

# Sources of pollutant emissions affecting air quality in rural and urban areas in northern Africa

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Aerosol particles play an essential role in the atmosphere because of their impact on air quality, human health, and climate-related processes. However, the characterization and the identification of natural and anthropogenic atmospheric particles can be challenging due to the complex mixture occurring during atmospheric transport. Some studies reporting measurement at background remote sites have been reported mostly in central Europe, Asia, and North America. However, few studies exist in African regions despite their diversity in natural and anthropogenic emissions. In this study, filter samples were collected during an intensive campaign at the three sites in Middle Atlas region in Morocco simultaneously: Atlas Mohammed V (AMV) observatory, a newly established research station located at high altitude (2100 m.a.s.l) in the Atlas Mountains, and two suburban sites located at Fez-city. Particulate matter (PM<sub>10</sub>) was collected in September-October 2019 using a high-volume (HV) collector with a PM<sub>10</sub> inlet 12h sampling. The chemical composition of the samples was analyzed for particulate mass, trace metals, inorganic ions, organic and elemental carbon, and a wide range of organic species. The results show that urban pollution in Fez contributes to an increase in PM<sub>10</sub> concentration by up to 55% compared to AMV during the sampling period. The chemical composition of PM<sub>10</sub> is dominated by inorganic species such as mineral dust (48-65%) and organic matter (10-24%). Fez's urban site was characterized by anthropogenic tracers (up 62%) such as Zn, Pb, Ni, levoglucosan and 4-nitrophenol, anthracene and indicating biomass burning, typical for industrial emission, waste incineration, and other combustion processes. Moreover, biogenic organics contributed up to 40% of the identified organic matter with high contributions of terpene SOA tracers such as pinic and pinonic acid, resulting from plant wax abrasion in the surrounding forests.