

# ***U.S. and Soviet Press Studies of a Colder Arctic***

**By WALTER SULLIVAN**

The United States and the Soviet Union are mounting large-scale investigations to determine why the Arctic climate is becoming more frigid, why parts of the Arctic sea ice have recently become ominously thicker and whether the extent of that ice cover contributes to the onset of ice ages.

The projects, which involve nuclear submarines, earth satellites, aircraft and numerous manned and unmanned stations on the drifting ice, are being pressed with special urgency in view of recent discoveries of important resources in the Soviet and the American Arctic.

These include gold and other ores on the Taimir Peninsula, the northernmost part of Siberia, and one of the world's richest oil fields on the North Slope of Alaska.

Because of increased ice along the north coast of the

Soviet Union and in view of heavier demands for late-season shipping, the Soviet Ministry of Shipbuilding is studying plans for a series of new icebreakers.

The icebreakers would be half again — or even twice — as powerful as the Lenin, the world's most powerful. Driven by nuclear reactors, the Lenin has 40,000 horsepower. The new ships may be driven by diesel-electric or gas turbine engines.

The American plan, which is being developed by the University of Washington with support from the National Science Foundation, is known as AIDJEX, for Arctic Ice Dynamics Joint Experiment. An area of the pack ice some 300 miles square would be studied intensively.

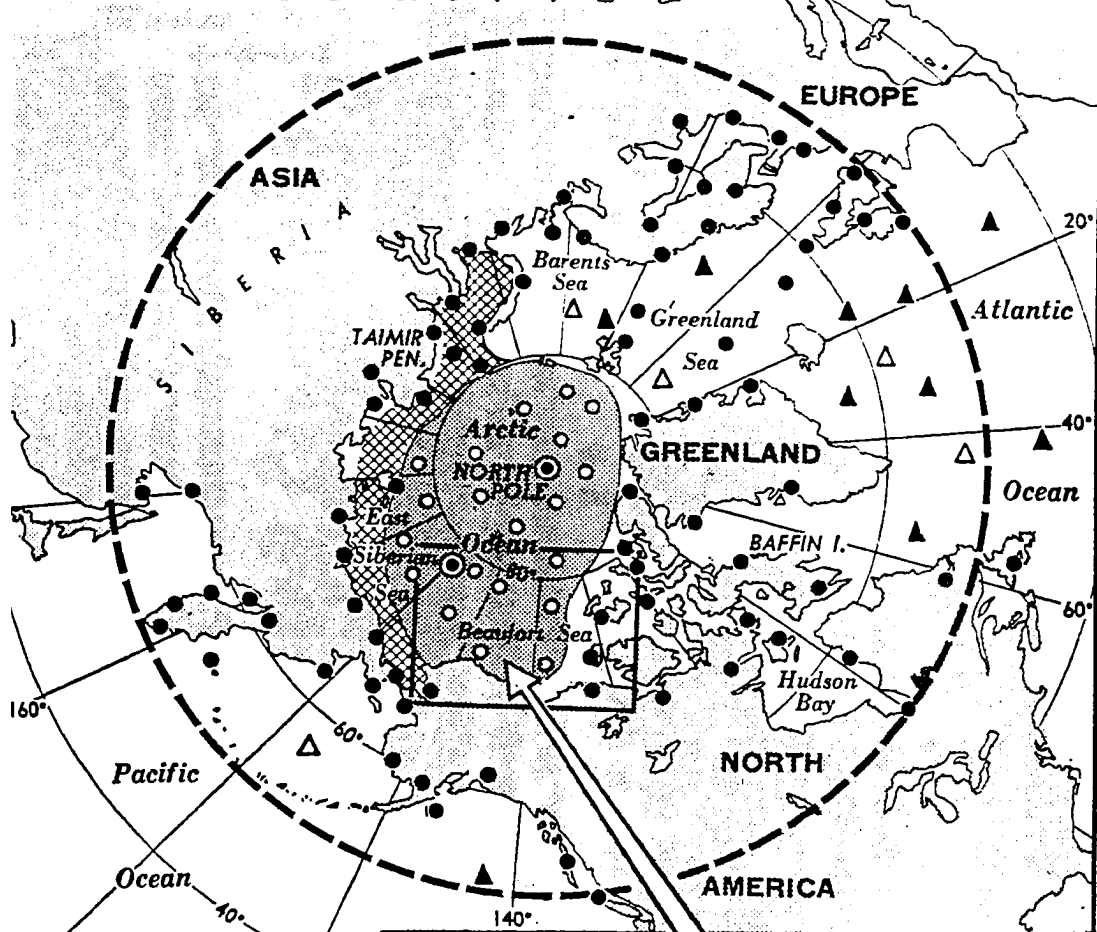
The Soviet plan is known as N.E.I. for Natural Experiment on Interactions. It seeks an understanding of factors that control how much energy enters the Arctic via winds, ocean currents and sunlight and how much is lost to space. The Russians now have four manned research stations on drifting Arctic ice.

The N.E.I. project, which is scheduled to last at least seven years, would also operate two dozen unmanned stations on the ice. Five special weather

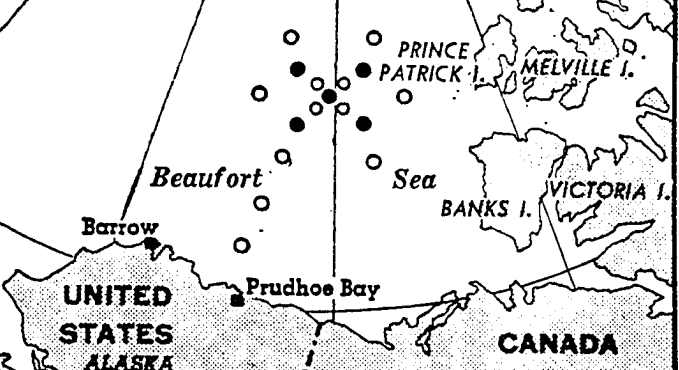
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# THE SOVIET ARCTIC PROJECT (NEI)



## THE AMERICAN ARCTIC PROJECT (AIDJEX)



**MAJOR ARCTIC RESEARCH:** The United States and Soviet Union will explore why the Arctic has recently become colder. Scientists on ships, on drifting ice floes, in aircraft and in nuclear submarines will seek factors that control climate change and, perhaps, initiate ice ages. Worsening ice conditions are impeding access to new Soviet ore deposits on the Taimir Peninsula, and exploitation of oil near Prudhoe Bay, Alaska, depends in part on better predictions of ice movements. In the seven-year Soviet project ships will patrol the Bering Strait and the passage between Greenland and Norway.

# U.S. and Soviet Press Arctic Studies

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ships would be added to ships of the international weather program that occupy stations further south.

Such ships, according to the Soviet polar specialist, Dr. Aleksei F. Treshnikov, can fire rockets to monitor upper-air winds.

In addition, Soviet ships are to monitor the two "warm water faucets" that feed the Arctic Basin. These are the Bering Strait and the passage between Norway and Greenland.

Dr. Treshnikov heads the Arctic and Antarctic Research Institute in Leningrad. He was interviewed during his visit Thursday to Columbia University's Lamont-Doherty Geological Observatory at Palisades, N. Y.

### Scientist Is Host

Among his hosts there was Dr. Kenneth H. Hunkins, who, with Dr. Norbert Untersteiner of the University of Washington, originated the American project. Both have worked in drifting stations on the Arctic ice.

Director of the multimillion-dollar, six-year United States project, which in its most intensive period, in 1972 or 1973, will involve many Government agencies, is Col. Joseph O. Fletcher of the Rand Corporation in Santa Monica, Calif.

In 1952, Colonel Fletcher, then still on active duty in the Air Force, established the first American drifting station on an ice island known as T-3, or Fletcher's Ice Island. An ice island, as opposed to an ice floe, is a flat-topped iceberg that was formed on land or while attached to the coast.

The use of such an ice island as the support base of the American project is considered essential. Air strips on ice floes are subject to rupture when the floes split. Ideally such an island would form the central base, with four unmanned stations spaced 12 miles apart around it.

The ice island, in that case, will have to be small enough not to have a major influence on typical stresses and strains within the surrounding pack ice. Farther away, forming a square some 60 miles on a side, will be four manned stations on the drifting ice. Beyond them is to be still another ring of six unmanned stations.

### Stations Will Move

Under the influence of wind, ocean currents and the earth's rotation, the floes carrying these stations will continuously change their relative positions. Observations every hour for the inner stations and every two hours for the outer ones are to keep track of these movements.

Nuclear submarines, according to the American plan, will sail back and forth, echoing sonar beams off the undersides of the floes to determine their roughness (and thus their susceptibility to water drag).

Aircraft as low as 500 feet are to sweep the surface with laser beams to determine the extent of pressure ridges and other sail-like features that affect response to wind.

Aircraft and earth satellites equipped with side-scanning radar, infrared sensors and cameras will record the extent of

open water and temperature variations.

Recent research suggests that heat flow from the ocean into the atmosphere is 100 times greater through patches of open water than through areas where there is ice cover. Yet estimates of the extent of open water in the pack vary widely (from 1 per cent to 10 per cent).

### Stations to Be Monitored

Relative movements of the ice floe stations will be determined by electronic navigational systems or by monitoring a Transit navigational satellite. This will show to what extent the pack ice is being crushed together or pulled apart under varying conditions of wind and ocean current.

Such knowledge should help in future predictions of navigation conditions and in assessing the variations in escape of oceanic heat to the Arctic air.

Among the hypotheses to be assessed is one that attributes ice ages to the absence of pack ice on the Arctic Ocean. Winds off that ocean are very dry and drop little snow on Northern lands, but if the sea were open the snows would be heavy and ice sheets would begin to form, the hypothesis holds.

Such an idea assumes that the ocean, once free of ice, would not soon freeze again. At present, the brilliant snow surface of the pack reflects much solar energy back into space. If the ocean were ice-free, it is argued, this would not occur, and the water would warm up enough to prevent re-freezing.

### Other Proposals

Other scientists have proposed that, by sprinkling coal dust on the pack, or through other manipulation, it would be possible to melt the ice, open the ocean to navigation and ameliorate the northern climate.

Yet another argument concerns the long-discussed Soviet plan to divert north-flowing rivers southward, irrigating

arid lands and checking the steady drop in level of the Caspian Sea. Since these rivers deliver fresh, relatively warm water to the Arctic Ocean, it is feared that their curtailment might induce a new ice age.

Dr. Treshnikov said no river diversion was projected in the next Soviet Five-Year Plan, although studies continue. However, he added, a preliminary examination indicates that a 25 per cent curtailment is unlikely to have any effect, since, from natural causes, flow in the rivers varies 40 per cent from year to year.

A major puzzle is why climate variations of the last century have been more intense in the Arctic than in lower latitudes. During the half-century that ended about 1940 the world climate became warmer, but the effect was particularly marked in such Northern lands as Spitsbergen.

Since then there has been a steady cooling, again most marked in the Far North. Ice conditions off the Soviet coast, said Dr. Treshnikov, have in the last few years been the worst since the twenties or thirties.

There are other weather mysteries, as noted in the prospectus of the Soviet plan.

These include a "warm nucleus" in the atmosphere over the northern Pacific and peculiar repetition cycles of two and six years in air circulation patterns.