

A study to investigate the use of natural radionuclides as radiotracers in sedimentation processes

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The natural occurring radionuclides of thorium, uranium and potassium is present in varying concentrations in all rocks and sand. Natural radionuclides can therefore be a good tool when studying sediment characteristics. The uranium nuclide usually has the lowest activity concentrations, and potassium by far the highest concentrations. Natural radionuclide concentrations were consequently acquired and mapped by means of in situ measurements at various locations. These locations included beaches, pans and rivers in South Africa, Mozambique, Botswana and Namibia. The distribution of the naturally radionuclides demonstrated good agreement with the geophysical characteristics of the areas which includes underlying sedimentation processes. These studies also showed that radionuclide mapping provides valuable information on beach formation and erosion.

Black sand that contain high levels of heavy minerals were also gathered from some of the sites and analysed. Uranium and thorium concentrations in excess of 550 Bq/kg and 950 Bq/kg, respectively, were measured. Very low concentrations of potassium were however detected in the black sand. These exceptionally high levels of radionuclides gave rise to the idea that black sand can be used as a natural radiotracer when studying sediment transport. This article will explore the possible utilization of natural thorium and uranium in black sand as radiotracers.

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