

# KIC 006019416

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006019416-01	OBS	No	0.569597	131.550624	30.6	0.881	10.4	1.5	1.98	7308	1.28	38672.37
006019416-02	OBS	No	0.569616	131.744380	174.6	1.927	9.2	8.0	1.98	7308	2.72	38670.66
006019416-03	OBS	No	4.804386	135.107729	732.3	10.789	8.0	10.3	1.98	7308	6.12	2252.37
006019416-04	OBS	No	22.915723	151.866839	1589.5	2.603	7.6	6.3	1.98	7308	8.55	280.53
006019416-05	OBS	No	38.765512	170.024849	61.9	5.000	7.5	-1.0	1.98	7308	1.58	139.18

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006019416-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—CENT_SATURATED
006019416-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—SAME_NTL_PERIOD—CENT_SATURATED
006019416-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—CENT_SATURATED—HALO_GHOST
006019416-04	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED—HALO_GHOST
006019416-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED

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

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

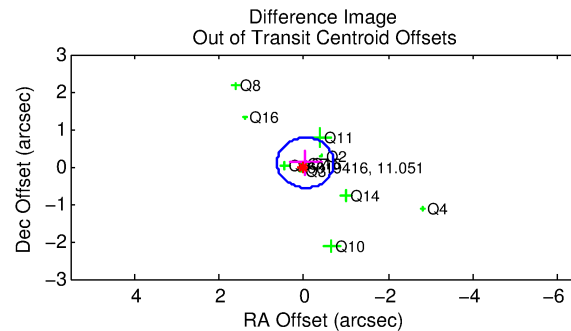
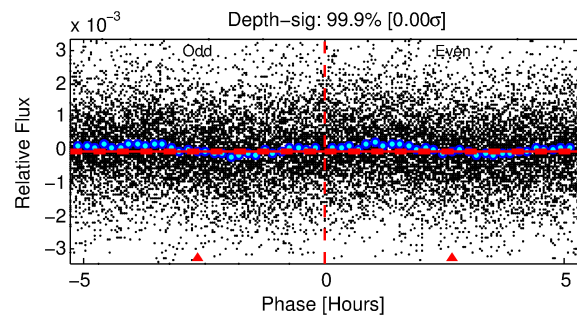
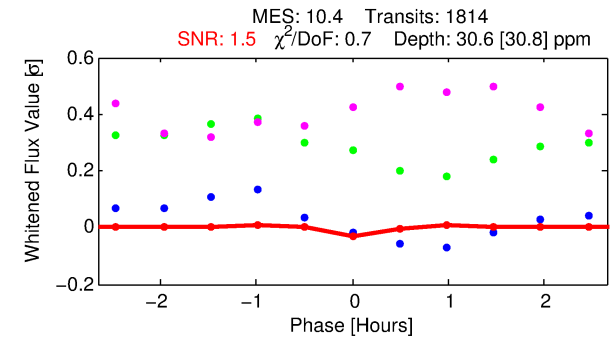
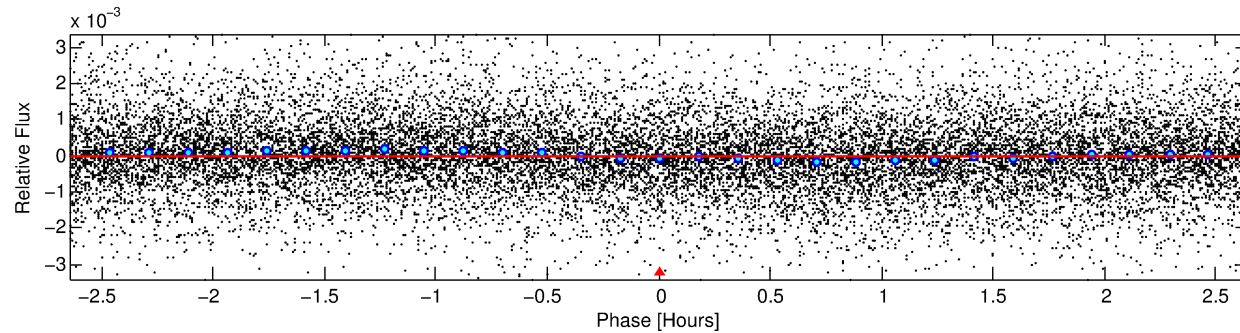
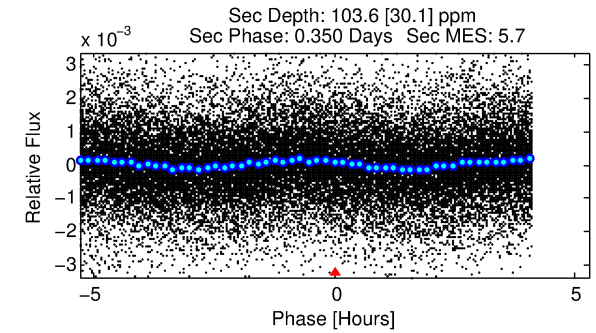
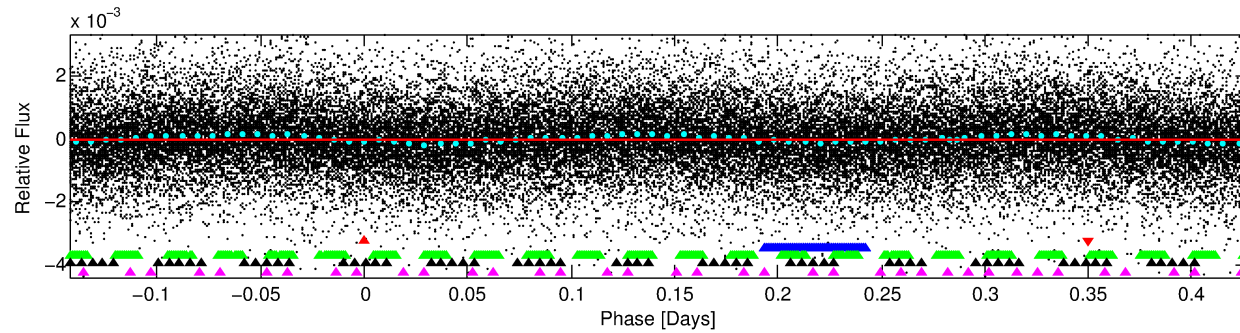
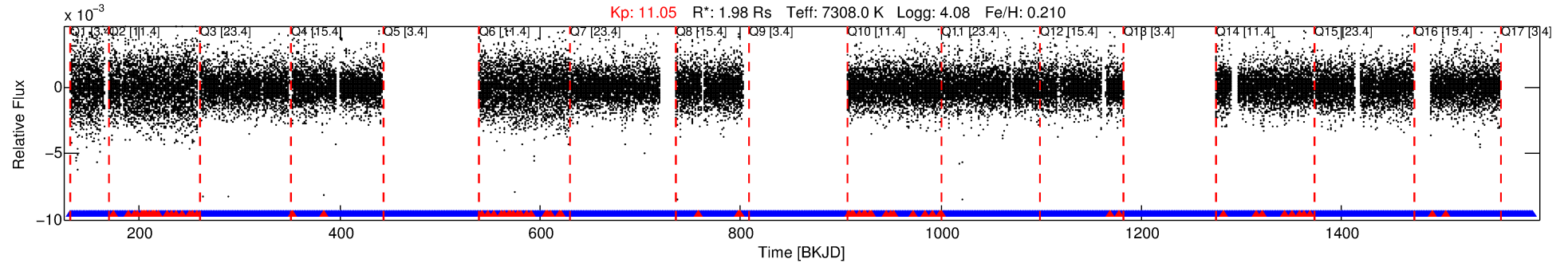
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 006019416-01

No Significant Match Found

# DV One-Page Summary

KIC: 6019416 Candidate: 1 of 5 Period: 0.570 d



## DV Fit Results:

Period = 0.56960 [0.00008] d  
Epoch = 131.5506 [0.0074] BKJD  
 $R_p/R^*$  = 0.0059 [0.0064]  
 $a/R^*$  = 2.41 [12.17]  
 $b$  = 0.90 [1.31]  
 $S_{\text{eff}}$  = 38672.37 [14442.50]  
 $T_{\text{eq}}$  = 3576 [334] K  
 $R_p$  = 1.28 [1.42]  $R_e$   
 $a$  = 0.0161 [0.0036] AU  
 $A_g$  = 9.01 [19.77] [0.40σ]  
 $T_{\text{eff}}$  = 9578 [5221] K [1.15σ]

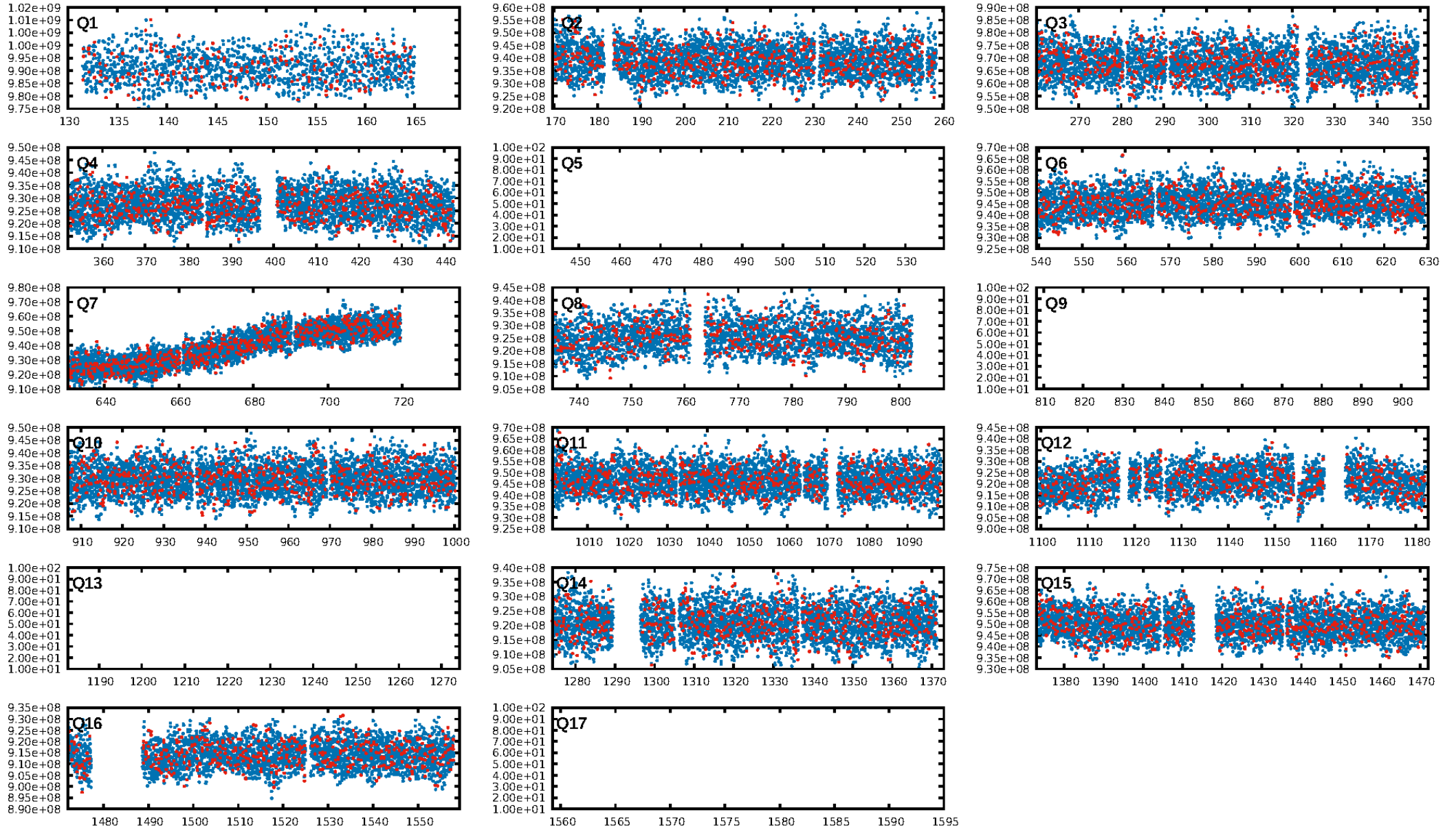
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 0.95 [1674/1755]  
GhostDiagnostic-chr: -0.3577  
Centroid-sig: 4.0%  
Centroid-so: 1.185 arcsec [1.81σ]  
OotOffset-rm: 0.113 arcsec [0.51σ]  
OotOffset-st: 4/4/3/0 [11]  
KicOffset-rm: 0.182 arcsec [0.70σ]  
KicOffset-st: 4/4/3/0 [11]  
DiffImageQuality-fgm: 0.64 [7/11]  
DiffImageOverlap-fno: 0.00 [0/13]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 10:44:32 Z

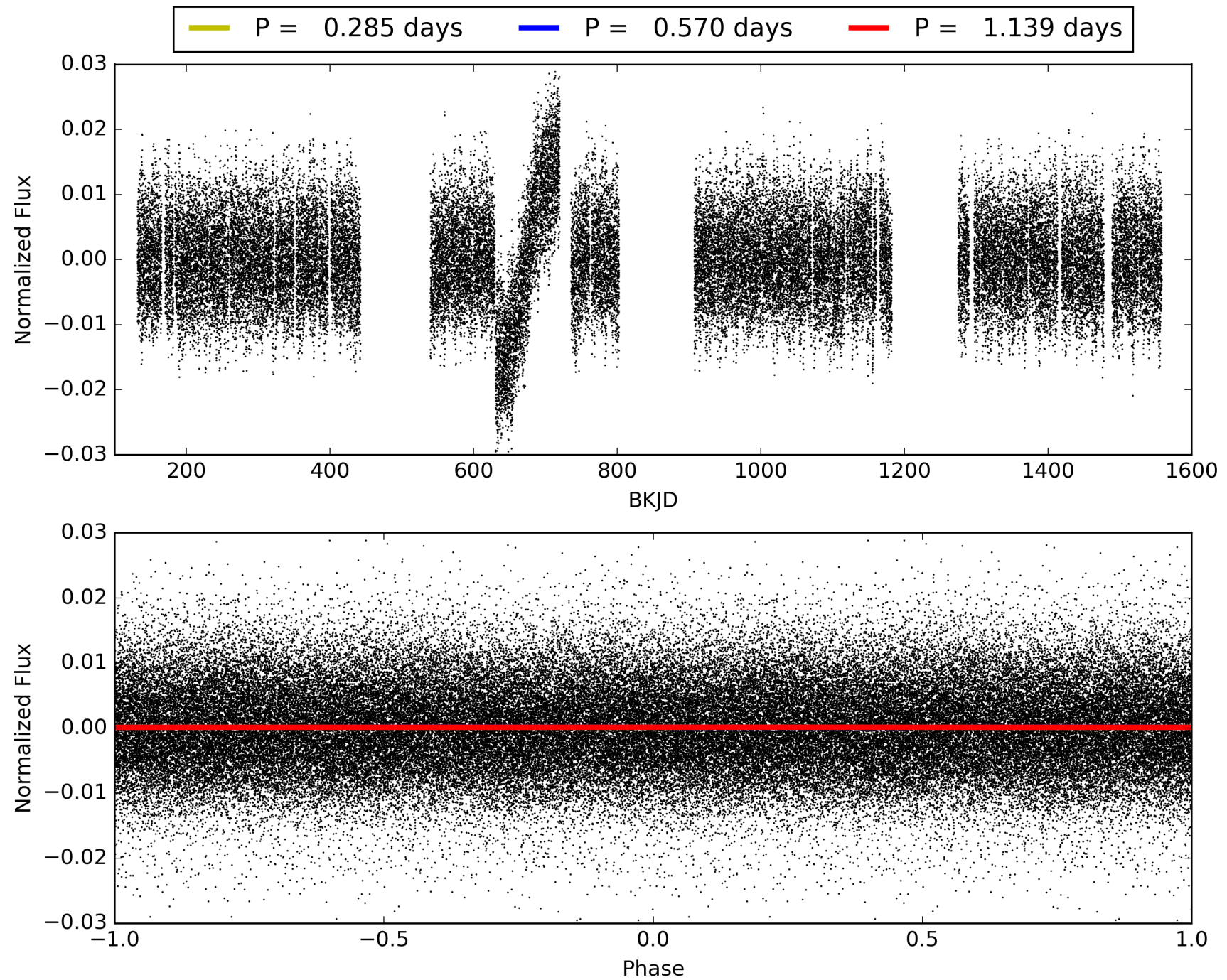
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 006019416-01, PDC Light Curves





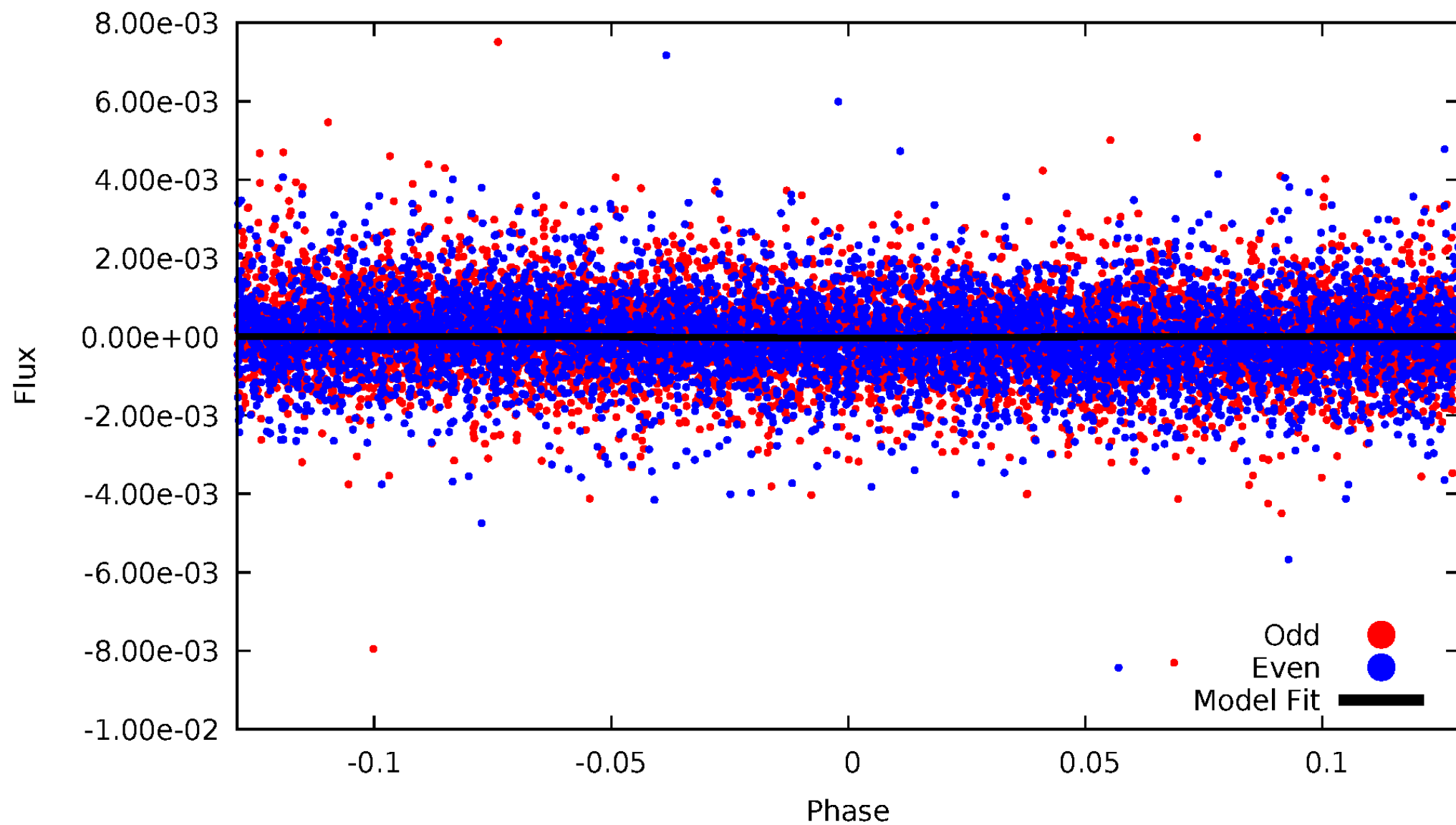
TCE 006019416-01





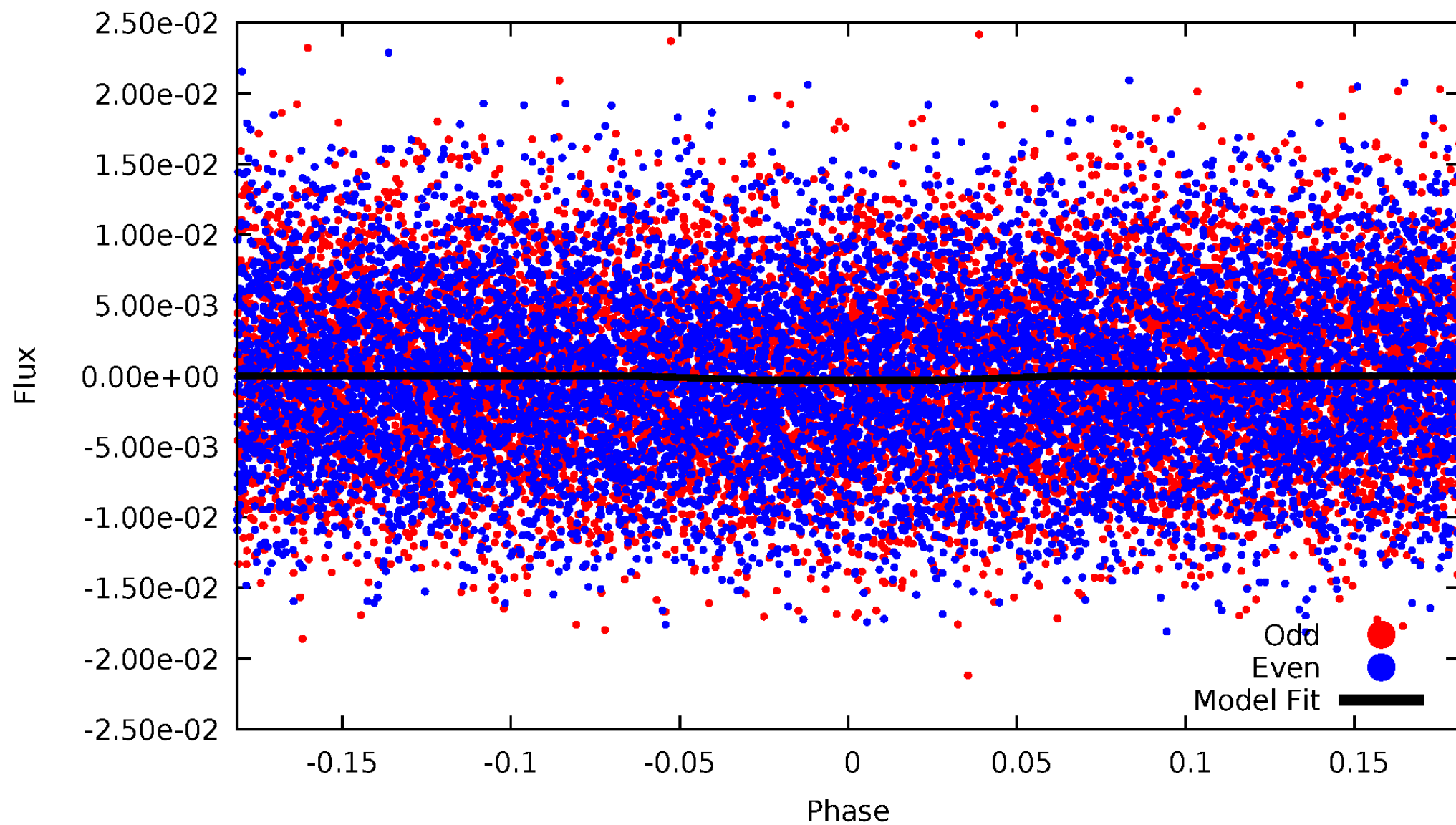
# DV Odd/Even

TCE 006019416-01



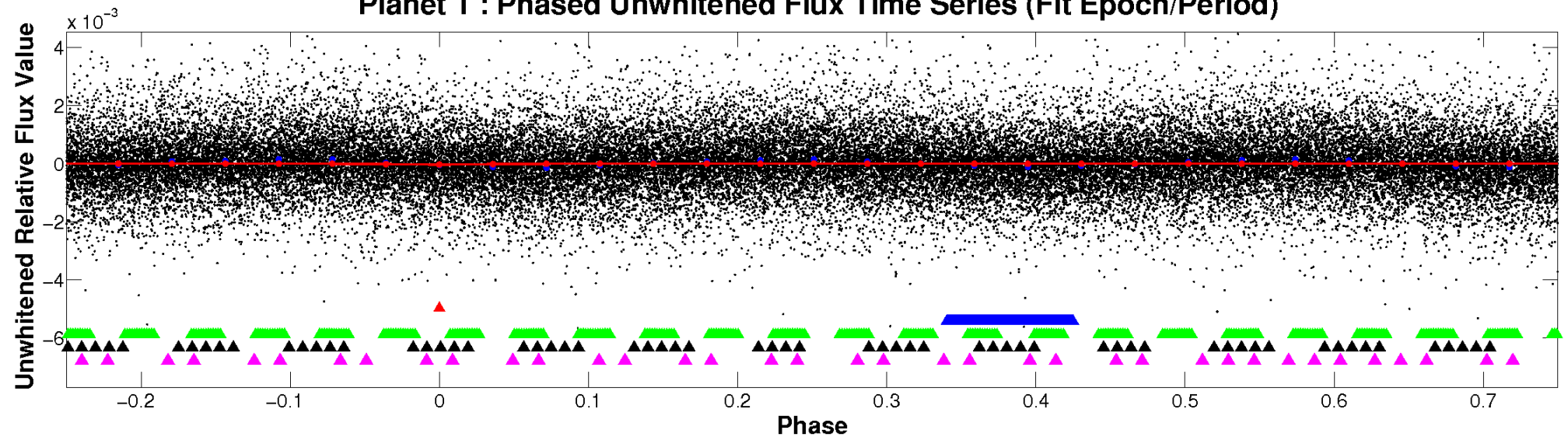
# ALT Odd/Even

TCE 006019416-01

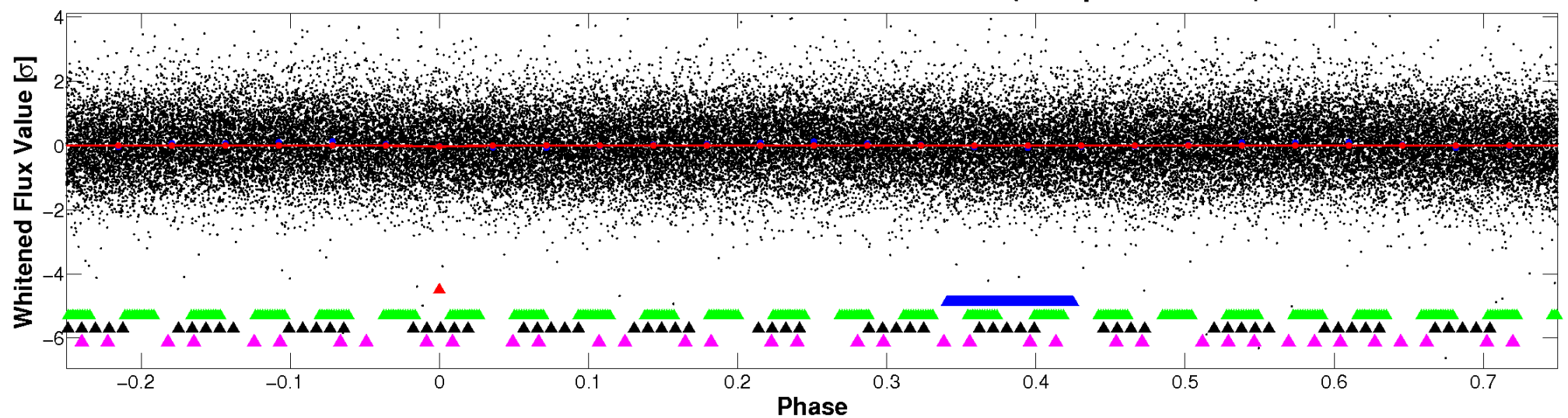


# Non-Whitened Vs. Whitened Light Curve

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



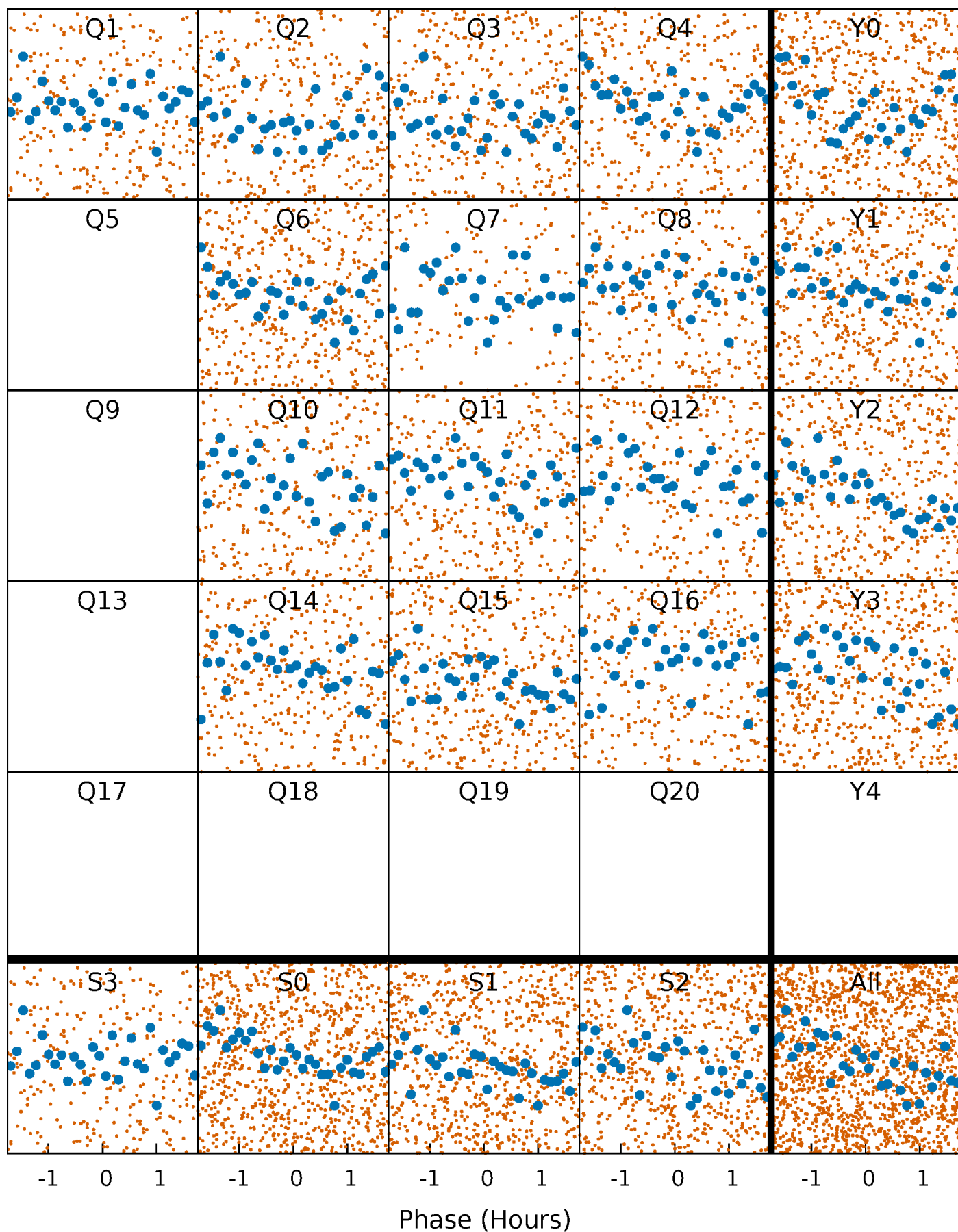
## Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)





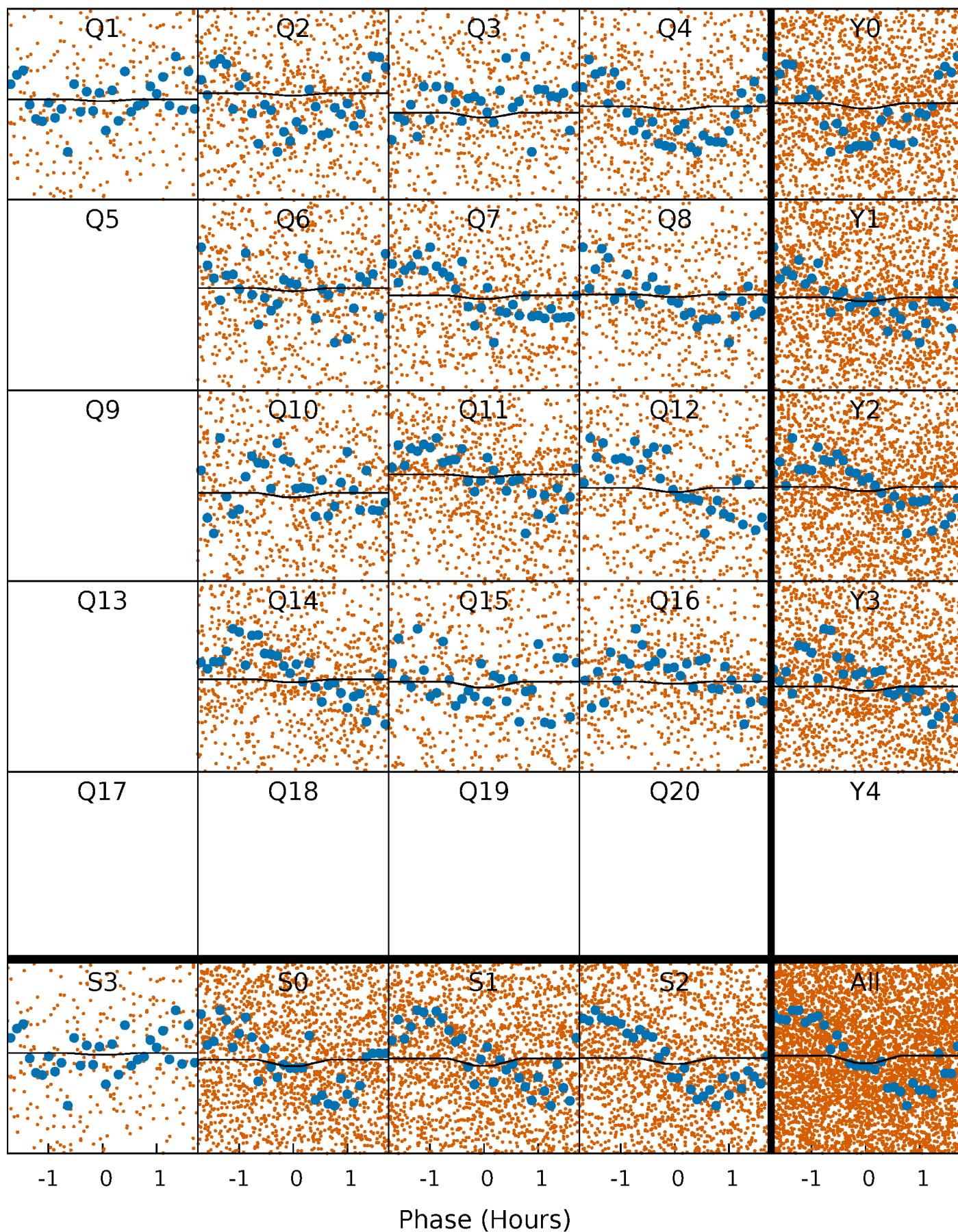
# PDC Quarter-Phased Transit Curves

TCE 006019416-01 P= 0.569597 Days  $T_0=131.550624$  (BKJD)



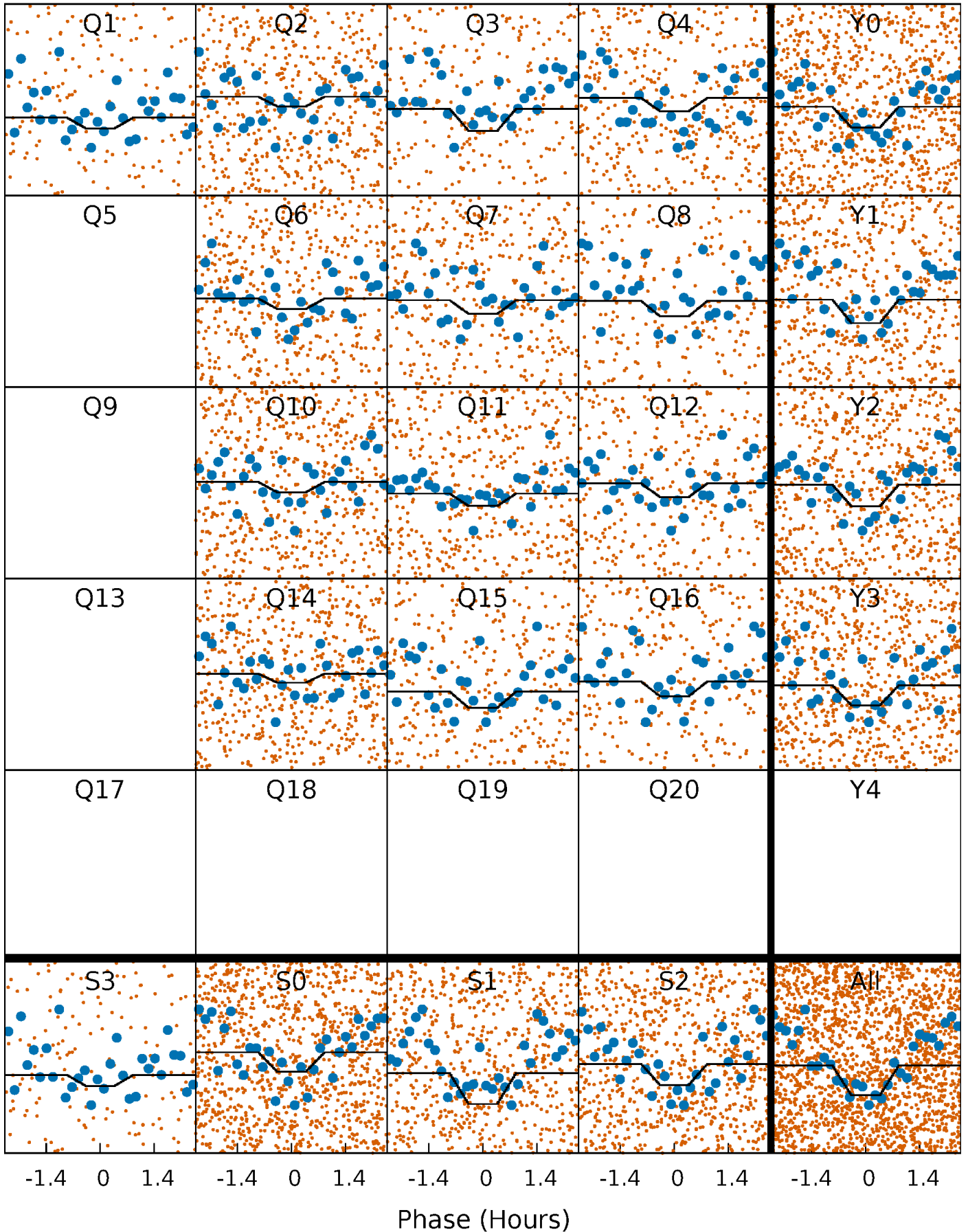
# DV Quarter-Phased Transit Curves

TCE 006019416-01 P= 0.569597 Days  $T_0=131.550624$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 006019416-01 P= 0.569630 Days  $T_0=131.550263$  (BKJD)

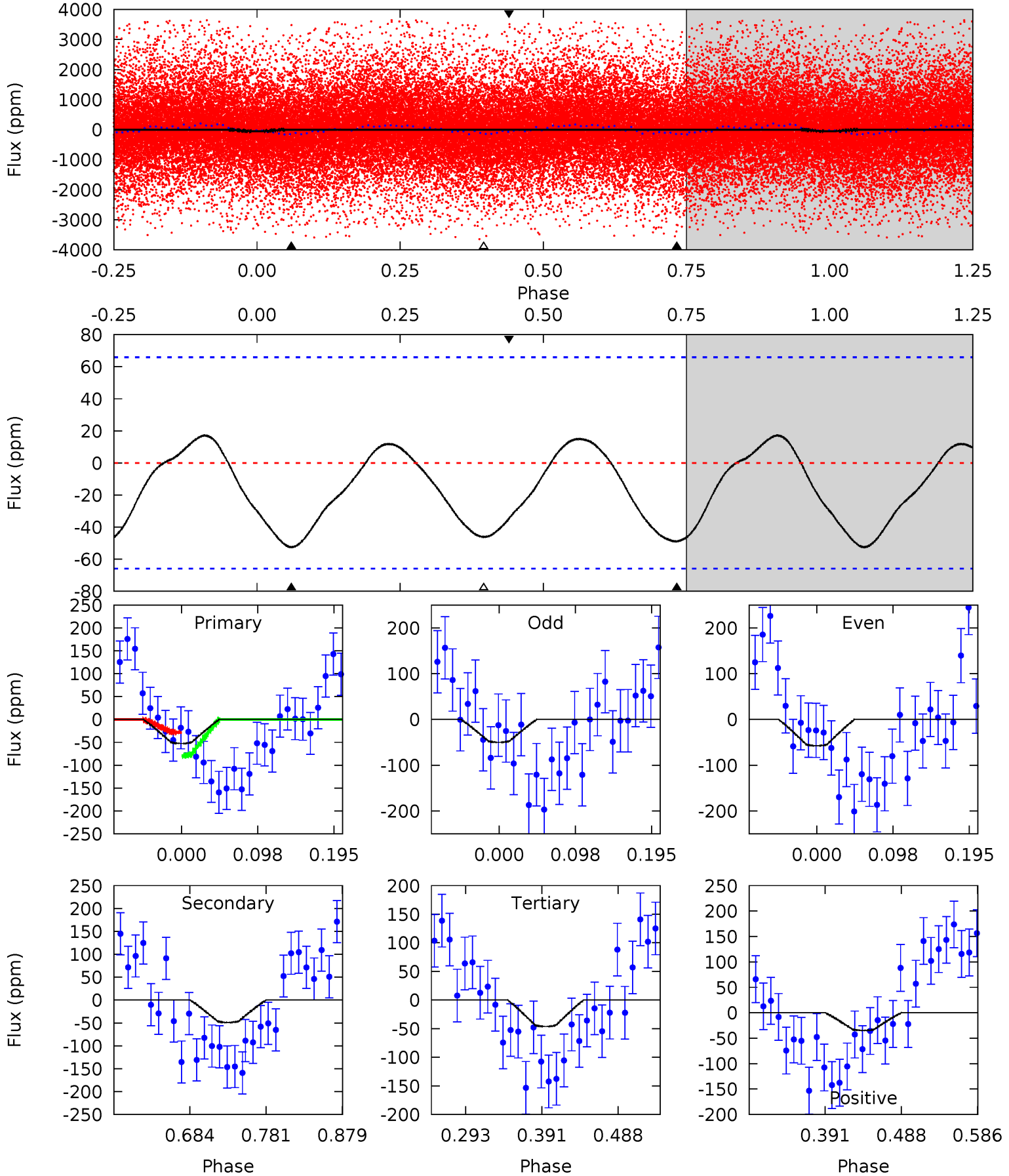




# DV Model-Shift Uniqueness Test

006019416-01, P = 0.569597 Days, E = 130.981027 Days

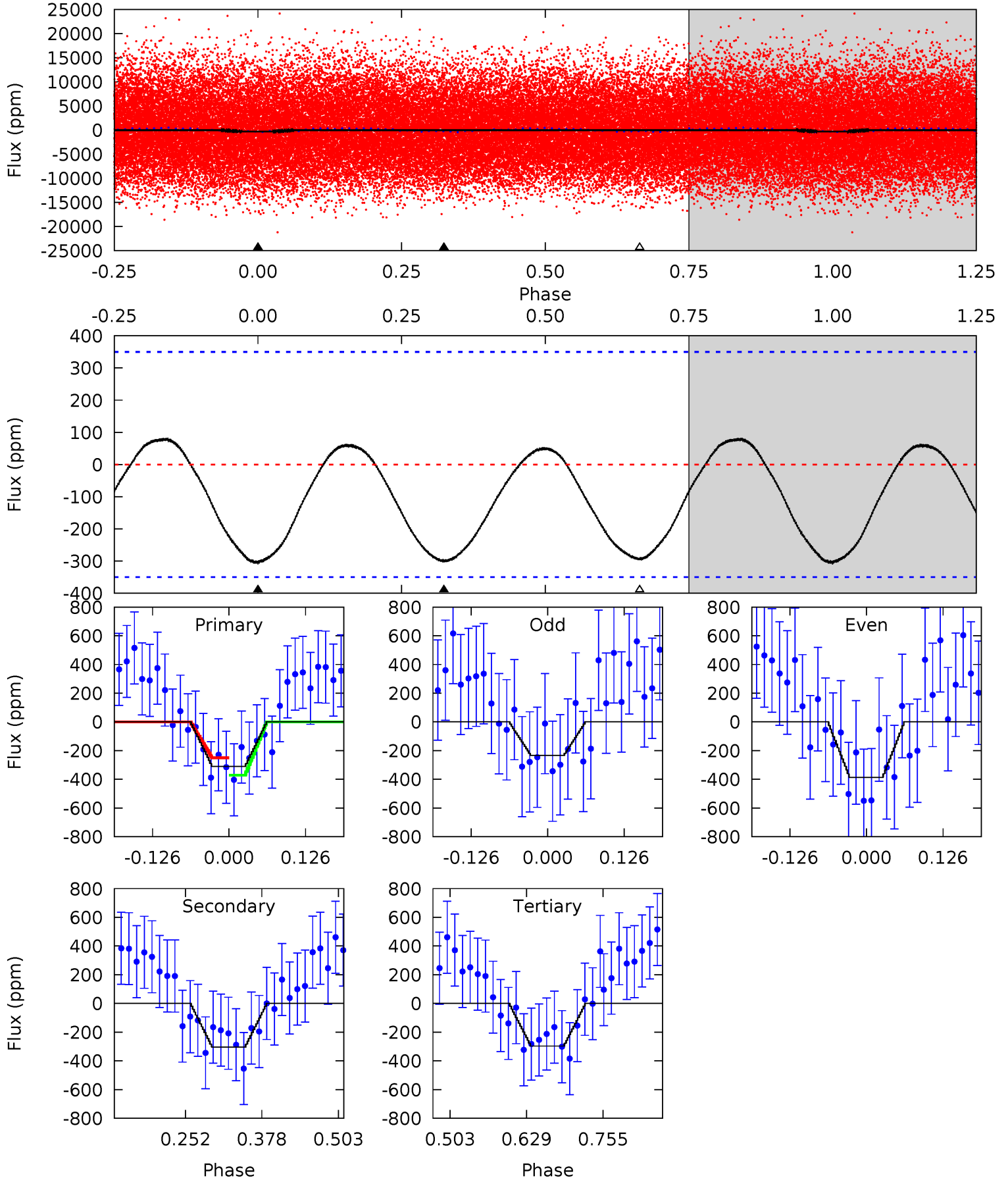
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
3.65	3.40	3.21	-2.41	4.57	1.66	1.34	0.44	6.05	0.19	5.81	0.26	0.62	0.25	1.78



# Alt Model-Shift Uniqueness Test

006019416-01, P = 0.569630 Days, E = 130.980633 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
4.00	3.92	3.83	0	4.52	1.53	1.66	0.17	4.00	0.09	3.92	0.98	0.70	0.21	0.78



### Stellar Parameters For KIC 006019416

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$7308^{+206}_{-353}$	$4.079^{+0.140}_{-0.171}$	$0.210^{+0.150}_{-0.350}$	$1.982^{+0.542}_{-0.394}$	$1.716^{+0.184}_{-0.276}$	$0.311^{+0.218}_{-0.149}$
	+3%/-5%	+3%/-4%	+71%/-167%	+27%/-20%	+11%/-16%	+70%/-48%
Source	PHO54	PHO54	PHO54	DSEP		

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

### Secondary Eclipse Parameters for KIC 006019416-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-49 \pm 14$	$1.57^{+1.33}_{-0.97}$	$4974^{+393}_{-331}$	$6765^{+7177}_{-2022}$	$2.665^{+16.331}_{-1.890}$
Alt.	$-304 \pm 77$	$3.72^{+1.52}_{-1.46}$	$4976^{+376}_{-332}$	$7039^{+2910}_{-1391}$	$3.000^{+5.309}_{-1.607}$

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



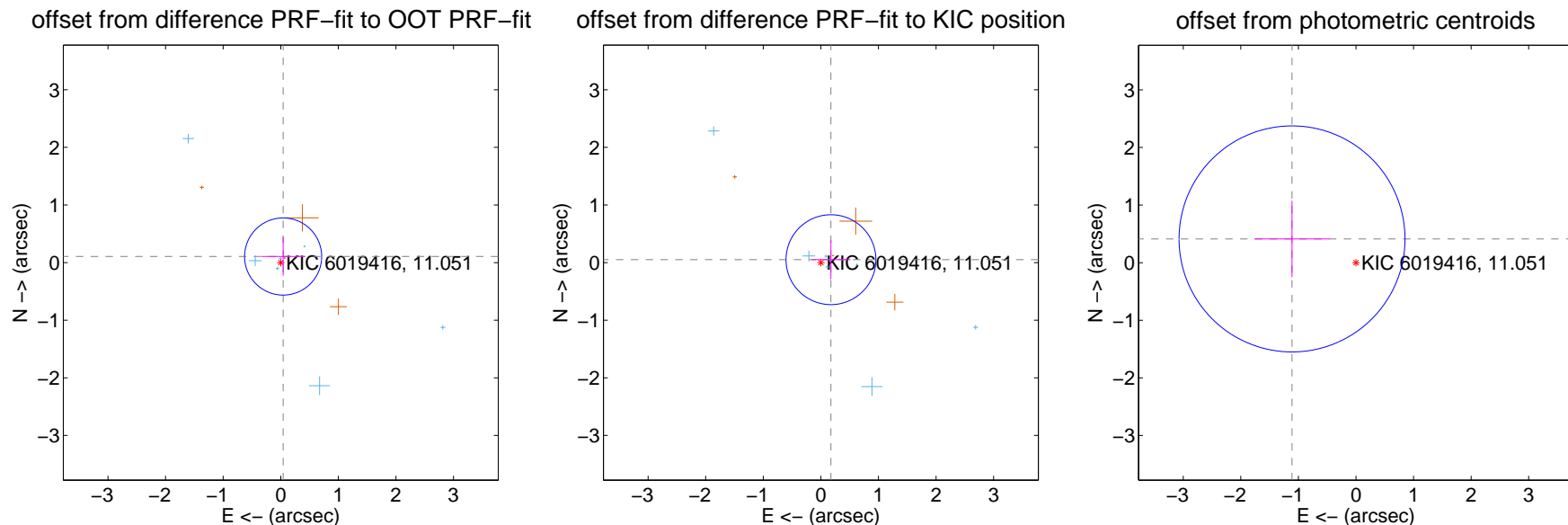
## DV Centroid Data

Supplemental centroid analysis for 006019416-01. **Kepler magnitude: 11.05.** Transit SNR 1.50

There are 7 quarters with good PRF difference image offsets

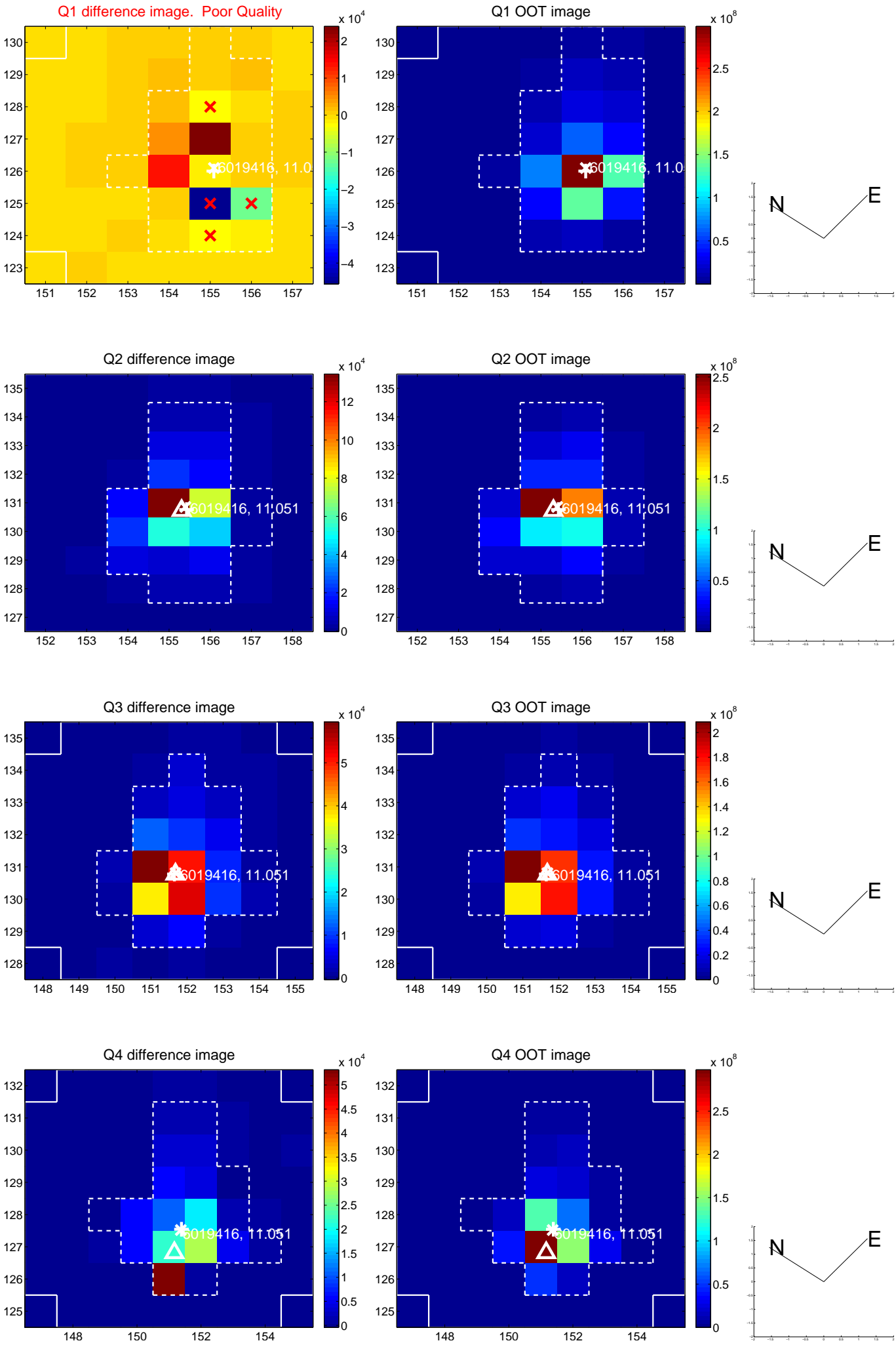
The direct PRF centroid is offset from the target star catalog position by about 0.22 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.113 \pm 0.223$	0.51	$-0.041 \pm 0.374$	$0.105 \pm 0.335$
PRF-fit source offset from KIC position	$0.182 \pm 0.260$	0.70	$-0.175 \pm 0.336$	$0.050 \pm 0.339$
photometric centroid source offset	$1.18 \pm 0.65$	1.81	$1.11 \pm 0.65$	$0.41 \pm 0.66$

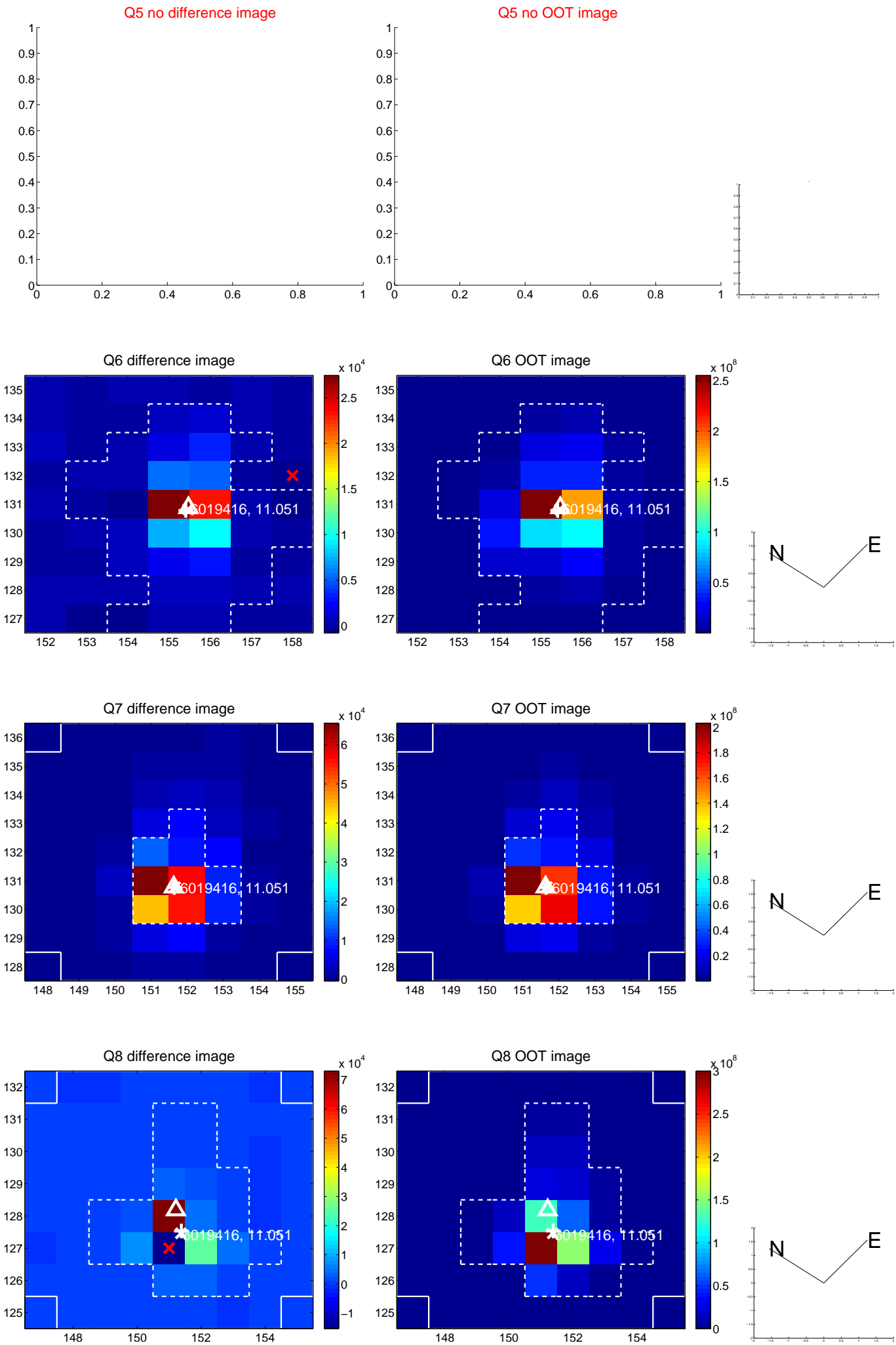


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

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

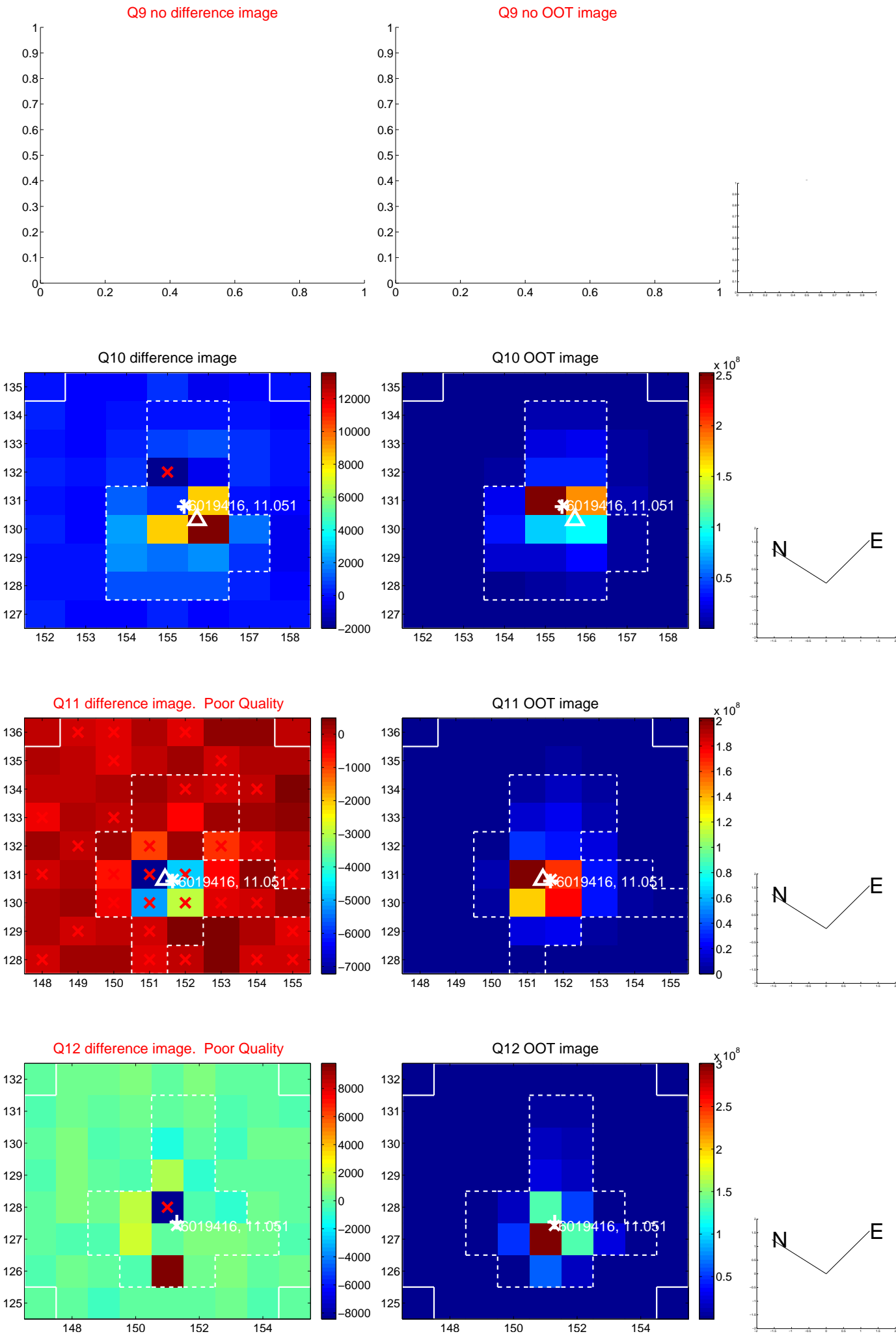


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

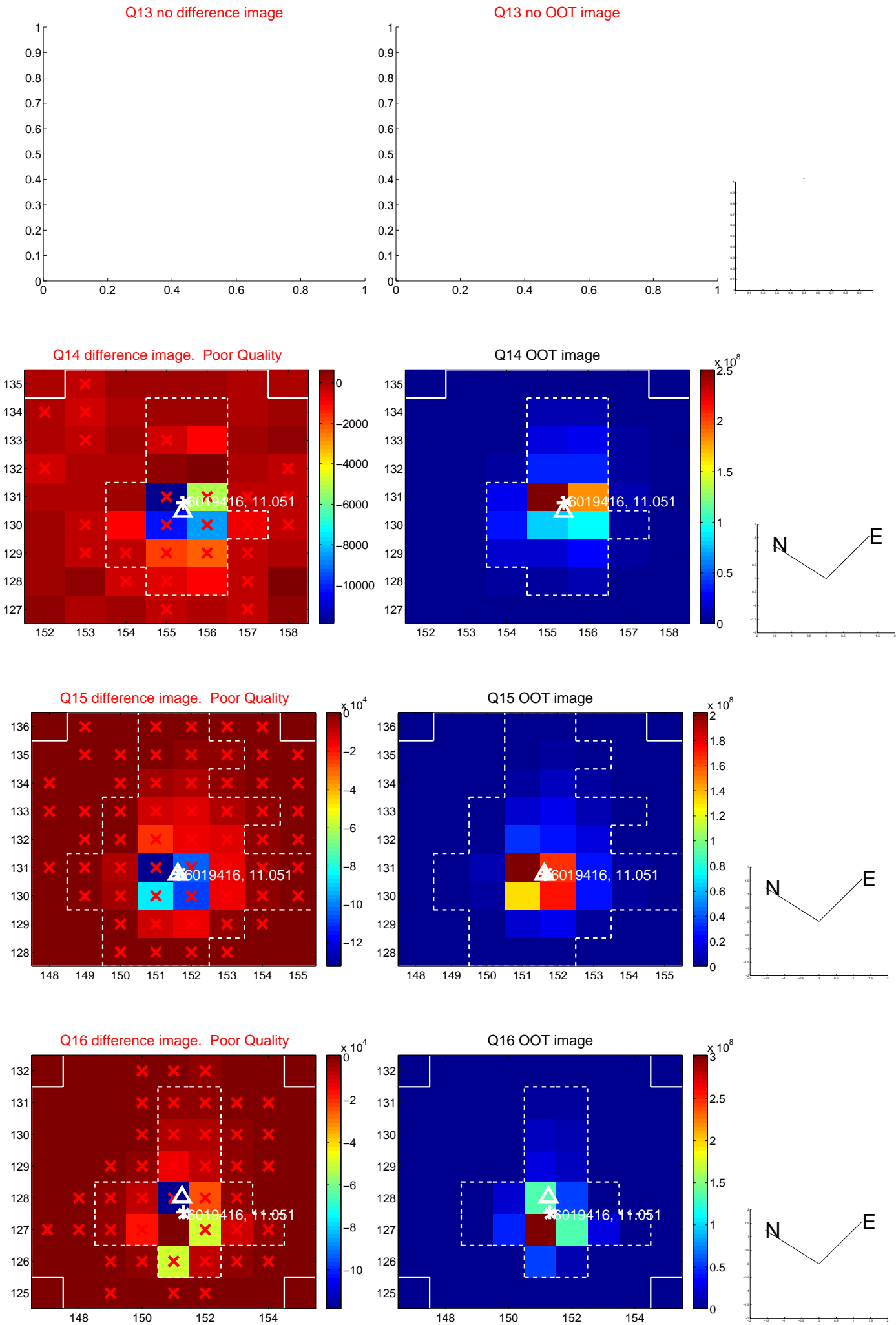




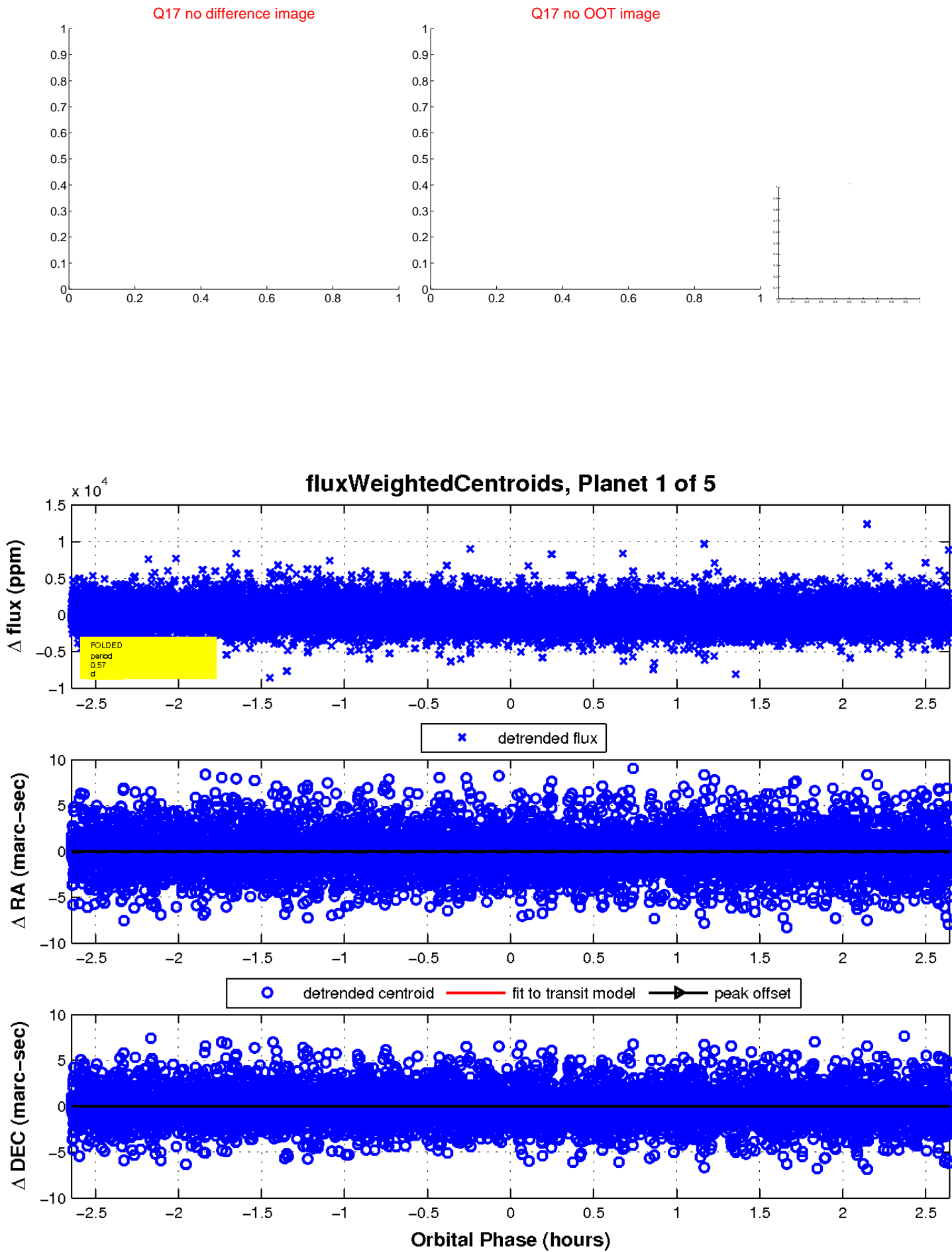
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



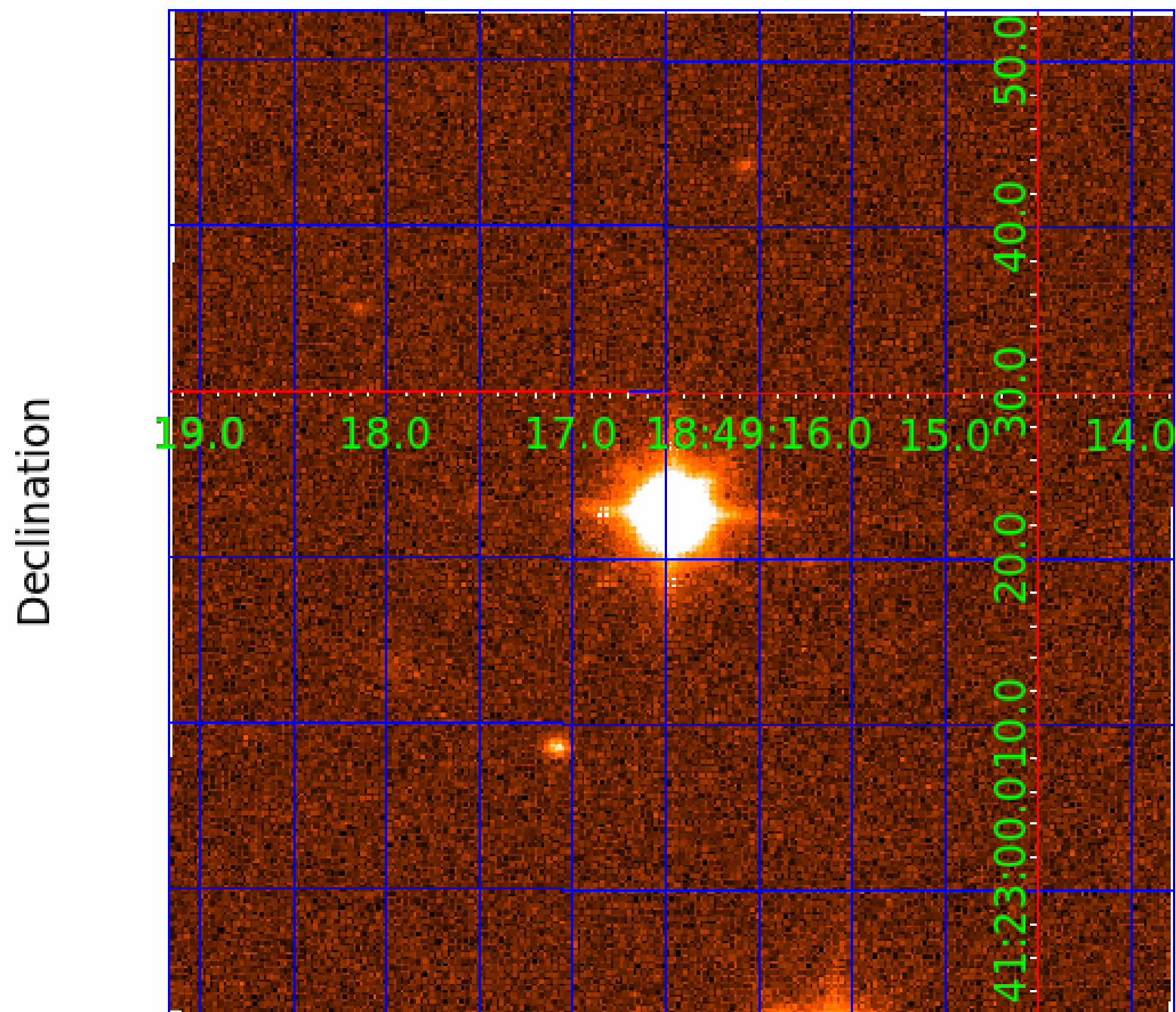
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image



# KIC 006019416

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006019416-01	OBS	No	0.569597	131.550624	30.6	0.881	10.4	1.5	1.98	7308	1.28	38672.37
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## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006019416-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—CENT_SATURATED
006019416-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—SAME_NTL_PERIOD—CENT_SATURATED
006019416-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—CENT_SATURATED—HALO_GHOST
006019416-04	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED—HALO_GHOST
006019416-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED

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

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

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

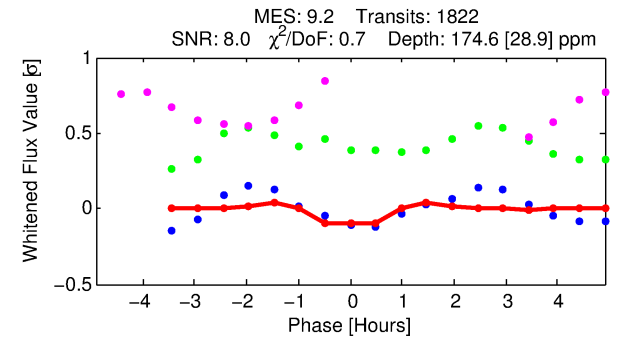
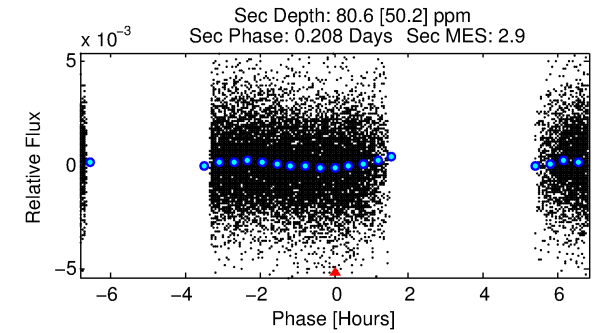
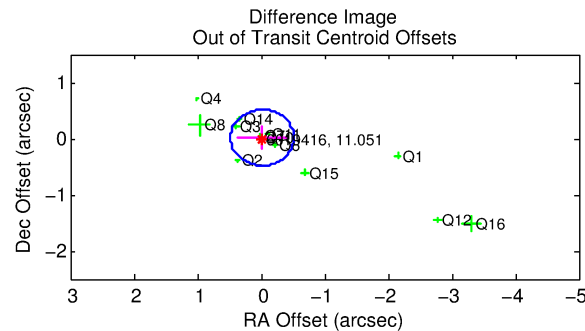
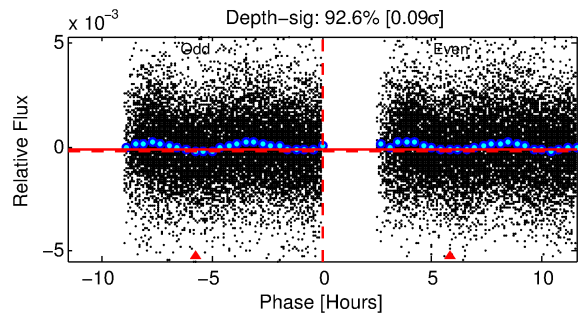
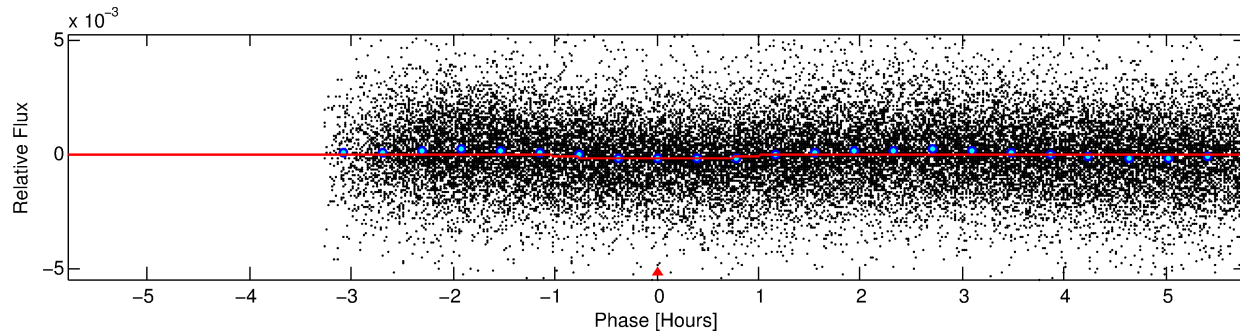
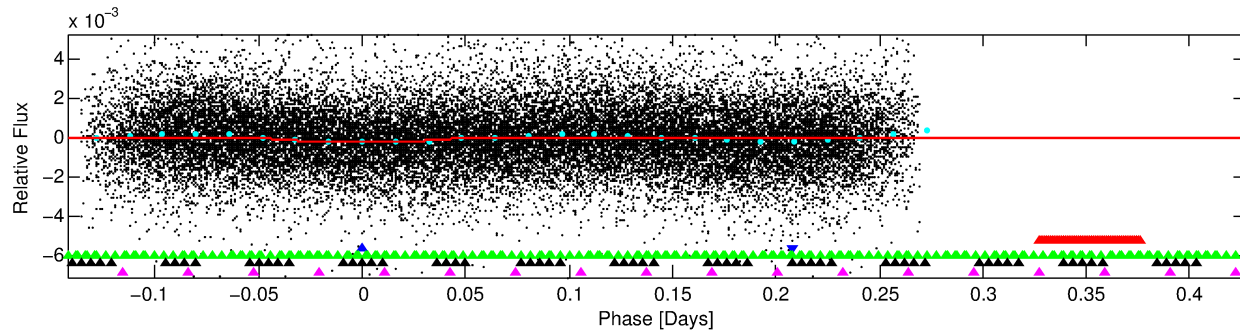
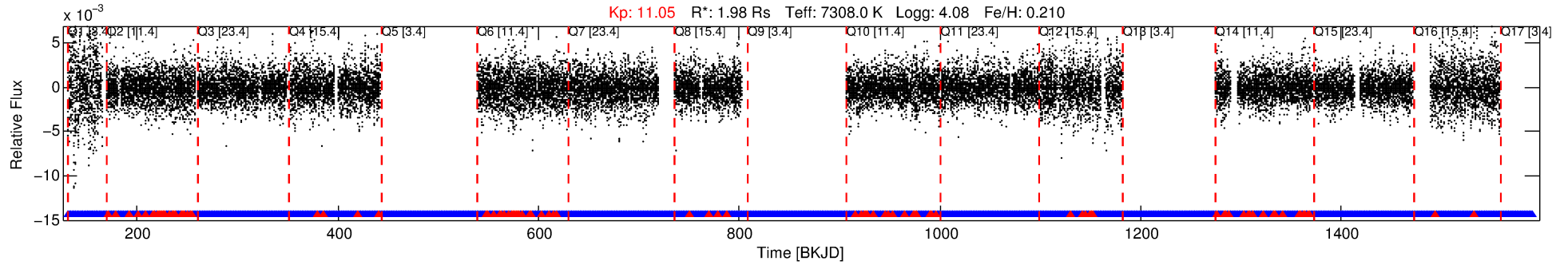
## Ephemeris Match Information For 006019416-02

No Significant Match Found



# DV One-Page Summary

KIC: 6019416 Candidate: 2 of 5 Period: 0.570 d



## DV Fit Results:

Period = 0.56962 [0.00001] d  
Epoch = 131.7444 [0.0019] BKJD  
Rp/R\* = 0.0126 [0.0050]  
a/R\* = 2.12 [3.88]  
b = 0.49 [3.62]  
Seff = 38670.66 [14441.86]  
Teq = 3576 [334] K  
Rp = 2.72 [1.31] Re  
a = 0.0161 [0.0036] AU  
Ag = 1.55 [1.65] [0.34 $\sigma$ ]  
Teffp = 6173 [1587] K [1.60 $\sigma$ ]

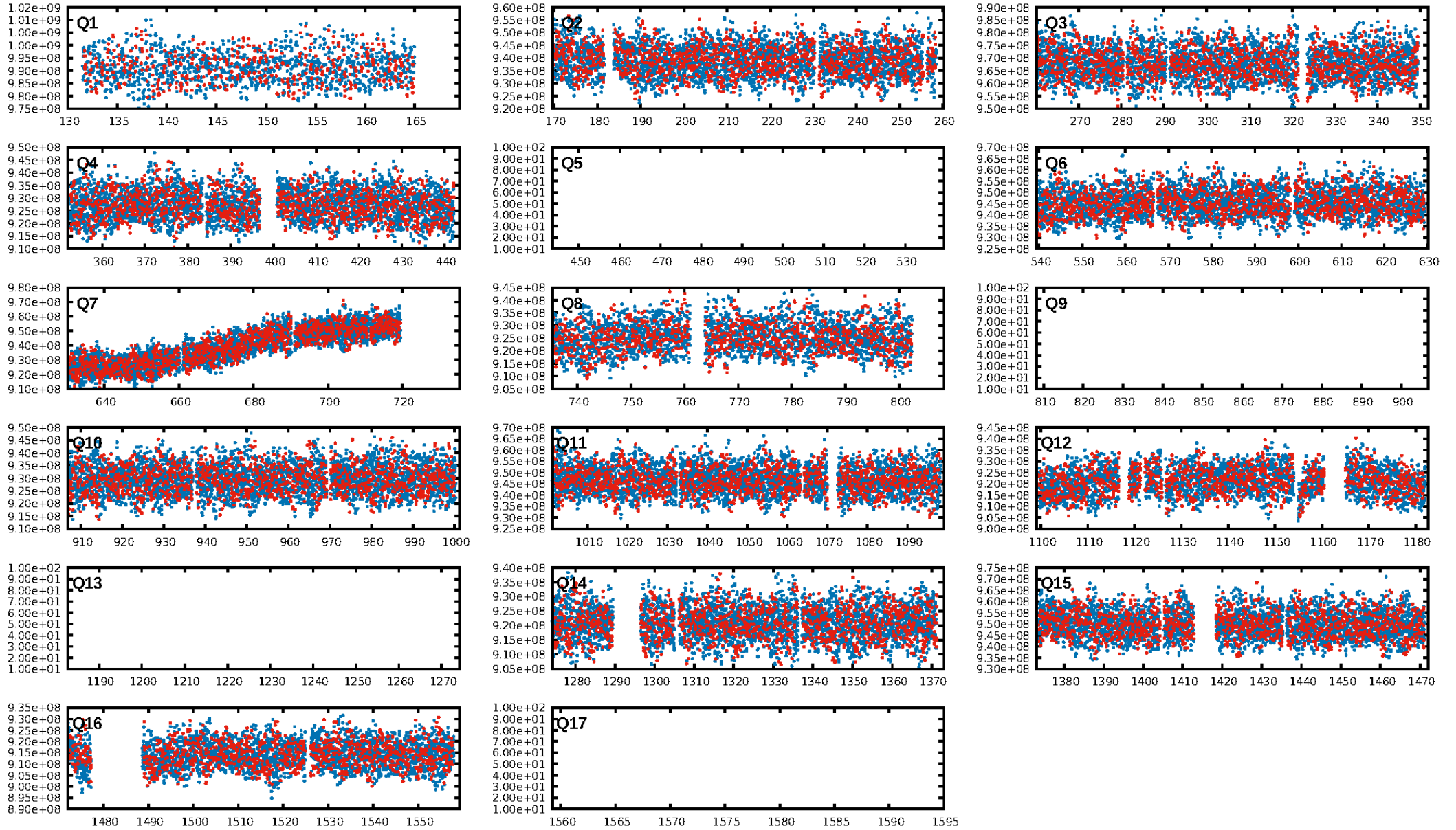
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00 $\sigma$ ]  
LongPeriod-sig: 100.0% [9.27 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 0.94 [1660/1763]  
GhostDiagnostic-chr: 4.294  
Centroid-sig: 0.0%  
Centroid-so: 0.371 arcsec [4.58 $\sigma$ ]  
OotOffset-rm: 0.025 arcsec [0.15 $\sigma$ ]  
KicOffset-rm: 0.188 arcsec [0.70 $\sigma$ ]  
OotOffset-st: 4/4/4/1 [13]  
KicOffset-st: 4/4/4/1 [13]  
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DiffImageOverlap-fno: 0.00 [0/13]

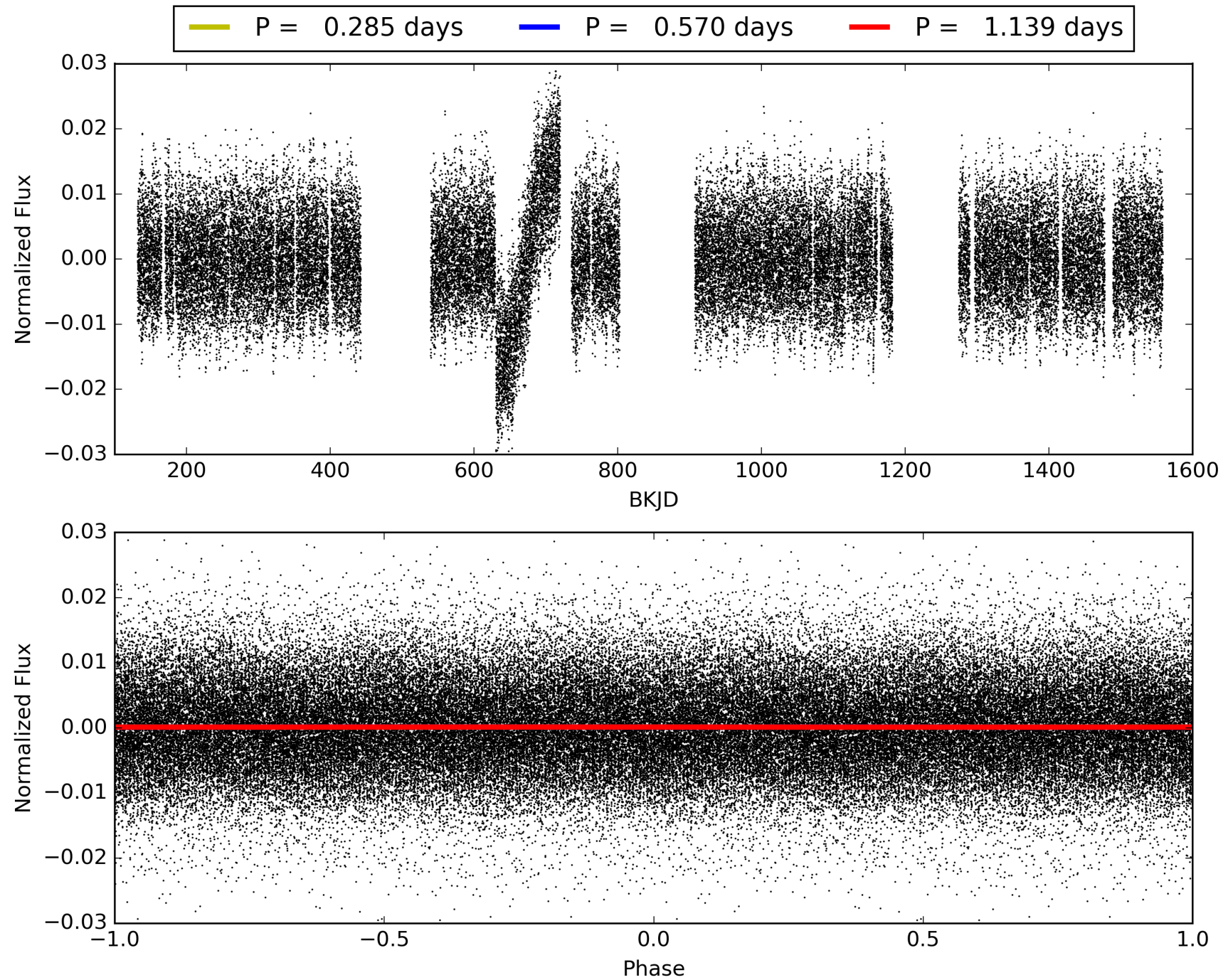
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 10:44:41 Z

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

# TCE 006019416-02, PDC Light Curves



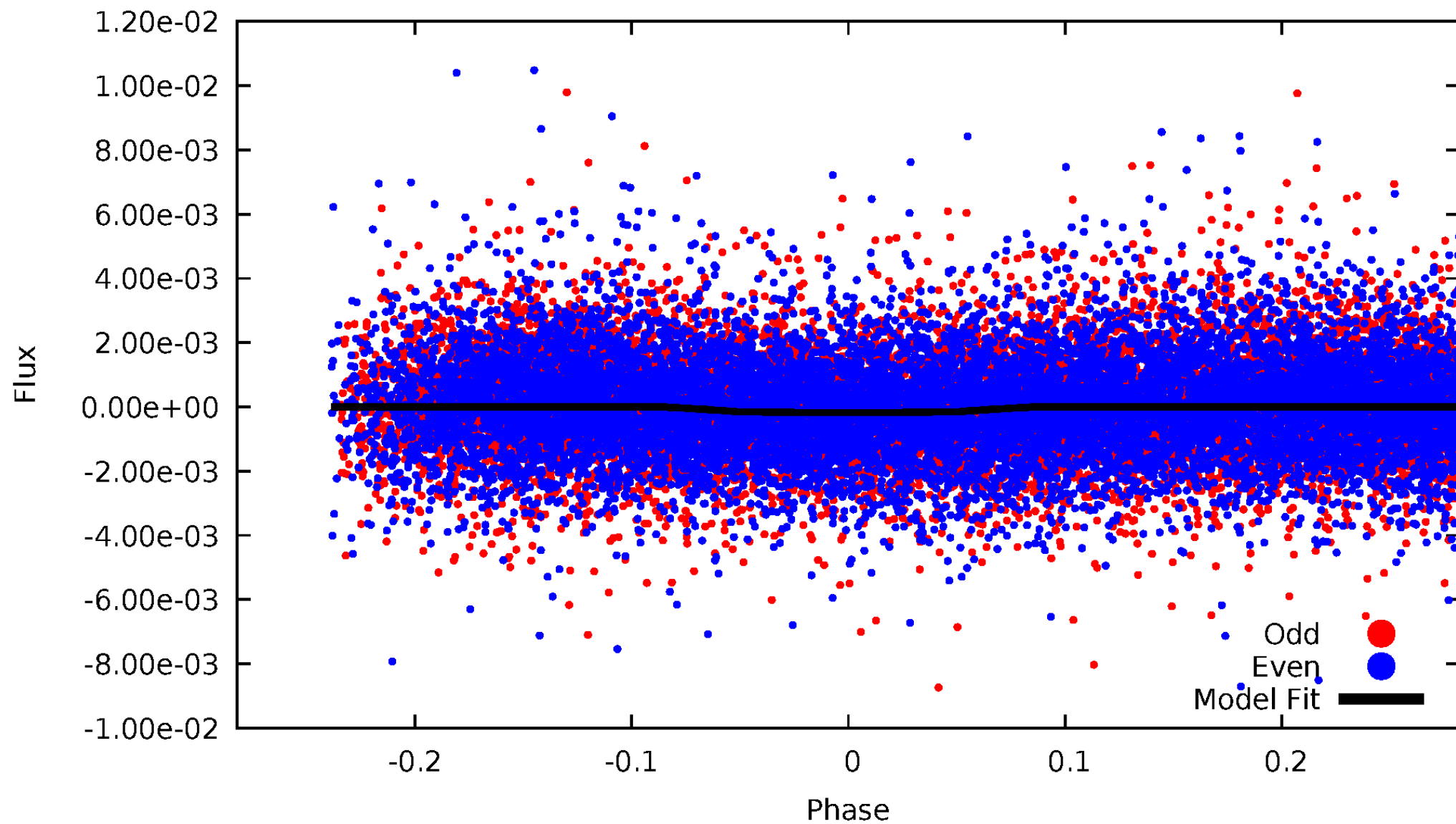
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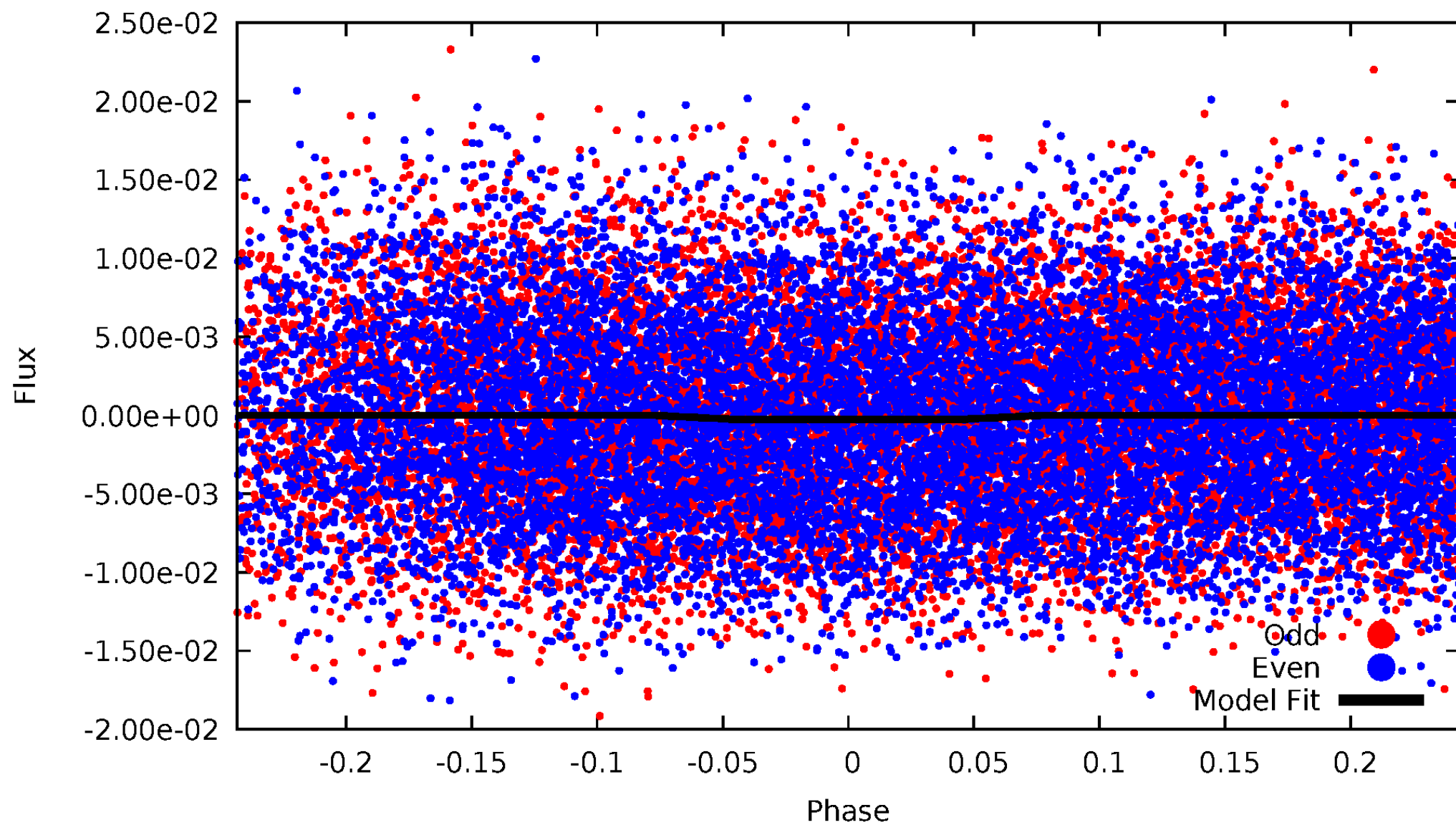
# DV Odd/Even

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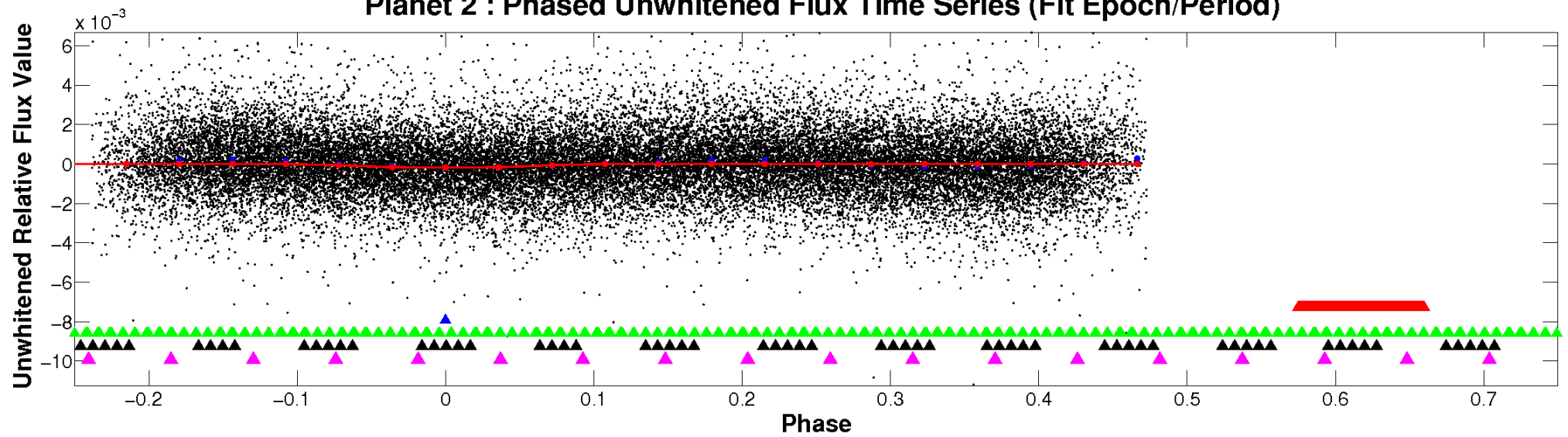
# ALT Odd/Even

TCE 006019416-02

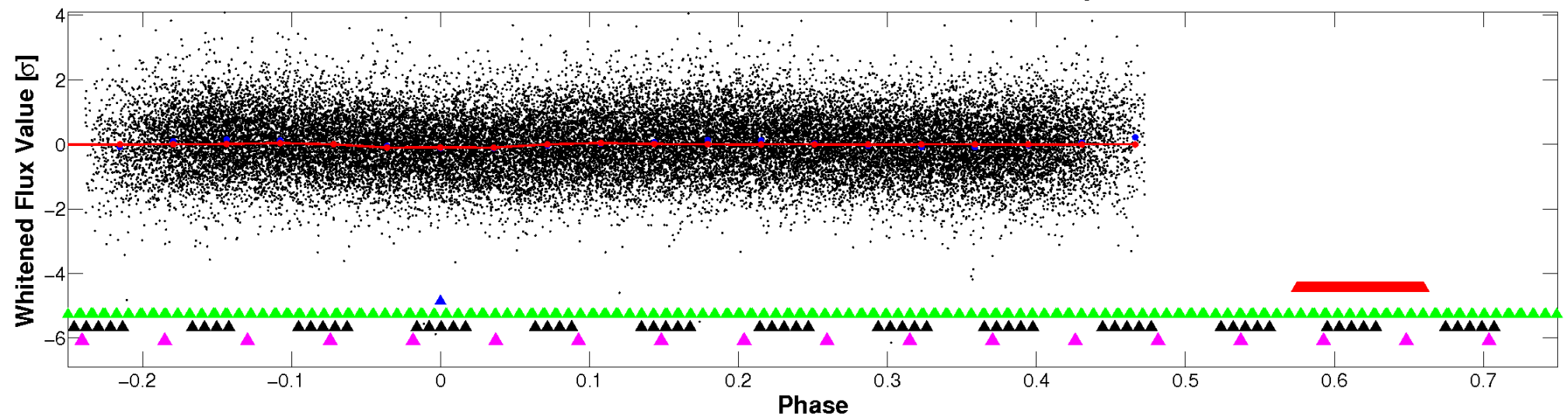


# Non-Whitened Vs. Whitened Light Curve

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



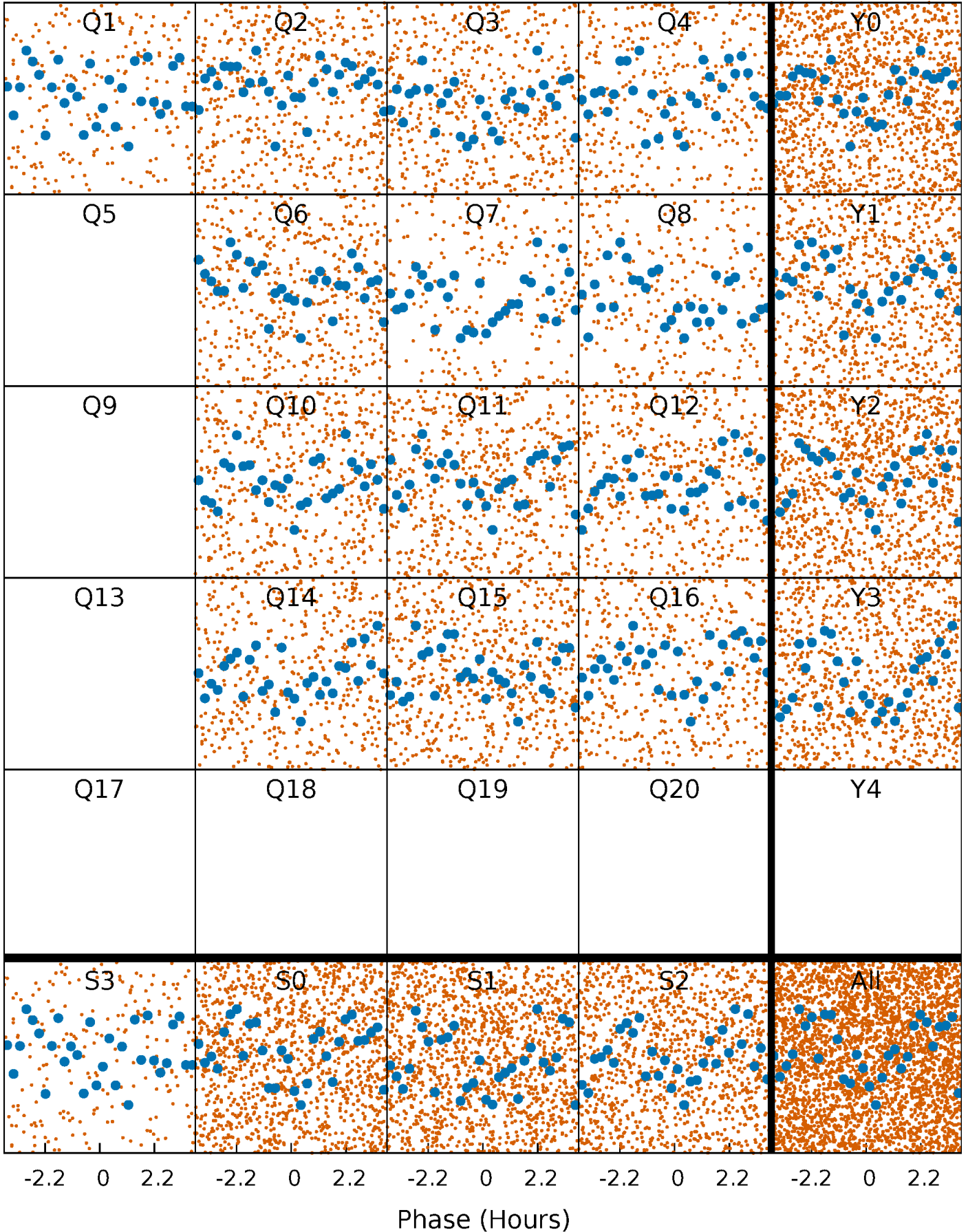
## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)





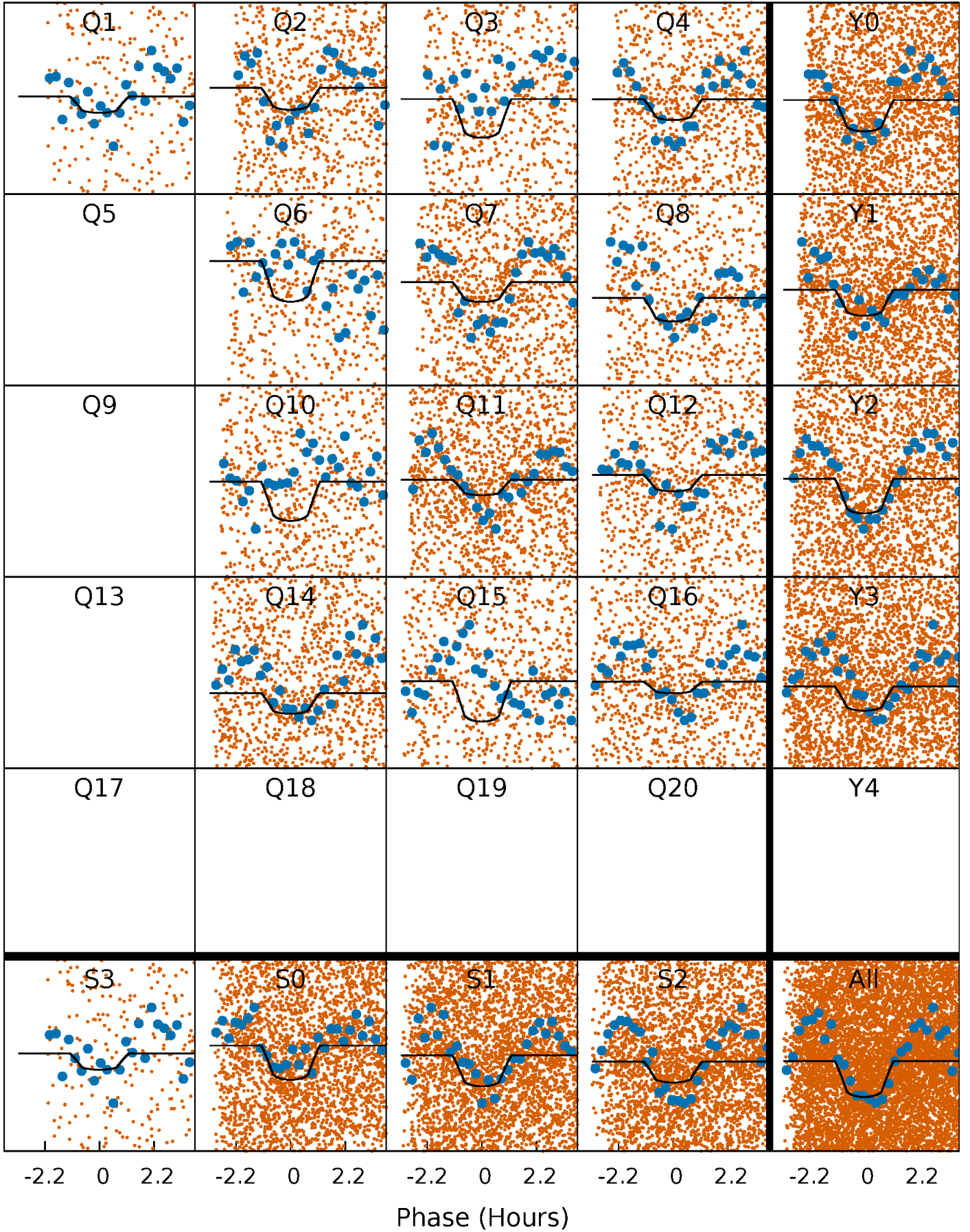
# PDC Quarter-Phased Transit Curves

TCE 006019416-02   P= 0.569616 Days    $T_0=131.744380$  (BKJD)



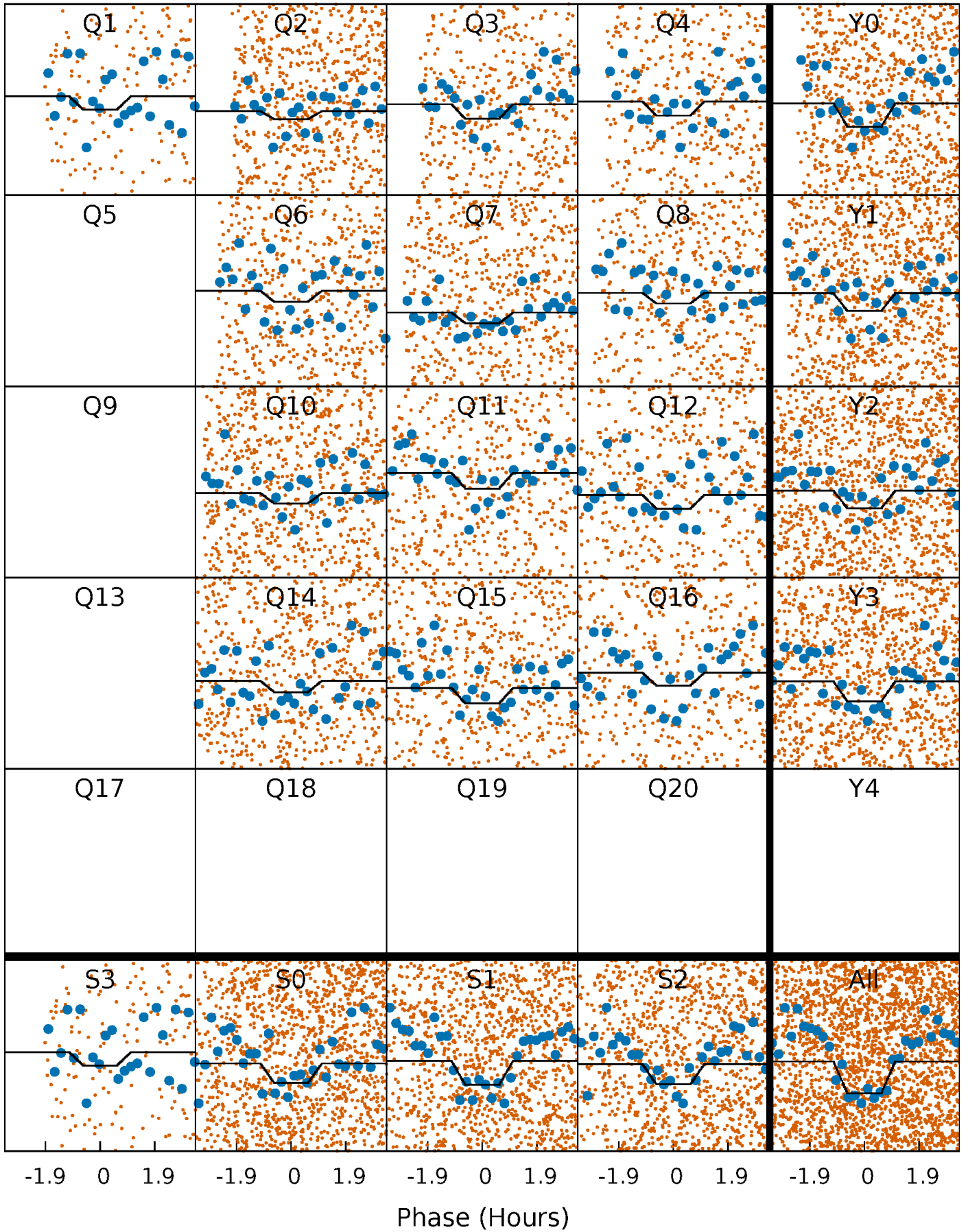
# DV Quarter-Phased Transit Curves

TCE 006019416-02   P= 0.569616 Days    $T_0=131.744380$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 006019416-02 P= 0.569630 Days  $T_0=131.734279$  (BKJD)

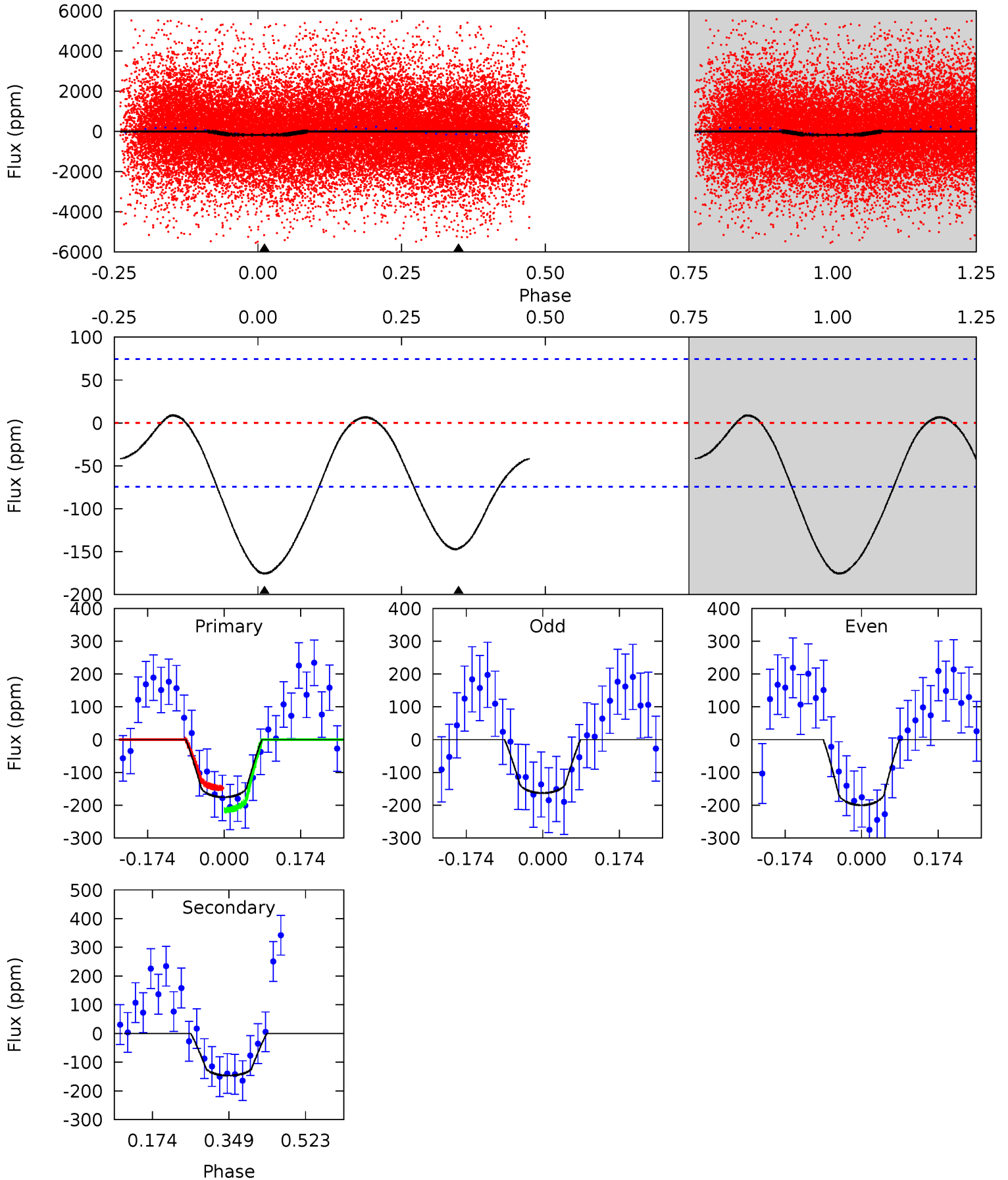




# DV Model-Shift Uniqueness Test

006019416-02, P = 0.569616 Days, E = 131.174764 Days

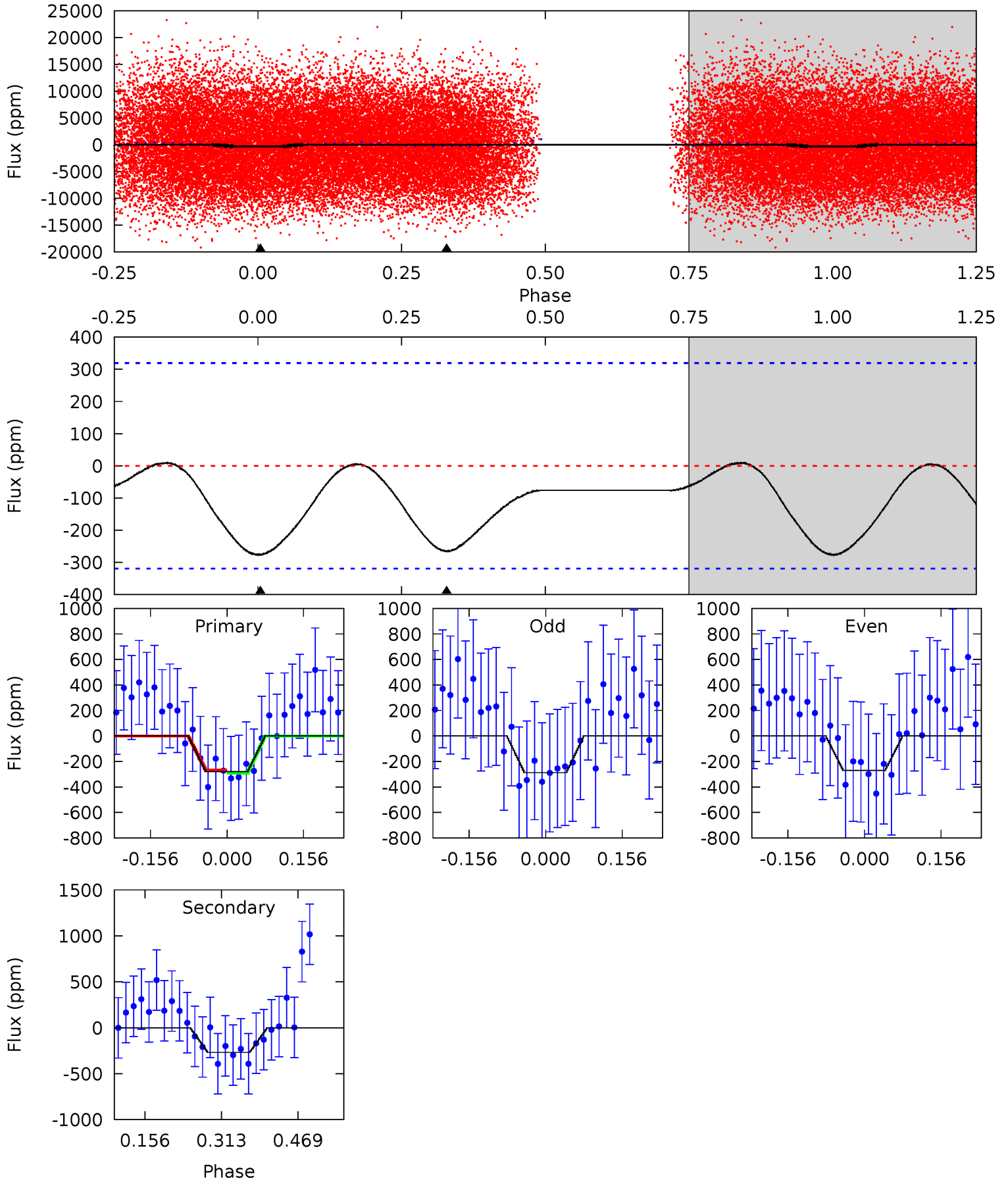
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.5	8.75	0	0	4.45	1.36	0.90	10.5	10.5	8.75	8.75	1.11	1.04	0.05	2.11



# Alt Model-Shift Uniqueness Test

006019416-02, P = 0.569630 Days, E = 131.164649 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
3.90	3.76	0	0	4.47	1.42	0.36	3.90	3.90	3.76	3.76	0.12	0.63	0.04	0.18



### Stellar Parameters For KIC 006019416

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$7308^{+206}_{-353}$	$4.079^{+0.140}_{-0.171}$	$0.210^{+0.150}_{-0.350}$	$1.982^{+0.542}_{-0.394}$	$1.716^{+0.184}_{-0.276}$	$0.311^{+0.218}_{-0.149}$
	+3%/-5%	+3%/-4%	+71%/-167%	+27%/-20%	+11%/-16%	+70%/-48%
Source	PHO54	PHO54	PHO54	DSEP		

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

### Secondary Eclipse Parameters for KIC 006019416-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-146 \pm 17$	$2.63^{+1.22}_{-1.00}$	$4978^{+329}_{-361}$	$6966^{+2418}_{-1315}$	$2.898^{+4.656}_{-1.456}$
Alt.	$-268 \pm 71$	$3.63^{+1.24}_{-1.09}$	$5011^{+388}_{-331}$	$6901^{+1894}_{-1252}$	$2.786^{+3.246}_{-1.450}$

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



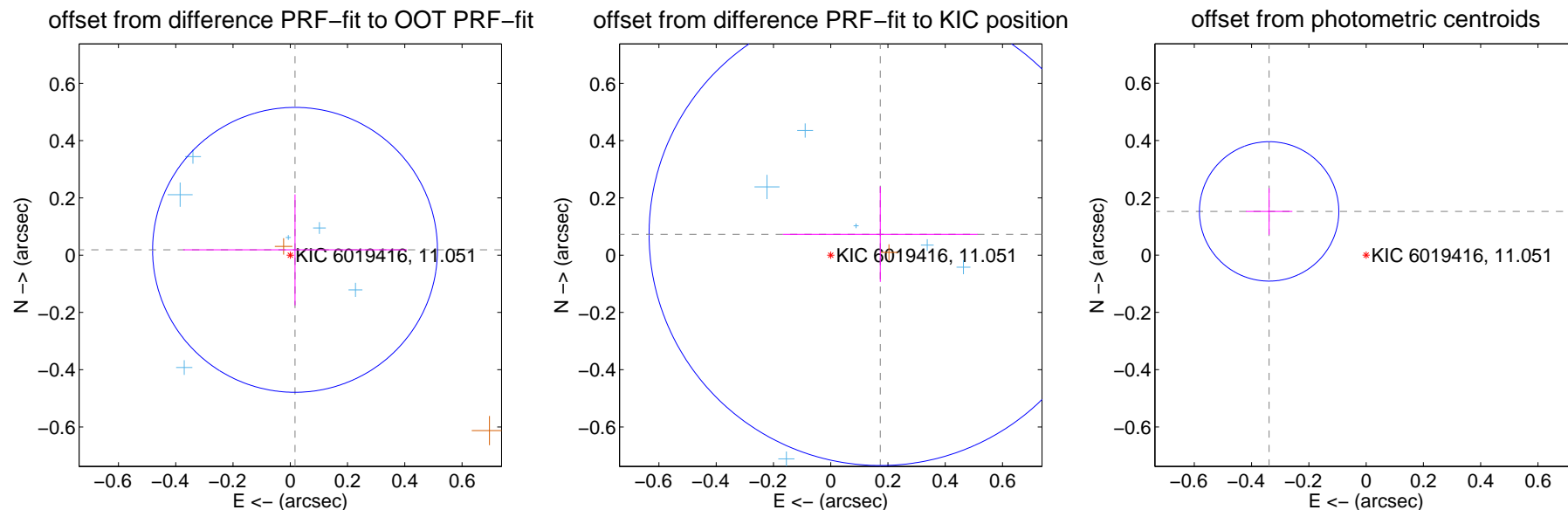
## DV Centroid Data

Supplemental centroid analysis for 006019416-02. **Kepler magnitude: 11.05**. Transit SNR 7.99

There are 9 quarters with good PRF difference image offsets

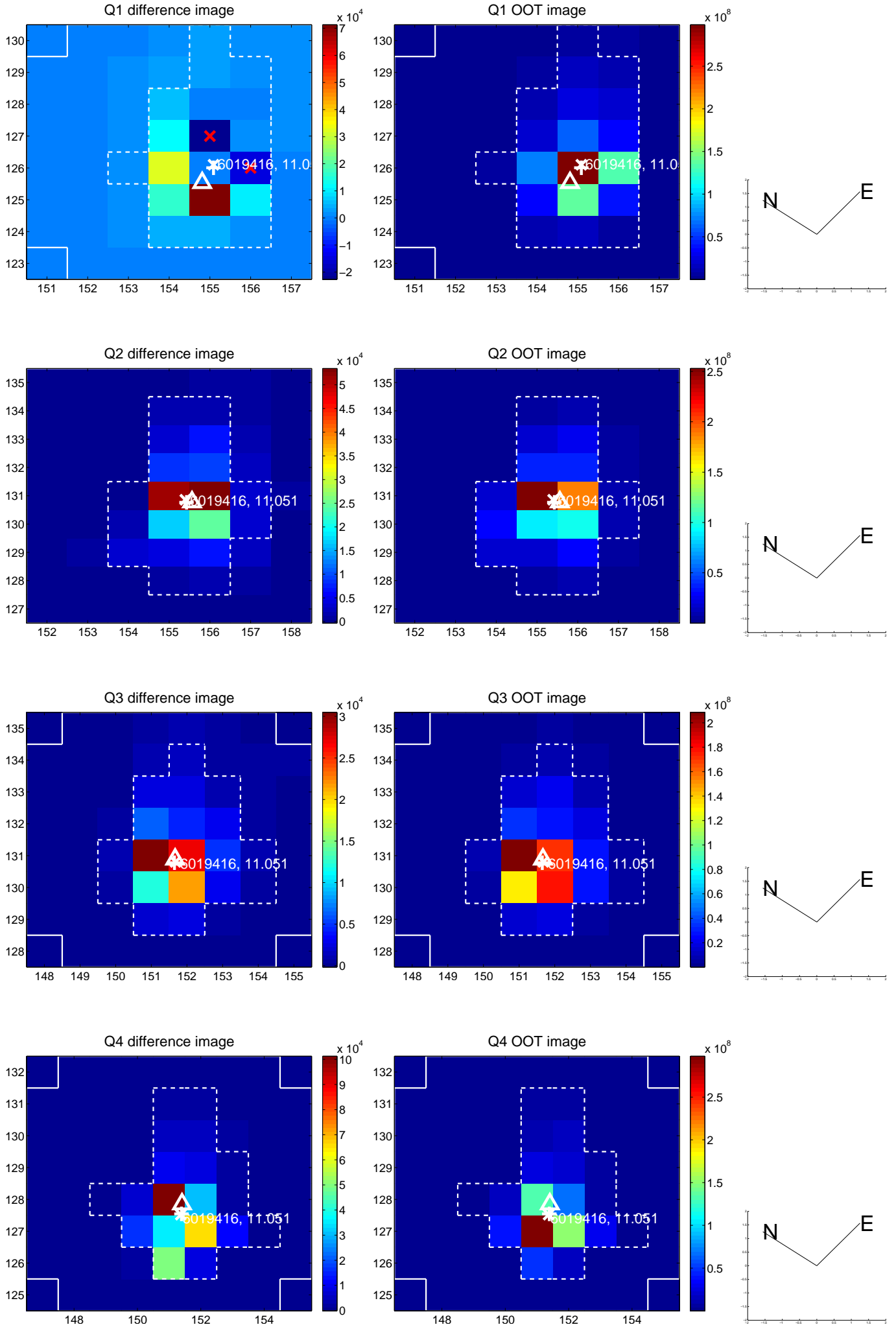
The direct PRF centroid is offset from the target star catalog position by about 0.22 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.025 \pm 0.166$	0.15	$-0.017 \pm 0.391$	$0.019 \pm 0.194$
PRF-fit source offset from KIC position	$0.188 \pm 0.269$	0.70	$-0.173 \pm 0.340$	$0.073 \pm 0.166$
photometric centroid source offset	<b><math>0.37 \pm 0.08</math></b>	<b>4.58</b>	$0.34 \pm 0.08$	$0.15 \pm 0.08$

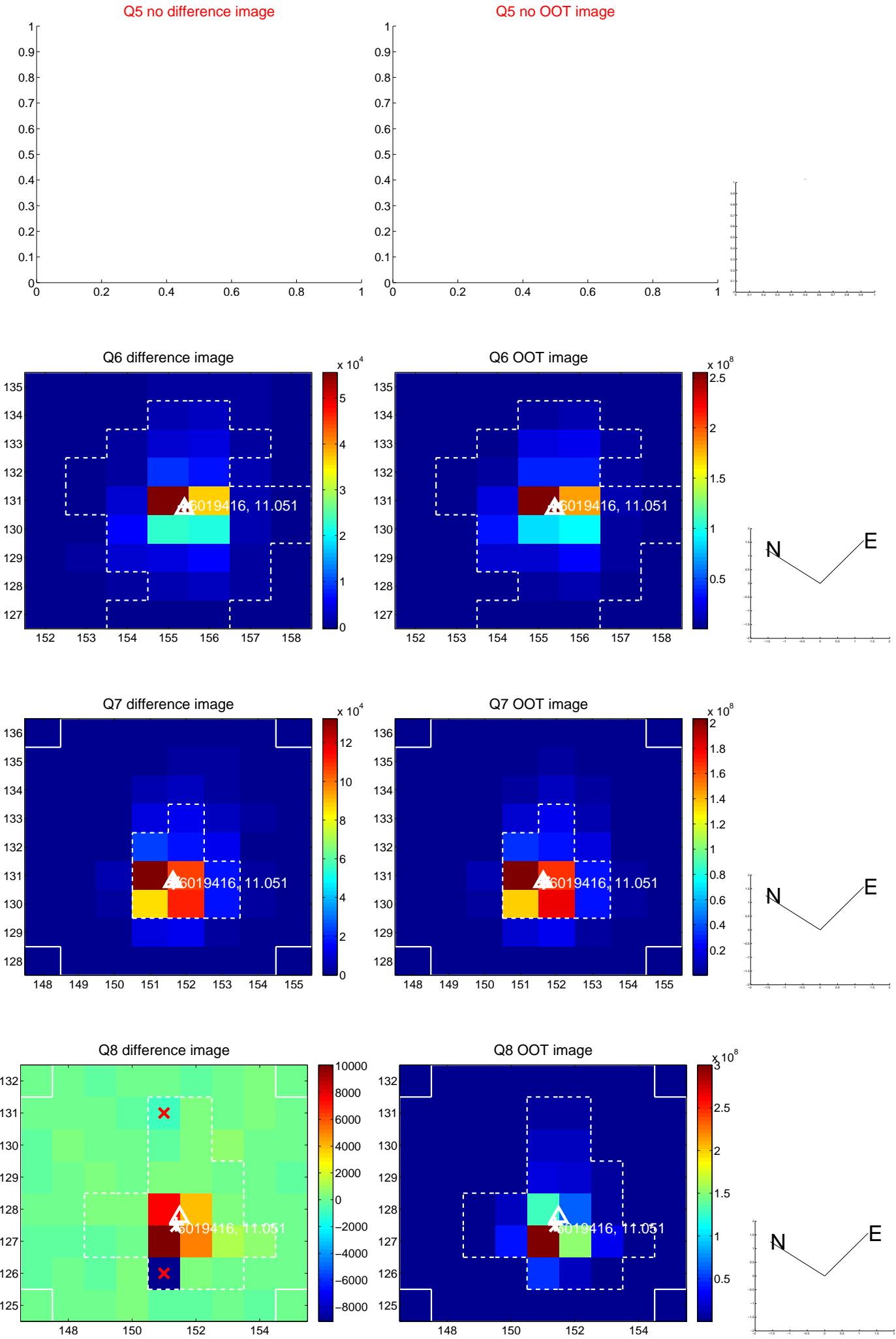


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

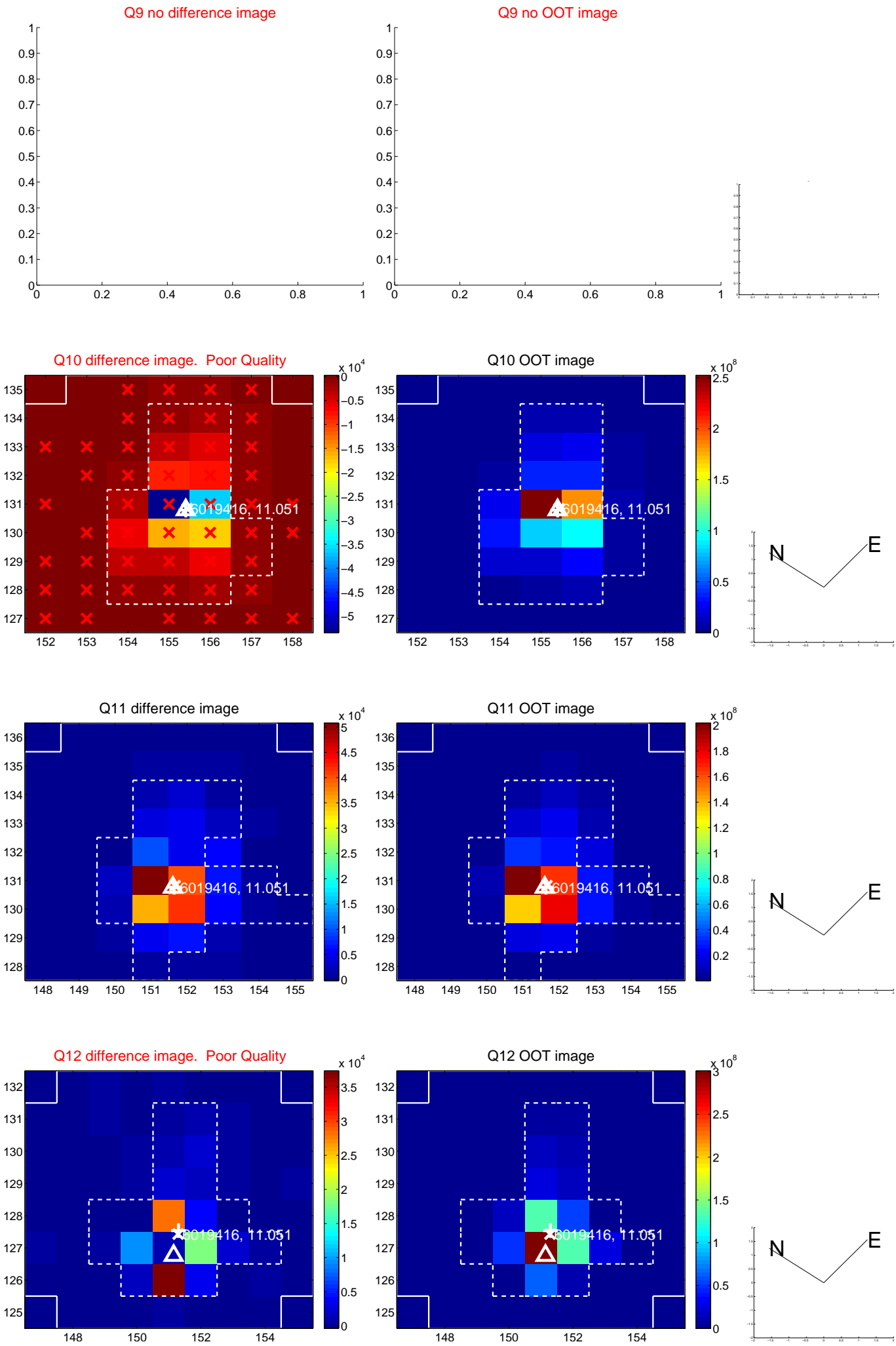
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



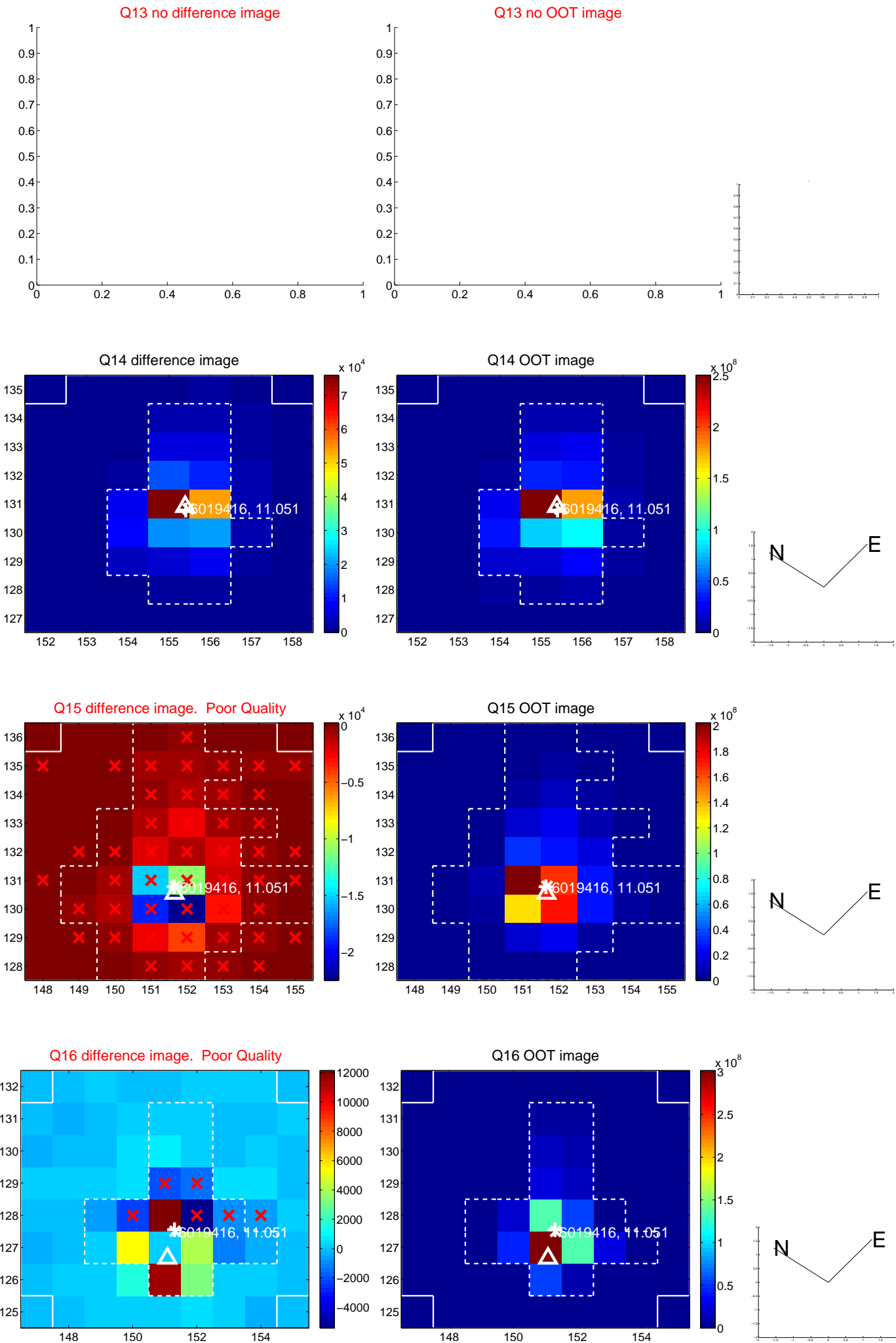
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

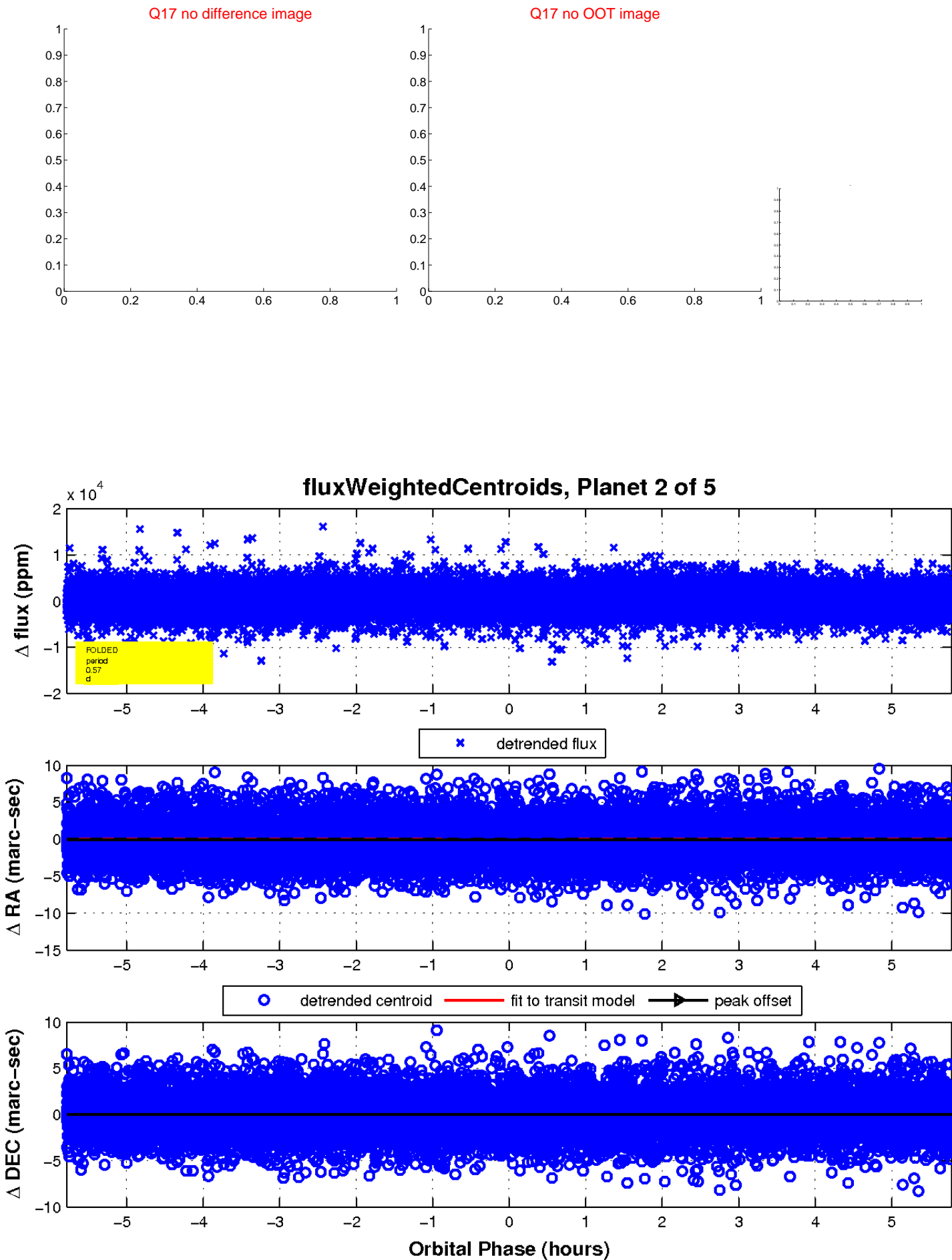


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

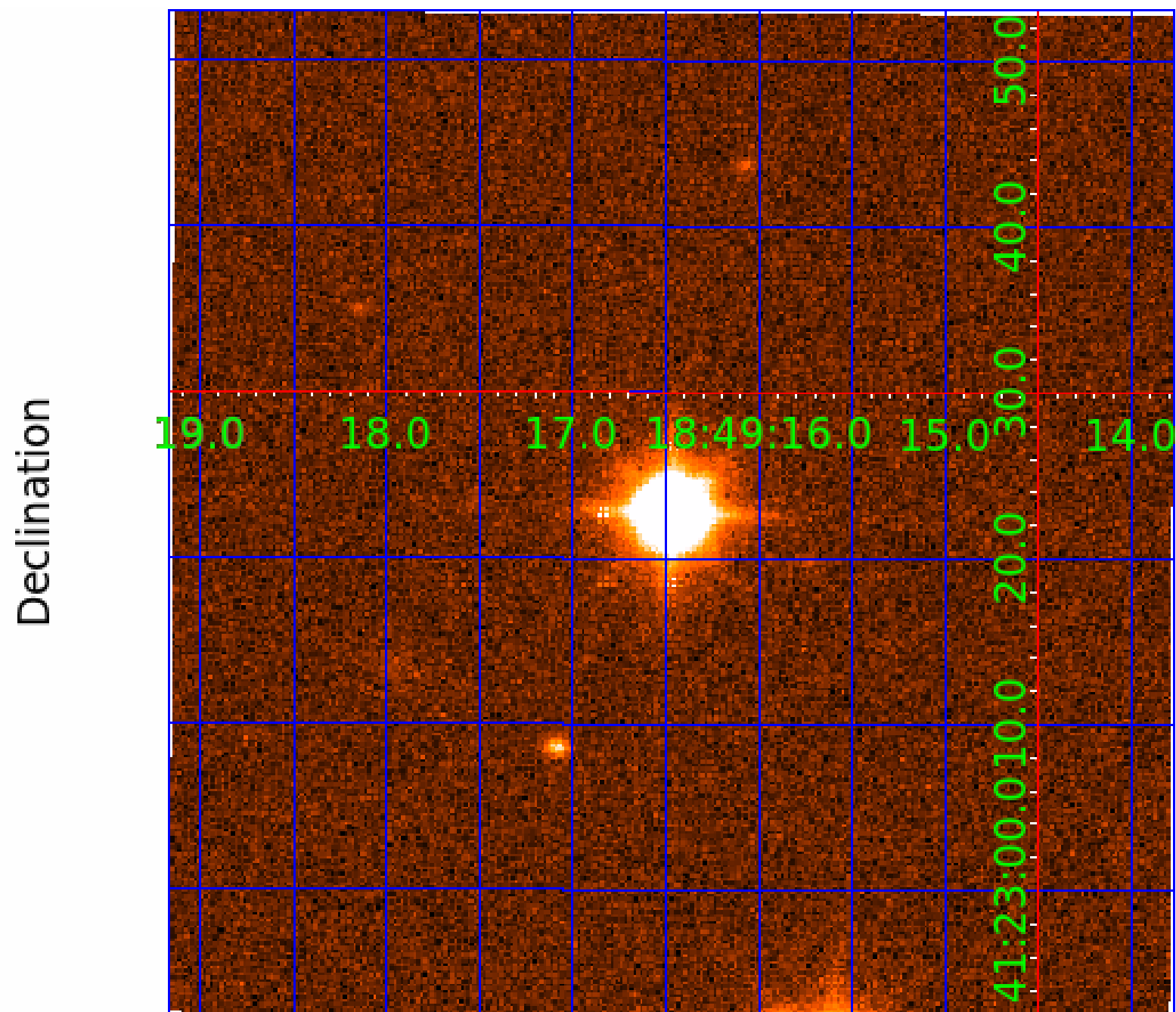




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image



# KIC 006019416

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006019416-01	OBS	No	0.569597	131.550624	30.6	0.881	10.4	1.5	1.98	7308	1.28	38672.37
006019416-02	OBS	No	0.569616	131.744380	174.6	1.927	9.2	8.0	1.98	7308	2.72	38670.66
006019416-03	OBS	No	4.804386	135.107729	732.3	10.789	8.0	10.3	1.98	7308	6.12	2252.37
006019416-04	OBS	No	22.915723	151.866839	1589.5	2.603	7.6	6.3	1.98	7308	8.55	280.53
006019416-05	OBS	No	38.765512	170.024849	61.9	5.000	7.5	-1.0	1.98	7308	1.58	139.18

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006019416-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—CENT_SATURATED
006019416-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—SAME_NTL_PERIOD—CENT_SATURATED
006019416-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—CENT_SATURATED—HALO_GHOST
006019416-04	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED—HALO_GHOST
006019416-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED

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

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

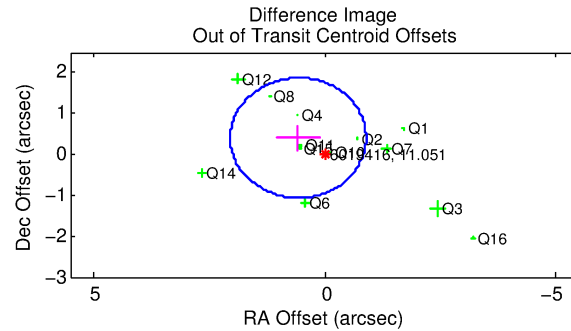
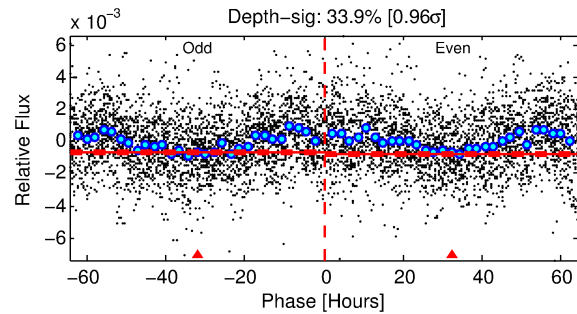
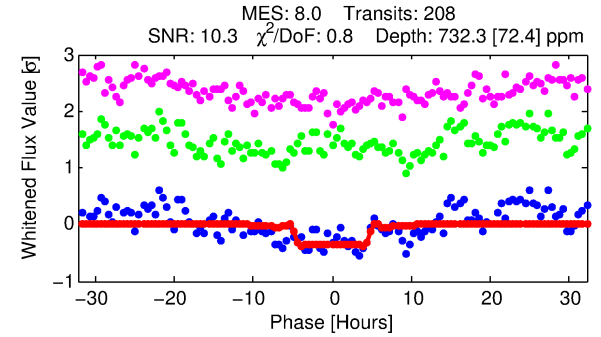
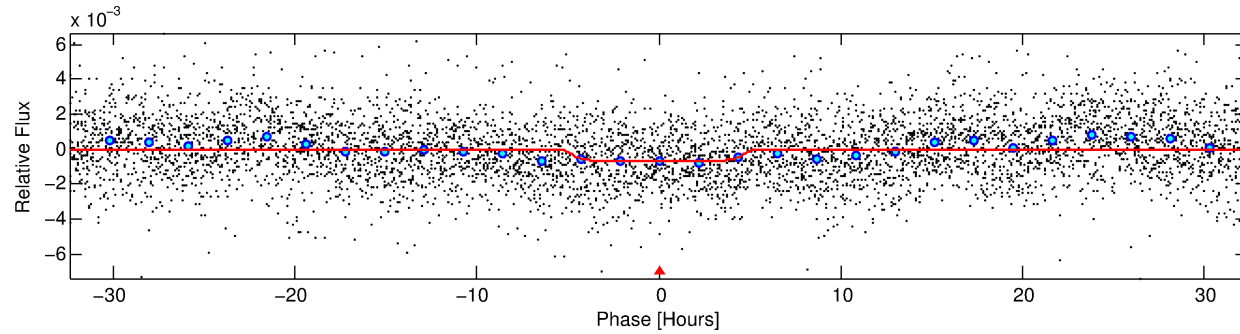
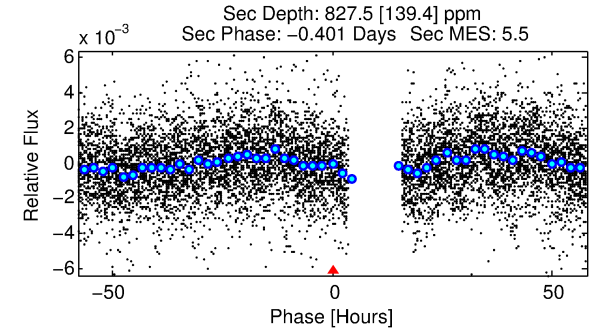
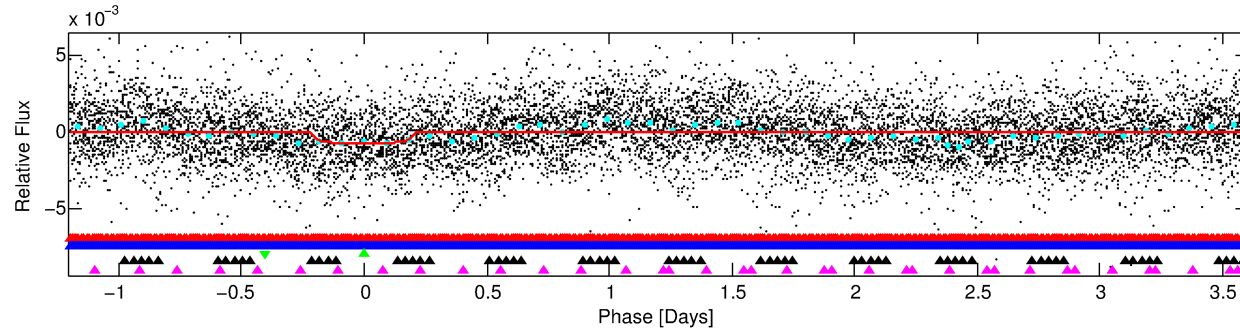
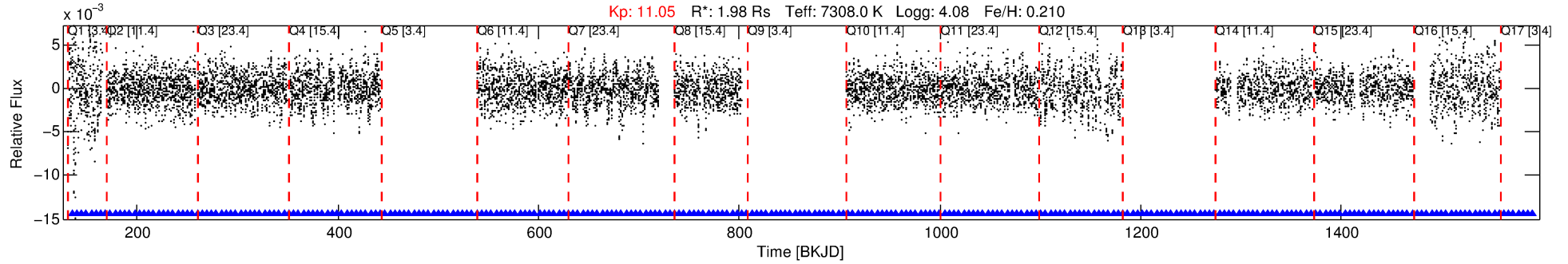
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 006019416-03

No Significant Match Found

# DV One-Page Summary

KIC: 6019416 Candidate: 3 of 5 Period: 4.804 d



## DV Fit Results:

Period = 4.80439 [0.00009] d  
Epoch = 135.1077 [0.0133] BKJD  
Rp/R\* = 0.0283 [0.0022]  
a/R\* = 2.05 [0.53]  
b = 0.88 [0.09]  
Seff = 2252.37 [841.17]  
Teq = 1757 [164] K  
Rp = 6.12 [1.74] Re  
a = 0.0668 [0.0150] AU  
Ag = 54.11 [21.22] [2.50σ]  
Teffp = 7366 [549] K [9.79σ]

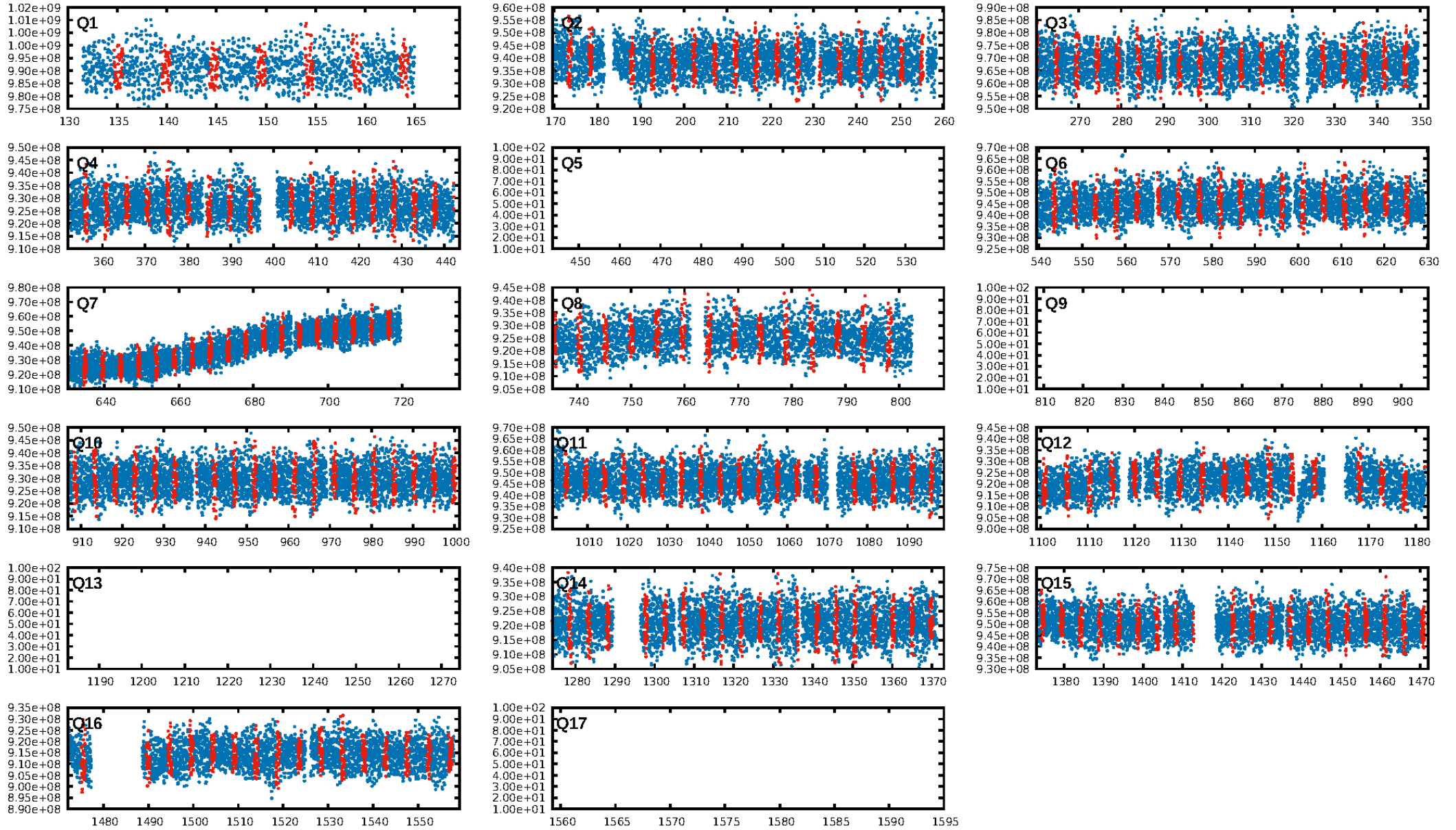
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [9.27σ]  
LongPeriod-sig: 100.0% [39.17σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [201/201]  
GhostDiagnostic-chr: -0.0923  
Centroid-sig: 79.0%  
Centroid-so: 0.097 arcsec [2.74σ]  
OotOffset-rm: 0.702 arcsec [1.43σ]  
KicOffset-rm: 0.516 arcsec [1.15σ]  
OotOffset-st: 4/4/4/1 [13]  
KicOffset-st: 4/4/4/1 [13]  
DiffImageQuality-fgm: 0.62 [8/13]  
DiffImageOverlap-fno: 0.00 [0/13]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 10:44:49 Z

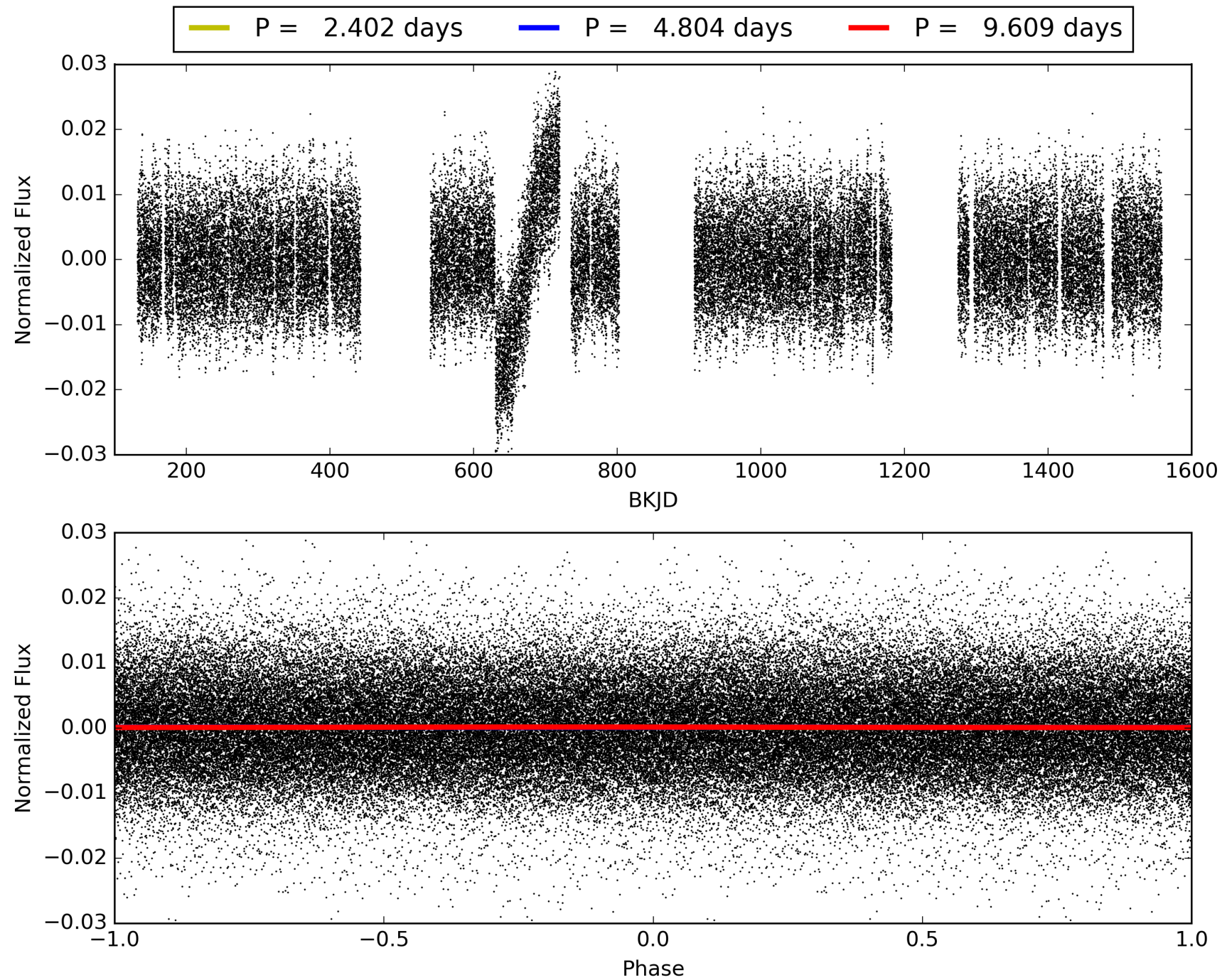
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 006019416-03, PDC Light Curves





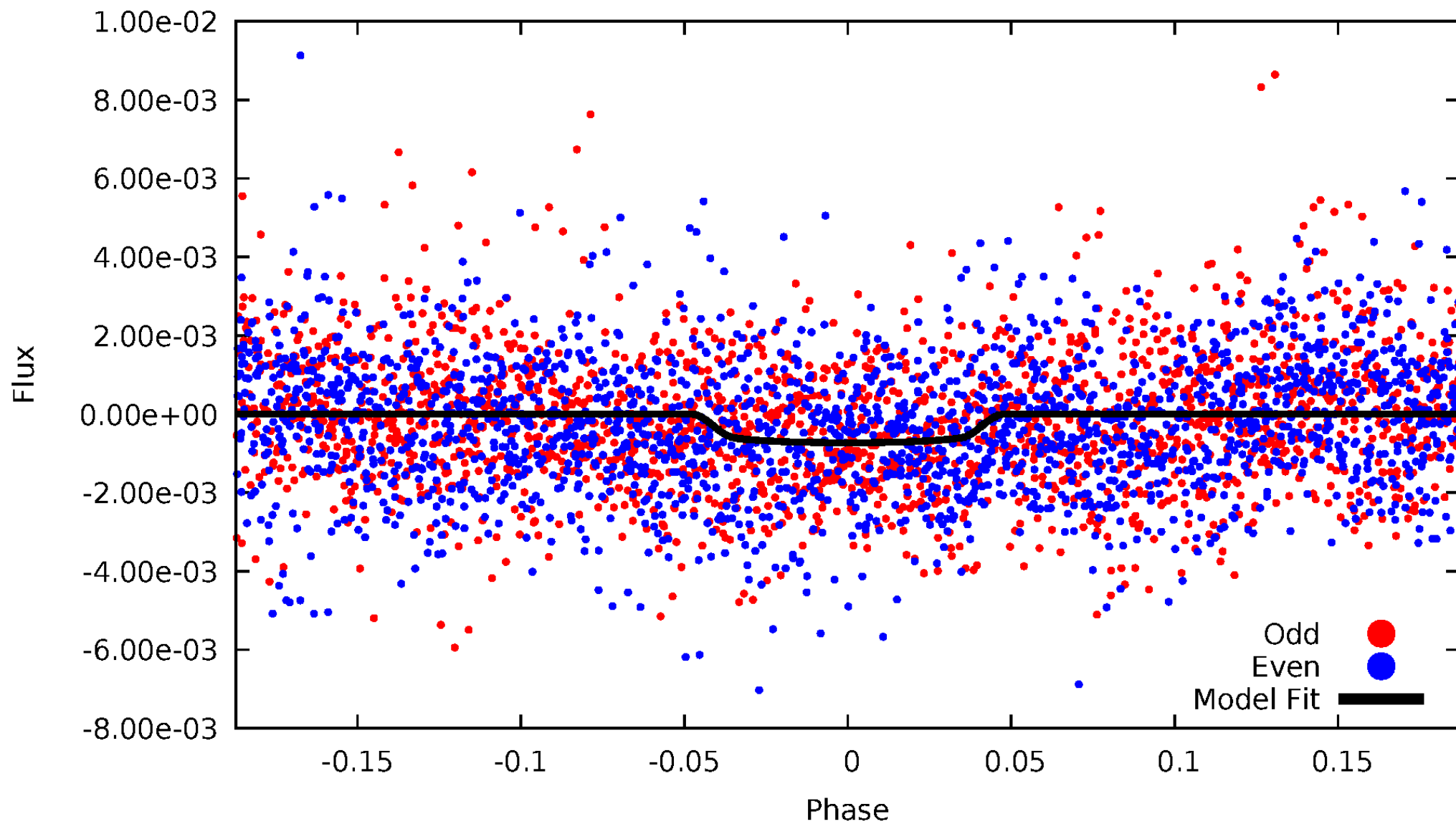
TCE 006019416-03





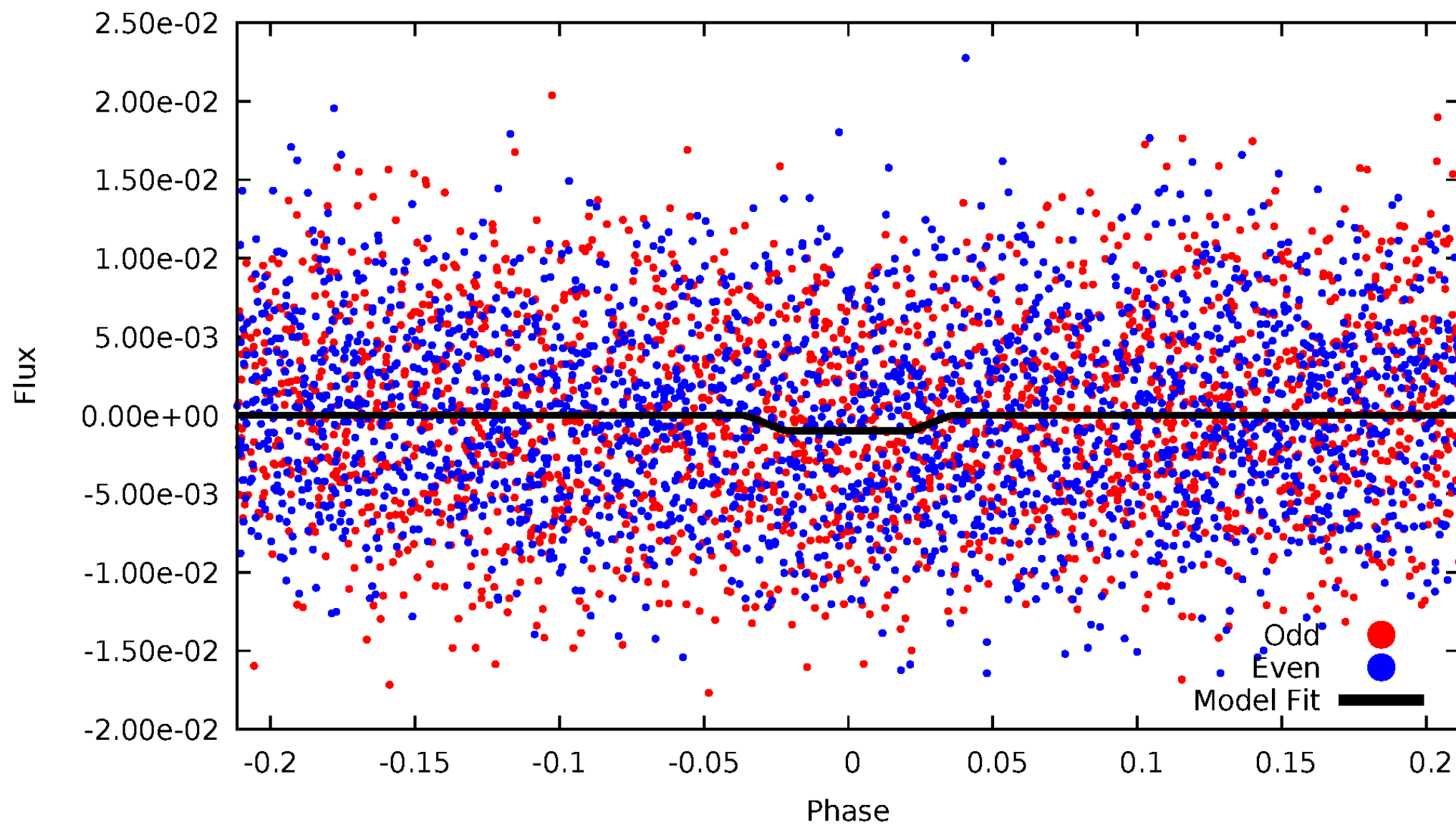
# DV Odd/Even

TCE 006019416-03



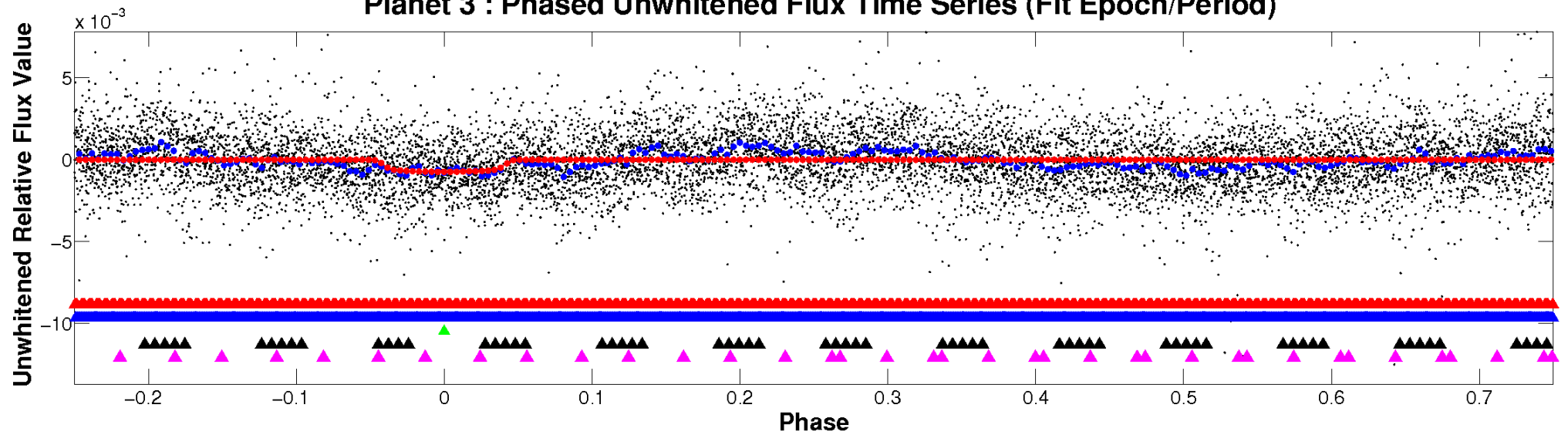
# ALT Odd/Even

TCE 006019416-03

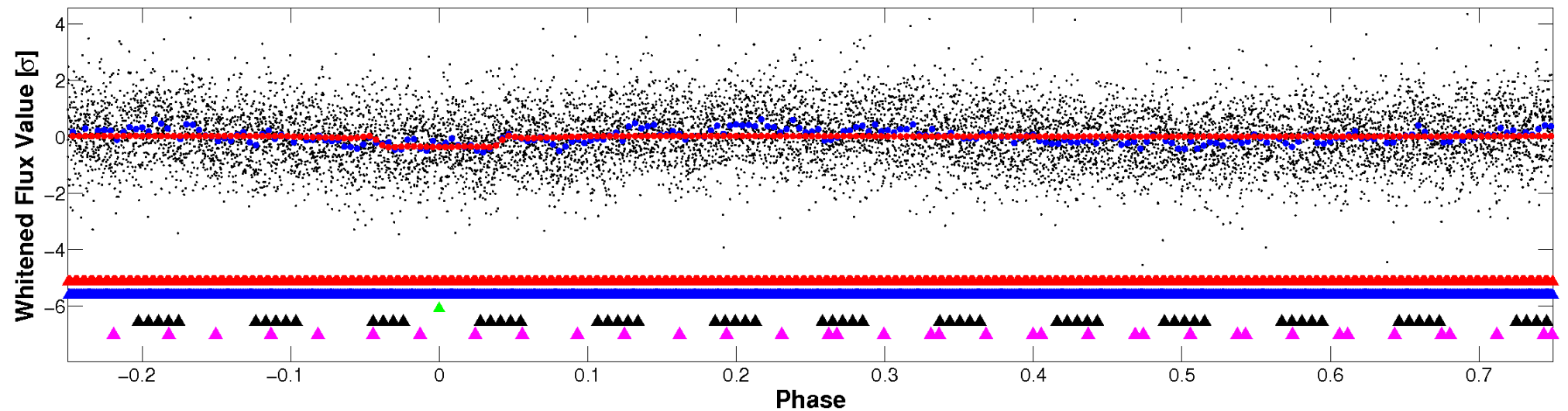


# Non-Whitened Vs. Whitened Light Curve

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

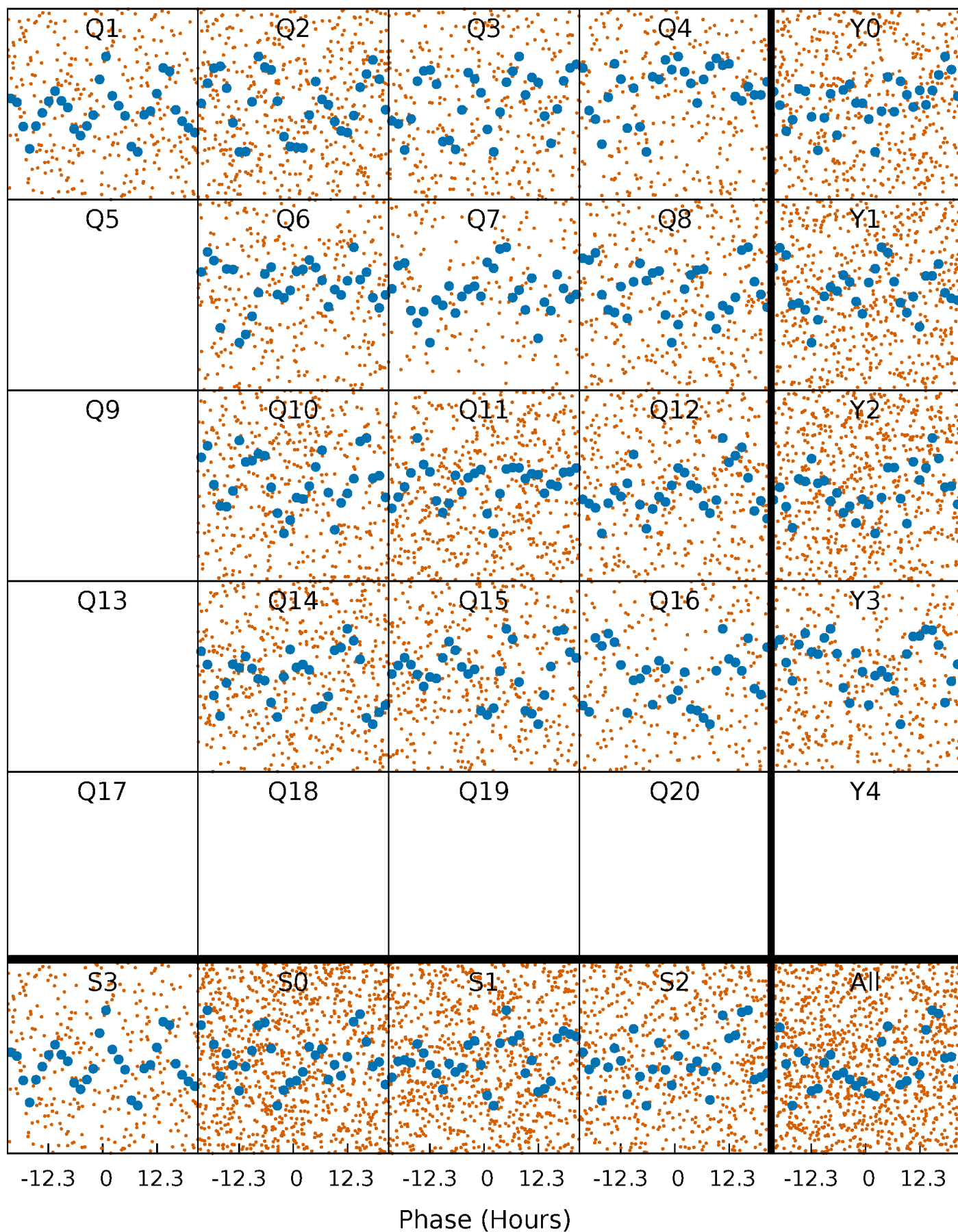


## Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



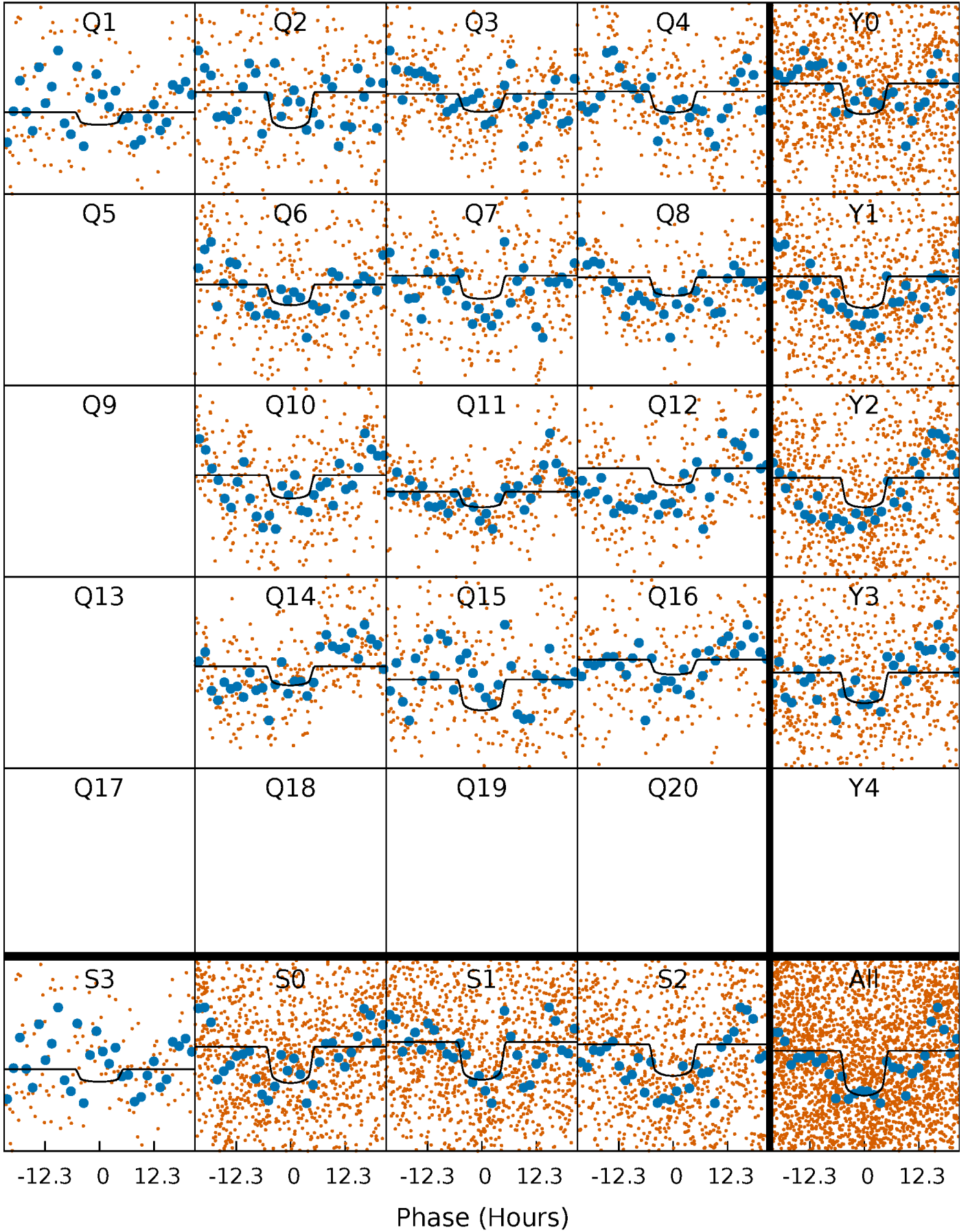
# PDC Quarter-Phased Transit Curves

TCE 006019416-03   P= 4.804386 Days    $T_0=135.107729$  (BKJD)



# DV Quarter-Phased Transit Curves

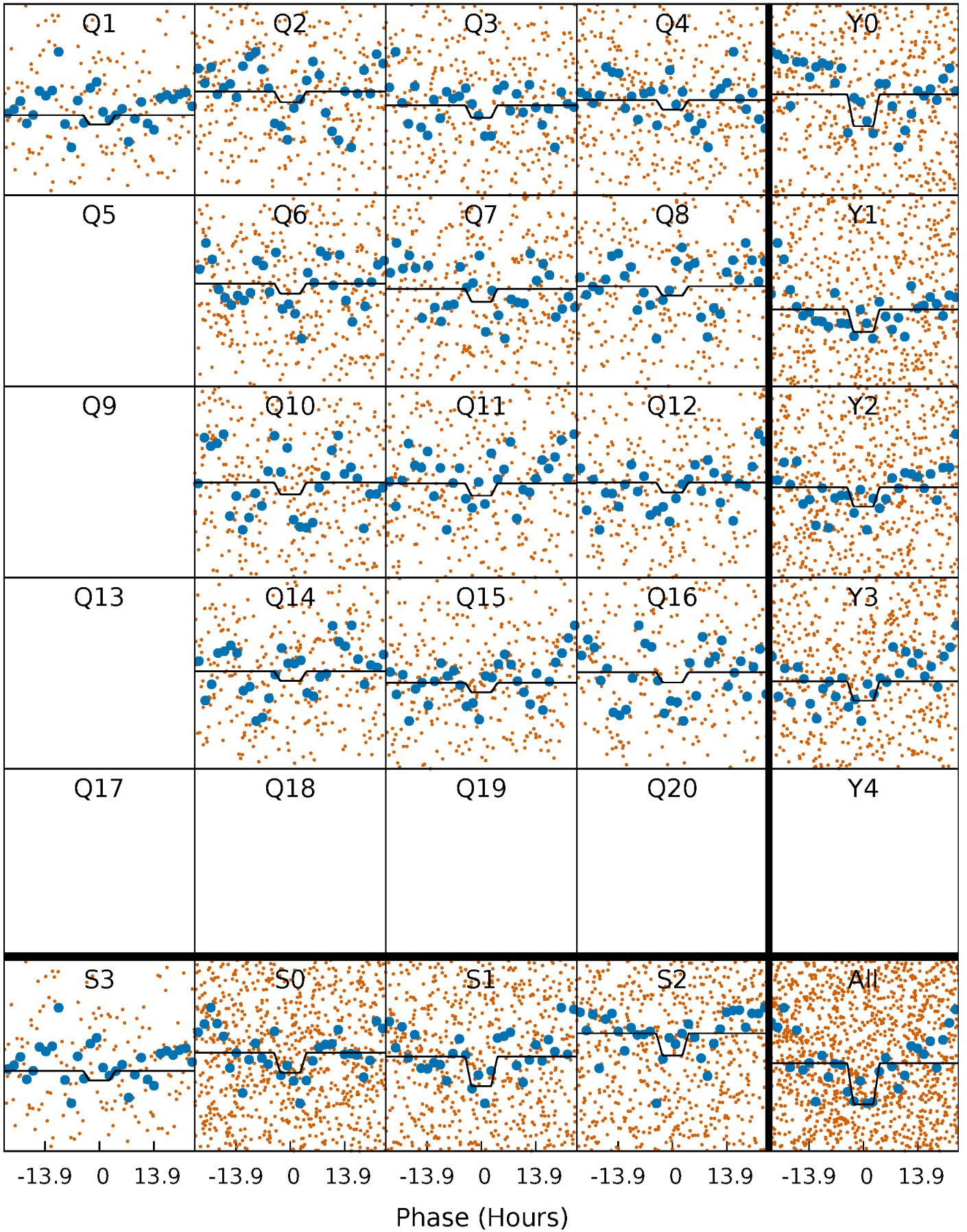
TCE 006019416-03 P= 4.804386 Days  $T_0=135.107729$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

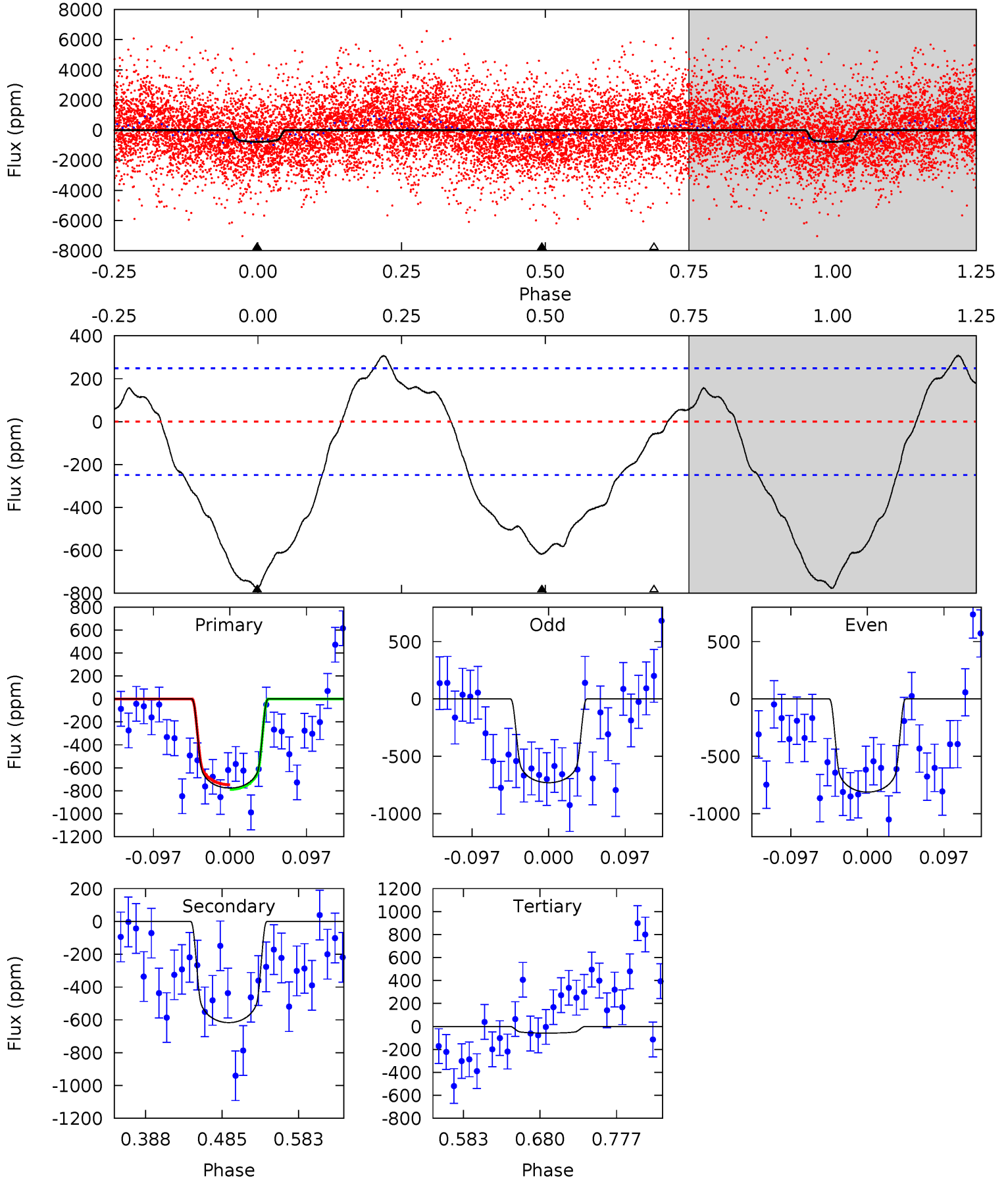
TCE 006019416-03 P= 4.804449 Days  $T_0=135.146096$  (BKJD)



# DV Model-Shift Uniqueness Test

006019416-03, P = 4.804386 Days, E = 130.303343 Days

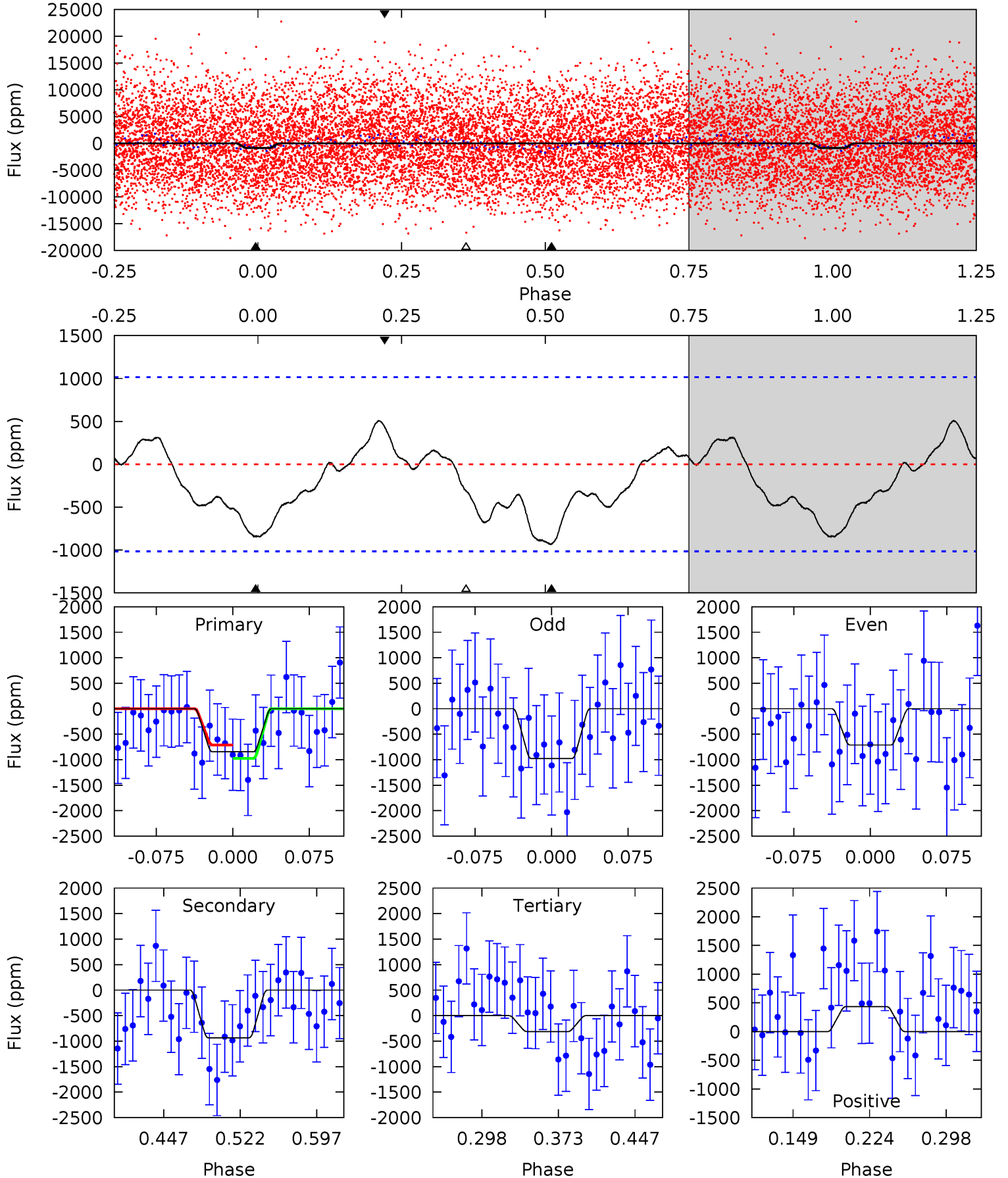
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
14.3	11.3	1.07	0	4.57	1.66	3.64	13.2	14.3	10.3	11.3	0.76	0.86	0.28	0.37



# Alt Model-Shift Uniqueness Test

006019416-03, P = 4.804449 Days, E = 130.341647 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
3.85	4.25	1.42	1.98	4.63	1.78	1.29	2.43	1.87	2.83	2.27	0.60	1.87	0.35	0.60



### Stellar Parameters For KIC 006019416

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$7308^{+206}_{-353}$	$4.079^{+0.140}_{-0.171}$	$0.210^{+0.150}_{-0.350}$	$1.982^{+0.542}_{-0.394}$	$1.716^{+0.184}_{-0.276}$	$0.311^{+0.218}_{-0.149}$
	+3%/-5%	+3%/-4%	+71%/-167%	+27%/-20%	+11%/-16%	+70%/-48%
Source	PHO54	PHO54	PHO54	DSEP		

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

### Secondary Eclipse Parameters for KIC 006019416-03 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-617 \pm 54$	$6.12^{+0.98}_{-0.82}$	$2451^{+177}_{-162}$	$6722^{+426}_{-374}$	$39^{+14}_{-10}$
Alt.	$-933 \pm 219$	$6.85^{+1.01}_{-0.95}$	$2447^{+178}_{-172}$	$7134^{+582}_{-657}$	$48^{+20}_{-16}$

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

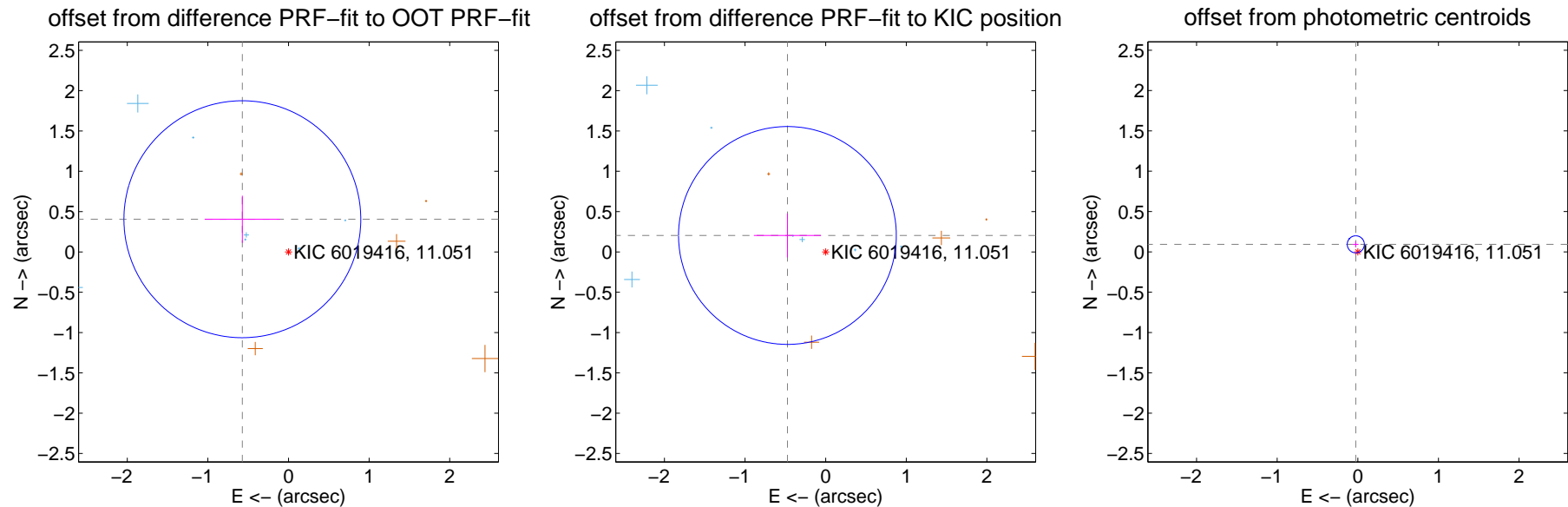
## DV Centroid Data

Supplemental centroid analysis for 006019416-03. **Kepler magnitude: 11.05.** Transit SNR 10.32

There are 8 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.19 arcsec

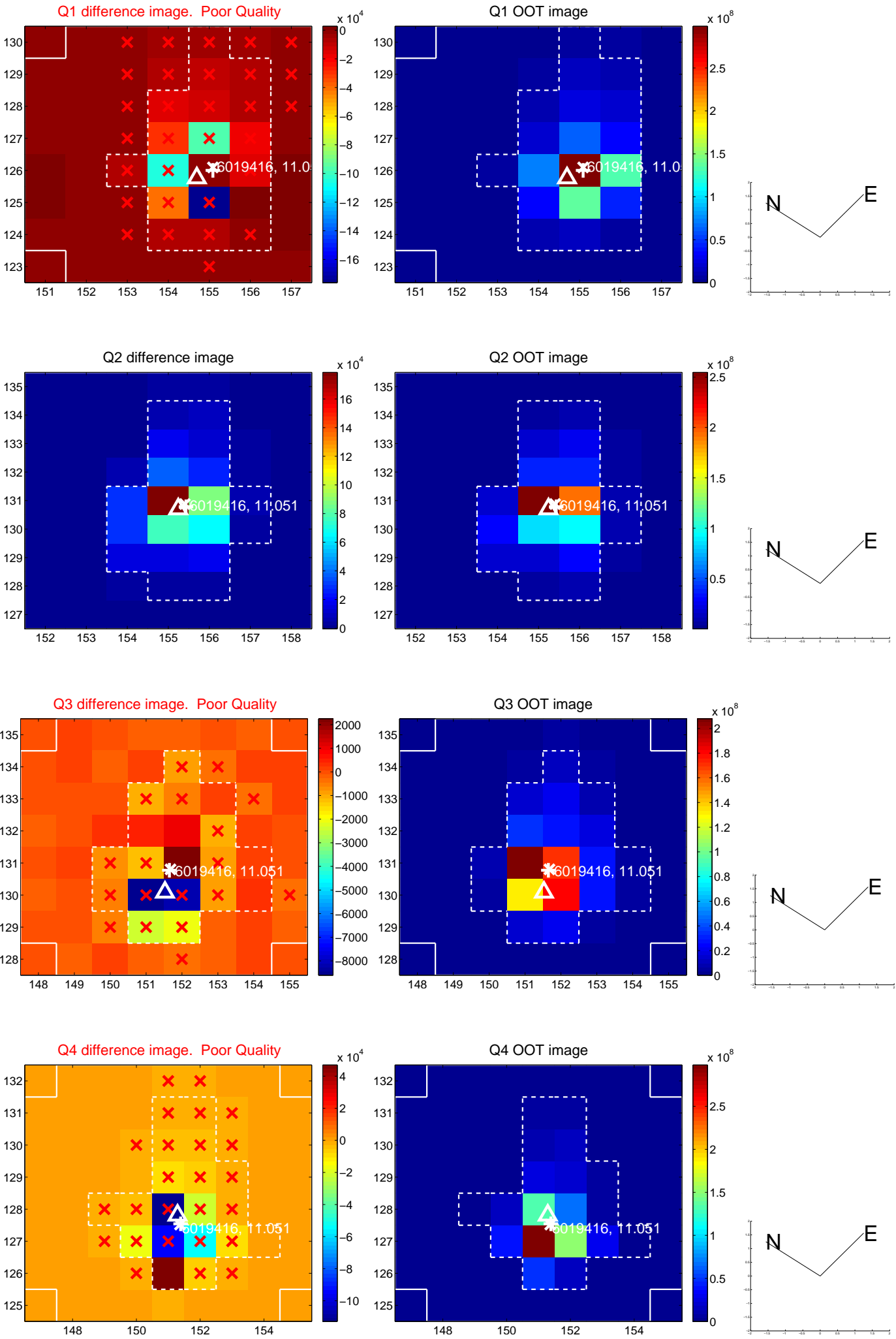
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.702 \pm 0.490$	1.43	$0.572 \pm 0.467$	$0.405 \pm 0.292$
PRF-fit source offset from KIC position	$0.516 \pm 0.450$	1.15	$0.474 \pm 0.416$	$0.204 \pm 0.272$
photometric centroid source offset	$0.10 \pm 0.04$	2.74	$0.03 \pm 0.03$	$0.09 \pm 0.04$



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.

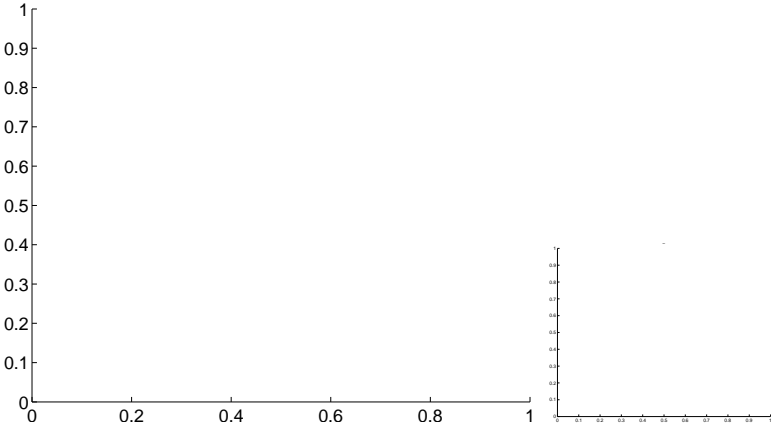


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

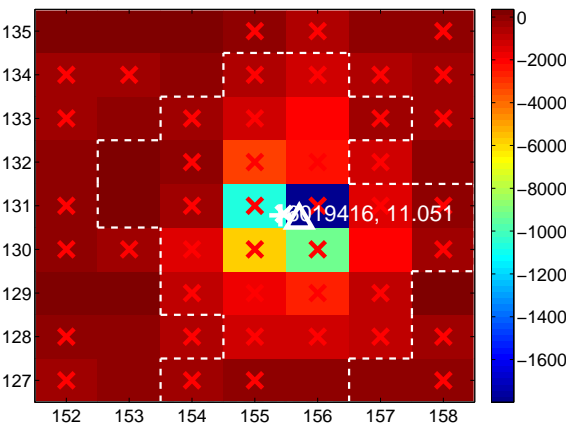
Q5 no difference image



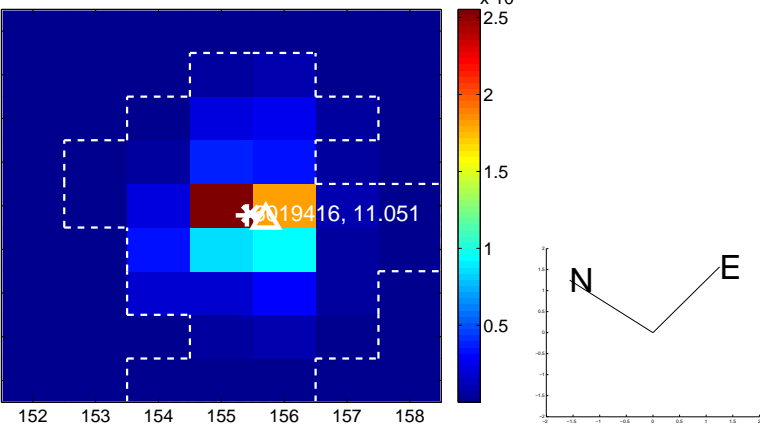
Q5 no OOT image



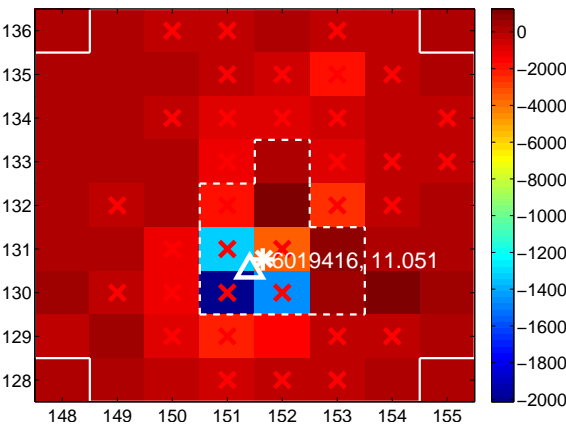
Q6 difference image. Poor Quality



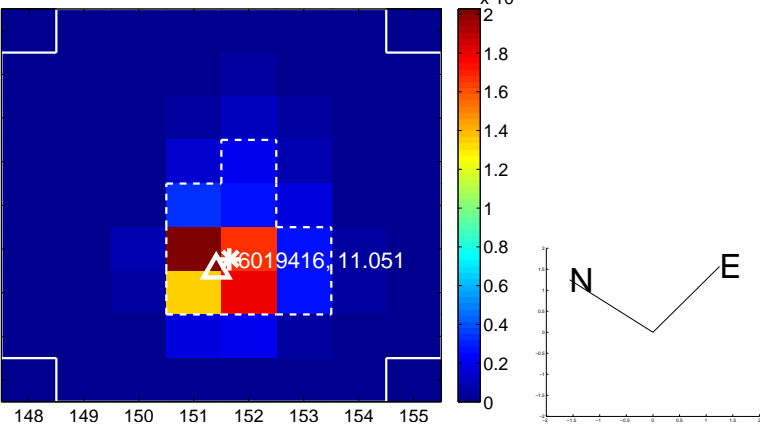
Q6 OOT image



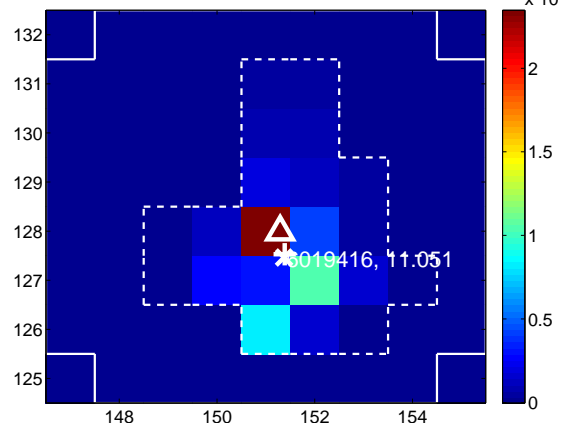
Q7 difference image. Poor Quality



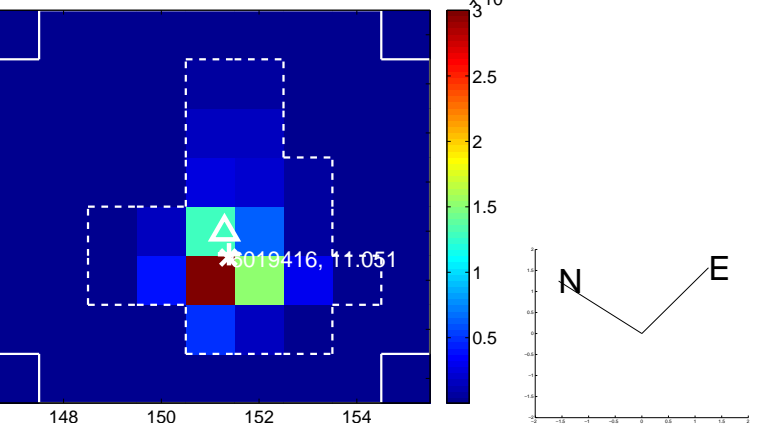
Q7 OOT image



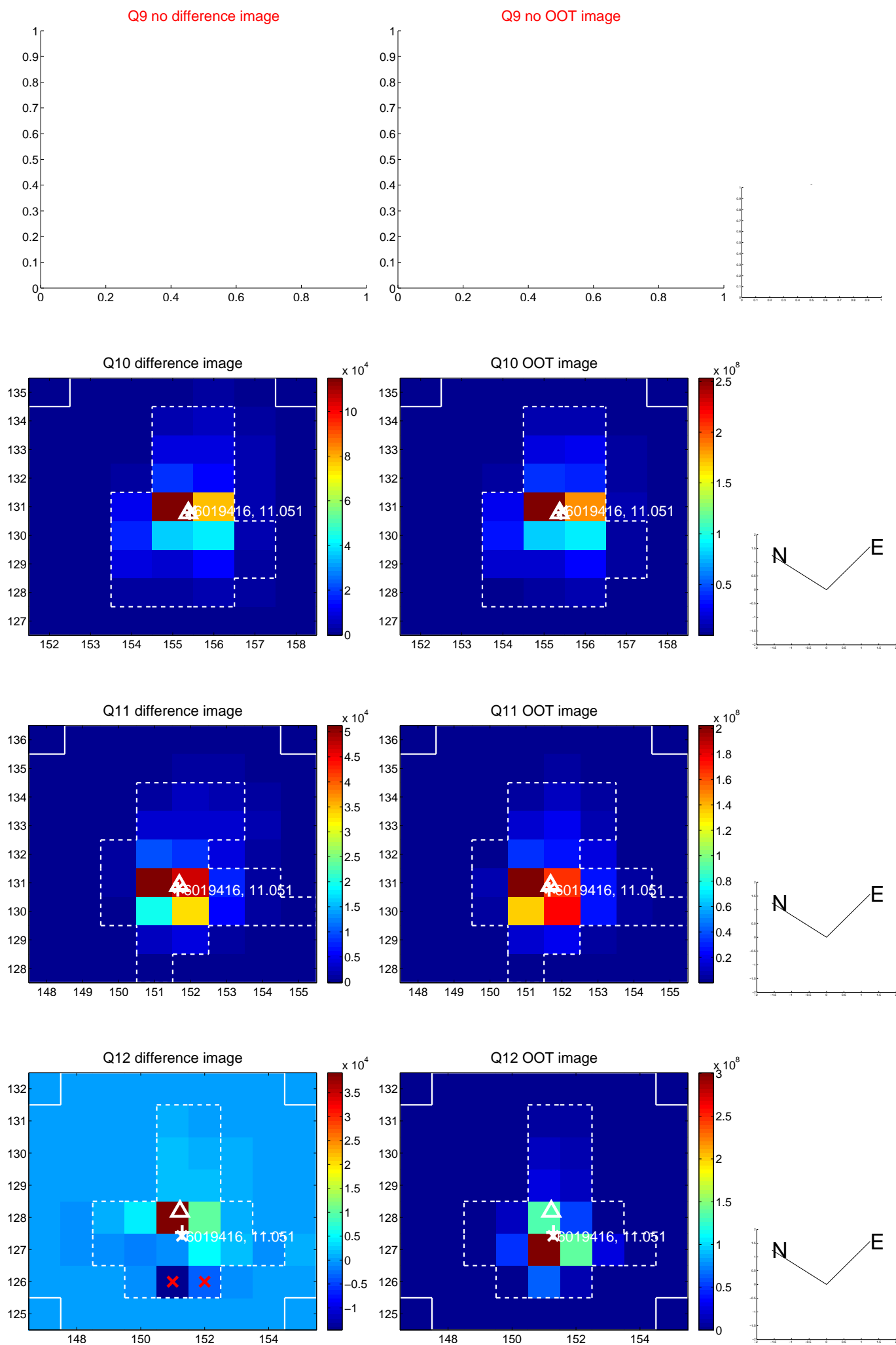
Q8 difference image



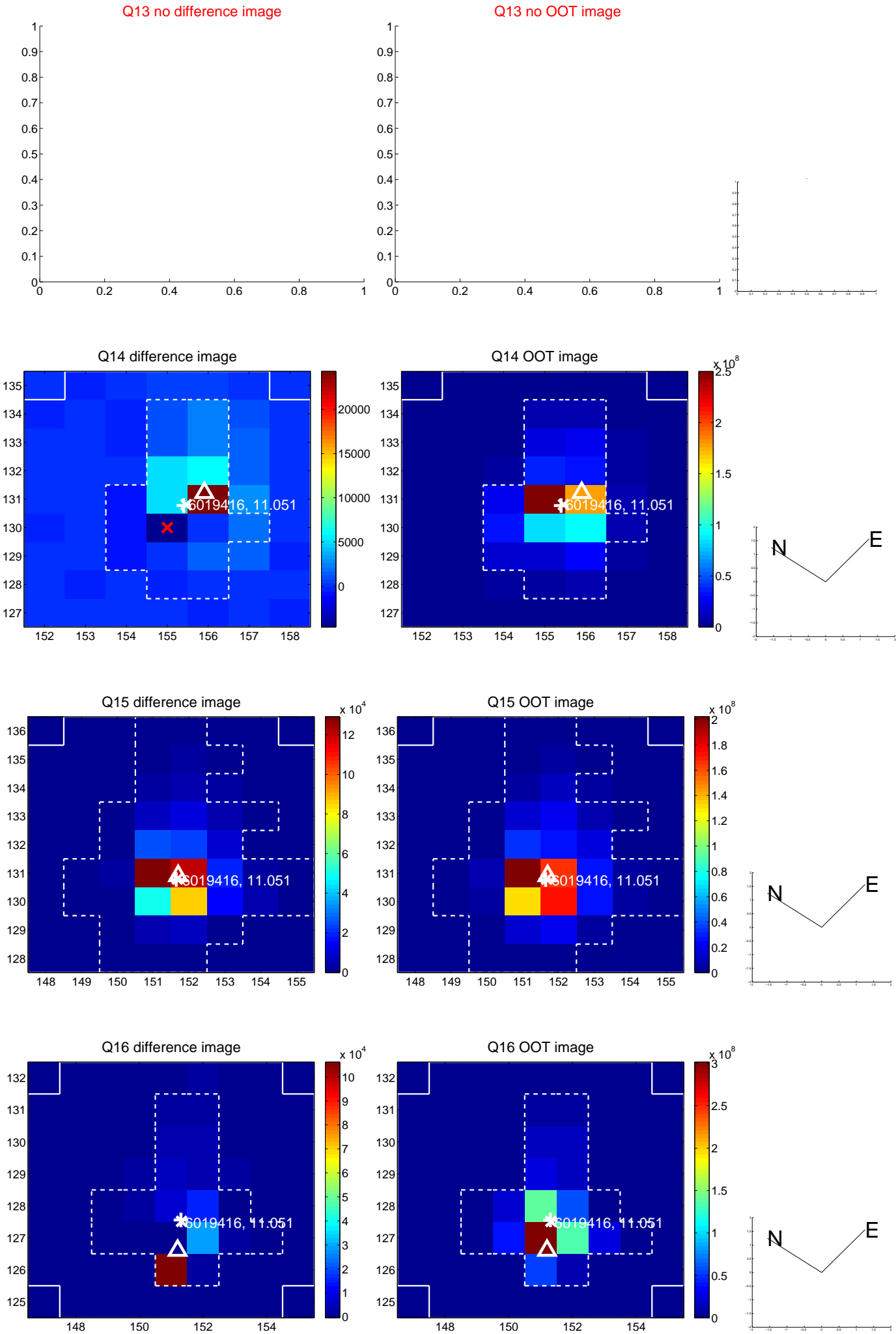
Q8 OOT image



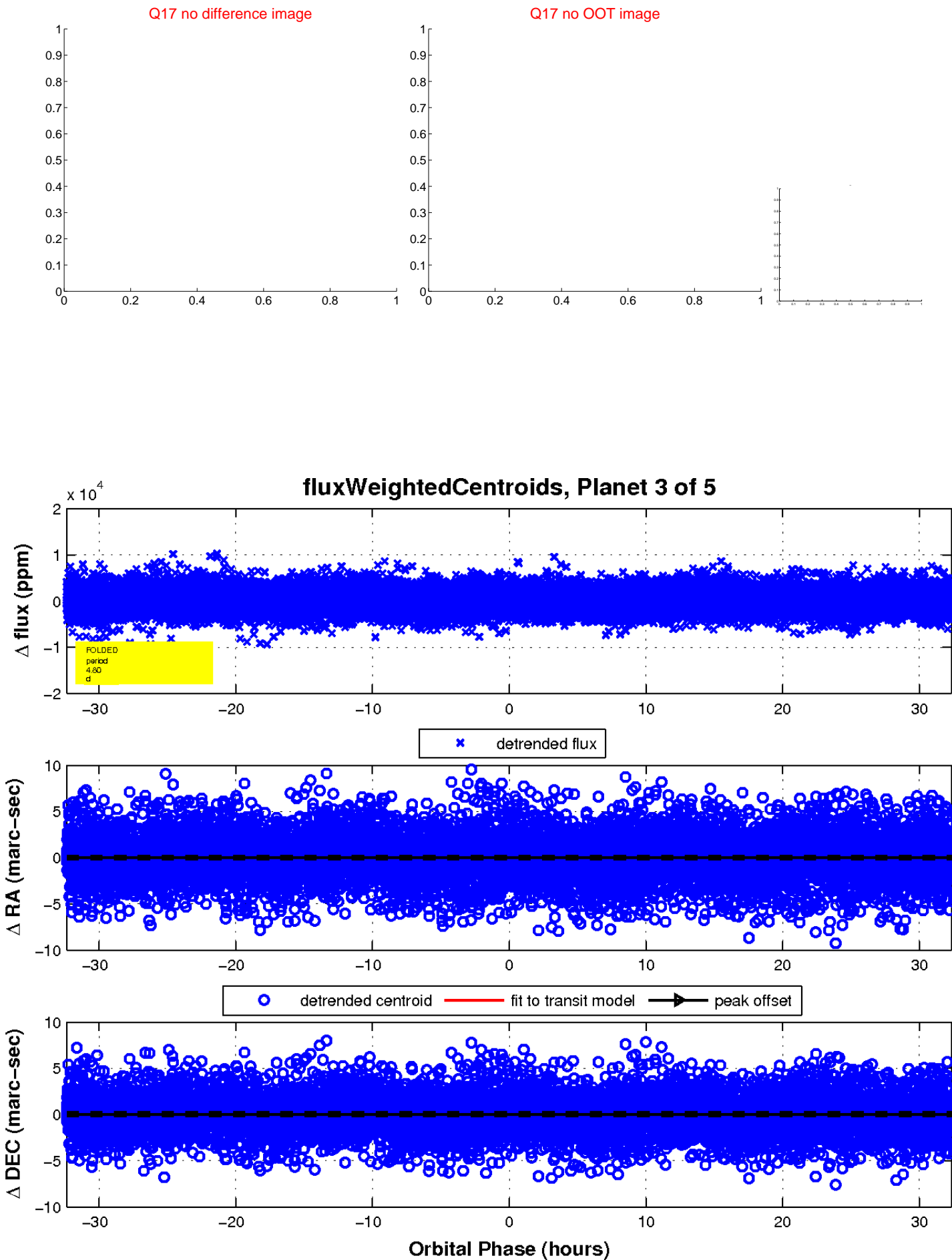
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



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

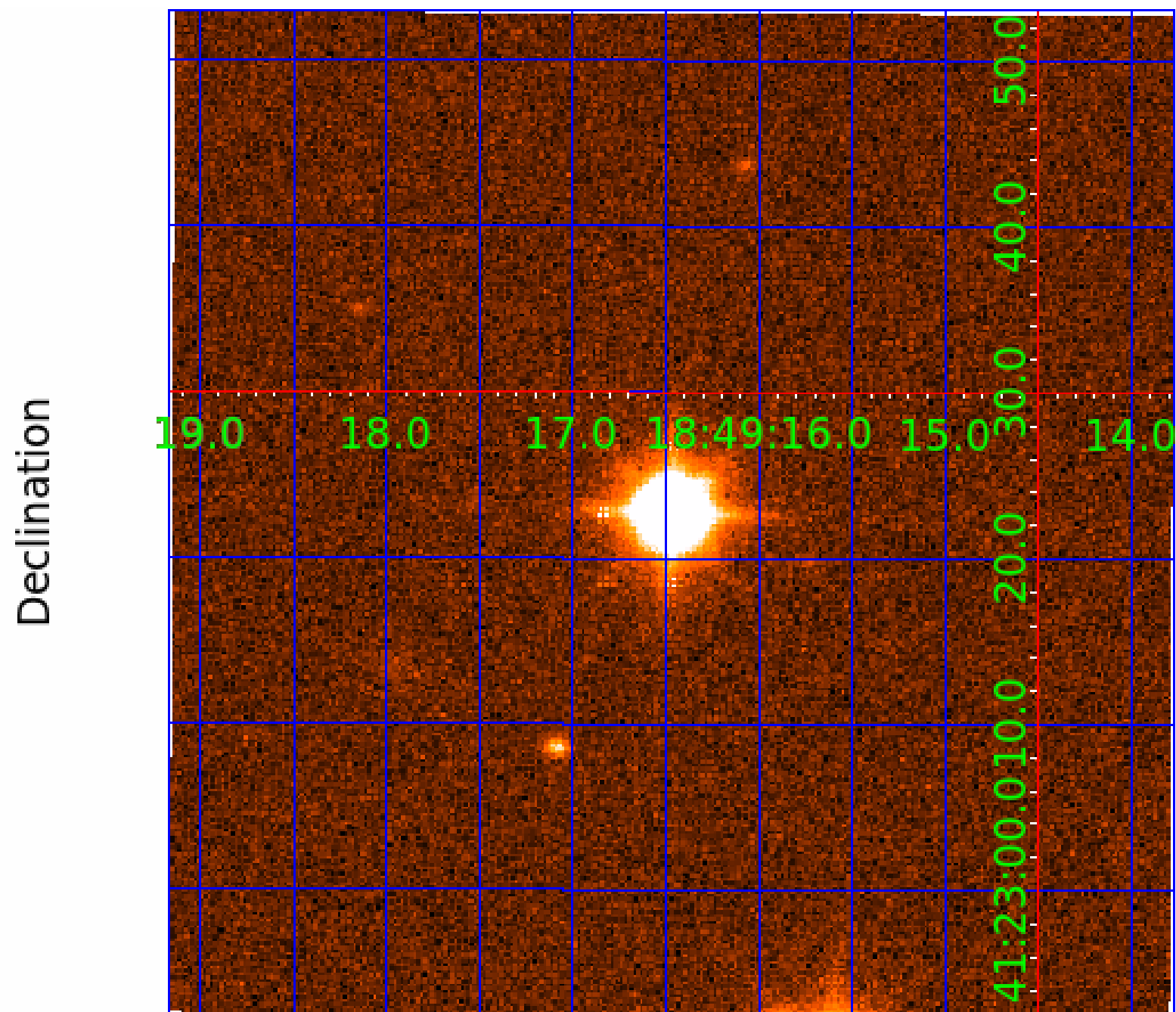


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image



# KIC 006019416

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006019416-01	OBS	No	0.569597	131.550624	30.6	0.881	10.4	1.5	1.98	7308	1.28	38672.37
006019416-02	OBS	No	0.569616	131.744380	174.6	1.927	9.2	8.0	1.98	7308	2.72	38670.66
006019416-03	OBS	No	4.804386	135.107729	732.3	10.789	8.0	10.3	1.98	7308	6.12	2252.37
006019416-04	OBS	No	22.915723	151.866839	1589.5	2.603	7.6	6.3	1.98	7308	8.55	280.53
006019416-05	OBS	No	38.765512	170.024849	61.9	5.000	7.5	-1.0	1.98	7308	1.58	139.18

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006019416-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—CENT_SATURATED
006019416-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—SAME_NTL_PERIOD—CENT_SATURATED
006019416-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—CENT_SATURATED—HALO_GHOST
006019416-04	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED—HALO_GHOST
006019416-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED

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

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

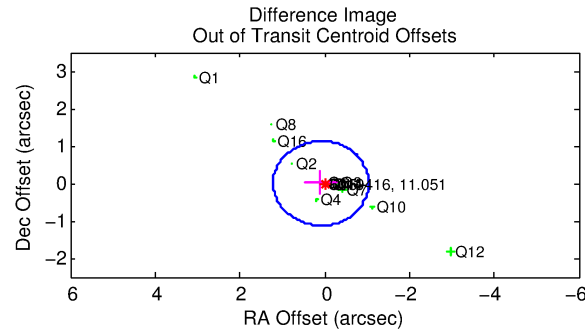
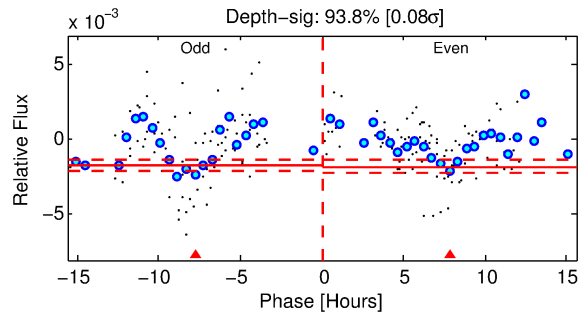
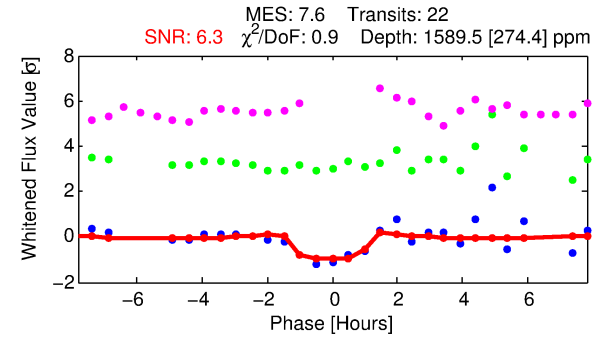
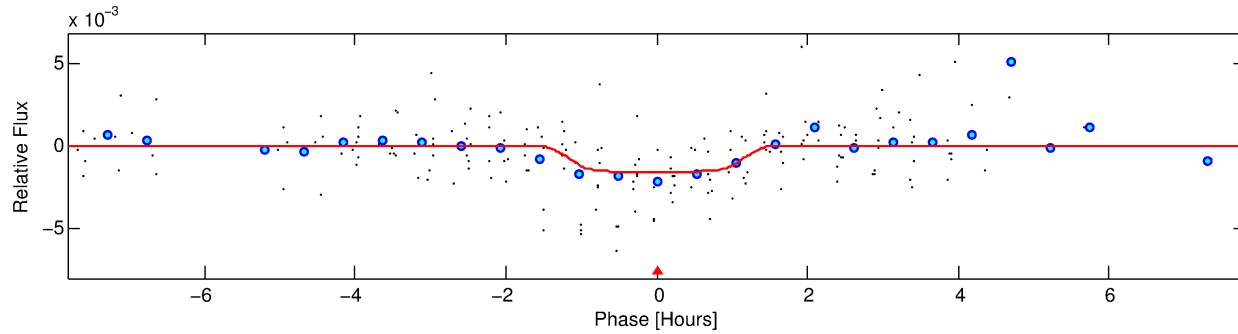
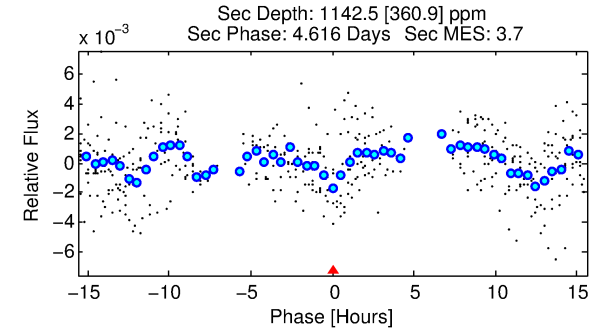
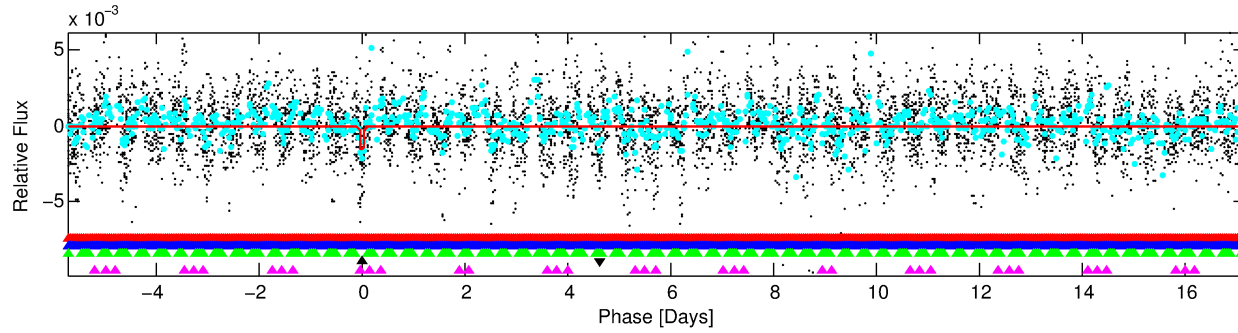
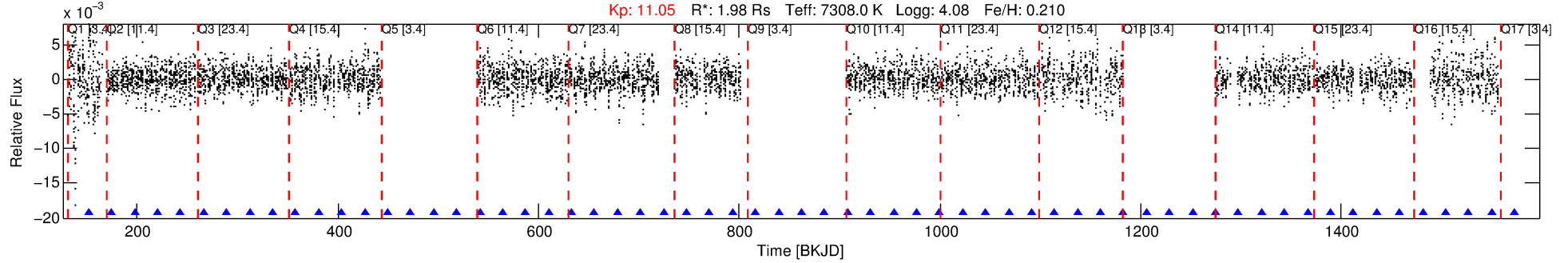
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 006019416-04

No Significant Match Found

# DV One-Page Summary

KIC: 6019416 Candidate: 4 of 5 Period: 22.916 d



## DV Fit Results:

Period = 22.91572 [0.00022] d  
Epoch = 151.8668 [0.0083] BKJD  
Rp/R\* = 0.0395 [0.0221]  
a/R\* = 49.28 [161.57]  
b = 0.74 [2.04]  
Seff = 280.53 [104.77]  
Teq = 1044 [97] K  
Rp = 8.55 [5.31] Re  
a = 0.1892 [0.0425] AU  
Ag = 307.47 [369.76] [0.83σ]  
Teffp = 6756 [1985] K [2.87σ]

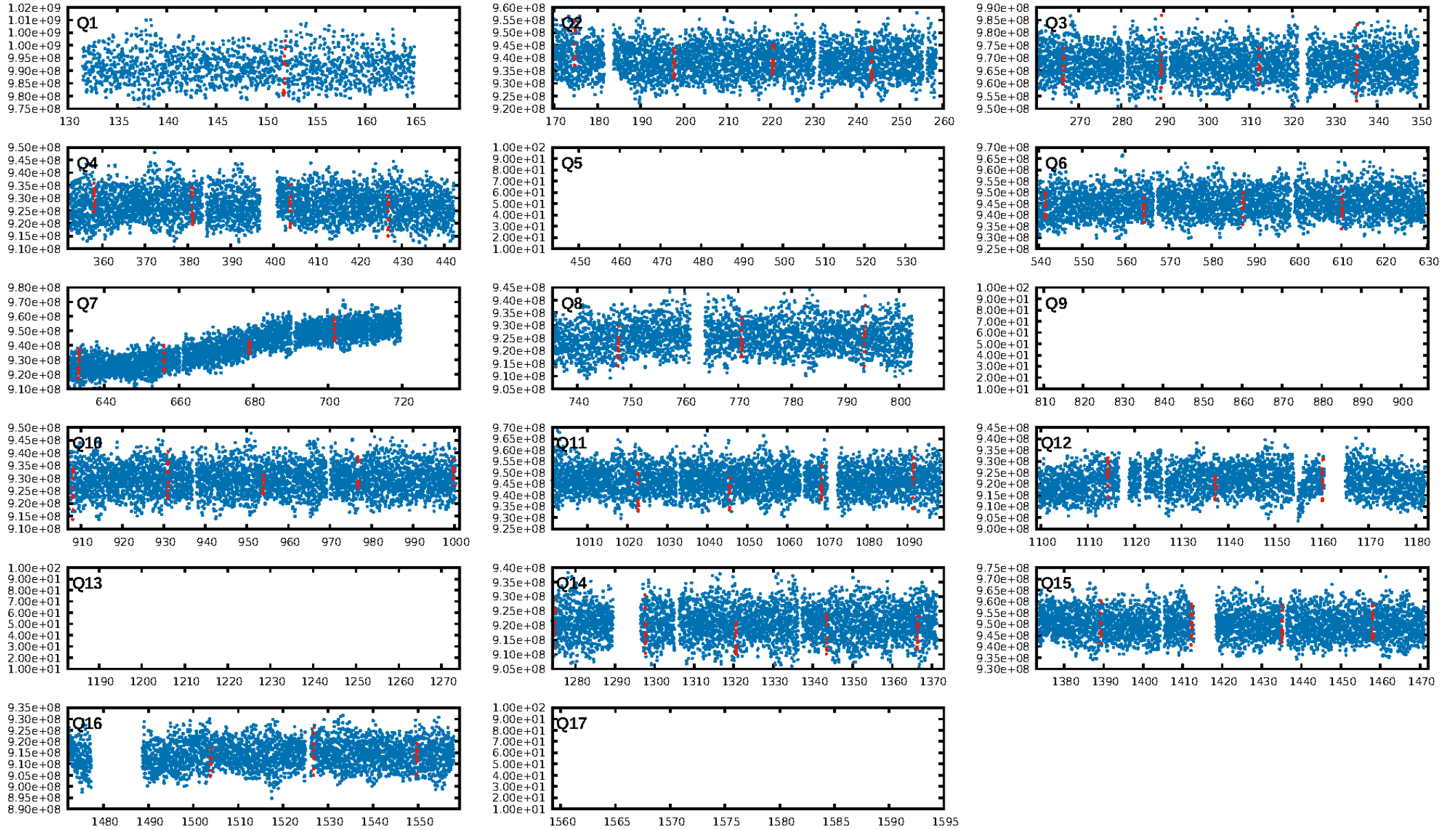
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [39.17σ]  
LongPeriod-sig: 100.0% [67.48σ]  
ModelChiSquare2-sig: 21.8%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [21/21]  
GhostDiagnostic-chr: -0.06245  
Centroid-sig: 8.5%  
Centroid-so: 0.154 arcsec [3.01σ]  
OotOffset-rm: 0.090 arcsec [0.24σ]  
KicOffset-rm: 0.155 arcsec [0.44σ]  
OotOffset-st: 4/4/4/1 [13]  
KicOffset-st: 4/4/4/1 [13]  
DiffImageQuality-fgm: 0.62 [8/13]  
DiffImageOverlap-fno: 0.00 [0/13]

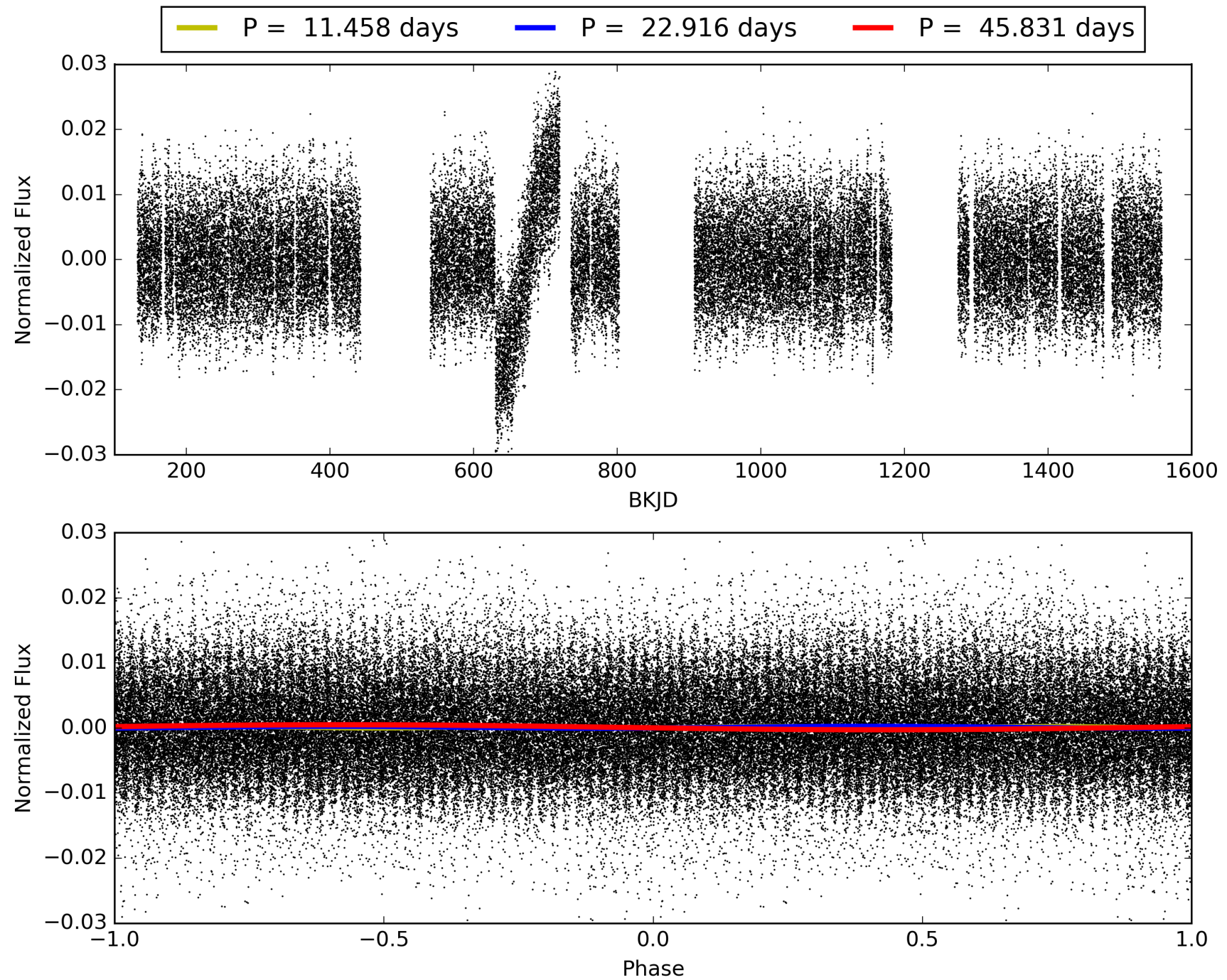
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 10:44:53 Z

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

# TCE 006019416-04, PDC Light Curves



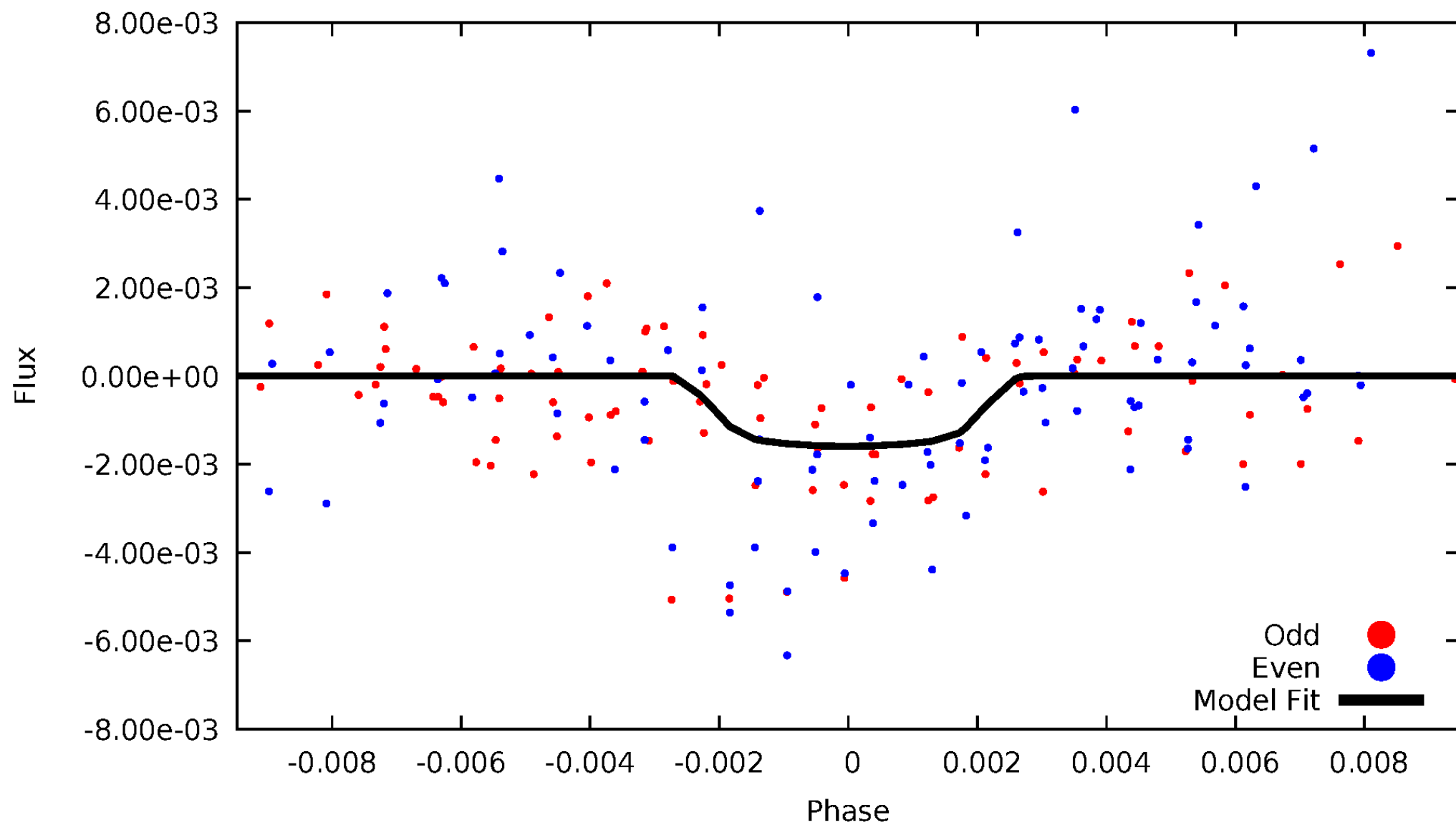
TCE 006019416-04





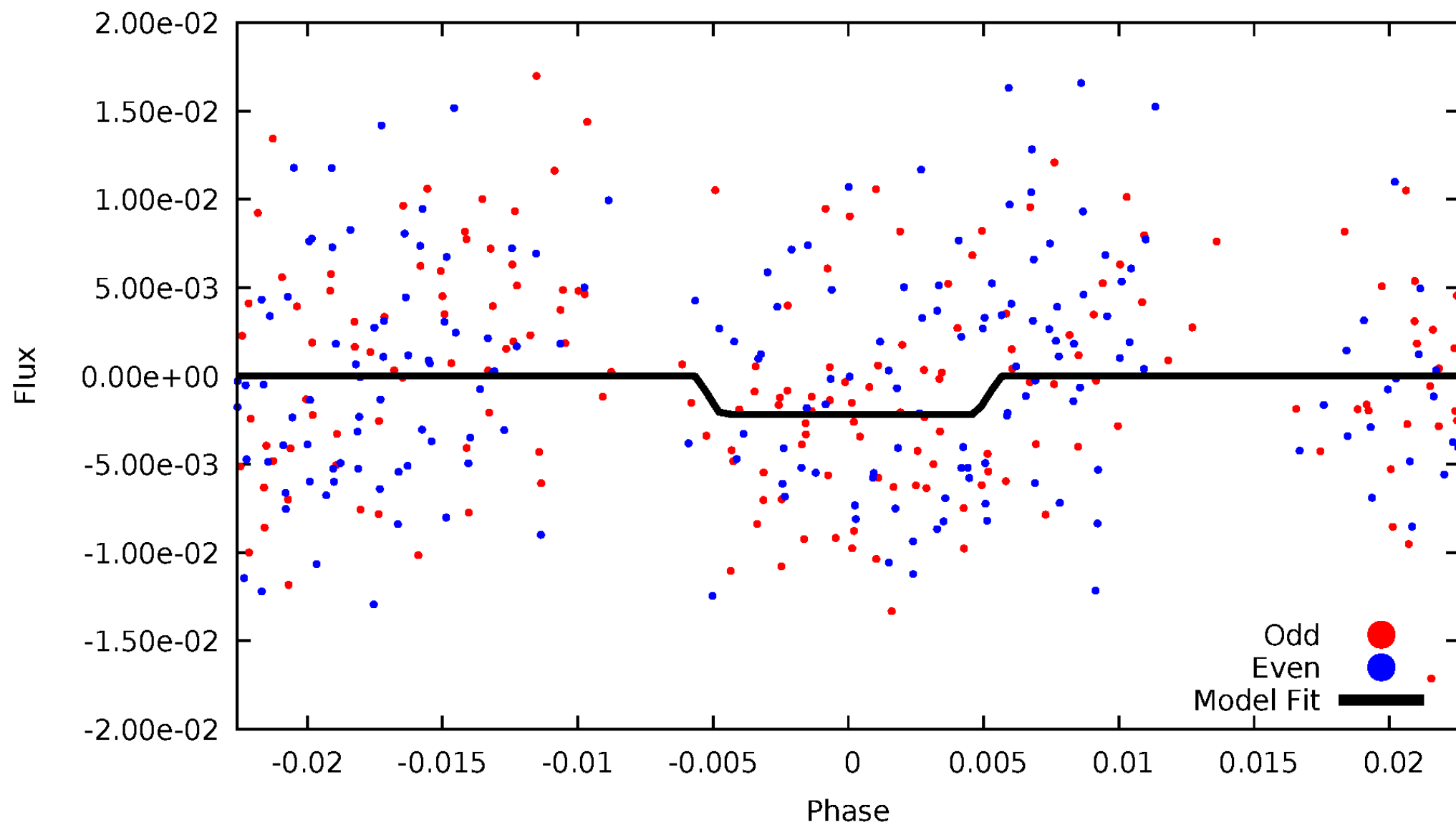
# DV Odd/Even

TCE 006019416-04



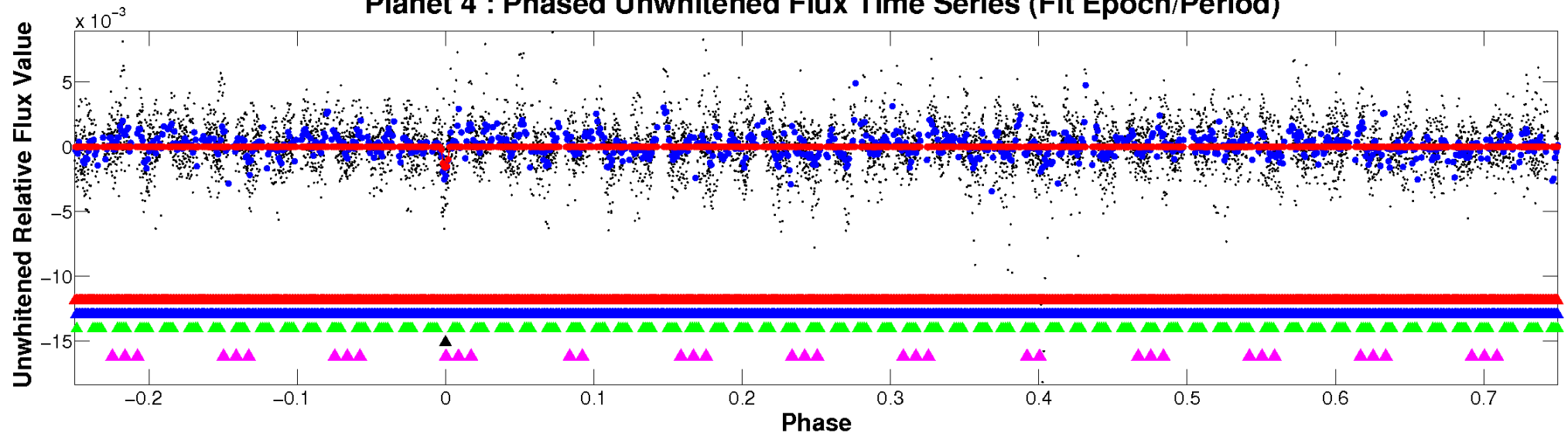
# ALT Odd/Even

TCE 006019416-04

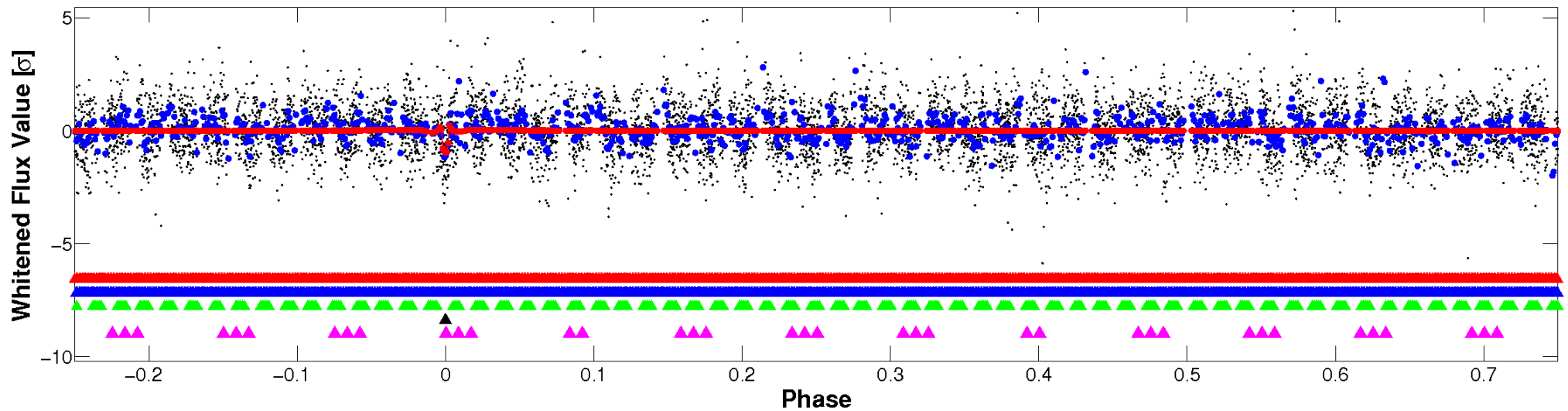


# Non-Whitened Vs. Whitened Light Curve

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

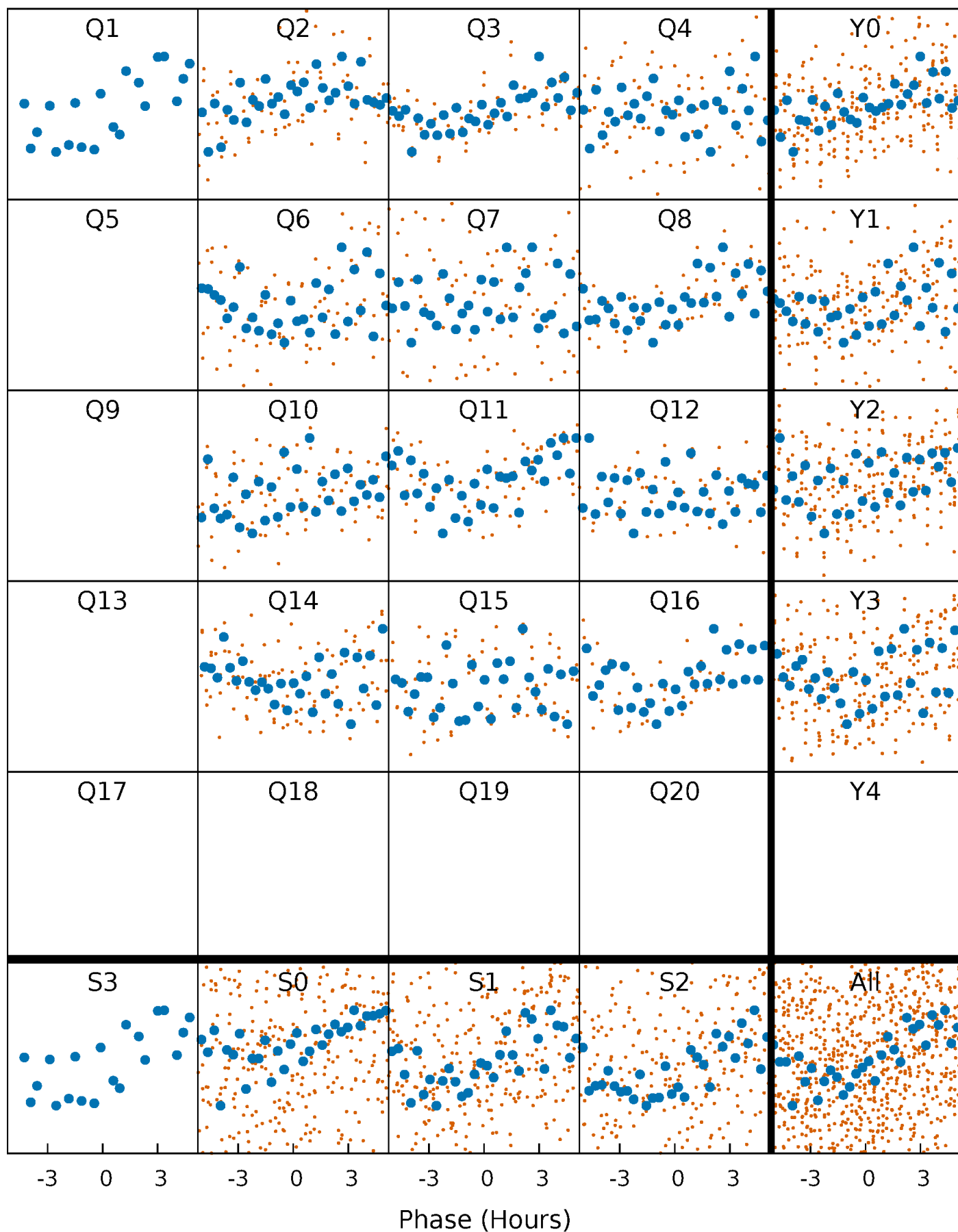


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

TCE 006019416-04 P= 22.915723 Days  $T_0=151.866839$  (BKJD)



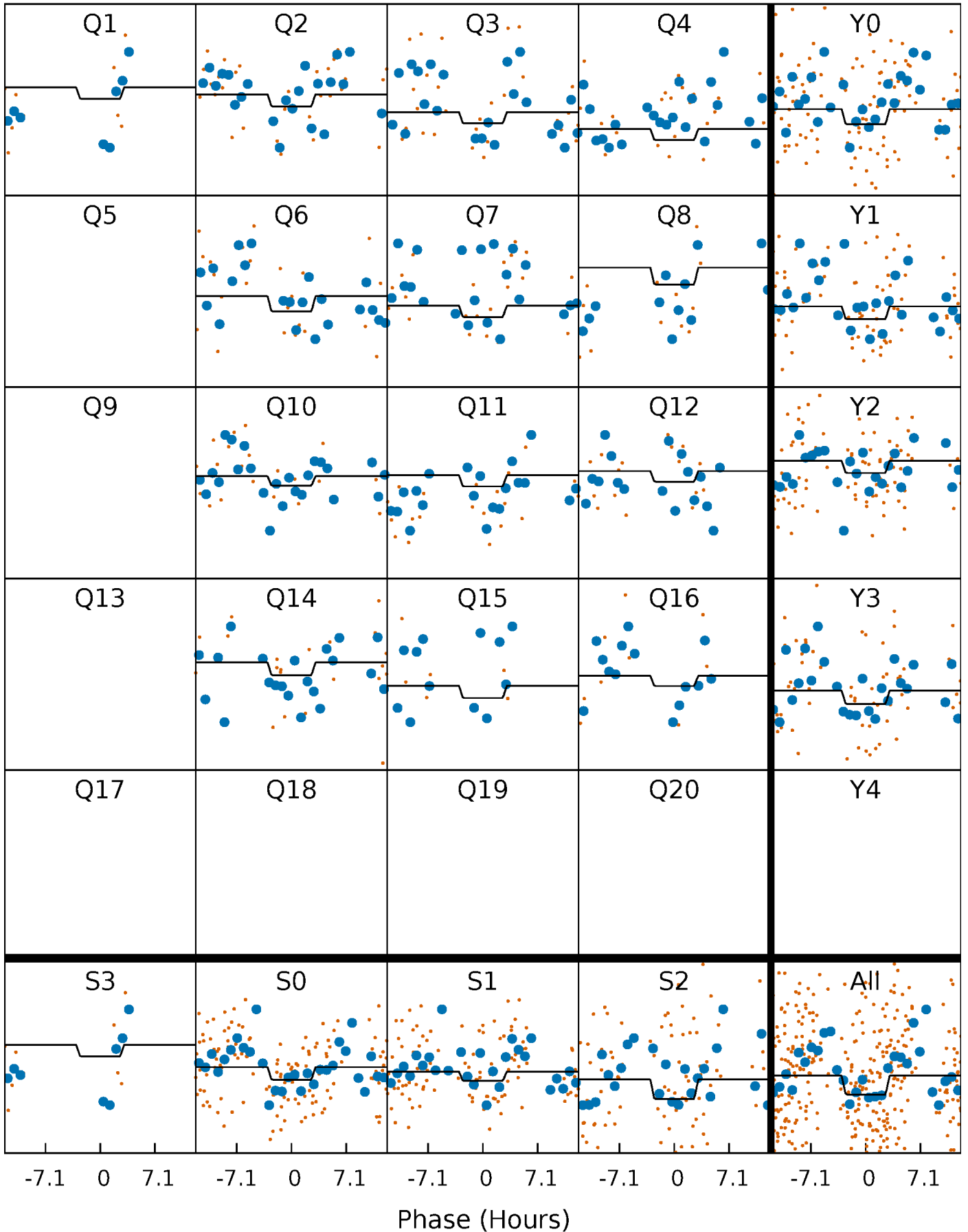
# DV Quarter-Phased Transit Curves

TCE 006019416-04 P= 22.915723 Days  $T_0=151.866839$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 006019416-04 P= 22.915897 Days  $T_0=151.790300$  (BKJD)

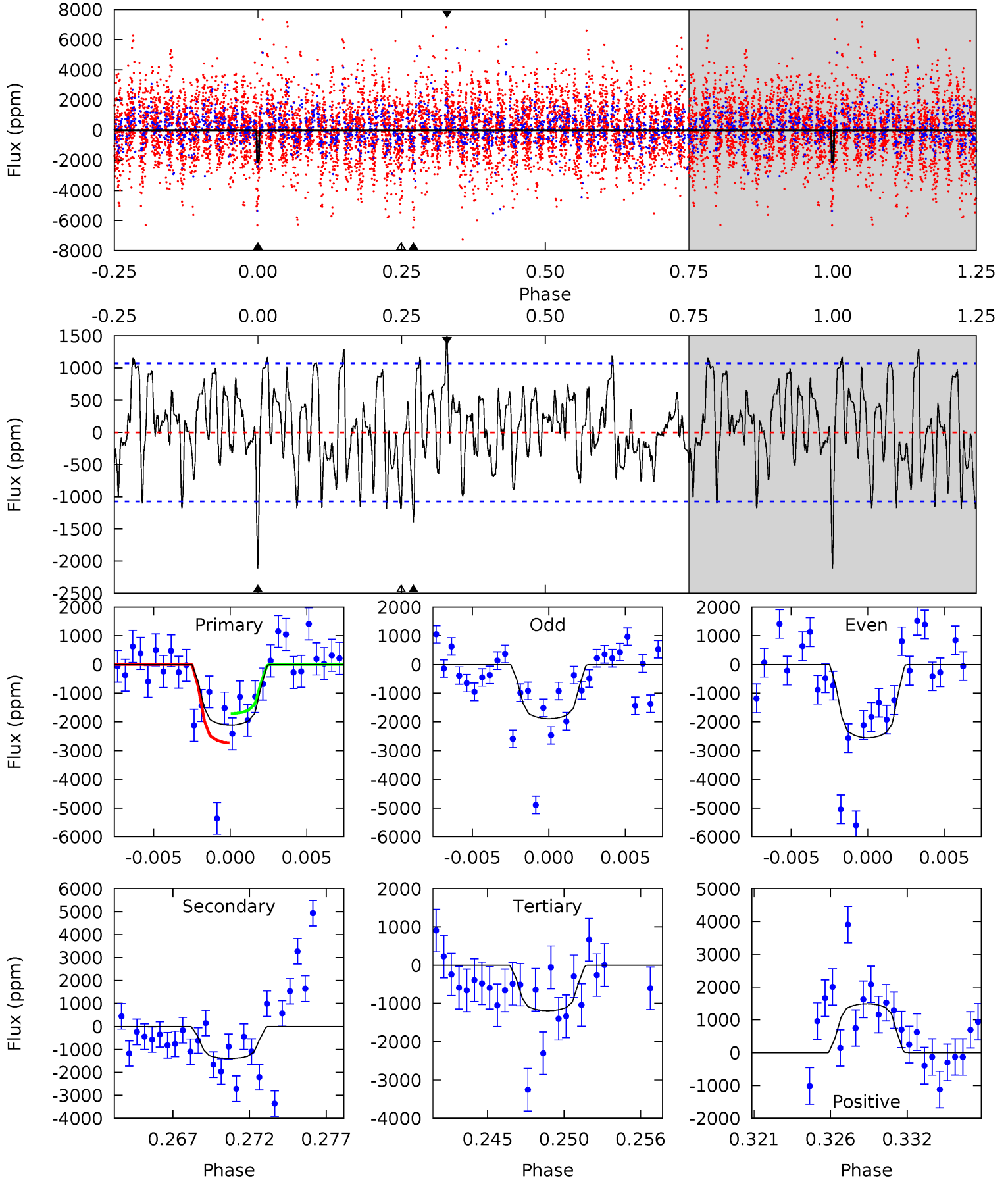




# DV Model-Shift Uniqueness Test

006019416-04, P = 22.915723 Days, E = 128.951116 Days

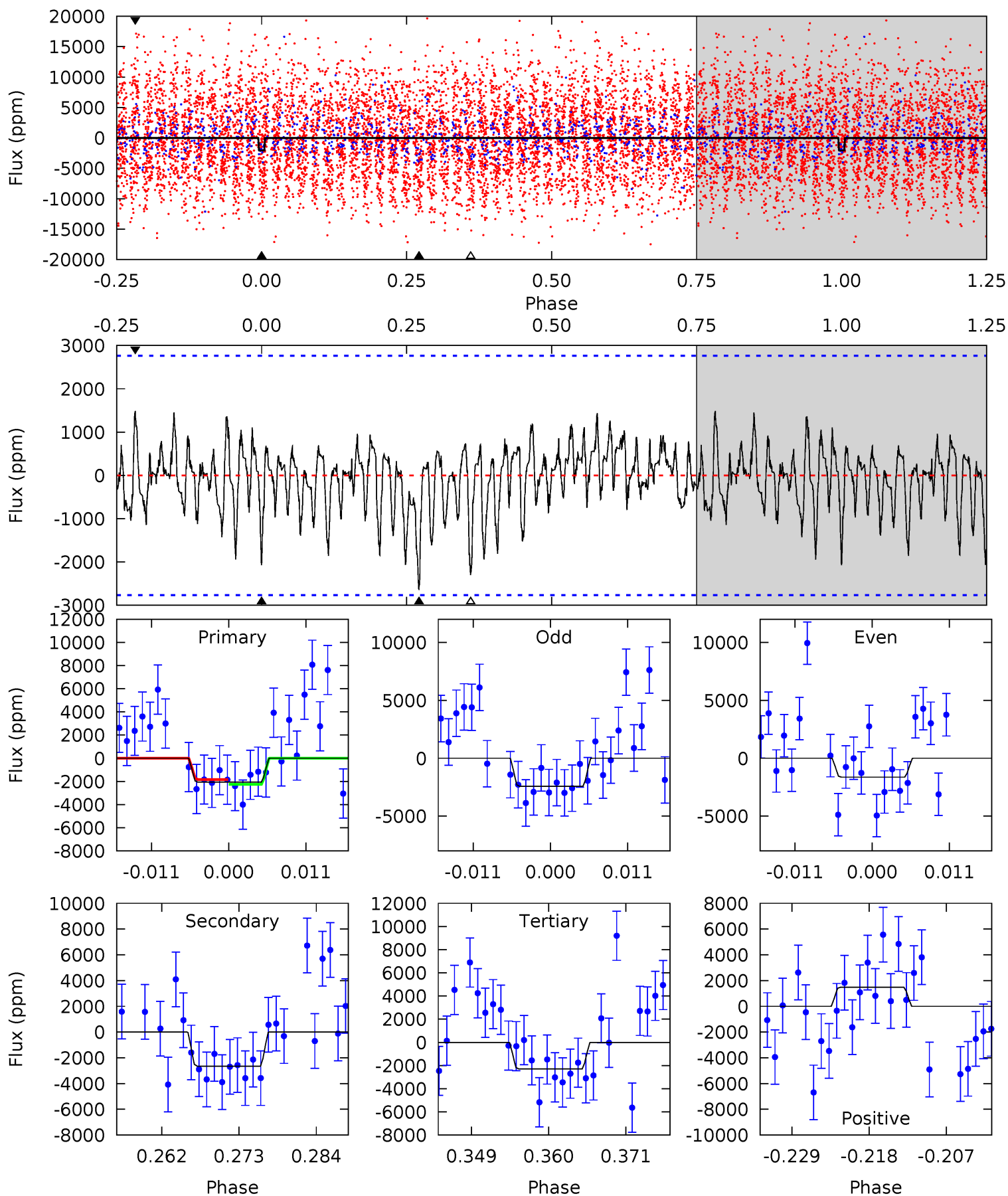
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.1	6.69	5.70	7.13	5.14	2.78	2.38	4.43	2.99	0.99	-0.44	1.60	1.12	0.41	2.44



# Alt Model-Shift Uniqueness Test

006019416-04, P = 22.915897 Days, E = 128.874403 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
3.75	4.80	4.17	2.69	5.01	2.55	1.28	-0.42	1.06	0.63	2.10	0.71	0.67	0.36	0.37



### Stellar Parameters For KIC 006019416

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7308^{+206}_{-353}$	$4.079^{+0.140}_{-0.171}$	$0.210^{+0.150}_{-0.350}$	$1.982^{+0.542}_{-0.394}$	$1.716^{+0.184}_{-0.276}$	$0.311^{+0.218}_{-0.149}$
	+3%/-5%	+3%/-4%	+71%/-167%	+27%/-20%	+11%/-16%	+70%/-48%
Source	PHO54	PHO54	PHO54	DSEP		

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

### Secondary Eclipse Parameters for KIC 006019416-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-1396 \pm 209$	$8.72^{+4.88}_{-4.62}$	$1458^{+101}_{-104}$	$6905^{+4534}_{-1386}$	$353^{+1283}_{-212}$
Alt.	$-2647 \pm 552$	$10.23^{+5.20}_{-4.81}$	$1458^{+101}_{-100}$	$7597^{+4286}_{-1451}$	$483^{+1262}_{-272}$

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

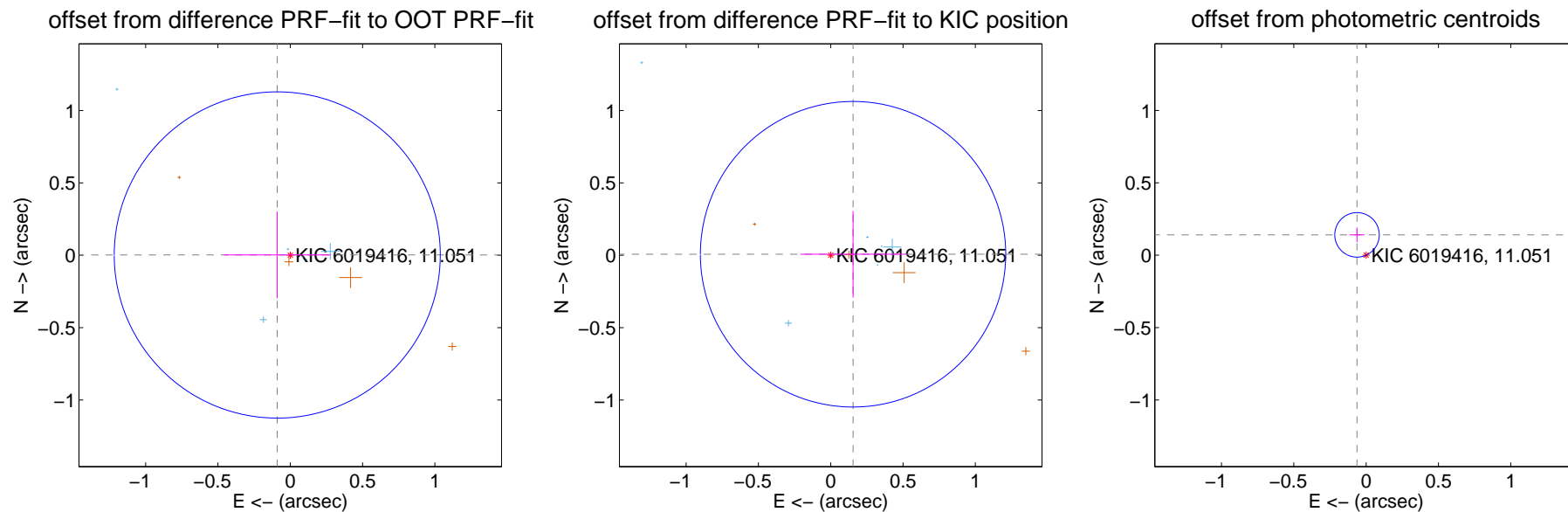
## DV Centroid Data

Supplemental centroid analysis for 006019416-04. **Kepler magnitude: 11.05**. Transit SNR 6.34

There are 8 quarters with good PRF difference image offsets

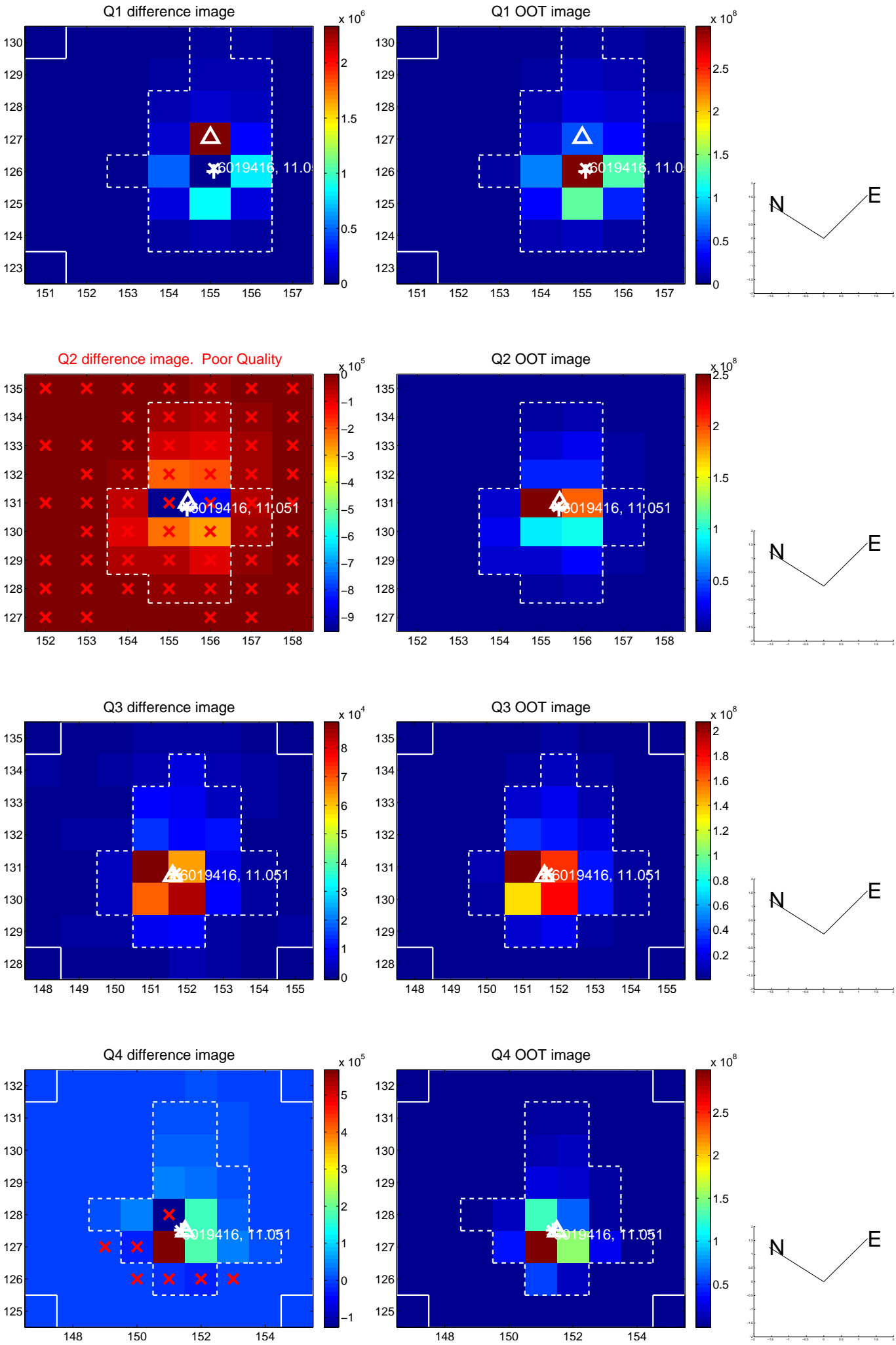
The direct PRF centroid is offset from the target star catalog position by about 0.21 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.090 \pm 0.376$	0.24	$0.090 \pm 0.370$	$0.002 \pm 0.299$
PRF-fit source offset from KIC position	$0.155 \pm 0.352$	0.44	$-0.154 \pm 0.365$	$0.007 \pm 0.299$
photometric centroid source offset	<b><math>0.15 \pm 0.05</math></b>	<b>3.01</b>	$0.06 \pm 0.05$	$0.14 \pm 0.05$

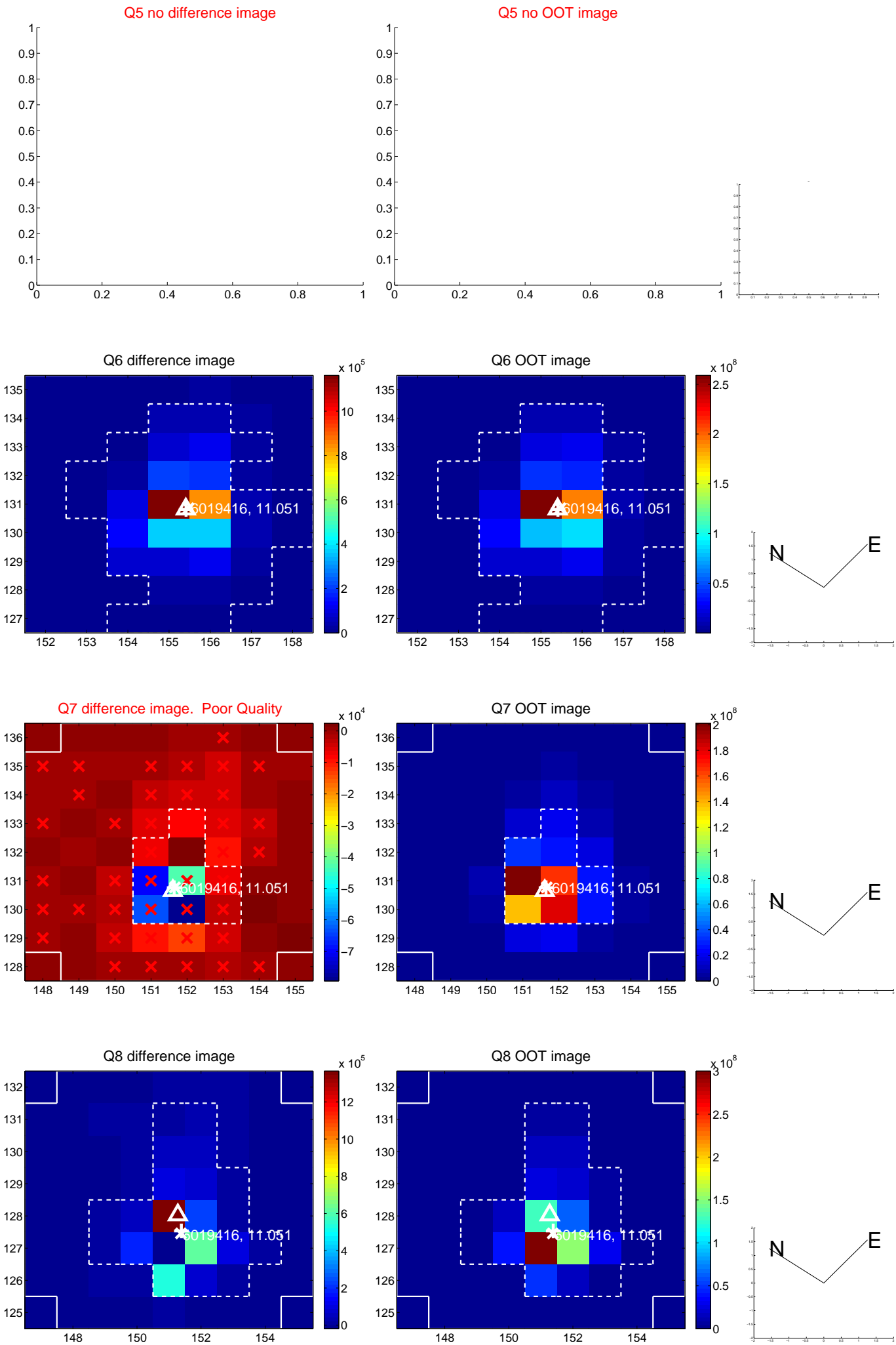


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

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

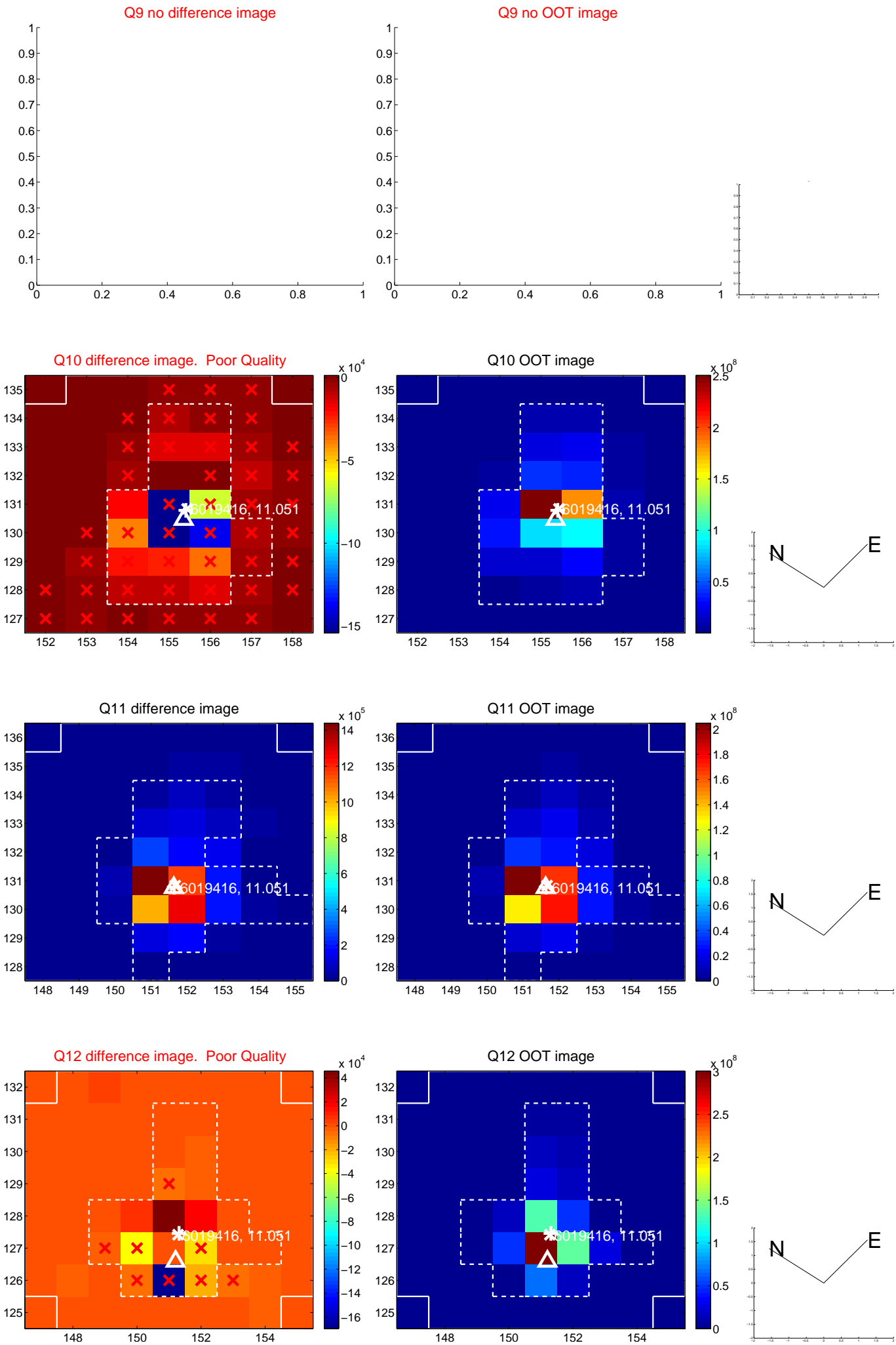


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

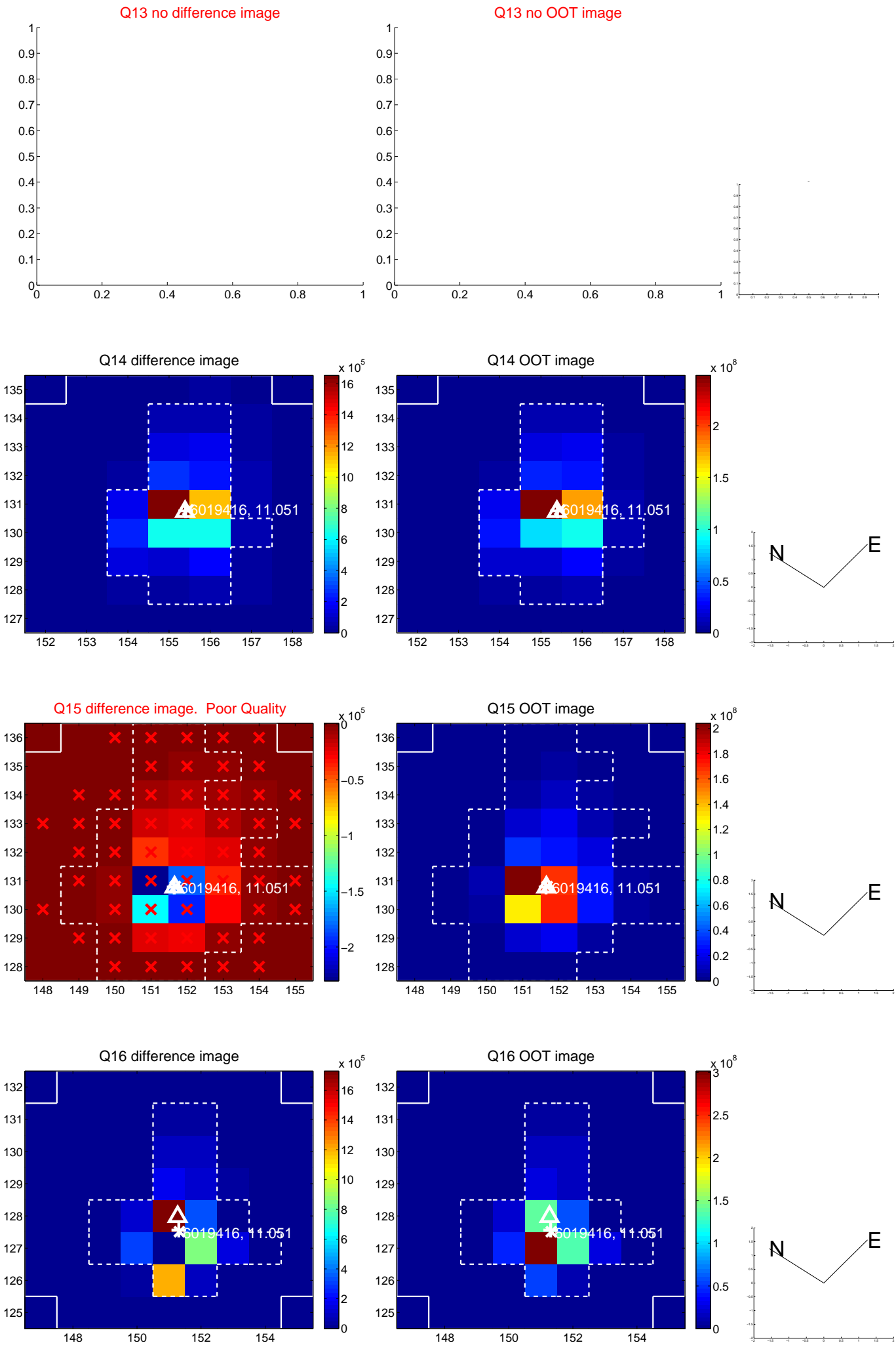




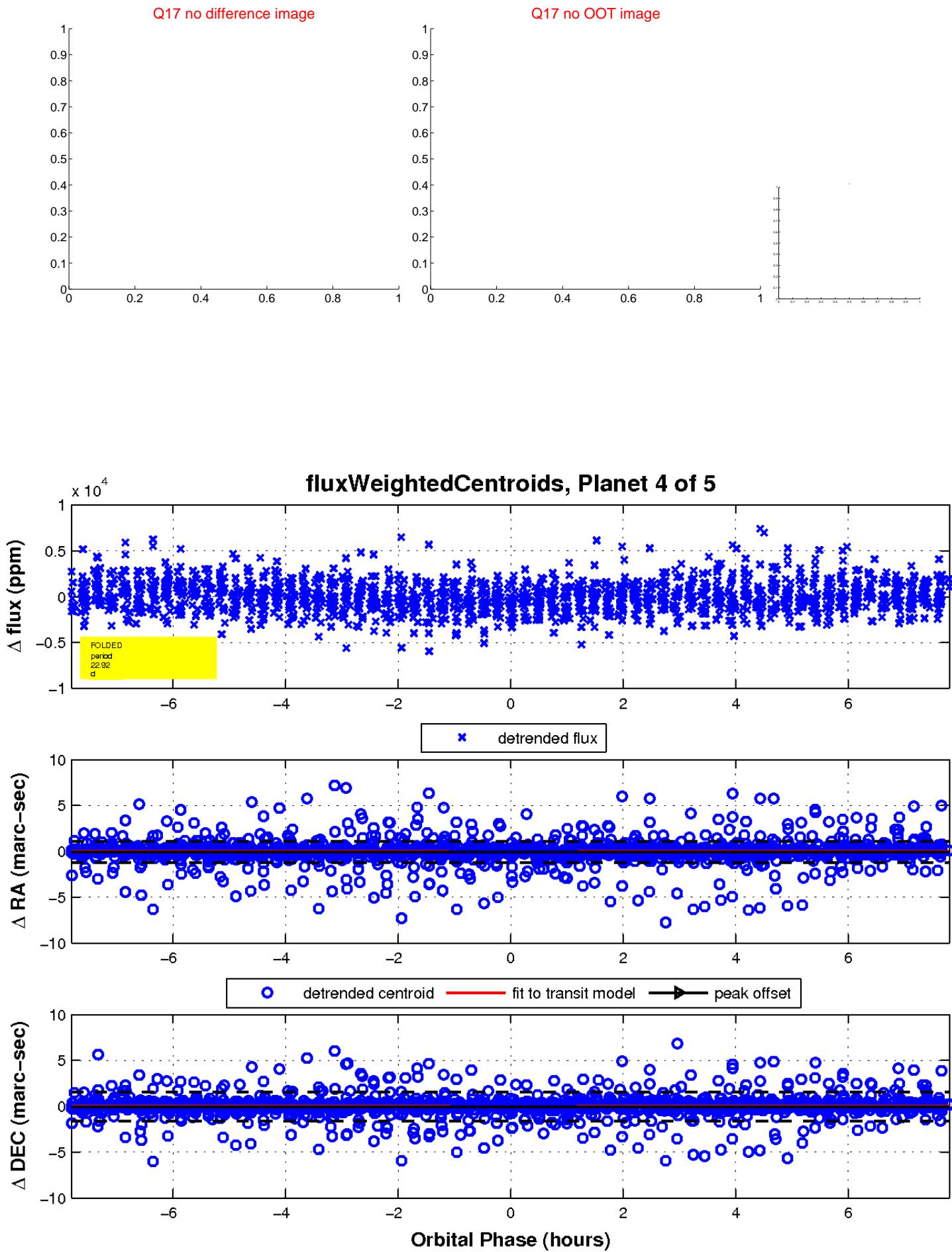
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



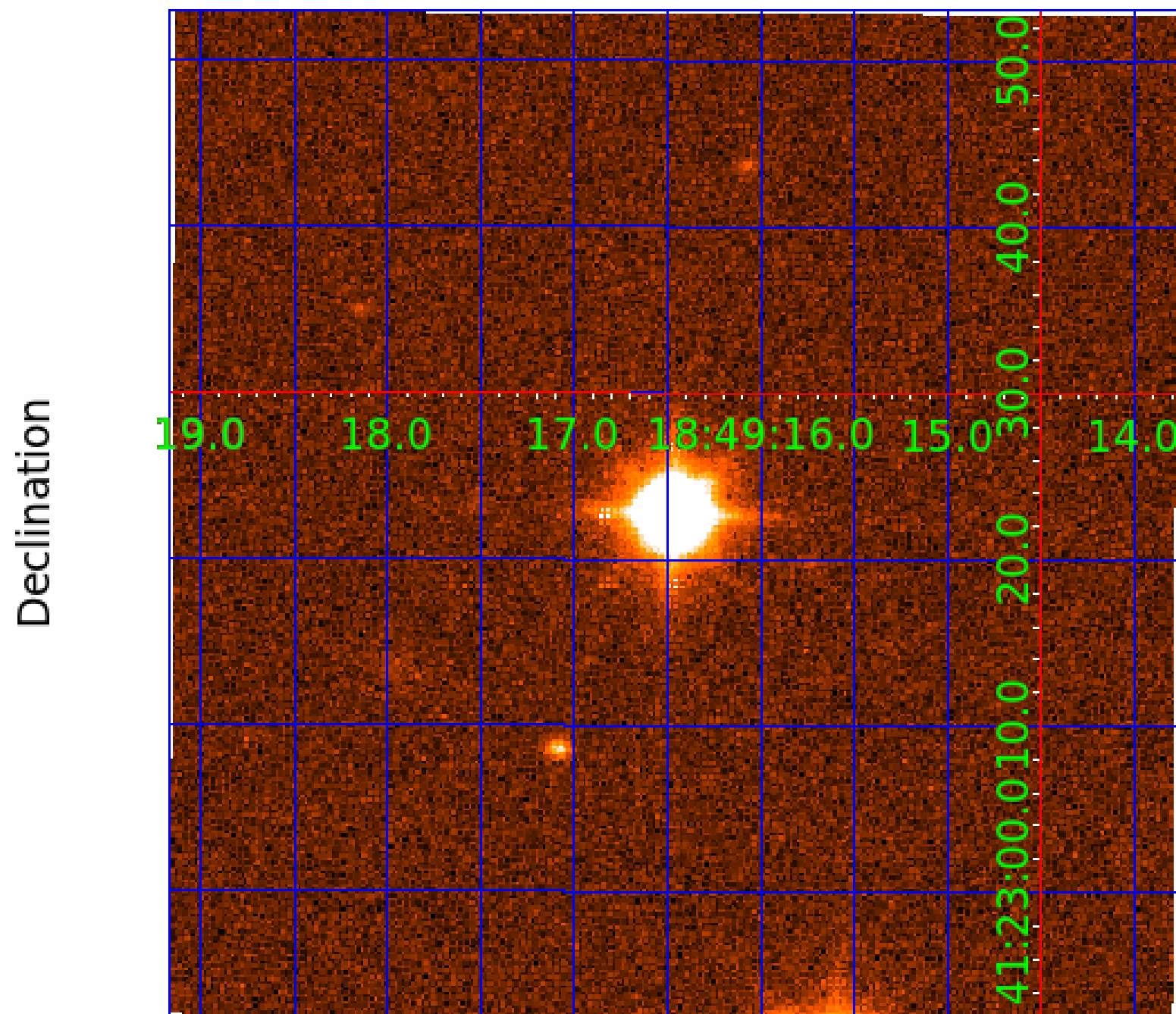
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image



# KIC 006019416

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006019416-01	OBS	No	0.569597	131.550624	30.6	0.881	10.4	1.5	1.98	7308	1.28	38672.37
006019416-02	OBS	No	0.569616	131.744380	174.6	1.927	9.2	8.0	1.98	7308	2.72	38670.66
006019416-03	OBS	No	4.804386	135.107729	732.3	10.789	8.0	10.3	1.98	7308	6.12	2252.37
006019416-04	OBS	No	22.915723	151.866839	1589.5	2.603	7.6	6.3	1.98	7308	8.55	280.53
006019416-05	OBS	No	38.765512	170.024849	61.9	5.000	7.5	-1.0	1.98	7308	1.58	139.18

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006019416-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—CENT_SATURATED
006019416-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—SAME_NTL_PERIOD—CENT_SATURATED
006019416-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—CENT_SATURATED—HALO_GHOST
006019416-04	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED—HALO_GHOST
006019416-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED

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

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

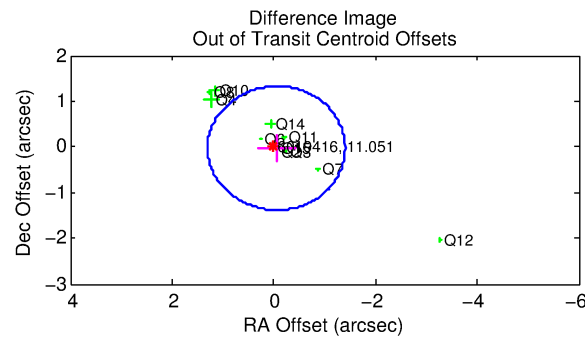
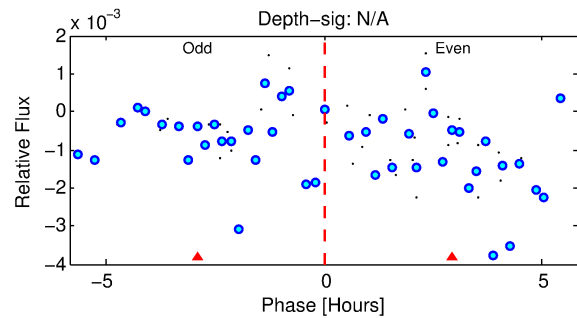
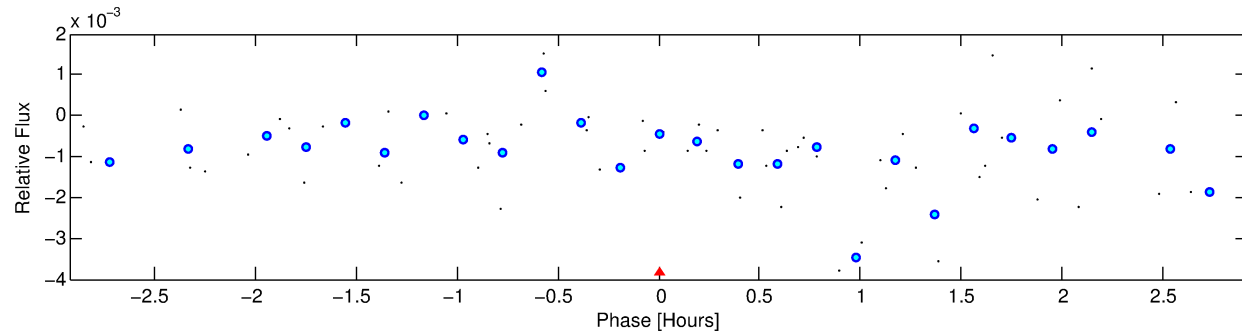
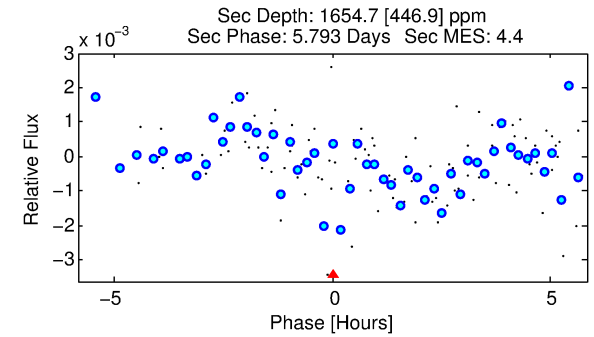
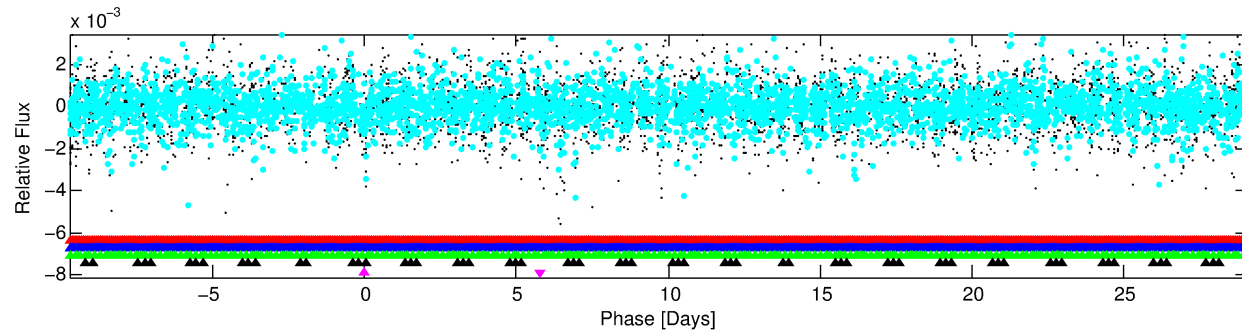
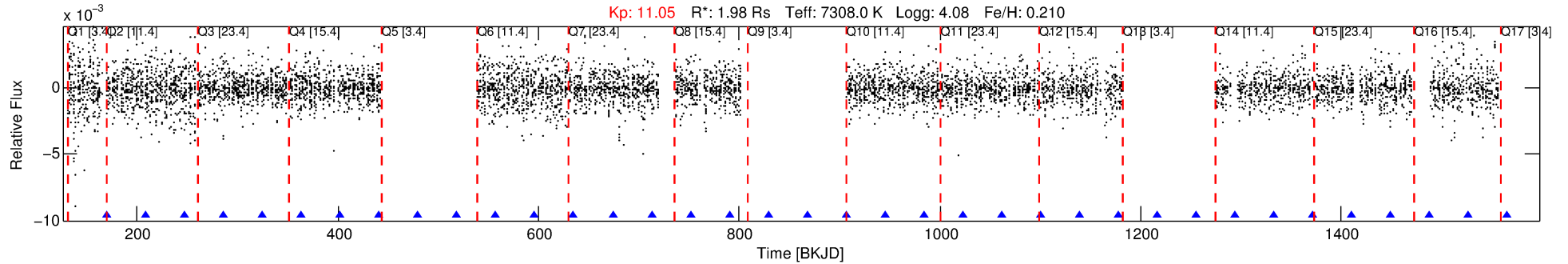
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 006019416-05

No Significant Match Found

# DV One-Page Summary

KIC: 6019416 Candidate: 5 of 5 Period: 38.766 d



## TPS TCE Results:

Period = 38.76551 d  
Epoch = 170.0248 BKJD

DV fit results are unavailable

## DV Diagnostic Results:

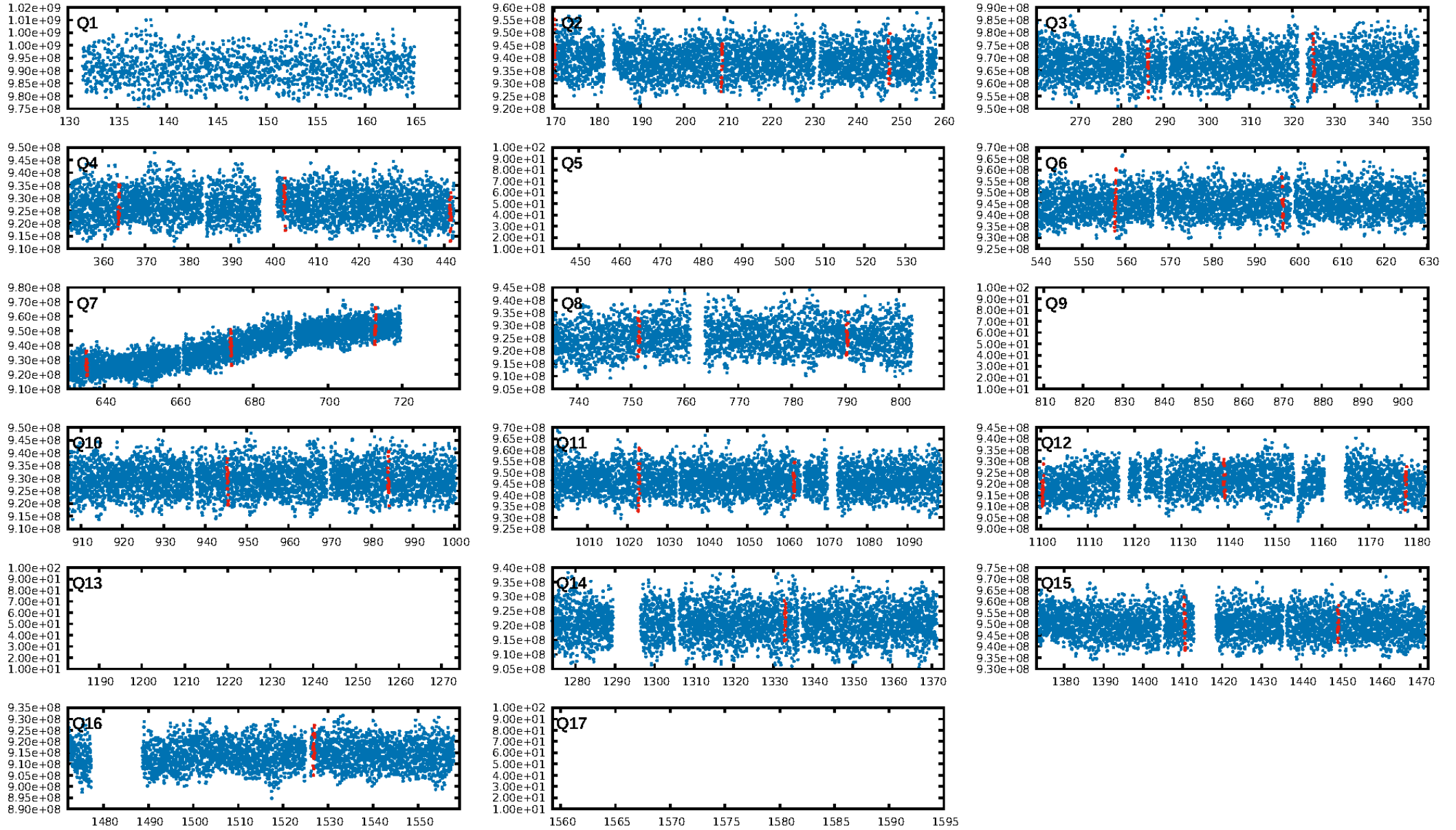
ShortPeriod-sig: 100.0% [67.48 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [11/11]  
GhostDiagnostic-chr: 0.4093  
Centroid-sig: 25.3%  
Centroid-so: 0.137 arcsec [2.87 $\sigma$ ]  
OotOffset-rm: 0.058 arcsec [0.13 $\sigma$ ]  
KicOffset-rm: 0.216 arcsec [0.55 $\sigma$ ]  
OotOffset-st: 4/4/3/0 [11]  
KicOffset-st: 4/4/3/0 [11]  
DiffImageQuality-fgm: 0.73 [8/11]  
DiffImageOverlap-fno: 0.00 [0/11]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 10:44:57 Z

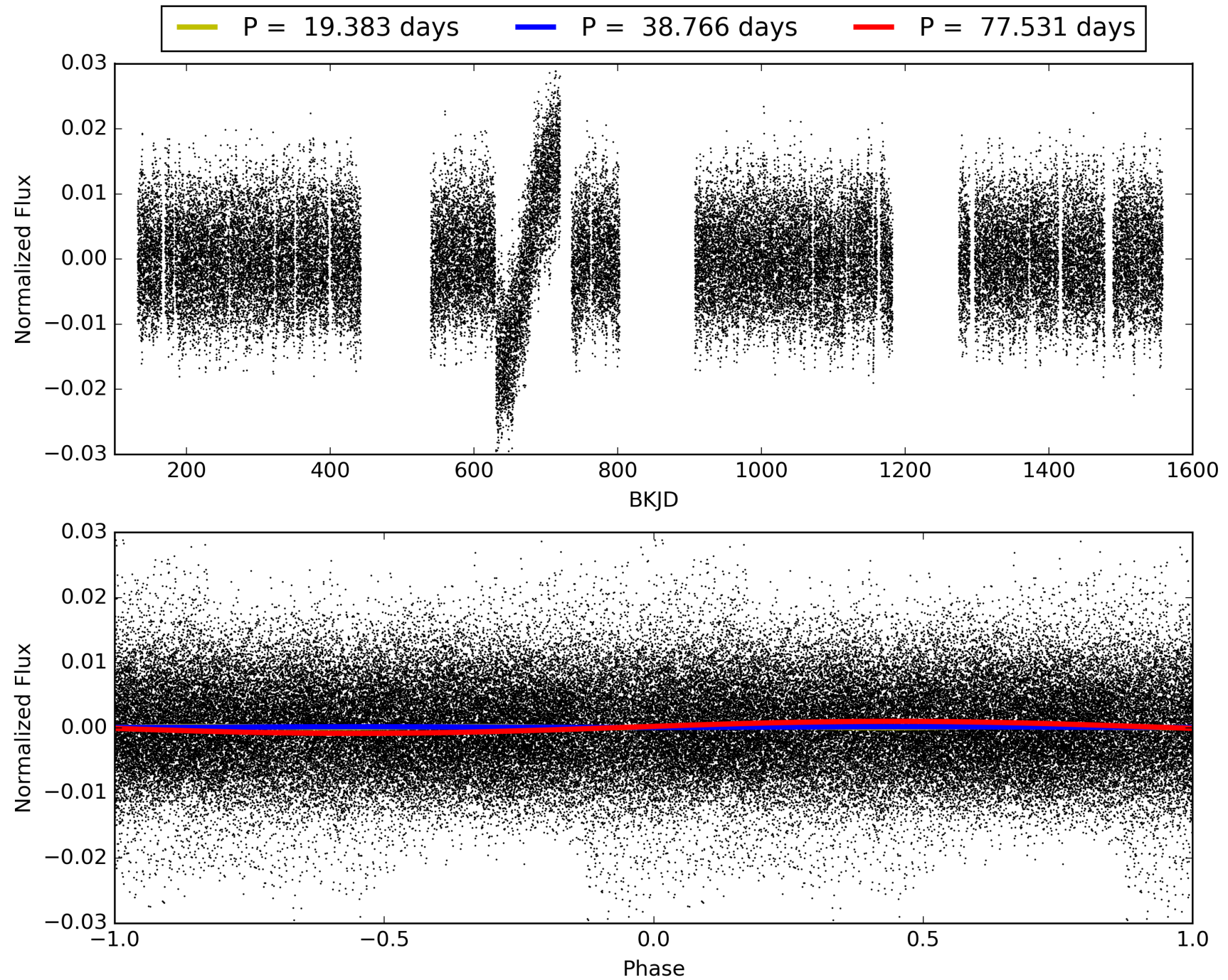
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 006019416-05, PDC Light Curves

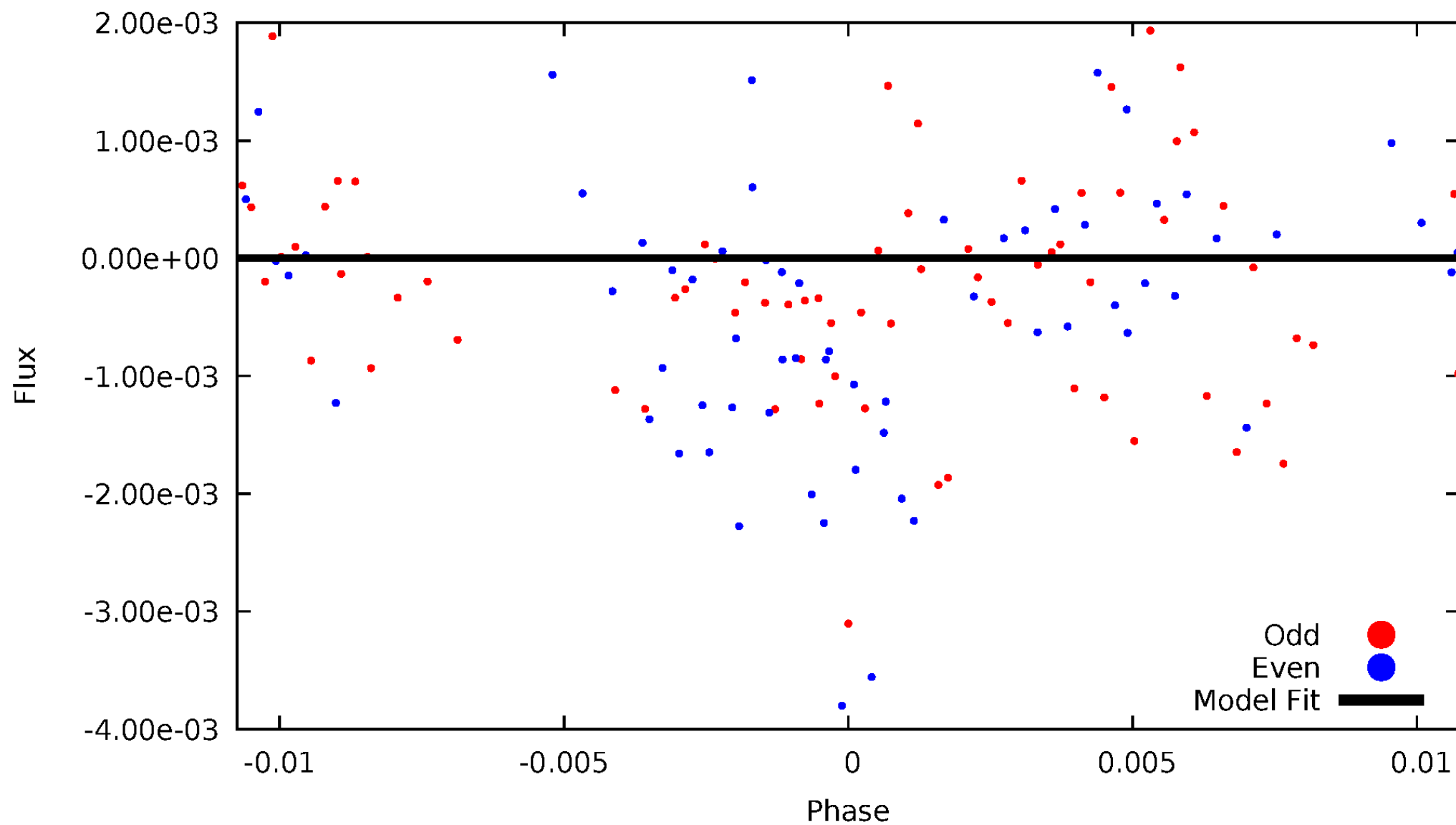


TCE 006019416-05



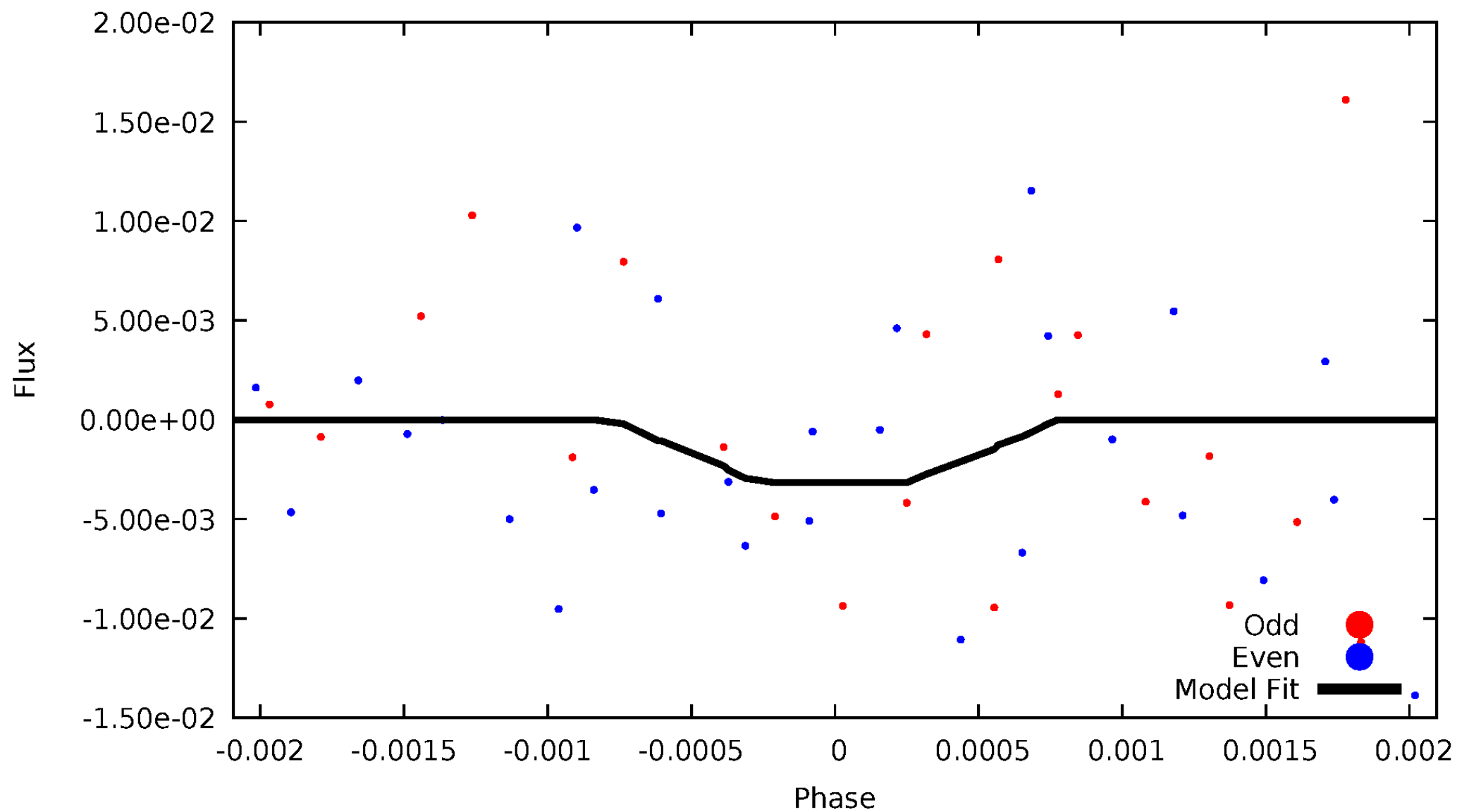
# DV Odd/Even

TCE 006019416-05

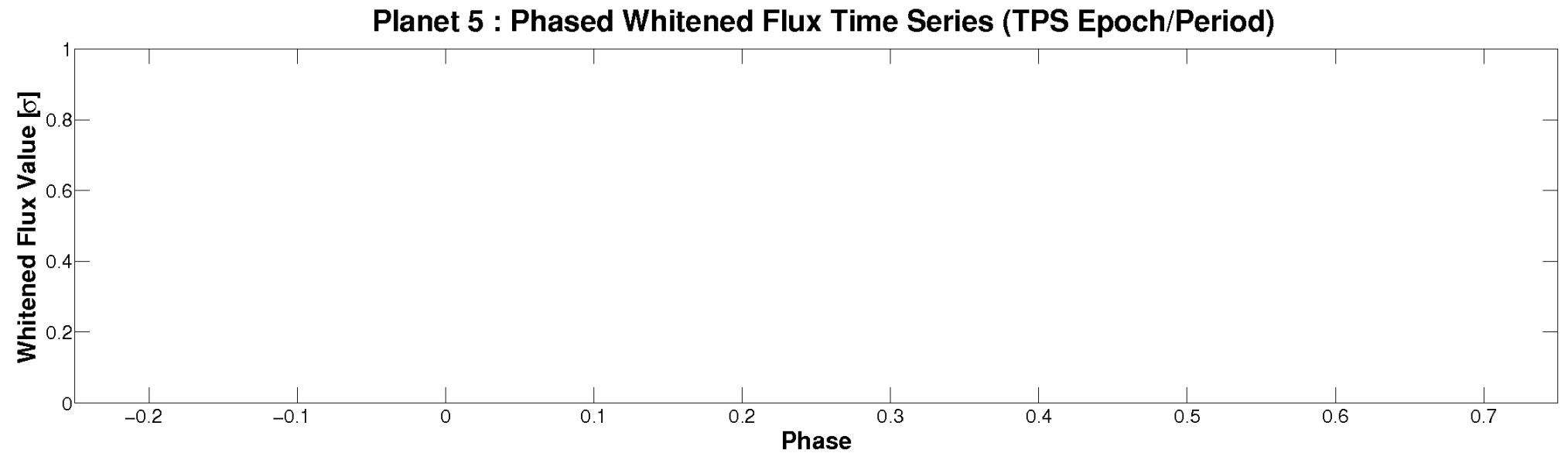
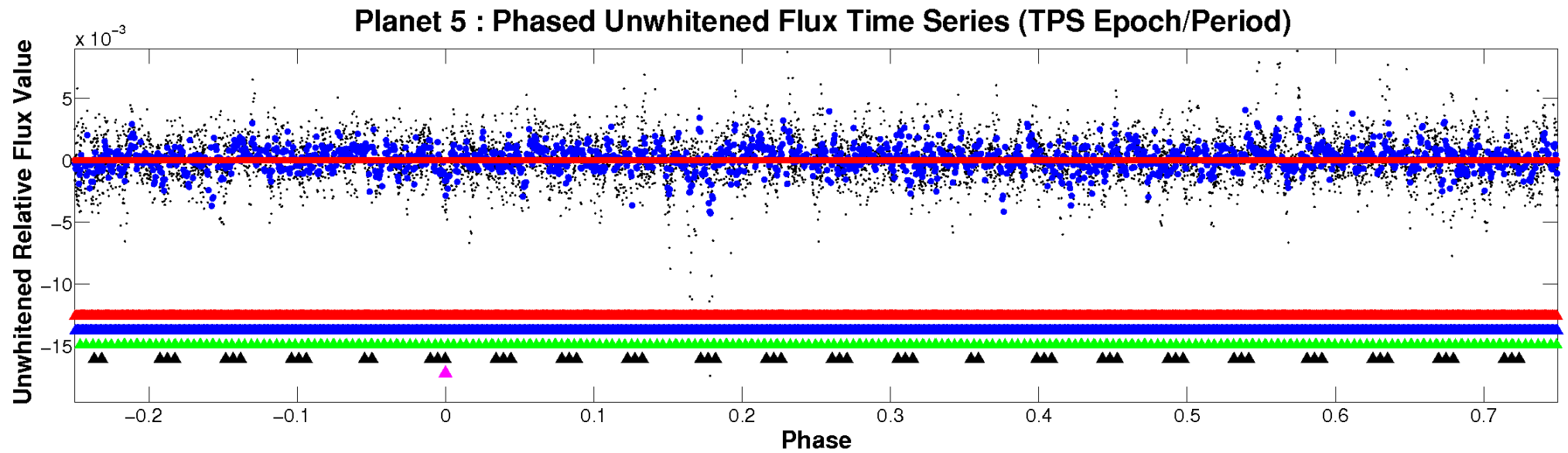


# ALT Odd/Even

TCE 006019416-05

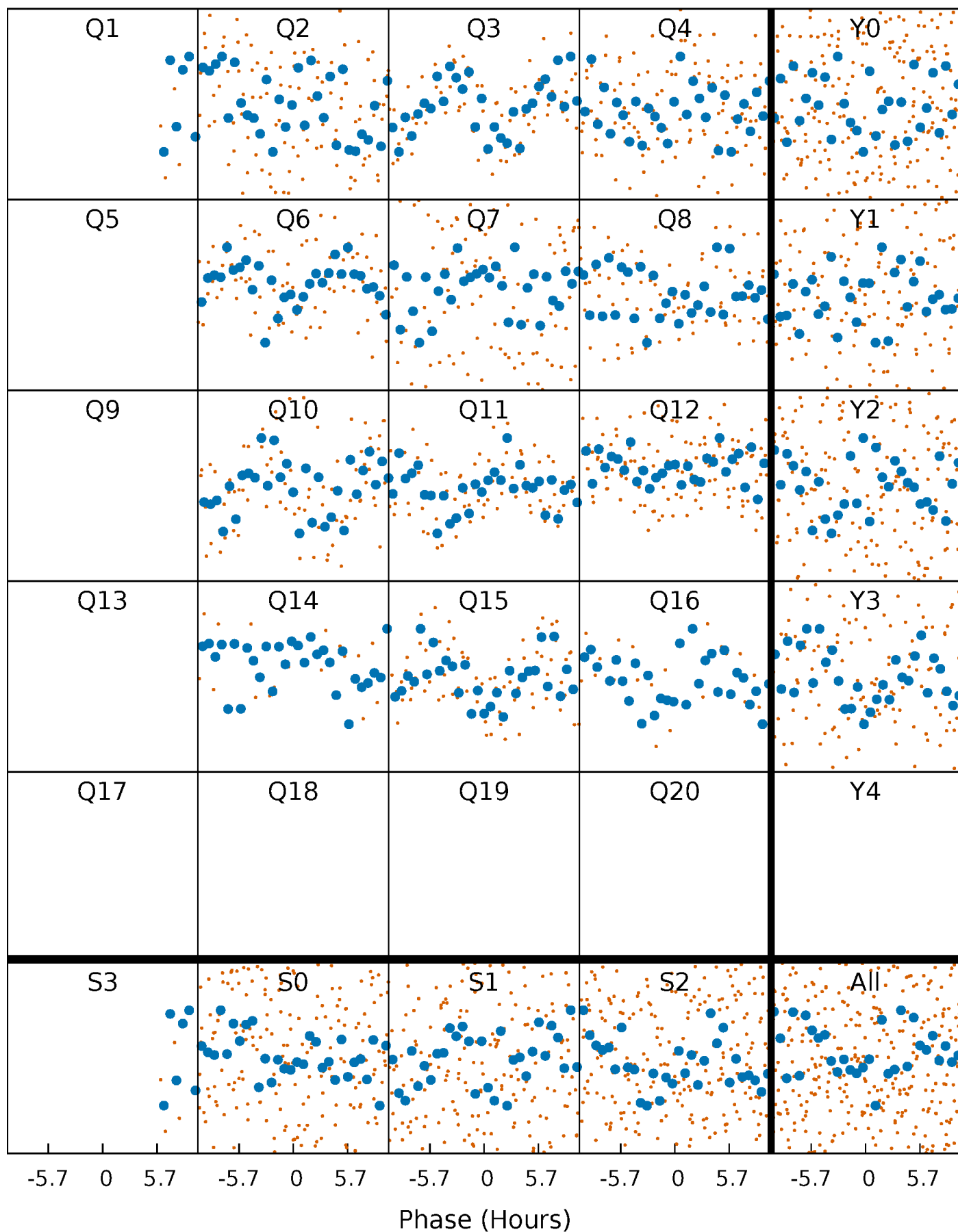


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

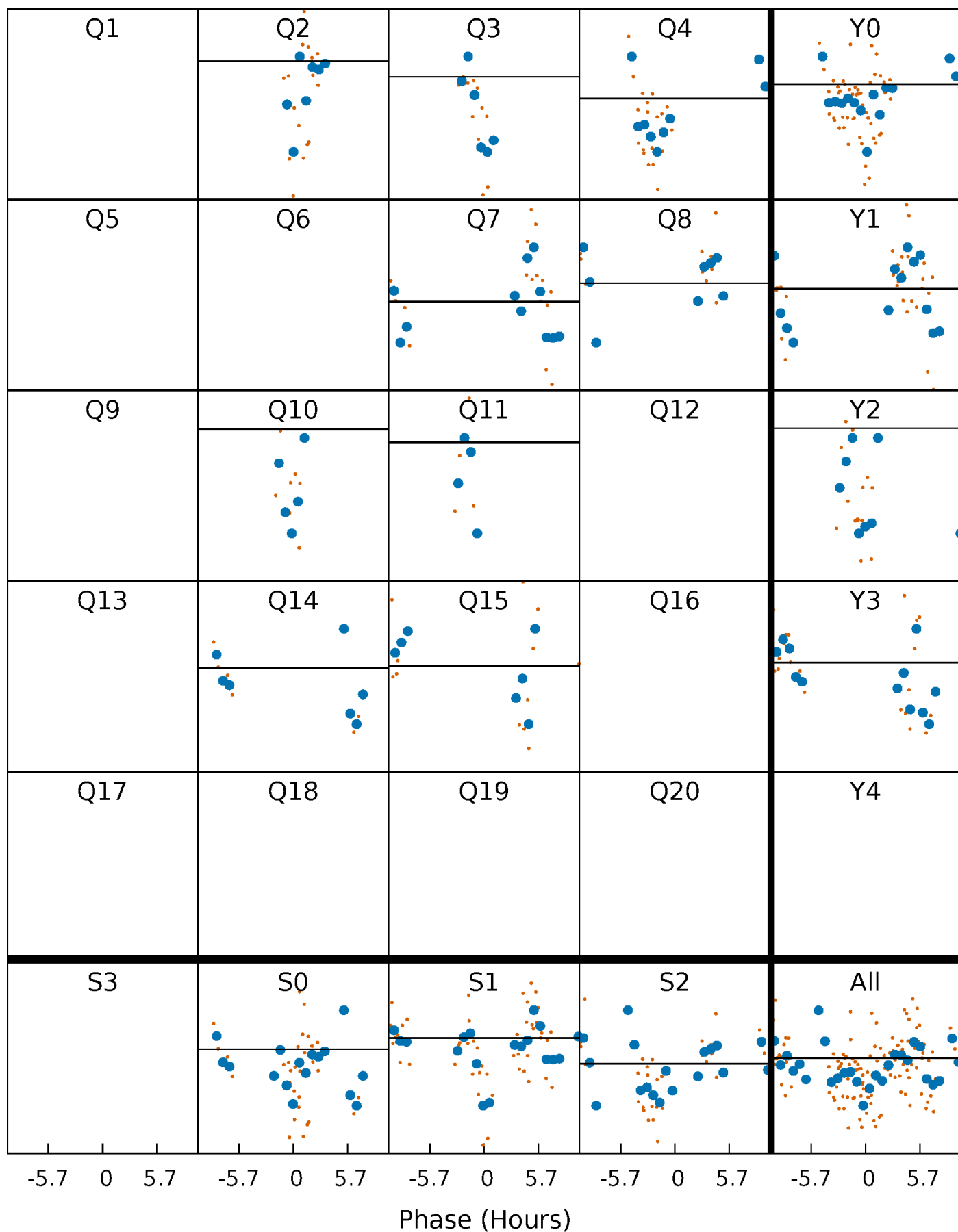
TCE 006019416-05 P= 38.765512 Days  $T_0=170.024849$  (BKJD)





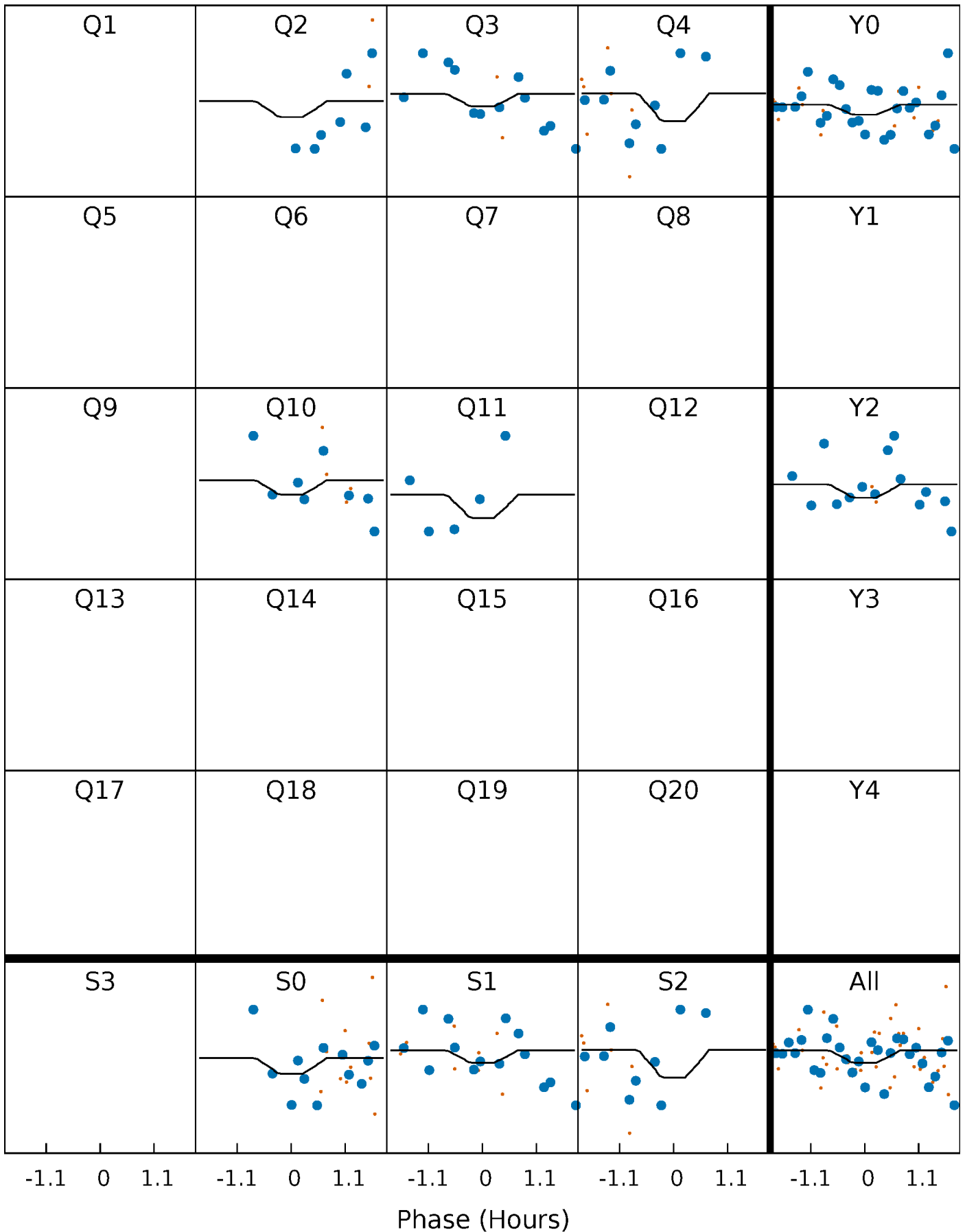
# DV Quarter-Phased Transit Curves

TCE 006019416-05 P= 38.765512 Days  $T_0=170.024849$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

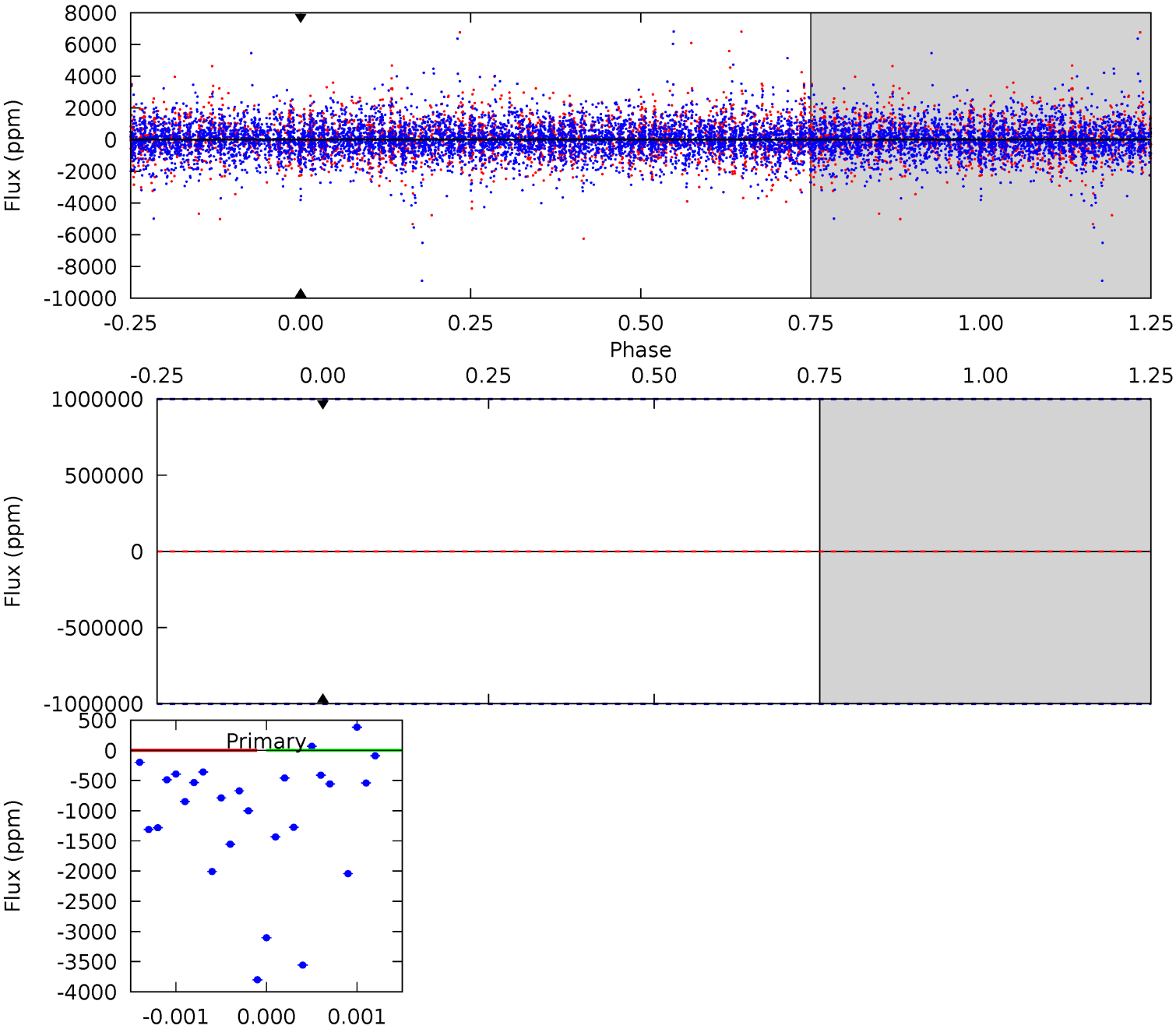
TCE 006019416-05     $P = 38.765512$  Days     $T_0 = 169.982984$  (BKJD)



# DV Model-Shift Uniqueness Test

006019416-05, P = 38.765512 Days, E = 131.259337 Days

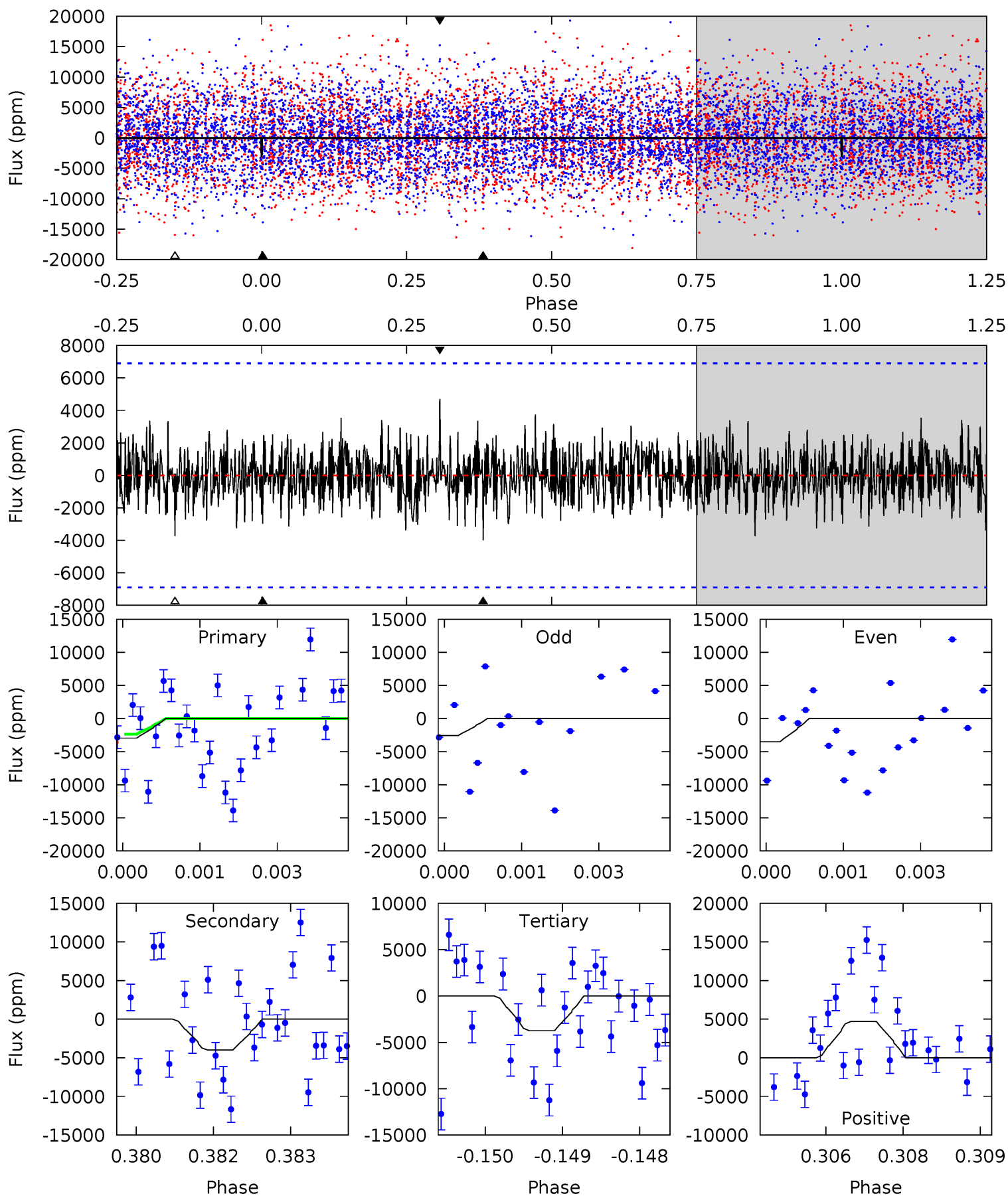
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



# Alt Model-Shift Uniqueness Test

006019416-05, P = 38.765512 Days, E = 131.217472 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
2.32	3.12	2.92	3.68	5.39	3.20	0.93	-0.60	-1.37	0.20	-0.57	0.37	2.84	0.54	0.47



### Stellar Parameters For KIC 006019416

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$7308^{+206}_{-353}$	$4.079^{+0.140}_{-0.171}$	$0.210^{+0.150}_{-0.350}$	$1.982^{+0.542}_{-0.394}$	$1.716^{+0.184}_{-0.276}$	$0.311^{+0.218}_{-0.149}$
	+3%/-5%	+3%/-4%	+71%/-167%	+27%/-20%	+11%/-16%	+70%/-48%
Source	PHO54	PHO54	PHO54	DSEP		

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

### Secondary Eclipse Parameters for KIC 006019416-05 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$0 \pm 1000000$	$15.34^{+17.62}_{-11.06}$	$1221^{+92}_{-80}$	$-4180^{+44597}_{-36796}$	$-73.667^{+32071.886}_{-30598.683}$
Alt.	$-3989 \pm 1280$	$20.40^{+17.52}_{-13.25}$	$1223^{+85}_{-86}$	$5781^{+5269}_{-1435}$	$349^{+2545}_{-256}$

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

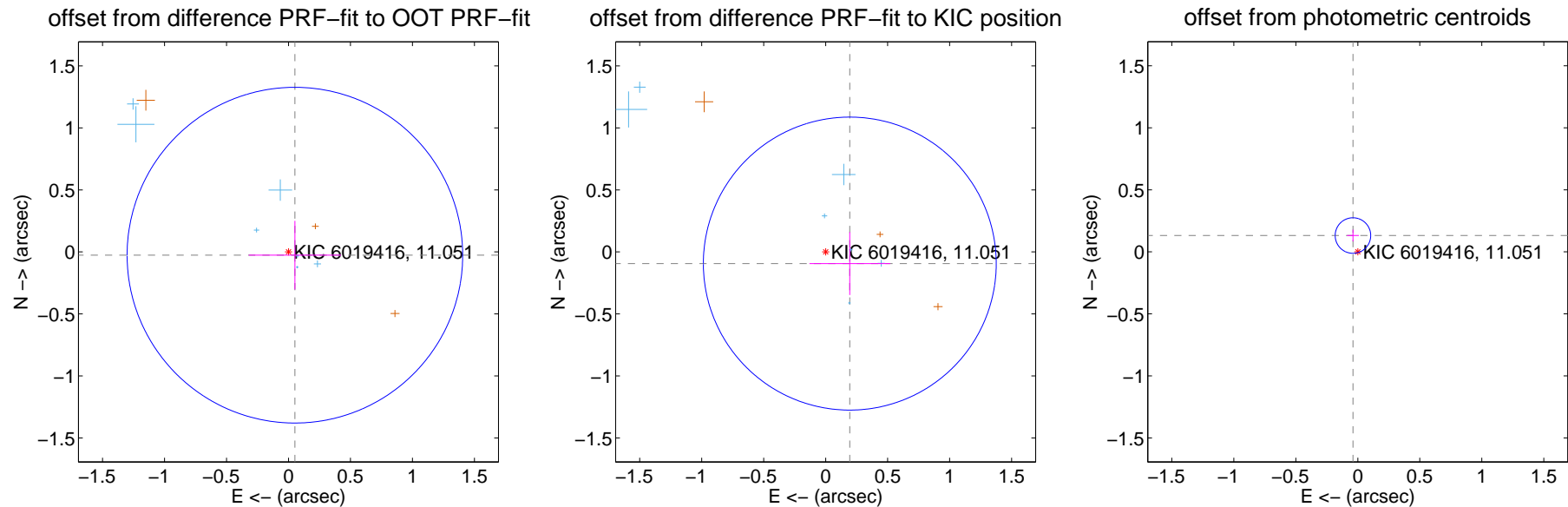
## DV Centroid Data

Supplemental centroid analysis for 006019416-05. **Kepler magnitude: 11.05.** Transit SNR -1.00

There are 8 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.14 arcsec

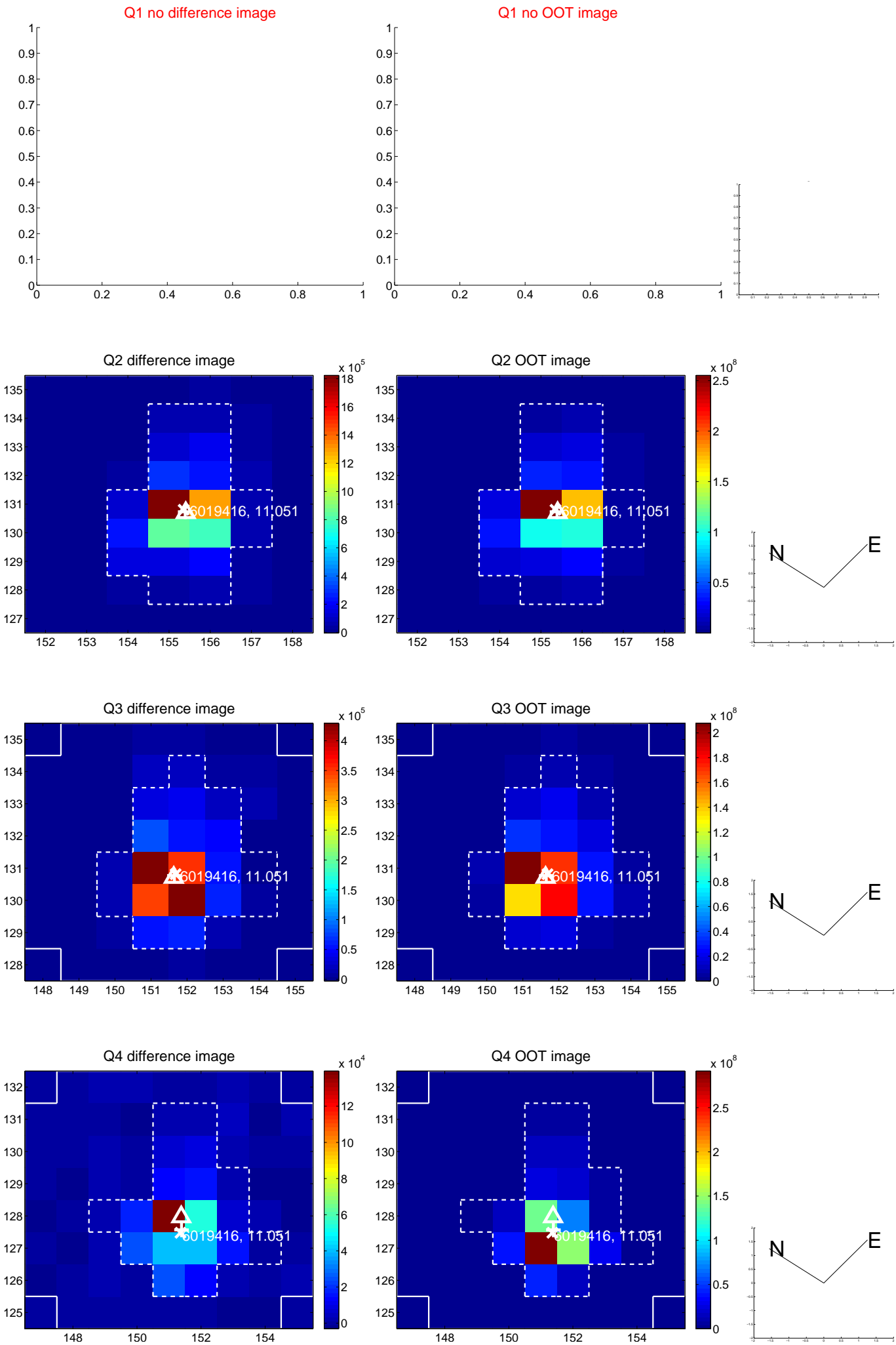
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.058 \pm 0.451$	0.13	$-0.052 \pm 0.372$	$-0.026 \pm 0.277$
PRF-fit source offset from KIC position	$0.216 \pm 0.394$	0.55	$-0.195 \pm 0.326$	$-0.094 \pm 0.254$
photometric centroid source offset	$0.14 \pm 0.05$	2.87	$0.04 \pm 0.05$	$0.13 \pm 0.05$



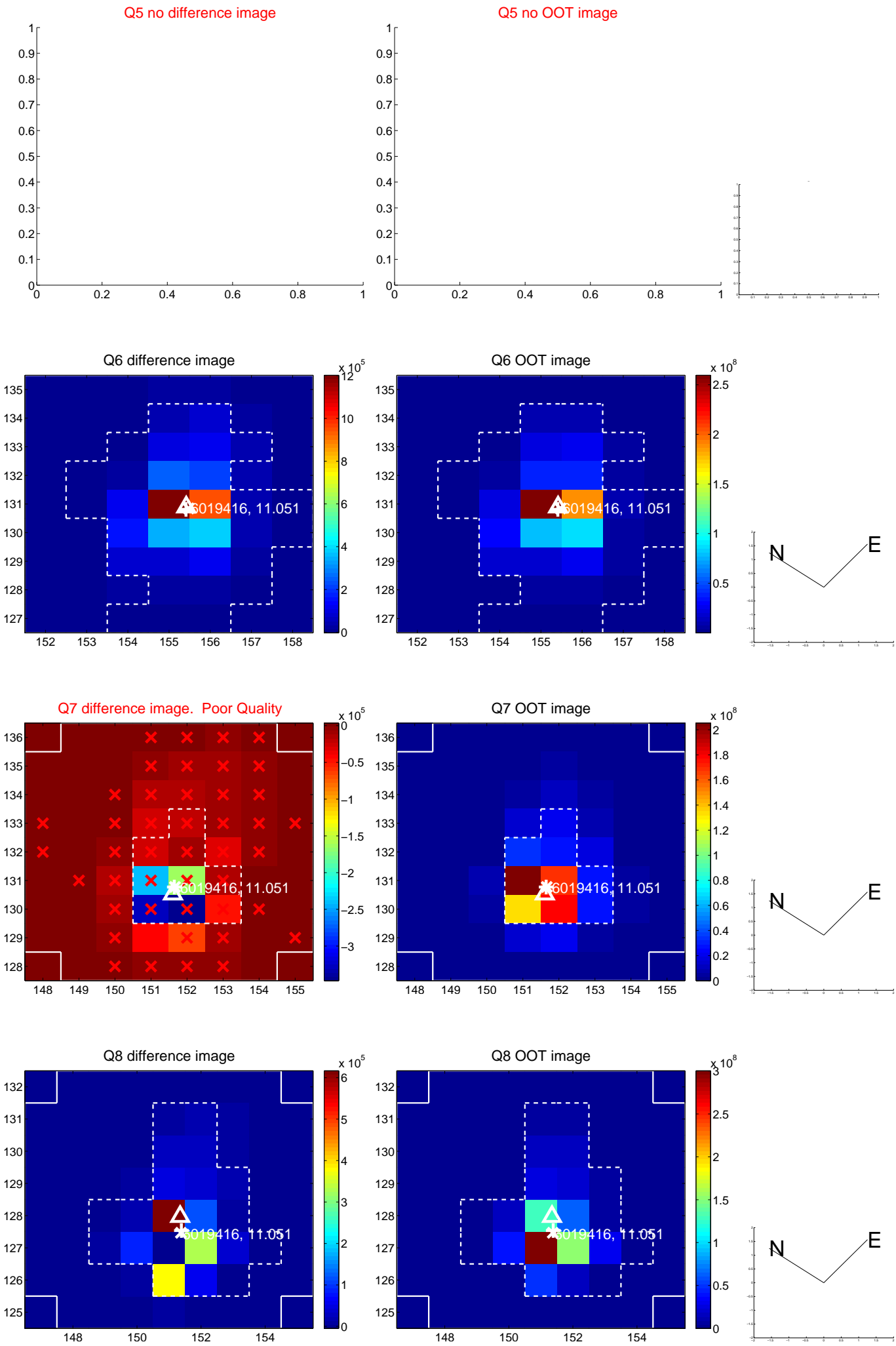
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



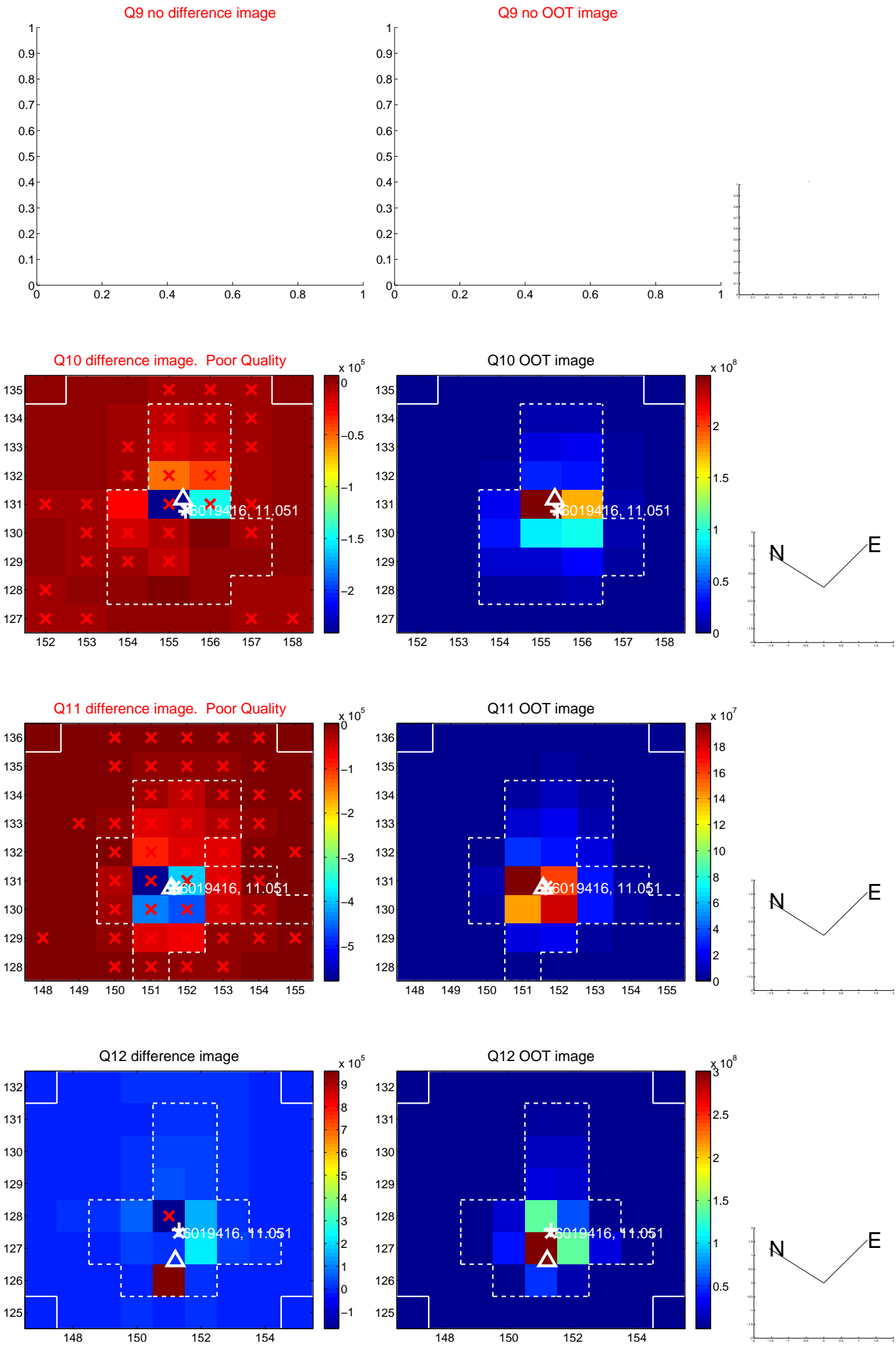
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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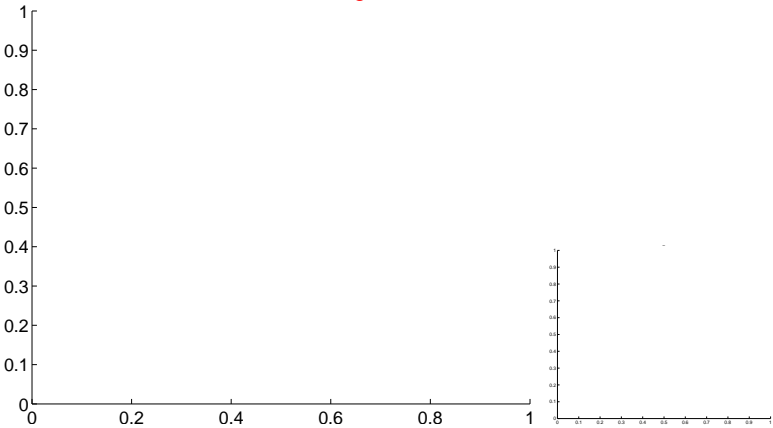


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

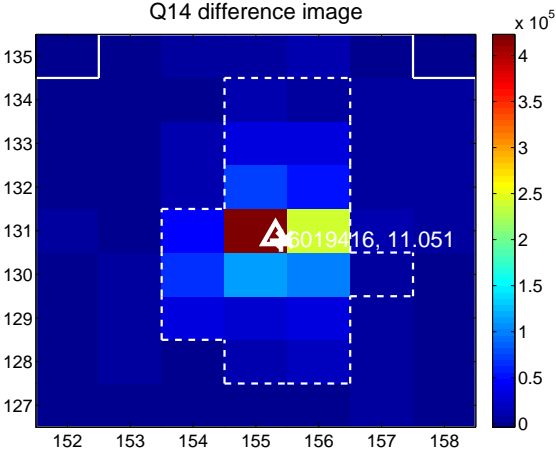
Q13 no difference image



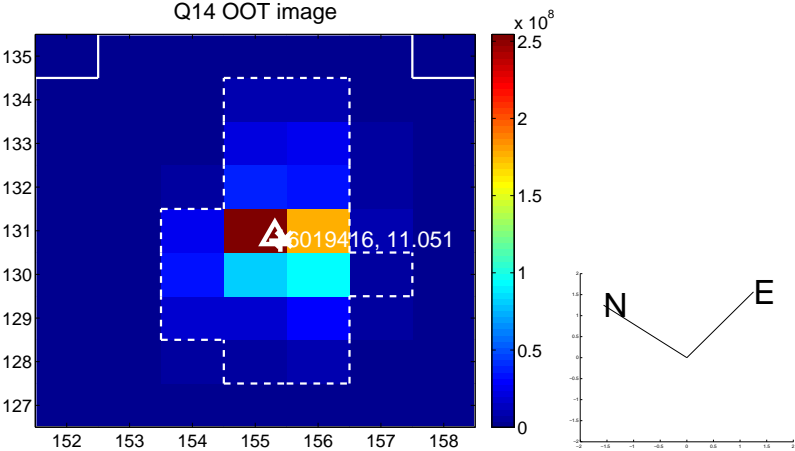
Q13 no OOT image



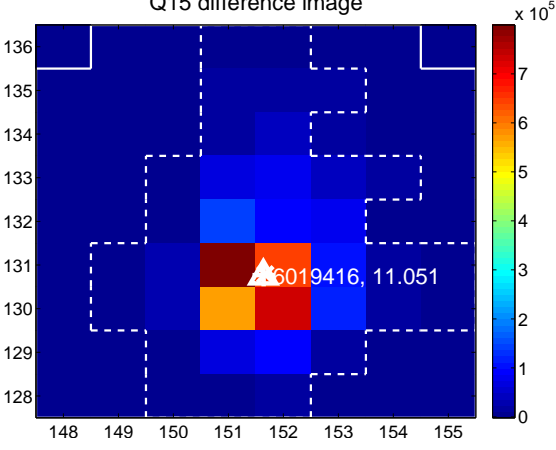
Q14 difference image



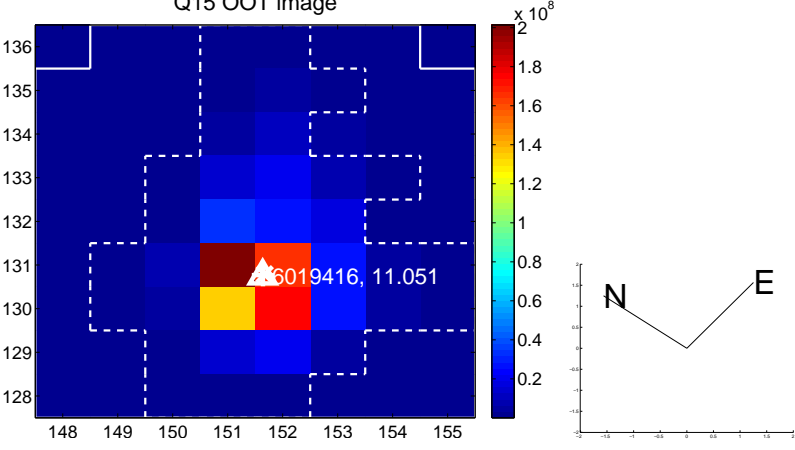
Q14 OOT image



Q15 difference image



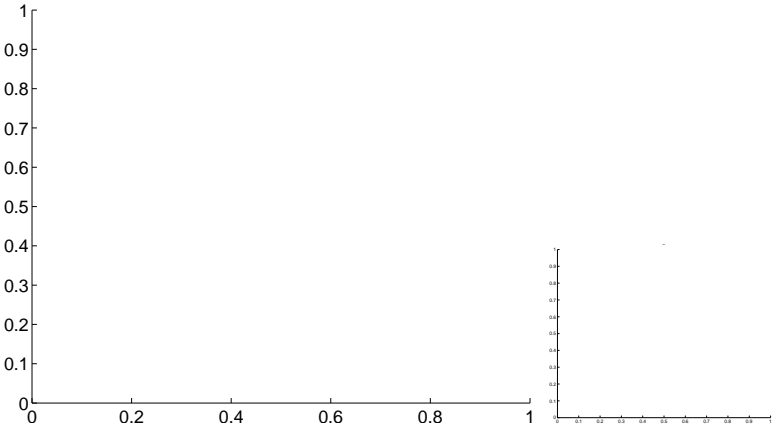
Q15 OOT image



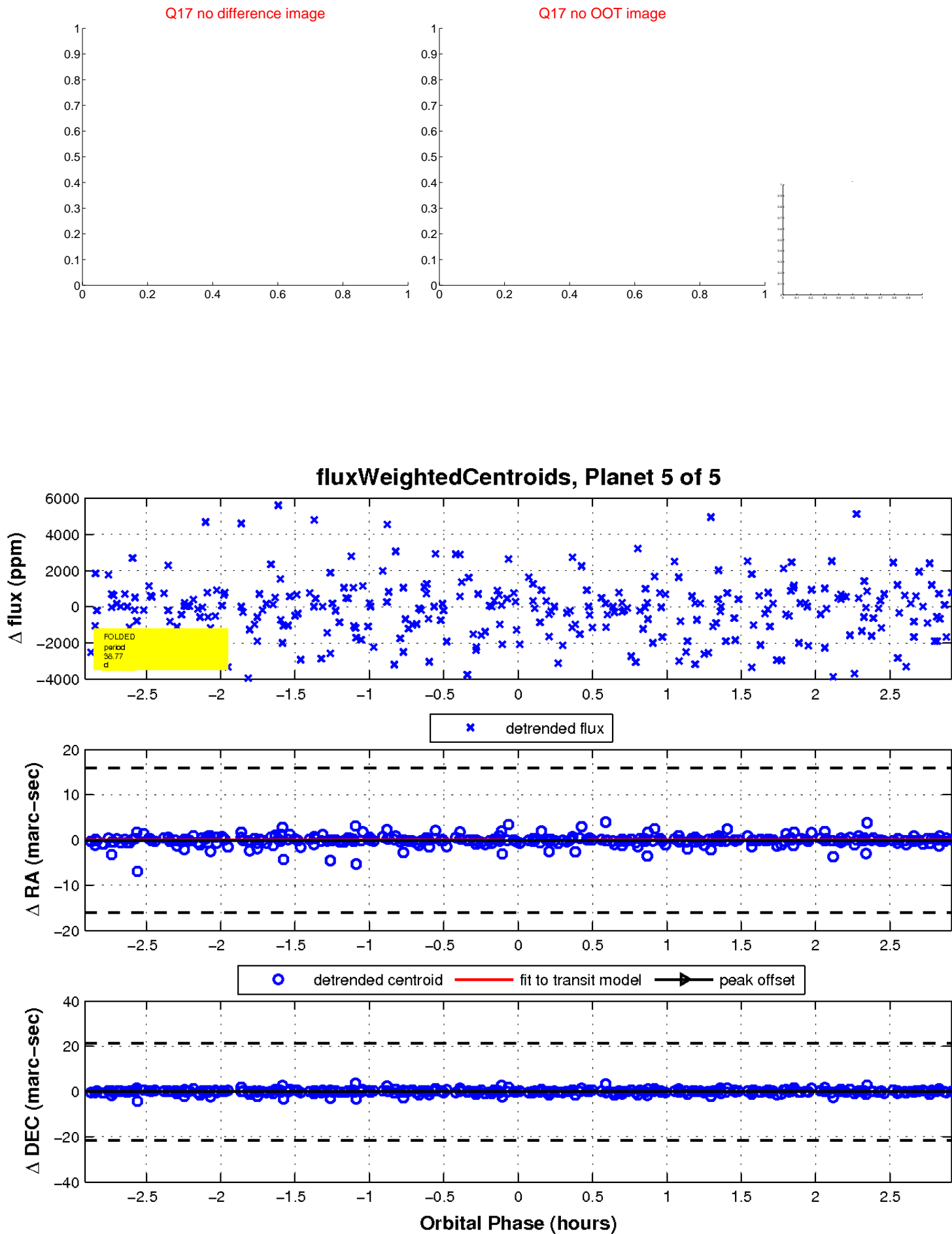
Q16 no difference image



Q16 no OOT image



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



UKIRT Image

