

The Med-CORDEX initiative: towards fully coupled Regional Climate System Models to study the Mediterranean climate variability, change and impact.

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The Mediterranean region is considered as particularly vulnerable to climate variability and change (Giorgi, 2006; IPCC, 2007), in particular, to changes in its regional water cycle. This climate vulnerability is a key issue for the 500 million inhabitants living in the 30 Mediterranean countries. In addition, the Mediterranean basin is a good case study for climate regionalization. It is indeed surrounded by various and complex topography channelling regional winds (Mistral, Tramontane, Bora, Etesian, Sirocco) than defined local climate. Many small-size islands limit the low-level air flow and its coastline is particularly complex. Strong land-sea contrast, land-atmosphere feedback, intense air-sea coupling and aerosol-radiation interaction are also among the regional characteristics to take into account when dealing the Mediterranean climate modeling. What is true for the Mediterranean climate is also true for the Mediterranean Sea that show complex bathymetry including narrow and shallow straits, a strong eddy activities and various distinct and interacting water masses. For all these reasons, the Mediterranean area has been chosen as a CORDEX sub-domain (MED) leading to the Med-CORDEX initiative endorsed by Med-CLIVAR and HyMeX. In addition to the core CORDEX framework (Atmosphere-RCM, 50 km, ERA-Interim, RCP4.5, RCP8.5), two more tiers have been defined for Med-CORDEX. The first one would like to assess the added-value of higher-resolution RCMs pushing the horizontal resolution up to 10 km. The second one will serve to test new regional climate modeling tools called Regional Climate System Models (RCSM) including a high-resolution and coupled representation of all the physical components of the regional climate system: atmosphere, land surface, vegetation, surface hydrology, rivers and ocean. In addition, the Med-CORDEX initiative is strongly coordinated with the HyMeX program that plans large field campaigns within the area of interest, development of new regional satellite products and meso-scale modeling activities targeting the study of the Mediterranean hydrological cycle and the related extreme events. The coordination with MedCLIVAR and HyMeX ensures the set-up of a large and multi-skilled Med-CORDEX evaluation team as well as the access to specific databases and to the regional impact community. Up to 10 modeling centers have already joined the Med-CORDEX initiative including groups in Italy, Spain, France, Israel, Turkey, Germany, Tunisia and Serbia. The first ERA-Interim driven runs have been carried out with the RCMs at 50 km, the RCMs at 10 km and the RCSMs. The RCP driven runs are now starting closely following the CMIP5 simulations. The design of the Med-CORDEX intercomparison experiment as well as the first results using the ERA-Interim driven runs will be presented.