Evaporation over saturated bare soil: the role of soil texture
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Calculating actual bare soil evaporation (Ea) on the basis of potential bare soil evaporation (PE) is a widely followed approach in many disciplines including hydrogeology, hydrology and agricultural sciences. This approach considers that PE is independent from soil properties, and only Ea is affected by soil properties. A unique experiment was set-up to measure diurnal and seasonal PE for fine (PEfine), coarse (PECc) and gravel (PEGr) sands.

The evaporation rates over saturated bare soil showed clear differences between gravel, coarse sand and fine sand, with higher PE for fine sand, smaller PE for coarse sand and smallest PE for gravel, especially during spring and summer. In autumn and winter, the measured PE rates over different surfaces showed only minor differences (Figure 3).

These results can be quantitatively explained with detailed calculations of the energy balance method. Considering the different porosities for gravel, coarse sand and fine sand, as well as the thermal conductivities of the phases which constitute the porous media. Gravel sand consumed more heat flux resulting in less energy for evaporation.

The measurement data also revealed that during spring and summer night-time PE was considerable with ~1.0 mm per night (Figure 4).

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Conclusion and outlooks
Potential evaporation differs among soil textures, which is caused by differences in the ground heat flux. Differences are larger when the evaporative demand is higher. The Community Land Model (CLM) will be used to calculate latent heat flux from different saturated bare soils in future.

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