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南極氷床での広域観測を目的とした吹雪自動計測システムの開発

Development of an Automatic Blowing Snow station

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On the Antarctic ice sheet, strong katabatic winds blow throughout the year and a large but unknown fraction of the snow which falls on it is removed continuously. This constitutes a significant factor in mass and energy balance and is all the more important when predicting the likely effects of global climate change. Further, recent experimental work has indicated that the snowdrift sublimation can lead to significant mass losses during strong winds and can be also an important factor in the surface mass balance of the Antarctic ice sheets.

Nishimura and Nemoto (2005) carried out the blowing snow observations at Mizuho station, Antarctica in 2000 with the snow particle counters (SPC) that can sense not only the number of snow particles but also their diameters. SPC worked properly and the data obtained revealed profiles of mass flux and particle size distributions as a function of the friction velocity. However, the SPC requires rather high power supply and the data is stored in PC; it is not always suitable for the unmanned observations under the severe Antarctic conditions. Thus, we have developed a simpler device 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 SPC in a cold wind tunnel system and it proved adequately fit for practical use by combining the output of the anemometer. In 2009/2010 winter, three systems have been set at Ishikari, Col du Lac blanc in France, and S17 near Syowa station in Antarctica, and the tests are still continuing.

キーワード:吹雪,南極

Keywords: Blowing snow, Antarctica