

Reviews

I

Dynamische Meteorologie (In German) by K. T. Logwinow. Published by VEB Deutscher Verlag Der Wissenschaften, Berlin, 1955; pp. 154 and 43 figures.

This is a small book of 154 pages containing a brief resume of the basic concepts in Dynamic Meteorology. Published originally in Russian in 1952, from Leningrad, it is the outcome of a series of lectures delivered to synopticians over a series of years. It was intended to serve as a short first introduction to Dynamic Meteorology for those members of the USSR Weather Service, who wished to study the subject without a teacher.

In this brief and elementary presentation of the subject the emphasis is not so much on the rigorous derivation of mathematical formulae as on the results and their physical significance.

The book consists of ten chapters. Chapter I—Introduction, 13 pp; Chapters II and III—Thermodynamics of the Atmosphere, 36 pp; Chapter IV—Statics of the Atmosphere, 8 pp; Chapter V—Kinematics of the Atmosphere, 8 pp; Chapter VI—Dynamics of the Atmosphere, 27 pp; Chapter VII—Atmospheric Turbulence, 13 pp; Chapter VIII—Atmospheric Energetics, 12 pp; Chapter IX—General Circulation, 7 pp; Chapter X—Kibel's method of predicting pressure and temperature fields, 14 pp.

Except for the material contained in the last chapter the treatment is elementary and covered adequately in the many text books in Dynamic Meteorology available in the English language. It is unfortunate and rather surprising to the reviewer, that there is absolutely no information about the recent and important developments in dynamic meteorology based on the vorticity concept and its connection with horizontal divergence.

In spite of this serious deficiency, the book is a useful addition to the large group of text books in elementary Dynamic Meteorology, now available.

P. R. PISHAROTY

II

Grundwassermessungen ihre Aufgaben und Verfahren in Dienste der Landeskultur (in German) by Horst Andrae, published by VEB Deutscher Verlag Der Wissenschaften, Berlin, 1959, pp. 47.

The book, as the title indicates, deals with the problems and methods of groundwater measurement as applied to land culture in the German Democratic Republic. It has two main parts (excluding Introduction and Summary), the first dealing with the general aspects of the hydrologic cycle. The occurrence of water in the ground and its exploitation possibilities are considered in the next section which emphasizes the proper land management by efficient irrigation and drainage practices.

The second part is entirely devoted to groundwater measurements and outlines the conventional methods for measuring depths of water-table and temperature and movement of sub-surface waters. The author initially explains the peculiarities in the groundwater temperature measurement and then describes some recent electrical instruments of indicating and recording type for the purpose. In the next section he discusses certain electrical devices for remote measurement and registration of water-tables and their variation. Of great interest in this connection is the UKW-equipment for automatic transmission and reception of water-table data. Finally, there is an account of current meters for the determination of the speed and direction of motion of underground waters. The author, who has himself partly contributed to the development of the instruments described in this work, invites attention to the relative superiority of the various new devices over the existing ones in view of the former's simplicity of design, low costs of construction and operation and high orders of accuracy.

The book is primarily written with reference to the problems of water economy in the German Democratic Republic but the subject matter is of inspiring interest to every one concerned with the vital role of water conservation in the national economy of any country in general. The monograph for its size is adequately illustrated with photographs and diagrams in the instrumentation part and contains a list of references at the end. It would be a welcome addition to the library shelves of any practical hydrologist.

V. P. SUBRAHMANYAM

III

Physics of Precipitation, Geophysical Monograph No. 5, published by American Geophysical Union of the National Academy of Sciences, National Research Council, 1960, pp. 435+xii, price \$ 12.50.

The attractively produced monograph presenting the proceedings of the Conference on 'Physics of Precipitation', held at the Woods Hole Oceanographic Institution on 3-5 June 1959 is a most valuable addition to current literature on the subject, and will be greatly welcome by all meteorologists and cloud physicists. The conference is the second in the series to meet at the same venue, the first under a somewhat restricted, but more intriguing, title "Artificial Rain" having been held there three years earlier. The decision to hold this second meeting under the more fitting title was a happy one, and in conformity with the objective that the planners of the conference had in view, namely, so to arrange its programme that all the different scales of cloud physics, from the micro-scale conditions of cloud and cloud particles to large or macro-scale features of atmospheric circulation patterns, were given due emphasis in consideration and study of the details of precipitation characteristics associated with clouds of different types in various meteorological situations.

In the admirably written preface to the monograph, the editor has so ably summarised the proceedings of the conference and highlighted the salient points brought out by the papers and also the more important discussions thereon, that it makes any further review of the volume largely redundant. The proceedings of the conference began with an address on the subject entitled, 'Problems and Methods of Rain-fall Investigation', by the Honorary Chairman, Dr. Tor Bergeron who, besides

holding a most honoured position in the field of modern meteorology, is widely known all over the world for his brilliant exposition, in 1933, of the ice crystal hypothesis of rain formation in clouds, which led eventually to the present ideas about artificial stimulation of rain by methods of cloud seeding. No greater and more fitting appreciation of the most illuminating and inspiring address by the Conference Chairman is possible than by repeating the observation made by Dr. Weickmann at the conclusion of the lecture, that its effect was like that of 'a cool breeze after the heat of many years' caused by the controversies on the subject of artificial rainmaking by increasing the number of nuclei in air.

The 48 papers presented at the conference and included in the volume are grouped under five sections, (i) Morphology of precipitation clouds and cloud systems, (ii) Morphology of precipitation and precipitation particles, (iii) Fundamental precipitation processes; (iv) Hail formation and (v) Artificial precipitation control. Each section is embellished with papers by some of the leading authorities in the respective fields. The papers under the first three sections dealing with studies on the various aspects of cloud physics from the macro-scale features of synoptic weather to the microphysics of cloud elements, through the mesophysics of individual clouds or a cloud system, show how the phenomena on the three scales are closely interlinked and how, by suitably interacting on each other in a manner as determined by circumstances, these influence the distinguishing characteristics of precipitation processes in various situations. The wide variety of subjects dealt with in the papers, such as, on 'Synoptic and Planetary Scale Phenomena Leading to the Formation and Recurrence of Precipitation', 'Energetics and the Creation of a Self-Sustaining Local Storm', 'Snow Crystal Analysis as a Method of Indirect Aerology', 'The Relation between Cloud Droplet Spectra and the Spectrum of Cloud Nuclei', 'The Nucleation and Growth of Ice Crystals', 'Some Observations of Chloride—Sulphate Relationships in the Atmosphere and in Precipitation', and the discussions which followed, bring out clearly and convincingly the need for so much more critical studies being made, in order that we may have a clearer and more complete understanding of the processes governing natural precipitation of different types.

A separate section is allotted to hail formation—a subject which, despite considerable advance made in its study in recent years, is still only imperfectly understood. The series of nine papers presented under the section furnish much valuable material, helping a better understanding of the mechanisms of hail. The features discussed in some of the papers, showing how a critical microscopic study of hailstone structure helps us to gain useful insight into the details of precipitation processes in a hailstorm and into its life history are stimulating readings.

The concluding section of the volume discusses some of the latest advances made in recent years in the application of our present knowledge of rain physics to attempted artificial control of rainfall and also projects, such as, hail suppression by seeding techniques. The results presented in the papers are of much interest, and the most stimulating discussions which followed in relation, particularly, to the methods adopted on evaluation of the experiments should be of considerable benefit to workers engaged in this field of study. In this connection, one interesting suggestion made by Mr. Jerome Namias, namely, whether, in evaluating seeding effects, use could not be made of the weather forecaster as some sort of a control by asking him to predict rainfall amounts over a long period of time, and by considering the discrepancy between the predictions and the observed amounts as the likely results of seeding operations,

should be deserving of consideration by meteorologists. The paper by Henry Dessens on 'A Project for a Formation of Cumulonimbus by Artificial Convection', discussing plans to enhance the local system of convection sufficiently to produce more rain, by making use of an installation called 'metatron', is of much interest to areas situated in and near equatorial regions, but for the high cost involved in the project requiring consumption of one ton of fuel oil per minute. In connection with this paper, the special comment added by Dr. Bergeron, on African meteorology and on the possibilities of working there a scheme, when we have economical atomic energy, seeking to effect a more rational distribution of atmospheric humidity, and thereby cause the northern tropical front over Africa to move a little northwards, is one which we, in India, may profitably note for application, at some future date, to help shift a little northwestwards the monsoon front over Rajasthan, so that the areas situated in the more arid regions might have a little more share of monsoon rains.

The value of the book under review has been greatly enhanced by the edited discussion remarks following each paper, for which and for the most illuminating preface to the volume the editor deserves high praise.

A. K. ROY
