

79-030

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REPORT OF CRUISE NO. 79-030

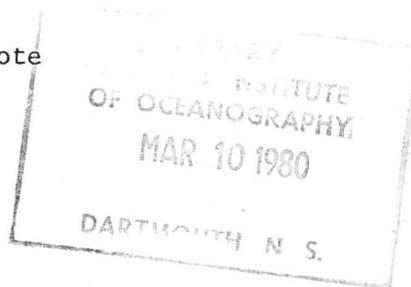
CSS DAWSON

Phase 1 November 26-30 November 1979

Phase 2 6-11 December 1979

by

T.R. Foote



LOCAL CRUISE DESIGNATION:

BIO 79-031

79-030

VESSEL:

CSS Dawson

DATES:

26-30 November 1979, Phase 1
6-11 December 1979, Phase 2

AREA:

Gulf of St. Lawrence

RESPONSIBLE AGENCY:

Atlantic Oceanographic Laboratory
Bedford Institute of Oceanography
Coastal Oceanography Division

OFFICER IN CHARGE:

T.R. Foote

SHIP'S MASTER:

Captain R. Dickenson

PERSONNEL:

Phase 1

E. Verge, AOL, Bedford Institute of Oceanography
G. Taylor, AOL, Bedford Institute of Oceanography
P. Keenan, AOL, Bedford Institute of Oceanography
H. Mcruer, Ice Central, Ottawa

NATURE AND QUANTITY OF DATA GATHERED

Twelve Oceanographic Stations (STD) and current meter data from 4 moored current meters at 4 sites in the Gulf of St. Lawrence.

PURPOSE OF CRUISE

Phase 1 To sample temperatures and salinities in the upper 100 m of water at representative stations throughout the Gulf of St. Lawrence, and thus to provide the T-S data with which the Ice Forecast Central Office of the Department of Environment prepare their ice forecast for the winter season in the Gulf.

Phase 2 To recover four (4) current meter moorings and reinstall five (5) current meter moorings for long term deep flow measurements. Current meters to be recovered in spring 1980.

EQUIPMENT AND METHODS USED IN GATHERING AND PROCESSING DATA

Temperature, salinity and pressure data were collected at 12 historical stations throughout the Gulf of St. Lawrence with the use of the Guildline STD system yielding data in analogue form on X-Y plots and by computer printout (HP2100). A running check was kept on the STD by comparison with temperature and salinities obtained from water samples taken with Knudsen water bottles.

DISCUSSION AND COMMENTS

This year marks the 19th consecutive year in which the Ice Forecast cruise has been done in the Gulf of St. Lawrence and a seasonal outlook of ice conditions prepared. The forecast, issued in the first week of December,

provides information on the timing of freeze-up and the spread and development of the ice pack. Due to the variability of the oceanographic parameters from year to year a large variation can exist in the date of freeze-up. Oceanographic observations are a necessary prerequisite in the development of a forecast. In the fall, heat losses establish a convective cooling process which penetrates deeper and deeper as the water temperature decreases toward the freezing point. The depth to which this mixing must penetrate may be calculated from the oceanographic observations and so provide a method of determining the amount of heat which must be extracted before an ice cover will begin to form.

Analysis of the long range meteorological conditions and a quantitative examination of the heat budget of the Gulf enables calculation of the rate of heat loss or gain by the water, and thereby a means of predicting freeze-up and the development of the ice cover.

The seasonal outlook of ice conditions in the Gulf of St. Lawrence and Newfoundland waters is attached.

Four current meter moorings were recovered, part of a five current meter mooring program of G. Bugden. The fifth mooring has been found torn away by a fishing dragger. It was the intention to reinstall all 5 moorings but weather prevented the installation of two in the Cabot Strait area. G. Bugden's program is designed to gain data to properly examine the dynamics of the deep water in the Laurential Channel.

The mooring positions are shown on the attached chart. Moorings 1 and 2 are intended to monitor the exchange of bottom water at Cabot Strait, moorings 3 and 4 the length scales of the motion, at the same time keeping clear of wind generated gyres and nonlinear effects which might predominate in the Gaspé Passage Region and mooring 5 will provide data on the motion in the upper estuary.

SEASONAL OUTLOOK OF ICE CONDITIONS

IN THE GULF OF ST. LAWRENCE AND NEWFOUNDLAND WATERS

WINTER 1979-80

INTRODUCTION

This general outlook of ice conditions is provided to interested agencies and shipping concerns as an aid in planning winter activities. To supplement and update this outlook, a regular Thirty Day Ice Forecast will be issued twice a month. Operational ice forecasts and charts are prepared and broadcast daily during the ice season.

The data base for this outlook consists of: water temperatures recorded in the Gulf of St. Lawrence on an oceanographic cruise conducted during the last week of November, the latest thirty day temperature and mean sea level progs, assumed normal weather regime from January onwards, and historical data.

METEOROLOGY

Looking at the past summer as a whole, melting degree day totals throughout the St. Lawrence River, the Gulf of St. Lawrence, Newfoundland, and southern Labrador were generally greater than normal. During the last 7 to 10 days of November mean daily temperatures were running as much as 5 to 10 degrees above seasonal values in the St. Lawrence River and over much of the Gulf, a complete reversal from conditions last year. Across Newfoundland and southern Labrador the temperatures were generally closer to normal.

The thirty day weather outlook for December predicts a deep low east of Iceland with a trough extending westward to southern Greenland and then into Davis Strait and Baffin Bay to produce a moderate northwesterly windflow across Canada's East Coast. Temperatures are predicted to average above normal over the St. Lawrence River, near normal through the Gulf of St. Lawrence including the Estuary, and below normal east of Newfoundland and southern Labrador including the Strait of Belle Isle.

OCEANOGRAPHY

At the end of November surface water temperatures were near normal through the Estuary, Gaspé Passage, and northern half of the Gulf. Water temperatures were one to two degrees above normal in the southern Gulf but ranged up to one and one-half degrees below normal along the west coast of Newfoundland and in Jacques Cartier Passage. The heat loss required before initial ice formation was above normal in the southern Gulf, slightly above normal through Jacques Cartier Passage and the Estuary, near normal in the central Gulf, but was below normal through Gaspé Passage and along the west coast of Newfoundland.

ST. LAWRENCE RIVER AND ESTUARY

Patchy new ice forming in the river between Montreal and Quebec City during the second week of December will quickly spread eastward beyond Quebec City during the second half of the month. By the end of December new and grey ice will cover the southern half of the Estuary, with mainly new ice across the Estuary to the north shore and to Anticosti Island by mid January. Patches of grey-white ice can be expected to develop further upstream by mid January.

GULF OF ST. LAWRENCE

During the third week of December, new ice will form on shorelines of Chaleur Bay, the New Brunswick Coast, and Northumberland Strait. By the end of December new and grey ice will begin to spread from the Estuary along the Gaspé Coast but remain confined to the coastal shallows into Northumberland Strait.

The shipping routes through Gaspé and Jacques Cartier Passages are expected to become ice covered by mid January. At that time ice cover is expected in Northumberland Strait and within 20 to 30 miles of the New Brunswick coast. Eastward spread of ice during the second half of January will produce an ice edge extending from northwestern Cape Breton Island to the central Gulf to Lobster Cove, Newfoundland.

By mid February the ice edge is expected to extend from Bay of Islands, Newfoundland to 40 miles off Cape Ray to Cape North with some ice development along the east coast of Cape Breton Island into the Sydney approaches. Ice will spread across Cabot Strait and to Scatari Island by the end of February with grey-white and white ice predominating in the central Gulf.

Assuming that spring temperatures are near normal, break-up should develop in the St. Lawrence River Estuary by mid March.

In summary the initial ice formation in the St. Lawrence River will be delayed about a week. In the Gulf of St. Lawrence the pattern of development and spread of ice is expected to be close to normal with extensive ice coverage of the Gulf and Cabot Strait indicated by the end of February.

EAST NEWFOUNDLAND

The Strait of Belle Isle and the waters east of Newfoundland are expected to be open water during the month of December. The first appearance of new ice in the Strait of Belle Isle is forecast during the early days of January. Indications are for a close to normal extent of the pack ice. Pack ice spreading southward is predicted to reach the Baie Verte Peninsula by the end of January, across Notre Dame Bay to Cape Freels during the first half of February and approaching Cape St. Francis by the end of February. It is a little too early to state to what extent, if any, ice will affect the port of St. John's.

I S S U E D B Y

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04 DECEMBER 1979

