**Hydrology and
Earth System
Sciences
Discussions**

Interactive comment on "Robust extraction of thalwegs network from DTM: application on badlands" *by* N. Thommeret et al.

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The authors thank Paolo Tarolli for his comment where he supplies valuable references. These references will permit particularly to enlarge the discussion. We try here to answer to the comments.

1) We agree that the references mentioned are interesting and should be cited in the reviewed manuscript.

2) We could have tested the different curvature threshold computations however this wasn't the aim of the paper. The main idea for this part is to determine a threshold that doesn't need a calibration on data. As P. Tarolli said, we have also understood that not all the convergent pixels present in the landscape are channelized. For that reason, our

aim was to use the DTM altimetrical error parameter to discriminate significant convergence pixels. The choice of 2σ is supported by a statistical analysis. In general, with a Gaussian distribution, 95% of the values are in the interval $[\mu\text{-}2\sigma; \mu\text{+}2\sigma]$ with μ the mean value. As only negative values represent convergence, we consider the values in interval $[\mu\text{-}2\sigma; 0]$. By taking $\mu\text{-}2\sigma$ as threshold on CI, we accept that 2.5% of the negative CI values are due to hazard. This simple method provides an objective threshold directly related to the DTM noise (since the threshold is determine from a simulated DTM which is a titled plane with the same altimetrical error spatial distribution).

3) We totally agree that considering different size of moving window is an important issue. The references given will improve the discussion. In this work, for both the plan curvature and convergence index, the kernel used is a 3×3 moving window. We intend to extract different size morphological elements so Pirotti and Tarolli (2010) will help extracting testing different size for the convergence index. The bankfull widths range from few meters (for large gullies) to few centimetres (for ephemeral rills). There is no direct relation between the bankfull width and the buffer size. The buffer is determined considering the DTM resolution and accuracy. The choice of buffer width is arbitrary: we choose to take a buffer with a width of twice the resolution. This choice is consistent to the planimetric error of the elevation data.

4) The DTM RMSE is around 0.17 m. Bretar et al. (2009) and us worked on data stemming from the same LiDAR mission. But Bretar et al.(2009) worked on the full-wave form signal, whereas we used the point cloud resulting from the last echo. Indeed, a location map of the study area and a picture should help the reader to have the Draix badlands morphology in mind.