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International Cooperation in Earth Sciences

Prospects are excellent that research in the earth sciences will continue to be exciting and productive. Progress in the past two decades was fostered by the use of equipment such as the deep-sea drilling ship, by the emergence of the concept of plate tectonics, and by growing international cooperation among various branches of the earth sciences. New equipment is being developed, and the quality of older forms is being improved. The concept of plate tectonics has been stimulating and fruitful, but it does not readily explain, for example, earthquakes in supposedly stable places. Thus the extent of the applicability of plate tectonics is being questioned, and the questions create research opportunities.

International cooperation in earth sciences is being facilitated by major programs sponsored by the International Scientific Unions and United Nations agencies. The International Scientific Unions generally have fostered cooperation since their founding. However, those in the earth sciences have been particularly active. Geologists have conducted great quadrennial geological congresses at far-flung sites since 1880. Carefully prepared field trips associated with the congresses have enabled visiting scientists to examine important outcrops in many lands. This tradition will be continued when the next congress is held in Paris in July 1980 and field trips are conducted in western Europe.

Another, more intense form of cooperation in science was initiated with the International Geophysical Year (IGY) during 1957 and 1958. Major cooperative programs dealing with many phases of the solid earth and its envelope were conducted. Participants from various nations found stimulus and satisfaction in joint efforts. The success of the IGY led to further programs in the earth sciences, including an Upper Mantle Project (1962 to 1970) initiated by the International Union of Geodesy and Geophysics (IUGG).

The International Union of Geological Sciences (IUGS) joined with Unesco to initiate in 1973 an International Geological Correlation Program, which now involves about 1000 geologists, 62 projects, and a total of 115 countries. The program is designed to encourage international research on geological problems related to the identification and assessment of natural resources and the improvement of the environment.

During the 1970's IUGS also collaborated with IUGG in the International Geodynamics Project. This interdisciplinary program emphasized study of tectonic plates and phenomena attending their collisions. Attention was focused on the ocean basins, island arcs, and continental margins. Since the ocean basins are comparatively young, the program dealt essentially with events of the past 200 million years. But 200 million years is only about 5 percent of the earth's age, and it is study of the continents that will reveal ancient events. At present, about 20 percent of the heat generated within the earth reaches the surface by conduction. The remainder is available for other processes such as mechanical work. During the past 200 million years sufficient energy was available in the earth to move continents thousands of miles. In an earlier day, when still more energy was present, motions probably occurred more rapidly and the energy might have been manifested in ways other than horizontal motion.

To understand the workings of the great heat engine known as the earth, observations from many places must be correlated. The present state must be examined, and evidence must be assembled about events that occurred in earlier times. The phenomena involved are complex; crucial data are difficult to obtain; potential sources of data everywhere must be tapped. Without comprehensive planning and good exchange of information and ideas, progress would be slow.

Thus the opportunities of the next decade call for further international cooperation among geologists, geochemists, geodesists, and geophysicists. Negotiations between IUGS and IUGG are proceeding. Prospects are good that a new joint program will be formulated.—PHILIP H. ABELSON