



Identifiant du résumé : 288

Radiocarbon dating of small foraminifera samples with a gas ion source

Contenu

AixMICADAS (Bard et al, 2015 NIMB) is equipped with the gas interface system (GIS) coupled with the carbonate handling system (CHS, Wacker et al. 2013 NIMB, www.ionplus.ch). This system is designed to analyze carbonate samples ranging from ca. 100 ug to 5 ug of C. Although the method looks promising and allows dating sediments where foraminifera are rare, it has not yet been applied widely.

The method based on the hydrolysis of carbonates leached online to remove 30% of the initial mass was applied to date the top four meters of a deep-sea sediment core characterized by an average sedimentation rate of 14 cm/kyr. Replicate ^{14}C gas analyses (between 3 and 6 individual gas target for each sample) on two planktonic foraminifera species (*Globorotalia inflata* and *Globorotalia truncatulinoides*) hand-picked in two granulometric fractions ($> 315 \mu\text{m}$ and $> 425 \mu\text{m}$) were performed to establish the chronology of the core. In addition to gas samples (a total of more than 400 hundreds gas targets), conventional solid targets were also prepared when large amounts of foraminifera were available downcore.

Comparison between solid and gas measurements on foraminifera picked at the same depth showed a good agreement. However, gas measurements on different foraminiferal samples of the same depths (ranging between 10 and 40 individuals depending on the foraminifera species and granulometric fraction) showed dispersions sometimes much larger than expected from the analytical precision ($\sim 7\%$ on a modern carbonate sample). It is well known that open ocean sediments are made of various biogenic, detrital and authigenic materials of different ages mixed by physical and biological processes. Bioturbation could indeed contribute to the age heterogeneity, but it remains unclear if this process could explain very young anomalies. We will also discuss about other sedimentological effects or artefacts that may explain anomalous results.

Student Submission

No

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