

living planet symposium BONN 23-27 May 2022

TAKING THE PULSE OF OUR PLANET FROM SPACE

CECMWE CE

Valentin PILLET*, Agnès BALTZER**, Maria JENSEN***, Manon BESSET*, Olivier REGNIERS*, Virginie LAFON*, Aurélie DEHOUCK*, Franck GARESTIER***

*i-Sea, Bordeaux, France, **LETG, UMR 6554, Nantes, France, ***UNIS, Arctic Geology Department, Svalbard, Norway, ****M2C, Caen, France



05/24/2022











Introduction

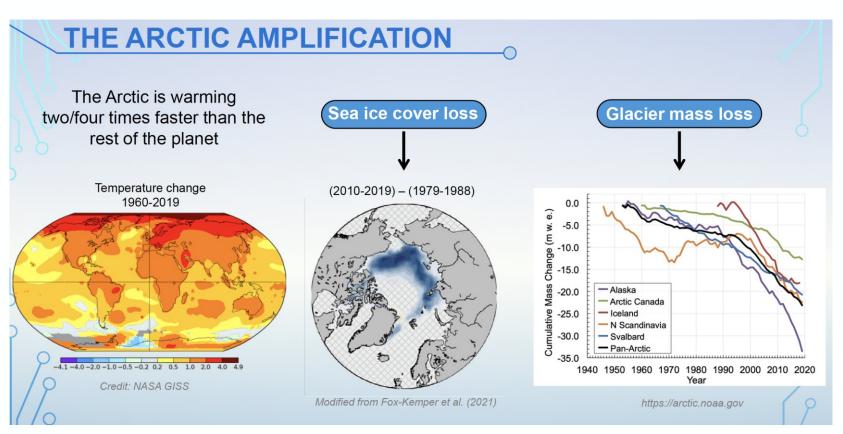


Climate change impacts

- Increasing temperature
- Sea ice cover and glacier
 losses

Studying Arctic coasts

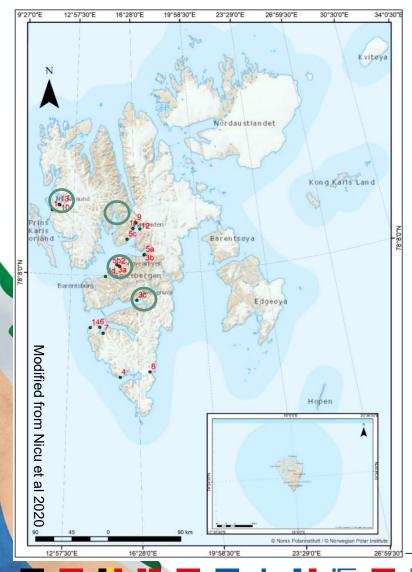
- Lack of large scale shoreline
 mapping
 - Improve knowledge of past trends to better address future changes



The Arctic is warming 3x times faster than the rest of the planet

Scientific background





Studies of coastal dynamics in Svalbard 2005-2021

Sites 1-14: Coastal erosion (Nicu et al 2020)

UNIS- studies System understanding (cases) and long term monitoring:

- Adventfjorden
- Sassenfjorden
- Dicksonfjorden
- Hollendarbukta
- Gipsvika

V Forskningsrådet

S V A L B A R D S M I L J Ø V E R N F O N D

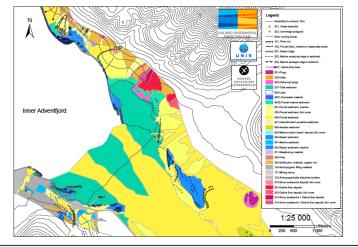
- Van Mijenfjorden
- Prins Karls Forland

And international partners

DynaCoast: Dynamic Svalbard Coastline

- First dataset for the Svalbard coastline
- Geomorphological mapping of the coastal zone

https://svalcoast.com



Study Area



Northernmost study area of the Space for Shore project

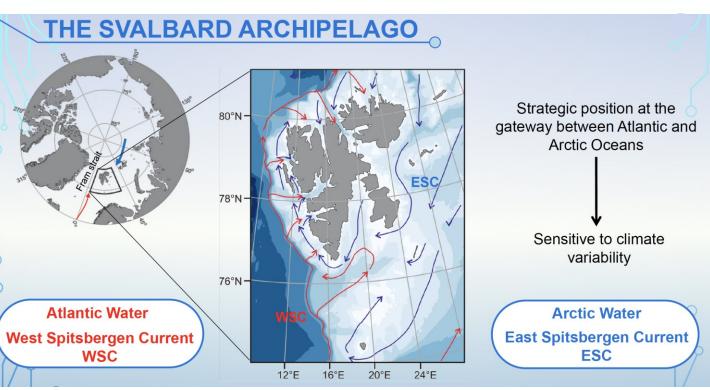
- Arctic coasts
 - Some of **the most rapidly changing** coasts on Earth (Irrgang et al., 2022)
- Real need for shoreline mapping
 - **Fjords** are poorly covered (Rubensdotter and Jensen, 2020)
 - Limited availability of observational, oceanographic and environmental data (Irrgang et al., 2022)

Five study areas in Spitsbergen

 Rocky shores alternating with sand and gravel beaches and glaciers

Challenge

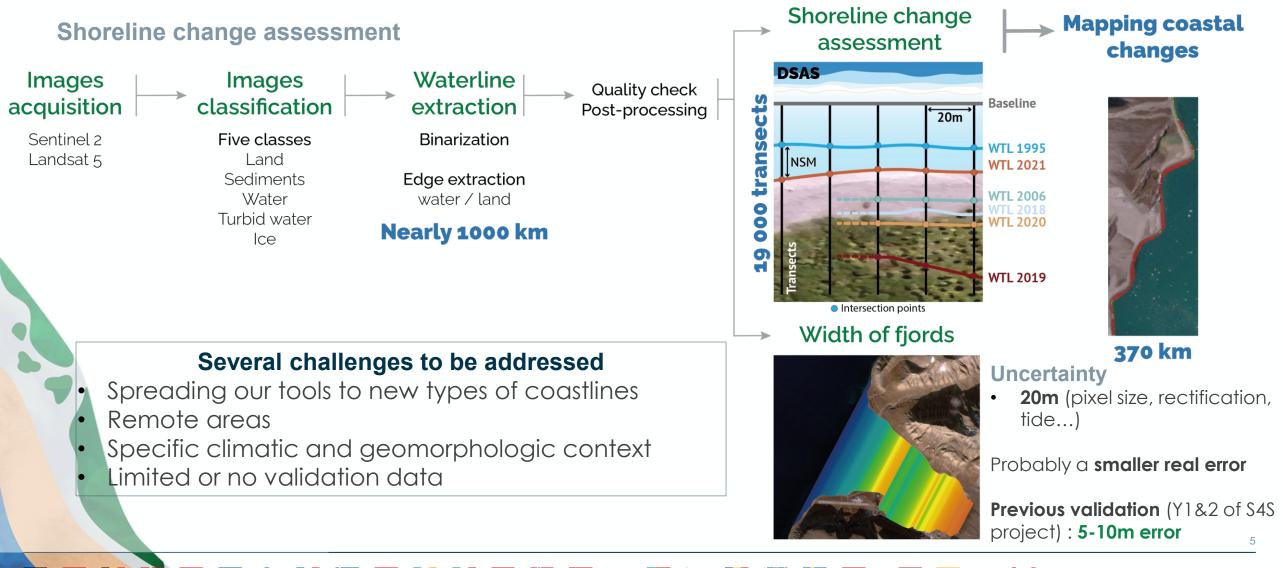
Assessing the relevance of our tools to new coasts



Material and Method







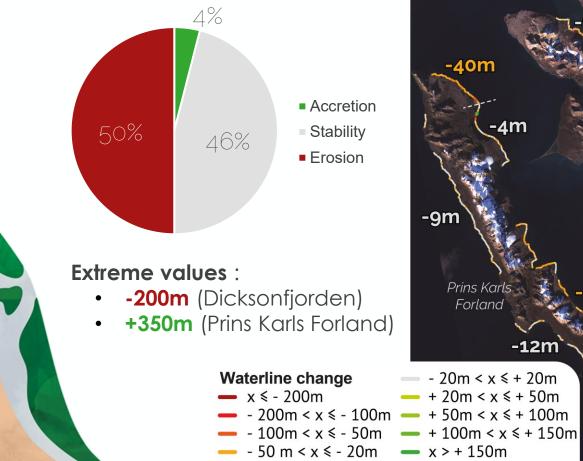
Results - Shoreline change

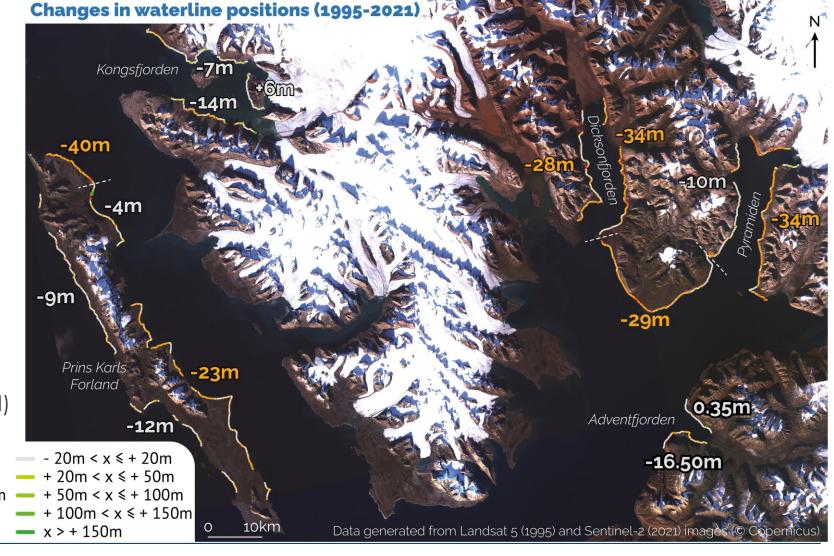




→ THE EUROPEAN SPACE AGENCY

Shoreline retreat = main pattern of change

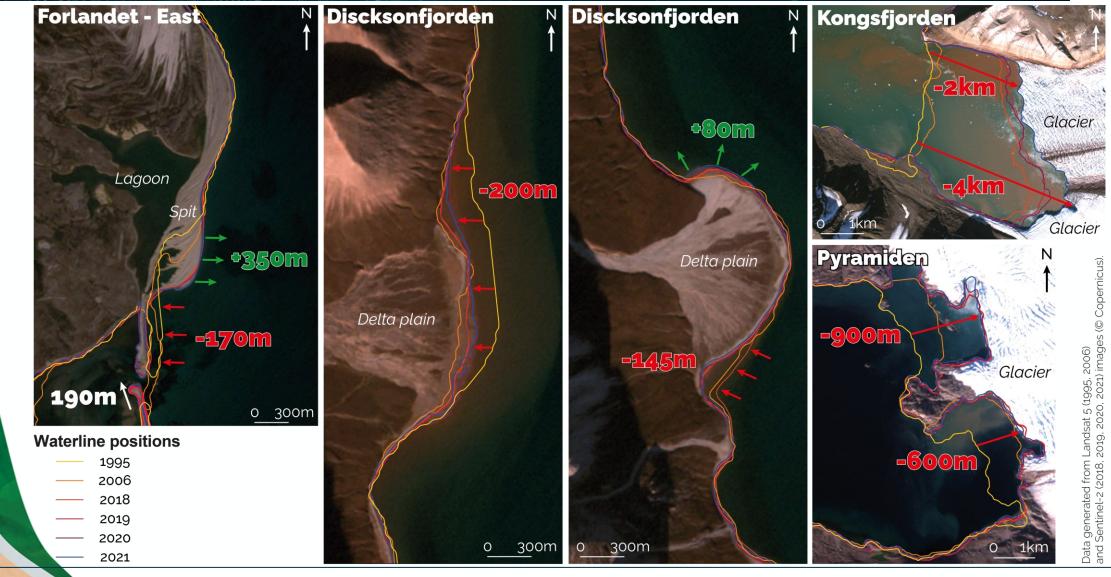




Results - Shoreline change







→ THE EUROPEAN SPACE AGENCY

|

What next? - Bathymetry

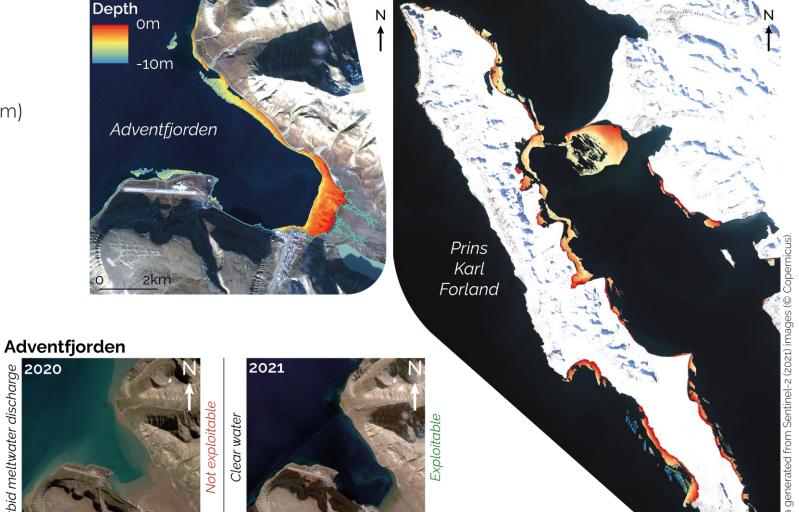




15km

Satellite-derived bathymetry

- Shallow water mapping (0 / -10m)
- Complements field data (start below -10m)
- Mapping changes in the foreshore



Some limitations

- Context-specific (Fjords)
 - step fore beach slopes

Few usable images

- Not context-specific:
 - Turbidity
 - Cloud
 - lce



Conclusion

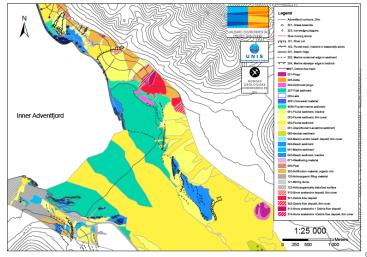


Extraction of coastal dynamics indicators from satellite images: a key data source for remote areas

- Assess coastal dynamics in areas where no historical data exists
- An interesting cost-benefit ratio, especially for remote and hard-to-reach areas
- Possibility of studying a territory in its entirety and of detecting changes on a local scale
- Ability to monitor all types of coasts

Work with local experts to move from detecting coastal dynamics to attributing observed changes

Collaboration with **local experts** is needed to validate the results **DynaCoast**: mapping of the coastal features could help to attribute the detected changes and to identify the key processes (help for the coastal zones management, especially in high latitudes)





living planet symposium BONN 23-27 May 2022

TAKING THE PULSE OF OUR PLANET FROM SPACE



💿 i-Sea



BROCKMANN

Consult GmbH

THANK YOU FOR YOUR ATTENTION

valentin.pillet@i-sea.fr Agnes.Baltzer@univ-nantes.fr MariaJ@unis.no

H Universität Hamburg

TERRASIGNA

UNIVERSITY OF BUCHAREST

TERRA SPATIUM SA

ESA UNCLASSIFIED – For ESA Official Use Only

DLR

05/24/2022

