Contribution ID: **1016** Type: **Verbal**

Determination of Natural Radionuclides in Groundwater Samples in Austria –Analysis of Seasonal Variations and Correlations with Chemical Parameters

Wednesday, 18 May 2022 09:06 (18 minutes)

The Monitoring of natural radionuclides in groundwater samples has been carried out in various projects in Austria over the last 25 years. A large project monitoring groundwater samples from all over Austria took place in 2008 and 2009. Building on this, a follow-up project was launched in 2021, funded by the Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology. Sampling sites were selected to check whether activity concentrations have changed over the years. In addition, samples were taken at these sampling sites each quarter of the year to analyse seasonal variations at these sampling sites. Rn-222, Ra-226, Ra-228, Pb-210 and Po-210 were analysed by liquid scintillation counting. U-238, U-235 and U-234 were analysed by ICP-MS. Pb-210 and Po-210 were measured using the extractive scintillation cocktail Polex™. Radionuclides were separated by sulfide and sulfate precipitation, and only 1 L of water sample was used. Rn-222 activity concentrations were between the lower limit of detection (LLD) and 620 Bq/l. The activity concentration of Ra-226 and Ra-228 was between the LLD and 0.14 Bq/l and 0.11 Bq/l respectively. The activity concentration of Pb-210 and Po-210 was between the LLD and 0.07 Bq/l and 0,11 Bq/l respectively. The activity concentration of U-238, U-235 and U-234 was between the LLD and 2.7 Bq/l, 0.13 Bq/l and 2.0 Bq/l respectively. Correlations between these radionuclides and chemical parameters such as chloride, boron, sulfate, oxygen content, hydrogen carbonate, nitrate, sodium, potassium, magnesium were analysed. In the presentation a short description of the method is given and the results of the analysis of the seasonal variations and the correlations are presented.

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Session Classification: Environmental Radioactivity

Track Classification: Radionuclides in the Environment, Radioecology