



STUDY OF THE AEROSOL ELEMENTAL COMPOSITION IN FOUR SOUTHERN EUROPE CITIES: FIRST RESULTS FROM THE LIFE + AIRUSE PROJECT

FRANCO LUCARELLI*, GIULIA CALZOLAI¹, MASSIMO CHIARI¹, SILVIA NAVA¹,
MARTINA GIANNONI¹, DANIELE FROSINI¹, FULVIO AMATO², ANGELIKI KARANASIOU²,
XAVIER QUEROL², CÉLIA ALVES³, DANILO CUSTÓDIO³, CASIMIRO PIO³,
KOSTAS ELEFThERiADIS⁴, EVANGELIA DIAPOULI⁴, VASILIKI VASILATOu⁴

¹Department of Physics and Astronomy, University of Florence and INFN, Sesto Fiorentino, 50019, Italy

²Institute of Environmental Assessment and Water Research (IDAEA-CSIC), Barcelona, 08034, Spain

³Centre for Environmental and Marine Studies (CESAM), Department of Environment, University of Aveiro, Aveiro, 3810-193, Portugal

⁴Environmental Radioactivity Laboratory, National Center for Scientific Research "Demokritos", Athens, 15310, Greece

*lucarelli@fi.infn.it

In Europe, the current policy efforts have not fully delivered the expected results and many urban areas still do not meet the air quality standards (2008/50/EC Directive). This is especially true for Southern Europe, which is affected by important contributions of particulate matter from both anthropogenic and natural (Saharan dust, marine aerosols, etc.) origin.

Within this framework, the AIRUSE project aims at testing existing and future mitigation measures and developing new strategies for the improvement of air quality in Southern European countries (www.airuse.eu). For the project, involving public and private institutions of Spain, UK, Portugal, Italy and Greece, PM₁₀ and PM_{2.5} daily samplings have been scheduled for one year (from January 2013) in four urban sites, Barcelona (Spain), Porto (Portugal), Athens (Greece), and Florence (Italy). Further, the project includes samplings with hourly resolution and coarse/fine particles segregation for limited periods (a couple of weeks in wintertime and summertime). The time-extensive daily data set gives an overall representative picture of the PM composition in these urban sites, while hourly samples may help in disentangling the contributions from different aerosol sources and give better source profiles due to the capability of tracking rapid changes as the ones occurring in most particulate emissions as well as in atmospheric transport and dilution processes.

Both daily and hourly samples have been analyzed by PIXE (Particle Induced X-ray Emission) for the simultaneous assessment of the concentration of all the elements with $Z > 10$.

First results on elemental composition on both daily and hourly samples will be presented. PIXE data give important information on re-suspended or African dust, as PIXE is highly sensitive to most of the crustal markers (e.g. Al, Si, K, Ca, Ti, Fe, Sr...), and on biomass burning. Furthermore, preliminary results on the source apportionment by PMF (Positive Matrix Factorization) based on hourly data will be also shown.

This work was supported by the European Commission (LIFE + Environment Policy and Governance, LIFE11 ENV/ES/584).