



Which scales are relevant in snow models?

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Physical properties of a snowpack show different characteristic length scales, as most sediments. In a snowpack, typical vertical scales are a few millimeters for the snow microstructure, around 0.1 m for distinct stratigraphic features (layers), and rarely exceeding a few m in depth. Horizontally, the typical scale within a layer is mostly determined by the depositional history, and can range from 0.01 m (infiltration channels) to small scale disturbances by wind (0.1 m) to hundreds of meters (surface hoar, crusts, sastrugi). Recently developed methods, as in-situ micro-tomography, 3D-reconstruction from planar sections, snow-micropenetrometry, near-infrared photography and radar allow to measure and interpret the stratigraphy of snowpacks in unprecedented detail. Snow models usually can not take into account all these physically relevant features, but must lump together the detailed effects in an efficient and useful way. Measurements and simulations suggest that the choice of a representative volume strongly depends on the investigated process and the stratigraphy.