

Topic: Improvements in modelling processes, interactions, and feedbacks

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Modelling of carbon cycle in grassland ecosystems of diverse water availability using Biome-BGCMuSo.

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Grassland ecosystems have an important role in agriculture, and at the same time, are highly sensitive to changes in land use and climate change. Simulation of the biogeochemical cycles of managed grasslands may help in identifying and quantifying the main processes contributing to changes in their productivity. In our work we used the latest version of Biome-BGCMuSo model, the modified version of the widely used biogeochemical Biome-BGC model, with structural improvements to simulate herbaceous ecosystem carbon and water cycles more faithfully.

Our sampling areas were in diverse grasslands in the Kiskunság, Hungary. Different soil texture and changing water table level, consequently highly different water conditions are characteristic in these ecosystems, influencing the development and productivity of vegetation, and also the potential for animal husbandry. Hence, for the meadows and the marshland ecosystems we included mowing management in the simulations. In order to compare the ecosystems and study their functions we simulated ecosystem variables, such as ecosystem respiration, standing and harvested aboveground biomass etc.

We found that ecosystems with higher water availability are more sensitive to changes in water conditions, and their productivity is more variable between years. By calibration processes using leaf area and aboveground biomass we aim to further specify our findings.

Biome-BGCMuSo is available as a standalone model, but also through virtual laboratory environment and Biome-BGC Projects database (<http://ecos.okologia.mta.hu/bbgcdb>) developed within the BioVeL project (<http://www.biovel.eu>). Scientific workflow management, web service and desktop grid technology can support model optimization in the so-called „calibrated runs” within MACSUR.