A new Modular Biosphere Modelling

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A 'Modular Biosphere simuLation Environment' (MoBiLE) is presented that reads and – if necessary — complements site information as well as climatic and other driving forces, writes output files, calls selected modules, and provides the communication between these modules. The framework concentrates on the biosphere aspects: Microclimatic Conditions, Canopy Air Chemistry, Water Balance, Carbon and Nitrogen Cycle in the Soil, Carbon and Nitrogen Processes in the Vegetation, and Stand Structural Changes.

MoBiLE is already complemented with a number of modules that describe different one-dimensional biosphere processes. For example the PnET-N-DNDC model (Li et al., 2000) has been modularized and fit into the framework, now providing a simple distribution of canopy radiation and temperature as well as soil temperature, a full water balance model, a soil carbon and nitrogen balance model, and a forest carbon and nitrogen balance model. Further implemented models include the physical energy and water balance model OSU (Chen and Dudhia 2001), and the Mediterranean soil water model QUERCUS (Rambal 1993).

The simulation framework is ideally suited to estimate feedback responses, analyse models, and carry out model comparisions. We demonstrate the applicability of the outlined water balance models to different sites (temperate coniferous stand, Mediterranean forest, savanna grassland) and show their dependency on the vegetation boundary conditions and to the availabiltiy of initialisation data. Further applications will be outlined.