

## Response to reviewer 2

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We would like to thank the reviewer 2 for his meaningful comments that will significantly help us to improve the quality of the paper. Our stepwise response to the reviewer's comments is written in bold italic in the following text, the reviewer's comments are in regular text format. All substantial modifications that were included in the revisited version of the manuscript are written in blue.

### 1. General comments.

The first comment addresses the structure of the article.

***We assume that the first submitted version was following our reasoning but may not appear very clear for external readers. Therefore, the article structure was modified to better fit a "classical" article plan. It is now more clearly stated (1) what comes from bibliographic review and (2) what is the original contribution of this work.***

The second comment refers to the figure 6 and the methodology employed to build the network graph based on the geomorphological map.

***We added a dedicated sub-section in the methodology. Please see section 3.4 "implementation" on page 8, lines 15 to 23. This paragraph was originally integrated in the "case study" section. We assume it is now clearer for the reader.***

The third general comment suggest an edition of the English grammar and insists on the problem of structuration of the paper.

***The paper has been proofread by a professional English editing service. The structure of the article was modified to better articulate the novelty of this work and provide a more complete description of the application***

### 2. Detailed manuscript comments

P 1, L 6: "To understand the sedimentary signal: authors refer to the concept of connectivity."  
Author's do not refer to connectivity to understand the sedimentary signal. Instead they may refer to connectivity to \*describe\* the sedimentary signal. Or they may \*apply\* the concept of connectivity to understand the sedimentary signal.

***This was modified according to the reviewer's comment. We used the term "describe" instead of "understand".***

P 1, L 7: I am not sure what "filiations" refers to.

***The term "filiations" is currently used in French to describe the cascading interactions of processes. We switched to the term of "local links" which may sound clearer in English in the sentence.***

P 1, L 20: In what way are these indices robust? I do not recall reading this in the main text? "and may lead to simulations" in what way lead to simulations? Akin to work by Czuba and Foufloula-Georgiou (2014) and Schmitt et al. (2016) or something else? Please more fully discuss.

***The concerned sentence: "We demonstrate that these indices are robust, and may lead to simulations", was modified to be more accurate and more in accordance with the discussion of the paper: i.e. we now state that "We demonstrate that these indices may lead to simulations of sediment transfer and help in identifying the hotspots of geomorphic change." Which is now clearly addressed in the discussion (please see the discussion P 14 L 20 to P15 L 5)***

P 1, L 24-25: Are you saying here that connectivity was first defined by ecologists or by Bennet (2004) specifically? Be certain and careful if saying the latter.

***We stated here that the use of connectivity for spatial analysis was first addressed by ecologists and cited Bennet 2004 which is among the most accepted references on the topic.***

P 3, L 4: I suggest using subscripts for “h” and “o” in “Vh” and “Vo”. And elsewhere, see P 3, L 25 also.

***All concerned formulas and indices were written using subscripts. Additionally, formulas were retyped in a formula editor.***

P 5, L 8: “whithin” should be “within”.

***This was corrected accordingly***

P 8, L 25: The work of Czuba and Foufoula (2014) and Schmitt et al. (2016) (and their subsequent work) are relevant here as they both explicitly take steps, under several assumptions including that the sediment remains in the channel, to assess sediment connectivity with time as the important quantity for transfer through a link.

***References to the suggested articles have been integrated in the revisited version and the associated discussions have been included***

P 11, L 28: What specifically is original about this work? It seems to me that much of the graph theory work for describing sediment connectivity that is presented here has its origins elsewhere.

***We actually used 2 existing indices in connectivity analysis (i.e. Potential flow and accessibility). They have been combined to create the IC (index of connectivity). This is now clearly addressed in the conclusion (please see P 15 L 9 to 12).***

References

***The two proposed references have been integrated in the text and in the reference list.***