A Mott Smith gravimeter was purchased by the Observatory from the Atlas Corporation of Houston, Texas, in 1946. Over 1,600 observations have since been made with it across Canada between Amherst, N.S., and Jasper, Alta. A network of gravity and magnetometric stations was established in the mining areas of northern Ontario and western Quebec in 1947 and pronounced anomalies related to the geology were observed. It is believed that study of the results will lead to better understanding of the correlation between the anomalies and the geology. Observations over the Prairies suggest the existence and indicate the location of buried formations underlying the soil, clay and gravel.

During 1947, a party in charge of M. J. S. Innes, of the staff of the Dominion Observatory, operated in an area in northern Canada almost entirely within the Canadian Shield observing gravity and vertical magnetic intensity. A gravimeter was hired from the North American Geophysical Company of Houston, Texas for this work. Traverses were made along the northern railways leading to Hudson and James Bays. A test of the applicability of gravity and magnetic methods to the location and delineation of mineral deposits was made by Mr. Innes by observation of 220 stations over the East Sullivan sulphide ore body at Val d'Or, Que. Two hundred and thirteen stations were established by Mr. Innes' party in six weeks during July and part of August in northwestern Ontario, northern Manitoba and Saskatchewan between latitudes 50° and 58° N. and longitudes 92° and 108° W. covering an area of 185,000 sq. miles within the Canadian Shield. An aeroplane was employed for transportation in this work.

Section 2.—Seismology

That branch of science which treats of earthquakes has received considerable attention in Canada during recent years. It has been generally recognized that earthquakes are frequent in regions of adjustment of strata and are characteristic of the newer mountain and coastal regions where steep level-gradients occur. The energy radiated from an earthquake in the form of elastic waves in the earth is, however, recorded on sensitive seismographs up to great distances, even to the antipodes of the earthquake. Seismological researches, while regularly recording the routine statistical data regarding earthquakes, seek also to determine particular causes. Moreover, they endeavour to ascertain the physical properties of the earth's crust and interior as revealed by the peculiarities on the "time-distance curves" for earthquakes.

A time-distance curve, as its name implies, shows the relation between the arcual surface distances from the origin of the earthquake to the various recording stations and the elapsed time required for the initial impulses and their various reflections from layers in the earth to reach each station from the origin concerned. Of late years, these time-distance curves have been greatly improved. Further improvement of these curves must be through taking account of the depth of the origin—the "focal depth". The point within the earth from which energy of an earthquake is liberated is called the "focus"; the point vertically above the focus, on the surface, the "epicentre".

The records of seismograph stations within 500 miles of an earthquake are used to determine the epicentre, focal depth, and focal time. Those same stations, together with the others at distances up to the antipodes of an earthquake, are used to determine arrival times for making up the time-distance curves. The curves themselves are the point of departure for a study of the earth's crust and deep interior.