



Use of fallout radionuclides and stable elements to characterize the contribution of the different sediment sources in small river catchment, in King George Island, Maritime Antarctica

Alejandra Castillo (1), Valentin Golosov (2), Bulat Mavlyudov (3), Heitor Evangelista (4), Gerd Dercon (5), Ana Navas (6), and Paulina Schuller (1)

(1) Universidad Austral de Chile, Ciencias Químicas, Ciencias, Valdivia, Chile (acastill@uach.cl), (2) Laboratory for Soil Erosion and Fluvial Processes, Faculty of Geography, Lomonosov Moscow State University, Moscow, Russian Federation, (3) Institute of Geography, Russian Academy of Sciences, Moscow, Russian Federation, (4) LARAMG/ Rio de Janeiro State University, Rio de Janeiro, Brazil, (5) Soil and Water Management & Crop Nutrition Laboratory, Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture, Seibersdorf, Austria, (6) Estación Experimental de Aula Dei (EEAD-CSIC), Consejo Superior de Investigaciones Científicas, Zaragoza, Spain

Climate change has a global incidence, and its effects are evidenced at a general level, although they are not fully identified and quantified. In any case, there is a consensus that some areas are especially sensitive to these changes, including the polar and high mountain regions, where the increase in temperatures and the change in the amount and the partition of precipitations are causing the melting glaciers and threatening the water supply for hundreds of millions of people.

Therefore, studying the concentration of radioactive fallout radionuclides (FRNs) ^{137}Cs and $^{210}\text{Pb}_{ex}$ and environmental radionuclides (ERNs) ^{238}U , ^{226}Ra , ^{232}Th and ^{40}K can provide valuable information on soil factors and processes that affect their spatial patterns, and on changes in environmental conditions in areas free of ice, thus contributing to a better understanding of the impact of climate change on the Antarctic ecosystem.

For this purpose, in a catchment located at the foot of the Bellingshausen Dome glacier in King George Island, South Shetland Islands, Antarctic Peninsula, soil and sediment samples were collected in areas identified as potential sources and sink of sediment and a sediment core was collected in the pro-glacial lake. Additionally, soil profiles were collected in depth increments at three different reference sites away from the glacier.

The total inventories of ^{137}Cs in the sink areas were slightly higher than in the sources areas, suggesting that sediment movement processes are important. In areas located near the glacier, concentrations of ^{137}Cs were below the limit of detection, which would show that there is sediment delivered from under the glacier. At the reference sites, the mean value of the ^{137}Cs inventory was 165 Bq m^{-2} and the distribution of the FRNs in the soil profile was the expected for an undisturbed soil and the vertical distribution of ERNs showed a relatively homogeneous distribution.

The results show that the FRNs and ERNs, complemented with geochemical analyses and other soil properties can be used for the application of the sediment fingerprinting technique, as well as for evaluation the sedimentation rates.

This study was supported by the IAEA Technical Cooperation Programme through the INT/5/153 project together with funds from the Universidad Austral de Chile (DID-I_2014_09).