Reiterated measurements of an experimentally accessible quantity of a dynamical system result in a time series, and one may wonder, what this information can tell about the system on which the measurements are done. Time series analysis is, thus, a very obvious way of an attempt to understand nature—already Kepler did it when studying the observations of Tycho Brahe. He came up with a very simple synopsis formulated in his famous laws and Newton could ascribe these to a single law by postulating a fundamental gravitational force. This marks the beginning of modern science and then, in exploring the nature, fundamental laws or equations motivated by first principles played a dominant role.

Turning to more and more complex systems guidance by first principles became less fruitful for finding a mathematical model. Thus, observations cannot serve any more as indication or pointer to some fundamental underlay but have to be regarded only as a fingerprint of the system. First tasks in analyzing these fingerprints then are e.g. characterization or establishing a relation or correlation to other observations. Time series analysis in this sense, thus, has already a long history in fields where the systems to be studied are very complex such as meteorology or medical science. Sophisticated mathematical methods appeared first in late 19th century and during the last decades these methods have been utilized also by many scientists working in applied fields. This has led to many successes in understanding complex systems.

This handbook comprises a wide range of current topics in the field of time series analysis. The editors are well-known for both their theoretical work on time series analysis techniques and their applications. Therefore, the editors attached great importance to both theoretical work and applications. Especially, the interplay of theory and practice is included in this Handbook of Time Series Analysis. The editors brought together contributions of worldwide accepted experts of different branches, e.g. from Physics, Mathematics, Biology, Medicine, Neuroscience, and Engineering. With respect to the theory this Handbook covers a broad variety of presently used methodologies in different disciplines, ranging from linear stochastic systems to Nonlinear Dynamics, from univariate to multivariate time series analysis.

The Handbook of Time Series Analysis will provide guidance for all those working on time series analysis, from students to experienced investigators. I
hope that it develops into a standard textbook and that the editors find time to keep it up-to-date in future.

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