

IAPP Report to the AOSB in Oslo, Norway 4/98

Prof. Louis Legendre, Chair of the Scientific Coordination Group for the IAPP (IAPP-SCG), noted that the concept of an IAPP had been developed in 1987 in Santander and that a study of the Northwater had been proposed initially at the same time. In 1988 in Bremerhaven, three polynyas were identified as targets for potential study: NEW, NOW and the St. Lawrence Island Polynya (SLIP).

The NEW field programs and analyses have been completed and the results presented at a very successful Symposium in 1997. In 1991 a proposal for Canadian study of NOW was submitted to Canadian authorities for funding but was not successful. Planning for study of NOW continued in Canada into 1994-1995. In 1996 a detailed proposal for Canadian study of NOW was approved by the National Science and Engineering Research Council (NSERC) for support and was approved in February of 1997. Scientists from Japan, Denmark, Poland, the United States, Belgium, and Great Britain are participating.

Many Canadian governmental institutions and universities are now involved in the comprehensive study of NOW. The central hypothesis is that there are two principal mechanisms of polynyas -- latent heat (acting through winds) and sensible heat (working through movement of ice). It is thought that, in the Northwater, the two co-exist, not always acting at the same time. Many predictions have been developed as to the response of biological systems to these driving forces, because such response will vary, depending on the relative importance of the two driving forces. This interaction of sensible and latent heat is predicted to govern, not only the biology, but also the carbon cycle in the polynya.

About sixty principal investigators are involved (thirty from Canada and thirty from other countries) in the field study which was launched in 1997 with deployment of deep moored arrays, including upwards-looking ADCP's, from the CCGS Louis St. Laurent.

In 1998 field program is expected to involve about 120 scientists and the primary platform will be the CCGS Pierre Radisson. The first three legs will involve 83 stations. Seven of the nine 1997 instrument lines will be redeployed, but others will be placed at different locations to better study the inflow and outflow of subsurface waters. In addition, the 1998 field program utilizes a trackline that avoids the fixed-ice regions that the local populations use as a hunting ground. Surface temperature, salinity and chlorophyll will be monitored continuously; birds and mammals will be monitored. Land-based studies will be conducted. Remote sensing of ice conditions and color will be monitored by remote sensing continuously for the next five years.

For this year, a major objective is to determine whether the sensible heat mechanism is very active along the coast of Greenland, as indicated by the initial preliminary studies in mid-May of 1991. At that time record levels of chlorophyll had been observed in this region. Connections with the Arctic basin may be considered for future study.

The shore-based program will focus on ice studies around Cape Isabella at the northern end of the study region and on bird studies at Coburg Island in the south. The efforts of Polish scientists will address primarily near-shore processes, but also expected to contribute to study of water

exchange with the Arctic. An initial cross-section of the Jones Strait was conducted in 1997. It is hoped that funding from other participating countries can be found to undertake additional studies in August of 1999 when the moorings will be retrieved. Canadian funding is not expected to be available for such research.

The SCG has been informed by U.S. colleagues that an organized study of the SLIP is now very unlikely. It was suggested that, if the SCG continues, then it should focus on Arctic polynyas on the Russian side of the basin, especially the Laptev Sea polynya. It was also noted that, while sediment traps had been deployed and a few cores had been obtained in polynya studies, sedimentary processes and influences have not been a major component of polynya studies to date.

A major objective of the IAPP was to consider the linkages between polynyas and broader-scale ocean circulation. The U.S. and Australia are involved in such a study in the Antarctic.

The NEW program resulted in new hypotheses regarding the relationship between biological productivity and physical processes. These hypotheses were then considered in planning for the NOW program. A synthesis paper prepared for NOW planning identified the ice barrier issue as important, but the ice barrier has not reappeared. This year the ice in front of one of the major glaciers disappeared and no icebergs were generated in this region.

It is not clear what role is played by ice bridges in the NOW region, but one of the early exciting conclusions was that there may be a persistent catabatic wind on some glaciers. An array of weather stations will be deployed that may provide additional information on this.

It was agreed that the improved understanding of polynyas that has resulted from the IAPP to date should assist scientists to identify future polynya research for study and determine what such studies should involve. The SCG/IAPP will be asked to consider whether the program should be broadened and, if so, how new components should be initiated and which other organizations might best be involved.

It was agreed that the SCG be encouraged to meet as soon as possible after the NOW field season to consider future directions for the IAPP. It was agreed that a scientific workshop might be the best way to determine what the next area of research should be relative to the issues which need still to be resolved.

Action: The Chair of the SCG/IAPP, will be asked to convene a meeting of the SCG prior to the Tokyo AOSB Meeting. The Agenda and discussion papers will be organized by the SCG under the direction of Dr. Legendre and administrative arrangements will be coordinated by the Secretariat.

Scientists involved in polynya research should be invited to participate to bring together the results of NEW and NOW and develop lessons for the future. The scientists should be asked to formulate the scientific questions; consider the extent to which the NEW and NOW answered these questions; and then assist the Board to determine where it needs to go next.

Questions that the SCG and/or such a workshop should be asked to consider include:

1. whether Arctic basin polynyas, especially those on the Russian side, for example, the large Laptev Sea polynya, should be included in the program;
2. the role of the carbon cycle and the sediments in polynyas; and
3. comparison of Arctic and Antarctic polynyas.

It was suggested that the SCG should meet initially through a teleconference and then at a later date in a regular meeting.

Action: An agenda item for the SCG meeting in Tokyo should be the planning for an IAPP Workshop. An interim planning Board should be set up by Dr. Legendre immediately to work by correspondence to prepare recommendations for the SCG.

The membership of the SCG needs to be strengthened, especially to provide expertise not now available to the SCG. To address this need, AOSB Members will be invited to nominate scientists for the SCG, particularly in the areas of mammals and physical oceanography.

Action: The Chairman should write to AOSB Members to invite the nominations of scientists to the SCG.