Journal: ACP
Title: Assessing large-scale weekly cycles in meteorological variables: a review
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MS No.: acp-2011-944
MS Type: Review Article

Response to Anonymous Referee #1

Minor Comments:

This paper is a very thorough and most updated summary on the current understanding of the weekly cycles in meteorological variables. The reviewer enjoyed reading the article. There are a few minor comments that the reviewer wants to make.

We appreciate these comments. Minor revisions are addressed below.

1. P. 1456, L. 21-22: "This implies that the WC is a large scale phenomenon, although it also has a clear distinct large-scale pattern." This sentence is unclear and should be rewritten.

We have rewritten the sentence that now reads as: "This implies that the WC is a widespread phenomenon, although it also shows a large-scale pattern. The strong spatial differences in the WCs sign and magnitude are difficult to explain, as for example the absence of significant results over Europe where the anthropogenic emissions and human activities are larger than in other areas that show significant WCs (e.g. Canada, Mongolia, etc.)."

2. P. 1463, L. 6: and Roh (2010)

The typo has been corrected.

3. P. 1464, L. 24-25: "neglecting "spatial auto-correlation while assessing the statistical significance of the merged time series" I agree with this statement of Hendricks-Franssen (2008). Considering temporal and spatial covariance structures also help us understand the physical nature of weekly cycles in meteorological variables. I think that this statement is worth repeating in the conclusion.

This statement is included in the Conclusions section when the major weaknesses of the studies dealing with the WCs are listed. In the revised manuscript this part of the Section 6 reads as: "The major weaknesses in the studies focusing on the WCs topic are linked to 1) neglecting spatial autocorrelation of the data, which if considered will reduce the number of independent series and the degrees of freedom; 2) the need of a better design of the methods in order to detect weekly cycles in large-scale averages; 3) the assumption of the normality in the series, which it is not always present in the climate data, especially when dealing with daily resolution; 4) the necessity of correcting the significance testing for the effects of the FDR problem if the analysis are performed on site by site or season by season basis without specifying choices a priori; and 5) the publication bias towards papers reporting significant results, which are more likely to be published than papers showing non-significant WCs."

4. Conclusion: Improvement of statistical tests is important to validate (or invalidate) weekly cycles in meteorological variables. In my opinion, however, it is extremely important to first understand the physical nature of weekly cycles, if any, in meteorological variables. Kim et al. (2010) paper is a clear indication that natural weekly cycles exist despite seemingly variable phases of those cycles. A typical dataset may not belong enough to eliminate natural weekly cycles completely. Then, statistical significance of weekly cycles, particularly in regard to an anthropogenic origin, does not make much sense. It is the reviewer's opinion that a significant improvement should be made in both physical and statistical approaches to weekly cycles. In order to look at the physical nature of weekly cycles, spatial and temporal covariance structures should be examined simultaneously.

In the revised manuscript we have included modifications in the Conclusions following this reviewer's suggestions, as well as the ones suggested by the other reviewer. Together with the revised text shows in item 3, we also pointed out the reviewer's suggestion in the last paragraph of the manuscript: "More research is needed on this topic, especially in order to improve the statistical methods and analysis of spatial and temporal patterns of the WCs. Additionally it is necessary to identify, understand and quantify the physical mechanisms beyond these atmospheric changes. This will yield a better understanding of the anthropogenic perturbations of the Earth's climate system, and especially the impact of the aerosol effects on the radiative balance."