

## Measurement of snow depth distribution in the upper basin in the Japanese Alps using an airborne laser scanning

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In the Japanese Alps region, large amounts of precipitation in the form of snow constitute a more important water resource than rain. During the winter, precipitation that is deposited as snowfall accumulates in the river basins, and it forms natural dams known as “white dams.” A quantitative understanding of snow depth distribution in these mountainous areas is important not only for evaluating water resource volume, but also for understanding the effects of snow in terms of its impact on landforms and its effect on the distribution of vegetation.

However, it is not easy to perform a quantitative evaluation of snow depth distribution in mountainous areas. Several methods have been proposed for clarifying snow depth distribution. The most widely used of these is a method of inserting a sounding rod into the snow to measure its depth at each geographic position. Another method is to dig a trench in the snow and then perform an observational measurement of the side of the trench. These methods enable accurate measurement of the snow depth; however, when the snow is several meters deep, the methods may be limited by the measuring capacity of the equipment, or by the time restrictions of the survey. For these reasons, wide area measurement of the spatial distribution of snow is very difficult, and it is not suitable for investigating snow depth distribution in river basins.

In recent years, a measurement technology has been developed that uses laser scanners mounted on aircraft. This method enables researchers to obtain ground surface coordinate data with high precision over a wide area from the air. Using such a scanner to measure the ground surface during snow coverage and during no snow coverage, and then finding the differences between the surface elevations, has made it possible to ascertain snow depth with high precision. Airborne laser measurement enables high-precision measurements over a wide area and in a short amount of time, and measurements can be made regardless of geographical factors such as sloping ground. As such, it enables measurement of snow depth distribution over a wide area without having to worry about the undulations of the land.

In this study, airborne laser scanning was carried out on the snow surface in the upstream region of the Kamikochi-Azusa River in the Japanese Alps on March 29, 2012 and on April 4, 2013, in order to clarify the snow depth distribution.