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Wet granular materials submitted to thermal cycling GEOFFROY LUMAY, FRANCOIS LUDEWIG, University of Liege, JORGE FISCINA, Saarland University, MARYAM PAKPOUR, NICOLAS VANDEWALLE, STEPHANE DORBOLO, University of Liege — Many phenomenons observed in nature are related to the particular behavior of wet granular materials submitted to temperature cycling: ice-lens formation in soil leading to frost heaving, landslides, structures formation in permafrost, stone heave and possibly some geological formations observed on Mars. We present experimental results concerning the effect of thermal cycling on the packing fraction of equal spheres with the presence of water. First, the case corresponding to completely immersed granular piles is considered. Afterward, the effect of thermal cycling on unsaturated granular piles is discussed. The pile is submitted to temperature cycling ranging from T1 to T2. If the temperature is always higher than 4°C, the temperature increase (or decrease) induces a dilatation (or contraction) of the grains and of the water. We show that the packing fraction variation is mainly related to water dilatation and contraction. If the temperature decreases under 0°C during a cycle, the water situated between the grains experiences a strong dilatation during the freezing step and a contraction during the ice melting step. In this case, we show how the freeze-thaw transition affects the packing fraction of the pile.

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