

Comparison of surface energy balance of seasonal snowcover for three sites in Japanese alpine region

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Process of snow and glacier ablation is one of the indicator of global climate change, so is of interest as understanding earth system. In the discussion of snow ablation process, calculating surface energy balance (SEB) is one effective method, and it is generally analysed with local meteorological observation data. SEB is sensitive to regional atmospheric conditions, therefore it often reflects in situ regional climate and surrounding environment. This presentation offers the result of regional SEB analysis in central Japanese alpine region, Kamikochi (1490 m a.s.l.), Norikura highland (1590 m a.s.l.) and Nishi-Hodaka (2355 m a.s.l.) to reveal the characteristic of SEB of seasonal snowcover in Japanese sub-alpine region. Three automatic weather stations, operated by Shinshu University, were located each targeted region in snow covered period of 2016/17 (Hydrological year). SEB analysis was conducted using surface energy balance method, and an analysis of turbulent heat flux was done using the bulk aerodynamic method. SEB analysis were conducted only snow covered period from October, 2016 to June, 2017.

The most major energy source was net shortwave radiation and negative energy flux was offered by net longwave radiation and latent heat flux in every site. Those characteristics were often reported in continental regions and high elevation areas, such as alpine region, because atmospheric condition in those regions are often cold and dry so that incoming turbulent energy flux were restrained. The most attractive characteristic resulted in SEB comparison is that the behavior of snowmelt energy flux in later ablation period is different in three sites. Snowpack in Nishi-Hodaka is persisted longer (until June) than other two sites due to a lot of snowfall offered in winter, so that atmospheric condition (e.g. air temperature, specific humidity) and radiation components in later ablation period have been different from other two sites. Therefore the different SEB properties in each site were also discovered.

Similar and difference SEB properties, which are resulted from regional climate condition and local topographic environment, among the three target sites were revealed. It is interesting that the target sites, relatively near but different (or same) elevation band, have each different SEB properties, so more detailed analysis of regional SEB properties are required. Comparison of surface energy balance of seasonal snowcover for three sites in Japanese alpine region

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