Methods

Holocene Sedimentation from High-Resolution Chirp Sonar Data and IMAGES core MD99-2286 in Northeastern Skagerrak

Skagerrak is the deepest part and the major sediment trap of the North Sea. The investigated area is characterized by intensive river input and high sediment topography, up to 1.7 km above sea level (ref. 2, 3, 4, 5). It is a branch of the North Atlantic Current that embrace the Skagerrak sill, which diverges and distributes the inflowing Atlantic water to the Baltic Sea. The uppermost area of the Skagerrak sill is marked by a seismo-stratigraphic high known as the Skagerrak Bank, which is characterized by acoustic turbidity reflectors. The present paper provides a detailed view of the Holocene stratigraphy in northeastern Skagerrak by reprocessing a 3D seismo-stratigraphic model from high-resolution chirp sonar data, multibeam bathymetry data from the Geological Survey of Norway (ref. 8), and sediment properties of IMAGES core MD99-2286. The age model based on 25 radiocarbon dates shows that core MD99-2286 spans 12 000 calendar years, thus encompassing the entire Holocene and uppermost Pleistocene. Information on the sedimentary environment obtained from the work also provides the spatial context necessary for interpreting measured sediment properties in core MD99-2286.

Introduction

The uppermost units (A+B) represent marine Holocene sediments deposited in a more or less distal glacial marine sedimentation environment. The change to Holocene conditions (lower unit C) is interpreted to have occurred during a period of strong ice margin retreat and facies changes in the southern part of the study area, the most probable cause of this event being a minor glaciational advance of the late Weichselian glacial period. The uppermost Pleistocene units (D+F) are correlated to the Late Weichselian glaciation of the southern part of the Skagerrak area, dated to 10 000-20 000 years ago (ref. 4). The basal core sediment was measured using coulometry on 60-mg milled, freeze-dried samples. The AMS 14C ages were measured on split core halves using the Radiocarbon AMS Laboratory of the University of Utrecht, The Netherlands. All modern and marine 14C ages were corrected using the 

North Sea ocean circulation

Core MD99-2286 is 32.0 m long, and spans 12 040 calendar years. It follows that the sharp boundary between unit C and unit D, reflector 3, represents the Pleistocene/Holocene transition (1 150 cal y BP) in the chirp sonar data. The uppermost unit of the MD99-2286 core (unit D) is composed of fine-grained, clayey sediments with high carbonate content. The uppermost unit of the MD99-2286 core (unit D) is composed of fine-grained, clayey sediments with high carbonate content. The uppermost unit of the MD99-2286 core (unit D) is composed of fine-grained, clayey sediments with high carbonate content. The uppermost unit of the MD99-2286 core (unit D) is composed of fine-grained, clayey sediments with high carbonate content. The uppermost unit of the MD99-2286 core (unit D) is composed of fine-grained, clayey sediments with high carbonate content.

References

- Sørensen, R. 1979. Late Weichselian deglaciation in the Oslofjord area, south Norway. Dept. of Geology and Geochemistry Stockholm University; and last, but definitely not least, my family acknowledge the Geological Survey of Norway for generously providing the bathymetric data.

A three-dimensional shadow relief view of the bathymetry in northeastern Skagerrak. Distinct bathymetric and seismic reflection boundaries are indicated. Multibeam bathymetry from the Norwegian Hydrographic Service (ref. 8).

3D Interpretation Environment

Conclusions

- Core MD99-2286 represents a continuous high-resolution record of Holocene and uppermost Pleistocene sediments.
- Unit D is interpreted as glacial marine sediments rapidly deposited close to a calcite front.
- Reflector 3, separating the most resistant (C-14) from the underlying stratified unit 528, is interpreted to indicate a change to Holocene conditions.
- The change to Holocene conditions (lower unit C) is interpreted to have occurred during a period of strong ice margin retreat and facies changes in the southern part of the Skagerrak area.
- The uppermost units (A+B) represent marine Holocene sediments deposited in a more or less distal glacial marine environment, which gradually replaced the glacial marine sedimentation environment.
- Unit C is interpreted as distal glacial marine sediments gradually changing to postglacial marine sediments deposited during recent Holocene times.

Core Correlation

- Core MD99-2286 spans the uppermost Pleistocene (unit D) and Holocene (unit C).
- Core MD99-2286 was measured using coulometry on 60-mg milled, freeze-dried samples from the Geological Survey of Norway (ref. 8).
- Core MD99-2286 was measured on split core halves using the Radiocarbon AMS Laboratory of the University of Utrecht, The Netherlands. All modern and marine 14C ages were corrected using the

3D View of Bathymetry and Chirp Sonar Trackline

Three-dimensional shadow relief view of the bathymetry in northeastern Skagerrak. Distinct bathymetric and seismic reflection boundaries are indicated. Multibeam bathymetry from the Norwegian Hydrographic Service (ref. 8).

Acknowledgements

- Richard Gyllencreutz, Dept. of Geology and Geochemistry, Stockholm University, SE-106 91 Stockholm, Sweden, richard.gyllencreutz@geosc.se