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MODELLING CHEMICAL PATTERNS OF ATMOSPHERIC POLYCYCLIC AROMATIC HYDROCARBONS (PAHs) IN THE IBERIAN PENINSULA

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Semi-volatile organic compounds (SVOCs) such as PBDEs, PCBs, organochlorine pesticides (OCPs) or PAHs, are widespread and generated in a multitude of anthropogenic (and natural for PAHs) processes and although they are found in the environment at low concentrations, possess an extraordinary carcinogenic capacity (Baussant et al., 2001) and high ecotoxicity due to their persistence in different matrices (air, soil, water, living organisms). In particular, PAHs are originated by combustion processes or release from fossil fuels and can be transported in the atmosphere over long distances in gaseous or particulate matter (Baek et al., 1991).

The establishment of strategies for sampling and chemical transport modelling of SVOCs in the atmosphere aiming the definition and validation of the spatial, temporal and chemical transport patterns of contaminants can be achieved by an integrated system of third-generation models that represent the current state of knowledge in air quality modelling and experimental data collected in field campaigns. This has implications in the fields of meteorology, atmospheric chemistry and even climate change.

In this case, an extensive database already obtained on levels of atmospheric PAHs from biomonitoring schemes in the Iberian Peninsula fuelled the establishment of the first models of behaviour for PAHs. The modelling system WRF+CHIMERE was implemented with high spatial and temporal resolution to the Iberian Peninsula in this first task (9 km for the Iberian Peninsula, 3 km to Portugal, 1 hour), using PAHs atmospheric levels collected over a year-long sampling scheme comprising 4 campaigns (one per season) in over 30 sites. Daily information on meteorological parameters such as air temperature, humidity, rainfall or wind speed and direction was collected from the weather stations closest to the sampling sites. Diagnosis and forecasts of these meteorological variables using MM5 or WRF were used to feed a chemistry transport model (CHIMERE), providing information about the levels and transport patterns (e.g. dispersion) of PAHs in the area.

The justification for this study is the gaps still existing in the awareness of the life cycles of such and related contaminants. The comparison of the levels on a regional and on a European scale will enable the strong enhancement of the knowledge available in the current scientific literature for studies of atmospheric chemistry and transport of trans-boundary pollutants, which is scarce (and even more if we consider its model validation against experimental data).