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Validation of a capacitance probe for use in detecting solid-liquid phase change of water in a snowpack

A method for measuring the liquid water content of a snow sample is important to research of snow melt mechanisms and has implications for avalanche and water supply forecasting. Currently, there is no reliable and easily applicable method to measure the presence of liquid water in a snow sample. This project tests the hypothesis that the presence of liquid water in a snow sample has a larger influence on the sample's capacitance than other factors. Other main factors that influence the capacitance of snow are temperature, density, and grain structure. This project uses a capacitance probe manufactured by Capacitec. The probe measures the dielectric properties of a small section of snow within a sample, representative of several grains. Preliminary results show that the probe does detect the appearance of liquid water in a sample. This is seen as a sharp drop in probe values when snow melts, at 0°C. Results from this project will be used in the design and implementation of a sensor array, which will be used to study melt-freeze fronts in a snow sample.