**MedCLIVAR, Regional ocean climate change scenarios for the Mediterranean Sea: assessing the uncertainties along the 21st century**

**01 | INTRODUCTION**

Following the IPCC scenarios (Gibelin and Déqué 2003, Giorgi 2006, IPCC 2007, Somot et al. 2008), the climate over the Mediterranean basin is forecasted to become warmer and drier during the 21st century. In terms of density, these two effects may have an opposite impact on the Mediterranean Sea.

**02 | MODEL and SIMULATIONS**

**MODEL DESIGN**

Following the design described in Somot et al. (2006), seven 140-year long numerical experiments (1961-2100) have been run with a 10km-resolution Mediterranean Sea regional ocean model (NEMOMED8) forced by varying the boundary conditions that is to say (i) the daily air-sea fluxes coming from 50-km regional climate models (two versions of the RCM ARPEGE-Climate), (ii) the Mediterranean river runoff fluxes and Black Sea freshwater inputs and (iii) the near-Atlantic water characteristics.

**03 | OCEAN FORCING**

Along the 21st century and in all scenarios, the Near-Atlantic heat becomes warmer and more salty, surface water density increases partly due to the river runoff decrease and the surface heat loss decreases. Salter and warmer Mediterranean Sea is expected.

**04 | SEA SURFACE CHARACTERISTICS**

Along the 21st century and in all scenarios, SSS and SST increase as expected from the forcing analysis. Surface water density response is not straightforward.

**05 | DEEP LAYERS**

Along the 21st century and in all scenarios, the Mediterranean deeper layers become warmer and saltier. This warming and salting trend is accelerating along the 21st century, particularly in the bottom layer after the 2000s. In most of the runs, the Mediterranean Sea becomes denser at depth.

**06 | WATER MASS FORMATION PROCESS**

We analyse here the Mediterranean THC in the NM8-A2-A4R run.

**07 | FUTURE PLANS**

- Intercomparison of diverse regional ocean and atmosphere models in a coordinated international framework (HyMex and Med-CORDEX)
- The use of fully coupled Regional Climate System Models
- The use of eddy-resolving ocean models
- A better description of the near-Atlantic influence and of the Gibraltar Strait (sea level issue)