

active isotope techniques to measure biogenic silica production and dissolution have given us a much better idea of where opal is being produced. The processes that control opal production are also better understood when the role played by silicic acid availability is considered. Indeed, silicic acid is often neglected as a potential limiting nutrient in pelagic environments, despite its key role in the control of phytoplankton succession and in the export of biogenic matter.

Significant progress has been made recently in the study of sediments, in particular by using flow-through dynamic techniques that quantify biogenic silica solubility and reactivity. There are many important factors that should be incorporated in models describing the early diagenesis of biogenic opal. These include the quantification of the downcore decrease in silica reactivity due to surface aging or growth of surface coatings; the importance of aluminum in controlling silica solubility; the role of the opal rain rate and the importance of the detrital material in controlling asymptotic silicic acid concentration; and the normalization of opal flux to the known flux of ^{230}Th , which is scavenged from the water to correct for sediment focusing or winnowing.

Despite substantial progress in these areas, we still need a better understanding of several important aspects of the modern silicon cycle before opal can be used effectively as a proxy. The process of silicification needs to be described in detail if we are to better understand the processes that control opal dissolution, and ecological and physiological studies of diatoms' life cycle will help us better interpret the sedimentary record of siliceous microfossils assemblages. In the water column, it is not yet clear whether or not grazing acts as an accelerator of the biogenic particle flux or favors opal dissolution. Furthermore, high interannual variability, lateral transport, and the importance of episodic events that produce radiolarian pulses or laminated diatom sediments are other examples of short timescale phenomena that may greatly influence the sediment record but are difficult to take into account.

The need for further study of paleoproductivity proxies in the modern ocean led the participants to recommend that the meeting be used to launch a broad OPALEO project in which biogeochemists, micropaleontologists, and paleoceanographers will join efforts through a series of seasonal cruises at particular sites that present a large range of

conditions for opal sedimentation. A follow-up meeting for the principal investigators of OPALEO is planned for early 1997.

Sponsorship

The workshop was organized under the umbrella of the European Commission, the North Atlantic Treaty Organization, the Ministère de l'Éducation Nationale, de l'Enseignement Supérieur et de la recherche, the Centre National de la Recherche Scientifique (CNRS), the Conseil Régional de Bretagne, the University of Western Brittany, the Communauté Urbaine, and the town of Brest. All these partners are gratefully acknowledged. The authors also wish to thank all the participants and the local organizing committee for participating in such a fascinating and convivial meeting.—*Olivier Ragueneau, Aude Leynaert, and Paul Tréguer, Unité de Recherche Associée au CNRS 1513, Institut Universitaire Européen de la Mer, Brest, France; David J. Demaster, Department of Marine, Earth and Atmospheric Sciences, North Carolina State University, Raleigh; and Robert F. Anderson, Lamont-Doherty Earth Observatory, Geochemistry Building, Palisades, N.Y.*

FORUM

Tropospheric Chemistry: Global Change and Urban Neglect

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During the past decade, major advances have been made in the field of tropospheric chemistry, especially with regard to ozone and associated species (reactive nitrogen, peroxides, and OH). These advances have been driven largely by a series of field measurement campaigns in locations ranging from Brazil and Hawaii to Greenland and Nova Scotia. There is a major gap in the coverage of the tropospheric research program, however. Ozone chemistry is not measured in urban and downwind locations in the United States that are subject to violations of air quality standards.

The key species for evaluating ozone chemistry (speciated reactive nitrogen and hydrogen peroxide) are measured extensively at rural sites in the United States. Over

the past 5 years, more than 50 articles analyzing measurements of ozone chemistry have appeared in the *Journal of Geophysical Research* and other peer-reviewed journals. Only two of these articles gave field measurements for cities in the United States (Los Angeles and Atlanta), and analyses of these measurements were far less extensive than those for the rural sites.

The lack of attention to urban air exhibited by the atmospheric research community is striking. For example, a recent field campaign followed the evolution of the urban plume from the northeast corridor of the United States as it traveled across the Atlantic Ocean, but no field campaign has ever analyzed the chemistry of air within the northeast corridor itself. It is almost as though highly polluted environments are outside the domain of interest of the atmospheric chemistry community.

The failure to include urban and urban-downwind regions in field campaigns reflects the attitude among funding agencies that only rural and remote locations are worthy of scientific investigation. The chemistry of ozone in urban areas is thought of as an affair for regulatory policy rather than science.

To the contrary, urban chemistry is every bit as challenging as the remote troposphere, and it is certainly worthy of attention from the best scientists in the field. Five years ago National Research Council recommended that a program of research into the chemistry of urban ozone be established and controlled independently of the U.S. Environmental Protection Agency. Despite this recommendation, the funding agencies that traditionally support atmospheric chemistry research continue to devote little effort to urban environments and instead focus on global-scale processes.

At the AGU Fall Meeting, special sessions on the Southern Oxidants Study (**A12E**, **A21D**, and **A31A**) measurement effort in Nashville, Tenn., will illustrate the exciting science that can be done in urban environments. I invite all conference attendees to take the opportunity to learn about this frequently neglected subject.—*Sanford Sillman, Department of Atmospheric, Oceanic and Space Sciences, University of Michigan, Ann Arbor*