

Geologic Structures of the Arctic Basin

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Editors

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 Springer

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Preface

By the mid-1980s of the last century, the uniqueness of the Arctic Ocean became apparent to the researchers involved in its regional investigations. They found that nowhere on Earth so many diverse structures are confined to such limited space according to global standards. Perhaps, the proximity of the region to the rotational pole of the planet, where rotational forces control to some degree the orderliness of the tectonic movements to their minimum, may explain such diversity.

For the whole abyssal part of the Arctic Ocean, there is only one well drilled in 2004 under the project ACEX (Arctic Coring Expedition) TD-ed at 400 mbsf; only few deep seismic soundings (DSS) are available, leaving many structures with no deep data at all. Hence, the ambiguity of interpretation of the existing geological and geophysical information is limited until recently only to the potential field anomalies maps, bathymetry, and sporadic DSS.

Situation drastically improved at the beginning of the twenty-first century when Circum-Arctic States – Russia, Canada, USA, Denmark, and Norway – initiated active research programs to substantiate the claims enlarging the outer boundaries of the Arctic continental shelf. With this goals in sight, many scientific expeditions using specialized research vessels and even nuclear icebreakers studied abyssal parts of the Arctic Ocean.

Integrated geological and geophysical investigations were run on the Mendeleev and the Lomonosov Ridges and their corresponding junctions with Siberian shelves, on one side of the Arctic Ocean, and with the Greenland and the Canada Archipelago shelves, on the other. These efforts included DSS and multi-channel seismic (MCS) surveys, bottom samplings, and aeromagnetic and airborne gravity surveys. High quality MCS surveys covered most of the Amundsen and the Nansen Basins in Eurasian Arctic and Canada Basin – in Amerasian.

The results of these investigations were published worldwide. Nevertheless, there is still no universally accepted seismic stratigraphy scheme for the sedimentary cover of the Arctic Basin. Despite the progress in absolute geochronology,

many questions regarding the evolution of magmatism in the Arctic region remain unanswered. Classification and evolution of the main structural elements are also far from being finalized.

The main purpose of this volume is to demonstrate the contemporary level of our understanding of the geology of the Arctic region and outline remaining unsolved topical geological problems.

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