



Is microbiology an alternative route to photochemistry in atmospheric chemistry?

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Until very recently scientists from atmospheric sciences focussed their studies on physical and chemical phenomena taking place in cloud water phase neglecting the presence of active microorganisms in this medium. For instance, considering atmospheric chemistry, solar light is considered as the predominant catalyser for chemical reactions occurring in the atmosphere.

However recent studies show that living and active microorganisms, including bacteria, yeasts and fungi, are present in the atmospheric water phase and could play an active role in chemistry of clouds. Indeed living microorganisms are clearly biocatalysts which could transform organic compounds as an alternative route to photochemistry. The objective of our project is to bring answers to this new scientific question by a multidisciplinary approach involving atmospheric physicists, photochemists and microbiologists.

Microorganisms have been isolated and identified in cloud water sampled at the puy de Dôme summit which is an atmospheric observatory and a European referenced site. Laboratory experiments were carried out to evaluate the potential of organic species (carboxylic acids) degradation by the photochemical or microbiological ways. The project was centred on few carboxylic acids among them succinic, acetic, formic and oxalic acids (the most important organic acids in cloud water sampled at Puy de Dôme). Degradation rates were measured during biodegradation alone (*Pseudomonas syringae*), photochemistry alone (hydrogen peroxide + light) and combining both processed using artificial reconstituted cloud water. Our first results show that the obtained degradation rates are in the range of order.