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Atmospheric Chemistry and Physics Discussions

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

Anonymous Referee #1

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This paper presents an analysis of mostly rural and remote measurements of particulate matter mass and chemical composition in the USA, typically at national parks and wilderness areas. The main question being considered is whether there are significant weekly cycles in the data. A major strength of the analysis is the large underlying number of data points (many sites, a continuous 6-year data record with sampling once every third day), with extensive chemical analysis of the filter samples in addition to mass determinations. The paper is well-written, and original in terms of data used to address weekly cycle issues that have not been widely studied for particulate matter.

Specific Comments

Individual sites have been clustered based on geographic location as shown in Figure 1 of the Discussion paper. National averages were formed by averaging results for each cluster with equal weighting regardless of number of sites or average pollutant levels

in each cluster (Figures 2, 4, 7 and 8; lower right panel). There is an inconsistency in the way individual site data were averaged into clusters versus how clusters were aggregated into the national averages. The authors rationale on page 529, lines 20-25, for how normalized daily values for each cluster were combined into a national average, also would apply to averaging data from individual sites within a cluster. The statistical significance of the findings will be strengthened if a "normalize first, average second"; approach is applied to individual sites. As the authors note in the text starting at line 28 on page 526, there can be significant dilution effects that lead to differences in absolute pollutant loadings at individual sites within a cluster, due for example to differences in proximity to upwind sources. Such dilution effects give rise to site-to-site variability that is not relevant to the assessment of weekly cycles in the data, and the dilution effects should therefore be removed from the analysis (prior to clustering) wherever possible.

Technical Corrections

Page 529, line 3, please clarify which figure you are referring to.

Page 531, line 19, what is the reduction in diesel emissions on weekends?

Page 532, line 11, delete southern.

Reference list issues. Page 537, line 4, Aerosp. should be Aerosol. Also the abbreviation for J. A&WMA should be J. Air Waste Manage. Assoc. at lines 2, 8 on p. 537 and lines 6, 18 on p. 538. There is a spurious ? appearing at line 2 on p. 538.

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