

The influence of the radioactive fallout pattern and sediment/water chemical properties on the ^{137}Cs concentrations in lake sediments

MÄKINEN JARI¹

¹Geological Survey of Finland
P.O.Box 1237, FI-70211
Kuopio, Finland
jari.makinen@gtk.fi

The amount of radioactive fallout in lacustrine sediments, mainly depends on the magnitude of the fallout and also on the mobility of the elements in the watershed-lake basin system. This was studied in mid-Finland, around Kuopio, by collecting sediment samples from 127 headwater lakes. The lakes have mainly forested catchments and thus the sediment organic content is high (C=24 %) and human impact is reasonably low. In contrast, there is a strong radioactive fallout gradient because the Chernobyl fallout was 0-6 kBq/m² in the NE part of the area while it was as high as 45 – 80 kBq/m² in the SW part (STUK).

The sediment cores were sliced in 1 cm slices in the field, dried, weighed and analyzed for ^{137}Cs activity and chemical composition. In addition, water quality observations for the lakes were used in the analysis.

The results show that the spatial distribution of $^{137}\text{Cs}_{\text{max}}$ corresponded well to the spatial pattern of the Chernobyl fallout with highest peak activities in the SE and lowest in the NE. $^{137}\text{Cs}_{\text{max}}$ was 14 235 Bq/kg on average, with a maximum activity concentration of 140 091 Bq/kg and a log-normal distribution of concentrations. There was also correlation between $^{137}\text{Cs}_{\text{max}}$ values and the sediment chemistry and water quality data. This suggests that the concentrations of ^{137}Cs are not only related to the fallout pattern but also to the variation of other elements, water quality, and, therefore, watershed/lake system.