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Trees as bioindicators of industrial air pollution during implementation of pro-environmental policy in Silesia region (Poland).

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The aim of research conducted within the project entitled "Trees as **bio**indicators of industrial air pollutants during the implementation of pro-environmental **pol**icies in the area of Silesia" (acronym **BIOPOL**) is the reconstruction of climate changes and anthropogenic effects and monitoring of the influence of human activities related to industrial development and the introduction of pro-environmental policy. The analysis will concern the climatic and anthropogenic signals recorded in annual tree rings width of Scots pine and in the isotopic composition of wood and its compenents (such as alpha-cellulose and glucose). Only a few studies made a complex multiproxies analysis of the influence of industrial air pollutants on changes in the tree rings width and their isotopic composition in any selected region. In addition, research is usually for a period of industrial development, is a lack of analysis for the period of implementation of EU law and standards on air quality to Polish law.

The research area are the forests close to 3 different industrial plants (chemical- nitrogen plants, steel mills, power plants), in Silesia, where operating companies have strategic importance for the region and country. By analyzing the structure of land in Silesia noted a significant advantage of forest land and agricultural land. A large percentage of forest land providing protection for residents in case of failure in any of the plants. A cloud of noxious fumes is possible in large part retained in the trees. Waste generated by the chemical industry, metallurgy and energy represent the largest proportion of waste generated in the region. Already in the beginning of 21stcentury, the Waste Management Plans for various cities in Silesia are set out various strategic objectives to 2015, including in the economic sector: the implementation of non-waste technology and less and the best available techniques (BAT), the introduction of the principles of "cleaner production".

The BIOPOL innovation is:

a) multiproxy spatio-temporal analysis of the effects of climate changes and emission of air industrial pollution on trees during the development of industry and the implementation of pro-environmental policies in Silesia:

- Analysis of the width of annual tree rings (since 1975)

- Analysis of underestimation of the ^{14}C concentration during the implementation of European standards (since 2000)

- Analysis of the recorded signals of environmental changes in the composition of stable isotopes in annual tree rings – wood and its components

b) modeling of the influence of pollutants emitted into the atmosphere on the width of annual growth of trees and C,O,N stable isotopes and radiocarbon

- Spatio-temporal model of environmental change in the tree rings width and their isotopic composition close to each of the selected plants - comparison to the impact of climate change and industrial pollution for 3 different industries (steel

mills, power plants, nitrogen plants) in the period from 1975 to present

- Space model of environmental changes in the isotopic composition of trees near each of the selected plants (at varying distances from the chosen site) based on analysis of isotopic composition of annual shoots of pine trees in three consecutive years: from 2012 to 2014)

- Estimation of emission components originating from industrial pollution for individual plants

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