
REVIEW

Radiation Regime of Inclined Surfaces (WMO-Technical Note No. 152). By K. Ya. Kondratyev. (World Meteorological Organization, Geneva, Switzerland), 1977. Pp. xiv + 82. Price : Not given.

This important monograph was prepared by Professor Kondratyev, in his capacity as Rapporteur on Atmospheric Radiation for the WMO Commission on Atmospheric Sciences. Based on information presented by the author at the UNESCO/WMO Symposium on the Use of Solar Energy held at Geneva in 1976, the book describes scientific work carried out on radiation incident upon inclined surfaces and on assessing the radiation balance therefrom, making full use of data available from the world-wide network of radiation stations. The author shows that by making use of these data and the methods of transforming the values of the radiation balance and its components for horizontal surfaces into the corresponding values for the radiation regime of inclined surfaces, it is possible to collect all the information necessary for estimating the possibilities of using solar energy from the point of view of environmental conditions. The availability of such an approach, using appropriate calculations methods and empirical relationships is very significant, because the radiation regime of horizontal surfaces has been adequately studied for many regions throughout the world.

In the Introduction the author emphasizes the importance of understanding the radiation regime of inclined surfaces in an attempt to make direct use of solar radiation as a source of energy. In Chapter 1, techniques to calculate direct solar radiation fluxes incident on inclined surfaces of different orientation and steepness are described. The author makes an extensive analysis of results obtained from a number of theoretical and experimental investigations, and provides diagrams to illustrate characteristic features of heat fluxes received on slopes in different latitudes and seasons. He shows that the problem of calculating direct solar radiation fluxes on inclined surfaces can be easily solved, provided there are climatic data on direct solar radiation at the earth's surface, atmospheric transparency and cloudiness conditions.

In Chapter 2 the author deals with techniques to calculate scattered radiation fluxes on inclined surfaces

and discusses the adequacy of isotropic approximation in the calculation of these fluxes and the effects of various other factors. He next considers the contribution of radiation reflected from a horizontal surface to an inclined surface and the importance of reflection from snow-covered surfaces. He finally presents experimental results, which demonstrate the broad dependence of the income of scattered radiation on the orientation of the surface and on the solar elevation.

The practical problem of estimating global solar radiation fluxes on differently oriented inclined surfaces is discussed in Chapter 3, taking into account the contribution from direct, scattered and reflected radiation. The dependence of incoming global radiation fluxes on the steepness of slopes and their orientation is considered in detail and the daily variation and daily totals of global radiation and their significant features are analysed, with an assessment of the influence of variable cloudiness on the calculation of incoming global radiation fluxes.

In the last chapter 4 techniques to determine long-wave net radiation fluxes on the basis of a simplified formula relating flux intensity on an inclined surface to the flux intensity on a horizontal surface are described. With an extensive analysis made of the results of experimental investigations, the author indicates the possibility of calculating the long-wave net radiation from inclined surface under clear skies. An equation for calculating the radiation balance at an arbitrarily inclined surface and the radiation balance of slopes with various orientations are included.

The object of the Technical Note is stated as "to help meteorologists in atmospheric radiation research as well as solar energy engineers to understand the relevant meteorological implications in the planning and development of solar energy utilization". One can without any reservation say that the author has eminently succeeded in this object.

One hundred and fifty second in a series of extremely useful Technical Note published by the World Meteorological Organization since 1952 and the last, of a long list of books published by the distinguished author on radiation (he gave the IMO lecture on Radiation Processes in the Atmosphere in 1975) the present work makes a very valuable addition to the literature on the subject.

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