



Title: Evolution of fine and ultrafine particles over Barcelona

Context : High concentrations of particulate matter are frequently observed in urban areas, particularly due to the proximity of sources: traffic, residential sector, industry. Particulate matter compounds can be primary or secondary (i.e. formed by physico-chemical transformations of gaseous precursors resulting from interactions of different sources). The spatial heterogeneity of the urban environment and the proximity of sources make the modelling of aerosols and particles complex, because the characteristic times of evolution are short and require a fine representation. The high concentrations observed in the urban environment have an impact on visibility, buildings and people's health. Fine-scale urban modelling is essential for representing the population's outdoor exposure to pollutants, for understanding the sources of pollution and for remedying them.

Health impacts are large for particles, with varying effects depending on the particle diameters. The modelling of ultrafine particles (diameters lower than 0.1 μm) has improved recently, but still remains a challenge in terms of computing time and understanding of the precursors. We are looking for an enthusiastic and skilled scientist to simulate urban air quality using multi-scale modelling for pollutants of health interest, including fine and ultrafine particles.

Main activities:

You will use a regional chemistry-transport model and a street network model to simulate the concentrations of pollutants and particles in Barcelona, taking into account all sources of pollutants and the formation of secondary aerosols. You will be working on the numerical and physical aspects linked to the formation of ultrafine particles, on comparisons between models and measurements in order to improve the models, as well as on the implementation of emission scenarios that consider low-emission vehicles.

Formation/skills:

A master or engineering diploma in science, Familiar with the LINUX environment. Python. Interest in computing and understanding physical mechanisms.

Job situation and conditions :

The PhD student will be attached to the atmospheric composition modelling team at CERECA (Paris region). The research will be conducted in close collaboration with the Atmospheric Composition group of the Barcelona Supercomputing Center, and several stays at the BSC (Barcelona) are to be expected.

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