

Title of the thesis: Study in the new atmospheric simulation chamber CHARME of the formation and aging of secondary organic aerosols formed from the oxidation of volatile organic compounds

University: Université du Littoral Côte d'Opale (ULCO)

Scientific domain: Physico-Chemistry of the Atmosphere

Laboratory: Laboratory for Physico-Chemistry of the Atmosphere

Research project: the thesis subject enters in the field of the research projects of the Labex CaPPA and the CPER CLIMIBIO

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ABSTRACT

Atmospheric aerosols scatter and absorb solar and terrestrial radiation, influence cloud formation and participate in heterogeneous chemical reactions of the atmosphere, thereby affecting the abundance and distribution of atmospheric trace gases. As a result, aerosols markedly affect the radiative balance of the Earth's atmosphere and play a central role in climate. Moreover, aerosols also have an important impact on human health.

One of the main uncertainties in the estimation of the radiative effect of the aerosols concerns the contribution of secondary organic aerosols (SOA). SOA originate from chemical transformations of primary volatile organic compounds (VOC) to lower volatility products that partition into the condensed phase. About 20% to 90% of the aerosol mass would be constituted by organic matter and more than 60 % of this fraction would be from secondary origin.

This research subject concerns the study of the formation and aging of SOA formed from the atmospheric oxidation of VOCs both from biogenic and anthropogenic origins. The experiments will be performed in the new LPCA simulation chamber CHARME (Chamber for the Atmospheric Research and the Metrology of the Environment). CHARME is 9 m³ stainless steel cylinder irradiated by 4 xenon lamps to reproduce the solar radiation. It is equipped with a large panel of analytical instruments dedicated to the measurement of the gas and particulate phases of the atmosphere: PTR-ToF-MS, GC-MS, GC-FID, NO_x and ozone analyzers, SMPS...

The obtained results will be usable for air quality and climate models.

Candidate profil: A Master degree in atmosphere sciences, environmental sciences or physico-chemistry is required. Good knowledge in analytical chemistry (chromatography, mass spectrometry, spectroscopy ...) and/or in the fields of the atmospheric chemistry and chemical kinetics will be appreciated.

Contacts: The applications (CV + motivation letter) have to be sent to the following contacts: Dr. Cécile COEUR - coeur@univ-littoral.fr; (+33).321.99.64.05 ; Laboratoire de Physico-Chimie atmosphérique, Dunkerque.