

Canada

Developing Operational Oceanography in Canada



Brad deYoung
Memorial University
St. John's NL

Operational Oceanography

Many different groups contributing to development and application

- **Universities** – contribute to the development of new observational systems (e.g. OTN, Venus and Neptune) and in new modelling techniques (assimilation techniques) and in prototypes of operational models, e.g. storm surge models (east coast and west coast) (Memorial, Dalhousie, UQAR, UofA, UBC, UVic)
- **Private sector** – including environmental consultants and offshore exploration companies, primarily in the Beaufort Sea and offshore Newfoundland, typically tied to governmental or university developments
- **Federal government** – with a focus on the public benefit, led by Fisheries and Oceans Canada, Environment Canada and Department of National Defense

- Has been focused on Placentia Bay an active area of fishing and shipping (oil)
- Presently offering real-time buoy and wind data to shipping and fishermen
- Partners with AMEC, Shipping Companies, Marine Institute (Memorial)
- Uses the GEM model through a private company (AMEC)
- Will offer circulation modelling and simple oil spill modelling

MEOPAR

A relocatable coupled atmosphere-ocean prediction system

Ocean Model Code: Shelf version of NEMO using system already implemented by CONCEPTS for Gulf of St. Lawrence

Initial and Boundary Conditions: From large-scale, operational models already in place. Initial conditions based on downscaling, enhanced by assimilation of local observations.

Assimilation: Multivariate, ensemble-based optimal interpolation.

Downscaling: Forecasts from large-scale, coarser resolution models will be an important source of information.

Atmospheric Model: High resolution version of GEM.

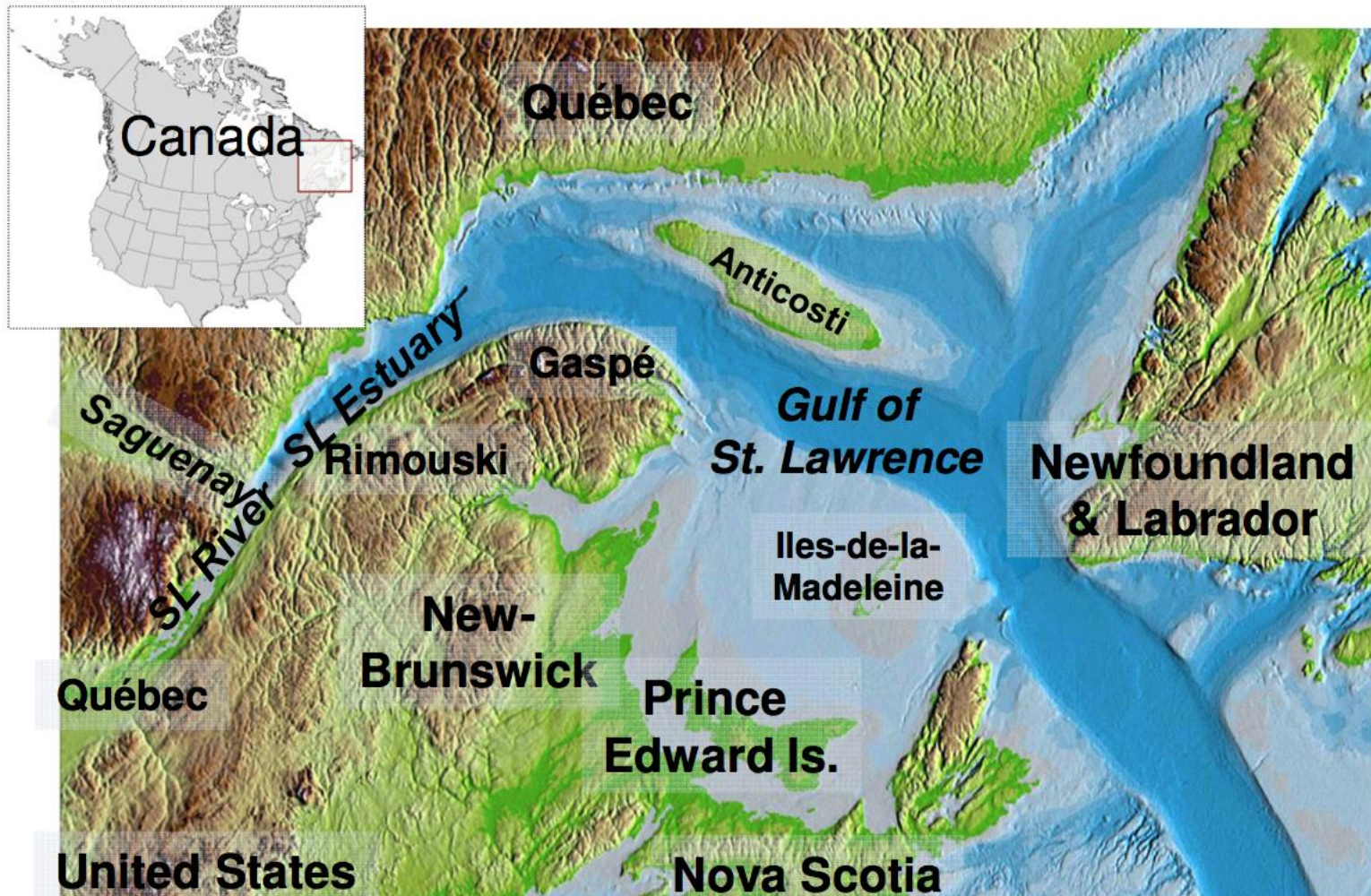
MEOPAR

A relocatable coupled atmosphere-ocean prediction system

Strait of Georgia (years 1 to 3): In situ ocean observations from VENUS (e.g., surface current fields from CODAR, temperature and salinity from moorings, gliders, and instrumented ferries). Ocean model will be forced with high resolution winds from high res forecast model developed for the 2010 Olympics.

Scotian Shelf (years 4 to 5): In situ ocean data collected by Meopar and OTN, supplemented by hydrographic measurements made by autonomous surface vehicle operated by Observation Core. Small scale tracer release experiment, carried out in parallel with OTN measurements, will be performed on the inner Scotian Shelf.

St. Lawrence Global Observatory



St. Lawrence Global Observatory

Existing capabilities

Observatory

Monitoring
Acquisition
Observations

Processing
Validation
Interpretation

Data bases
Information
Models

Access
Dissemination

- **Network of sensors:** tides, water levels, weather...



- **Monitoring & sampling programs** – ocean & freshwater

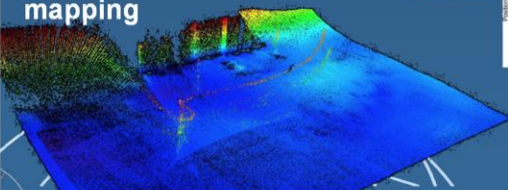


- **Research platforms**



- **Remote sensing**

- **Seabed mapping**

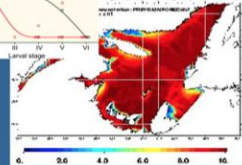
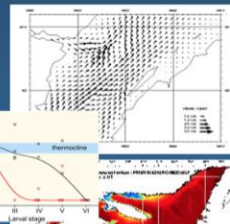


- **Network of experts**
- **Data management policies & processes**

- **Advisory Committees**



- **Archives, time series**
- **Climate models**
- **Forecasts:** sea ice, currents, storm surges...
- **Operational services**



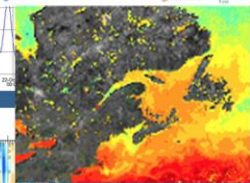
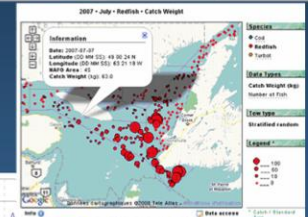
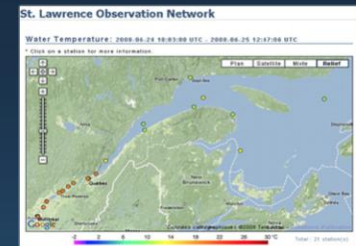
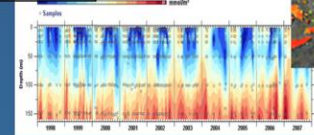
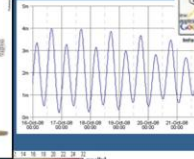
- **Web development expertise**

- **On-line data, information, products**

- **Web services**

- **On-line applications**

- **Large client base**



Concepts – Federal Government

- Collaboration between several government departments – Fisheries and Oceans, Environment Canada and Department of National Defense
- Couples NEMO, GEM and CICE with evolving capabilities
- Formal MOU with Mercator
- Will develop a real-time operational capacity for national waters with focus on the Arctic and Atlantic to begin
- Core forecasting capacity at short (days) for tactical response such as pollution dispersal, and search and rescue
- Output available to government departments, the public and private sector users

Concepts – Federal Government

- Weather prediction (days to seasons)
- Sea ice prediction
- Coast Guard Operations, e.g. seal hunt, navigation
- Fisheries and aquaculture management
- Attribution and mitigation of regional climate change impacts
- Risk assessment for extreme events (sea level, waves, currents)
- Emergencies: Search and Rescue, pollutant dispersal

Concepts – Federal Government

CONCEPTS Global System: A sister configuration of MERCATOR PSY3 Global System. Operational in June 2013.

CONCEPTS Regional: 1/12th degree Arctic/North Atlantic Configuration at 3-7km resolution. Expected operations June 2014

CONCEPTS Shelf: 1/36th degree: High resolution system for oil industry areas of interest on the Newfoundland and Labrador Shelves. Expected operations June 2015.

Summary and Overlapping Interests

- Growing supply of real-time data feeding operational ocean models
- Diversity of skills, interests and strengths balanced against limitations in resources, functional constraints and priorities
- Shared common interests, tools and requirements
- We should form partnerships around shared technological interests, e.g. NEMO modelling and observatory developments
- Creating added value to the data is one of the central challenges and an opportunity to expand the interest and demand for operational ocean systems
- Programs like Meopar and Concepts already include some collaboration but there are resources, interests and potential benefits suggesting that more can be done