

Cold Air Pool Formation and its Weather Conditions in Kamikochi

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Cold air pool is a ground inversion layer that is likely to form in a basin that is a closed terrain at a clear and calm night. A special case has been discovered for the formation process of cold air pool. For example, Dorninger et al. (2011) patterned the formation of special cold air pool such as “cool air pool resolved before sunrise” and “cold air pool with formation times of less than one hour”, and investigated their respective formation factors. The formation mechanism of the special cold air pool has been found in various basins, and regional characteristics can be seen depending on each climatic and topographical condition. However, few studies have been conducted from this point of view, and it is necessary to conduct research in another area to confirm the regional characteristics of the cold air pool formation mechanism. In this study, the cold air pool structure formed in Kamikochi where the difference between the bottom (elevation 1490 m) and the edge (elevation 2355 m) is large was patterned, consider how to prevent this.

This study, Kamikochi (1490 m), Dakesawa (1600 m, 1700 m, 1800 m) and Nishihotakadake (2355 m) are set as observation points. Observation items are temperature (°C), relative humidity (%), atmospheric pressure (hPa), wind direction (degree), wind speed (m s^{-1}), downward and upward short-wave and long-wave radiation (W m^{-2}) at Kamikochi and Nishihotakadake, and only the temperature (°C) in Dakesawa. For each observation item, data at 60 minutes intervals were used. The analysis period is from October 29, 2016 to July 24, 2018. The snow season (Kamikochi) is from December 6, 2016 to May 3, 2017, and from November 15, 2017 to April 15, 2018. In this study, it is defined that a cold air pool was formed when the temperature at an altitude of 1490 m was lower than that at an altitude of 1700 m. In this study, cold air pool formed during the analysis period were classified into eight types of cold air pool formation patterns. The days of occurrence of these eight types of cold air pool are summarized for each month from October 2016 to July 2018. The number of all types of cold air pool was the lowest in winter, increased in spring, and highest in summer and autumn. This tendency was remarkable especially in the variation in the number of days of "quiet development" (formation of a common cold air pool). It is considered that the atmospheric pressure arrangement where "quiet development" is likely to be formed is a mobile high pressure, and the weather is almost free of clouds and strong winds. In addition, the number of days covered by mobile highs tends to be low in winter and high in autumn. In this presentation, we focused on two patterns, "reformation" and "short-time cold air pool". "Reformation" is a process in which a cold air lake is formed during a short period of time when the air is mixed with the clouds and winds in the sky during a cool and quiet weather condition covered by a mobile high pressure and a cold air pool is forming. There are many processes that can be resolved. Conversely, in the "short-time cold air pool", the atmosphere is mixed by clouds and winds over the sky due to the effect of the pressure valley, and clouds and winds are generated for a short time at night, which is not suitable for the formation of a cold air pool. There are many processes in which a cold air pool is formed by disappearance.

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