The SM4 Snowpack Temperature and Snow Depth Sensor

Órn Ingolfsson 1 Harpa Grimsdottir 2

1 POLS Engineering, Isafjordur, Iceland; 2 Icelandic Meteorological Office, Avalanche Research Center, Isafjordur, Iceland

An instrument for measuring snow depth and snow temperature has been developed by POLS engineering in Iceland. The goal was to develop a simple, robust unit with a low operating cost that may be easily installed on steep hillsides. The snow sensor (SM4) consists of a series of digital thermistors mounted with a fixed interval on a pole that extends through the snowpack. Measurements from the thermistors are logged with a few minute interval to an internal memory chip and are transferred regularly to a central computer through a wireless connection. The SM4 measures snow depth by identifying thermistors buried in the snow, based on the damping of temperature fluctuations that is caused by the snowpack, compared with temperature fluctuations in air. The temperature profile of the snowpack is obtained as additional information. The Icelandic Meteorological Office (IMO) has operated SM4 sensors for two years in three avalanche starting areas, together with ultrasonic snow depth sensors. The results show that SM4 was able to measure snow depth with adequate accuracy, also during periods of snowdrift and icing, when the ultrasonic sensors stopped working.