

The Handbook of Environmental Chemistry

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Sedimentation Processes in the White Sea

The White Sea Environment Part II

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Aims and Scope

Since 1980, *The Handbook of Environmental Chemistry* has provided sound and solid knowledge about environmental topics from a chemical perspective. Presenting a wide spectrum of viewpoints and approaches, the series now covers topics such as local and global changes of natural environment and climate; anthropogenic impact on the environment; water, air and soil pollution; remediation and waste characterization; environmental contaminants; biogeochemistry; geoecology; chemical reactions and processes; chemical and biological transformations as well as physical transport of chemicals in the environment; or environmental modeling. A particular focus of the series lies on methodological advances in environmental analytical chemistry.

Series Preface

With remarkable vision, Prof. Otto Hutzinger initiated *The Handbook of Environmental Chemistry* in 1980 and became the founding Editor-in-Chief. At that time, environmental chemistry was an emerging field, aiming at a complete description of the Earth's environment, encompassing the physical, chemical, biological, and geological transformations of chemical substances occurring on a local as well as a global scale. Environmental chemistry was intended to provide an account of the impact of man's activities on the natural environment by describing observed changes.

While a considerable amount of knowledge has been accumulated over the last three decades, as reflected in the more than 70 volumes of *The Handbook of Environmental Chemistry*, there are still many scientific and policy challenges ahead due to the complexity and interdisciplinary nature of the field. The series will therefore continue to provide compilations of current knowledge. Contributions are written by leading experts with practical experience in their fields. *The Handbook of Environmental Chemistry* grows with the increases in our scientific understanding, and provides a valuable source not only for scientists but also for environmental managers and decision-makers. Today, the series covers a broad range of environmental topics from a chemical perspective, including methodological advances in environmental analytical chemistry.

In recent years, there has been a growing tendency to include subject matter of societal relevance in the broad view of environmental chemistry. Topics include life cycle analysis, environmental management, sustainable development, and socio-economic, legal and even political problems, among others. While these topics are of great importance for the development and acceptance of *The Handbook of Environmental Chemistry*, the publisher and Editors-in-Chief have decided to keep the handbook essentially a source of information on "hard sciences" with a particular emphasis on chemistry, but also covering biology, geology, hydrology and engineering as applied to environmental sciences.

The volumes of the series are written at an advanced level, addressing the needs of both researchers and graduate students, as well as of people outside the field of

“pure” chemistry, including those in industry, business, government, research establishments, and public interest groups. It would be very satisfying to see these volumes used as a basis for graduate courses in environmental chemistry. With its high standards of scientific quality and clarity, *The Handbook of Environmental Chemistry* provides a solid basis from which scientists can share their knowledge on the different aspects of environmental problems, presenting a wide spectrum of viewpoints and approaches.

The Handbook of Environmental Chemistry is available both in print and online via www.springerlink.com/content/110354/. Articles are published online as soon as they have been approved for publication. Authors, Volume Editors and Editors-in-Chief are rewarded by the broad acceptance of *The Handbook of Environmental Chemistry* by the scientific community, from whom suggestions for new topics to the Editors-in-Chief are always very welcome.

Damià Barceló
Andrey G. Kostianoy
Editors-in-Chief

Preface

The book *The White Sea Environment* in the series “The Handbook of Environment Chemistry” contains the most important results of multiannual investigations conducted by the Shirshov Institute of Oceanology of the Russian Academy of Sciences over 2001–2016. Part II of this book aims to join results of the multidisciplinary researches of sedimentation processes in the White Sea. The long-term investigations in a small Arctic sea, as the White Sea is, have revealed new regularities of sedimentation processes which are characteristic of the sub-Arctic zones.

In Part II, for the first time, the in situ sedimentation processes in the White Sea were studied with the automatic deep-water observatories of sedimentation (AGOS). This led us to estimate contribution of sedimentary matter over different timescales: months, seasons, and years. The mineral, grain-size, isotopic, and elemental composition, including certain biogeochemical proxies, have been studied in both dispersed (suspended particulate matter and vertical fluxes of settling particles) and consolidated (bottom sediments) forms of sedimentary matter. It allowed us to estimate the biogeochemical processes of transformation, which take place within the water column in such key areas of the White Sea as the riverine–seawater interface.

The development history in Holocene and a three-member structure of the Quaternary cover have been revealed. Environmental conditions versus abundance and species composition of microalgae associations have been studied in bottom sediments, which improved our knowledge about relationships between different ecosystem components. The mineral phases of sedimentary matter at different stages of sediment formation have been documented. A specific character of the early diagenesis was revealed, as well as regularities of heavy metal accumulation, including the most toxic mercury, as well as aliphatic and polycyclic aromatic hydrocarbons in bottom sediments of different areas of the sub-Arctic White Sea.

This book is addressed to the specialists working in various fields of environmental problems, especially in marine geology, ecology, and biogeochemistry.

Collection and processing of sedimentary matter were performed in the framework of the state assignment of FASO Russia (theme No 0149-2018-0016). Analysis, interpretation of the data obtained, as well as preparation of materials for publication were supported by Russian Science Foundation grant (project No 14-27-00114-P).

Moscow, Russia
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