Title: **The Influence Of The Spatial Structure Of Aerosol Precursors On The Components Of Secondary Atmospheric Aerosol And Their Potential Environmental And Health Effects**

The Earth's atmosphere is a chemical mixture with a very complex composition. It is estimated that about 2000 Tg*/year of organic compounds are emitted into the atmosphere as gases and another 300 Tg/year as suspended particulates (aerosols). The formation of aerosol particles in the atmosphere has been intensively studied owing to their tremendous impact on human health, air quality, and climate change. Secondary organic aerosol (SOA) represents a significant portion of aerosols in the troposphere.[1-2]

The Northern Hemisphere is known for large emissions of biogenic VOCs from coniferous and deciduous forests.[3] Therefore, the troposphere can be described as a chemical reactor in which the aerosol is a mixture of particles generated/emitted from natural and anthropogenic sources. Scientific data have shown that terpenes, emitted mainly by coniferous trees in huge quantities, have the greatest share in forming atmospheric aerosol.[5] Additionally, due to their structure, the reaction of terpenes with oxidizing reagents present in the atmosphere produces new compounds with different spatial configurations. (**Figure 1**) Each of the resulting conformers may have different effects on human lung cells. Taking this into account, in the presented project we will provide reliable scientific data on the composition of secondary organic aerosols resulting from the oxidation of terpene compounds, and we will also examine their impact on human lung cells.[5]

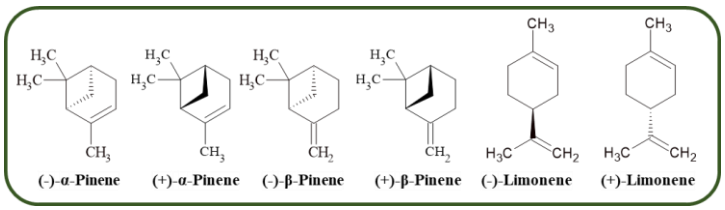

Figure 1 Structures of compounds selected for study.

The research plan includes:

1. Conducting a 40-day field campaign in the suburban "Kampinos National Park" in Granica and determining metrographic parameters and concentrations of selected locations in a given area;
2. Laboratory experiments on the oxidation of individual selected secondary organic aerosol precursors, considering their chirality.
3. Theoretical proposal of oxidation mechanisms, considering the stereoisomerism of precursors and their oxidation products.
4. Toxicological tests of selected oxidation products of volatile organic compounds that are stereoisomers on lung cells.
5. Statistical correlations of the obtained experimental data with weather and atmospheric conditions on the day of sample collection.

Literature:

1. Hallquist, M., et al., *Atmospheric Chemistry and Physics* **2009**, *9*, 5155-52362.
2. https://warszawa.naszemiasto.pl
3. Brauer SG, Woollacott M, Shumway-Cook A. *J Gerontol A Biol Sci Med Sci*. **2001** Aug;56(8):M489-96.
4. L. Han et all. *Science of The Total Environment*, 730, **2020**
5. Kaltsonoudis, C., et al., *Atmos. Chem. Phys*., 16, 14825–14842, **2016**.