

CLIMATE IN A SMALL AREA

An Introduction to Local Meteorology

MASATOSHI M. YOSHINO

UNIVERSITY OF TOKYO PRESS

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CLIMATE IN A SMALL AREA

Dedicated to Midori

PREFACE

From experience we know that weather and climate change from place to place even in a small area. The local phenomena of weather and climate are apt to be thought of as “special phenomena” in a restricted area, because of their local nature. When the synoptic meteorological situation and the topographical conditions are similar, however, similar phenomena occur in any place and in any season. This book is a completely revised and enlarged edition of my earlier work entitled *Shôkiko* (Microclimate), which was written in Japanese in 1961. Here the emphasis is largely on the following points: (1) analysis of the horizontal structures of the phenomena; (2) comparison of as many examples as possible; (3) introduction to the synoptic climatological method; and finally, (4) arriving at general rules. In short, it may be said that the methodology here is not very physical in the description.

After a definition of local and microclimate and the histories of the studies, the phenomena on various ground surfaces such as grassland, cultivated fields, urban areas, industrial regions, forests, seashores, and lakeshores are dealt with. Then phenomena occurring under the influence of topographical conditions are discussed. These include the vertical and horizontal distributions of temperature, winds, precipitation, sunshine, and other climatic elements on mountain tops and slopes, in hilly regions, and in basins and valleys.

The third part concerns local meteorological evidence obtained through synoptic climatological methods, that is, (a) wind, precipitation, and air temperature distributions in relation to the local airstream conditions, (b) the micro-scale and meso-scale discontinuous lines and the local weather associated with them, (c) the föhn, bora, chinook, and other famous local winds in the world, (d) the cold air drainage and the cold air lakes appearing at night, and (e) climatological features of inversion layers as one of the controlling factors of local weather conditions.

The last part describes, within the framework of applied local climatology, some of the plant ecological and geomorphological facts under the influence of local climatological conditions. For example, wind-shaped trees are a type of plant ecological evidence whose distribution is greatly controlled by the local climatological conditions. This relation can be used in a survey of local wind conditions. Thus, using the wind-shaped trees as an indicator of wind conditions, the local wind conditions can be inferred from an extensive observation of the wind-shaped trees in a small area. Some local aspects of periglacial evidence can also be used in the same way.

The earlier edition of this book (in Japanese) contained a chapter on local climate and agriculture, forestry, rural houses, disasters, or nature modification, but space does not allow discussion of these topics in this book.

I would like to express my sincere thanks to Dr. Eiichiro Fukui, emeritus professor at Tokyo University of Education, who first guided me to the study of climatology when I was a student; to Dr. Carl Troll, emeritus professor at the University of Bonn, who recommended that I translate the Japanese edition into English; to Dr. Hermann Flohn, professor of meteorology at the University of Bonn, who has always encouraged me to continue climatological research; to Dr. Rudolf Geiger, emeritus professor at the University of München, from whom I got most valuable suggestions through personal conversations as well as from his book.

I am also indebted to Professor Kenzo Kihara and Assistant Professor Yoshihisa Miyakawa, both of Ochanomizu Women's University, and to Miss Kumiko Shinozuka, lecturer at the Japan College of Health and Physical Education, who all helped me in translating this book into English. I am grateful to Dr. Shûji Yamashita, Aichi University, who read and checked the manuscript thoroughly from the climatological viewpoint; to Miss Keiko Kai, Miss Mitsuko Hoshino and Mr. Yasuo Noguchi for their expert typewriting; and to Miss Keiko Kai for her technical assistance in completing the manuscript. Without help by these people, this book would not have been accomplished. Finally, partial financial support was given by the Ministry of Education for the publication of this volume.

June 1974

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Notes

- a) Figures and tables with caption (Yoshino, without published year) were prepared for this book.
- b) Time is expressed by local standard time in terms of h and m. For instance; 2 h or 2 h 00 m means 2 a.m. and 13 h 05 m means 5 minutes past 1 p.m.
- c) hr means hour(s) and min minute(s).
- d) Spelling of the place and region names in the non-English-spoken countries is in English, if they are used commonly. For instance; Vienna (Wien), Munich (München) or Belgrade (Beograd).
- e) N is north, northern or northerly; E east, eastern or easterly; S south, southern or southerly; W west, western or westerly and so on.
- f) a.s.l. means above sea level.

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