

# Application of a Coupled Ocean - Atmosphere - Wave - Sediment Transport (COAWST) system to assess wind-induced coastal changes

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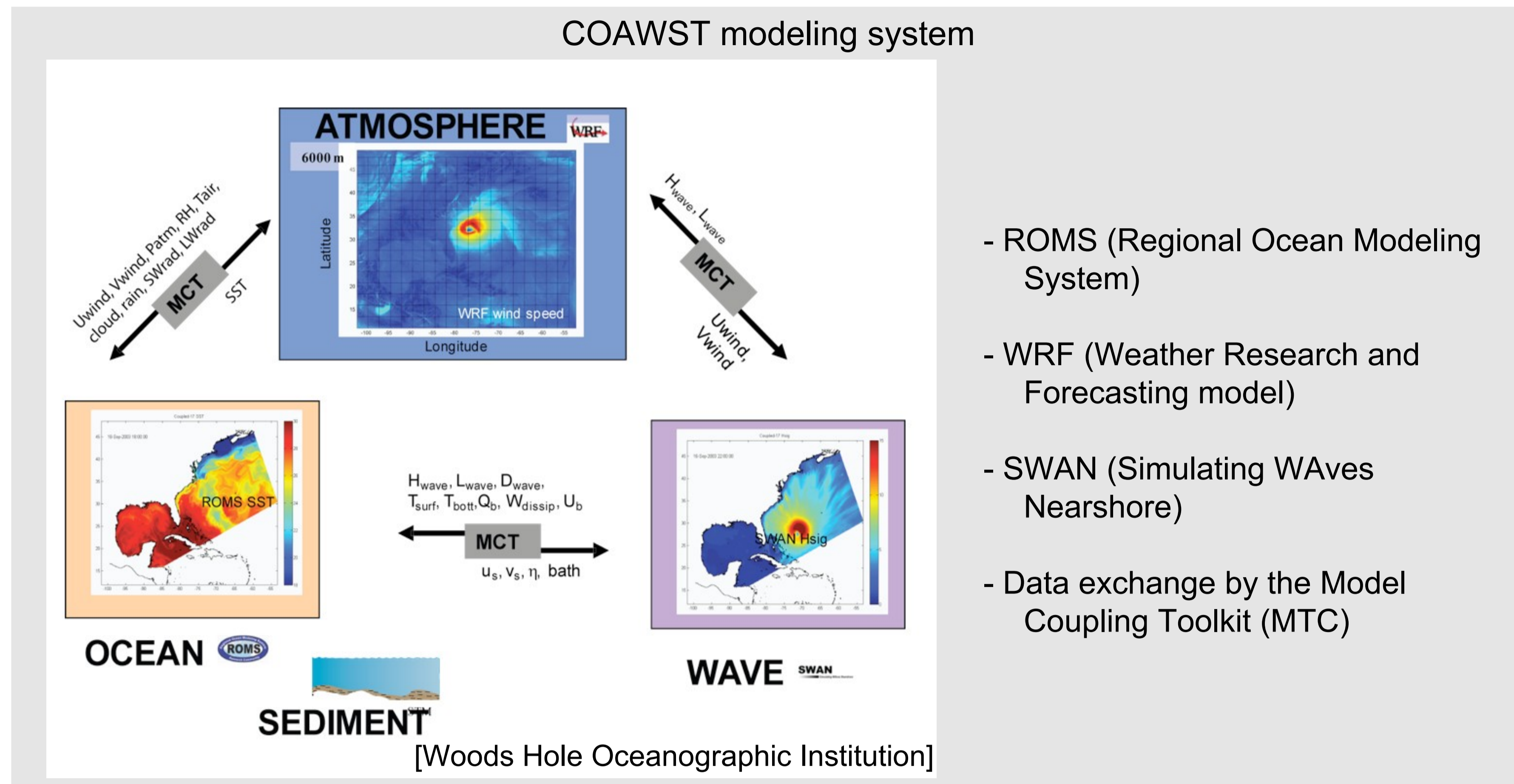
## Introduction & aims

Storm events presumably have a strong influence on coastal regions. Regarding western Europe and in particular the North Sea region, some projections indicate an enhanced occurrence of strong storm events (Haarsma et al., 2013) or a change in the direction of extreme wind events (de Winter et al., 2013) related to global warming.

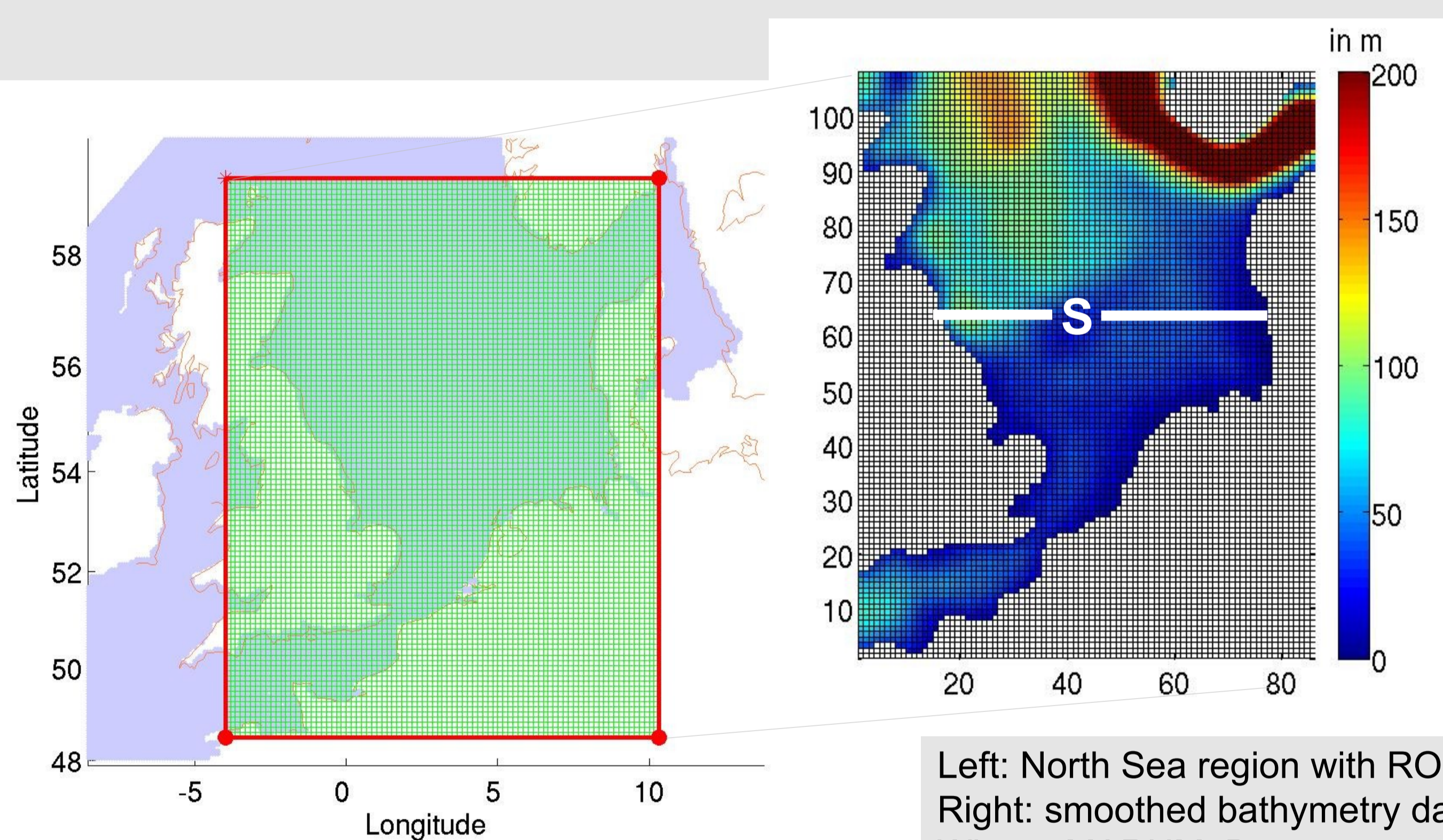
The aim of this study is to gain an improved understanding of the impacts of historical and future storm events. Interactions between regional atmosphere, ocean circulation and sediment transports are taken into account regarding the questions:

- I) How strong is the influence of single extreme storm events compared to atmospheric mean conditions on the sediment transport and distribution in the southern North Sea region?
- II) What could be the effects of changing atmospheric conditions in the future on the system?

## Method



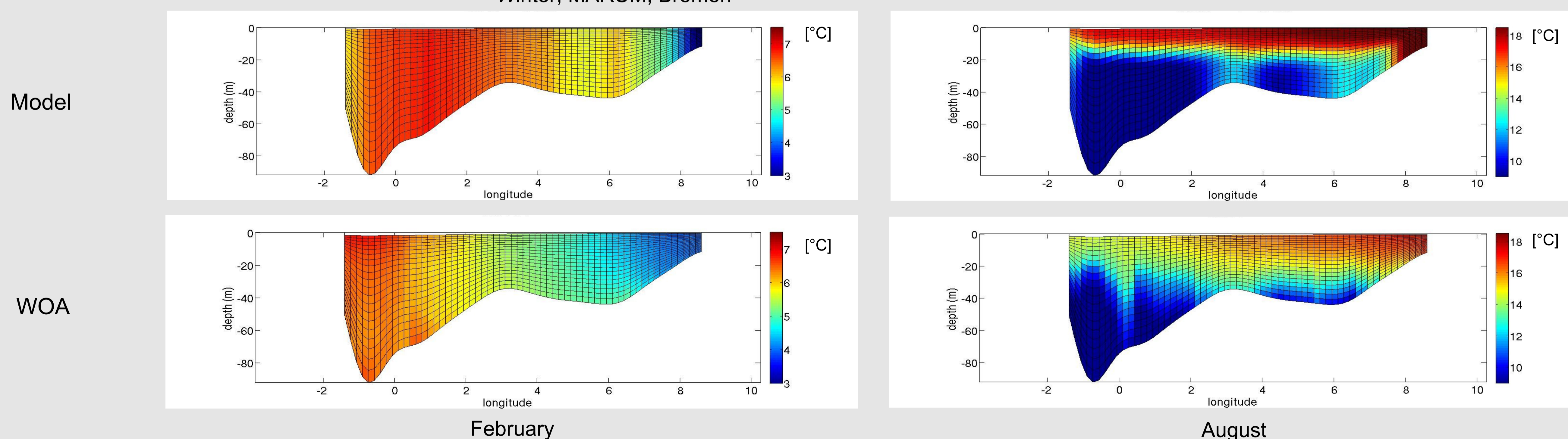
## ROMS (ocean) application



### Setup ROMS

- Horizontal resolution: 1/6 ° longitude; 1/10 ° latitude
- Vertical resolution: 21 layers
- Time step: 400 sec.

Model	Model results from ROMS stand-alone run using several datasets (World Ocean Atlas [initial and boundary data], TPX06 [tides], NCEP Reanalysis [forcing])
WOA	Monthly mean temperature from World Ocean Atlas (WOA) 2009

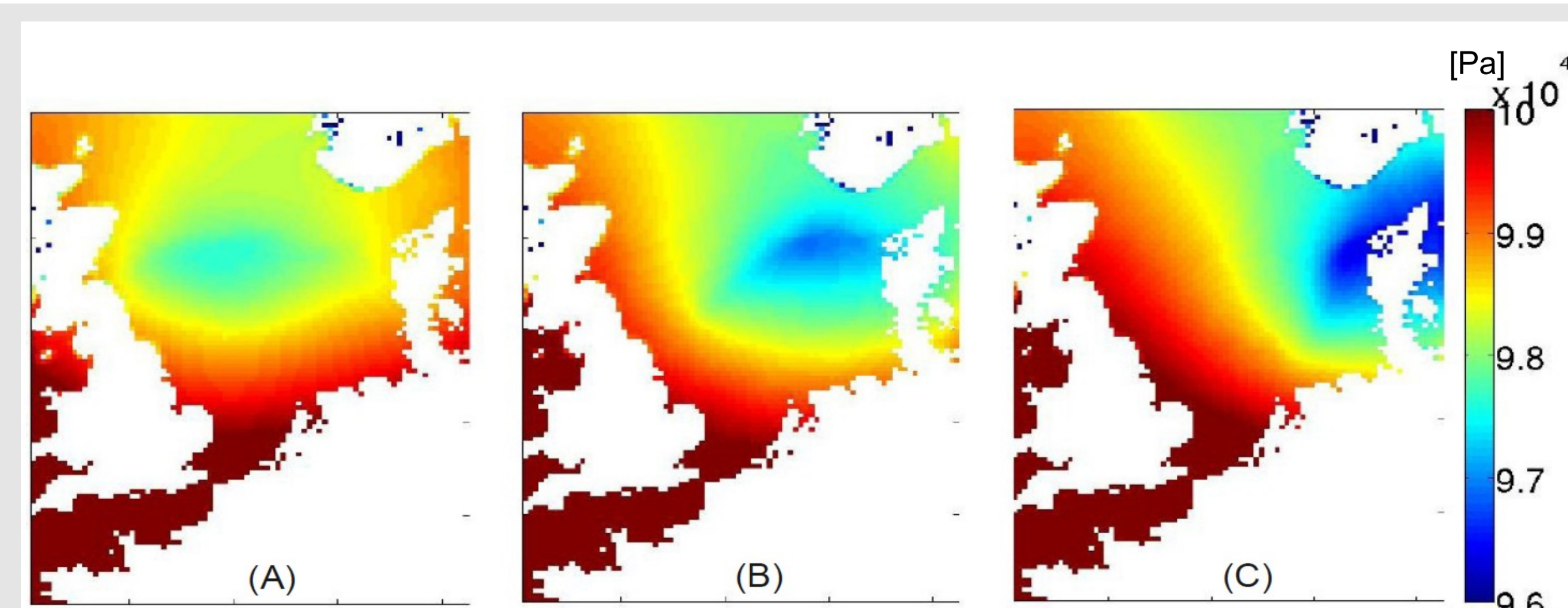


## WRF (atmosphere) application

- Horizontal resolution: 1/6 ° longitude; 1/10 ° latitude
- Vertical resolution: 30 layers
- Time step: 90 sec.

Left: Storm track of storm 'Anatol' and central pressure in hPa in 3-hourly steps (Deutscher Wetterdienst, DWD) showing locations A (03.12.1999, 10:00 MEZ), B (13:00 MEZ) and C (16:00 MEZ) for comparison with WRF test results

Right: WRF results, surface pressure in Pa



## Outlook

- Setup of ocean – atmosphere coupled model
- Inclusion of sediment module
- Application for a strong historical storm event