# A laboratory experiment on stone decay by combination of salt and ice crystallization

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A laboratory weathering experiment simulating combination of salt and ice crystallization was carried out using four types of rocks (porous tuff, dense tuff, dense sandstone, and porous andesite) with three types of salts (sodium chloride, sodium sulfate, or magnesium sulfate). The rock specimens were subjected to freeze-thaw cycles in a climatic cabinet where air temperature ranged from -30℃ to 10℃ within 24 hours. Prior to the freeze-thaw experiment, the specimens were immersed in saturated salt solutions at 10˚C or distilled water for 72 hours, and covered with foil for preventing the specimens from drying.
The specimens immersed in saturated salt solutions showed greater weight losses, reductions in Equotip rebound value and longitudinal wave velocity and surface expansion than those immersed in distilled water. Saturated solution of magnesium sulfate induced the greatest damage on rock specimens, although magnesium sulfate has been regarded as an inactive salt in the previous freeze-thaw experiments in which rock specimen were partly immersed in salt solution with dilute or mild concentration. Sodium sulfate induced rock damages comparable with sodium chloride. Sodium and magnesium sulfate crystallized from saturated solution and induced rock expansion prior to freezing. These salt crystals may fill micro-pores in rock and facilitates rock expansion and breakdown due to freezing.

Keywords: alt weathering, frost weathering, freeze-thaw, surface hardness, longitudinal wave velocity, surface expansion

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