

scale maps. Surveillance would not have to be continuous, and it would not be essential to detect or track the flights of missiles or aircraft. Some delay in reporting would be tolerable. But it would be necessary to obtain imagery with high resolution, making it possible to distinguish tanks from trucks, for example, and to identify certain types of weapon systems. For surveillance, useful results could be expected from thermal imaging systems mounted in low speed aircraft flying at low altitudes.

Civil Peacetime Value of Aerospace Surveillance of Aircraft and Surface Ships

Among the responsibilities of a sovereign nation are measures to ensure safety of navigation at sea and in the air. Safe navigation at sea requires accurate charts, including depth soundings in shallow water. Once made, most charts have a long useful life, but in some waters the combinations of current and deposits of silt cause the depths to change, requiring charts to be amended (or dredging conducted). Although soundings can be taken by a ship with a fathometer at any depth, it is now possible to survey shallow bottoms by laser sensors¹² operating from an aircraft or satellite.

Ice is a hazard to navigation in the Arctic, the northwest Atlantic, and on the Great Lakes. It is now normal practice for icebreakers to use light helicopters to reconnoitre the ice in their vicinity, but more extensive surveys can be done by airborne or spaceborne radar, passive radiometry, or photography. Oil drilling and production platforms can be endangered by icebergs, and if sufficient warning is provided they can be towed out of danger.

Navigation both at sea and in the air relies on weather forecasts, which are becoming ever more dependent on satellite observation, especially over the oceans and

¹² "Navy, DARPA Study Lasers to Detect Soviet Submarines" *Defense News*, 11 September 1989, p. 14.