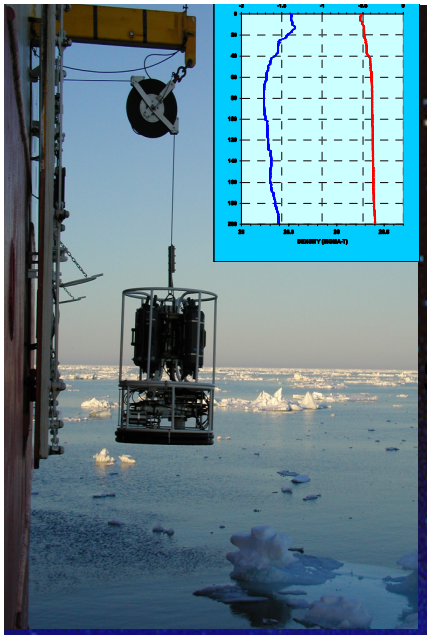
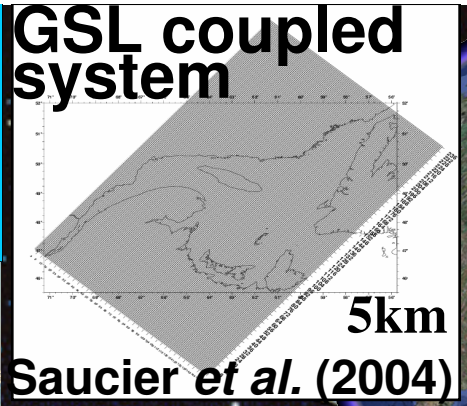
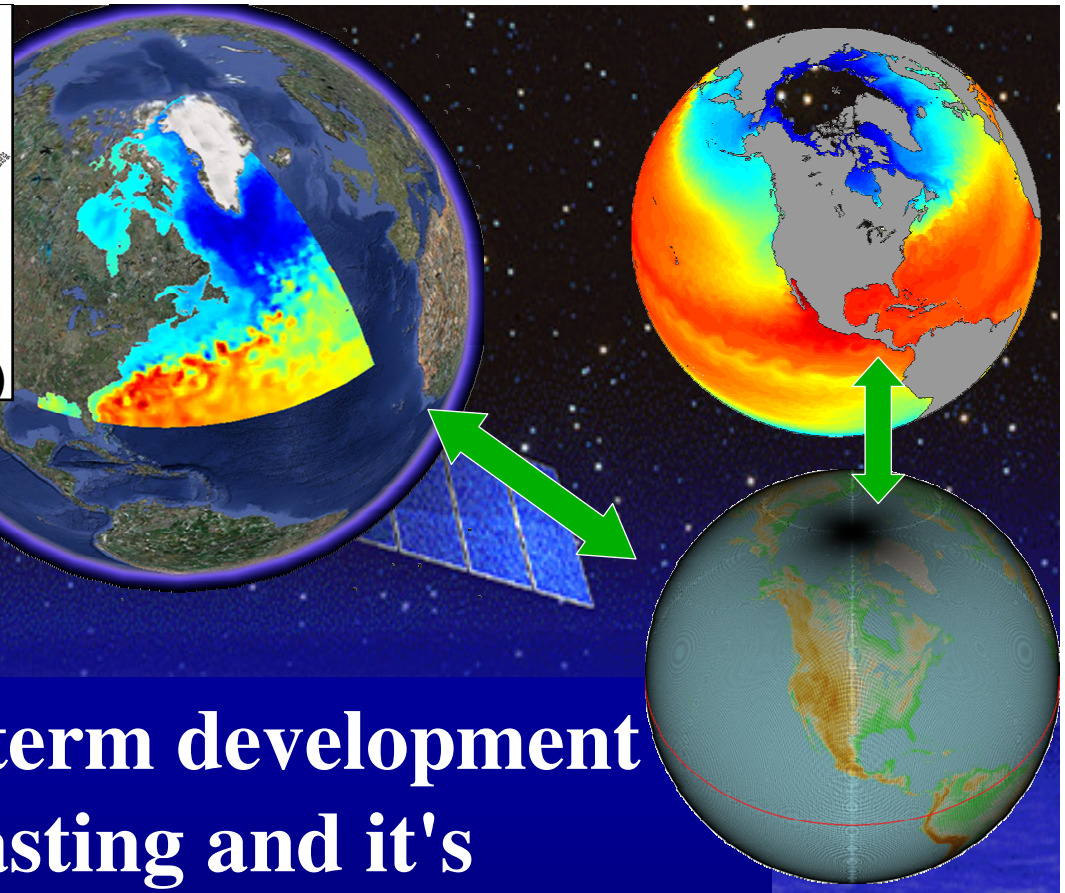
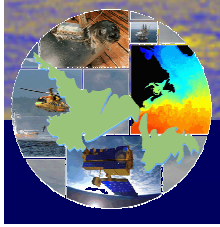






Present and longer term development of ocean forecasting and it's applications in DFO. Where GOAPP research fit's in.

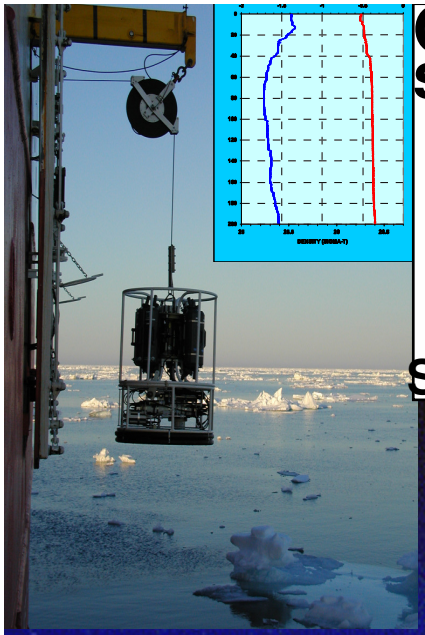
F. J Davidson[1] and many Collaborators:

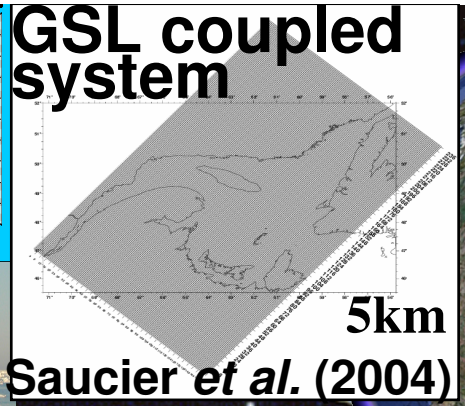


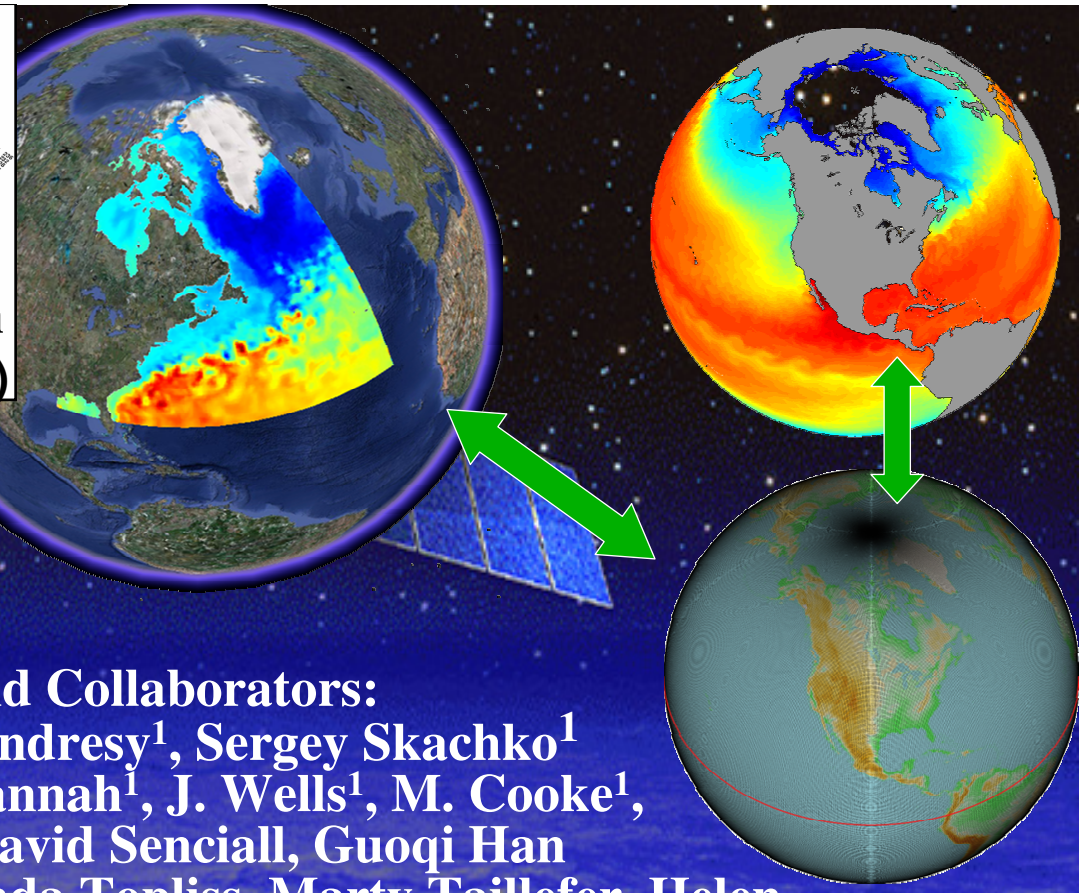
CSA ASC

SEARCH AND RESCUE RECHERCHE ET SAUVETAGE

MERCATOR OCEANOGRAPHIE OPERATIONNELLE

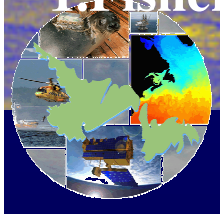






F. J Davidson[1] and Collaborators:
G C Smith[2], A W Ratsimandresey[1], Sergey Skachko[1]
D Power[1], C Bishop[1], C G Hannah[1], J. Wells[1], M. Cooke[1],
Z. Wang, E Colbourne, David Senciall, Guoqi Han
David Brickman, Joel Chasse, Brenda Topliss, Marty Taillefer, Helen Joseph, Dan Wright, Youyu Lu, Charles Hannah, John Loder,
Z. Wang1, F. Dupont2 ,Francois Roy2, Pierre Pellerin2
3. F Hernandez, Marie Drevillion, Eric Dombrowsky, Benoit Tranchant, Charles Emannuel Testut, Lucas Nouel, Gaetan Vinay,

1.Fisheries and Oceans Canada 2. Environment Canada3. Mercator-Ocean

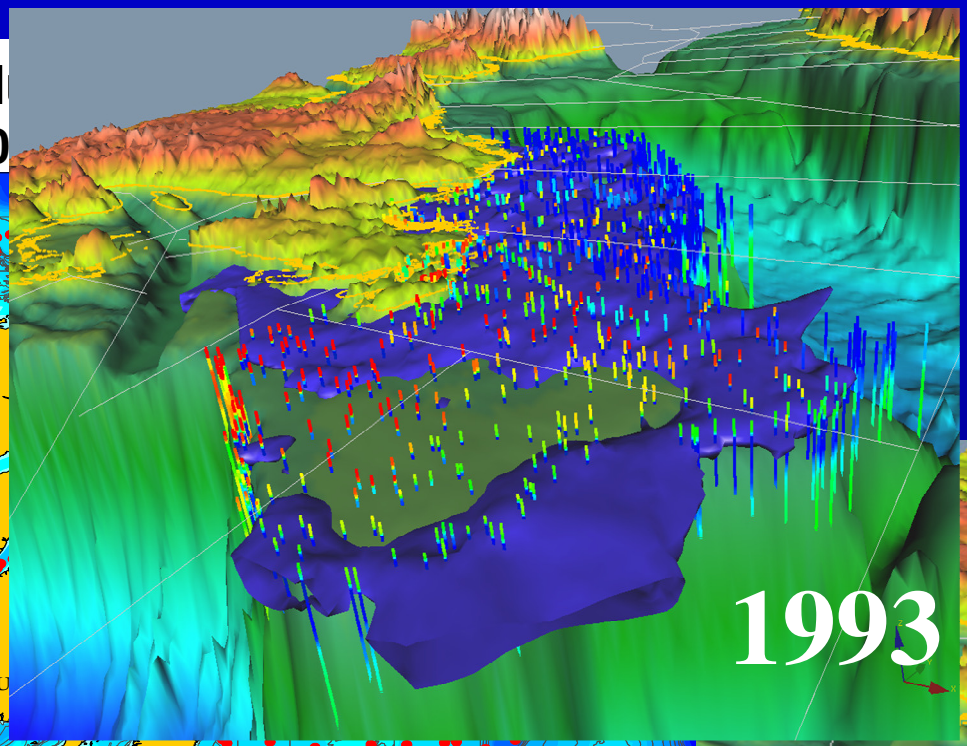


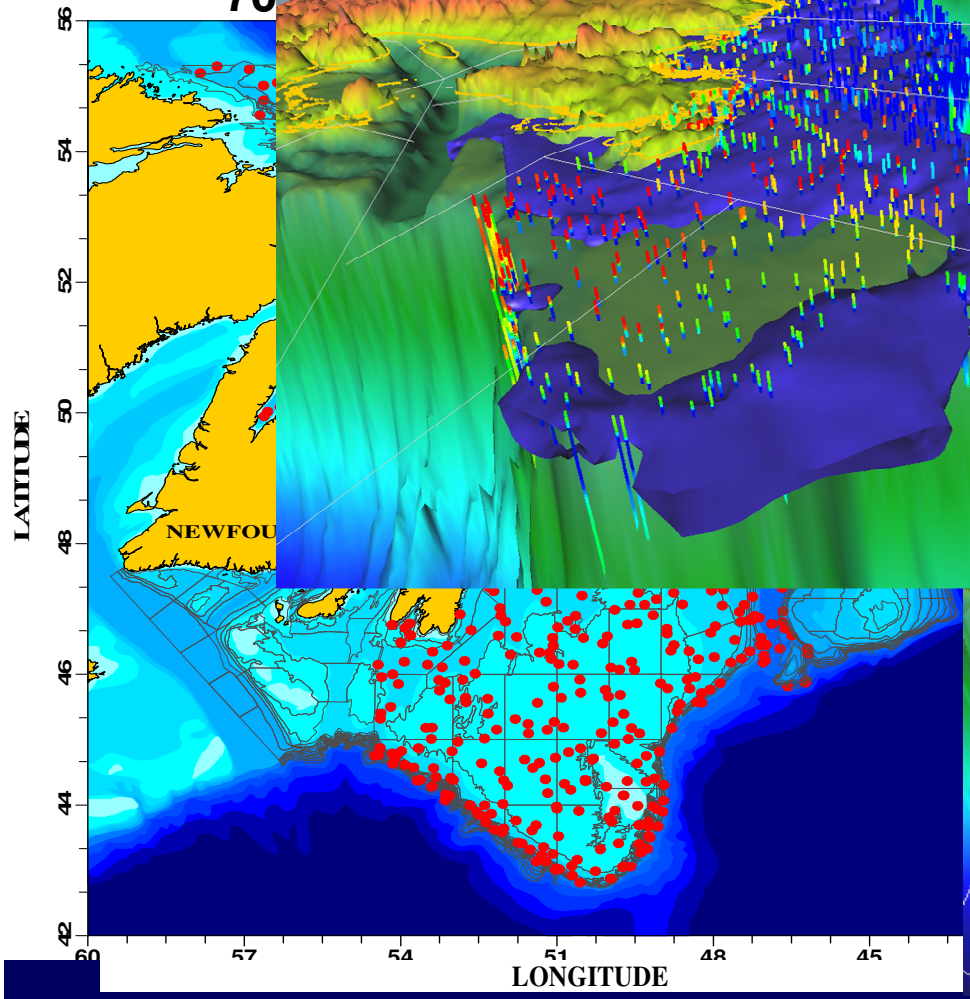
CSA ASC

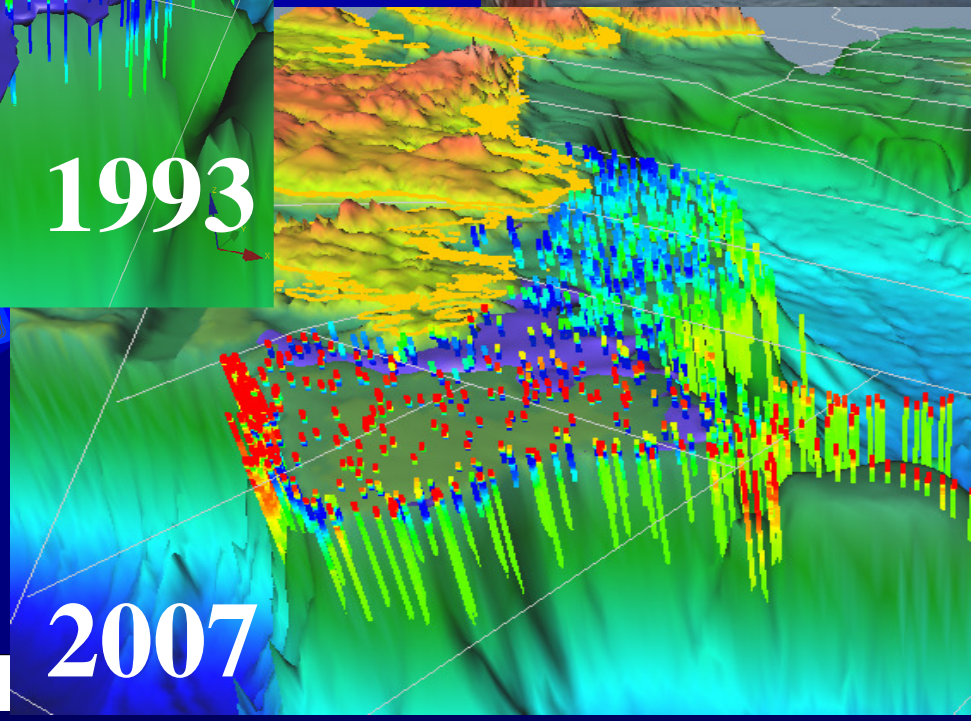
SEARCH AND RESCUE / RECHERCHE ET SAUVETAGE

MERCATOR OCEANOGRAPHIE OPERATIONNELLE

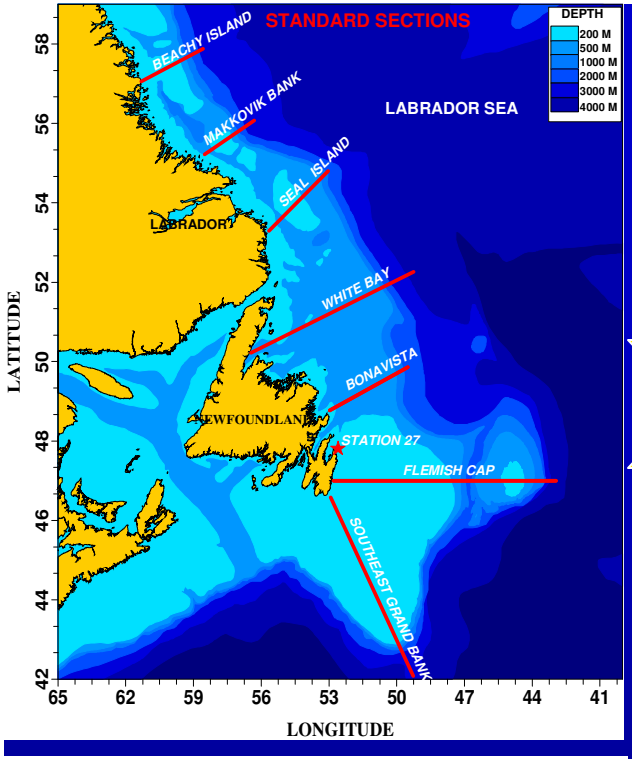
DFO In-situ OBSERVATION PROGRAMS

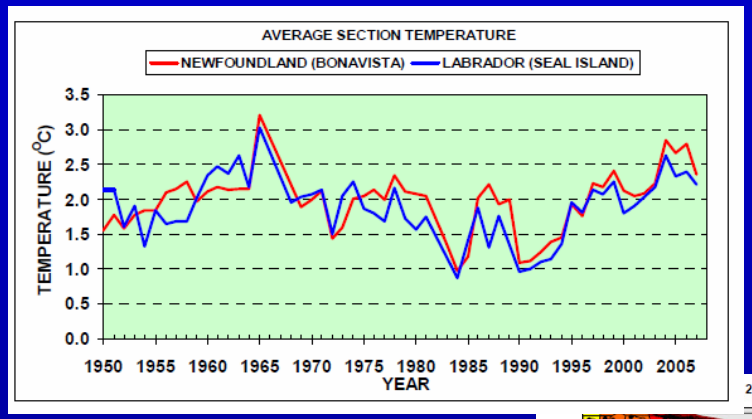




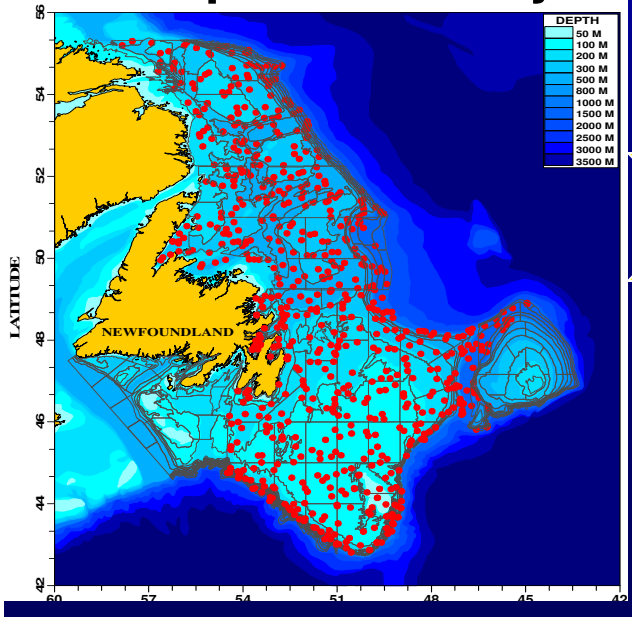


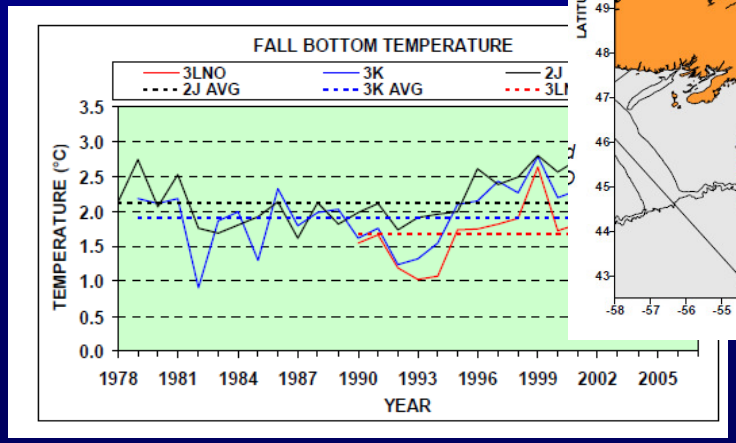
DFO In-situ OBSERVATION PROGRAMS

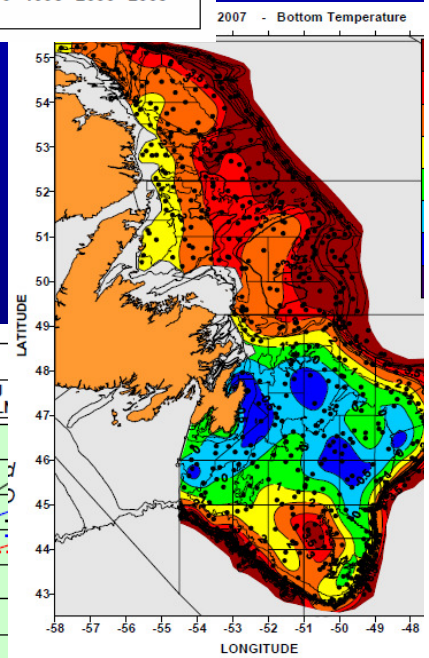




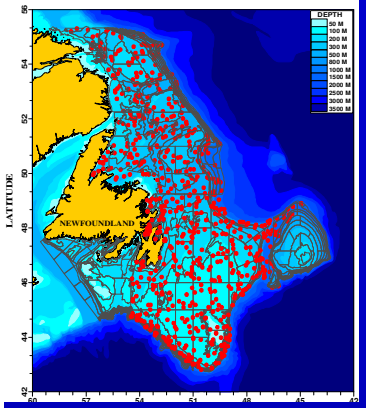
Multi Species survey

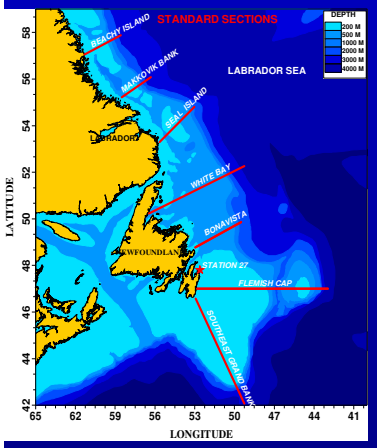


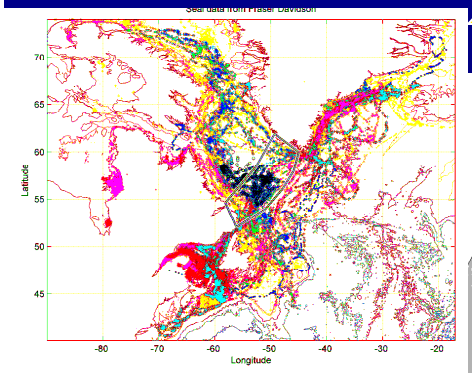


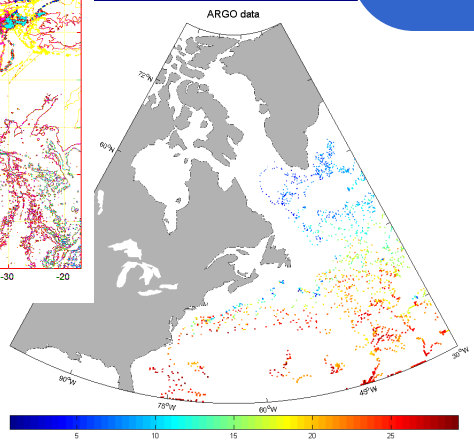


Enhancing DFO In-situ OBSERVATION PROGRAMS



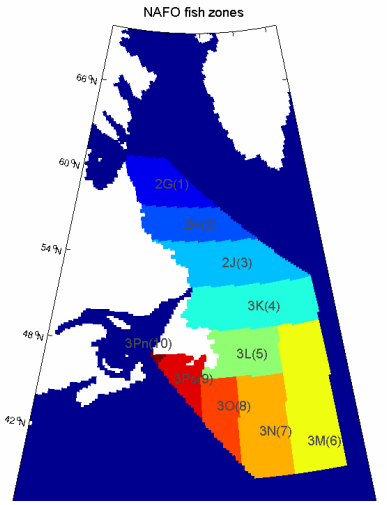


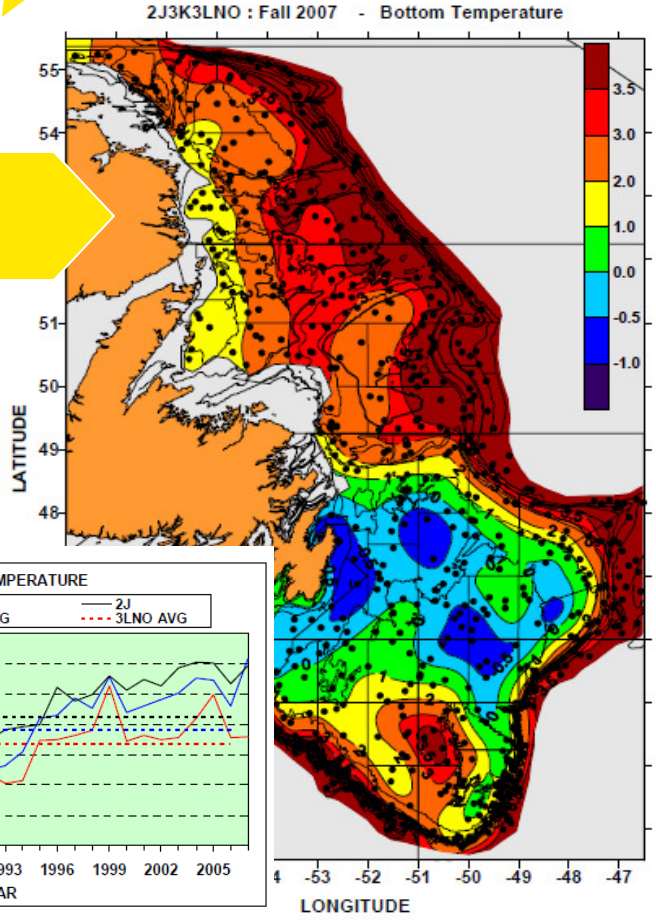


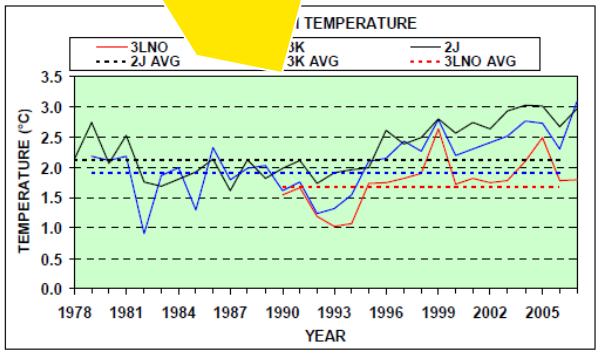


Assimilation
Ocean Modelling

Ocean:
- Historical Reconstruction
- Forecasting





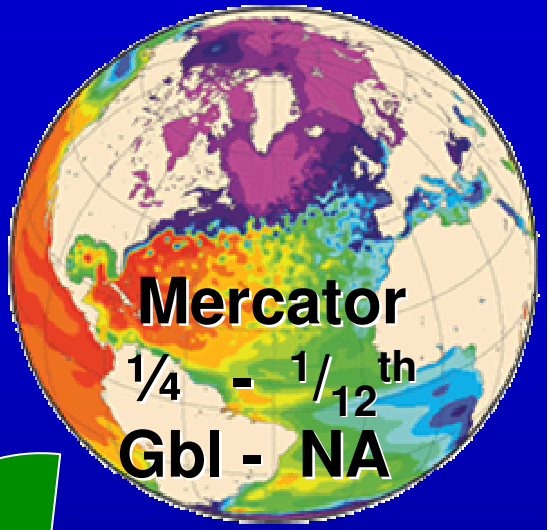


C-NOOFS Regional System

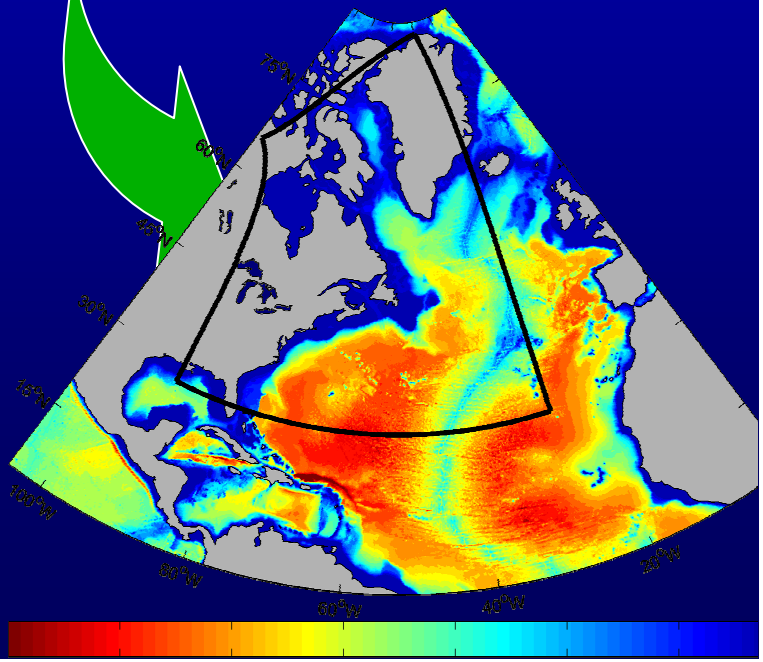
Part of a Unified Canadian approach

- Defense
- Environment Canada
- Fisheries and Oceans Canada

In which MERCATOR-OCEAN is a strategic partner.



Analysis

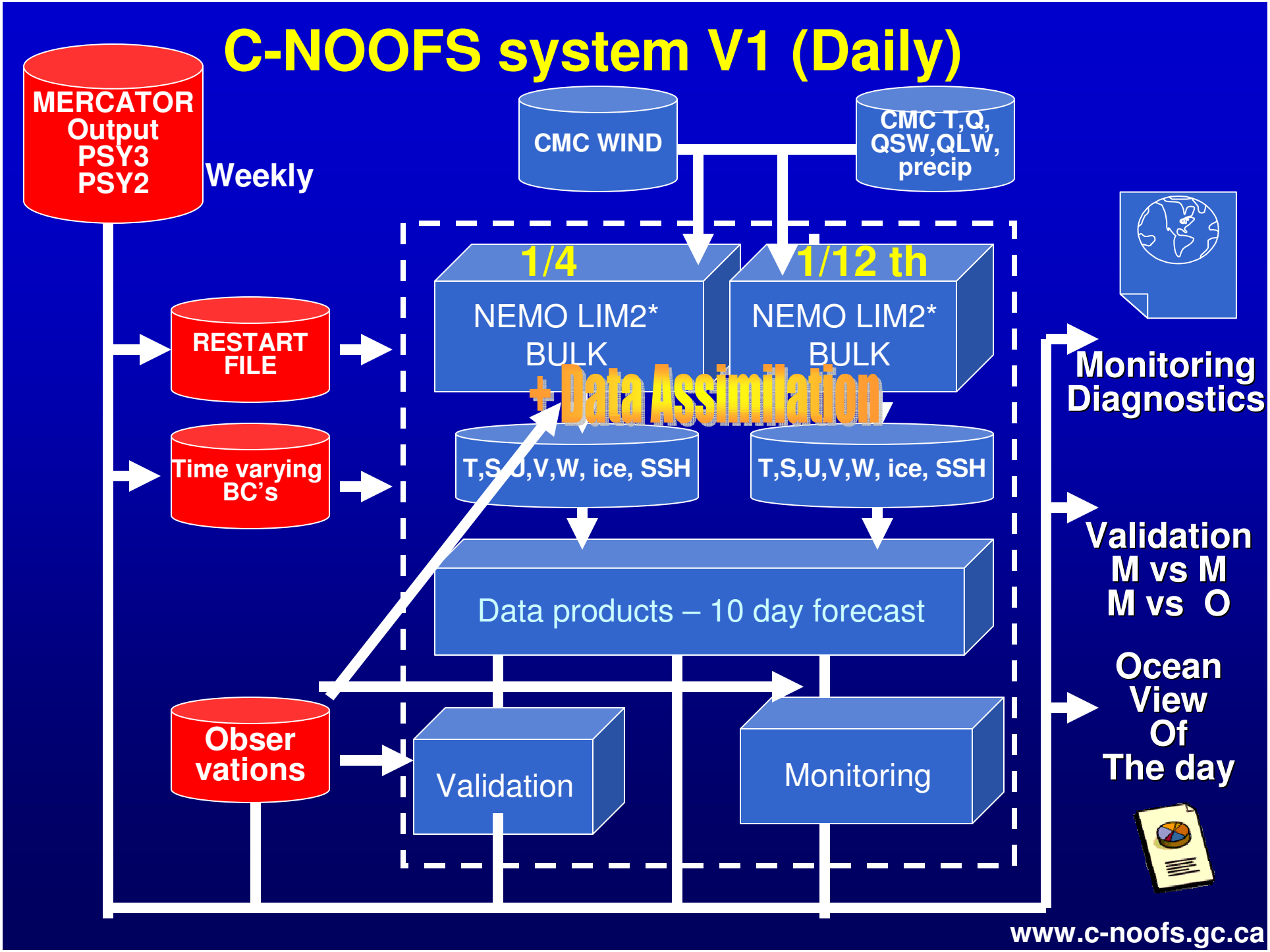


Objective

Pre-operational ocean ice forecast system for Atlantic Canada

Pre-requisite for coupled atmosphere ocean ice forecast system @ Environment Canada

C-NOOFS system V1 (Daily)



Validation Package

Quantitative methodology to assess ocean model performance

Inter-comparison with

observations and other models

For hindcasting and forecasting

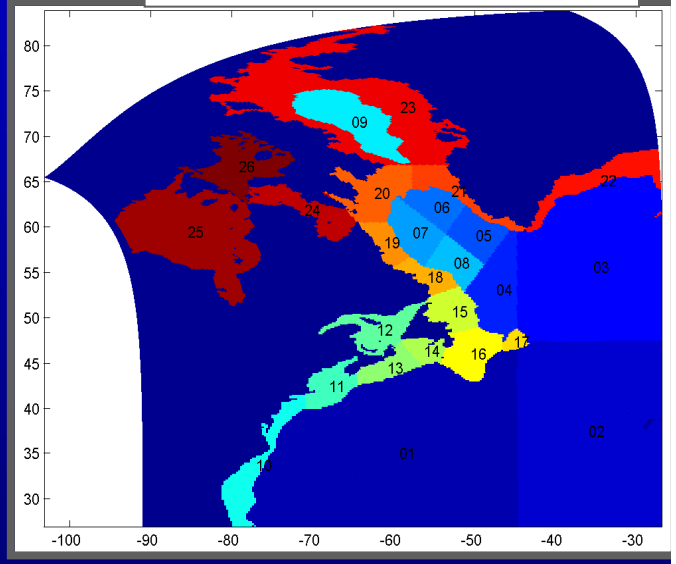
Present package:

- Ice Extent (fraction)
- Sea Surface Height
- Sea Surface Temperature

Future package:

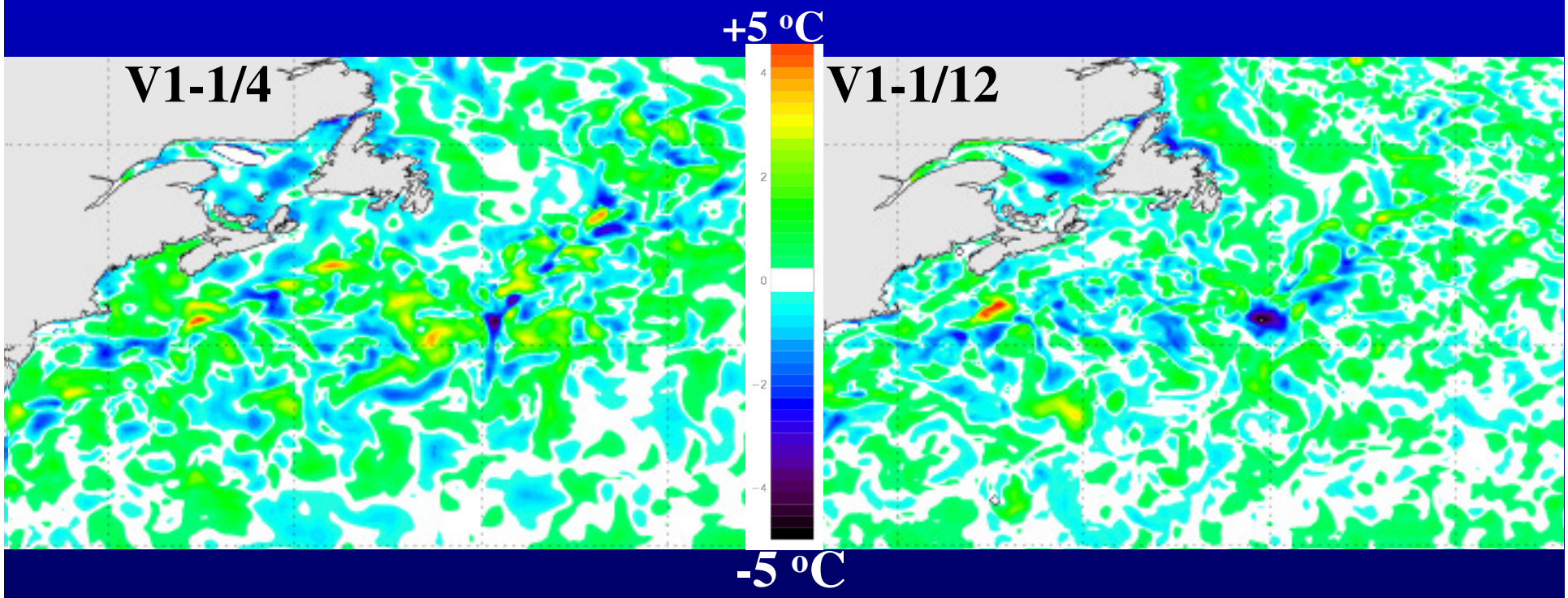
- Mooring inter-comparison module
- In-situ profile comparison (ARGO, CTD)
- Drifter comparison module
- End user validation modules

Analysis also by Region



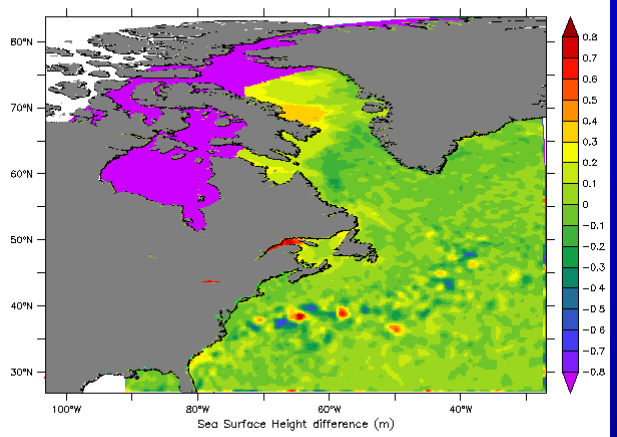
Satellite SST Validation
Model – Observed Differences
Sea surface temperature

DaY10 of Forecast: October 7th 2009



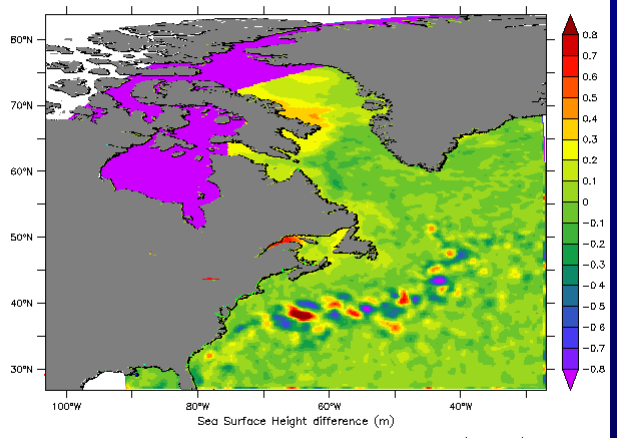
Sea Surface Height Validation with AVISO Altimetry

1 day error



NWA025.v1 compared to AVISO Forecast 20090513 (day 1)

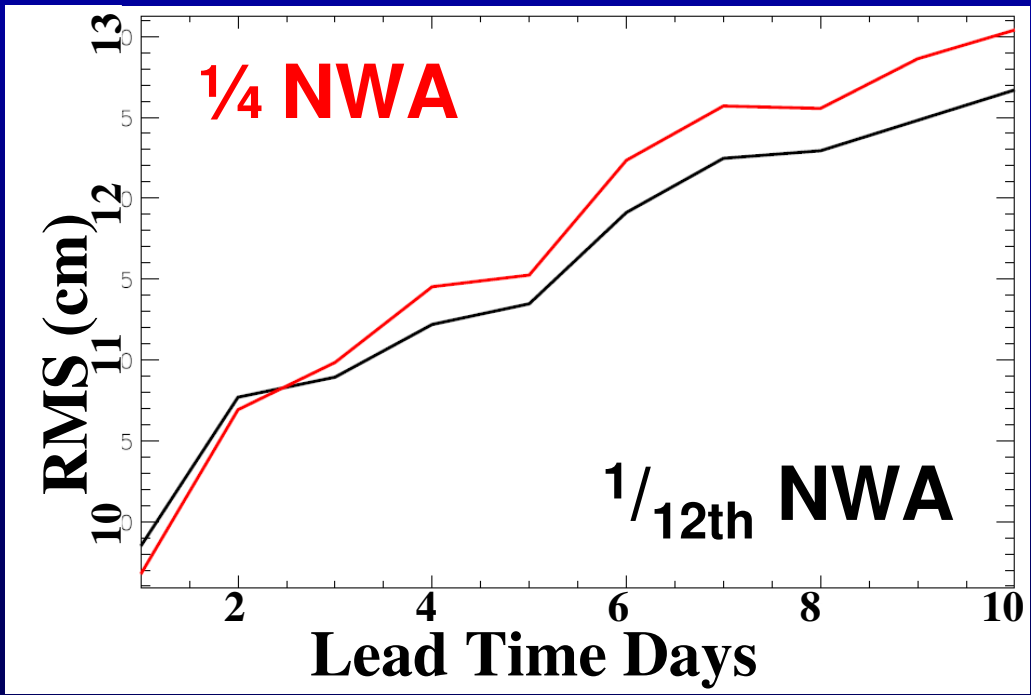
10 day error



NWA025.v1 compared to AVISO Forecast 20090522 (day 10)

- C-NOOFS NWA025 – AVISO after
  - 1 day and
  - 10 days of forecast

MODEL Sea Surface Height Error Growth



Planned End Use Validations

- Drifters:
  - Field Experiment September 2010:
    - 20 Drifters deployed at 1m and 15m
  - Create database of drifter data from Canadian Coast Guard database
  - Important to demonstrate usefulness/limitations of models for Search and Rescue

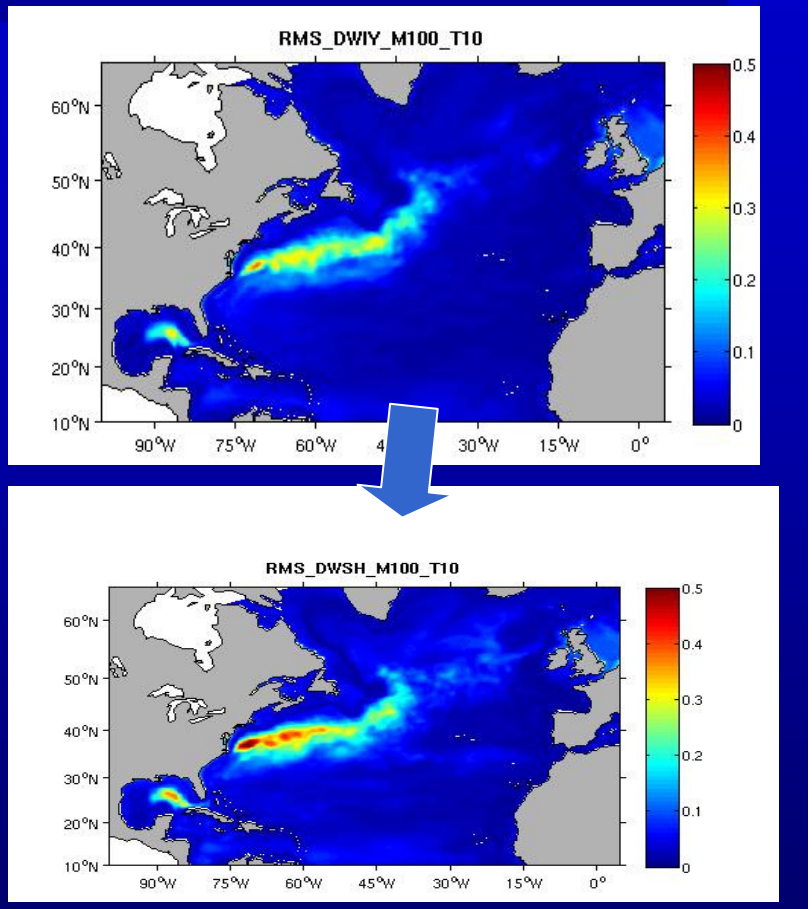
- Iceberg drift:
  - Create daily iceberg drift prediction for 10 days along observed iceberg trajectory
  - Develop statistics of drift prediction skill:
    - Separation distance at 1, 2 … 10 days of forecast.
    - Statistics over long periods of drift for a particular tracked iceberg:
      - Provides confidence in how well the model produces drift
      - Permits end users to make decisions on model accuracy

DFO Uses of GOAPP Enhanced Ocean Information: Historical Reconstructions

- Important for DFO's new ecosystem approach.
- Useful for interpreting historical fish/larvae/zoo plankton population observations
  - i.e. spawning times
- Useful for evaluating and adjusting DFO observations programs:
  - Multi-species surveys
  - AZMP program

Requirements:

- Accessible data sets and info
  - Can be used by biologists to collaborate with oceanographers
- Accessible demonstration of value historical reconstructions



GOAPP: Example Improvement of using new Climatology (Wright)

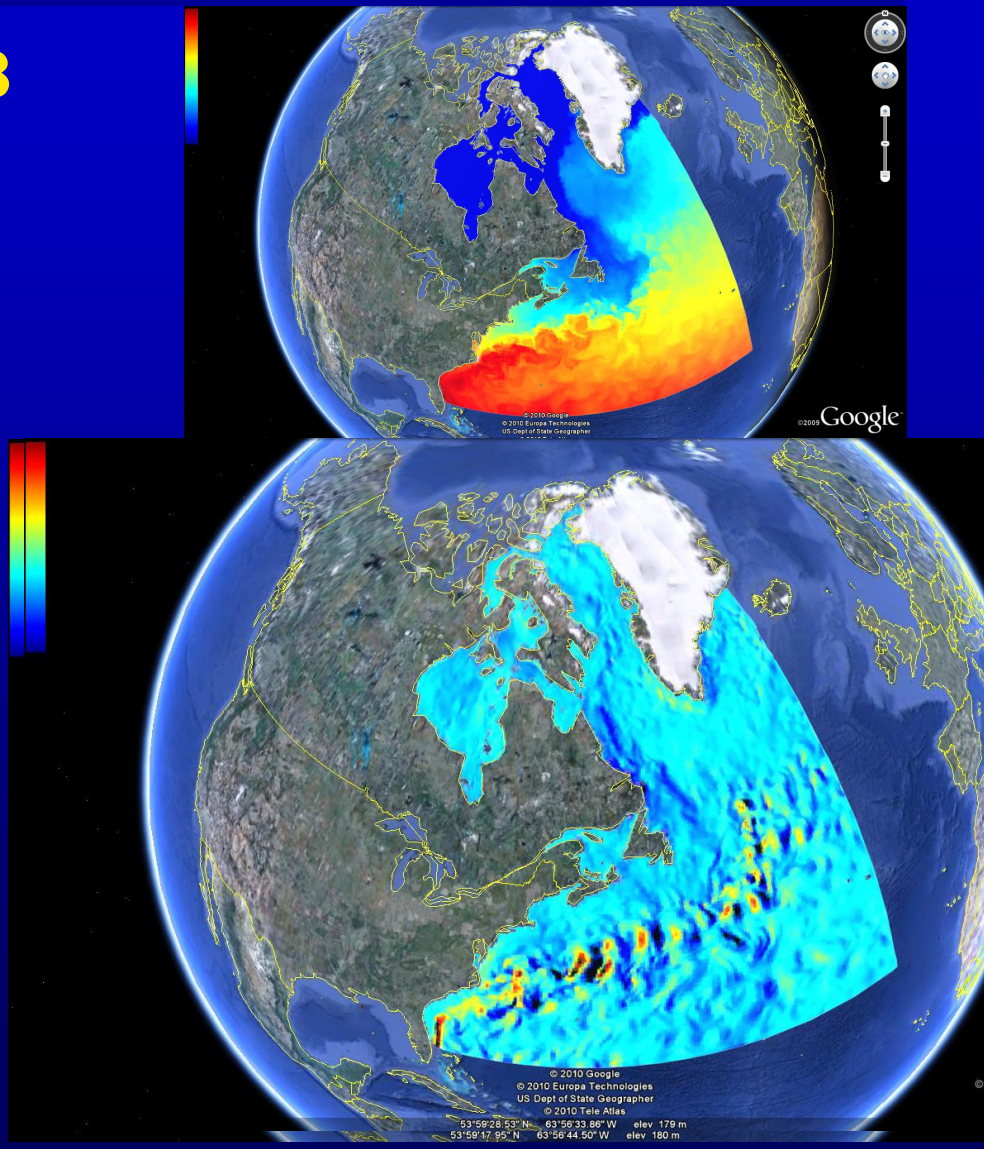
DFO Uses of GOAPP Enhanced Ocean Information: Historical Reconstructions

Common DFO-GOAPP WEB objectives:

- Solidify web presence and accessibility
  - WMS server GODIVA system
  - OCEAN DIVA Server
  - Thredds data server
  - Validation system in

- Development of on line validation system
  - Ice distribution
  - Satellite validation
  - In-situ validation
  - Recreating observed indexes.

- Historical Reconstructions:
  - 2002–2009
- Forecast Runs



Department of Fisheries and Oceans

- Regionalised government department
- Strong will for oceanographers to work nationally together
- Dearth of Data Assimilation Expertise
- CONCEPTS, COMDA and GOAPP collaborations are essential:
  - Provide national cohesison

Concluding Comments
Long Term Vision

- DFO needs to know the state of the ocean; past present and future to better deliver it's mandate.
- EC requires to deliver best possible weather forecast: short term, medium term long term.
- Coupled Atmosphere Ocean, Atmosphere, Ice forecast systems with:
  - assimilation in all 3 components will provide the ultimate environment description tool for all.
- University research fosters much needed expertise and knowledge as demonstrated through GOAPP.
- Challenge:
  - Working together to build a Canadian Capacity in Environmental Prediction
  - Information/plans need to be shared