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First continuous high-resolution aerosol record from the East Greenland Ice Core Project (EGRIP), covering the last 15,000 years

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Ice sheets are reliable archives of atmospheric impurities such as aerosols and gasses of both natural and anthropogenic origin. Impurity records from Greenland ice cores reveal much information about previous atmospheric conditions and long-range transport in the Northern hemisphere going back more than a hundred thousand years.

Here we present the data from the upper 1,411 m from the EGRIP ice core, measuring conductivity, dust, sodium, calcium, ammonium, and nitrate. These records contain information about ocean sources, transport of terrestrial dust, soil and vegetation emissions as well as biomass burning, volcanic eruptions, etc., covering approximately the past 15,000 years. This newly obtained data set is unique as it provides the first high-resolution information about several thousands of years of the mid-Holocene period in Greenland that none of the previous impurity records from the other deep Greenland ice cores had managed to cover before due to brittle ice. This will contribute to further understanding of the atmospheric conditions for the pre-industrial period.

The ammonium record contains peaks significantly higher than the background level. These peaks are caused by biomass burning or forest fires emitting plumes of ammonia large enough so that they can extend to the free troposphere and be efficiently transported all the way to the Greenland ice sheet. Here we present preliminary results of the wild fire frequency covering the entire Holocene, where the wild fires are defined as outliers in the ammonium record of annual means.