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Water masses between the Baltic Sea Proper and the Bothnian Sea

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The Baltic Sea consists of consecutive basins, which are in most cases separated by underwater sills. Deep waters of these basins are waters that are below the sill depths and below the seasonal vertical overturning depths. Such waters in the largest of these basins, the Baltic Sea proper, suffer from continuous anoxia, whereas the deep waters of the other large basin, the Bothnian Sea, are always considered healthy in term of oxygen conditions. This difference between the deep waters of the basins follows from the water exchange where the surface waters of the Baltic Sea proper ventilate the deep waters of the Bothnian Sea. A possible question is: can this situation change with climate change.

Although the water exchange between the basins is relatively well know on a general level, there are too few data available to understand the processes in detail and to study the dynamics in the smaller connecting basins. To acquire more data, we did a field experiment in spring 2017 that included observations from one research ship, two gliders and one moored ADCP station to look at the water masses and their mixing on their way from the Baltic Sea proper to the Bothnian Sea. Furthermore the experiment was the first international two-glider mission in the Baltic Sea with one glider from Finland and one from Estonia measuring in the same area at the same time.

Here we present the first analysis of the data sets collected during the cruise. In the smaller connecting basin, the Lågskär deep, between the Baltic Proper and Åland deep we found very dynamic processes with a moving salinity front in the surface layer and lenses with warmer water in the intermediate layer.