

CODS

The Canadian Ocean Data System (CODS) uses a series of drifting buoys to measure winds, temperatures, wave heights and other aspects of the oceans.

The system started in 1979 with the first Global Atmospheric Research Program, in which 300 remote sensing buoys were released into oceans of the southern hemisphere. Originally intended to give preliminary mappings of ocean circulation patterns, the experiment was instrumental in encouraging the development of a general technology behind this type of data collection. Its success has led to the design of buoys with more advanced technical capabilities.

Canada has begun phasing-out the collection of oceanic and atmospheric data by weather ships stationed in the Pacific. The ships will probably be replaced by a combination of sophisticated, fully-automated floating platforms — developed in Dartmouth, Nova Scotia — and satellite weather information.

This is only one possible application of this sort of advanced sensing technology. The platforms are used extensively by Canadian institutes for oceanographic research, and by several oil companies seeking on-the-spot information about ice conditions and other ocean phenomena off the east coast and in the Arctic.

FLUORESCENT LINE IMAGER

The Fluorescent Line Imager (FLI) is a remote imaging sensor usually mounted on aircraft or satellite. It is designed to relay data to a ground receiving station which, when interpreted by computer, makes images of chlorophyll concentrations in the oceans. Chlorophyll subtly alters the colour make-up of water — with the level of change varying according to concentration. Although the colour variations are not visible to the naked eye, they can be detected by special sensing equipment. The FLI has been designed to register and enhance these variations, making it easier to pinpoint areas of high chlorophyll concentrations.

Concentrations of chlorophyll are directly related to the abundance of microscopic forms of plant life (phytoplankton). A more complete knowledge of where, and how much, chlorophyll exists will lead to a better understanding of phytoplankton ecology, its relationship to higher aquatic life forms, and to the ecological effects of water pollution in coastal areas. Also, since phytoplankton has no power of independent motion, realistic models can be developed about circulation patterns of the oceans simply by observing phytoplankton movements.

FLI has been tested extensively at the Institute of Ocean Sciences. There, in a joint effort by Canadian and German scientists, the sophisticated instrument was mounted on aircraft for use in low-altitude surveys of the British Columbia coast, the eastern Arctic and the Mediterranean.

FLI is only one product of Canada's pioneering efforts in the relatively recent field of remote sensing technology. The first satellite to possess a chlorophyll sensor was the US's *Nimbus 7*, launched in 1978. It did not carry a Canadian-made FLI, and in experiments corroborated by the West

Germans, the Canadian imager was proved more accurate and more versatile in differing weather conditions.

THE CANADIAN HYDROGRAPHIC SERVICE

Hydrography is the practice of surveying and charting waters for navigation. In early seafaring days this meant lowering a lead weight on a line over the side of a ship to obtain critical depth measurements. In modern times, soundings are taken using sonar. Sound waves projected downward from the surface echo back from the ocean floor, providing accurate estimates of water depth and bottom-terrain characteristics.

Organized hydrographic surveys of Canadian waters began in the late eighteenth century. Among the earliest contributors were the great explorers Cartier, Cabot and Champlain. Prior to the British North America Act in 1867, all surveying off Canadian shores was done by British ships. Then, in 1904, with the creation of the Canadian Hydrographic Service, Canada undertook full responsibility for all hydrographic research in national waters. This meant charting 131 650 nautical miles of coastline and 739 366 square nautical miles of continental shelf and territorial waters.

During 1982, CHS compiled and produced the fifth edition of the General Bathymetric Chart of the Oceans (GEBCO). The series of charts is the culmination of eight years' work by CHS and hydrographers and oceanographers throughout the world. CHS produced it for the International Hydrographic Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization.

These charts of the floor of the oceans, which are the major source of reference for oceanographers, provide invaluable information for maritime countries seeking to establish offshore limits to regular petroleum development and other submarine resources.

With bases at three advanced Canadian institutes (Bedford in Nova Scotia, the Bayfield Centre in Ontario and the Institute of Ocean Sciences in British Columbia) and controlling a \$175-million fleet comprising 180 vessels of varying size and function, CHS is one of the best equipped hydrographic agencies in the world.

Canadian research vessels Baffin and Hudson are used primarily for soundings, gravity readings and magnetic readings. Hudson was the first ship to circumnavigate North and South America.