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New Developments in Environmental Marine Geoscience

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Aller au sommaire du numéro

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NEW SERIES

New Developments in Environmental Marine Geoscience

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Does technological advance lead to increased scientific understanding? During the last 10 years, environmental marine geoscience has seen a remarkable advance in the technologies available for studies of the seabed, sediment column, and water column. Much of this development can be ascribed to the digital revolution, in which data are stored electronically and processed by computer. Whereas computer technology has been around for some time, it is as if a threshold in processor speed and data storage has been passed. As processors leap forward in hundreds of megahertz, and disk capacities advance in gigabytes, we are now able to use personal computers to deal with the volumes of data required for complete seafloor coverage by sonar or for characterizing wave spectra. The cost of data processing is going down and thus accessibility to advanced techniques is increasing.

Analytical technology has also leapt ahead, making possible elemental and isotopic analyses of tiny quantities of sediment possible. The resolution of environmental parameters through sediment proxies seems to be limited only by the preservation of primary lamination. In areas such as Saanich Inlet, where anoxic conditions prevail and sedimentary structures are nearly perfectly preserved, detailed reconstructions of climate on an annual or even sub-annual scale are possible.

Canadian geoscientists have been prominent in both the development of new analytical tools and in the use of new technologies to interpret seafloor geology and sedimentary processes. The objective of this new series is to mark this point in development and to review the advances that the digital revolution has permitted in environmental marine geoscience. A broad range of papers is being solicited that encompasses the field of marine geoscience. The first paper in the series, "Status and trends of marine high-resolution seismic reflection processing: data acquisition," follows. In future papers we hope to consider multibeam bathymetry and acoustic reflectance imaging of shelf environments, deep water multibeam and sidescan imaging, nearshore sediment dynamics and processes, advances in sediment transport modelling, and advances in coastal evolution. A goal of all of these papers is to evaluate the influence that new technologies has had and is having on the science and, through case studies, review the major advances in knowledge.

So, does technological advance lead to increased understanding? As this series develops, we should be better placed to answer this question. What will become immediately obvious is that there has been a major evolution in the way that data can be presented, as well as acquired. Seabed bathymetry and, in principle, any other spatial information, can now be presented in 3-D relief from any orientation and with side illumination to enhance geomorphological characteristics. Time series data can be presented using colour to show vertical profile information. In some cases, this provides immediate, new insight, while in others, new problems of data analysis emerge.

In many ways the seabed is still largely uncharted and the marine geoscientific challenge is still a question of exploration. It will become clear in this series that we still have some way to travel in maximizing the use of new technologies. In some fields, the data stream is still too rapid to process with microcomputers. We are still some distance from being able to carry out true 3-D seismic surveys at high resolution. In sediment transport studies, so much data can be collected that it can take months of graduate student labour merely to check data quality. Nevertheless, the face of environmental marine geology is changing dramatically through technological advances. It's time to take stock, and that is the aim of this new *Geoscience Canada* series.

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