

## Review of manuscript egosphere-2024-2640

Tarmo Soomere, Mikolaj Zbiegniew Jankowski, Maris Eelsalu, Kevin Ellis Parnell, and Maija Viška: Alongshore sediment transport analysis for a semi-enclosed basin: a case study of the Gulf of Riga, the Baltic Sea

### 1. General comments

The authors study coastal sediment transport dynamics in the Gulf of Riga, a semi-enclosed bay at the eastern coast of the Baltic Sea using high-resolution wave time series (SWAN wave model) and the Coastal Engineering Research Centre (CERC) equations for the time span 1990-2022. Based on a hierarchical decomposition of the sedimentary near-coast sedimentary system into compartments and cells, the authors are able to specify transport dynamics along the coast. Integrating these local and regional features the authors draw a generalized picture of the wave-driven potential sediment transport dynamics of the study area. In addition to the natural meteorological, oceanographic and sedimentological environment also anthropogenic coastal structures influencing the transport processes are considered.

The work represents a valuable contribution to the model-based description of coastal dynamics of the eastern Baltic Sea. The methodology can be generalized to be applied to microtidal sandy coastal systems for sustainable coastal zone management.

A publication is recommended after **moderate revision**.

### 2. Specific comments

A restructuring of the text is suggested:

1. The **introduction** should primarily present the scientific task and the concept of its solution based on current knowledge, and quote to references (including authors' publications).

2. A next section should give an overview of the **study area** which is required especially for readers outside the Baltic region who are not familiar with the regional peculiarities. This concerns a description of the geographical, geological, climatic and oceanographic characteristics of the Baltic Sea before the Gulf of Riga is described in more detail, whereby the sedimentological peculiarities of the coast should be taken into account. Sediment sources (including inputs from the open Baltic Sea and discharge from rivers) and sinks should be specified.

The **methods and data** section should include information on all primary (measured) or model-derived secondary data used, as well as a description of the models and their handling (such as the decomposition of the coastal space into cells and compartments and the model grid design). Regarding the models, it concerns the SWAN wave model and the ERA5 model for generating forcing data, the CERC equations and their parameterization.

In a separate section, the **results** already described in the present manuscript should be presented in a coherent manner. However, by now there is a discrepancy between the numerical model approaches and the purely qualitative verbal (or graphic) form of the result descriptions. This discrepancy could be minimized through quantification (increased use of statistically estimated generalizing parameters and parameter functions).

A separate **discussion** section is recommended. In this section, the acceptability of generalized data as model input should be discussed in particular. Other points are the reliability of the results and the limitations of the methods used. It is also important to refer

here to the effects of anthropogenic structures in the coastal area on sediment dynamics, which are mentioned in various places in the text but are not yet discussed sufficiently.

In a final **summary and outlook** section, the results are to be concluded and a perspective is to be given. Figure 13 can be used as a basis for a graphic summary. However, the question arises whether the potential net transport could not be quantified by scaling the corresponding arrows.

In order to facilitate the understanding of the spatial and temporal relationships of the local model results, an additional tabular summary of the results is recommended.

In the outlook, the spatial extension of the investigations already indicated in the last sentence of the manuscript, as well as a methodological refinement for sustainable coastal zone management, should be addressed in more detail.