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TRAVELLING IN THE SUBSOIL TO REVEAL AN ALMOST UNKNOWN SOCIETY: THE CASE OF MONT'E PRAMA (SARDINIA, ITALY)

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Sardinia is characterized by unique features which confer on it a charm that few other regions in the world possess. Certainly the most important is the presence of the Nuraghi, clear evidence of an evolved and organized people. Over 7,000 and perhaps as many as 10,000 Nuraghi of different forms and complexity are scattered across Sardinia, dating back to the second millennium BC. They tell of a pragmatic people, expert in building futuristic structures, in hydro-geological research and in territorial planning, on with particular attention also devoted to artistic aspects, and with customs and traditions which are not yet fully understood. A particular example comes from a micro-region called Sinis where the presence of Nuraghi exceeds two per square kilometer and where about 45 years ago a necropolis was discovered, with aligned well-tombs covered with slabs and. A parallel sacred road and giant stone sculptures were also found. After a few days of excavations carried out over a period of five years, the searches were hastily interrupted. Only four years ago the research was resumed by the Universities of Cagliari and Sassari, both geophysical surveys and archaeological digs. The task of finding out what the necropolis was linked to and its extent was made possible with the application of advanced geophysical methods. Above all the use of a multichannel Georadar, but also of aerial photos, thermal surveys from aerostats, rapid electrical survey and 3D ERT allowed us to explore a vast area and therefore to understand the extent and perhaps the meaning of some "digital" structures. Moreover, integration with the data of an aerial laser scanner has enabled us to create a system of visualization of dense geophysical data which enables us to attribute archaeological identity to the anomalies identified. In this way it is now possible to travel within the subsoil to discover the way of life of this almost unknown civilization.

Recent Publications

1. Santarato G et al. (2017) The consolidation and stabilization soils through the injection of expanding polyurethane resin under a non-invasive diagnostic check by 3D-4D- ERT. Soil Stabilization Types, Methods and Applications. Nova Science Publishers. pp:165-230. ISBN: 978-1-53612-507-8.
2. Ranieri G et al. (2016) Geophysical Prospection of the Roman city of Pollentia, Alcudia (Mallorca, Balearic Islands, Spain). Journal of Applied Geophysics. 134:125-135. Doi:10.1016/j.appgeo.2016.08.009.
3. Trogu A et al. (2014) The ancient Roman aqueduct of Karales (Cagliari, Sardinia - Italy): applicability of geophysics methods to find the underground remains. Archaeological Prospection. 21(3):157-168. Doi:10.1002/arp.1471.
4. Piga C et al. (2016) Geophysical and aerial sensing methods for archaeology: a case history in the Punic Site of Villamar (Sardinia, Italy). Remote Sensing. 11(6):10986-11012. Doi:10.3390/rs61110986.

Biography

Gaetano Ranieri is retired and formerly has been full Professor of Applied Geophysics from the Faculty of Civil, Environmental Engineering and Architecture of the University of Cagliari (Italy). He has been the Director of the 1st International School on Soil and Environment Protection (1988) at Polytechnic University of Turin (Italy), Co-founder of (Environmental and Engineering Geophysical Society) (now NSG); Organiser of the first International Meeting on Sustainable Environment in Turin, Italy (1995). His main research topics include gravity, seismic, geo-electric, thermic and electro-magnetic applications to civil, mining, environment, agriculture and archaeology fields. He was the first to apply the geophysical methods to soil remediation, waste disposal, precision farm, monuments and earthquake precursors. In the archaeological field he made some important discoveries such as the Volubilis amphitheatre in Morocco, the continuation of the structures in Pollentia (Spain) and in the wide area of Mont'e Prama in Sardinia. He has led various research team in Europe, Africa and Latin America. He has more than 200 papers, 2 patents and 10 awards to his credit.

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BARATTI IN 3D PROJECT: THE ETRUSCAN NECROPOLIS OF POPULONIA ENVIRONMENT, TUMBS, FINDS IN VIRTUAL HERITAGE

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Framework of the research: The current potentialities of virtual archaeology allow the general public, archaeologists and museum curators to well understand the contexts and somehow retrieve, with modern technologies and languages, the "restoration of archaeology" and the highly imaginative aspect of the reconstructive representation interrupted at the end of the 19th century. Moreover, this kind of promotion of archaeology in all categories of citizens together with the renewal of approaches and languages are the crucial key to attaining cognitive and emotional knowledge through active educational activities.

Subject: Populonia was for centuries a major iron production centre, favoured by its proximity to the sea - being the only Etruscan city with this peculiarity - and by its position in front of the Tuscan archipelago, at the junction of important Mediterranean trade routes. The artifacts investigated in the BARATTI IN 3D PROJECT are the Monumental Necropolis of San Cerbone – extending inland at sea level from the Gulf of Baratti - and several finds excavated from its "tombs of princes" (all the finds are exhibited in the Archaeological Museum of Populonia and in the National Archaeological Museum of Florence).

Methodology: This paper addresses some results of the project, intended to document the tombs and finds in light of their subsequent virtual relocation in order to show, in its entirety, their provenance context. The methodology of the study was constituted by the chain of "data metrical survey - 2D and 3D representation - communication" applied in two different sets of techniques on the tombs and the finds.

Results: The necropolis consists of approximately 200 remains, of which we have investigated the 30 most important tombs and two sets of their grave goods; the remains have been measured, described in their morphology, size, geometry, material nature and represented in 2D drawings and metrically reliable 3D models; finally, the "match" allowed us to virtually "reproduce" their provenance context.

Conclusions: In addition to digital models, as a physical fallout of this research, a permanent exhibition in the Archaeological Museum of Populonia has been realized, applying electronic engineering to three replicas of the finds, making an innovative approach to the knowledge of archaeology visible and allowing a subsequent rapid expansion of this museum's audience.

Recent Publications

1. Puma P (2018) Sperimentazioni di didattica museale per l'attivazione di processi educativi evoluti nel programma Digital Cultural Heritage- DigitCH. In Luigini A, Panciroli C (eds.), Ambienti digitali per l'educazione all'arte e al patrimonio. FrancoAngeli, Milano.
2. Puma P. (2017) Dal Rilievo al 3D: la rappresentazione del patrimonio archeologico nel progetto "Un museo in tutti i sensi", From survey to 3D: the representation of the archaeological heritage in the project "A museum in every sense". In Territori e frontiere della ricerca/ Territories and frontiers of Research, Gangemi, Roma.
3. Puma P. (2017) Tourism and heritage: integrated models of surveys for the multi-scale knowledge and dissemination of the historical towns, the architecture, the archaeology. In: The book of heritage VS tourism, an international point of view, Universidade Lusiana, Lisbona.
4. Puma P. (2016) Surveying and communicating for the virtual archaeological exhibitions: 3D low cost modeling of finds from the tomb of a Faliscan princess, the project "The Faliscan princess's grave goods in 3D". In: Le ragioni del disegno, the reasons of drawing Pensiero,

forma e modello nella gestione della complessità Thought, shape and model in the complexity management, Gangemi.

5. Puma P. (2016). The Digital Cultural Heritage- DigitCH programme: experiences of documentation and survey for the smart fruition of archaeological heritage. SCIRES-IT 6: 151-164.

Biography

Paola Puma has completed her MA in Architecture, her PhD in Survey and representation of Architecture and environment and postdoctoral studies in the same field from University of Florence; from 2015 is Associate professor at the Department of Architecture of Florence. She is the coordinator of the research group Digital Cultural Heritage- DigitCH, active in the field of survey and representation of architecture and archaeology. She has published more than 100 books and papers in reputed journals and is serving as an editorial board member of reputed journals. Carries out teaching and research in Bachelors degree of Architecture and the Master degree of Architecture, the Master degree of Primary Teacher Education, the PhD School in "Survey and representation of the built environment".

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