

# Marine Geology and Oceanography of the Arctic Seas

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Volume 3, Number 1, February 1976

URI: [https://id.erudit.org/iderudit/geocan03\\_01rv06](https://id.erudit.org/iderudit/geocan03_01rv06)

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## Publisher(s)

The Geological Association of Canada

## ISSN

0315-0941 (print)

unknown (digital)

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## Cite this review

Pelletier, B. R. & Vilks, G. (1976). Review of [Marine Geology and Oceanography of the Arctic Seas]. *Geoscience Canada*, 3(1), 61–61.

## Marine Geology and Oceanography of the Arctic Seas

Edited by Yvonne Herman  
Springer-Verlag, N.Y., 397 p., 1974.  
\$34.80

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The book gives a comprehensive coverage in oceanography both in the geographical and conceptual sense. The information given is reasonably up-to-date, and the authors have attempted to include recent findings that became available while the book was being printed. New information is included in the form of appendices. Thus the book is useful for both the specialist and the worker who is marginally involved with Arctic oceanography. The authors bring out the fact that current measurements are necessary for budget calculations of Arctic waters mainly because, according to the existing information, there is a large variability in advection in crucial areas.

Over the Arctic ocean, the ice cover is an important modifier of the marine environment. It is maintained by a net loss of heat from the water to the atmosphere, which in turn stabilizes the water column and minimizes the transfer of heat from a warmer subsurface layer to the surface. Changes in surface salinities during the past may have influenced the extent of the ice cover, with a corresponding effect on the climate of the northern hemisphere. It is therefore reasonable to look for evidence of these changes in the sediment column using the preserved remains of microfauna. An attempt has been made to do this, although the readers may find it difficult to see a connection between the changes in faunas and proposed paleosalinities.

The three new species of *Globigerina* may prove to be useful as paleoceanographic indicators. However the author failed to provide good scanning electron micrographs of the controversial sub-tropical - tropical planktonic foraminifera found in the Arctic cores. The line drawings of the species are not convincing.

In a work such as this, it is difficult to obtain a uniform presentation for each geographic subdivision, and this is apparent in the treatment of the sediments from one Arctic sea to the next. As a beginning for the ideal case, the best example is the study on the Bering Sea by C. H. Nelson, D. M. Hopkins and D. W. Scholl in which the tectonic framework is given in order to present the case for Holocene stratigraphy and sedimentation. However, this is only part of the story, and what is required as follow up would be a study similar to that on the Bering Shelf by G. D. Sharma, which embraces the oceanographic aspects of modern sedimentation. This author clearly shows the relationship of sediment dispersal to hydrodynamic factors such as vigour and direction. In contrast, the contribution by K. J. Knebel, J. S. Creager and R. J. Echols on the Holocene sedimentary framework demonstrates an interpretation of ancient oceanographic factors relating to sedimentation. These authors, in a fairly well-rounded approach, used sonic, seismic, paleontologic and granulometric data to support their conclusions. Another paper on Holocene history is given by M. L. Homes and J. S. Creager who have used rates of sedimentation and radio-carbon dating of sediment cores to support their interpretations of sea-level fluctuations and paleogeography of the Laptev Sea shelf.

Three very fine studies in surficial sediments, besides that of Sharma, are given by several authors. Each contribution has its own approach so that the reader is presented with a wide spectrum of sedimentological studies. The treatment of sediments from the Alaskan Beaufort Sea is given by A. S. Naidu and deals with source area, routes of sediment transport, and diagenesis from the standpoints of texture, mineralogy and geochemistry. In the study of sediments from the East Siberian Sea by F. P. Nauglet, N. Silverberg, and J. S. Creager, the application of textural parameters and mineralogy was made to explain sediment dispersal and its relation to the hydrodynamic environment. The final work in sediments concerns the deep areas of the northern Kasa Sea by J. A. Andrew and J. H. Kravitz who relate sediment dispersal to the existence of deep currents.

We found the review articles most interesting, comprehensive and informative, particularly the accounts on oceanography by L. K. Coachman and K. Aagaard, on tectonism by P. R. Vogt and O. E. Avery, and on glaciation by E. P. J. van der Heuvel and P. Buurman. It is difficult to argue with the authors here because their treatment is fair. They are most certainly entitled to their opinions which, on all subjects, are sufficiently documented for a public statement. The accounts on topography, though, were somewhat thin in comparison with those of the other disciplines, due perhaps to the absence of abundant bathymetric data. Climatology of The Holocene is well presented by several authors, and is supported by considerable biological evidence.

In summary this book is not a whole text on the Arctic marine areas, but is a collection of contributions on various geographical areas, with an uneven treatment of the subject matter. It would require an additional three or four volumes to achieve full coverage over a period of many years when the investigations have been completed. The reader must keep in mind that the Arctic Ocean is one of the most inhospitable areas in the world for carrying out work from ships, and consequently ice platforms must be used and equipment, workers and support elements transported to them. We think this book is worthy of library acquisition and for the Arctic specialists, they should have it at their desks.

MS received November 3, 1975.