Use of 7Be as a sediment tracer: a scope for testing and refining key assumptions related to its adsorption on a catchment scale

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To date the use of Beryllium-7 (^{7}Be) as a sediment tracer on catchment scale is largely understudied, although several studies applied the ratio ^{7}Be/^{137}Cs or ^{7}Be/^{210}Pb$_{ex}$ for sediment source fingerprinting. Several key assumptions, (1) spatially uniform fallout, (2) immediate adsorption upon contact with the soil and (3) irreversible adsorption by the soil, must hold if ^{7}Be is to be used as a sediment tracer. However, recent studies have raised questions about the validity of these assumptions in the changing environments on a catchment scale. In this study three representative soil types of the Mariaborrebeek catchment, a small watershed located in the Flemish Ardennes in Belgium, were collected to assess the adsorption rate of ^{7}Be on the soil surface in this catchment. In a laboratory experiment, soil samples were equilibrated with a stable Be solution of 1 mg l^{-1} at a soil:solution ratio of 1:10 and the adsorption of Be was measured at different time intervals. Furthermore, different amendments were applied to assess the impact of soil pH, fertilizer and organic matter on the adsorption of Be. Preliminary results confirm a rapid and almost complete Be adsorption and a negative correlation between pH and Be adsorption. The results of this study might lead to the formulation of interpretation guidelines for the use of ^{7}Be to assess short-term soil redistribution and sediment source fingerprinting on catchment scale.