

Status of CONCEPTS

Canadian Operational Network of Coupled Environmental Prediction Systems



Government
of Canada

Gouvernement
du Canada

Canada

What is CONCEPTS?

Interdepartmental initiative to establish operational global coupled atmosphere-ocean-ice assimilation and modelling system in Canada

Will take advantage of new ocean models and global ocean data streams (Argo, altimetry)

Benefits include

- new ocean products**
- Better weather and climate predictions**

Partnerships

For cost effectiveness, EC, DFO and DND are collaborating on this major initiative through CONCEPTS (Canadian Operational Network of Coupled Environmental Prediction Systems)

CONCEPTS is partnering with Mercator-Ocean on ocean modelling and assimilation

Three-Track Approach

Operations: Built on existing EC infrastructure by coupling GEM with NEMO

Research and Development: Long-term government research and complementary academic research networks (GOAPP)

Products: Identify, develop and disseminate relevant products and outputs

CONCEPTS' Core Projects

- **CMC systems installation, coupling and support**
- **Basin-to-global ocean analyses for prediction and validation studies**
- **Demonstration of regional ocean prediction capability and applications**
- **Sea ice modelling and data assimilation**

Examples of CONCEPTS Activities

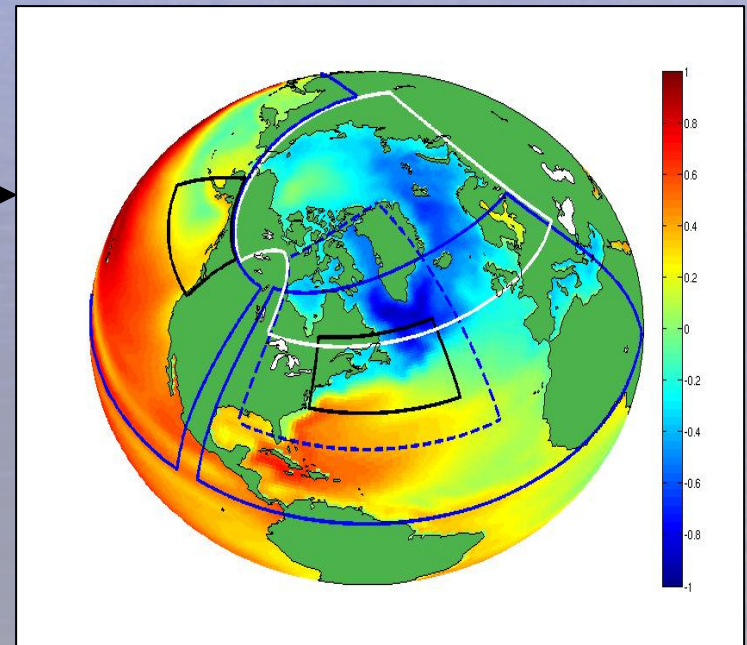
Gulf of St Lawrence Forecast System

Pre-operational coupled forecast system in the Gulf of St. Lawrence
(successful pilot project (~10 yrs) using the ice-ocean model from Saucier *et al.* 2004)

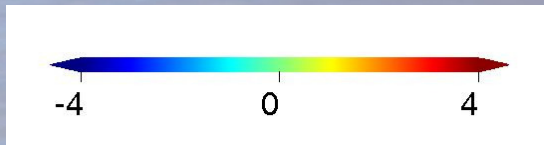
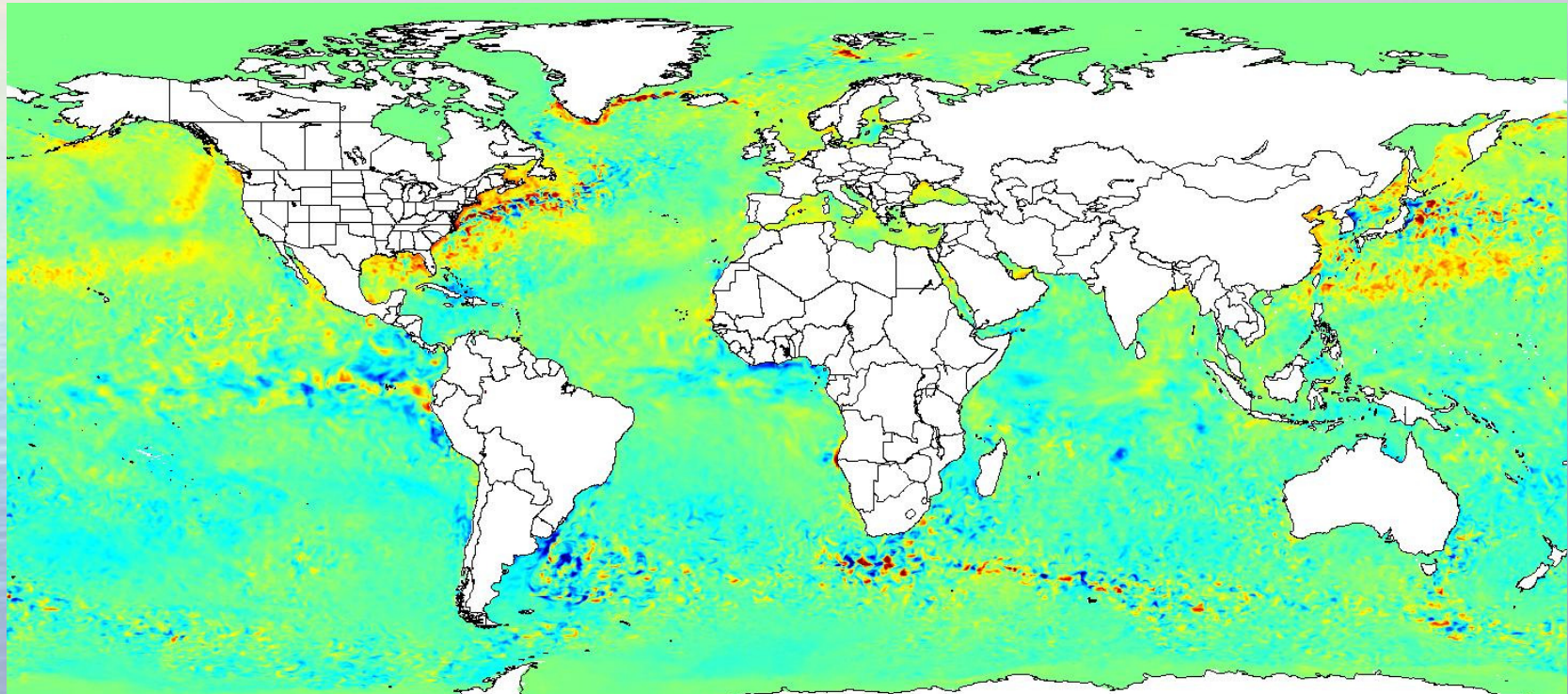
Goal: unified framework for global and regional coupled systems (GEM/NEMO)

Technology transfers

Ongoing development of Canadian applications gathering ocean modelers around one core system (NEMO)

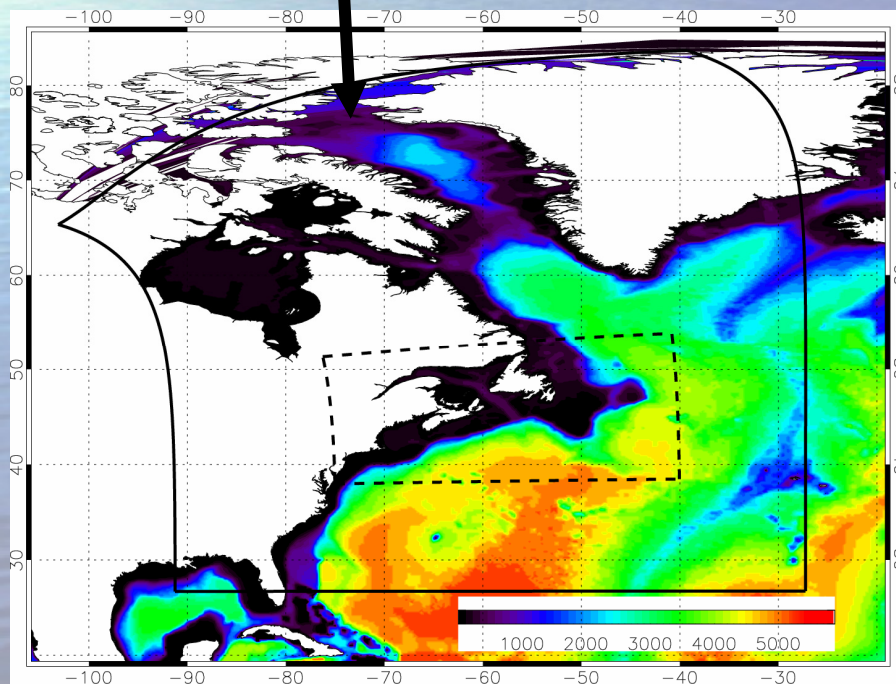
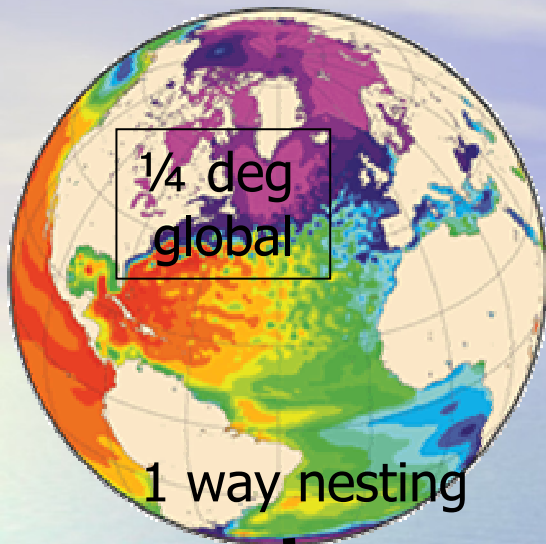


CMC Has Implemented the 1/4° Global NEMO Model and One-Way Coupled to GEM



- SST trend over 10d forecast period
- Validation underway

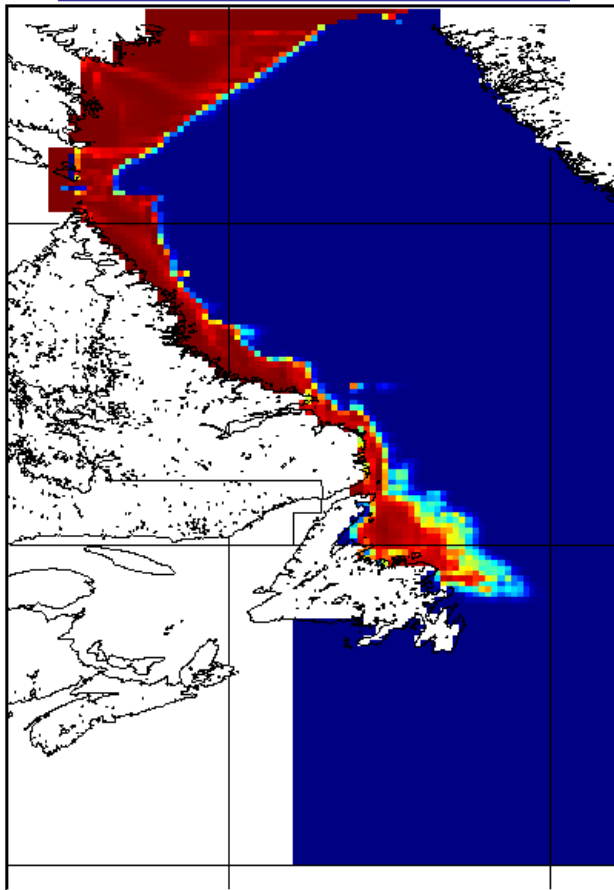
Canada Newfoundland Operational Ocean Forecasting System



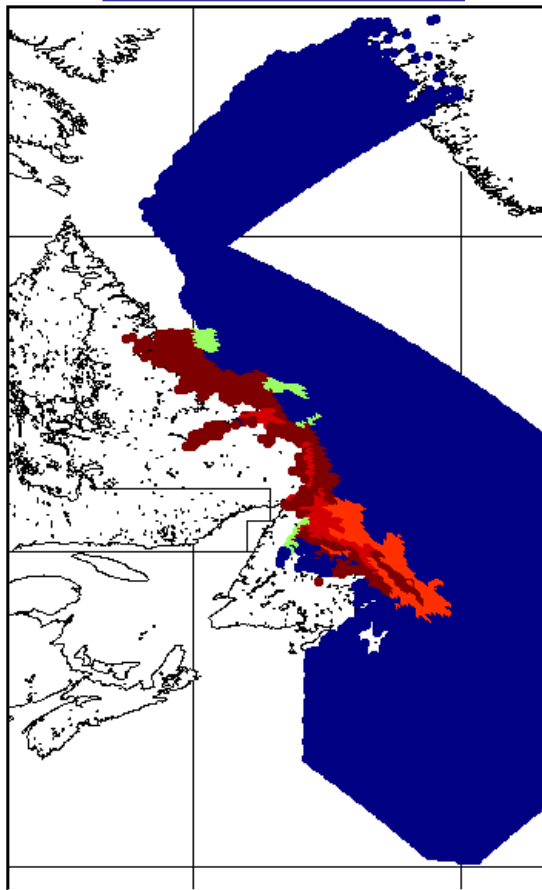
- Based on NEMO
- Pre-operational system
- 1h (16 cores) for 1d forecast
- $1/4^\circ$ resolution
- Ice to be added March 2009

Sea Ice Data Assimilation

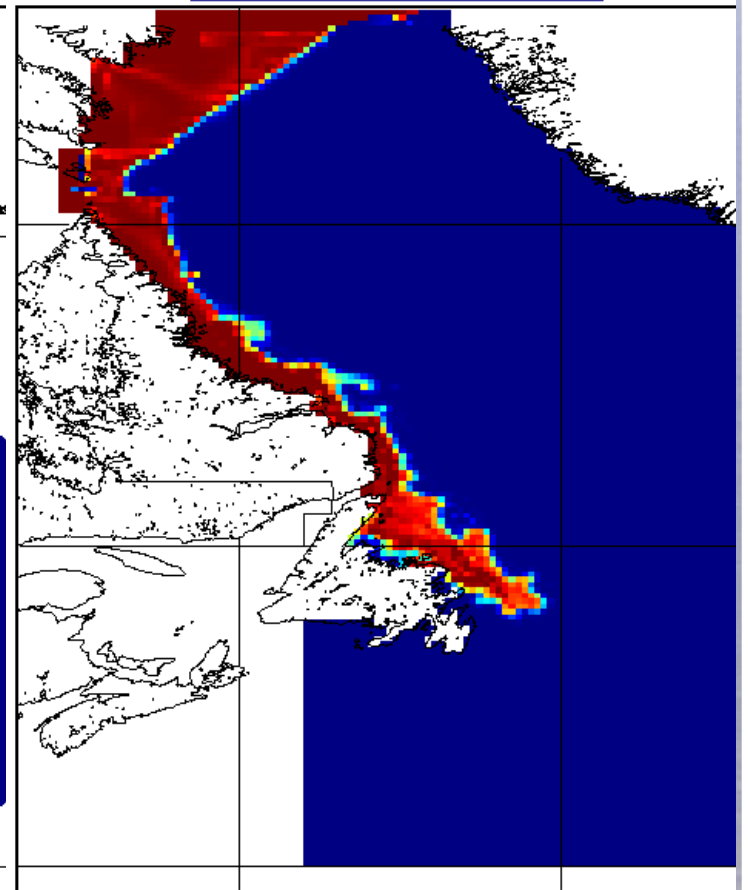
Background Estimate
(24h fct)



Observations
(CIS Ice Chart)



Analysis
(initialize next fct)



Next steps: Include more regions (e.g., Arctic Archipelago); better use of satellite data.

CFCAS supplementary funding:

**Transitioning GOAPP
Research to Operations:
Real-Time Data Assimilation and
Forecast Systems**

**Hal Ritchie, Keith Thompson
Pierre Gauthier, Dan Wright**

Objective:

Optimize, evaluate and transfer of new ocean and atmospheric data assimilation schemes and models for operational use.

Projects:

- 1) Real-Time System for Forecasting Mesoscale Variability of the North Atlantic
- 2) Real-Time Global Coupled Atmosphere-Ocean System – a transition to operations

Evaluation and Implementation:

The new pre-operational systems to be evaluated for possible implementation through collaboration with CONCEPTS

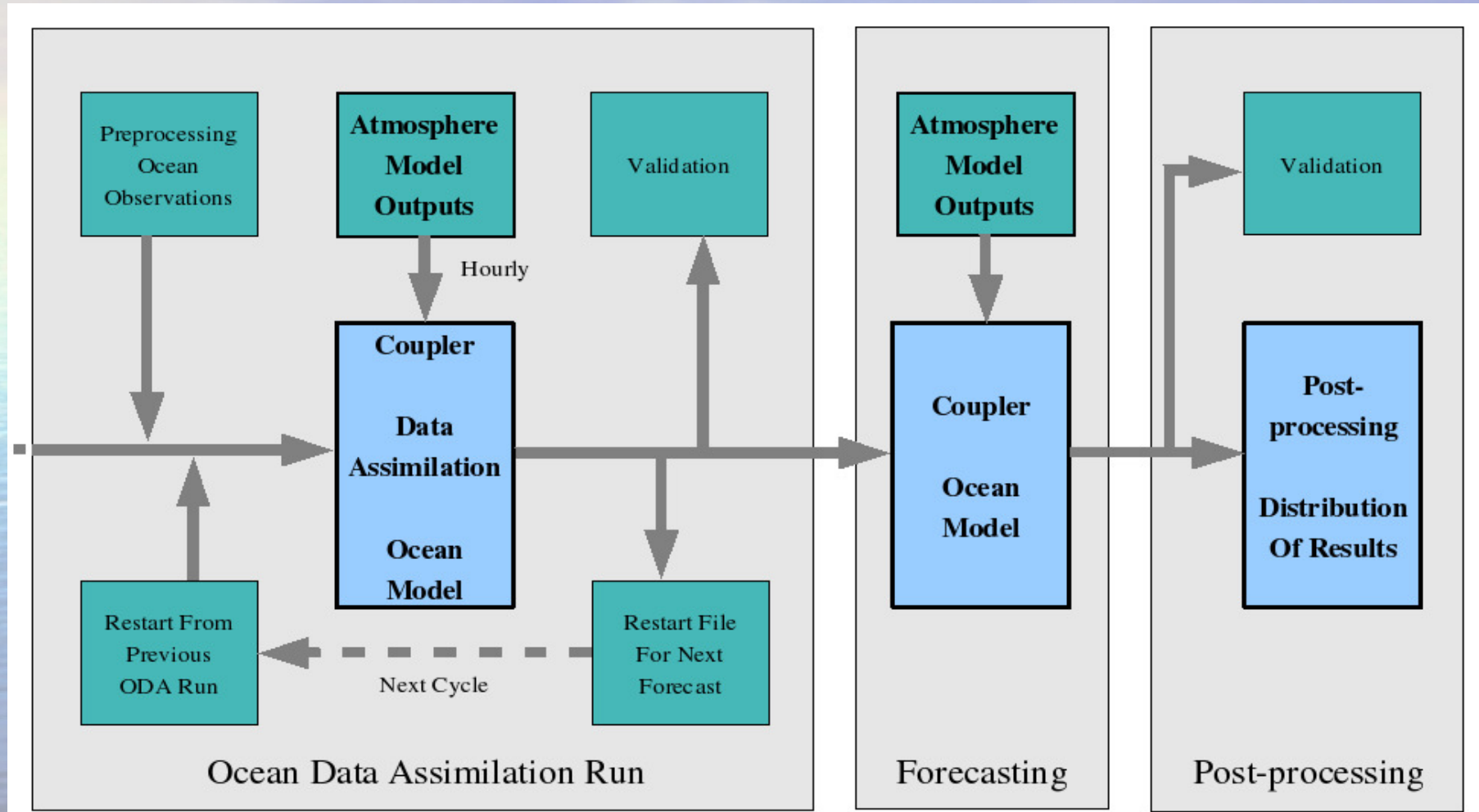
Real-Time System for Forecasting Mesoscale Variability of the North Atlantic

- **Develop forecast system for North Atlantic ($1/6^\circ$, 20d)**
- **Assess forecast skill in operational setting.
Comparison with CONCEPTS baseline system.**
- **Selected products through the GOAPP web page.**
- **Extend to global domain.**
- **Transfer system to CONCEPTS end of 2010.**

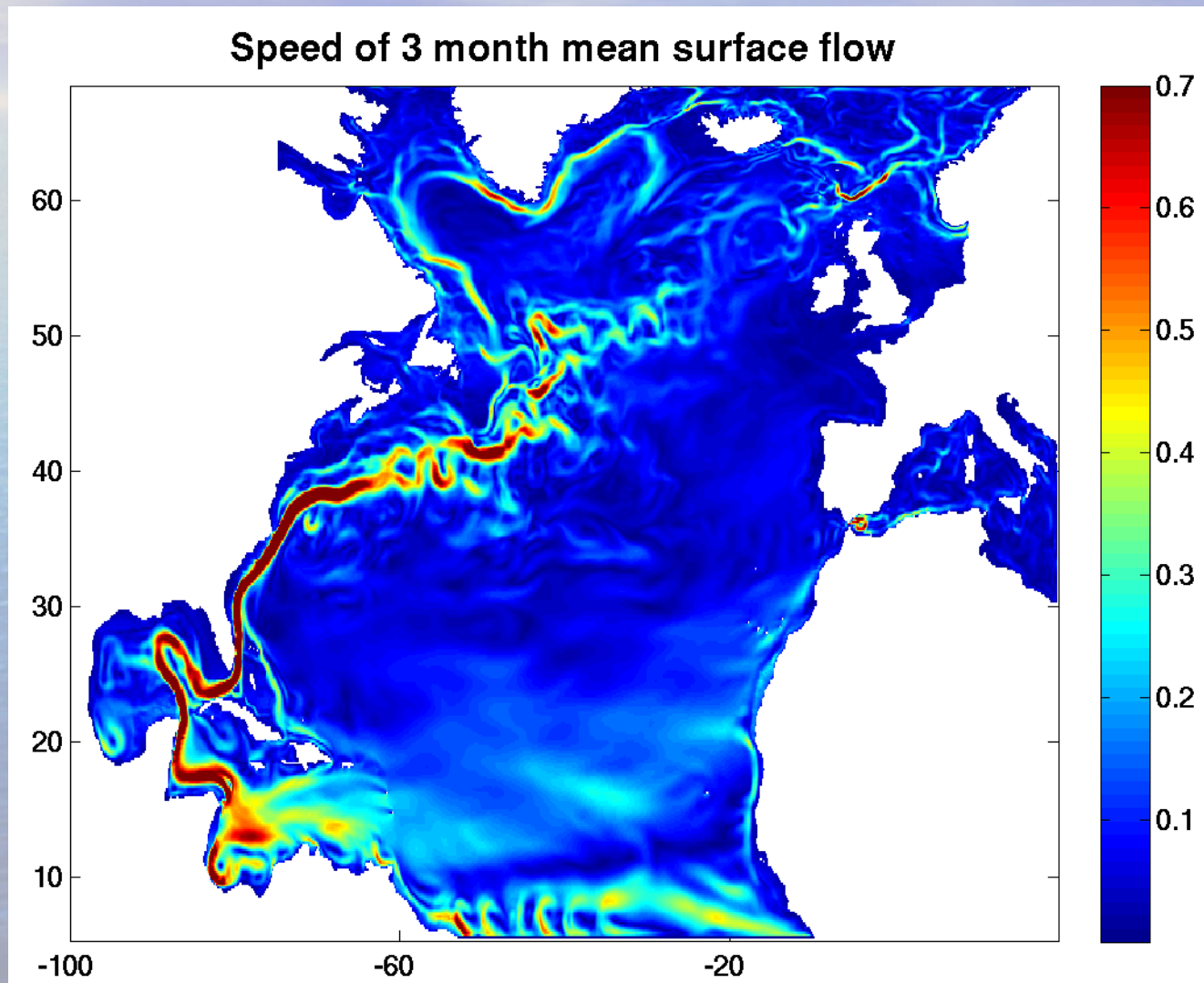
Real-Time Global Coupled Atmosphere-Ocean System: Transition to Operations

- **Couple and test CONCEPTS R&D global ocean model with meso-global GEM atmospheric model.**
- **Transfer GOAPP North Atlantic data assimilation system to the CONCEPTS R&D global ocean model**
- **Run the global coupled data assimilation and forecast system in real-time; compare against the benchmark CONCEPTS system. Complete by the end of 2010.**

Progress: Forecasting Ocean Weather



Initial Results From 1/6° NEMO



Concluding Comments

- CONCEPTS is progressing for both global and Canadian regional applications.
- Collaborations in progress with Mercator scientists.
- Proposing complementary, mutually beneficial exchanges with Mercator scientists for the enhancement of the Mercator data assimilation and prediction system.
- Development of new pre-operational ocean forecast system (supplementary funding) is underway.