Did a lake exist under the north-western Laurentide Ice Sheet?

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Researchers were surprised to discover that subglacial lakes with flowing water exist today beneath the Antarctic Ice Sheet.[1] Past study has identified at least 68 lakes under the sheet.[2] Lake Vostok is the largest, measuring 230 km long, 50 km wide, and 600 m deep. The lakes are commonly in deep troughs or basins below the ice. Glaciologists once thought that the pressure gradient beneath the ice sheet should have driven out all of the subglacial water[3] but this is obviously not the case.

The persistence of liquid water under the Antarctic Ice Sheet is explained by its thickness. Although temperatures are well below zero on top of the ice sheet, the ice generally insulates the bottom. Within the uniformitarian ice-age model, as the ice built up, the temperatures at the base slowly warmed by very weak geothermal heat conduction from the interior of the earth.

Postulated subglacial lake underneath the Laurentide Ice Sheet

These findings from the Antarctic have significant ramifications for the Laurentide Ice Sheet that covered central and eastern Canada and the adjacent northern United States during the Ice Age.

Glaciologists are uncertain about how thick the Laurentide Ice Sheet was and whether it had a single dome or multiple domes over Hudson Bay. Nevertheless, most researchers now seem to accept the multiple dome model.[4] Because the ice sheet no longer exists, they have attempted to piece together its characteristics using indirect evidence.

Glaciologists think there must have been subglacial lakes underneath the Laurentide Ice Sheet, since they conclude it was as large as the Antarctic Ice Sheet.[1] The Keewatin ice dome of the Laurentide Ice Sheet is postulated to have been ~4 km thick during the last glacial maximum. The northern portion of this dome was centred over Great Slave Lake in the western North West Territories of Canada (figure 1). Modelling suggests that if the ice dome was greater than 3 km thick, its base would have been wet with meltwater. Therefore, based on uniformitarian assumptions, the high Keewatin ice dome would likely qualify as thick enough to have subglacial lakes after tens of thousands of years of basal warming.

Researchers have proposed one candidate for a subglacial lake in the fault-bounded eastern arm of Great Slave Lake.[5] Great Slave Lake is the sixth deepest and tenth largest lake in the world. It is the deepest in North America with a depth of 614 m in its eastern arm. The lake is 480 km long and varies in width from 109 km to 19 km. The evidence for a subglacial lake is derived from 500 km of seismic reflection data and three 2-m-long sediment cores of the lake bottom sediments from the deep eastern arm (figure 2). However, these sediments are up to 150 m thick and the cores only sampled the very top of the sediments. Unit 1 is interpreted as glacial ground moraine, the only ice-contact deposit in the sediments. Unit 2 is believed to be the lake bottom sediments deposited when the trough was a subglacial lake, and units 3 and 4 are thought to be late-glacial and post-glacial sediments.

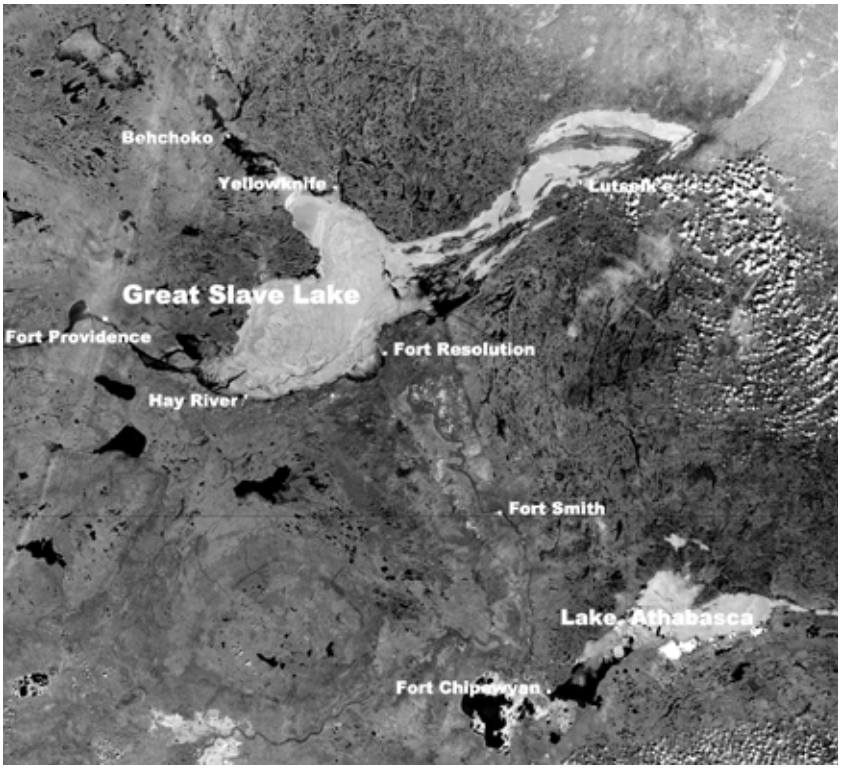

Figure 1. Great Slave Lake (Jacques Descloitres, MODIS Land Rapid Response Team, NASA/GSFC)

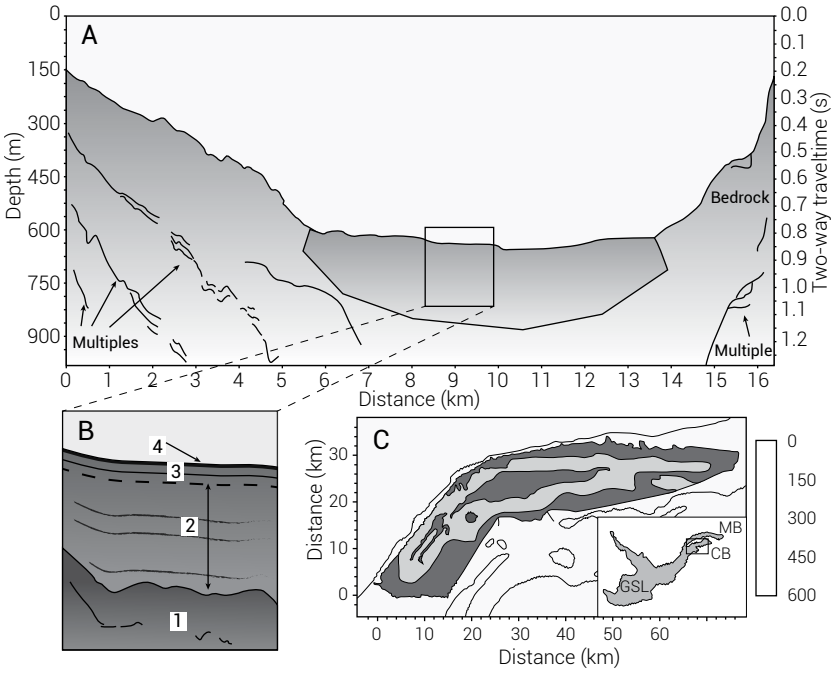

Figure 2. A: Seismic reflection profiles across Christie Bay of the deep eastern arm of Great Slave Lake. Bedrock shows up as the rough surface with unreal multiple reflections of the bottom topography deeper in the rock. B: Close-up of the sedimentary units. C: Bathymetry of Christie Bay (CB). (From Christoffersen *et al.*[1]).

Subglacial lake interpretation questionable

The suggestion of a subglacial lake in Great Slave Lake depends upon the existence of a 4-km-high Keewatin ice dome and the existence of unit 2 in the seismic reflection data. Such a thick ice dome over Keewatin during the Ice Age is unreasonable because the area is very dry today and likely would have been even drier during an ice age as envisioned by uniformitarian scientists, because colder air holds less water vapour. Evaporation from the Arctic Ocean would be of little help since uniformitarian scientists believe the ocean has been capped by sea ice for hundreds of thousands of years.

The scientists did not directly sample unit 2 by bottom cores but unit 2 shows up well on seismic reflection profiles (figure 2). The suggestion that unit 2 represents deposition from a subglacial lake is partly an inference based on the hypothesized thickness of the Keewatin dome.

Creationist interpretations

The creationist model of a rapid, post-Flood Ice Age[6] would also place an ice dome over Keewatin, although it would be significantly thinner than 4 km. The key is that after the Flood the Arctic Ocean would have had no sea ice and been warm. Moreover, North America would have had mild winters and cool summers. Evaporation from the warm water of the Arctic Ocean would be huge and would blanket northern Canada with heavy snow, eventually producing one or more ice domes. It is likely there was another ice dome over the Queen Elizabeth Islands of north-east Canada.

Moreover, the creationist model explains the existence of subglacial lakes under Antarctica without tens of thousands of years of geothermal heat conduction into the base of the ice sheet. In this scenario, the climate would have been much warmer early in the Ice Age than what is observed on top of the Antarctic Ice Sheet today.[7] Meltwater would have filled up troughs early in the Ice Age. The presence of the subglacial lakes are better explained by the warmer oceans during the post-Flood Ice Age, rather than the standard earth history advocated by uniformitarian scientists.

The sediments in Great Slave Lake can also be reinterpreted within the biblical timeframe. Unit 1 has a hummocky surface and so the uniformitarian interpretation that this unit is a ground moraine is likely correct.[8] Units 2 to 4 show no other ice contact features,[9] so they were likely deposited in a lake during deglaciation, possibly even in a subglacial lake. A deglaciation or meltwater deposit is also an alternative interpretation dismissed by the investigating scientists.[10] The fact that the sediments are as thick as 150 m is not unusual, as many lakes in deep troughs in British Columbia that were glaciated show thick deglacial sediments at their base.[11] Moreover, there was a giant deglacial lake called Lake McConnell that covered the area encompassing the present Great Slave Lake.[12] The sediments in these meltwater lakes were possibly deposited from suspended fine-grained material and mass flows along the bottom of the lakes that ended up in the deepest part of the lake.

Finally, sediments on the bottom of Great Slave Lake indirectly support only one ice age, since there is no record of previous ice ages below the moraine sediments and the bedrock (unit 1 in figure 2). Uniformitarian scientists could claim that each ice age scours out deposits from previous ice ages but, within their model, one would expect that some sediment from previous ice ages would remain by being trapped in the deep trough.

Conclusion

There is no need to suspect that a lake existed under the Laurentide Ice Sheet.

Neither is there evidence that this ice sheet was over 4 km deep or that there were multiple glaciation periods. The seismic reflection data and the core samples taken from Great Slave Lake support a biblical timeframe and post-glaciation processes.

References

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