Methodological advances in recording housepit stratigraphy: Using GIS to integrate disparate data

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Abstract

The complete occupation history of housepits has been a long-standing issue in the Mid Fraser region and has received little methodological attention. Work on the South Terrace of Keatley Creek begins to combine systematic micromorphological sampling with GIS technology in order to effectively plot data into a spatial database to assist in reconstructing the depositional history of these structures. GIS work at the site is developing into a method for digitizing and excavation data into a modern spatial database encompassing the entire site grid results will help to facilitate computerized analysis.

Introduction

The late prehistoric record of the Mid Fraser region of British Columbia has been the focus of intense investigations into the evolution and organization of complex hunter-gatherer communities (e.g. Stirling 1976; Hayden 2000; Frost et al. 2005). The long-term excavation program at Keatley Creek has provided some of the most comprehensive data sets for dealing with these issues (Hayden 1987, 1997; Haynes and Spafford 1995; Spafford et al. 1996). Excavations at the site have primarily involved full coverage of occupation floors to examine the organization of social units, inter-housepit variability and the internal ranking of corporate group households. Yet, the same use life of these structures, rebuilding and abandonment histories of these structures can result in overlapping, complex stratigraphy (e.g. Hayden 1997; 2000; Goldberg 2000).

Recent debate concerning the occupation history of large structures has called into question previous stratigraphic interpretations concerning the history of individual structures as well as the site as a whole (methodological approaches are being developed to better understand and interpret house-pit stratigraphy). Methodological goals include using a geospatial database for accurate plotting of artifact and feature location and orientation, and stratigraphic contacts, combined with detailed stratigraphic and micromorphological analysis to infer understanding of depositional components. These data are used to point interpretations of high resolution geophysical data, which in turn is applied to further guide excavations. In this case study, these components and interpretation presented here was undertaken in absence of archaeological results.

Methodology

Creating a spatial database

From the site datum was located, using magnetic north, the site grid was re-established with a Leica Total Station (EDM) (Figure 1). The accuracy of this grid was verified by checking coordinates for house-pits in the main area against those recorded on old site plans (Figures 2 and 3). The artifact and feature data are then vectorized and stored as point or polygon shapefiles (Figures 9 and 10).

Referencing other data

First, excavation data from archived plan sheets was referenced into the site grid. This was done by creating shapefiles representing each of the structures in ArcGIS (Figures 5 and 6). These shapefiles were then used and referenced in the shapefile of each unit (Figures 7 and 8). The artifacts and feature data are then vectorized and stored as point or polygon shapefiles (Figures 9 and 10).

Plot scale ground penetrating radar investigations

Following excavation and subsequent micromorphological sampling in Structure 112, ground penetrating radar (GPR) scans were acquired to investigate potential for remote interpretation and interpolation of archaeological information. Georeferenced horizon locations are indicated in Figure 4. Ideally, radar scans would be acquired in conjunction with pendulum direct correlation between radar reflectivity and archaeological features, including significant stratigraphic horizons, related depositional units and isolated deposits. In the present case, scans were sufficiently offset from both grid excavations to avoid interference due to related scattering of the radar pulse. Radar scans were acquired using a GSSI L-06-300 digital radar with 400 MHz antenna.

Works Cited


Figure 3: Topographic points and interpolated surface for HP 112

Figure 4: Contour lines and excavation datum for HP 112

Figure 5: Excavation unit in ArcGIS

Figure 6: Environmental and topographic data

Figure 7: Excavation context in ArcGIS

Figure 8: Excavation digital documentation unit

Figure 9: Excavation grid and excavation datum

Figure 10: Excavation context in ArcGIS

Figure 11: Preliminary Ground Penetrating Radar Data

Results

Following excavation and subsequent micromorphological sampling in Structure 112, ground penetrating radar (GPR) scans were acquired to investigate potential for remote interpretation and interpolation of archaeological information. Georeferenced horizon locations are indicated in Figure 4. Ideally, radar scans would be acquired in conjunction with pendulum direct correlation between radar reflectivity and archaeological features, including significant stratigraphic horizons, related depositional units and isolated deposits. In the present case, scans were sufficiently offset from both grid excavations to avoid interference due to related scattering of the radar pulse. Radar scans were acquired using a GSSI L-06-300 digital radar with 400 MHz antenna.

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