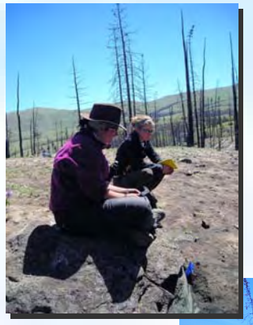
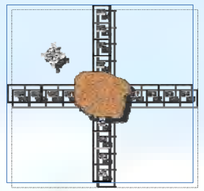
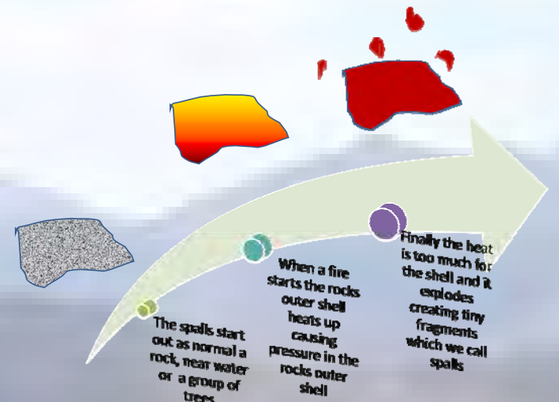
BAAM! : Thermal spalls and the archaeological formation process

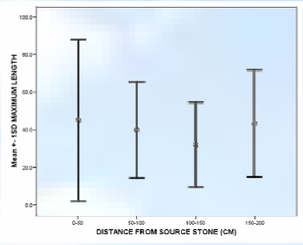
By Jena Sadd jsjenas@simla.colostate.edu
Colorado State University

One obvious impact of forest fires is the production of thousands of sharp edged heat spalls that in some places, blanket the ground with a scatter of fragments up to several meters away from their source rock. Developing a better understanding of these spalls adds to our understanding of archaeological site formation and regional Geoarchaeology. These topics were addressed in 2007 through field research in the Shoshone National Forest, north western Wyoming. In the area of the Grey bull river drainage where a year earlier the little Venus fire cleared out much of the forested area. There seem to be three main factors: 1) the thermal environment of the rock; 2) the composition of the rock; and 3) the water content of the rock. A thermal spall results from an explosive fracture of the rock's surface. A sample of 30 spalled rocks was selected for documentation and analysis. Specimens within this sample differed in three ways: the size of the rock, how much of its outer shell that had been spalled, and the distance of the fragment that was displaced. For each spall in the sample there was a maximum length, width, and thickness was measured. Sample plots consisted of four 200x50 cm transect that spanned the four cardinal directions (north, east, south, and west). Rock spalls haves the potential to illustrate the role of natural vs. cultural situations on the surface. This research complements other approaches for understanding regional prehistoric site formation patterns and fire histories studies.

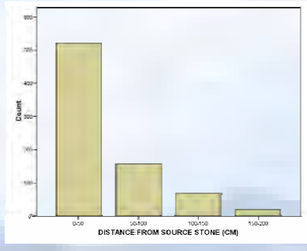


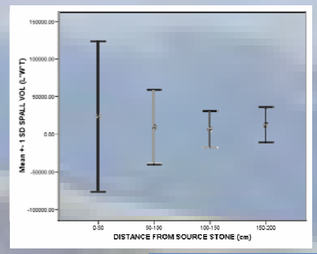






Top Graph: this graph shows the distance that the spalls traveled from the source rock. We found that there was two distances where most of the spalls landed, the first area being the 0 to 50 cm box; this is where the last of the outer shell falls, and the second area being the 150 to 200 cm box; where the first of the outer shell lands after the initial explosion.



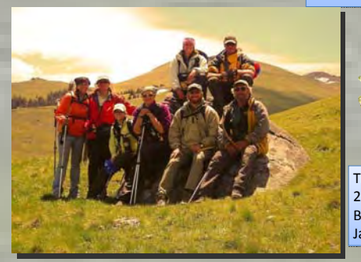


Data was collected by choosing thirty different types of rocks. The rocks were chosen by many different variations; size, area, and amount of spalls that were given off. The four cardinal directions; North, East, South, and West were also looked at. The spalls were split into four different boxes which went out 200 cm to the north, south, east and west. These spalls were also broken into sectioned boxes of fifty centimeters. The spalls themselves were measured by maximum length, width, and thickness

There were many different areas where the spalled rocks were found. Many of these areas had a body of water and trees near the spalled rocks. The data showed that the more water that a rock was near, the more of its shell was shed, and the same with the trees. The more trees that surrounded the rock the more of the rocks outer shell was shed.

Top Graph shows the average distances of where the spalls landed and the amount of spalls in each box of the directions (north, south, east, and west.). We found that there is a higher volume of spalls in the 0 to 50 cm boxes then in any other area.
Bottom Graph shows the same thing as the top graph, that the spalls tend to stay in the same 0 to 50 cm box The bottom graph also shows that the closer the spall to the source rock the greater the variability in size the spalls are, but the greater the distance the more the spalls decreases. Until the last box when size increases. Rock spalls show the effect on fire histories and the archaeological record by leaving a layer of fire altered rocks and eventually restarting the archaeological record.

Top: measuring the spalls. Measuring the maximum length, width, and thickness of each spall. To get an idea on how much of the rocks outer shell was lost. Top and bottom right: measuring out the different sizes of rocks. Center: one of the many different sizes of rocks that spalled.



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