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Long-Term INP Measurements within the BACCHUS project

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The European research project BACCHUS (Impact of Biogenic versus Anthropogenic emissions on Clouds and Climate: towards a Holistic UnderStanding) studies the interactions between aerosols, clouds and the climate system, and tries to reconstruct pre-industrial aerosol and cloud conditions from data collected in pristine environments. The number concentration of Ice Nucleating Particles (INP) is an important, yet scarcely known parameter. As a partner of Work package 1 of BACCHUS we began in September 2014 to operate a globally spanned network of four INP sampling stations, which is the first of its kind. The stations are located at the ATTO observatory in the Brazilian Rainforest, the Caribbean Sea (Martinique), the Zeppelin Observatory at Svalbard in the Arctic, and in central Europe (Germany). Samples are collected routinely every day or every few days by electrostatic precipitation of aerosol particles onto Si substrates. The samples are stored in petri-slides, and shipped to our laboratory in Frankfurt, Germany. The number of ice nucleating particles on the substrate is analyzed in the isothermal static diffusion chamber FRIDGE by growing ice on the INP and photographing and counting the crystals. The measurements in the temperature range from -20°C to -30°C and relative humidities of 100-135% (with respect to ice) address primarily the deposition/condensation nucleation modes.

Here we present INP and supporting aerosol data from this novel INP network for the first time.