Trace gas - ice interaction measurements with microstructure control

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The surfaces of snow and ice have significant impact on the physicochemistry and thus chemical budgets of near-surface air. In these environments the availability of chemical species depends sensitively on the structural character of the snowpack and its transport parameters. As a result the thermodynamic and kinetic characteristics of trace gas – ice interactions are of fundamental interest and have potential implications in geochemical cycling and climate. We have developed a unique experimental method for measuring trace gas – ice interactions with careful control of ice microstructure. More specifically, the grain size at the ice-air interface can be varied and analyzed. The new Ice Flow Tubes allow us to sensitively explore the temperature dependence of trace gas – ice interactions with a high resolution and minimal foreign body surfaces. In preliminary experiments H$_2$O$_2$ has been used to successfully demonstrate the working principle, and results are indicative of the power and utility of the new method.