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Coupling non-linear optical spectroscopy and surface chemistry: Towards new insights in atmospheric chemistry and aerosols

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For decades, the observation of atmospheric processes in general and ice nucleation in particular bridged the scales from macroscopic to microscopic levels. They delivered a wide variety of results in cloud microphysics, particularly concerning the ice nucleation ability of atmospheric aerosol particles [1]. The surface properties of an ice-nucleating particle (INP) play a major role in its ice nucleation ability. This role is not well explored in terms of water/INP-surface molecular-level interactions. For example, we found recently that surface-charge induced templating hampers ice nucleation [2]. Aging of an INP in a cloud may change its surface properties and hence its ice nucleation efficiency. To improve our understanding of heterogeneous ice nucleation, we combine chemical and optical surface techniques to probe the change in surface properties of an INP and the corresponding water structuring on it, respectively. The presentation will show the different scenarios after aging of an INP in a cloud and the impact on its ice nucleation ability.

References

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