

DOMESTIC HEATING CONTRIBUTION ON AIR QUALITY IN A PROVINCIAL TOWN OF NORTHERN GREECE

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ABSTRACT

One of the most common pollutants affecting air quality and human health is suspended particulate matter, particularly the inhalable fraction with an aerodynamic diameter less than or equal to 10 microns (PM₁₀).

Suspended particles are derived from primary sources (combustion of conventional fuels in power plants, industries, transportation, mining activities, soil dust from erosion, marine aerosol, natural forest fires, volcanic activity, industrial emissions, agricultural activities, wood burning, etc) and secondary sources (gas-to-particle chemical conversions) while they consist of organic and inorganic fraction.

In the case of residential areas, the most significant source of particulate matter is mainly the domestic heating, using consumption of several types polluting fuels in open fire hearths (fireplaces, stoves). In recent years, the increased price of oil combined with the negative consequences of the previous economic crisis, led residents to consume the less expensive fuels (wood, biomass) as energy source for household heating, resulting in significant air pollution episodes during the winter season.

The aim of this work is to investigate the effect of increasing biomass use for residential heating on air quality during the winter period in a medium-sized city. For this purpose, a one-year sampling campaign (from February 2022 to May 2023) for particles PM₁₀ was conducted at the city of Grevena, where primarily biomass as well as oil is the main fuel for domestic use.

PM₁₀ samples collected at the area of interest were analyzed for associated metallic components and particle-bound PAHs. Finally, the datasets of PM₁₀ concentration levels and their chemical constituents presented here were compared to those of the international literature^[1-3].

KEYWORDS: PM₁₀, Elemental Analysis, PAHs, Biomass Burning, Air Quality

REFERENCES

- [1] S.K. Garas, A.G. Triantafyllou, E.I. Tolis, C.N. Diamantopoulos, J.G. Bartzis, (2022). Positive matrix factorization on elemental concentrations of PM₁₀ samples collected in areas within, proximal and far from mining and power station operations in Greece. *Global Nest J.*, pp. 132-142, 10.30955/gnj.003128
- [2] Saffari, A.; Daher, N.; Samara, C.; Voutsas, D.; Kouras, A.; Manoli, E.; Karagkiozidou, O.; Vlachokostas, C.; Moussiopoulos, N.; Shafer, M. M.; Schauer, J. J.; Sioutas, C. Increased Biomass Burning Due to the Economic Crisis in Greece and Its Adverse Impact on Wintertime Air Quality in Thessaloniki. *Environ. Sci. Technol.* **2013**, *47*, 13313– 13320, DOI: 10.1021/es403847h
- [3] DG Kaskaoutis, G Grivas, K Oikonomou, P Tavernarakis, K Papoutsidaki, ...(2022). Impacts of severe residential wood burning on atmospheric processing, water-soluble organic aerosol, and light absorption, in an inland city of Southeastern Europe. *Atmospheric Environment* **280**, 119139.