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The History of Snow Measurements

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Snow cover is a key driver of the Earth's climate system. As an essential component of the cryosphere, snow cover influences soil temperature, freeze and thaw cycles, permafrost stability, and the hydrological cycle. The quantification of snow cover properties is therefore essential for environmental and economic impact assessments, particularly for trend calculations within the context of climate change impact assessments.

Operational snow monitoring stations were set up when national weather services were founded in the 19th century in order to perform snow observations on a regular basis. Despite the fact that some long-term snow records are available, little is known about the measurement principles which were used during the past or even those used today at the international level. Therefore, the aim of this review is to improve the current knowledge and awareness of the international snow (science) community, on the historical development of methods and instruments used to perform basic measurements of the following snow variables: snow depth (HS), depth of snowfall (HN), water equivalent of both snow cover (SWE) and snowfall (HNW), and presence of snow on the ground (PSG). From 200 years ago till today, the similarities and differences of snow measurement methods as well as the motivation behind these observations are compared worldwide. Thereby we will trace when and where regular measurements of which snow variable started.