The lithic industry of the Early Neolithic at Uzzo Cave (Trapani, Sicily). A landscape perspective on the operational chains and the raw material availability

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ABSTRACT

In this article data from the technological analysis on the lithic industry of the Early Neolithic levels at Uzzo Cave (Trapani, Sicile) are treated in a landscape perspective. Setting the subject of the operational chains and of the raw material management in a landscape perspective, we utilised a GIS application as a representative model able to integrate the study on the technological behaviours and operational sequences. The purpose is to identify a management model of both technical behaviours and technological strategies. These last are intended as the combination of all the activities carried out since the acquisition of raw material until the abandon of the lithic products considering the effect produced by the same activities in terms of landscape behaviours, raw materials availability and acquisition modalities. A cartographical base related to the topographical and geological aspects of the promontory of San Vito lo Capo has been also implemented into a GIS application, with the aim to organise and eventually integrate the landscape variables concerned and to employ statistical methodologies in the processing of inter-site spatial data.

INTRODUCTION

The concept of the operational chain (Pelegrin, 1988, p. 55; Tixier, 1995, p. 14) allowed the prehistorians to see the lithic industry, like other kinds of archaeological records, as the result of a complex process of interaction between man and environment. The aim of this article is to link the data derived from the technological analysis (Collina, 2001, p. 181) on the lithic industry of the Early Neolithic levels at Uzzo Cave in Western Sicily, with an analysis of the landscape and of the raw material sources. By setting the analysis on the operational chains and on the raw material management in a landscape perspective, we used a GIS application as a representative model integrating the study on the technological behaviours and operational sequences. We tried to favour a synoptic approach.

1. THE SITE

Uzzo Cave (Costantini *et al.*, 1987, p. 97), located in the eastern side of San Vito lo Capo promontory (Trapani, Sicily), is one of the most important sites for the understanding of the Mesolithic-Neolithic transition process in the Western Mediterranean Basin. The systematic excavations of the cave, carried out since the second half of the seventies until the first half of the eighties, put to light at least two phases of the Mesolithic frequency as well as different Early Neolithic horizons.

2. TECHNOLOGICAL DATA SYNTHESIS

The traditional studies on the neolithisation and the Early Neolithic in Southern Italy, which focused on chronological and typological aspects of material culture, ignored some technological features as the "structures" of the lithic assemblages and the methods of "débitage". Moreover the acquisition, the management and the circulation of the raw materials have also been overlooked.

For that reason, we have adopted the concept of the operational chain (Binder, 1987, p. 45; Pelegrin, 1988, p. 57; Tixier *et al.*, 1995, p. 14). An operational chain consists of three elements: the knapped stone objects, related to different phases of the debitage process and of the operational project (acquisition of the raw material, initial shaping out of the core, core reduction, production of tools, utilisation, abandon); the behavioural sequence which produces the artefacts and determines the initial interaction with the environment; the specific knowledge possessed by the knapper. In such way, the petrographical and technological data of the Neolithic levels of Uzzo Cave are set in a landscape perspective of management of the raw material sources, both in primary and secondary place (Fig. 2). At Uzzo Cave, the petrographical analysis allowed the identification of several different groups of flints through a systematic evaluation of both macroscopic and microscopic features (Fig. 1). The varieties of flint recorded lead back to the Cretaceous-Eocene formations in the structural unities of the promontory. The lithic system carried out at Uzzo Cave shows the adoption of the pressure bladelets debitage with some relevant variants in the technical procedures. The lithic assemblage is remarkably characterized by microlithic geometric tools as the trapezes, obtained by the microburin technique.

3. THE GIS APPLICATION AND THE CONSTRUCTION OF A DIGITAL ELEVATION MODEL

To assess the possible relationships between the site-location and the raw material sources, in primary and in secondary positions, a cartographic base of the promontory of San Vito lo Capo has been implemented into a GIS application. The cartographic base[1] is related to the topographical and geological aspects, as well as to the archaeological data (Fig. 2).
All data gathered have been reproduced in a vector format and integrated in a GIS, which allowed the spatial analysis of all cartographical and archaeological information and was very helpful in the location and the visualisation of landscape patterns. The data concerning the relief and the hydrographical system have been pulled out from the topographical maps; the data related to the different geological formations and to the relative tectonic events have been extracted from the geological maps (Fig. 1).
We have used GIS as a powerful managerial and visualising tool for spatial data sets to access, analyse, and interpret the archaeological and environmental data in a territory previously required. The model is built on an analysis based on different thematic maps of the data relevant to the relationship between the geological formations containing flint and/or radiolarite samples, the flint sources in secondary positions and the kinds of flint recognized within the Uzzo lithic complex.
In prevision of a future survey and an elaboration of a site prediction model, a three-dimensional model of the ground has been elaborated (Fig. 3).
The Digital Elevation Model (DEM) used for this research was created from digitised 25 m contours from the 1:50 000 topographical maps. In order to construct a usable DEM, questions of interpolation become fundamental considerations in the representation of topographic data. In fact, different algorithms can provide different elevations for the same points in the space and an uncritical use of interpolation algorithms can result in unrealistic representations of the landscape (Hageman and Bennet, 2000). We tested the TIN (Triangulated Irregular Network) and the Custom Point Estimation, the first realized with Arc View, the second performed with Vertical Mapper. TIN is often used to construct DEMs to use in archaeological predictive modelling. A TIN is composed of a set of triangular facets derived from irregularly spaced data points (Fig. 3.1).
On the contrary, in the case of the Custom Point Estimation (Fig. 3.2), grid cell values are calculated from data points within a specified search radius using a user-defined Mathematical operation. Mathematical operations include sum, minimum, maximum, average, count and median. The time necessary for the elaboration of the different landscape models is restricted to a purely descriptive finality of the data both territorial and archaeological. For the future, secondary data sets such as slope, aspect, and distance to water will be developed and added to these primary data sets within the GIS.

4. FINAL CONSIDERATIONS

This study represents a preliminary result of the GIS analysis in order to prepare a systematic survey of San Vito Lo Capo promontory. As for the Neolithic of the Uzzo Cave, data on technological behaviours and information from the analysis of the raw material availability in the landscape lead us to discuss about the realisation of a complex "technical system" based on simple provisioning strategies.

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1 **For the topography: IGM (Istituto Geografico Militare) maps 593, 605, 606 (1974; scale 1:50000). For the geology: Map 257 (Castelvetrano) of the Geological Map of Italy (1883; scale 1:100000); geological map of the Capo San Vito Promontory (Abate *et al.*, 1993; scale 1:25000).**

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FIGURES

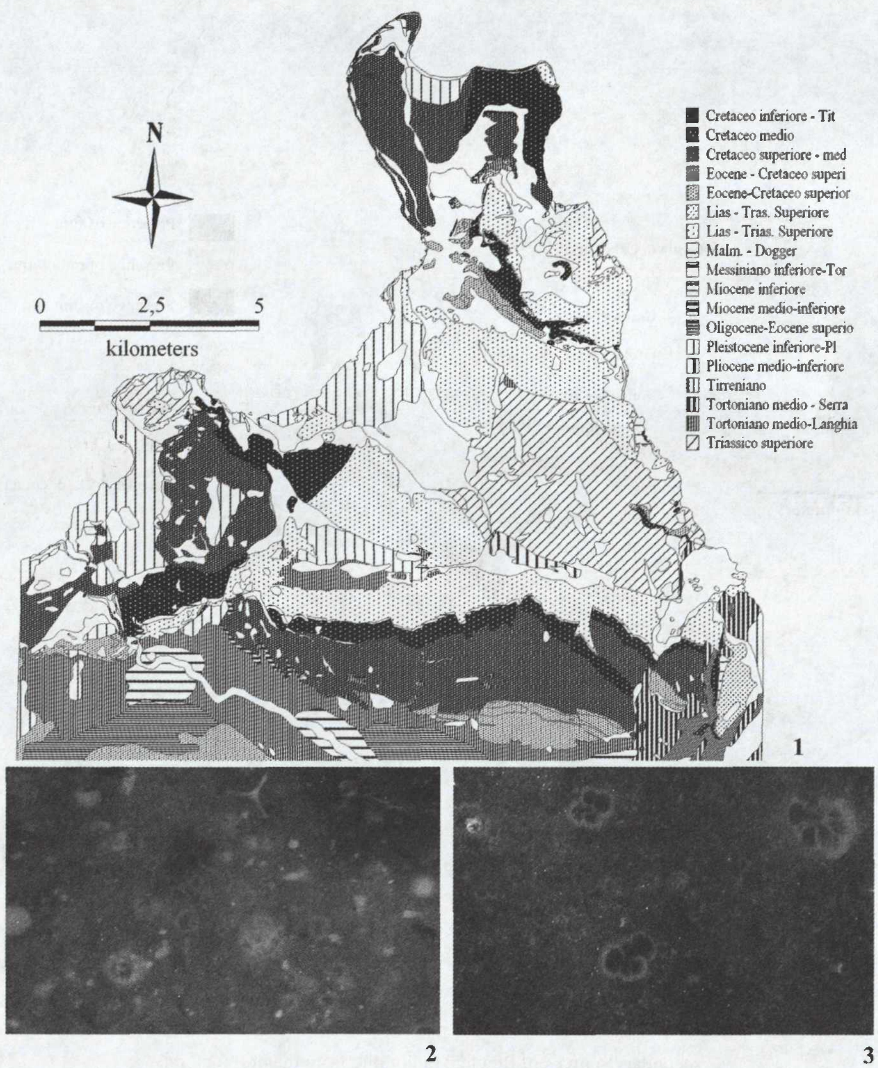

Fig. 1 – 1: chronology of the geological formations of the promontory of San Vito lo Capo. 2,3: petrography at Uzzo Cave: sample of the group 3a (black/gray detrital flint with Radiolaria and Planctonic Foraminifera (Globoquadrina, Globurotalia; 6,5X); sample of the group 2 (black homogeneous flint with Planctonic Foraminifera (Globutruncana? Globurotalia; 7X).

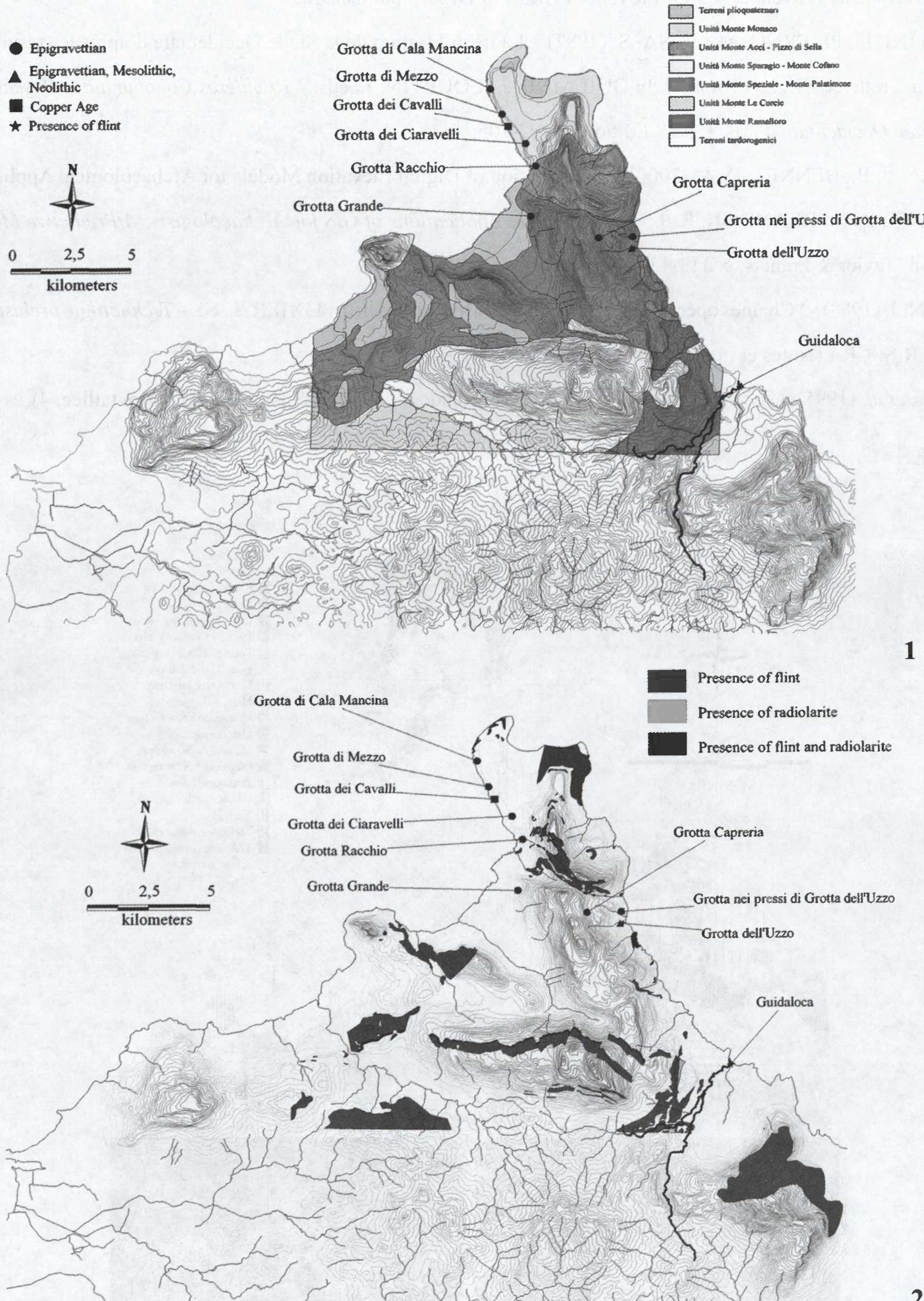

Fig. 2 – Promontory of San Vito lo Capo, GIS application. 1: topography, hydrology, structural unities and prehistoric sites (1). 2: primary and secondary sources of flint and radioralite from the promontory.

1

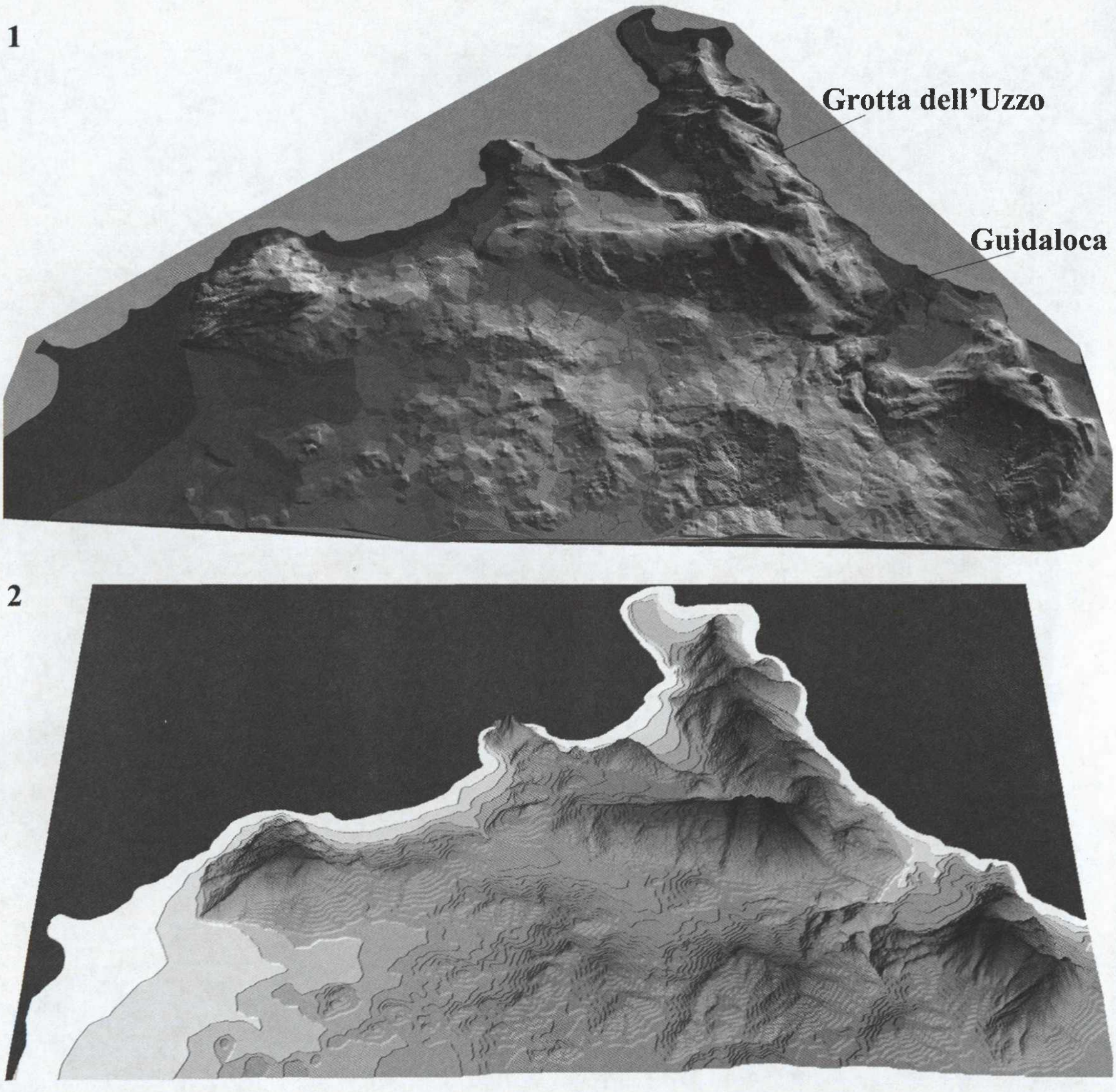

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Fig. 3 – DEMs of the Promontory of San Vito lo Capo. 1: TIN model, promontory viewed from south. 2: Custom Point Estimation model, promontory viewed from south.