

Atlas of the Surface Heat Balance of the Continents

By

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Published by Gebrüder Borntraeger, Berlin and Stuttgart, 1989, pp. *i-vi*+1-402 with 327 continent Maps and 15 Tables (19×29 cm), ISBN 3-443-01025-3. Price 178 DM (Hard bound)

The Atlas under review presents the results of investigations of a heat and water balance project originally undertaken by a noted German heat-balance climatologist, F. Albrecht, in the early sixties and which, after his death in 1965, was continued, expanded and completed by the author in the seventies. It presents, in maps and tables, the estimated values of a number of important components and parameters of heat and water balances of the surface of the continents, as computed by three semi-empirical methods, *viz.*, those of F. Albrecht, M. I. Budyko and H. L. Penman, using long-term monthly climatological data. The components and parameters evaluated are : (1) Net radiation, (2) Surface albedo, (3) Total cloud cover, (4) Effective outgoing long-wave radiation, (5) Actual evapotranspiration, (6) Sensible heat flux, (7) Modified Bowen ratio (the ratio of the heat needed for actual evapotranspiration to the total energy available), (8) Radiational index of dryness (Budyko ratio) and (9) Runoff. Information, also in map form, is furnished of the months of maximum fluxes of net radiation, sensible heat, actual evapotranspiration and modified Bowen-ratio. Area-averages of these fluxes and parameters and a global heat balance are also presented. In the maps and tables, absolute figures are given of the results by Albrecht approach only, while those obtained by the other two methods are given as differences or ratios. The author states that he adopted this procedure because, according to an assessment made by him, the estimates made by the Albrecht approach were found to be closer to measurements than those derived by the other two approaches.

The contents of the volume are arranged as follows: In the first 75 pages, the author gives an introduction, states the data, explains the different heat and water balance methods and presents detailed commentaries on the maps and tables. The remaining 327 pages are devoted to maps of continents on which monthly, seasonal, half-yearly and annual values of the different fluxes and parameters, as computed, are presented. Of the maps, the first 222 give the estimated values

based on the Albrecht method in absolute figures, while the remainder give the ratios or differences derived from equivalent results as obtained by the different methods applied.

Even a cursory examination of the atlas will convince the reader that the results based on the Albrecht approach have been given the pride of place in it. One would think that, perhaps, that is how the author wanted to highlight the work of F. Albrecht, whose contributions to heat and water balance studies were, indeed, very valuable and noteworthy.

There is little doubt that the atlas contains information which is likely to be useful to scientists in a variety of disciplines, such as, climatology, geology, geophysics, hydrology, agronomy, ecology, oceanography, etc. In recent years, satellite measurements of outgoing long-wave radiation from the earth-atmosphere system have greatly improved our knowledge of this important component of the heat balance of the earth. It seems unlikely that similar direct measurements by satellite of the other important components and parameters of the heat and water balance of the surface of the earth will be available to scientists in the near future. Till then, it is believed, available published literature such as the present atlas will be in demand. However, considering the semi-empirical nature of the methods applied and inhomogeneity of the data used, it may be advisable to regard the values of the different fluxes and parameters presented in the atlas as very rough estimates only.

The book is well-written and its get-up is excellent. However, the reviewer noted a problem in map 28 (page 103) in which the annual surface albedo over North America is given as varying from about 150% to about 500 % or even more, whereas in map 30 (page 105) relating to Central Asia the annual surface albedo nowhere exceeds a value of 29%. Why is this disparity in the magnitudes of the albedo between the two continents? On page 3, line 2, the word, 'monthly' is spelt as 'montly'. But these are only minor blemishes in a publication which otherwise promises to be a valuable reference material in heat and water balance studies. The reviewer, therefore, has no hesitation in recommending it to all scientists and engineers engaged in such studies and their institutional libraries in all parts of the globe. However, at 178 DM, the price of the publication appears to be a little on the high side for an average scientist.

—K. R. SAHA