

An Integrated GIS, GPS Mapping Protocol at Stone Circle Sites on the Northwestern Plains



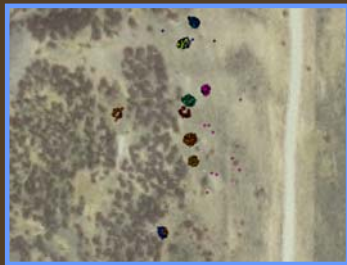
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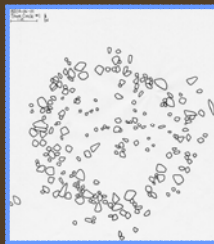
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Introduction

In June of 2006, a cooperative archaeology field school between Indiana University and Northwest College conducted research on stone circles sites, also known as tipi rings, in the Bighorn Canyon National Recreation Area. These stone circles are a common cultural resource found throughout the plains, and one of the most predominant architectural remains. Teams used Thales Promark 3 survey grade GPS equipment to map stone circles and Dell Axim X51v PDA's to record attribute data about each circle, including information on material type, length, width, and long axis orientation. The information was merged into ArcGIS software, enabling researchers to view the stone circle GPS points over a detailed map of the site. The information would provide a chance for spatial analysis in order to study domestic space, temporal change, economic organization, mobility and subsistence strategies, social organization and family relationships, and season and length of occupation.



ArcGIS image of stone circle GPS points at Bighorn Canyon Site 1. With the aid of the GIS imagery topographic and cultural features, including roads and historic trails can be seen along side archaeological features.



A hand drawn map of stone circle 1 from Bighorn Canyon. These maps were used to accompany the information gathered by GPS and PDAs



ArcGIS image of the three sites surveyed in June 2006 at Bighorn Canyon. Satellite images were uploaded into ArcGIS and were overlain with GPS points. Each colored dot represents a point taken, and the colors correspond to different days in which the points were taken. Using this program researchers have access to not only topographical features of the surrounding landscape, but also access to information recorded in the field pertaining to each point including length, width, long axis orientation, and dip.

- GPS (Global Positioning System)
 - Thales Promark 3 survey grade GPS were used by teams to map each individual stone
 - Units recorded subcentimeter accuracy on each stone, generally within 5-6 mm
 - Two separate units were employed, using one as a base and the other as rover
 - Coordinate UTM data was entered into ArcGIS

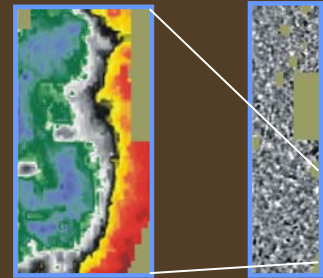


- PDA (Personal Digital Assistant)
 - Data from stone circles was collected using Dell Axim X51v PDA
 - Recorded information including material type, including length, width, height, and long axis orientation
 - Data was entered directly into Data on the Run spreadsheets (compact Microsoft Access)



- Remote Sensing
 - Conducted by Dave Maki of Archeo-physics LLC
 - 3 Methods of Remote Sensing Employed
 - Gradiometry, Ground Penetrating Radar, and Electrical Resistivity
 - Employed to determine the extent of subsurface anomalies such as hearths, pits, and buried stone circles

Remote Sensing Imagery



Electric Resistivity

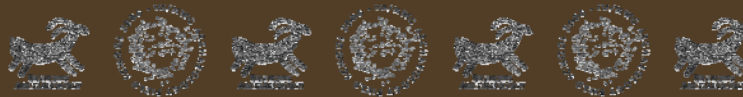
Gradiometry



Maureen Boyle stands holding the Thales Promark 3 GPS rover. The unit was held above each stone in the circle as information was sent from the rover to the base station.



The two Thales Promark 3 GPS units used by students to take UTM coordinate data for each stone circle.



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