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Hydrology and Earth System Sciences
Discussions

Interactive comment on "A conceptual model of check dam hydraulics for gully control" *by* C. Castillo et al.

Anonymous Referee #1

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The manuscript is clearly written, straightforward and the story is easy to follow. The paper is technically sound and the methods are well described. This paper is an important contribution to our understanding of the effects of check dams on hydrological processes occurring in the gullies. It is one of the more comprehensive attempts to quantify energy dissipation in a gully-check dam system.

General comments: 1) The authors present the location of hydrologic jump as one of the key factor in determining dam spacing. This location is subject to change depending on discharge, potential silting of inter-dam spaces and changes in roughness. Hence the planner must take most conservative approach ensuring hydraulic jump occurs at the toe of the dam regardless. Further, a straightforward rule for check dam spacing in the field is then proposed to be "head-to-toe rule". Did we come full circle?

Wasn't it one of the most common criteria found in the literature all along with some variations (Heede, 1978) referred to in the Introduction?

2) In the Discussion the authors suggest that fine gully sediments in agricultural setting might lead to almost horizontal slopes with shear stresses below the critical value. Based on the literature and experience I have never found this (horizontal depositional areas) to be the case regardless of the settings. Could this conclusion be the result of the simplifying assumptions made in the paper? Namely, the channels are straight and rectangular. Does the complexity of the natural channel accounts for the difference between this hypothesis and empirical observations?

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 11901, 2013.