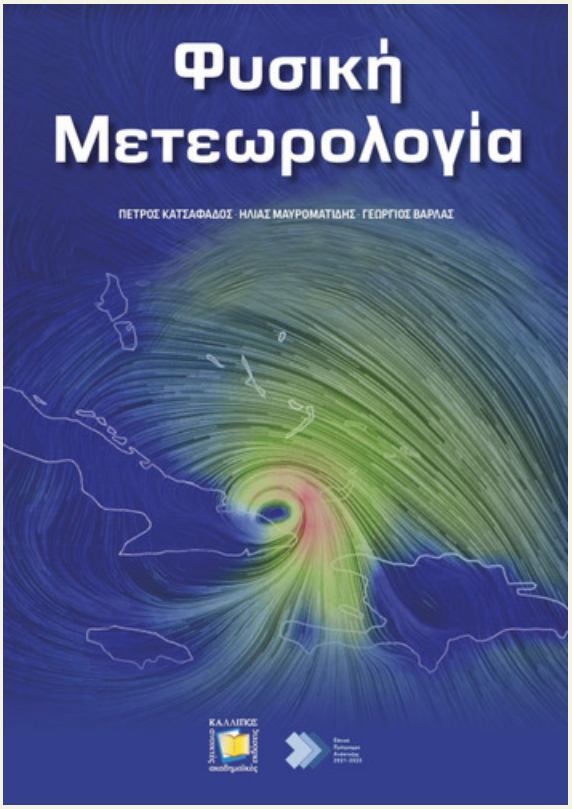

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Abstract

This comprehensive book incorporates fundamental knowledge on theoretical and applied Physical Meteorology. It has been written to support undergraduates and postgraduates in several introductory courses in atmospheric sciences available in the Greek universities. It covers a range of topics from the analysis of thermodynamic processes and the planetary radiative transfer, as well as the atmospheric motions, the cloud physics and the atmospheric boundary layer. It also includes an introductory and applied approach to the methods and techniques of numerical weather prediction (NWP) and offers the essential material for meteorological data assimilation (DA). All these objectives are given in an introductory and applied approach. The book is divided into nine chapters and the appendix. In the first chapter, an introduction of the Earth's atmospheric environment is presented, while the radiation budget of the planet is covered in the second chapter. Atmospheric thermodynamics and motions are presented in the chapters three and four respectively. Next chapters (five, six and seven) are devoted to the weather systems characteristics, the cloud physics as well as the turbulent motions in the atmospheric boundary layer respectively. The theoretical and practical material of the NWP and DA is covered in the chapters eight and nine respectively. The appendix includes a series of experiments, with the description of the relevant infrastructure hosted at the Geography Department, aiming to offer an insight into the gas laws, the adiabatic process, the force balances and the friction. More than 100 questions and exercises are included at the end of the chapters to help the students to understand the meaning and the application of basic physical principles. The answers and the solutions of most of them are incorporated into the text. The entire material of this book can be covered in one or in multiple semesters depending on the character of the undergraduate/postgraduate course and the option of the instructor.

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