Editorial

Seminal questions concerning the evolution of the Solar System and, in particular, of the planet earth and its climatic history, can now be pointedly addressed by investigating the isotopic records preserved in the earth, the moon and meteorites, thanks to the progressive refinement of experimental techniques and the new development of Accelerator Mass Spectrometry. To take just one example, the use of isotopic tracers has led to the delineation of past climates and of the dynamics of one of the major reservoirs of our planet, the Ocean system.

The papers contained in this special volume, highlight new and potentially illuminating areas of research which can better characterize and quantify the processes taking place in the earth and in planetary systems. Generally, most of these have been selected from the presentations made at the International Conference on '**Isotopes in the Solar System**', held at the Physical Research Laboratory, Ahmedabad in November 1997. They expose new results obtained from the study of isotopic records preserved in samples of meteorites, terrestrial rocks, sea sediments, ice cores, glaciers, corals, cave deposits and in river, ocean and ground waters. In Earth Sciences, paleoclimate studies, particularly the signatures of rapid climatic changes recorded in glaciers and deep sea sediments, and the role of oceanic and atmospheric circulations in contributing to these abrupt changes, continue to be a topic of intense research. On a longer time scale, the impact of mountain building, especially of the voluminous Himalayan orogeny and associated chemical weathering, in influencing global climate and the chemical and isotopic make up of sea water is hotly debated. It is well known that rivers, glaciers and the atmosphere are the primary pathways for the transfer of materials from continents to oceans. Recent evidence gathered from isotopic mass balance considerations, however, suggest that direct discharge of subsurface water into coastal regions may be an important source of water and material flux to the sea. The magnitude of this flux and its environmental consequence warrant further study. The application of the longer-lived cosmic ray produced isotopes to study surficial processes on Earth has gained considerable impetus after the development of accelerator mass spectrometry that allows rapid analysis of minute quantities of radioactivity in terrestrial samples. In the field of solar system studies, the possibility of a triggered origin of the Solar System is supported by recent results obtained from the studies of now-extinct short-lived nuclide records in primitive meteorites and numerical simulation studies of assisted collapse of molecular cloud fragments to form a Sun-like star. The evolution of planetary atmospheres on the Earth and Mars is another area of active interest in the field of planetary science. Furthermore, new possibilities are now offered by the isotopic records preserved in the interstellar grains of diamond, silicon, carbide and graphite found in meteorites to attempt a better understanding of the processes of stellar nucleosynthesis.

Papers in this issue discuss most of these aspects, and should prove valuable to researchers involved in isotopic studies in the field of Earth and Planetary Sciences as well as to graduate students and other scientists who may be interested in acquainting themselves with the contemporary scene in this field of research.

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