Geophysical Research Abstracts, Vol. 9, 03467, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-03467

Computation and analysis of the Radioxenon background in high Northern Latitudes based on a new emission inventory

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Monitoring of radioactive noble gases, in particular Xenon isotopes, is a crucial activity for the verification of the Comprehensive Nuclear-Test-Ban Treaty. Therefore, the global distribution of these isotopes based on emission and transport patterns need to be well understood. It is known from previous studies that a regular low-level background of the isotope ^{133}Xe does exist in the high northern latitudes, for example at the two remote stations Yellowknife and Spitsbergen. This background was found to be consistent, on the order of magnitude, with the estimated emissions of ^{133}Xe in the reactor regions of North America and Europe. Meanwhile, a new emission inventory of ^{133}Xe has been compiled (see paper by Tuma and Kalinowski in same session), which specifies source terms for each power plant and distinguishes between continuous and batch releases. This allows distributing the emissions to the power plant locations instead of defining a few extended boxes. Therefore, the computations done for the original study are repeated, using three different scenarios: in scenario 1, the continuous and batch releases are added and treated as continuous release term. In scenario 2, the batch releases are treated differently by introducing random release times for each power plant with a repetition time typical for this type of source. In scenario 3, additional releases are assumed from known medical radioisotope production facilities, in particular from Chalk River, Canada, and Fleurus, Belgium. Emissions from these sites are known to exceed the other source strengths by orders of magnitude. Results from the new analyses and computations are presented and discussed.