

MAS as Component of Integrated Modeling Systems

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Abstract

Multi-Agent Systems applied to land-use modeling (MAS/LUCC) are highly suitable for integration into larger modeling systems. MAS/LUCC are implemented at fine resolution in a spatially explicit manner, typically based on raster cellular component. This cellular component could then be used as an interface to biophysical software, for example hydrology or crop growth models.

The challenge of integrating various model components is, of course, not only relevant for land system modeling, but also for numerous business applications. Computer science and software engineering have therefore developed methods and tools that help to achieve model integration and linking, at a manageable cost. Some of these methods are of potential interest to land system modeling, for example object-oriented concepts, component-oriented programming and software frameworks. Several research groups in Europe have started developing integrated modeling frameworks for the environmental and agricultural sciences, e.g. OpenMI for the coupling of hydrology simulation models and SeamFrame for the coupling of agricultural simulation models.

In Hohenheim we have successfully coupled the agent-based agro-economic software MP-MAS and the spatially distributed hydrology software WASIM-ETH. A component-based approach for data transfer between model components was chosen, using the software TDT, which was developed at the Potsdam Institute for Climate Impact Research. Currently, the integrated modeling system is submitted to extensive empirical testing, as part of the project “Integrating Governance and Modeling” within the CGIAR Challenge Program on Water and Food.