Séminaire – OSUG Atelier Neige

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Salle Louis Lliboutry, LGGE

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Microstructure and Mechanical Behavior of Ice and Snow

This presentation will cover three aspects of research on ice and snow. First, an overview will be presented of dislocation behavior in ice focusing on dislocation/grain boundary interactions in ice polycrystals studied using in situ deformation synchrotron X-ray topography. Second, the effects of impurities, particularly sulfuric acid - one of the principal impurities in natural ice in the Arctic and Antarctic - on the mechanical properties of ice single crystals will be discussed. It has been demonstrated that sulfuric acid decreases both the peak stress and the subsequent flow stress of ice single crystals, but that the stress exponent is unaffected. Finally, the use of modern analytical techniques to characterize the microstructures of ice and snow will be outlined. Micro X-ray computed tomography can be used to determine the porosity, density, tortuosity and the surface area/unit volume of pores non-destructively in the snowpack and to observe bubbles in ice. It can also be used to study the evolution of individual snowflakes with time. High-resolution characterization can performed using a SEM equipped with a cold stage, an energy dispersive spectrometer and electron backscattered patterns.