

A spatial variation in albedo and amounts of dust on Tyndall Glacier in the Patagonia Icefield derived from a Landsat image

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Glacial shrinkages have been reported in many parts of the world. The surface albedo of glaciers is one of the important factors to affect glacial melting. The glacial albedo spatially varies on a glacier and also varies among glaciers. The variation in surface albedo is usually due to physical condition of surface ice/snow and an amount of dust on the surface. In order to evaluate glacial changes, it is important to quantify the albedo and amount of dusts on the glacial surface. Remote sensing could be a useful method to quantify surface albedo and dust on a large area of glaciers. This study aims to describe a spatial variation in the surface albedo of Tyndall Glacier in the Southern Patagonia Icefield with a Landsat satellite image. The mean surface albedo derived from the satellite image was 0.48 in the ablation area. This is equivalent to that of clean ice, suggesting that most of the glacial surface is clean ice with little impurities. The spatial distribution of the albedo showed that the albedo decreased with the altitude and that that in the left-bank side (east) was relatively lower than that in the right-bank side (west). The band 2-4 ratio, which is indicative to amounts of dust on glacial surface, indicates a notable distribution of surface dust in the ablation area. The areas with larger amounts of dust were in the middle part of the left-bank side and the lower part of the glacier.