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# Characterization of Atmospheric Ions at the High Altitude Station Jungfraujoch (Switzerland)

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Understanding ion composition in the atmosphere is of high interest since ions control the electrical properties of the atmospheric medium, participate in ion-catalysed and ion-molecule reactions and contribute to physico-chemical interactions, including ion-induced nucleation (Arnold, 2008). In the last decade, the interest in atmospheric ions has increased because of the potential impact of the ion-aerosol-cloud interaction on climate (Hirsikko et al., 2011). Therefore, several laboratory and field measurements have been performed trying to understand the precise role of ions in new particle formation.

The free troposphere represents an interesting region with no immediate contribution from biogenic or anthropogenic sources, low pollution and low temperatures, where new particle formation can make an important contribution to the total particle number concentration. Thus, the characterization of ions in this region of the atmosphere is an important step to understand new particle nucleation.

In August 2013 we started measurements at the Jungfraujoch (JFJ, 3580 m asl; 46.55ºN, 7.98ºE) in the Swiss Alps to investigate the composition of atmospheric ions in the lower free troposphere for around 9 months.

The instrument employed was an Atmospheric Pressure Interface Time-of-Flight Mass Spectrometer (TOFWERK AG, Thun Switzerland) for ion characterization in positive and negative mode (alternately). We will present an overview of the major positively and negatively charged inorganic, organic and halogenated ions. We will also present back trajectories calculated with two different models: HYSPLIT for air transport and dispersion, and FLEXPART for surface residence time, along with correlations with the abundance of specific ions. As measurements were conducted continuously over a long period we were able to compare ion compositions under different conditions of solar radiation, presence or absence of clouds and wind direction/ air mass origin and to evaluate correlations with nucleation events. Diurnal variations of ion composition and correlations between ion species provided additional information on transport and formation of ion precursors.

**References**

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