# Characterization of volatile organic compounds in two urban sites in the Italian Po Valley: Milan and Bologna

## N. Zannoni1 et al.

### 1CNR-ISAC, via Gobetti 101, Bologna

### Nora.zannoni@cnr.it

Volatile organic compounds (VOCs) emitted into the atmosphere from natural and anthropogenic sources play a crucial role in atmospheric chemistry. These compounds react with atmospheric oxidants, leading to the formation of secondary organic aerosols and tropospheric ozone, which influence air quality, human health, and climate.

In Europe, air quality policies implemented over the last decades have successfully reduced concentrations of some pollutants. For example, nitrogen dioxide and particulate matter levels decreased by 30-50% between 2000 and 2010, resulting in a decline in related adverse health effects. Yet, 70% of the EU population resides in urban areas, and 97-99% of these urban inhabitants are exposed to fine particulate matter and ozone levels exceeding the 2021 WHO guidelines for public health protection (EEA, 2021). The Po Valley in northern Italy is among the most polluted regions in Europe, frequently exceeding air quality limits.

Within the framework of the EU-funded RI-URBANS/ ACTRIS and ITINERIS projects, we carried out two field campaigns in two urban areas, situated approximately 200 km apart in the Po Valley: Milan and Bologna. VOC measurements were performed using a Vocus CI-ToF 2R mass spectrometer (Tofwerk, Switzerland), which operated in Milan from January 2023 for one year, and subsequently in Bologna for one month beginning in September 2024. Our study focuses on sixteen VOCs commonly detected at both sites, identified and quantified using a certified VOC standard mixture, spanning a mass range of 42–371 amu. We analyze the concentrations, along with the diel and seasonal variations of VOCs in Milan and Bologna, emphasizing the influence of atmospheric dilution and chemical reactivity on the observed levels. Additionally, implications for the formation of ozone and secondary organic aerosols are discussed.

**Keywords: Urban atmospheric chemistry, VOC, Po valley**