

Greenland Country Update

Árni Hjartarson and Halldór Ármannsson

Grensasvegur 9, 108 Reykjavík

ah@isor.is; halldor.armannsson@isor.is;

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ABSTRACT

The exploration of geothermal energy in Greenland is still at an early stage. Surface manifestations of geothermal activity are rare in this large country. They are mainly found in the basaltic areas at Scoresbysund and Disko and a single geothermal site is in Uunartoq, South Greenland used for bathing. The Greenland Glacier covers over 80% of the country and the majority of all hot springs and geothermal sites are believed to be ice covered. The highest temperatures are found on the east coast, north and south of Scoresbysund, and the warmest spring there is near Cape Tobin, 62°C. The warmest one in Disko is around 18°C and in Uunartoq the temperature is 37°C. A limited investigation has been made into the possibility of geothermal utilisation in Disko, West Greenland. Twelve small geothermal fields are known there. One of the warmest is near the town of Qeqertarsuaq. Research drilling has been suggested but no action has been taken because of nature conservation. Limited information about the geothermal gradient and heat flow in Greenland has been reported. Currently, geothermal water is used in natural spas in one or two places for bathing, balneology and tourism with little economic return.

1. INTRODUCTION

The first written information on geothermal activity and utilisation in Greenland goes back to the medieval Greenland description of Ívar Bárðarson written after his dwelling in the Norse settlement sometime around 1300 AD. He mentions warm springs in the small islets of the old Hrafnarfjörður (Ravensfjord) which is now known as the Island of Uunartoq. He also describes their annual temperature fluctuations and their therapeutic properties. He writes: "In these islets there is a lot of warm water. In winter it is so hot that no one endures it but in summer it is suitable for bathing. There many people have got holistic treatment and good healing and remedy of illnesses." (Halldórsson 1978, p. 135). Archaeological research has revealed ruins of a nunnery built near the hot springs after Greenland was first introduced to Christianity around 1000 A.D.

2. GEOTHERMAL SITES

Geothermal springs with a homoeothermic source water temperature $>2^{\circ}\text{C}$ (homeothermic springs) can be found all over Greenland but warm springs $\geq 10^{\circ}\text{C}$ are very rare. They are found primarily in Disko Island, West Greenland with a maximum temperature of 18°C (Hansen et.al. 1988, Heide-Jørgensen and Kristensen 1999) and on the east coast at a number of locations north and south of Scoresbysund (Fig 1). There the warmest geothermal springs of Greenland, $55\text{--}62^{\circ}\text{C}$, are found near Cape Tobin. Outside these regions only two occurrences of geothermal springs are known, that is at Uunartoq Island in South-Greenland ($34\text{--}38^{\circ}\text{C}$) (Fig. 2) and Ikasagtivaq on the southeast coast near Ammassalik (25°C). On the Uunartoq Island in the vicinity of the town there are geothermal springs with temperatures between 34 and 38°C . The Greenland Glacier covers over 80% of the country and the majority of all hot springs and geothermal sites are believed to be ice covered. Recently it has been pointed out that high heat flow below the glacier might in some areas contribute to the ice melt (Petrunkin et al. 2013) and consequently it has to be taken into account in planning deep ice drilling campaigns and climate reconstruction.

3. GEOTHERMAL INVESTIGATIONS

Geothermal exploration in Greenland has been mainly aimed at establishing the influence of the warm springs on the flora and fauna (Kristensen 1987, 2000). The flora and fauna around the thermal springs are noted for the large element of southern species, which in many cases have their northern limits in these areas.

A limited investigation has been made into the possibility of geothermal utilisation in Disko, West Greenland on possible utilisation for space heating or power production. Twelve small geothermal fields are known there. Unartorsuaq is the second warmest geothermal site in Disko. It is near the town Qeqertarsuaq. Research drilling has been suggested but no action has been taken because of nature conservation (Hjartarson and Ármannsson 2005, 2010). Little is known about the geothermal gradient and heat flow in Greenland although a few investigations have been reported (Bondham and Bøgvad 1952, Sass et al. 1972).

4. CONCLUSIONS

The use of geothermal energy in Greenland is negligible. Currently, geothermal water is used in natural spas in one or two places (Uunartoq and Cape Tobin) for bathing, balneology and tourism with little economic return. No official plans for geothermal research or utilization have been made.

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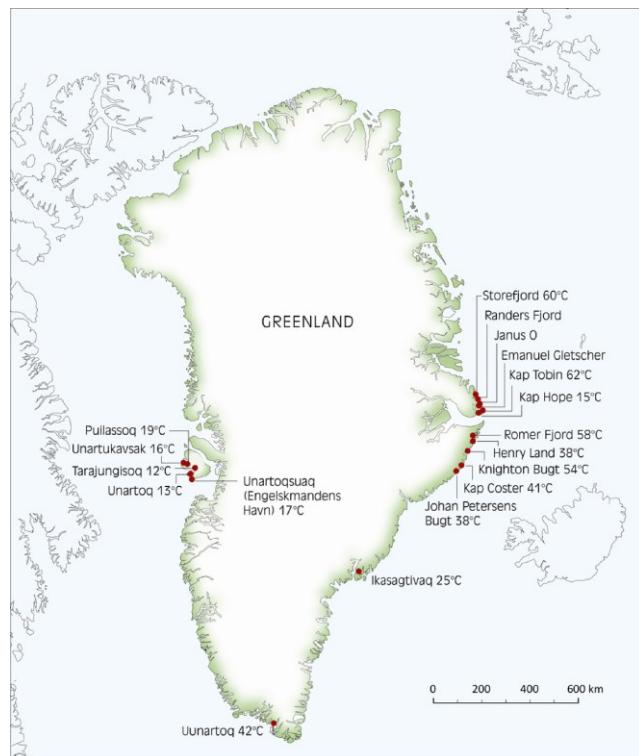


Figure 1. Geothermal springs in Greenland $\geq 10^{\circ}\text{C}$. From Hjartarson and Ármannsson (2010)



Figure 2. The geothermal spa in Uunartoq, Island S-Greenland. There are three naturally heated springs which run together to a small stone-dammed pool 37-38°C. Here people have gone bathing for 1,000 years. (From Wikipedia. Photo. Svičková)