NEWS From GEORGIA TECH'S
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RADAR MAY INCREASE
ARCTIC OIL SHIPPING

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ATLANTA, GA -- Petroleum reserves in the Arctic are plentiful but shipping this oil to the outside world remains a difficult proposition. Only during the five warmest months of the year are many of these waterways sufficiently free of ice for tanker ships to move in and out of them safely. Arctic ice may not impede these ships much longer. The Canadian government hopes to use radar so that icebreakers can roam the oil-rich Beaufort Sea year-round, hauling petroleum away from petroleum fields.

That's what took three engineers from EES' Radar and Instrumentation Laboratory to Baffin Island in Canada. They spent May camping out in a plywood shack at a remote oceanside site several hundred miles above the Arctic Circle along with personnel from the Canadian Department of Fisheries and Oceans and McMaster University. These researchers are radar reflectivity specialists, and their mission was to find the radar characteristics which distinguish thin from inpenetrable ice.

"The Canadians want to equip a fleet of icebreakers with radar units which can scan a waterway and tell them at a glance where the thickest ice is," says mission leader Nick Currie of EES. "This is absolutely critical because an iceberg can stop an icebreaker and sometimes even sink it. You can't always tell the difference with the naked eye between breakable ice and ice which is dangerously thick. But radar may be able to make the distinction, and that's what we're looking for."

Atlanta, Georgia, is a long way from the Canadian border, but in the world's small radar community the Engineering Experiment Station is well-known. The Station has worked actively in radar research for more than 30 years and helped to pioneer developments in the millimeter wave spectrum (the band where ice is

particularly easy to "see" with radar). EES not only built the first millimeter wave radar in the late 1950's but its engineers also recently developed the highest frequency millimeter wave system in existence, operating at 220 GHz. In addition, the Station has become well-versed in the radar characteristics of snow and ice through a number of research programs.

The three EES researchers -- Currie, Jerome Callahan and Chris Lott -- spent five weeks preparing for their Arctic expedition and carried six planeloads of research equipment to northern Canada. They spent May measuring a variety of sea ice forms with a battery of high frequency radars. To accomplish this, the team mapped a 10 mile radius of the bay and recorded these measurements on digital tape. They used a battery of radars to measure the reflectivity of ice at 2, 10, 16 and 35 GHz, with each frequency reading seen at dual polarizations.

The engineers still must analyze the measurements before drawing definite conclusions (a process which will take six to nine months). However, their preliminary evaluation is promising. It appears likely that:

o There are frequencies at which large icebergs and other multi-year accumulations of ice can be seen easily at either 10 or 16 GHz.

o Strong orthogonal radar returns from small icebergs suggest that this could be a key for distinguishing thick from thin ice.

"I can't overstress the fact that these are tentative observations, but if they can be backed up by the detailed analysis it would be a significant discovery," says Currie. "With this information, it might be possible to construct a 'gate' in a radar system which could allow only dangerous areas of ice to be displayed on a video screen for a tanker pilot to see."

Currie hopes that oil companies in the United States will sponsor continued research at EES to determine if such a radar application is feasible.

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