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Recent trends in radiometrics and mass spectrometry technologies –synergy in environmental analyses

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The dominant development in the radiometrics techniques has been the utilisation of large HPGe detectors in underground laboratories with anti-cosmic or anti-Compton shielding for the analysis of short and medium-lived radionuclides in the environment. They have included applications of high efficiency HPGe detectors (up to 200% relative efficiency to a 75 mm diameter, 75 mm long NaI(Tl) detector), often operating at least a few tens of metres underground, where the nucleonic component of cosmic rays is reduced by several orders of magnitude. In the mass spectrometry sector, applications of Inductively Coupled Plasma Mass Spectrometry (ICPMS) and Accelerator Mass Spectrometry (AMS) for the analysis of long-lived radionuclides in the environment are the most important recent achievements. These developments in both sectors did not only considerably decrease the detection limits for several radionuclides (up to several orders of magnitude), but they also enable to decrease sample volumes so that sampling e.g. of the water column or sediments can be much easier and more effective. A comparison of radiometrics and mass spectrometry results for the analysis of radionuclides in the environment shows a reasonable agreement –within quoted uncertainties, for wide range of activities and different sample matrices analysed. ^{137}Cs , ^3H , ^{14}C , ^{129}I and Pu isotopes water profiles recently obtained for the Indian Ocean will be discussed in detail.

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