Water vapor variation of blizzard at Syowa Station, Antarctica

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Syowa Station at Antarctica is a Japanese research station located on East Ongul Island in Queen Maud Land, Antarctica. A blizzard, which is a storm with strong winds and snow, has occurred frequently in this area. There have been several investigations of blowing snow in this area (e.g. Nishimura and Nemoto, 2005). In recent years, there is a growing recognition that water vapor is efficiently transported from the coastal area to the inland area of Antarctica due to the disturbance of synoptic scale about ten times a year (Hirasawa et al., 2000). In addition, it is reported that the air temperature rises in the blizzard caused by the passage of the low pressure, and the air temperature drops in the blizzard caused by the Katabatic wind (Japan Meteorological Agency, 2008). Therefore, to clarify the variation characteristics of blizzard around Syowa Station, Antarctica, based on blizzard analysis using meteorological observation data by previous research (Sato, 2004; Sato and Hirasawa, 2007), we investigate the variation of water vapor density from 24 hours before the start of blizzard to 24 hours after the end of blizzard. We used the surface synoptic data in the Antarctic meteorological data obtained by Japan Meteorological Agency at Syowa station. The analysis period is from 2000 through 2015, and the observation point is Syowa station, Antarctica. From the analysis results, representative blizzard cases (class A, B and C) are shown in Figure 1. In any of the blizzard classes, it can be seen that the water vapor density rises before the blizzard. This may be explained by the fact that the moist air from low latitudes flows in and that blowing snow particles are sublimated actively due to the inversion-layer breakup associated with wind disturbance. In addition, as the wind speed increases, it is reasonable to expect that the spatial density of blowing snow particles in the air increases and that sublimation is further promoted. Now we are going to further analyze the variation characteristics of blizzard using the meteorological data such as air temperature, relative humidity and wind direction.

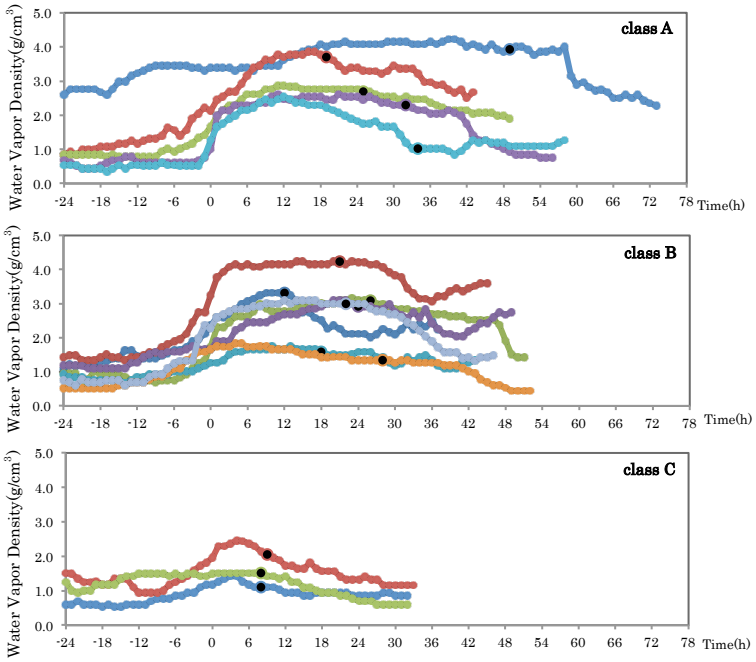

Figure 1. Time variation of water vapor density in 2008. The horizontal axis sets the blizzard start time to 0. The black dot indicates the end time of the blizzard.

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