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Dating young stalagmite using 210Pb excess method: example from Han-sur-Lesse cave, Belgium

Bassam Ghaleb (1), Mohammed Allan (2), Sophie Verheyden (3), Daniele Pinti (1), and Nathalie Fagel (2)

(1) Université du Québec à Montréal, GEOTOP, Montreal, Canada (ghaleb.bassam@uqam.ca), (2) AGEs, Géologie, Université de Liège, 14 Allée du 6 Août, 4000 Liège, Belgium, (3) Analytical, Environmental and Geo- Chemistry- AMGC, Vrije Universiteit Brussel - VUB, Pleinlaan, 1050 Brussels, Belgium

Speleothem cave deposits (particularly stalagmites) represent often high–resolution continental records for reconstruction of paleoclimate and/or paleoenvironmental conditions through their oxygen and carbon stable isotope compositions (delta 18O and delta 13C) (McDermott, 2004) and their trace elements concentrations (e.g., Mg, Sr and Ba) (Fairchild et al, 2000). The advantage of using very young speleothems (1-120 yrs timescale) is the possibility to validate such reconstructions when compared with historical and instrumental records (e.g., meteorological parameters). U-series radiochronology remains the most suitable method to obtain reliable absolute ages of speleothems even for relatively young deposits, avoiding uncertainties related to multiple sources of CO_2. In cases of pristine and clean speleothems with relatively high U-contents, precise U/Th ages can be obtained even for very recent stalagmite (e.g., Shen et al, 2013). However, this is rarely the case because speleothems often contain low U-contents (ppb levels) and traces of detrital contaminants, which require often complicated age corrections. Such corrections result in relatively high uncertainties on the final age calculation. We present here the results of 210Pb measurements carried out on high growth rate and laminated stalagmite from Han-sur Lesse cave, southern Belgium. The 210Pb results show a clear well defined exponential with depth decreasing allowing to calculate an age-depth model. These 210Pb ages were confronted to ages of the stalagmite obtained by counting laminae and considered as true ages and confirm the annual character of the laminae.
The results show a good agreement between the two ages within the analytical errors and open a new potential for dating recent not laminated speleothems using 210Pb excess method.
References:
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