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Liquid water infiltration into a layered snowpack: evaluation of a 3-D water transport model with laboratory experiments

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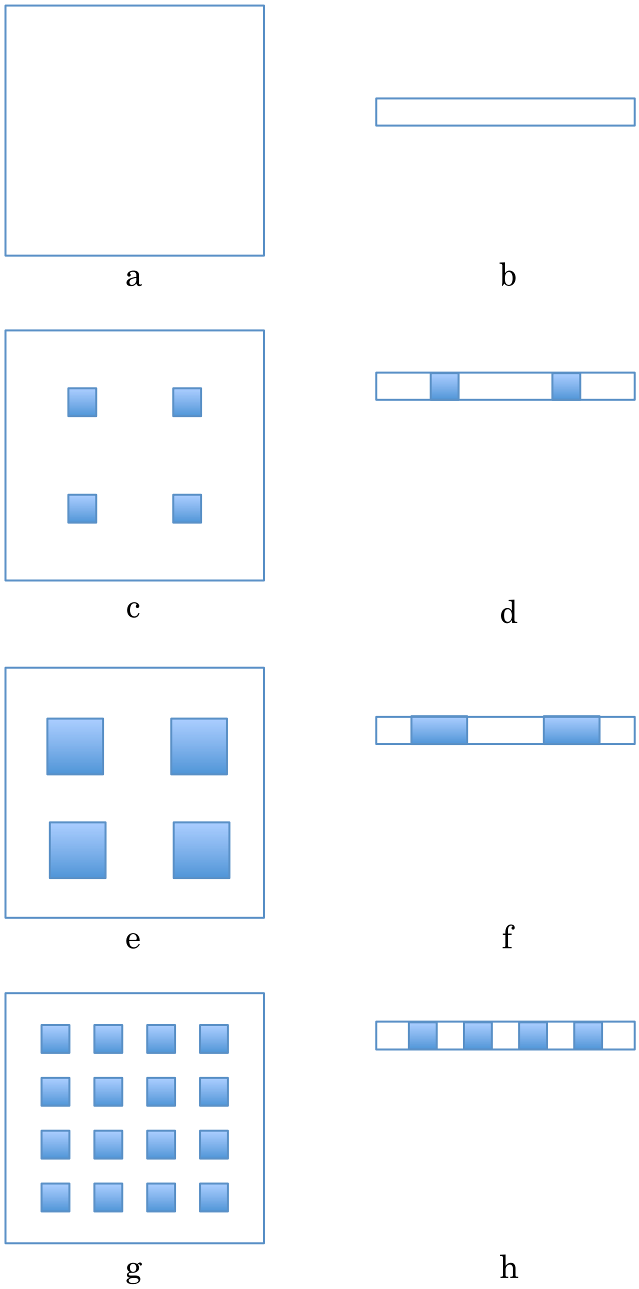
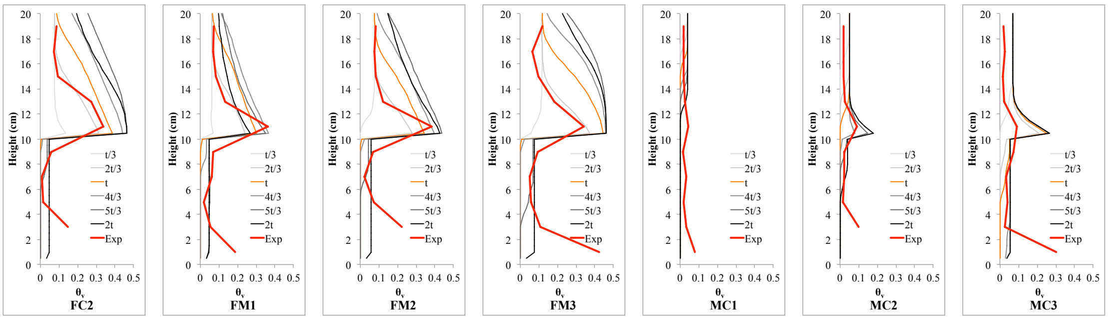


Figure S1: Effect of the number of dimensions of a model on simulated wet snow area. Figures S1 (a), (c), (e) and (g) refer to a 3D snow section with size 10 x 10 cm^2; Figures S1 (b), (d), (f) and (h) refer to a 2D snow section with size 10 cm. The initial conditions (Figures S1c and S1d) are preferential flow paths of size equal to 1cm and distance between paths equal to 5 cm. If the width of 3D preferential flow paths doubles, the ratio of wet snow area will become four times higher because both sides of the paths double (e). On the other hand, in a 2D simulation, wet snow area will double (f). If the distance between preferential flow paths reduces to 2.5 cm, the number of paths will become four times larger in a 3D simulation, while it will double in a 2D simulation.



a b c d e f g

Figure S2: Temporal evolution of simulated water content profiles in the SNOWPACK RE-model. Six profiles are shown in units of the arrival time at snow base in experiment, t (see Table 2).

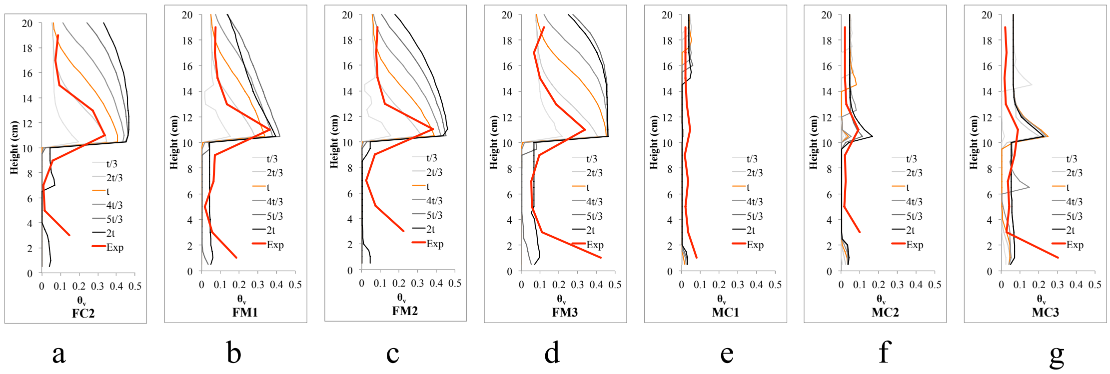
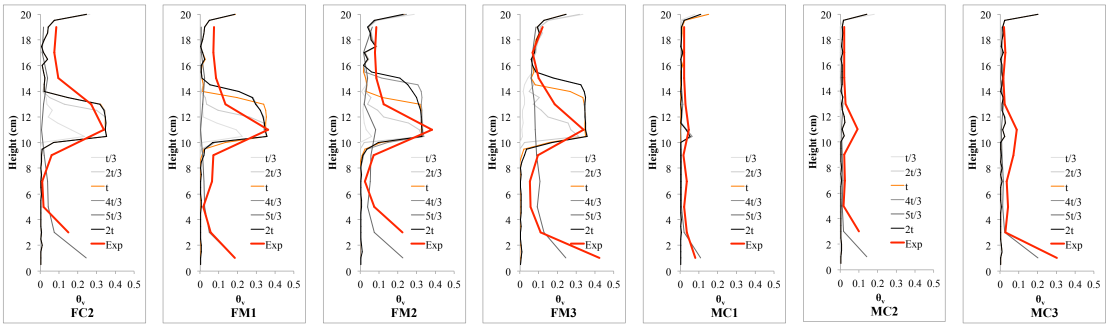
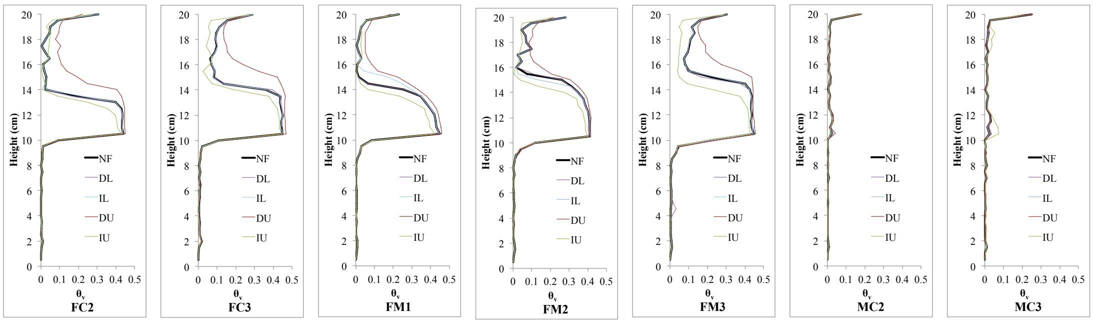


Figure S3: Temporal evolution of simulated water content profiles in the SNOWPACK DDA-model. Six profiles are shown in units of the arrival time at snow base in experiment, t (see Table 2).



a b c d e f g

Figure S4: Temporal evolution of simulated water content profiles in the 3D model. Six profiles are shown in units of the arrival time at snow base in experiment, t (see Table 2).



a b c d e f g

Figure S5: Changes in water content profiles due to fluctuations of grain size. NF: no fluctuation, IU: increase 0.1 mm for upper layer, DU: decrease 0.1 mm for upper layer, IL: increase 0.1 mm for lower layer and DL: decrease 0.1 mm for lower layer.