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Validation of the land surface model ISBA-A-gs at a global scale

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Biogeochemical processes must be included into climate models in order to simulate interactions between the atmosphere and the global carbon cycle, and to study anthropogenic climate change. The land surface model ISBA-A-gs (Interactions between Soil, Biosphere and Atmosphere) has been configured on a global scale. This model simulates LAI (Leaf Area Index) and canopy conductance, two main parameters which control exchanges between the land surface and the atmosphere.

A meta-analysis from published data and a sensitivity study have been performed to determine the parameters for each vegetation type present in the model. A ten-year forced simulation (1986-1995) has been performed on a global scale, using the ECOCLIMAP surface parameters database. Simulated LAI have been compared with NOAA AVHRR satellite data. This comparison shows that the model is able to simulate the main observed spatial and temporal characteristics, as well as interannual variability, over most regions of the globe.

The parameterization of soil heterotrophic respiration will be added to the ISBA-A-gs model in order to represent all parts of the terrestrial carbon cycle. This new model will be used to simulate natural carbon fluxes as part of the GEOLAND European project. It will also be coupled with the general circulation model ARPEGE-Climat, for studying interactions between vegetation and climate.