Developments of NEMO/AGRIF

F. Dupont, D. Wright, Y. Lu, Z. Wang

Canadian Foundation for Climate
and Atmospheric Sciences (CFCAS)

Fondation canadienne pour les sciences
du climat et de l'atmosphère (FCSCA)

GOAPP
Global Ocean-Atmosphere
Prediction and Predictability
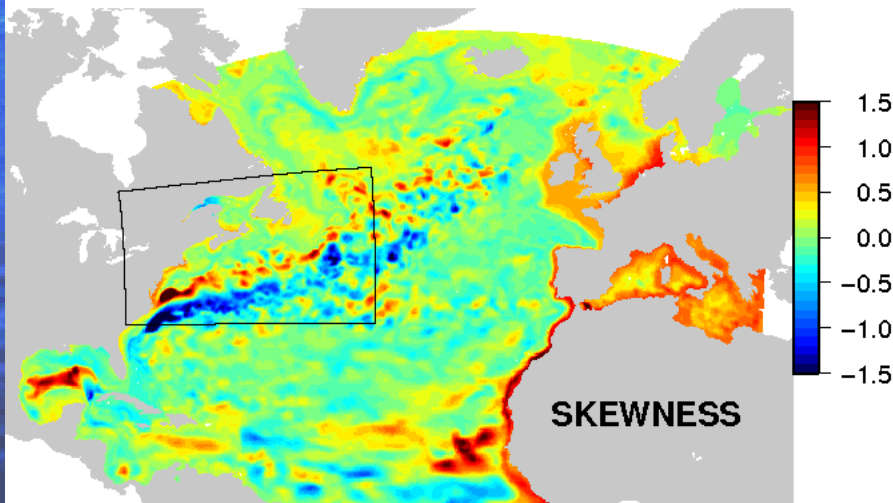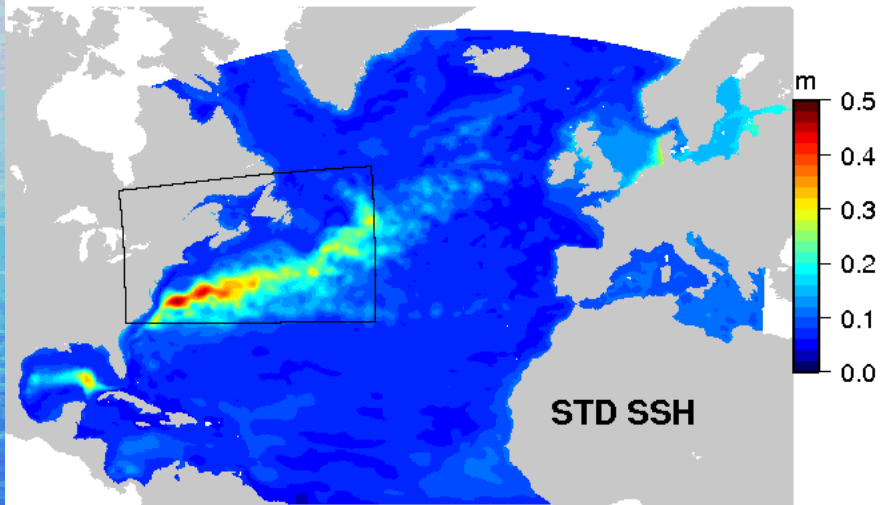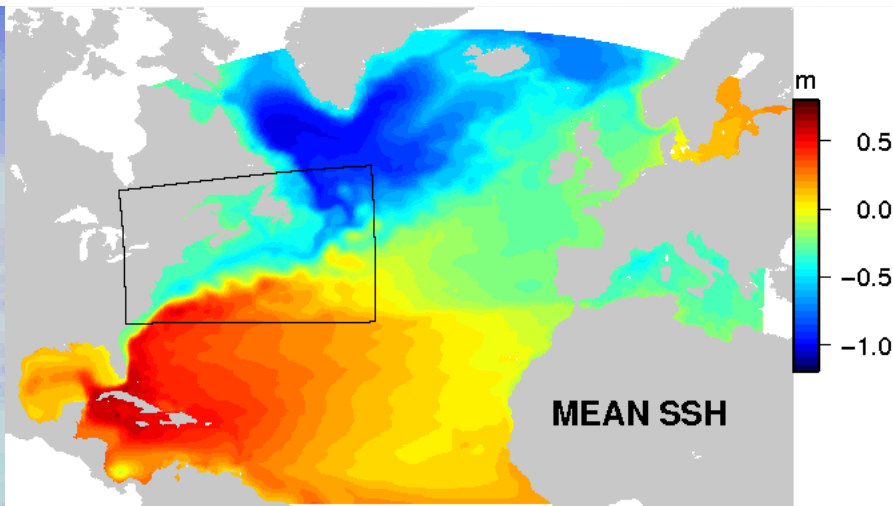
Dalhousie-DFO

Code updates

- **Spectral nudging enabled in NEMO.**
- **AGRIF enabled** with ice included.
- **Neptune Effect.** JGR, Holloway and Wang, accepted.
- **OBCs fully enabled.** No computed phase velocity used, advective velocity instead. Best would be to include first-baroclinic phase speed.
- **OBC volume conservation for multi-processors**: missing mask for active nodes, added double double precision summation.
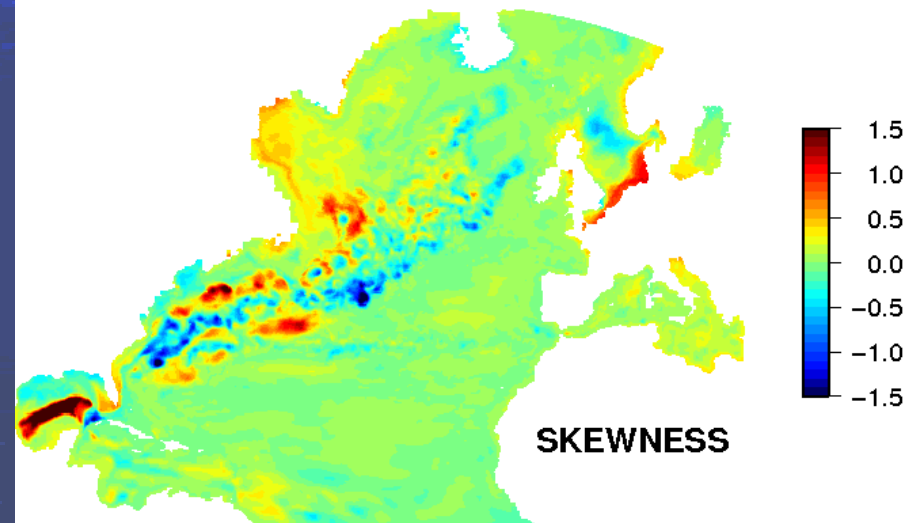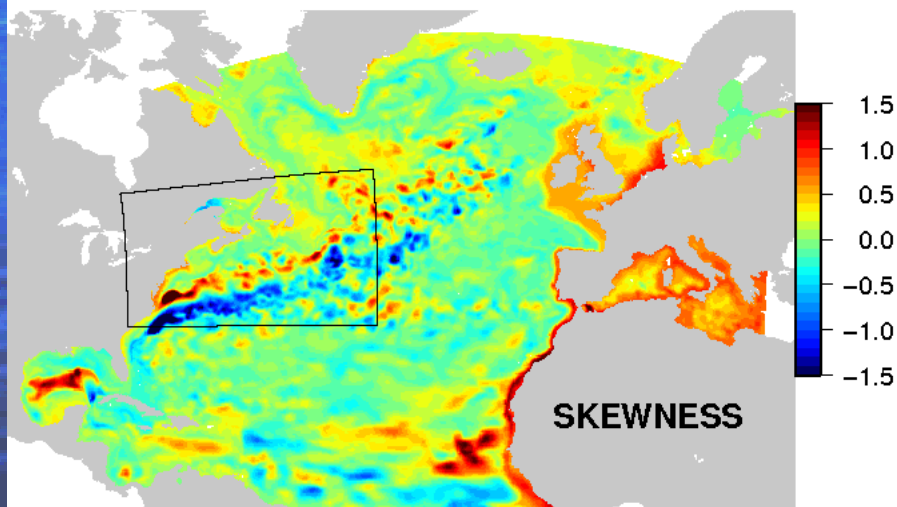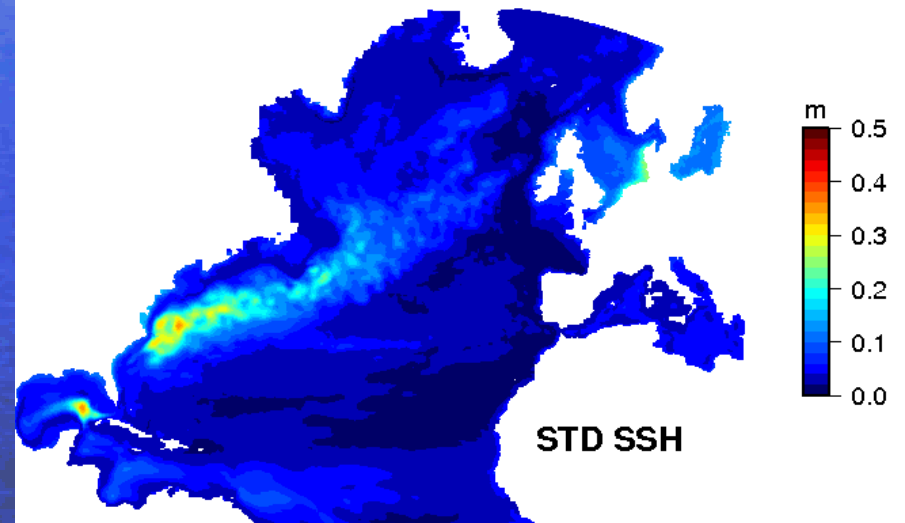- **OBC tides**, including astronomical tides.

Dalhousie-DFO

Spectral nudging

MEAN SSH

STD SSH

SKEWNESS

No-spectral nudging

MEAN SSH

STD SSH

SKEWNESS
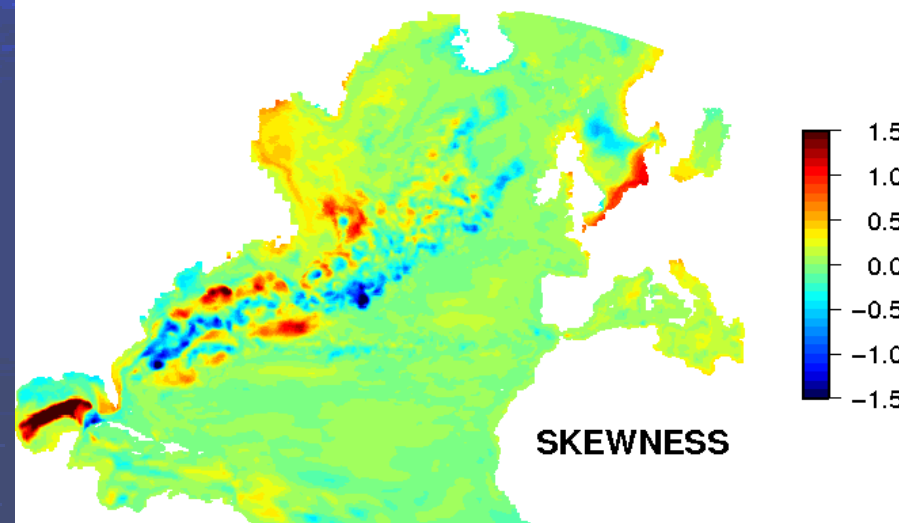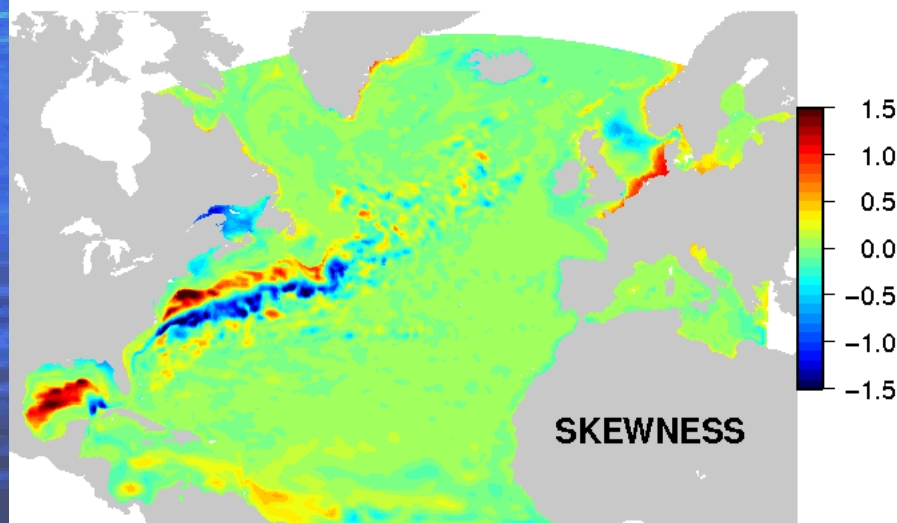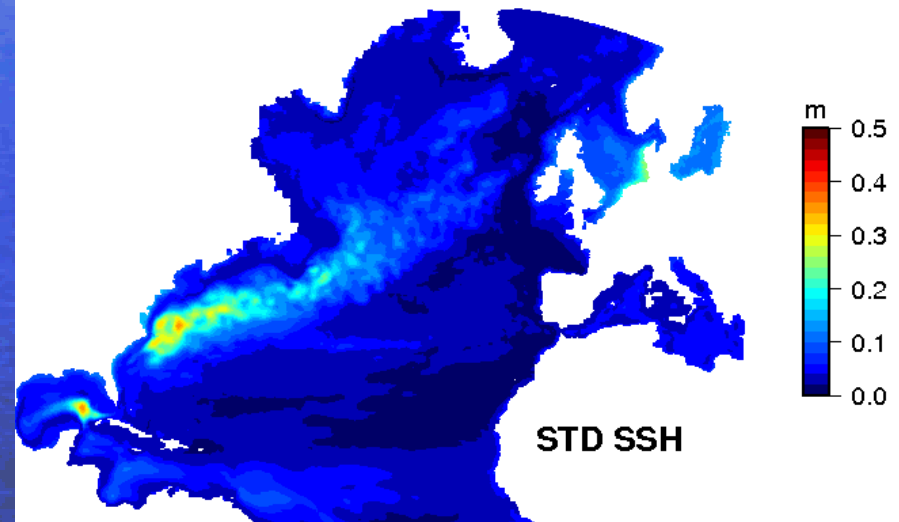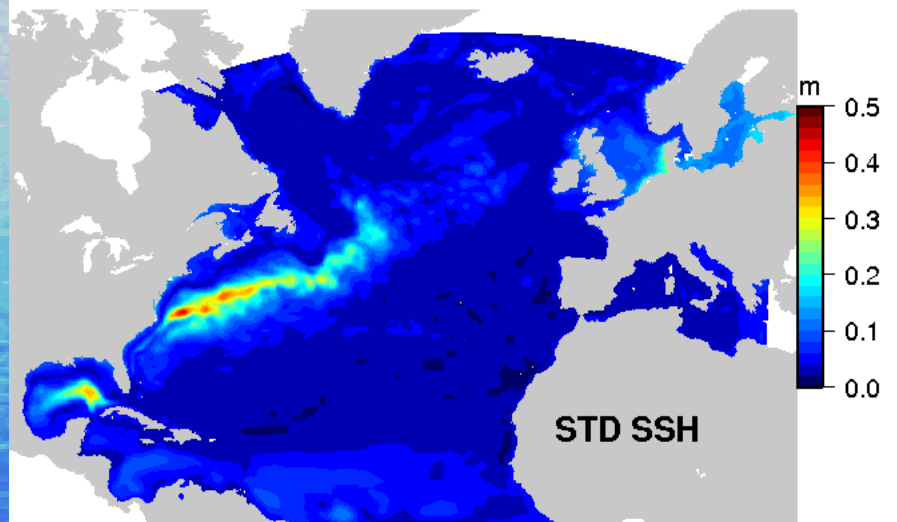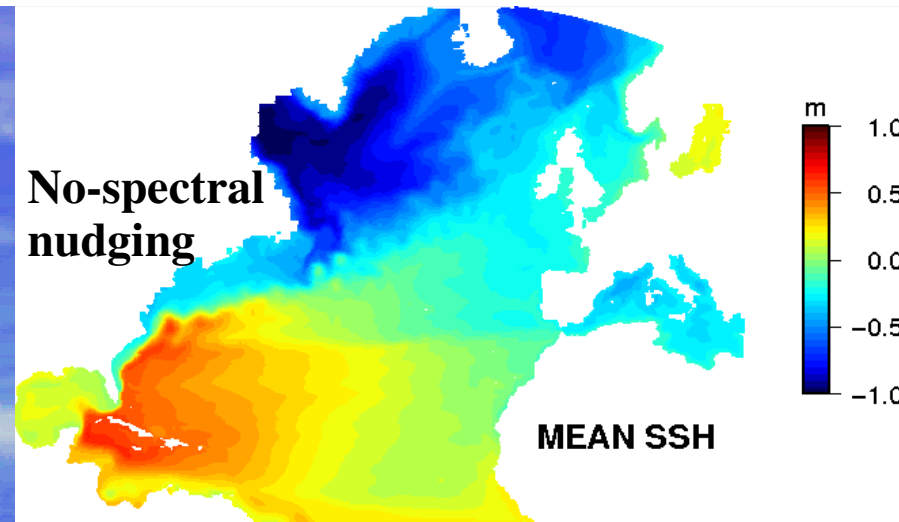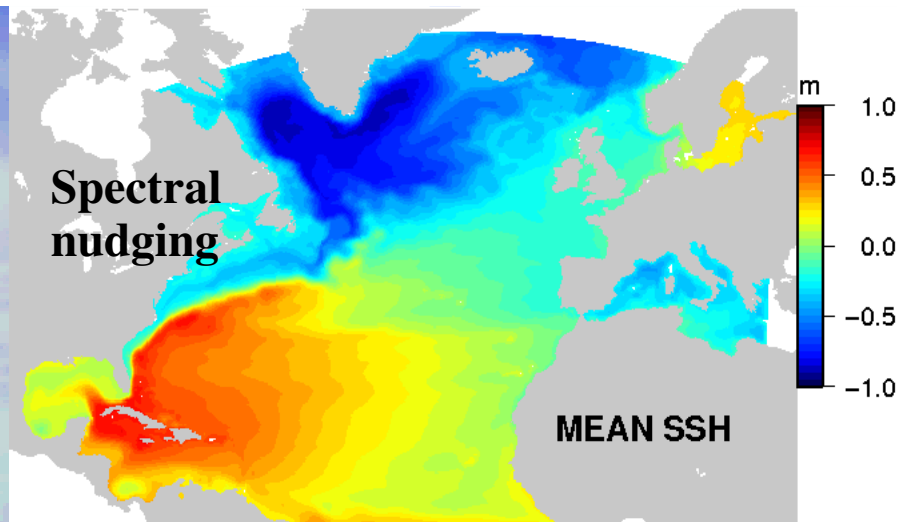
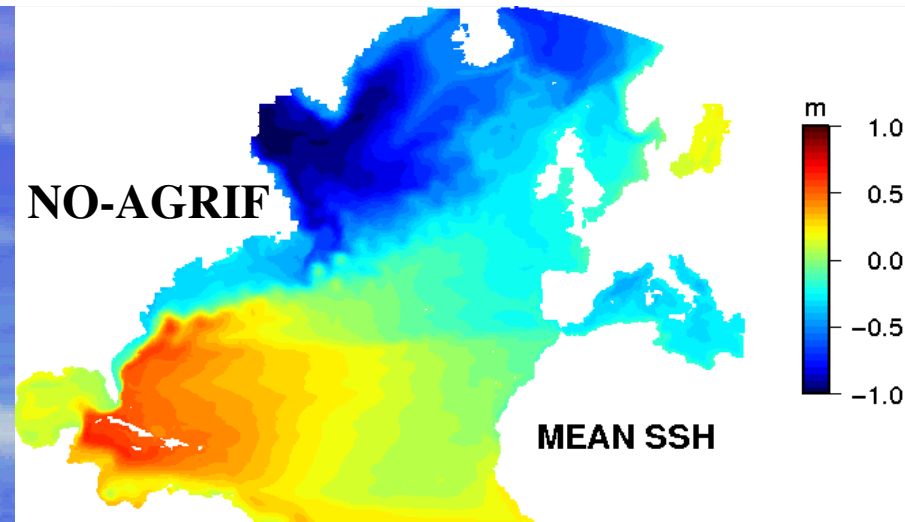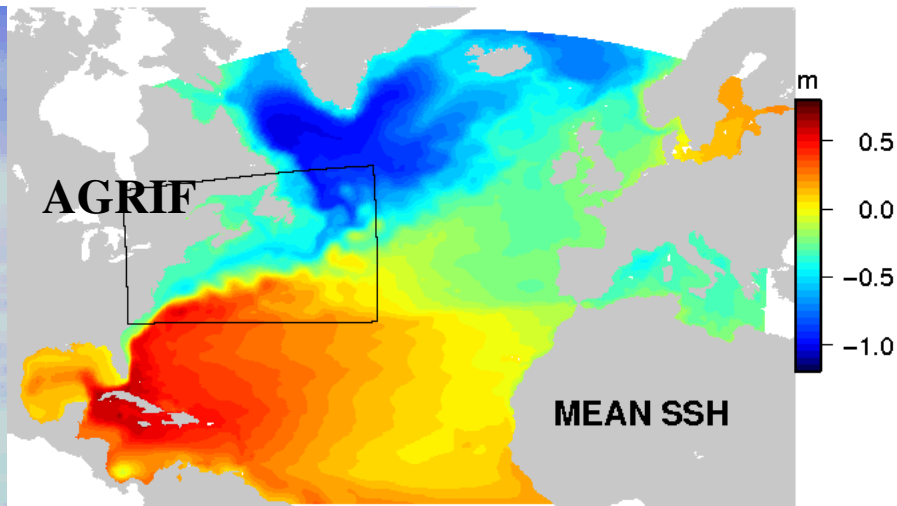**AGRIF test with ¼ degree NA with 1/12 degree embedded.**

This test run has been run for only 5 years and the statistics only excludes the first 12 month

Remaining issues: correcting at each time-step E-P fields too difficult. Annual volume correction done instead.

Nemo developer meeting 2009

AGRIF

NO-AGRIF

MEAN SSH

MEAN SSH

STD SSH

STD SSH

SKEWNESS

SKEWNESS
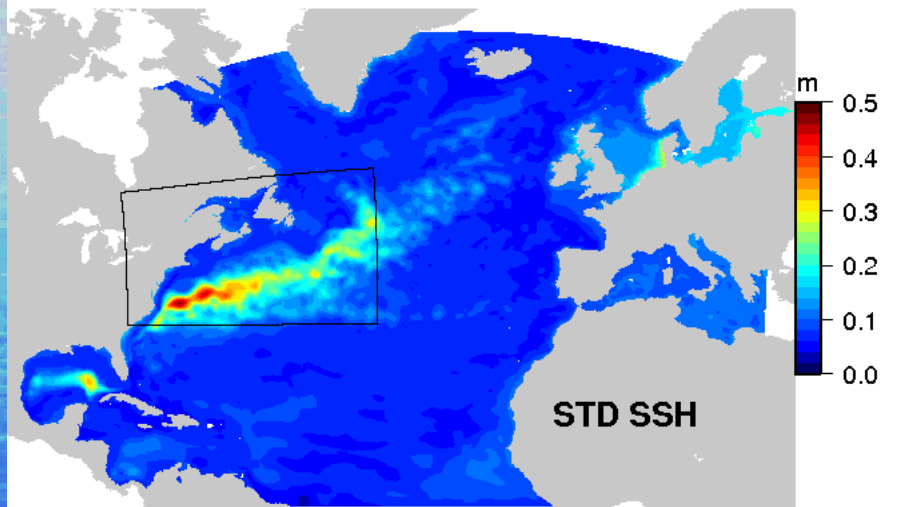
AGRIF test with ice between 1 degree global and ¼ North Atlantic, using DFS4 atmospheric forcing

SST March 1969

Dalhousie-DFO
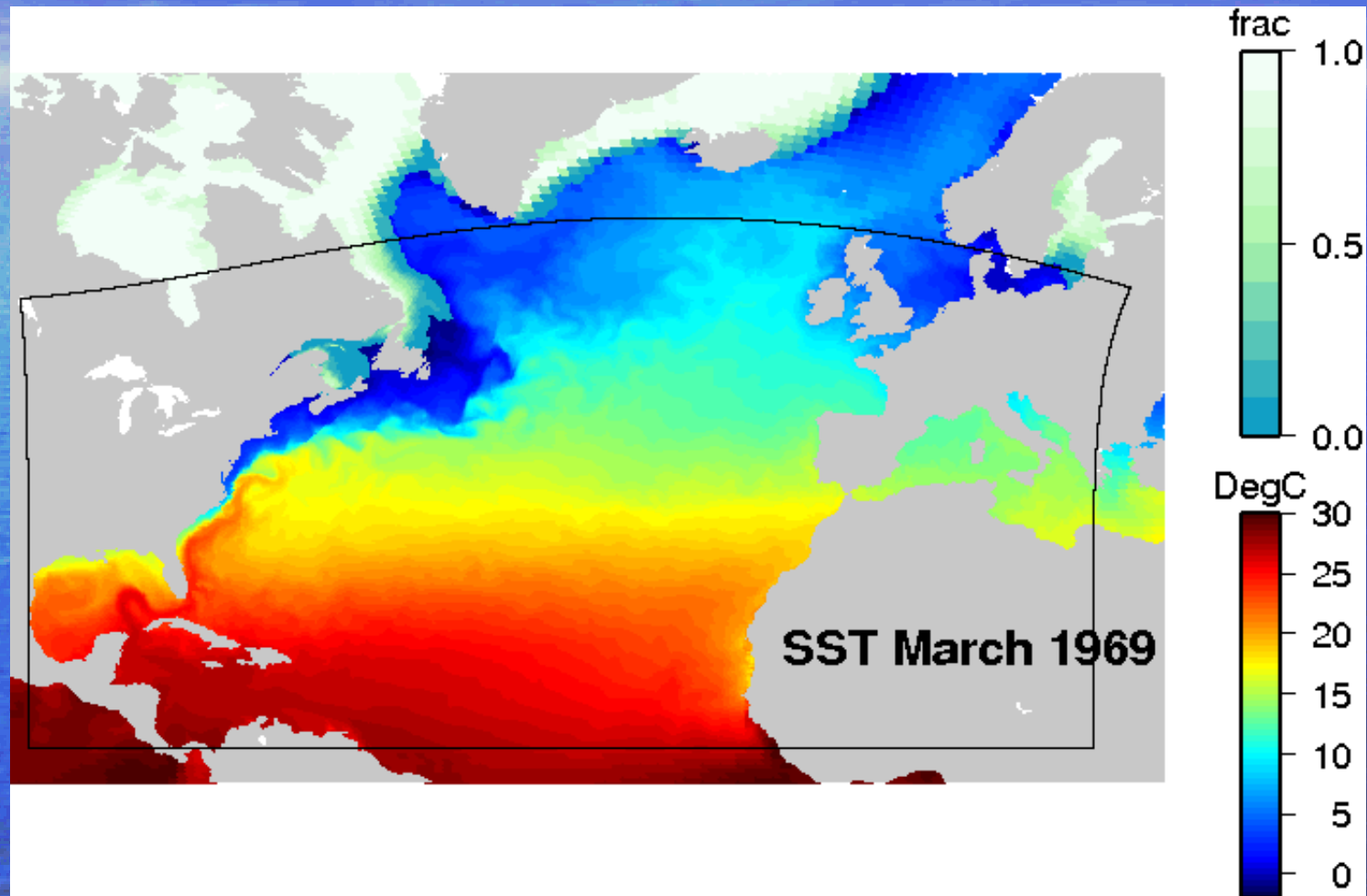
AGRIF test with ice between 1 degree global and ¼ North Atlantic for March 1969 (run started in 1958)

Dalhousie-DFO
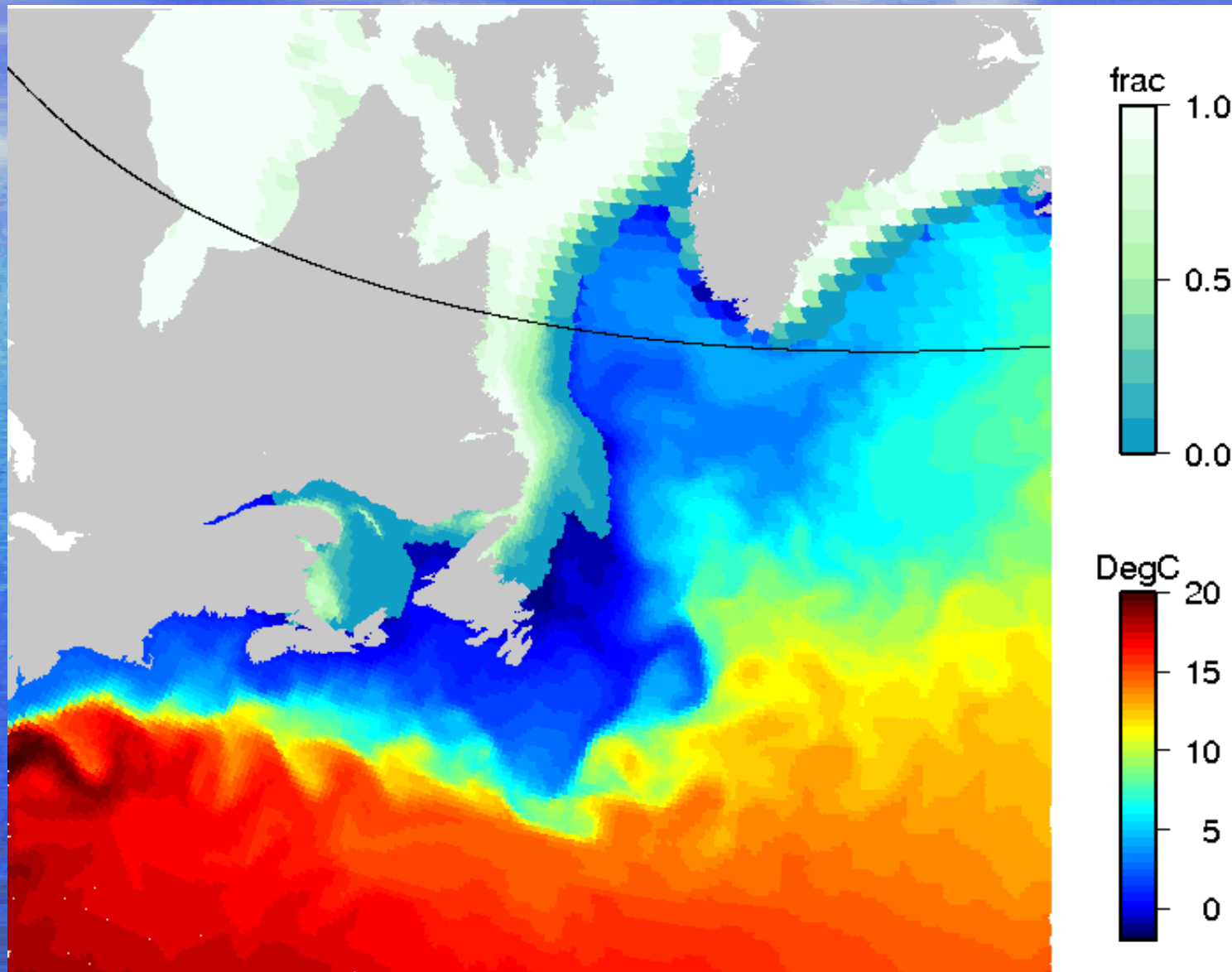
NEMO Restart Problem

Model:

NEMO2.3

ORCA1, 46 levels

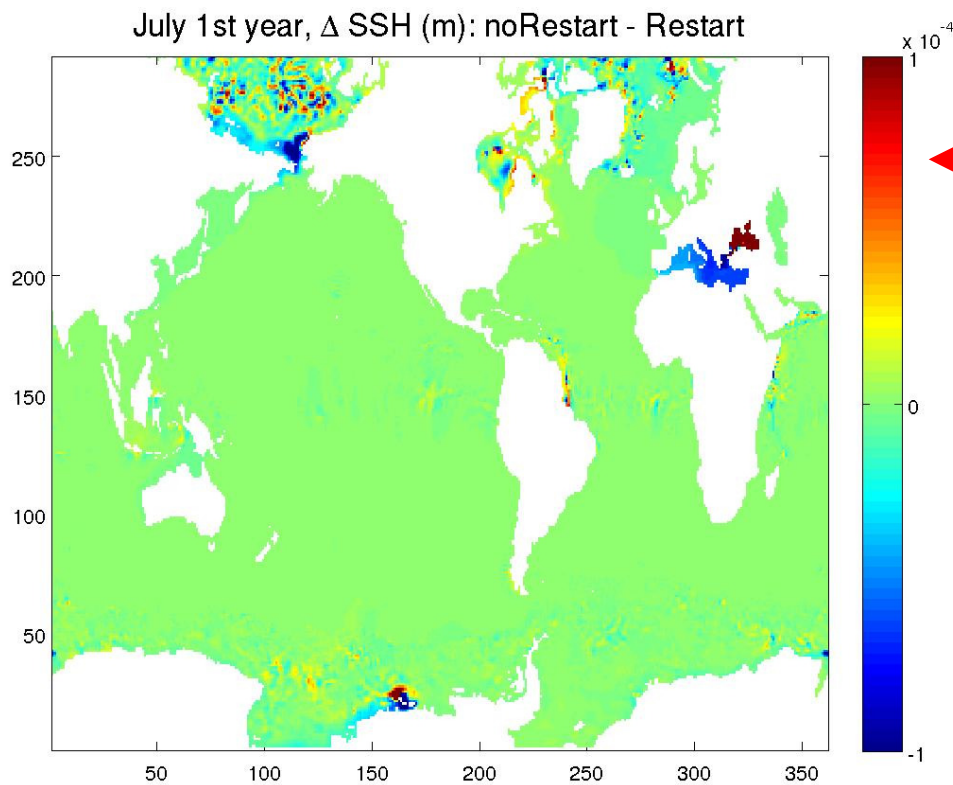CORE "normal-year" forcing

Test runs:

Run 1: 1-year without restart
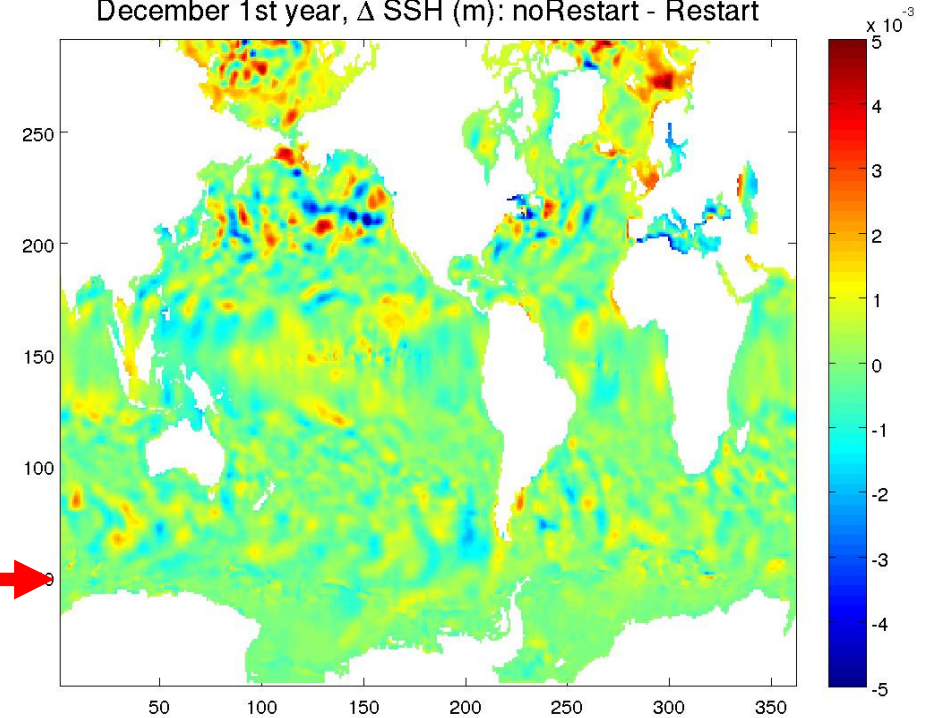
Run 2: 1-year with restart at beginning of July

Monthly fields saved for comparison

SSH difference (in m): NonRestart - Restart

July 1st year, Δ SSH (m): noRestart - Restart

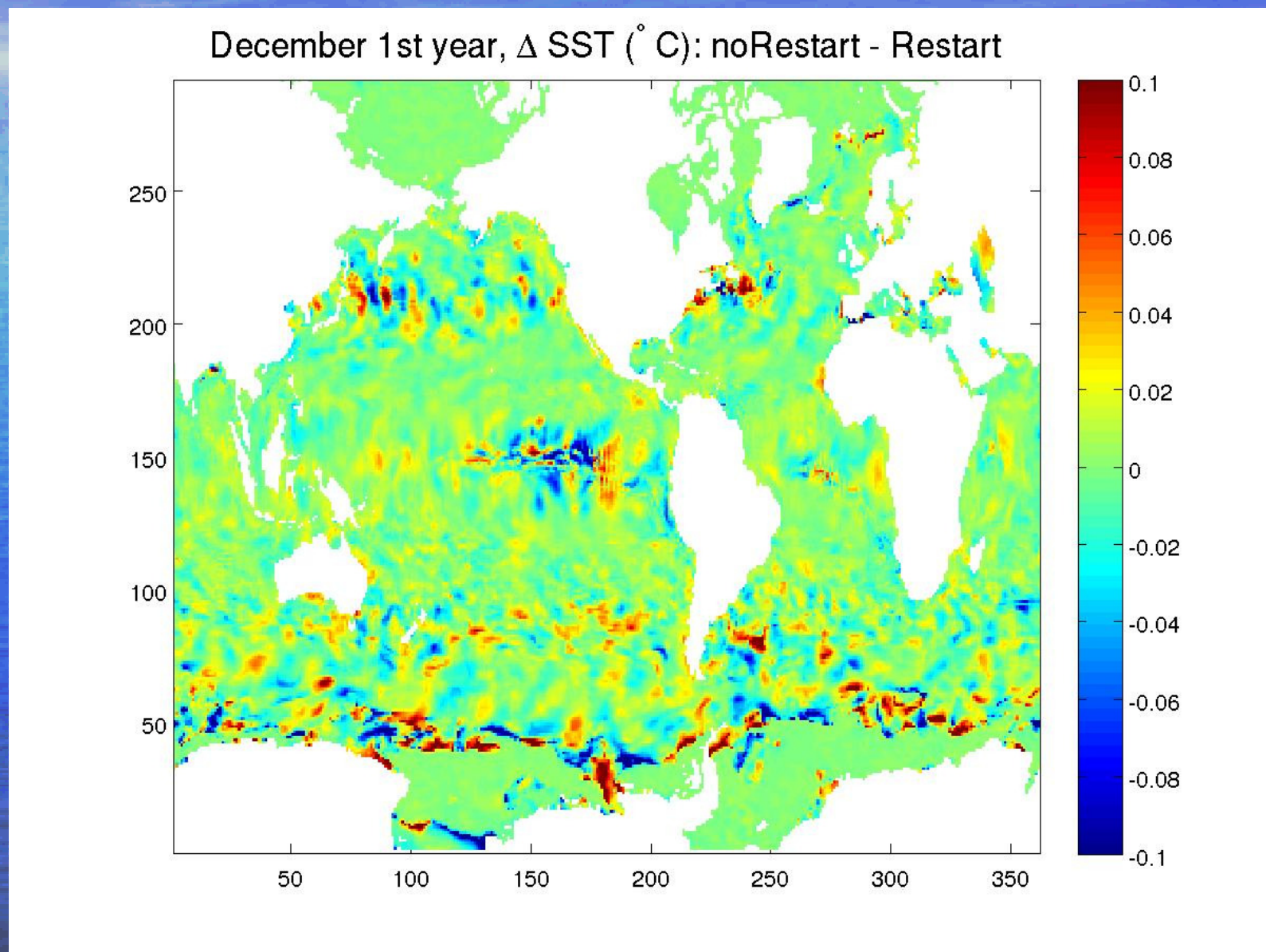**July: 1 month after restart Maximum difference ~0.1 mm**

December 1st year, Δ SSH (m): noRestart - Restart

December: 6 months after restart Maximum difference ~3 mm

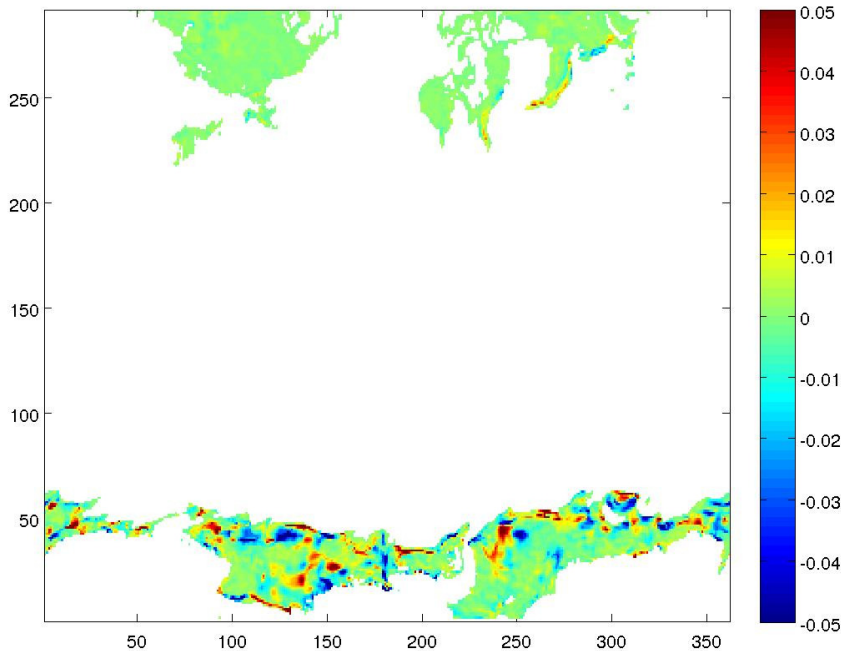# SST difference: NonRestart - Restart

December: 6 months after restart, Maximum difference ~0.1 ℃

December 1st year, Δ SST (°C): noRestart - Restart

Sea-Ice difference: NonRestart - Restart

December: 6 months after restart

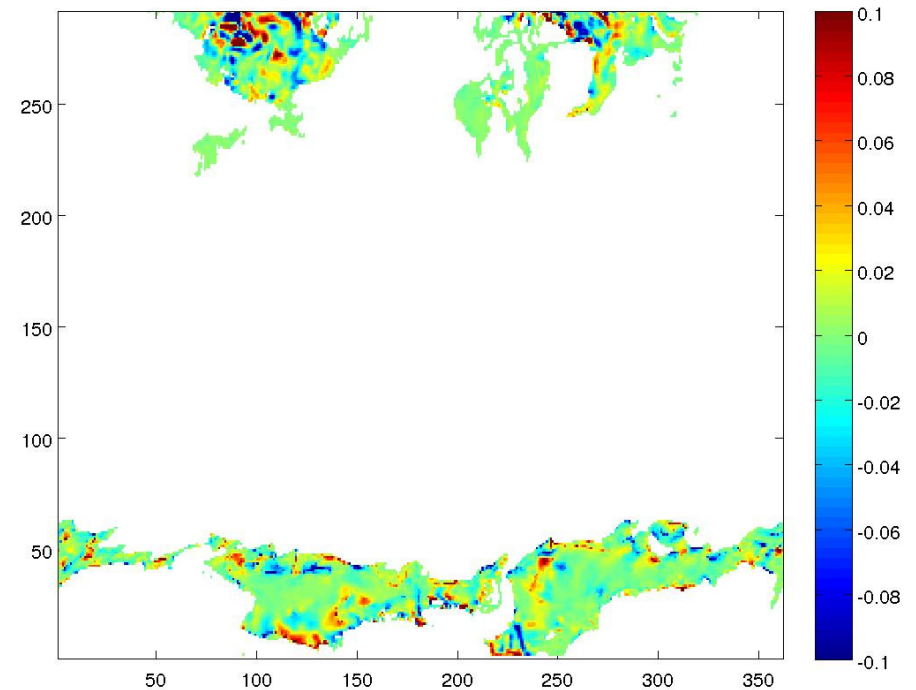December 1st year, Δ Ice Concentration: noRestart - Restart

Ice Concentration: Maximum difference ~4%

December 1st year, Δ Ice Thickness (m): noRestart - Restart

Ice Thickness: Maximum difference ~8 cm

Summary Comments On:

- Spectral nudging

- AGRIF (with ice)

- Neptune Effect

- OBCs

- Tides

- Restart issues