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Characteristic sensitivity of snow accumulation to temperature change in the arctic glaciers

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On the Arctic glaciers, snow accumulation on a glacier almost limited to the beginning and end of winter, because the stable high pressure stays in the winter. Therefore, the snow accumulation depends on the rain/snow period duration and much sensitive to temperature change rather than in mid-latitude area. During the observation at No.31 glacier in Suntar-Khayata, eastern Siberia, from August 2004 to August 2005, the snow accumulation was large in September and May, which agreed with the result of NCEP recalculating analysis.

According to the NCEP data from 1950 to 2009, temperature increased by 1.9oC during this 60-year period. As an example of the arctic glacier, the surface mass balance of No. 31 glacier was calculated. The ELA of No. 31 glacier is about 2350 m in present, and it will increase by150 m when temperature rises by 1oC. If the present warming lasts more next 50-60 years, the ELA will increase to about 2600 m, which is the upper end of the glacier. In this stage, the accumulation area of the glacier will disappear and the glacier tends to decline.

Keywords: Arcitc galciers, snow accumulation, temperature change, Equilibrium Line Altitude, Siberian High