

AGRIF configurations in NEMO3.6

– insights and requirements –

Franziska Schwarzkopf

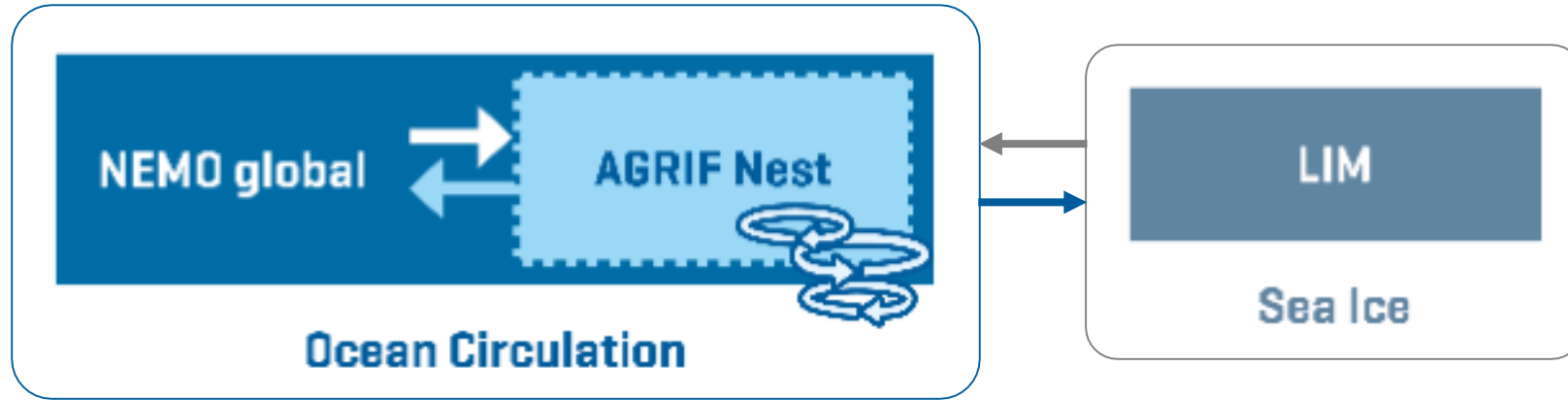
with contributions from

Arne Biastoch, Claus Böning, Klaus Getzlaff, Jan Harlaß, Torge Martin, Christina Roth, René Schubert, Patrick Wagner



insights

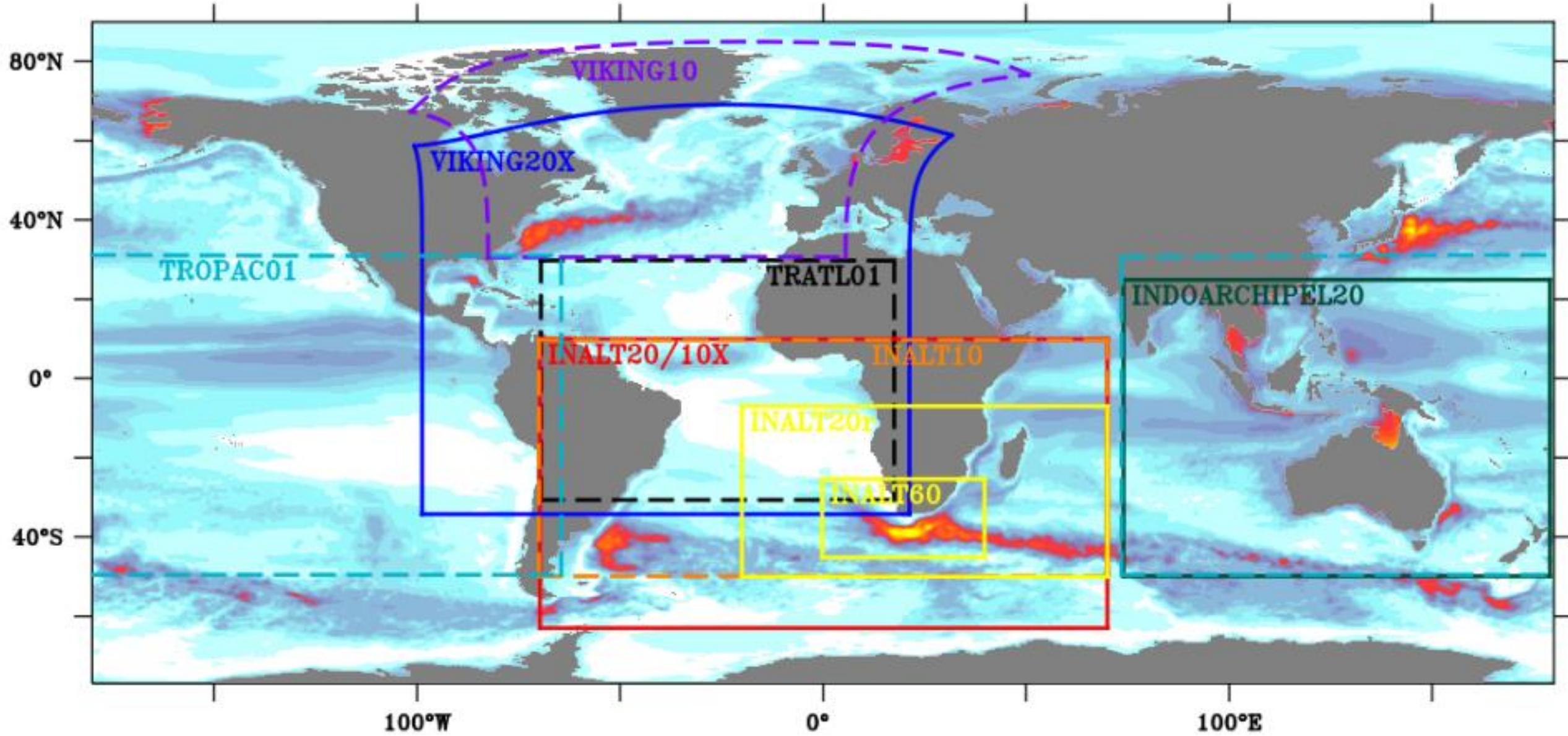
“what is working fine with NEMO...”

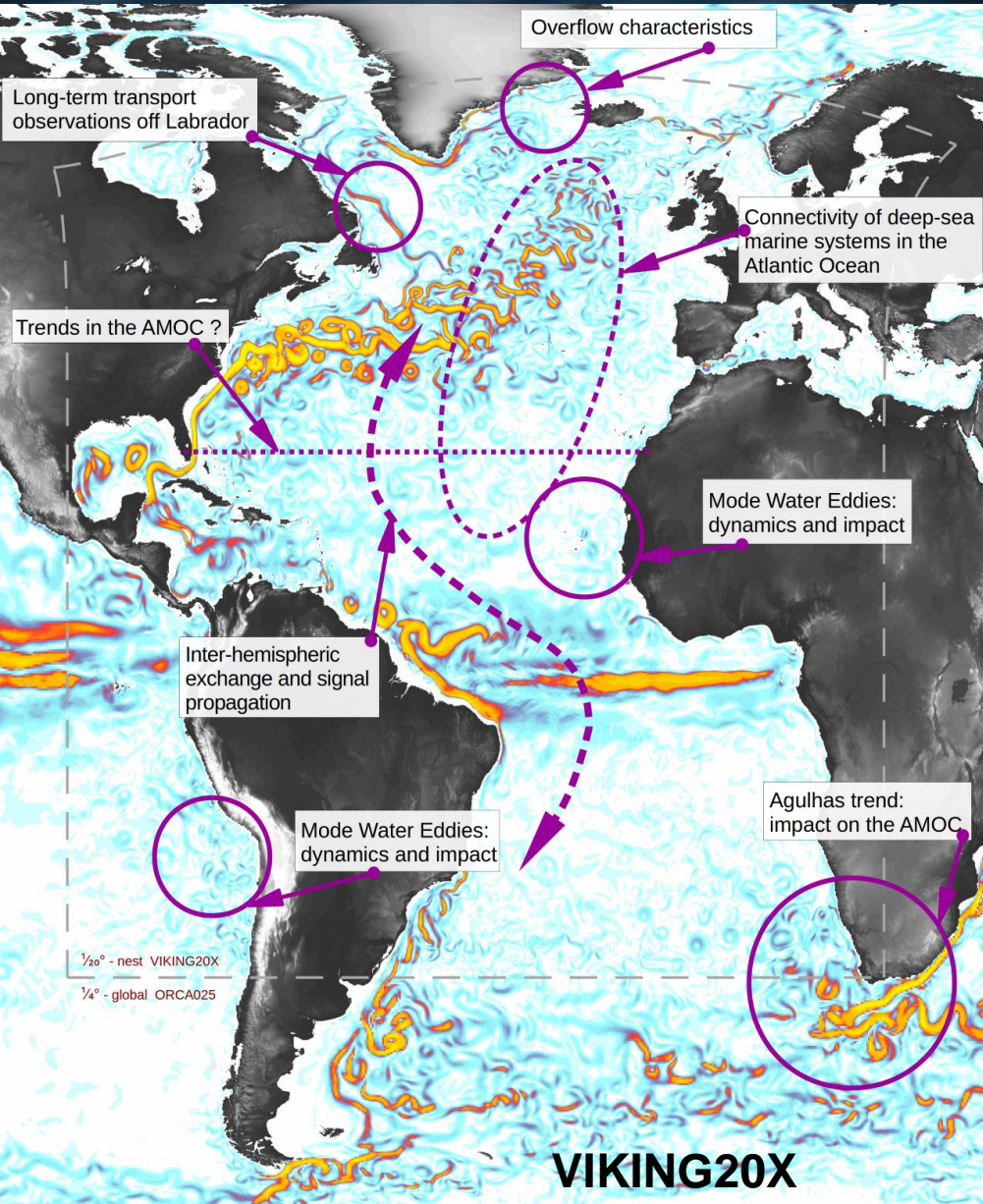


NEMO3.6 – rev. 6721
plus bug fixes
(mainly included in later revisions)

LIM2-VP

global configurations based on ORCA05 or ORCA025 as host grids
with 5-fold refined nests
→ 1/10° or 1/20° horizontal resolution



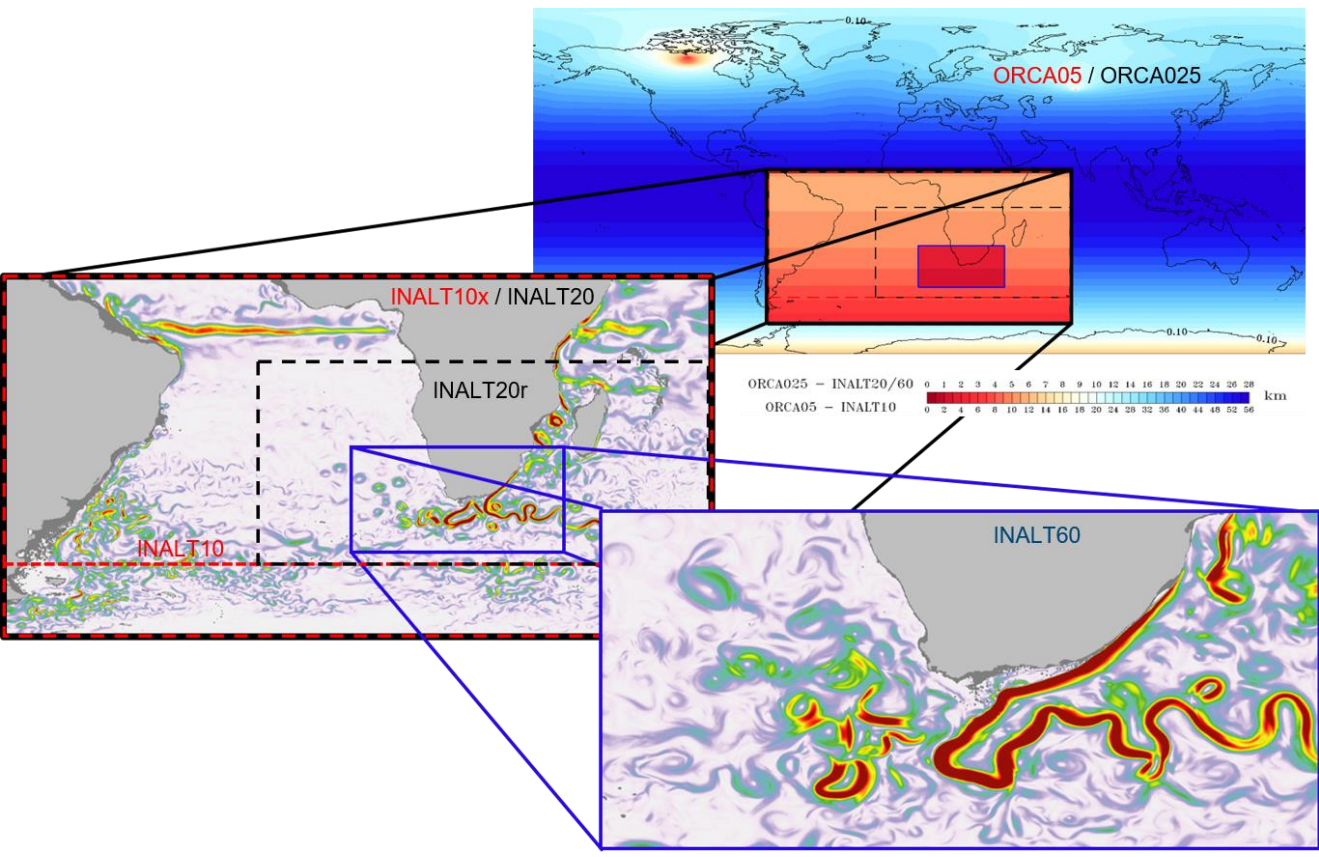


Project: RACE WP 3.1

Changes of the Atlantic circulation systems in high-resolution ocean models: regional impacts and global projections

- Relative importance and possible interaction of northern and southern hemispheric influences on the generation of decadal variability and long-term trends
- Manifestation of large-scale circulation changes (AMOC, SPG, STCs)
- Changes and trends in local hydrography due to changes in the circulation system, particularly along the continental shelves
- Application of high-resolution model results to the interpretation of marine biological findings

The INALT Family



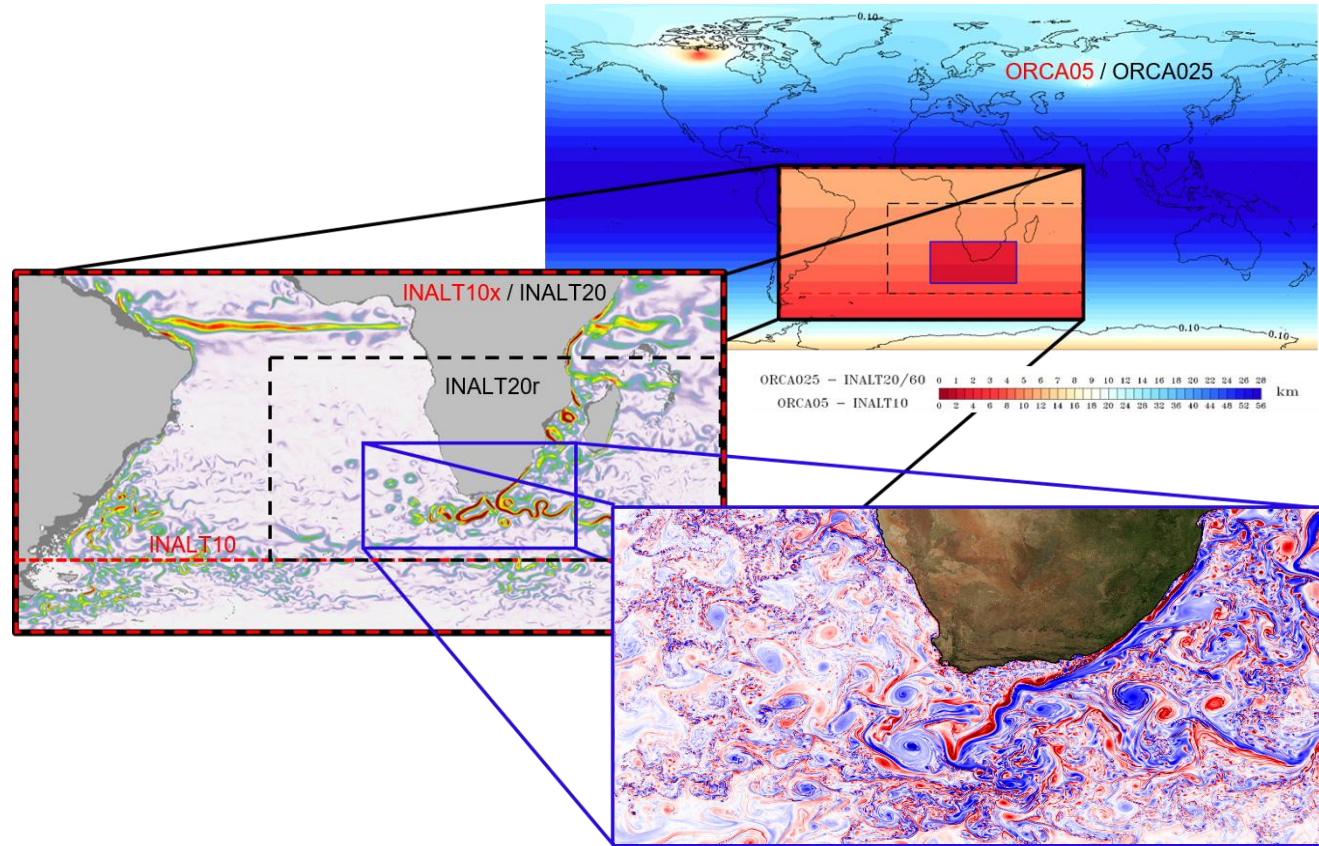
Project: SPACES II: CASISAC

Changes in the Agulhas System and its Impact on Southern African Coasts

- High resolution modelling of the Greater Agulhas System and beyond with improved representation of near coastal processes and sea level.



The INALT Family

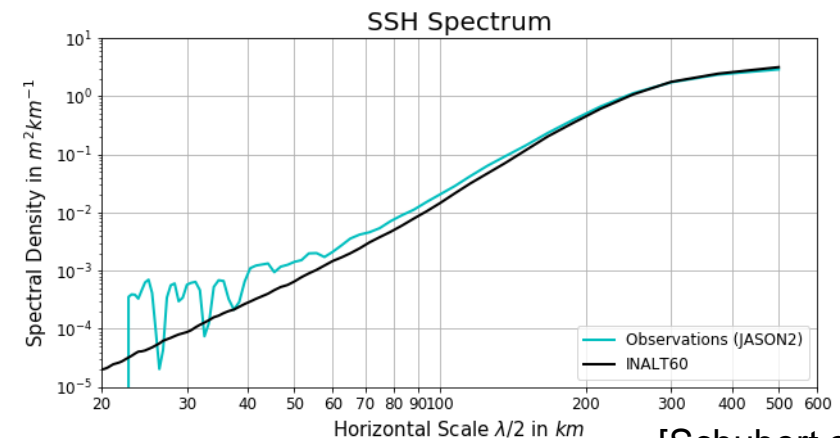


Project: SPACES II: CASISAC

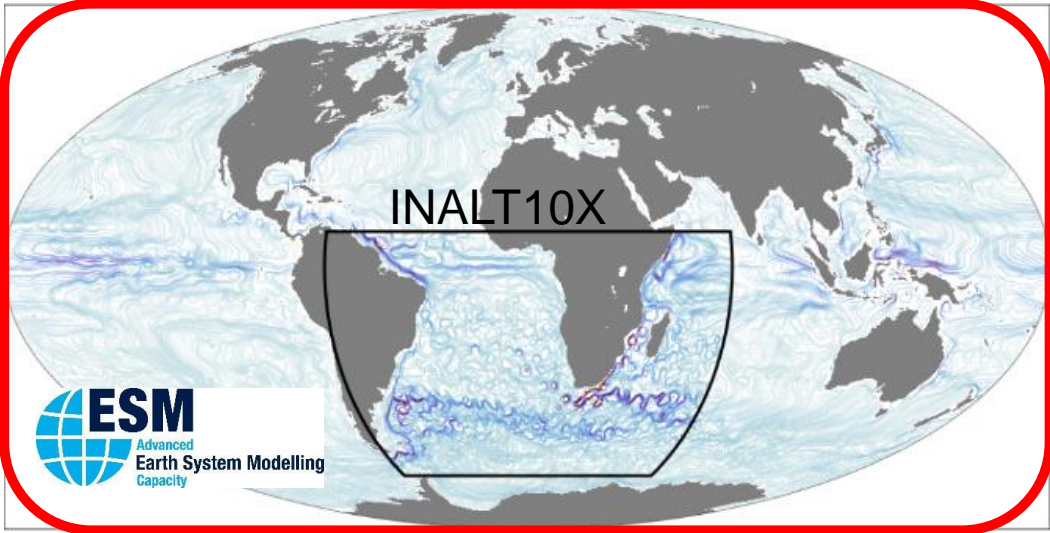
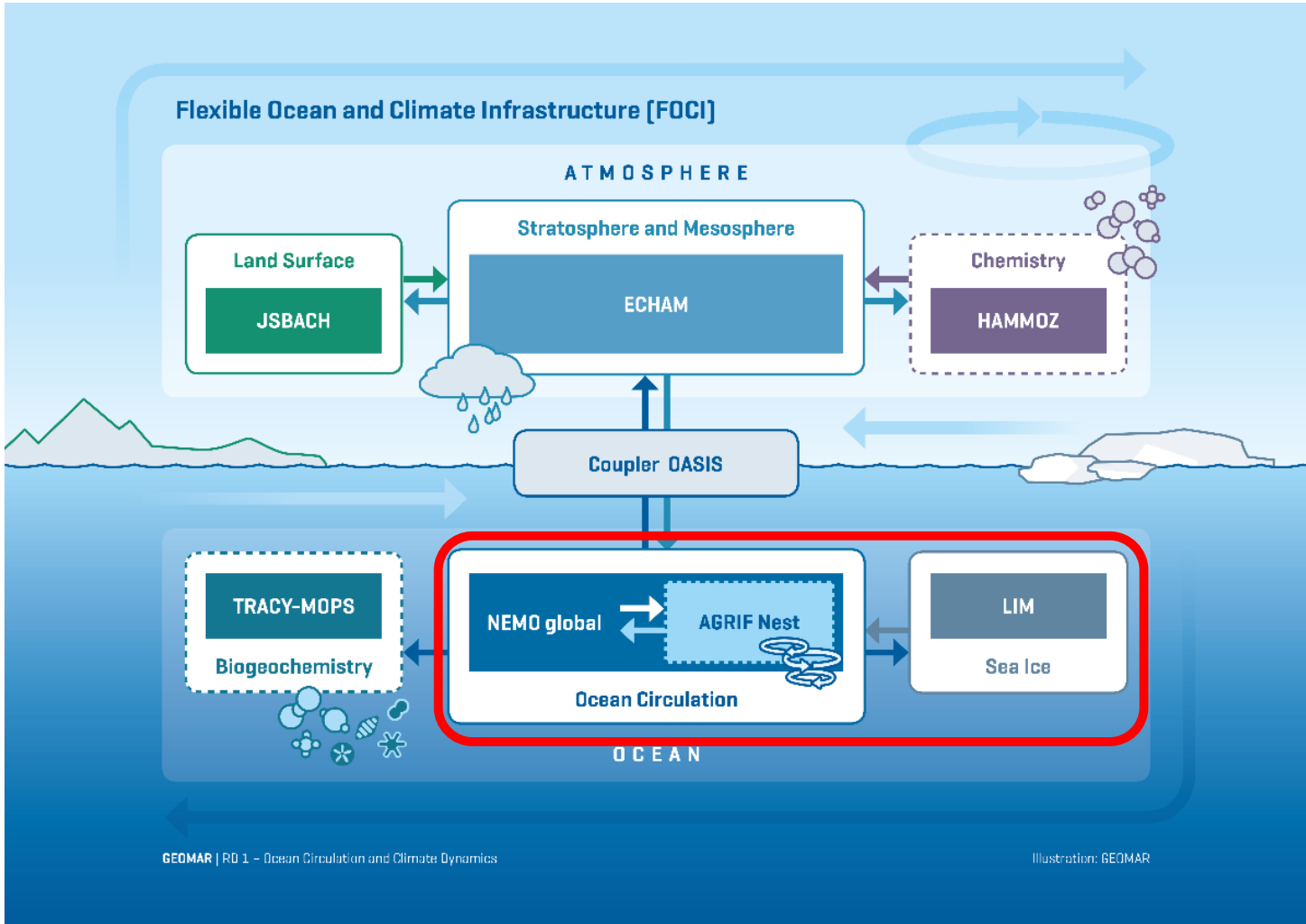
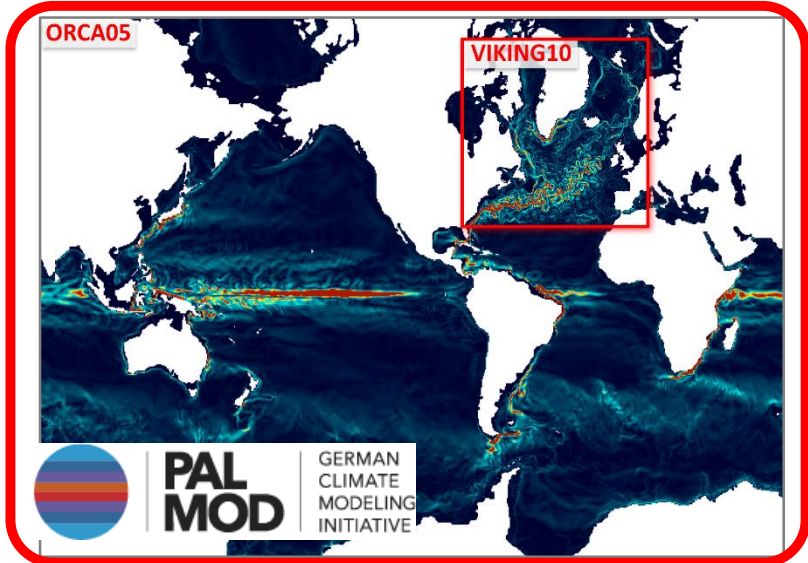
Changes in the Agulhas System and its Impact on Southern African Coasts

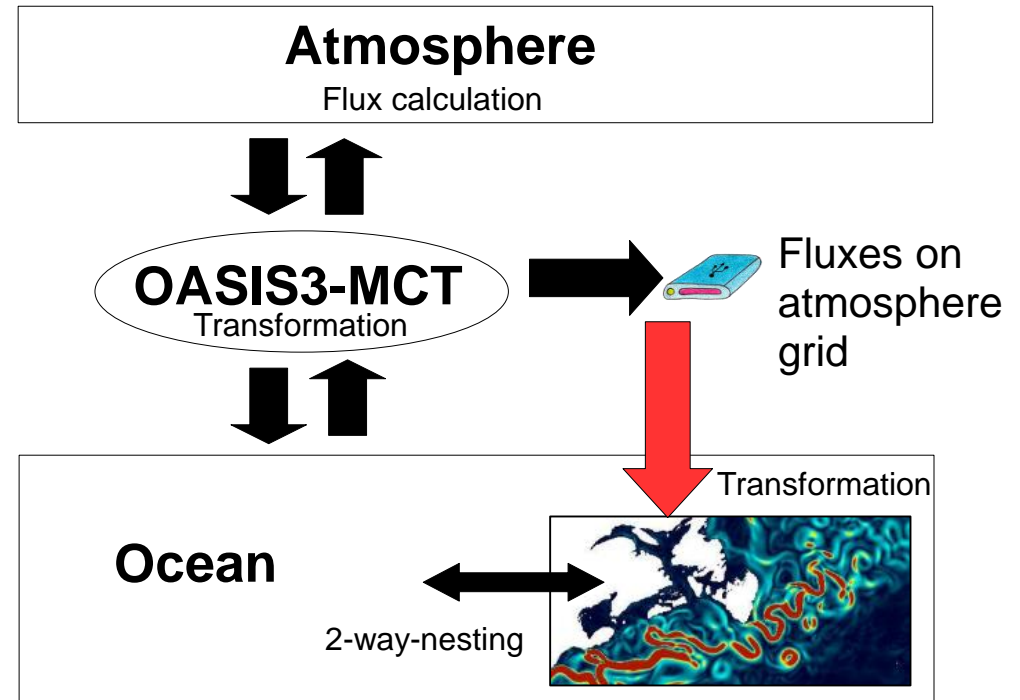
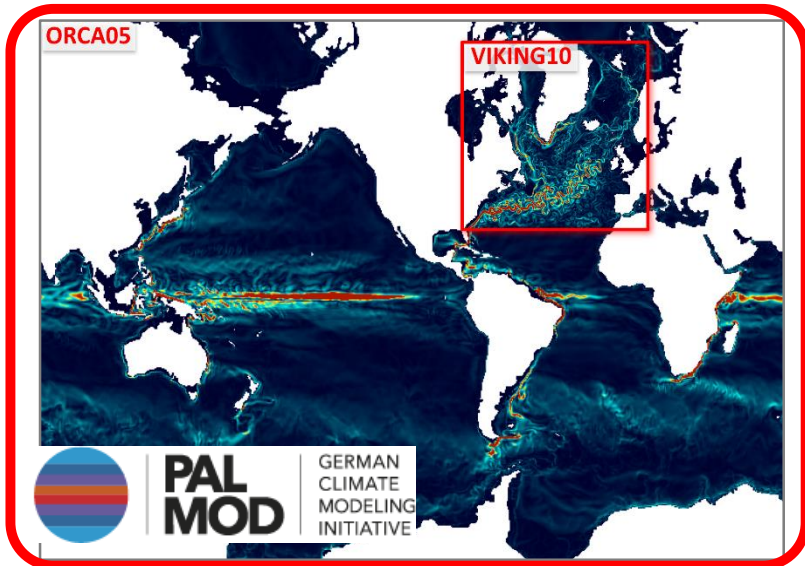
- High resolution modelling of the Greater Agulhas System and beyond with improved representation of near coastal processes and sea level.

- Simulate submesoscale processes at $1/60^\circ$

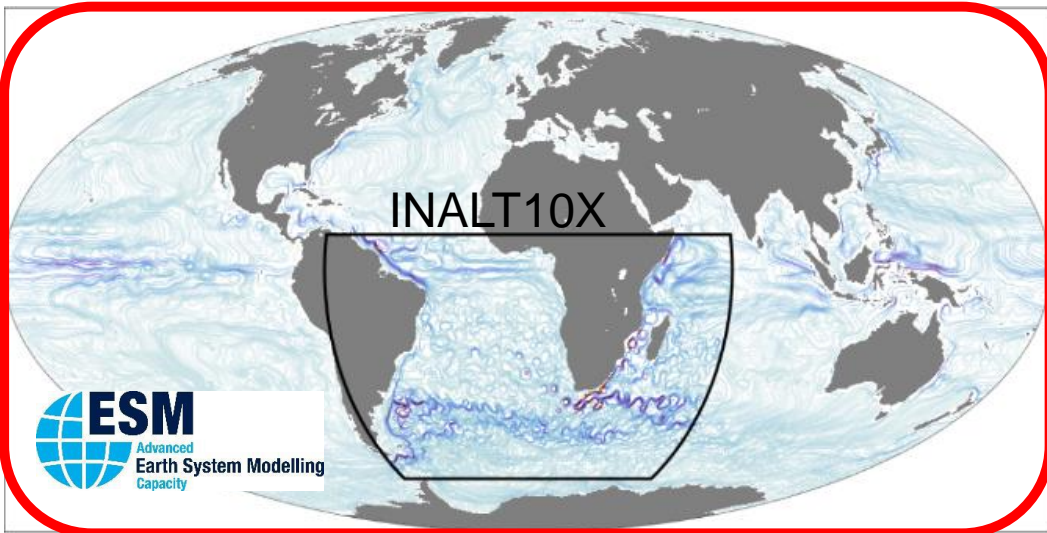


[Schubert et al. in prep]

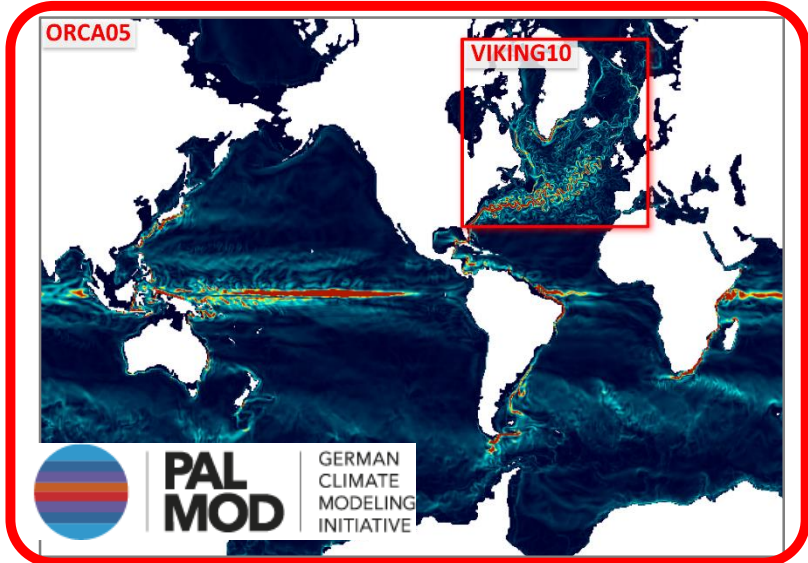




- > ~1000 new code lines in NEMO
- > new routines to process input from ECHAM6:
sbc_echam_oce, sbc_echam_ice_flux, sbc_echam_ice_tau
- > fine tuning LIM2, heat flux scaling, sea ice growth in sponge layer
- > 2 coupler switches for base/nest
- > routine for hosing experiments
- > new namelist blocks
- 25% overhead for coupling



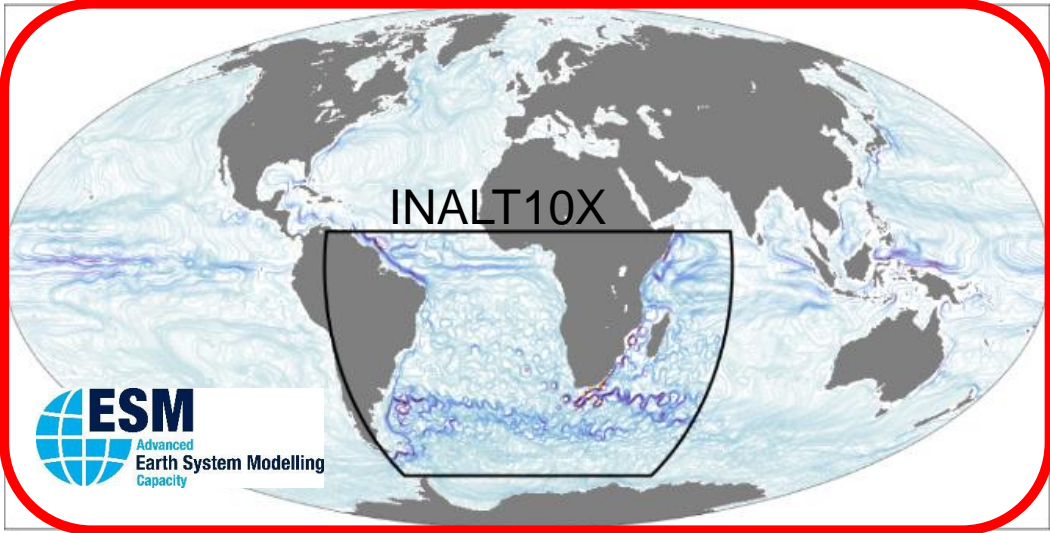
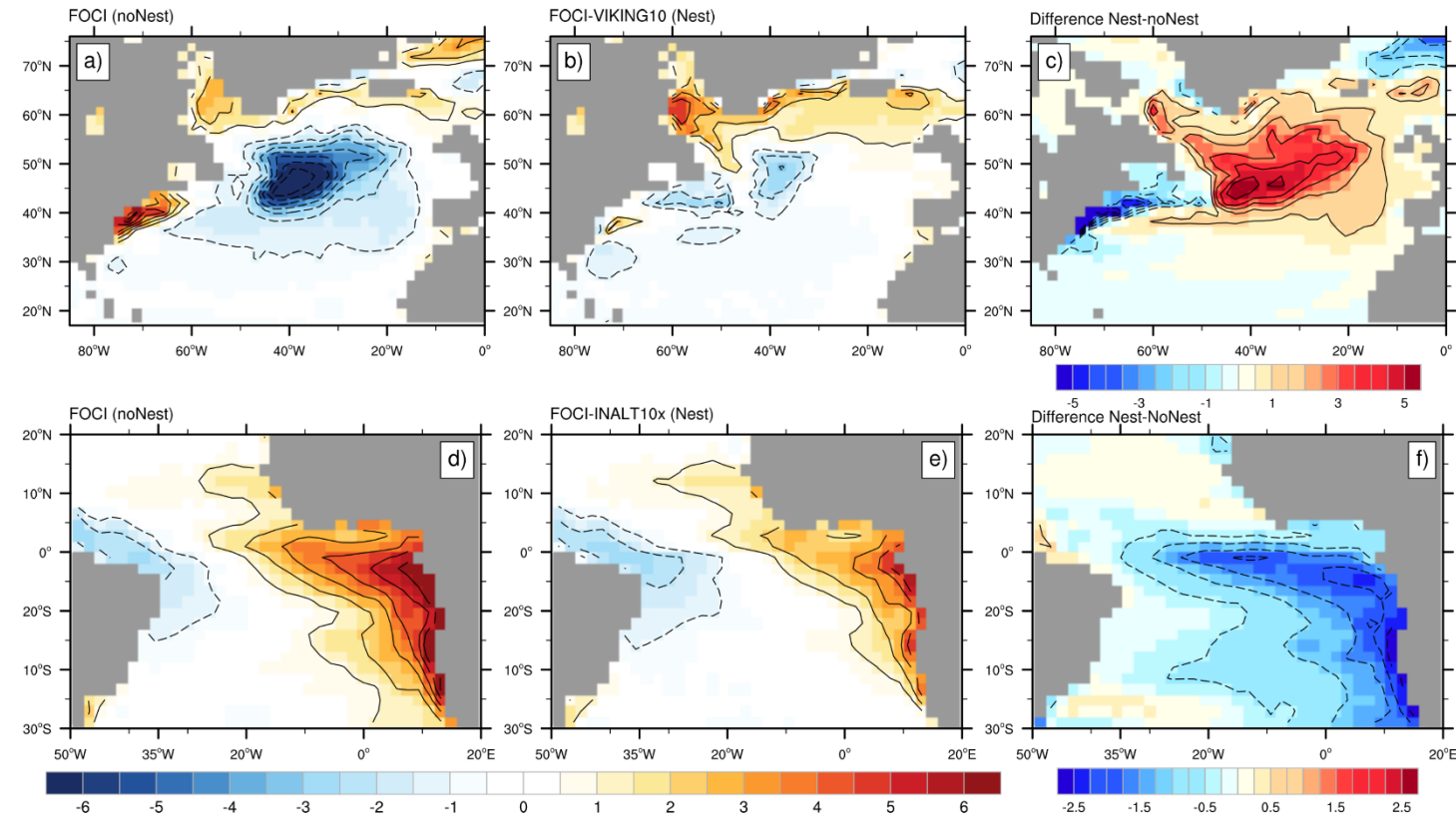
Reduction of SST bias in coupled simulations



unnested

nested

nested - unnested



[Matthes et al. in prep]

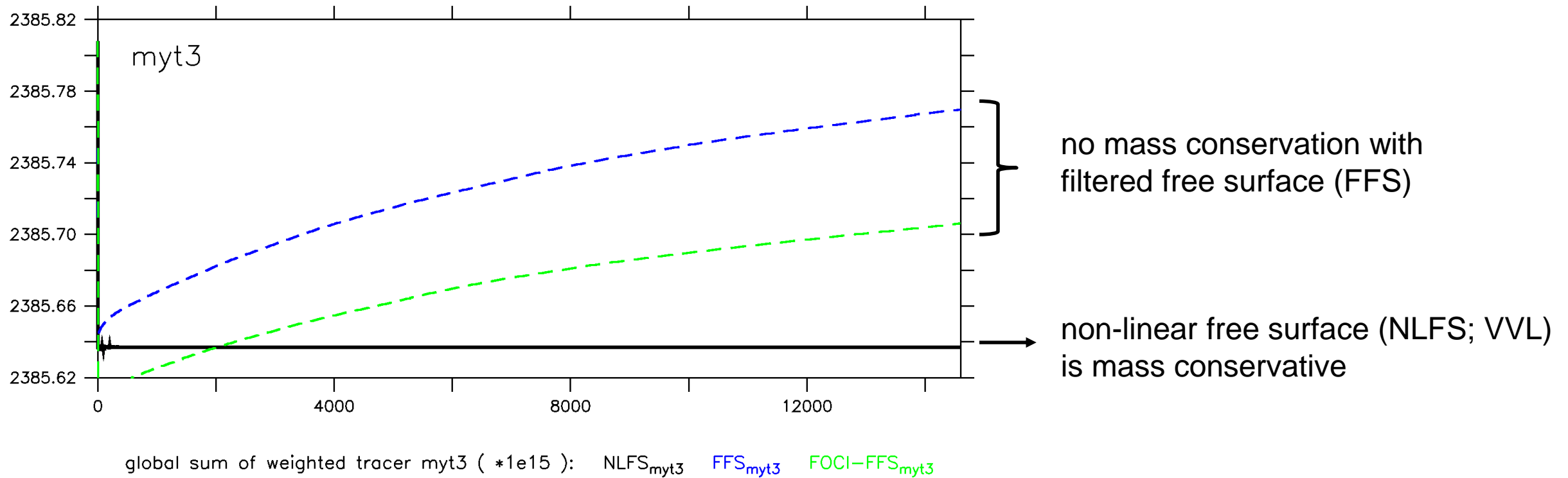
insights

“what is working fine with NEMO...”

requirements

“...and also what is not”

Centennial scale simulations with biogeochemical tracers



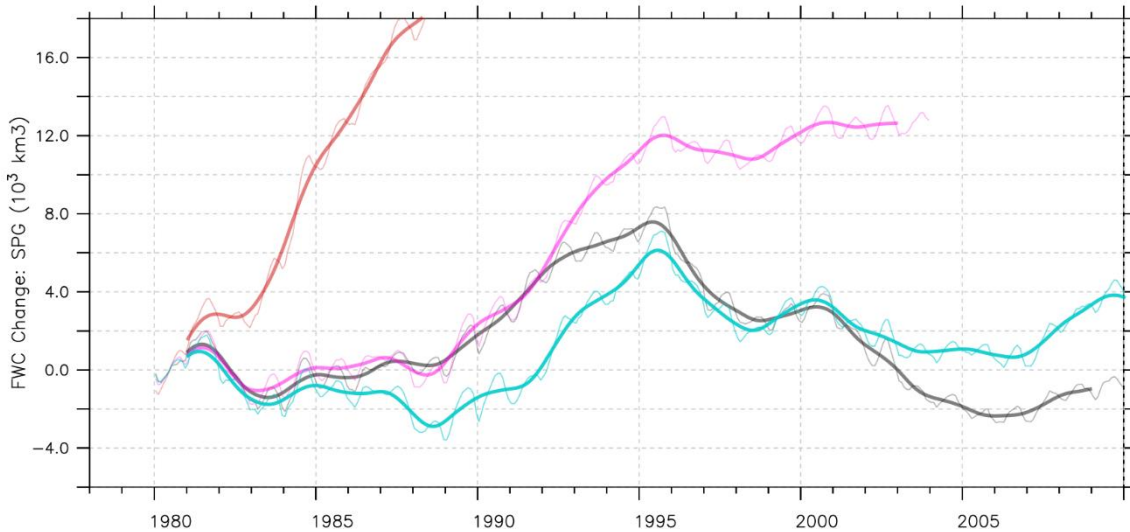
Centennial scale simulations with biogeochemical tracers (and simulation of tides)

→ **VVL** option AGRIF compatible

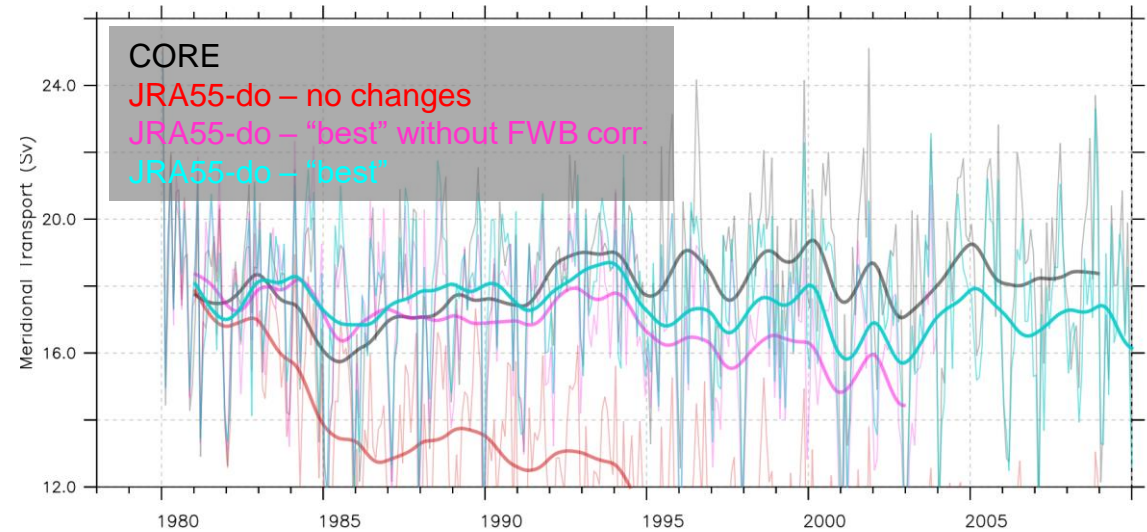
Centennial scale simulations with biogeochemical tracers (and simulation of tides)
→ VVL option AGRIF compatible

Change forcing from CORE to JRA55-do

Freshwater Content Change
Subpolar North-Atlantic



AMOC Maximum between 36.0°N and 47.0°N



Test-integrations in ORCA025 show the necessity to correct the fresh water budget (FWB) to get stable simulations.

Centennial scale simulations with biogeochemical tracers (and simulation of tides)

→ **VVL** option AGRIF compatible

Change forcing from CORE to JRA55-do

→ **FWB correction** also necessary with AGRIF

Centennial scale simulations with biogeochemical tracers (and simulation of tides)

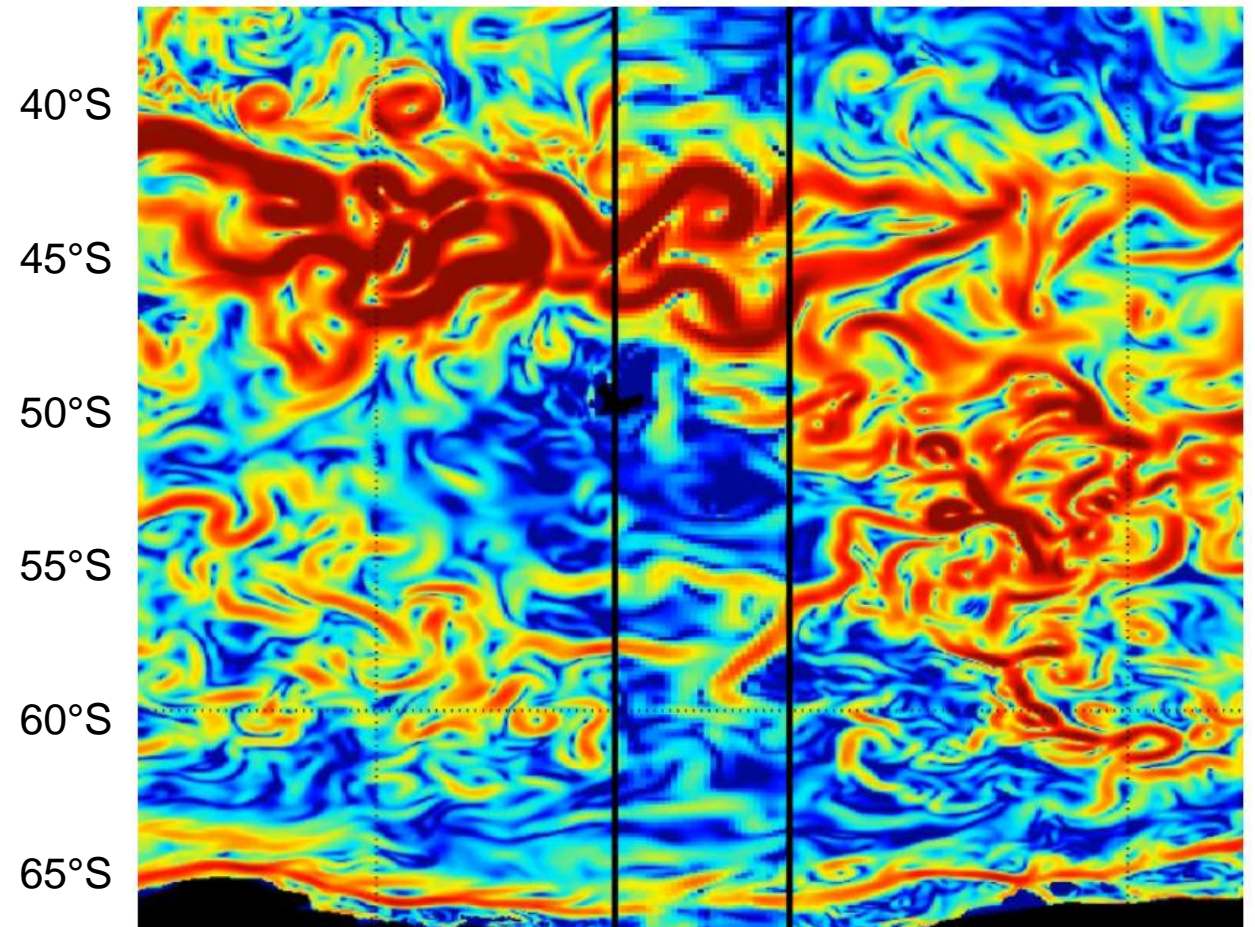
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Change forcing from CORE to JRA55-do

→ **FWB correction** also necessary with AGRIF

Circumpolar Southern Ocean nest

ORION12



73°E

[Patara et al. 2016]

Centennial scale simulations with biogeochemical tracers (and simulation of tides)

→ **VVL** option AGRIF compatible

Change forcing from CORE to JRA55-do

→ * **FWB correction** also necessary with AGRIF

Circumpolar Southern Ocean nest

→ **Crossing the cyclic boundary**

The nested simulations become more and more expensive

→ * **Land processor elimination** AGRIF compatible

* ...we started to work on fixes for these issues (with contributions from the system team)... no working solution yet.