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Snow Particle Speed in Blowing Snow obtained with SPC 2

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The transport of snow by the wind has major implications in engineering and geophysical fields. On roads, drifting snow causes snowdrifts and reduced visibility. In mountainous regions, non-uniform distribution of snow due to blowing snow, such as locally increased snow drift and snow cornices on the leeward of slopes, leads to avalanche release. Redistribution of snow by the wind is also important for hydrological processes and mass balance, especially in Arctic and Antarctic regions.

In the last decade, large progress has been made in modelling blowing snow. However, interaction between snow particles and air, that is one of the key processes in the model, is still poorly understood. In this study we tried to obtain the snow particle speeds in the blowing snow directly with the Snow Particle Counter (SPC). The SPC is able to sense particle diameter as well as particle number and, in general, is used to measure the change in the mass flux with time, such as every second. However, the high frequency recordings of the signal from the transducer make possible to deduce the particle speed one by one. Analysis was carried out using the data measured not only in the cold wind tunnel but also at the Col du Lac Blanc, French Alps and Mizuho Station, Antarctica.

Then, obtained particle speed distribution was discussed with wind speed profiles, hardness of the snow surface and so on. Further, comparison was made with the Lagrangian stochastic model, which accounts for the turbulence effects on the suspension of snow grains and also includes aerodynamic entrainment, the grain-bed collision process, wind modification by grains, and a distribution of grain sizes.

Keywords: blowing snow, SPC