

Characterization of the Chambre atmospheric simulation chamber

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ChAMBRé (Chamber for Aerosol Modelling and Bio-aerosol Research) is a stainless steel atmospheric simulation chamber (volume approximately 3 m³) recently installed at the National Institute of Nuclear Physics in Genoa (INFN-Genova, www.ge.infn.it) in collaboration with the Environmental Physics Laboratory at the Physics Department of Genoa University (www.labfisa.ge.infn.it). ChAMBRé is one of the nodes of the EUROCHAMP2020 European network of atmospheric simulation chambers.

ChAMBRé (Figure 1) will be mainly devoted to bioaerosol studies with an experimental activity targeted to the assessment of the behavior of most common pathogens for humans and plants and to the analysis of the mechanisms controlling bacteria interactions with other aerosols and within the atmosphere. Subjects of investigations will be defined considering the most relevant pathogens for public health and identifying non-pathogenic bacteria with similar characteristics to allow for experiments in safe conditions. We have selected a reasonable number of different bacteria to cover the widest range of morphological features, belonging to phyla most commonly encountered in the atmosphere (e.g. Firmicutes, Proteobacteria and Actinobacteria) and taking into consideration their ability to produce endotoxins, spores and biofilm.

The first experiments will be performed on:

Bacillus subtilis (Phyla Firmicutes, rod-shaped, GRAM+, obligate aerobe with possible anaerobe phases, spore-forming)

Pseudomonas syringae (Phyla Proteobacteria, rod-shaped, GRAM-, highly pathogen for plants, common antimicrobial protection resistant)

Streptomyces coelicolor A3(2) (Phyla Actinobacteria, GRAM+, soil-dwelling, spore-forming, high similarity with several plants pathogens)

Microrganisms suspended in liquid solutions will be aerosolized through nebulization (Blaustein Atomizer – BLAM by CH-Technologies) and injected in ChAMBRé, where selected atmospheric conditions. Very promising results in this direction were obtained by the INFN-Genoa group and co-workers in a pilot experiment, performed at the CESAM facility thanks to the transnational access grant funded by Eurochamp-2 project, whose results have

been recently published (Brotto, 2015). Moreover another very interesting paper by Amato and co-workers (Amato, 2015) published nearly at the same time, reports the results of simulation chamber experiments performed at AIDA facility to investigate bacteria viability and ice nucleation activity.



Figure 1: the Chambre structure: a 7-stage Andersen impactor for bioaerosol collection is visible on the right side

The ChAMBRé set-up is going to be completed and its characterization (aerosol lifetime, wall losses, background levels, protocol for bioaerosol injection) is in progress. Results will be given at EAC focussing on the outcomes of the first experiments with bacteria.

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P. Brotto et al, *Aerobiologia*, 2015

P. Amato et al, *ACP*, 2015