

# KIC 005648449

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005648449-01	OBS	0979.01	4.348876	132.260109	616.4	3.238	345.6	333.6	101.45	3598	569.55	0.00
005648449-02	OBS	No	4.348898	134.247919	207.1	2.782	114.2	123.6	101.45	3598	134.56	0.00

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005648449-01	OBS	FP	0.00	0	1	0	0	PLANET_IN_STAR—MOD_SEC_DV—MOD_SEC_ALT—DEEP_V_SHAPED—HAS_SEC_TCE—CENT_SATURATED
005648449-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE—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.

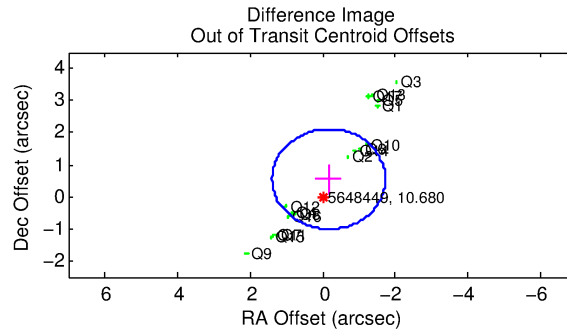
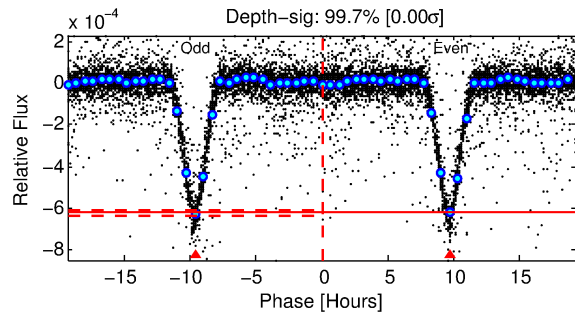
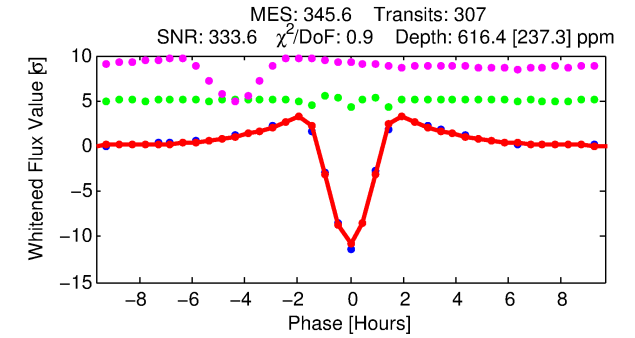
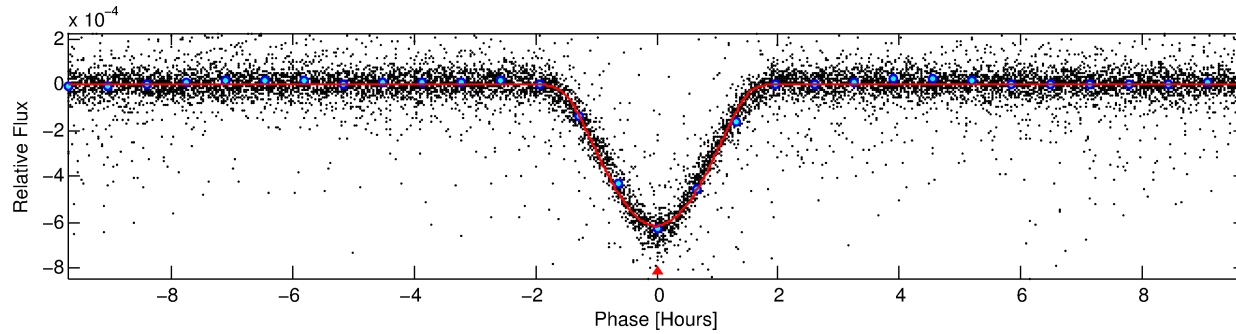
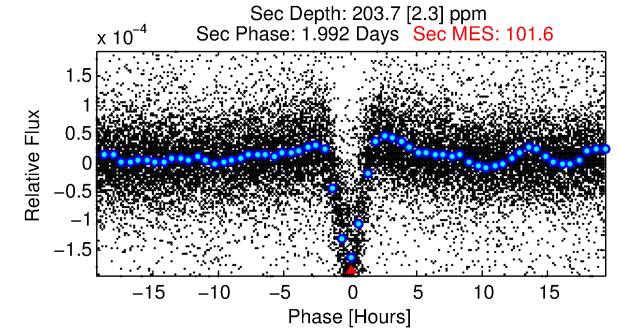
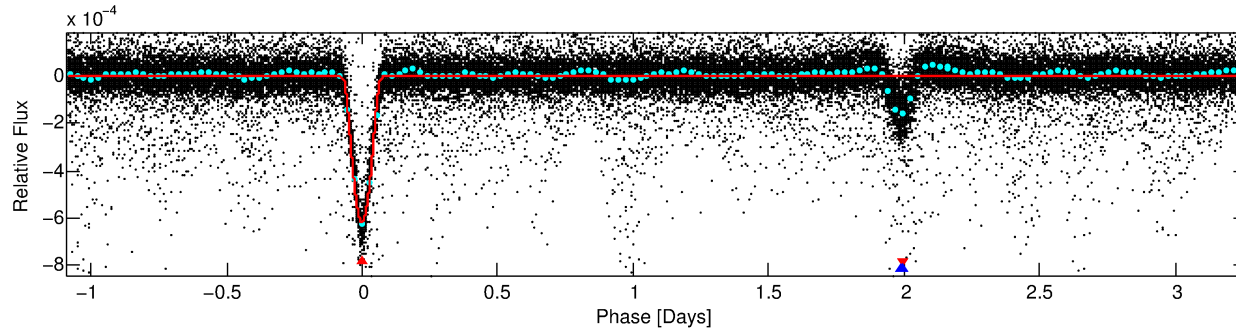
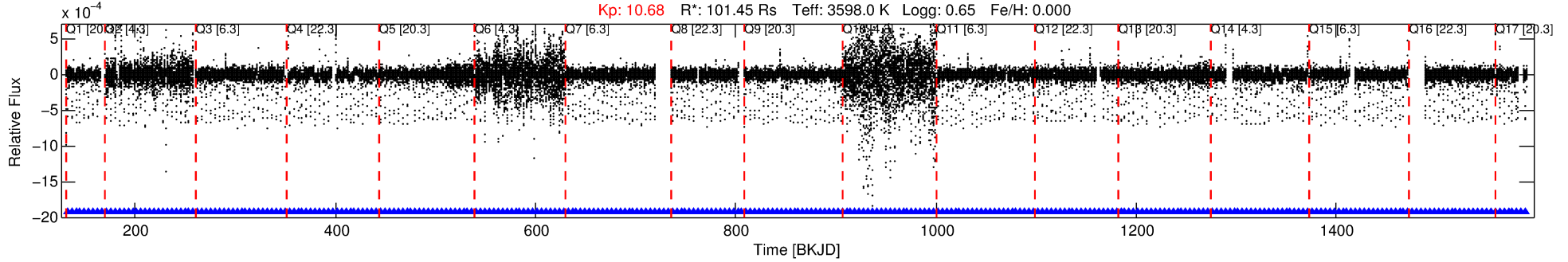
## Ephemeris Match Information For 005648449-01

No Significant Match Found

# DV One-Page Summary

KIC: 5648449 Candidate: 1 of 2 Period: 4.349 d  
KOI: K00979.01 Corr: 0.993

Kp: 10.68 R\*: 101.45 Rs Teff: 3598.0 K Logg: 0.65 Fe/H: 0.000



## DV Fit Results:

Period = 4.34888 [0.00000] d  
Epoch = 132.2601 [0.0002] BKJD  
Rp/R\* = 0.0514 [0.0071]  
a/R\* = 3.49 [0.10]  
b = 1.00 [0.00]  
Seff = N/A  
Teq = N/A  
Rp = 569.55 [204.74] Re  
a = N/A  
Ag = N/A  
Teffp = N/A

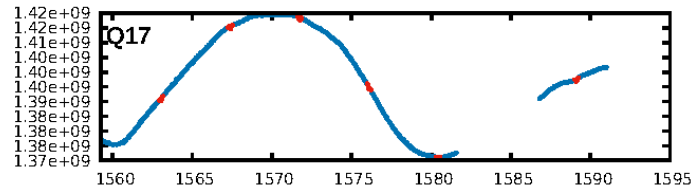
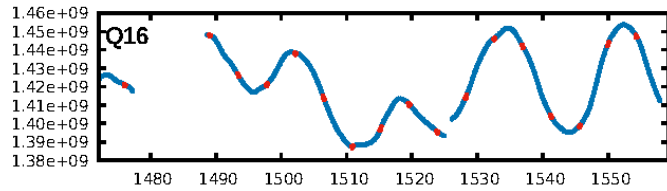
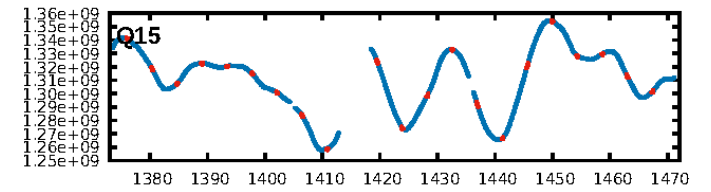
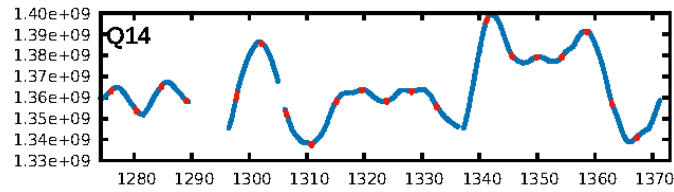
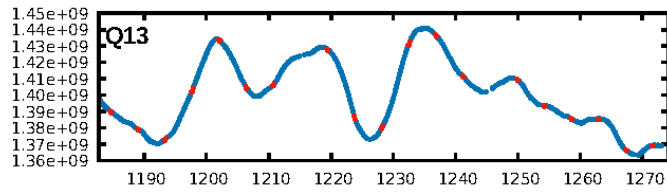
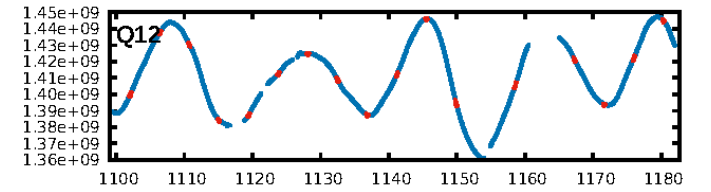
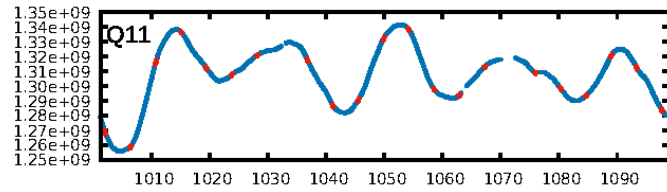
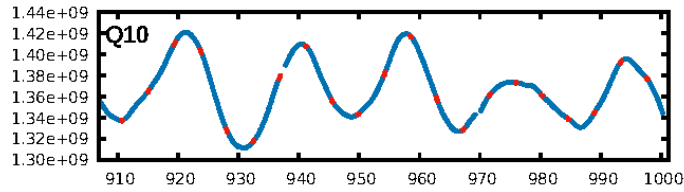
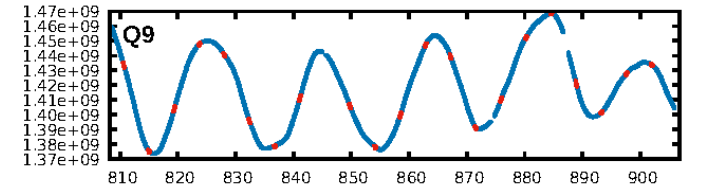
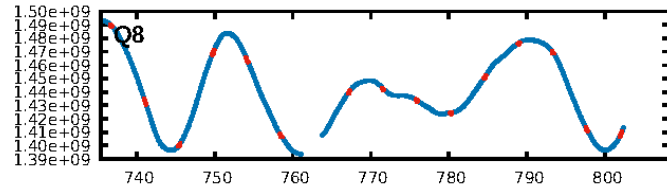
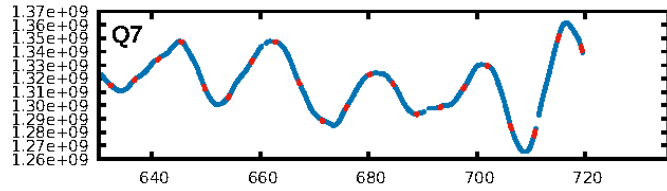
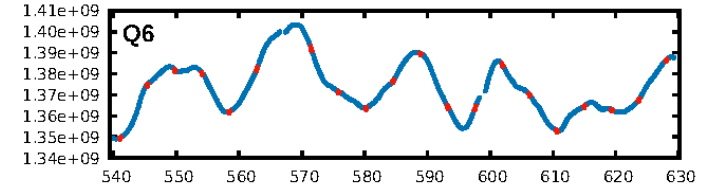
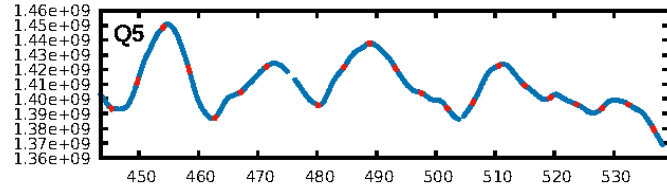
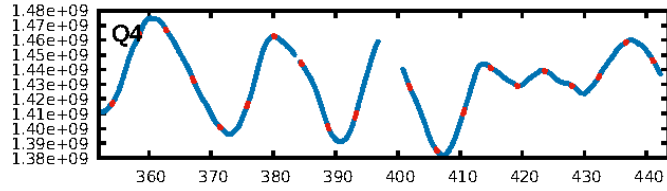
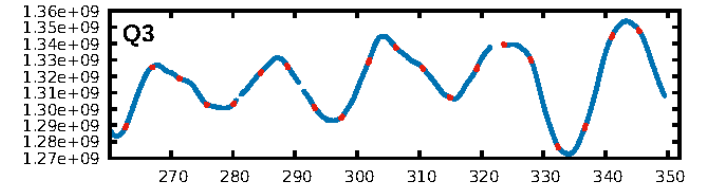
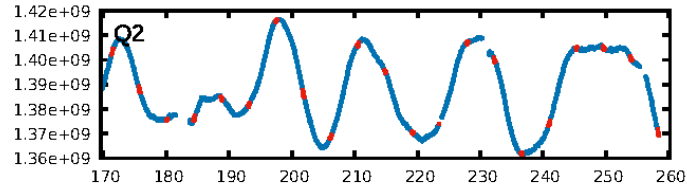
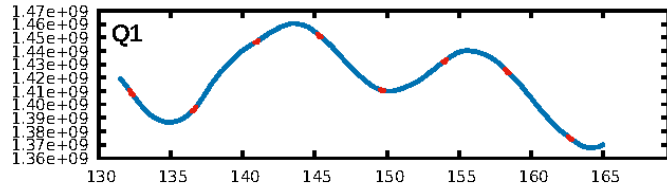
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [293/293]  
GhostDiagnostic-chr: 1.705  
Centroid-sig: 0.0%  
Centroid-so: 0.445 arcsec [7.65σ]  
OotOffset-rm: 0.573 arcsec [1.10σ]  
KicOffset-rm: 0.240 arcsec [0.55σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.35 [6/17]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 10:28:11 Z

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

# TCE 005648449-01, PDC Light Curves

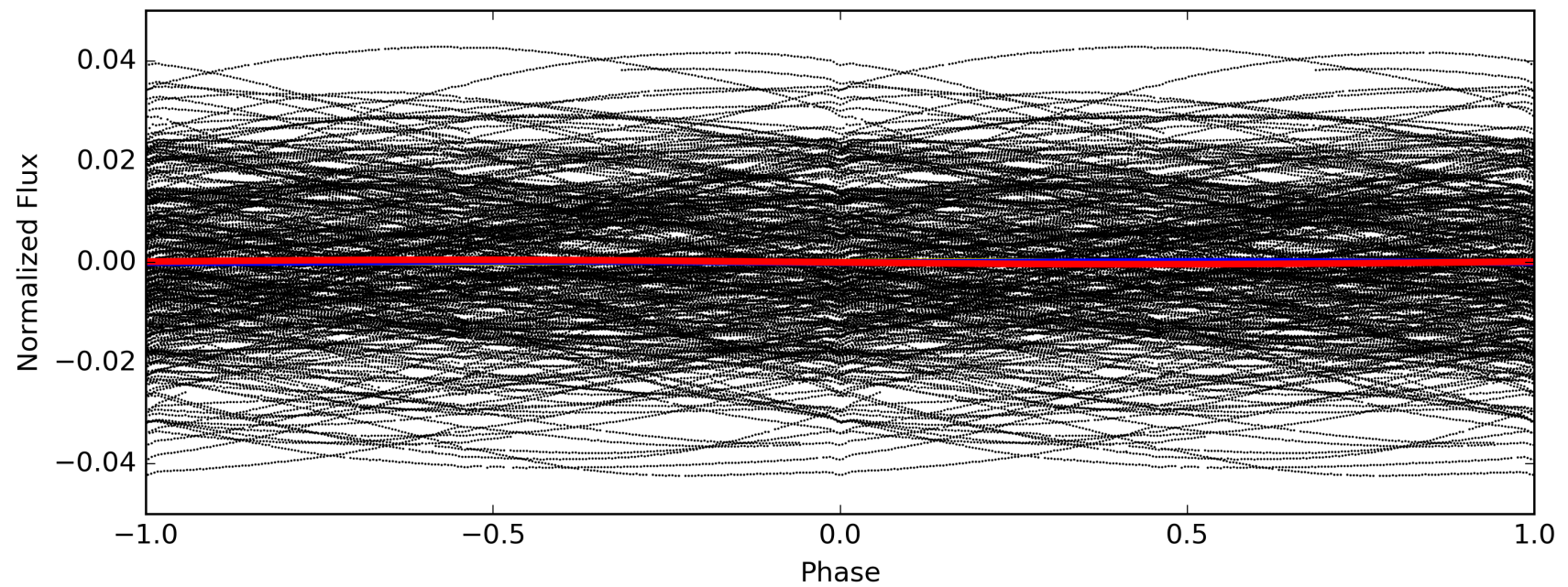
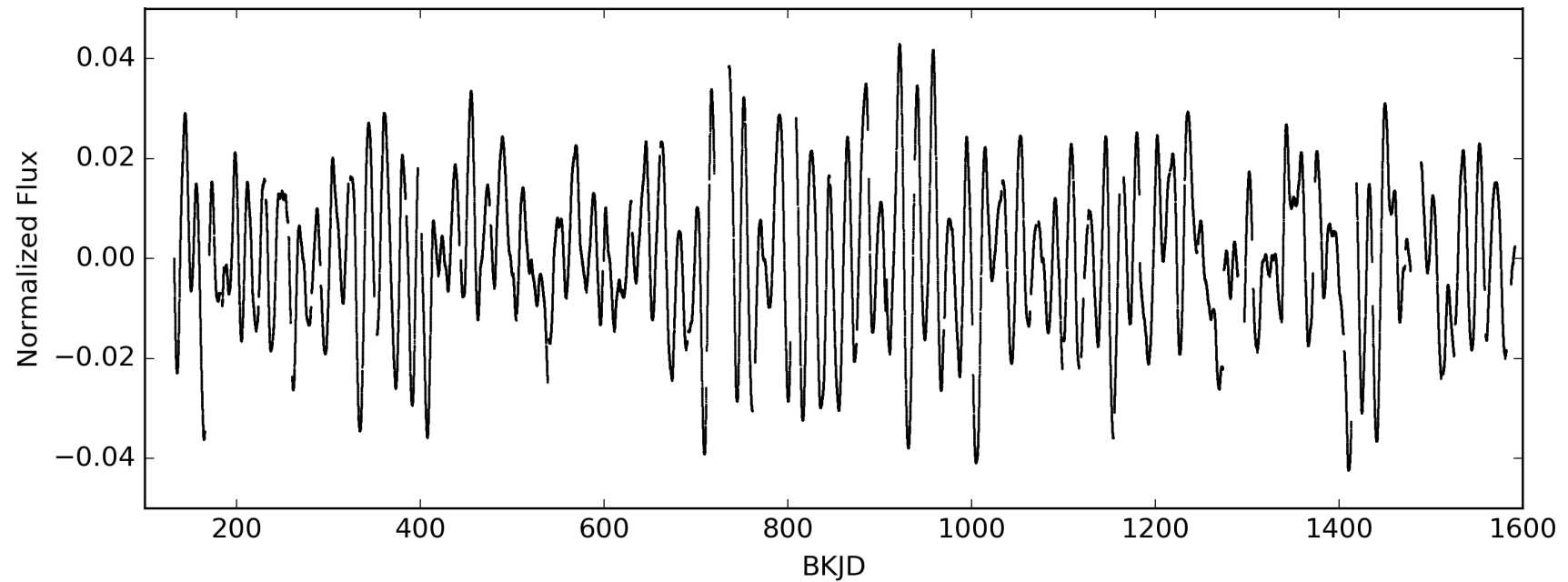


TCE 005648449-01

P = 2.174 days

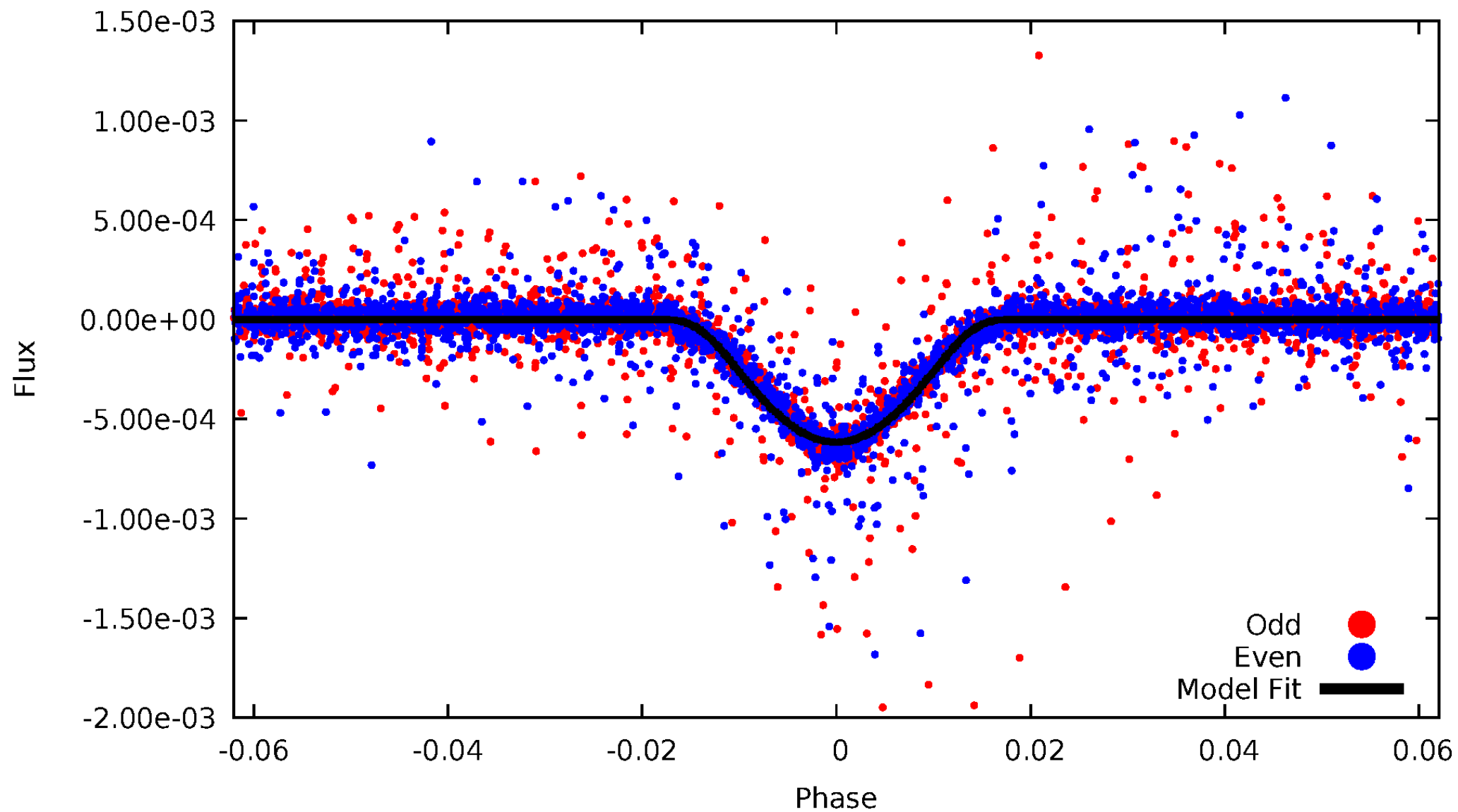
P = 4.349 days

P = 8.698 days



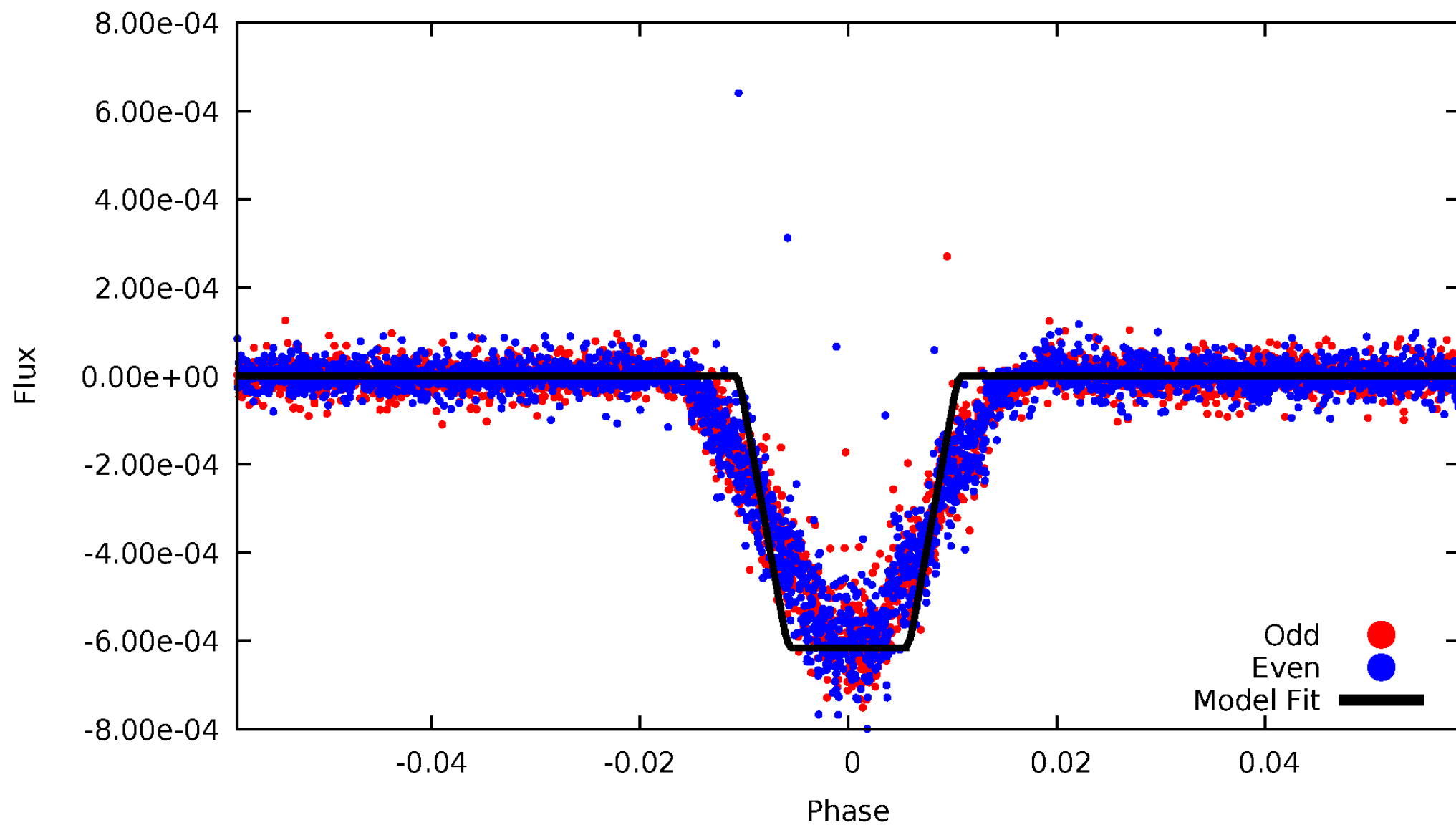
# DV Odd/Even

TCE 005648449-01



# ALT Odd/Even

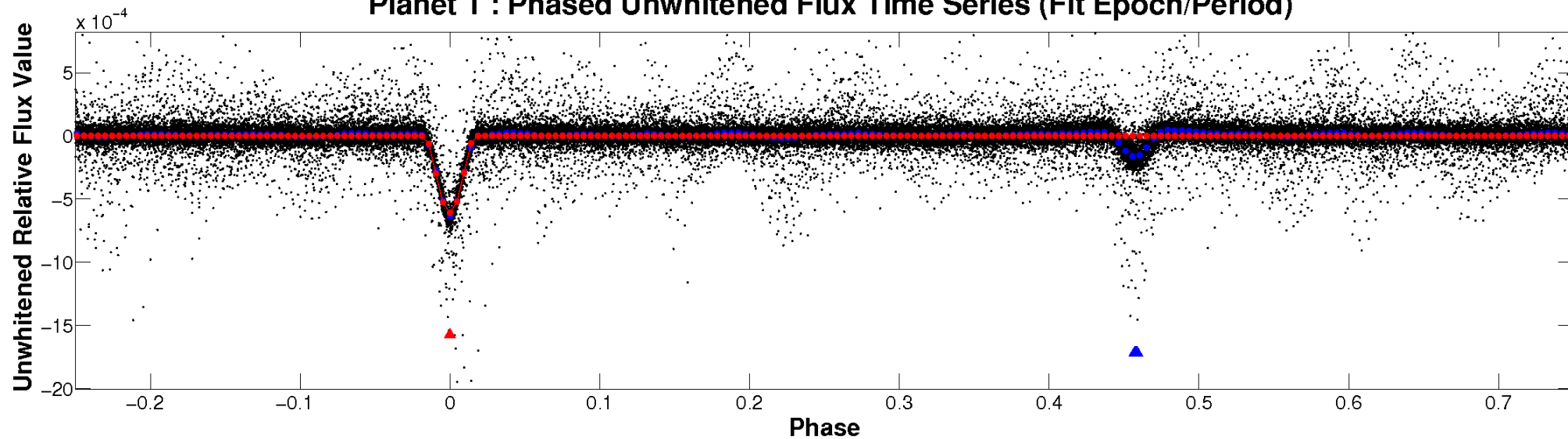
TCE 005648449-01



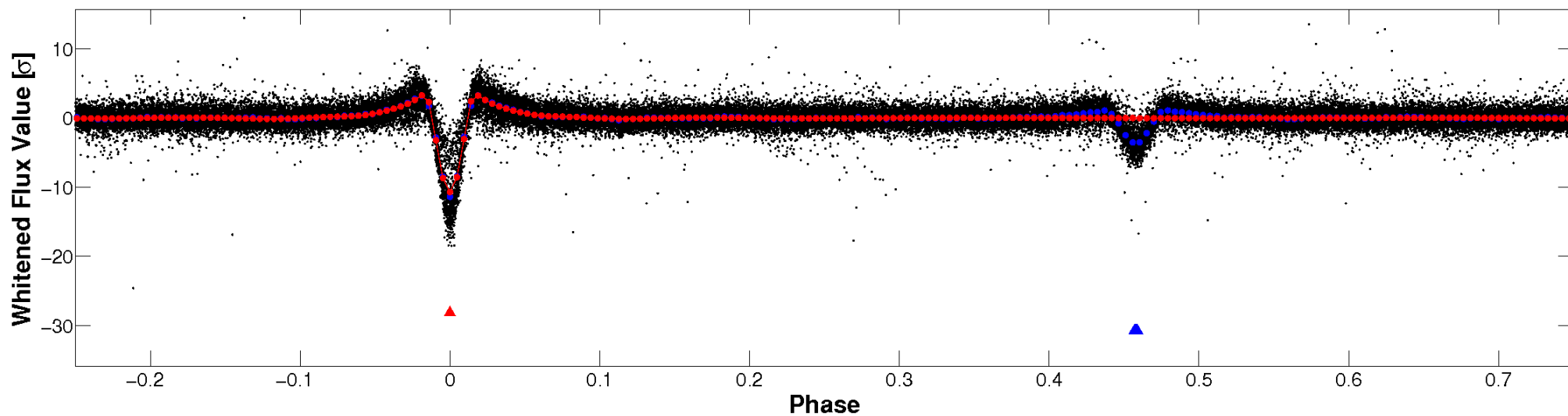


# Non-Whitened Vs. Whitened Light Curve

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

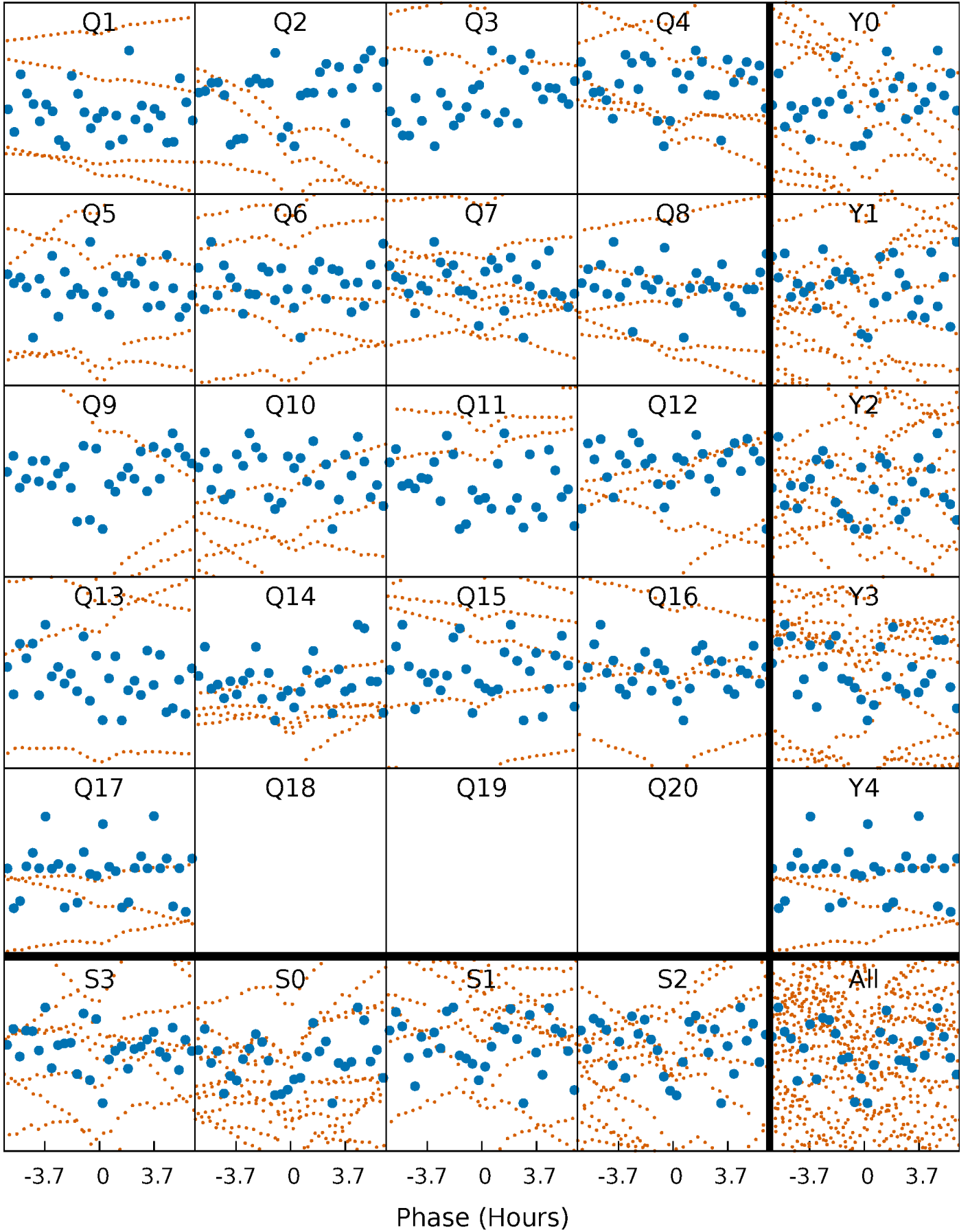


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

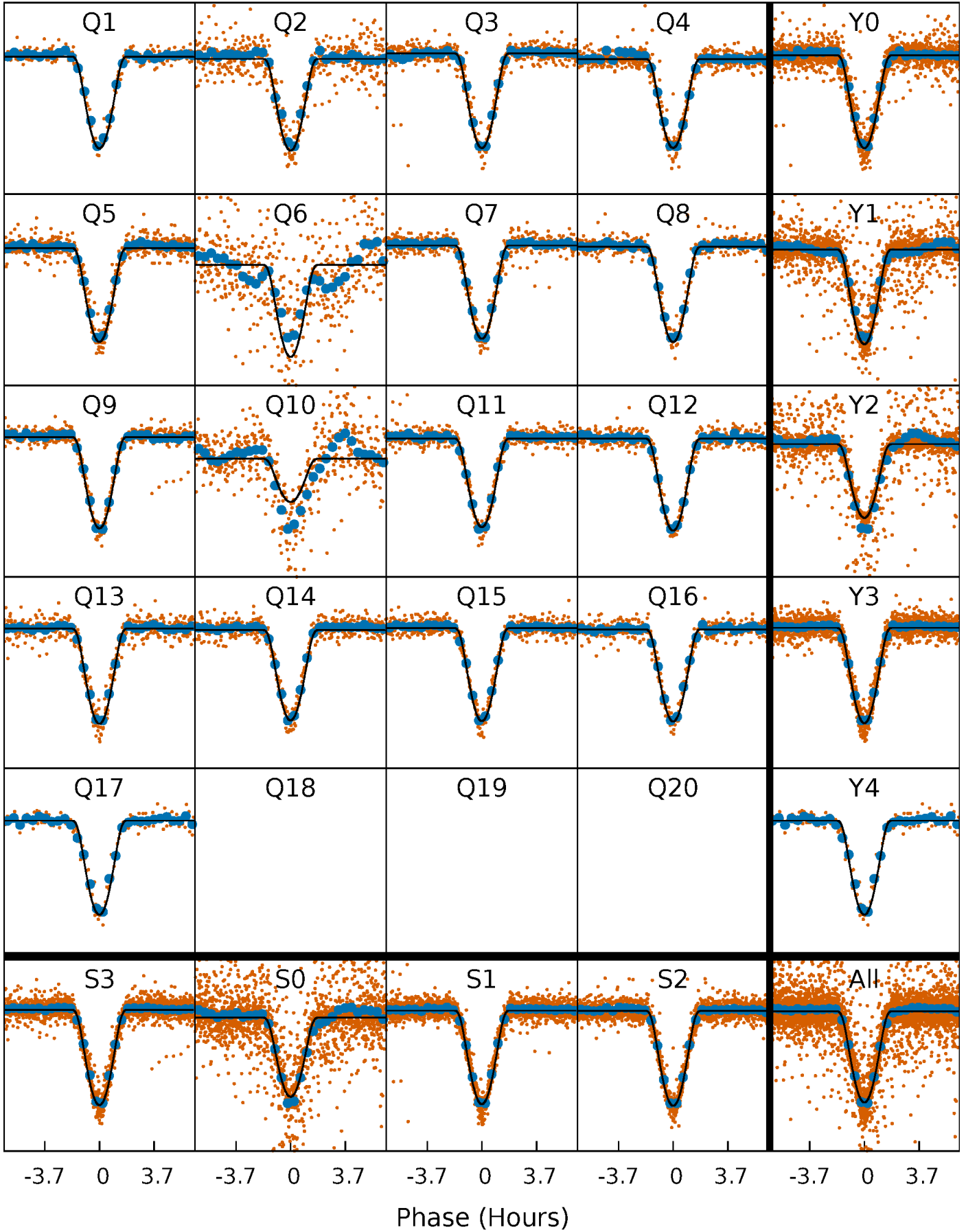
TCE 005648449-01 P= 4.348876 Days  $T_0=132.260109$  (BKJD)





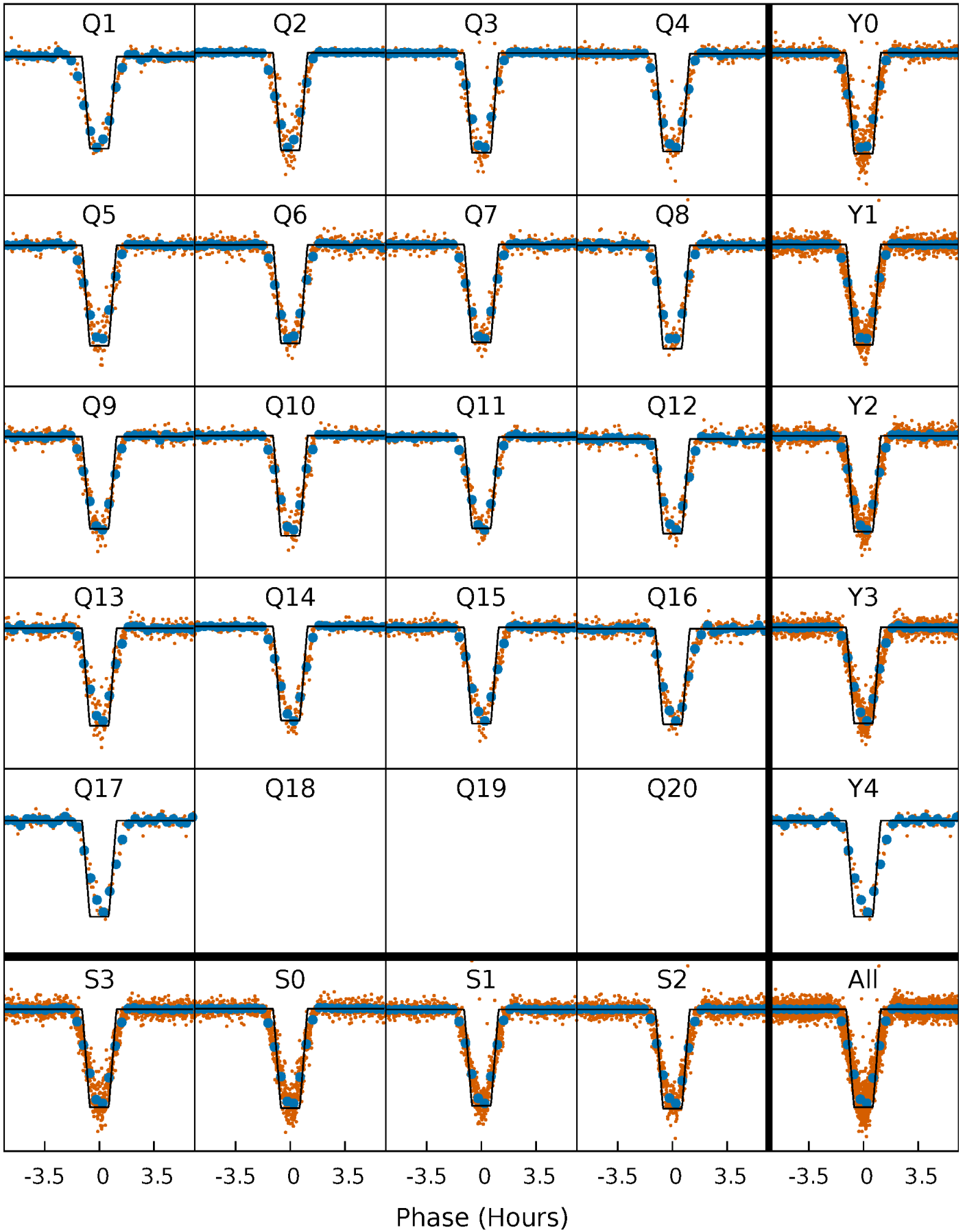
# DV Quarter-Phased Transit Curves

TCE 005648449-01 P= 4.348876 Days  $T_0=132.260109$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

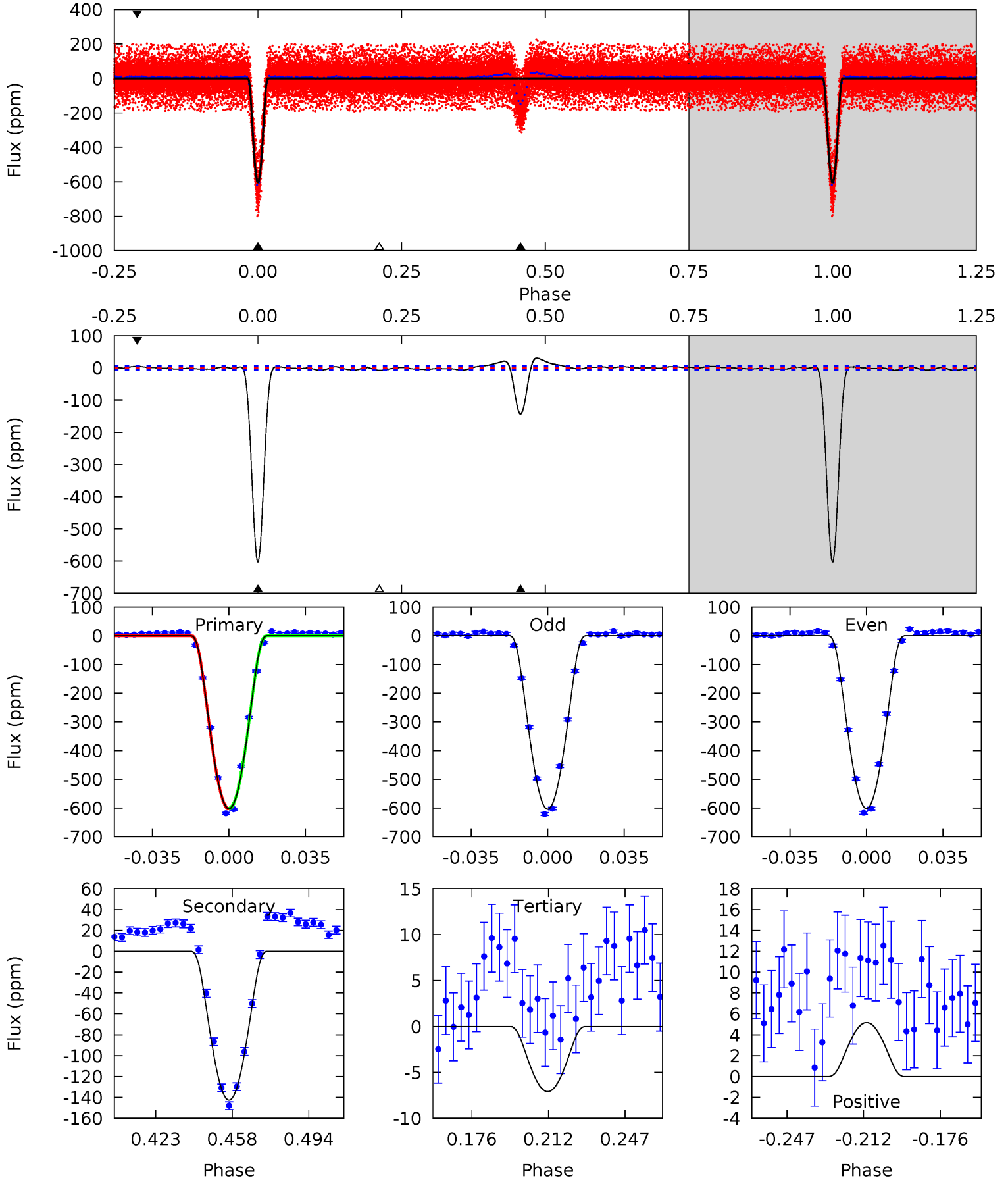
TCE 005648449-01 P= 4.348846 Days  $T_0=132.263371$  (BKJD)



# DV Model-Shift Uniqueness Test

005648449-01, P = 4.348876 Days, E = 127.911233 Days

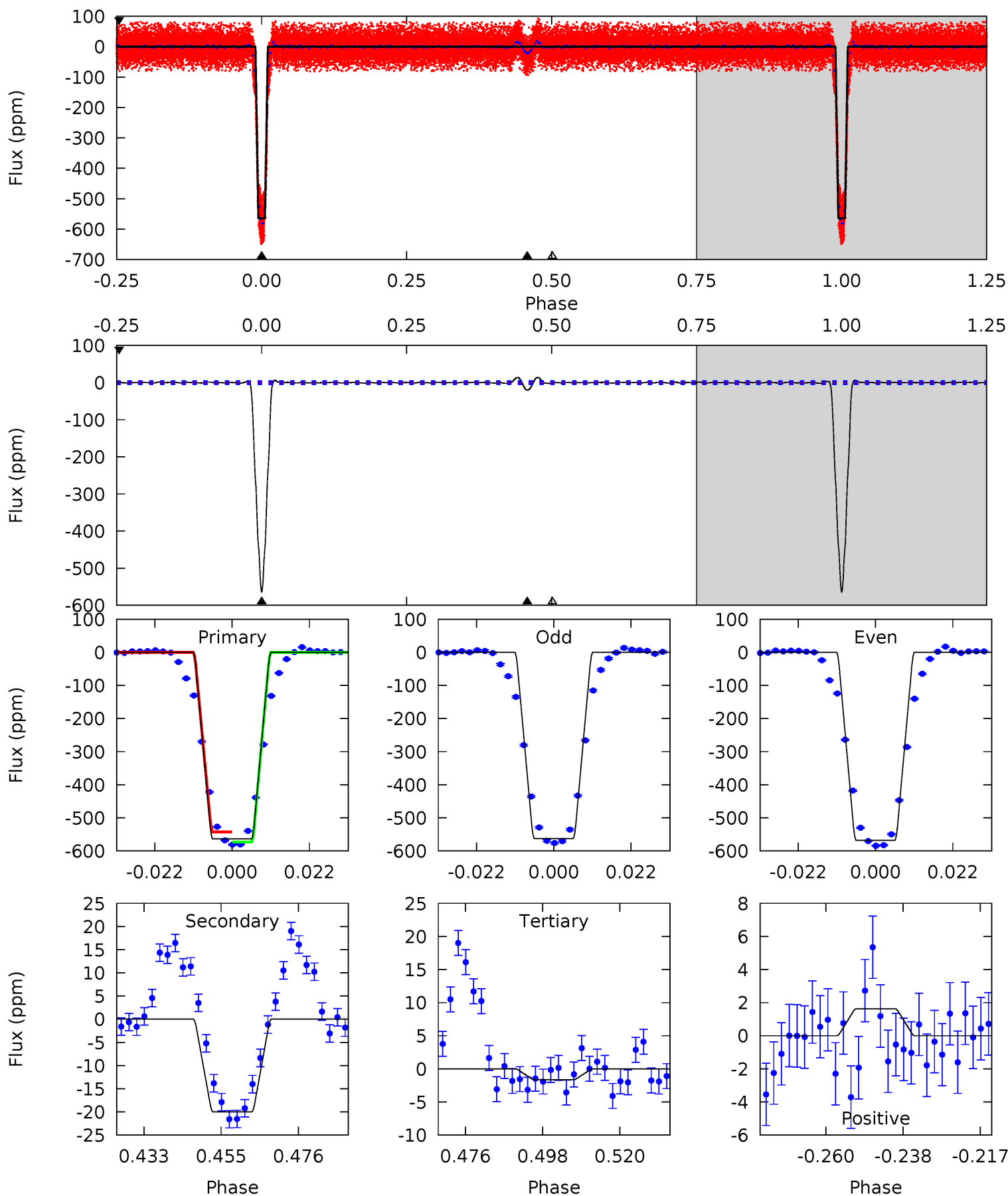
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
523.9	124.0	6.16	4.49	4.78	2.11	4.28	517.7	519.4	117.8	119.5	1.06	1.01	0.05	0.41



# Alt Model-Shift Uniqueness Test

005648449-01, P = 4.348846 Days, E = 127.914525 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
722.2	25.6	2.10	2.09	4.88	2.30	1.36	720.1	720.1	23.5	23.5	3.54	1.00	0.02	18.8



### Stellar Parameters For KIC 005648449

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3598^{+78}_{-78}$	$0.650^{+0.258}_{-0.211}$	$0.000^{+0.250}_{-0.250}$	$101.451^{+20.714}_{-33.660}$	$1.679^{+0.094}_{-0.564}$	$0.000^{+0.000}_{-0.000}$
	+2%/-2%	+40%/-32%	+inf%/-inf%	+20%/-33%	+6%/-34%	+174%/-50%
Source	SPE14	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 005648449-01 / KOI 0979.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-143 \pm 1$	$553.11^{+132.00}_{-123.95}$	$9019^{+649}_{-800}$	$-6469^{+596}_{-514}$	$0.001^{+0.001}_{-0.000}$
Alt.	$-20 \pm 1$	$269.32^{+90.68}_{-87.60}$	$9073^{+666}_{-765}$	$-6487^{+570}_{-568}$	$0.001^{+0.001}_{-0.000}$

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

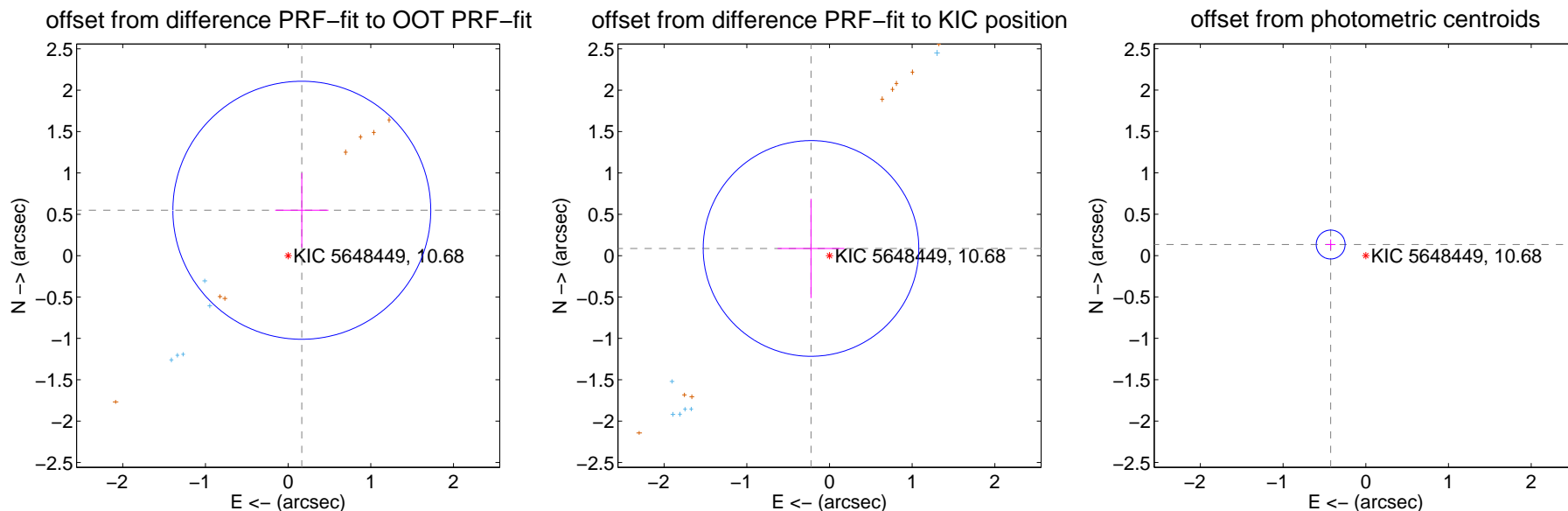
## DV Centroid Data

Supplemental centroid analysis for 005648449-01. **Kepler magnitude: 10.68.** Transit SNR 333.63

There are 6 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.39 arcsec

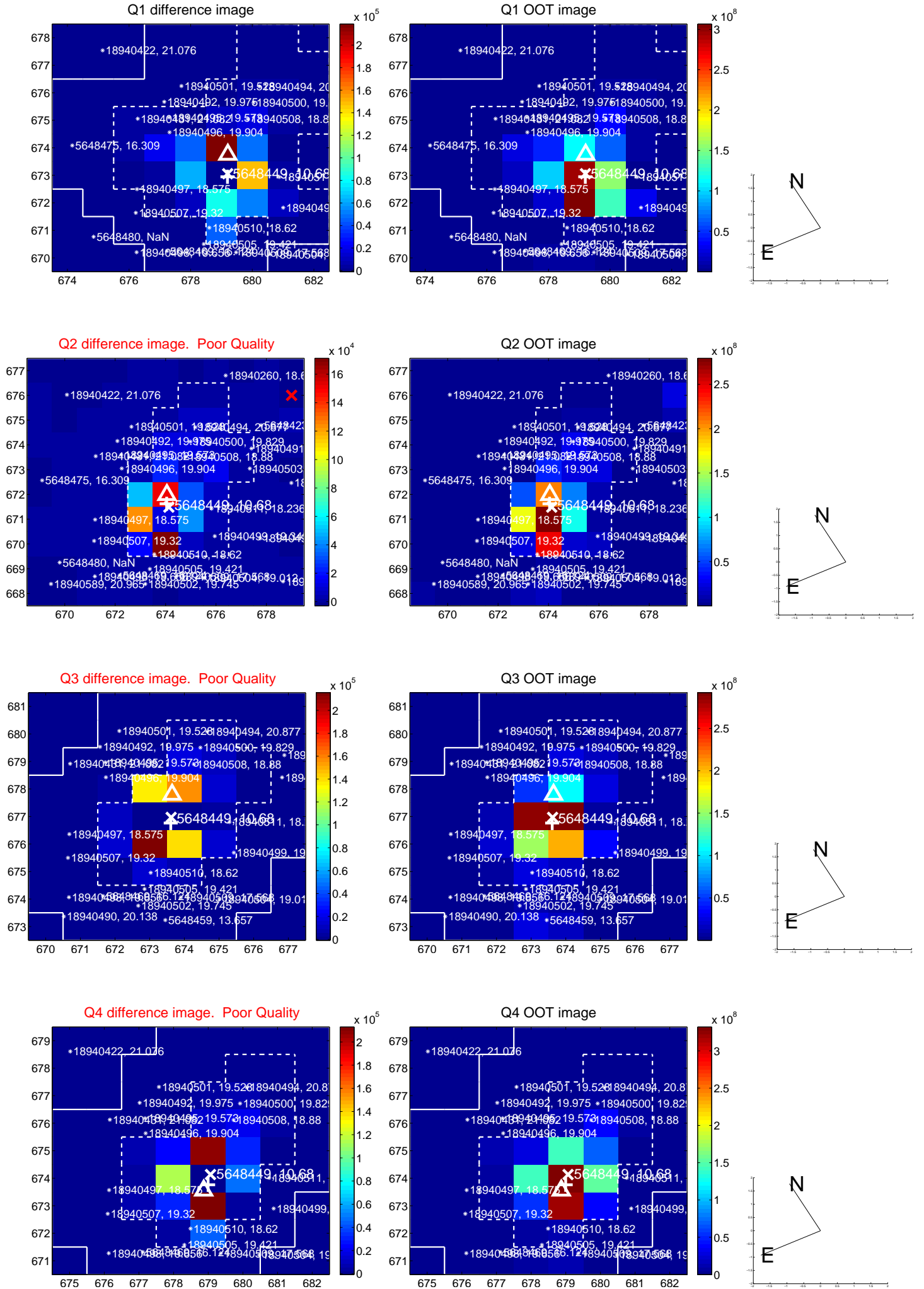
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.573 \pm 0.520$	1.10	$-0.166 \pm 0.322$	$0.549 \pm 0.450$
PRF-fit source offset from KIC position	$0.240 \pm 0.435$	0.55	$0.224 \pm 0.404$	$0.087 \pm 0.600$
photometric centroid source offset	<b><math>0.45 \pm 0.06</math></b>	<b>7.65</b>	$0.42 \pm 0.06$	$0.13 \pm 0.06$



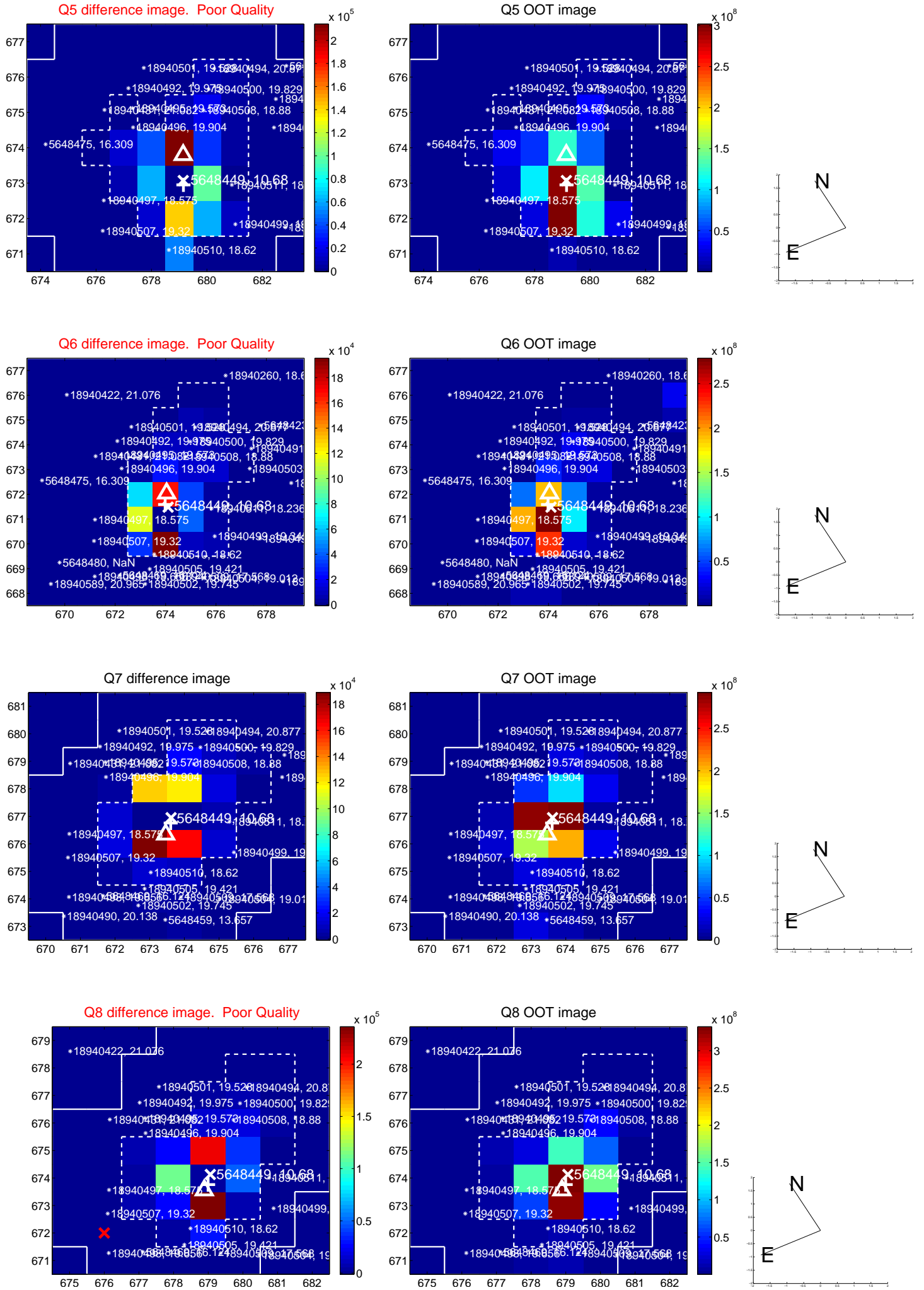
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



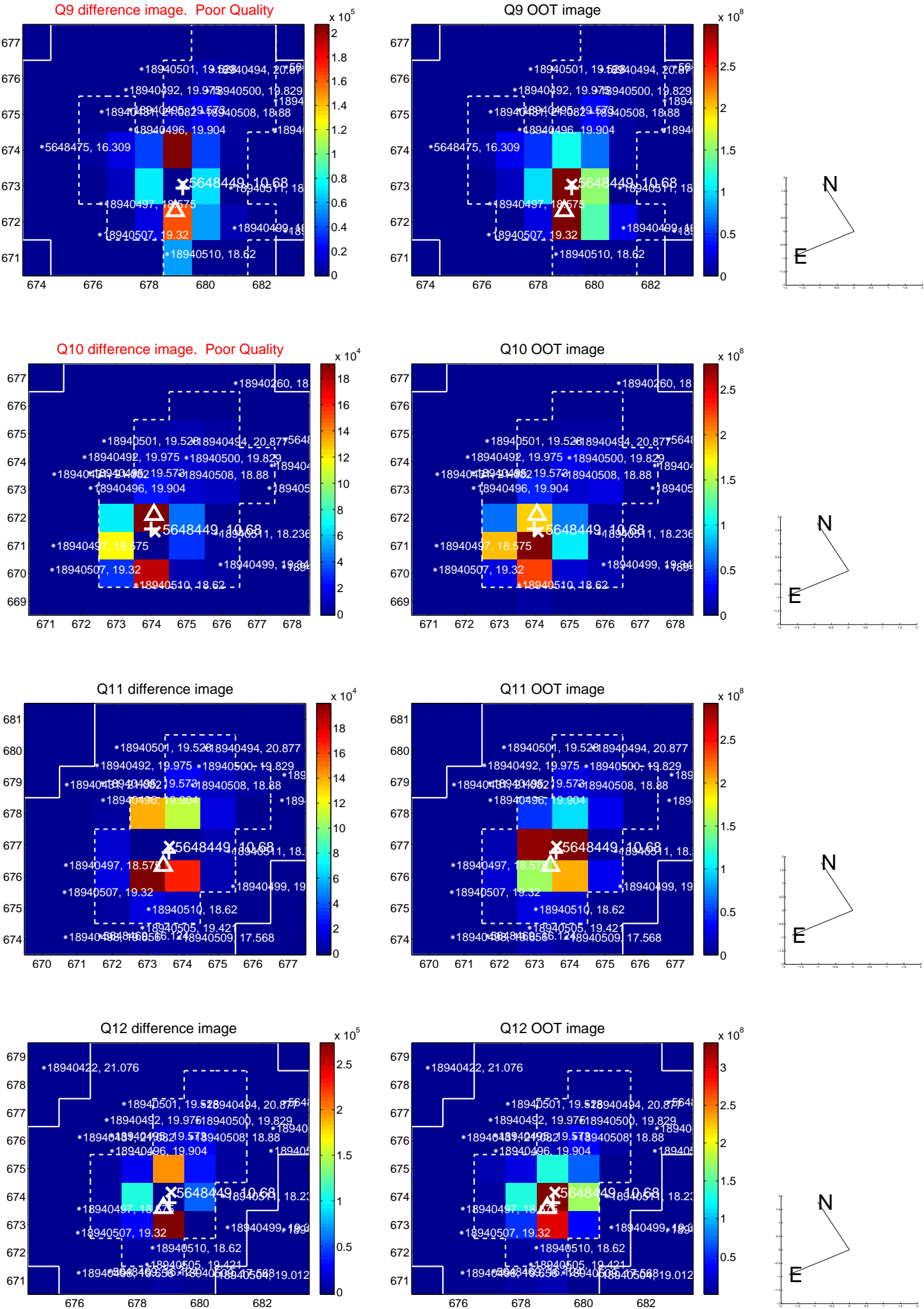
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



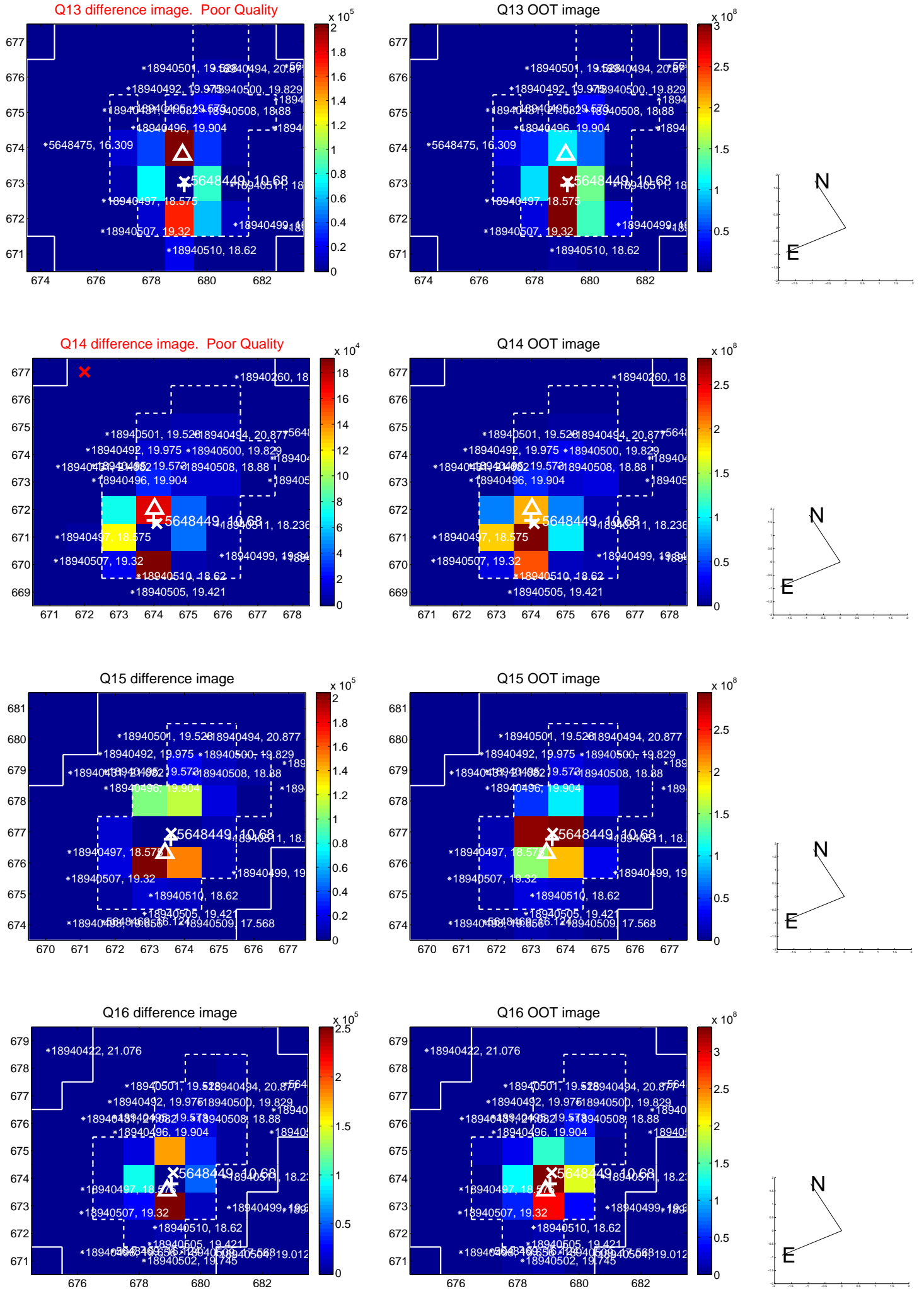
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



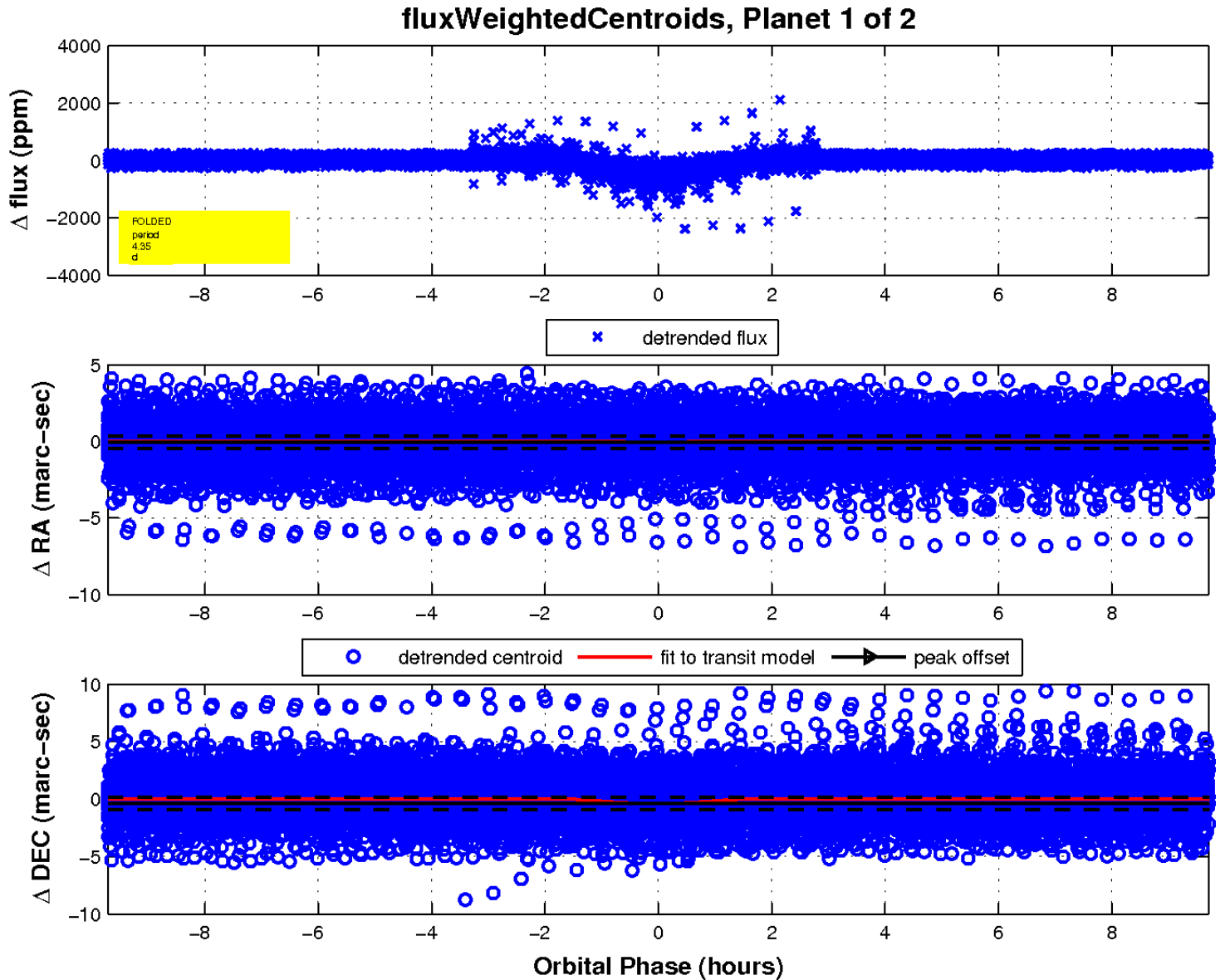
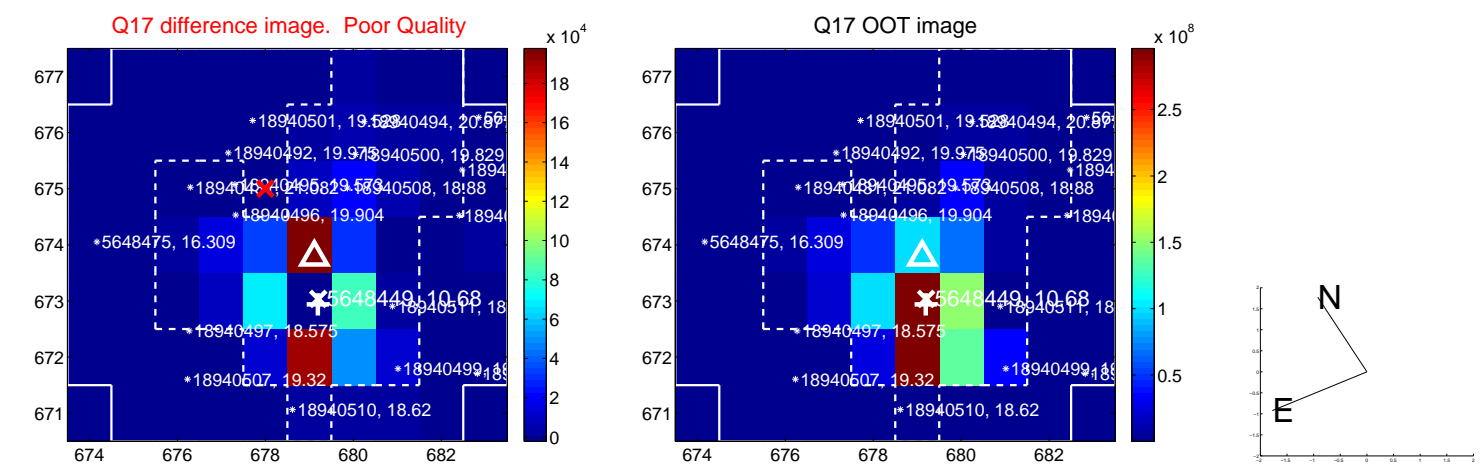
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



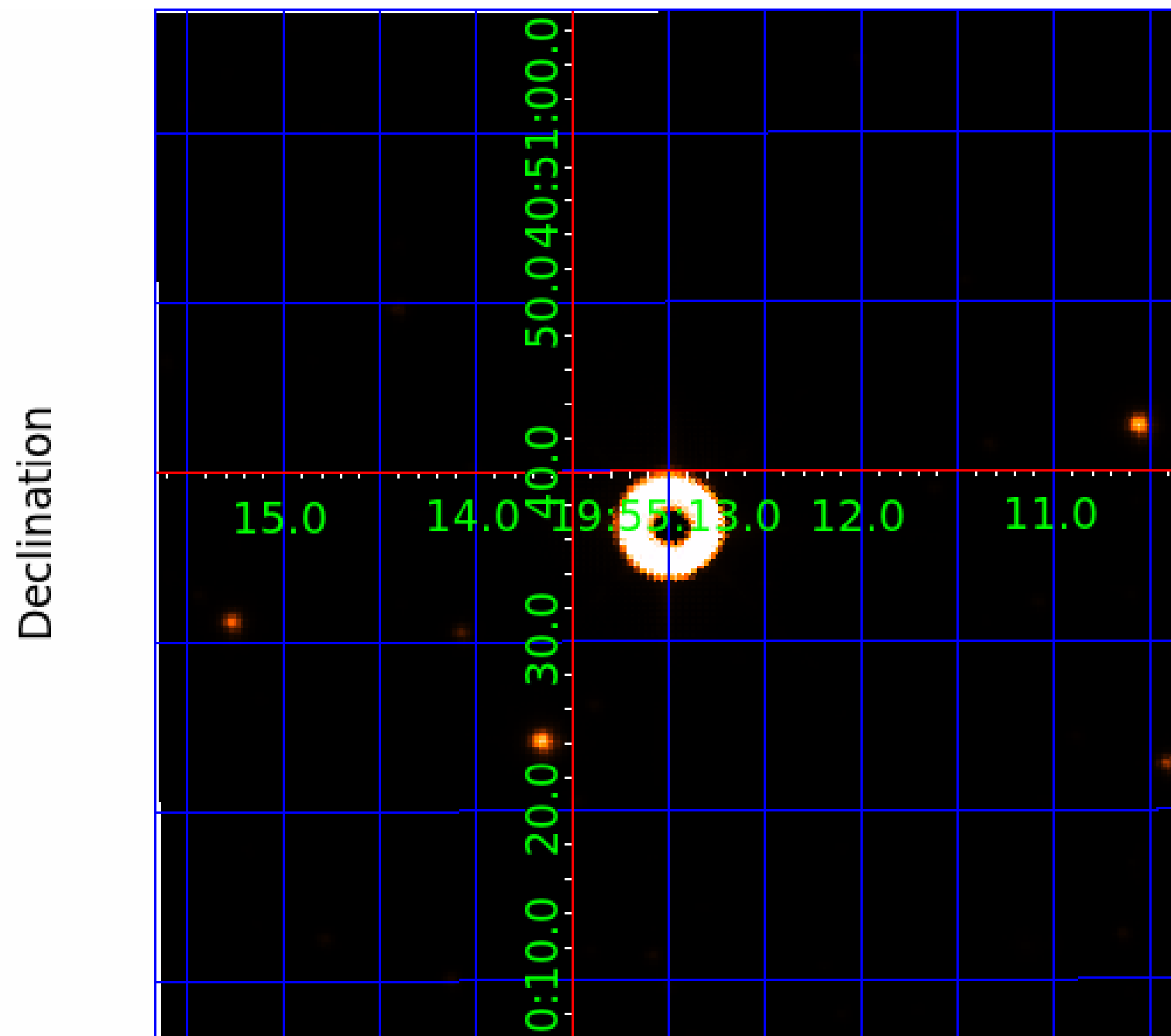
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image





# KIC 005648449

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005648449-01	OBS	0979.01	4.348876	132.260109	616.4	3.238	345.6	333.6	101.45	3598	569.55	0.00
005648449-02	OBS	No	4.348898	134.247919	207.1	2.782	114.2	123.6	101.45	3598	134.56	0.00

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005648449-01	OBS	FP	0.00	0	1	0	0	PLANET_IN_STAR—MOD_SEC_DV—MOD_SEC_ALT—DEEP_V_SHAPED—HAS_SEC_TCE—CENT_SATURATED
005648449-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE—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 005648449-02

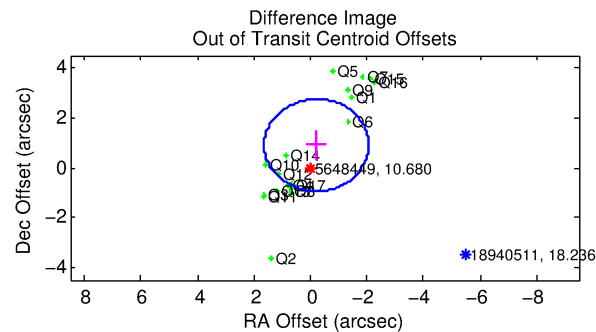
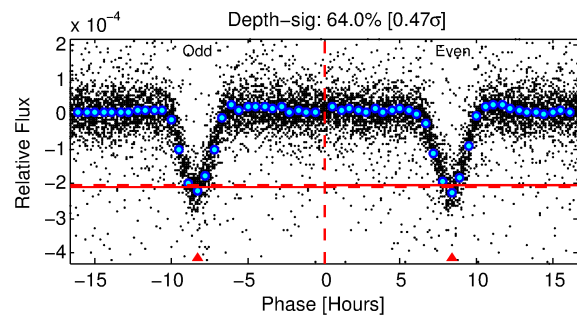
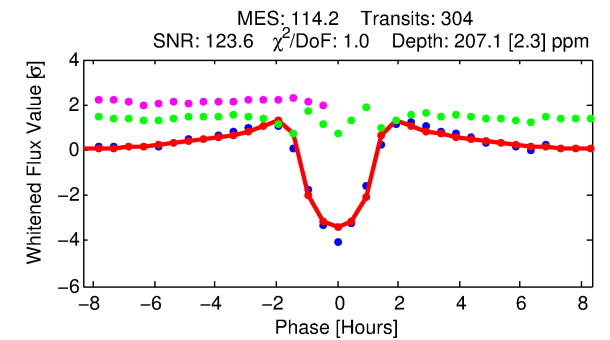
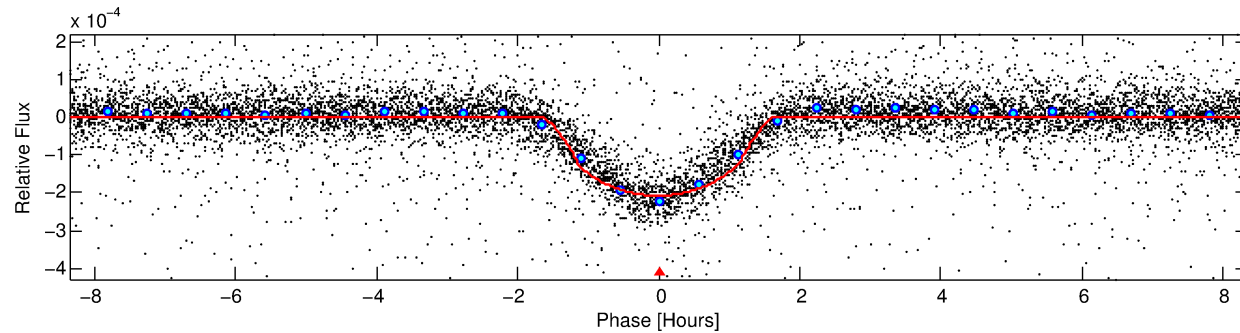
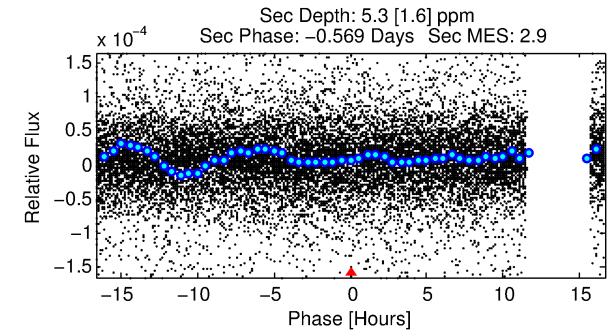
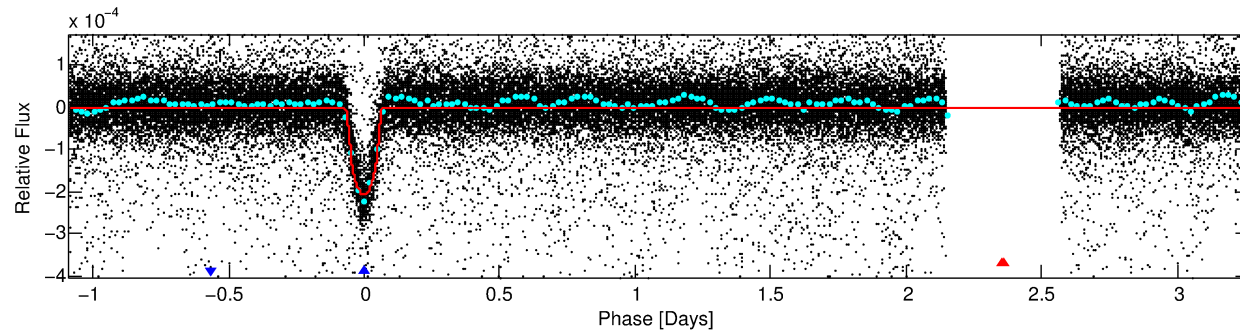
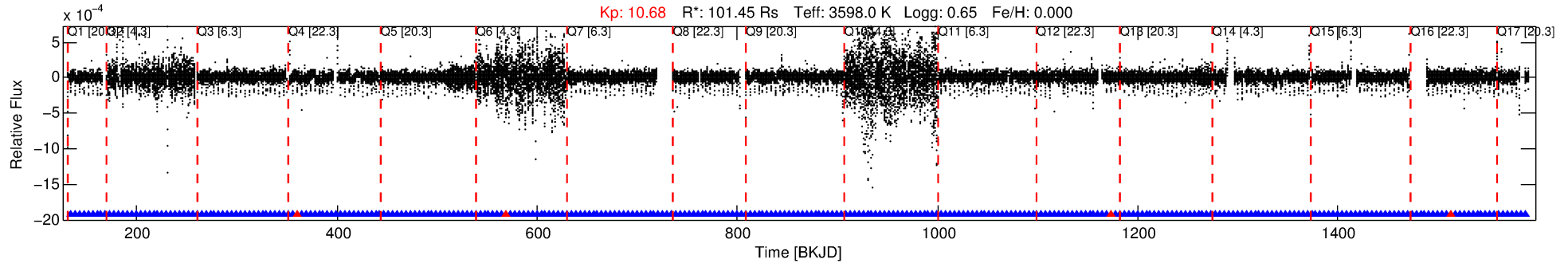
No Significant Match Found

# DV One-Page Summary

KIC: 5648449 Candidate: 2 of 2 Period: 4.349 d

KOI: K00979 Corr: No Ephemeris Match

Kp: 10.68 R\*: 101.45 Rs Teff: 3598.0 K Logg: 0.65 Fe/H: 0.000



## DV Fit Results:

Period = 4.34890 [0.00000] d  
Epoch = 134.2479 [0.0004] BKJD  
Rp/R\* = 0.0122 [0.0008]  
a/R\* = 12.10 [1.56]  
b = 0.00 [35.21]  
Seff = N/A  
Teq = N/A  
Rp = 134.56 [45.48] Re  
a = N/A  
Ag = N/A  
Teffp = N/A

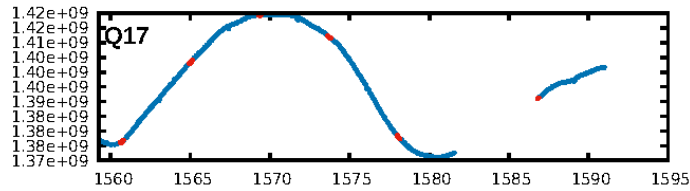
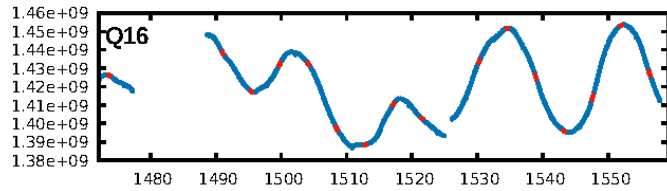
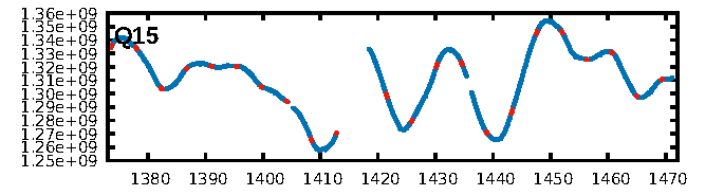
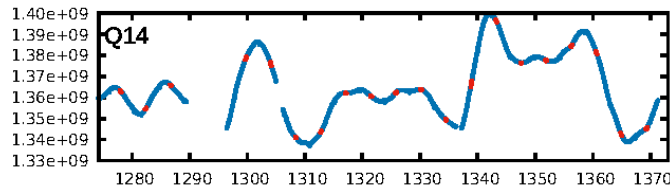
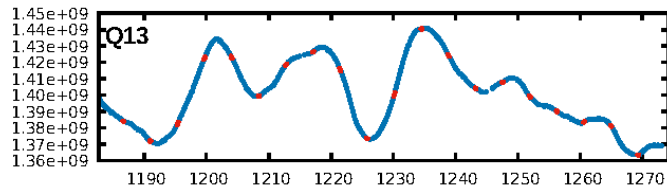
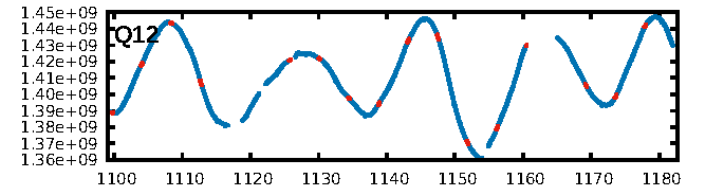
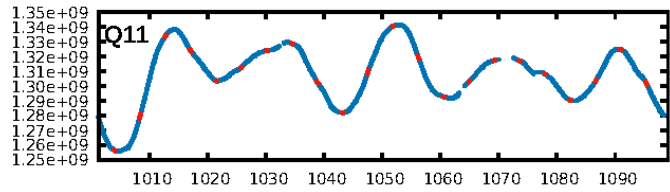
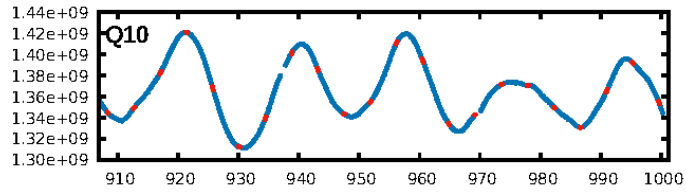
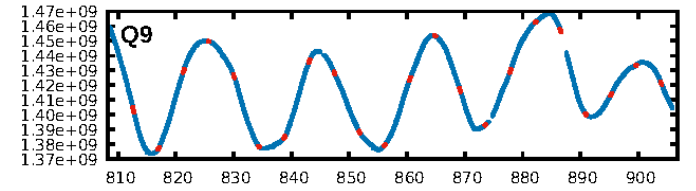
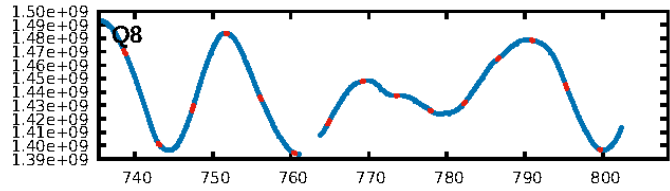
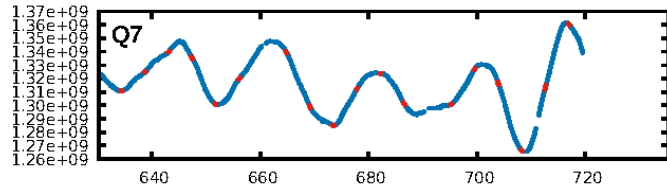
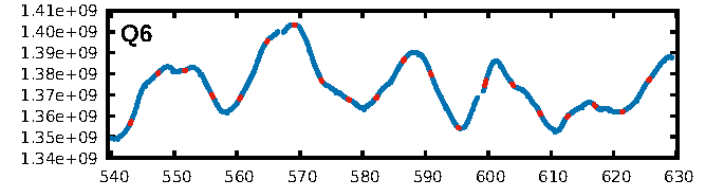
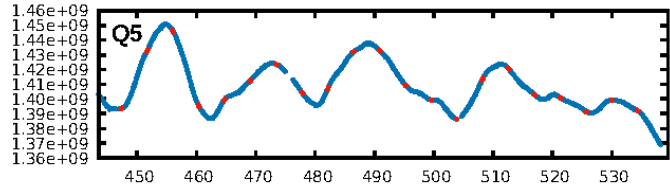
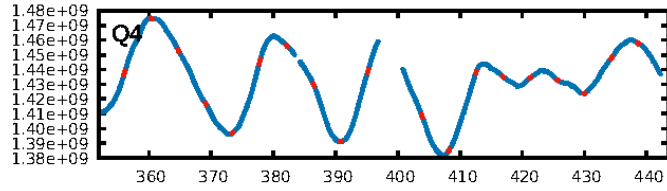
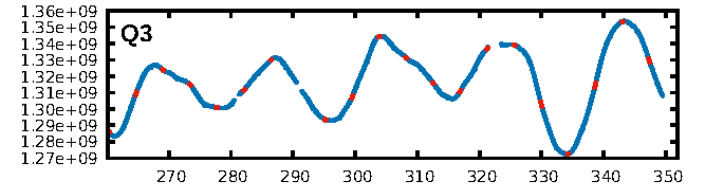
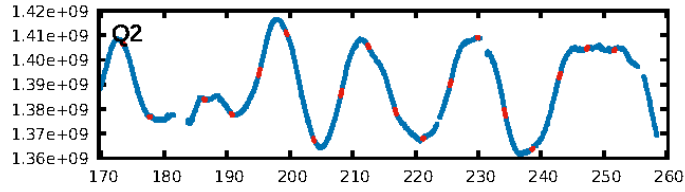
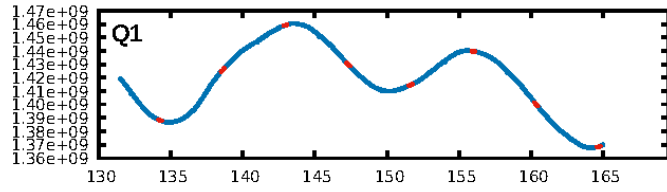
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 0.99 [286/290]  
GhostDiagnostic-chr: 2.632  
Centroid-sig: 0.0%  
Centroid-so: 0.816 arcsec [4.93σ]  
OotOffset-rm: 0.925 arcsec [1.51σ]  
KicOffset-rm: 0.561 arcsec [0.95σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.35 [6/17]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 10:28:18 Z

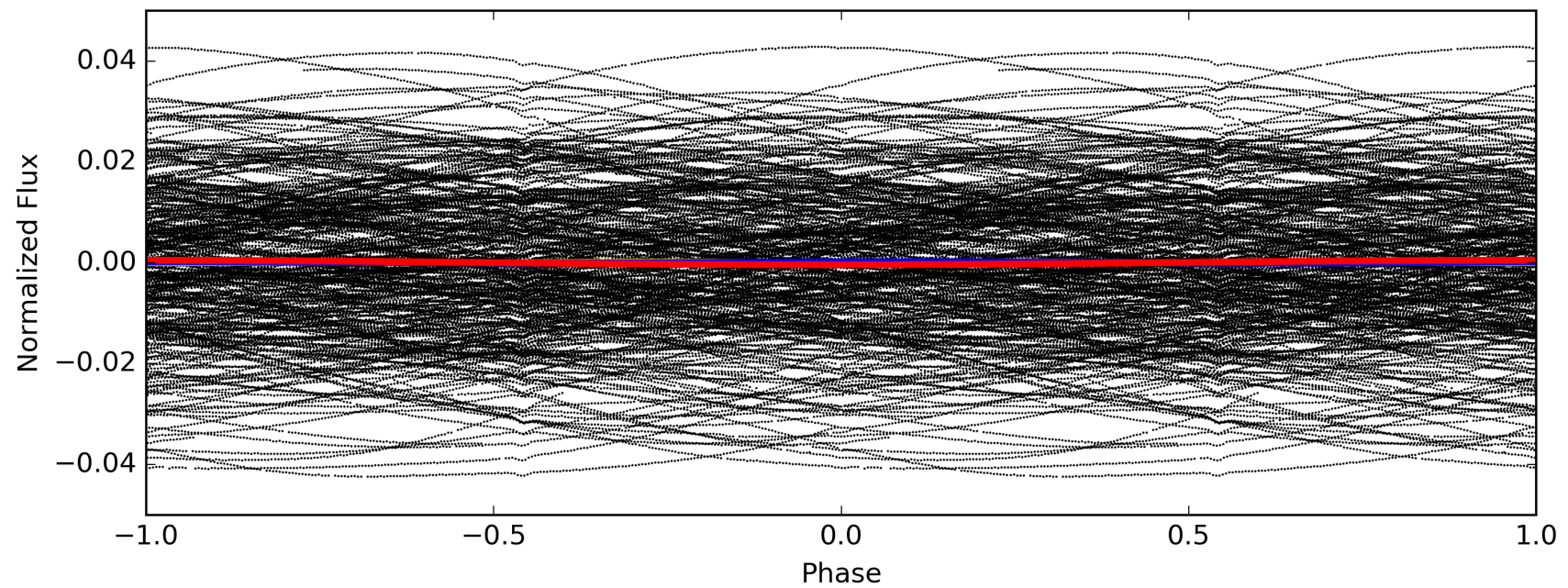
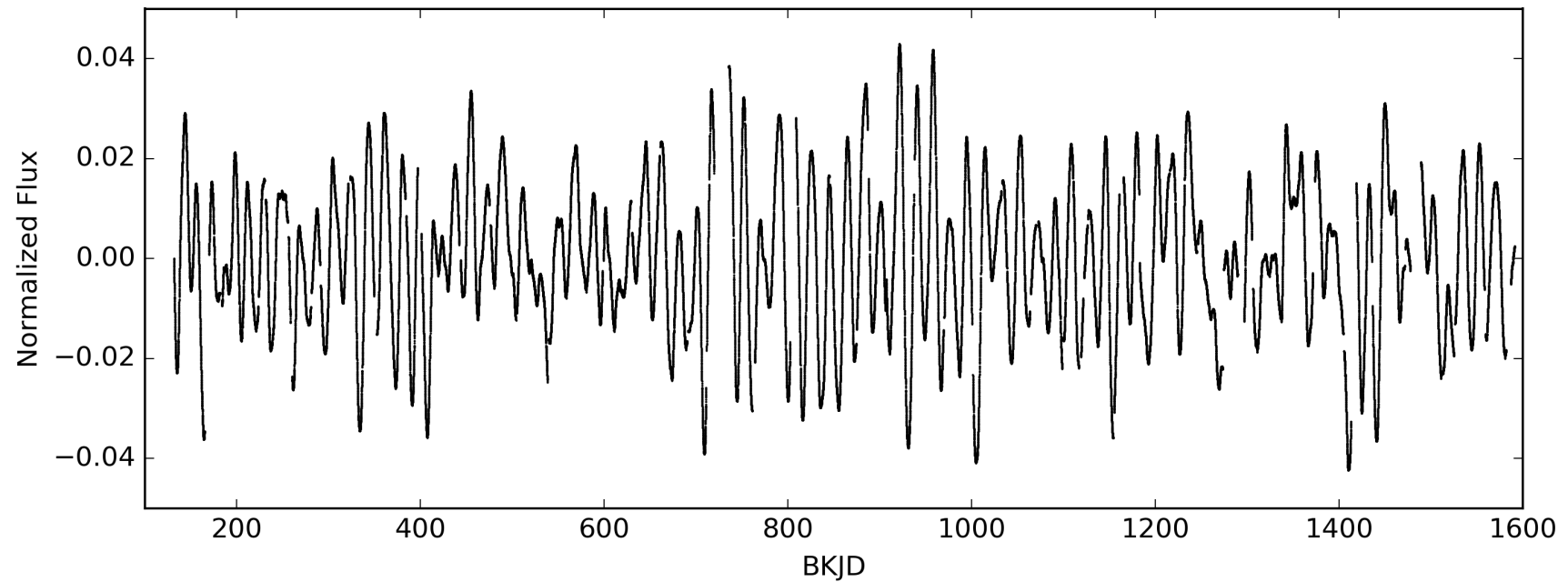
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 005648449-02, PDC Light Curves



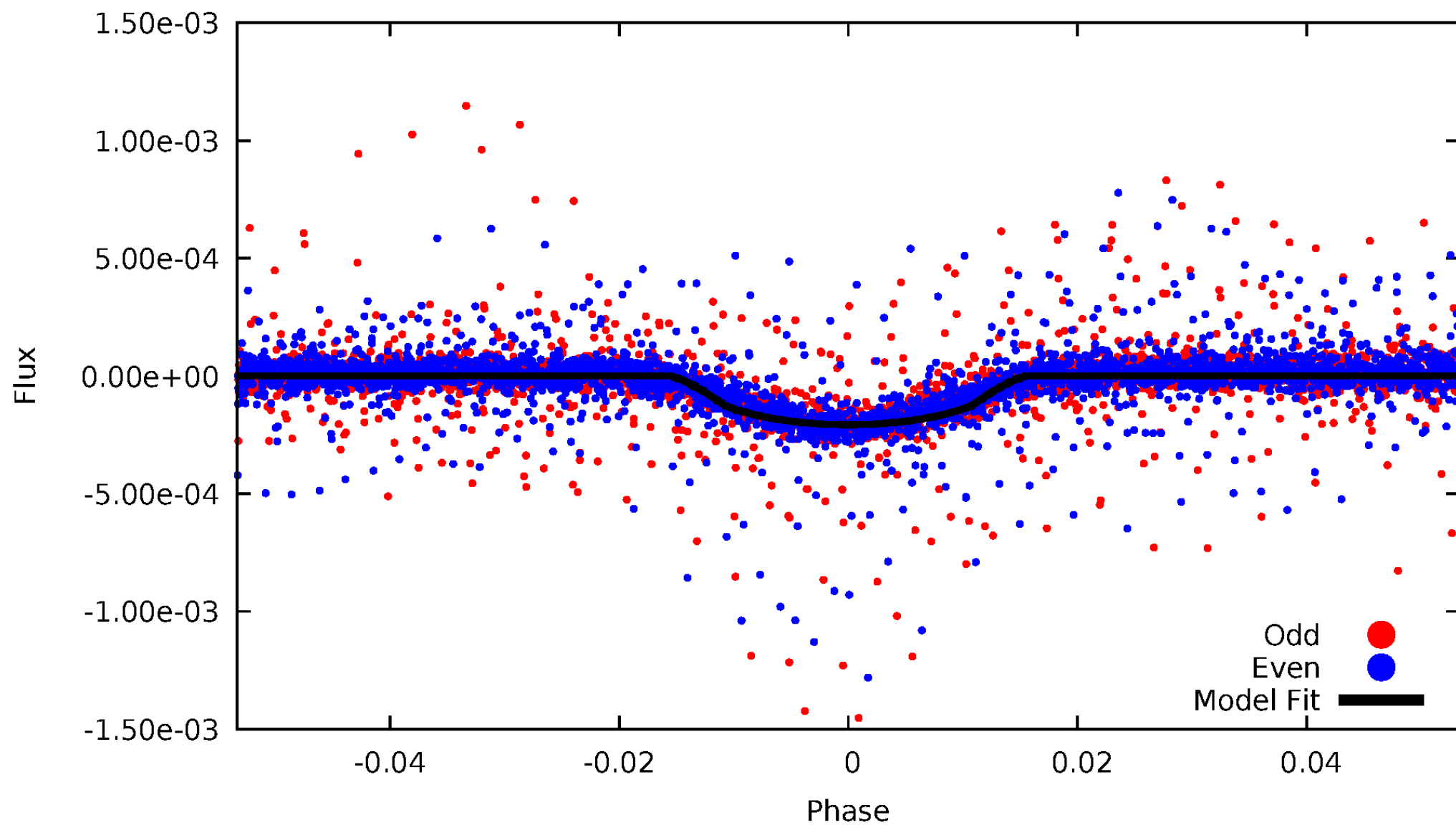
TCE 005648449-02

— P = 2.174 days — P = 4.349 days — P = 8.698 days



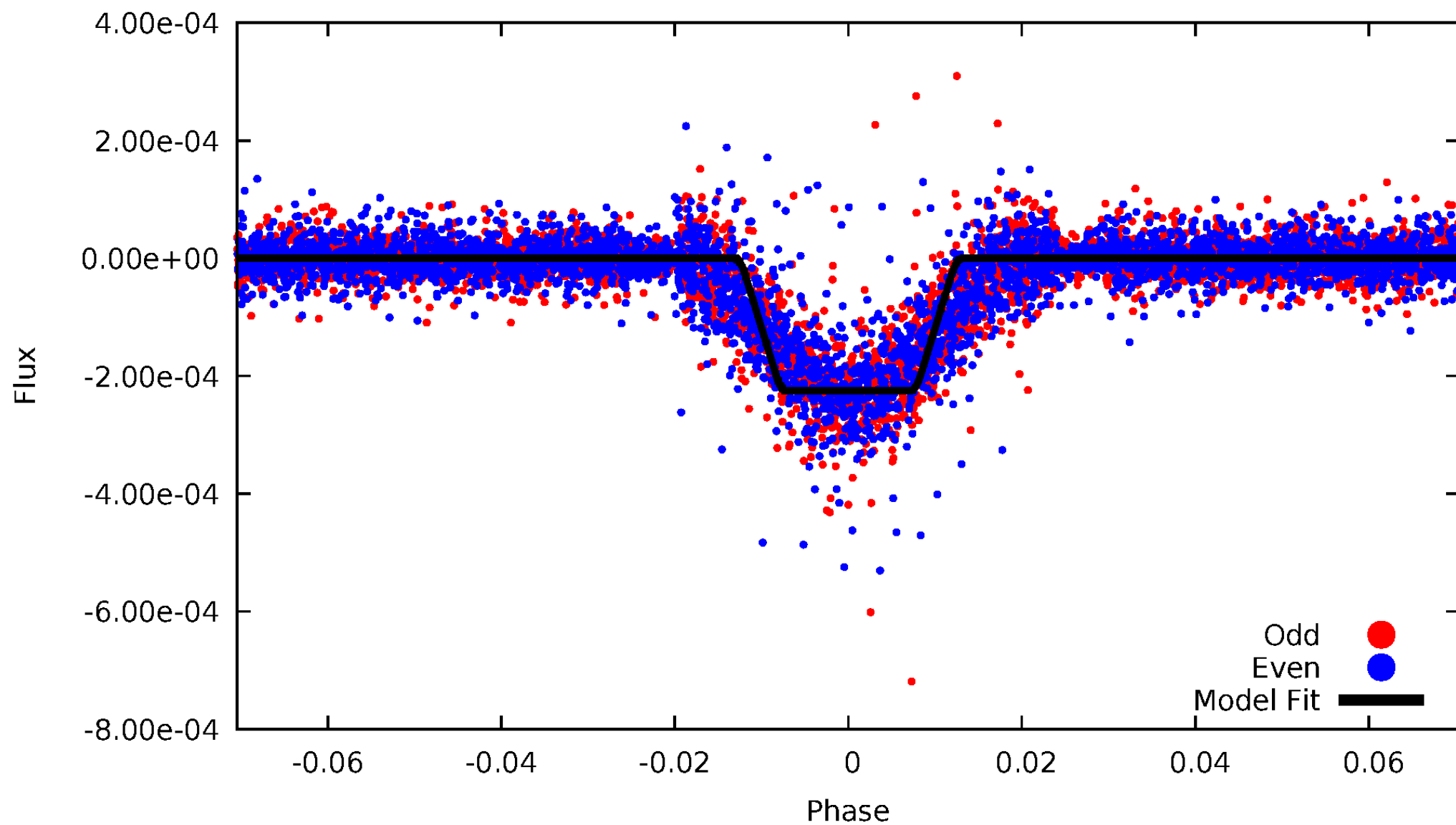
# DV Odd/Even

TCE 005648449-02



# ALT Odd/Even

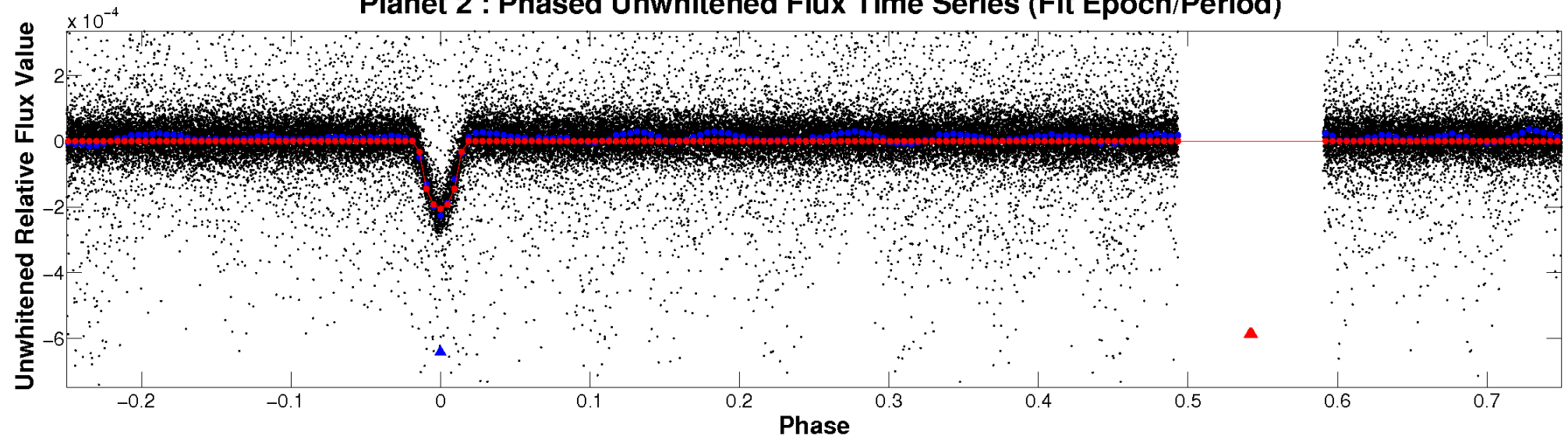
TCE 005648449-02



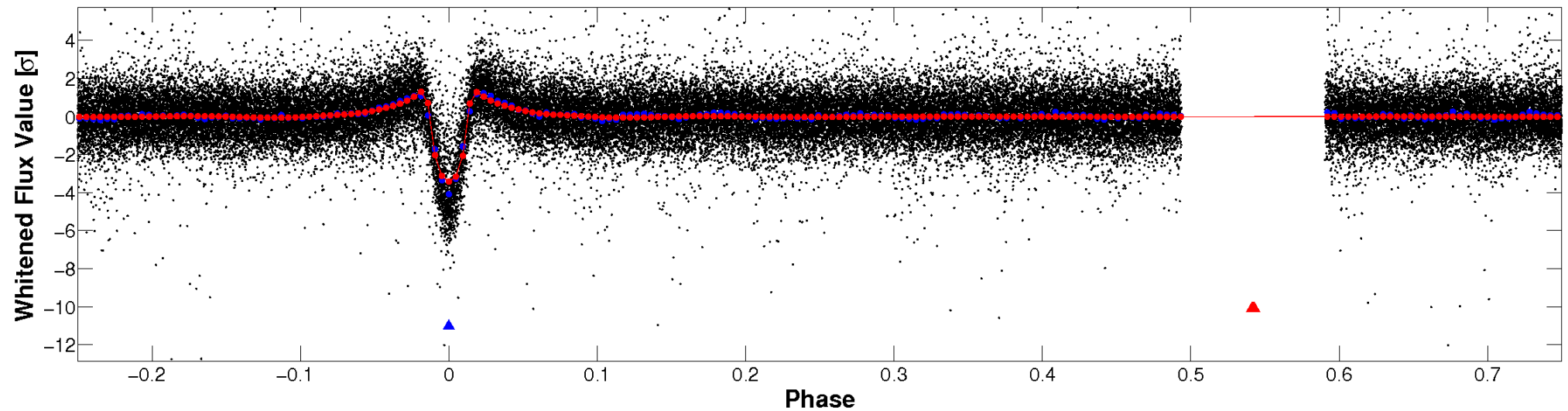


# Non-Whitened Vs. Whitened Light Curve

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

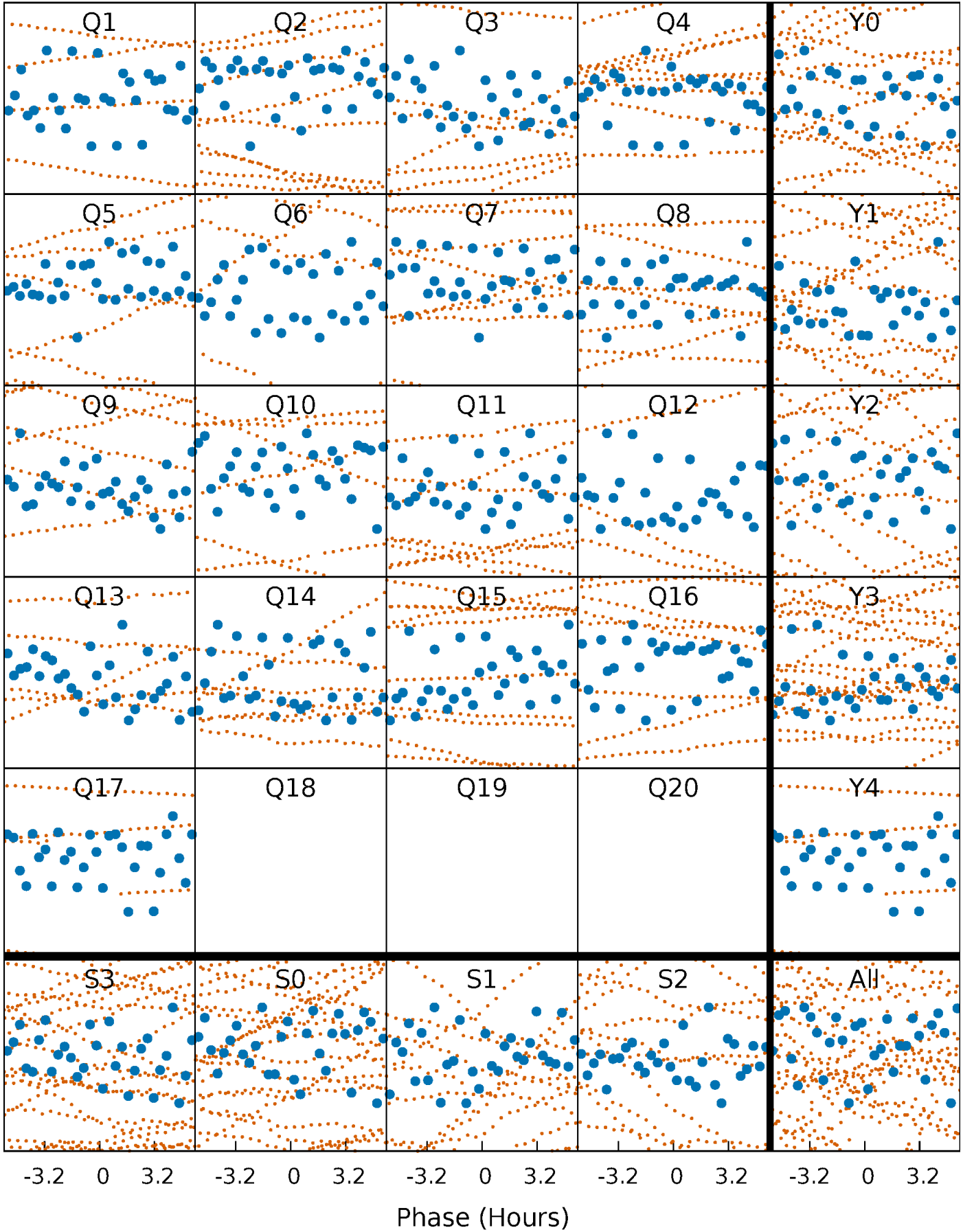


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



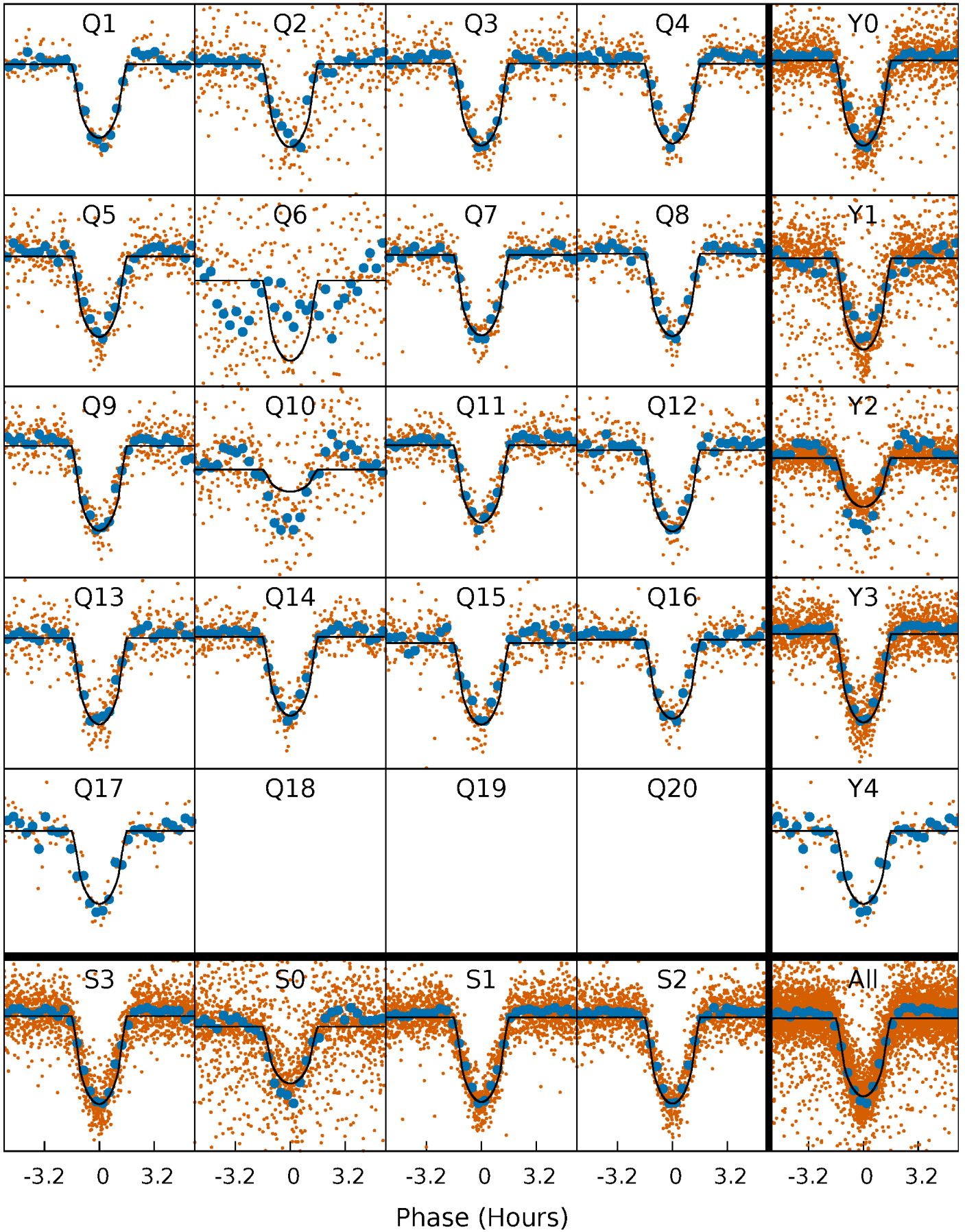
# PDC Quarter-Phased Transit Curves

TCE 005648449-02   P= 4.348898 Days    $T_0=134.247919$  (BKJD)



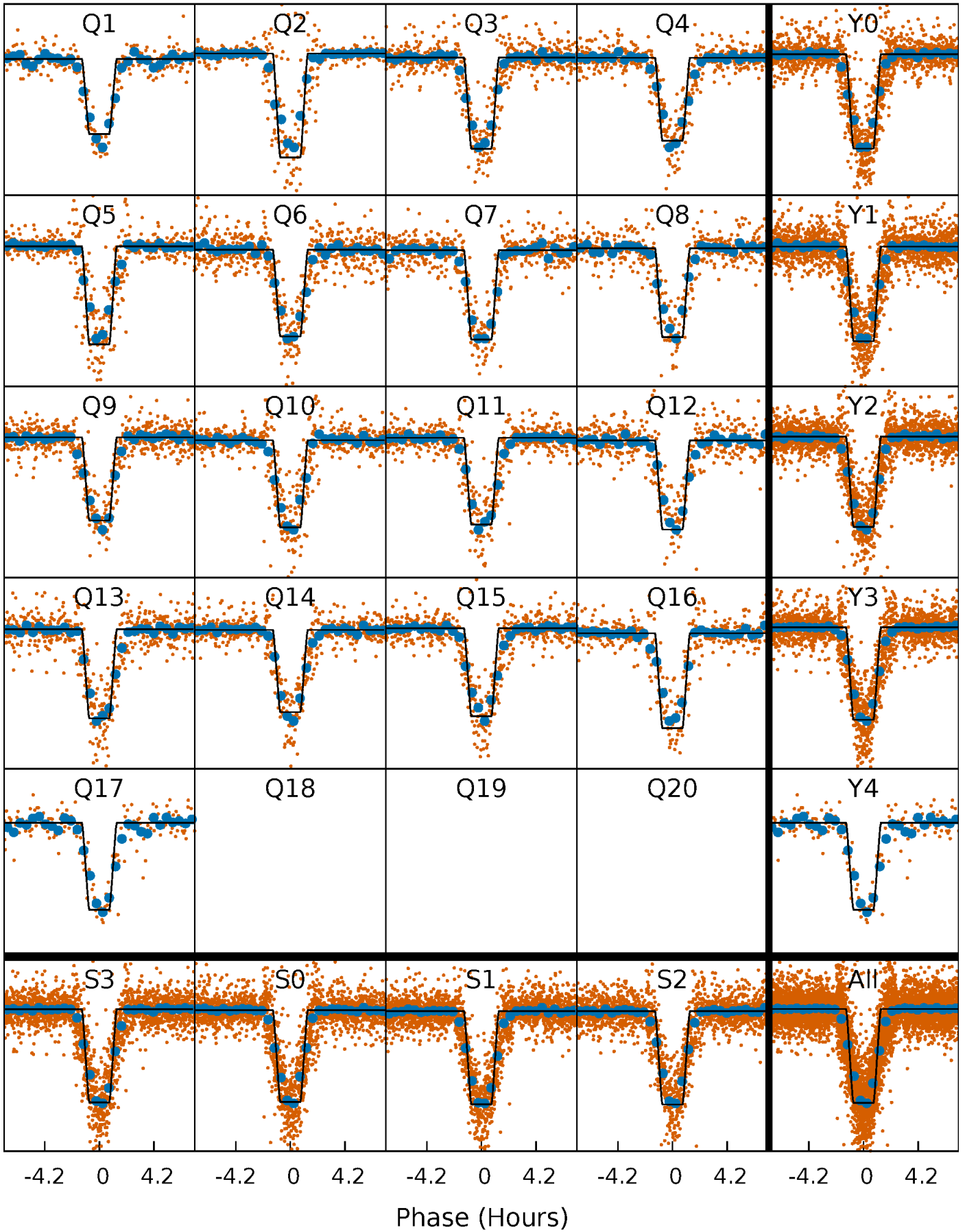
# DV Quarter-Phased Transit Curves

TCE 005648449-02   P= 4.348898 Days    $T_0=134.247919$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

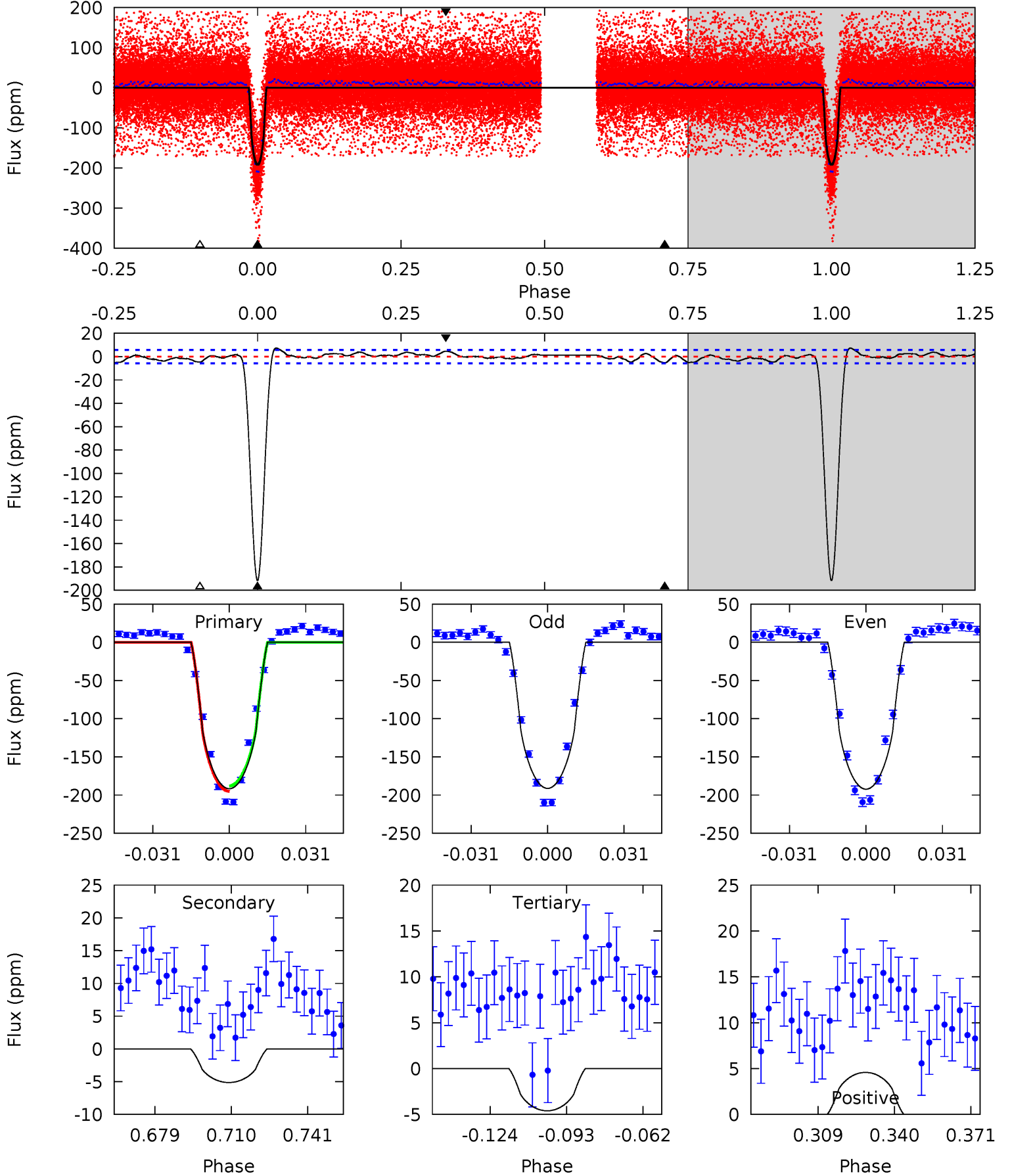
TCE 005648449-02 P= 4.348863 Days  $T_0=134.251387$  (BKJD)



# DV Model-Shift Uniqueness Test

005648449-02, P = 4.348898 Days, E = 129.899021 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
159.8	4.28	3.84	3.82	4.81	2.16	1.86	156.0	156.0	0.44	0.46	0.45	1.06	0.04	2.98

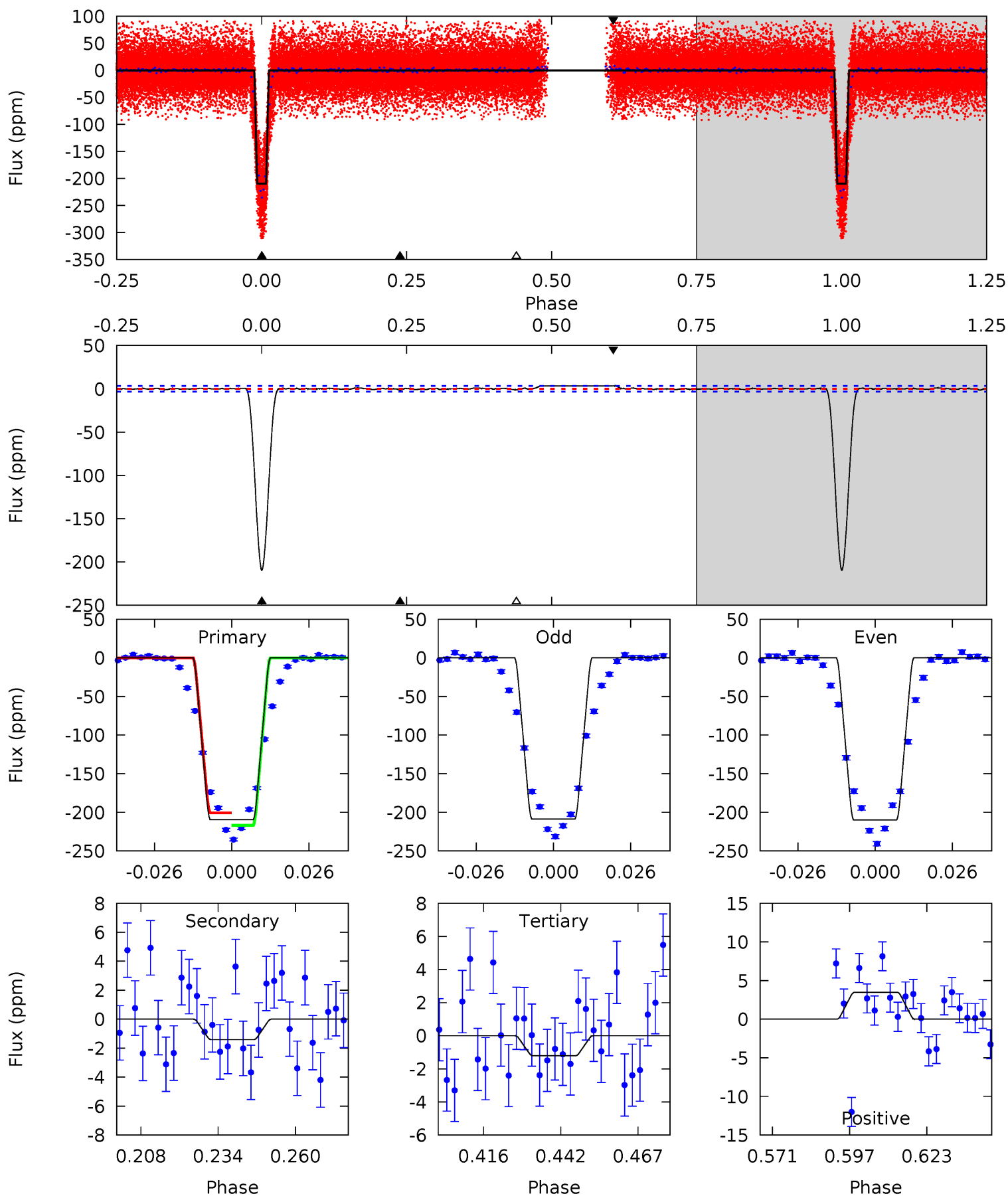




# Alt Model-Shift Uniqueness Test

005648449-02, P = 4.348863 Days, E = 129.902524 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
305.6	2.06	1.76	5.08	4.84	2.23	0.91	303.8	300.5	0.30	-3.02	0.84	1.02	0.02	11.9





### Stellar Parameters For KIC 005648449

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$3598^{+78}_{-78}$	$0.650^{+0.258}_{-0.211}$	$0.000^{+0.250}_{-0.250}$	$101.451^{+20.714}_{-33.660}$	$1.679^{+0.094}_{-0.564}$	$0.000^{+0.000}_{-0.000}$
	+2%/-2%	+40%/-32%	+inf%/-inf%	+20%/-33%	+6%/-34%	+174%/-50%
Source	SPE14	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 005648449-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-5 \pm 1$	$133.10^{+21.43}_{-24.96}$	$8995^{+679}_{-692}$	$-6438^{+516}_{-558}$	$0.001^{+0.000}_{-0.000}$
Alt.	$-1 \pm 1$	$165.70^{+25.85}_{-29.40}$	$9027^{+702}_{-682}$	$-6470^{+533}_{-579}$	$0.000^{+0.000}_{-0.000}$

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

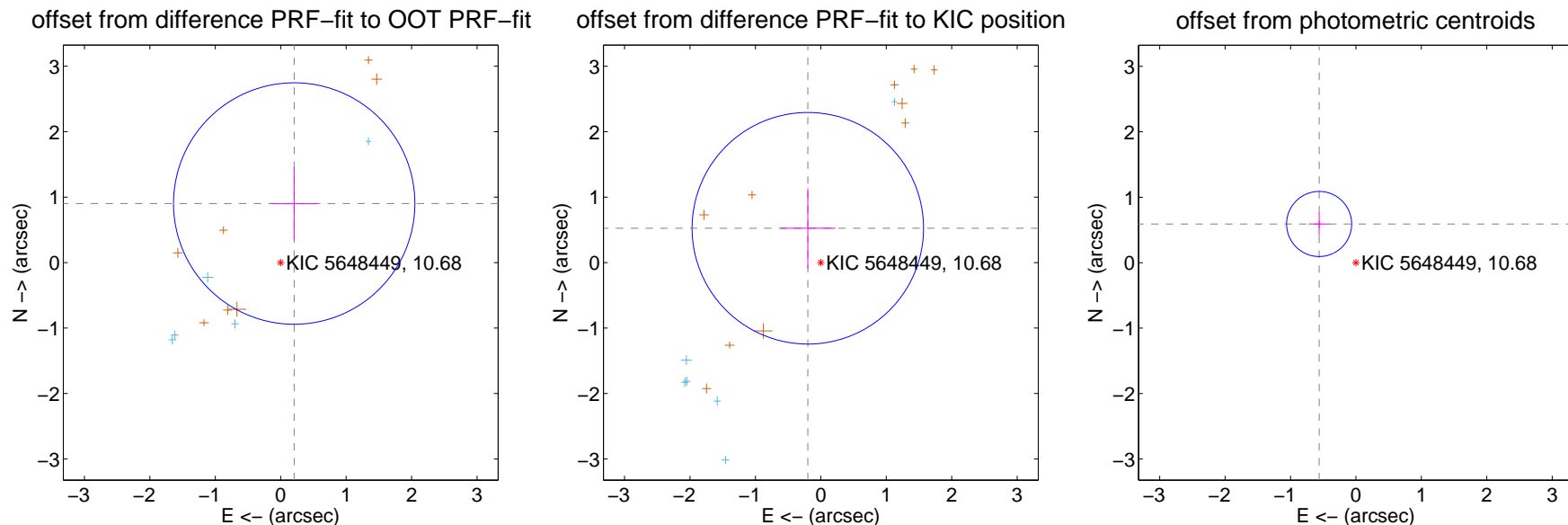
## DV Centroid Data

Supplemental centroid analysis for 005648449-02. **Kepler magnitude: 10.68.** Transit SNR 123.61

There are 6 quarters with good PRF difference image offsets

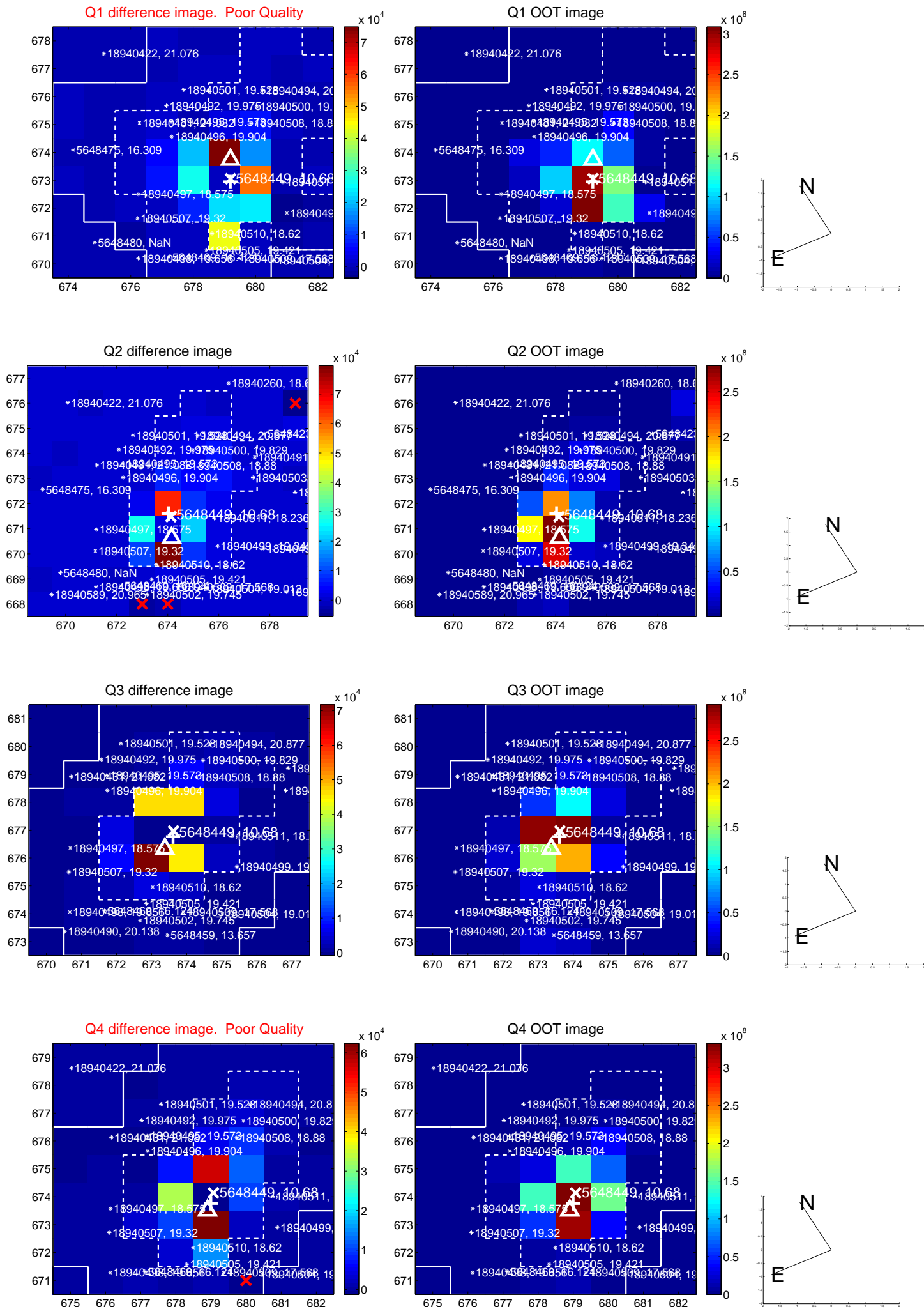
The direct PRF centroid is offset from the target star catalog position by about 0.39 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.925 \pm 0.615$	1.51	$-0.206 \pm 0.360$	$0.902 \pm 0.557$
PRF-fit source offset from KIC position	$0.561 \pm 0.590$	0.95	$0.199 \pm 0.423$	$0.524 \pm 0.610$
photometric centroid source offset	<b><math>0.82 \pm 0.17</math></b>	<b>4.93</b>	$0.56 \pm 0.16$	$0.59 \pm 0.17$

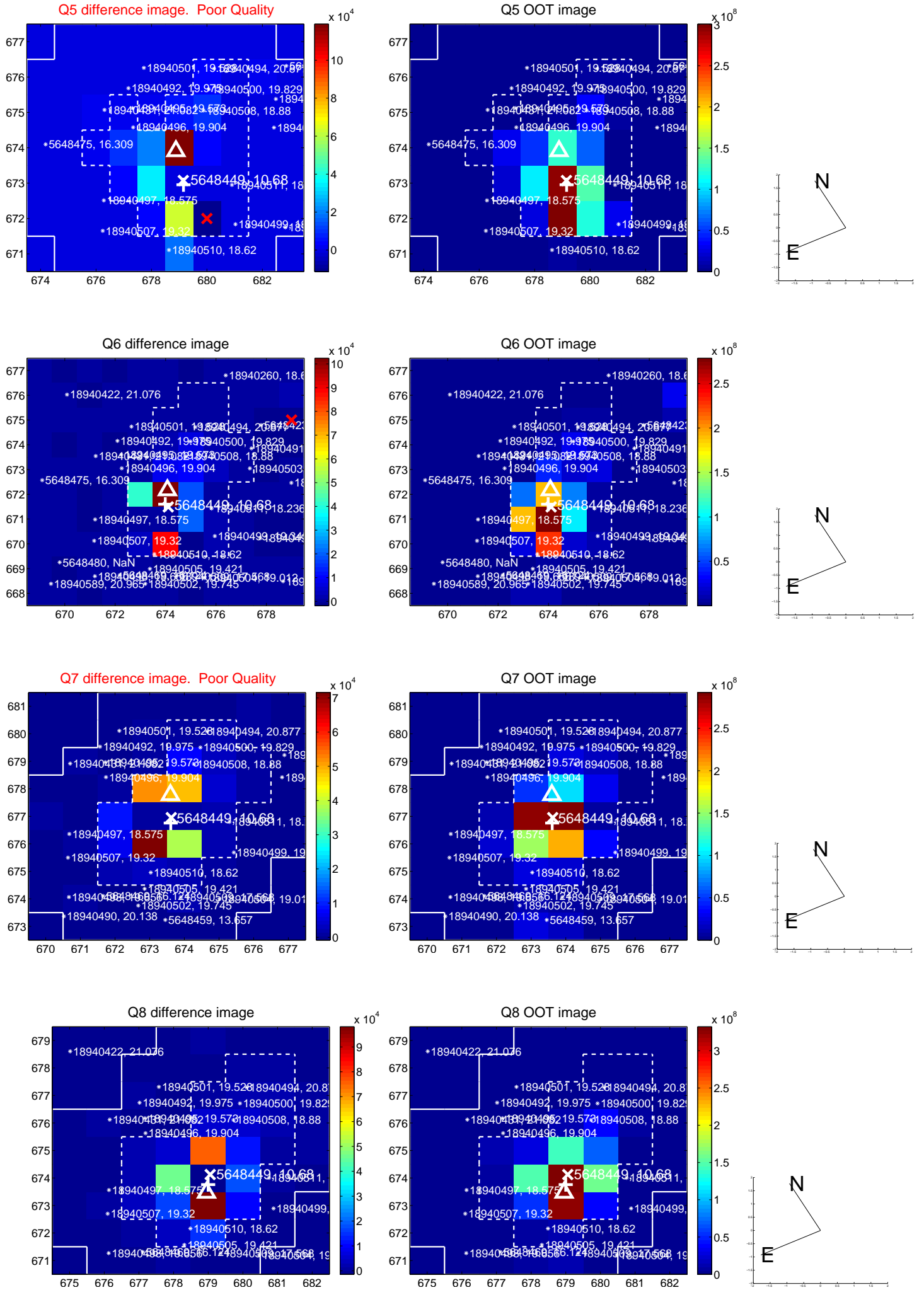


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

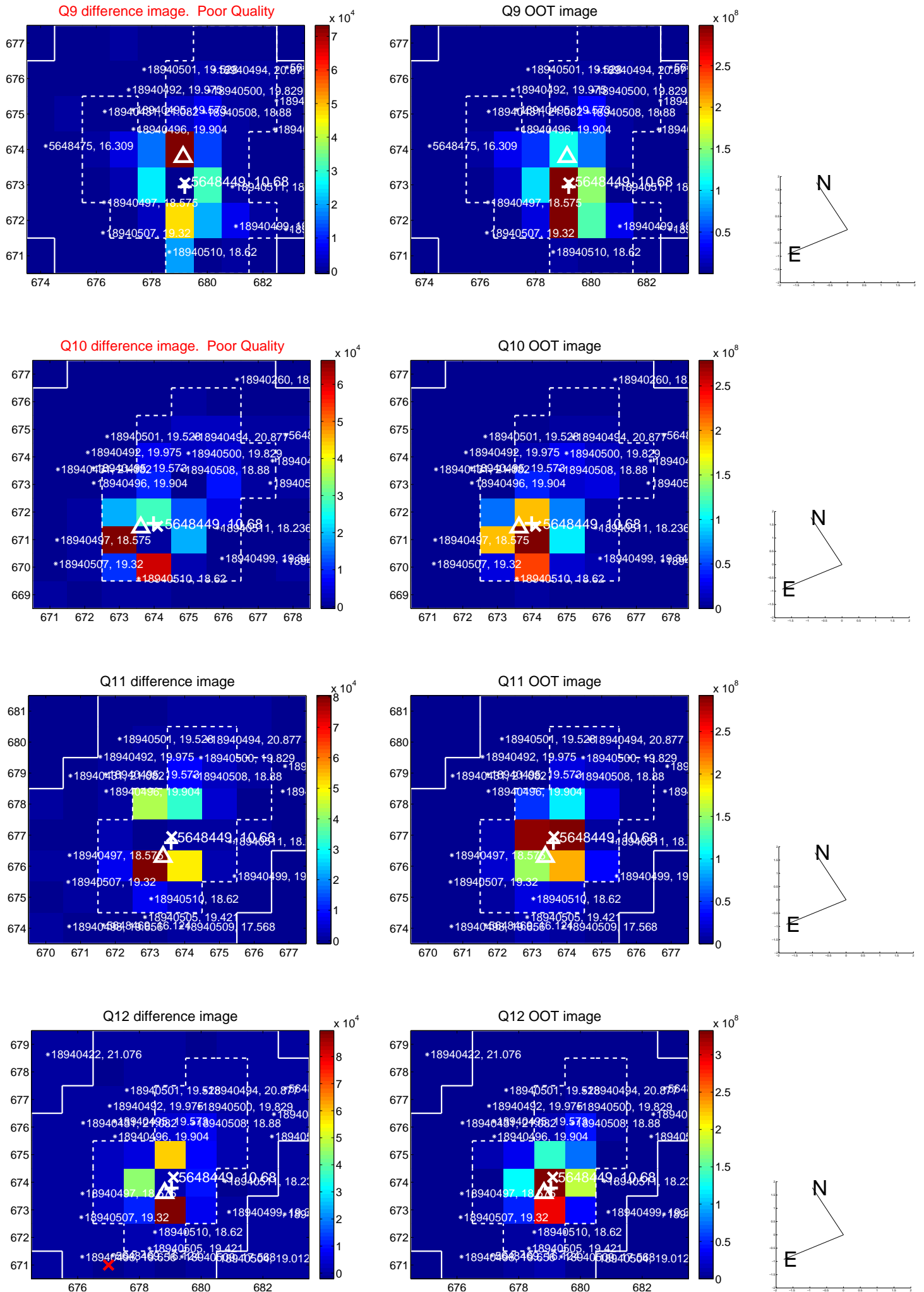
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



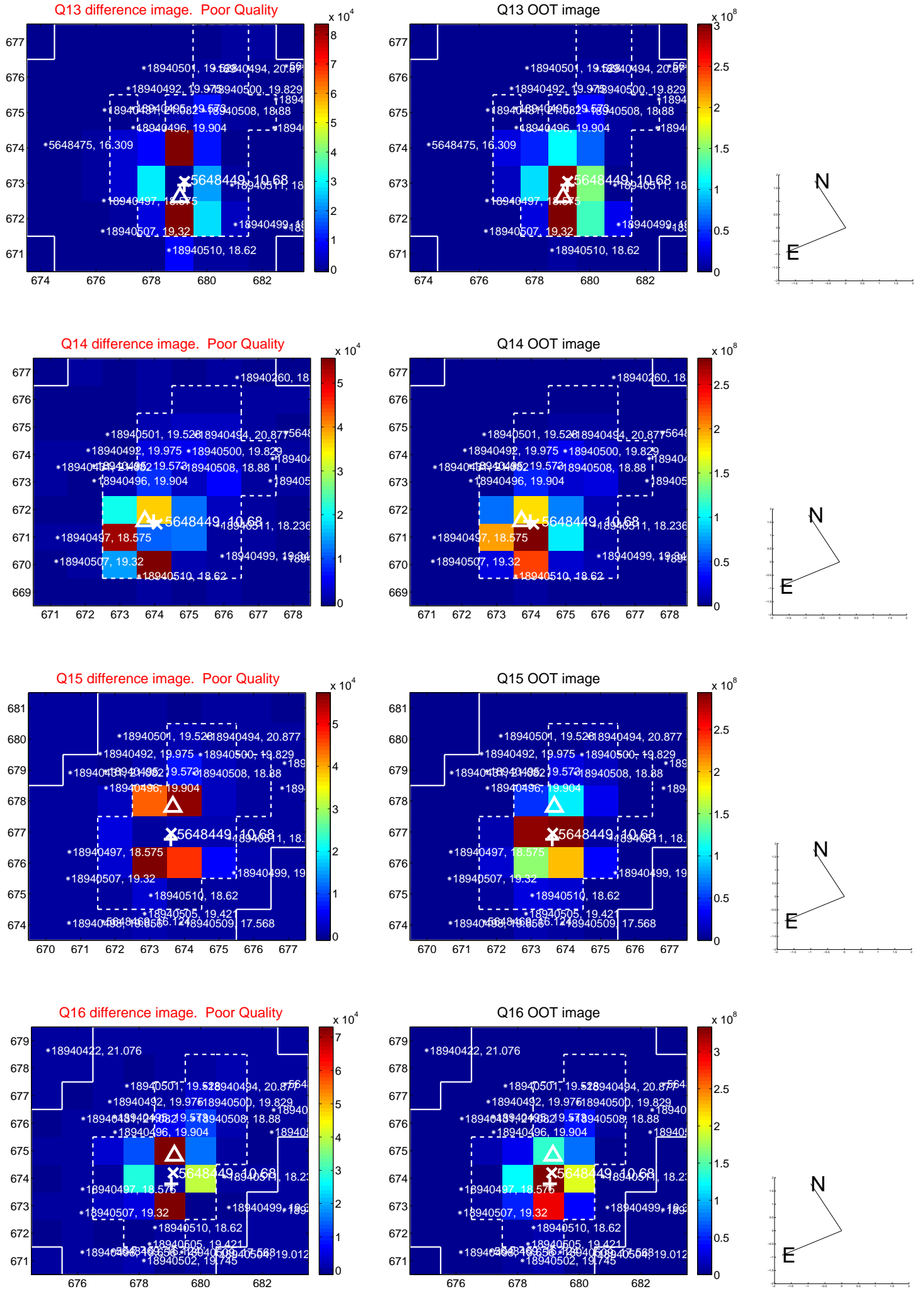
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



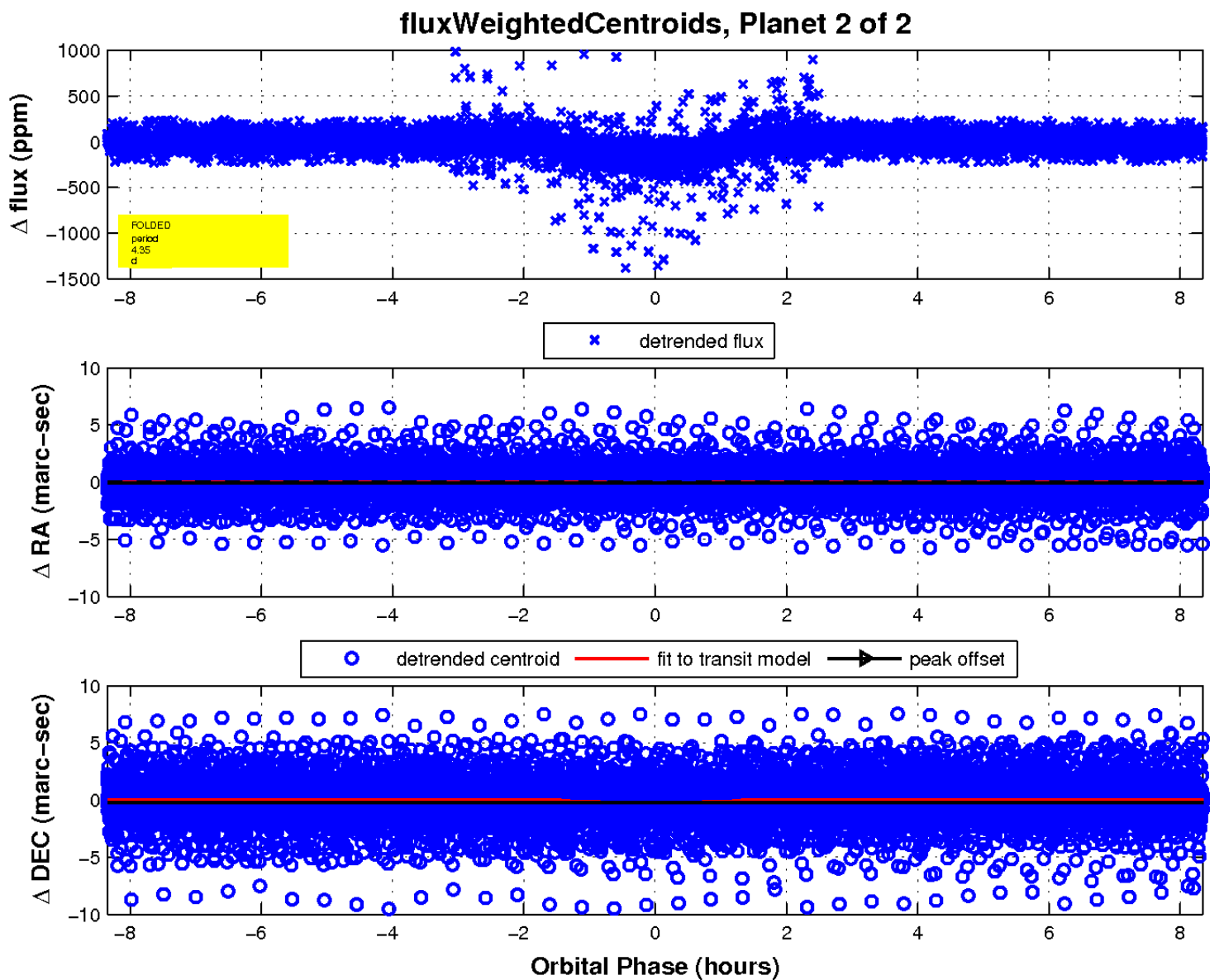
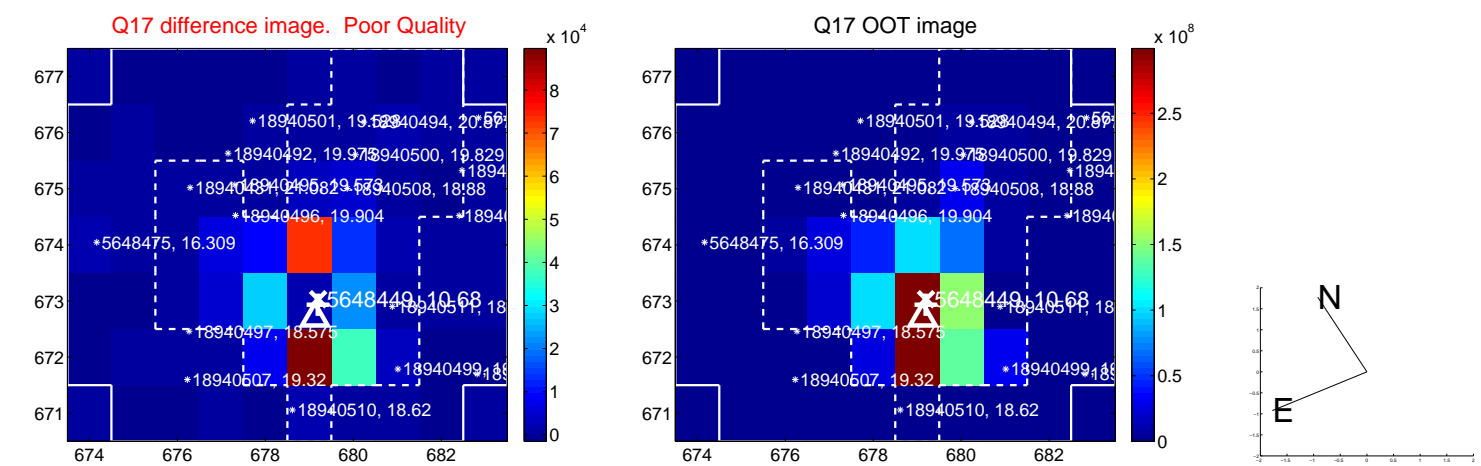
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

