

photography and Earth Resources Technology Satellite imagery. Photographs can be ordered through the Library in Ottawa or at the Geological Survey's Institute of Sedimentary and Petroleum Geology in Calgary.

Geological surveys provide an inventory of the potential resources of Canada, aid in the discovery of mineral deposits, and assist in other aspects of the national economy influenced by geological factors. Each year, over 100 parties are placed in the field. Large reconnaissance projects are mounted in the northern regions of the country, and more detailed investigations in the better-known southern areas. Geological maps are published either separately or, more commonly, as part of scientific papers.

Both the Geological Survey and the Earth Physics Branch carry out geophysical surveys, resulting in maps showing such features as variations in terrestrial magnetism, gravity and seismology. The geophysicists of the Geological Survey are interested mainly in outlining local magnetic variations indicative of mineral deposits, while those of the Earth Physics Branch map the earth's total magnetic field. The Earth Physics Branch operates 23 first-order and six second-order seismic observatories throughout Canada, whose records are used in compiling and updating an earthquake zoning map of Canada of interest to architects and engineers. A gravity map of Canada is also being published and updated.

In the drafting and printing of the maps, highly advanced techniques for the automatic transfer of terrain features from air photos to drafting sheets and precise lithographing are combined to assure speedy processing of field data and the production of colourful, easily understood and relatively inexpensive maps for every type of user, from vacationer to town planner and from prospector to pilot. In the fall of 1972, the first map using the automated cartography system developed by the Surveys and Mapping Branch was produced. This system allows maps to be drawn directly from a computerized data base rather than through the use of draftsmen. The Department operates a large modern plant to print maps and charts compiled by its several branches and by other government departments and agencies. The Surveys and Mapping Branch has a stock of 22.6 million maps from which it distributes about 4 million annually.

1.2 Geology

Canada is composed of some 17 geological provinces that may be grouped under four main categories — continental shelf, platform, orogen and shield. The geologically youngest provinces, the Atlantic, Pacific and Arctic Continental Shelves are made up of little deformed sediments and volcanics, mainly of Mesozoic and Cenozoic age, which have accumulated and are still accumulating along the margins of the present continental mass. The St. Lawrence, Interior, Arctic and Hudson Platforms are formed of thick flat-lying Phanerozoic strata which cover large parts of the crystalline basement rocks of the continental interior, the extension of the Canadian Shield. The Appalachian, Cordilleran and Innuitian Orogens are mountain belts of deformed and metamorphosed sedimentary and volcanic rocks mainly of Phanerozoic and Proterozoic age, intruded by granitic plutons. They were produced during the various Phanerozoic orogenies 50 to 500 million years ago. Of the seven provinces comprising the Precambrian Canadian Shield, the Grenville, Churchill, Southern and Bear embrace the orogenic belts that were produced during the Proterozoic orogenies, 900 to 1,800 million years ago. The remaining three, the Superior, Slave and Nutak Provinces, were deformed during the Archean Eon, and include the oldest continental crust known in Canada, 2,500 to 3,000 million years old. The Precambrian orogenic belts have many features in common with those of Phanerozoic age but are so deeply eroded that the mountainous parts have been reduced to plains or lowlands and in many places the basement crystalline rocks upon which the sediments and volcanics initially accumulated are now exposed.

The land and freshwater area of Canada is 3,852,000 sq miles, but unique among the nations of the world, Canada also includes within this area some 858,000 sq miles of marine waters. The rocks beneath have geological features akin to the adjacent regions on-shore. In addition, the submarine area of the bordering continental shelves is about 523,000 sq miles and of the continental slopes, 563,000 sq miles. In common with other maritime nations, Canada exercises sovereign rights over all these adjacent regions under the sea for the purpose of exploring and exploiting their natural resources, and so, within the confines of the continental slopes, Canada embraces 5,526,000 sq miles (15,000,000 sq km), about 3% of the surface of the globe.