Sediment Dating of a sedimentary core from Moulay Bousselham region using ^{210}Pb and ^{137}Cs

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The sediments are valuable historical archives and their study (in particular the sedimentary column) makes it possible to trace the history of terrigenous and/or anthropic inputs in lacustrine, marine and estuarine environments.

In this work, we were interested in the study of a sedimentary core collected in 2009 in the region of Moulay Bousselham by considering two radionuclides, which are:

- The ^{210}Pb which is a natural radionuclide allowing the reconstruction of the geochronology via the estimation of the ages and the accumulation rates of the deposited sediments during the last 150 years;
- The ^{137}Cs, an artificial radionuclide which has the advantage of providing two absolute dates (1963-1964 and 1986).

The determination of these radionuclides was carried out by Gamma Spectrometry using a Hyper-Pure Germanium. Then, based on a number of hypotheses concerning the sedimentation rate, the ^{210}Pb flux and the surface activity, we have applied three mathematical models of dating by the ^{210}Pb, namely:

- The CF-CSR model (Constant Flux-Constant Sedimentation Rate);
- The CIC model (Constant Initial Concentration);
- The CRS model (constant Rate of Supply).

The results obtained show that the sedimentation rate is of the same order of magnitude for the three models CF-CSR, CIC and CRS (respectively 0.38, 0.31 and 0.26 g/cm²). Also, the dates obtained by the three models are essentially the same from the sampling date to the 1960s. However, CRS experienced a divergence from the other models for the lowest dates (deeper layers); this can be explained by the persistence of significant levels of ^{210}Pb at the base of the core making it difficult to accurately assess the ^{210}Pb sediment inventories required for the CRS method.

Keywords: ^{210}Pb, ^{137}Cs, Gamma Spectrometry, dating sediment, CF-CRS model, CRS model, CIC model, accumulation rates, chronology