

X-ray Micro-tomography of Snow and Porous Ice Media

*Themes:
Experimental achievements*

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Abstract

X-ray micro-tomography (XRT) has become an important non-destructive technique in material science, both in terms of optimisation of material properties as well as improved understanding of the mechanisms that create their microstructure. It is now increasingly used to study the microstructure of porous ice and snow. Applications with respect to ice in the environment include atmospheric ice particles, snow and polar firn, sea ice, frozen soil as well as hydrate-ice media. Industrial fields for which ice microstructure is relevant include the food industry, where crystal structure and pore space relates to food quality, ice cream production as well as refrigeration technology. All fields share several challenges during XRT measurements, e.g. (i) proper sample cooling during imaging, (ii) trade-off between spatial resolution and sample sizes to observe crystal structure, (iii) upscaling of properties to larger samples, (iv) enhancement of contrast between ice, fat/oil and impurities, (v) in situ studies of ice freezing and metamorphosis; (vi) as for material scientists has synchrotron-based XRT, during the past two decades, opened new possibilities to perform studies at high spatial and temporal resolution, and enhance contrast.

The present mini-symposium aims to collect research and applications of X-ray microtomography of porous media containing ice and snow from different fields. Model studies motivated by XRT are also welcome. It aims to stimulate a discussion on the similarities between porous ice media and the challenges that X-ray cryo-tomography of ice involves (cooling setup, contrast, resolution, in-situ studies, conventional X-ray tubes vs synchrotron radiation, etc...).

References: