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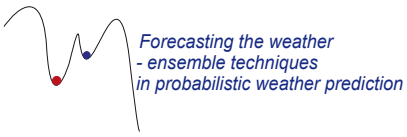

Evaluating links between atmospheric circulation and surface air temperature in climate models in control and future climates

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Regional climate models (RCMs) driven by outputs from global climate models (GCMs) are the most widely used tools for simulating regional scenarios of climate change. Since their biases may depend on atmospheric circulation, it is important to evaluate how large-scale atmospheric circulation and links between circulation and surface variables are reproduced in recent/control climate. The present study expands the up-to-now research and examines how RCMs from the ENSEMBLES project capture the links between atmospheric circulation (represented by circulation indices – flow direction, strength, and vorticity, derived from gridded mean sea level pressure) and surface air temperatures over Central Europe in control climate (1961-1990), and how these links may change in future climate change scenarios (for selected time slices in the first and second half of the 21st century). The particular aims of the study are (i) to identify errors in RCM-simulated distributions of circulation indices in the control climate in individual seasons, (ii) to identify errors in simulated distributions of daily maximum, minimum and mean temperatures under particular circulation types, (iii) to evaluate changes of the surface air temperature distributions and atmospheric circulation in future climate scenarios, (iv) to evaluate changes of the relations between atmospheric circulation and surface air temperatures in the future climate scenarios in comparison to the control climate, and (v) to compare the performance of the individual RCMs and dependence of the results on the driving GCM. Observed data are represented by the ERA-40 re-analysis (mean sea level pressure fields) and the gridded dataset interpolated from a high-density station network in the Czech Republic (temperature).