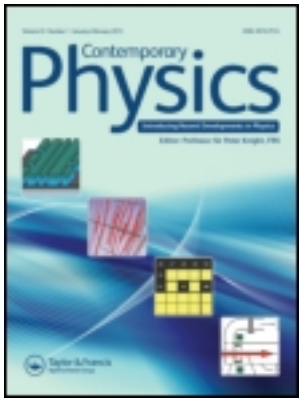

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Noise-Induced Phenomena in the Environmental Sciences, by Luca Ridolfi, Paolo D'Odorico and Francesco Laio

Miguel A.F. Sanjuán [a]
[a] Universidad Rey Juan Carlos
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understand, several black and white figures are used for illustration. The quality of the print, the paper and the book as a whole is excellent. It can be recommended to any interested readership at advanced undergraduate level and above.

Manuel Vogel
TU Darmstadt and *GSI Darmstadt*
m.vogel@gsi.de

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Noise-Induced Phenomena in the Environmental Sciences, by Luca Ridolfi, Paolo D'Odorico and Francesco Laio, Cambridge, Cambridge University Press, 2011, 322 pp., £70.00 (hardcover), ISBN 978-0-521-19818-9. Scope: monograph. Level: graduate students and specialists, general readers, undergraduates, postgraduates, specialists.

The role of randomness, noise and fluctuations is ubiquitous in nature. The occurrence of rainfall, sea storms, droughts, fires or insect outbreaks are typical examples of random environmental processes. When attempting to describe natural phenomena, one needs to take into account the intrinsic randomness associated to the dynamical phenomena. The understanding of the role of noise in natural sciences has been a matter of intense research mostly in the fields of physics and mathematics in the past few years. There has been a common understanding for years that the main role of random fluctuations was to create disorder around the steady states of the underlying deterministic dynamical systems. However, due to the strong efforts of the scientific community to unveil the nature of random disturbances, there has been a common awareness about the constructive role played by the noise, in the sense that noise can generate new states and new dynamical patterns as well. Much discussion has existed also concerning the counterintuitive aspects of certain effects of noise. These noise-induced phenomena are characterised, as a matter of fact, by the ability of noise to induce order in dynamical systems, either in space or in time, just to the contrary to the previous notion associated to disorder. Typically, these noise-induced phenomena appear when the noise intensity exceeds a critical level and they disappear for very small values of noise intensity.

This book represents a good example showing how certain scientific ideas and concepts, which are firstly developed mainly by physicists and mathematicians, later in time are disseminated and transferred to other scientific communities, in this case to the Environmental Sciences.

There is certainly a rich literature on noise-induced phenomena, though mostly focused in physics, chemistry and biology. Moreover, there is also a rich body of literature on noise-induced phenomena in the environmental sciences, which is actually the research field of the authors of this book, though mainly published in research journals. From this viewpoint, it is reasonable to write a book describing the main ideas and concepts of the field focusing towards other applied sciences.

The goal of this book is to provide a synthesis of theory and methods for the study of noise-induced phenomena in the environment and to draw the attention of the earth and environmental science communities toward this fascinating and challenging research area. The book possesses six chapters, which can be classified in three main parts, each one of them containing two chapters. The first part contains the first two chapters introducing the fundamental ideas and concepts from the mathematical and physical point of view. The rigorous mathematical tools provided are written in a very clear manner and I consider them to be accessible to a broad readership of environmental scientists, not necessarily familiar with stochastic processes. A second part, with Chapters 3 and 4, introduces noise-induced phenomena in time, where one of the chapters is completely focused on describing applications in environmental sciences. And the final part, containing Chapters 5 and 6, is concentrated on noise-induced phenomena in space and pattern formation, where the applications to environmental sciences are specifically given in Chapter 6. Interesting mathematical appendices appear at the end of the book as well as an exhaustive bibliography with many interesting references.

The contents of the book are organised in such a way, that it can be perfectly used as a textbook for a graduate level course in Environmental Sciences. However, I consider it can be also a nice and useful source reference for courses in Physics of Complex Systems with applications. This book can be very beneficial for many people, including graduate students and young researchers, as well as other scientists, not only environmental scientists, interested to learn methods and techniques useful for applications in complex systems sciences.

I recommend this book as a very useful guide to be introduced into the fascinating field of noise phenomena in complex dynamical systems, with particular emphasis in applications in environmental sciences.

Miguel A.F. Sanjuán
Universidad Rey Juan Carlos
miguel.sanjuan@urjc.es

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