



A 750 year ice core record of past biogenic emissions and wild fires from Siberian boreal forests

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Direct emissions from forests and forest fires represent an important source of gaseous precursors of aerosols and soot that can significantly alter the regional radiation balance. Long-term records of gaseous and particulate emissions are available for Northern America and the Amazon Basin, whereas the historical development of emissions from Siberian forests, comprising about 20% of the world's forested area, is unknown so far. Here we investigate ice core ammonium, formate, nitrate, potassium, and charcoal records for the last 750 years, representing direct biogenic and biomass burning emissions from boreal Siberian forests in the pre-industrial era. Biogenic emissions were found to be closely related to changes in temperature following variations in solar activity. Emissions from forest fire activities do not show a long-term trend, but a period of strongly increased frequency around 1600-1670. The reasons are most probably exceptionally dry conditions in the period 1550-1600 and increased temperatures. In addition, anthropogenic emissions have caused a strong increase of the ammonium and nitrate concentrations and a drop of the formate concentrations in the last 60 years.