

Altitudinal distribution characteristics of snow water equivalent at snow-clad volcanoes where cyclonic snowfall dominates

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Eruptions at snow-clad volcanoes bring about intensive snowmelt, which may cause enormous damage by the occurrence of volcanic mudflow. Assessments of the risk associated with volcanic mudflows due to snowmelt require the understanding of temporal and spatial distribution of snow water equivalent (SWE) on the slope of volcanoes. Because of the insufficient knowledge of the altitudinal distribution characteristics of SWE at snow-clad volcanoes where cyclonic snowfall dominates, we conducted snow surveys at Ontake volcano, Azuma Adatara volcanoes, and Kusatsu-Shirane (Motoshirane) volcano since the snow season of 2014/15. Consequently, snow surveys revealed that SWE depends on altitude (H) approximately linearly, which is given by $SWE = a \cdot H + b$, where the proportional coefficient a means the rate of increase in SWE per unit height. Obtained values of increasing rate a range from 0.3 to 1.1 mm/m, indicating that the increasing rate is much smaller at snow-clad volcanoes where cyclonic snowfall dominates in comparison with those where snowfall by winter monsoon dominates. The present paper discusses the influence of snowfall processes and meteorological conditions on altitudinal distribution characteristics of SWE.

Keywords: snow-clad volcano, snow water equivalent, volcanic mudflow due to snowmelt