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MEASUREMENT AND INTERPRETATION OF ACIDITY IN SOUTHERN CALIFORNIA RAINFALL AND AEROSOLS

James J. Morgan
Principal Investigator

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Measurement and Interpretation of Acidity in Southern California Rainfall and Aerosols

INVESTIGATORS: J. J. Morgan, Professor of Environmental Engineering Science
H. M. Liljestrand, Graduate Student, Environmental Engineering Science

The long-term goal of this work is to assess the environmental significance of acidity transport in the Southern California region. There are three potentially important transport routes: wet flux of acidity to the surface of the basin; dry flux of acidity as aerosol deposition; absorption of acidic and basic gases at the basin surface. We view the research from two perspectives: (1) the overall mass balance aspect of sources and sinks for various acids and bases (nitric acid, sulfuric acid, ammonia, organic acids, etc.) in the basin, and (2) the potential environmental impact of acid components transported via specific routes.

The purpose of this research is to understand the transport of acidity in its various physical-chemical forms from energy-related sources to receptors in the Southern California region. The work entails: (a) chemical characterization of rainfall to define kinds and amounts of acid substances present; (b) relationships between air quality and the acid-base chemistry of Southern California rainfall; and (c) the relationships between acid transport and sources of acidity.

Work completed to date includes: (1) continued sampling of rainfall at Pasadena and the analytical determination of pH, total acidity, major anions and cations, organic carbon, and certain trace metals in samples; (2) establishment of precipitation sampler stations and collection of rainfall samples at Azusa, Central Los Angeles,

Mount Wilson, Westwood, Riverside, and Wrightwood; (3) measurement of dry deposition of aerosols on snow and determination of acidity transport thereby; (4) initial studies on dry aerosol deposition and associated acidity transport at Pasadena, Mount Wilson, Riverside, Los Angeles, and Westwood.

The coming year's work will emphasize completion of the mass-balance aspect by continued rainfall sampling at several locations, further dry aerosol deposition flux measurements at several locations, and intensive measurement of gas profiles of SO_2, NO_x, and NH_3 near the basin surface in order to estimate gas absorption fluxes. In order to better define the importance of organic acids in rainfall we will collect samples to be freeze-dried and separated by high pressure liquid chromatography (HPLC). Acids will then be detected by UV spectrophotometry, Ce fluorescence, and conductivity.

PUBLICATIONS FROM PROJECT ELEMENT NO. 8

*8a Liljestrand, H. M., and Morgan, J. J., "Chemical Composition of Acid Precipitation in Pasadena, California," Environmental Science and Technology Vol 12 (1978): 1271-73.

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*Asterisks denote publications containing work not sponsored directly by DOE.