

Aerosol Characterization in a Coastal Urban Area in Rimini, Italy

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Abstract : The Po Valley, in the north of Italy, is one of the most polluted areas in Europe. The air quality of the area is linked not only to anthropic activities but also to its geographical characteristics and stagnant weather conditions with frequent inversions, especially in the cold season. Even the coastal areas present high values of particulate matter (PM₁₀ and PM_{2.5}) because the area closed between the Adriatic Sea and the Apennines does not favor the dispersion of air pollutants. The aim of the present work was to identify the main sources of particulate matter in Rimini, a tourist city in northern Italy. Two sampling campaigns were carried out in 2018, one in winter (60 days) and one in summer (30 days), in 4 sites: an urban background, a city hotspot, a suburban background, and a rural background. The samples are characterized by the concentration of the ionic composition of the particulates and of the main hydro-sugars, in particular levoglucosan, a marker of the biomass burning, because one of the most important anthropogenic sources in the area, both in the winter and surprisingly even in the summer, is the biomass burning. Furthermore, three sampling points were chosen in order to maximize the contribution of a specific biomass source: a point in a residential area (domestic cooking and domestic heating), a point in the agricultural area (weed fires), and a point in the tourist area (restaurant cooking). In these sites, the analyzes were enriched with the quantification of the carbonaceous component (organic and elemental carbon) and with measurement of the particle number concentration and aerosol size distribution (6 - 600 nm). The results showed a very significant impact of the combustion of biomass due to domestic heating in the winter period, even though many intense peaks were found attributable to episodic wood fires. In the summer season, however, an appreciable signal was measured linked to the combustion of biomass, although much less intense than in winter, attributable to domestic cooking activities. Further interesting results were the verification of the total absence of sea salt's contribution in the particulate with the lower diameter (PM_{2.5}), and while in the PM₁₀, the contribution becomes appreciable only in particular wind conditions (high wind from north, north-east). Finally, it is interesting to note that in a small town, like Rimini, in summer, the traffic source seems to be even more relevant than that measured in a much larger city (Bologna) due to tourism.

Keywords : aerosol, biomass burning, seacoast, urban area

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