

Aqua/MODIS データによる融解期のグリーンランド氷床暗色域と融解域のモニタリング

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Monitoring of the dark and the melting region on the Greenland ice sheet by Aqua/MODIS data during melting season

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We monitor the dark region in the western and northern bare ice areas of Greenland ice sheet by using MODIS images during the melting season. The areas of dark region and their albedo variations make a large contribution to the total melt energy, which is important to control temporarily and spatially melt water generation. We built monthly composite MODIS images by collecting clear day (cloud-free) pixels, and then examined the recent trend of temporal and spatial variations of the dark and melting region. Figure 1 shows true color images over the Greenland ice sheet. We found that the dark region in the western area and the surrounding blue-ice expanded during eleven years, and the north/northwest coastal area also was confirmed to be dark. Figure 2 shows radiance profiles for different years as observed by the MODIS visible channel (470 nm) in the western (Fig.2a) and northern bare ice areas (Fig.2b). The radiance profiles of the dark region drastically decreased in 2007, and lower radiance areas extended toward the inner area including the dark region especially during recent three years. This means there was an expansion of the blue ice or large snow-grain-size area due to the melting of snow/ice because the melting region was flaged and ice surface temperature of $\sim 0^{\circ}\text{C}$ was observed by the MODIS. This phenomenon is caused by the snow impurities such as dust and glacial microbes together with recent surface temperature increasing.

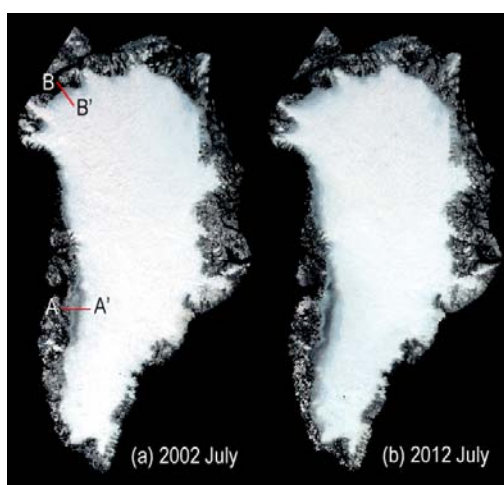


Figure 1 MODIS monthly composite true-color image.

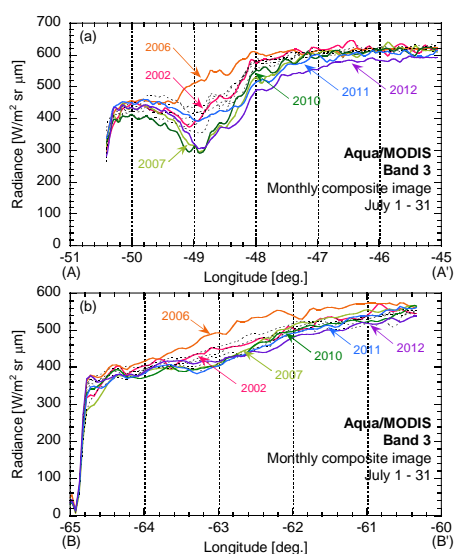


Figure 2 Radiance profiles at different years for (a) A-A' and (b) B-B' profile of Fig. 1.