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Heat budget of the snow pack and interstitial exchange processes

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Air-snow transfer processes influence the snow-internal and surface energy budgets which control spatial and temporal variations in snow accumulation and melting. First results from a field study of snow-atmosphere interaction and snow internal exchange processes are presented. The measurements are taken on a snow-covered, flat glacier at a site 2800m above sea level in the Swiss Alps. For this study, a newly developed set of temperature and air pressure sensors are deployed in the snow on the glacier surface. Experiments aim at quantifying interstitial heat and moisture transport associated with air flow in the snow pack. The relation between near-surface atmospheric turbulence and wind pumping is investigated and the depth to which these processes are effective is determined considering the stratigraphy of the snow pack. To this end, vertical density profiles and the micro-structure of the snow pack are measured together with changes of the level of the snow surface as a result of accumulation, melting or compaction. Finally, a surface energy budget is calculated from measurements of radiative fluxes, skin and air temperatures, and humidity to investigate the effects of temporal changes in the surface energy budget on snow-internal processes.