Ice thikness measurement on glaciers in Suntar Khayata, Eastern Siberia (A preliminary result)

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Introduction

Glaciological observations were carried out in Suntar Khayata, Eastern Siberia (see Fig.1 and Fig. 2 for its location) in July-August 2012 as a joint project between JAMSTEC program on Terrestrial Environment Change research to clarify the cryosphere change in the Northern Eurasia and GRENE-Arctic Project -- Cryosphere Research – Glaciers and Ice caps. The research in this region was selected due to the following reasons.

(1) The Arctic glacier and mountain environment are changing drastically due to recent strong warming occurring in the Arctic Regions.
(2) The Siberian glaciated region is one of the low studied areas in the whole Arctic.
(3) There are observation and measurement data at Suntar-Khayata Region at the timing of IPY (1957 – 59) by Russian Groups and, two recent researches by Russian/Japanese research groups in 2001 and 2004/2005, which will make it possible to clarify the changes under the strong warming, if recent data are added.

Objectives of this study

To clarify the change in the glacier morphology since the mid 20th century is the main target of this study. Length and area of glaciers are detectable by satellite remote sensing technique, but not its volume. Information on ice thickness is required through ground observations.

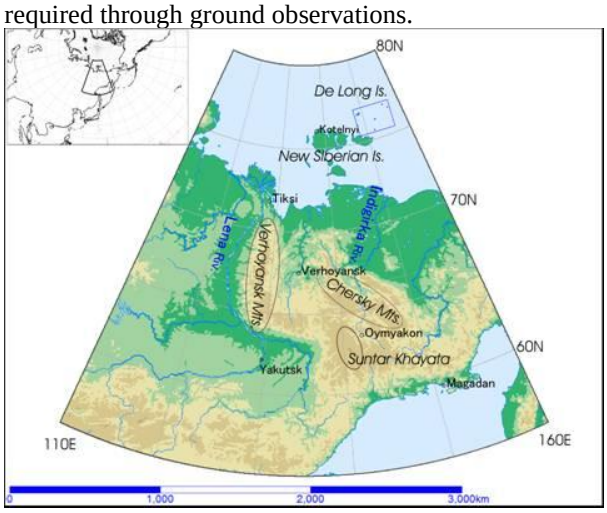

Figure 1. Location of Suntar Khayata, Eastern Siberia.

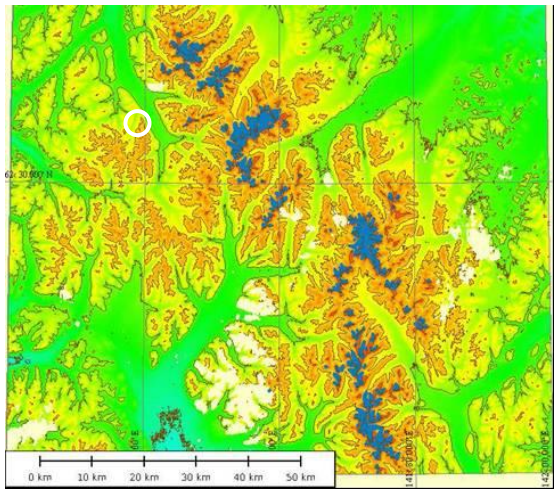

Figure 2. Distribution of glaciers (hatched areas) in Suntar Khayata Detailed study area is marked by a white circle.

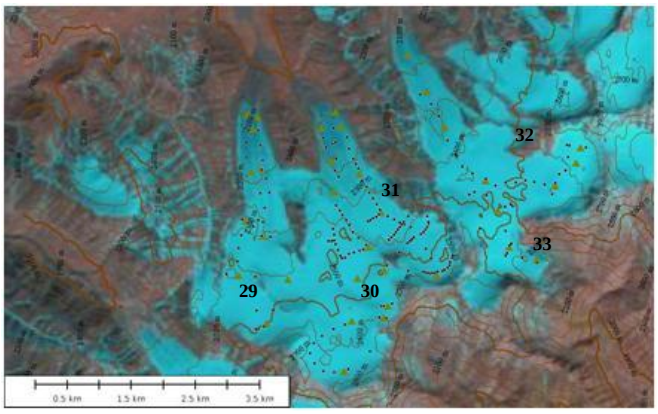

Figure 3. Map showing the five glaciers (No. 29, 30, 31, 32 and 33) where ice measurement were carried out.Stakes (triangles) and measurement points are also shown.

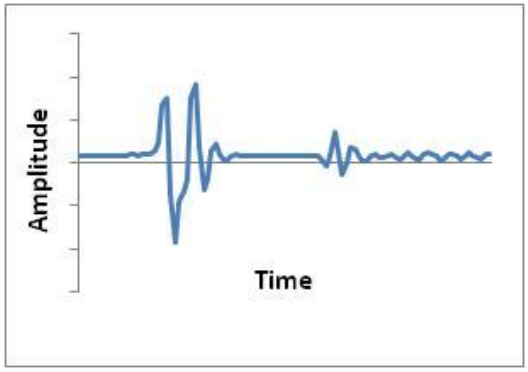

Figure 4. An example of the echograms aquired by radio-echo soundings on Glacier No. 31 in Suntar Khayata.

Observation

Radio-echo soundings were conducted on five glaciers. A total of more than 200 points were occupied and the points were located by a handy GPS (Fig. 3). Figure 4 shows an example of the echograms aquired by radio-echo soundings on Glacier No.31

Results and discussion

Figure 5 shows a comparison of results of ice thickness measurement between those in 1958-1959 and in 2012. There are large differences between the two. Downwasting might occur during these 50 years. It should be, however, considered the difference in the method of soundings, i. e. seismic in 1958-1959 and radio-echo in 2012. Accurate information on surface elevations in the different periods is desirable.

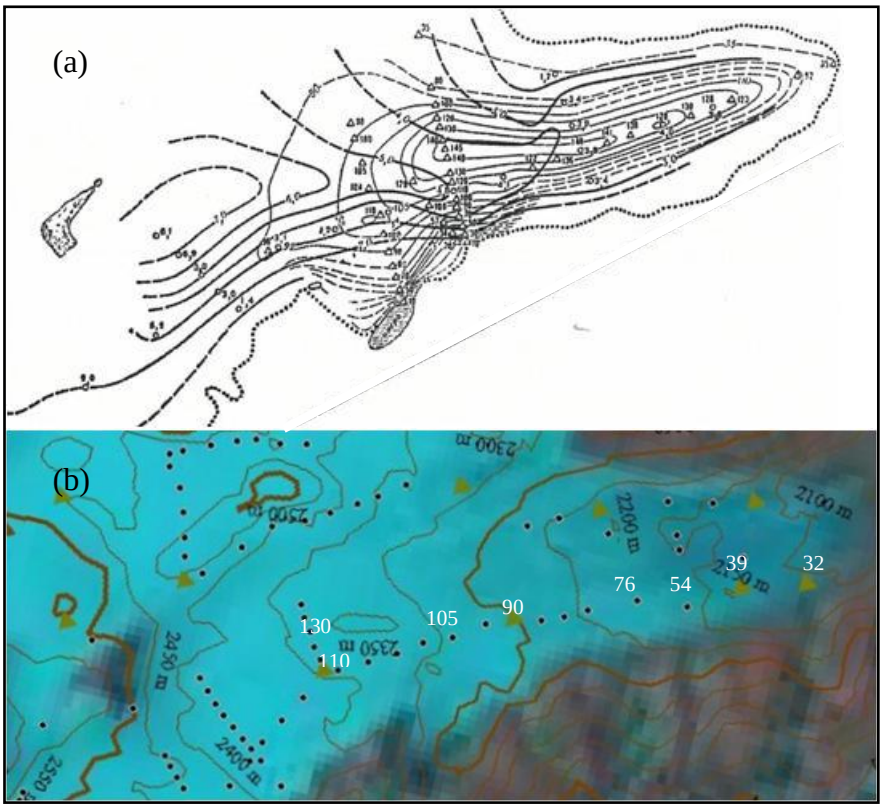

Figure 5. (a) Isolines of flow velocity and ice thickness of Glacier No. 31 in 1958-1959. (After Koreisha, 1963). (b) A part of results of spot measurement of ice thickness in 2012.

Concluding remark

Since we have just started analysing data, a preliminary result is described here. Future plan is as follows;

1) To collect topographical data in 1958-1959
2) To estimate volume of glacier
3) To derive a relation between area and volume of glaciers

References

M. M. Koreisha (1963): Modern glaciations of the Suntar-Khayata Ridge, Glaciology IX section of IGY Program No. 11. Publishing House of the Academy of Sciences of the USSR