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A review of: “Biogenic Trace Gases: Measuring Emissions From Soil and Waters”

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BOOK REVIEW

BIOGENIC TRACE GASES: MEASURING EMISSIONS FROM SOIL AND WATERS, P. A. Matson and R. C. Harriss, publ. Blackwell Science, printed University Press, Cambridge, Price £26.50 (paperback), 394 pp., 70 Figures, 15 Tables, references and index. ISBN 0-632-03641-9.

The aim of the series “Methods in Ecology” of Blackwell’s is to provide ecologists with concise and authoritative books for choosing and applying appropriate methods. Earlier books in this series had single or double authors, so they could be seen in that light. The overall editors of the series argue that the books claim to take a critical look at different approaches of a problem, whether in the laboratory or the field, as well as providing a source of reference to the literature.

The book focuses on microbial transport of carbon and nitrogen compounds as well as some sulphur gases. This claim to provide a critical review is covered and that certainly it provides the latter—each chapter has four to more than nine pages of references. Individual or joint authors of the eleven chapters seem initially to be too much for the “appropriate or selected” methodology for sampling the complex issues involved in sampling even such a complex ecosystem. The chapters, however, trace out the problems of measuring emissions in atmosphere, water exchanges and several techniques are covered, including one on microbial processes governing nitric oxide.

The book gives reviews on standard methods of measuring trace gases, chemistry at ambient concentrations, spectrometric measurement, and the use of isotopes and tracers. Three chapters develop methods for enclosure measurements, air/water transfer in fresh water and coastal environments, and the ebullition and transfer by

plants. Two chapters concentrate on microbial processes. The final chapter proposes models on processes and spatial extrapolation.

The work on the biosphere-atmosphere gas exchange through the effort of atmospheric scientists covers many aspects of changes in relationships of trace gas exchanges with other media, such a surface water, sediments, soils, and parts of atmosphere. To some extent the overall flux of gases (sources and sinks) are well known, but some are missing or poorly estimated and knowledge of the causes of climatic change become critical and it is difficult to assess change. The book tries to develop better understanding of what factors control fluxes, arrange for measurements useful for regional or global scale estimates, and to predict disturbances which may affect fluxes in future. The chapters given here show the differences between different ecosystems and methods of measuring them but the spatial and temporal flexibility of fluxes is seen as one of the problems in estimating gas fluxes, although this also shows how the variability can be seen to improve our understanding. The distinction is made in terms of soil differences—the proximal ones relate to the oxygen, carbon dioxide and nitrate changes, but the more distal ones relate to climate, disturbance and soil types. These effect the difference between the scale of small enclosers, and the distal ones reflect much coarser scales.

In the past, site-based measurements were done by atmospheric chemists who carried out much solid work on regional/global systems estimates, and soil and microbial processes were carried out by ecologists, microbiologists and soil physicists. Today interdisciplinary teams often try to estimate and evaluate gas fluxes but also the controlling mechanisms of change. Today measurements are made with different gases, and, for instance, the nitrogen story is one with much effort made to gather information from different kinds of abiological and microbial processes. This approach is why simulation models are developed, and need some scale on which the processes can be refined by real data.

There is much to ponder about on this theme, and many of the chapters show attempts to get around many of the processes that control gas fluxes, whether the role of guiding scientists on the “right” way to undertake research is difficult; I think the choice made by the book is the result of working back through information in many ways.

The chapter authors are almost entirely American, but typesetting is English! Generally the book is well produced and planned. At the (American?) price it is a book that can be on many library shelves.

G. Howells
7 May 1996