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BOOK OF ABSTRACTS



Beryllium-7 activity concentration trends in Serbia and Slovenia

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Beryllium-7 is a natural radionuclide used as a tracer of the stratospheric-tropospheric exchange. Its abundance in the surface air is expected to change as the temperatures in the atmosphere increase.

To investigate the temporal trends of the beryllium-7 activity concentrations and temperature, we apply spectral analysis to time series from three sampling sites: Belgrade in Serbia, and Ljubljana and Krško in Slovenia. The sites lie close to the 45 °N parallel, with Krško approximately 400 km and Ljubljana around 500 km west of Belgrade. Between January 1991 and December 2019, the air filter samples were collected using air samplers; a monthly composite sample was formed and analysed by gamma spectrometry. We use monthly mean temperature records from the European Climate Assessment & Dataset, the Republic Hydrometeorological Service of Serbia for Belgrade, and the Slovenian Environment Agency for the sites in Slovenia.

In the spectral analysis decomposition, we look into a term called trend that represents the overall growth (increase or decrease) in the data records. The trend is calculated using a linear fit. All three sites show 1) positive temperature trends, however statistically insignificant (at the 95 % confidence level), and 2) statistically significant beryllium-7 activity concentration trends of 2.26 %/year, 1.13 %/year, and 0.50 %/year in Belgrade, Ljubljana, and Krško, respectively.

The results confirm our initial hypothesis—over the 28 investigated years, the beryllium-7 activity concentrations increase in the surface air. On the other hand, the non-significant temperature rise in our records suggests that within our method, the temporal resolution of one month is insufficient for obtaining a statistically significant temperature trend.

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