UiT Norges arktiske universitet

Climate change and adverse incidents in the Arctic

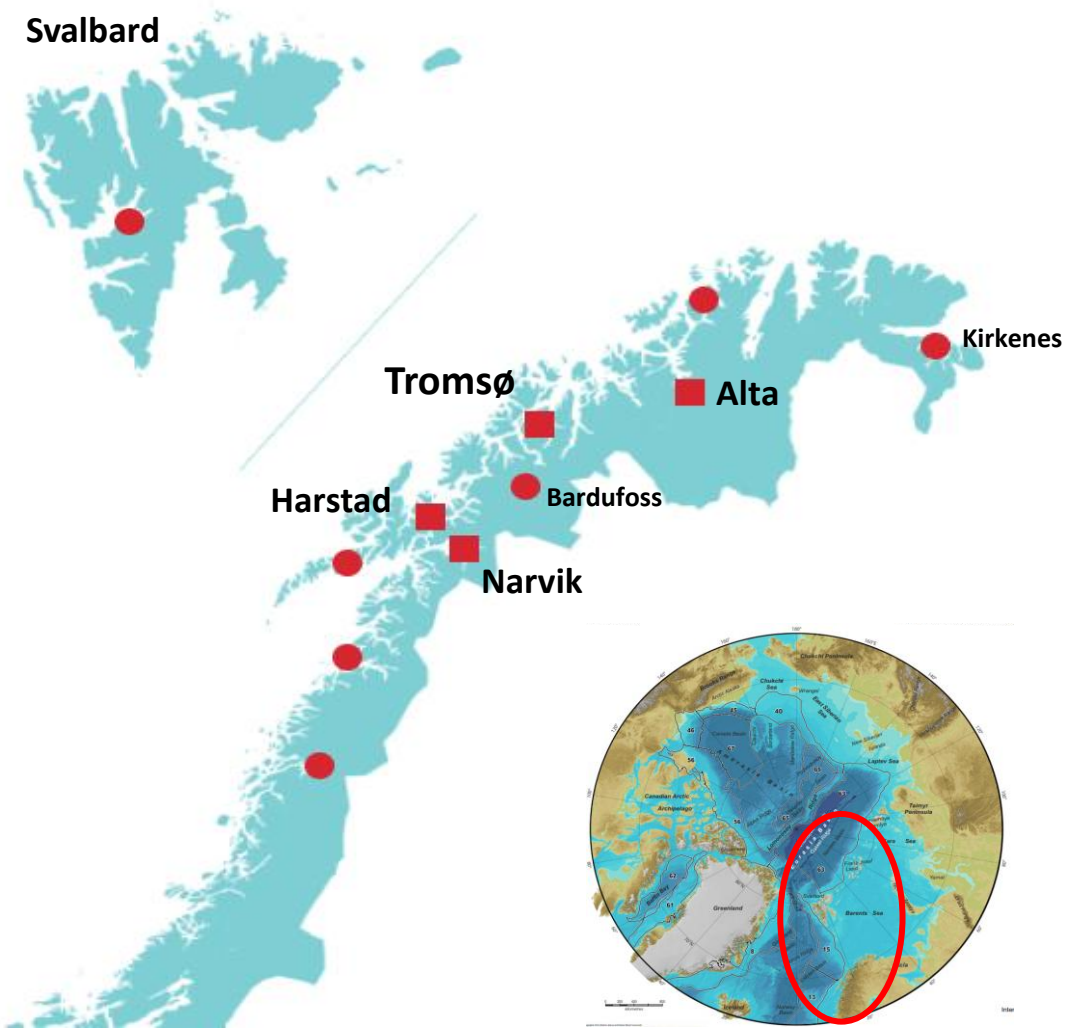
Examples from the Norwegian-Barents Sea Region

APRI annual meeting Innsbruck November 2025

Professor Erik Henriksen
UiT , The Arctic University of Norway
Temporally located at Wien University

UiT- The Arctic University of Norway

Campus and locations



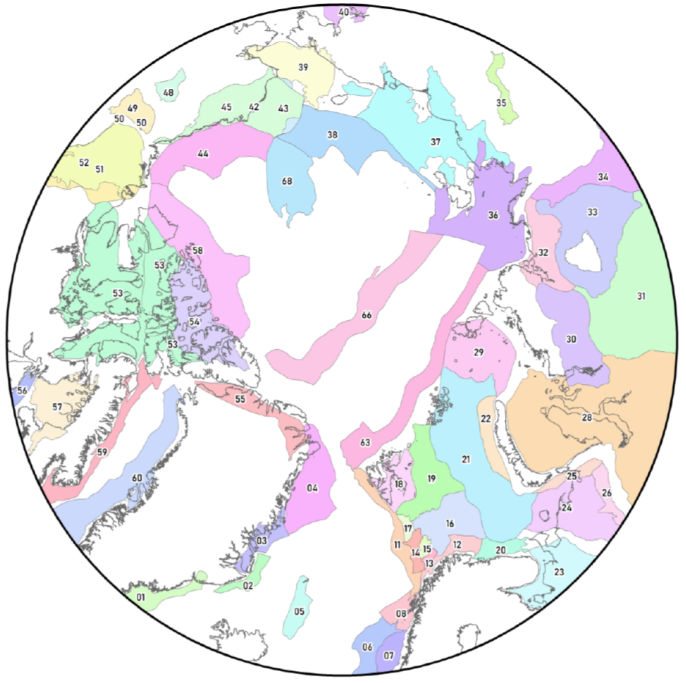
GSL Memoir 57–printed November 2025

- **1100 pages**
- **67 scientific papers**
- **Online first, partly open access;**

https://www.lyellcollection.org/toc/mem/57/1

Arctic Tectono-Sedimentary Elements: Continents & Rifted Margins

A total of 67 elements



No	NAME	CLASS
1	AMMASSALIK RIFTED MARGIN CTSE	RIFTED MARGIN
2	SCORESBYSUND BASIN CTSE	RIFTED MARGIN
3	CENTRAL & NE GREENLAND RIFTED MARGIN CTSE	RIFTED MARGIN
4	NE GREENLAND RIFTED MARGIN CTSE	RIFTED MARGIN
5	JAN MAYEN CTSE	RIFTED MICROCONT.
6	MØRE-VØRING RIFTED MARGIN CTSE	RIFTED MARGIN
7	TRONDELAG PLATFORM & HALTEN AND DONNA TERRACES CTSE	RIFTED MARGIN
8	LOFOTEN RIFTED MARGIN CTSE	RIFTED MARGIN
11	WEST BARENTS SHEARED MARGIN CTSE	RIFTED MARGIN
12	FINNMARK PLATFORM CTSE	CONTINENTAL PLATFORM
13	HAMMERFEST BASIN CTSE	CONTINENTAL RIFT
14	TROMSØ – BJØRNØYA CTSE	CONTINENTAL RIFT
15	LOPPA HIGH CTSE	CONTINENTAL PLATFORM
16	SOUTH-CENTRAL BARENTS CTSE	CONTINENTAL PLATFORM
17	STAPPEN HIGH-BJØRNØYA TSE	CONTINENTAL PLATFORM
18	SVALBARD CTSE	CONTINENTAL PLATFORM
19	NORTH BARENTS CTSE	CONTINENTAL PLATFORM
20	KOLA-KANIN MONOCLINE CTSE	PERICRATONIC
21	EAST BARENTS CTSE	CONTINENTAL SAG
22	ADMIRALTY HIGH CTSE	CONTINENTAL SAG
23	BELOMOR-MEZEN CTSE	INTRACRATONIC
24	TIMAN-PECHORA CTSE	PERICRATONIC
25	KOROTAIKHA BASIN CTSE	FORELAND
26	KOSYU-ROGOV CTSE	FORELAND
28	NORTHERN WEST SIBERIA-SOUTH KARA CTSE	CONTINENTAL SAG
29	NORTH KARA CTSE	CONTINENTAL PLATFORM
30	YENISEI-KHATANGA CTSE	PERICRATONIC
31	KUREYA-TUNGUSKA CTSE	INTRACRATONIC
32	ANABAR-LENA CTSE	PERICRATONIC
33	OLENEK-ANABAR CTSE	INTRACRATONIC
34	PRIVERKHOYANSK-VILYUI CTSE	PERICRATONIC
35	ZYRYANKA BASIN TSE	FORELAND

No	NAME	CLASS
36	LAPTEV RIFT SYSTEM CTSE	RIFTED MARGIN
37	SOUTHERN EAST SIBERIAN SEA CTSE	OROGENIC COLLAPSE
38	NORTH CHUKCHI BASIN CTSE	CONTINENTAL SAG
39	SOUTH CHUKCHI-HOPE TSE	OROGENIC COLLAPSE
40	ANADYR BASIN TSE	OROGENIC COLLAPSE
42	ARCTIC ALASKA BASIN CTSE	COMPOSITE
43	HANNA TROUGH CTSE	INTRACONTINENTAL RIFT
44	BEAUFORT-MACKENZIE RIFTED MARGIN CTSE	RIFTED MARGIN
45	COLVILLE BASIN CTSE	FORELAND
48	YUKON FLATS TSE	OROGENIC COLLAPSE
49	OGILVIE PLATFORM CTSE	PERICRATONIC
50	EAGLE BASIN TSE	FORELAND
51	MACKENZIE-PEEL PLATFORM CTSE	INTRACRATONIC
52	CORDILLERAN FORELAND BASIN TSE	FORELAND
53	FRANKLINIAN CTSE (Canadian Arctic)	INTRACRATONIC
53a	Queen Elizabeth Islands Basin (part of Franklinian CTSE)	FORELAND
54	SVERDRUP BASIN CTSE	CONTINENTAL SAG
55	FRANKLINIAN NORTH GREENLAND CTSE	PERICRATONIC
56	HUDSON STRAIT PLATFORM & BASINS TSE	INTRACRATONIC
57	FOXE PLATFORM & BASIN TSE	INTRACRATONIC
58	CANADIAN ARCTIC-BEAUFORT-MACKENZIE RIFTED MARGIN	RIFTED MARGIN
59	NORTHEAST CANADA RIFTED MARGIN CTSE	RIFTED MARGIN
60	WEST GREENLAND RIFTED MARGIN CTSE	RIFTED MARGIN
63	EURASIAN ARCTIC RIFTED MARGIN CTSE	RIFTED MARGIN
66	LOMONOSOV RIDGE CTSE	RIFTED MICROCONT.
68	CHUKCHI BORDERLAND CTSE	RIFTED MICROCONT.

The Norwegian Government Invests in “Arctic Ocean 2050” Research

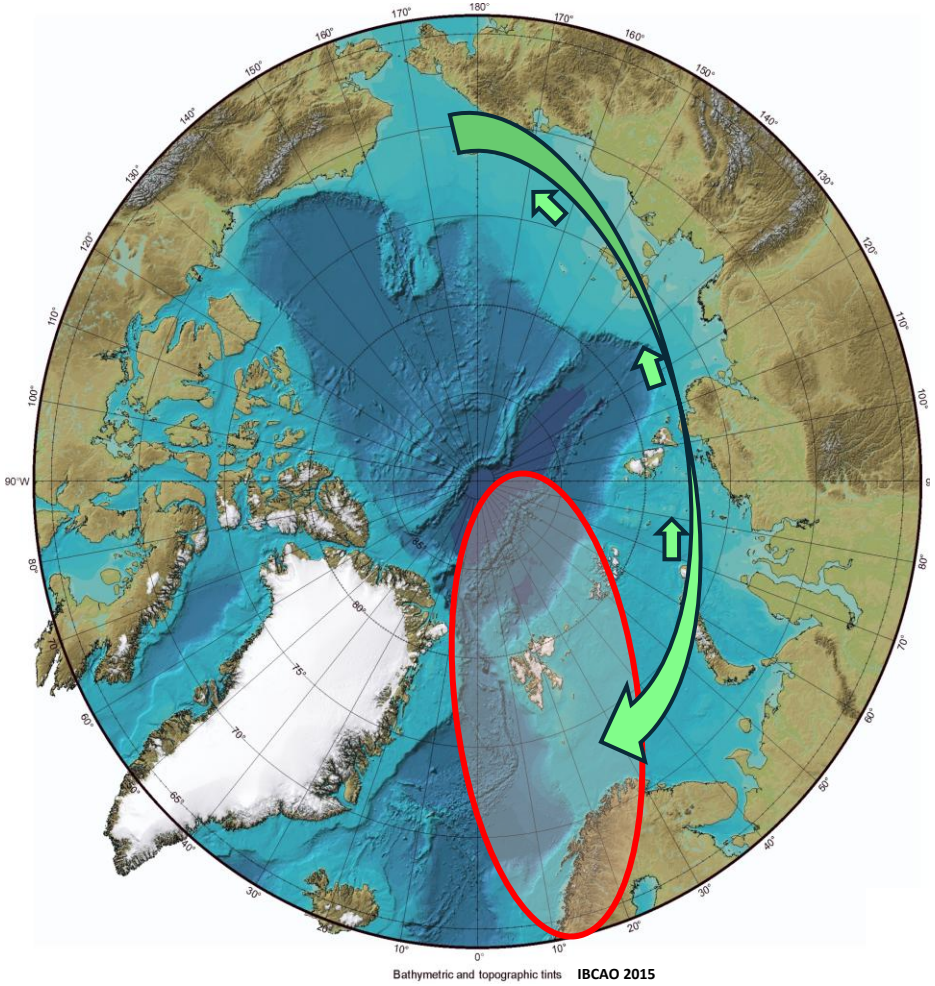
Allocates 1 Billion NOK over the Next Decade

FOTO: ERIK WAAGBØ / NRK

FOTO: TRINE LISE SVIGGUM HELGERUD,
NORSK POLARINSTITUTT / NORSK POLARINSTITUTT

Future Arctic Climate and Maritime Implications

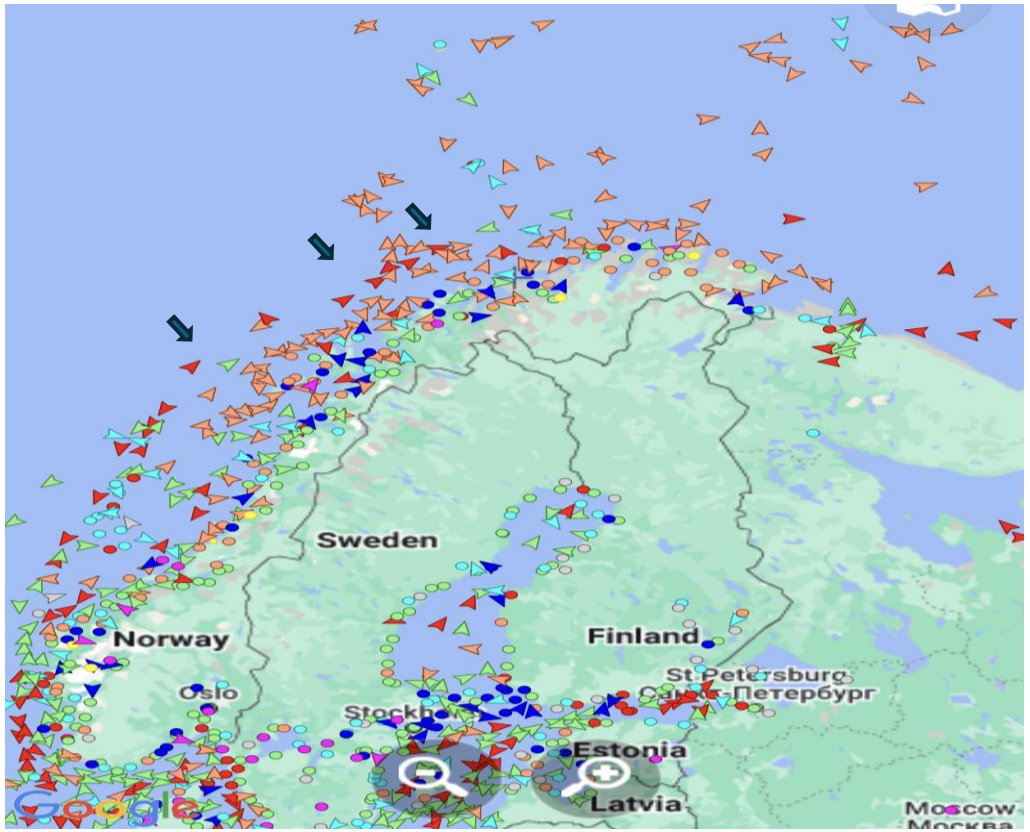
- Increased risk of Pollution -
  75 oil and gas tankers from Russia to China in 2023.
- Tourism in environmentally sensitive areas
- Military activity – potential risk of misunderstandings
- Relocation of fish stocks and change of ocean currents
- Business opportunities



High activity along the Norwegian coast
Satellite surveillance crucial

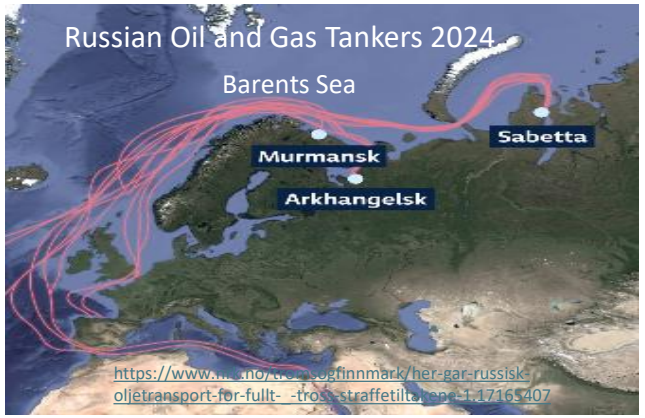
- Petroleum industry (94 offshore fields)
- Fishing Industry
- Local Cargo
- Large tankers and tourist ships

- Satellite surveillance crucial for security and coexistence offshore – monitoring risk for sabotage




Viking Sky Cruise Ship – Hustadvika 2019

Foto: Odd Roar 2019 Lange NTB Scanpix

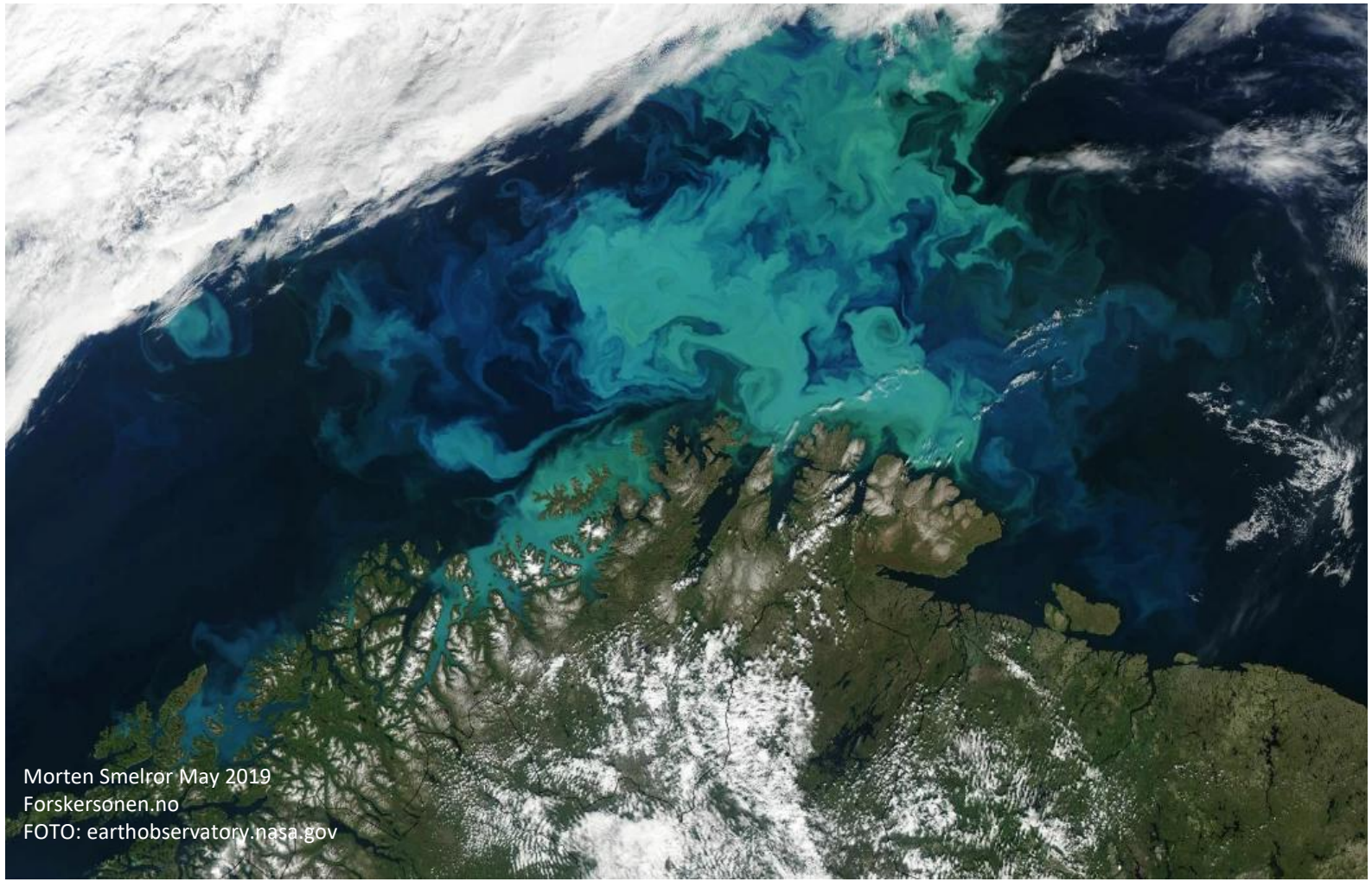


Algal blooms – an Impact of Anthropogenic Activity

Are the farming industries prepared?

Death Algae "Kills":

- *More than 12.000 ton fish died following this algal bloom*
- *Potential crises for the farming industry – preparedness plans needed*
- *Onshore farms*



Increase in Onshore Geohazards - A Consequence of:

- Climate Changes
- Other Anthropogenic Influence

Landslides, Rock Falls and Floods

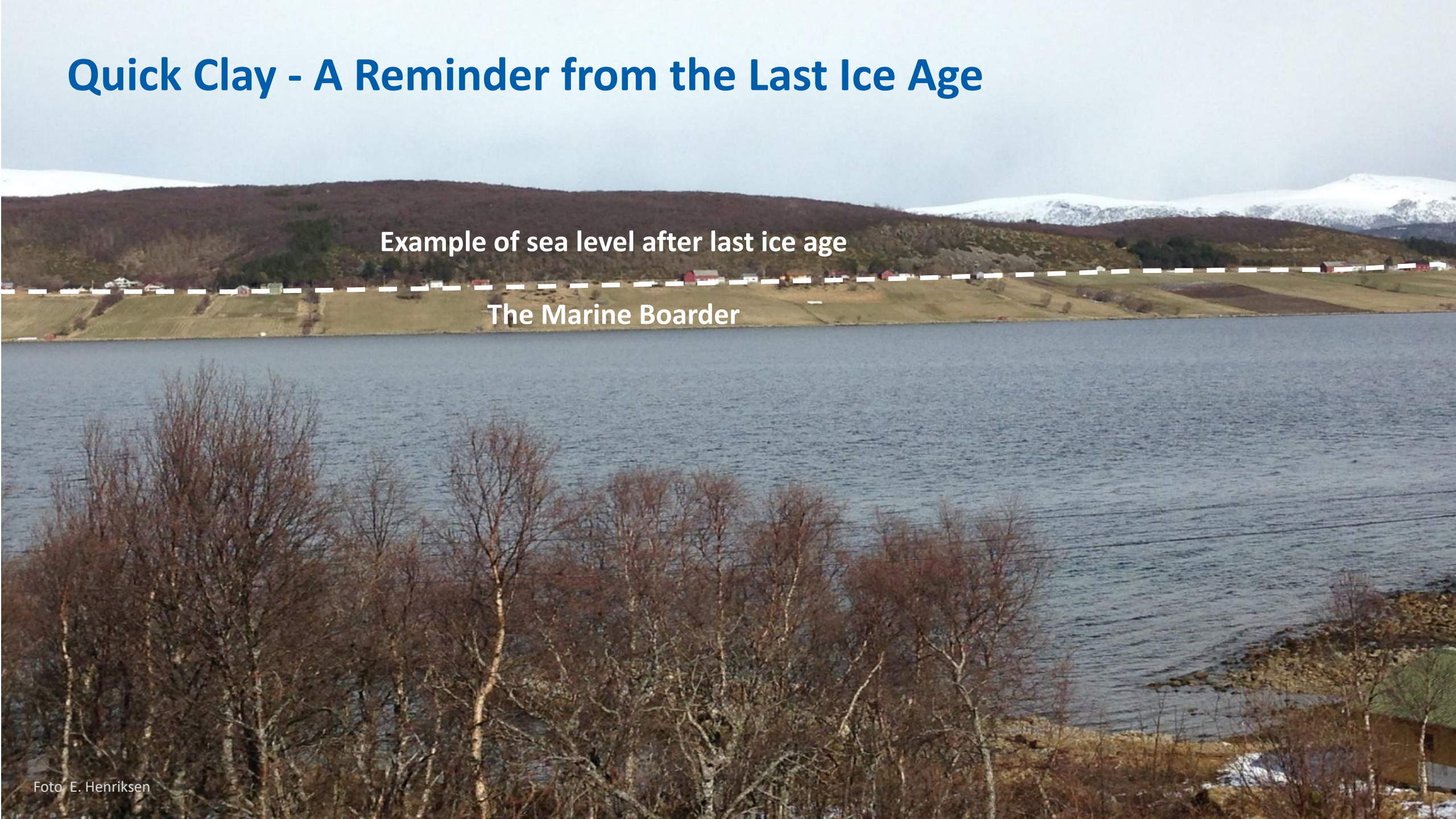
Strategies for Development of New Acreages: Houses, Industry, Roads

Foto. Halvor Bunkholdt

Dokka 2023
Foto: Stian Lysberg Solum / NTB

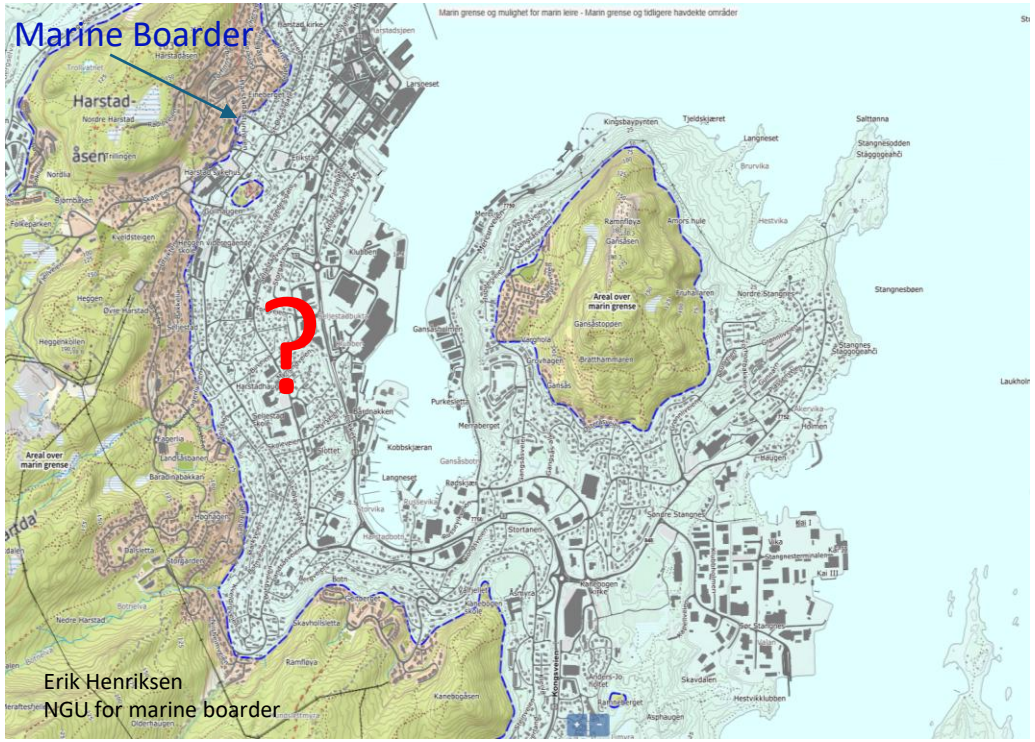
Avalanches, Examples from the Stubaytal and Gschnitz Areas - 2025

Quick Clay - A Reminder from the Last Ice Age



Quick Clay and its Impact on Social Security in Residential Areas

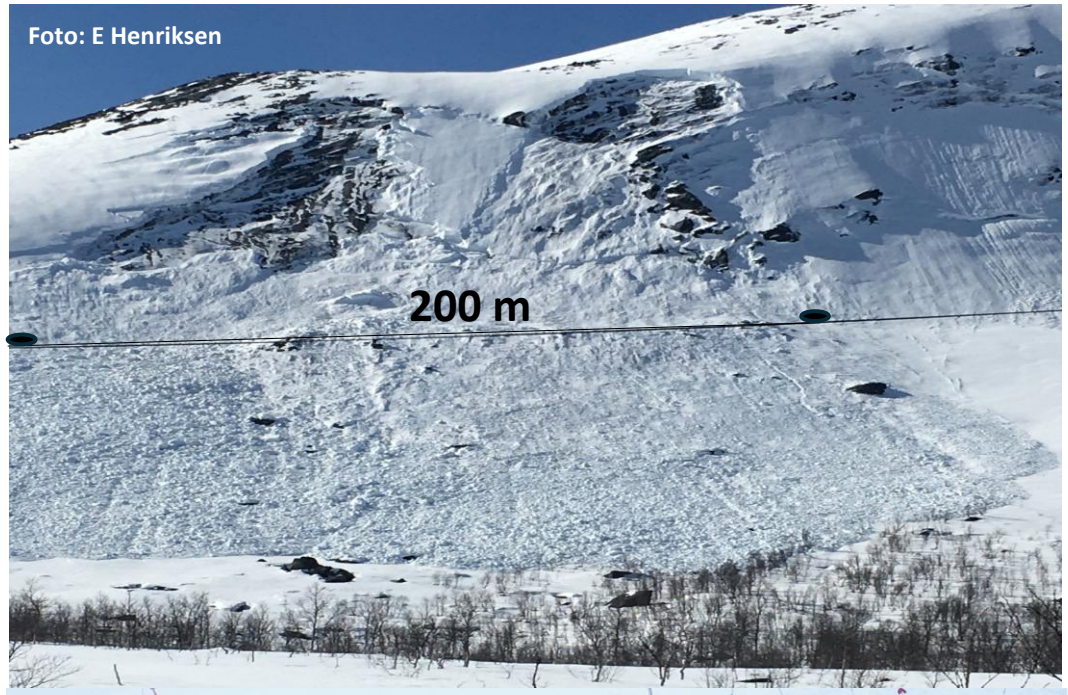
Potential Risk Areas Harstad Town, Norway



Quick Clay Avalanche Levanger Norway, August 2025.

Snow Avalanches and Preparedness

Norway and European Alpine Countries Share Several Common Challenges



Example avalanche search - Lyngen

Snow avalanches - accidents in Norway over the last 10 years

Season	Dead	Affected
2014/2015	6	41
2015/2016	5	85
2016/2017	2	40
2017/2018	3	89
2018/2019	13	69
2019/2020	3	79
2020/2021	9	92
2021/2022	5	95
2022/2023	8	84
2023/2024	4	84
2024/2025	5	88
Total	63	846

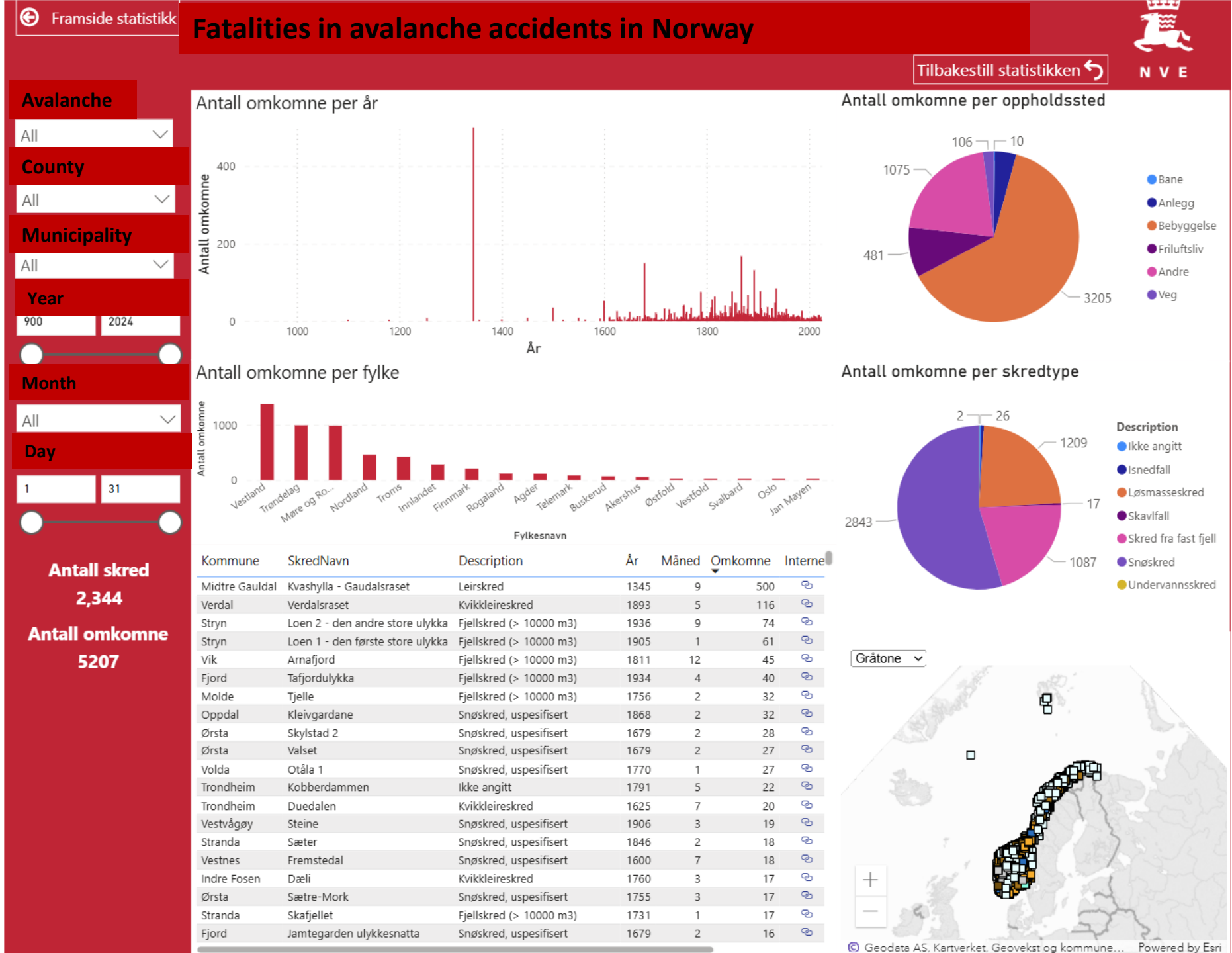
Numbers from NVE Varsom .no

NVE:

[The Norwegian Water Resources and Energy Directorate – NVE]

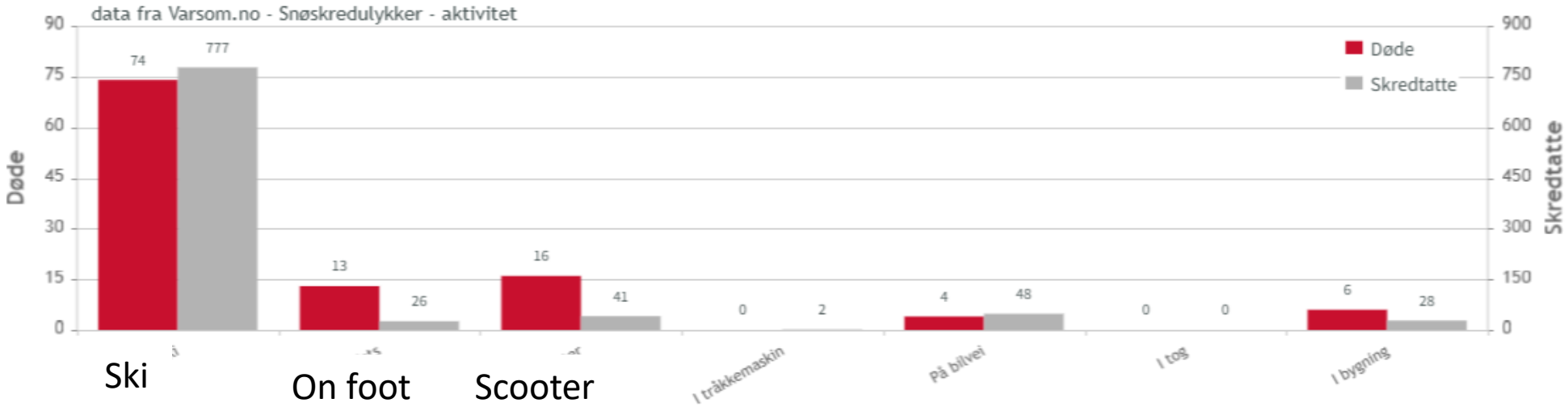
Management tool

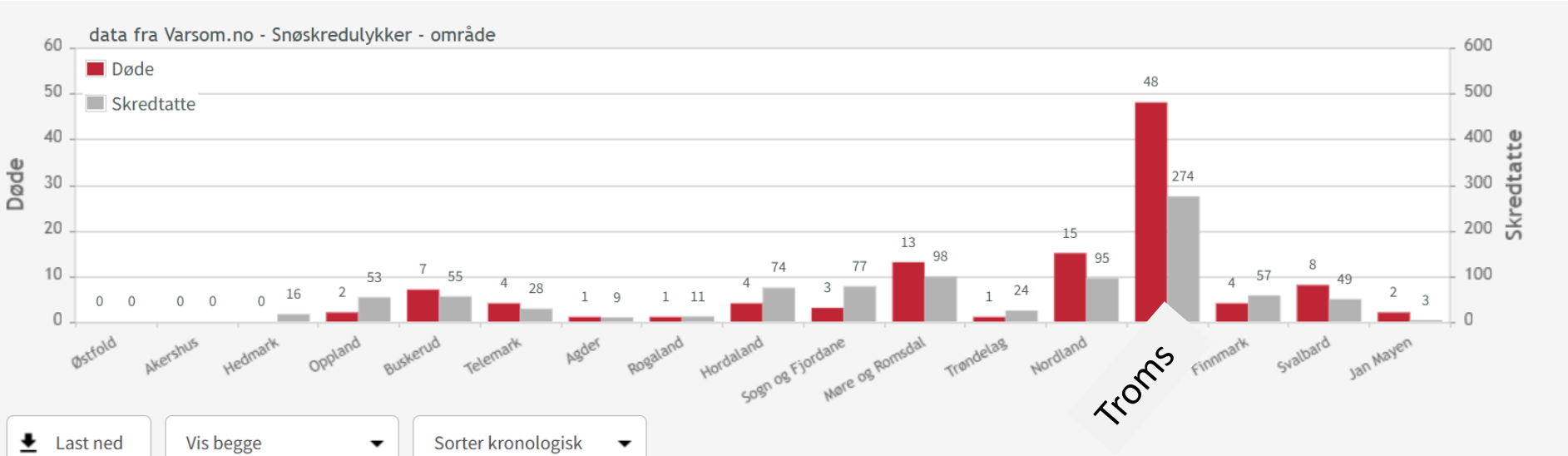
- Examples of avalanches per year
- Death rate
- Area description
- Type of avalanche



Kommune	SkredNavn	Description	År	Måned	Omkomne	Interne
Midtre Gauldal	Kvashylla - Gaudalsraset	Leirskred	1345	9	500	
Verdal	Verdalsraset	Kvikkleireskred	1893	5	116	
Stryn	Loen 2 - den andre store ulykka	Fjellskred (> 10000 m3)	1936	9	74	
Stryn	Loen 1 - den første store ulykka	Fjellskred (> 10000 m3)	1905	1	61	
Vik	Arnafjord	Fjellskred (> 10000 m3)	1811	12	45	
Fjord	Tafjordulykka	Fjellskred (> 10000 m3)	1934	4	40	
Molde	Tjelle	Fjellskred (> 10000 m3)	1756	2	32	
Oppdal	Kleivgardane	Snøskred, uspesifisert	1868	2	32	
Ørsta	Skylstad 2	Snøskred, uspesifisert	1679	2	28	
Ørsta	Valset	Snøskred, uspesifisert	1679	2	27	
Volda	Otåla 1	Snøskred, uspesifisert	1770	1	27	
Trondheim	Kobberdammen	Ikke angitt	1791	5	22	
Trondheim	Duedalen	Kvikkleireskred	1625	7	20	
Vestvågøy	Steine	Snøskred, uspesifisert	1906	3	19	
Stranda	Sæter	Snøskred, uspesifisert	1846	2	18	
Vestnes	Fremstedal	Snøskred, uspesifisert	1600	7	18	
Indre Fosen	Dæli	Kvikkleireskred	1760	3	17	
Ørsta	Sætre-Mork	Snøskred, uspesifisert	1755	3	17	
Stranda	Skafjellet	Fjellskred (> 10000 m3)	1731	1	17	
Fjord	Jamtegarden ulykkesnatta	Snøskred, uspesifisert	1679	2	16	

NVE – Snow avalanches, situation and frequency per county

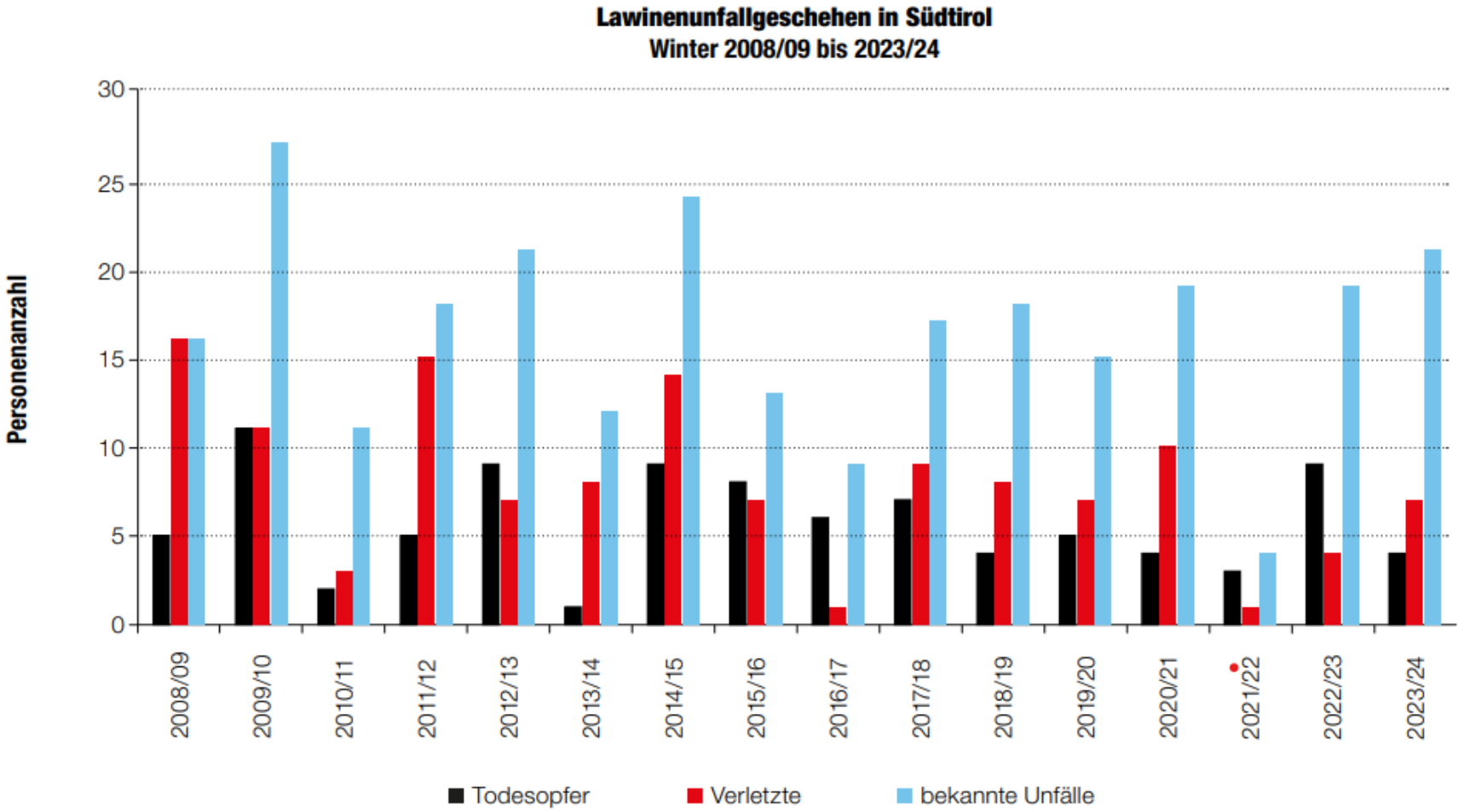




Antall døde og skredtatte i snøskredulykker fordelt på områder. Tallene baserer seg på data fra og med vinteren 2008/09, og skredtatte inkluderer både døde og overlevende. De seks første vintrene ble skredtatte kun registrert når noen omkom.

Thorough analysis yearly by *Lawinewarndienste* - in Austria

Important input to management tools – does it exist a national overview?



OeBericht_2023_2024.pdf

Risk mitigation and management

- Improved management plans and warning systems needed
- The Arctic Sea Routes - opportunities and increased risks of emission and conflicts
- Respect for International laws, and cooperation is crucial for peaceful development
- A stronger integration of geological and biological risk management into local planning is essential for building resilient societies

- *What about combining the Norwegian – Austrian registration of avalanches and make joint National Management Tool*

Potential Research project
World Champioship Alpin in Narvik 2029

- **Cooperation project**
- **Exchange of experience**