A NOBLE GAS PALAEOTEMPERATURE RECORD 
FROM THE LEDO-PANISELIAN AQUIFER IN 
BELGIUM

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The Ledo-Paniselian sands form a confined coastal aquifer, extending from north- 
western Belgium (Flanders) towards the Netherlands. An extensive record of noble 
gas temperatures (NGTs) from this aquifer indicates strong glacial cooling. While 
Holocene samples yield NGTs of 8 to 10 °C, in agreement with modern air temper- 
atures, NGTs near the freezing point (3 °C) are observed in a narrow region about 
12 km downstream of the recharge area. Possibly, even colder conditions prevailed 
during the period of the Last Glacial Maximum (LGM), but are not represented in the 
groundwater archive. During the LGM, permafrost may have inhibited groundwater 
recharge, as has been inferred for other European aquifers. As often in groundwater- 
based palaeoclimate studies, precise dating of the record is difficult. The flow pattern 
and infiltration conditions in the Ledo-Paniselian aquifer are rather complicated and 
were subject to hydrological changes during the past. The chronology of the climate 
record can be constrained by using 14C and 4He data, which correlate quite well. Cal- 
culation of 14C-ages requires careful consideration of the geochemical and isotopic 
data. The systematic evolution of water chemistry in this freshening aquifer has been 
described before and was used to cross-check and correct the dating by taking into 
account chemical reactions and isotope exchange. The large noble gas data set (44 
samples from 39 wells) encourages a systematical study of the factors affecting the 
composition of dissolved noble gases in groundwater. Some samples show a clear de-
gassing pattern, which was reproduced in a few wells that were sampled both in 1998 and 2001. This finding indicates that degassing is not an artefact of sampling. We discuss possibilities to model the effect of degassing in order to derive reliable NGTs from these samples.