Interactive comment on “Spectral representation of the annual cycle in the climate change signal” by T. Bosshard et al.

Anonymous Referee #1

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1 General Comments

In the manuscript “Spectral representation of the annual cycle in the climate change signal” T. Bosshard, S. Korlarski, T. Ewen and C. Schär suggest a parametric model based on harmonic functions to describe the annual cycle in temperature and precipitation data. Compared to a moving average, this approach yields a smoother estimate of the annual cycle, is less sensitive to sampling artefacts and allows a more robust estimation of the change signal of control and scenario runs. A nice illustration of the sampling problem for moving averages is given on the basis of synthetically generated precipitation series. The order of harmonic functions is chosen by cross validation on a set of observations. For a large set of various GCM-RCM chains, the parameters
of the harmonic functions describing temperature and precipitation in a control and
two scenario runs are estimated. The difference between control and scenario runs
are calculated and discussed. This discussion includes comparison to an estimate of
natural variability.

The manuscript is very well written and clearly understandable. The methods used are
briefly but sufficiently described. The illustrative simulation study for sampling prob-
lems is exemplary; as is the selection of harmonic orders based on cross validation.
Using harmonic functions in this case (in particular for temperature) is self-evident and
I wonder that this has not already become a standard approach. I consider this ap-
proach more difficult for precipitation due to the problems addressed by the authors
(skewed distribution, zero values); a Box-Cox transformation with a small offset is here
a straight forward but not necessarily the most sophisticated approach.

It was a pleasure to read the paper.

2 Specific Comments

2.1 Introduction

Another recent review on precipitation downscaling is D. Maraun et al., “Precipitation
Downscaling under Climate Change. Recent Developments to Bridge the Gap Be-

2.2 Techniques

I wonder, how well the Box-Cox transform does in transforming the precipitation distri-
bution towards a Gaussian. This might be a point to discuss.

2.3 Figures

Figures are in general well designed and informative. There seems to be a problem in Fig. 5, left column, panel 1 and 3: I suppose the black lines should be grey, indicating observations not changes in the cycle.

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