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The structure of a snowstorm associated with a convergence zone in the Hokuriku District of Japan

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Snow clouds formed around a convergence zone sometimes bring a heavy snowfall. Recently, intensive observations were made on the significant convergence zone frequently formed at the central part of the Japan Sea *JPCZ* *1*. However, the snow cloud significantly affected by the topography and the 110 km scale structure of the snowstorm associated with the JPCZ is not clear especially near and over land. We investigated the structure of a typical snowstorm associated with the JPCZ in the Hokuriku District on 46 January 2003. The snowstorm caused a daily new snow depth of 55 cm at Nagaoka Institute of Snow and Ice Studies(NISIS). The snowstorm was mainly composed of four types of snow clouds in the following order: echo vortices(Vmode), spreading echoes (Smode), transversal lines (Tmode) and longitudinal lines (Lmode). The characteristics of the four "snowfall modes" are summarized in Table 1.

The snowstorm moved southwestward, and the order of the four modes reflected the structure of the snowstorm from southwest to northeast. The Vmode corresponded to the vigorous convective snow clouds developed along the horizontal shear environment of the JPCZ. The Sand Tmodes were the structure included in the thick band cloud. The Lmode corresponded to the cloud street to the northeast of the thick band cloud.

Keywords: snowstorm; radar; convergence zone

Table 1 Characteristics of the snowfall modes during the snowstorm on 4-6 January 2003.

Snowfall mode	echo vortex (V)	spreading echo (S)	transversal line (T)	longitudinal line (L)
Duration	>5.5 hours	5 hours	16 hours	20 hours
Total precipitation #	11.39 mm	9.82 mm	7.77 mm	6.78 mm
Mean precipitation intensity #	2.14 mm h^{-1}	1.96 mm h^{-1}	0.49 mm h^{-1}	0.34mm h^{-1}
Typical echo top height $	5 km	4 to 4.5 km	3 km	2 to 3 km

Arithmetic mean of 13 surface stations. $ Derived from vertical pointing data.

References

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