

# KIC 009705459

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009705459-01	OBS	1448.01	2.486595	131.621454	42390.5	2.849	844.7	1524.2	1.20	5892	25.29	1080.05
009705459-02	OBS	No	1.243296	131.623249	918.7	2.769	41.0	44.5	1.20	5892	4.34	2721.56
009705459-03	OBS	No	436.194596	145.432940	4555.8	12.721	11.8	6.7	1.20	5892	15.04	1.10
009705459-04	OBS	No	435.183153	278.057801	3399.5	5.899	9.5	8.3	1.20	5892	8.53	1.10
009705459-05	OBS	No	272.272769	388.005558	2442.8	2.499	9.2	7.9	1.20	5892	5.85	2.06

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009705459-01	OBS	PC	0.87	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—PLANET_OCCULT_ALT—HAS_SEC_TCE
009705459-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE
009705459-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009705459-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—CENT_FEW_DIFFS
009705459-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_TER_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS

**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.

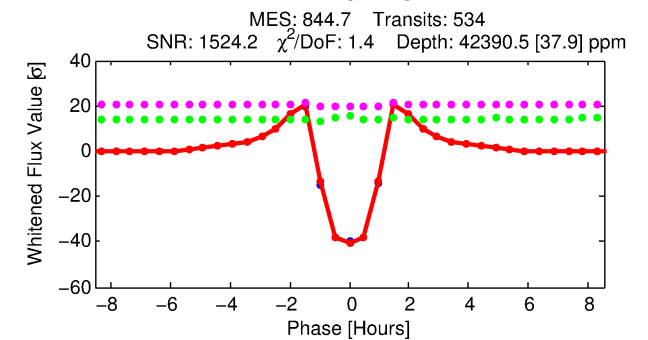
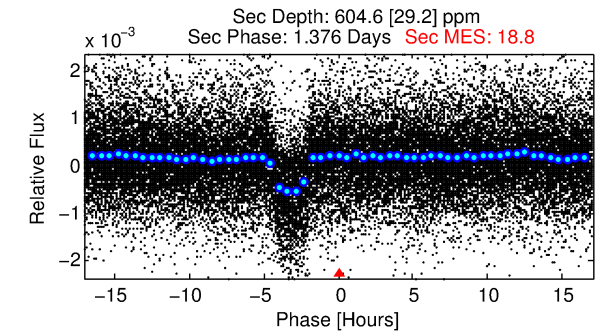
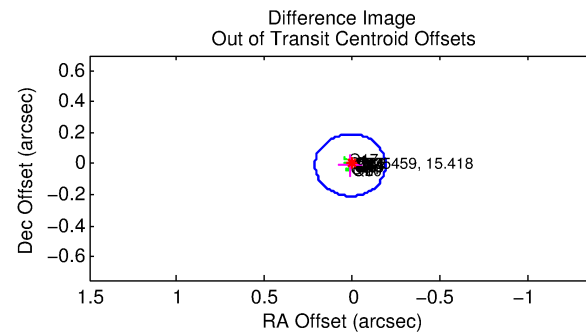
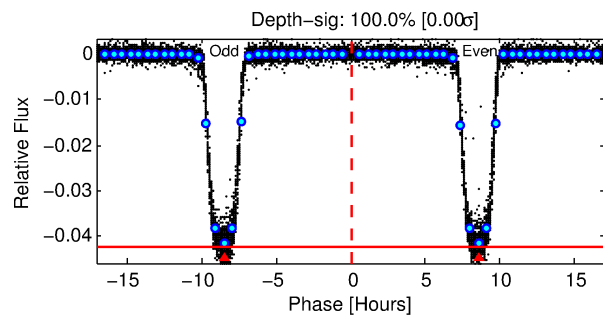
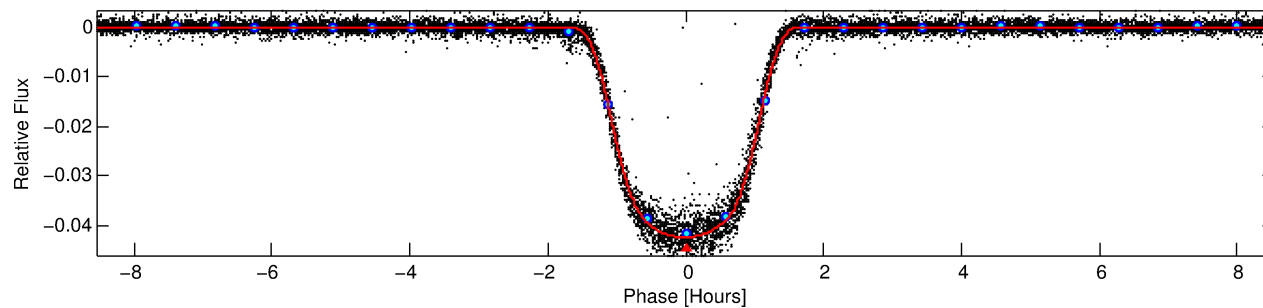
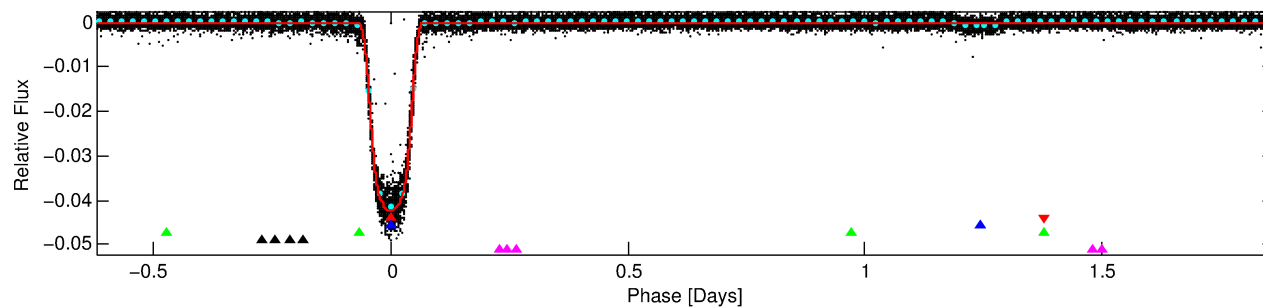
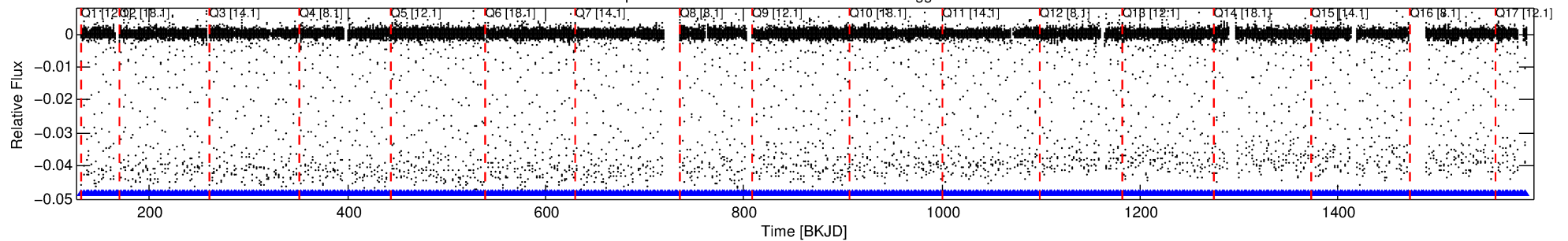
## Ephemeris Match Information For 009705459-01

No Significant Match Found

# DV One-Page Summary

KIC: 9705459 Candidate: 1 of 5 Period: 2.487 d  
KOI: K01448.01 Corr: 0.980

Kp: 15.42 R\*: 1.20 Rs Teff: 5892.0 K Logg: 4.35 Fe/H: 0.480



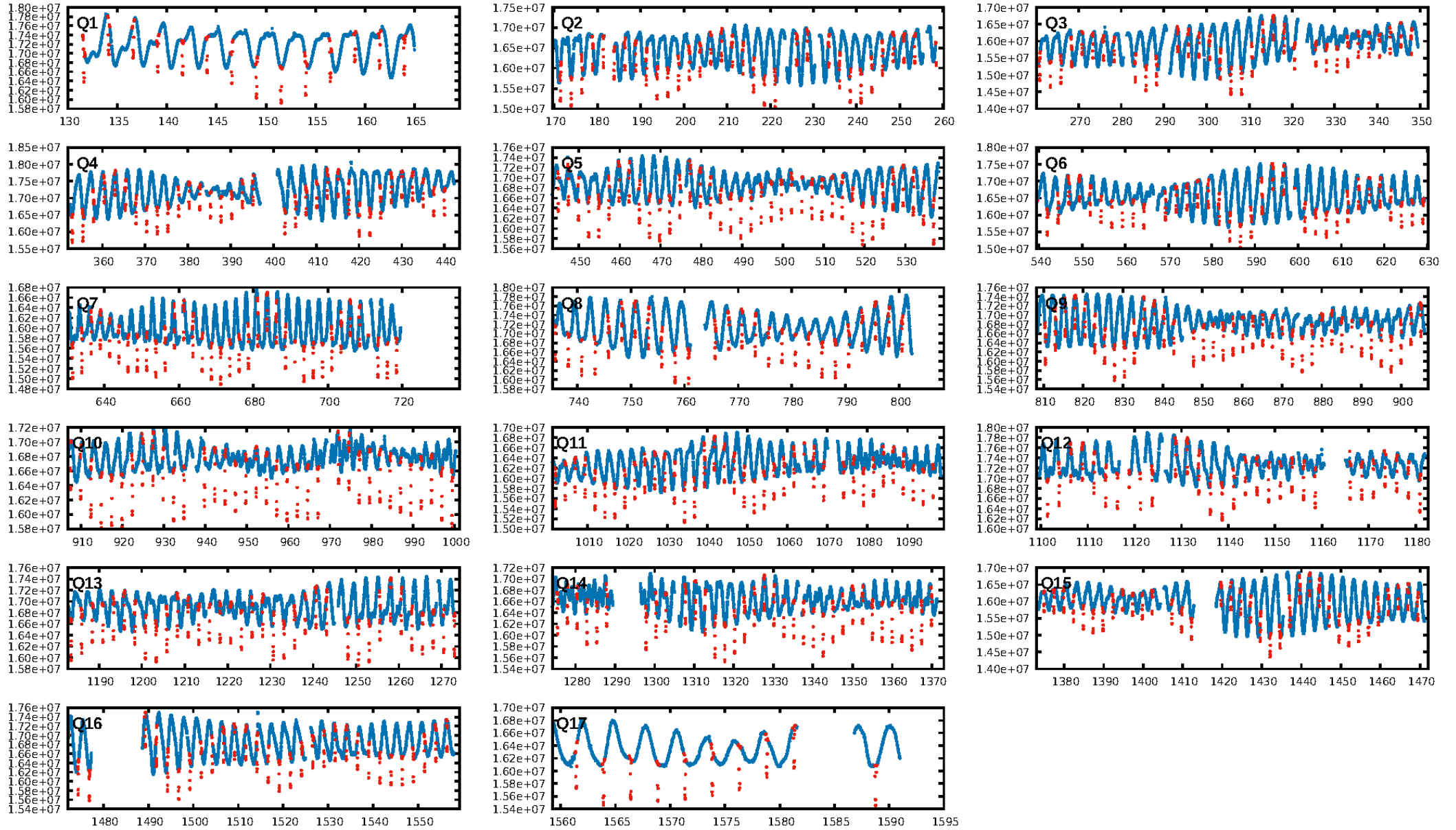
## DV Fit Results:

Period = 2.48659 [0.00000] d  
Epoch = 131.6215 [0.0000] BKJD  
Rp/R\* = 0.1935 [0.0002]  
a/R\* = 7.27 [0.02]  
b = 0.50 [0.00]  
Seff = 1080.05 [432.82]  
Teq = 1462 [146] K  
Rp = 25.29 [7.92] Re  
a = 0.0379 [0.0099] AU  
Ag = 0.75 [0.28] [-0.90σ]  
Teffp = 2101 [78] K [3.85σ]

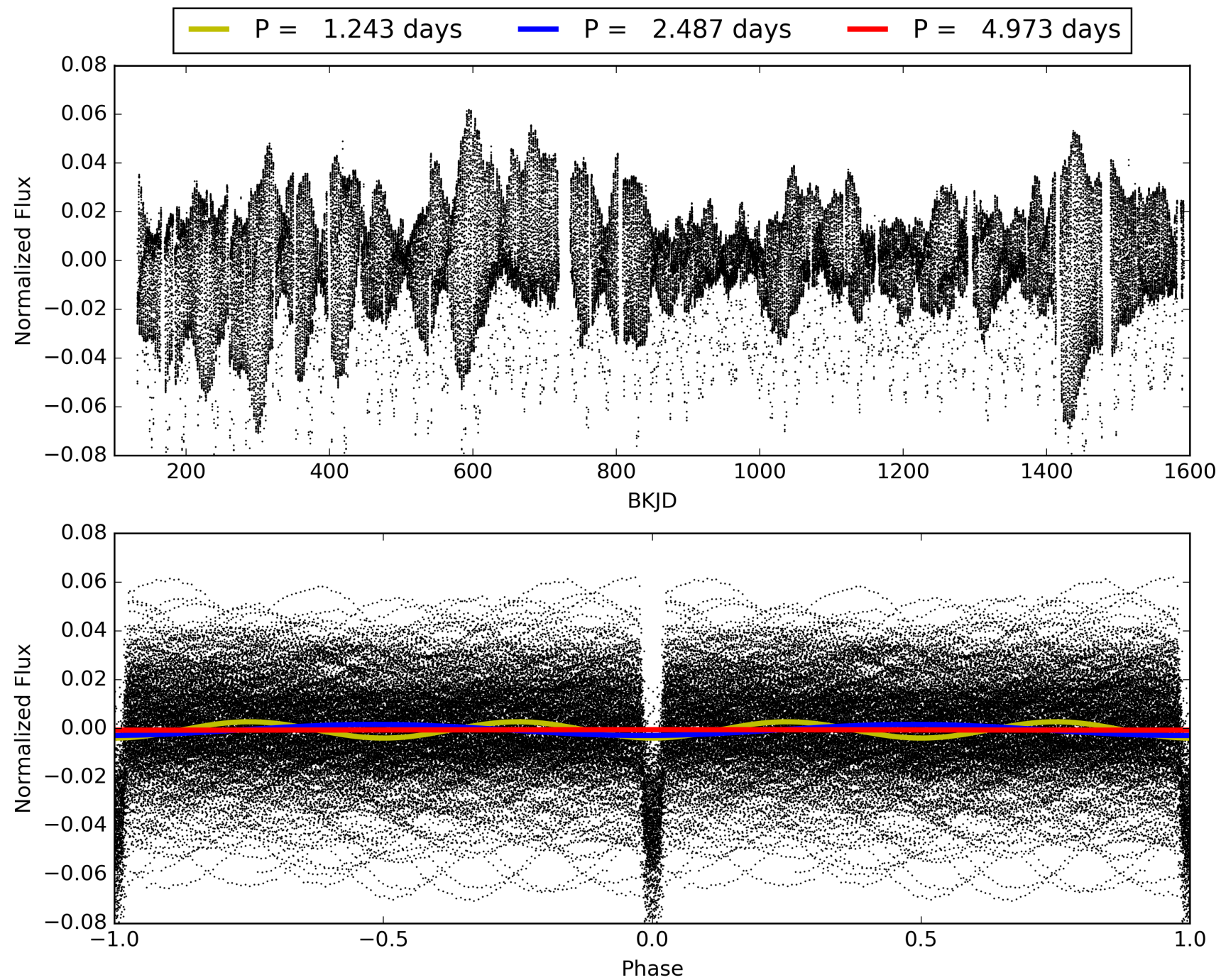
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [7.51σ]  
LongPeriod-sig: 100.0% [1708.81σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [510/510]  
GhostDiagnostic-chr: 1.604  
Centroid-sig: 0.0%  
Centroid-so: 0.077 arcsec [13.68σ]  
OotOffset-rm: 0.015 arcsec [0.23σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-rm: 0.108 arcsec [1.62σ]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 0.00 [0/17]

# TCE 009705459-01, PDC Light Curves



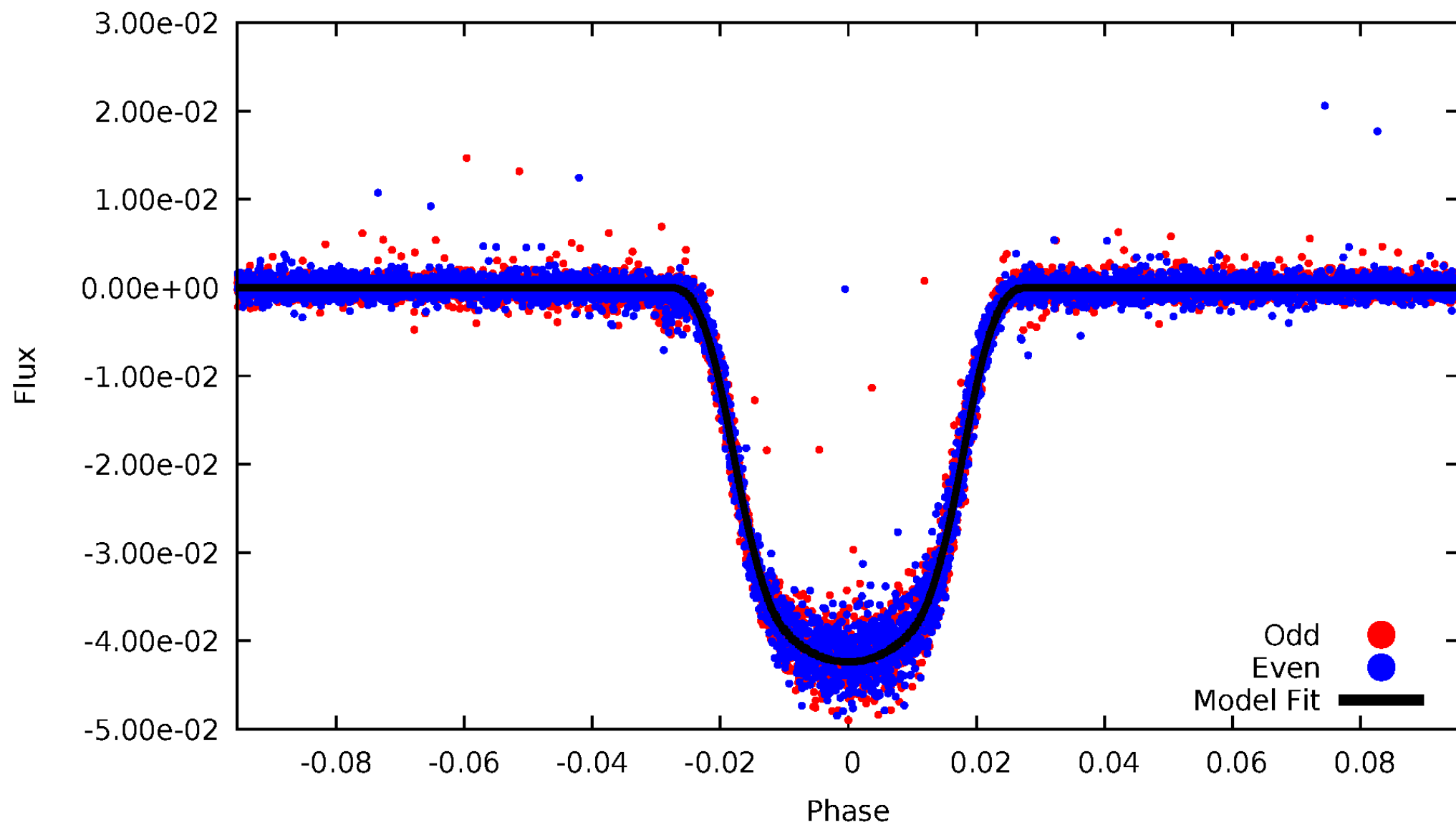
TCE 009705459-01





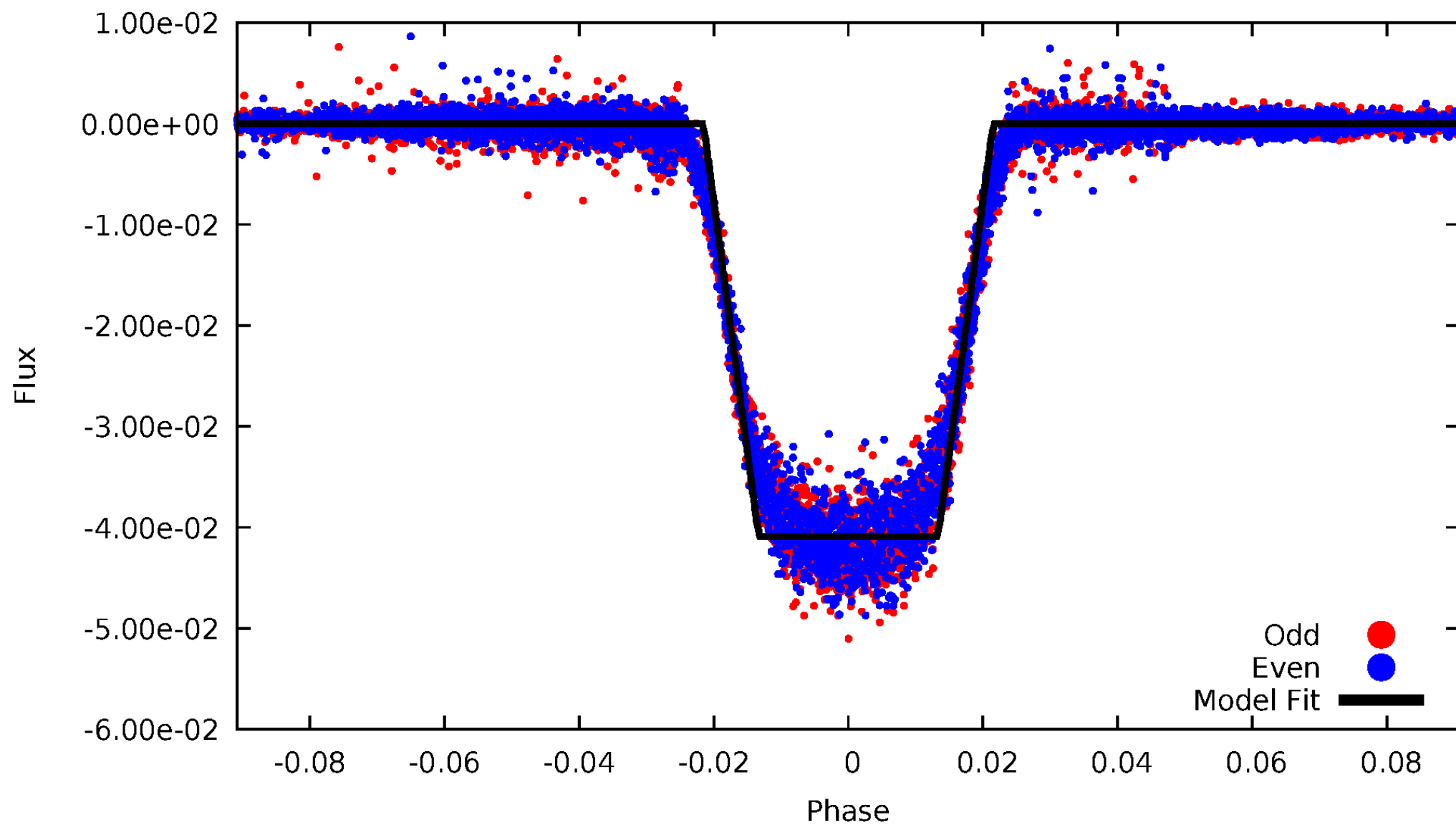
# DV Odd/Even

TCE 009705459-01



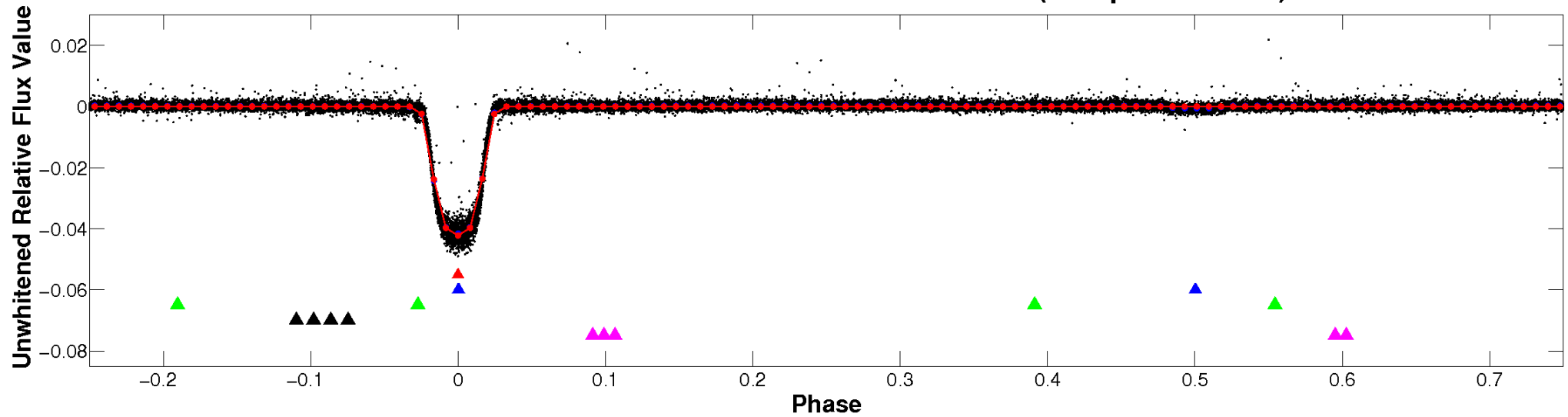
# ALT Odd/Even

TCE 009705459-01

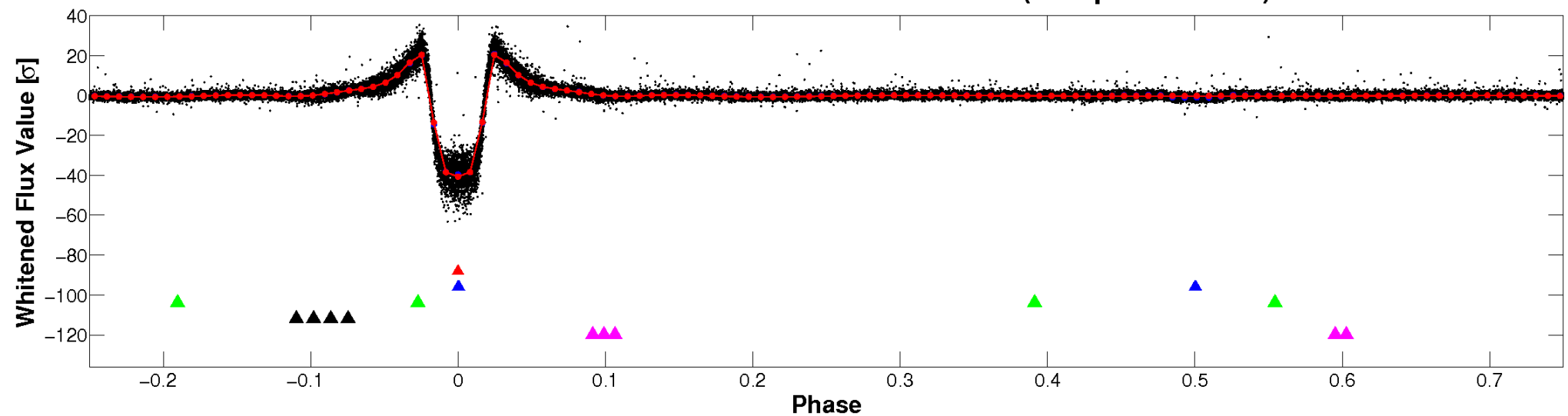


# Non-Whitened Vs. Whitened Light Curve

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

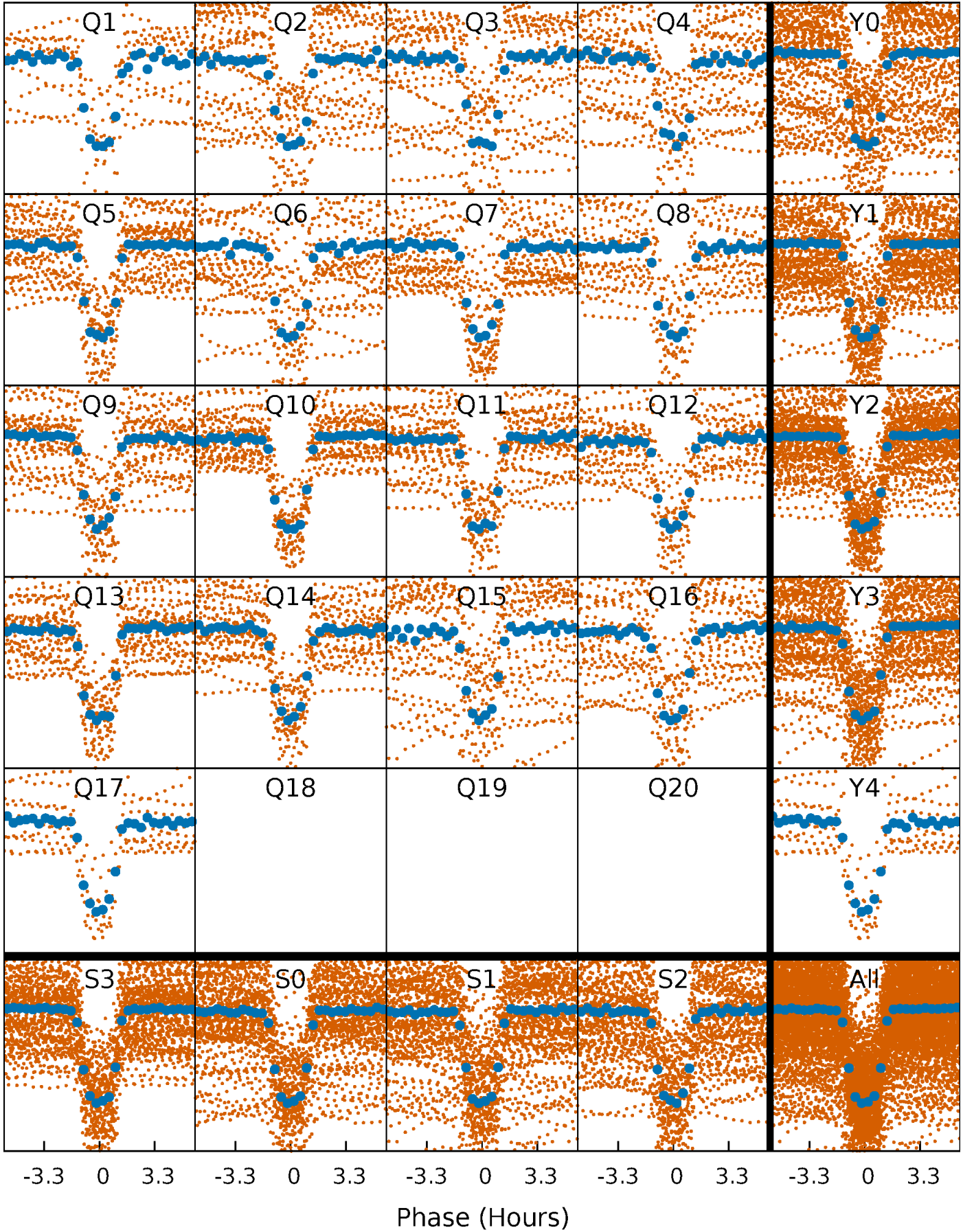


## Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

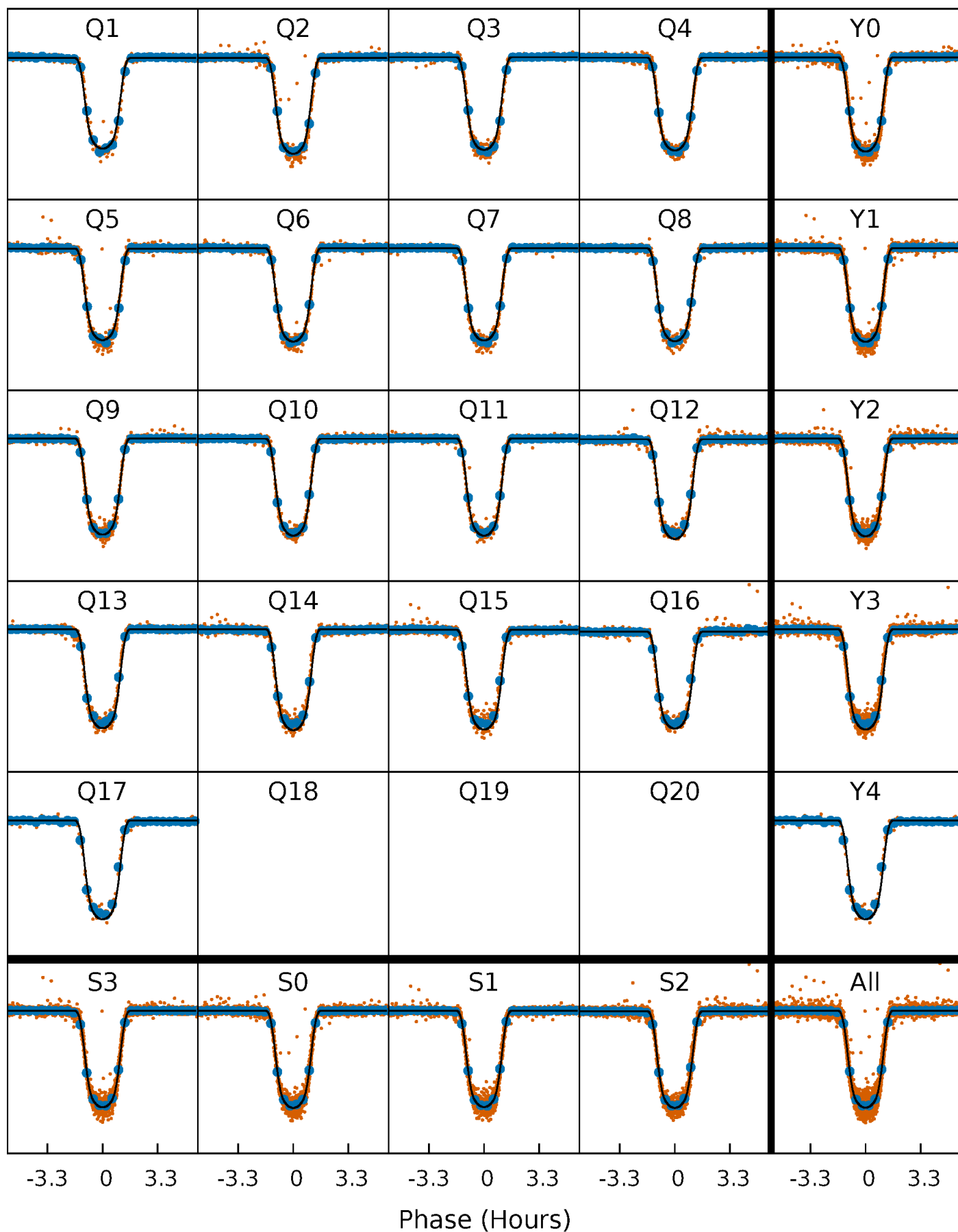
TCE 009705459-01   P= 2.486595 Days    $T_0=131.621454$  (BKJD)





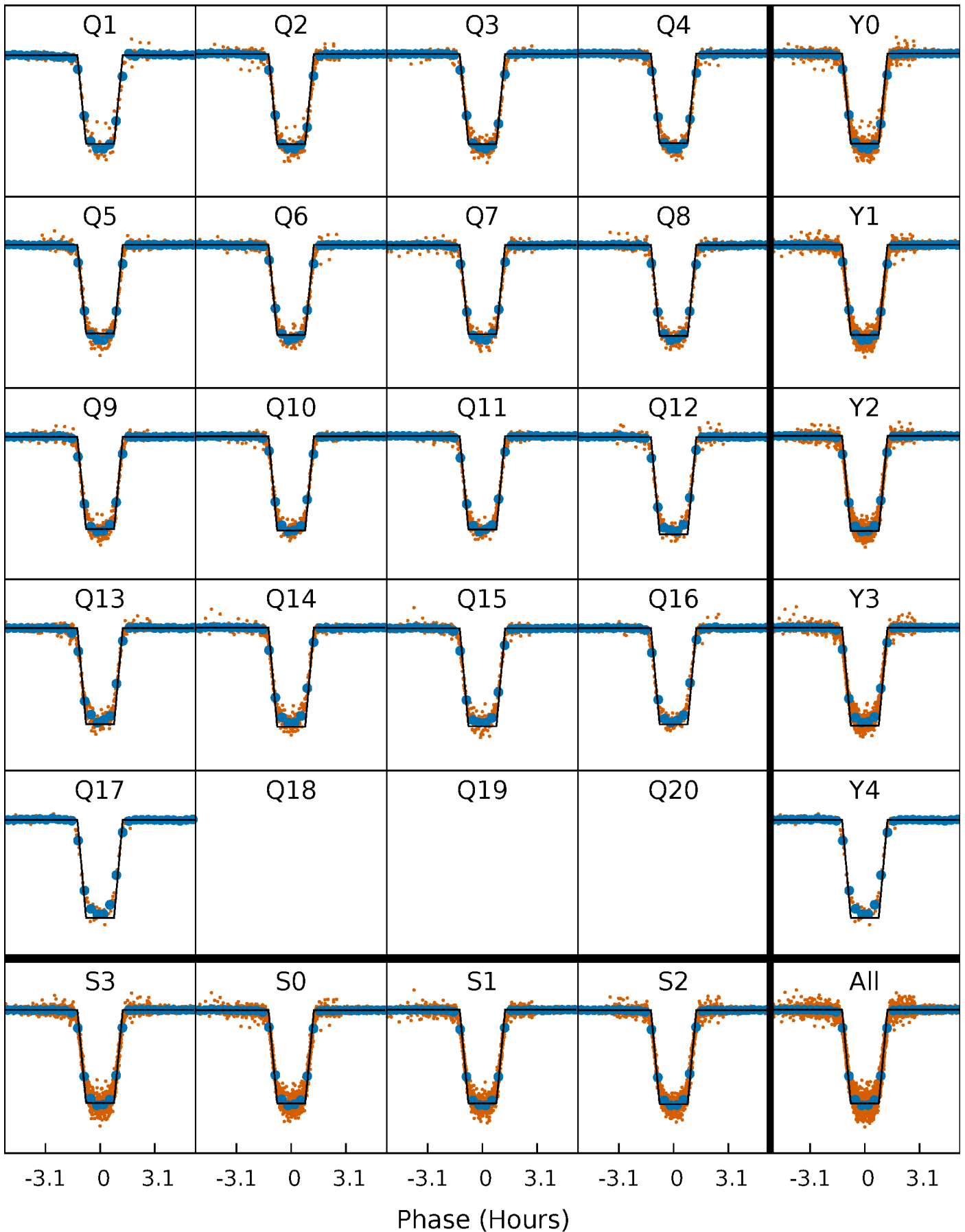
# DV Quarter-Phased Transit Curves

TCE 009705459-01 P= 2.486595 Days  $T_0=131.621454$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

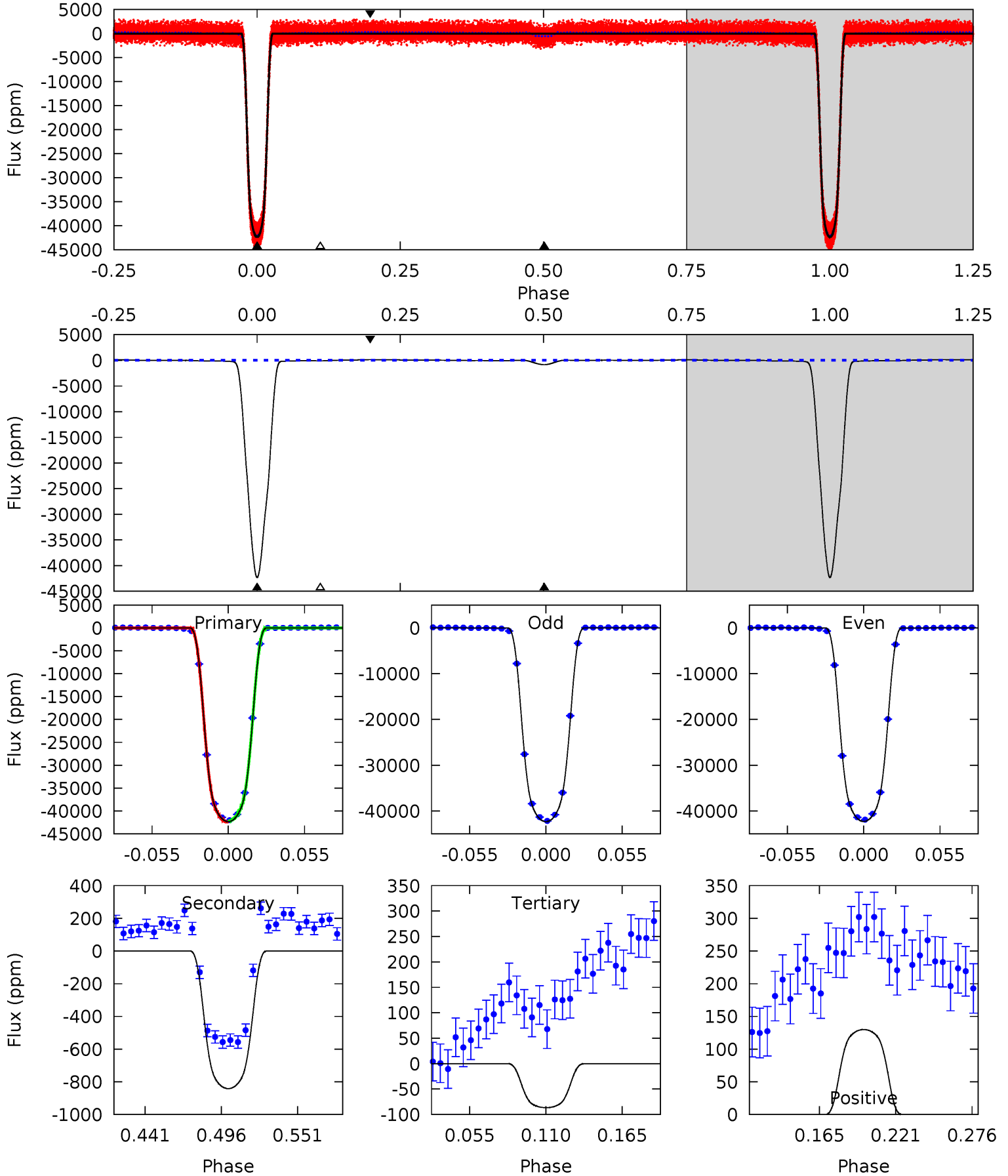
TCE 009705459-01   P= 2.486593 Days    $T_0=131.621662$  (BKJD)



# DV Model-Shift Uniqueness Test

009705459-01, P = 2.486595 Days, E = 129.134859 Days

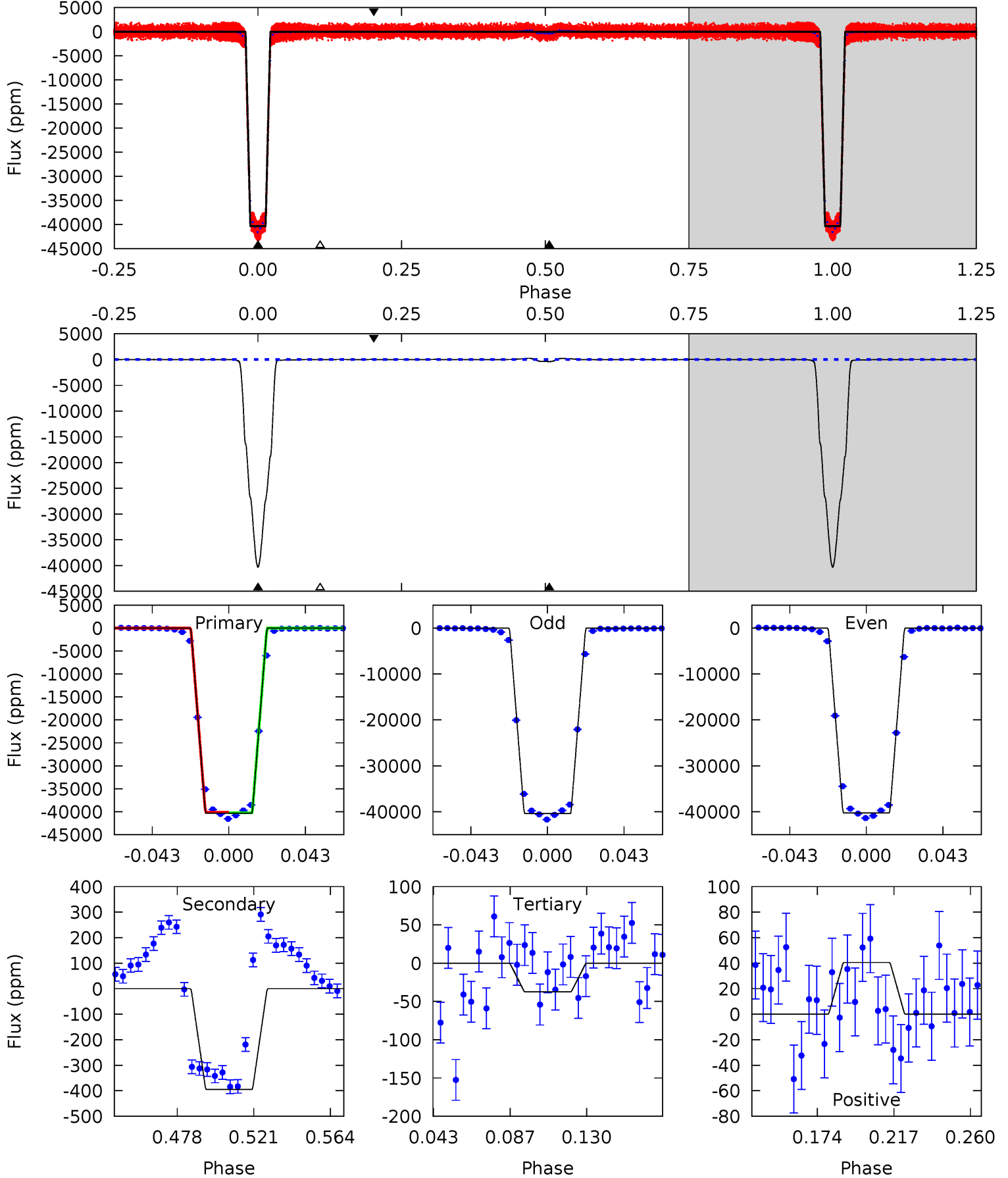
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
3082	61.3	6.30	9.46	4.69	1.92	4.68	3076	3072	55.0	51.8	1.81	0.99	0.00	9.49



# Alt Model-Shift Uniqueness Test

009705459-01, P = 2.486593 Days, E = 129.135069 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
2960	29.0	2.75	2.98	4.74	2.02	1.99	2957	2957	26.3	26.0	4.21	1.00	0.01	3.98





### Stellar Parameters For KIC 009705459

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5892^{+174}_{-208}$	$4.350^{+0.087}_{-0.203}$	$0.480^{+0.050}_{-0.300}$	$1.198^{+0.375}_{-0.161}$	$1.173^{+0.122}_{-0.150}$	$0.962^{+0.384}_{-0.500}$
	+3%/-4%	+2%/-5%	+10%/-62%	+31%/-13%	+10%/-13%	+40%/-52%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 009705459-01 / KOI 1448.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-842 \pm 14$	$25.52^{+4.59}_{-2.16}$	$2066^{+161}_{-110}$	$2813^{+63}_{-75}$	$1.003^{+0.171}_{-0.265}$
Alt.	$-395 \pm 14$	$26.71^{+4.75}_{-2.21}$	$2069^{+164}_{-116}$	$2280^{+100}_{-358}$	$0.427^{+0.076}_{-0.109}$

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

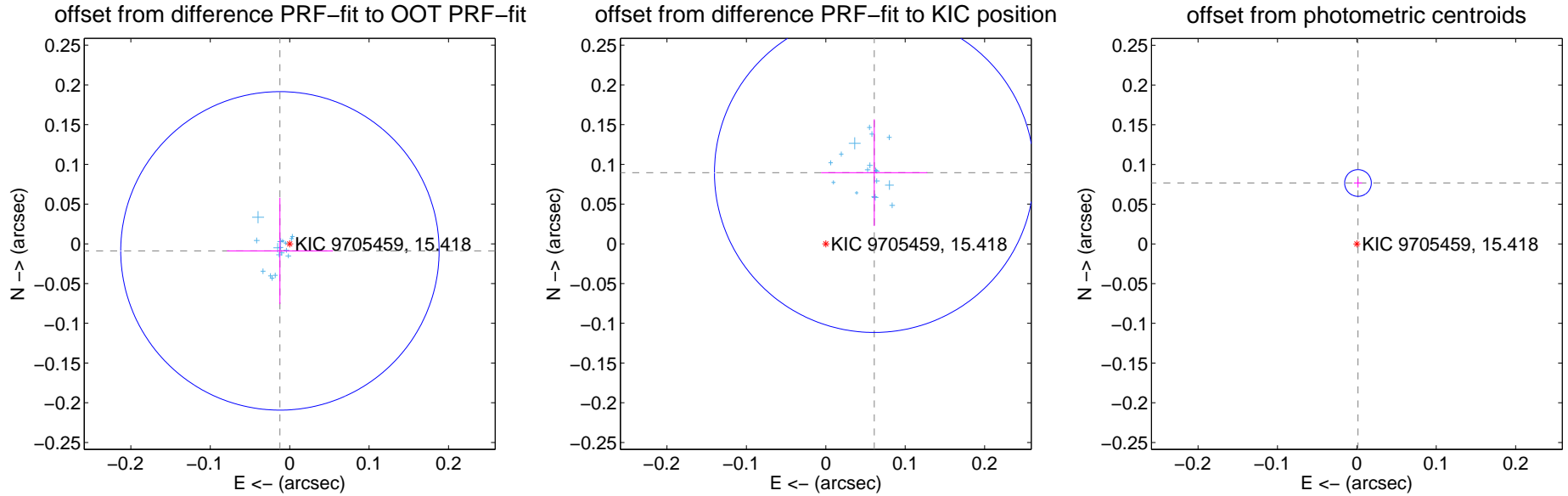
## DV Centroid Data

Supplemental centroid analysis for 009705459-01. Kepler magnitude: 15.42. Transit SNR 1524.16

There are 17 quarters with good PRF difference image offsets

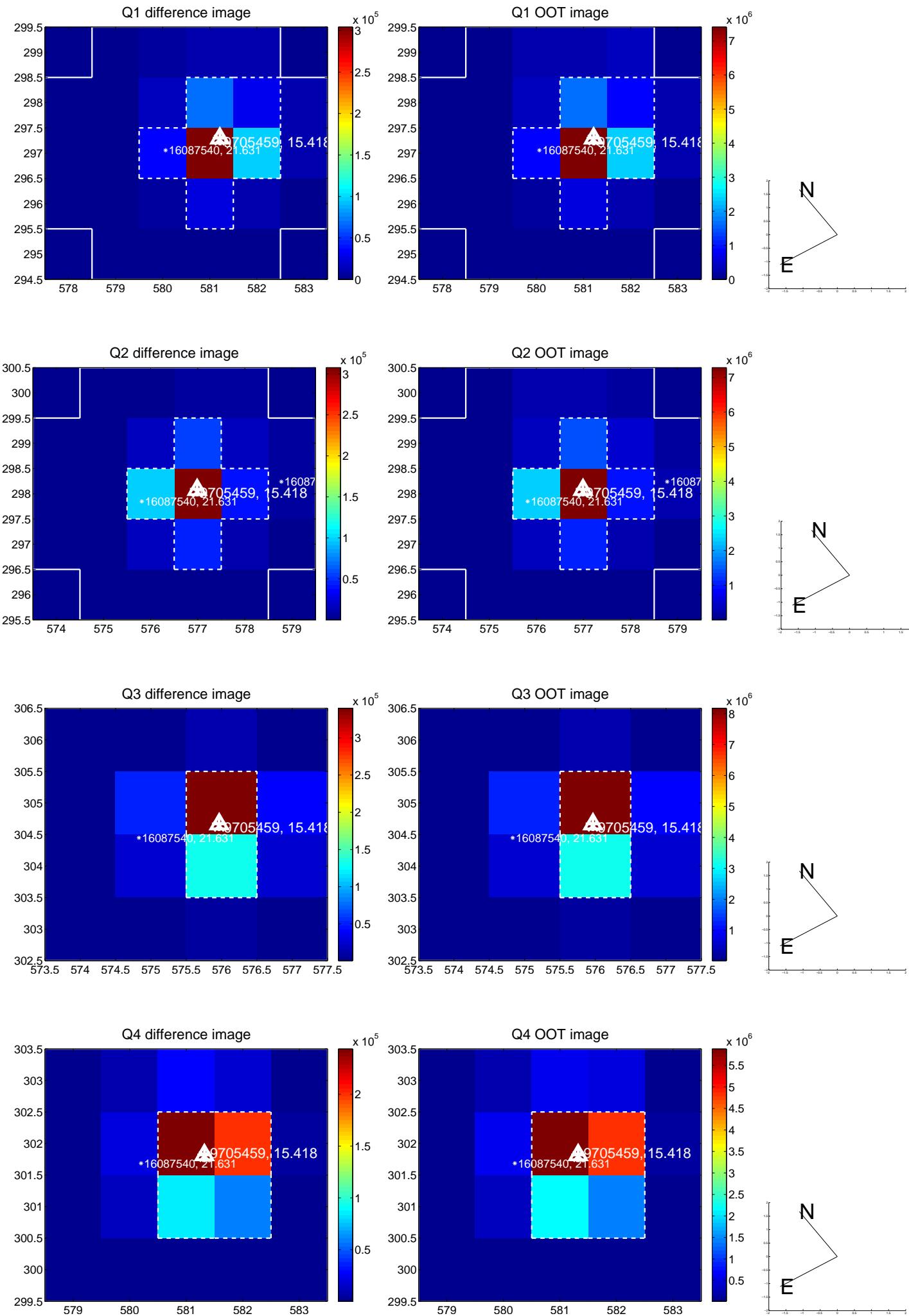
The direct PRF centroid is offset from the target star catalog position by about 0.12 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.015 \pm 0.067$	0.23	$0.012 \pm 0.067$	$-0.009 \pm 0.067$
PRF-fit source offset from KIC position	$0.108 \pm 0.067$	1.62	$-0.061 \pm 0.067$	$0.090 \pm 0.067$
photometric centroid source offset	$0.08 \pm 0.01$	13.68	$-0.00 \pm 0.01$	$0.08 \pm 0.01$

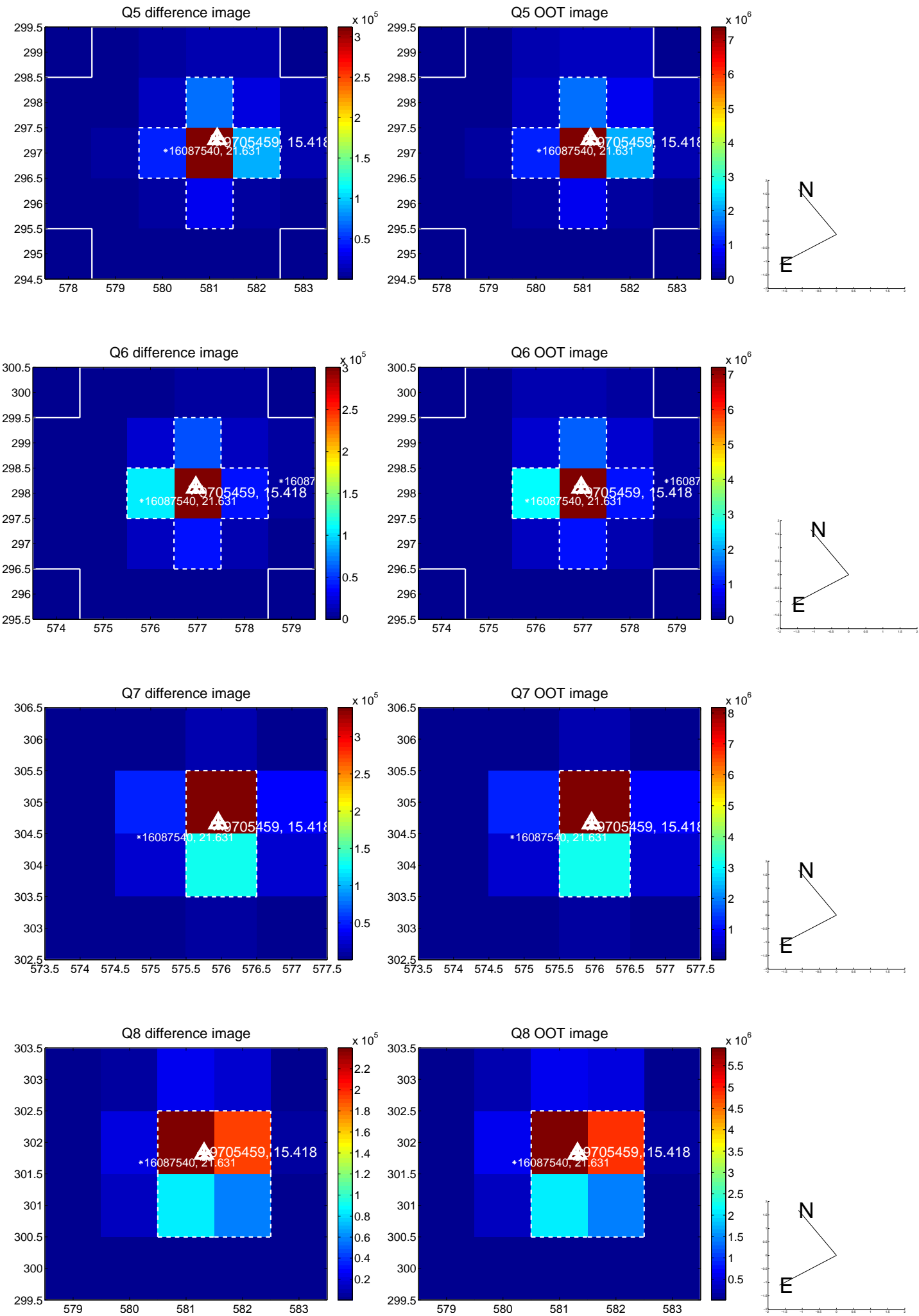


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

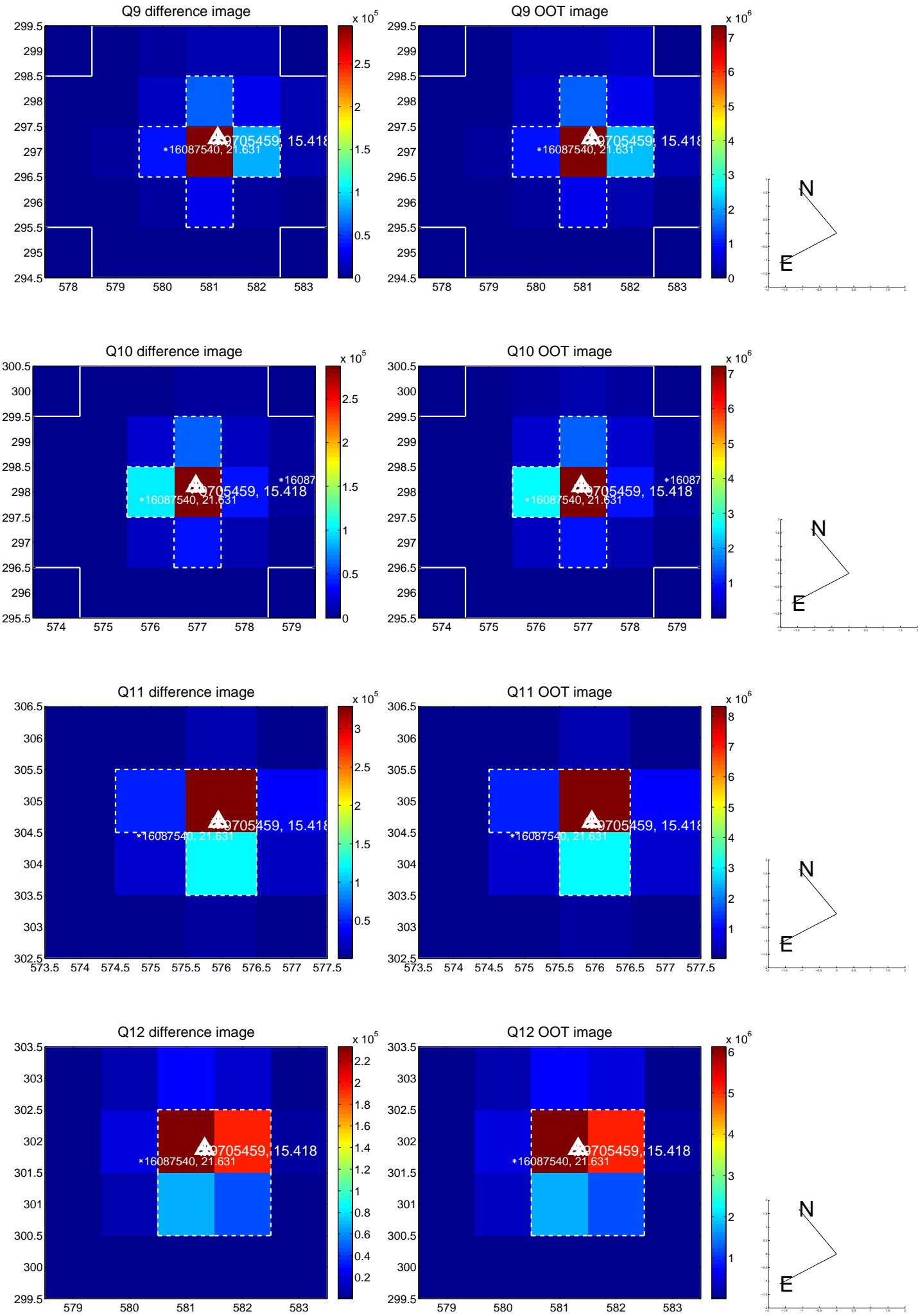


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

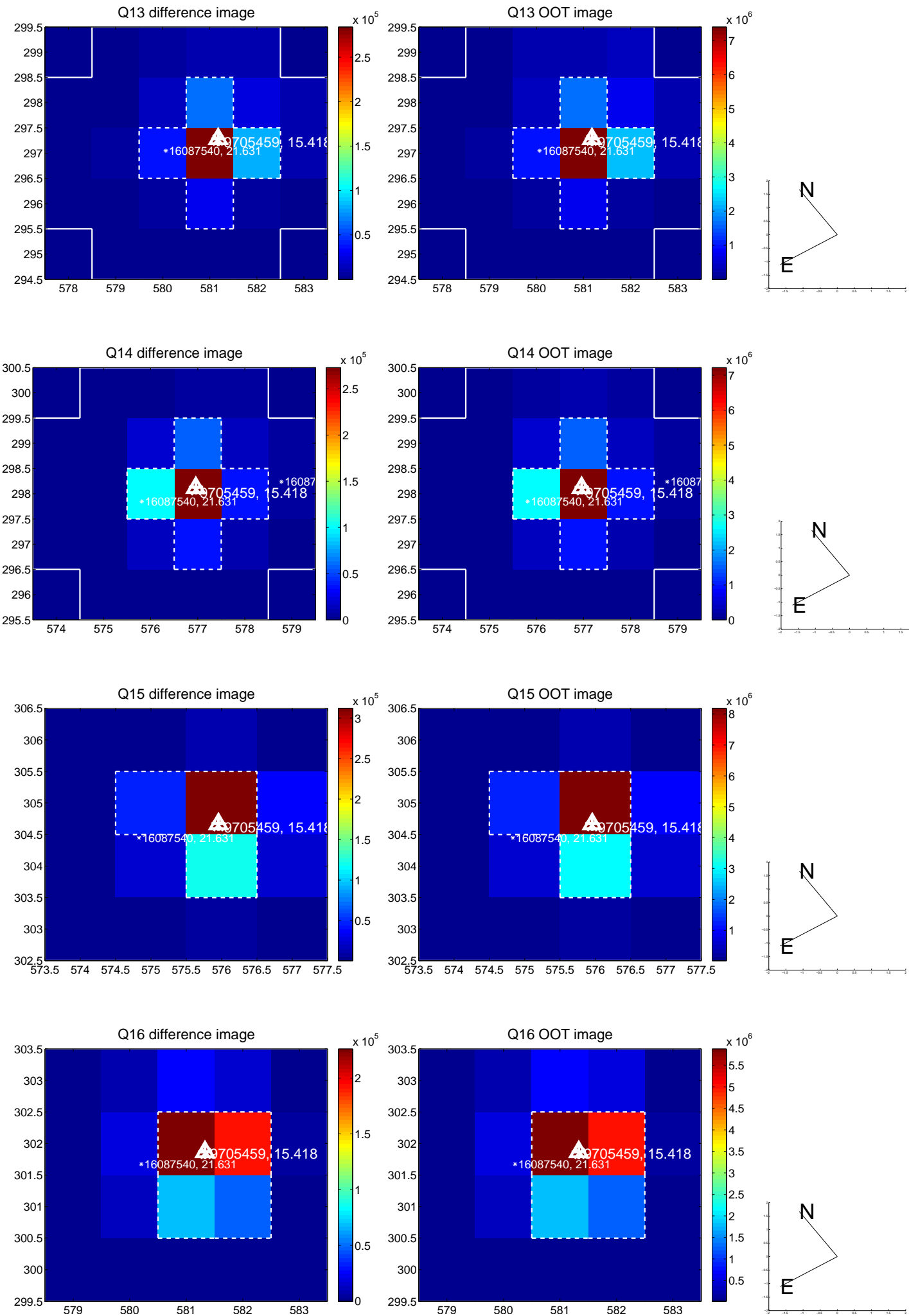




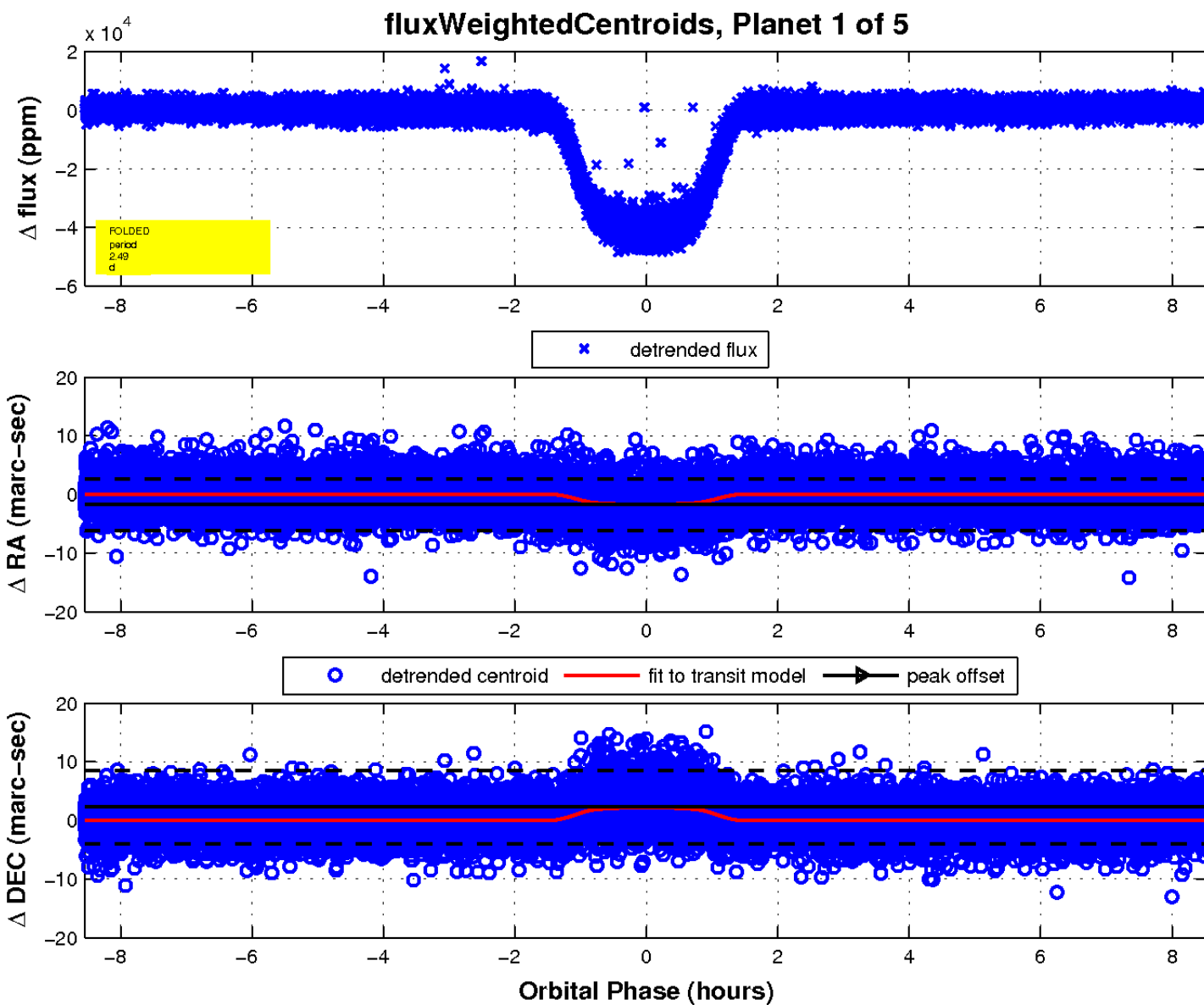
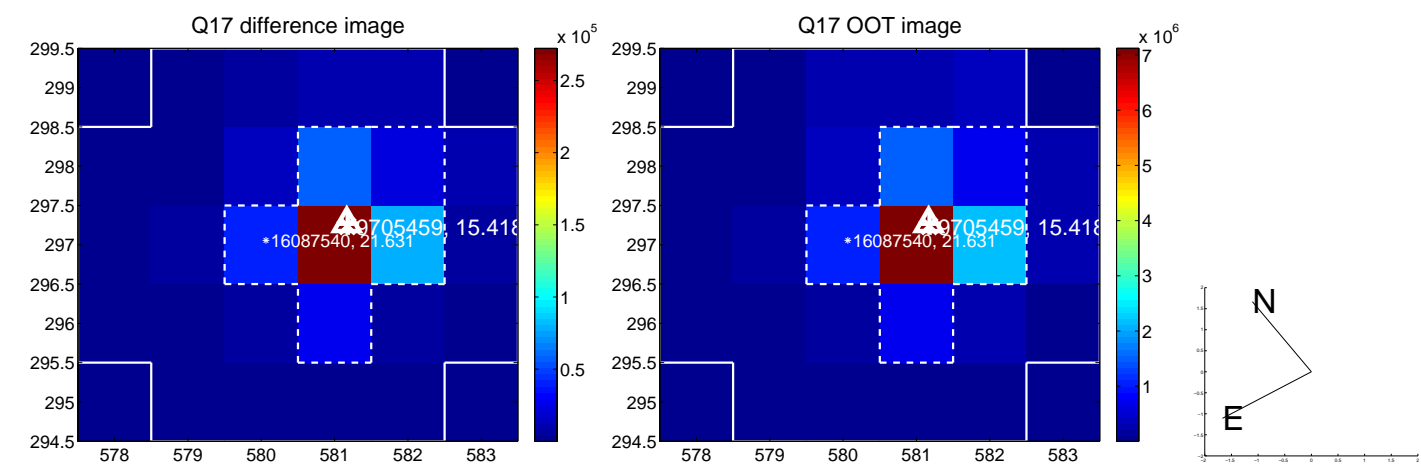
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

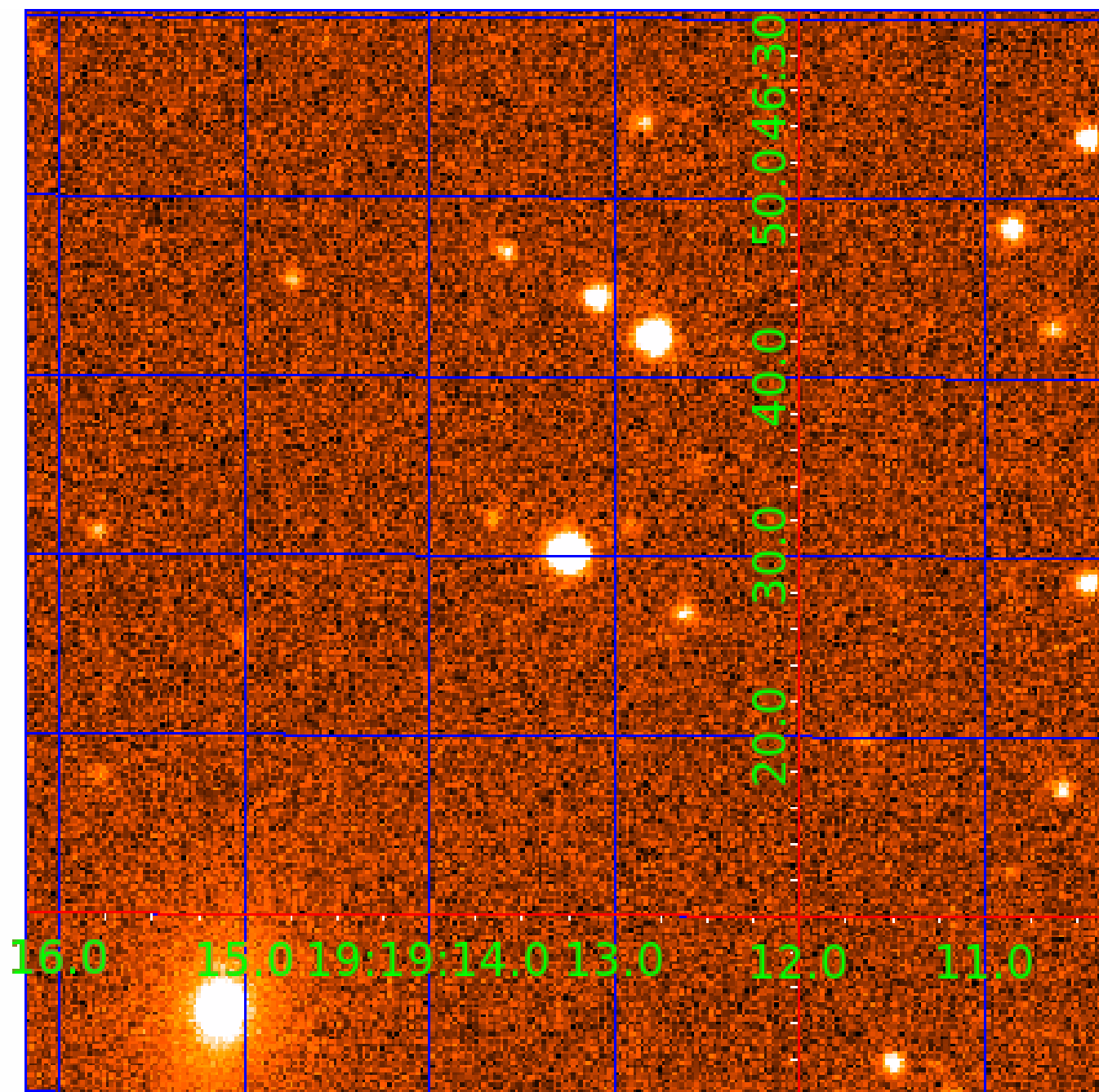


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 009705459

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009705459-01	OBS	1448.01	2.486595	131.621454	42390.5	2.849	844.7	1524.2	1.20	5892	25.29	1080.05
009705459-02	OBS	No	1.243296	131.623249	918.7	2.769	41.0	44.5	1.20	5892	4.34	2721.56
009705459-03	OBS	No	436.194596	145.432940	4555.8	12.721	11.8	6.7	1.20	5892	15.04	1.10
009705459-04	OBS	No	435.183153	278.057801	3399.5	5.899	9.5	8.3	1.20	5892	8.53	1.10
009705459-05	OBS	No	272.272769	388.005558	2442.8	2.499	9.2	7.9	1.20	5892	5.85	2.06

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009705459-01	OBS	PC	0.87	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—PLANET_OCCULT_ALT—HAS_SEC_TCE
009705459-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE
009705459-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009705459-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—CENT_FEW_DIFFS
009705459-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_TER_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS

**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 009705459-02

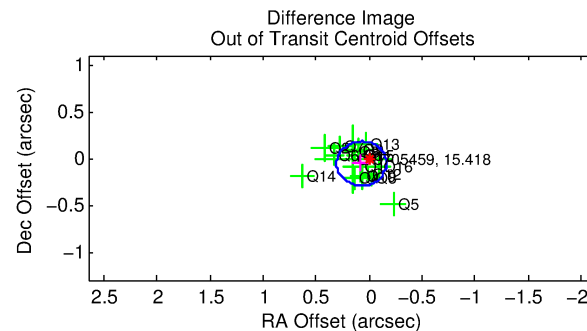
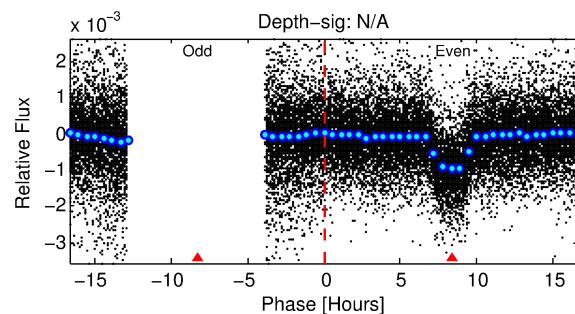
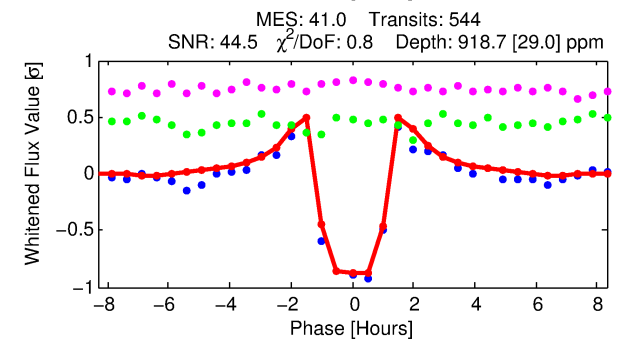
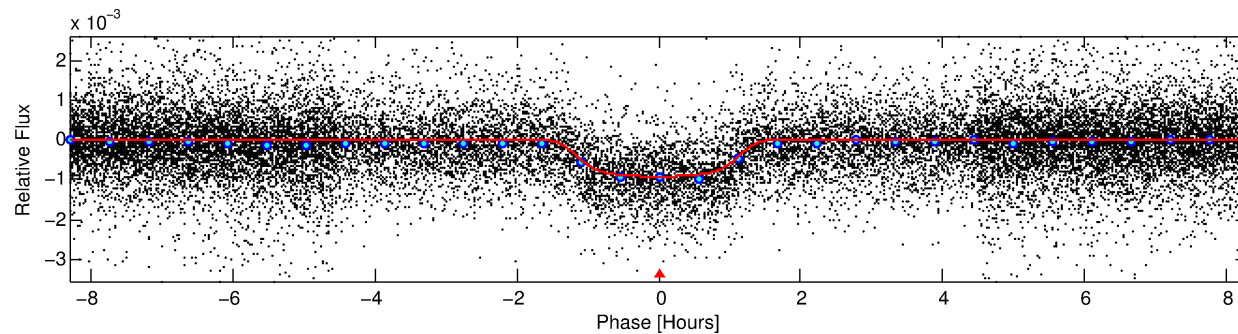
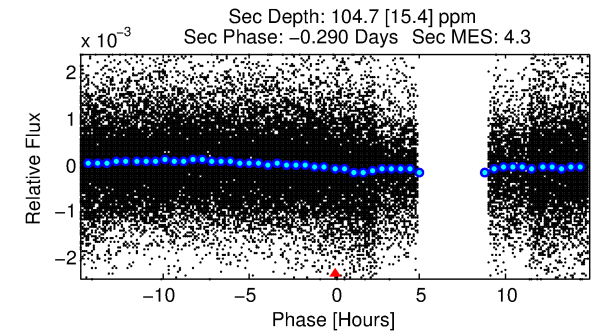
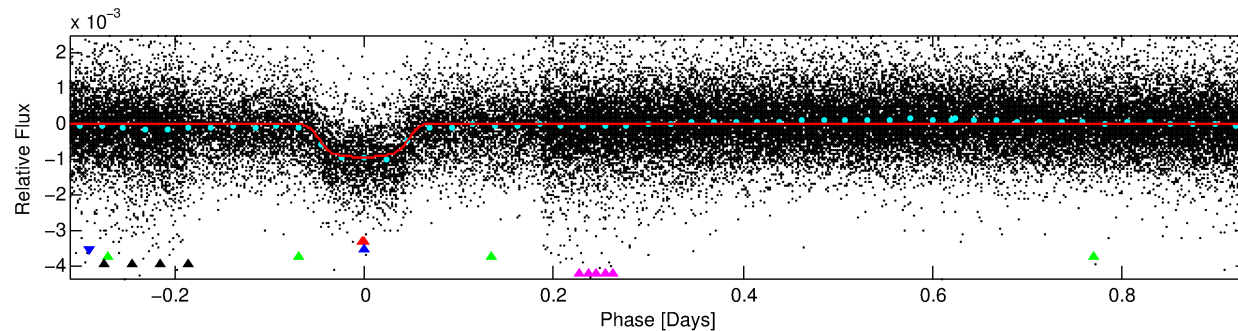
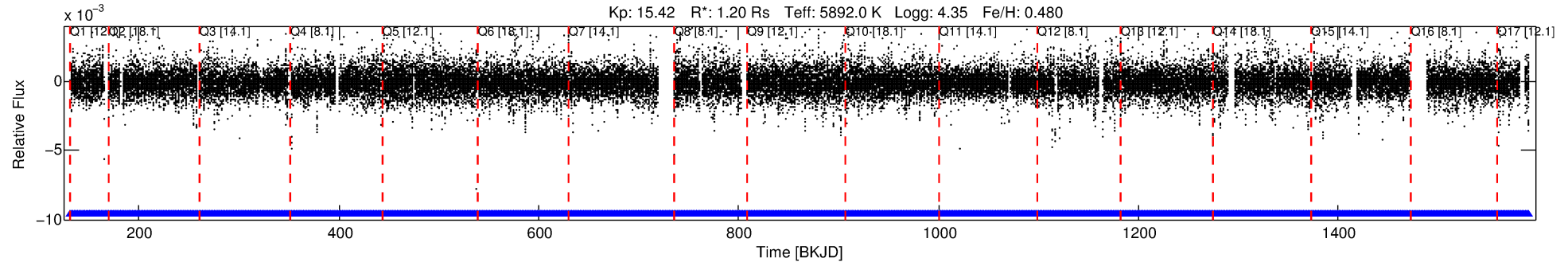
No Significant Match Found

# DV One-Page Summary

KIC: 9705459 Candidate: 2 of 5 Period: 1.243 d

KOI: K01448 Corr: No Ephemeris Match

Kp: 15.42 R\*: 1.20 Rs Teff: 5892.0 K Logg: 4.35 Fe/H: 0.480



## DV Fit Results:

Period = 1.24330 [0.00000] d  
Epoch = 131.6232 [0.0005] BKJD  
Rp/R\* = 0.0332 [0.0012]  
a/R\* = 1.98 [0.19]  
b = 0.90 [0.03]  
Seff = 2721.56 [1090.64]  
Teq = 1842 [185] K  
Rp = 4.34 [1.37] Re  
a = 0.0239 [0.0062] AU  
Ag = 1.74 [0.71] [1.04σ]  
Teffp = 3271 [176] K [5.60σ]

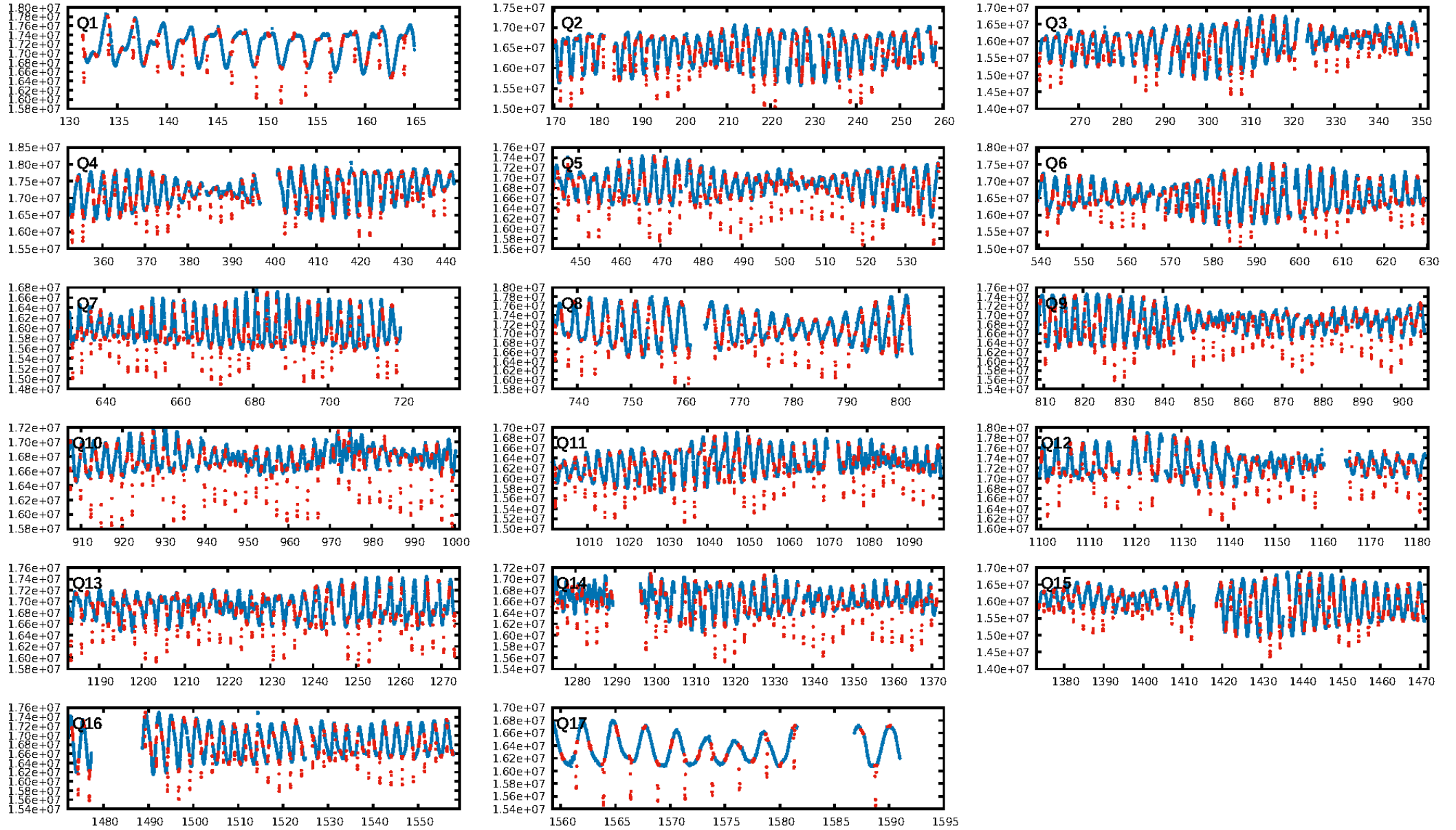
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [7.51σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 1.94e-297  
RollingBand-fgt: 1.00 [520/520]  
GhostDiagnostic-chr: 1.105  
Centroid-sig: 4.9%  
Centroid-so: 0.281 arcsec [1.65σ]  
OotOffset-rm: 0.092 arcsec [1.17σ]  
KicOffset-rm: 0.050 arcsec [0.59σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 1.00 [17/17]

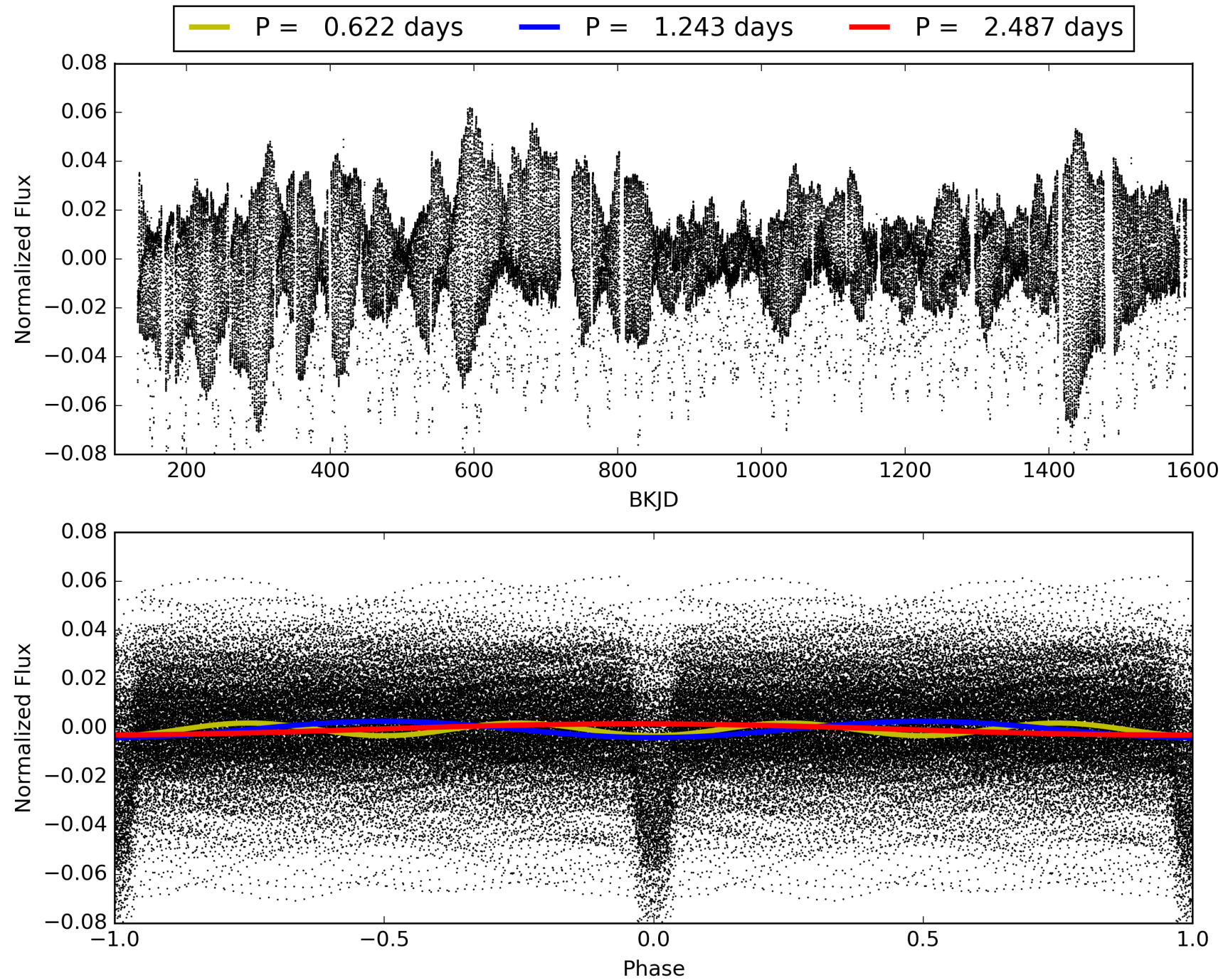
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:28:48 Z

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

# TCE 009705459-02, PDC Light Curves



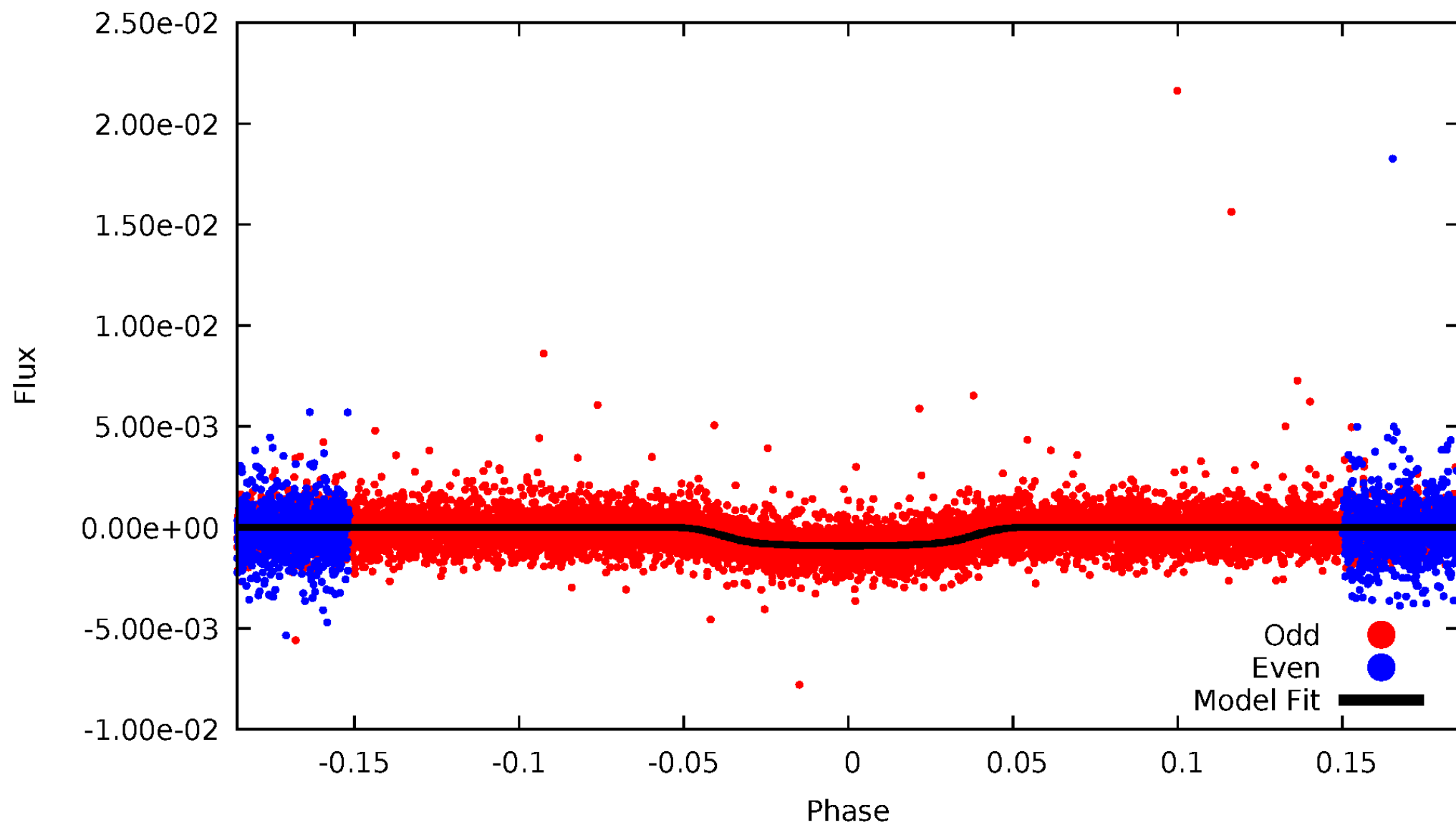
TCE 009705459-02





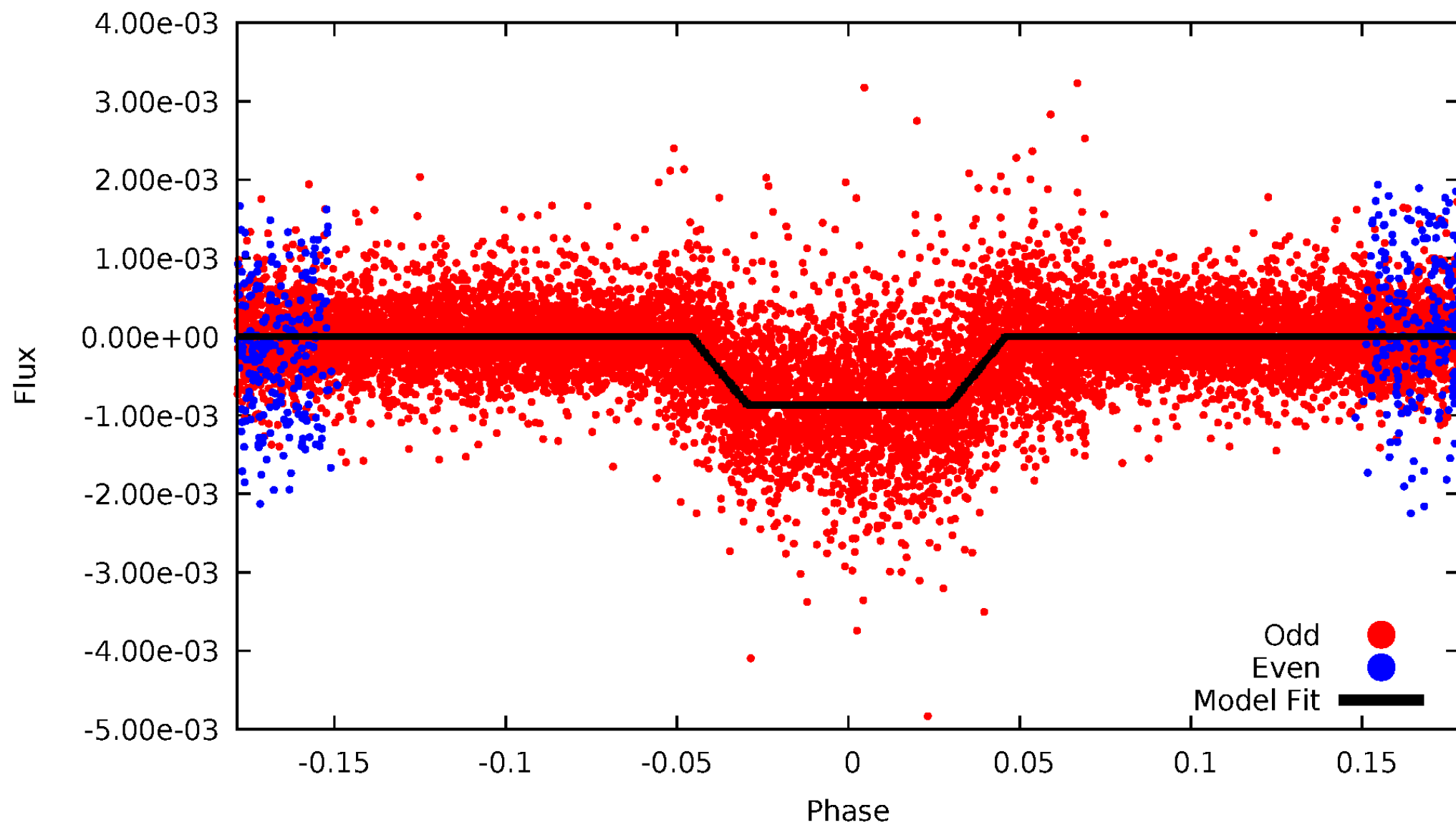
# DV Odd/Even

TCE 009705459-02



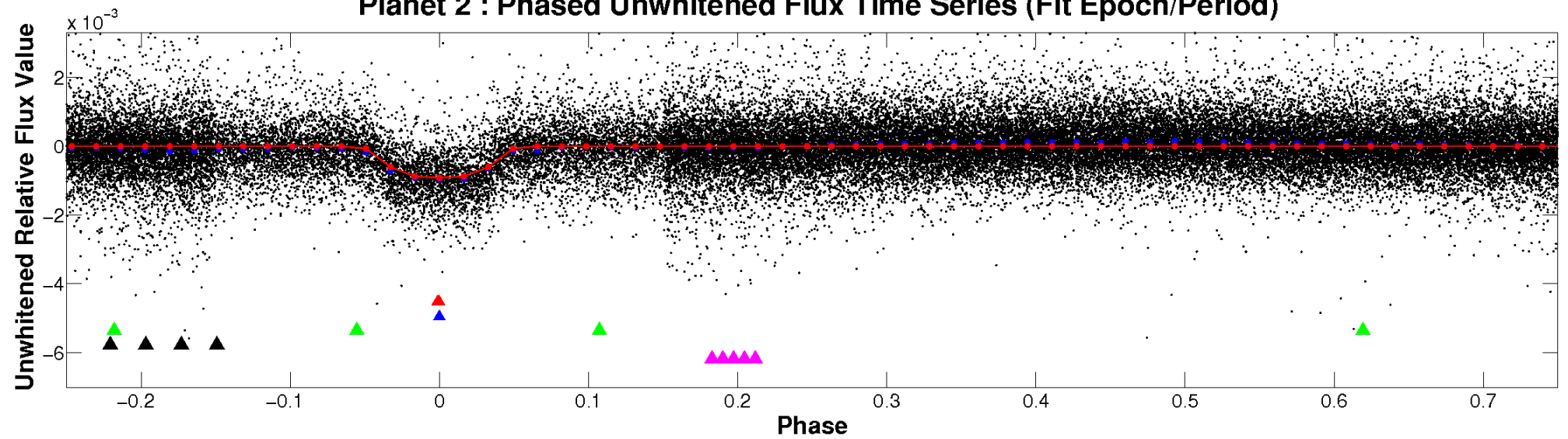
# ALT Odd/Even

TCE 009705459-02

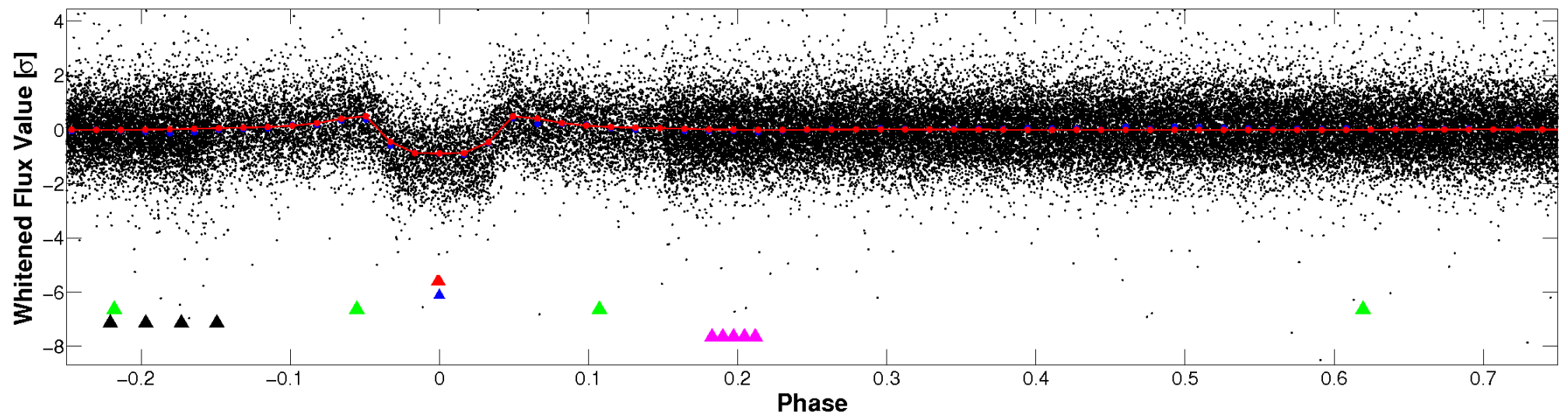


# Non-Whitened Vs. Whitened Light Curve

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



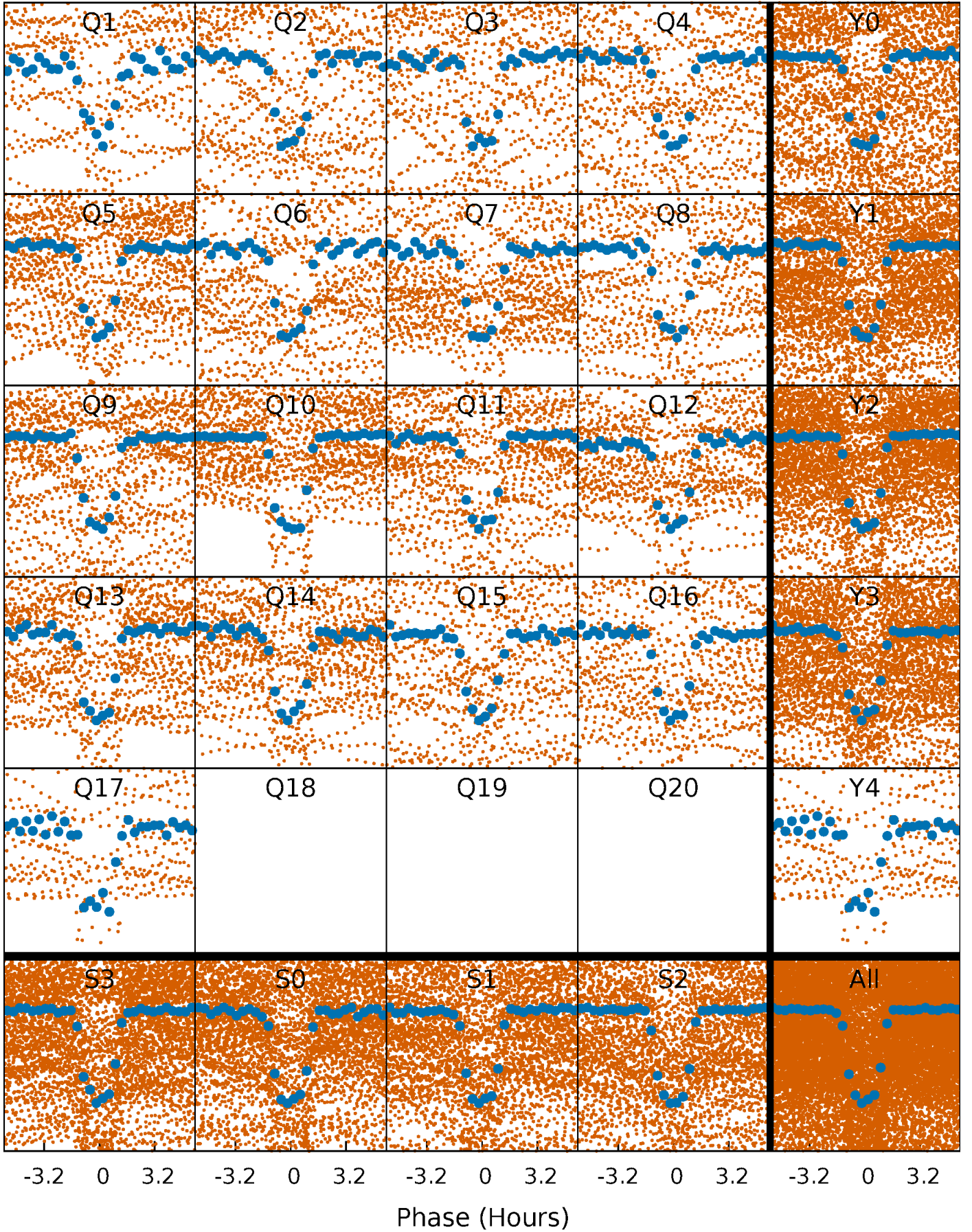
## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)





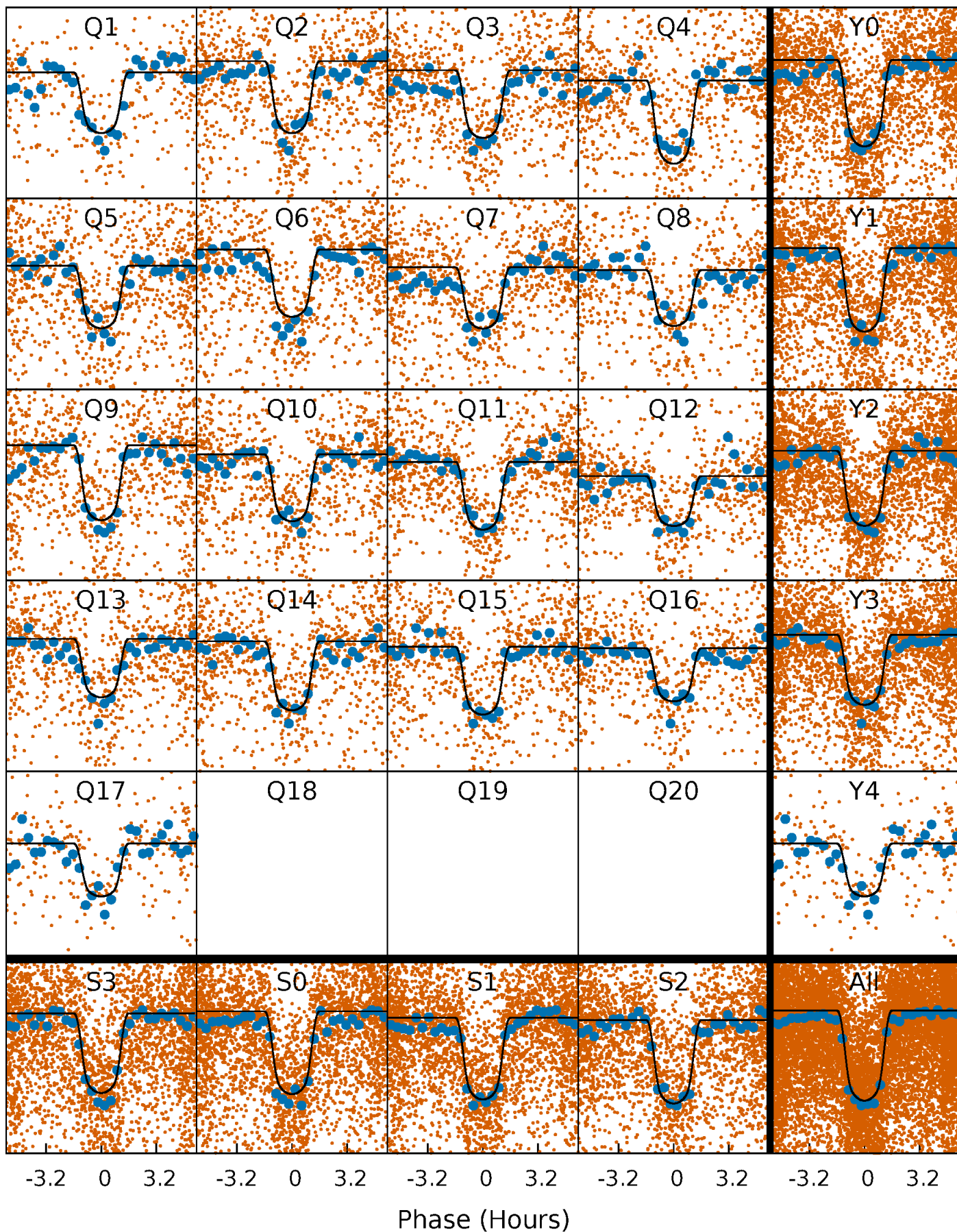
# PDC Quarter-Phased Transit Curves

TCE 009705459-02   P= 1.243296 Days    $T_0=131.623249$  (BKJD)



# DV Quarter-Phased Transit Curves

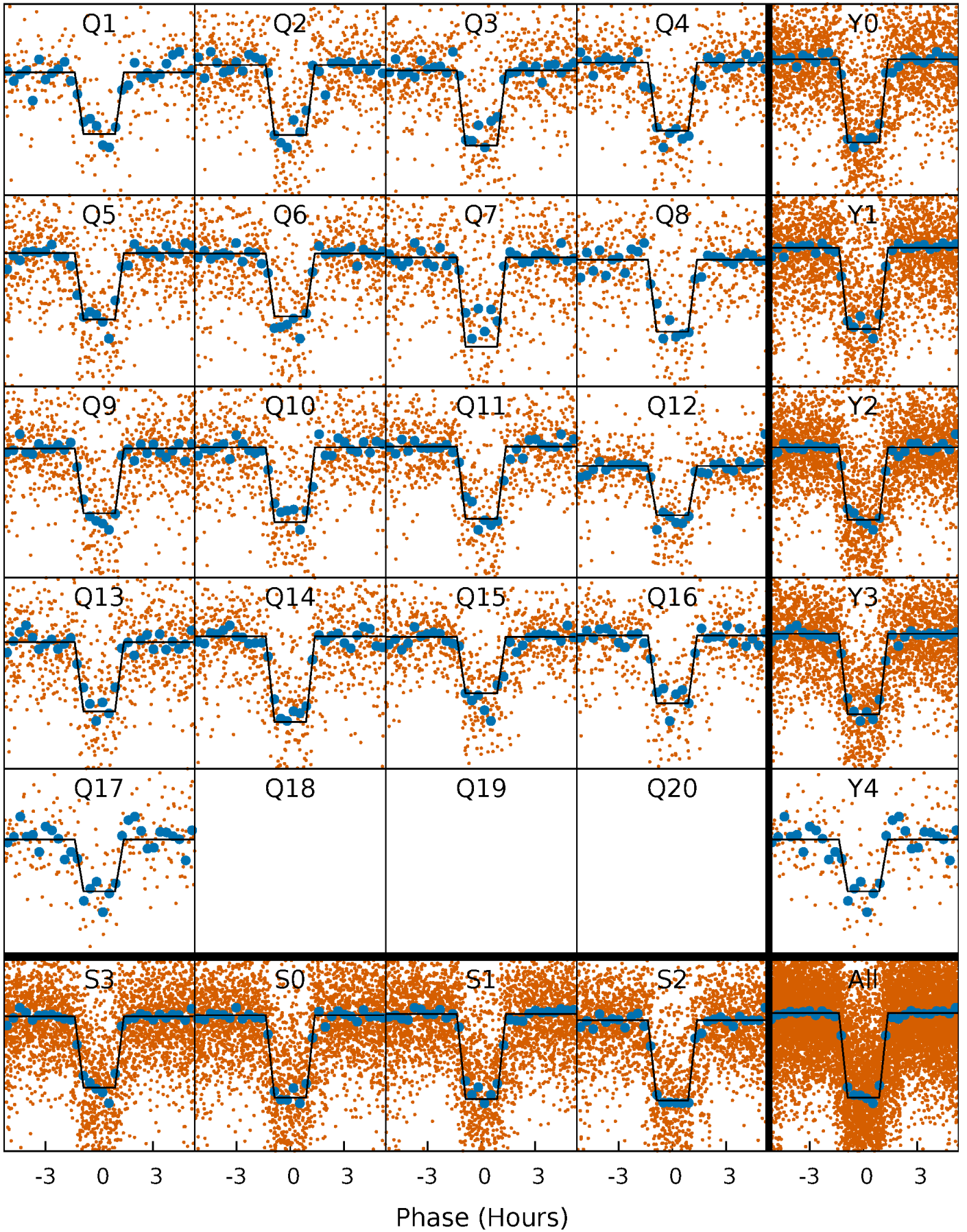
TCE 009705459-02   P= 1.243296 Days    $T_0=131.623249$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

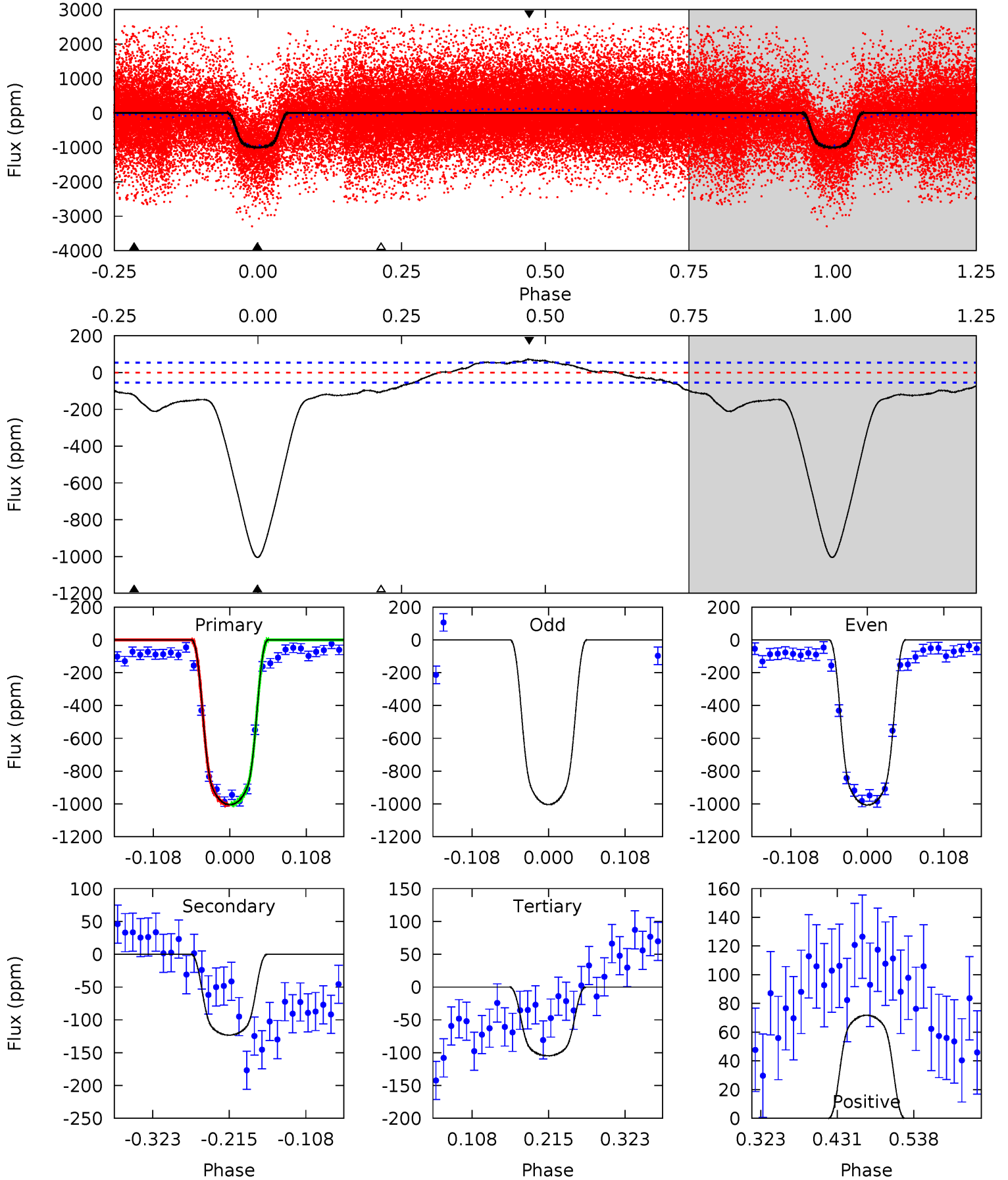
TCE 009705459-02   P= 1.243290 Days    $T_0=131.626596$  (BKJD)



# DV Model-Shift Uniqueness Test

009705459-02, P = 1.243296 Days, E = 131.623249 Days

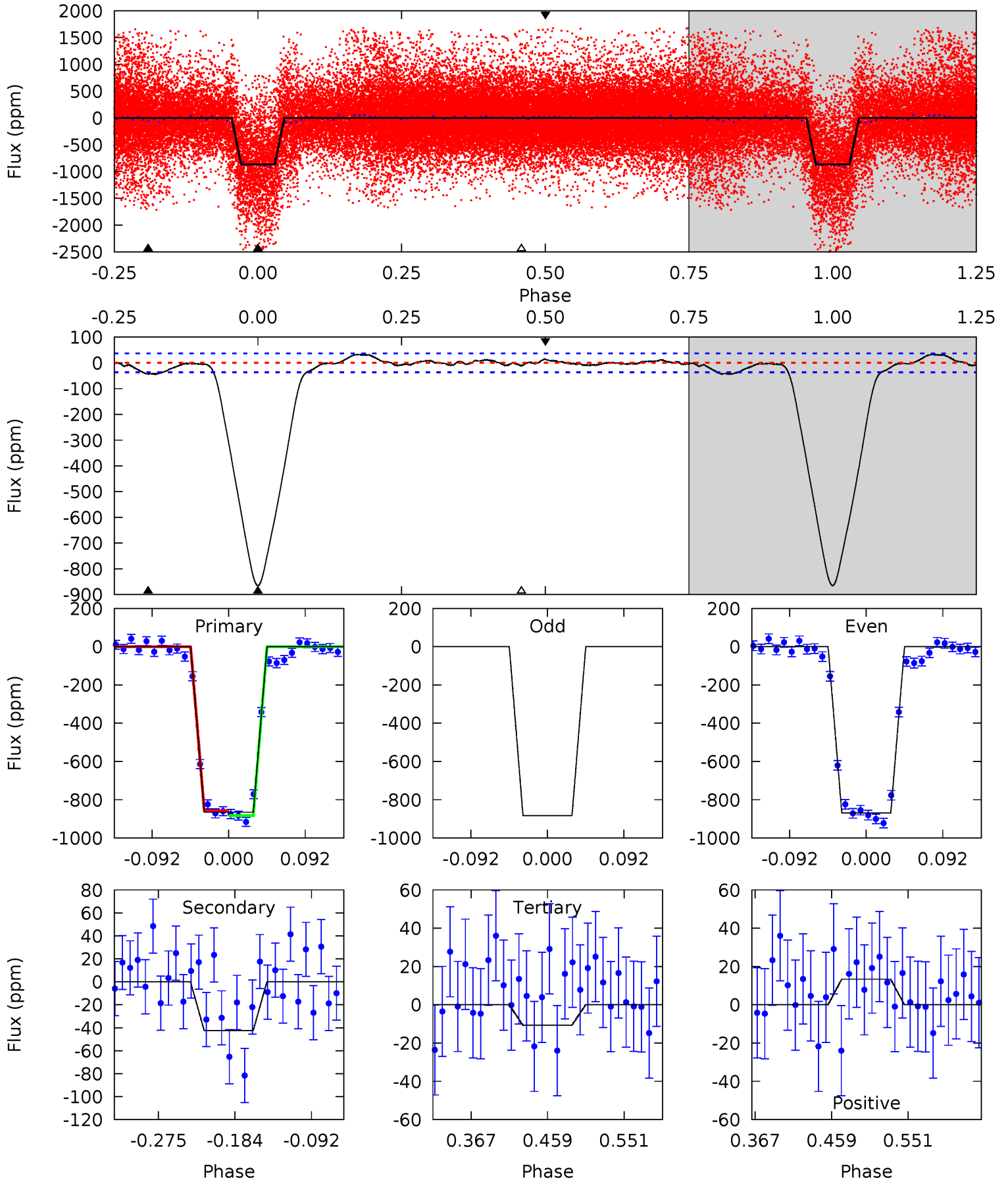
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
84.4	10.4	8.81	6.03	4.55	1.61	5.03	75.6	78.4	1.55	4.33	0.12	1.01	0.07	0.15



# Alt Model-Shift Uniqueness Test

009705459-02, P = 1.243290 Days, E = 131.626596 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
108.0	5.30	1.34	1.66	4.58	1.69	1.13	106.7	106.4	3.96	3.63	0.99	1.02	0.04	1.52



### Stellar Parameters For KIC 009705459

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5892^{+174}_{-208}$	$4.350^{+0.087}_{-0.203}$	$0.480^{+0.050}_{-0.300}$	$1.198^{+0.375}_{-0.161}$	$1.173^{+0.122}_{-0.150}$	$0.962^{+0.384}_{-0.500}$
	+3%/-4%	+2%/-5%	+10%/-62%	+31%/-13%	+10%/-13%	+40%/-52%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 009705459-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-123 \pm 12$	$4.36^{+0.77}_{-0.36}$	$2597^{+198}_{-143}$	$3675^{+114}_{-141}$	$1.940^{+0.503}_{-0.505}$
Alt.	$-42 \pm 8$	$3.91^{+0.68}_{-0.37}$	$2616^{+192}_{-158}$	$3092^{+156}_{-177}$	$0.827^{+0.288}_{-0.233}$

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

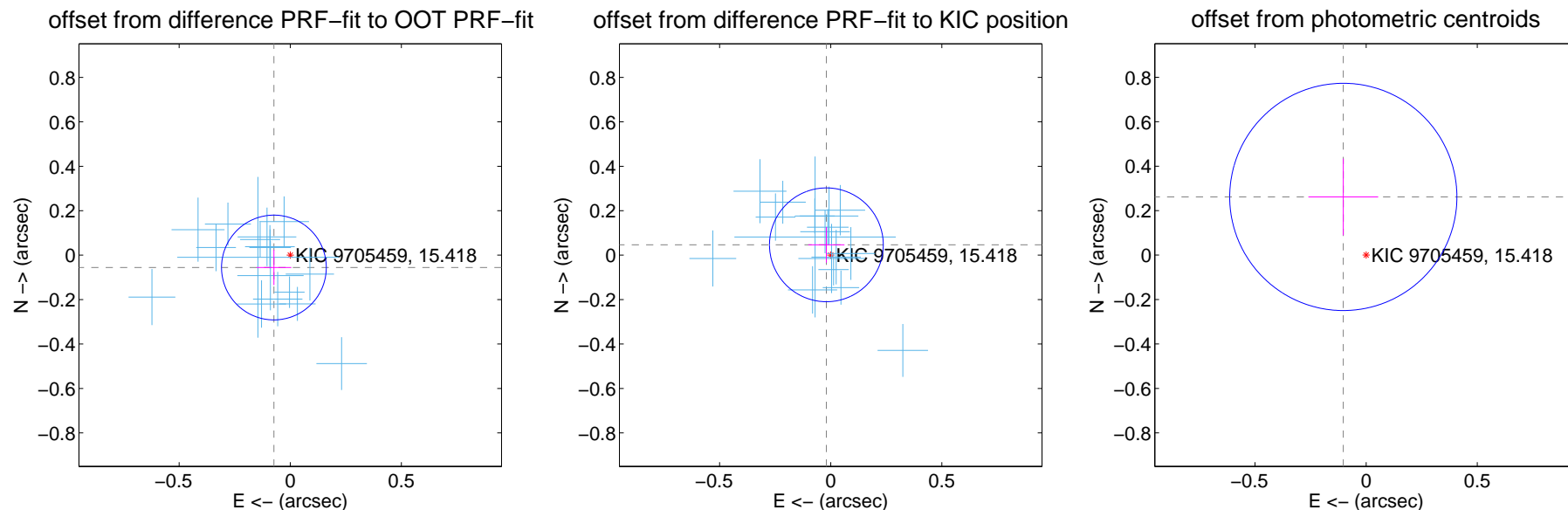
## DV Centroid Data

Supplemental centroid analysis for 009705459-02. Kepler magnitude: 15.42. Transit SNR 44.48

There are 17 quarters with good PRF difference image offsets

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

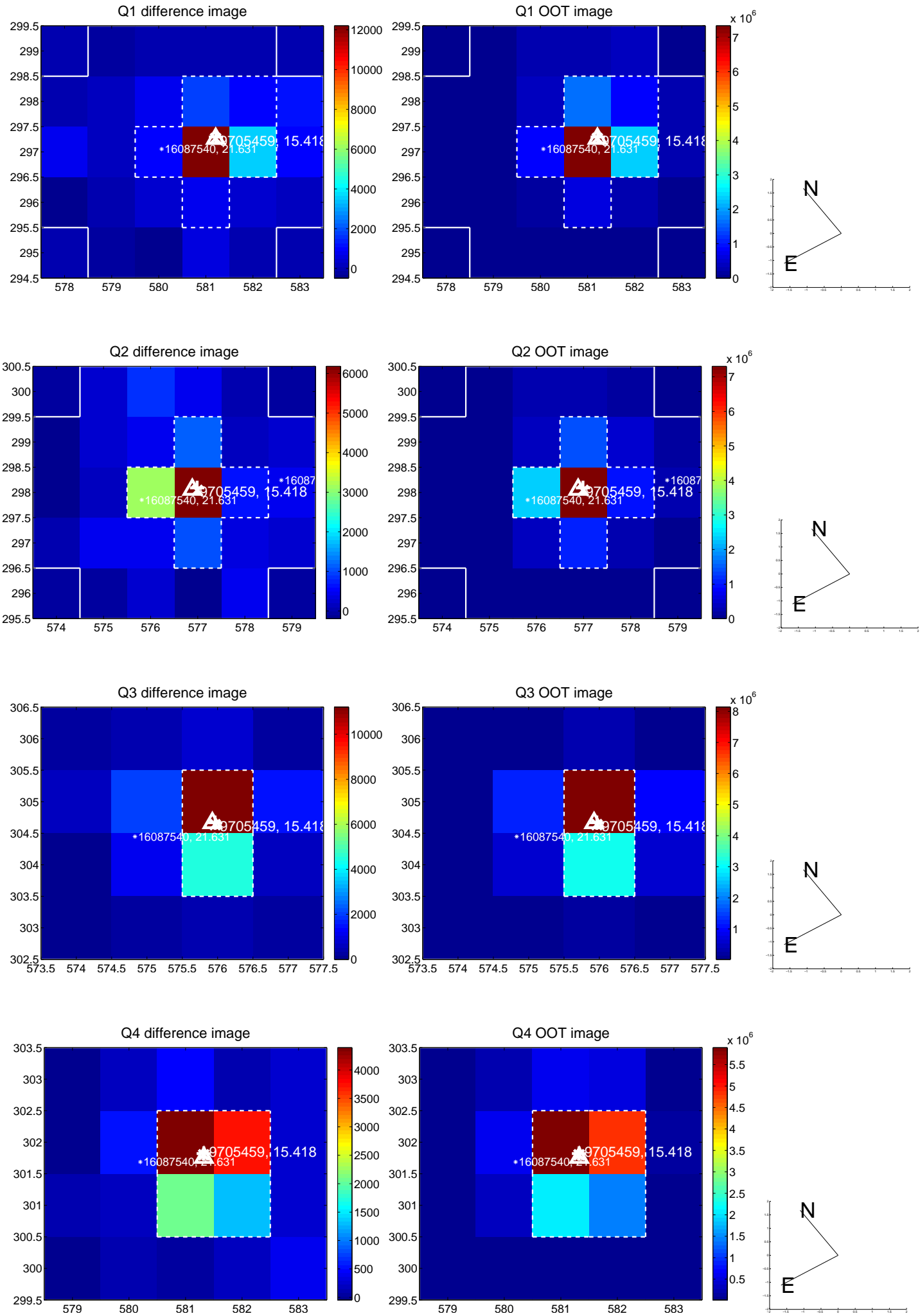
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.092 \pm 0.079$	1.17	$0.074 \pm 0.078$	$-0.056 \pm 0.079$
PRF-fit source offset from KIC position	$0.050 \pm 0.085$	0.59	$0.020 \pm 0.081$	$0.047 \pm 0.080$
photometric centroid source offset	$0.28 \pm 0.17$	1.65	$0.10 \pm 0.16$	$0.26 \pm 0.17$



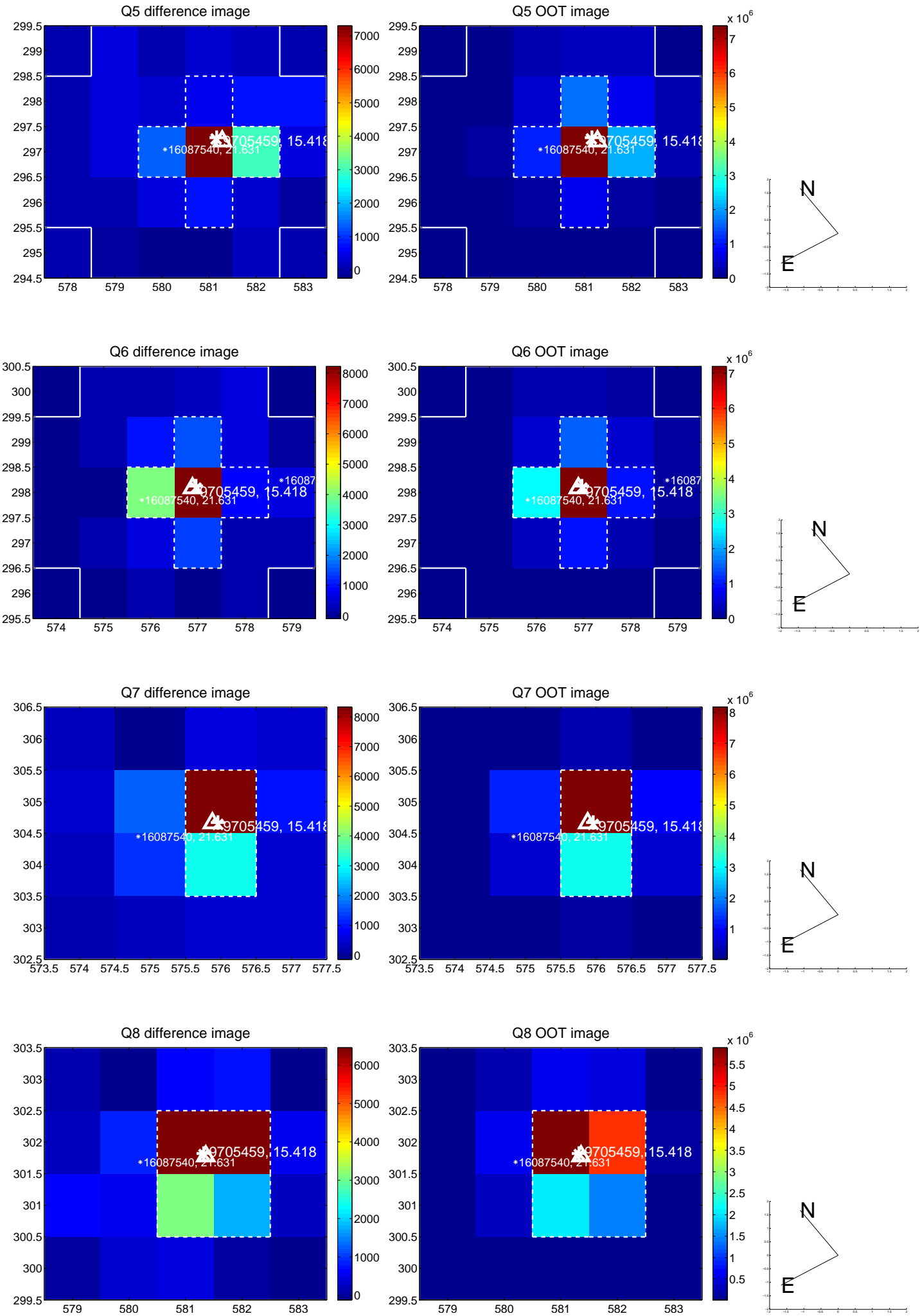
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



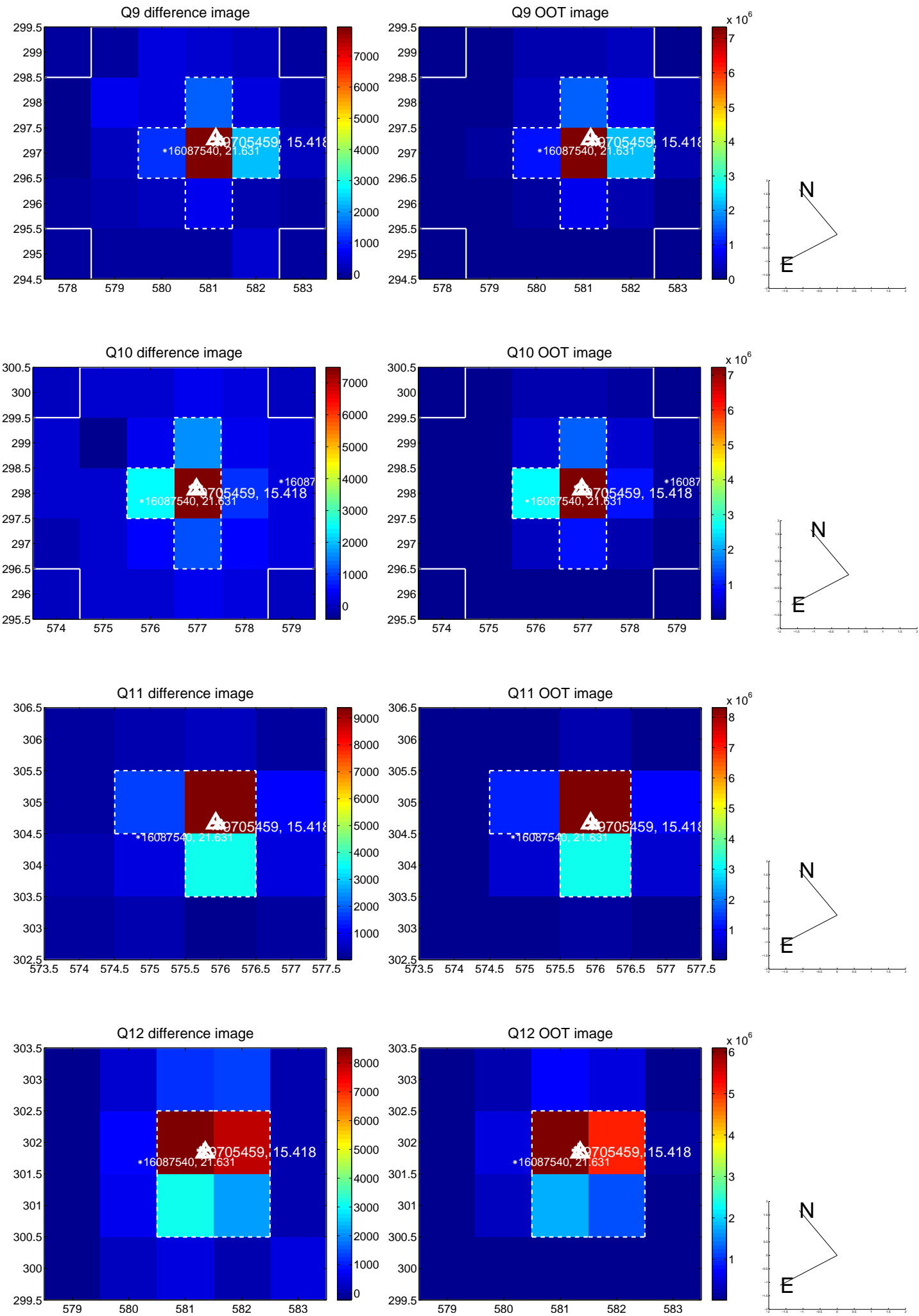
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



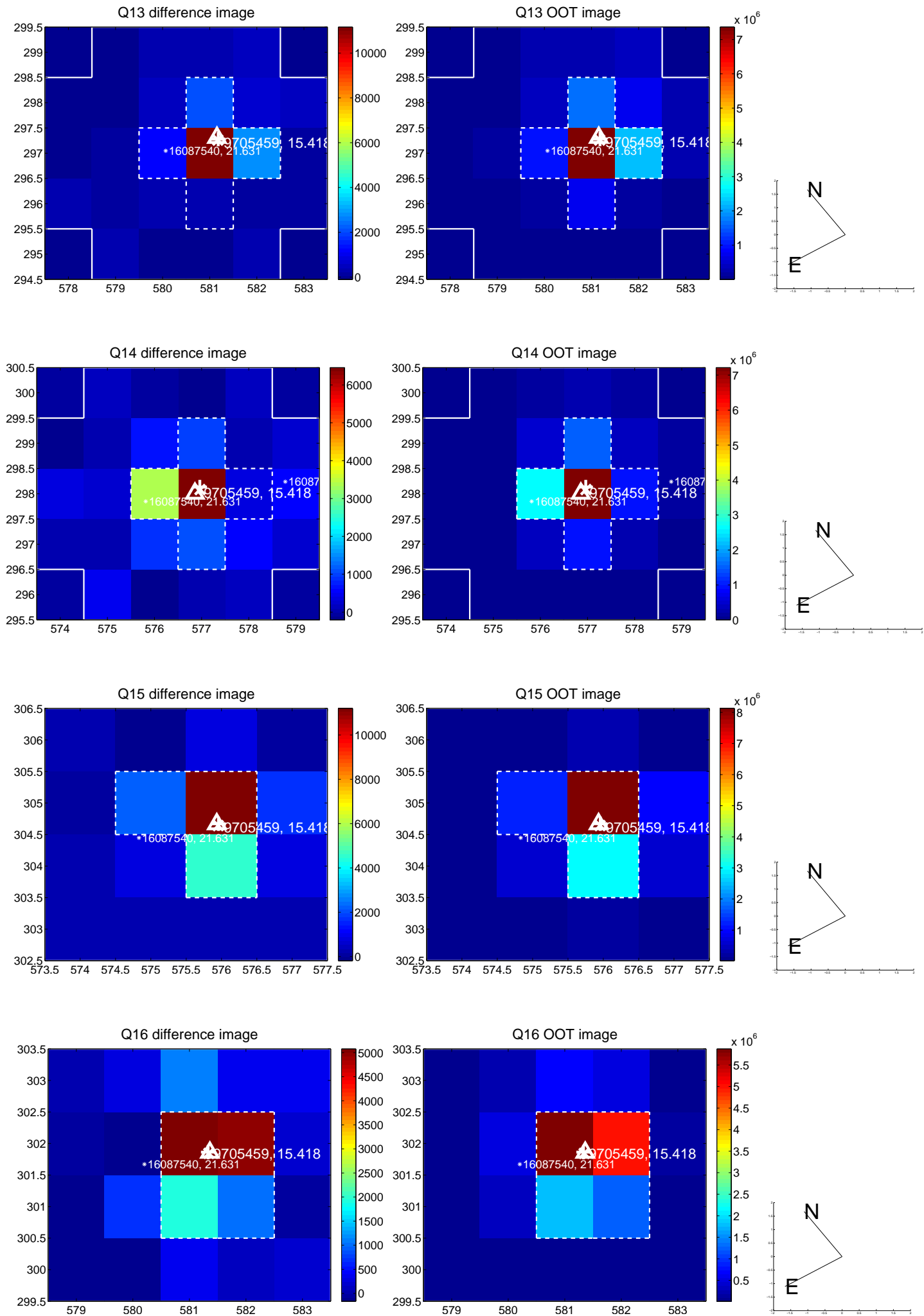
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



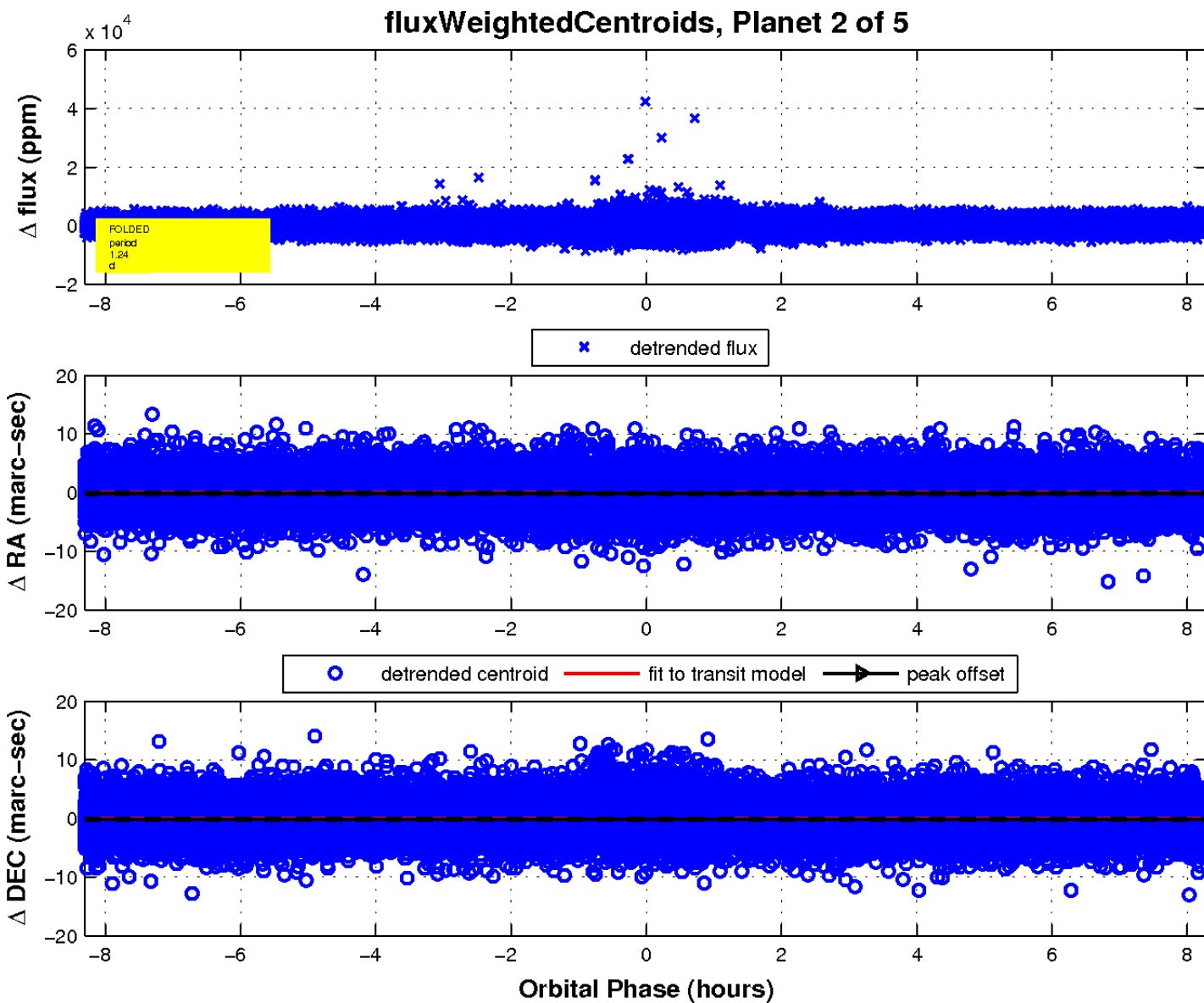
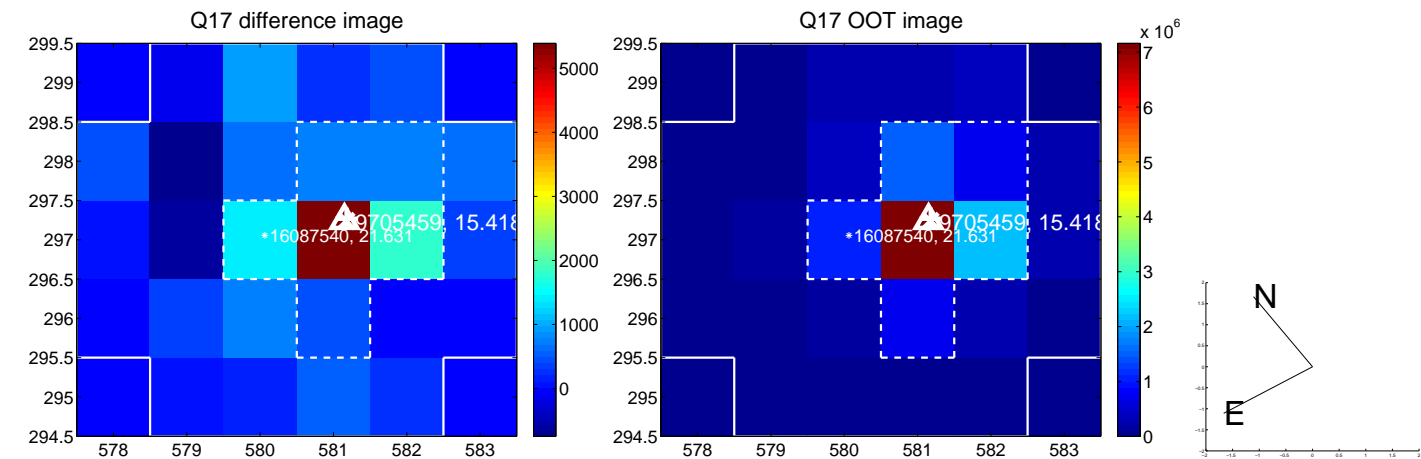
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

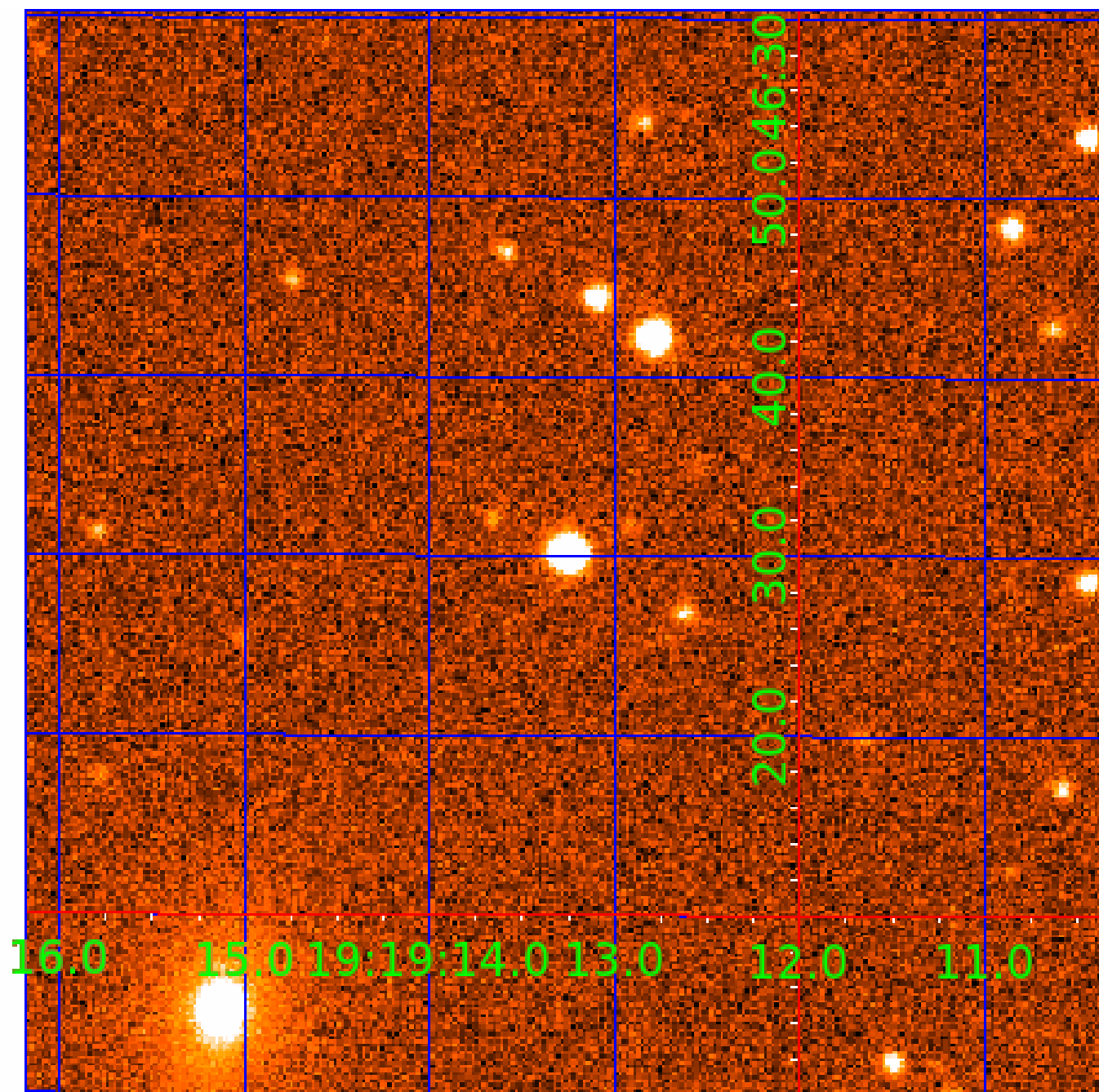


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 009705459

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009705459-01	OBS	1448.01	2.486595	131.621454	42390.5	2.849	844.7	1524.2	1.20	5892	25.29	1080.05
009705459-02	OBS	No	1.243296	131.623249	918.7	2.769	41.0	44.5	1.20	5892	4.34	2721.56
009705459-03	OBS	No	436.194596	145.432940	4555.8	12.721	11.8	6.7	1.20	5892	15.04	1.10
009705459-04	OBS	No	435.183153	278.057801	3399.5	5.899	9.5	8.3	1.20	5892	8.53	1.10
009705459-05	OBS	No	272.272769	388.005558	2442.8	2.499	9.2	7.9	1.20	5892	5.85	2.06

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009705459-01	OBS	PC	0.87	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—PLANET_OCCULT_ALT—HAS_SEC_TCE
009705459-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE
009705459-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009705459-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—CENT_FEW_DIFFS
009705459-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_TER_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS

**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 009705459-03

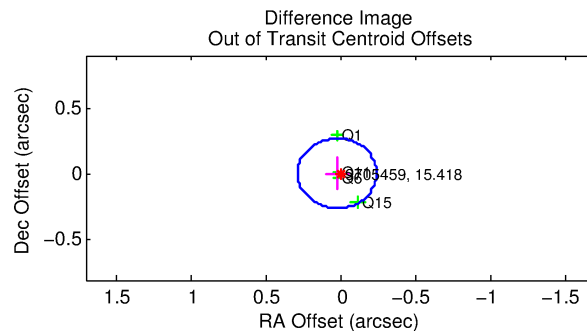
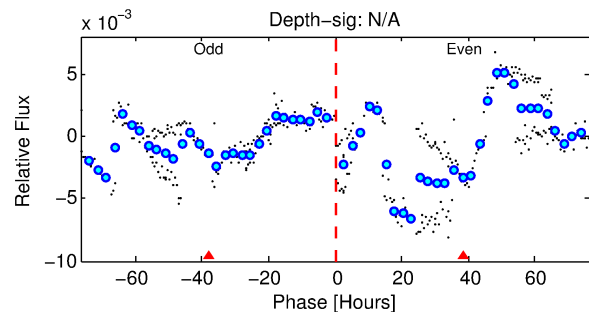
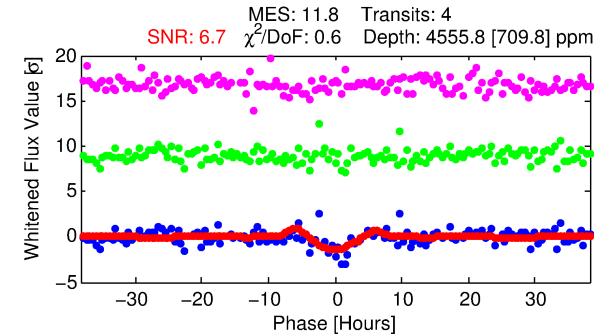
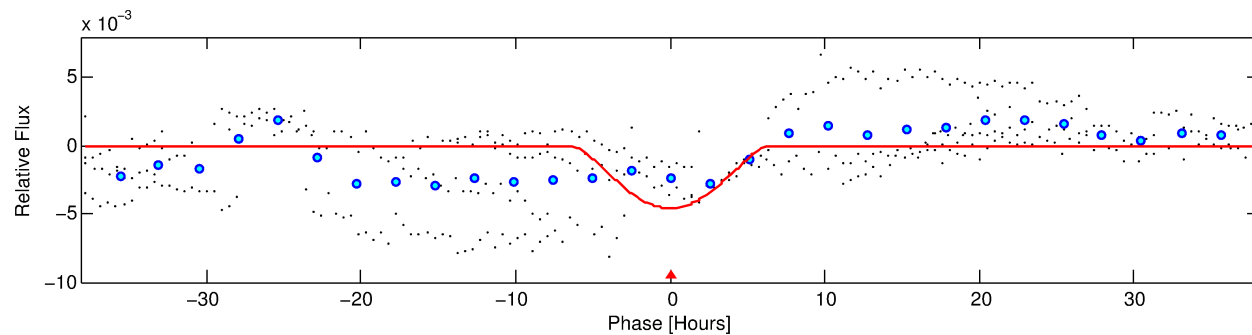
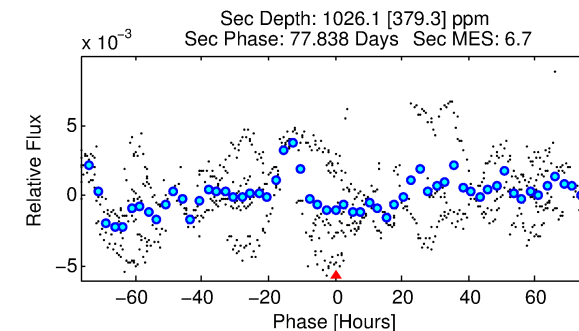
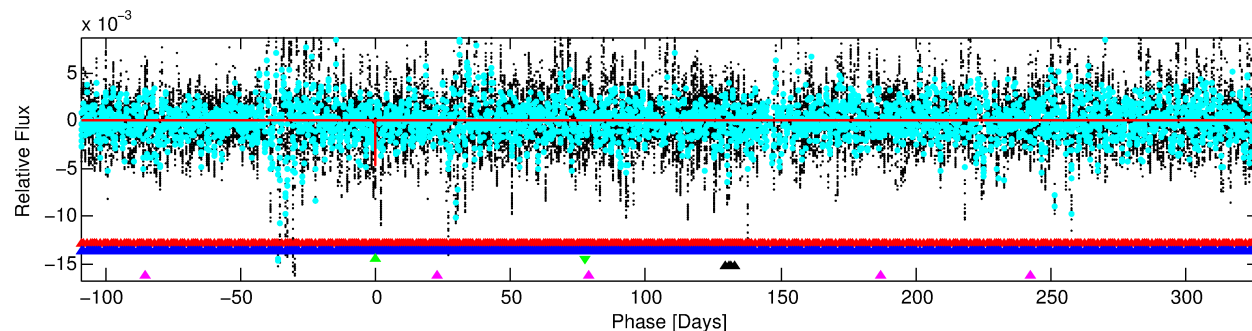
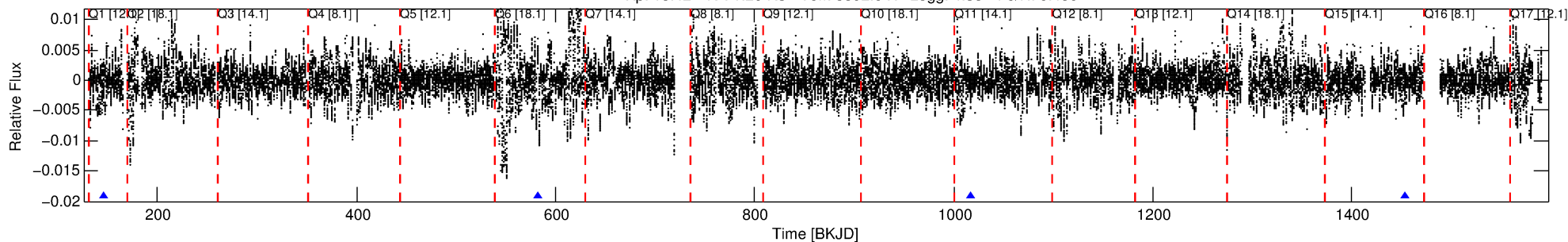
No Significant Match Found

# DV One-Page Summary

KIC: 9705459 Candidate: 3 of 5 Period: 436.195 d

KOI: K01448 Corr: No Ephemeris Match

Kp: 15.42 R\*: 1.20 Rs Teff: 5892.0 K Logg: 4.35 Fe/H: 0.480



## DV Fit Results:

Period = 436.19460 [0.01066] d  
Epoch = 145.4329 [0.0239] BKJD  
Rp/R\* = 0.1151 [0.1745]  
a/R\* = 129.40 [35.18]  
b = 1.00 [0.24]  
Seff = 1.10 [0.44]  
Teq = 261 [26] K  
Rp = 15.05 [23.30] Re  
a = 1.1870 [0.3091] AU  
Ag = 3513.72 [10815.70] [0.32σ]  
Teffp = 3108 [2377] K [1.20σ]

## DV Diagnostic Results:

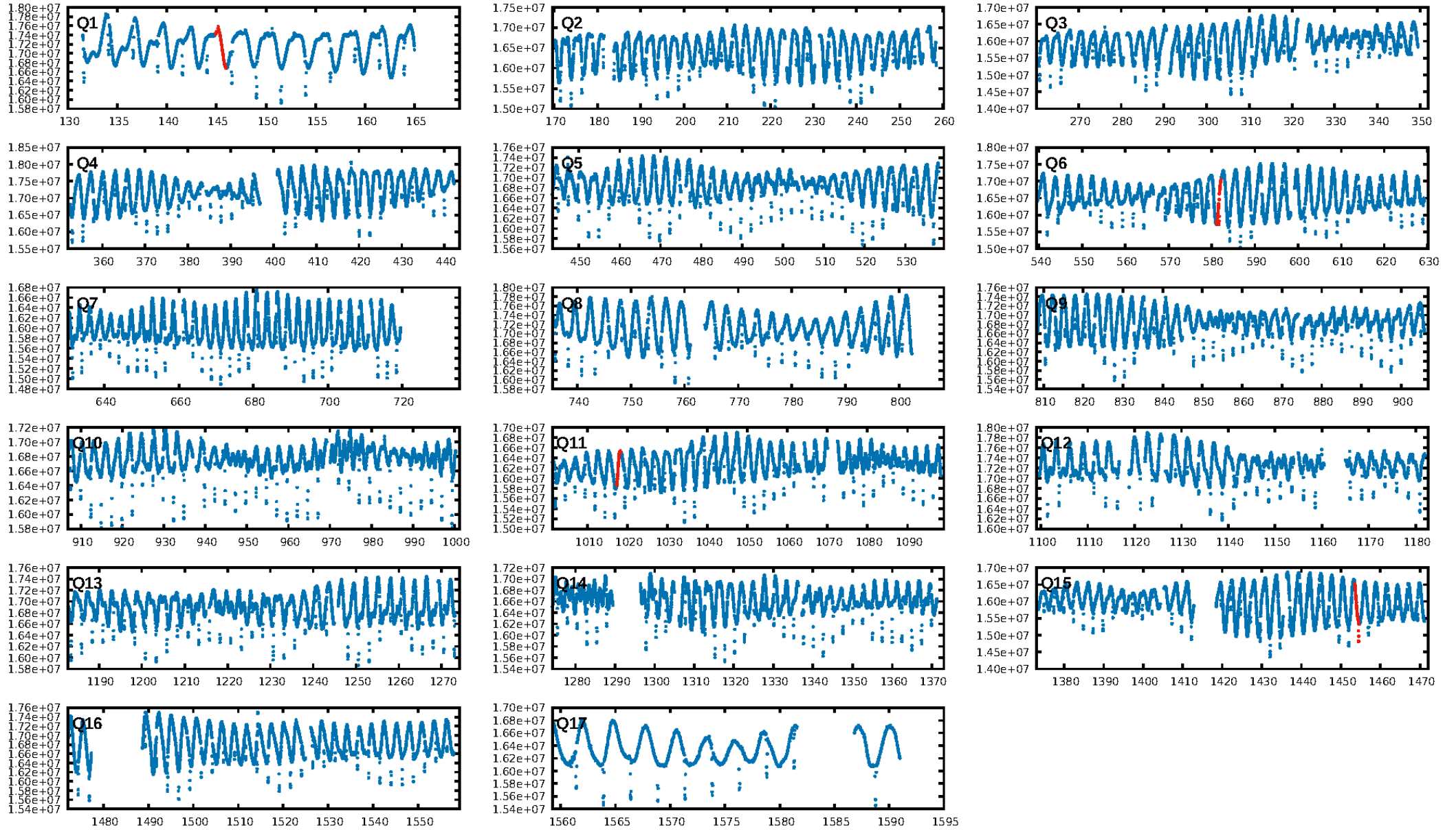
ShortPeriod-sig: 91.7% [1.73σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 76.2%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 6.36e-13  
RollingBand-fgt: 1.00 [3/3]  
**GhostDiagnostic-chr: -0.3166**  
Centroid-sig: 43.7%  
Centroid-so: 0.335 arcsec [1.17σ]  
OotOffset-rm: 0.022 arcsec [0.25σ]  
KicOffset-rm: 0.126 arcsec [1.23σ]  
OotOffset-st: 1/2/0/1 [4]  
KicOffset-st: 1/2/0/1 [4]  
DiffImageQuality-fgm: 0.50 [2/4]  
DiffImageOverlap-fno: 0.00 [0/4]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:28:58 Z

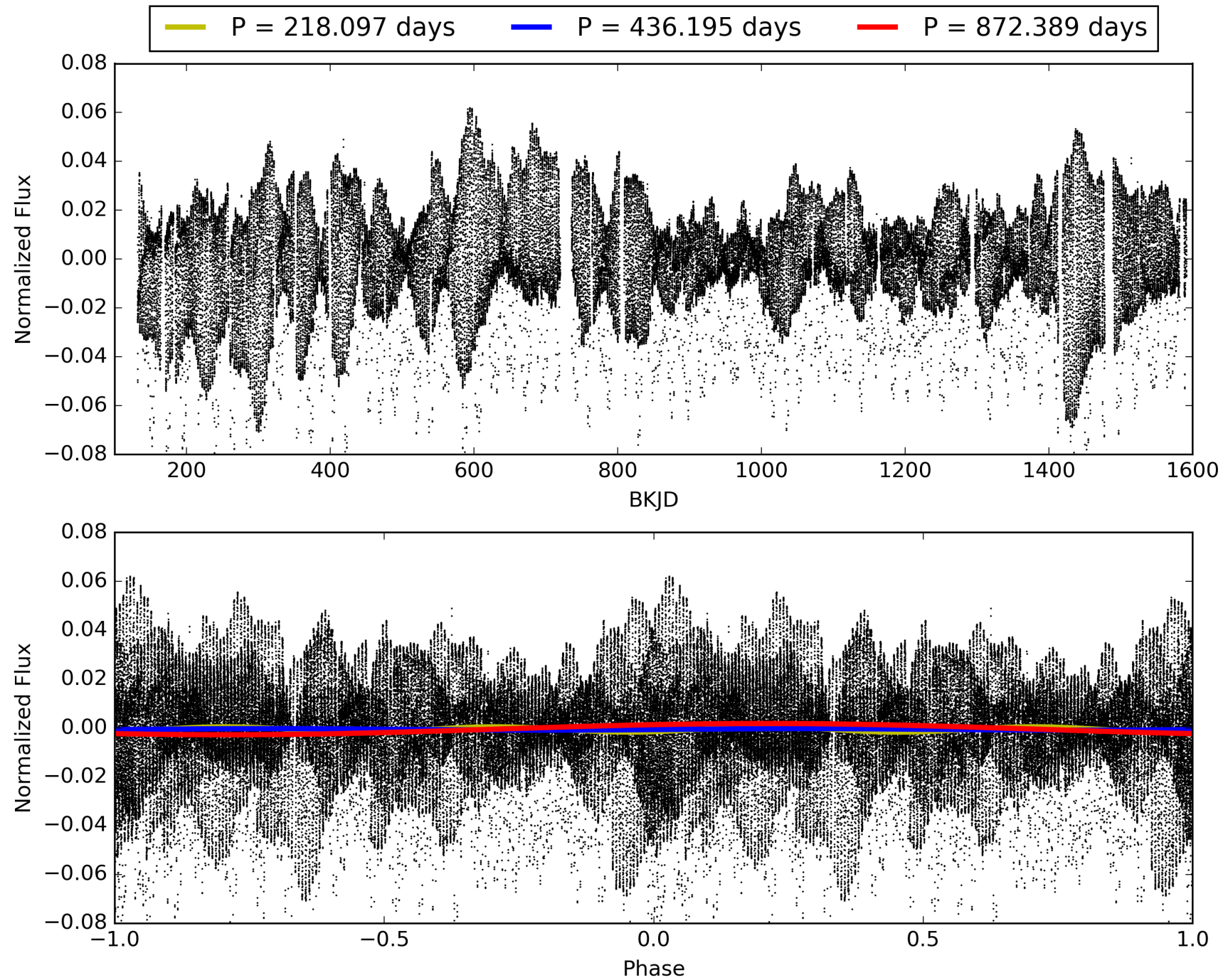
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 009705459-03, PDC Light Curves

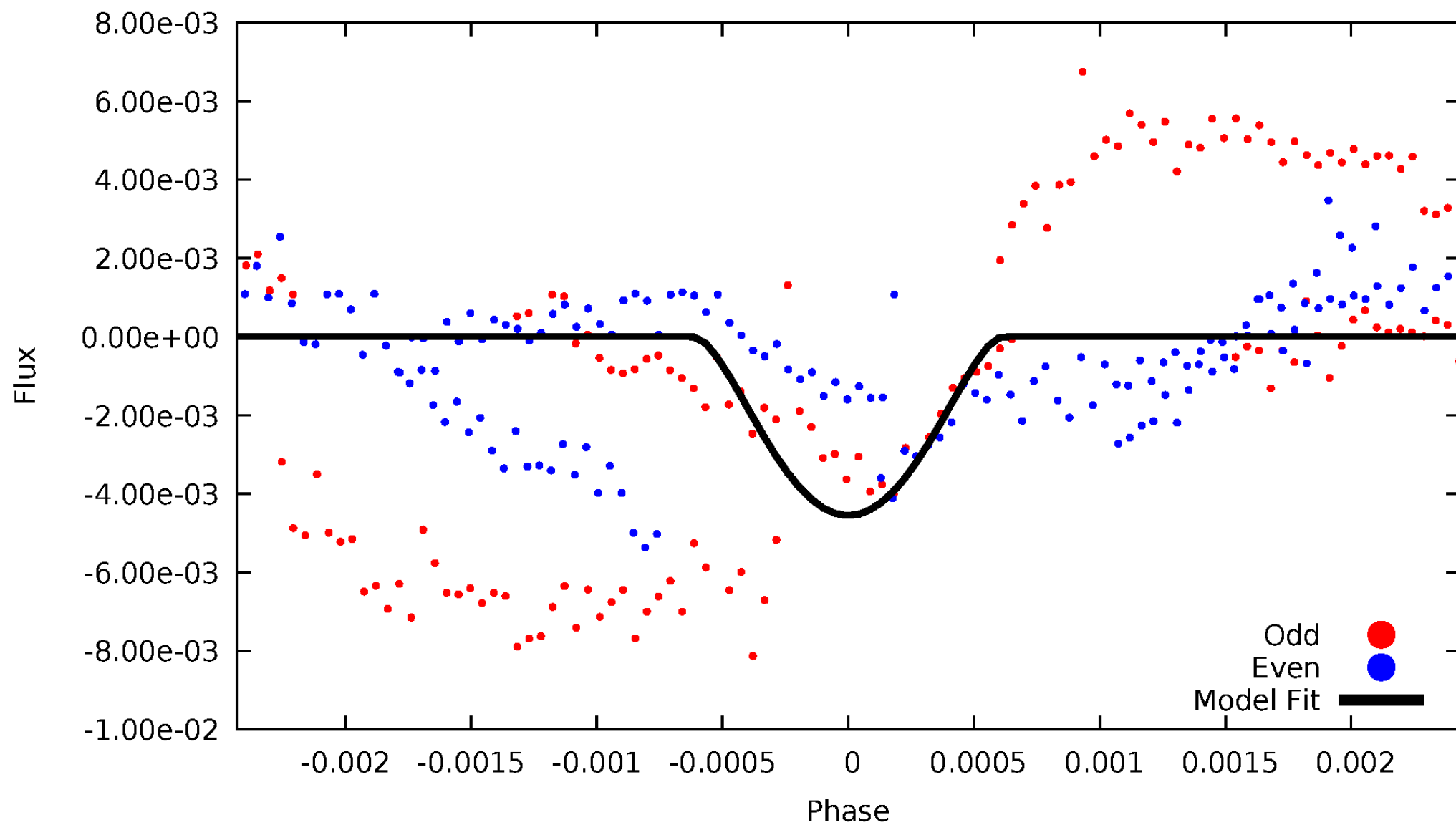


TCE 009705459-03



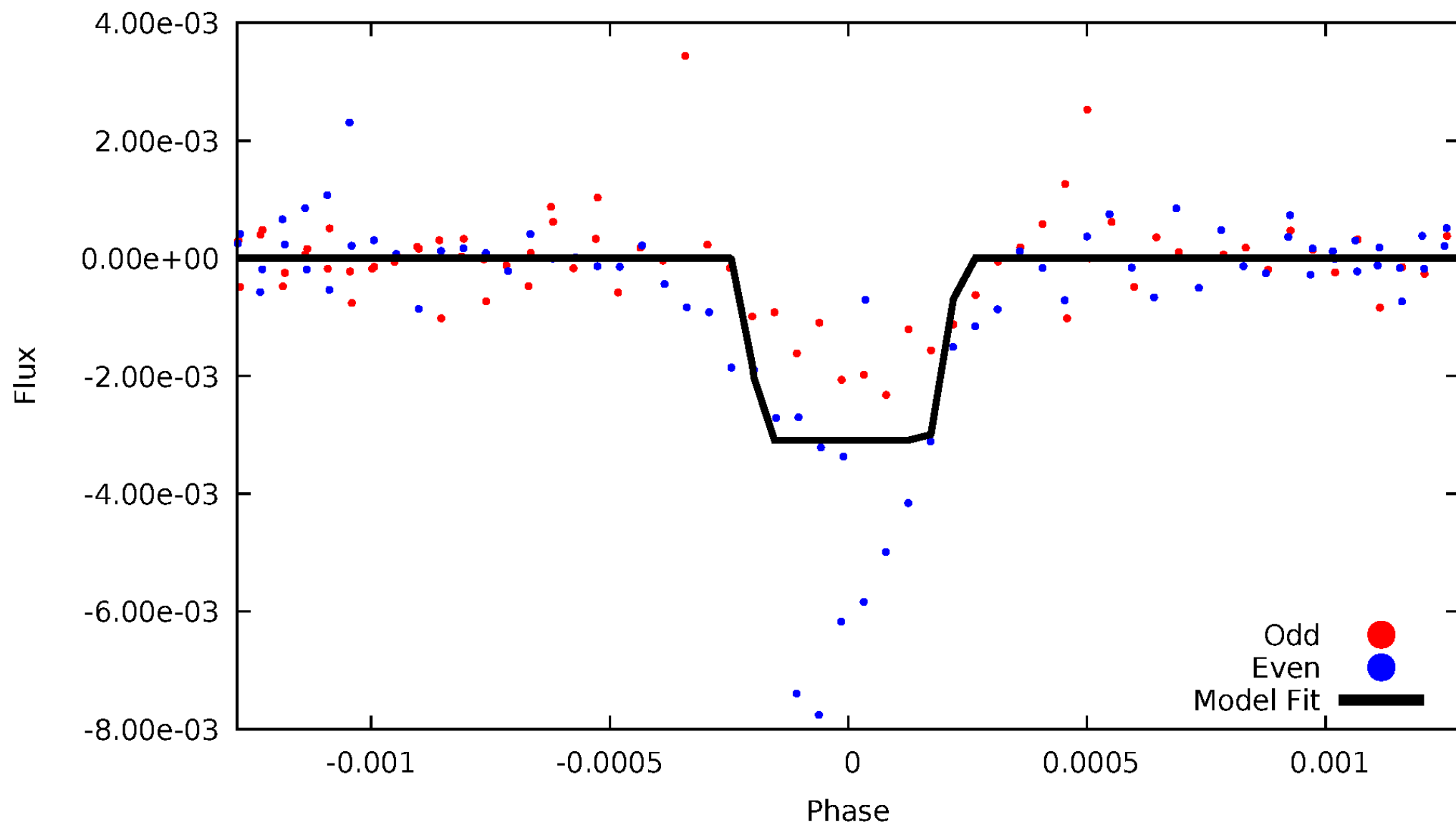
# DV Odd/Even

TCE 009705459-03



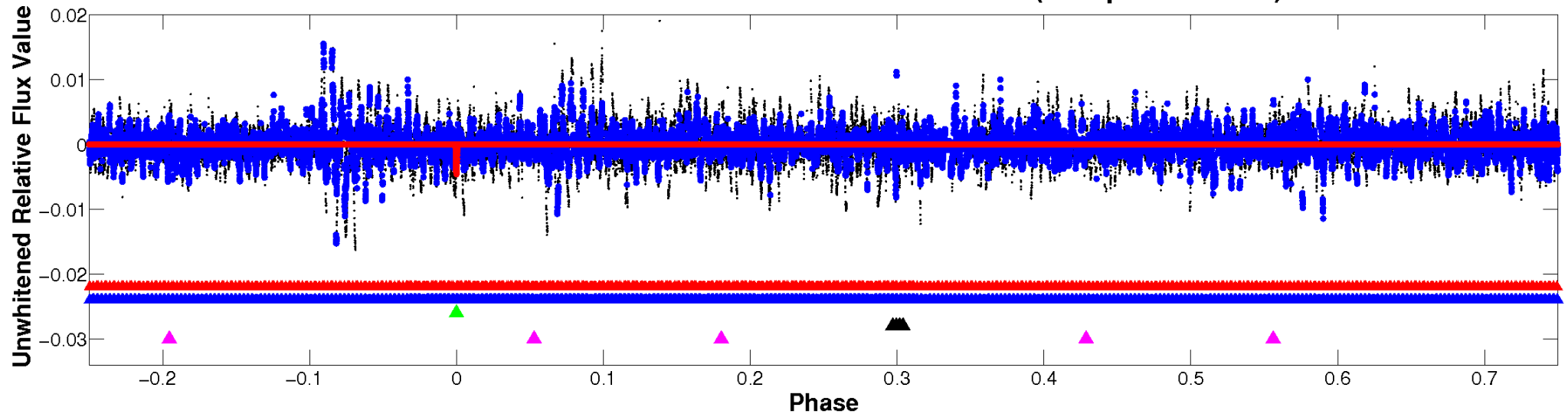
# ALT Odd/Even

TCE 009705459-03

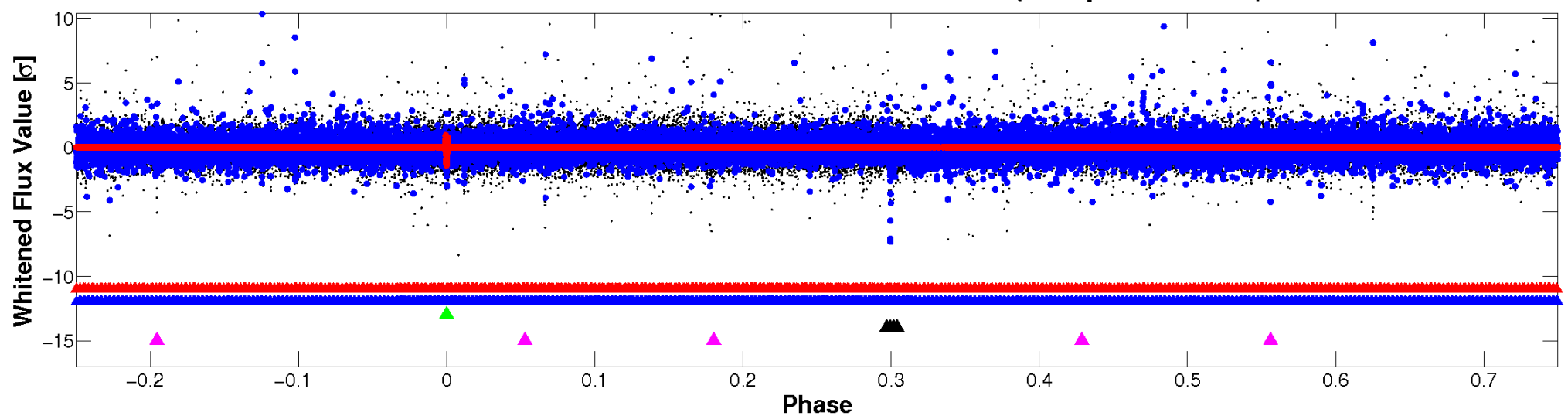


# Non-Whitened Vs. Whitened Light Curve

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

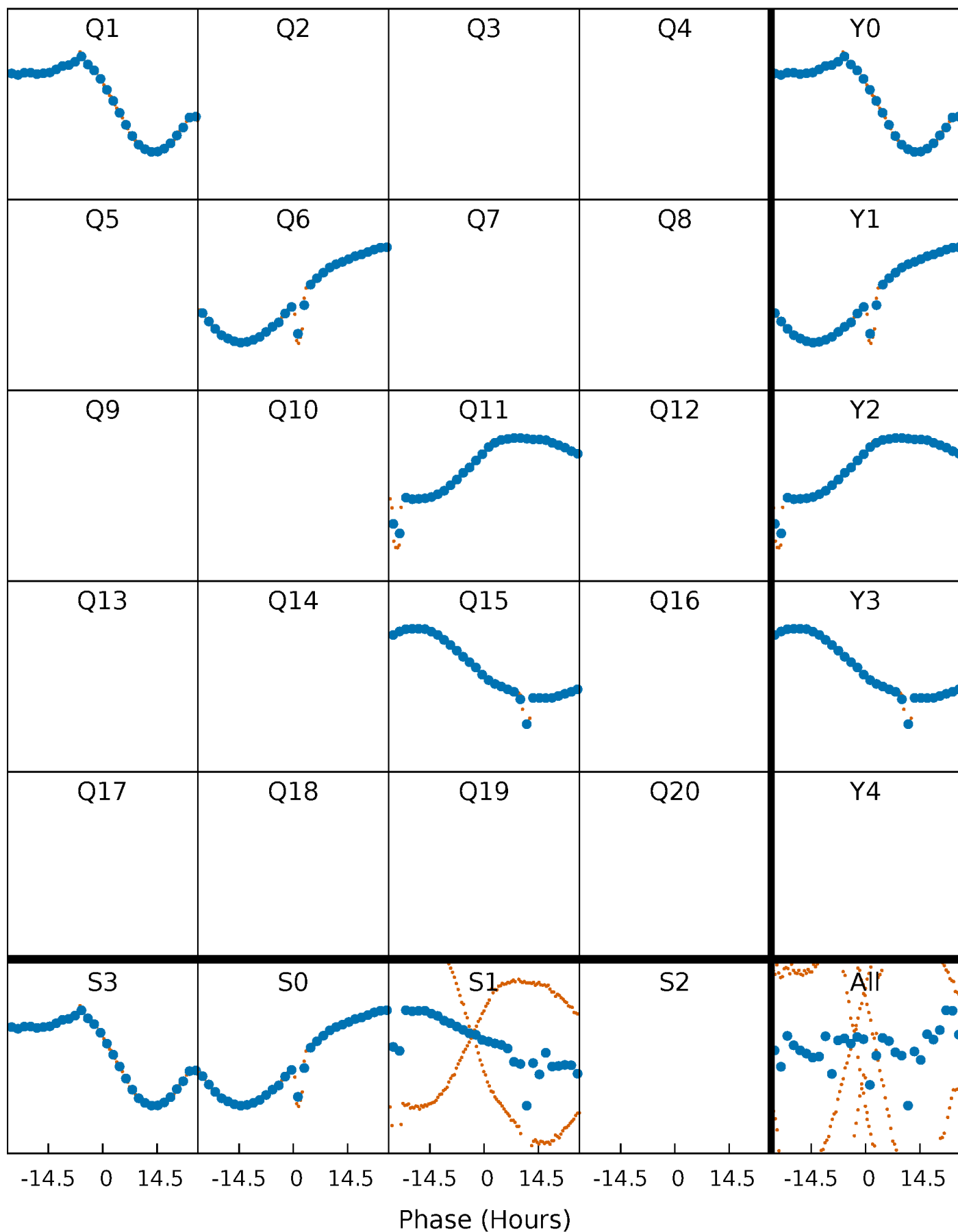


Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



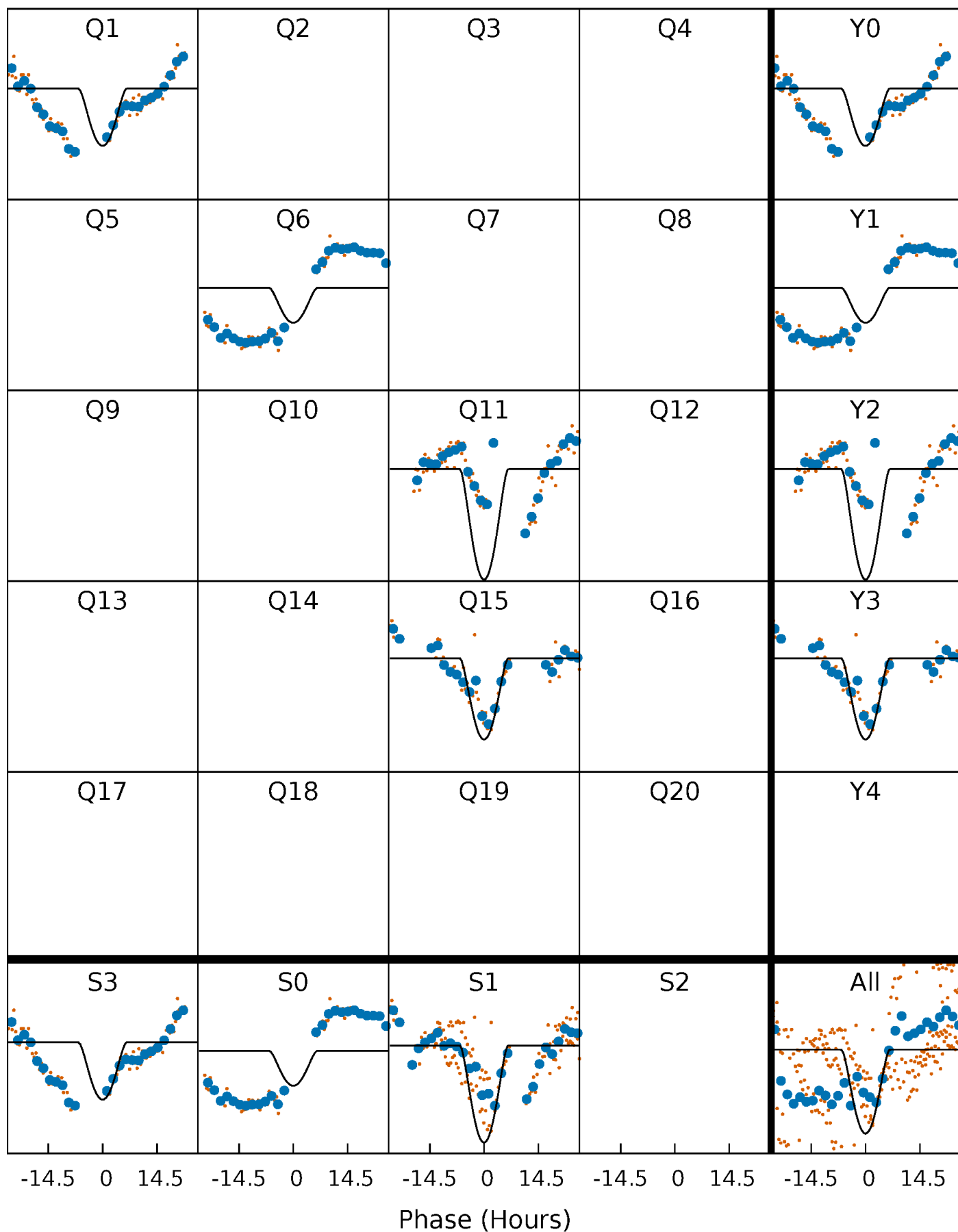
# PDC Quarter-Phased Transit Curves

TCE 009705459-03     $P=436.194596$  Days     $T_0=145.432940$  (BKJD)



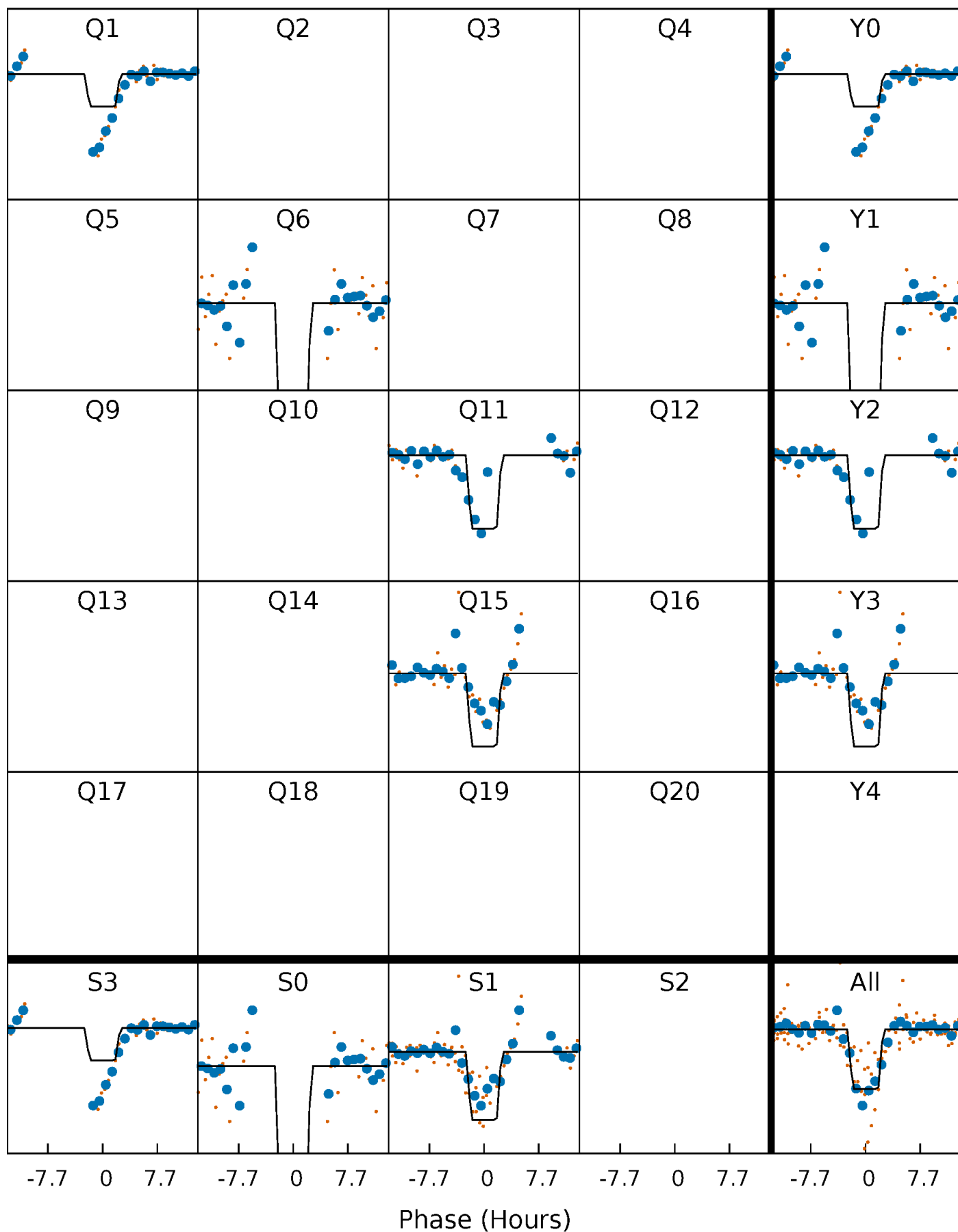
# DV Quarter-Phased Transit Curves

TCE 009705459-03     $P=436.194596$  Days     $T_0=145.432940$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 009705459-03     $P=436.174772$  Days     $T_0=145.536707$  (BKJD)

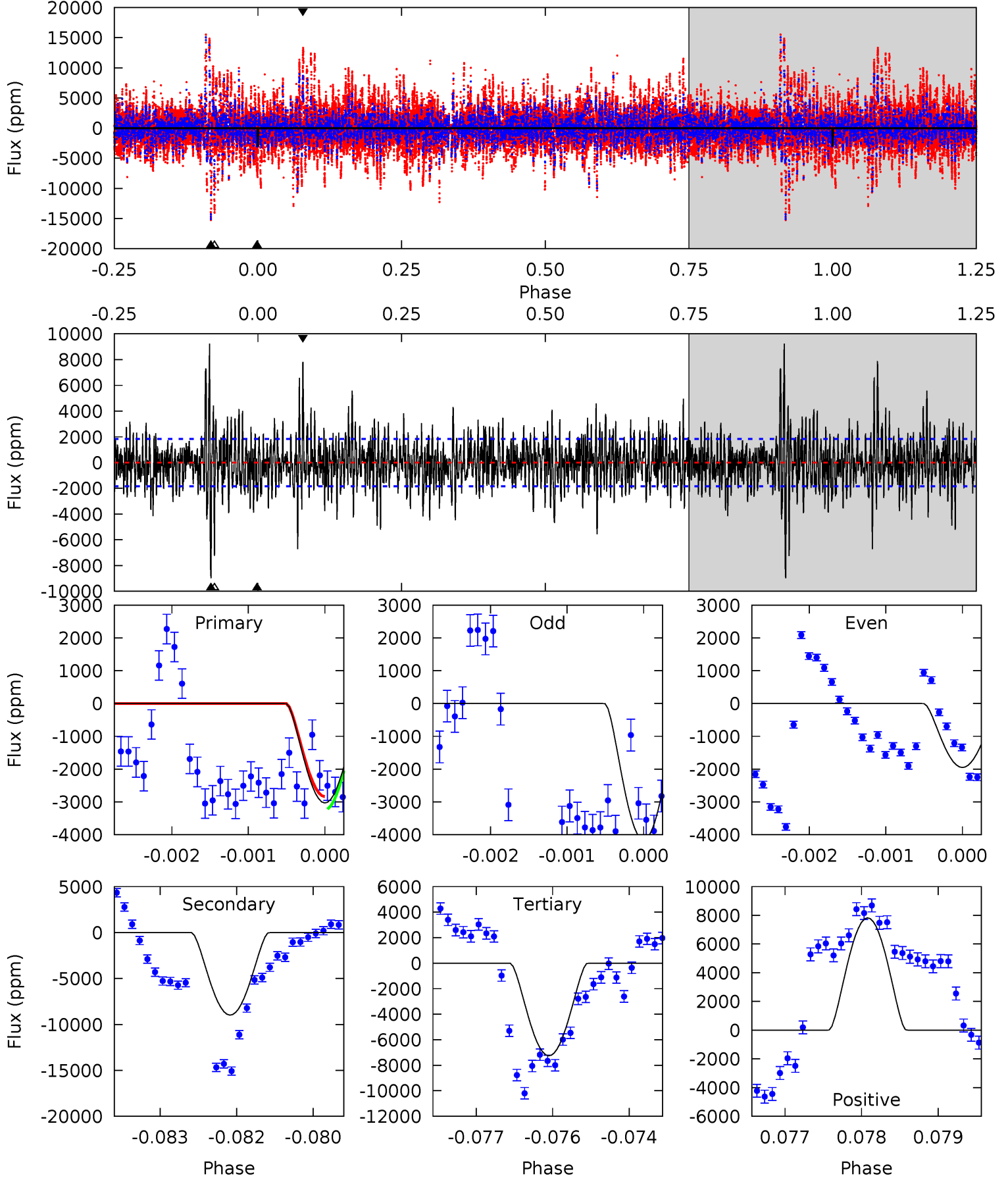




# DV Model-Shift Uniqueness Test

009705459-03, P = 436.194596 Days, E = 145.432940 Days

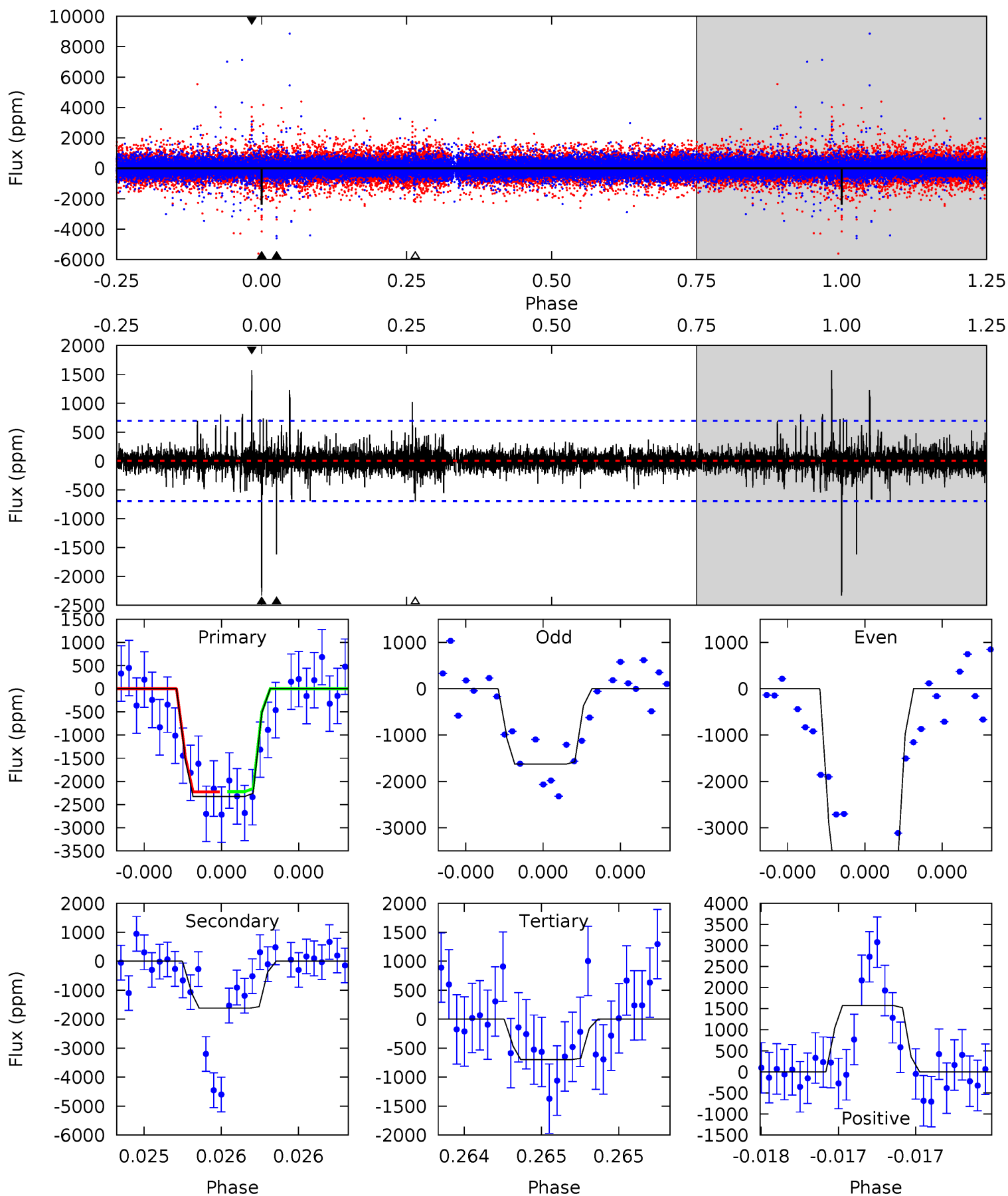
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.93	26.5	21.4	23.1	5.42	3.23	4.65	-12.4	-14.1	5.08	3.40	3.23	1.40	0.51	0.56



# Alt Model-Shift Uniqueness Test

009705459-03, P = 436.174772 Days, E = 145.536707 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
18.8	13.0	5.62	12.7	5.60	3.53	0.97	13.1	6.09	7.42	0.37	11.2	1.28	0.40	0.01



### Stellar Parameters For KIC 009705459

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5892^{+174}_{-208}$	$4.350^{+0.087}_{-0.203}$	$0.480^{+0.050}_{-0.300}$	$1.198^{+0.375}_{-0.161}$	$1.173^{+0.122}_{-0.150}$	$0.962^{+0.384}_{-0.500}$
	+3%/-4%	+2%/-5%	+10%/-62%	+31%/-13%	+10%/-13%	+40%/-52%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 009705459-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-8982 \pm 339$	$23.98^{+21.12}_{-16.53}$	$368^{+27}_{-20}$	$4458^{+3620}_{-881}$	$11719^{+114684}_{-8402}$
Alt.	$-1618 \pm 124$	$18.85^{+19.47}_{-12.73}$	$369^{+27}_{-22}$	$3579^{+1983}_{-657}$	$3569^{+29618}_{-2705}$

$T_{\text{max}}$  = 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

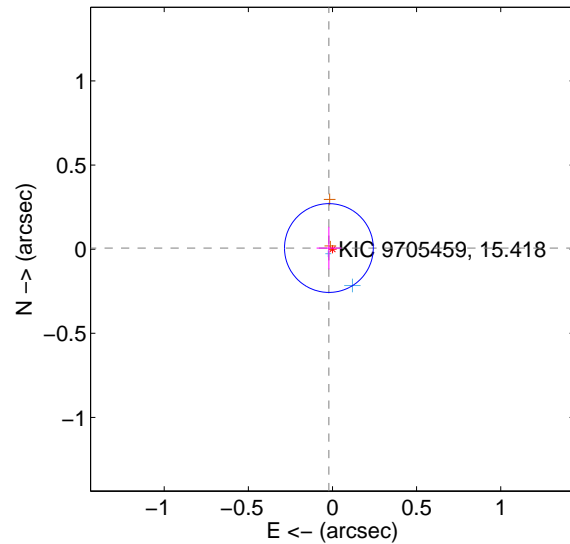
Supplemental centroid analysis for 009705459-03. Kepler magnitude: 15.42. Transit SNR 6.70

There are 2 quarters with good PRF difference image offsets

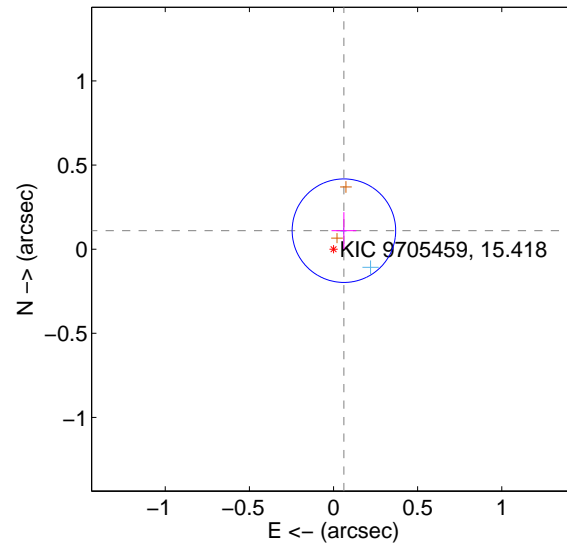
The direct PRF centroid is offset from the target star catalog position by about 0.15 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.022 \pm 0.088$	0.25	$0.021 \pm 0.073$	$0.007 \pm 0.125$
PRF-fit source offset from KIC position	$0.126 \pm 0.103$	1.23	$-0.062 \pm 0.074$	$0.110 \pm 0.110$
photometric centroid source offset	$0.34 \pm 0.29$	1.17	$0.09 \pm 0.23$	$0.32 \pm 0.29$

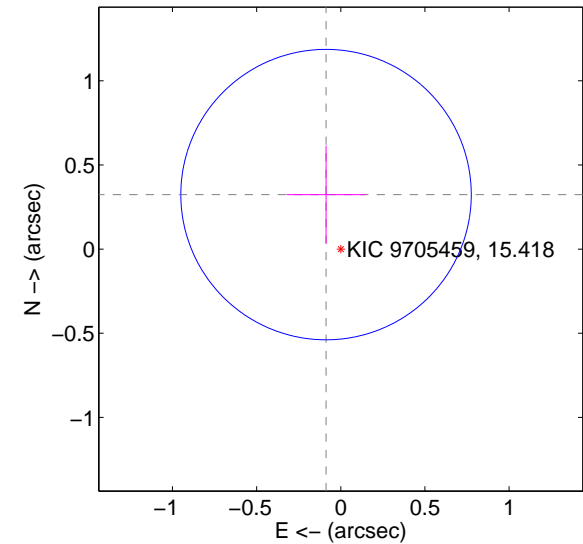
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

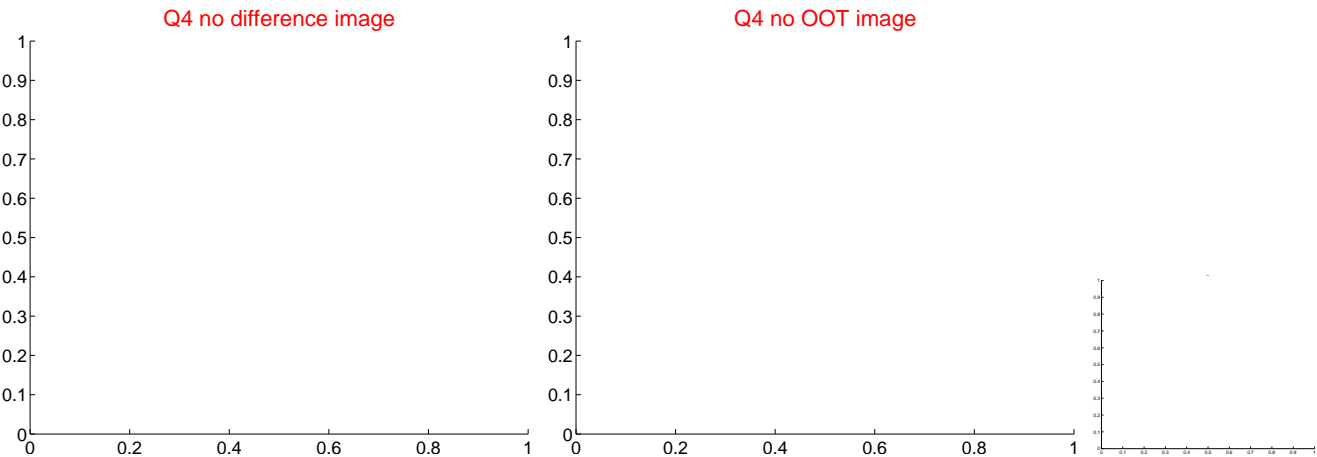
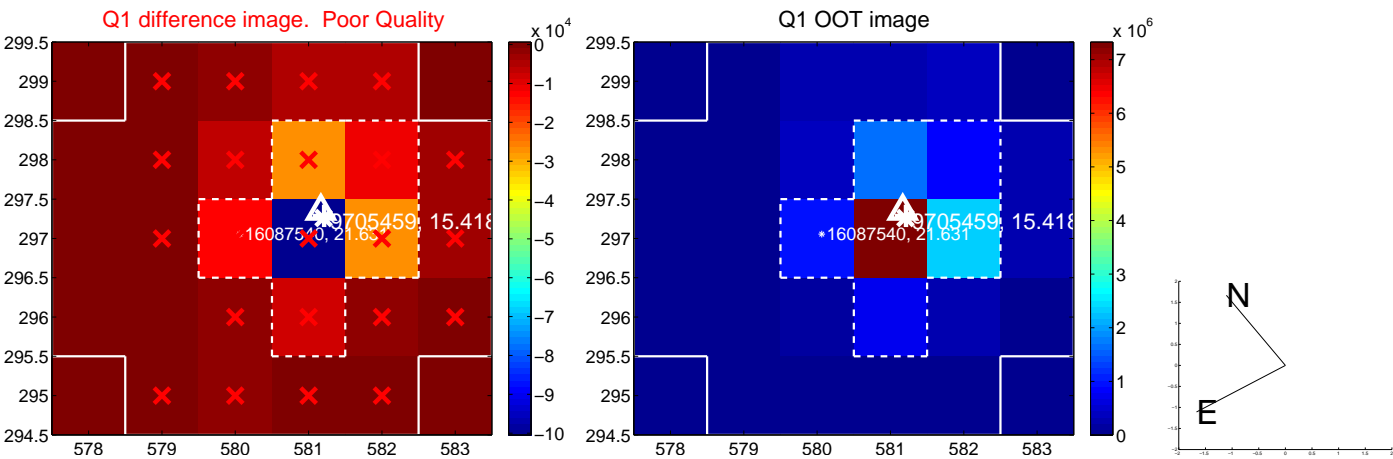


offset from photometric centroids



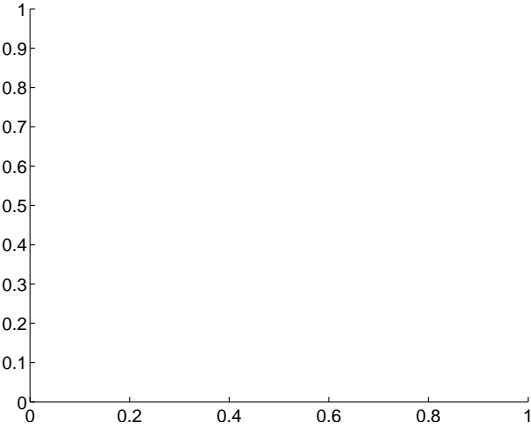
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

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

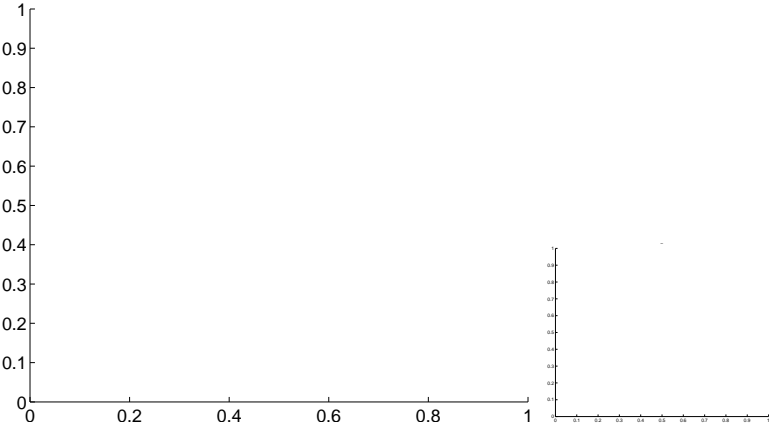


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

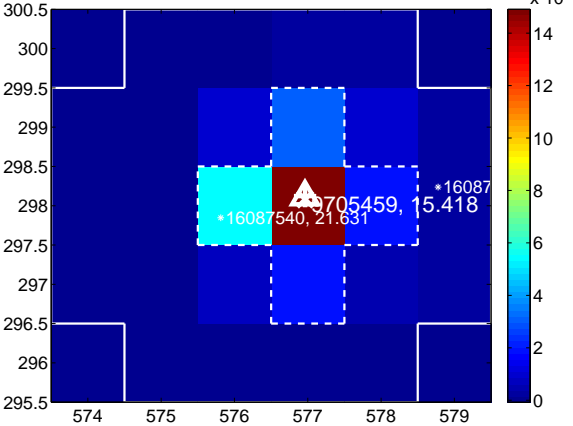
Q5 no difference image



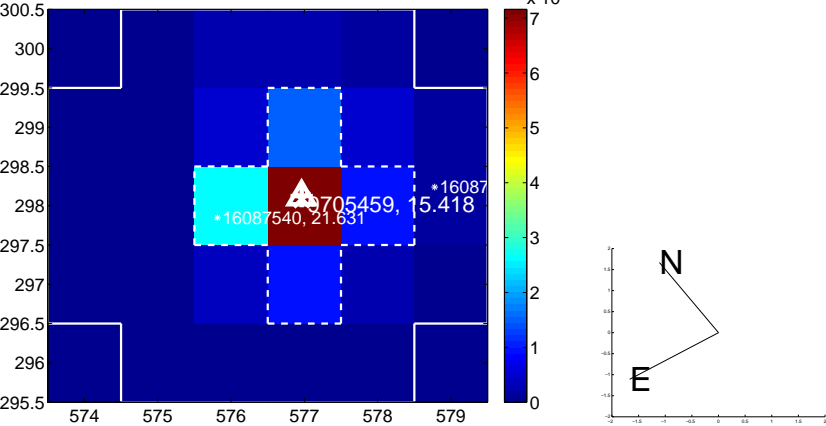
Q5 no OOT image



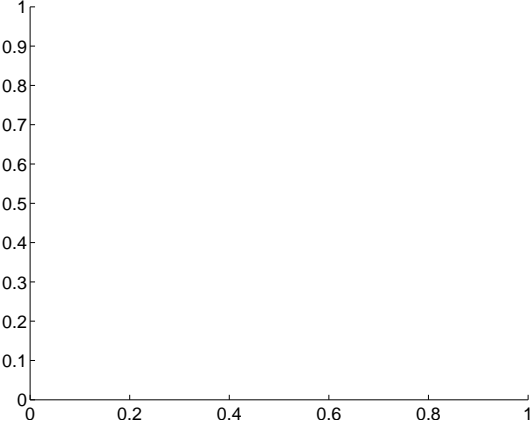
Q6 difference image



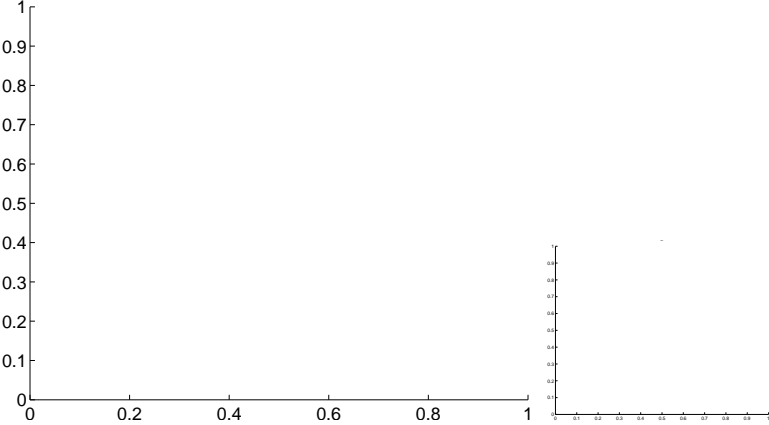
Q6 OOT image



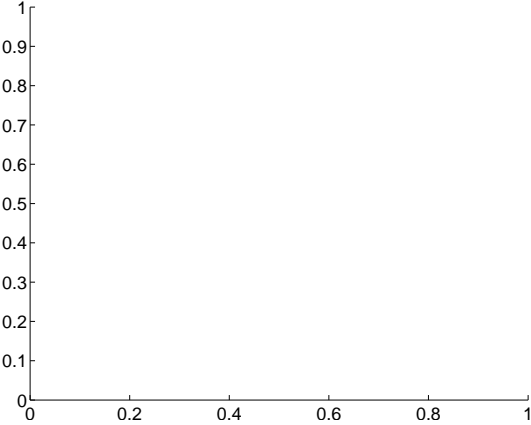
Q7 no difference image



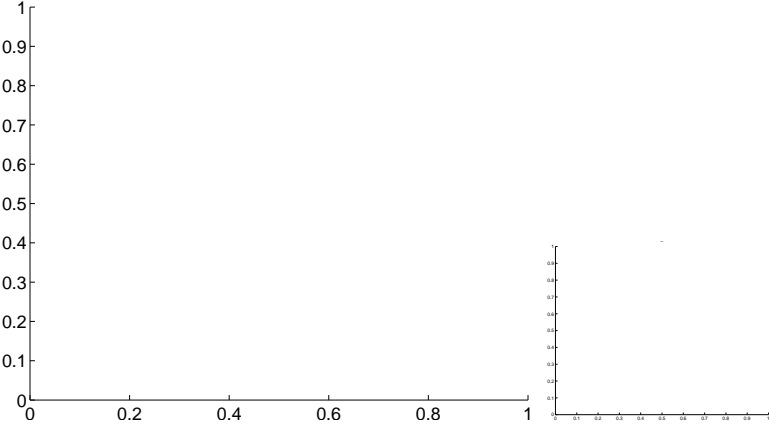
Q7 no OOT image



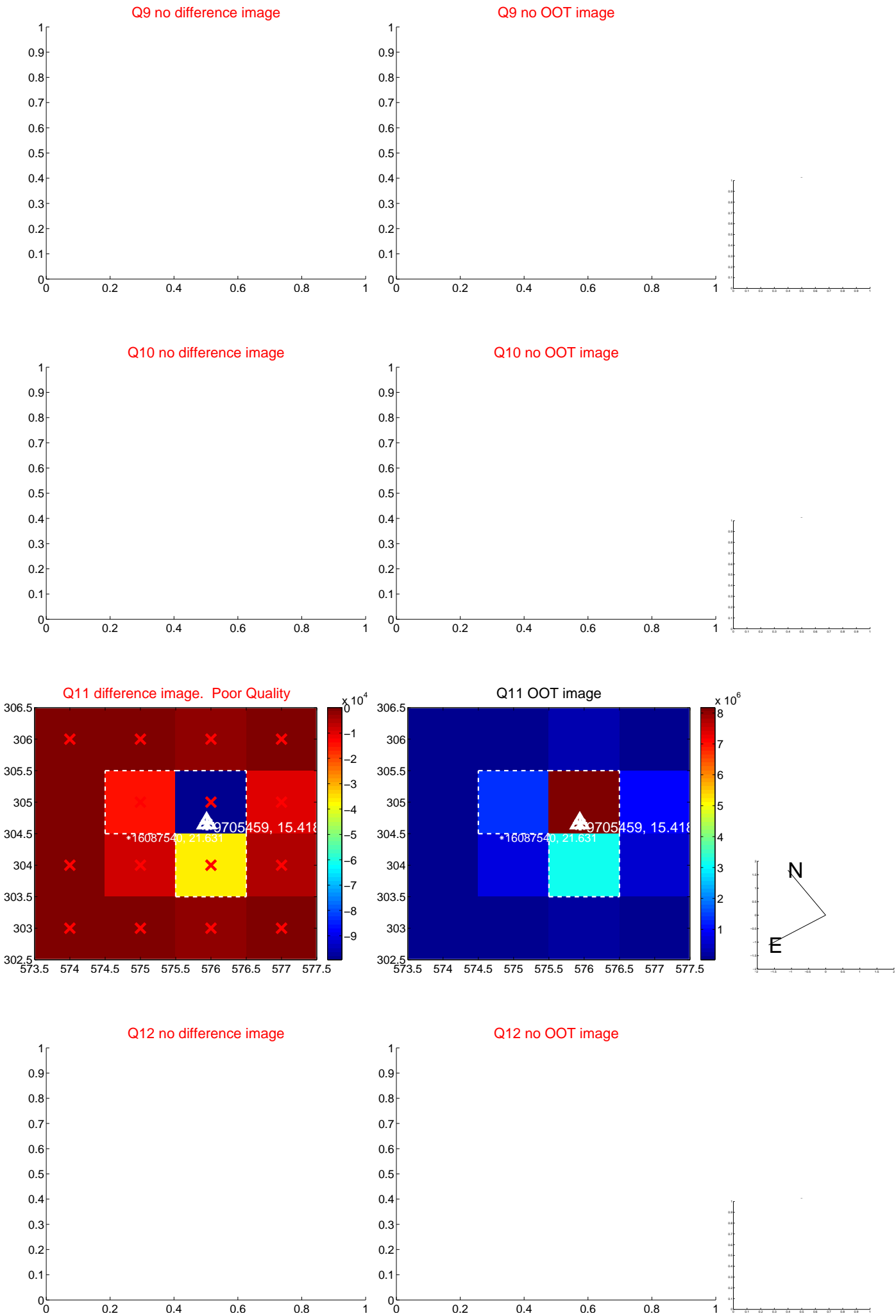
Q8 no difference image



Q8 no OOT image

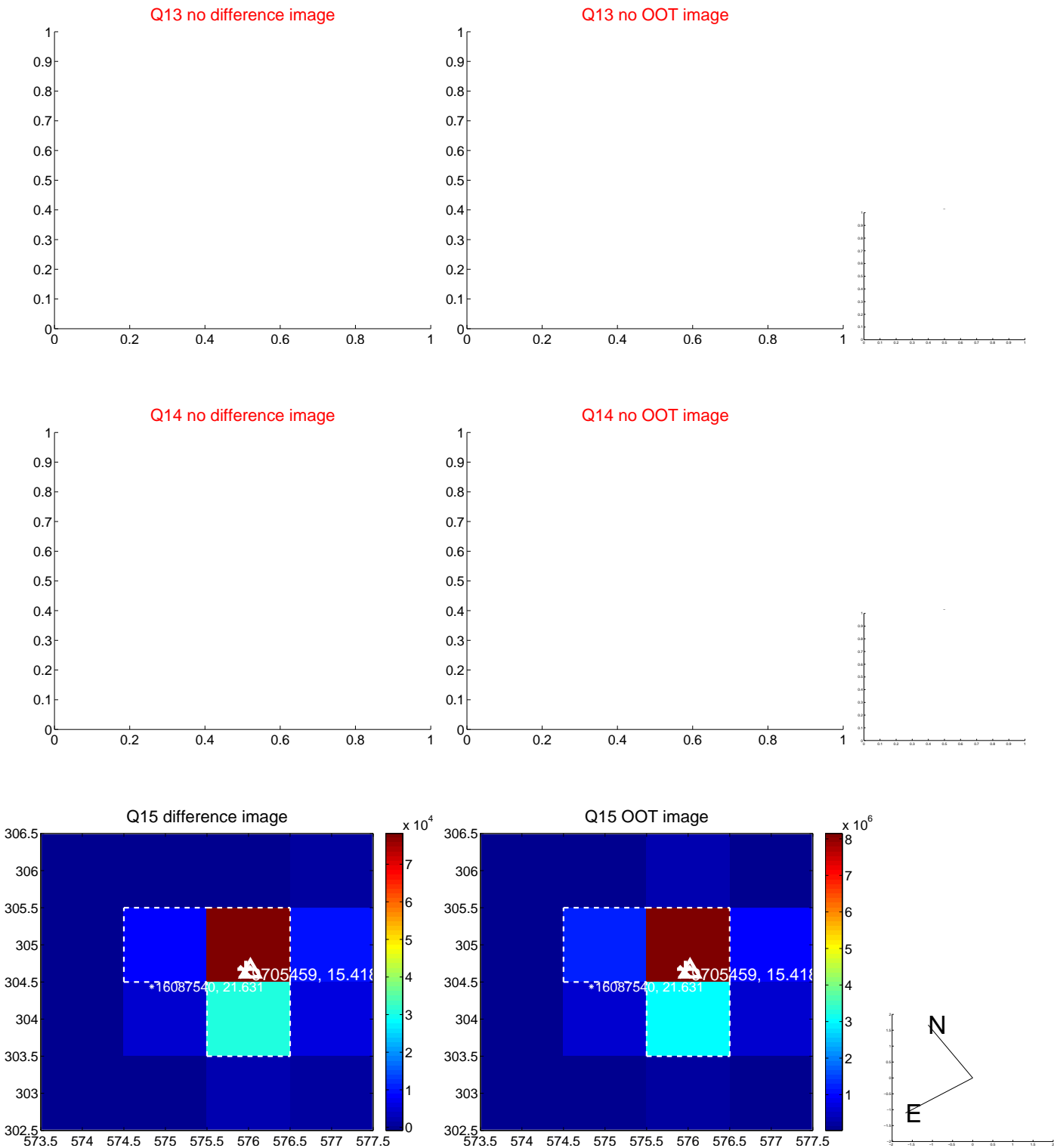


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

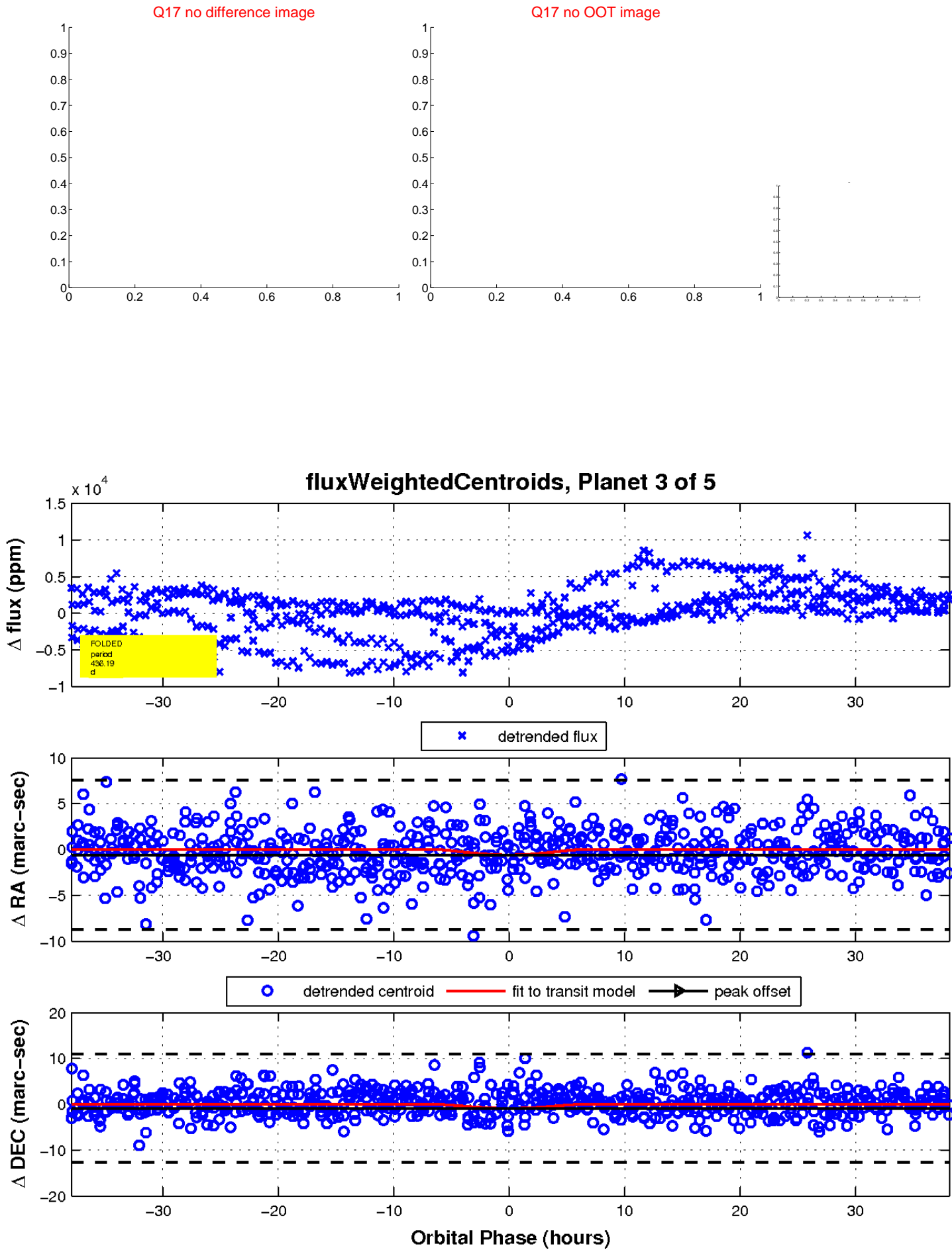




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

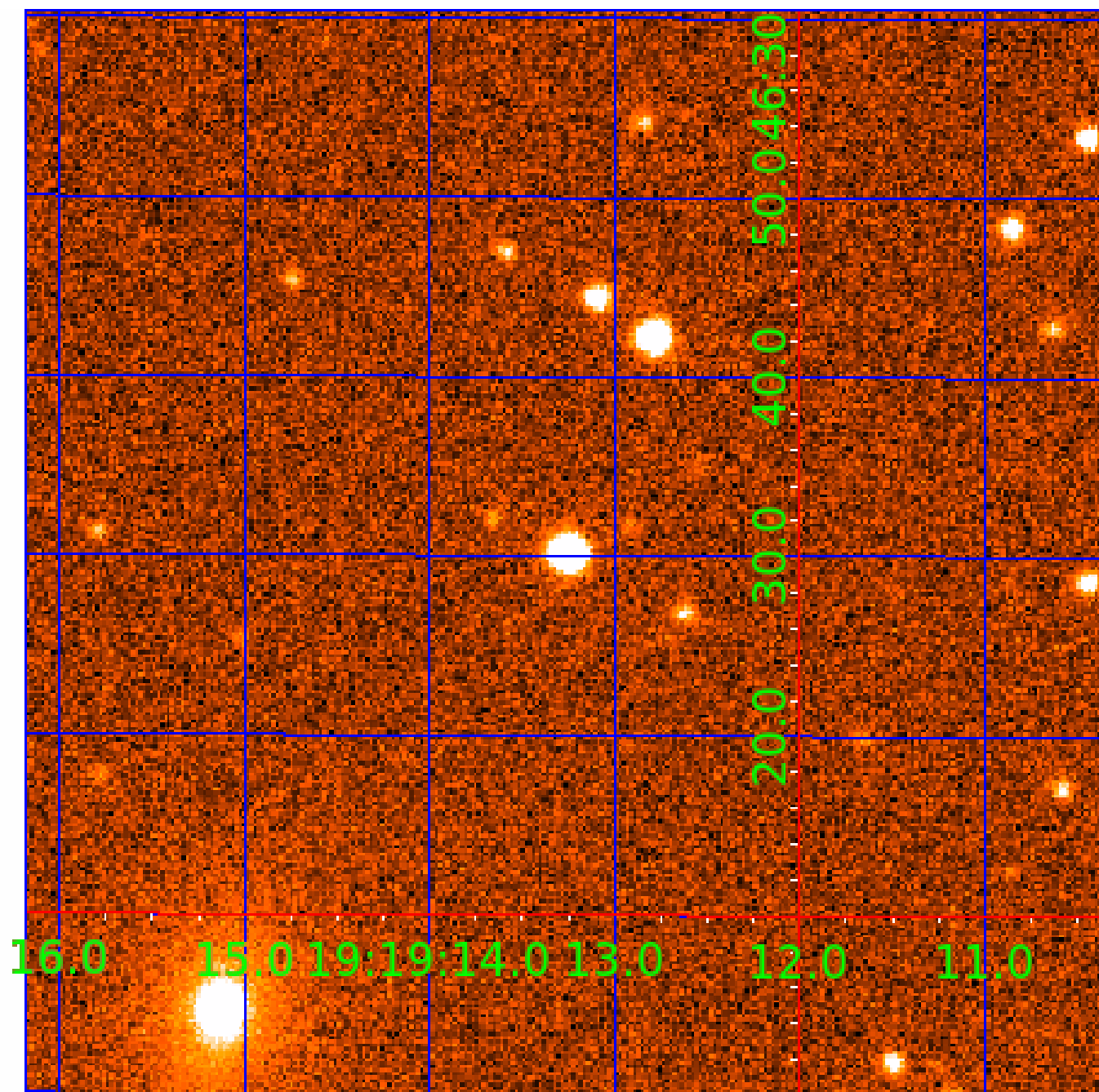


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 009705459

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009705459-01	OBS	1448.01	2.486595	131.621454	42390.5	2.849	844.7	1524.2	1.20	5892	25.29	1080.05
009705459-02	OBS	No	1.243296	131.623249	918.7	2.769	41.0	44.5	1.20	5892	4.34	2721.56
009705459-03	OBS	No	436.194596	145.432940	4555.8	12.721	11.8	6.7	1.20	5892	15.04	1.10
009705459-04	OBS	No	435.183153	278.057801	3399.5	5.899	9.5	8.3	1.20	5892	8.53	1.10
009705459-05	OBS	No	272.272769	388.005558	2442.8	2.499	9.2	7.9	1.20	5892	5.85	2.06

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009705459-01	OBS	PC	0.87	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—PLANET_OCCULT_ALT—HAS_SEC_TCE
009705459-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE
009705459-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009705459-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—CENT_FEW_DIFFS
009705459-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_TER_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS

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

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

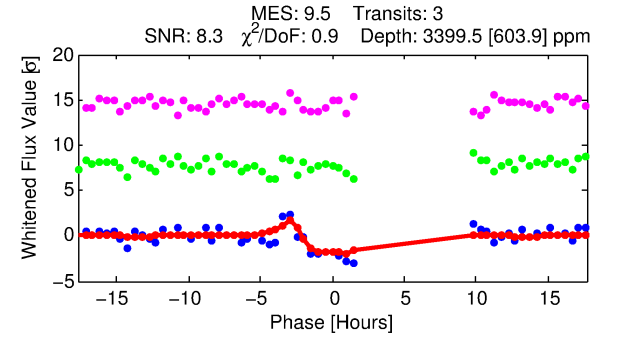
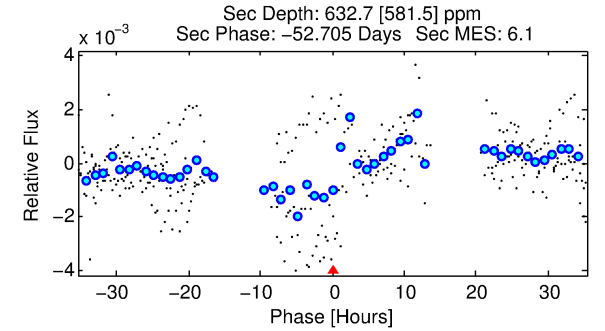
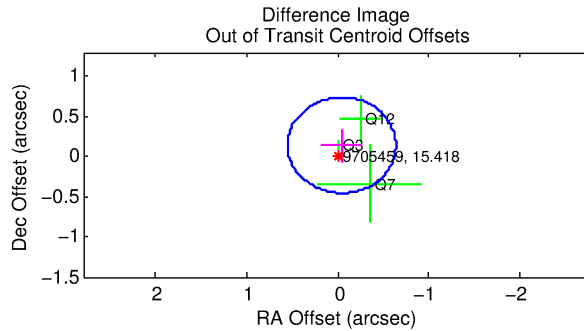
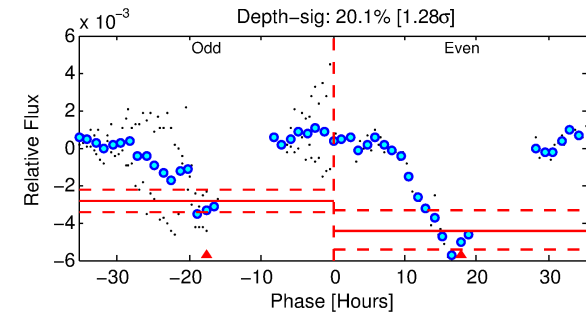
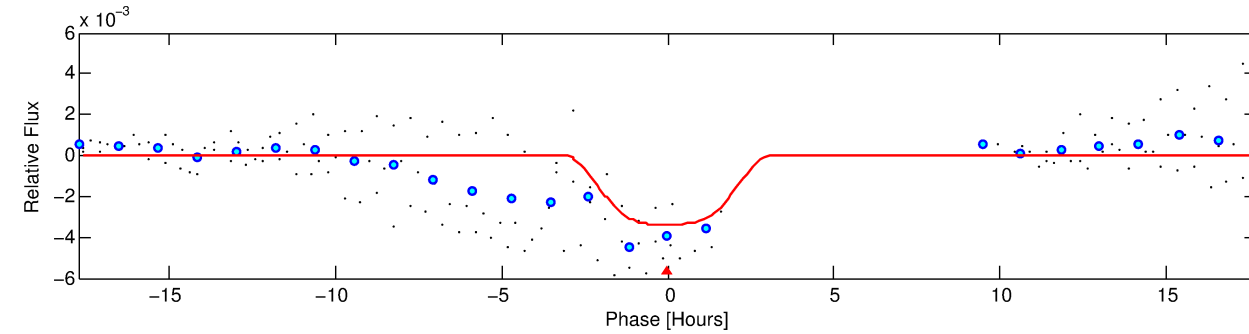
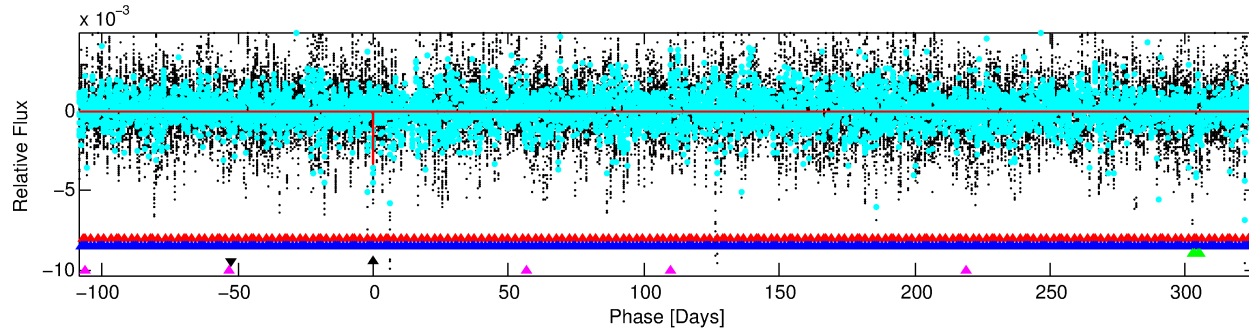
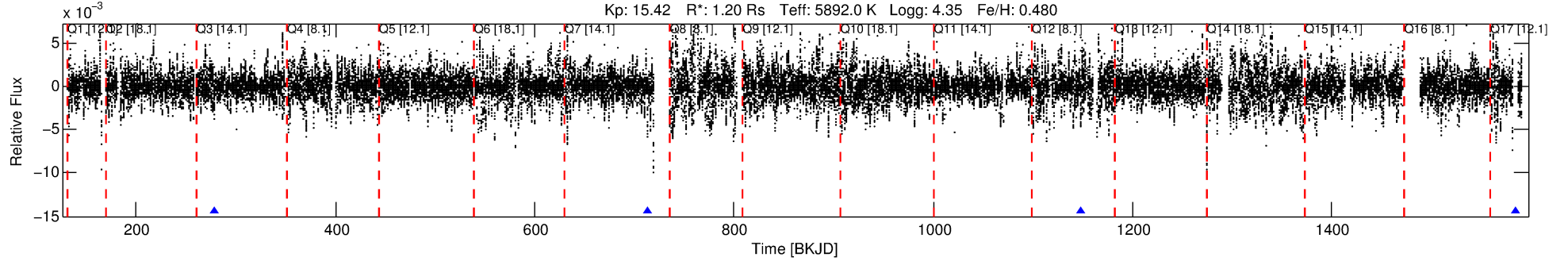
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009705459-04

No Significant Match Found

# DV One-Page Summary

KIC: 9705459 Candidate: 4 of 5 Period: 435.183 d  
KOI: K01448 Corr: No Ephemeris Match



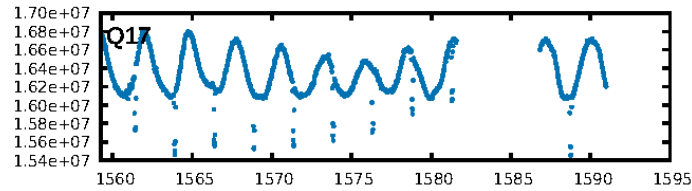
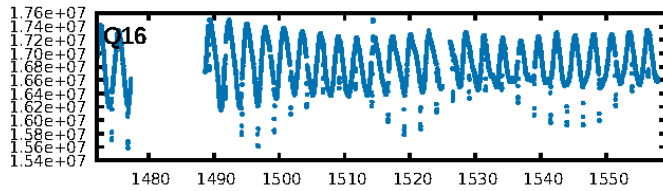
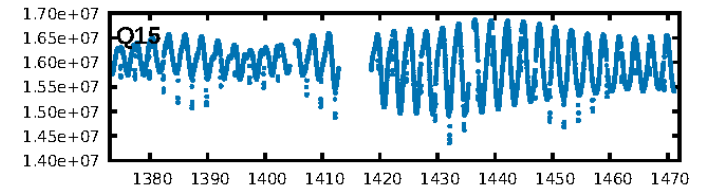
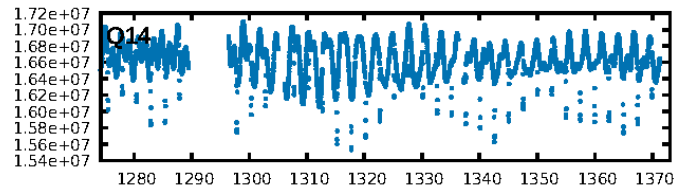
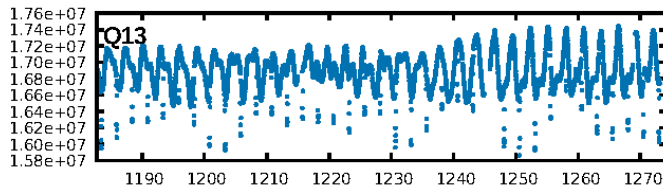
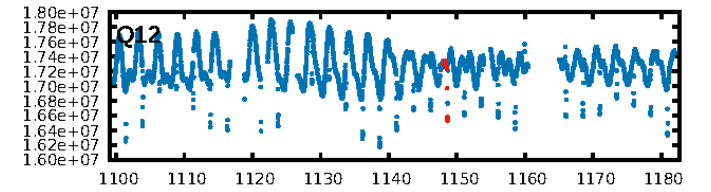
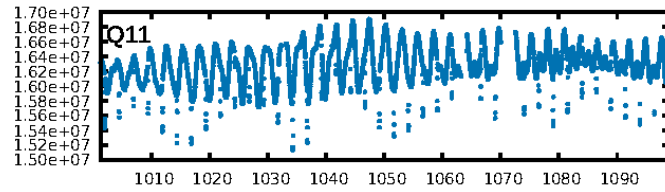
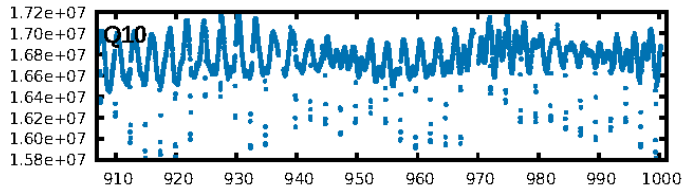
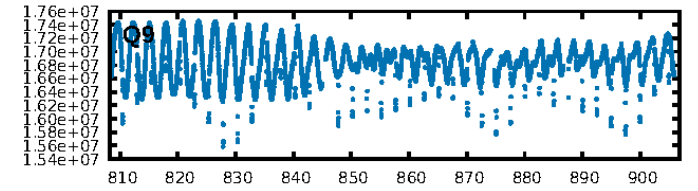
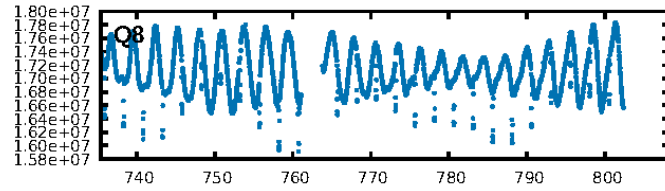
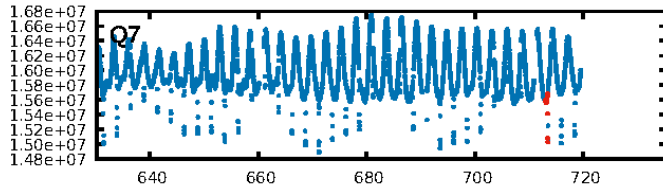
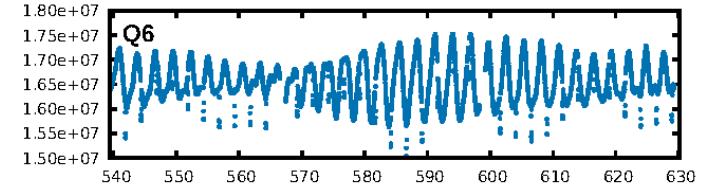
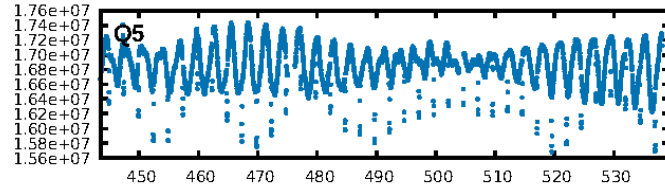
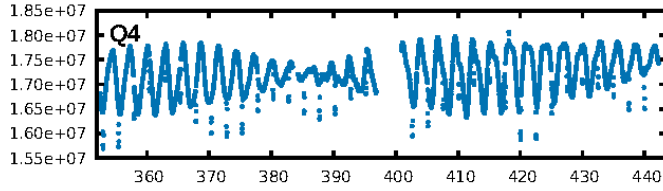
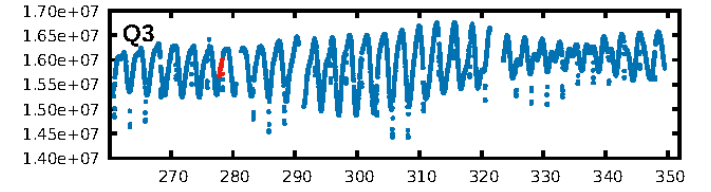
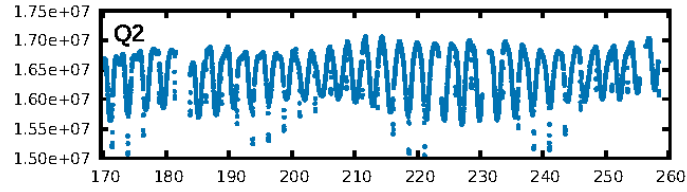
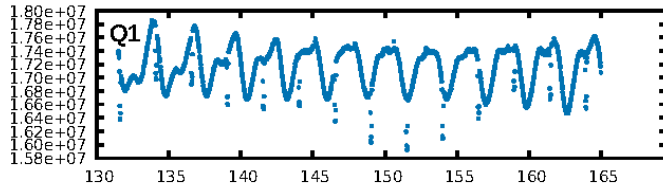
## DV Fit Results:

Period = 435.18315 [0.00748] d  
Epoch = 278.0578 [0.0106] BKJD  
Rp/R\* = 0.0652 [0.0067]  
a/R\* = 306.99 [53.45]  
b = 0.92 [0.02]  
Seff = 1.10 [0.44]  
Teff = 261 [26] K  
Rp = 8.53 [2.81] Re  
a = 1.1852 [0.3087] AU  
Ag = 6724.03 [6815.80] [0.99 $\sigma$ ]  
Teffp = 3659 [871] K [3.90 $\sigma$ ]

## DV Diagnostic Results:

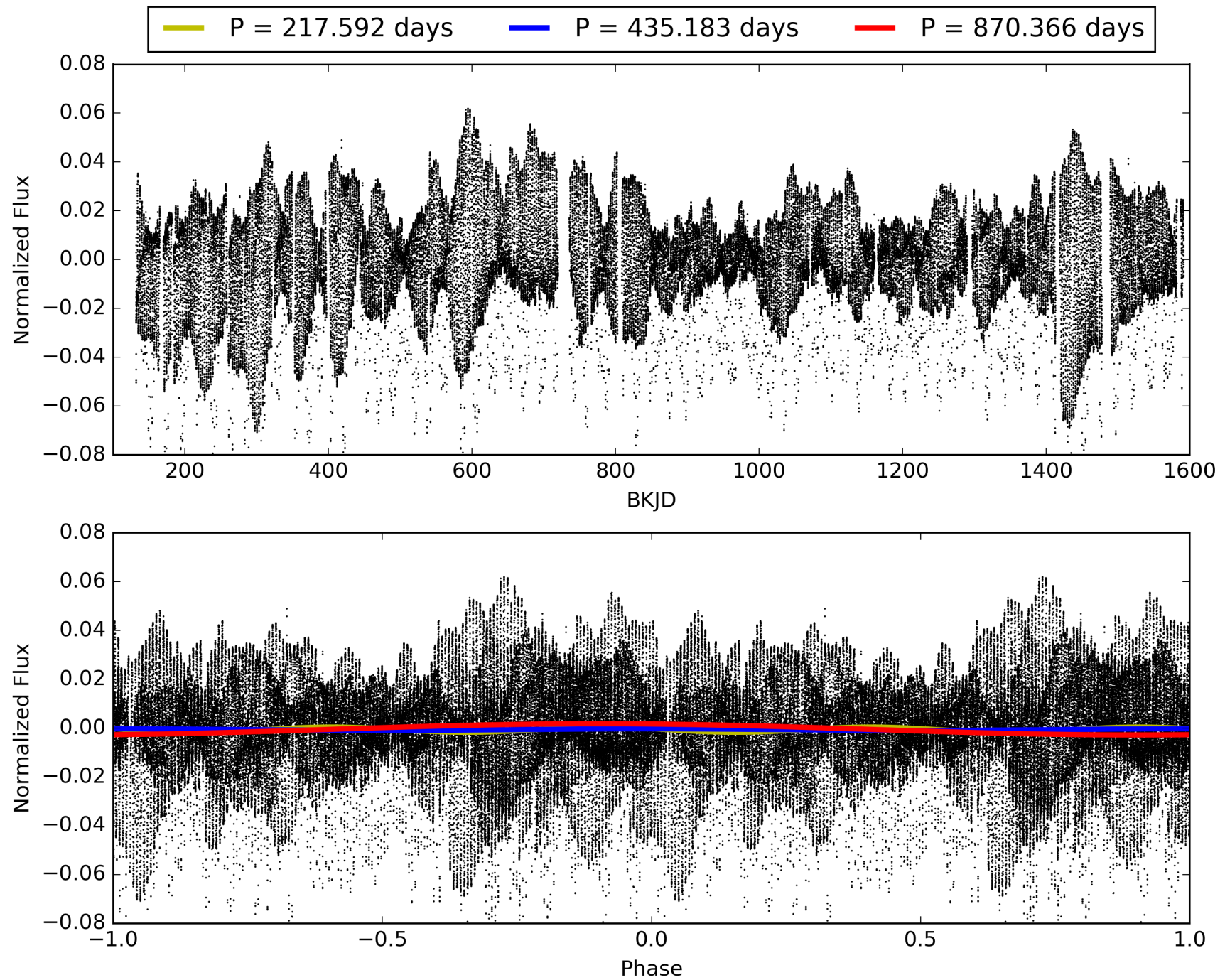
ShortPeriod-sig: 100.0% [610.31 $\sigma$ ]  
LongPeriod-sig: 91.7% [1.73 $\sigma$ ]  
ModelChiSquare2-sig: 22.1%  
ModelChiSquareGof-sig: 99.4%  
**Bootstrap-pfa: 2.04e-09**  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 1.676  
Centroid-sig: 91.9%  
Centroid-so: 0.120 arcsec [0.33 $\sigma$ ]  
OotOffset-rm: 0.148 arcsec [0.74 $\sigma$ ]  
OotOffset-st: 0/2/1/0 [3]  
KicOffset-rm: 0.246 arcsec [1.23 $\sigma$ ]  
KicOffset-st: 0/2/1/0 [3]  
DiffImageQuality-fgm: 0.00 [0/3]  
DiffImageOverlap-fno: 0.00 [0/3]

# TCE 009705459-04, PDC Light Curves





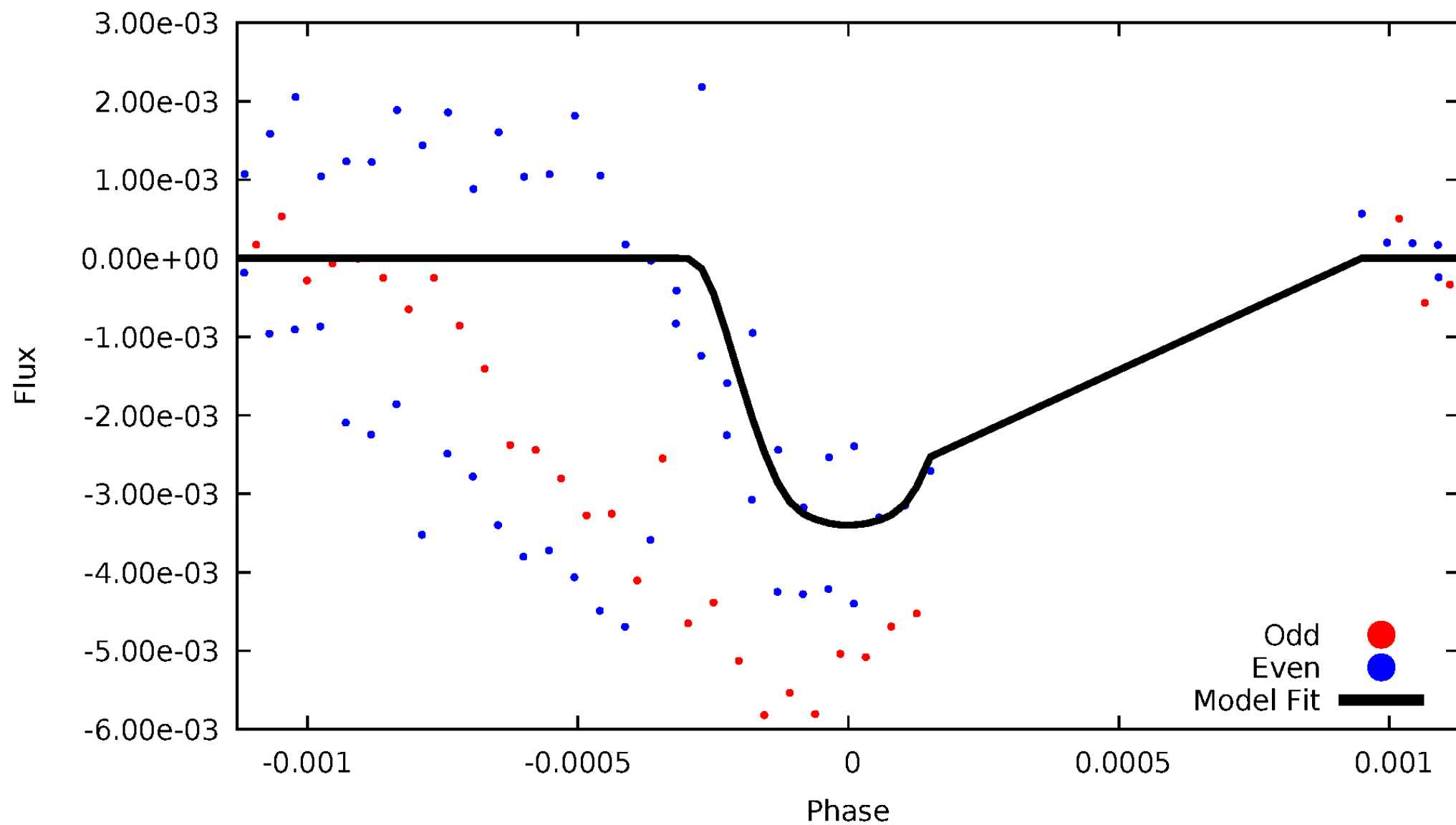
TCE 009705459-04





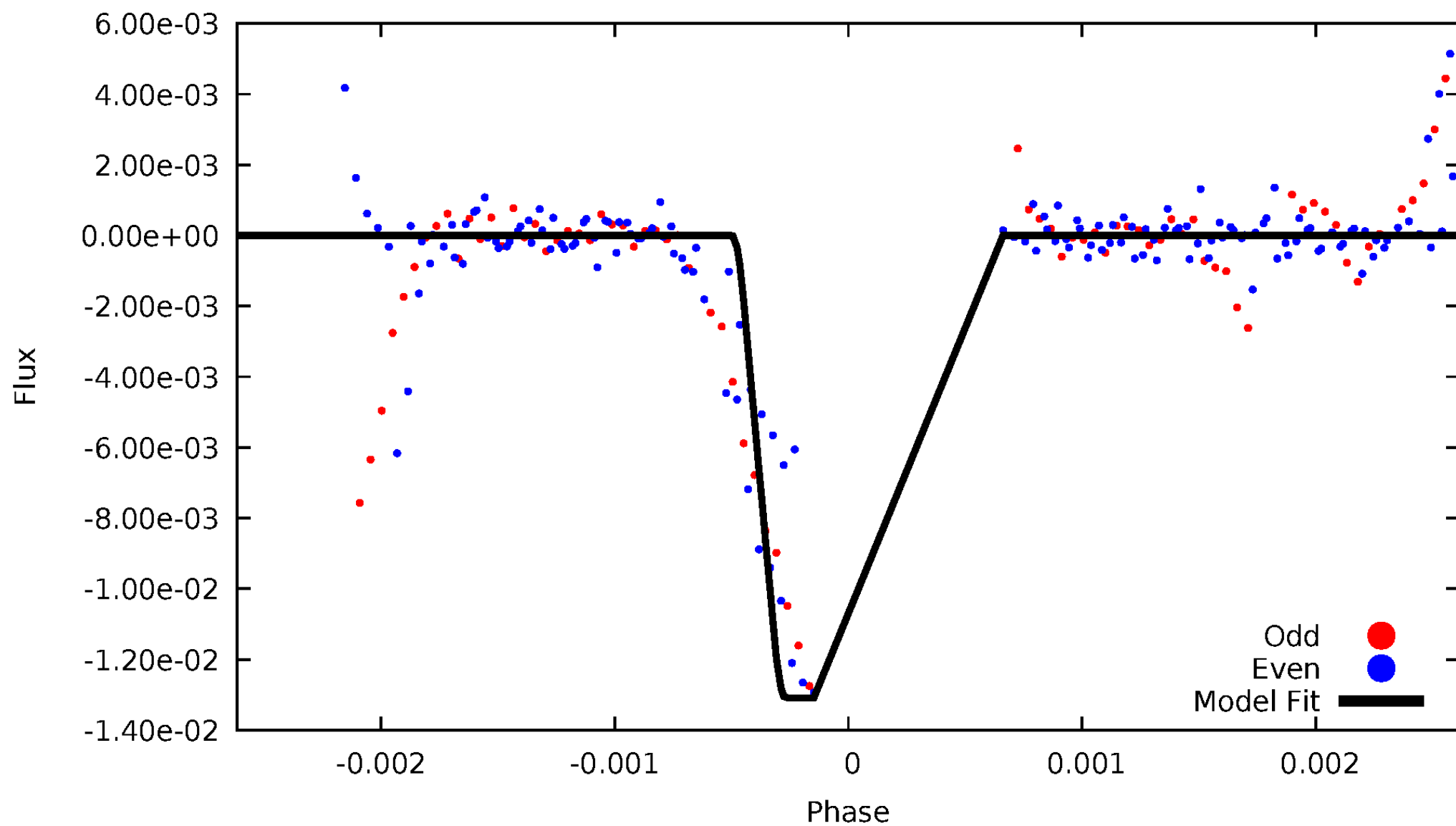
# DV Odd/Even

TCE 009705459-04



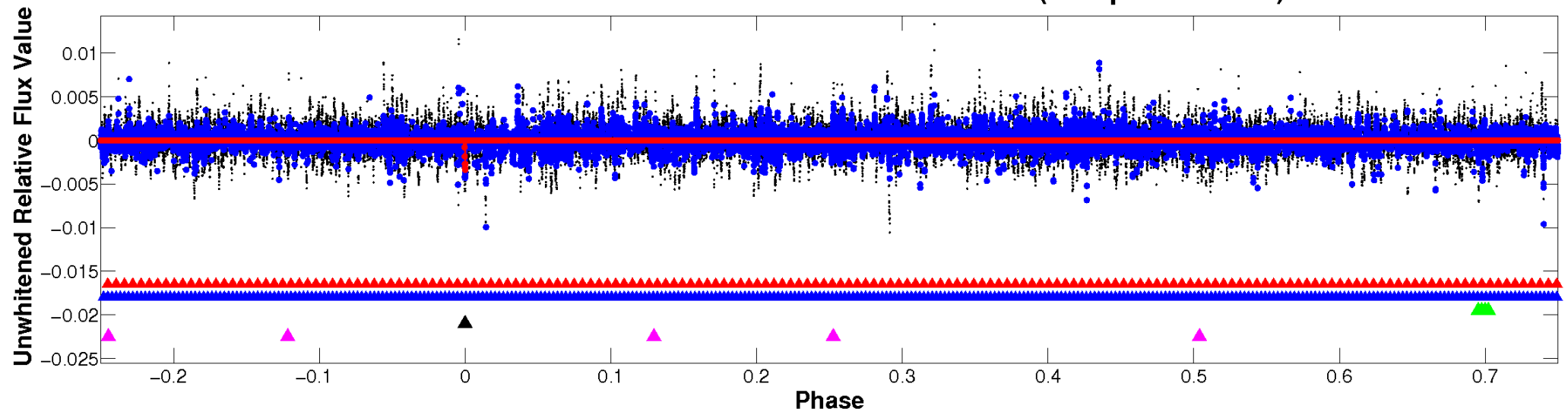
# ALT Odd/Even

TCE 009705459-04

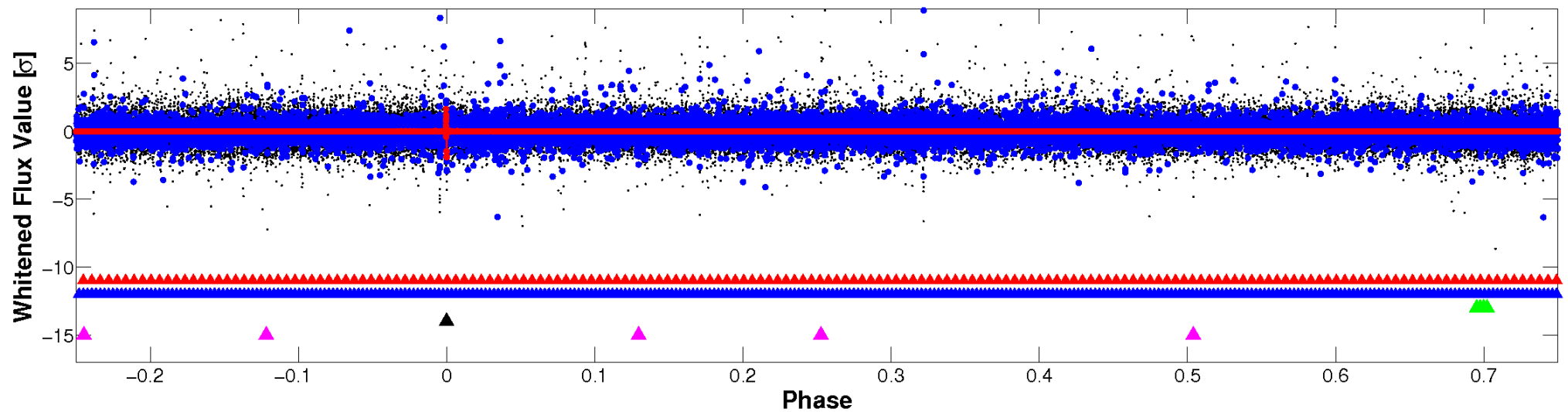


# Non-Whitened Vs. Whitened Light Curve

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

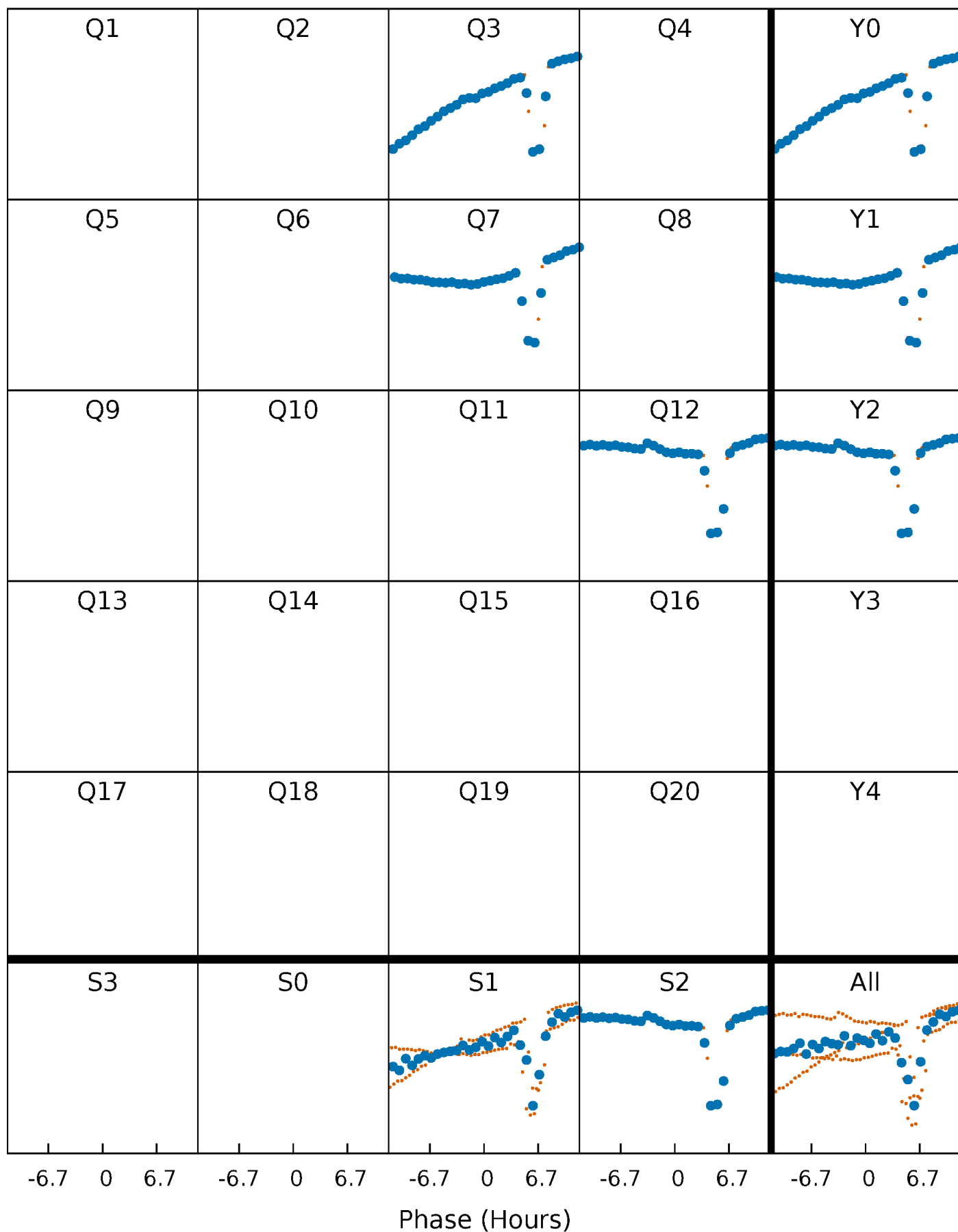


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



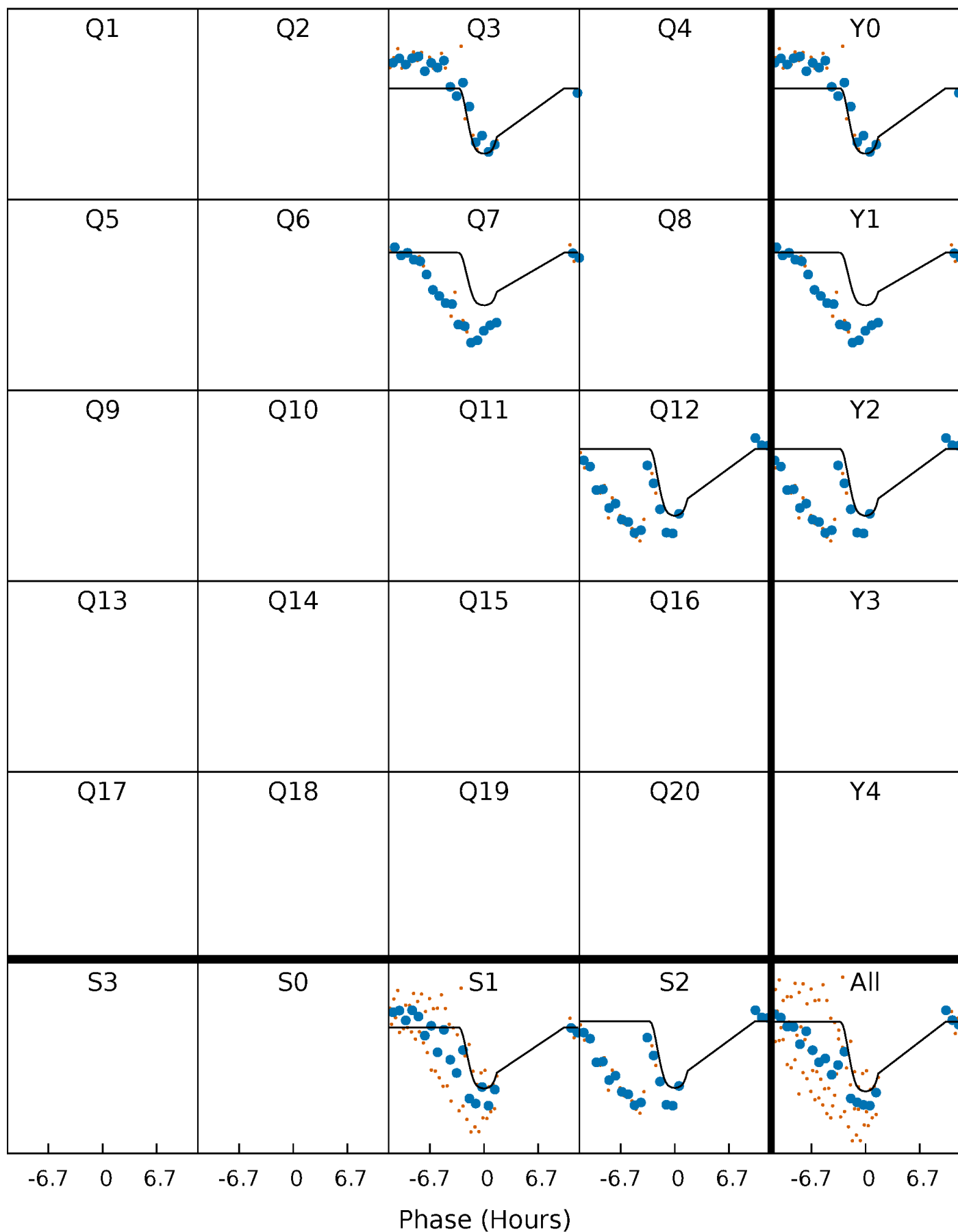
# PDC Quarter-Phased Transit Curves

TCE 009705459-04     $P=435.183153$  Days     $T_0=278.057801$  (BKJD)



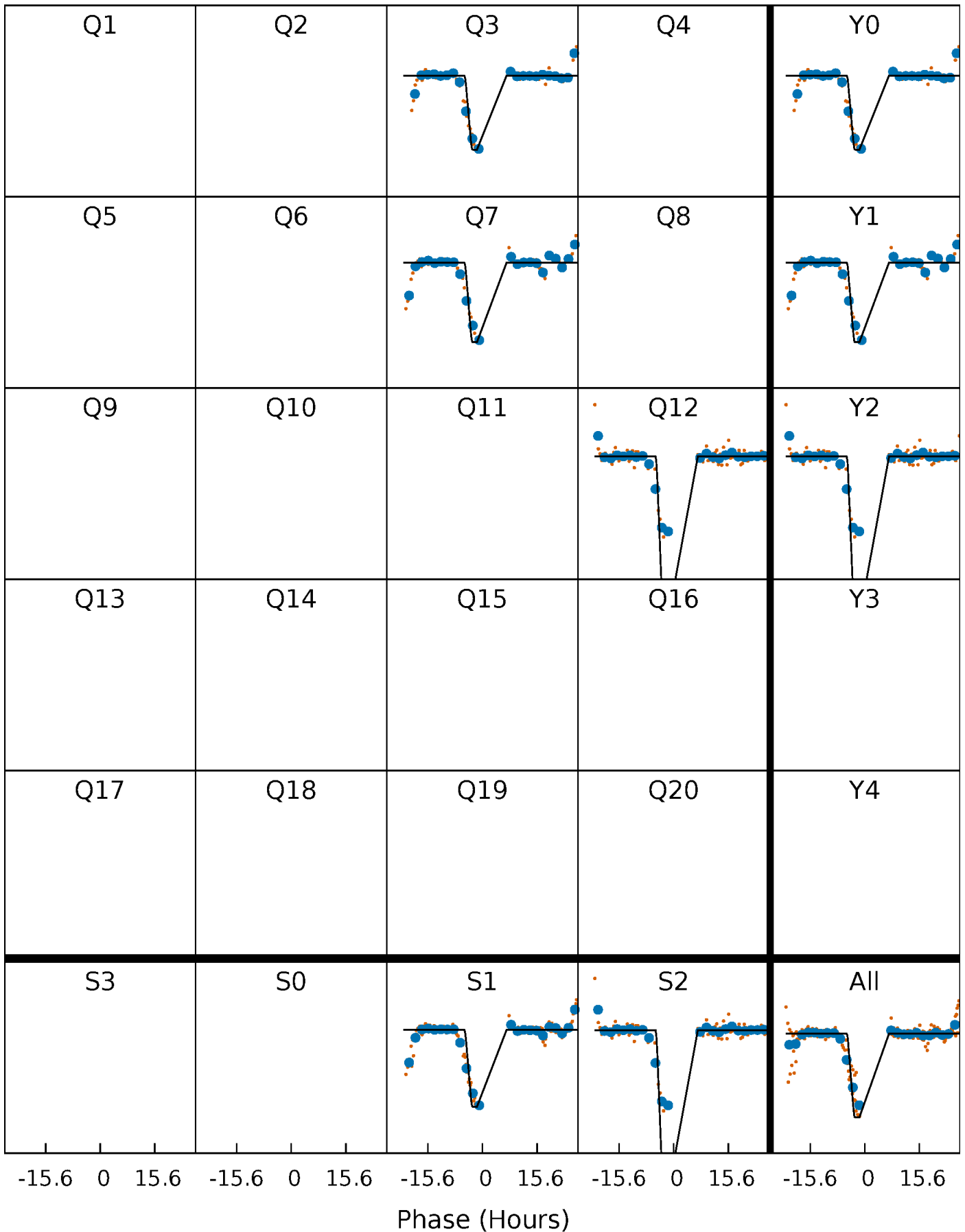
# DV Quarter-Phased Transit Curves

TCE 009705459-04 P=435.183153 Days  $T_0=278.057801$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

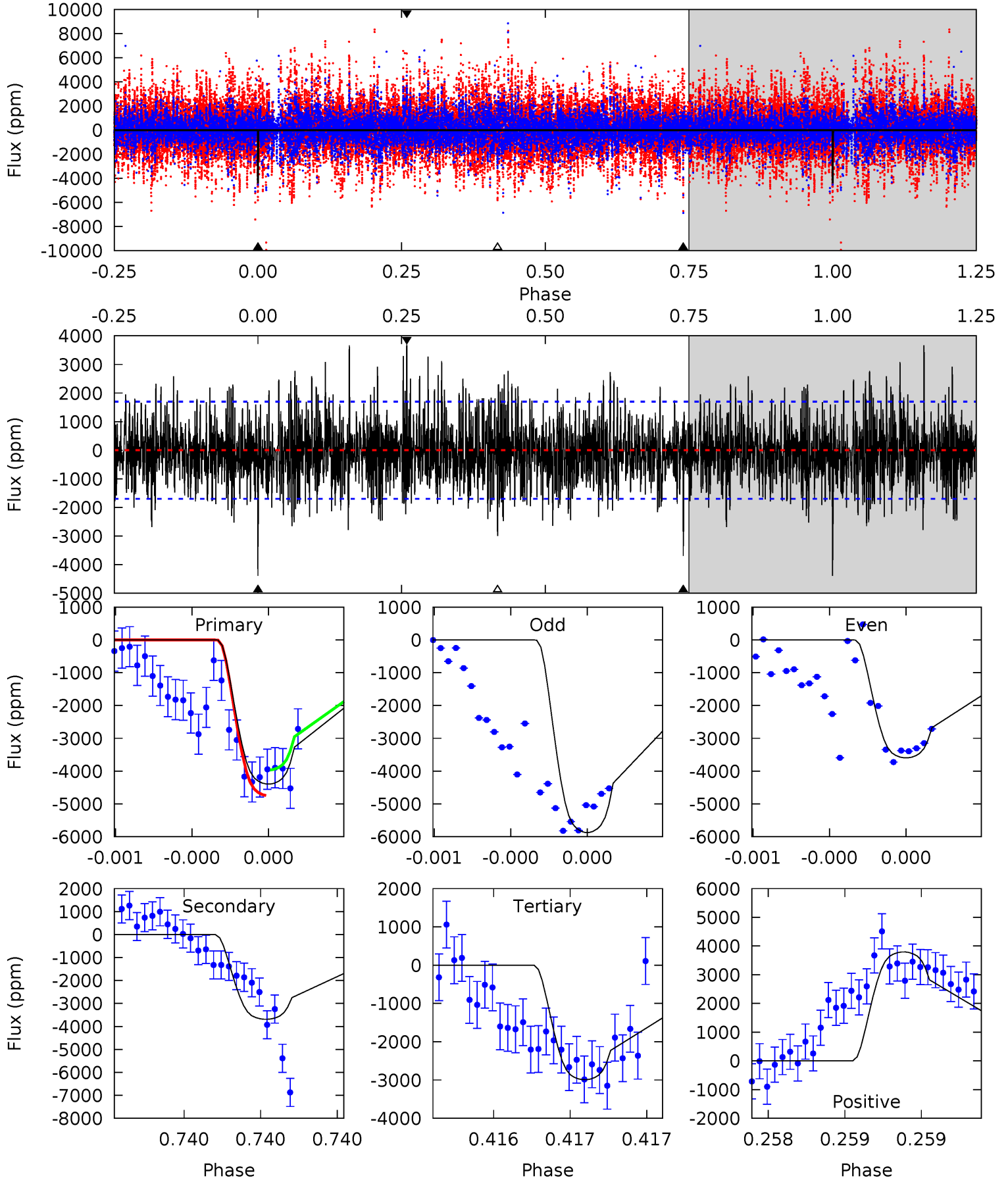
TCE 009705459-04     $P=435.180339$  Days     $T_0=278.188058$  (BKJD)



# DV Model-Shift Uniqueness Test

009705459-04, P = 435.183153 Days, E = 278.057801 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
14.5	12.1	9.84	12.5	5.59	3.51	2.94	4.62	1.98	2.30	-0.34	3.44	1.00	0.46	1.14

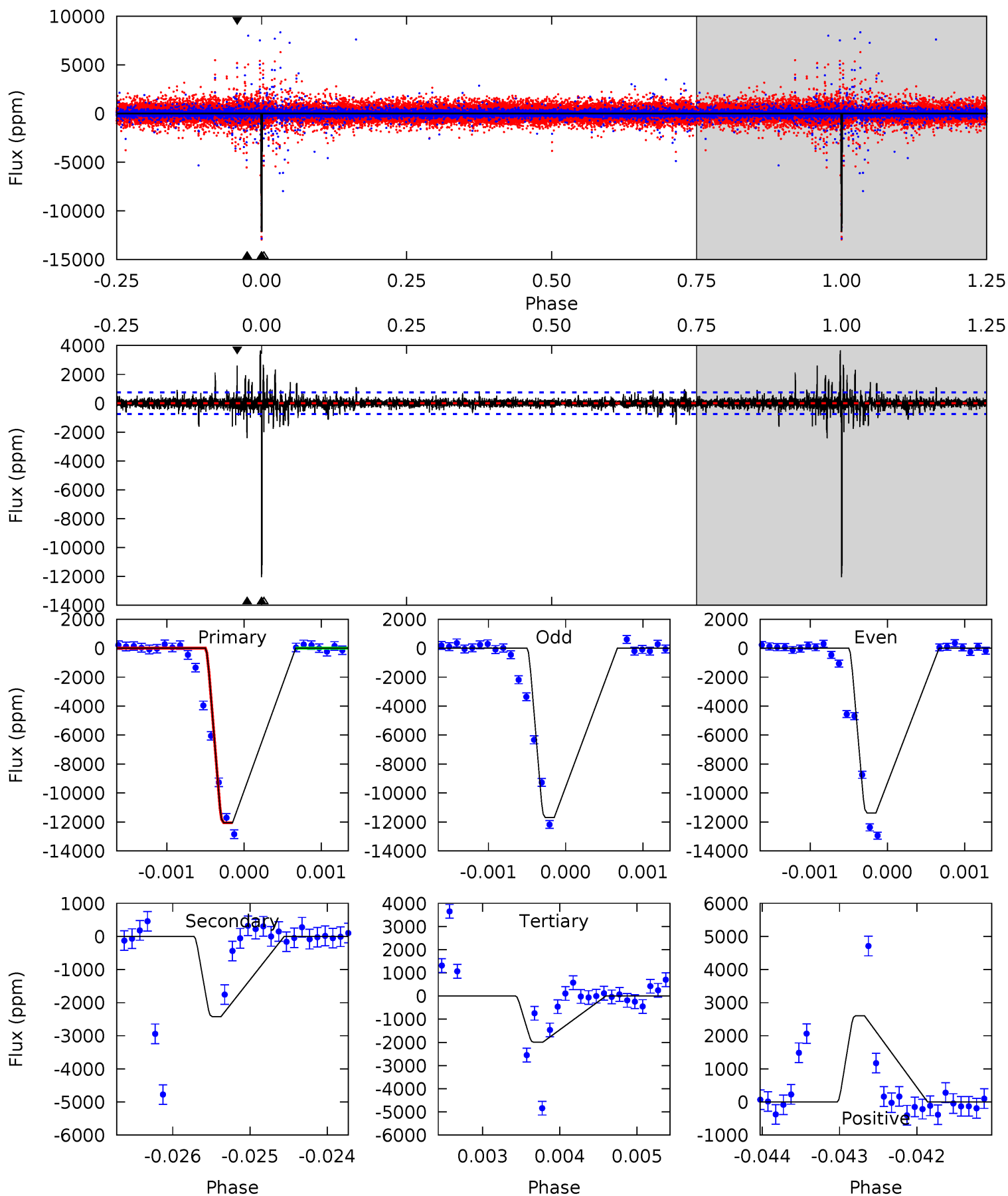




# Alt Model-Shift Uniqueness Test

009705459-04, P = 435.180339 Days, E = 278.188058 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
88.1	17.7	14.6	19.0	5.45	3.29	1.42	73.5	69.1	3.11	-1.33	1.06	0	0.23	0



### Stellar Parameters For KIC 009705459

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5892^{+174}_{-208}$	$4.350^{+0.087}_{-0.203}$	$0.480^{+0.050}_{-0.300}$	$1.198^{+0.375}_{-0.161}$	$1.173^{+0.122}_{-0.150}$	$0.962^{+0.384}_{-0.500}$
	+3%/-4%	+2%/-5%	+10%/-62%	+31%/-13%	+10%/-13%	+40%/-52%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 009705459-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-3689 \pm 304$	$8.73^{+1.59}_{-1.22}$	$370^{+29}_{-20}$	$5659^{+401}_{-298}$	$36732^{+13380}_{-10816}$
Alt.	$-2422 \pm 137$	$15.34^{+2.46}_{-1.67}$	$370^{+27}_{-20}$	$4130^{+150}_{-136}$	$7853^{+2001}_{-1976}$

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

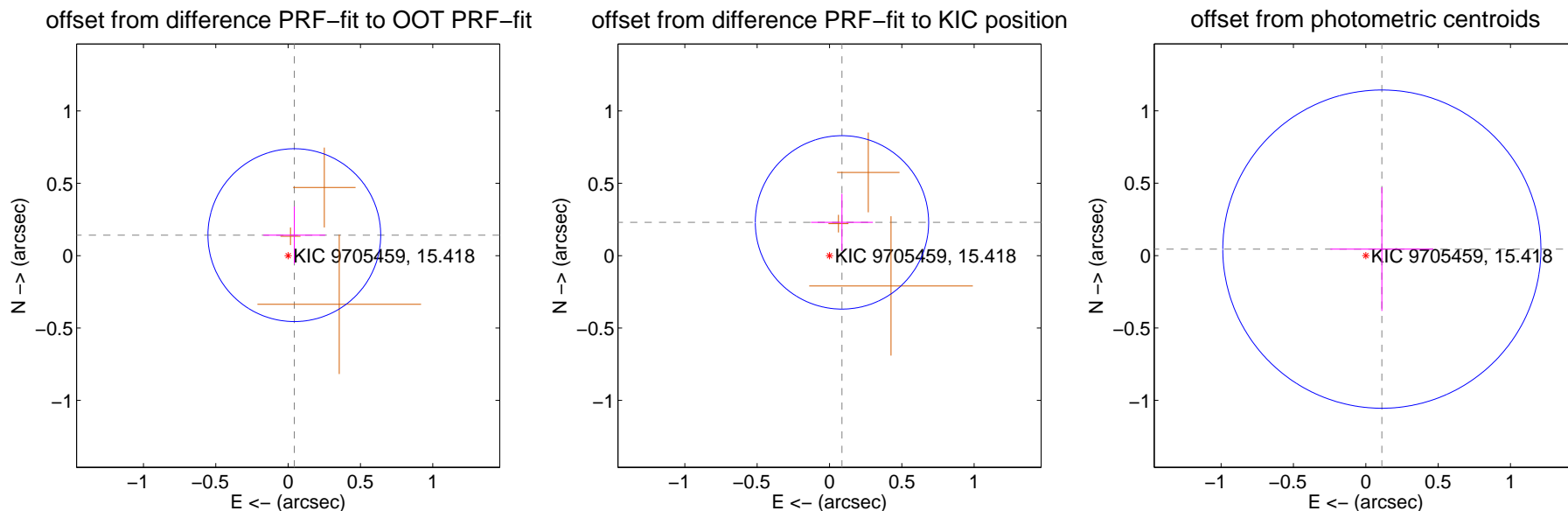
## DV Centroid Data

Supplemental centroid analysis for 009705459-04. Kepler magnitude: 15.42. Transit SNR 8.29

There are 0 quarters with good PRF difference image offsets

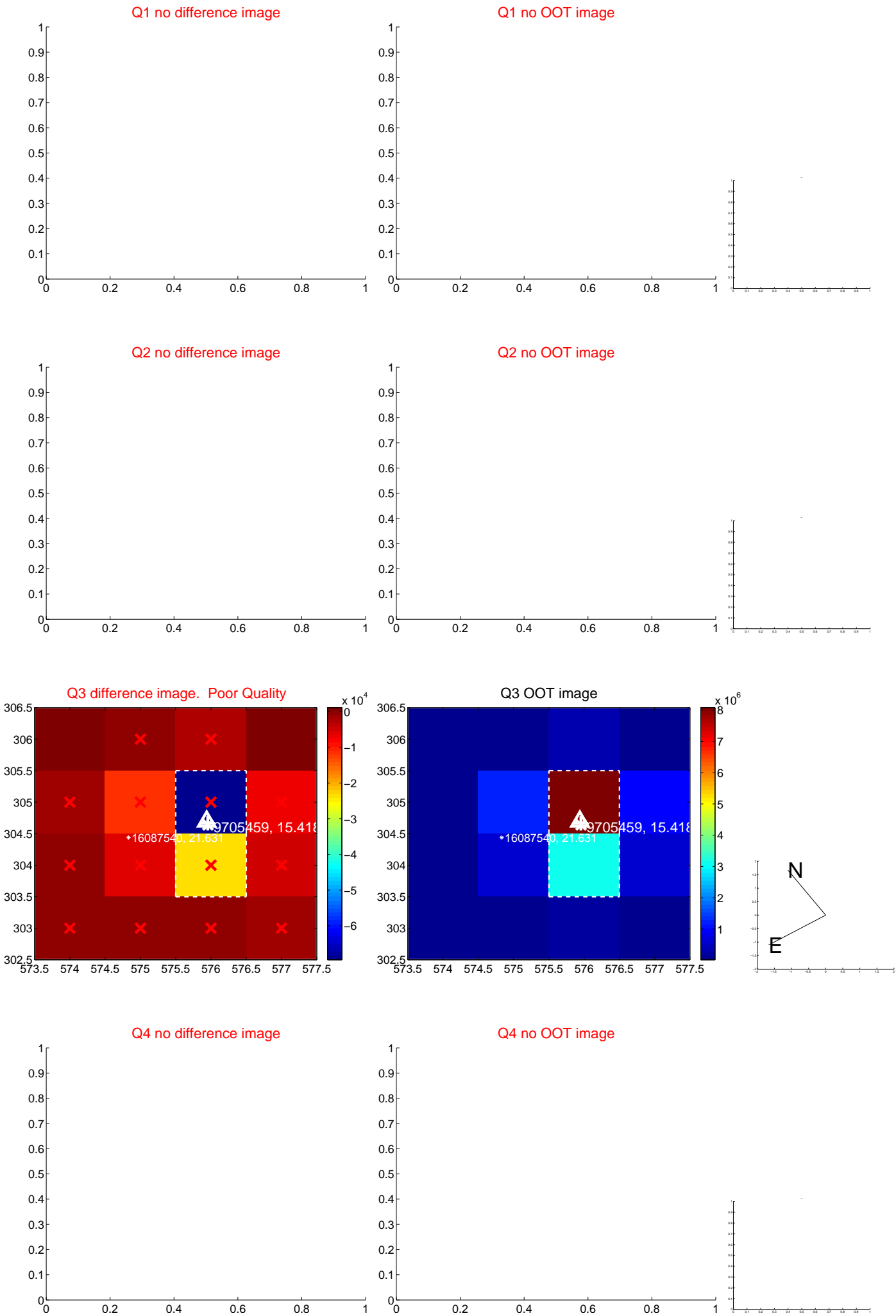
The direct PRF centroid is offset from the target star catalog position by about 0.11 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.148 \pm 0.199$	0.74	$-0.043 \pm 0.214$	$0.142 \pm 0.198$
PRF-fit source offset from KIC position	$0.246 \pm 0.200$	1.23	$-0.086 \pm 0.214$	$0.230 \pm 0.198$
photometric centroid source offset	$0.12 \pm 0.37$	0.33	$-0.11 \pm 0.36$	$0.04 \pm 0.43$

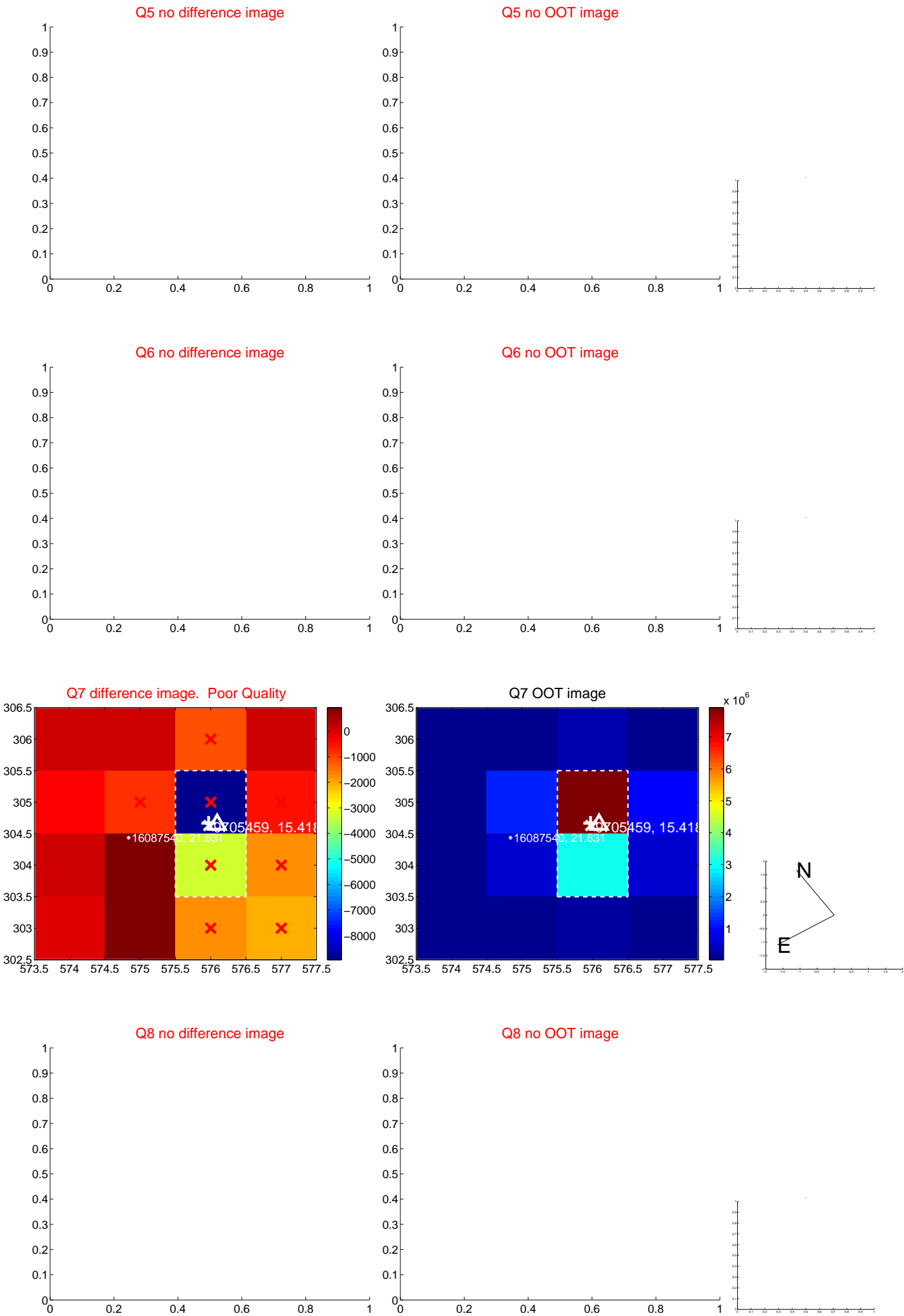


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

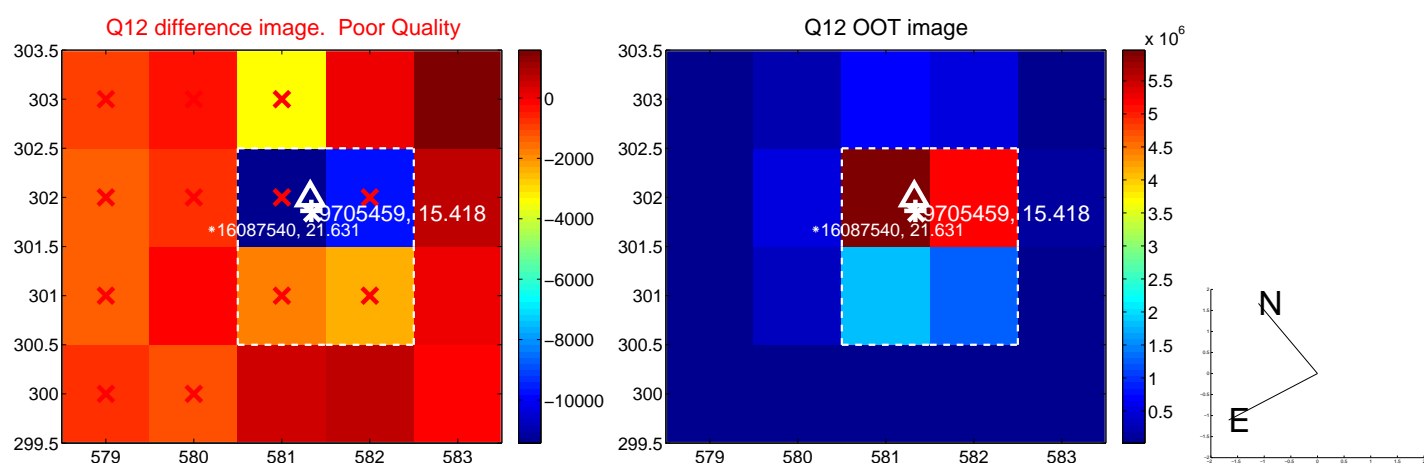
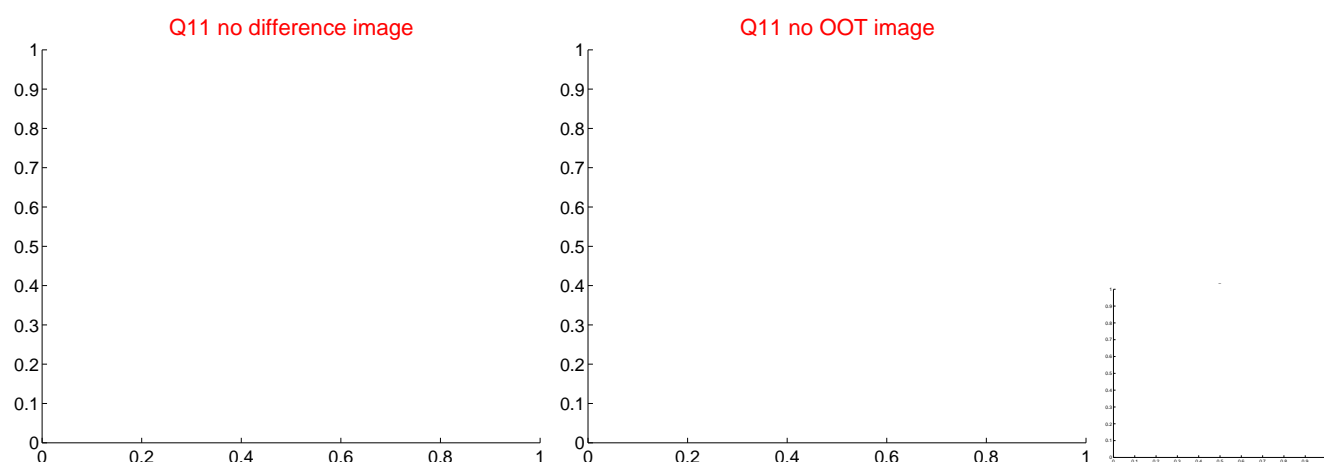
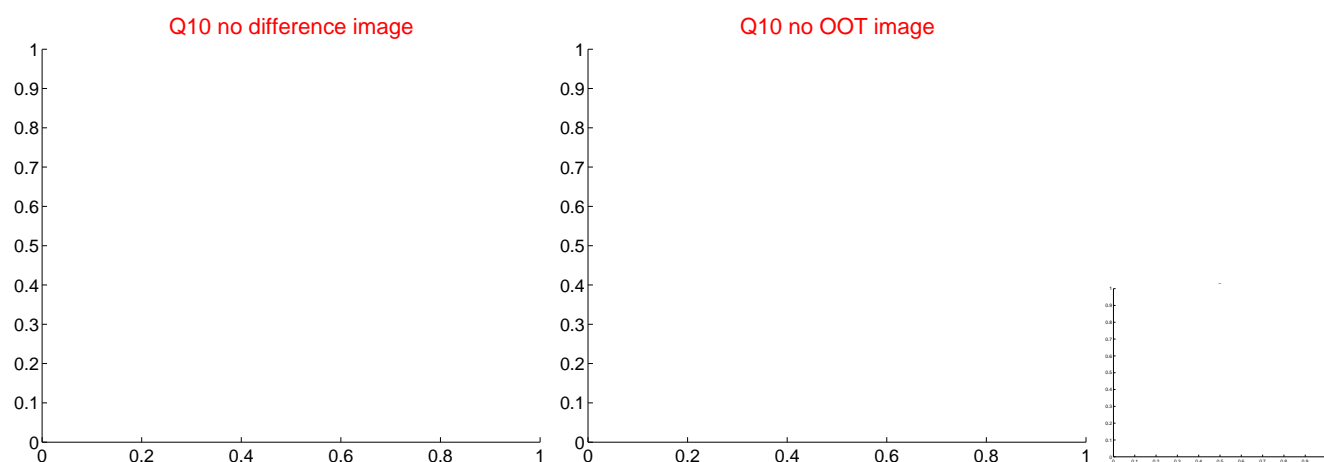
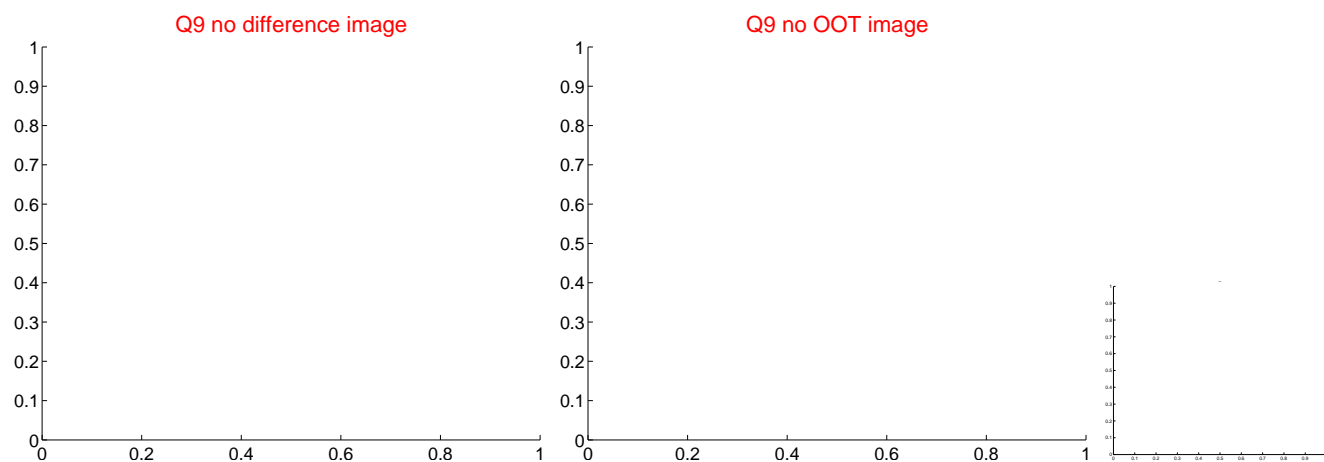
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



white ×: 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

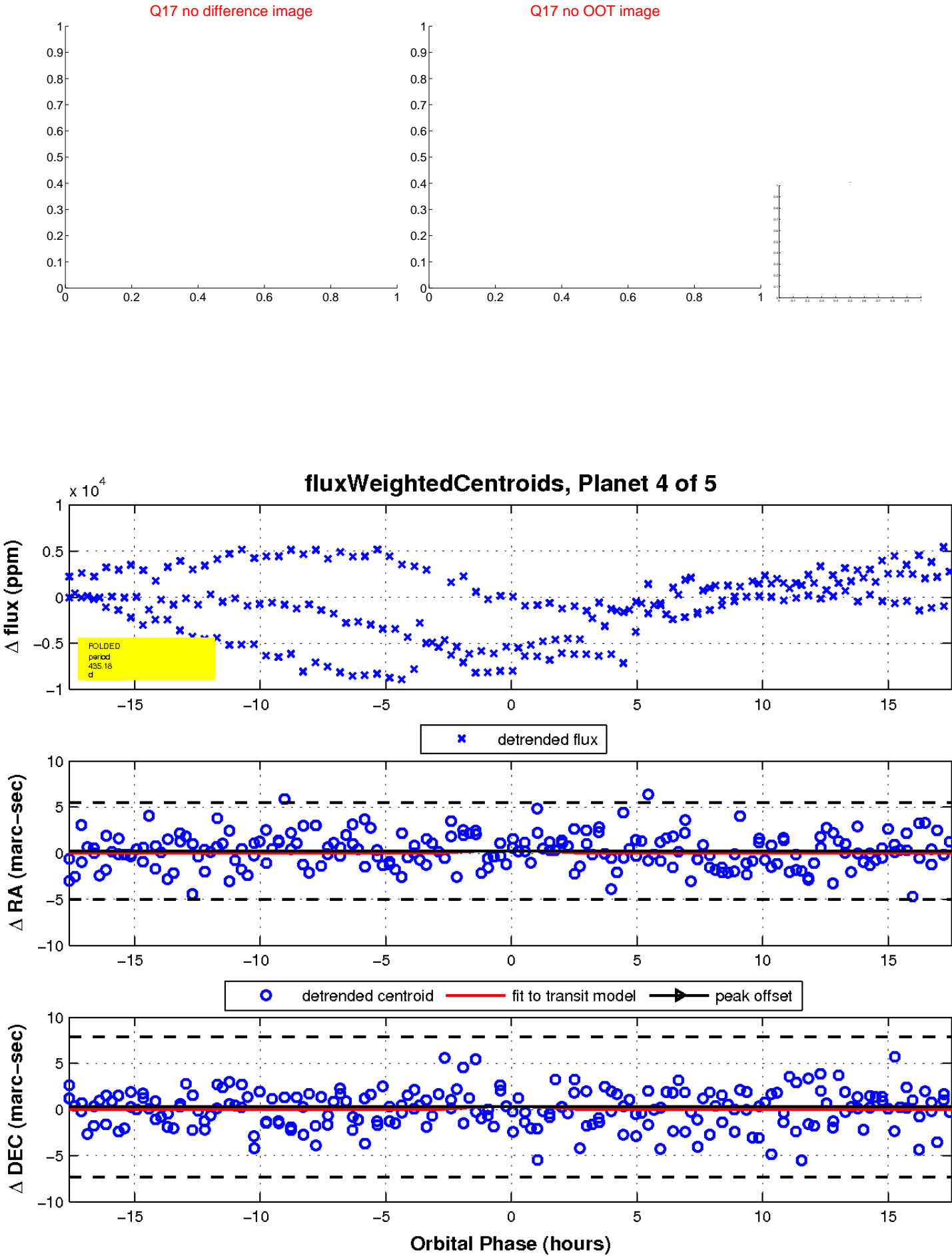


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



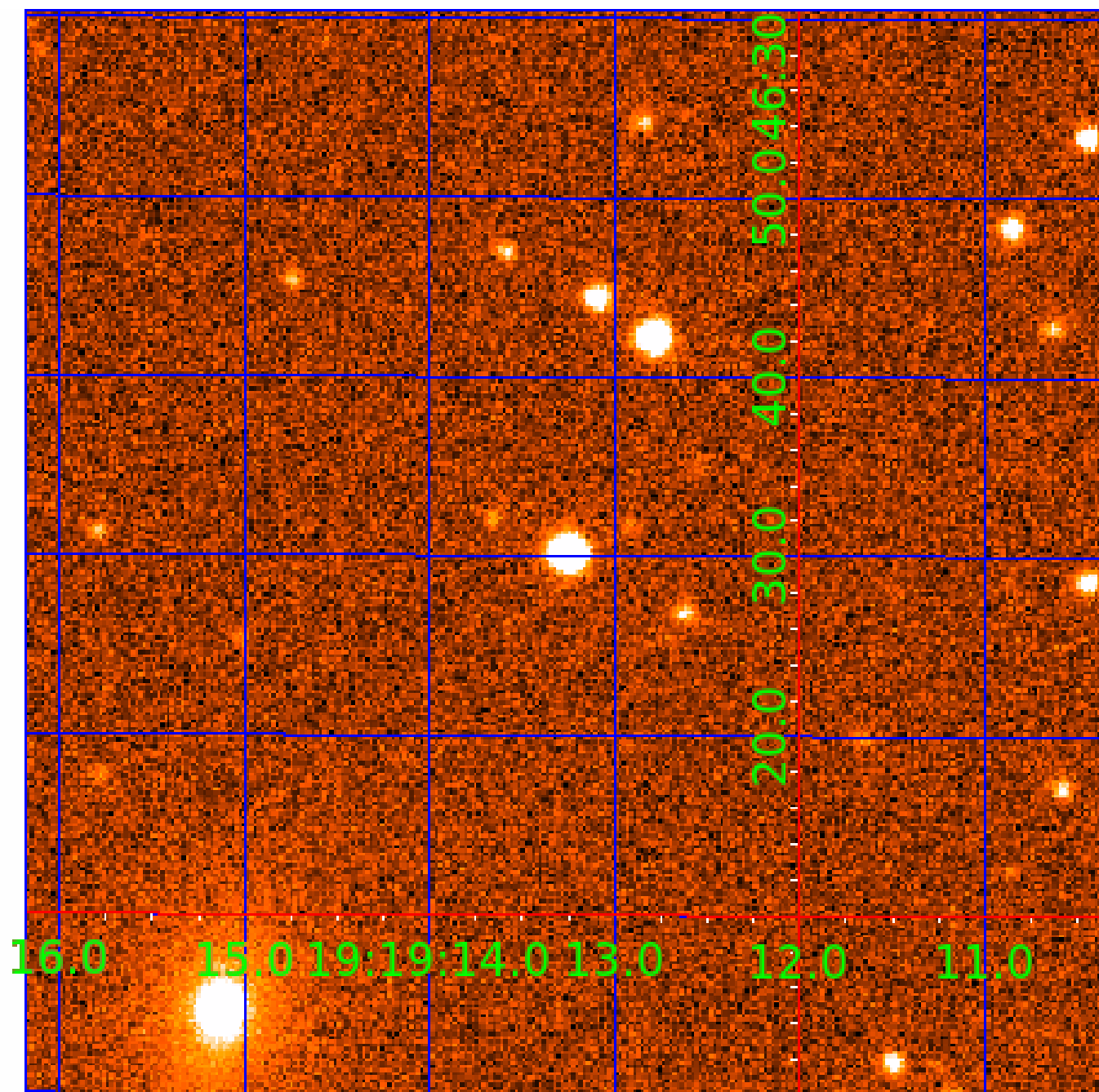


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 009705459

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009705459-01	OBS	1448.01	2.486595	131.621454	42390.5	2.849	844.7	1524.2	1.20	5892	25.29	1080.05
009705459-02	OBS	No	1.243296	131.623249	918.7	2.769	41.0	44.5	1.20	5892	4.34	2721.56
009705459-03	OBS	No	436.194596	145.432940	4555.8	12.721	11.8	6.7	1.20	5892	15.04	1.10
009705459-04	OBS	No	435.183153	278.057801	3399.5	5.899	9.5	8.3	1.20	5892	8.53	1.10
009705459-05	OBS	No	272.272769	388.005558	2442.8	2.499	9.2	7.9	1.20	5892	5.85	2.06

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009705459-01	OBS	PC	0.87	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—PLANET_OCCULT_ALT—HAS_SEC_TCE
009705459-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE
009705459-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009705459-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—CENT_FEW_DIFFS
009705459-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_TER_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS

**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 009705459-05

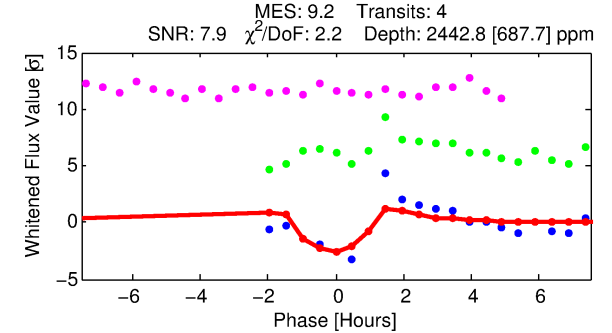
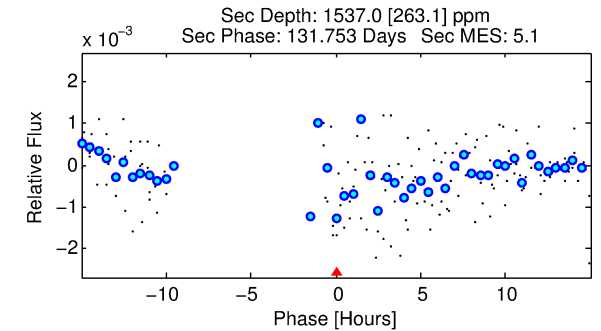
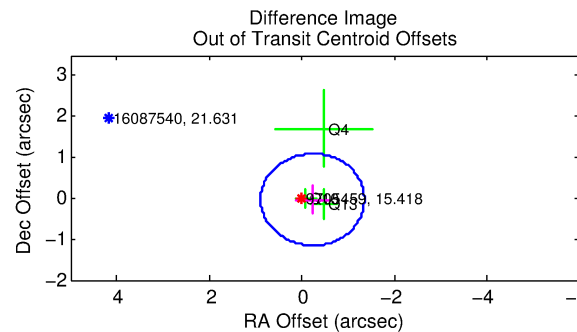
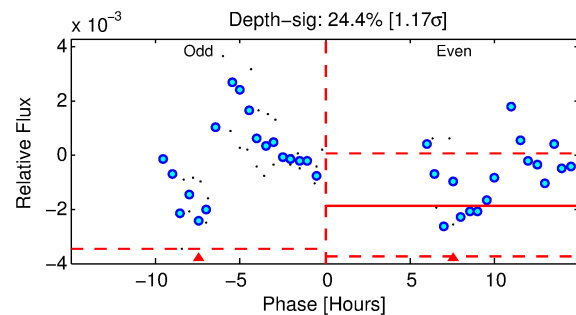
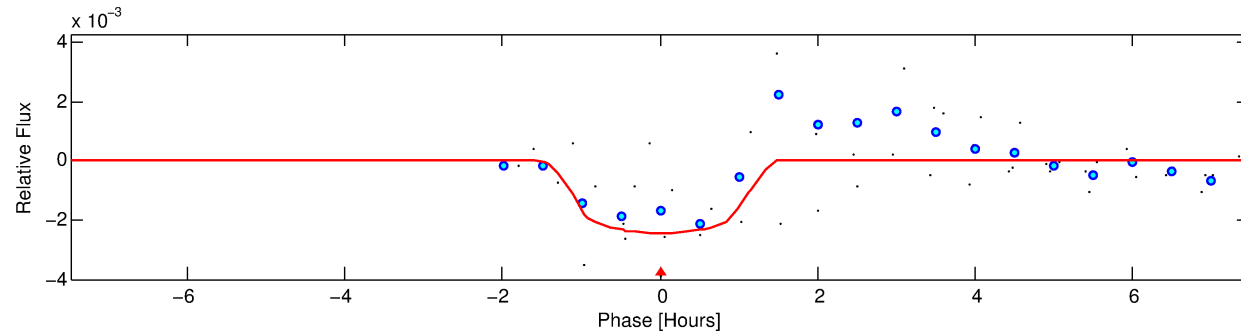
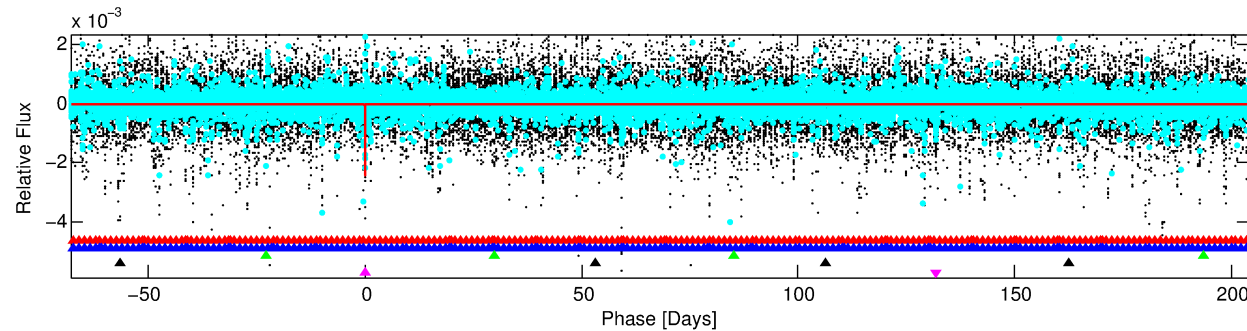
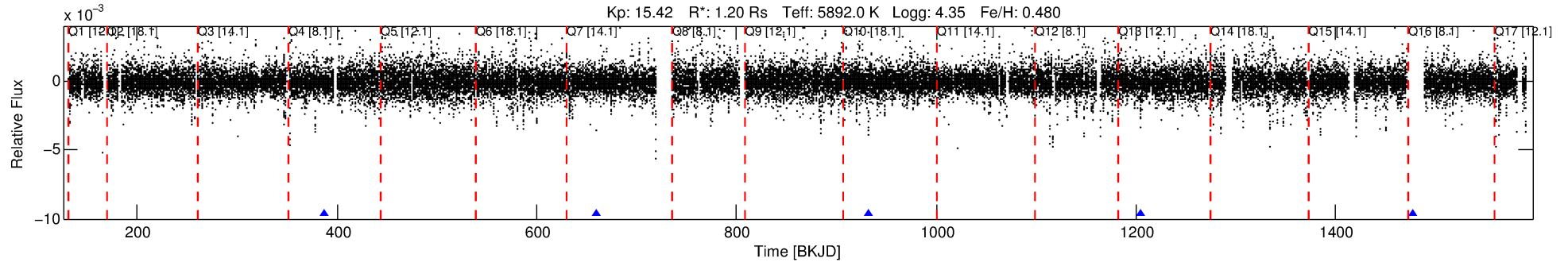
No Significant Match Found

# DV One-Page Summary

KIC: 9705459 Candidate: 5 of 5 Period: 272.273 d

KOI: K01448 Corr: No Ephemeris Match

Kp: 15.42 R\*: 1.20 Rs Teff: 5892.0 K Logg: 4.35 Fe/H: 0.480

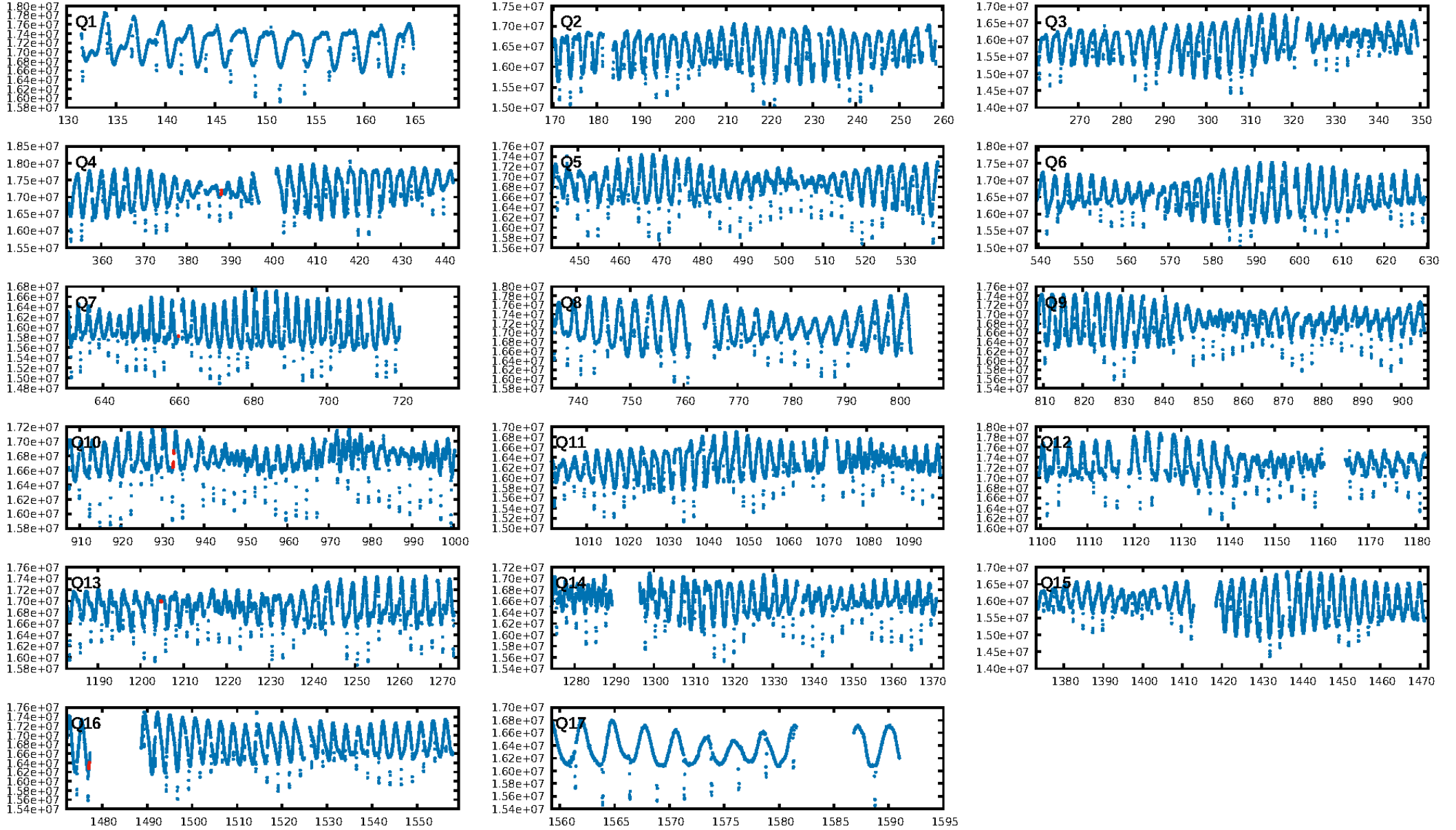


DV Fit Results:	DV Diagnostic Results:
Period = 272.27277 [0.00534] d	ShortPeriod-sig: 100.0% [1708.81σ]
Epoch = 388.0056 [0.0087] BKJD	LongPeriod-sig: 100.0% [610.31σ]
Rp/R* = 0.0447 [0.2992]	ModelChiSquare2-sig: 0.2%
a/R* = 869.67 [24447.55]	ModelChiSquareGof-sig: 75.8%
b = 0.00 [13983.25]	Bootstrap-pfa: 5.79e-10
Seff = 2.06 [0.83]	RollingBand-fgt: 1.00 [4/4]
Teq = 306 [31] K	GhostDiagnostic-chr: 0.4343
Rp = 5.85 [39.16] Re	Centroid-sig: 66.4%
a = 0.8670 [0.2258] AU	Centroid-so: 0.516 arcsec [0.61σ]
Ag = 18596.30 [248950.85] [0.07σ]	OotOffset-rm: 0.234 arcsec [0.63σ]
Teffp = 5517 [18457] K [0.28σ]	OotOffset-st: 1/0/1/1 [3]
	KicOffset-rm: 0.343 arcsec [0.93σ]
	KicOffset-st: 1/0/1/1 [3]
	DiffImageQuality-fgm: 0.33 [1/3]
	DiffImageOverlap-fno: 0.00 [0/3]

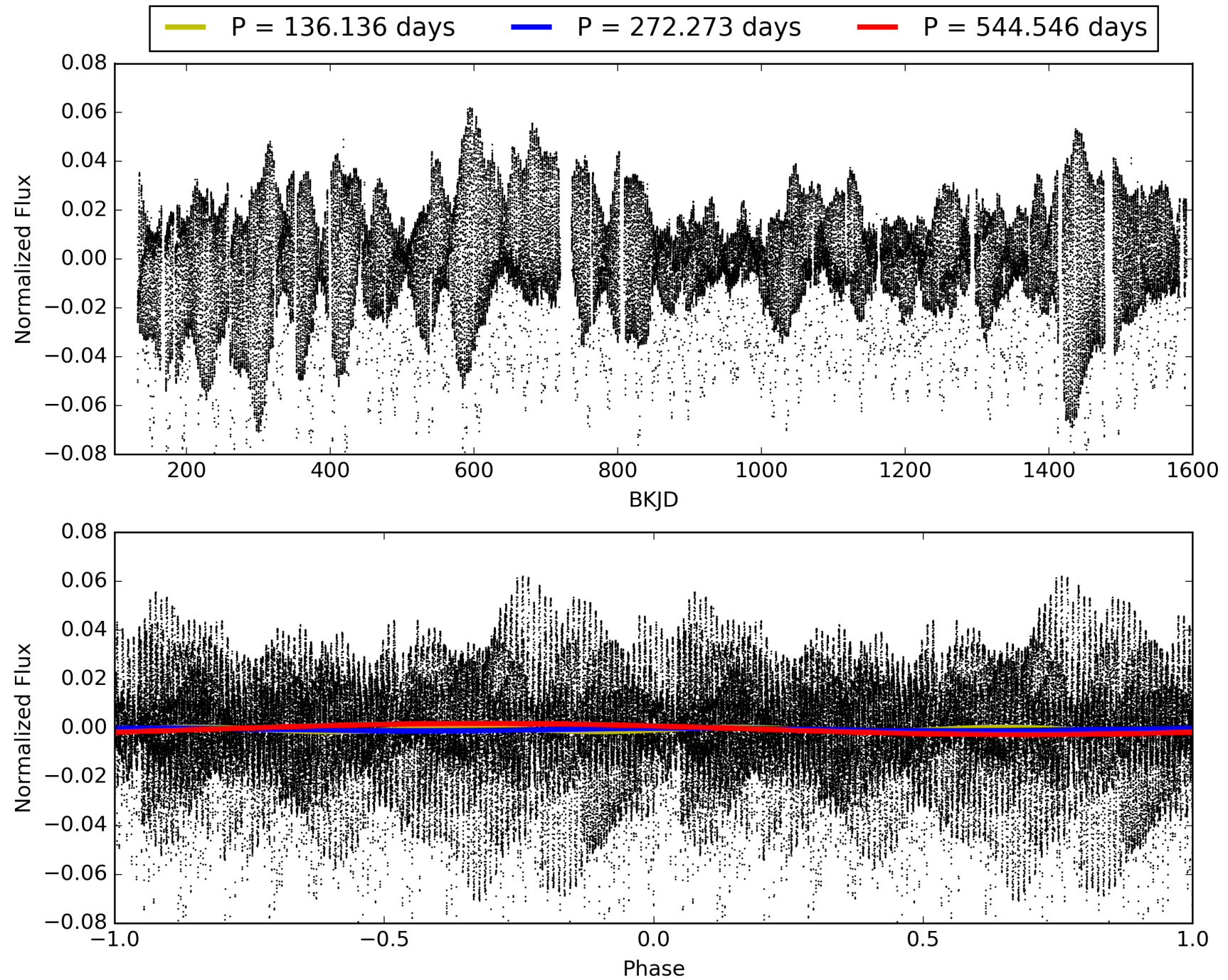
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:29:21 Z

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

# TCE 009705459-05, PDC Light Curves



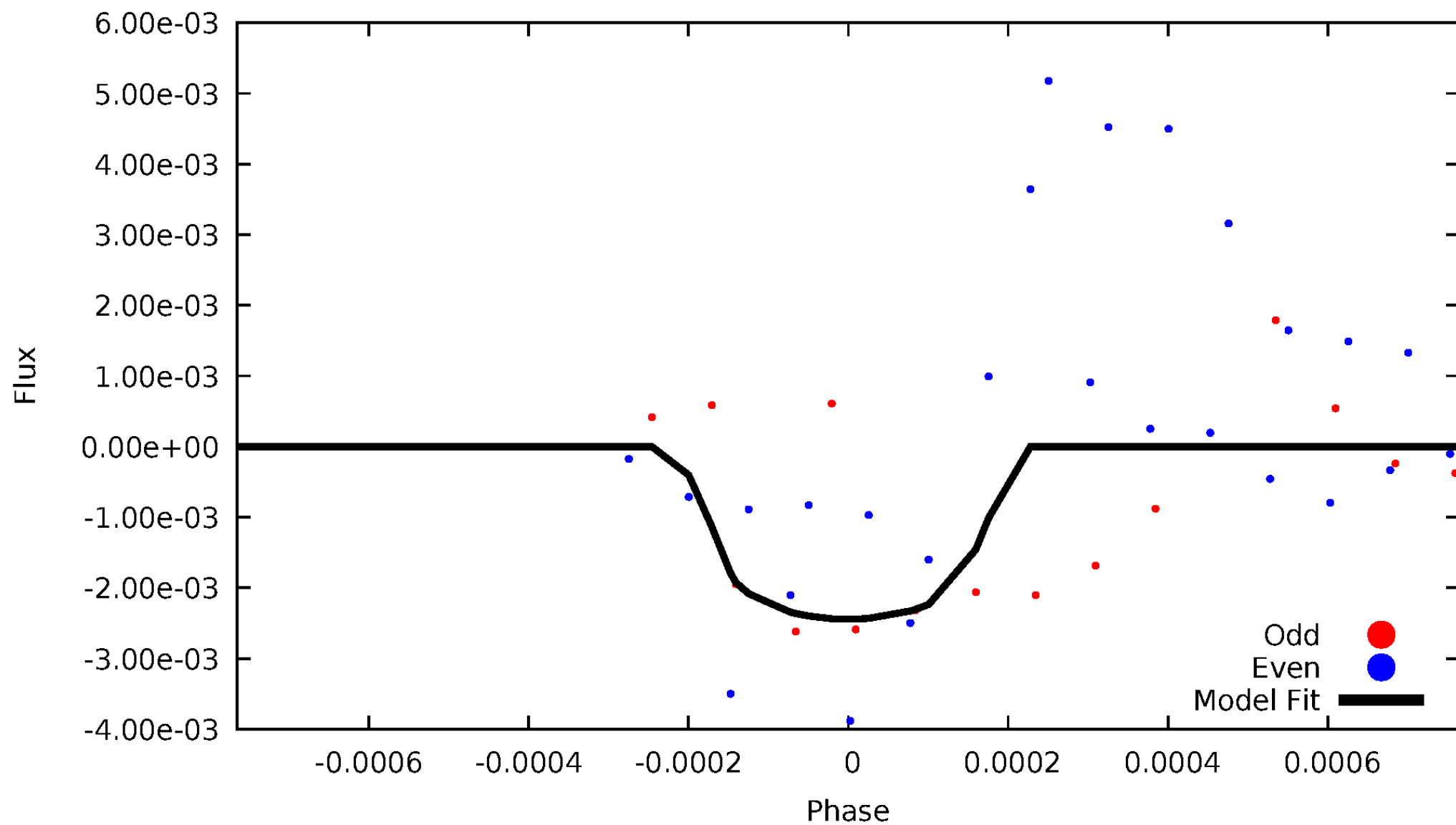
TCE 009705459-05





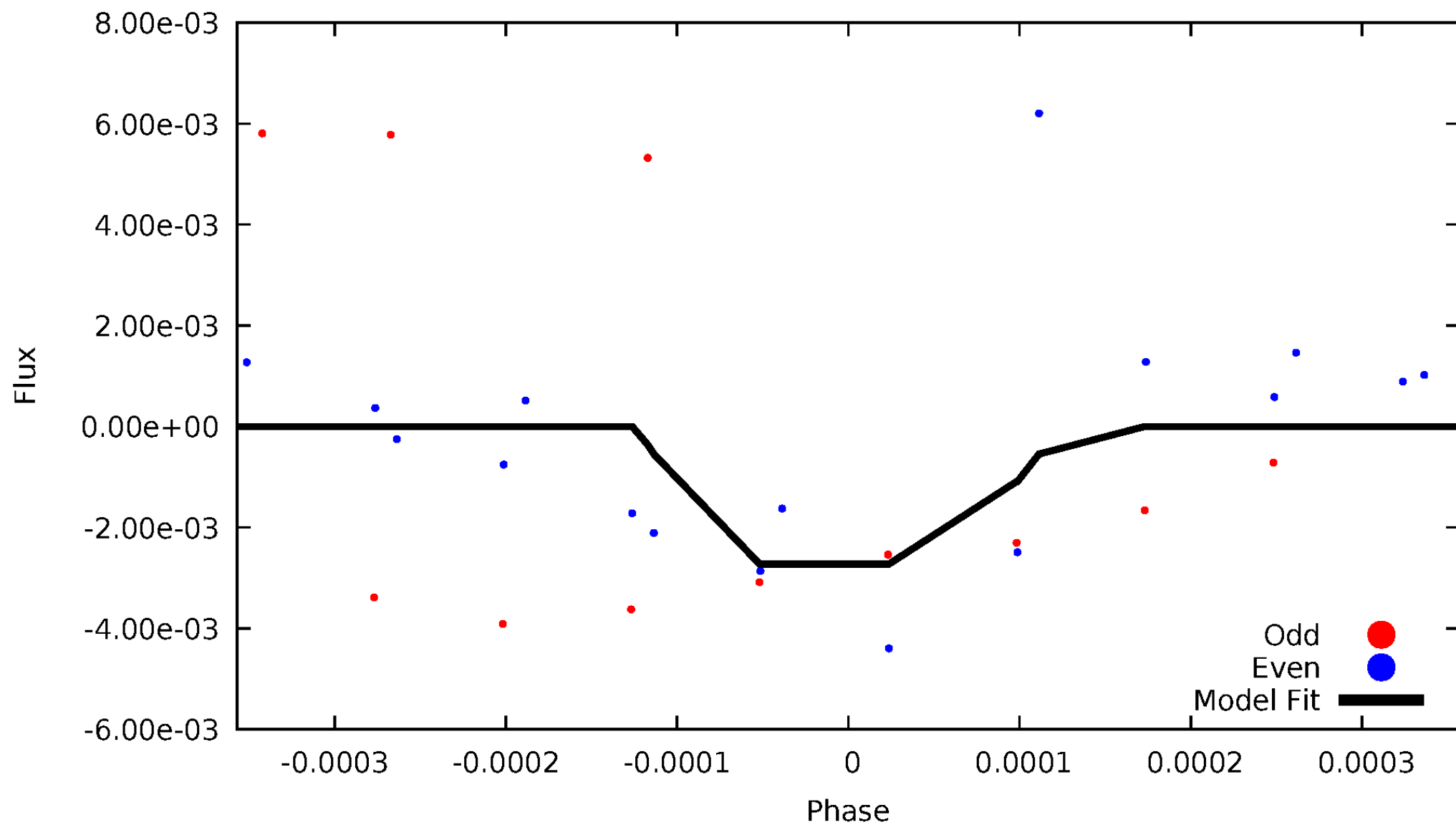
# DV Odd/Even

TCE 009705459-05



# ALT Odd/Even

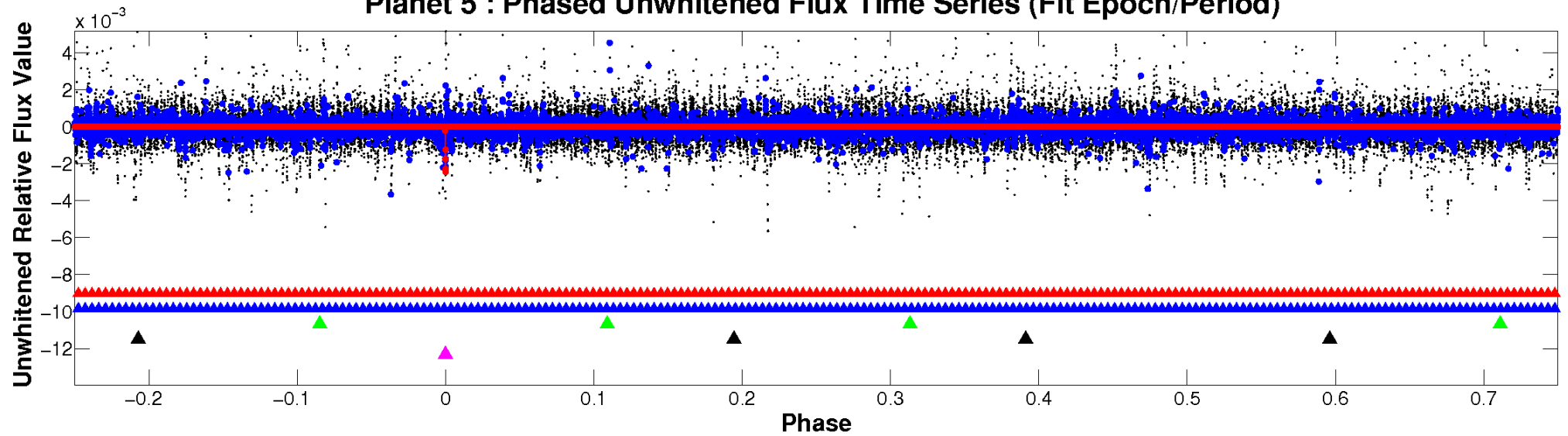
TCE 009705459-05



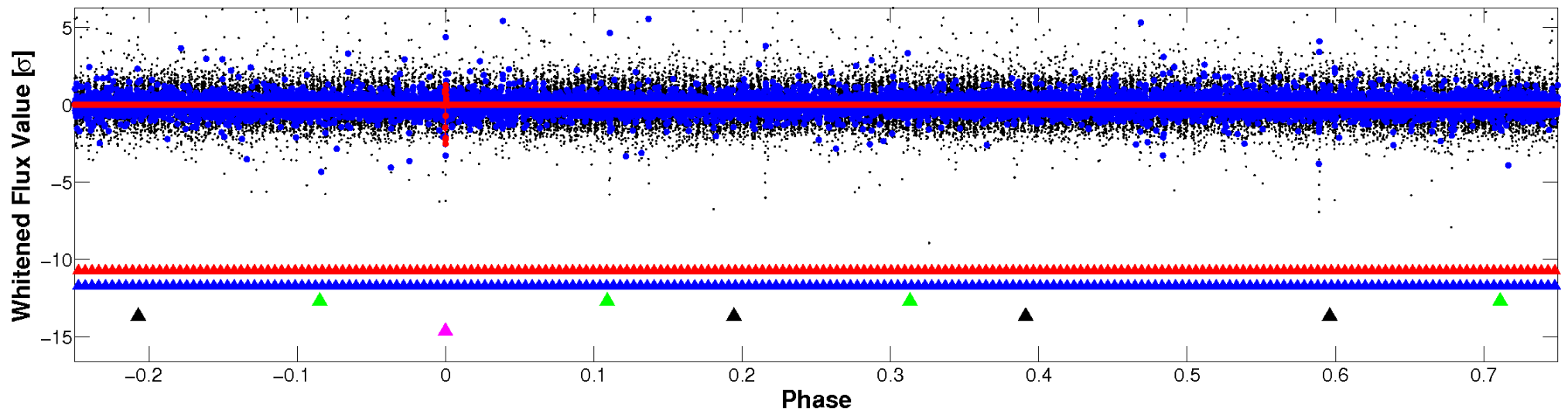


# Non-Whitened Vs. Whitened Light Curve

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

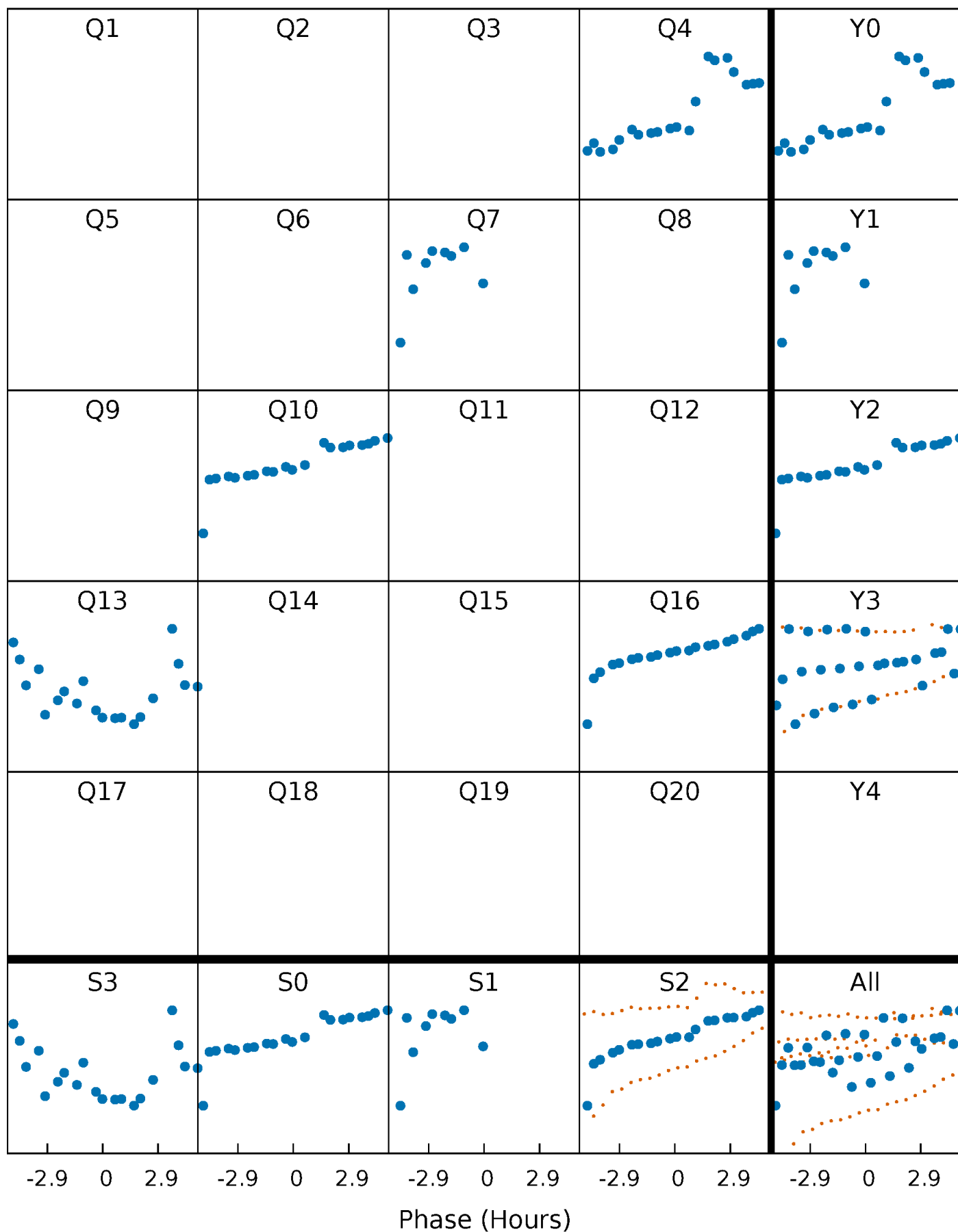


Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)



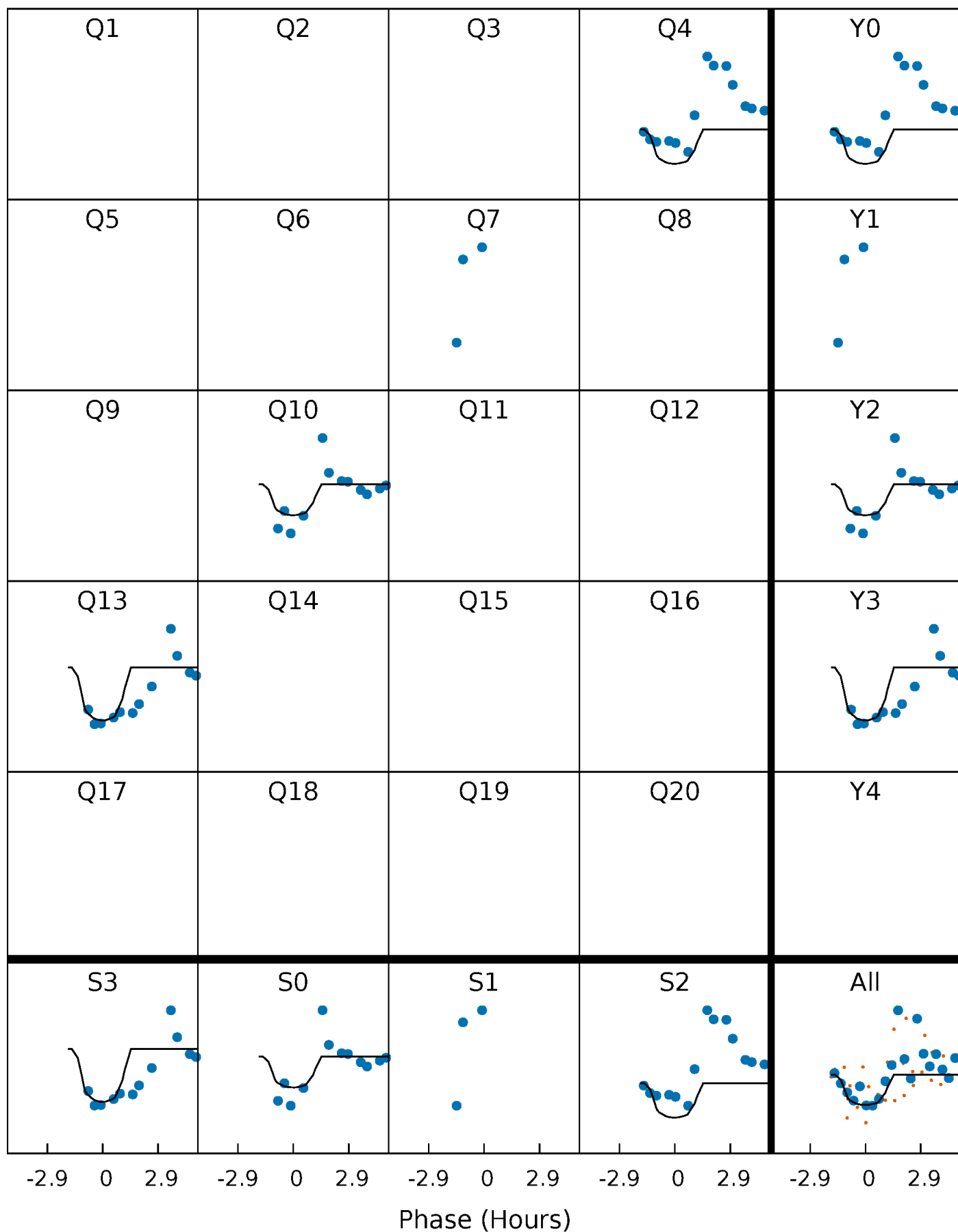
# PDC Quarter-Phased Transit Curves

TCE 009705459-05     $P=272.272769$  Days     $T_0=388.005558$  (BKJD)



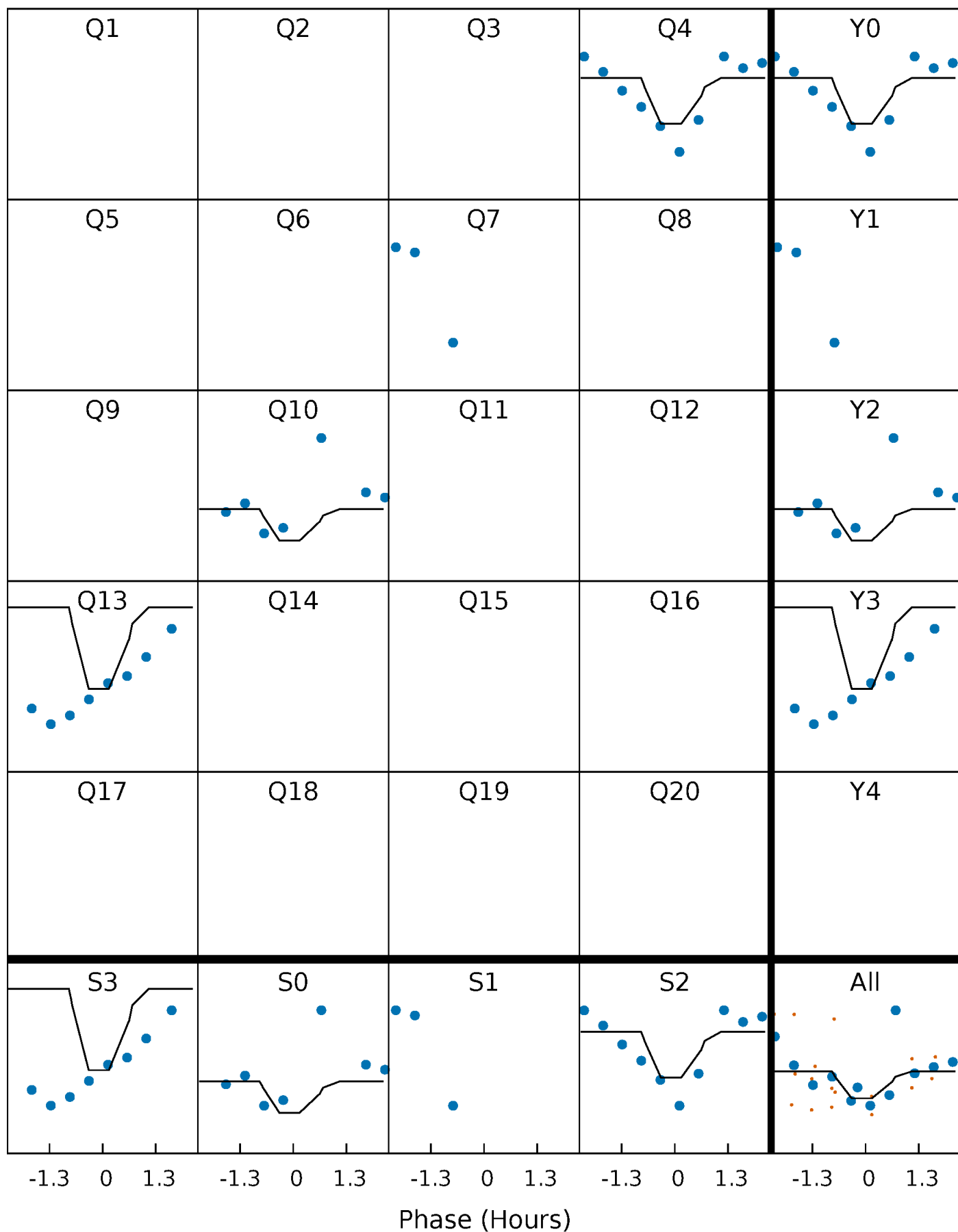
# DV Quarter-Phased Transit Curves

TCE 009705459-05 P=272.272769 Days  $T_0=388.005558$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

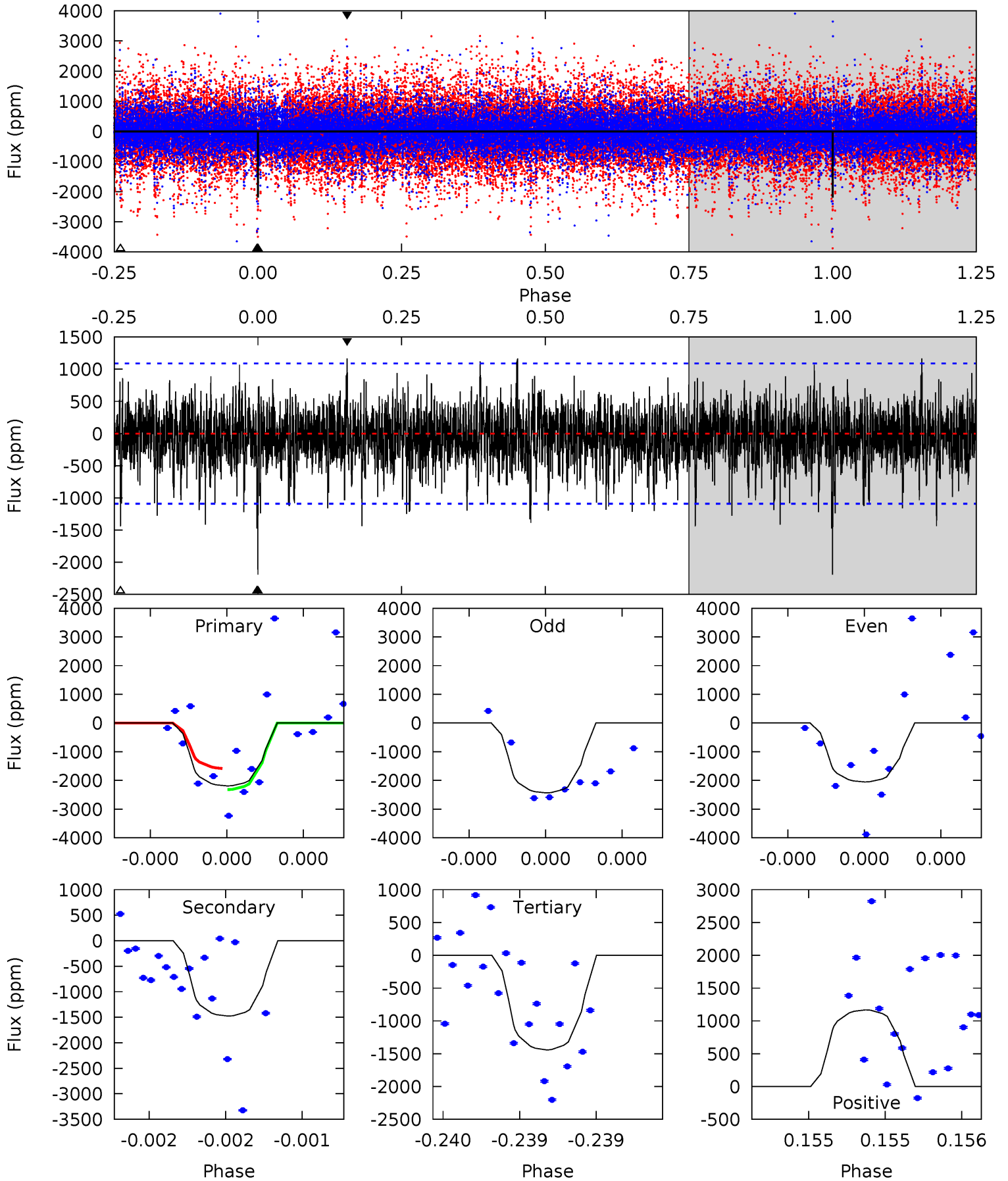
TCE 009705459-05 P=272.278165 Days  $T_0=388.026453$  (BKJD)



# DV Model-Shift Uniqueness Test

009705459-05, P = 272.272769 Days, E = 115.732789 Days

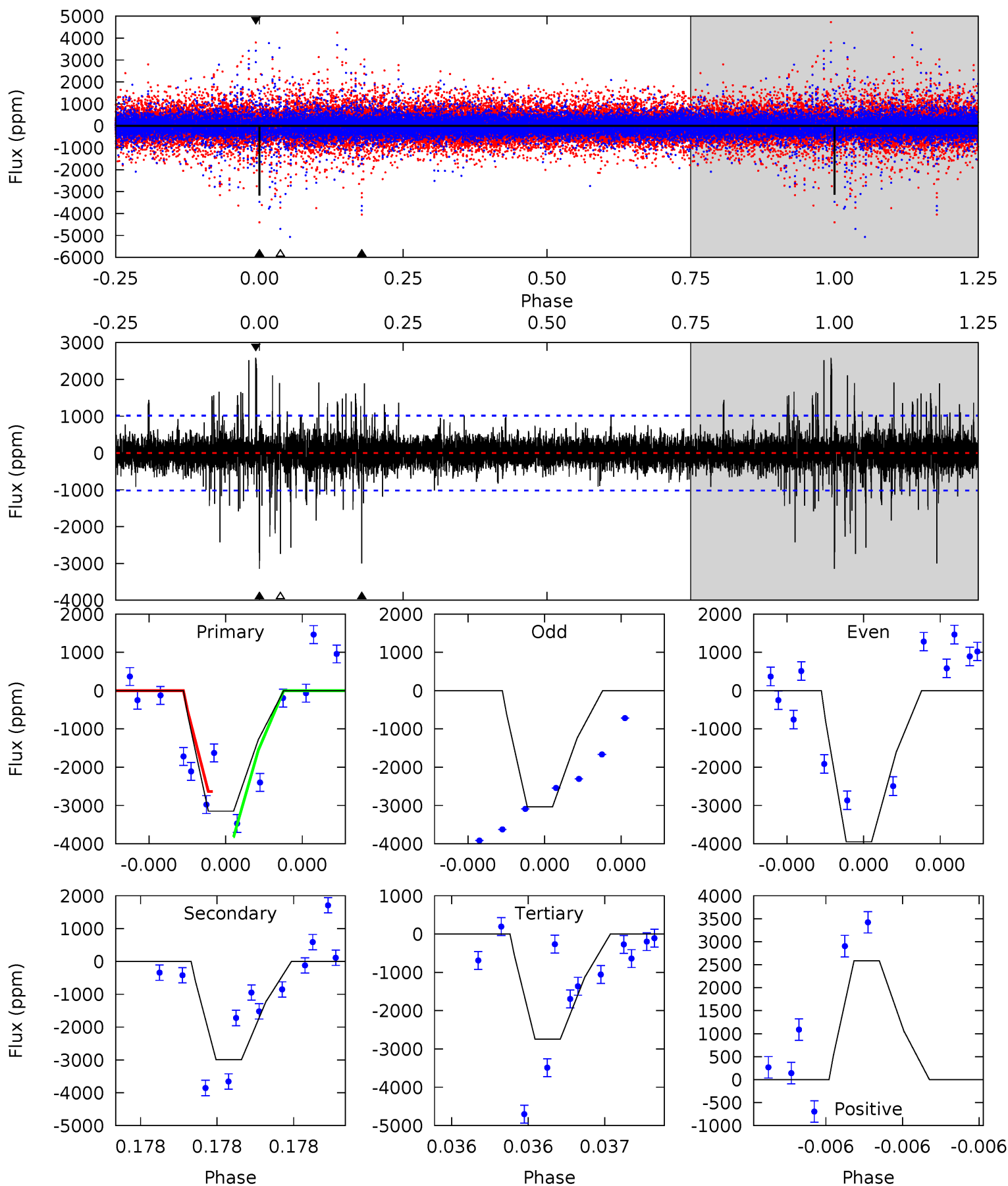
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.3	7.63	7.46	6.04	5.64	3.58	1.53	3.88	5.30	0.18	1.60	0.95	0.84	0.35	1.98



# Alt Model-Shift Uniqueness Test

009705459-05, P = 272.278165 Days, E = 115.748288 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
17.6	16.8	15.4	14.5	5.71	3.69	1.36	2.27	3.15	1.43	2.31	2.10	0.84	0.45	3.36



### Stellar Parameters For KIC 009705459

	$T_{\text{eff}} (K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M (M_{\odot})$	$\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5892^{+174}_{-208}$	$4.350^{+0.087}_{-0.203}$	$0.480^{+0.050}_{-0.300}$	$1.198^{+0.375}_{-0.161}$	$1.173^{+0.122}_{-0.150}$	$0.962^{+0.384}_{-0.500}$
	+3%/-4%	+2%/-5%	+10%/-62%	+31%/-13%	+10%/-13%	+40%/-52%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 009705459-05 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-1477 \pm 193$	$27.81^{+31.38}_{-20.05}$	$431^{+31}_{-24}$	$3161^{+1692}_{-593}$	$797^{+8574}_{-626}$
Alt.	$-2996 \pm 178$	$30.64^{+33.55}_{-20.56}$	$433^{+33}_{-25}$	$3418^{+1686}_{-667}$	$1294^{+11545}_{-988}$

$T_{\text{max}}$  = 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

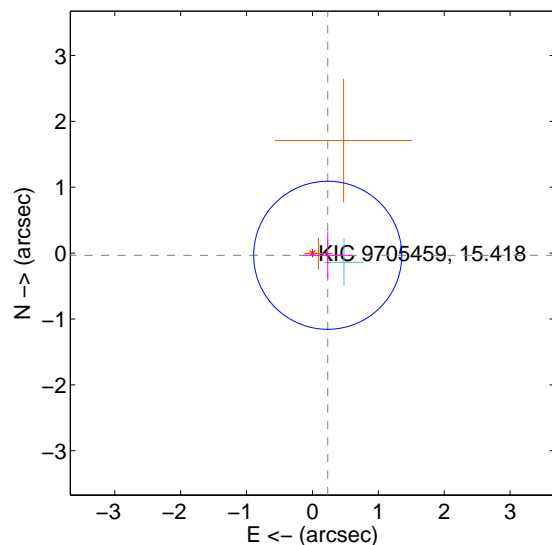
Supplemental centroid analysis for 009705459-05. Kepler magnitude: 15.42. Transit SNR 7.92

There are 1 quarters with good PRF difference image offsets

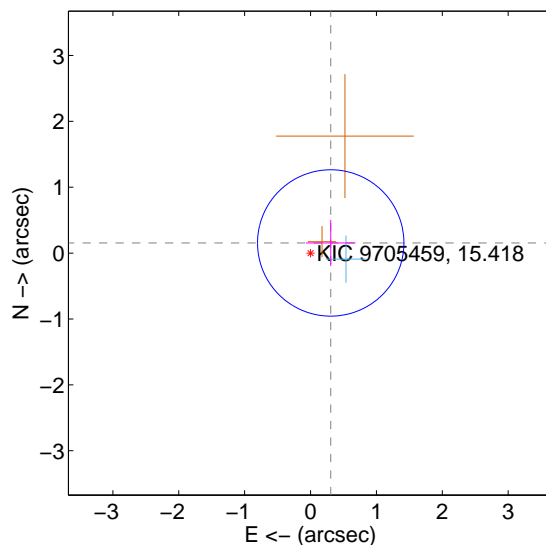
The direct PRF centroid is offset from the target star catalog position by about 0.08 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.234 \pm 0.375$	0.63	$-0.232 \pm 0.375$	$-0.033 \pm 0.351$
PRF-fit source offset from KIC position	$0.343 \pm 0.370$	0.93	$-0.306 \pm 0.375$	$0.154 \pm 0.351$
photometric centroid source offset	$0.52 \pm 0.85$	0.61	$0.28 \pm 0.80$	$0.43 \pm 0.87$

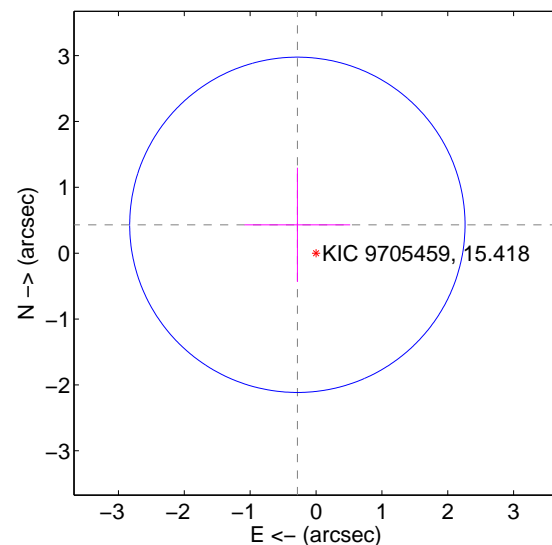
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

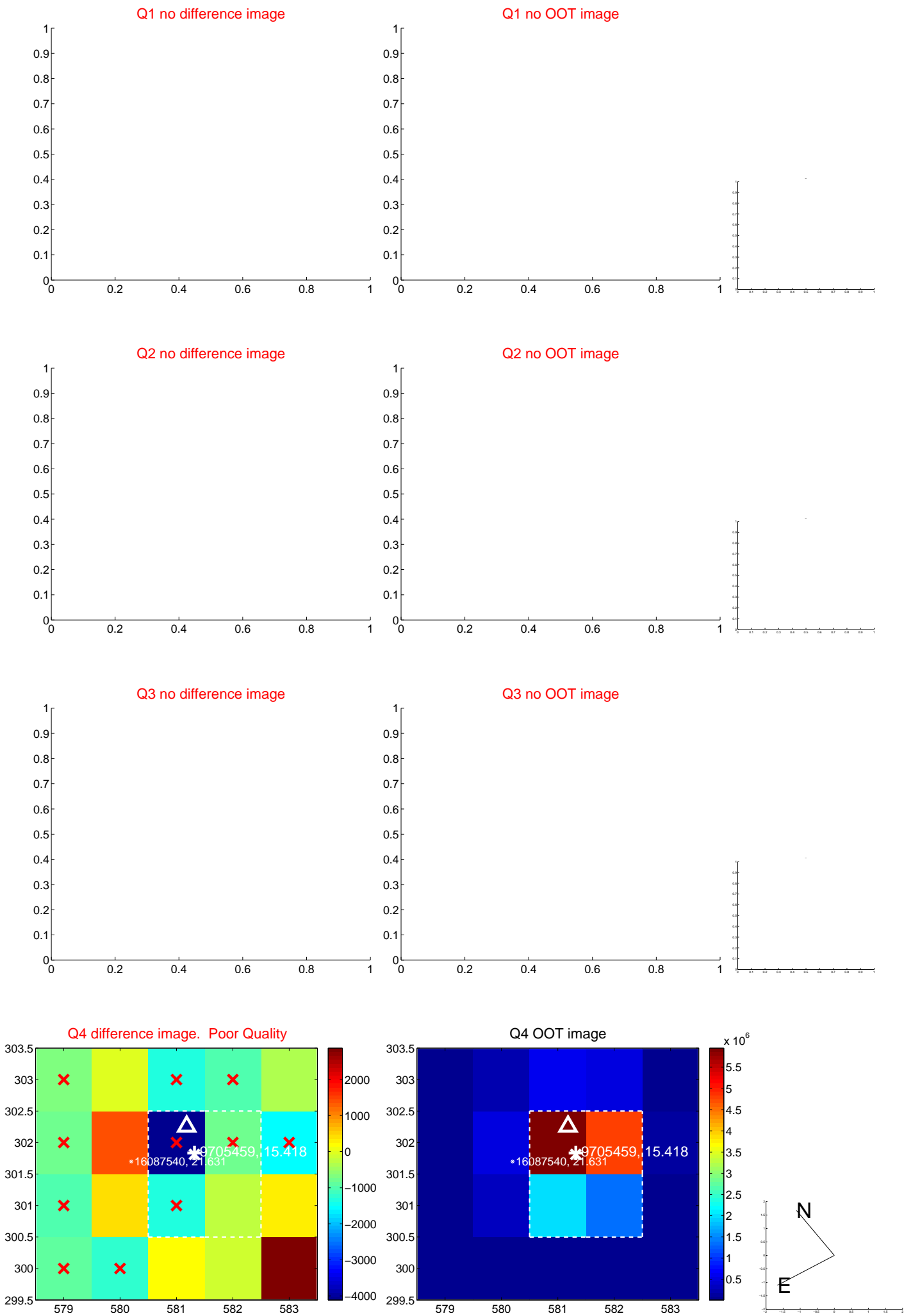


offset from photometric centroids

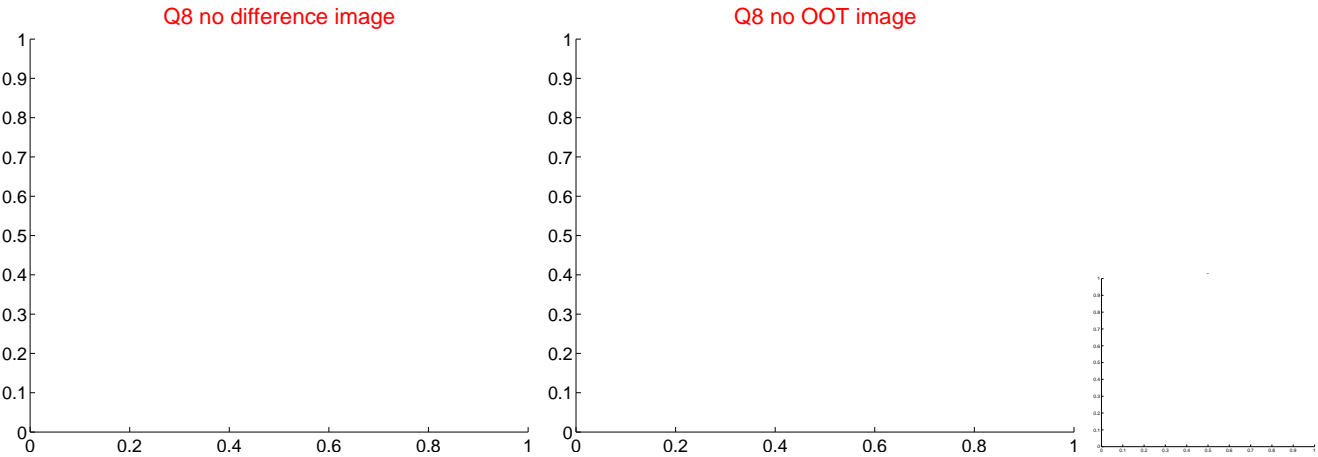
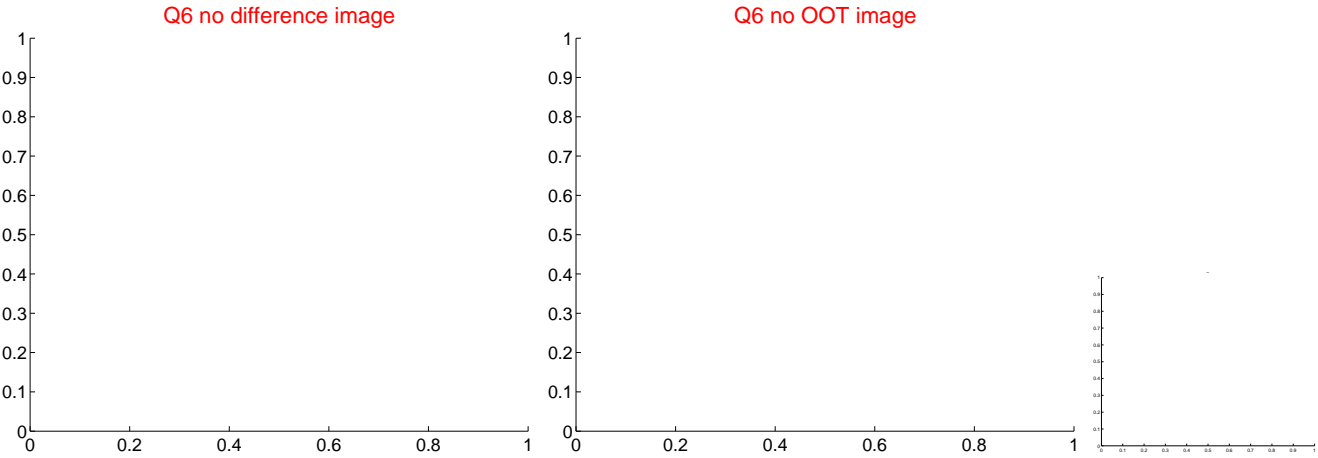
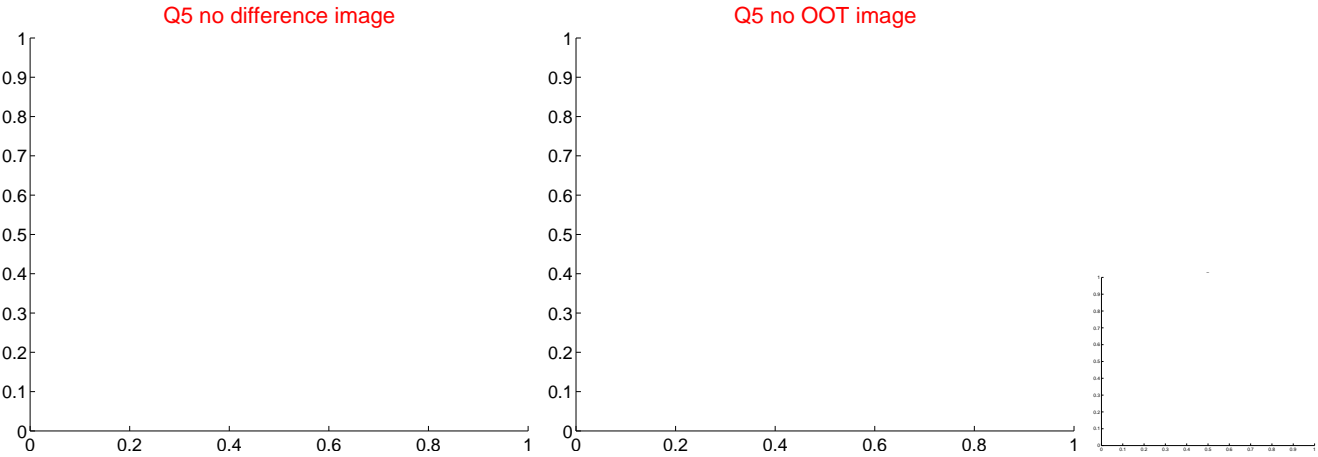


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

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



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



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

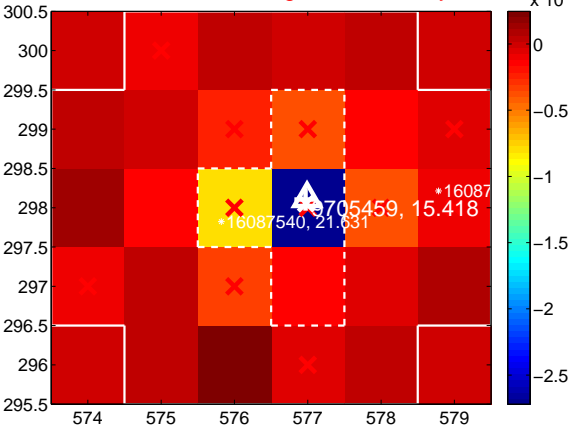
Q9 no difference image



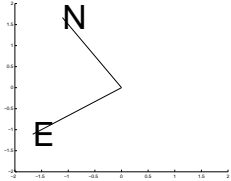
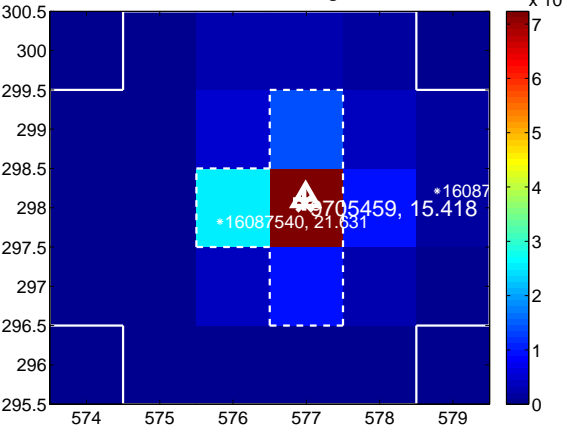
Q9 no OOT image



Q10 difference image. Poor Quality



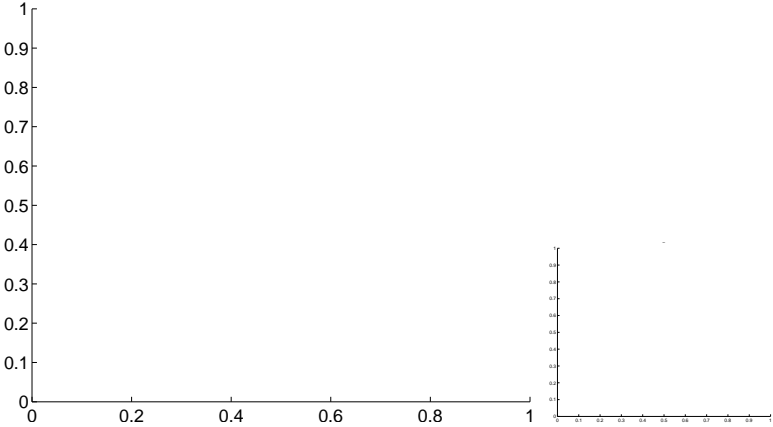
Q10 OOT image



Q11 no difference image



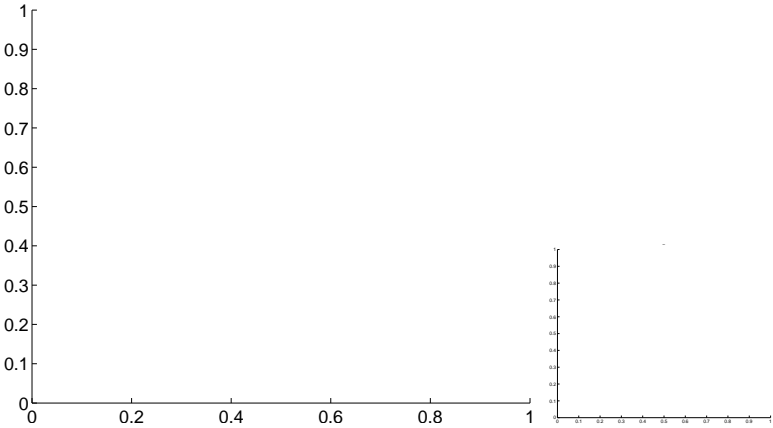
Q11 no OOT image



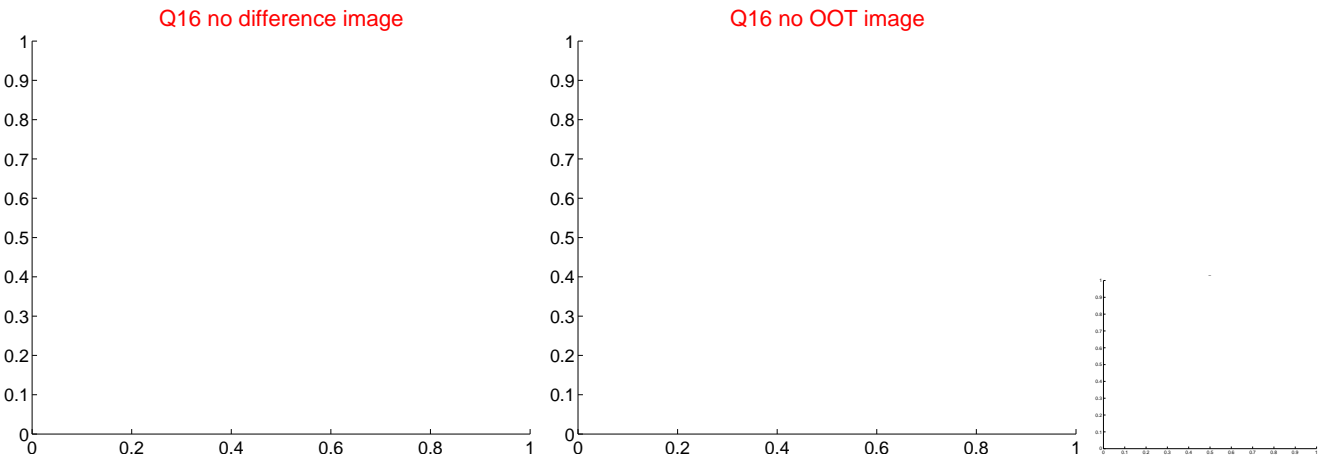
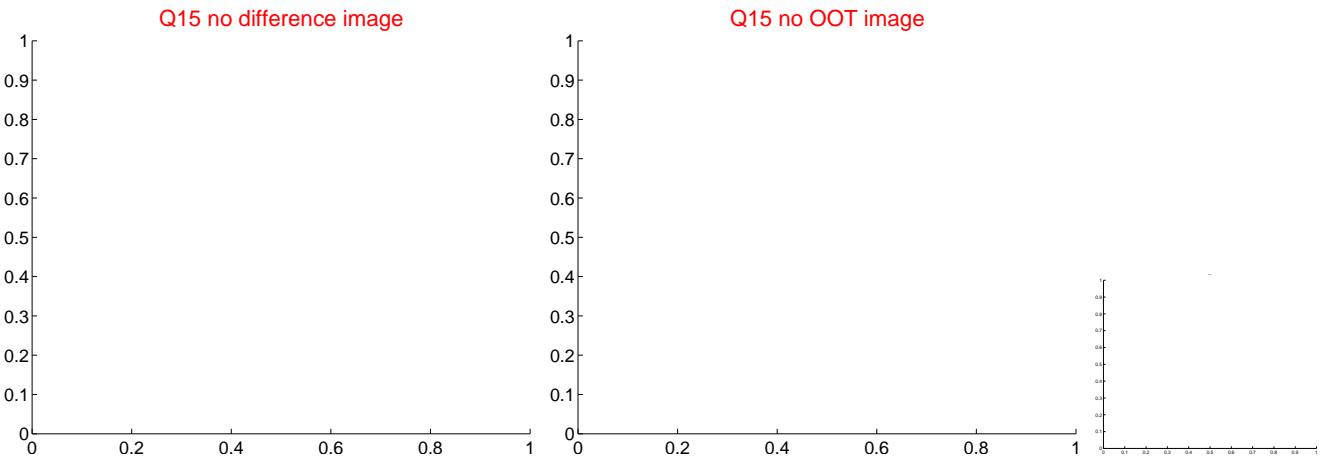
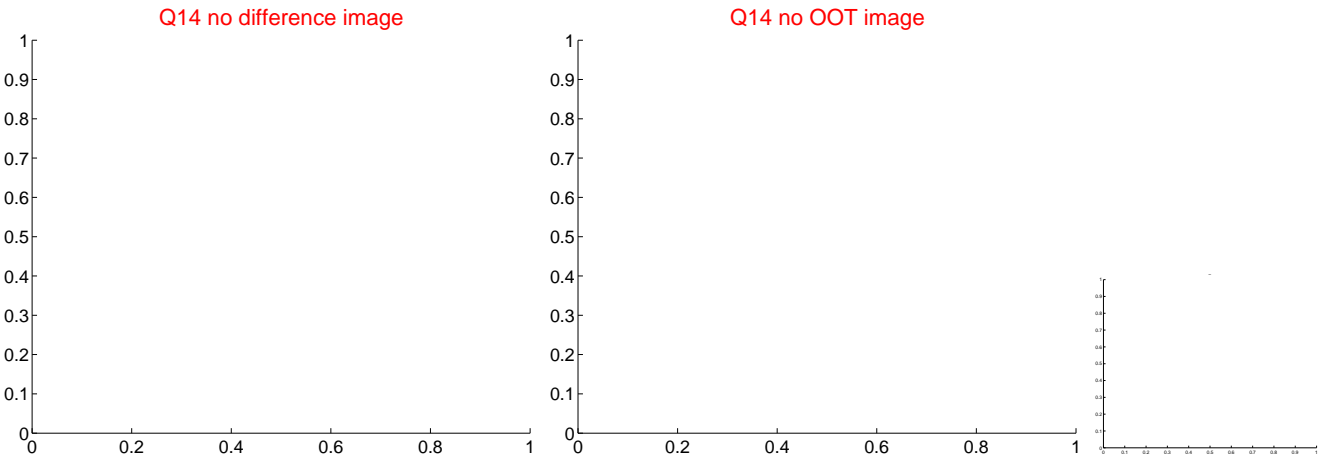
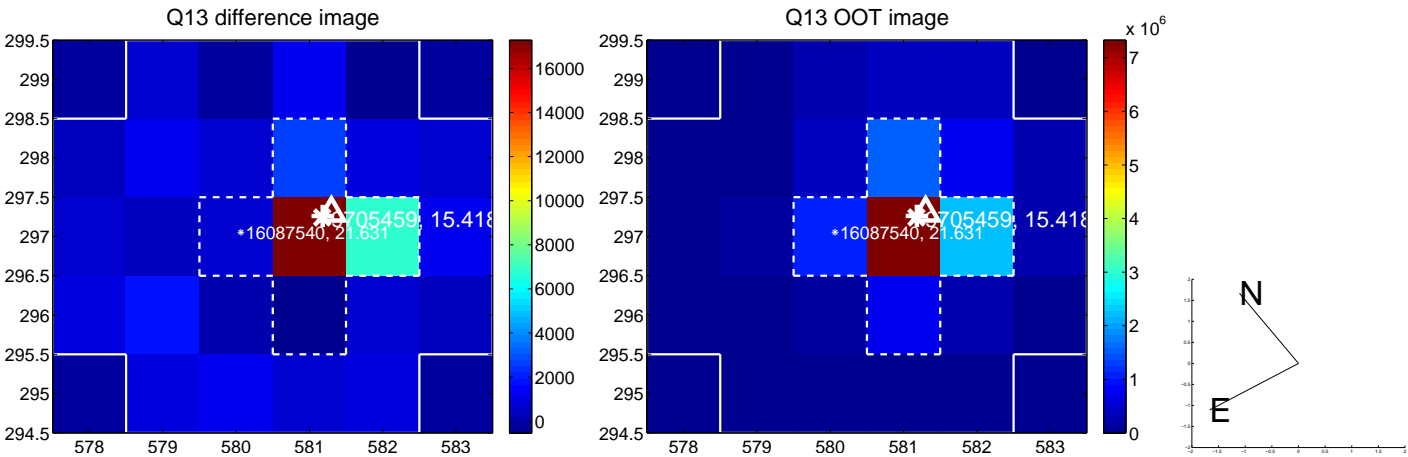
Q12 no difference image



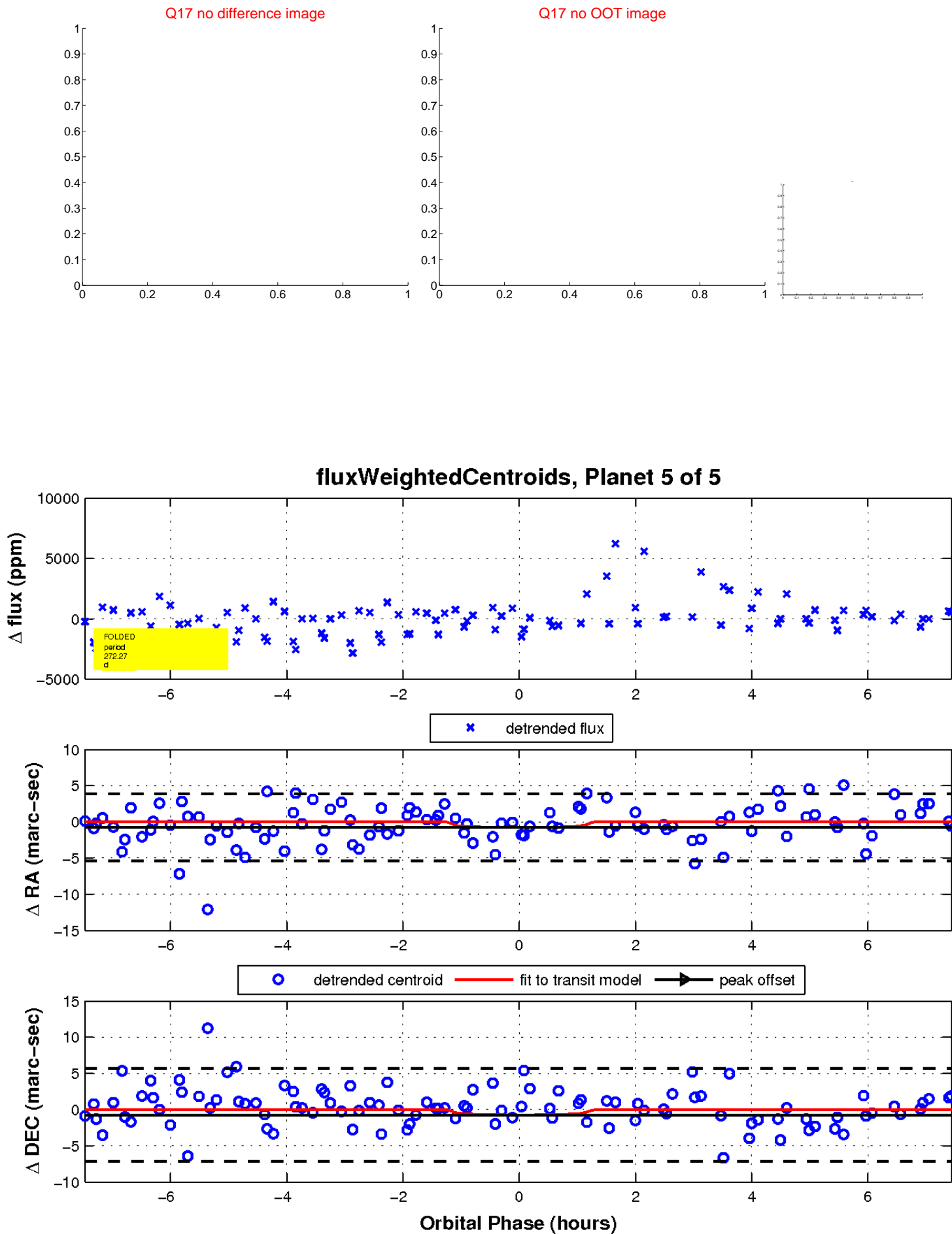
Q12 no OOT image



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



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



UKIRT Image

Declination

