d1 RUPESTRIAN ARCHAEOLOGY, QUESTIONS & ANSWERS: TOOLS, METHODS AND PURPOSES

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This session is meant to analyze in depth the issues related to the relationships among methods, techniques of analysis and goals of the archaeological research applied to the rock art studies.

The technological innovation of the last thirty years has favored the development of new methods in support of the historical and archaeological studies; the approach to these disciplines has been often changed, broadening horizons and opening new ones. Among the others fields, we may focus on innovations based on computer sciences - both hardware and software, mathematics, optics, physics, mechanics and network communication.

The need to find other research tools beyond the traditional ones is the core of many of the most recent contributions, which significantly boosted the development of new documentation methods and of archaeological data representation.

At the same time, the so-called "traditional" recording methods, to collect and analyze data on an archaeological basis, have greatly refined their strategies, confirming the centrality of their role and taking advantage of the many opportunities offered by a continuous technical and computer-based upgrade.

Once we have collected, therefore, the outcomes of such a research phase, both innovative and experimental, it is time to reopen the debate to face the core issues with a new overlook, in the light not only of the new perspectives and analytical paths, but also of the research history, which is always appropriate to consider. Rock art studies offer us, today, the opportunity to evaluate in depth how the plurality of recording methods influenced the research goals and its results.

So, this session will gives space to communications, whether presenting the new methods development or addressing the integration, or re-reading, of the traditional ones. Similarly, it will hosts contributions related to the impact for the different research approaches produced by various recording and communication tools. A look at the future, meant as a planning able to treasure the continuous upgrade of its tools and the awareness of its own history.

Parietal art of Kapova cave: the specificity of documenting the wall paintings in the Chamber of Signs

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Kapova cave is situated in the Southern Urals (Russia). The Upper Paleolithic wall paintings were discovered in 1959. The archaeological research was conducted by O. Bader (1960-1978) and V. Shchelinsky (1982-1991). The Southern Urals archaeological expedition of the Lomonosov Moscow State University started to work at Kapova cave in 2008.

Since the discovery of the paintings in Kapova cave there has been several attempts by archaeologists to document them (O. Bader, V. Shchelinsky), and by specialists in the natural sciences (A. Ryumin, Y. Lyakhnitsky, A. Solodeinikov). But there is still no complete catalogue with all the necessary data. One of the main problems encountered by the Southern Urals archaeological expedition of MSU during the cataloguing of the wall paintings were the problems in identifying images of poor preservation, determining boundaries for measurements and the relationship between separated painted elements.

The importance of this problem is determined by the need for clear measuring criteria for the recording of wall images. The authors offer new approaches to documenting the wall paintings of Kapova cave, based on the latest results of work in the Chamber of Signs.

Fig.1 - Bison, Capova Cave, Chamber of Signs. (© Anisovets Yulia)
Fig.2 - Trapezium, Capova Cave, Chamber of Signs. (© Vladislav Zhitenev)

RARO - RockArt RecOrder, a dedicated software for cataloguing rock art figures

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Taking advantage of the new study of the Naquane Great Rock, the author compiled a self-executable portable application, the first of its kind, for cataloguing rock art engraved and painted figures. The source code is written in X-Base, ported to 32-64bit thanks to the HMG-Harbour MiniGUI Graphical User Interface. Its main features are the editing of rock and figure records, the managing of the related pictures – cropping, rotating, resizing, renaming, saving – and the automatic output in html format of the catalogue of the figures, complete with pictures, drawings and stats. Figure record definitions – such as styles, general and specific categories, chronological areas, detailed chronologies and execution techniques – are highly customizable, offering a tool adaptable to any worldwide rock art area; multi-choice fields are managed by drop-down boxes, while descriptive text-fields may contain hundreds of types each; the figure record is designed to facilitate comparisons among figures. RARO is also intended to perform specific queries over a large amount of data, making it a matter of seconds for the production of detailed catalogues limited to any chosen area: rock, chronology, typology, text-string or a combination of all of these. In a few words, a tool for editing, a tool for studying.
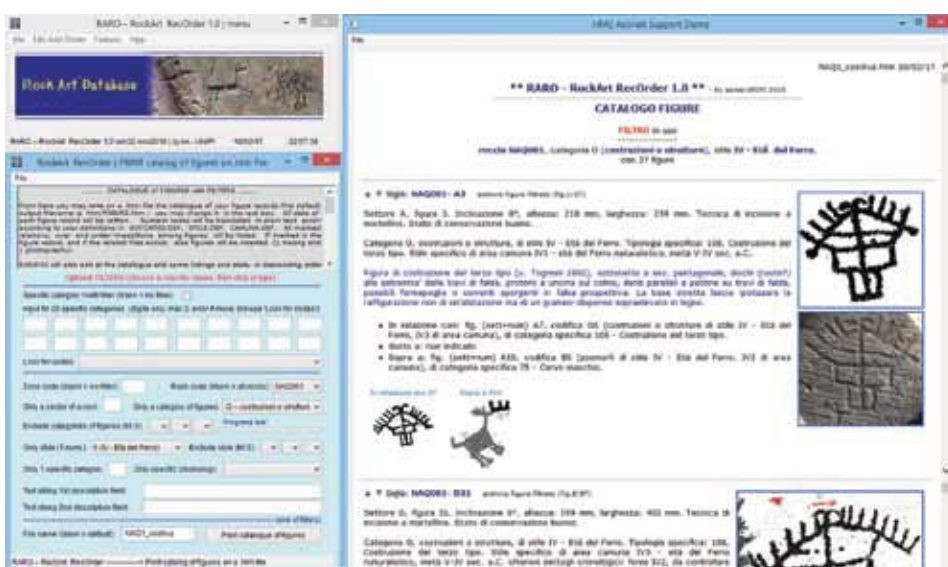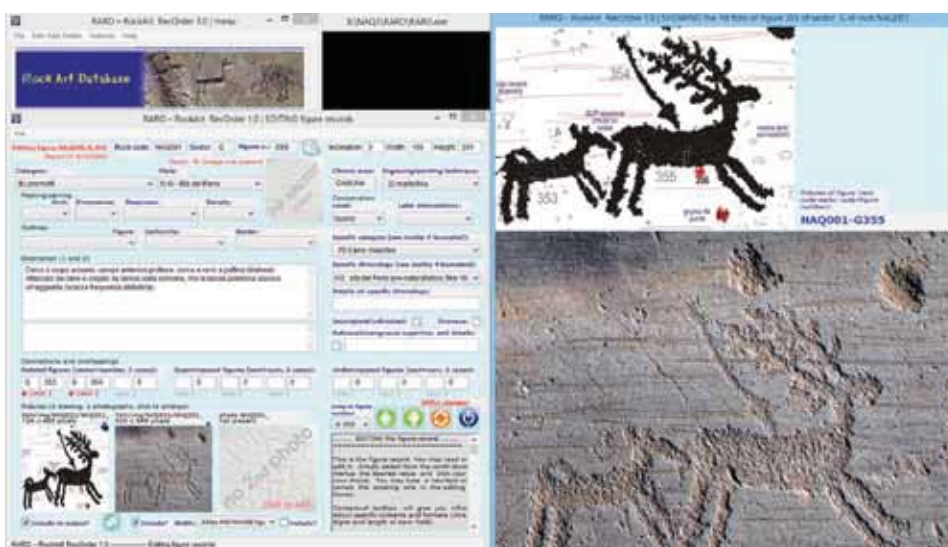
Rupestrian Archaeology in Brazilian Amazonia - Problems and Prospects - The Case of "Pedra do Sol" Rockshelter and its Rock Art Landscape

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Keywords: Brazilian Amazonia, petroglyphs, archaeological dating, archaeological context, rock art landscape

In the Brazilian Amazon, very few petroglyph sites (for the moment just 3 known sites) are able to be excavated and yield plausible chrono-stratigraphic archaeological data which is associated to the production and use of the type of rock art identified in that region. In one of these cases, Pedra do Sol Rockshelter, in Roraima State, the excavation process has already begun. Though still in its incipient stage, it has produced very coarse preliminary results that can now be brought to the debate, as two new dates emerged for the human occupation of the shelter, 4.500 BP and 9.400 BP. Although only disputably associated with the rock art inside the shelter, these dates provide a clue to the possible antiquity of the occupation of such shelter sites with petroglyphs in the higher and dryer lands of the Guianese Shield, Northern South America. As such, this paper intends to give a brief overview of the major problems faced by Amazonianist Rupestrian Archaeology, but with a focus on the preliminary results obtained from the first subsurface excavation project on the Pedra do Sol rockshelter and its implications for future research regarding dating and understanding some of the archaeological contexts of Amazonian Rock Art.

Compositions in the figural rock art of the Daureb, Namibia

The Cologne record of the rock paintings of the Brandberg/Daureb (Namibia) is uniquely suited for identifying and explaining patterns in rock art without having to rely on a presupposed cultural context. Our case study exploits this rich database on rock art by combining information theory and statistics with archeology. This rock art data has been recorded with a textual methodology and includes all rock paintings in an area of c. 300 km² on the Inselberg, which contains over 840 sites with more than 39000 individual figures in 4863 scenes. Individual figures are conceptualized in terms of the linguistic notion of a proposition (subject, predicate and object relation). Our formal approach provides a rigid framework for the definition of scenic coherence encompassing Gestalt and interaction. With the majority of interactions enacted by human figures, our data suggests that combination of different gender roles may produce narratives of distinctive hierarchical agency. In the long run we aim at grasping the structures of scenic narratives with the means of computer science, exploring whether algorithm based data mining enables us to identify underlying rules of scene formation. This research, details our approach of statistical pattern analysis and give examples concerning a variety of research questions, such as gender roles, similarity and relationship networks.

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Keywords: Gestalt, linguistic proposition, data mining, scenic composition, forager rock art
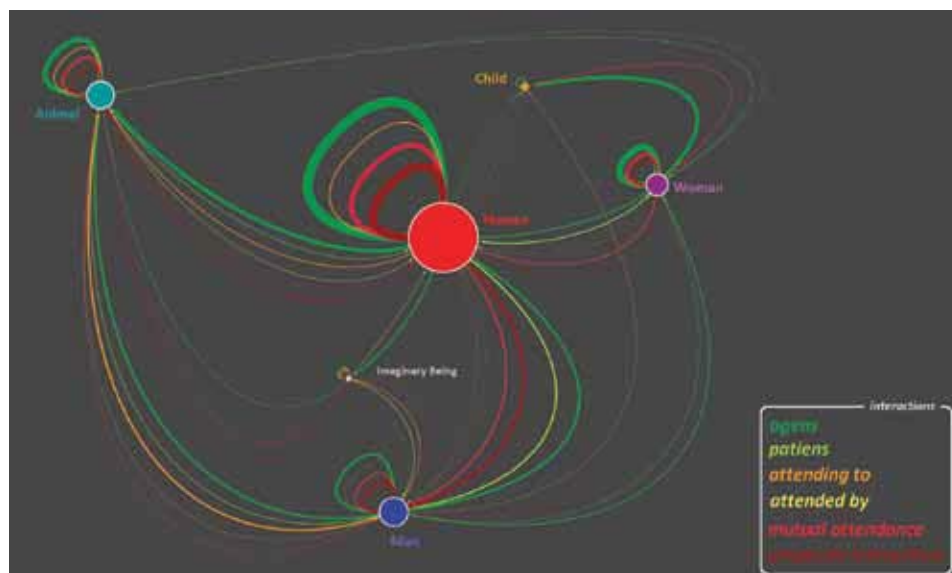

Fig.1 - Network of hierarchical and non-hierarchical interaction between depicted figures of the forager rock art of the Daureb. (Eymard Fäder)
Fig.2 Panel with complex and multiple interactions, Daureb, Namibia. (Heinrich-Barth-Institut)

New technologies for the survey, documentation and representation of rock art evidence

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Within the scope of a targeted digital documentation of archaeological sites, characterized by Rock art representations, for the first time the methods of survey and data acquisition of three particular case studies are presented in a detailed manner: Anfratto Palmerini (Monte la Queglia, Pescara), Parete Manzi (Montelapiano, Chieti), Pietra delle Croci (Lettopalena, Chieti). The acquisition of data and their three-dimensional digital representation, developed in the context of virtual reality and augmented reality, opens up new and intriguing perspectives for research and the communication of information, assists in the conservation of evidence threatened by degradation and highlights various aspects from differing disciplinary fields otherwise difficult to compare. The geographical distances and the difficulties of access encountered by rock art research, both by professionals and non-professionals, and the fact that the current technologies used are outdated, confirms the importance of these new developments. Thus, this research feeds into the cognitive experience, oriented at the research world or towards the touristic-cultural advances and takes on dynamic and evolving aspects, the documentation can be enriched and updated in real time. Conservation, remote multidisciplinary study and museum design are the future objectives to which these new technologies in the field of Rock art are aimed.

Fig.1 - Monte la Queglia (PE). (Gianni Furiassi, 2016)
Fig.2 - Montelapiano (CH). (Gianni Furiassi, 2016)

GiRA - A GIS-implemented Rock Art database for the study and analysis of Rock Art

In the field of computer science many attempts have been made to support rock art studies, mostly focused on the improvement of recording and documentation techniques that focus on gathering extensive amounts of data. It is now necessary to rethink data management and improve its qualitative and quantitative analysis. The aim is to create a new database where it is possible to collect and integrate both records produced with analogic and digital processes. This process has presented several issues: specific requirement and features, the necessity to link specific information, the time and resources required to implement the system. Given this, it is almost impossible to find a ready-to-use solution, thus we decided to create a dedicated database, specifically adjusted to these requirements. The nominated choice was an open-source system, intuitive to use, without the assistance of computer technicians; furthermore, this database will be linked to a GIS, which allows for maintaining the topographical relations between different types of information within the database (with the level of detail equivalent to traditional catalogues). In the presentation we will highlight the structure of the DB and will provide examples of the potentiality of this system, which maintains the information gained from decades of research integrating it into a wider and more complex system.

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Spatial distribution of pigments in stratigraphy: a door to understanding the rock art practice in Cerro Casa de Piedra 7 (Santa Cruz, Argentina)

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Cerro Casa de Piedra 7, located in the Santa Cruz Province, Argentina, was repeatedly occupied since ca. 10500 years BP. It has a well preserved record that's been the subject of several excavations over the last thirty years. Recent investigations applied vector graphics software to digitize old excavation plans in order to better understand the spatial distribution of material remains found within the site. This process transformed the assemblage of the digitized units into a single general plan of the site and the selective visualization of each type of material; enabling questions to be addressed regarding the distribution of different types of remains and the relationship between them. This permitted the identification of several distribution patterns.

This particular project focuses on the distribution of remains that came into contact with pigments (crayons, rocks, bones, leather, etc.), and their relationship with other vestiges. Given that the cave is almost completely covered with paintings, we propose that most of the pigments were involved in the production of rock art. Consequently, these materials are expected to be widely spread within the site, and a certain relationship between the pigments found in the stratigraphy and the closest rock art manifestations is likely to be found.
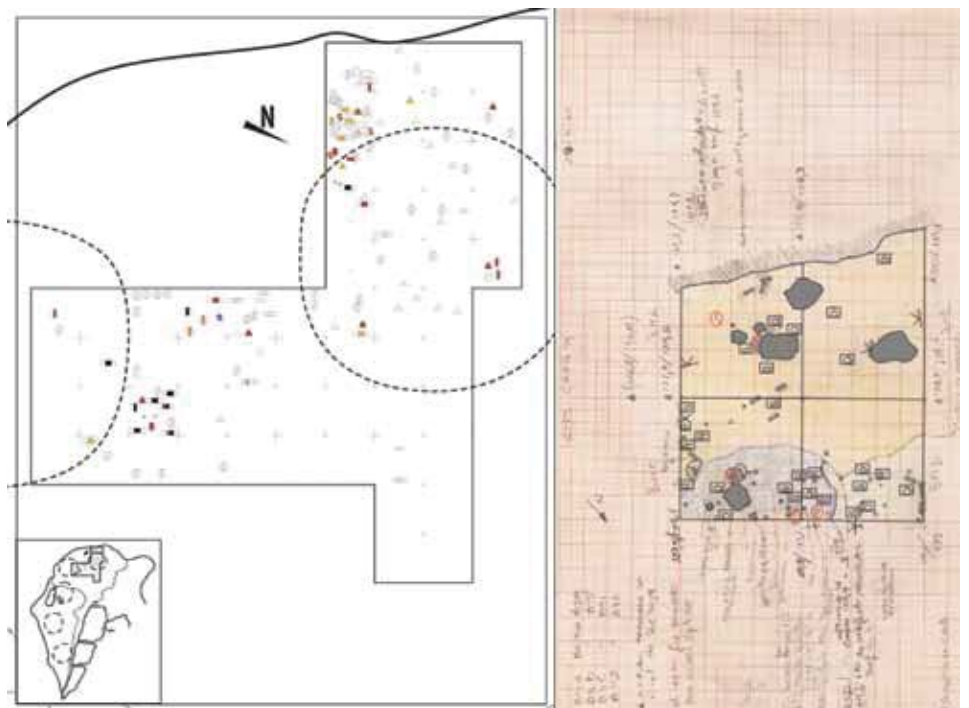
Documentation of the Rock Paintings in Serrania de la Lindosa, Colombia

Since the beginning of the GIPRI´s research, during the 1970s, the main concern has been the exhaustive documentation of each of the elements that constitute the rock art sites. In addition to the different symbolic motifs on the panels, it is essential to study different relevant aspects that account for the rock art and its environment. The recording of the Serrania de La Lindosa, has had the collaboration of an interdisciplinary group to cover all these relevant aspects. One dedicated to the documentation of the state of conservation of the sites and the natural environment of the area, another to photographically register the rock painting murals, another being the geological and archaeological analysis of the pigments and finally a team has been responsible to make an audiovisual record of the aforementioned recesses. The results and implications of this documentation will be the central theme of this paper, placing special emphasis on rock painting panels, which due to their size has involved their adjustment within new documentation formats. This project has been financed by the National Archaeological Research Foundation of Colombia.

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Keywords: documentation, rock paintings, geology, conservation, archaeometry, recording formats, rania de la Lindosa
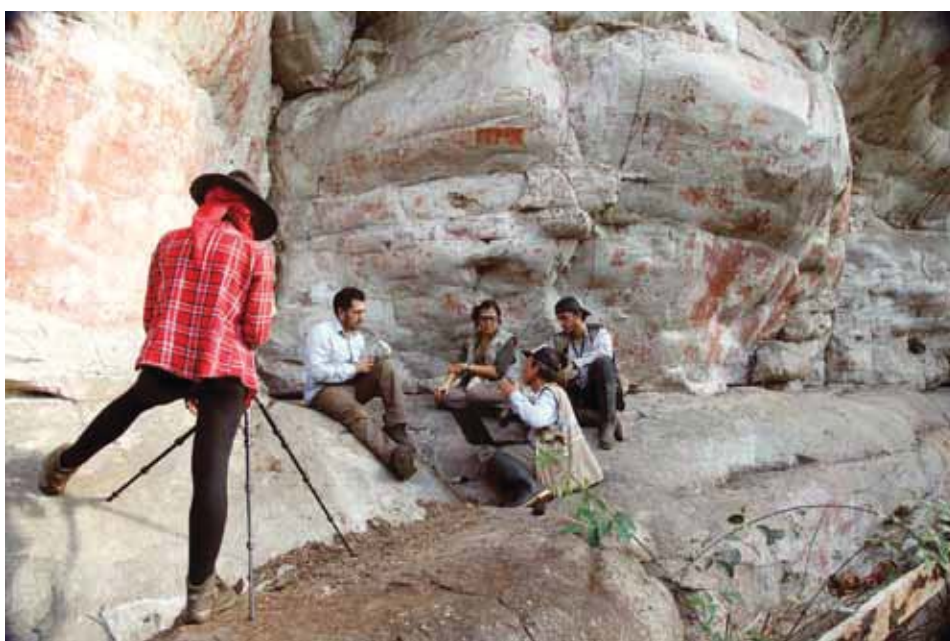

Fig.1 - Documentation and in situ analysis of rock paintings, Serrania La Lindosa, Colombia. (photo Gipri)
Fig.2 - Photographic documentation of rock paintings with drone and 360º photography, Serrania La Lindosa Colombia. (photo Gipri)

Numerical simulation to understand thermo-alterations and fires in the Chauvet-Pont d'Arc cave

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The Chauvet-Pont d'Arc cave (Ardèche, France), famous for its rock art, contains some Aurignacian thermal marks on the walls. The thermo-alterations include rubification (high-temperature chemical reactions revealed by limestone color changes), several flaking and soot deposits (for instance the Megaloceros gallery). The scale of the rubified areas which have been found to reach 25m² (only in the Chamber of the Bear Hollows) and the importance of flaking, has generated questions on the intensity and function of these fires. The issue was firstly examined experimentally as part of the research program CarMoThaP. The different kinds of thermal modifications were reproduced by means of localized fires, similar to the Aurignacian fires, within a limestone quarry. Based on the results of this experiment, a numerical process was constructed. OpenFOAM, an open source software, was improved to describe combustion and aeraulics. Then, the thermo-mechanical software Cast3M was used to estimate thermo-alterations induced by the simulated temperatures. It was then possible to run several numerical scenarios of fires in the 3D Chauvet-Pont d'Arc cave model. The ignition source, the power, the length of fires and the supply method are the archaeological parameters of interest that are estimated by the study, which also enable links to its compatibility with habitation and to the rock art.

Fig.1 - Bear of the recess, Chauvet-Pont d'Arc cave. (photo C.Ferrier)
Fig.2 - Numerical fire in the quarry performed by the software OpenFOAM

Semiotic hypothesis for the vulvar sign in the Western European Upper Paleolithic

A semiotic hypothesis about the formal dynamics of the vulvar sign in the European Upper Paleolithic is presented. The method observes prehistoric art as a visual language applying categories of signs, without attribution of meaning, but which are linked to a temporal significance. The objective is to examine the visual production of the vulvar sign from the understanding of the life cycle of signs in semiotic terms. The importance of investigating the beginning and end of each semiotic episode is highlighted, because the representational dynamic has its own temporality that is not governed by the same criteria as human occupation, but is indicative of social changes. An episode can be limited between an inaugural event and its symbolic reproduction, but the dynamics of the signs are not exhausted in these two states, we must also consider the indicial production and the iconic reproduction in the context of a tradition. Examples of all these categories will be shown. This paper aims to provide criteria of visual semiotics to traditional archaeological arguments in the study of prehistoric art, and to reflect on the use of dating techniques as a strategy aimed at contrasting an archaeological hypothesis.

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Keywords: vulvar, visual semiotcs, event, symbolism, dating, Upper Paleolithic
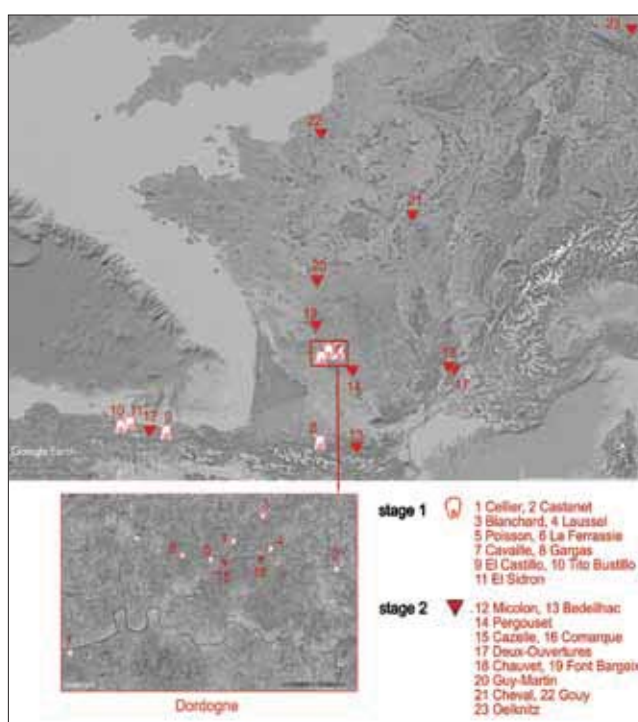

Fig. 1 - 1 Cellier, 2 Castanet, 3 Blanchard, 4 Laussel, 5 Poisson, 6 La Ferrassie, 7 Cavaille, 8 Gargas, 9 El Castillo, 10 Tito Bustillo, 11 El Sidron, 12 Micolon, 13 Bedeilhac, 14 **Pergouset,** 15 Cazelle, 16 Comarque, 17 Deux-Ouvertures, 18 Chauvet, 19 Font Bargeix, 20 Guy-Martin, 21 Cheval, 22 Gouy, 23 Oelknitz. (Blanca Samaniego)

Fig. 2 – Tito Bustillo and Laussel. (Blanca Samaniego)

The Sardinian "Domus de Janas" with paintings: some case studies

There are 3500 funeral hypogea that have been counted so far, called "Domus de Janas" and ascribed to the Middle Neolithic B, Late Neolithic and Copper Age (from the end of Vth to the IIIrd millennium BC), around 150 of these still have visible traces of paintings. This paper highlights the problems concerning the techniques, pigments and tools used, the figurative motifs and their typology, the techniques of documentation, their territorial diffusion and their inclusion in the chrono-cultural sequences of Sardinian Prehistory, and in the wider sphere of Mediterranean Prehistory.

Specific attention is made regarding the most recent techniques used for documenting the representations: the use of the application 'open-source D-stretch', with the 'albedo' image (the pure surface color, without any influence of projected color shades), drawn from the 3D processing of the surface's dataset using the Photometric Stereo technique. Within this frame of reference is presented the recent research conducted on the Pubusattile IV.

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Keywords: Domus de janas, Painting, D-stretch, Photometric stereo

Fig.1 - Illorai (SS), Molia, Tomb VII. (photo Luca Doro)
Fig. 2 - Villanova Monteleone(SS), Pubusattile IV. (photo Carla Mannu)