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Modeling Holocene paleoclimate of Konya basin and comparison with proxy data

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Konya closed basin, located on the Anatolian plateau, hosted plenty of cultures and civilizations throughout the Holocene. The abundance of archaeological settlements and the current ecological fragility of the basin have increased the scholarly focus on the region. The basin offers a long-term and multi-dimensional record of human-environment interactions that reflect social, environmental, political, and economic processes. Paleolimnology studies are significant to reconstruct the paleoclimate and the paleoenvironment of the region. Sediment cores obtained from the basin, which is known to be paleo lake formerly and its surrounding lakes, provide multiple proxy records. Although plenty of paleoenvironmental studies were conducted in the region, reaching a temporally and regionally homogenous and long-term dataset is not straightforward. First, this research aims to build a paleoenvironmental synthesis of the Konya Basin. Secondly, it aims to reveal the climatic changes in the region throughout the Holocene quantitatively. In this study, Macrophysical Climate Model (MCM) was run with thirty years of observation data from a total of 20 meteorological stations located in and around the study area. The model outputs were compared with the local proxy records (oxygen isotopes and pollen records) obtained from the lacustrine environments of the region. MCM is a heat-budget modeling method to precisely recognize the mean centers of high and low sea-level pressure systems that manage the weather and wind patterns at mid-latitudes. The MCM model allows us to predict meteorological parameters at the interval of 100 years from the present to 40,000 years ago. Preliminary findings from the MCM point to the wetter and warmer periods in the Early Holocene, similar to isotope proxies in the region. Towards the end of the Early Holocene, precipitation decreases, and the driest climatic conditions occur in the Middle Holocene. The model outputs confirm the cessation of the active alluvion process in the Middle Holocene, which was experienced due to the reduction in the seasonality of precipitation. It was seen that increasing trend in winter temperatures during the Holocene for analyzed stations. On the advancing parts of the research, the findings from this study will be used in an agent-based modeling platform to understand the complex human-environment interaction in the region.