



Snow experiments with a large-scale coaxial rheometer: physical and numerical modelling

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In situ snow experiments with a large-scale coaxial rheometer have been performed in order to investigate rheological aspects of dry snow. The outer cylinder is equipped with an inflatable membrane that allows controlling the radial pressure. Contrary to open-channel rheometers where snow is flowing along an inclined plane our experimental setup enables shearing of snow crystals along a rotating cylinder. This cylinder is now driven by an electro-hydraulic device which delivers constant power independent of the test sites' elevation. The instrumentation allows measuring the shear force for different rotational speeds and radial pressures. The density and the temperature for both, the natural snow cover and the snow inside the rheometer just before the tests are also measured. Additionally to the physical tests with snow a numerical simulation is presented. A 2-dimensional molecular dynamic code has been used to describe the snow experiments. It gives access to crucial information that is currently not available in the snow experiments such as the velocity profile between the two cylinders and the transmission of pressure from the outer cylinder towards the inner one. Combined experimental and numerical approaches make it possible to investigate the behavior of snow under large ranges of normal pressure and speed.