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Intra-site spatial analysis and GIS: preliminary results from Alpe Veglia

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ABSTRACT - This contribution illustrates the results of a preliminary analysis undertaken by the authors on the spatial distribution of the Mesolithic artefacts (mainly in rock crystal) recovered during the 1988-1997 excavation campaigns over an area of almost 118m^2 in Alpe Veglia, district of Verbania, Italy (altitude 1750m). The software Idrisi 2 for Windows was used for the spatial analysis. The implementation and manipulation in the GIS of maps representing the variations in density, expressed in percentage frequency, of the main functional categories of lithic artefacts (tools, microlithic tools, microburins, cores and flakes) within the excavation grid (formed by 50x50cm^2), resulted in the identification of three main concentrations of archaeological materials. These are constituted by the repetitive association of different kinds of lithics and thus seem to indicate the presence of activity areas.

KEY WORDS : Alpe Veglia, Piemonte, Mesolithic, Intra-site analysis, GIS

PAROLE CHIAVE : Alpe Veglia, Piemonte, Mesolitico, Analisi intra-sito, GIS

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1. INTRODUCTION

The aim of this contribution is to describe how the use of GIS (Geographical Information Systems) graphical and analytical computerised tools has contributed to both the assessment of the internal organisation and function of the Mesolithic site of Alpe Veglia and the planning of the excavation strategy.

2. THE SITE

The site of Alpe Veglia lies in the Upper Val d'Ossola, at an altitude of 1750m, near the village of Cianciàvero. It is located within a glacial valley surrounded by mountains higher than 3000m, on an alluvial cone dissected by a stream called the Rio delle Streghe.

The site was discovered by Angelo Ghiretti in 1986 during field-walking and since 1988 it has been the object of systematic excavations (Gambari *et al.*, 1991; Guerreschi *et al.*, 1991): at present it is the only early Holocene site known on the Italian side of the Western Alps. The archaeological excavations are carried out by a team of the University of Ferrara directed by Antonio Guerreschi, in collaboration with the Ente Parco Alpe Veglia and with the sponsorship of the Regione Piemonte. So far they have uncovered an area of about 118m^2 which slopes down towards the North and which is bounded to the North by the upper edge of an escarpment and to the East by a pathway (Fig.1). This area has been excavated using squares measuring 50x50cm. These form the basis for the spatial attribution of the archaeological materials, which are contained within a 25cm thick podzolised layer, immediately underneath the meadow, and which are generally distinguishable only after the sieving and sorting procedures.

3. THE LITHIC INDUSTRY

Since the acidity of the soil has not consented the preservation of the organic remains, the archaeological record from Alpe Veglia is constituted exclusively by lithic artefacts, almost entirely made of local rock crystal. Overall, ca. 10kilos of artefacts have been retrieved so far; 897 artefacts are retouched. Typologically, the industry is referrable to the Early or Middle Sauveterrian (FONTANA *et al.*, in press).

4. THE SPATIAL ANALYSIS

Along with the techno-typological study, a preliminary spatial analysis was also carried out on lithic artefacts from Alpe Veglia, by means of the programme Idrisi 2 for Windows (EASTMAN, 1997). The use of such software has made it possible to automatically produce distribution maps of the individual functional categories of artefacts (tools, microlithic tools, microburins, flakes and cores), through the direct transfer of alphanumerical data, contained in the database Access, onto a cartographical basis. The latter, represented by the excavation plans, was acquired through the manual digitisation in AutoCad, exported into Idrisi as a "dxf" file and there rasterised. In the distribution maps of the individual classes of artefacts, the frequency value of the archaeological materials per 50x50cm^2 has been expressed in percentage density (reclassifed in standard categories, ranging from 0.01% to 10%). In this way, it has been possible to correlate categories of artefacts whose frequency per square had been recorded according to different parameters (weight, in the case of flakes; number, for all the other classes of materials).

Secondly, the GIS made it possible to mathematically combine the original distribution maps, in order to obtain other layers containing new information. These layers, named "overlays", represent the superimposition, or co-presence, of two or more classes of materials, always per square, either at a presence/absence or at a quantitative level.

Some of the maps resulting from the overlay procedure - which are here provided as examples (Fig.2-4) - seem clearly to suggest the existence of rather well defined and structured distributional patterns within the Mesolithic site. This makes it possible to suggest on the one hand that the positioning of the lithic materials within the podzolised layer is not very dissimilar, horizontally, from the original one (the post-depositional effects would be limited to a vertical shift of the artefacts) and on the other hand to postulate the presence of a series of zones with the function of areas of activity rather than of deposition or evacuation.

As far as the contribution made by the spatial analysis to the planning of the excavation strategy is concerned, it is sufficient to recall that the use of the preliminary results of this study as guidance for the organisation of the 1997 excavation campaign made it possible to define better two concentrations of materials which appeared on the maps along the western side of the archaeological area, and to discover - in just one season - about ¼ of the total finds retrieved since the beginning of the research.

SUMMARY - This contribution illustrates the results of a preliminary GIS spatial analysis on the Mesolithic rock crystal artefacts recovered between 1988-1997 over an area of almost 118 square meters in Alpe Veglia. The implementation and manipulation in the GIS of maps representing the variations in density of the main functional categories of lithic artefacts (tools, microlithic tools, microburins, cores and flakes) within the excavation resulted in the identification of three main concentrations, characterised by the association of different kinds of lithics according to repetitive patterns, and which thus seem to indicate the presence of activity areas.

RIASSUNTO - Questo contributo illustra i risultati di un'analisi preliminare GIS sui manufatti Mesolitici in cristallo di rocca recuperati tra il 1988 e il 1997 su di un'area di quasi 118 mq nel sito di alta quota di Alpe Veglia. L'elaborazione e manipolazione nel GIS di mappe rappresentanti la variazione in densità delle principali categorie tecno-funzionali di materiali litici (strumenti, armature, residui di strumenti a ritocco erto, nuclei e schegge) all'interno della quadrettatura di scavo ha permesso di identificare tre concentrazioni principali caratterizzate dall'associazione di diversi tipi di manufatti secondo patterns ripetitivi e perciò verosimilmente interpretabili come aree di attività.

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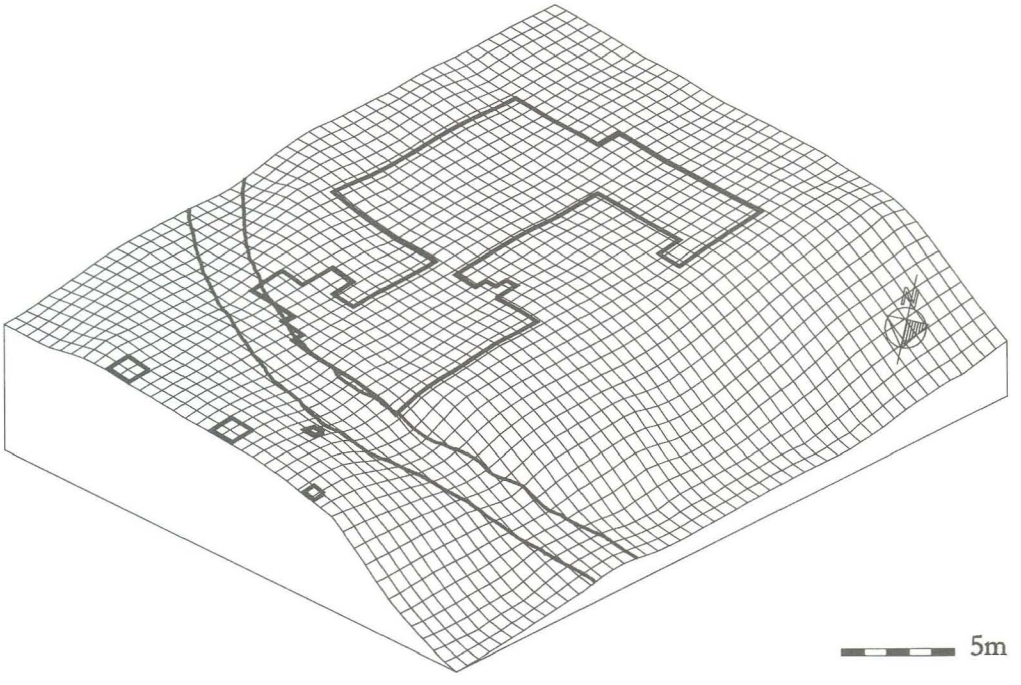

Fig. 1 - Digital Elevation Model of the excavation area of the Mesolithic site of Alpe Veglia (elaboration: N. Vullo)

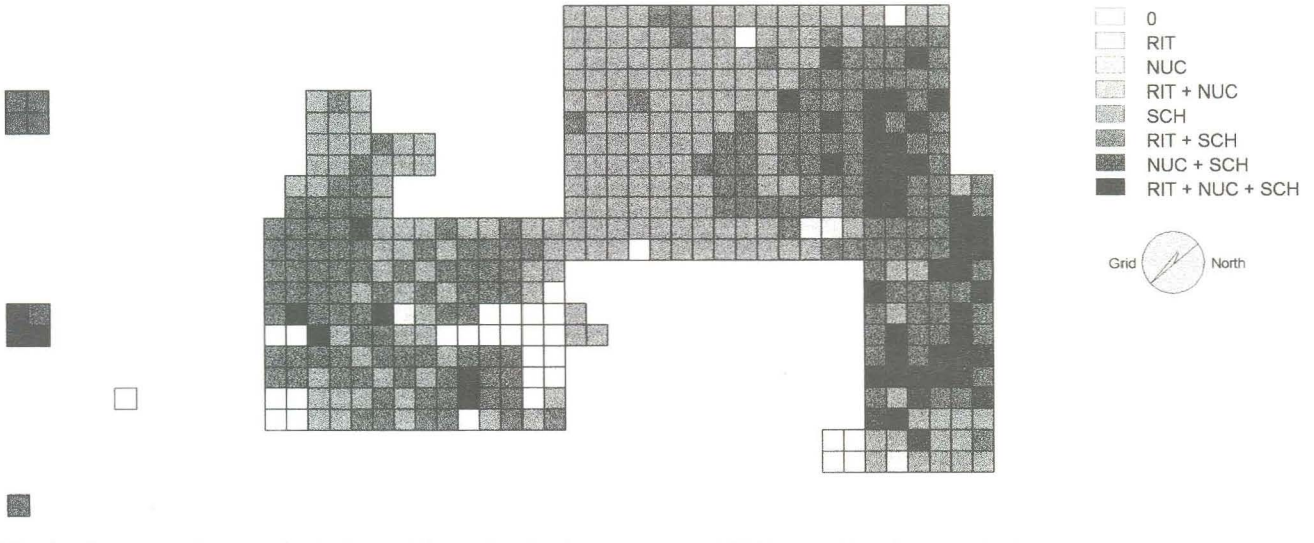

Fig. 2 - Overlay of retouched pieces (plus microburins), cores and flakes (elaboration: N. Vullo)

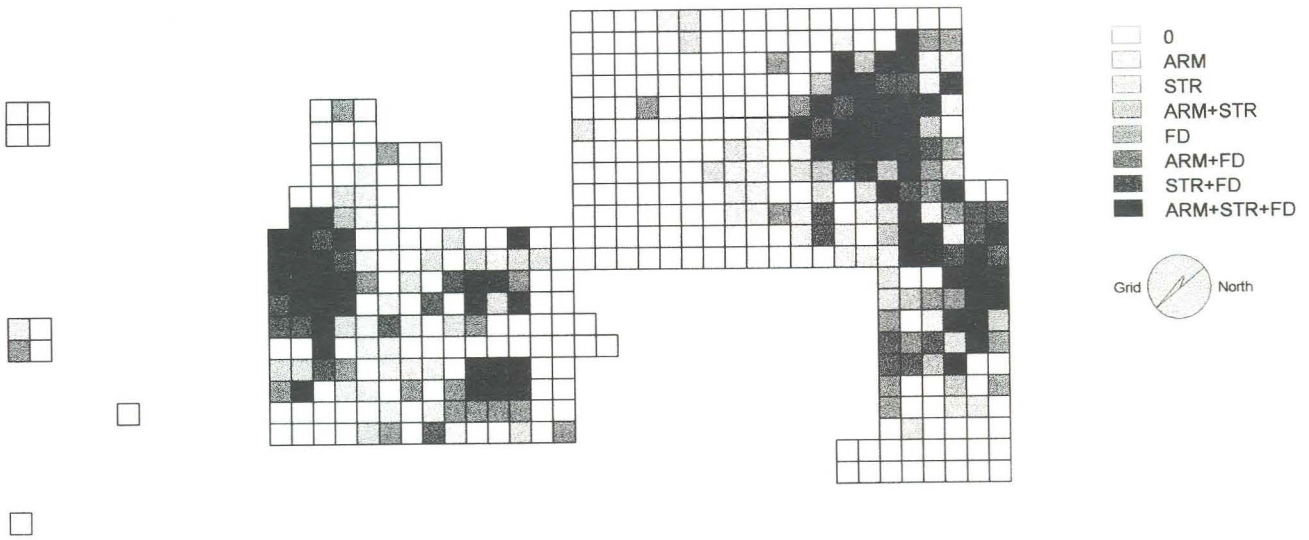

Fig. 3 - Overlay of tools, microlithic tools and fragmented backed pieces (elaboration: N. Vullo)

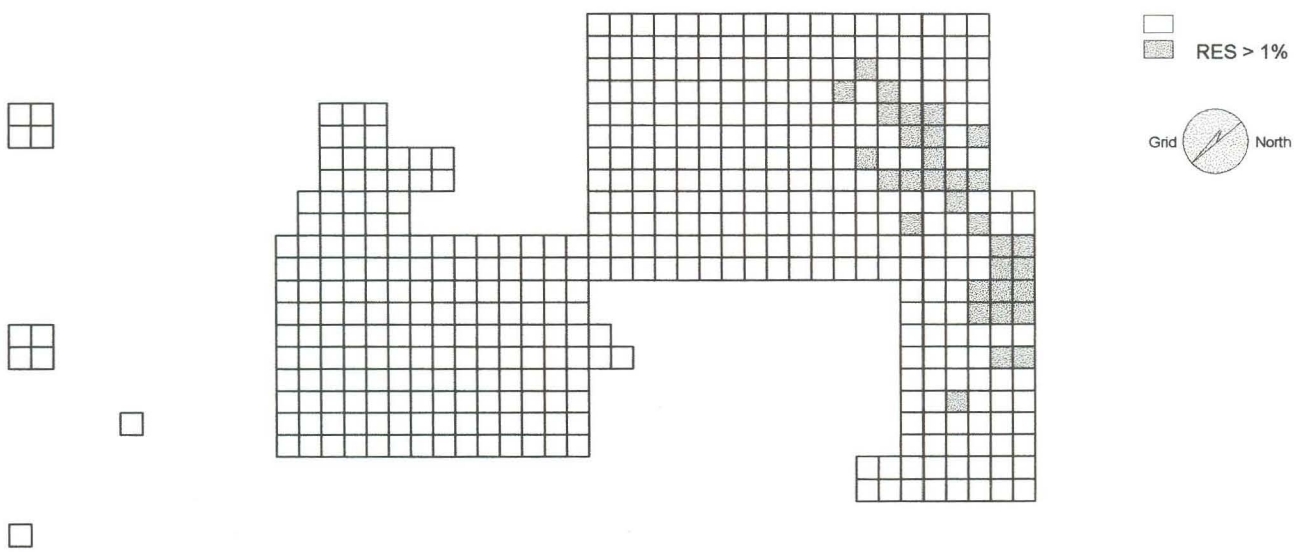

Fig. 4 - Microburins: percentage density > 1% (elaboration: N. Vullo)