

# KIC 008149616

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008149616-01	OBS	No	1.780615	132.506653	106.6	10.625	12.2	9.1	0.27	3332	0.28	23.72
008149616-02	OBS	No	103.037639	191.572038	1341.1	7.500	13.7	-1.0	0.27	3332	0.96	0.11
008149616-03	OBS	No	75.872076	140.582029	1321.3	3.000	10.3	-1.0	0.27	3332	0.95	0.16
008149616-04	OBS	No	118.587620	199.638830	818.9	41.613	10.2	7.4	0.27	3332	0.75	0.09
008149616-05	OBS	No	101.068333	174.446642	1333.8	4.115	9.1	7.7	0.27	3332	1.91	0.11
008149616-06	OBS	No	11.360095	135.155291	323.3	4.579	9.0	7.8	0.27	3332	0.51	2.00
008149616-07	OBS	No	45.419802	152.259980	583.6	16.676	9.8	8.3	0.27	3332	0.67	0.32
008149616-08	OBS	No	62.341047	160.117011	578.1	5.954	9.8	9.3	0.27	3332	0.66	0.21

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008149616-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—CENT_KIC_POS
008149616-02	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—INCONSISTENT_TRANS—CENT_NOFITS
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008149616-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES—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
008149616-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS
008149616-06	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
008149616-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT
008149616-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—CENT_KIC_POS

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

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

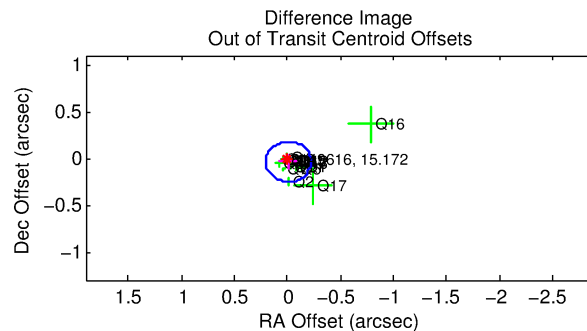
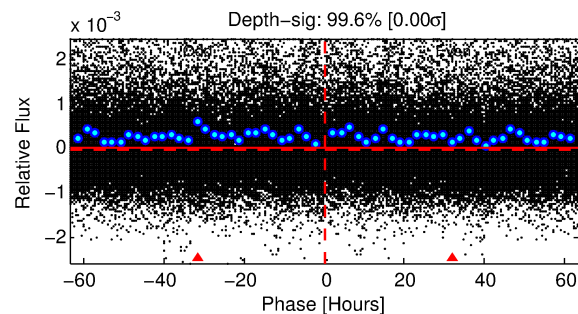
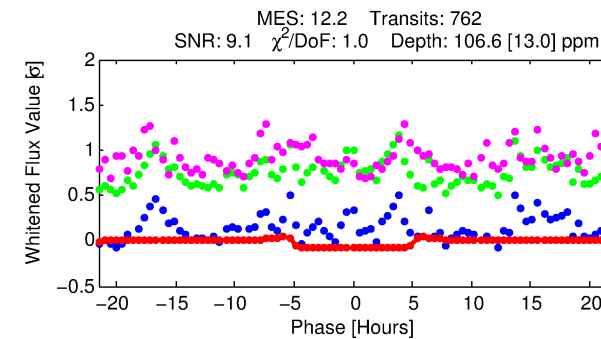
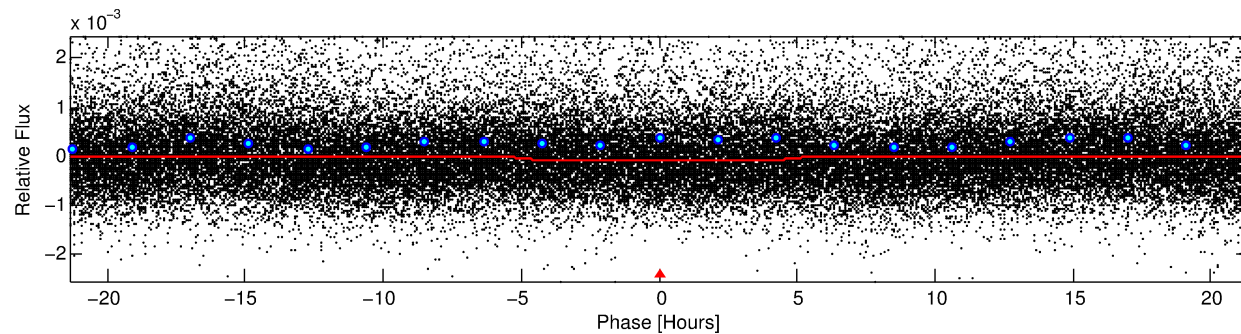
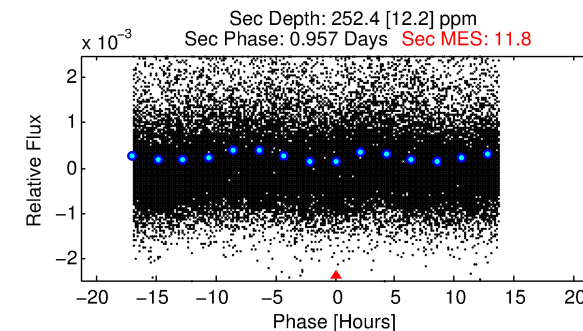
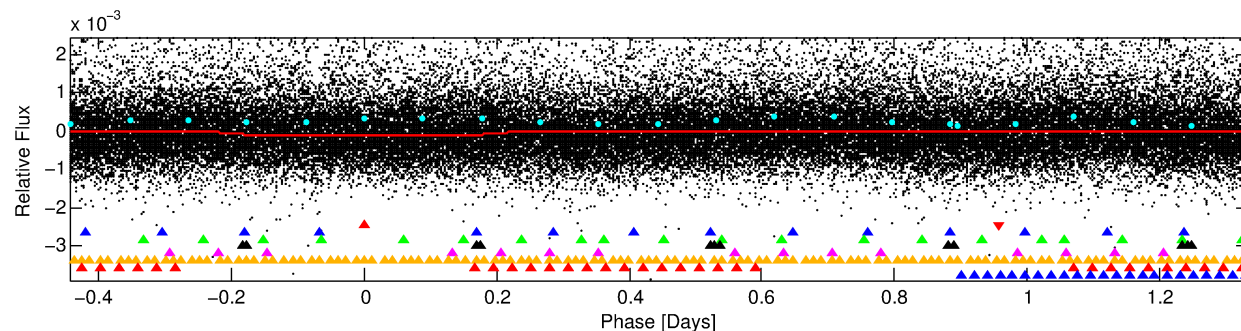
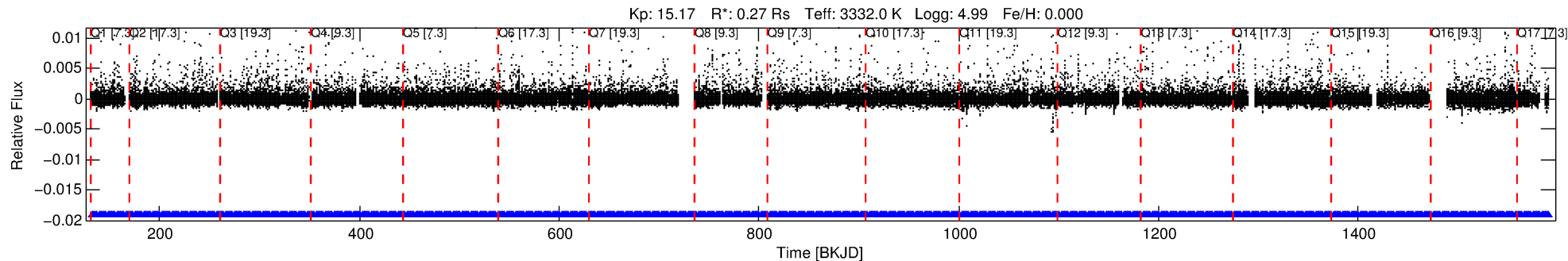
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 008149616-01

No Significant Match Found

# DV One-Page Summary

KIC: 8149616 Candidate: 1 of 8 Period: 1.781 d



## DV Fit Results:

Period = 1.78061 [0.00002] d  
Epoch = 132.5067 [0.0059] BKJD  
Rp/R\* = 0.0097 [0.0083]  
a/R\* = 1.34 [2.19]  
b = 0.51 [5.34]  
Seff = 23.72 [3.03]  
Teq = 563 [18] K  
Rp = 0.28 [0.24] Re  
a = 0.0181 [0.0018] AU  
Ag = 581.60 [1002.96] [0.58σ]  
Teffp = 4273 [1839] K [2.02σ]

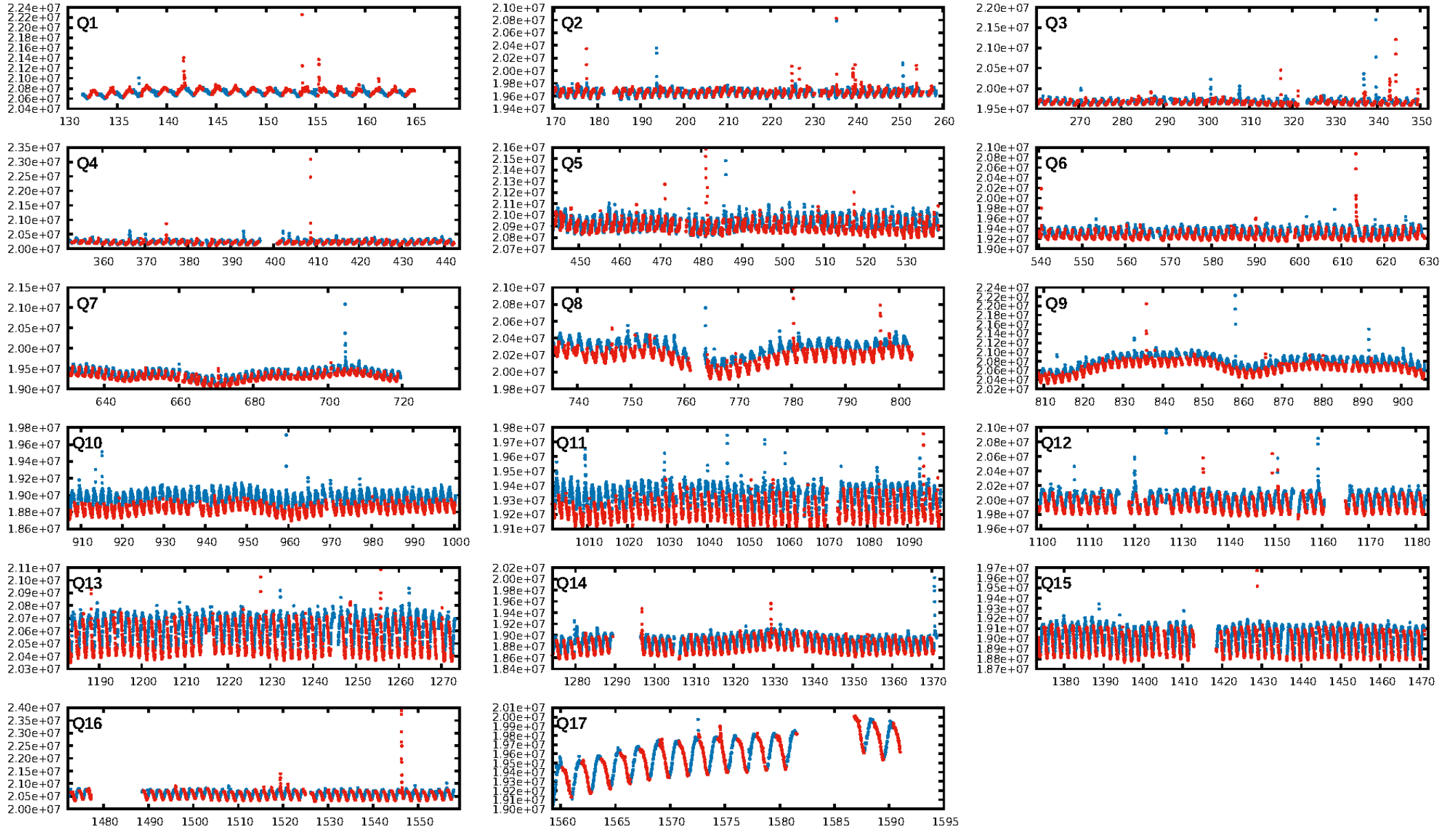
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [19.87σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [728/728]  
GhostDiagnostic-chr: 1.795  
**Centroid-sig: 0.1%**  
Centroid-so: 1.078 arcsec [2.10σ]  
OotOffset-rm: 0.039 arcsec [0.55σ]  
**KicOffset-rm: 0.513 arcsec [6.27σ]**  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.82 [14/17]  
DiffImageOverlap-fno: 1.00 [17/17]

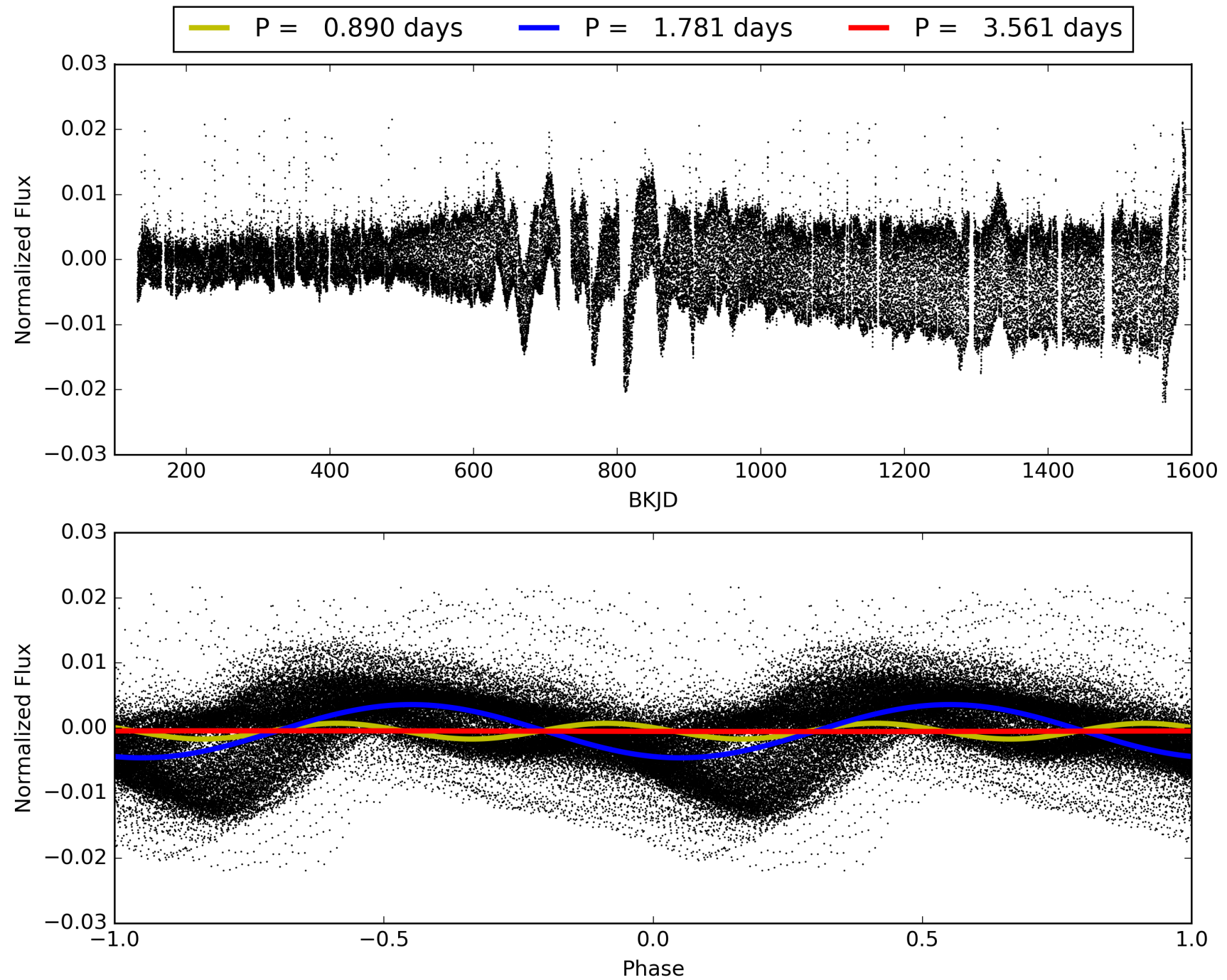
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 08:16:50 Z

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

# TCE 008149616-01, PDC Light Curves



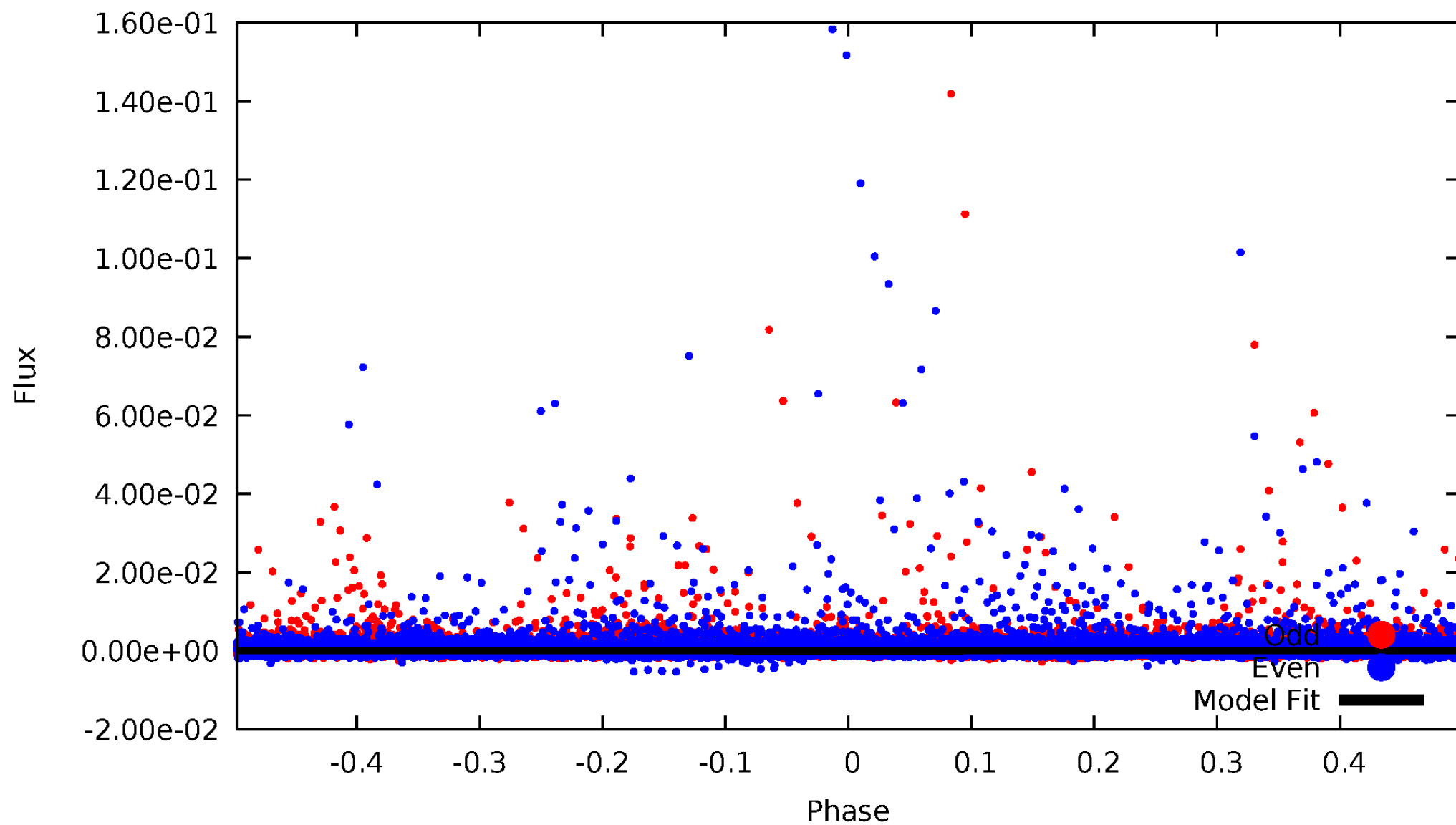
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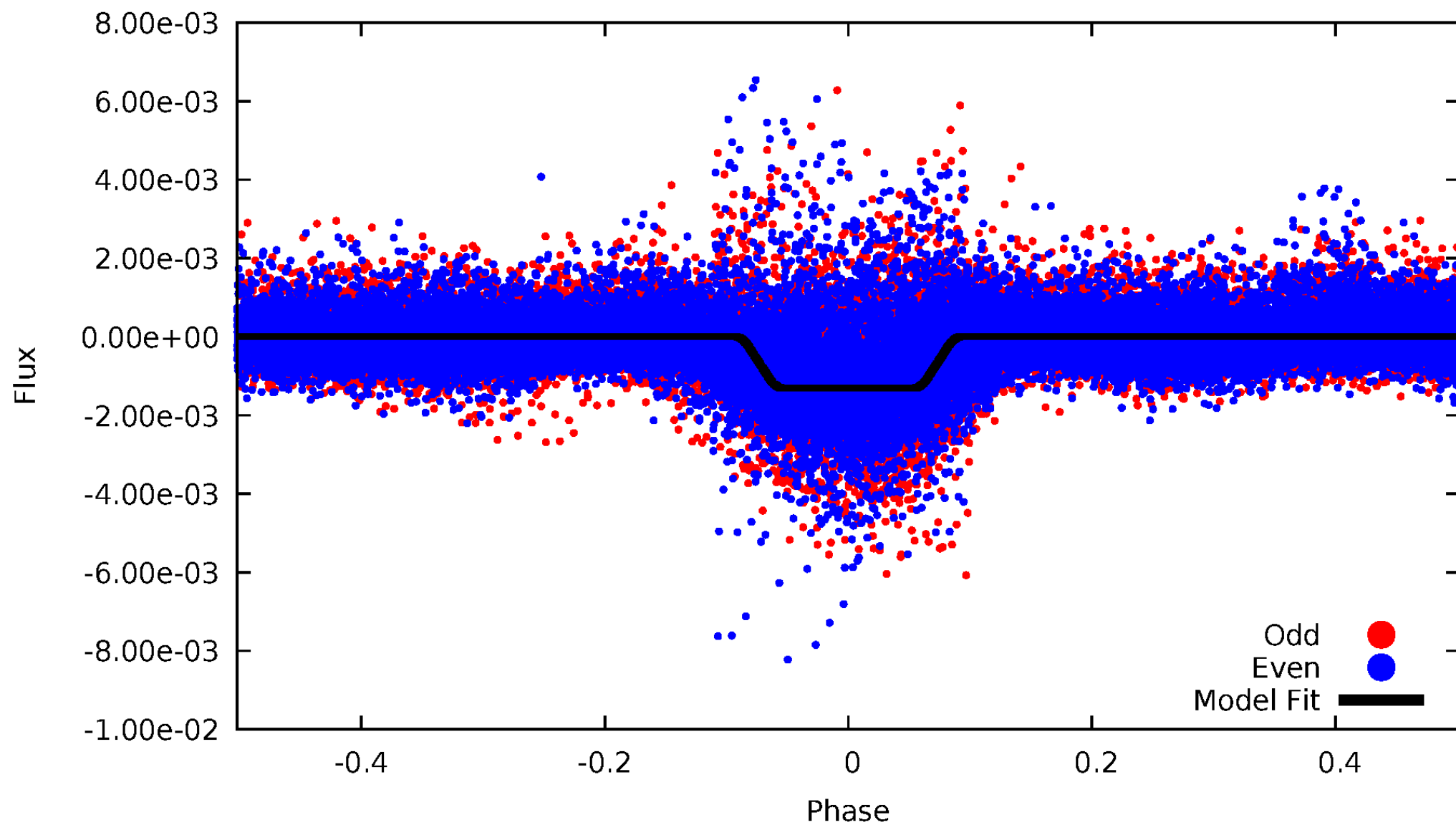
# DV Odd/Even

TCE 008149616-01



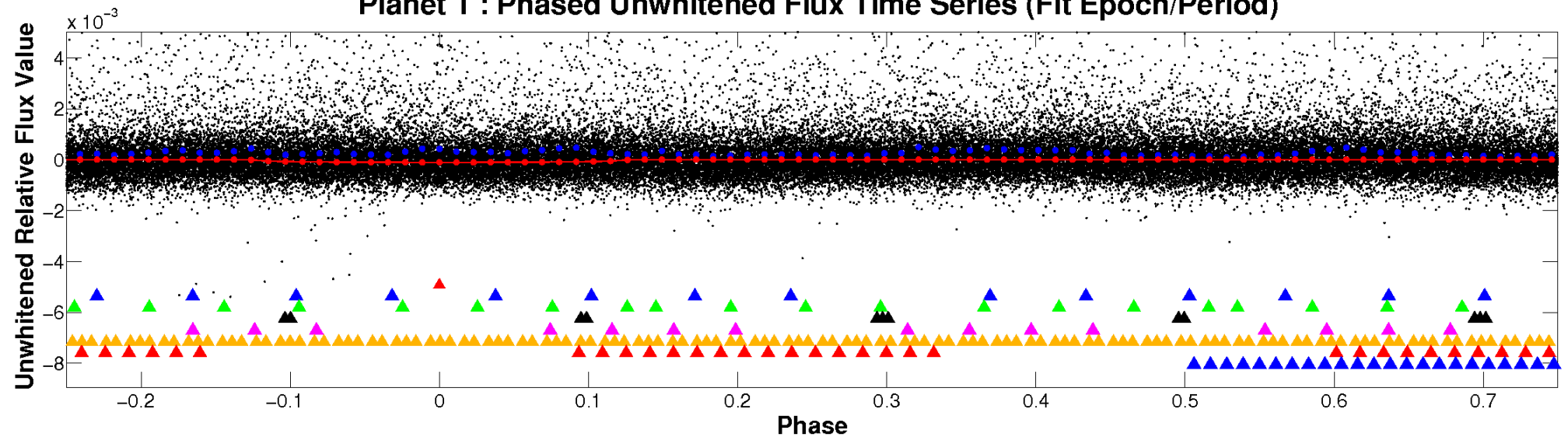
# ALT Odd/Even

TCE 008149616-01

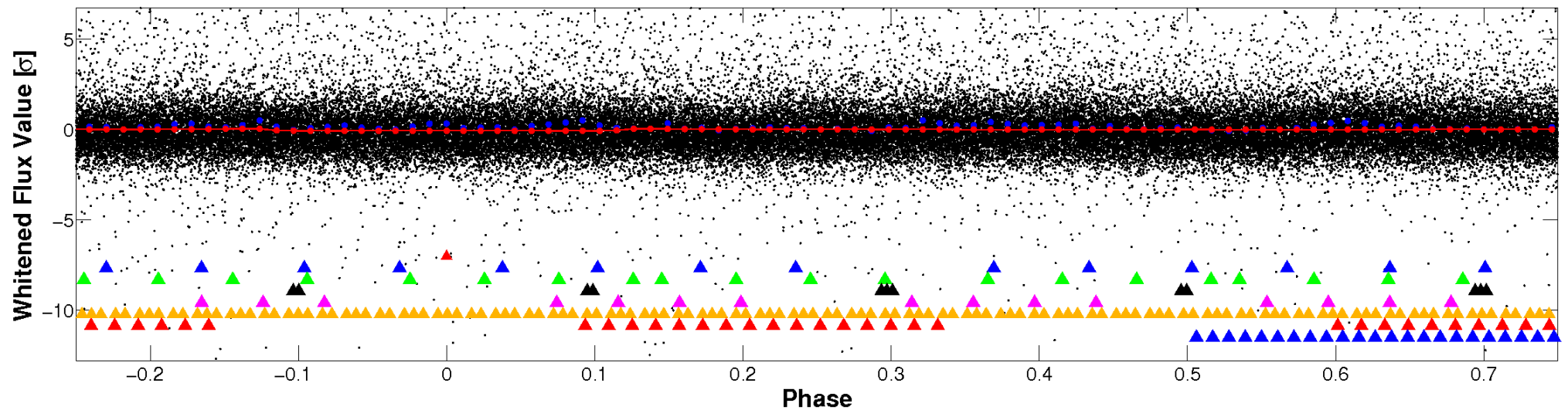


# Non-Whitened Vs. Whitened Light Curve

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

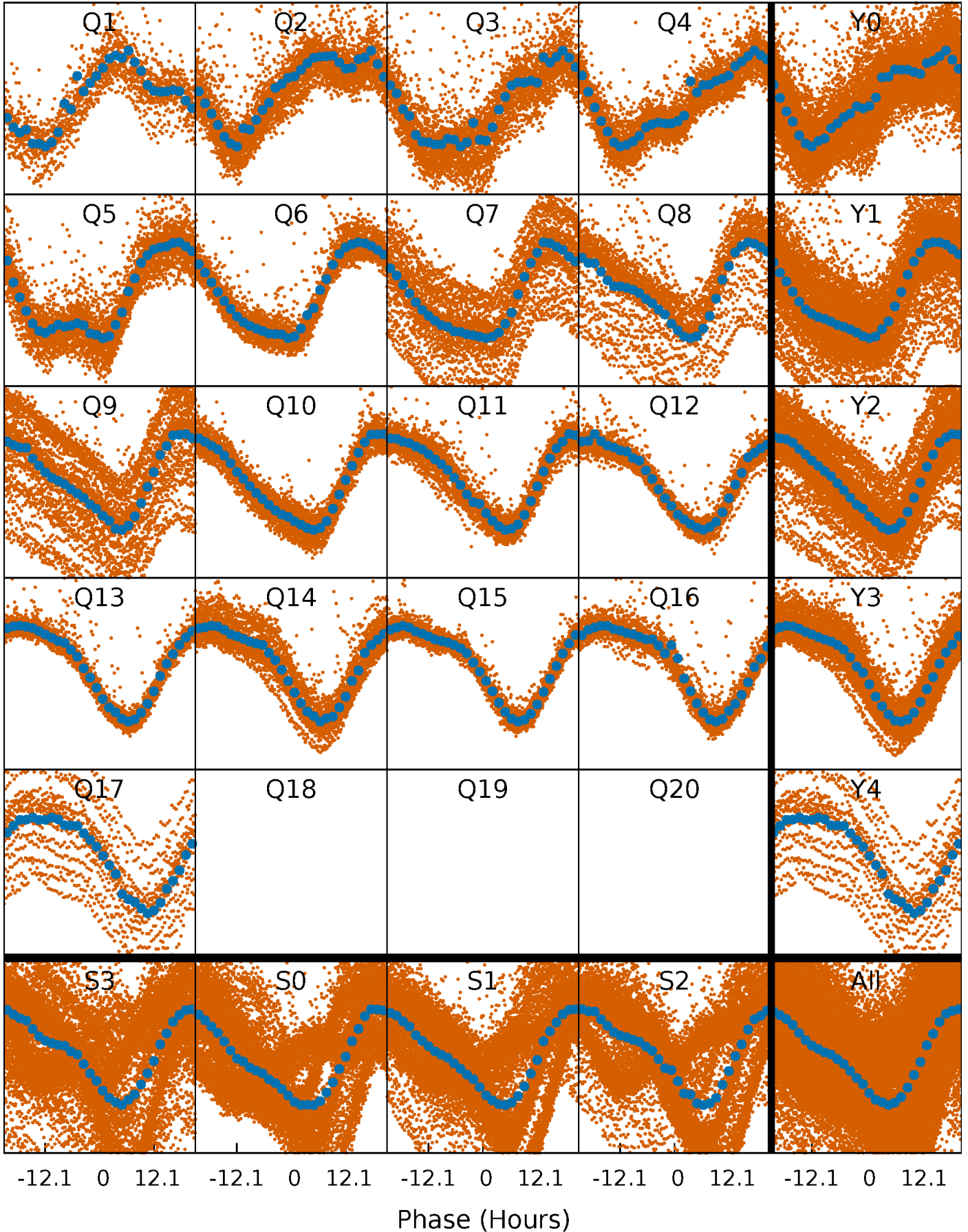


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

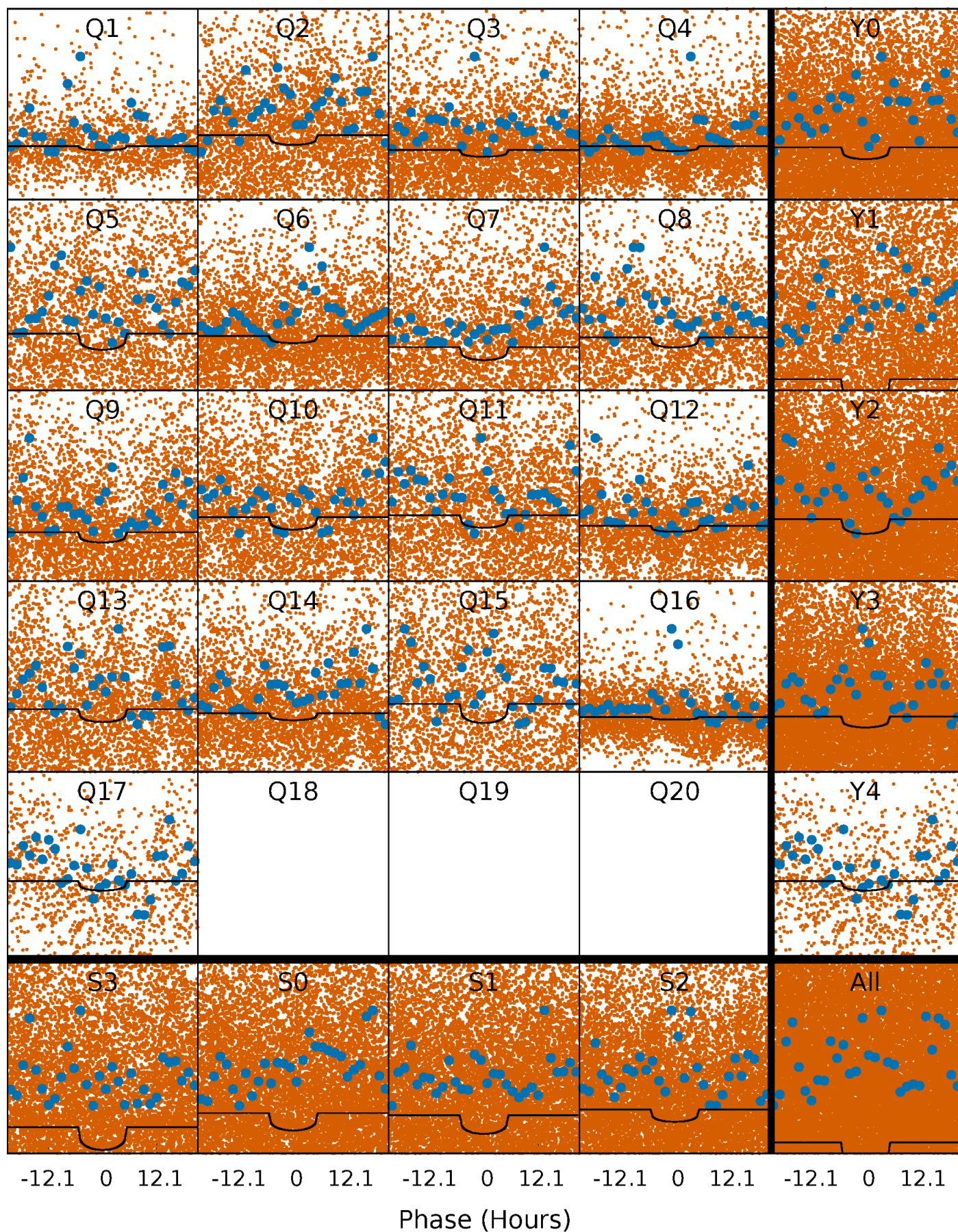
TCE 008149616-01 P= 1.780615 Days  $T_0=132.506653$  (BKJD)





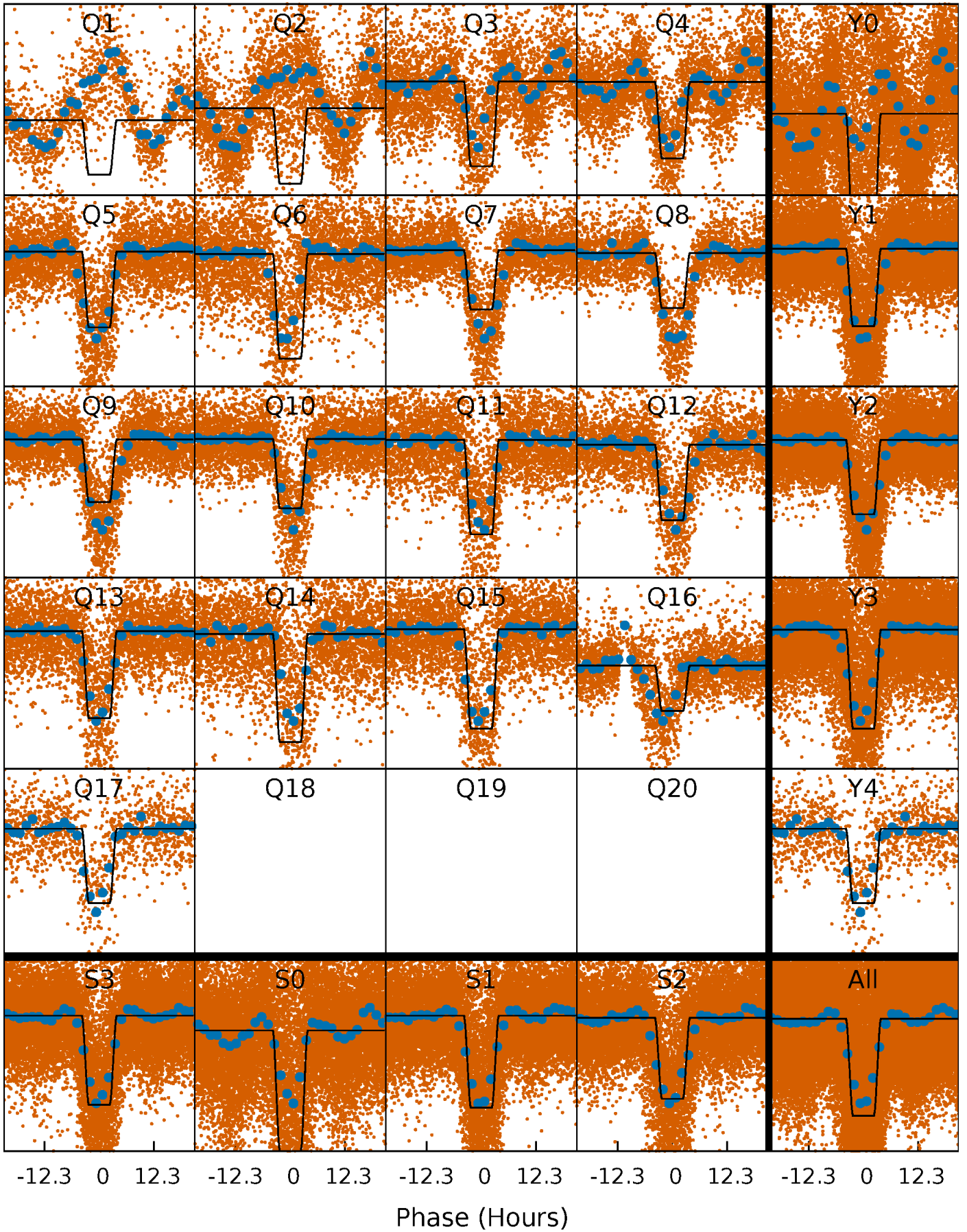
# DV Quarter-Phased Transit Curves

TCE 008149616-01 P= 1.780615 Days  $T_0=132.506653$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

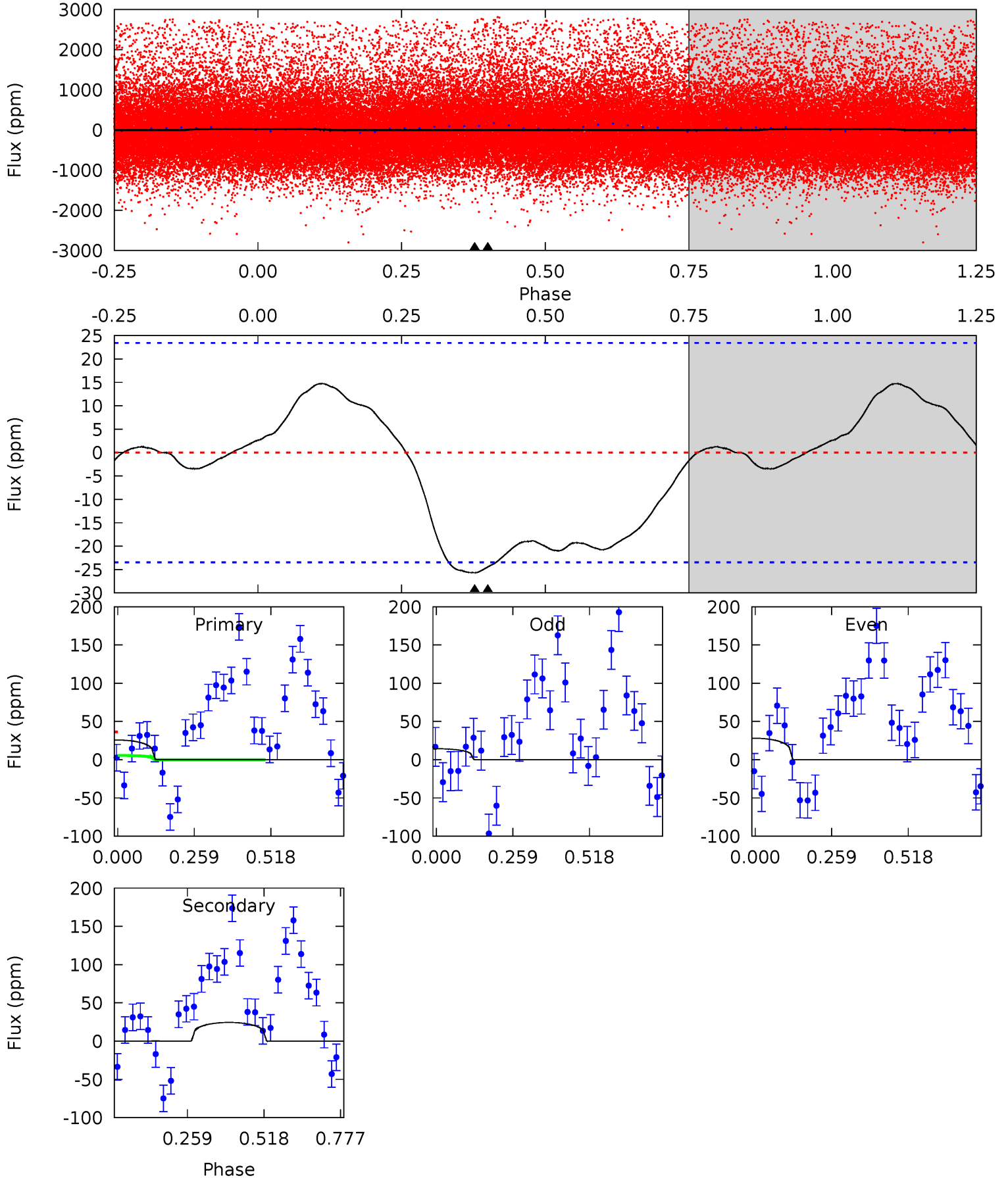
TCE 008149616-01 P= 1.781190 Days  $T_0=132.503570$  (BKJD)



# DV Model-Shift Uniqueness Test

008149616-01, P = 1.780615 Days, E = 130.726038 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
4.78	4.55	0	0	4.36	1.13	1.31	4.78	4.78	4.55	4.55	1.28	4.79	0.36	2.93

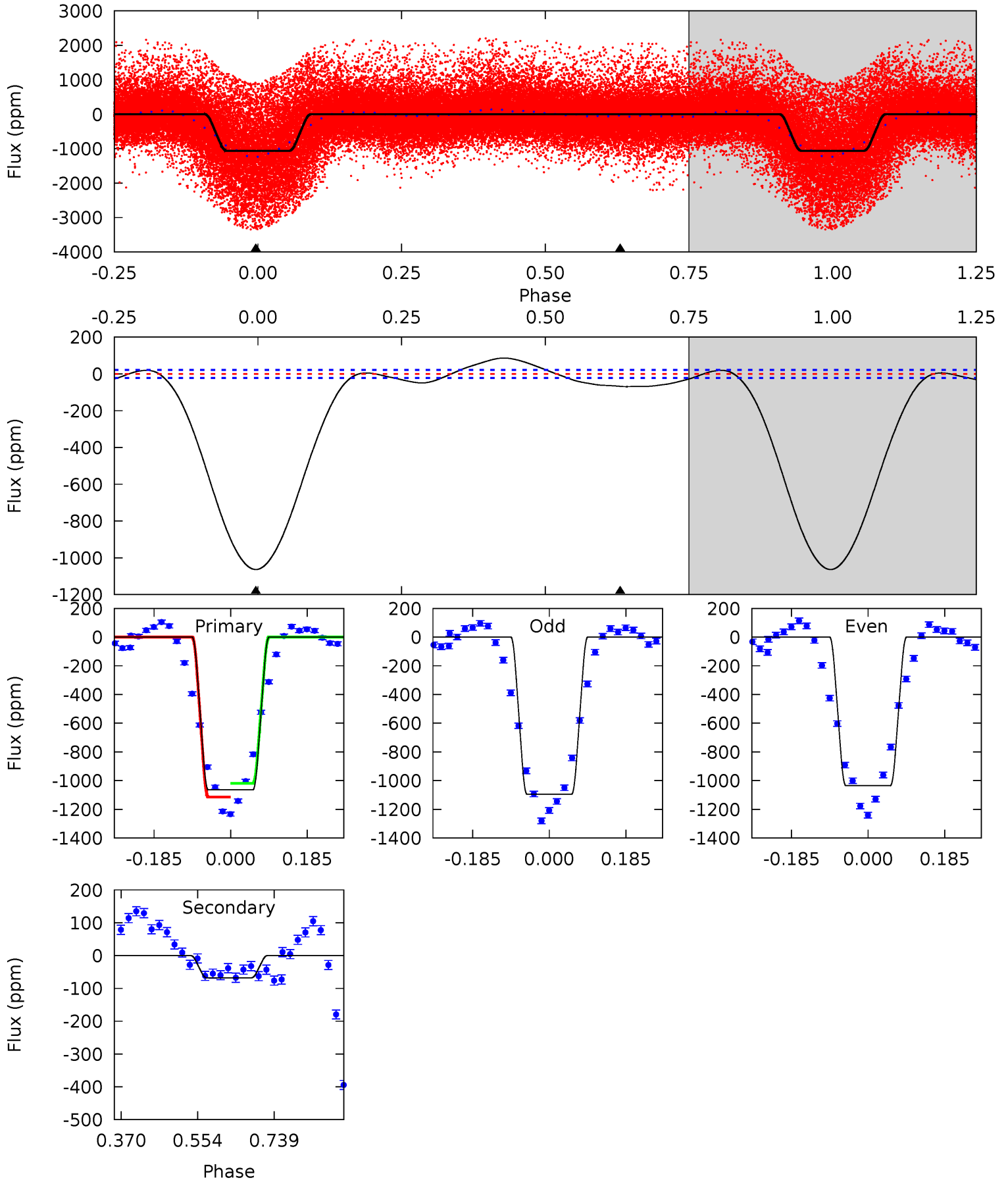




# Alt Model-Shift Uniqueness Test

008149616-01, P = 1.781190 Days, E = 130.722380 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
220.1	14.0	0	0	4.43	1.33	9.34	220.1	220.1	14.0	14.0	6.26	1.03	0.08	9.90





### Stellar Parameters For KIC 008149616

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3332^{+43}_{-36}$	$4.987^{+0.044}_{-0.040}$	$0.000^{+0.100}_{-0.100}$	$0.265^{+0.038}_{-0.027}$	$0.248^{+0.045}_{-0.030}$	$18.820^{+4.559}_{-3.663}$
	+1%/-1%	+1%/-1%	+inf%/-inf%	+14%/-10%	+18%/-12%	+24%/-19%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 008149616-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-24 \pm 5$	$0.32^{+0.22}_{-0.20}$	$785^{+19}_{-18}$	$2677^{+851}_{-346}$	$44^{+258}_{-29}$
Alt.	$-68 \pm 5$	$1.05^{+0.24}_{-0.25}$	$787^{+18}_{-20}$	$2261^{+138}_{-112}$	$11^{+8}_{-4}$

$T_{max}$  = Theoretical Maximum Planetary Temperature

$T_{obs}$  = Observed Planetary Temperature (Assuming  $A=0.3$ )

$A_{obs}$  = Observed Albedo (Assuming  $T=0$ )

If a secondary eclipse is present, the system is likely an EB if  $T_{obs} \gg T_{max}$  AND  $A_{obs} \gg 1.0$

## DV Centroid Data

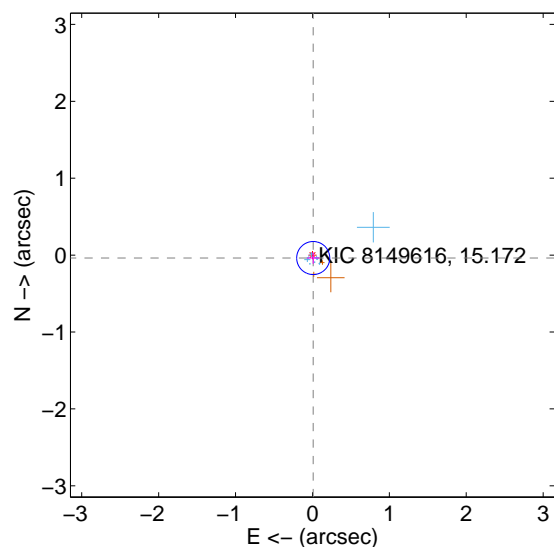
Supplemental centroid analysis for 008149616-01. Kepler magnitude: 15.17. Transit SNR 9.08

There are 14 quarters with good PRF difference image offsets

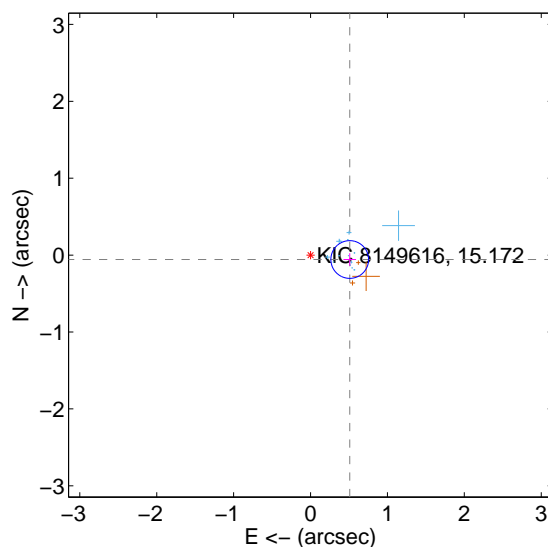
The direct PRF centroid is offset from the target star catalog position by about 0.48 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.039 \pm 0.072$	0.55	$-0.010 \pm 0.080$	$-0.038 \pm 0.074$
PRF-fit source offset from KIC position	$0.513 \pm 0.082$	6.27	$-0.510 \pm 0.082$	$-0.057 \pm 0.082$
photometric centroid source offset	$1.08 \pm 0.51$	2.10	$-0.35 \pm 0.52$	$-1.02 \pm 0.51$

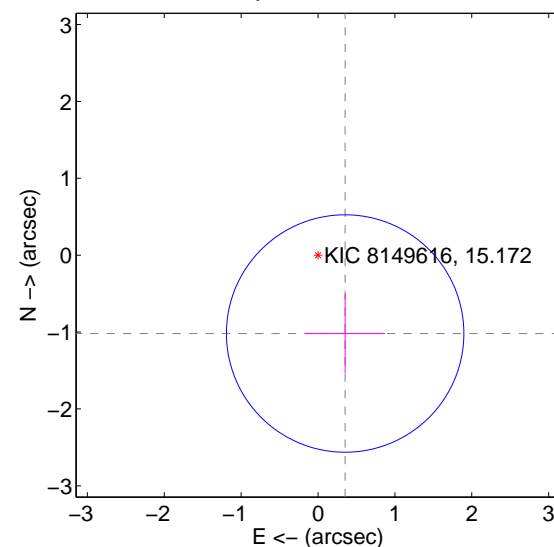
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

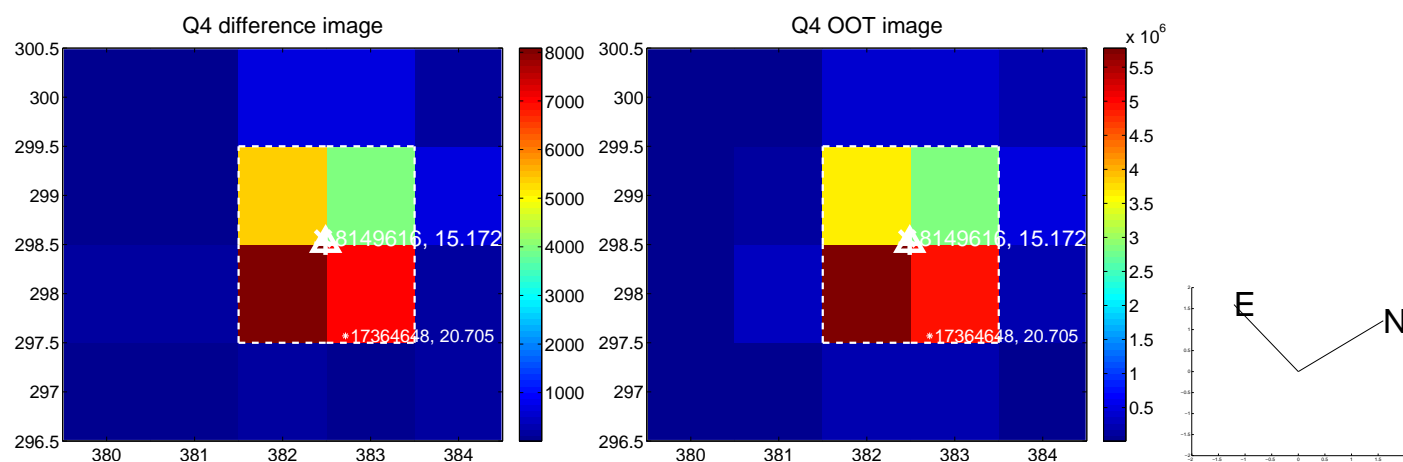
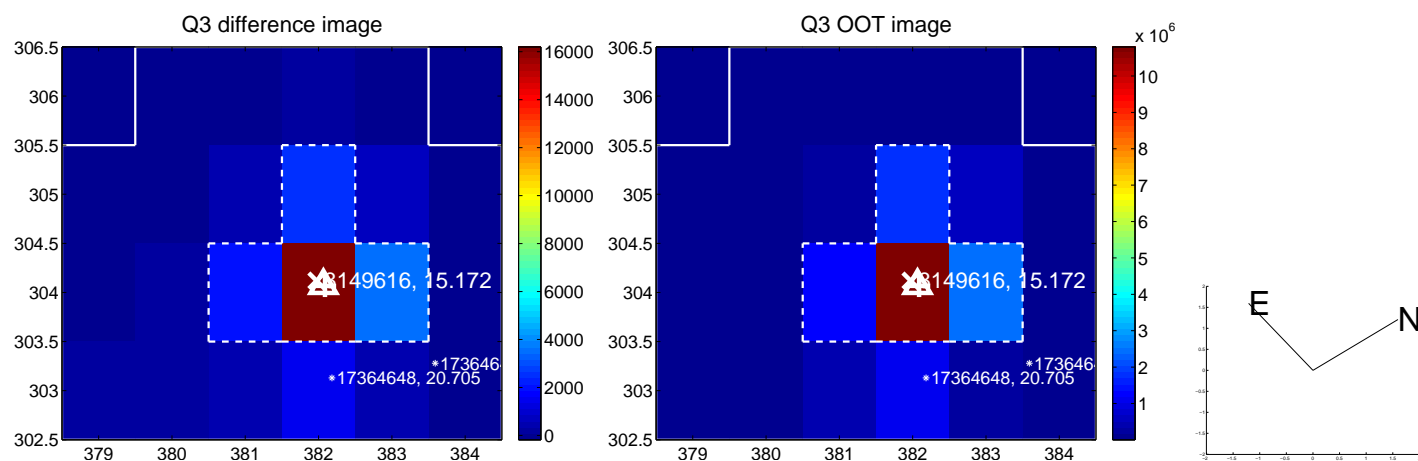
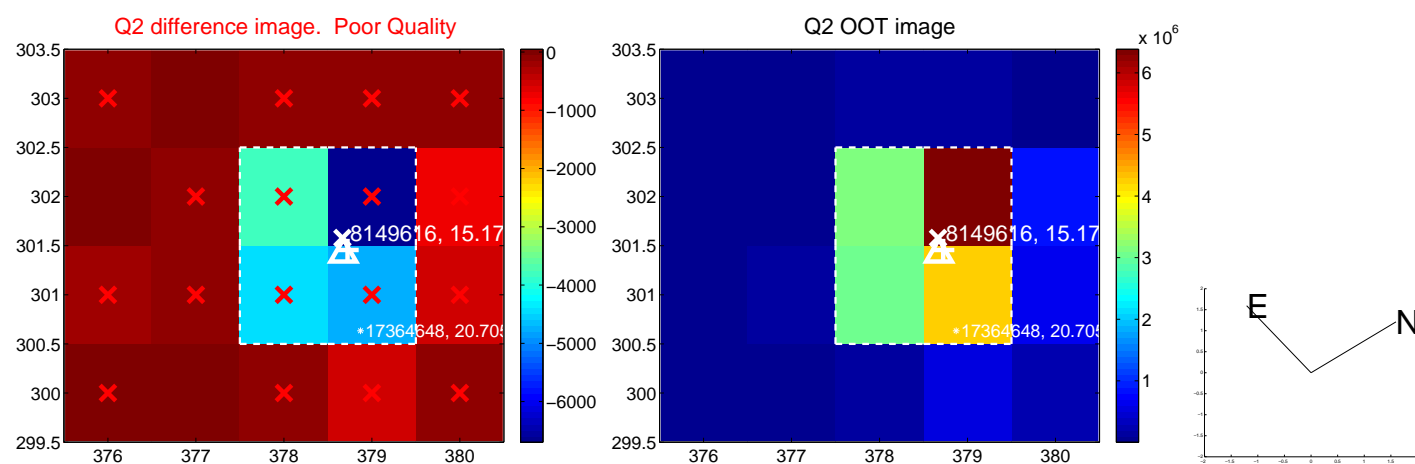
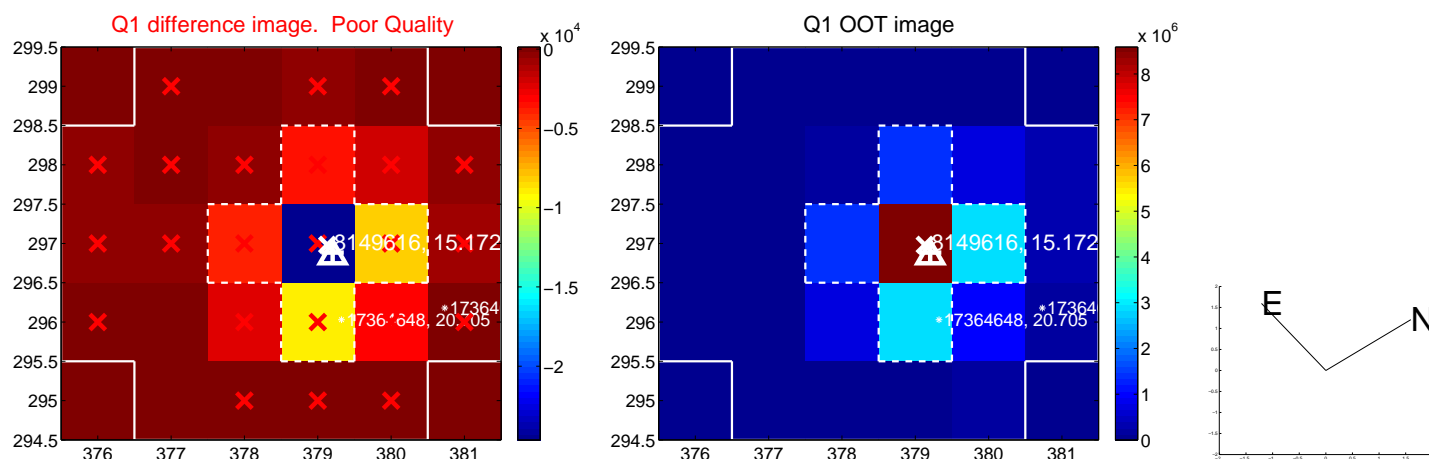


offset from photometric centroids

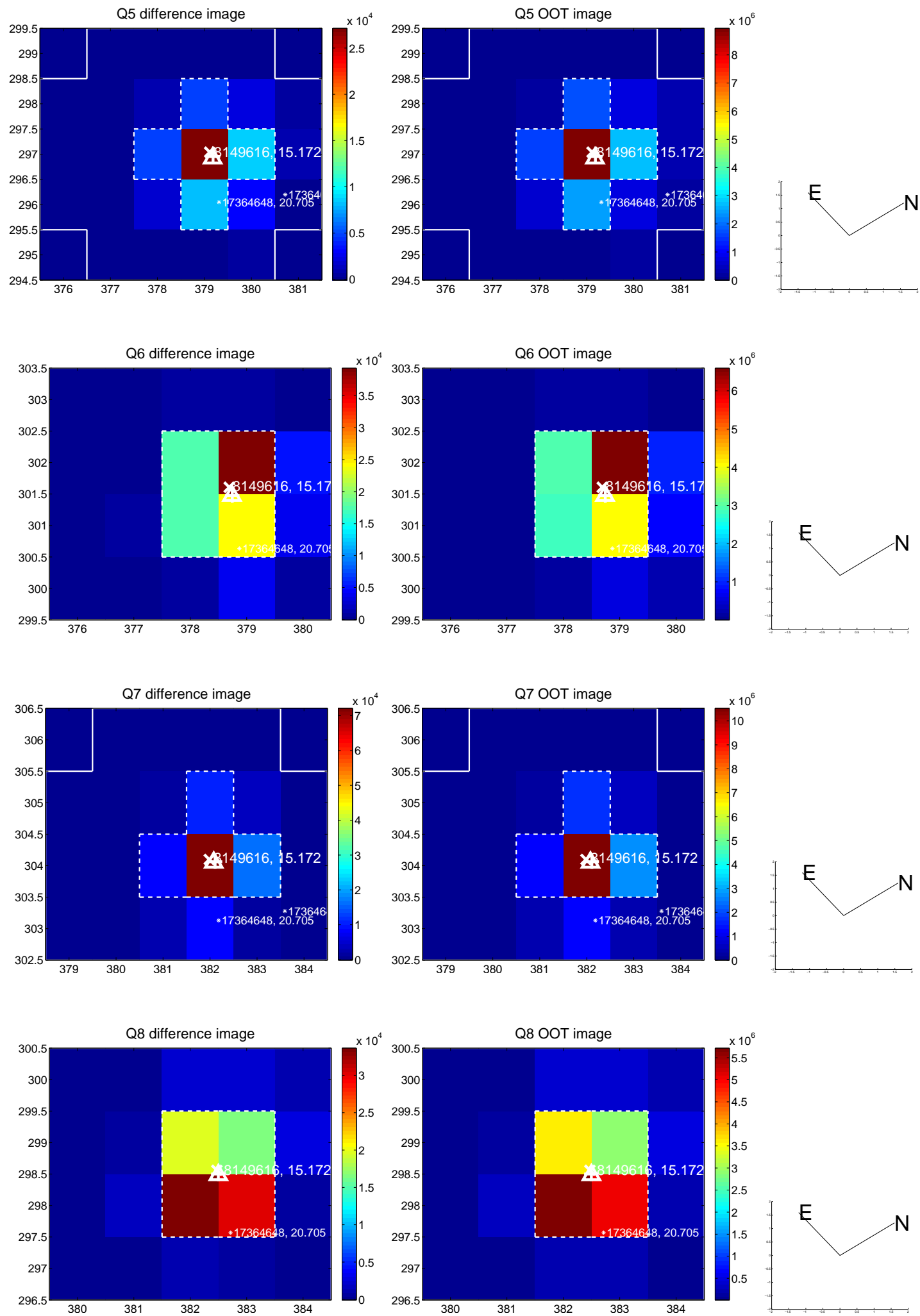


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

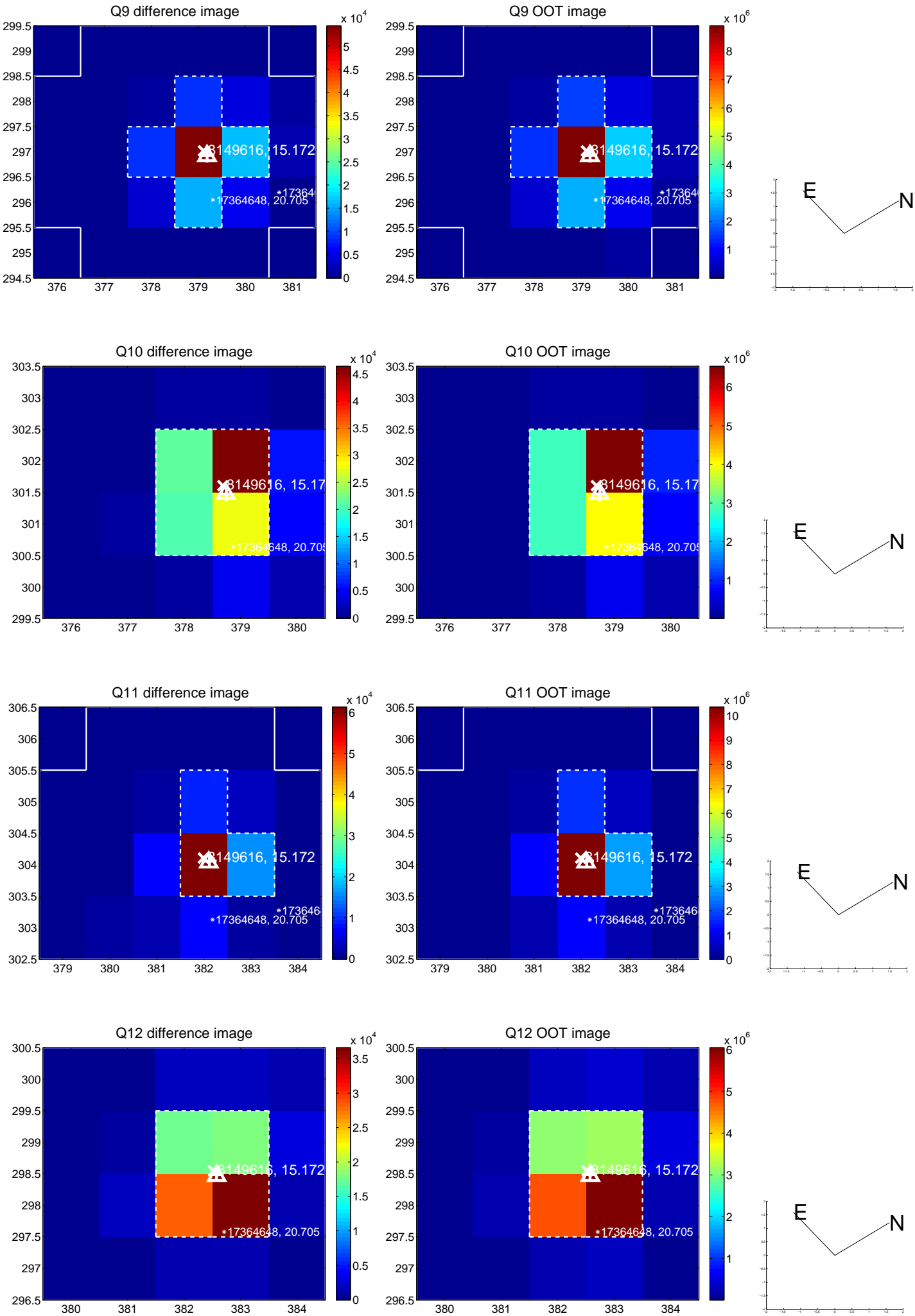


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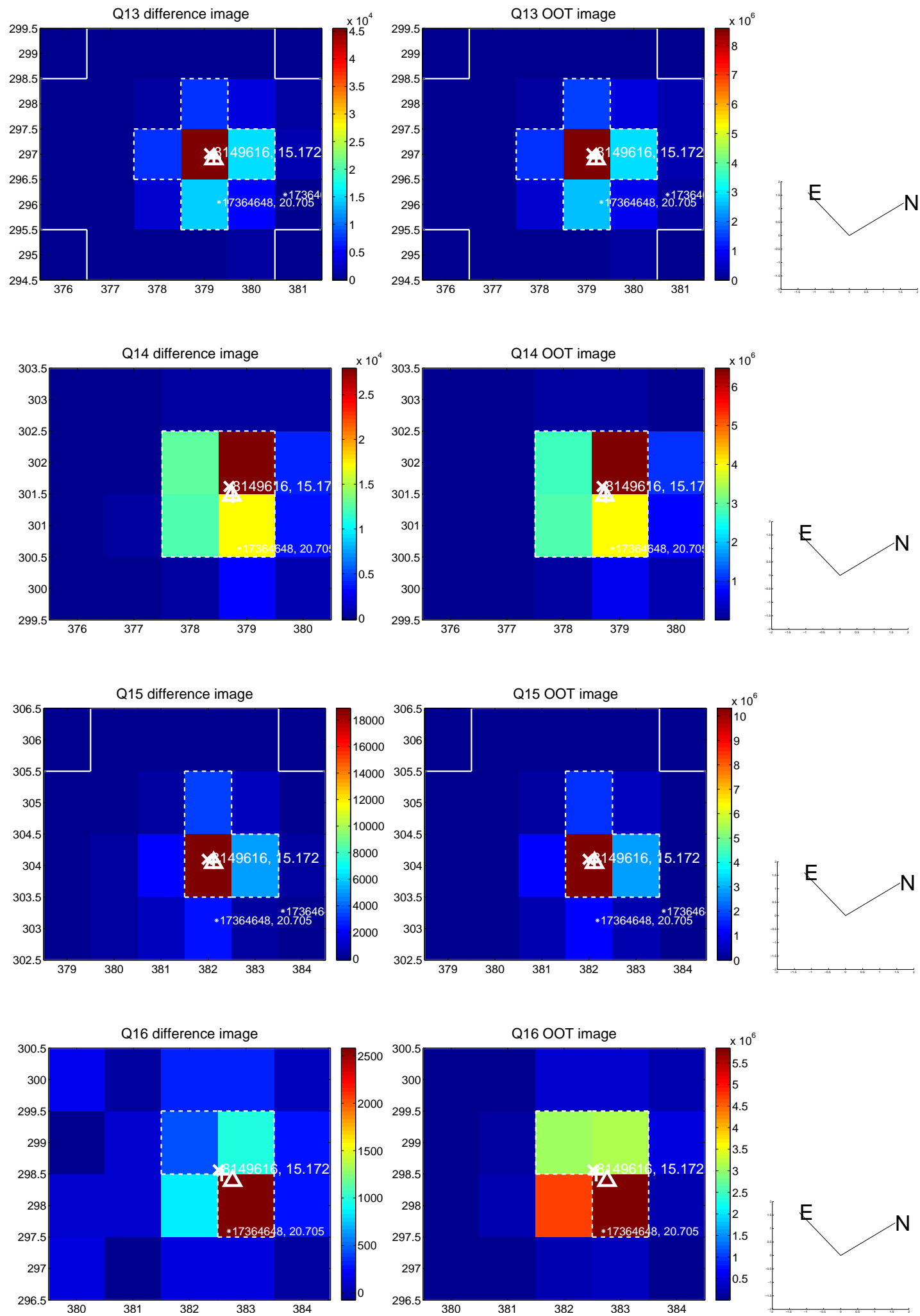




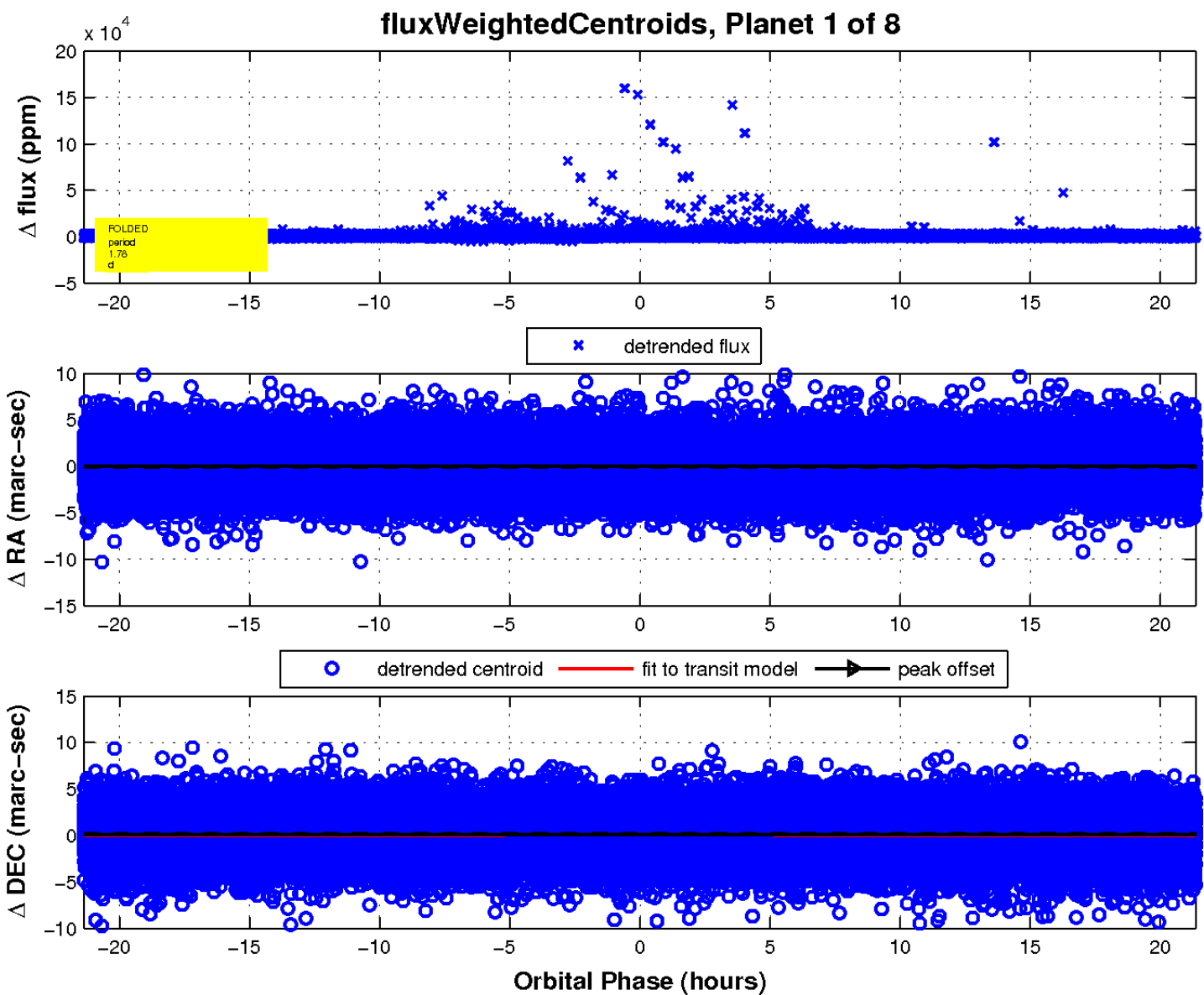
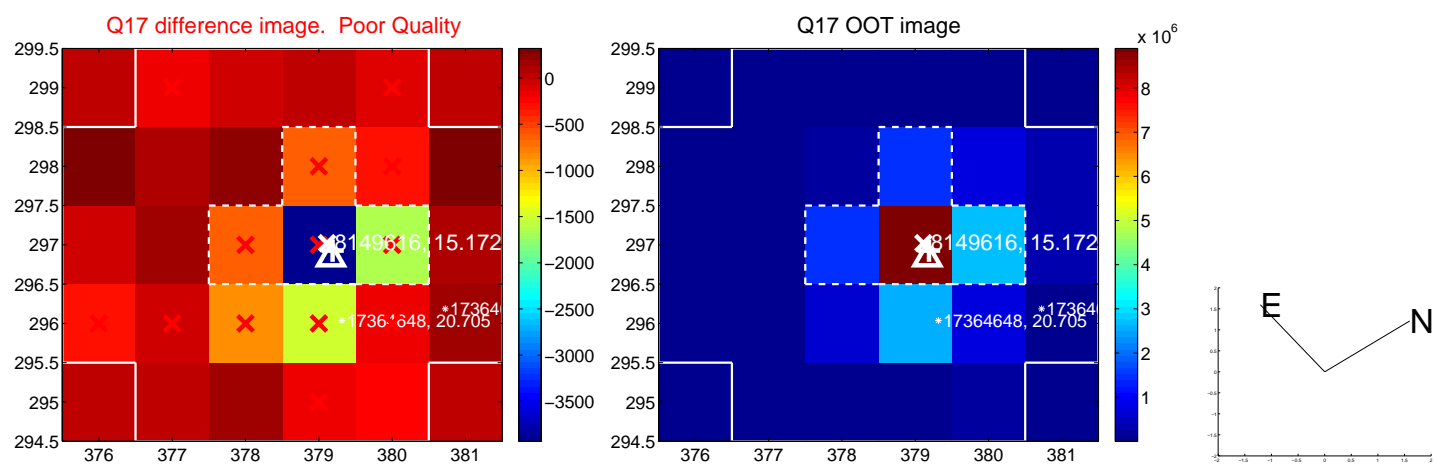
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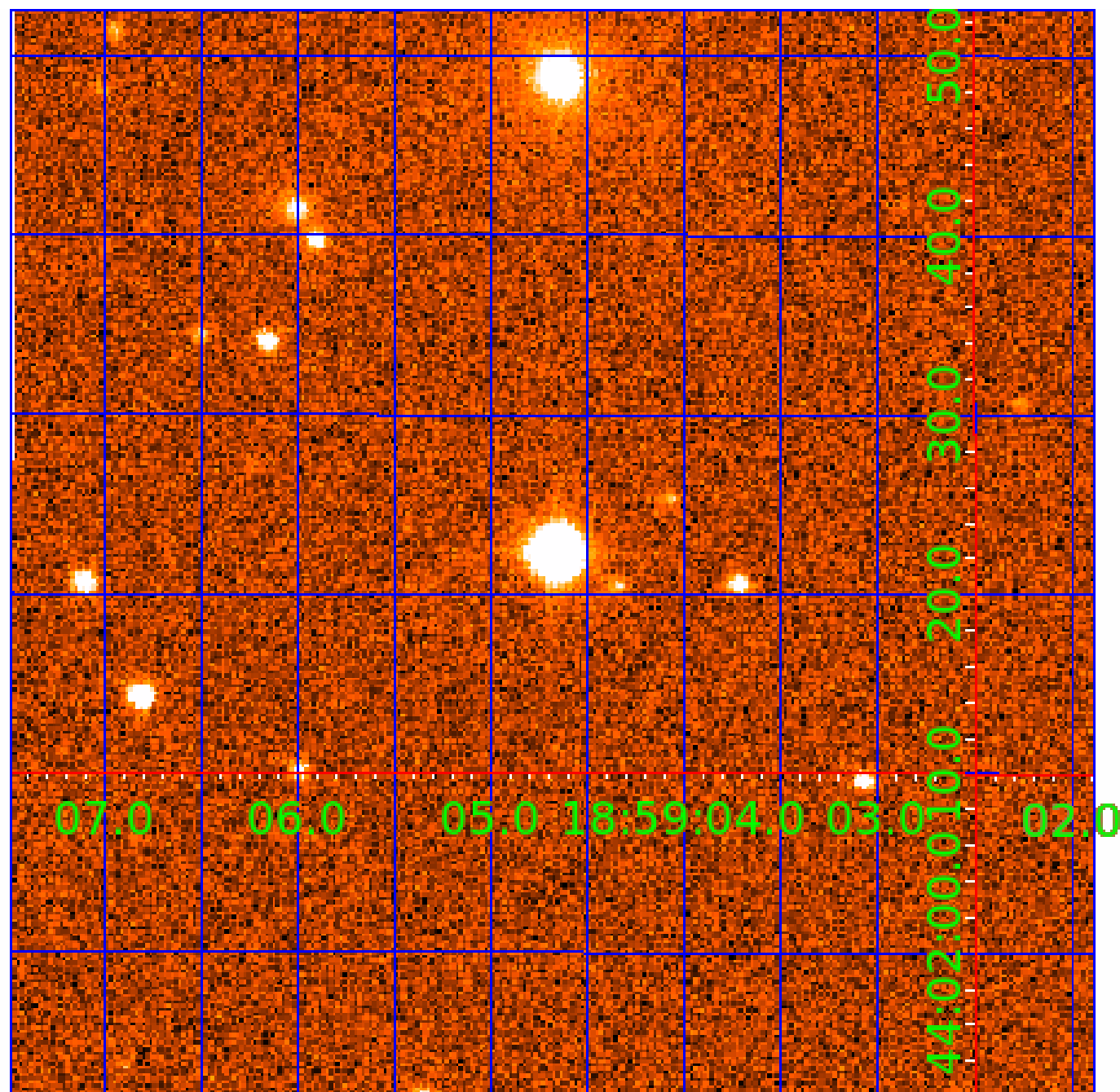


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UKIRT Image

Declination





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008149616-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES—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
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008149616-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT
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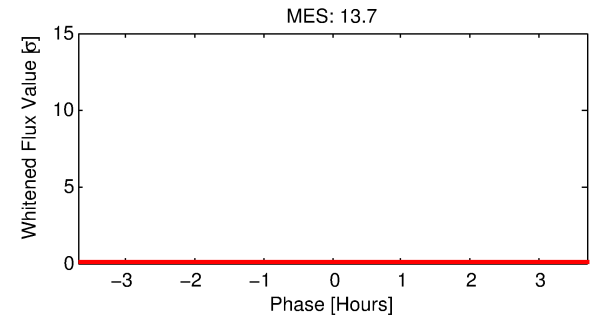
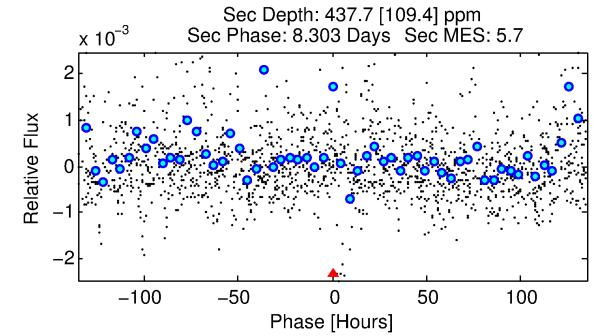
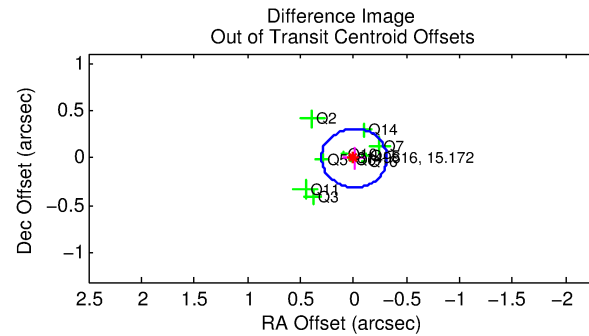
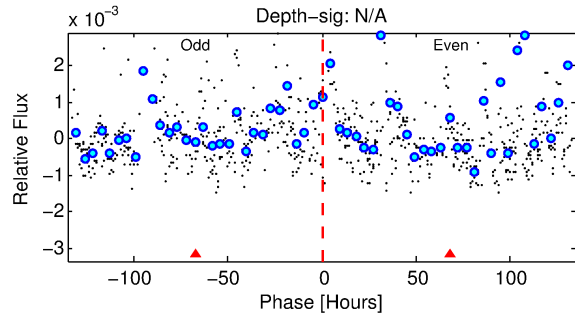
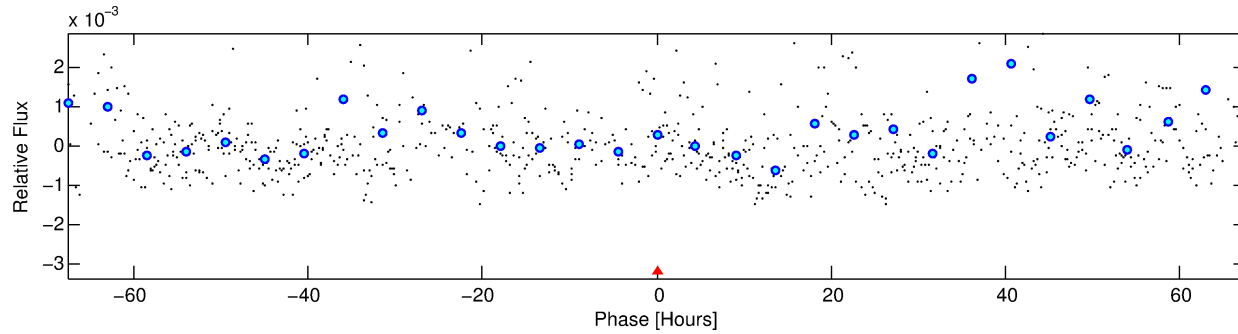
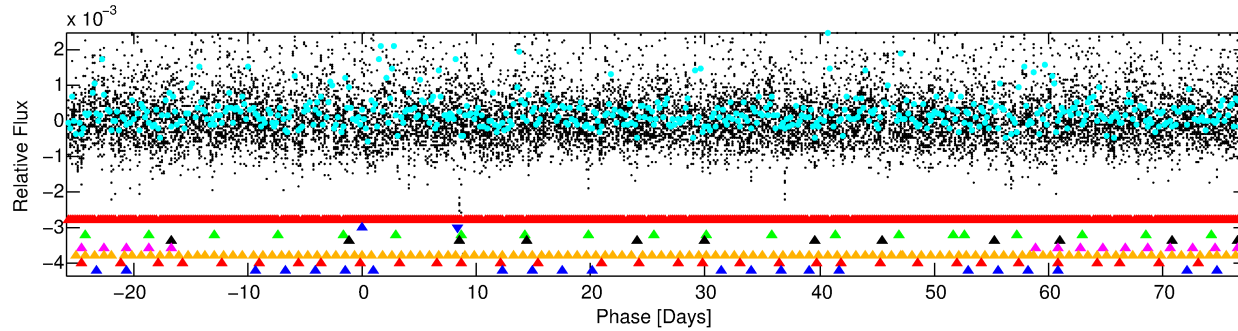
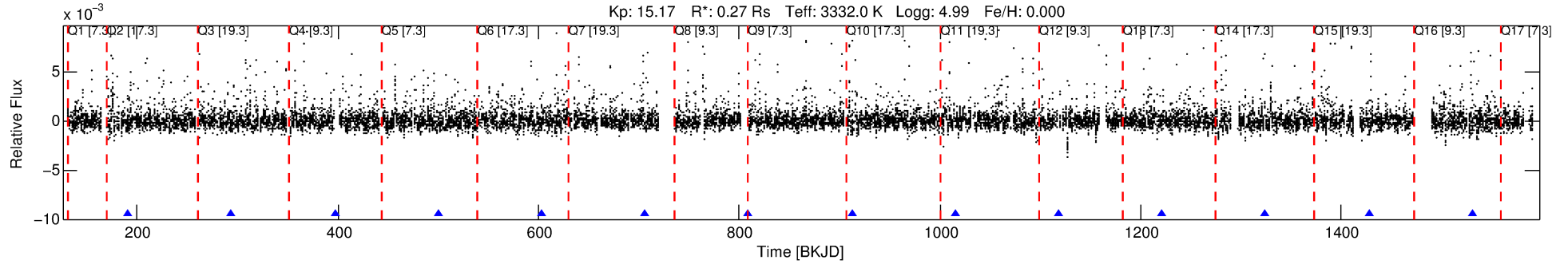
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 008149616-02

No Significant Match Found

# DV One-Page Summary

KIC: 8149616 Candidate: 2 of 8 Period: 103.038 d



## TPS TCE Results:

Period = 103.03764 d  
Epoch = 191.5720 BKJD

DV fit results are unavailable

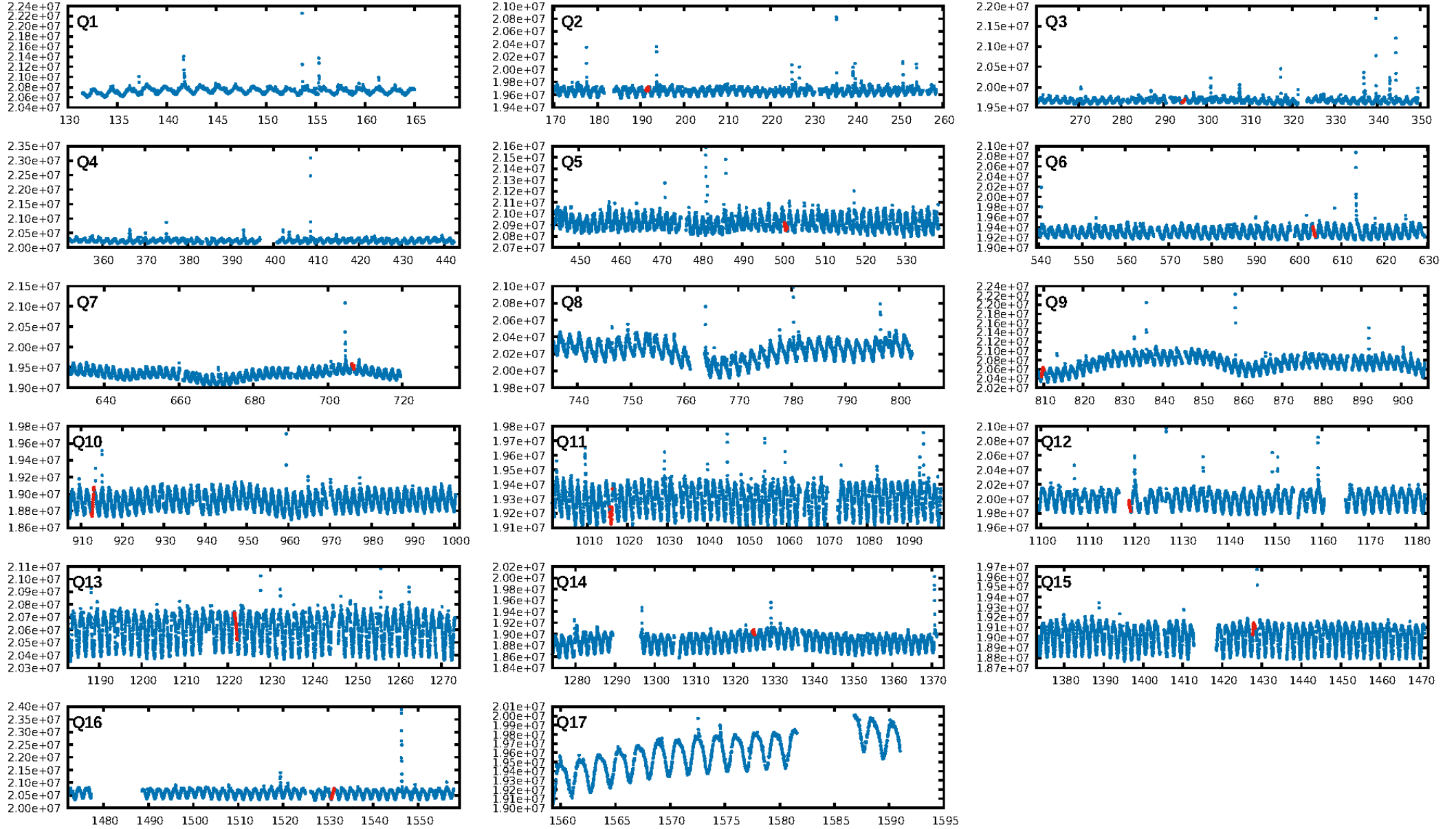
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [5.52σ]  
LongPeriod-sig: 100.0% [8.83σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [10/10]  
GhostDiagnostic-chr: -0.7295  
Centroid-sig: 27.9%  
Centroid-so: 0.303 arcsec [0.55σ]  
OotOffset-rm: 0.008 arcsec [0.08σ]  
KicOffset-rm: 0.486 arcsec [4.46σ]  
OotOffset-st: 4/4/1/1 [10]  
KicOffset-st: 4/4/1/1 [10]  
DiffImageQuality-fgm: 0.60 [6/10]  
DiffImageOverlap-fno: 0.00 [0/10]

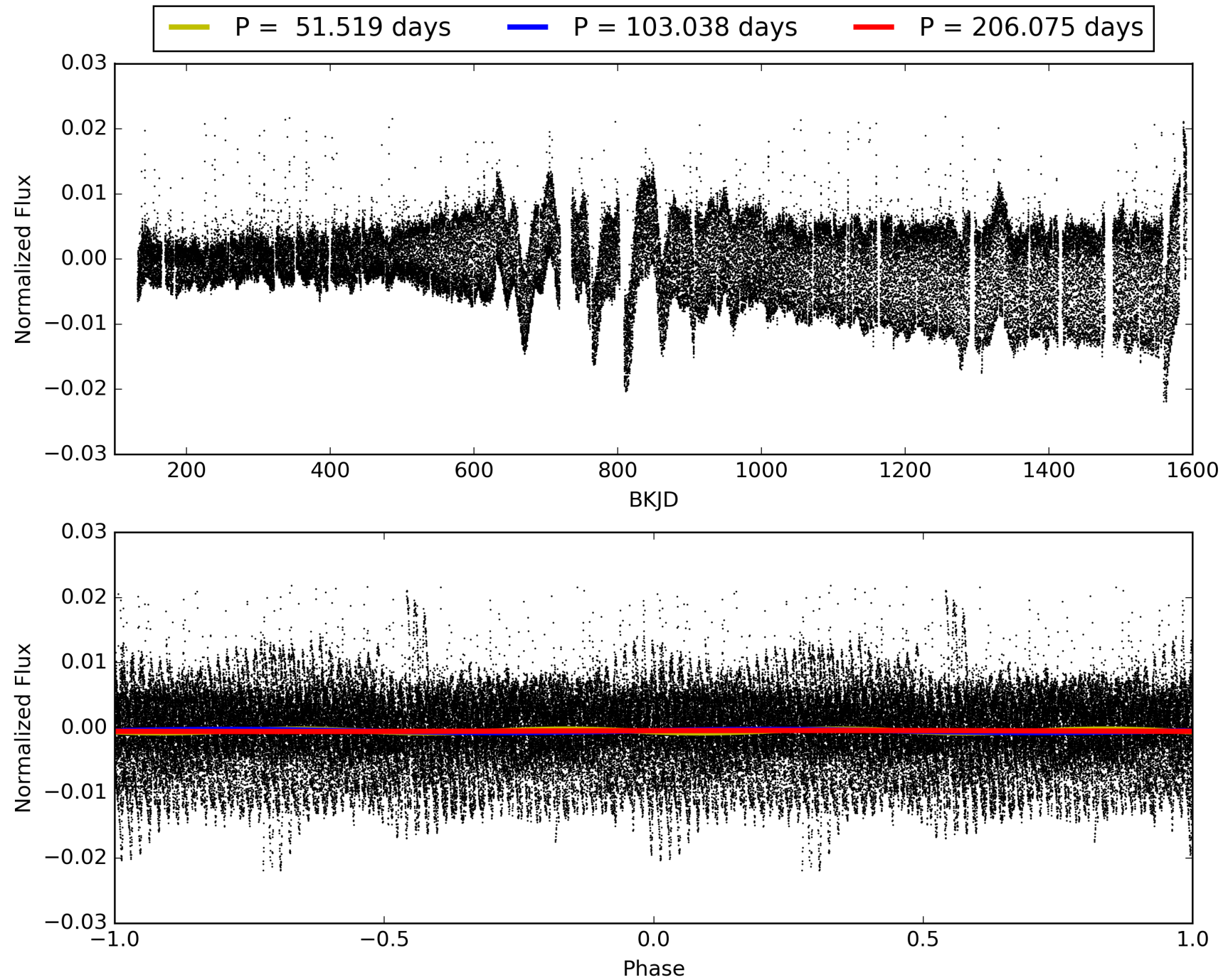
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 08:17:01 Z

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

# TCE 008149616-02, PDC Light Curves

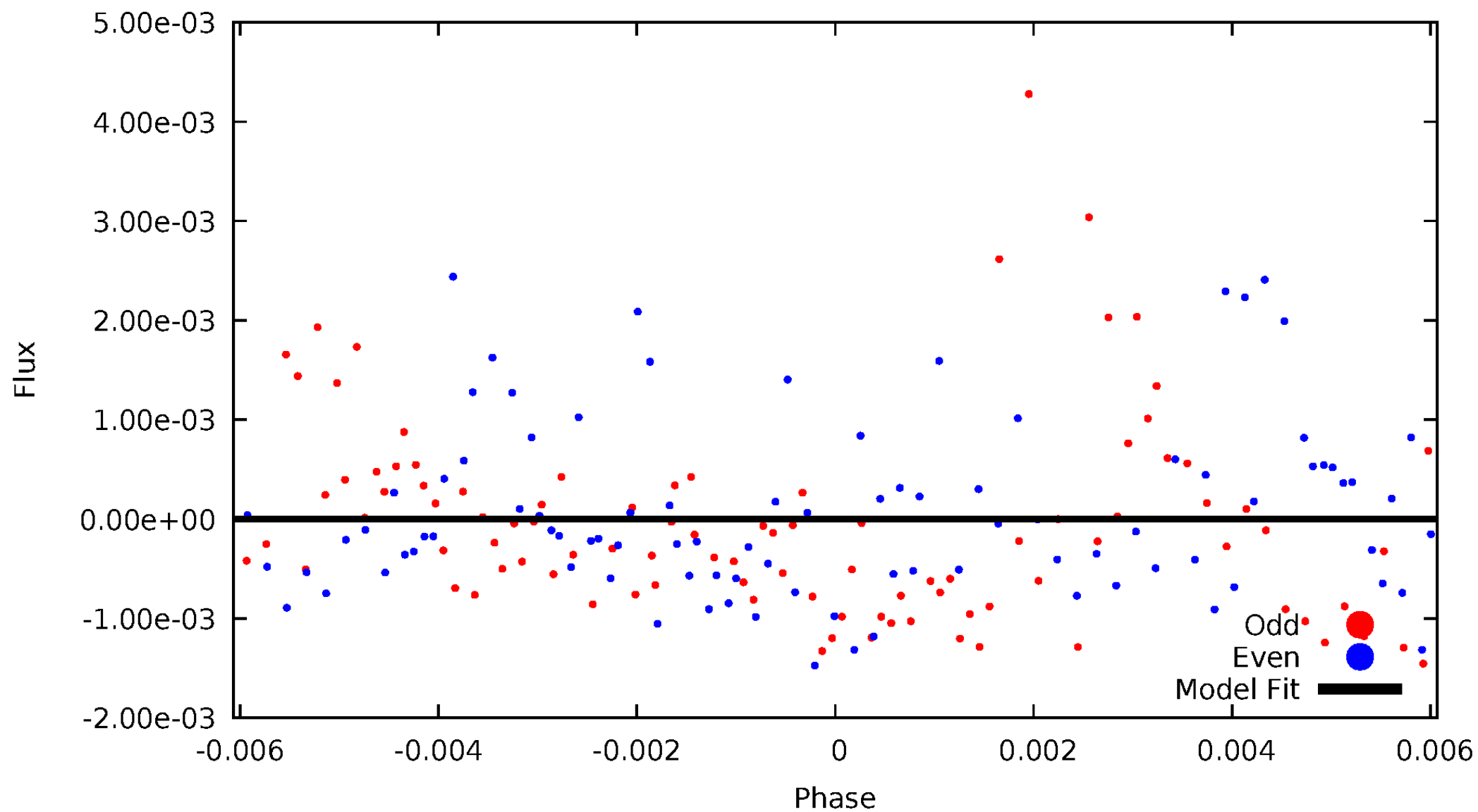


TCE 008149616-02



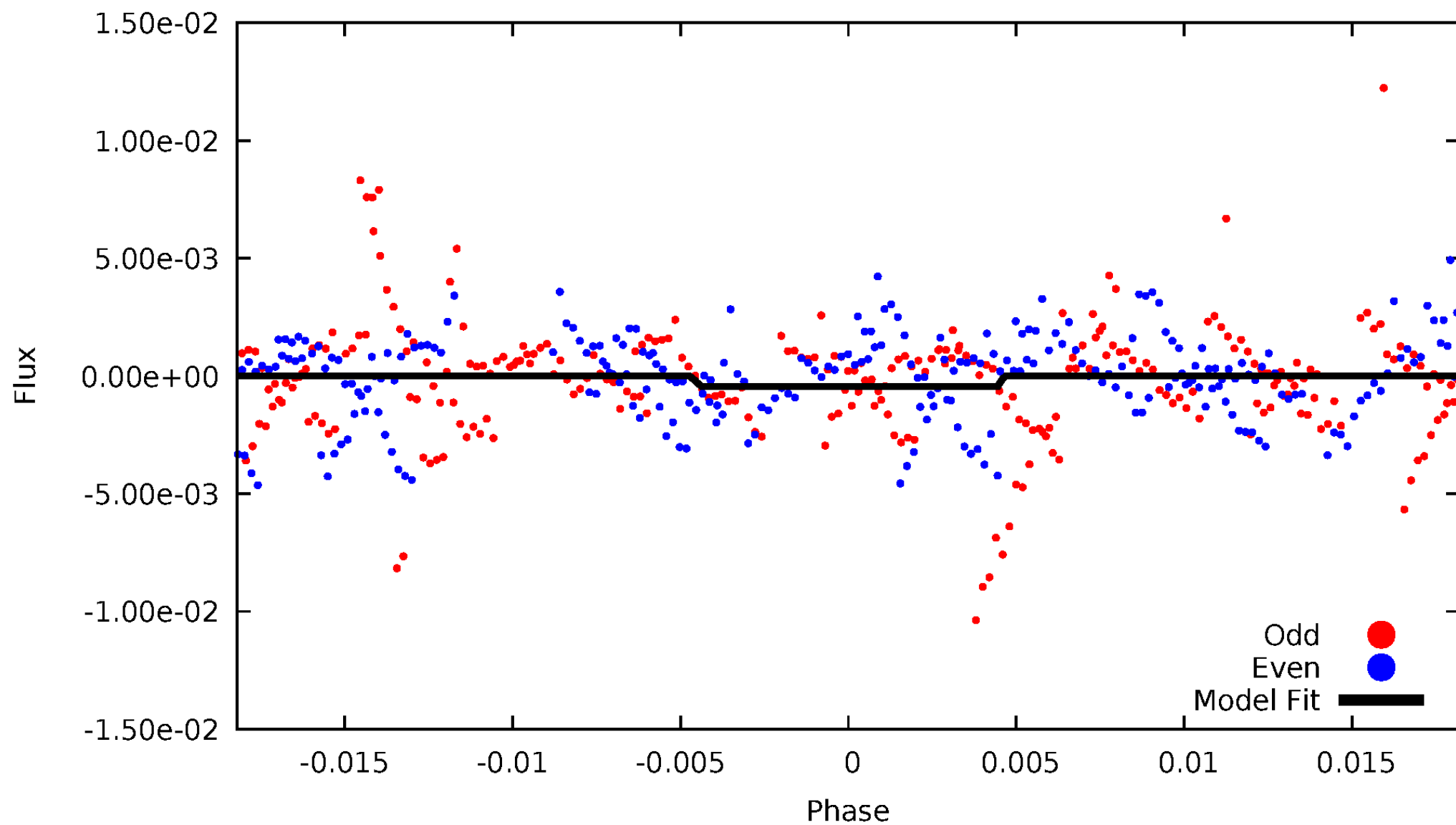
# DV Odd/Even

TCE 008149616-02



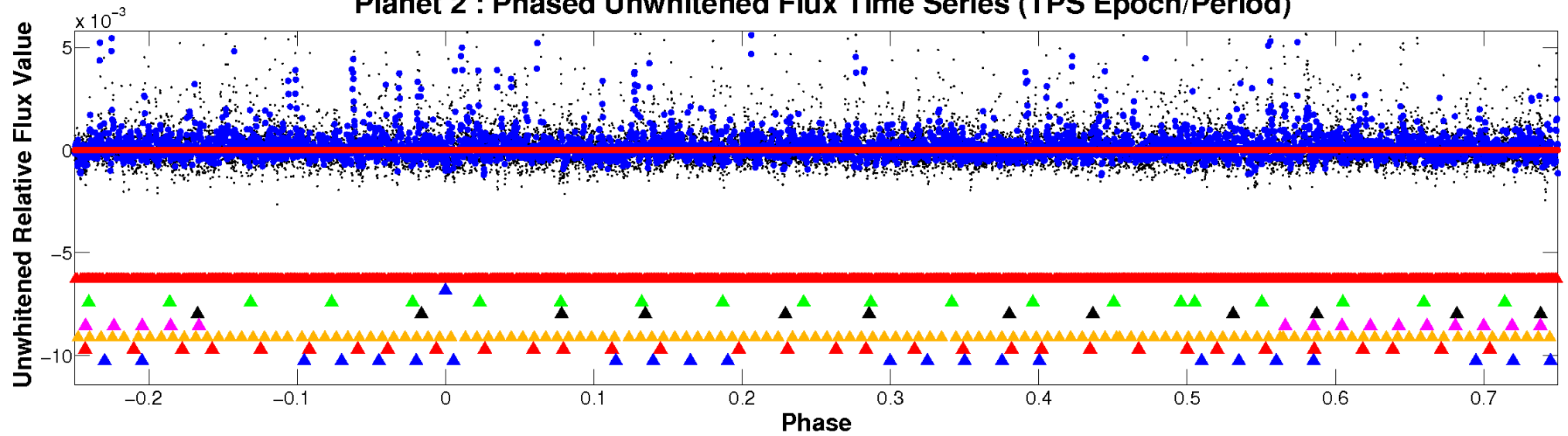
# ALT Odd/Even

TCE 008149616-02

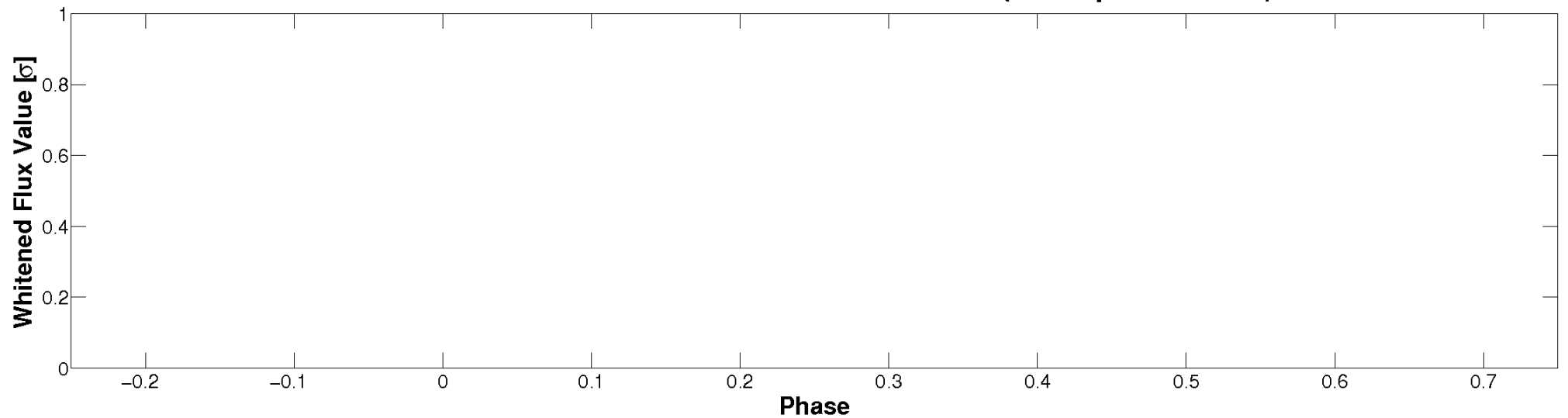


# Non-Whitened Vs. Whitened Light Curve

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



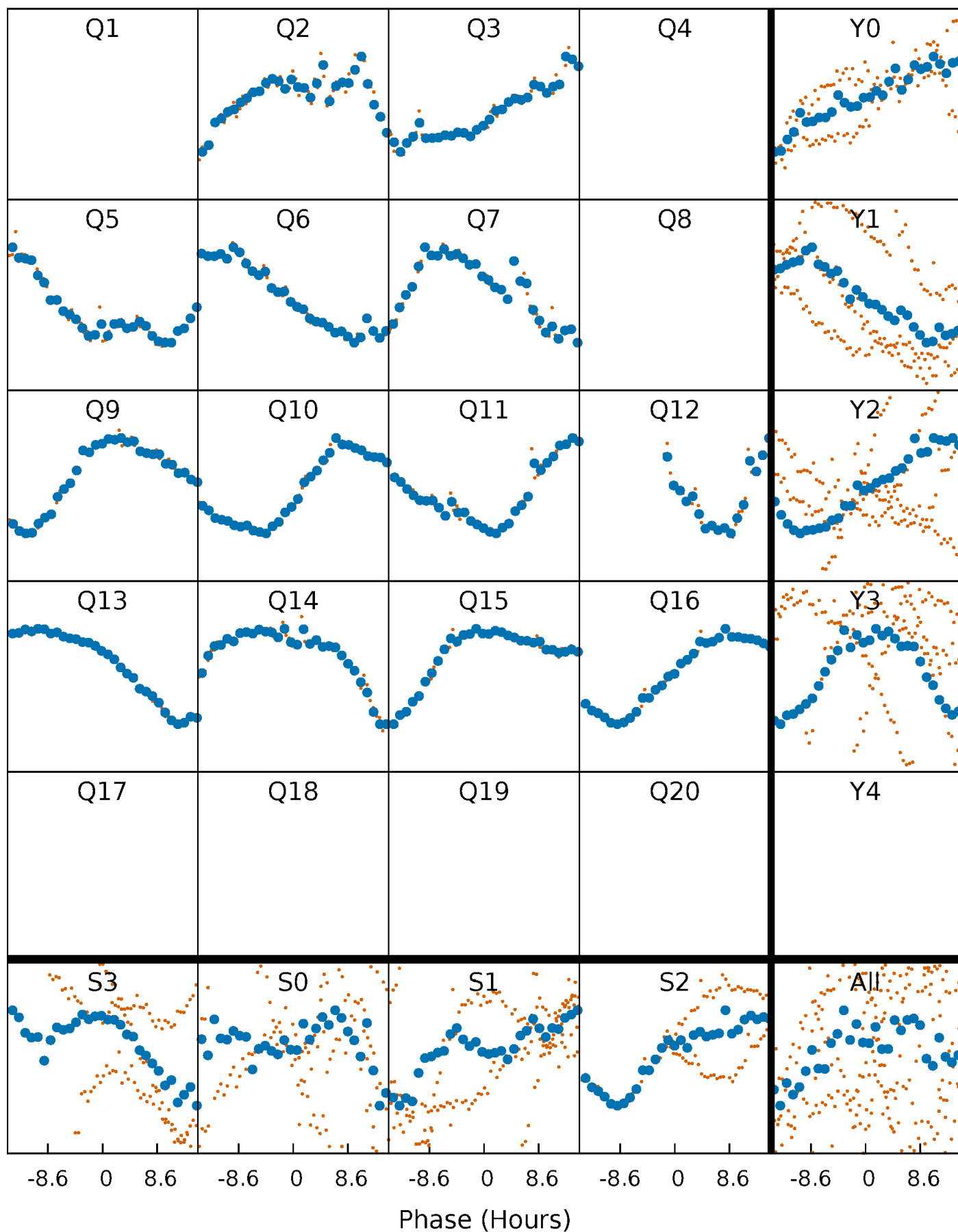
**Planet 2 : Phased Whitened Flux Time Series (TPS Epoch/Period)**





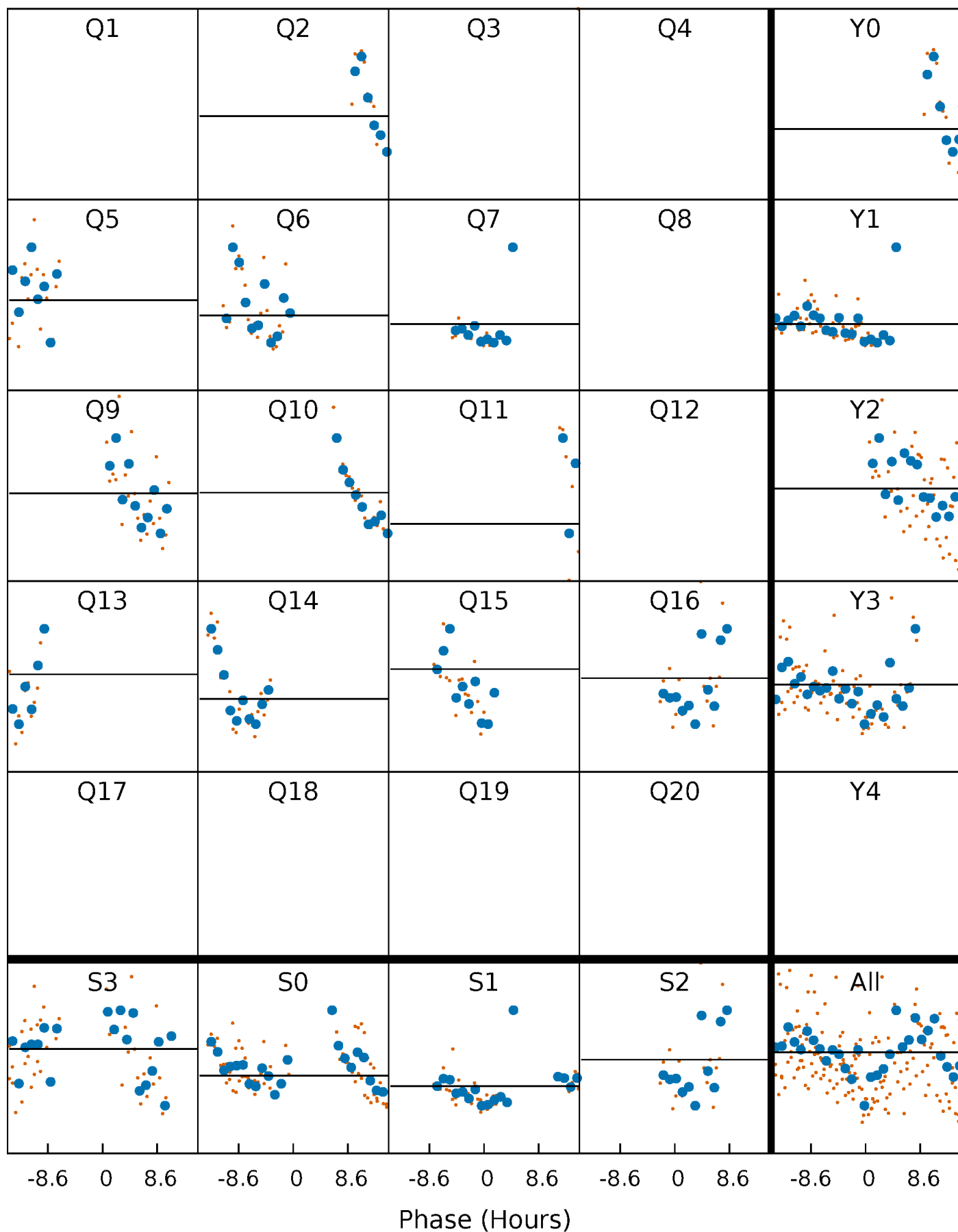
# PDC Quarter-Phased Transit Curves

TCE 008149616-02 P=103.037639 Days  $T_0=191.572038$  (BKJD)



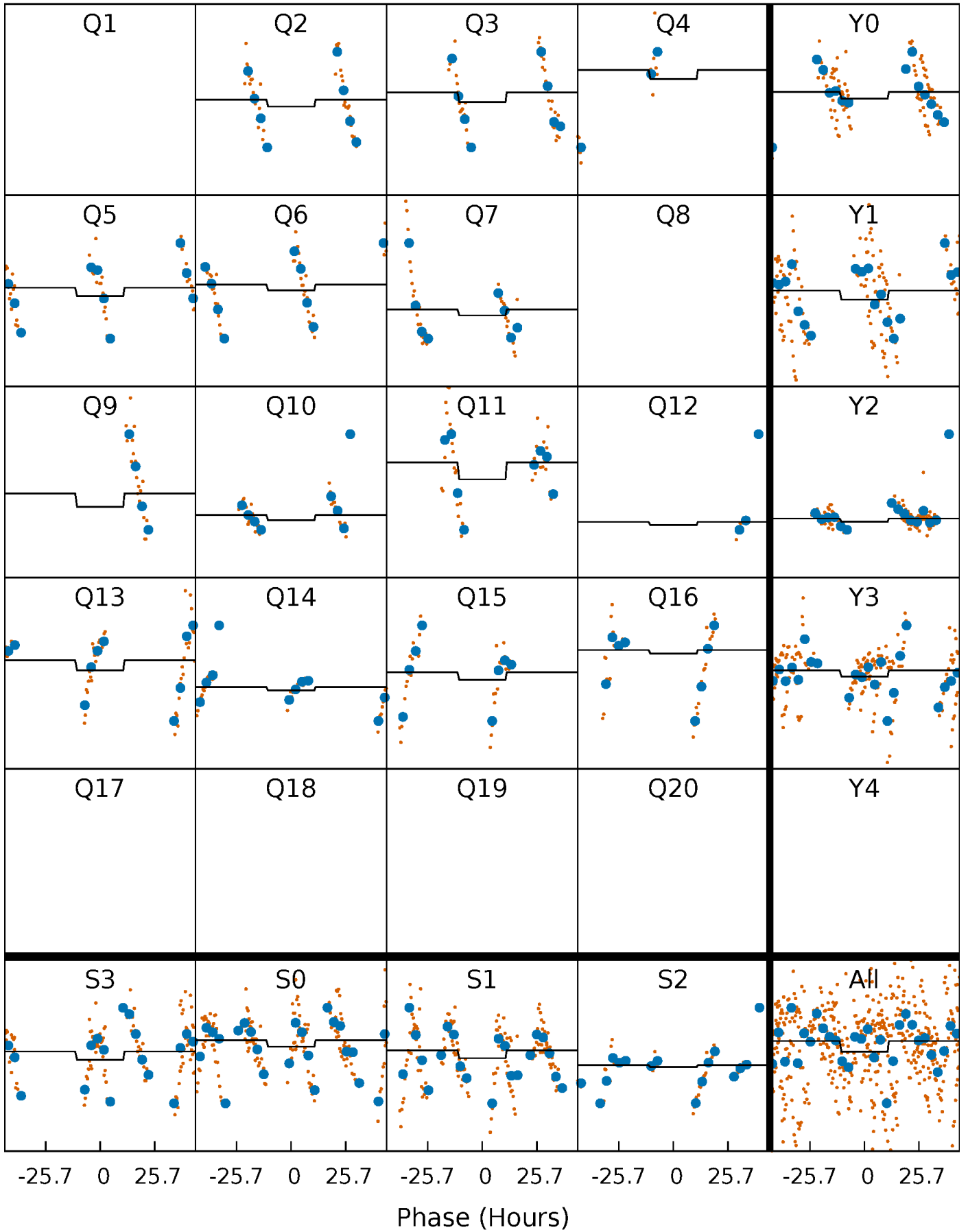
# DV Quarter-Phased Transit Curves

TCE 008149616-02   P=103.037639 Days    $T_0=191.572038$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

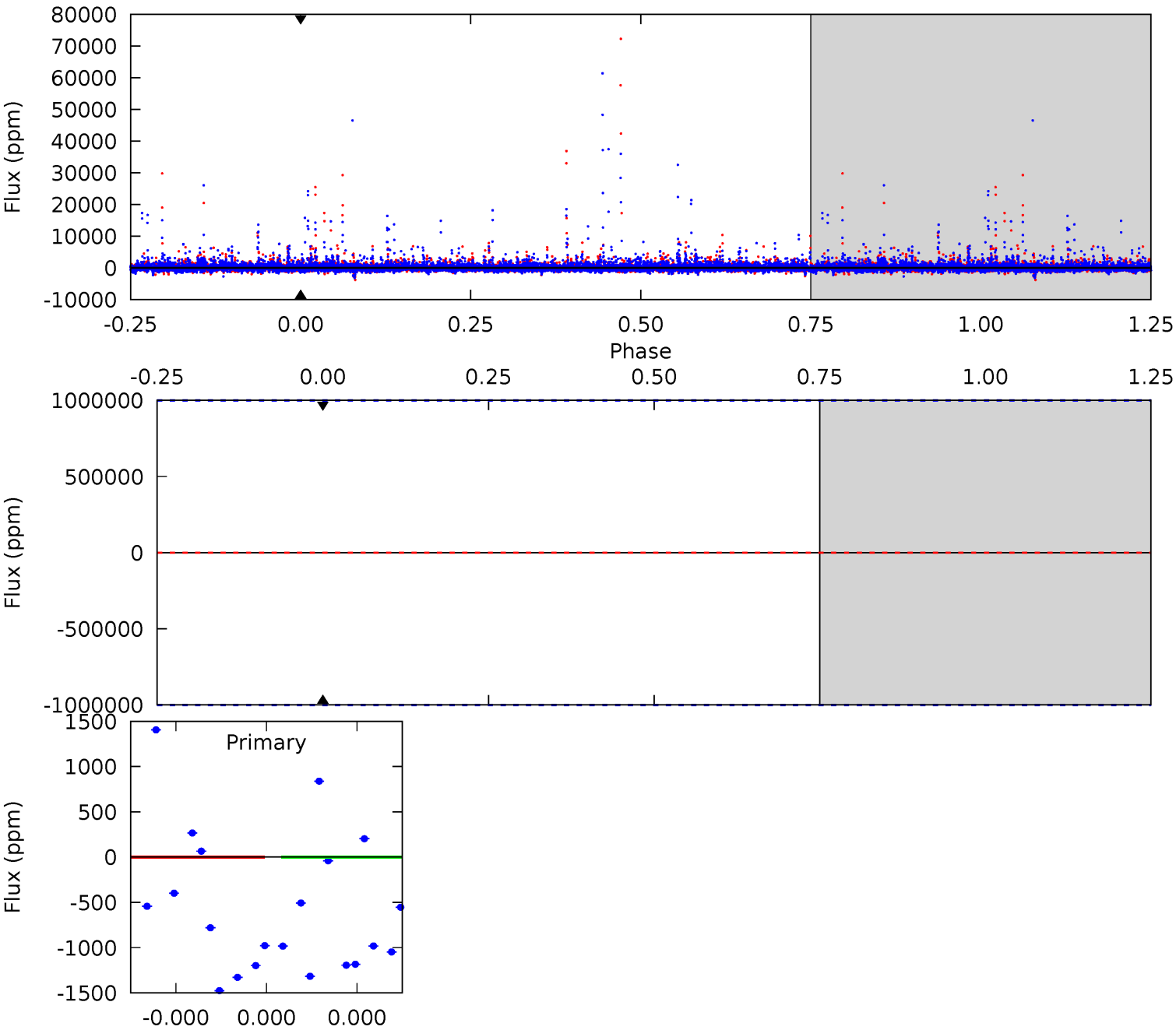
TCE 008149616-02 P=103.037639 Days  $T_0=191.084763$  (BKJD)



# DV Model-Shift Uniqueness Test

008149616-02, P = 103.037639 Days, E = 88.534399 Days

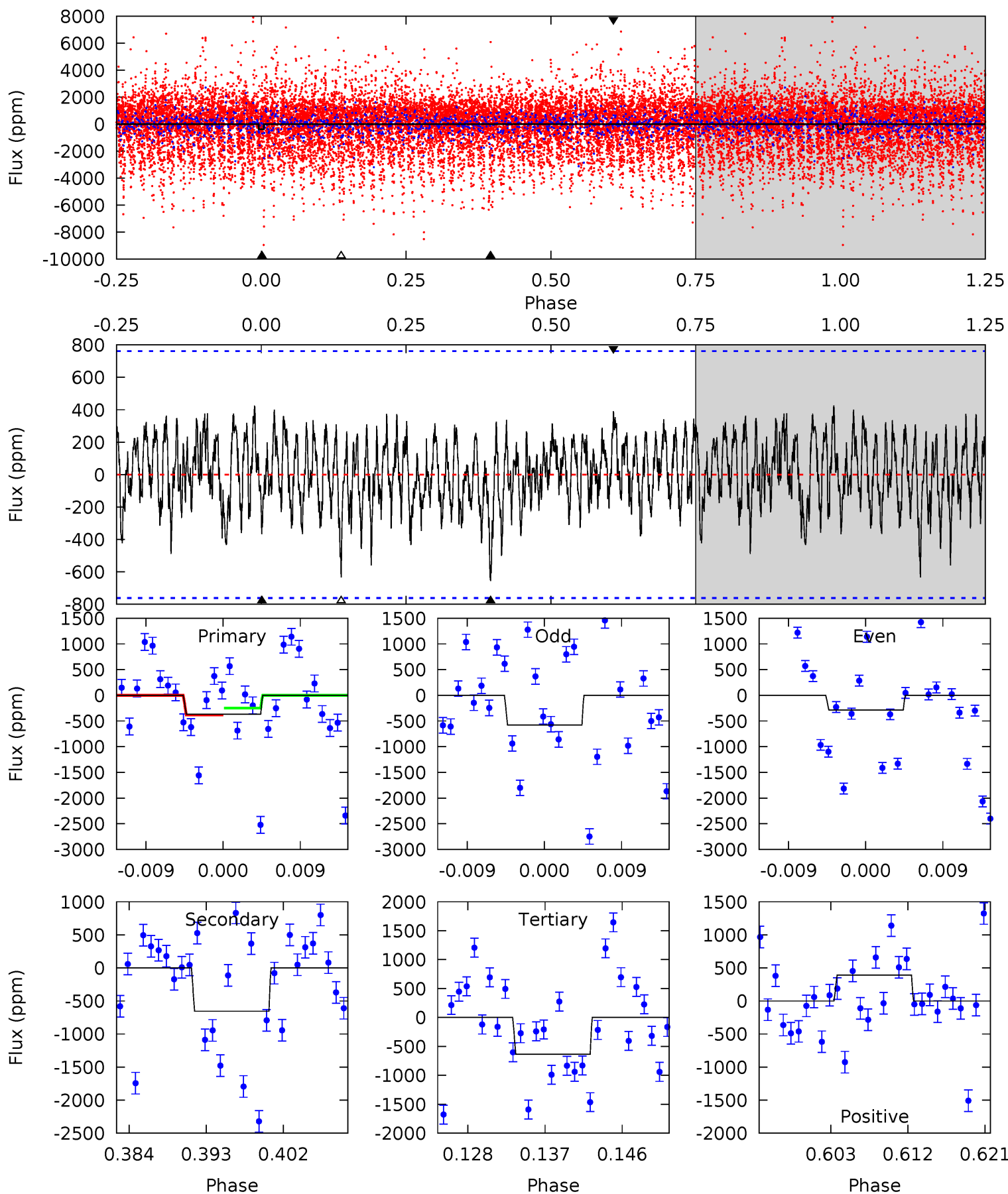
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



# Alt Model-Shift Uniqueness Test

008149616-02, P = 103.037639 Days, E = 88.047124 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
2.43	4.34	4.20	2.58	5.04	2.61	1.19	-1.77	-0.15	0.14	1.75	0.95	8.01	0.39	0.43



### Stellar Parameters For KIC 008149616

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3332^{+43}_{-36}$	$4.987^{+0.044}_{-0.040}$	$0.000^{+0.100}_{-0.100}$	$0.265^{+0.038}_{-0.027}$	$0.248^{+0.045}_{-0.030}$	$18.820^{+4.559}_{-3.663}$
	+1%/-1%	+1%/-1%	+inf%/-inf%	+14%/-10%	+18%/-12%	+24%/-19%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 008149616-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$0 \pm 1000000$	$2.45^{+2.29}_{-1.72}$	$203^{+5}_{-5}$	$3187^{+3487}_{-8873}$	$35322^{+1690202}_{-895592}$
Alt.	$-655 \pm 151$	$2.12^{+2.30}_{-1.38}$	$203^{+5}_{-5}$	$2503^{+858}_{-399}$	$5805^{+43776}_{-4546}$

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

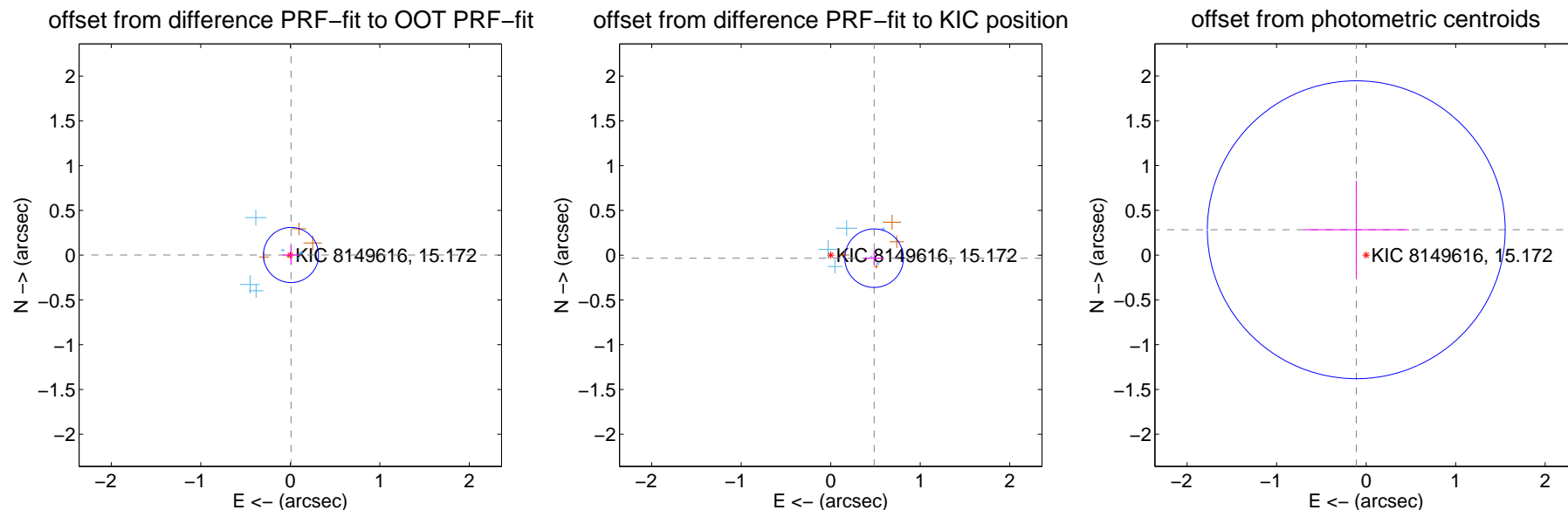
## DV Centroid Data

Supplemental centroid analysis for 008149616-02. Kepler magnitude: 15.17. Transit SNR -1.00

There are 6 quarters with good PRF difference image offsets

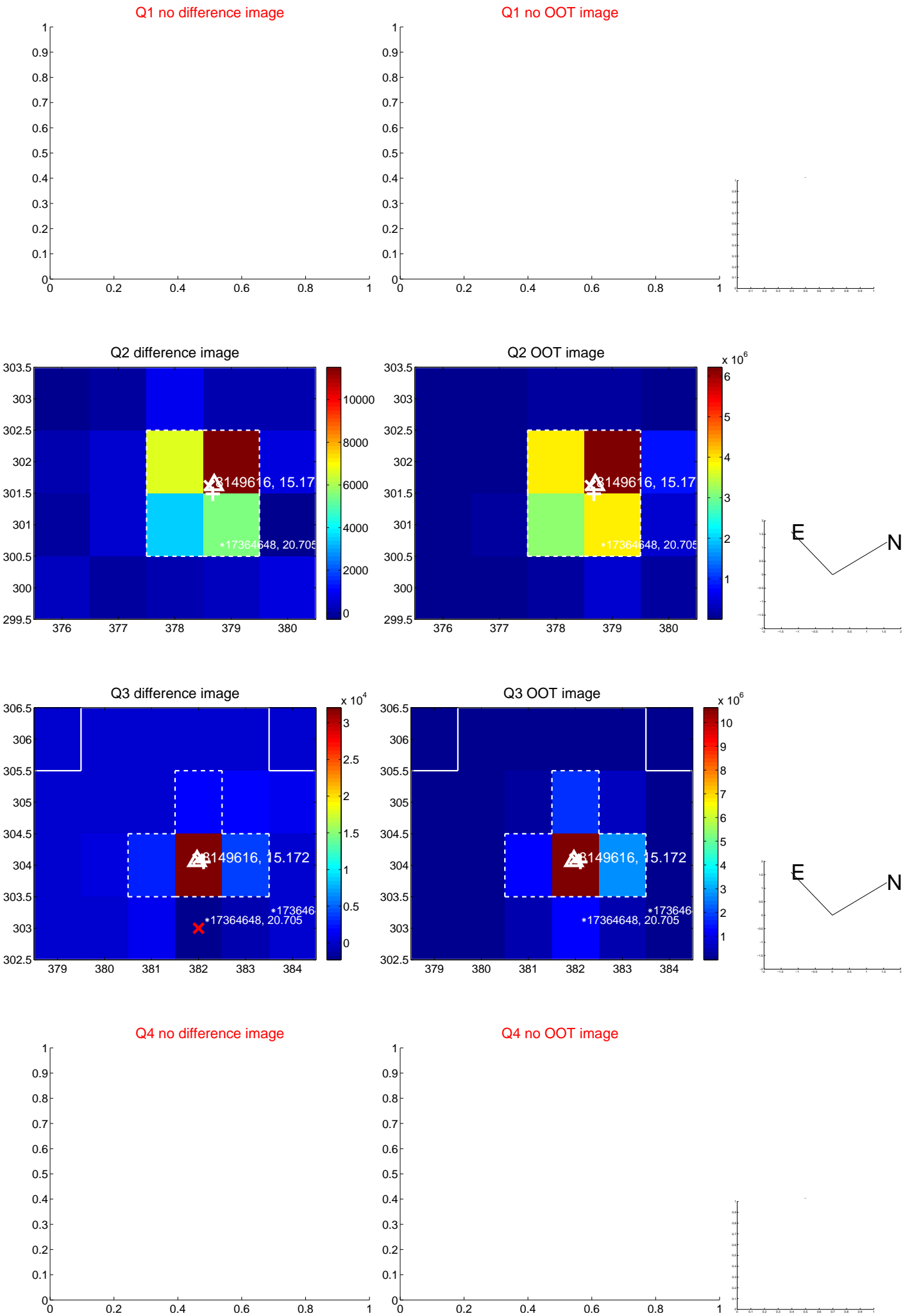
The direct PRF centroid is offset from the target star catalog position by about 0.36 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.008 \pm 0.103$	0.08	$-0.008 \pm 0.096$	$0.002 \pm 0.107$
PRF-fit source offset from KIC position	$0.486 \pm 0.109$	4.46	$-0.485 \pm 0.110$	$-0.034 \pm 0.084$
photometric centroid source offset	$0.30 \pm 0.55$	0.55	$0.11 \pm 0.59$	$0.28 \pm 0.55$



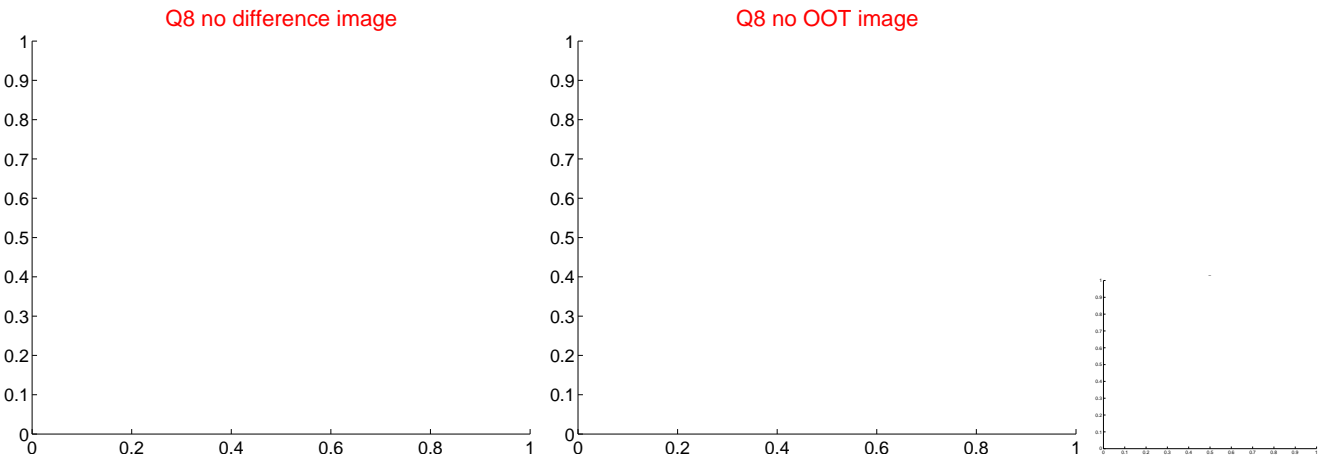
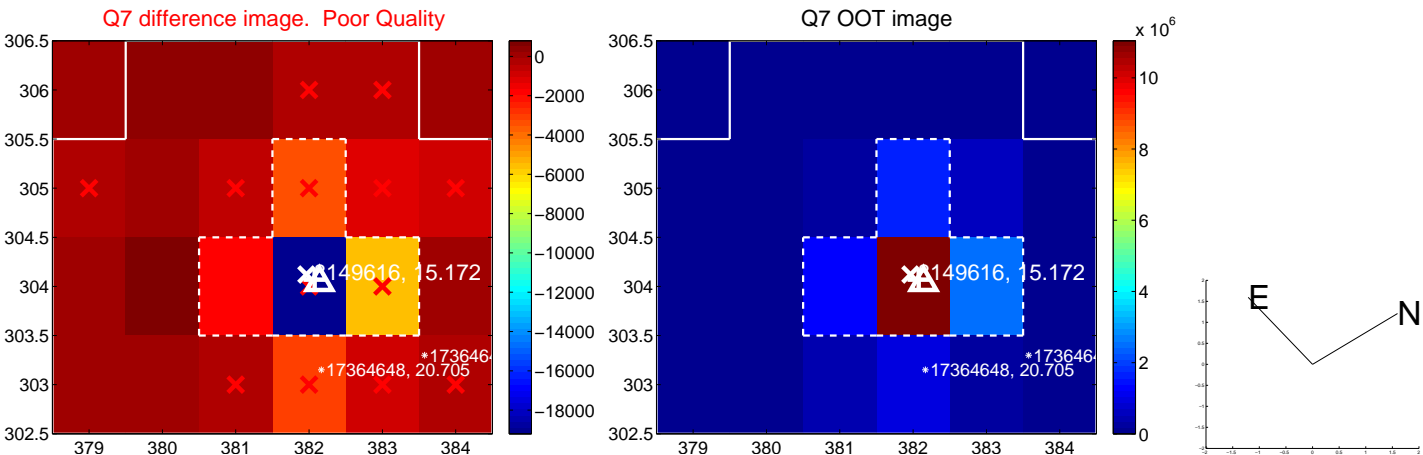
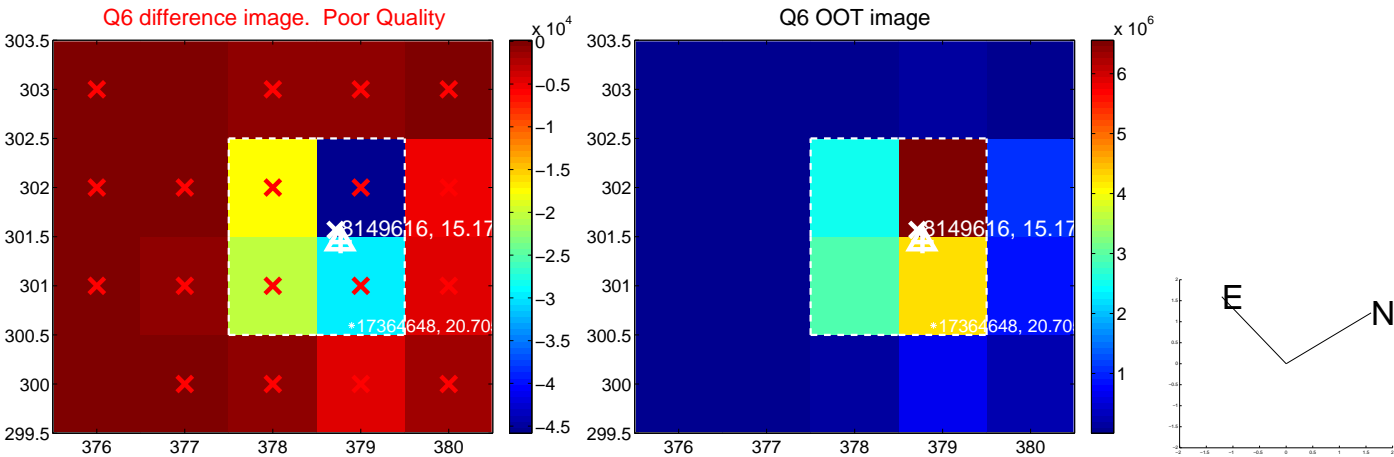
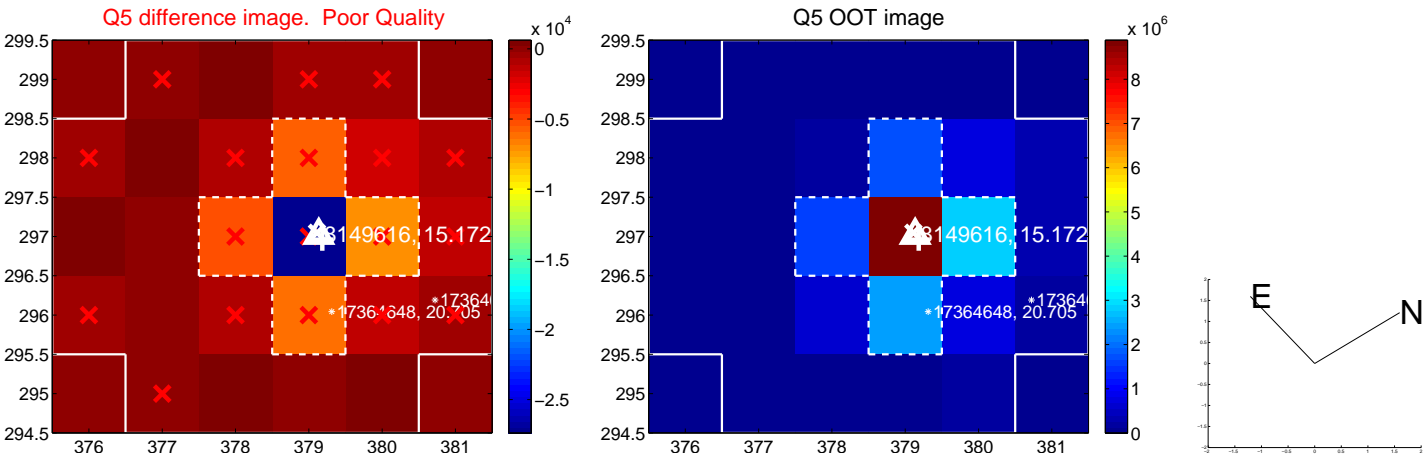
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



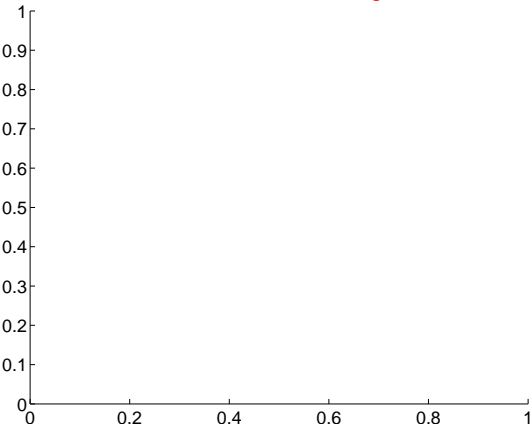


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

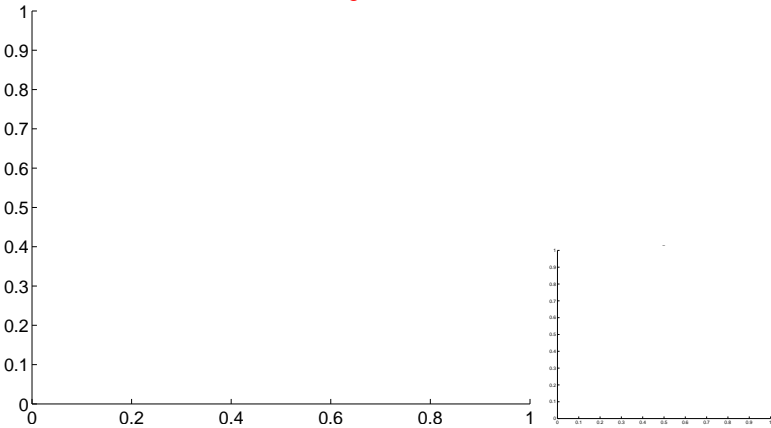


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

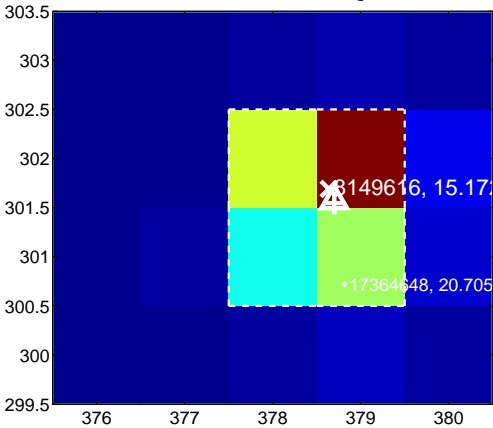
Q9 no difference image



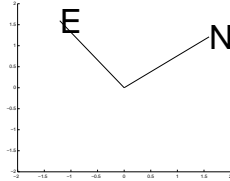
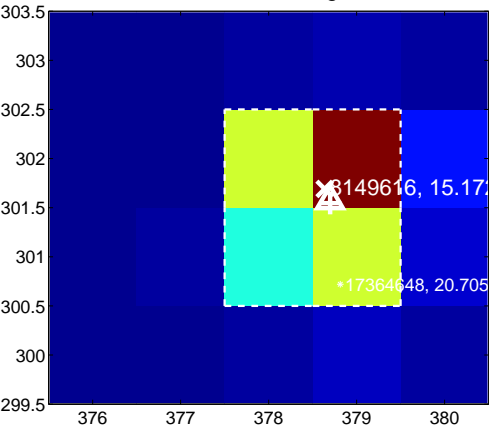
Q9 no OOT image



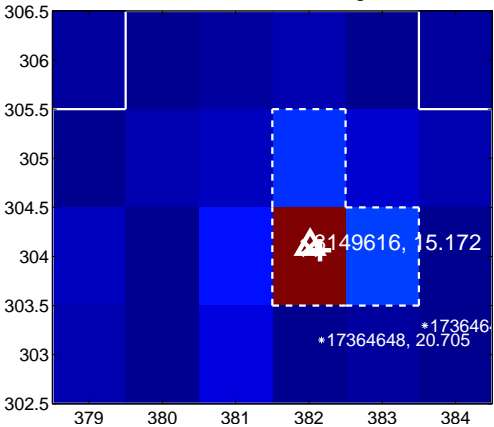
Q10 difference image



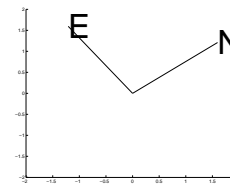
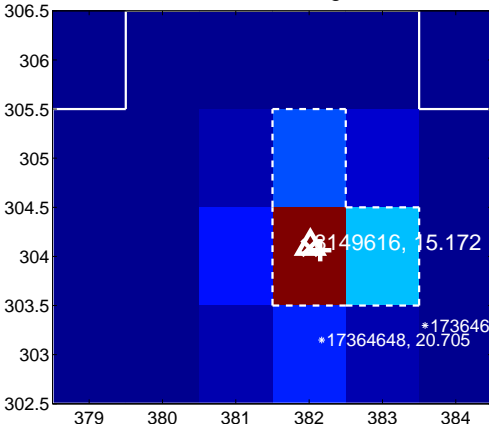
Q10 OOT image



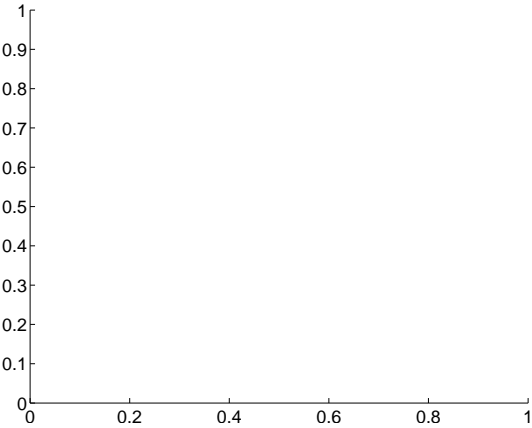
Q11 difference image



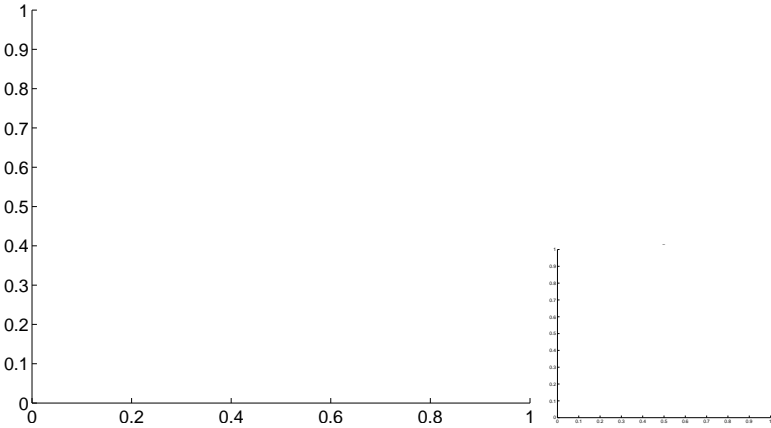
Q11 OOT image



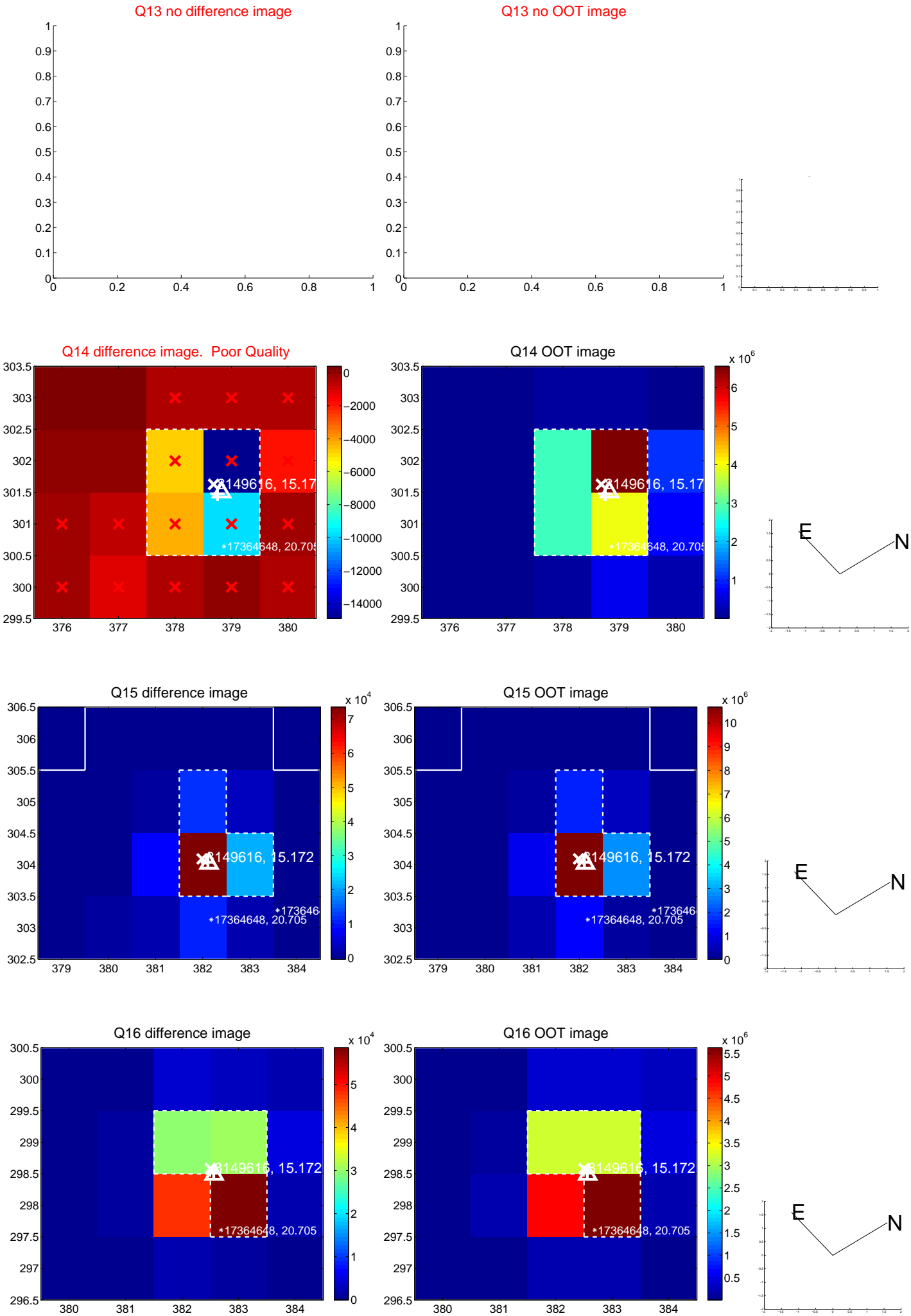
Q12 no difference image



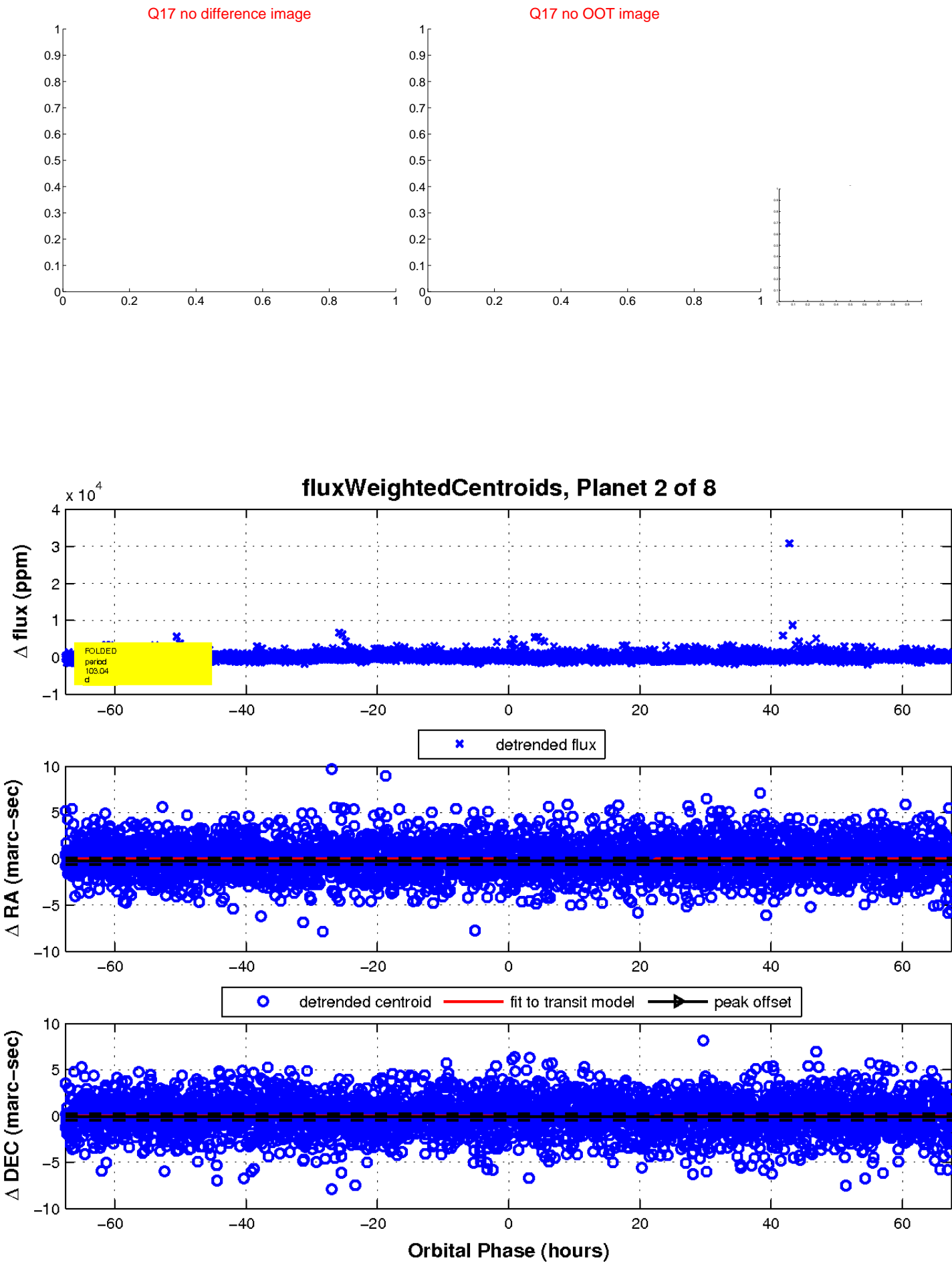
Q12 no OOT image



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

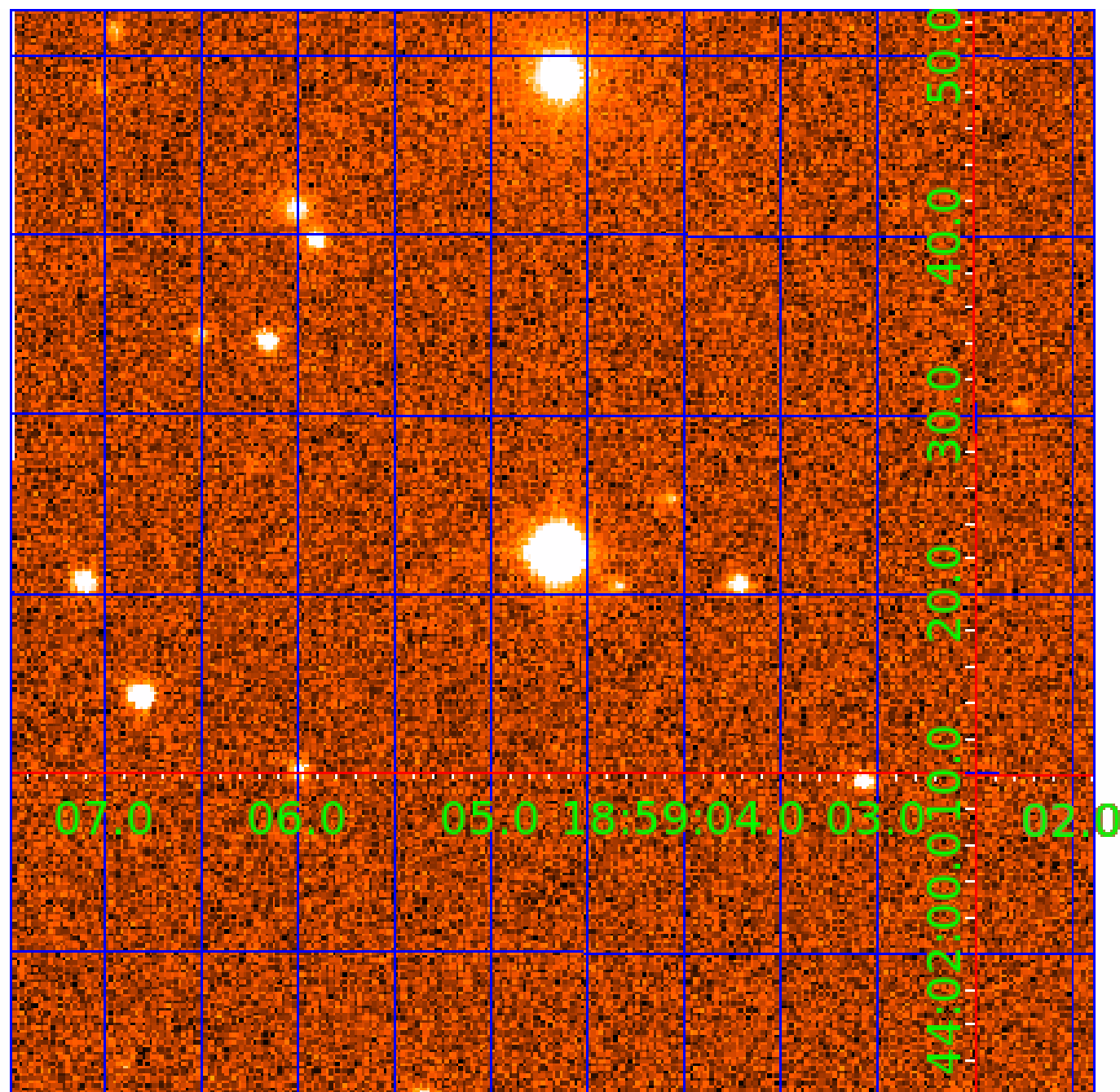


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 008149616

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008149616-01	OBS	No	1.780615	132.506653	106.6	10.625	12.2	9.1	0.27	3332	0.28	23.72
008149616-02	OBS	No	103.037639	191.572038	1341.1	7.500	13.7	-1.0	0.27	3332	0.96	0.11
008149616-03	OBS	No	75.872076	140.582029	1321.3	3.000	10.3	-1.0	0.27	3332	0.95	0.16
008149616-04	OBS	No	118.587620	199.638830	818.9	41.613	10.2	7.4	0.27	3332	0.75	0.09
008149616-05	OBS	No	101.068333	174.446642	1333.8	4.115	9.1	7.7	0.27	3332	1.91	0.11
008149616-06	OBS	No	11.360095	135.155291	323.3	4.579	9.0	7.8	0.27	3332	0.51	2.00
008149616-07	OBS	No	45.419802	152.259980	583.6	16.676	9.8	8.3	0.27	3332	0.67	0.32
008149616-08	OBS	No	62.341047	160.117011	578.1	5.954	9.8	9.3	0.27	3332	0.66	0.21

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008149616-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—CENT_KIC_POS
008149616-02	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—INCONSISTENT_TRANS—CENT_NOFITS
008149616-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_NOFITS
008149616-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES—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
008149616-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS
008149616-06	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
008149616-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT
008149616-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—CENT_KIC_POS

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

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

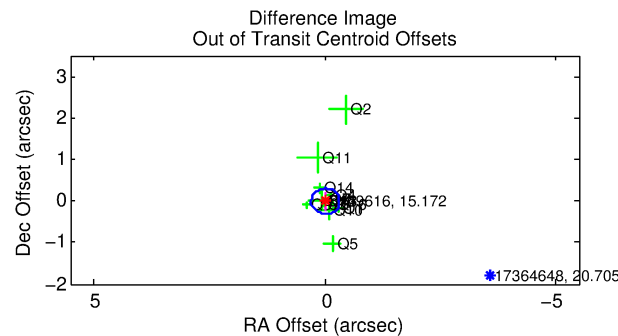
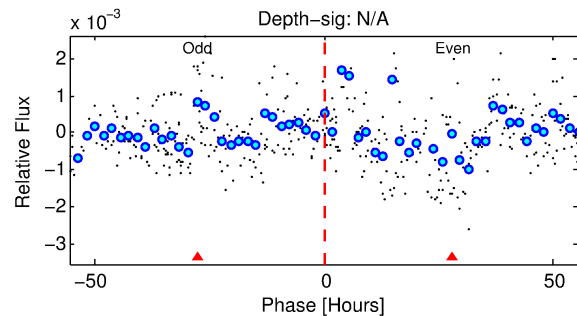
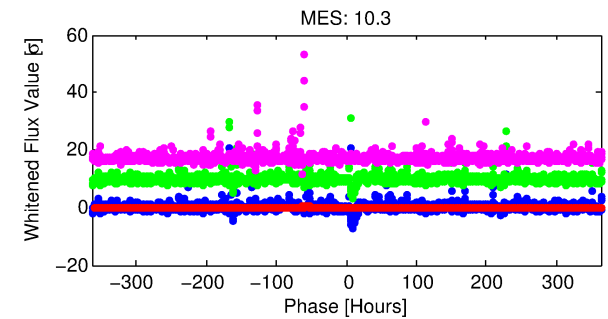
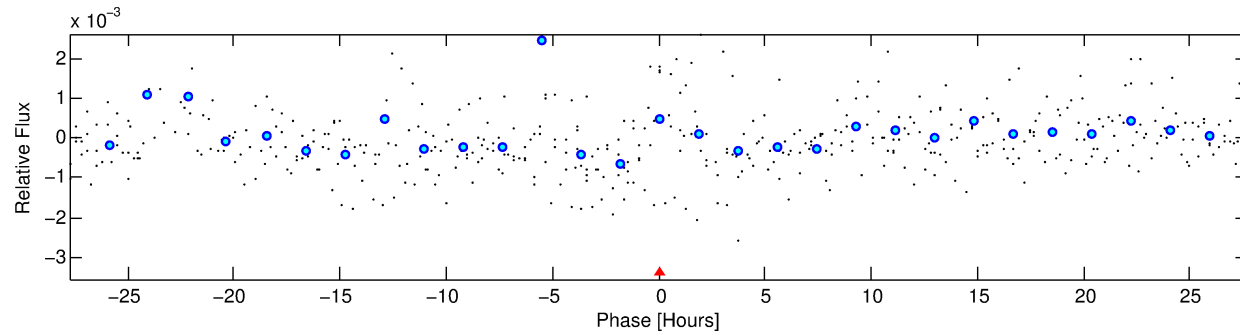
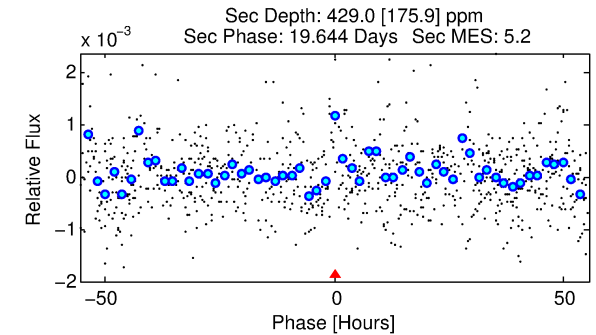
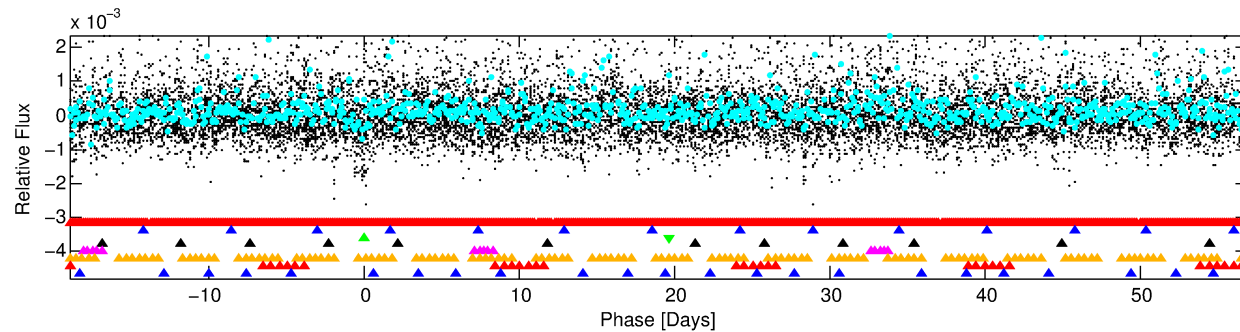
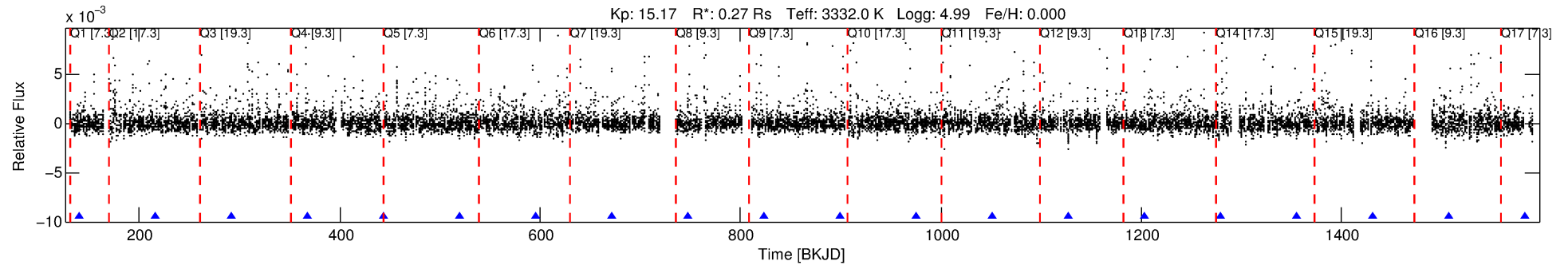
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 008149616-03

No Significant Match Found

# DV One-Page Summary

KIC: 8149616 Candidate: 3 of 8 Period: 75.872 d



TPS TCE Results:

Period = 75.87208 d  
Epoch = 140.5820 BKJD

DV fit results are unavailable

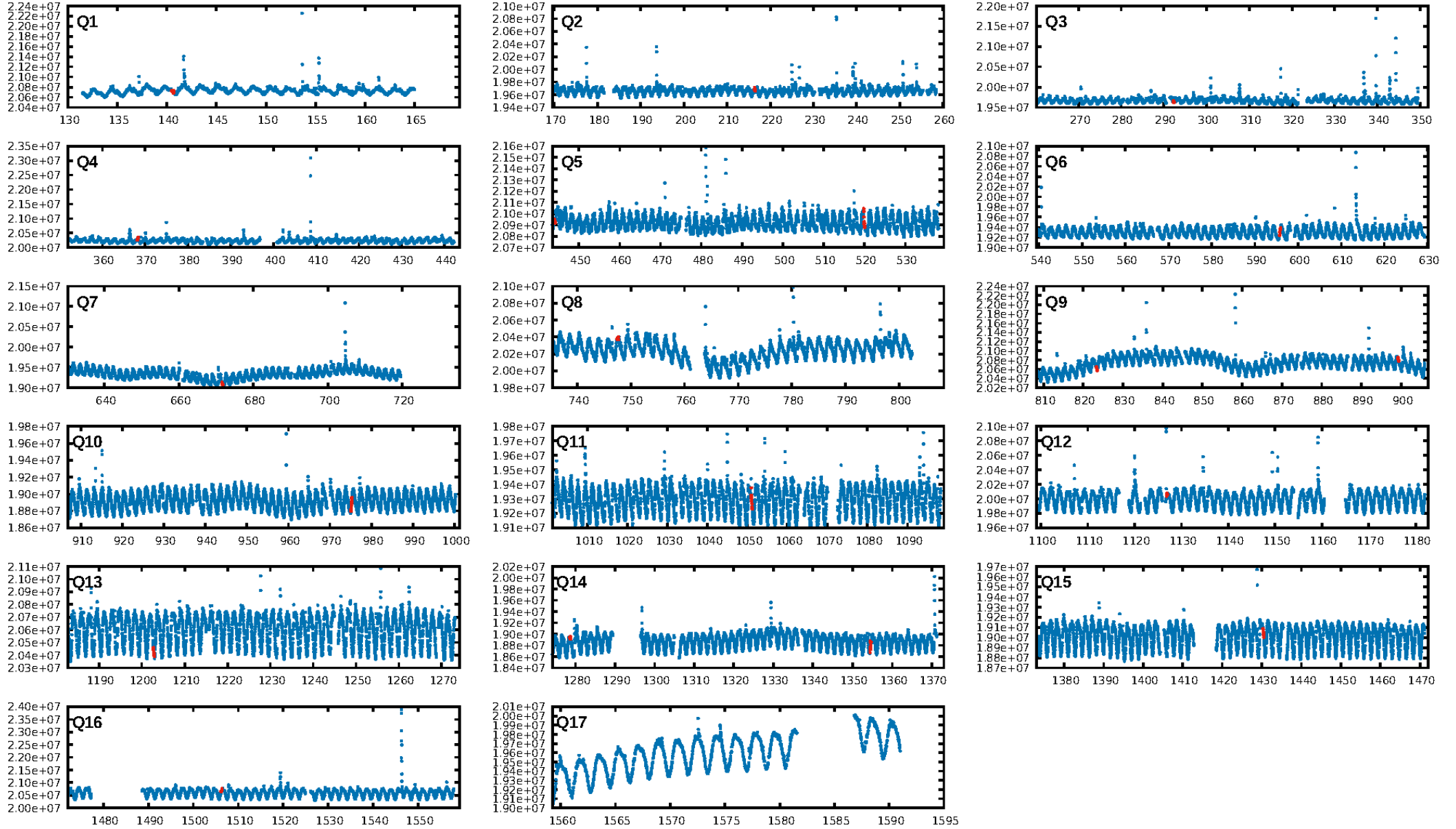
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [48.71σ]  
LongPeriod-sig: 100.0% [118.74σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [8/8]  
GhostDiagnostic-chr: -0.4901  
Centroid-sig: 9.8%  
Centroid-so: 0.659 arcsec [1.85σ]  
OotOffset-rm: 0.016 arcsec [0.16σ]  
KicOffset-rm: 0.446 arcsec [5.09σ]  
OotOffset-st: 4/3/3/4 [14]  
KicOffset-st: 4/3/3/4 [14]  
DiffImageQuality-fgm: 0.50 [7/14]  
DiffImageOverlap-fno: 0.00 [0/14]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 08:17:04 Z

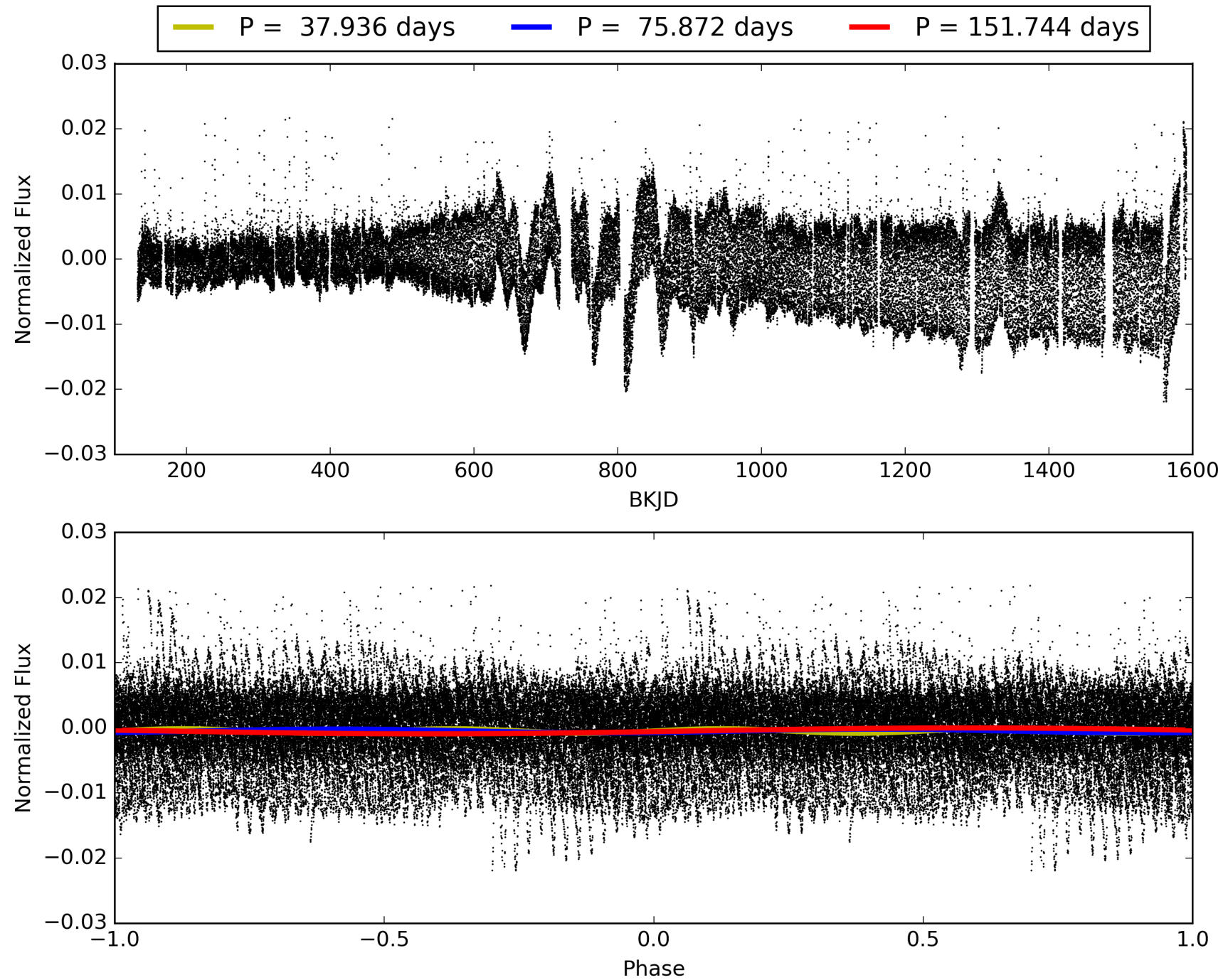
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 008149616-03, PDC Light Curves



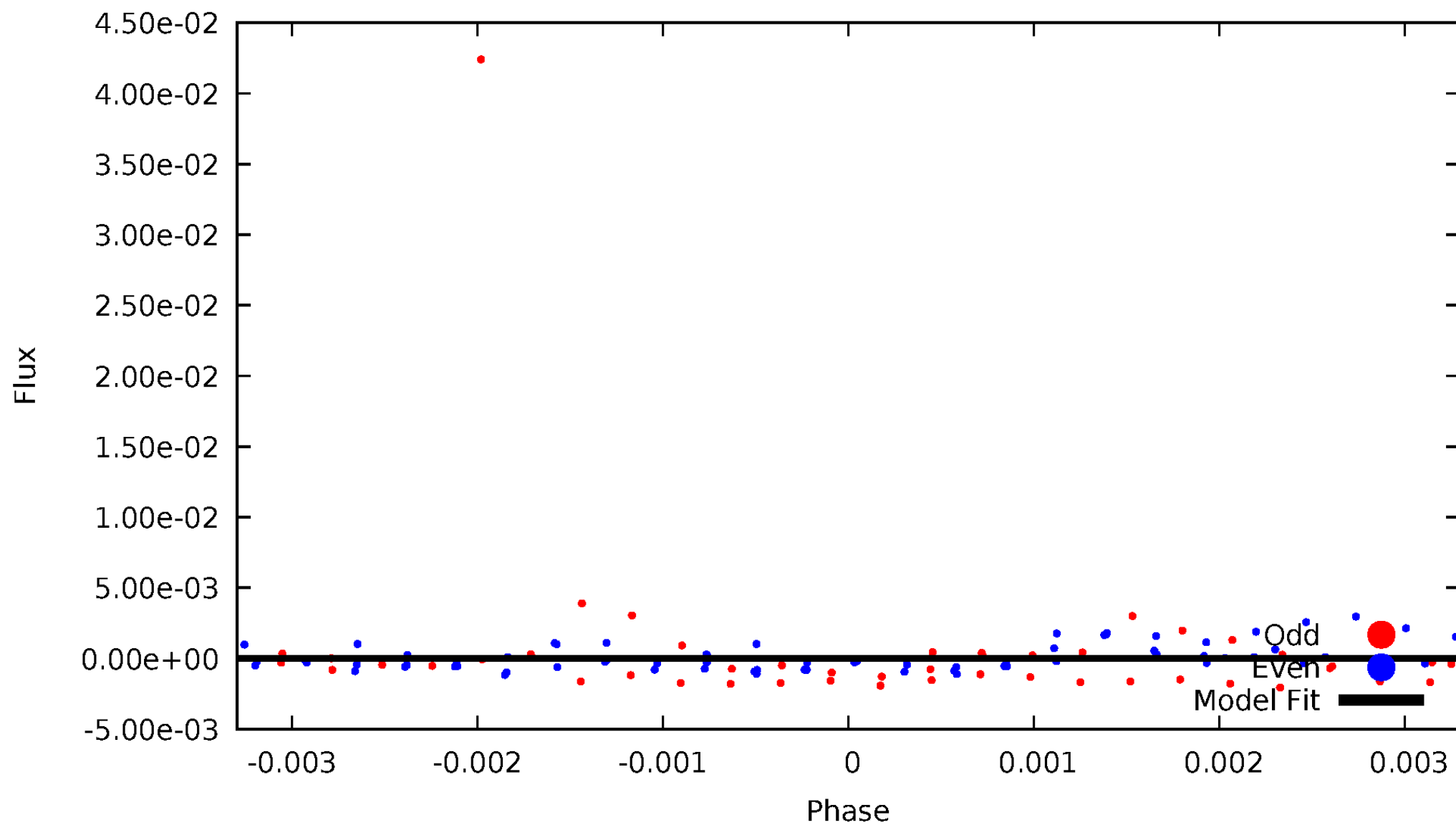


# TCE 008149616-03



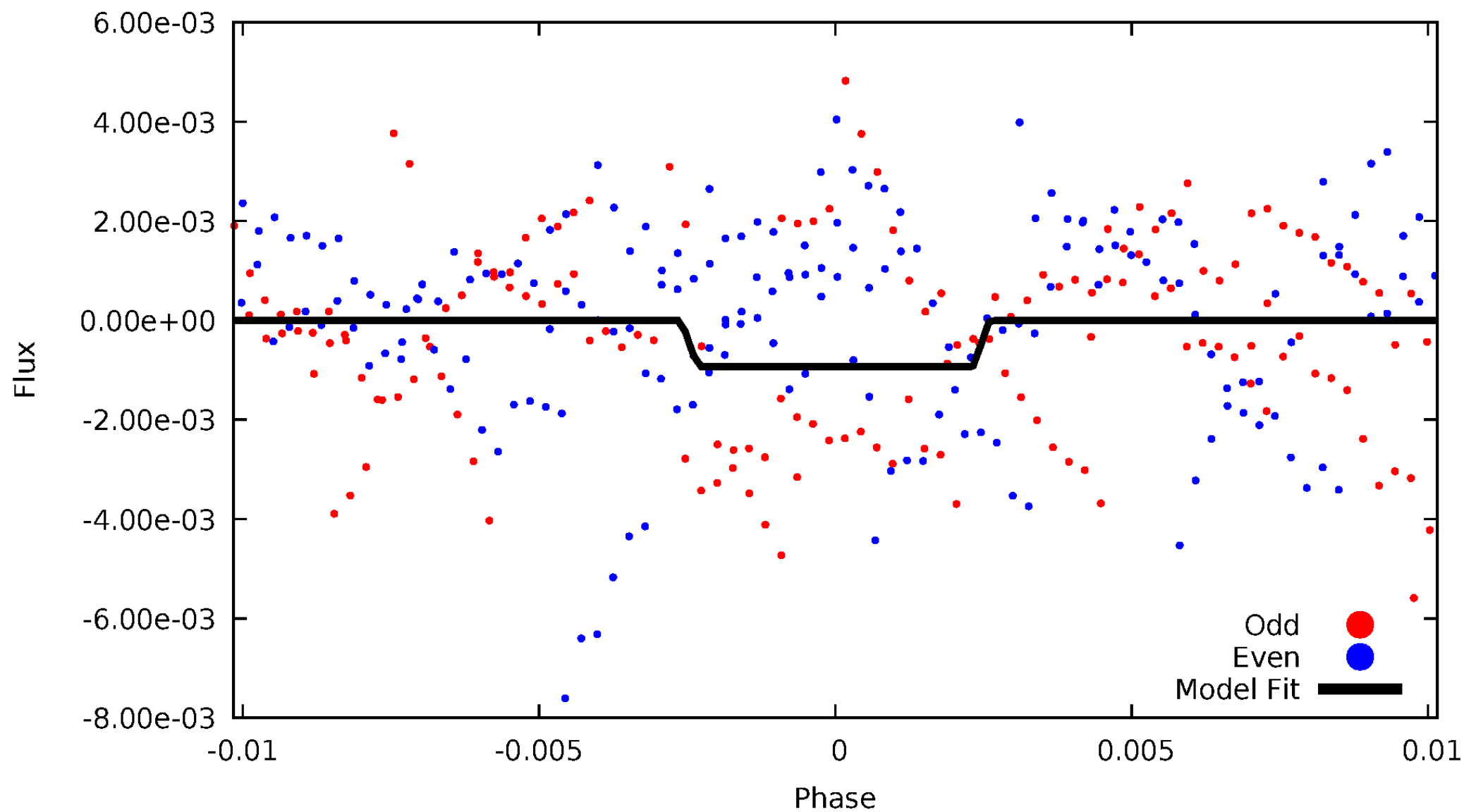
# DV Odd/Even

TCE 008149616-03

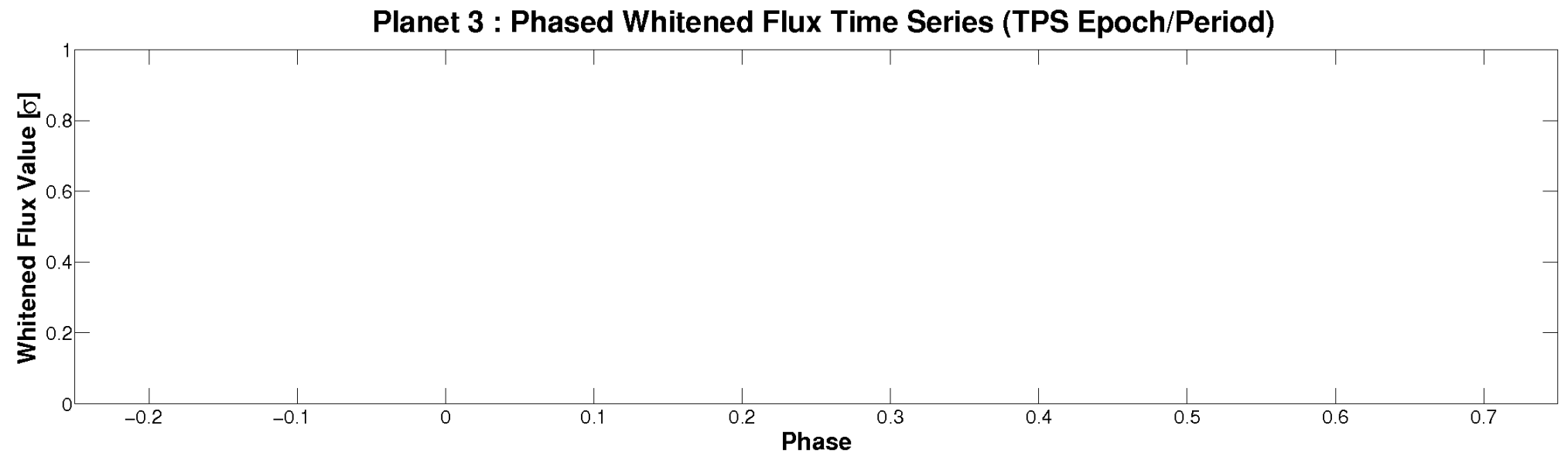
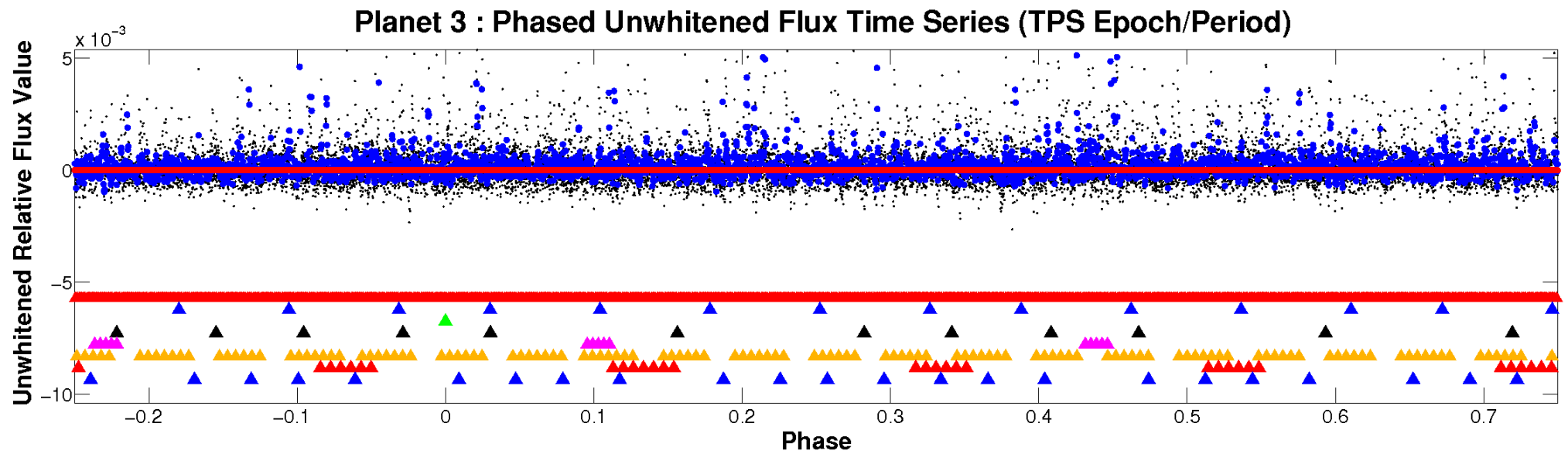


# ALT Odd/Even

TCE 008149616-03

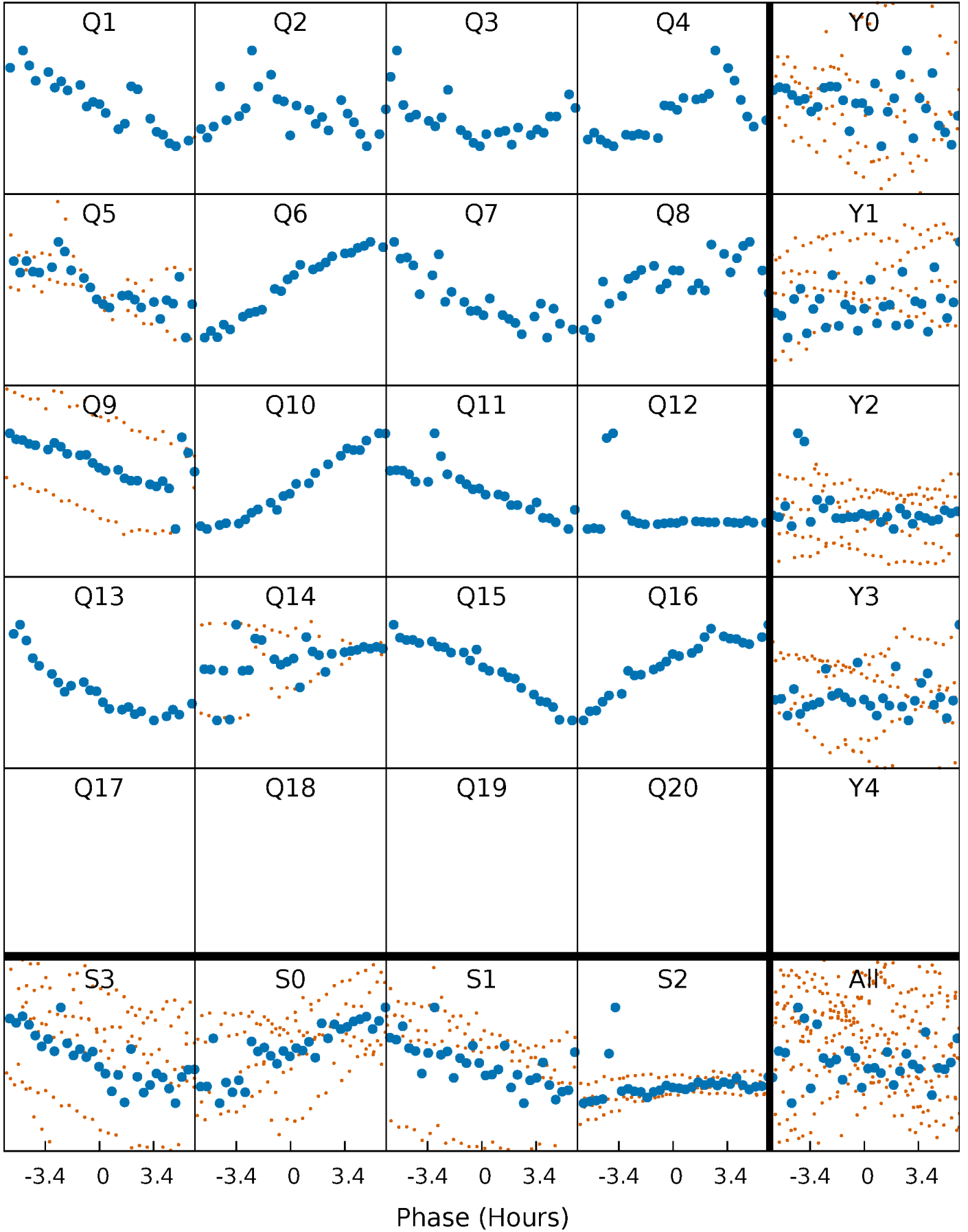


# Non-Whitened Vs. Whitened Light Curve



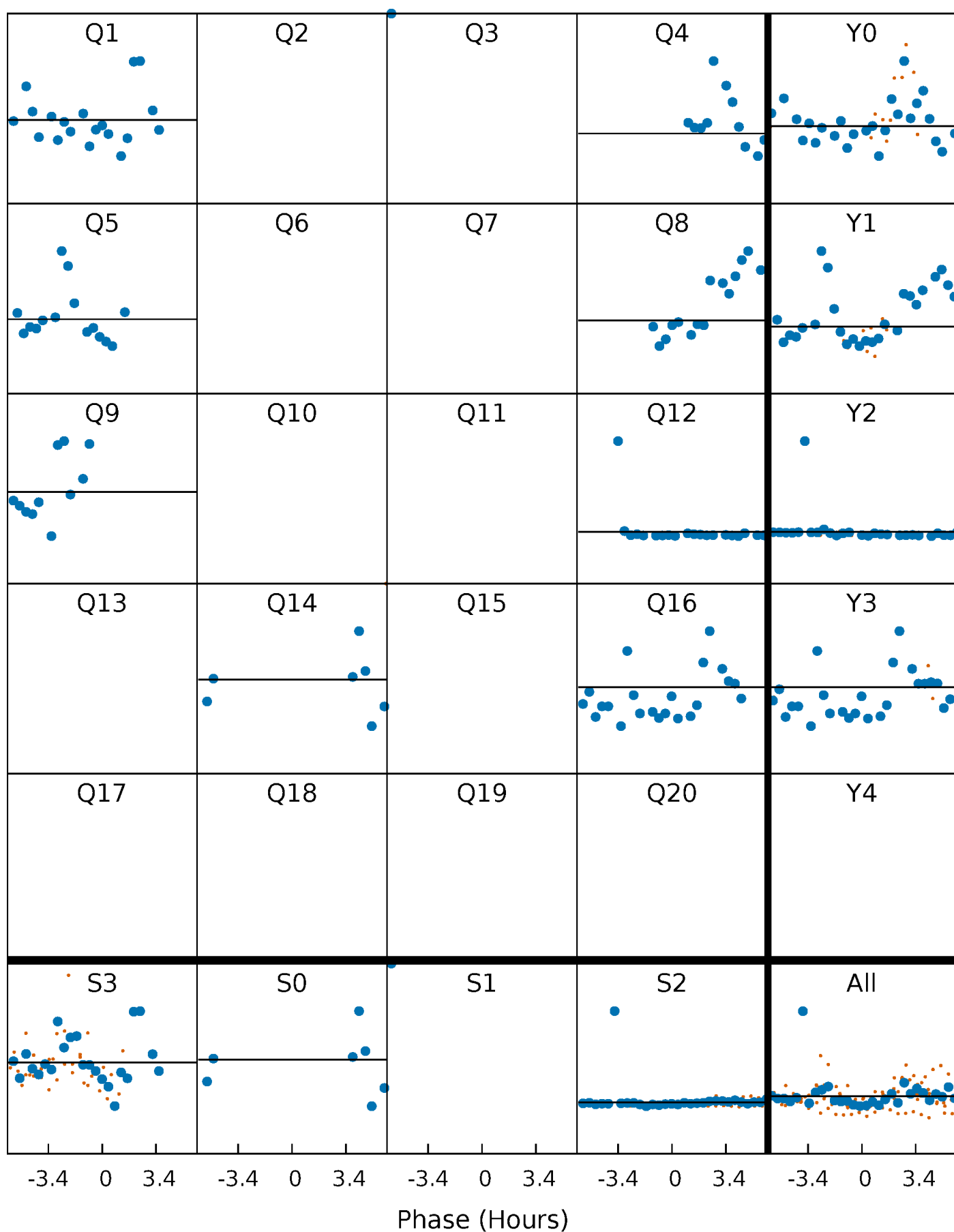
# PDC Quarter-Phased Transit Curves

TCE 008149616-03   P= 75.872076 Days    $T_0=140.582029$  (BKJD)



# DV Quarter-Phased Transit Curves

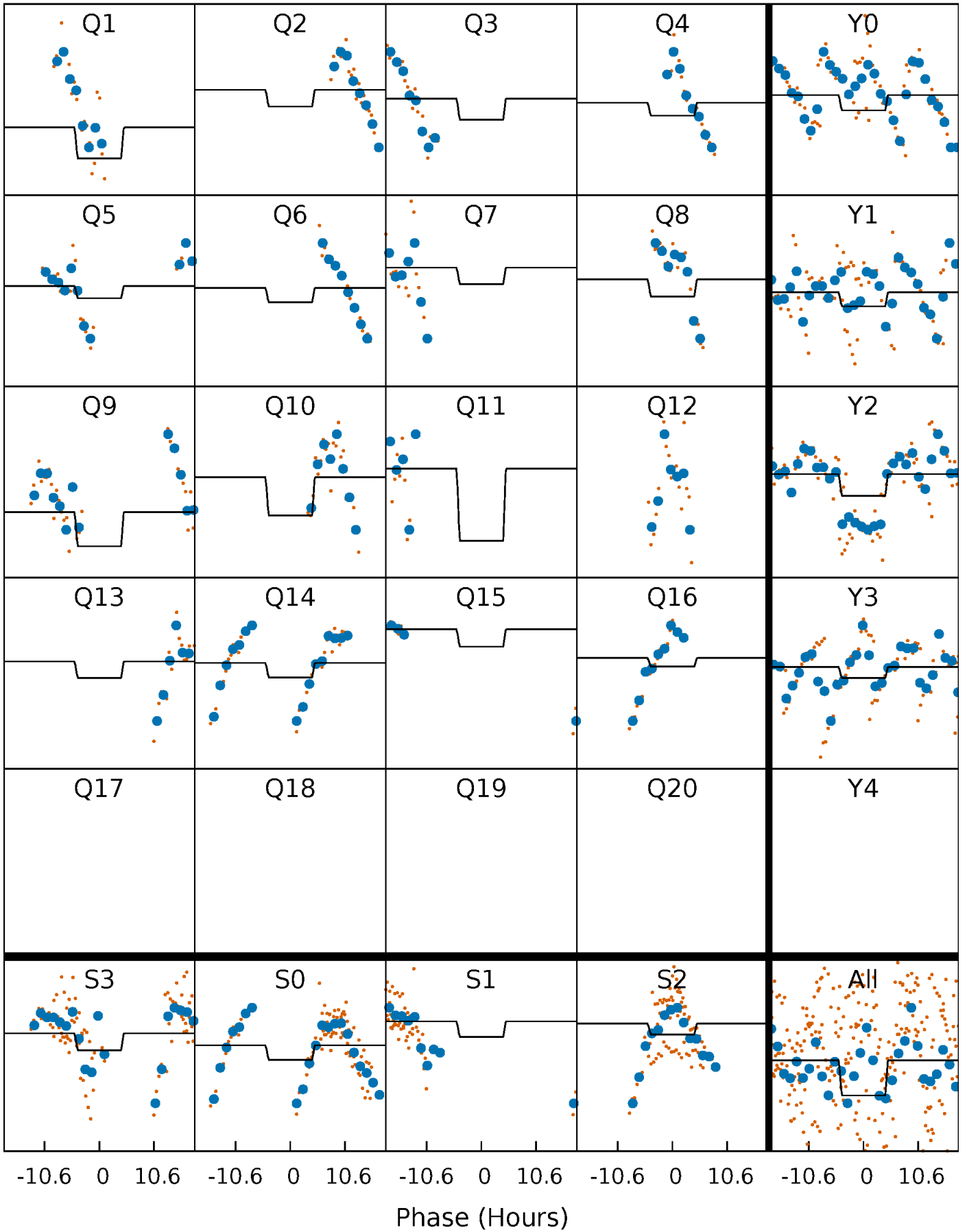
TCE 008149616-03     $P = 75.872076$  Days     $T_0 = 140.582029$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

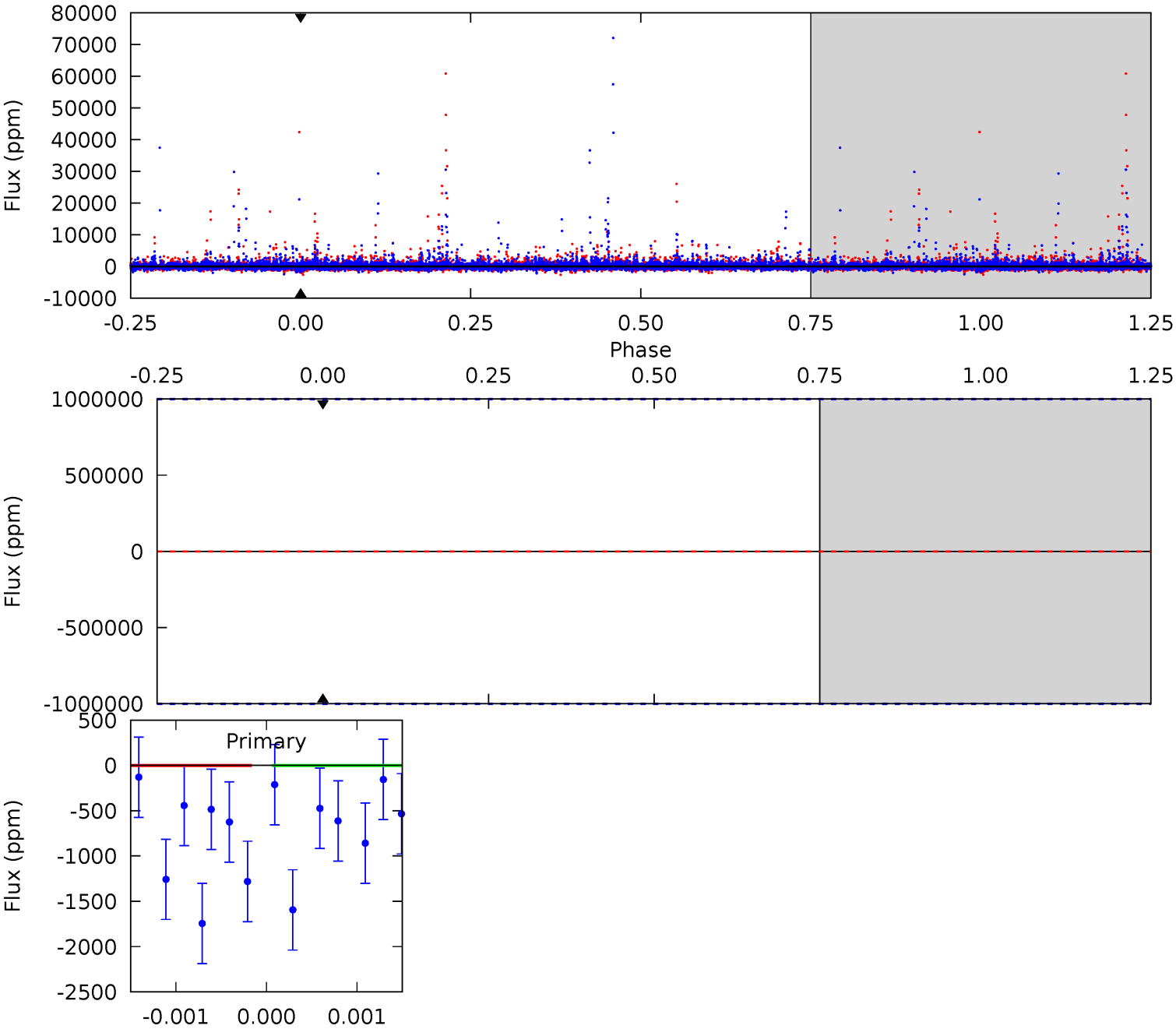
TCE 008149616-03   P= 75.872076 Days    $T_0=140.685214$  (BKJD)



# DV Model-Shift Uniqueness Test

008149616-03, P = 75.872076 Days, E = 64.709953 Days

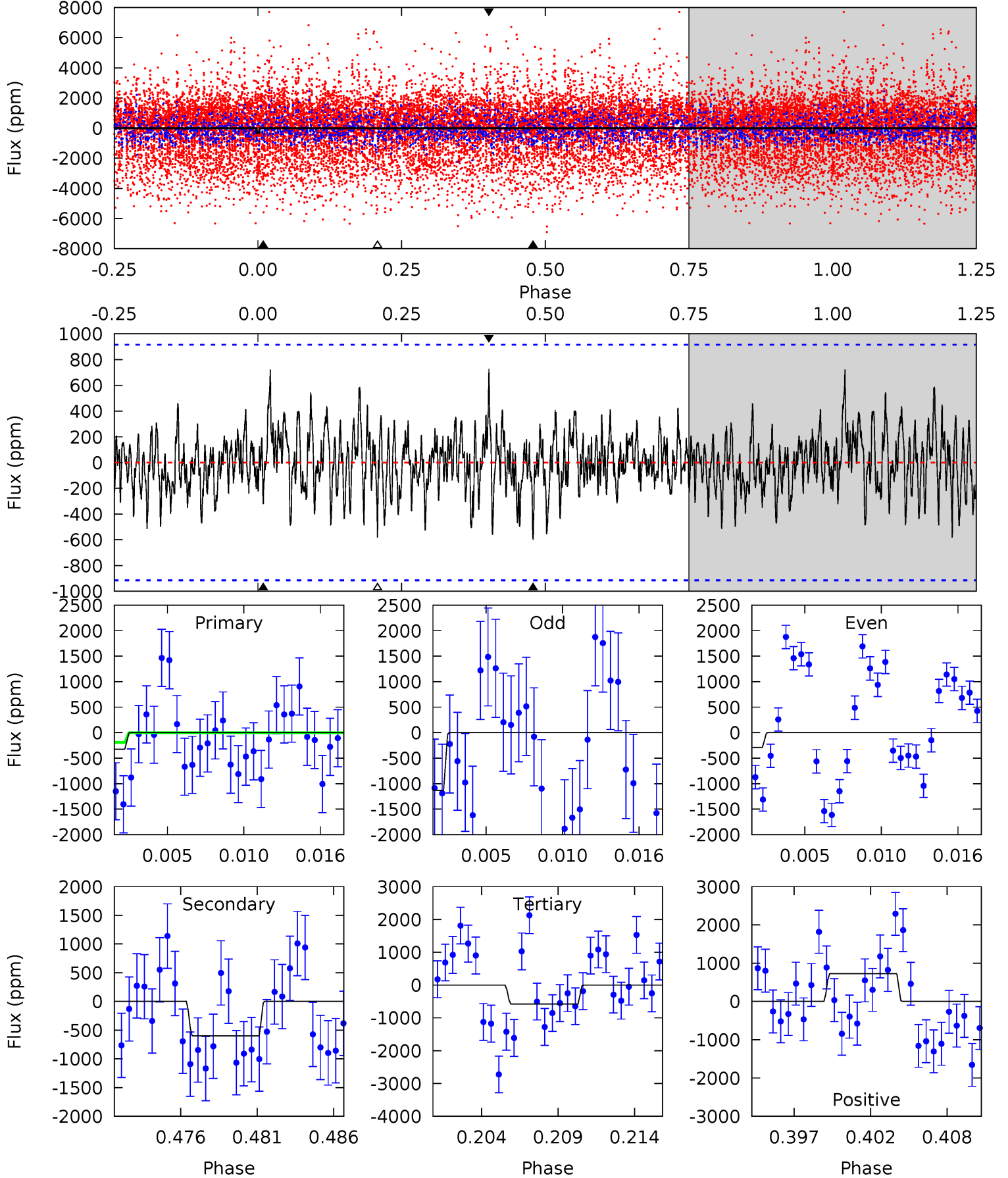
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



# Alt Model-Shift Uniqueness Test

008149616-03, P = 75.872076 Days, E = 64.813138 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
1.82	3.36	3.27	4.09	5.15	2.79	1.10	-1.45	-2.28	0.09	-0.73	2.31	1.41	0.55	0.72



### Stellar Parameters For KIC 008149616

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3332^{+43}_{-36}$	$4.987^{+0.044}_{-0.040}$	$0.000^{+0.100}_{-0.100}$	$0.265^{+0.038}_{-0.027}$	$0.248^{+0.045}_{-0.030}$	$18.820^{+4.559}_{-3.663}$
	+1%/-1%	+1%/-1%	+inf%/-inf%	+14%/-10%	+18%/-12%	+24%/-19%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 008149616-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$0 \pm 1000000$	$2.37^{+2.48}_{-1.64}$	$225^{+5}_{-5}$	$2550^{+3856}_{-8503}$	$5056^{+903424}_{-689161}$
Alt.	$-597 \pm 178$	$2.19^{+2.28}_{-1.49}$	$225^{+5}_{-5}$	$2435^{+890}_{-362}$	$3052^{+29934}_{-2341}$

$T_{max}$  = Theoretical Maximum Planetary Temperature

$T_{obs}$  = Observed Planetary Temperature (Assuming  $A=0.3$ )

$A_{obs}$  = Observed Albedo (Assuming  $T=0$ )

If a secondary eclipse is present, the system is likely an EB if  $T_{obs} \gg T_{max}$  AND  $A_{obs} \gg 1.0$

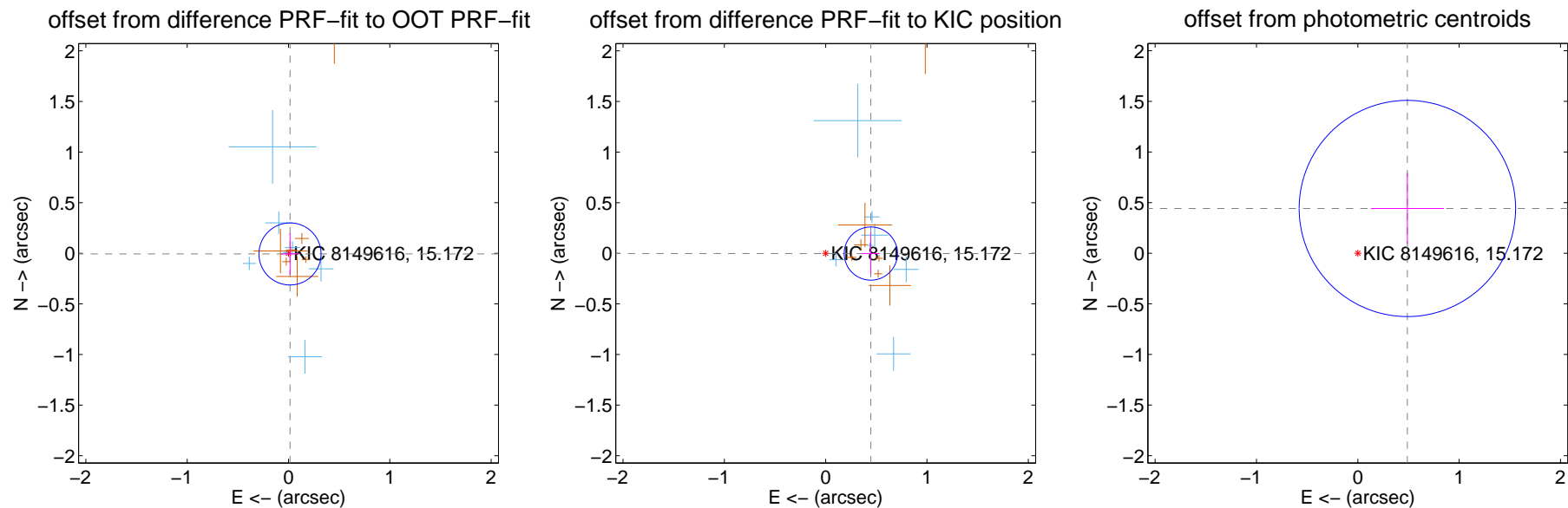
## DV Centroid Data

Supplemental centroid analysis for 008149616-03. Kepler magnitude: 15.17. Transit SNR -1.00

There are 7 quarters with good PRF difference image offsets

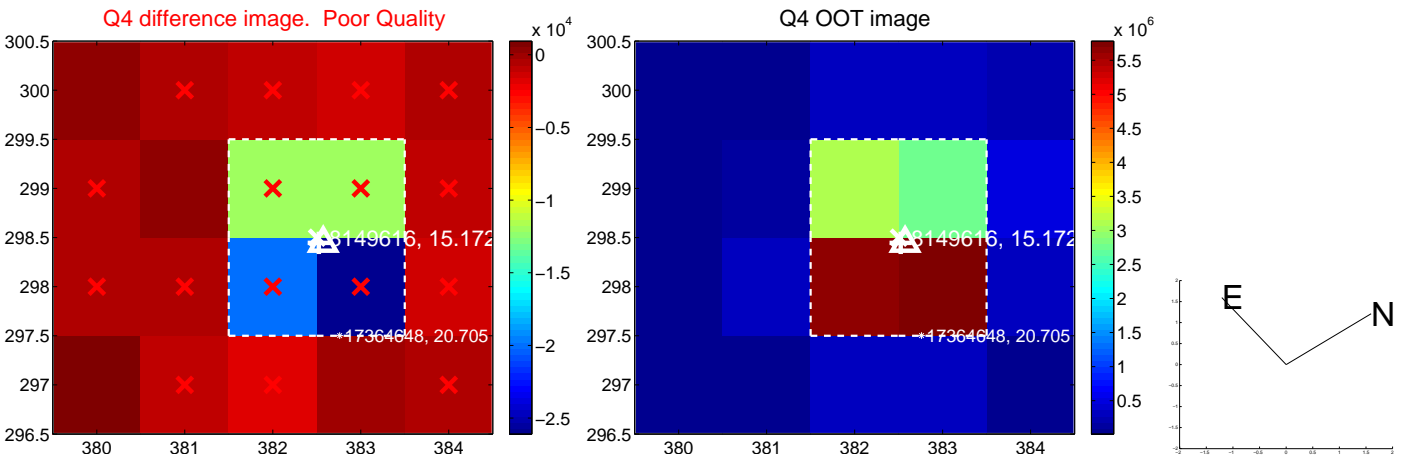
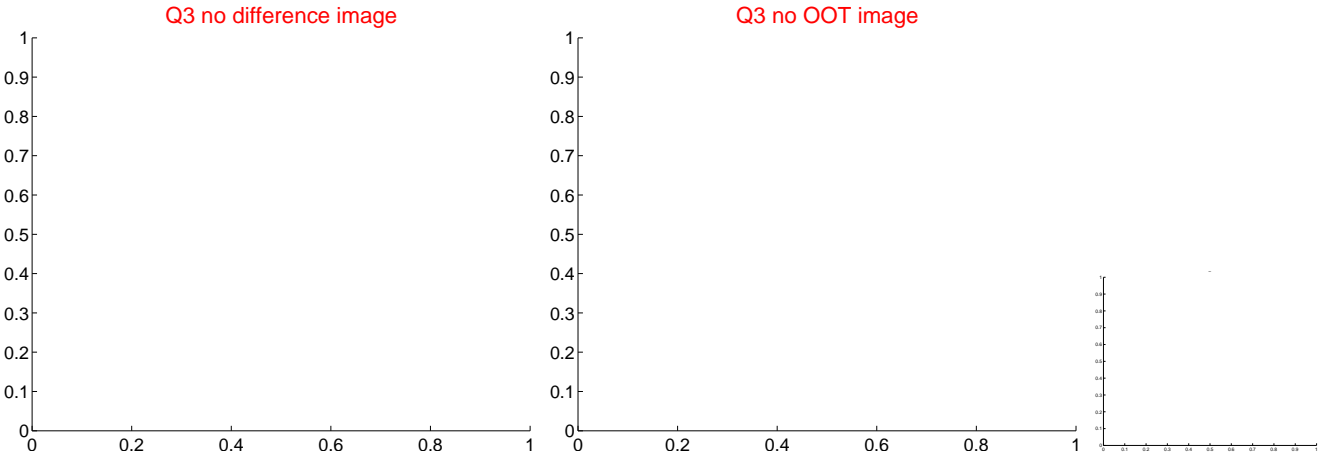
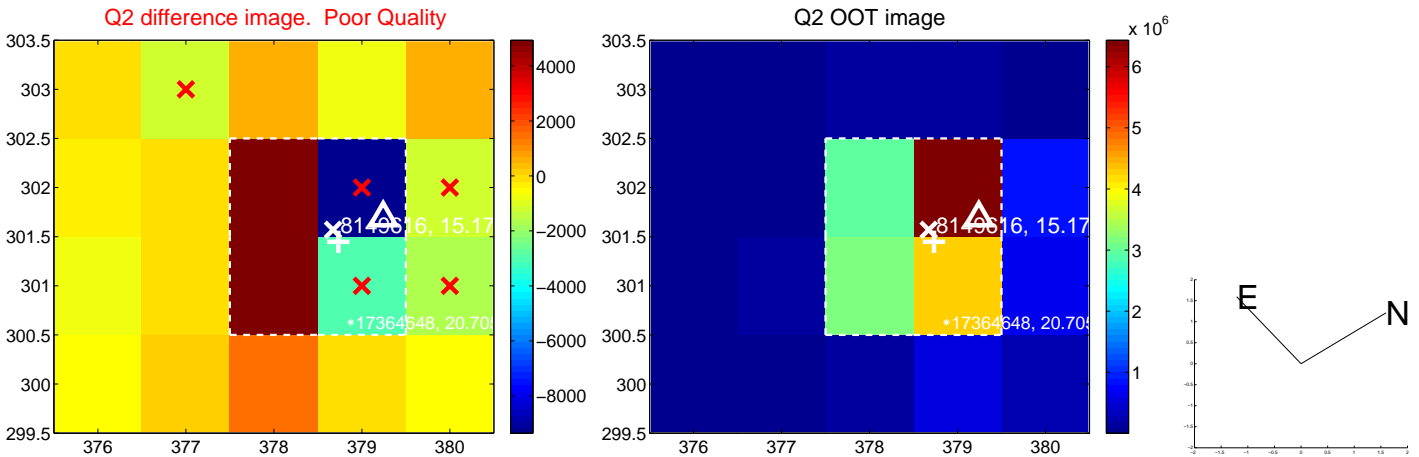
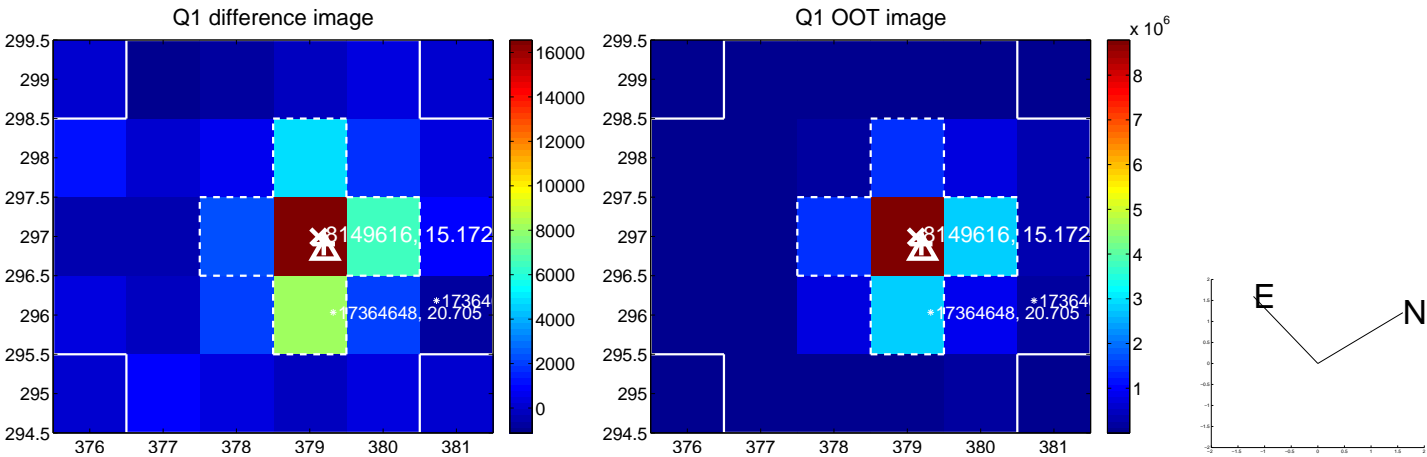
The direct PRF centroid is offset from the target star catalog position by about 0.36 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.016 \pm 0.102$	0.16	$-0.015 \pm 0.087$	$-0.007 \pm 0.206$
PRF-fit source offset from KIC position	$0.446 \pm 0.088$	5.09	$-0.446 \pm 0.088$	$-0.003 \pm 0.205$
photometric centroid source offset	$0.66 \pm 0.36$	1.85	$-0.49 \pm 0.36$	$0.44 \pm 0.35$

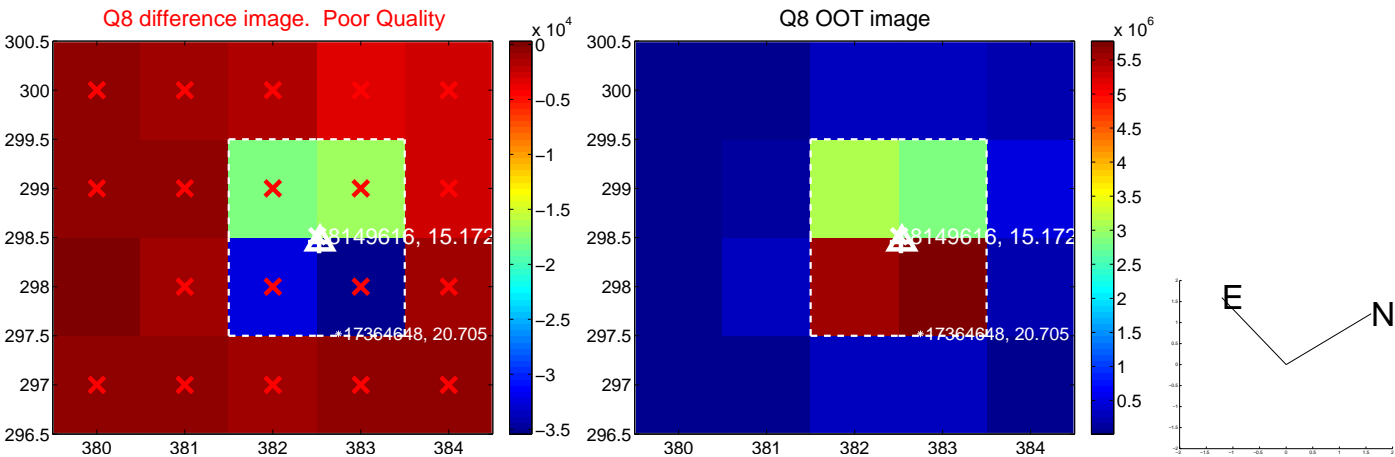
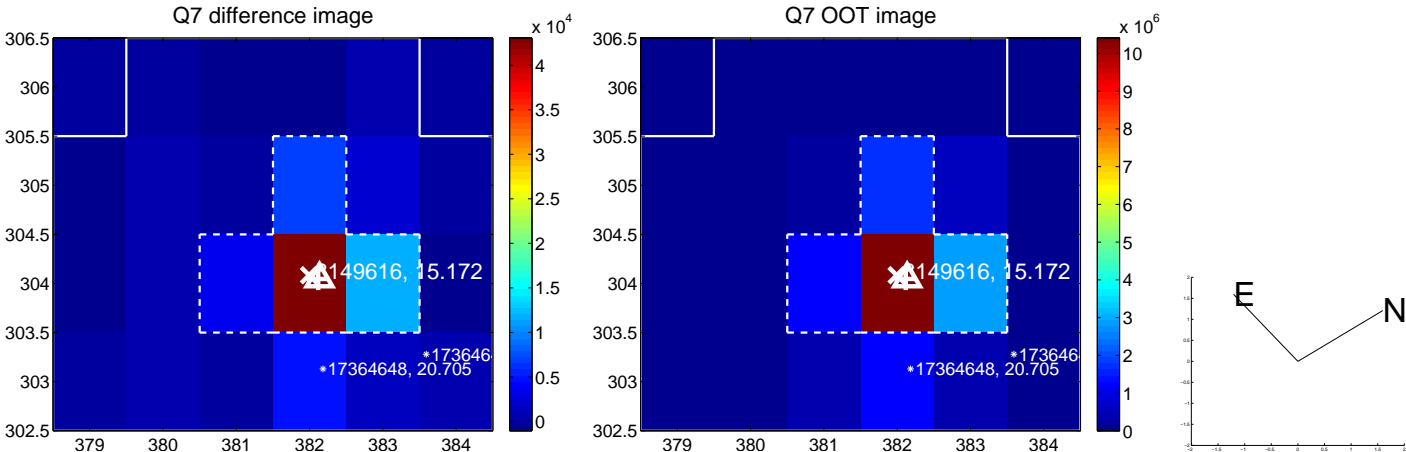
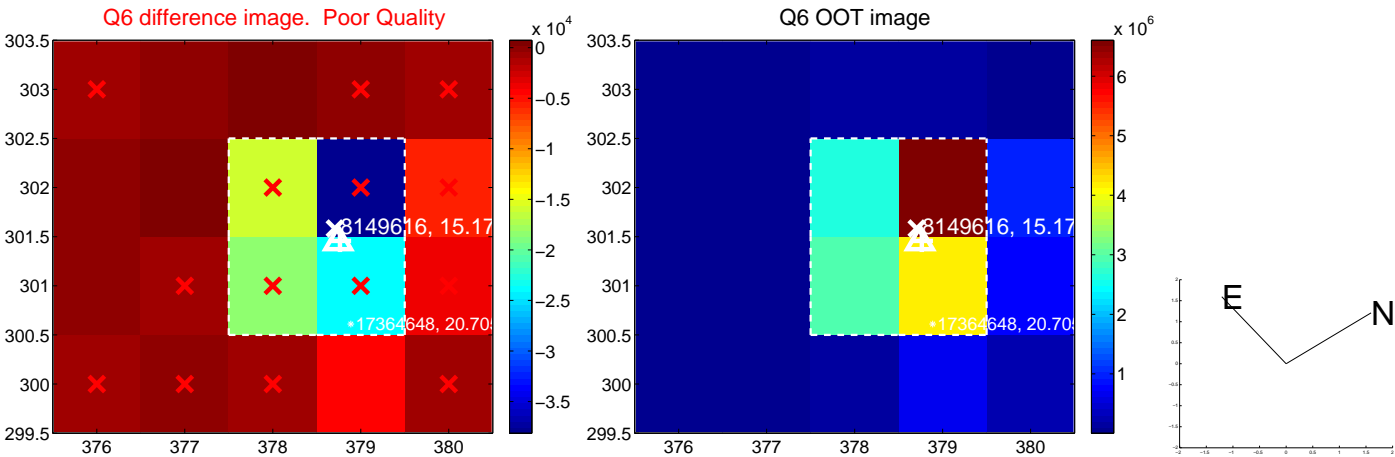
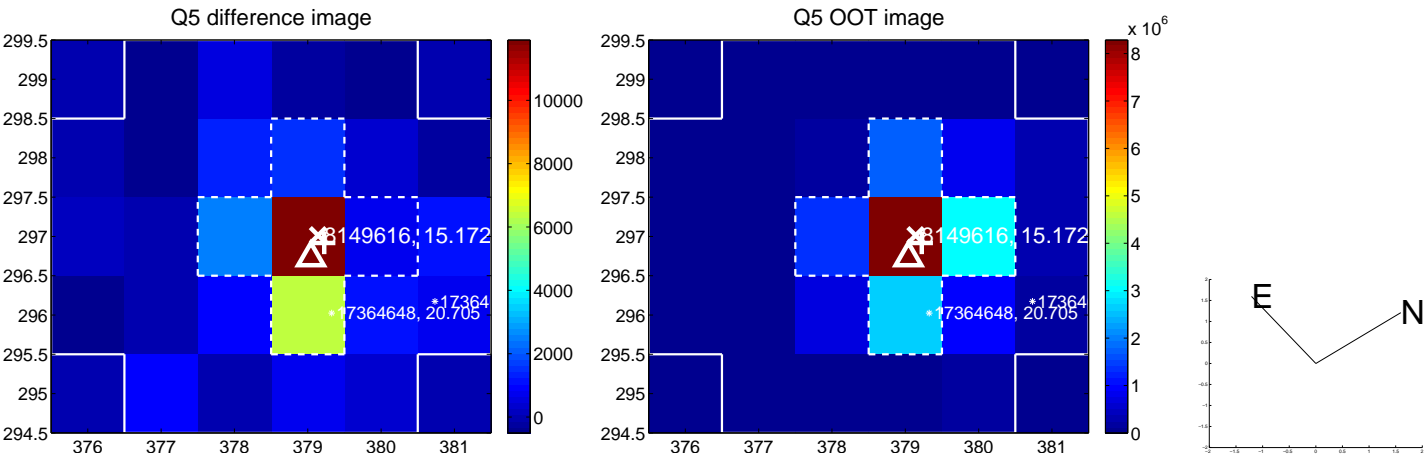


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

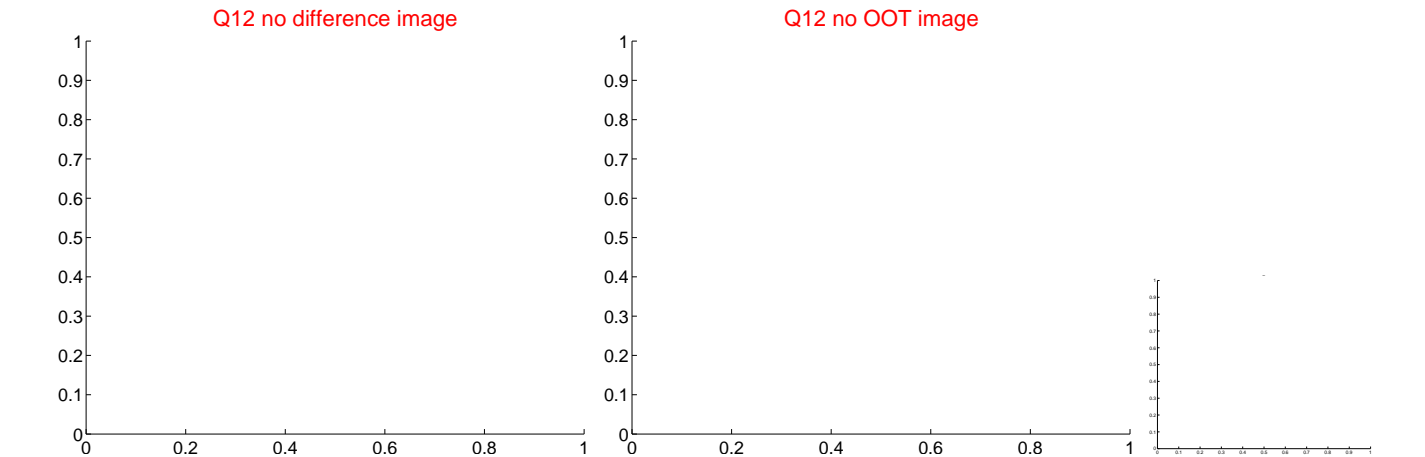
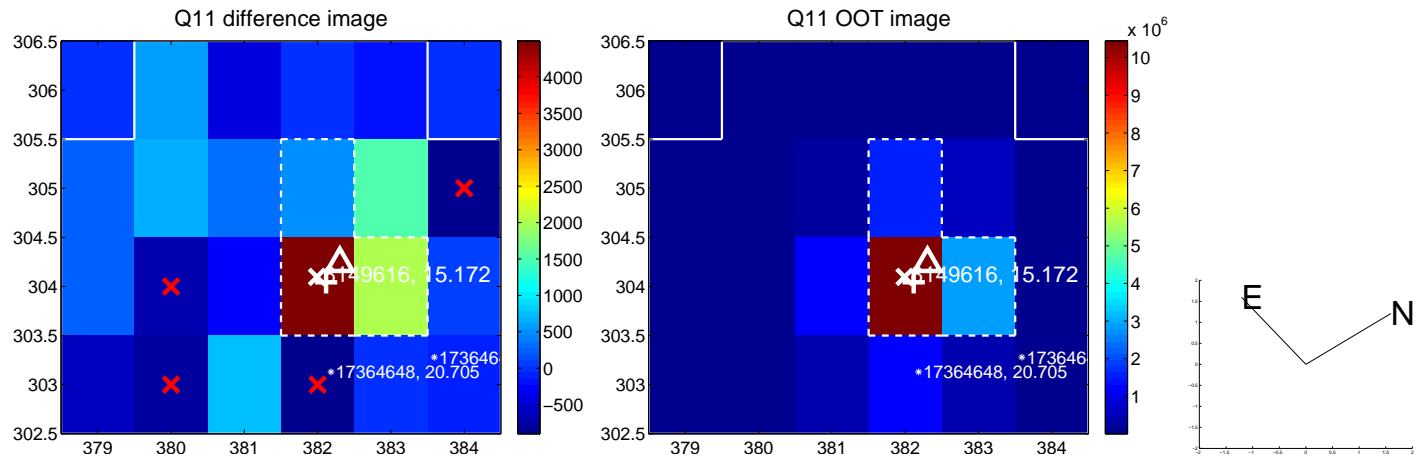
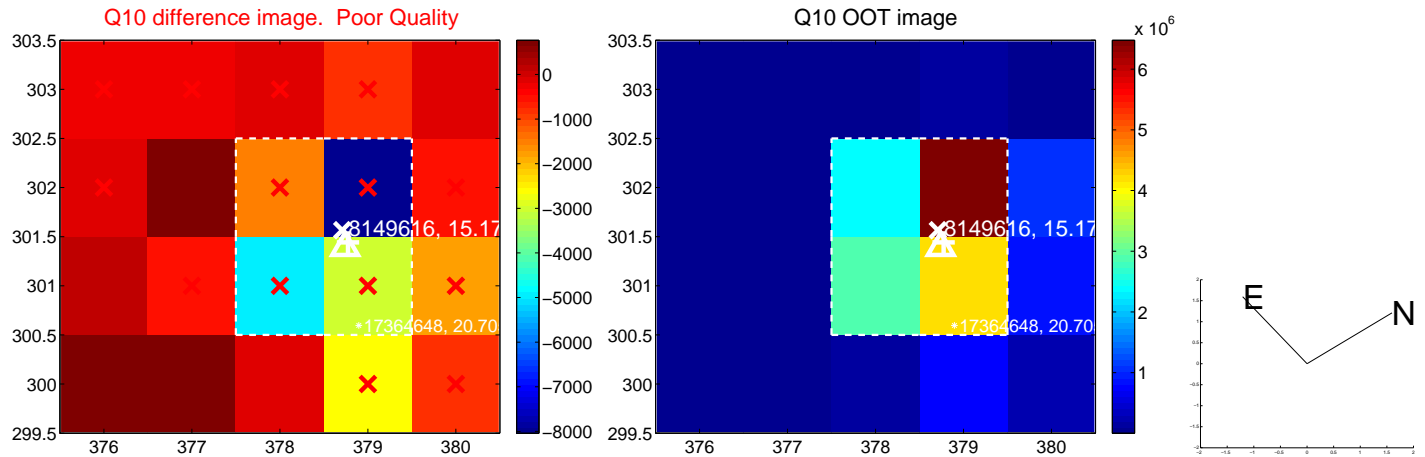
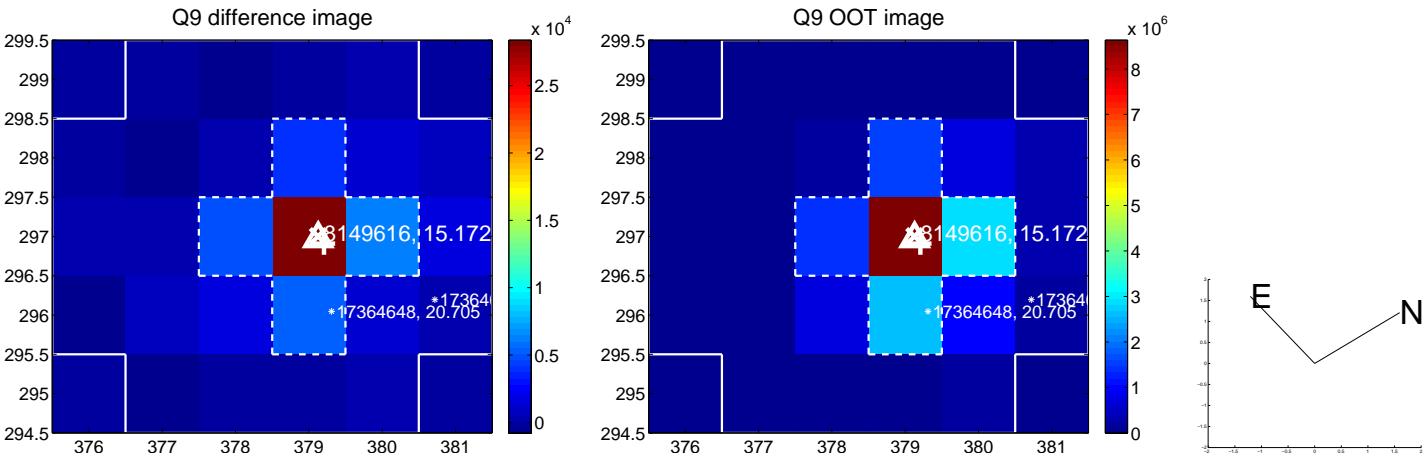
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

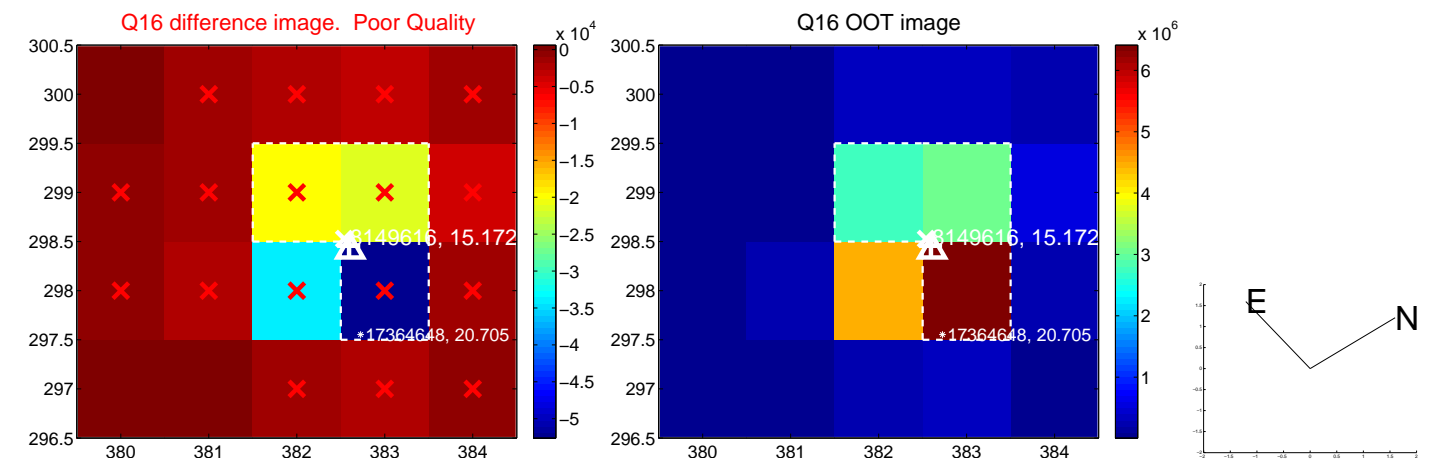
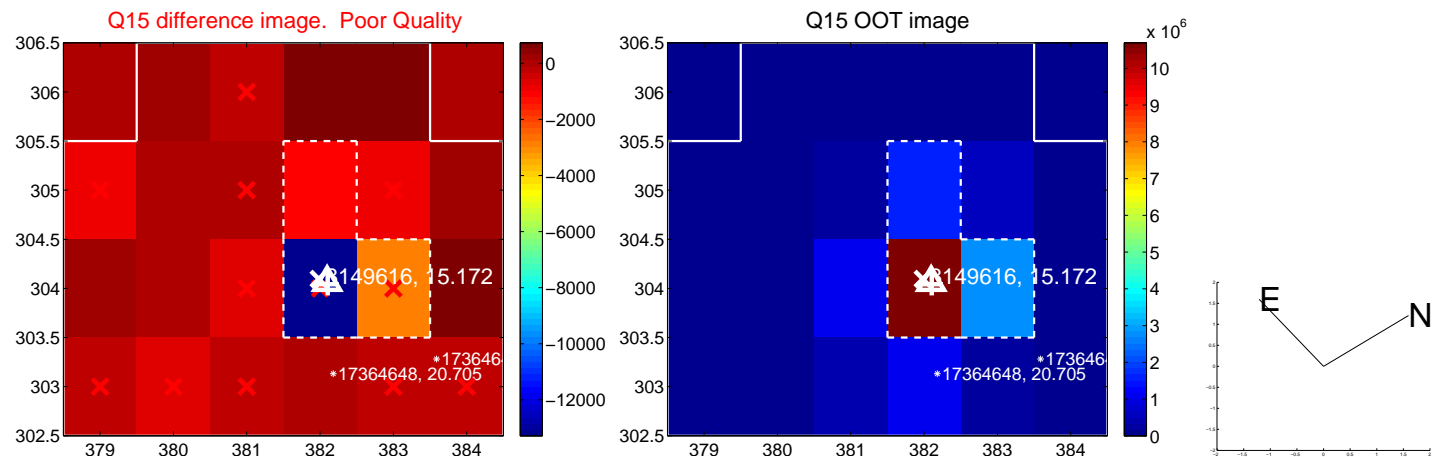
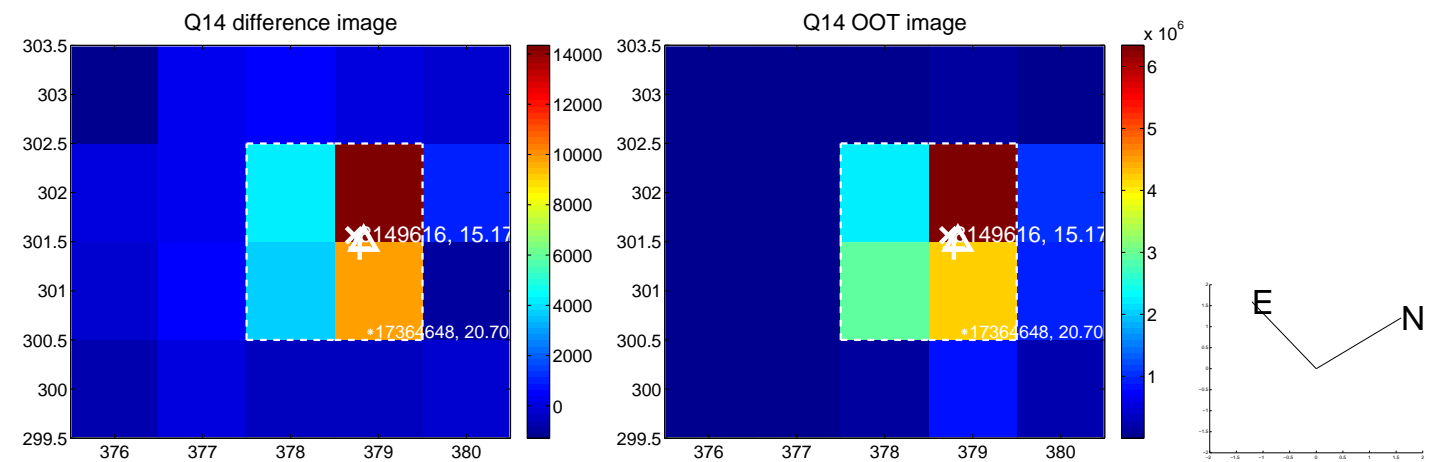
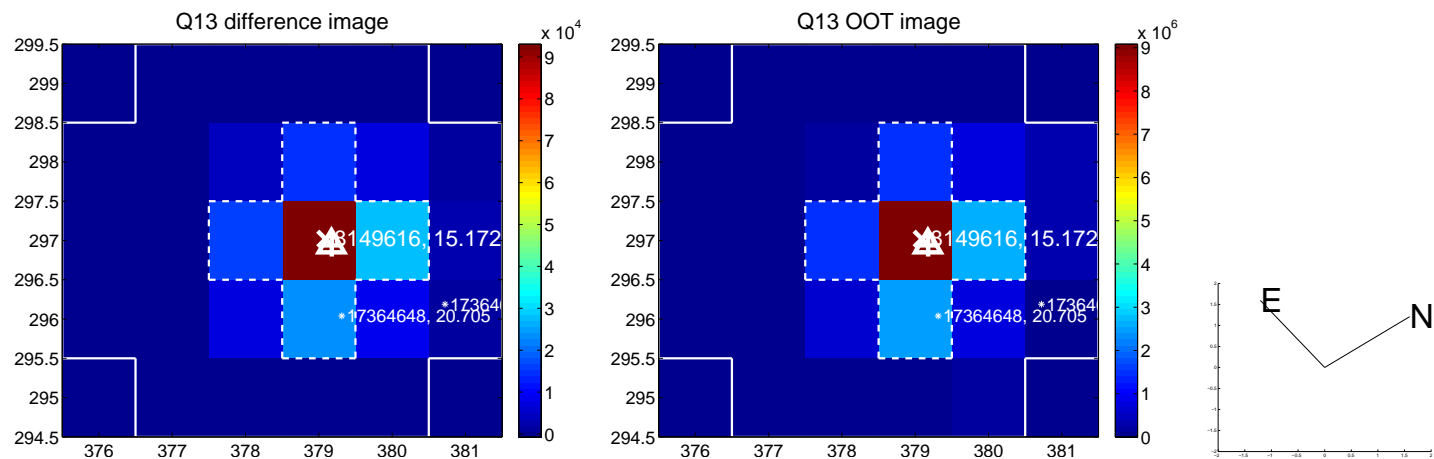


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

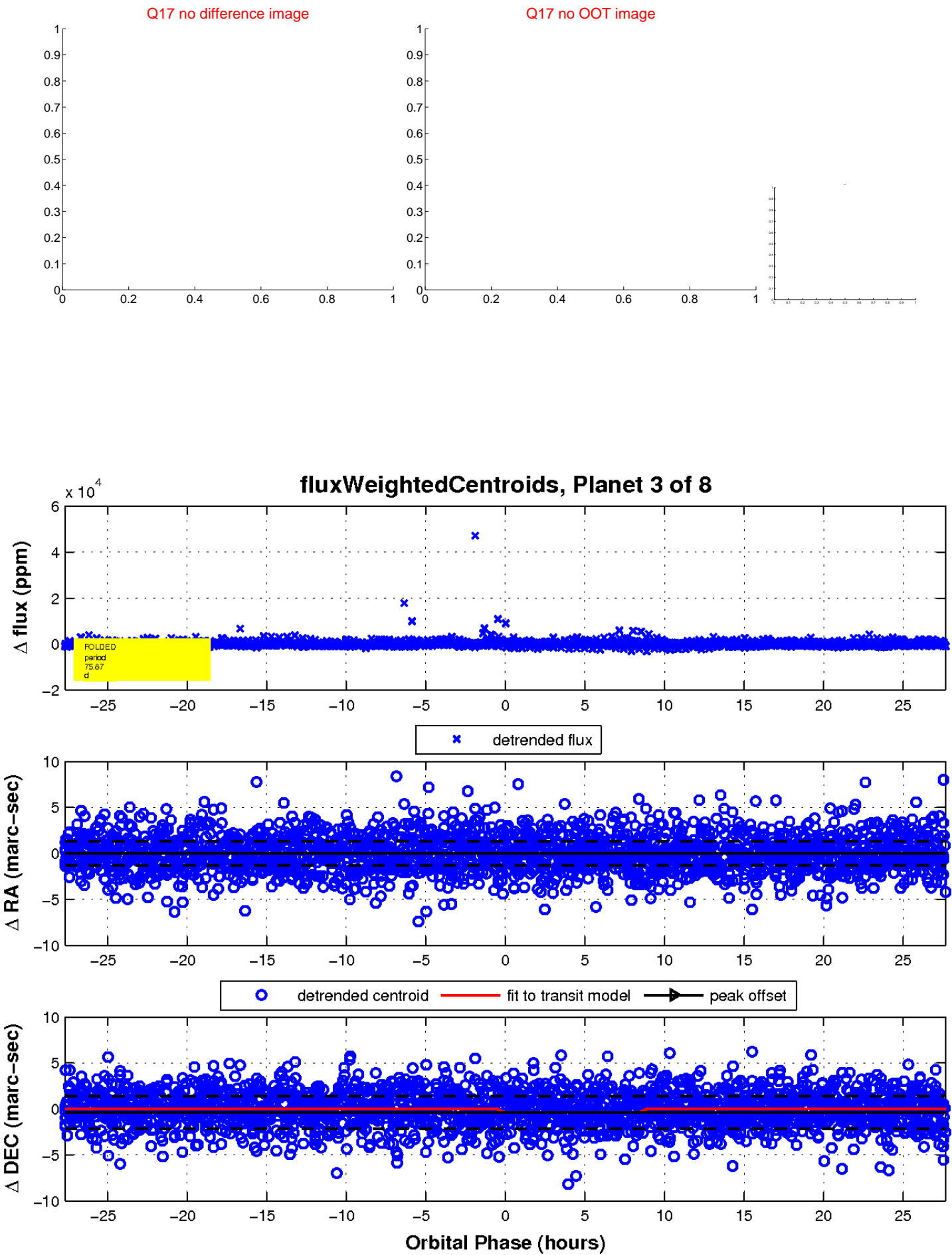




white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

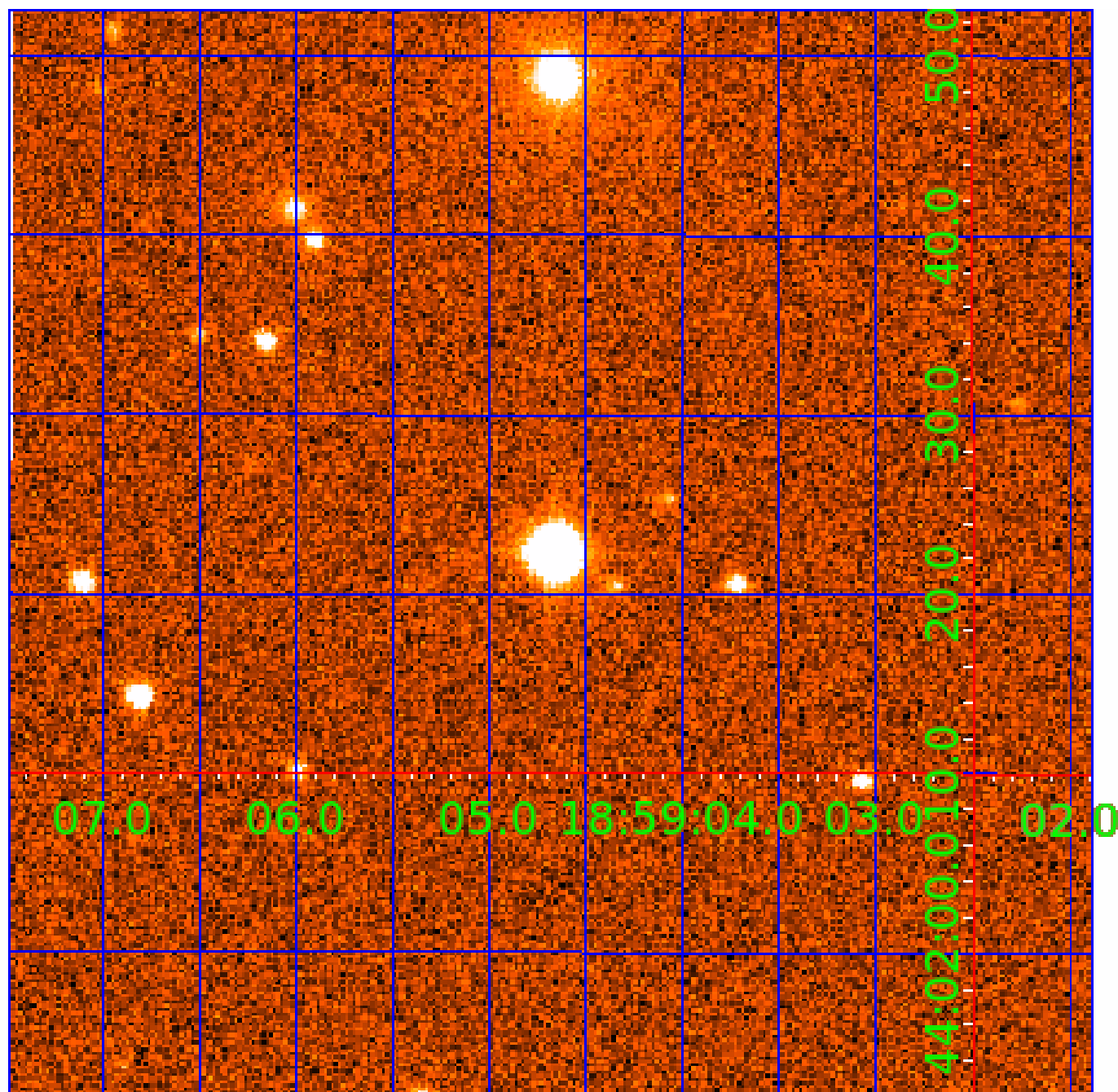


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 008149616

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008149616-01	OBS	No	1.780615	132.506653	106.6	10.625	12.2	9.1	0.27	3332	0.28	23.72
008149616-02	OBS	No	103.037639	191.572038	1341.1	7.500	13.7	-1.0	0.27	3332	0.96	0.11
008149616-03	OBS	No	75.872076	140.582029	1321.3	3.000	10.3	-1.0	0.27	3332	0.95	0.16
008149616-04	OBS	No	118.587620	199.638830	818.9	41.613	10.2	7.4	0.27	3332	0.75	0.09
008149616-05	OBS	No	101.068333	174.446642	1333.8	4.115	9.1	7.7	0.27	3332	1.91	0.11
008149616-06	OBS	No	11.360095	135.155291	323.3	4.579	9.0	7.8	0.27	3332	0.51	2.00
008149616-07	OBS	No	45.419802	152.259980	583.6	16.676	9.8	8.3	0.27	3332	0.67	0.32
008149616-08	OBS	No	62.341047	160.117011	578.1	5.954	9.8	9.3	0.27	3332	0.66	0.21

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008149616-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—CENT_KIC_POS
008149616-02	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—INCONSISTENT_TRANS—CENT_NOFITS
008149616-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_NOFITS
008149616-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES—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
008149616-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS
008149616-06	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
008149616-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT
008149616-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—CENT_KIC_POS

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

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

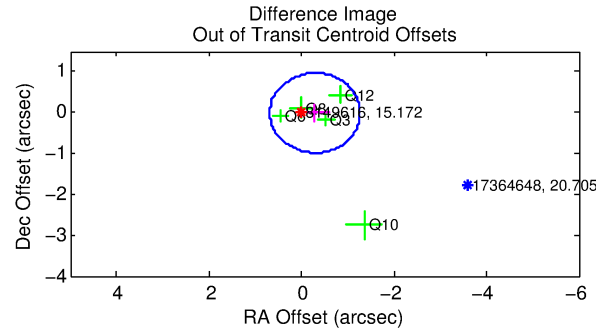
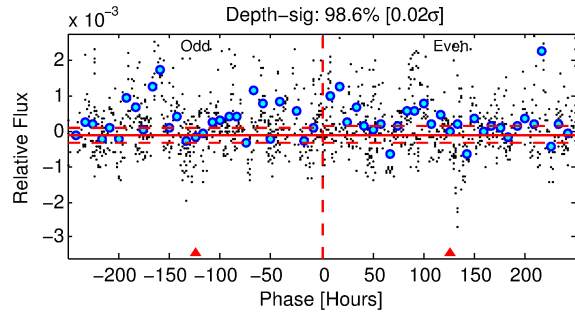
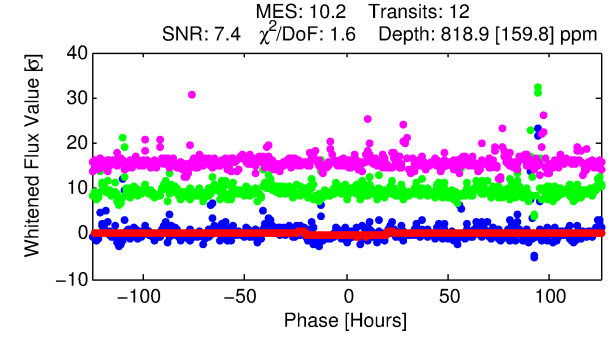
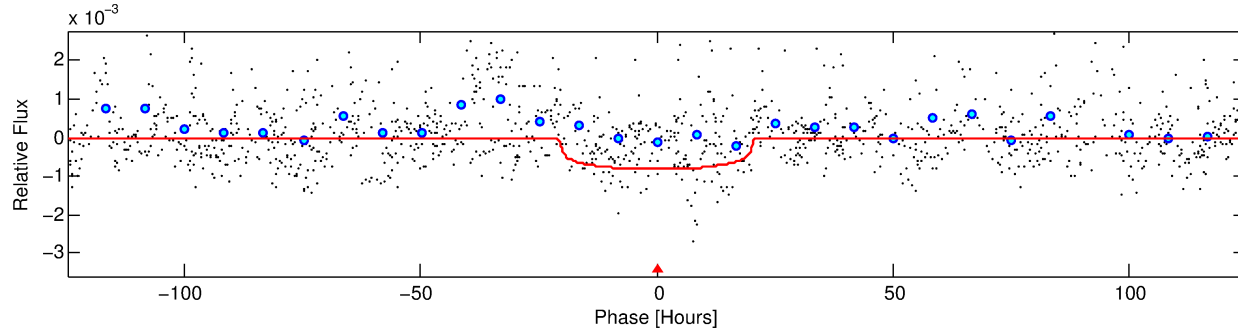
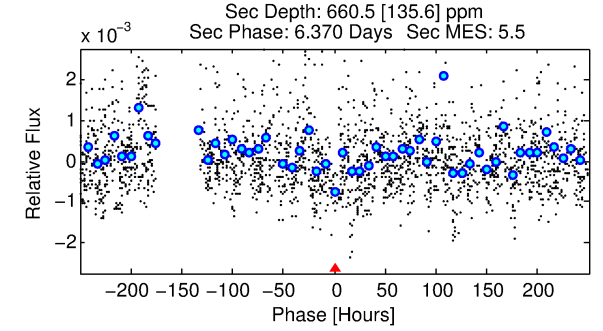
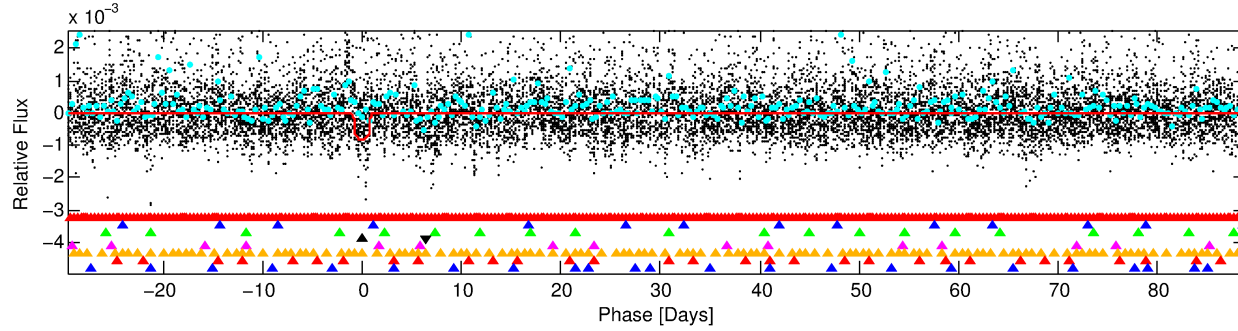
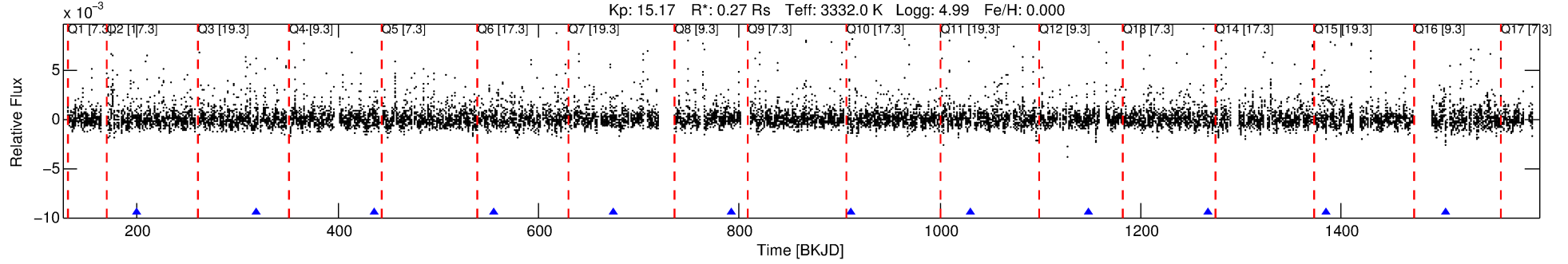
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 008149616-04

No Significant Match Found

# DV One-Page Summary

KIC: 8149616 Candidate: 4 of 8 Period: 118.588 d



## DV Fit Results:

Period = 118.58762 [0.00838] d  
Epoch = 199.6388 [0.0507] BKJD  
Rp/R\* = 0.0259 [0.0089]  
a/R\* = 22.33 [30.86]  
b = 0.03 [42.78]  
Seff = 0.09 [0.01]  
Teq = 139 [4] K  
Rp = 0.75 [0.28] Re  
a = 0.2971 [0.0301] AU  
Ag = 57371.80 [41841.03] [1.37σ]  
Teffp = 3322 [599] K [5.31σ]

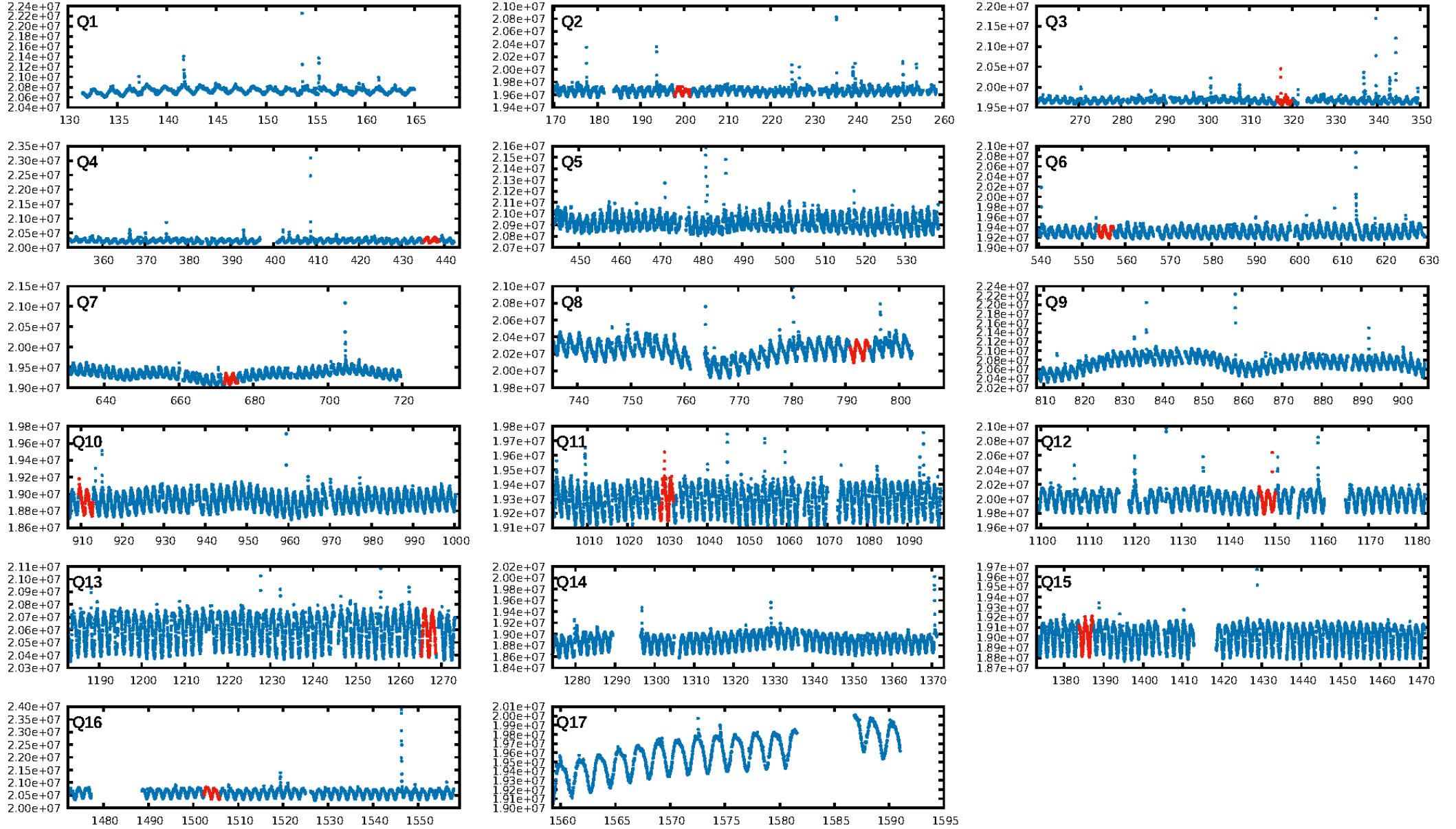
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [8.83σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.6%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [12/12]  
GhostDiagnostic-chr: 1.869  
Centroid-sig: 1.3%  
Centroid-so: 0.421 arcsec [1.68σ]  
OotOffset-rm: 0.290 arcsec [0.89σ]  
OotOffset-st: 2/1/2/0 [5]  
KicOffset-rm: 0.737 arcsec [2.19σ]  
KicOffset-st: 2/1/2/0 [5]  
DiffImageQuality-fgm: 0.20 [1/5]  
DiffImageOverlap-fno: 0.00 [0/6]

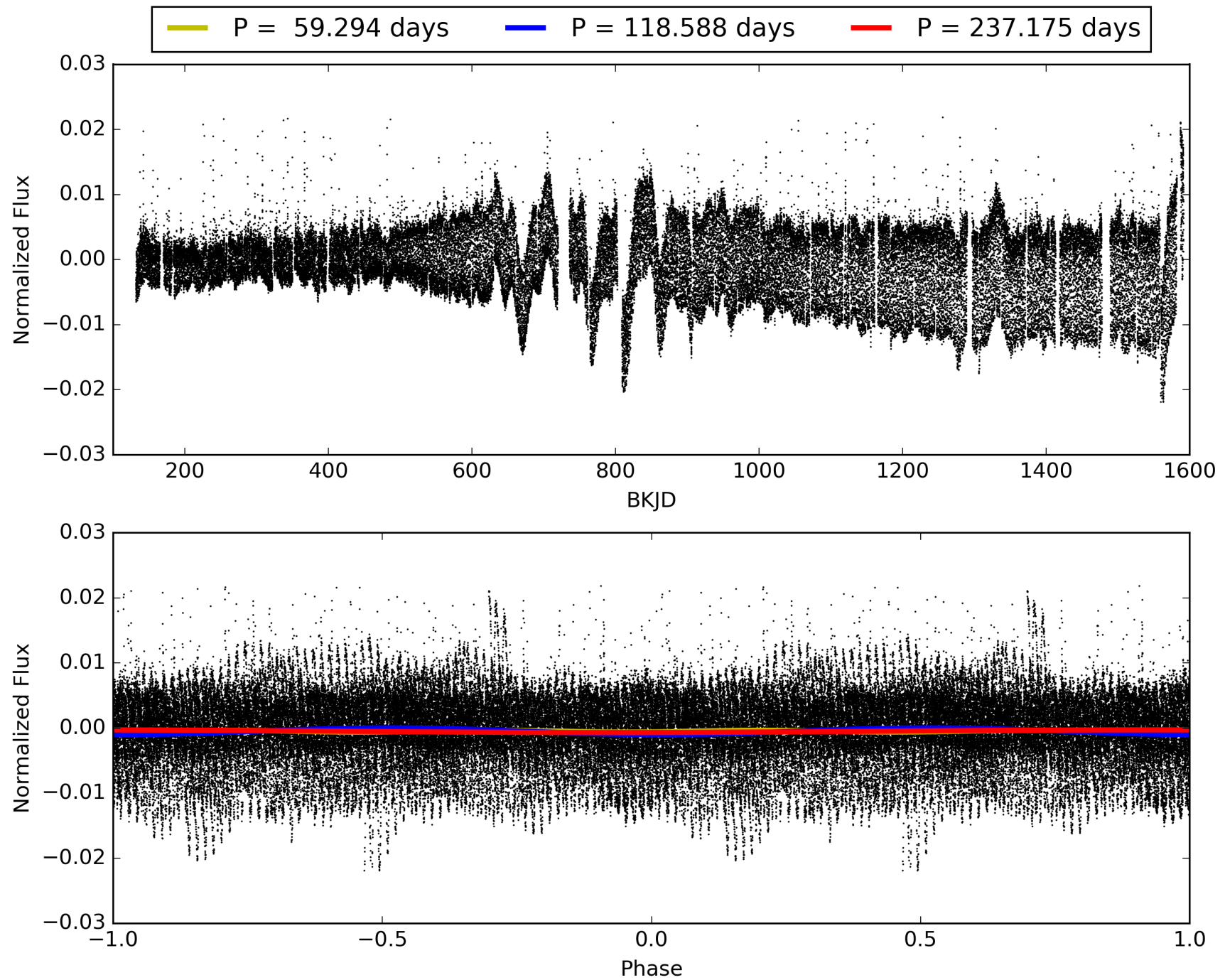
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 08:17:10 Z

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

# TCE 008149616-04, PDC Light Curves



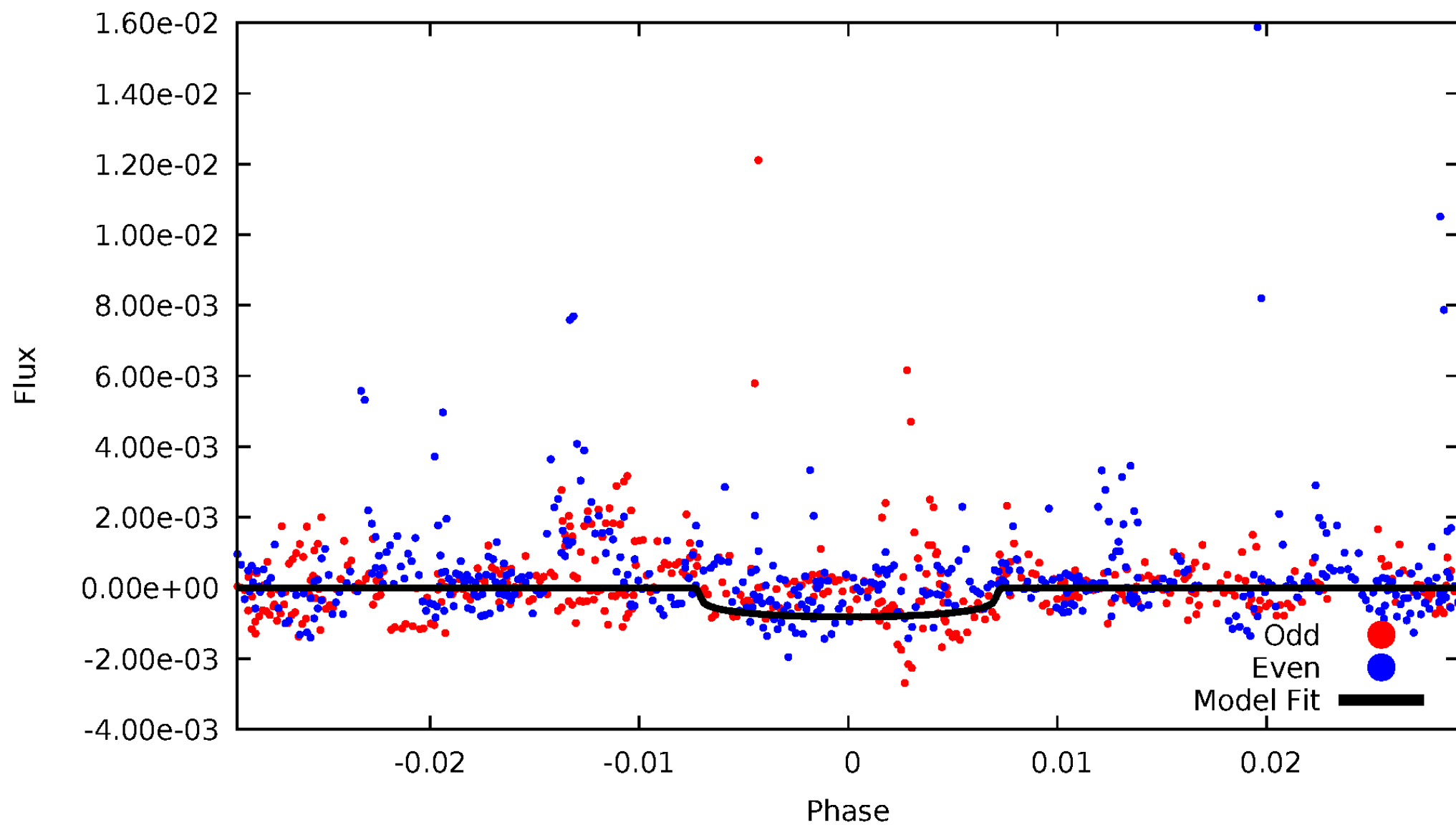
TCE 008149616-04





# DV Odd/Even

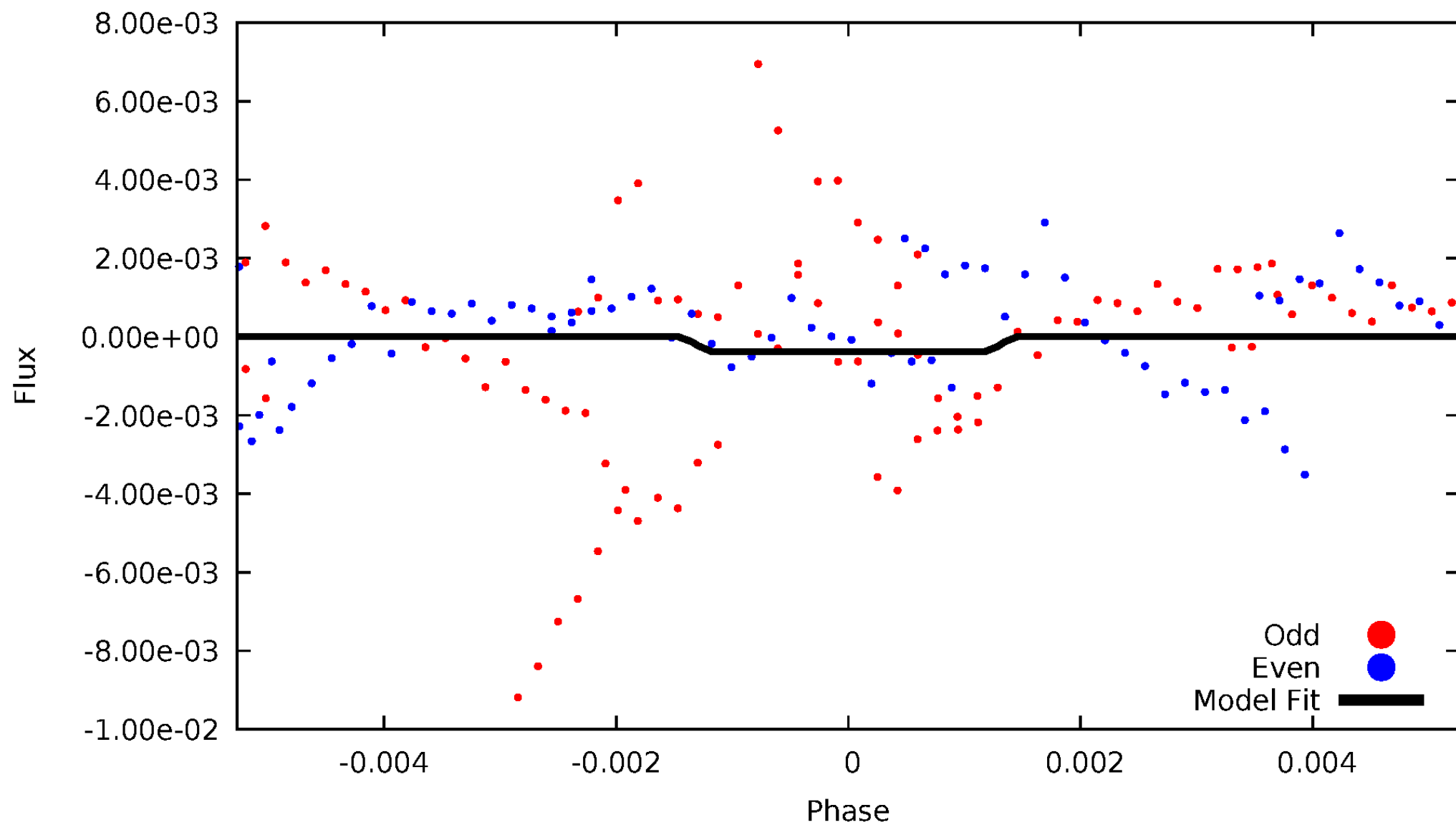
TCE 008149616-04





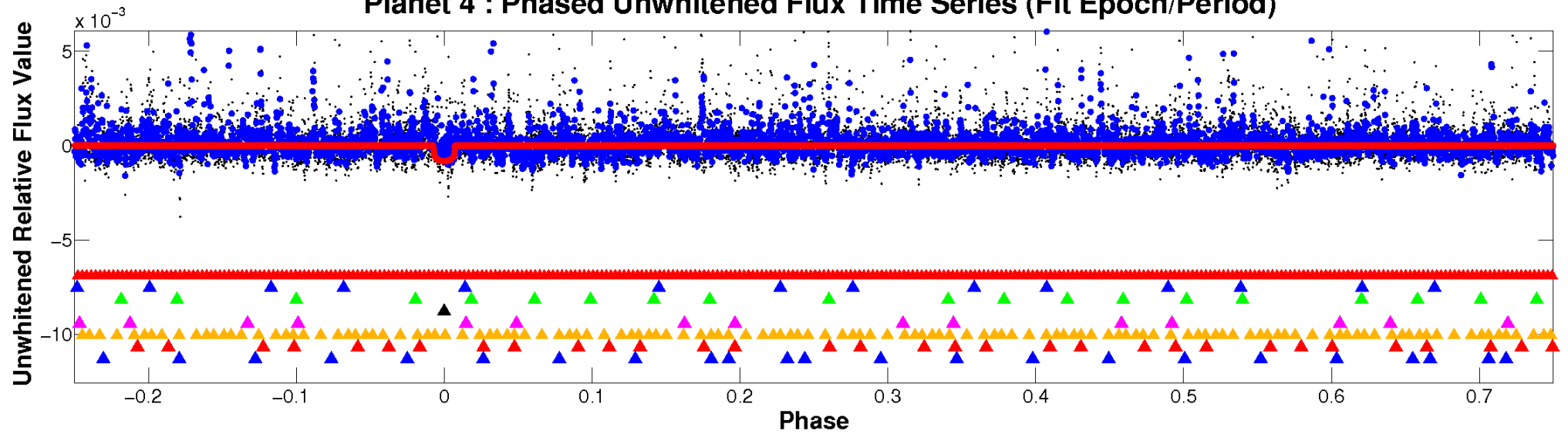
# ALT Odd/Even

TCE 008149616-04

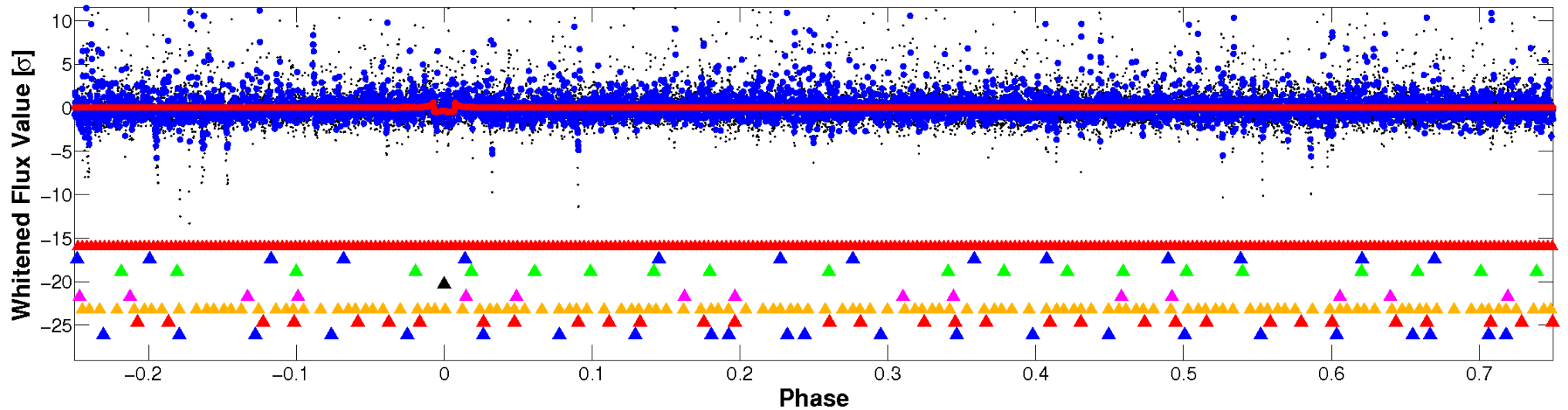


# Non-Whitened Vs. Whitened Light Curve

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

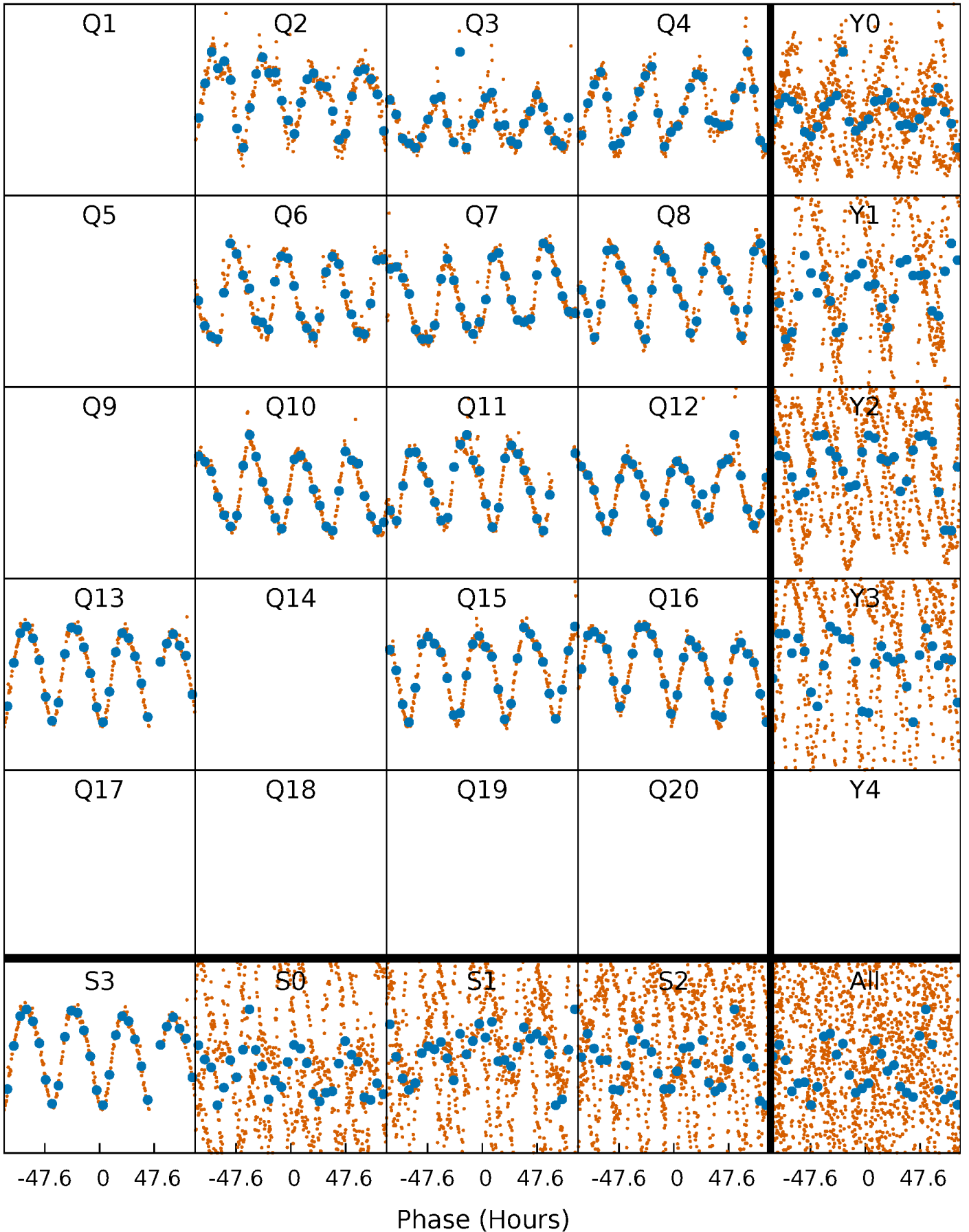


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



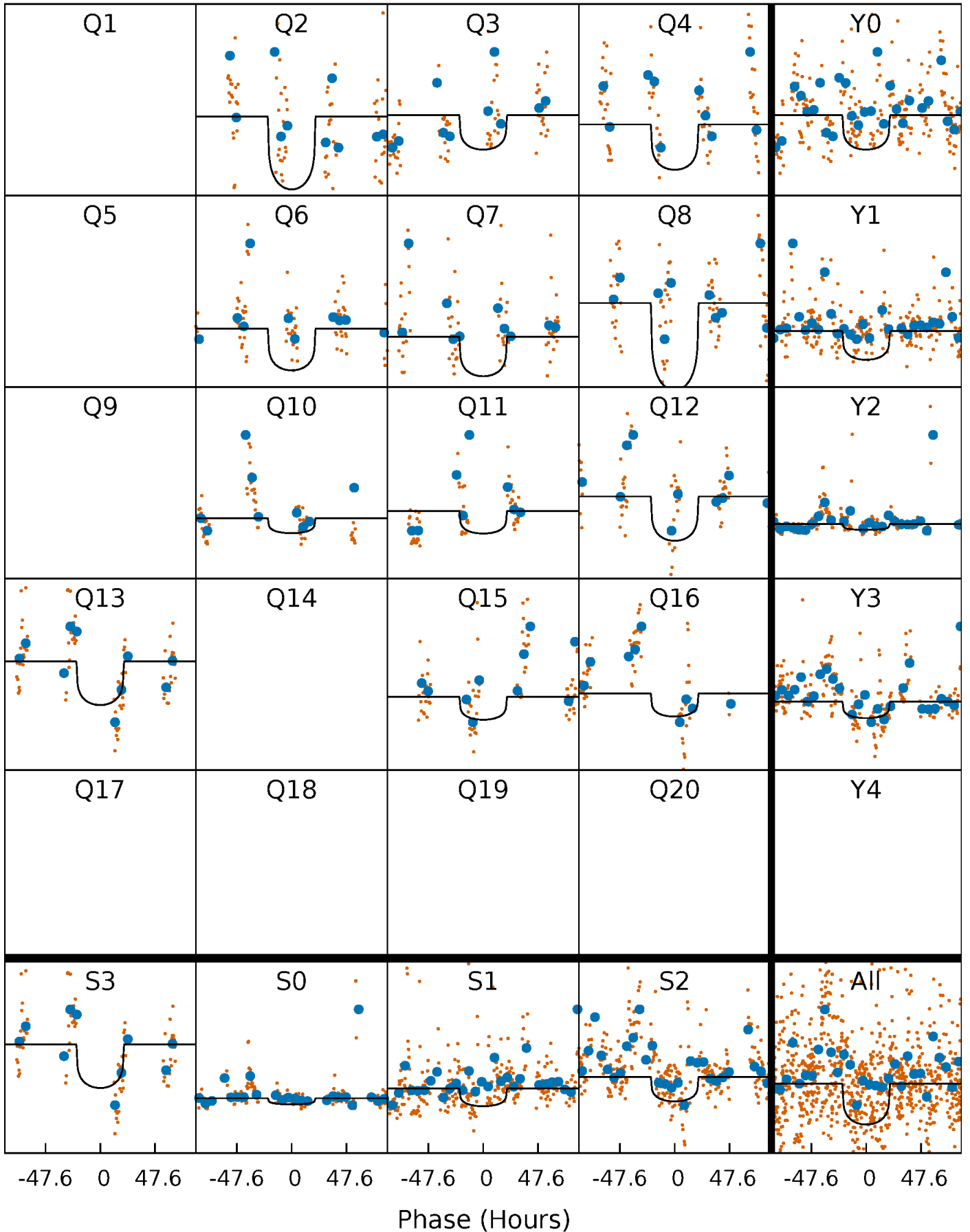
# PDC Quarter-Phased Transit Curves

TCE 008149616-04 P=118.587620 Days  $T_0=199.638830$  (BKJD)



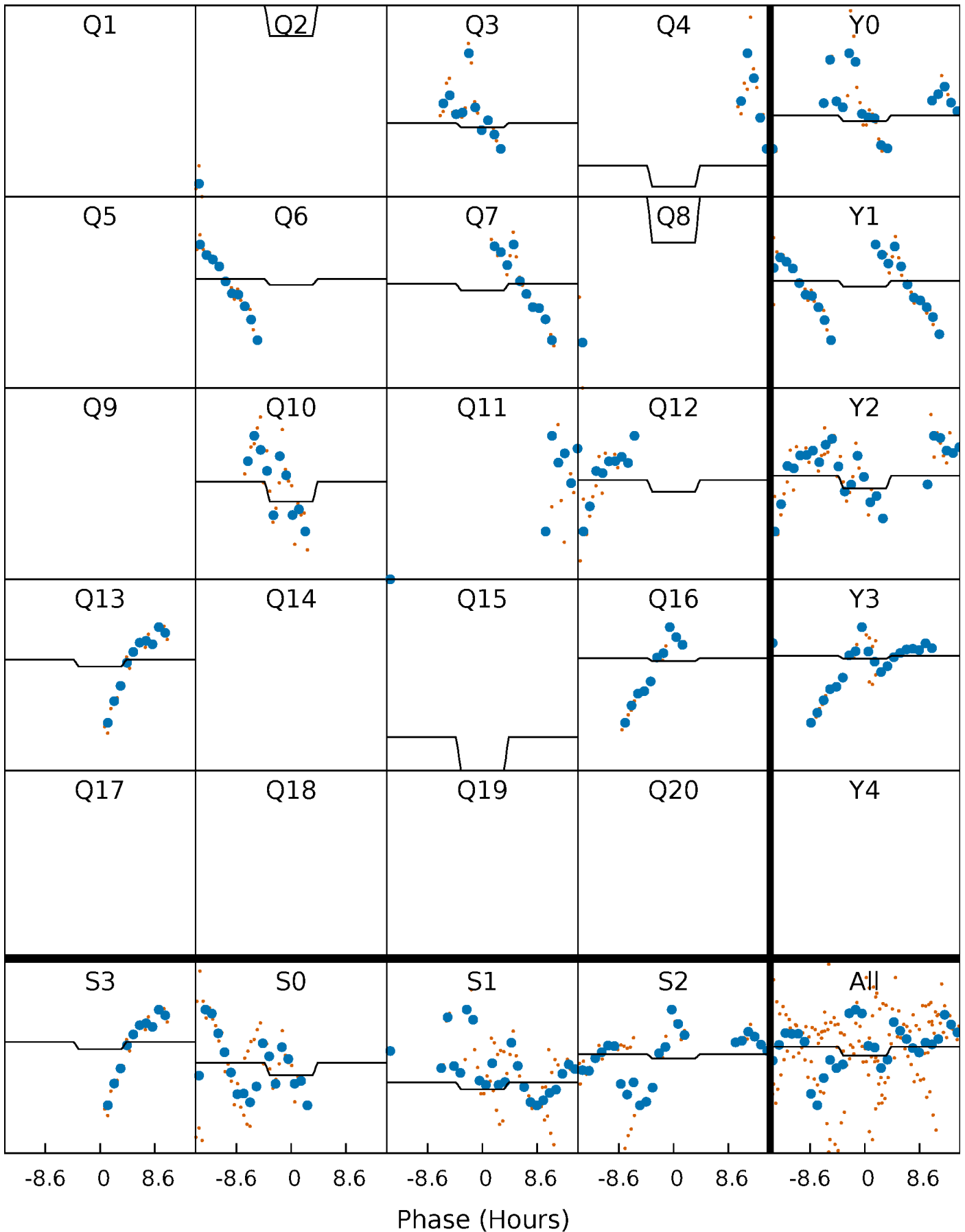
# DV Quarter-Phased Transit Curves

TCE 008149616-04 P=118.587620 Days  $T_0=199.638830$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

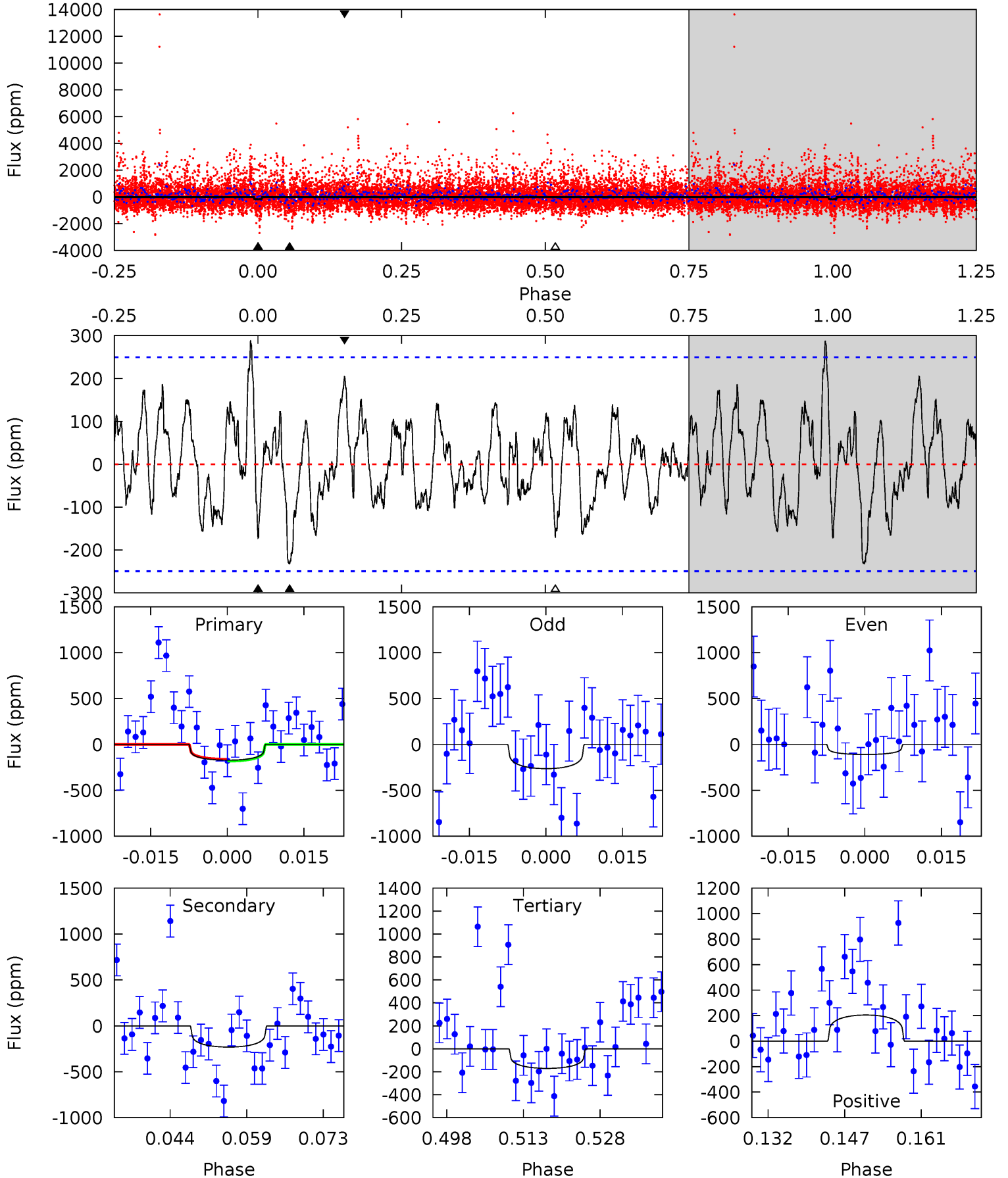
TCE 008149616-04 P=118.594438 Days  $T_0=200.057839$  (BKJD)



# DV Model-Shift Uniqueness Test

008149616-04, P = 118.587620 Days, E = 81.051210 Days

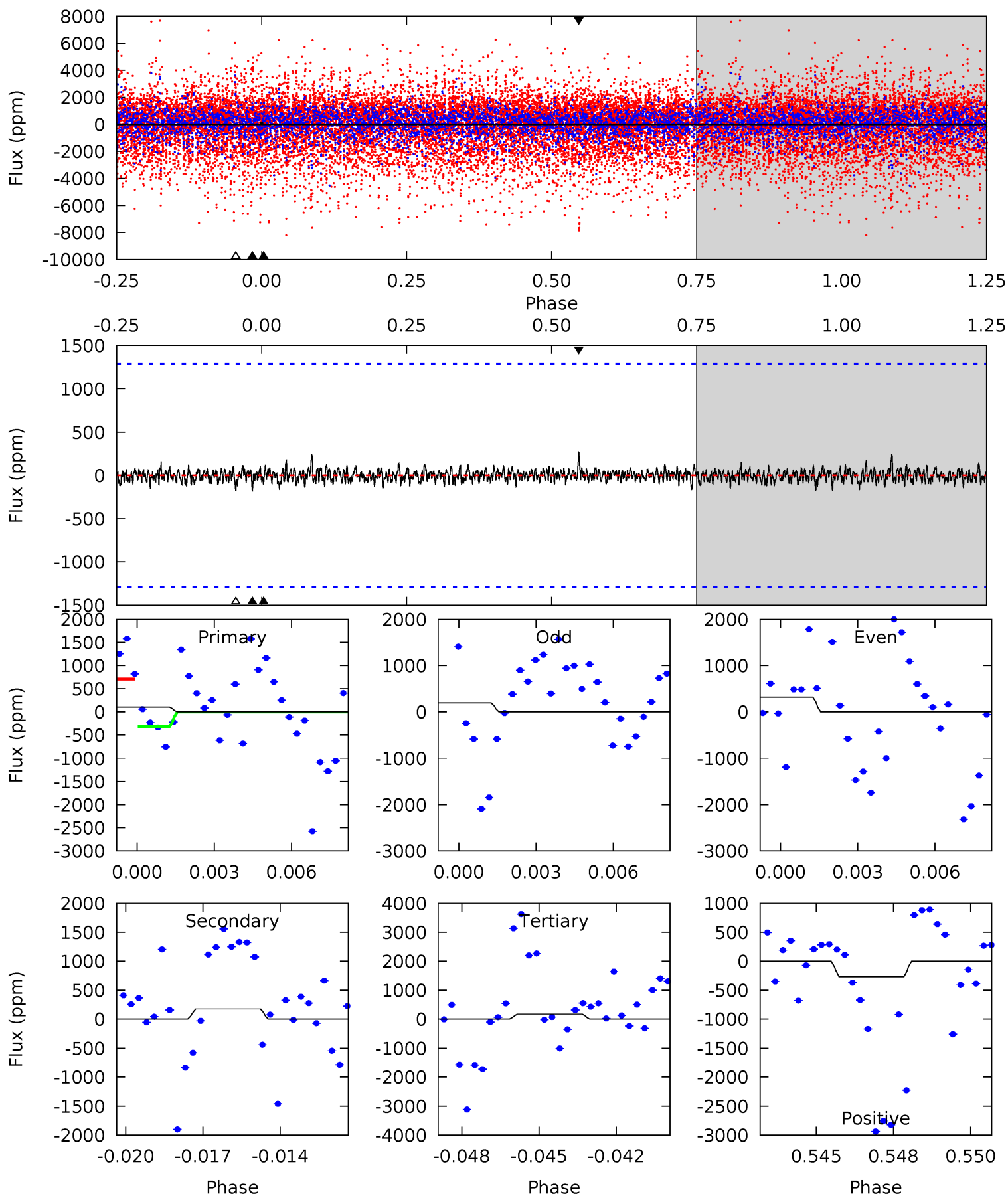
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
3.41	4.59	3.39	4.06	4.95	2.44	1.56	0.03	-0.65	1.21	0.53	1.14	-0.40	0.55	0.19



# Alt Model-Shift Uniqueness Test

008149616-04, P = 118.594438 Days, E = 81.463401 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
0.42	0.72	0.71	1.09	5.26	2.99	0.22	-0.29	-0.66	0.01	-0.37	0.24	0.29	0.60	0.80



### Stellar Parameters For KIC 008149616

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3332^{+43}_{-36}$	$4.987^{+0.044}_{-0.040}$	$0.000^{+0.100}_{-0.100}$	$0.265^{+0.038}_{-0.027}$	$0.248^{+0.045}_{-0.030}$	$18.820^{+4.559}_{-3.663}$
	+1%/-1%	+1%/-1%	+inf%/-inf%	+14%/-10%	+18%/-12%	+24%/-19%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 008149616-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-231 \pm 50$	$0.77^{+0.27}_{-0.28}$	$194^{+4}_{-4}$	$2841^{+381}_{-228}$	$19106^{+27929}_{-8943}$
Alt.	$-176 \pm 245$	$0.56^{+0.24}_{-0.23}$	$194^{+4}_{-4}$	$2885^{+734}_{-5523}$	$21832^{+72762}_{-33247}$

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



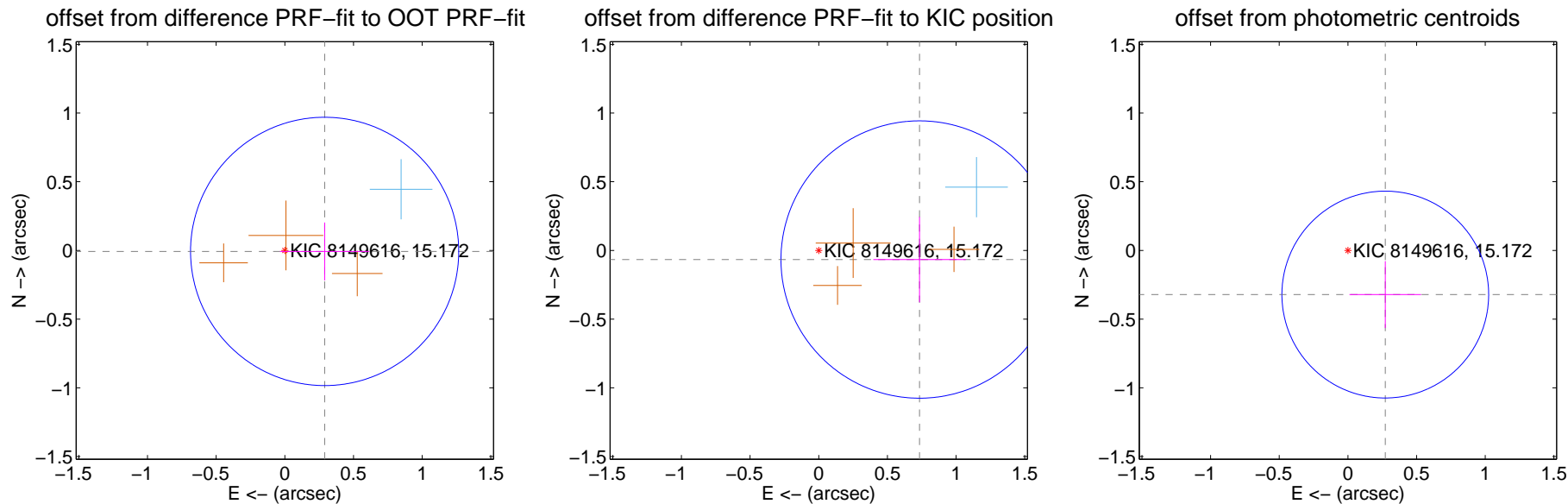
## DV Centroid Data

Supplemental centroid analysis for 008149616-04. Kepler magnitude: 15.17. Transit SNR 7.44

There are 1 quarters with good PRF difference image offsets

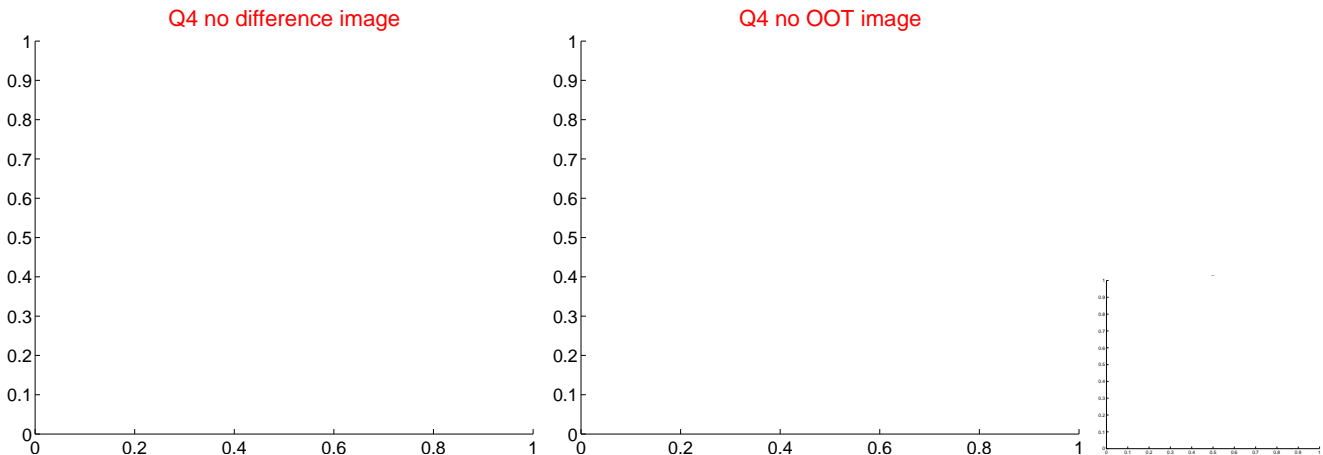
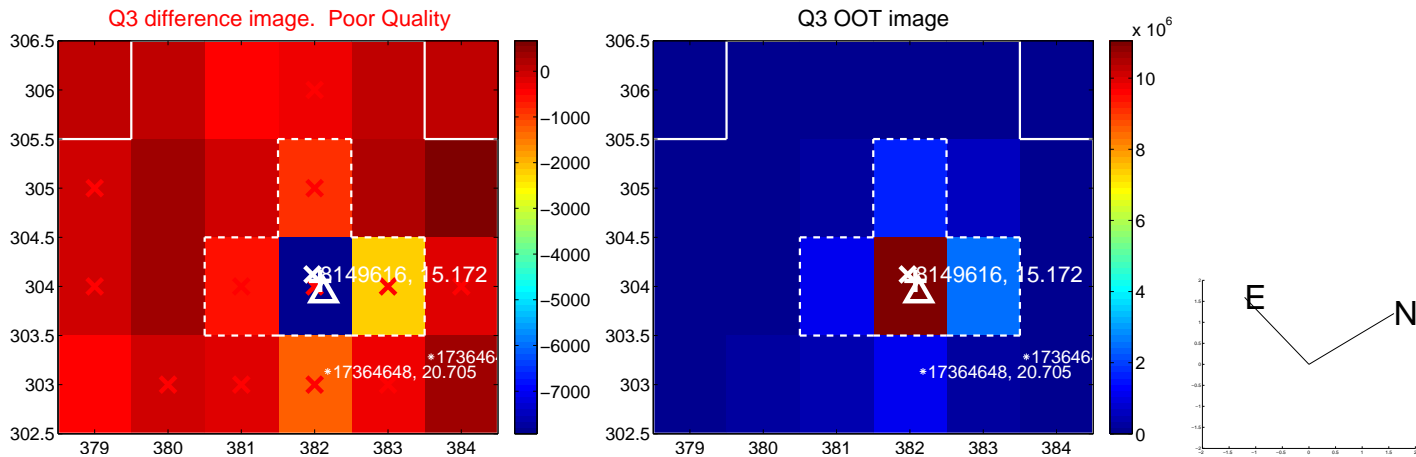
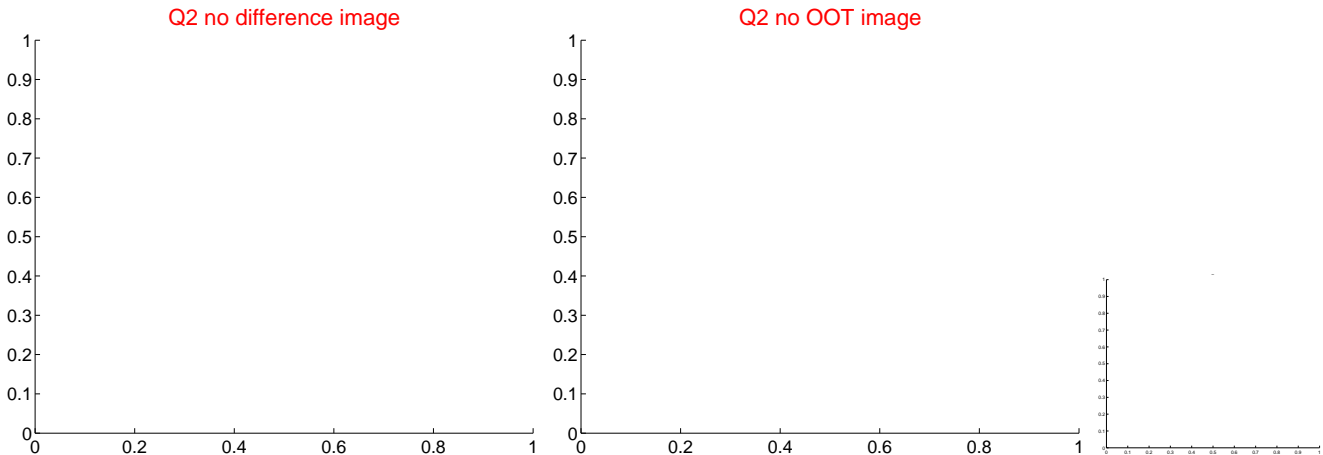
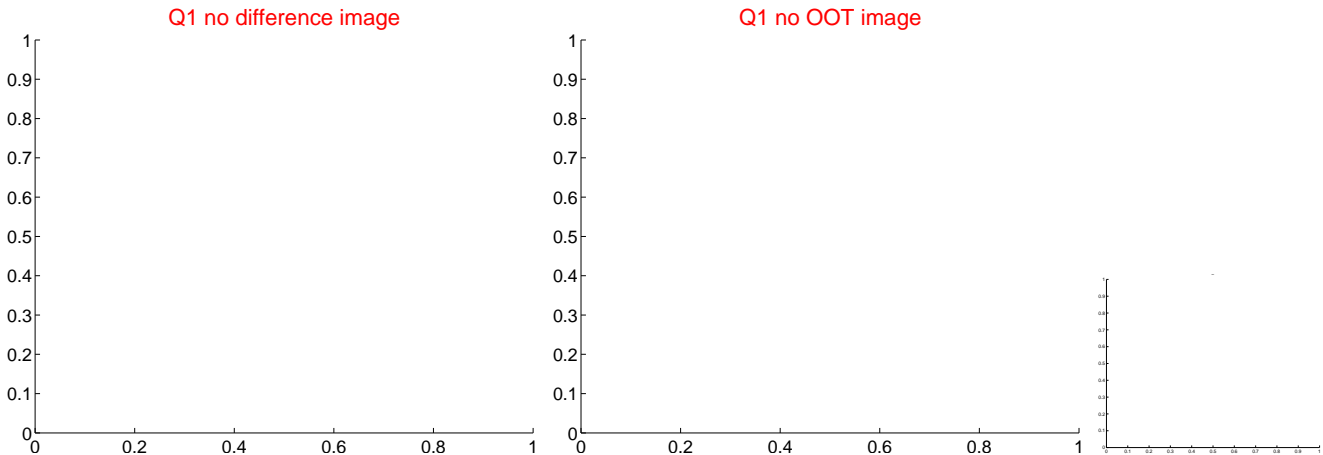
The direct PRF centroid is offset from the target star catalog position by about 0.30 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.290 \pm 0.326$	0.89	$-0.290 \pm 0.326$	$-0.007 \pm 0.211$
PRF-fit source offset from KIC position	$0.737 \pm 0.336$	2.19	$-0.734 \pm 0.337$	$-0.066 \pm 0.311$
photometric centroid source offset	$0.42 \pm 0.25$	1.68	$-0.27 \pm 0.26$	$-0.32 \pm 0.24$

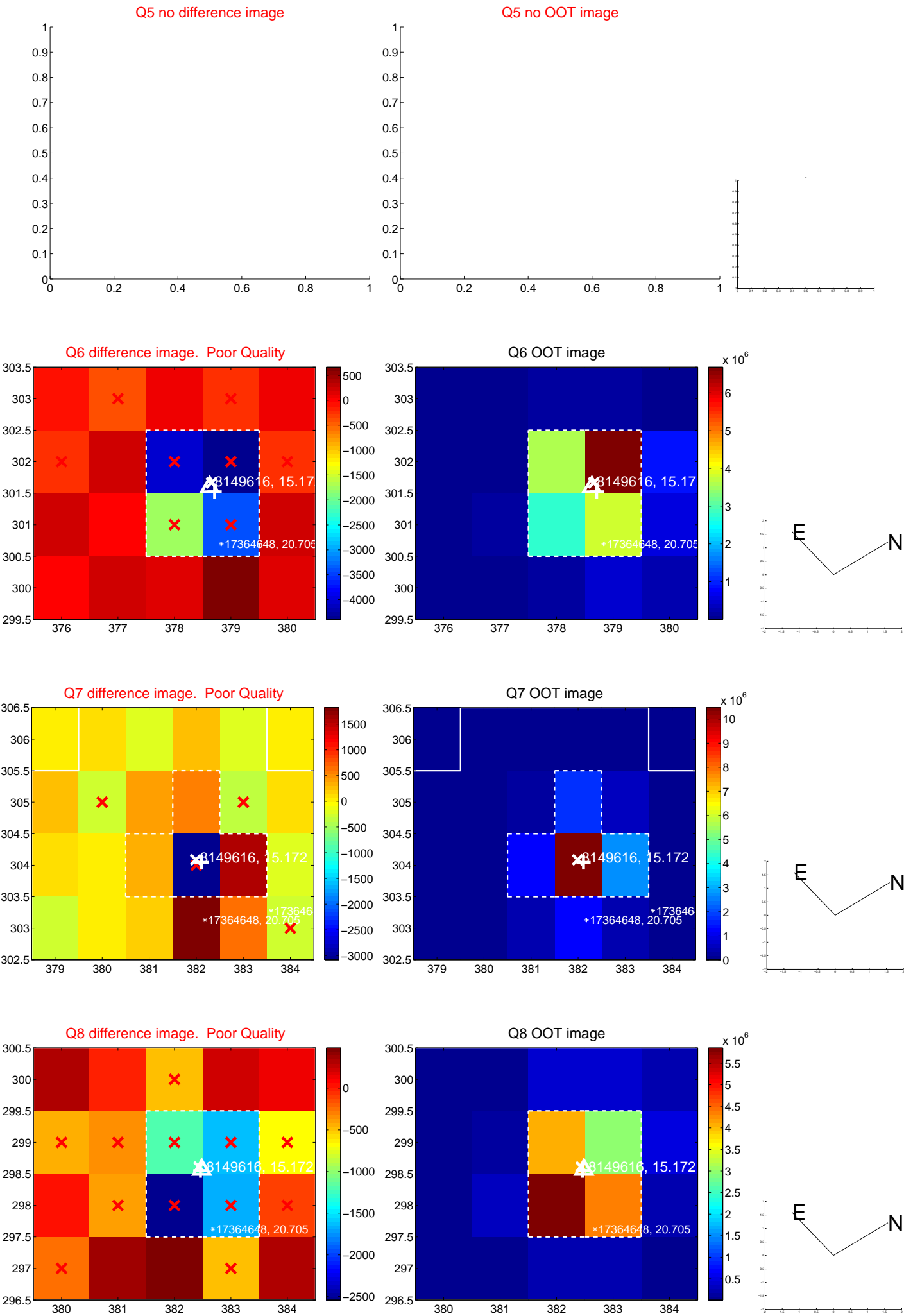


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

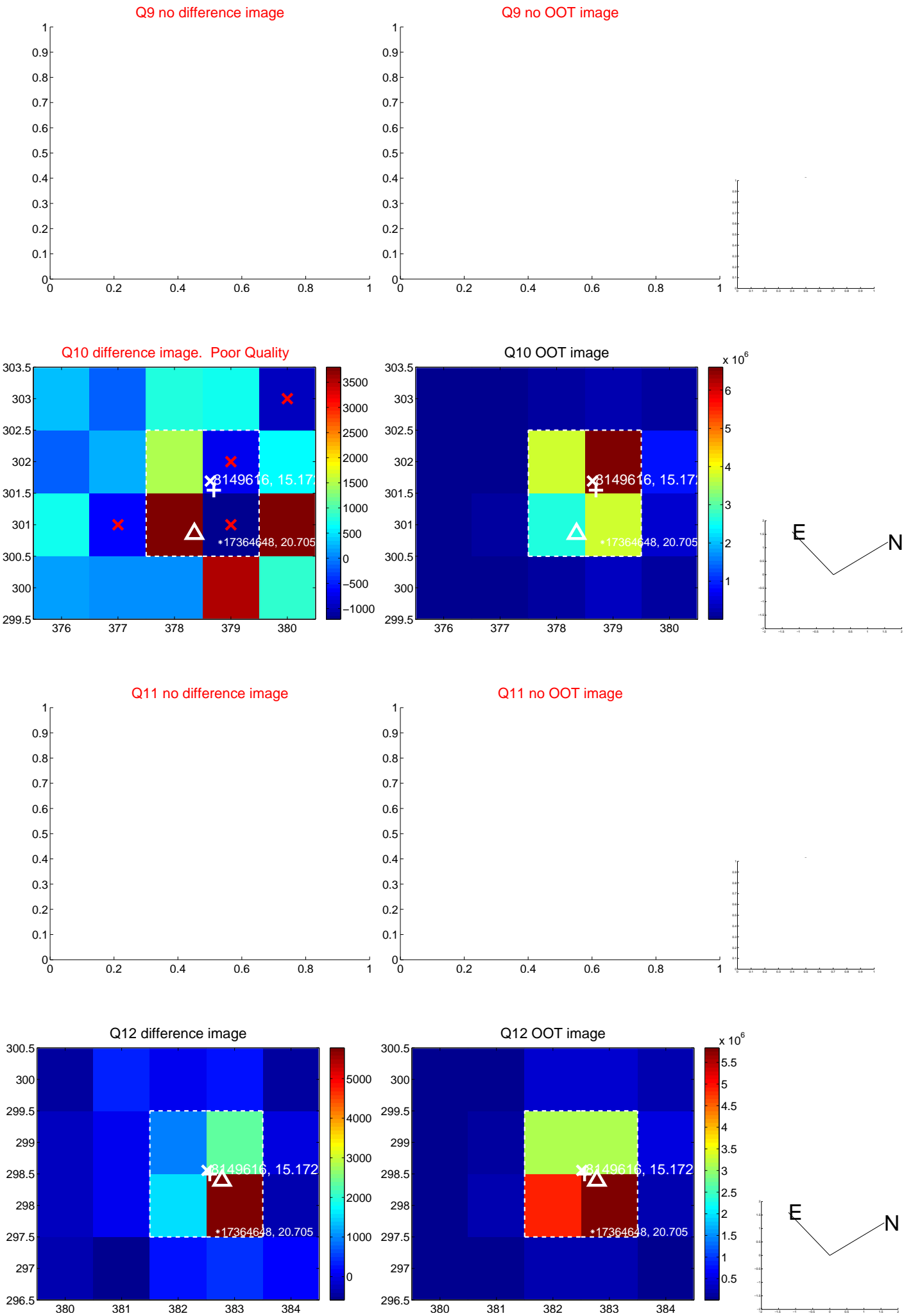
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



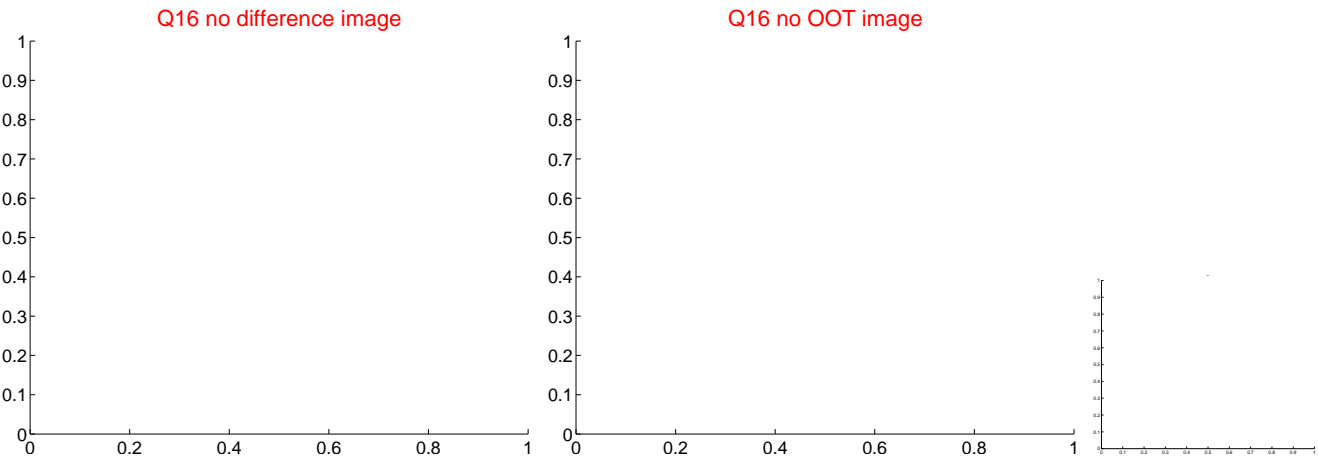
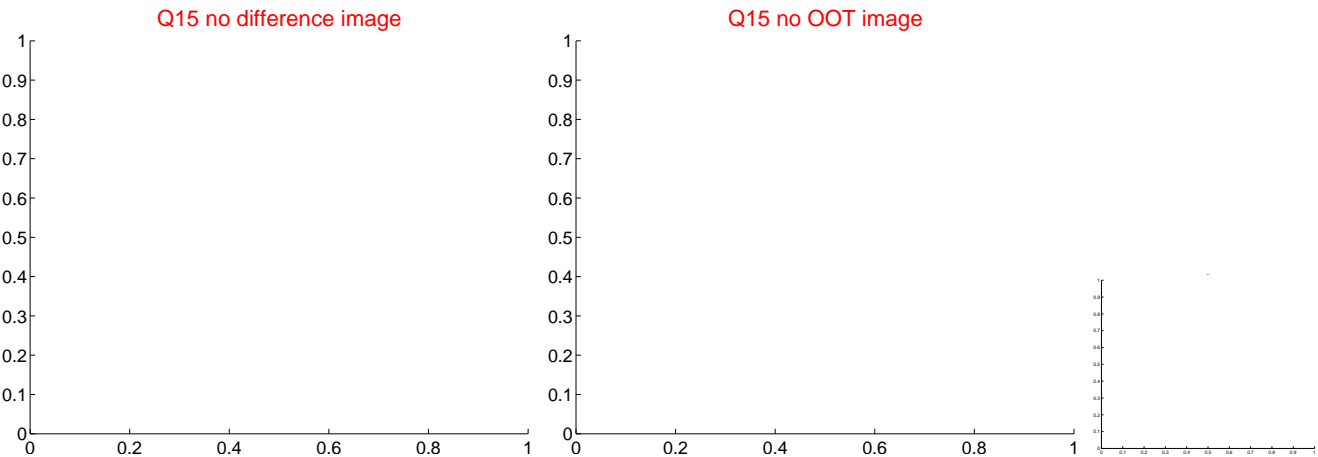
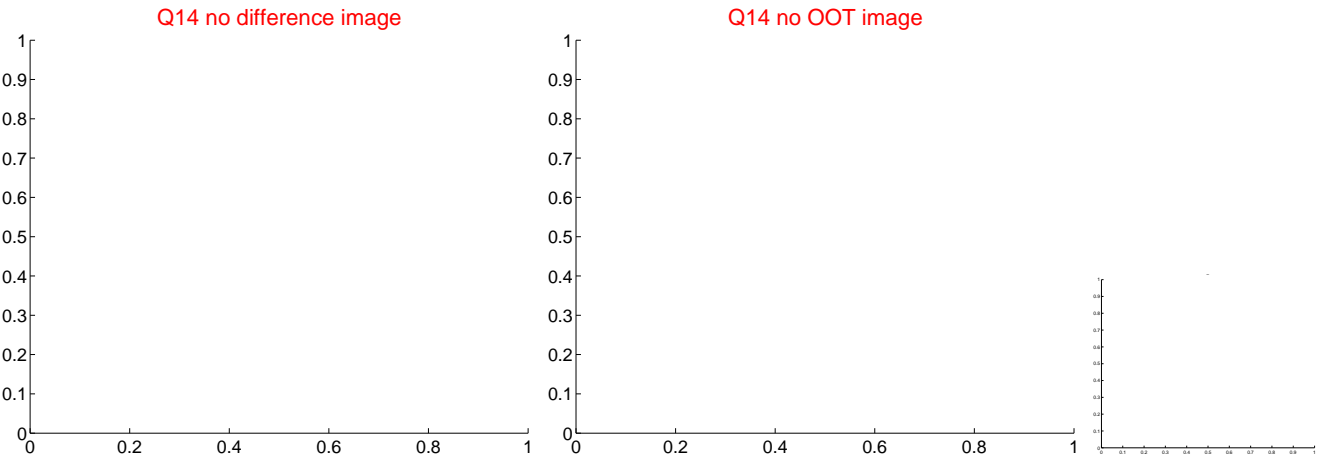
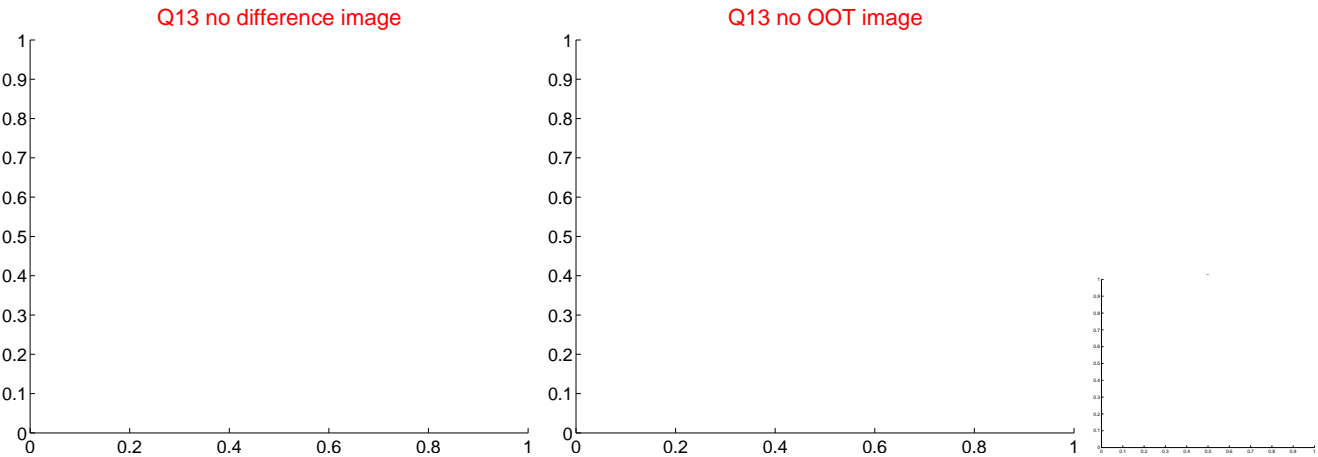
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



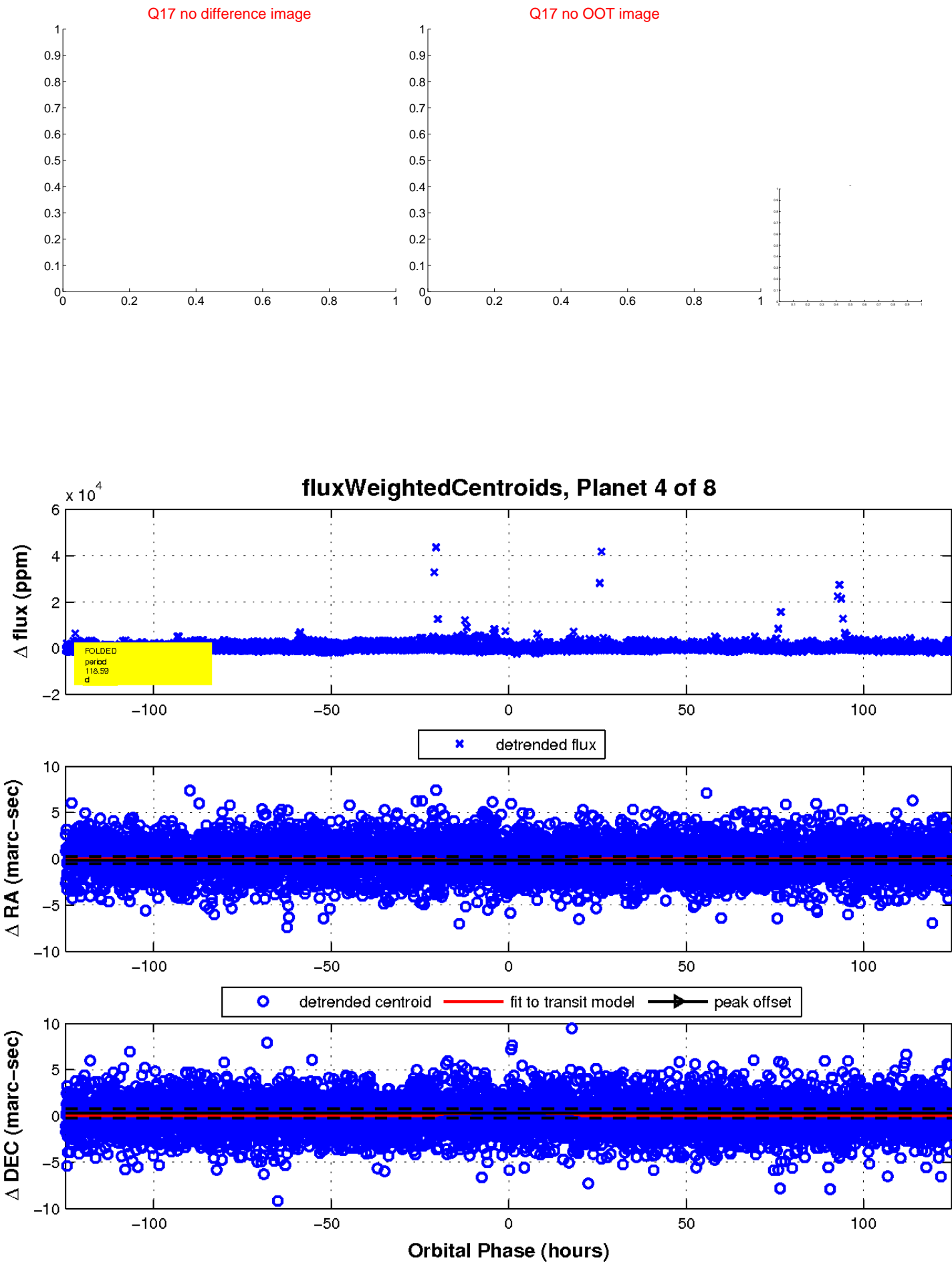
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

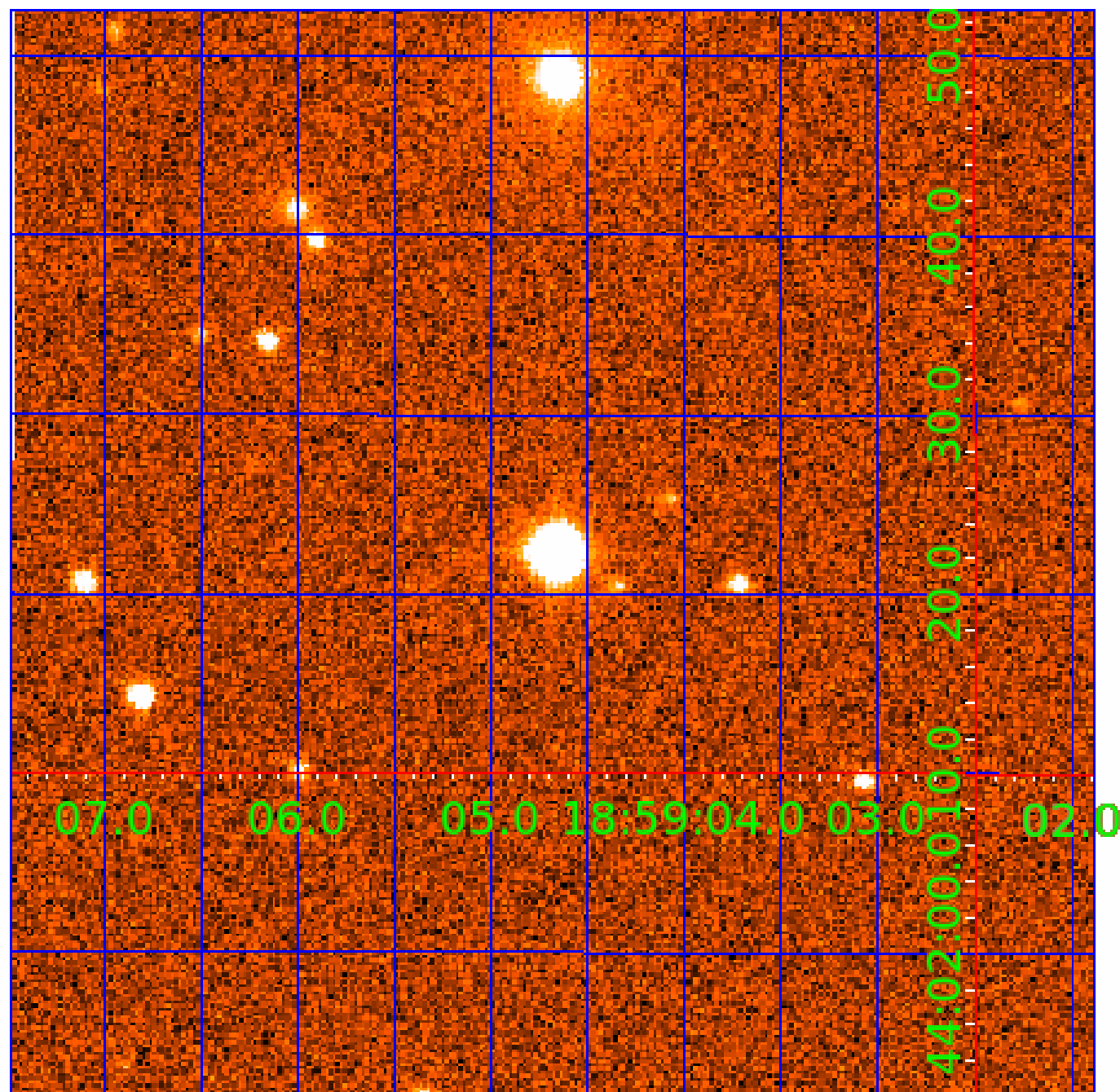


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 008149616

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008149616-01	OBS	No	1.780615	132.506653	106.6	10.625	12.2	9.1	0.27	3332	0.28	23.72
008149616-02	OBS	No	103.037639	191.572038	1341.1	7.500	13.7	-1.0	0.27	3332	0.96	0.11
008149616-03	OBS	No	75.872076	140.582029	1321.3	3.000	10.3	-1.0	0.27	3332	0.95	0.16
008149616-04	OBS	No	118.587620	199.638830	818.9	41.613	10.2	7.4	0.27	3332	0.75	0.09
008149616-05	OBS	No	101.068333	174.446642	1333.8	4.115	9.1	7.7	0.27	3332	1.91	0.11
008149616-06	OBS	No	11.360095	135.155291	323.3	4.579	9.0	7.8	0.27	3332	0.51	2.00
008149616-07	OBS	No	45.419802	152.259980	583.6	16.676	9.8	8.3	0.27	3332	0.67	0.32
008149616-08	OBS	No	62.341047	160.117011	578.1	5.954	9.8	9.3	0.27	3332	0.66	0.21

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008149616-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—CENT_KIC_POS
008149616-02	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—INCONSISTENT_TRANS—CENT_NOFITS
008149616-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_NOFITS
008149616-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES—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
008149616-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS
008149616-06	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
008149616-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT
008149616-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—CENT_KIC_POS

**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.

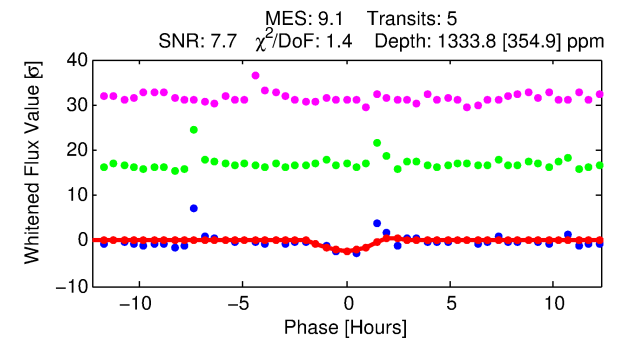
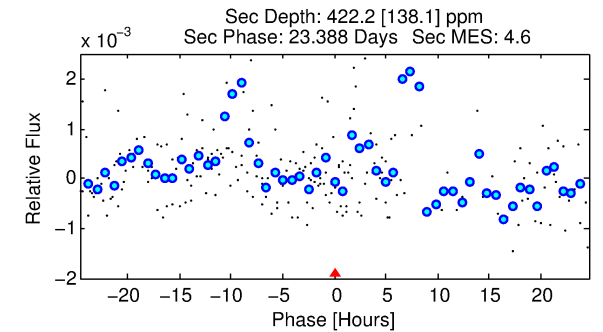
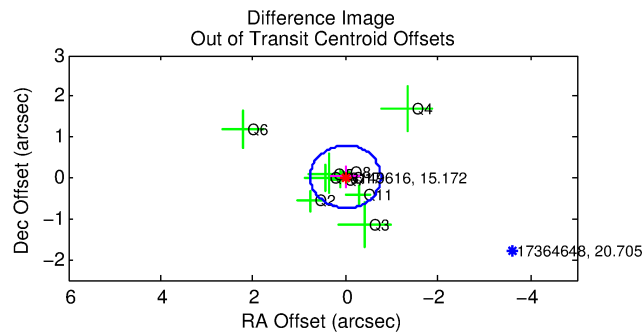
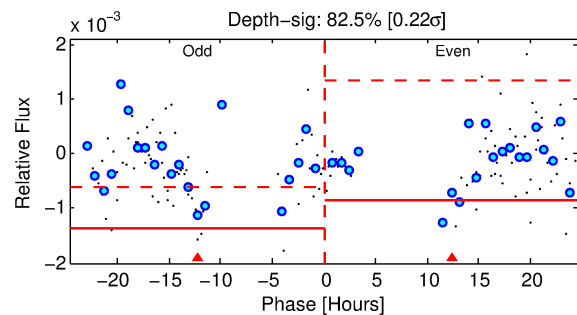
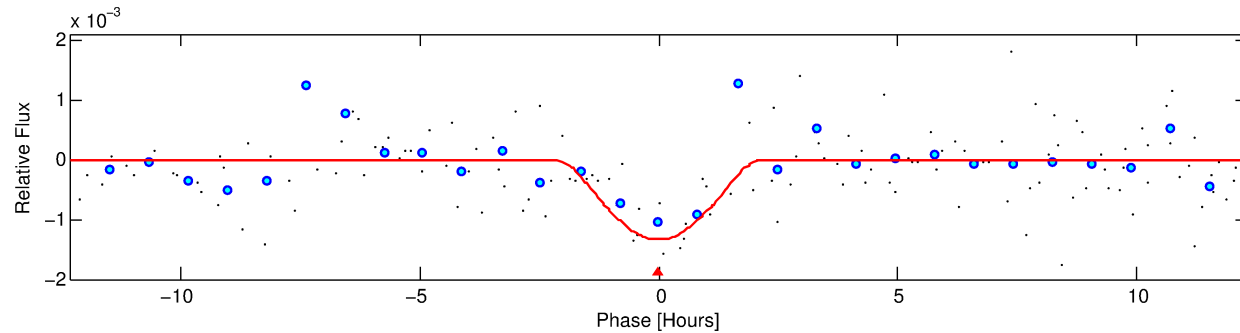
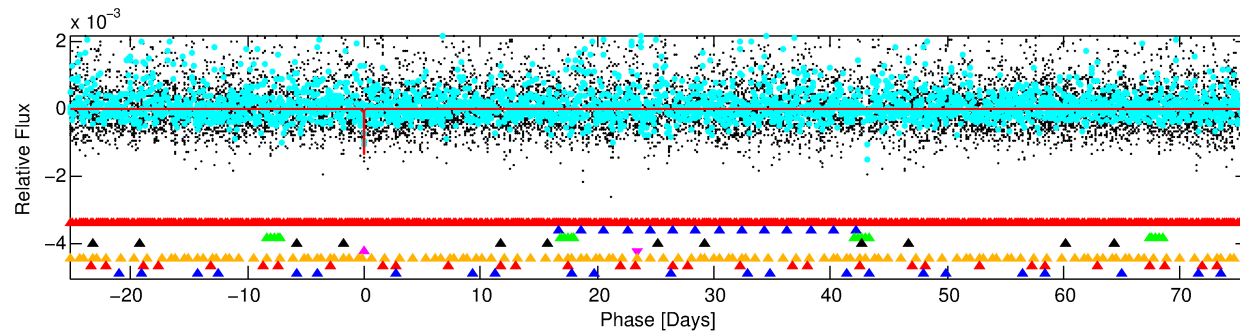
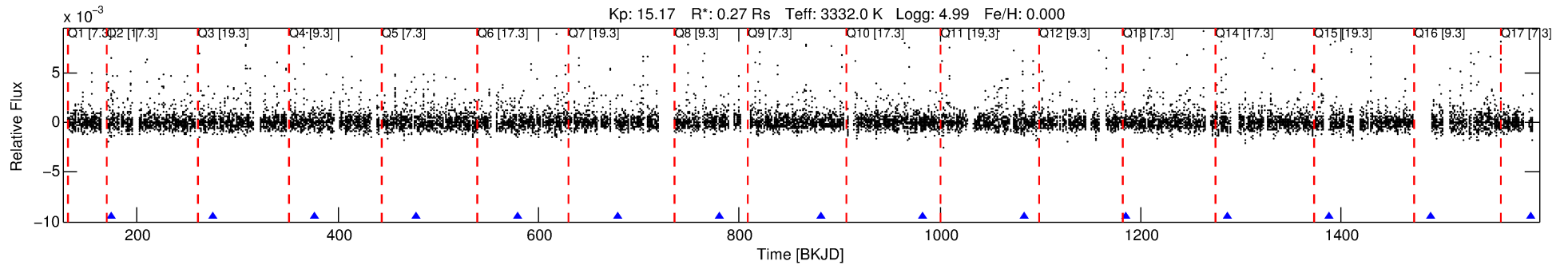
Ephemeris Match Information For 008149616-05

No Significant Match Found



# DV One-Page Summary

KIC: 8149616 Candidate: 5 of 8 Period: 101.068 d



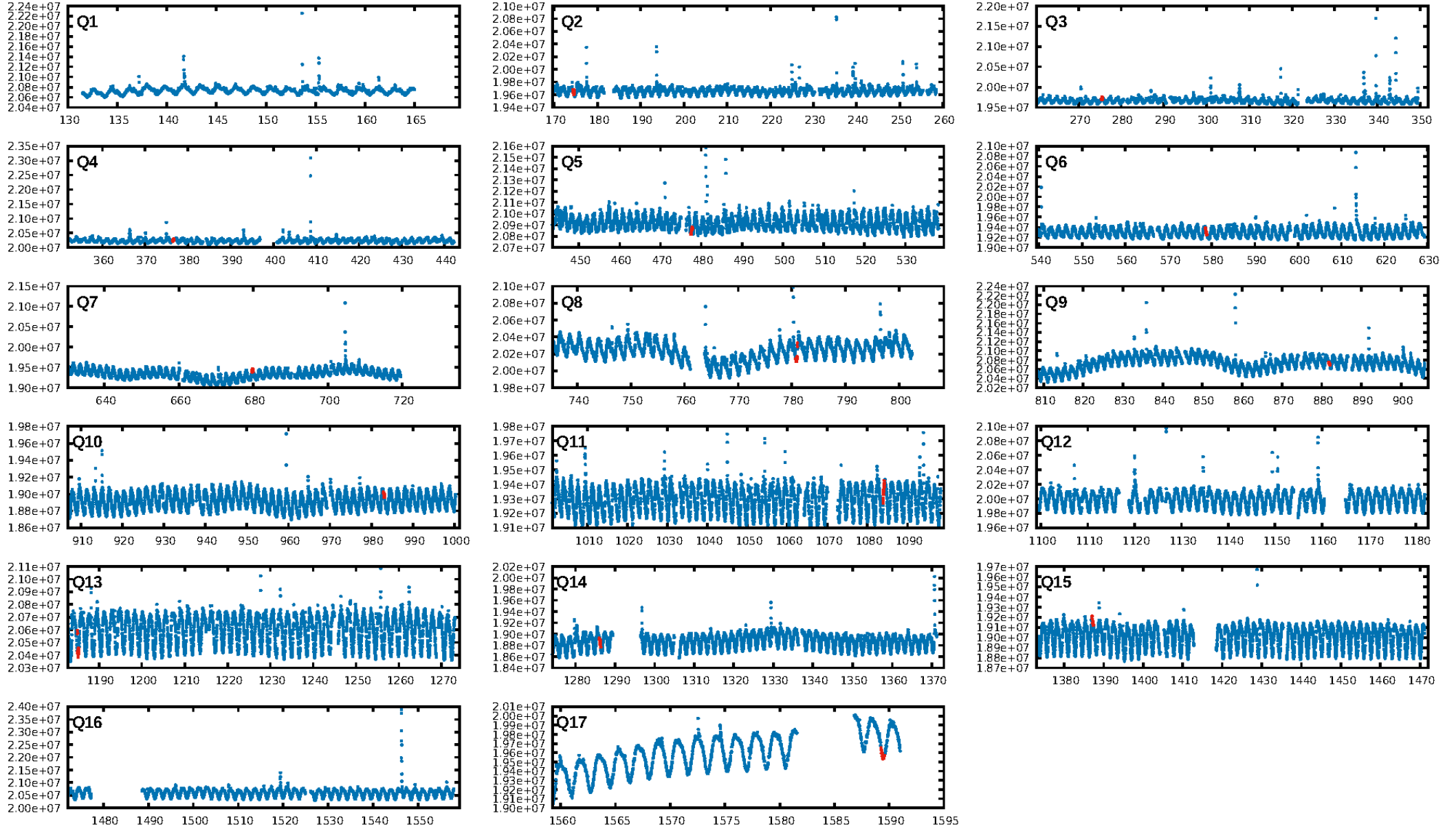
## DV Fit Results:

Period = 101.06833 [0.00258] d  
Epoch = 174.4466 [0.0152] BKJD  
Rp/R\* = 0.0661 [0.4701]  
a/R\* = 69.54 [109.96]  
b = 1.00 [0.66]  
Seff = 0.11 [0.01]  
Teq = 146 [5] K  
Rp = 1.91 [13.60] Re  
a = 0.2671 [0.0271] AU  
Ag = 4528.18 [64392.40] [0.07 $\sigma$ ]  
Teffp = 1857 [6602] K [0.26 $\sigma$ ]

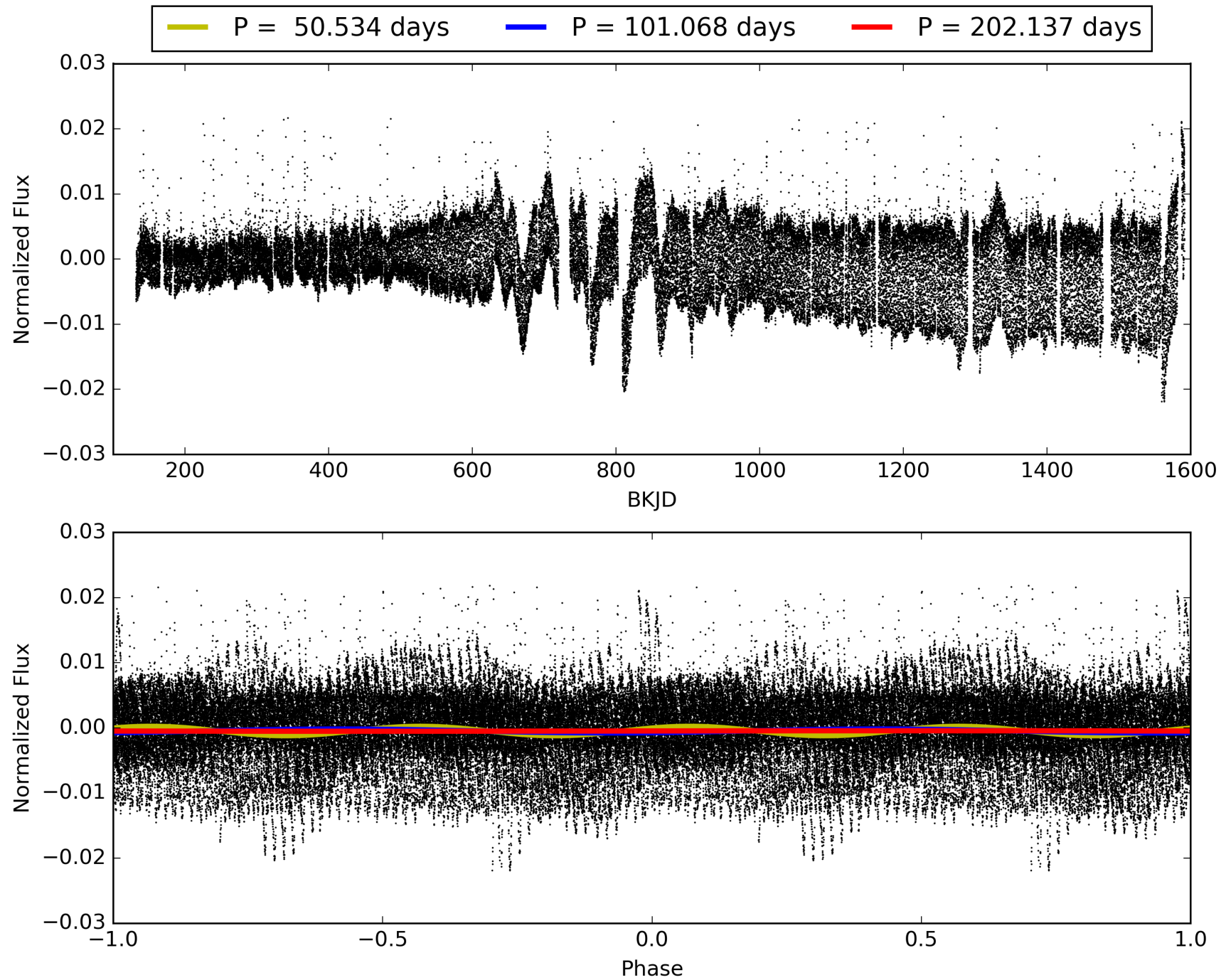
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [118.74 $\sigma$ ]  
LongPeriod-sig: 100.0% [5.52 $\sigma$ ]  
ModelChiSquare2-sig: 20.4%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: 1.778  
Centroid-sig: 13.9%  
Centroid-so: 0.467 arcsec [0.76 $\sigma$ ]  
OotOffset-rm: 0.027 arcsec [0.11 $\sigma$ ]  
KicOffset-rm: 0.354 arcsec [1.20 $\sigma$ ]  
OotOffset-st: 3/3/2/2 [10]  
KicOffset-st: 3/3/2/2 [10]  
DiffImageQuality-fgm: 0.50 [5/10]  
DiffImageOverlap-fno: 0.42 [5/12]

# TCE 008149616-05, PDC Light Curves

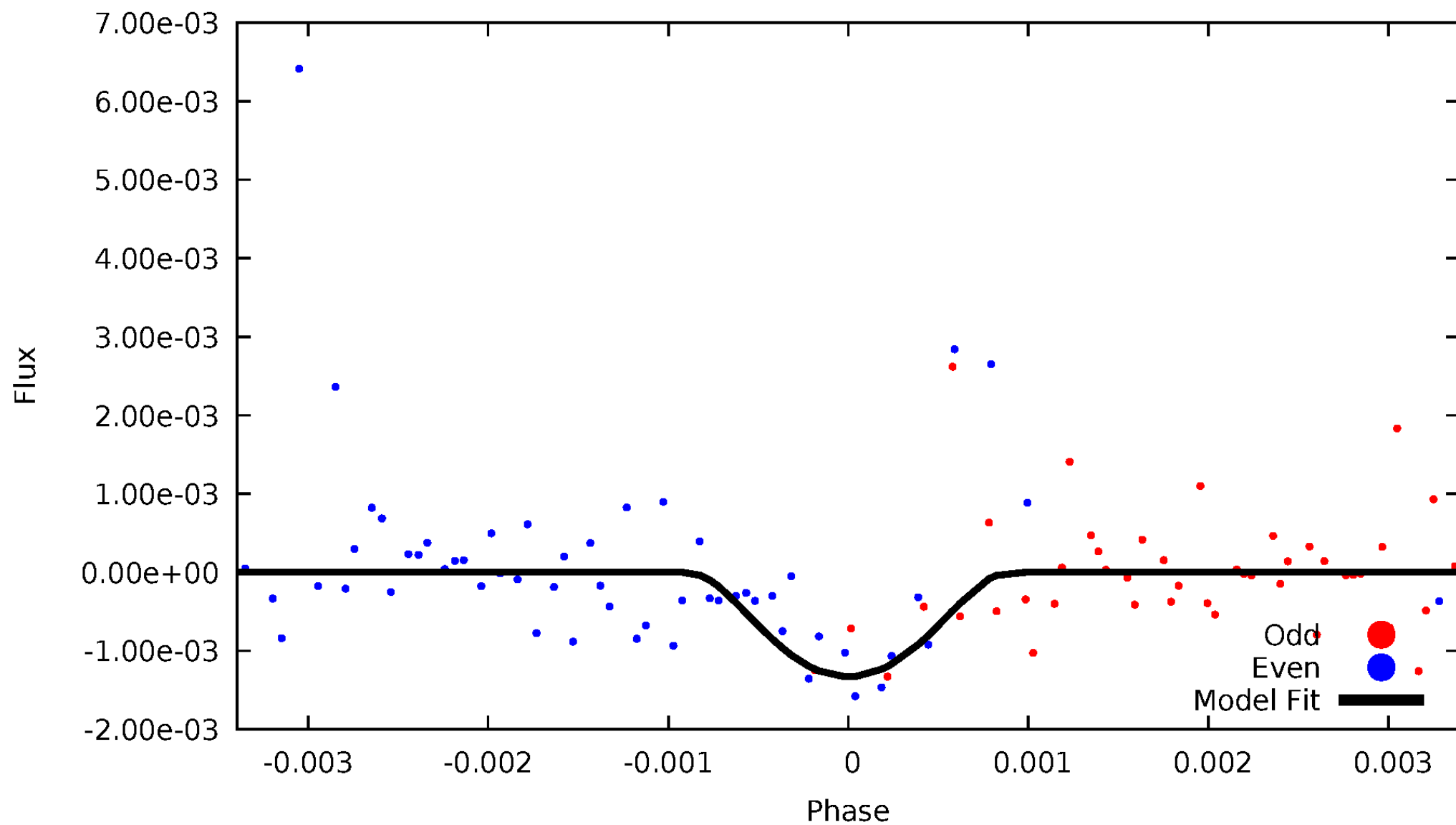


TCE 008149616-05



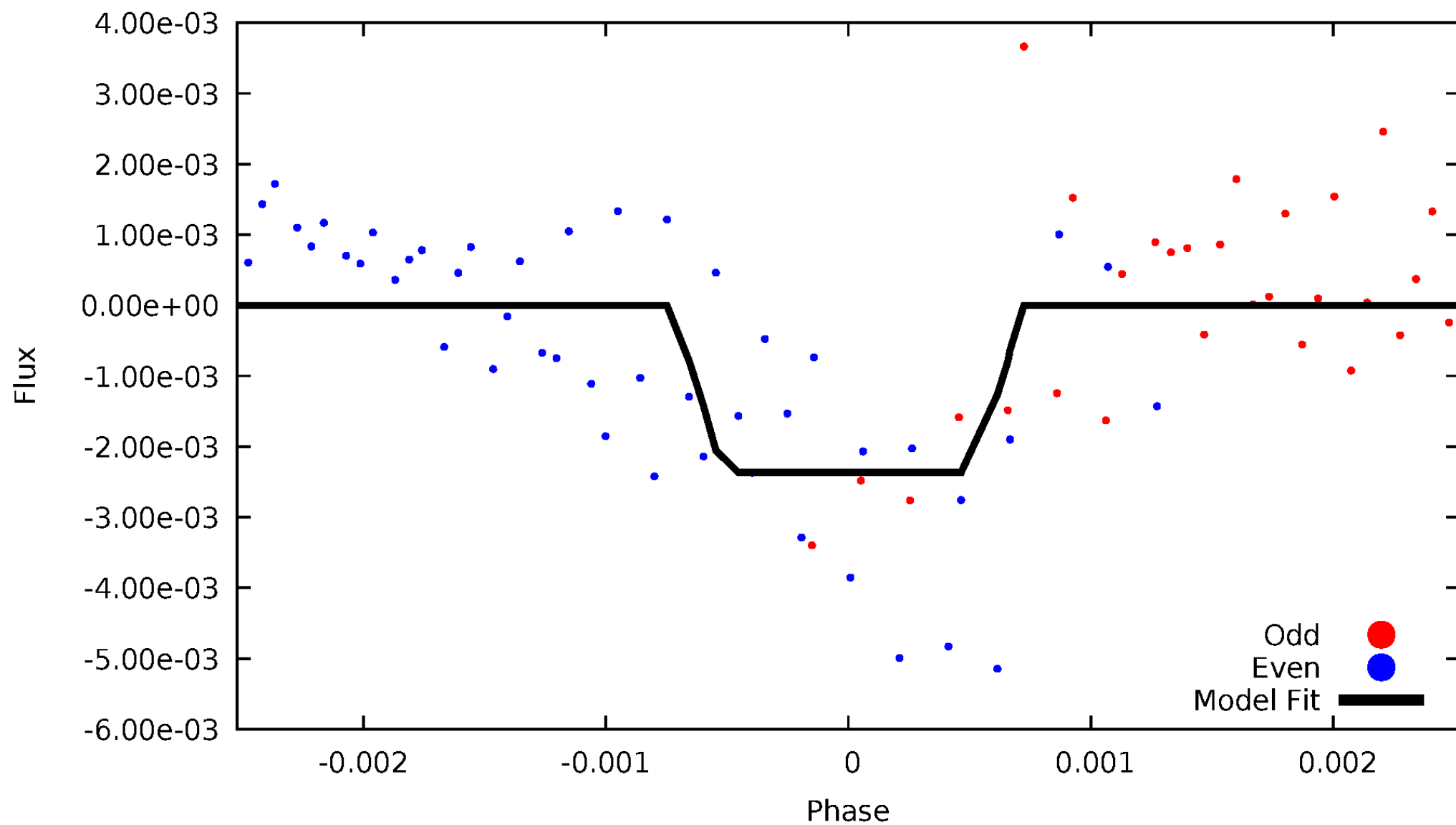
# DV Odd/Even

TCE 008149616-05



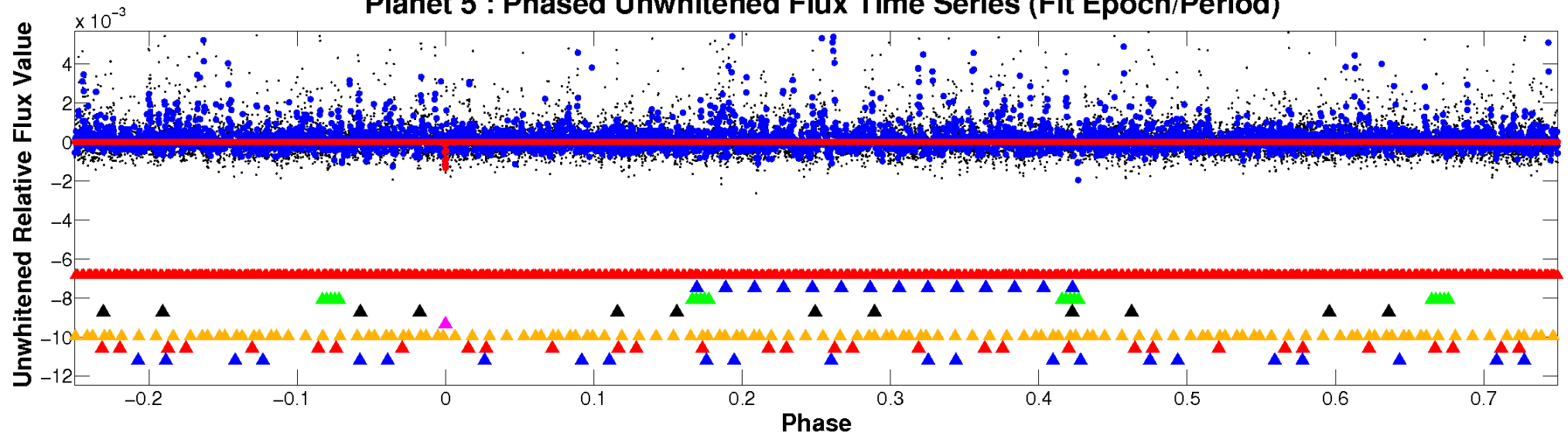
# ALT Odd/Even

TCE 008149616-05

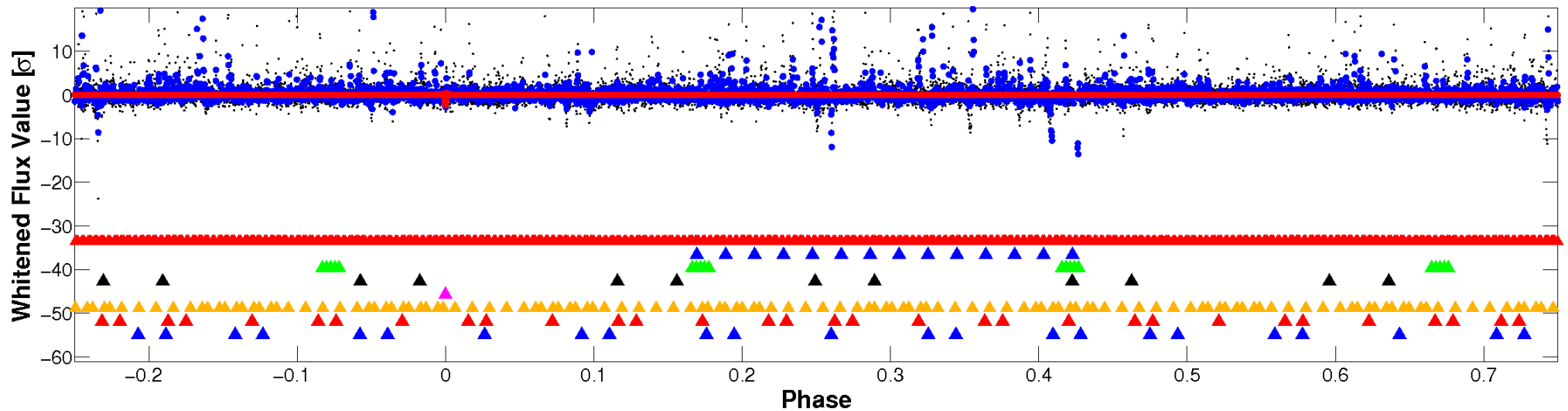


# Non-Whitened Vs. Whitened Light Curve

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

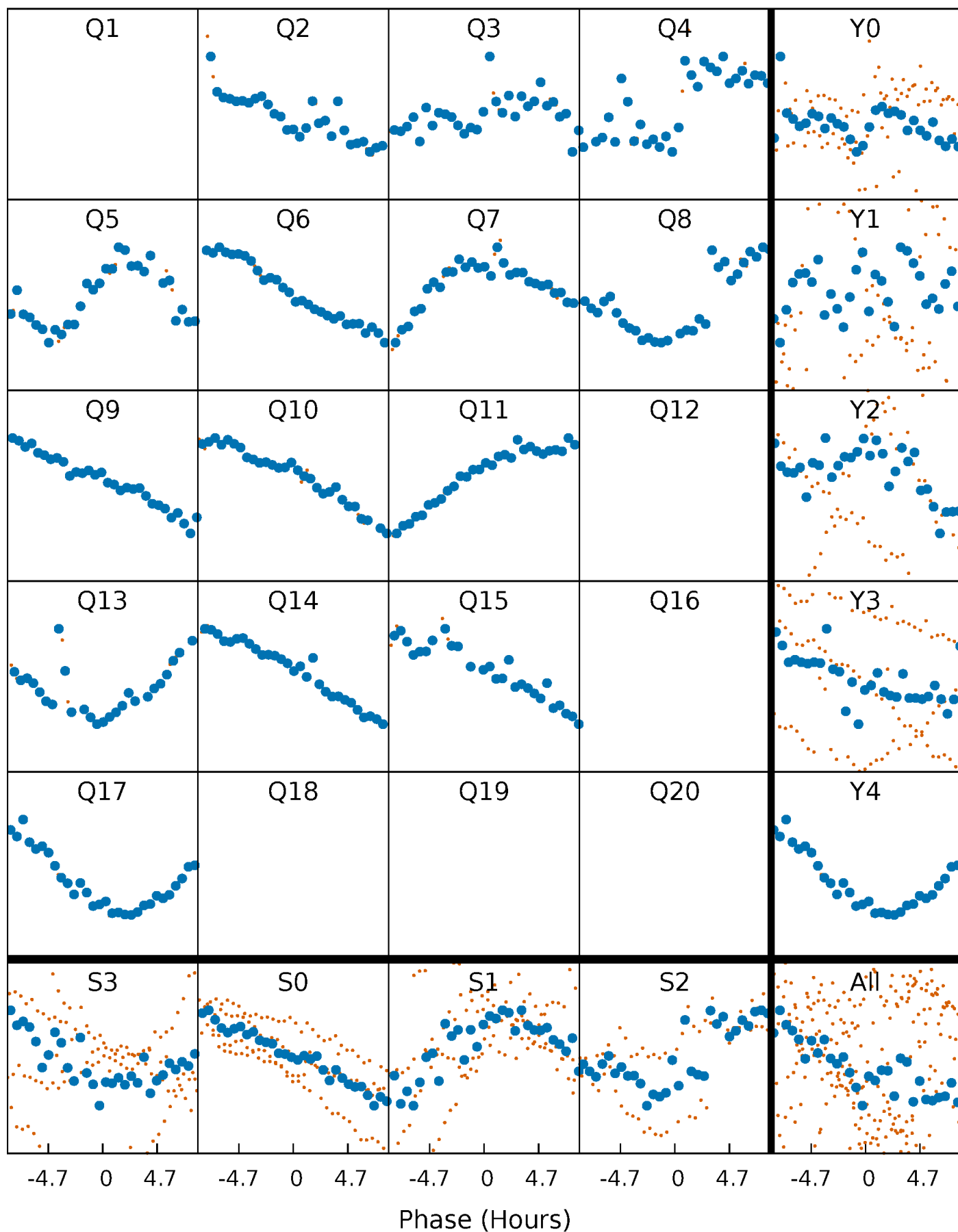


## Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)



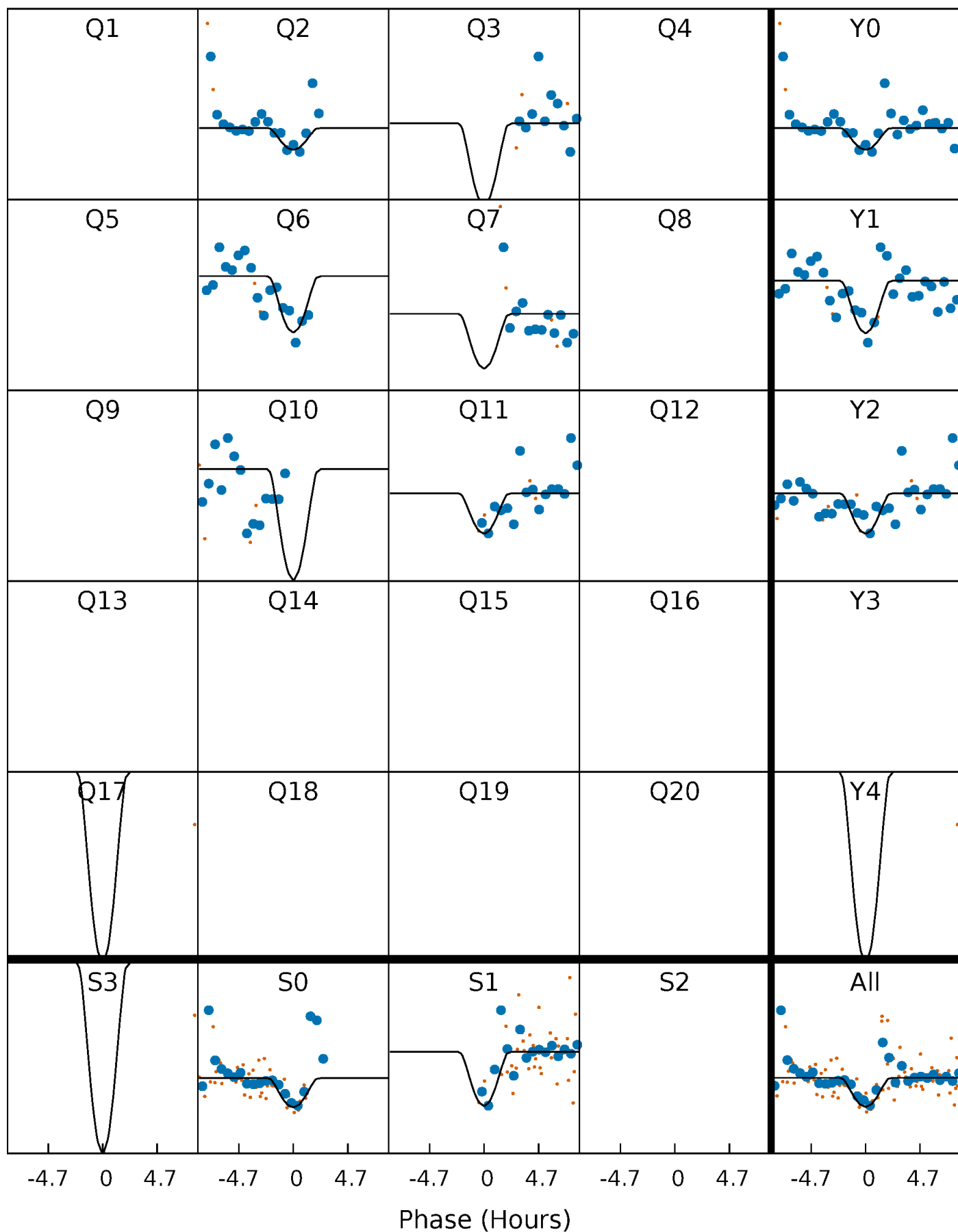
# PDC Quarter-Phased Transit Curves

TCE 008149616-05   P=101.068333 Days    $T_0=174.446642$  (BKJD)



# DV Quarter-Phased Transit Curves

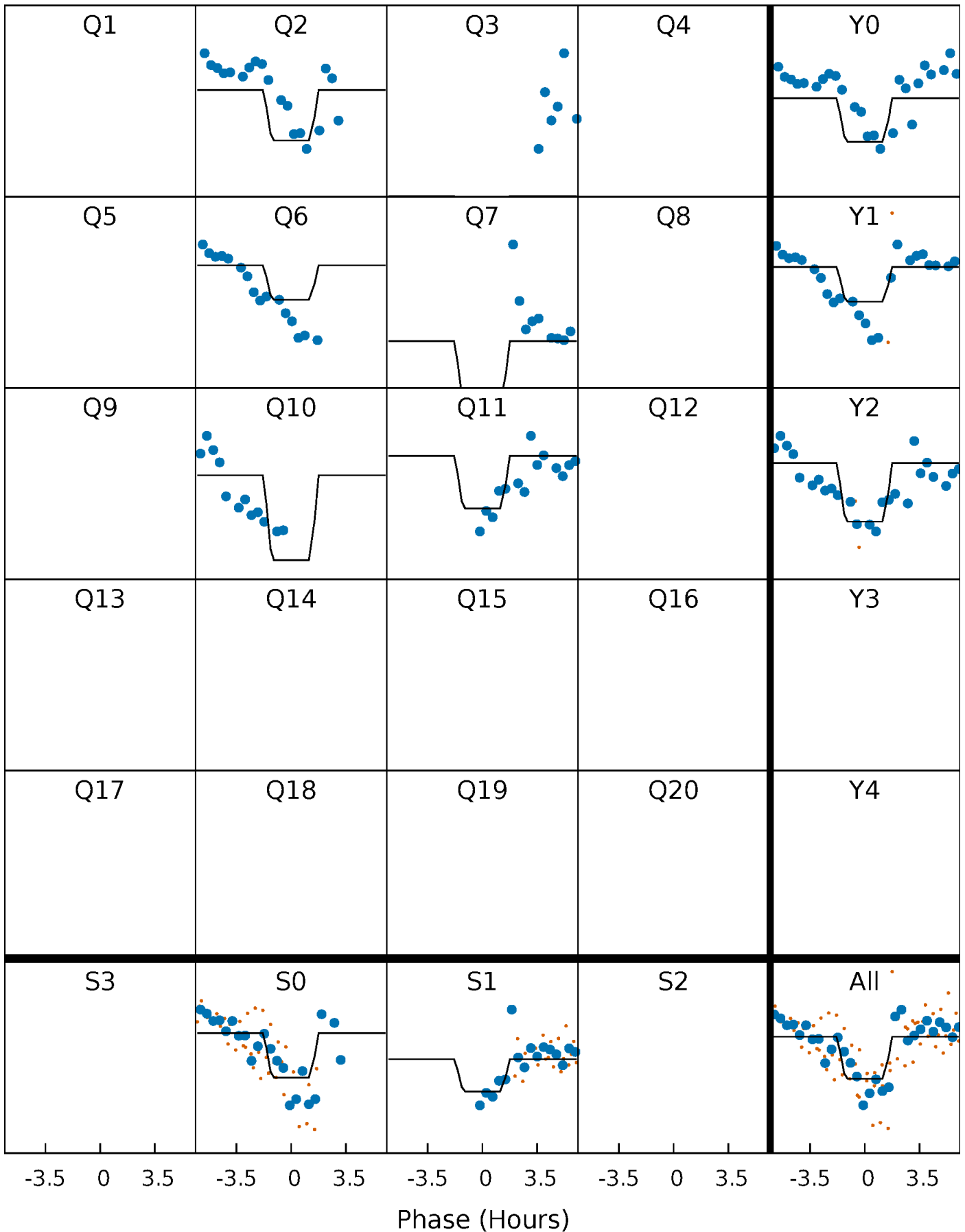
TCE 008149616-05     $P=101.068333$  Days     $T_0=174.446642$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

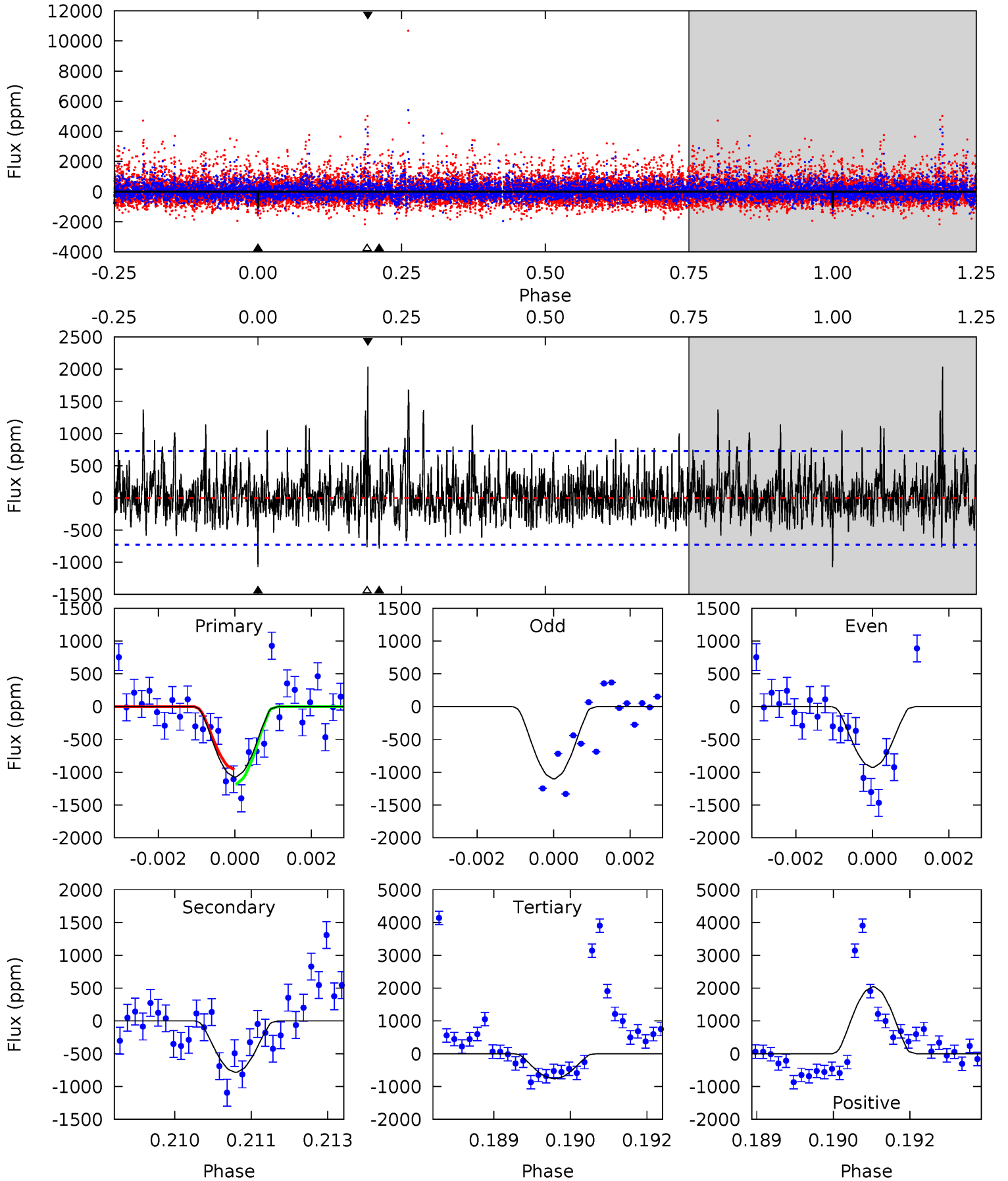
TCE 008149616-05 P=101.071058 Days  $T_0=174.418367$  (BKJD)



# DV Model-Shift Uniqueness Test

008149616-05, P = 101.068333 Days, E = 73.378309 Days

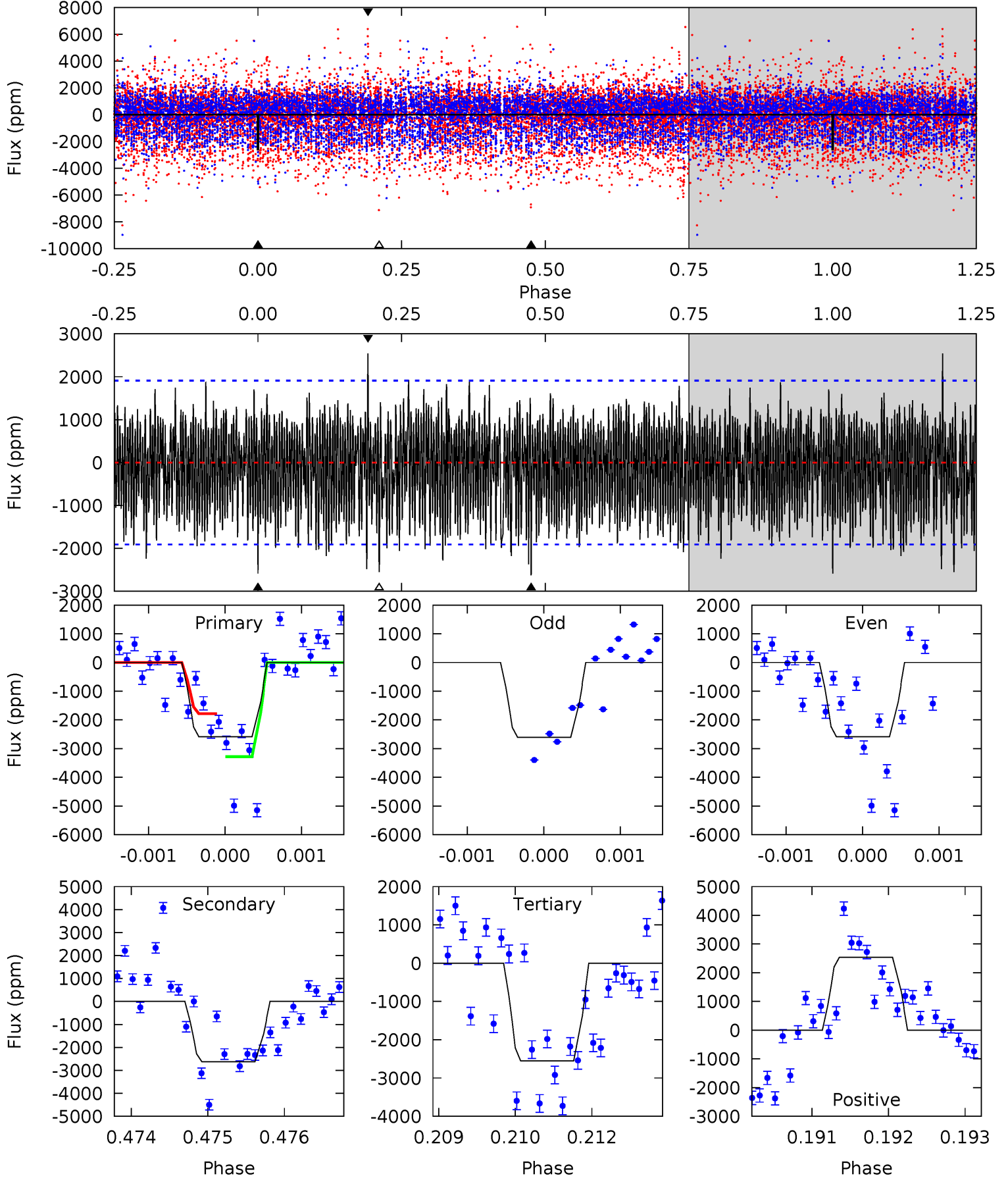
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.88	5.75	5.61	15.0	5.35	3.13	2.11	2.27	-7.08	0.14	-9.22	0.46	-0.96	0.66	0.83



# Alt Model-Shift Uniqueness Test

008149616-05, P = 101.071058 Days, E = 73.347309 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
7.32	7.43	7.22	7.19	5.40	3.21	2.59	0.10	0.14	0.21	0.24	0.03	1.15	0.49	2.13



### Stellar Parameters For KIC 008149616

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3332^{+43}_{-36}$	$4.987^{+0.044}_{-0.040}$	$0.000^{+0.100}_{-0.100}$	$0.265^{+0.038}_{-0.027}$	$0.248^{+0.045}_{-0.030}$	$18.820^{+4.559}_{-3.663}$
	+1%/-1%	+1%/-1%	+inf%/-inf%	+14%/-10%	+18%/-12%	+24%/-19%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 008149616-05 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-783 \pm 136$	$9.86^{+10.67}_{-7.01}$	$204^{+5}_{-4}$	$1834^{+525}_{-230}$	$325^{+3284}_{-255}$
Alt.	$-2624 \pm 353$	$9.98^{+9.02}_{-7.12}$	$204^{+5}_{-4}$	$2063^{+683}_{-258}$	$1017^{+10925}_{-745}$

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

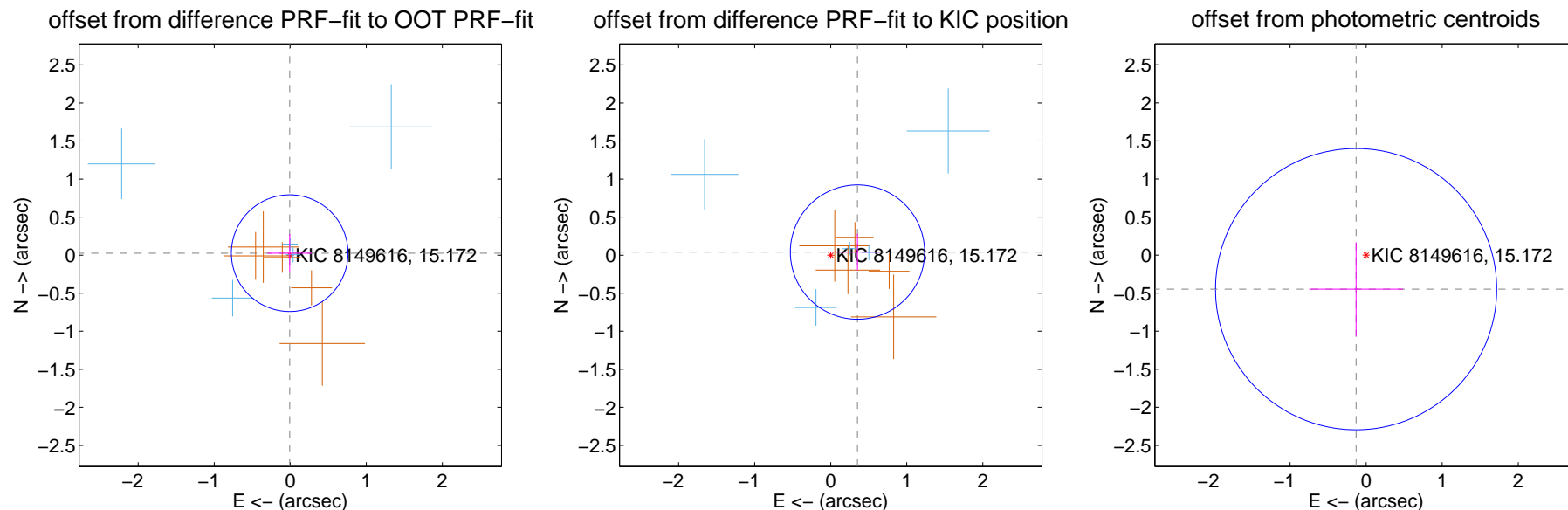
## DV Centroid Data

Supplemental centroid analysis for 008149616-05. Kepler magnitude: 15.17. Transit SNR 7.67

There are 5 quarters with good PRF difference image offsets

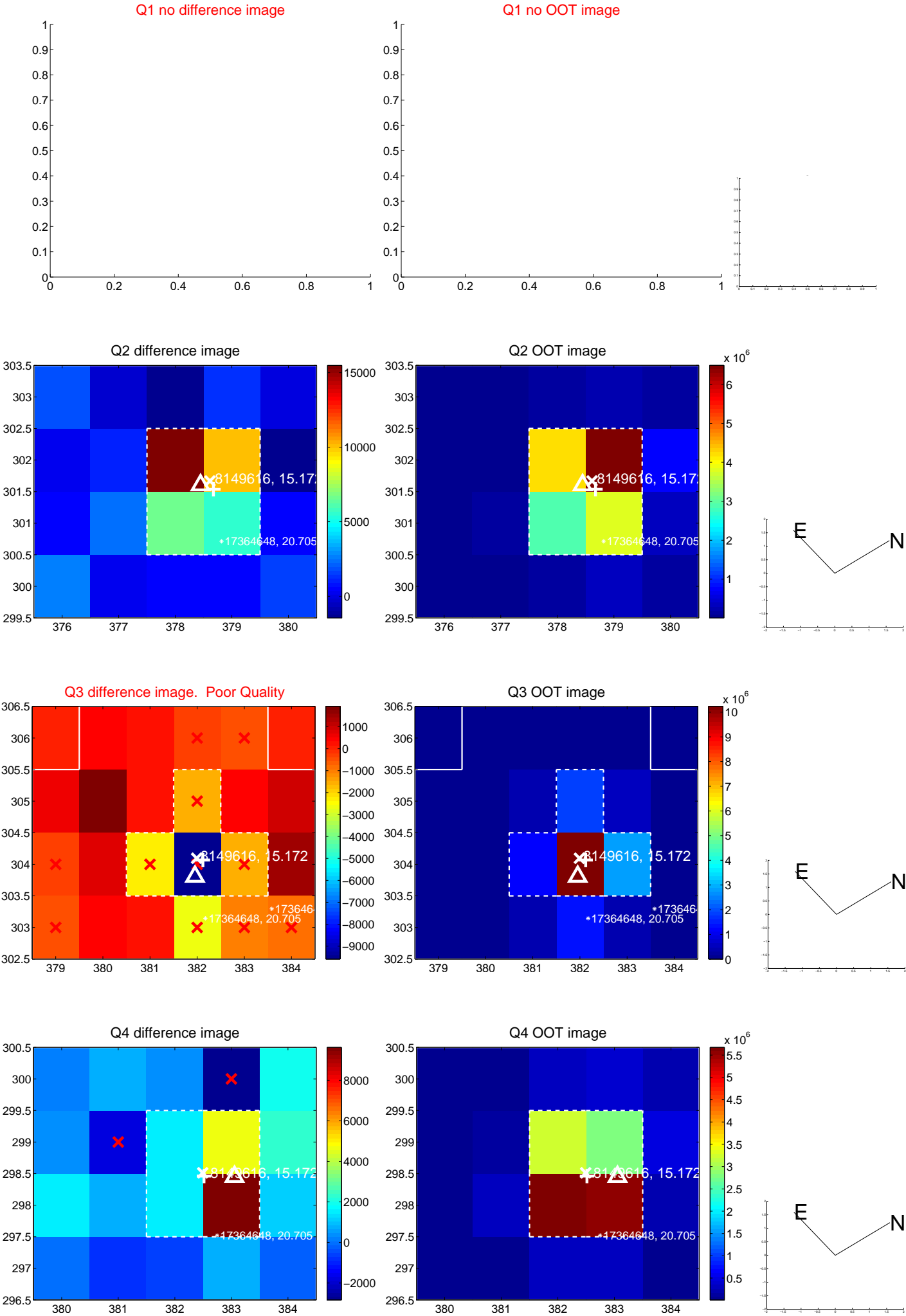
The direct PRF centroid is offset from the target star catalog position by about 0.46 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.027 \pm 0.256$	0.11	$0.007 \pm 0.292$	$0.026 \pm 0.251$
PRF-fit source offset from KIC position	$0.354 \pm 0.294$	1.20	$-0.352 \pm 0.297$	$0.040 \pm 0.241$
photometric centroid source offset	$0.47 \pm 0.62$	0.76	$0.13 \pm 0.62$	$-0.45 \pm 0.62$

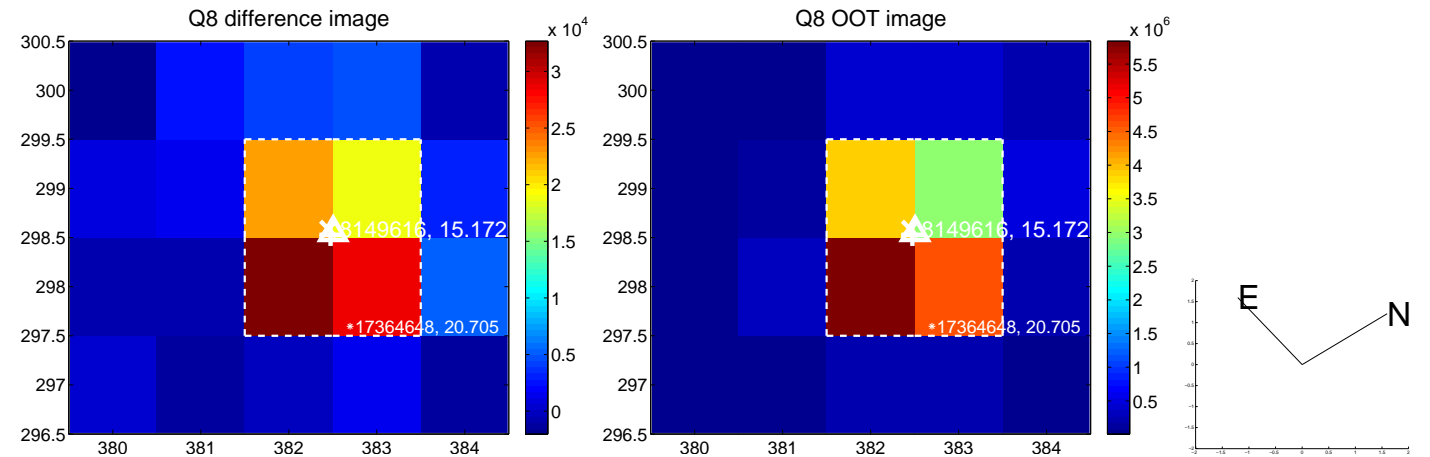
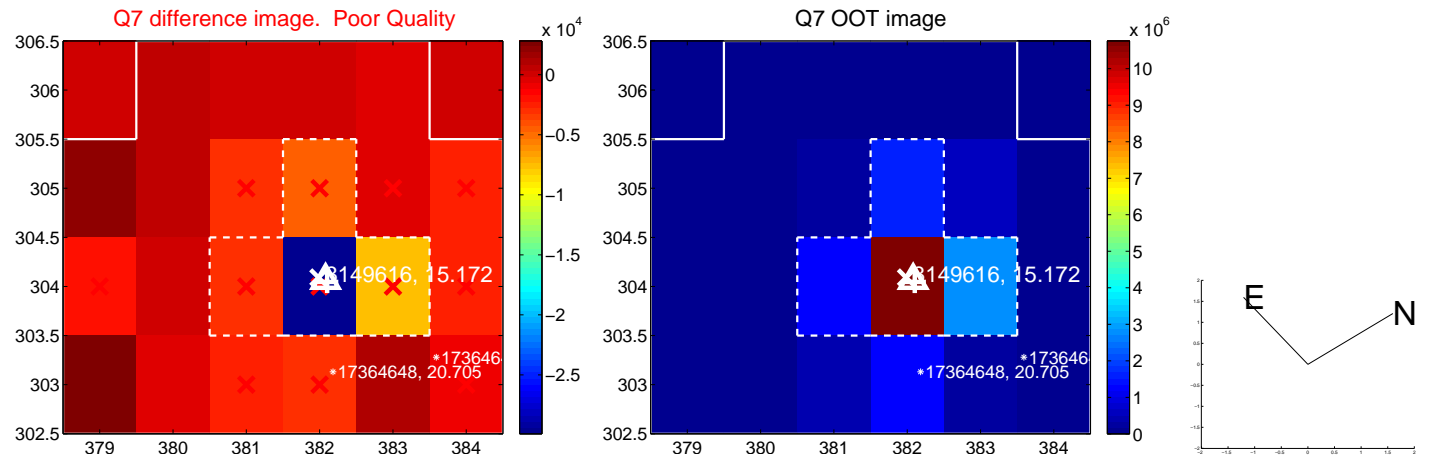
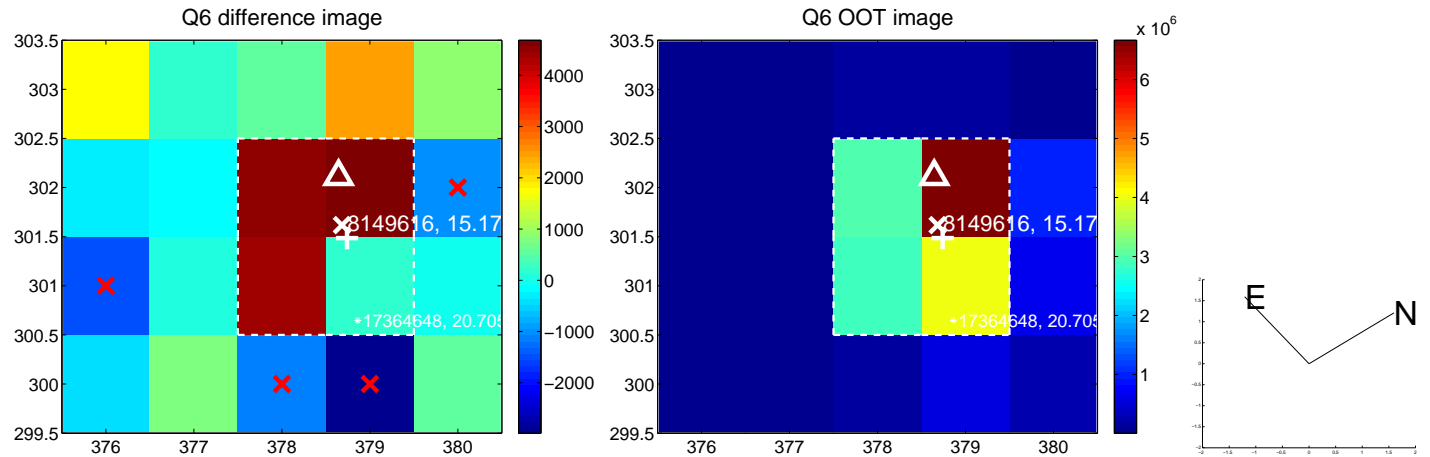
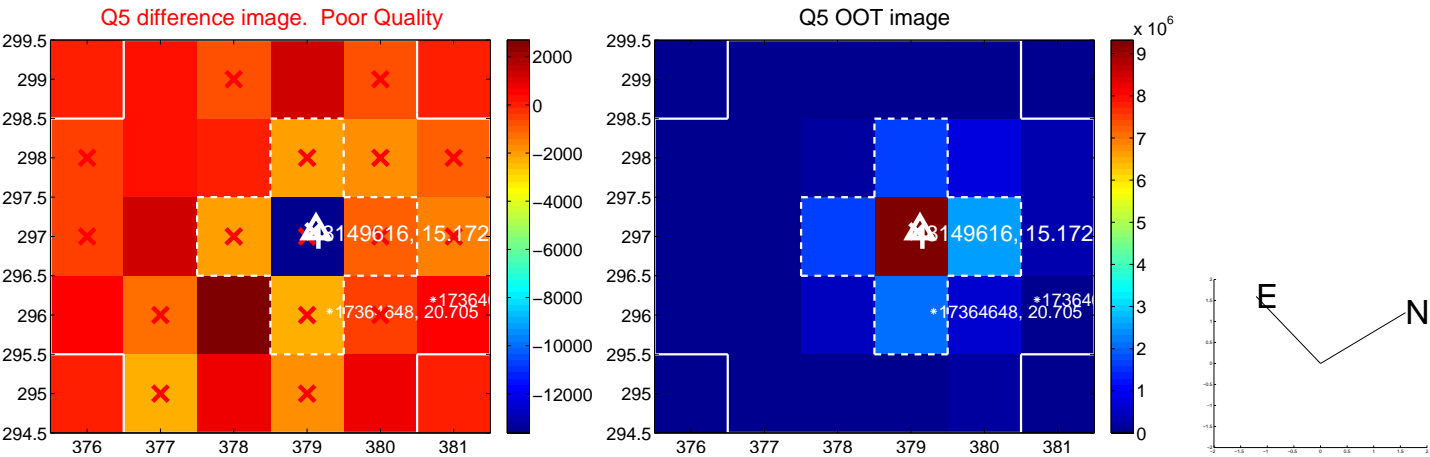


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

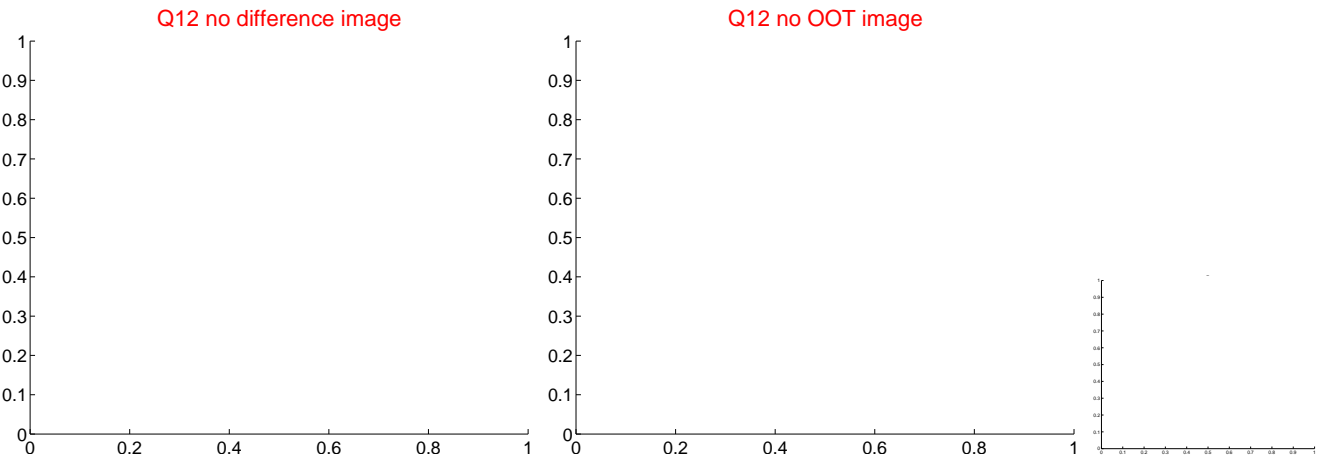
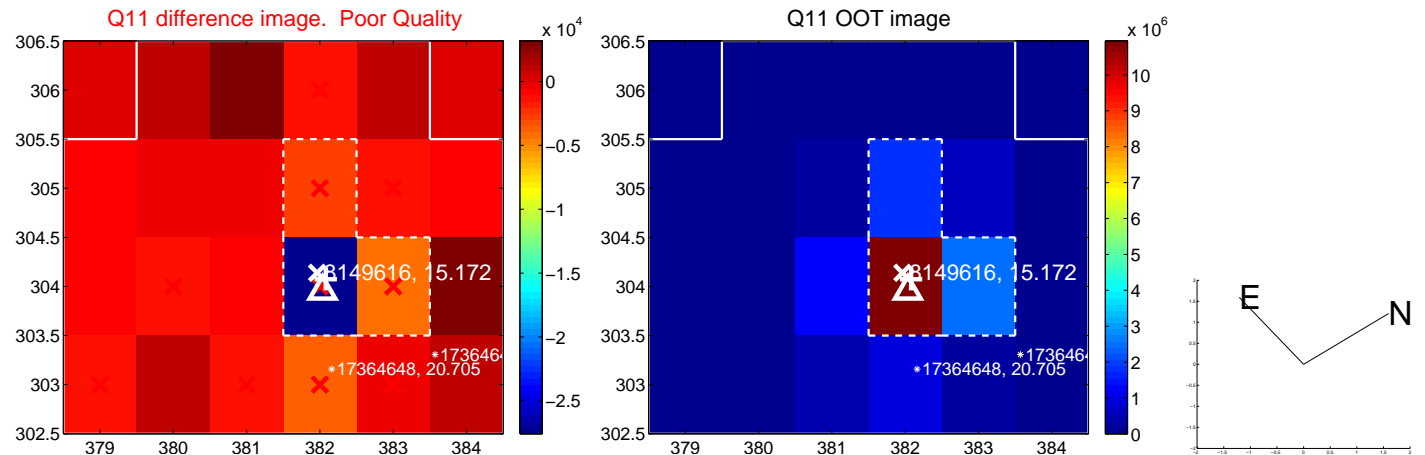
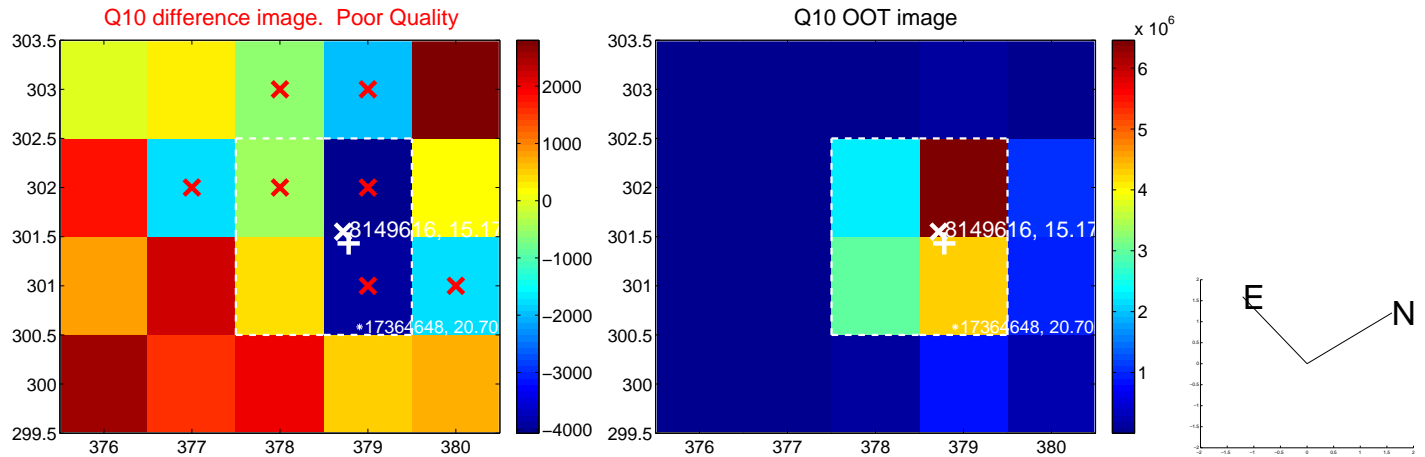
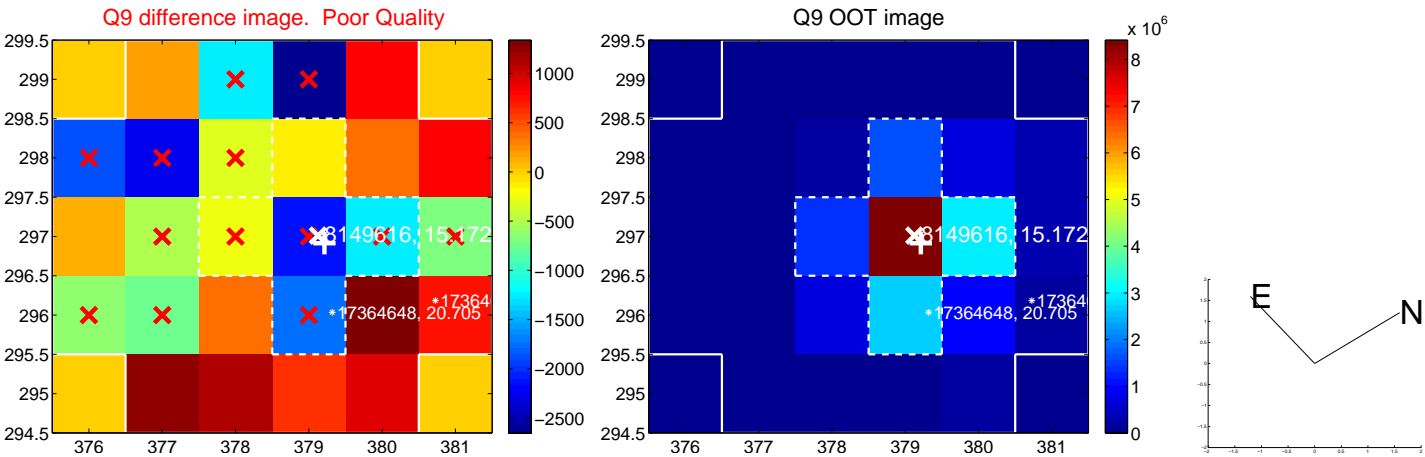
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

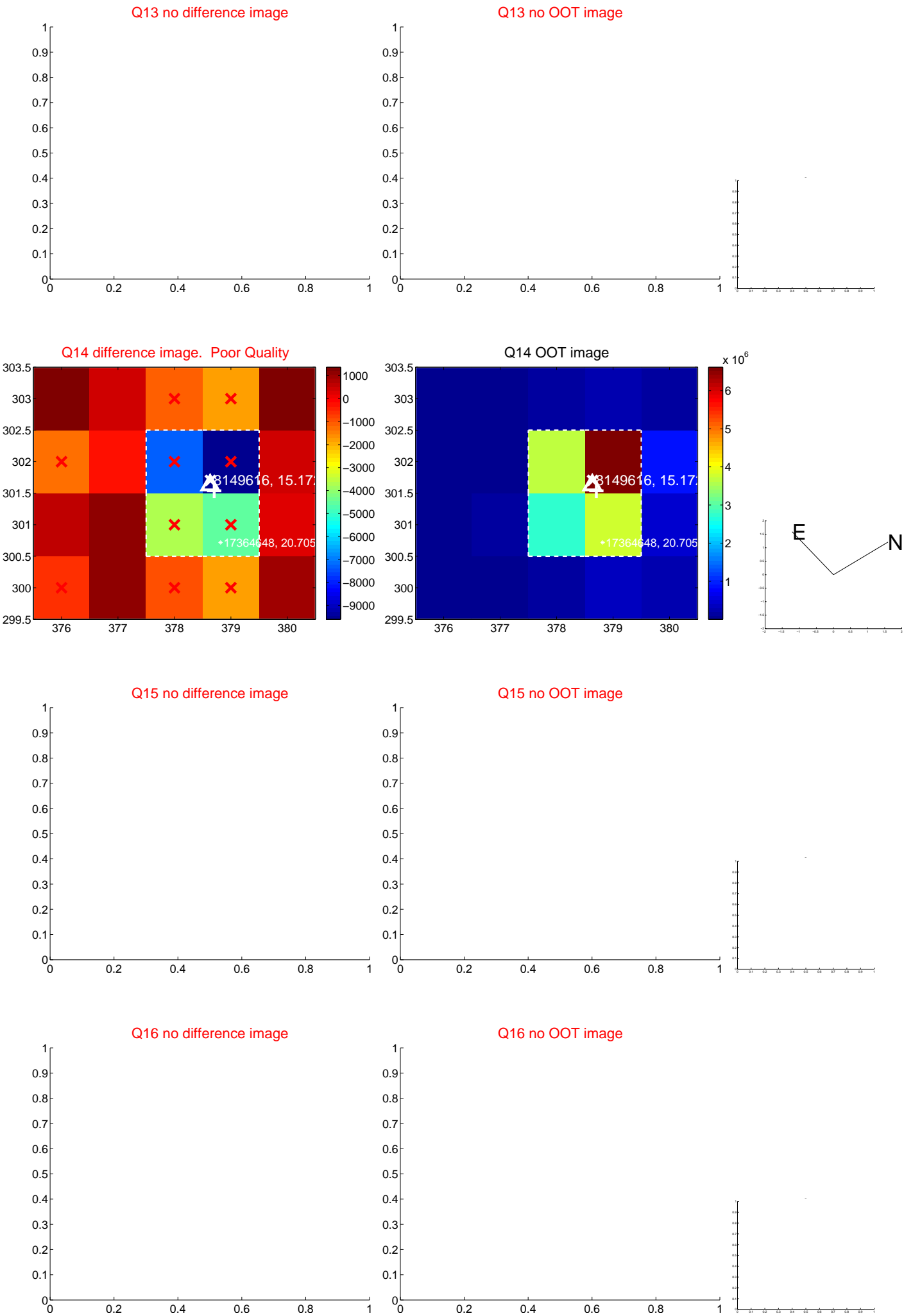


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

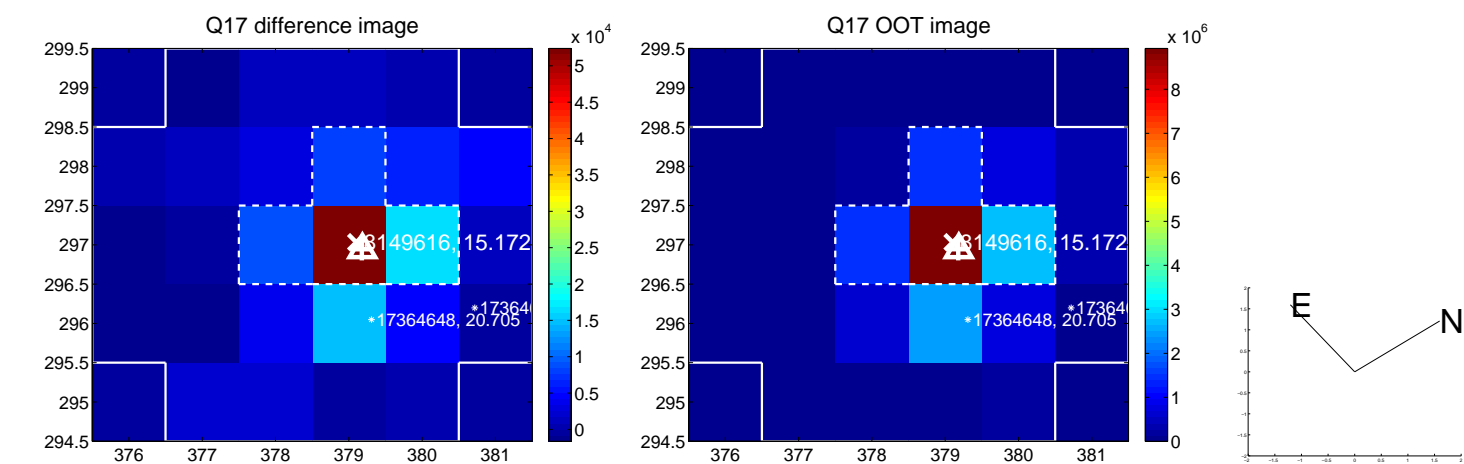




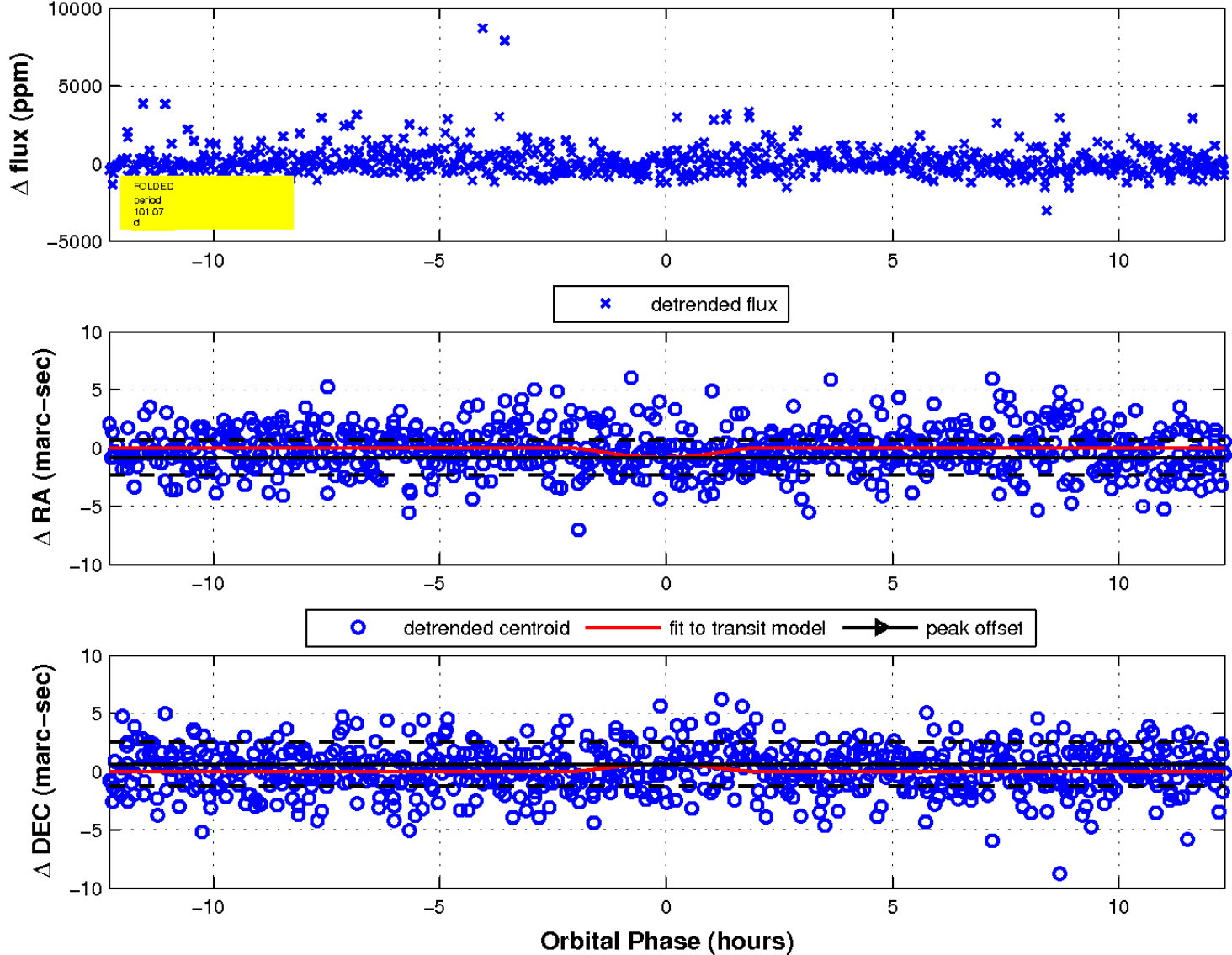
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



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

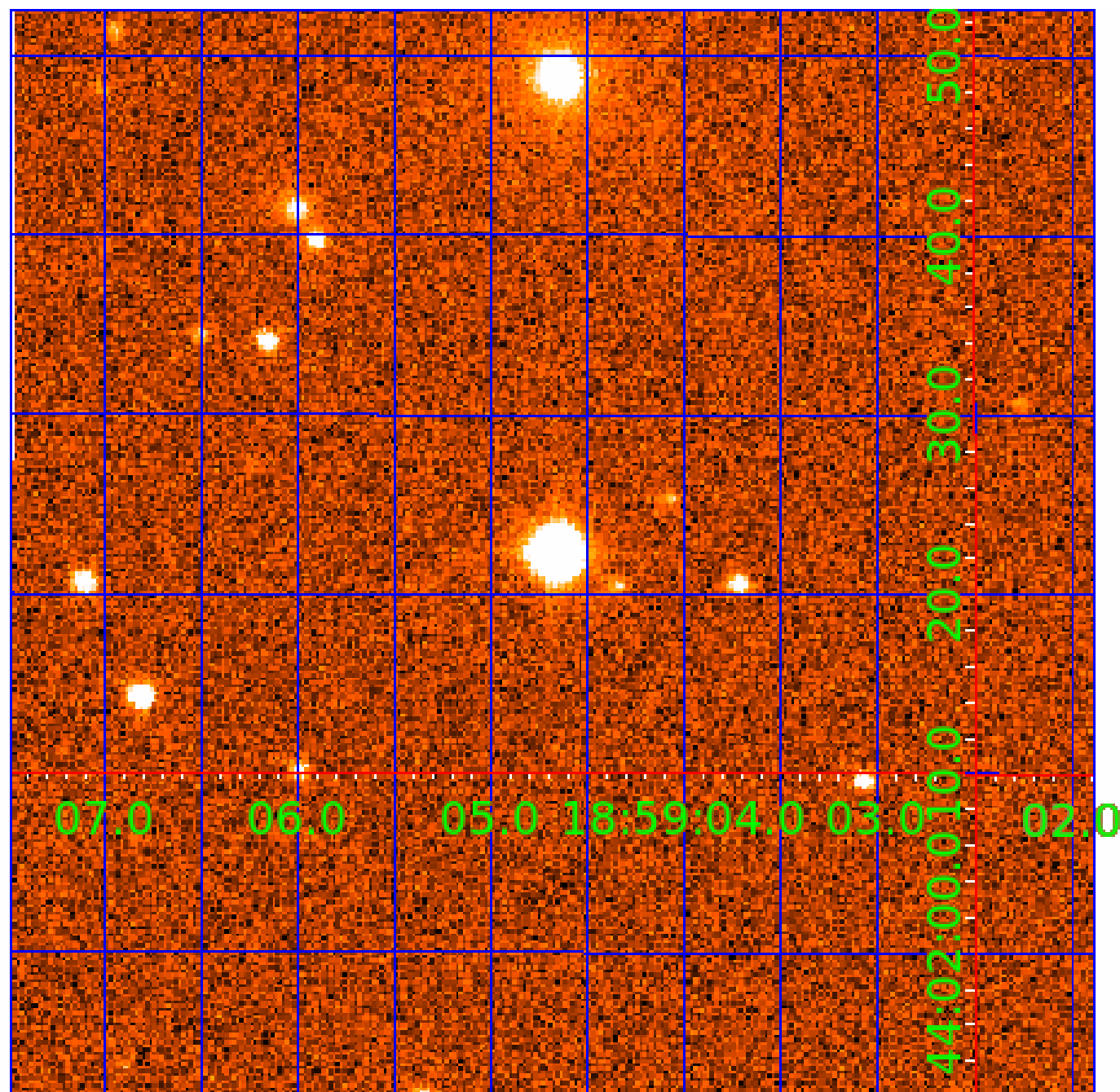


fluxWeightedCentroids, Planet 5 of 8



UKIRT Image

Declination



# KIC 008149616

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008149616-01	OBS	No	1.780615	132.506653	106.6	10.625	12.2	9.1	0.27	3332	0.28	23.72
008149616-02	OBS	No	103.037639	191.572038	1341.1	7.500	13.7	-1.0	0.27	3332	0.96	0.11
008149616-03	OBS	No	75.872076	140.582029	1321.3	3.000	10.3	-1.0	0.27	3332	0.95	0.16
008149616-04	OBS	No	118.587620	199.638830	818.9	41.613	10.2	7.4	0.27	3332	0.75	0.09
008149616-05	OBS	No	101.068333	174.446642	1333.8	4.115	9.1	7.7	0.27	3332	1.91	0.11
008149616-06	OBS	No	11.360095	135.155291	323.3	4.579	9.0	7.8	0.27	3332	0.51	2.00
008149616-07	OBS	No	45.419802	152.259980	583.6	16.676	9.8	8.3	0.27	3332	0.67	0.32
008149616-08	OBS	No	62.341047	160.117011	578.1	5.954	9.8	9.3	0.27	3332	0.66	0.21

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008149616-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—CENT_KIC_POS
008149616-02	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—INCONSISTENT_TRANS—CENT_NOFITS
008149616-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_NOFITS
008149616-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES—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
008149616-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS
008149616-06	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
008149616-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT
008149616-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—CENT_KIC_POS

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

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

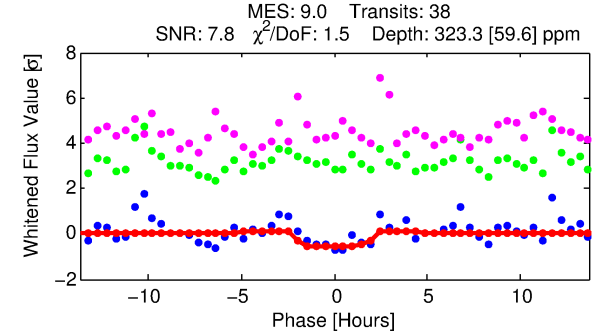
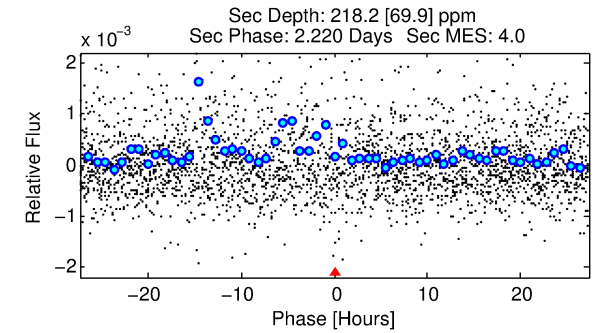
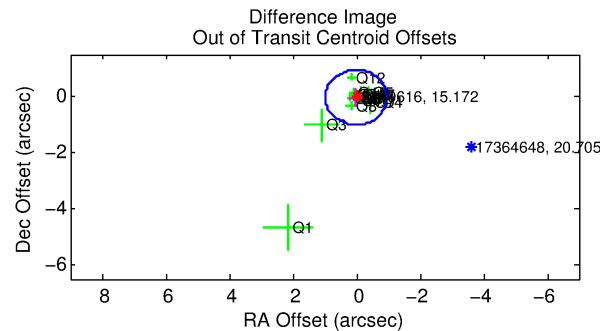
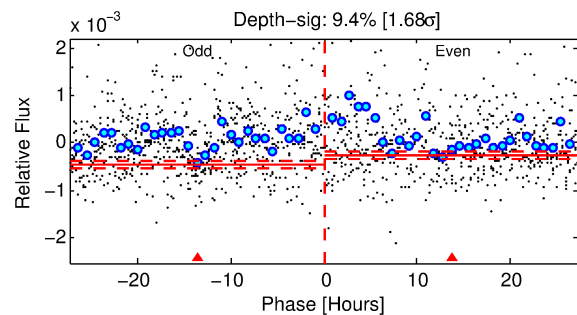
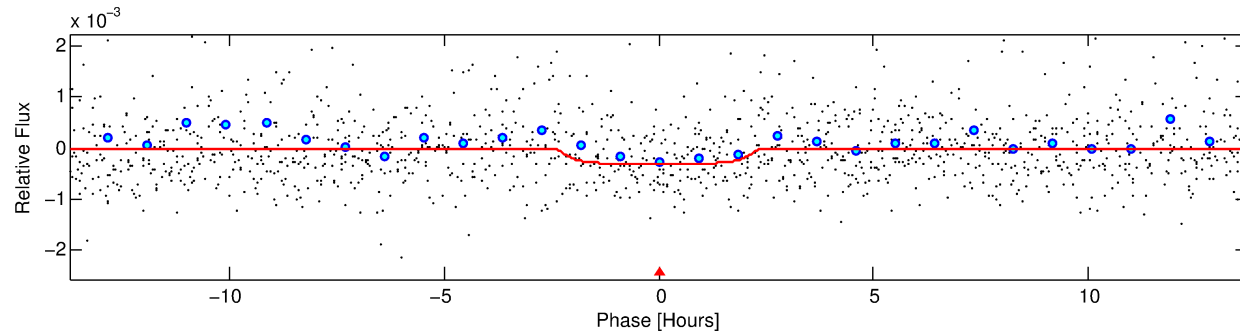
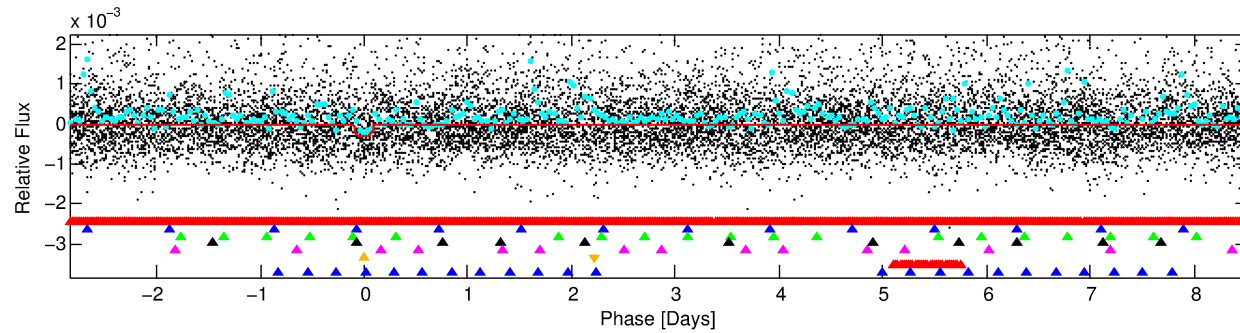
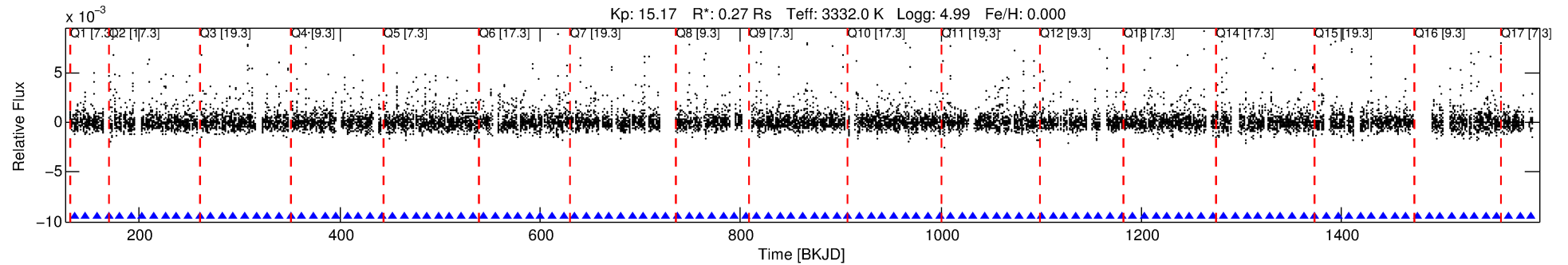
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 008149616-06

No Significant Match Found

# DV One-Page Summary

KIC: 8149616 Candidate: 6 of 8 Period: 11.360 d



## DV Fit Results:

Period = 11.36010 [0.00021] d  
Epoch = 135.1553 [0.0145] BKJD  
Rp/R\* = 0.0177 [0.0285]  
a/R\* = 13.60 [93.64]  
b = 0.72 [4.60]  
Seff = 2.00 [0.26]  
Teq = 303 [10] K  
Rp = 0.51 [0.83] Re  
a = 0.0622 [0.0063] AU  
Ag = 1776.82 [5762.28] [0.31 $\sigma$ ]  
Teffp = 3046 [2468] K [1.11 $\sigma$ ]

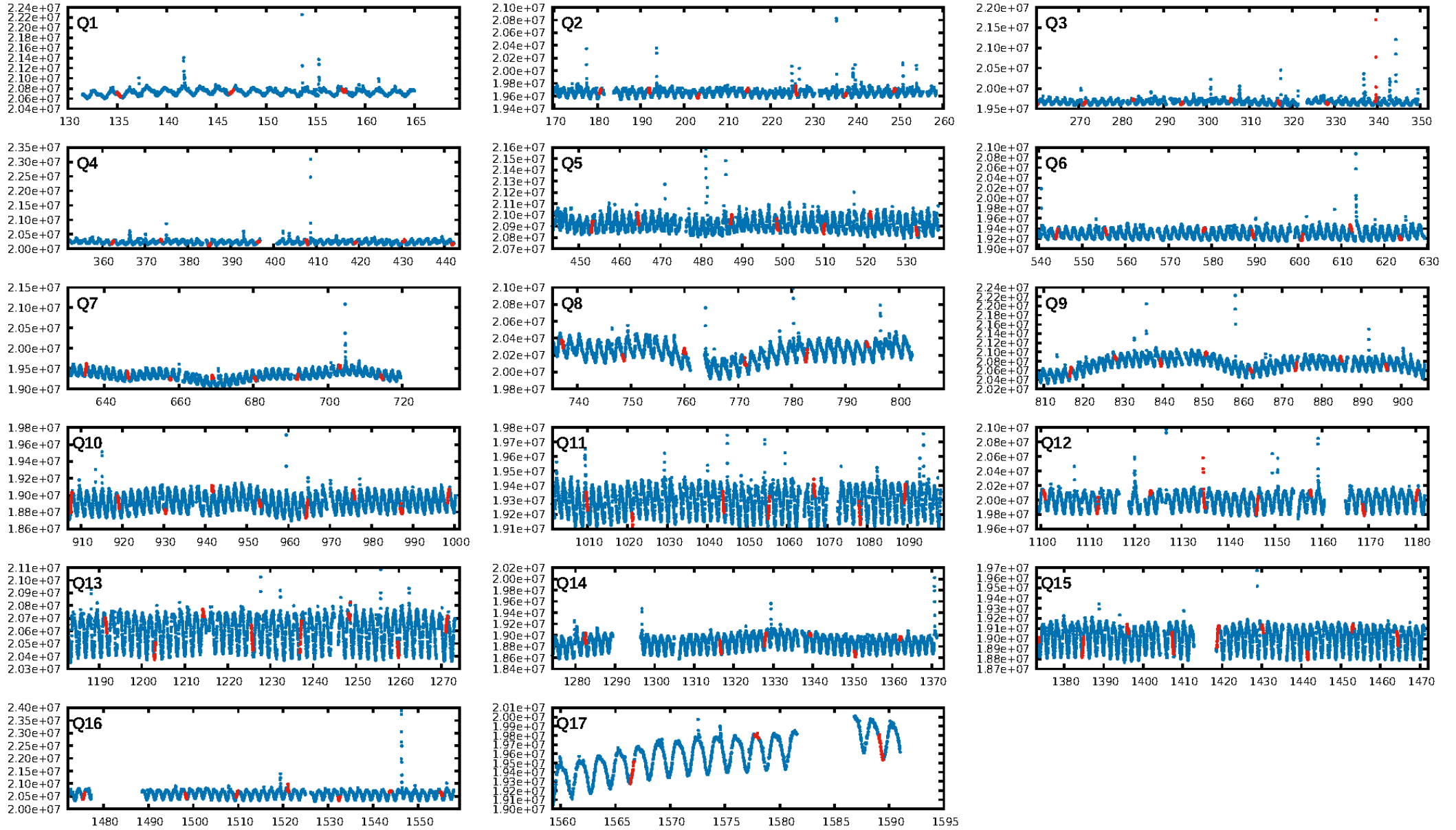
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [19.87 $\sigma$ ]  
LongPeriod-sig: 100.0% [47.27 $\sigma$ ]  
ModelChiSquare2-sig: 12.6%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [36/36]  
GhostDiagnostic-chr: -2.463  
Centroid-sig: 28.8%  
Centroid-so: 0.264 arcsec [0.41 $\sigma$ ]  
OotOffset-rm: 0.041 arcsec [0.13 $\sigma$ ]  
KicOffset-rm: 0.439 arcsec [2.90 $\sigma$ ]  
OotOffset-st: 3/4/4/5 [16]  
KicOffset-st: 3/4/4/5 [16]  
DiffImageQuality-fgm: 0.06 [1/16]  
DiffImageOverlap-fno: 0.94 [16/17]

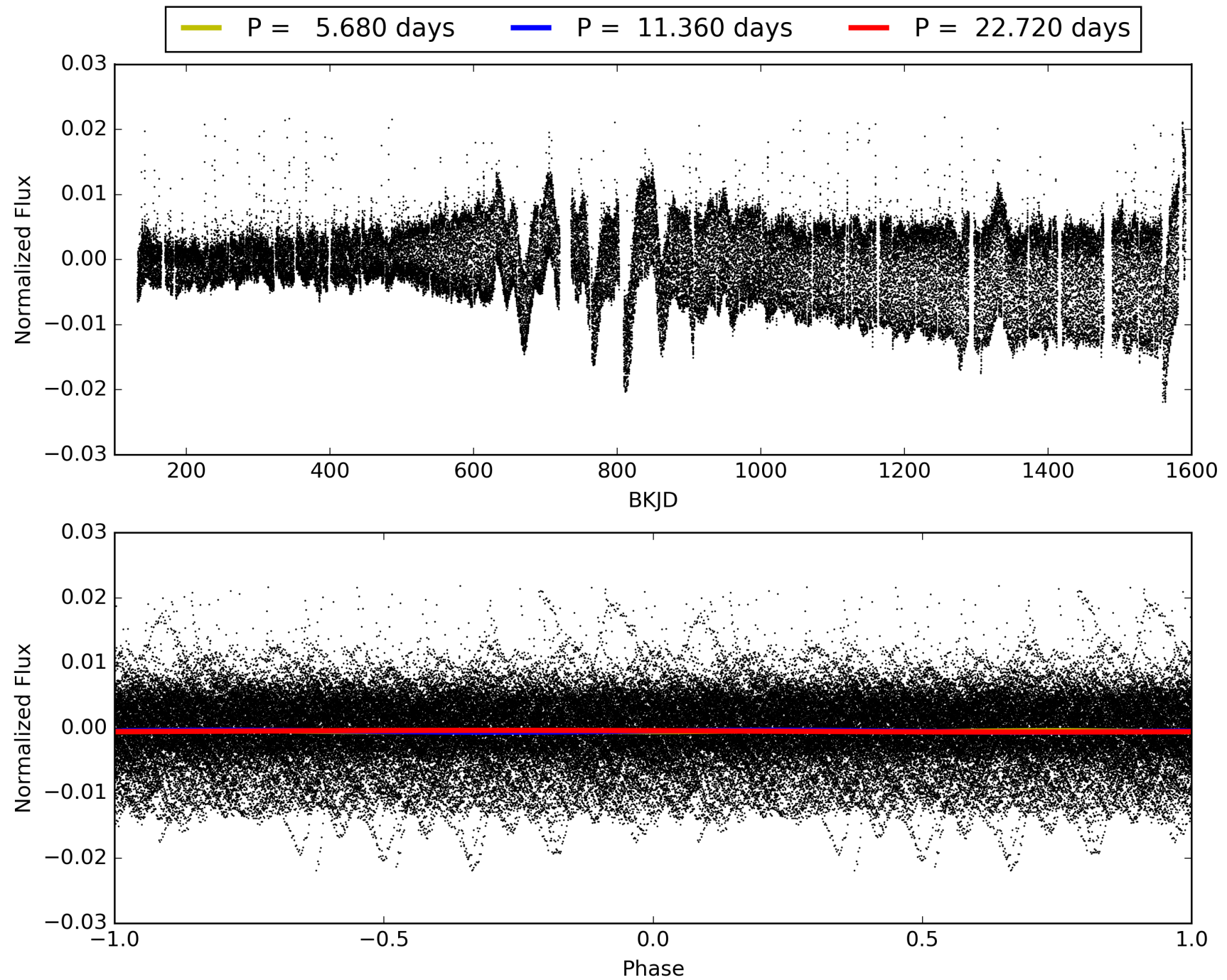
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 08:17:18 Z

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

# TCE 008149616-06, PDC Light Curves



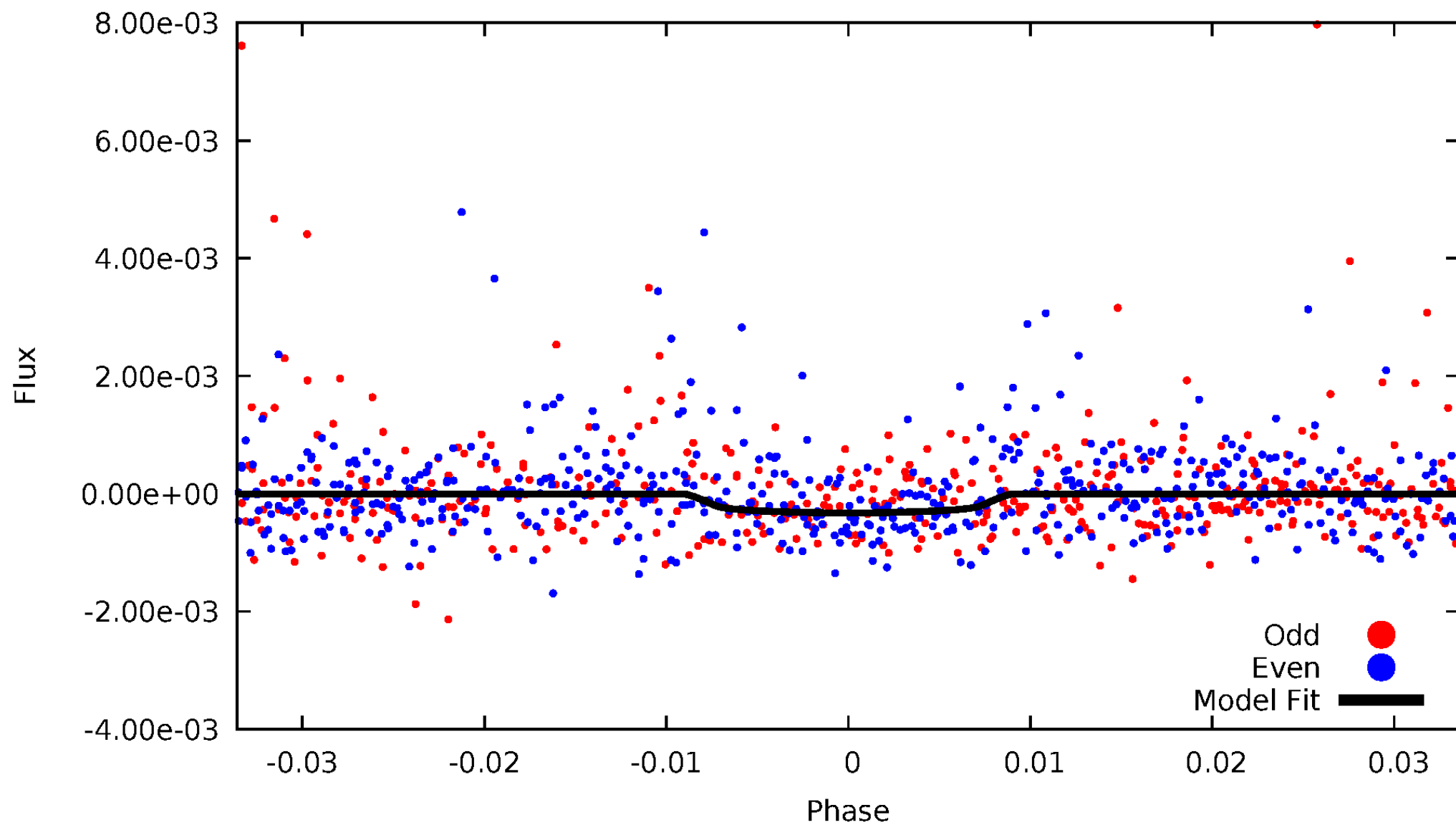
# TCE 008149616-06





# DV Odd/Even

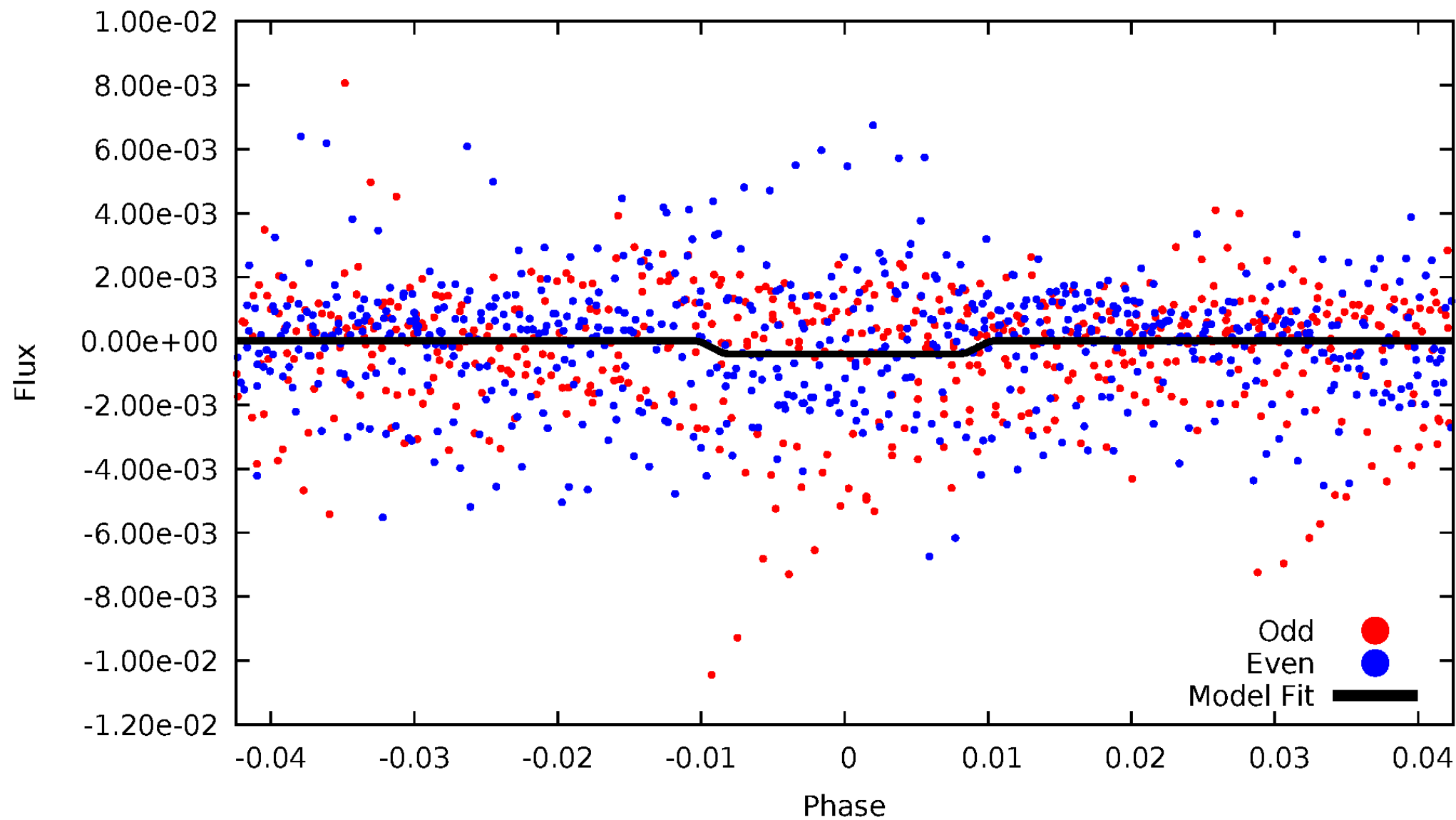
TCE 008149616-06





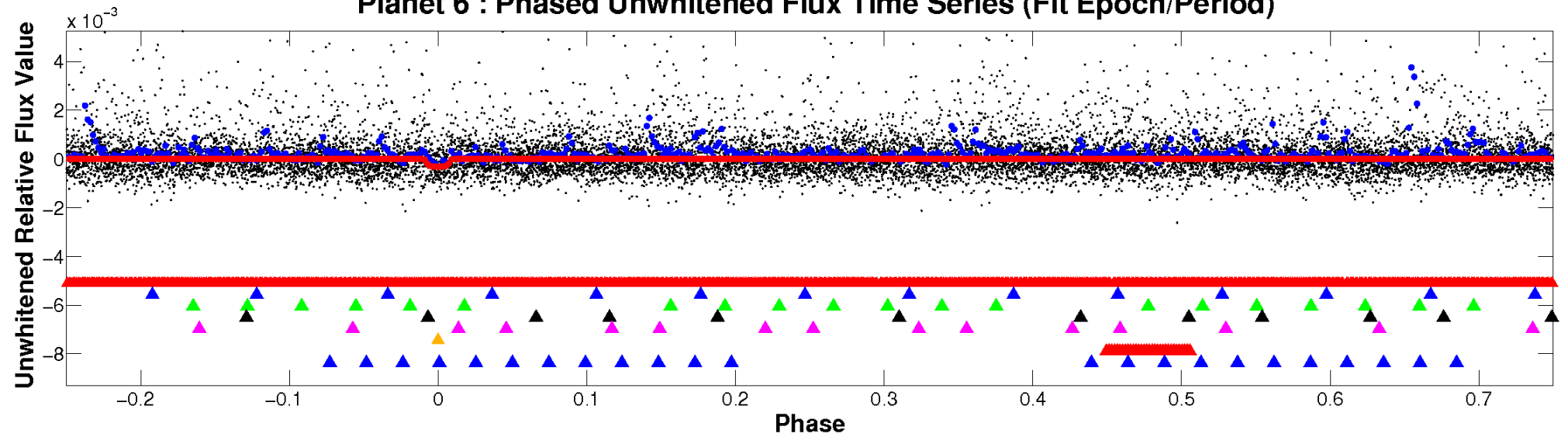
# ALT Odd/Even

TCE 008149616-06

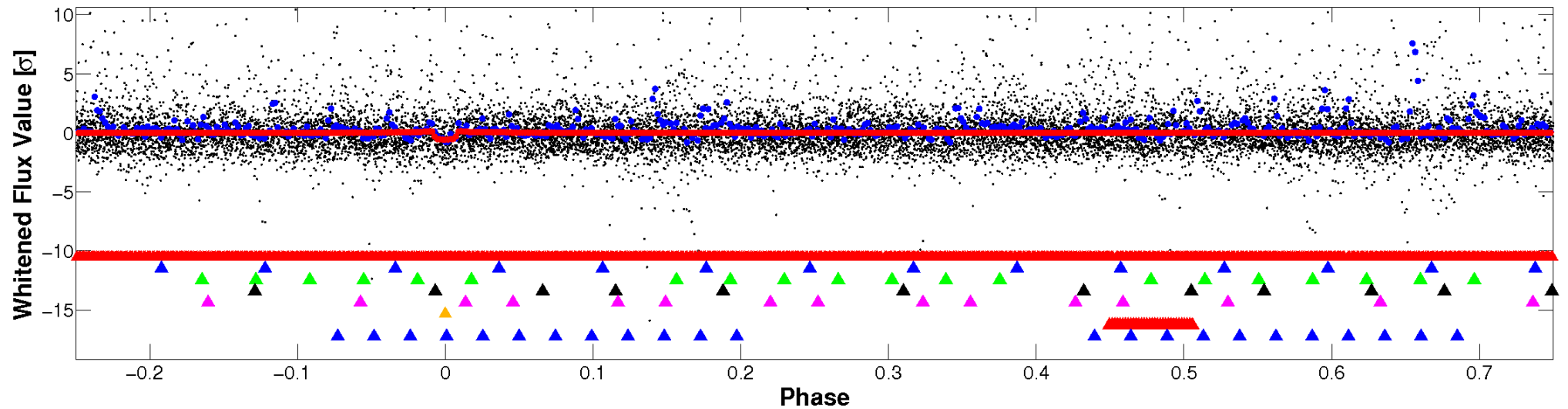


# Non-Whitened Vs. Whitened Light Curve

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

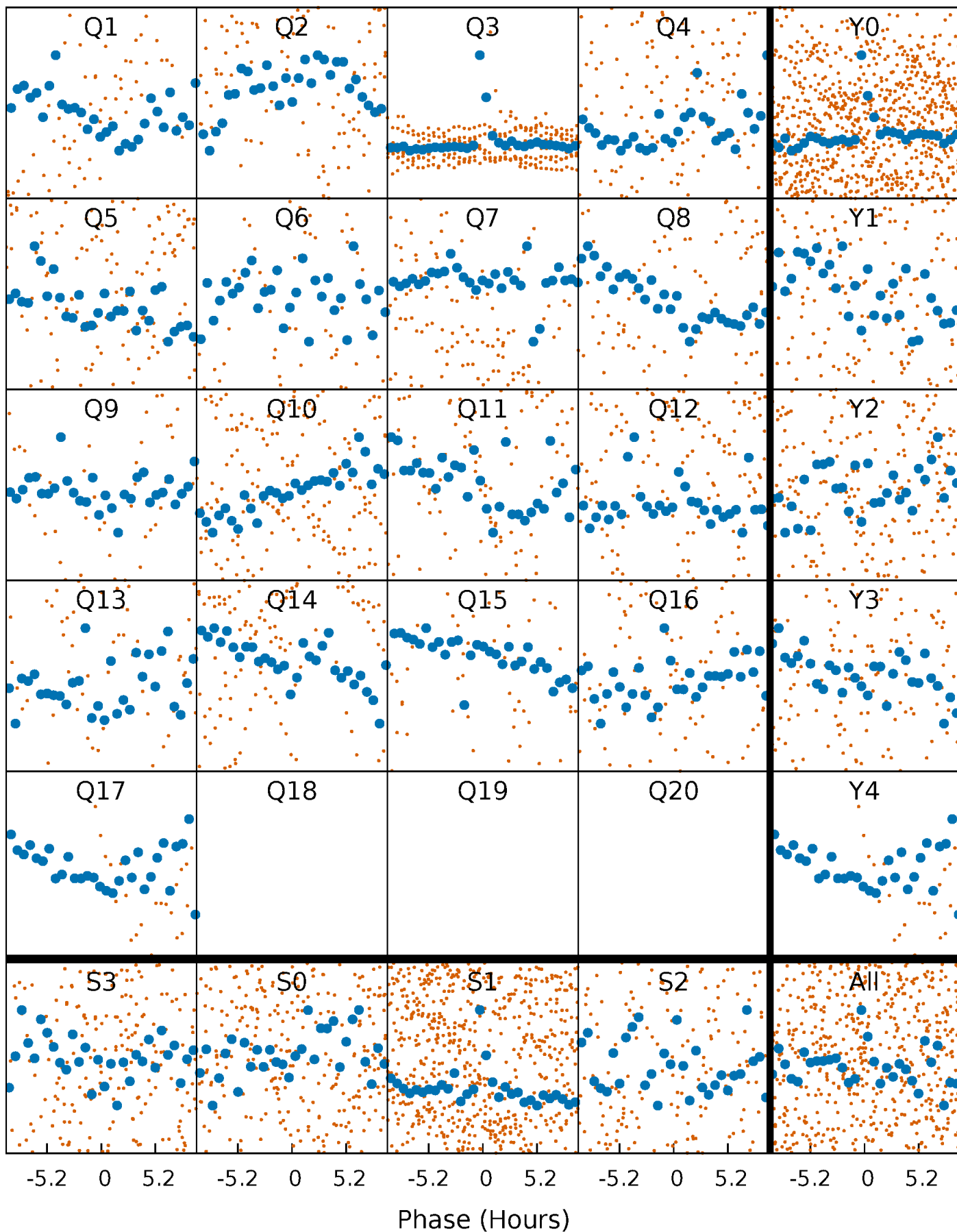


## Planet 6 : Phased Whitened Flux Time Series (Fit Epoch/Period)



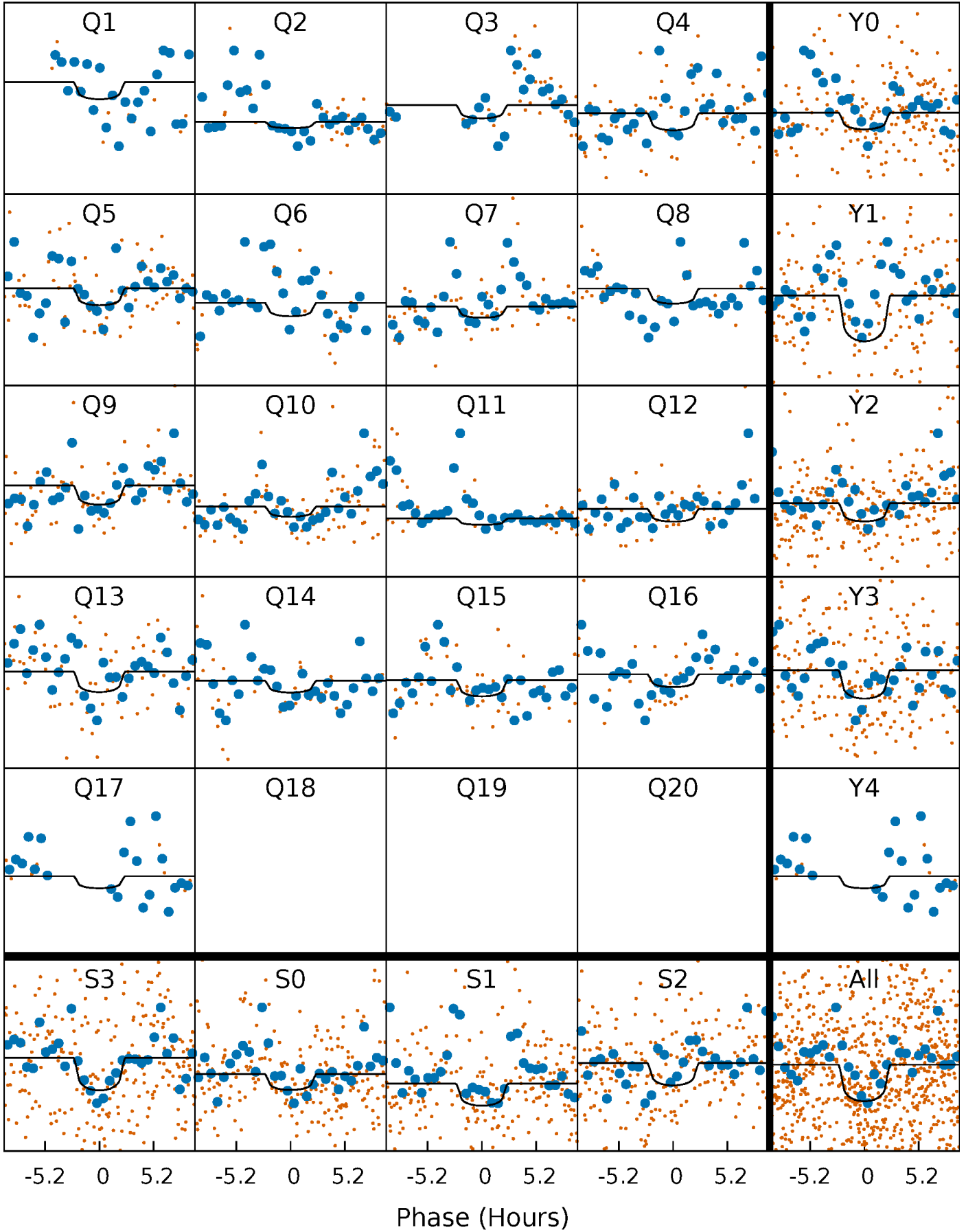
# PDC Quarter-Phased Transit Curves

TCE 008149616-06 P= 11.360095 Days  $T_0=135.155291$  (BKJD)



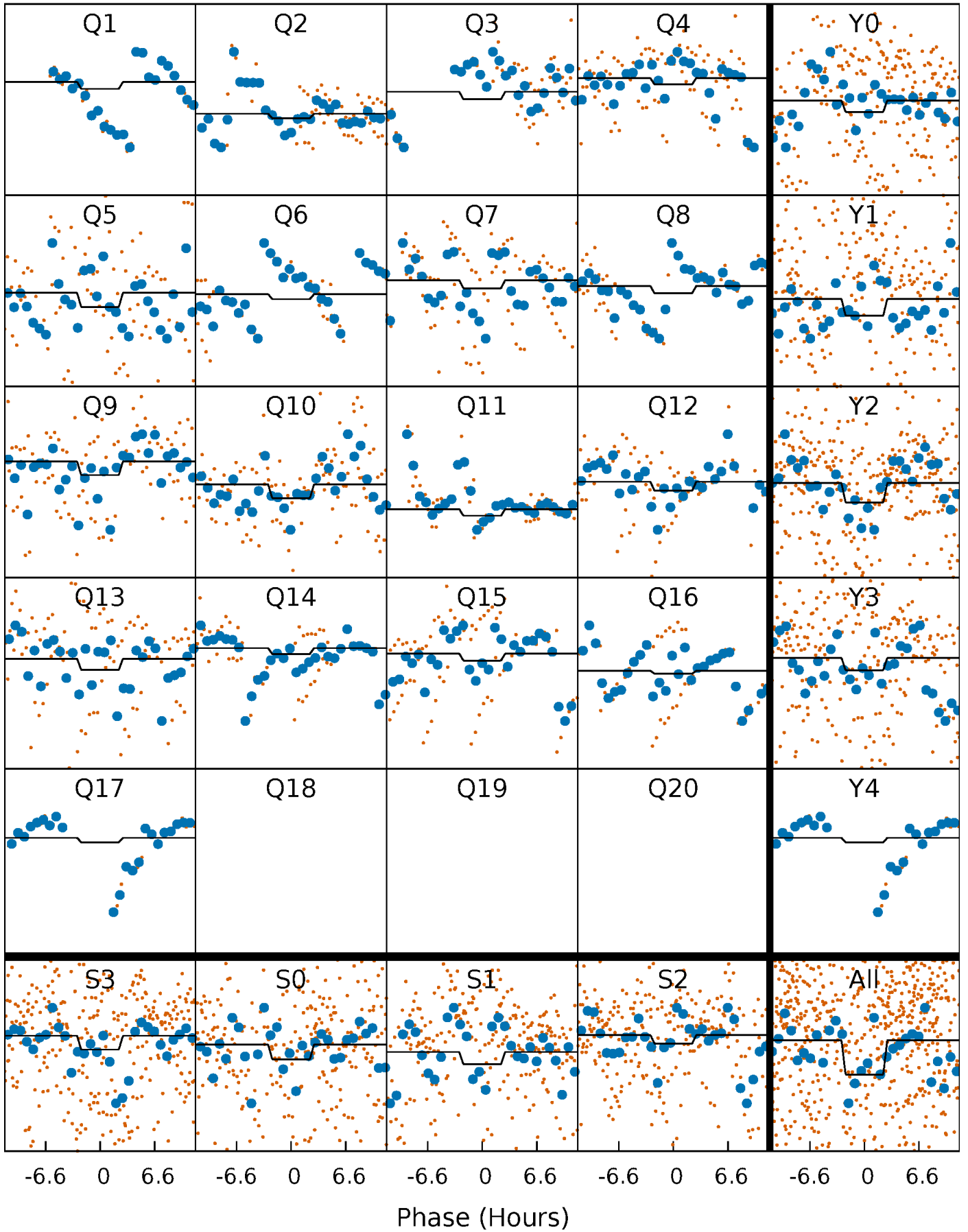
# DV Quarter-Phased Transit Curves

TCE 008149616-06 P= 11.360095 Days  $T_0=135.155291$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

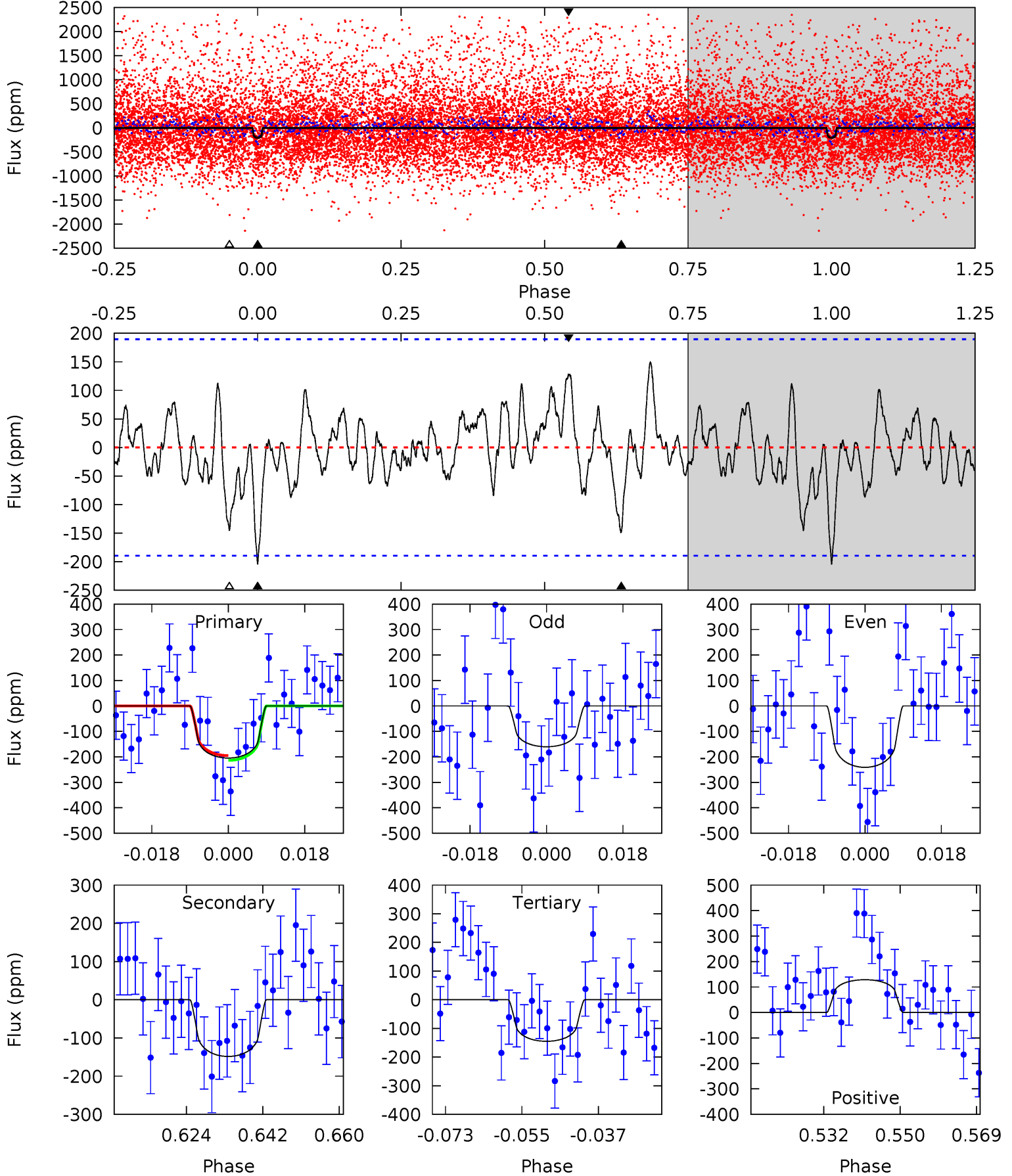
TCE 008149616-06 P= 11.359509 Days  $T_0=135.217430$  (BKJD)



# DV Model-Shift Uniqueness Test

008149616-06, P = 11.360095 Days, E = 123.795196 Days

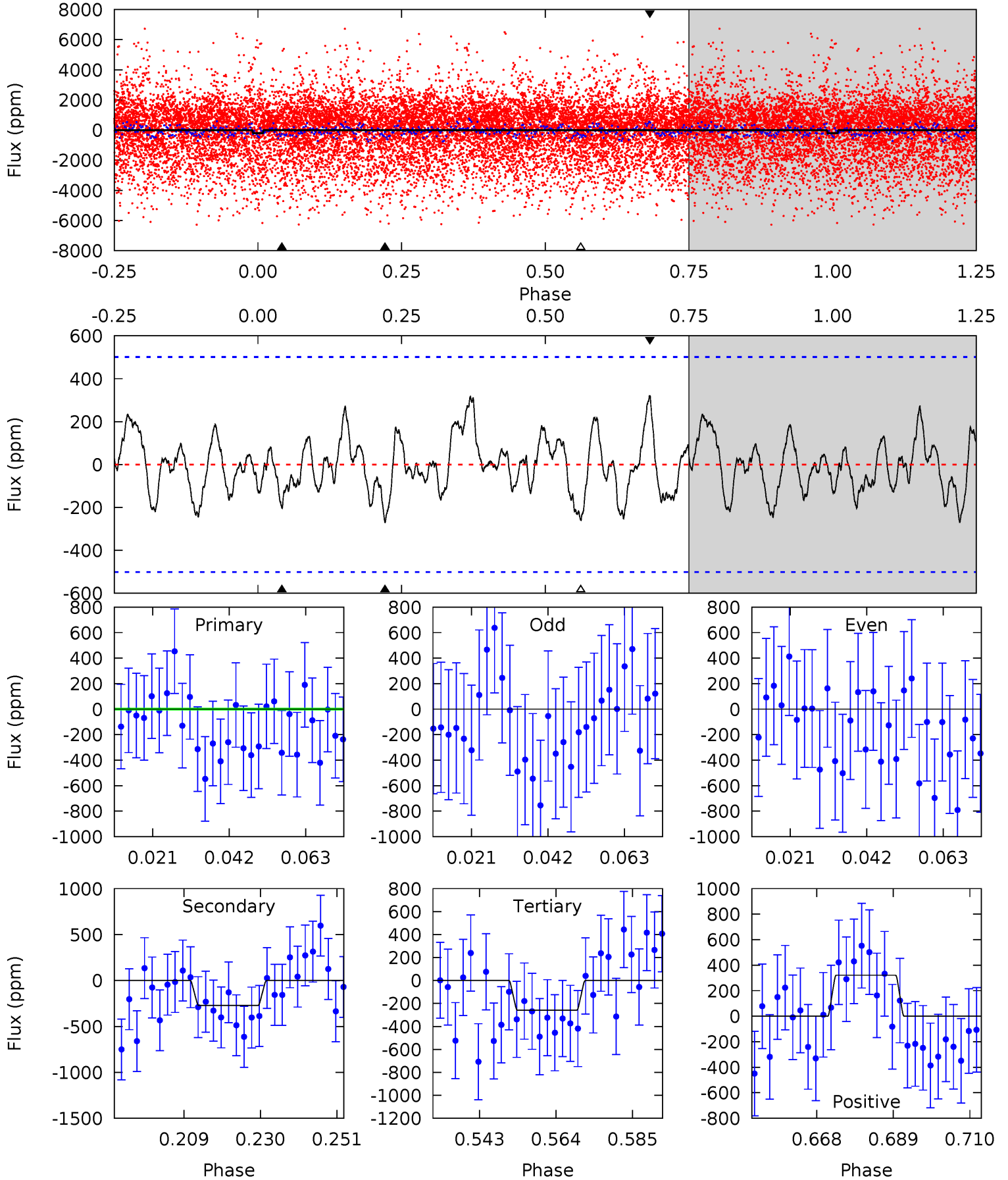
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.30	3.84	3.76	3.33	4.91	2.36	1.27	1.55	1.97	0.09	0.51	1.05	0.80	0.42	0.25



# Alt Model-Shift Uniqueness Test

008149616-06, P = 11.359509 Days, E = 123.857921 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
1.98	2.65	2.52	3.13	4.88	2.31	1.18	-0.54	-1.15	0.13	-0.49	2.08	-8.87	0.54	0.84





### Stellar Parameters For KIC 008149616

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3332^{+43}_{-36}$	$4.987^{+0.044}_{-0.040}$	$0.000^{+0.100}_{-0.100}$	$0.265^{+0.038}_{-0.027}$	$0.248^{+0.045}_{-0.030}$	$18.820^{+4.559}_{-3.663}$
	+1%/-1%	+1%/-1%	+inf%/-inf%	+14%/-10%	+18%/-12%	+24%/-19%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 008149616-06 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-148 \pm 39$	$0.79^{+0.72}_{-0.51}$	$424^{+10}_{-10}$	$2654^{+859}_{-395}$	$487^{+3153}_{-357}$
Alt.	$-272 \pm 103$	$0.84^{+0.76}_{-0.56}$	$423^{+10}_{-9}$	$2820^{+1078}_{-430}$	$806^{+5959}_{-596}$

$T_{max}$  = Theoretical Maximum Planetary Temperature

$T_{obs}$  = Observed Planetary Temperature (Assuming  $A=0.3$ )

$A_{obs}$  = Observed Albedo (Assuming  $T=0$ )

If a secondary eclipse is present, the system is likely an EB if  $T_{obs} \gg T_{max}$  AND  $A_{obs} \gg 1.0$



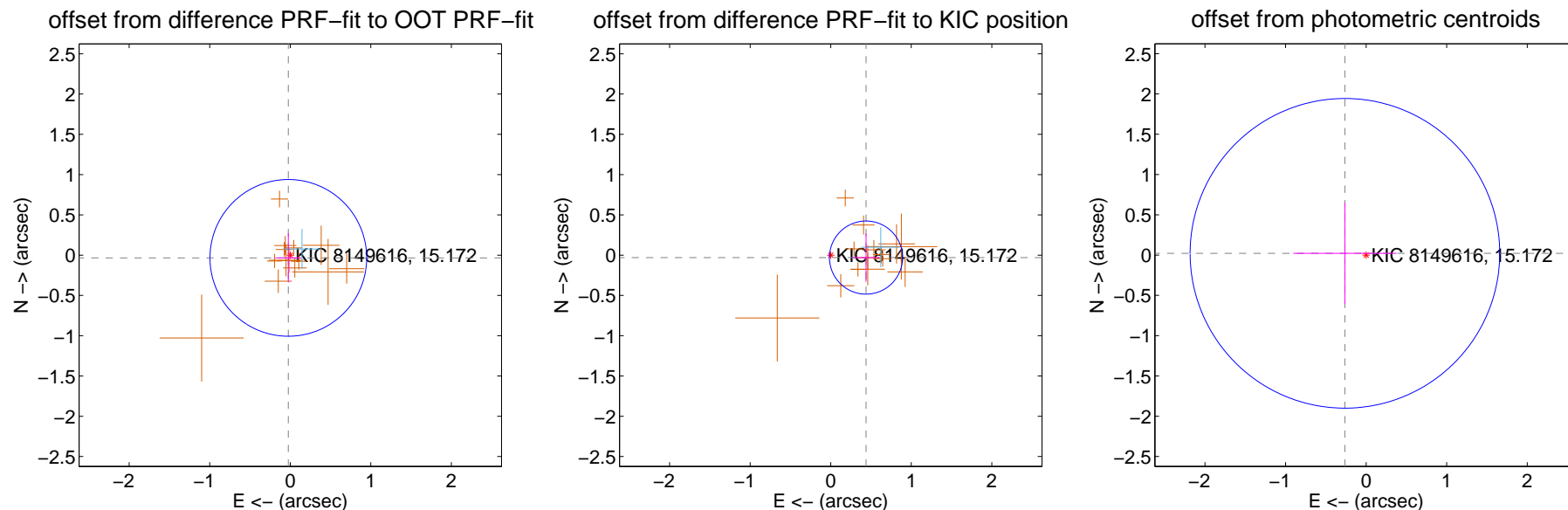
## DV Centroid Data

Supplemental centroid analysis for 008149616-06. Kepler magnitude: 15.17. Transit SNR 7.81

There are 1 quarters with good PRF difference image offsets

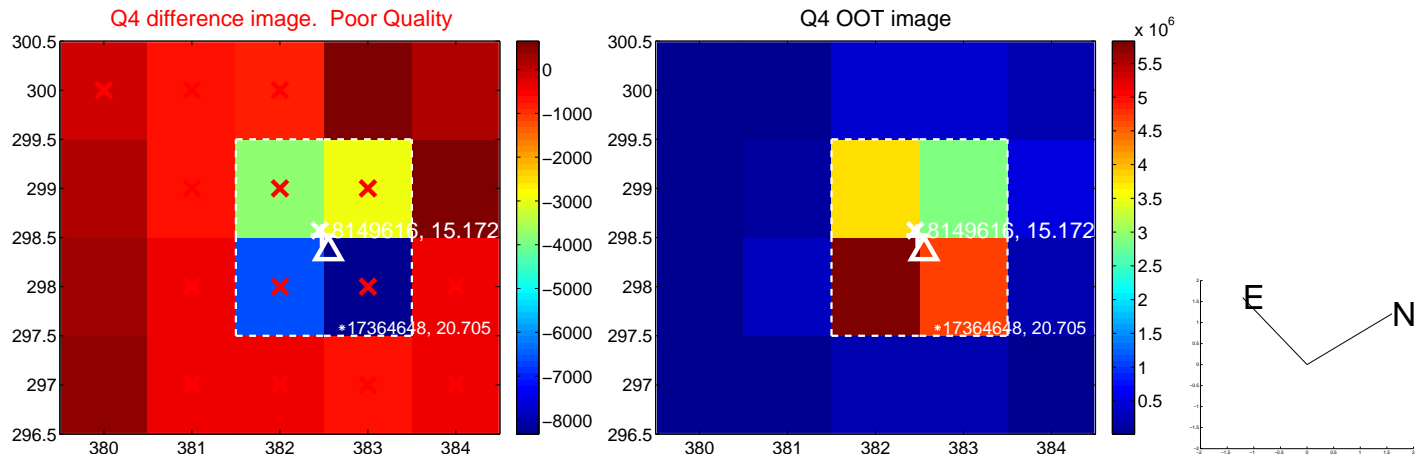
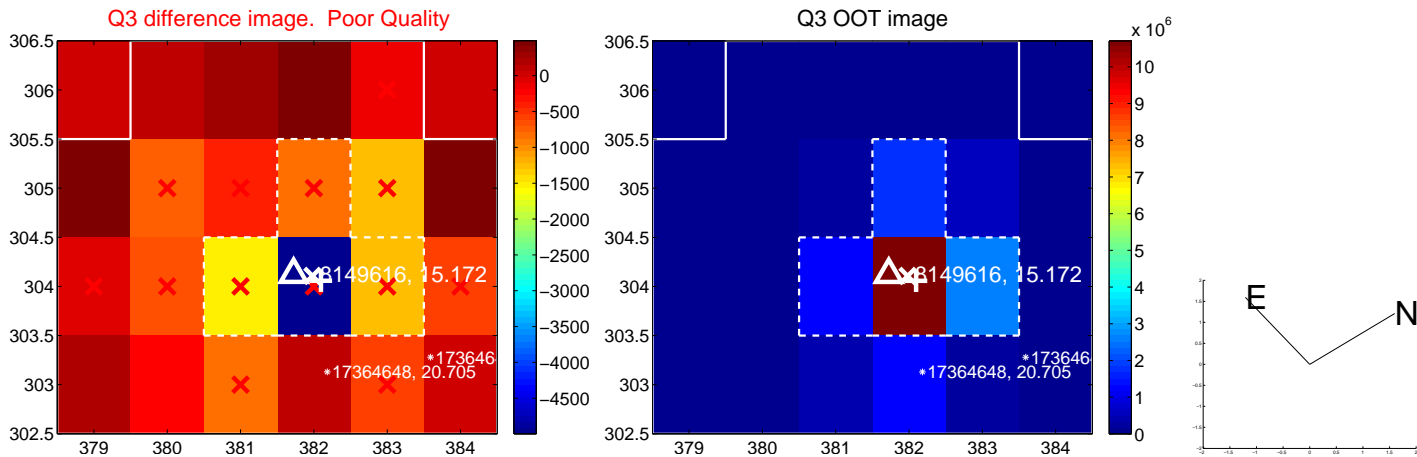
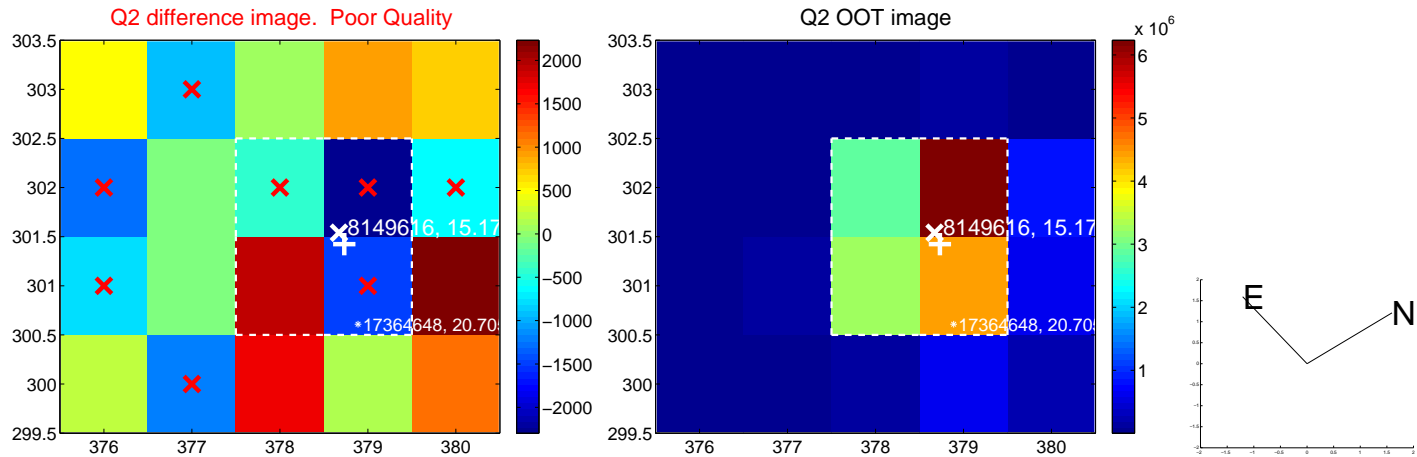
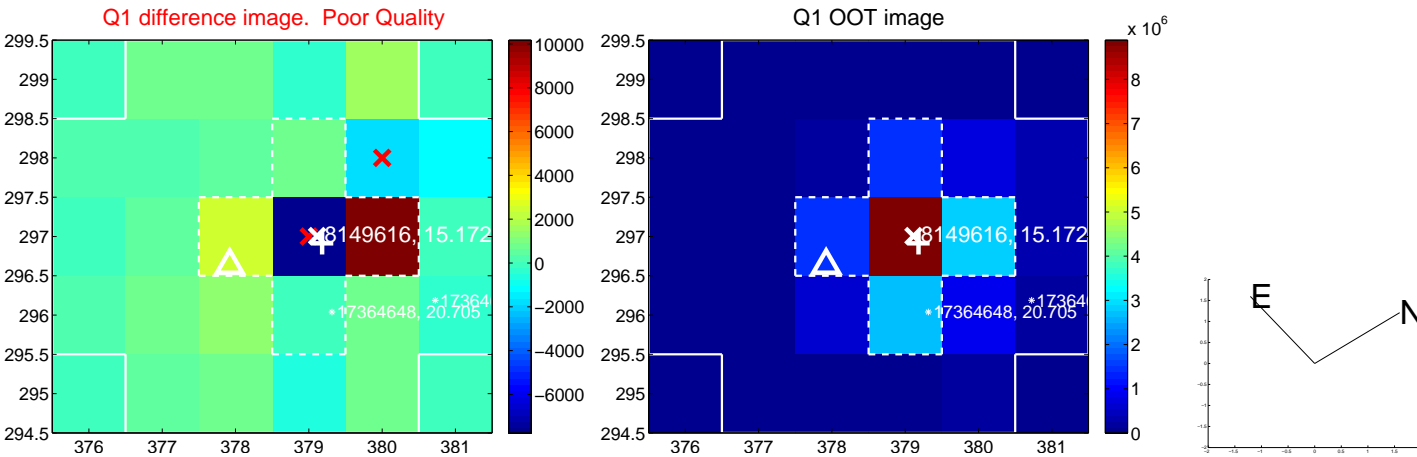
The direct PRF centroid is offset from the target star catalog position by about 0.48 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.041 \pm 0.324$	0.13	$0.024 \pm 0.162$	$-0.034 \pm 0.305$
PRF-fit source offset from KIC position	$0.439 \pm 0.151$	2.90	$-0.438 \pm 0.167$	$-0.030 \pm 0.299$
photometric centroid source offset	$0.26 \pm 0.64$	0.41	$0.26 \pm 0.64$	$0.02 \pm 0.63$

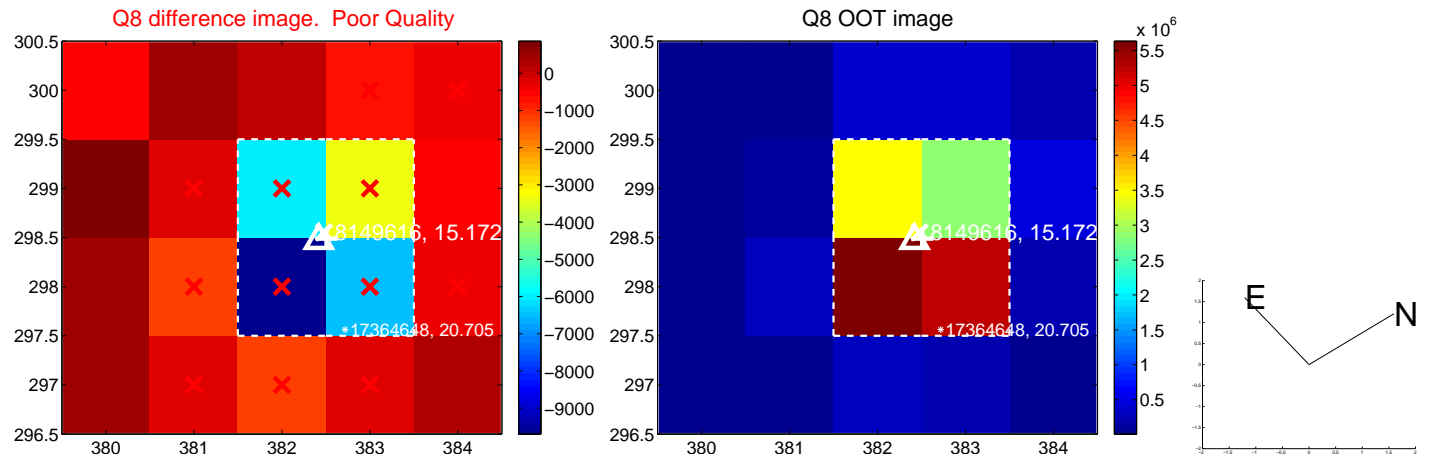
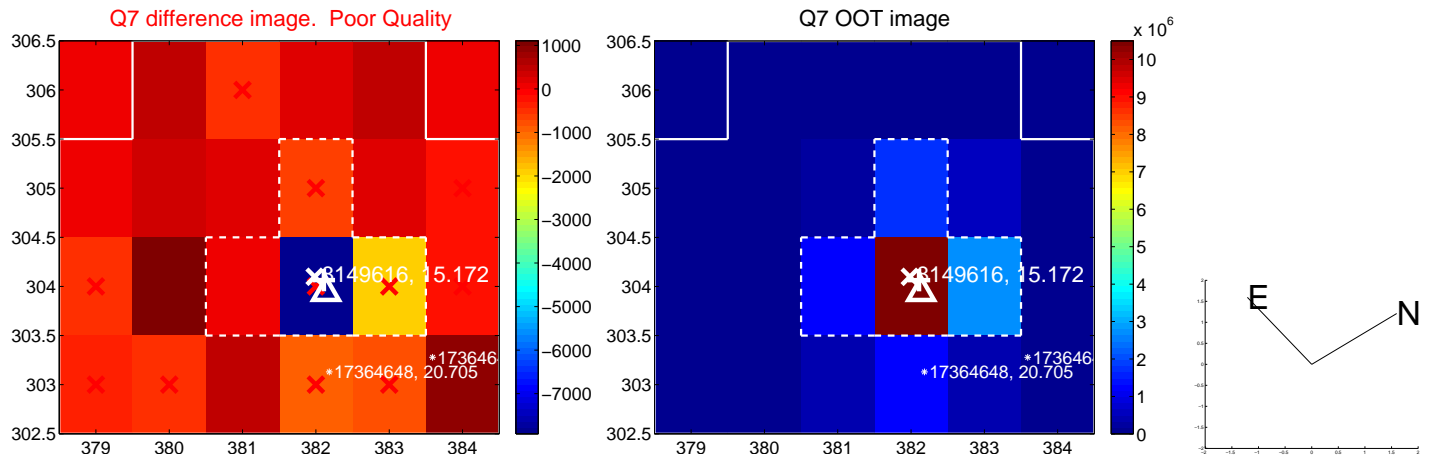
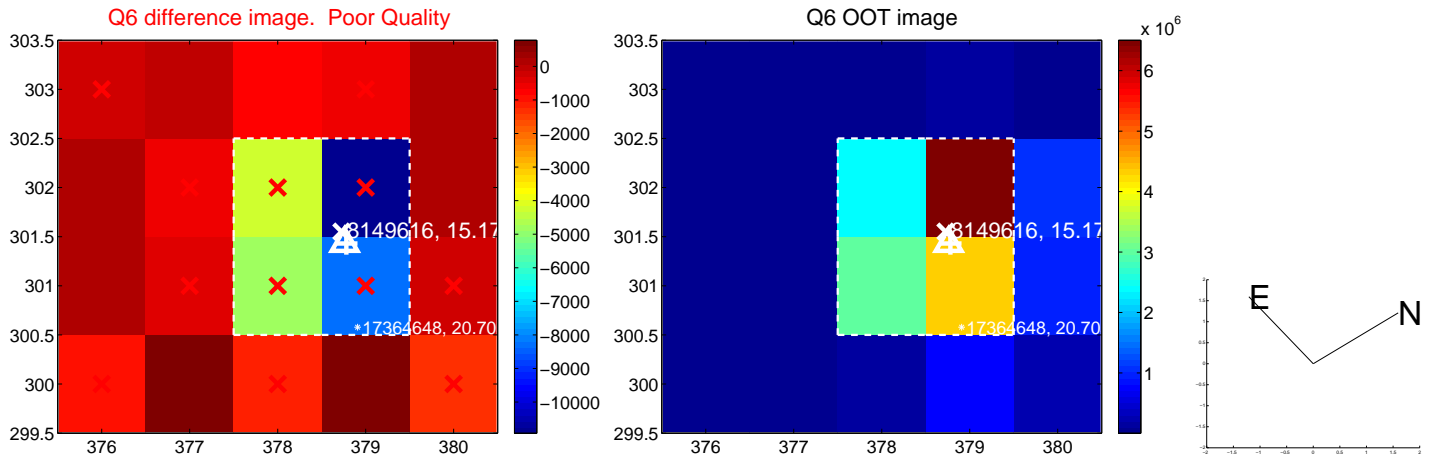
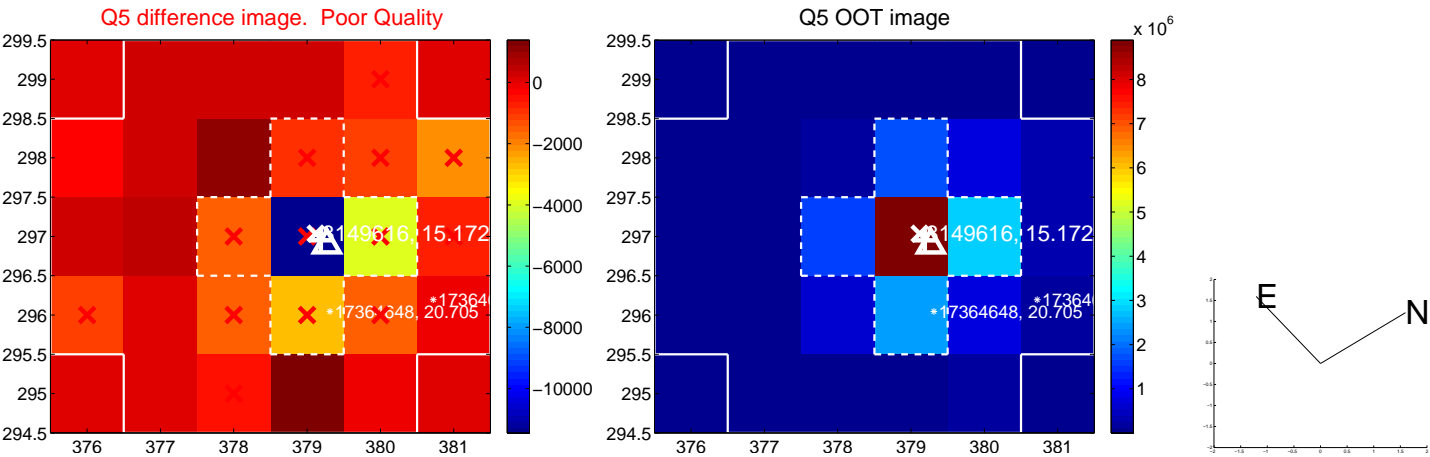


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

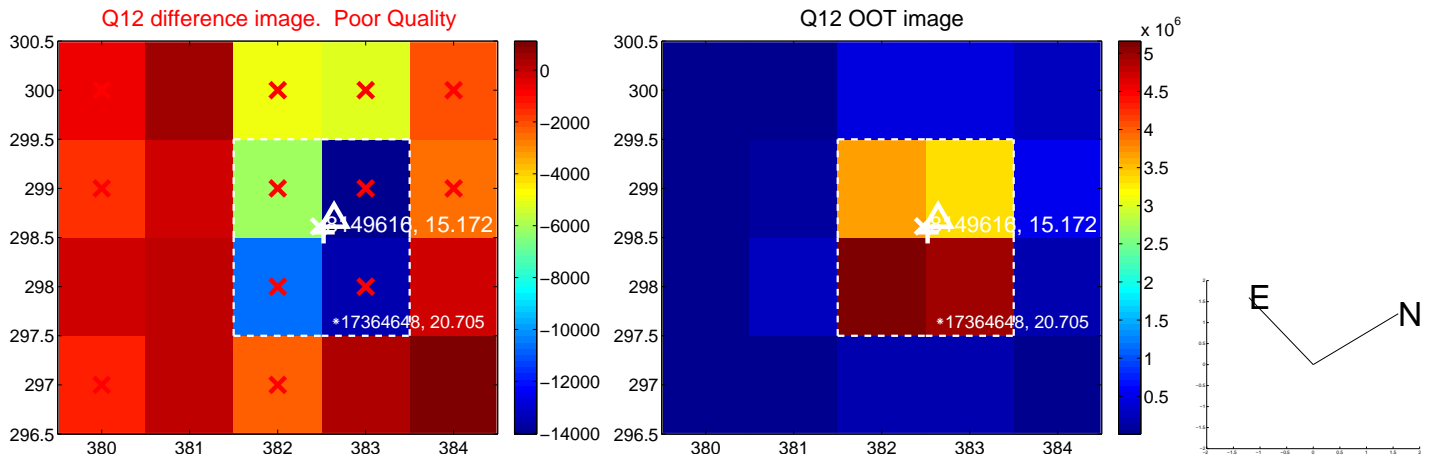
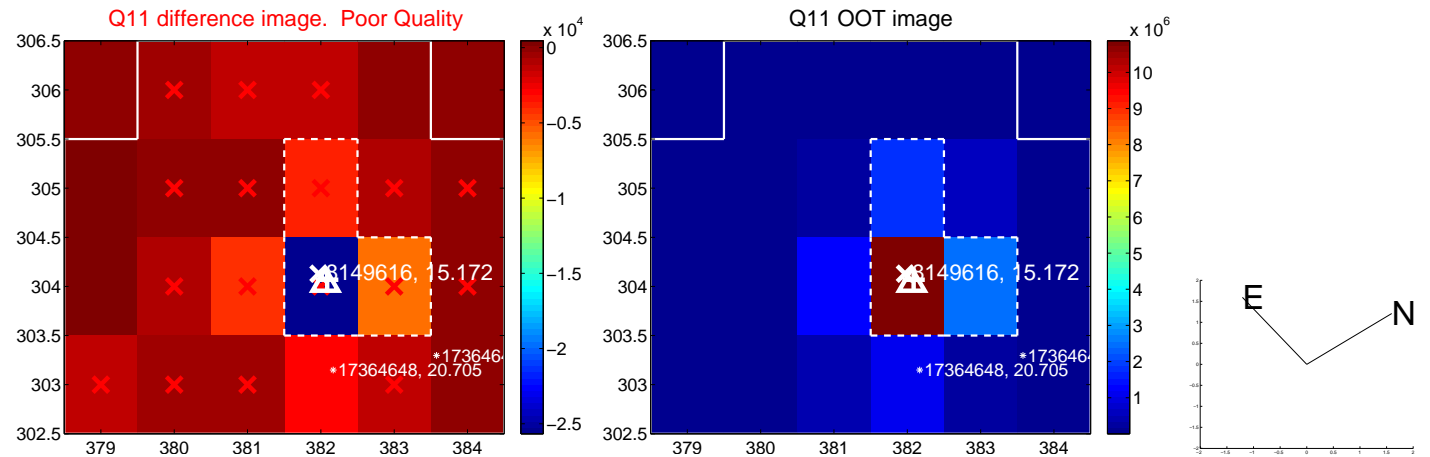
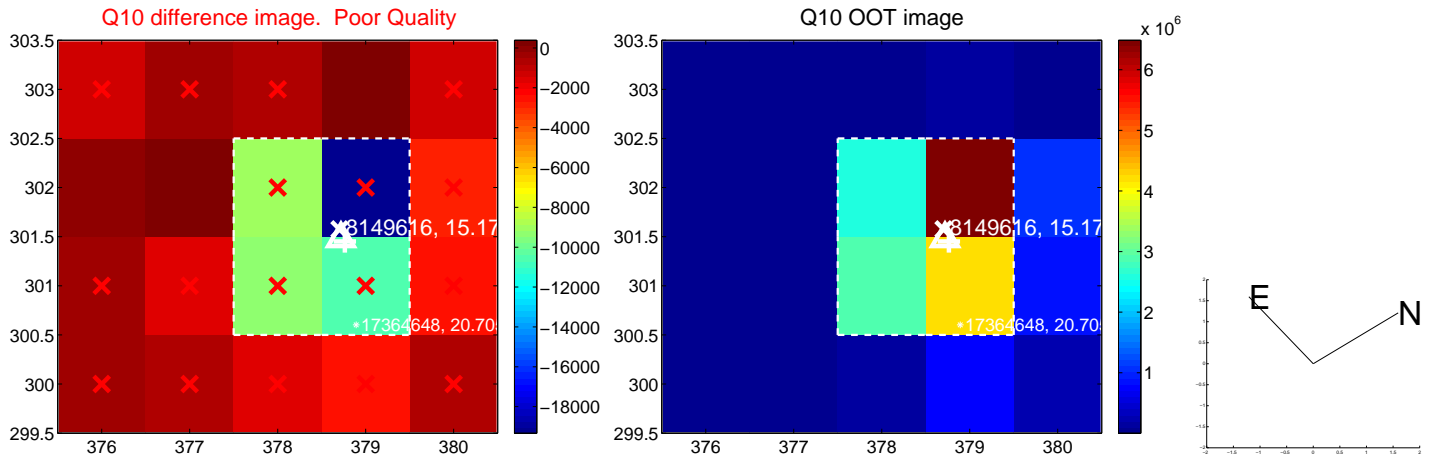
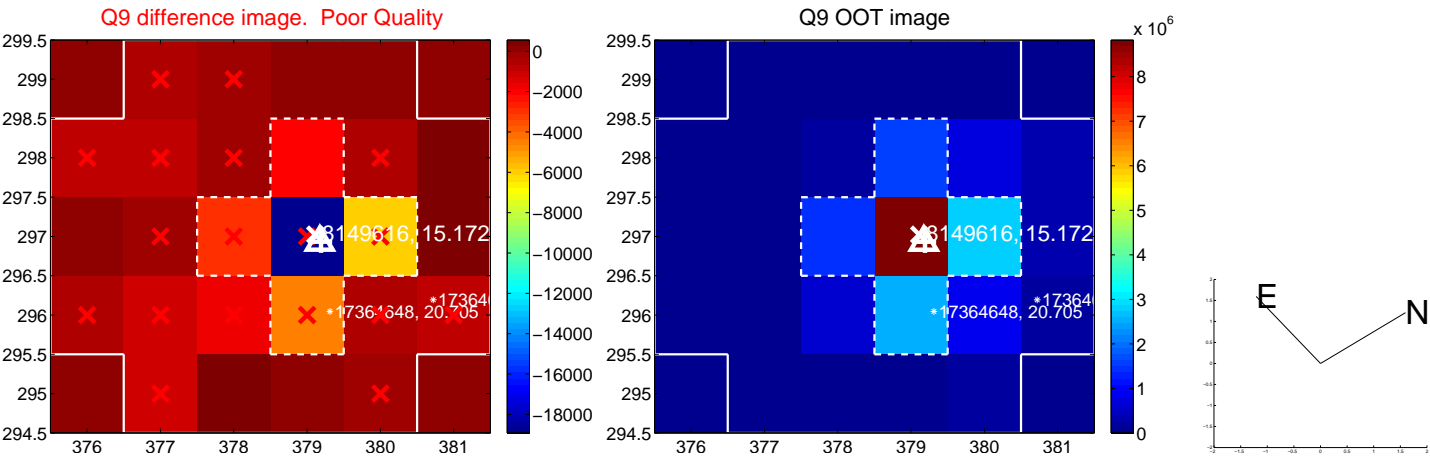
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



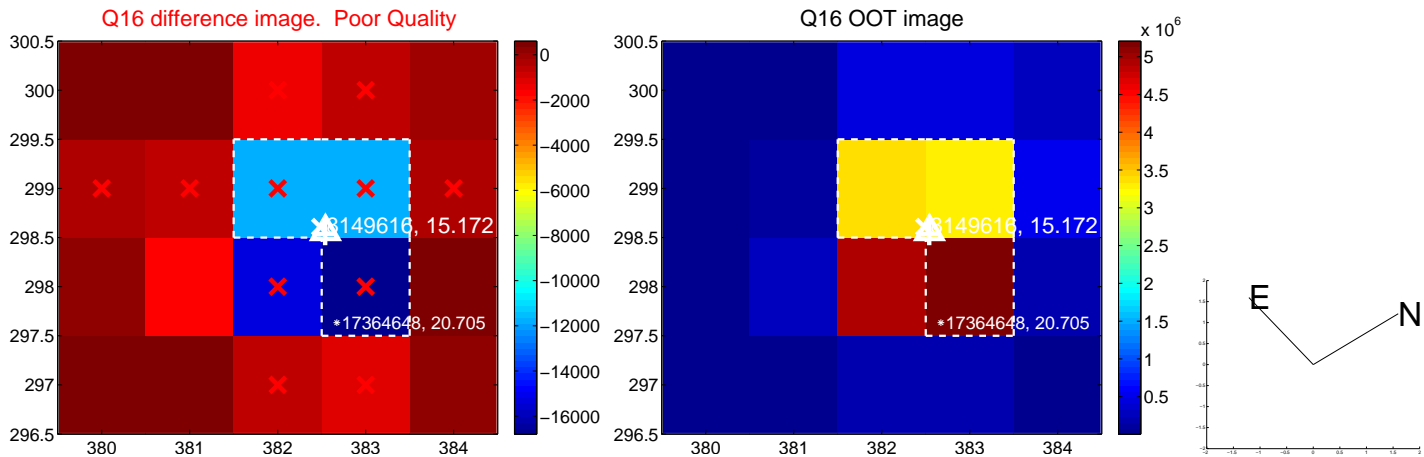
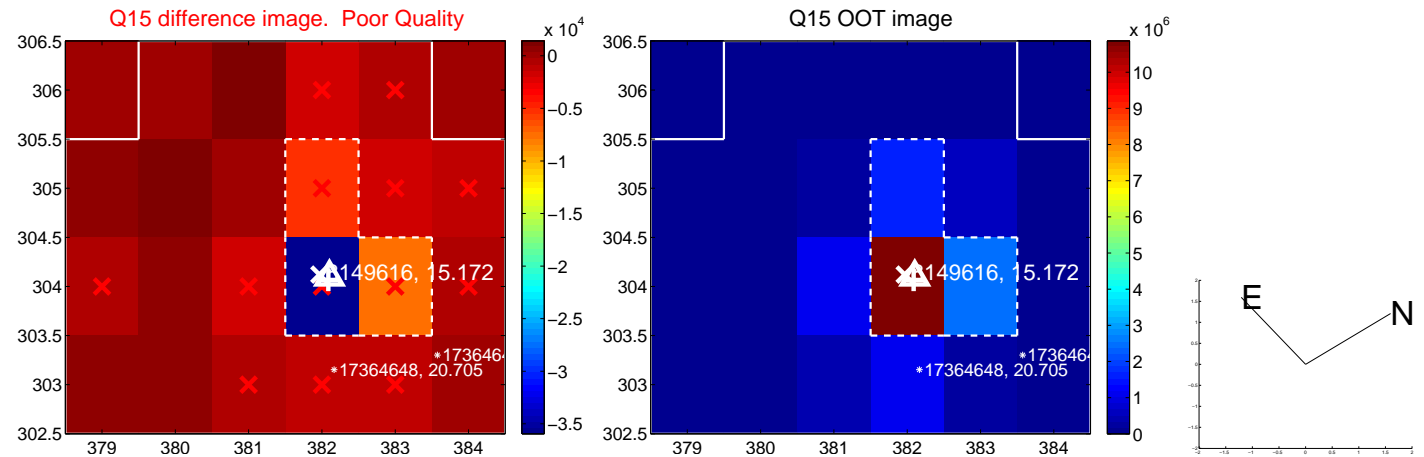
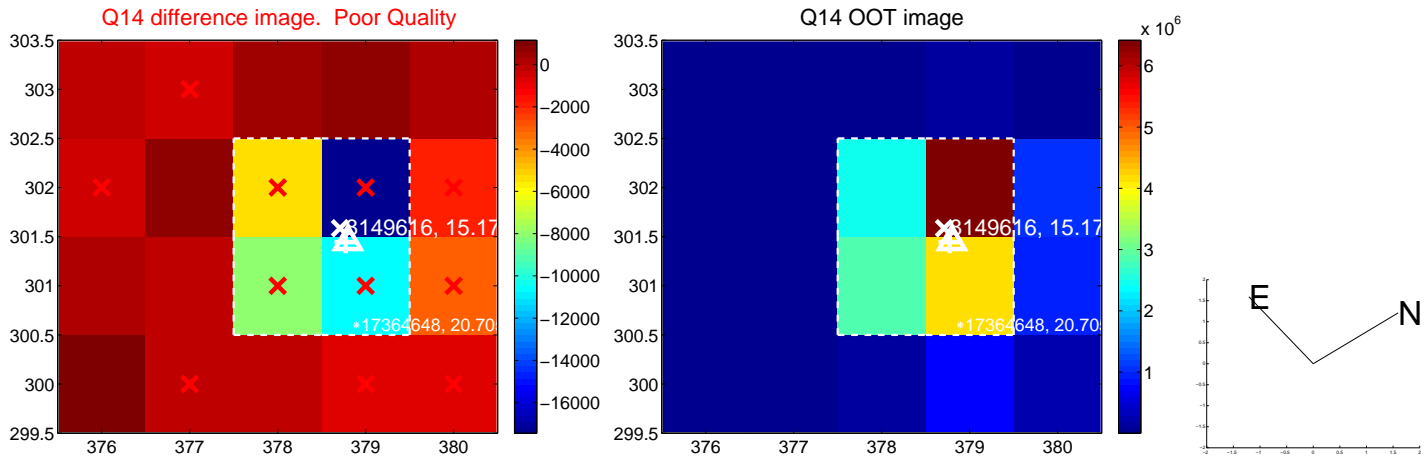
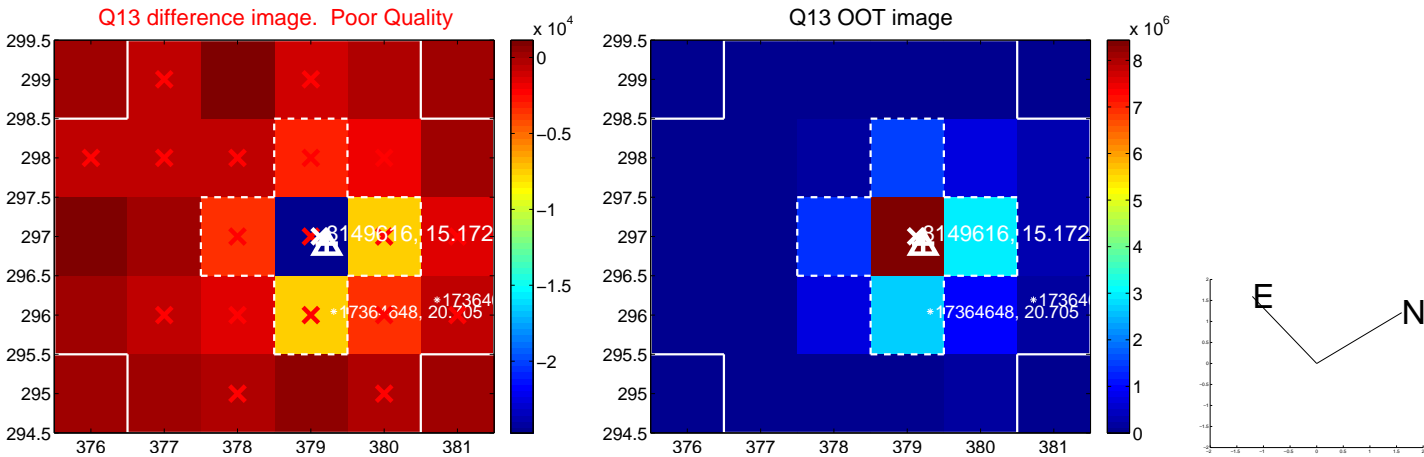
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



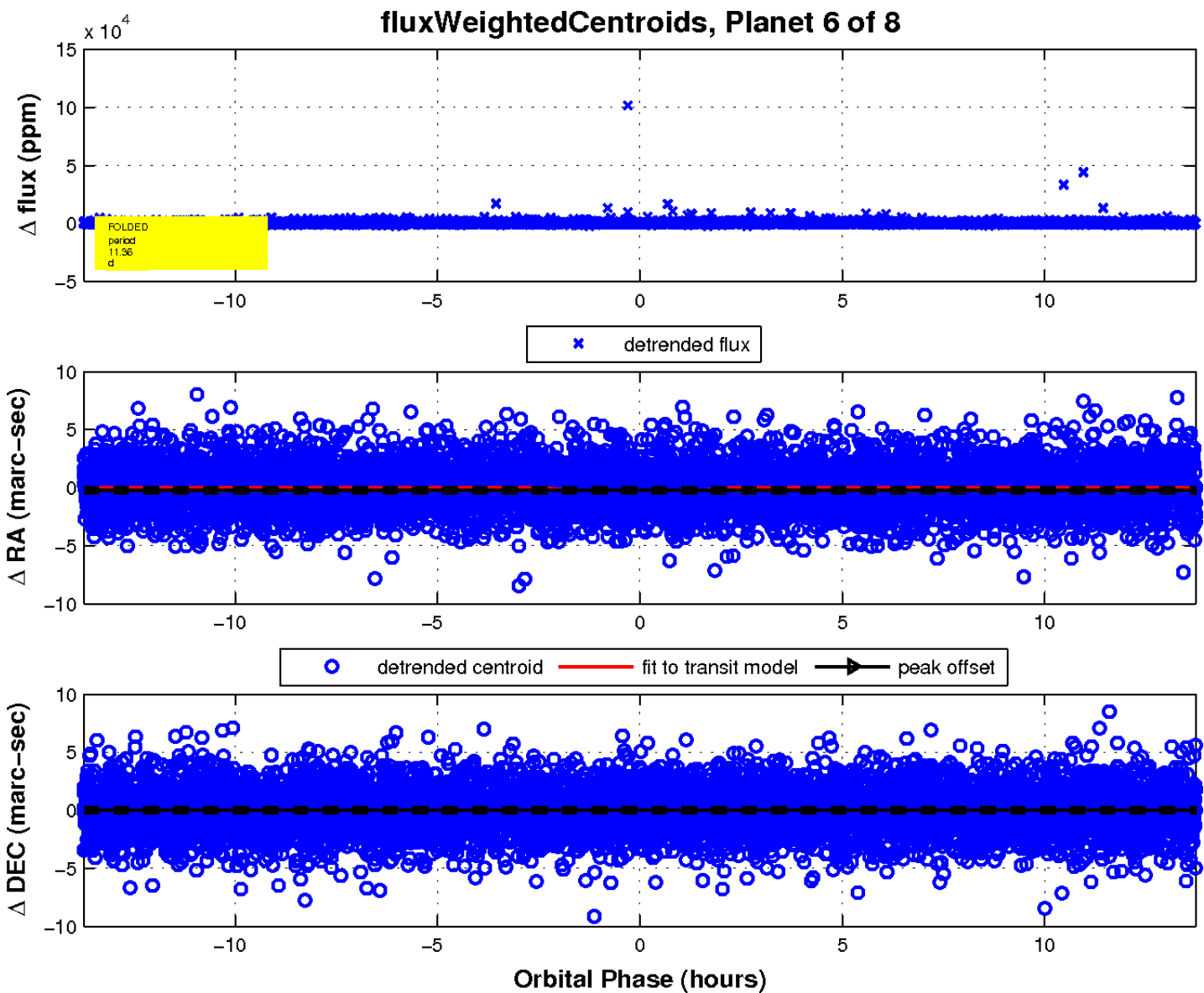
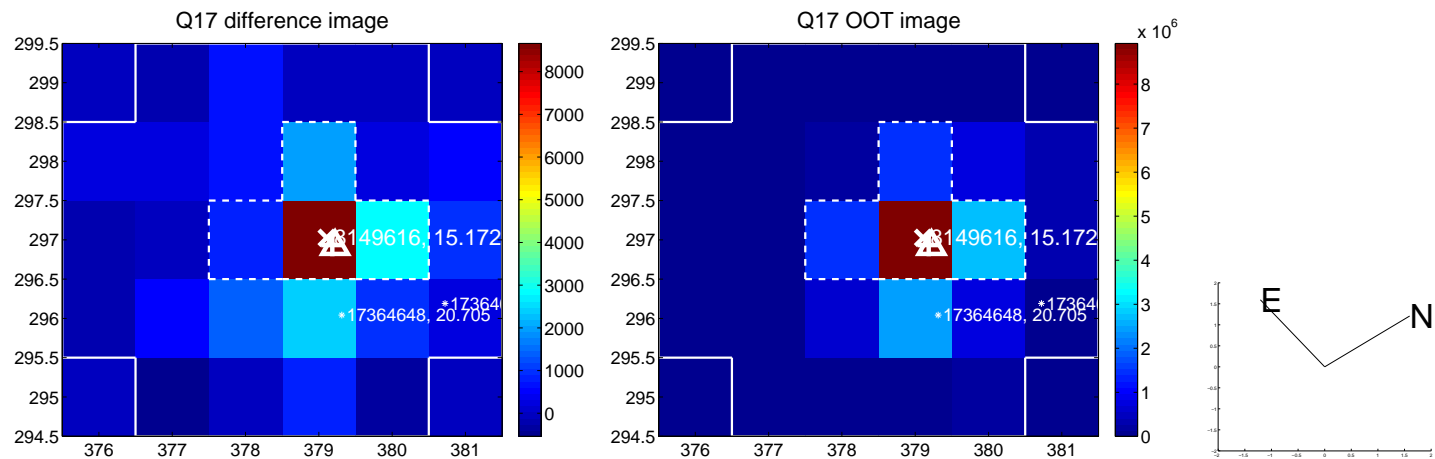
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

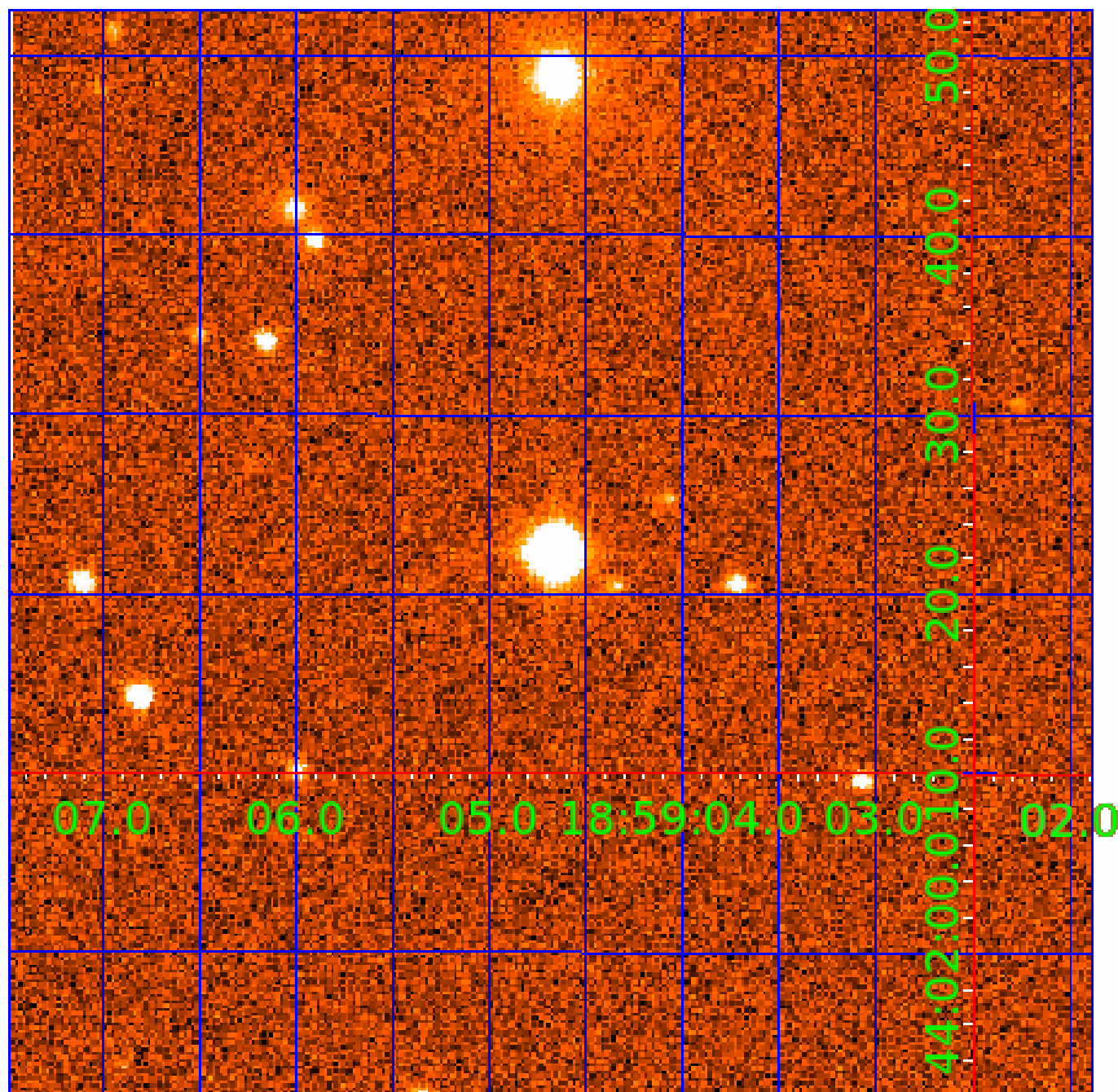


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 008149616

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008149616-01	OBS	No	1.780615	132.506653	106.6	10.625	12.2	9.1	0.27	3332	0.28	23.72
008149616-02	OBS	No	103.037639	191.572038	1341.1	7.500	13.7	-1.0	0.27	3332	0.96	0.11
008149616-03	OBS	No	75.872076	140.582029	1321.3	3.000	10.3	-1.0	0.27	3332	0.95	0.16
008149616-04	OBS	No	118.587620	199.638830	818.9	41.613	10.2	7.4	0.27	3332	0.75	0.09
008149616-05	OBS	No	101.068333	174.446642	1333.8	4.115	9.1	7.7	0.27	3332	1.91	0.11
008149616-06	OBS	No	11.360095	135.155291	323.3	4.579	9.0	7.8	0.27	3332	0.51	2.00
008149616-07	OBS	No	45.419802	152.259980	583.6	16.676	9.8	8.3	0.27	3332	0.67	0.32
008149616-08	OBS	No	62.341047	160.117011	578.1	5.954	9.8	9.3	0.27	3332	0.66	0.21

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008149616-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—CENT_KIC_POS
008149616-02	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—INCONSISTENT_TRANS—CENT_NOFITS
008149616-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_NOFITS
008149616-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES—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
008149616-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS
008149616-06	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
008149616-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT
008149616-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—CENT_KIC_POS

**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.

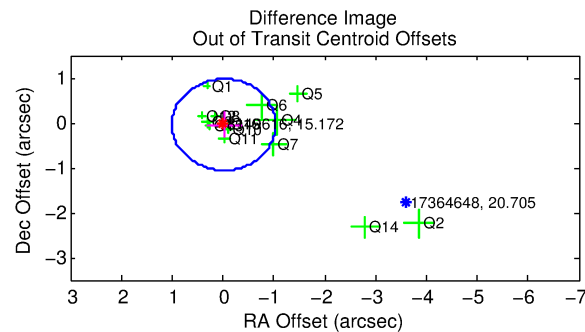
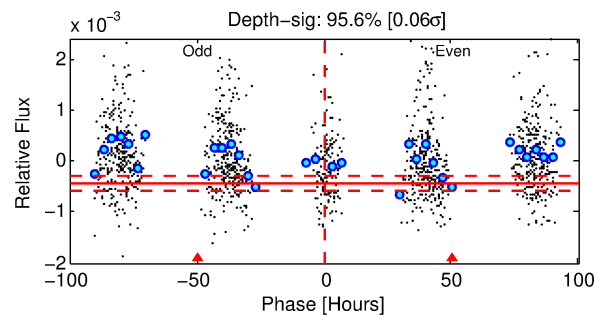
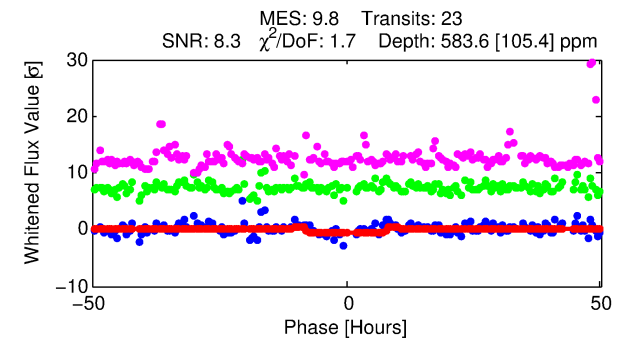
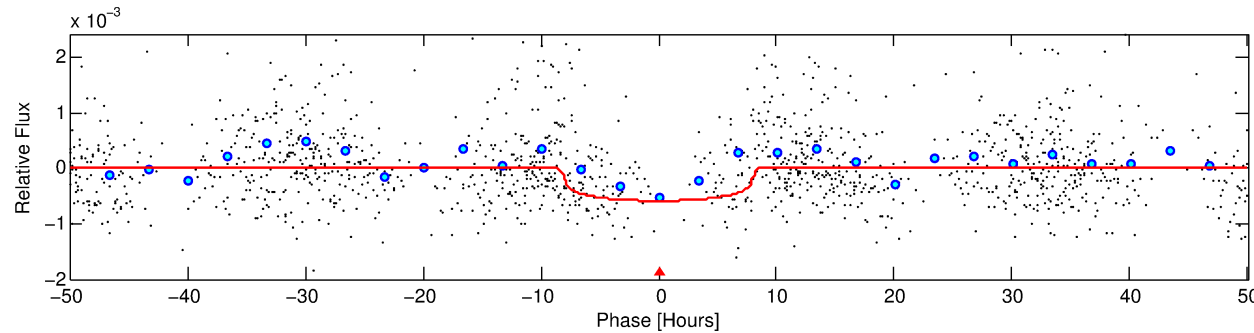
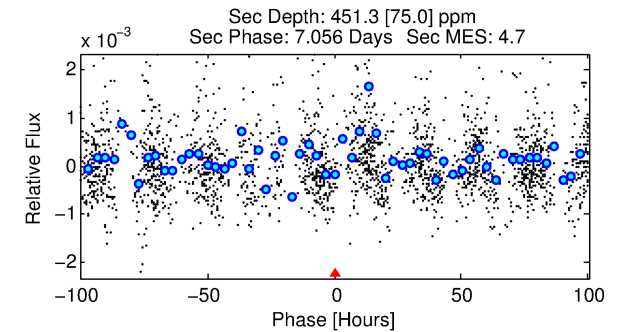
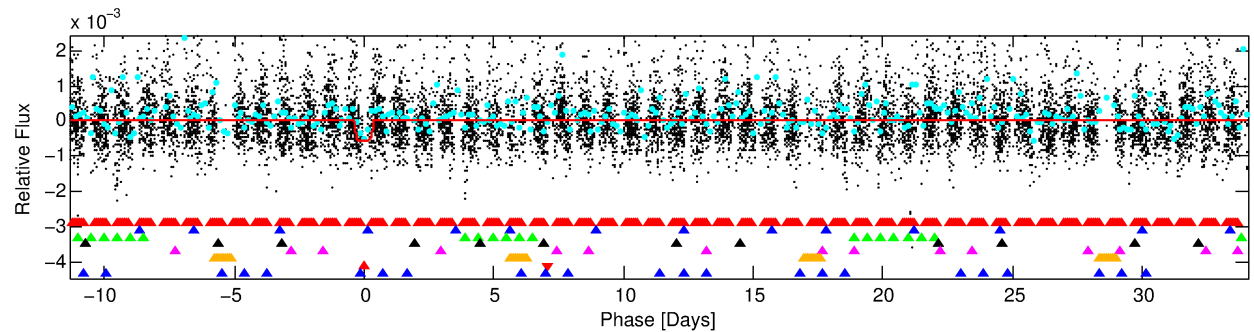
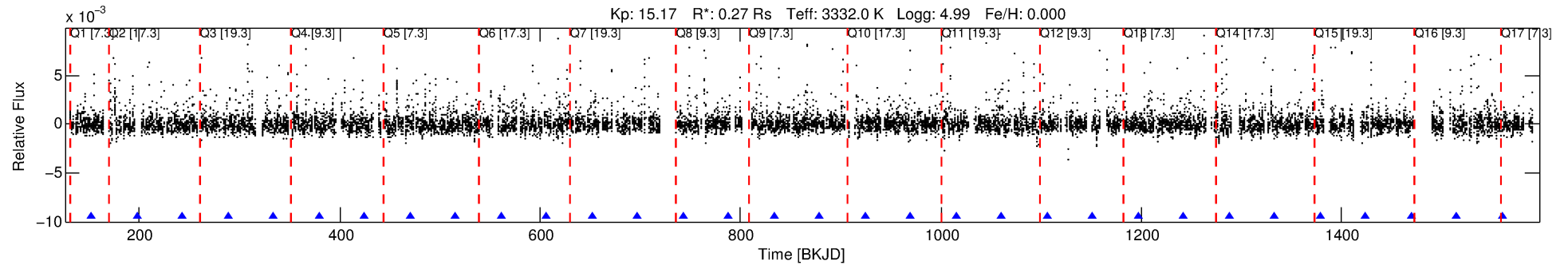
Ephemeris Match Information For 008149616-07

No Significant Match Found



# DV One-Page Summary

KIC: 8149616 Candidate: 7 of 8 Period: 45.420 d



## DV Fit Results:

Period = 45.41980 [0.00157] d  
Epoch = 152.2600 [0.0300] BKJD  
Rp/R\* = 0.0230 [0.0069]  
a/R\* = 17.04 [19.90]  
b = 0.61 [1.20]  
Seff = 0.32 [0.04]  
Teq = 191 [6] K  
Rp = 0.67 [0.22] Re  
a = 0.1567 [0.0159] AU  
Ag = 13738.46 [8702.29] [1.58 $\sigma$ ]  
Teffp = 3200 [500] K [6.02 $\sigma$ ]

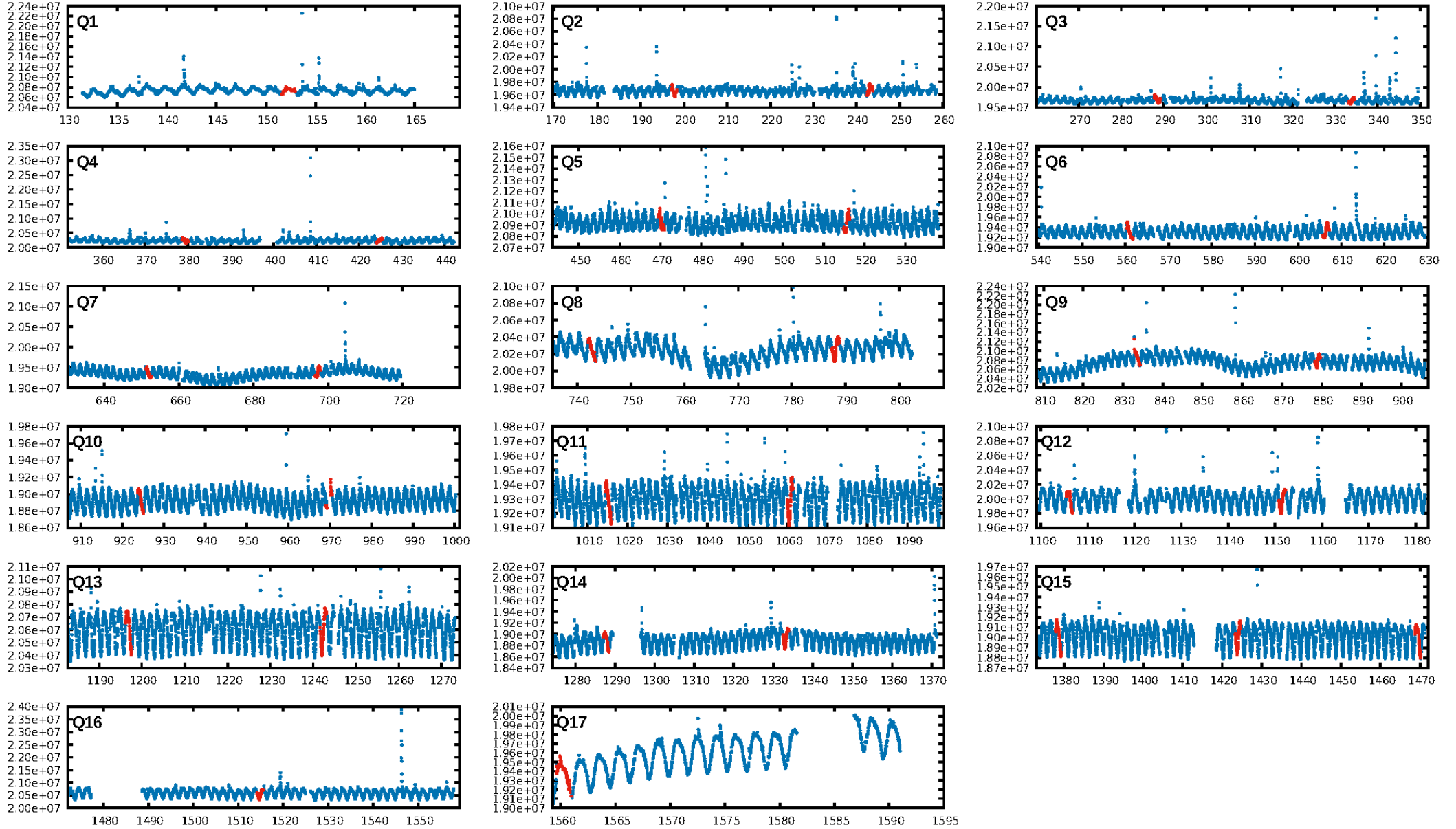
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [47.27 $\sigma$ ]  
LongPeriod-sig: 100.0% [22.93 $\sigma$ ]  
ModelChiSquare2-sig: 5.8%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [23/23]  
GhostDiagnostic-chr: 1.057  
Centroid-sig: 91.5%  
Centroid-so: 0.586 arcsec [1.58 $\sigma$ ]  
OotOffset-rm: 0.046 arcsec [0.13 $\sigma$ ]  
OotOffset-st: 4/4/4/2 [14]  
KicOffset-rm: 0.401 arcsec [1.25 $\sigma$ ]  
KicOffset-st: 4/4/4/2 [14]  
DiffImageQuality-fgm: 0.57 [8/14]  
DiffImageOverlap-fno: 0.00 [0/15]

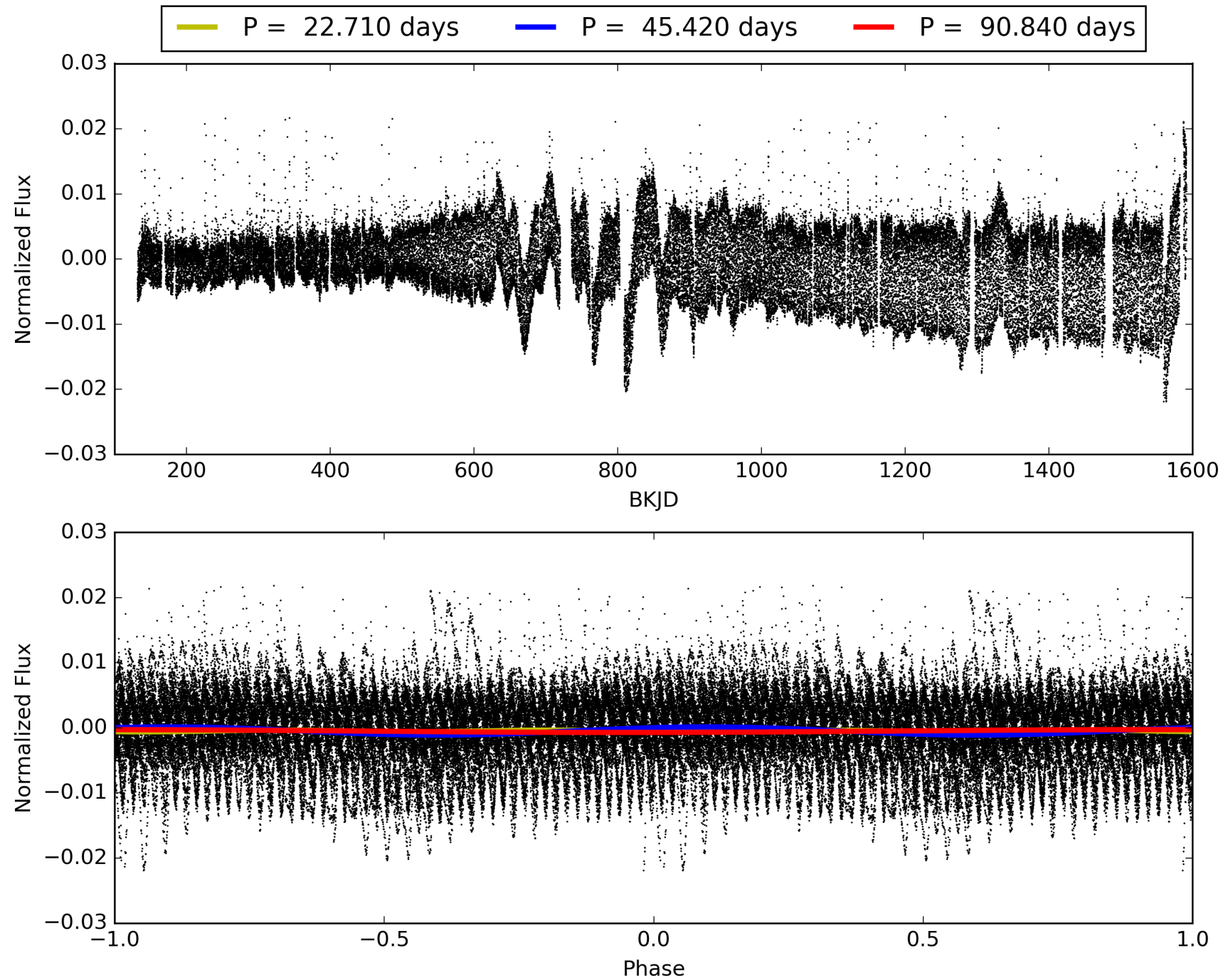
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 08:17:22 Z

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

# TCE 008149616-07, PDC Light Curves

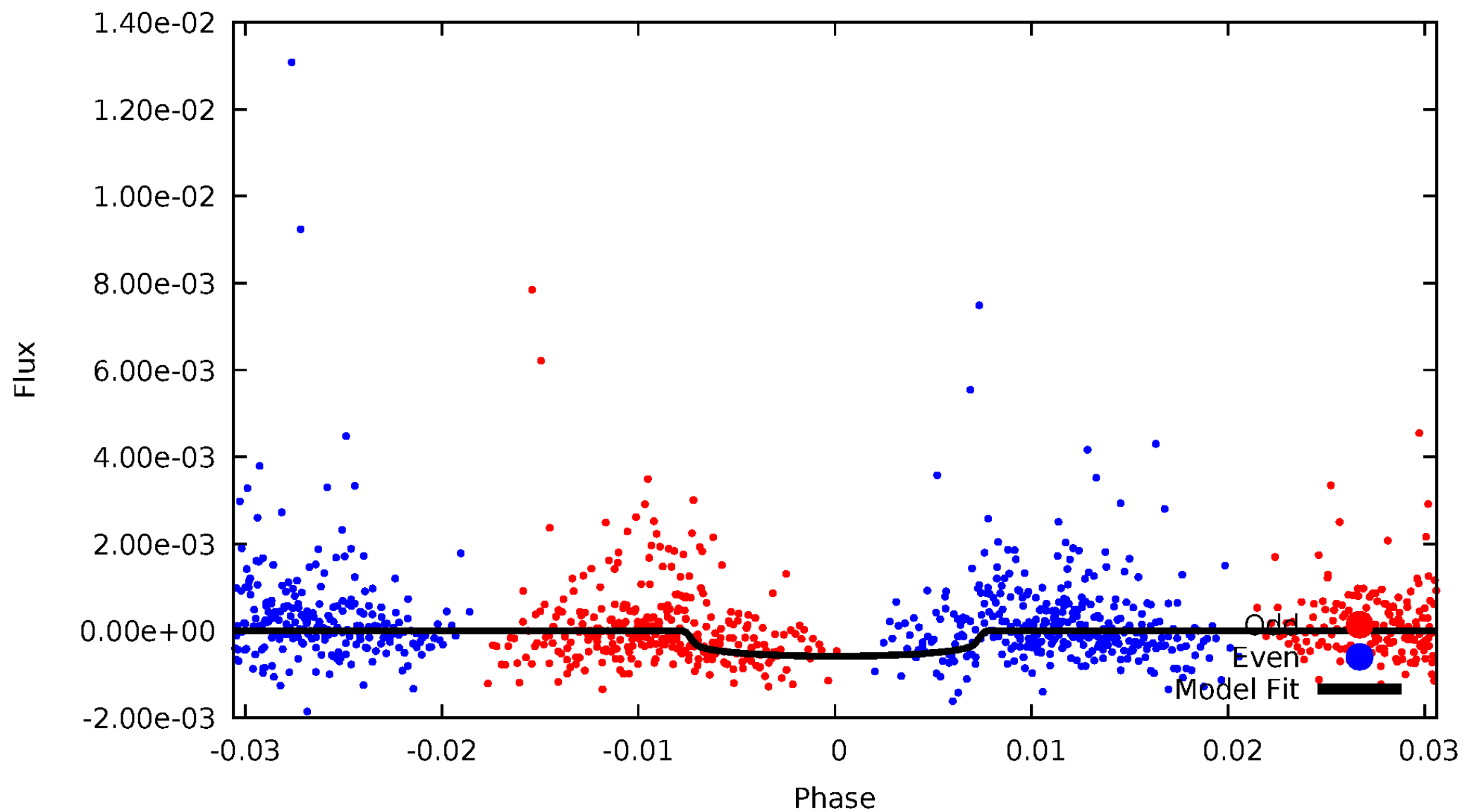


TCE 008149616-07



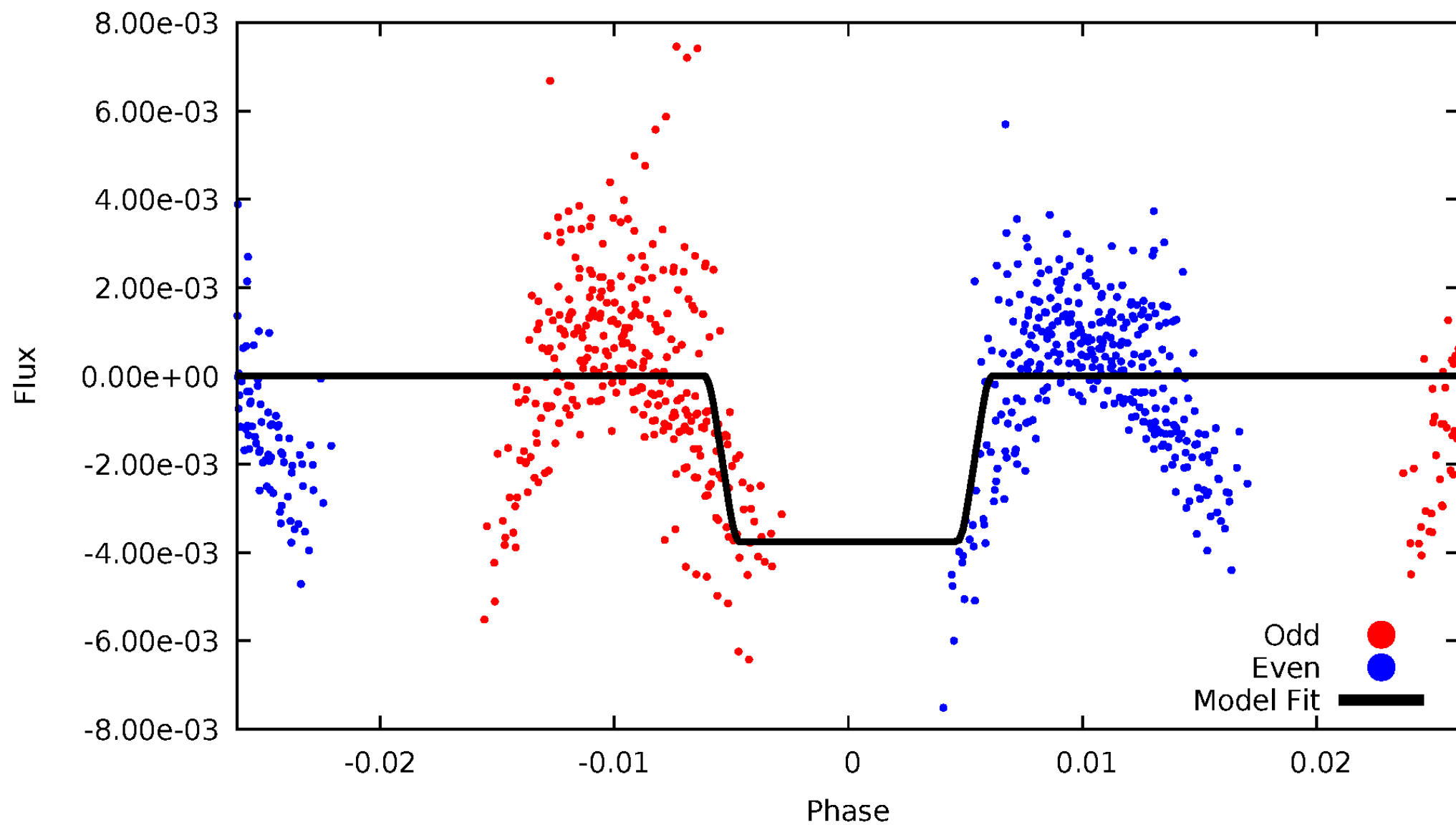
# DV Odd/Even

TCE 008149616-07



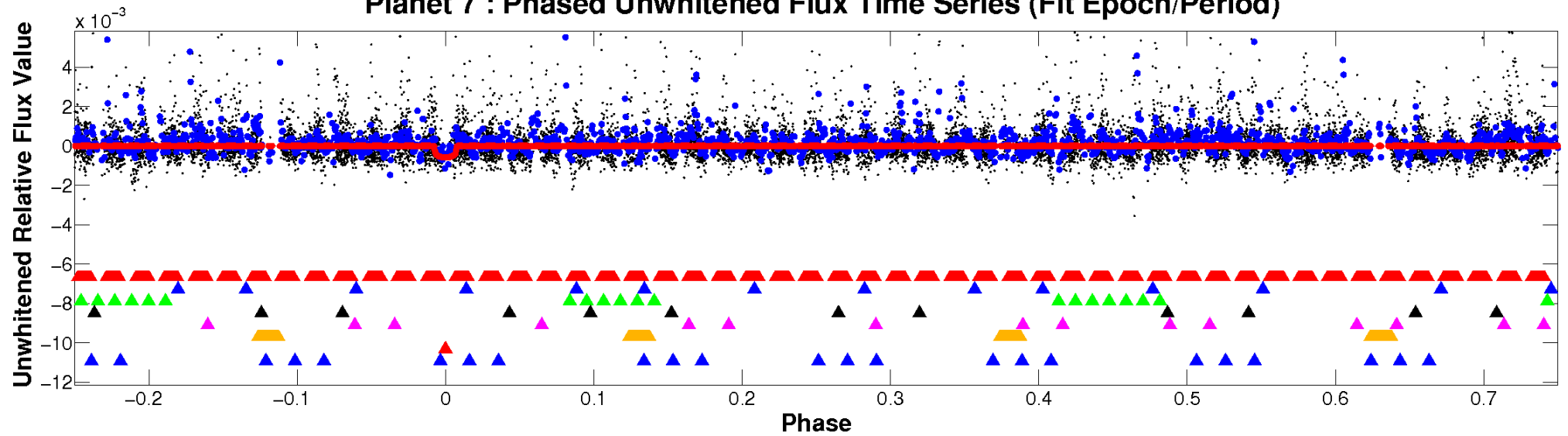
# ALT Odd/Even

TCE 008149616-07

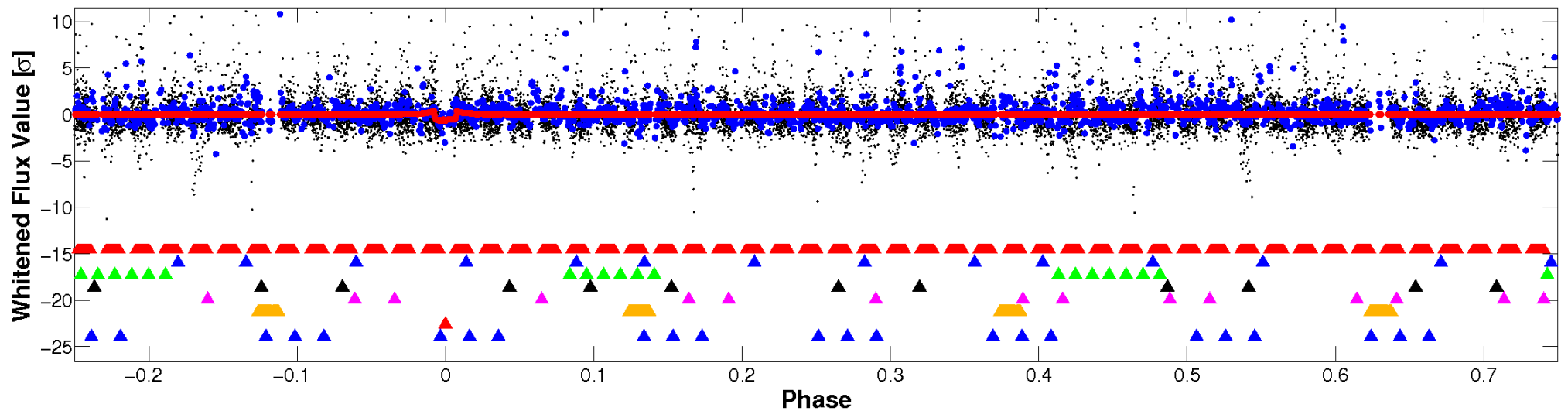


# Non-Whitened Vs. Whitened Light Curve

## Planet 7 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)



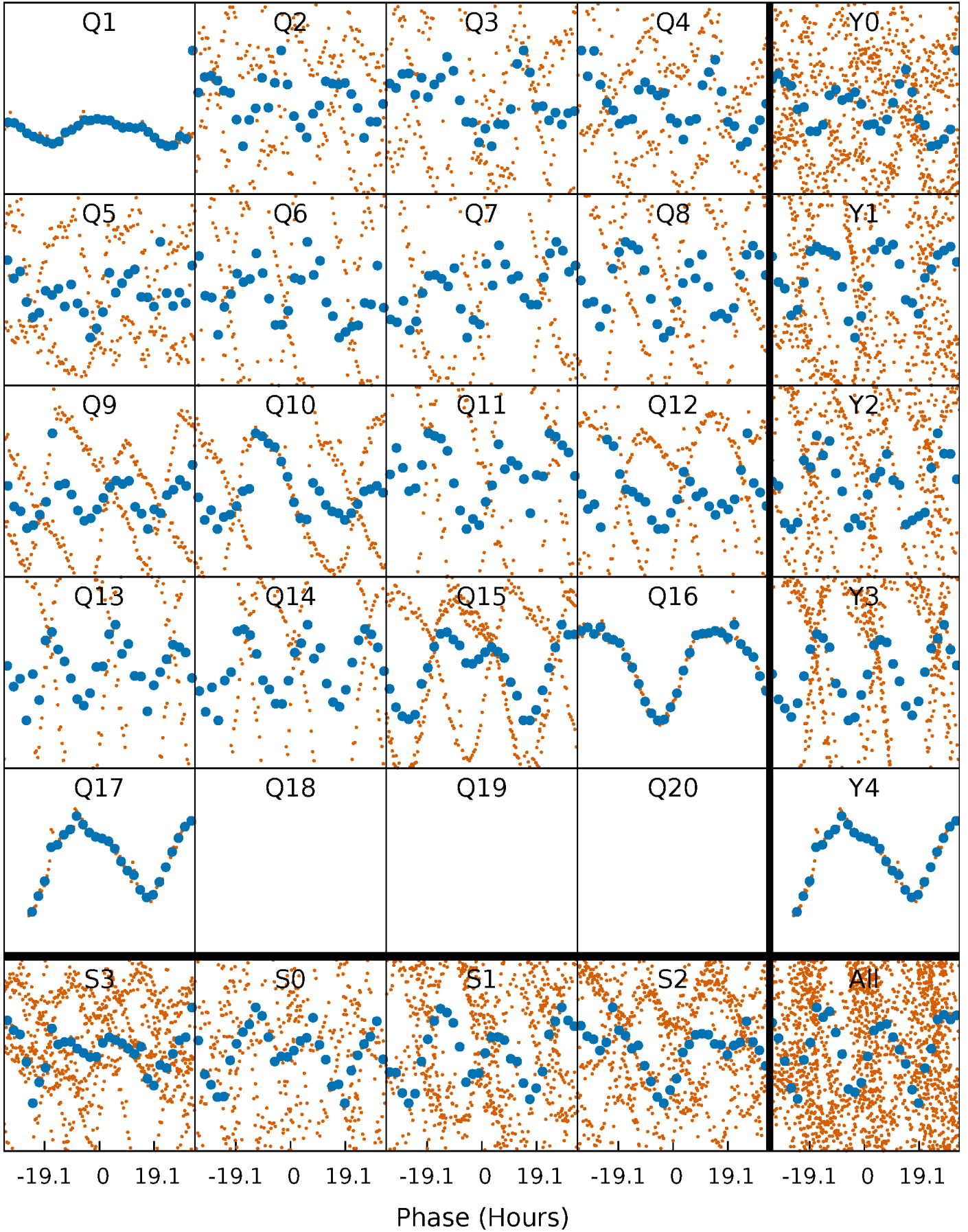
## Planet 7 : Phased Whitened Flux Time Series (Fit Epoch/Period)





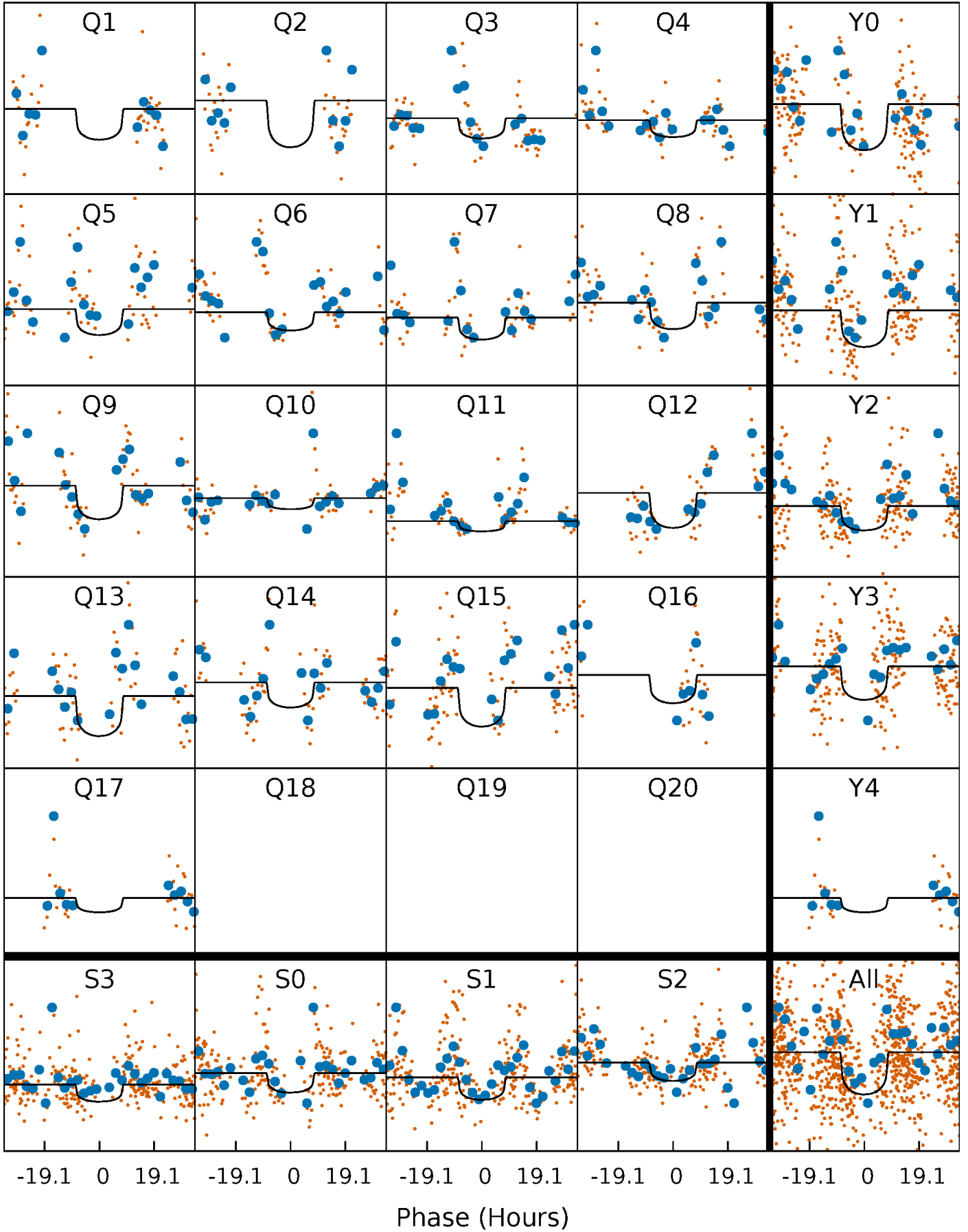
# PDC Quarter-Phased Transit Curves

TCE 008149616-07 P= 45.419802 Days  $T_0=152.259980$  (BKJD)



# DV Quarter-Phased Transit Curves

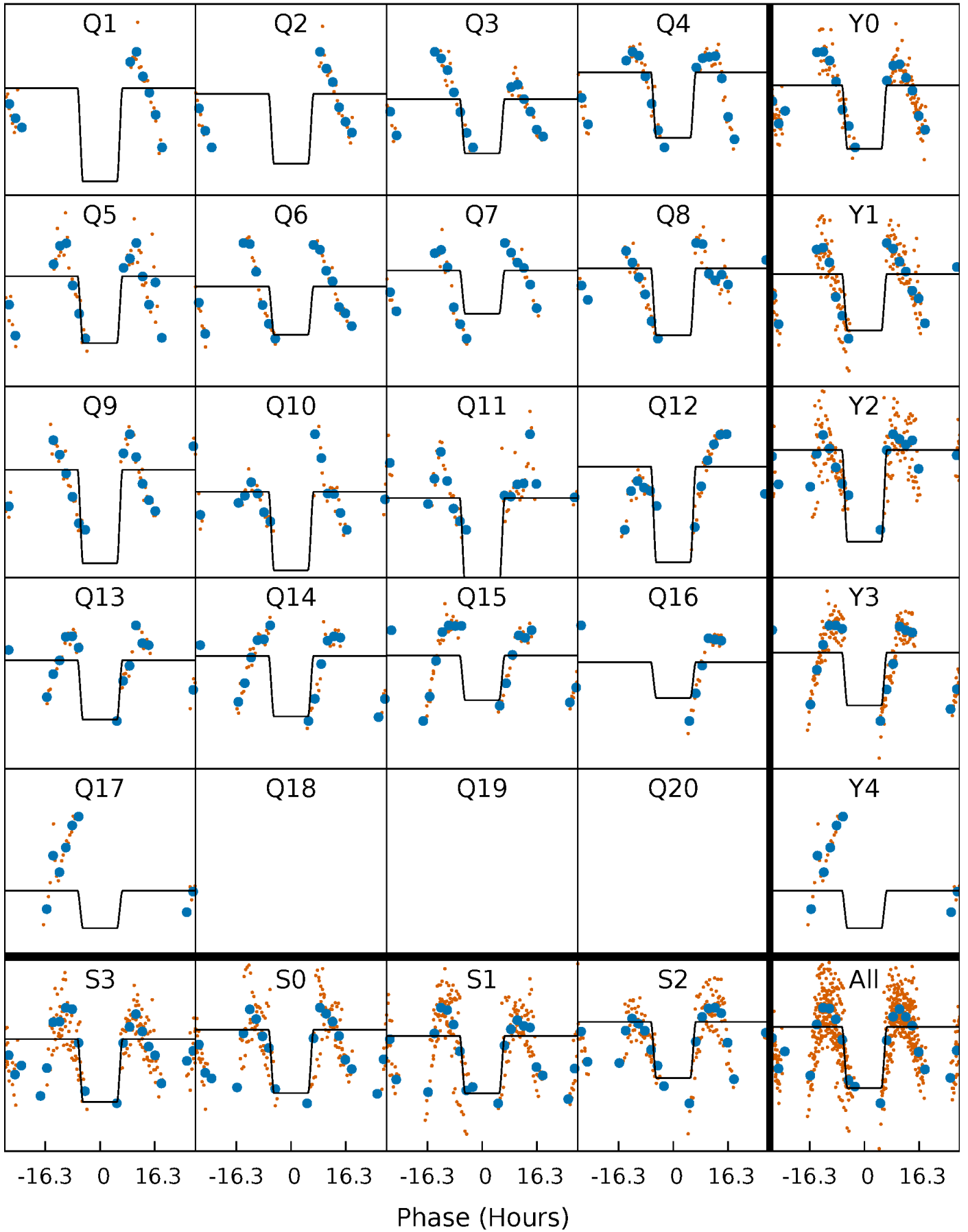
TCE 008149616-07   P= 45.419802 Days    $T_0=152.259980$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

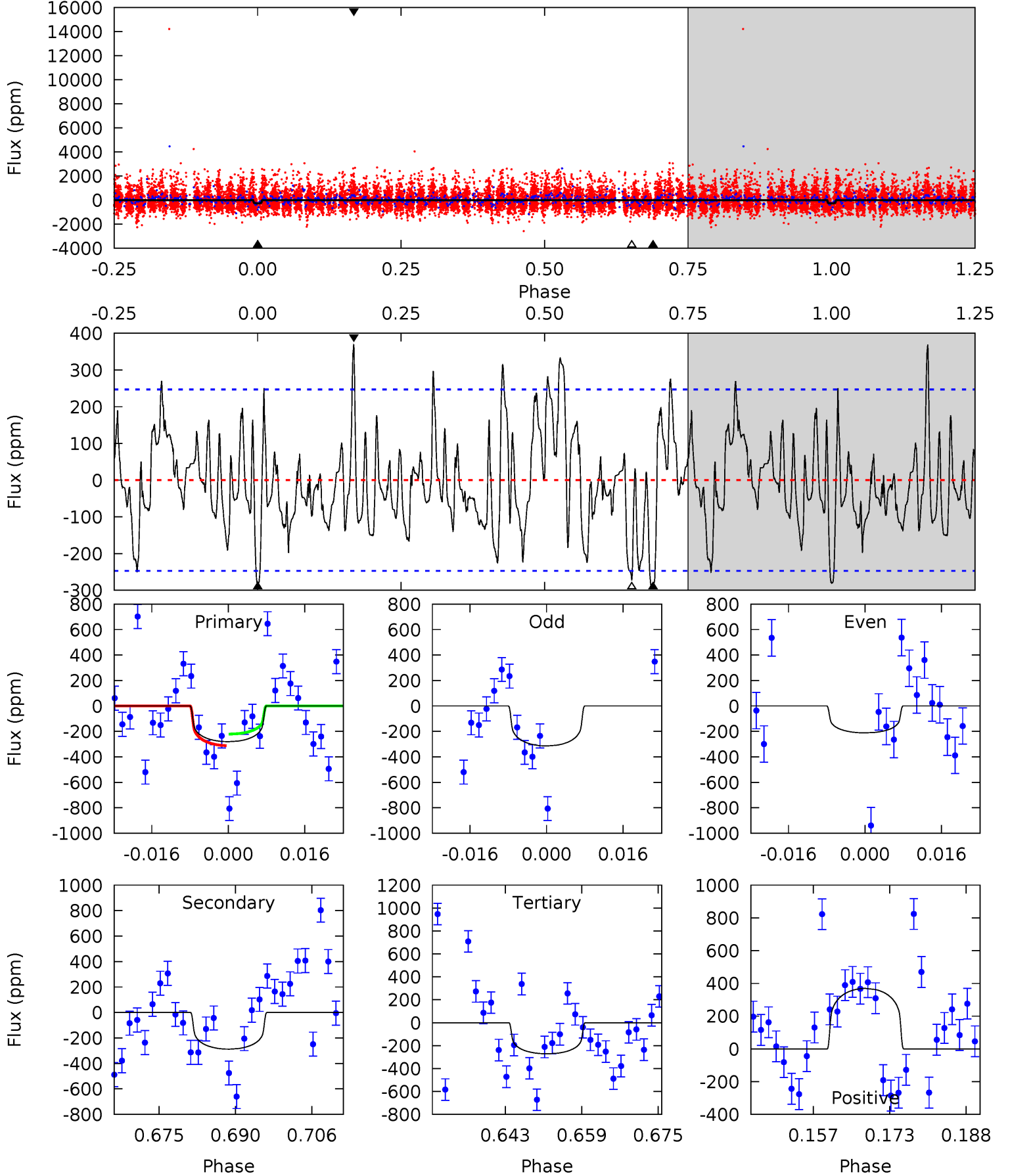
TCE 008149616-07   P= 45.411408 Days    $T_0=152.419070$  (BKJD)



# DV Model-Shift Uniqueness Test

008149616-07, P = 45.419802 Days, E = 106.840178 Days

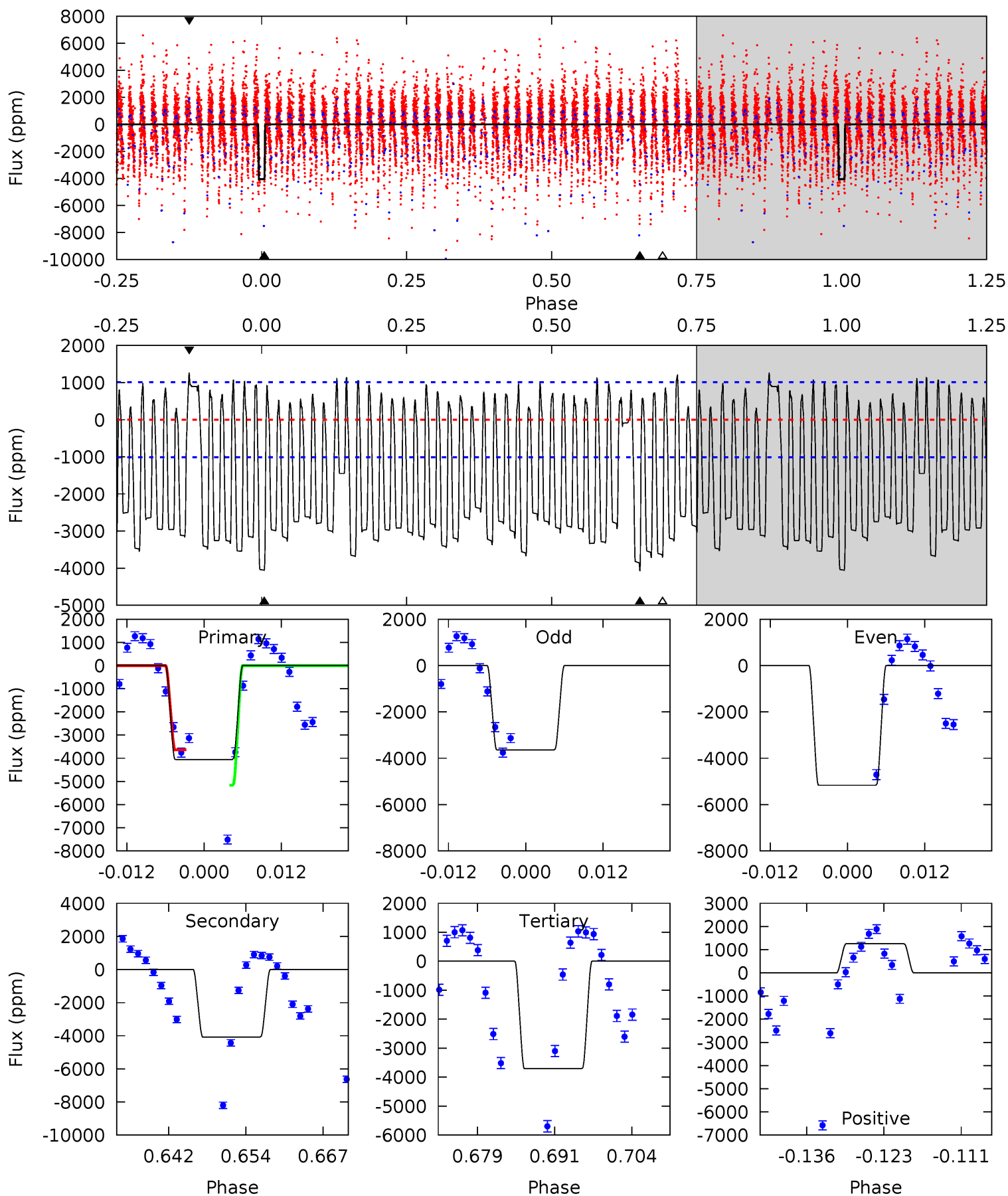
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.61	5.76	5.43	7.38	4.94	2.42	2.33	0.18	-1.77	0.33	-1.63	1.00	-0.47	0.56	0.89



# Alt Model-Shift Uniqueness Test

008149616-07, P = 45.411408 Days, E = 107.007662 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
20.0	20.1	18.3	6.19	4.99	2.50	6.09	1.70	13.8	1.82	13.9	3.53	0.85	0.24	3.54



### Stellar Parameters For KIC 008149616

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3332^{+43}_{-36}$	$4.987^{+0.044}_{-0.040}$	$0.000^{+0.100}_{-0.100}$	$0.265^{+0.038}_{-0.027}$	$0.248^{+0.045}_{-0.030}$	$18.820^{+4.559}_{-3.663}$
	+1%/-1%	+1%/-1%	+inf%/-inf%	+14%/-10%	+18%/-12%	+24%/-19%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 008149616-07 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-288 \pm 50$	$0.67^{+0.20}_{-0.20}$	$267^{+7}_{-6}$	$3042^{+346}_{-228}$	$8677^{+9161}_{-3676}$
Alt.	$-4079 \pm 203$	$1.77^{+0.24}_{-0.22}$	$267^{+6}_{-6}$	$3379^{+146}_{-123}$	$17596^{+5173}_{-3687}$

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

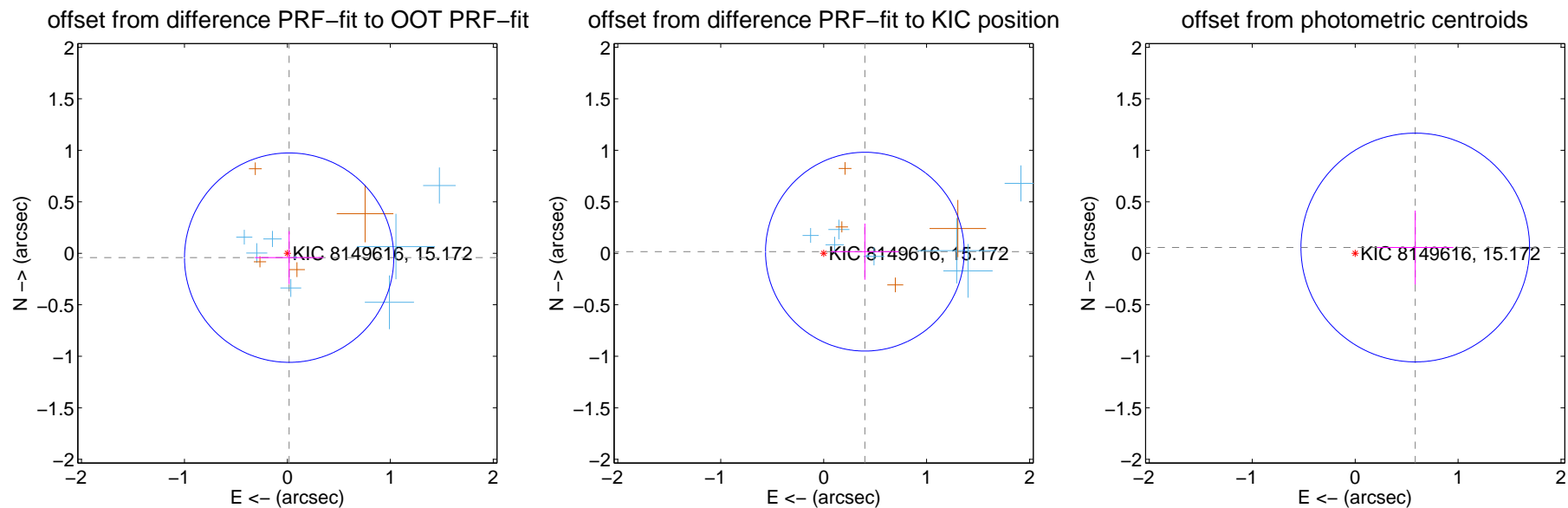
## DV Centroid Data

Supplemental centroid analysis for 008149616-07. Kepler magnitude: 15.17. Transit SNR 8.26

There are 8 quarters with good PRF difference image offsets

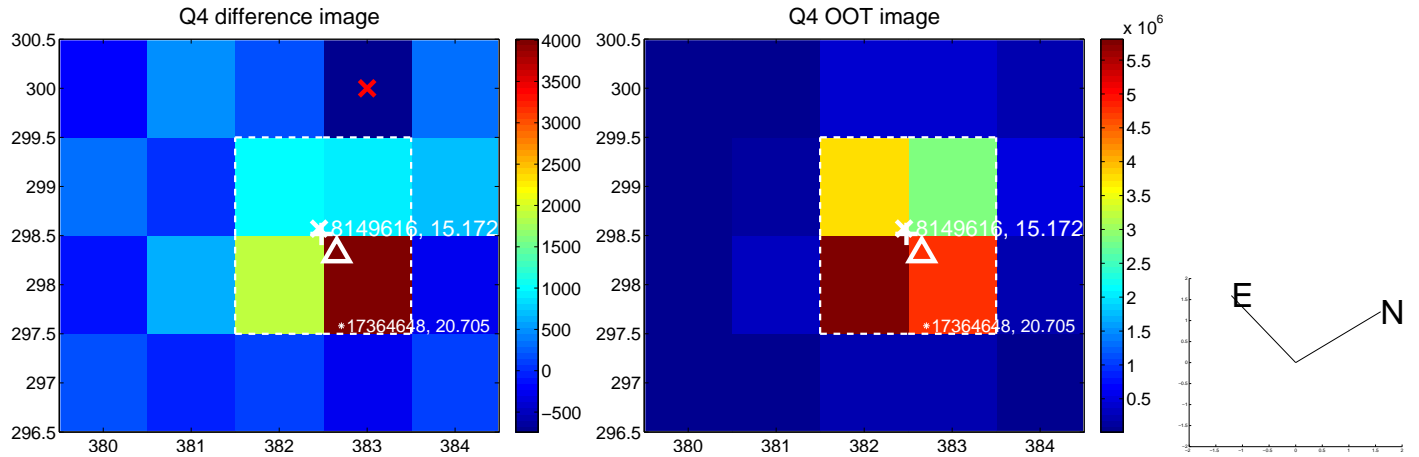
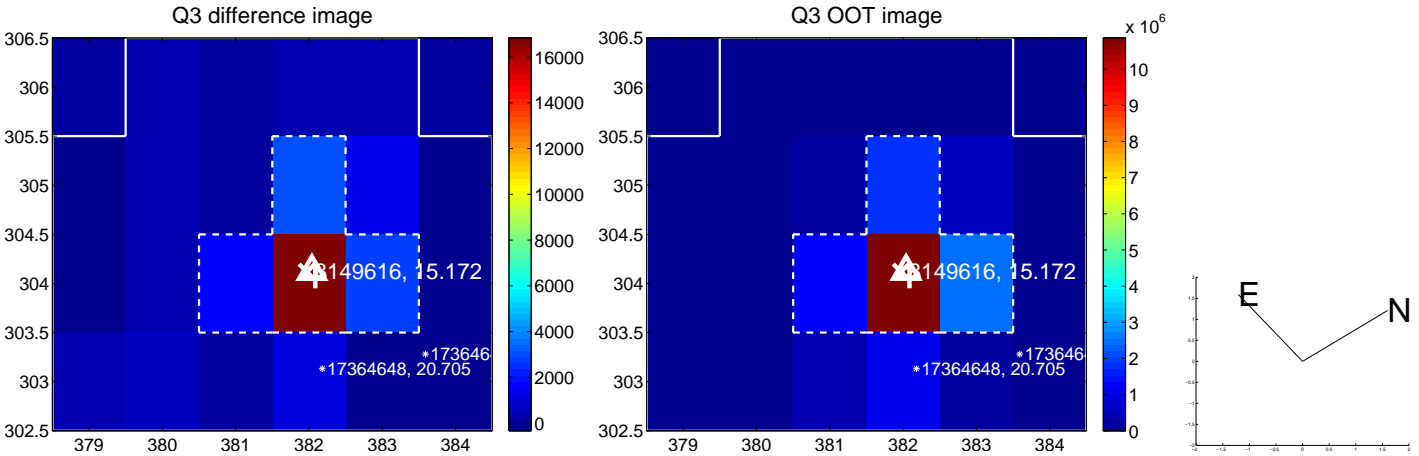
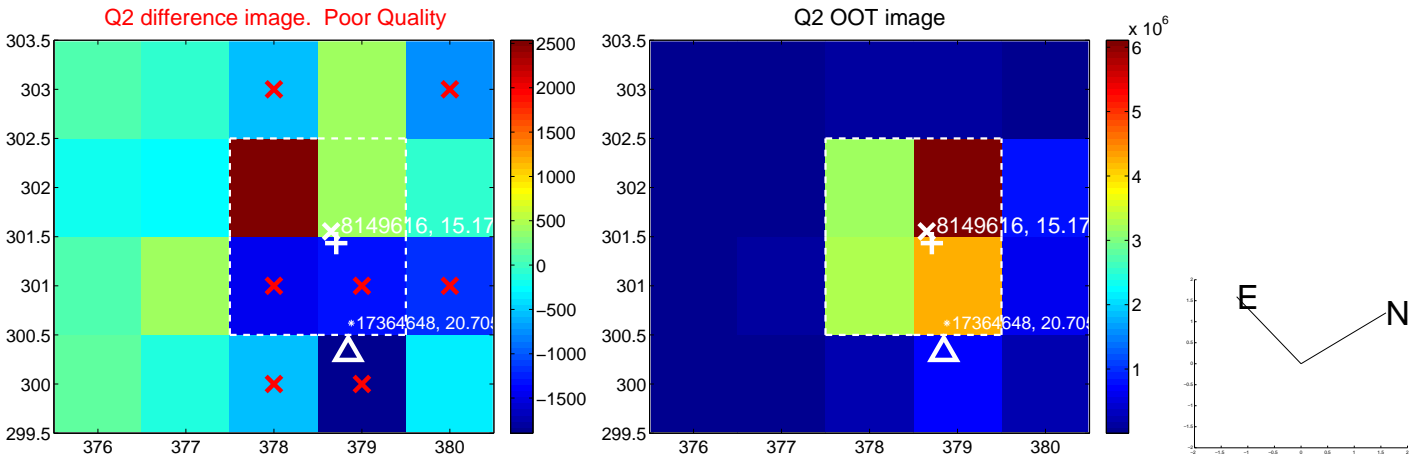
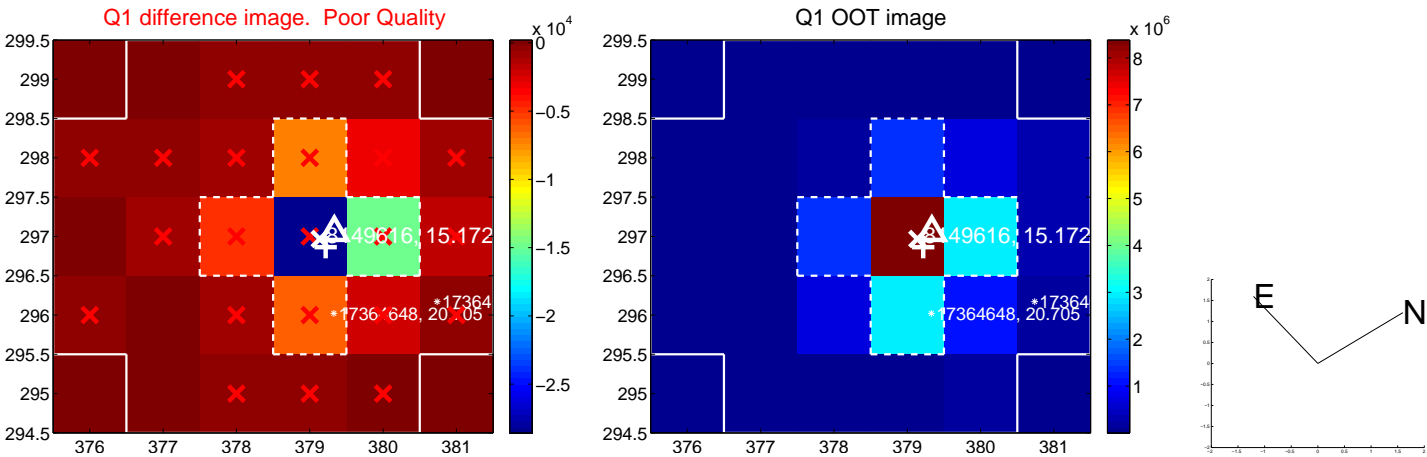
The direct PRF centroid is offset from the target star catalog position by about 0.35 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.046 \pm 0.339$	0.13	$-0.017 \pm 0.332$	$-0.042 \pm 0.257$
PRF-fit source offset from KIC position	$0.401 \pm 0.322$	1.25	$-0.400 \pm 0.330$	$0.016 \pm 0.273$
photometric centroid source offset	$0.59 \pm 0.37$	1.58	$-0.58 \pm 0.37$	$0.06 \pm 0.36$

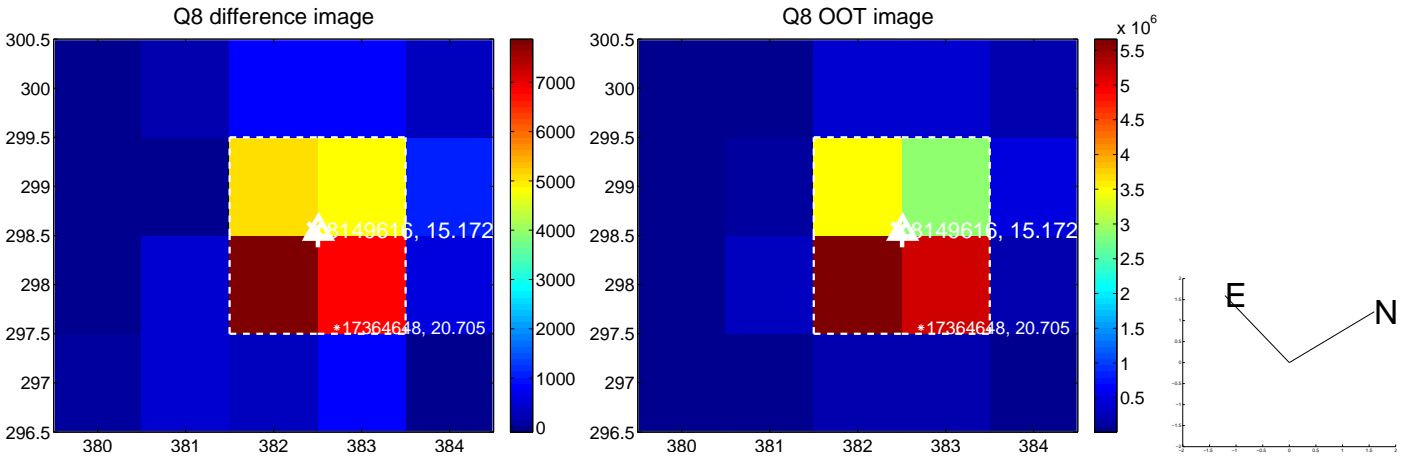
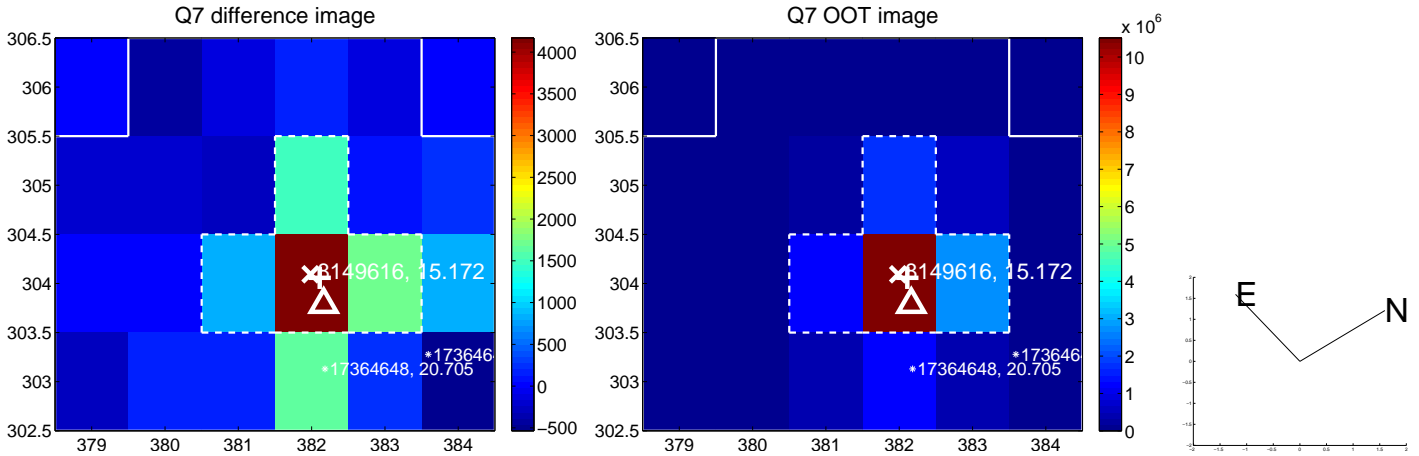
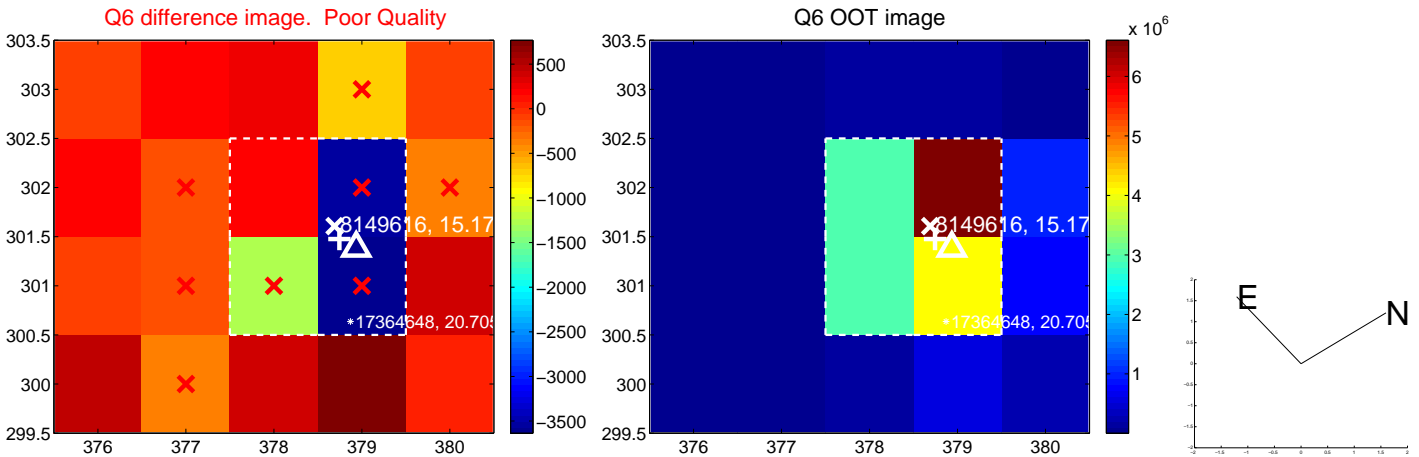
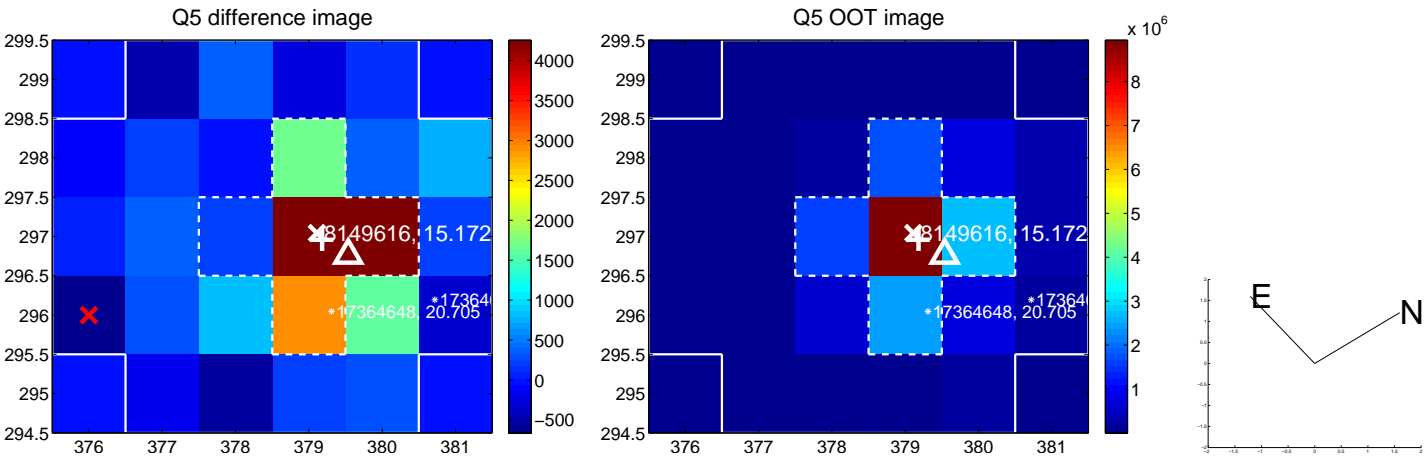


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

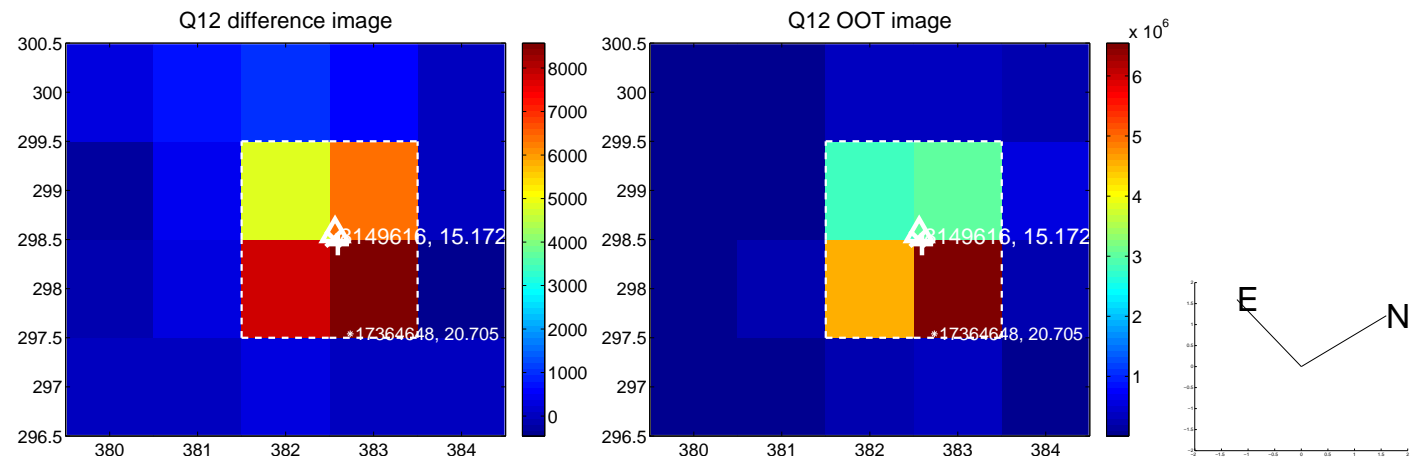
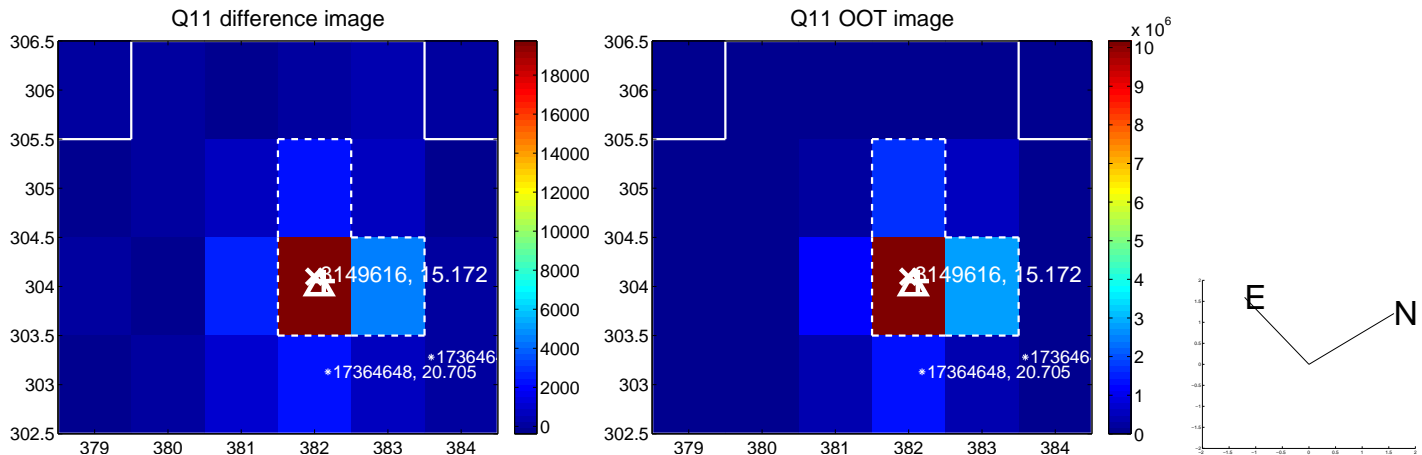
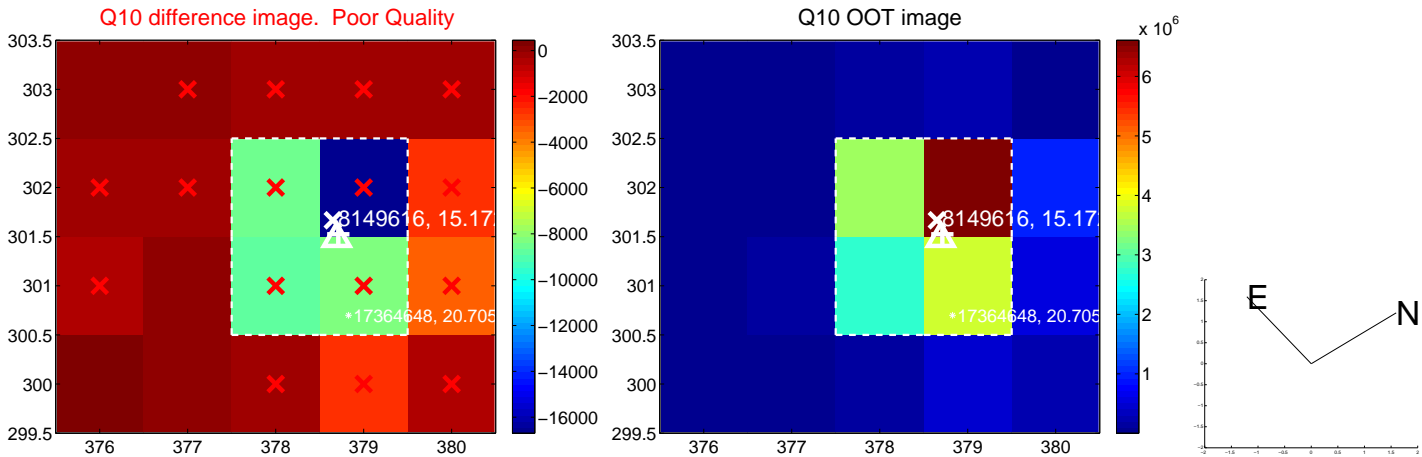
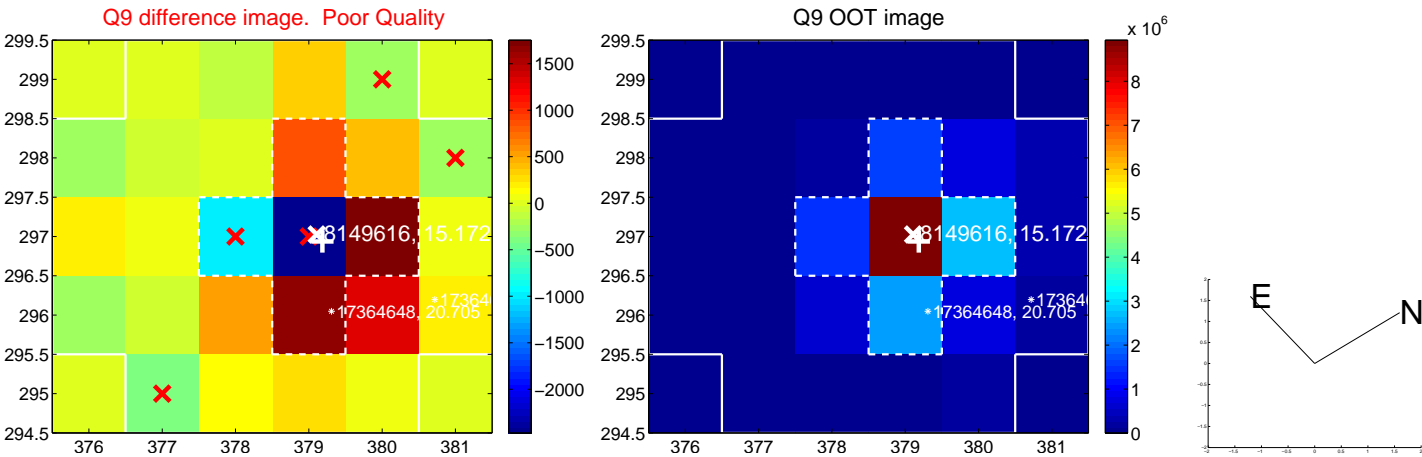
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

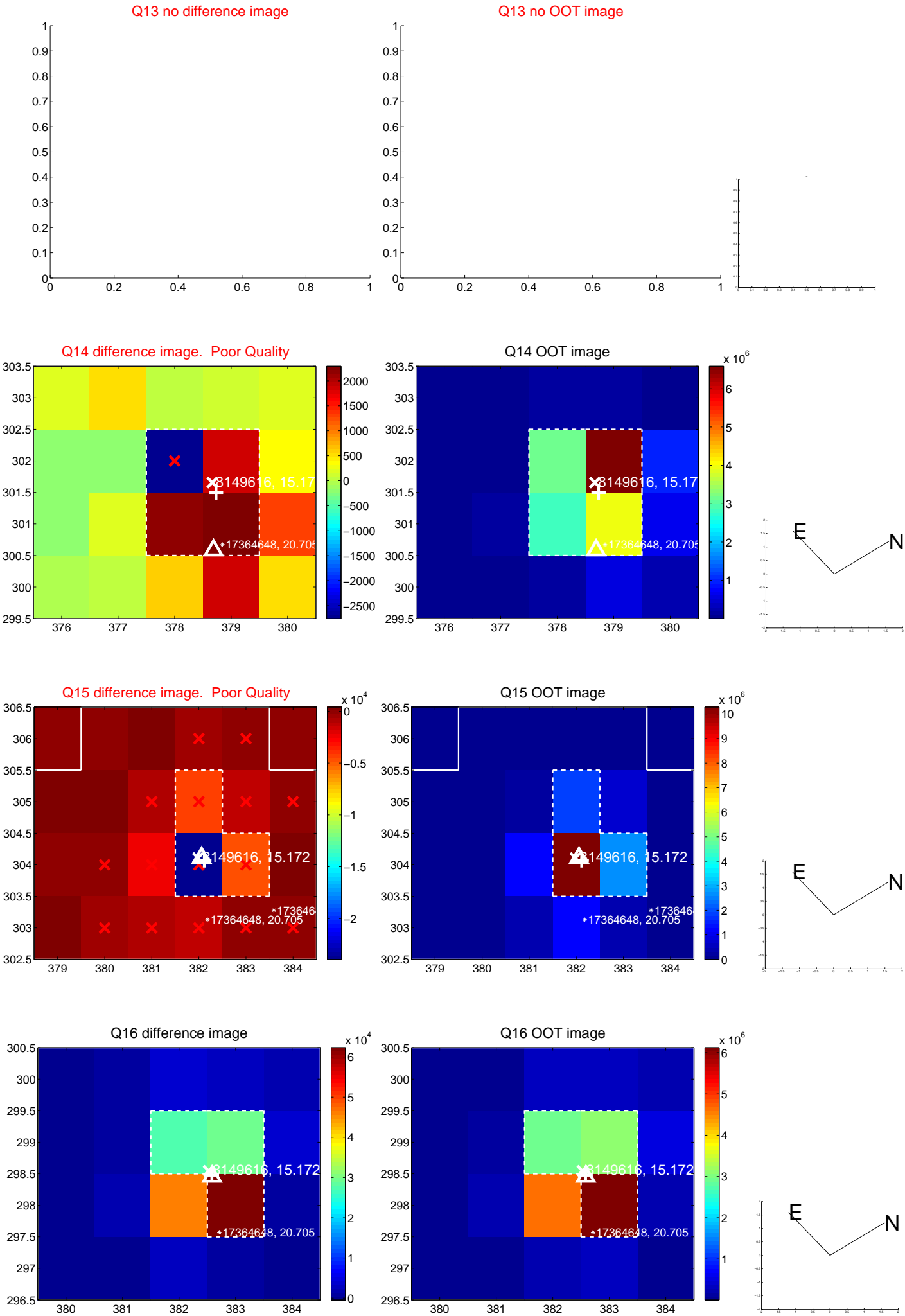


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

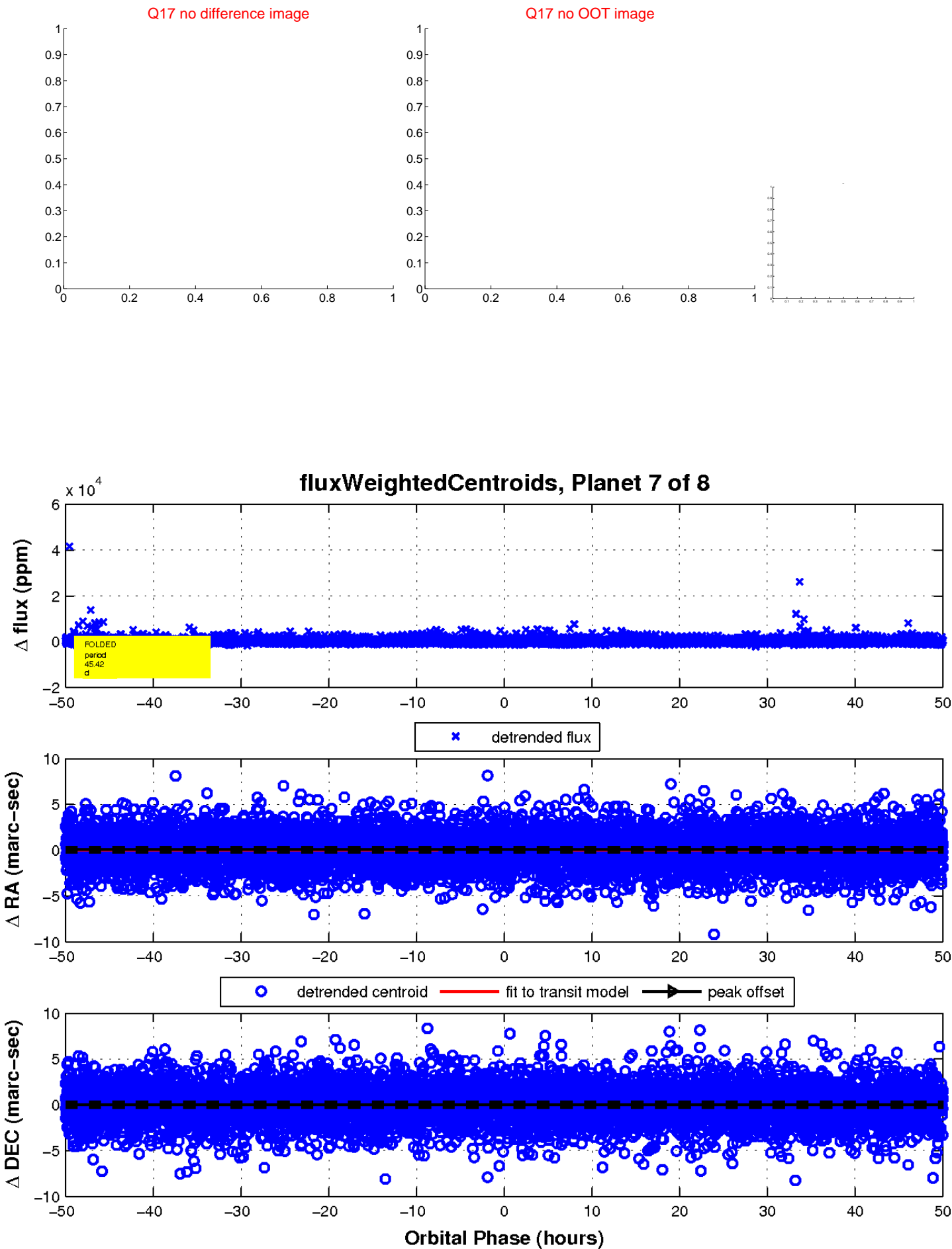




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

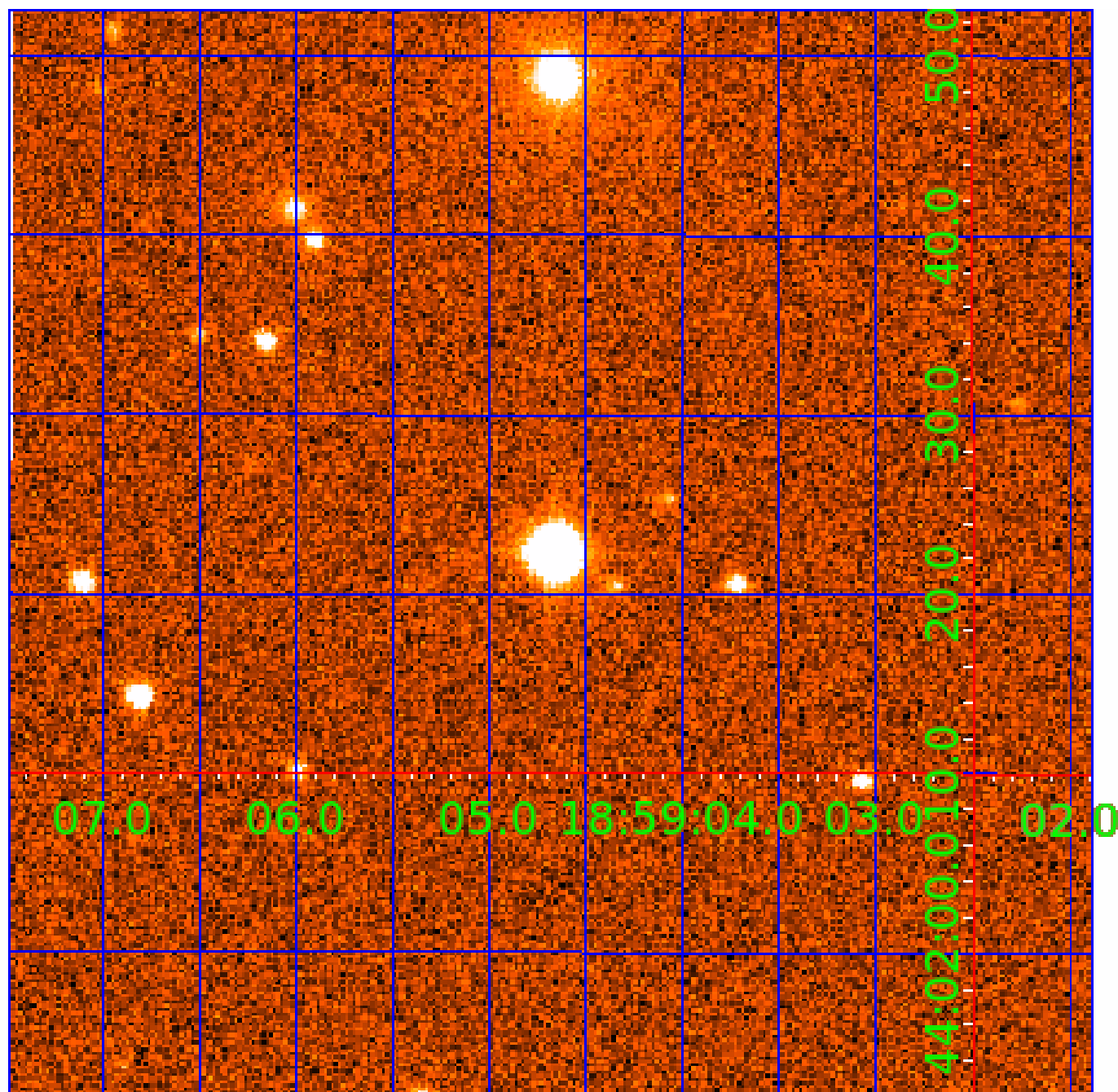


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 008149616

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008149616-01	OBS	No	1.780615	132.506653	106.6	10.625	12.2	9.1	0.27	3332	0.28	23.72
008149616-02	OBS	No	103.037639	191.572038	1341.1	7.500	13.7	-1.0	0.27	3332	0.96	0.11
008149616-03	OBS	No	75.872076	140.582029	1321.3	3.000	10.3	-1.0	0.27	3332	0.95	0.16
008149616-04	OBS	No	118.587620	199.638830	818.9	41.613	10.2	7.4	0.27	3332	0.75	0.09
008149616-05	OBS	No	101.068333	174.446642	1333.8	4.115	9.1	7.7	0.27	3332	1.91	0.11
008149616-06	OBS	No	11.360095	135.155291	323.3	4.579	9.0	7.8	0.27	3332	0.51	2.00
008149616-07	OBS	No	45.419802	152.259980	583.6	16.676	9.8	8.3	0.27	3332	0.67	0.32
008149616-08	OBS	No	62.341047	160.117011	578.1	5.954	9.8	9.3	0.27	3332	0.66	0.21

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008149616-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—CENT_KIC_POS
008149616-02	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—INCONSISTENT_TRANS—CENT_NOFITS
008149616-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_NOFITS
008149616-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES—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
008149616-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS
008149616-06	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
008149616-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT
008149616-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—CENT_KIC_POS

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

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

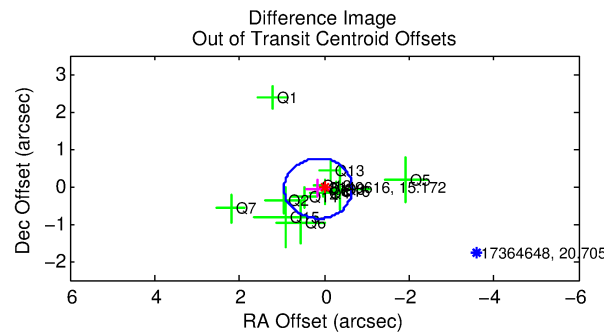
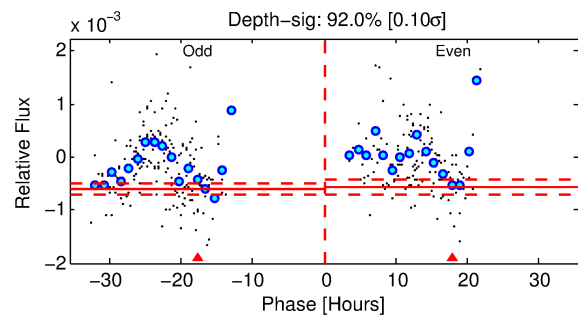
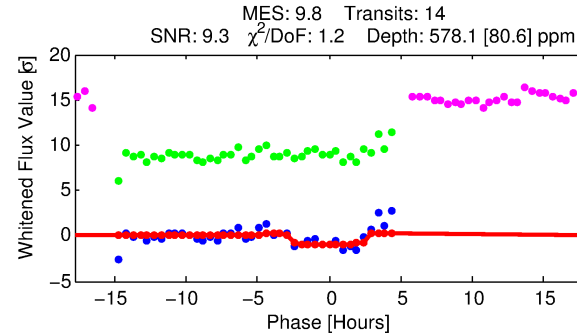
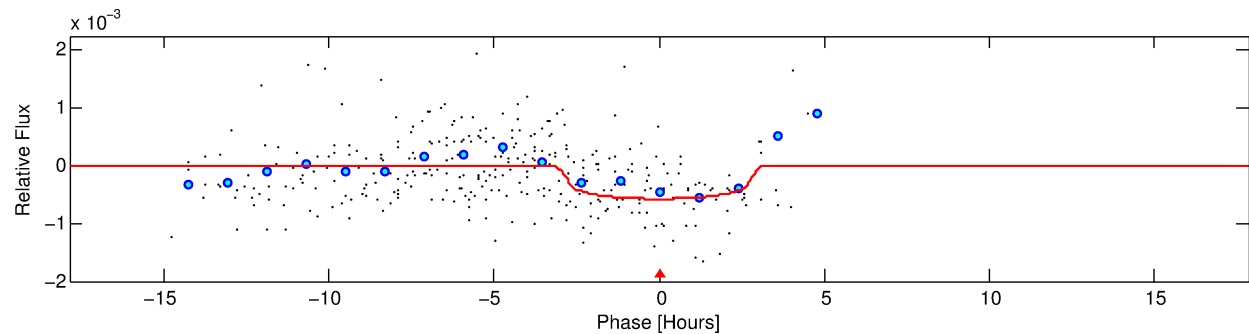
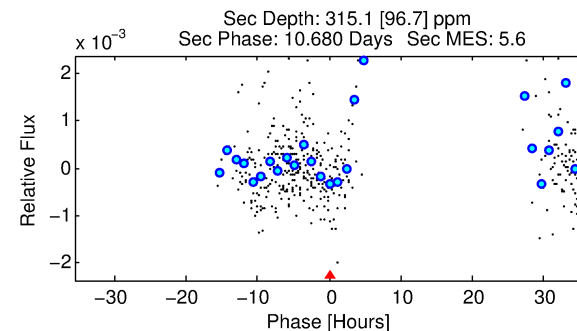
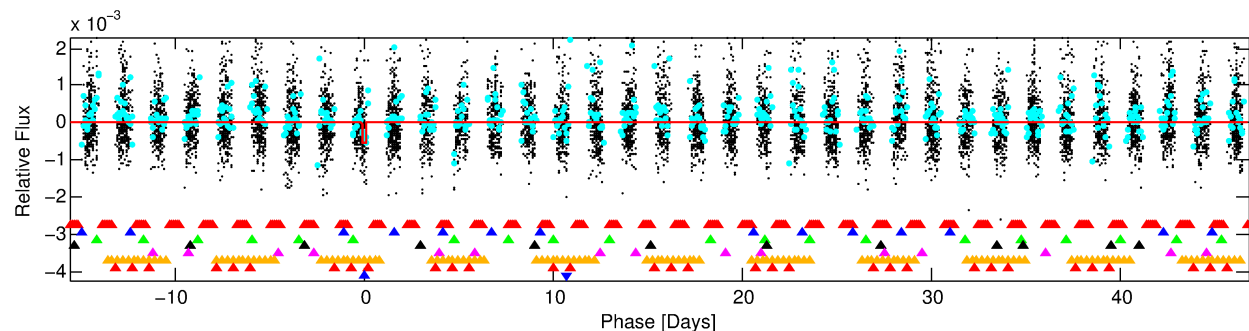
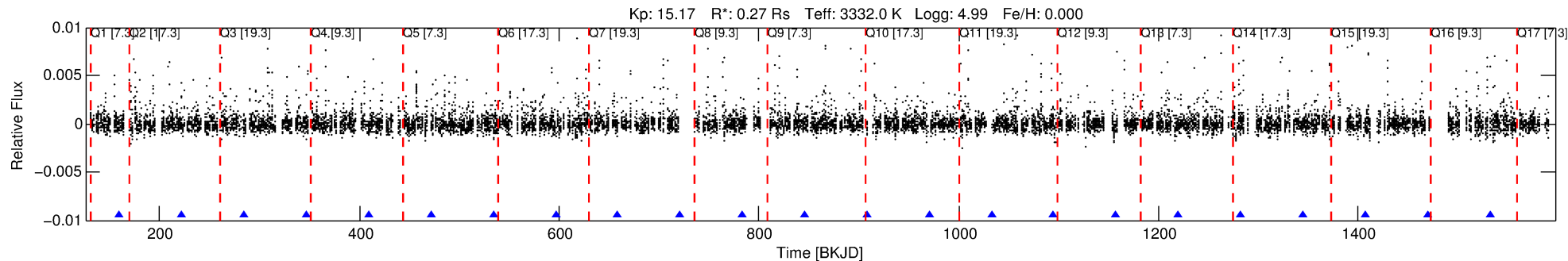
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 008149616-08

No Significant Match Found

# DV One-Page Summary

KIC: 8149616 Candidate: 8 of 8 Period: 62.341 d



## DV Fit Results:

Period = 62.34105 [0.00162] d  
Epoch = 160.1170 [0.0101] BKJD  
Rp/R\* = 0.0227 [0.0295]  
a/R\* = 67.58 [376.47]  
b = 0.58 [6.48]  
Seff = 0.21 [0.03]  
Teq = 172 [6] K  
Rp = 0.66 [0.86] Re  
a = 0.1935 [0.0196] AU  
Ag = 15002.33 [39233.47] [0.38σ]  
Teff = 2943 [1923] K [1.44σ]

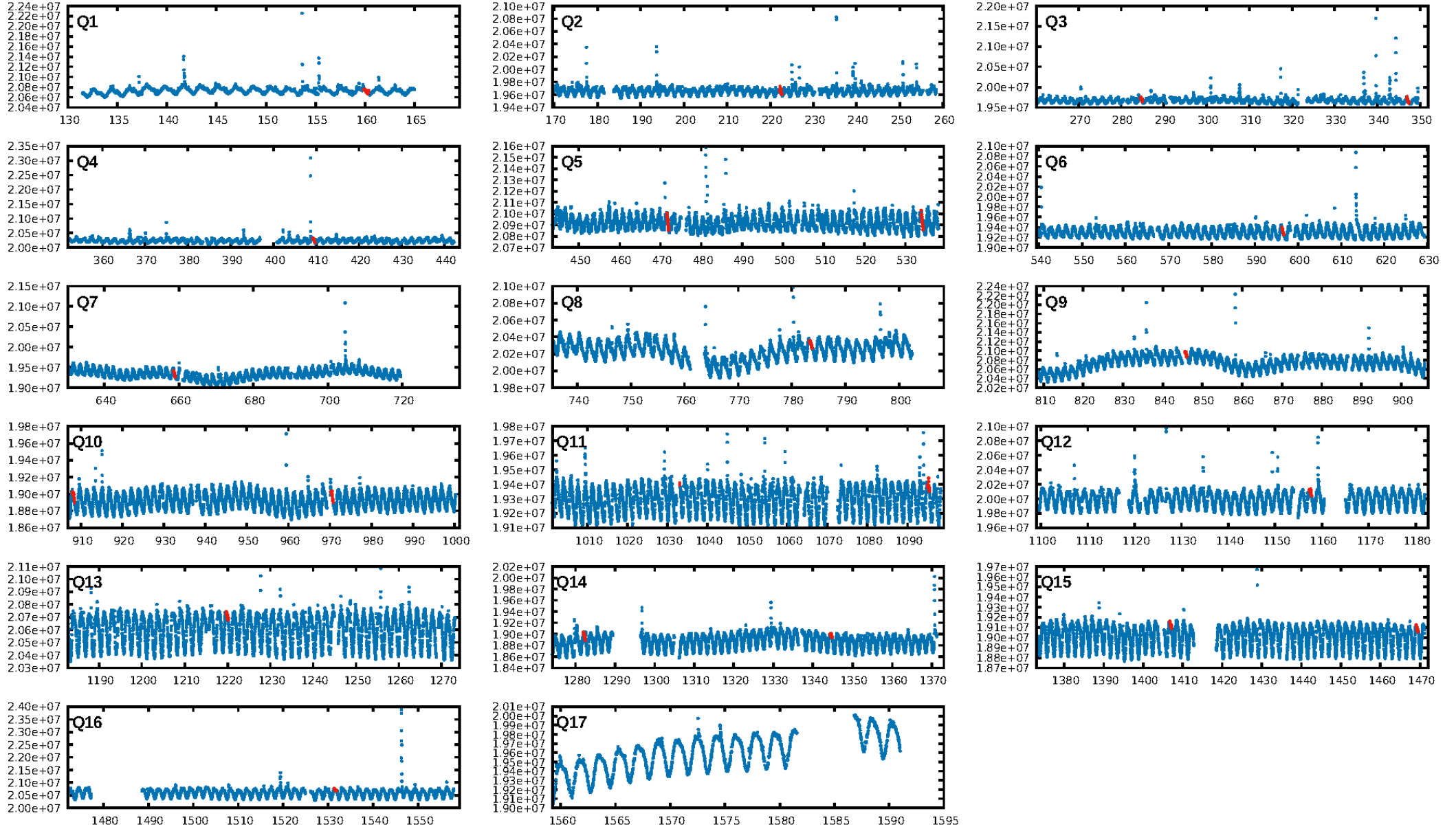
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [22.93σ]  
LongPeriod-sig: 100.0% [48.71σ]  
ModelChiSquare2-sig: 21.3%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [13/13]  
GhostDiagnostic-chr: -1.072  
Centroid-sig: 15.8%  
Centroid-so: 0.559 arcsec [0.76σ]  
OotOffset-rm: 0.150 arcsec [0.56σ]  
KicOffset-rm: 0.247 arcsec [0.91σ]  
OotOffset-st: 3/4/3/3 [13]  
KicOffset-st: 3/4/3/3 [13]  
DiffImageQuality-fgm: 0.31 [4/13]  
DiffImageOverlap-fno: 0.43 [6/14]

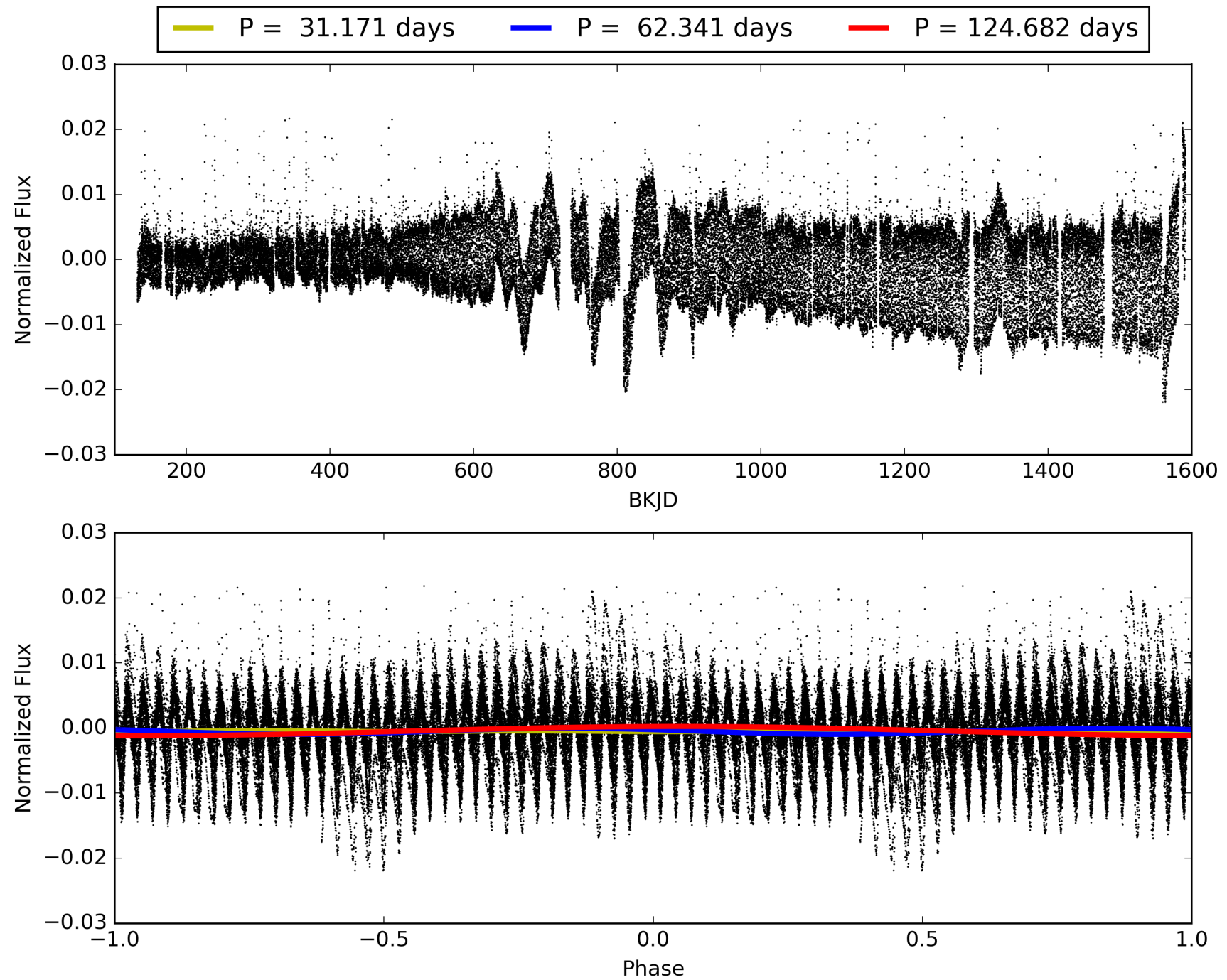
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 08:17:26 Z

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

# TCE 008149616-08, PDC Light Curves

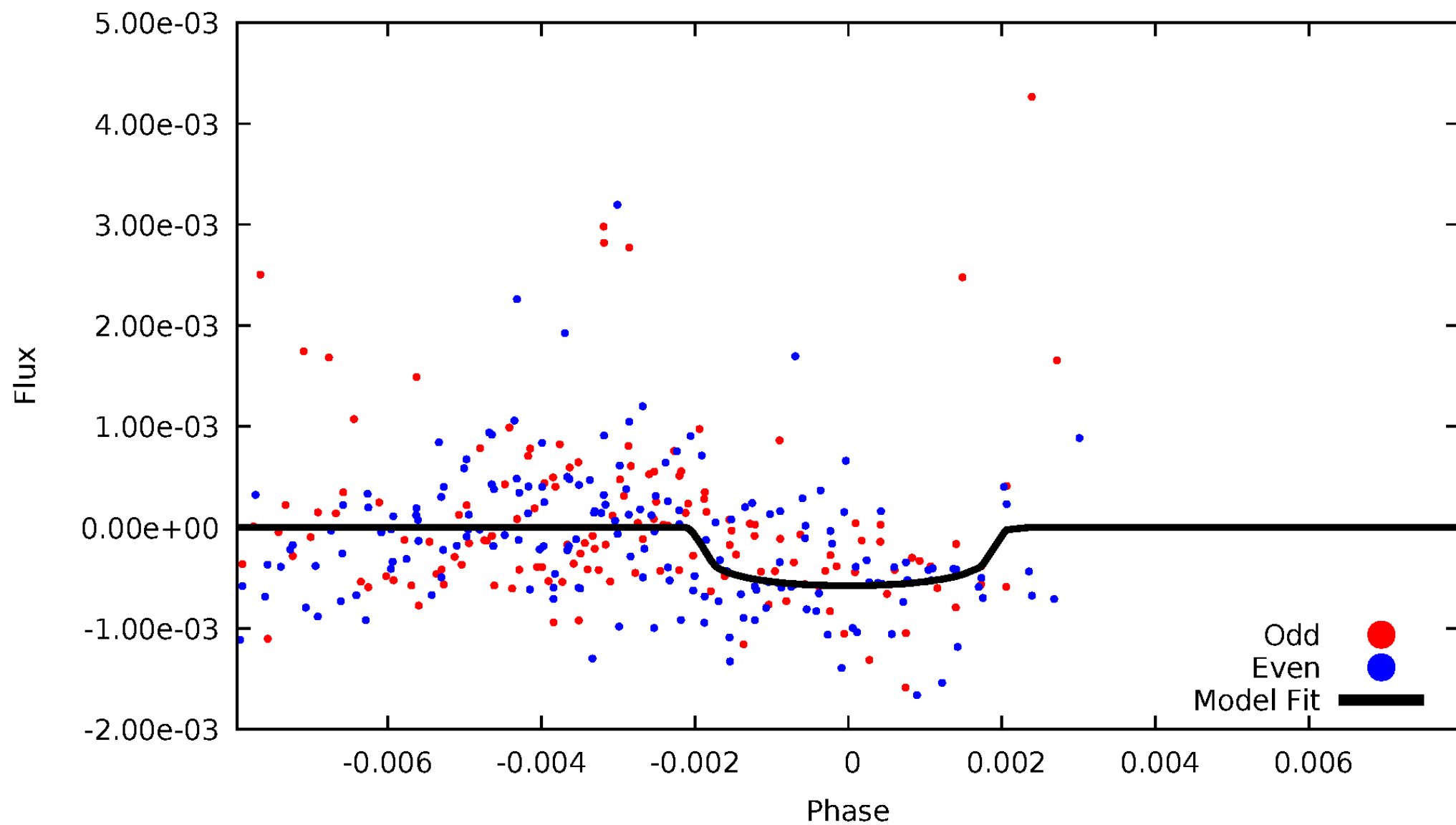


# TCE 008149616-08



# DV Odd/Even

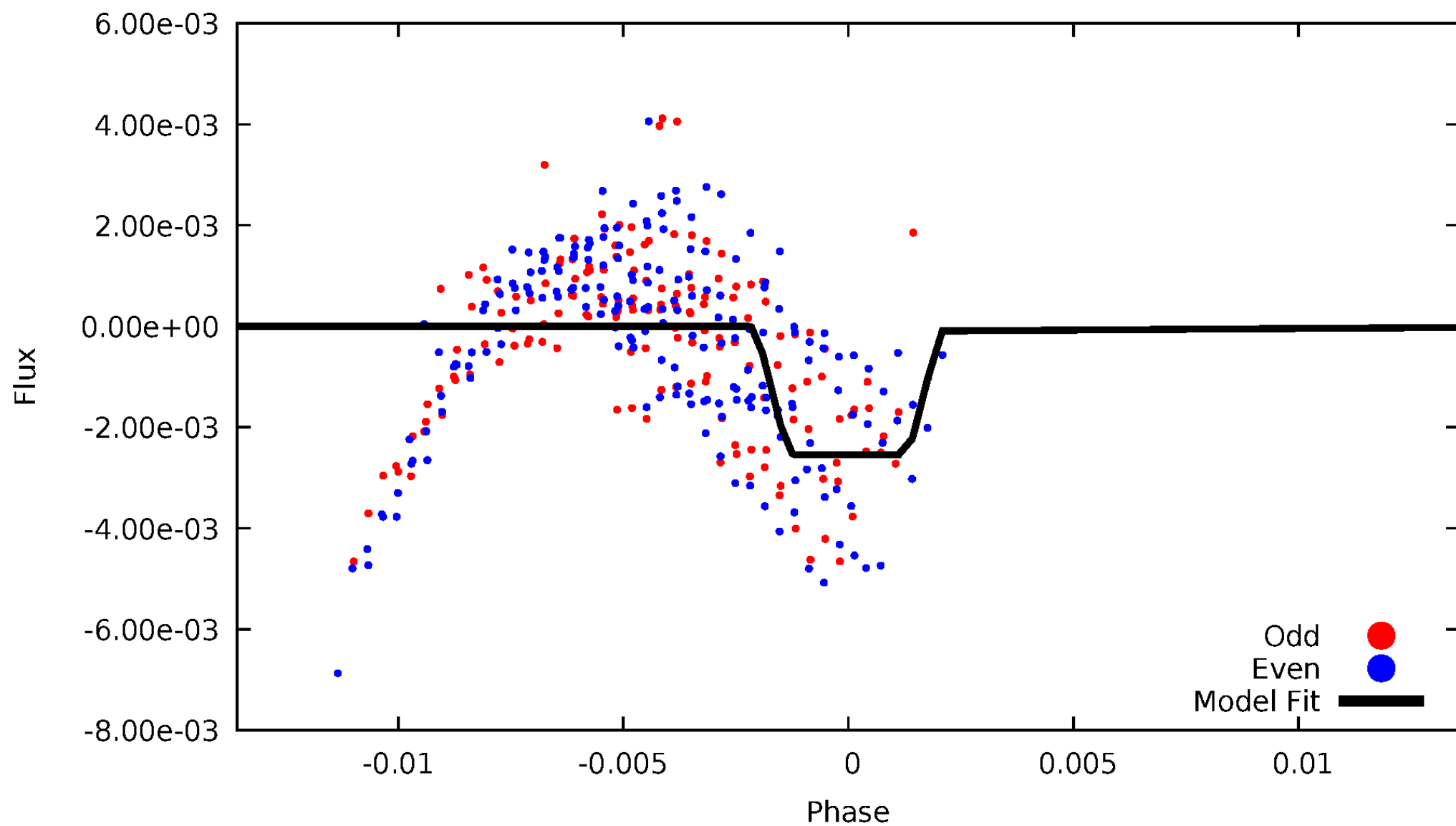
TCE 008149616-08





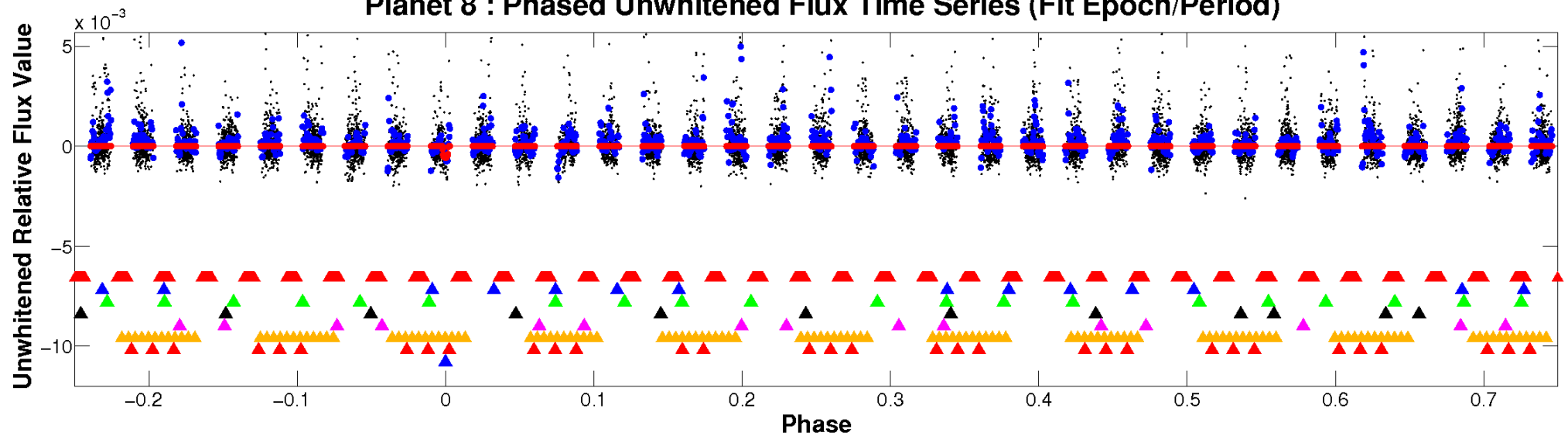
# ALT Odd/Even

TCE 008149616-08

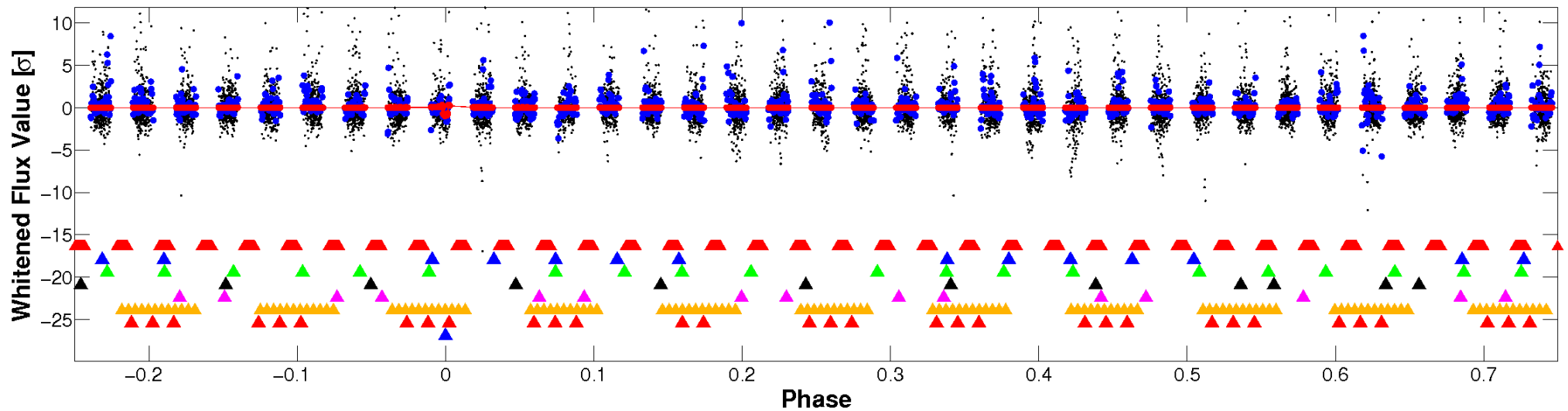


# Non-Whitened Vs. Whitened Light Curve

## Planet 8 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

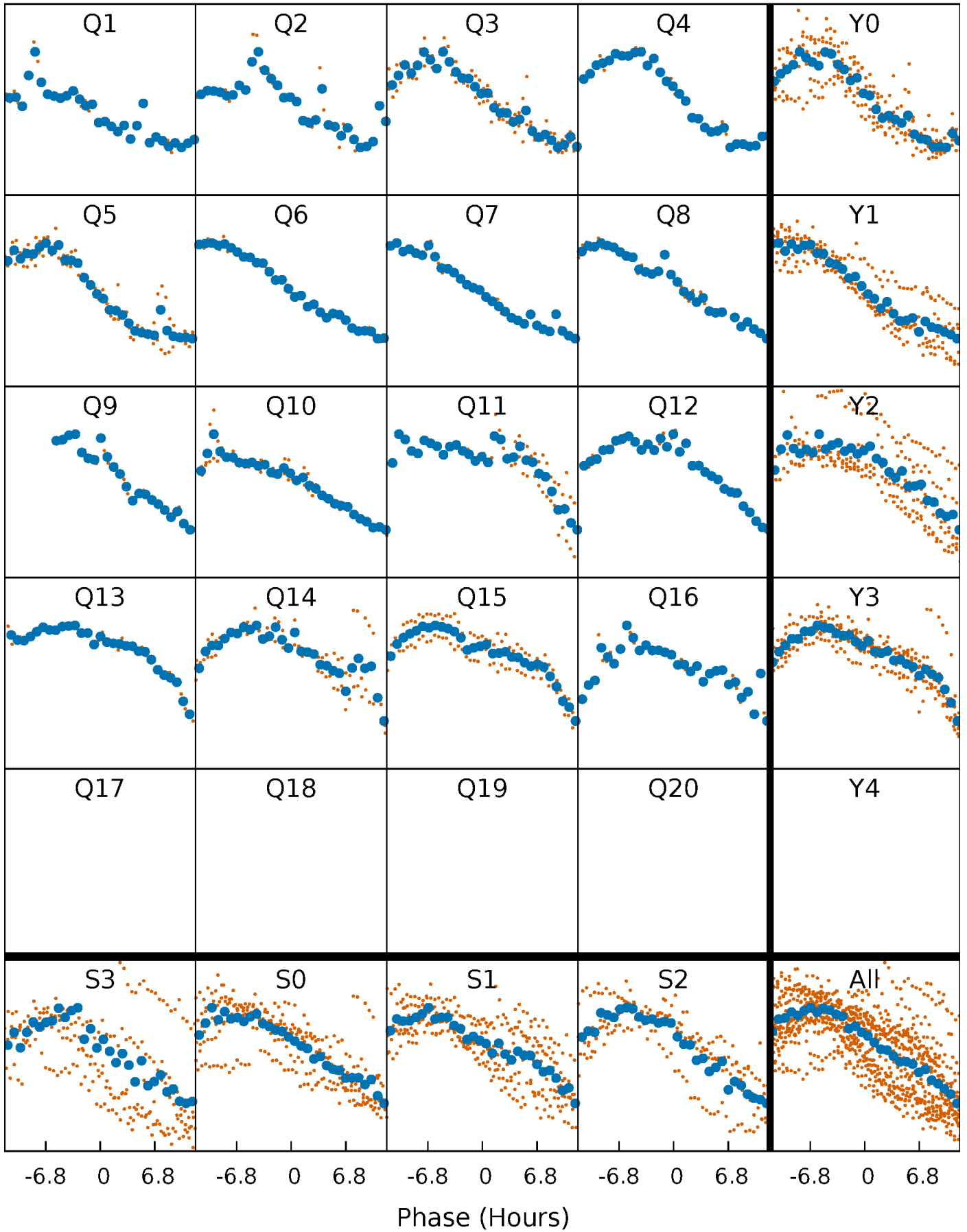


## Planet 8 : Phased Whitened Flux Time Series (Fit Epoch/Period)



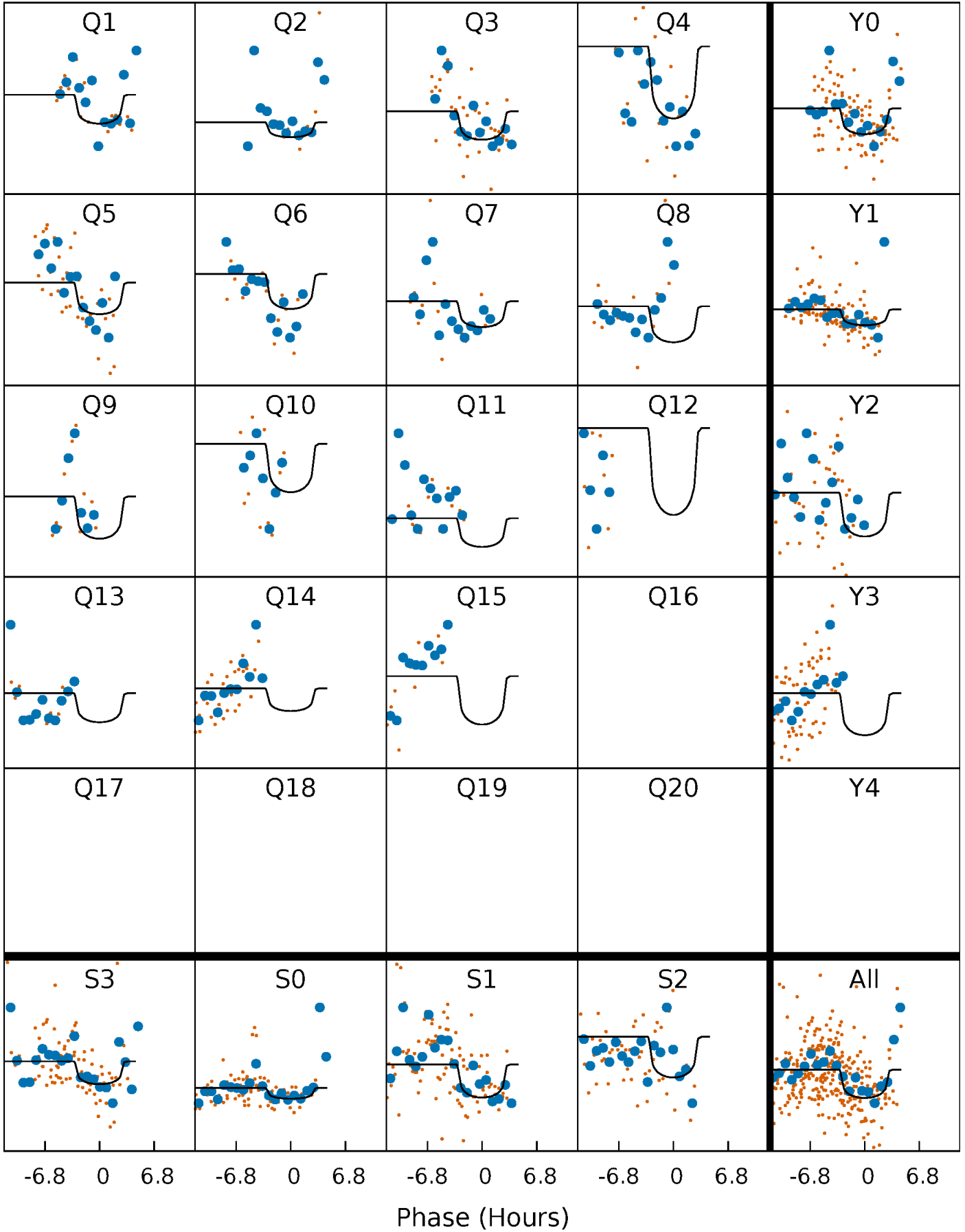
# PDC Quarter-Phased Transit Curves

TCE 008149616-08   P= 62.341047 Days    $T_0=160.117011$  (BKJD)



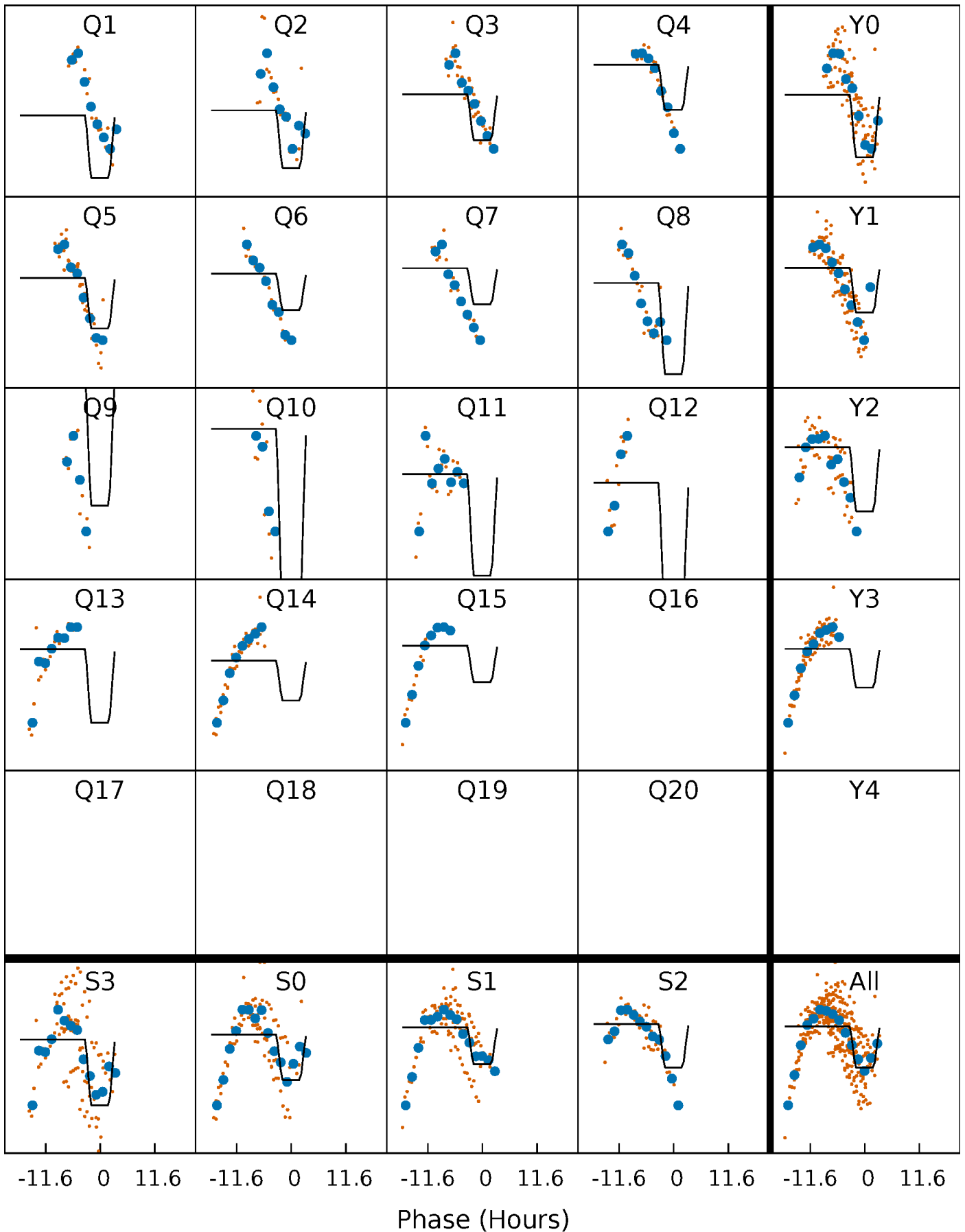
# DV Quarter-Phased Transit Curves

TCE 008149616-08 P= 62.341047 Days  $T_0=160.117011$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

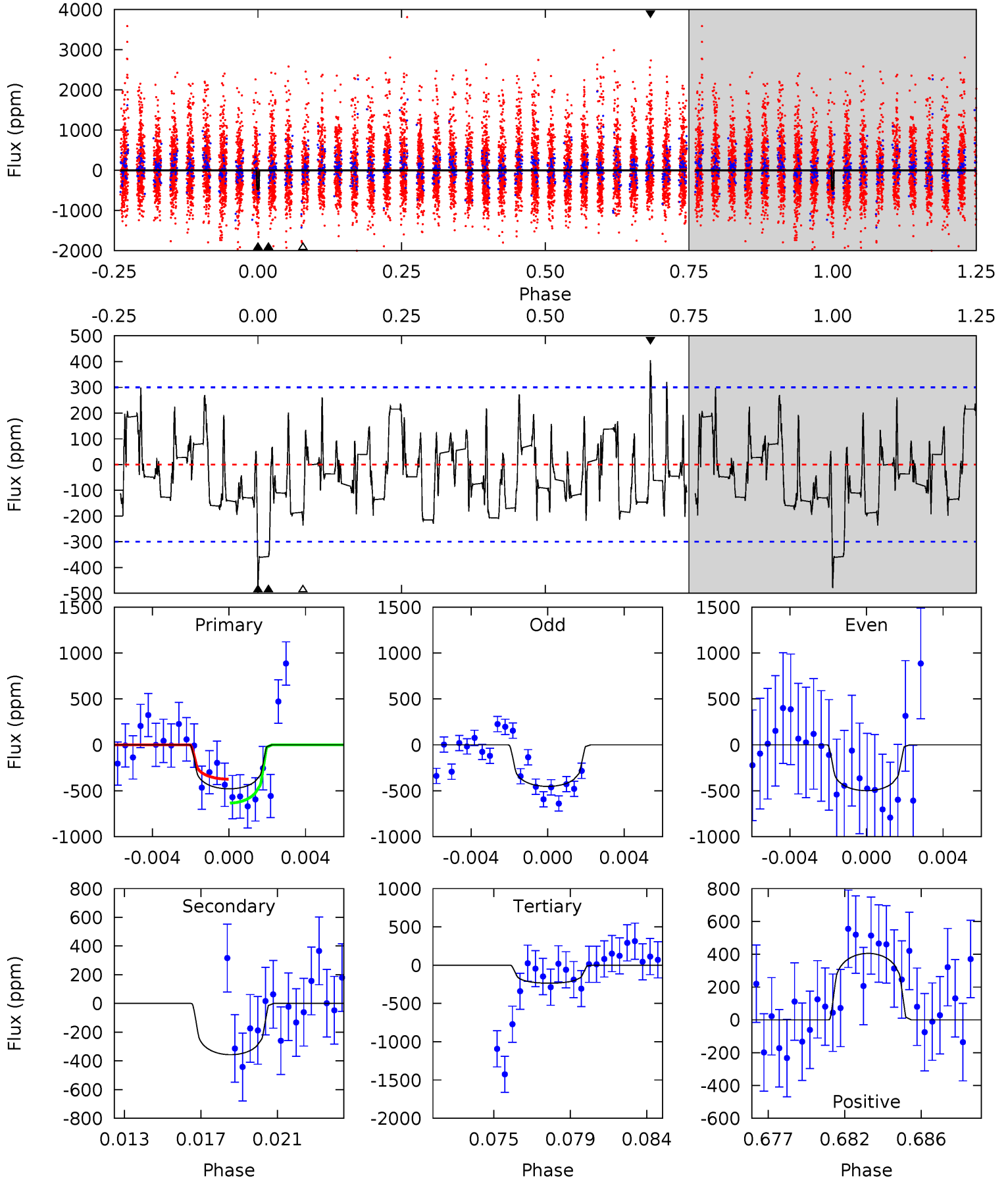
TCE 008149616-08     $P = 62.342808$  Days     $T_0 = 160.174297$  (BKJD)



# DV Model-Shift Uniqueness Test

008149616-08, P = 62.341047 Days, E = 97.775964 Days

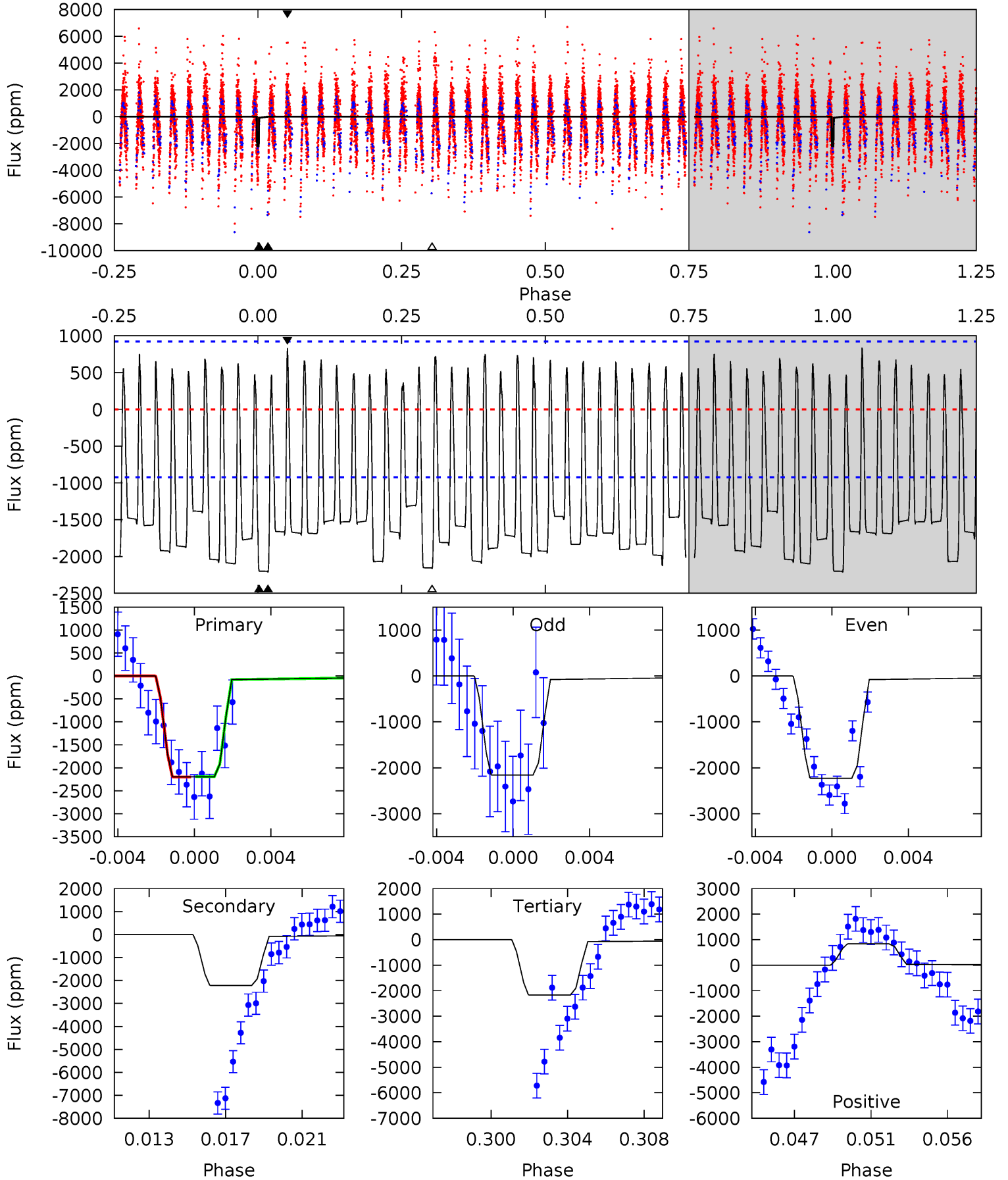
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.30	6.18	4.09	7.02	5.19	2.86	2.00	4.21	1.28	2.10	-0.83	0.39	0.90	0.46	2.21



# Alt Model-Shift Uniqueness Test

008149616-08, P = 62.342808 Days, E = 97.831489 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
12.3	12.4	12.2	4.67	5.19	2.86	4.53	0.16	7.67	0.26	7.78	0.19	0.99	0.27	0.01



### Stellar Parameters For KIC 008149616

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3332^{+43}_{-36}$	$4.987^{+0.044}_{-0.040}$	$0.000^{+0.100}_{-0.100}$	$0.265^{+0.038}_{-0.027}$	$0.248^{+0.045}_{-0.030}$	$18.820^{+4.559}_{-3.663}$
	+1%/-1%	+1%/-1%	+inf%/-inf%	+14%/-10%	+18%/-12%	+24%/-19%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 008149616-08 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-357 \pm 58$	$0.89^{+0.78}_{-0.55}$	$240^{+6}_{-5}$	$2902^{+1011}_{-439}$	$9432^{+59893}_{-6790}$
Alt.	$-2216 \pm 178$	$1.47^{+0.78}_{-0.79}$	$240^{+5}_{-5}$	$3262^{+891}_{-389}$	$21105^{+77439}_{-11766}$

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



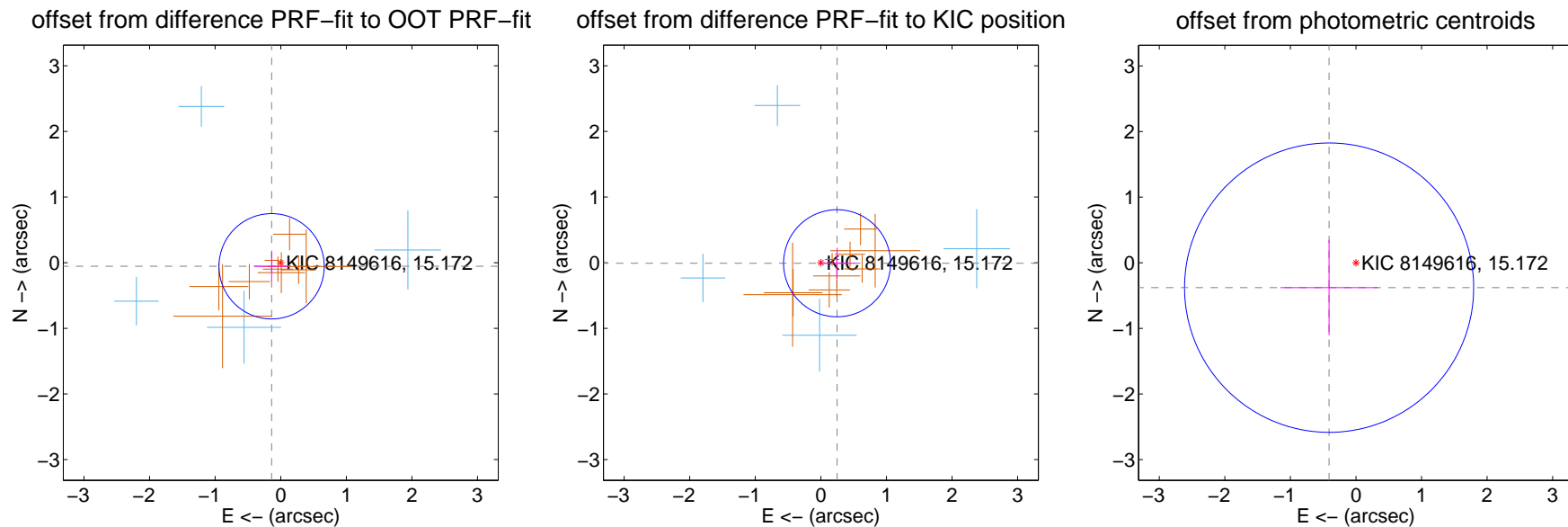
## DV Centroid Data

Supplemental centroid analysis for 008149616-08. Kepler magnitude: 15.17. Transit SNR 9.33

There are 4 quarters with good PRF difference image offsets

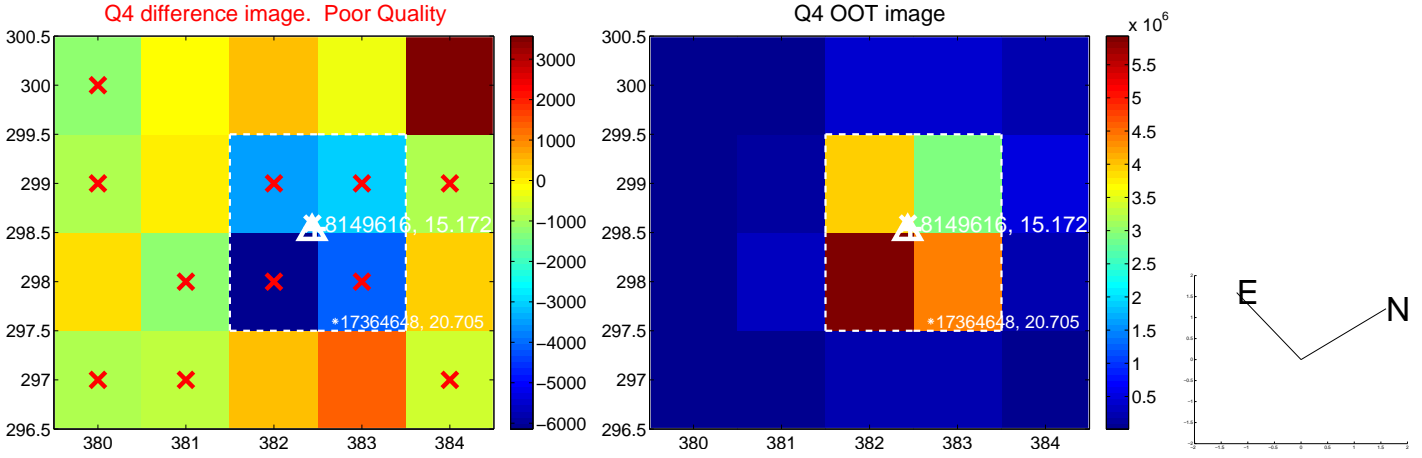
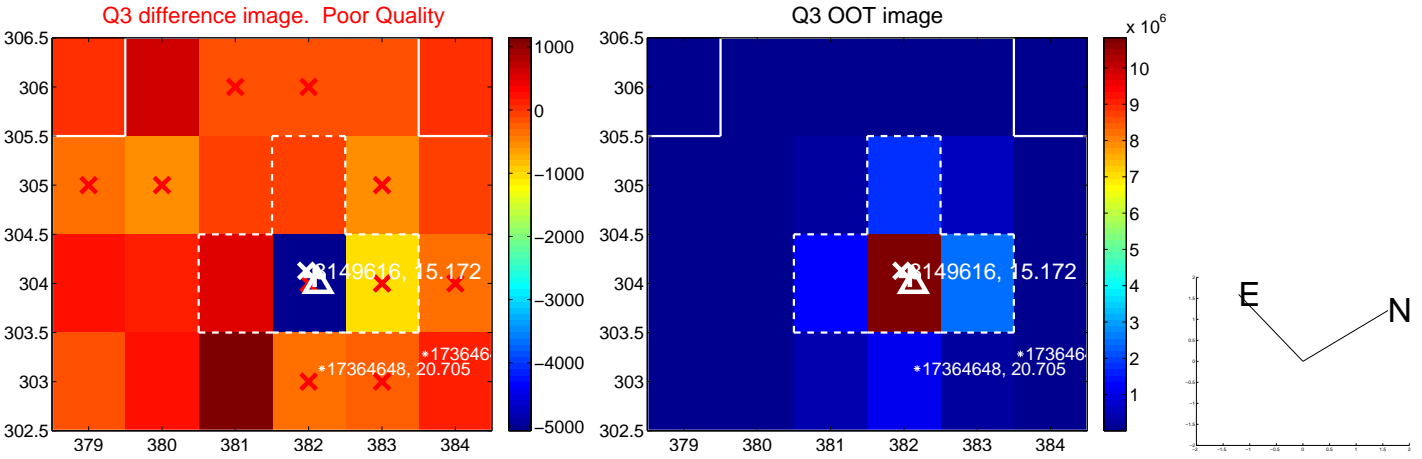
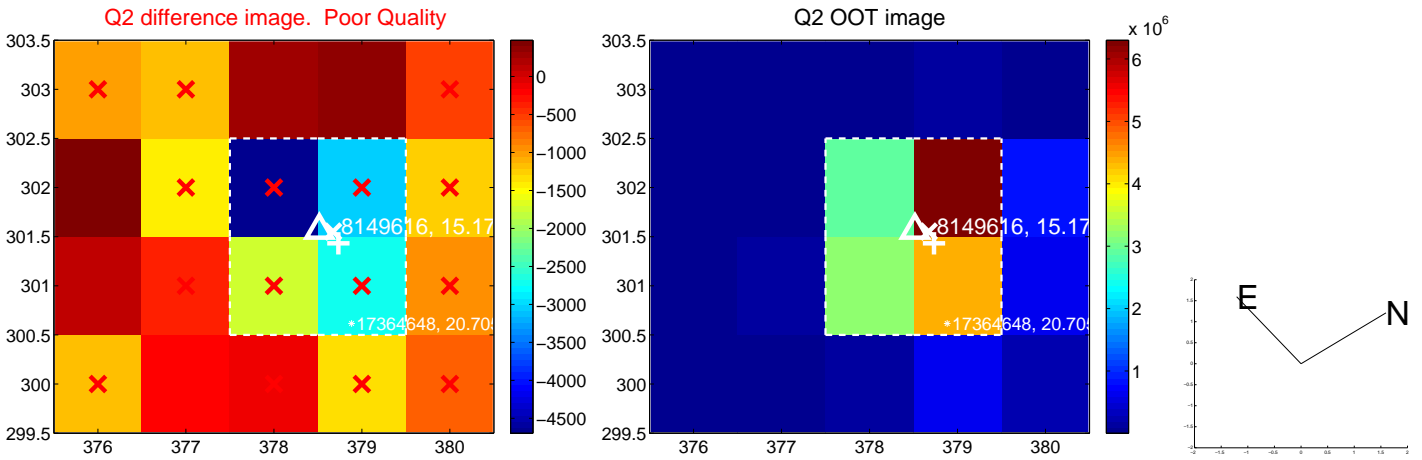
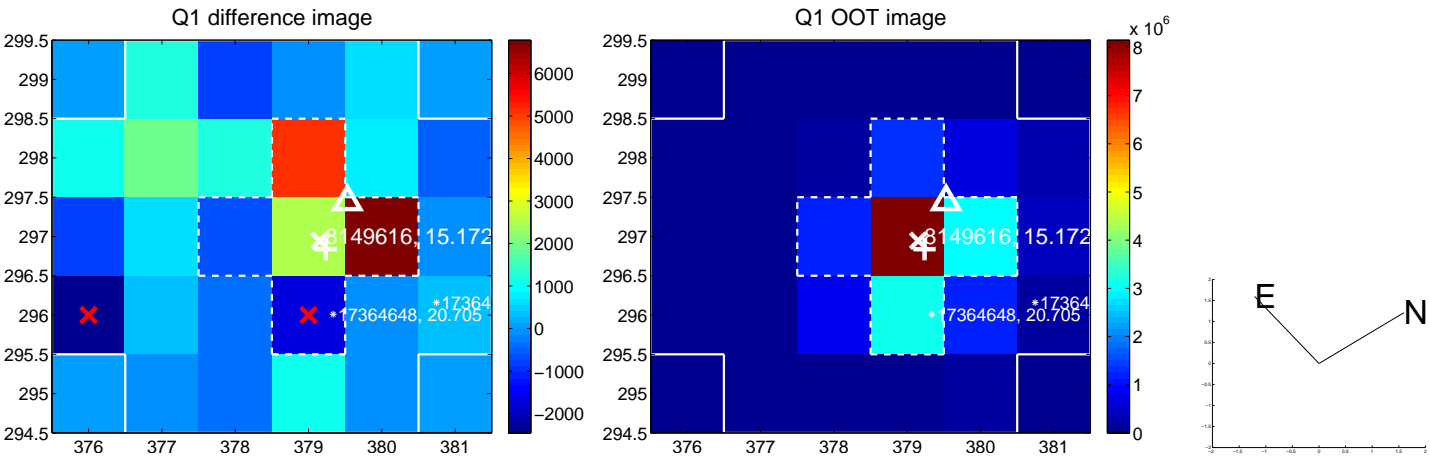
The direct PRF centroid is offset from the target star catalog position by about 0.36 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.150 \pm 0.268$	0.56	$0.139 \pm 0.266$	$-0.055 \pm 0.222$
PRF-fit source offset from KIC position	$0.247 \pm 0.272$	0.91	$-0.247 \pm 0.271$	$-0.008 \pm 0.235$
photometric centroid source offset	$0.56 \pm 0.74$	0.76	$0.41 \pm 0.74$	$-0.38 \pm 0.73$

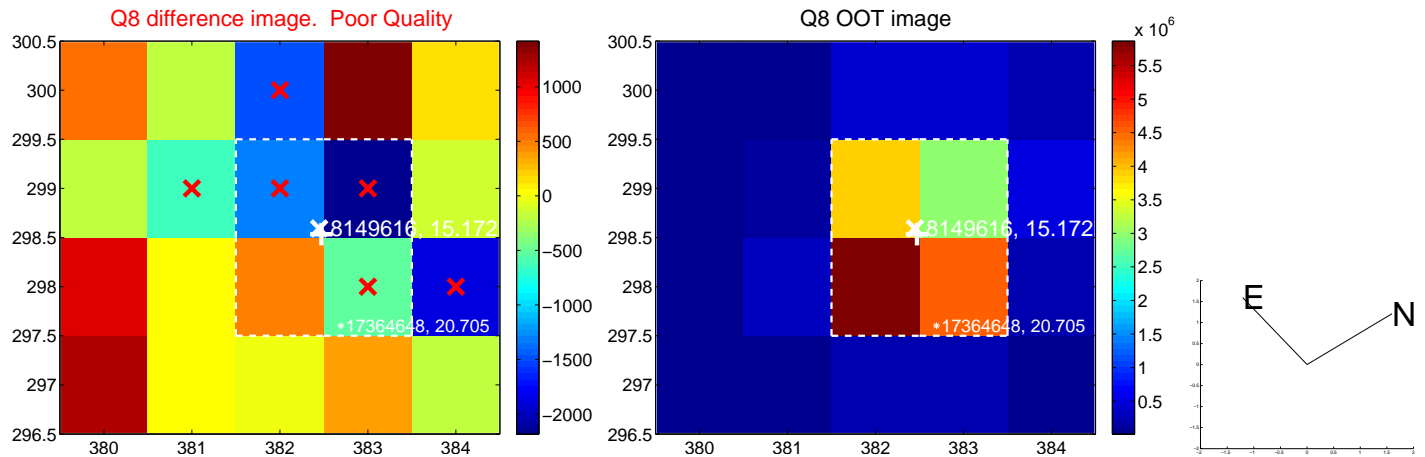
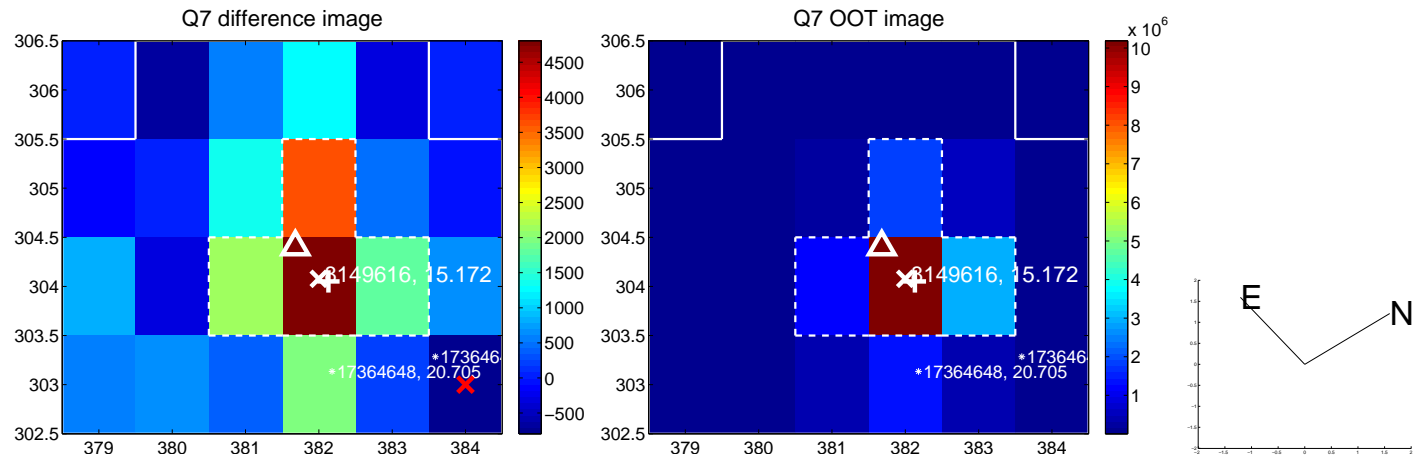
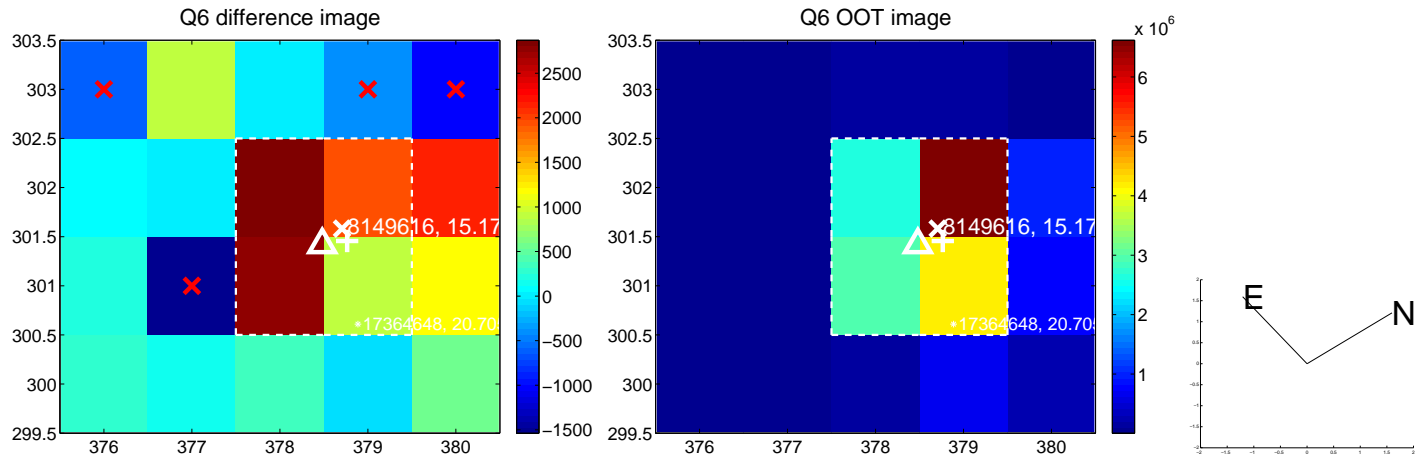
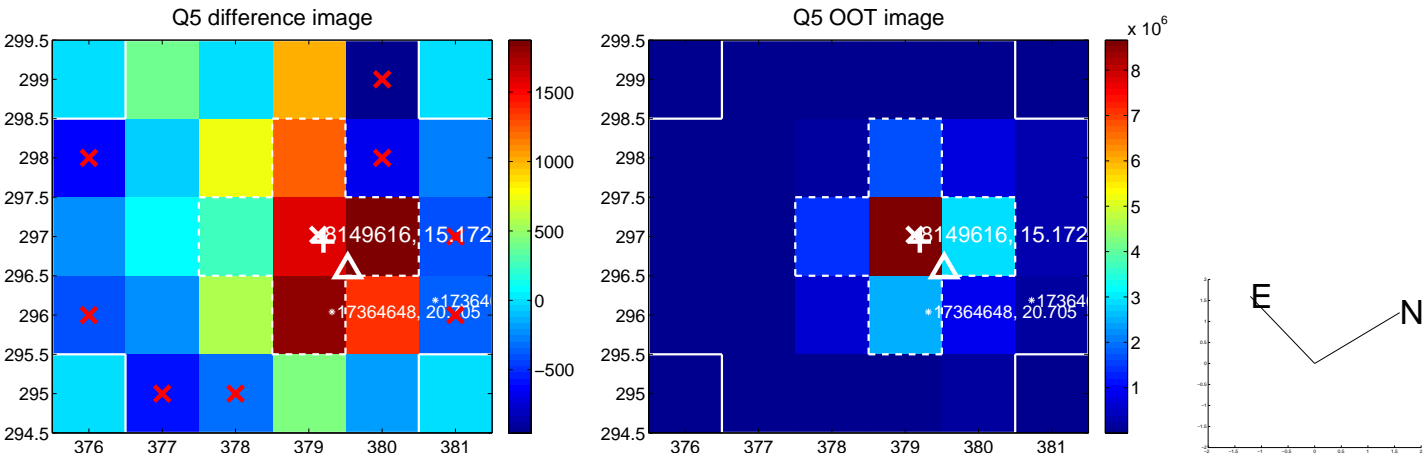


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

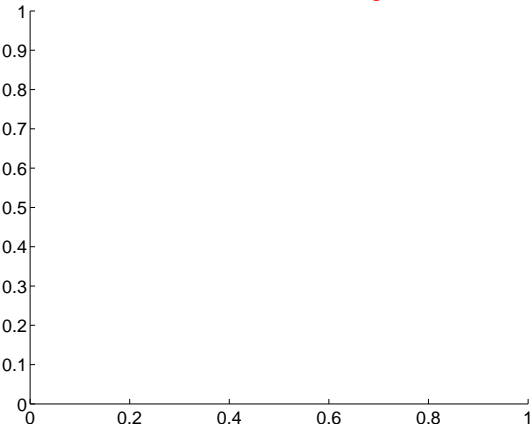


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

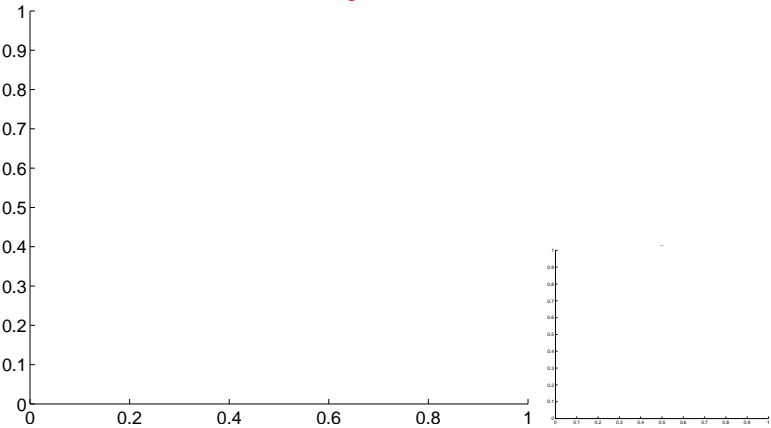


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

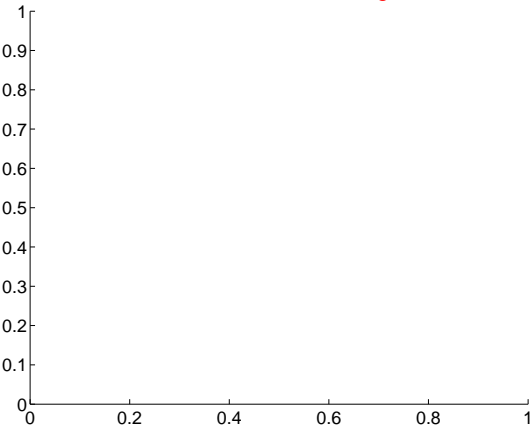
Q9 no difference image



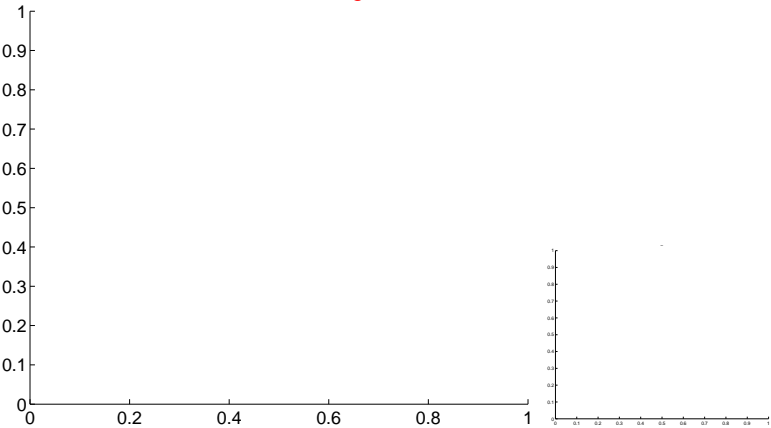
Q9 no OOT image



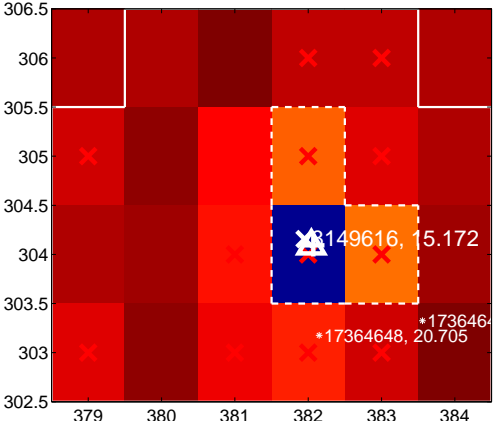
Q10 no difference image



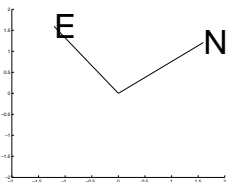
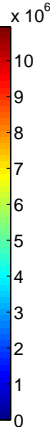
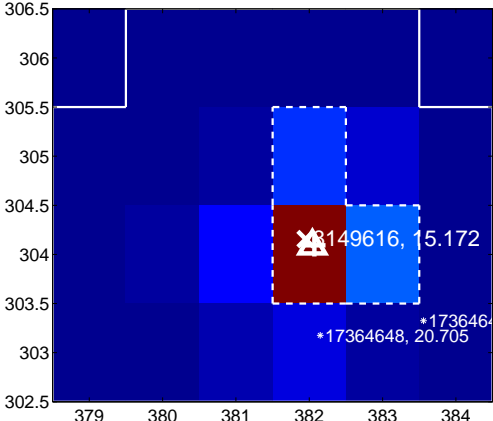
Q10 no OOT image



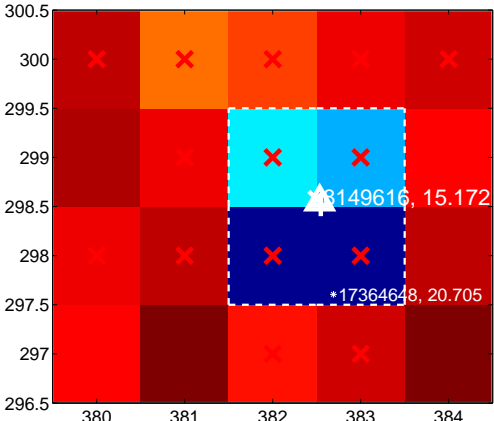
Q11 difference image. Poor Quality



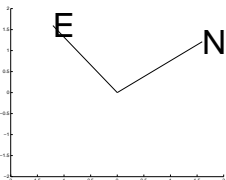
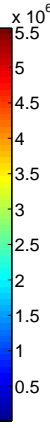
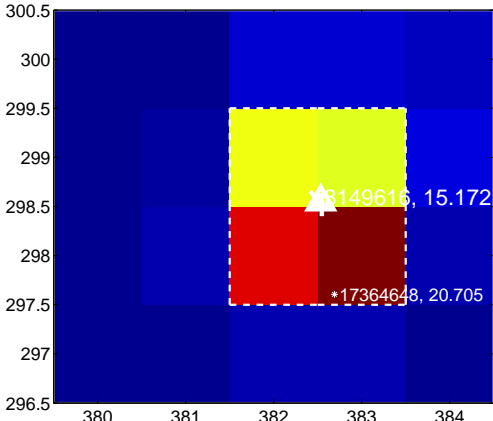
Q11 OOT image



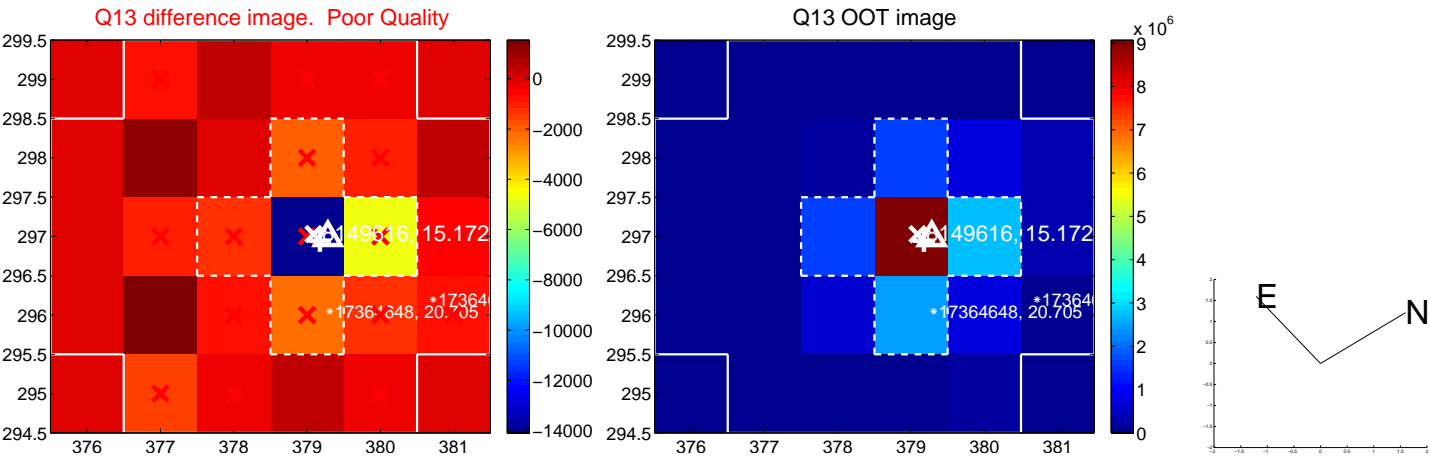
Q12 difference image. Poor Quality



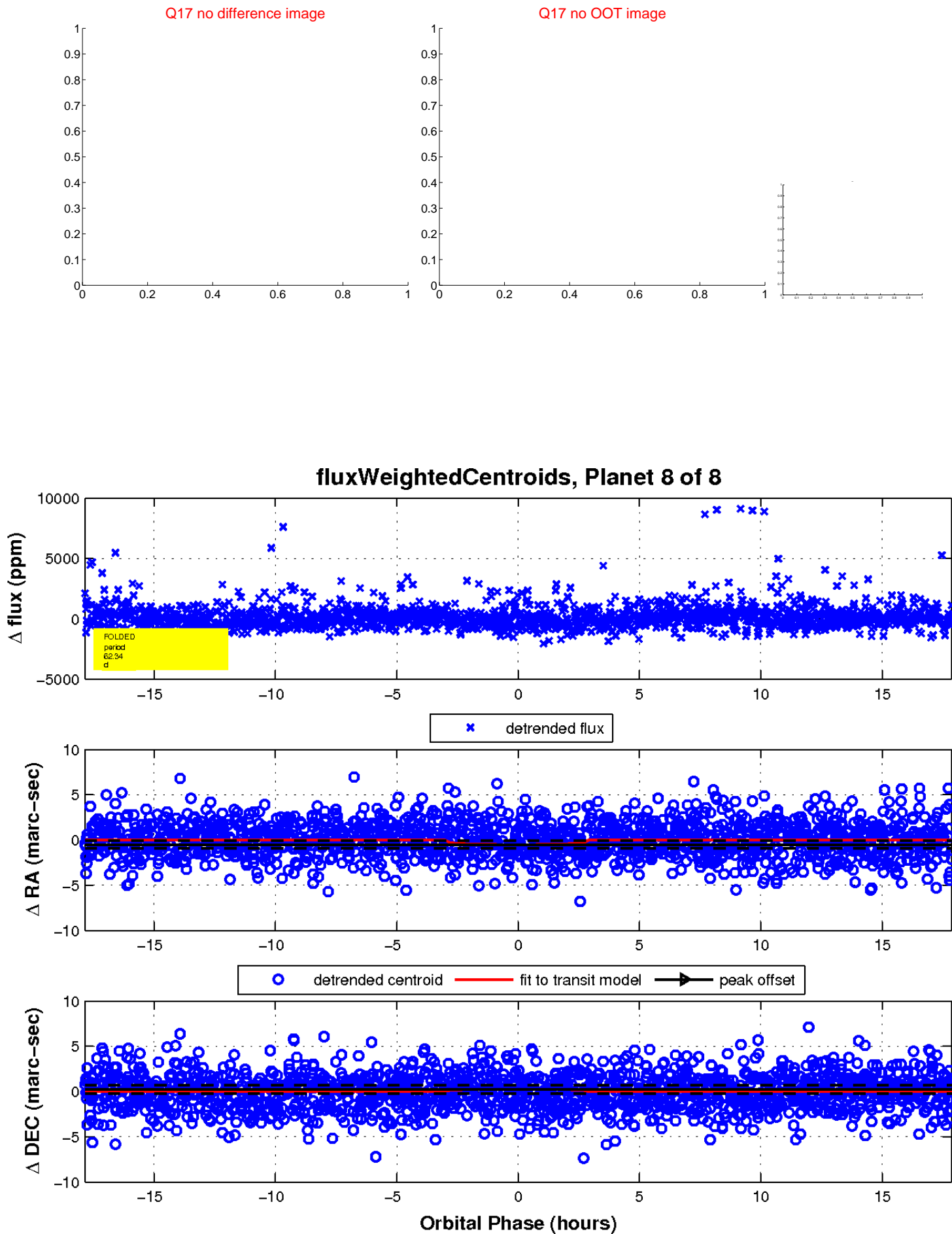
Q12 OOT image



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



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



UKIRT Image

Declination

