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DISTRIBUTION OF POTENTIALLY ACTIVE TURBIDITY CURRENTS IN EASTERN BAFFIN ISLAND FIORDS

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Rationale

The Public Safety Geoscience program of Natural Resources Canada aims at improving the understanding of geological processes and marine geohazards in Baffin Bay. This information supports community, Nunavut government, and regulator decisions on the use of offshore areas and provide northern coastal communities with better knowledge for improving public safety.

Turbidity currents are underwater currents, usually rapidly moving, composed of sediment-laden water moving down a slope. They represent a significant marine geological hazard (geohazard) since they can break communication cables, subsea pipelines, and oil and gas infrastructure. The knowledge of where, when and how they occur is of prime importance to mitigate their impact and for the management of seabed infrastructure. This map presents an overview of the likelihood of active turbidity currents at the mouth of rivers in fiords of eastern Baffin Island.

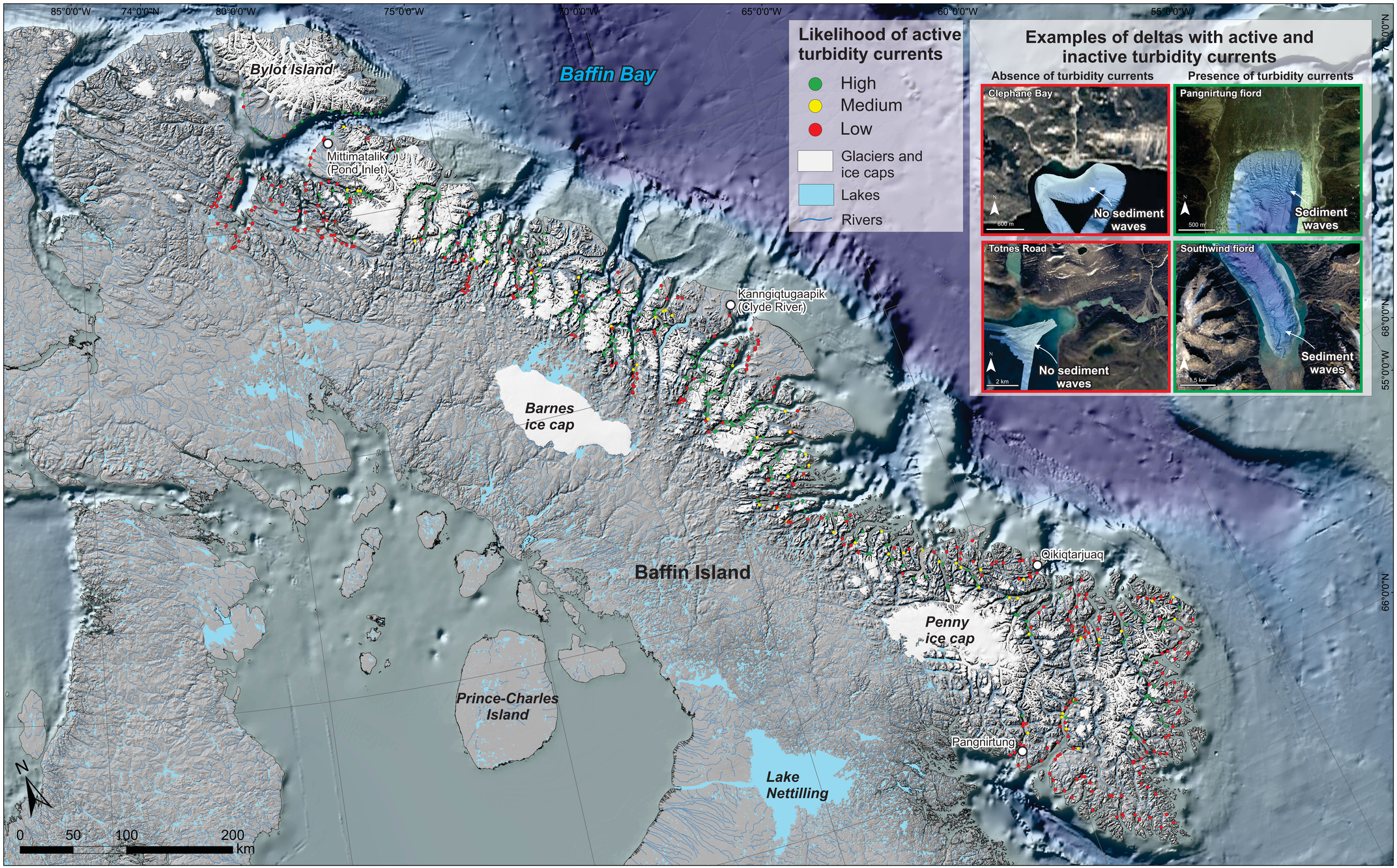
Approach

The activity of turbidity currents is here viewed through the presence of submarine sediment waves on submarine deltas. Sediment waves are known to be formed by turbidity currents. Turbidity currents are therefore considered active if sediment waves are present along a delta slope.

Thirthy-one river mouths were examined for the presence of sediment waves and their hydrological and glaciological watershed characteristics were extracted to identify the factors controlling the occurrence of turbidity currents. The percentage of glacial ice within watersheds, but excluding lake sub-watersheds, is the most significant parameter controlling the presence of turbidity currents on deltas because of the important glacial sediment supply and meltwater it provides to fiords. Therefore, this parameter was used to predict the location of active turbidity currents on fiord deltas of eastern Baffin Island where 1) less than 10% glacial ice in a river watershed suggests that the likelihood of turbidity currents is low; 2) between 10 and 20% glacial ice suggests a medium likelihood of their presence; and 3) more than 20% glacial ice suggest that the likelihood is high. Comparing these thresholds to the 31 known deltas shows that this prediction is valid 93.5% of the time. Since monitoring of turbidity currents has not yet been done in these fiords, it is impossible to assess the recurrence of turbidity currents (monthly, yearly or more). However, where similar sediment waves are present, turbidity currents often occur a minimum of once a year. For more information, refer to Normandeau et al. (2019).

Reference:
Normandeau, A., Dietrich, P., Hughes Clarke, J., Van Wychen, W., Lajeunesse, P., Burgess, D., Ghienne, J.-F. (2019) Retreat pattern of glaciers controls the occurence of turbidity currents on high-latitude fiord deltas (eastern Baffin Island). *Journal of Geophysical Research: Earth Surface*, DOI: 10.1029/2018JF004970.

Disclaimer: *This predictive map does not replace proper seabed mapping to assess the activity of turbidity currents.This map does not consider submarine landslides and turbidity currents not associated with rivers.*



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