

Issues in Atmospheric Science

“Everybody talks about the weather, but nobody does anything about it.” Atmospheric science includes understanding and predicting weather, of course, but it encompasses much more than that. Many chemical reactions in the atmosphere involve very small concentrations and occur at conditions of pressure and temperature that are difficult to obtain in laboratory measurements of rate constants. Coupled with complicated mass transport as well as photochemistry, this makes for an extraordinary set of problems, requiring both exotic laboratory procedures and great physical insight. *Science* regularly reports significant advances in all of the atmospheric sciences; the AAAS-Newcomb Cleveland prize for outstanding articles published in *Science* was awarded recently for two papers (one authored by Molina, Tso, Molina, and Wang; the other by Tolbert, Rossi, Malhotra, and Golden) in the atmospheric sciences that address the problem of important reactions occurring on particulate matter, especially ices, in the stratosphere.

In spite of the rather fatalistic remarks about doing nothing about the weather, in recent years we have actually been doing quite a lot. And much of what we have been doing about the atmosphere and our climate is apparently undesirable. In this issue on atmospheric sciences we present overviews of four areas in which major advances have occurred in our understanding of the chemistry of the atmosphere and the impact that various human activities are having on it. The articles view aspects of atmospheric problems on scales that range from local urban areas to the entire global atmosphere. In this all-encompassing view, we see, for example, that ozone can be both good and bad. It acts as a significant pollutant locally, while at high altitudes it provides a valuable photochemical screen whose destruction plays an important role in overall global climate warming. Each of the authors addresses not only the causes and consequences of various activities, but also possible ways of attacking some of the problems.

Seinfeld discusses urban air pollution, a critical problem for everyone who lives in a large city. Seinfeld characterizes the urban atmosphere as a giant chemical reactor in which a variety of undesirable materials are formed. A good deal of what is occurring is now well understood, but uncertainties remain. Schwartz deals with a regional problem: acid deposition. In this arena of regional-scale air pollution, the difficulties are magnified because of the high density of emission sources and mutual zones of influence. Although much is now understood about the basic nature of the problem, it is not yet possible to put forward a credible source-receptor scientific model. It is clear that reduced emissions will, however, result in reduced deposition. McElroy and Salawitch address the changing composition of the global stratosphere. Models show excellent agreement for many of the species. Ozone is a key compound here, and the effects of human activity, especially with regard to halocarbons, play an important role in the chemistry.

Finally, Schneider addresses global climate warming, the “greenhouse effect.” Is there one? What are its consequences? It is clear from other work, some recently published in *Science*, that short-term climatic problems, such as last year’s drought, are a result of other effects. Schneider, however, makes the case that we are likely to see a rise in global temperature, and even a modest increase is predicted to have a substantial impact. Consequences and ways of dealing with the problems are presented. Atmospheric science is an area in which scientific understanding is critical to our long-term quality of life. The progress that has been made recently has been remarkable. We need to respond now to what we know, while continuing to develop the knowledge base. Simply describing what is happening, however, should be only part of the story.

—JOHN I. BRAUMAN

American Association for the Advancement of Science
Science serves its readers as a forum for the presentation and discussion of important issues related to the advancement of science, including the presentation of minority or conflicting points of view, rather than by publishing only material on which a consensus has been reached. Accordingly, all articles published in *Science*—including editorials, news and comment, and book reviews—are signed and reflect the individual views of the authors and not official points of view adopted by the AAAS or the institutions with which the authors are affiliated.

Publisher: Philip H. Abelson, Acting

Editor: Daniel E. Koshland, Jr.

Deputy Editor: John I. Brauman (Physical Sciences)

EDITORIAL STAFF

Managing Editor: Patricia A. Morgan

Assistant Managing Editor: Nancy J. Hartnagel

Senior Editor: Eleanor Butz

Associate Editors: Keith W. Broekhuizen, Martha Coleman, R. Brooks Hanson, Barbara Jansy, Katrina L. Keiner, Edith Meyers, Linda J. Miller, Phillip D. Szustrom, David F. Voss

Letters Editor: Christine Gilbert

Book Reviews: Katherine Livingston, editor

This Week in Science: Ruth Levy Guyer

Contributing Editor: Lawrence I. Grossman

Chief Production Editor: Ellen E. Murphy

Editing Department: Lois Schmitt, head; Mary McDaniel, Patricia L. Moe, Barbara E. Patterson

Copy Desk: Joel S. Granger, Jane Hurd, MaryBeth Sharlie, Beverly Shields

Production Manager: Karen Schmoles Colson

Assistant Production Manager: James Landry

Graphics and Production: Holly Bishop, James J. Olivarr, Yolanda M. Hook

Covers Editor: Grayce Finger

Manuscript Systems Analyst: William Carter

NEWS STAFF

News Editor: Barbara J. Culliton

Deputy News Editors: Roger Lewin, Colin Norman

News and Comment/Research News: William Booth, Greg-ory Byrne, Mark H. Crawford, Constance Holden, Richard A. Kerr, Eliot Marshall, Jean L. Marx, Robert Pool, Leslie Rob-erts, Marjorie Sun, M. Mitchell Waldrop

European Correspondent: David Dickson

Contributing Writer: John Walsh

BUSINESS STAFF

Circulation Director: John G. Colson

Fulfillment Manager: Ann Ragland

Business Staff Manager: Deborah Rivera-Wienhold

Classified Advertising Supervisor: Karen Morgenstern

Guide to Biotechnology Products and Instruments: Shauna S. Roberts

ADVERTISING REPRESENTATIVES

Teleex 42513; FAX (0647) 52053.

Damascus, MD 20872; Rick Sommer, 11318 Kings Valley Dr.

VT 05251; Fred W. Dieffenbach, Kent Hill Rd. (802-867-5581);

95112; Bob Brindley, 310 S. 16th St. (408-998-4690); Dorset,

CA 95112; W. Higgins Rd. (312-885-8675); San Jose, CA

Callis, 12 Umani Lane (201-889-4873); Chicago, IL 60914;

way (212-730-1050); Scotch Plains, NJ 07076; C. Richard

Sales: New York, NY 10036; J. Kevin Henneberry, 1515 Broad-

Employment Sales Manager: Edward C. Keller

Marketing Manager: Herbert L. Burkland

Advertising Sales Manager: Richard L. Charles

Traffic Manager (Recruitment): Gwen Canler

Director: Earl J. Scheraga

Information for contributors appears on page XI of the 23

December 1988 issue. Editorial correspondence, including

requests for permission to reprint and reprint orders, should

be sent to 1333 H Street, NW, Washington, DC 20005. Tele-

phone: 202-326-6500.

Advertising correspondence should be sent to Tenth Floor,

1515 Broadway, New York, NY 10036. Telephone 212-730-

1050 or WU Teleex 968082 SCHEERAGO, or FAX 212-382-

3725.