The Baltic Sea is a brackish, semi-enclosed shelf sea that has a catchment area roughly four times larger than the sea surface itself. Significant terrestrial inputs of nutrients cause relatively high productivity and lead to the eutrophication of the sea. This results in high organic matter concentrations within the sediments and low oxygen concentrations in the bottom waters. The oxygen depletion enhances the organic matter decay, thus promotes the returning fluxes of organic carbon and accompanied nitrogen and phosphorus to the water column. Although, there are some quantitative estimations of the dissolved organic carbon (DOC) – a measure of dissolved organic matter (DOM) – return fluxes from the Baltic Sea sediments, the fate of the sediment-derived DOC remains highly unknown. It is still unclear to what extent this DOC pool is bioavailable and how fast can it be remineralised. This missing knowledge is extremely desired as it would allow for a better understanding of the processes shaping the carbon cycling in the Baltic Sea (and likely in other shelf regions). Furthermore, quantification of the sediment-derived DOC remineralisation will contribute to the better parameterization of the oxygen consumption in the deep parts of the Baltic Sea – an issue that still requires more attention in the Baltic Sea research. As the knowledge on the bioavailability of the sediment-derived DOC is presently missing, the results of the proposed project will also improve performance of the biogeochemical models – the only available tools allowing for the holistic, large-scale ecosystem studies and for predicting potential changes in the marine carbon cycle in the future warmer and $CO_2$-rich world. The proposed project will be based on the incubation experiment of the bottom seawater mixed with interstitial waters containing sediment-derived DOC in three different temperatures. This will allow quantifying the shares of labile, semi-labile and refractory fractions in the sediment-derived DOC; estimate remineralisation rate constants, half-life times and the oxygen demand for different bioavailable fractions of DOC as well as to assess the temperature impact on the decay of sediment-derived DOC.