Radiocarbon dating of ultra-small carbonate samples from deep-sea sediments and coral reef cores: opening a can of worms

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For ^{14}C measurements of ultra-small samples we use the gas ion source of the AixMICADAS facility (Bard et al. 2015 *Nucl. Instr. Meth.*) equipped with a gas interface system coupled to a carbonate handling system (CHS). Our method is based on the online sequential leaching of ca. 30 % of the sample mass with HCl using the CHS, followed by complete hydrolysis of the residual carbonate with phosphoric acid. The precision, accuracy and blank levels have been tested extensively with reference materials and internal standards, including corals and foraminifera samples ranging from about 3 to 100 μg of carbon (Tuna et al. 2018 *Nucl. Instr. Meth.*, Fagault et al. 2019 *Nucl. Instr. Meth.*).

We will present ^{14}C results from a high sedimentation rate core located within the present oxygen minimum zone of the northern Indian Ocean. We dated 12 different species of benthic foraminifera adapted to various dissolved oxygen conditions over several Heinrich and Dansgaard-Oeschger events. The capacity to date individual shells of foraminifera allowed us to study in detail the transitions in and out the H1 event, leading to important implications for the hypothetic release of ^{14}C-depleted CO_2 from ocean mid-waters into the atmosphere.

Another illustration of the usefullness of ^{14}C dating of ultra-small carbonate samples is its application to study sea-level changes during the last deglaciation, notably for the site of Tahiti in French Polynesia (Bard et al. 1996 *Nature*, Bard et al. 2010 *Science*, Deschamps et al. 2012 *Nature*). U-Th dating of aragonitic corals provides the ultimate geochronological precision, but the most precise information on past sea levels is based on calcitic organisms, which cannot be dated reliably by U-Th due to their small size (e.g. vermetids) or high $^{232}Th/^{238}U$ ratio (crustose coralline algae, microbialite). We will present new ^{14}C measurements performed on fossil assemblages of samples bracketing the meltwater-pulse 1A from Tahiti cores. The comparison of ^{14}C ages of the different fossil organisms allows strengthening the estimations of amplitude and timing of MWP-1A.