



## Systematic errors in regional climate model RegCM over Europe and sensitivity to variations in PBL parameterizations

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Systematic errors in near-surface temperature (T2m), total cloud cover (CLD), shortwave albedo (ALB) and surface net longwave (SNL) and shortwave energy flux (SNS) are detected in simulations of RegCM on 50 km resolution over the European CORDEX domain when forced with ERA-Interim reanalysis. Simulated T2m is compared to CRU 3.0 and other variables to GEWEX-SRB 3.0 dataset. Most of systematic errors found in SNL and SNS are consistent with errors in T2m, CLD and ALB: they include prevailing negative errors in T2m and positive errors in CLD present during most of the year. Errors in T2m and CLD can be associated with the overestimation of SNL and SNS in most simulations. Impact of errors in albedo are primarily confined to north Africa, where e.g. underestimation of albedo in JJA is consistent with associated surface heating and positive SNS and T2m errors.

Sensitivity to the choice of the PBL scheme and various parameters in PBL schemes is examined from an ensemble of 20 simulations. The recently implemented prognostic PBL scheme performs over Europe with a mixed success when compared to standard diagnostic scheme with a general increase of errors in T2m and CLD over all of the domain. Nevertheless, the improvements in T2m can be found in e.g. north-eastern Europe during DJF and western Europe during JJA where substantial warm biases existed in simulations with the diagnostic scheme. The most detectable impact, in terms of the JJA T2m errors over western Europe, comes from the variation in the formulation of mixing length.

In order to reduce the above errors an update of the RegCM albedo values and further work in customizing PBL scheme is suggested.