Geophysical Research Abstracts
Vol. 12, EGU2010-12693, 2010
EGU General Assembly 2010

Drilling Polar Oceans with the European Research Icebreaker AURORA BOREALIS: the IODP Context

Lester Lembke-Jene (1), Bonnie Wolff-Boenisch (1), Roberto Azzolini (2), Joern Thiede (3), Nicole Biebow (2), Olav Eldholm (4), and Paul Egerton (2)

(1) Alfred Wegener Institute - Bremerhaven, European Research Icebreaker Consortium - AURORA BOREALIS, Bremerhaven, Germany (lester.lembke-jene@awi.de), (2) European Science Foundation, Strasbourg, France (razzolini@esf.org, pegerton@esf.org), (3) University of Copenhagen, Denmark (jt@geo.ku.dk), (4) University of Bergen, Norway (olav.eldholm@geo.uib.n)

Polar oceans are characterized by extreme environmental conditions for humans and materials, and have remained the least accessible regions to scientists of the IODP. DSDP and ODP have for long faced specific technical and logistical problems when attempting to drill in ice-covered polar deep-sea basins. The Arctic Ocean and large areas of the high-latitude Southern Ocean remained largely un-sampled by ODP and remain one of the major scientific and technological challenges for IODP. Drilling in these regions has been discussed and anticipated for decades and the scientific rationales are reflected in the science plans of the international Nansen Arctic Drilling Program (NAD) or the Arctic Program Planning Group (APPG) of ODP/IODP, amongst others. More recently, the rationale to investigate the polar oceans in a holistic approach has been outlined by workshops, leading to strategic assessments of the scientific potential and new drilling proposals.
The European Polar Board took the initiative to develop a plan for a novel and dedicated research icebreaker with technical capabilities hitherto unrealised. This research icebreaker will enable autonomous operations in the central Arctic Ocean and the Southern Ocean, even during the severest ice conditions in the deep winter, serving all marine disciplines of polar research including scientific drilling: The European Research Icebreaker and Deep-Sea Drilling Vessel AURORA BOREALIS.
AURORA BOREALIS is presently planned as a multi-purpose vessel. The ship can be deployed as a research icebreaker in all polar waters during any season of the year, as it shall meet the specifications of the highest ice-class attainable (IACS Polar Code 1) for icebreakers. During the times when it is not employed for drilling, it will operate as the most technically advanced multi-disciplinary research vessel in the Arctic or polar Southern Ocean. AURORA BOREALIS will be a „European scientific flagship facility" (fully open to non-European partners), a multidisciplinary platform for studies ranging from the sub-seafloor into the atmosphere.
AURORA BOREALIS was planned for her role in deep-sea drilling in consultation with engineers and technical experts familiar with the program and the operation of these vessels. All techniques currently deployed on IODP expeditions can be implemented onboard the vessel under polar weather and ice conditions, including the full range of re-entry, casing and cementing, and instrumentation options and the entire suite of downhole logging tools. Due to sufficient laboratory space, a full analytical workflow can be easily established comparable to existing permanent platforms, including clean rooms, diverse scanning and logging or incubation facilities. While the vessel is equipped with a dedicated deep-sea drilling rig, other coring and drilling techniques can be employed if needed (e.g. Rockdrill, MEBO, large diameter Kasten cores). AURORA BOREALIS is fitted to operate a CALYPSO Piston Coring System in polar waters. Future mud-return systems under consideration and testing for IODP to provide controlled borehole conditions in difficult facies are compatible with the layout of AURORA BOREALIS. The berthing capacity of 120 personnel total (scientists, technical support and crew) allows to accommodate a sufficient number of science party members offshore.
The present scientific implementation documents plan for about one polar scientific drilling expedition per year in a to-be-determined configuration. As the vessel is a multi-dsiciplinary platform, operations for the entire year are not dependant on drilling operations alone. While principal access to the vessel will be based on a competitive proposal review and evaluation system, the allocation of timeslots specifically for drilling would preferably be given over to IODP handling and planning systems in a cooperative mode using the strengths and capacitites of the

future program. Depending on interests and needs of the scientific communities a preferential focus in non-drilling expedition planning could be established e.g. for dedicated geophysical pre-site survey works in areas inaccessible by other vessels to secure critical data needed for later drilling expeditions.
Based on ongoing expert consultations, it is safe to assume that the average costs for an Arctic or polar drilling expedition will be considerably lower than with an otherwise necessary multi-ship setup based on modelled expedition scenarios and annual operational cost calculations. Still, AURORA BOREALIS shall provide substantially enhanced scientific, operational, personnel and technical capacities offshore.