



New method for quantitative analysis of dissolved helium isotopes in sediment pore-waters

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Helium isotopes are powerful tools to study sediment pore-waters. They reflect the mixing between depth fluids and overlying water incorporated during sedimentation. Thus helium isotopes can allow to constrain fluid origin, quantify the flux of exchanges between the different reservoirs and also archive the bottom water past conditions. There was no method up to now to analyse quantitatively helium concentrations in pore-water at various depths of a core.

A new method has been developed for the sampling and the quantitative extraction of dissolved helium from sediment pore-water, leading to the determination of helium concentration and isotopic ratio ${}^3\text{He}/{}^4\text{He}$ profiles. The core sampling is a non destructive technique (no squeezing), using a piston system to sample the extremities of core sections into copper tubes sealed by metallic clamps. This method has been tested on piston and gravity cores during sea cruises but is also applicable to lake sediment cores. We also developed an original line to extract the sediment from the copper tube, without heating the sediment, to avoid any release of radiogenic helium produced in the sediment by the decay of U and Th (Brennwald et al., 2003). The heating of a degassed water reservoir allows to push the sediment outside the tube by water dilatation. Dissolved helium is then extracted and analysed using the standard method developed for water samples.

This method has been tested successfully on an artificial core, realized by sedimentation of a sediment and water mixture. Helium concentrations and isotopic ratios ${}^3\text{He}/{}^4\text{He}$ are reproducible between all samples taken at core top and are in agree-

ment with helium solubility data at same temperature and pressure. Samples of the mud prior deposition have been analysed by the standard method and are also in good agreement with core samples analysed by our new technique.

Results from the REGAB pockmark region (Zaire deep-sea fan) are presented on a separate poster (SSP16).

Brennwald M., *Limnology and Oceanography : Methods*, **1**, 51-62, (2003)