Introduction

Palaeolithic sites associated with the Eemian interglacial (MS 5e) are very rare in Northern France. Their preservation is restricted to very specific geological contexts, in association with carbonated tufs (Caours) or peat deposits (Waziers) (Figure 1).

ESR-U-series dating method was hence applied on teeth recovered from different levels of the two sites, in the aim to evaluate the quality of the results obtained in very clearly chronologically constrained stratigraphic sequences. The results obtained will be displayed and discussed in this paper.

Material and method

ESR-U-series dating method was applied according to the protocol of preparation and analyses described in Bahn et al. (2010).

Equivalent doses were determined using single exponential function. The dose rate was estimated from measurements by gamma-ray spectrometry, both in laboratory with a low background, high purity germanium detector and in situ using Cadmium-Spectroscopic 1000 spectrometer. Recoil loss from each tissue was determined by combining alpha-spectroscopy and gamma-ray data (Bahn et al., 1992). The dose rate was used according to the formula of Prentice and Hutton (1994).

The following parameters were used in the age determination:
- a Leigh evolution of 0.13 ± 0.02 (Grün & Katzenberger-Apel, 1994).
- water content of sediments was measured for each dated level by drying it at oven at 40°C during one week.
- water contents of 0.06% in the enamel and 5.7% in the dentine.
- beta attenuation values in dental tissues were calculated using a Monte Carlo approach (Brennan et al., 1997).

Results

The ESR-U-series results are shown in Table 1. Several interesting points can be highlighted in these data.

Conclusions

The combined ESR-U-series analyses realised on teeth carried out from two Eemian sites of Northern France, Caours and Waziers, demonstrate the reliability of the method to date Middle Palaeolithic sites, and despite particular palaeo-environmental characteristics of part of the analysed tissues, the validity of the used analytical protocols. This work demonstrates in particular the importance of the in situ dosimetry in the age calculation.

At Caours, the obtained ESR-U-series ages are in excellent agreement with the other available geochronological data derived from U-series and luminescence studies. They permit to calculate a new mean age for the lower part of the sequence (128 ± 9 ka and for unit N1, N1-7) and 127 ± 13 ka for units N1-6 to N1 (excluding N3, N-9). Associated by available palaeo-environmental and archaeological data, they make of this site one of the best known Middle Palaeolithic sequence of France.

For Waziers, the new established ESR-U-series chronology, with a mean age of 120 ± 11 ka, confirms the record of Saalian Late Glacial deposits at the bottom of the sequence and of the subsequent Eemian interglacial stage, evidenced by palaeo-environmental and palaeontological studies. These results show the interest to integrate ESR-U-series dating analyses through the chronological study of Middle Palaeolithic sites when possible and demonstrate the necessity to involve geochronologists to the fieldworks and excavations, since its earliest stages.

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