

ANALECTA
PRAEHISTORICA
LEIDENSIA

28

PUBLICATIONS OF THE INSTITUTE OF PREHISTORY
UNIVERSITY OF LEIDEN

INTERFACING THE PAST

COMPUTER APPLICATIONS AND QUANTITATIVE
METHODS IN ARCHAEOLOGY CAA95 VOL. II

EDITED BY
HANS KAMERMANS AND KELLY FENNEMA



UNIVERSITY OF LEIDEN 1996

Graphic design: Henk de Lorm

Computer graphics: Peter Heavens

Copy editor: Marianne Wanders

Copyright 1996 by the Institute of Prehistory, Leiden

ISSN 0169-7447

ISBN 90-73368-10-3

Subscriptions to the series *Analecta Praehistorica Leidensia* and single volumes can be ordered from:

Institute of Prehistory
P.O. Box 9515
2300 RA Leiden
The Netherlands

contents

VOLUME I

Hans Kamermans Kelly Fennema	Preface
Data Management	
Jens Andresen Torsten Madsen	IDEA – the Integrated Database for Excavation Analysis 3
Peter Hinge	The Other Computer Interface 15
Thanasis Hadzilacos Polyxeni Myladié Stoumbou	Conceptual Data Modelling for Prehistoric Excavation Documentation 21
E. Agresti A. Maggiolo-Schettini R. Saccoccio M. Pierobon R. Pierobon-Benoit	Handling Excavation Maps in SYSAND 31
Alaine Lamprell Anthea Salisbury Alan Chalmers Simon Stoddart	An Integrated Information System for Archaeological Evidence 37
Jon Holmen Espen Uleberg	The National Documentation Project of Norway – the Archaeological sub-project 43
Irina Oberländer-Tárnoveanu	Statistical view of the Archaeological Sites Database 47
Nigel D. Clubb Neil A.R. Lang	A Strategic Appraisal of Information Systems for Archaeology and Architecture in England – Past, Present and Future 51
Nigel D. Clubb Neil A.R. Lang	Learning from the achievements of Information Systems – the role of the Post-Implementation Review in medium to large scale systems 73
Neil Beagrie	Excavations and Archives: Alternative Aspects of Cultural Resource Management 81
Mark Bell Nicola King	The MARS Project – an interface with England's past 87

Archaeometry

- M.J. Baxter
H.E.M. Cool
M.P. Heyworth
Detecting Unusual Multivariate Data: An Archaeometric Example 95
- Jon Bradley
Mike Fletcher
Extraction and visualisation of information from ground penetrating radar surveys 103
- Gayle T. Allum
Robert G. Aykroyd
John G.B. Haigh
Restoration of magnetometry data using inverse-data methods 111
- W. Neubauer
P. Melichar
A. Eder-Hinterleitner
Collection, visualization and simulation of magnetic prospection data 121
- A. Eder-Hinterleitner
W. Neubauer
P. Melichar
Reconstruction of archaeological structures using magnetic prospection 131
- Phil Perkins
An image processing technique for the suppression of traces of modern agricultural activity in aerial photographs 139
- Statistics and Classification**
- Clive Orton
Markov models for museums 149
- Juan A. Barceló
Heuristic classification and fuzzy sets. New tools for archaeological typologies 155
- Kris Lockyear
Dmax based cluster analysis and the supply of coinage to Iron Age Dacia 165
- Christian C. Beardah
Mike J. Baxter
MATLAB Routines for Kernel Density Estimation and the Graphical Representation of Archaeological Data 179
- John W.M. Peterson
A computer model of Roman landscape in South Limburg 185
- Sabine Reinhold
Time versus Ritual – Typological Structures and Mortuary Practices in Late Bronze/Early Iron Age Cemeteries of North-East Caucasia ('Koban Culture') 195
- Leonardo García Sanjuán
Jesús Rodríguez López
Predicting the ritual? A suggested solution in archaeological forecasting through qualitative response models 203
- Johannes Müller
The use of correspondence analysis for different kinds of data categories: Domestic and ritual Globular Amphorae sites in Central Germany 217
- J. Steele
T.J. Sluckin
D.R. Denholm
C.S. Gamble
Simulating hunter-gatherer colonization of the Americas 223

- Paul M. Gibson An Archaeofaunal Ageing Comparative Study into the Performance of Human Analysis Versus Hybrid Neural Network Analysis 229
- Peter Durham Image Processing Strategies for Artefact Classification 235
Paul Lewis
Stephen J. Shennan
- Gijsbert R. Boekschoten A new tool for spatial analysis: "Rings & Sectors plus Density Analysis and Trace lines" 241
Dick Stapert
- Susan Holstrom Loving Estimating the age of stone artifacts using probabilities 251
- Oleg Missikoff Application of an object-oriented approach to the formalization of qualitative (and quantitative) data 263

VOLUME II

Geographic Information Systems I

- David Wheatley Between the lines: the role of GIS-based predictive modelling in the interpretation of extensive survey data 275
- Roger Martlew The contribution of GIS to the study of landscape evolution in the Yorkshire Dales, UK 293
- Vincent Gaffney Extending GIS Methods for Regional Archaeology: the Wroxeter Hinterland Project 297
Martijn van Leusen
- Trevor M. Harris Multi-dimensional GIS: exploratory approaches to spatial and temporal relationships within archaeological stratigraphy 307
Gary R. Lock
- Philip Verhagen The use of GIS as a tool for modelling ecological change and human occupation in the Middle Aguas Valley (S.E. Spain) 317
- Federica Massagrande The Romans in southwestern Spain: total conquest or partial assimilation? Can GIS answer? 325
- Shen Eric Lim Recent examples of geographical analysis of archaeological evidence from central Italy 331
Simon Stoddart
Andrew Harrison
Alan Chalmers
- Vincent Gaffney Satellite Imagery and GIS applications in Mediterranean Landscapes 337
Krištof Oštir
Tomaž Podobnikar
Zoran Staničič
- Yvette Bommeljé The long and winding road: land routes in Aetolia (Greece) since Byzantine times 343
Peter Doorn

- Javier Baena Preysler
Concepción Blasco Application of GIS to images and their processing: the Chiribiquete Mountains Project 353

Geographic Information Systems II: The York Applications

- Julian D. Richards From Site to Landscape: multi-level GIS applications in archaeology 361
- Harold Mytum Intrasite Patterning and the Temporal Dimension using GIS: the example of Kellington Churchyard 363
- A. Paul Miller Digging deep: GIS in the city 369
- Julian D. Richards Putting the site in its setting: GIS and the search for Anglo-Saxon settlements in Northumbria 379
- Jeffrey A. Chartrand Archaeological Resource Visibility and GIS: A case study in Yorkshire 389

Visualisation

- John Wilcock A description of the display software for Stafford Castle Visitor Centre, UK 405
- Christian Menard
Robert Sablatnig Pictorial, Three-dimensional Acquisition of Archaeological Finds as Basis for an Automatic Classification 419
- Katalin T. Biró Simple fun – Interactive computer demonstration program on the exhibition of the Szentgál-Tűzköveshegy prehistoric industrial area 433
- György Csáki
Ferenc Redő Documentation and modelling of a Roman imperial villa in Central Italy 437
- Maurizio Forte
Antonella Guidazzoli Archaeology, GIS and desktop virtual reality: the ARCTOS project 443
- Germà Wunsch
Elisabet Arasa
Marta Pérez Dissecting the palimpsest: an easy computer-graphic approach to the stratigraphic sequence of Túnel VII site (Tierra del Fuego, Argentina) 457
- David Gilman Romano
Osama Tolba Remote Sensing and GIS in the Study of Roman Centuriation in the Corinthia, Greece 461
- F.J. Baena
F. Quesada
M.C. Blasco An application of GIS intra-site analysis to Museum Display 469

Education and Publication

- Robin B. Boast
Sam J. Lucy Teaching with objects 479

- Martin Belcher
Alan Chalmers
Andrew Harrison
Simon Stoddart
Teaching the Visualisation of Landscapes – Approaches in Computer based learning for Archaeologists 487
- Anja C. Wolle
Stephen J. Shennan
A Tool for Multimedia Excavation Reports – a prototype 493
- G. Gyftodimos
D. Rigopoulos
M. Spiliopoulou
Exploring Archaeological Information through an Open Hypermedia System 501
- Martijn van Leusen
Sara Champion
Jonathan Lizee
Thomas Plunkett
Toward a European Archaeological Heritage Web 511
- Mike Heyworth
Seamus Ross
Julian Richards
Internet archaeology: an international electronic journal for archaeology 521
- Virgil Mihailescu-Bîrliba
Vasile Chirica
A Survey of the Development of Computer Applications in Romanian Archaeology 529
- Kris Lockyear
Computer-aided publication in practice 535

Simple fun – Interactive computer demonstration program on the exhibition of the Szentgál-Tűzköveshegy prehistoric industrial area

1 Introduction

This paper aims at reporting on an interactive computer demonstration program installed in an exhibition, the first of its kind in Hungary. The subject of the excavation was the prehistoric industrial area on and around the Tűzköveshegy ('Flintstone Mountain' at Szentgál, West-Central Hungary (fig. 1). Red radiolarite from the environs of Szentgál was first mentioned in archaeological technical literature in 1876 (Lipp 1876); thereafter, however, the site was neglected and only the investigations of the past few years could prove its actual significance amongst Hungarian prehistoric sites.

The archaeological rediscovery of the exploitation area took place in 1982, in the frame of systematic fieldwork for the exploration of potential sources of prehistoric lithic raw materials (Biró 1986a, 1986b). The workshop character of the site was immediately recognised. Excavations started there in 1983 and are still in progress. The first mining pits were found in 1993; so far, 5 individual mining pits have been separated.

For the determination of the period of mining, parallel excavations were started by J. Regenye (Regenye 1994). Systematic fieldwork and a survey of museum material on the distribution of the raw material was also done (Biró/Regenye 1991). By 1995, the gathered information formed the basis for the setting up of an exhibition devoted to the problems and results of the Szentgál industrial complex. The exhibition was opened on 15th March 1995 in the Veszprém Laczkó Dezső Museum and is reported to be fairly popular. It will be open till 31st March 1996 and there are plans for a permanent exhibition in a different museum after that date.

Both the excavations and the exhibitions had a very low budget. We had the support of volunteers for the excavation and lots of friends to help with the installation of the exhibits, as well as the compilation of the computer program.

The idea of setting up an interactive computer demonstration program within the exhibition was already considered in 1993 (Biró 1993). The discovery of evidence of mining in the exploitation area gave a last impetus in the realisation of this exhibition, because unlike with other flint

mines (e.g., Tata, Sümeg; Fülöp 1973, Bácskay 1986), there seemed to be no chance of preserving the shafts and pits and arrange a presentation to the public.

2 The exhibition

The exhibition of the Szentgál-Tűzköveshegy prehistoric industrial complex is unusual in many ways. It is devoted to joint studies of two archaeologists on a range of related problems: formation, exploitation, access, distribution, prehistoric and modern use of 'Szentgál flint'¹. The focus of interest is not on 'objects' but on context. We therefore used a model based presentation and tried to place the individual finds in a realistic context. Formation of the radiolarite was modelled and map information was collected in a tangible, relief form. There are 3-D 'in situ' models of the mine, the source area and the location of the prehistoric industrial settlements, the excavation and the reconstruction of the prehistoric settlement features. Visitors have a chance to handle some of the exhibits and the interactive computer demonstration program, which is the subject of this paper, is also offered for manipulation.

3 The computer program in the exhibition

3.1 TECHNICAL SOLUTIONS

From the start, we were aware that in installing an interactive computer demonstration program we would have to keep everything very simple. This was partly necessary because of the very limited funds but also because of the novelty of our enterprise. We aimed at the knowledge and interest of the young 'computer generation', but the whole program had to be constructed in a way that does not require sophisticated means nor any substantial knowledge of computers. Thus the basis of our exhibition program had to be very easy to handle and not very demanding as far as hardware was concerned. Also, we had to base our presentation on legal software. To meet all these requirements, the public domain hypertext program, HYPLUS, by Neil Larson was selected. We had tested the potential of this program in the construction of textbooks and lectures previously, both as users (students; Bakonyi *et al.* 1994) and as authors and lecturers (Biró *et al.* 1994, as well as different conferences and symposia).

This program runs on a minimal configuration effectively (AT 286 with min. MS-DOS 5.0, Hercules and/or mono VGA monitor). The generous support of the SZÜV (a local computer dealer) and the Ministry of Education finally made it possible to run the exhibition program on a 486 SX computer with SVGA monitor, which is certainly much better for speed and aesthetical quality. The manipulation of the program can be realised by the cursor keys alone. To filter out possible sources of errors, the exhibition program is started by the autoexec.bat file with all necessary settings. The computer is placed in a closed box for protection and the keyboard is partly covered. The museum attendants have no special duty but to switch it on and off like the light in a room. The motherboard is 'green', so that it can be operated during all exhibition hours. Switch-off time is set to 5 minutes.

3.2 CONTENTS

The contents of the program was constructed to cover basic fields of the exhibition with a detailed explanation and many illustrations. The complete structure of the hypertext is outlined in figure 2.

The deeper layers of the program contain specialists' information, i.e., archive data and text of available publications. The full text of the exhibition guide is also included, in a Hungarian, English and German version. For the foreign visitors, a simplified version of the hypertext with full illustration list is given in English and German. There is a special part for youngsters who have as yet no school experience in prehistory, geology and related problems. The program had two short slide shows on the production and refitting of a core. The elements of the slide show were registered step by step on an experimental series.

The most demanding part of the construction of our application was the compilation and proper quality of illustrations. There are currently 144 images included in the program (with the slide shows, 191). The origin of these images is very varied. Some were constructed in the computer by drawing programs (CorelDraw, Paintbrush etc.). Other elements, like spatial statistical data and 3-D models of the environs of the site, were made with GIS packages. Part of the images were scanned and manipulated to fit in the exhibition demo. Video scanning and digitalization of microscopic images was also utilised. For part of the images, particularly the slide shows, a digital camera was used. For all the facilities we used, I have to thank a number of good friends.² Inserting the images into the program required a lot of patient work, conversion between forms and formats, hardware platforms and resolution. The more demanding pictures (photos) were finally inserted in the form of self-extracting images (.exe form) because the viewer of the hypertext could not handle high quality images in acceptable quality.

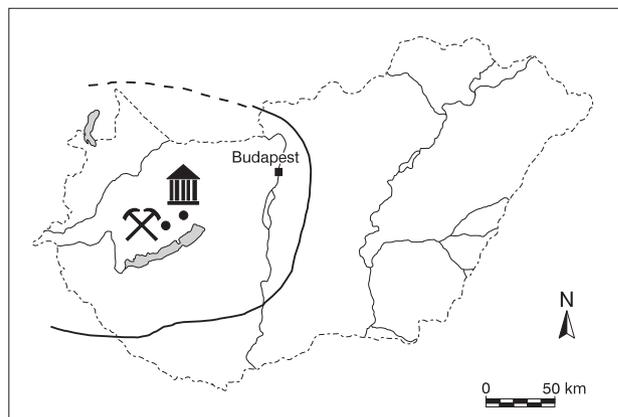


Figure 1. Location of the site and its environs.

4 Current experiences

To the best of our knowledge, the program has been very well received. It was certainly a challenge to the museum staff; as they had to master not only the handling of the program (which is really very simple) but also had to have a different attitude towards visitors. In contrast with the former duties ('don't touch the exhibits!'), the visitors have to be encouraged to touch, to try and manipulate the program. Many teachers with schoolchildren have discovered the possibilities offered by this different exhibition approach. Excavators of the past 10 years have shown much interest in the parts relating to their own work: chronicle, excavation reports, documentative photos. We are following comments in the guestbook and intend to complete the illustration material, especially in some fields which were not fully documented.

5 Documentation, availability

The full text of the program (1.0, test version and 1.1, first exhibition version) was compiled into a text file and printed as reference material for museum educational purposes. The latter text version is available through the INTERNET from the Museum shelf of the Hungarian Electronic Library (currently at the gopher service of the University of Economics, ursus.bke.hu). The possibility of producing a CD on the basis of the exhibition material is also considered³.

notes

1 More exactly, radiolarite.

2 Especially, F. Gyulai (National Science Foundation Archaeological Instruments' Centre), Gy. Munkácsy (Photographic Collection of the National Pedagogical Museum) and Á. Burkus (Museum of Fine Arts).

3 The CD was published for the 18th of May 1995, the International Museum's Day, and can be obtained from the author.

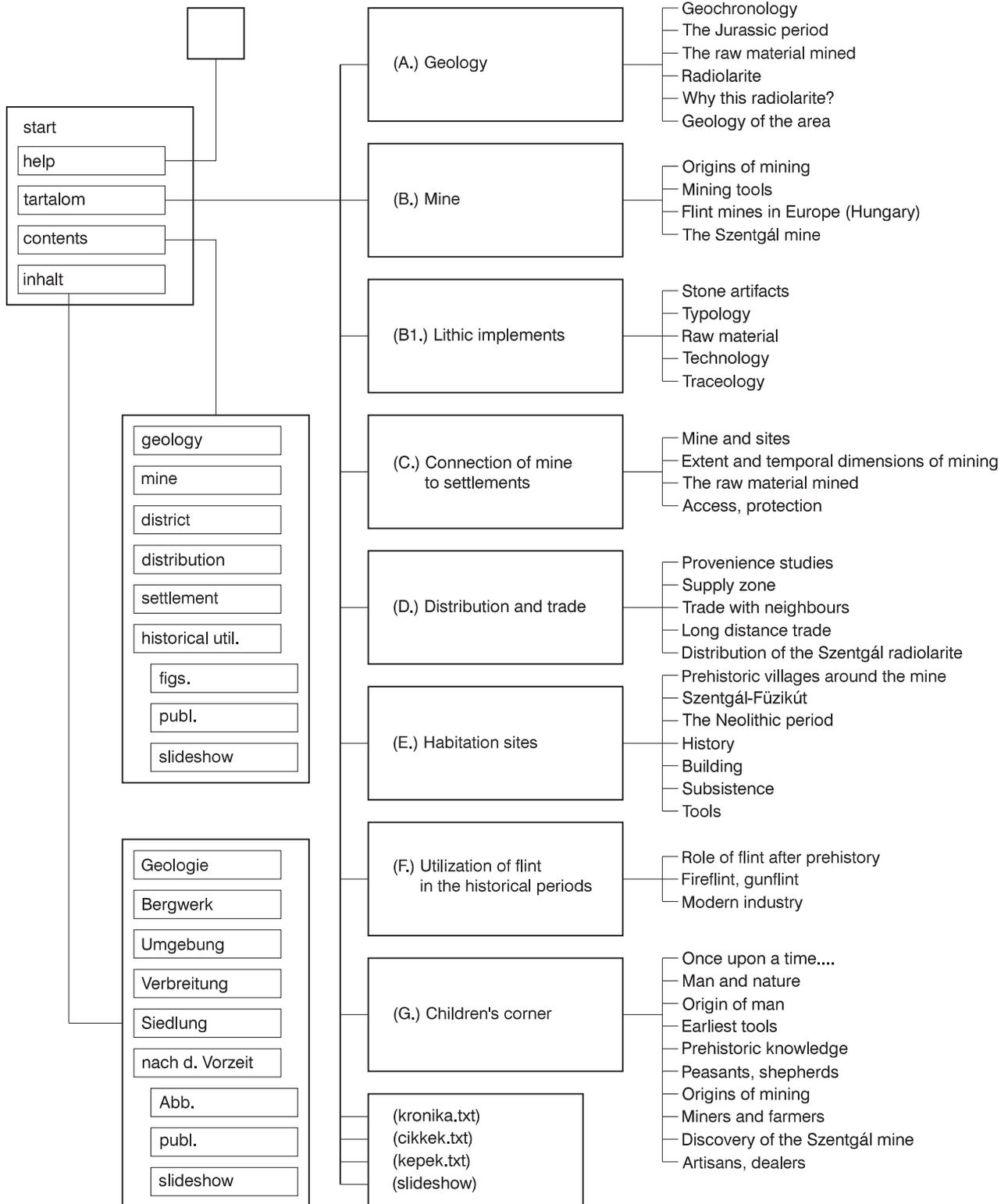


Figure 2. Structure of the hypertext exhibition guide.

references

- Bakonyi G.
L. Drótos
K. Kokas 1994 *Hálózati információforrások használata* (The use of net information sources) E-book in the Hungarian Electronic Library, Miskolc.
- Bácskay E. 1986 State of Affairs at Sümeg. In: K. Biró (ed.), *Sümeg Conference Papers I*, Budapest, 11-26.
- Biró, K. 1986a Prehistoric workshop sites in Hungary, WAC Preprints, Southampton, 1-30.
1986b The Szentgál workshop complex. In: Biró, K. (ed.), *Sümeg Conference Papers I*, Budapest, 101-106.
1993 Computer application in the study of the Szentgál-Tűzköveshegy mine, HCAA Abstracts.
- Biró, K.
J. Regenye 1991 Prehistoric workshop and exploitation site at Szentgál-Tűzköveshegy, *Acta Archaeologica Hungarica* 43, 337-375.
- Biró, K.
Gy. Munkácsy
M. Rajczy 1994 *Rendszergazda tanfolyam. Muzeológusoknak, IBM PC kompatibilis személyi számítógépekről* (System administrator's course for museologists). E-book in the Hungarian Electronic Library, Budapest.
- Fülöp J. 1973 Funde des prähistorischen Silexgrubenbaues am Klávária-Hügel von Tata, *Acta Archaeologica Hungarica* 25, 3-25.
- Lipp V. 1876 Vas vármegyei leletekről, *Archaeológiai Értesítő* 8.
- Regenye, J. 1994 Előzetes jelentés a lengyeli kultúra szentgáli telepének kutatásáról, *Veszprém Megyei Múzeumok Évkönyve* 19-20, 69-88.

Katalin T. Biró
Hungarian National Museum
Department of Information
Pf. 124
1450 Budapest
Hungary
e-mail: h5852tbi@ella.hu