

Sustainable Arctic Marine and Coastal Technology (SAMCoT)

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Illustration: Bjarne Stenberg



Illustration: Bjarne Stenborg

WP6: Coastal Technology

WP5: IM&Design Philosophy

WP4: Floating Structures in Ice

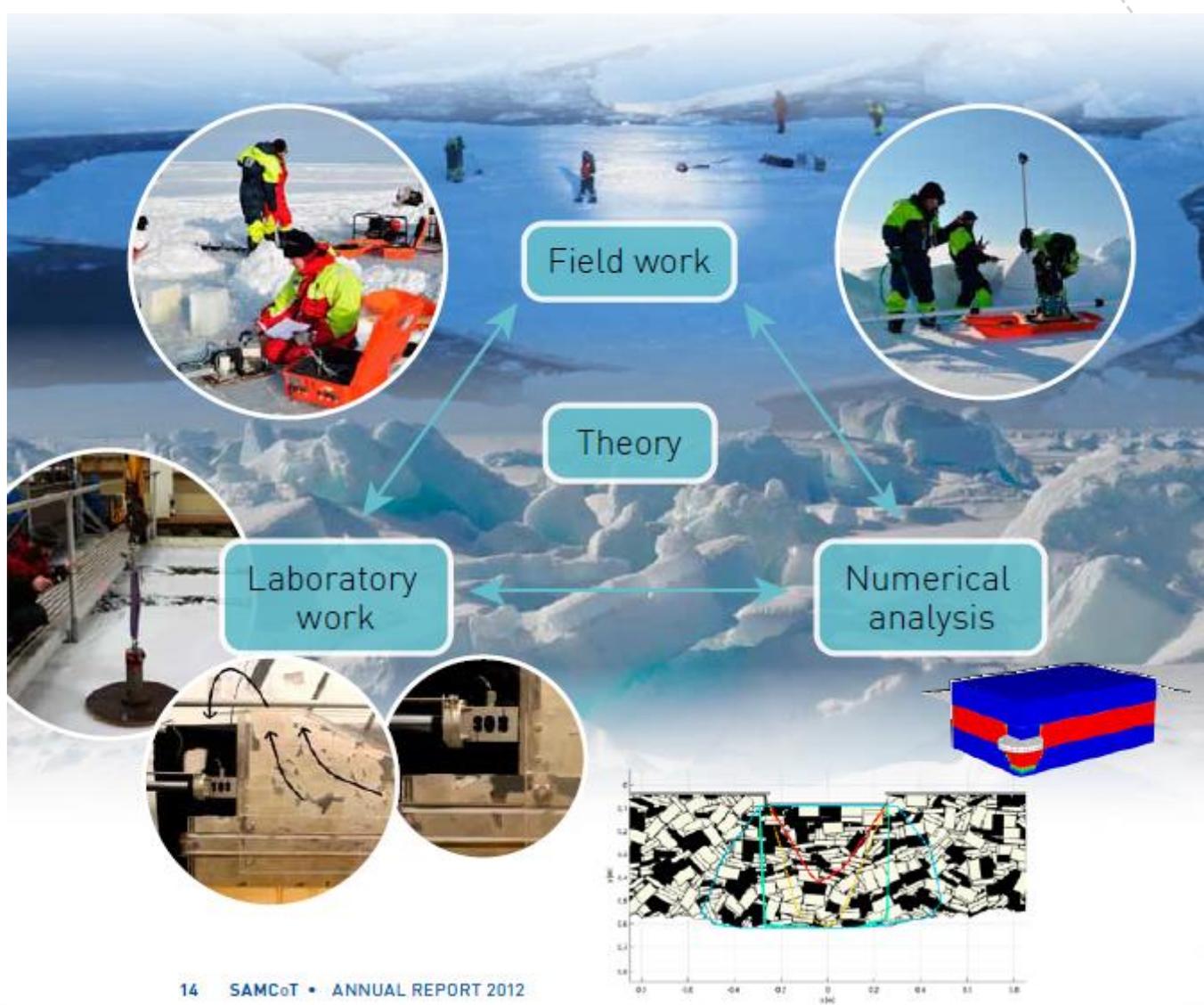
WP3: Fixed Structures in Ice

WPs 1&2: Quantifying the Physical Environment



12 Industry Partners
9 Research Partners
2 Public Partners

Research strategy



Mantra: Full-scale data - Research Cruises



2012



2013



2015

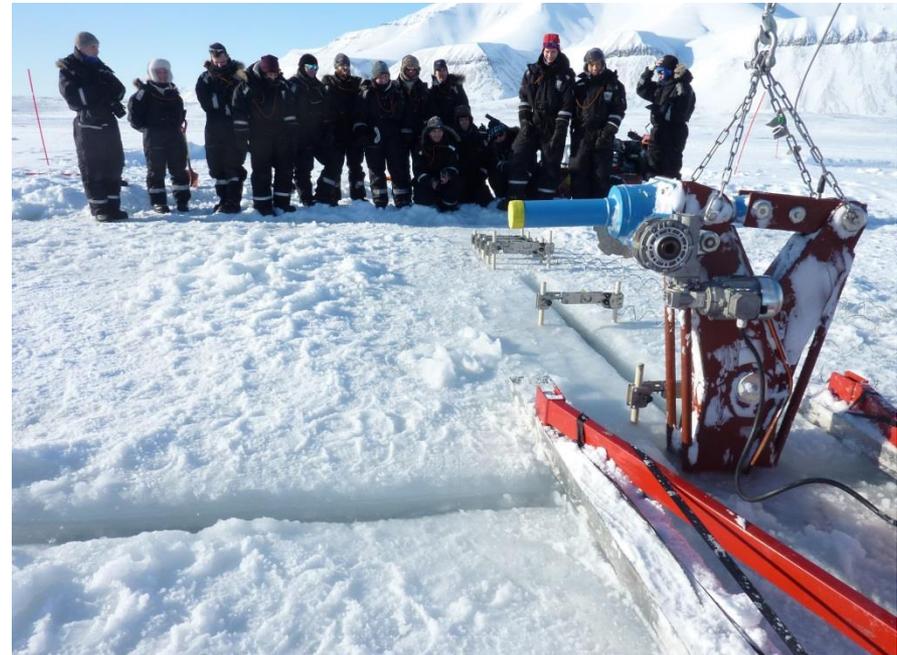


Arctic
Ocean 2016

Oden Arctic Technology Research Cruises: 2012, 2013 and 2015

Mantra: Full-scale data – Field work at Svea, Spitsbergen

Data Set	Period	Place / Platform	Description
Large Scale Field Sea Ice Fracture Experiment (Part I: Size Effect)	06.03.2016 – 18.03.2016	Svea, Svalbard	In total 17 ice floes, with 15 useful results, were splitted Floe size ranges from 3 m to 10 m (in length wise)
Large Scale Field Sea Ice Fracture Experiment (Part II: Loading Rate Effects)	09.03.2017 – 19.03.2017 & 02.04.2017 – 07.04.2017	Svea, Svalbard	In total 13 ice floes, with 17 useful results, were splitted Loading rate ranges from 1.5 mm/s, 0.6 mm/s to 0.015 mm/s
Large Scale Field Ice Ridge Splitting Experiment	19.02.2017 – 26.02.2017 & 02.04.2017 – 07.04.2017	Svea, Svalbard	One ice ridge was made in Feb. 2017 The Ice ridge is splitted after one month of consolidation

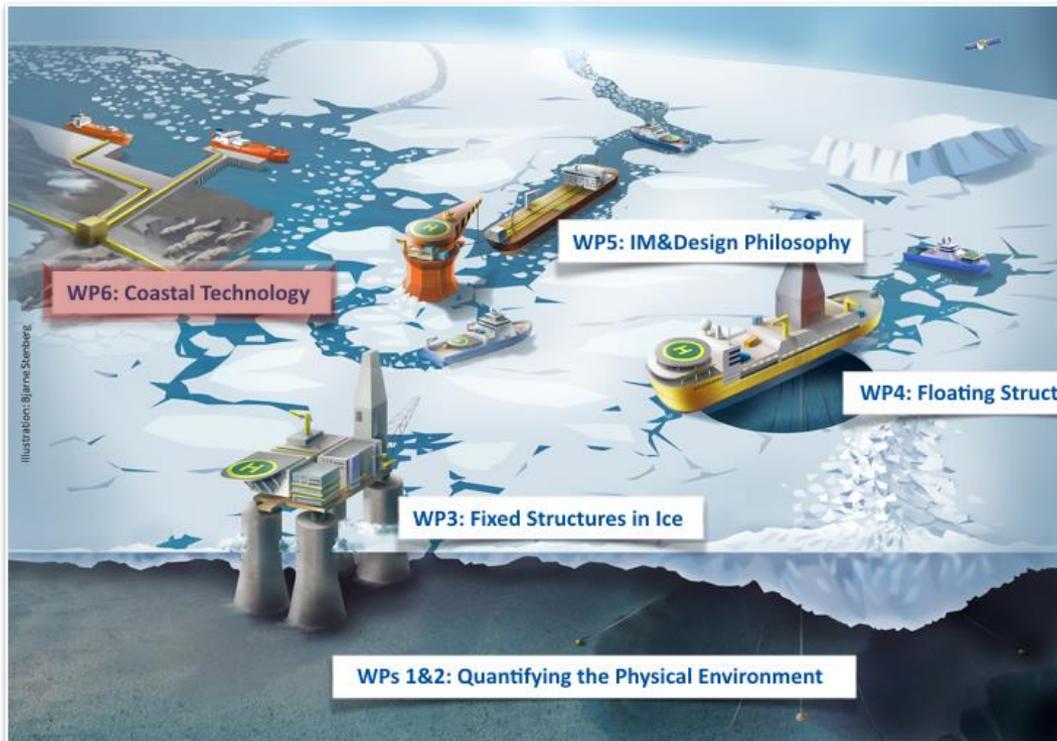


Example of laboratory work at the ice tank HSVA, Germany

Data Set	Period	Place / Platform	Description
Loads on structures- Waves propagating in ice LS-WICE	24.10.2016- 11.11.2016	HSVA- Germany	Three groups of experiments were performed: ice fracture under wave actions, wave attenuation/dispersion in broken ice covers, and ice-structure interaction under wave



Overview

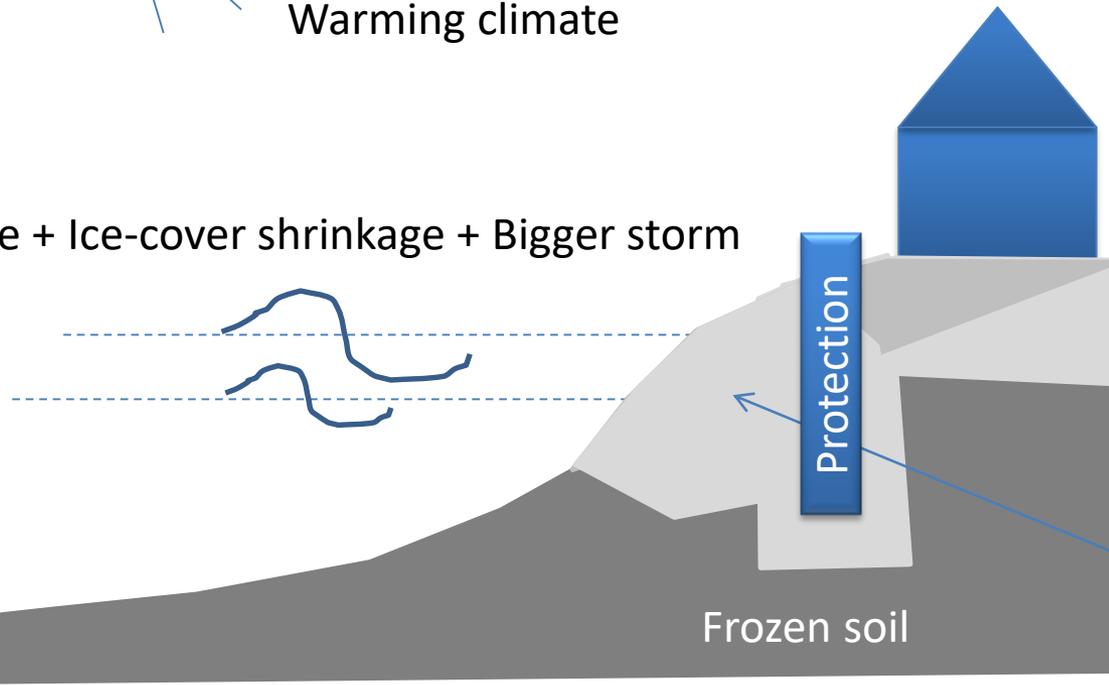


WP6

Soil Stability (e.g. slope stability, bearing capacity, settlement, etc.) must be assured during the lifetime of our coastal structures



Sea-level rise + Ice-cover shrinkage + Bigger storm



Here in addition to the thermal interaction, we also have mechanical interaction (abrasion)



@TOTAL

<http://www.total.com/en/energy-expertise/projects/oil-gas/lng/yamal-lng-cold-environment-gas>

Arctic coastal erosion investigations

Sites investigations/monitoring (Since 2012)

- Evaluated historical erosion rates (aerial photographs/satellite images)



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- Evaluated historical erosion rates (aerial photographs/satellite images)
- **Field survey**

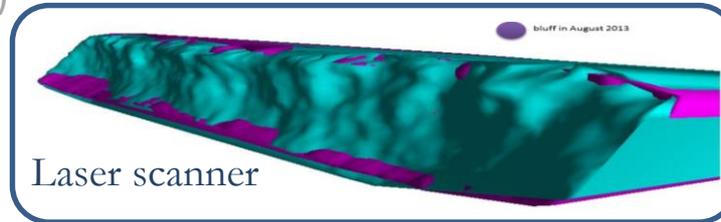


Arctic coastal erosion investigations

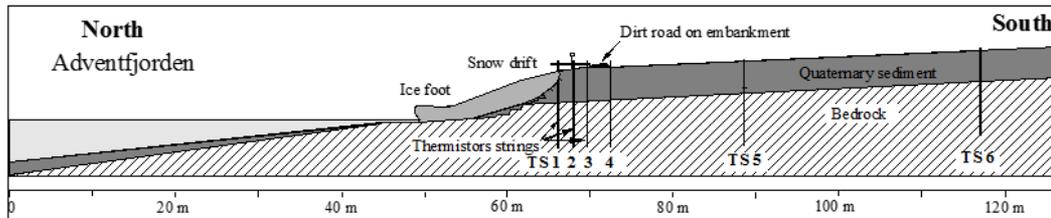
Sites investigations/monitoring (Since 2012)

- Evaluated historical erosion rates (aerial photographs/satellite images)
- Field survey
- **Instrumentation**

Time-lapse camera



Laser scanner

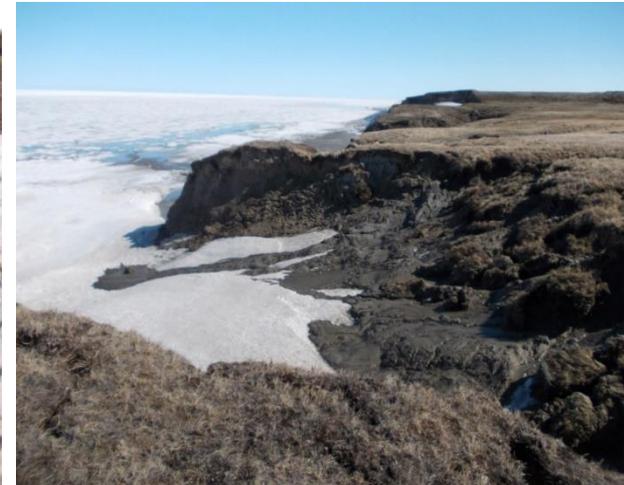


Thermistor-strings

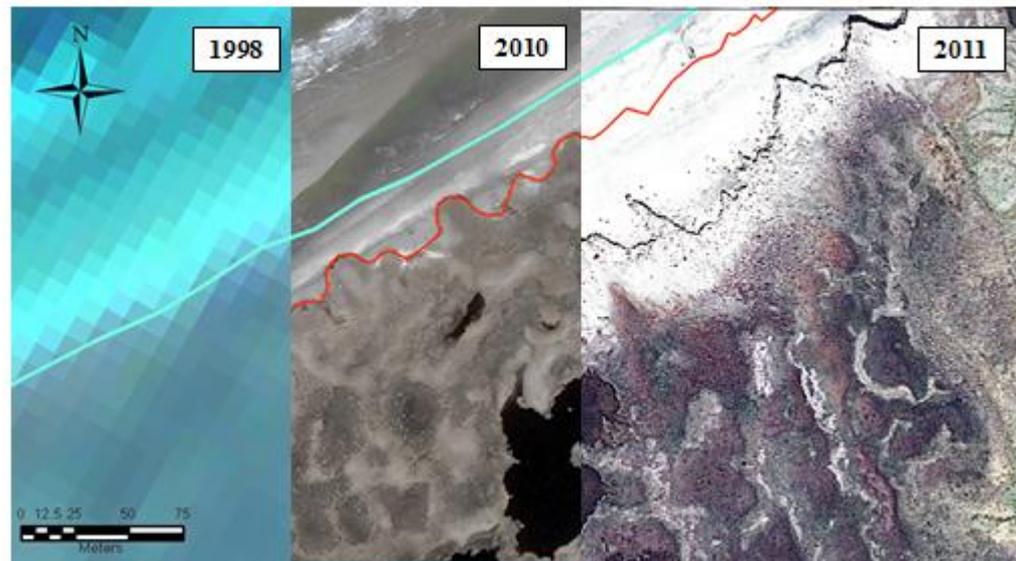
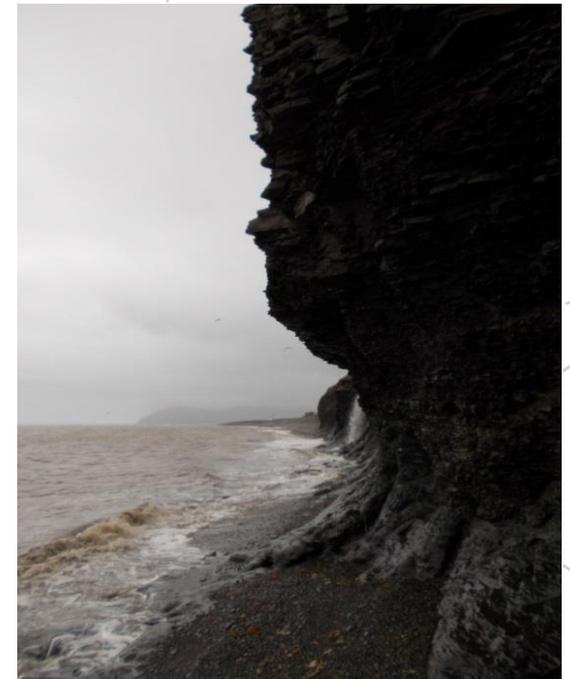
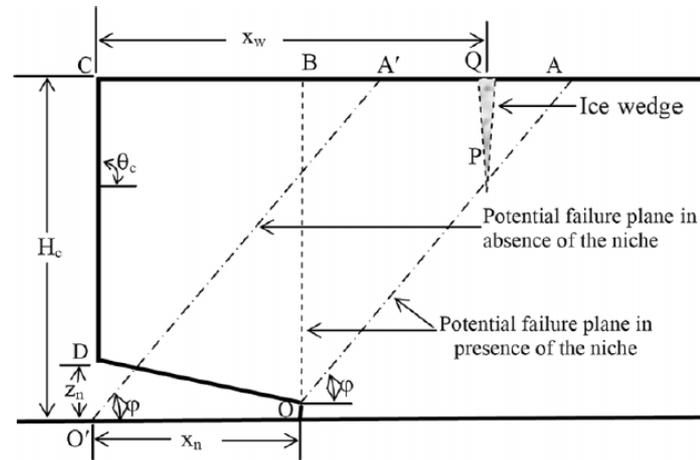


Identification of environmental forces and processes responsible for coastal recession on sites

- Thermo-denudation

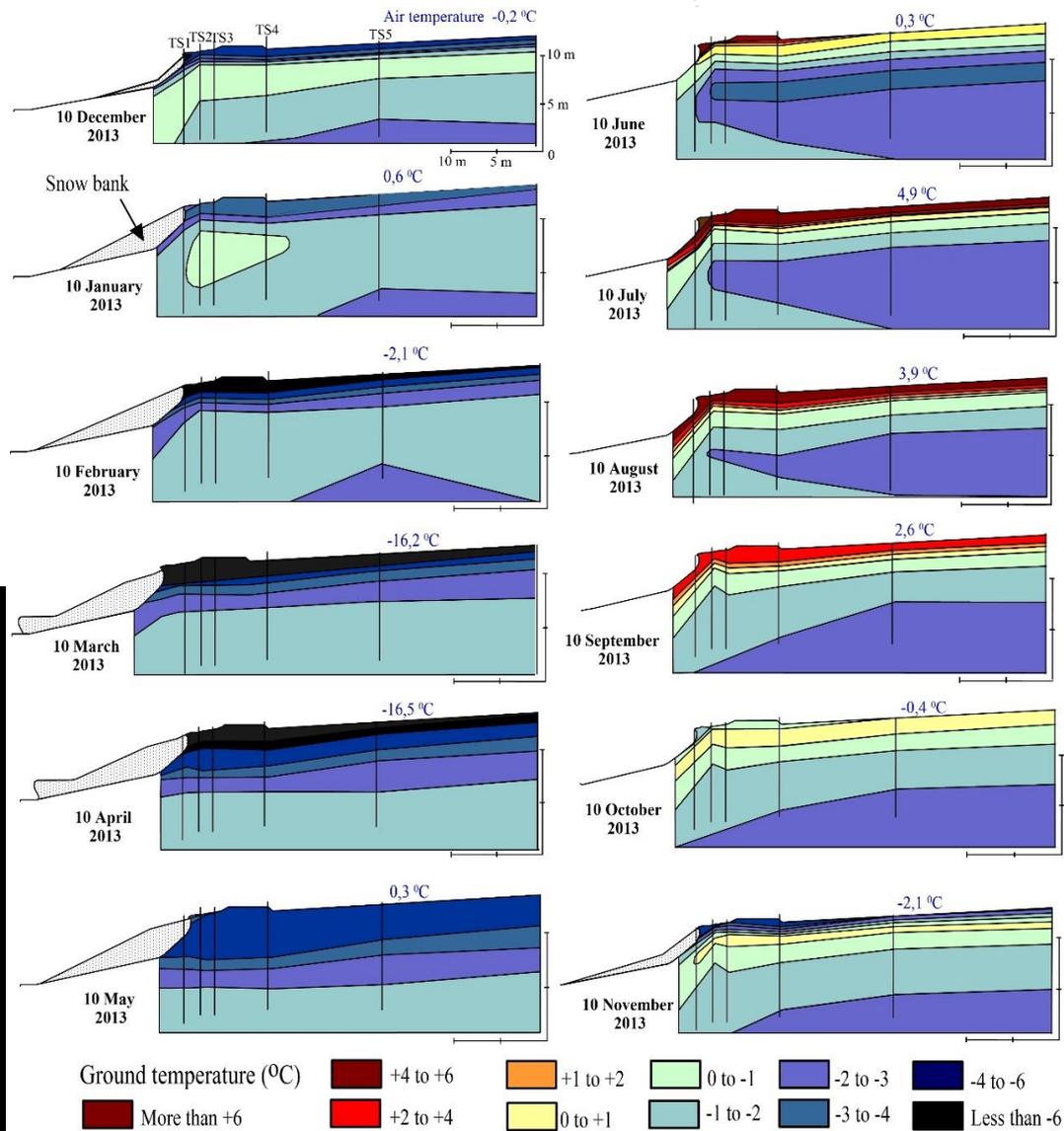


- Thermo-abrasion



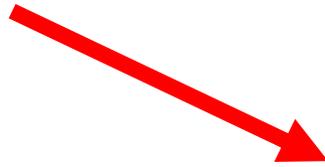
Vestpynten (Svalbard)

27 May to 1 July
2013
(1 month)

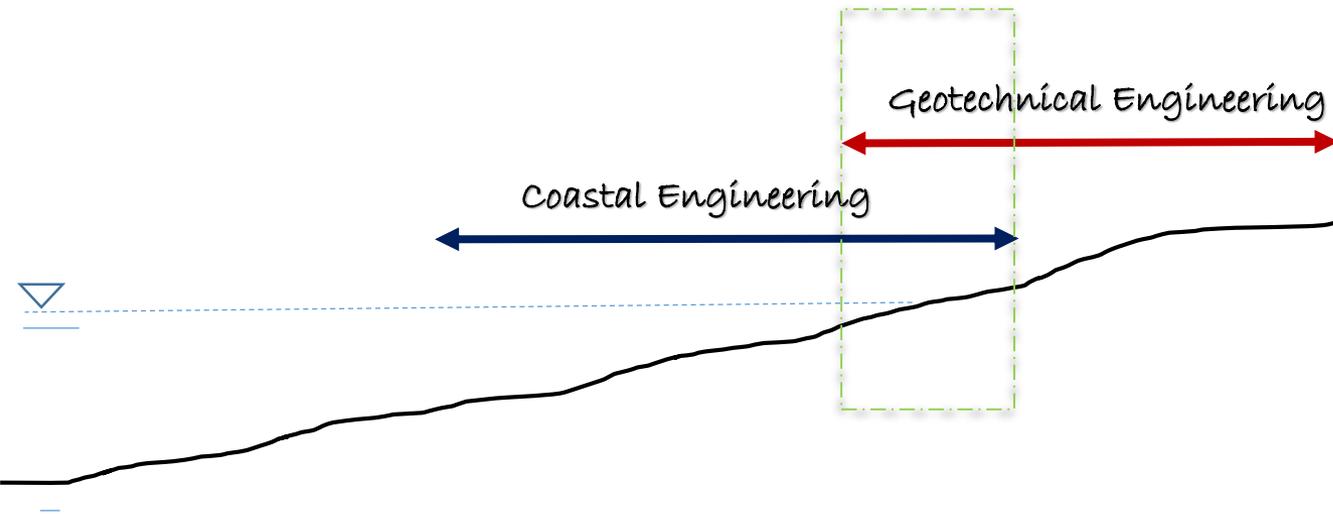


Arctic coastal erosion investigations

**Sites investigations/monitoring
(Since 2012)**



Modelling



	Dr. Seyed A. G. Amiri	NTNU	Postdoc: Thermo-Hydro-Mechanical (THM) modelling of frozen soils
	Dr. Mohammad Saud Afzal	NTNU	Postdoc: Development of an integrated system model for Arctic coastal erosion (MA)
	Mr. Nadeem Ahmad	NTNU	PhD student: High resolution CFD modelling of Arctic coastal erosion
	Mr. Hongtao Li	NTNU/DTU	PhD student: Modelling the propagation of sea-waves in the presence of sea-ice
	Mr. Dennis Monteban	DTU/NTNU	PhD student: Measurements and modelling of Arctic coastal environments
	Ms. Julie Malenfant Lepage	NTNU/Laval	PhD student: Erodibility characteristics of frozen/thawing soils