

## **A soil carbon model for the regional climate modeling system COSMO-CLM**

Prof. Dr. Bodo Ahrens, Dr. Jana Schröder

Within the project a soil carbon model for use at the regional scale has been developed. It is based on the well-established ECOSSE model and has been adapted to be applicable together with the land-surface model TERRA of the regional climate modeling system COSMO-CLM. This new soil carbon model allows sensitivity studies and projections of the soil carbon balance at the regional scale, such as for large river basins.

For the basin of the river Main sensitivity experiments were performed in which the model sensitivity using different soil and land use data sets was examined and discussed in the context of a changing climate. It was found that under the given model assumptions, the use of different soil data sets has only a small influence on the simulated CO<sub>2</sub> release in the Main basin. The use of different land use data sets, however, resulted in significantly greater differences.

To put the results in relation to the impact of a changing climate, the warmest and the coldest year and additionally the most favorable year for carbon decomposition (summer warm, but not too dry) were selected. With these three years three new synthetic climate time series were generated which were used as forcing in carbon budget calculations. The simulated sensitivity of CO<sub>2</sub> release for different soil data sets clearly falls within the climate bandwidth. But the sensitivity spanned by the use of different land use data sets is larger. This result shows that (a) important data, such as land use, still show large uncertainties and that (b) regional land use scenarios in climate projections with carbon budget have an important role to play.