



Project Summary

Regional Acid Deposition: Design and Management Plan for a Comprehensive Modeling System

This companion report to *Regional Acid Deposition: Models and Physical Processes* presents a design and management plan for the development of an Eulerian regional acid deposition model. It first reviews the fundamental physical processes relevant to acid deposition and then describes the proposed model system. The principal components are discussed in detail with special emphasis on model initialization and subsystem validation. The total system integration and full validation are presented separately. The management plan section focuses on internal structure, external interactions, and special facility needs. Strongly managed interdisciplinary interactions and intensive "hands-on" working groups for external interactions are suggested.

This Project Summary was developed by EPA's Environmental Sciences Research 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

This document presents a design and management plan for developing of a state-of-the-art Eulerian model for regional acid deposition. This plan is based on the companion document *Regional Acid Deposition: Models and Physical Processes*, the key conclusions of which are:

- Existing models of regional acid deposition contain fundamental weaknesses, particularly by not accounting for upper-air transport and dispersion, omitting detailed chemical reactions, neglecting cloud physics, and inadequately treating terrain and surface effects.
- Marked improvements in acid deposition modeling are now possible because of recent advances in mesoscale meteorology and tropospheric chemistry; a comprehensive regional acid deposition model can thus be constructed.
- The development of such a comprehensive model requires a clearly focused, multidisciplinary group effort under strong scientific leadership.
- The Eulerian framework is most suitable for representing the essential physical and chemical processes in regional acid deposition

Conclusions and Recommendations

A plan is presented for integrating recent advances in mesoscale meteorology, tropospheric chemistry, and advanced computing into a scientifically defensible, state-of-the-art regional acid deposition modeling system. A model system developed according to this plan would differ from current models in the following ways:

- It would be based on an established, proven, mesoscale meteorological model and its analysis techniques.
- It would use fundamental chemical process equations to predict the relevant transformations; thus, our understanding of the fundamental processes could be tested by comparison with observed data.
- It would incorporate the details of both wet and dry deposition.
- Effort would be focused on analyzing the sensitivity of model predictions to uncertainties in chemical initialization and parameterizations.
- Effort would also be focused on the proper statistical interpretation and application of the model results.
- It would be modular and highly flexible and would thus allow the easy incorporation of new research results.

This Project Summary was authored by staff of The NCAR Acid Deposition Modeling Project, National Center for Atmospheric Research, Boulder, CO 80307.

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The complete report, entitled "Regional Acid Deposition: Design and Management Plan for a Comprehensive Modeling System," (Order No. PB 84-116 003; Cost: \$8.50, subject to change) will be available only from:

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