



Scientific Drilling in the Arctic Ocean: A challenge for the next decades

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Although major progress in Arctic Ocean research has been made during the last decades, the knowledge of its short- and long-term paleoceanographic and paleoclimatic history as well as its plate-tectonic evolution is much behind that from the other world's oceans. That means - despite the importance of the Arctic in the climate system - the data base we have from this area is still very weak, and large parts of the climate history have not been recovered at all in sedimentary sections. This lack of knowledge is mainly caused by the major technological/logistic problems in reaching this permanently ice-covered region with normal research vessels and in retrieving long and undisturbed sediment cores.

With the successful completion of IODP Expedition 302 ("Arctic Coring Expedition" – ACEX), the first Mission Specific Platform (MSP) expedition within the Integrated Ocean Drilling Program - IODP, a new era in Arctic research has begun. For the first time, a scientific drilling in the permanently ice-covered Arctic Ocean was carried out, penetrating about 430 meters of Quaternary, Neogene, Paleogene and Campanian sediment on the crest of Lomonosov Ridge close to the North Pole. The success of ACEX has certainly opened the door for further scientific drilling in the Arctic Ocean, and will frame the next round of questions to be answered from new drill holes to be taken during the next decades.

In order to discuss and plan the future of scientific drilling in the Arctic Ocean, an international workshop was held at the Alfred Wegener Institute (AWI) in Bremerhaven/Germany, (Nov 03-05, 2008; convenors: Bernard Coakley/University of Alaska Fairbanks and Ruediger Stein/AWI Bremerhaven). About 95 scientists from Europe, US, Canada, Russia, Japan, and Korea, and observers from oil companies participated in the workshop. Funding of the workshop was provided by the Consortium for Ocean Leadership (US), the European Science Foundation, the Arctic Ocean Sciences Board, and the Nansen Arctic Drilling Program as well as by sponsorships from British Petroleum, ConocoPhillips, ExxonMobil, Norwegian Petroleum Directorate, StatoilHydro, and Shell International.

The major targets of the workshop were:

- (1) to bring together an international group of Arctic scientists, young scientists and ocean drilling scientists to learn and exchange ideas, experience and enthusiasm about the Arctic Ocean;
- (2) to develop a scientific drilling strategy to investigate the tectonic and paleoceanographic history of the Arctic Ocean and its role in influencing the global climate system;
- (3) to summarize the technical needs, opportunities, and limitations of drilling in the Arctic;
- (4) to define scientific and drilling targets for specific IODP-type campaigns in Arctic Ocean key areas to be finalized in the development of drilling proposals.

Following overview presentations about the history of the Arctic Ocean, legacy of high-latitude ocean drilling, existing site-survey database, technical needs for high-latitude drilling, possibilities of collaboration with industry, and the process of developing ocean-drilling legs through IODP, the main part of the workshop was spent in thematic and regional break-out groups discussing the particular questions to be addressed by drilling and the particular targets for Arctic scientific drilling. Within the working groups, key scientific questions (related to the overall themes paleoceanography, tectonic evolution, petrology/geochemistry of basement, and gas hydrates) and strategies for reaching the overall goals were discussed and – as one of the main results – core groups for further developing drilling proposals were formed. Based on discussions at this workshop, approximately ten new

pre-proposals are planned to be submitted to IODP for the April 01- 2009 deadline. We hope that the development of new scientific objectives through the pre-proposal process will help reshape plans for scientific ocean drilling beyond 2013 and direct the program north towards these critical priorities and advance exploration of the Arctic.