



## Spatial distribution of summertime particulate matter and its composition in Greece

Maria Tsiflikiotou (1,2), Dimitris Papanastasiou (1), Paulos Zarmpas (3), Despoina Paraskevopoulou (4), Evangelia Diapouli (5), Evangelia Kostenidou (1), Christos Kaltsoudis (1,2), Aikaterini Bougiatioti (3), Christina Theodosi (3), George Kouvarakis (3), Eleni Liakakou (4), Vassiliki Vassilatou (5), Dimitris Siakavaras (6), George Biskos (6), Konstantinos Eleftheriadis (5), Evangelos Gerasopoulos (4,7), Nikos Mihalopoulos (3), Spyros Pandis (1,2,8)

(1) Department of Chemical Engineering, University of Patras, 26504, Greece, (2) Institute of Chemical Engineering Sciences, (FORTH/ICE-HT), 26504, Patras, Greece, (3) Environmental Chemical Processes Laboratory, Department of chemistry, University of Crete, 71003 Voutes, Heraklion, Greece, (4) Institute for Environmental Research and Sustainable Development, National Observatory of Athens, I. Metaxa and Vas. Pavlou, 15236, P. Penteli, Athens, Greece, (5) Institute of Nuclear Technology and Radiation Protection, Environmental Radioactivity Laboratory, National Centre of Scientific Research Demokritos, 15310 Ag. Paraskevi, Attiki, Greece, (6) Department of Environment, University of the Aegean, 81100, Mytilene, Greece, (7) Navarino Environmental Observatory, Costa Navarino, 24001, Messinia, Greece, (8) Department of Chemical Engineering, Carnegie Mellon University, Pittsburgh, PA 15213, USA

A field campaign was conducted in Greece during the summer of 2012 (8 June - 26 July) to investigate ambient particulate matter (PM) levels, chemical composition and contribution of regional and local sources. Simultaneous collection of PM<sub>1</sub>, PM<sub>2.5</sub> and PM<sub>10</sub> samples from seven different sampling sites in Greece were collected, two sites in Athens - Ag. Paraskevi Demokritos campus (suburban background), - Penteli (National Observatory of Athens NOA premises, suburban background), one in Thessaloniki (suburban background), two stations in Patras - Centre (urban background), - suburbs/ICE FORTH campus (suburban background), one at Finokalia in the northeast part of Crete (remote background) and the last one at the Navarino Environmental Observatory (NEO) in southwest Peloponnese (rural background). These different background sites were chosen in order to estimate both the local emissions sources and the long range transport. A suite of continuous/online instruments were deployed in selected sites including an Aerodyne High-Resolution Time-of-Flight Aerosol Mass Spectrometer (HR-ToF AMS), an Aerosol Chemical Speciation Monitor (ACSM), a Proton Transfer Reaction-Mass Spectrometer (PTR-MS), a Tapered Element Oscillating Microbalance (TEOM), Nephelometers and Aethalometers, gas-phase monitors, etc. The collected filter samples from all sites were analyzed for major ions, OC/EC, metals, etc.

The fine PM mass concentration and chemical measurements were quite similar in all sites suggesting significant contributions of transported regional pollution and smaller contributions of local sources. The campaign average PM<sub>2.5</sub> ranged from 17.5 to 20  $\mu\text{g m}^{-3}$  for the different sites. The Athens suburban site in Demokritos had the highest concentration PM<sub>2.5</sub> levels. Sulphates and organics were the major PM<sub>2.5</sub> components while nitrates, mineral dust and sea-salt for the coastal areas were also important for the PM<sub>10</sub> fraction. The sulphate levels were similar in all sites, while the concentration of the organics and mineral dust were more variable. Most of the organic aerosol was highly oxygenated.