

Progetto Pran'e Siddi: Preliminary Report of Excavations at Nuraghe Sa Conca 'e sa Cresia (Siddi, SU)

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Abstract: In 2009-2011, *Progetto Pran'e Siddi* excavated two trenches at Nuraghe Sa Conca 'e sa Cresia, located on the Siddi Plateau in the Marmilla region of south-central Sardinia, uncovering 1.8 meters of stratified deposits of a primarily domestic character. Radiocarbon analysis dates the site to 1750-1450 BCE. Preliminary results from the analysis of pottery, fauna, and botanical remains are presented here.

Keywords: Nuragic culture, Bronze Age, environmental archaeology, Marmilla, Siddi.

Riassunto: Nel 2009-2011, il Progetto Pran'e Siddi ha consentito di effettuare due saggi presso il Nuraghe Sa Conca 'e sa Cresia, situato sulla "Giara" di Siddi nella regione della Marmilla, scavando 1,8 metri di depositi stratificati a carattere prevalentemente domestico. L'analisi al radiocarbonio fa risalire il sito al 1750-1450 a.C. Si presentano in questo contributo i risultati preliminari dell'analisi delle ceramiche, della fauna e dei resti botanici.

Parole chiave: civiltà Nuragica, età del Bronzo, archeologia dell'ambiente, Marmilla, Siddi.

INTRODUCTION

Progetto Pran'e Siddi is an Italian-American archaeological project established to characterize, date, and analyze the Nuragic settlement system of the Siddi Plateau in the Marmilla region of south-central Sardinia within its palaeoenvironmental context. The Siddi Plateau settlement system includes seventeen megalithic monuments (Fig. 1); sixteen of these structures are nuraghi and one is the well-known giants' tomb Sa Domu 'e s'Orku. The settlement system of the Siddi Plateau has been considered likely to date to the early development of the Nuragic culture based on the architecture of its nuraghi, the better-known and better-preserved of which belong to the type variously referred to as protonuraghi, pseudonuraghi, and corridor nuraghi or archaic nuraghi (MANCA DEMURTAS, DEMURTAS 1992; MORAVETTI 1992; PERRA 1997; UGAS 1998; LILLIU 2005; VANZETTI *et alii* 2013); we prefer the term corridor nuraghi.

Archaeological work undertaken on the Siddi Plateau prior to the beginning of *Progetto Pran'e Siddi* includes a general survey conducted by Giovanni Lilliu in 1939 (LILLIU 1941) and excavations and conservation work at the corridor nuraghe Sa Fogaia (1993-1994, 2003-



2004) and the giants' tomb Sa Domu 'e s'Orku (1990), though these projects remain largely unpublished with only brief reports of their results in the literature (BALMUTH 1992; BADAS 2001; SANTONI 2001A; SANTONI 2001B; COSSU, PERRA 2008; SANTONI 2009; DEPALMAS, DEIANA 2011). There is disagreement about the dating of Sa Fogaia. Santoni considers it to date to the middle or end of the Early Bronze Age (BA2) based on the pottery found in *vano a* of the site, which he identifies as Sa Turricula or Bonnanaro A (SANTONI 2009); however, other researchers would place these same materials in the beginning of the Middle Bronze Age (BM1) (DEPALMAS 2009), and some explain the presence of Early Bronze Age pottery at Sa Fogaia as evidence for settlement continuity in the area rather than for the date of the structure itself (PERRA 2016). The giants' tomb Sa Domu 'e s'Orku is constructed in the coursed-stone style and dated to the late Middle Bronze Age (15th–14th century BCE) based on a small amount of pottery found among fragments of grave goods distributed across a bed of carefully laid basalt stones and marl. Any later Nuragic material was removed or destroyed by subsequent reuse, indicated by Punic and Roman pottery at the site (BALMUTH 1992).

The other Nuragic monuments on the Siddi Plateau have received little scholarly attention after Lilliu's initial survey. Most works that reference them include only a classification of their construction, and these do not always agree (LILLIU 1975; BADAS *et alii* 1988; VAN DOMMELEN 1998; KRIEK 2020). Additionally, few radiocarbon dates exist for corridor nuraghi outside *Progetto Pran'e Siddi*. One corridor nuraghe for which a reliable radiocarbon date is available is Bruncu Madugui on the Giara di Gesturi (3770 +/- 250, stratum 3 of *vano e*, Gif-243), located approximately 12 km east-northeast of the center of the Siddi Plateau (DELIBRIAS *et alii* 1966; TYKOT 1994). Additional dates are available from the combination corridor/*tholos* nuraghe Albucciu in Arzachena (3170 +/- 250, lower layer 6, Gif-242), located approximately 160 km to the north-northeast; however, these dates may relate to later use of the structure rather than its first foundation (DELIBRIAS *et alii* 1966; ANTONA RUJU, FERRARESE CERUTI 1992: 58; TYKOT 1994).

The lack of in-depth study of the nuraghi of the Siddi Plateau, the early dates for the settlement system indicated by the excavations at Sa Fogaia and Sa Domu 'e s'Orku, and the paucity of scientific dates for the early Nuragic culture made the Siddi Plateau a promising location for new excavations and research.

PROGETTO PRAN'E SIDDI: AIMS AND METHODS

The scientific aims of *Progetto Pran'e Siddi* (PPS) are to investigate human-environment dynamics in the early development of the Nuragic culture using the community of the Siddi Plateau as a case study. PPS is particularly interested in resource use, economic development, and environmental change. The project uses excavation and survey to collect detailed, site-specific information and contextualize it within broader understandings of settlement patterns and landscape use. Excavated ceramics, lithics, faunal remains, macrobotanical

remains, and microfossils enable integrated assessments of the relationships among production, consumption, and local environments at selected sites. Survey of the Siddi Plateau and the surrounding area, conducted as the subsidiary *Pran'e Siddi Landscape Project*, allows for general comparisons of the monuments on the plateau in terms of their structures, locations, viewsheds, potential catchments, and the labor used to build them. In the future, PPS hopes to expand both components of its research program to include excavating trenches at more of the plateau's structures and systematic off-site fieldwalking.

EXCAVATIONS BY PROGETTO PRAN'E SIDDI

In 2009-2011, *Progetto Pran'e Siddi*¹ (scientific director, Mauro Perra; field director, Emily Holt) excavated trenches at three of the nuraghi on the Siddi Plateau: Sa Conca 'e sa Cresia at the north end of the plateau, Sa Gruxi in the center (Fig. 2), and Pranu Casti at the southeast end (Fig. 3). These structures were chosen 1) because their patterns of collapse meant it was possible to excavate in or near them without having to move collapsed rubble, 2) because broadly comparable visible architecture – evidence of rounded chambers external to the main structure at Sa Conca 'e sa Cresia and Pranu Casti – suggested that the underlying deposits might have been formed by comparable human practices, and 3) because the directors wished to sample the plateau geographically. Unfortunately, there were no archaeological deposits preserved at Sa Gruxi in the area excavated. The deposits inside the structure at Pranu Casti indicated that it was most likely a Late Antique animal pen, and the results from its excavation are not reported here.

The two trenches excavated at Sa Conca 'e sa Cresia (Fig. 4) uncovered deposits dating to the early Nuragic period: Trench I excavated the east half of a naviform room, and Trench II excavated the inside of a small tower or hut. Only Trench I preserved early Nuragic material in reliable contexts; the following discussion therefore focuses primarily on the results from Trench I.

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Sa Conca 'e sa Cresia: Trench I

The area inside the naviform room was sealed by the later partial collapse of Sa Conca 'e sa Cresia's central structure, preserving the deposits below in excellent condition (Fig. 5). Seven distinct phases could be discerned within these deposits: 1) a foundation layer, possibly related to the building of the central structure rather than to the building of the naviform room itself, 2) the construction of the naviform room and its first occupation phase, 3) an industrial phase, 4) a second occupation phase, 5) the abandonment and/or destruction of the naviform room, 6) the collapse of the nuraghe, and 7) modern use of the site. For reasons of safety, we did not excavate all the way to the north wall of the naviform room (Fig. 6).

Materials from all contexts were dry sieved using a 1 cm² mesh. Sediment samples from all contexts from Phases 1-4 that did not include obvious bioturbation were collected and processed using a bucket flotation method (FAIRBAIRN 2005). The resulting light fraction was collected with chiffon netting and dried out of direct sunlight. The heavy fraction was sieved using a 1 mm² wire mesh, collected in 1 mm² netting, and dried out of direct sunlight. Occupation surfaces were sampled for microfossil analysis using a pinch sampling method, with half of the sample preserved with alcohol and half without following the methodology of Pearsall (PEARSALL 2000). A summary of the occupation phases with associated stratigraphic and architectural units is given in Table 1.

Table 1. Occupation phases identified in Sa Conca 'e sa Cresia Trench I with associated stratigraphic units and radiocarbon dates.

Phase	General description	Associated stratigraphic units (US) and architectural units (USM)	Scientific dating (uncalibrated dates in years BP)
7	Recent collapse	US: 1	Not applied
6	Mixed collapse episodes with evidence of Punic/Roman site reoccupation	US: 2, 3	Not applied
5	Burned daub layer filling in naviform room	US: 4, 4.1, 5, 6, 7	Not applied
4	Second habitation phase consisting of packed clay floors and hearths; subdivision of naviform room	US: 8, 9, 10, 11, 12, 15, 16 USM: 3, 4	3,204 +/- 56 (US 10, AA95923)

Layers
6 (2021)

3	Industrial phase	US: 13, 17, 18, 21, 23	Not applied
2	Preparation of bedrock for building (south side of the naviform room); first habitation phase consisting of packed clay floors and hearths	US: 20, 22, 24, 25, 26, 28, 29, 30, 31, 32, 34, 35, 36, 37, 38, 40, 41, 44, 45, 46, 47 USM: 1, 2	3,303 +/- 40 (US 22, AA95924) 3,344 +/- 53 (US 40, AA99799) 3,285 +/- 41 (US 47, AA95926) 3,418 +/- 41 (US 47, AA95925)
1	Preparation of bedrock for building (north side of the naviform room)	US: 39, 42	3,395 +/- 40 (US 42, AA95927) 3,431 +/- 41 (US 42, AA95928)

Trench I: Phase 1

Phase 1 consisted of hard-packed clay filling leveling the bedrock on the north side of the naviform room. This clay was completely sterile of artifacts, though it did include some carbonized seeds, two of which were radiocarbon dated (see below). The nature of this foundation layer contrasts markedly with the foundation layer on the south side of the naviform room (Phase 2, US 47). The differences between the two foundations layers lead us to interpret the Phase 1 deposits as being associated with the initial preparation of the site for the construction of Sa Conca 'e sa Cresia's central structure rather than for the later construction of the naviform room. Whether the north wall of the naviform room (USM 1) rests on top of this surface could not be directly determined due to the safety restrictions on our excavation.

Trench I: Phase 2

This phase appears to begin with the preparation layer for the construction of the naviform room itself (US 47). Large amounts of cultural debris, probably produced by the occupation of Sa Conca 'e sa Cresia's central structure, were dumped into the uneven bedrock under the south side of the naviform room to level it. This cultural debris was not hard-packed throughout like the clay foundation on the north side of the naviform room; instead, it was only hard-packed near the surface. The southeast wall of the naviform room (USM 2) was built on top of this preparation layer. Because of the large oval shape of the naviform room, it may have been difficult to roof with stone; wattle-and-daub or thatch are more likely roofing materials, an interpretation supported by the materials excavated in Phase 5 (see below).

After its construction, the naviform room was used intensively as a habitation. The associated deposits were a series of packed clay floors with baked hearths constructed on top

of them. Pottery and other artifacts were found embedded in the surfaces of the floors. The first hearth, which was constructed directly on top of the cultural fill layer, was circular and located in the south-center of the excavated part of the naviform room (Fig. 7). With each successive floor, the hearth became more oval in shape and migrated slightly southeast toward the wall (Fig. 8). These floors, totaling eleven including the initial fill layer and a final degraded living surface, sometimes had an associated ash pile on top of them. The floors were extremely fine, often only a couple of centimeters deep, and probably represent the frequent remaking of the living area by the occupants during a restricted chronological span. The excavation of the naviform room was complicated by a later wall, constructed through the room at the beginning of Phase 4, which divided the excavated area into two parts. It was much easier to differentiate floors in the part of the trench that contained the hearths (southeast), where the hearth construction itself as well as embedded pottery and artifacts indicated floor levels. It was frequently impossible to differentiate between floors in the part of the trench that did not contain the hearths (northwest).

Trench I: Phase 3

After the series of occupations of the naviform room, the habitation of the room was abandoned and the room appears to have been used as a dumping area for refuse from some kind of industrial production. The fills of this phase consisted of a vitrified ash indicating extremely high temperatures. This ash was frequently white in color, but could also be gray, reddish, or yellowish; the color variations were probably caused by minerals present in the materials involved in the production process or in the fuel used to heat these materials. Animal bones found in these layers were frequently stained green, probably indicating the presence of copper (Fig. 9). Further investigation to clarify the nature of this deposit is underway.

Trench I: Phase 4

The use of the naviform room changed again after the industrial phase. On the northwest side of the trench there is evidence for a packed clay floor containing burned daub that hardened and turned red through exposure to heat. There is no evidence for this floor on the southeast side of the trench, and the floor appears to have been mostly destroyed before the next layer was laid down. This next layer was a packed clay foundation on which the internal wall was built (USM 3). The building of the internal wall represents a major change in the organization of the space. The internal wall subdivided the space and also blocked the former entrance to the naviform room (Fig. 10). Whether and where a new entrance was constructed, or whether the new space was entered from above, cannot be determined on the basis of the excavated area.

There was a small pile of compact domestic ash on top of the foundation layer, perhaps indicating a short occupation before the wall was built. Unlike the vitrified ash of Phase 3, we do not take it to suggest industrial activity. Also, shortly after the internal wall was built, it was partially dismantled to create a lower platform near the blocked former entrance (USM 4). This platform was used as the base for a hearth which appears to be associated more closely with the southeast part of the trench than the northwest part. The fill of the southeast part of the trench is highly ashy and extends up to the height of the hearth. The stratigraphically comparable fill on the northwest side of the trench is a compact clay occupation layer with no ash in it.

Trench I: Phase 5

This phase seems to follow quickly after the building of the internal wall. Clay layers containing large amounts of burned daub suggest that the room may have been roofed with wattle and daub or had wattle and daub walls that extended the stone walls. These appear to have burned down, whether intentionally or accidentally, and been thrown into the room with clay to level the space. One possibility is that the naviform room was put out of use intentionally due to topography problems. The naviform room was built very near the edge of the plateau. It is possible that this area of the plateau was larger in antiquity, but that erosion and collapse reduced the available space and made the naviform room either inconvenient or dangerous to use. The filled-in naviform room may have served other purposes, such as a workspace.

Trench I: Phase 6

Sometime after the naviform room was filled in, the central structure of the nuraghe was abandoned and began to collapse. There is currently no way to date this abandonment, and it may or may not have happened immediately following the abandonment of the naviform room. The latest pottery from Phase 5 is Late Middle Bronze Age/Early Late Bronze Age. However, the latest pottery found in the collapse layers is Punic/Roman, similar to that found in Trench II (below). This does not necessarily imply that the occupation of the site was continuous or that the inhabitants of the site continued to be culturally “Nuragic” simply because they were living in a Nuragic structure. However, it does indicate that active use of some part of the nuraghe continued after the naviform room was put out of use, and that the Punic/Roman inhabitants of the site found some of the Nuragic architecture still standing and usable.

An Italian coin dating to 1941 was also found in the upper part of the collapse layers, indicating that the structure experienced multiple episodes of collapse; these episodes could not be distinguished stratigraphically during excavation.

Trench I: Phase 7

This phase documents the continued frequenting of the site by modern Sardinians, including surface finds. Finds included numerous shotgun shells, the key from a sardine-type metal can, a metal buckle, a plastic button, and additional fragments of plastic.

Sa Conca 'e sa Cresia: Trench II

The excavation of Trench II at Sa Conca 'e sa Cresia (Fig. 11) was less informative about the Nuragic-period occupation of the structure. Architectural analysis indicates that this circular structure was built during an expansion phase at the site, when the central structure was elaborated with elements of *tholos* construction. It probably dates to the end of the Middle Bronze/beginning of the Late Bronze Age; however, excavation of the structure indicated that it had been reoccupied and extensively disturbed during the later Punic/Roman period. Only the foundation layer – hard packed clay as in Phase 1 of Trench I – appeared undisturbed. Although distinct layers could be distinguished stratigraphically, the finds from these layers were extremely mixed in terms of their chronology. All layers except the foundation layer included both Punic/Roman pottery and pottery from much earlier Nuragic periods, indicating that the later occupants of the site had dug up older deposits in the area, mixed the Nuragic material with their own discarded material, and used the mixed material to even the floor in the reoccupied circular structure. Given the chronologically mixed character of these deposits and the impossibility of dating non-diagnostic materials such as carbonized seeds without direct radiocarbon dating, a process that would be prohibitively expensive to apply to anything close to a statistical sample of materials from the deposits, these deposits were not sampled for flotation. The analysis of the Punic/Roman pottery from the site is not reported here.

RADIOCARBON DATING

A total of seven carbonized grain seeds from five stratigraphic contexts were selected for radiocarbon dating. All seeds used for radiocarbon dating were specimens that could not be identified more specifically than “cereal seeds.” Samples were selected to provide a chronological sequence of the activity at the site while minimizing any potential loss of information, and special attention was paid to dating the foundation layers on the northwest (US 42) and southeast (US 47) sides of the naviform room. Radiocarbon dating was performed by the University of Arizona Accelerator Mass Spectrometry Laboratory (sample numbers AA95923, AA95924, AA95925, AA95926, AA95927, AA95928, AA99799). The dates as presented here were calibrated using OxCal v.4.4.3 using the IntCal 20 calibration curve (BRONK RAMSEY 2009, BRONK RAMSEY 2021). Six of these dates have been reported previously (VANZETTI *et alii* 2013), where they were calibrated with CalPal-2007 (WENINGER *et alii* 2012) giving comparable results.

The radiocarbon dating of the site (Fig. 12) indicates occupation from the mid 18th-end of the 15th century BCE. The dates from US 42 probably relate to the initial preparation of the site for the construction of Sa Conca 'e sa Cresia's central tower rather than for the naviform room and suggest that the foundation of the site occurred in the mid 18th-mid 17th century BCE. The dates for US 47, considered to be the foundation preparation for the naviform room itself, are somewhat conflicting. One of the specimens from US 47 (AA 95925) dates to the same range as the dates for US 42 while the other (AA 95926) is similar to the subsequent occupation dates from US 40 (AA99799) and especially US 22 (AA95924). Two scenarios seem possible. US 47 may have been created significantly after US 42 but have incorporated material from long-established middens, causing more ancient and more recent specimens to be mixed together. Such repurposing of more ancient deposits was noted in the fill layers of Trench II, and it is possible that it was a common practice. It is equally possible that US 42 and US 47 were laid down at roughly the same time and that a later specimen found its way into the earlier deposit through bioturbation. Bioturbation caused by rodents and insects was noted during the excavation of Trench I, and though the team did its best to excavate these deposits separately and exclude them from analyses, some mixed material may have slipped through.

Interpreted as a group, the analyzed specimens indicate that this area of Sa Conca 'e sa Cresia was first occupied in the mid-late 18th through 17th century BCE, and that the primary use of the naviform room occurred during the 16th and 15th centuries BCE.

CERAMIC DATA

Progetto Pran'e Siddi recovered more than 20,000 sherds of pottery, the analysis of which is ongoing. A brief summary of the relative chronology is offered here, and a more detailed discussion is available in an unpublished master's thesis (SCHIRRU 2015).

Overall, a wide variety of ceramic forms were identified at Sa Conca 'e sa Cresia. The ceramics from Phases 1 and 2 are stylistically similar to those found in later Middle Bronze Age contexts (BM2 and BM3) at other sites in the Marmilla. The ceramic forms from Phase 3 are unique to that phase and may reflect their use in the particular industrial activity that characterized it; stylistically, they are also similar to ceramics found in other BM2 and BM3 contexts. The ceramics from Phases 4 and 5 relate to the final activity in the naviform room and indicate a relative chronology slightly later than the earlier phases, being stylistically similar to ceramics from BM3 as well as Late Bronze Age (BR) contexts. The relative dating of the pottery presents an interpretive challenge in that it does not match well with the radiocarbon dating (Fig. 13), which would place the site somewhat earlier (SCHIRRU 2015). Further analysis is underway that will help clarify these issues.

FAUNAL REMAINS

Progetto Pran'e Siddi recovered more than 5,000 individual fragments of animal bone and marine and terrestrial shell from the sieved excavated sediment. Microfaunal remains were recovered from the heavy fractions of floated sediments; however, these will not be reported here. The analysis of the larger faunal materials is also ongoing, but an approximately 35% sample has been examined to date. Of the 2,029 identified specimens, 581 (29%) could be identified to some taxonomic level: 361 *Ovis/Capra*, 136 *Sus*, 45 *Bos*, 13 *Prolagus sardus*, 8 Aves, 6 Cervidae, 6 Rodentia, 4 *Canis*, 1 Osteichthyes, and 1 somewhat damaged Artiodactyla remain that could be from a small deer or large sheep. The remaining 1,448 specimens were from mammals and could be identified only to a size class: large (cattle or deer-sized), medium (sheep/goat, pig, or large dog-sized), or small (*Prolagus sardus*-sized).

While the formation processes of Phases 1, 3, and 5 are sufficiently different that their faunal remains should not be directly compared, Phases 2 and 4 both consist of thin, hard-packed clay floors that represent similar social and depositional processes. Comparing the faunal remains from Phases 2 and 4 suggests important changes in the animal economy during the life of the site. A comparison of the identifiable remains indicates that pigs (*Sus scrofa*) increased in importance while ovicaprids decreased in importance between the first and second occupation phases (Fig. 14). No change in the importance of cattle (*Bos taurus*) could be seen in the identifiable remains; however, comparing the mammal remains that could only be identified to a size class suggests that cattle may have increased in importance as well (Fig. 15). It is not surprising that this increase would not be visible in the identifiable remains: most cattle bones that are complete enough to be identifiable are quite large and are more likely to be removed and discarded elsewhere than to be incorporated into living surfaces.

PALAEOBOTANICAL REMAINS

Soil samples were taken from all archaeological strata that were considered to have relatively low bioturbation, resulting in a total of 22 samples. The project aimed to take samples of 50-60 liters of sediment to maximize the chance of achieving an optimal sample size of 400-500 identified specimens (VAN DER VEEN, FIELLER 1982); small contexts were sampled in their entirety. Palaeobotanical analysis is being conducted in the Archaeology Laboratory at the University of Queensland, Australia.

A total of 6,182 specimens were recovered from all contexts. While a more complete analysis is in progress, some preliminary results can be reported. The economic species at the site were primarily free-threshing wheats (*Triticum durum/aestivum/turgidum*) and cultivated barley (*Hordeum vulgare* subsp. *distichum*), with only one grain of einkorn (*Triticum monococcum*) found in Phase 2 (US 22). An increase in wheat and a decrease in barley between Phases 2 and 4 suggests possible changes in food preference over time (Fig. 16). Additionally, a total lack of chaff remains after Phase 2 indicates a change in how food processing was spatially organized at the site. Legumes and fruits were present in the assemblage in small numbers, including

three grape pips and two olive stones, too few to differentiate between wild and domesticated plants. The assemblage overall was dominated by the wild taxa, particularly Fabaceae (legume family) and Brassicaceae (mustard family) (DIGHTON, FAIRBAIRN 2012).

WOOD CHARCOAL

The wood charcoal at the site indicates the burning of macchia-type species for fuel (Fig. 17). The branches selected were small; tree ring curvatures indicated branch diameters generally less than 30mm and only occasionally as large as 50mm. This suggests daily collection of fuel from near the site, though wood may not have been the only fuel used at the site (see below). The only evidence for large timbers was found in Phase 5 (US 4), with *Pistacia* sp. up to >200mm in diameter and *Quercus* sp. up to >300mm. These charcoals were very burnt (VEAL 2012). The timber diameters and intense burning of the charcoals in Phase 5 support the identification of Phase 5 as the accidental or intentional burning of the roofing of the naviform room before it was put out of use.

MICROFOSSIL ANALYSES

Sediment samples for plant microfossil analysis were taken from the majority of excavated contexts at Sa Conca 'e sa Cresia. Seven samples (US 1, 8, 9, 10, 11, 13, and 16) were processed and analyzed for pollen in the Palynology laboratory of Texas A&M University using standard laboratory procedures. Unfortunately, all seven samples showed very poor preservation and extremely low concentrations of fossil pollen. The fossil pollen that was identified was consistent with the most common types found in highly degraded archaeological samples. The nature of the archaeological deposits themselves was identified as the likely cause of pollen destruction, and further pollen analysis was not advised (BRYANT 2010).

Fifteen samples from fourteen contexts (US 10, 12, 18, 22, 26, 30, 32, 36, 40, 41, 42, 44, 45, and 47) were processed and analyzed for phytoliths at the Institute of Archaeology, University College London, following established protocols (ROSEN 2005). While fifteen samples is too few to establish robust temporal or spatial trends, some indications of crop and wild resource use as well as overall environment could be identified. Results indicate that cereal crops (Fig. 18), which may have been irrigated, and agricultural weeds were transported together to the site (Fig. 19), but that processing of the grain and later storage of hay and fodder usually took place elsewhere. The dung of grazing animals may have been used for fuel. Wetland plants were common at the site, suggesting they were gathered beyond the immediate environs and brought to the site for use in flooring, basketry, and roofing. Environmental indicators suggest a generally dry environment with possible open woodlands or riparian forest nearby (MARSH 2012).

PRELIMINARY CONCLUSIONS

Preliminary analyses of the results of *Progetto Pran'e Siddi* give a complex picture of an early Nuragic community. While some results could be anticipated – such as the agropastoral economy – others were not – such as the chronological offset between the radiocarbon dates and the relative dates of the pottery as well as the intense industrial activity of Phase 3². It should be kept in mind that these results come from one small area of a much larger site and should therefore be interpreted with caution; however, further analysis of the material from Sa Conca 'e sa Cresia will continue to add to our understanding of the beginnings of the Nuragic culture.

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² The authors of this article, as directors of the excavation, disassociate ourselves from the claims about the industrial activity at Sa Conca 'e sa Cresia currently being made in the media (July 2021). More analysis is needed before any conclusions about the nature of this deposit can be reached.

REFERENCES

- ANTONA RUJU, FERRARESE CERUTI 1992: A. Antona Ruju, M. L. Ferrarese Ceruti, *Il Nuraghe Albucciu e i Monumenti di Arzachena*, Carlo Delfino Editore, Sassari 1992.
- BADAS 2001: U. Badas, *Dom 'e S'Orcu in Pran 'e Siddi*, in G. Serreli, D. Vacca (eds.), *Aspetti del megalitismo preistorico*, Grafiche del Parteolla, Dolianova 2001, pp. 13-15.
- BADAS *et alii* 1988: U. Badas, E. Atzeni, A. Comella, C. Lilliu, *Villanovaforru*, in G. Lilliu (ed.) *I civici musei archeologici della provincia di Cagliari*, Amministrazione Provinciale di Cagliari Assessorato Cultura e Turismo, Sassari 1988, pp. 7-24.
- BALMUTH 1992: M. Balmuth, *Archaeology in Sardinia*, «American Journal of Archaeology» 96, 1992, pp. 663-697.
- BRONK RAMSEY 2009: C. Bronk Ramsey, *Bayesian analysis of radiocarbon dates*, «Radiocarbon» 51, 2009, pp. 337-360.
- BRONK RAMSEY 2021: C. Bronk Ramsey, *OxCal 4.4*, < <https://c14.arch.ox.ac.uk/oxcal.html> >, accessed 8 April 2021.
- BRYANT 2010: V. M. Bryant, *Searching for Pollen in a Middle Bronze Age (c. 1700-1365 BCE) site in south-central Sardinia*, unpublished report 2010.
- COSSU, PERRA 2008: T. Cossu, M. Perra, *I Sistemi Territoriali della Barbagia-Mandrolisai e della Marmilla*, in F. Campus, T. Cossu, V. Leonelli, F. Lo Schiavo, M. Perra, M. Sanges (eds.), *Il paesaggio nuragico sull'altipiano di Pran'e Muru*, Comune di Orroli, Orroli 2008, pp. 119-130.
- DELIBRIAS *et alii* 1966: G. Delibrias, M. T. Guillier, J. Labeyrie, *Gif Natural Radiocarbon Measurements II*, «Radiocarbon» 8, 1966, pp. 74-95.
- DEPALMAS 2009: A. Depalmas, *Il Bronzo medio della Sardegna*, in C. Lugliè, R. Cicilloni (eds.), *Atti della XLIV Riunione Scientifica: La Preistoria e la Protostoria della Sardegna. Cagliari, Barumini, Sassari 23-28 novembre 2009. Volume I - Relazione generali*, Istituto Italiano di Preistoria e Protostoria, Firenze 2009, pp. 123-130.
- DEPALMAS, DEIANA 2011: A. Depalmas, A. Deiana, *La fase finale della cultura di Monte Claro e il rapporto con i successivi aspetti culturali dell'età del Bronzo*, in *Atti della XLIII Riunione Scientifica Istituto Italiano di Preistoria e Protostoria, Bologna (Italy), 26-29 novembre 2008. L'età del rame in Italia*, Istituto Italiano di Preistoria e Protostoria, Firenze 2011, pp. 135-142.
- DIGHTON, FAIRBAIRN 2012: A. Dighton, A. Fairbairn, *Interim Report on the Archaeobotanical Analysis. Progetto Pran'e Siddi – Sa Conca 'e sa Cresia*, unpublished report 2012.
- FAIRBAIRN 2005: A. Fairbairn, *Simple bucket flotation and wet-sieving in the wet tropics*, «Palaeoworks Technical Papers» 4, 2005, pp. 1-15.
- KRIEK 2020: T. Kriek, *Map of Nuraghi*, in Tharros.info [Internet], 2020. [cited 20 Feb 2020]. Available: <https://www.tharros.info/#/>
- LILLIU 1941: G. Lilliu, *Siddi. «Su Pranus» di Siddi e i suoi monumenti preistorici*, «Notizie degli Scavi» 1941, pp. 130-163.
- LILLIU 1975: G. Lilliu, *Antichità Nuragiche nella Diocesi di Ales*, in C. Puxeddu (ed.), *La diocesi di Ales-Usellus-Terralba: aspetti e valori*, Sarda Fossataro, Cagliari 1975, pp. 133-164.

- LILLIU 2005: G. Lilliu, *I Nuraghi. Torri preistoriche di Sardegna*, Ilisso Edizioni, Nuoro 2005.
- MANCA DEMURTAS, DEMURTAS 1992: L. Manca Demurtas, S. Demurtas, *Tipologie Nuragiche: I Protonuraghi con Corridoio Passante*, in R. H. Tykot, T. K. Andrews (eds.) *Sardinia in the Mediterranean: A Footprint in the Sea*, Sheffield Academic Press, Oxford 1992, pp. 176-184.
- MARSH 2012: A. Marsh, *Phytolith analysis at Sa Conca, Sardinia: Preliminary analysis*, unpublished report 2012.
- MORAVETTI 1992: A. Moravetti, *Sui Protonuraghi del Marghine e della Planargia*, in R. H. Tykot, T. K. Andrews (eds.) *Sardinia in the Mediterranean: A Footprint in the Sea*, Sheffield Academic Press, Oxford 1992, pp. 185-197.
- PEARSALL 2000: D. Pearsall, *Paleoethnobotany: A Handbook of Procedures*, Academic Press, San Diego 2000.
- PERRA 1997: M. Perra, *From Deserted Ruins: An Interpretation of Nuragic Sardinia*, «Europaea» 3, 1997, pp. 49-76.
- PERRA 2016: M. Perra, *Tempi che cambiano, luoghi che si trasformano: i mutamenti nei nuraghi fra l'età del Bronzo ed il primo Ferro*, «Layers. Archeologia Territorio Contesti» 1, 2016, pp. 371-381.
- ROSEN 2005: A. Rosen. *Phytolith indicators of plant and land use at Catalboyuk*, in I. Hodder (ed.), *Inhabiting Catalboyuk: reports from the 1995-99 seasons*, McDonald Institute for Archaeological Research / British Institute of Archaeology at Ankara, Cambridge and London 2005, pp. 203-212.
- SANTONI 2001a: V. Santoni, *Il Nuraghe a Corridoio Sa Fogaia di Siddi*, in *Territorios Megalíticos del Mediterráneo. Gorafe (Granada, España) y Sa Corona Arrùbia (Cagliari, Cerdeña, Italia)*, Líder Comarca de Guadix, Guadix 2001, pp. 84-97.
- SANTONI 2001b: V. Santoni, *Il nuraghe Su Nuraxi di Barumini*, Soprintendenza Archeologica per le province di Cagliari e Oristano, Quartu Sant'Elena 2001.
- SANTONI 2009: V. Santoni, *La cultura del Bronzo Antico I-II in Sardegna*, in C. Lugliè, R. Cicilloni (eds.), *Atti della XLIV Riunione Scientifica: La Preistoria e la Protostoria della Sardegna Cagliari, Barumini, Sassari 23-28 novembre 2009 Volume I - Relazione generali*, Istituto Italiano di Preistoria e Protostoria, Firenze 2009, pp. 113-121.
- SCHIRRU 2015: D. Schirru, *Origine ed evoluzione del paesaggio nuragico della Marmilla (VS, Sardegna)*, Università degli Studi di Roma "La Sapienza", unpublished master thesis 2015.
- TYKOT 1994: R. Tykot, *Radiocarbon dating and absolute chronology in Sardinia and Corsica*, in R. Skeates, R. Whitehouse (eds.), *Radiocarbon Dating and Italian Prehistory*, The British School at Rome and Accordia Research Centre, London 1994, pp. 115-145.
- UGAS 1998: G. Ugas, *Centralità e periferia. Modelli d'uso del territorio in età nuragica: il Guspinese*, in M. Khanoussi, P. Ruggeri, C. Vismara (eds.), *L'Africa Romana, Atti del XII Convegno di Studio, Olbia 12-15 dicembre 1996*, Editrice Democratica Sarda, Sassari 1998, pp. 513-548.
- VAN DER VEEN, FIELLER 1982: M. Van der Veen, N. Fieller, *Sampling Seeds*, «Journal of Archaeological Science» 9, 1982, pp. 287-298.
- VAN DOMMELEN 1998: P. van Dommelen, *On colonial grounds. A comparative study of colonialism and rural settlement in first millennium BC west central Sardinia*, Faculty of Archaeology, University of Leiden, Leiden 1998.

Layers

6 (2021)

VANZETTI *et alii* 2013: A. Vanzetti, G. Castangia, A. Depalmas, N. Ialongo, V. Leonelli, M. Perra, A. Usai, *Complessi Fortificati della Sardegna e delle Isole del Mediterraneo Occidentale nella Protostoria*, in G. Bartoloni, L. M. Michetti (eds.) *Mura di legno, mura di terra, mura di pietra: fortificazioni nel Mediterraneo antico. Atti del Convegno Internazionale Sapienza Università di Roma, 7-9 Maggio 2012*, Global Print, Gorgonzola (MI) 2014, pp. 83-123.

VEAL 2012: R. Veal, *Pran 'e Siddi Charcoal – Final Results*, unpublished report 2012.

WENINGER *et alii* 2012: B. Weninger, O. Jöris, U. Danzeglocke, *CalPal-2007. Cologne Radiocarbon Calibration & Palaeoclimate Research Package*, < <http://www.calpal-online.de/> >

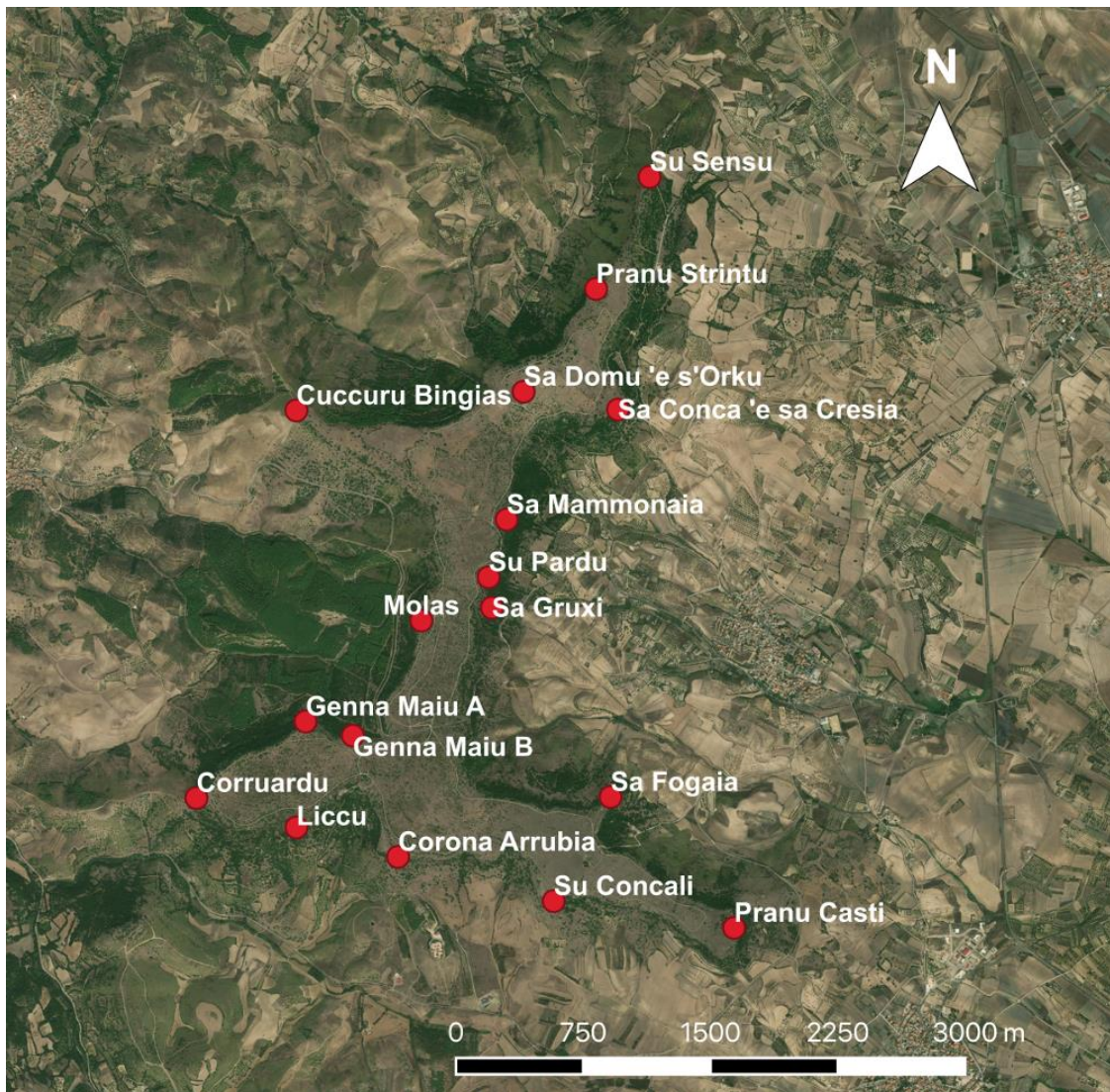


Fig. 1: SIDDI – Map of the Siddi Plateau in the Marmilla region showing the locations of its seventeen Nuragic monuments (map E. Holt).

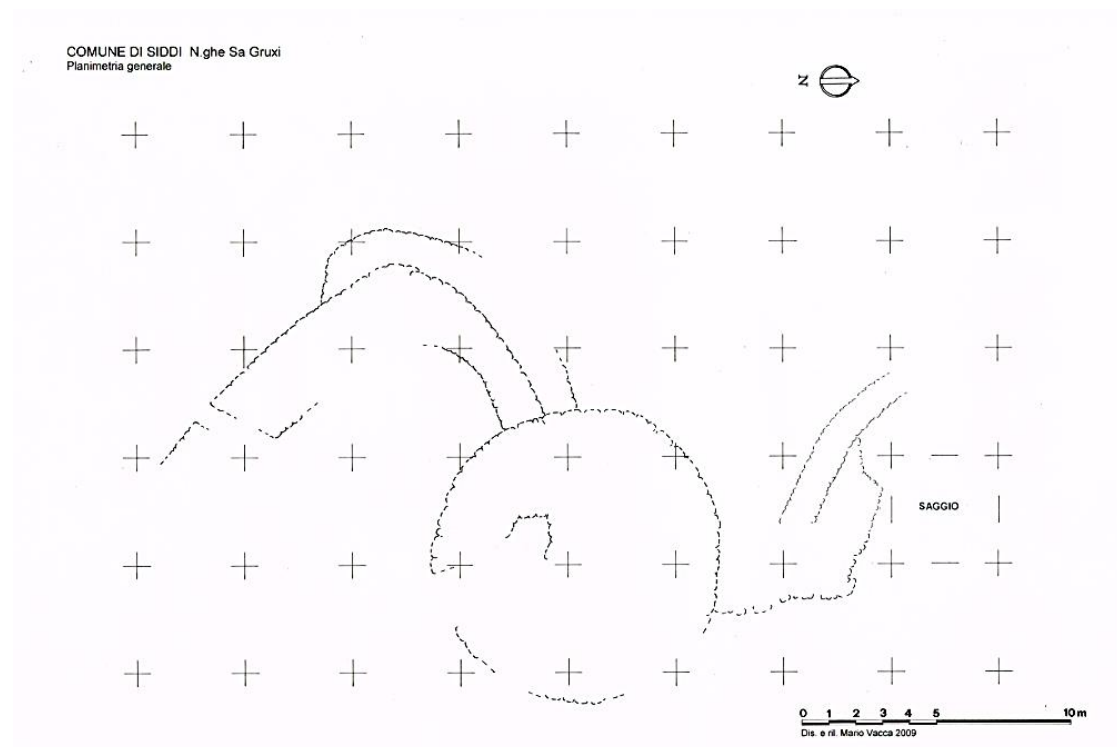


Fig. 2: SIDDI – Drawing showing nuraghe Sa Gruxi and location of *Progetto Pran'e Siddi* excavations (drawing M. Vacca).

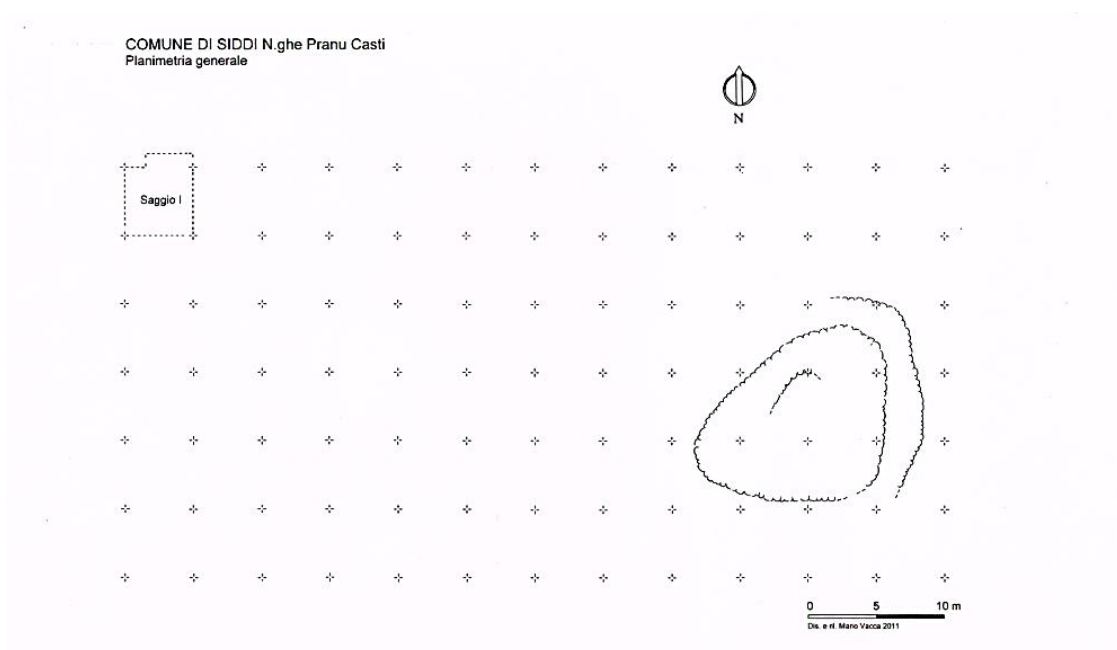


Fig. 3: SIDDI – Drawing showing nuraghe Pranu Casti and location of *Progetto Pran'e Siddi* excavations (drawing M. Vacca).

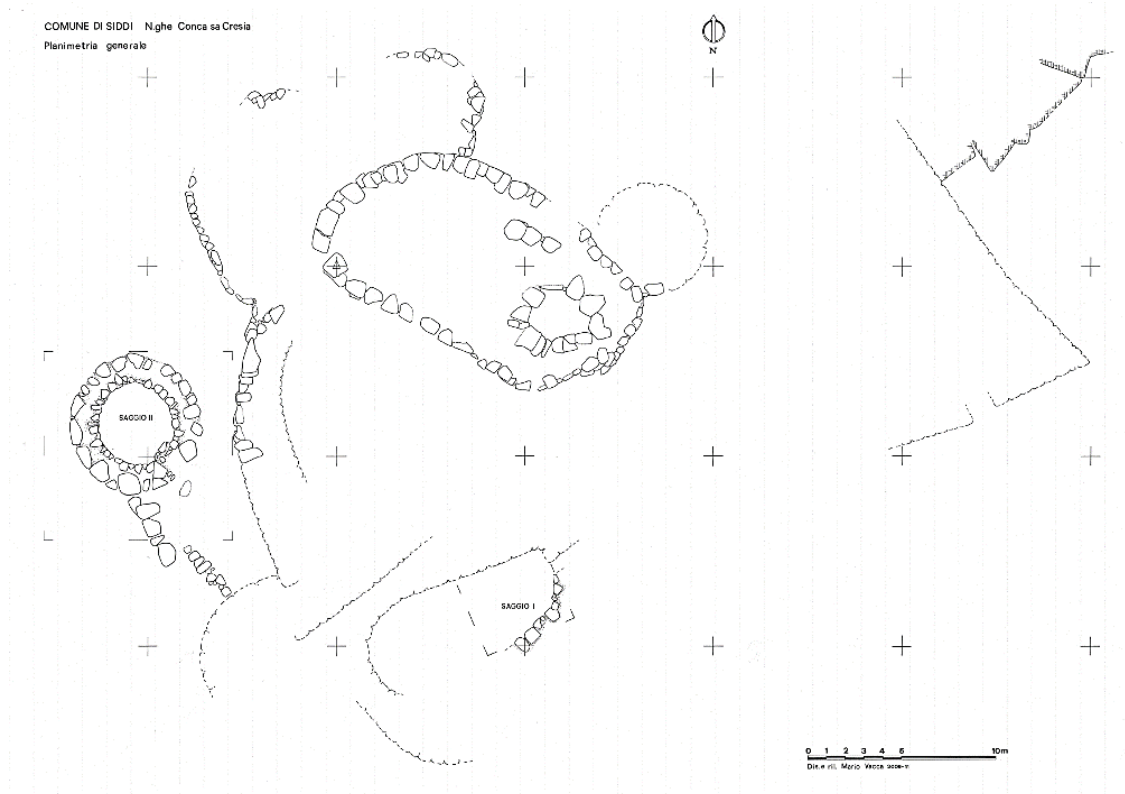


Fig. 4: SIDDI – Drawing of Sa Conca 'e sa Cresia showing the locations of Trench I and Trench II (drawing M. Vacca).

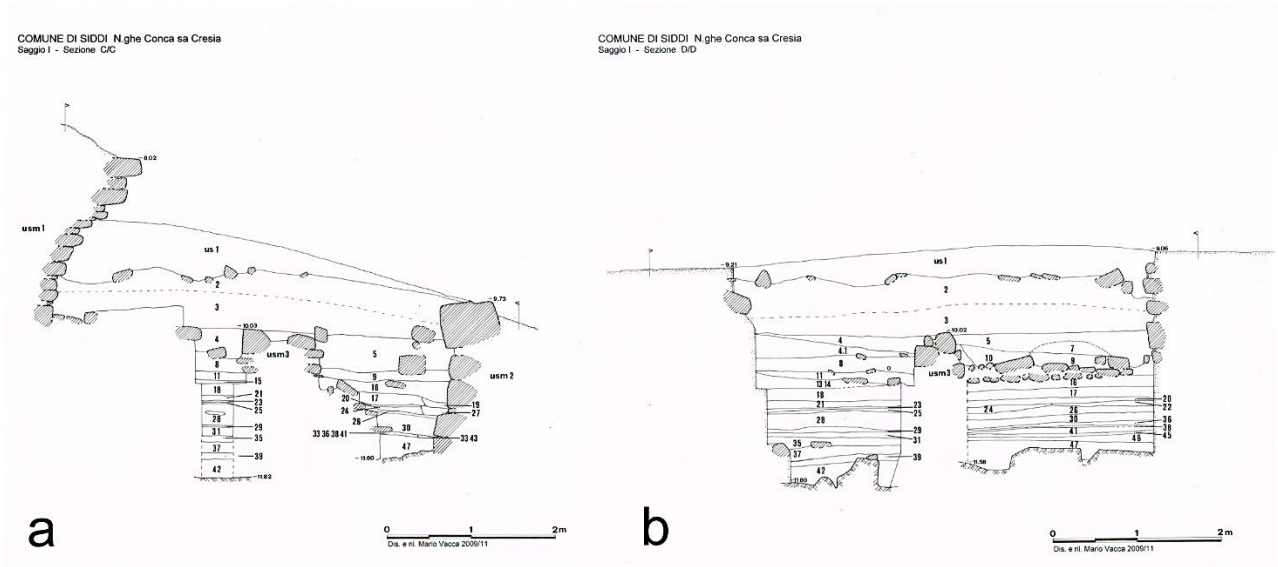


Fig. 5: SIDDI – a) North-northwest-south-southeast and b) southwest-northeast section drawings of Trench I (drawings M. Vacca).

COMUNE DI SIDDI N.ghe Conca sa Cresia
Saggio 1 - Pianta integrata USM 1,2 US1

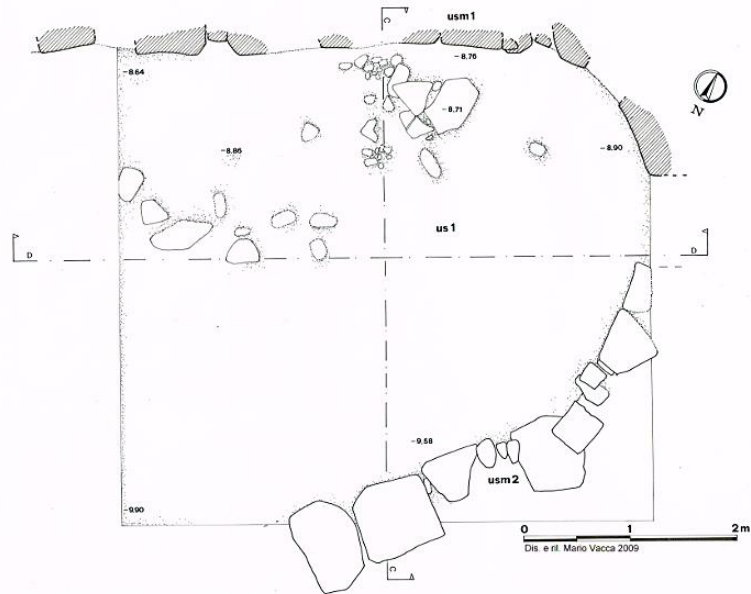


Fig. 6: SIDDI – Drawing of Trench I showing excavated part of the naviform room and architectural units (USM) 1 and 2 (drawing M. Vacca).

COMUNE DI SIDDI N.ghe Conca sa Cresia
Saggio 1 - Pianta integrata US 47

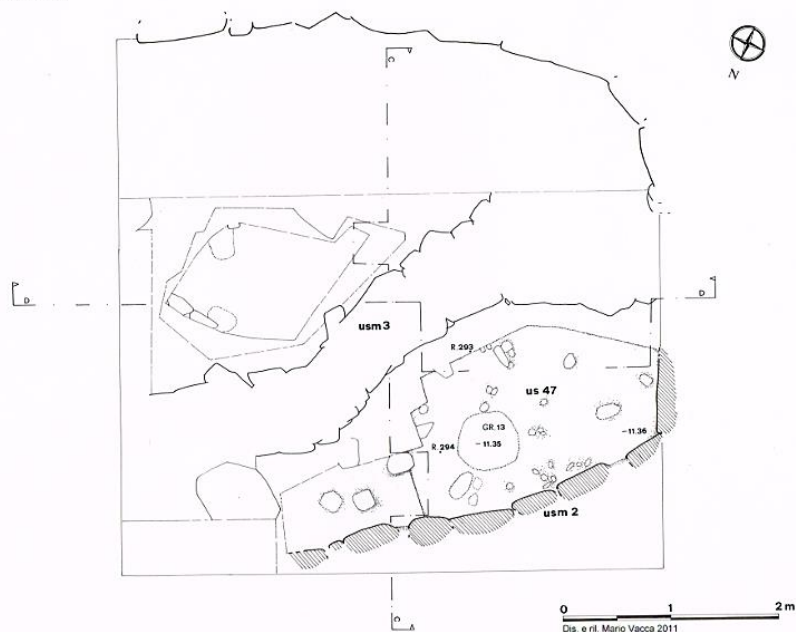


Fig. 7: SIDDI – Drawing of US 47 on the southeast side of the naviform room showing the size and location of the earliest baked clay hearth (GR.13) (drawing M. Vacca).

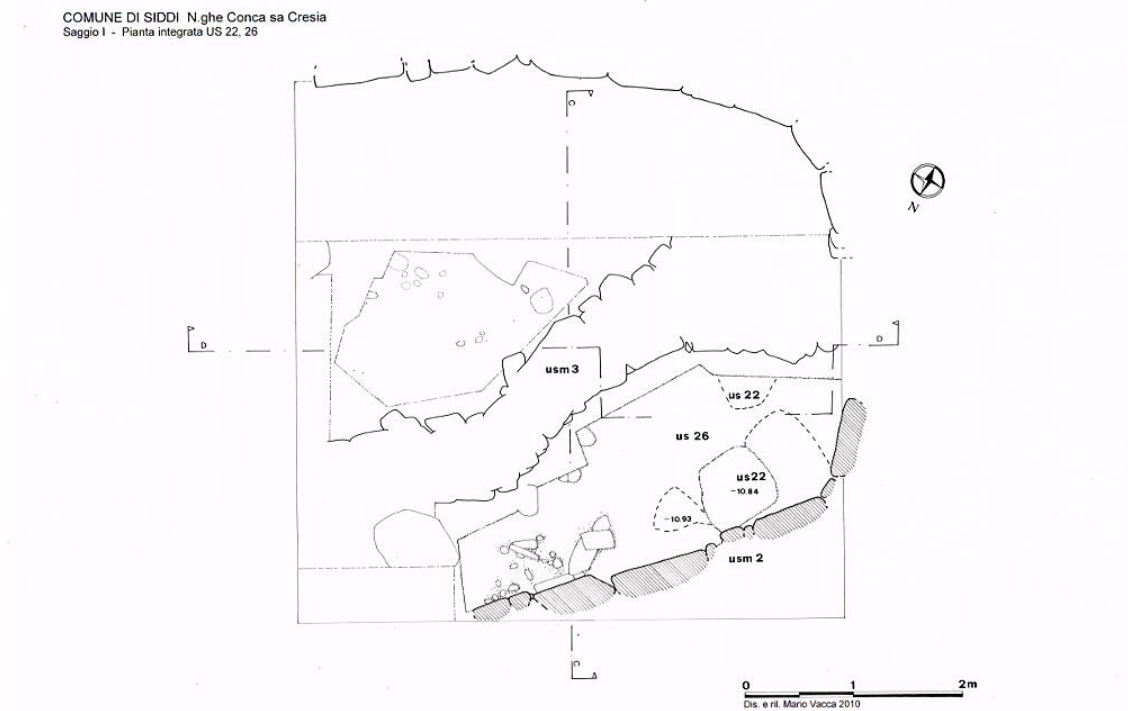


Fig. 8: SIDDI – Drawing of US 26 on the southeast side of the naviform room showing the size and location of the latest baked clay hearth (stippled outline of subcircular feature on east side of trench, touching USM 2, drawing M. Vacca).



Fig. 9: SIDDI – Photo of stained faunal remains from Phase 3 (photo E. Holt).

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COMUNE DI SIDDI, N. ghe Conca sa Cresia
Saggio I - Pianta integrata USM 3 US 12, 13/14, 15, 16

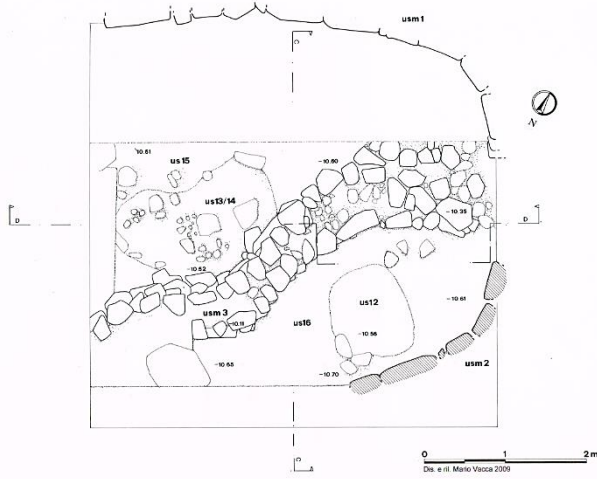


Fig. 10: SIDDI – Drawing (left) and photo (right) of the internal wall (drawing M. Vacca, photo E. Holt).



Fig. 11: SIDDI – Photo of Trench II (photo E. Holt).

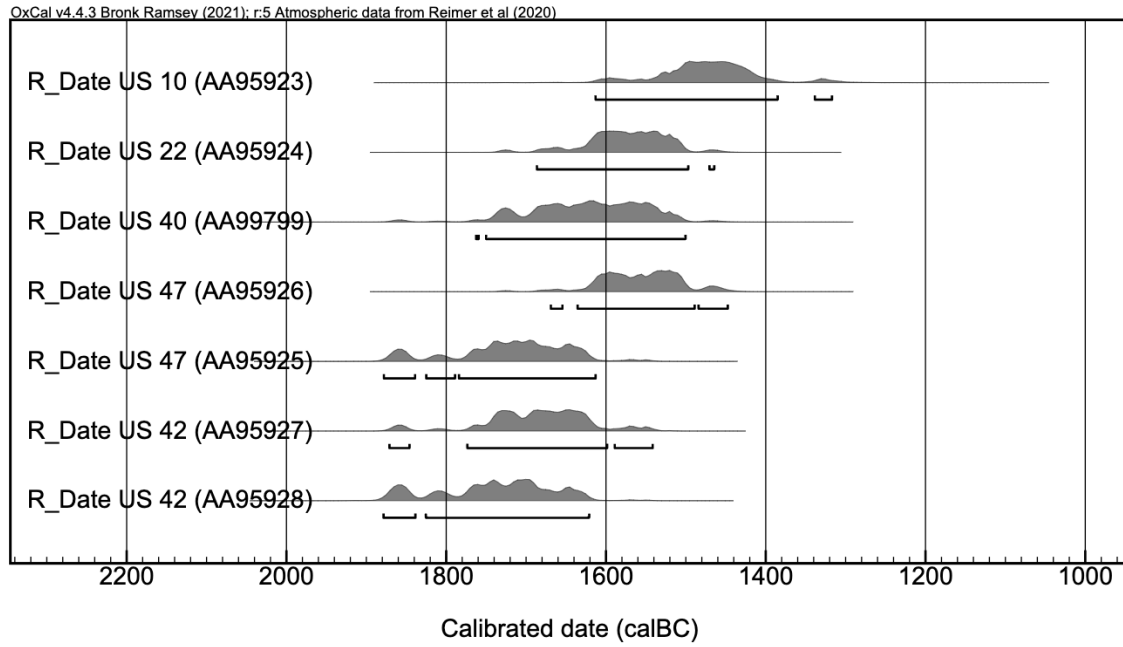


Fig. 12: SIDDI – Results of radiocarbon dating of carbonized seeds from Sa Conca 'e sa Cresia Trench I (visualization E. Holt, using OxCal v. 4.4.3, IntCal 20 calibration curve, BRONK RAMSEY 2021).

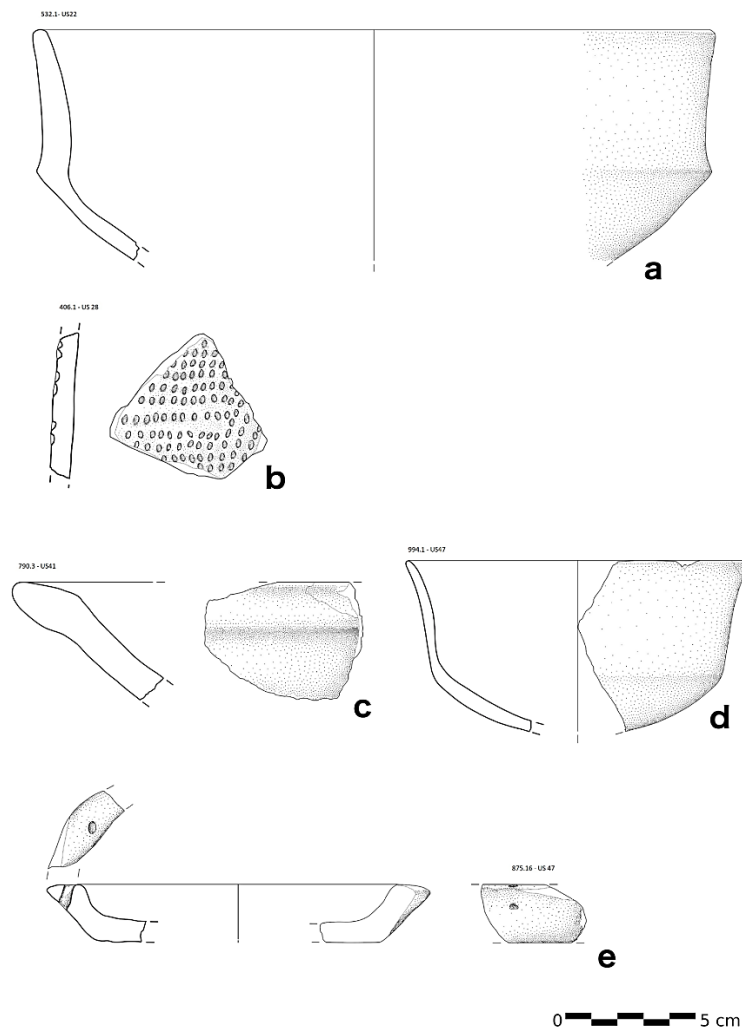


Fig. 13: SIDDI – Examples of sherds associated with radiocarbon dates earlier than their traditional style typologies would suggest: **a)** 532.1 – Carinated bowl, directly associated with radiocarbon date AA95924, usually dated stylistically to RBA (see Nuraghe Su Mulinu, Vano F1, Liv. 4) **b)** 406.1 – Pyxis fragment with dotted decoration, closely associated with radiocarbon date AA95924, usually dated stylistically to BM2 or BM3A (e.g. Giant’s Tomb of San Cosimo, Gonnosfanadiga) **c)** 790.3 – Large bowl with everted rim, closely associated with radiocarbon date AA99799, usually dated stylistically to BM3 (e.g. Nuraghe Su Mulinu, Vano Bs) **d)** 994.1 – Carinated bowl, directly associated with radiocarbon dates AA95925 and AA95926, showing generic similarity with specimens coming from the Giant’s Tomb of Su Monte de S’Abe (esedra, strato B – Arzachena), generically attributable to BM or perhaps as late as BR **e)** 875.16 – Possible lid with through hole in the rim, directly associated with radiocarbon dates AA95925 and AA95926, generically dated stylistically to BM3 (e.g. in Archaic Nuraghe Faurras, Villamar, where the shape is reconstructed as a bowl) (drawings D. Schirru, illustrations G. Pisano).

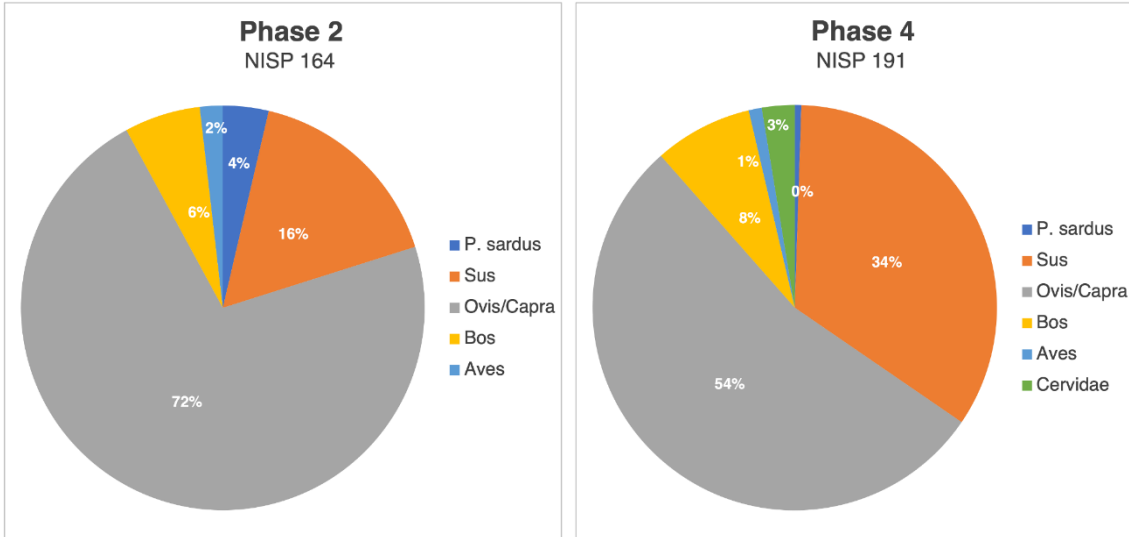


Fig. 14: SIDDI – Comparison of identified faunal remains from Sa Conca 'e sa Cresia Trench I, Phases 2 and 4 (figures E. Holt).

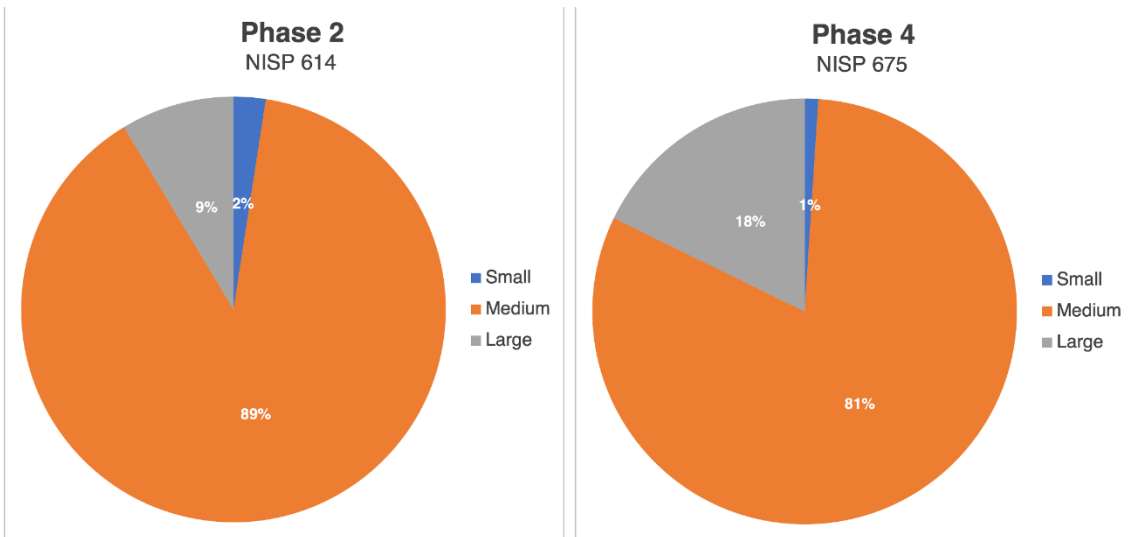


Fig. 15: SIDDI – Comparison of unidentifiable mammal remains from Sa Conca 'e sa Cresia Trench I, Phases 2 and 4 (figures E. Holt).

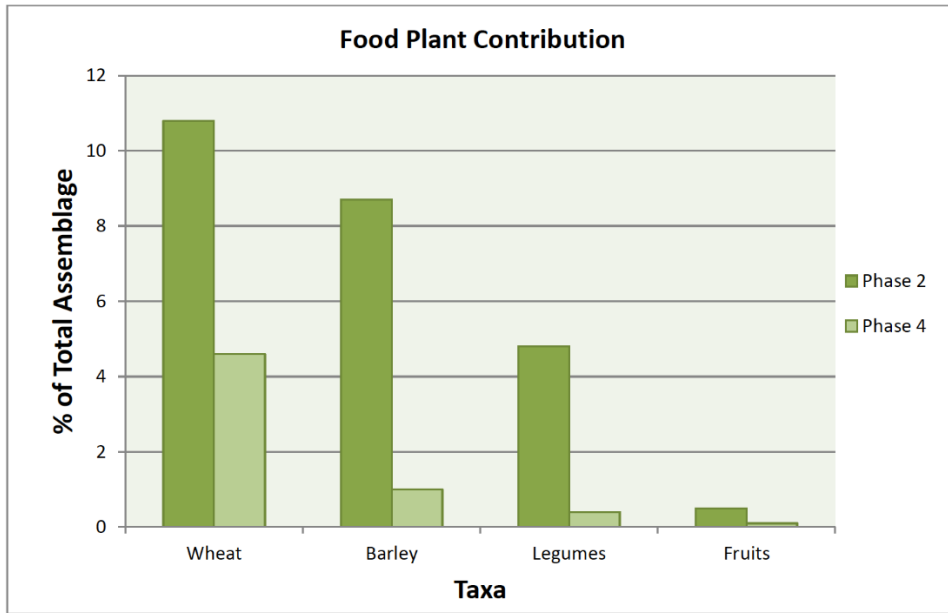


Fig. 16: SIDDI – Comparison of macrobotanical remains of food species from Sa Conca 'e sa Cresia Trench I, Phases 2 and 4 (figure DIGHTON, FAIRBAIRN 2012, fig. 2).

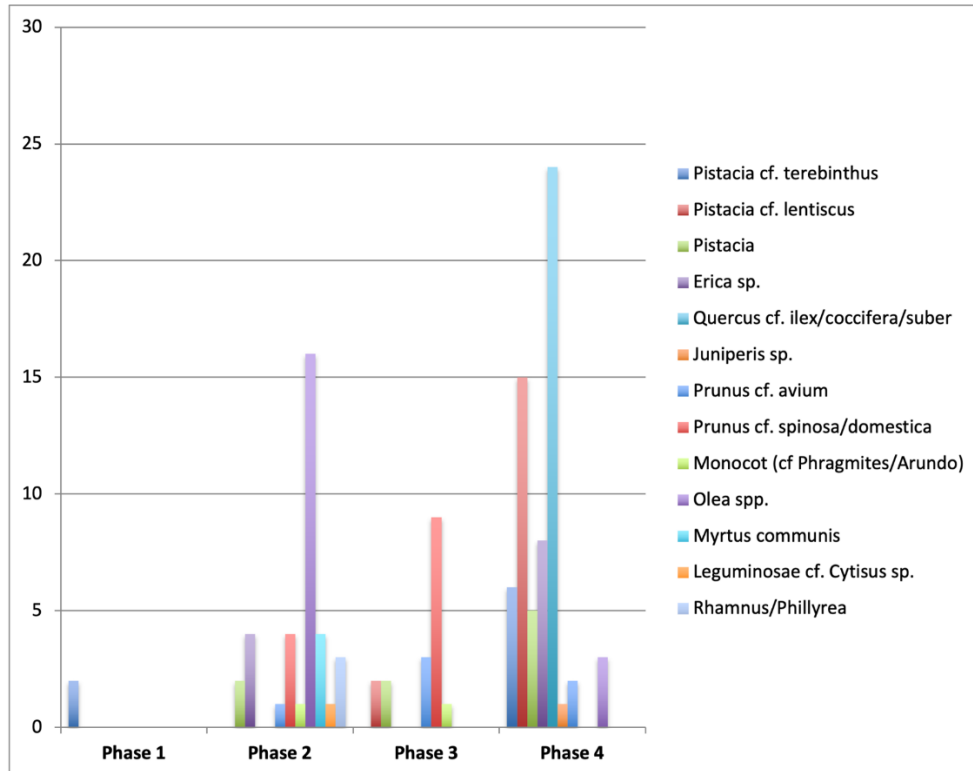


Fig. 17: SIDDI – Graph comparing species of wood charcoal specimens identified in samples from Sa Conca 'e sa Cresia Trench I by percentage of assemblage (figure R. Veal).

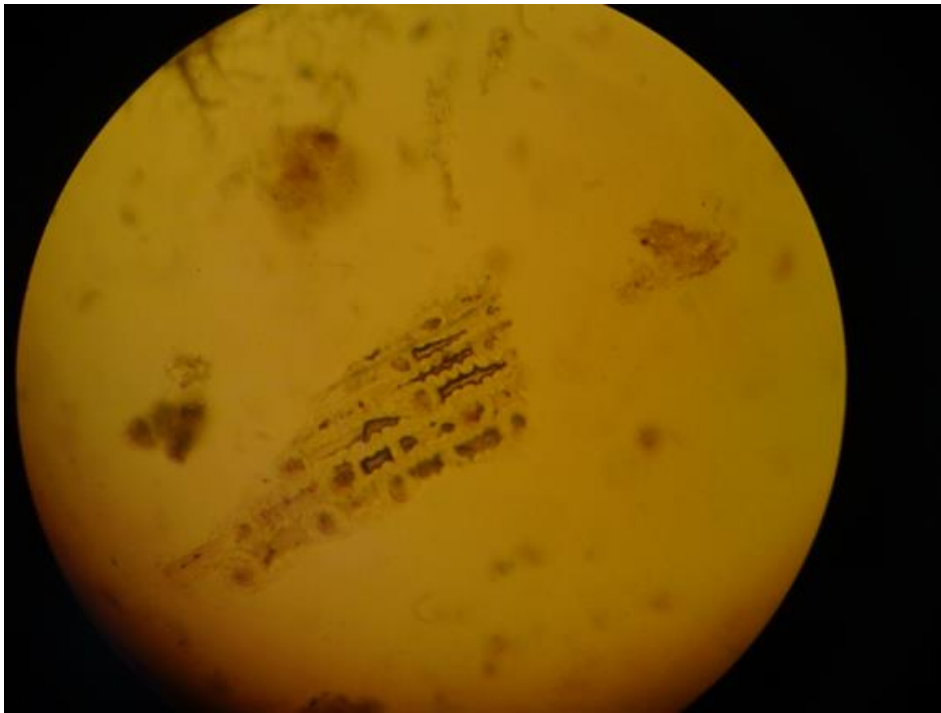


Fig. 18: SIDDI – Image of a cereal husk phytolith from Sa Conca 'e sa Cresia Trench I (image A. Marsh).

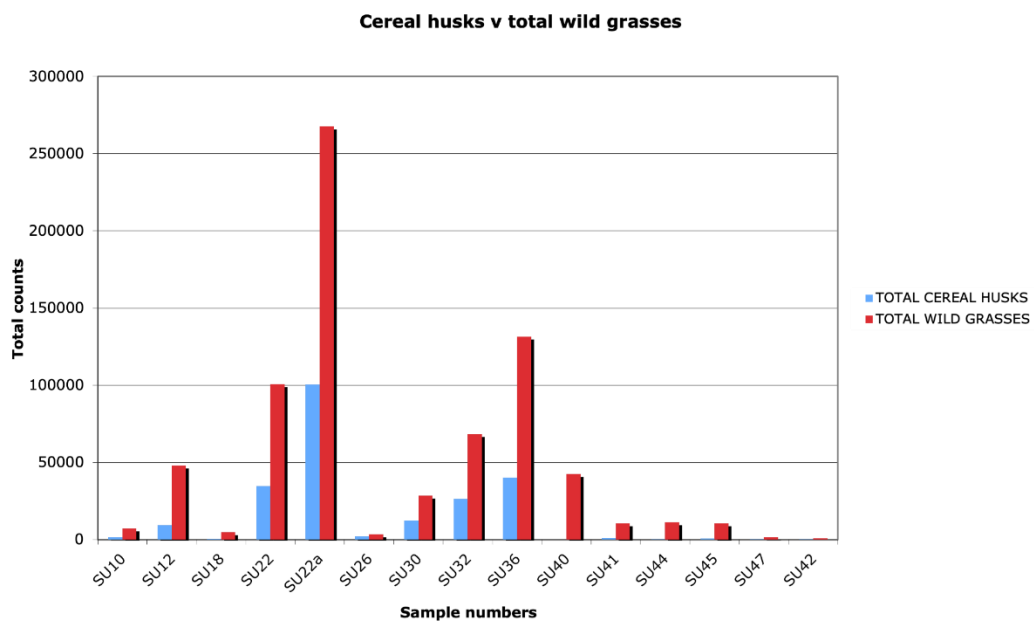


Fig. 19: SIDDI – Graph showing covariance of agricultural and wild plant phytoliths from Sa Conca 'e sa Cresia Trench I (figure A. Marsh).