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Monte Carlo simulation of an in-situ gamma-ray detector system used in conjunction with a planned calibration facility

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Abstract content
   (Max 300 words)

Following the release of anthropogenic radioactivity into the environment, for example due to nuclear accidents, it is required that the radioactivity levels in soils be measured so that radiation dose to affected groups can be estimated. In this regard in-situ gamma-ray measurements have the advantage that large areas can be mapped by mounting detectors, coupled with GPS technology, on a vehicle. An example of such an in-situ gamma-ray spectrometry system is the Multi Element Detector for Underwater Sediment Activity (MEDUSA) system which makes use of a CsI(Na) scintillator (70 mm diameter and 150 mm length).

This MEDUSA system can used in several measurement geometries. A common geometry used to assess radioactive fall-out is that of a flat bed, i.e. detector suspended above flat ground. One way to calibrate such a detector system for this geometry is to use calibration pads (with well characterized (natural) radioactivity content). An alternative approach which is more economical in terms of space is to use a drum or "castle" constructed from radiometrically well characterized bricks/slabs. For this case, measurements combined with Monte Carlo simulations of the detector in the calibration and application geometry (e.g. flat bed) are required. We report here on initial results from simulations for a calibration facility being planned at iThemba LABS (Cape).

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Msc

Main supervisor (name and email)
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