

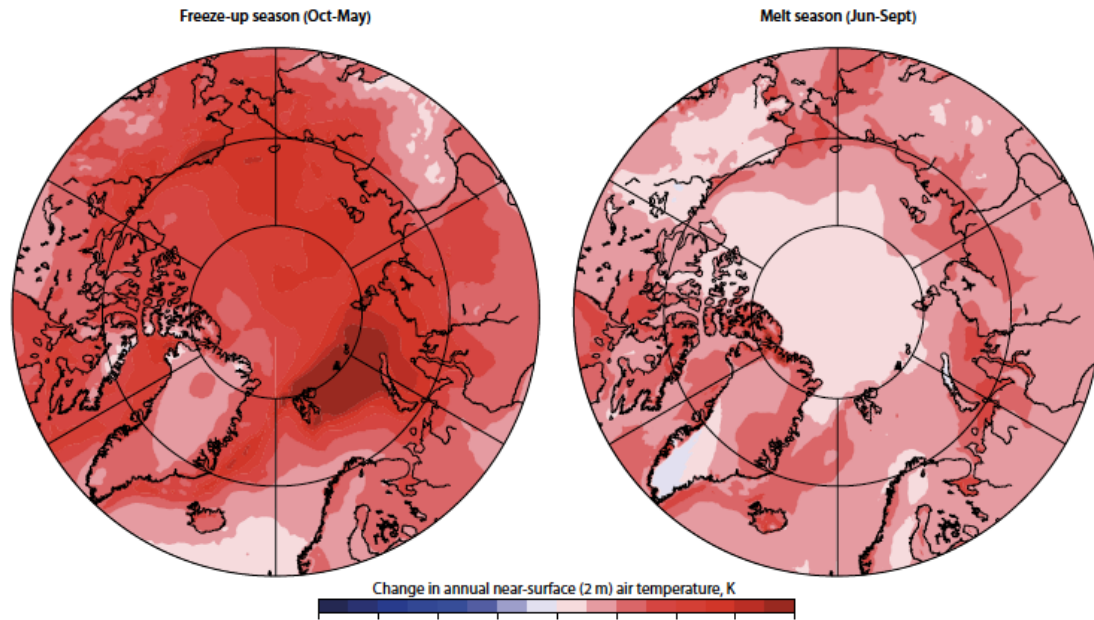
The first high-resolution dataset of Arctic coastal landforms and processes for the Svalbard Archipelago, Western Barents Sea

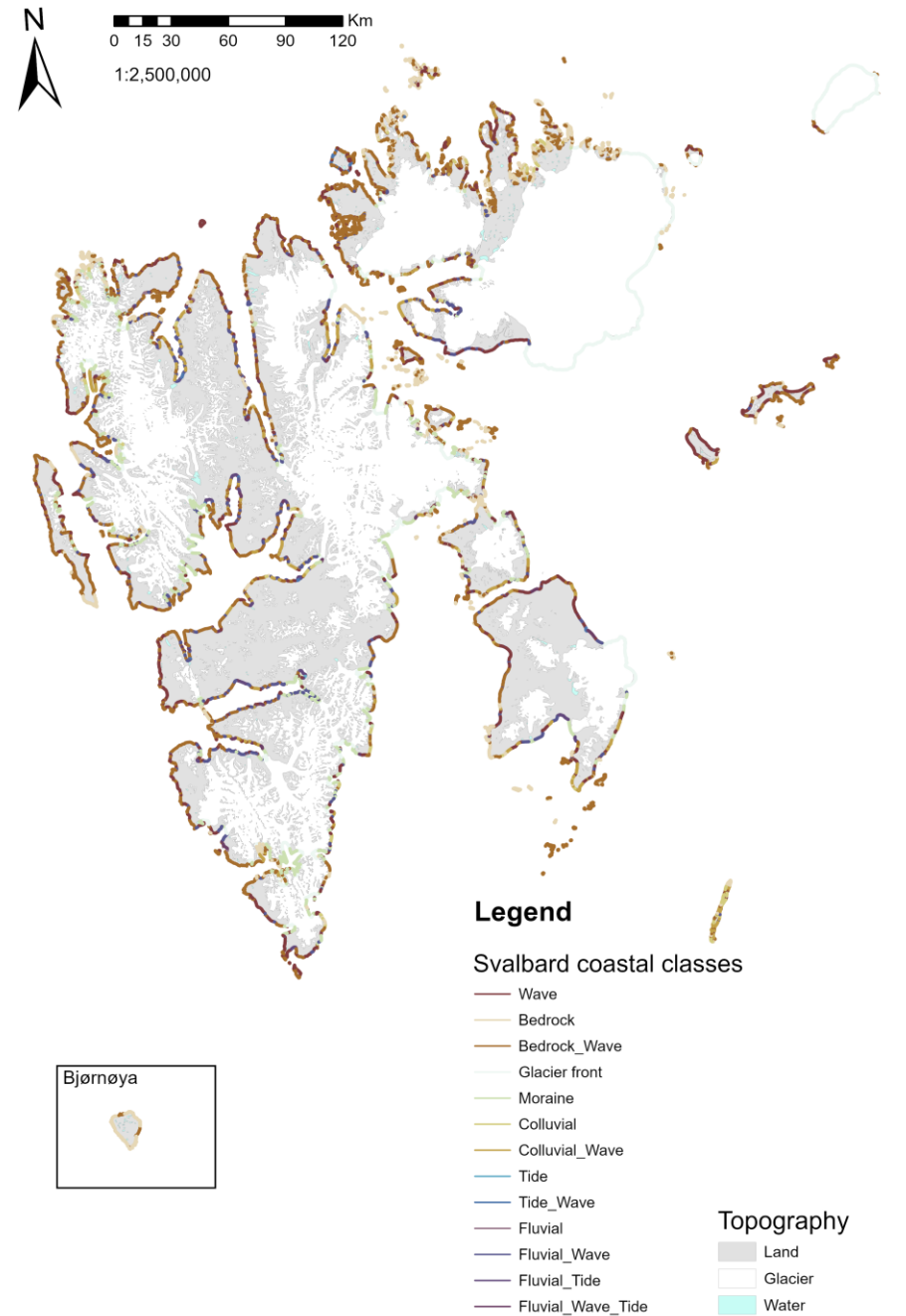
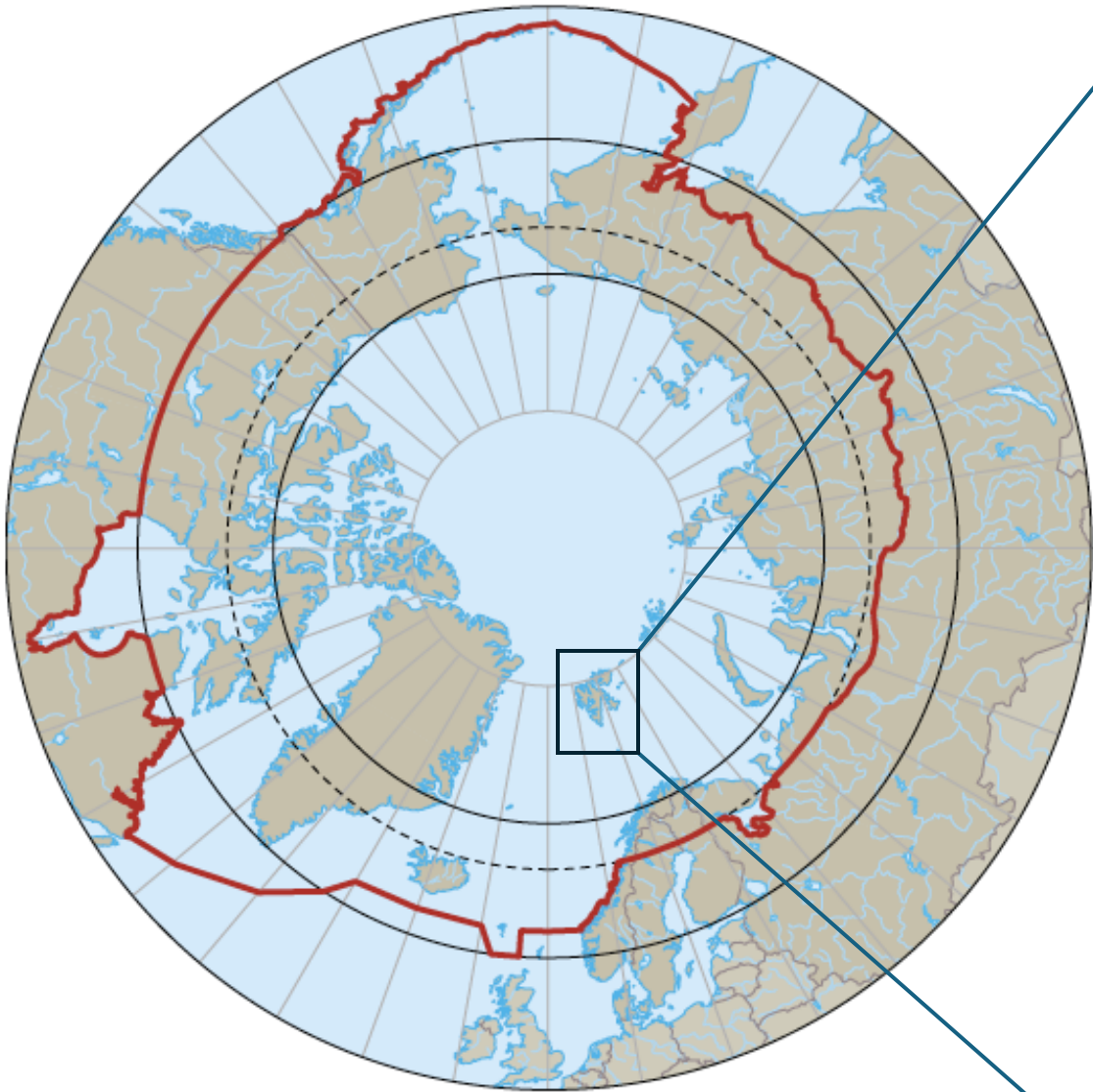


Maria Ansine Jensen¹, Carlette N. Blok^{1,2}, Lena Rubensdotter^{1,3} & Amandine Missana^{1,4}

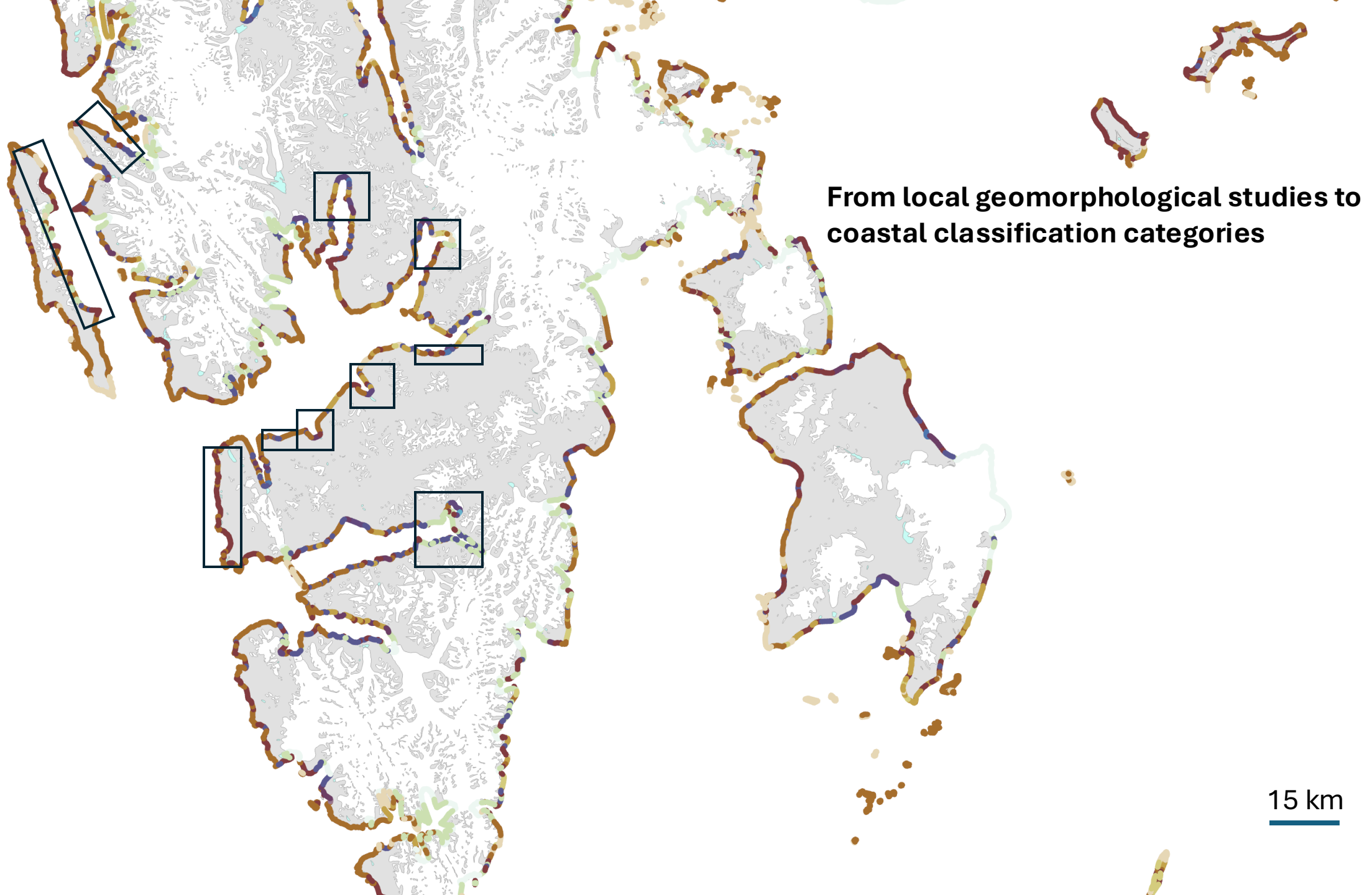
1) UNIS – The University Centre in Svalbard, 2) GEUS – Geological Survey of Denmark and Greenland,
3) NGU – Geological Survey of Norway, 4) NTNU – Norwegian University of Science and Technology

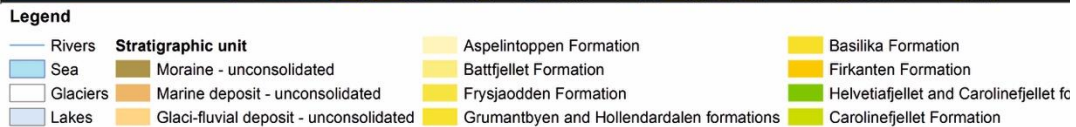
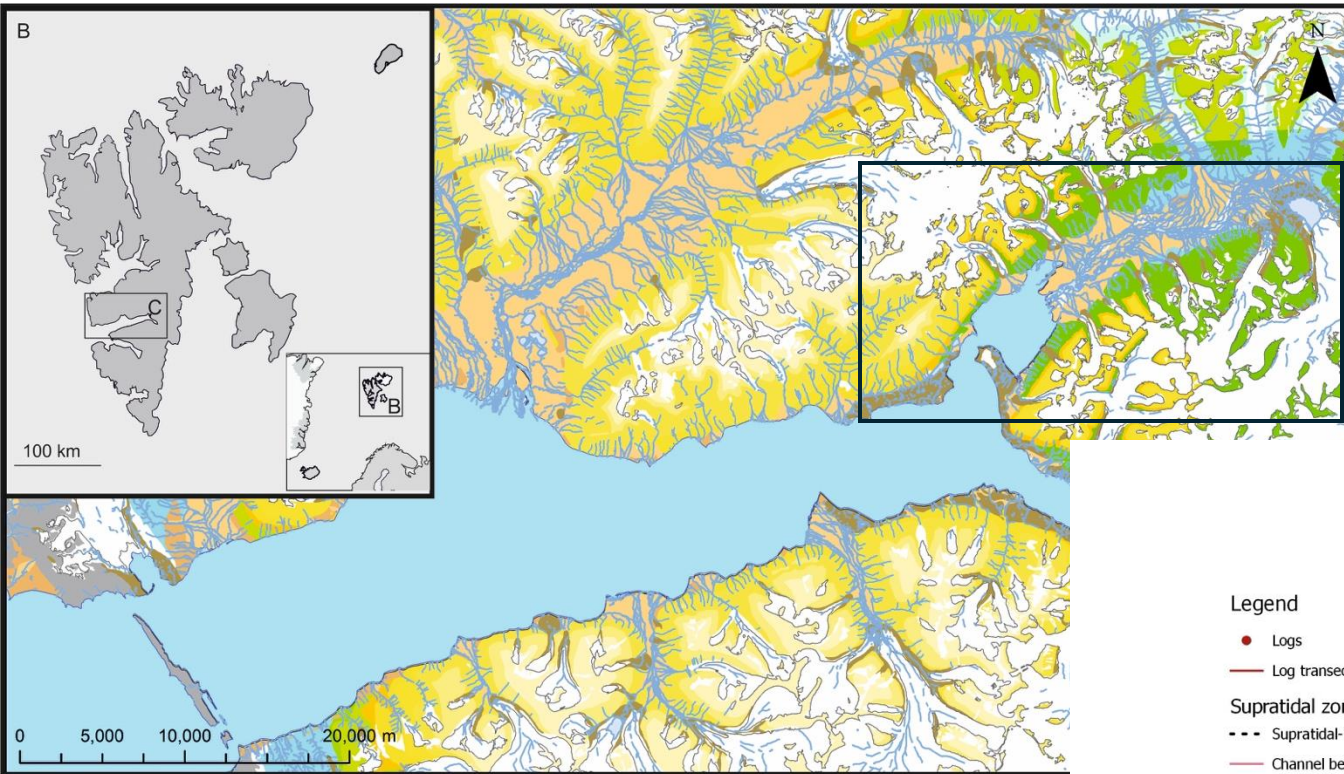






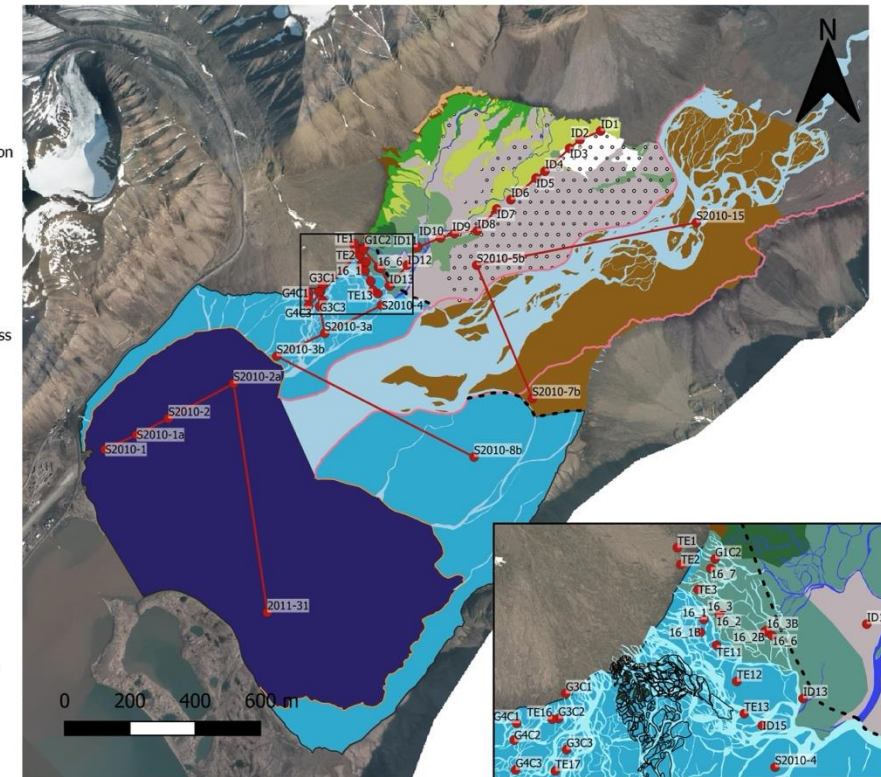
Blok, Carlette N; Missana, Amandine F J M; Rubensdotter, Lena; Jensen, Maria A (2024): Arctic landforms and processes around the coast of Svalbard [dataset]. PANGAEA, <https://doi.org/10.1594/PANGAEA.973595>

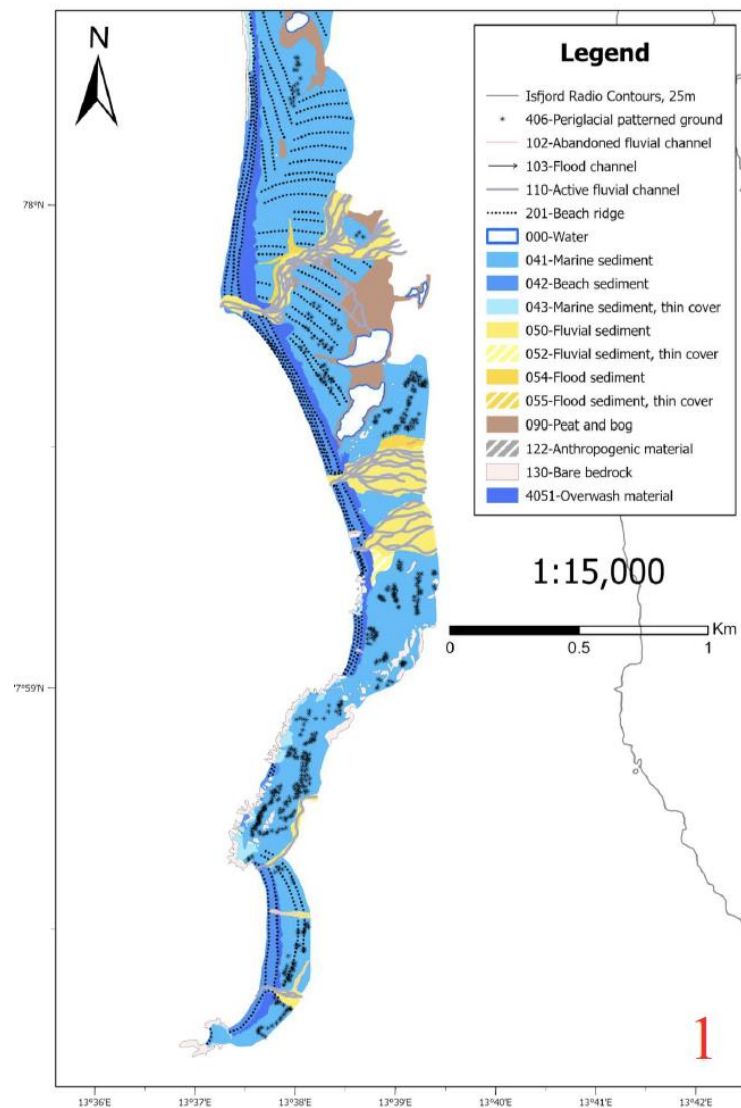




Tidal flat, Braganzavågen,
Van Mijenfjorden

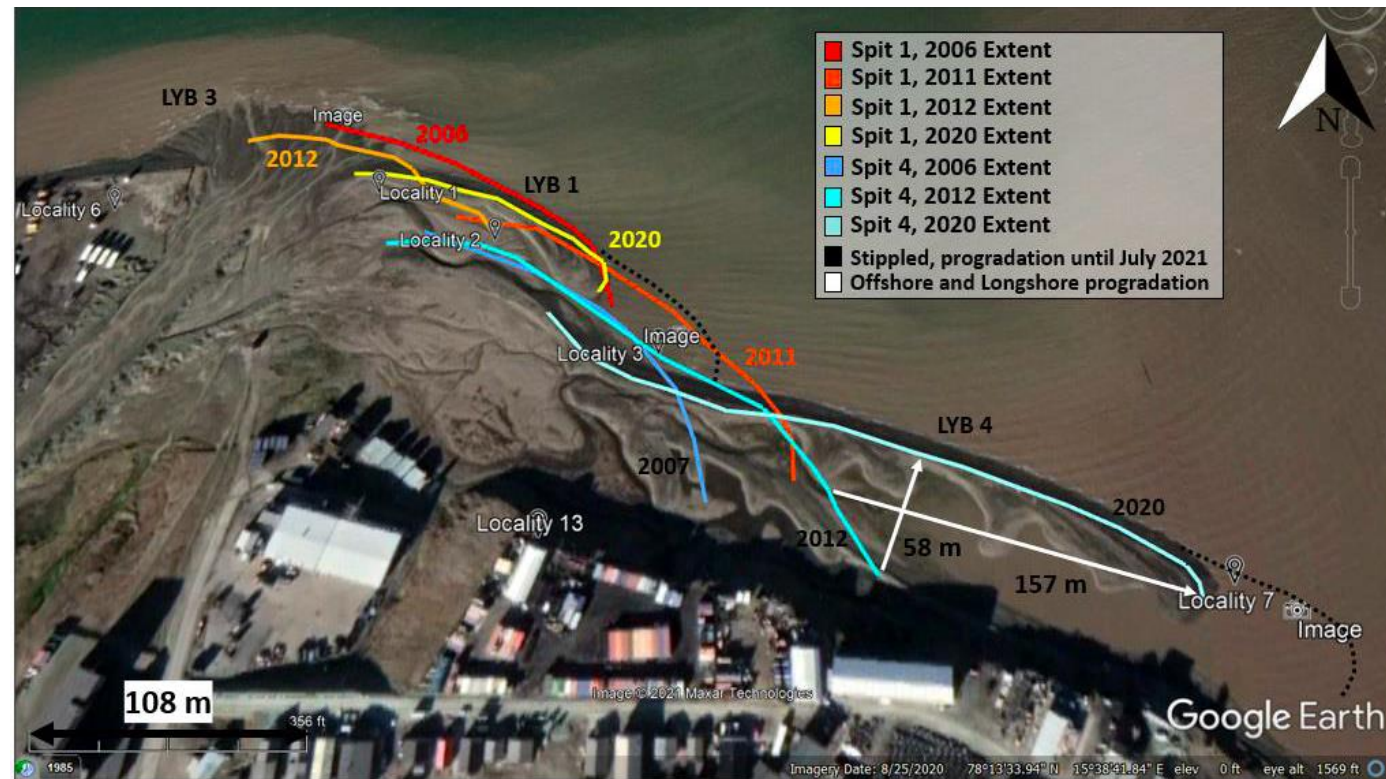
Complex multiprocess coastal dynamics



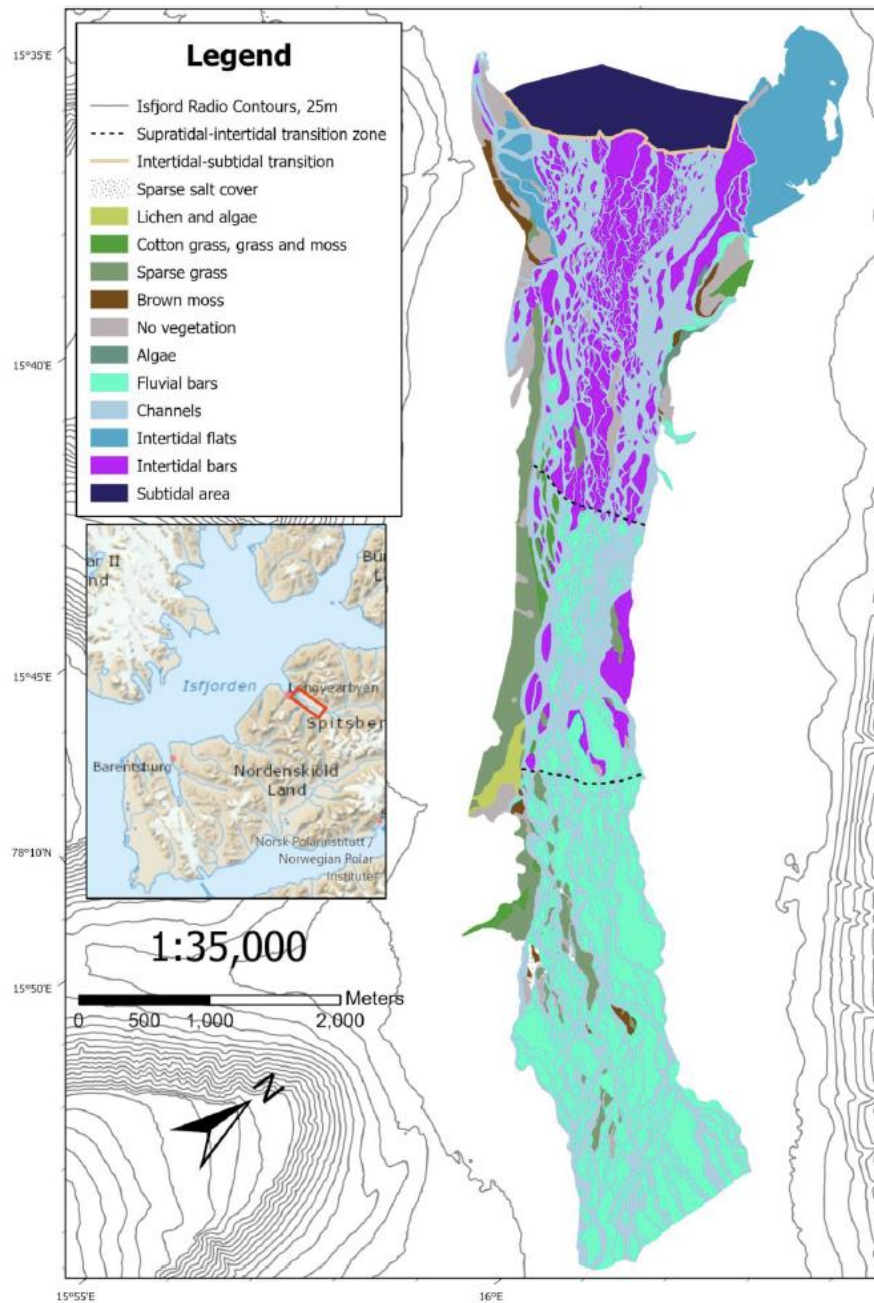


Nordenskiöld coast (Ferrier, 2022)

Wave exposed coasts with fluvial input



Longyearrelva delta (Dahlin, 2021)



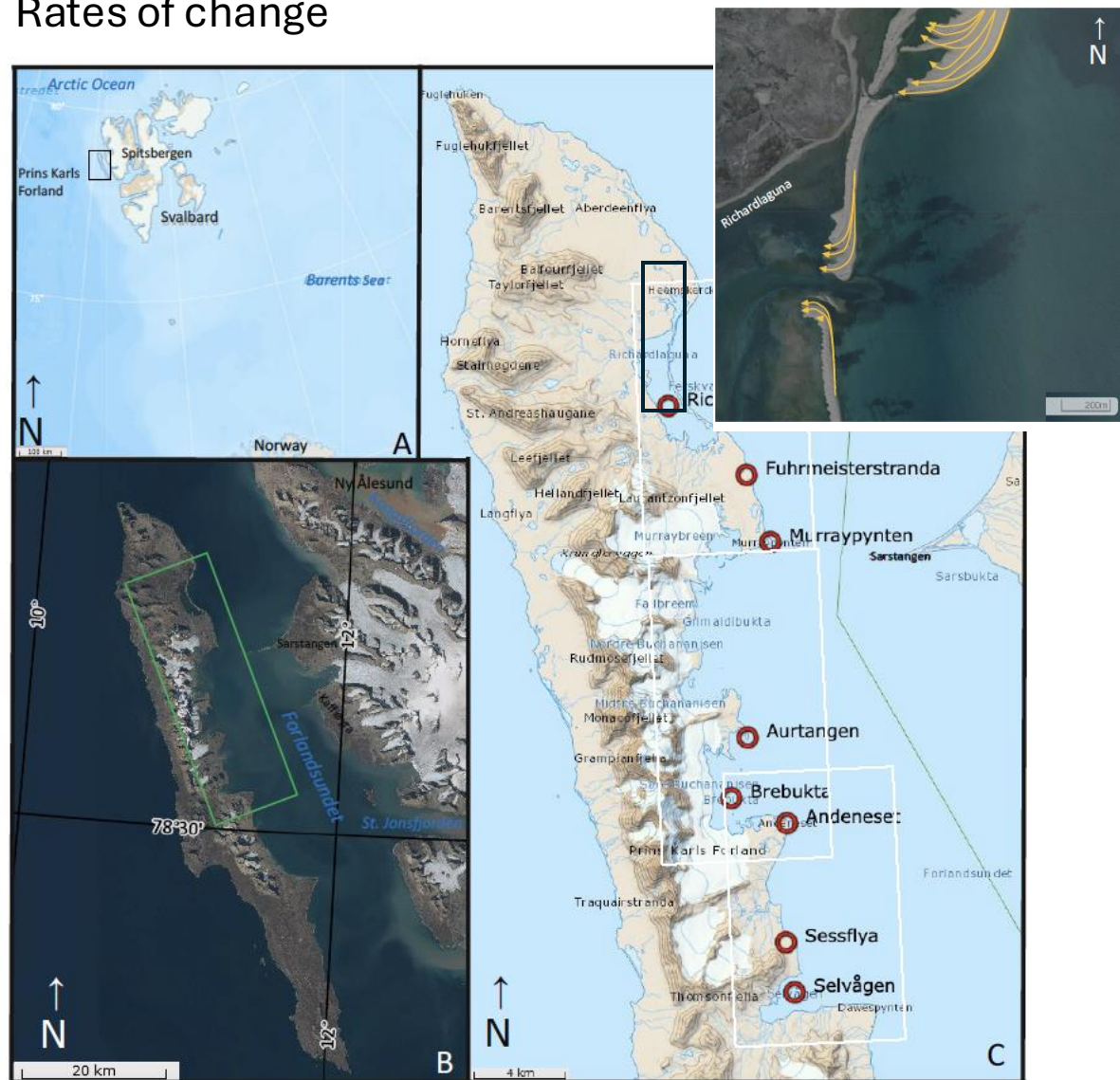
Rates of change



Fluvial – wave interaction , Longyearrelva
(Ottem, 2022)

Fluvial – tidal interaction, Adventelva delta
(Ferrier, 2023)

Rates of change



Wave – tide interaction, Richardlaguna, Prins Karls Forland, (Hagen, 2022)

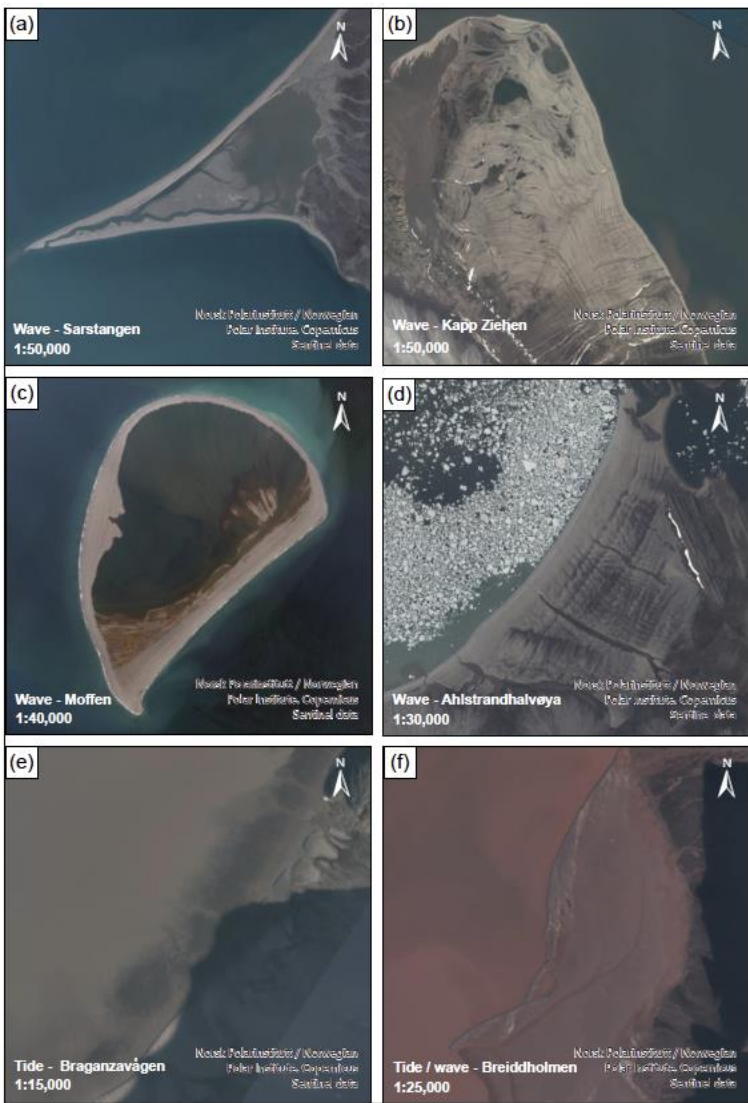
Class	Definition	Characteristics
Wave	Coastline formed or eroded by wave activity	Beaches, beach ridges, spits and barrier islands, wash-over fans or signs of erosion by wave activity. Barriers may have protected lagoons, wetland or tidal flats on the landward side.
Tide	Coastline formed primarily by tidal currents	Tidal flats
Tide Wave	Combination of tide and wave generated coastline	Tidal flats with spits along the margins or wave modified bars at the front
Bedrock	Lithified rock at the coast	Protects the coast, no deposits or erosion.
Bedrock Wave	Interaction between wave-generated deposits and lithified bedrock	Non-continuous lithified rocks with beaches, created by waves.
Fluvial	Coastline formed primarily by fluvial (river) deposits.	Progradation of river sediment into the fjord, deltas or mouth bars.
Fluvial wave	River deposits being modified by wave processes	Deltas with sandy or gravelly spits along the margin or wave-modified bars at the delta front
Fluvial tide	River deposits being modified by tidal currents	Fluvial deltas with tidal mudflats in the seaward area
Fluvial Wave Tide	River deposits being modified by waves and tidal currents	Fluvial deltas with tidal mudflats and sign of spit or barrier formation on the margins or in the delta front
Colluvial	Slope deposits/talus ending directly into the fjord	Compilation of talus, originating from steep rock slopes or cliffs
Colluvial Wave	Slope deposits/talus being modified by wave processes	Slope sediments or alluvial fans that flow into the fjord, with wave activity forming beaches between the slopes and fjord
Glacier front	The mappable coastline is an ice front.	Glaciers ending directly in the water without a rim of sediment or bedrock in-between in the scale mapped
Moraine	Glacial moraines form the coastline.	Glacially formed landforms consisting of till (a mixture of all grain sizes deposited by ice)

Svalbard coastal classes

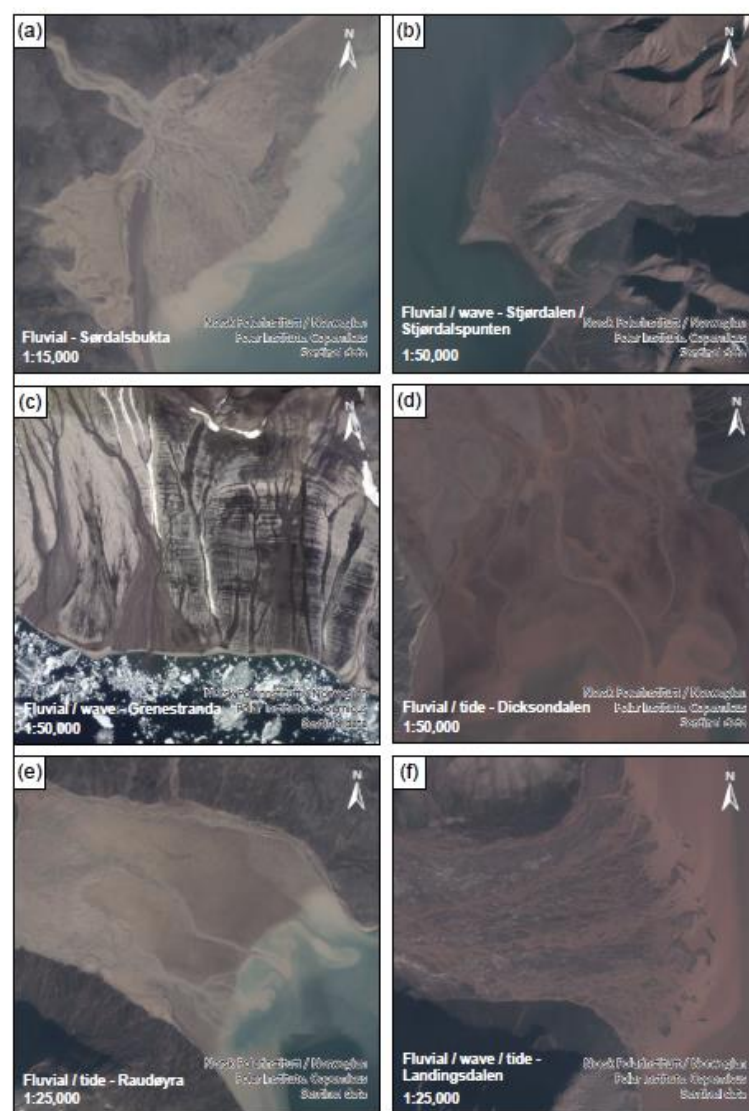
- Wave
- Bedrock
- Bedrock_Wave
- Glacier front
- Moraine
- Colluvial
- Colluvial_Wave
- Tide
- Tide_Wave
- Fluvial
- Fluvial_Wave
- Fluvial_Tide
- Fluvial_Wave_Tide

Topography

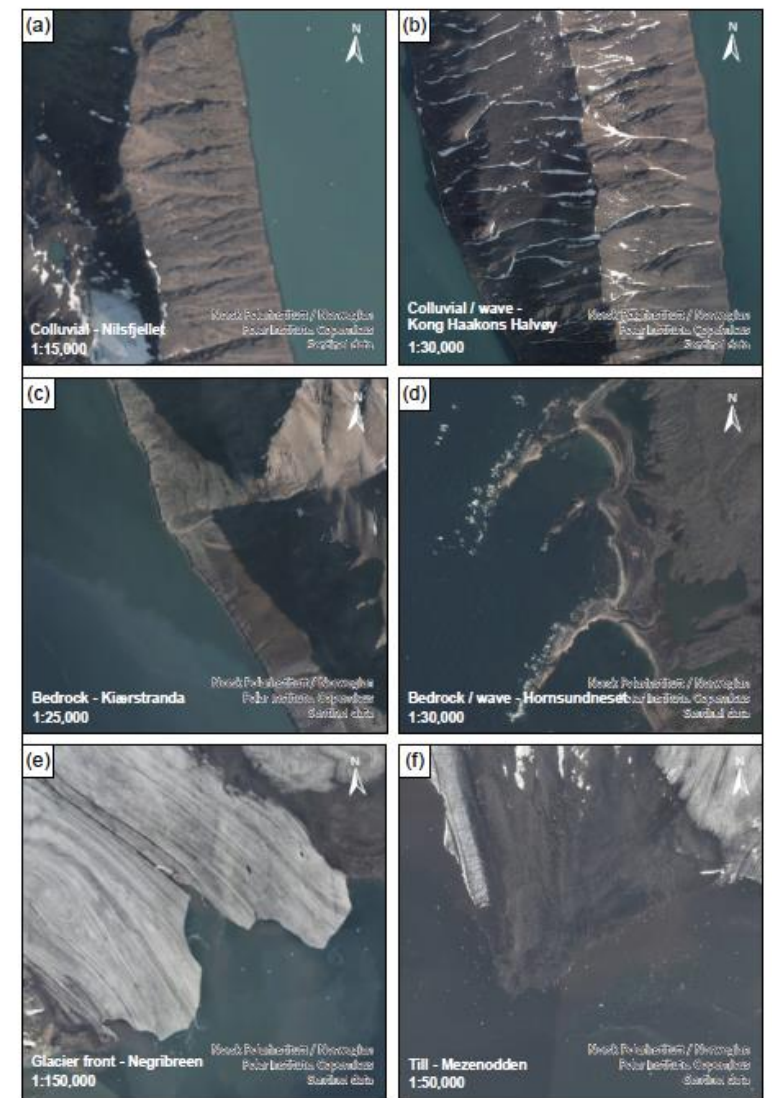
- Land
- Glacier
- Water



Wave- tide

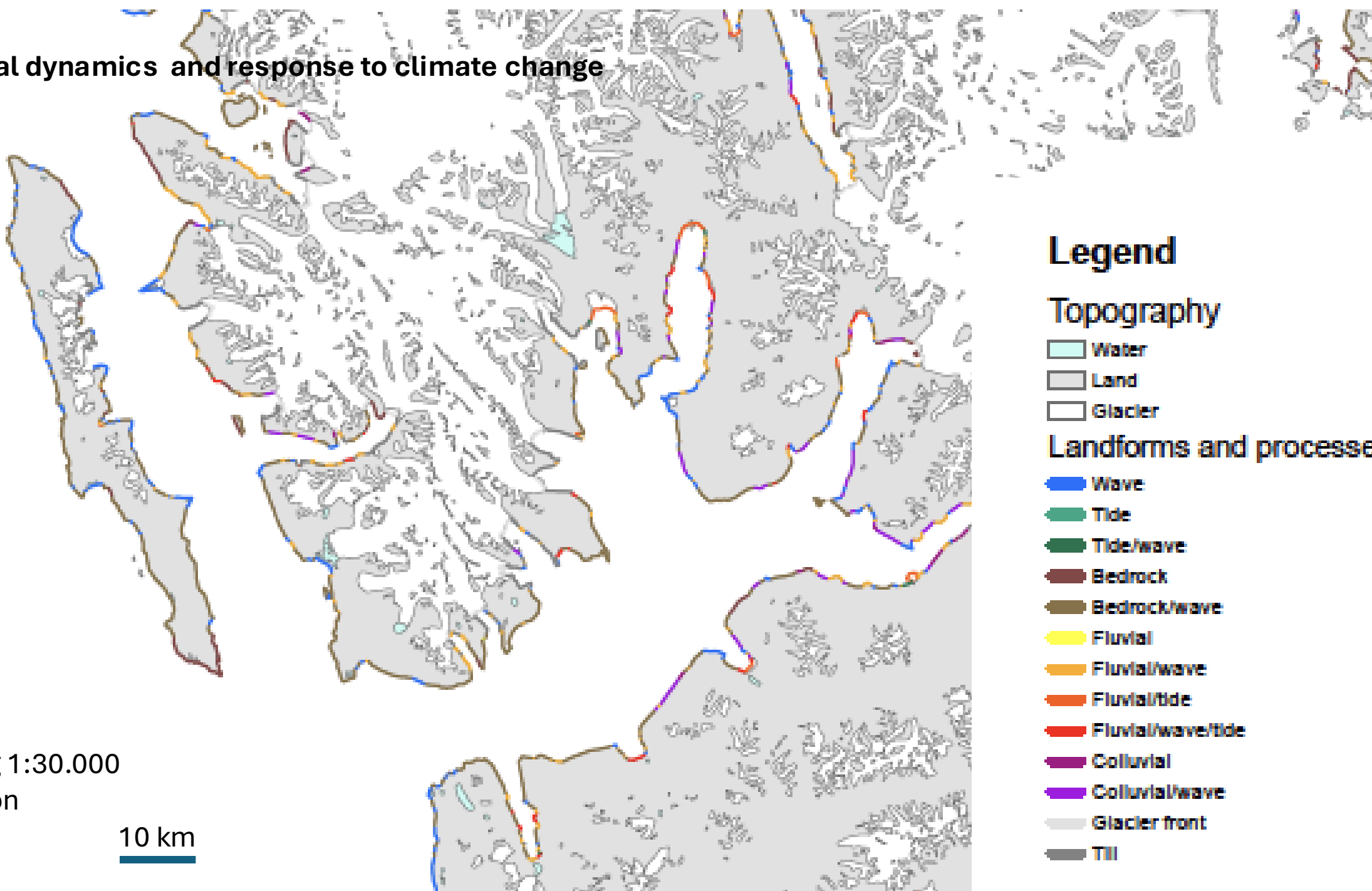


Fluvial



Colluvial, bedrock, glaciers

Coastal dynamics and response to climate change



Legend

Topography

- Water
- Land
- Glacier

Landforms and processes

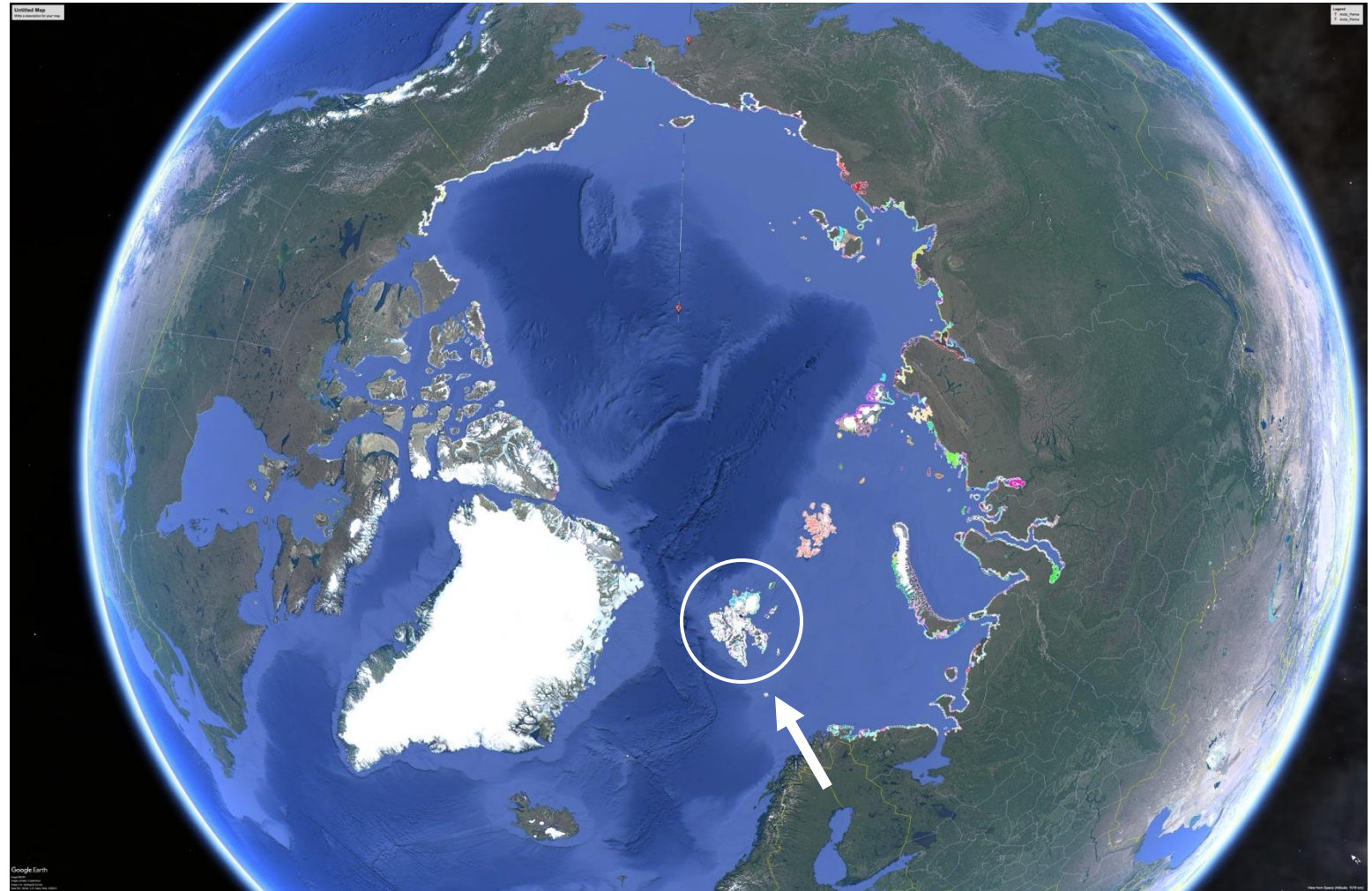
- Wave
- Tide
- Tide/wave
- Bedrock
- Bedrock/wave
- Fluvial
- Fluvial/wave
- Fluvial/tide
- Fluvial/wave/tide
- Colluvial
- Colluvial/wave
- Glacier front
- Till

Mapping 1:30.000
resolution

10 km

Some examples of applications

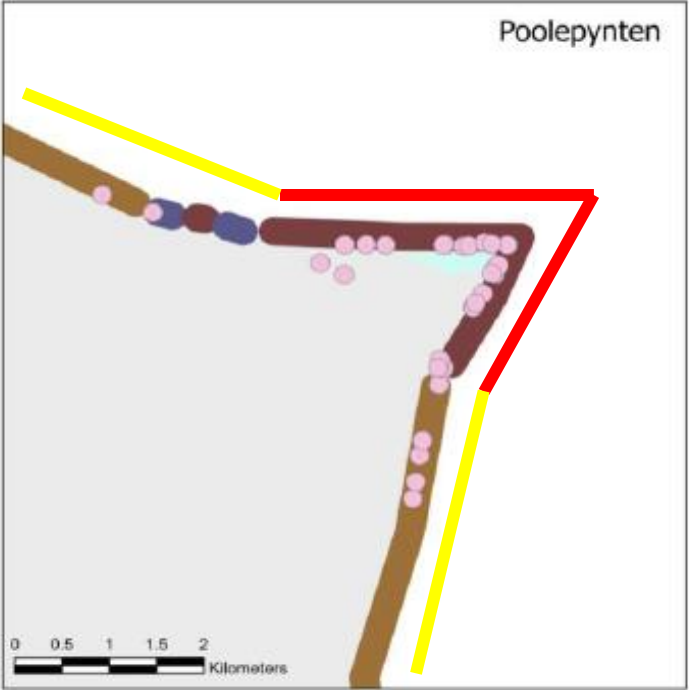
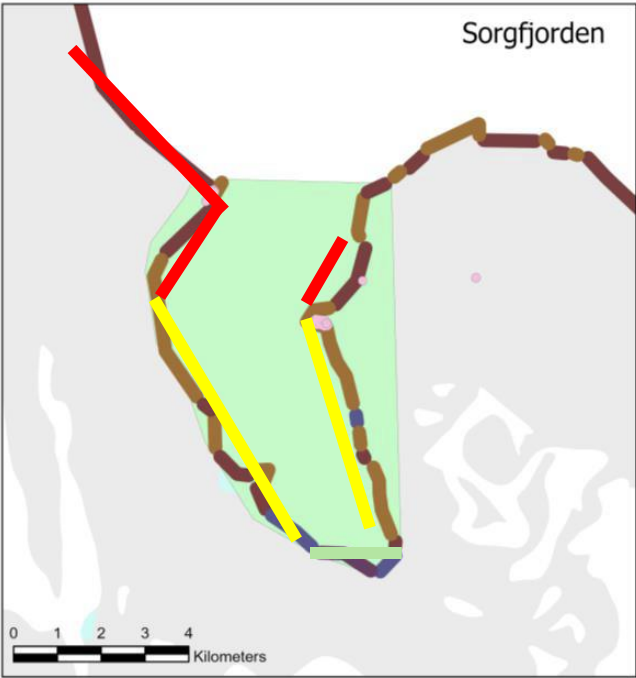
- 1) High-resolution data set to improve Svalbard Sector of Arctic Coastal Dynamics Database (Lantuit et al. 2020)



2) Assessment of coastal erosion risk



Process	Risk profile	Coastal classes	Colour codes in data set
Coastal retreat	High risk	Wave	Dark brown
	Medium risk	Bedrock wave, colluvial wave, fluvial wave, Tide wave	Darker shades of brown, dark blue and dark purple
	Low risk	Bedrock, colluvial, tide, fluvial, fluvial tide, moraine	Light blue, light green, light brown, purple



Circles: Cultural heritage registered in Norwegian Directorate for cultural heritage database

 Prioritized cultural heritage area

3. Assessment of coastal carbon cycling

Thanks to students contributing

Matthew Ferrier (UNIS & University of Copenhagen)

Linda Skinner (UNIS & Université de Lyon)

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