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Project Summary

A Data Users Guide to the Mountain Cloud Chemistry Project

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Atmospheric pollution is deposited on the forests of the eastern United States in a variety of forms. Concern has been raised that the exposure to and deposition of these atmospheric pollutants may play a role in the decline of these forests. The Mountain Cloud Chemistry Project (MCCP), sponsored by the U.S. Environmental Protection Agency (EPA) and the National Acid Precipitation Assessment Program (NAPAP), has studied the exposure and deposition of atmospheric constituents to these forests.

Research scientists and technicians of the MCCP have measured the concentrations of atmospheric pollutants at six remote monitoring stations for four growing seasons (1986-89). Measurements of ozone, sulfur dioxide, oxides of nitrogen, hydrogen peroxide, cloud and rain water ions, meteorological parameters and other parameters of interest were collected at sites in Howland ME, Mt. Moosilauke NH, Whiteface Mt. NY, Shenandoah Park VA, Whitetop Mt. VA, and Mt. Mitchell NC. Not all measurements were made at all sites in all years.

This report serves to document the type and amount of data collected for the Mountain Cloud Chemistry Project during the four warm seasons between 1986 and 1989. Details are presented on: the locations of the six research/ monitoring sites, the types of measurements made, the periods of record, the quality of the data, and the availability of the data.

This Project Summary was developed by the EPA's Atmospheric Research and Exposure Assessment Laboratory, Research Triangle Park, NC, to announce key findings of the research project that is fully documented in a separate report of the same title (see Project Report ordering information at back).

Introduction

During the warm months of 1986-89 the MCCP made measurements at six remote sites in the eastern U.S.. These data were collected under one set of protocols and quality assurance procedures. A database containing these data was assembled by The Fleming Group in Albany, NY. This report documents the types of data collected and archived by the MCCP, and the periods of record for these data.

The Mountain Cloud Chemistry Project (MCCP) was constituted to address three primary objectives:

(1) Determine the elevational gradients in wet and dry deposition of pollutants and climate variables;

(2) Determine the relative significance of various deposition mechanisms to the fluxes of chemical species into and through forest canopies;

(3) Determine the frequency distributions of chemical, physical and climatic exposure.

These objectives have been addressed in other reports, most recently and completely in "An Assessment of Atmospheric

Exposure and Deposition to High Elevation Forests in the Eastern United States."

Measurement Sites

Research/monitoring sites associated with MCCP, their site codes and the locations of their primary measurement sites are presented in Table 1.

Table 1. MCCP Sites

Howland Forest, ME	*lat. 45°12'N*
HF	*long. 68°42'W*
	elev. 65 m
Mt. Moosilauke, NH	*lat. 43°59'N*
MS	*long. 71°48'W*
	elev. 1000 m
Whiteface Mountain, NY	*lat. 44°23'N*
WF	*long. 73°57'W*
	elev. 1483 m
Shenandoah Park, VA	*lat. 38°38'N*
SH	*long. 78°21'W*
	elev. 1014 m
Whitetop Mountain, VA	*lat. 36°38'N*
WT	*long. 81°36'W*
	elev. 1689 m
Mt. Mitchell, NC	*lat. 35°44'N*
MM	*long. 82°16'W*
	elev. 2038 m

Measurements

The measurements presented in Table 2 were made in accordance with the "MCCP Standard Operating Procedures" and the "MCCP Quality Assurance Plan." The data collected at the MCCP sites may be categorized as gaseous chemical measurements, aqueous chemical measurements and physical/meteorological measurements.

Periods of Data Records

Measurements were performed during the warm seasons at the MCCP sites from 1986-89. The Howland Forest site commenced operations in 1987. The starting and ending dates of these seasons varied by site and year, largely due to logistical constraints. However, the sites generally began operations in April-May and continued through September-November.

These dates correspond closely with the periods of record for continuous gas, presence of cloud, throughfall and meteorological measurements. However, cloud water sampling and liquid water content measurements were performed during shorter, "intensive" monitoring periods during the field seasons. Intensives might be as short as two weeks or as long as two months. During intensives the field technicians attempted to collect samples whenever possible (placing health and safety concerns first and foremost).

Quality Assurance

The MCCP research sites follow standard data collection protocols and follow MCCP Quality Assurance Project Plans (QAPjPs) for all network standard measurements. In the final measurement season (1989), the QAPjPs in force covered meteorological monitoring, cloud water collection and analysis, liquid water content measurement, and monitoring of ozone and sulfur dioxide.

Semi-annual QA reports summarize the QA program activities at each of the MCCP field sites and labs. These reports include a presentation of data collected, precision and accuracy goals, QC check results and significant operational problems and corrective measures taken at each lab and field site for each measurement system.

Table 2. MCCP Measurements

Gaseous chemical measurements:			
ozone-continuous	*TECO 49 UV photometry*	*hourly average*	*ppbv*
sulfur dioxide-continuous	*TECO 43a pulsed fluorescence*	*hourly average*	*ppbv*
oxides of nitrogen-continuous	*TECO 14 emission spectroscopy*	*hourly average*	*ppbv*
hydrogen peroxide	*Kok enzyme catalyzation*	*hourly average*	*ppbv*
Aqueous chemical measurements:			
cloud water inorganic ion chemistry	*ASRC and CASC string collectors*	*hourly during events*	*µmol/l*
cloud water hydrogen peroxide	*ASRC and CASC string collectors*	*hourly during events*	*µmol/l*
rain chemistry from precipitating clouds	*funnels or buckets*	*hourly during events*	*µmol/l*
throughfall chemistry	*funnels*	*weekly*	*µmol/l*
Physical/Meteorological measurements			
cloud liquid water content	*Valente gravimetric*	*hourly during events*	*g/m²*
presence of cloud	*AWS forward scatter*	*hourly total*	*hours*
precipitation amount	*tipping bucket*	*hourly total*	*mm*
air temperature	*thermistor*	*hourly average*	*°C*
relative humidity	*capacitor*	*hourly average*	*%*
solar radiation	*silicon photocell*	*hourly total*	*W/m²*
barometric pressure	*piezoresistance*	*hourly average*	*mb*
wind speed	*propellor anemometer*	*hourly average*	*m/s*
wind direction	*vane potentiometer*	*hourly vector ave.*	*degrees*

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Ralph Baumgardner is the EPA Project Officer (see below).
The complete report, entitled "A Data Users Guide to the Mountain Cloud Chemistry Project," (Order No. PB91-168 484 /AS; Cost: $11.00, subject to change) will be available only from:
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
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