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Canadian contribution up to 2001 Department of Fisheries and Oceans

Introduction

Canada, bordering three oceans, has a strong tides and water level program in support of navigation, marine transportation and climate research. As part of this program, a number of tides/water level gauges are installed and operated providing data in real-time in many cases. The responsibility for these gauges are shared by the Department of Fisheries and Oceans and the Department of Environment, the former for the marine gauges and the latter for fresh water sites. Six of these stations, all under the responsibility of the Department of Fisheries and Oceans, were designated as GLOSS stations, however, only four are currently in operation (Table 1).

Future Plans

Canada is in the process of developing a tides and sea-level monitoring program in the higher latitudes including the Arctic. In addition to direct sea level rise, there is another important need for Arctic tide gauges. The flow of relatively fresh water from the Pacific Ocean to the Arctic and on to the Atlantic is driven by sea level height difference of about 50 cm. This height difference is maintained by an excess of precipitation in the North Pacific relative to the North Atlantic. The imbalance in precipitation, and hence the height and resulting flow, could well change with change in climate, but could also be monitored by Arctic tide gauges. The delivery of cold fresh Arctic water to the Labrador Sea is an important factor to the stability of the upper ocean in the Labrador Sea and changes can influence ocean deep convection in the region. Changes in deep convection in turn, directly affects the rate of CO₂ sequestration into the oceans.

In addition to monitoring sea level changes, data obtained by these tide gauges would also be used by a variety of other Canadian groups, for both navigation safety, and numerous scientific studies.

Currently limited funding has been approved and four sites are under consideration:

- Alert (specifically identified by GCOS as a required site);
- Cape Parry (to monitor sea-level as a measure of freshwater storage in the Arctic Ocean, and of the forcing of flow from the Arctic to Baffin Bay);
- Nain (northern Labrador site also identified by GCOS as one of the more critical), replacing the previously discontinued GLOSS station; and
- Pond Inlet (Baffin Island)

These gauges will be geocentrically positioned, and co-installed with continuously recording GPS sensors to allow interpretation of any tectonic motion required and thus to determine actual change in ocean volume.

IHO Constituents Data Base

The IHO Tidal Constituent Database was operated by Canada, on behalf of the IHO, from 1978 to 2000. Last year Canada declared that it had become increasingly difficult to effectively manage the database due primarily to the set of extremely restrictive dissemination policies

placed on the constituent data by the IHO Member States. These policies were in response to increased commercial use of their data sets. The restrictions on data distribution and the fact that most Member States were providing few or no updates to their data holdings, prompted Canada to suggest that, under its existing terms of reference, the Database had become ineffective and had outlived its usefulness. IHO Member States agreed and subsequently voted overwhelmingly to disband the databank. While this decision clearly satisfied Member State concerns over commercial use of their data, it left various groups within the scientific community, notably GLOSS, without a valuable source of data.

Should the GLOSS Group of Experts decide that having access to an international Constituents data set is important and essential, and should the member countries agree to provide the constituents tables to such a database and make a commitment to keep it up-to-date, it would be fairly easy technologically, to build such a data base that can be accessed over the internet.

Canada will be very happy to contribute free of charge, the constituents associated with its current GLOSS and future climate stations to the international community. Furthermore, Canada will be willing to participate in the development of a new and Internet accessible constituents data base for GLOSS.

Other related activities

Canada has also several research initiatives to detect, understand and model sea level variability and change. These include: analysis of historical sea level data and associated modelling to delineate the primary causes of sea level variability; integration and interpretation of altimetry data and sea level time series to detect and understand eddy formation in the oceans, El Nino events, etc. Canada is also in the process of modernizing its gauges to real-time where appropriate and disseminating historical time series on-line in support of climate research.

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Table 1: Status of GLOSS Stations in Canada

GLOSS ID	Location	Status
222	Halifax	<ul style="list-style-type: none">• Ongoing, currently using a digital gauge• All the historical tabulated hourly heights have been recovered for this station.• The period of record spans from Oct 1895 to March 2001.• 78.9 % of the hourly height data now in MEDS data bases.• Data up to Dec 2000, has been sent to PSMSL.
153	Little Cornwallis Island	Closed
224	Nain	Closed
155	Prince Rupert	<ul style="list-style-type: none">• Ongoing, currently using a digital gauge.• MEDS recovered 276 station months of historical tabulated hourly heights from 1939 to 1962 (23 years), as part of a Data Archaeology Program.• The period of record spans from Jan 1909 to Dec 1999.• 79.0 % of the hourly height data is now in MEDS data bases. <p>The complete data set, up to Dec 1999, has been transmitted to PSMSL.</p>
223	St. John's	<ul style="list-style-type: none">• Ongoing, currently using a digital gauge.• All the historical tabulated hourly heights have been recovered for this station.• The period of record spans from Aug 1935 to 31 March 2001.• 68.6 % of the hourly height data is now in MEDS data bases.• The complete data set, up to Dec 2000, has been transmitted to PSMSL.
156	Tofino	<ul style="list-style-type: none">• Ongoing, currently using a digital gauge.• MEDS recovered 258 station months of historical tabulated hourly heights from 1909 to 1956 (21.5 years) as part of a Data Archaeology Program.• The period of record spans from Oct 1909 to Dec 1999.• 89.7 % of the hourly height data is now in MEDS data bases.• The complete data set, up to Dec 1999, has been transmitted to PSMSL.