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COMPARISON OF CONCENTRATION ACTIVITIES OF RUTHENIUM ISOTOPES MEASURED OVER SLOVENIA AND SERBIA

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The isotopes of ruthenium (Ru-106, Ru-103) were detected by several European environmental networks involved in the monitoring of atmospheric radioactive contamination in late September 2017. The radioactive cloud passed over the countries in the east and south-east of Europe, while other countries in Europe were just brushed up with very low activity concentrations of Ru-106. Ruthenium is very rare and hence its presence may suggest that an event of some nature occurred. Ruthenium-106 is a fission product from the nuclear industry and it is also used in medical procedures, such as brachytherapy treatments. Ruthenium-106 is a beta emitter with a half-life of 1.02 year so the isotopic presence may persist for some time, with its duration depending on many factors. Apart from the disintegration of Ru-106 to the ground state of a short-lived Rh-106, some characteristic gamma rays are emitted. The origin of Ru-106 in the atmosphere is still unclear.

Among the countries that were affected by the passage of the radioactive cloud containing isotopes of ruthenium were the Republic of Slovenia and Republic of Serbia. The activity concentrations of Ru-106 in the air detected in several stations of both countries were of a similar magnitude. The activity concentrations were determined by standard gamma spectrometry measurements at the Vinča Institute of Nuclear Sciences and Jožef Stefan Institute for the Serbian and Slovenian sampling sites, respectively. Ruthenium was also detected in trace levels in other environmental media (precipitation).

Several statistical calculations to compare measurement results in Slovenia and Serbia are carried out. Those calculations also take into account other radionuclides, such as cosmogenic beryllium-7 and a long-lived radon progeny lead-210, to investigate possible atmospheric processes accompanying the release of ruthenium.

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