Analysis of Climate Variability
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von Storch, Hans and Antonio Navarra (Eds.): Analysis of Climate Variability–Applications of Statistical Techniques. Proceedings of an Autumn School Organized by the Commission of the European Community on Elba from October 30 to November 6, 1993. – Springer-Verlag, 1999, 342 pp. DM 139,-; öS 1015,-; sFr 126,50. ISBN 3-540-66315-0. Second, Updated and Extended Edition.

The book presents an overview on modern statistical methods useful in various fields of climate research and discusses several applications. It is based on a sample of lectures held at an Autumn School on Elba in 1993. The first edition is published in 1995 and is extensively reviewed by A. HENSE (in Meteorol. Z., N.F. **5**, p. 173, 1996). This review recommends the book for someone "who is already involved in the context and who is willing to extract a bit more statistics from his/her data than mean and variance". Here, the carefully updated and slightly extended second edition shall be discussed.

The book consists of four parts with a total of fifteen chapters. Two introductory chapters make up part I. One chapter is on the development of climate research (A. NAVARRA) and one is on possible misuses of statistical analysis in the field (H. v. STORCH). These chapters are recommended to everybody who is a beginner in statistical climate analysis. The second part is on analyzing the observed climate. Part II deals with climate spectra (C. FRANKIGNOUL), with instrumental (P. JONES) and proxy climate data (K.R. BRIFFA), and with an empirical orthogonal function application example on sea-surface temperature to atmospheric variability relationship analysis (M.N. WARD). The third part is on analyzing simulated climate using weather types (K.R. BRIFFA), statistical techniques like standard tests, permutation procedures and skill scores (C. FRANKIGNOUL, R.E. LIVEZEY), and the use of downscaling in case of precipitation (D. LETTENMAIER). Part II and III are useful if the reader is interested in applications of statistical methods. The fourth part deals with patterns. A sample of analysis techniques for teleconnection, spatial, temporal, and multivariational patterns (A. NAVARRA, H. v. STORCH, R. VAUTARD, J.-S. v. STORCH) is introduced in a compact and self-contained manner. In this part mathematical tools named, for example, singular value decomposition, empirical orthogonal functions, singular spectrum analysis, or principal oscillation patterns are discussed and applied.

The second edition updates the literature list, but there are relatively small extensions in the content of singular chapters (overall about 10 more pages and one additional figure). There are new sub-sections, for example, on moving block bootstrap in chapter 9, on reproducibility and skill of teleconnection patterns in model evaluations in chapter 12, and on optimal regression patterns in chapter 13. A new sub-section in chapter 4 reflects the new results in climate change detection and attribution since the first edition. The main improvements in the detection investigations after 1995 are the successful multi-signal (e.g., signal due to greenhouse gas and sulfate aerosol) studies. These investigations are mentioned, but not thoroughly discussed.

The book's purpose is to serve as an introduction of relevant methods and as a resource for introductory application examples. An in depth discussion of the use of up-to-date optimal detector or pattern similarity statistics would stress this purpose. The basics of these methods are well explained on an introductory level for the newbie in the field. With these basics at hand the original literature should be understandable. The textbook of VON STORCH and ZWIERS (H. v. STORCH and F. W. ZWIERS, 1999: Statistical Analysis in Climate Research. – Cambridge University Press, Cambridge, 484 pp.) explains the methods more completely, but the present book edited by VON STORCH and NAVARRA gives a different and simpler view on a subset of methods. This book offers some extended application examples of the methods and additional concepts (e.g., in the chapter on stochastic downscaling of precipitation). Therefore. VON STORCH and ZWIERS recommended the book for complementary reading. They wrote that the book is a collection of many statistical techniques that does not cover the field systematically but "offers examples of the exploitation of statistical methods in the analysis of climate data and numerical experiments". The reviewer follows this recommendation.

Already the first edition of the book edited by VON STORCH and NAVARRA has been very well written by well known experts in their fields. has been well edited and printed, and this is even improved in the second edition. Although there are only small changes and slight extensions the second edition is an up-to-date introduction into the field of statistical climate analysis. The book can be recommended for someone with a good knowledge of standard statistics and climatology, who wants an overview on different relevant statistical methods and possible applications.

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