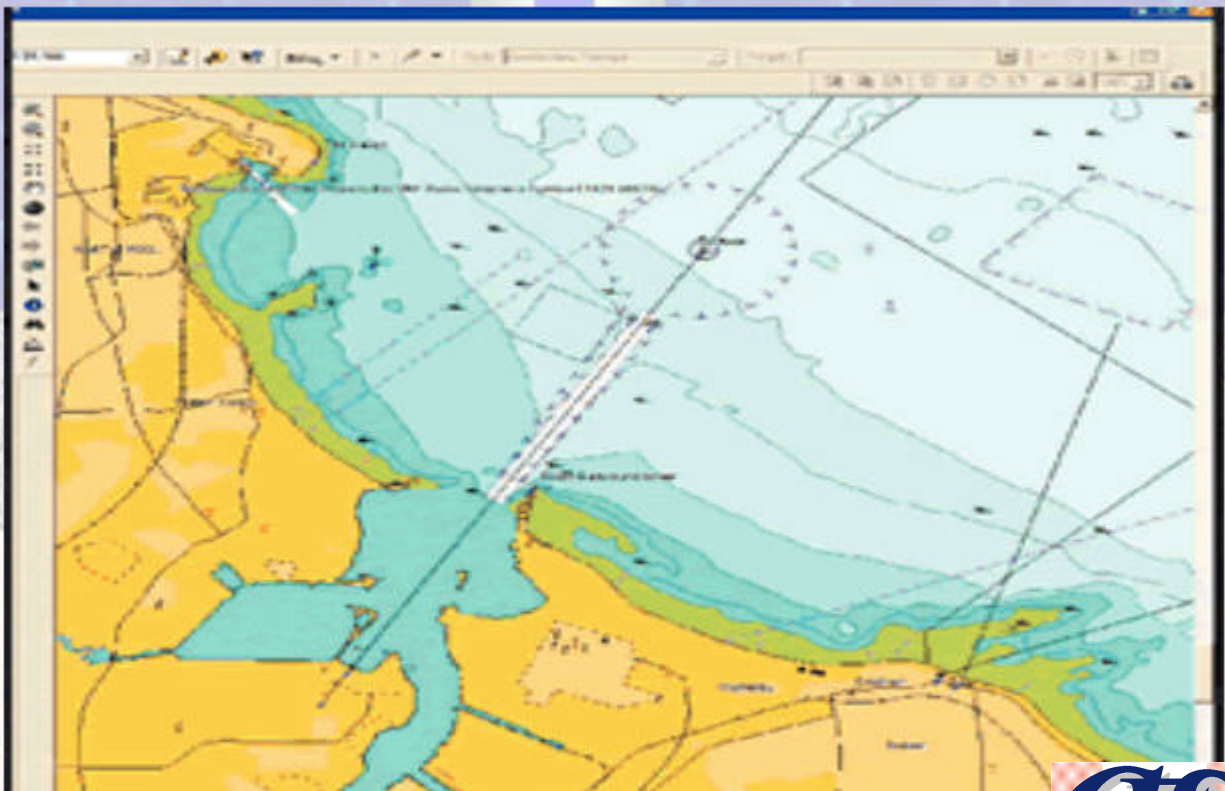


## Marine Surveying, Oceanographical & Meteorological Observation



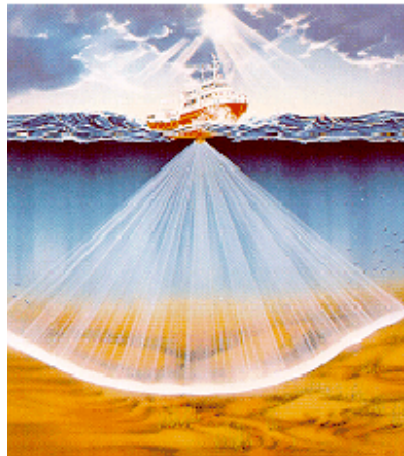
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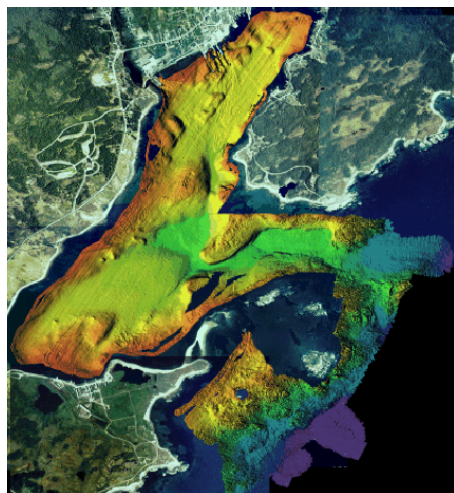


## Multibeam Bathymetry and Oceanographic Observation



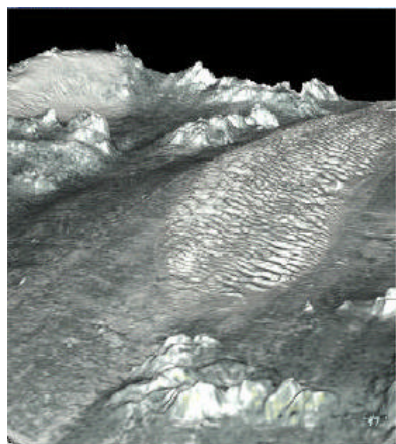
Multibeam bathymetric survey techniques provide a rapid means of determining the morphology and nature of the sediments on the seafloor or lake bottom. A multi-element transducer provides many (30-150) individual soundings of the water depth and echo strength for each ping. Automatic seafloor tracking programs determine depths and echo strengths for each transducer element, correct for transducer motion, and calculate a geographic coordinate for each individual sounding.

A wide swath (up to 7 times the water depth) can be surveyed in a single pass through an area. Survey lines are spaced to provide overlapping coverage of the seafloor. The data are used to generate high resolution images which contain information about the morphology of the seabed. These techniques have detected features that are not always detected by ordinary bathymetric soundings.



Digital multibeam bathymetry has become the primary reconnaissance mapping tool used by the Geological Survey of Canada for marine geology surveys. Multibeam bathymetry and backscatter intensity data are collected as the first stage of multiparameter geophysical surveys. The multibeam bathymetric data are used to create shaded relief images that depict seafloor morphology. These images are used to interpret features on the seafloor such as channels, areas of bedrock outcrop, small scale bedforms, rocks and other small objects. In some areas it has been possible to map changes in bedrock geology based in the change in seafloor character over the different rock types. Acoustic backscatter intensity measurements are used to determine the general distribution of coarse and fine sediments. The maps and images form the basis for the preliminary interpretation of geological processes and features, and are used to plan subsequent surveys using higher resolution sidescan sonar and seismic reflection systems to better define features identified on the multibeam data.

Bathymetry data collected with these systems are processed to remove the effects of vessel motion, corrected for errors due to tides, and geographically referenced. The data are then imported into a Geographic Information System (GIS) for analysis and display.



## Coastal Oceanography



Measuring currents and other physical parameters in the ocean has always been an integral part of Elmosa's principle field of operation – engineering and construction of seawater intake systems. Recording Current Meters, Temperature Profile Recorders and Water Level Recorders have been used for oceanographic studies. Other examples of oceanographic instruments used are a Coastal Monitoring Buoy, a Telemetering Temperature Profiling Buoy, self recording Temperature and Conductivity Profile Recorders, Water Level Recorders and Wave and Tide Recorders.

Coastal Oceanography includes a variety of applications, from small hand-held systems to extended fixed installations where data are transferred in real-time.

The Data Buoy is a rugged, lightweight and compact data buoy intended for use along the coast, in ports and harbours and near off-shore platforms. It measures wave height and period, sea current speed and direction, sea temperature as well as the most important meteorological parameters and transmits data ashore in real-time if a VHF or UHF radio or radio modem is connected. If a GSM modem 3865 is connected the buoy can be dialed up and data can be downloaded.

### **Data display on a PC using 3710 program**

Another alternative is to connect the radio receiver to a PC via Deck Unit 3127. The PC runs Display Program 3710 that is a real time display program with data storage capability. When using radio transmission, the program can handle data from up to 20 buoys providing data multiplexing is employed or the receiving station is equipped with several radio receivers, Deck units and Com -ports. When using GSM communication, data can be downloaded via modem. The user can set up the visual display as wanted. Five different basic windows are available:

- a bar graph to show for example water level
- a directional compass for wind or current
- a diagram display to show historical development of for example air temperature
- a text display to show static text
- a number display to show exact values.

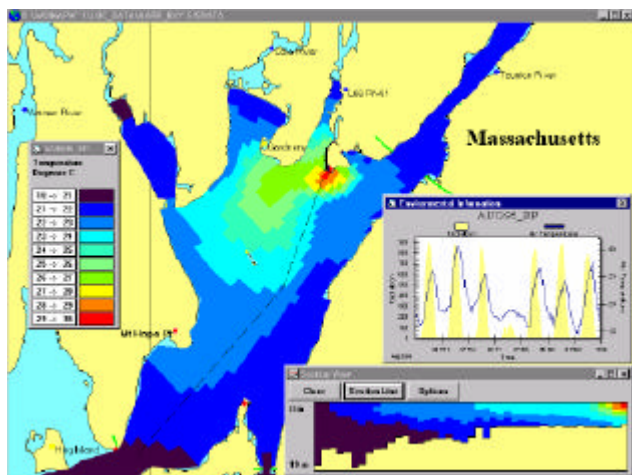
A complete display can then be built up by using a combination of these five windows. The on-line help will lead you, step by step, through a build-up of the display.

The program works almost like a drawing program with the ability to alter the drawing as the physical parameters change. Three display examples are available which can be altered by the user at will.

## Circulating Water Recirculation Study, two & three dimensional numerical modeling



We use the hydrothermal model, to assess the conceptual designs of intake and discharge locations. The model has previously been used extensively in the analysis of thermal plumes from power plants and industrial facilities around the world. The model can operate in two dimensional (vertically averaged) or three-dimensional mode as needed. The model solves the momentum and mass equations to generate time series of currents on a boundary fitted grid. The model is driven by typical tide and wind conditions for the site and results compared with available data, either historical or collected as part of the field program. Additional runs are performed using typical conditions that include summer and winter winds. Numerical models are applied for intake and discharge configurations.



Numerical modeling also solves the energy (temperature) equation to provide time series of temperatures on the same boundary fitted grid. Modeling outputs include temperature fields for comparison to the field program data as well as temperature fields for the set of environmental conditions for each of the conceptual configurations.