

For Canada, the need for the surveillance of submarines presents three quite different aspects. In the Atlantic, it is related to the protection of shipping between North America and Europe (indicated by the dashed lines on Figure 2, which follow great circle routes to Europe). In the Arctic, it is concerned with detection of passage of attack submarines through the Canadian Archipelago. In the Pacific, the two principal problems are protection of shipping through the strait between Vancouver Island and Washington State, including that of US strategic submarines from the great base in Bangor, and of tanker traffic from Alaska to Western Canada and the Pacific coast of the continental USA.

This paper is concerned with surveillance from space, air and ground of the approaches to and the territory of Canada, and can make no more than passing reference to the important problems of surveillance of underwater activity. The most effective instrument for surveillance of surface ships is the maritime patrol aircraft, equipped with radar. Although difficult in the open ocean, surveillance of submarines is best carried out by bottom-mounted passive sonar, backed up by maritime patrol aircraft equipped with sonobuoys. Canada's Aurora aircraft are very effective for surveillance of both surface ships and submarines, but eighteen aircraft are insufficient to perform adequate surveillance in three oceans, especially when they are often diverted for other tasks.

For surveillance of the passages through the Canadian Archipelago, ice cover makes aircraft of very limited use for initial detection. What is needed here is the construction of sonar barriers across a few narrow passages, selected for their physical characteristics and so that passage from the Arctic Ocean into the North Atlantic must cross at least one of them. Failing the provision of submarines capable of operating under the ice, prosecution of contacts made by Canadian sonar in the Arctic would have to be performed by United States nuclear-powered submarines, except for instances in which open water would allow employment of aircraft equipped with sonobuoys.

Space vehicles are unlikely to play a major part in antisubmarine surveillance, except for their role in communications and navigation. They could be important for the