General comments

The authors developed a new bedform tracking tool based on natural river bathymetry data with the particular purpose of separating distinct bedform scales when several hierarchies of bedforms coexist. The introduced bedform tracking tool in this manuscript is expected to play an important role in understanding multi-scale bedform dynamics and help decode their different behaviors and potential dependencies among them. The manuscript is clearly and concisely written, and would be of great interest to readers of *Earth Surface Dynamics.* I truly support the authors' work and the manuscript is worthy of publication without any doubts. However, some minor changes need to be made before publication for clarification and presentation of the work.

Specific comments

1. Lines 8-10: please rework the sentence, “The approach to decompose bedforms adopted in the presented tool is particularly applicable where secondary dunes are large and thus filtering could easily lead to undesired smoothing of the primary morphology.” I could fully understand what this sentence actually means after reading the manuscript. The main source of confusion is that there was no explanation about the referred filtering in this sentence. I am sure the authors meant conventional smoothing filters widely used in bedform tracking, but it is worth specifying it in the sentence or before.

2. Line 44: please distinguish other methods that apply smoothing algorithms and spectral methods. From my understanding, the main disadvantage of using spectral methods is that bedform shape needs to be pre-defined with base functions (e.g. wavelet or sinusoidal functions) and it is assumed that self-similarity of bedform shape extends across scales. This is fairly different from drawbacks of using smoothing algorithms. In this context, it is worth mentioning and citing the following papers.

- Ganti, Vamsi, Chris Paola, and Efi Foufoula‐Georgiou. "Kinematic controls on the geometry of the preserved cross sets." *Journal of Geophysical Research: Earth Surface* 118, no. 3 (2013): 1296-1307.
- Lee, Jiyong, Mirko Musa, and Michele Guala. "Scale‐dependent bedform migration and deformation in the physical and spectral domains." *Journal of Geophysical Research: Earth Surface* 126, no. 5 (2021): e2020JF005811.

3. Lines 45-46: I understand that the main advantage of the bedform tracking tool in this manuscript is preserved steep lee side angle of primary bedforms. But it is also important to note that the conventional smoothing filter can distort morphology of secondary bedforms.

4. Method section: there are other polynomial function based fitting algorithm like LOESS curve (e.g. Savitzky-Golay filter) as well as decaying functions like Sigmoid. I am wondering whether the authors have applied other methods for extracting primary bedforms and preserving their lee-side angle. I don’t think sensitivity analysis using other algorithms is necessary in this manuscript since the introduced bedform tracking is robust and works well. In addition, there might be only small discrepancies in results obtained from using different fitting and decaying functions. But it might be worth mentioning potential candidates for the smoothing and decaying functions because this manuscript focuses on the technicality of the new bedform tracking method. This would

allow readers to know available alternatives in the fitting algorithms and replace them if needed. Addressing what considerations need to be made in selecting algorithms would also be appreciated.

5. Method section: please add a unit of degree for the cutoff slope to give a better idea on the steepness of the slope.

6. Figure 3: it is interesting to see asymmetric primary bedforms in the first top two panels and more symmetric primary bedforms in the bottom two panels. Any brief comments on the potential reasons would be appreciated. It seems to me this is beyond the scope of the work, so addressing this in the manuscript is not required.

7. Lines 186-190: potential opportunities and limits of applying this method can be addressed here in detail. I suppose the introduced bedform tracking tool in this manuscript would work well in characterizing most of the riverine bedforms with unidirectional flows. However, would this method work in aeolian dunes or tide induced bedforms? What considerations need to be made before extending this method to bedforms created in other environments.

Conclusion
Minor revision