

The formations of temperature inversions and cold air pools in Kamikochi valley, the Japanese Alps

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Meteorological measurements were conducted in Kamikochi valley, the Japanese Alps, to reveal weather conditions and factors that affect the development of cold air pools. Result showed that the frequency of temperature inversions increased in spring and autumn, and decreased in winter, roughly corresponding to the variation of monthly sunny-days ratio. Large proportion of temperature inversion days were seen for both migratory anticyclone synoptic type and summer synoptic type. Remarkably small value of both inversion frequency and intensity were connected with winter synoptic type. Both monthly sunny-days ratio and monthly appearance frequency of migratory anticyclone synoptic type had a significant positive relationship within the monthly ratio of temperature inversion days. In contrast to the variation pattern of inversion frequency, the intensity of inversions strengthened in winter and weakened in summer, corresponding to the annual variation of nighttime length. Case studies from typical nocturnal cold air pools in summer and winter suggested that more tenacious and deeper inversion layer was constructed in winter season in Kamikochi valley, primarily due to the longer night.

Keywords: cold air pool, temperature inversion, mountain area