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Sensitivity of the regional climate model ALARO-0 to land surface changes

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It is well known that climate change affects the ecosystem structure and its functions. This can in its turn lead to permanent changes in the land structure. Likewise, the land use and land cover changes impact the local and regional climate. The interactions between these land surface changes and climate changes are studied within the project MASC “Modelling and assessing the surface change impacts on the Belgian and Western European climate”. The aim of the experiment presented here is to test the sensitivity of the regional climate model ALARO-0 to land surface changes.
In this project, ALARO-0 is coupled to the land surface model SURFEX, which is based on a tiling approach. The tiles provide information on the surface fluxes for different types of surfaces: nature, town, inland water and ocean. A parameterisation exists for each component of the surface. Each tile is divided in different patches, according to the tile type. These patches correspond to the plant functional types described in ECOCLIMAP, which is a 1km horizontal resolution global land cover database that is provided with SURFEX. It assigns the tile fraction together with the corresponding physical parameters, such as the leaf area index and the albedo.
The regional climate is firstly simulated with the original physical parameters from ECOCLIMAP, and boundary conditions from ERA-Interim. Next, these parameters are updated according to the output from the dynamic vegetation model (CARAIB), that calculates the productivity and growth of natural and managed vegetation. The original setup of CARAIB is forced with atmospheric conditions from the monthly global CRU climatology. This way, a first sensitivity test is executed. Finally, CARAIB is forced with the atmospheric conditions from ALARO-0. The resulting physical parameters are provided as new input for ALARO-0, and those results will be compared to the first sensitivity test.