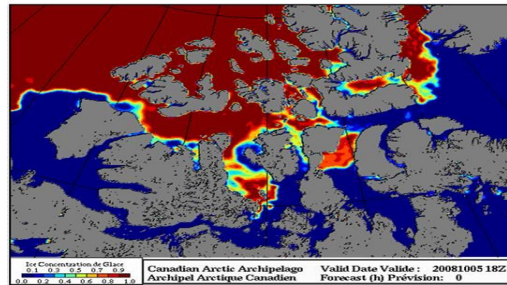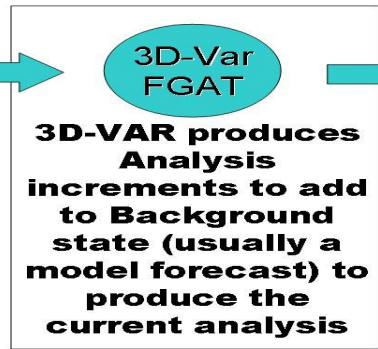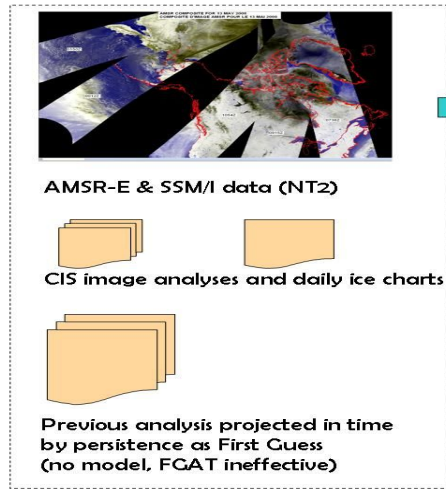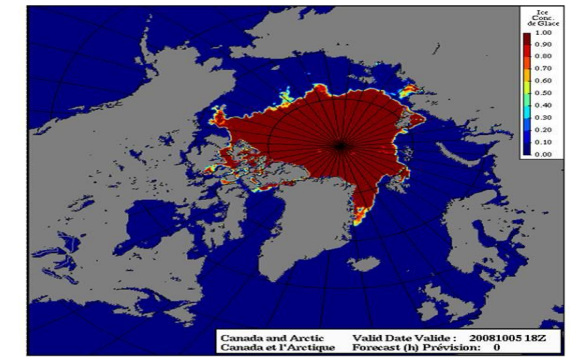# Uses of 3D-Var Data Assimilation for Sea Ice Analysis

Paul Pestieau (CIS), Alain Caya (MRD), Tom Carrieres (CIS), Mark Buehner (MRD)

3D-Var cycles running at CIS in real time — simultaneous assimilation of multiple data sources

AMSR-E & SSM/I data (NT2)

CIS image analyses and daily ice charts

Previous analysis projected in time by persistence as First Guess (no model, FGAT ineffective)

3D-Var FGAT

3D-VAR produces Analysis increments to add to Background state (usually a model forecast) to produce the current analysis

CIS Ice concentration analysis
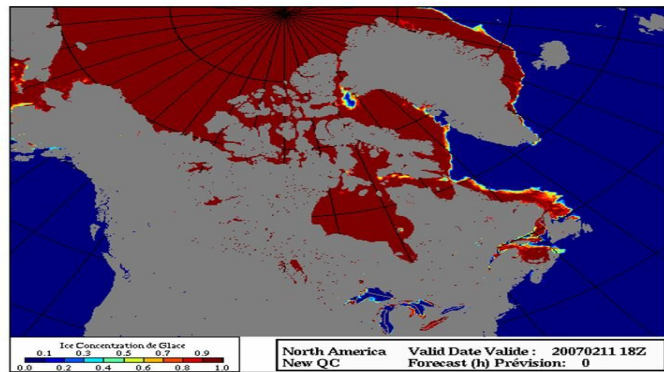CAA, Res : 5 km
Rerun and available for 2007

CIS Ice concentration analysis
Polar, Res : 15 km

These are a continuous cycles using persistence to supply the background state

North America Ice Analysis — run 4 x a day at 5 km resolution

Operational Implementation planned for 2010 at the Canadian Meteorological Centre

CIS Ice concentration analysis
North America, Res : 5 km

Automated Ice Edge for Davis Strait — a Canadian Ice Service product - will be the first operational application with many more to follow

ICE ANALYSIS
ANALYSE DE GLACE
Davis Straight
Détroit de Davis
Date   20070211 18Z
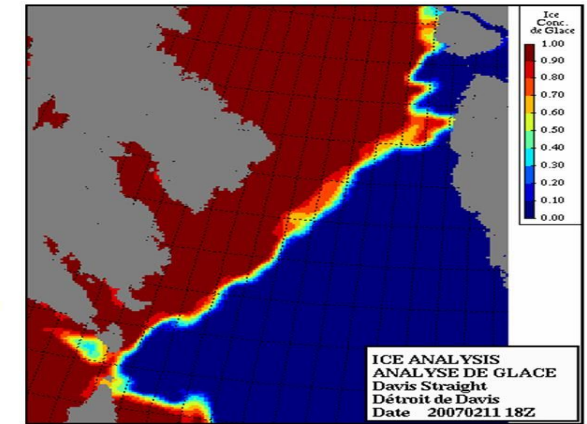
CIS Ice concentration analysis
Portion of North America, Res : 5 km

Ice extent from CIS Polar analysis (NSIDC insert)

Arctic Sea Ice Cover

2008 ice extent
2009 ice extent
2010 ice extent
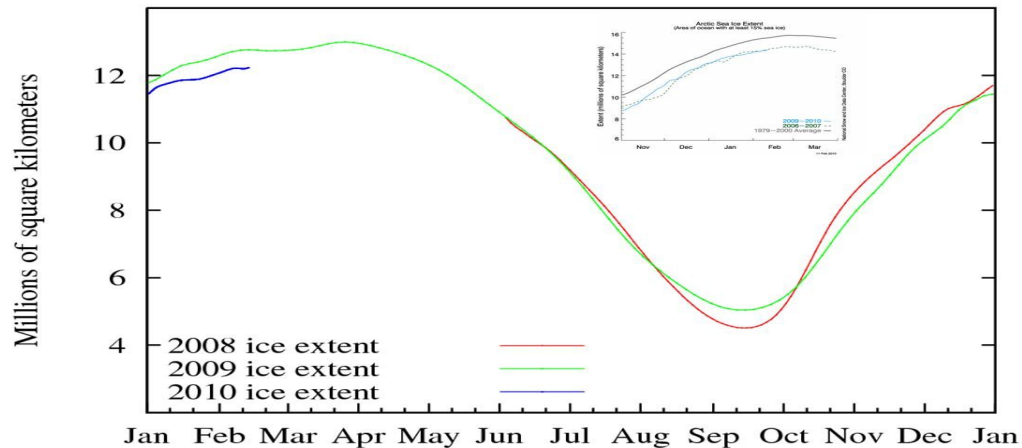
Future work:

- Replace persistence with model (CICE) to analyse ice types and thickness
- Add 3D-Var ice DA to CMC Gulf of St-Laurent coupled atmosphere-ice-ocean model
- Add 3D-Var to CECOM (Canadian East Coast Ocean Model from BIO)
- Extend Analysis domain to both hemispheres to replace CMC global ice analysis for NWP purposes
- Exploring further assimilation data sources: SSMIS, AVHRR, Vis/IR and SAR
- Add ocean model (NEMO) to assimilate SST and currents