Hydrological Extremes in a Changing Environment: Modelling and Attribution Analysis

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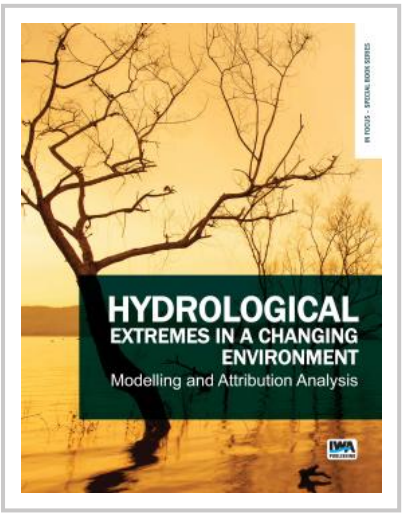

This book focuses on climate change and hydrological extremes, i.e. droughts and floods, which are globally important natural hazards with associated costly impacts on society and the environment. Floods and droughts result from the superposition of different processes at various space and time scales: physical processes in the atmosphere, catchments, the river systems, and anthropogenic activities. However, the characteristics of hydrological extremes have been altered due to climate change and variability, such that approaches for their detection, attribution, and the frequency of occurrence need to be revisited as they are no longer stationary processes. For more accurate estimation of hydrological extremes under nonstationary and uncertain conditions, there is a need for holistic assessments. Time–frequency analysis, hydrological modeling, physical-cause analysis, multivariate statistical analysis, and uncertainty analysis are powerful tools for detecting, attributing, and making frequency analysis of nonstationary hydrological extremes in a changing climate. Both nonstationarity and uncertainty of frequency analysis of extreme hydrological events should be integrated to reveal the possible operational alternatives to the assumption of stationarity in hydrological extremes frequency analysis.

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