Dear Editor and reviewer,

We grateful for the positive review and the thoughtful comments. Here below we replied in details for all the comments. In general - comments (1), (2), and (4) were addressed in the revised manuscript and corresponding changes are described herein. However, we do not agree with comment (3) as explained below.

We wish to thank you again for the helpful review process, which greatly improved the paper and we hope that now you will find it suitable for publication at HESS.

The authors addressed most of my comments satisfactorily. There are two comments they seemed to have misunderstood. Finally, I noticed some problems with the scale of the setups that were used to investigate the length of stage 1 evaporation.

(1) Considering hydraulic soil parameters of the materials, the change of state 1 to stage 2 evaporation seems to be determined by the no-flow bottom boundary condition of the relatively short columns. Using a very simple steady-state solution of the Richards equation, I calculated that an evaporation rate of 0.65 cm/d can be sustained in the coarse material when the water table is at roughly 50 cm depth and at 190 cm in the homogeneously mixed soil. (Here I assumed that the tortuousity parameter of the Mualem van Genuchten unsaturated hydraulic conductivity curve was 0.5. The authors should include the value they used in their simulations). Based on this calculation, the duration of stage 1 evaporation should be much longer in the mixed soil than in the coarse soil whereas the simulation results in figure 6 show the opposite. This simple calculation shows that the duration of stage 1 evaporation in the 10 cm long columns must have been influenced by the no-flow bottom boundary condition. The question is how it influenced the simulations and experiments with the compacted layer and salt layers at the surface.

In the caption of Table #1 we added information about the tortuosity parameter, which indeed is equal to 0.5.

We agree that the length of the experimental columns and corresponding simulations were shorter than the capillary length of the different porous media. And indeed, if the profiles were longer they would have supported a longer S1. Nevertheless, we don't believe that the lengths affected the general behavior of evaporation and salt precipitation patterns under compacted and non-compacted conditions. We tested it numerically with a simulated columns of 100 cm long, and as expected, the length of S1 was extended. However – also for the long column setup – compaction (fine texture layer at the soil surface) resulted in longer S1, compared to the non-compacted setup. In order not to further encumber the text we prefer not to add more modeling to the paper. However, as suggested by the reviewer, we elaborated on that issue in the text and emphasized that the long columns experiments (Figure 11) tackle this issue [P18, L423-429].

(2) My comment is on Figure 11 was apparently misunderstood. The evaporation rate during stage 1 is clearly smaller for the compacted salt treatment than for the others. The slope of the cumulative evaporation versus time curve is clearly lower during stage 1 than for the other

cases. It is clear that stage 1 lasts longer for the compacted salt than for the uncompacted salt treatment. But the slopes of the curves for the two treatments during stage 1 is different. Under the same conditions, I would expect these slopes to be the same, and smaller than the slopes of the cumulative evaporation versus time of the DI water treatments (because of the lower vapor pressure of the salt water). In Figure 9, this is clearly the case but not so in Figure 11. Are the lower evaporation rates during stage 1 from the compacted salt treatment caused by the mulching effect of the salt layer that emerged on top of the compacted layer? But, if the salt layer reduces the evaporation rate, can we still speak of phase 1 evaporation? Or would it be a pseudo phase 1. I propose to make that clearer in the text why the slopes of the curves at the beginning of the experiment during the so-called phase 1 are different from each other.

This is an important point – thank you.

This reduced evaporation rate is not associated to flow resistance of the salt crust (for water or vapor), as no salt precipitation was observed during S1. In the revised section we pointed on this reduction in evaporation rate during S1 and proposed a mechanism to explain it:

"S1 duration of the compacted saline setup was approximately twice as long as the non-compacted saline domain (~40 hour vs 20 hours, respectively). However, cumulative evaporation during S1 was only ~40% higher for the compacted setup (~4.8 mm) compared to the non-compacted domain (~3.5 mm), a result of lowered evaporation rate during S1 for the saline-compacted setup, compared to all other setups. Future studies should clarify this disparity, yet it could be related to preferential water flows that may be developed at compacted soils (Zhang et al., 2018; Shein et al., 2003; Nagy et al., 2018), due to heterogeneous changes of the compacted soil texture and structure along the stress chains (Nawaz et al., 2013; Naveed et al., 2016). Consequently, evaporation may be concentrated in specific locations at the soil surface and not homogeneously distributed as common for homogeneous domains. This may lead to elevated salt concentration at the pore water in the locations of evaporation, in higher levels compared to homogeneous distribution of the water at the soil surface, as demonstrated by Shokri-Kuehni et al. (2020). The increased salt concentration results in increased osmotic pressure and reduced vapor pressure of the solution, which reduces evaporation. It is likely that at the glass beads experiments this phenomenon was not observed since the glass beads layers were homogeneously packed. "

(3) The second comments that was not fully understood is related to the text on Ln 117-ln 128 'In addition, structural changes of the soil along the vertical axis (with depth), may also affect evaporation (e.g., Or et al., 2007; Lehmann et al., 2008; Shokri et al, 2010; Assouline et al., 2014; Assouline and Narkis, 2019). It was shown that porous media composed of a fine texture domain that overlies a coarse texture domain may result in longer duration of S1 and increased cumulative evaporation with respect to the homogeneous domain, composed of the coarse texture matrix only. In the layered structure, as soon as the drying front reaches the layers with the relatively larger pores, rapid water displacement will occur from the large pores to the overlying finer pores. The pressure in the coarse layer changes abruptly from its air-entry value to the air-entry value at the evaporation front, which is associated to the higher capillary suction of the small pores (Or et al, 2007; Shokri et al, 2010). Consequently, the coarse texture layer acts as a water reservoir that supplies extra water to sustain a longer S1 and higher cumulative evaporation, compared to the homogeneous soil structure'.

This text block is still confusing to me. In the first part, the compacted layer on top of the coarser layer is compared with evaporation from a homogeneous coarse layer. The fine layer will indeed increase the duration and amount of evaporation but this increase is only due to the amount of water that can evaporate from the top fine layer in addition to the amount of water that can evaporate from the coarse layer below. I dispute that capillary forces exerted by the fine layer on top of a coarse layer will pull out more water from a coarse layer below than a free air flow over a coarse layer. Compared with the uniform coarse soil, the moisture profile is simply shifted downward (see figure 7A) so that at the same depth, the coarse layer below the fine layer is indeed drier than the uniform coarse layer. But, there is not more water extracted from the coarse layer. The only reason why more water evaporates from the compacted setup is because there is additional water that can be extracted from the fine layer on top. The presence of the fine layer on top of the coarse layer will not increase the amount of water that will be lost from the coarse layer compared to evaporation from a homogeneous coarse layer. Thus, again, the amount of water that can evaporate during stage 1 from the layered soil is only larger compared to the homogeneous coarse soil because there is extra water that can evaporate from the fine soil layer on top of the coarse layer. But, the second part of the text suggests that more water will evaporate since 'the coarse layer acts as a water reservoir that supplies extra water to sustain a longer S1 and higher cumulative evaporation, compared to the homogeneous structure.' When we keep the uniform coarse layer as the reference homogeneous structure, this reasoning is incorrect since there will not be more water extracted from this coarse layer whether a fine layer is present on top or not. The same 'water reservoir' is present in the coarse layer when no fine layer is on top. So the problem is that the authors are shifting the reference case and are now comparing evaporation from a layered system with a fine layer on top and a coarse layer below with evaporation from a homogeneous fine layer.

We do not agree with this comment. A key point of the paper is the extension of S1 by the fine texture layer that overlies a coarse texture domain. This setup forces the suction of excess water from the coarse texture domain towards the evaporation front. A lot of effort was put in supporting this concept both by experimental work and the numerical model. This concept is also supported by previous robust works which are being cited in the paper (e.g., Or et al., 2007; Lehmann et al., 2008; Shokri et al, 2010; Assouline et al., 2014; Assouline and Narkis, 2019).

It is well demonstrated in the paper that the fine pores layers on top of the coarse pores layers result in extension of S1 (Figures 6, 9 and 11), and the numerical model (Figure 7) and the column experiments (Figure 8) nicely support the concept of upward water flow from the coarse texture domain towards the fine layers near the soil surface.

Therefore, we prefer to keep on this message and to stand behind our statement as it is written in lines 117-128, and elsewhere in the text.

(4) Figure 7: Isn't the legend of the figure mixed up. Isn't black homogeneous mixed, blue full homogeneous coarse and dashed blue homogeneous coarse compacted?

True – Corrected.