# *Editorial*

## *Climate variability of the past millennium in Hungary*

Due to recent environmental change issues, climate research of the past millennium has gained special interest in the past few decades. Among other things, this is caused by the fact that the process of making short- and medium-term climate projections requires much better understanding of climate cycles and past climate processes. The growing relevance of historical climate research can be seen as well in European climate studies. Within the framework of the currently ongoing European project (FP-6) entitled *Millennium – Climate and Its Past Dynamics*, significant efforts have been made, funded by the European Union, to provide complex and precise multi-proxy reconstructions of the variability of the European climate over the last thousand years. In a joint investigation by European scientists, studies and records from various fields and different parts of Europe, including Hungary and the Carpathian Basin are gathered.

Both in Hungary and the surrounding areas of the Carpathian Basin, either in the form of medium- or long-term climate reconstructions or impact case studies of weather anomalies and extremes, in the recent decades and especially in the last few years, a rapidly developing interest among scientists and historians can be perceived. In this issue we will present new results of long-term climate investigations in Hungary, provided by 16 scientists from various fields like paleoecology, geology, geochemistry, dendroclimatology, geography, and environmental history.

The paper of *Siklósy et al.* provides a reconstruction of climate variations that have occurred in the past millennium. In their paper temperature, precipitation, as well as vegetation changes in northeastern Hungary (Bükk Mountains), based on high-resolution stable isotope (oxygen, carbon) and trace-element analyses for a 1100-year long stalagmite record with decadal cycles, are discussed. While oxygen isotope content is mainly related to temperature and carbon is related to precipitation, a combined trace-element (Mg, Sr, and P) variation method was applied to detect changes in evapotranspiration. A significant result was that the predominantly wet and warm Medieval Warm Period, after a transition period of several dry spells, was followed by a colder, humid Little Ice Age.

In a study by *Sümegi et al.*, based on geoarchaeological methods (pollen, macrofossil, sediment analyses), a palaeoecological and palaeoclimatological reconstruction for northern Hungary was carried out for a period of two millennia. Also, based on the evidence derived from sediment depositions, after the high water level of Nádas Lake, which lasted until the mid-Holocene period, a 5000-year gap in deposits occurred due to the deepening of the lake basin in the Imperial period. At the same time as the depth of the lake was increasing, around 200 AD the water level decreased, which caused an eutrophication of the water. This process was followed by paludification, which occurred from ca. 1300 onwards. Their investigation suggests that warm conditions prevailed in the Imperial period, and then in the late Migration period. Once again, warm (and dry) conditions returned in the 8–12th centuries and ended around the mid-1200s.

*Kern et al.* carried out an investigation on August-July precipitation, focusing on the southern sections of the Bakony Mountains in west central Hungary, based on the ring widths of oak trees. Their reconstruction covers a period of 258 years, starting from 1746 AD. The reconstructed precipitation series suggests that very dry conditions occurred in the late 1740s, while the wettest part of the period occurred in the late 1700s. This was followed by a

downward trend in precipitation, with short dry spells in the 1840s, 1860s, and 1940s. However, the driest period of the last 258 years in west central Hungary occurred in the period after the 1980s.

Following the three papers on data analysis, the review article of *Andrea Kiss* provides a synthesis of research in historical climatology and a study of hydrometeorological extremes in Hungary, based on documentary evidence, for the past millennium. In addition to compilations and analyses of long-term climate variability, case studies on hydro-meteorological extremes (e.g., droughts and floods) and their impact over the past thousand years are also elaborated.

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