

BRITISH ANTARCTIC SURVEY SCIENTIFIC REPORTS

No. 41. D. H. ELLIOT. *The Petrology of the Argentine Islands.* 1964. 31 pp. 13s. 6d.

THIS report is concerned mainly with the petrographic description of the rocks occurring in and near the Argentine Islands.

The Upper Jurassic Volcanic Group and the Andean Intrusive Suite have already been described in detail from other areas of the west coast of Graham Land. Little has been added to the study of these rocks, mainly because of the limited outcrops in the Argentine Islands. The Upper Jurassic Volcanic Group comprises andesite lavas and dacite crystal tuffs and breccias. The Andean Intrusive Suite comprises granodiorites with rare tonalite, hornblende-gabbro and quartz-norite. Thermal metamorphism of the volcanic rocks and pre-Andean dykes is confined to rocks close to the contact, at which only a moderate grade of metamorphism is reached. Metasomatic effects, chiefly soda-metasomatism and silicification, are much more widespread.

Of much greater significance is the study of the numerous hypabyssal rocks occurring in the Argentine Islands. The very limited number of contacts between dykes and sills and the lack of clearly defined dyke trends means that the rocks have been subdivided mainly on their petrographic characters. Because of this there is some doubt as to the actual order of intrusion and the classification of members which might fall within more than one petrographic class.

The pre-Andean dykes are microdioritic and their composition is fairly uniform, though there have been localized changes due to metasomatism. The post-Andean dykes are more varied, ranging from microgabbro to microdiorite, but again secondary alteration has considerably changed their original composition. The recording of dykes and one lava, which are comparatively unaltered and are probably much later than the post-Andean dykes, is quite important because suspected middle to late Tertiary rocks are believed to occur in many other parts of the Graham Land west coast. It would be very useful to have some of these hypabyssal rocks dated by radio-active methods and it is hoped that this will be done.

An important feature of this report is the presentation of eight new chemical analyses of hypabyssal rocks. The analyses show that all the dyke rocks contain a high proportion of alumina which is typical of rocks from the Andean Intrusive Suite and in general of rocks from orogenic belts. The other marked feature is the deficiency in potassium which is shown well in the triangular variation diagram. By itself the geochemistry does not provide much information of interpretative value because of the diversity of the dyke groups analysed, but it is hoped that this work will be followed by further detailed studies on hypabyssal rocks from other areas of the west coast of Graham Land. In such a case this report will form a valuable basis for future work on rocks which may prove to have considerable significance in the interpretation of the geological history of Graham Land.

No. 42. R. M. KOERNER. *Glaciological Observations in Trinity Peninsula and the Islands in Prince Gustav Channel, Graham Land, 1958-60.* 1964. 45 pp. 15s. 6d.

TRINITY PENINSULA consists basically of a 1,000-1,600 m. plateau separating the east and west coast ice piedmonts. These piedmonts descend from 800 m. a.s.l. at the foot of the plateau to sea-level in a distance of approximately 11 km. The continuity of these ice piedmonts is broken only by occasional ridges and valley glaciers.

Accumulation and ablation is described and analysed for Depot Glacier and the ice piedmont between Hope Bay and Trepassey Bay. There is considerable variation from year to year in the conditions giving rise to accumulation and ablation. The summer of 1959-60, the period when the most detailed studies were conducted, proved to be one of unusually high ablation. It is impossible to determine the percentage of melt water retained in crevasses by Depot Glacier. Similarly, it is not known what relationship exists between the surface area of ice calving from the snout of Depot Glacier (which was surveyed by plane-table) and the amount calving from below sea-level. This results from a lack of knowledge of ice

flow at depth. Therefore, the annual budget figures must be treated with caution. Nevertheless, the results show that the budgets of both Depot Glacier and the ice piedmont between Hope Bay and Trepassey Bay are close to equilibrium.

Movement studies on these two ice masses show that any channelling of ice results in an increase of movement rate. Overall, the results show a very low budget resulting partly from the small size of the accumulation areas, but mainly from the local climatic conditions where accumulation and ablation are of a low order.

Farther south on Trinity Peninsula the glacier budgets decrease from west to east. On the west coast ice piedmont the firn line lies below 150 m. a.s.l. Rime ice and fog deposit accumulation here is important. The prevailing north-west winds descend the east coast ice piedmont under föhn conditions and hence accumulation is reduced and ablation increased. As a result, the firn line increases in altitude with increasing distance eastwards from the plateau. It lies between 230 and 270 m. a.s.l. on the east coast south of Duse Bay, at 300 m. a.s.l. on Tabarin Peninsula and above 300 m. a.s.l. on the islands off the east coast. Similarly, glacier budgets decrease in a west to east direction. Measurements on two valley glaciers on the east coast of Trinity Peninsula showed maximum movements of 0.54 m./day and 0.25 m./day, whereas a valley glacier on Eagle Island with a similar accumulation area and slope showed a maximum of only 0.03 m./day.

Moraines, abandoned cirques, glacial striae and other glacial features provide evidence for an analysis of the glacial history of Trinity Peninsula. The Mount Flora cirque is fronted by three series of ice-cored moraines. Morainic material and numerous erratics are strewn over Scar Hills which form the south-east side of the lower reaches of Depot Glacier. This evidence, together with glacial striae, suggests that the existing ice masses originally extended 2–3 km. beyond their present limits and that the ice in Depot Glacier was at least 170 m. thicker. Truncation of the lower parts of intergully ridges and misfit valleys in the ice-free area south of Hope Bay indicate the presence of a pluvial interglacial immediately before the formation of the second of the three Mount Flora moraines.

On Trinity Peninsula south of Tabarin Peninsula similar evidence indicates that ice filled Prince Gustav Channel to a height of more than 300 m. a.s.l. Abandoned cirques with base levels between sea-level and 30–40 m. a.s.l. indicate a recent increase in glacierization since the last maximum.

There is little evidence of glacier retreat this century but it is concluded that the general retreat of glaciers, during which the Mount Flora cirque has retreated from its second moraine, has resulted from a shift in the track of depressions mainly southwards, but also eastwards.