**7Be and other radionuclides as climate change tracers in the air**

**Magdalena Długosz-Lisiecka1,\***

*1Lodz University of Technology, Institute of Applied Radiation Chemistry, Wroblewskiego 15, 90-924 Lodz, Poland*

\* *e-mail:* [*magdalena.dlugosz@p.lodz.pl*](mailto:magdalena.dlugosz@p.lodz.pl) *- corresponding/presenting author*

Radioactive isotopes present in the atmosphere continuously vary in concentration due to a series of natural, often repetitive processes. Although the abundance of these elements changes over time, such variations are generally predictable and can be described mathematically.

When the composition of the atmosphere shifts, the dynamics of atmospheric processes also change. These changes inevitably affect the behavior and production of naturally occurring isotopes. Consequently, research in this field focuses on correlating deviations in isotope concentrations from established trends with key meteorological parameters and pollutant levels.

Analyzing climate change is a complex task that involves assessing numerous parameters and their influence on local and global environments. Environmental systems are influenced by a wide array of natural and anthropogenic processes, which often act synergistically and affect other interconnected systems.

The study of climate change is rooted in the analysis of observed trends and correlations between meteorological parameters and the influx of radionuclides such as beryllium-7 (⁷Be) into the atmosphere. Chemometric methods, including Principal Component Analysis (PCA) and other multivariate techniques, provide powerful tools for detailed environmental data analysis and for identifying potential ecological impacts.

However, limited awareness and understanding of these analytical techniques often hinder their broader adoption within the scientific community and beyond. Yet, their application holds great promise for enhancing current practices in environmental monitoring and sensor-based systems. It is anticipated that broader use of these methods will not only advance environmental research but also support informed decision-making by governmental bodies and research institutions.