Fire Cracked Rock Appearance Replication

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Abstract

Fire cracked rock (FCR) is common in archaeological sites of the Bighorn Basin, Wyoming. Heating of rocks and creating FCR as a side effect of cooking and boiling water by different prehistoric groups. Several experiments were conducted in order to determine the morphological properties of thermally fractured rocks. The goal of the experiment was to create FCR in a controlled environment, recording temperatures every two minutes. The experiment was designed to replicate the morphological characteristics of FCR seen in the field and to determine how much the materials have been utilized. The extent of utilization of quartzite cobbles can be seen in the amount of fracturing and thermal alteration observed on the material. The rocks were heated in an excavated fire pit, approximately 30 cm deep with the experimental cobbles of the same size, approximately 15 to 20 cm. The materials were then flash cooled in a separate pit filled with room temperature water. It is from this process that some of the thermal fractures form and create diagnostic material. Crazing is the small fractures that run throughout the material and weaken the materials integrity as a result of the heating process. The experiment revealed that not only do the cobbles become FCR in the water bath with rapid cooling, but also fractures when the crazed material is discarded.. Even with the smallest amount of force exerted, cobbles can be fractured into many small pieces. Another part of the experiment was testing the rigidity of the cobbles by dropping a crazed cobble from approximately one meter high onto another rock, and resulted in creation of FCR. With most of the quartzite, impact modulation from animals or discarding the material would create diagnostic FCR.

Documentation of FCR in the field by CSU field crew members. Some of the sites surveyed in the 2004 field season had abundant amounts of FCR. When artifacts in the field are recorded several attributes are recorded along with the GPS location.

Environment where FCR is found in nature. The area that the field season was operating in was the Greybull basin area in northern Wyoming, near Meeteetse Wyoming. The area where it is found is the same

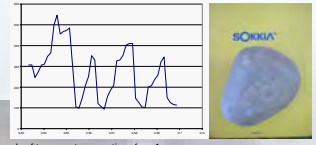
Fire pit with three heating rocks at early stage in experiment.

Fire pit during experiment, major fracturing occurring with discoloration.

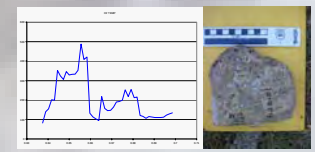
Water pit with heating rocks as water boils.

Fire pit during experiment, fracturing occurring.

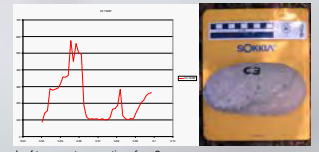
Condition of heating stone after experiment, major fracture lines visible.



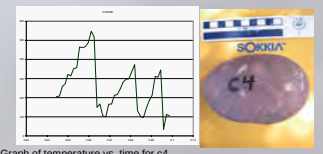
Graph of temperature vs. time for c1



Graph of temperature vs. time for c2



Graph of temperature vs. time for c3



Graph of temperature vs. time for c4

These graphs represent the temperatures of the stones taken every minute and plotted against time. The temperatures show that the different material can transfer varying amounts of heat to the water. The different materials also act differently under the same environmental conditions and can be seen in the products of the experiment.

During the experiment two separate pits were dug close to the same dimensions and the water pit was lined with a standard blue tarp to keep the water from absorbing in the ground.

The field crew during the experiment observing the rocks and controls the experiment by placing the rocks in the water when they are at their hottest, and heating them when they are at lower temperatures.

The two pits after the experiment being documented and recorded.

Crazing is visible after experiment. Crazing is the weakening of the stone, where small cracks form in the surface of the stone. Under this state the stone is easily fractured into many small pieces.

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