Baltic Sea deeps constitute sedimentation basins, areas where sediments accumulates. Riverine input as well as decent of fragmented dead marine planktonic organisms, as well of sinking particles of atmospheric aerosols are the main sources of marine sediments. Particles undergoes various physical, chemical and microbial transformations processes, which are regulated by oceanographic conditions: salinity, temperature and dissolved oxygen concentration. One of them is hydrolysis of particles into a dissolved phase, mainly dissolved organic matter, DOM. Its quantity measured as the dissolved organic carbon concentration, DOC, is usually significantly higher in sediments pore waters than in overlying near bottom waters. Results of experimental studies has shown, that during anoxic conditions the release of dissolved organic matter from sediments pore water to near bottom water may occur. This project proposes to study the mechanism of dissolved organic matter release in two Baltic Sea deeps: Bornholm Deep and Gdansk Deep. The main goal of the project is to determine diffusion coefficient of identified DOM fraction from pore waters into near bottom water, and to determine the magnitude of diffusion coefficient in relation to oceanographic conditions: (salinity, dissolved organic matter concentration). The goal will be achieved through description of qualitative characterization of the dissolved organic matter – DOM in the Baltic Sea deep's bottom sediments pore waters and overlaying near bottom water and water column in different oceanographic conditions with use optical methods and chromatography and developed statistical relationships between dissolved iron and DOC and DOM optical properties. The significant fraction of dissolved organic matter exhibits optical properties: it absorbs and fluorescence light. Therefore optical methods are easy to apply and cost effective to study qualitative and quantitative properties of dissolved organic matter. Comparison of DOM composition in sediments pore water, near bottom waters and in overlying water column will enable understanding of DOM transformation processes during its early diagenesis. The main goal of this project will be achieved through the field work campaigns undertaken during research cruises on board of r/v Oceania to Bornholm Deep, Gdansk Deep and Gotland Deep in the Baltic Sea. Those chose study sites differ from each other by frequency of bottom ventilation events and there are different physical and chemical water masses characterization (salinity, temperature, pH, and dissolved oxygen concentration). Water samples extracted from different types of bottom sediments, from to 5 – cm sediments layer, and from near bottom waters as well as water column will be collected for laboratory optical and chromatographic analysis and chemical. Optical analysis that include measurements of absorption spectra and fluorescence matrix spectra, and chemical analysis for determination of dissolved organic iron an DOC concentration will be done in the laboratories of Institute of Oceanology, PAN, Sopot, Poland. Chromatographic analysis will enable separation of different molecular weight DOM fractions, and fractionated samples will undergo optical analysis at the laboratory of Danish Technical University, National Institute of Aquatic Resources, DTU Aqua, w Lyngby, Denmark. Results of optical and chromatographic measurements will be further analyzed statistically to identify molecular weight and qualitative DOM fractions, and determine their relationships with dissolved iron and DOC. The diffusion coefficient from sediment to overlying water of dissolved iron is well established therefore developed statistical relationship will enable to estimate DOM diffusion coefficient and identify those DOM fractions that would be most susceptible to migrate and in which direction across sediments/near bottom water interface. The return DOM flux from sediments to near bottom water may act as the transportation medium and possible mechanism of heavy metals and pollutants re-mobilization. Determination of diffusion coefficient of different DOM fraction, and determination of environmental conditions when such flux would occur, could a potential tool for risk assessment for heavy metals and pollutants re-mobilization.