

Chemical characterization of PM_{2.5} and PM₁₀ at five sites in Southern Italy during wintertime and spring

A. Marinoni¹, P. Bonasoni¹, P. Cristofanelli¹, C. Calidonna², I. Ammoscato², D. Gulli², A. Dinoi³, D. Contini³, D. Cesari³, F. Sprovieri⁴, V. Andreoli⁴, A. Naccarato⁴, G. Tirimberio⁵, E. Chianese⁵, A. Riccio⁵

¹Institute of Atmospheric Science and Climate, ISAC-CNR, 40129 Bologna, Italy

²Institute of Atmospheric Science and Climate, ISAC-CNR, 88046 Lamezia Terme, Italy

³Institute of Atmospheric Science and Climate, ISAC-CNR, 73100 Lecce, Italy

⁴Institute of Atmospheric Pollution, IIA-CNR, 87036 Rende, Italy

⁵Science and Technology Department, Parthenope University, 80010 Napoli, Italy

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Presenting author email: a.marinoni@isac.cnr.it

Atmospheric aerosols can affect the climate directly by absorbing or scattering incoming radiation and indirectly by acting as a cloud condensation nuclei (CCN). It also constitutes a crucial factor of air pollution since it presents adverse effects on health and environment. The Mediterranean basin is a hot spot for climate change, but little information are available on aerosol properties in this area.

In the framework of I-AMICA project (www.i-amica.it), funded by the Italian Research Ministry through the European Fund for Regional Development, an infrastructure network for environmental monitoring has been realized in the Convergence Regions, including four long term observatories for studying atmospheric composition and climate change: Lecce (40°20'8"N-18°07'28"E, 37 m asl, in Apulia), Lamezia Terme (40°3'N, 16°1'E, 50 m asl, in Calabria), Monte Curcio (39°2'N, 16°2'E, 1763 m asl, in Calabria) and Capo Granitola (37.575°N, 12.659°E, 5 m asl, in Sicily). All these observatories were accepted by the GAW-WMO (Global Atmosphere Watch) program, as Regional Sites and are equipped with instrumentation for physical, optical and chemical properties of atmospheric aerosol, as well as the main green house and reactive gases, radiation and meteorological parameters.

The instrumentation includes an automatic sampler (Swam5A Dual Channel Monitor, FAI Instruments, 2.3 m³/h), allowing the daily aerosol mass measurement, based on β radiation absorption.

Simultaneous field campaigns have been performed on all the I-AMICA observatories plus the urban site of San Marcellino (40°50'48"N, 14°15'30"E), in the urban area of Naples (Campania region), that is equipped with the same sampler. The first field campaign started on November 25th 2015 and was conducted during 36 consecutive days, with the aim of a comprehensive characterization of the aerosol chemical composition in five sites on Southern Italy, ranging from a urban site (Naples) to a suburban background (Lecce), and the remote sites on Sila mountains (Monte Curcio) and Sicily coast (Capo Granitola). The second experiment

started on April 4th, with the same set up as the December campaign.

The sampling was carried out on daily basis (midnight to midnight) on burned quartz filters, analyzed by Ion Chromatography for ion detection (Cl⁻, NO₃⁻, SO₄²⁻, C₂O₄²⁻, HCOO⁻, CH₃COO⁻, Ca²⁺, Na⁺, NH₄⁺, K⁺, Mg²⁺), by a thermal optical transmission technique by using Sunset Laboratory Inc. (Oregon) carbon analyzer for determination of organic and elemental carbon fraction and by ICP-MS technique for metals analyses (EUSAAR II protocol).

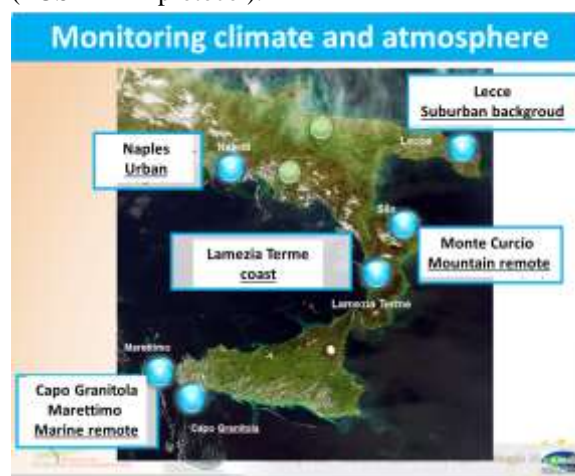


Figure 1. I-AMICA observatories, where the field campaigns have been conducted.