

## ***Interactive comment on “A wind proxy based on migrating dunes at the Baltic Coast: statistical analysis of the link between wind conditions and sand movement” by Svenja E. Bierstedt et al.***

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### General comments

This is, in principle, an interesting piece of work that addresses a new option of construction of a proxy of wind regime in the past using the formation of sand layers of active dunes with different properties under anisotropic wind climates. Even if the pattern of correlations of wind properties, Baltic Sea water levels as their proxy and features of sand layers remains quite noisy, the message itself is valuable and worth of further elaboration.

Unfortunately several flaws in the manuscript defocus the outcome and diminish the

C1

implications of the analysis. It is still likely that the manuscript will become publishable after major revision.

### Specific major aspects

1. No information is presented about statistical significance of the presented correlations. Even though this way of categorisation of links between different quantities is basically formal and may provide false positive or negative conjectures, it is important to amend the material so that the strength of correlations is characterised by some other kind of measure with clear interpretation. Also, in some occasions other measures such as root mean square deviation or similar would be helpful to clarify the context.

2. The formulation of the main outcome (the existence of positive/negative correlations) is interpreted in a manner that is not really supported by the presented analysis. This first of all applies to wording like "validation" of the results. Even though the correlations in question are interesting and potentially valuable, essentially no validation is provided in the manuscript.

3. It is questionable whether it is acceptable to rely so strongly on a source (Ludwig et al. 2016) that is currently not yet published and has thus not fully undergone quality control of the peer-review process. A partial solution would be to make this source available, e.g., via ArXiv.org or similar channels.

4. The use of English is generally fine but the use of several specialised terms is questionable and in some locations help from a native speaker might make the presentation more transparent and compact. The text contains numerous unnecessary repetitions, redundant words and phrases. The examples below highlight only a small selection of these, so the text should be thoroughly and entirely polished. The Abstract is far too long and contains several exact sentences from the body of the manuscript. The Discussion is basically a reformulation of work done, including assumptions, and contains no proper discussion. The list of references systematically ignores capitalisation

C2

of proper names.

Technical issues and recommendations for Sections 1 and 2 (pages 1–5)

Page 1, sentences on lines 3–4, 6–8, and 9 should not be part of Abstract and the rest of Abstract should also be compactified.

Line 18: the expression "that this type of dunes can be validated with dendrochronological methods and derive acceptable validation values" requires complete rewriting.

Line 20: " from the meteorological reanalysis" is redundant.

Lines 21–24: the two sentences are redundant (or packed into a few words) without any loss to the content.

Page 2, line 2: remove "Future" as the statement is valid also for the past and present

Line 13 "during migration" is redundant.

Line 15: " This kind of dunes do not only exist at the Polish coast, but also ..." should be rephrased.

Line 20: it is questionable whether it is appropriate to appraise here a source that is not yet published.

Line 23 "measure device" should be corrected; also probably "step-like" is meant.

Page 3, lines 1–2: "instead of direct station observations " is redundant without any loss of content.

The sentence on lines 7–9 is weakly (if at all) connected with the text and could be deleted without any harm to the core message.

Line 10: "statistical link" sounds strange.

Line 11 and in many occasions below: the term "dune intervals" is, to my knowledge, not widely used in coastal science. Its classic (but perhaps partially outdated) notion

C3

is the distance between crests of two subsequent dunes. Its use in the context of this manuscript may collide with the use of "interval" in a completely different sense as intervals between glacial cycles. Thus, I strongly recommend to consider another term, and if "dune intervals" is generally used in this field of science, to bring a thorough explanation and references in order to avoid misinterpretation.

Line 11: "the relationships between the reconstructed wind and wind characteristics" is incomprehensible.

Line 12: say just "speed" instead of "wind speed".

Lines 20–22: such short introductions to chapters are basically fine, but they also serve as partial repetitions of the material in Introduction and could be merged with the information on lines 17-18.

Line 25: the sentence is pure repetition of material on lines 3-4 and should be omitted.

Line 29: "changes" requires "are".

Lines 30–31: the length of the coastDat2 does not make it homogeneous, so please reformulate the claim.

Line 32: the text says already fourth time here that coastDat2 is used in the presented manuscript.

Page 4, line 1: "COSMO-CLM" should appear only once.

Line 3: a comma before the equality sign should be deleted, and one should say "levels".

Line 5 " on hourly temporal resolution": say simply "hourly".

Line 8: delete " (used to generate coastDat2)" as this information was already provided.

Line 10 and several other occasions: "comparable" is not a good adjective to characterise the match of two quantities; please use some more exact quantification.

C4

The sentence on lines 18-20 seems not to carry any new information and could be deleted.

Line 20: consider replacing "And although there exist" by "Although there exists".

Line 22: consider replacing "be dependent" by "depends".

Lines 23-24: remove " Regarding temperature," and " Regarding precipitation".

Line 25: remove " obtained with coastDat2 data" as it is clear from the context from where the results stem.

Page 5, lines 5–6: consider replacing the unclear phrase " which mostly occur and are strongest" by "which are most frequent and strongest".

Lines 7–8: delete "due to sediment deposition on its lee side" as this is clear from the first part of the sentence.

Lines 11–12: the claim " Nevertheless, winds are the most important drivers of aeolian processes in general" is true by definition (Aeolus was the Greek god of the winds) and should be removed from here.

Line 12: remove "amount".

Line 15: please provide standard deviations of the seasonal and annual temperatures; otherwise the claim that the area undergoes only small annual temperature variations is not justified.

Lines 18–19: as above, please consider whether "interval" is the appropriate term here; also rephrase "intervals with interspersed intervals of heavy minerals".

Lines 21–22: the sentence almost exactly repeats material on lines 6-7.

Lines 24–25: remove " GPR has already been used to analyse dunes by ".

Line 27: it is not clear what "its thickness" means (of layers, not the code?).

C5

Line 28: either "not linear"(without a hyphen) or "non-linear"; please notice that these categories are different.

Line 29: remove "rather".

Line 31: consider saying "cluster" instead of "dune complex composed".

Page 6: "progradation" generally cannot be "higher" but should be faster (or its rate may be higher).

Sections 3–5 the manuscript contain a more or less similar proportion of small issues per page but I do hope that they will all be removed in the substantially revised version of the paper.

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C6