

Workshop: Salt water inflow

The Baltic Sea - The second biggest brackish water body on earth

Do you know what “brackish” water means? The Baltic Sea is really special with respect to its location, topography and water. This workshop makes you familiar with all of this.

- 1) Read about what makes the Baltic Sea to be a special sea in worksheet 1.
- 2) Run the experiment 1 in groups of 2-3 students. Read the instructions first, conduct the experiment and answer all given questions.

Worksheet 1: Some facts about the Baltic Sea

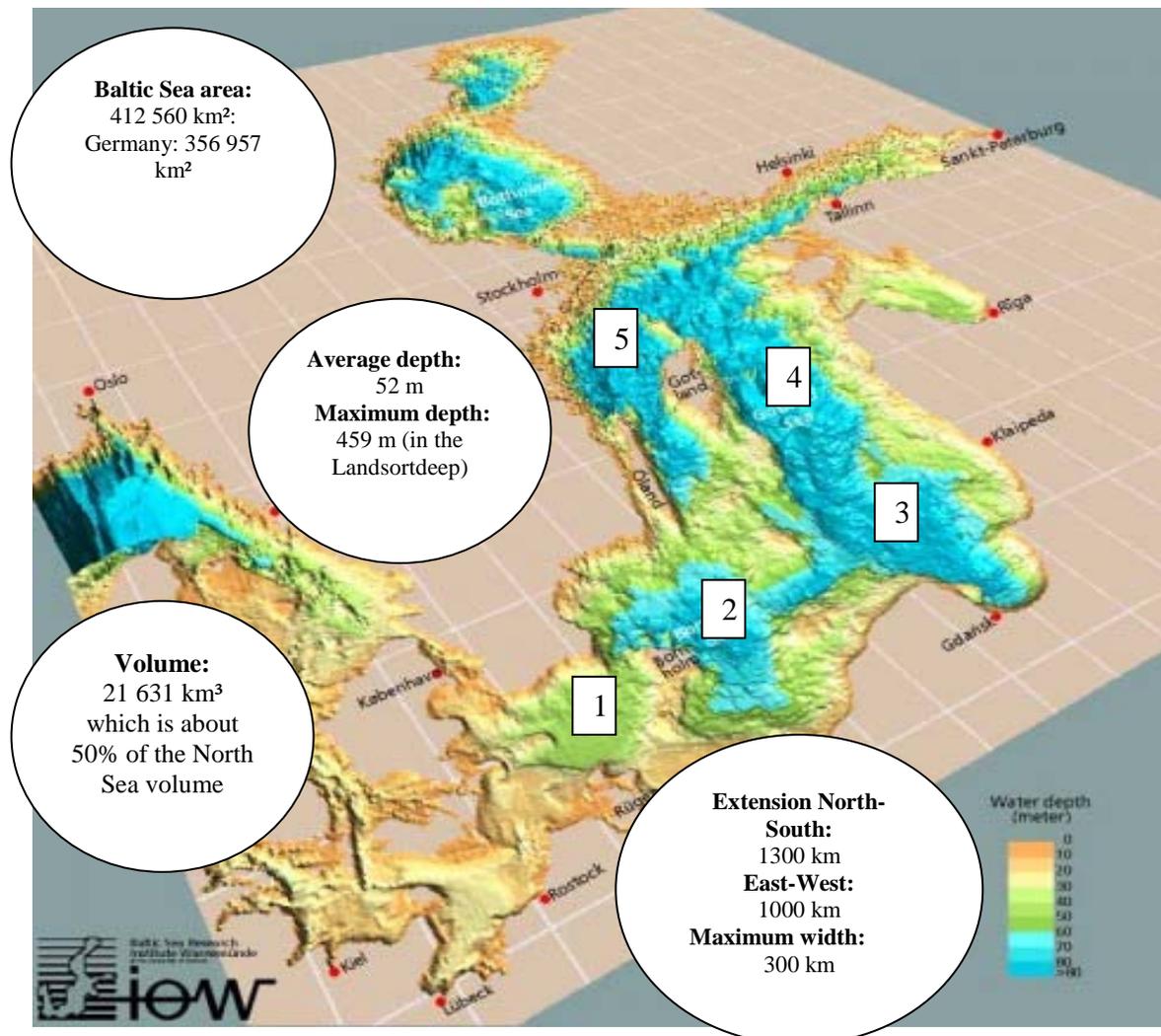


Fig. 1: Some facts about the Baltic Sea

Maximum Depth of Basins:

1. Arkona Basin	48 m	3. Gdansk Basin	112 m
2. Bornholm Basin	92 m	4. Eastern Gotland Basin	248m
		5. Western Gotland Basin	459 m

Due to being almost completely land locked the Baltic Sea is a so-called a semi-enclosed Sea. It is connected to the North Sea via the sound between Denmark and Sweden (Fig. 2 - 1), the Great Belt (Fig. 2 -2) and the Small Belt (Fig. 2 - 3). All three are important pathways for saltwater entering the Baltic Sea. On the other hand many smaller and bigger rivers drain into the Baltic Sea with Oder (Germany, Poland), Vistula (Lithuania, Poland), Neva (Russia) and Torneälven (Sweden) being the biggest rivers, causing a large amount of freshwater input. The mixture of sea- and freshwater is called **brackish water**. Water from North Sea contains 35 g salt/L (35 PSU)¹, but salinity of Baltic Sea waters varies according to location and depth from 2 to 20 g/L (2-20 PSU). A cross section through the Baltic Sea reveals that it consists of a series of basins which are separated from each other by sills. Usually due to the freshwater input the water table of the Baltic Sea is elevated compared to the North Sea causing Baltic Sea water streaming out towards the North Sea. But how does saline water manage to flow into the Baltic Sea? And are there any obstacles which have an impact on water exchange?

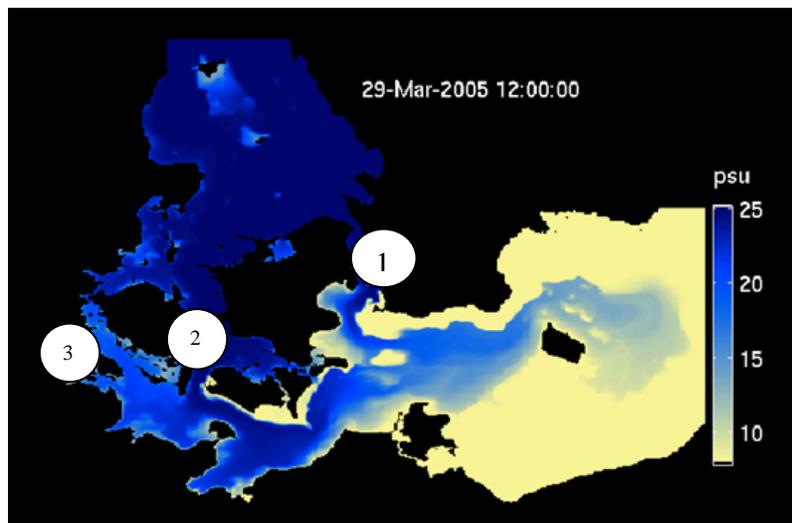


Fig. 2: Inflow of North Sea water into Western Baltic Sea. Salinities from the bottom layer are displayed.

¹ Salinity expressed in PSU (Practical Salinity Units) which mean g salt /kg seawater. 10 g salt per kg water equals to 10 PSU which is 1 mass- %.

Experiment 1: Experiment to study inflow of North Sea water into the Baltic Sea

Instruments:

North-/Baltic Sea Modell, salinometer, electronic balance, measuring cylinder

Chemicals:

freshwater, salt (sodium chloride), blue ink

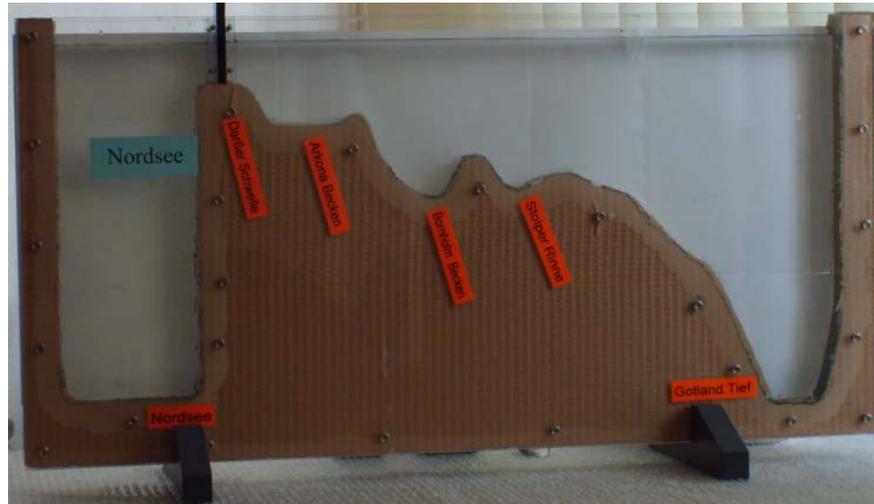


Fig. 3: Model for visualization water exchange North Sea /Baltic Sea

Preparations/Instructions:

- prepare 5 l of 35 PSU water
- close the connection between Baltic Sea and North Sea using the rubber lid
- fill in 35 PSU water to the North Sea and freshwater into Baltic Sea, North Sea water should have a slightly higher water table (approx.. 1 cm)
- put 20 ml of blue ink into the North Sea and stir carefully
- allow North Sea water to enter the Baltic Sea by removing the barrier
- document the progress of the inflow by making a series of pictures or a video
- when the inflow is finished, carefully measure the salinity in the North Sea and in all Baltic Sea basins both on the surface and close to the bottom
- prepare a sketch of the model and insert the measured salinities

Tasks:

1. Describe the way how the North Sea water enters the Baltic Sea. Give reasons why it occurred in this way
2. Try to transfer the experimental data to the Baltic Sea wide scale with respect to horizontal and vertical distribution of salt in the water. Where do you expect highest and were lowest values and why?
3. Do you expect salinities to be stable on a given location for time spans of month or even years? Please try to give reasons for your answer.
4. Which role do the sills have regarding the inflow of North Sea water?
5. What do you like best on the model and what least?

Notes:

Empty rectangular box for notes.



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