Abstract

The amount and distribution of liquid water is important for assessing the mechanical strength, meltwater generation and meltwater transmission in snow cover. It also has a profound effect on the performance of active and passive remote sensing systems operating in the microwave and millimeter wave region of the electromagnetic spectrum. New methods of measuring liquid water have been reported which show considerable promise. Our purpose is to address the question of measurement equivalence by intercomparing the three absolute methods of freezing calorimetry, alcohol calorimetry, and dilution and by comparing the precision of a calibrated capacitance probe with one of the absolute methods. All intercomparisons were made in a laboratory cold room with homogeneous snow having a mass liquid water content from 0% to 20%. The intercomparisons show that the methods are equivalent and that the experimental errors associated with the measurements are not greater than ± 1.8%. However, the operational achievement of equivalence is strongly dependent on a variety of factors such as sample size, mixing of snow and working fluid, and operator skill. The most versatile method is the capacitance probe method. It requires no auxiliary equipment and minimal operator skill.