

with the most recent equipment was carried out by members of the party. They also saw a trained rescue dog (*Lawinenhund*) at work. It found its man lying under two feet of snow within six minutes.

The course is open to scientists, ski instructors and snow experts from all countries. On this occasion it was attended by a party of twelve from Italy, Czechoslovakia, Switzerland and Yugoslavia. It appears to have been very successful and it has now been decided to hold a course every winter.

The credit of initiating the course belongs to M. C. Egmond d'Arcis, of Geneva. He is President of the International Union of Alpine Associations, under the auspices of which the course is to be continued. The British Mountaineering Council (c/o The Alpine Club, 74 South Audley Street, London, W.1.) is a member of the I.U.A.A. and details of future courses are obtainable from them.

REVIEWS

LOSSES DUE TO EVAPORATION AND MELTING OF THE ALPINE SNOW COVER PRIOR TO SPRING THAW. O. KIRSCHMER and K. RIMKUS. Field Information Agency Technical, United States Group, Control Council for Germany, Publication No. 1008.

THIS report gives details of a series of experiments carried out in the Bavarian Alps by Drs. Kirschmer and Rimkus of the *Forschungsinstitut für Wasserbau und Wasserkraft* in Munich. The apparatus used was a specially designed snow-balance which was built in a pit. The "pan" of the balance consisted of a sampling table (6.25 m.²) exactly level with the surface of the ground. The table was insulated from below and so arranged that the melt water could run through a pipe into a sampling vessel also standing on the balance. The authors claim that with this instrument they have, so far as is possible, reached natural conditions for evaporation and melting.

The weight of the snow on the table together with the melt water was measured every day at 7.30 a.m. Measurements were usually made only on days without precipitation, when conditions for evaporation were most favourable.

If the weight of the snow on the table one day is W_1 and 24 hours later W_2 , then

$$W_1 = W_2 \pm G$$

where $+G$ represents the evaporation which has taken place, $-G$ the condensation during the same interval.

The authors found that only an extremely small and practically negligible amount of snow was evaporated during the seven winters (1937-38 and 1944-45). The condensation was also quite small. They also found that throughout all the winters, independently of temperature, the snow cover was melting from below, which means that there is a run-off of melting water during the whole winter. From this they conclude that the common conception, that the snow will keep its water content until the spring thaw, is wrong, since an appreciable amount of water had run off during the cold season.

These experiments are interesting, especially from a hydrological viewpoint, but one would have liked them to have been carried out in conjunction with meteorological observations. We know from many experiments that under special conditions evaporation from snow can be considerable. G. Seligman, for instance, in his book *Snow Structure and Ski Fields*, Chapter 5, has discussed his own experiments and reviewed some others which certainly show that evaporation under special circumstances is very high. We also know on theoretical grounds that evaporation can only take place if the vapour pressure is decreasing from the snow surface upwards. If the opposite is the case condensation will occur.

As we do not know anything about the temperature and moisture conditions under which the experiments discussed above were carried out, it is very difficult to determine the reasons for the low evaporation. It seems reasonable to assume, however, that the temperature was generally below 0° C. Since 680 calories are needed to evaporate 1 gramme of snow it is understandable that the lower the temperature the better must be the convectional or insolation conditions to obtain any evaporation at all. To get evaporation we need relatively dry air above the snow surface and also heat from insolation, generally from a clear sky or by a strong wind causing great turbulence. It is of course quite possible that such conditions would not occur in the region where the experiments were carried out until the spring, when stronger insolation would undoubtedly favour evaporation.

The authors cannot, therefore, draw the general conclusion that there is no snow evaporation in the Alps. It is not even possible to state that it does not take place during the winter, because such conditions as strong föhn winds must cause evaporation even in winter. Therefore if a thorough understanding of the results is to be reached, experiments for the study of the factors involved in ablation must go hand in hand with the study of the meteorological conditions.

It can therefore be said that the experiments made by the German scientists do not contradict any of the previous results that have been obtained in glaciological experiments. For hydrological purposes the results may of course be of practical value, but because of the intimate relationship between evaporation and other meteorological factors mentioned above, it seems dangerous to suggest that the results are valid for regions outside a rather small area centred around the place where the experiments were carried out.

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SUR LA DÉTERMINATION DE LA COUCHE DE SOL GELÉ. ANDRÉ CAILLEUX et ÉMILE THELLIER. *Comptes rendus des séances de l'Académie des Sciences*, Tome 224, séance du 21 avril 1947, p. 1174-75.

SUR L'ÉPAISSER DU SOL GELÉ PENDANT L'HIVER 1946-47. ANDRÉ CAILLEUX et ÉMILE THELLIER. *Académie d'Agriculture de France*, procès-verbal de la Séance du 14 Mai 1947.

THE first paper describes a simple instrument, called a "cryopedometer," for measuring the depth of frost in the ground and the second gives some observations recorded by the instrument at the Parc Saint-Maur observatory.

The instrument* consists of a series of small open-ended glass capillary tubes, 4 mm. in diameter and 20 mm. long, containing water, which are mounted horizontally at 6 mm. centres on a notched wooden rod. The rod slides into a tube set vertically in the ground. The capillary tubes, in which the water becomes frozen, are readily seen when the rod is withdrawn.

The observations in the second paper show that the ground froze twice to a depth of 23-24 cm. during the winter. The slow initial melting of the frozen zone from above and below and the final sudden disappearance of the frost are to be noted.

The simplicity of the instrument suggests that it might be very useful for expedition work and in other conditions which do not warrant employing sensitive potentiometers or other instruments.

A close sliding fit between the wooden rod and the ground tube is essential to prevent convection between adjacent capillary tubes. The reviewer is constructing an instrument as the author suggests, out of plastics, for use during the 1947-48 winter.

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* Manufactured by S. A. N. Boubée et Cie, 3 Place Saint-André-des-Arts, Paris.