

Preface

This book considers and contains research results on aeolian processes as dust and sand storms in the deserts of Central Asian and Kazakhstan. Dust and sand storms are a common natural phenomenon in the arid and semi-arid regions of Central Asia and Kazakhstan, especially in its southern parts where the land is covered by a great variety of deserts, which are a powerful source of mineral and salt aerosols.

Aeolian processes as storms are important in arid environment such as deserts. Desert covers >40% of the territory of Central Asia. These deserts are characterized by large areas and empty expanses of sand. The sandy deserts of Central Asia are bordered by the green plains of the Central Asian steppe in the north and abutted by soaring mountain ranges that border with Iran, Afghanistan, and China in the south and east.

Deserts occupy much of Kazakhstan and almost all of Uzbekistan and Turkmenistan. The deserts of Kazakhstan mostly cover lowlands and extend from the eastern coast of the Caspian Sea to the piedmonts of the Tien-Shan Mountain.

Central Asian deserts—particularly the sandy northern desert in central Kazakhstan and the southern desert, which covers Turkmenistan, Uzbekistan, and southern Kazakhstan—have a great diversity of natural conditions.

Desert areas are major source areas of dust- and sand-storm activities. Storms are particularly dangerous for the environment because they have a great impact on soil conditions. Thus, the study of aeolian processes as dust and sand storms in the sandy deserts of Central Asia and Kazakhstan has great importance toward aiding in the prediction and monitoring of storms and their movement patterns.

The aim of the study is the detection of dust, sand, and salt storm sources and determining their causes based on the consideration and analysis of numerous cartographic materials, data from weather stations, and satellite-monitoring materials, thereby providing an accurate picture of the distribution and frequency of storms over the deserts of the Central Asia and Kazakhstan. In addition, we also aimed to conduct a quantitative assessment of sand and dust transport during the process of deflation and thus determine the mobile-sand process in the deserts of Central Asia and Kazakhstan.

Consideration of the interesting topic of dust- and sand-storm distribution in the deserts of Central Asia and Kazakhstan, as well as the identification of powerful sources of dust- and sand-storm origin, is important and required to determine their role in soil deflation and desertification. Information and published scientific materials on dust and sand storms in Central Asia are quite limited, and especially rarely do such publications appear in English-language peer-reviewed journals. Therefore, this publication will fill a gap in our knowledge of aeolian processes as dust and sand storms in arid or desert areas of Central Asia and Kazakhstan.

The book is mainly addressed to scientists and researchers whose research has been focused on storm and land-degradation and -desertification studies as well as students and planners. It is intended to be a source of information and inspiration for all readers who feel responsible for initiating the sustainable development and sustainable use of natural resources in Central Asian countries. We are hopeful that readers will gain some useful information and inspiration from this book for their own work. We believe that this publication provides a great contribution to our knowledge about the nature of dust and sand storms, the causes of their origin, and the environmental issues they create.

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