Expedition Co-Chief Scientists

Dr Thomas Andrén

Thomas Andrén is an Associate Professor at the School of Natural Sciences, Technology and Environmental Studies, Södertörn University, Sweden. He undertook a PhD in Quaternary Geology at Stockholm University 1990 with a thesis entitled "Till stratigraphy and ice recession in the Bothnian Bay" and since then his research has been focused on the Late glacial and Holocene history of the Baltic Sea. Thomas has been the leader of research projects such as the EU financed interdisciplinary BASYS project (Baltic Sea System Study, 1997-1999) and the lead proponent of the IODP Proposal #672 leading to Expedition 347. Since 2006 he has held a position as researcher and teacher in Environmental Science at Södertörn University and his research interests include Quaternary stratigraphy, paleoclimatology, sedimentology and the geological history of the Baltic Sea basin.

Dr Bo Barker Jørgensen

Bo Barker Jørgensen is the Head of the Center for Geomicrobiology, University of Aarhus, Denmark. He has a PhD in biology from Aarhus University where he taught microbiology and ecology. He was Director of a new Max Planck Institute for Marine Microbiology from 1992 and Professor of Geology at Bremen University, Germany. Since 2007 he has been Head of the Center for Geomicrobiology and professor at Aarhus University. The Center studies the microbiology and biogeochemistry of the sub-seafloor biosphere. Co-chief of ODP Leg 201, the first drilling expedition devoted to the deep biosphere. Bo's research interests include the geochemistry and microbiology of sulfur and carbon cycling in marine sediments and the subsurface life under extreme energy limitation.

Expedition Operator

Mission-specific platform operations are conducted for IODP by the European Consortium for Ocean Research Drilling (ECORD), which represents the ocean-drilling efforts of 17 European countries and Canada. Operations are undertaken by the ECORD Science Operator comprising the British Geological Survey (BGS), the University of Bremen and the European Petrophysics Consortium (the universities of Leicester, UK, Montpellier, France, and Aachen, Germany).

During the expedition regular updates are posted on the expedition webpage at:

www.eso.ecord.org/expeditions/347/347.php

Integrated Ocean Drilling Program **www.iodp.org**

The Integrated Ocean Drilling Program (IODP) is an international marine research programme that explores Earth's history and structure recorded in seafloor sediments and rocks, and monitors sub-seafloor environments. Through multiple platforms - a feature unique to IODP - scientists explore the deep biosphere and sub-seafloor ocean, environmental change, processes and effects, and solid earth cycles and dynamics.

IODP is funded by a number of entities acting as international partners: the U.S. National Science Foundation (NSF) and Japan's Ministry of Education, Culture, Sports, Science and Technology (MEXT) are Lead Agencies. Additional funding is provided by the ECORD contributing members, the Australia-New Zealand IODP Consortium (ANZIC), India's Ministry of Earth Sciences (MoES), the People's Republic of China (Ministry of Science and Technology), the Korea Institute of Geoscience and Mineral Resources and Brazil's Ministry of Education (CAPES).

Credits: cover, sand dunes Slowinski National Park, Poland (photo courtesy Dominique Weis); inserts, Baltic Sea (SeaWiFS Project, NASA/Goddard Space Flight Center, and ORBIMAGE), *Greatship Manisha* (Geoequip Marine, courtesy of Island Drilling Singapore Pte. Ltd), varved glacial sediments (photo courtesy Thomas Andrén).

This brochure was produced by the ECORD Science Operator.

IODP
INTEGRATED OCEAN DRILLING PROGRAM

The Baltic Sea Paleoenvironment Expedition

The climate of the Baltic Sea: 130,000 years of change

IODP Expedition 347

ECORD
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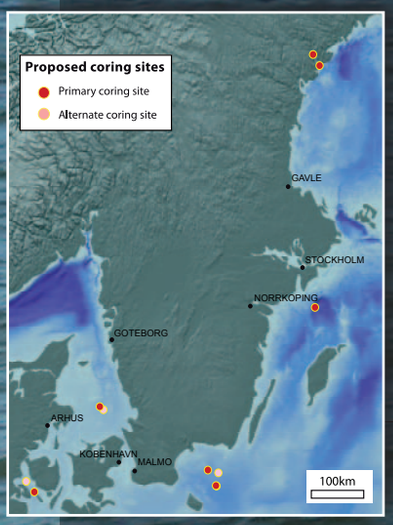
Glacial climate in the Baltic Sea region



The Baltic Sea Basin (BSB) is a brackish sea located in northern Europe. Its location, in the heartland of past Scandinavian Ice Sheet (SIS) advances and retreats, has resulted in the formation of a rare geological and microbiological archive, and a unique record of past environments.

The sediments within this basin have been subjected to repeated glaciations, which have affected past sea levels and patterns of sedimentation. The high sedimentation rates in the basin (1 to 5 metres per thousand years), give scientists an unparalleled insight into four overarching themes:

- Understanding the history of the BSB during the last interglacial period (the Eemian interglacial) 130,000 years ago, with a particular focus on how this period ended at the onset of the last ice age (Weichselian glacial). This will provide information about the development of climate in the region and make it possible to model the future of the Baltic Sea climate.

- By focusing on the advances and retreats of the Scandinavian Ice Sheet between 100,000 and 20,000 years ago, it is hoped to better understand whether the SIS influenced North Atlantic climatic oscillations or if it simply responded to those climate changes and shifts in ice sheet cover. During the most recent glacial period, the BSB was intermittently free of ice, during which the basin was occupied by lakes. There is strong evidence to suggest that the lake deposits were not disturbed by the final ice advance over the southern Baltic and so taking cores from these sediments will provide new and exciting information on the climatic development of a previously poorly understood time period.

- The expedition will study the microbiology and biogeochemistry of the BSB and the responses to shifts in the environment encompassing lacustrine, brackish and marine phases as well as the major climatic transitions between glacial to interglacial periods.

- The expedition scientists will also study the history of the BSB during the last 20,000 years and examine how the ecosystem has responded to climatic change and forcing mechanisms prior to any human influence.

Reconstruction of variations in climate based on cores collected during the expedition will be of significant importance both regionally and globally. Analysis of terrestrial, marine and ice archives combined with numerical models have shown that the North Atlantic Ocean circulation plays an important role in the global climate systems that affect North America and Europe in particular. The position of the BSB, halfway between the North Atlantic Ocean and Asia, allows the scientific team to record the response of the northern European continent to oceanic and climatic forcings, which can also be linked to the Asian monsoon system.

The expedition objectives

IODP Expedition 347 will use a geotechnical drillship, the *Greatship Manisha,* to core and wireline-log six of the sub-basins within the BSB. To obtain the most complete record of the paleoceanographic and microbiological history recorded within the sediments from the last 130,000 years, a series of holes will be cored at seven sites in different water depths *(see map)*, adopting an offset coring methodology, to ensure as complete a composite section as possible is recovered at each site. These records will be supplemented by a series of short cores that will capture an undisturbed record of the water/seabed interface and upper 0.75m of sediments. Four sites have been identified as being critical for the investigations into the response of the deep biosphere to the climatic changes within this basin, and so at each of these sites an additional hole will be cored and dedicated to microbiological sampling.

The offshore phase of the Baltic Sea Paleoenvironment Expedition will also include measurement of ephemeral core properties and microbiological sub-sampling, but the main analyses will take place at the IODP Bremen Core Repository and MARUM labs (University of Bremen) a few months after the expedition when the cores will be split, described and sampled.