The need for data harmonization in a multinational region

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Introduction

- Approximately 3 billion people around the world live within 200 km of a coastline.
- This growing coastal population and increased activities in coastal and marine areas have threatened the marine environment worldwide, also in the Baltic Sea.
- To implement ecosystem-based management for sustainable use of the marine resources and protection of marine nature, effective tools are needed.

Introduction

- The Marine Landscape and Habitat maps are one of those urgently needed tools.
- However, to produce this information for the whole Baltic Sea, a large amount of data is needed.
- Especially in a multinational region, like in the Baltic Sea region, this task is very challenging.

Multinational data

- The existing national and international data is numerous, but very diverse.
- Marine data (geophysical and biological) has been derived using different field techniques during the past decades.
- Terminology and classifications vary as well, since 10 different circum-Baltic nations (Norway included) have interpreted their own data (e.g. seabed sediment) according to different national classification schemes.

Multinational data

- Harmonization of national categories to one classification scheme is essential for interoperability.
- This has been acknowledged in several national and international connections (e.g. The INSPIRE Directive*), which emphasize the importance of spatial data harmonization.

CHAPTER III
INTEROPERABILITY OF SPATIAL DATA SETS AND SERVICES
Article 7

1. Implementing rules laying down technical arrangements for the interoperability and, where practicable, harmonisation of spatial data sets and services, designed to amend non-essential elements of this Directive by supplementing it, shall be adopted in accordance with the regulatory procedure with scrutiny referred to in Article 22(3). Relevant user requirements, existing initiatives and international standards for the harmonisation of spatial data sets, as well as feasibility and cost-benefit considerations shall be taken into account in the development of the implementing rules. Where organisations established under international law have adopted relevant standards to ensure interoperability or harmonisation of spatial data sets and services, these standards shall be integrated, and the existing technical means shall be referred to, if appropriate, in the implementing rules mentioned in this paragraph.

* Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE).

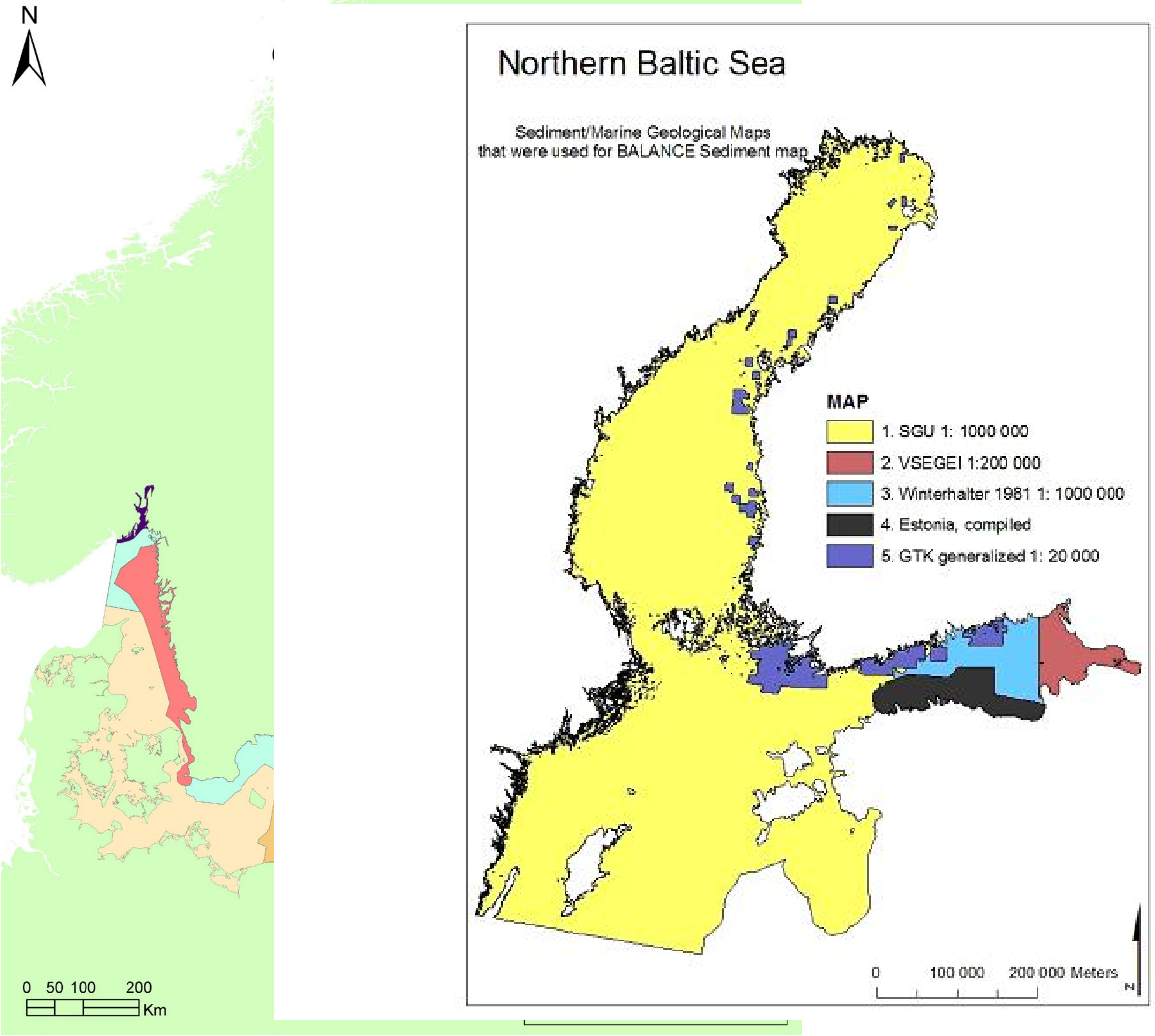
Multinational sediment data

- Seabed substrates are important in shaping the physical structure and function of marine habitats.
- No readily available sediment map covering the whole Baltic Sea

  → sediment data needed

Photo: Anu Reijonen/GTK

Multinational sediment data

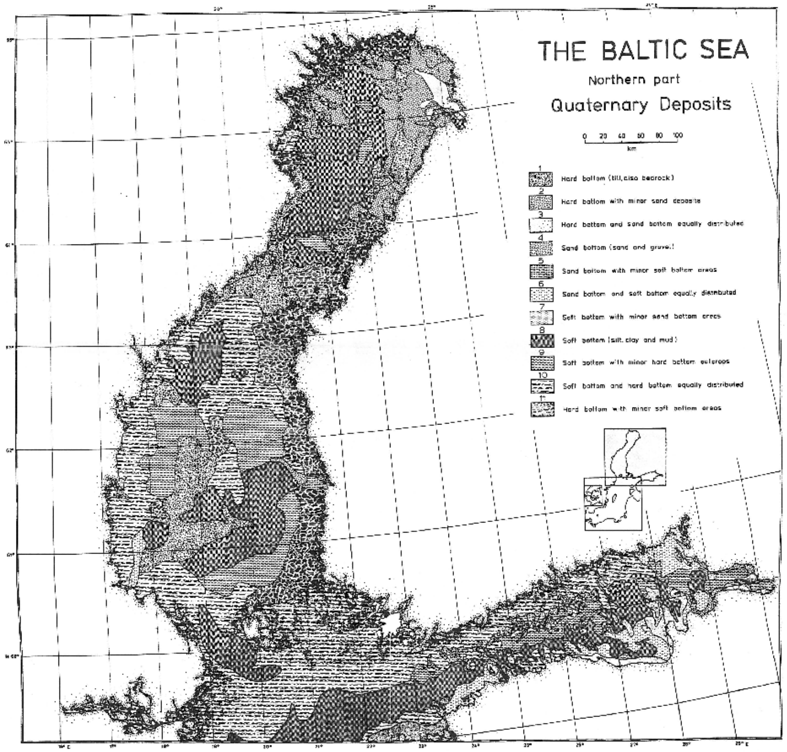


Multinational sediment data

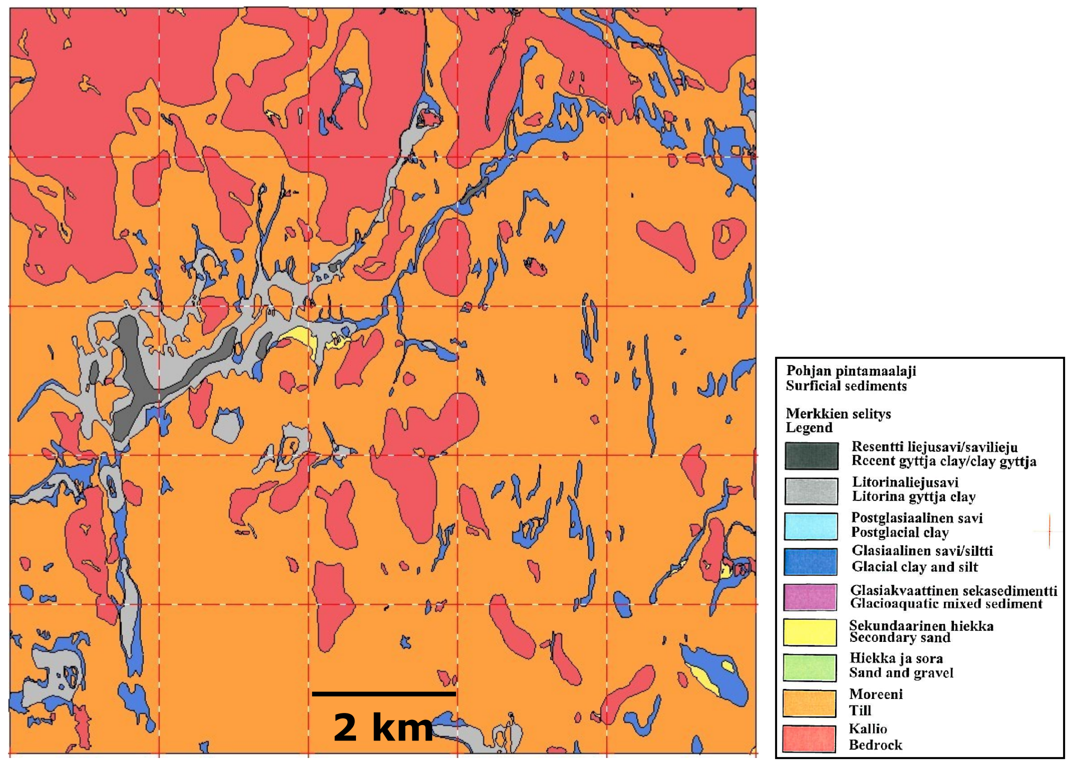
- Institutes around the BS (10 nations)
- Year ranges (1970’s → 2005)
- Different field techniques
- Scales (1: 20 000 → 1: 1 000 000)
- Interpretation methods
- Terminologies
- Classifications (19 different classifications)

Multinational sediment data

1: 1 000 000

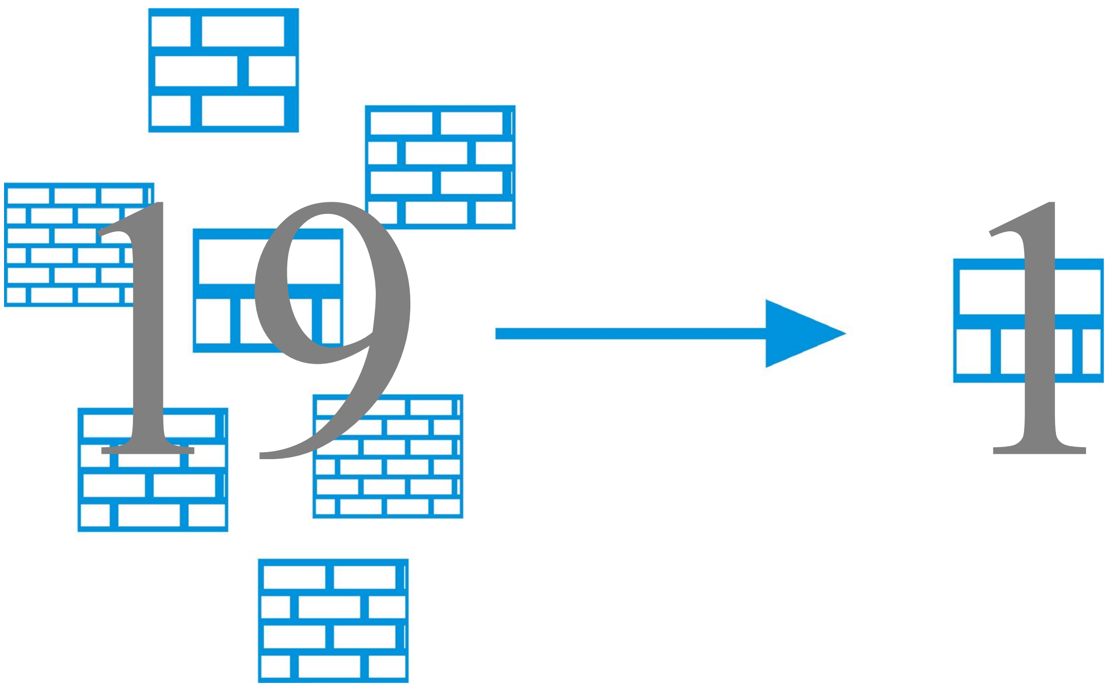


1: 20 000



Harmonization of sediment data

Classification of existing data into uniform categories



Harmonization of sediment data

- Collecting all available data.

- Careful examination which sediment classes can be extracted from existing data.

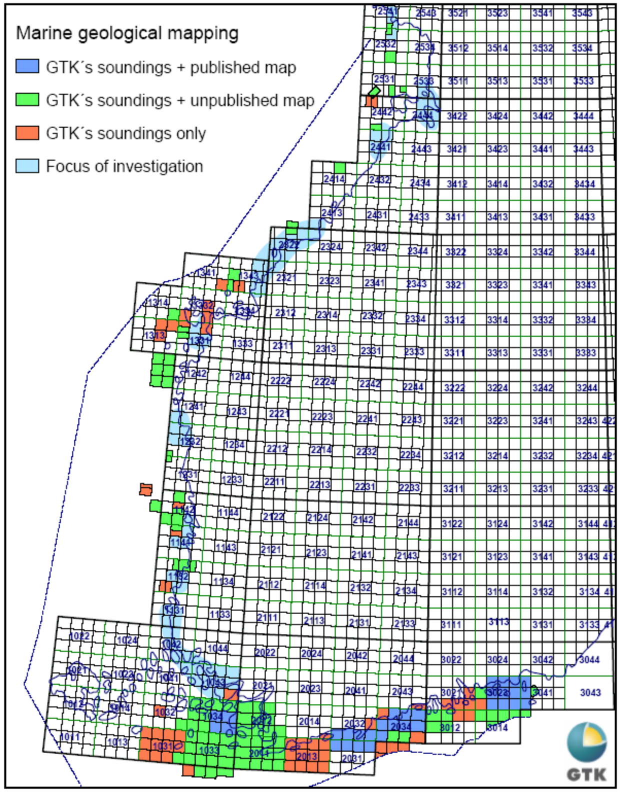
- Aim was to develop classification scheme, as simple as possible, but ecologically relevant.

The BALANCE sediment classes

1. Hard bottom, Bedrock (crystalline and sedimentary), Bedrock covered with boulders.
2. Hard bottom, Complex, patchy hard surface, coarse sand (sometimes also clay) to boulders.
3. Sand, fine to coarse sand (with gravel exposures).
4. Hard clay, sometimes/often/possibly exposed or covered with a thin layer of sand/gravel.
5. Mud, gyttja-clay to gyttja-silt.

Harmonization of sediment data

- Digitizing collected data (or transforming already digitized data) into ArcGIS format.
- Re-projection of data (WGS84, UTM34).
- Reclassification to BALANCE sediment classes.
- Transforming from vector to grid data, and data generalization.
- Each dataset was examined and controversies were studied carefully by expert judgement.

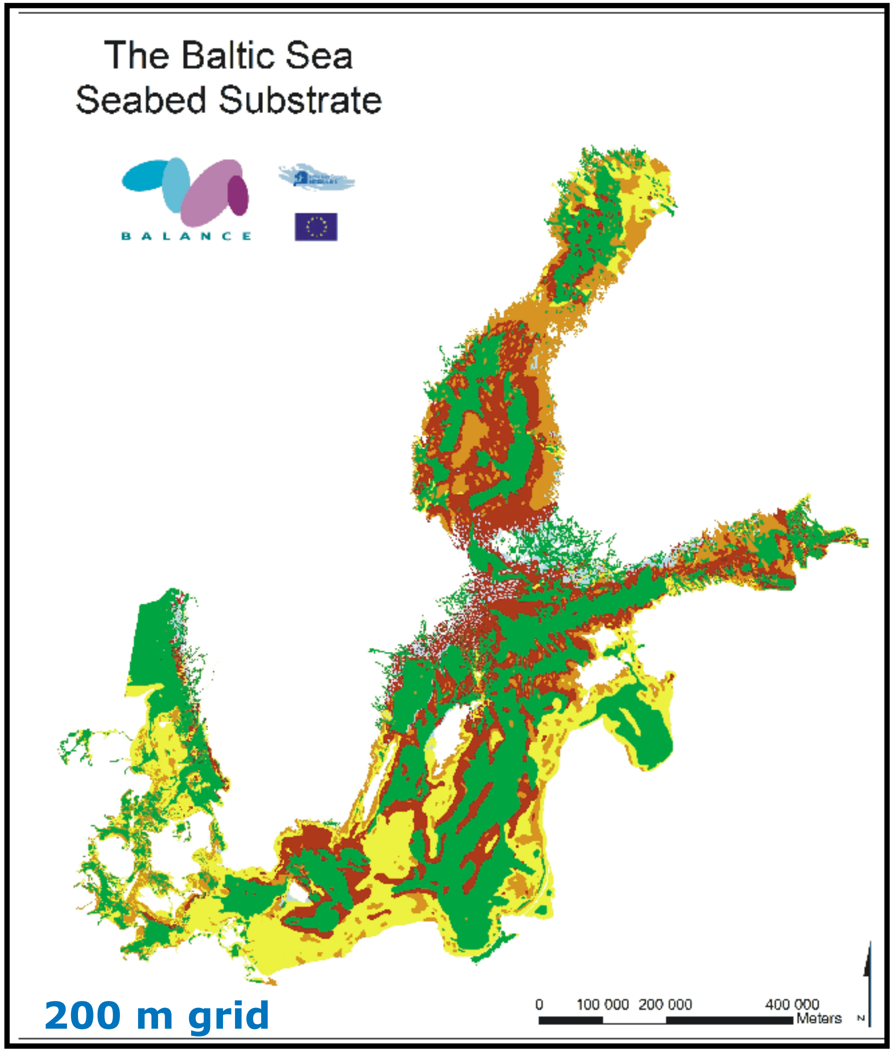


Reclassification of sediment data

Table 1. The BALANCE sediment classes, Marine geological sediment classes and the predicted surface sediments

Balance substrate classes, harmonisation Finnish data		
Balance category	**Predicted surficial material**	**Marine Geological map, GTK 1: 20 000 categories**
1. Hard bottom, Bedrock (crystalline and sedimentary), Bedrock covered with boulders.	Bedrock, boulders	Crystalline bedrock
		Sedimentary bedrock
2. Hard bottom, Complex, patchy hard surface, coarse sand (sometimes also clay) to boulders.	Complex, almost everything	Till
		Glacioaquatic sediment
3. Sand	Fine to coarse sand (gravel)	Sand and gravel
		Secondary sand or silt
4. Hard clay	Thin layer of sand, clay, clay with coarse sed. (varved clay, glacial clay)	Glacial clay and silt
5. Mud, Gyttja	Mud, gyttja clay to silt	Clay (sulphide)
		Gyttja clay or clayey gyttja (litorina)
		Recent gyttja, gyttja clay or clayey gyttja (litorina)

Results – BALANCE sediment data



Legend

1. Bedrock
2. Complex sediments
3. Sand
4. Hard clay
5. Mud & clay

The BALANCE sediment classes

- Using the BALANCE substrate classification it was possible to distinquish major bottom types as well as special substrates which are characteristic to the Baltic Sea (like till covered seabottom and hard clay substrates/glacial varved clays)

- The BALANCE sediment classification consists only of 5 classes, however the grouping is relative similar to EUNIS classification

- The BALANCE classification is not directly divided according to the mobility of substrates

- In BALANCE classification scheme glaciofluvial and morainic formations are divided into different categories, “Sand, fine to coarse sand (with gravel exposures)” and “Hard bottom, Complex”, respectively.

Conclusions

• Data collection and harmonization is a challenging and arduous task.

• The resultant sediment map is no better than the information which it was developed – for some areas data are scarce.

• Even if the sediment classification is rough, produced data is very usable for regional scale modelling, like for the development of the Baltic Sea Marine Landscapes.

• Data (and used classification) is not suitable for fine scale planning.

• It has not been possible to gain access to all known data sets for various reasons (e.g. military restrictions).

• Importance of international standards for the harmonization of spatial data sets.

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Thank you for your attention