



Prehistoric land use and Neolithisation in Europe in the context of regional climate events

C. Lemmen (1,3), KW Wirtz (1), and D Gronenborn (2)

(1) GKSS-Forschungszentrum Geesthacht, Institut für Küstenforschung, Ökosystemmodellierung Geesthacht, Germany, (2) Römisch-Germanisches Zentralmuseum, Mainz, Germany, (3) carsten.lemmen@gkss.de / +49 4152 87-2020

We present a simple, adaptation-driven, spatially explicit model of pre-Bronze age socio-technological change, called the Global Land Use and Technological Evolution Simulator (GLUES). The socio-technological realm is described by three characteristic traits: available technology, subsistence style ratio, and economic diversity. Human population and culture develop in the context of global paleoclimate and regional paleoclimate events. Global paleoclimate is derived from CLIMBER-2 Earth System Model anomalies superimposed on the IIASA temperature and precipitation database. Regional a forcing is provided by abrupt climate deteriorations from a compilation of 138 long-term high-resolution climate proxy time series from mostly terrestrial and near-shore archives. The GLUES simulator provides for a novel way to explore the interplay between climate, climate change, and cultural evolution both on the Holocene timescale as well as for short-term extreme event periods. We successfully simulate the migration of people and the diffusion of Neolithic technology from the Near East into Europe in the period 12000–4000 a BP. We find good agreement with recent archeological compilations of Western Eurasian Neolithic sites. No causal relationship between climate events and cultural evolution could be identified, but the speed of cultural development is found to be modulated by the frequency of climate events. From the demographic evolution and regional resource consumption, we estimate regional land use change and prehistoric greenhouse gas emissions.