Neutral cluster and Air Ion Spectrometer (NAIS) measurements at Jungfraujoch

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1. Project description

A neutral cluster and air ion spectrometer (NAIS) has been running at the Sphinx observatory since Nov 2019. The instrument measures air ion (0.8-42 nm) and aerosol particle (2-42 nm) number size distributions.

During the approximately two years of data collection the instrument has had no major technical issues. However, an unstable laptop has caused unwanted breaks in the measurement.

Figure 1 shows time series of the cluster ion number concentration. In general there appears to be roughly two orders of magnitude difference between the number concentration of positive (~1000 cm-3) and negative (~10 cm-3) cluster ions (concentrations converted to standard conditions: 273.15 K and 101325 Pa). This is likely related to the so-called atmospheric electrode effect (Chalmers, 1957), which could be significantly enhanced at mountain peaks or ridges.

New particle formation (NPF) is common at the observatory. NPF event frequency, particle and ion growth rates and formation rates are still to be determined as part of a global analysis of NAIS measurements. Figure 2a shows that NPF events generally start between sunrise and noon.

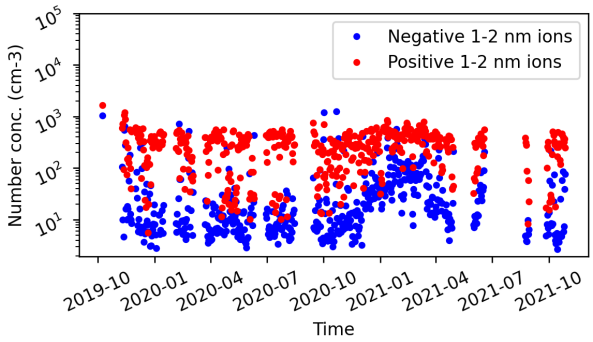

Figure 1. Time-series of negative and positive cluster ions (1-2 nm) at Jungfraujoch, Sphinx observatory.

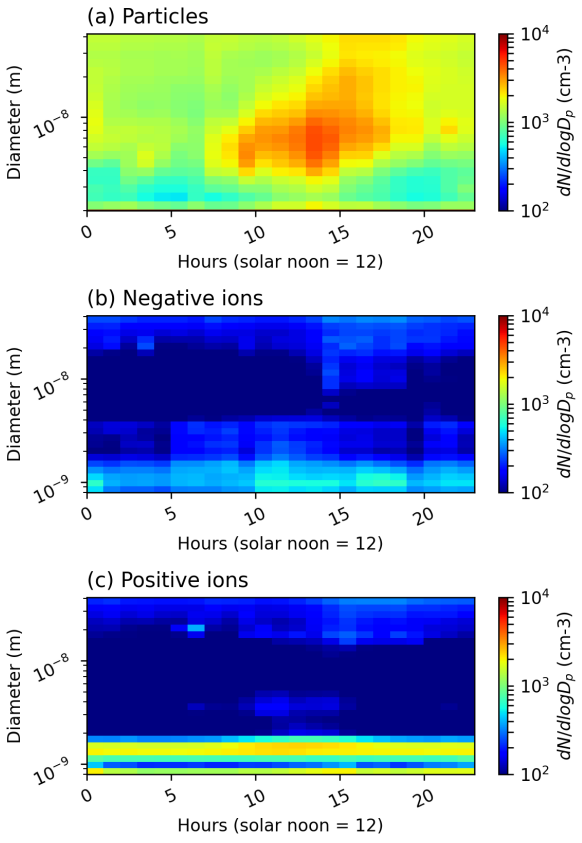

Figure 2. The mean number size distribution during solar day for (a) particles, (b) negative ions and (c) positive ions at the Jungfraujoch Sphinx observatory.

References

Chalmers, J. A.: Atmospheric Electricity, London, 348 pp., 1957.

Collaborating partners / networks

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