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Radiocarbon dating of carbonate samples—different treatment methods compared

Irka Hajdas (1), Georges Bonani (1), Wallace S. Broecker (2), Elizabeth Clark (2), Michael Molnar (1,3), Carla Taricco (4), Gulianna Vivaldo (4), and Lukas Wacker (1)

(1) Laboratory of Ion Beam Physics, ETH Zurich, Switzeraland (hajdas@phys.ethz.ch), (2) LDEO, Columbia University, NY 10964, USA, (3) Institute of Nuclear Research, Hungarian Academy of Sciences, 4026 Debrecen, Hungary, (4) Department of Physics, University of Turin and IFSI-INAF,Turin, Italy

Various types of carbonate are used as material for radiocarbon dating. Very common are shells of foraminifera, mollusk, ostracodes, corals and stalagmites/stalactites. Other such as eggshells or pearls are less common but might be equally challenging. Previous studies have shown that secondary carbonates might cause problems in providing accurate radiocarbon ages. Different methods of treatment have been proposed to remove the potential contamination by leaching of the surface either with acid or hydrogen peroxide. For example, treatment of foraminifera shells was addressed in the inter-comparison exercise, where all these methods of treatment were applied to the handpicked single-species foraminifera from the same depth (Broecker et.al., 2006), resulted in different 14C ages of treated and untreated fractions. It remains to be clarified which of the method is most effective and when should be applied.
Similarly, a treatment of macroscopic shells (mollusk, gastropodes and ostracodes) has not been fully investigated. In general, a removal of more then 50% of a surface assumed to be sufficient and applied to large shells. However, sporadically effectiveness of this treatment is questioned, especially when ages of the shells are close to the limit of 14C dating.
In this study we compare the effects of various treatment methods applied to very old shells of different type, age and location.
References:
Broecker WS, Barker S, Clark E, Hajdas I, Bonani G (2006). Anomalous radiocarbon ages for foraminifera shells, Palaeocenography 21(2) PA2008 doi.10.1029/2005PA001212.