Dear Editor and Referees, thank you very much for the comprehensive, constructive and helpful feedback on our study. In this document, we address all the comments and questions raised by the two referees concerning the second revision.

Below, comments of Referee #1 are highlighted in blue and comments of Referee #2 in orange. Our responses are provided in *black*. Line numbers of the referee comments refer to the first revision. Line numbers in the answers refer to the second revision.

Based on two reviews, the authors have undertaken a major revision which implied changes to the title and focus of the study as well as multiple new text sections added to the Introduction and Discussion chapters. I generally welcome the undertaken steps which certainly helped to enhance the quality of the manuscript. However, I would now like to encourage the authors to reconsider the focus of their study and identify all elements that could be shifted to a Supplementary Material file in order to further improve readability. I provide some suggestions how this could be achieved in the attached PDF file along with several minor comments.

Thanks a lot for this feedback. We agree that there are certain tables and figures, which do not necessarily have to be included in the main text. We have therefore identified these and moved them to the appendix in favor of shortening the manuscript (instead of creating a supplementary material file for only a few elements?). As a result, we have shortened the manuscript by 4 pages. We also agree that the methodology contains aspects that are well-established. However, in different steps of the workflow we have added new features or introduce new parameters, which we need to explain here. We believe that this is important for understanding the following sections. Shifting these explanations to a separate file would force the reader to constantly jump back and forth, which in our opinion would impair readability.

In addition, the size of some figures and tables could be significantly reduced in the final layout, which can further reduce the length of the manuscript.

L1: Personally, I would start with sensitivity before estimating uncertainty.

Agreed. We have updated this.

L2: analyses?

We have updated this.

L10: these

We have updated this.

L11: I would still say, it's odd to claim, it had not been investigated "how to set the values for these parameters". Yet, the influence of these settings may be.

We have rephrased the sentence.

L36: Check citation style.

We have updated this.

L62: The following explanations regarding the methodology are at least surprising in an Introduction chapter. What I would expect instead is a clear definition of a knowledge gap and BRIEF overview of how you are planning to address it (answering specific research questions) in the following. But I don't insist on this framework.

We rephrased the paragraph starting in L68 by formulating the key research questions of this study.

L101: I understand that this is important to you but, especially because much of this methodology is "well-established", I would suggest to shift most of the details to a Supplemental Material file and only give an overview how methods are combined here.

We agree that the methodology contains aspects that are well-established. However, in different steps of the workflow we have added new features or introduce new parameters, which we need to explain here. We believe that this is important for understanding the following sections. Shifting these explanations to a separate file

would force the reader to constantly jump back and forth, which could impair readability. Nevertheless, we agree that not all figures and tables are essential to follow the text. We have therefore identified these and moved them to the appendix in favor of shortening the manuscript. In addition, the size of some figures and tables could be significantly reduced in the final layout, which can further reduce the length of the manuscript. See also answer to first comment.

L146: significance level

We have updated this.

L177: Different from all following illustrations blue and red are not partially transparent here leading to more saturated colors. Consider adjusting this for consistency.

We have updated this.

L190: "is no objective criterion" or "are objective criteria"

We have updated this.

L222: 90th percentile

We have updated this.

L225: There is no subscript in the following. instances. Please check for consistency.

We have updated this.

L229: I suggest you further shorten the manuscript at some point. This and the following table could be content to be included in a Supplementary Material file.

See answer to first comment.

L261: allow for

We have updated this.

L342: Maybe fit for the Appendix as well.

Agreed.

L358: This explanation can be given in the Response to Review file but, to me, seems too detailed at this point.

Agreed.

L430: highlighted text

We have updated this.

L466: median migration rates?

We have updated this.

L488: Again, transparency could be added.

We have updated this.

L536: Could this really be a source of uncertainty in your analysis?

Scheiber & Lefebvre (2023) investigated the influence of different definitions of bedform height based on an already defined bedform geometry. In our study we investigate the influence of input parameter settings on the previous step: the determination/discrimination of bedform geometries (by creating the baselines). In the following steps we use two definitions and different statistical analyses of bedform heights (T90 vs. H).

In the annotated text passage we want to emphasize that in addition to the aspects investigated in our study, there are further sources of uncertainty that have been investigated in other studies. All these sources must be taken into account when e.g. bedform heights from different studies are compared.

L561: If you conduct short-term measurements (to calculate the migration of small-scale bedforms), it should be easy to use every i-th measurement to investigate the migration of large-scale bedforms. So, it's not necessarily a matter of conducting multiple measurements but of choosing adequate sampling rates to allow for different time scales.

In case of the investigated dataset small-scale bedforms could only be tracked by using time intervals of less than two hours, while time intervals of more than 19 hours were suitable for the large-scale bedforms. This is quite a big difference, which could not necessarily be covered by a constant sampling rate.

L576: Could you give an order of magnitude here, so that this can be compared to the uncertainty from dunetracking inputs?

We have added a sentence that there is a linear relation between the value of porosity/grain density and resulting bedload transport rates. Further on, there is site-specific and predictor-specific knowledge available (e.g. Frings et al., 2011, DOI 10.1029/2010WR009690) but we cannot give a general answer as this aspect requires extensive literature review.

L587: highlighted text

We have updated this.

L602: highlighted text

We have updated this.

L603: highlighted text

We have updated this.

L606: highlighted text

We have updated this.

L617: in advance

We have updated this.

L636: parameters

We have updated this.

L678: It could be helpful to repeat at least the specificities of "setting 1" and "setting 3" in this figure caption.

We have added this information to Figure 14-16.

L684: I personally like this Conclusions chapter. However, the manuscript currently encompasses 41 pages, 850 lines and 17 Figures. This is certainly too long to catch and sustain a reader's attention, so you may consider shortening the text wherever possible. The Conclusions give a good overview of what is important in this study. I encourage you to shift everything else (or as much as possible) to a Supplementary Material file to improve readibility. In my view, this could be much of the detailed Methodology (14 pages!) and parts of the Results. This content would not be lost in an SM file but facilitates focusing on the primary findings, i.e. influence of inputs and uncertainties.

See answer to first comment.

L689: I would say migration as this is what you quantify.

We defined the term dynamics as including both migration and bedload transport.

L702: Dunetracking-induced uncerainties?

Agreed.

L713: I wonder if "sensitive" is the right term to describe an input variable.

Agreed. We rephrased the sentence accordingly.

L748: Please make sure that all references have a DOI (in the same style).

We have updated this (where possible).

The authors have carefully revised the manuscript and have eliminated almost all of my concerns. The manuscript is now more focused and reads well. Nonetheless, I still have some comments and suggestions (mostly of editorial/technical nature):

Overall comments:

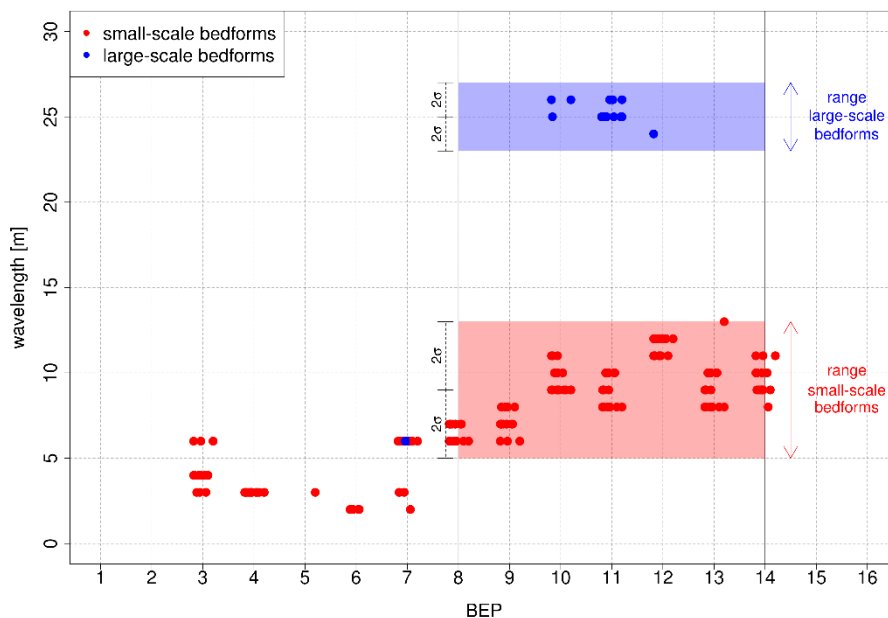
Please check format; e.g. super- and subscript – m2 should be m^2.

We have updated this.

Check references; e.g., reference Scheiber, Lojek, et al., 2021 (L36) is the same as Scheiber et al. 2021 (L46)?

Yes, we have updated this.

Figure 8: I had some trouble interpreting this plot – four scans were analysed, but the results show zero to four determined wavelengths for each profile (small-scale; a similar comment could be given for the large-scale bedforms). What is the reason for this? Does that mean that for some scans bedform wavelengths were identified but not for others; what about the different significant levels? This should be explained more clearly, since the data were collected within a time-window of 2 days…

The figure contains the resulting window sizes for each BEP based on four echo soundings and three significance levels. So, potentially 12 different results per BEP are possible. However, for some BEPs no peaks were identified at any selected significance level. In addition, values have been rounded to whole meters. Therefore, there are overlaps that cannot be recognized in the figure. Below we added the same figure showing these overlaps. In favor of a simpler and clearer illustration, we have decided to retain the original version in the manuscript but we have added a short explanation to the text (L362).

L390: Referring to my last comment – it is stated that temporal changes can be neglected due to short time differences between individual measurements… Therefore, it is probably worth explaining the different number of detected wavelengths (or I missed the explanation).

See answer to previous comment.

Suggestions (I leave this to the discretion of the authors)

L17: delete "decided to"

Agreed. We have updated this.

L39: This depends on the model type (i.e., 1-D, 2-D or 3-D and associated grid-resolution).

Agreed. We added "often".

L79: I suggest rephrasing. "would be a larger group of users" sounds partly strange.

We have rephrased the sentence.

Figure 3: Provide information on size of averaging window?

We have updated this.

L247: delete "here"

Agreed.

Figure 5: If present field data are shown, I would recommend indicating from which dataset (here it was probably No. 9 & 10 in Table 3?).

We have added this information to the figure caption.

L316: Redundant information – the same information was provided @L94. Some more passages with redundant information can found throughout the manuscript.

We agree that this is redundant information since this has already been mentioned in the introduction. However, this is essential information for introducing the dataset, so we have decided to briefly repeat it here. If the reader enters at this point, he/she is not forced to search the entire manuscript for this information.

L326: Replace "three" by "3.2"

We have updated this.

Figure 6: I recommend including an arrow indicating the flow direction.

We have updated this.

L482: Provide cross-reference to equation 4?

There already is a cross-reference to equation 4 in L460.

Finally, I encourage the authors to include a statement regarding the analysis of 3D-dunes in the discussion – a sentence like the one in the rebuttal letter (to my comment @L71) would be, in my opinion, sufficient. The same applies to curved river sections (see the rebuttal to my comments @L85/108).

We have added a sentence regarding 3D-analysis in L93.