

# **Ion Analysis in Atmospheric Research**

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The physical and chemical properties of aerosol particles in the atmosphere impact a large number of important processes in the Earth System, ranging from the radiative balance of the Earth over interactions with ecosystems to adverse effects on human health.

Elucidating the composition of aerosol particles is therefore an important part of atmospheric research, especially where the atmospheric multiphase system, i.e. the complex system of gas phase, solid or liquid particles, and aqueous droplets is considered.

Ions are main constituents of aqueous particles and droplets and their determination requires state-of-the-art analytical instrumentation and methods.

The presentation will first introduce the tropospheric multiphase system with its diverse processes and interactions and then focus on aerosol particles, challenges and achievements in the determination of their ionic content and the resulting insights into different processes and impacts.

Application of ion chromatography for the determination of the most abundant inorganic ions will be discussed and examples of recent field campaigns will be given.

Next to inorganic ions, a large number of organic ionic compounds form a second major fraction of aerosol particles. The composition of this complex organic mixture is determined by coupled gas and aerosol phase processes, but only to some extent known on a molecular level. Analytical approaches to determine individual known constituents from different emission sources or formation pathways such as carboxylic acids, organic bases, and saccharidic compounds, as well as novel attempts to characterize the complex mixture as a whole will be presented.