Modeling effects of land use and management changes on water, nutrient and carbon fluxes in agro ecosystems

Project period

01.03.2004 – 28.02.2006

Institution

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Project coordination

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Brief project description:

Within the framework of the GLOWA-DANUBE project the sub-project ‚Agricultural Ecosystems' has the major goal to model the growth of agricultural plants (wheat, barley, maize, beets, potatoes, grassland) considering the interaction with other sub-models. Hence, the subproject is strongly linked to Natural Ecosystems (Bayreuth) as well as Agro-economy (Stuttgart), Hydrology (Munich) and Meteorology (Munich, Mainz). To reach this goal a model of plant growth, including a sub-model taking into account the nitrogen transformation, has to be developed, tested and validated. The plant growth model will be integrated into the decision support system DANUBIA developed within the framework of GLOWA-DANUBE.

The model is based on: (i) existing models documented in literature (CERES, SUCROS, SUBSTOR, FORGRO) and (ii) the PROMET-V, which was developed in the working group.

To validate the Agricultural Ecosystem model existing data, collected by the project partners Natural Ecosystems and Hydrology, will be used together with data from external cooperation's (e.g., Fraunhofer Institute Jena, eddy-flux-measurements) and own field measurements. These data sets together with aggregated (e.g., crop statistics, biomass) and remote sensing data (e.g., Landsat-TM) allow for a rigid model testing and hence a quantification of model uncertainty.

Thus the water consumption of economic plants should be modeled with high accuracy and reliability and hence the subproject Agricultural Ecosystems will contribute substantially to the quality of the decision support system DANUBIA.

Due to the delayed start of the subproject ‚agricultural ecosystems' in the second phase of the GLOWA-DANUBE project, no results can be presented in the moment.

Publications

Schneider, K., 2004. Prozessbasierte und gekoppelte Modellierungen von Wasserflüssen und Pflanzenwachstum mit dem PROMET-V Modell. Marburger Geographische Schriften, Marburg.

Schneider, K., 2003. Assimilating remote sensing data into a land surface process model. International Journal of Remote Sensing 24, 2959-2980.

Schneider, K., und Mauser, W., 2000. Using remote sensing data to model water, carbon and nitrogen fluxes with PROMET-V. Proceedings 4171: Remote Sensing for Agriculture, Ecosystems and Hydrology.

Schneider, K., 1999. Gekoppelte, flächenverteilte Modellierung von Pflanzenwachstum und Verdunstung im Ammereinzugsgebiet mit dem prozeßorientierten Evapotranspirations- und Vegetationsmodell PROMET-V. Geowissenschaftliche Fakultät der Ludwigs-Maximilians-Universität München, München.