

detailed geological and geophysical study across the mountains from about Banff in Alberta to Vancouver, and studies of the area between Greenland and Canada.

Geophysicists of the Dominion Observatory are using seismology, gravity, geomagnetism and the study of earth currents and heat flow in the study of depths beyond the reach of drilling. Seismological data are obtained from two sources—the network of seismic stations being set up throughout the country for the study of earthquakes, and explosion seismology to determine the depth of the mantle beneath the earth's crust. At most of the stations in the seismic network, holes will be drilled to measure heat flow from within the earth and heat-flow measurements will also be taken from holes drilled by departmental geologists. Gravity data are used to locate areas in Canada where the heavy rocks of the upper mantle lie closest to the surface and to study vertical movements of the crust in response to surface loading and currents within the mantle, and variations in the earth's magnetic field are employed to estimate the electrical conductivity of the mantle.

In another fundamental study, aimed at a better understanding of the solar system and the early history of the earth, Observatory scientists are studying circular structures believed to be the result of the impact of meteorites. Geophysical surveys are being used to investigate a number of such features that have been located in the Canadian Shield (see also p. 45).

**Geographical Surveys.**—The Geographical Branch of the Department carries out various types of surveys, ranging from terrain and glaciological studies to surveys of sea-ice distribution and of urban and rural land use. Major projects currently under way include a long-range study of Baffin Island, the detailed geomorphological mapping of the dry regions of southwestern Saskatchewan, and the study and mapping of sea-ice distribution in the St. Lawrence River and Gulf and in the Queen Elizabeth Islands. The latter is part of the Department's oceanographic research program and the relationships between the various climatic factors and ice distribution are being studied in an effort to improve the accuracy of long-range ice forecasting.

The investigation of Baffin Island includes the mapping of surface conditions, the study of the history of the landscape's development, and research into geomorphic processes affecting present-day landscape changes. This work is largely of an experimental nature and should provide more precise information on the character of natural processes affecting the development of terrain, relative movements of land and sea, retreat of glaciers, mass movement of the surface materials, and the distribution of patterned ground in relation to permafrost. Many of these studies have an important bearing on engineering problems, the development of resources, and the determination of the feasibility of cross-country travel in the North. Experimental geomorphic maps have been completed showing surface conditions for parts of Ellef Ringnes Island, and the results of this work are being applied to geomorphic and hydrographic (surface water) mapping at 1/50,000 in the semi-arid prairie areas.

A comprehensive study of land use in Prince Edward Island, the first of a series of monographs to be prepared in the land-use mapping program, was produced in 1963. By early 1964 some 30 land-use maps, at various scales, had been published covering such areas as the important fruit-growing region of the Niagara Peninsula, large tracts of Nova Scotia and New Brunswick, parts of the Prairie Provinces, and the Lower Fraser Valley of British Columbia. This program is being modified to embrace the mapping of land use of the whole of Southern Canada on a scale of 1/50,000 and will form part of the Canadian Land Inventory of the Agricultural Rehabilitation and Development Act program (see Chapter X on Land Use and Resource Development).

In the urban field, geographers are mapping the physical characteristics, population distribution, population fluctuations and urban land use of major Canadian cities. The mapping of the city of Vancouver has been completed and detailed studies of Montreal and Toronto are under way. The data collected will provide a valuable basis for intensive research into many aspects of urban geography.