

## General comments

Overall this is a very interesting paper, worthy of publication. It addresses an important topic in improving the representation of topography in unundation models – I particularly like the balance between practicality (the method is applicable to models that engineers use in practice) and science. As the author notes, the approach is quick – avoiding using any vector processing and doing everything on the grid helps. Should be of interest to scientists and practitioners alike – I can think of a number of potential applications already.

There are some shortcomings – the approach appears to have been tested on a single small area of LiDAR data only, and we should worry about potential unintended consequences when applied to other data sets. This could be tested on further LiDAR data, or on synthetic DTMs representing linear features of different widths, orientations, heights etc. There are also a number of parameters used in the method; the choice of values of these need to be justified further.

## Specific Comments

Section 1: This is a really good introduction to the issues addressed in this paper, of relevance to practitioners and researchers alike.

P1430, I21: “... identifying and connecting linear topographic features has not been addressed ...” - the work of Cobby does look at this for roughness rather than topography, but should be acknowledged (it is referenced later).

P 1433, I3: Define again what  $\Delta C$  and  $\Delta F$  are at this point.

P1433, I6: The method aims to block edges (between cells) in the topographic model – most cartesian models will allow this (e.g. TUFLOW), this should be mentioned it is relevant for practitioners.

P1434, I12: Was any sensitivity testing done on the choice of median filter window size? How does the choice of size impact on the approach's ability to detect features of a given width? While the heuristic argument given in the paper is (vaguely) convincing, I'd like to see some more thorough discussion of the role of the median filter.

P1435, I10: The cutoff height is chosen as 0.2m – why? How does this relate to flow depths, noise in LiDAR data, width of median filter etc? Any sensitivity testing done? It may seem a small point, but my experience indicates that choices of parameters like these can be crucial – and if a method is sensitive to these parameters then it can make the difference between a useful, robust approach and one that requires so much manual input and expert tweaking that it isn't usable in practice.

P1435, I13 onwards: Can we have a clearer description of the binary data manipulation without reference to Matlab functions, so as to be as generic as possible?

P1442: As well as discussing improvements, the author should also address how the current method might go wrong when applied more widely. Issues like whether we're using DTM or DTM, presence of noise in the LiDAR data, vegetation, buildings etc etc can all have an effect on the outputs.

## Typos etc.

P1425, I22: Should be “fewer” rather than “less”