
REVIEWS

The Planetary Boundary Layer (Technical Note No. 165). (WMO. No. 530). (World Meteorological Organisation, Geneva, Switzerland), Pp. 201. Price; Not given.

This Note of approximately 200 pages is about that part of the atmosphere that is directly affected by the surface of the earth: under normal conditions, this atmospheric boundary layer extends to a height of the order of a kilometre. (Incidentally, the use of the adjective 'planetary', in this Note as in much other recent literature, is surely a surrender to fashion; the word misleads the reader into expecting studies of conditions not only on the earth but on other planets as well, or of global scale phenomena. However, the subject of study is usually only the atmospheric boundary layer of the earth—and this is often very non-homogeneous, being known to vary, e.g., from a city to its surroundings). Interest in the subject is still growing rapidly, partly because this boundary layer provides the environment for most human activity, and partly also because its dynamics has a significant effect on weather and climate.

The Note is edited from contributions made by ten authors; its objective is to 'bring up-to-date technical knowledge on the boundary layer to general meteorologists'. An introductory chapter is followed by discussion of the Ekman layer and of the tropical boundary layer. Three further chapters deal respectively with numerical modelling, observational methods and programmes, and applications.

The greatest merit of the Note is its coverage of many different aspects of its subject: it is not possible to find elsewhere, within the covers of a single volume, discussion of the observed structure of the boundary layer in the tropics and elsewhere, numerical models of varying complexity and sophistication, instruments for *in situ* as well as remote sensing of boundary layer quantities, surface winds and turbulence for aeronautical applications, problems of urban heat islands, mountain-induced winds and electromagnetic and acoustic wave propagation. On the other hand, none of these problems is treated in great depth; in particular it is unfortunate that the material on the tropical boundary layer (which should be of special interest to Indian readers) has had to be compiled without the benefit of the final results from GATE (for the Global Atlantic Tropical Experiment), whose Boundary Layer Sub-Programme has given us much new insight and information on the subject. The

authors of the Note are aware of this circumstance, and have done well to refer the reader to the publications containing the preliminary results from GATE.

At some places, the latest thinking is not yet reflected in the Note. For example, the sections on aeronautical meteorology do not give an adequate indication of the very serious effort now under way to specify suitable non-Gaussian and ordered models of turbulence. Some topics are treated only sketchily or not at all: e.g., mountain and valley winds, local flows, pollution problems.

There are occasional typographical errors: e.g., something is missing at the bottom on p. 154.

Taken together, however, the Note definitely fulfils its stated objective. With its coverage of physical, numerical and observational aspects of the subject, and the extensive lists of references, it will for several years to come be a useful document for the general meteorologist, and a good introduction to the subject for prospective research workers.

Department of Aeronautical Engineering
Indian Institute of Science,
Bangalore 560 012.

RODDAM NARASIMHA.

Review of Urban Climatology 1973-76. By T. R. Oke. (Technical Note No. 169, World Meteorological Organization, Geneva, 1979), Pp. 100. Price: Not given.

The application of climatology to urban planning problems has become increasingly important in recent years, at least in the West, and this second publication by the World Meteorological Organization on urban climatology is therefore to be welcomed. The present volume, an addendum to an earlier review of urban climatology published in 1974, reviews developments in the field during 1973-76. With over 500 references, the book provides a reasonably comprehensive coverage of literature in the field. References to Indian work is limited, as often happens in reviews published abroad. But work done in this area in India is also sparse, despite our burgeoning urban population and India's almost insuperable problems in sensible urban planning. Indian meteorologists would do well to extend their earlier Bombay and Poona studies to all large cities in India.

The report is in two parts the first concentrates on observational studies, including research into the radiation, energy and water balances of cities, inadvertent modification of cloud and precipitation and the perturbation of wind, temperature and moisture fields by urban areas.

The second part deals with attempts to construct models (scale, statistical and theoretical) to simulate the atmosphere both below urban roof-level and in the overlying boundary layer. The models range from those aimed at statistical prediction of a single climatic variable to those attempting to simulate the three-dimensional characteristics of the urban boundary layer.

The increasing concern over the state of the atmospheric environment, especially with regard to air pollution in cities, in the last decade is mainly responsible for the upsurge in interest and consequent increase in the number of publications and international conferences, on urban and mesoscale meteorology, modelling the urban boundary layer, human settlements, inadvertent weather modification, and atmospheric turbulence, diffusion and air pollution. The welcome change in methodology from the descriptive climatological tradition towards a more physically oriented approach is also the result of a recognition of the need for the solution of urban planning problems.

We are all aware of the adverse effects of industrialization and urbanization on human settlements, of the creation of three-dimensional heat islands as the result of heat output from industrial, transportation and domestic sources into the atmosphere and of the climatic changes caused by increased surface roughness, changed albedo, accelerated runoff and the changed heat storage capacity resulting from the replacement of forests and fields by concrete and buildings. One can only hope that the knowledge gathered so systematically in other parts of the world lead to better designed buildings and better planned and built cities in India in future.

Raman Research Institute,
Bangalore 560 080.

A. MANI.

Man, Religion and Science. By William Bailey. (Wm. Bailey, Publisher, P.O. Box 935, Santa Barbara CA 93102, USA), Pp. 242. Price : \$ 9.95.

This is a strange book. Clearly it has arisen out of the author's concern to interpret, and try and integrate, the two great endeavours of man, one ancient, but yet persistent, *Religion*; and the other relatively recent and strongly dominant, *Science*. This concern

is not new. Indeed it has been plaguing man almost from the time science arrived with the flourish and promise of sweeping away religion. Great thinkers, among them scientists as well as philosophers, have been worrying about the relationship between them and also their respective roles in the determination of the future of man. The past 50 years have seen a proliferation of literature on the subject. Bailey's is one of the newest efforts in the direction.

The author regards both religion and science as results of brain function; nothing new in that. But when he goes on to say the two are closely related and that science is a derivative of religion, one does have reservations. Any analysis of behaviour, scientific or religious, must involve the human brain, which occupies Bailey's attention extensively. He is strongly influenced by Niko Tinbergen's concept of IRM (Innate Releasing Mechanism) which Bailey finds so attractive and so suitable to his ideas that almost anything that man is and does is attributable to his IRM's. There is not much evidence for it, but Bailey locates them in the hypothalamus or in the limbic system.

Bailey has refreshingly novel ideas about consciousness, memory and the learning process, but these, in the present state of our knowledge, remain mere ideas. It does not seem Bailey is a competent neuro-scientist (he claims in one place that physics and biology are his 'fields'), and one is not sure how valid or even how serious are his many pronouncements about brain function as related to human behaviour. However, he sets himself (and after him, he sets to others) the prodigious task of identifying all IRM's in man and feels this is one of the most essential and elementary needs to delineate man and his society.

Bailey's ideas of Religion are just as quaint. "All social animals including ants, bees, etc., are religious," he says in one place. He must be dealing with something other than the religion most of us know. That religion has some links with social organization, harmony and efficiency, may be accepted, but only as a superficial view; but that religion and ritual have their specific hormones is something which one has to wait for scientific confirmation.

Bailey's outstanding contribution (some may even say outlandish contribution) is his views of man's society, both present and future. Men are of three kinds: Psychopaths, Assertives and Sensitives. Bailey has no use for the first; he would exterminate them, not necessarily by humane methods. Assertives too are abhorrent to him. The only category of permissible are the sensitives (Bailey claims to be one) and it is hoped that the earth will be peopled in a not too distant date almost entirely by sensitives.

Bailey has strange ideas, and one is not sure how he came to possess them, nor how seriously one has to take them. There is no indication anywhere in the book what he does (outside writing a book of this sort), what his background is. That he was unable to find a publisher for his book and was forced to publish it himself, could very well mean that his ideas are strange and that they have little chance of endorsement.

But Bailey appears to be the kind of man who does not care whether the world accepts him or not. He has the urge, the IRM, and that's it.

C.T.S., Indian Institute of
Science.
Bangalore 560 012.

B. R. SESHACHAR.

NATION. SOLAR ENERGY CONVENTION-1980

The fifth annual convention of the Solar Energy Society of India was held at the Anna University from December 19-21, 1980 and was attended by nearly 300 scientists and engineers, working on solar and other renewable sources of energy in the country.

A welcome innovation at this Convention was the replacement of the formal inaugural function by a *general discussion meeting*, at which various non-technical aspects of solar energy, such as national policies on the practical uses of solar energy, the popularization of the use of renewable sources of energy, the fiscal incentives to be provided, etc., were discussed. Prof. A. K. N. Reddy's review of a strategy for resolving India's oil crisis through the provision of lighting by electricity and cooking using biogas was the most interesting of the talks by the panel members. An excellent film on solar energy produced by the Department of Science and Technology gave an overview of developments in the country in solar energy applications.

The theme of the Convention was agricultural applications of solar energy and the two keynote addresses were on different aspects of this topic. The technical session on agricultural applications was followed by two parallel sessions on solar thermal devices and photovoltaics. Excellent state-of-the-art reports summarized the world situation and that in India in these two major areas, and on renewable sources of energy. A significant development reported in the review talks was the evolution of solar ponds for electrical power generation systems. Recent developments in the production of solar cells were also described.

Another welcome feature was a plenary session on the last day when rapporteurs presented resumes of the papers presented in the major areas. The resumes were frank and critical and served a very useful purpose. It is hoped that they will set standards for papers in future conventions.

Poster sessions provide a very effective means for communication between the author and a person

interested in a specific piece of work. However, for reasons which are not obvious, in India a paper accepted for a poster session is generally considered to be inferior to that accepted for an oral presentation. It was disheartening to find that many of the authors did not even attend the poster sessions.

A small but substantial exhibition was organized during the Convention. Various solar thermal devices and windmills and a diesel engine modified to run partly on alcohol were exhibited. The exhibition drew large crowds on all the three days and was a great success.

The organization of the Convention was very good. The organizers would have done even better had the University been functioning normally at the time of the Convention.

The quality of the papers and their presentation on the whole were somewhat disappointing and one could not help feeling that nothing very new or exciting had happened in the field of solar and other renewable sources of energy in the country. Although annual conventions serve the useful purpose of bringing people together, they should also serve as vehicles for the presentation and discussion of new ideas and for a critical appraisal of existing notions. This calls for a certain degree of seriousness and an appreciation of diverse points of view. To this writer, these features were often conspicuous by their absence. In fact an outside observer would have found it difficult to believe that the delegates had gathered to discuss the ways of using an energy source that holds so much promise for the future. But then this is not possible without *user participation*. The same lack of interest was observed at the last Convention held at Bombay when the theme was industrial applications of solar energy. A conference of this type on such a vital area is surely far too important to be allowed to languish in this manner.

Professor of Mechanical Engg.,
I.I.T., Bombay.

S. P. SUKHATME.