Ecole Doctorale des Sciences Fondamentales

Title of the thesis: Are marine microorganisms influencing clouds?

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Summary :

Marine aerosol particles play an important role in climate, and understanding their origin is crucial. Marine emissions are actually not properly characterized, especially regarding their dependence to the seawater biogeochemical properties. One potential emission path of marine particles is their formation from gas-to-particle conversion at the nanometric scale (nucleation). Within the framework of the international projects HYMEX and CHARMEX, multiple nucleation events were observed from airborne measurements over the Mediterranean Sea in 2012 and 2013. In parallel to these field campaigns, semi-controlled experiments (marine mesocosms) were conducted during which new particle formation were observed to be linked to seawater emissions.
The aim of the thesis is to apprehend, how important is for the formation of ultrafine particles in the marine atmosphere under diverse atmospheric conditions, and its impact on climate relevant parameters. The first part of the thesis will aim at deriving parametrization of the new particle number flux and properties as a function of identified marine precursors and their relationship to seawater biogeochemical properties from a data set that will be acquired during the oceanographic campaign on board of the "Pourquoi pas" French research vessel in may 2017, but also from new data sets that should be acquired during the thesis in different locations of the southern hemisphere. The thesis is multidisciplinary and involves working with marine biogeochemists and atmospheric scientists. The first year of the thesis should be located at the National Institute of Water and Atmospheric research (NIWA, Wellington, NZ). Knowledge in experimental atmospheric science is required.