Contribution ID: **17** Type: **not specified**

The ice - air interface in snow - the molecular to micron scale perspective

Tuesday, 7 June 2011 09:50 (30 minutes)

Ice is a high temperature material in the sense that under environmental conditions it is close to its melting temperature. This leads to peculiarities that determine the physical and chemical properties of the ice - air interface but also the larger scale snow structure. While this is reasonably well understood for pure ice, contaminants present in environmental snow interact with the structure of ice and are believed to significantly alter the ice surface. This overview presents results of novel spectroscopic experiments that directly probe this interface in presence of a number of different contaminants. It highlights that the molecular environment around soluble species at the surface is resembling that of a concentrated solution containing this solute. The surface energy is minimized by accommodating the trace species into a local solution like environment. Therefore, at low contaminant levels, the elusive quasi-liquid layer is not extending over larger scales than the hydration shells of solutes present at the surface, and the majority of the ice surface remains ice-like. Whether such hydrated species prefer the ice - air interface or grain boundary remains an open question. In contrast, if solutes may form a stable solution in equilibrium with ice, they form a separate phase. For halides, such brines tend to be excluded to the ice surface, while their surface chemical properties are consistent with the halide - water - ice phase diagram. These features of the contaminated ice surface govern the chemical properties and thus reactivity. When scaled up to the level of snow, the continuously evolving structure of snow becomes important, as it determines in what way the contaminant species are exposed to the interstitial air or the transport processes into and out of the snowpack

Please list some keywords

snow, ice, quasi-liquid layer, nitrate, sea salt,

Primary author: AMMANN, Markus (Paul Scherrer Institut)

Presenter: AMMANN, Markus (Paul Scherrer Institut)