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LAMONT-DOHERTY GEOLOGICAL OBSERVATORY PALISADES NY
ARCTIC MARINE ACOUSTICS AND OCEANOGRAPHY. (U)
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FINAL TECHNICAL REPORT
for
OFFICE OF NAVAL RESEARCH
CONTRACT N00014-75-C-0595

April 1975 - March 1979

ARCTIC MARINE ACOUSTICS and OCEANOGRAPHY

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Lamont-Doherty Geological Observatory
of Columbia University
Palisades, New York

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Marine Geology and Geophysics

A research camp was maintained continuously on Fletcher's Ice Island (T-3) in the Arctic Ocean from May, 1962, until September, 1974. During those 12 years a scientific party from Lamont maintained a program of geophysical data collection on the ice island as it drifted with wind and currents over a 14,000 km track in the Beaufort Sea. The location of the ice island was determined by celestial navigation using a theodolite up until 1967 when a satellite navigation was installed. Ocean depth was measured with a 12 k Hz echo sounder continuously during the drift except for minor gaps due to equipment failures. Gravity was read several times each day with a LaCoste and Romberg gravimeter. The total magnetic field was measured with a proton precession magnetometer and recorded continuously except for some gaps due to instrument problems. These data constitute a valuable resource for studies of ice drift and of crustal structure in the Beaufort Sea. One of the objectives of this contract was the organization, reduction, storage and display of this data set. This was accomplished with the information being stored in accessible form on digital magnetic tape which was made available to government agencies such as NOAA and DOD Gravity Services Division, which requested it.

The T-3 geophysical data were published completely in a technical report issued under this contract (Hunkins and Tiemann, 1977). This report contains complete listings of position, depth, gravity (observed, free-air and Bouguer anomalies) at 12 hour intervals over the entire period of drift. Maps of T-3 drift and geophysical sections are also included.

Photography of the Arctic Ocean floor with a bottom camera lowered and raised from a drifting ice camp was begun on Drifting Station Alpha and continued on T-3. A total of over 3,000 negatives were collected representing a

great variety of biological and geological abyssal environments. These negatives have all been printed on a uniform 5"x7" size, catalogued and stored at Lamont. The collection has been utilized by a number of investigators at different institutions, including the University of Wisconsin, the Bureau de Recherches Géologiques et Minières of France and the Département Geologie Marine of France. Use was made of these photographs in a study of abyssal organisms and their tracks (Kitchell et al, 1978).

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Proposed Nansen Drift Station

Planning for an icebreaker expedition into the Eurasian Basin of the Arctic Basin was carried out under this contract with expectation that the Lamont Arctic Group would take a key part in the physical oceanography and marine acoustics part of the research. An ad hoc committee for the Nansen Drift Station was formed by the Polar Research Board of the National Research Council. The physical oceanography panel was chaired by K. Hunkins and the marine acoustics panel by H. Kutschale. The resulting Scientific Plan for the Proposed Nansen Drift Station (1976) was published by the National Academy of Sciences. As it turned out, the plan was never implemented since it failed to get the necessary cooperation and financial support required from government agencies.

Although the Nansen Drift Station itself was never established, a smaller set of drifting ice stations was substituted to explore the Eurasian Basin. Although these stations could not explore the most distant parts of this Basin, they could carry out many of the other objectives of the Nansen Drift Station in an efficient and effective program. These Fram expeditions, beginning with Fram I in 1979, received many benefits from the Nansen Drift Station planning. The original Fram planning also was carried out under this contract. (Hunkins et al, 1979).

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