



Effects of documented land use changes on climate in Hungary simulated by the MM5 high-resolution model

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Potential effects of land use changes on the surface albedo and evapotranspiration are not negligible. These land use changes were rather significant in Hungary according to the database of the Hungarian Central Statistical Office in the second half of the 20th century (i.e. between 1959 and 1999). For this reason, the objective of our study is to evaluate climatic effects of these land cover changes using the MM5 (The Fifth-Generation NCAR/Penn State Mesoscale Model) non-hydrostatic dynamical model. As a first step, the land surface parameters (albedo, moisture availability) of the model were improved corresponding to the archive of systematic and expeditions measurements in Hungary. Lower boundary conditions for each investigated years (i.e. 1959, 1979, 1999) were next generated. The MM5 was run with the same meteorological conditions of selected days from 2005, representing the whole set of pre-defined macrosynoptic situations for Hungary, but with modified lower boundary conditions (i.e. 3x13 forecasts, each for 60 hours). The simulated fields representing the 20 years shifts in the land use, were then compared with each other.

According to the first available comparisons, climatic effects of the land use changes during the surveyed 40 years are not negligible in Hungary. In average, they caused + 0,2 K maximum temperature rising in the vegetation period. In selected unstable cases the land cover differences can even perturb the precipitation fields significantly.