

As part of the Upper Mantle Project, a five-year international study of the earth's upper mantle, the Geological Survey is making a comprehensive petrological and mineralogical study of the Muskox ultrabasic intrusion in the Northwest Territories to obtain information on the origin, mode of emplacement and subsequent geological history of the intrusion, which rates as one of the world's finest examples of a differentiated ultrabasic body.

To assist industry in the location of buried orebodies, concealed by glacial deposits and soil and not readily found by standard prospecting means, the Survey has set under way biogeochemical studies to determine the influence on overlying vegetation of various metal elements in soil from the vicinity of a known major base-metal deposit in northern Ontario. It is testing the extent of absorption of certain ore elements by various types of trees.

The growing importance of groundwater supplies to the economy of Canada, particularly in the Prairie Provinces where supplies are limited, has led the Survey to increase its studies of the various factors that determine the availability and quality of groundwater. In the Prairie Provinces, it is studying several drainage basins to determine the nature of groundwater conditions and the water balance. In one such study, that of the relationship of groundwater and vegetation, for instance, it has found that losses in flow in major rivers can be accounted for in the use of water by vegetation along the banks.

Geophysics, which has become a major arm of geological research, is dealt with in Chapter VIII on Scientific and Industrial Research, pp. 404-405.

The *Marine Sciences Branch* was formed in 1962 to meet the need for oceanographic information on Canada's coastal and inland waters for defence and civilian purposes. Its program in Atlantic and sub-Arctic waters is carried out from the Bedford Institute of Oceanography at Dartmouth, N.S. A similar institute is to be built on the West Coast at Colwood near Victoria, B.C.

In the Arctic, the need for reconnaissance surveys in the navigable channels of the archipelago system (carried on for the past ten years through the use of ice-breakers) is giving way to more precise and detailed studies of the character and outflow of the waters in Baffin Bay and Davis Strait to gain a more thorough understanding of oceanographic influences in the North Atlantic. These studies will be expanded gradually to the level in which quantitative current measurements will be made on a routine basis in the Arctic, supported with predetermined oceanographic research projects. Atlantic studies cover the circulation and mixing of the waters of the North Atlantic Ocean, with special attention being given to the behaviour of the Gulf Stream beyond the Tail of the Grand Banks and the circulation and mixing of the Gulf Stream and the Labrador Current.

The Gulf of St. Lawrence is proving to be an ideal marine laboratory for the study of both estuarine and oceanic phenomena and for the testing and evaluation of instruments, methods and techniques. Institute oceanographers are studying the temperature-salinity characteristics in summer and winter and are setting up a large-scale observational program of oceanic factors, including current-meter recording.

Research in tidal prediction and in the forecasting of water-level changes caused by non-astronomic forces is carried on under Branch auspices in Ottawa.

In the study of energy exchanges across the air-sea interface, a long-term project, most of the effort to date has been on the development of instruments and measuring techniques. In 1964, oceanographers from the Bedford Institute and from the United States oceanographic centre at Woods Hole near Boston carried out a successful trial of their instruments on a stable platform in the Caribbean Sea just north of Aruba near Venezuela, and in 1965 BIO oceanographers measured wind stress, water currents and energy transports across the interface from a stable platform off North Point, P.E.I. The Canadian Oceanographic Data Centre, operated by the Branch at Ottawa, processes all data collected by the Canadian oceanographic community and is also responsible for international data exchange.