

in quite a different manner to a relatively small difference in weather conditions. The cause is obviously the difference in their inclinations. This raises the further question of how climatic changes influence glaciers and also in what manner climatic fluctuations and changes can be known or calculated from the behaviour of glaciers. The problems involved by such questions could well be the subject for the next symposium for the Commission on Snow and Ice, which is to be held between the Congress of the I.U.G.G. at Helsinki, and that to be held three years later. It was resolved at Chamonix that such a symposium should also be held triennially in the year preceding the I.U.G.G. Congress.

This may be a suitable occasion to say something about the influence of climate on glaciers and the evaluation of suitable figures denoting as clearly as possible the effect of these influences. This effect is closely connected with the movement of the ice and the slope of the glacier as shown above. It is also connected with the time which the ice needs to come down from the firn regions to the lower parts of the tongue, *i.e.* the length of the glacier. If this time is long the effects of short climatic fluctuation of perhaps one or two years are superimposed upon the effects of longer climatic periods; for instance, the 35-year period of Brückner or the period which is indicated by the retreat of glaciers since 1850 until the present day.

In order to find out, and to distinguish the individual influences, it seems desirable to investigate short and rather steep, as well as longer, flatter glaciers. In my view the best method for an investigation of this nature is the volumetric method briefly described in the *Journal of Glaciology*, Vol. 2, No. 15, 1954, p. 308, and fully detailed in the *Zeitschrift für Gletscherkunde und Glazialgeologie*, Bd. 2, Ht. 2, 1953, p. 189-239. From repeated geodetic measurements over the whole glacier surface, the ablation and the accumulation surplus is obtained for single zones and also for the whole glacier. This deficit or surplus expressed as metres of water is the decisive figure, and can be brought into relationship with the meteorological data of the period. With the aid of the volumetric method investigations were made on several glaciers of the eastern Alps for the periods 1850-90, 1890-1920, and particularly for the period 1920-50. It was possible to obtain quite reliable figures for these periods. More detailed observations for shorter periods of one or a few years have also been systematically undertaken in the eastern Alps since 1950. The treatment of shorter periods, especially those of one year, raises certain problems, for instance in regard to obtaining results of sufficient accuracy. On the other hand data of glacier fluctuation during a single year provide better possibilities for tying these up with the meteorological data of the same year. The experiences, results and problems connected with glacier fluctuation and climate during these shorter periods will be dealt with in a future publication.

R. FINSTERWALDER

*Institut für Photogrammetrie, Topographie und Allgemeine Kartographie,
Technische Hochschule, Munich.
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