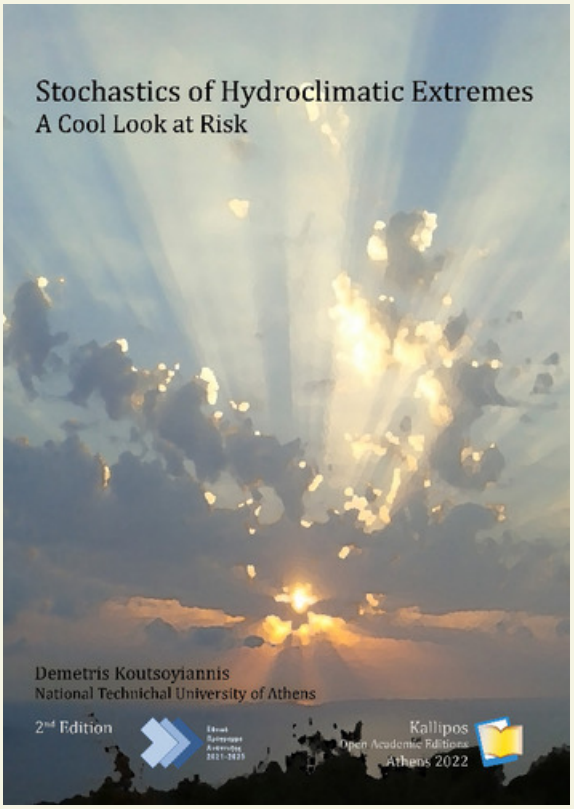

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Abstract

Much is said and written about hydroclimatic hazards: storms, floods, droughts. Such hazards have existed and will always exist, while the usual scaremongering on them is of little help to avoid them. Instead, what is needed is a cool look at risk, based on measurement data, using scientific methodology, and ultimately employing technology in the service of reducing hazards and their consequences. This is attempted in the book. Much of it is devoted to the theory of stochastics —the mathematical language for analysing extremes. Stochastics is a scientific area broader than statistics —according to the definition adopted in the book, statistics is part of stochastics. Another part is the theory of stochastic processes, in which time has a hypostasis that is typically absent in statistics. Thus, statistics is in relation to stochastic what statics are in relation to dynamics. The commonly used classical statistics (based on the assumption of independence) is a special case of stochastics and, as the book proves, is inappropriate for the subject. This does not mean that statistics are abandoned or underrepresented in the book. On the contrary, several new developments are presented —most notably the new tool of knowable moments, which have two relevant characteristics: they are closely connected to extremes and their estimation is unbiased in the framework of classical statistics or involves small (and determinable) bias in stochastic processes with dependence in time, whilst the bias in the estimation of classical statistical moments can be huge. The new theoretical analyses are supported by mathematical proofs, which, to improve readability, are contained in a number of appendices in each of the 10 main chapters of the book. Along with the development of the theory, the book is oriented to the application, which is supported by a variety of examples, usually standing out as parenthetical sections or Digressions, as well as by tabulations of mathematical formulae that are used for each task.

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