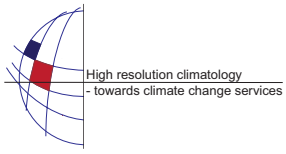
EMS Annual Meeting Abstracts
Vol. 7, EMS2010-509, 2010
10th EMS / 8th ECAC



Investigation of the atmosphere-land-ocean interaction at the southwestern edge of the Saharan heat low

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The inflow of relatively cold and stably-stratified air from the Atlantic Ocean into western Mauritania and into the southwestern part of the Saharan heat low is studied using forecasts of the COSMO model. The COSMO model was employed to provide an operational forecast for the GERBILS field campaign, which was conducted by the MetOffice in West Africa in June 2007. The forecasts were validated against airborne measurements as well as satellite imagery and were found to represent the main synoptic features of the region accurately.

A complex mesoscale feature in western Mauritania, which we call the Atlantic Inflow, was identified in the model output, as an interaction between the diurnal occurrence of the sea breeze, and larger-scale, higher-altitude fluctuations in the thermal and humidity advection. The balance between horizontal advection of cool maritime air and turbulence in the convective boundary layer over land was found as driving mechanism for the nocturnal inland penetration of the sea breeze front using slightly adapted COSMO model code. Above the sea breeze layer thermal advection in the Saharan Atmospheric Boundary Layer (SABL) controls the structure of the Atlantic Inflow. A marked baroclinic zone was observed, in which the temperature and humidity made a relatively smooth transition from values typical of the Atlantic air to values characteristic of the SABL. Further the COSMO forecasts showed, that through its cooling and occasional moistening at low levels, the Atlantic Inflow has an important impact on the regional heat and moisture budgets.