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- Title and Author Search

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[Volumes and Issues](#) [Contents of Issue 10](#)

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Weekly patterns of aerosol in the United States

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Abstract. Data from the Interagency Monitoring of Protected Visual
Environments (IMPROVE) network of aerosol samplers and NOAA
monitoring sites are examined for weekly cycles. At remote and rural sites,
fine particle elemental carbon, crustal elements, and coarse particle mass
had pronounced (up to 20%) weekly cycles with minima on Sunday or
Monday. Fine particle organic carbon and mass had smaller amplitude
cycles, also with Sunday or Monday minima. There was no statistically
significant weekly cycle in fine particle sulfate despite a 5 to 15% weekly
cycle in power plant SO₂ emissions. Although results for nitrate may be
more susceptible to sampling artifacts, nitrate also showed a pronounced
weekly cycle with an amplitude similar to elemental carbon. The only
species found with a weekend maximum was Pb, probably from general
aviation on weekends. Aerosol optical properties at NOAA monitoring sites
were consistent with the IMPROVE chemical data, with significant weekly
cycles in aerosol light absorption but not light scattering. These results
support a large role of diesel emissions in elemental carbon aerosol over
the entire United States and suggest that a large fraction of the airborne
soil dust is anthropogenic. They also suggest that studies of weekly cycles
in temperature, cloudiness, precipitation, or other meteorological variables
should look for causes more in light-absorbing particles and possible ice
nucleation by dust rather than sulfate or total aerosol. There are also
implications for personal exposure and epidemiological studies of aerosol
health effects.

[Final Revised Paper](#) (PDF, 776 KB) [Discussion Paper](#) (ACPD)

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