New methods for quantitative climate reconstructions applied to the Levant

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On his migration out of Africa, anthropological modern human had to cross the Levant, among other places. Today, there are many different climatic zones, which are particularly evident along the Jordan Valley. For example, the Dead Sea and the Sea of Galilee in Israel are reservoirs of climate proxies and reflect climate variability during the Holocene, based on pollen and plant remains in their lake sediments.

In addition to plant information, speleothems are also useful as climatic proxies. They have been studied in many caves in the Levant. From their isotopic data, conclusions can be drawn about the climate in specific periods and areas. One task is their appropriate use in terms of quantitative climate reconstruction.

Another topic is the consideration of age uncertainties in paleoclimatology and their influence on reconstruction techniques. For this purpose, it is advantageous to use mathematical formulations that are easy to implement and calculate.

Based on data from a sediment core of Sea of Galilee we will discuss and present results for the following sequence of points: the mathematical formulation of climate reconstruction using Bayesian hierarchical models, the computation of transfer function connecting proxy information with physical climate data using machine learning techniques, and the inclusion of age uncertainty based on the output from the latest BACON version.