

EGU21-10687

<https://doi.org/10.5194/egusphere-egu21-10687>

EGU General Assembly 2021

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Chemical characteristics of particulate matter - problem of Polish cities with air pollution

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Recent years have brought a significant increase in public awareness of the issue of poor air quality in Poland. It is understandable that this problem has a direct impact on the quality of life of citizens of this country. Over the last few decades a concern over the health effects associated with air pollution was growing, mainly due to their carcinogenic and mutagenic properties. Various actions initiated by non-governmental organizations forced the authorities to undertake certain measures aimed at improving the quality of air in Poland, which, in the reports of the European Environment Agency is listed as one of the most polluted countries in the entire European Union. A model example here is the Krakow agglomeration. The city, located in a basin extending in the Vistula valley, surrounded on three sides by hills, in the cold period of the year struggles with the problem of poor air quality (very high concentrations of particulate matter and benzo(a)pyrene).

The objective of this research was better characterization of two major elements responsible for poor air quality in Krakow agglomeration: existing sources of pollution and local meteorology during heating season (HS) and non-heating season (NHS). Samples were collected with 24h resolution using Low-Vol samplers in Krakow (50°00'38.1"N 19°56'57.1"E, Kurdwanow, Malopolska, South Poland) from February 2014 to January 2015. Based on the results of polycyclic aromatic hydrocarbons, cations, anions, mercury, organic and elemental carbon analyzes of samples of particulate matter collected in the city's atmosphere, sources have been identified and classified them from the most to the least significant ones. The modeling tool Hybrid Single-Particle Lagrangian Integrated Trajectory model (HYSPLIT), developed by NOAA's Air Resources Laboratory, was used to investigate the possible trajectories of air pollutants.

This research was partially financed by the AGH UST grant 16.16.210.476 subsidy of the Ministry of Science and Higher Education. PF and AS have been partly supported by the EU Project POWR.03.02.00-00-I004/16. The infrastructure of the AGH Center of Energy in Kraków was applied in order to determine the concentration of ions.