Development and Validation of a Regional Earth System Model (RegESM) for the Mediterranean Region

Turuncoglu, U. (1), (2)

1) Informatics Institute, Istanbul Technical University, 34469, Istanbul, Turkey
2) Earth System Physics Section, International Center for Theoretical Physics, 34151, Trieste, Italy

The large water bodies such as the Mediterranean and Black Seas are one of the main driving components of the basin's hydrological budget, and the connection among these seas and the ocean through the straits (i.e. Straits of Gibraltar, Dardanelles, and Bosporus) plays a very exclusive and interesting role in the water balance of the seas along with the contributions of land-based runoff, evaporation and precipitation. Especially, the interaction between Mediterranean and Black Seas through the Turkish Strait System (TSS; Dardanelles, and Bosporus) is very complex component of the water budget of the both seas as well as their hydrodynamic properties. As a result of the recent studies, the investigation of nonlinear interaction between atmosphere and large water bodies (i.e. Mediterranean and Black Sea) and the identifying of their connections with the regional climate of the Mediterranean Region (especially Anatolian Peninsula) become very crucial and open research areas. Especially in the winter and fall seasons the feedback mechanisms between large water bodies (i.e. Mediterranean Sea) and atmosphere might became very significant due to the increased evaporation over the seas and the fully coupled regional atmosphere-ocean models, which represent these interactions more realistically than the standalone regional climate models, might help to understand the mechanisms behind these complex interactions.

In this study, the newly designed fully coupled regional earth system model (RegESM) is used to investigate the climate of the Mediterranean region. The model is capable to estimate the heat and water balance of the Mediterranean Sea. The regional earth system model is run for the period 1979-2012 and it is compared to corresponding standalone model simulation and the available observational datasets to evaluate the performance of the modeling system.

Acknowledgement: This study has been supported by a research grant (113Y108) provided by The Scientific and Technological Research Council of Turkey (TUBITAK). The computing resources used in this work to analyze the data were provided by the National Center for High Performance Computing of Turkey (UHEM) under grant number 500308201.