



First evidence of new particle formation at the free tropospheric site of puy de Dôme

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Background and anthropogenic aerosol formation needs to be evaluated and understood in order to predict climate change due to atmospheric aerosols. The number concentration of atmospheric particles is mainly driven by the formation rate of new ultrafine particles, typically of the order of 1-2 nm in size, formed through gas-to-particle conversion processes. Once stable, the newly formed particle clusters can grow through coagulation and condensation processes to sizes of 50-100 nm where they can directly (and indirectly through cloud formation) influence the radiative budget.

The source zones of the newly formed particles are not yet well defined. Natural environments such as the boreal forest and coastal areas are known to be fertile for new particle formation under clean air masses conditions. However, it has been difficult to evaluate the vertical extent of new particle formation events. Particles may be formed at the interface between the boundary layer, rich with condensable gases, and the free troposphere where the condensable sink due to pre-existing particles is low.

The puy de Dome Research station offers the possibility to study new particle formation at an altitude of 1465 m a. s. l., within air masses of various origins. Moreover, cloud formation frequently occurs at the summit of the puy de Dôme, allowing for the study of the interference between clouds and new particle formation.

A twin-dmps, consisting of a nano-SMPS scanning particles from 3 to 40 nm, and a SMPS scanning particles from 20 to 400 nm has recently been installed at the station for the monitoring of such events. Case studies of nucleation events at the puy de Dôme will be presented, in polluted and clean background air masses.