7th IBERIAN MEETING
AEROSOL SCIENCE AND TECHNOLOGY
9 TO 11 JULY 2019
RICTA19 LISBON

CHARACTERIZATION OF A SETTLED DUST EVENT IN AN URBAN AREA AFFECTED BY INDUSTRIAL ACTIVITIES

C. Gamelas[1,2], A.R. Justino[1], N. Canha[1,3], J.T. Coutinho[1], Z. Kertesz[4], S.M. Almeida[1]

[1]Centro de Ciências e Tecnologias Nucleares, Instituto Superior Técnico, Universidade de Lisboa, 2695-066 Bobadela LRS, Portugal
[2]Escola Superior de Tecnologia de Setúbal, Instituto Politécnico de Setúbal, 2910-761 Setúbal, Portugal
[3]CESAM - Centre for Environmental and Marine Studies, University of Aveiro, 3810-193 Aveiro, Portugal
[4]Institute for Nuclear Research, Hungarian Academy of Sciences, Debrecen, Hungary
Keywords: Air pollution; industrial environments; pollution sources; settled dust; PIXE
Presenting author email: carla.gamelas@ctn.tecnico.ulisboa.pt

Due to a higher awareness of citizens towards air pollution, the population of the Seixal municipality (Portugal), noticed occasional settled dust events and questioned the local authorities in order to understand its sources and potential health hazards. Aiming to address the population's needs, the local council promoted a set of actions. Therefore, this study aimed to identify possible sources of a settled dust event that occurred in January 2019, in Seixal municipality, an urban area with 165 547 inhabitants, located nearby an industrial area, characterized by a steelwork, shipyard and other metallurgic activities.
The chemical characterization of the settled dust was determined by PIXE (Fig. 1), focusing on a total of 29 elements.

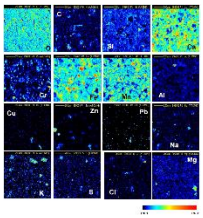

Fig. 1. Micro-PIXE elemental maps of a sample

Comparison with the chemical profiles of particulate matter from different types of environment was conducted (Fig. 2). For that purpose, a literature review was performed to gather mean values of the chemical composition of PM_{10} for different settings, in different countries ([1-5], among other references).

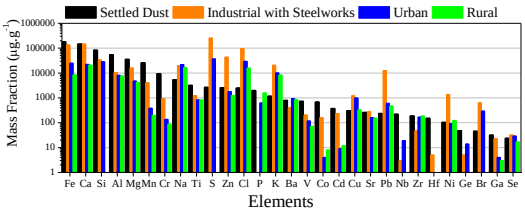

Fig. 2. Comparison of elemental mass fractions of the studied settled dust and in PM_{10} studies available in the literature

The assessment of crustal enrichment factors (EF) was also performed (Fig. 3). Several elements presented EF values above the threshold of 10, which indicates their non-crustal origin.

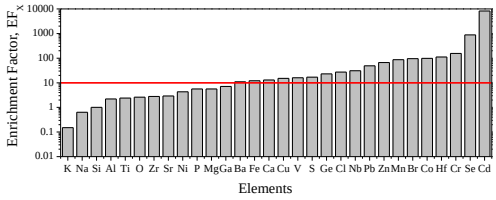

Fig. 3 Crustal enrichment factors for the studied settled dust

The above mentioned analysis, along with Spearman correlations between the assessed elements, allowed to understand which sources contributed to the settled dust event. The influence of a nearby industrial area was identified, due to the contents of Fe, Cr and Mn, which are typical tracers of iron and steel industries.

This work was supported by FCT – Fundação para a Ciência e a Tecnologia, I.P. (Portugal) through the UID/Multi/04349/2013 project.

[1] Amato F. et al. (2016) AIRUSE-LIFE+: A harmonized PM speciation and source apportionment in five southern European cities. *Atmos Chem Phys,* 16, 3289–3309.
[2] Aldabe J. et al. (2011) Chemical characterisation and source apportionment of PM2.5 and PM10 at rural, urban and traffic sites in Navarra (North of Spain). *Atmos Res,* 102, 191–205.
[3] Rodríguez S. et al. (2004) Comparative PM10-PM2.5 source contribution study at rural, urban and industrial sites during PM episodes in Eastern Spain. *Sci Total Environ,* 328, 95–113.
[4] Sylvestre A. et al. (2017) Comprehensive chemical characterization of industrial PM2.5 from steel industry activities. *Atmos Environ,* 152, 180–190.
[5] Querol X. et al. (2007) Source origin of trace elements in PM from regional background, urban and industrial sites of Spain. *Atmos Environ,* 41, 7219–7231.