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Specific call for research proposals 2021

WALDO

Where are **A**ll the (proglacial) **L**ake se**D**iments in the N**O**rth Sea Basin?

DURATION
15/12/2021 - 15/03/2026

BUDGET
€ 641 001

PROJECT DESCRIPTION

Proglacial lakes have an enormous influence on glacier/ice margin stability, global sea level and climate; this is true for the past, the present and, more than ever, the near future. Such lakes form in front of glaciers or ice margins, where meltwater ponds in between the ice and a dam. Commonly, such dams consist of bedrock or glacial sediment deposited by the ice when it reached its maximum extent. When these dams are broken or overtopped, glacial lake outburst floods (GLOFs) occur. These are catastrophic drainage events that not only dramatically alter the landscape, but can also influence local and regional oceanography and climate.

Proglacial lakes are believed to have existed in the southern North Sea when ice extended southwards during the last three glaciations – the Elster (c. 500k-300k years ago), Saale (c. 300k-130k years ago) and Weichsel (c. 115k-11.7k years ago). The ice sheets isostatically depressed the underlying crust, resulting in vast amounts of meltwater ponding in front of the ice as one or several proglacial lakes. During those periods, many of the northwest European rivers also drained into the southern North Sea, adding more freshwater to the system. During the Elsterian, a chalk bedrock ridge formed a dam at the Dover Strait, holding freshwater to the north of it. A major GLOF, some time between 450k and 200k years ago, is believed to have breached the ridge and opened the Strait. It carved an erosional megaflood landscape which is still visible on the seabed. Subsequent glaciations did not advance as far south, but proglacial lake formation and continued erosion of the Dover Strait is thought to have been repeated.

With the exception of the erosional features in the English Channel, which have been linked to GLOFs, direct evidence of proglacial lakes in the southern North Sea remains fragmentary or elusive. Yet, the existence of proglacial lakes during the three last glaciations is a widely referred hypothesis. Such lakes would be expected to have left behind a stratigraphic record of proglacial lake sediments, traceable over long distances on seismic data and in cores. However, the current sedimentary and seismic records do not provide sufficient evidence to support the presence of proglacial lakes, extensive enough to explain the erosional landforms detected in the Dover Strait and English Channel.

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With this project we aim to address this dichotomy, by taking a regional geological approach. Through the use of existing and newly-acquired high-resolution (sparker, parametric echosounder, multibeam) geophysical data, combined with (vibro)core sampling, we will test the hypothesis that proglacial lakes were important landscape features in the southern North Sea during the last three ice ages. Two PhD researchers will join VLIZ and UGent researchers to work on updating the seismo- and lithostratigraphic framework of the southern North Sea, and creating detailed palaeo-environmental reconstructions. The results will be used to assess where exactly these potential lakes were located, what their extent was and during which periods they existed. The results will be presented at international conferences, published in peer-reviewed journals and collated as two PhD theses. Data will also be made available to other researchers for future multi-disciplinary collaborations, and further or new hypothesis testing.

Furthermore, proglacial lakes can be relatively long-lived and can remain after climate amelioration. If this was the case in the North Sea, these lakes and their drainage systems could have influenced animal and human migration across the exposed North Sea plain during the Palaeolithic. In the same way that GLOFs are a present-day hazard to communities living near glaciers, they would also have had an enormous (perhaps) devastating impact on the environment (faunal, floral), and potentially human populations living on the North Sea Plain in the past.
Of equal significance to the scientific outcomes, is the importance of providing opportunities and training to a new generation of young researchers in the field of North Sea Quaternary geology. This project ensures Belgian marine geological research continues to move forward and remains active on the international stage.

CONTACT INFORMATION

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LINKS

https://www.researchgate.net/project/WALDO-Where-are-All-the-proglacial-Lake-seDiments-in-the-NOrth-Sea-Basin