**Atmospheric
Chemistry
and Physics
Discussions**

Interactive comment on "Weekly patterns of aerosol in the United States" *by* D. M. Murphy et al.

Anonymous Referee #2

Received and published: 28 February 2008

General comments

This paper presents an analysis of weekly cycles in aerosol concentrations in the USA. The paper is very well written and generally easy to follow. I have a few issues that I would like to see addressed, most of which relate to statistical aspects of the paper that affect the data interpretation, which I outline below

Specific comments

The authors state on page 525, line 28, that "The exact technique used to generate the clusters is less important than having some sort of regional averaging." I have concerns about this, because if clustering is done only on geographical basis, physical or statistical uniformity of clusters is not guaranteed. Averaging without ensuring each member of the cluster represents the same physical process will possibly merge data that are inhomogeneous, resulting in a new type of relationship that does not portray

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

well any of the individual station data. This leads to a question that if weekly cycles are not significant at single sites, what causes the significant differences between weekdays seen in clusters? In addition, one must be careful in forming the clusters; results can vary wildly depending on the method (see e.g. Gong and Richman, 1995) and different hierarchical clustering methods can give different grouping on the same data set with the same number of clusters.

Statistical significance of the variation between weekdays is tested only by comparing the measured weekly cycle into 500 randomized samples of the data. Resampling methods have their advantage over normality assumption based methods in this kind of data with known autocorrelations, but they have their flaws especially with sample sizes as small as 500. Some rank sum based nonparametric methods (used e.g. in Schultz et al. (2007) to detect weekly cycles in the amounts of precipitation) could give a clue if the significant differences between days of the week gained with resampling are real and not just a result of a sampling error.

I would like to see more clearly how sample collection only every third day affects the interpretation of the results, as an individual sample is not a value of a single day but a sum from three consecutive days. In addition, I did not find notation from the text if the sample collection day is the same within each cluster. If the collection days differ within clusters, it is a potential source of additional random variation and it should be taken into account when judging the statistical significance of weekly cycles.

Minor comments

Weekly cycles in different clusters are hard to detect from figures (e.g. fig. 3) in printed form. Would it be possible to increase the sizes of the distributions or present the daily means/medians and appropriate confidence limits in a table?

In Figure 7. summer minimum seems to be on Monday, not on Sunday as stated on page 533, line 2. Conclusions made about seasonal differences should be corrected respectively.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

References

Gong, X.-F. and M.B. Richman, 1995: On the application of cluster analysis to growing season precipitation data in North America east of the Rockies. J. Climate, 8, 897-931.

Schultz, D. M., S. Mikkonen, A. Laaksonen, and M. B. Richman (2007), Weekly precipitation cycles? Lack of evidence from United States surface stations, Geophys. Res. Lett., 34, L22815, doi:10.1029/2007GL031889.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 521, 2008.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper