Atmos. Chem. Phys. Discuss., 13, C3614–C3616, 2013
www.atmos-chem-phys-discuss.net/13/C3614/2013/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Aerosol and precipitation chemistry in the southwestern United States: spatiotemporal trends and interrelationships" *by* A. Sorooshian et al.

Anonymous Referee #3

Received and published: 14 June 2013

General Comments

This paper provides a long-term (15 year) comparison of aerosol characteristics (coarse and fine particulate matter) and precipitation characteristics (rain and snow) based on simple statistical analyses (averages, standard deviations, and correlation coefficients) of archived data obtained from the IMPROVE and NADP Networks. Data from six national parks and monuments were analyzed, spanning four states (Utah, Arizona, Colorado, and New Mexico) in the Southwest. The Southwest was an appropriate choice for this study given its high dust concentrations and meteorological variability.

The authors did a good job of focusing on major trends in the paper, such as the role of crustal elements in increasing rainwater pH, the role of particulate as CCN and IN, and the decreasing concentrations of SO42- during to air regulations. They also provided possible explanations for trends that could not be readily explained, such as the precipitation NO3-:SO4- ratios and the roles of different particle sizes as CCN and IN. Appropriate references were cited throughout the paper, and the authors used the literature, together with their own findings, to identify and explain key trends. The paper makes a strong contribution to the field of atmospheric chemistry because of these strengths. The trends described will also be worth monitoring over time – to see how changes in climate (e.g., less snow and more dust) or air regulations (reducing sulfate and nitrate emissions) will affect these findings.

The graphs and tables were clear and concise. The tables (in both the paper and appendix) provide more detailed information for interested readers, while the text highlights more general trends.

Specific Comments and Questions

In Table 1, could you also include the states in which the national parks or monuments are located? They are indicated in Fig. 1, but would also be useful in the table.

I was surprised that Grand Canyon National Park was not included among your sites. Any reason? To my knowledge, both aerosol and wet-deposition measurements were recorded there as well during this time period.

Could you comment on why you chose 3 days for the HYSPLIT back trajectories and 10 m AGL? (I am more accustomed to authors using 100, 500, and 1500 m AGL.)

The HYSPLIT back trajectories typically include the Phoenix area (Maricopa and Gila Counties), yet you make no mention of anthropogenic sources of pollutants from this region. (Hutchings et al., 2009 suggested that the Phoenix metropolitan area had influenced cloud chemistry in Flagstaff.)

ACPD
13, C3614–C3616, 2013

Biomass burning is mentioned on several occasions in a general way, but Arizona is well-known for extensive prescribed burning (mostly in early Spring and late Fall) and catastrophic fires (e.g., the Rodeo-Chediski fire in 2002). Was there any evidence that those events impacted the OC levels in the aerosol data?

Technical Corrections

None. The paper was well organized and clearly written.

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 8615, 2013.