

Observation and Modeling of Buried Melt-Freeze Crust

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Melt-freeze crusts often occur as a result of wet snow, rain or strong insolation. Past observations have revealed the formation of weak layers at their boundaries, even when the depth-averaged temperature gradient favours rounding. Research has, however, predominantly targeted temperature regimes dominated by kinetic growth. During the winter of 2007-2008 University of Calgary researchers undertook systematic observations of the early December melt-freeze crust that was present throughout much of Western Canada. The data gathered included ongoing measurement of the temperature gradient across the crust, snow load and shear strength. These observations were used along with meteorological measurements to drive the Swiss SNOWPACK model, a physically based single column model which simulates the evolution over time of a number of microstructural and mechanical properties of the snowpack. We present here the observations from the first year, initial efforts to identify parameters with the greatest influence on mechanical properties and results from model simulations.