

Levels of carbonaceous aerosols in remote, rural, urban and industrial sites of Spain

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The objectives of this study is interpreting the time and spatial variability of ambient air levels of particulate non mineral carbon (nmC), organic and elemental carbon (OC and EC) and BC in rural/remote, industrial, urban and traffic environments across Spain. To this end data obtained with similar methods in 72 monitoring sites across Spain in the period 1999-2011 is compiled and interpreted. Major focus on: a) Mean concentration ranges for nmC, OC, EC, BC reached in the above environments; b) Inter-annual and seasonal trends; c) OC/EC ratios; d) BC/EC ratios; e) possible origins of OC and EC. We obtained data on nmC from 72 monitoring stations across the Iberian Peninsula (IP), the Balearic and Canary Archipelagoes and the Spanish Northern African territories. For OC and EC we obtained data from 32 sites. The determinations were carried out in PM₁₀, PM_{2.5} and PM₁ samples. Below are summarized the sites from which we obtained C_{nm}, **OC/EC** and **BC** levels (**the two latter in bold and bold underlined letters**, respectively):

- 2 remote sites at NE Iberian Peninsula (**Monstec**) and the canary Islands (**Izaña**)
- 9 rural/regional background sites in the IP, including **Montseny**, **Monagrega**, Bemantes, El Perdón in the northern part of the IP Cortijo Endrinales, **San Jorge** in the central IP and Matalascañas, Valverde and Campillo in SW IP.
- 8 industrial-rural or industrial-suburban sites including **Ponferrada**, Plaza Castillo-Almería and Poblado-Córdoba (power generation) and Torrelavega (chemical industry) in N IP, **Monzón** (metal and agro-industry) in NE IP, **Arenosillo** (metallurgy, petrochemical plants and fertilizers) and Punta Umbria (metallurgy and fertilizers) in SW IP and **Santa Cruz** (shipping and petrochemical emissions) in the Canary Islands.
- 19 industrial sites including Tarragona, Puertollano (both with large chemical and petrochemical estates), **Huelva**, **La Linea**, Puente Mayorga, Los Barrios and Aguadulce (with petrochemical and metallurgical estates),

L'Alcora, **Onda**, Vila-real, **Borriana** and Almazora (influenced by ceramic and glass manufacture emissions form a large industrial estate), **Bailén** (manufacture of breaks), Llodio, **Bajo Cadagua** and **Zabalgarbi** (metallurgy), **Avilés** (coke production), Torredonjimena and **Montcada** (cement production).

- 7 suburban sites in the IP and the Balearic islands, including Palma, Chapineria, Burgos, Badajoz, Santa Ana-Cartagena, El Vacar-Córdoba, Nerva-Huelva. These are stations located in the outskirts of cities or villages.
- 18 urban background sites including, **Granada**, **Melilla**, Las Palmas de Gran Canarias, **Albacete**, **Santander**, Alcobendas, **Madrid**, **Barcelona**, **Sabadell**, Girona, Moguer, Cadiz, Córdoba, Sevilla, Jaén, 2 sites in **Bilbao** and **Zaragoza**.
- 9 road traffic sites in **Sabadell**, Girona, Barcelona, **Madrid**, Granada, Almería, **Barreda-Torrelavega**, **Bilbao** and Cartagena.

In all cases with the exception of the urban background from Madrid measurements were carried out by filter sampling of PM_x with high or low volume samplers followed by sample treatment and laboratory analyses.

The presentation summarizes major finding on the interpretation of the time and spatial variability of levels of nmC, EC and OC.

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