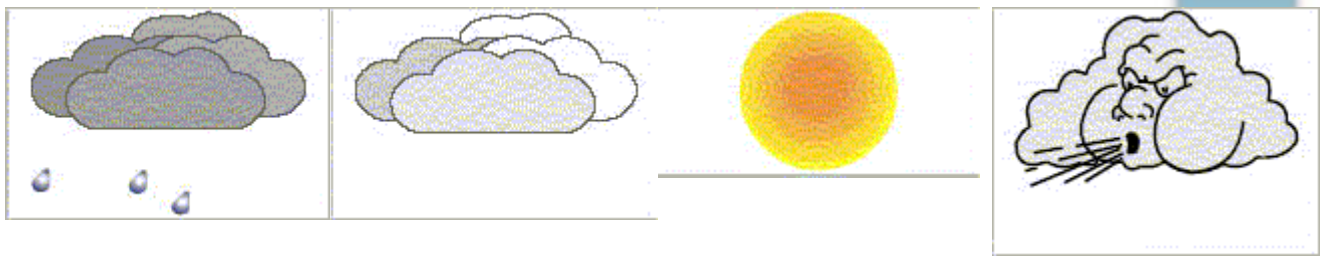
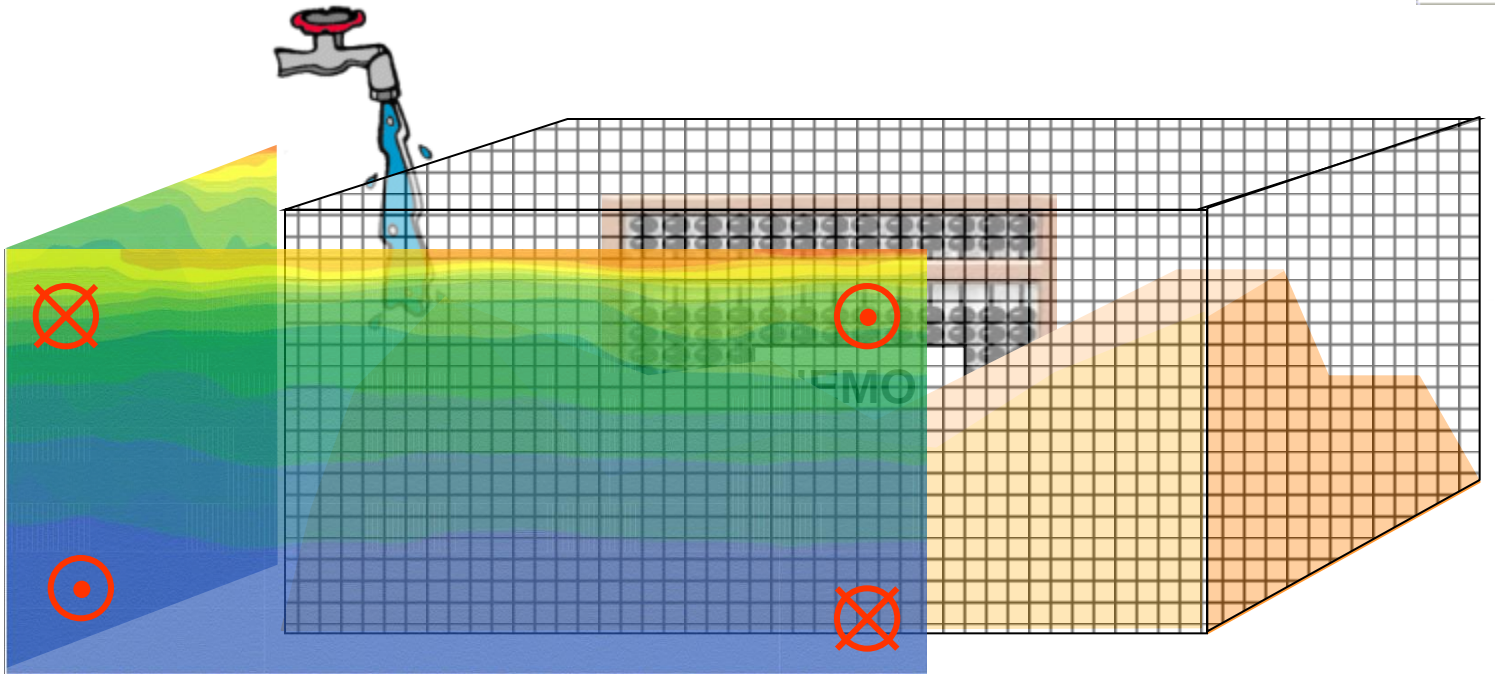
Numerical ocean model

Workshop IPEE/CLS - 3-FEB-2010

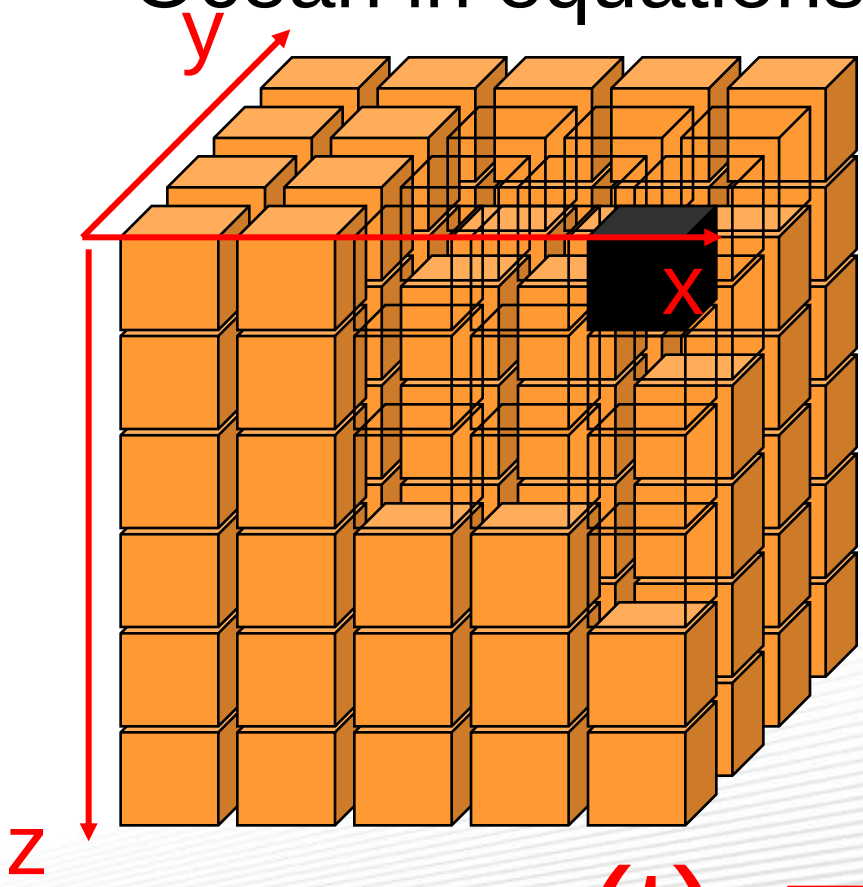
What is a numerical model?





Numerical modelling

- Ocean in equations



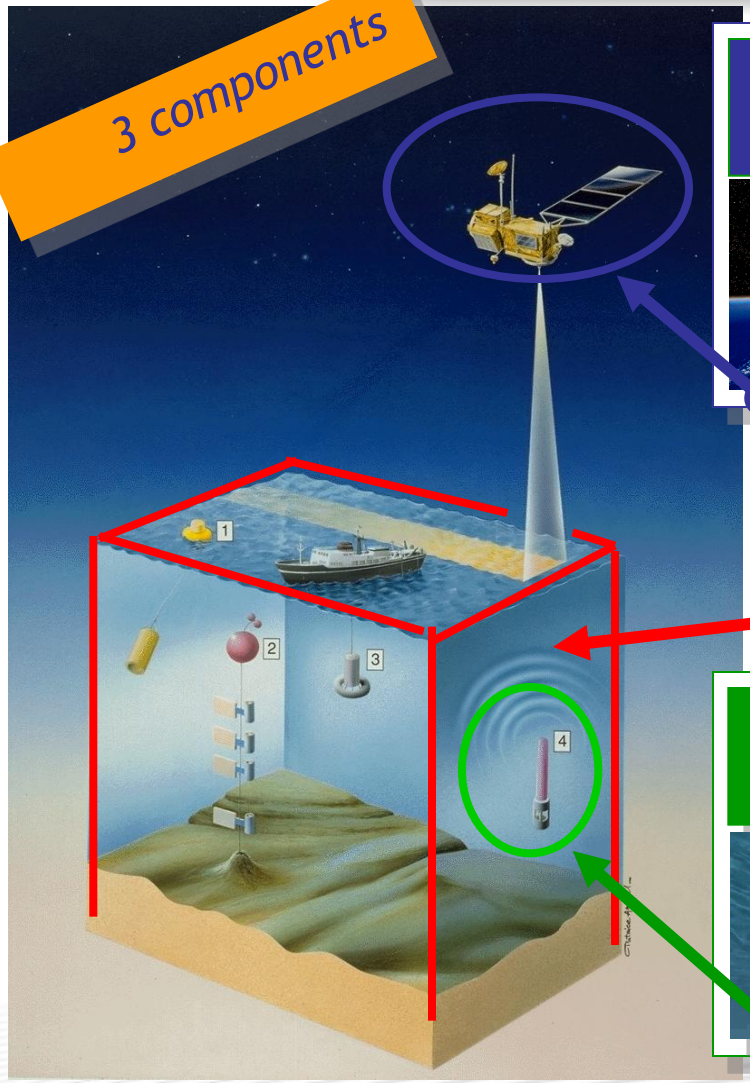
(Approximations of)
Equations of geophysical fluids

Coherence and extrapolation:

- **spatial** (« representation of a 3D fields »)
- **temporal** (« keep in memory… and forecast »)
- **inter-variables** (« measure temperature, deduce salinity, compute currents…»)

(t) → (t+1)

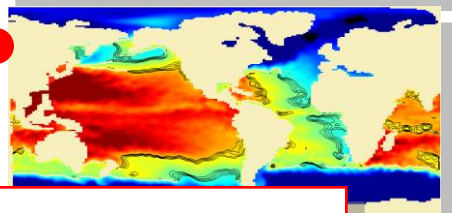
Integrated system



SATELLITE observation

SSALTO

MODELISATION ASSIMILATION

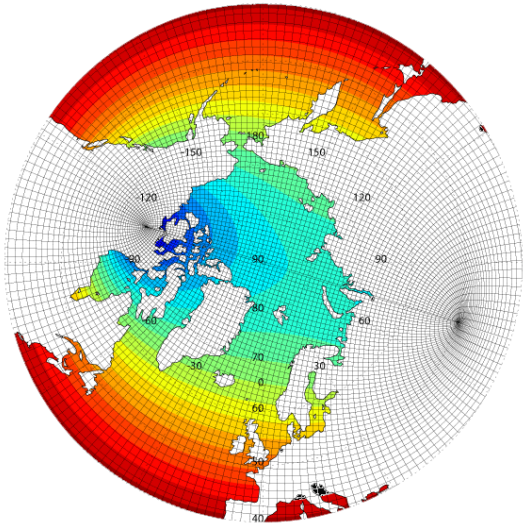


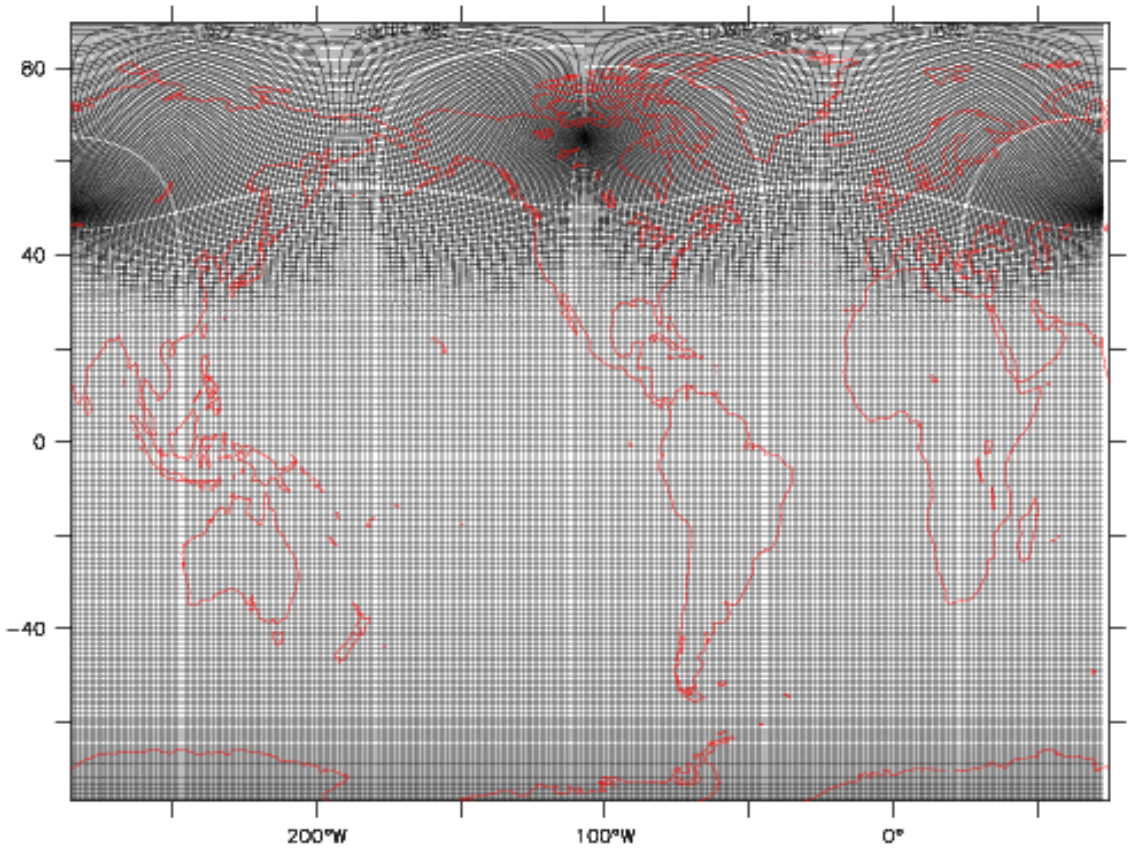
MERCATOR

IN SITU observation

CORIOLIS

Numerical grid





ORCA Global Grid

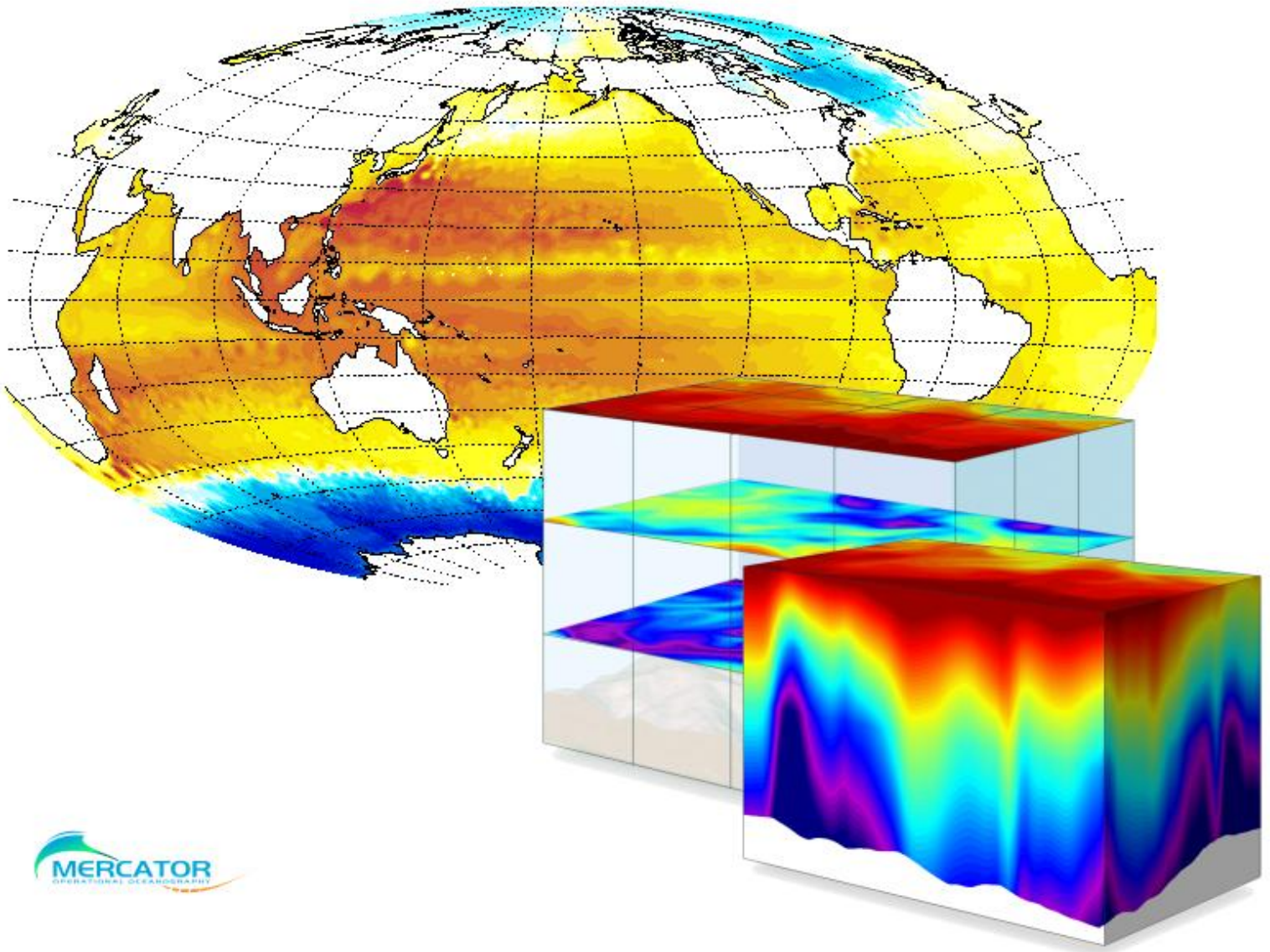
Ocean model

- Processes greater than the grid scale
  - Explicitly solved
- Processes sub grid scale:
  - Parameterized
  - i.e. vertical mixing horizontal mixing
- The higher the resolution the fewer parameterizations… but needs huge computation capacities

Limitations

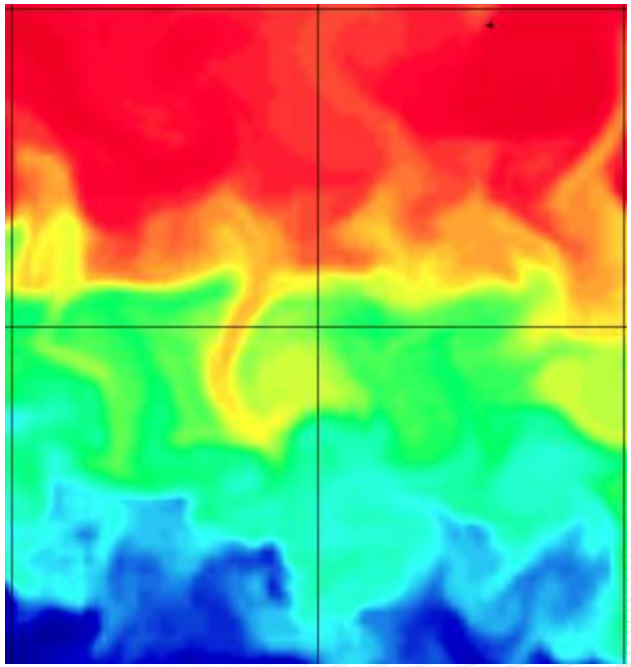
- Initial conditions
- Atmospheric forcings
- Parametrisations
- Approximation (hydrostatic)
- Numerical cost
- Outputs (volume of data, 4D visualization)

Ocean in 3D

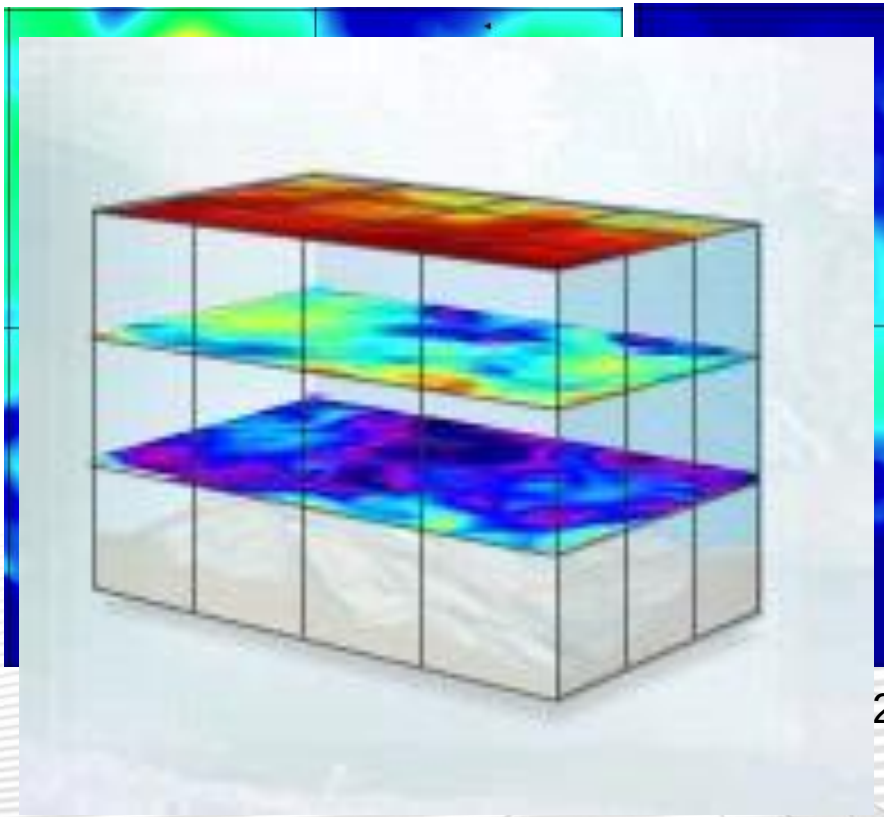


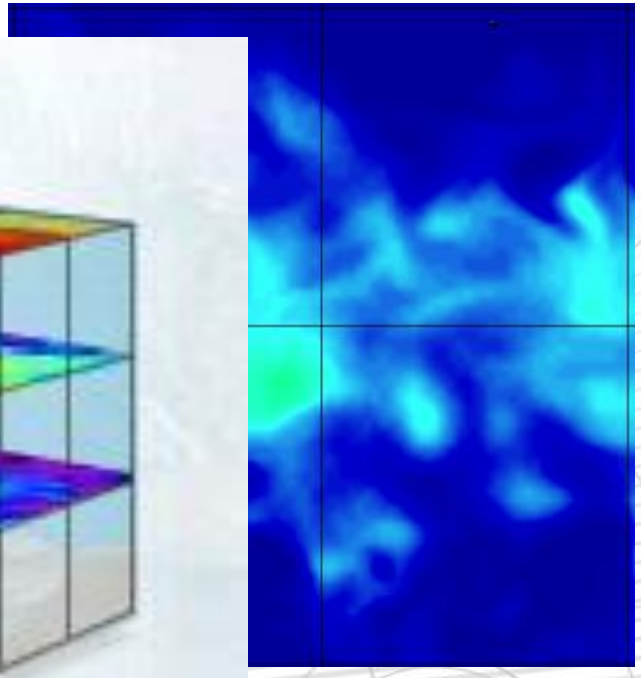
Model outputs: temperature

- From 0m to 5500m



75 m

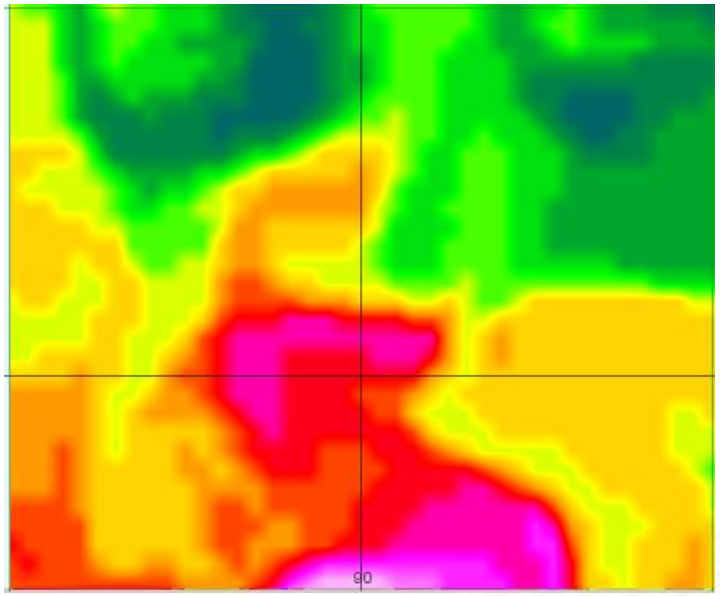


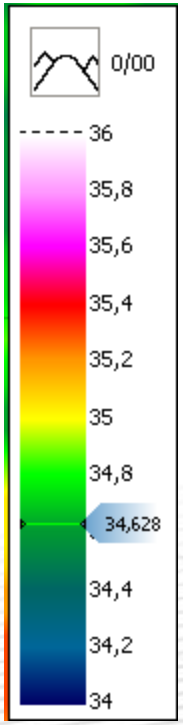


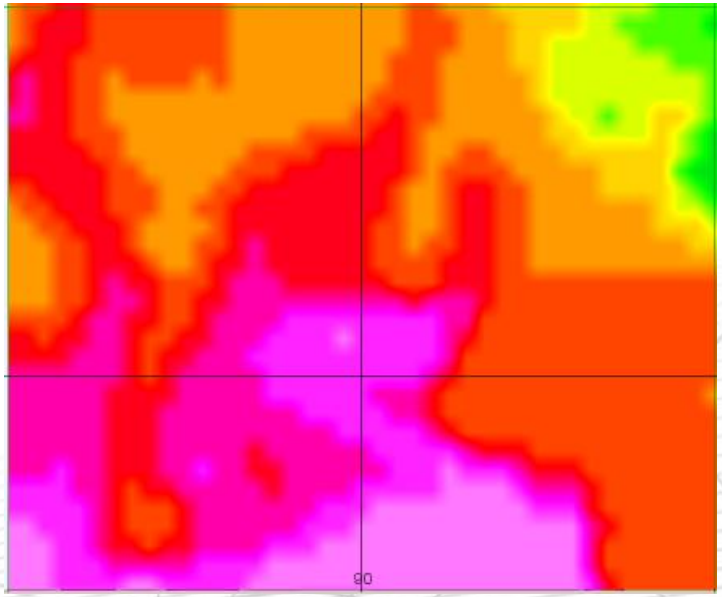
200 m

Model outputs: salinity

➔Concentration of salt in the water (ppm, % per thousand)
➔Product available between 0 m and 5500 m







30 m

125 m