



## **10Be dating of the Main Terrace level in the Amblève valley (Ardennes, Belgium): new age constraint on the archaeological and palaeontological filling of the Belle-Roche palaeokarst**

Gilles Rixhon (1), Didier L. Bourlès (2), Régis Braucher (2), Lionel Siame (2), Jean-Marie Cordy (3), and Alain Demoulin (4)

(1) Institute of Geography, University of Cologne, Zùlpicher Str. 45, 50674 Cologne, Germany (grixhon@uni-koeln.de), (2) Aix-Marseille Université, CNRS-IRD-Collège de France, UM 34 CEREGE, Technopôle de l'Environnement Arbois-Méditerranée, BP80, 13545 Aix-en-Provence, France, (3) Institute for Zoology, University of Liège, Place Delcour 17, 4020 Liège, Belgium, (4) Department of Geography, Unit of Physical Geography and Quaternary, University of Liège, Allée du six Août 2, 4000 Liège, Belgium and FRS-FNRS, Brussels, Belgium

It is still disputed whether very old archaeological and palaeontological remains found in the Belle-Roche palaeocave (eastern Belgium) pertain to the Early ( $\sim 1$  Ma) or Middle ( $\sim 0.5$  Ma) Pleistocene. Here, in situ-produced cosmogenic  $^{10}\text{Be}$  concentrations from a depth profile in nearby sediments of the Belle-Roche terrace (Amblève Main Terrace level) are used as an indirect solution of this chronological issue. The distribution of  $^{10}\text{Be}$  concentrations in the upper 3 m of this profile displays the theoretically expected exponential decrease with depth. Assuming a single exposure episode, we obtain a best fit age of  $222.5 \pm 31$  ka for the time of terrace abandonment. However, below 3 m, the  $^{10}\text{Be}$  concentrations show a marked progressive increase with depth. This distinctive cosmogenic signal is interpreted as the result of slow aggradation of the fluvial deposits over a lengthy interval. Modelling of the whole profile thus suggests that the onset of the terrace formation occurred at around 550 ka, with a sediment accumulation rate of  $\sim 20$  mm/ka. Based on two slightly different reconstructions of the geomorphic evolution of the area and a discussion of the temporal link between the cave and Main Terrace levels, we conclude that the fossil-bearing layers in the palaeokarst pertain most probably to MIS 14–13 (or possibly MIS 12–11) and the artifact-bearing layer to MIS 13 (or possibly MIS 11). This age estimate for the large mammal association identified in the Belle-Roche palaeokarst and the attribution to MIS 14–13 of a similar fauna found in the lowermost fossiliferous layers of the Caune de l'Arago (Tautavel) are in mutual support. Our results therefore confirm the status of the Belle-Roche site as a reference site for the Cromerian mammal association and the Early Palaeolithic industry in NW Europe.