Avatar: Examples of Weathering

Slide 1
About 1.7 billion years ago, this area was just ordinary granite rock overlain by sandstone rocks and soil. Slowly, the overlying soil and sandstone eroded away by wind or water. This led to a physical weathering process called pressure release. After the top material was gone, the granite rock underneath expanded and developed cracks. The water entered those cracks and caused further chemical weathering. Chemical weathering rounded the granite pieces, making them into spheres.

Slide 2
Notice how this large boulder has been cracked into two pieces. This is because of thermal stress and the resulting physical weathering. During the day, the rocks are warmed by the sun and expand slightly. At night they cool and contract. This daily expanding and contracting puts stress on the boulders, causing many of them to crack.

Slide 3
During cold temperatures, even small amounts of water in tiny cracks in rocks will freeze. As the water freezes, it expands and puts pressure on the rock. If you live in a cold environment, you may have noticed the affect this has on the roads after a big snow storm. The characteristic breaking apart indicates frost wedging. Like all types of physical weathering, rocks are only broken down into smaller pieces—they undergo no chemical change.

Slide 4
The pitting that you see in the stones here is a result of haloclasty, or the growth of salt crystals in tiny holes within the stones. Over time it will continue to eat through the stones until they are broken up into small pieces.

Slide 5
This was once a solid piece of limestone, but it has undergone chemical weathering by carbonation, which is the reaction of carbonic acid in the atmosphere with the minerals in the limestone. Limestone is very susceptible to this kind of weathering.

Slide 6
Natural arches are some of the most dramatic examples of how weathering affects the landscape. Arches form when sandstone rocks are subjected to physical weathering over time. First, cracks develop in a layer of sandstone rock. Then, the cracks grow until the rock body becomes broken into several thin sandstone walls. Next, frost wedging causes crumbling of some of the underlying material. Finally, an arch forms as material under it is entirely weathered away. Arches are common in several national parks of the intermountain west. Many of these are located in the United States, like Arches National Park and Rainbow Bridge Monument.

Slide 7
Any structure, building, or statue made of stone is subject to the same forces of weather as materials in natural environments. Many ancient works of art have been lost to the forces of weathering—like these statues that have had their features worn down by weathering.