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Interactive comment on "Characterization of stony soils' hydraulic conductivity using laboratory and numerical experiments" *by* M. Pichault et al.

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Dear Dr. Garré

your paper on the effect of stone content on the saturated and unsaturated conductivity of soils was reviewed by three reviewers. The comments of one reviewer, you find as an attachement to this note. The three reviewers consider your paper to be relevant for publication in SOIL and mention that the effect of an increasing stone content leading to an increasing saturated hydraulic conductivity is an interesting result. This effect could not be reproduced by numerical simulations which suggests that it is due to effects at the stone-fine soil interface which are not represented in the model. One reviewer asks if this could be considered in numerical simulations by for instance introducing a small

layer around the stones with different hydraulic properties. This reviewer also proposes to discuss the fact that this phenomenon can be related to the texture of the fine soil, which was loam-clay in your study but mostly sand in other experimental studies.

You also investigated the effect of stone content on the unsaturated conductivity and in contrast to the saturated conductivity, you did not find an increase unsaturated conductivity in a stony soil compared to a soil without stones. But, it must be noted that for the stone content that you considered in the unsatured lab experiment, there was no increase in the saturated conductivity. An experiment in which unsaturated soil properties are determined for a higher stone content would therefore be important. The conclusion that the unsaturate hydraulic properties could still be described using the same shape factors as the ones that describe the hydraulic properties of the fine soil might have to be revised when the saturated hydraulic conductivity increases with stone content whereas the unsaturated conductivity decreases. As pointed out by one reviewer, the description of the hydraulic properties of the soil near saturation may require other functions than the Mualem-van Genuchten functions to describe the behavior.

One of the critical remarks is that there is no replicates of soil samples. Especially since the variability of soil properties is larger in stony soils, this is a critical issue. Therefore, I would suggest to include, if possible, extra experiments with replicates.

Finally, the reviewers make good suggestions to improve the structure and readability of the paper by for instance using a consistent naming of the different types of experiments that were done.

Please also note the supplement to this comment:
http://www.soil-discuss.net/2/C726/2016/soild-2-C726-2016-supplement.pdf

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Interactive comment on SOIL Discuss., 2, 1103, 2015.

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