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SPECIAL RESEARCH QUESTIONS IN THE COASTAL-ZONE OF FINLAND AND UNIVERSITY OF OULU PERSPECTIVES

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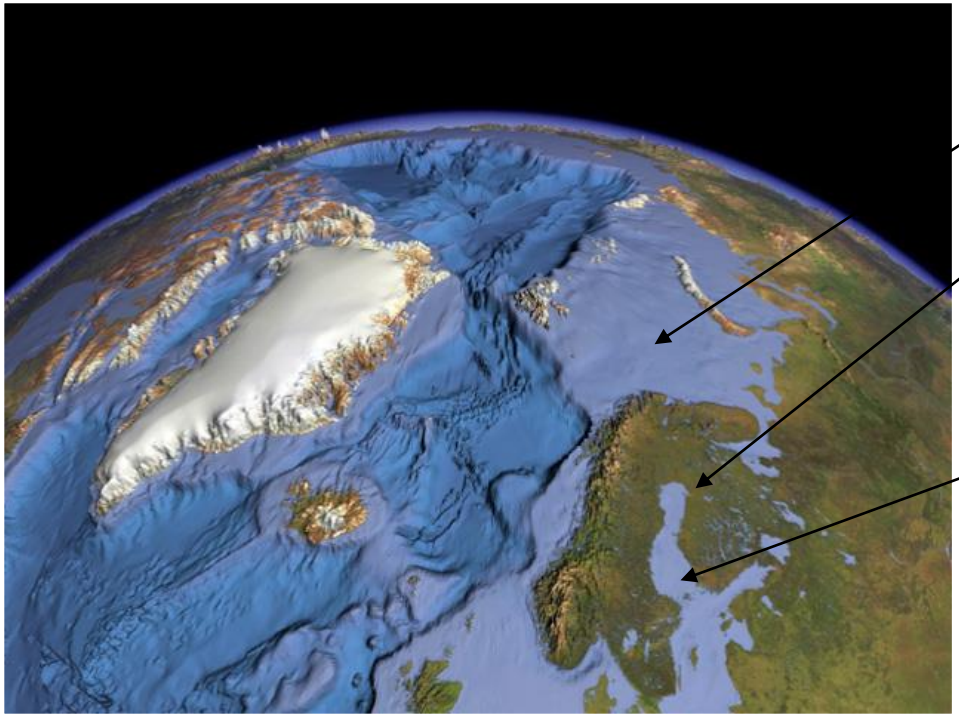
THE BOREAL-COASTAL ZONE IN FINLAND

It is a complex environment owning special characteristics because of geology, land rise, and climate.

Human impacts relate to agriculture and forestry, fishing, pollutions in sea and for example constructions related to wind power plants.



ACID SULFATE SOILS IN FINLAND

Measures to prevent and reduce damages

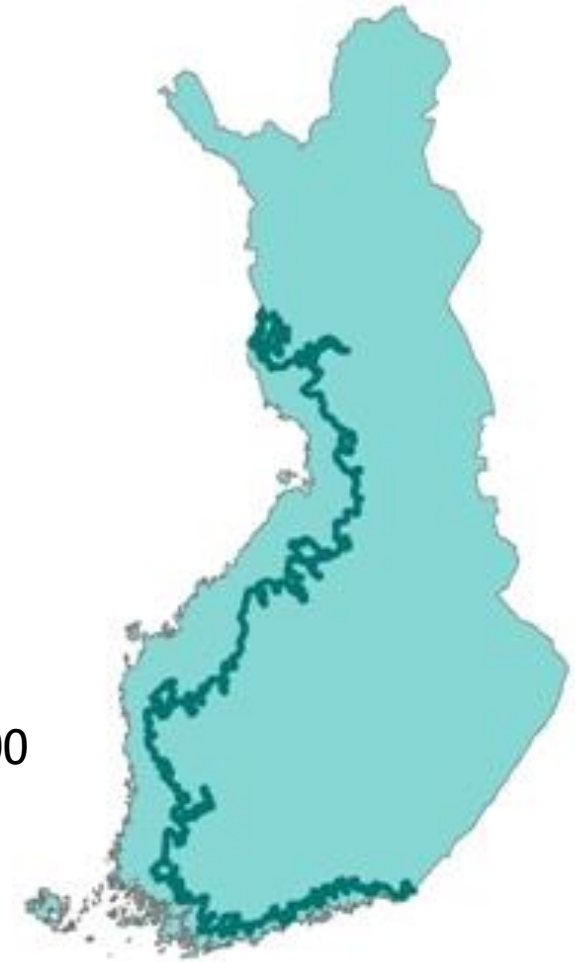
During the Holocene Epoch (last 11700 y) large areas of sulfide-bearing sediments were deposited under reducing conditions on the bottom of the Baltic Sea between Finland and Sweden.

Because of the rapid postglacial land uplift (today up to 8 mm/a) in the area, a large portion of these sediments have been raised up to 100 m above current sea level. The upper 1-2 meters have generally been oxidized into acid sulfate soils giving Finland the largest known occurrence of acid sulfate soils (ASS) in Europe, roughly 1000 km^2.

These soils leach huge amounts of metals into watercourses and for several heavy metals the amounts could exceed the total metal discharge in effluents from the entire Finnish industry thus causing severe damage on the ecology.

LANDSCAPE IN COASTAL ZONE OF FINLAND

AS Soil landscape near Seinäjoki, 70 kilometers inland from Vaasa (photo by Peter Edén, 2011)

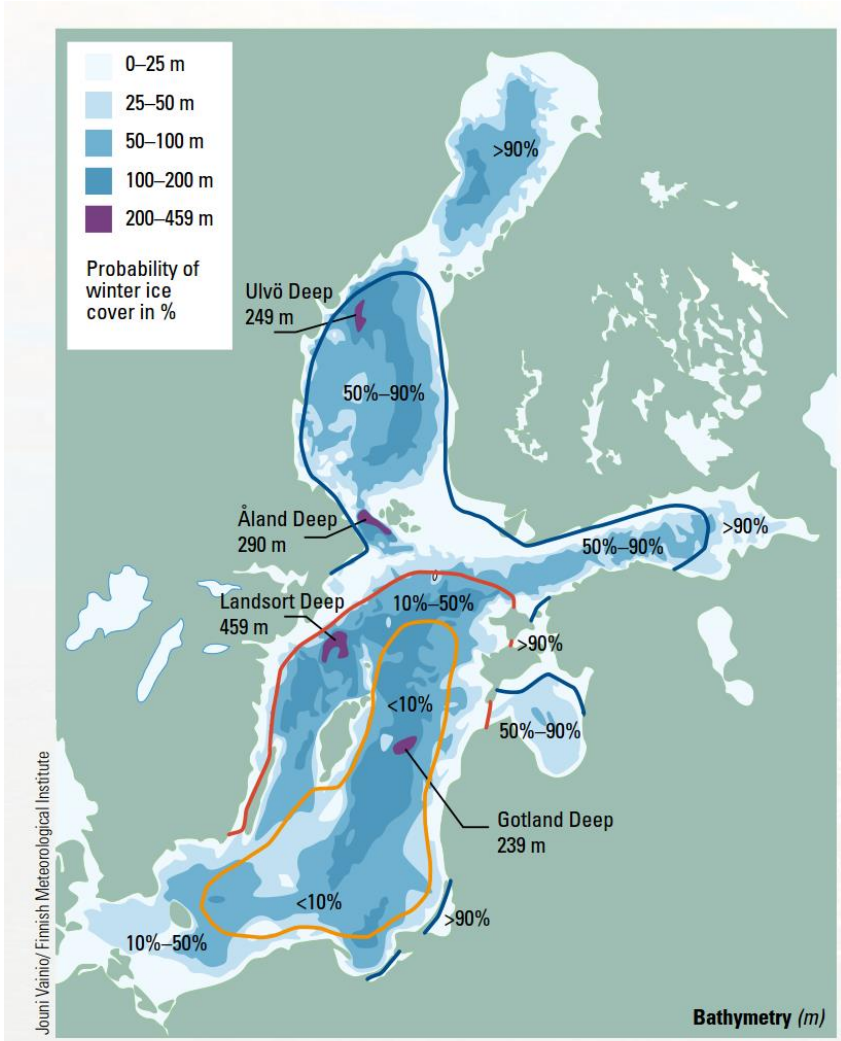


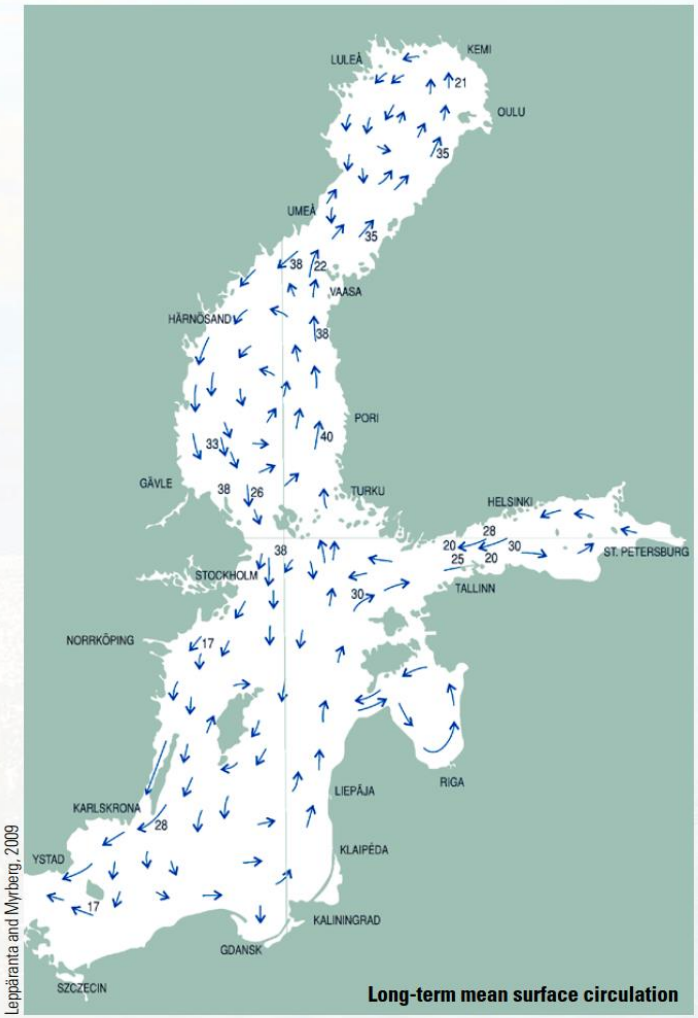
Extent of the former Litorina Sea (8000 BP). Nearly all indicated AS soils in Finland occur below the highest shoreline of the former Litorina Sea and are now activated in many places by human activities further effected by climate conditions and river runouts to sea. Some rivers can be fishless.

AGRICULTURE AND FORESTRY IN COASTAL ZONE OF FINLAND

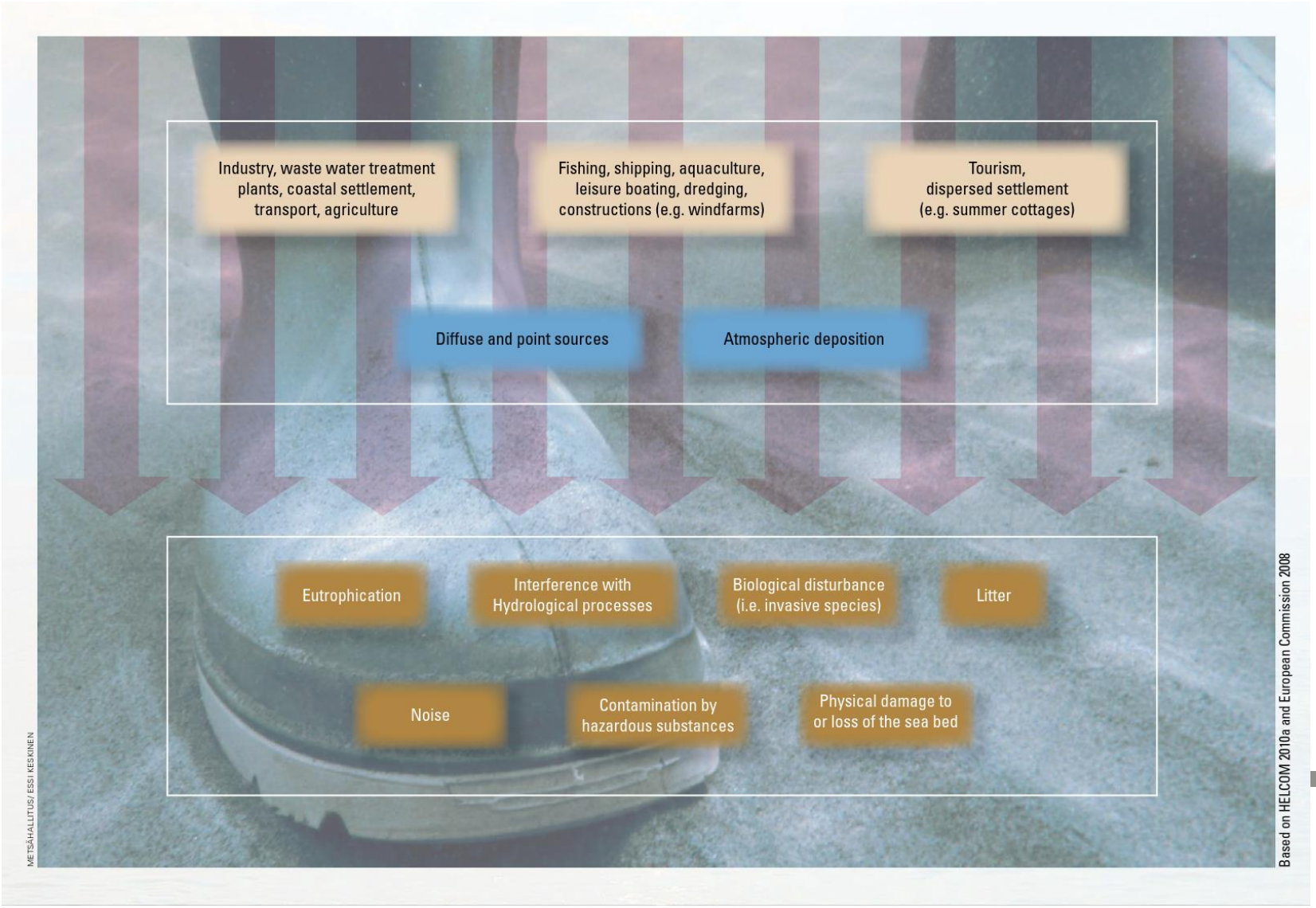
- Major effects to shallow sea like Baltic Sea.
- Measures need to be taken in the whole catchment area of the Baltic Sea to reduce land-based pollution.
- The holistic assessment shows that presently none of the open-water basins are in a good environmental state.
- The human communities linked to the sea have been negatively affected by the deteriorated state of the Baltic Sea.
- Given the current impaired status of ecosystem health, the pressures from agriculture, fisheries, industries, the maritime sector ask further studies.
- This demand communities to be more effectively managed.

FACTS ABOUT THE SHALLOW BALTIC SEA

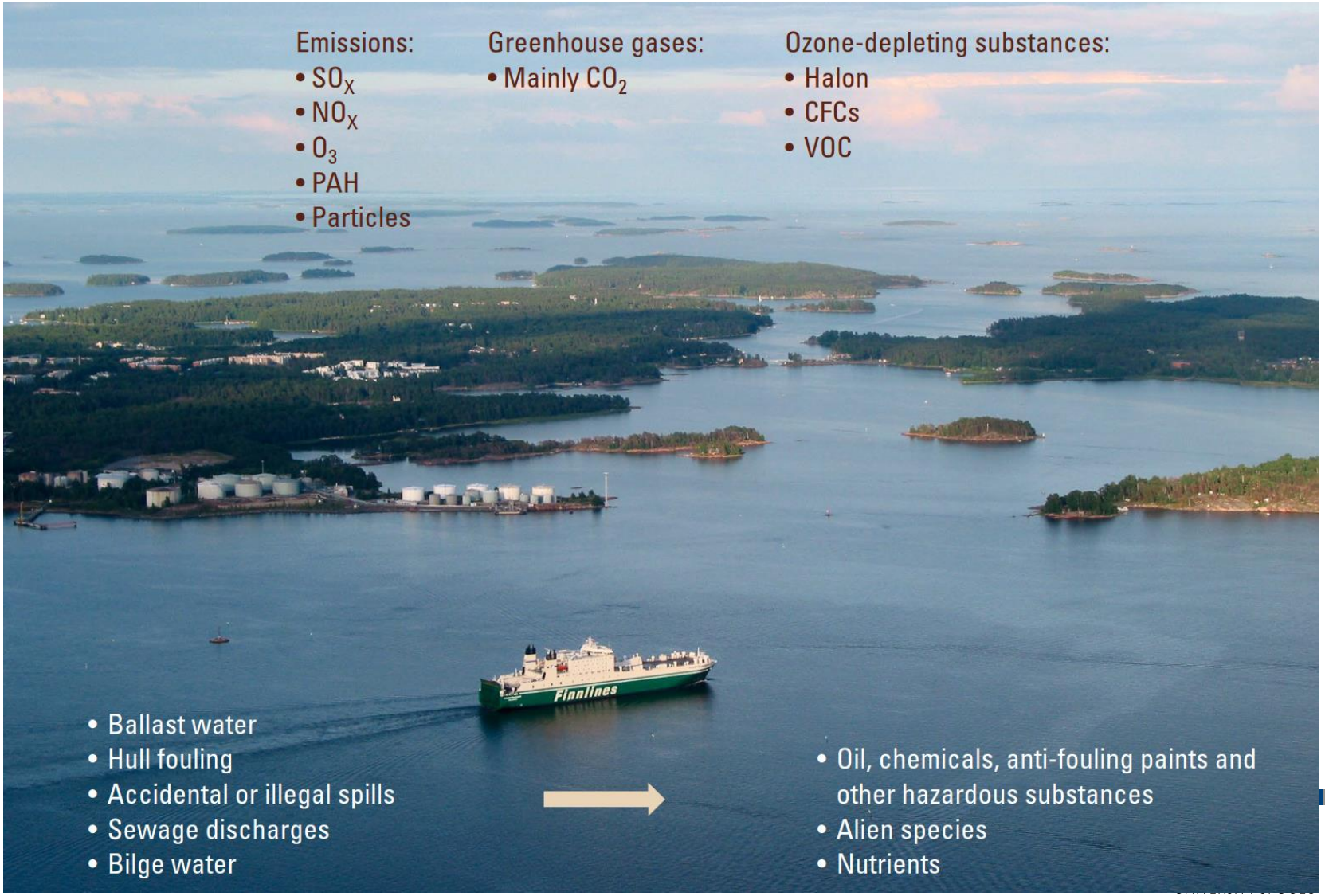




IMPACT OF HUMAN ACTIVITIES ON BALTIC SEA



EFFECTS OF MARITIME TRANSPORTATION



TO PREVENT BALTIC SEA POLLUTION

The Convention on the Protection of the Marine Environment of the Baltic Sea Area entered into force on 17 January 2000 and the governing body of the Convention is the Helsinki Commission also known as HELCOM.

HELCOM was established already four decades ago to protect the marine environment of the Baltic Sea from all sources of pollution through intergovernmental cooperation of all Baltic Sea countries.

Projects and expert working groups are an integral part of HELCOM everyday work.

SUSTAINABLE SOCIETY UNDER CHANGING COASTAL ENVIRONMENTS

Research communities efforts

Coastal structures, such as power plants, dams, waste-water treatment plants, bridges and wind farms, can cause changes in the thermal or salinity regimes demanding further research.

The main pressures on the marine environment include nutrient and organic matter enrichment and contamination by hazardous substances as well as interference with hydrological processes and physical loss of the seabed.

Currently, over 2000 vessels are at sea at any time in the Baltic, and the trend is increasing. It has been estimated that the number of vessels will be doubled over the next 20 years with effects being still mostly unknown.

OPPORTUNITIES FOR UNIVERSITY OF OULU

University of Oulu acts as an international science and innovation university and likes to participate in solving global challenges in its focused knowledge areas.

Strategic aims are to achieve a sustainable environment and also economic and social development of the region.

Establishment of the academic consortiums among universities are further needed for shaping the sustainable society under the changing climate.

INTERNATIONAL SCIENCE AND INNOVATION UNIVERSITY THAT PARTICIPATES IN SOLVING GLOBAL CHALLENGES

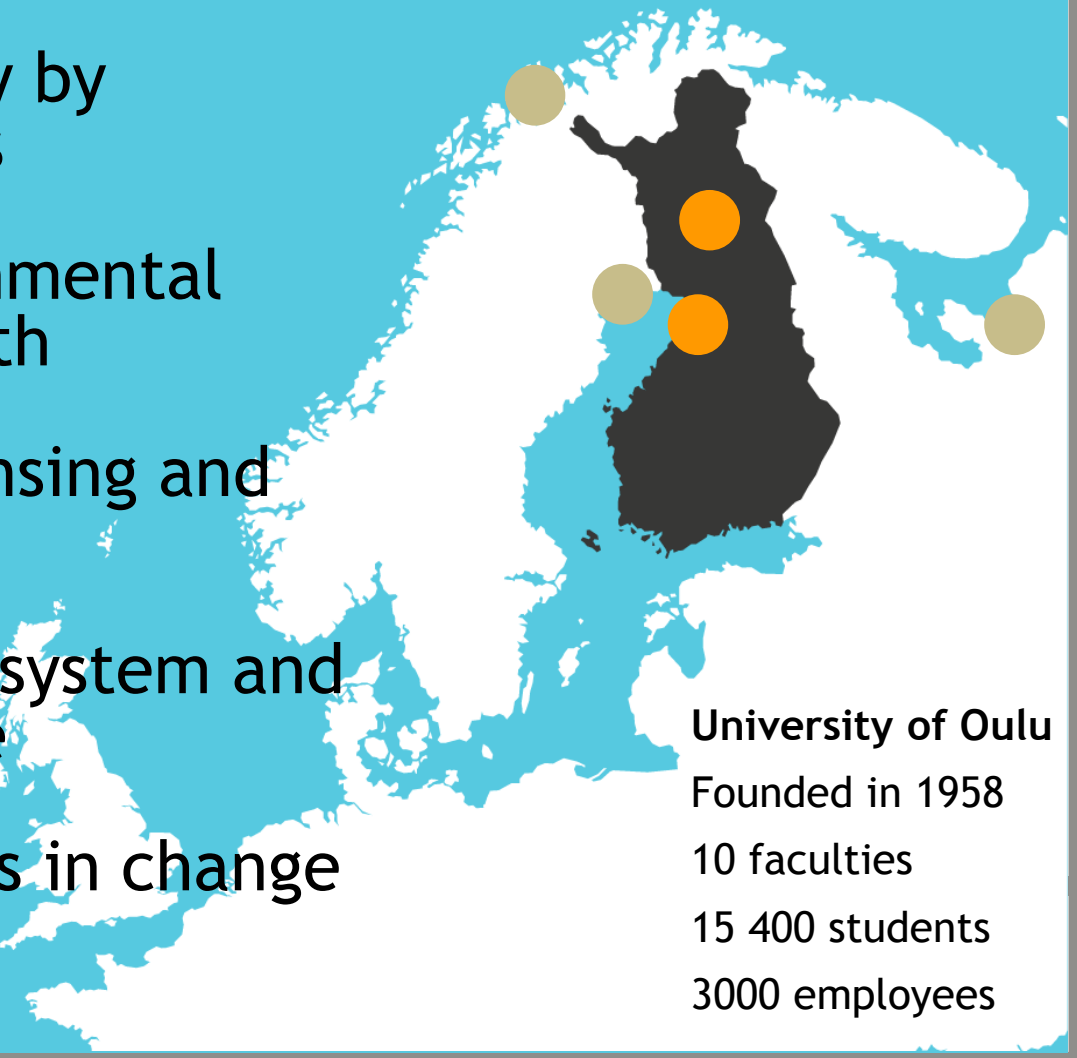
Creating sustainability by materials and systems

Molecular and environmental basis of life-long health

Digital solutions in sensing and interactions

Earth and near-space system and environmental change

Understanding humans in change



University of Oulu

Founded in 1958

10 faculties

15 400 students

3000 employees

STRATEGIC RESEARCH PROGRAMMES IN OULU UNIVERSITY

Under these spearheads there will be strategic research programmes guiding the allocation of financial resources
as well as related doctoral programmes e.g. Aurora DP that connects also to coastal research questions in its actions.

Thule Institute at the University of Oulu is an excellent contact point for the research groups which relates to the Earth and near-space system and environmental change research as well as innovations creating sustainability by materials and systems.

At the University of Oulu there is also excellent connections to research state institutes such as Geological Survey of Finland (GSF) and Finnish Environment Institute (SYKE) as well as those Uarctic thematic networks consisting costal zone research activities.

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