Distribution of surface dust in the bare ice area of the Greenland Ice Sheet derived from Landsat ETM images

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The Greenland ice sheet has been reported to be significantly shrieked recently. Surface albedo is one of the important factors affecting the melting of the ice sheet. Surface albedo depends on amounts of impurities on the surface of snow/ice. Thus, it is important to describe the distribution of impurities on the ice sheet to evaluate melting of the ice sheet.

This study aims to describe the distribution of the surface albedo and amounts of impurities in the bare ice area of the Greenland ice sheet derived from Landsat-7/ETM+ satellite images. Three areas of the west coast of the ice sheet, where in situ investigation was conducted in 2007, were selected for analysis. The surface albedos varied among the areas, but their mean value of the each area did not show significant difference. However, the band 2-5 ratio, which is indicative to amounts of impurities on the ice surface, showed significant difference between the three areas. The mean ratio of the northern area was lower than those of the southern and middle areas. This suggests that amounts of impurities of the northern area are larger than those of middle and southern areas. This difference agreed with the results of in situ field measurements of the amounts of the surface impurities.