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Ocean Science Discussions

Interactive comment on "Modeling of discharges from Baltic Sea shipping" *by* Jukka-Pekka Jalkanen et al.

Daniel Heydebreck (Referee)

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The authors provided a well-written manuscript on a tool called STEAM that is able to calculate different streams of pollutants and nutrients from ships into the Baltic Sea. Detailed explanations are given in the Materials and Methods section and data from other studies and own surveys are provided in the supplement. STEAM has been a valuable tool before this update and now produces data that are even more useful. These data are valuable for scientists in different fields. To make STEAM data actually re-usable by other scientists, a detailed description of the model and publication is necessary – which was done by the authors. In addition, the output data have been persistently published with a DOI. Proper metadata is assigned to the published data and the data files comply with the CF Conventions. I consider this important so that

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Discussion paper

other scientist actually can re-use these data.

I do not see any major issues or inconsistencies in the manuscript with respect to scientific quality or methodology. There are a few question with respect to the Good Scientific Practice:

- Is the model code freely available?
- Is the model code well documented in the sense that it is re-usable by other scientists?
- Are the emission data available for additional years? If yes, are these data published as well? If not, is it possible to publish the other years? They might be valuable for

My specific comments mainly deal with missing references and figures that are hard to understand by color-blind readers. These comments are provided as comments in the attached pdf copy of the manuscript.

Please also note the supplement to this comment:
https://os.copernicus.org/preprints/os-2020-99/os-2020-99-RC2-supplement.pdf

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Ocean Science Discussions

Modeling of discharges from Baltic Sea shipping

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Abstract. This paper describes the new developments of the Ship Traffic Emission Assessment Model (STEAM) which enable modeling of pollutant discharges to water from ships. These include nutrients from black/grey water discharges as well as from food waste. Further, also the modeling of contaminants in ballast, black, grey and scrubber water, bilge discharges and stern tube oil leaks are described, as well as releases of contaminants from antifouling paints. Each of the discharges are regulated by different sections of IMO MARPOL convention and emission patterns of different pollution releases vary significantly. The discharge patterns and total amounts for year 2012 in the Baltic Sea area are reported and open loop SOx scrubbing effluent was found to be the second largest pollutant stream by volume. The scrubber discharges have increased significantly in recent years and their environmental impacts need to be investigated in detail.

1. Introduction

Ship operations produce waste streams related to propulsion and engine operations, as well as crew and passenger activities (Fig 1). The waste streams related to propulsion and engine operations include bilge water from the machinery spaces, stern tube oil from lubrication of the propeller shaft, scrubber wash water from Exhaust Gas Cleaning Systems (EGCS) for reduction of emissions of sulphur oxides into the atmosphere, ballast water from maintaining ship stability, biocides used in antifouling paints to prevent hull growth, cooling water and tank cleaning residuals. Waste streams related to humans on board include food waste, black water (sewage), and water from galleys and showers (grey water), as well as other solid waste. Operational emissions and discharges from ships are regulated through international conventions, primarily the IMO MARPOL with its

Fig. 1.