

## An experimental study on salt weathering in cold and dry climate

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To examine the effects of salt weathering on tafoni growth in cold and dry climate like Antarctica and Mars, a laboratory experiment was carried out using two types of rocks (Oya tuff and Aoshima sandstone) and three types of salt solutions (NaCl, Na<sub>2</sub>SO<sub>4</sub> and MgSO<sub>4</sub>). Cubic specimens with a side of 5 cm in length were immersed in each saturated salt solution for 10°C for 72 h. After immersion, specimens were oven-dried at 110°C for 48 h and stored in a desiccator for a month. Then, specimens were subjected to wetting/drying cycles in a cold chamber with humidity change, which ranges from 20 to 100%RH within every 6 hours. Air temperature was kept to 10°C in the cold chamber. Fine materials with the size of < 2 mm were splitted off from the surface of specimens with salts. The weight reduction of the specimen was largest for the case using NaCl. The decrease in Equo-tip hardness value of specimens with NaCl indicated the reduction of the surface strength. The longitudinal wave velocity of all specimens did not change. Therefore, salt weathering only occurred on the rock surface. The temperature on all specimens increased immediately after humidity increased, and the degree of temperature change was larger for the specimens with NaCl which deliquesces in air with high humidity. These temperature changes might be induced by salt dissolution and deliquescence with water condensation.

Keywords: salt weathering, humidity change, tafoni, Antarctica, Mars