

# Modelling of population density, land use and settlement dynamics in Neolithic and Bronze Age Western Switzerland [Arbeitstitel]

**Project:** „Beyond lake settlements: Studying Neolithic environmental changes and human impact at small lakes in Switzerland, Germany and Austria“. Universität Bern, Institut für Archäologische Wissenschaften, Abt. Prähistorische Archäologie und Oeschger Centre for Climate Change Research (OCCR). SNF-Forschungsprojekt (CR2011L\_152862).

Dissertationsprojekt Julian Laabs, M.Sc.

## Keywords:

human-environment relationship, land use, simulationmodelling, Neolithic, Bronze Age

The interdisciplinary SNF DACH-Project „Beyond Lake Settlements: Studying Neolithic environmental changes and human impact at small lakes in Switzerland, Germany and Austria“ combines research agendas on micro, meso and macro scale to gain further insights into the human-environment relationships of the Northern Alpine Foreland. Beside the archaeological and palynological investigations the project enables studies concerned with the dynamic spatial modelling of prehistoric communities. The main focus of attention is on settlement behaviour and land use going along with the landscape's transformation. In this context the reciprocal relations in the human-environment system are of special interest.

My dissertation project deals with the establishment of the land use simulation model LUTES (Land Use and Technological Evolution Simulator) for the Western Swiss Plateau during the Neolithic and Bronze Age (4300-2200 cal. BC). LUTES is a hybrid model, which is based on a regionally scaled down version of the numerical model GLUES (Global Land Use and technological Evolution Simulator; Wirtz/Lemmen 2003) and the agent-based simulation model WELASSIMO (Wetland Settlement Simulator; Baum et al. 2016). The GLUES module simulates the population growth and decline of a community adaptively depending on the usable potential of the environment, the proportion of agricultural and foraging in subsistence strategy, the technological maturity and economic diversity of a community. The simu-

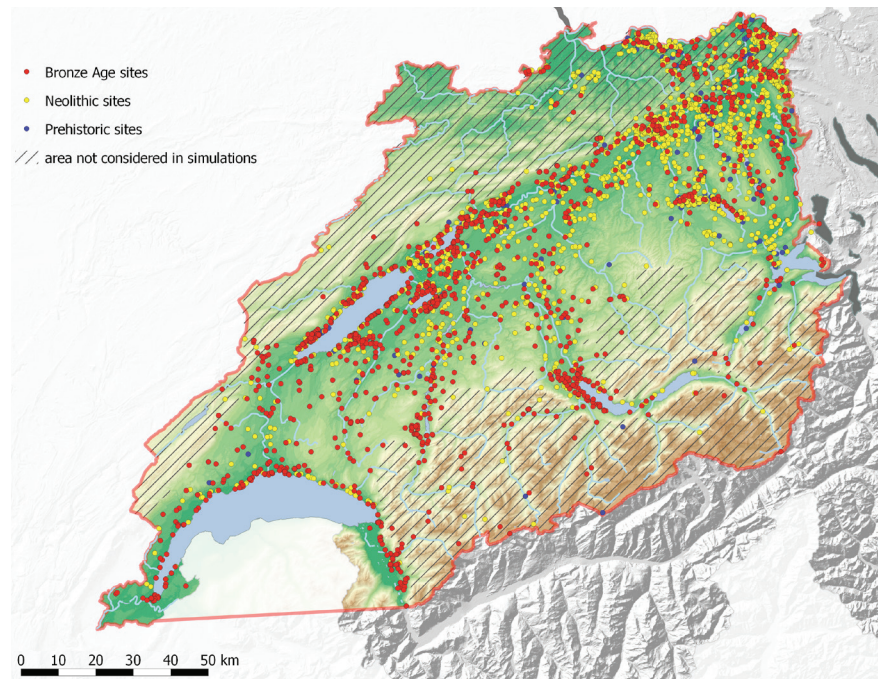


Abb. 1: Karte

lated population sizes are „translated“ into land use by the WELASSIMO module. The transformation of landscape variables by human land use and/or climatic changes in turn has an influence on the usable potential of the environment (e.g. soil degradation, long-term changes in precipitation) and thus has a feedback on the GLUES module. Depending on the hypotheses and scenarios implemented in LUTES, the settlements (agents) react to changes in the environment or the social network in different ways and from different thresholds.

The aim of the dissertation project is to formulate and simulate plausible hypothe-

sis-based scenarios of Neolithic and Bronze Age land use and landscape transformation under influence of climatic changes and human spatio-temporal behaviour. Within the scope of the „Beyond Lake Settlements“ project the question about the lakes' Hinterland occupation will play a centre role in scenario creation. For that reason, with the support of the Swiss cantonal heritage departments, a database on Neolithic and Bronze Age sites in Western Switzerland was created to estimate human activities aside from lake shores (Fig. 1). The simulation results of LUTES will be evaluated against the archaeological database and pollen records of the Swiss plateau.

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