

## Heat Balance Analysis of Cold Air Pool Formation in Kamikochi

\*Sayuri Koyama<sup>1</sup>, Motoshi NISHIMURA<sup>2</sup>, Keisuke Suzuki<sup>3</sup>

1. Graduate school of science and technology, Shinshu University, 2. Interdisciplinary Graduate school of Science and Technology, Shinshu university, 3. Department of Environmental Sciences, Faculty of Science, Shinshu University

Meteorological observation and heat balance analysis were conducted in Kamikochi (1490 m), Dakesawa (1600 m, 1700 m, 1800 m) and Nishi-hotakadake (2355 m), and the formation mechanism of cold air pool was clarified. The observation period is the snowy season at Kamikochi from December 6, 2016 to May 4, 2017 and from November 17, 2017 to April 16, 2018.

In this study, with referring to Dorninger et al. (2011), the cold air pools that occurred during the observation period were classified into eight types of the cold air pool events, undisturbed evolution, late buildup, early breakup, mixing event, temperature rise of all layers in a short time, upper disturbance, lower disturbance and short time cold air pool.

The cold air pool events occurred 28 times in April 2017 and 27 times in March 2018. However, mixing event, temperature rise of all layers in a short time, upper disturbance and lower disturbance hardly occurred in both 2016/17 and 2017/18. It is thought that Kamikochi is terrain that is difficult to generate turbulence.

The undisturbed evolution, the late buildup, and the early breakup differed in the time when the cold air pools were built and the time when they were destroyed. While the cold air pools were built, the sensible heat flux and latent heat flux were  $0 \text{ W m}^{-2}$ . The mixing event, the temperature rise of all layers in a short time and upper disturbance were different in depth of rise in temperature generated in the cold air pool and the increase amount in temperature. Regarding the sensible heat flux and latent heat flux amount, the mixing event was  $5.0 \text{ W m}^{-2}$  or more, the temperature rise of all layer in a short time was  $0.5 \text{ W m}^{-2}$  or more, and the upper disturbance was  $0 \text{ W m}^{-2}$ . The lower disturbance is the event in which a short-time increase in temperature occurs near the bottom of the basin. The cold air pools with formation time of less than 6 hours were classified as the short time cold air pool. These cold air pool events are largely responsible for the generation of clouds and the generation of turbulence by the wind, the time of occurrence and duration of clouds and wind, and the strength of turbulence are considered to be the main factors.

Keywords: Cold air pool, Heat balance