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Studies on snow redistribution on the Antarctic Ice Sheet with a new blowing snow observation system

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On the Antarctic ice sheet, strong katabatic winds blow throughout the year and large amount of snow is continuously removed. This consists a significant factor in mass and energy balance, and is all the more important when predict the likely effect of global climate change. Further recent experimental work revealed the snow-drift sublimation can lead to significant mass losses during strong winds and can be an important factor in the surface mass balance of the Antarctic ice sheets.

In this study we have started to develop an Automatic Blowing snow station (ABS) by measuring the attenuation of the light intensity, which strongly depends on the blowing snow flux. A small wind turbine and a cold-proof battery were utilized as a power source. Firstly, its performance was tested with comparing the Snow Particle Counter (SPC) in a cold wind tunnel system. Then, ABSs have been set at Ishikari and Wakkanai in Japan, Col du Lac Blanc in France, and S17 near Syowa station in Antarctica. So far, the ABS seems adequately fit for practical use. However, more careful and precise calibrations and field performance tests with SPC throughout a winter are needed. In fact, wind tunnel experiment indicates the output depends on the wind speed; ABS overestimates the mass flux more or less at higher wind speeds.

Keywords: Antarctica, Blowing snow