

Intensive air pollution monitoring campaign at the Barcelona port

Aerosol levels and chemical composition measurements were performed at the Barcelona port area from February 2011 to February 2012. Simultaneously, similar measurements were carried out at the urban background site Palau Reial.

At the Barcelona port monitoring site daily 24-hour ambient PM₁₀ and PM_{2.5} samples were collected on quartz fibre filters using high volume samplers (Figure 1). For a selection of these filters at one of the monitoring sites (one filter every four days), chemical analysis were performed (see Pey et al. 2010). Identical chemical analyses were performed for the urban background samples.

The components analysed from the filters were:

- Carbonaceous compounds (OC and EC): Sunset thermo-optical carbon analyser
- Soluble ions from water leaching of filters.
 - Cl⁻, NO₃⁻, SO₄²⁻: ion chromatography
 - NH₄⁺: selective electrode
- Major and trace elements from acid digestion of filters.
 - Al, Ca, K, Na, Mg, Fe, P, S, Ti, Mn: ICP-AES
 - Li, Ti, V, Cr, Co, Ni, Cu, Zn, Ga, As, Se, Rb, Sr, Y, Zr, Cd, Sn, Sb, Cs, Ba, Pb, Bi, Th, U, rare earths: ICP-MS

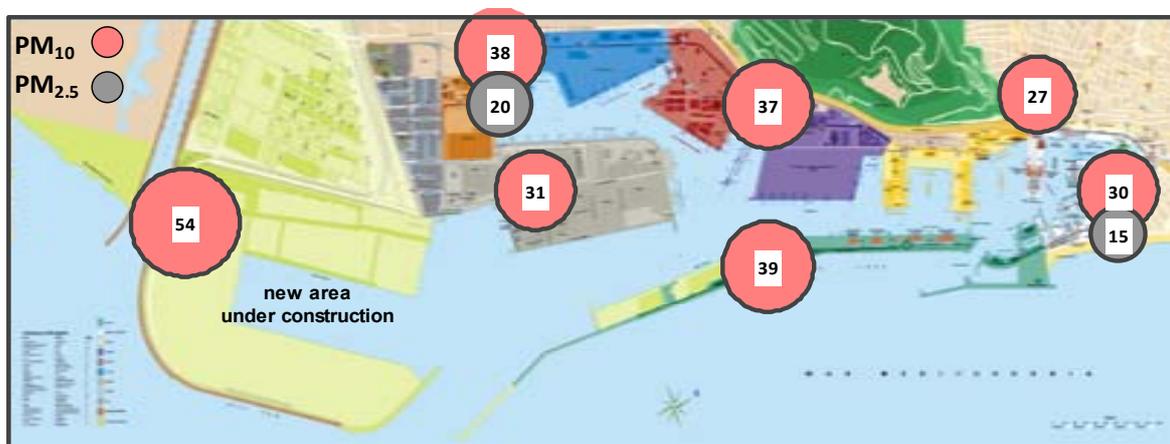


Figure 1. PM₁₀ and PM_{2.5} levels measured at different monitoring sites at the Barcelona port area.

In addition, ½ hourly levels of gaseous pollutants were monitored at the port and the urban sites:

- NO, NO₂, SO₂ and H₂S at the port monitoring site.
- NO, NO₂, O₃, SO₂ and CO at the urban monitoring site

Moreover, at the Barcelona port area, measurements of NO₂ and NH₃ were carried out at 8 different places, using passive dosimeters (Figure 2), in order to identify possible emission sources of these gaseous pollutants in the port area.

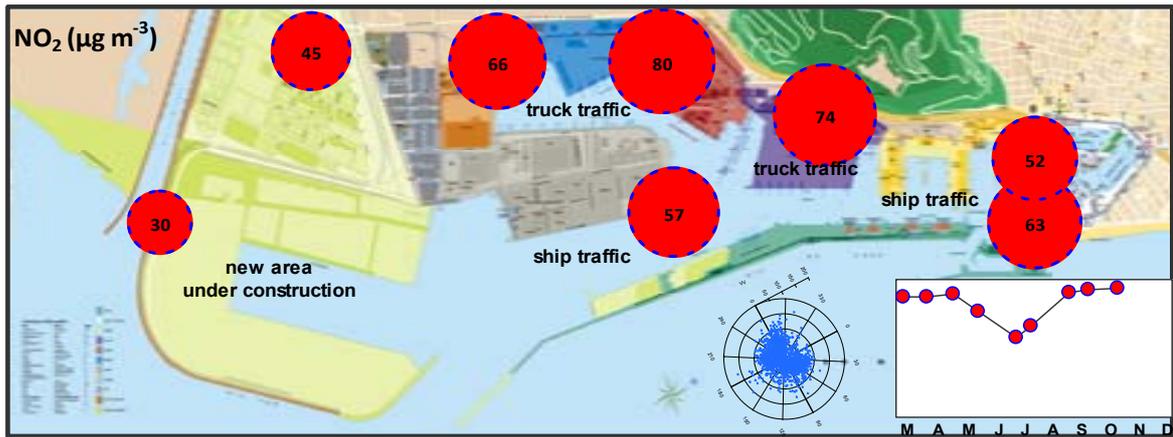


Figure 2. NO₂ levels measured at different sites in the Barcelona port area.

In order to identify chemical tracers of harbour activities, a number of additional studies have been done including:

- sampling of road dust
- characterization of bulk materials (scrap, coal, soy)
- sampling of fresh shipping emissions

Furthermore, a comprehensive study of PM levels and gaseous pollutants will be done for the whole port area and the metropolitan area of Barcelona. To this end, data on gaseous pollutants and particles have been supplied by the Autonomous Government of Catalonia (*Departament de Territori i Sostenibilitat*) in the case of the metropolitan region, and the *Autoritat Portuaria de Barcelona*, in the case of the harbour area.

Reference

Pey J., Querol X., Alastuey A., 2010. Discriminating the regional and urban contributions in the North-Western Mediterranean: PM levels and composition. *Atmospheric Environment*, 44, 1587-1596.