Application of in-situr measurement to determine 137Cs in the Swiss Alps

JournalArticle (Originalarbeit in einer wissenschaftlichen Zeitschrift)

ID 258541
Author(s) Schaub, M; Konz, N; Meusburger, K; Alewell, C
Author(s) at UniBasel Alewell, Christine ; Di Bella, Katrin ;
Year 2010
Title Application of in-situr measurement to determine 137Cs in the Swiss Alps
Journal Journal of environmental radioactivity
Volume 101
Number 5
Pages / **Article-Number** 369-76
Keywords Nal detector, GeLi detector, Alps, In-situ measurements, Field application
Establishment of Cs-137 inventories is often used to gain information on soil stability. The latter is crucial in mountain systems, where ecosystem stability is tightly connected to soil stability. In-situ measurements of Cs-137 in steep alpine environments are scarce. Most studies have been carried out in arable lands and with Germanium (Ge) detectors. Sodium Iodide (Nal) detector system is an inexpensive and easy to handle field instrument, but its validity on steep alpine environments has not been tested yet. In this study, a comparison of laboratory measurements with GeLi detector and in-situ measurements with Nal detector of Cs-137 gamma soil radiation has been done in an alpine catchment with high Cs-137 concentration (Urseren Valley, Switzerland). The aim of this study was to calibrate the in-situ Nal detector system for application on steep alpine slopes. Replicate samples from an altitudinal transect through the Urseren Valley, measured in the laboratory with a GeLi detector, showed a large variability in Cs-137 activities at a meter scale. This small-scale heterogeneity determined with the GeLi detector is smoothed out by uncollimated in-situ measurements with the Nal detector, which provides integrated estimates of Cs-137 within the field of view (3.1 m(2)) of each measurement. There was no dependency of Cs-137 on pH, clay content and carbon content, but a close relationship was determined between measured Cs-137 activities and soil moisture. Thus, in-situ data must be corrected for soil moisture. Close correlation (R-2 = 0.86, $p < 0.0001$) was found for Cs-137 activities (in Bq kg(-1)) estimated with in-situ (Nal detector) and laboratory (GeLi detector) methods. We thus concluded that the Nal detector system is a suitable tool for in-situ measurements in alpine environments. This paper describes the calibration of the Nal detector system for field application under elevated Cs-137 activities originating from Chernobyl fallout.
Publisher Elsevier
ISSN/ISBN 0265-931X
edoc-URL http://edoc.unibas.ch/dok/A5265715
Full Text on edoc No;
Digital Object Identifier DOI 10.1016/j.jenvrad.2010.02.005
PubMed ID http://www.ncbi.nlm.nih.gov/pubmed/20307920
ISI-Number WOS:000277530800007
Document type (ISI) Journal Article