St. Lawrence TECHNOLOGIES

ABSTRACT

The firm Enviromer Inc. has developed a current meter to monitor the movements of surface waters on land or from a mobile station. Drifting buoys continually transmit information, in real time, on the velocity and direction of surface currents. This data is then integrated into a spatially-referenced framework.

The OBELIA system gathers data on local water current patterns in specific areas. This data may be used by existing current metering models. The system was also designed to monitor oil slicks in the event of a spill at sea, or to simulate the drift of an object, thereby maximizing the efficiency of rescue and salvage operations.

INNOVATIVE TECHNOLOGY

OBELIA: A SURFACE-CURRENT MONITORING SYSTEM

MAIN FEATURES

System Components

- Drifting buoy(s)
- GPS and DGPS receivers
- Radio receiver (T-Modem)
- Rechargeable battery
- Software functions in a Windows™ environment
- S57 and NTX digitized marine chart
- Portable computer.

System Operation

- Monitor surface currents
- Transmit georeferenced positions
- Display data in real time on vector map and archive data
- Viewing of buoy movement over time
- Display speed and trajectory of buoy movement.

Saint-Laurent Vision 2000

Environment Canada Protection Québec Region

Environnement Canada Protection Région du Québec

Enviromer

NRC·CNRC

Federal Office of Regional Development (Québec)

Bureau fédéral de Développement régional (Québec)

PROJECT OBJECTIVES

The aim of the project was to develop a precise, efficient, and economical monitoring system for surface currents that could be adapted to the particular needs of different users. This new system would have a mobile current-monitoring unit made up of a float and a GPS, and a real-time data transmission system, including a modem and a data archiving and presentation software using a digitized marine chart as a base map.

The project's technical objectives were as follows:

- **To optimize production costs of the float**
- **To improve its hydrodynamic characteristics**
- **To improve the system's energy self-sufficiency**
- **To develop a real-time communications system between the float and the observation base**
- **To improve data archiving, formatting and display.**

BACKGROUND

Most fixed or mobile systems used to measure currents are very costly and the logistics of their implementation are considerable.

The OBELIA system uses a satellite positioning system (GPS) that takes frequent and very precise readings on buoy positioning and transmits this information to a land or mobile base station. The buoy may be released from any type of vessel. Users have immediate access to data in real time and presented on a digitized base map in Windows™.

TECHNOLOGY

The OBELIA system is the product of a combination of different technologies.

The GPS continually records the buoy's position with a precision that varies from 3 m (DGPS) to 10 m (GPS).

Data are transmitted by shortwave to a computer. Under normal conditions, transmission distance is roughly ten nautical miles.

A software operating in Windows™ integrates the data transmitted by the buoy onto a vector map from which they may be superimposed on electronic maps. On screen, each buoy is identified by a different colour. The software allows a user to view the movements of 16 buoys simultaneously.

Made of polymers, the drifting buoy is oil- and impact-resistant. It is composed of a watertight box that has been subjected to more than one atmosphere of pressure and a drifting tube of variable length, depending on the desired use. The box holds the GPS and radio receiver.

RESULTS

With its multiple applications, ease of use and affordability, the OBELIA current metering system offers many advantages in the area of environmental and scientific monitoring.

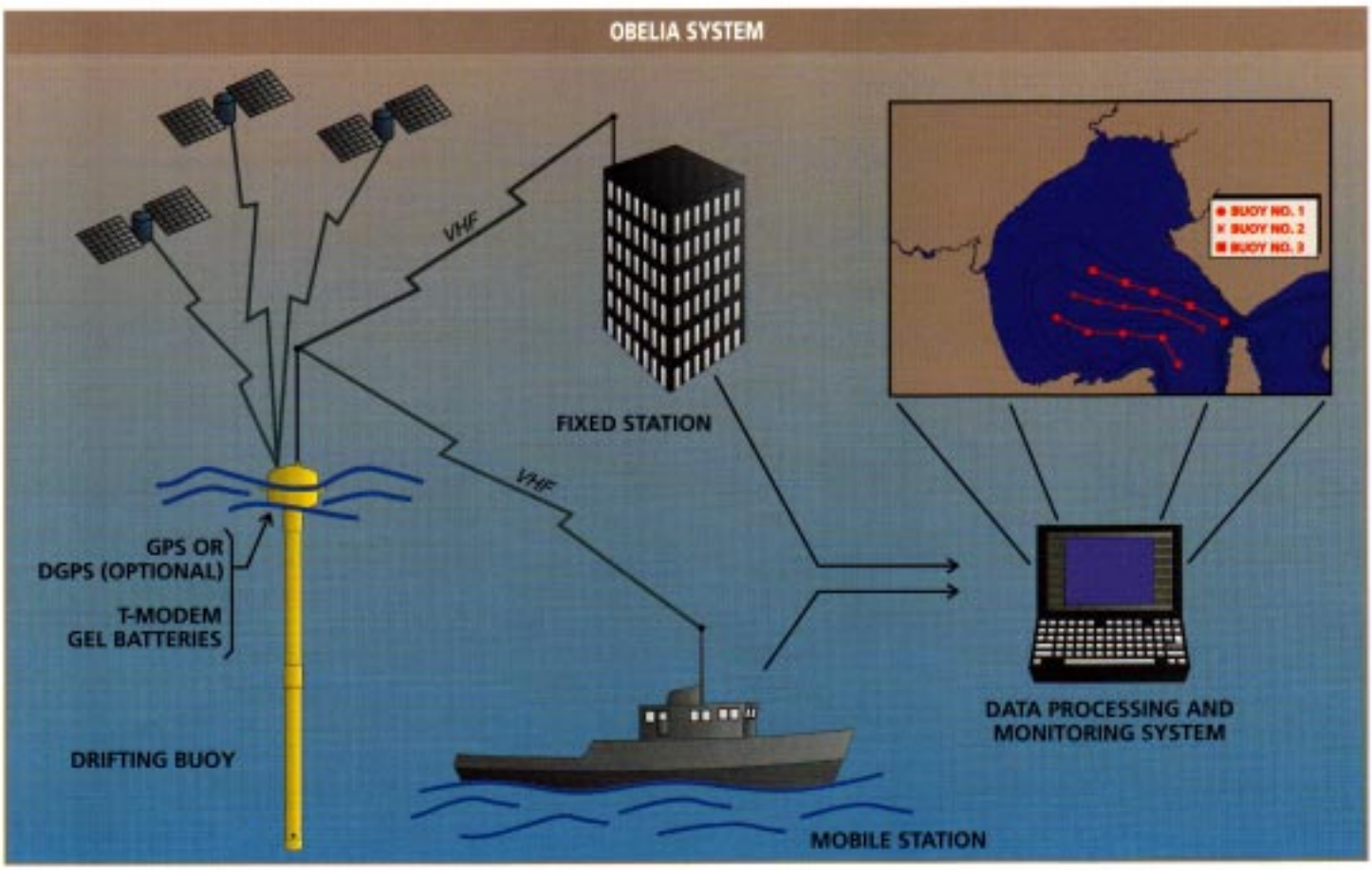
In emergency situations, the buoy is easily tossed from a boat by a single individual. The data may be accessed immediately and used, for instance, to monitor the movements of an oil slick, in real time, from a work station.

Such information will optimize the choice of intervention strategies and maximize the success of such an operation. This greatly mitigates the logistical work that results from our inability to accurately predict the trajectory of an oil slick by the usual means.

In addition to providing information on the actual position of the slick, the OBELIA system will inform on its theoretical course and offer a time estimate of when it will reach shore.

In the case of search and rescue operations, this apparatus, released at the estimated position of the shipwreck, will allow rescue teams to define more precisely the search area. Installation of drifting tubes of variable lengths help to simulate the drift of the wreck.

As digitized modeling becomes more widespread, new technologies are being developed apace to validate, in the field, the various parameters studied. OBELIA allows such work to be carried out by small work teams using lightweight craft, thereby significantly reducing the costs of ocean missions.



POTENTIAL AND LIMITATIONS

The OBELIA system makes it possible to combine all the data needed to understand surface currents in areas of special interest, such as zones sensitive to ocean pollution. The buoy is easily moored and the data are transmitted in real time, making OBELIA an important tool in computer modeling work.

The data produced by OBELIA have many possible applications, including optimizing ocean emergency intervention scenarios. For instance, in the case of a coastal oil spill, the buoy acts like a tracer in surface waters, monitoring the oil slick. It thus becomes possible to predict the best place and time to intervene in order that traditional techniques (booms) are deployed most effectively, thus preventing the slick from reaching shore.

The actual distance of transmission will be greatly enhanced when satellite telephone transmission is available.

INFORMATION

This technology data sheet was prepared based on the design of a new prototype for a drifting current meter developed by the firm Enviromer Inc. Funding and technical assistance were provided by the Technology Development Section of Environment Canada, the Industrial Research Assistance Program (IRAP) of the National Research Council of Canada, and the Federal Office of Regional Development - Quebec, under its IDEA-SME program.

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St. Lawrence TECHNOLOGIES

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Canada