

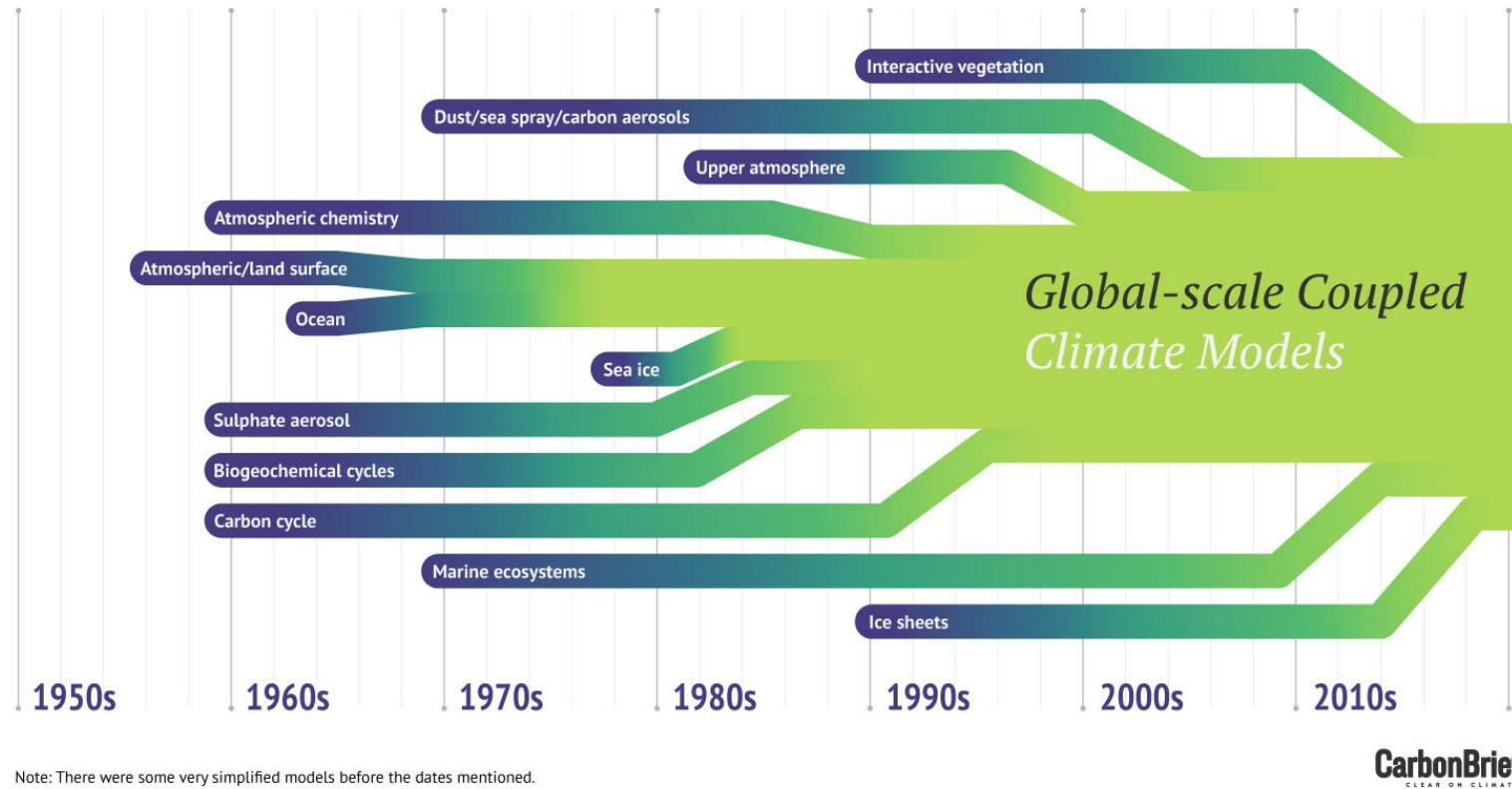


Workshop/Training on

Software-engineering aspects of composed Earth System Models

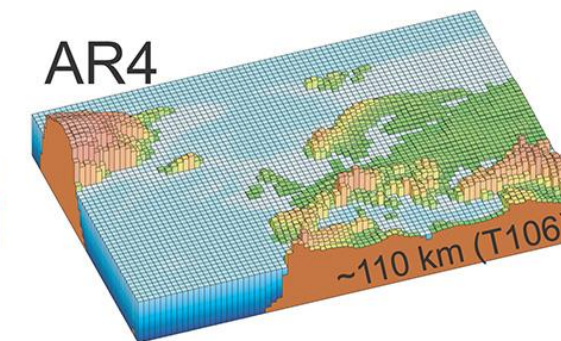
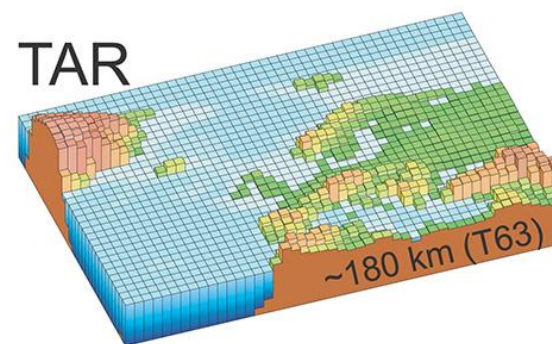
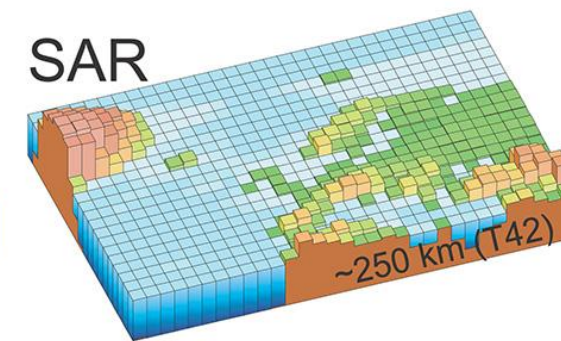
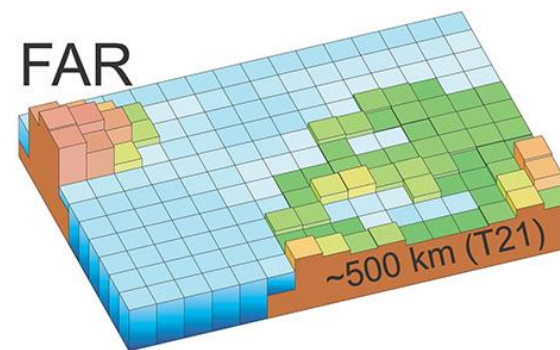
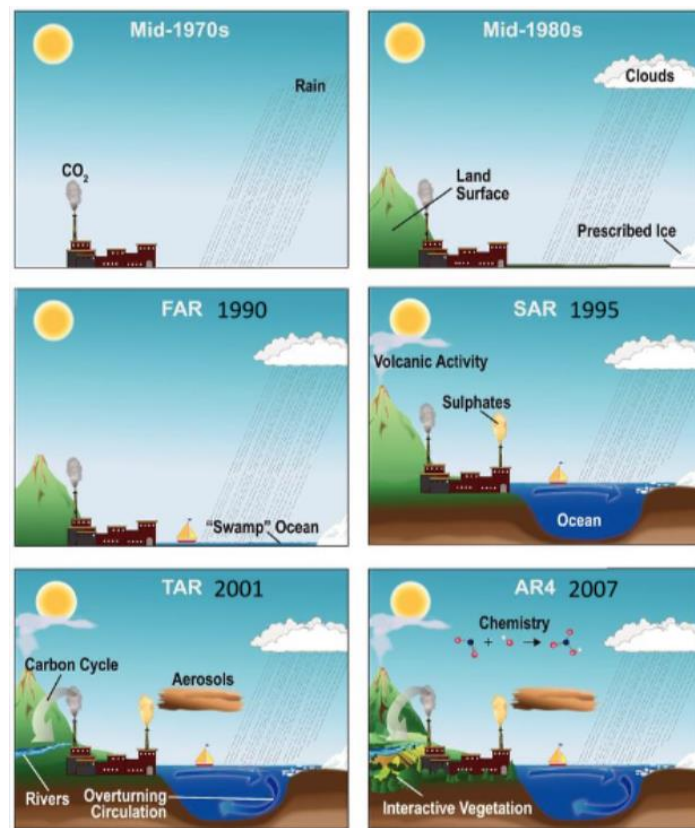
Hendryk Bockelmann (DKRZ)

Why natESM support and training?



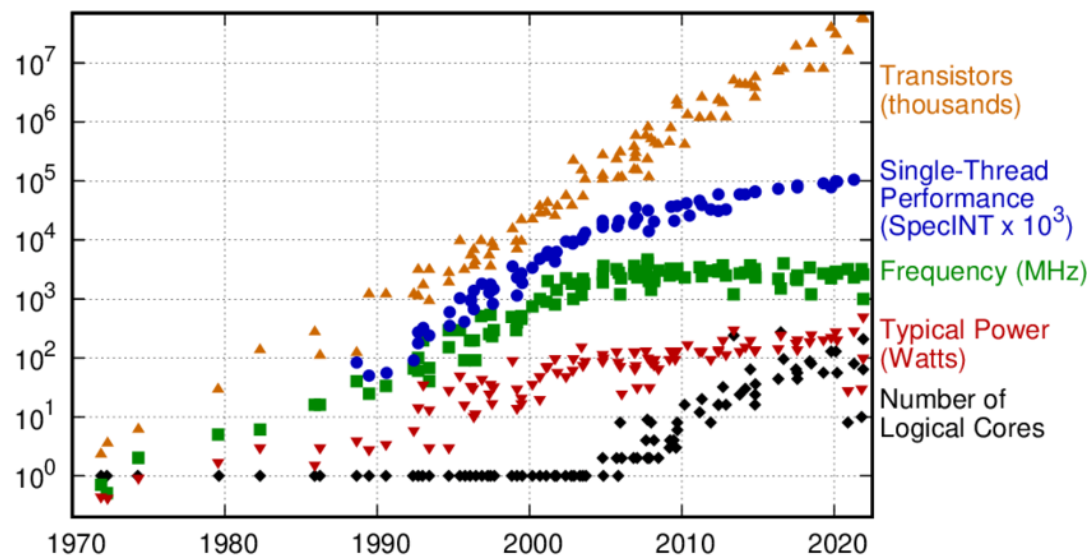
Coupled climate models are becoming increasingly complex ...

Why natESM support and training?

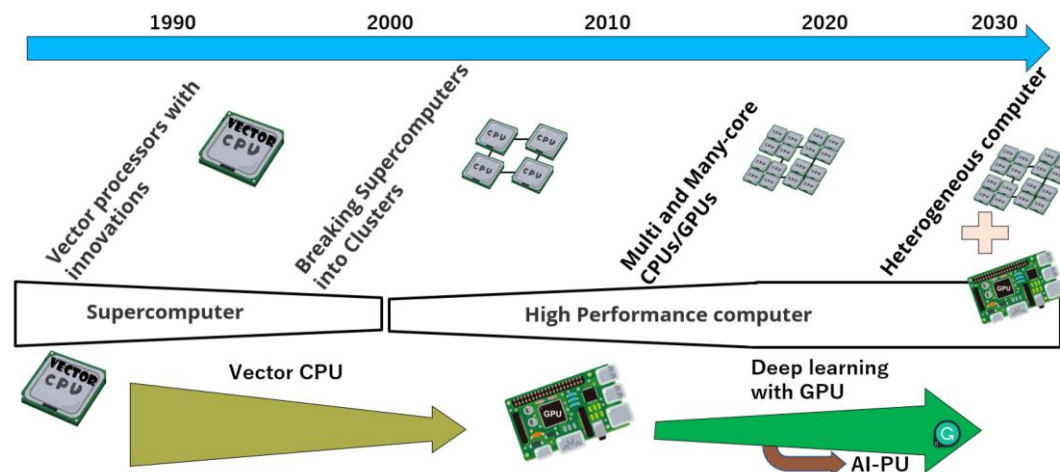


... in terms of resolved processes/compartments and resolution

Why natESM support and training?



Original data up to the year 2010 collected and plotted by M. Horowitz, F. Labonte, O. Shacham, K. Olukotun, L. Hammond, and C. Batten
 New plot and data collected for 2010-2021 by K. Rupp



High-Performance Computing in Meteorology under a Context of an Era of Graphical Processing Units,
<https://doi.org/10.3390/computers11070114>

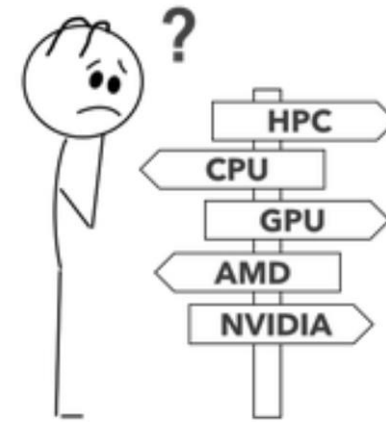
At the same time, an improvement in computing power through processor/chip design is only possible with new architectures

Why natESM support and training?

⇒ ESM must be co-developed with RSEs specialised in HPC architectures

⇒ ESM must allow for easier coupling/composition

This is why we are here these days ...



What natESM sprints achieved so far

Model	Scope	Status
ICON-Art	Analysis of ART code for GPU porting	Closed
ICON-mHM-YAC	Online coupling mHM into ICON using YAC	Closed
FESOM	Port FESOM 2.1 to JUWELS booster and Levante- GPU	Closed
ParFlow	Port ParFlow to AMD GPUs, Inspection of RAPID Memory Manager and Hipification, Performance Analysis	Closed
MESSy	Optimise the data transfers between host (CPU) and device (GPU)	Closed
ESMValTool	Updating the remaining non-lazy preprocessor functions to be memory efficient AND updating ESMValCore	Ongoing
HAMOCC	concurrent HAMOCC on GPU	Ongoing
MESSy-ComIn	couple the Modular Earth Submodel System (MESSy) to ICON via the ICON Community Interface (ComIn)	Ongoing
LAGOON (CLaMS, MPTRAC)	develop a concept and provide a first implementation of a framework for Lagrangian transport modeling	Ongoing

Schedule

Today until ~18:00

- (Classical) Coupling with ICON
 - ICON-CLM example
 - The YAC way – presentation and hands-on
 - Coffee break at 15:00

Tomorrow from 10:00 to 17:00

- Before lunch
 - The (old) MESSy way and the new ComIn way for tight interfaces
- After lunch
 - Using YAXT to enable easier inter-node communication and advanced model composition

Housekeeping

- Dinner (from 18:00 on) and Lunch (tomorrow 12:30) in the other room
- Coffee breaks are flexible
- Wifi access
 - eduroam
 - SSID “natESM-Workshop” with pswd “DKRZ_esm_2023”

This training/workshop is meant to be interactive. Although the speakers prepared nice slides, feel free to ask/discuss anytime.

Questions?