

Towards the use of currents for reducing anthropogenic risks for the Baltic Sea coasts

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Recent studies have indicated the existence of semi-persistent patterns of currents in various parts of the Baltic Sea. Their presence leads to a high variability of the transport of dangerous substances and adverse impacts from different open and coastal sea areas to the vulnerable areas. This variability and accompanying heterogeneity of current-driven transport opens a principally new way towards the use of intrinsic properties of marine dynamics for reducing the environmental risks stemming from shipping, offshore, and coastal engineering activities. The key benefit is an increase of time during which an adverse impact (for example, an oil spill) reaches a vulnerable area after an accident has happened.

The material is presented from the viewpoint of a generic example of management of risks stemming from potential pollution due to the heavy ship traffic and reduction of such risks for vulnerable sea areas through a proper choice of the fairway. The approach, however, is fairly general and can be used for management of a large variety of risks and adverse impacts carried by sea currents. Obvious applications are, for example, problems connected with the drift of various items such as vessels without propulsion, rescue boats and lost containers, or questions arising in planning of large-scale underwater pipelines.

The relevant studies form the core of activities of the major international research project BalticWay that involves 8 partners from 5 Baltic Sea countries and is funded by the BONUS+ program. The objective is to combine recent developments in physical oceanography of the Baltic Sea to develop a scientific platform for an innovative low-cost technology of rapid estimates of and offering a way towards minimizing adverse impacts of anthropogenic activities. The technology will be first applied to place dangerous activities in areas, an accident in which will have a minimum threat to vulnerable areas. We present the major challenges (scientific and otherwise) to be dealt with in this project, formulate a concrete implementation plan for the practical adoption of the relevant environmental management technology, and describe blueprints for further research and development.