

SCOR WG 58 THE ARCTIC OCEAN HEAT BUDGET

Report of Chairman, Dr A. Foldvik

SCOR WG 58 met from 5 to 7 September 1978 at the Geophysical Institute, University of Bergen, Norway. The terms of reference were

- I to assess the present state of knowledge of the Arctic Ocean Heat Budget and the physical processes which control it, and
- II to recommend a coordinated and international research effort to significantly improve understanding of the controlling processes, taking into account the plans for the Polar sub-programme of the Global Atmospheric Research Programme.

Substantial progress was made in the preparation of a full report responding to the group's terms of reference. The report will be completed by late 1978 and will be published in the University of Bergen report reviews. With reference to the first terms of reference, the full report identifies the major components and processes of the Arctic Ocean Heat Budget, including items that are sufficiently well known and important information gaps. With reference to item II, we recommend the following course of action:

1. That SCOR WG 58 be perpetuated as a forum for international discussion, planning and coordination of investigations into the role of the Arctic Ocean Heat Budget and its relation to world climate; that funding for the organization be sought outside SCOR; that activities be coordinated from a center in Norway; and that working group members in their own countries attempt to inform and stimulate interest in the programs proposed below with a view to obtaining participating and funding.
2. That the following field projects be carried out as soon as possible to improve understanding in the areas described. The group emphasises that such projects require a coordinated and international effort:
 - a. Advective exchange of latent (ice) and sensible (water mass) heat across the whole Fram Strait.
 - b. A synoptic hydrographic survey of the Eurasian Basin down to depths of 800m, and deployment of recording sensors to examine variability and the dynamics of the polar mixed layer.
 - c. An investigation of heat exchange over open water and associated effects on the underlying water column, with a view toward parameterizing the ocean-wide surface heat flux in terms of ice cover and thickness.

We note that field projects presently directed toward the above studies are currently underway at the University of Washington, the Frozen Sea Research Group in Sidney British Columbia, the University of Bergen and the Polar Institute of Oslo.

3. That modelling efforts be initiated early in the program to explore dynamical processes, identify important time-scales, and as aids in experimental design. A possible hierarchy of models would include

- a. One-dimensional models of the seasonal polar mixed layer, and longer time-scale "filling box" type models to investigate the effects of climatic changes on ocean structure.
- b. Circulation models including the seasonal advance and retreat of river plumes, and advection of deep ocean currents.
- c. Climate models including an evaluation of the effect of ice-cover on the Arctic-atmosphere, and in turn, the effect of changes in the Arctic atmosphere on world climate. Model studies on the role of abyssal circulation in global heat transport. Such models urgently need new information of polar mixing processes.