Implementing the NOAH-MP land surface scheme in the new intermediate complex atmospheric research (ICAR) model

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The intermediate complex atmospheric research (ICAR) model represents a fast and dynamic regional downscaling approach, filling the gap between computationally efficient statistical downscaling methods and complex dynamic but CPU-intensive numeric atmospheric models like the weather research and forecast (WRF) model. Developed at NCAR (Boulder, Colorado, USA), the simplified three-dimensional atmospheric ICAR model is comparable to WRF by providing various parametrization schemes for the different atmospheric components, for example for microphysics. However, ICAR only has one land surface scheme available at the moment, the community NOAH land surface model (NOAH LSM). In this study, we present the implementation of the NOAH multi-physics model (NOAH MP) which is well-established and an extended version of NOAH LSM. As a first evaluation of the new land surface scheme, we compare the ICAR model runs with NOAH LSM and NOAH MP for several years in a lowland and an Alpine region in Central Europe. The focus region in the experiments includes the lowland Attert catchment in Luxembourg and the alpine Zugspitzplatt catchment in Germany.