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The Physical Weathering of Rocks: The Freeze Thaw Cycle

Weathering is the in situ decomposition of rock by physical and chemical processes. My project dealt with physical weathering of rocks by "The Freeze-Thaw Cycle". Rock weathers when water in pores and cracks freezes and thaws. Porosity is empty space in rock. There are two types of porosity, primary and secondary. Primary porosity is the space between grains of rock. Secondary porosity is fractures in rock. Rock weathers because the volume of water increases 9% when water changes into ice. I tested known densities of water and ice to see if my experimental results were the same. I found that the density of water at 18.5 C and the density of ice at 0 C were similar to the known values. Next, I determined the porosity of my rock samples. I used red and white sandstone from the Fountain Formation, granite, and Niobrara Limestone. Red and white sandstone had similar porosities of 17.6% and 16.8% respectively. The granite had a porosity of 6.7%. The porosity of the limestone was 8.7%. The final part of my project was to determine how these different rocks weather. I found that the red sandstone easily weathered away. Flakes of rock or individual grains of sand broke off along the bedding planes. The limestone broke along bedding planes and fractures. White sandstone and granite showed no sign of weathering after 14 freeze-thaw cycles. This type weathering is important in Colorado's mountains, because the freezing and thawing causes rock to fall on mountain roads.