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On the Risk of Mediterranean and Sub-tropical Climate Expansion into Central Europe

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Many contemporary studies of climate change focused on or including Central Europe suggest significant changes of future climate characteristics. The scope of this transformation includes increased mean annual temperature, increased frequency and intensity of heat waves and droughts and changes in spatiotemporal precipitation characteristic including the tendency to occurrence of dangerous torrential rains. This makes from the region one of the particularly vulnerable area increasing the necessity of providing reliable, precise and comprehensible information both to the decision makers and general public. In our study we decided to examine climate change signal using the Köppen-Geiger climate classification on corrected output of high resolution simulations performed with the RCMs ALADIN-Climate/CZ and RegCM, nested in GCM ARPÉGE 5.0 lateral boundary conditions and ECHAM4 respectively. Both experiments were forced by IPCC SRES A1B scenario. Climate classifications like that of Köppen-Geiger are useful in wider range of ecological disciplines including forestry and agriculture as they correlate with their bio-ecologically oriented classification systems. In order to address regional and local character of climate change signal we decided to study simulations performed in 10km resolution, which is capable to capture even relatively fine scale geomorphological details. To retain as much fine scale signal as possible, model output was corrected using measured data from the dense observation networks operated by the national meteorological services of Austria (north to the Alps), Czech Republic and Slovakia. Thus, we are able to detect changes in climate characteristics affecting small scale geomorphological features like individual Alps and Carpathian mountain ranges, individual mountain systems of Bohemian massif, rift and river valleys, which are usually poorly represented in more coarse resolution. Our findings among other suggest the risk of large scale expansion of Mediterranean climate types into Central Europe and changes affecting the climate regime of individual regions. Moreover, it appears that urbanized landscape will act as the factor enhancing the intensity and the pce of this change.