

4. Structure of the inland ice sheet and ice shelves as revealed from deep pits and bore holes.

(c) *Geomorphology*.—Studies of land forms should be made with particular attention to the geological role of an inland ice sheet past and present.

(d) *Cartography*.—A comprehensive, coordinated mapping program should have high priority. Adequate maps and charts are necessary tools for the support of most of the proposed Antarctic program. Aerial photographs are likewise very desirable tools and should be secured whenever feasible.

3.2.3 Report of SCAR Working Group III: Seismology, gravity, and volcanology

Seismology is to a very large extent concerned with using records of earthquake waves to infer the earth's crustal and subcrustal structure. There are two principal problems of Antarctic seismological research:

(a) To use local earthquakes to infer Antarctic crustal structure; (b) to use distant earthquakes both to obtain evidence on Antarctic structure and also on the earth's deeper structure. In connection with (b), a further point is that the establishment of first-class seismological observatories in the Antarctic can fill in an important global gap; it is important for the advance of knowledge of the earth's internal structure that the global coverage of seismological observatories should be as uniformly distributed as possible.

The setting up of new seismological observatories in the Antarctic is to a considerable extent experimental. Relevant factors include the suitability of particular sites (difficulties with microseisms, etc.), the human difficulties, and the as yet not fully known local seismicity. There must of necessity be much trial and error, moving gradually toward the establishment of a number of first-class observatories. The present number of seismological observatories in the world is of the order of 700. These should ultimately be not less than a corresponding number, determined on the basis of geographical area, of stations in the Antarctic. A priori, it is desirable that the stations should be uniformly distributed over the area; but special problems, and special features of local seismic activity, may in due course lead to a deviation from this.

It is desirable that each station, in addition to having an adequate set of good seismographs, should have assured absolute time marks recorded on the seismogram, so that absolute time can be read to less than a second. It is desirable that stations should in due course become permanent; in seismology it is in general important that long-sustained data from fixed centers should be obtained. It would be unwise to plan a detailed program now for the year after 1958. It is unwise to plan a detailed program now for the year after 1958. It is most important that, first of all, very considerable attention be paid to collating the results obtained during the IGY period. But it would be a pity if well setup stations were to be abandoned.

Broadly speaking the problem of gravity is similar to that of seismology, in that the Antarctic constitutes a serious gap in global coverage which it is most desirable to fill in. Gravity observations to throw light not only on aspects of local crustal coverage is desirable, but subject again to more intensive coverage where there are special problems.

It is desirable to have absolute measurements of gravity at certain stations, and the means of making comparative measurements elsewhere which can be linked with the base stations. The ultimate aim should be to achieve a coverage comparable with that in other continental areas.

It is more difficult to set down a specific program for volcanology. To begin with, volcanological studies are likely to emerge from broader geological studies, and then become more specialized as development continues.

The Antarctic borders on the Pacific Ocean, round the rim of which is much of the world's principal seismic and volcanic activity. Eighty-five percent of the total energy released in earthquakes comes from the Pacific Ocean rim. It is therefore important that great attention be paid to the seismic and volcanological problems of the Antarctic.

4. DESCRIPTION OF PROPOSED UNITED STATES SCIENTIFIC PROGRAM (1959)

4.1 General description

Even though the research program conducted in Antarctica during the IGY will achieve the greatest increase in knowledge ever attained from this area, and a great quantity of data will have been gathered, Antarctica still remains largely unexplored. Encompassing almost 6 million square miles, this continent, covered by a mantle of snow and ice averaging some 10,000 feet in thickness, still