Authors' Response to AE

AE: *Reviewer 1 points out the connection of lateral erosion to meandering, the minimum requirements for the modelling of which have been studied by Knutson and Howard (1984). The considerations in this paper should be discussed and incorporated in any revisions of the model.*

Authors: The work of Knutson and Howard (1984) and other advances in modeling meandering have been added and discussed more thoroughly. We have also added a substantial amount of text to the new "Approach and Scope" section to articulate the differences between a meander model and a landscape evolution model. In brief, the former represents the trace of a single channel whereas the latter represents the topography in which channels are embedded. This is a very important distinction, which we hope is now clear in the revised manuscript.

AE: *Reviewer 2 is concerned about grid resolution issues and the treatment of channel width. I think these points are very important and should be taken seriously. Id like to point out here the paper of Stark and Stark (Am. J. Sci. 2001), who developed a sub-grid approach to treat channels, which may be instructive for dealing with this criticism. A related point here is the frequency of contact of the flowing water with the banks, as made by Bufe, the importance of which has been pointed out by Hancock and Anderson (GSAB 2002).*

- Both reviewers 1 and 2 also pointed out some previous treatments of bank erosion/ lateral mobility/meandering, for instance the above-mentioned paper by Knutson and Howard, but also the treatments within CAESAR (e.g., Coulthard and van de Wiel, ESPL 2006) and EROS (e.g., Carretier et al., ESurf 2016). A review of these treatments would be appropriate, highlighting of their different merits and why another (new) approach is necessary.

Authors: We have added text regarding the issues reviewer 1 raises about channel width and grid size to the manuscript in several sections and have written a new supplementary materials section that presents the results of new model runs showing the effect of grid size on valley width and the magnitude of lateral erosion in the models. More background on previously published models with a treatment of lateral erosion was added to better place our model within the context of existing landscape evolution models and highlight the advances we have made with our model.

AE: *Many of these points culminate in the statement made explicitly by reviewer 1 at the end of the review. You construct some model and explore its dynamics to some extent, but the question remains as to why we should believe that it is a true or even useful description of reality. I agree here that the paper could benefit from a well-defined research hypothesis and a set of criteria that could be used to evaluate the model against field data or compare it against the performance of other available models.*

Authors: We have added a figure with examples of bedrock valleys and strath terraces that are much wider than their channels in several different environments, including wide valleys created by both meandering and non-sinuous rivers. This figure demonstrates qualitatively the differences between a typical narrow bedrock valley and a valley that has experienced a phase of significant lateral erosion. We have also added a significant amount of text at the end of the discussion section where we discuss different measurements and metrics needed from field or lab experiments in order to test this and future models. We also discuss a potential test of the model presented in the manuscript from a specific field site.

The approach presented here is intended to be a starting point, but not an ending point. Our main goal is to draw attention to the importance of lateral stream erosion within the context of drainage-basin evolution, and to offer some ideas for how this might be addressed in the framework of a conventional grid-based LEM.