

## ***Interactive comment on “Long-term coastal openness variation and its impact on sediment grain-size distribution: a case study from the Baltic Sea” by Wenxin Ning et al.***

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Ning, Tang and Filipsson use GIS data coupled with grain size data from core to analyze the effect of sea level changes on the sedimentary record of an inlet system.

I have several major and minor comments, listed below.

Respectfully, Evan B Goldstein

Major Comments:

1) I believe this manuscript could benefit with more description as to the mechanics of sediment transport in this specific system to justify the results (Section 3.2). For

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instance, what drives sand transport in the modern system? Does sand come from the Baltic into the inlet? or is the sand coming from the terrestrial setting? i.e., as a reader it would be helpful to understand in more detail how this physical system works?

2) Can the authors connect openness index with a near bottom water velocity and sediment transport in some way - i.e., fetch, wind speed, and water depth to calculate wave orbital motions at the bed using the relations presented in Young and Verhagen (1996)? Or perhaps the authors could relate the (spatial) change in openness index to the wind field (modern or ancient) and the fetch?

3) The authors focus on developing an 'openness index' which is the average length of line from the core site to land at a given time/sea level. Why are landward vs. seaward openness indices differentiated? And a related comment, the shifting angle is discussed only briefly. Can the authors give us some guidance on picking a starting position? Do any radial lines, at any time, make it to the open Baltic sea (i.e., do any openness measurements exceed the 8 km line segments used)? Are these lines important? (i would presume so, because these directions would permit larger waves into the system and exert more work on the bed.)

4) The authors present Figure 6 and 7 to show there is variation in the openness index for a given degree interval (or shifting angle) at a given time. Is there a way to make this analysis more quantitative? (i.e., p5, line 9; how much 'larger'?) One suggestion to illustrate this in the figures is to plot openness variance as opposed to the raw openness index. On a related note, the authors state that they endeavor to find an optimal degree interval (p. 5 line 3). I assume 'optimal' in this context refers to a negligible variance in openness index relative to decrease computation time (associated with increasing the degree interval)? Perhaps quantifying the variation in openness index for a given degree interval will aid them in searching for an 'optimal' interval?

5) The authors present openness index data and grain size in figure 8. I believe more quantitative analysis could be performed with this data to convince the readers. For

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instance, what values of shifting angle and degree interval was used? why? What is the correlation between opening index vs sand %? or openness index vs silt/clay?

6) Has there been erosion of the islands since 5 ka? (i.e., is the present subaerial expression of the islands identical to the coastlines of the island in the past?) how could this impact your study?

Minor Comments:

-The manuscript referee to 'radical' lines (e.g., p4; line 10-15). Would 'radial' be a more fit word instead?

-The reference for Al-Hamdani and Reker is incomplete.

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