

Holocene paleoclimate reconstructions from Belgian continental archives (HOPES)

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Comparing climate reconstructions based on proxy data approach with climate modelling enables to test both assumptions underlying the interpretation of climate reconstructions and to refine predictive models. Among geological archives, speleothems (secondary carbonate deposits in caves) and peatbogs are now regarded as important archives of past climatic and environmental conditions on the continents, offering a number of advantages relative to other continental archives (such as lake sediments, tree rings, ice cores). Both archives, presented in Belgium, are reliable continental environmental archives of high interest due to their dating possibilities and their possibility to preserve multi-proxy records of environmental and climatic dynamics. Combining studies on speleothems and peatbogs from the same area was provided an age-constrained reconstruction of climatic variability at decennial resolution for key intervals of the Holocene (6.5 to 5.5 ka, 5.2 to 4.2 ka and 3.2 to 2.2 ka). The reconstructed precipitation and temperature curves in NW European settings, as proposed in HOPES, are essential to better constrain the Northern Hemisphere climatic record and to test climate models. Our strategy was derived from a comparative study of two continental archives: speleothems and peatbogs. Time series of elemental and stable isotope geochemistry were established for the 2 archives. Precipitation and humidity conditions over Belgium was reconstructed by integration of results derived from the two continental archives. Such comparison allows to reduce the bias related to the specific sensitivity to climate changes of each archive. Time-series was first screened using classical time-series analysis techniques in order to detect potential quasi-periodic patterns in the paleoclimate records. As a second step, statistical modeling will be developed to associate peatbog and speleothem data in a single, consistent framework at the Belgian scale, and then to associate these data into larger data network. Our data will thus complement the information on rapid climate change and regional variability across Europe gained through research programs funded by the European Science Fundation and the European commission like Holivar (www.esf.org), ACCROTEL M (www2.glos.ac.uk/accrotelm/) or Past4Future (www.past4future.eu).