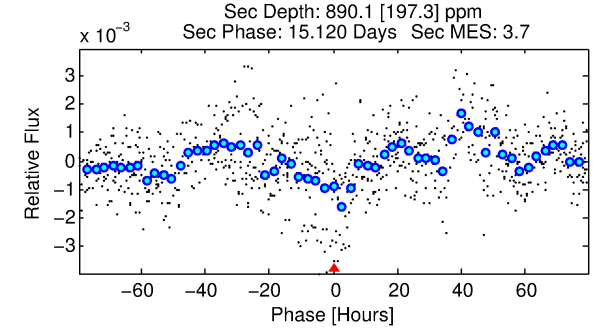
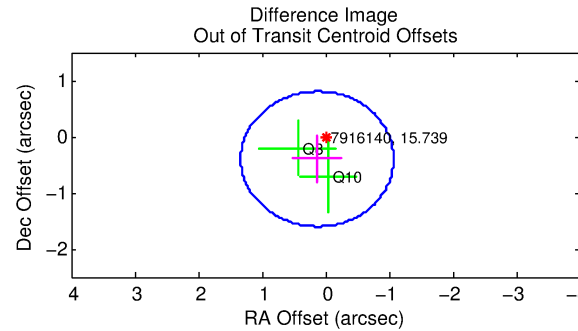
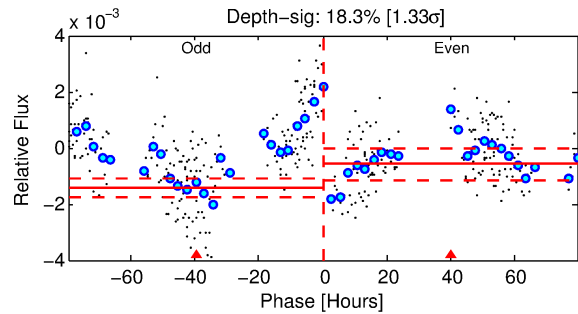
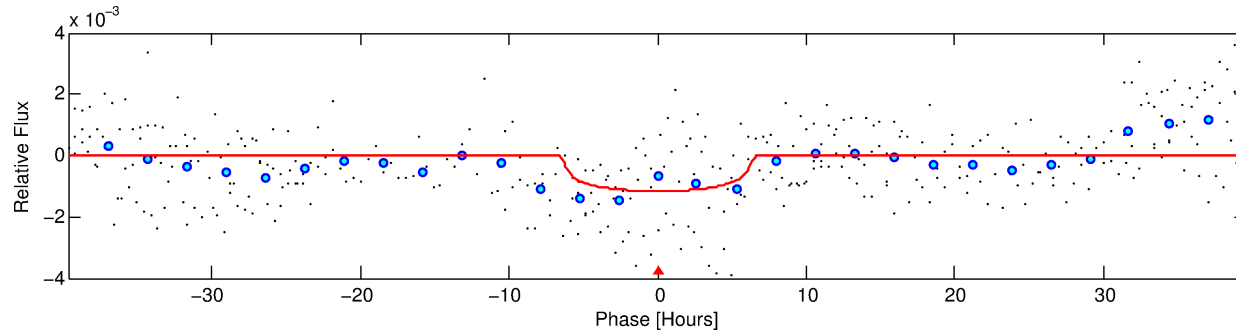
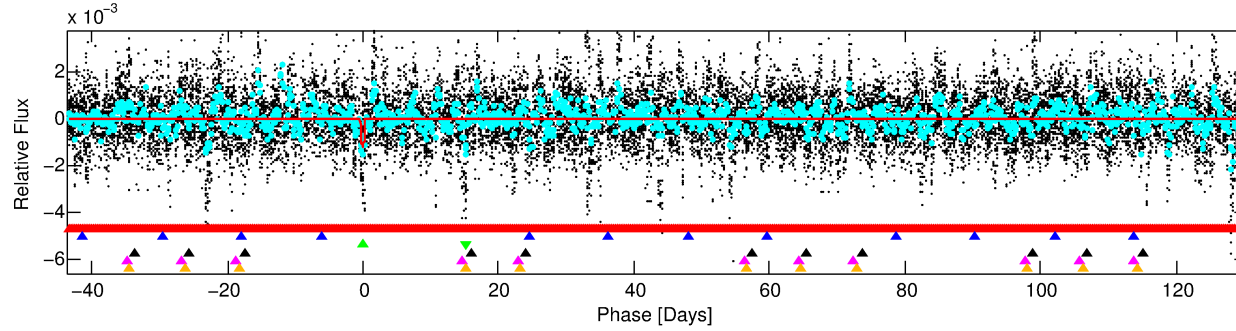
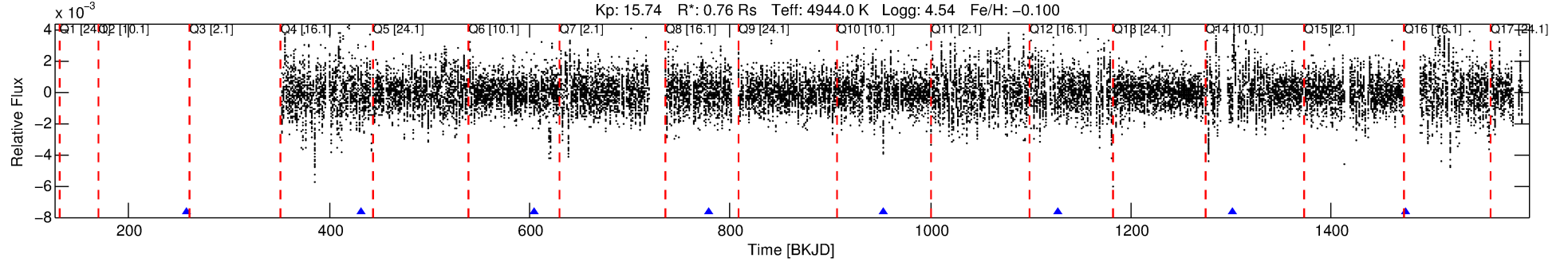
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 007916140-03

No Significant Match Found

# DV One-Page Summary

KIC: 7916140 Candidate: 3 of 6 Period: 173.881 d



## DV Fit Results:

Period = 173.88060 [0.00769] d  
Epoch = 257.5018 [0.0272] BKJD  
Rp/R\* = 0.0330 [0.0138]  
a/R\* = 79.33 [107.80]  
b = 0.67 [1.15]  
Seff = 1.02 [0.20]  
Teq = 256 [12] K  
Rp = 2.73 [1.18] Re  
a = 0.5491 [0.0487] AU  
Ag = 19770.04 [17282.40] [1.14 $\sigma$ ]  
Teffp = 4698 [1029] K [4.32 $\sigma$ ]

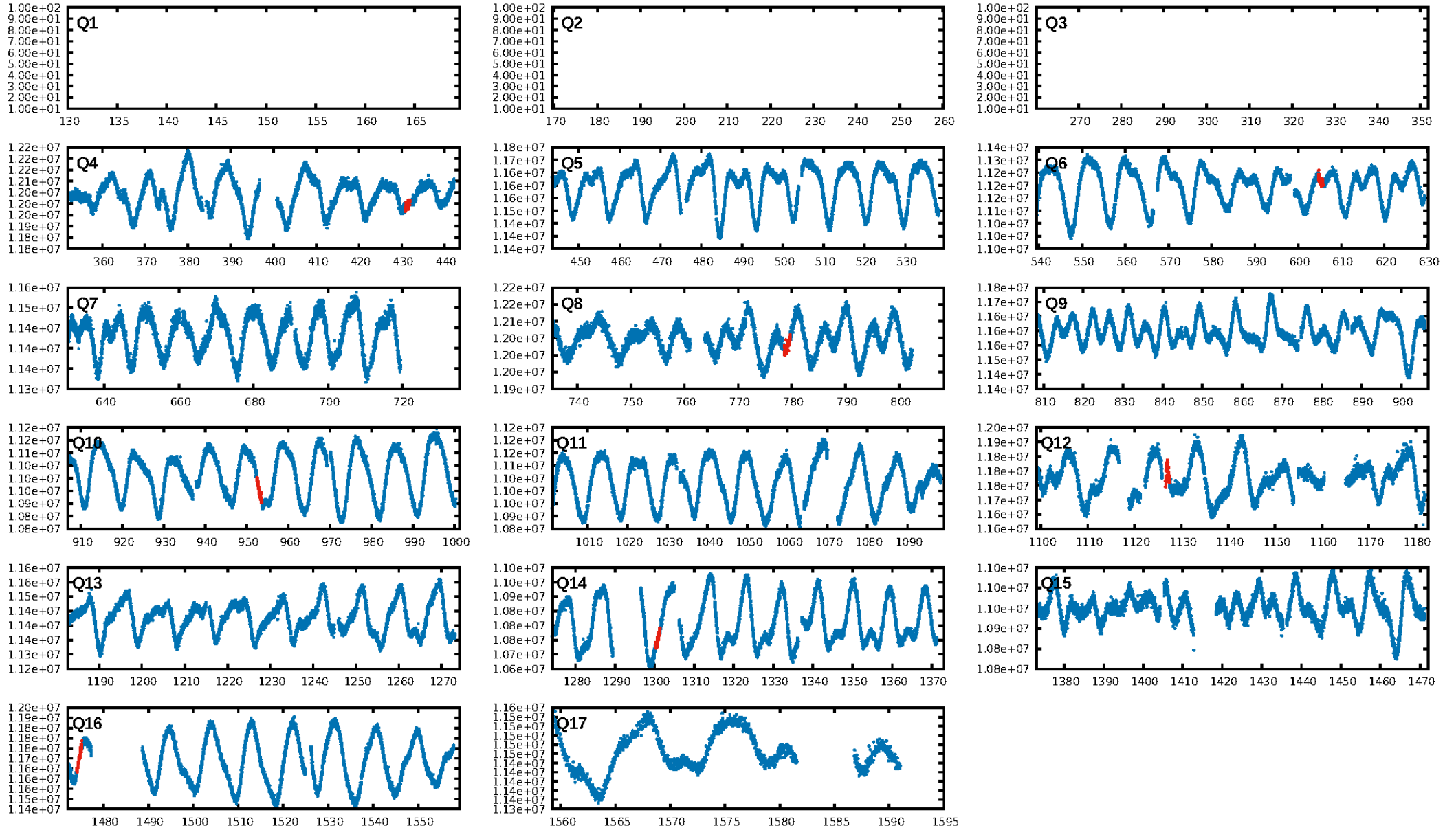
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [73.91 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 42.2%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 5.91e-10**  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: 1.993  
**Centroid-sig: 0.0%**  
Centroid-so: 2.633 arcsec [2.82 $\sigma$ ]  
OotOffset-rm: 0.420 arcsec [1.05 $\sigma$ ]  
OotOffset-st: 1/0/1/0 [2]  
KicOffset-rm: 0.474 arcsec [1.18 $\sigma$ ]  
KicOffset-st: 1/0/1/0 [2]  
DiffImageQuality-fgm: 1.00 [2/2]  
DiffImageOverlap-fno: 0.00 [0/5]

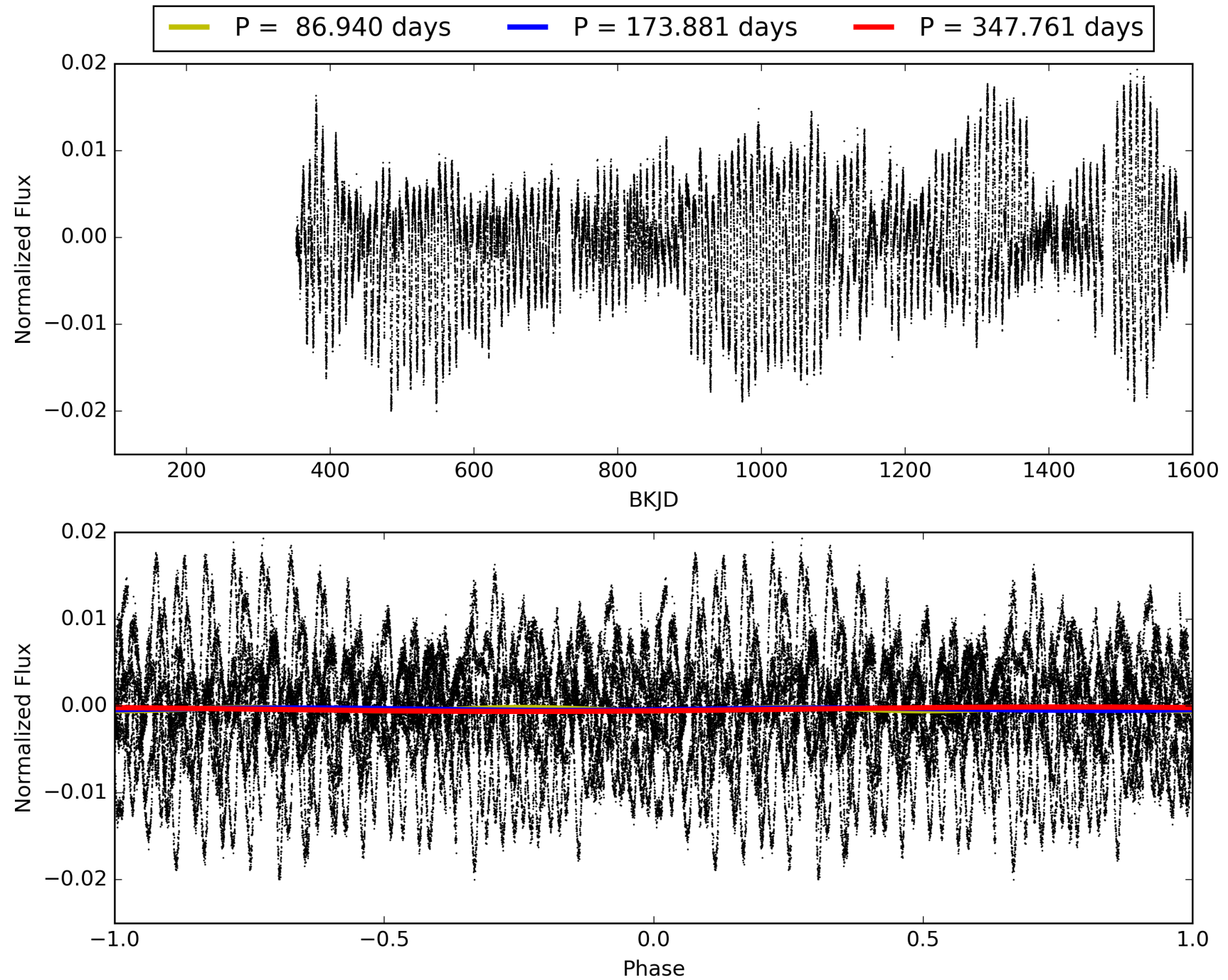
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 05:17:18 Z

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

# TCE 007916140-03, PDC Light Curves

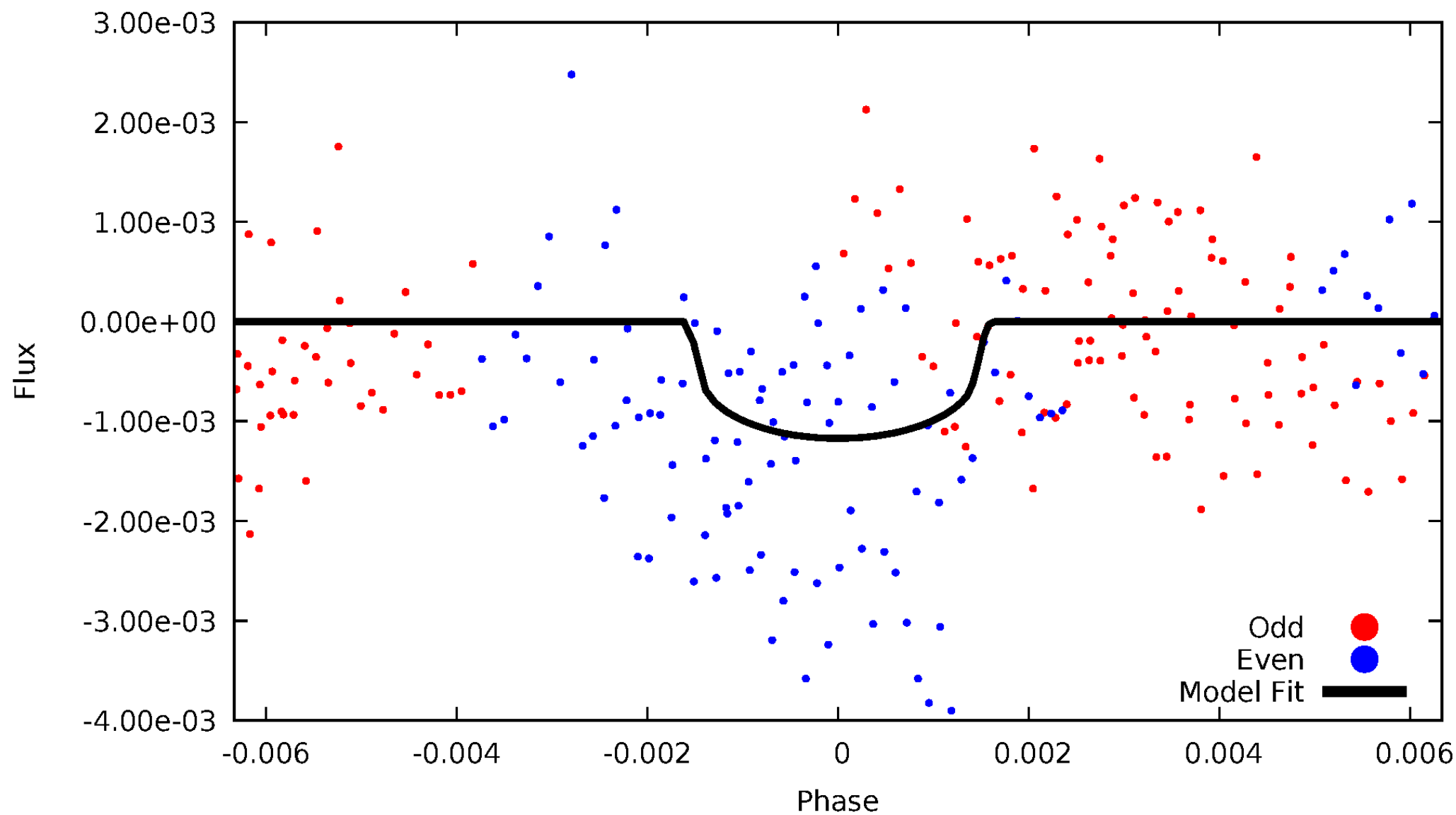


TCE 007916140-03



# DV Odd/Even

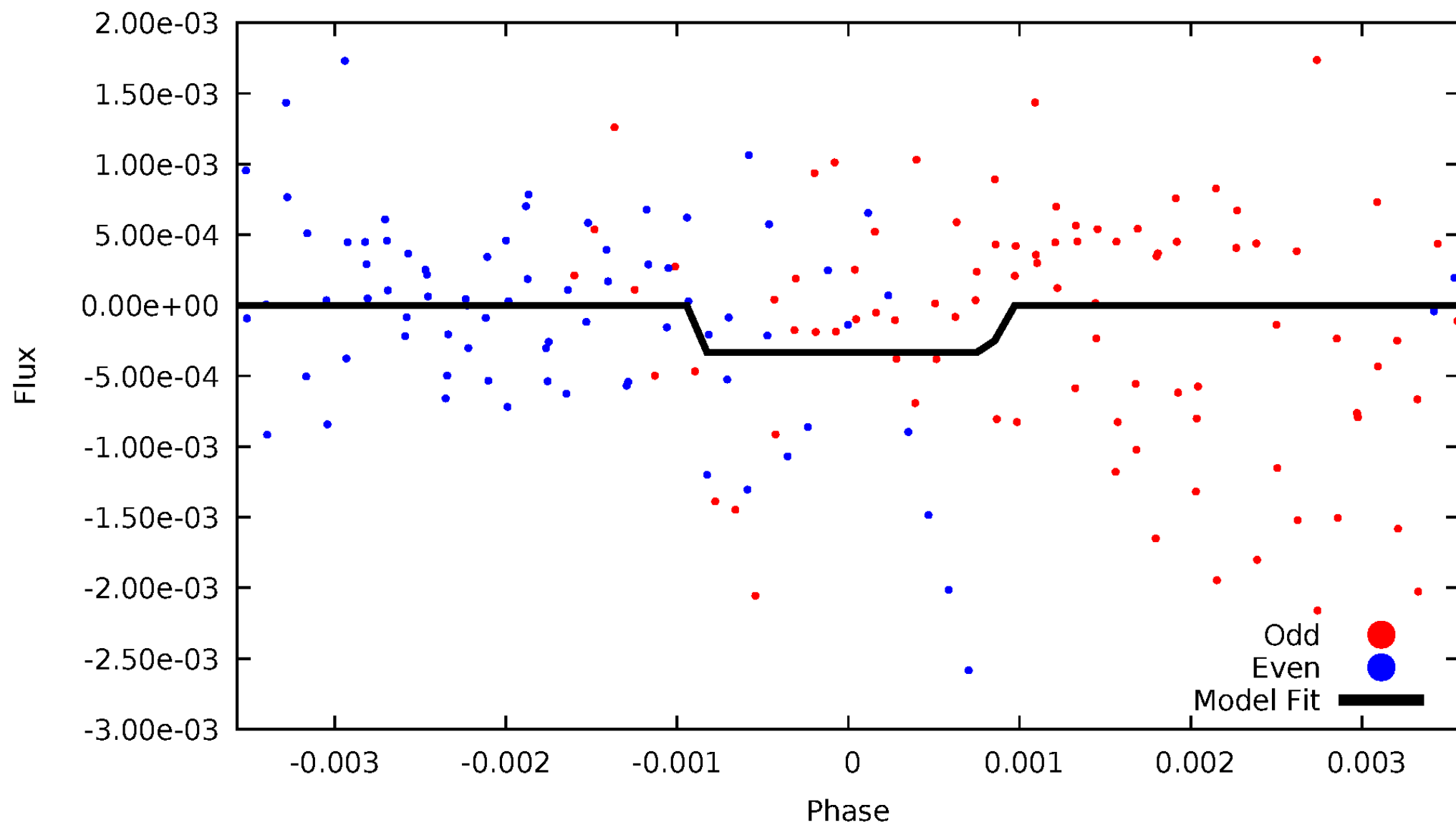
TCE 007916140-03





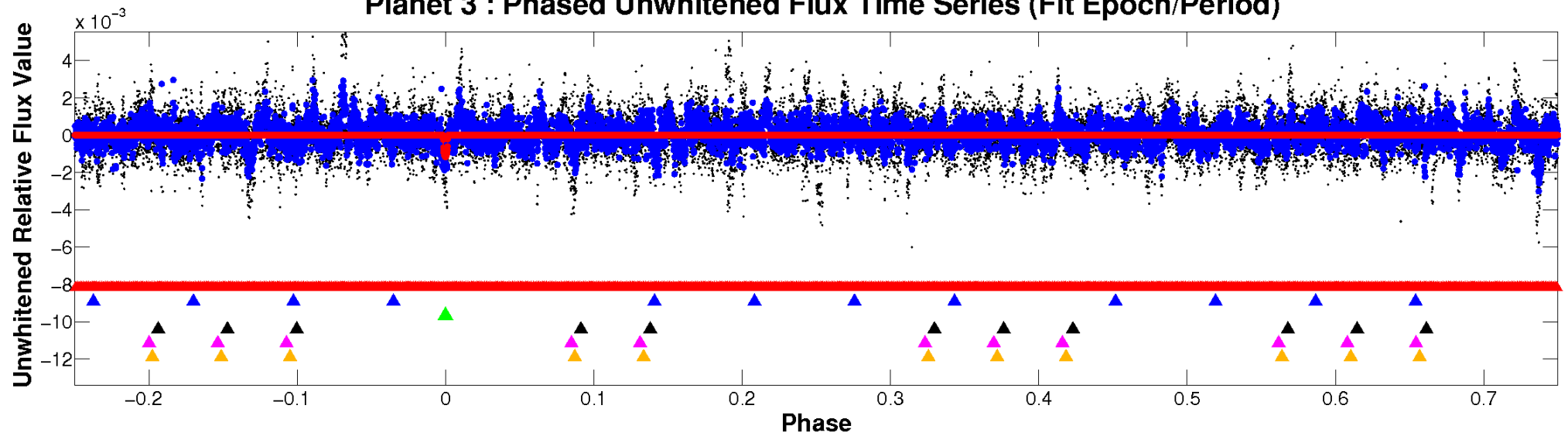
# ALT Odd/Even

TCE 007916140-03

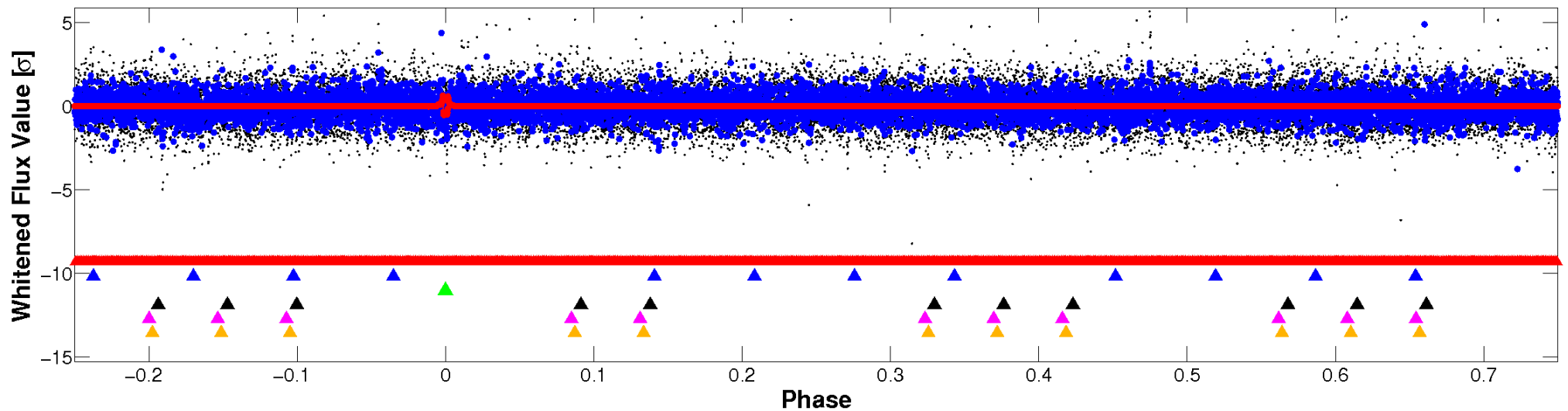


# Non-Whitened Vs. Whitened Light Curve

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

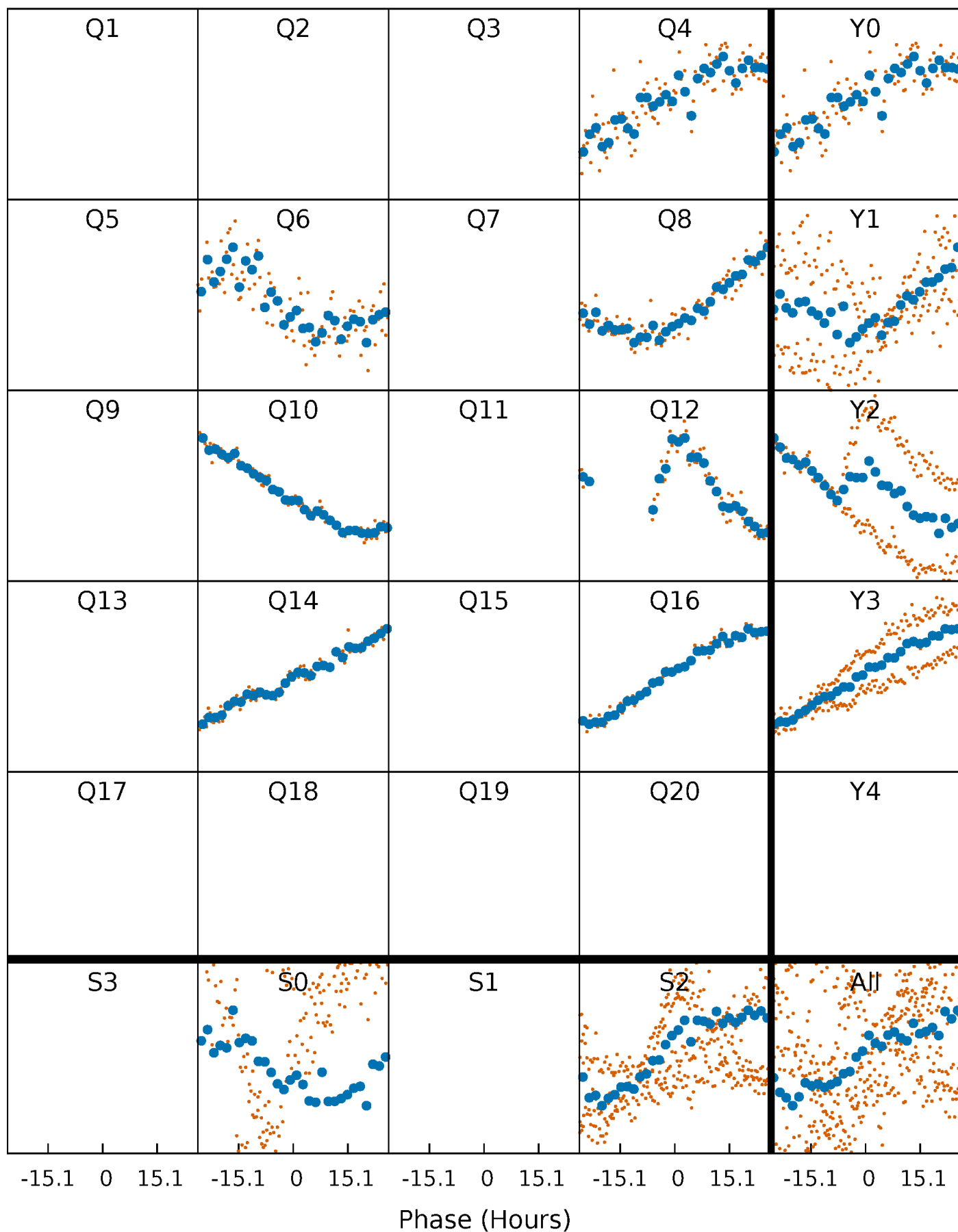


## Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



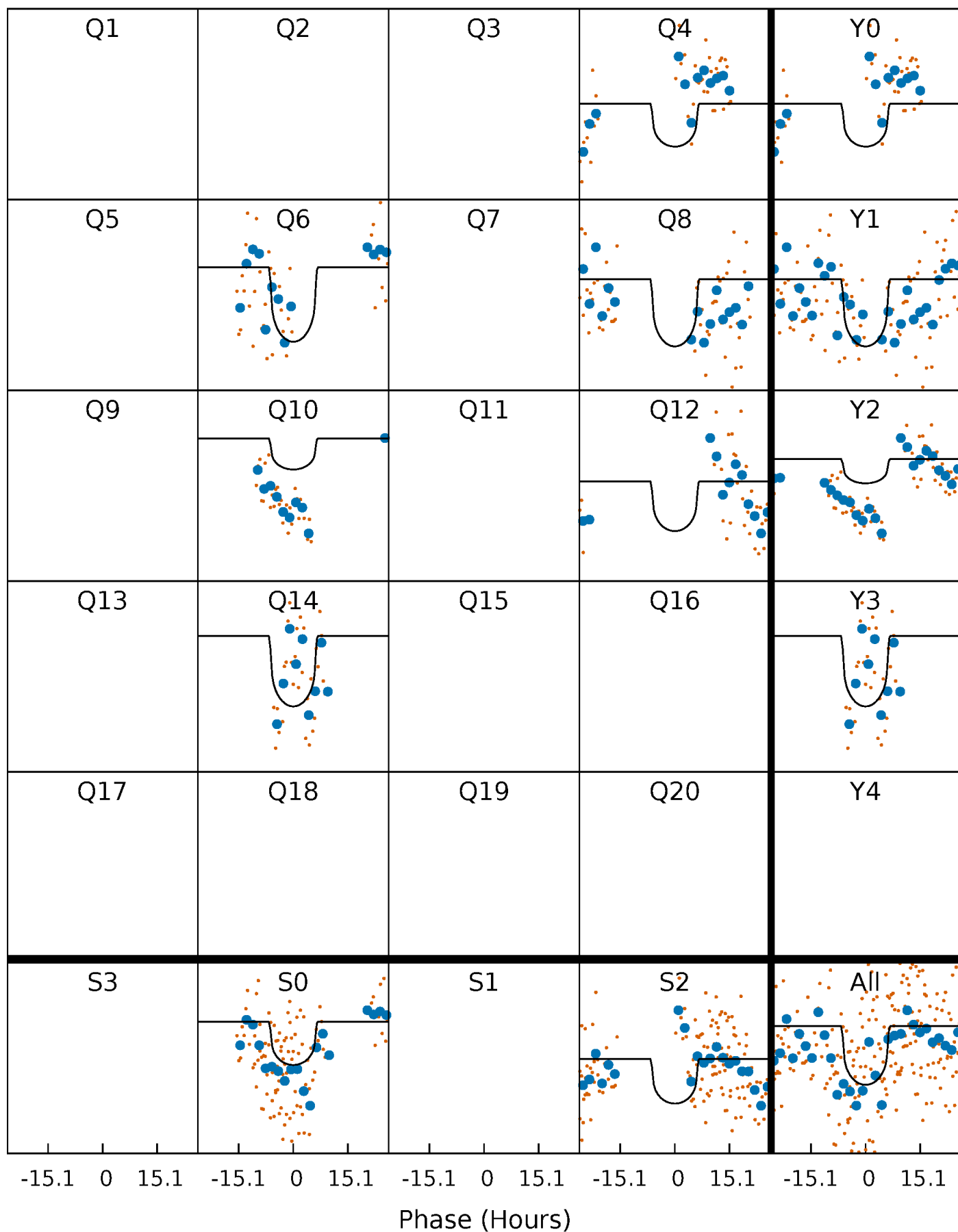
# PDC Quarter-Phased Transit Curves

TCE 007916140-03 P=173.880601 Days  $T_0=257.501795$  (BKJD)



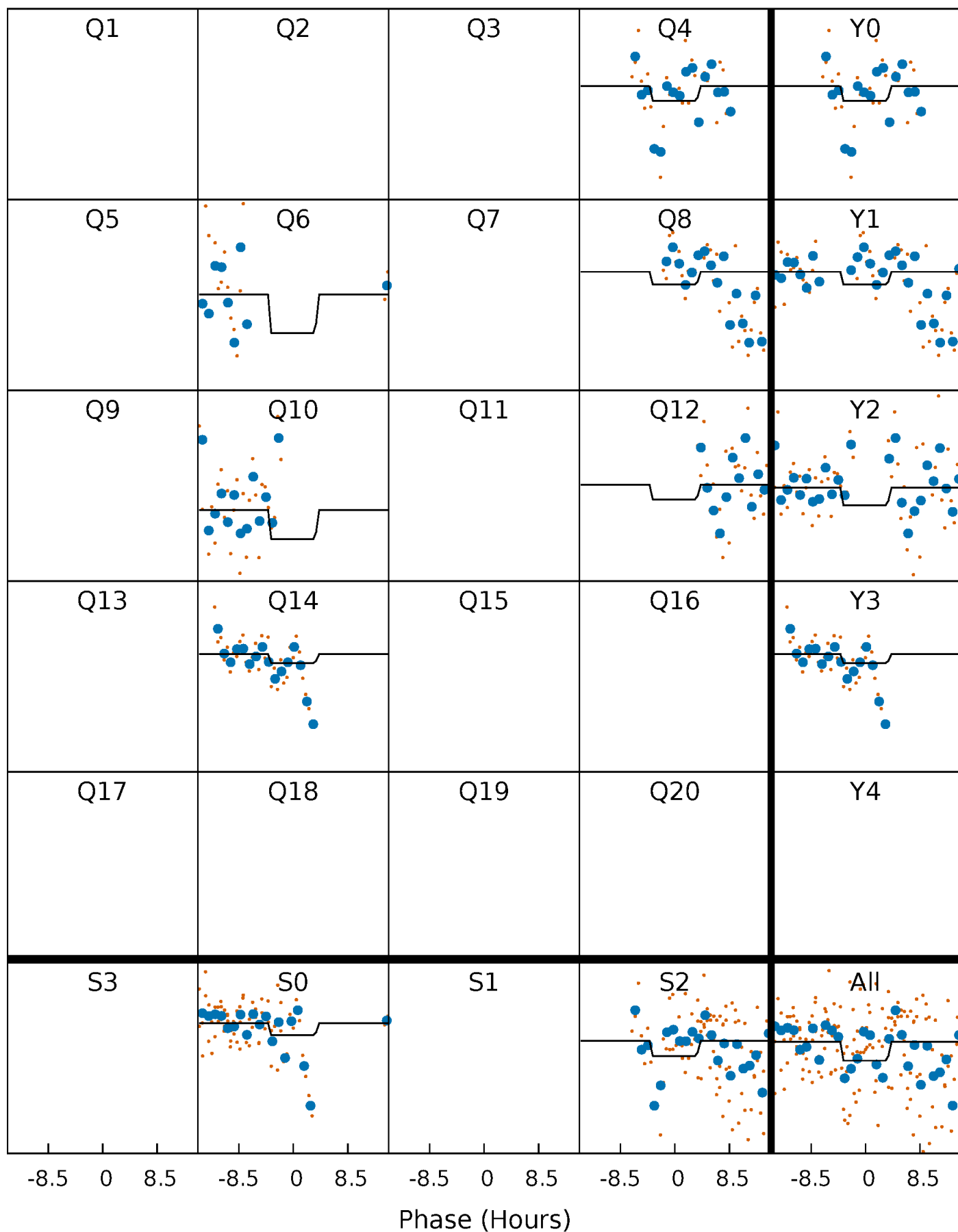
# DV Quarter-Phased Transit Curves

TCE 007916140-03 P=173.880601 Days  $T_0=257.501795$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

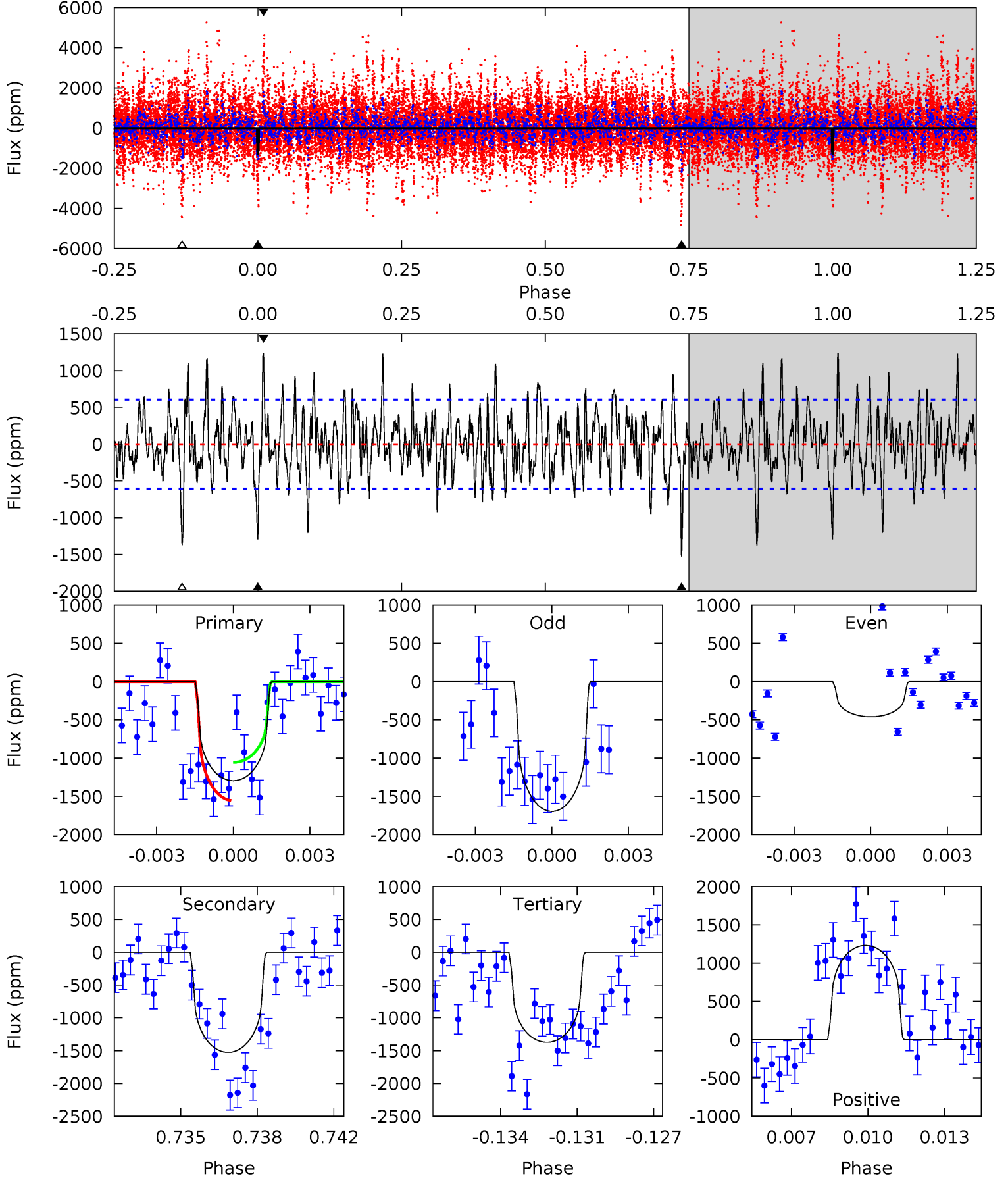
TCE 007916140-03 P=173.880238 Days  $T_0=257.790766$  (BKJD)



# DV Model-Shift Uniqueness Test

007916140-03, P = 173.880601 Days, E = 257.501795 Days

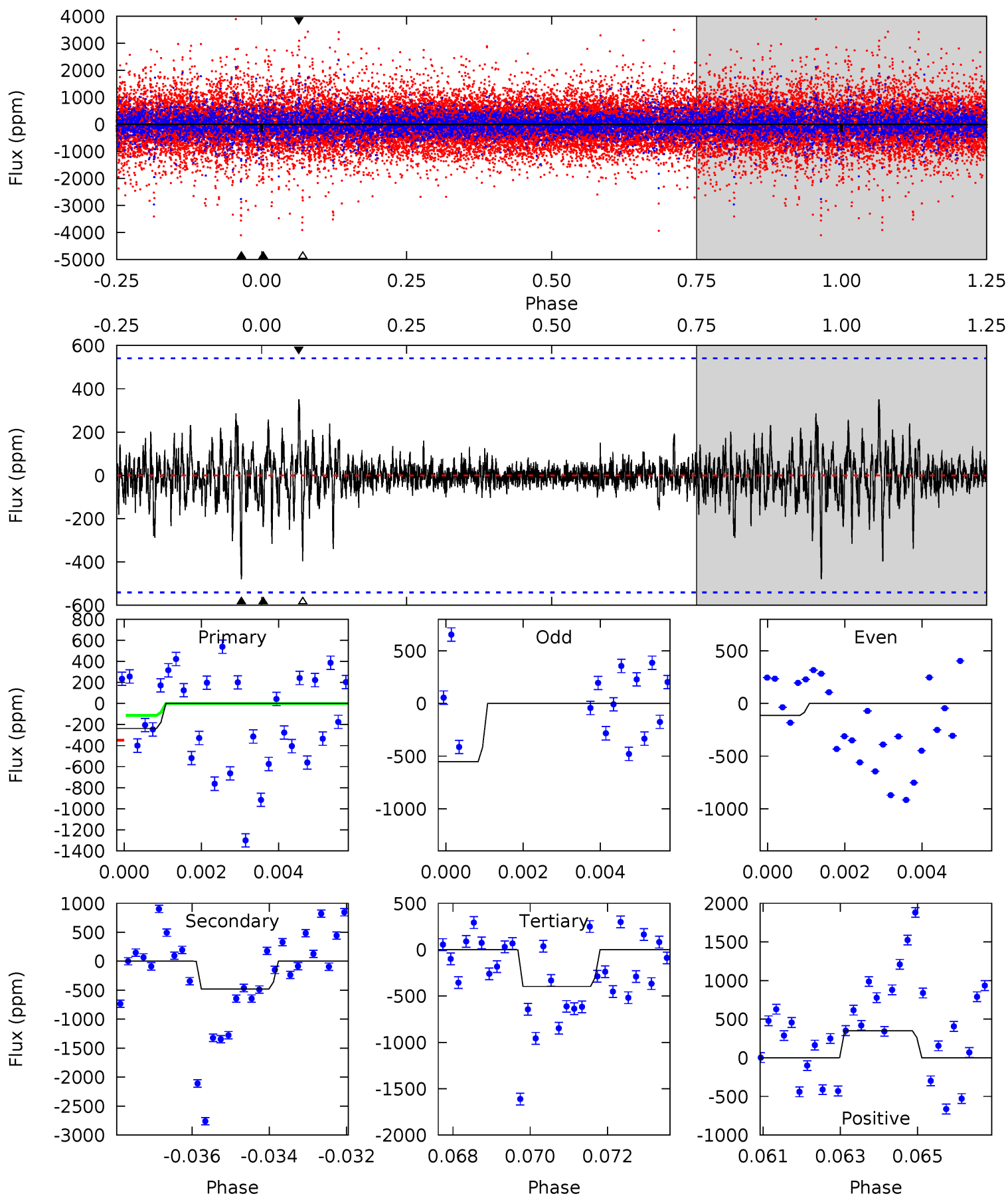
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.2	13.2	11.9	10.7	5.24	2.94	3.17	-0.68	0.54	1.33	2.55	4.33	1.33	0.45	2.17



# Alt Model-Shift Uniqueness Test

007916140-03, P = 173.880238 Days, E = 257.790766 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
2.35	4.73	3.92	3.46	5.35	3.12	0.65	-1.57	-1.11	0.81	1.27	2.15	1.60	0.42	1.17





### Stellar Parameters For KIC 007916140

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4944^{+176}_{-176}$	$4.542^{+0.072}_{-0.048}$	$-0.100^{+0.300}_{-0.300}$	$0.758^{+0.071}_{-0.079}$	$0.731^{+0.093}_{-0.057}$	$2.359^{+0.749}_{-0.396}$
	+4%/-4%	+2%/-1%	+300%/-300%	+9%/-10%	+13%/-8%	+32%/-17%
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 007916140-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-1526 \pm 115$	$2.70^{+1.19}_{-1.12}$	$357^{+15}_{-16}$	$5337^{+1791}_{-781}$	$34772^{+65901}_{-17999}$
Alt.	$-479 \pm 101$	$1.56^{+1.14}_{-0.97}$	$356^{+16}_{-14}$	$5257^{+3708}_{-1125}$	$32648^{+204297}_{-22254}$

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

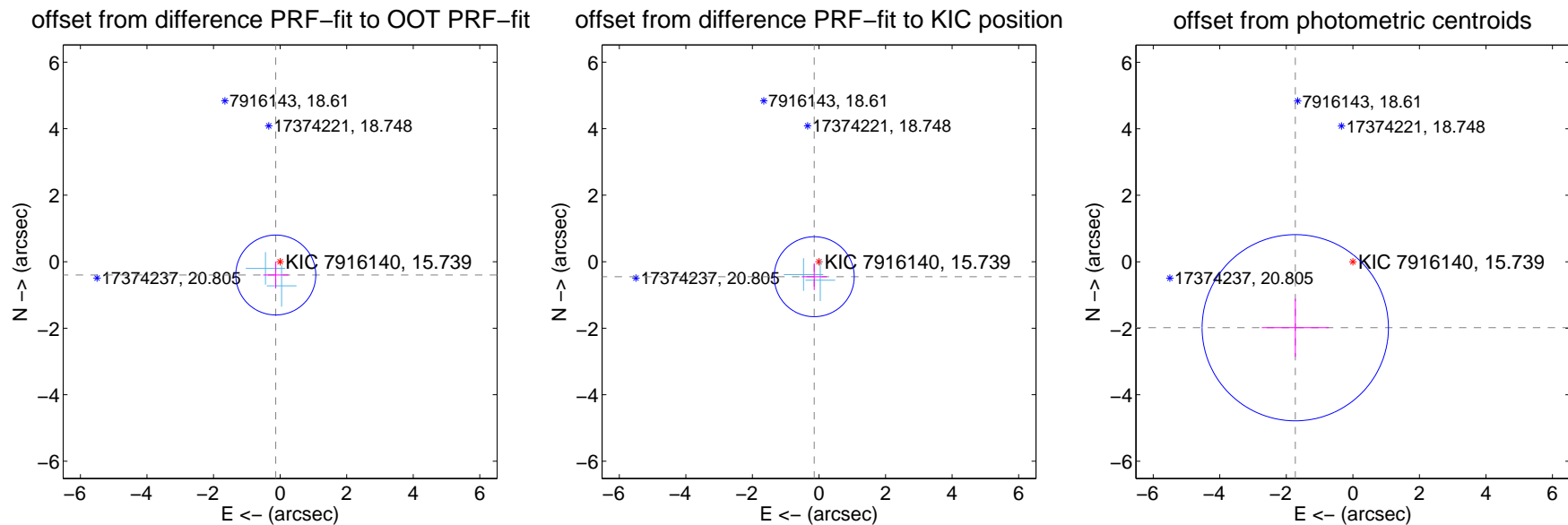
## DV Centroid Data

Supplemental centroid analysis for 007916140-03. Kepler magnitude: 15.74. Transit SNR 4.89

There are 2 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.17 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.420 \pm 0.401$	1.05	$0.130 \pm 0.377$	$-0.400 \pm 0.403$
PRF-fit source offset from KIC position	$0.474 \pm 0.401$	1.18	$0.144 \pm 0.377$	$-0.451 \pm 0.403$
photometric centroid source offset	$2.63 \pm 0.93$	2.82	$1.73 \pm 1.01$	$-1.98 \pm 0.87$



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



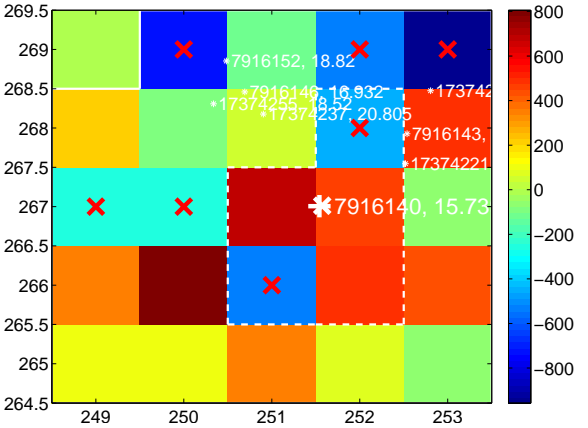
Q3 no difference image



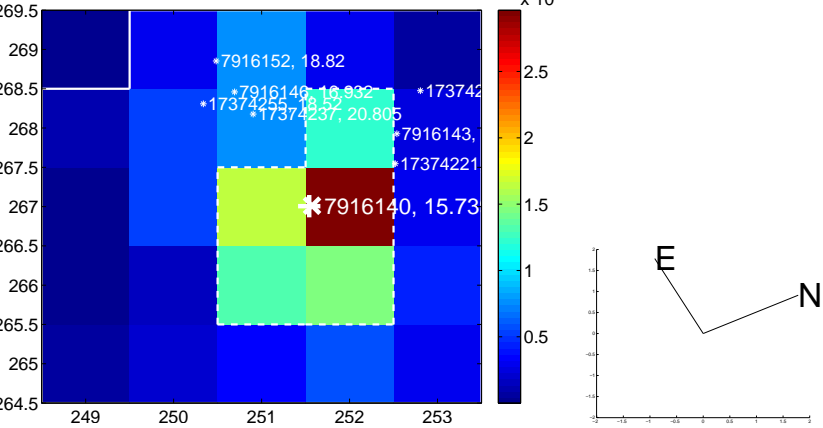
Q3 no OOT image



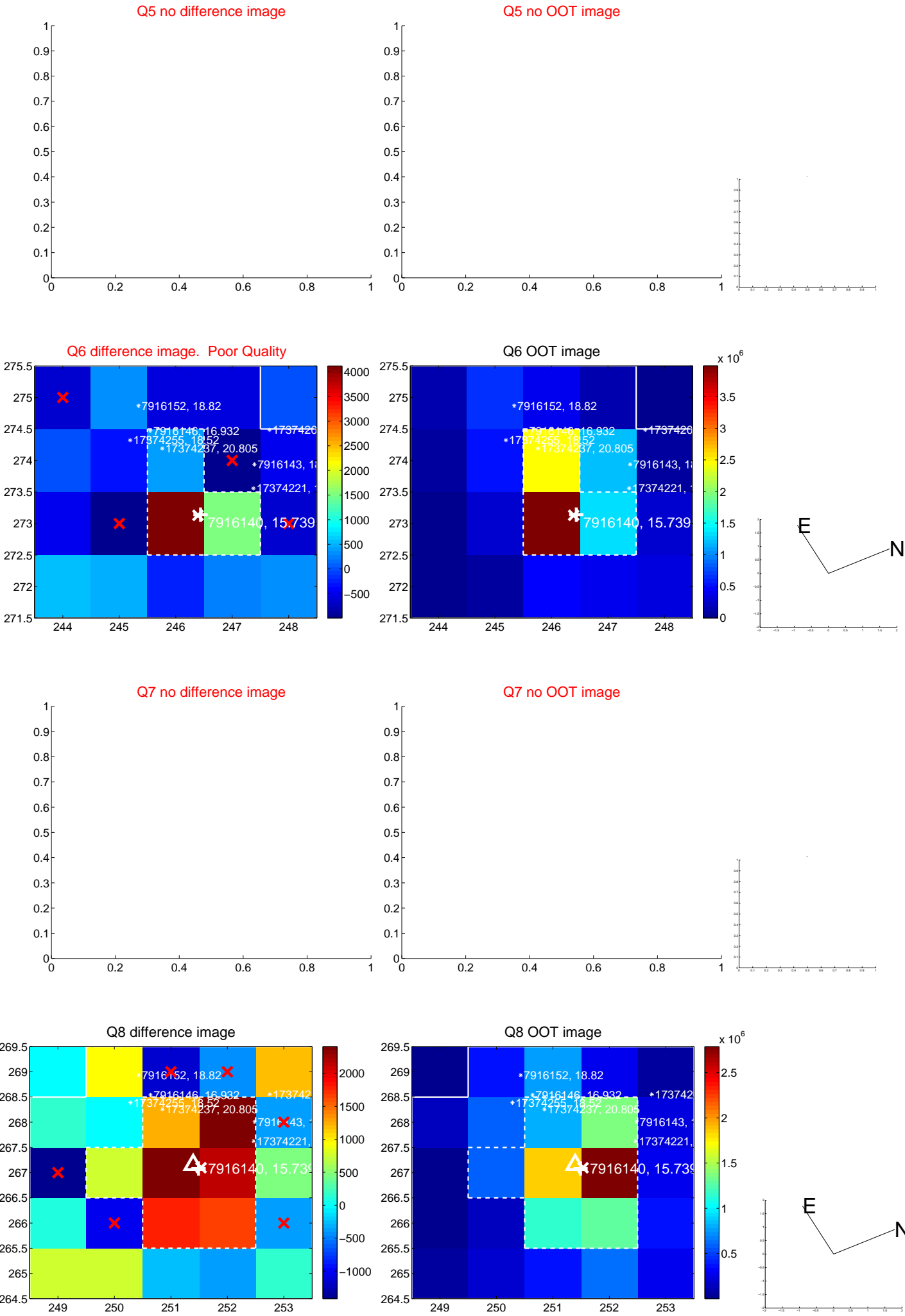
Q4 difference image. Poor Quality



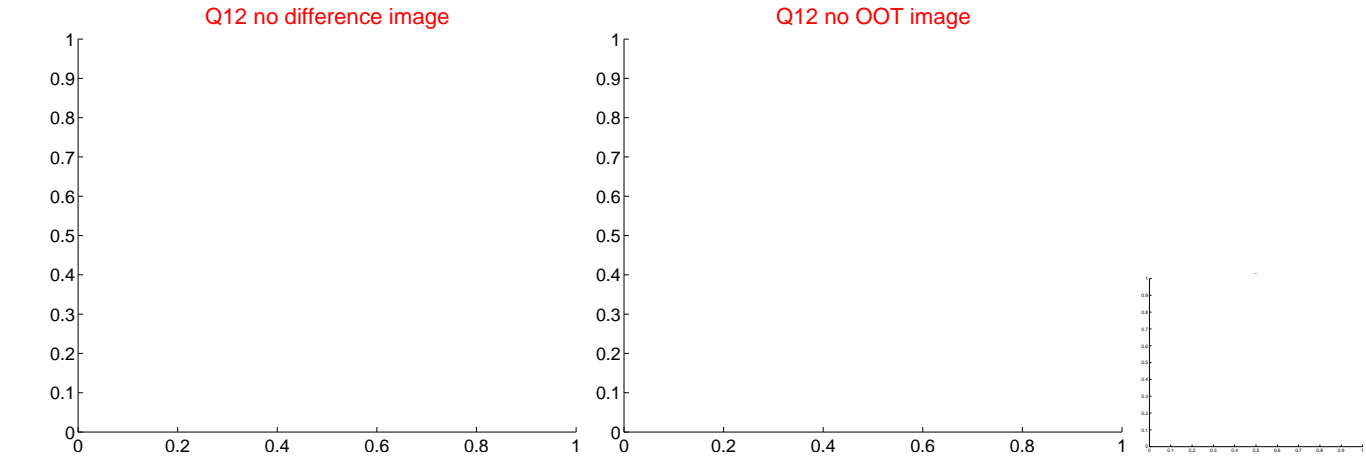
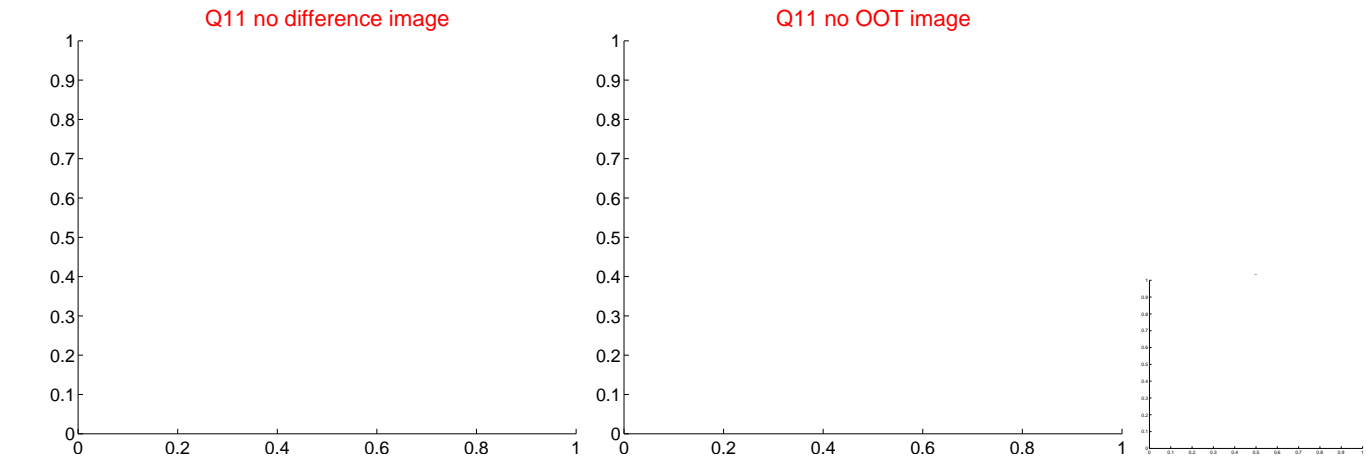
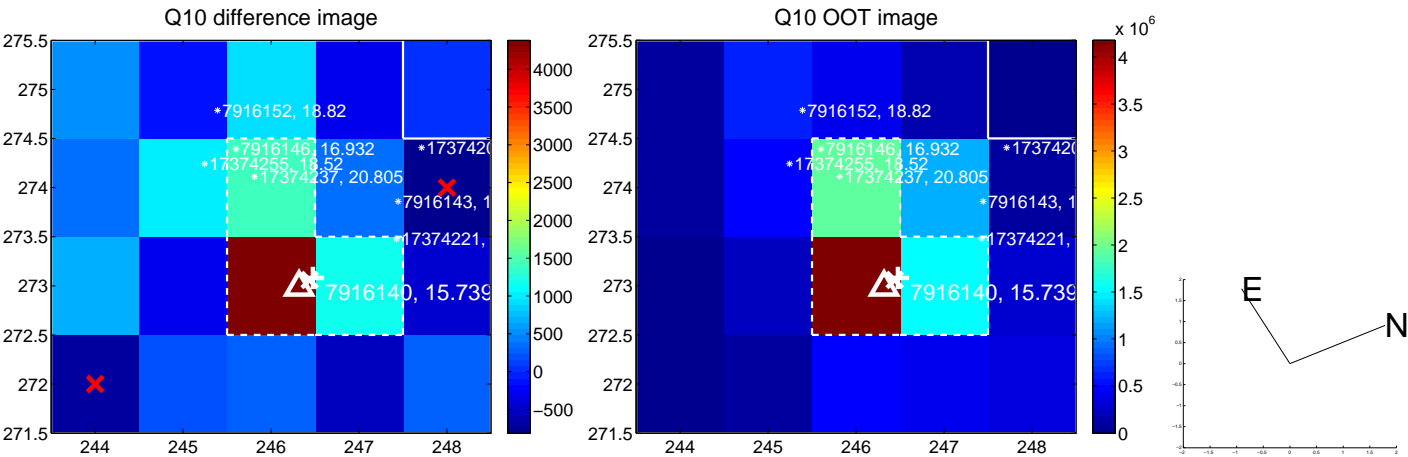
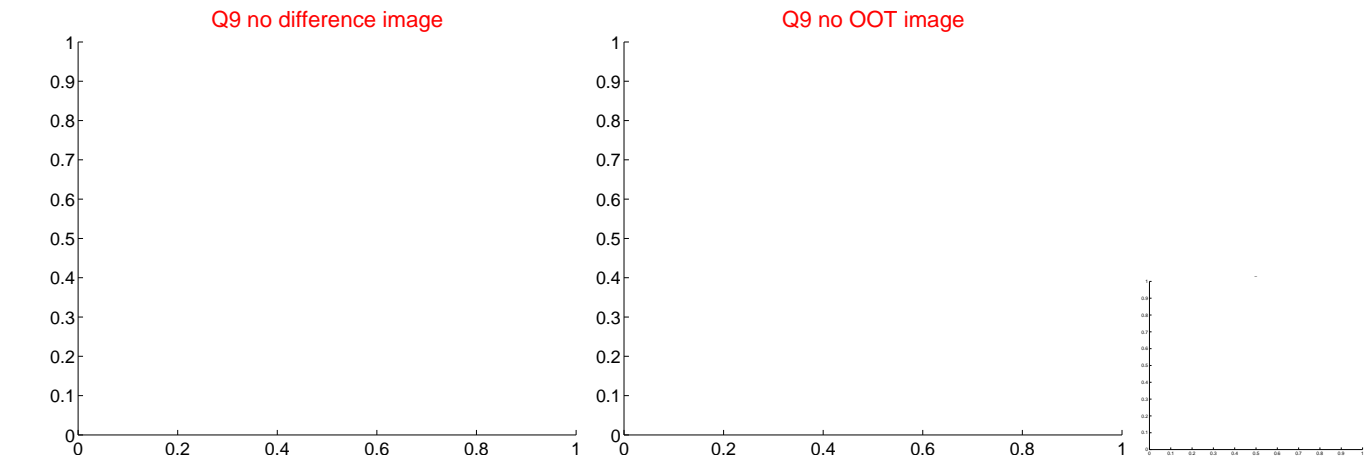
Q4 OOT image



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



white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



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

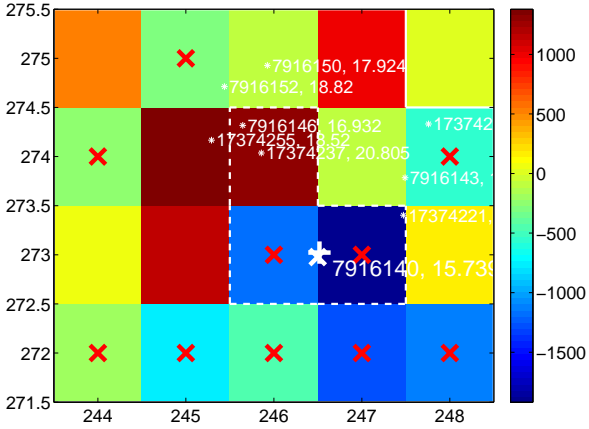
Q13 no difference image



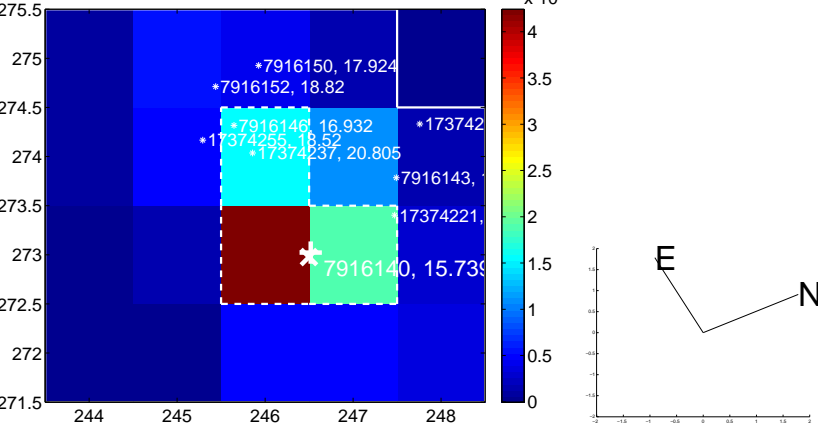
Q13 no OOT image



Q14 difference image. Poor Quality



Q14 OOT image



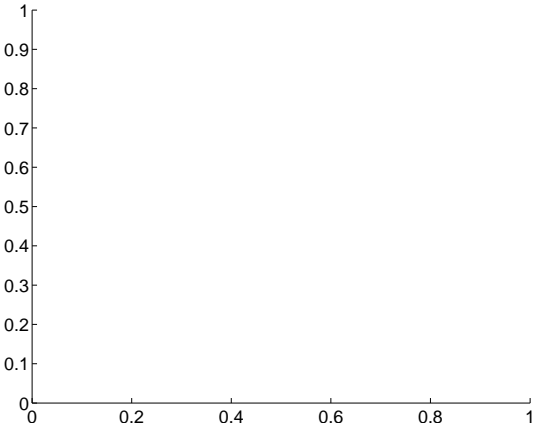
Q15 no difference image



Q15 no OOT image



Q16 no difference image



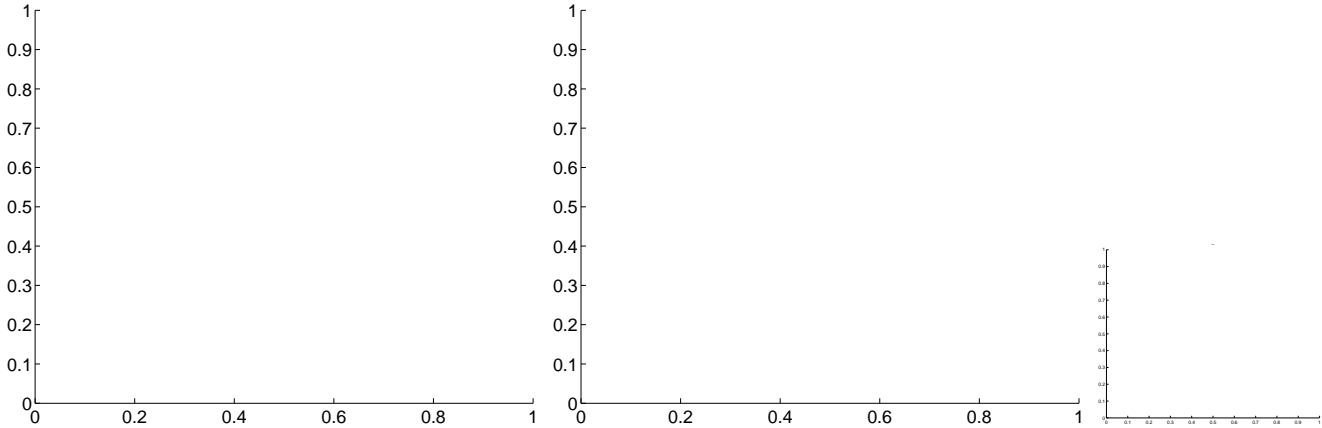
Q16 no OOT image



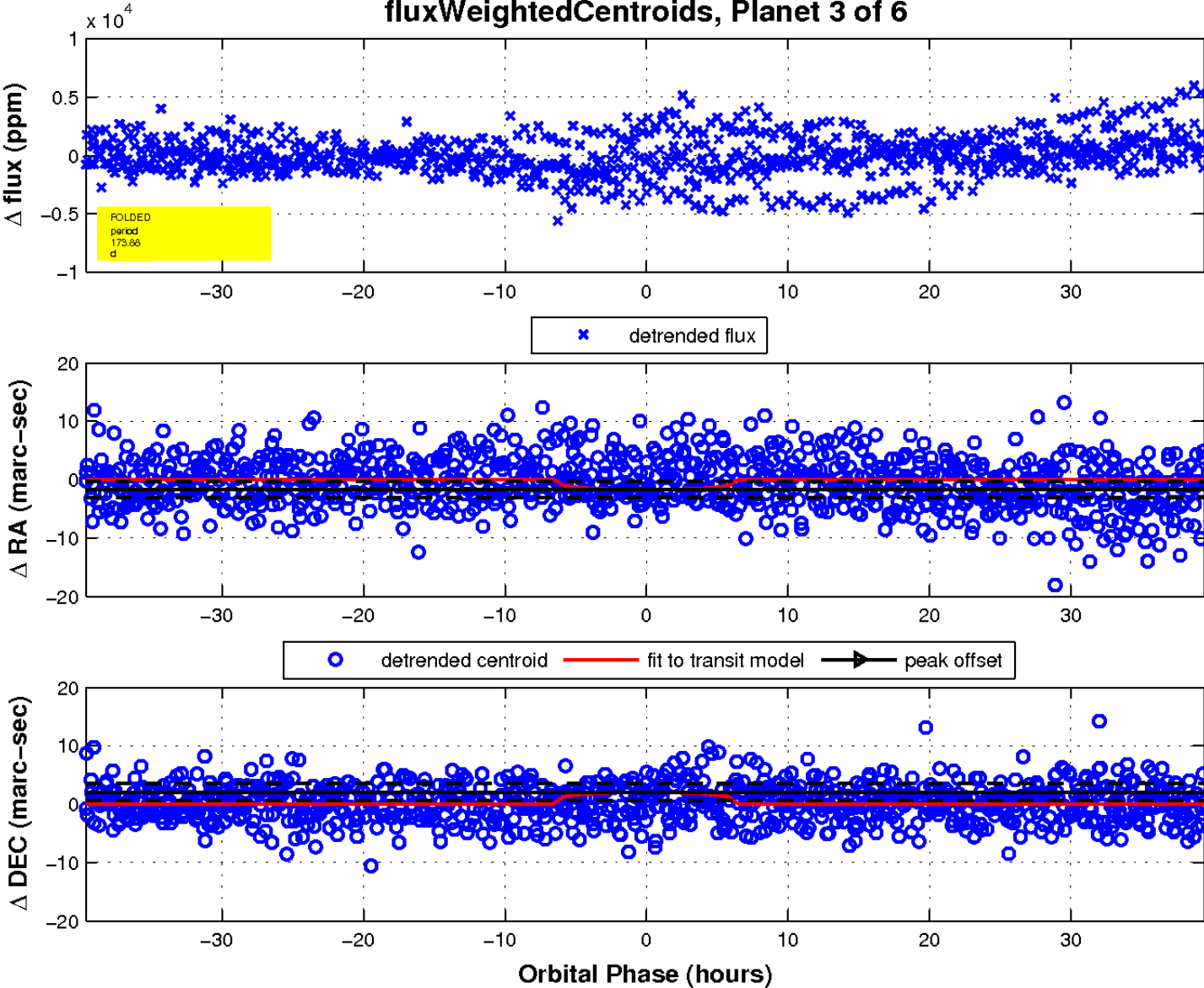
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

Q17 no difference image

Q17 no OOT image



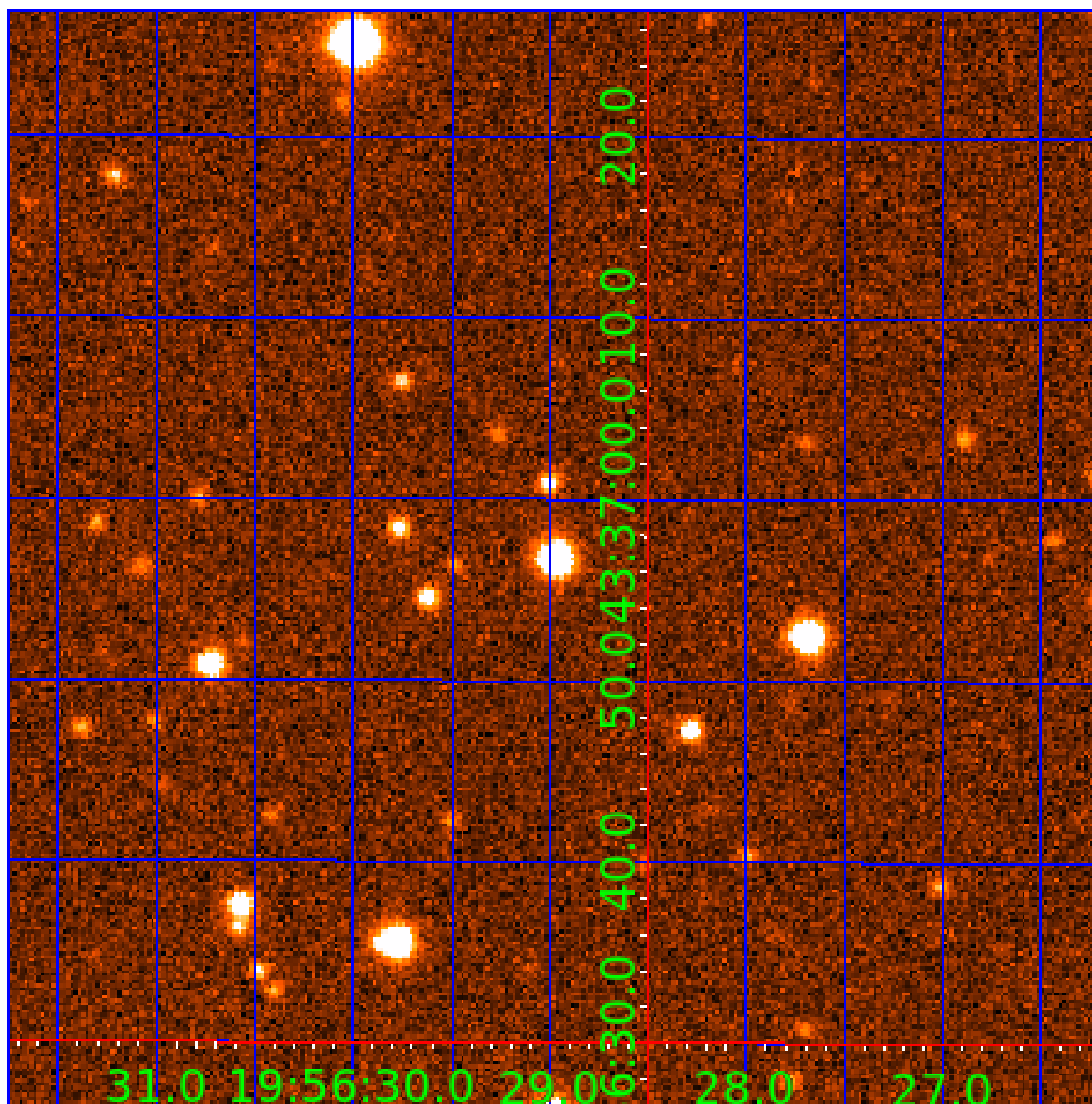
fluxWeightedCentroids, Planet 3 of 6





UKIRT Image

Declination



# KIC 007916140

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007916140-01	OBS	No	1.532918	132.025157	116.4	6.755	7.9	9.4	0.76	4944	0.83	560.14
007916140-02	OBS	No	119.828930	216.226989	1032.9	16.409	11.9	5.1	0.76	4944	2.44	1.68
007916140-03	OBS	No	173.880601	257.501795	1171.8	13.209	7.3	4.9	0.76	4944	2.73	1.02
007916140-04	OBS	No	132.440521	223.824721	479.3	2.565	7.8	2.2	0.76	4944	1.66	1.47
007916140-05	OBS	No	132.423177	222.756419	487.8	2.231	8.0	1.9	0.76	4944	2.01	1.47
007916140-06	OBS	No	132.427963	223.136063	1547.1	12.867	12.2	7.9	0.76	4944	2.91	1.47

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007916140-01	OBS	FP	0.00	1	0	0	0	LPP_DV
007916140-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—INCONSISTENT_TRANS
007916140-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
007916140-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
007916140-05	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_SKYE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—SAME_NTL_PERIOD—CENT_FEW_DIFFS—HALO_GHOST
007916140-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—SAME_NTL_PERIOD—CENT_FEW_MEAS

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

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

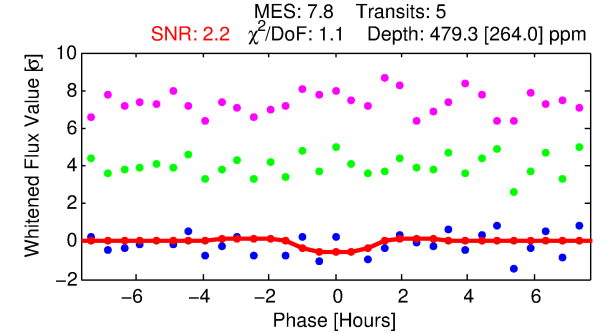
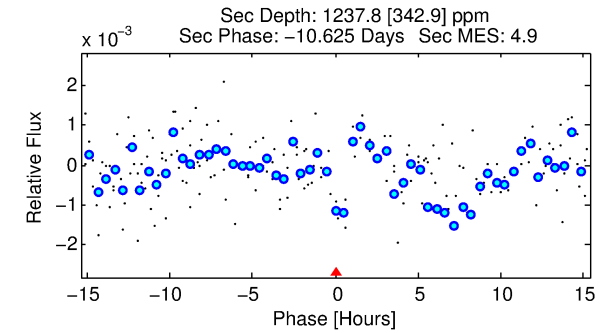
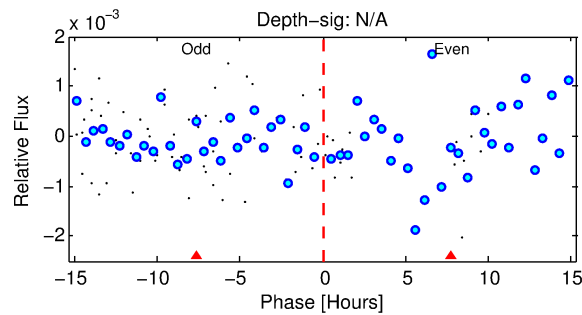
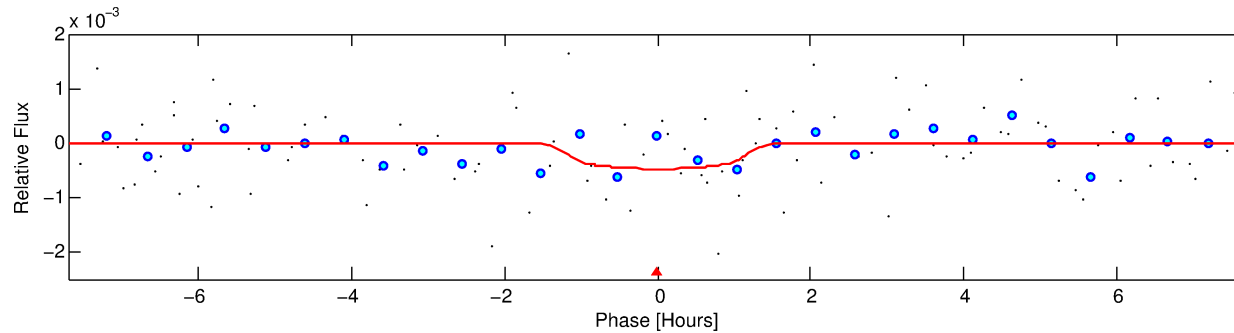
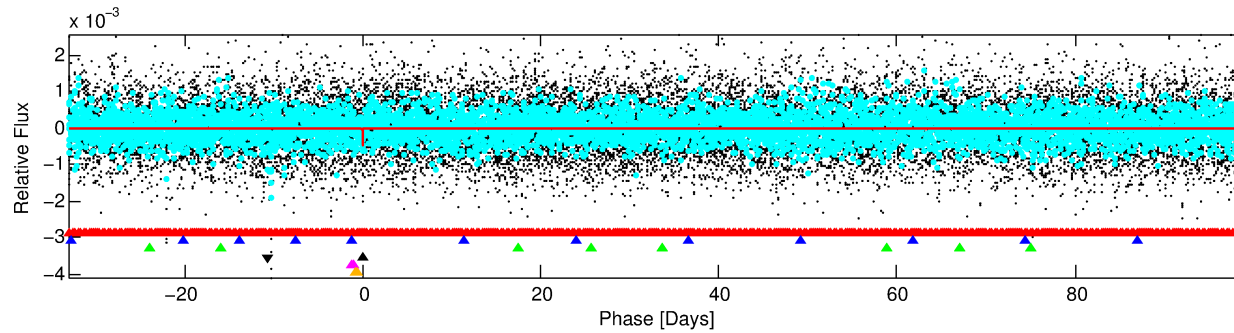
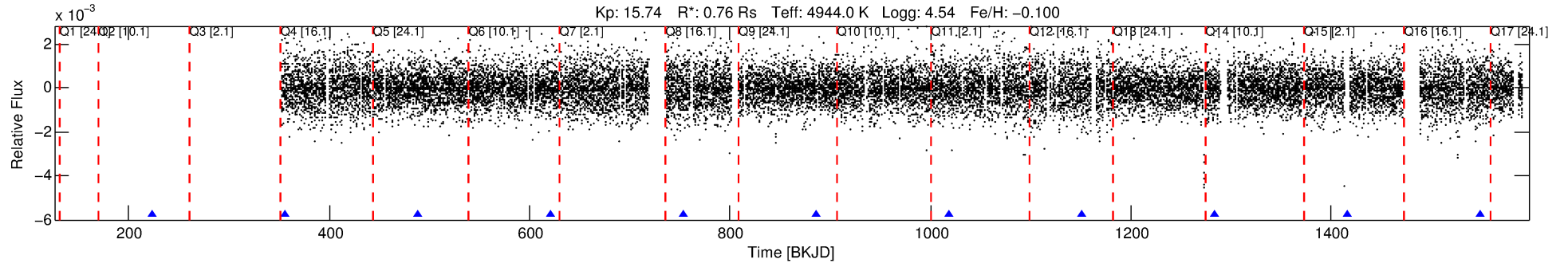
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 007916140-04

No Significant Match Found

# DV One-Page Summary

KIC: 7916140 Candidate: 4 of 6 Period: 132.441 d



## DV Fit Results:

Period = 132.44052 [0.00599] d  
Epoch = 223.8247 [0.0332] BKJD  
Rp/R\* = 0.0201 [0.2441]  
a/R\* = 359.57 [14620.78]  
b = 0.46 [71.73]  
Seff = 1.47 [0.28]  
Teq = 281 [14] K  
Rp = 1.66 [20.19] Re  
a = 0.4580 [0.0407] AU  
Ag = 51650.62 [1254193.36] [0.04σ]  
Teffp = 6540 [39704] K [0.1σ]

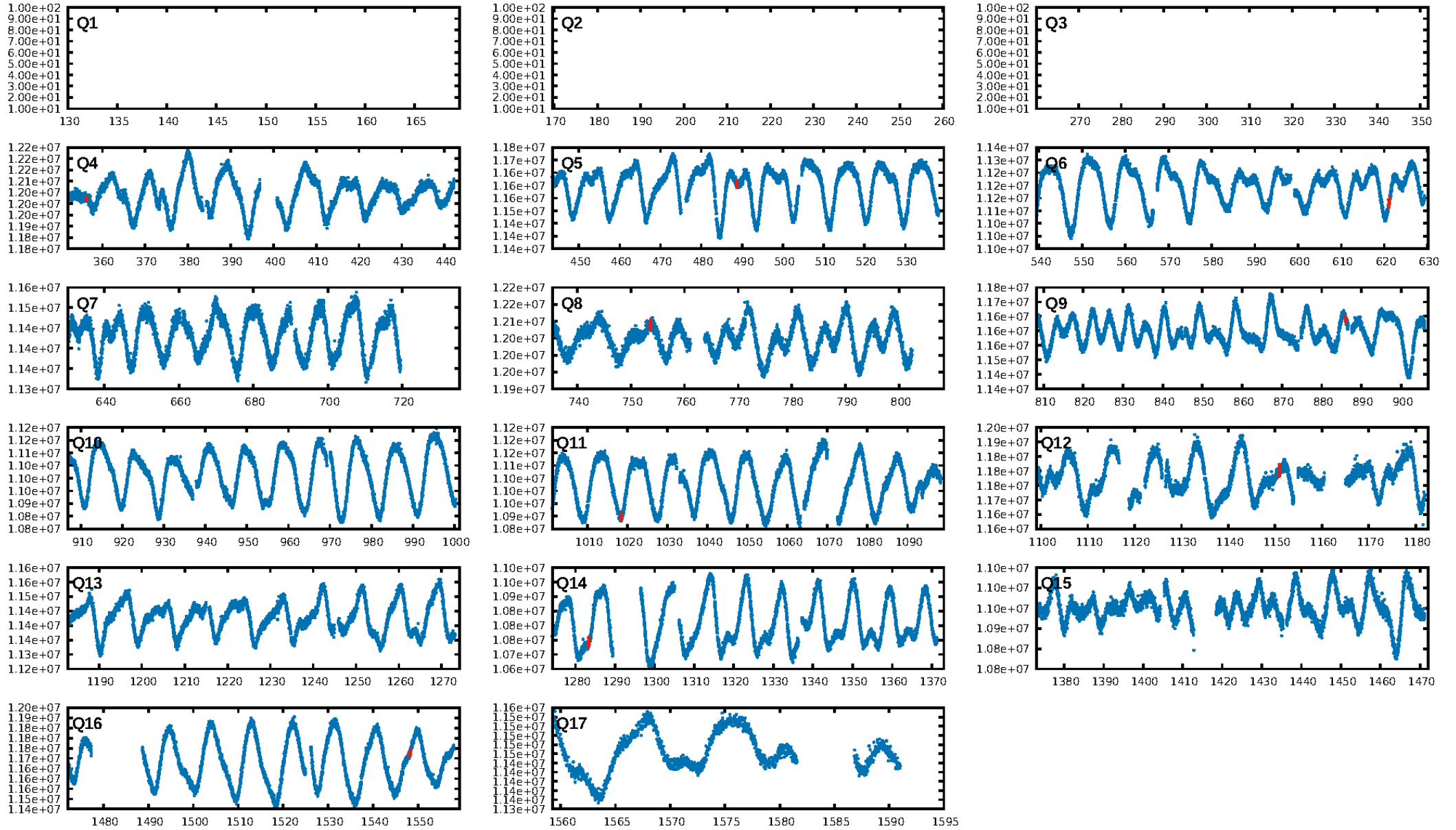
## DV Diagnostic Results:

ShortPeriod-sig: 1.8% [0.02σ]  
LongPeriod-sig: 100.0% [73.91σ]  
ModelChiSquare2-sig: 89.8%  
ModelChiSquareGof-sig: 98.0%  
**Bootstrap-pfa: 3.36e-09**  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: -1.034  
Centroid-sig: 71.6%  
Centroid-so: 1.616 arcsec [0.49σ]  
OotOffset-rm: N/A  
KicOffset-rm: N/A  
OotOffset-st: 0/0/0/0 [0]  
KicOffset-st: 0/0/0/0 [0]  
DiffImageQuality-fgm: N/A  
DiffImageOverlap-fno: 0.38 [3/8]

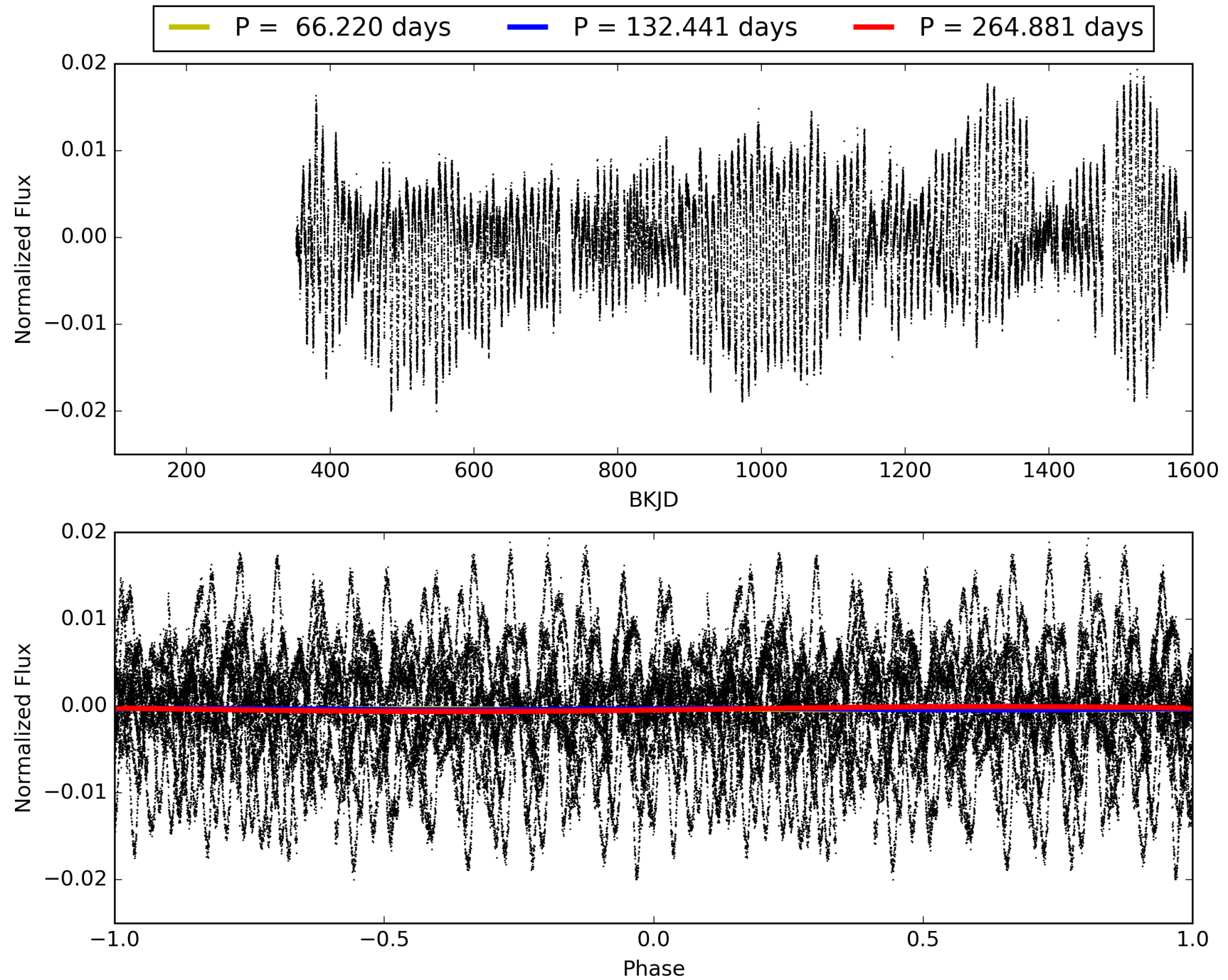
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 05:17:23 Z

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

# TCE 007916140-04, PDC Light Curves

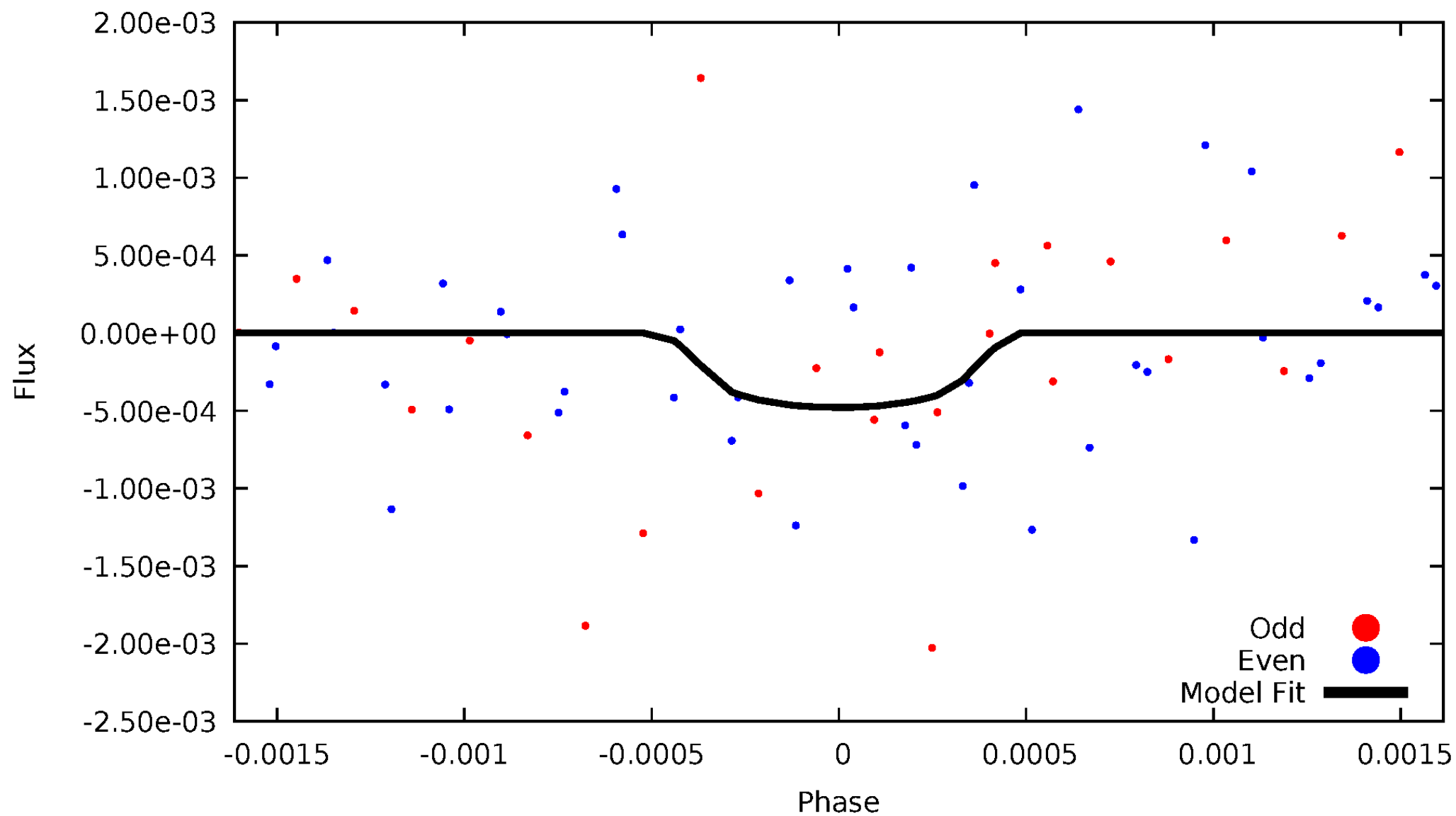


# TCE 007916140-04



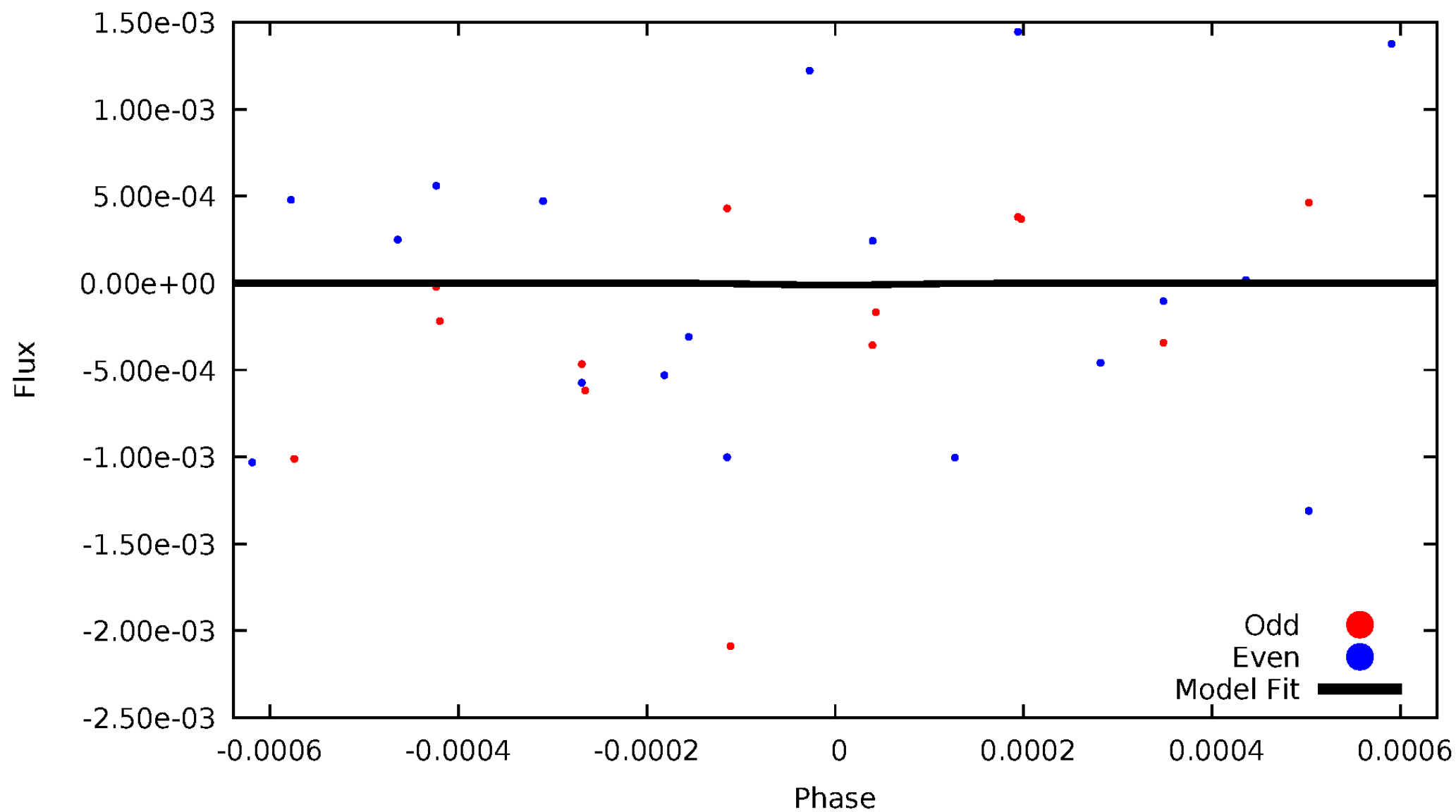
# DV Odd/Even

TCE 007916140-04



# ALT Odd/Even

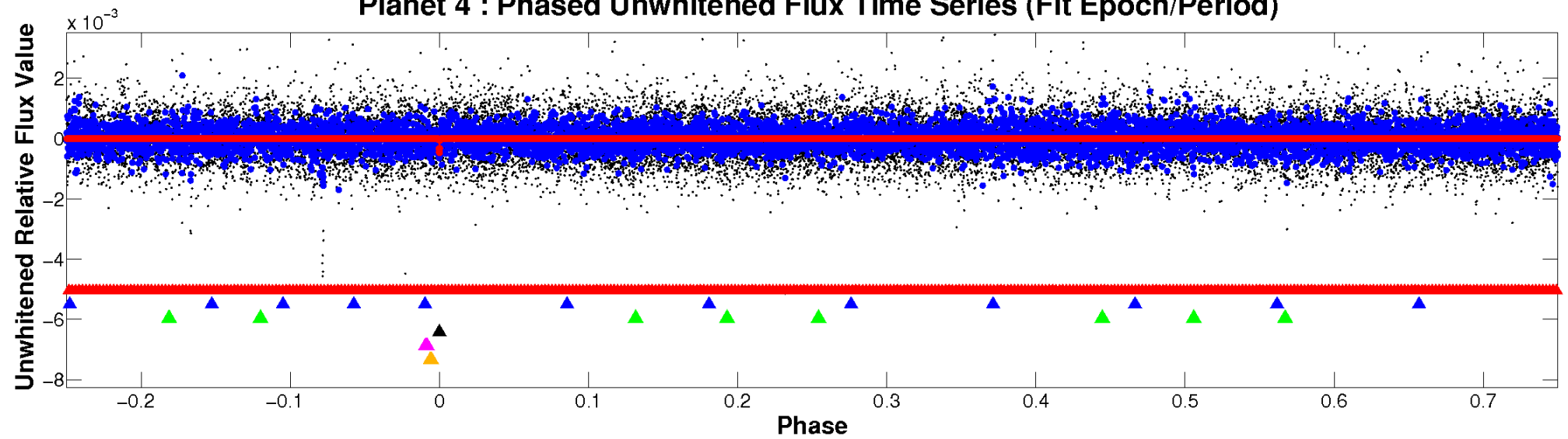
TCE 007916140-04



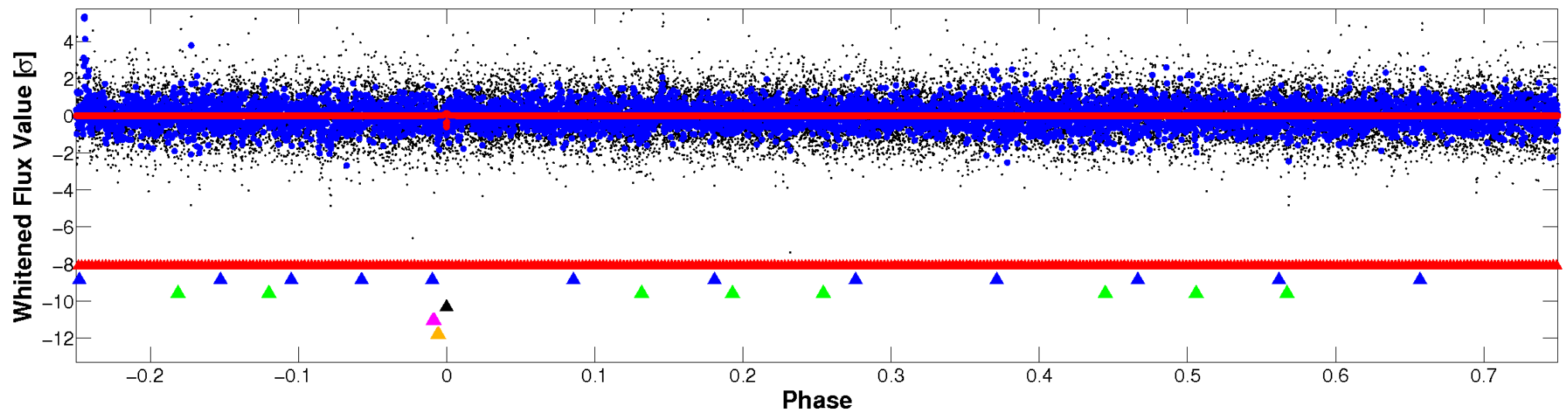


# Non-Whitened Vs. Whitened Light Curve

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

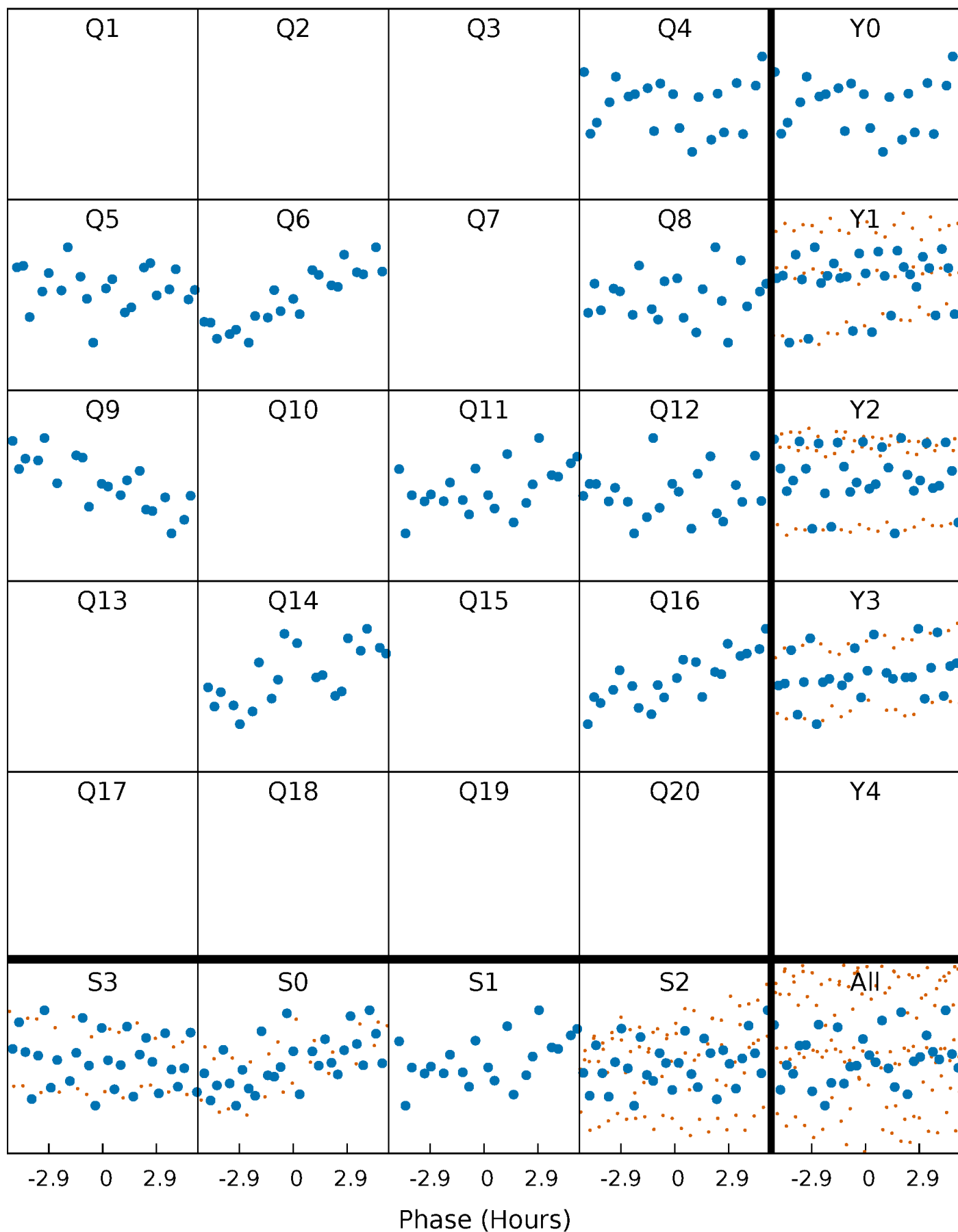


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



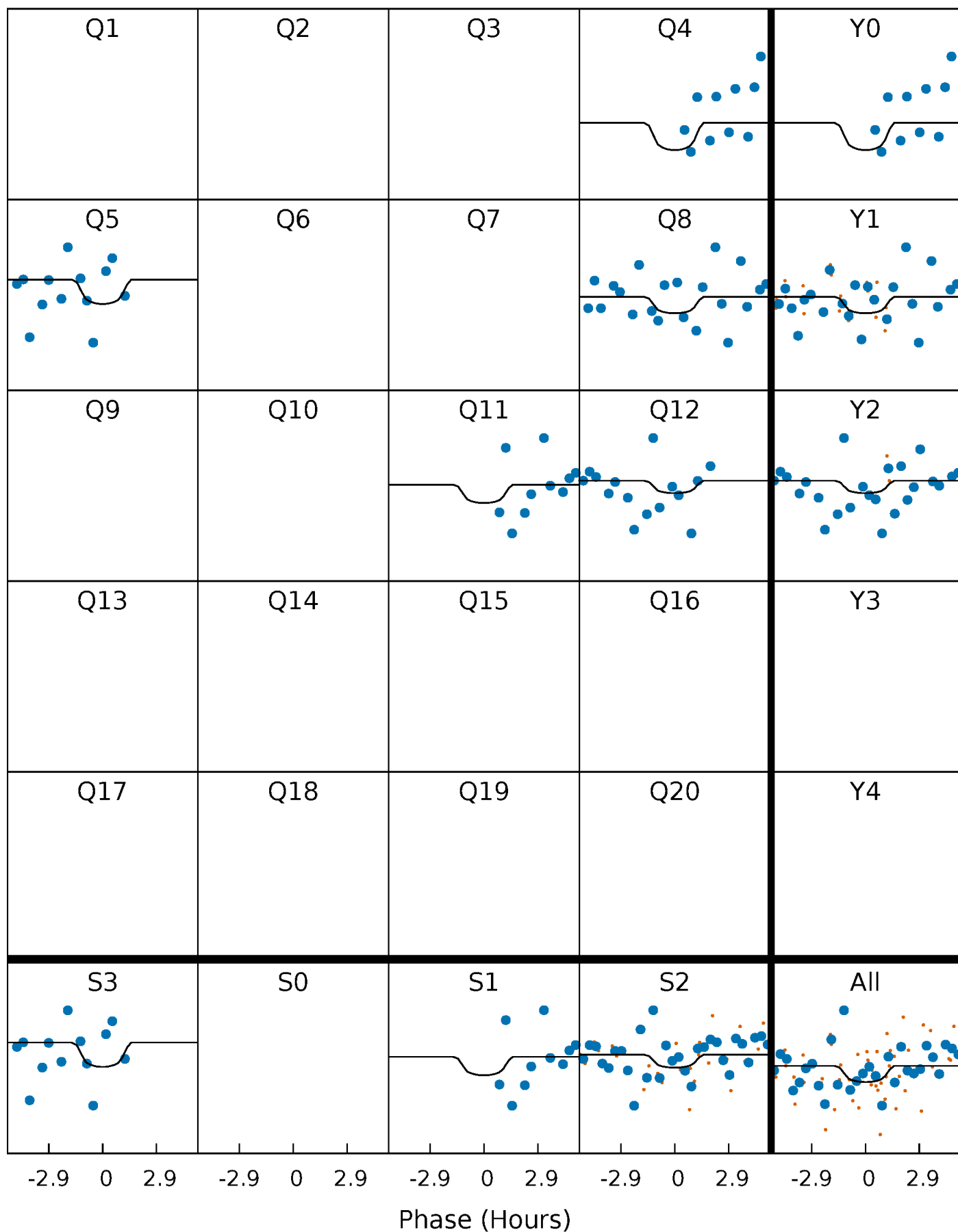
# PDC Quarter-Phased Transit Curves

TCE 007916140-04 P=132.440521 Days  $T_0=223.824721$  (BKJD)



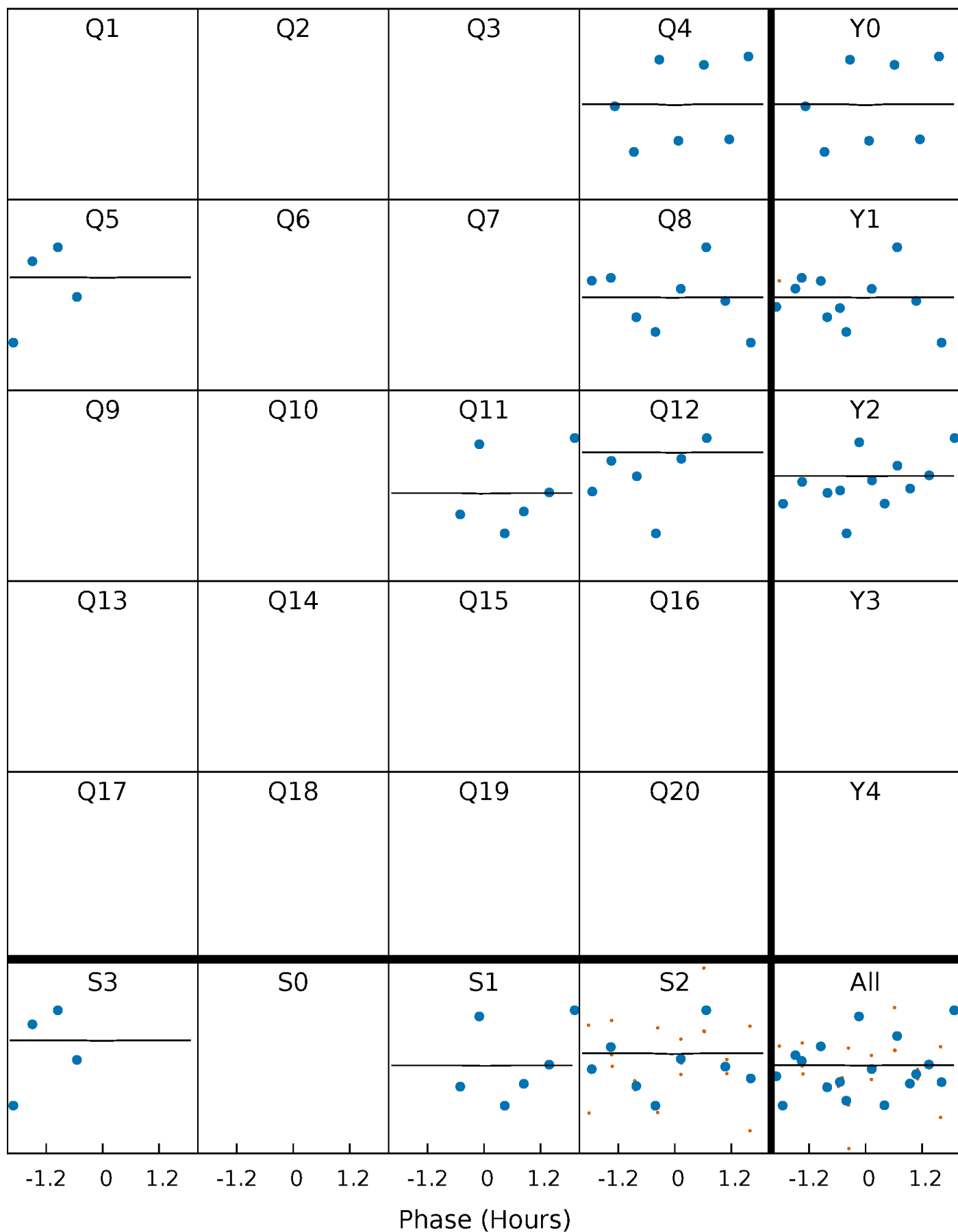
# DV Quarter-Phased Transit Curves

TCE 007916140-04 P=132.440521 Days  $T_0=223.824721$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

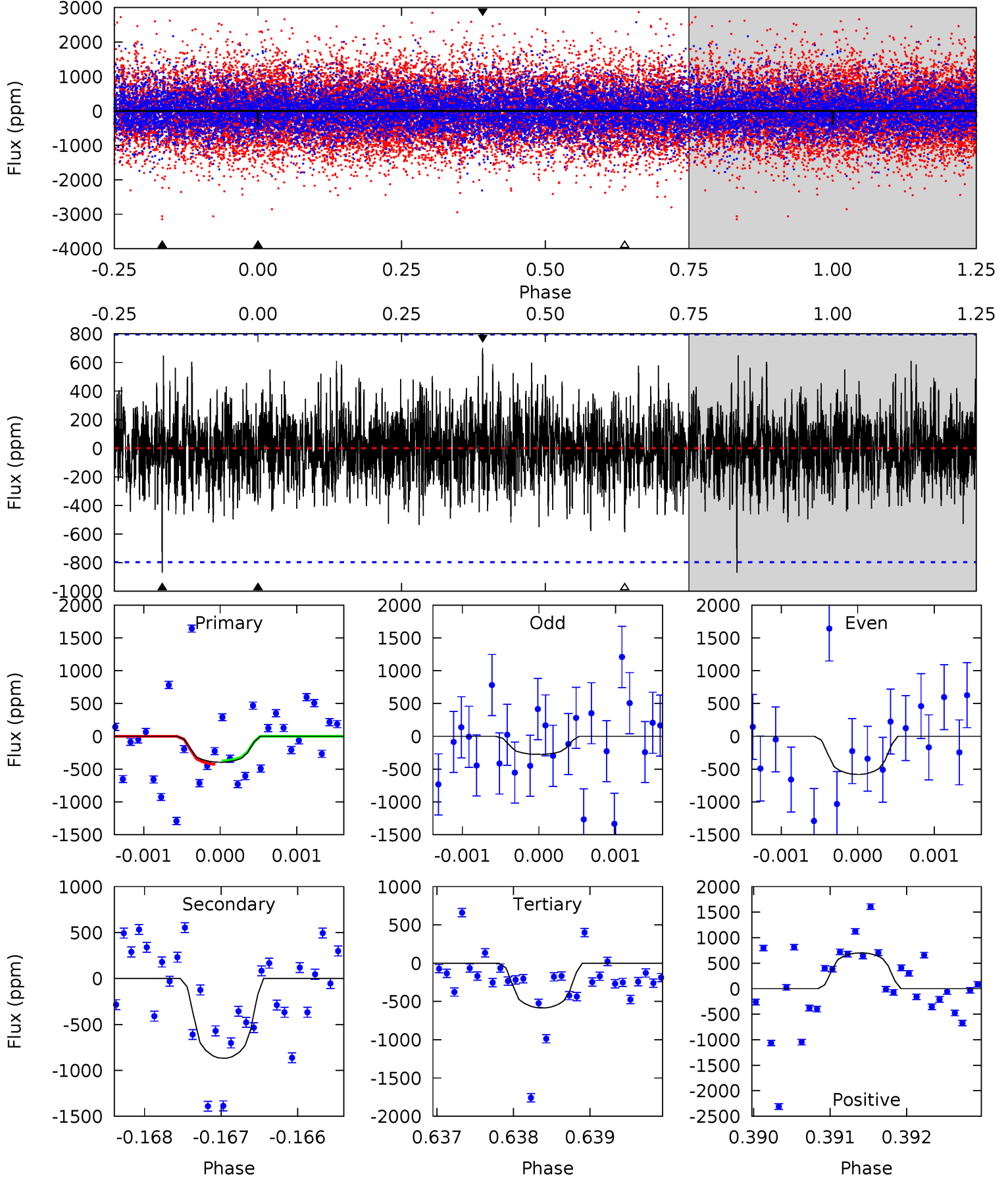
TCE 007916140-04 P=132.436713 Days  $T_0=223.899005$  (BKJD)



# DV Model-Shift Uniqueness Test

007916140-04, P = 132.440521 Days, E = 223.824721 Days

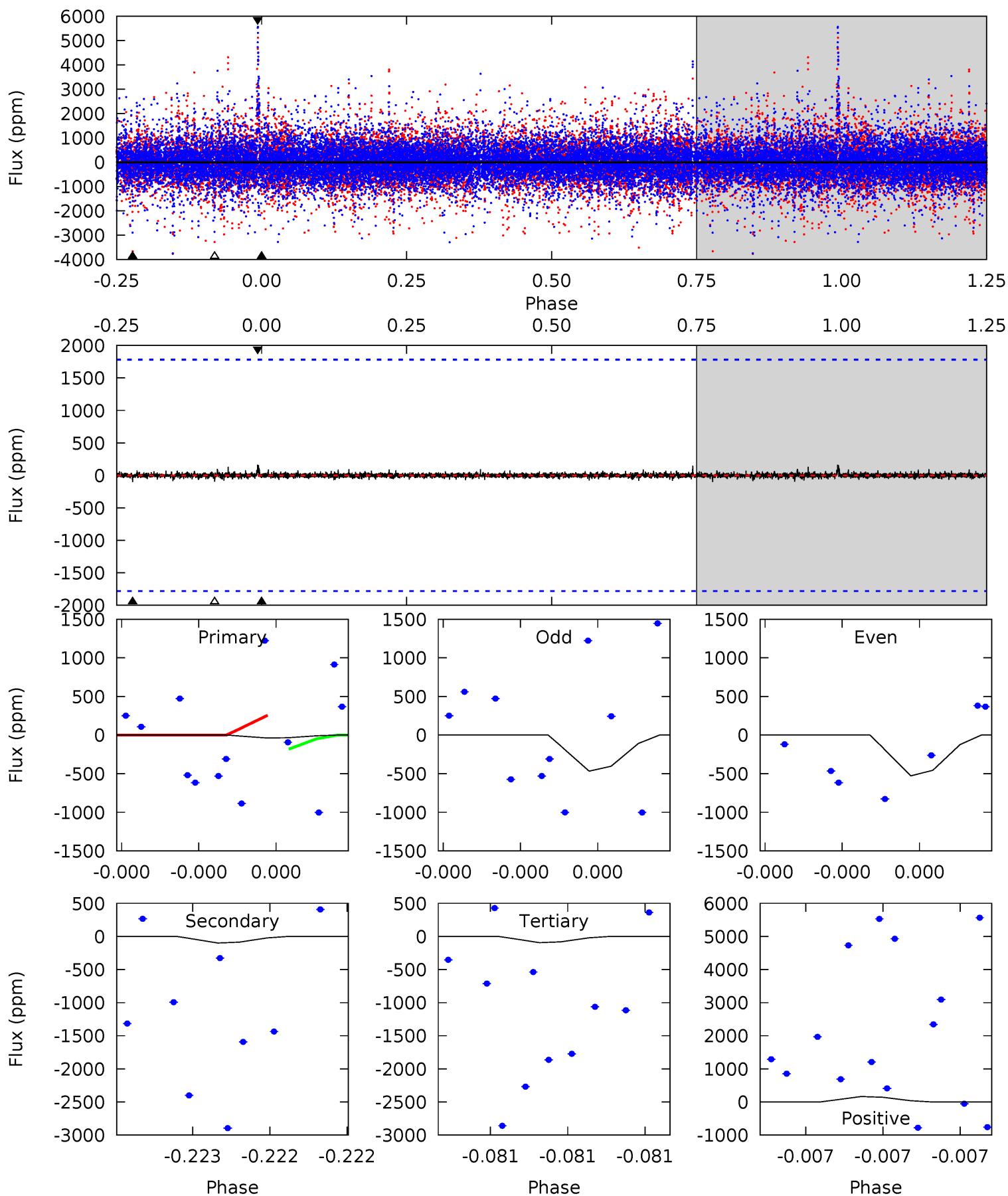
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
2.71	5.97	4.02	4.82	5.47	3.31	1.25	-1.30	-2.11	1.95	1.15	1.03	1.30	0.45	0.18



# Alt Model-Shift Uniqueness Test

007916140-04, P = 132.436713 Days, E = 223.899005 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
0.12	0.32	0.30	0.52	5.70	3.67	0.06	-0.18	-0.40	0.02	-0.21	0.09	0.61	0.62	0.12



### Stellar Parameters For KIC 007916140

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4944^{+176}_{-176}$	$4.542^{+0.072}_{-0.048}$	$-0.100^{+0.300}_{-0.300}$	$0.758^{+0.071}_{-0.079}$	$0.731^{+0.093}_{-0.057}$	$2.359^{+0.749}_{-0.396}$
	+4%/-4%	+2%/-1%	+300%/-300%	+9%/-10%	+13%/-8%	+32%/-17%
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 007916140-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-869 \pm 146$	$13.45^{+15.44}_{-9.21}$	$391^{+17}_{-17}$	$2804^{+1211}_{-486}$	$548^{+5140}_{-423}$
Alt.	$-100 \pm 313$	$14.34^{+14.61}_{-9.75}$	$391^{+17}_{-16}$	$2039^{+851}_{-4326}$	$36^{+648}_{-146}$

$T_{\text{max}}$  = 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

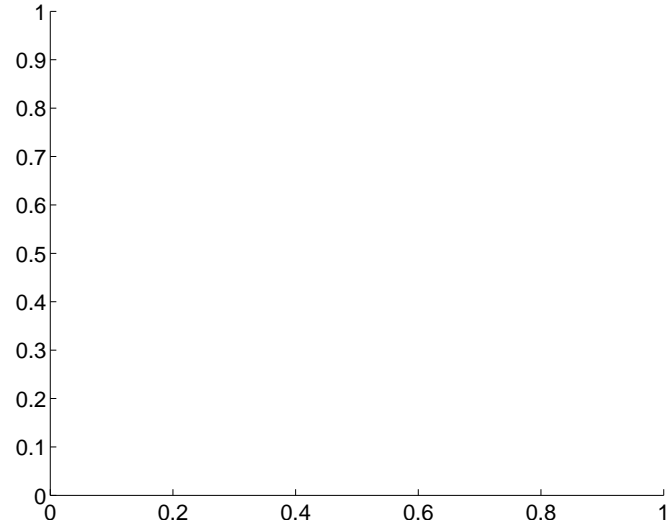
Supplemental centroid analysis for 007916140-04. Kepler magnitude: 15.74. Transit SNR 2.17

There are 0 quarters with good PRF difference image offsets

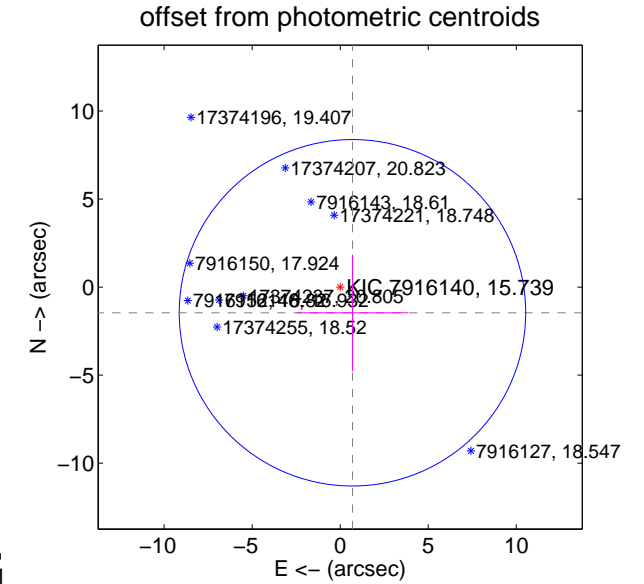
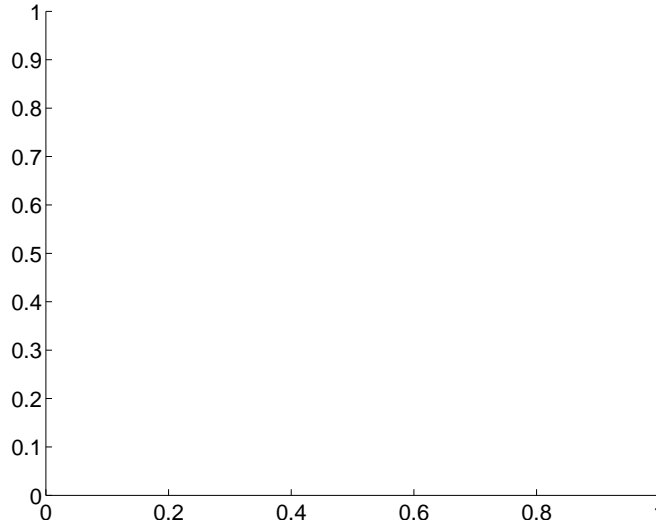
The direct PRF centroid is offset from the target star catalog position by about NaN arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	—	—	—	—
PRF-fit source offset from KIC position	—	—	—	—
photometric centroid source offset	$1.62 \pm 3.28$	0.49	$-0.70 \pm 3.17$	$-1.46 \pm 3.30$

There is no PRF-fit offset from OOT-fit

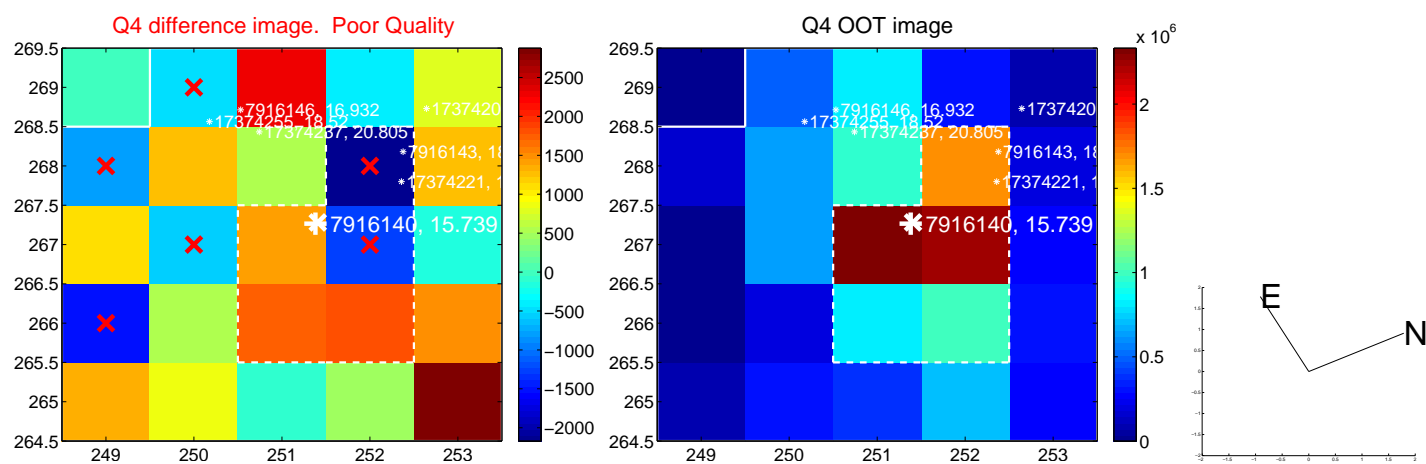
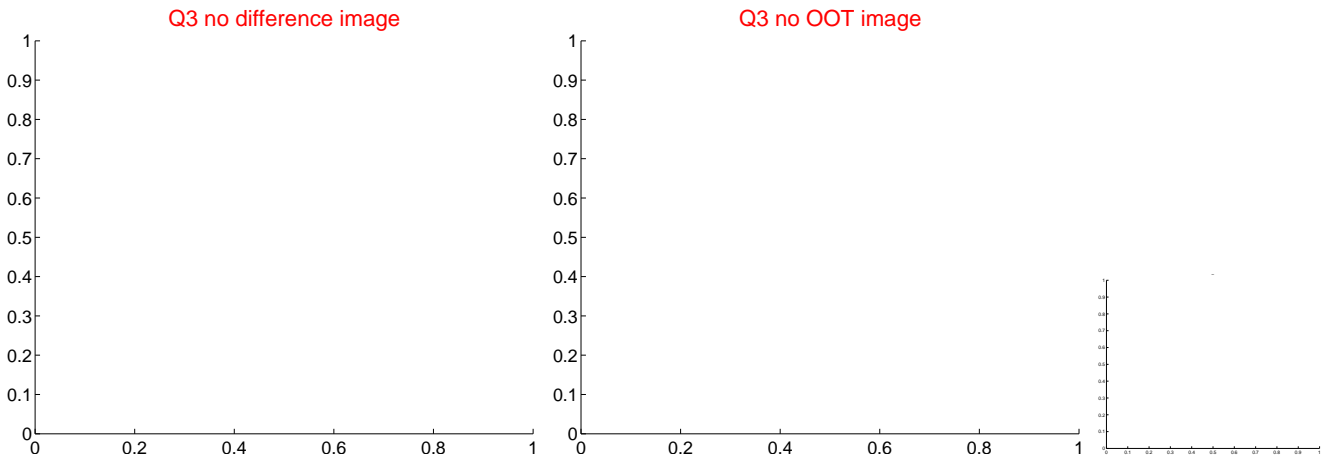
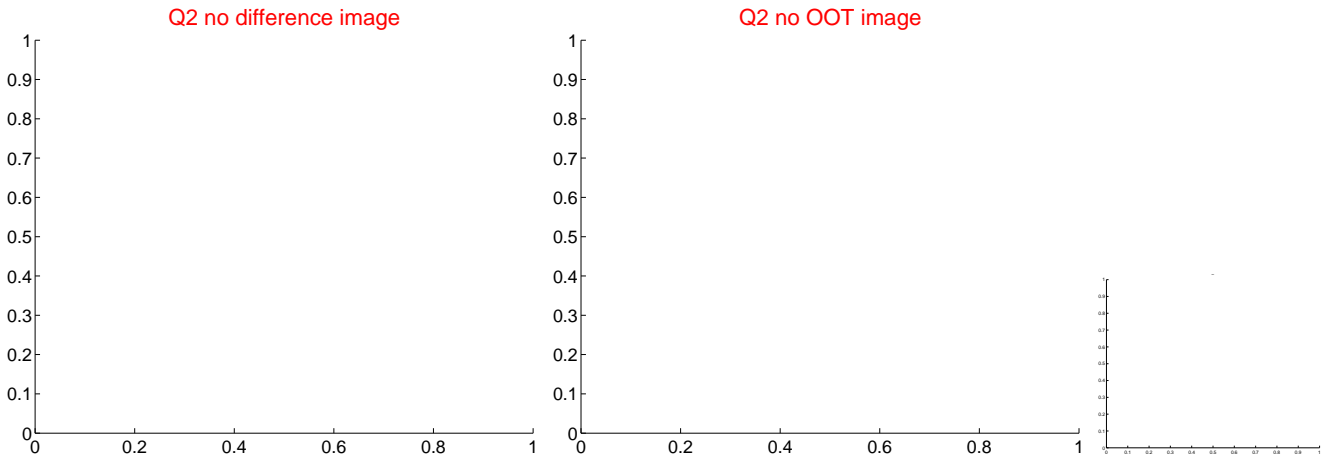
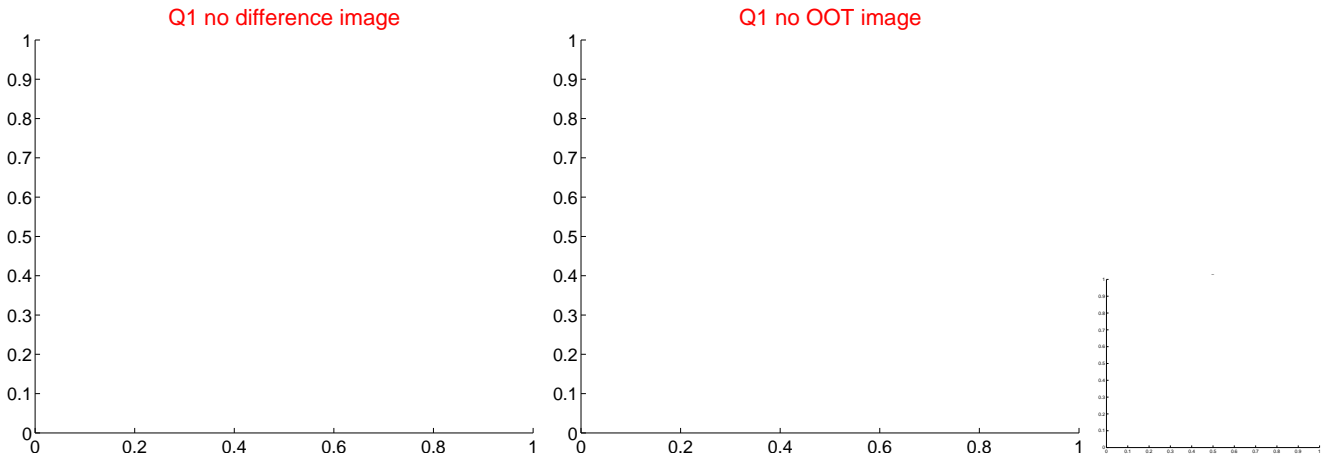


There is no PRF-fit offset from KIC

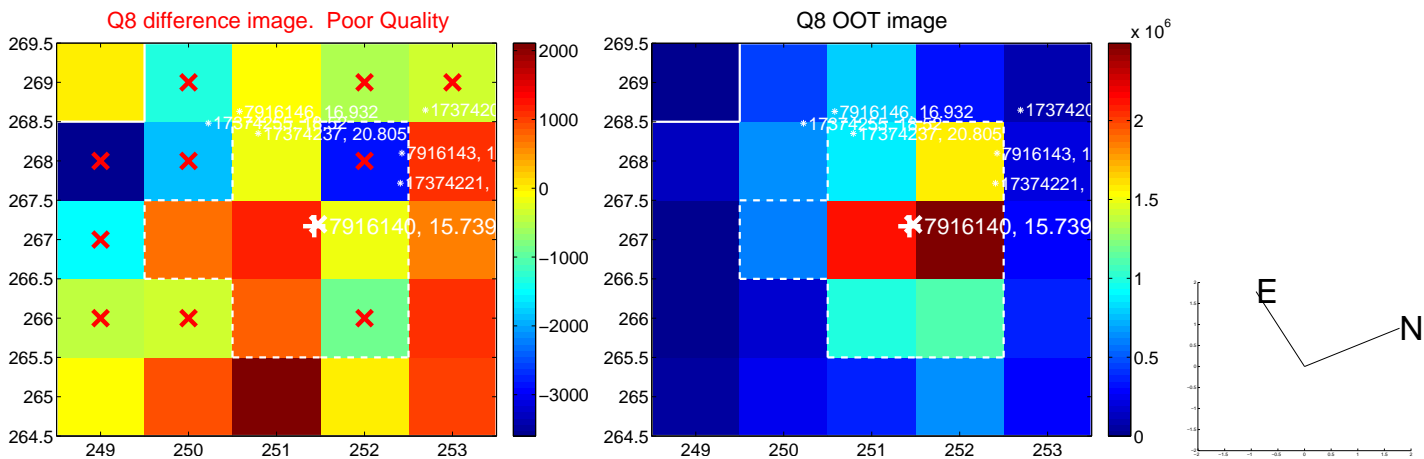
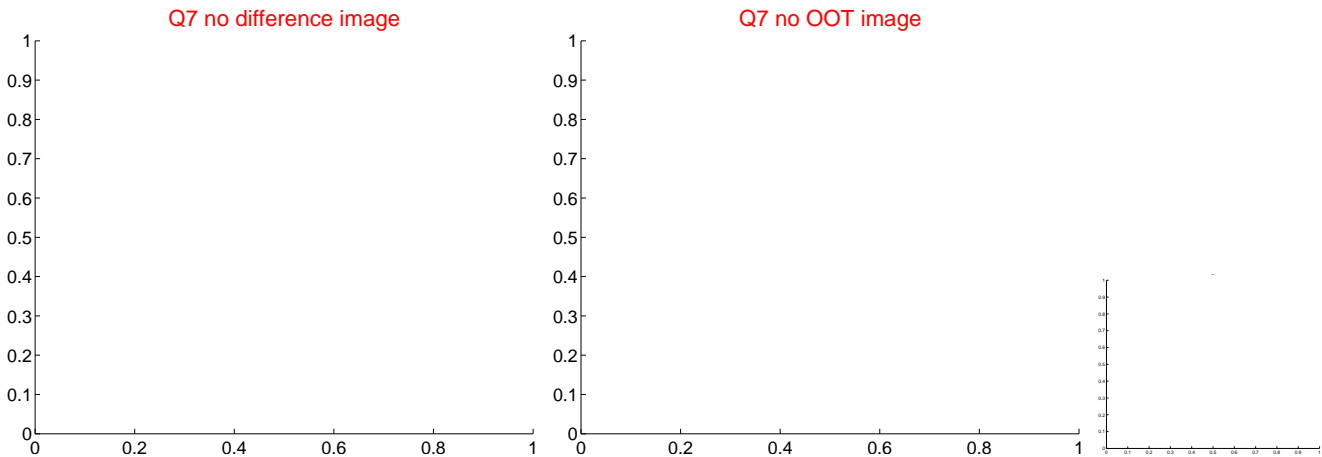
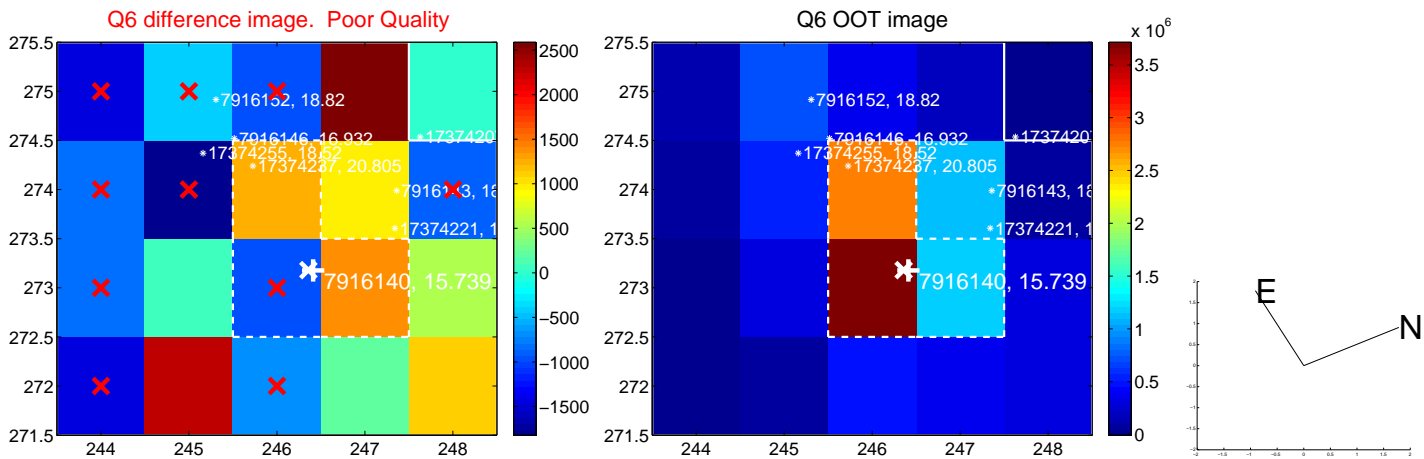
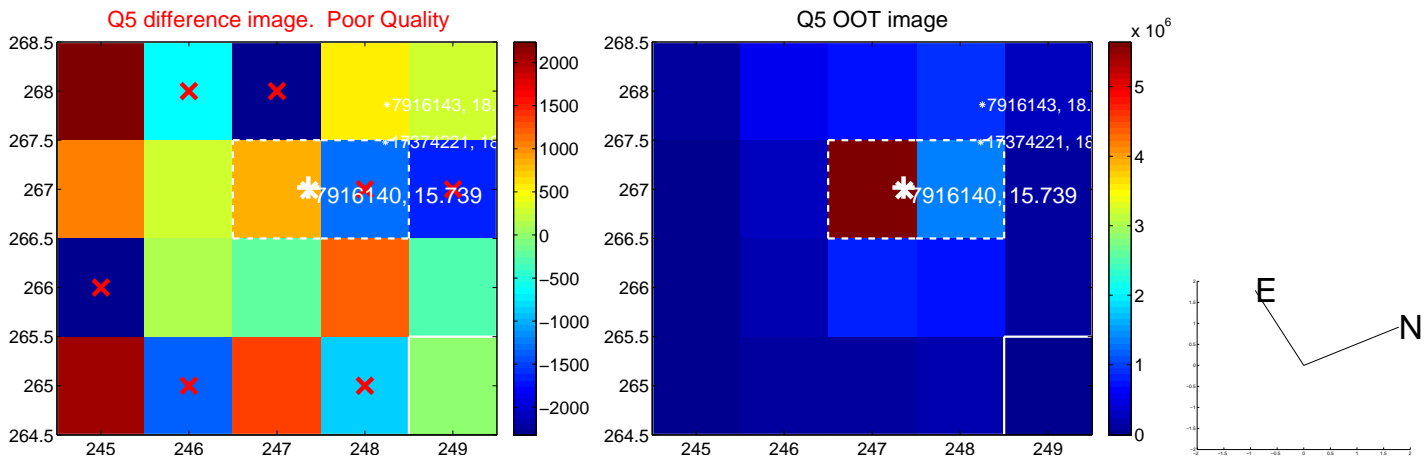


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

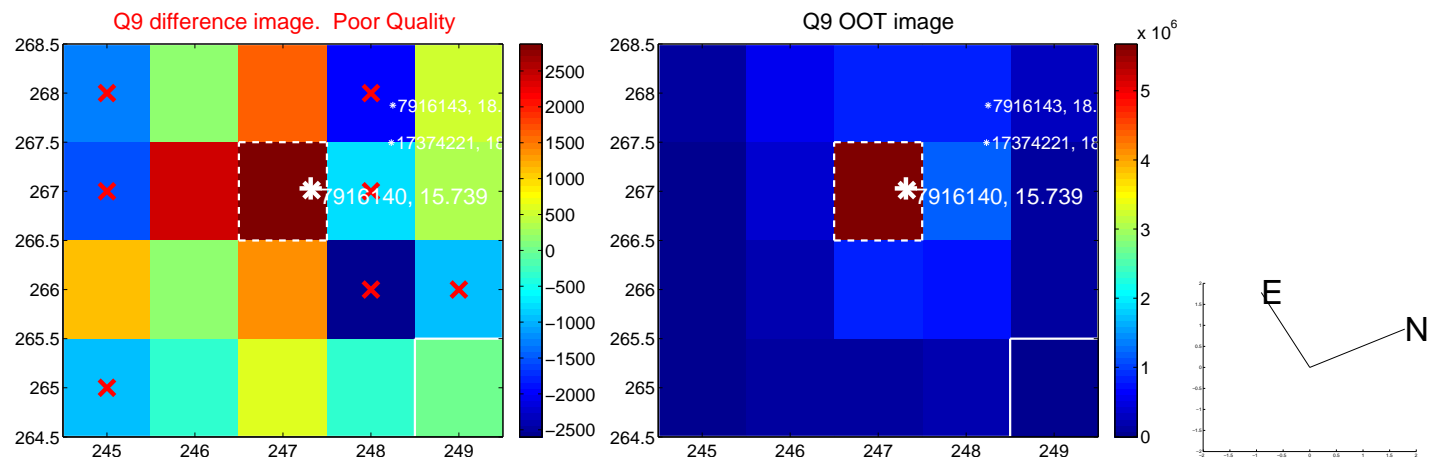
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



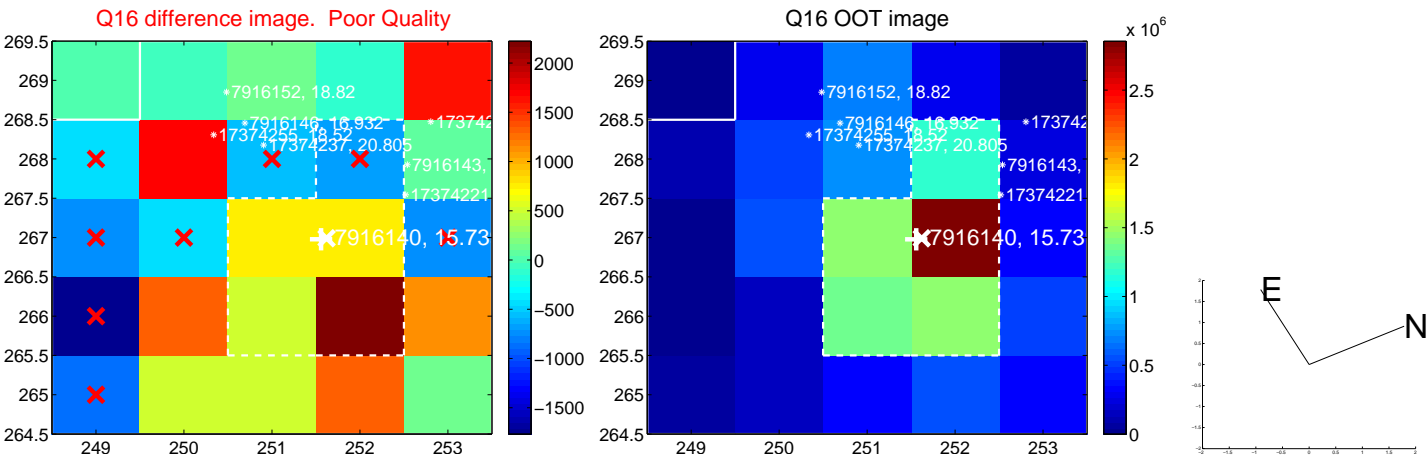
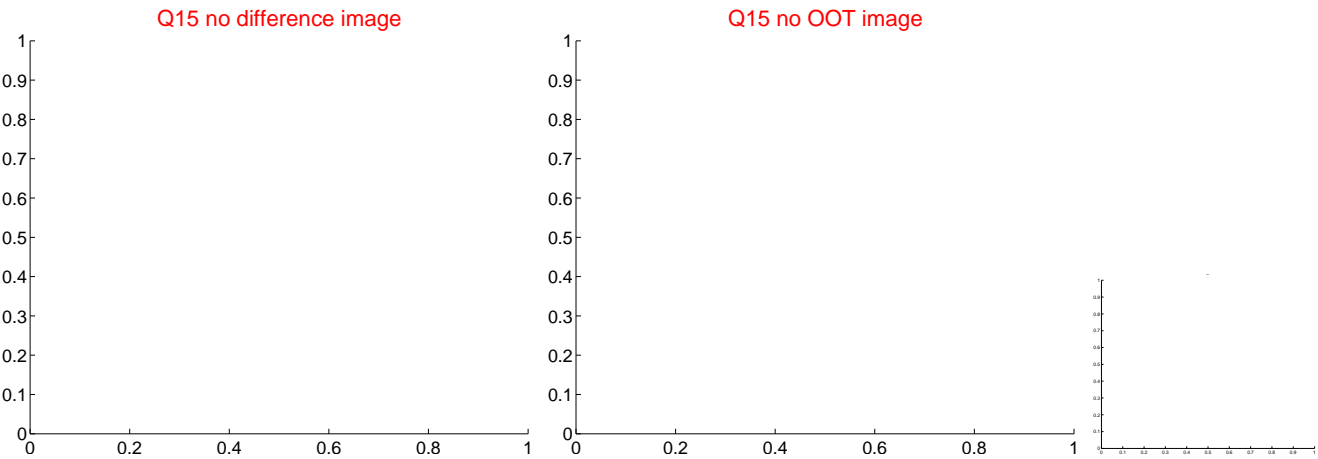
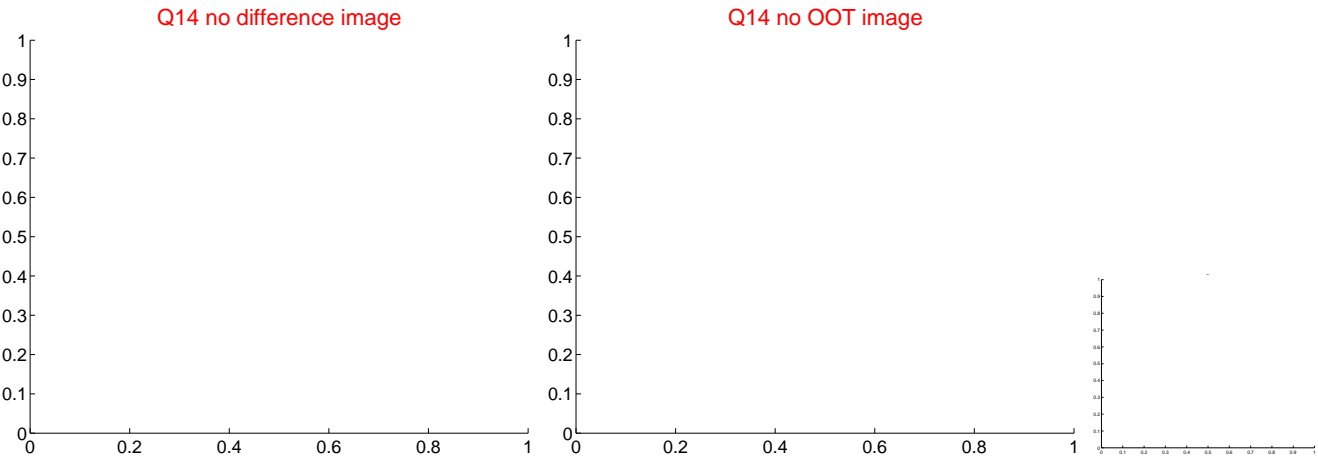
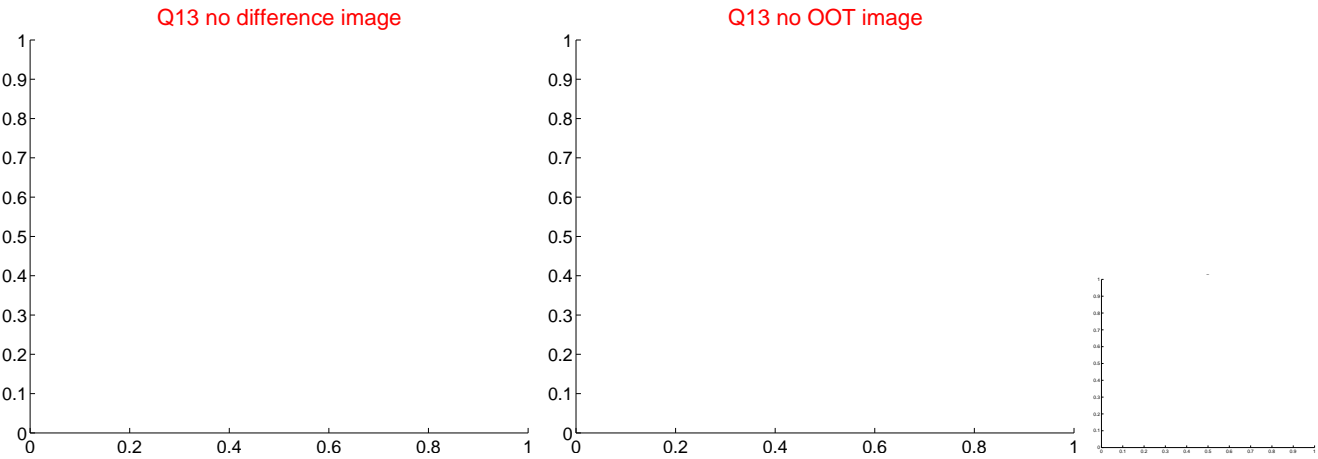
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



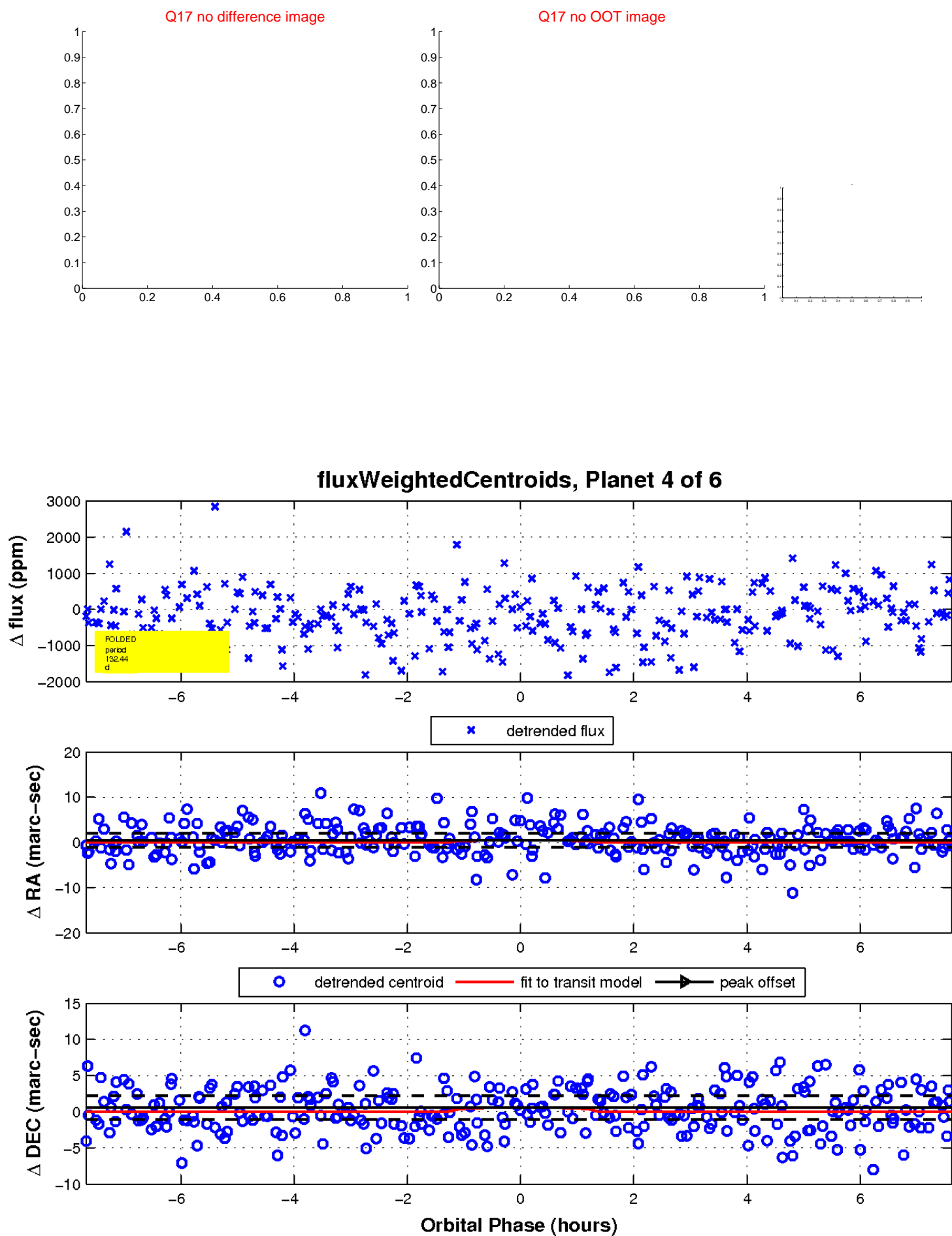
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.

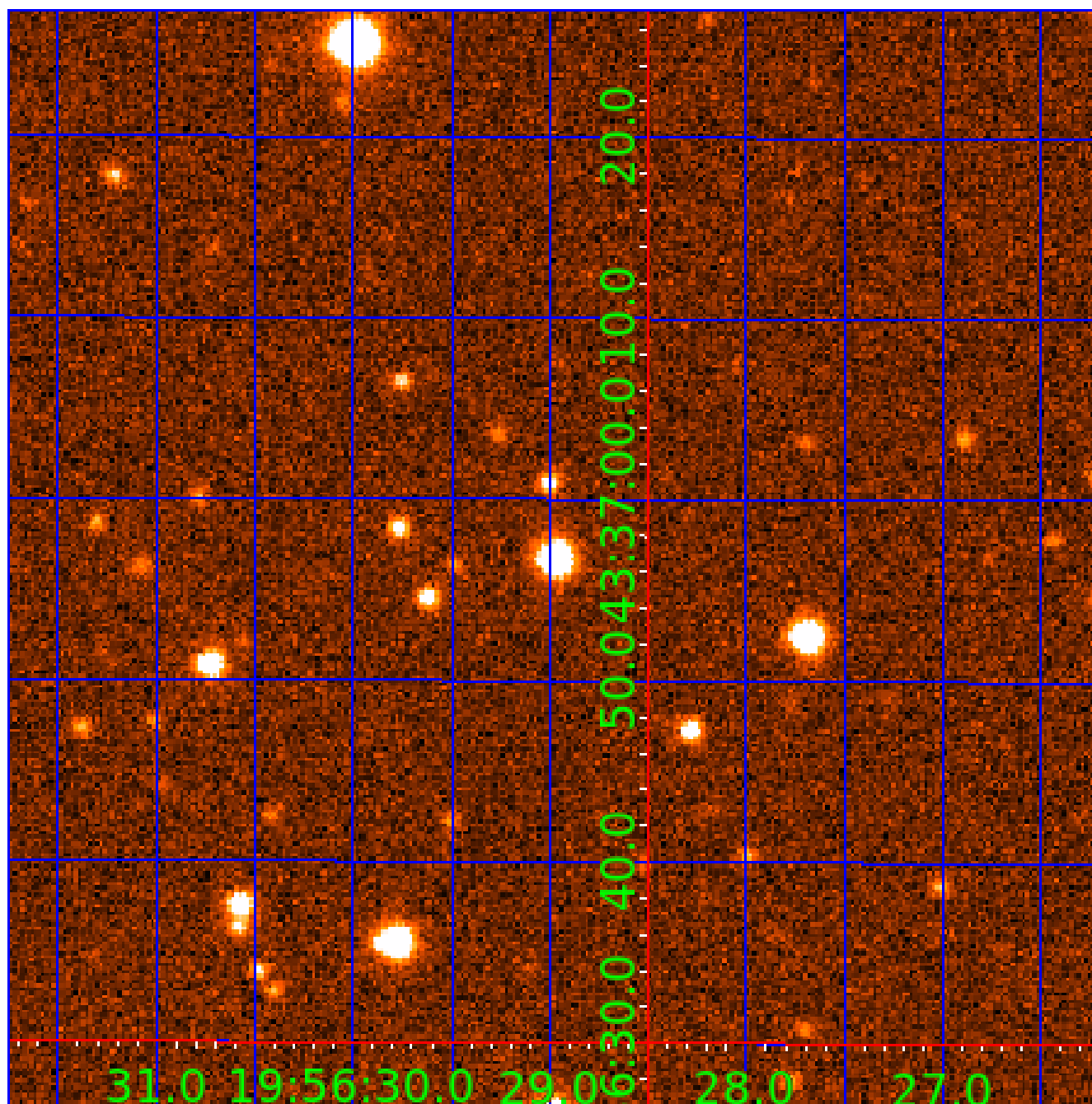


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 007916140

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007916140-01	OBS	No	1.532918	132.025157	116.4	6.755	7.9	9.4	0.76	4944	0.83	560.14
007916140-02	OBS	No	119.828930	216.226989	1032.9	16.409	11.9	5.1	0.76	4944	2.44	1.68
007916140-03	OBS	No	173.880601	257.501795	1171.8	13.209	7.3	4.9	0.76	4944	2.73	1.02
007916140-04	OBS	No	132.440521	223.824721	479.3	2.565	7.8	2.2	0.76	4944	1.66	1.47
007916140-05	OBS	No	132.423177	222.756419	487.8	2.231	8.0	1.9	0.76	4944	2.01	1.47
007916140-06	OBS	No	132.427963	223.136063	1547.1	12.867	12.2	7.9	0.76	4944	2.91	1.47

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007916140-01	OBS	FP	0.00	1	0	0	0	LPP_DV
007916140-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—INCONSISTENT_TRANS
007916140-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
007916140-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
007916140-05	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_SKYE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—SAME_NTL_PERIOD—CENT_FEW_DIFFS—HALO_GHOST
007916140-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—SAME_NTL_PERIOD—CENT_FEW_MEAS

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

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

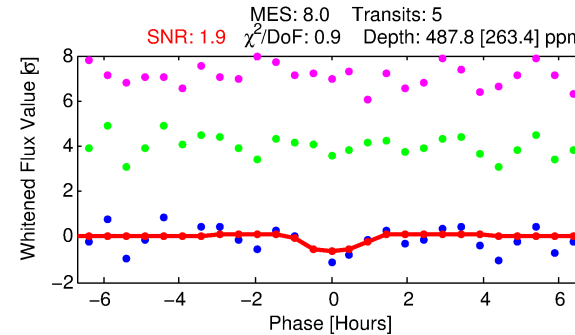
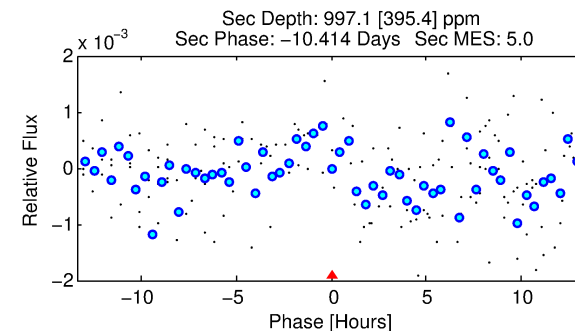
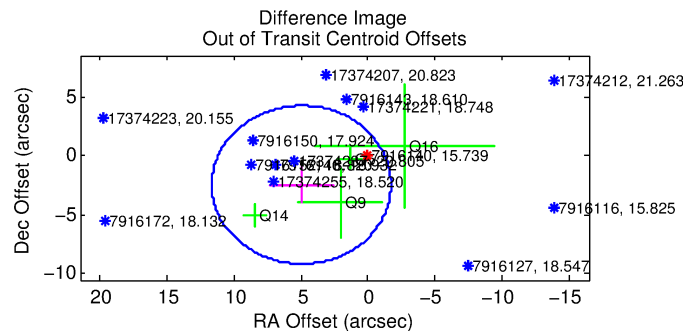
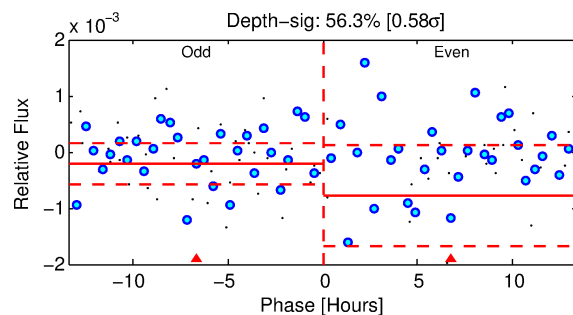
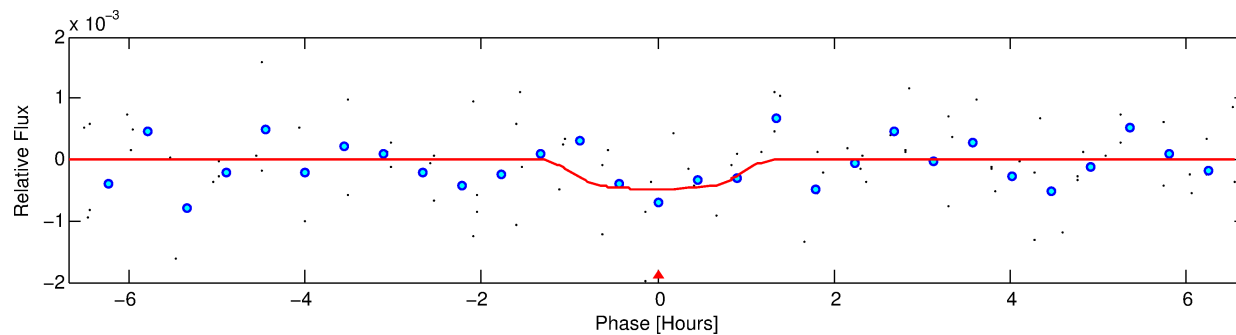
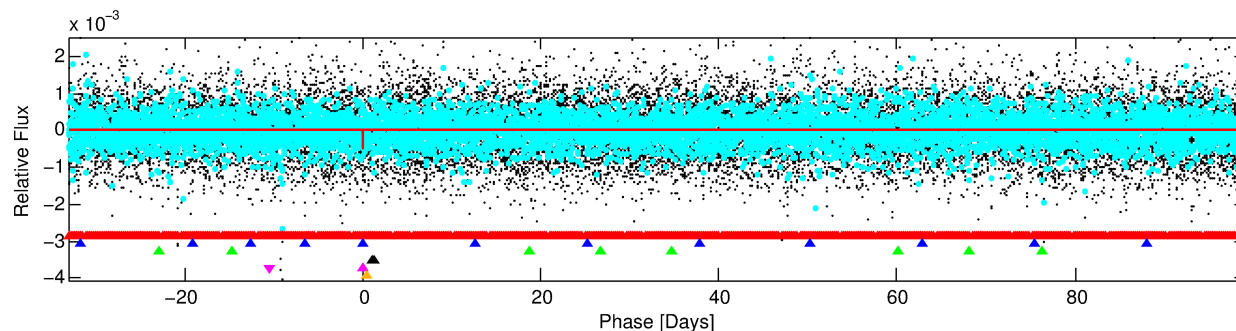
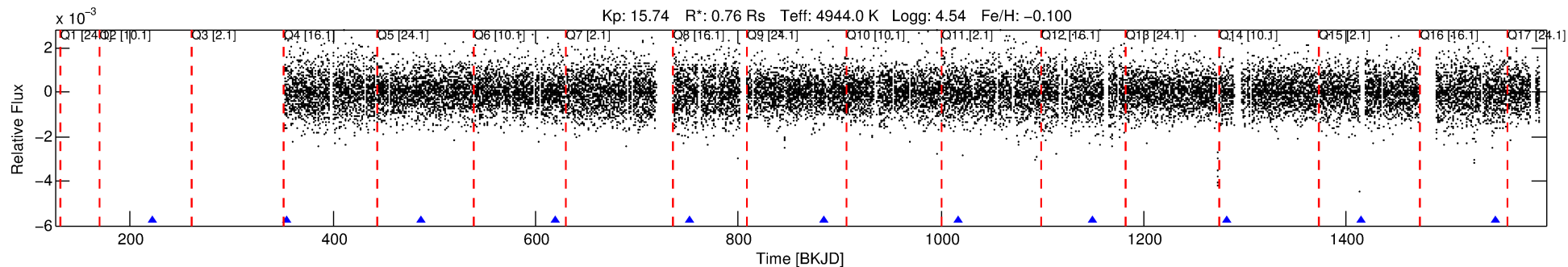
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 007916140-05

No Significant Match Found

# DV One-Page Summary

KIC: 7916140 Candidate: 5 of 6 Period: 132.423 d



DV Fit Results:

Period = 132.42318 [0.00594] d  
Epoch = 222.7564 [0.0278] BKJD  
Rp/R\* = 0.0244 [0.1330]  
a/R\* = 233.10 [4912.22]  
b = 0.89 [5.25]  
Seff = 1.47 [0.28]  
Teq = 281 [14] K  
Rp = 2.01 [11.00] Re  
a = 0.4579 [0.0407] AU  
Ag = 28355.16 [309976.17] [0.09 $\sigma$ ]  
Teffp = 5630 [15387] K [0.35 $\sigma$ ]

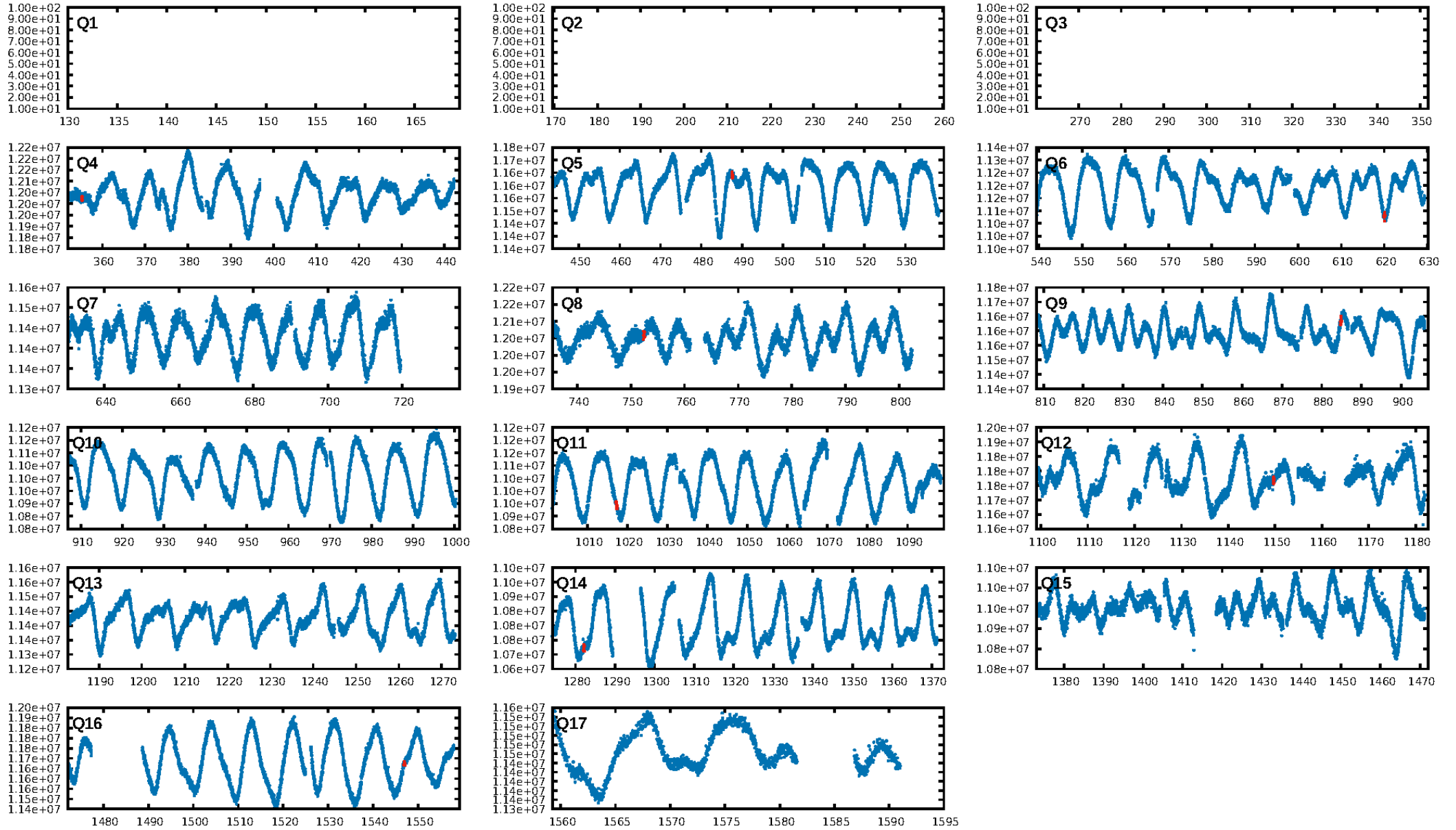
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [18.25 $\sigma$ ]  
LongPeriod-sig: 0.7% [0.01 $\sigma$ ]  
ModelChiSquare2-sig: 62.4%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 8.95e-12  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: 0.06651  
Centroid-sig: 1.0%  
Centroid-so: 7.215 arcsec [2.13 $\sigma$ ]  
OotOffset-rm: 5.546 arcsec [2.49 $\sigma$ ]  
KicOffset-rm: 5.680 arcsec [2.50 $\sigma$ ]  
OotOffset-st: 1/0/1/2 [4]  
KicOffset-st: 1/0/1/2 [4]  
DiffImageQuality-fgm: 0.25 [1/4]  
DiffImageOverlap-fno: 0.00 [0/9]

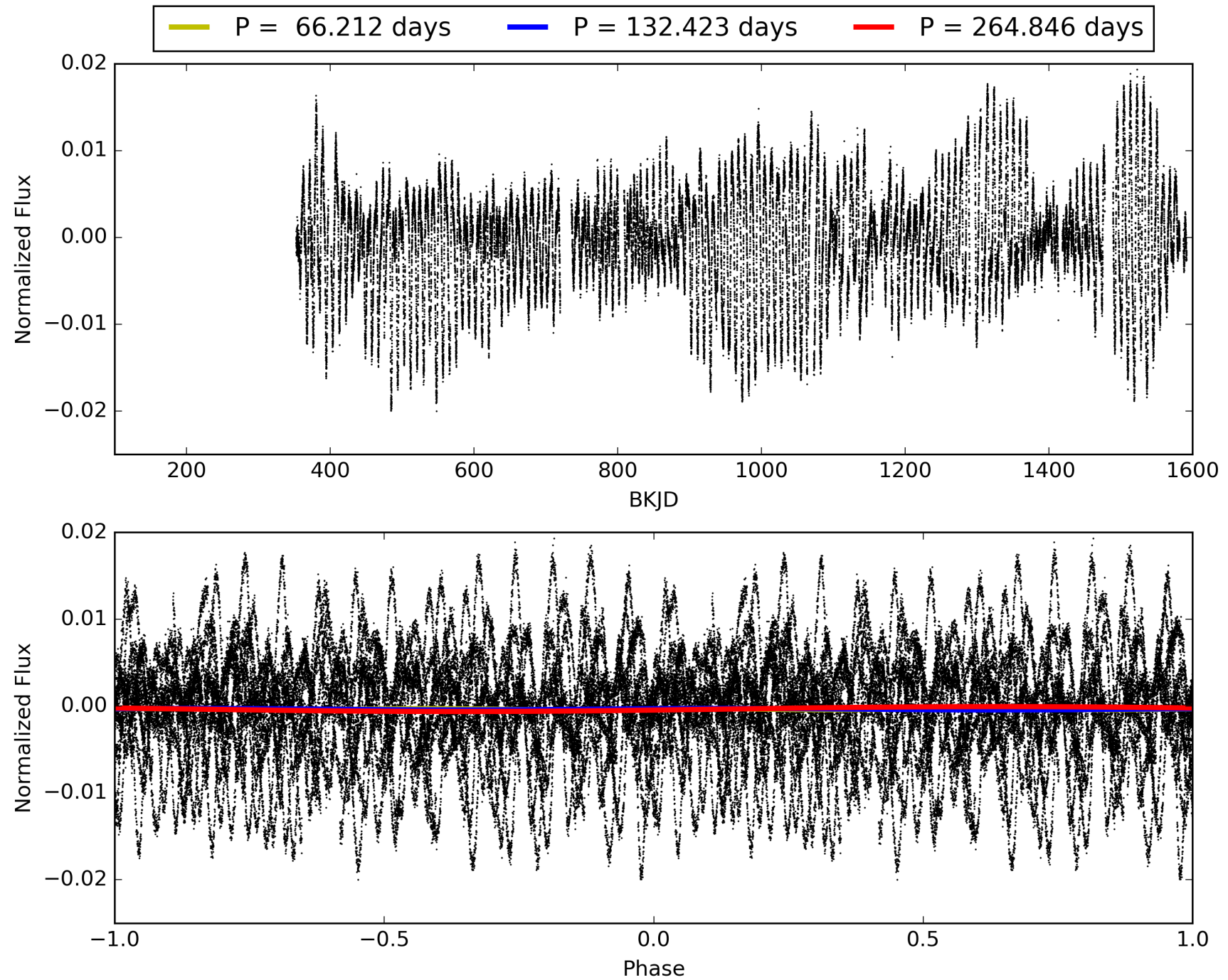
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 05:17:30 Z

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

# TCE 007916140-05, PDC Light Curves

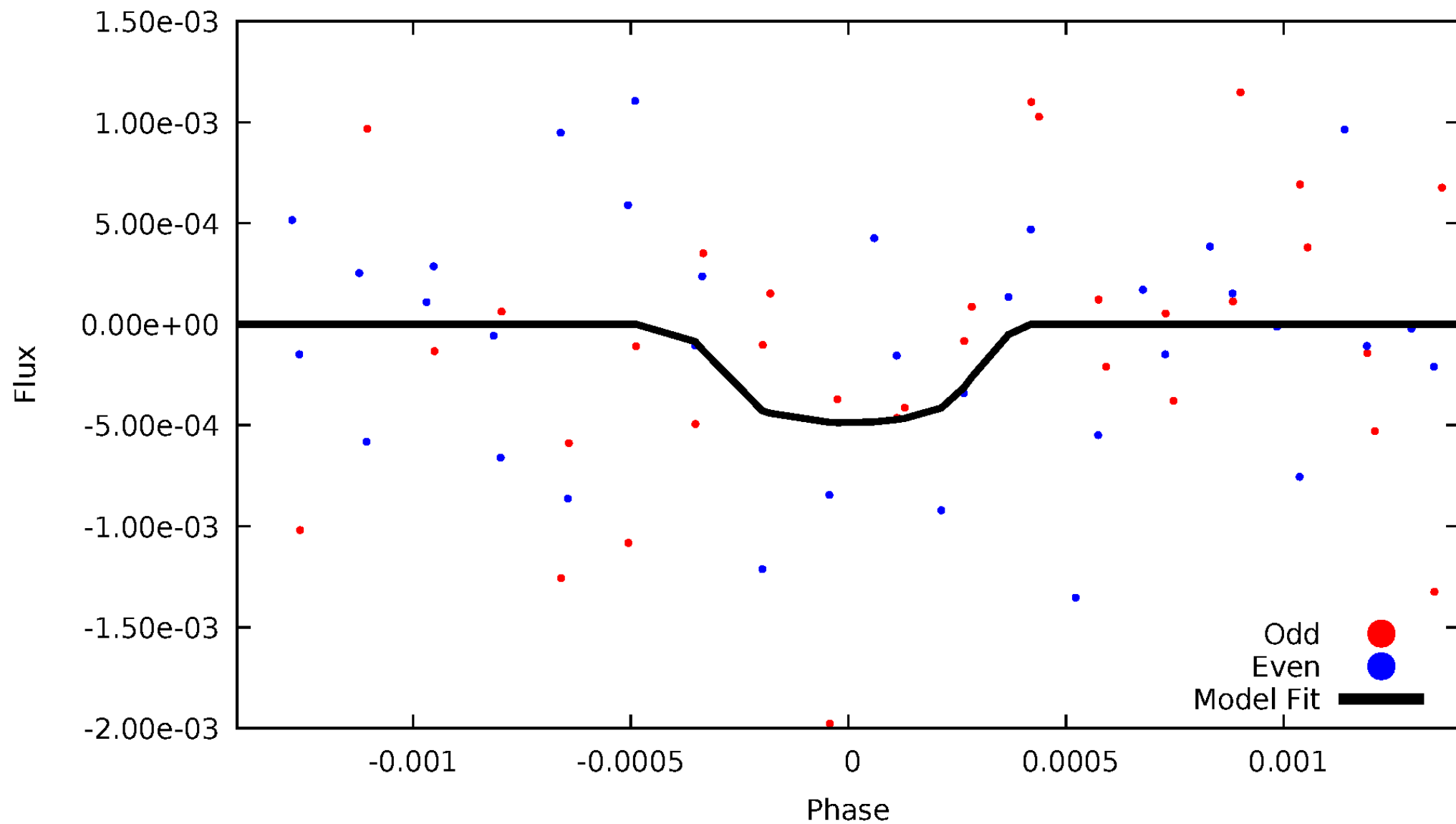


TCE 007916140-05



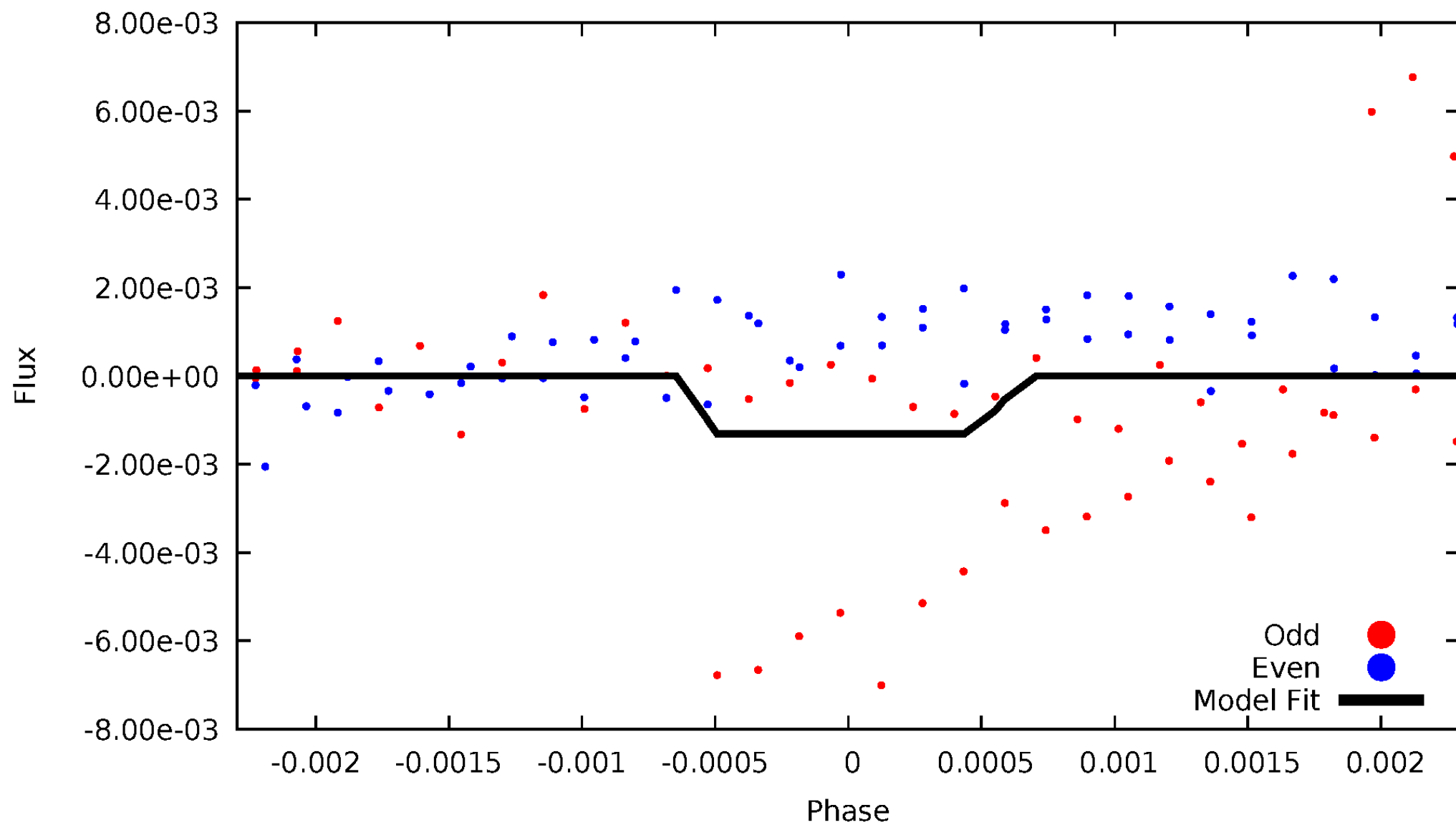
# DV Odd/Even

TCE 007916140-05



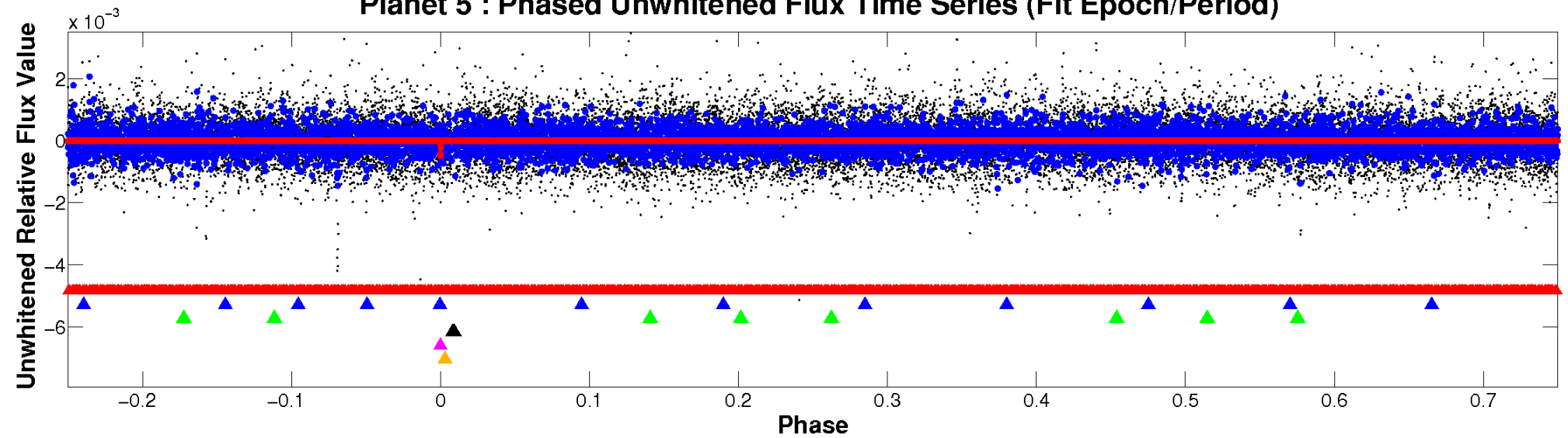
# ALT Odd/Even

TCE 007916140-05

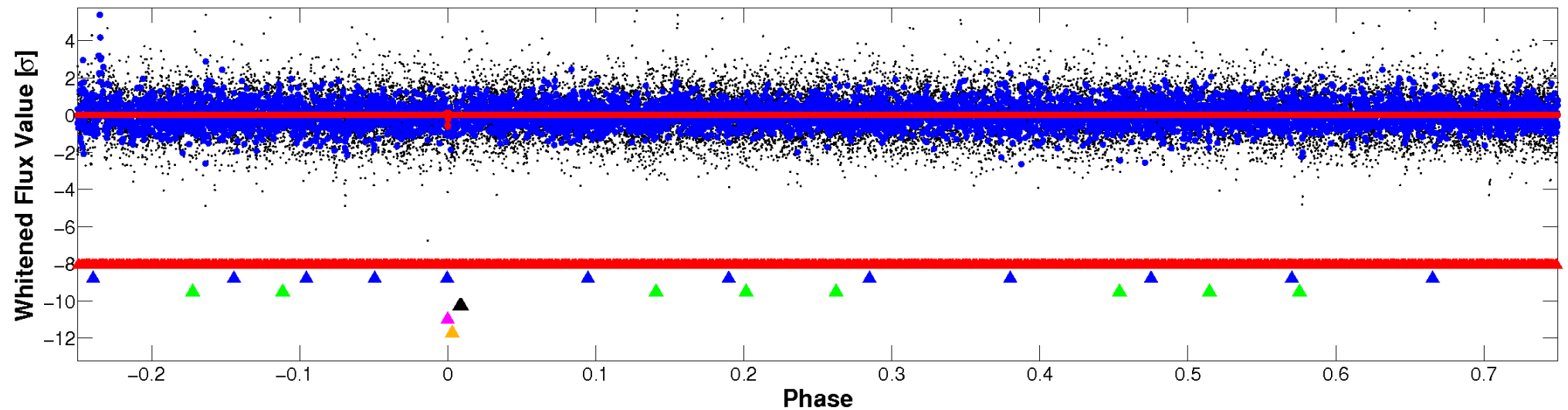


# Non-Whitened Vs. Whitened Light Curve

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

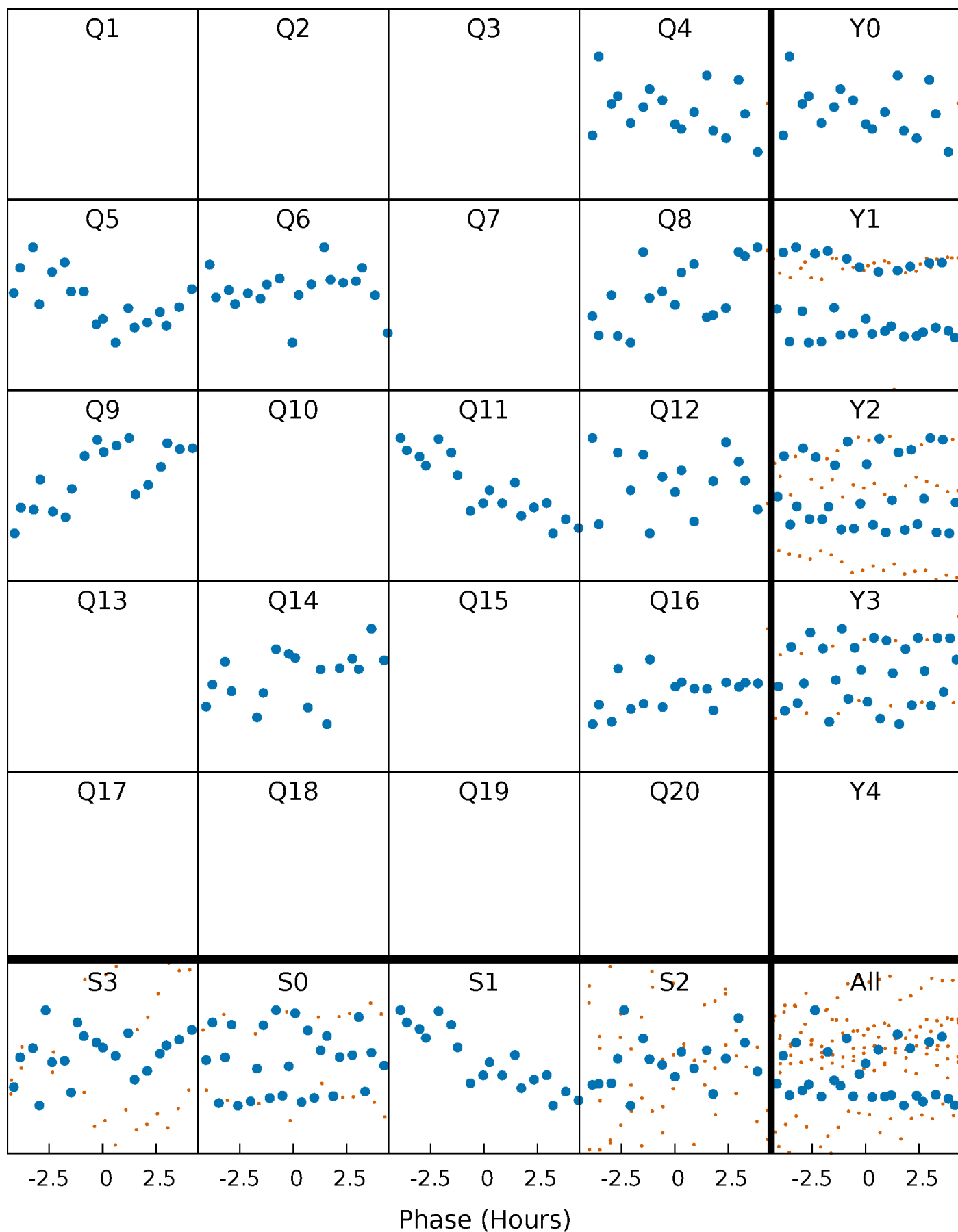


## Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

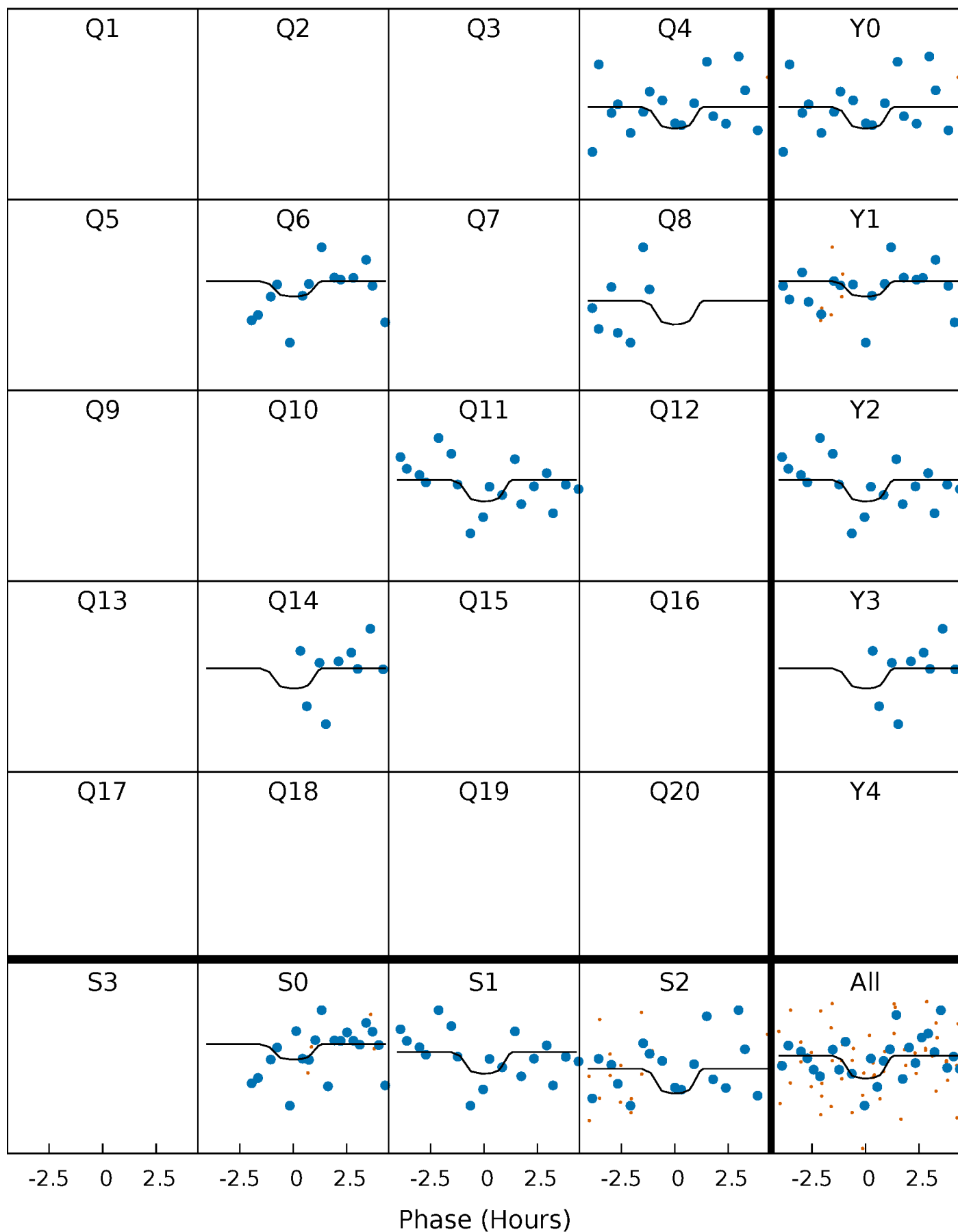
TCE 007916140-05     $P=132.423177$  Days     $T_0=222.756419$  (BKJD)





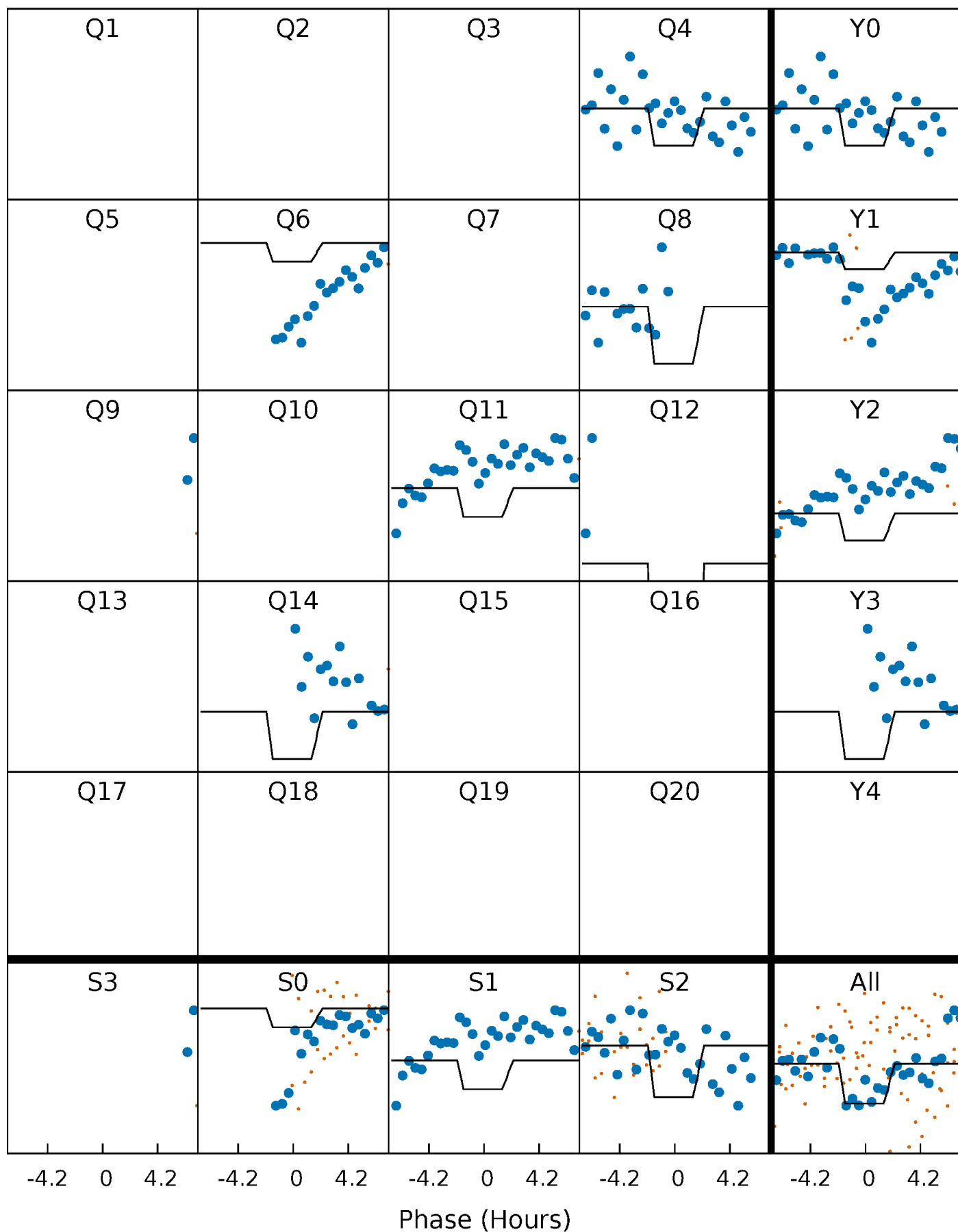
# DV Quarter-Phased Transit Curves

TCE 007916140-05     $P=132.423177$  Days     $T_0=222.756419$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

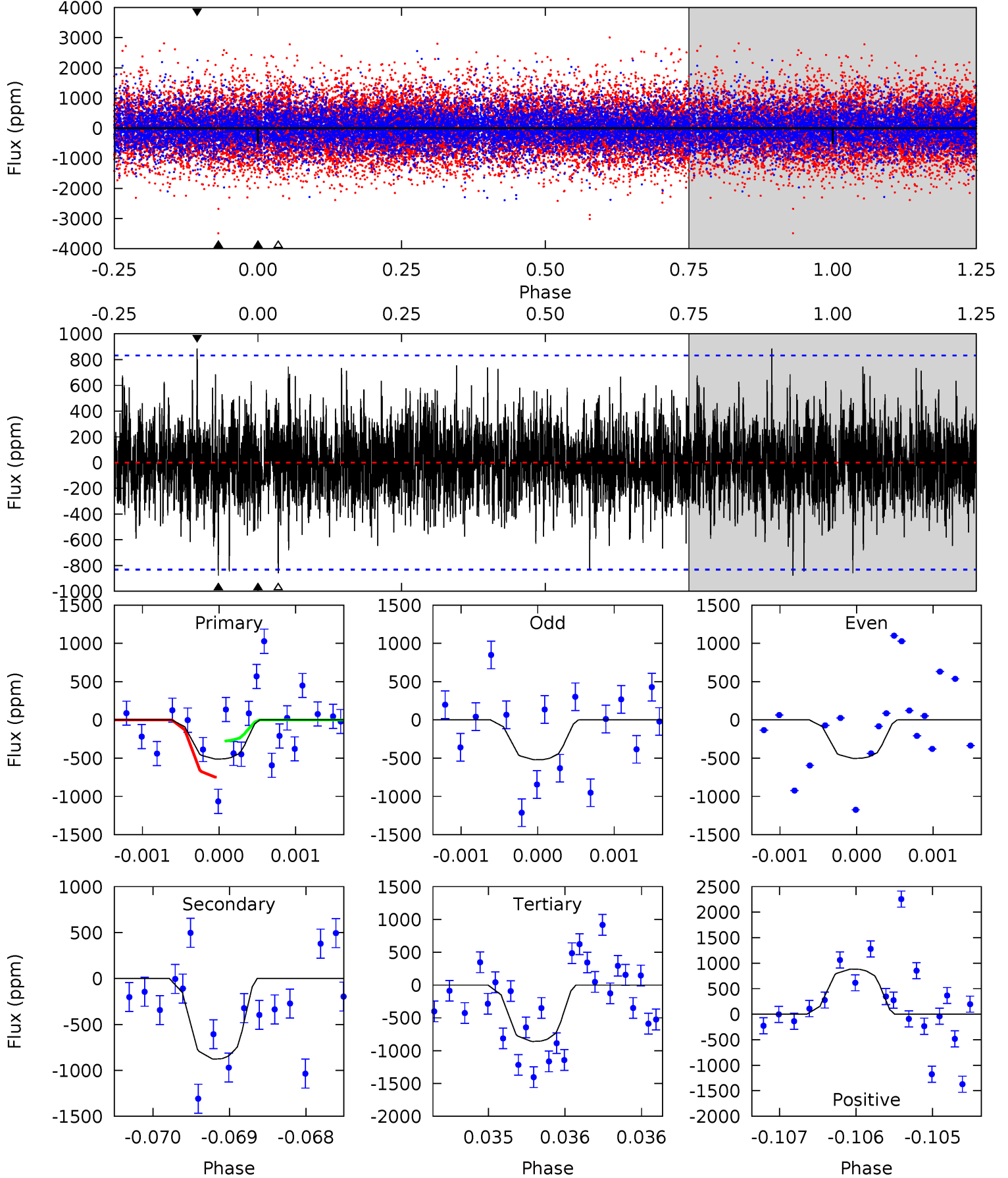
TCE 007916140-05 P=132.429902 Days  $T_0=222.714179$  (BKJD)



# DV Model-Shift Uniqueness Test

007916140-05, P = 132.423177 Days, E = 222.756419 Days

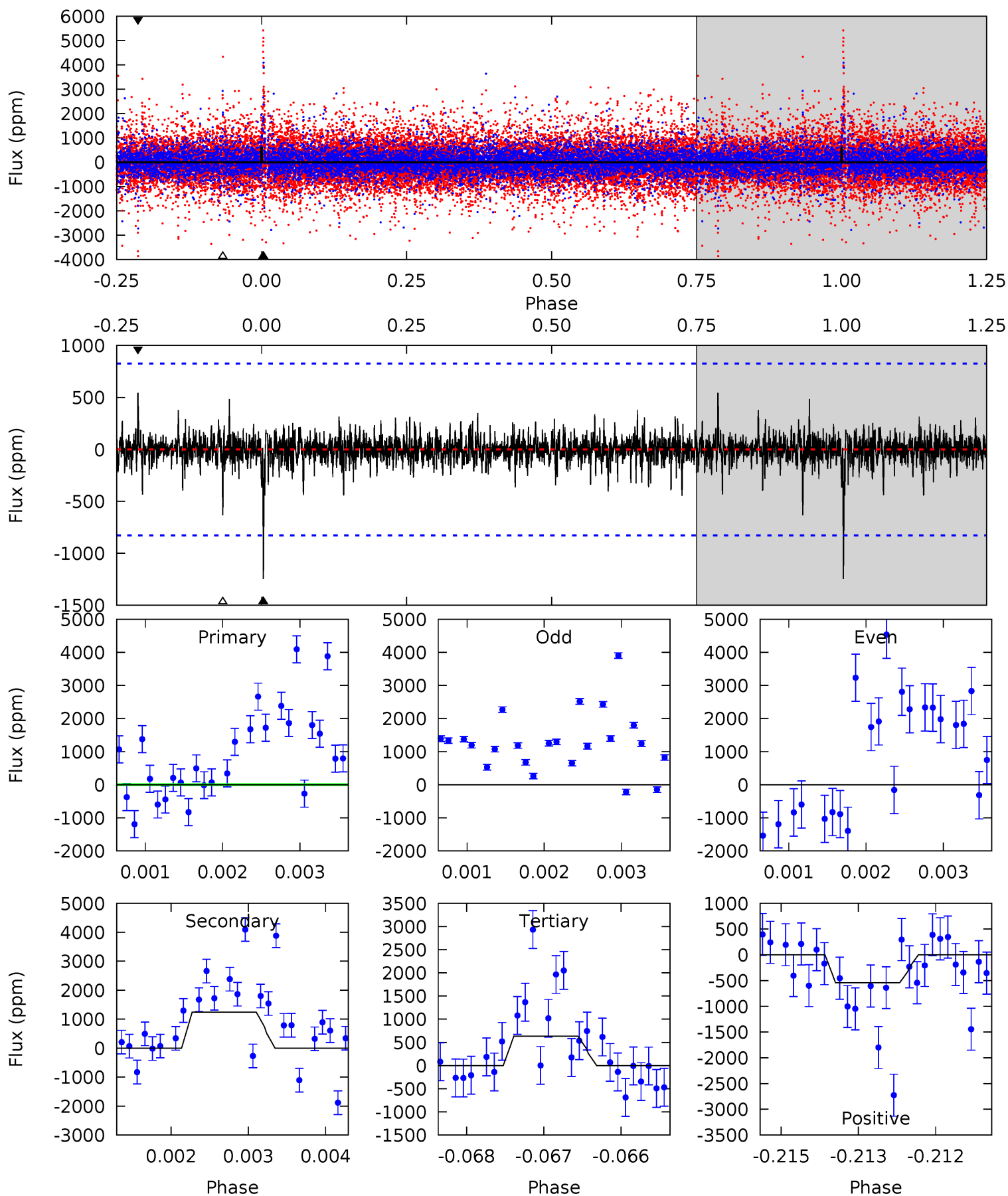
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
3.39	5.80	5.68	5.85	5.49	3.36	1.40	-2.30	-2.46	0.12	-0.04	0.06	1.04	0.50	1.56



# Alt Model-Shift Uniqueness Test

007916140-05, P = 132.429902 Days, E = 222.714179 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
3.93	8.17	4.15	3.57	5.43	3.26	0.67	-0.22	0.36	4.02	4.60	6.47	-1.42	0.30	0.23



### Stellar Parameters For KIC 007916140

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4944^{+176}_{-176}$	$4.542^{+0.072}_{-0.048}$	$-0.100^{+0.300}_{-0.300}$	$0.758^{+0.071}_{-0.079}$	$0.731^{+0.093}_{-0.057}$	$2.359^{+0.749}_{-0.396}$
	+4%/-4%	+2%/-1%	+300%/-300%	+9%/-10%	+13%/-8%	+32%/-17%
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 007916140-05 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-878 \pm 151$	$7.87^{+8.09}_{-5.39}$	$390^{+18}_{-19}$	$3262^{+1627}_{-585}$	$1668^{+14461}_{-1281}$
Alt.	$-1244 \pm 152$	$9.02^{+8.59}_{-6.44}$	$391^{+18}_{-16}$	$3306^{+2003}_{-564}$	$1771^{+21901}_{-1298}$

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

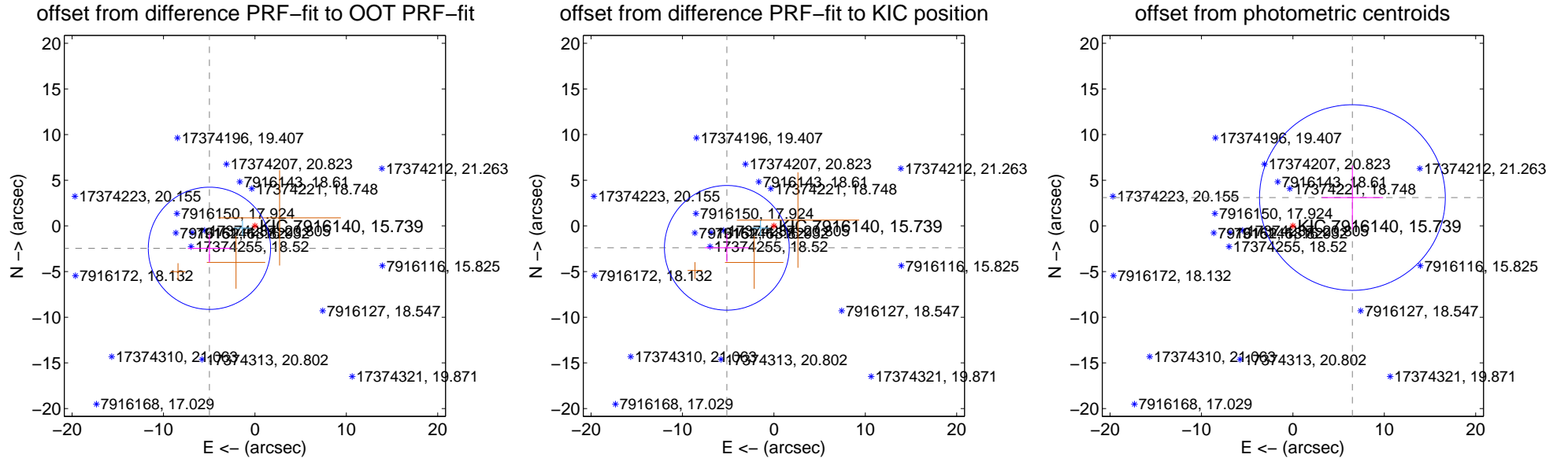
## DV Centroid Data

Supplemental centroid analysis for 007916140-05. Kepler magnitude: 15.74. Transit SNR 1.93

There are 1 quarters with good PRF difference image offsets

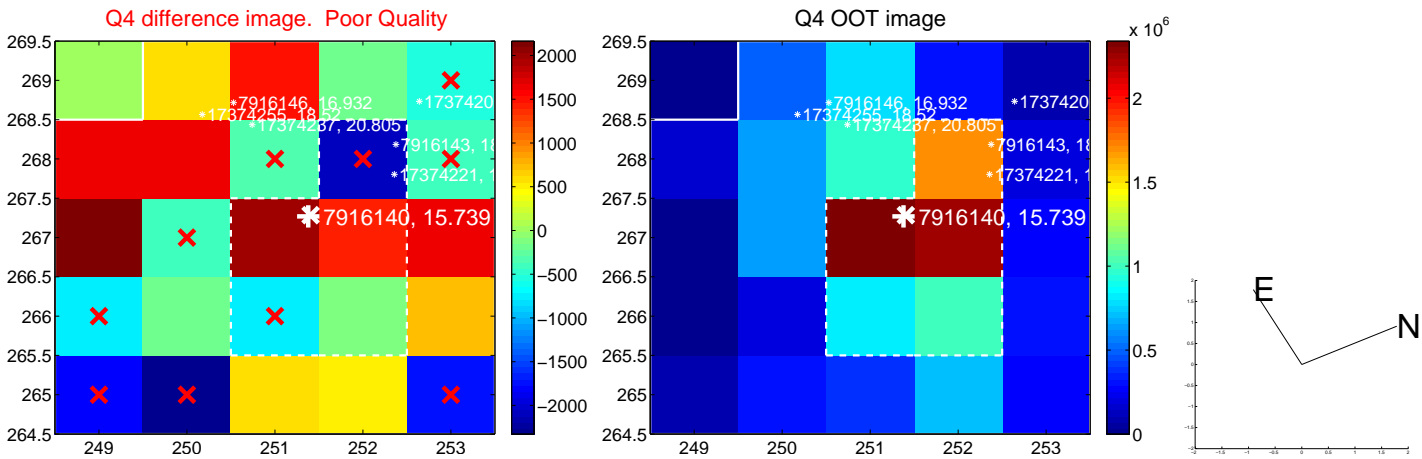
The direct PRF centroid is offset from the target star catalog position by about 0.25 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$5.546 \pm 2.230$	2.49	$4.976 \pm 2.366$	$-2.449 \pm 1.550$
PRF-fit source offset from KIC position	$5.680 \pm 2.276$	2.50	$5.149 \pm 2.408$	$-2.397 \pm 1.522$
photometric centroid source offset	$7.21 \pm 3.39$	2.13	$-6.51 \pm 3.36$	$3.11 \pm 3.50$

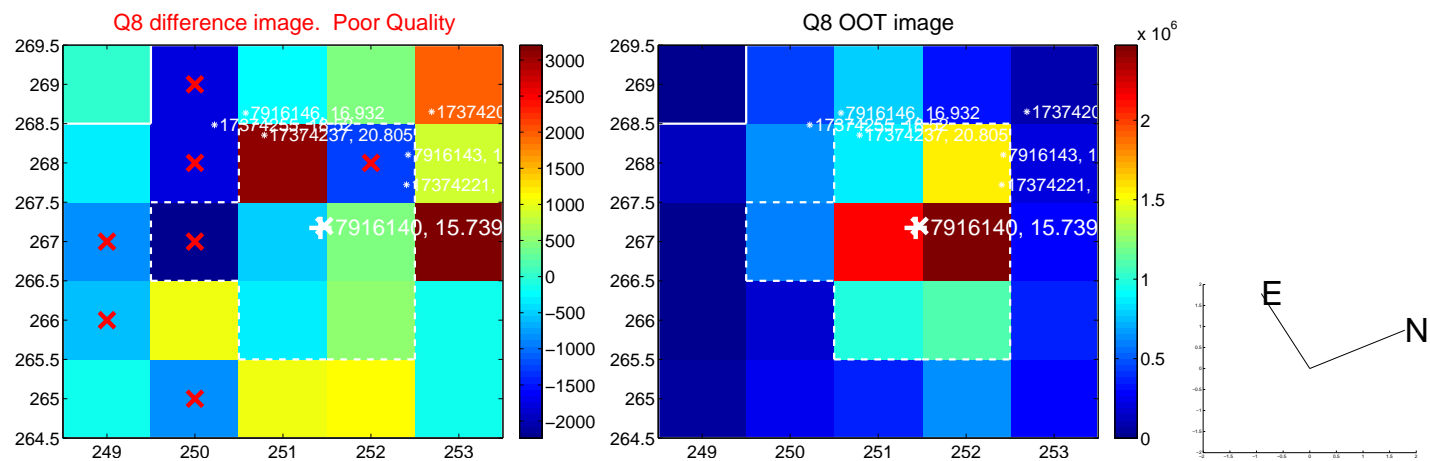
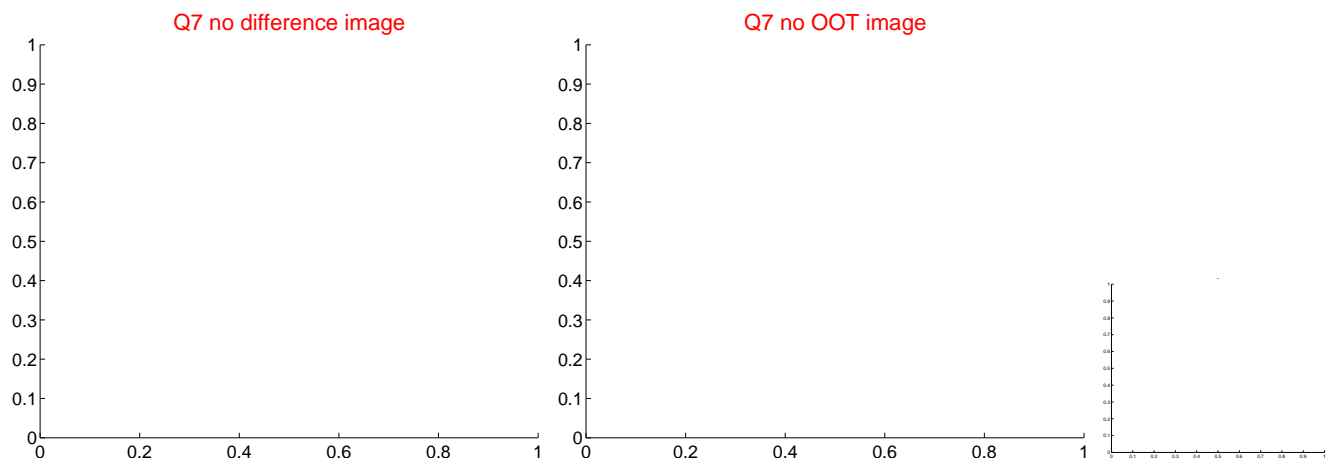
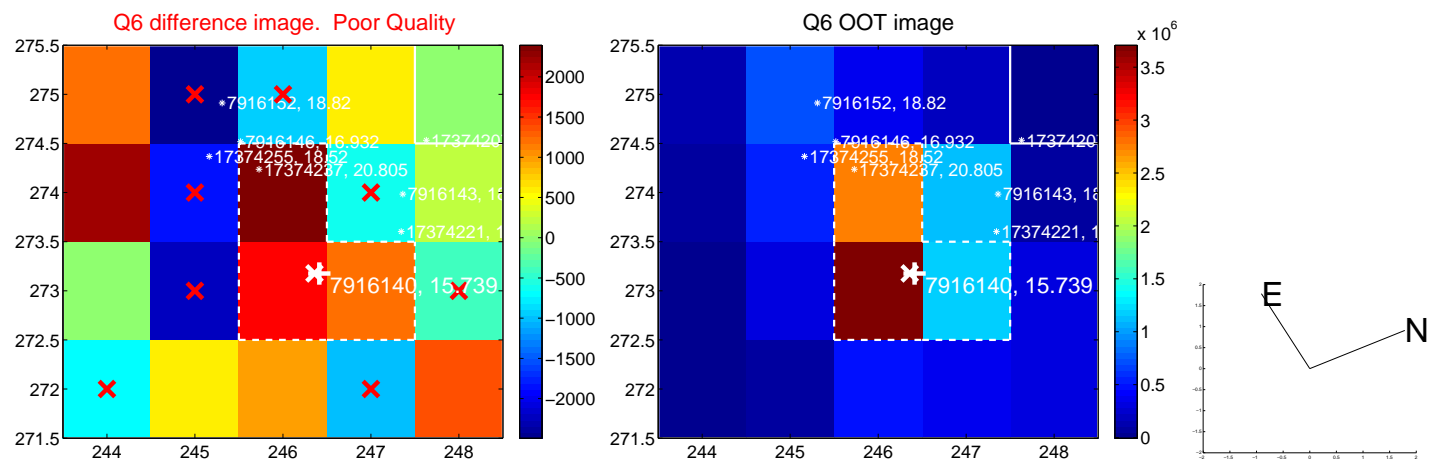
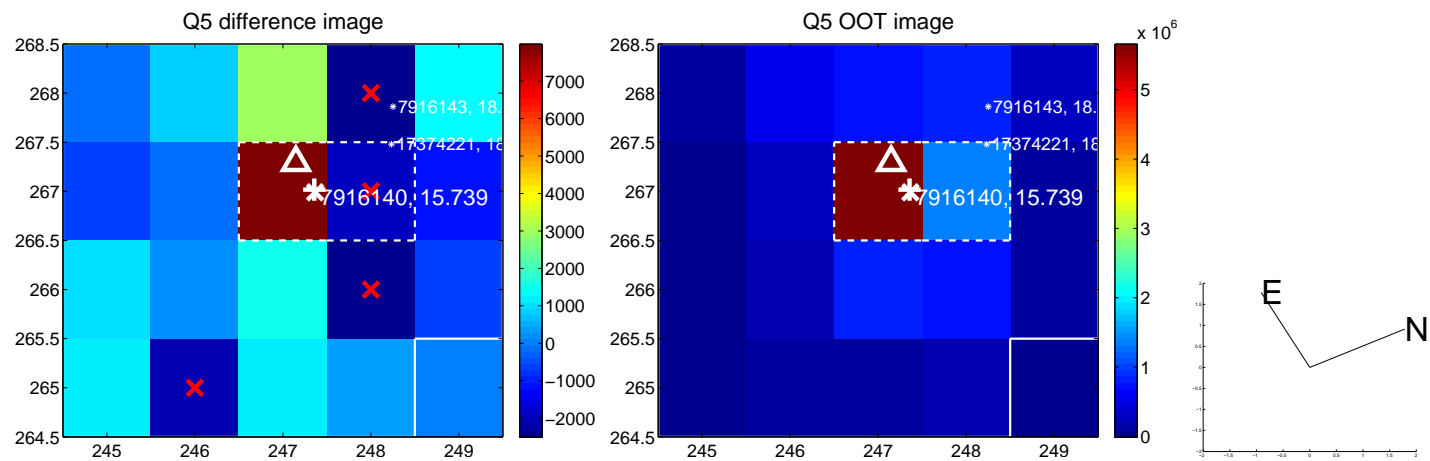


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

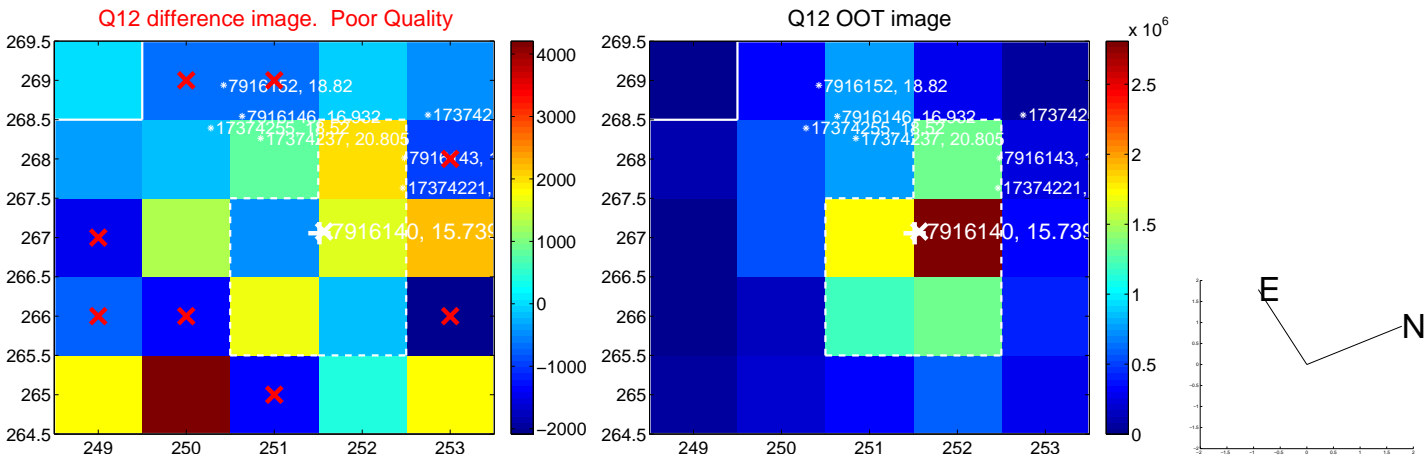
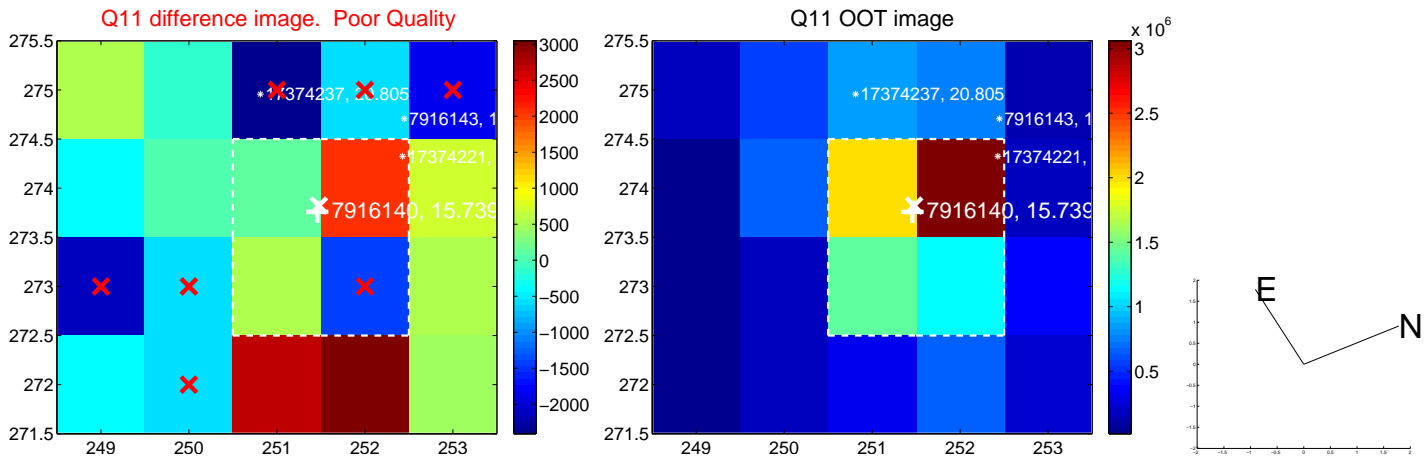
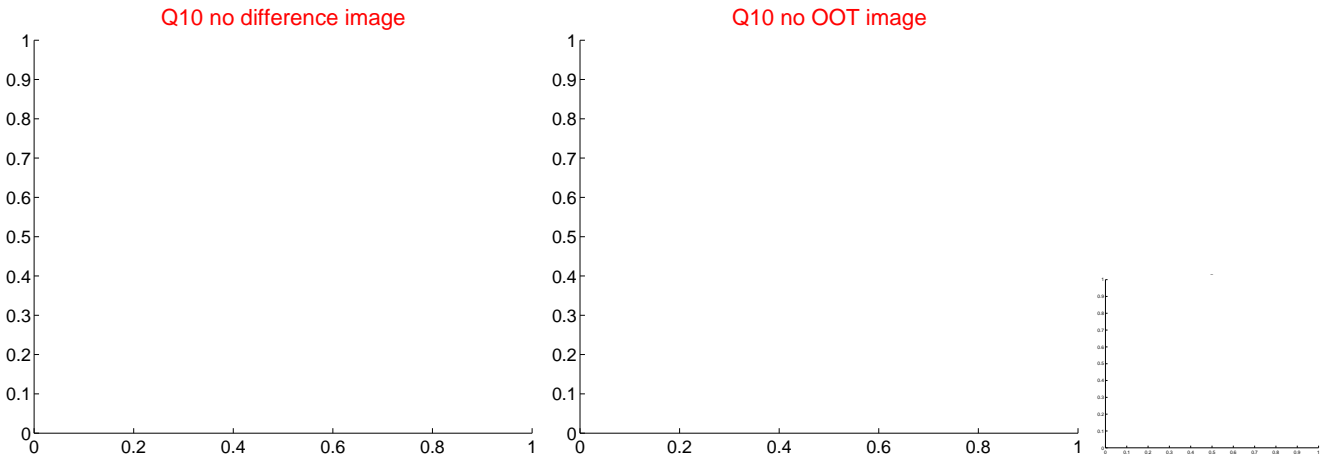
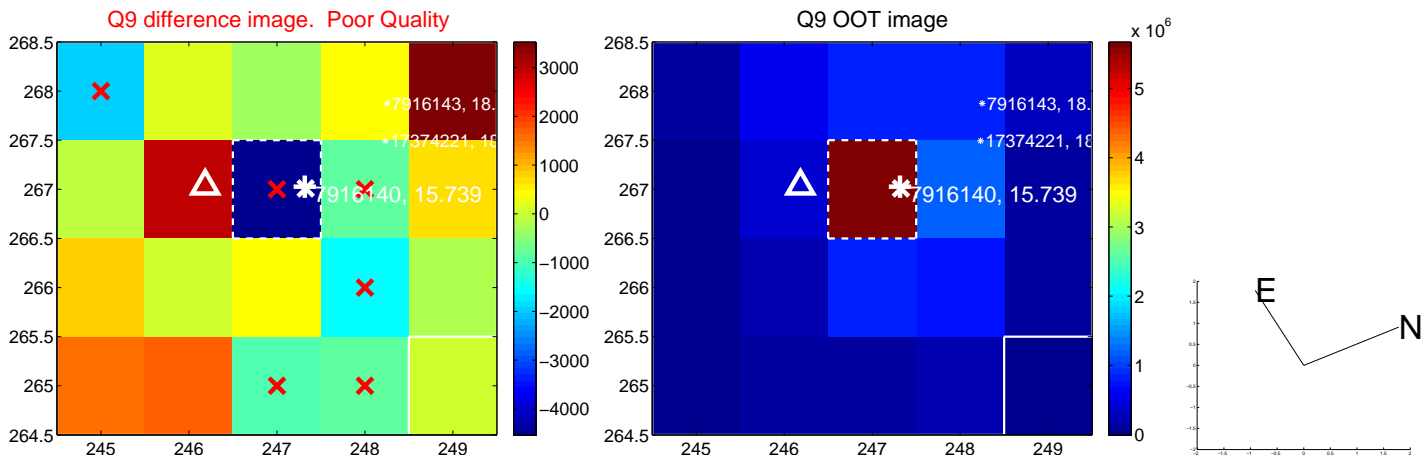


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





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.

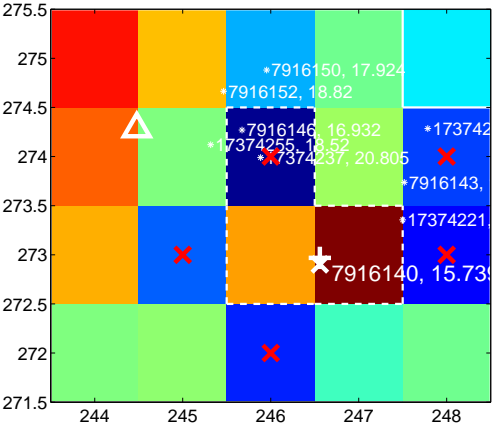
Q13 no difference image



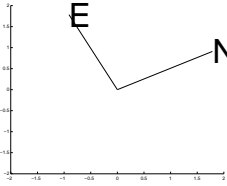
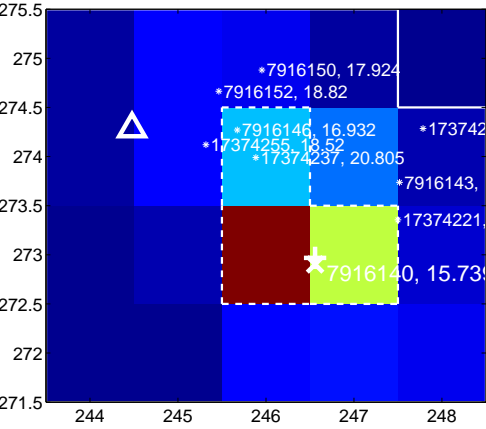
Q13 no OOT image



Q14 difference image. Poor Quality



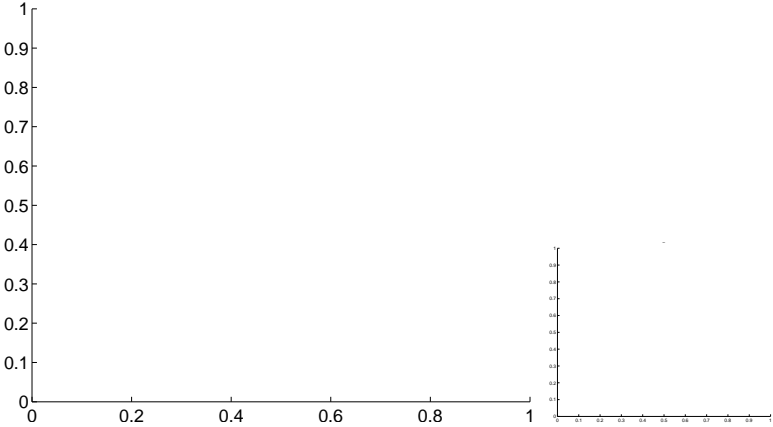
Q14 OOT image



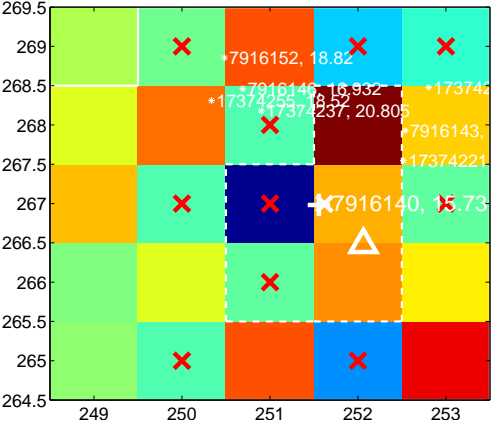
Q15 no difference image



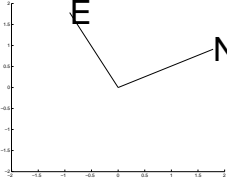
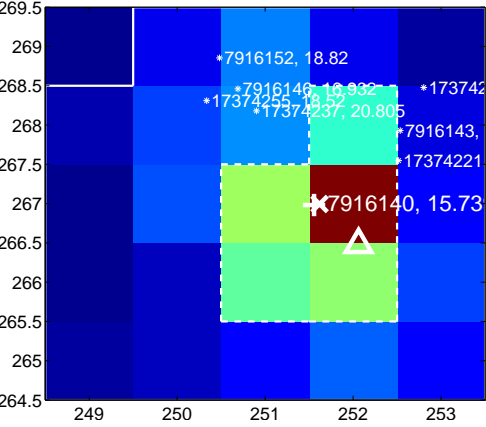
Q15 no OOT image



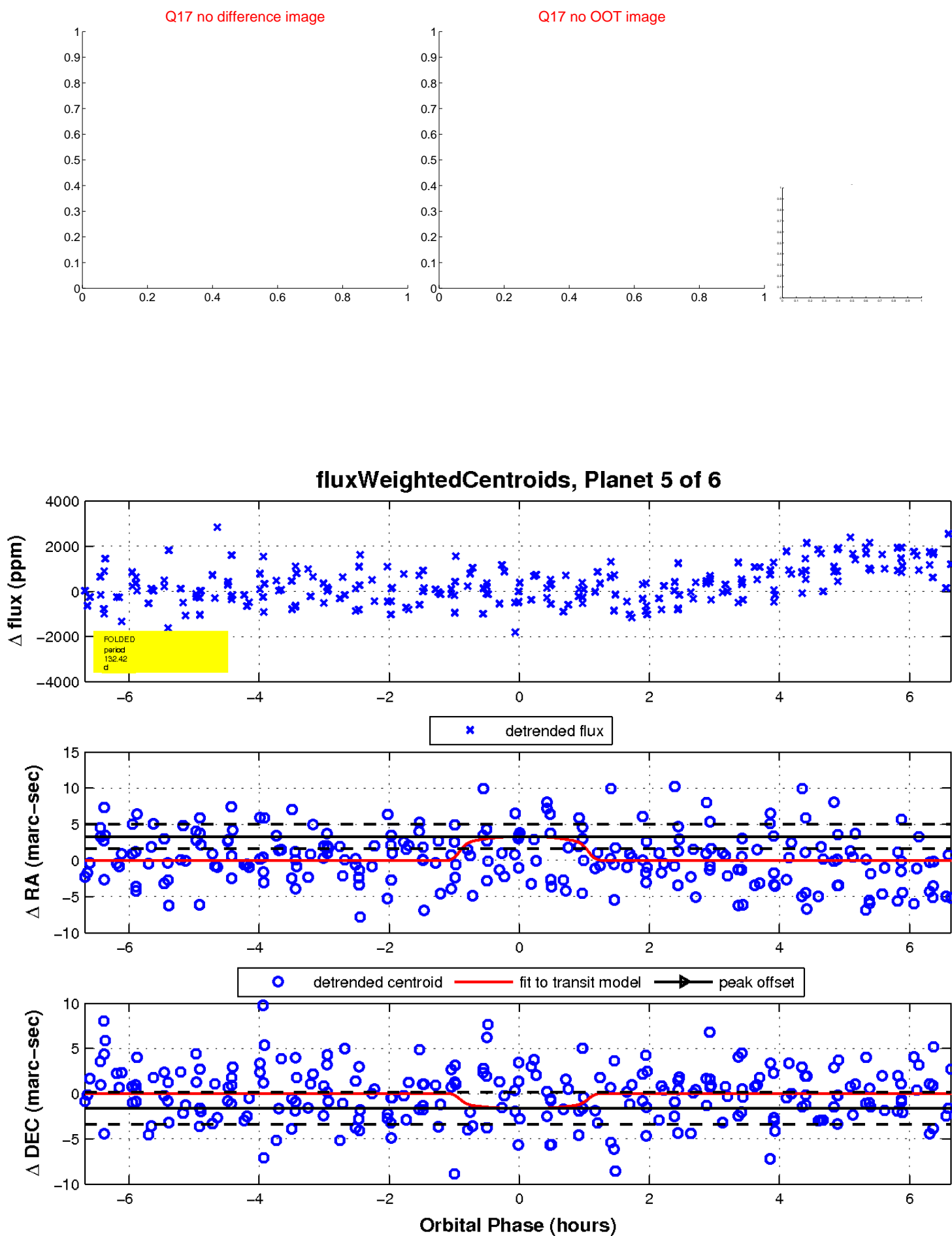
Q16 difference image. Poor Quality



Q16 OOT image

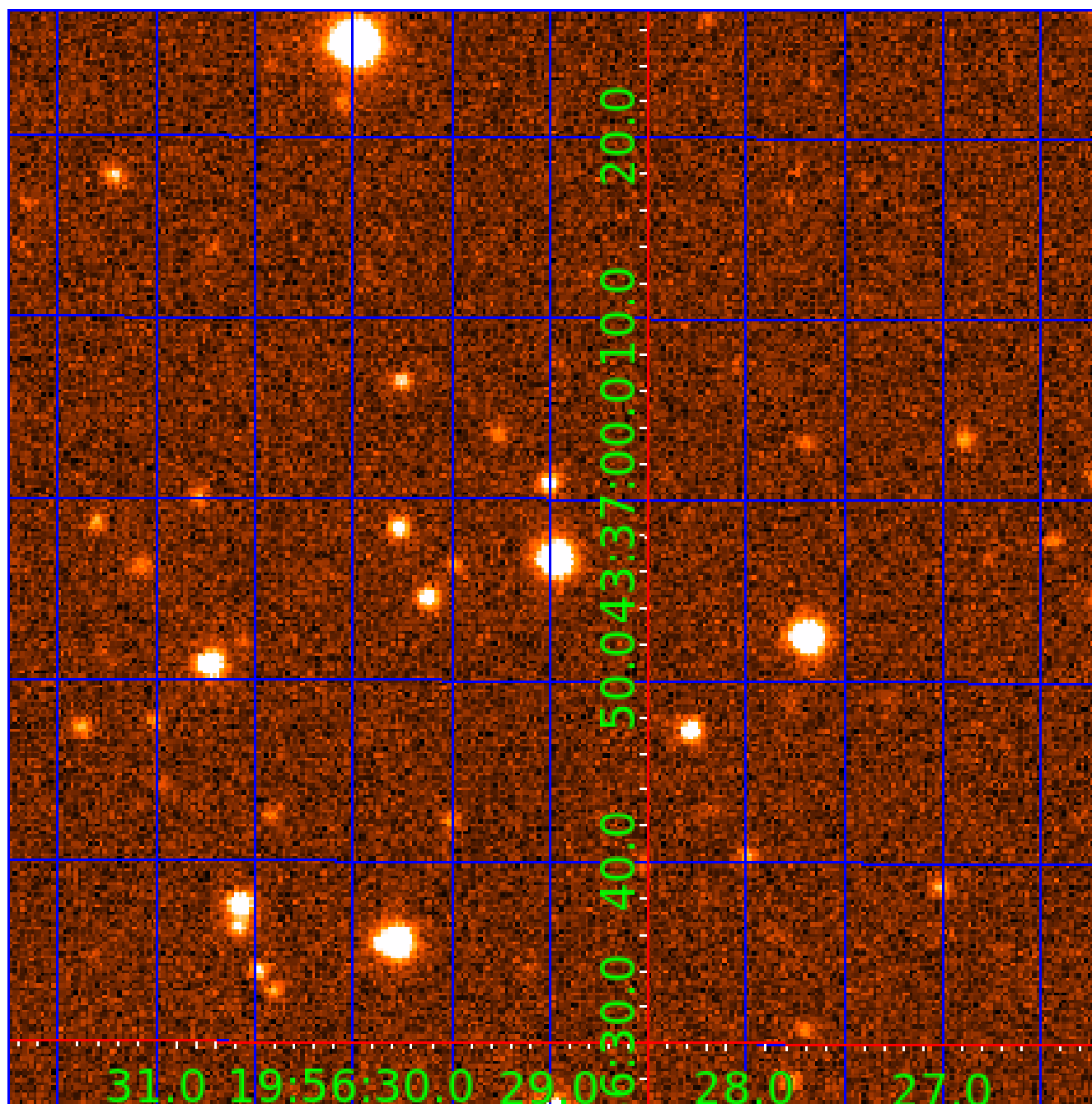


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 007916140

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007916140-01	OBS	No	1.532918	132.025157	116.4	6.755	7.9	9.4	0.76	4944	0.83	560.14
007916140-02	OBS	No	119.828930	216.226989	1032.9	16.409	11.9	5.1	0.76	4944	2.44	1.68
007916140-03	OBS	No	173.880601	257.501795	1171.8	13.209	7.3	4.9	0.76	4944	2.73	1.02
007916140-04	OBS	No	132.440521	223.824721	479.3	2.565	7.8	2.2	0.76	4944	1.66	1.47
007916140-05	OBS	No	132.423177	222.756419	487.8	2.231	8.0	1.9	0.76	4944	2.01	1.47
007916140-06	OBS	No	132.427963	223.136063	1547.1	12.867	12.2	7.9	0.76	4944	2.91	1.47

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007916140-01	OBS	FP	0.00	1	0	0	0	LPP_DV
007916140-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—INCONSISTENT_TRANS
007916140-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
007916140-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
007916140-05	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_SKYE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—SAME_NTL_PERIOD—CENT_FEW_DIFFS—HALO_GHOST
007916140-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—SAME_NTL_PERIOD—CENT_FEW_MEAS

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

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

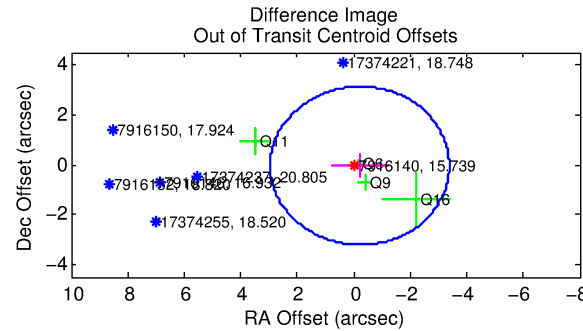
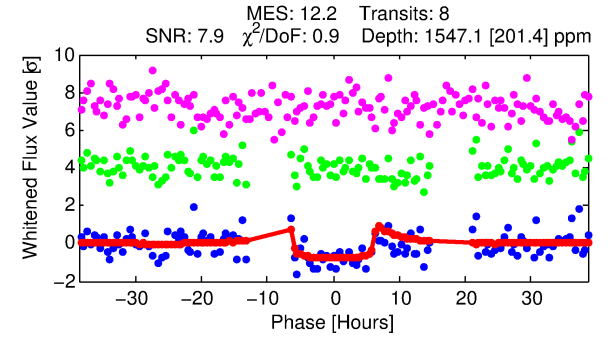
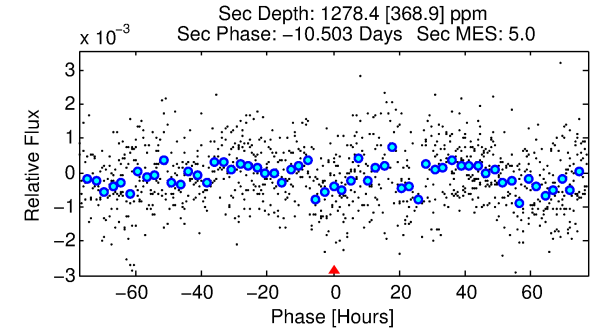
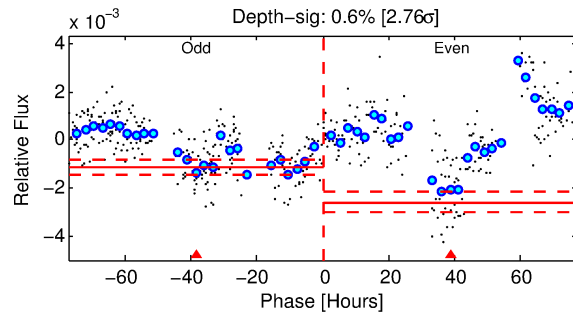
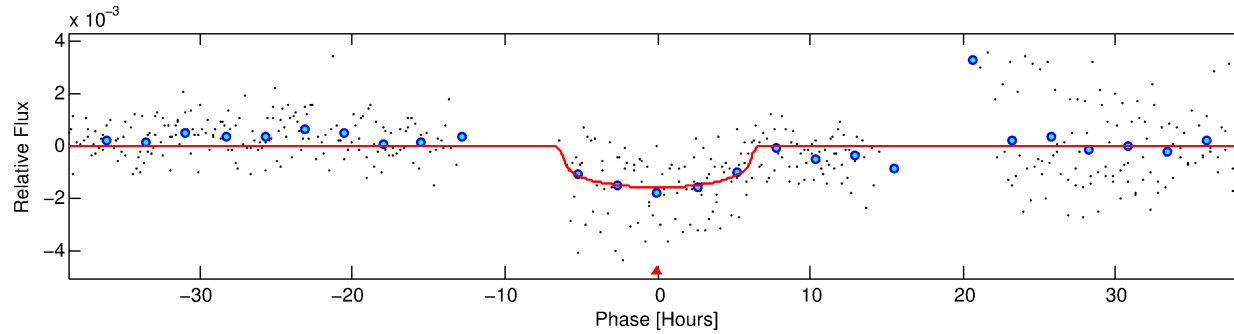
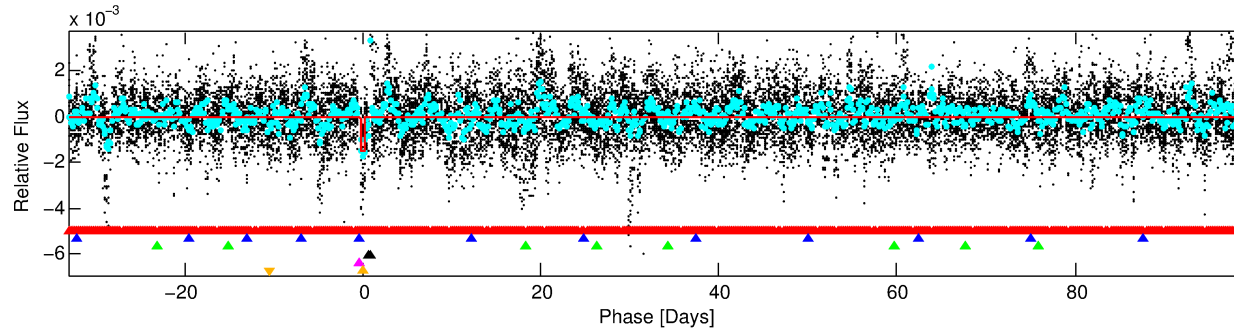
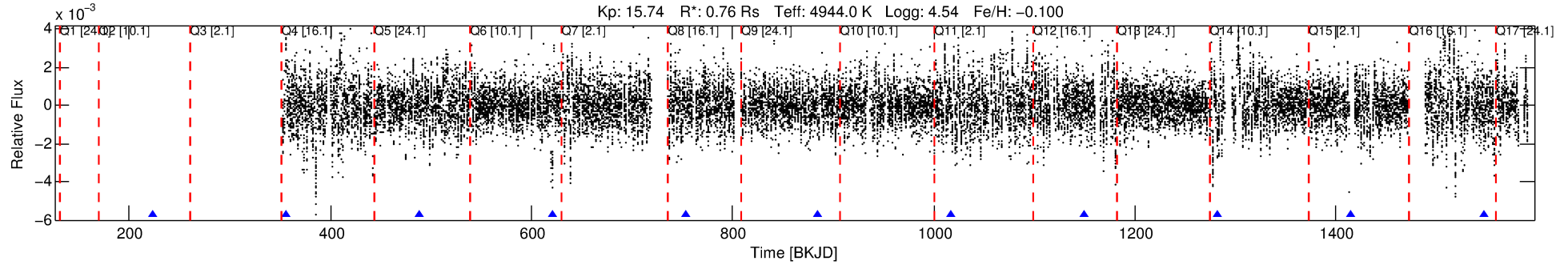
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 007916140-06

No Significant Match Found

# DV One-Page Summary

KIC: 7916140 Candidate: 6 of 6 Period: 132.428 d



## DV Fit Results:

Period = 132.42796 [0.00324] d  
Epoch = 223.1361 [0.0216] BKJD  
Rp/R\* = 0.0352 [0.0194]  
a/R\* = 78.43 [143.92]  
b = 0.28 [6.17]  
Seff = 1.47 [0.28]  
Teq = 281 [14] K  
Rp = 2.91 [1.64] Re  
a = 0.4579 [0.0407] AU  
Ag = 17366.34 [19937.63] [0.87 $\sigma$ ]  
Teffp = 4981 [1431] K [3.28 $\sigma$ ]

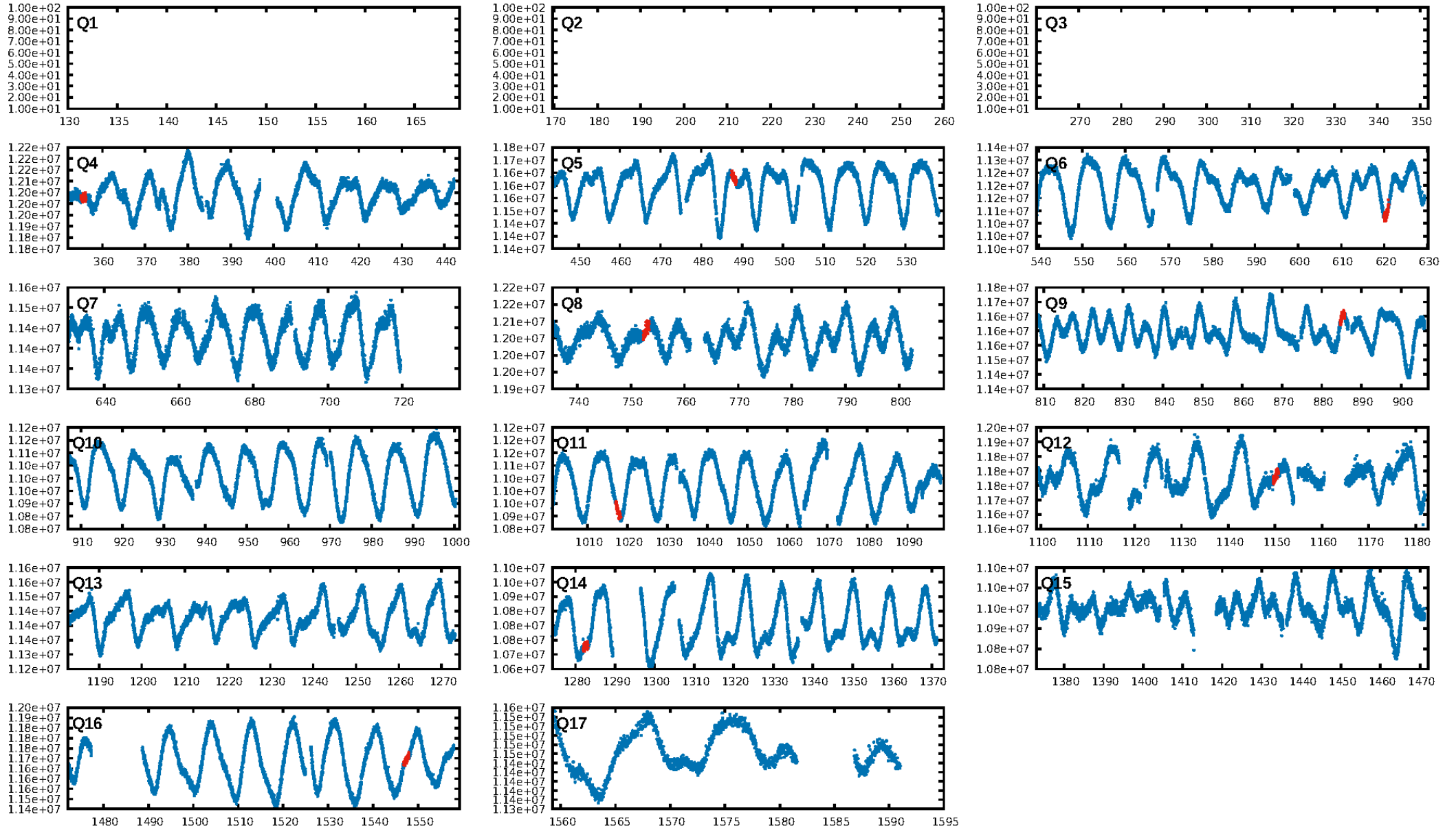
## DV Diagnostic Results:

ShortPeriod-sig: 0.7% [0.01 $\sigma$ ]  
LongPeriod-sig: 1.8% [0.02 $\sigma$ ]  
ModelChiSquare2-sig: 1.8%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 2.14e-23  
RollingBand-fgt: 1.00 [8/8]  
GhostDiagnostic-chr: 0.2602  
Centroid-sig: 15.5%  
Centroid-so: 0.719 arcsec [1.41 $\sigma$ ]  
OotOffset-rm: 0.218 arcsec [0.21 $\sigma$ ]  
OotOffset-st: 1/1/1/1 [4]  
KicOffset-rm: 0.309 arcsec [0.29 $\sigma$ ]  
KicOffset-st: 1/1/1/1 [4]  
DiffImageQuality-fgm: 0.25 [1/4]  
DiffImageOverlap-fno: 0.00 [0/8]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 05:17:34 Z

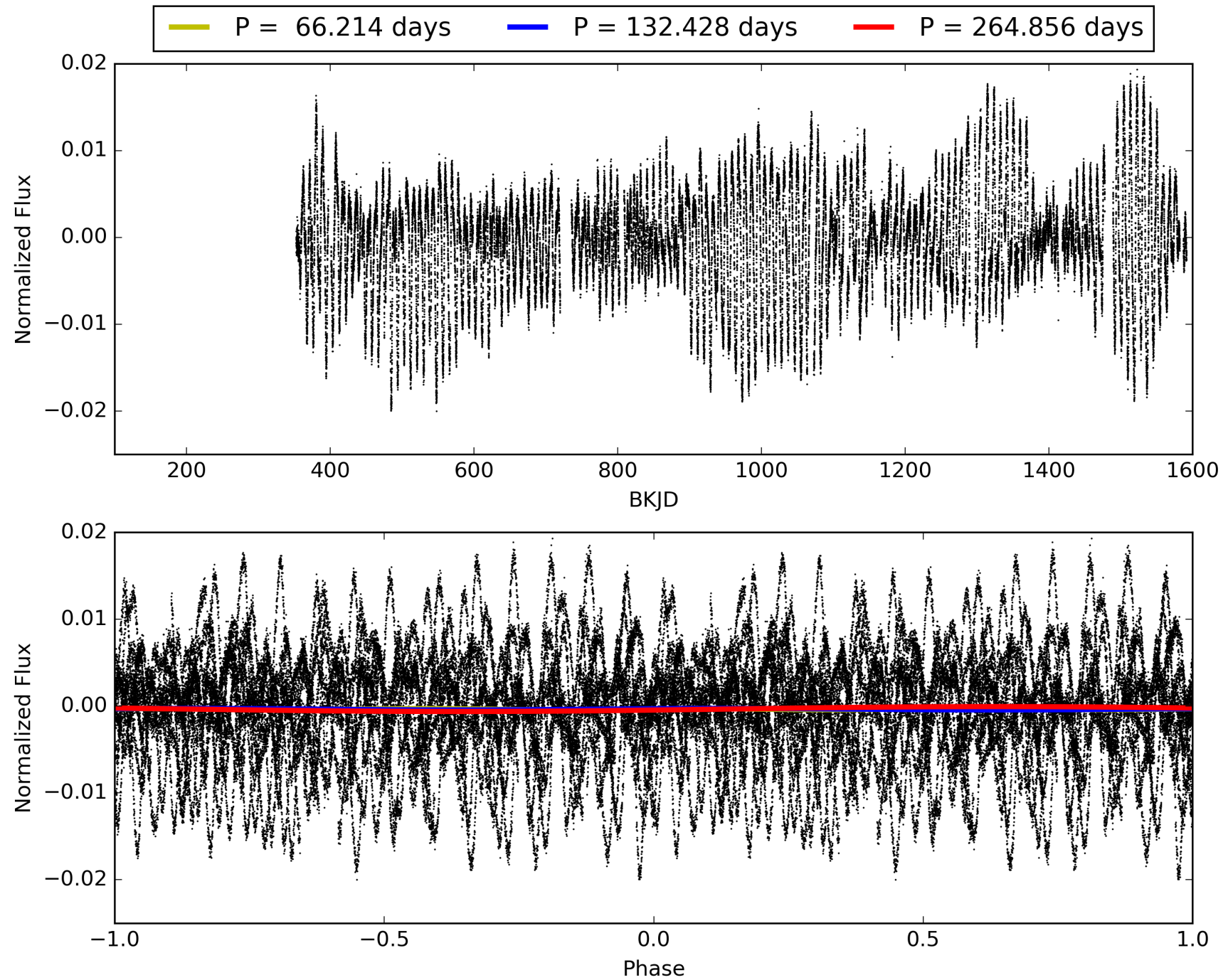
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 007916140-06, PDC Light Curves





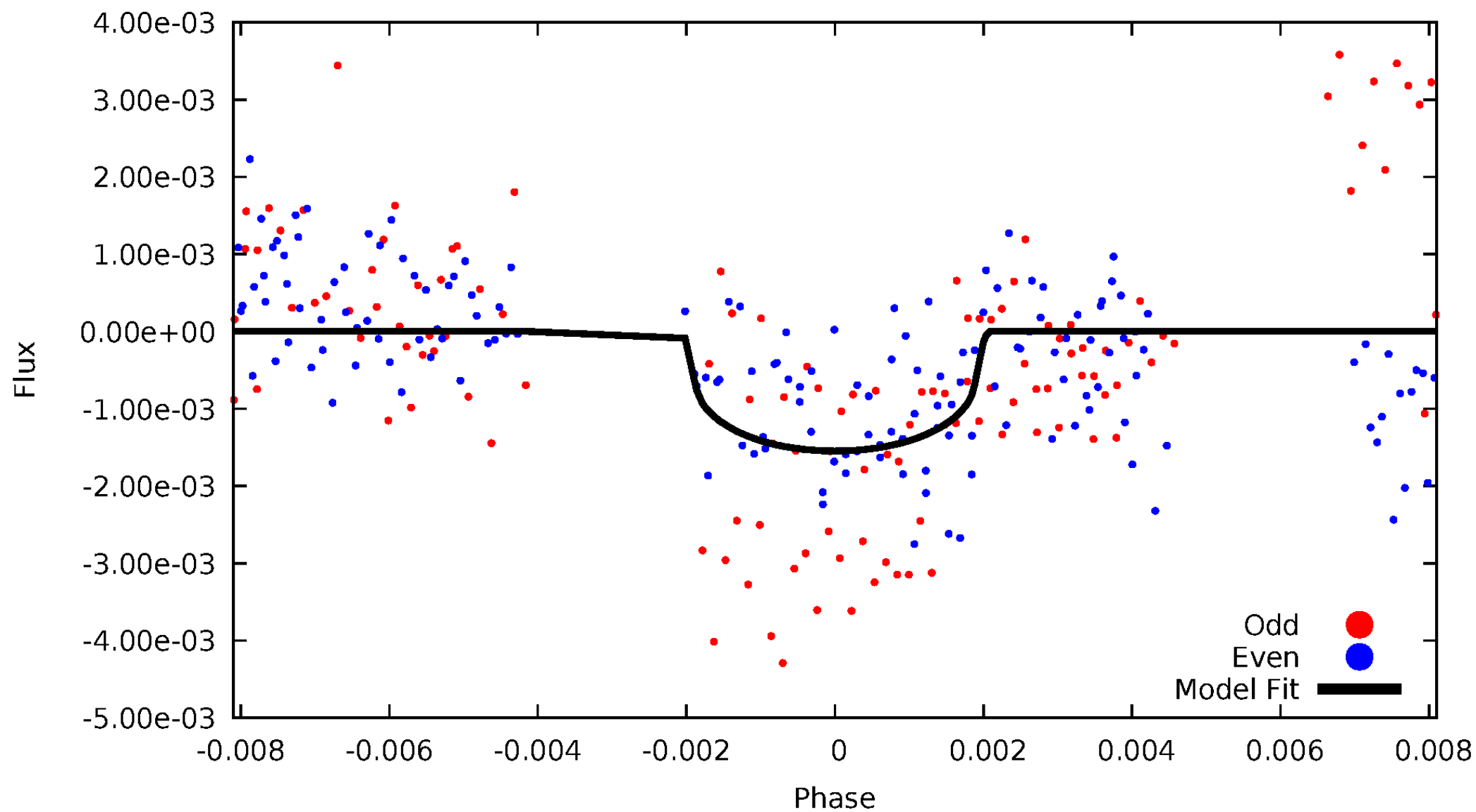
# TCE 007916140-06





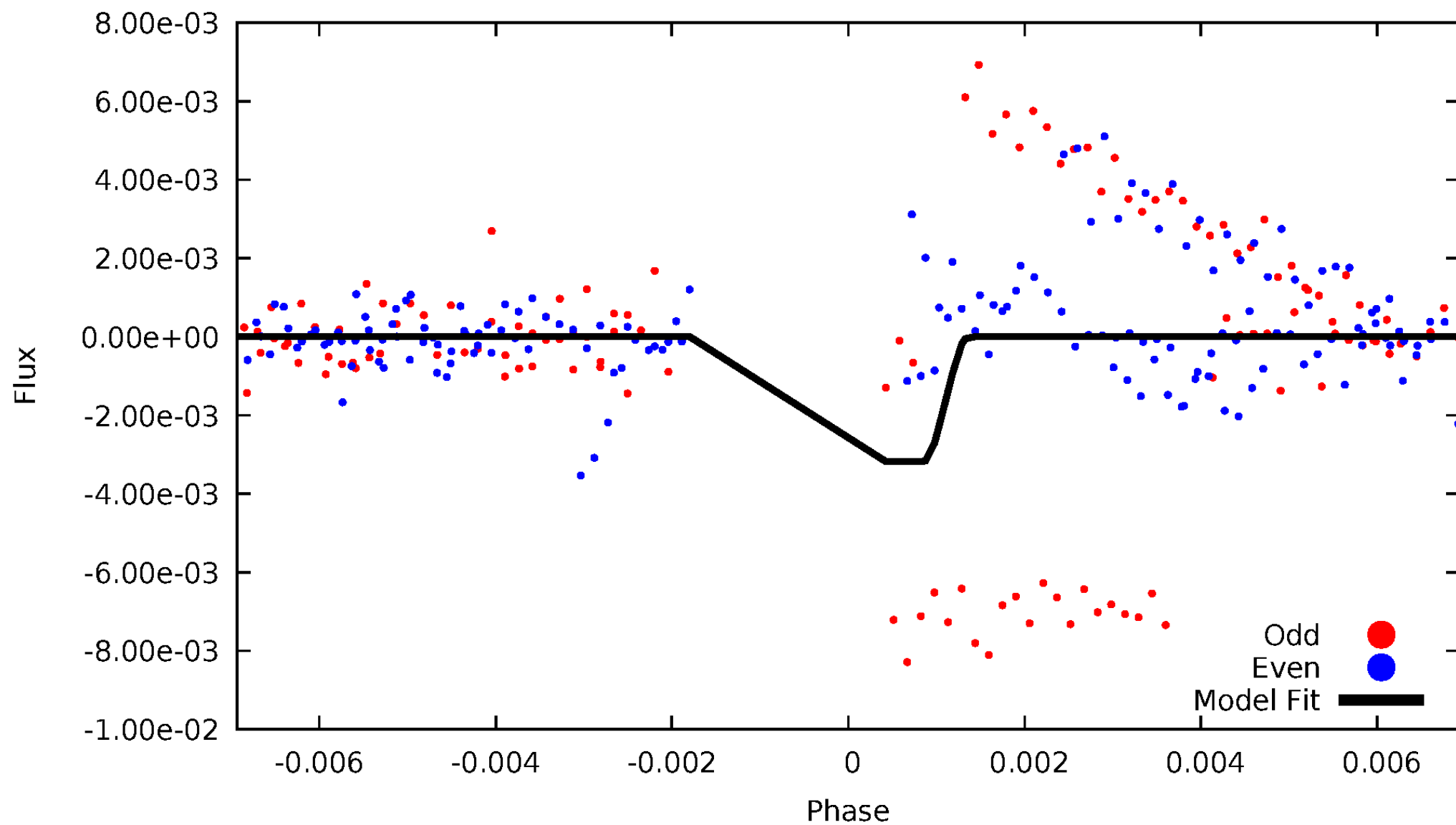
# DV Odd/Even

TCE 007916140-06



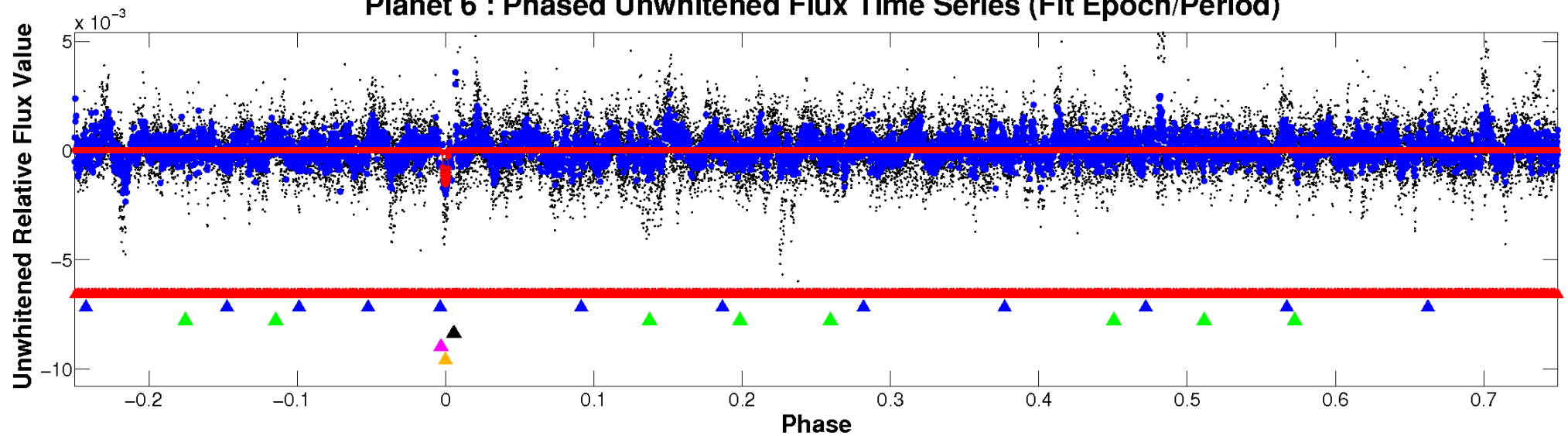
# ALT Odd/Even

TCE 007916140-06

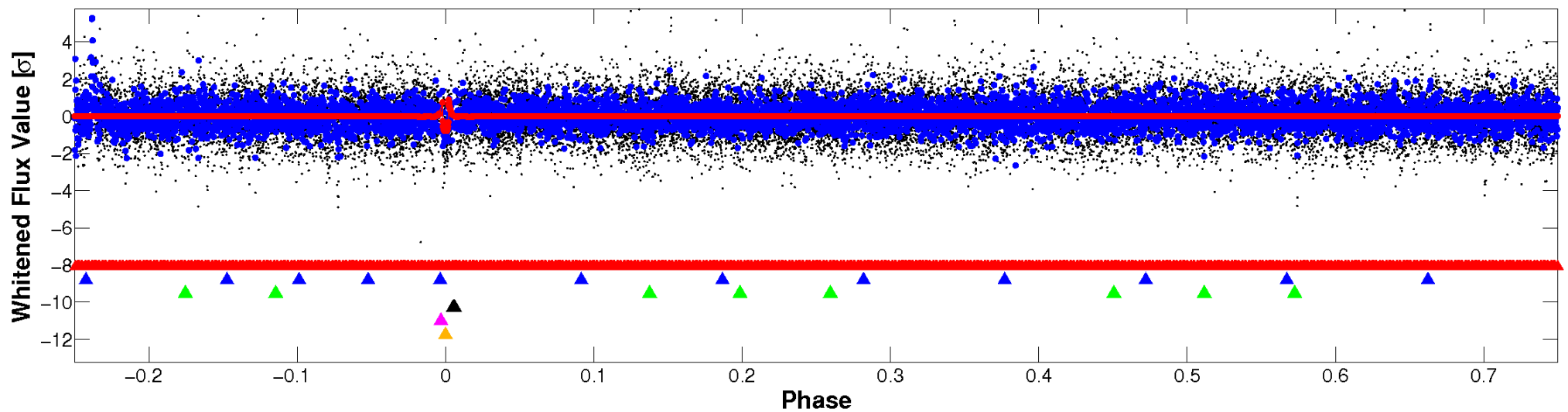


# Non-Whitened Vs. Whitened Light Curve

Planet 6 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

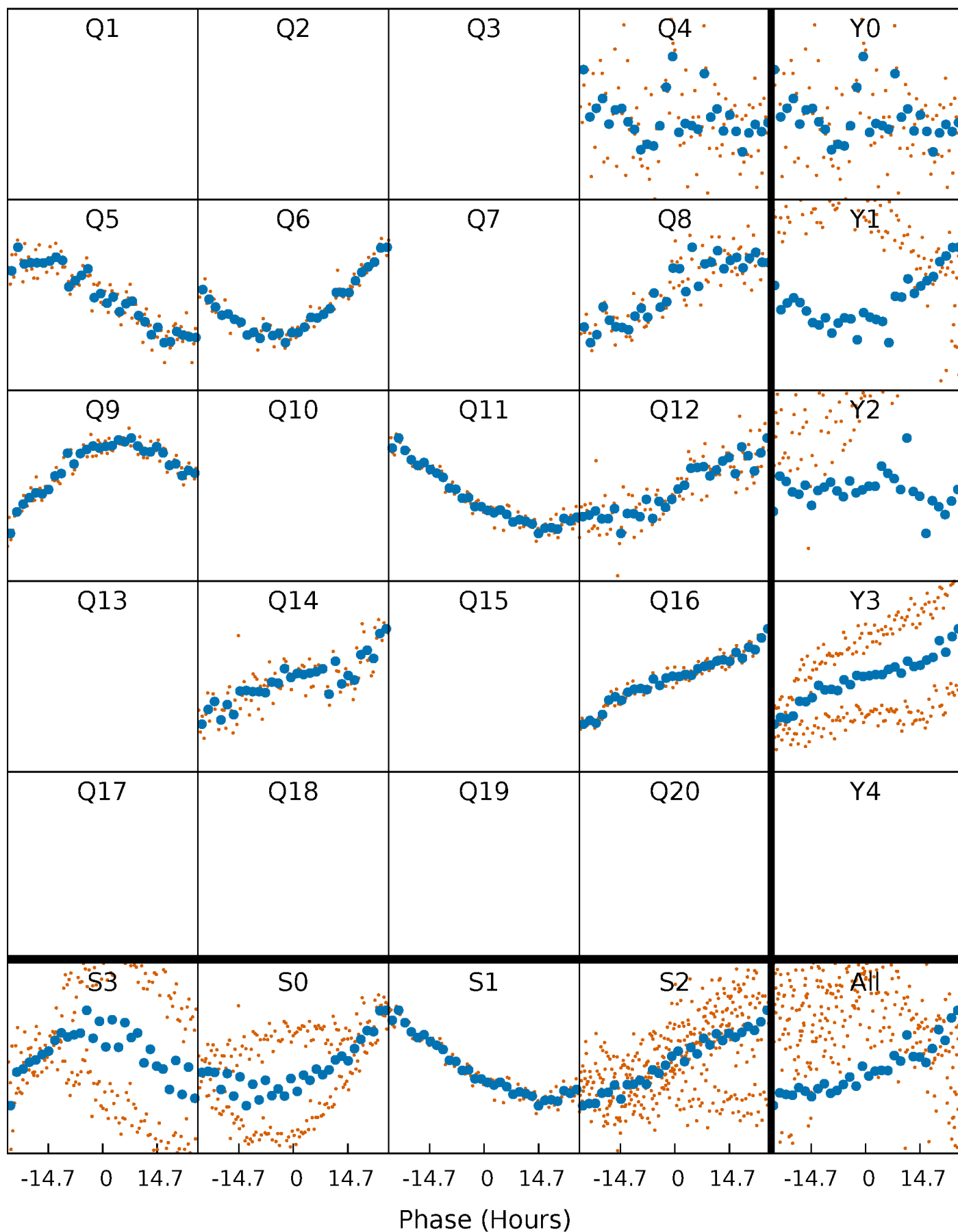


Planet 6 : Phased Whitened Flux Time Series (Fit Epoch/Period)



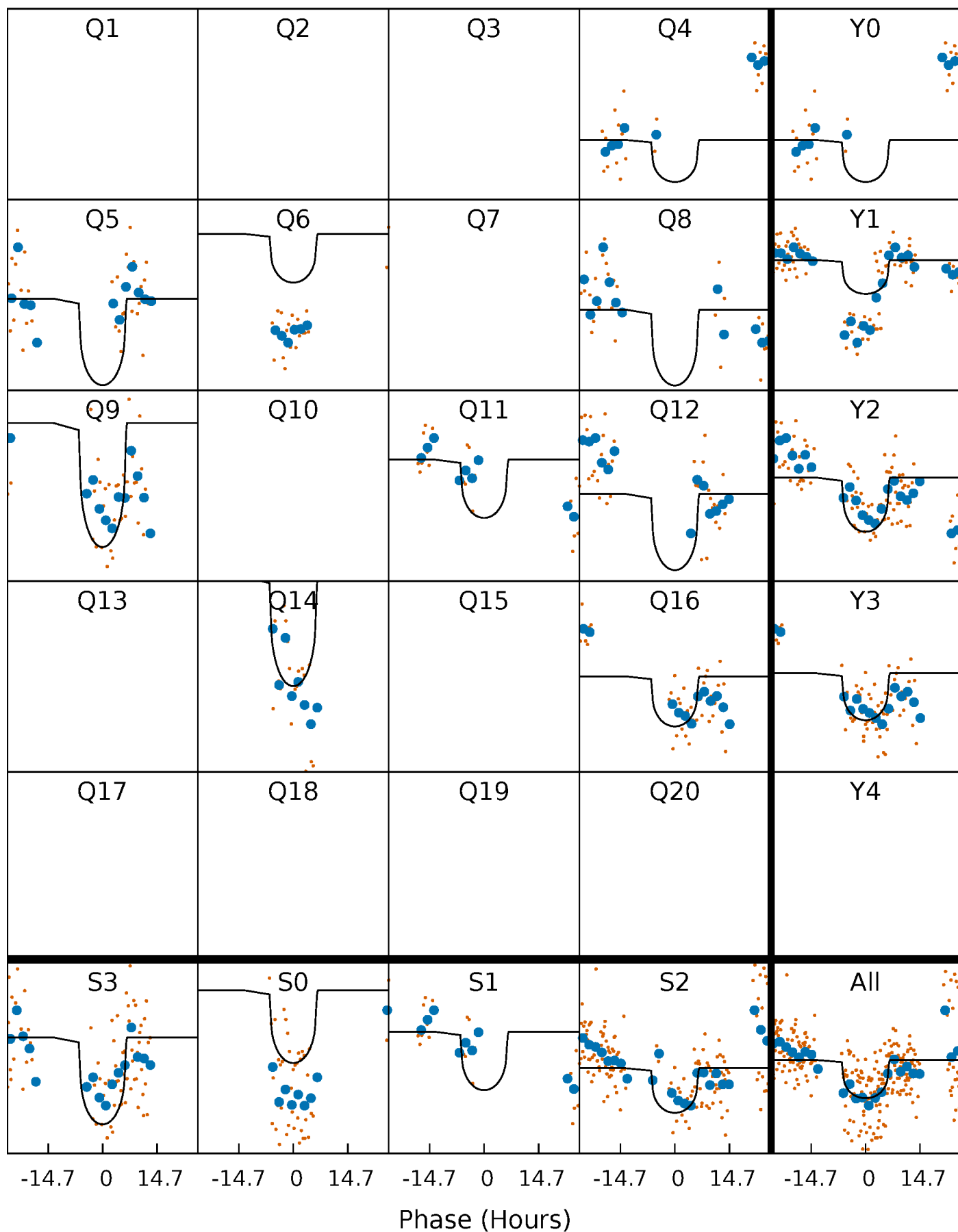
# PDC Quarter-Phased Transit Curves

TCE 007916140-06 P=132.427963 Days  $T_0=223.136063$  (BKJD)



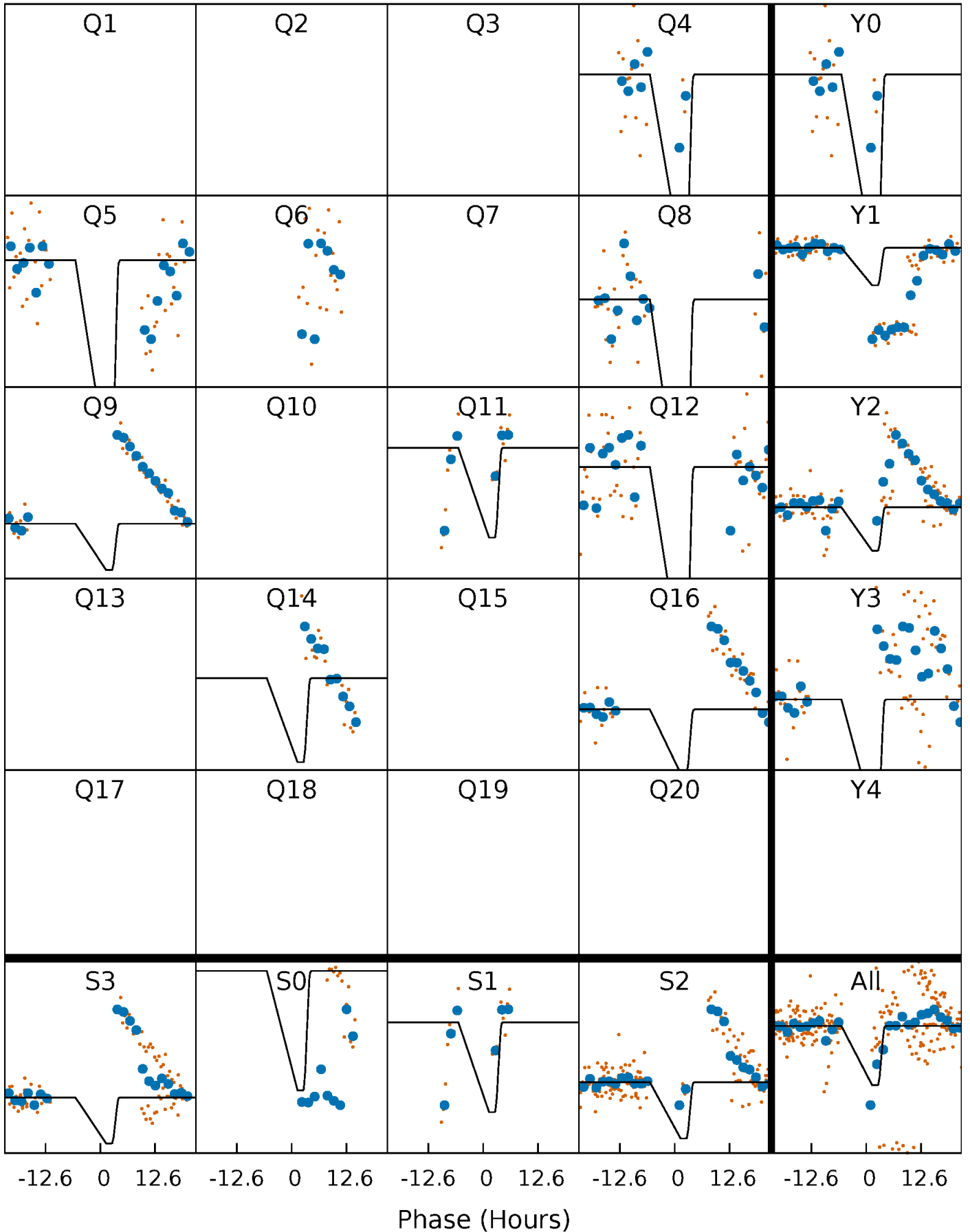
# DV Quarter-Phased Transit Curves

TCE 007916140-06 P=132.427963 Days  $T_0=223.136063$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

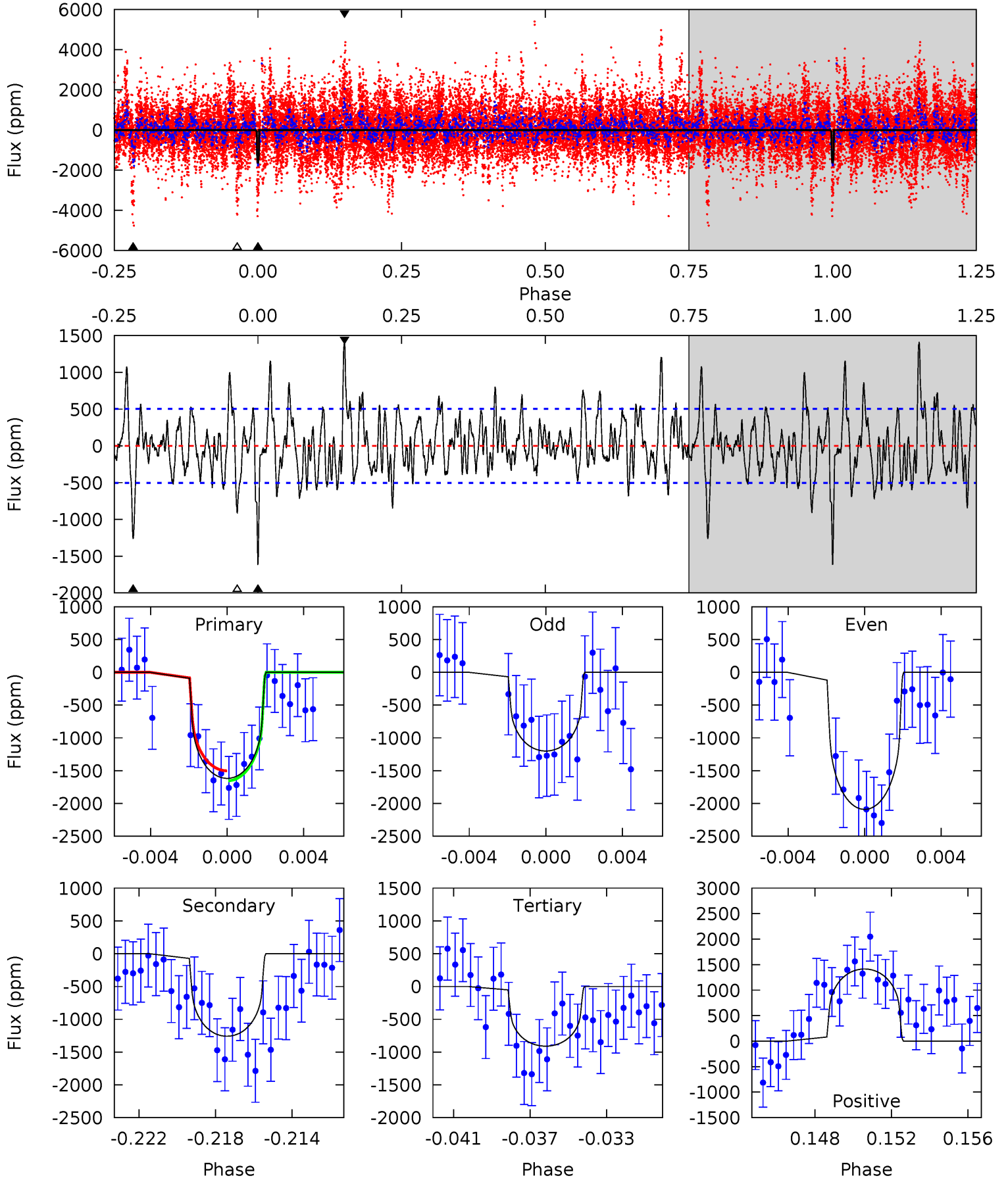
TCE 007916140-06 P=132.416280 Days  $T_0=222.866978$  (BKJD)



# DV Model-Shift Uniqueness Test

007916140-06, P = 132.427963 Days, E = 223.136063 Days

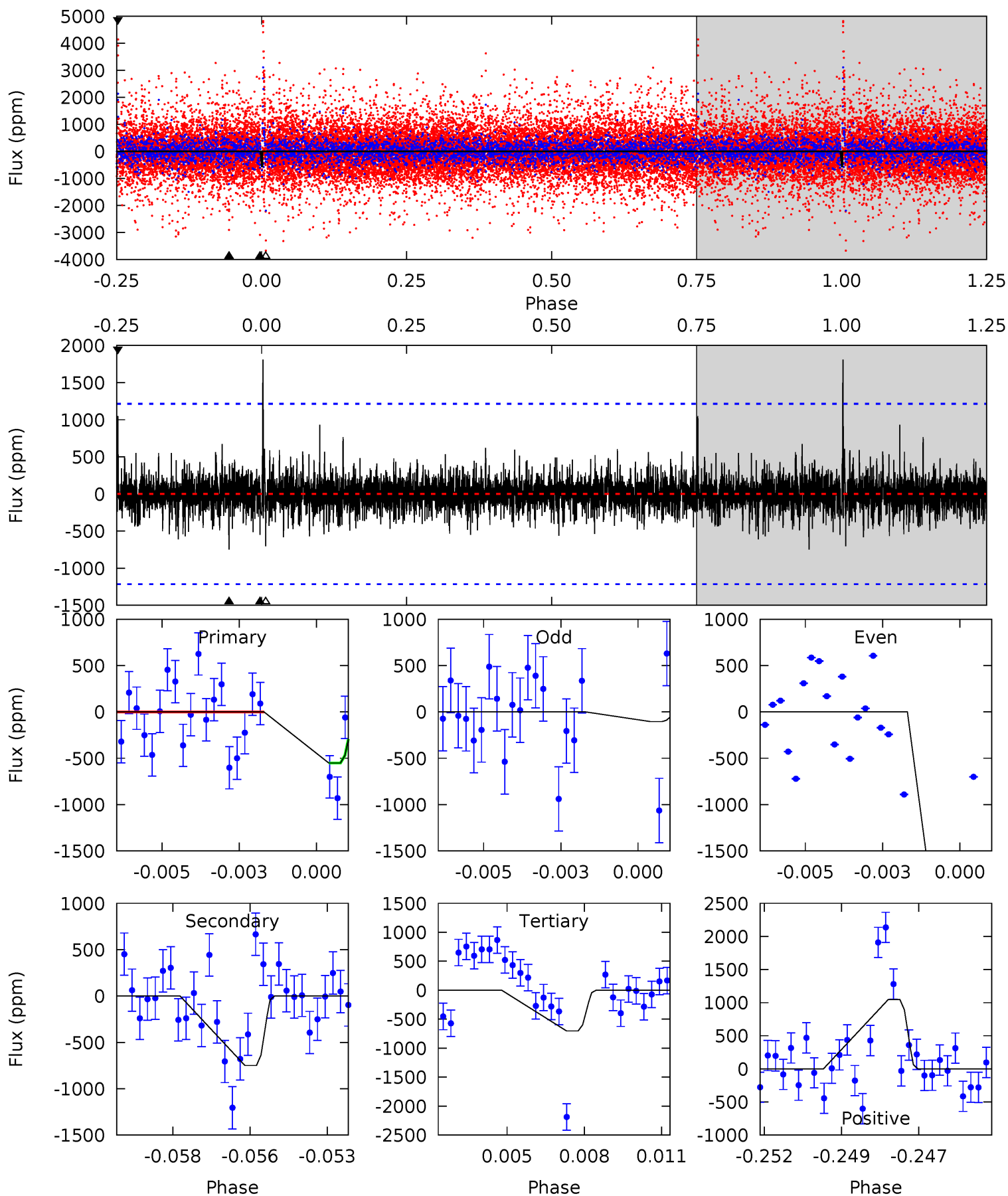
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
16.7	13.0	9.37	14.6	5.19	2.87	3.57	7.29	2.10	3.59	-1.60	4.52	1.24	0.47	0.78



# Alt Model-Shift Uniqueness Test

007916140-06, P = 132.416280 Days, E = 222.866978 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
2.40	3.25	3.05	4.55	5.28	3.01	0.70	-0.65	-2.15	0.20	-1.29	12.7	2.30	0.71	0





### Stellar Parameters For KIC 007916140

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4944^{+176}_{-176}$	$4.542^{+0.072}_{-0.048}$	$-0.100^{+0.300}_{-0.300}$	$0.758^{+0.071}_{-0.079}$	$0.731^{+0.093}_{-0.057}$	$2.359^{+0.749}_{-0.396}$
	+4%/-4%	+2%/-1%	+300%/-300%	+9%/-10%	+13%/-8%	+32%/-17%
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 007916140-06 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-1259 \pm 97$	$2.90^{+1.53}_{-1.44}$	$391^{+17}_{-16}$	$4955^{+2015}_{-765}$	$17640^{+51809}_{-10060}$
Alt.	$-749 \pm 230$	$4.61^{+1.69}_{-1.58}$	$390^{+17}_{-17}$	$3773^{+639}_{-411}$	$4106^{+5675}_{-2149}$

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

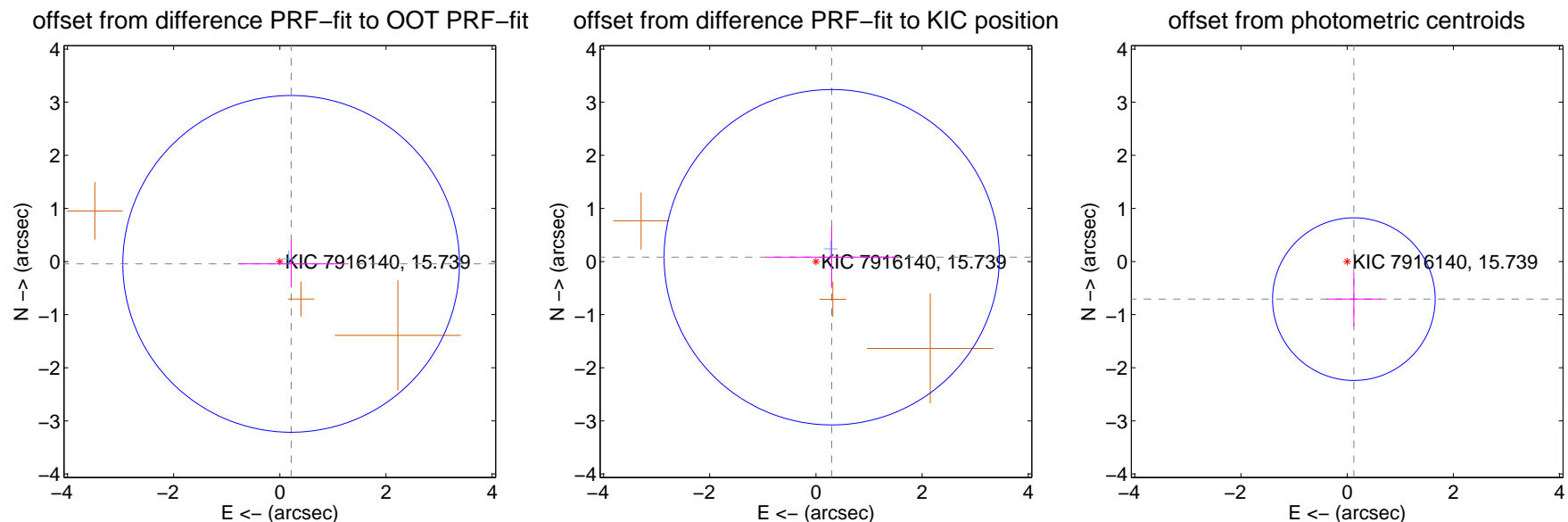
## DV Centroid Data

Supplemental centroid analysis for 007916140-06. Kepler magnitude: 15.74. Transit SNR 7.87

There are 1 quarters with good PRF difference image offsets

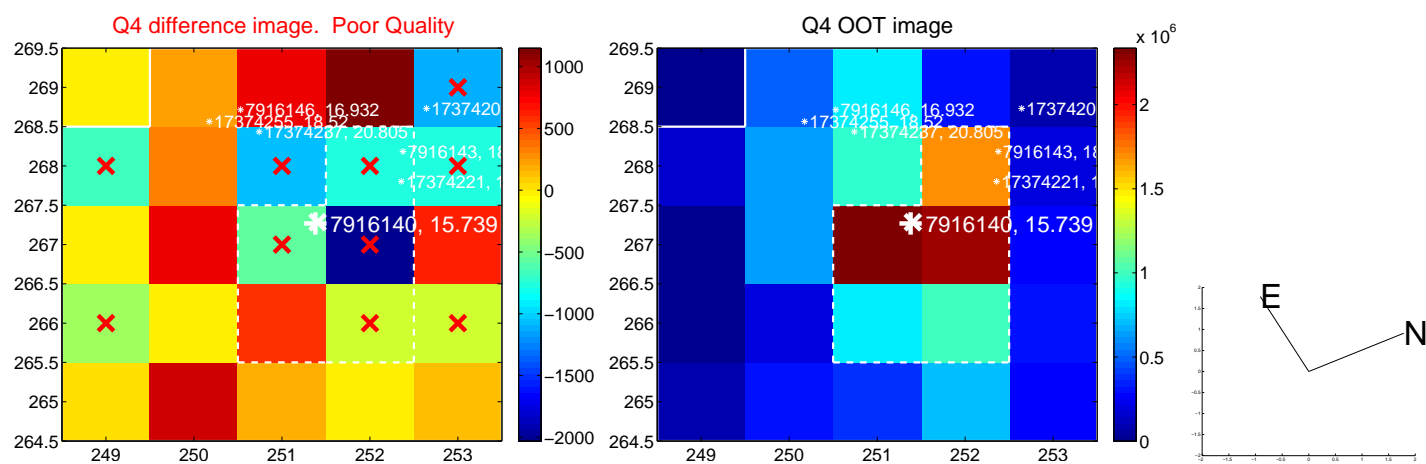
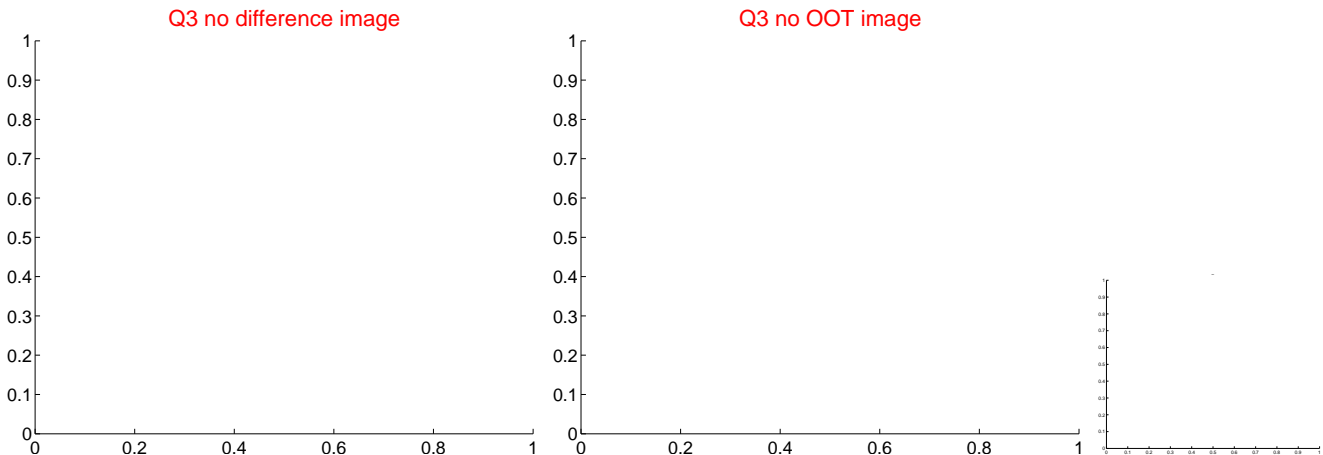
The direct PRF centroid is offset from the target star catalog position by about 0.26 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.218 \pm 1.057$	0.21	$-0.214 \pm 0.998$	$-0.044 \pm 0.439$
PRF-fit source offset from KIC position	$0.309 \pm 1.053$	0.29	$-0.298 \pm 1.240$	$0.081 \pm 0.577$
photometric centroid source offset	$0.72 \pm 0.51$	1.41	$-0.13 \pm 0.52$	$-0.71 \pm 0.51$

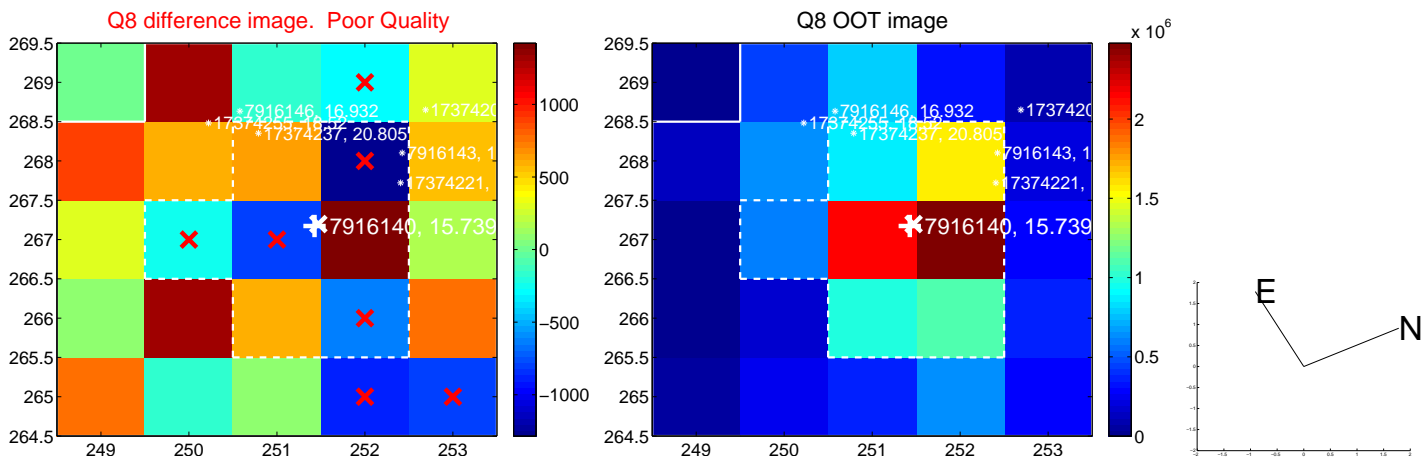
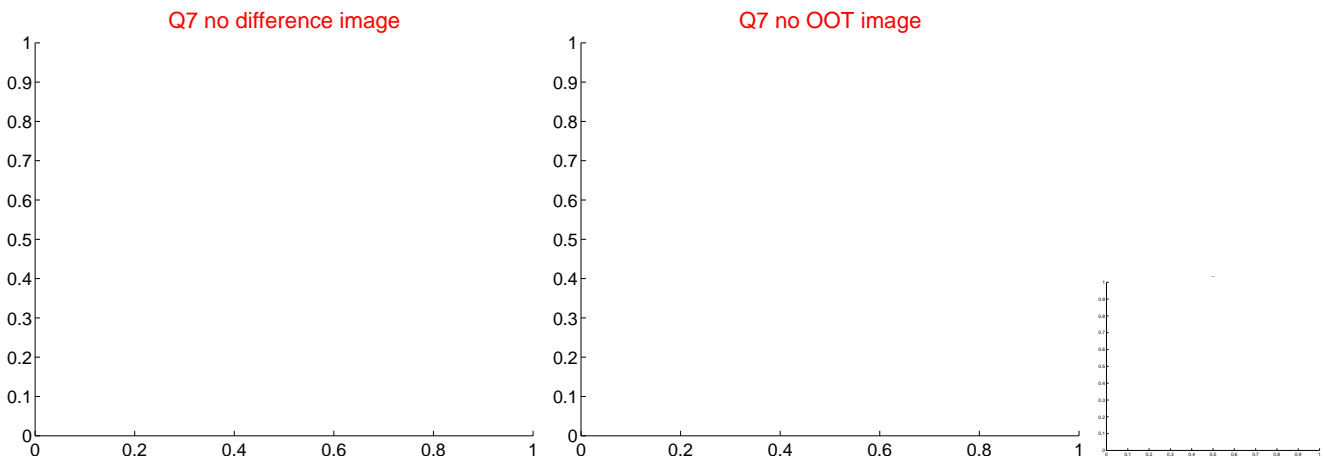
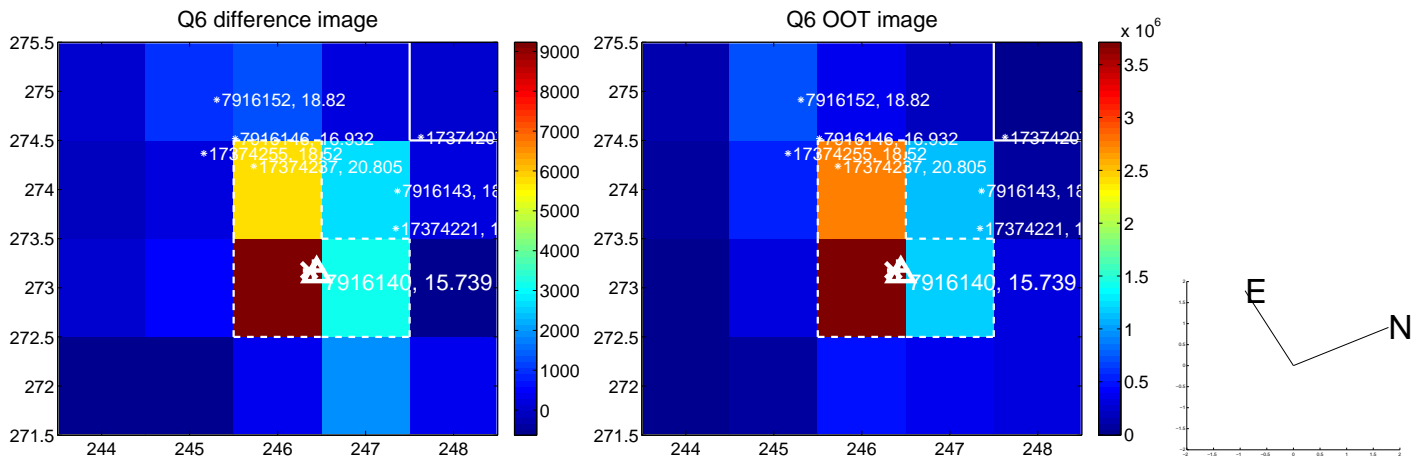
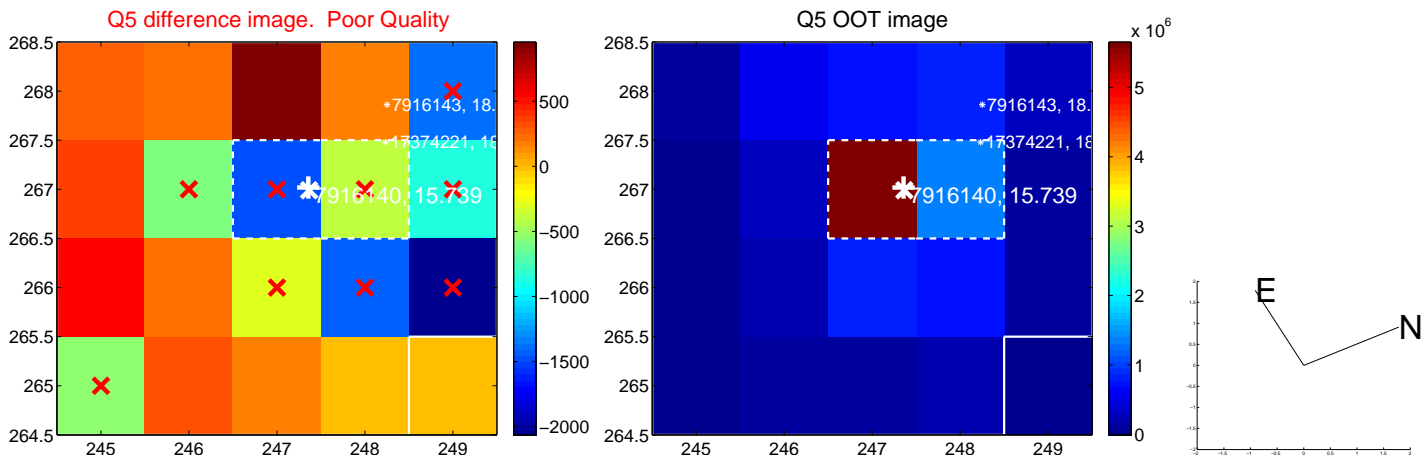


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

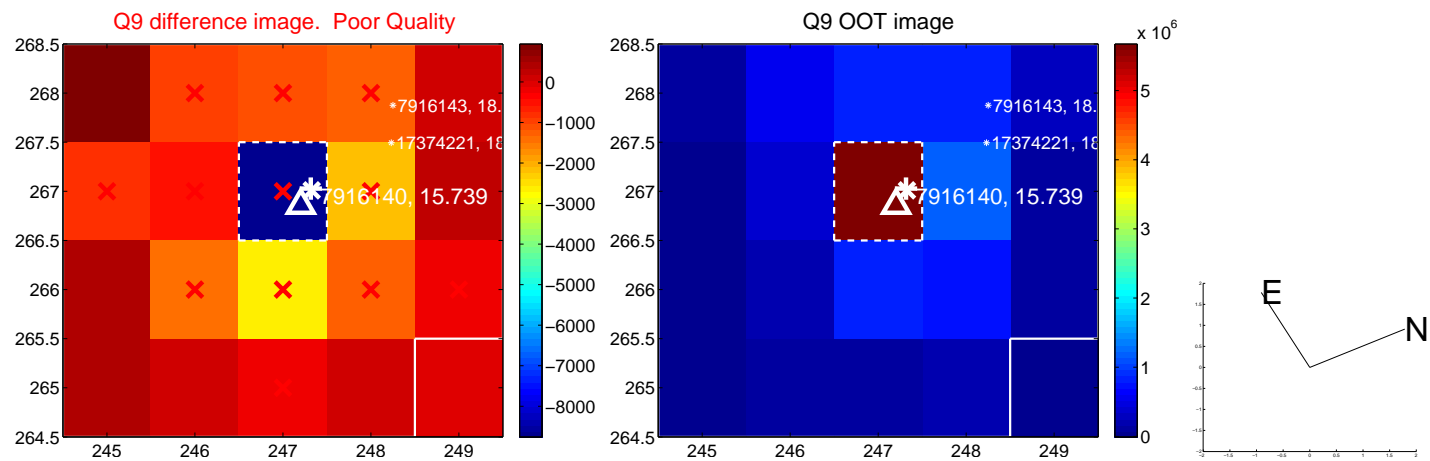
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



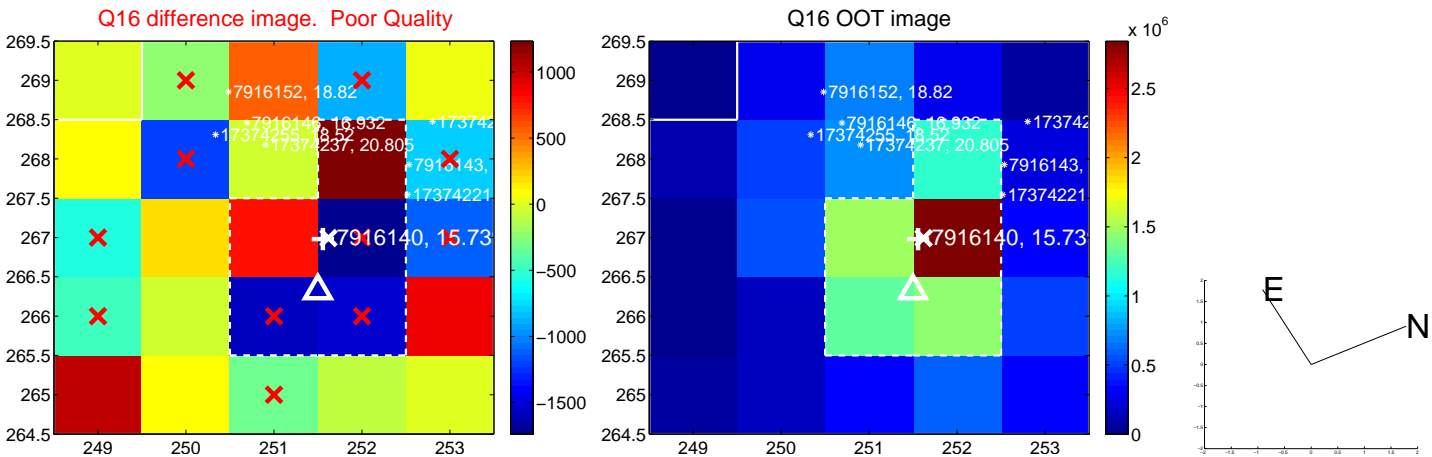
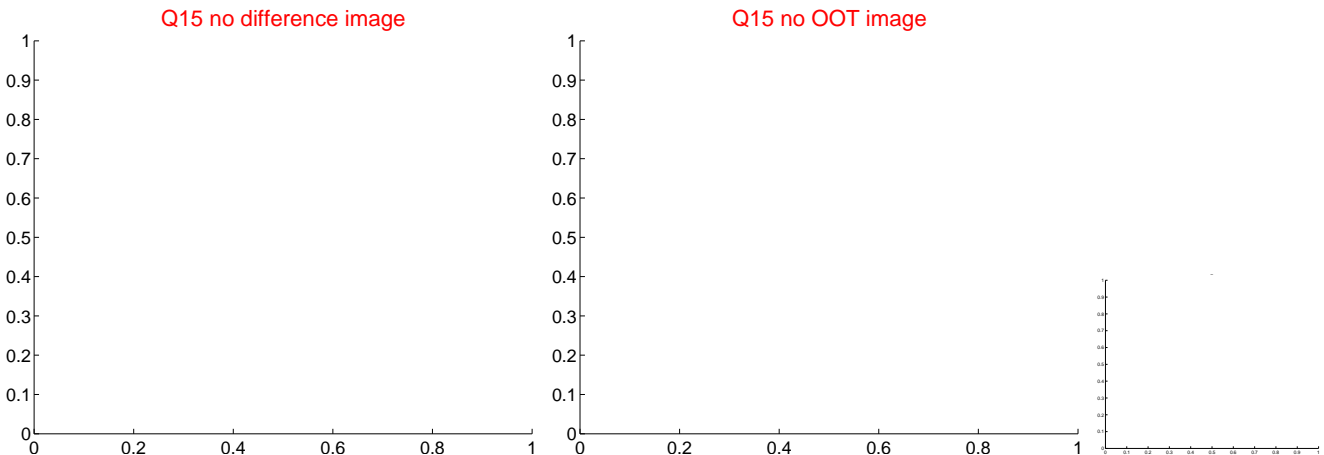
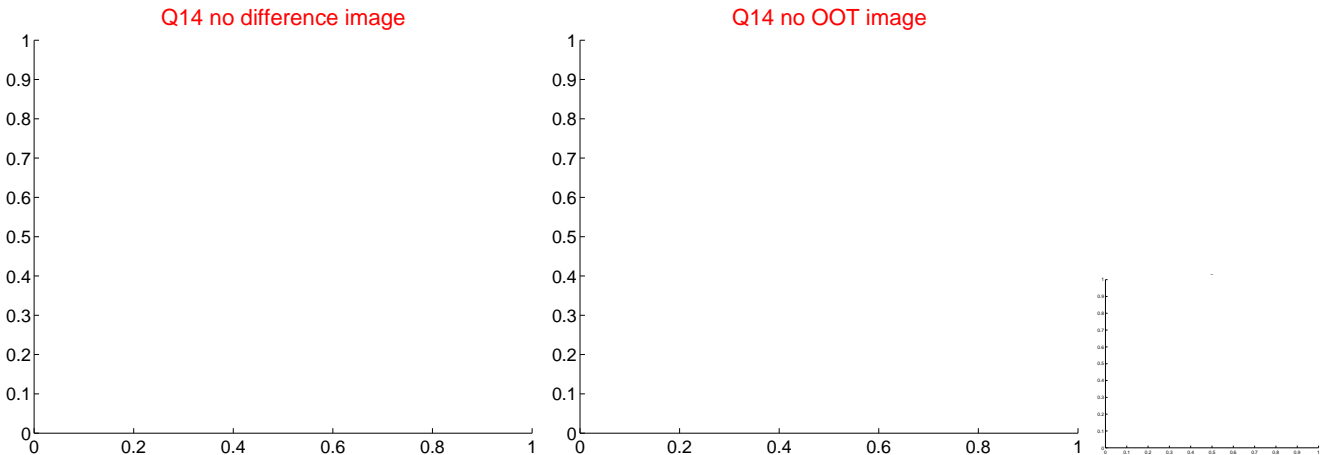
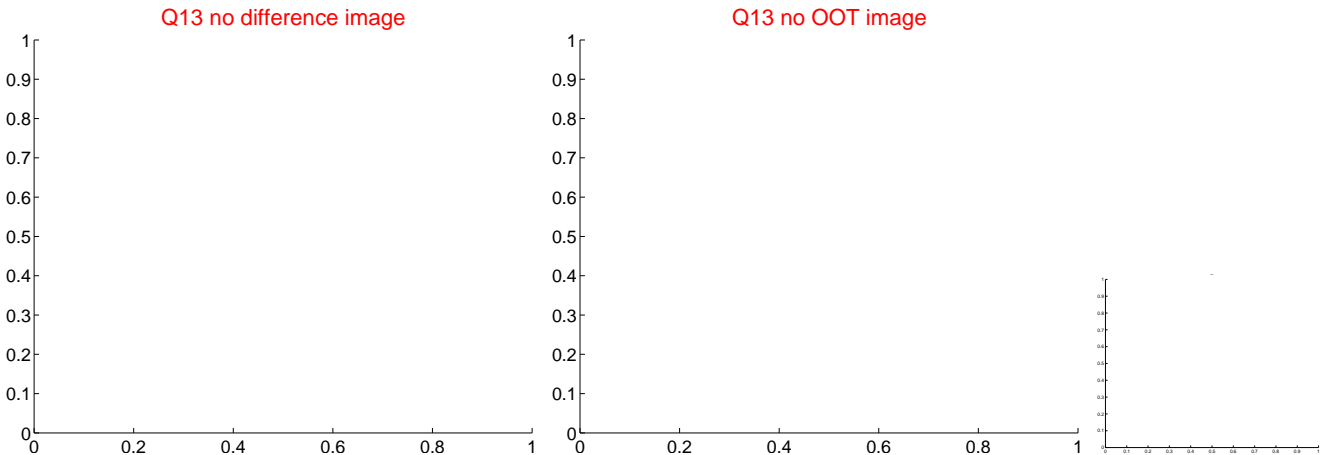
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



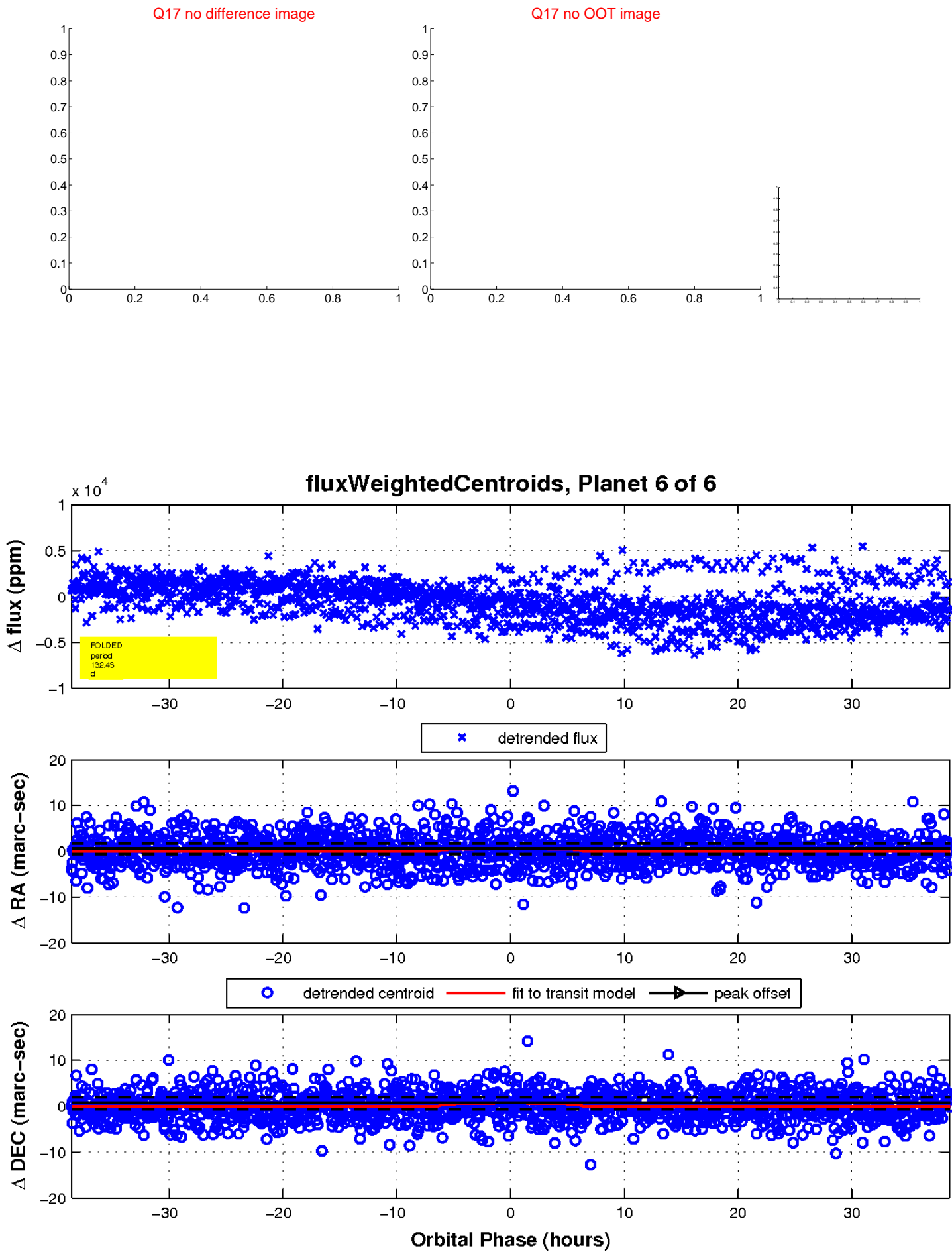
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



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



UKIRT Image

Declination

