

Geophysical Analysis of Glacio-Lacustrine Stratigraphy Within Lake Bottoms of the North and South Twin Lakes near Millinocket, Maine

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Introduction

- North Twin and South Twin are lakes located west of Millinocket, Maine and are connected to the Pemadumcook chain of lakes.
- Glacial retreat influenced most of the lakes in Maine and left behind many sediments that can be seen using seismic reflection.
- The goal of this work was to evaluate the internal stratigraphy of the lakes and to better guide a core sampling program.

Methods

- CHIRP profiles were collected across these lakes and analyzed to find the spatial distribution of stratigraphic units under the lakes.
- Seismic facies distributions were mapped on forty-four key CHIRP lines.
- We mapped facies distributions using Google Earth.

Location map

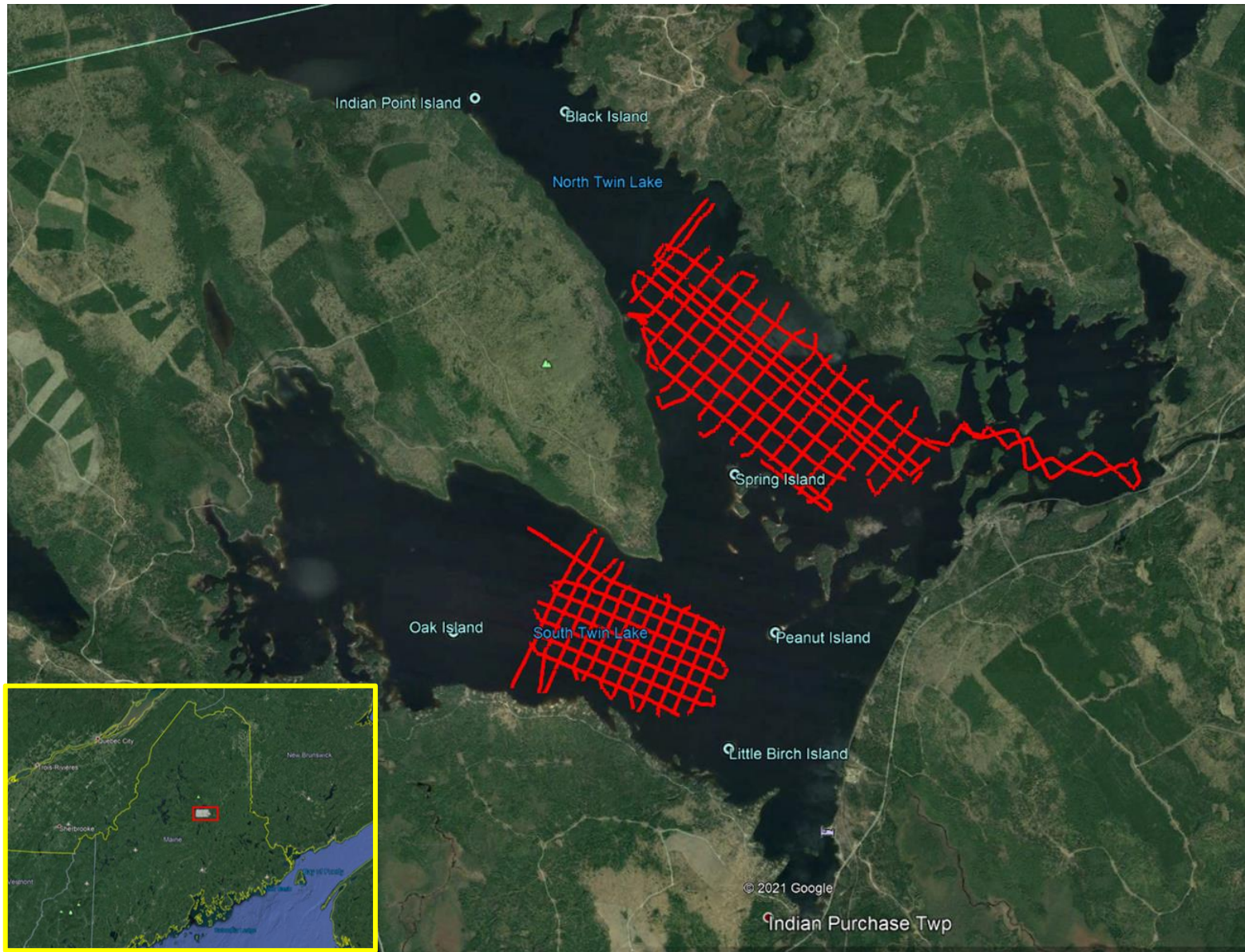


Figure 1: CHIRP profile location in North Twin and South Twin Lakes, Millinocket, Maine. Rectangle represents approx. area of study.

Key Lines and Seismic Facies

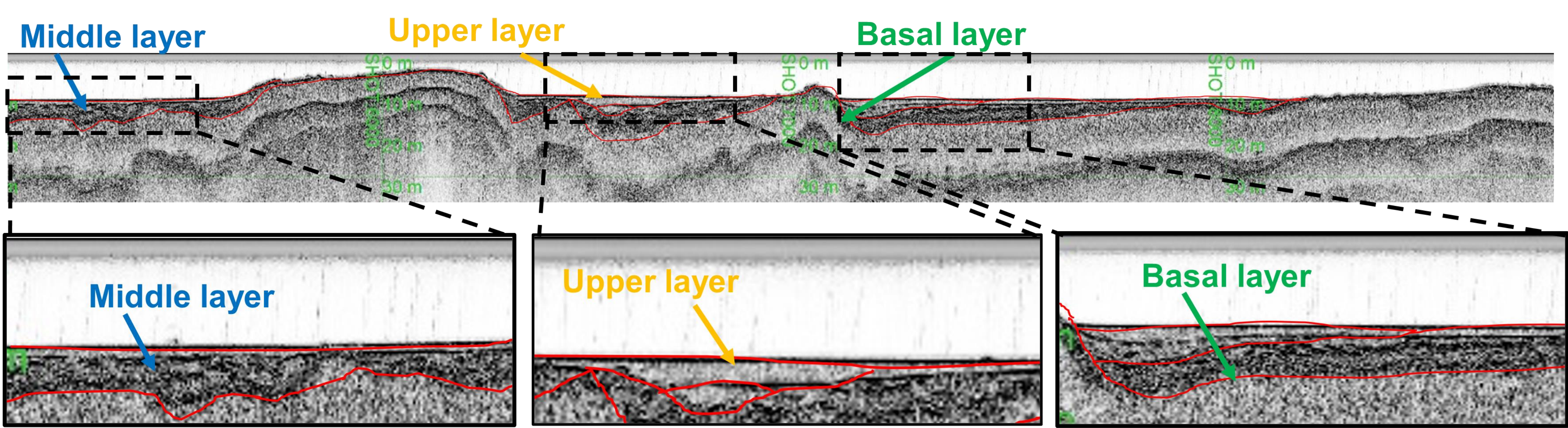
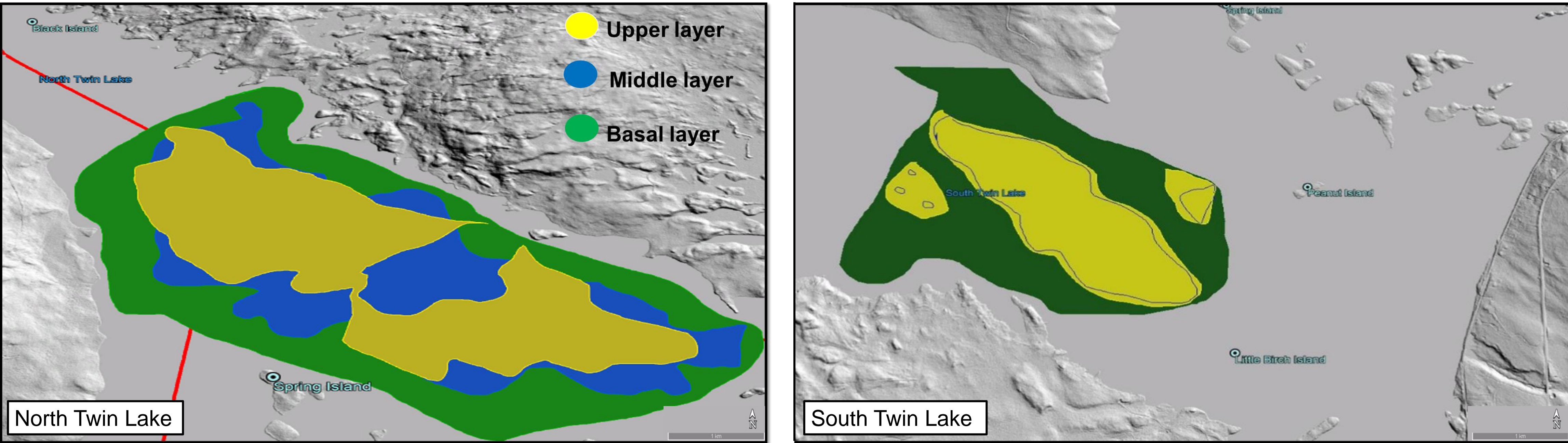


Figure 2: Sample CHIRP line taken from North Twin Lake. Seismic facies isolated and labeled above.

Distribution of Seismic Facies within Lake Bottoms of North and South Twin



Figures 3 and 4: Distribution of Seismic Facies under North Twin Lake (Figure 3, left) and South Twin Lake (Figure 4, right). Each colored polygon shows surficial extent of units. Note: Middle layer is not exposed at the surface in South Twin, the subsurface extent of the middle layer is denoted by blue outline.

Discussion

- The basal layer is a dark grey undulatory layer that is present in all CHIRP profiles. It is akin to the ridges and till found on the lake shore deposited directly by Pleistocene glaciers. This layer is typically exposed at the lake bottom in shallow parts of the lake.
- The middle layer is well-structured, with parallel, continuous dark (thin) and light (thick) bands. This layer is typically found in deep depressions of the basal unit in both lakes. The distribution of the middle unit suggests glacio-lacustrine deposition. The meltwater from the glacier deposited these bedded sediments (in contrast to the basal unit being deposited directly by the glacier).
- The upper layer is a lighter package that contains anomalies identified as boulder, likely emplaced by lake ice. This layer is typically exposed at the surface where the basal layer forms a depression in the subsurface.

Conclusions

- North Twin Lake and South Twin Lake have very similar seismic units and distributions of facies
- The basal layer in these lakes is representative of the surrounding topography and was deposited directly by Pleistocene glaciers.
- The middle sediment package is the glacio-lacustrine unit and was deposited onto the lake bottoms by a stream of glacial meltwater.
- The uppermost layer is likely post-glacial in age, deposited after the retreat of the glaciers.