Simple is beautiful ? Building a simple climate model for modelling archaeological issues
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Simple is beautiful?
Building a simple climate model for modelling archaeological issues

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Scientific requirements

Archaeological and paleo-environmental models do not focus on climatology dynamics but need to integrate climate evolutions within their simulations of human-environment issues. However, present-time climate models are modelling tools, i.e. they explicitly reconstitute the complexity and the interactions between climate intrinsic forces which eventually induce climate fluctuations while paleo-environmental models need only simulations, i.e. climate fluctuations.

We implemented a very simple model of the European climate for the Linear Band Keramik (LBK) period, i.e. 6000-5000 BC. The model requirements were:
- To mimic the seasonal cycle and variability of the seasons;
- To mimic the temporal variations of the climate along the LBK period;
- To mimic such a well-fitted differentiation and variability for the whole Europe;
- To mimic a spatial precision at the operating level of the model, i.e. the hectare;
- In terms of variables, Precipitation and Temperature were the sole to be required for implementing agriculture & vegetation models;
- No retro-impact of vegetation on climate;
- Present-time climate variability applied to the LBK period; No impact of wind, foehn, mountain barriers on P & T;
- No differentiation between real variability and error margins;
- One source of climate history, even calibrated and not the whole EPD;
- Northern Europe LBK climate variability applied to central Europe;
- Differentiation between real variability and error margins;
- Several works may then be pursued for understanding the climate of the LBK period:
- Since then, WorldClim has generated past climate data for the whole Holocene;
- MD99-2292: the most detailed pollen sequence providing data for the whole LBK period;
- Palynology: Vegetation-level climate dynamics for central Europe were correlated.

Reconstitution of climate temporal dynamics

WPALS 2 Analysis of the Marine Sequence of Norway MD99-2292 (Ortu et al., 2002)
- Norway: more P & T extremes & variability.
- LBK period: climate dynamics of northern & central Europe were correlated.
- Palynology: Vegetation-level climate dynamics & MD99-2292: the most detailed pollen sequence providing data for the whole LBK period

Acknowledged assumptions, simplifications & errors

- Present-time climate variability applied to the LBK period;
- No impact of wind, foehn, mountain barriers on P & T;
- Present-time P & T climate grids with a 1-km² spatial resolution and with a one-month temporal resolution
- Present-time P & T climate grids with a 1-km² spatial resolution and with a one-month temporal resolution
- Spatially calibrated LBK P & T climate grids for central Europe providing 1K climate dynamics for central Europe
- Spatially calibrated LBK P & T climate grids with a 1-km² spatial resolution and with a seasonal temporal resolution providing 1K climate dynamics for central Europe
- Integration of the impact of Elevation on Temperature
- Spatially calibrated LBK P & T climate grids with a 1-km² spatial resolution and with a seasonal temporal resolution providing 1K climate dynamics for central Europe

Perspectives

- Seasonal P & T are randomly provided to mimic means & variabilities, but no differentiation between real variability and error margins;
- No impact of wind, foehn, mountain barriers on P & T;
- No impact of elevation on rainfall;
- Several works may then be pursued for understanding the connections between human settlement dynamics and climate past evolutions
