

# THE POLAR TIMES



# **National Oceanic and Atmospheric Administration**

## **The Polar Times**

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August 6, 2010



### CUTTER STORIS STEAMS FOR PRUDHOE BAY

The Kodiak-based Coast Guard Cutter Storis helps clear a path in six-inch ice for 15 tugs and 15 barges trying to reach North America's largest known oil field. The 235-foot ship broke ice during the weekend with another Kodiak-based cutter, Citrus,

to help the tugs and barges reach their destination. This photo was taken by an Atlantic Richfield photographer about 10 miles west of the Lonely Dew line site and 100 miles west of Prudhoe Bay.



**READY FOR UNLOADING**—These barges sit at Prudhoe Bay after a successful trip to the oil rich slope. After a long battle with ice and weather, the

barges containing material for oil field production were ready for unloading.

# The Polar Times

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No. 81

DECEMBER 1975

## FIRST BARGES GET TO PRUDHOE BAY

Ice Broached and Supplies for Oil Pipeline Arrive

The New York Times

ANCHORAGE, Alaska, Sept. 30—In a path hacked through the ice by two Coast Guard cutters, the first of 15 barges with key pipeline supplies reached Prudhoe Bay today.

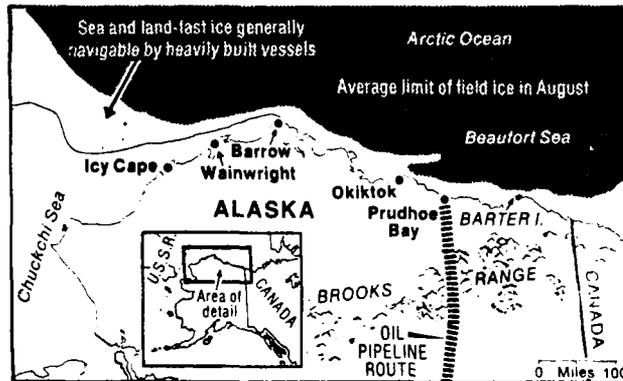
In an 11th-hour gamble to get modular units for oil wells, fuel, bridges, and seven-story assembled buildings to the North Slope oil fields this year, Arctic Marine freighters, tugboats and barges followed a small path in the ice made by the cutters. The 15 barges were carrying \$500-million in equipment for North Slope operations.

The Atlantic Richfield Company's spokesman in Anchorage, Tom Brennan, said today: "The first barge came in at around 3 A.M. this morning and we expect that all the barges will be into Prudhoe within the next 48 hours. The majority of the barges are still some 70 miles out of Prudhoe."

The arrival of the 15 barges will signal the end of a two-month drama in the arctic seas. Only July 23, barges from as far away as Japan and Houston began what was to be a 60-day wait for the arctic ice packs to move offshore.

The arctic ice packs usually move out to sea during July and August before returning for the rest of the year. However, this year the ice pack moved offshore in early September, but opened only long enough for 10 barges to dash around the northernmost point at Point Barrow and into Prudhoe.

The thirty-seven remaining barges then broke into two groups. Nineteen remained in the icy waters 300 miles from Prudhoe and the rest retreated to southeastern Alaska ports, where their supplies are now being unloaded for the three-day journey overland from Seward to Prudhoe Bay.



The New York Times/August 20, 1975

The 19 barges that stayed behind have mostly cargo that cannot be transported except by barge. If they had been unable to move through the ice, the barges would have joined next years planned flotilla, Mr. Brennan said.

During the last two weeks the barges had edged toward Barrow only to be forced away by ice. Finally, on Saturday a long-awaited wind moved the heavy ice pack away from the shore.

President Ford earlier this month had ordered Coast Guard cutters to aid the civilian flotilla. They have been breaking the way for the flotilla.

"The ice is strong enough for a man to walk on," said Mr. Brennan, who returned from Prudhoe earlier this week. Snow was blowing yesterday at the oil fields where caribou wander amid wells and workers spot polar bear tracks. The temperature was 5 degrees.

James Lowe, project manager for Arctic Marine Freighters, said chances that the tugs and barges would be able to get out before the main ice pack returns "are practically nil" at this point.

The barges were to be used next year when an even larger flotilla is expected to make its way around Alaska to Prudhoe Bay. "We've been assured by Arctic Marine Freighters that there will be enough barges to meet our needs next summer," Mr. Brennan said.

There are still four barges that will try to follow the Coast Guard cutters. Three are waiting off Port Clarence and one is in Kotzebue Sound, said Mr. Brennan. Although some of the barges have been damaged by the ice, "there's no substantial damage to any of the modules," he said.

Another barge, the North Star Three, carrying 900 tons of

## Barges Penetrate Ice To Reach Prudhoe Bay

The New York Times

LOS ANGELES, Oct. 3—The Atlantic Richfield Company said today that the last of 15 barges, whose delayed voyage under severe ice conditions had threatened to postpone the development of Alaska's North Slope oil, arrived at their destination, Prudhoe Bay, late last night.

Safe arrival of the barge convoy, which had been blocked by the Arctic ice pack for two months, means that Arco and three other companies will be able to begin producing 600,000 barrels of oil daily from the North Slope by mid-1977, the company said.

winter supplies essential for survival of the Eskimo community at Barrow, also is expected at Point Barrow today or tomorrow. If this ship cannot get into Barrow, its cargo may be airlifted by helicopter.

## Fur Seals Will Be Wired For Radio in Experiments

SEATTLE, Wash. (AP)—Fifty fur seals are to be wired for radio this year to that scientists of the National Marine Fisheries Service center here can learn more about their feeding, movements and behavior.

Harnesses with radio transmitters are to be attached to 50 young males when they return to St. George Island in the Pribilofs after their annual migration southwards.

Little is known about the activities of these young males because they make up most of the annual harvest.

## FORD, IN ALASKA, PRAISES PIPELINE

On Trip to Peking, He Calls Project Weapon in Fight for Independence on Oil

By JAMES M. NAUGHTON

The New York Times

FAIRBANKS, Alaska, Nov. 29—President Ford, clad in an arctic parka, walked along the trans-Alaska pipeline today and hailed the construction project as a weapon in the struggle to "liberate" the United States from "unreliable" foreign sources of oil.

On his way to Peking to renew the personal diplomacy with China that President Nixon initiated four years ago, Mr. Ford declared that the "fundamental differences between the American and Chinese societies" would not prevent mutual efforts to nourish peace in Asia.

Alaska, across the Bering Strait from the eastern edge of Asia, was an appropriate stopping place to note that "America's interests are linked to Asia," Mr. Ford told a crowd gathered alongside his plane in a hangar at Eielson Air Force Base.

### Prods Congress

Although his overnight stay in Alaska was but a rest stop on the long journey to Peking, Mr. Ford made the most of it to engage in some broad and narrow politicking.

He prodded Congress to move more quickly toward energy independence, using a 10-mile tour along the pipeline project to underline his contention that "we have the physical resources, the economic resources, the ingenuity and the national will" to attain the goal.

In a thinly veiled overture to the 1976 Alaskan electorate, the President rhapsodized at length on Alaska's frontier spirit, its awesome size and its place, as

he put it, as "an inspiring and shining northern star in our constellation of states."

Mr. Ford's automobile trek across the frozen landscape to the site of a pipeline pump station 35 miles south of Fairbanks served as a means of acclimatizing the Presidential party to the chill of wintry Peking that Mr. Ford hopes will be climatic and not diplomatic.

Muffled in a thick coat against the 10-degree temperature and a steady snow, Mr. Ford alighted from his limousine to inspect Arctic construction equipment and accept light refreshments from burly workers assembled in a mess hall.

He had already said, in an apt phrase at the air base, that the 1973 Arab oil embargo had a "chilling" impact on the American economy.

"We are determined to liberate ourselves from this threat," he said. "In our vast Alaskan reserves we have the means to help accomplish the goal of energy independence."

Despite persisting qualms among environmentalists about the pipeline's possible impact on the state's ecology, Mr. Ford said hewas "pleased that the pipeline has proven to be an outstanding example of how our ecology can be preserved while energy needs are met."

The President paid tribute to Alaska and Alaskans.

"Everything about Alaska is impressive," he said. He spoke of the "hearty" resident, of the "alert" military forces stationed here, of pride in the "largest privately financed construction project in world history," and of the "splendid job" the state has done in absorbing the oil-boom migrants.

"We salute Alaska," Mr. Ford said, adding a phrase that could easily represent his view on the coming national campaign, "I count on you."

### The Polar Times

Published June and December  
by the  
AMERICAN POLAR SOCIETY,  
August Howard, Secretary,  
98-20 62nd Drive (Apt. 7H),  
Rego Park, New York 11374

AUGUST HOWARD, Editor

THE POLAR TIMES highly recommends "The Polar Record," published by the Scott Polar Research Institute, Cambridge, England.

The American Polar Society was founded Nov. 29, 1934, to band together all persons interested in polar exploration. Membership dues are \$2.00 a year or \$5.00 for 3 years, which entitles members to receive THE POLAR TIMES twice a year.

Back issues, No. 1 through No. 77, if available are 50 cents each. Issue 78 and onward are \$1.00.

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## Archeologist Believes 'Dig' To Illustrate Eskimo Life

KAILAIGAMIUT (AP) — (AP) — An archeological dig here by a Washington State University graduate student may provide anthropologists with a vivid illustration of how Eskimos adapted to a changing environment.

Robert L. Shaw's excavations at this abandoned village in southwestern Alaska have unearthed pottery shards confirmed as being 1,200 years old. The site is a coastal plain between the Yukon and Kushokwim rivers, believed to have had a warm climate from 1000 to 1300 AD.

Dr. Robert E. Ackerman, an anthropology professor who recently returned from the village, said, "We should be able to see how changes in time and environment influenced changes in culture."

Ackerman said that "because it is a frozen area in a permafrost region, many items are preserved that wouldn't be elsewhere."

The village was first excavated by Ackerman in 1972. It is believed to have been used by Eskimos from 800 until the

end of the 19th century, although work this summer indicates the village may have been occupied as recently as 1910.

Ackerman said the Eskimos apparently spent much of the winter in house pits at the village, occasionally venturing out to fish through the ice.

He said rapid thawing has made it possible for Shaw to reach the base of the mound, where specimens are older and better preserved.

In earlier digging, Ackerman uncovered seven pits, ranging from large communal-type houses to single-room dwellings.

He said special attention will be focused on the Eskimos' use of plants, as previous studies have concentrated on their reliance on animals for food. By comparing plant remains in the mound players with the plant life now growing at the site, Ackerman says scientists will study the evolution of plant life in the area.

Shaw will return with two field assistants for several months next summer to com-

plete the work, Ackerman said. The project is funded by a National Science Foundation Grant.

### ICE AT PRUDHOE BAY SAID TO HALT BARGES

SEATTLE, Oct. 11 (UPI) — The barges that defied ice and winds to bring essential materials to the Alaska oil pipeline project are stuck 4,500 feet from their destination at Prudhoe Bay, according to the president of a tug company.

Foot-thick ice is blocking the way to an unloading causeway, and tugboat crews are struggling to break a path for the barges, the official, Tom Crowley, president of Crowley Maritime, said yesterday.

Much of the cargo brought in by a 15-barge flotilla last month has yet to be unloaded. There is also heavy cargo aboard barges in the bay. The original fleet of more than 40 barges carried cargo valued at \$500-million.

"The whole area is frozen over about a foot thick," said Capt. Donald Bostdorff, assistant Pacific Coast operations manager for Crowley. "We churn it up into chunks, and there's a snap freeze and we wind up with ice three feet thick."

## Eskimos Save 23 in Plane Crash In Western Alaska; 10 Are Killed

ANCHORAGE, Alaska, Aug. 31 (AP)—Residents of an Eskimo village rescued 23 survivors from the wreckage of a plane that plunged into a fog-shrouded hillside yesterday on St. Lawrence Island off western Alaska. Ten others died in the crash, Alaska State troopers said.

The Wien Air Alaska F-27B turboprop was approaching Gambell, an island community about 200 miles off the Alaska mainland in the Bering Sea, when it crashed near the top of a 600-foot hill.

The pilot, copilot and one crewman were killed, a Wien spokesman said. A spokesman at the Anchorage hospital where most of the survivors were taken said the stewardess was one of the injured. Her condition was not known.

A crewman aboard a Coast Guard rescue plane said that villagers in the community of about 400 had evacuated, on makeshift stretchers, all but three persons when other help

arrived.

He said the Gambell residents climbed the hill with stretchers "made of cots, blankets, some of poles and chicken wire, anything they could put together to bring down those people."

The injured, including at least five children, were ferried across a lake outside town with small boats and were taken to the school, where they were treated by medical teams flown in from Nome, he said.

The survivors, wrapped in village blankets, handsewn quilts and sleeping bags, were flown in later to Anchorage hospitals aboard a Coast Guard plane.

The plane was on a regular weekly one-hour flight from Nome. Most of the passengers were native Alaskans.

The Gambell islanders hunt and fish for a living, and the island is noted for Eskimo art work.

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# King Olav V tours Prudhoe

By PEGGY ANDERSEN  
Associated Press Writer

PRUDHOE BAY (AP)—The sun was only a sulfur-colored smear in the overcast sky and the wind chill dropped temperatures to 50 degrees below zero as King Olav V toured the oil fields at Alaska's Prudhoe Bay.

The monarch wore only a topcoat over his business suit Tuesday and a soft gray hat barely sheltered his ears as he left the small De Havilland twin-engine jet to begin his inspection of Alaska's North Slope oil bonanza.

Officials greeted him as the wind stirred dry snow which added to poor visibility and a sense of vastness at the isolated camp carved out of the tundra at the top of the world.

He was escorted to Atlantic Richfield Co.'s facilities by Howard Slack, vice president of Arco's Alaska operations. He viewed diagrams of the production fields and visited the modular structures perched atop the frozen ground. Arco's Prudhoe Bay employees call those tightly insulated buildings home throughout the long dark arctic winter.

Curious employes gazed at the Scandinavian monarch as he passed the warm lunchroom accompanied by the royal party and Alaskan dignitaries who had flown hundreds of miles north from Anchorage to view the terrain with him.

Prudhoe Bay's camps have become one of the top tourist attractions in Alaska for visiting VIP's and the Norwegian king's visit Tuesday was just the latest in a long list of tours conducted by oil companies for traveling politicians, movie stars and corporation heads.

The king spoke briefly with Simeon Kunaknana, 30, of Barrow, Alaska. The Eskimo has worked on the North Slope for almost six years. The royal visitor inquired about his family, Kunaknana said. "I never met a king before...he was very nice," he said.

Maintenance carpenter Gary Beyer, 32, of Anchorage, asked if the king would pose with him for a snapshot. His majesty obliged.

The print from the 30-second camera was blurry, but, as Beyer said, "Oh well—it was just the idea..."

He described the 72-year-old monarch as "fantastic! He's just like one of us."



## HIS MAJESTY GOES TO THE SLOPE

King Olav tips his hat and shakes hands with Mrs. Eva Bilet as he arrives at the airport this morning to take a trip to Prudhoe Bay and the North Slope oilfields. At center is Robert Atwood, Norwegian consul

in Anchorage. The king returns to Anchorage tonight, when he will be feted at a dinner at the Atwood home. Atlantic Richfield Co. is the king's host on the slope

King Olav and his entourage moved on to the camp cafeteria where he nonchalantly picked up a tray and went through the plentiful food line with the rest of the diners. The visiting Norwegian press said the only time they had heard of such an occurrence was when his majesty paid a call on Norwegian oil installations at Ekofisk on the North Sea.

The recent oil discoveries there apparently whetted King Olav's intense interest in the Alaskan oil fields. Oct. 28

### Yukon Power Potential Cited

WHITEHORSE, Yukon (AP)—The Yukon has a hydroelectric potential of 7,500 megawatts, equivalent to 110 million barrels of oil a year or 27 million tons of coal for an indefinite period of time, the Northern Resources Conference has been told. The development project would invoke diverting the headwaters of the Yukon River at a cost of \$12-billion.

### Japan's Whaling Fleets Have Catch Quotas Cut

TOKYO, Aug. 23 (Reuters)—Japanese whaling fleets in the Southern Hemisphere have had their catch quotas slashed under a provisional international agreement reached here, the fishery agency announced today.

It said that in the 1975-76 season, Japan would only be allowed to catch 1,331 sei and 3,071 mink whales compared with 2,392 and 3,500, respectively, for the preceding season.

The provisional quotas were announced after a week-long four-nation conference attended by South Africa, Brazil, Japan and the Soviet Union.

The conference wound up without full agreement, Brazil insisting on a larger share.

According to the provisional quotas, the Soviet Union was temporarily allowed to catch

895 sei and 3,017 mink whales, down from 1,608 and 3,500 for the last season.

### Soviets Promise To Cut Whaling

MOSCOW, Nov. 4 (UPI)—The Soviet Union said Monday it would send fewer whaling ships to the Antarctic Ocean this year in an effort to preserve the dwindling number of whales there.

Observers from the International Whaling Commission will be aboard the ships that do go, said Vladimir Tveryanovich, chief specialist of the U.S.S.R. ministry of fisheries.

"It is not merely with words but with deeds that the Soviet Union is reducing considerably whaling in the Antarctic," Tveryanovich said in an interview with the Tass news agency.

# Alaska Pipeline 42% Done Despite Delays

## Costs Far Beyond the Forecasts

By **ROBERT LINDSEY**  
The New York Times

PRUDHOE BAY, Oct. 3

The brutal Arctic winter is fast approaching on Alaska's North Slope, and across rivers and over the tundra, through mountain passes, valleys and forests, the once controversial trans-Alaska pipeline is slowly nearing the halfway mark.

Costs are continuing to soar far beyond original forecasts. Work on the pipeline's southern terminal at Valdez, 798 miles south of here, is behind schedule. And construction crews may have to dig up some of the pipes they have recently buried because of a murky scandal involving allegations of skulduggery in X-raying the pipeline welds.

Despite such problems, managers of the massive project are predicting (at least for now) that they will meet their target of sending North Slope oil to waiting ocean tankers at Valdez by mid-1977.

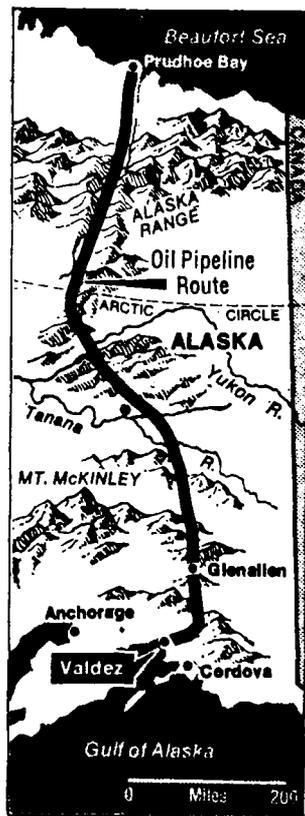
About 42 per cent of the pipeline work has now been completed, according to the Alyeska Pipeline Service Company, which is building the pipeline for a consortium of oil companies.

If weather permits, company spokesmen say, 50 per cent should be completed by the first week of November, when the present work force of 21,000 will be cut to about 9,000 for the winter. With temperatures already falling rapidly, the first phase of the winter cutback will begin next week with layoffs of about 3,000 workers.

"There's not much slack in their schedule, so it's going to be tight," said Newell Price, assistant director of the Pipeline Coordinator's Office, one of several Alaska state agencies monitoring the project.

"Problems keep arising, and they are not as far along in some sections as they are in others, but so far it looks as if they may be able to make it—although it may cost more money. If they fall behind, they can add more men and more money if they want to fill up the gaps."

One major uncertainty, Mr. Price said, is whether



The New York Times/

a month or so of work lost recently because of heavy rains at Valdez can be made up on the terminal construction.

Here at Prudhoe Bay, on the edge of the Arctic Ocean, is a hostile world of wind and ice with a subterranean reservoir of more than 9.6 billion barrels of proven reserves, which is the reason for building the pipeline. Oil drillers here insist they are also right on schedule in getting oil out of the ground—even though it took a bit of Hollywood drama to keep on their schedule.

After being blocked for more than two months by the worst icing conditions in this region in more than 77 years, the remnants of a convoy of barges carrying essential cargo for processing of North Slope oil arrived here Thursday night after a dramatic late-season opening in the ice.

Fifteen barges got through. Ten others had reached Prudhoe in mid-summer.

There are now about 3,000 men and women at work here, and they have established a firm foothold at the top of the world, with even a few touches of luxury in their Arctic camps.

Heated and lighted by energy from nearby gas fields, British Petroleum's employees live in a stunning complex of buildings brought here in modules by barge. The complex includes a swimming pool, sauna, Charles Eames furniture, a striking atrium alive with fresh trees and plants and a vast indoor recreation area with artificial grass and a volleyball court.

Other quarters are less luxurious. For the most part, however, they are modern and clean and have ample recreation facilities and kitchens that produce impressive meals.

Most of the oil workers toil seven to 10 hours a day, up to six weeks at a stretch without a day off. Schedules vary, but welders and construction men on the pipeline itself work more or less the same long hours. Most of them say they are clearing about \$750 a week, based on gross wages of \$1,200 or more.

Half of the 798 miles of pipe is being buried in trenches in conventional fashion, and half is being elevated at least two feet from the ground on H-shaped vertical support members. According to pipeline officials, a total of 208 miles of pipe has been put in place since the first unit was buried last March 27. Of this total, 49 miles of pipe is elevated; the rest is in the ground. Seventy more miles of pipe has been welded and is ready for installation, and 33,000 of the necessary 74,000 vertical support members are now in place.

The estimated 43 per cent of work completed includes all work on the pipeline, including roads: pumping stations, a 50-foot-wide pathway for the above-ground pipe and other work.

The pipeline is four feet in diameter and is formed by welding links of pipe 40 feet long—in some cases 60 feet long.

Meanwhile, cost increases are continuing to bedevil the project. In 1969, before a series of delays (caused largely by environmentalists objections) occurred, the estimated cost was \$900-million. By early last year it had climbed to \$4.5-billion. Now Alyeska's final official forecast of the cost is \$6.4-billion.

However, some Alaskans familiar with the project say this figure is almost certain

to rise substantially by the time the job is finished.

The pipeline has been progressing without major difficulties in two sectors: There are few objections from environmentalists now, and labor problems are rare.

There have been a few complaints about spilling of fuel in isolated regions when trucks have overturned. For the most part, however, environmentalist groups that have been monitoring the project have made few complaints about detrimental effects of the work.

Partly in trade for the high wages, organized labor agreed to a "no strike" pledge on the pipeline project.

There have been brief slowdowns by members of the teamsters' union complaining of unsafe equipment. And there has been some enmity between the drivers, most of whom are Alaskans, and the welders, most of whom are members of a Tulsa, Okla., union local. But, for the most part, there appears to have been relatively little labor strife so far.

While most people close to the project say they are reasonably satisfied with the progress so far, they say enormous amounts of work remain to be done this winter and next year to meet the mid-1977 target. Despite the hardships and complaints, there seems to be a sense of history in the minds of at least some of the men on the job.

"It's nice to know," said Mr. Rice, the drilling engineer, "that you're helping to develop one of the largest old fields in the world."

## Whale sounds protect salmon

North Hollywood, Calif.

Sockeye salmon have an electronic ally now as they enter Alaskan rivers to spawn. An underwater sound system is frightening away the Beluga whales which once waited to gobble up the salmon.

Called a Beluga Spooker, the system devised by a Bendix engineer plays tape recordings of the squealing and clicking sounds of the killer whale, the Beluga's natural enemy.

## UNDER THE POLE

The first undersea crossing of the North Pole was made by atomic submarine Nautilus on Aug. 3, 1958.

## OIL SPILLS CALLED PERIL TO CLIMATE

Weather Changes Foreseen From Arctic Ice Studies

The New York Times

SAN FRANCISCO, Dec. 9—Oil spills on Arctic ocean ice could conceivably create changes in the earth's climate, a scientist said here today.

An experiment conducted last year on the ice off Point Barrow, Alaska, dramatically demonstrated that ice contaminated by oil melted very rapidly while adjacent noncontaminated ice remained intact, said Charles Rodney Weir of the Coast Guard Oceanographic Unit in Washington, D.C.

Since many meteorologists and climatologists believe that the Arctic Ocean plays an important role in controlling various climate conditions in the Northern Hemisphere, Mr. Weir said, the possibility that oil spills might destroy the ocean ice also becomes very important.

Mr. Weir presented the results of his Alaska experiment for the first time today at the annual meeting of the American Geophysical Union.

The sun radiates a great deal of energy onto the ice in the Arctic, Mr. Weir said in an interview, but because ice tends to reflect rather than absorb energy, most of it is bounced away. Oil, however, is dark and dense and it tends to absorb energy radiated from the sun. Thus, large oil spills could significantly alter the heat budget in the Arctic, he said.

### Measurement of Energy

The heat budget, Mr. Weir said, is a mathematical equation that measures energy transactions that occur on the ice. It includes reflection of sunlight, evaporation rates, heat conduction, wind speed, relative humidity and other factors.

No one really understands how changes in the heat budget might affect climate, Mr. Weir said, but there is plenty of speculation that an ice-free Arctic Ocean might generate an ice age and that it might lamper with the ways in which high and low pressure areas are formed.

"We decided to go and see how an oil spill actually affects the heat budget," Mr. Weir said. "We obtained 10 gallons of Prudhoe Bay crude oil and spread it out on the ice a hundred yards off shore. The oil eventually spread out to cover an area about 10 yards in radius."



**LARGEST GEOGRAPHICAL COUNCIL IN WORLD—Dog and sled assist northernmost Scouts in Barrow for campout. Midnight Sun Council extends from the 62nd Parallel to the North Slope and from the Canadian border to the Bering Sea.**

Measurements were taken. "The normal ice predictably absorbed from between 30 and 10 per cent of the short-wave radiation from the sun, which is the sunlight we see," Mr. Weir said. The oil-contaminated ice, on the other hand, began to absorb up to 93 percent of the incoming sunlight. "This large increase came as a great surprise," Mr. Weir said. "We expected less."

"The oil-contaminated ice also melted more rapidly than we expected," Mr. Weir said. After five days the oil-soaked ice disintegrated and sank. The adjacent ice did not melt at all.

"The oil alters every single component in the heat budget equation," Mr. Weir said.

"Next we plugged the melt rate into an excellent heat budget model developed at the University of Washington," Mr. Weir said, "and we determined that within one to two years all the contaminated ice in a hypothetical barge spill would disappear."

It was not easy to clean up the fouled ice, Mr. Weir said. "We tried scraping and mopping it up but a residue was left. The dirty ice also tended to absorb extra radiation. We figured it would take only three months longer for the cleaned-up ice to melt the

## Scouting is great on top of the world

Scouting came to Alaska as early as the Goldrush. Back in 1910 in Nome, a Scout Troop was formed, this coincided with the origin of Scouting in America. For 65 years Scouting has built boys into men of character and strength.

The Midnight Sun Council was formed in June 1960, serving Interior Alaska. Today the Council consists of 56 units, with 560 adult leaders and serves over 1,700 boys in populous and bush areas of Alaska.

Thousands of hours are spent by people of varied occupations, ranging from former president of the University of Alaska, to housewife, mechanic, clergymen to colonels in the Army.

original contaminated ice."

Mr. Weir said it was not yet possible to say what size oil spill would pose a hazard in terms of weather dangers. But spills around 60 miles wide might have an impact, he said.

It is possible to envision a tanker spill or an oil rig blow-out in offshore drilling over the Arctic Ocean, Mr. Weir said. "Such accidents occur in Louisiana where conditions are very good."

American oil companies in Alaska do not plan to start offshore drilling in the Arctic until after 1980, Mr. Weir said. "And that gives us some time to consider this problem in more detail."

Greenland, the world's largest island, is the source of most of the Arctic's largest icebergs.

## ESKIMOS HARMED BY SNOWMOBILES

Canadians' Hearing Loss  
Linked to Noise Level

By BAYARD WEBSTER  
The New York Times

A change in the life-style of Canadian Eskimos, who now hunt with snowmobiles rather than with dog teams, has brought with it serious problems of hearing losses, a study conducted by a group of scientists and audiologists from McGill University has disclosed.

A survey of 3,770 Eskimos in the Baffin Island area of the Northwest Territories found that of 1,201 adult males tested, 33 per cent suffered from impaired hearing.

In Pangnirtung, a village on Cumberland Sound in the eastern part of Baffin Island, 83 per cent of the adult males—all of whom drove snowmobiles for long hours in their daily search for caribou, seal, fish and snail game—were found to have serious hearing difficulties.

In each of the 13 hamlets and settlements that were visited, said Dr. James D. Baxter, one of the team leaders, the number affected was proportional to the amount of hunting done and the distance traveled to the hunting grounds. Women and children, who did not use snowmobiles extensively, were found to have relatively few hearing problems.

In many cases, the study group found, the constant noise level around the snowmobile driver, who sits about two or three feet from the engine, ranged from 105 to 120 decibels when the engine was running full speed. This is roughly comparable to the sound of a jet airliner on take-off 500 feet above the listener.

In the United States, the Federal Occupational Safety and Health Act of 1970 set daily permissible exposure levels of a maximum of 15 minutes for 115 decibels, 30 minutes for 110 decibels and one hour for 105 decibels. Even exposures as low as 90 decibels call for a maximum exposure of only six hours to prevent possible hearing damage. Ninety decibels of sound is about the equivalent of the noise of heavy city traffic heard from the sidewalk.

Dr. Baxter, head of the department of otolaryngology at McGill University's Royal Victoria Hospital in Montreal, said that the Eskimos on Baffin Island often drove their machines up to 10 hours a day, with

## New Explanation Offered For a Mirage's Existence

By JOHN NOBLE WILFORD  
The New York Times

On his penultimate push toward the North Pole, in 1906, Robert E. Peary sighted a range of peaks rising above the icecap about 400 miles west of the northern tip of Greenland. He named the distant peaks Crocker Land, and so they appeared on at least one map.

Seven years later, another Arctic explorer, Donald B. MacMillan, trekked to within a day's march of Peary's Crocker Land.

"Great heavens, what a land!" Commander MacMillan exclaimed. But as he drew closer, the peaks slowly disappeared, and by night he knew that there was nothing there but a flat plain of ice.

Crocker Land was a mirage, probably of the most spectacular type known as a fata morgana—which has played visual tricks on many a sailor or explorer down through the centuries.

Now a meteorologist at Pennsylvania State University has provided a new and more detailed scientific explanation of the atmospheric causes of mira-

ges, particularly the fata morgana.

Dr. Fraser said in a telephone interview that fata morgana mirages were most commonly seen on enclosed bodies of evenly illuminated water or ice, such as lakes, straits or sounds, in the afternoon when slightly warmer air blowing out from land moves over the cooler surface.

In polar regions, however, the necessary conditions are produced by the so-called Arctic inversion, in which temperatures are lowest at the surface and increase with altitude because more heat is being radiated from the surface than is being received.

Under either of these conditions, Dr. Fraser said, the atmosphere tends to magnify distant objects vertically, causing a small boat to loom as a towering lighthouse.

The atmosphere can also blur the surface so thoroughly that its true character is no longer recognizable—much like the gray smear of chalk dust left after a blackboard has been erased. The blur can resemble an uninterrupted bank of fog or a solid wall, which in reality is a magnified upward projection of the surface.

Conversely, the more familiar mirages, those pools of nonexistent water on the desert or the highway, are the refracted and shimmering images of the clear sky above. They occur when in the lowest few feet of the atmosphere the air is warmer and substantially less dense than the air above it.

To produce the more spectacular fata morgana mirages requires just the right profile of air temperatures—layers of slightly warmer air on top of cooler air—as well as subtle oscillations in the atmosphere, Dr. Fraser said. Then out of the blur certain shapes may appear to emerge — battlements, turreted castles, a city, an aqueduct, or mountains such as those of Crocker Land.

"The astigmatic character of the atmosphere-as-lens," Dr. Fraser explained, "causes the light to be redistributed unevenly — in bright and dark patches—across the field of view, making it possible for the viewer to see an apparition."

Since the occurrence of a fata morgana is dependent on a very precise combination of winds and temperatures, minor changes in those conditions will cause the mirage to vanish or to change kaleidoscopically. But some have lasted long enough to frighten coastal villagers into thinking they were being invaded by an armada.

Many of Dr. Fraser's observations were made at Lake Ontario and Puget Sound. He did abstract calculations of the way light behaves in the atmosphere and the way temperature changes affect that behavior. Subsequently, Dr. Fraser and Mr. Mach conducted computer simulations to test their models of what causes mirages.

The broader purpose of their research, which is funded by the National Science Foundation, is to investigate the use of optics in determining subtle changes in atmospheric temperatures at various altitudes. This could be applied in studying atmospheres of other planets or as a substitute for balloon flights in observing temperature profiles of the earth's atmosphere.

The mirages Dr. Fraser studied were named after the fairy Morgan, who was the sorceress half-sister of King Arthur. She lived on a distant island and through her magic could raise phantom castles from the water.

### Polar-Bear Pact to Senate

WASHINGTON, Nov. 29 (UPI) — President Ford asked the Senate today to ratify the world's first international agreement protecting polar bears. The agreement was signed two years ago in Oslo by the United States, Canada, Denmark, Norway and the Soviet Union. Mr. Ford said it offered "protection for polar bears consisting of a prohibition of hunting, killing or capturing the mammals subject to specified exceptions."

NOW IN THE NORTH

# AIDJEX Continues at Satellite Camp

Forced to abandon their main station Oct. 1 when the ice floe on which it was located began breaking up, scientists involved in the United States' largest research effort on the Arctic Ocean are carrying on their work at a nearby satellite station and hoping it will remain intact.

The Arctic Ice Dynamics Joint Experiment (AIDJEX), in which Canadian scientists are also taking part, is scheduled to continue through April of next year. The National Science Foundation is providing the bulk of the financial support for the research.

Logistical support for AIDJEX is being provided by the Naval Arctic Research Laboratory (NARL) at Barrow, operated for the Navy by the University of Alaska. Scientists from around the nation are participating in the research. Dr. Norbert Untersteiner of the University of Washington is chief scientist.

Following evacuation of the main station, designated "Big Bear," Untersteiner, NARL director Warren Denner and others had to decide whether AIDJEX would continue or end prematurely. Ultimately they concluded a new main station could be established on "Caribou," one of three satellite stations near Big Bear.

Without a runway at Big Bear or Caribou suitable for C130 Hercules landings, scientists had to rely on smaller Twin Otter aircraft for removal of equipment and supplies to Caribou, which meant, said AIDJEX logistics coordinator Andreas (Andy) Heiberg, that three heavy tracked vehicles and some other heavy materiel had to be left at Big Bear.

"We'll keep track of the station and



AIDJEX CHIEF SCIENTIST DR. NORBERT UNTERSTEINER sits before bank of communications equipment in hut on Arctic Ocean ice during 1972 research effort.

perhaps be able to get in next spring to pick up this equipment but there's not much chance," said Heiberg.

The move to Caribou was completed Nov. 9. Some half dozen wooden buildings were airlifted by helicopter from the former main station to the new one. By mid-November there were 17 persons at Caribou, including four meteorological observers, two oceanographers, a satellite navigation system operator, data buoy technician, camp nurse and two cooks.

Bob Burr of the University of Washington is station manager at Caribou, which in late October was some 50 nau-

tical miles southwest of Big Bear. The former main station was approximately 320 nautical miles east northeast of Barrow.

The stability of the ice at Caribou was in question as *Now in the North* went to press. Small cracks appeared in the runway in mid-November but the Twin Otter servicing the station could still use it. With the onset of winter, scientists expected the ice to become stronger.

If ice conditions force another evacuation, personnel will probably be removed to one of the two other satellite stations, "Snowbird" or "Blue Fox," said a NARL spokesman.

## Pipeline Archeologists Begin Work on Their Final Report

With \$503,508 in additional support from Alyeska Pipeline Service Co., University of Alaska archeologists responsible for surveillance of the trans-Alaska pipeline project are now analyzing what's been discovered to date and beginning work on a final report.

"Ten of us will be writing up everything," said Dr. John Cook, who is directing the surveillance. "I'll serve as editor. Under terms of our contract with Alyeska we have until next June to finish what promises to be the largest arch-

eological report in Alaskan history.

In addition to their report writing, the archeologists will continue to watch the pipeline, until oil begins to flow. So far they and their field crews have excavated and mapped some 300 archeological sites, places where traces of historic and prehistoric man have been found.

More than 20,000 relics—projectile points, knives, awls and such—have been recovered by the field crews from these sites along the pipeline right-of-way. Under construction stipulations

imposed by the federal Bureau of Land Management, they are empowered to halt construction at any point where a significant archeological find is uncovered, for as long as it takes to properly remove relics of value.

Theories about early human occupation of Alaska are undergoing some modification as a result of new finds. Evidence indicates that areas of Eskimo and Athapaskan occupation overlapped much more than was previously supposed.

With the \$503,508 in additional support, which will carry the surveillance operation through the current fiscal year, Alyeska has now made available more than \$1.5 million for this work.

# Svalbard Part of Norway for 50 Years

News of Norway

On August 14, 1975, it was 50 years since the Arctic islands called Svalbard were officially established as a part of the Kingdom of Norway. That event was based on the Svalbard Treaty of February 9, 1920, which was signed by 36 nations, including the United States, the Soviet Union, Great Britain and France.

King Olav and Prime Minister Bratteli were scheduled to attend the 50th anniversary celebrations in Longyearbyen on August 14. Weather conditions forced their plane to return to Tromsø, where an improvised anniversary dinner was held. In his speech, Prime Minister Bratteli emphasized that Norway alone has the authority to establish the rules for orderly economic activity and administration of the archipelago.

In Oslo, Foreign Minister Knut Frydenlund and Helge Ingstad, former Governor of Svalbard, gave the main speeches during a program at the University of Oslo. Crown Prince Harald, Members of the Cabinet and representatives of the Svalbard Treaty signatory powers were present.

The new all-year airport at Longyearbyen was formally opened on the same day, clearing the way for the extension of Scandinavian Airlines' North Norway route to provide regular flights to the islands.

A new series of postage stamps was issued on August 14 in commemoration of the 50th anniversary, and two books have been published this summer. One of them, Tim Greve's *Svalbard*, will soon be available in English translation.

Svalbard is the collective name of the islands situated between 74° and 81° northern latitude and between 10° and 35° eastern longitude, comprising the group of islands known as Spitzbergen as well as the islands of Bjørnøya, Kong Karls Land and Kvitøya. Svalbard covers an area of 24,000 square miles, one-fifth of mainland Norway and rather larger than Switzerland. Old Icelandic records refer to Svalbard as early as 1194 A.D.

In the preface to the above-mentioned book by Tim Greve, Prime Minister Trygve Bratteli states that Norway has the main responsibility to ensure that economic exploitation of natural resources at Svalbard is carried out without harm to the irreplaceable and unique natural environment. He describes this as a national as well as an international responsibility for the Norwegian authorities.

For several centuries, hunters from many countries hunted whales, seals and walrus nearly to extinction. A total ban on the hunting of walrus has been enforced by Norway since 1952, and herds of the large mammals are again starting to show up at the islands.

Land mammals native to Svalbard are polar bears, reindeer and Arctic fox. The reindeer, a smaller variety than those in mainland Norway, have been protected since 1925. Polar bears have been protected at Kong Karls Land, their main breeding ground, since 1939. In 1973 Norway announced a five-year ban on the hunting of polar bears anywhere in the islands. Three national parks, two large nature preserves and 15 bird sanctuaries have been established, and Norwegian research teams regularly visit the islands.

Economic activity in the 20th century has revolved around the coal industry. The first load of coal was brought back to Norway by an enterprising fishing boat captain in 1899, and the first Norwegian coal company was founded the following year. Businessmen from several countries started coal ventures in the succeeding years, including the American John M. Longyear of Boston, Mass., for whom Longyearbyen was named. This is now the administrative center on the islands. But while the 1920 Svalbard Treaty allows any signatory power to carry out economic activities on the islands, only Norway and the Soviet Union have engaged in coal mining in recent decades. Firms from several nations have drilled for oil and natural gas, but so far no commercially exploitable deposits have been found.

The possibility of oil production on the Continental Shelf in the vicinity of Svalbard raises political questions. The islands are on the Norwegian Continental Shelf. Therefore, the Treaty's limitations on Norway's authority when it comes to mining and other economic activity are not valid outside of the four-mile sea territory around the islands. Accordingly, exploration and drilling on the ocean floor outside these limits are subject to the rules which apply to the Norwegian Continental Shelf. So far, the Norwegian Government has only permitted such activities south of 62° northern latitude. When exploration further north begins in 1977, there is reason to believe that Norwegian interests will play a much larger role than they have done so far in the North Sea.

## Svalbard anniversary

**NORWAY — Three stamps 14 August 1975** to commemorate the annexation of Svalbard to Norway 14 August 1925; this is a group of Arctic islands consisting of Spitzbergen Bjornøya, Hopen, Kong Karls Land, and Kvitøya: 100 ore, The Temple (Templet) a mountain in western Spitzbergen (4,000,000); 125 ore, miners leaving after their work shift (7,000,000); 140 ore, polar bear (1,500,000); des. by Henry Welde; engr. by Welde and Knut Lokke-Sorensen; perf. 13; panes of 50; phosphorescent paper; taille-douce by Norges Bank, Oslo.



# Greenland Patrols: 2 Long Lonely Years

COPENHAGEN, Denmark, Oct. 11 (AP)—Cmdr. Mogens Guldbrandsen has issued his annual call for volunteers to join what Danish military men consider the world's loneliest patrol. For two years, it will travel over the icy wilderness of north and northeast Greenland.

The patrol, to uphold Danish sovereignty over an uninhabited region of the world's largest island, about 50 times the size of Denmark, is to set out next year.

By December, Commander Guldbrandsen will need about half a dozen healthy young men who have completed military service and who have the rank of at least sergeant in the Danish Army. They must be prepared to forsake civilization for at least two years, to like challenge, and they must have good teeth.

Few things, the commander says, are worse than a toothache when the nearest dentist is thousands of miles away and the sufferer has the company of only one other man and 10 dogs, in Arctic darkness at 70 degrees below zero.

## Screening Is Strenuous

This is the kind of hazard in store for the recruits who make it through a series of medical and psychological tests, complete dental overhauls, if needed, and five months of training, including five weeks at the Winter



The New York Times/Oct. 12, 1975

Warfare School of the Norwegian Army.

The successful recruits will be flown to Greenland to join what Commander Guldbrandsen calls "probably the most unmilitary outfit" in the Danish armed forces—the Sirius, or dog-sled patrols, named after the dog star. The patrols have operated for 25 years.

The pay ranges from \$12,000 a year for a sergeant major to \$18,000 for a captain, but it is all tax-free if the man completes his two-year tour. This is a considerable saving in Denmark where as much as 50 per cent of gross income can be taxed. The Sirius patrol salaries are about \$4,000 a year above the pay of soldiers in the regular army.

Six two-man sled patrols, armed with rifles and pistols, cover 8,000 miles of coastal

land from Scoresbysund on the east coast, around the northern tip of the island and down to Hall Land, 20 miles across the Robeson Channel from Ellesmere Island, Canada.

"Basically, the job is simply to be there and maintain a Danish presence in person," Commander Guldbrandsen said. The patrol members also serve as policemen and game wardens of the region, most of which was recently declared a national park and wildlife reserve.

The 45-year-old commander is the patrol's coordinator of operational planning, recruiting, training and logistics. He spends several months every year with his men in Greenland.

The patrols replaced improvised local operations organized during World War II to keep the German Navy from setting up meteorological stations on Greenland's east coast.

More than 500 patrols set out from the base camp at Daneborg each October, when the fjords have frozen, the paired men walking on skis, 10 dogs pulling the sled. Fully loaded with everything from tent and kerosene stove

to canned goods and dog food, such a sled weighs half a ton.

Some patrols, men, sleds, dogs and all, are airlifted to a starting point in the far north. The longest treks cover up to 1,500 miles and can take as much as five months to complete.

In midwinter the patrols, moving mostly on fjord ice, operate in darkness around the clock. Once a patrol has set out it is on its own, linked to its base camp only by radio. Positions are reported daily.

"One strict rule is that one of the two patrol members must be a veteran with at least a year's service," the patrol coordinator said.

On enlisting, every recruit is given a rank no lower than sergeant major. But all mention of rank is banned, in a spirit of equality that would prevent even the patrol chief from pulling rank to excuse himself from duties such as kitchen work. "One of our firmest traditions is that the cook must never be criticized since everybody is, sooner or later, the cook," the commander said.

Other rules ban solitary drinking on the base, but not communal drinking or between-patrol parties.

There is no record of fights, but there are stories of patrol members becoming bored and annoyed with each other. One pair of patrol members is said to have plodded along for a week without a word of conversation.

There is no time off for two years except for an annual visit to a dentist in Iceland, and on patrol there is only one rest day a week. In 25 years only one man has been lost. He froze to death in a blizzard.

## Through the Pack Ice

During the summer months of midnight sun, when dog-sledding is impossible, the patrols use small boats for inspection tours as far north as the pack ice will permit. They do not patrol inhabited areas of Greenland.

Some military experts have suggested the dog sled patrols be retired in favor of surveillance by plane, helicopter or snowmobile. Gen. O. Bixenchrone-Moeller, Chief of Staff of Denmark's armed forces, said he plans increased use of helicopters, but only as a supplement to the sled patrols.

"The Sirius patrols are not obsolete," he said.

Commander Guldbrandsen said he is convinced that no modern technology could do the job as efficiently, cheaply and safely as his men and their dogs.

## Dogs Are Their Radar

"In the Arctic stillness a man can hear a plane flying at 36,000 feet and the dogs will prick up their ears while it is still 70 miles away," he said.

"Even the worst weather can halt a patrol only temporarily. Unlike aircraft, sled dogs don't break down, and in case of damage the men can repair the sleds because they built them themselves.

"The patrols find their way even in darkness with the help of ordinary maps and their knowledge of landmarks. Actually, they use compasses only in fog and heavy snowfall."

## Ford Feels for Seals

Washington, Dec. 17 (AP) — President Ford urged the Senate today to ratify an international convention that restricts the hunting of seals in Aantartica.

## Sirius Sledge Patrol salute

Greenland marks the 25th anniversary of the Sirius Sledge Patrol with a 1-kroner stamp on Oct. 16, advises the Gronlands Postvaesen, Strandgade, Box 100, DK-1004 Copenhagen K, Denmark.

The design by Jens Rosing showing a two-man patrol party was engraved by Czeslaw Slania.

The sledge patrol in its present form was established in 1950 to enforce the Danish sovereignty in the northeastern portion of Greenland.

The area, one of the roughest and most desolate in Greenland, runs from Scoresbysund in the south to Peary Land in the north, a coastline of 1,200 kilometers.

A large part of the area has been set aside as a national park,



The 25th anniversary of Greenland's Sirius Sledge Patrol is commemorated with this 1.20-kroner stamp due from that country on Oct. 16.

which has necessitated civil police authority be conferred on the members of the Sirius Sledge Patrol in order to supervise the observation of preservation regulations.

Most of the area is patrolled with dog sledges, but airplanes are used for observations and supply replenishment.

# Arctic Yields a Tropic Link

By Harry S. Pease  
of The Journal Staff

July 29

Fossil fragments of bony animals that could have lived only in a hot climate have been found about 800 miles south of the North Pole on Canada's Ellesmere Island by a Milwaukee Museum scientist and a colleague from the Carnegie Museum of Natural History in Pittsburgh.



Robert M. West

Dating from more than 50 million years ago, the mammalian relics are the oldest ever found that far north. Plant and shellfish fossils of similar age have been found several places in the Arctic.

"This is a really consequential find . . . probably the most important field week in my life," Robert M. West, curator of geology at the museum here, wrote to his wife.

With him on the rugged, backpack search of the island is Mary R. Dawson, curator of vertebrate fossils at the Pittsburgh institution. They and two other scientists took part in a similar expedition two years ago.

West identified the fossil mammal tentatively as a perissodactyl, an early hoofed mammal with an odd number of toes. The finds also included parts of the jaw and skull of a crocodile-like creature, the cast of a soft shelled turtle and fish bones.

The scientist said he was sure the gray-brown mudstone outcrops would produce more specimens.

Ellesmere Island lies in the far northeast corner of the Canadian Archipelago, across a narrow strait from Greenland.

The significance of the West-Dawson discoveries lies in their similarity to other fossils found in northern Europe. Because they indicate that the continents were linked in the distant past and that the land which now is arctic must then have been in or near the tropics, they help to indicate the speed and direction of continental drift.

Only birds, mammals and fish live in the Arctic now; reptiles and amphibians cannot survive the severe climate.

West reported that he had seen musk oxen and Arctic hares frequently, but that the predators — polar bears, wolves and foxes — were more secretive. The explorers find evidence of their presence but rarely see the animals themselves.

At 78 degrees north latitude and only 800 miles from the pole, the island has 24 hours of daylight at this time of year. The ground is permanently frozen within a foot of the surface, but the

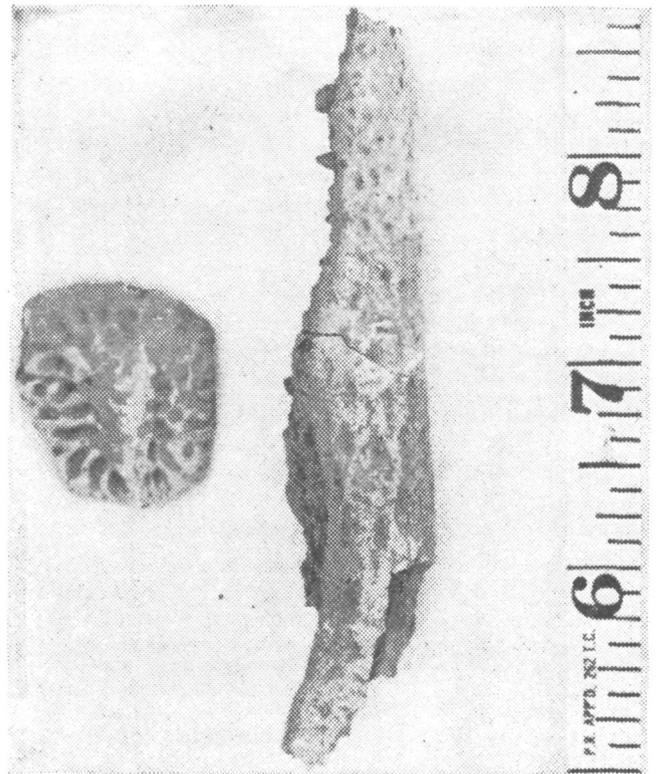


—By a Journal Artist

Fossils have been found on Ellesmere Island.

top foot is mostly mud. Temperatures get into the 40s in the hot part of the day, and there is lots of rain.

The tundra vegetation is less than knee high. The nearest



—Milwaukee Museum Photo

## Bone fragments found by the Museum expedition

tree grows 1,000 miles to the south.

The two scientists live in isolated tent camps while exploring. A small airplane takes them as near as it can to promising rock outcrops. From the landing points, they walk.

Their contact with the outside world is a portable short-wave radio through which they talk to the agency which supports them, a Canadian Continental Shelf Project base at Resolute Bay on Cornwallis Island. When West wrote to his wife, they were having radio trouble.

"Since it is our only contact with the world, we hope our message requesting a supply flight Thursday is heard," he said.

They must have been heard, because the pilot brought out his letter.

West plans to return to Milwaukee Aug. 6 and leave the following day for another fossil field in Wyoming. He will have all winter to study and classify the finds that made him so happy.

## CANADA ROUTE USED FOR PIPELINE CARGO

The New York Times

PRUDHOE BAY, Alaska, Aug. 20—While a fleet of barges laden with vital pipeline supplies is being delayed by ice 300 miles from here, barges slipping in from the east are unloading construction and drilling equipment needed to get North Slope oil flowing by the fall of 1977.

Supplies on 15 barges either enroute to or at Prudhoe have moved over Canadian routes. They started at the Great Slave Lake shores and moved up the Mackenzie River to the Arctic Ocean. These shipments, mostly

key supplies for the Atlantic Richfield Company and the British Petroleum Company, also have been somewhat delayed by ice conditions, according to Ernie Arp, chief logistics supervisor for Atlantic Richfield in Anchorage.

The shipments from Canadian ports, it is hoped, are just the beginning of Prudhoe's port activity this summer. About 47 barges, 150 men and close to \$2-billion in vital pipeline cargo are waiting in the Icy Cape area, 300 miles southwest of Prudhoe Bay, for a change in the weather that has prevented the equipment from reaching Prudhoe Bay. The barges arrived in the Arctic waters as long ago as July 23, when the ice usually moves out to sea for six weeks.

# USSR's polar ice studies

H.L. Atkinson

The U.S.S.R. has carried out extensive research in the Arctic and Antarctic to evaluate ice breaker performance, the physical characteristics of sea ice and the effect of arctic conditions on world weather. Data were gathered on drifting polar ice stations and in research laboratories. Dr. A.F. Treshnikov, director of the Arctic and Antarctic Institute of the U.S.S.R. described his organization's work in a talk presented to the Third International Conference on Port and Ocean Engineering Under Arctic Conditions held August 11-15 at the University of Alaska in Fairbanks. Dr. Treshnikov said he had been working on ice problems for 36 years—15 years as Institute director.

The main task of the institute is to study the hydrometeorological conditions of the Arctic Ocean and its fringing seas because of the relationship with transportation. For, as Dr. Treshnikov puts it, without a good transportation system and dependable logistical supplies, the coal, oil, gas, diamonds and gold of Siberia could not be marketed.

## FORECASTING WEATHER AND ICE

Treshnikov said as early as the 1930s the Russians established a network of ice stations—now part of the international hydrometeorological network—to transmit and disseminate weather forecasting information. Most of these stations are in Arctic seas. Aircraft and satellites are also used to gather and transmit data.

The U.S.S.R. has only one manned drifting ice island at the present time, *North Pole 22*, but has 10 automatic unmanned satellite ice stations in the Arctic. It is important to know the thickness and character of ice in the winter in order to predict ice conditions in the summertime—so ships can navigate through it safely.

Treshnikov said that long range forecasting of winds and temperature changes have been possible. In January, ice forecast preparation begins. In March, the basic forecast covering April, May, June and July is ready. In August, another forecast is made to cover the ensuing months, until shipping closes—about November.

“Wind and temperature regimes of the atmosphere have been developed by revelation of a succession of large scale atmospheric processes over the Arctic Ocean. Then using numerous ways and methods we determine those changes that



Dr. A.F. Treshnikov

would take place in ice distribution under the influence of currents and wind drift. We determine how ice would disintegrate under the influence of air temperature,” he said.

The Ministry of Merchant Marine uses the forecasts to plan ship convoy movements.

## POLAR ICE IS EXTRA-HARD

But ice breakers are used—just in case. Each caravan of ships is convoyed by ice breakers. The Arctic Institute studies interaction between ship hulls and ice. Results of their studies are made available to the institutions designing ice breakers. In an ice tank at the Institute, tiny models of various types of icebreakers are tested. Models are subjected to the same stresses a full size ship would meet. Data on hull shapes, sizes, speed and ice parameters are recorded, as well as ice distribution, strength and thickness.

Methods of breaking ice are under study. Because ice formation seems to depend entirely on the amount of heat contained in water and released by it, thermal ice breaking methods were considered first. However, there are no available cheap artificial sources of heat energy at man's disposal that could be used for breaking or melting the ice.

Treshnikov said that “If all 40,000 hp of the nuclear icebreaker *Lenin* could be used for melting ice, no more than six cubic meters of ice a minute would melt, and that would cut a channel only 86.4 meters long and 50 meters wide in 24 hours in two-meter-thick ice. So using heat energy for navigation is prospectless.”

Solar energy could be used to melt ice. Surfaces can be darkened with sand,

OCEAN INDUSTRY SEPTEMBER 1975

pulverized slag or coal dust. “This method has been used for cutting channels not more than 100 kilometers long. If the radiation method is used, only 500 tons of coal dust is required, but 18,000 tons of coal is needed to burn for the purpose, or if wood is used, it would take 90,000 cubic meters of wood,” he said.

He said blasting is not efficient. It is used only for breaking up small ice dams or for freeing ships when they become wedged. Using salt to chemically destroy ice would require one-third of the volume you wished to melt—in salt. Ultrasound oscillations have been tested on ice, but ice absorbs them with no effect. Other methods tried have proven useful only for destruction of small volumes of ice. Mechanical destruction is best. Icebreakers are the best means of mechanical destruction. The Soviet Merchant Marine has three powerful nuclear icebreakers—the *Lenin*, *Artica* and *Sibir*.

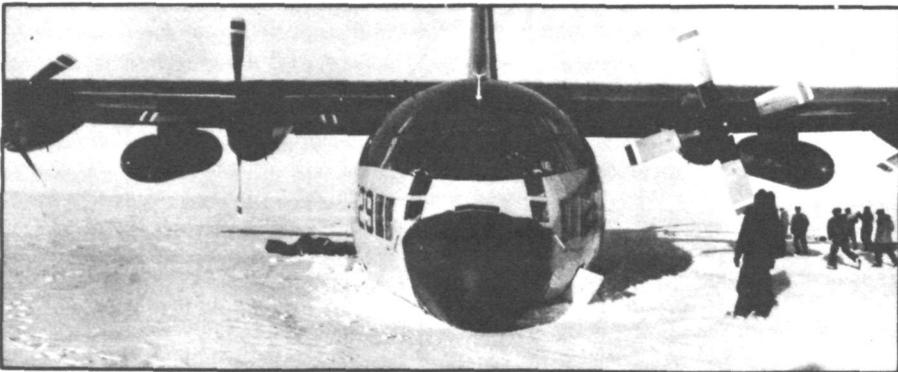
## UNDERSTANDING ICE PARAMETERS

The most important task on the way to understanding the physical basis of co-behavior of the atmosphere and the hydrosphere is to understand the interaction between the air and the ocean. This includes thermal, radiation and mechanical processes both in the surface layers of the ocean and in the lower layer of the atmosphere—as well as the study of phase transitions and diffusion of impurities.

In contrast to low latitudes the peculiarity of the air-sea interaction in the polar regions is associated with the presence of ice cover, which is a product of the interaction between the air and the ocean. The polar regions of the earth are the main areas of energy sink, and U.S.S.R.'s polex programs are designed to assess, on a quantitative basis, the role of the ocean and the air in energy balance. Large-scale long-period changes in hydrometeorological processes make it possible to forecast several years ahead and determine glaciation status and direction.

He said in conclusion that research in the Arctic is not being made on a separate basis, but with due regard for global processes, “If the tropics are a zone where solar energy accumulates, then the polar regions are places of the sink and expenditure of the energy brought here by air flows and ocean currents.”

## Rough flying for Antarctic research



Damaged during rescue mission, C-130 with collapsed nose gear nuzzles the snow.

When the first of Richard E. Byrd's Antarctic expeditions visited the bottom of the world in 1928, it arrived with three aircraft, one of which, a Fokker Super Universal monoplane, was abandoned in the frozen wastes when 150-mile-per-hour winds blew it away from a frozen lake in the Rockefeller Mountains east of Little America. Four aircraft accompanied the second trek in 1933, two of which crashed at Little America, and a third was so badly damaged while being loaded onto a ship for the return trip that it was scrapped when it reached the United States. Lincoln Ellsworth's first attempt to fly across Antarctica, in January of 1934, ended when his plane, the "Polar Star," was damaged by the breaking-up of the sea ice in the Bay of Whales. The first official U.S. Antarctic expedition of the 20th century, the Antarctic Service Expedition of 1939 to 1941, was forced to abandon two of its four aircraft.

Aircraft have been and still are vitally important to operations on the world's south polar cap—for supply, rescue, scientific research and general transport—but Antarctica has demanded a heavy toll. From the 1946 Operation Highjump, still the largest expedition ever sent there by any country, through the end of Operation Deep Freeze 1973, 50 aircraft were lost during U.S. operations, 20 of them helicopters. During the same period, 29 deaths resulted from aircraft accidents.

At the same time, costs—of research in general and of the aircraft themselves—have continued to grow. As a result, an ironic succession of mishaps this year has been "almost entirely" responsible, according to a National Science Foundation official, for reducing the number of U.S. scientific personnel in Antarctica by more than 50 percent. The U.S. Antarctic Research Program is funded by NSF to the tune of \$29 million for fiscal 1976.

On Jan. 15, a U.S. Navy C-130 Hercules transport, engaged in support operations during preparation for core-sample drilling in the ice, was taking off from the site when one of its JATO (Jet-Assisted

Take-Off) units exploded, causing the plane's right wing to burn off and destroying two engines in the process. The extra thrust provided by the JATO units is valuable in the thin air and icy terrain, where it enables the ski-equipped planes to take off in much shorter distances, saving vital time in runway preparation. Fortunately, no one was killed or injured in the accident—or in the ones to follow.

The same day, another C-130—they are the workhorses of Antarctica—was flown in to rescue the crew of the first, which included members of a French scientific party. It was decided that the plane would take off without using its JATO devices. But during the longer run over less-prepared surface the plane struck an icy hummock which completely collapsed its nose gear. A third C-130 successfully rescued both crews, but left behind at the site were more than \$18 million worth of vital transportation—40 percent of the U.S. workhorse fleet on the frozen continent.

Few places on the planet's "land" area could be less inviting spots in which to conduct massive repair operations. The double disaster took place essentially in the middle of nowhere, about 650 miles from the U.S. base at McMurdo and slightly closer to Vostok, the Soviet base at the south magnetic pole. The elevation at the site is more than 7,000 feet above sea level, and the mean temperature is about 30 degrees F. below zero. At Vostok, the lowest known temperatures in the world have been recorded: a trans-shivering 126.9 degrees F. below zero. Summer in the Northern Hemisphere is the winter of winters in Antarctica, leaving a working season that runs only from about October through February.

A full-scale repair operation was obviously necessary if the two vehicles were to be salvaged. Lockheed, the planes' manufacturer, fabricated an entire center section for the ruined wing, but it would have to be installed in the field. The effort was not able to get underway until mid-October, when engineers, technicians and equipment began arriving at the site.

Then, last month, on Nov. 4, the JATO unit on a C-130 being used in the operation broke free from its mounting, sheared into an engine and left a third crippled aircraft stranded in the cold.

It is also the least damaged of the three, points out Navy Capt. Eugene W. Van Reeth, who heads the Navy's Antarctic support program, and repair efforts are concentrating on it first. It will not be possible to complete work on the other two planes, however, until the next Antarctic summer, around the end of 1976.

The damage has not been confined to aircraft. The U.S. scientific complement in Antarctica, which included about 300 people last year, is down to little more than 100, says Guy Guthridge of the National Science Foundation. Most of the reduction is due to the costs involved in the recovery operations for the planes, as well as to the reduced airlift capacity for conducting and supporting research. "Many projects," says Guthridge, "were either curtailed or brought out of the field."

The NSF is buying two more C-130's—another \$18 million—but they are not scheduled to be delivered until 1977. They will be equipped with JATO units, but Guthridge points out the Navy investigated each of the previous mishaps (including a 1971 crash when a malfunctioning JATO blew off a propeller, leaving the aircraft stuck until it is now in snow "up to its tail") and found nothing that would justify imposing a permanent ban on the devices.

Meanwhile, the C-130's remain vital to work at the bottom of the world. "Those planes give the United States a flexibility that no other nation has in the Antarctic," says Guthridge. For both coastal and inland heavy-lift operations, he says, their high wings, high engines (to clear snow drifts) and huge tail doors (a bulldozer can simply be driven in and out) make them ideal. "If you ever had to design a plane from scratch," he says of the Antarctic mission, "it would probably look just about like a C-130." □

SCIENCE NEWS, DECEMBER 6, 1975



**GREENLAND** — A 1.30kr stamp 17 April 1975 (definitive) depicting Schooner *Sokongen*, famous vessel which saw much service in the Arctic; des. by Jens Rosing; engr. by Czeslaw Slania; blue; panes of 50. (Gronlands Postvasen, Box 100, DK1004, Copenhagen.)

# Antarctic Thought Vacuuming Pollution From Atmosphere

PULLMAN, Wash. (AP) — The antarctic may be acting as a giant vacuum cleaner, sucking some forms of pollution from the atmosphere, two Washington State University researchers say.

"We think this may be a major scientific discovery," said Dr. R. A. Rasmussen, who with K. Jerry Allwine spent January at the Scott-Amundsen polar station operated by the National Science Foundation and U.S. Navy.

"The antarctic may be a balancing mechanism of na-

ture, removing gaseous compounds from the air," Rasmussen said during an interview.

Rasmussen said the frozen continent may function as a giant precipitator as air warmer than the ice mass deposits water vapor containing trace gases.

The gases include such fluorochlorocarbons as Freon-11, which some scientists believe is destroying the earth's protective ozone layer, the scientists say. One source of Freon-11 is compounds released

from aerosol spray cans.

Examinations of the surface snow at the Scott-Amundsen station showed remarkably high concentrations of various trace gases, Rasmussen said.

"The findings are significant because it adds to our understanding of global air chemistry and the scavenging mechanisms nature operates," he said.

The research project may help determine how clean the earth's atmosphere was before the Industrial Revolution, Rasmussen said.

## Team Struck By Disease In Antarctic

WASHINGTON, Dec. 31 (AP)

A 12-man team at Siple Station, a remote U.S. scientific outpost in Antarctica, is being evacuated and the facility closed because one of the men developed symptoms of the contagious liver disease hepatitis, it was announced yesterday.

The National Science Foundation, which manages the U.S. program in Antarctica, said all of the men had experienced intermittent nausea, vomiting and diarrhea over the past two weeks.

A foundation spokesman said the decision to evacuate the men was made after one man, who was not identified, developed symptoms of jaundice and bilirubinuria, an excretion in the urine of a pigment normally present in liver bile.

Both symptoms are strong indications of hepatitis, the spokesman said.

Siple Station, located on the snow plain at the base of the Antarctic peninsula, has been used for studies of the physics of the upper atmosphere, especially particle and electrical field experiments.

## CLIMATE CLUES ON THE ICE

Dec. 18.

An international drilling operation "down into" the geological history of the Antarctic could yield critical evidence for predicting the pattern of the world's weather.

Dr S. B. Treves, project manager of the drilling for the last three years, made this claim today in Christchurch, pausing between flights from the ice to his Nebraskan home.

Dr Treves emphasized that such findings rested to some extent on the acceptance of the theory that the Antarctic was "the weather-maker for the world."

"If this is true, the knowledge as to whether the Antarctic ice sheet is advancing or retreating will help to predict the weather."

By "weather," he meant the general climate patterns for the world, such as the possibility that the world was about to enter another ice age.

"This is critical information for the world in terms of population growth and questions of famine," said the French-descended Dr Treves (pronounced "Treavis.")

A warm and relaxed man to talk to, he is looking forward to spending more time with his family after four successive seasons with the

## Penguins burn

SAN DIEGO (California), December 17.

Sixty penguins being held in quarantine were killed in a fire today, authorities reported.

The birds were brought to San Diego recently from the Antarctic, and were studied by the Scripps Institution of Oceanography at nearby La Jolla. The fire was caused by an electrical fault in the refrigeration system of the caravans in which they were being kept.

drilling and nine seasons on the ice all told.

Now that drilling is complete Dr Treves—together with the Japanese, New Zealand and other American scientists involved—has a vast task ahead of him analysing the 750ft of cores from the various drilling holes. Already 130 scientific papers have been produced on the project, but many more will follow.

Essentially, the project has been concerned with producing a geological history of the region, extending back into time between five and 20 million years.

The team worked in the Ross Sea area—"because there you have the ocean impinging on the continent, there is ice and there are volcanoes and therefore there are a number of interactions which should give us a better time scale."

The cores showed that the Antarctic ice had waxed and waned through time and that the dry valleys had in the past possibly been fords,

"We can compute the amount of snow and ice which has accumulated on the surface over the past 200 years," he explained. "By examining the character of layers set down in the 18th Century we should be able to get a picture of what air was like before the industrial age."

Rasmussen said he will head another team of WSU researchers which will undertake similar studies in the arctic region this summer.

"We need to know if the phenomenon is isolated to the South Pole or whether this scavenging of compounds might occur in both polar regions," he said.

Dr Treves said.

If the history — particularly the marine sediments—correlated with that of the test drillings done beneath the ocean in the Ross Sea by the Glomar Challenger, it would indicate the extent of the movement.

Dr Treves, who is chairman of the geology department at the University of Nebraska, first came to New Zealand as a Fulbright scholar in 1951.

## Discovery of lake in Antarctic

Dec. 10

An unmapped lake has been discovered by a New Zealand field party in the Dry Valleys region of the Trans Antarctic Mountain Range, west of Scott Base.

The lake, 3 kilometres long and covered by ice, is near the Miller Glacier in the Upper Victoria Valley, about 136 kilometres northwest of Scott Base.

It was found by a Ministry of Works hydrology and glaciology team, led by Mr T. Chinn, of Christchurch.

Mr Chinn said that the structure of the ice on the lake indicated that it melted each summer.

His party — the first into the field this season — is traversing the Dry Valleys on an annual survey of glaciers, lakes, and rivers.

The levels of the nine lakes and the mass balance of a number of glaciers are to be measured during the expedition. The survey is a way of keeping track of climatic trends in the region.

## Snow From Ice Age Found to Be Dirtier Than Today's Snow

COLUMBUS, Ohio, Aug. 30 (AP)—An Ohio State University study of ice cores from the last glacial period about 14,000 years ago shows that snow was much dirtier than that falling today.

The university's Institute of Polar Studies has been analyzing the cores taken from Byrd Station in West Antarctica and Camp Century in Greenland.

Lonnie G. Thompson, research associate at the institute, said the snow from Byrd Station was 100 times dirtier during the glacial period than it is today, and that the snow from Camp Century was four times dirtier.

Research also indicates that large-scale climatic changes may occur suddenly and that conditions causing them can develop in a relatively short time, Mr. Thompson said.

### 100-Year Time Period

"The transition from a high concentration of particles during the last glacial period to the low concentration of our present warm period takes place in less than 10 meters of ice, representing a time period of less than 100 years," he said.

Researchers found that the majority of particles from the last glacial period in West Antarctica were of volcanic origin, Mr. Thompson said.

"A similar study on the Camp Century core has shown that its particles—which showed a large increase in the glacial stage ice—are mainly from terrestrial sources, probably blown onto the ice sheet by the more intense winds which are thought to have characterized the last glaciation," he said.

### Greater Land Mass

The larger concentration of particles in the Greenland core could probably be attributed to the much greater land mass in the Northern Hemisphere, Mr. Thompson continued.

Studies at the NASA-Ames Research Center in Moffett Field, Calif., using the Ohio State data on concentration and size distribution in the Byrd core, showed that particle concentration was great enough to have caused the temperature changes typical of the last glacial period, he said.

In the last two million years, Mr. Thompson said, the earth has experienced at least five major glaciations, separated by relatively short periods of warmth such as the one we live in today.

## Gas discovery halts project

Nov. 26

Methane gas 615ft below sea level has halted coring work at an international drilling project on the west side of McMurdo Sound in Antarctica.

When the drill bit was 616.75ft below the surface of the 6ft thick McMurdo Sound ice, the drilling was stopped on Friday because of a combination of potentially unsafe factors.

An international team of geologists and geochemists discovered 38 per cent methane in gas obtained from some unconsolidated core, and an increase in temperature and temperature gradient. According to a manual on pollution prevention and safety in deep-sea drilling programmes, such gases and temperatures indicate that further drilling could threaten the safety of the drill team.

Other factors considered

in the decision to stop drilling included finding cracks in sea ice near the drill site, and some large working cracks in the annual ice which were traced to within five miles of the drill site before they passed into open water.

The Dry Valley Drilling Project is a co-operative deep earth sampling programme now in its fifth year. Fourteen earlier sites have yielded core from land sites but this was the first sea-floor drilling.

Scientists from Japan, New Zealand, and the United States are attempting to obtain a better understanding of the geological history of the McMurdo Sound region.

The drill rig is being dismantled and essential components of the rig and the drillers' camp will be returned to McMurdo Station. The rest of the gear will be stored at nearby Marble Point and at New Harbour.

## Fossils for Antarctic museum

Dec. 17

Fish fossils more than 300m years old, petrified plants, and burnable coal were among the prize finds of two women geologists who have just completed collecting specimens in Southern Victoria Land in the Antarctic.

The specimens were collected for the Canterbury Museum's new Antarctic centre, and the museum's geologist, Mrs Margaret Bradshaw, and a British geologist, Dr Susan West, have collected 360kg of rocks and fossils in the last four weeks.

They camped as high as 3000m and recorded temperatures down to 28deg below zero, while collecting from five locations in the Trans-Antarctic Mountains, west of Scott Base.

The two women, accompanied by field assistants for most of the time, camped further from Scott Base than any other New Zealand expedition this summer.

The women collected rocks, samples of coal, and fossils of plants and fish which are more than 120m years old.

Mrs Bradshaw was particularly excited about finding a grove of fossilised tree stumps, complete with growth rings—and this on a continent which no longer sustains trees.

## GEOLOGIST HURT ON ICE

Dec. 17

The leader of the New Zealand geological survey expedition, Dr David Skinner, was flown back to Scott Base last week-end with a leg injury he suffered during a sledge trip in a little-explored region of the Trans-Antarctic Mountains.

Dr Skinner, who is a geologist from Auckland, suffered severe thigh muscle strain when the sledge he was riding overturned on rough ice on the Skelton Glacier, about 160 kilometres south-west of Scott Base.

He was flown out by a United States helicopter after a radio consultation with a doctor.

The helicopter flew in a temporary replacement for Dr Skinner, a British geologist, Dr Susan West.

Dr Skinner said that the expedition had experienced difficult conditions, includ-

ing high winds, crevasses and sastrugi (wind-blown waves in ice). But the scientific value of the expedition was unquestioned, he said.

## Japanese Team Sails

Nov. 26

The Fuji, an antarctic observation ship, carrying Japan's 17th expedition team left Tokyo's Harumi Pier Tuesday morning for the Showa Base.

After refueling at Fremantle Australia, the ship with 182 men aboard is scheduled to reach the offing of the South Pole on or about Dec. 30.

Fresh supplies will be flown from there to the Showa Base

and the 16th wintering team brought back to the ship, which will leave there late February for home.

During its year-long observation activities, the new contingent will fire seven rockets to survey the super-high portion of the atmosphere.

Part of the team's program will be related to the International Magnetospheric Study (IMS) which will be held for three years from next year.

Other activities will include reception of radio waves through an earth satellite, surveying of pollutants in the air, water and soil, a seismological study and the study of the ionosphere.

# Vast Antarctic Studied for Clues to Ice Ages

By WALTER SULLIVAN

The view that another ice age will probably come, sooner or later, predominates among scientists, but it is argued by some that the last ice age may not be entirely finished.

The massive ice sheet covering West Antarctica, they say, is unstable and bound to disintegrate or slip into the ocean, raising worldwide sea levels some 20 feet. This would submerge many coastal cities as well as much of the world's food-producing areas.

It has even been suggested by strategic analysts in Washington that some malevolent group might bring about such flooding through the use of nuclear explosions to dislodge the ice sheet. The sufferers would include all the major world powers.

The proposition that the West Antarctic ice sheet may disintegrate arises in part from evidence that, between former ice ages, the seas rose some 20 feet higher than their level today.

The argument rests, as well, on the present status of that ice sheet and on evidence that a similar rapid disintegration—or slippage—cleared central Canada of ice some 8,000 years ago.

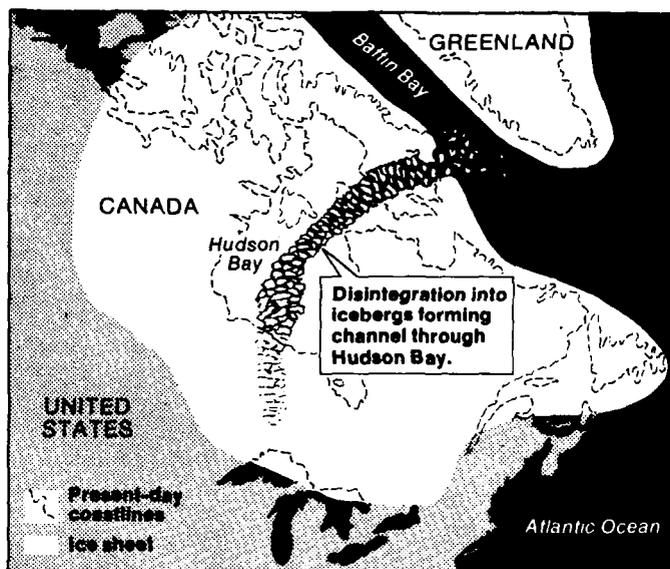
## Concept of Slippages

The concept of massive slippages or "surges" of Antarctic ice was set forth as early as 1964 by A. T. Wilson of Victoria University in New Zealand. He saw in them an explanation for periodic ice ages. He noted that the Antarctic ice sheet is massive, covering an area larger than Europe and reaching thicknesses of three miles or more.

When such ice flows out over the seas that surround Antarctica it spreads out over the frictionless water to a uniform thickness of about 600 feet. Thus, if a substantial part of the Antarctic ice slipped into the sea, it would spread to cover a large part of the southern oceans.

The snowy surface of this ice would reflect so much solar energy back into space that the entire atmosphere would be cooled, starting an ice age. The slippage would occur, according to the hypothesis, when the bottom layer of the ice blanketing the continent at the South Pole began to be melted by heat flowing up from within the earth, forming a lubricating slush.

A hole drilled through 7,200



Rapid disappearance of the Canadian ice sheet is attributed to "calving" or breaking out of icebergs to form a central channel into which more ice slipped.

feet of ice at Byrd Station has, in fact, revealed such a slushy layer. Furthermore radar probing by British scientists riding in American naval aircraft has shown numerous "lakes" beneath the ice.

That some group might use nuclear explosions to dislodge the ice sheet, or a large part of it, was discussed in the nineteen-sixties by strategic analysts, including Dr. Gordon J. F. MacDonald, then executive vice president of the Institute for Defense Analyses in Washington.

"The immediate effect of this vast quantity of ice surging into the water, if velocities of 100 meters per day are appropriate," Dr. MacDonald wrote, "would be to create massive tsunamis [tidal waves] that would completely wreck coastal regions even in the Northern Hemisphere." He is now on the faculty at Dartmouth College.

A year and a half ago, scientists at the Institute of Polar Studies of Ohio State University suggested that the ice covering West Antarctica might be unstable. West Antarctica is that part of the South Polar continent lying chiefly in the Western Hemisphere.

In contrast to East Antarctica, which is a vast continental land mass close to or above sea level, West Antarctica, without its ice, would largely be submerged with only a few islands rising above the sea.

The idea that its ice sheet may be unstable is based in part on evidence from elsewhere—including the Hudson



The New York Times/May 22, 1975  
Because most of the West Antarctic ice sheet rests on ground well below sea level, some fear it will disintegrate as did the ice sheet in central Canada some 8,000 years ago.

Bay area—that an ice sheet resting on land below sea level can become dispersed into icebergs far more rapidly than previously believed.

## Hudson Bay Slippage

From age determinations of vegetable matter in glacial debris left by the last ice sheet in Canada it has been determined by Victor K. Prest and others of the Geological Survey of Canada that, in two centuries or less, some 8,200 years ago, the central Hudson Bay area was cleared of a mile-thick blanket of ice.

On a recent visit to this country Dr. Mikhail Grosswald, a prominent Soviet specialist on past glaciations, argued that once the center of Hudson Bay had been cleared, the ice sheet to its west slipped into the emptied region in a massive surge, followed by a similar

slippage from the east.

Since so much of the land, under the ice of East Antarctica, is below sea level, concern has been expressed that a similar process might occur there. It is partly for this reason that an international study has been initiated in the manner in which that ice is discharging into the sea. It does so by way of an apron of floating ice—the Ross Ice Shelf—that covers the southern extremity of the Ross Sea.

It has been found that the Antarctic sheet in the past has been much thicker and has extended much farther out to sea than at present. Dr. Grosswald, in a colloquium at the American Geographical Society in this city, also cited the evidence elsewhere for higher sea levels between earlier ice ages.

From the scars left on islands surrounding the Barents Sea, north of Russia and Scandinavia, he has concluded that that sea once held a massive ice sheet that flowed out of it in all directions. Canadian scientists have recently reported evidence on the sea floor that a grounded ice sheet pushed far into the North Atlantic from Newfoundland.

Thus, it is argued by Dr. Grosswald and others, the amount of the world's water that was locked into ice sheets during the ice ages seems to have been considerably greater than previously supposed. This would have lowered sea new habitats as well as land bridges that made possible a variety of migrations.

## Planes Have to 'Move Over' And Make Room for Birds

WASHINGTON (AP) — Air planes still have to yield right of way on occasion to birds.

The Bureau of Land Management is rewriting its lease with Alaska International Airlines to prohibit use of the Sagwon Cliffs airstrip on the north slope of Brooks range during the period from April 15 to August 15 each year. This is to protect rare hawks such as gyrfalcons and peregrine falcons which use the cliffs to nest, hatch their eggs and raise their young to flight stage.

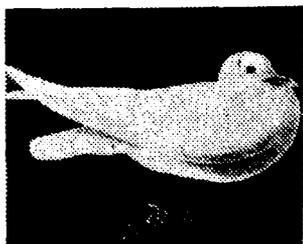
In addition, the Department of Interior has had one of the 12 Alaska pipeline pumping stations relocated for the same reason.

## Ivory Gull Makes Rare Appearance In Massachusetts

The New York Times

SALISBURY, Mass., Dec. 24—The tidal estuary here has attracted another extremely rare seagull, nine months after the appearance of a Ross's gull drew hordes of bird watchers.

This time, the visitor is an Ivory gull, whose breeding grounds are in Greenland. The Ross's gull breeds in



Ivory gull, from Audubon's "Birds of America."

Siberia, and until one showed up here last March had never been seen in the Eastern United States and seldom even in its own habitat.

Richard Forster of the Massachusetts Audubon Society, who saw and identified the Ivory gull yesterday, said that there had been about a half-dozen sightings of Ivory gulls in this region, the last previous one in 1959.

He described the bird as largely white with widely spaced dark spots on its wings and with dark gray feet. Its bill, he said, is blue-green at the base and green-yellow at the tip.

He said that he believed the Ivory gull was blown here by the weekend storm, which blanketed this area with snow. "This is an attractive area for most gulls," he said. "It still retains a bit of the Arctic flavor."

## Stranded Scientists Flown From Ship Stuck in Arctic

LONG BEACH, Calif., Aug. 29 (AP)—Scientists stranded in the Arctic ice cap aboard a crippled Coast Guard icebreaker, the Glacier, have been airlifted to Point Barrow, Alaska, and a sister ship is being readied to free the Glacier, a Coast Guard spokesman says.

The Glacier, mired in Antarctic ice 10 days in March, ran into trouble again Wednesday when her left propeller shaft

# A Great U.S. Expedition

By ALDEN WHITMAN The New York Times

THE GREAT UNITED STATES EXPLORING EXPEDITION OF 1838-1842. By William Stanton. 433 pages. Illustrated. University of California Press. \$14.95.

Nineteenth-century explorers were a fascinating lot—men of great bravery, tenacity and esprit and simultaneously men of great pride, ambition and nastiness. Livingston, Speke, Burton all exemplify these traits, which amount to a mixture of the majesty and meanness of human character. To this group may now be added Charles Wilkes, the commander of the Great United States Exploring Expedition of 1838-1842, whose story is admirably recounted by Prof. William Stanton of the University of Pittsburgh in the course of his splendid history of that tangled expedition.

Although Professor Stanton's book is first of all a biography of the Government-sponsored scientific expedition, a precursor of this century's journeys to the moon, it inevitably pivots on the personality of Wilkes, the 40-year-old, New York-born naval officer who led the disputatious explorers. He was, according to contemporaries, "violent, overbearing, insulting, taxing forbearance to the last degree," not to mention "incoherent and rude." He was also a martinet and a flogger—and he was proud and exceedingly ambitious for fame.

### Belief in His Destiny

By any ordinary measure, Wilkes should have been unfit for command. Yet he captained a squadron of sailing ships on a four-year voyage that outlined a major coastal area of Antarctica, discovered new islands and reefs in the Pacific, charted the Fijis and brought back scientific collections of imposing magnitude, on which were built the National Museum, the Naval Observatory and the United States Botanical Garden. Wilkes was able to do all these things because, despite his manifest deficits, he possessed the assets of courage, drive and single-mindedness in abundant amounts. He had, moreover, a sturdy belief in his destiny—a quality that seemed to goad him (and explorers like him) to exceed themselves.

The father of the Great United States Exploring Expedition was Jeremiah N. Reynolds, an eloquent lecturer on the mysteries of the polar regions and an advocate of scientific inquiry. Starting in the late 1820's, Reynolds virtually single-handedly prodded and coaxed the expedition into being. One of the virtues of Professor Stanton's book is his lively account of the

expedition's long gestation and the accompanying bureaucratic infighting in Washington. Both Andrew Jackson and Martin Van Buren backed the expedition while the Navy and many in its officer corps sought to balk it.

Ultimately, considerations of national pride prevailed, and the Navy was obliged to accommodate the civilian scientists, who were to give the expedition its enduring significance. This extraordinary group, all young, included Charles Pickering, the zoologist; William Rich, the botanist; Alfred Agate, the artist; Joseph P. Couthouy, the conchologist; and Titian Ramsey Peale, the naturalist. "Scientifics," as they were known, these men were pioneers in the difficult, and often tricky, collaboration between Government and science.

### A Vicarious Experience

Professor Stanton's narration of the expedition's often-perilous clashes with the elements in Antarctica is restrained yet vivid enough to give the reader a genuine sense of participation in the adventure. This would have been heightened, had the California University Press provided better maps. As it is, these are confined to the end papers, and fail to show the expedition's travels in Antarctica in sufficiently detailed relationship to the rest of its voyages.

Upon his return, Wilkes made extravagant claims to have been the discoverer of the continent, which damaged his scientific reputation. Professor Stanton concludes that "there was glory enough for all" those who were investigating the region and suggests that "Dumont d'Urville [of France] discovered [Wilkes Land], Wilkes explored it to the greatest extent, and [James Clark] Ross [of England] visited the portion nearest the pole." This appears to be a valid judgment, based even on Wilkes's logs.

Although Professor Stanton's book may be read with great satisfaction as an adventure tale, it is designed also to do justice to the scientific accomplishments of the expedition. In one area alone, that of charting the Pacific, the expedition's work was still in use during World War II. In another area, that of descriptive botany, its contributions were remarkable, while substantial advances were also made in astronomy, geology, anthropology and philology.

For recreating the glory of the Great United States Exploring Expedition, Professor Stanton deserves at least three cheers. His is a fine and readable book.

broke leaving the ship stuck in 10-foot ice.

The scientists, all from the University of Connecticut, were removed by helicopters because their experiments to conduct seismic shock wave studies using explosives and to examine sea life and currents in Alaskan waters could no longer be carried out.

## Historic Planes at Ford Museum

On Nov. 29, 1929 Adm. Richard E. Byrd became the first person to fly over the icy South Pole. His plane, a Ford Tri-Motor, was named for Floyd Bennett, the pilot who had flown Byrd over the North Pole three years earlier. For the next five years

the "Floyd Bennett" remained ice-bound at Byrd's Antarctic camp. Later, it was returned to the United States and is now part of the Henry Ford Museum's aircraft collection in Dearborn, Mich. Right next to it is the aircraft that carried Byrd and Bennett in 1926.

## FOCUS ON ANTARCTICA:

# South to Sanae

THE REPUBLIC OF SOUTH AFRICA'S SOUTHERLY POSITION PLACES HER STRATEGICALLY FOR ASSAULTS ON THE WHITE CONTINENT.

SOUTH AFRICAN SCOPE SEPTEMBER 1975

Each year the specially-equipped supply vessel "R.S.A." leaves Cape Town for Antarctica with members of the South African National Antarctic Expedition (Sanae) on board. The team of specialists undertakes scientific research of international importance as set forth in the Antarctic Treaty signed in Washington in 1959.

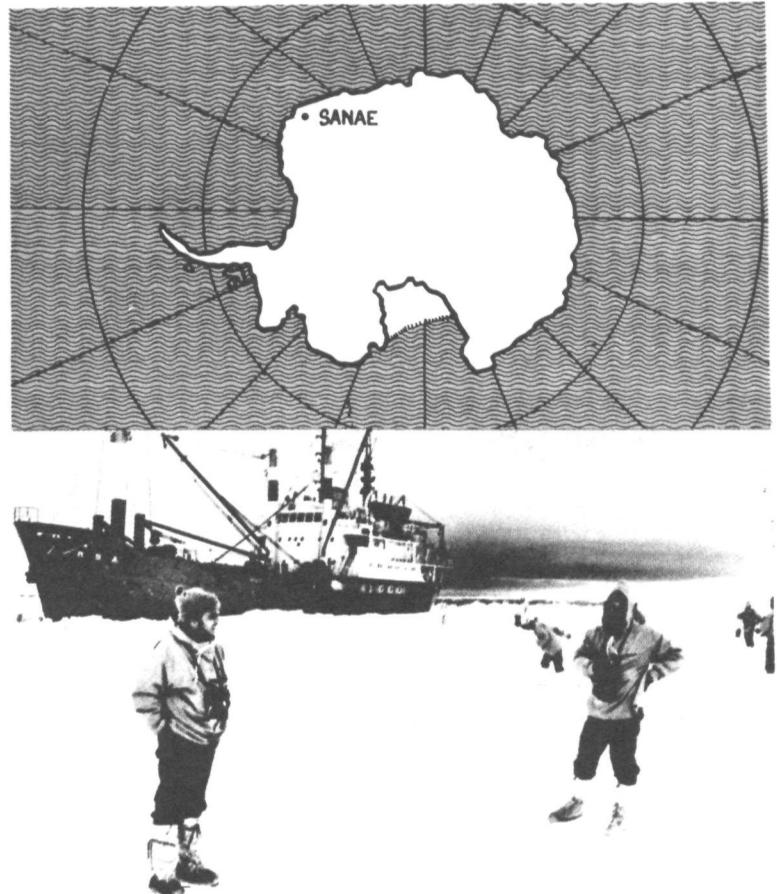
South Africa's association with the seventh continent — ANTARCTICA — dates back to 1957/58 when, during the International Geophysical Year, Mr. J. J. le Grange accompanied the well known British Commonwealth Trans-Antarctic Expedition under the leadership of Sir Vivian Fuchs.

Early in 1958, South Africa became one of 12 member countries of the Scientific Committee for Antarctic Research (SCAR), set up by the International Council of Scientific Unions (ICSU) to "further the co-ordination of scientific activity in Antarctica, with a view to framing a scientific program of circumpolar scope and significance." During 1959 the aims of SCAR received official recognition by the governments concerned with the signing of the Antarctic Treaty in Washington.

While the co-ordination and development of scientific research programs have remained the responsibility of SCAR, which is a non-governmental scientific body, the Antarctic Treaty provides for the freezing of all territorial claims on this continent for a period of 35 years, while also dealing with matters such as logistics, communications and the conservation of flora and fauna. Treaty matters are the main agenda items at regular inter-governmental treaty consultative meetings.

In South Africa the main agency responsible for activities in the Antarctic is the Transport Department, which regularly consults with the South African Department of Foreign Affairs and the Council for Scientific and Industrial Research (CSIR) in Pretoria.

The CSIR, as national scientific member of SCAR, formulates the South African research programs in Antarctica (excluding meteorology). The CSIR is assisted in this task by the S.A. Scientific Committee for Antarctic Research (SASCAR) and a number of honorary program directors, each dealing with a specific subdiscipline of the Republic's Antarctic program.



The supply ship "R.S.A." approaches the South African research base, Sanae. Seen here are members of the scientific team walking on ice for the first time.

Since 1962 the Republic has maintained a base in Queen Maud Land and yearly edges further south. The culmination of ten years' research work in the Antarctic was reached in March 1969 when one of the few remaining virgin territories in the southern continent was explored and mapped by members of the tenth South African Expedition.

History was made when the men left the Sanae base on the northern tip of Antarctica to trek 500 miles to the south by snow-tractor and sledge. They reached the Borg Massivet mountain range in a Norwegian region of the Antarctic where nobody had reportedly set foot before. The men had no maps of the area they were heading for, and had only seen poor quality aerial pictures taken by Norwegian explorers in 1950. The remote geological station they established in these mountains was always in radio contact with the main Sanae base and also with bases of other countries in the Antarctic.

The present South African base, which was built in 1971, is now buried some 10 feet under snow at roof level, and is about 12 miles from the sea. Its next-door neighbors are the British at Halley Bay some 380 icy miles to the east, and the Russian base Novolazarevskaya some 250 miles to the west.

Research continues throughout the year by the 21-man team, all of whom are specialists in their own field, each one contributing to the growing fund of knowledge about Antarctica. Central data pools make this information available to any country. The valuable work done and the high standard of contributions by these South African scientists have been acclaimed throughout the world.

# They were Antarctica's first settlers

## BLEAK WINTER FOR 10

By  
**Harold F. Griffiths**

The story of these 10 really starts in 1841, when the great British explorer, Sir James Clark Ross, discovered the sea named after him, and the magnificent coastline of South Victoria Land, whose north-eastern tip he named Cape Adare, after his friend Viscount Adare, M.P.

More than 50 years were to elapse before anyone followed in Ross's track, but in 1895 a whaling expedition sent by the veteran Norwegian whaler Svend Foyn under the command of Captain Kristensen made a landing on January 21 near Cape Adare. This was the first time in history that humans had set foot on the Antarctic mainland.

Among the whaler's crew was a young Australian of Norwegian ancestry, Carsten Egeberg Borchgrevink, who was so impressed with all he

had seen that he was anxious to lead an expedition of his own and, with a party of scientists, spend a winter at Cape Adare.

Shortage of funds kept him from carrying out his plan until the famous English publisher, Sir George Newnes, gave him £40,000 to further his proposed expedition.

Borchgrevink purchased an old Norwegian whaler, re-named her Southern Cross, and fitted her with new and powerful engines. He gathered round him a small but competent group, some of whom were to achieve fame on later expeditions.

The assistant zoologist was a young Englishman, Hugh Blackwall Evans. On his return from the Antarctic, he met the famous botanist, Sir Joseph Dalton Hooker, who had been with Ross in 1841, and so today Evans spans 133 years of Antarctic history.

The Southern Cross left Hobart on December 19, 1898 with its complement of 31

people and 90 Siberian dogs.

The ship was soon held up by heavy pack-ice, which persisted all the way south. Cape Adare was not reached until February 17, 1899. The Southern Cross entered the bay inside the cape and anchored off a little beach, which Borchgrevink named Ridley Beach, after his English mother's family.

Seventy-five dogs were safely got ashore. They were the first dogs to be used for Antarctic sledging.

The work of unloading stores was quickly begun and two 15ft x 15ft wooden huts were constructed a few yards apart on the beach. The wintering party, which was to consist of 10 men, used one hut as living quarters and the other as a storeroom. The huts were joined by a "covered way" of wood, sealskins, and canvas.

By the time construction was completed it was already the end of February, late for the short Antarctic summer. The ship left on March 2 to winter in Australian waters, leaving 10 men to face the icy rigours and darkness of the winternight.

### Icy gales

The wintering party soon discovered that they were almost marooned on an inhospitable beach. Behind them rose mountains with precipitous cliffs which barred any exploration to the south.

Down these mountains screamed a succession of icy gales, and had the huts not been securely anchored they would have been swept into the sea. One gale on March 18 reached a speed of 87

m.p.h. and lifted one of their two boats from the beach and smashed it on rocks 200 yards away.

The meteorologists soon set up their instruments and the zoologists were kept busy collecting specimens of penguins, seals and skua gulls. The geologists spent much time gathering specimens of rock.

Before the onset of winter the party made short exploring trips by dog sledge around the shores of the bay, and when this was strong enough, across the surface of the sea-ice. A trip was also made to the summit of Cape Adare, 950ft above sea level.

These novice explorers were now to learn how quickly conditions could change in the Antarctic. On April 22 the ice in the vicinity of the huts was two feet thick, and apparently safe enough to travel over.

Although the barometer was falling four men with 20 dogs, three sledges, a collapsible canvas boat and provisions for 20 days set out to explore the southern part of the bay, which had been named Robertson Bay by Ross in 1841 after the surgeon

of one of his ships, Dr Robertson.

The party camped at the foot of cliffs on a narrow strip of beach. During the night a southerly gale broke up the sea-ice and compelled a hurried move to the top of the slope on a ledge barely six feet wide.

### Exhausted

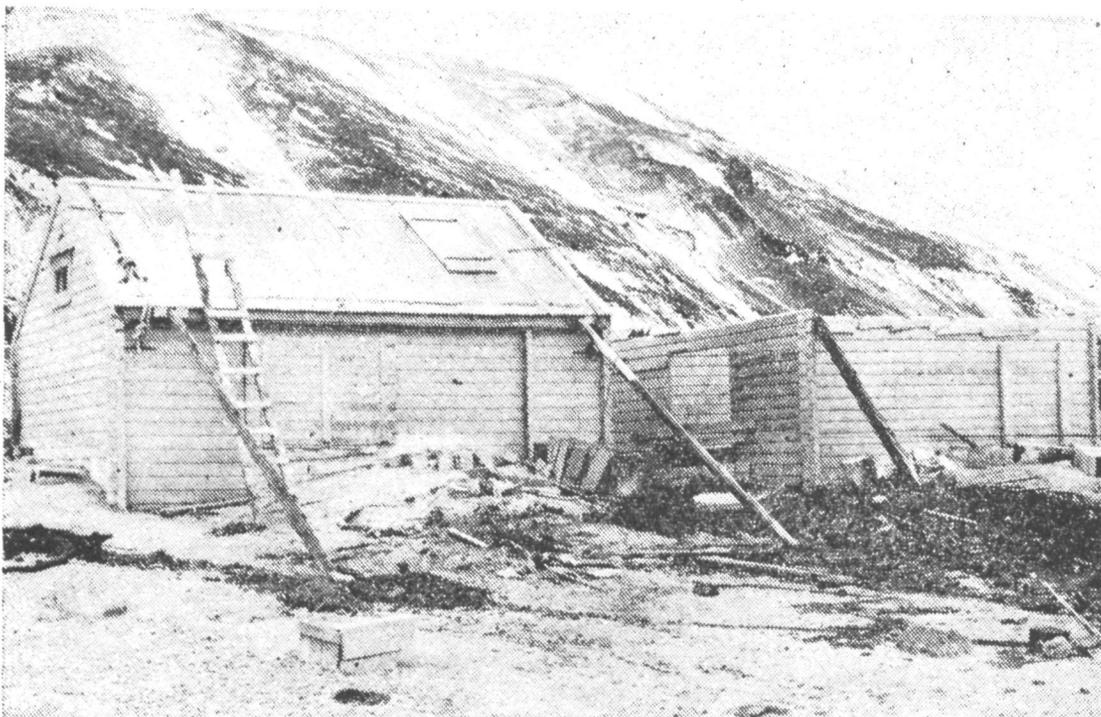
Two of the party set out in the boat for the main camp, leaving the other two at what they called "refuge Camp".

Two days later the boatmen were seen cutting steps down an ice slope towards "Refuge Camp" which they reached in an exhausted condition. Drifting ice had forced their boat on to the beach and they had spent two days and nights without sleep with only the canvas boat for shelter.

But they had sighted what looked like a way up the cliffs and on April 28 the four men set out to reach the main camp overland. It took them two hours to reach the landing place and four hours to climb the steep 600ft cliff. From here they tramped along the ridge and down to the camp, after a most unpleasant six days.

On May 15 the party saw the sun for the last time for 72 days. Snow piled up 10ft deep around the huts, and assisted in keeping the buildings warm.

In July the zoologist, Nicolai Hanson, became ill, possibly with beri-beri, but believed by his companions to be scurvy. He grew worse and died on October 14.



BORCHGREVINK'S huts on Cape Adare showing the props placed by two New Zealanders

At his request he was buried beside a huge boulder on the summit of Cape Adare.

The penguins returned in large numbers early in November, and with the coming of spring further exploratory work was carried out. The ship returned on January 28, 1900 and by February 2 she had embarked all hands and sailed from Cape Adare, to carry out further exploration further south before going home.

Following the departure of the Southern Cross party Cape Adare saw few visitors. An occasional call by ships proceeding to or returning from McMurdo Sound and two short stops by tourist

vessels were all that disturbed Ridley Beach. There were now three huts, for in 1911 Lieutenant Campbell, of Captain Scott's northern party, had erected a hut close to the other two, where he and five companions spent a winter.

## Maintenance

In February 1973 two members of New Zealand's Antarctic Research Programme, who had wintered at Scott Base, were put ashore by helicopter at Cape Adare from a United States ice-breaker.

Their task was to inspect the huts, carry out minor maintenance and assess what further work was required. They were equipped with a tent and a good supply of food, and would be picked up in a fortnight by a following icebreaker.

The two men soon became aware that the famous Cape Adare gales were no exaggeration. It required the largest boulders placed around the rim of the tent to prevent it blowing away. The sun shone only rarely, and most of the time grey clouds and light snow made the area gloomy and depressing.

An examination of the three huts showed the ravages of time and the elements. Only one wall of Campbell's hut was still standing, and Borchgrevink's stores hut had been unroofed. The main hut had, however, stood up well to 75 years of buffeting and was still sound.

Penguins were nesting in sheltered spots around the buildings and it was estimated that the beach contained 50,000 of the birds. As the count was made late in the season the men estimated that as many as a quarter of a million nested at Ridley Beach during the summer.

The contents of the huts were tidied. The man had the unpleasant task of removing penguin guano. Tins of treacle had rusted and added their sticky contents to the general mess. Of the cast-iron stove they reported "it is so rusted that it is just recognisable as a stove".

The huts were made as weatherproof as possible.



THE INTERIOR OF BORCHGREVINK'S HUT after being cleaned up by the New Zealanders. All pictures are from the Antarctic Division of the Department of Scientific and Industrial Research.

Nothing could be done to re-roof the stores building, but props were placed against the walls of the two huts pending a decision on the fate of the buildings.

One final task remained. The two men made the laborious climb to the summit of Cape Adare to inspect the grave of Nicolai Hanson. It

showed surprisingly little weathering, although the brass plaque with an inscription had broken off and was replaced.

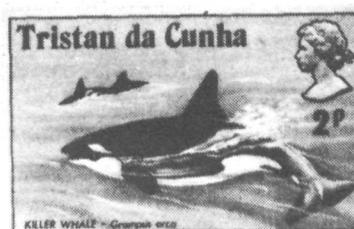
A commemorative plaque in four languages is to be placed near the grave designating it a "historic place" in terms of the Antarctic Treaty.

With their work done the men awaited the arrival of the relief ship. On February 19 they were whisked off Ridley Beach by helicopter, leaving the huts in their solitary isolation, with Nicolai Hanson Keeping eternal vigil over them from the heights above.



## Narwhal

Greenland depicts the narwhal on its 2-kroner stamp which was released on Feb. 20. The dark green emission was designed by Jens Rosing and engraved by Czeslaw Slania. The narwhal, a type of whale, lives in the Arctic water regions and grows to 20 feet in length with an ivory tusk up to six feet long. Ordering instructions for this and other Greenland postal emissions can be obtained from Greenland Postvaesen, Strandgade, Box 100, DK-1004, Copenhagen, Denmark.



## Tristan da Cunha quartet

Whales are the subject of this quartet of stamps due from Tristan da Cunha on Nov. 1. G. Drummond's designs of a killer whale (*Grampus orca*), 2 pence; rough-toothed dolphin (*Steno rostratus*), 3p; Atlantic right whale (*Balaena australis*), 5p; and a finback whale (*Balaenoptera physalus*), 20p will be lithographed by Britain's Walsall Security Printers Ltd. on Block CA watermarked paper, according to the British Crown Agents.

# Scott expedition Survivor dies

Nov. 13  
One of the last survivors of the shore party of Scott's last expedition, Sir Charles Wright, died in Victoria, British Columbia, at the beginning of this month. He was 88.

Sir Charles Wright was a young Canadian physics student at the Cavendish Laboratory, Cambridge, when he was selected to go south. He and the Australian geologist, Griffith Taylor, were students together, and joined the scientific staff of the expedition when it was suggested to Scott that Commonwealth scientists should be included.

In the Antarctic Sir Charles Wright transferred to the comparatively new science of glaciology. He was a member of one of the supporting parties in the attempt to reach the South Pole. In November, 1912, he was the navigator of the party which went out to find the bodies of Scott and his companions.

Near noon on November 12, the search party was 10 miles south of One Ton Depot. Sir Charles Wright, who was in charge of the Indian mules which formed the party's advance transport, saw a dark patch on his right about a quarter of a

mile away. He left the column and found that the patch was about 6in of the top of the tent at the Pole party's last camp.

Only one survivor of the search party is still alive. He is Major Tryggve Gran, the Norwegian ski expert, who now lives in retirement in Norway.

After his return to Britain from the Antarctic Sir Charles Wright was appointed a lecturer in cartography and surveying at Cambridge. He served in the First World War with the Royal Engineers and won a Military Cross. Later he was closely concerned with wireless, and finally was awarded the O.B.E. for his work as an intelligence officer at General Headquarters.

In 1919 Sir Charles Wright began a distinguished career as a naval research scientist. He joined the Admiralty Department of Scientific Research and Experiment, and then became head of the Admiralty Research Laboratory at Teddington.

From 1934 to 1946 Sir Charles Wright was Director of Scientific Research at the Admiralty, and from 1946 to 1947 was Chief of the Royal Naval Scientific Service. He then went to California where he became director of the marine physical laboratory of the Scripps Institution of Oceanography (1952-56), and a contractor for the Defence Research Board of Canada (1956-58). From 1964 to 1968 he lectured in geophysics at the



Sir Charles Wright outside Scott's first hut on Ross Island.

Institute of Earth Sciences, University of British Columbia.

Sir Charles Wright, who was born in Toronto, made two visits to the Antarctic in the 1960s to do more scientific work. While at McMurdo Station he visited the hut at Cape Evans where he had lived for more than two years, nearly 50 years earlier.

With Sir Raymond Priest-

ley, another member of the expedition, who died last year. Sir Charles Wright wrote the official report on glaciology, which was published in 1923. He and his friend and colleague, Griffith Taylor, both married sisters of Sir Raymond Priestley.

Sir Charles Wright is survived by one son and two daughters. One daughter, Mrs. J. Raeside, lived in Christchurch for several years.

## Grant Provides For Ice Study

### Anchorage Daily Times

FAIRBANKS — The University of Alaska received a grant for some \$20,000 from the Alaska Oil and Gas Association for research in off-shore permafrost and sea ice.

Presenting the check to President Robert Hiatt and William Sackinger, coordinator of the Arctic Coastal

Research for the university's Geophysical Institute, was O.G. Simpson, north Alaska district manager for Atlantic Richfield Co.

The association is made up of 28 member companies. This is the third year that has provided funds for the university's research projects.

Sackinger explained that the

sea ice research involved dynamics of ice motion and the study of internal stresses in the sea ice. Interest lies in that field because of hazards that ice presents to offshore structures, harbor facilities and marine transportation activities.

Research on the offshore permafrost is done in conjunction with offshore structures and sub-sea pipelines.

In thanking Simpson, who is chairman of the association's Arctic research subcommittee, Hiatt said, "University engineers and scientists should be taking the lead in research toward understanding of the environmental conditions of the North. The fact that we are able to combine support from private industry as well as government is the most appropriate way in which this project can be financed."

# Scientist killed at McMurdo

Oct. 14

An American scientist was killed in the Antarctic on Sunday when the tracked vehicle he was driving fell through the ice into 500 metres of water about 12 miles from McMurdo Station.

He was

Jeffrey D. Rude, aged 26, single, of Danville, California. He was working for the Scripps Institute of Oceanography.

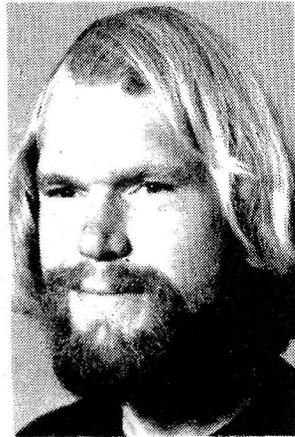
Three others in the vehicle escaped just before it sank. According to one survivor it disappeared in less than 20 seconds.

The accident occurred between Erebus Tongue and Turtle Rock.

Those in the vehicle were inspecting possible sites for huts from which to study Weddel seals. They left McMurdo Station at 8 a.m., and the accident occurred about 10.30 a.m.

Almost as soon as the ice they were driving over cracked the three passengers jumped out. Mr Rude did not have time.

The three waited in case he surfaced. They then walked back to McMurdo Station, arriving at 2.30 p.m.



Jeffrey D. Rude

The vehicle had a radio in it, said a United States Navy spokesman at Christchurch Airport yesterday, and earlier the scientists had reported to the radio-control centre at McMurdo Station, which keeps a record of the positions of all vehicles and aircraft.

At the time of the accident, there was visibility for 40 miles, the temperature was -34deg, and there was a wind of between five and 10 knots.

A safety investigation will probably be held by the Navy and the National Science Foundation.

## LOUIS DEROCHE

Paris, July 22 (AP) — Louis Deroche, 60, a correspondent for the French news agency, Agence France Presse, in Washington for 20 years, died last night in a hospital in Dijon after a long illness.

In 1957, Mr. Deroche was accredited to Operation Deepfreeze in Antarctica. He returned the following year during the International Geophysical Year and was the first Frenchman to set foot at the South Pole. At that time, he planted a French tricolor, handsewn by his wife, at the magnetic pole.

Mr. Deroche was a member of the National Press Club and the Antartican Society, whose emblem and flag were designed by Emilio Pucci, Italian fashion designer, at his request.

Both Mr. Deroche and Pucci had been designated Distinguished Alumni by the University of Georgia in



LOUIS DEROCHE

1973 at an international convocation.

He is survived by his wife, Christiane Ruisseaux Deroche, a son, Daniel, and a daughter, Gentine, all of the home, 431 43d St. NW, and his mother, Mme. Louis Deroche Picot, of Dijon.

# Hugh Brown, Who Cited Peril From Polar Ice Cap, Dies at 96

By ALBIN KREBS

The New York Times

Nov. 11

Hugh Auchincloss Brown Sr., an electrical engineer who devoted more than 60 years of his life to the promulgation of his theory that a vast polar ice cap would tip the earth over in this century and wipe out civilization, died Sunday night in his home at 115 Prospect Avenue, Douglaston, Queens. He was 96 years old.

Mr. Brown graduated from Columbia University in 1900. For many years he was president of Columbia's Grand Army of the 49th Street Era, an organization composed of graduates of the university when it was still on East 49th Street, the present site of Rockefeller Center.

As early as 1911, Mr. Brown became intrigued by reports that mammoths had been found frozen in the Arctic "with buttercups still clenched between their teeth." This led him to believe that an accumulation of ice at one or both poles periodically, perhaps every 8,000 years, upsets earth's equilibrium and causes it to tumble over "like an overloaded canoe."

## A Polar Doomsday

Mr. Brown continued to push his theories on an impending polar Doomsday, which he believed to be overdue, until his death. For years he bombarded members of Congress, editors of newspapers and magazines, government leaders and scientists with written "proof" of his theories.

Concerning his theories, Mr. Brown told a New York Times reporter, in 1948, that as an engineer he knew that the bulge of the earth around the equator stabilizes its spin. But, he said, an abnormal amount of Antarctic ice, at that time said to be two or three miles thick, could

be enough to topple the spin.

This would cause floods of enormous proportions, earthquakes, and other phenomena, Mr. Brown said, wiping out civilization. He said such a cataclysm was imminent, and noted that "tales of sudden floods and the mysterious appearance and disappearance of large land masses are found in the folklore and legends of all races of men."

Mr. Brown recommended establishment of a worldwide Global Stabilization Organization, and recommended that it devote \$10-million to a study of how to effectively set off atomic blasts in the Antarctic to break up the ice mass there and thus save the world from certain disaster.

Mr. Brown's book, "Cataclysms of the Earth," expanded on his theories. Published in 1967, it titillated many general readers but failed to raise a great deal of scientific concern, although it contained Mr. Brown's statement that a particularly ominous omen for the earth's future was the wobble in the planet's spin. Such a spin is a scientific fact, and continues to challenge scientists seeking an explanation for it.

Mr. Brown predicted that in a forthcoming cataclysm caused by the earth tipping over, New York would probably wind up 13 miles under water, and so would most of the rest of the world. Among the few survivors, he theorized, would be the Eskimos, because the polar areas would be the least subject to catastrophic water action.

Mr. Brown is survived by two sons, Samuel C. Brown, of Drixbury, Mass. and Hugh A. Brown Jr., of Glen Cove, L. I., five grandchildren and five great-grandchildren.

## DR. LOUIS L. RAY, 65, GEOLOGIST, IS DEAD

Dr. Louis L. Ray, an expert on glacial geology and geomorphology with the United States Geological Survey, died July 14 at his home in Washington. He was 65 years old.

Dr. Ray received A.B. and M.S. degrees in geology from Washington University in St. Louis and his M.A. and Ph.D. in geology and geomorphology from Harvard.

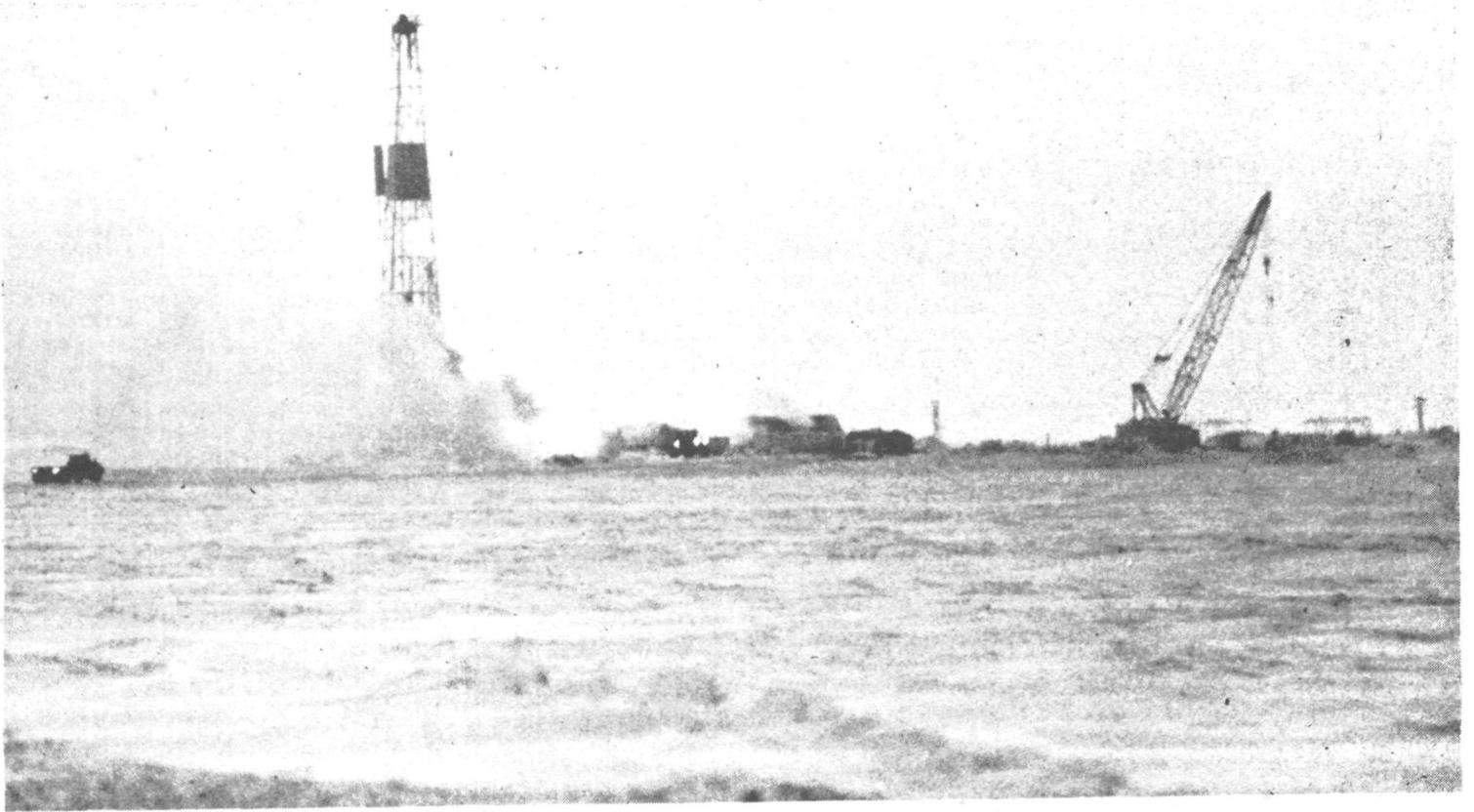
In World War II he worked on analyses of foreign terrain,

airfield sitings and traffic studies.

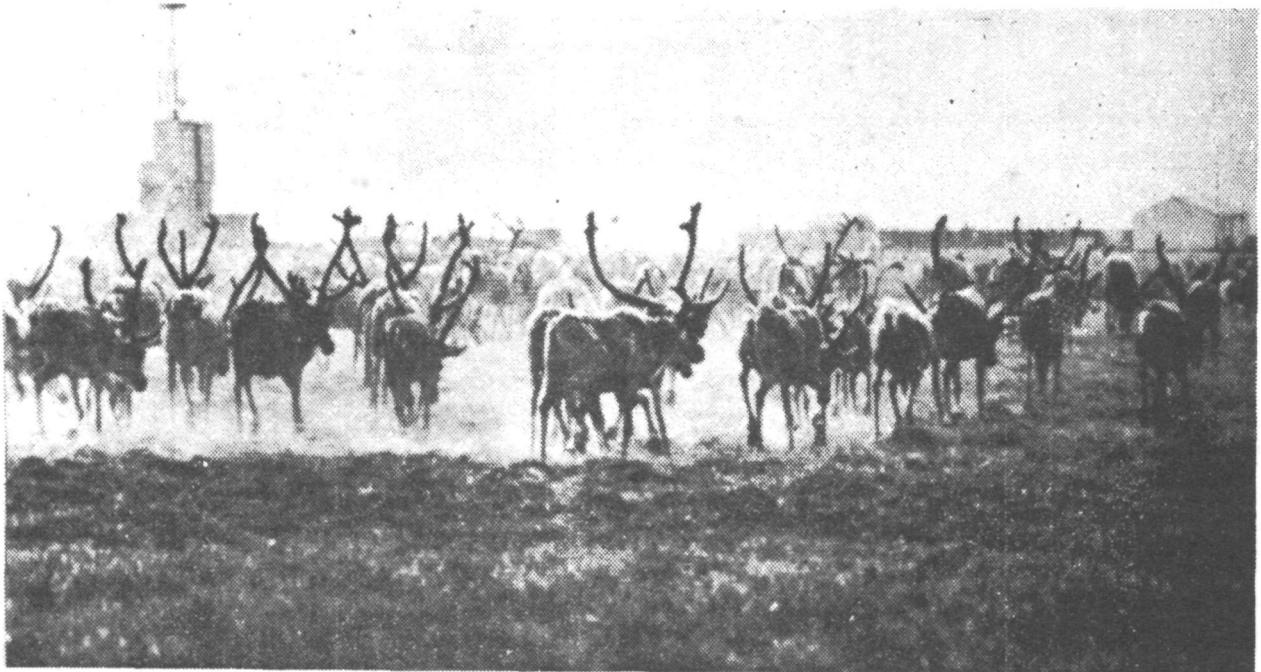
In the nineteen-fifties he was the geologist in charge of the Geological Survey's terrain and permafrost studies in Alaska.

Until his retirement last December, Dr. Ray studied geomorphology and quaternary geology of the Ohio River Valley and was in charge of the Survey's national landmarks program for the National Park Service.

He leaves his wife, Eleanor; two daughters, Victoria Crabbe and Deborah Lechert, and five grandchildren.



**DRILLING CONTINUED**—Day and night, every day, drill rigs like this are sinking shafts into the Sadlerochit oil and gas reservoir nearly two miles beneath Prudhoe Bay. More than 50 of the 72 planned wells in BP's western half of the oilfield have been drilled to date.



### **WHERE THE OIL AND THE CARIBOU MIX**

In an early morning light veil of ground mist, part of the 110,000-member Porcupine Caribou herd begins to group up near an oil well at Prudhoe Bay. The herd was forming to start the annual move to winter range. Caribou migration

routes came under intense study by Arctic Gas pipeline as part of its proposal to build a 2,600-mile natural gas pipeline to tap Prudhoe Bay and MacKenzie River Delta area gas reserves.