Mathematics & Climate

Hans Kaper and Hans Engler

Mathematics and Climate is a timely textbook aimed at students and researchers in mathematics and statistics who are interested in current issues of climate science, as well as at climate scientists who wish to become familiar with qualitative and quantitative methods of mathematics and statistics. The authors emphasize conceptual models that capture important aspects of Earth's climate system and present the mathematical and statistical techniques that can be applied to their analysis. Topics from climate science include the Earth's energy balance, temperature distribution, ocean circulation patterns such as El Niño–Southern Oscillation, ice caps and glaciation periods, the carbon cycle, and the biological pump. Among the mathematical and statistical techniques presented in the text are dynamical systems and bifurcation theory, Fourier analysis, conservation laws, regression analysis, and extreme value theory.

The following features make Mathematics and Climate a valuable teaching resource:

- Issues of current interest in climate science and sustainability are used to introduce the student to the methods of mathematics and statistics.
- The mathematical sophistication increases as the book progresses; topics can thus be selected according to interest and level of knowledge.
- Each chapter ends with a set of exercises that reinforce or enhance the material presented in the chapter and stimulate critical thinking and communication skills.
- The book contains an extensive list of references to the literature, a glossary of terms for the nontechnical reader, and a detailed index.

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