



Coupling of the ocean model NEMO to the regional climate model MAR over Greenland



-work in progress-

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Background

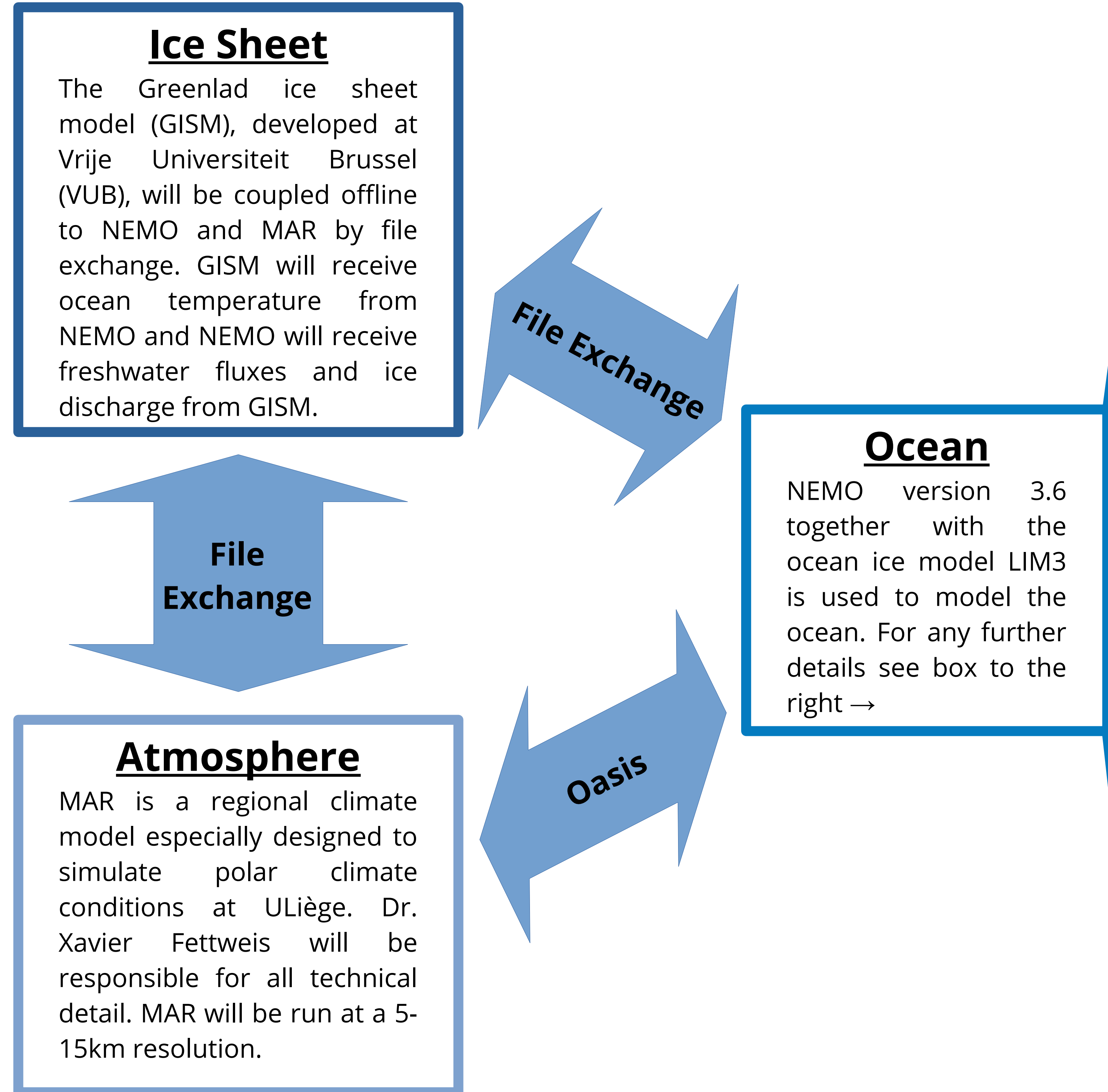
The Arctic is currently undergoing rapid changes with major effect on the global climate system. Since the Arctic is an environment which is hard to sample, modelling is often chosen to understand the different processes and interactions at play. Most regional modelling efforts however focus on only one component of the arctic climate system at a time (ocean, atmosphere, ice sheet) what complicates understanding the link between the different climate components. To address this problem, ice sheet, ocean, atmosphere models will be set up in the framework of the Belgian PARAMOUR project. The simulations will be run ca. 30 years in retrospective and ca. 30 years in prospective. The main subject of this poster is the set up of the ocean model NEMO.

Main Objectives

The presented work aims primarily to improve the understanding of key processes that control the variability of the ice-ocean- atmosphere system at decadal time scale, with a focus on:

- 1) decadal feedbacks of ocean temperature, Greenland ice sheet and atmospheric circulations over Greenland
- 2) decadal sea ice extent variability in the arctic
- 3) decadal sea surface temperature variability around Greenland

Coupling of the different models



The PARAMOUR Project

The presented project is part of the Belgian PARAMOUR project. PARAMOUR is funded by EOS - The excellence of Science as a program from the Fonds de la Recherche Scientifique – FNRS. The Universities involved are: Université catholique de Louvain, KU Leuven, Vrije Universiteit Brussel, Université de Liège, Université libre de Bruxelles and Barcelona Supercomputing Center. More infor can be found at:
<http://www.climate.be/php/users/klein/PARAMOUR/index.html>

NEMO configurations

Current state

The presented model set ups are partly best case scenarios for which we aim. In table 1 one can find the blue marked configuration on which I work at the moment. The yellow marked row is planned to be performed in the near future. The main problems are:

- 1) lateral boundary data in sufficiently high resolution of 1/4 of the desired model resolution (1/4° resolution of the boundary data will be sufficient for a 1/12° model resolution)
- 2) interpolation of the NEMO configuration files (currently under construction)

Table 1: technical details regarding the NEMO set up currently under construction (blue) and plant for the future (yellow).

Lateral boundary data	NEMO resolution	Time coverage
Mercator Ocean GLORYS12V1 reanalyses at 1/12° spacial resolution and 1 day time resolution	1/4°	1992/01/01 - 2016/12/31
Mercator Ocean GLORYS12V1 reanalyses at 1/12° spacial resolution and 1 day time resolution	1/12°	1992/01/01 - 2016/12/31
EC-Earth CMIP6 simulations at 1° spacial resolution and 6h time resolution	1/4°	2017/01/01 - 2050/12/31

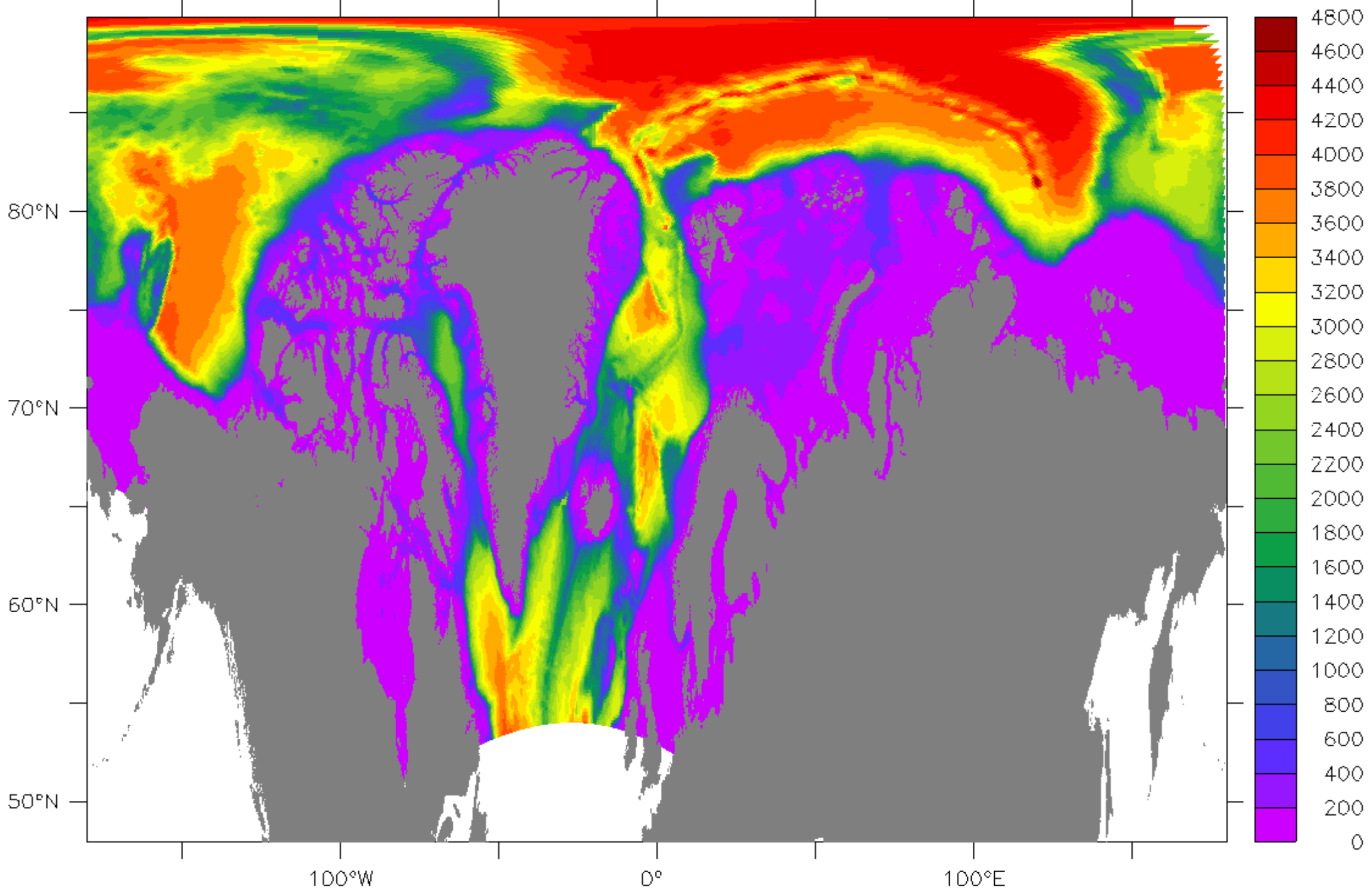


Fig. 1: Arctic NEMO domain with bathymetry in m

Future Plans: high resolution configuration over Greenland

As one of the main objectives of the presented work is to study the interaction between the Greenland ice sheet, the atmospheric and the ocean, and there only physical intersection around Greenland accues in its many fjords, it would be desirable to resolve some this fjords. To be able to resolve the fjords a Greenland configuration is planned further ahead. As named in the “current state” section, one of the main difficulties for high resolution configurations is sufficient input data at the lateral boundaries. As for now we only have sufficient data for the retrospective simulations. The configuration data for this runs are currently under construction.

Lateral boundary data	NEMO resolution	Time coverage
Mercator Ocean GLORYS12V1 reanalyses at 1/12° spacial resolution and 1 day time resolution	1/24° For resolution in km see fig. 2	1992/01/01 - 2016/12/31
Mercator Ocean GLORYS12V1 reanalyses at 1/12° spacial resolution and 1 day time resolution	1/12° For resolution in km see fig. 3	1992/01/01 - 2016/12/31

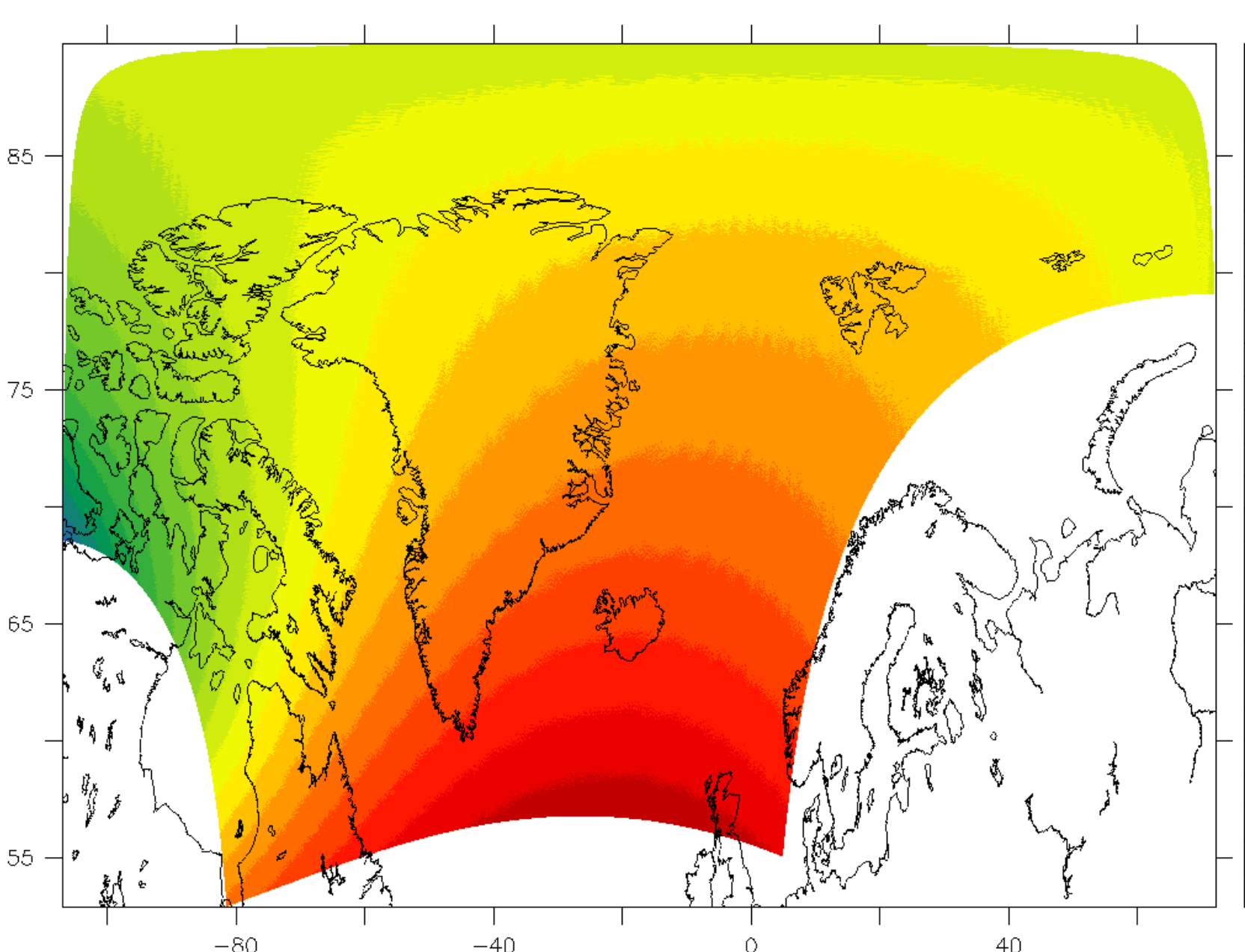


Fig.2: NEMO resolution in km of the 1/24° regional set up for Greenland

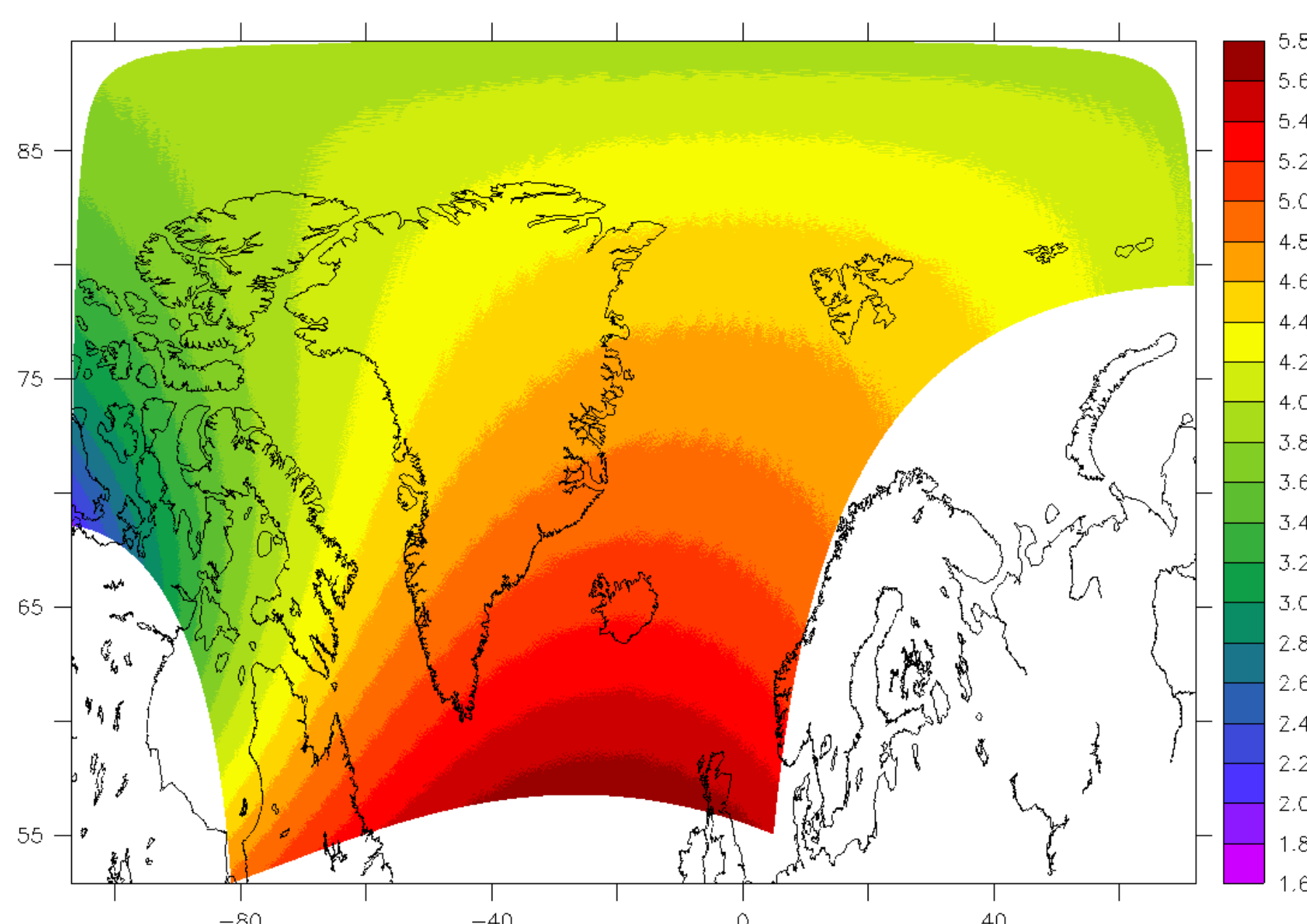


Fig.3: NEMO resolution in km of the 1/12° regional set up for Greenland