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The Climatology of Air-Mass and Frontal Extreme Precipitation

Study of meteorological data in Europe

 Springer

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Preface

This book consists of eight chapters. The executive summary followed by description of the sources from which meteorological and synoptic data were taken, the meteorological data selection and homogenisation procedure, as well as the characteristics of the spatial and temporal coverage of the data selected, are described in Chap. 1, *Introduction*. The diversity of definitions of an extreme event translates into a diversity of existing extreme event indices, including those applied to extreme precipitation. The definitions of extreme events and key indices of precipitation extremes are discussed in Chap. 2, *Definitions and Indices of Precipitation Extremes*. This chapter, which provides a background for further deliberations, discusses the amount and frequency of extreme precipitation in Europe, taking into account “absolute” extremes, and goes on to describe and explain the choice of the definition of extreme precipitation in this study. Chapter 3, *Origin-Based Types of Extreme Precipitation*, presents a classification of the origin-based extreme precipitation types based on fundamental dynamic processes leading to precipitation formation and the spatial and seasonal variability in the occurrence of the different types identified. Chapter 4, entitled *Regionalization of Extreme Precipitation Types Occurrence in Europe*, synthesizes the spatial and seasonal variability in the occurrence of individual extreme precipitation types by regionalising them, and thus to identify groups of stations characterised by similar structure of extreme air-mass and frontal precipitation occurrence. The chapter also includes the characteristics of the regional groups identified. In Europe, weather conditions, including the occurrence and amount of precipitation, depend significantly on the intensity of westerly air flow, which is described by the North Atlantic Oscillation Index. Chapter 5, *Relation Between Extreme Precipitation Occurrence and North Atlantic Oscillation*, describes the impact of westerly air flow on extreme precipitation occurrence in Europe. Chapter 6, *Air-Mass and Frontal Extreme Precipitation Occurrence in Circulation Types*, analyses the relationship between the occurrence of extreme

air-mass and frontal precipitation and atmospheric circulation. To this end, a methodologically uniform continent-wide catalogue, or strictly speaking, catalogues, of synoptic situations were developed.

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