

and as a result of the task force's work, the Canadian Government is negotiating with NASA to participate in the SEASAT program.

The Canada Centre for Remote Sensing, a branch of the Department of Energy, Mines and Resources, is organizing Canadian participation in the SEASAT program. Other departments involved are: Communications, Defence, Fisheries and the Environment, Indian and Northern Affairs, the National Research Council, Science and Technology, Supply and Services, and Transport.

If agreement is reached with NASA, Canada will spend about \$6 million in the next two years assessing the usefulness of satellite surveillance. Most of this money will be spent on contracts with Canadian companies.

Half the money will be for receiving, processing and interpreting the SEASAT data. For example, the satellite information receiving station at Shoe Cove, Newfoundland, is being modified to receive and process the data.

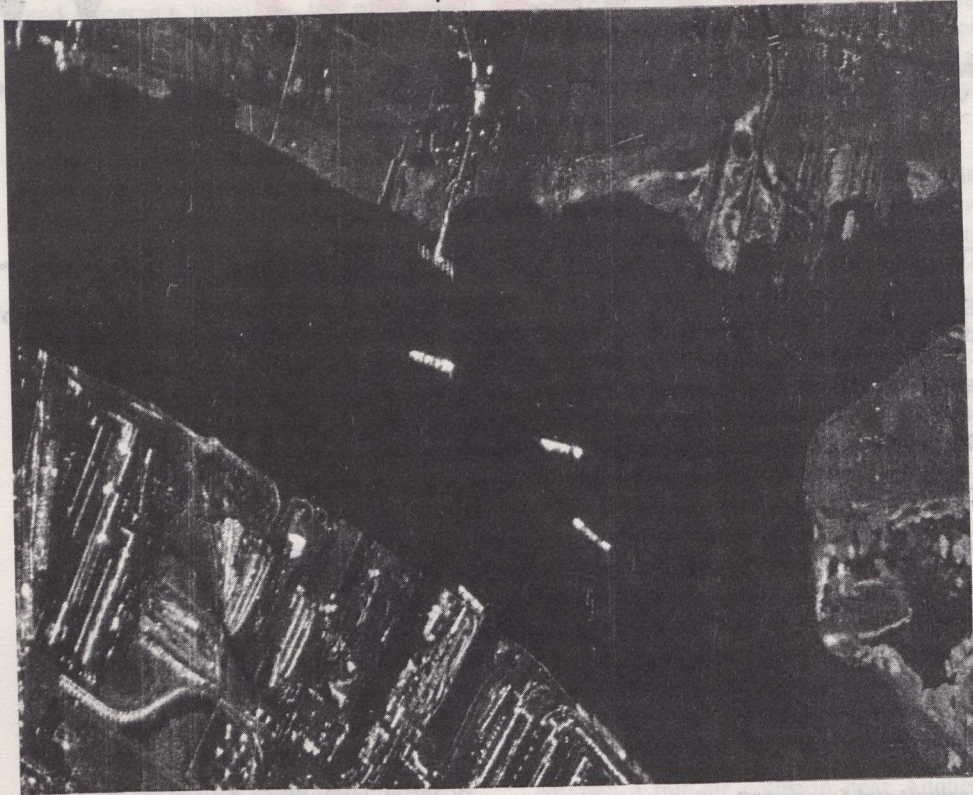
The rest of the funds will be spent on acquiring and interpreting "surface-truth" data. A long-range *Convair 580* aircraft belonging to the Canada Centre for Remote Sensing fitted with sensors similar to those in the satellite will fly under the satellite to evaluate the usefulness of the new sensors over a wide variety of situations.

Dr. L.W. Morley, Director-General of the Canada Centre for Remote Sensing, says in the foreword of the task force report that "potential benefits to Canada could exceed \$200 million *per year*".

Dr. Morley compares LANDSAT, an earlier satellite, with SEASAT and endorses the report of the task force as follows:

"New technology is generally oversold by its enthusiasts and underestimated or discounted by its critics. That was, and still is true, of LANDSAT, the picture-transmitting satellite, the first version of which (ERTS) was launched in July 1972. It was surprising how close the resolution of the LANDSAT pictures (80 metres) actually was to the predictions made by the scientists directly concerned. (The ability of the sensor in the satellite to discern small objects on the ground is called its "resolution" or "resolving power".)

"As a surveillance satellite, however, LANDSAT neither has the necessary resolution to detect many man-made objects nor can it penetrate cloud and fog whose occurrence off the east coast and in the

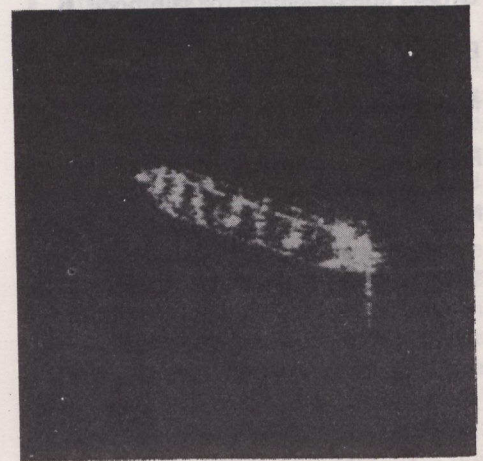


Airborne synthetic aperture radar image of ships in the Detroit River, processed to a three-metre resolution. (Below) photographic enlargement of part of first image.

Arctic averages about five days out of seven. LANDSAT, because of these known limitations, never was intended as a surveillance satellite. In July 1972, at the time of ERTS launch, satellites which could penetrate cloud and fog were not considered because of the complexity and greater power requirements of radar sensors.

"With the advances in the use of "synthetic aperture radar", which requires only a fraction of the power needed by conventional radars and whose resolution is independent of range, it is theoretically possible from orbital altitudes to discern objects on the earth's surface whose maximum dimensions are a few metres. Such a satellite would not be recommended at present because of the enormous cost of handling so much data. There must be a trade-off between resolution and cost of data handling.

"And so, the real possibility now exists of having radar surveillance satellites with ground resolutions of about 20 metres produce radar pictures showing the location of ships, the distribution of sea ice, the sea state and the temperature of the ocean surface — all through cloud, fog and darkness. The studies indicate that potential benefits to Canada could



exceed \$200 million *per year*. The risk is large, but it will be greatly reduced after the experience of NASA's SEASAT-A, particularly if Canada decides to participate in that experiment. The problems reduce to the simpler ones — do we need satellites and are they worth it? The opinion of the task force is "yes" to both these questions.

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"It is with great pleasure and satisfaction that I endorse and recommend this report for submission to Cabinet in response to its instructions."