

Reviews

I

Use of Ground-based Radar in Meteorology (excluding upper-wind measurements), WMO Tech. Note, 27, 1959, pp. xvi+80, 28 Figures. Price Sw. fr. 9.

This technical note represents the final report prepared by the CIMO Working Group consisting of several experts in the field of radio-meteorology.

The note presents an excellent picture in so far as the capabilities and potentialities of a ground-based radar set employed for detection of precipitation are concerned. At the same time, it offers a right caution against extravagant claims of what a radar can do. It also provides a basis for selection of suitable radars, for operational use in meteorology and for research purposes, to be used in different parts of the world. This aspect of the note is significantly important in the present circumstances when cheap war surplus radars are difficult to procure. It will thus be helpful to the Meteorological Services, who are planning to cover their countries with radar network, in deciding which type of radar they should acquire.

The technical note is divided into seven parts which cover almost all aspects of weather radar technique.

The first part deals with the basic theory. As unfamiliar terminology often handicaps the meteorologist in his understanding of the theory of the detection of precipitation by radar, the basic theory is described in as lucid a style as could perhaps be possible, at the same time keeping up the technical consistency and accuracy. At places, examples have been cited in order to facilitate understanding.

Radar equation has been given and explained in detail. The various implications of all the radar parameters and the suitability of different radar wavelengths from the point of view of attenuation considerations have been discussed in fair detail.

At the end of this chapter, an essential word of caution has been given to all prospective radar users, *viz.*, "provision for competent maintenance should be a sine qua non in setting up a weather (or any other) radar unit".

The second part deals with types of radar and displays. In the beginning, a good discussion on merits of different wavelengths (from 23 cm to 0.8 cm) has been given. Stepped sensitivity technique or calibrated gain technique instead of iso-echo system has been recommended for ground-based radars.

This part also deals with desirable characteristics of a weather radar installation including siting and choice of equipment.

The third part is devoted to the recording and transmission of weather radar information. In addition to detailing various methods available for recording scope presentation and the many numerical codes in use at present, it contains a comprehensive table giving details of various methods available for transmitting the radar echo picture. The table is very useful since it gives approximate costs of those methods and also other requirements thereof.

The fourth part deals with types of echo from precipitation. Echoes (and their characteristics) from different meteorological phenomena such as layer-type clouds, convective clouds, thunderstorms, hurricanes or typhoons, tornadoes and water-spouts, hail, snow and lightning have been discussed with the help of representative photographs. There is an appendix with 28 photographs of typical weather echoes. Appropriate legends including the characteristics of the radar set which recorded the echoes are given.

Echoes ascribed to phenomena not associated with precipitation such as angels, smoke, insects and birds have been discussed in the fifth part.

A useful discussion of practical applications of radar weather information to various users, has been given in part six.

The last part discusses the use of radar in meteorological research and many such uses have been enumerated. Lines on which work is being done are indicated and recommendations made for further work.

We find that in para 2.2.2.1 (page 26), a reference is made to empirical formula (12). There is no formula marked (12) and the indication appears to be towards formula (9) on page 16.

In the same section a mention has been made of an optional circuit which electronically corrects for range attenuation. In radar phraseology, this optional circuit is popularly known as sensitivity time control (STC). We feel that use of the term STC would have been in keeping with popular phraseology.

These points apart, the subject matter is very well presented in this technical note. There is a good summary in the beginning in four major languages, *viz.*, English, French, Russian and Spanish. The note points out very aptly the absence or scarcity of radar observations in tropical countries.

This note fulfills a long felt need. It will prove of immense use not only to those launching a weather radar programme or to those already working with weather radars but also to the synoptic meteorologists who in the days to come will have to make greater and greater use of radar weather information received either by direct look at radar-scopes or by long range transmission by code or other suitable means.

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II

Atmospheric Chemistry of Chlorine and Sulfur Compounds, Geophysical Monograph No. 3, edited by James P. Lodge, Jr. Published by American Geophysical Union of the National Academy of Sciences, U.S.A., 1959, pp. viii + 129.

This book is third in the Geophysical Monograph Series and contains 23 papers presented and discussed in a symposium held at the Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio, from 4 to 6 November 1957. These papers are classified in four groups, *viz.*, Analytical Methods, Field Techniques and Engineering Control, Atmospheric Concentrations and Atmospheric Budget.

In the section on 'Analytical Methods', we find that different techniques have been used for qualitative and quantitative analysis of chlorine and sulphur compounds and notice the applicability of the usual microanalytical methods of analysis, identification by phase-transition method, use of micrurgy, reagent film technique and spectrophotometric determination of chlorides and sulphur dioxide in air.

Atmospheric chemistry of chlorine compounds start from the precipitation analysis. Yet with the exception of Eriksson's short summary of the techniques of precipitation analysis used in Europe (the results of which are published periodically in *Tellus*), no other paper along this line appears in the present book. This perhaps accounts for the absence of some well known analytic techniques, like ion exchange. One would naturally expect that a greater emphasis would be given to the study of air pollution which is intimately connected with public health. This is revealed from the nature of the studies reported in most of the papers in the first three groups.

Group three contains some reports on actual measurements of chlorides, sulphates and other sulphur-containing pollutants in air. It also contains one paper on artificial cloud nucleation and two papers purely on chemical kinetics of certain possible reactions in lower atmosphere.

In group four there are two summaries and two reviews. Meetham's review on the study of sulphur dioxide pollution in England is highly stimulating while Eriksson's review on the Geochemistry of chloride and sulphate has the form of an introduction to the subject. On page 123 we find a summary of an article by Woodcock; it would have been very good if a reference as to where the full paper has been, or is intended to be, published was also available.

Lastly a mention should be made of the general discussion in pages 45 to 50 of the book. The reviewer agrees with the editor that this discussion has brought up a number of ideas not explicitly called forth by any individual papers; this may stimulate research in the related areas.

The Monograph will find a wide circle of readers particularly in the fields of cloud physics, atmospheric chemistry and air pollution.

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III

The Mountain World 1958/59, English version edited by Malcolm Barnes (Directed by Othmar Gurtner and Marcel Kurz on behalf of the Swiss Foundation for the Alpine Research), George Allen & Unwin Ltd., London, 1958, pp. 208 and 52 plates. Price 25 sh.

Like the previous volumes this one is also marvellously produced. The photographic plates are superb; as before there are a large number of double spreads photographs. We find that a few fold-outs have also been added which heighten the realism of the views depicted, thus animating the description to an unprecedented limit.

We are again taken around the world in this volume. We read about climbing and climbing-cum-scientific expeditions to North America including Mexico, South America and in the Olympus mountains in Europe. There is an informative historical account of the ascents in the Alps wherein we find the forthright stricture on the increasing frequency of accidents which unfortunately are claiming an alarmingly increasing number of the younger climbers.

Then of course we have the grand ramble amidst the giants in Himalayas, Gasherbrum in the Baltoro region (Karakoram); the sad story of the Broad Peak attempted by the Austrian Karakoram Expedition 1957—Hermann Buhl's superhuman performance on the Broad Peak and his tragic fall from the corniced ridge during the descent from Chogolisa—narrated by Kurt Diemberger with delicate feeling and sensitiveness. (Also we must not miss the unambiguous editorial note of Othmar Gurtner at the end of this narration). Next we have the Bara Sigbi 1956, the Machapuchara by Wilfrid Noyce followed by the Japanese conquest of Manaslu.

The item of greatest interest and certain amount of pleasant surprise is the report on "Eight months of Glacier and Soil Research in the Everest Region" by Fritz Müller which gives the story of his stay in the Khumbu Glacier region for eight months and his researches on geology, glaciology and his meteorological observations. What surprises us is Fritz Müller's intimate knowledge of the meteorological organisation in this part of the Nepal Himalayas revealed by his references to the observatories at Namche Bazar, Chaunrikharka, Aisyalukharka, Okhaldunga and Chisapani Bazar (page 197 ff). It may be of interest to mention here that considerable alterations have been effected in the manning and collection of the meteorological data from these observatories since the time of Herr Müller's Sojourn there (1956). His surmises on the weather conditions in the Khumbu area are extremely interesting. Many meteorologists and hydrometeorologists in particular in India and elsewhere will eagerly look forward to the publication of his paper giving the details of his meteorological and other observations.

Reading through this book is a rare treat indeed. In many portions of the book one is constantly aware of the fact that the narration is a translation into English from the language in which the original was written; this does not, however, in any way reduce the thrill of the experience described. Besides the photographs supply what the narration fails to convey, thus making the total effect a complete and satisfying experience. We recommend this book without any hesitation as a "must" for any collection of books on mountaineering.

U. K. BOSE