

Microwave signal changes by melting and refreezing of ice sheets and ice caps in the Arctic

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The Arctic is experiencing rapid environmental change due to climate warming, resulting in snow condition changes. Passive microwave observation is a useful tool to monitor these changes. Arctic research projects are sending field research groups and establishing observation sites in the various places in the Arctic. Satellite observation is available to supporting research planning, evaluation of observation period and place, as satellite observation can cover in time and space. This study used satellite passive microwave observation as this is available even in polar night when the sun light is not available, and cloudy or foggy conditions.

We collected microwave data from research sites in the North America, Siberia, Svalbard, Scandinavia and Greenland (Table 1). Many of those area have been observed by Japanese research groups. The data was sampled by pixel based on the location data of observation site and used for monitoring local snow and ice conditions. The present study introduces snow cover and melting durations. This study about the melting observation at Greenland ice sheet (Fig.1)

Microwave brightness temperature of high frequencies increases by surface melting Greenland Ice Sheet. The melting have been observed by various techniques. However, the lower frequency of microwave shows complicated variations brightness temperature change. The melting and freezing affect emission from ice sheet and observed by different frequencies.

This study introduces the complexities of microwave emission from ice sheet and ice caps in the Arctic, and also compares with the observation in the Antarctica.

Table 1. Location information of observation area.

Greenland 67.5N Transect		
Site	Latitude (deg.N)	Longitude (deg.E)
Greenland (coastal mountains)	67.50	309.00
Glacier terminus 400m	67.50	310.00
Dark zone lower 1200m	67.50	311.00
Dark zone higher	67.50	311.50
Melt pond zone 1500m	67.50	312.00
Ice/Snow 1800m	67.50	313.00
Snow 1 2000m	67.50	314.00
Snow 2 2250m	67.55	315.29
Snow 3 2450m	67.54	316.45
Snow 4 divide 2500m	67.53	317.62
Snow 5 divide 2500m	67.50	318.78
Snow 6 east 2380m	67.47	319.93
Snow 7 east 2100m	67.42	321.09
Snow 8 east	67.37	322.23
Snow 9 east	67.31	323.37
Snow 10 east 1900m	67.24	324.51
Ice 11 east 500m	67.17	325.64
Atlantic Coast	67.08	326.76

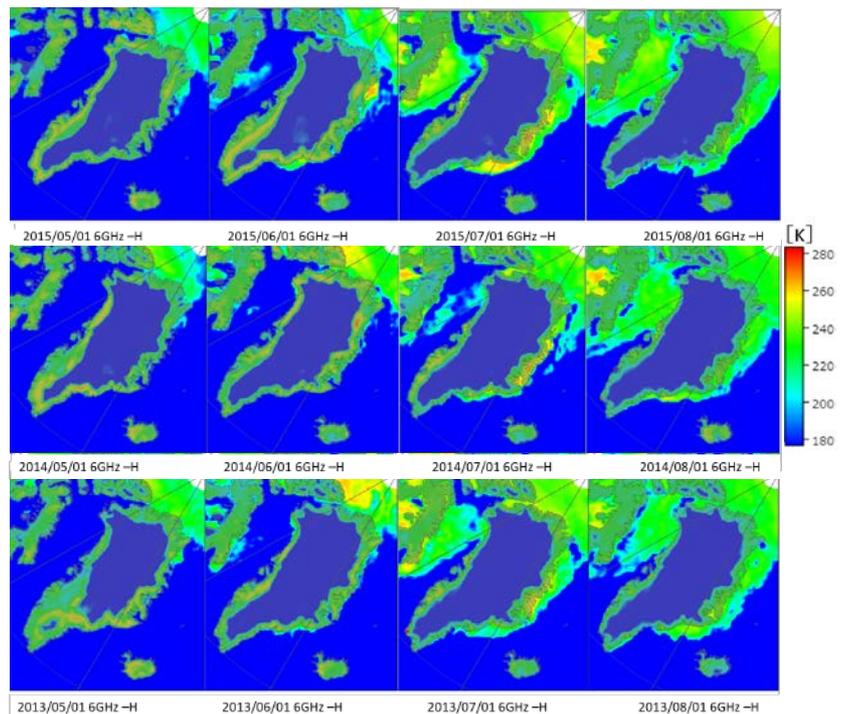


Figure 1. Melting observation in Greenland Ice Sheet.

References

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