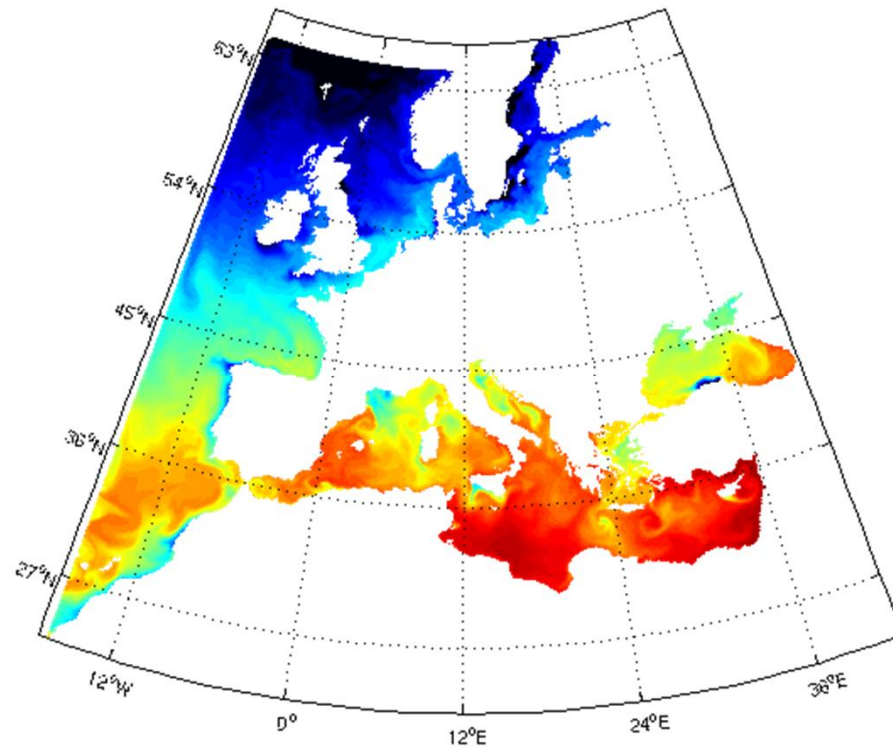


Next generation pan-European coupled Climate-Ocean Model

L. Jonasson, P. Berg and J. W. Poulsen, J. Murawski, J. She, T. Tian



Motivation

Research purposes

- Homogenised Operational forecast on a Pan-European scale (boundary condition, mme, ...)
- Address pan-European and regional aspects of climate change
- Provide a modelling tool capable of handling seamless forecast and interbasin exchange

Policy makers

- Homogenised product for EU agencies
- Provide a modelling tool to serve future GMES climate and marine services

...and

- Fairway design and ship routing

Ocean-wave



Ocean-atm



Pan European scale



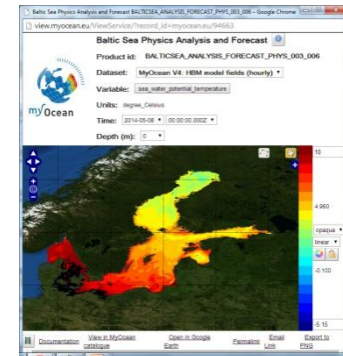
Key technical requirements

- Mature and high quality operational ocean model
- High resolution in regional seas
- Very high resolution in straits and channels
- Good HPC capabilities

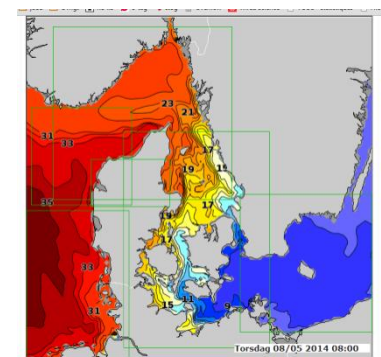
HBM (HI ROM-BOOS model)

- Implemented as operational forecast model at DMI for > 10 years and provides forecasts for MyOcean-Baltic
- 2-way nesting capabilities
- Good HPC performance (openMP, MPI, Vec.)
- Tidal potential
- Ice module
- Continuously developed and validated in the HBM community

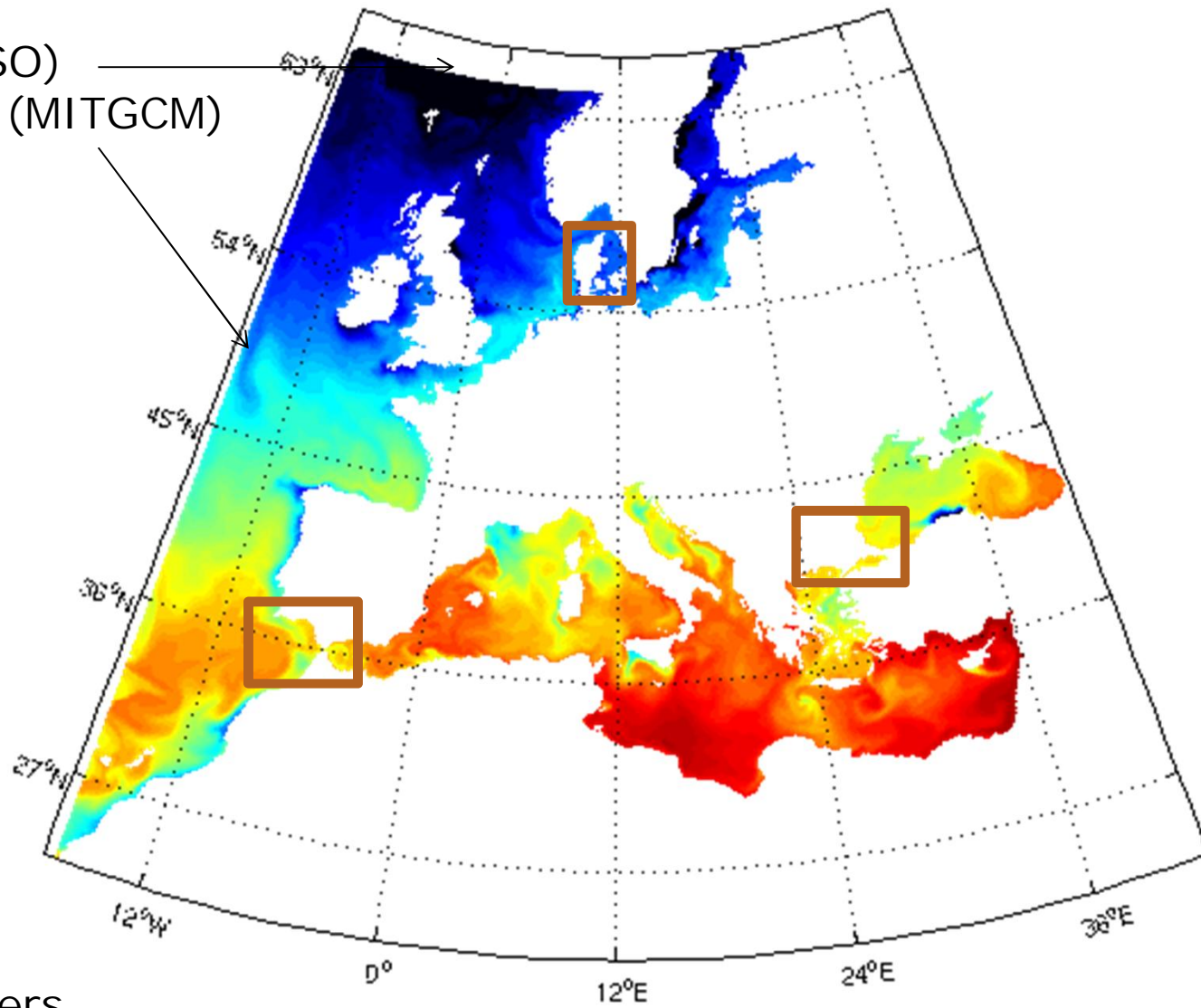
MyOcean



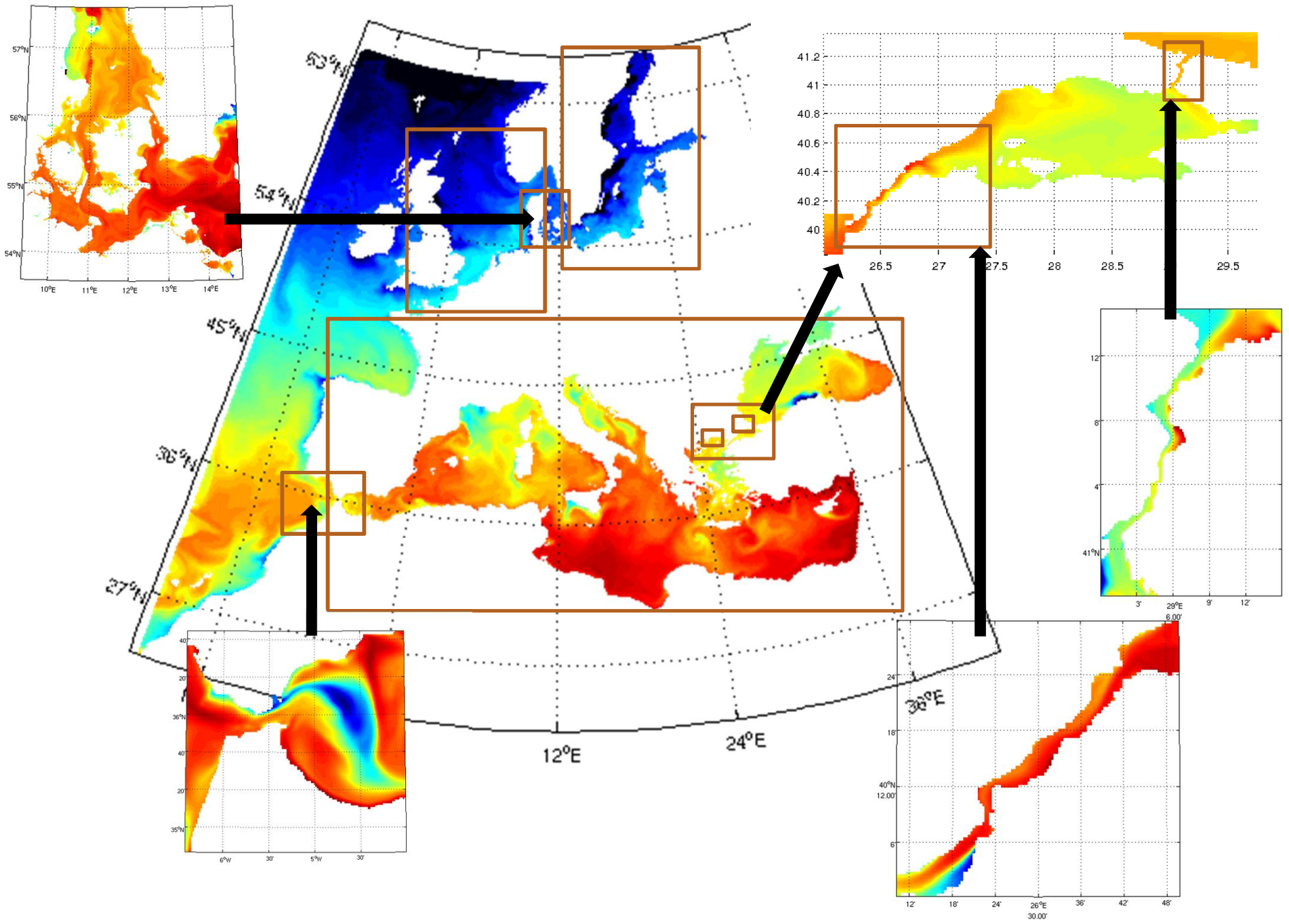
Dmi.dk



Tides (AVISO)
Montly S/T (MITGCM)



100+ rivers
(EHYPE, HBV, CLIM)



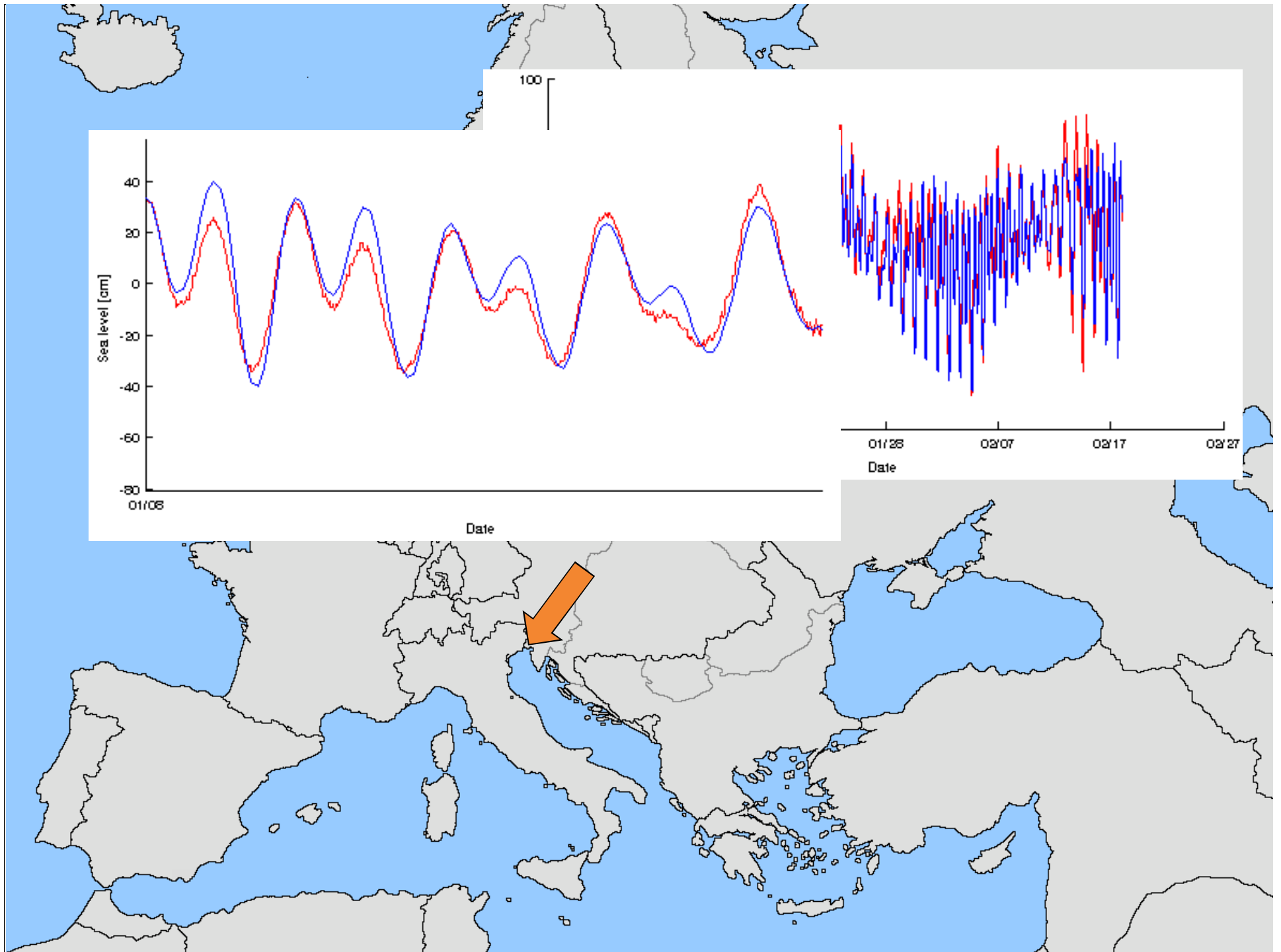
Short term goals

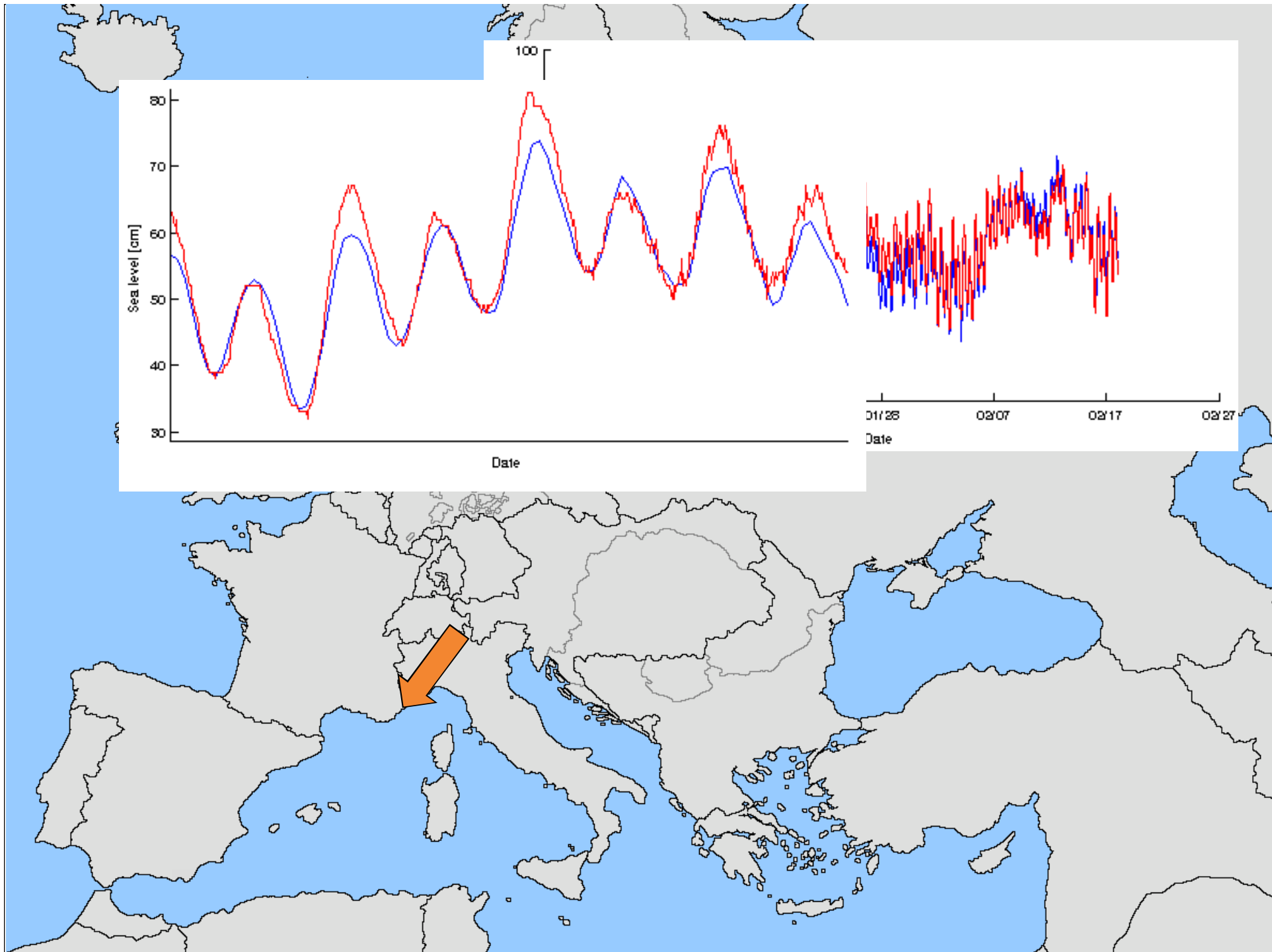
- Good regional forecasts on a Pan-European scale
- Improved interbasin connections
- Correct general circulation
- Realistic time consumption for 5-days forecast

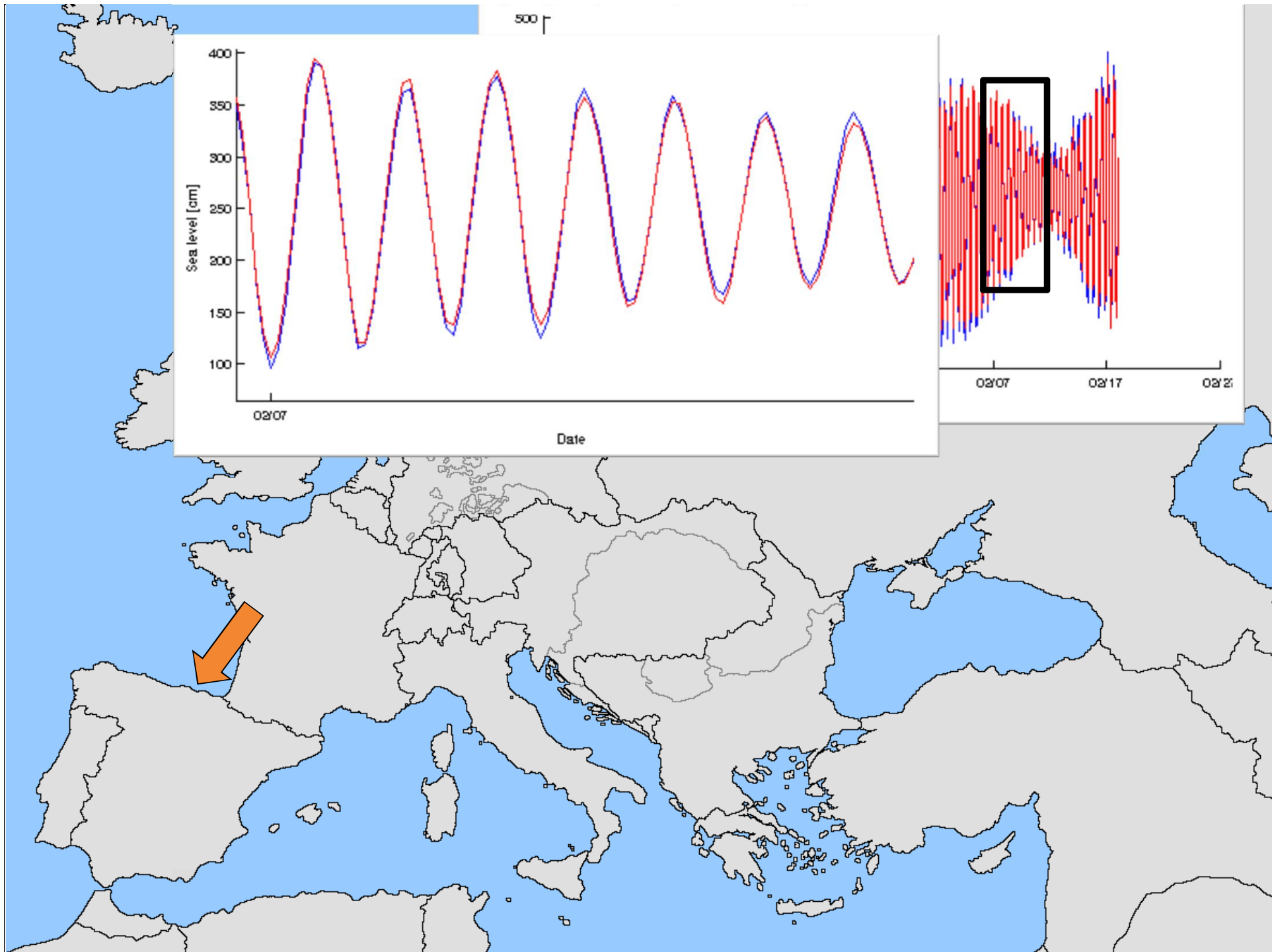
First test simulation:

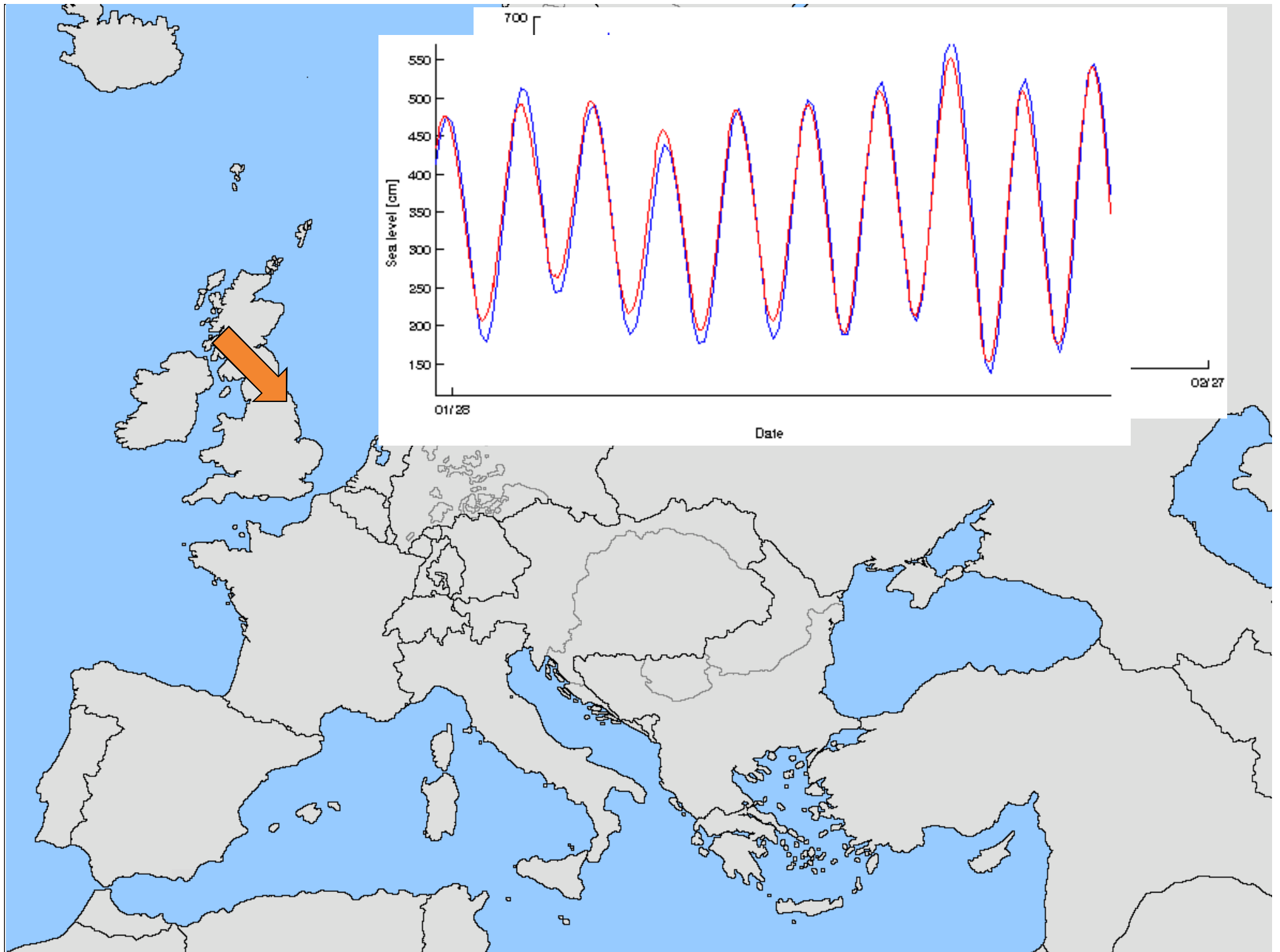
- Spinup 20060601-20070101 (Half a year)
- Start: 20070101 -
- Metforcing: DMI-HIRLAM, 15km hor. Res., 3 h temporal res.
- Init fields MITGCM

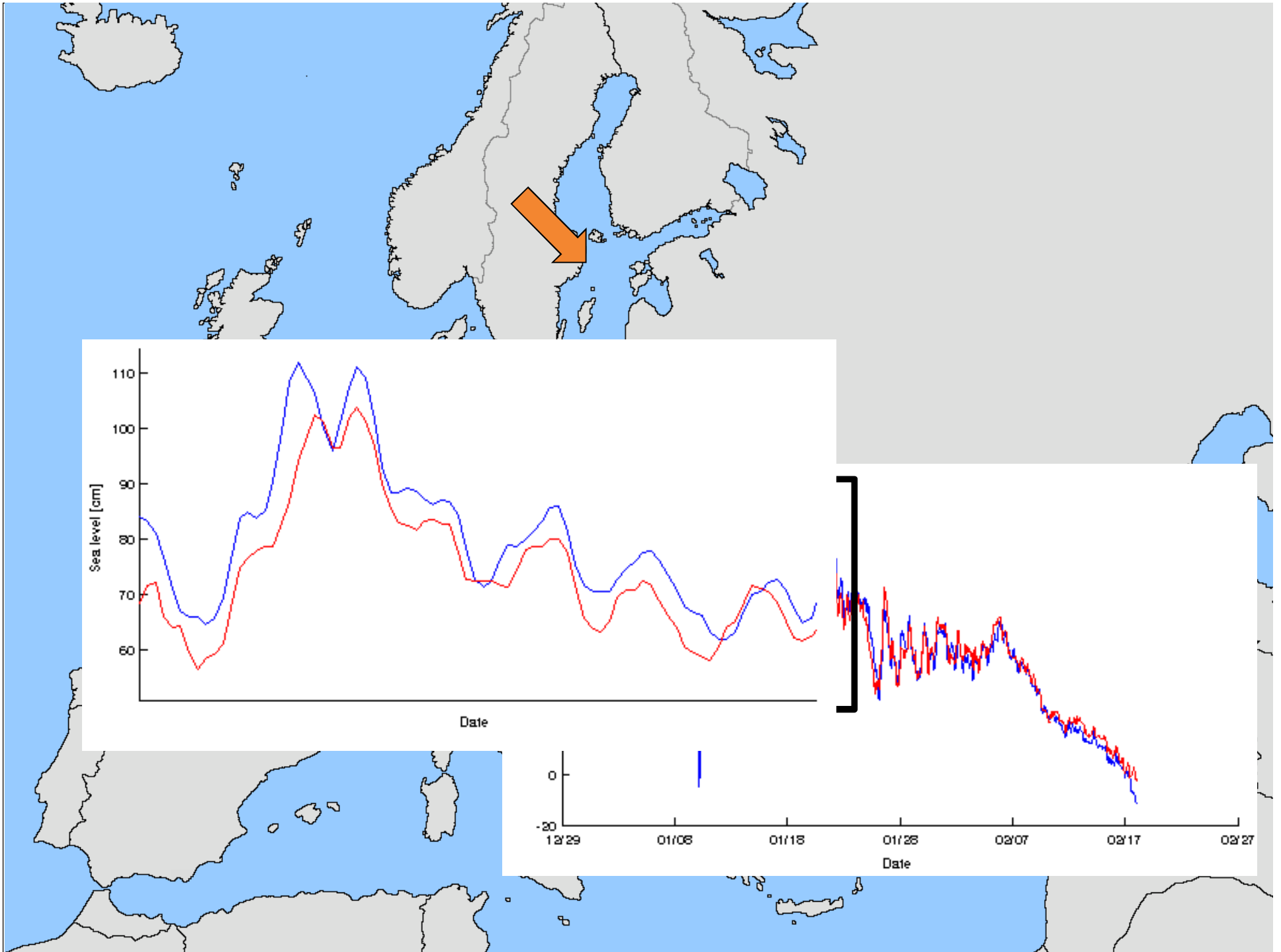
Good regional forecasts on a
Pan-European scale



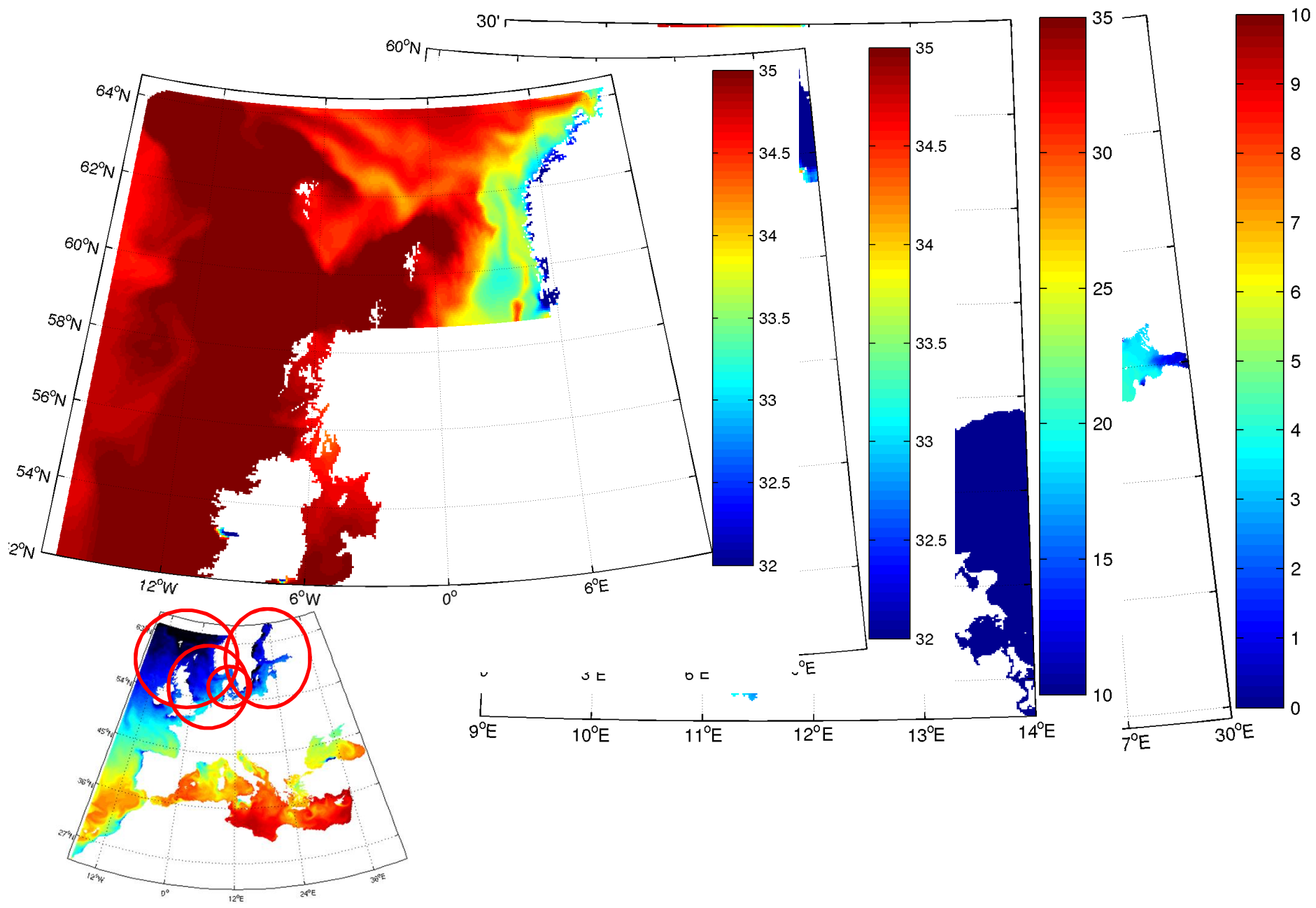


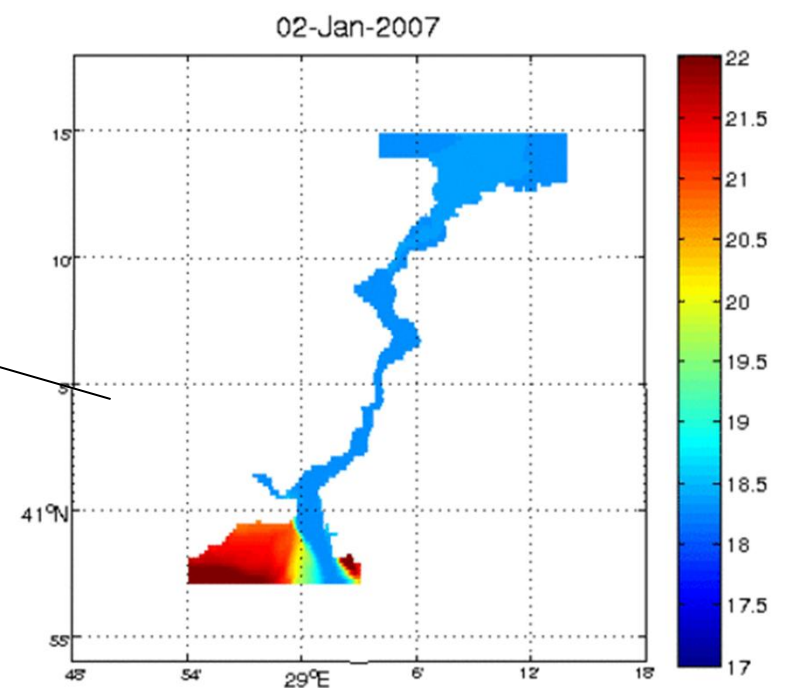
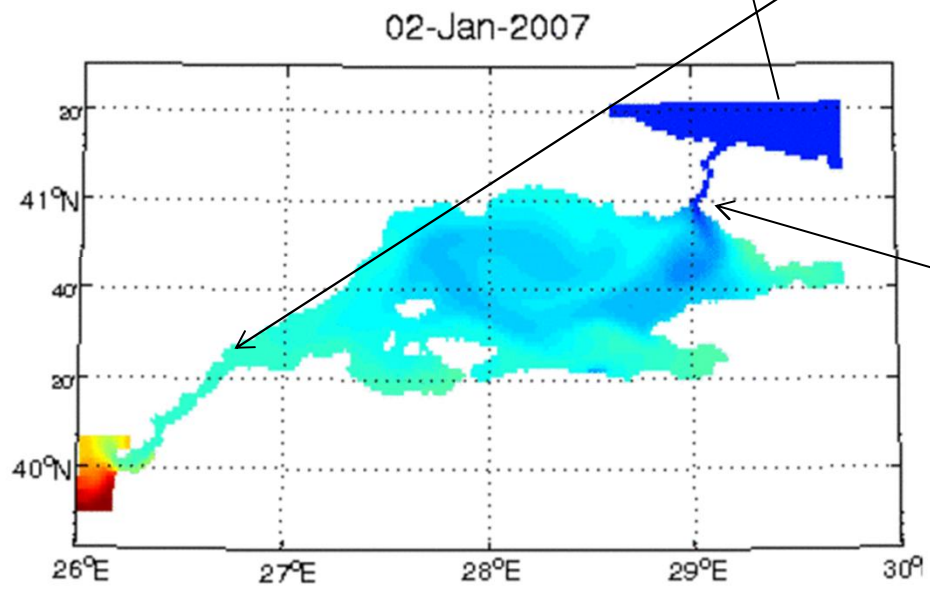
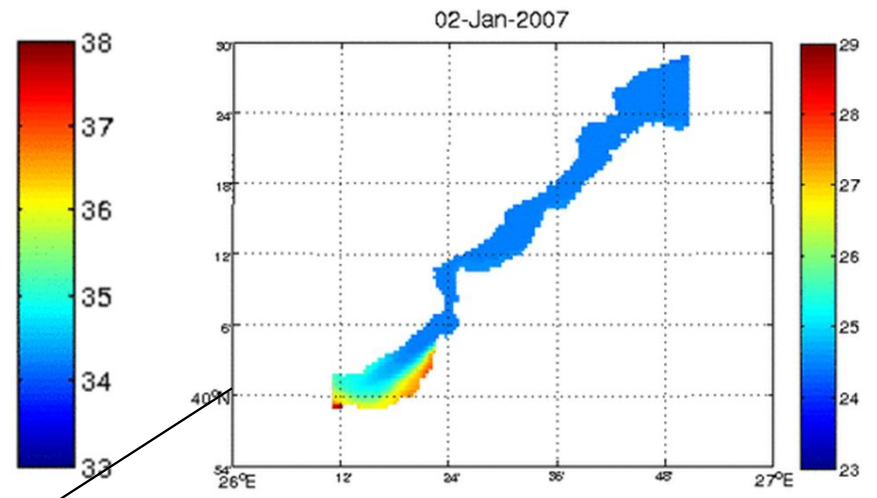
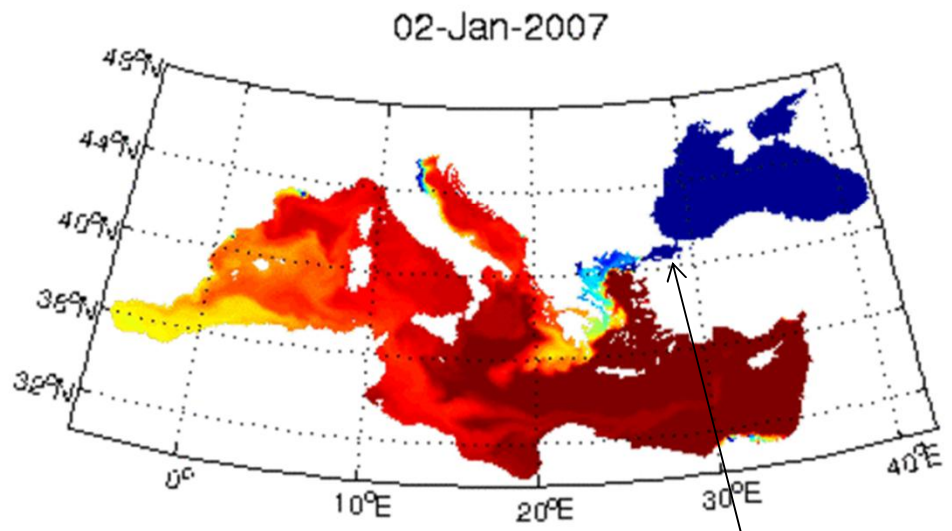


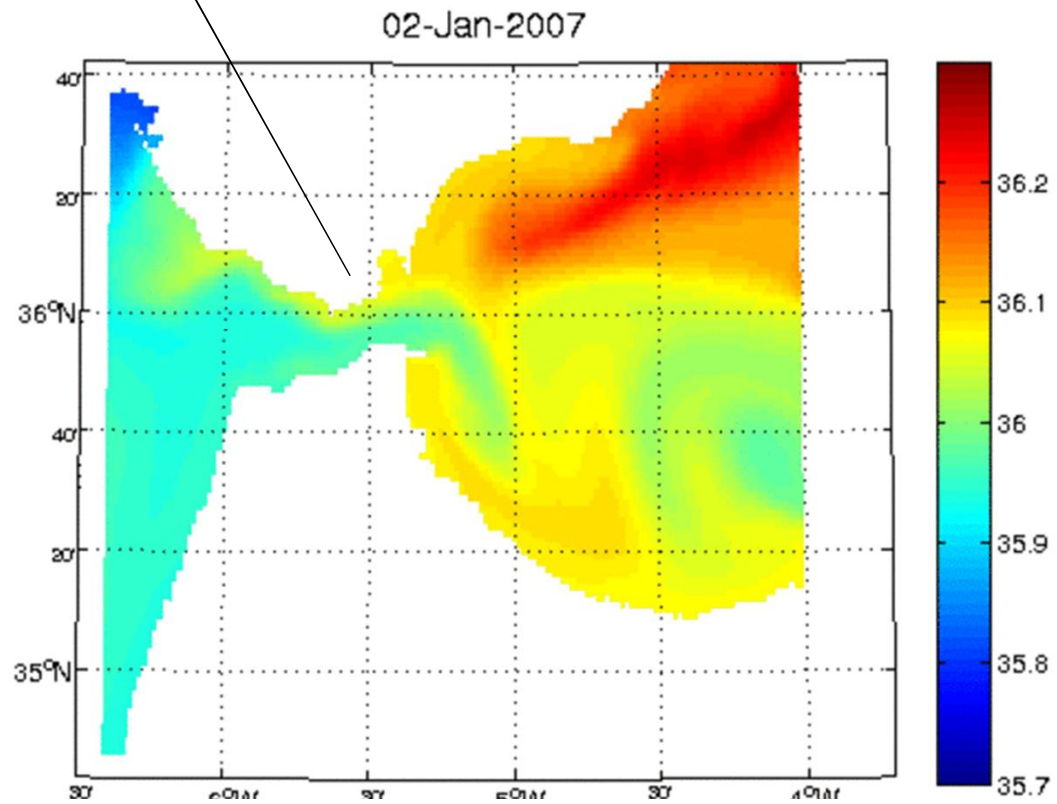
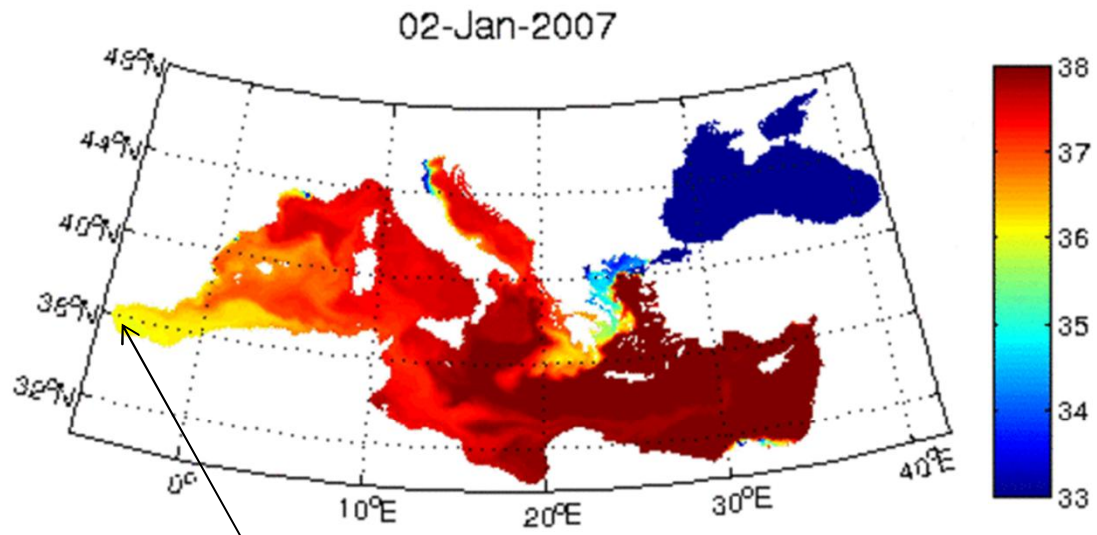




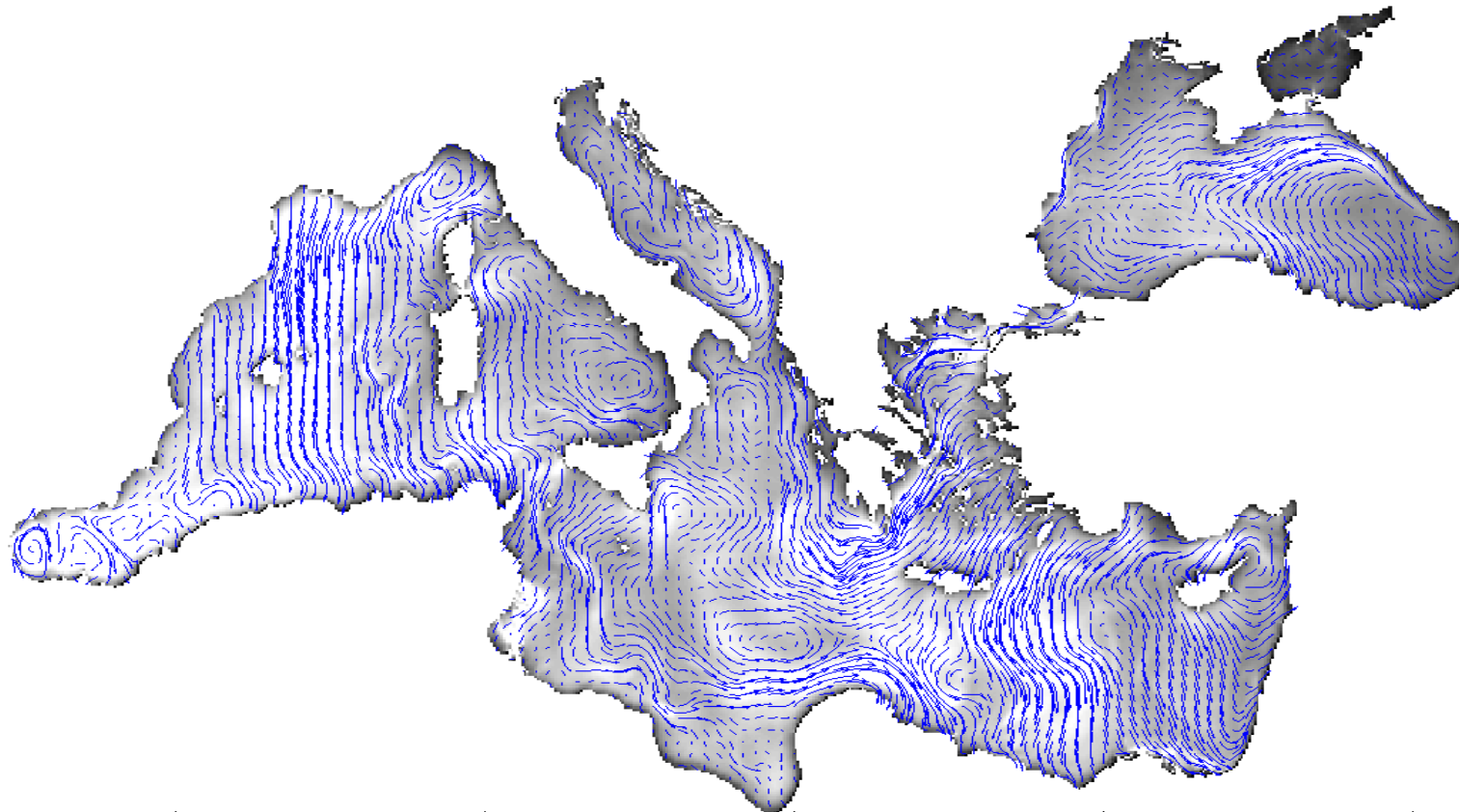
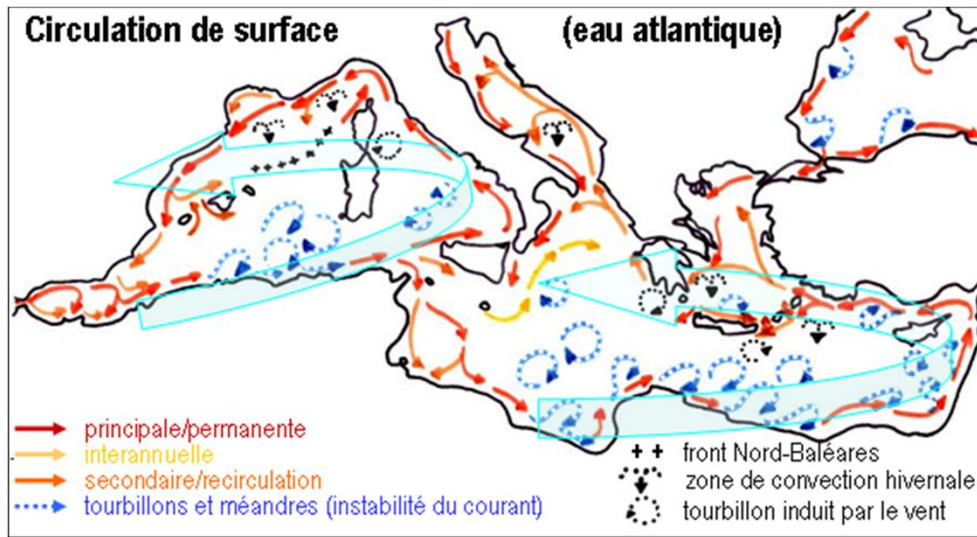
Interbasin connections

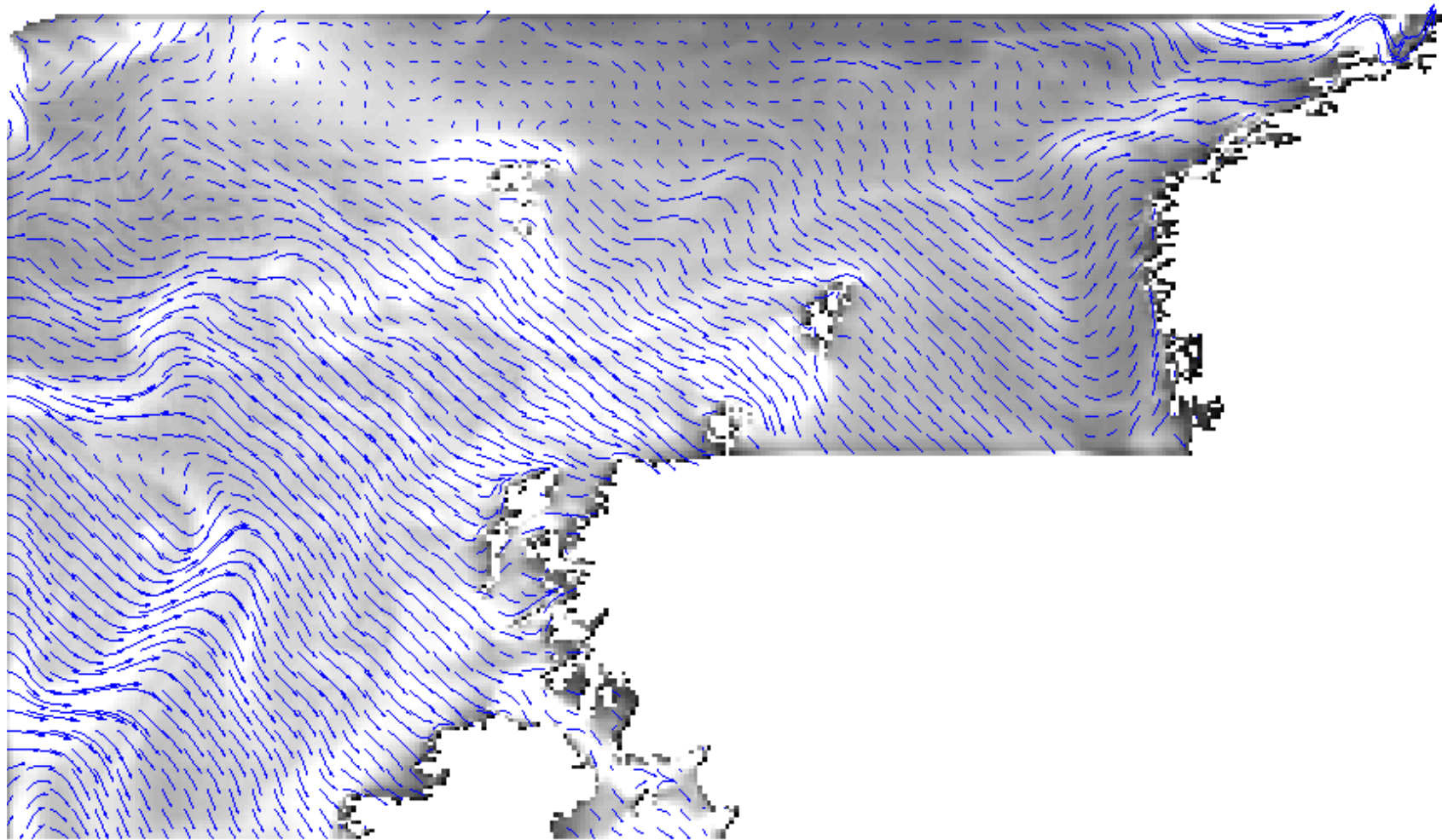


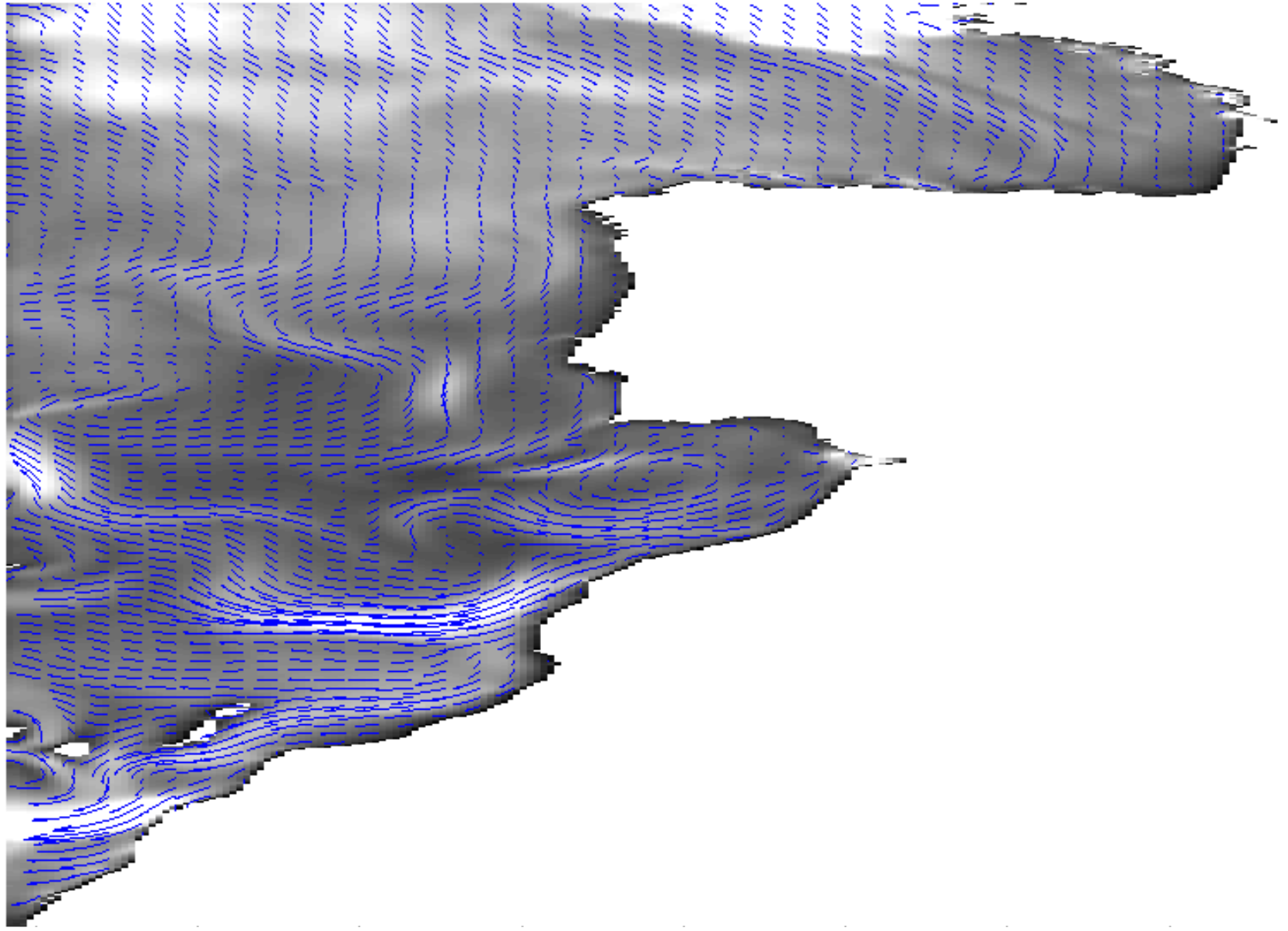


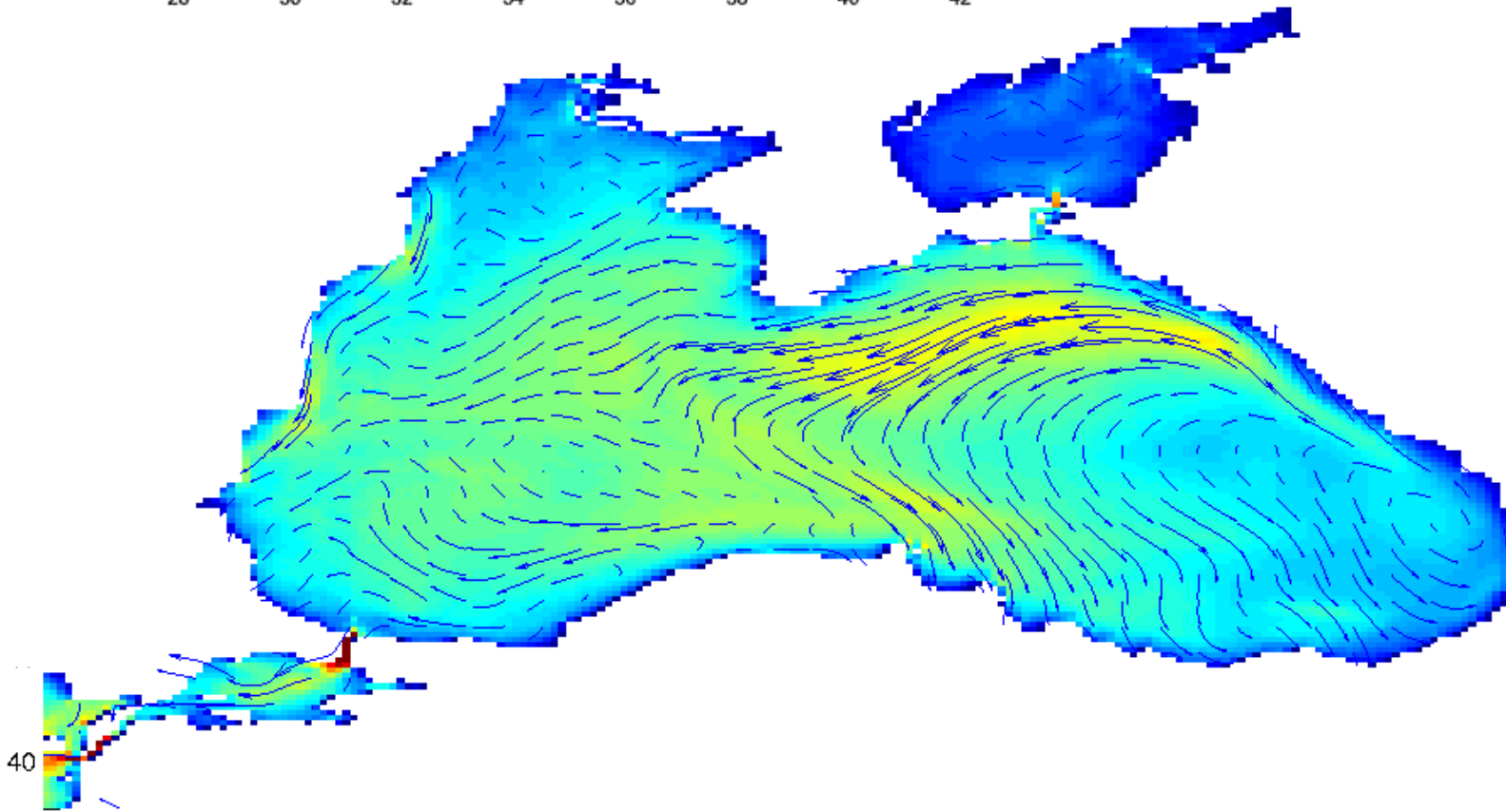
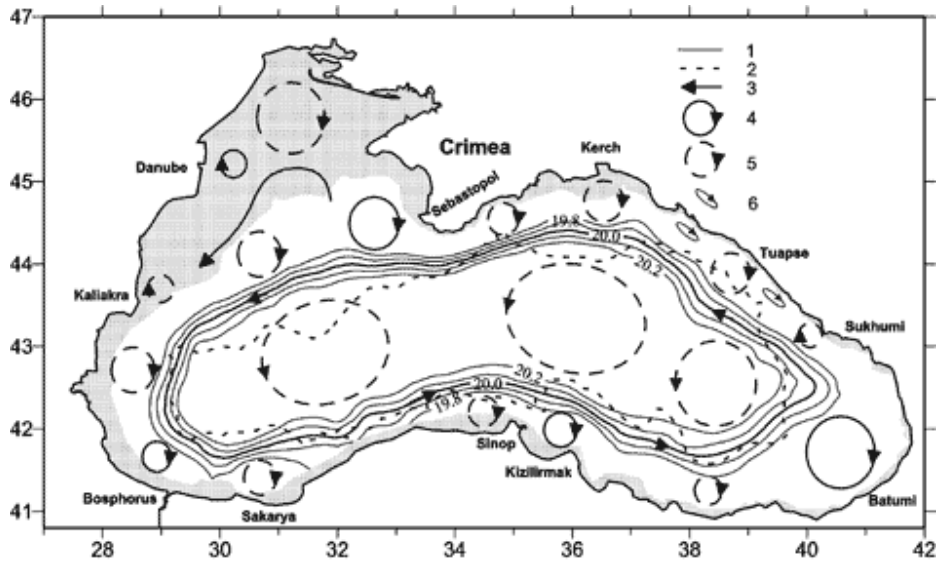


General circulation











Time consumption

On DMI's in house computer:

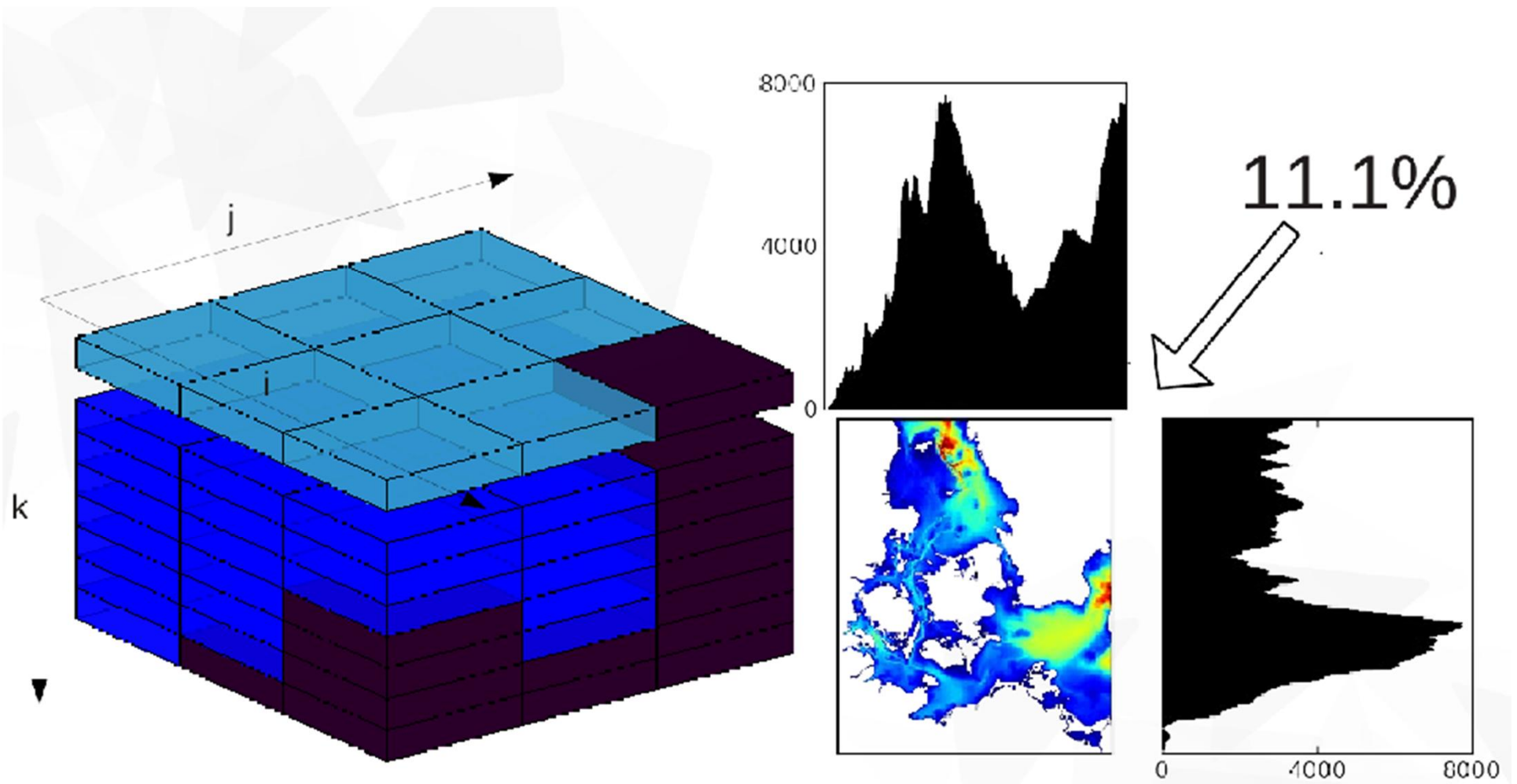
2.5h / 5 day forecast
(360 cores)

Modern computers
(Ivy bridge):

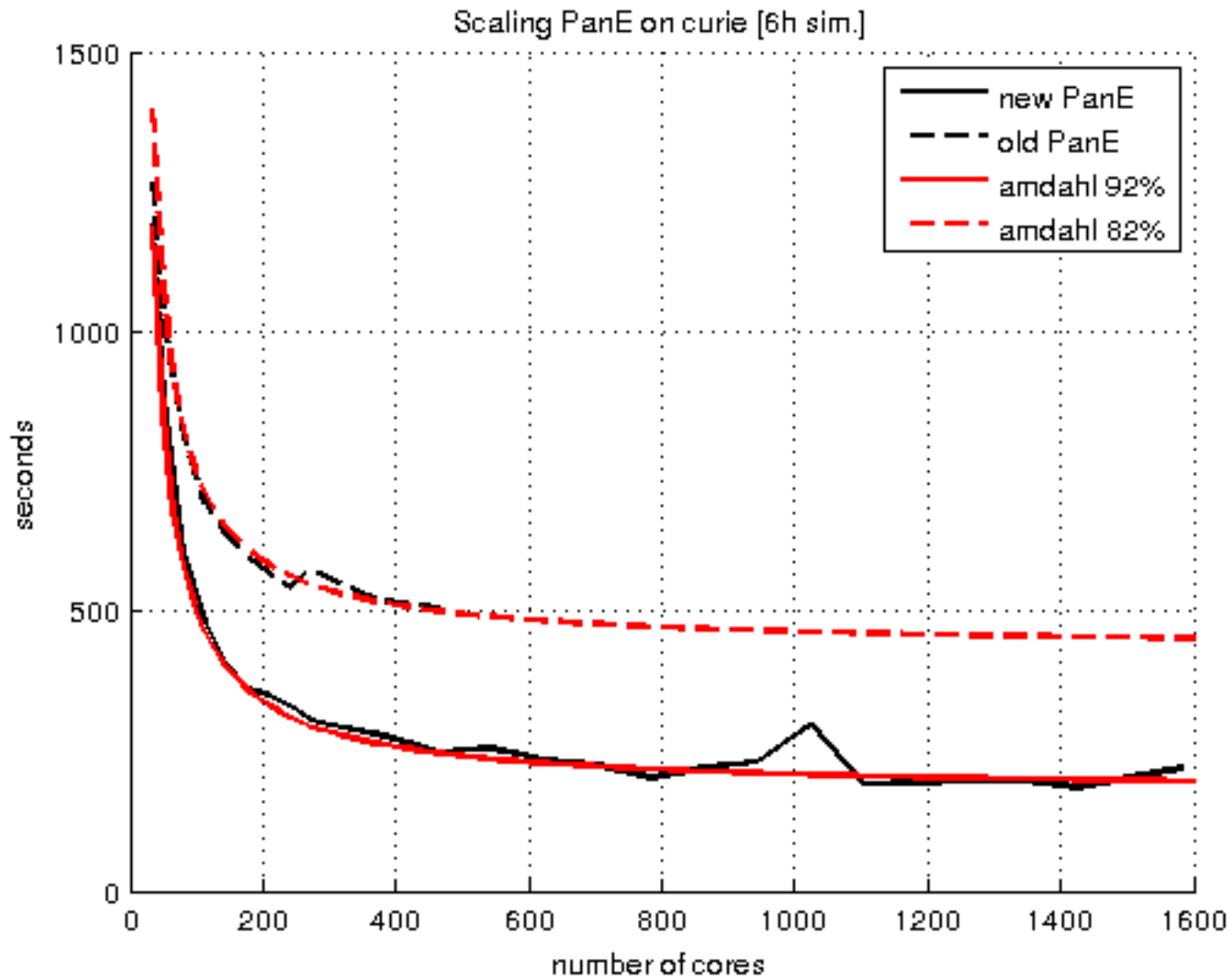
< 1.5h / 5 day forecast
(360 cores)

Scaling up to at least 1600 cores > we can do it faster!

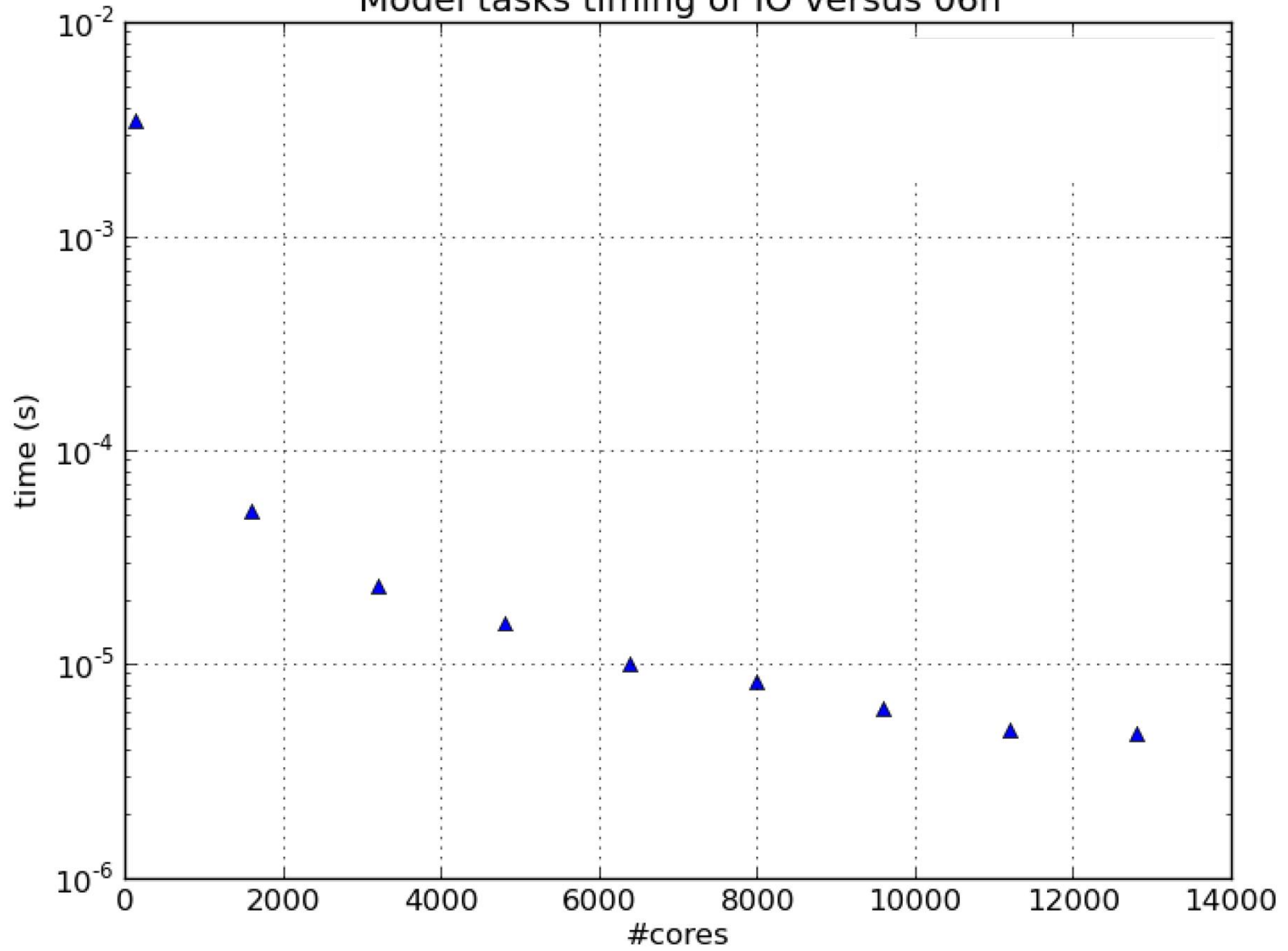
Model efficiency



Scaling



Model tasks timing of IO versus 06h

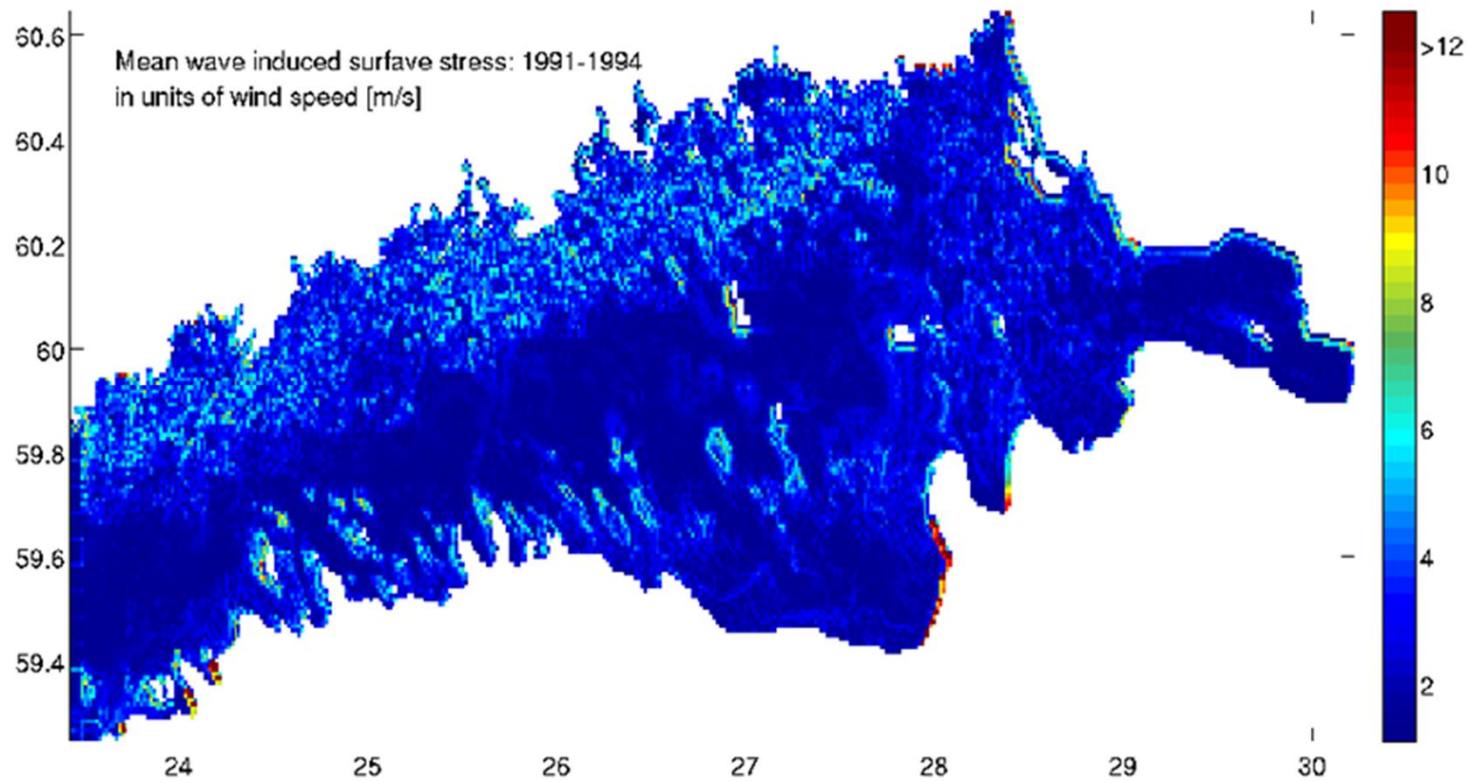


Future

- Validate – Short term
- Validate – Long term
- Couple Ocean – atmosphere (waves)
- HBM research agreements with contributing partners



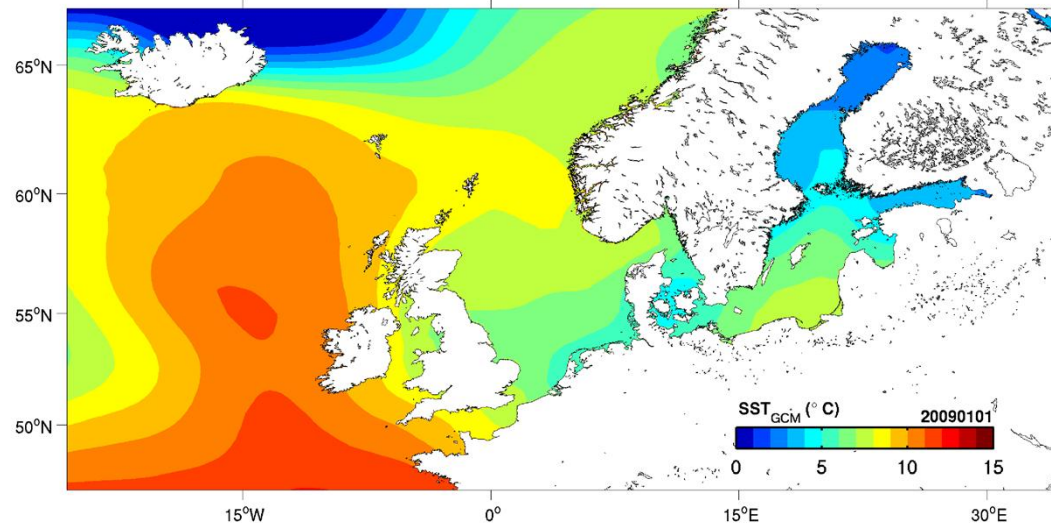
Ocean-Wave coupling





Ocean-atmosphere coupling

GCM only



GCM + RCM
+ HBM

