GEOCHEMICAL CYCLES OF NUTRIENT ELEMENTS

Life on Earth is heavily dependent upon the availability of nutrients for survival. Therefore, it is important for earth scientists to examine the processes whereby nutrients are added to and subtracted from natural geological reservoirs, especially natural waters. In this issue are presented four papers that deal with various aspects of the biogeochemical cycles of the major nutrient elements: carbon, nitrogen, phosphorus, and sulfur. The first three papers, “Carbon, Nitrogen, and Phosphorus Transport by World Rivers,” “Burial of Organic Carbon and Pyrite Sulfur in the Modern Ocean; Its Geochemical and Environmental Significance,” and “The Marine Phosphorus Cycle” are all devoted to quantifying, on a world-wide basis, the rates of transport of nutrient elements from one major earth surface reservoir to another. The first paper by M. Meybeck provides fundamental data on the rates of delivery of carbon, nitrogen, and phosphorus by rivers to the ocean and the effects of human activities on these rates. The second paper by R. A. Berner deals with the rates of removal of carbon, as organic matter, and sulfur, as pyrite, from the world ocean and also discusses the effects of man on these rates. The third paper by P. N. Froelich and others constitutes a major attempt at quantifying long term pre-agricultural phosphorus outputs from the ocean. All three papers come to the important conclusion that the worldwide cycles of the nutrient elements have been perturbed to a significant extent by human activities.

The last paper in this issue “An Idealized Model of Nitrogen Recycling in Marine Sediments” by G. Billen examines those major processes affecting nitrogen in surficial marine sediments and proposes new models for quantifying rates of these processes. A better knowledge of rates of biogeochemical processes in sediments is essential to a clearer understanding of how nutrients are regenerated from the sea floor.

We hope that these papers will serve to stimulate more thinking on the subject of biogeochemical cycling by earth scientists. There is a crying need for more and better data on rates of transfer between reservoirs and on the mechanisms by which these transfers occur. These papers, if they serve no other purpose, should point to the need for more such data.

ROBERT A. BERNER, Editor