Techno-cultural singularities in the southwestern region of the Brazilian central plateau in the early Holocene

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Abstract:

This article aims to contribute to expanding knowledge about the panoply of lithic tools present in Early Holocene archaeological sites located in the Brazilian Central Plateau. These sites have traditionally been interpreted within the context of the Itaparica tradition, whose artifacts called "slugs" or "plano-convex" were used as cultural markers. Technological research over the last twenty years on lithic materials from sites typologically attributed to the Itaparica tradition has allowed a better definition of what came to be called the Itaparica techno-complex. Due to the spectacular nature of the "plano-convex" objects identified in these ancient contexts, other artifacts are usually overlooked in research. Our proposal was, therefore, to look in more detail at the subtle incisive tools that are associated (or not) with "plano-convex" artifactual structures in the collections of two sites from the southwest region of the Central Plateau: the GO-JA-01 site (Diogo Lemes), dated from 12717 - 12143 cal. (Beta-3699), and the site MT-SL-31 (Morro da Janela), dated from 11994 - 11316 cal (Beta-78053). We could see that they are, very often, structured on other technical production principles and associated with specific operational schemes.

We based our research on the Techno-functional Approach. This approach allows us to identify the coherences that are established within a volumetric structure (a specimen) in terms of its structuring subsets -minimally, the transformative edge(s) and the possible prehensive unit(s) - in light of their functional potential. Furthermore, it allows us to think about the technical meaning of artefactual structures by reinserting them into the set of which they are part (a population), providing data on the techno-functional consistency of the collections. In methodological terms, the identification of the operational schemes was carried out based on the diacritical analysis of the negatives present in the artifact, with the production modes being highlighted based on the technical principles of affordance, debitage and shaping.

We were able to group the sharp tools from these collections into five techno-functional categories: unifacial shaped tools from normalized blanks (*limaces*); unifacial shaped tools on regularized blanks; tools shaped on blanks of cobble; tools with restricted modification; regularized and non-regularized blanks. We were also able to identify in the collections the representative

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occurrence of unexhausted cores with the presence of small negatives, which led us to infer the production of even smaller blanks which, however, were not detected in the collection. Furthermore, we identified the presence of discoid D-type debitage related to some of the tools. These technological details obtained with the investigation of the aforementioned archaeological sites of the Central Plateau, when considered in the light of spatial, chronological and paleoenvironmental information, allow us to consider the scenarios concerning the population dynamics of that period. The tools categories evidenced in this paper, added to the techno-cultural particularities found in other Central Plateau sites and expands the Itaparica toolbox. They bring about a greater understanding of the Techno-cultural diversity of the technical memories of the human groups that occupied the extensive area of the Central Plateau, enabling further investigations into the connections of technical knowledge between regions.

Keywords: southwestern Brazilian Central Plateau; Early Holocene; techno-functional; Itaparica; tools of low visibility

1. Introduction and background

This article aims to broaden the panoply of tools centered from the Early Holocene (EH) (The 11,700 yr BP - 8200 yr BP interval shall be considered the Early Holocene period (Walker *et al*. 2018)). The text will present some dates of Itaparica sites from the Central Plateau of the Pleistocene-Early Holocene transition) transition, stemming from the techno-cultural singularities of pieces from two archaeological sites located in the southwestern region of the Central Plateau. The Brazilian Central Plateau covers an extensive region, where the *Cerrado* biome is predominant and the Caatinga biome is restricted to the areas bordering the northeast (Ribeiro *et al*. 2008). Water resources are very significant in the area, with important hydrographic basins that are essential to the dynamics of individuals' navigability and mobility.

Since 1970, a significant number of lithic sites located in the Brazilian Central Plateau and dated in the Pleistocene-Holocene and Early Holocene transition have been linked to the Itaparica tradition. While this tradition was defined in the 1960s (Calderón 1969) in order to group sites from the northeastern region of the Plateau, it wasn't until the 1980s that its spatiotemporal, cultural and geo-environmental categories were expanded stemming from research carried out on sites in the southwestern region of the Plateau (state of Goiás, municipality of Serranópolis). In this region, Itaparica tradition relates to human groups that densely occupied the Plateau, and who, according to (Schmitz *et al*. 1989; 2004), would have had a diet based on widespread hunting, complemented by fishing and gathering. Bone artefacts are scarce, predominantly spatulas produced from mammals and, among the lithic artefacts, noteworthy are the "scrapers on flakes" featuring unifacial shaping, traditionally recognized as *limaces*. Such tools have been considered index fossils of this tradition. In the southwestern portion of the Central Plateau (state of Mato Grosso), there are also records of sites of this temporal range where *limaces* were either not described, as in the Abrigo do Sol site (Miller 1987), or where they were exogenous, as in the Santa Elina site (Vialou 2005: 245; Vialou *et al*. 2017).

From the 2000s, studies focused on lithic technology have intensified on such sites, covering different regions of the Central Plateau, including in the southeast (Fogaça 2001: 50; Rodet 2009); northwest (Bueno 2007), and northeast (Lucas 2020: 98; Parenti 2001: 109). Specifically in terms of the lithic collections of the southwest, noteworthy is the research carried out in Serranópolis by Fogaça (2003); Fogaça and Lourdeau (2008); Lourdeau (2010:361); Sousa (2015); Viana (2016); Oliveira (2019) and Rodet *et al*. (2019), and in Poxoreu, in the state of Mato Grosso by Oliveira (2014).

From a specific perspective, stemming from the principles of the techno-functional approach (Boëda 2013: 39), Lourdeau (2010:59) studied three lithic collections from the Southwest and northeast Plateau region, establishing the Itaparica techno-complex. According to the author, it is constituted by the functional complementarity between tools featuring unifacial shaping (*limaces*), retouched flakes and, not as recurrently, bifacial pieces. The volumetric structure of the tools featuring unifacial shaping (*limaces*) was produced to support one or more tools, used for a number of technical actions. Part of these tools present long life span characteristics, observed from successive technical states of blank reconfiguration (denaturation processes) (Lourdeau 2017).

In order to broaden the toolbox and emphasize aspects of the technical alterities of the Itaparica techno-complex, which are present in the archaeological records of the southwestern region of the Central Plateau, this paper will present the techno-functional analyses of two sites, namely GO-JA-01 (Diogo Lemes), in Serranópolis and MT-SL-31 (Morro da Janela), in Poxoréu whose results reveal the existence of techno-cultural singularities that have either scarcely or not yet been described for Itaparica.

The significant assemblages of lithic sites of this temporal range, widely distributed across the Brazilian Central Plateau, together with palaeoenvironmental data, in addition to the contextualizing the lithic artefacts, also allow for arriving at reflections about the spaces occupied and the flows of displacements and knowledge among human groups in these regions. Within this spectrum, and whilst also taking into account the presence of a well-defined lithic technology in the period, research has raised questions about techno-cultural correlations with Pleistocene occupations in Brazil (Boëda *et al*. 2014; 2016; Vialou 2005: 245; Vialou *et al*. 2017). Similarly, they have challenged the understanding of human occupations taking place at a later date, during the Mid-Holocene, seeking to understand the technical break existing between these two periods, Early and Mid-Holocene (Da Costa 2017: 131; Lucas 2016; Ramos & Viana 2019; Schmitz *et al*. 1986).

2. Materials and methods

The data presented refer to excavations carried out at site GO-JA-01 by Schmitz and team in the 1970s and 1980s Schmitz *et al*. (2004), and at site MT-SL-31 by Wüst (1992) in the 1990s.

The site GO-JA-01 is located in a sandstone shelter, Botucatu Formation, Paraná sedimentary basin (Cprm 2010), inserted in an escarpment resulting from geomorphogenetic processes that shaped the landscape, into a stepped slope that serves as a reference in the local topography. The slope's gradient results in a marked differentiation in visibilization (refers to how the site is viewed from the outside) and visibility (the visual field from the site), as discussed by Boado (1993), regarding the variables associated with visualization. Radel (2022) addressed some of these variables regarding the insertion of GO-JA-02 into the landscape, which allows for establishing certain considerations for GO-JA-01. For instance, the site's opening faces north or northwest, and the visibility from the site entrance is linked to the density of the vegetation canopy, which varies according to the *Cerrado* biome seasons - low visibility in the rainy season, when vegetation is dense, and better visibility in the dry season, when the vegetation canopy is sparse-. Taking into account the slope's gradient, the site's visibility from a 40 m - high plateau can reach a distance of 5 km in the direction of the Verde river. As for visibility, the slope on which site GO-JA-01 is located may be seen from about 8 km away, however, its better location may only be seen from approximately 4 km.

Regarding site MT-SL-31, it is located on an elevated residual relief originating from the Ponta Grossa Formation, Paraná sedimentary basin (Cprm 2010). It is associated with other escarpments, also of tabular form, which stand out in the topography, allowing a high

visibility from a radius of approximately 15 km, the same as the visibility from the top. The site's opening faces the entire southern portion, and from its base, visibility is much more restricted in the direction of the Engano stream, some 5 km away. In both visual range possibilities, the seasons will also interfere (Figure 1).

Figure 1. Site GO-JA-01: (a) site overview in the landscape. Photo: Sibeli Viana, 2021 (b) view from inside the site; site MT-SL-31: (c) site overview in the landscape; (d) view from inside the site. Photos Prefeitura de Poxoréu, and unpublished from C. Barreto

It should be noted that, for both cases, this current vegetational context may not correspond to the reality in the past.

As for the particularities of the excavations carried out at each of the sites, the site GO-JA-01 has an approximate area of 1,700 m2. The excavations were carried out at 10 cm artificial levels and reached a depth of about 2 m. The excavated area was 40 m2, where were identified 17 layers, with sterile zones and block rocks. In all layers, the presence of ash from combustion was mentioned, and the presence of coal was only not mentioned in three layers, located near the base (Schmitz *et al*. 1989; 2004).

In this paper, however, the analyses refer to the materials from grid square 16H - levels 160 cm to 180 cm (layers M to O), totaling 1,685 pieces, studied by Oliveira (2019). Part of

the materials from this site were also analysed by Fogaça & Lourdeau (2008) and by Lourdeau (2010:59) (Figure 2).

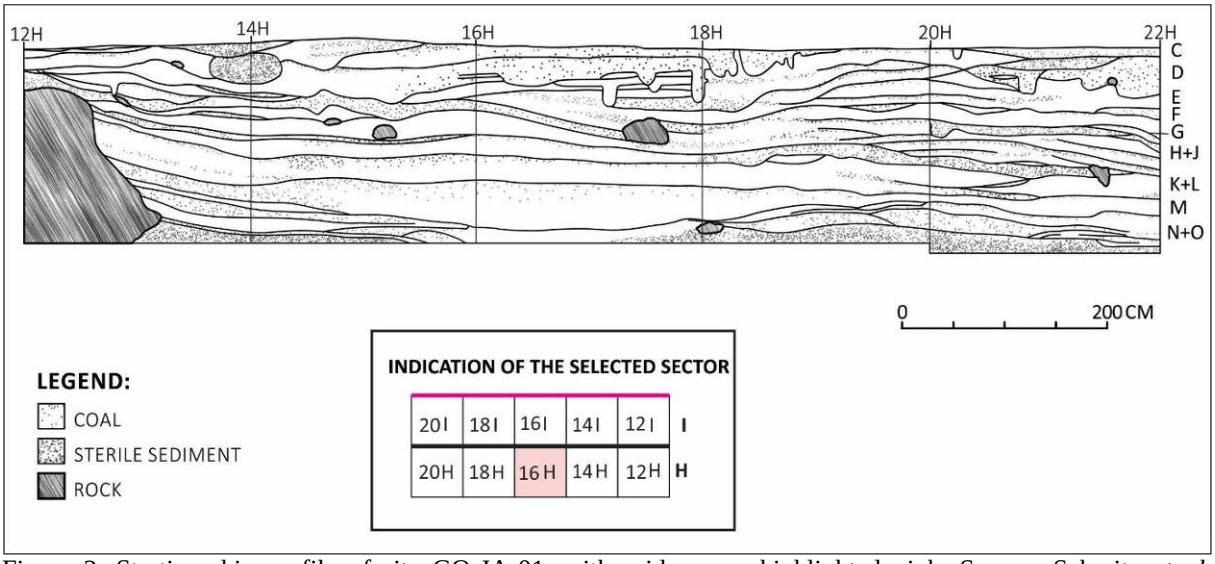

Figure 2. Stratigraphic profile of site GO-JA-01, with grid square highlighted pink. Source: Schmitz *et al.* (2004).

The site MT-SL-31 consists of a seawall about 8 0 m in length and 30 m in height. In the excavation area of site measuring 22 m2, with a depth of about 2.5 m, the eastern profile presents seven discontinuous stratigraphic layers, with sediments varying from sandy to clayey towards the deeper layers. Evidence has been found of campfire lenses, sparse and concentrated coals and animal-induced disturbance areas (Oliveira 2014).

The collection under study here corresponds to the materials of trench II, sector N14 to N17-18, levels 22 a 35, present in the last stratigraphic layers, totaling 1,626 pieces, investigated by Oliveira (2014) (Figure 3).

According to the scale of Figure 3, levels 22 to 35 correspond, in the field, to a thickness of 130 cm; the excavation reached about 250 cm in depth.

In order to provide a broader regional understanding, this article also integrates some specific data, selected from other locations in the southwest of the Central Plateau, such as from GO-JA-02, GO-JA-03, GO-JA-14 and GO-JA-26 in Serranópolis (Rodet *et al*. 2019; Rubin *et al*. 2020); from the Santa Elina site in the Paraguay River basin (Vialou 2005: 245) and also from sites AS4 and AS12 in the Sucuriú River basin (Martins & Kashimoto 2012). Additionally, paleoenvironmental data originating from research in *Cerrado* regions will also be included, such as from the Meia Ponte river basin (MPHB) (Barberi 2001: 84; Barberi & Lima-Ribeiro 2008; Rubin 2003: 258; Rubin *et al*. 2011); from Palestina de Goiás and Serranópolis, in the state of Goiás.

At the theoretical and methodological level, both collections (sites GO-JA-01 and MT-SL-31) were studied from the techno-functional approach (*sensu* Boëda 2013). It is assumed that the techniques are part of human existence, and they are therefore intertwined with the subjects (through traditions, knowledges, *savoir faire* and body schemas) to things, as well as to culturally inherited and re-updated memories (habits and values). They are also in interaction with their environments, places where people experience and (re)signify their experiences (Simondon 2020: 60; Tilley 2014; Vieira Pinto 1973: 174).

From this perspective, people are also defined by their actions with the artefacts they produce (modes of production - instrumentalization) and handle (schemes of use - instrumentation) (Boëda 2013: 40; Gonzatto & Merkle 2016), contextualized in an

environment understood as mediating and constituting the entanglement between the technical elements produced and the natural elements (De Weyer *et al*. 2022).

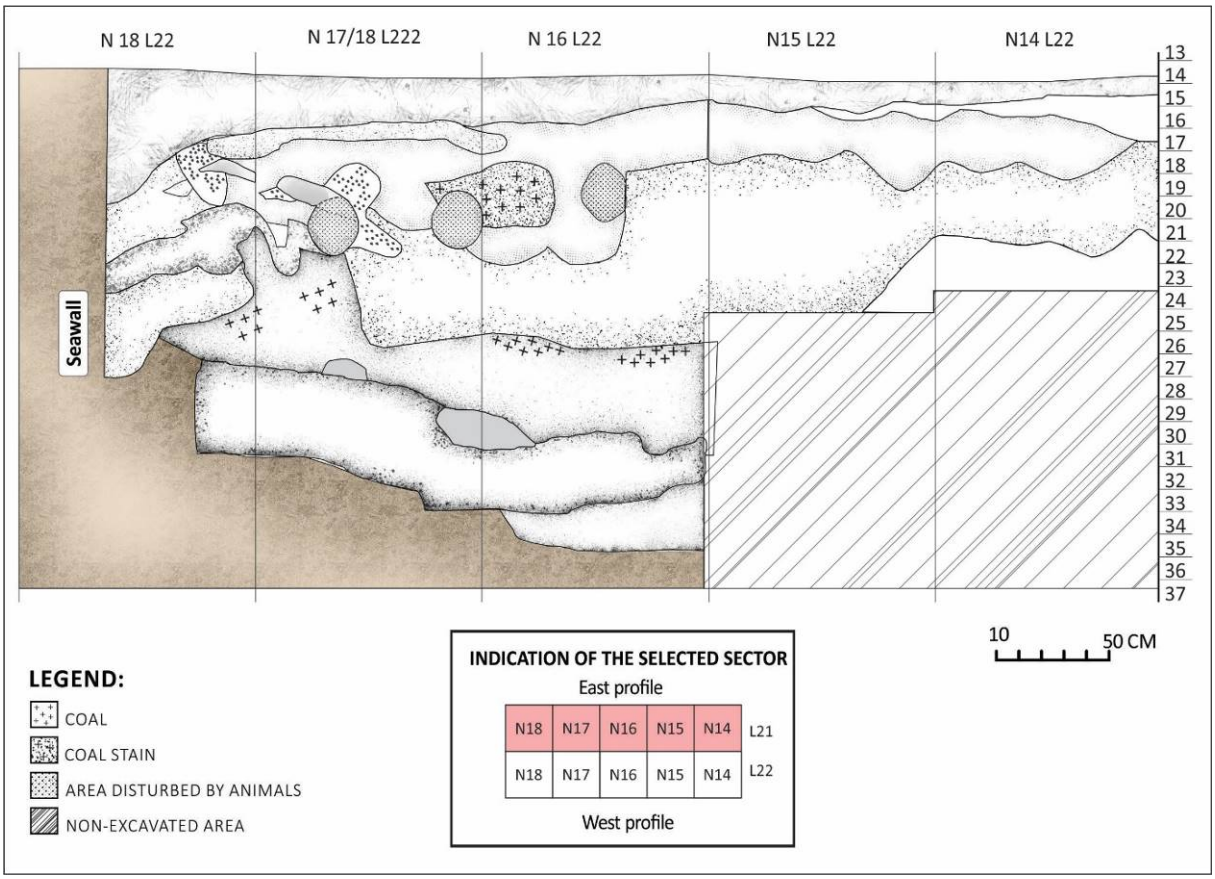

Figure 3. Stratigraphic profile of site MT-SL-31, with the levels analyzed highlighted in pink. Source: unpublished I. Wüst; C. Barreto, 1994 (field notes).

To express part of this entanglement, we propose the notion of affordance (Canguilhem 1968: 16; Knappett 2004), which, when applied to lithic studies (Boëda & Ramos 2017), reinforces both the integration of human behaviour in the natural environment, and of that of the natural environment in human behaviour (Simondon 2020). Affordance extends and complexifies the natural blank selection phase (raw material). In the context of lithic studies, affordance occurs when natural portions of the selected blank were intentionally maintained, as technical criteria, throughout the construction of the tool's structure and tool and functioning. This relationship unveils strong interactions of people with their environment (Boëda & Ramos 2017; De Weyer *et al*. 2022; Pérez *et al*. 2020; Ramos & Viana 2019). In this sense, the notion of affordance is understood as a technical principle to be positioned alongside with the shaping and the debitage.

Shaping modifies a lithic volume (Inizan *et al*. 1995: 49) in order to produce techno-functional criteria absent in the initial volume (Boëda 2013; Lourdeau 2010: 97; Ramos & Viana 2019), and the criteria of affordance may or may not be present in it. In debitage, which concerns the modification of a block that constitutes a useful and a non-useful volume (*sensu* Boëda 2013), the criteria of affordance may or may not also compose the volume of the core and the resulting blank flakes.

The useful volume (core) is modified by means of various conceptions of debitage, defined by the structural organization between both volumes (useful and non-useful), and presents six technical stages (A-F) that reveal additional or integrated structures (*sensu* Boëda 2013). In additional debitage (A, B, C, D) the useful volume is not technically connected with

the other parts of the block; often blank flakes are produced, which may require a further stage or further stages of modification, by shaping or retouching, in order to become a tool. In integrated debitage (E, F), the useful volume represents the whole block; it produces standardized flakes that often present all the technical criteria deemed sufficient and necessary for the instrumentation of the artefact in their structure - they are already in themselves a tool (Boëda 2013; Viana *et al*. 2023). While not overly standardized, the products of debitage D may also be considered tools-flakes.

The methods of analysis of the lithic assemblages from sites GO-JA-01 and MT-SL-31 were based on the notions of tool - understood from a possible prehensile techno-functional unit (UTF-p), energy-transmitting unit (UTF-tr) and transformative techno-functional unit (UTF-t) and the cutting edge that transforms the matter to be worked - and of the techno-functional intentions underlying the technical operations aimed at producing the specific structure of a tool (De Weyer *et al*. 2022). The identification of the operative schemes applied during the technical operations is carried out by means of diacritical analysis (Dauvois 1976) of the negatives present in the artefact, and by means of the characteristics of the blade edges, from which it is possible to individualize the techno-functional units (UTF-t, UTF-p and UTF-tr) (Da Costa 2017: 93; Hoeltz 2005: 96; Lourdeau 2010: 59; Lucas 2020: 89; Rocca 2013; Viana 2005: 124).

3. Spatial, temporal and environmental aspects of central plateau sites

Human occupations in the Central Plateau, in the *Cerrado* biome and the transition from *Cerrado* to Caatinga biomes, with Pleistocene-Early Holocene and Early Holocene chronologies, occur mainly in rock shelters. In this context, sites occur in clusters, as observed in the orthwest (Bueno 2007), northeast (Guidon 1986; Parenti 2001: 109), southeast (Fogaça 2001: 50; Prous *et al*. 1994; Rodet 2009) and southwest (Schmitz *et al*. 2004) regions of the Central Plateau (Figure 4). They are also isolated, but while they are identified in all regions, there are sizeable unrecorded spaces.

As for the chronologies of these occupations, the region has been observed to have been occupied throughout the entire transition period and during the Early Holocene proper. However, this does not mean that such dates are uniformly distributed in regional terms (Figure 5).

Certain sites present dates prior to the Pleistocene-Holocene transition, such as the Meio site - 14,572 cal BP, and the Toca do Gordo do Garrincho site - 14,107 cal BP, both located in the northeast region, as well as the Lapa do Boquete site, in the southeast region of the Central Plateau - 14,101 cal BP.

The records of available sites and dating extend from the transitional period and the start of the Early Holocene. The chronological limits are found at sites Lapa do Boquete - 12,903 cal BP and Lapa do Barreirinho - 9,972 cal BP, both located in the southeastern region of the Central Plateau.

Figure 4. Map of the location of archaeological sites in the Brazilian Central Plateau in *Cerrado* biome during the Pleistocene-Holocene Early Holocene transition. The southwestern region is highlighted. Base map: Braxmeier, 2023.

Sites: GO-NI-08 - 1; Lapa do Gentil - 2; GO-NI-49 - 3; GO-NI-148 - 4; Toca do Morcego - 5; Baixão da Perna I - 6; Toca do Pica-Pau - 7; Toca do Veado - 8; Toca da Janela - 9; Toca da Boa Vista I - 10; Toca do Bojo - 11; Toca do Paraguai - 12; T. Baixa das Cabaceiras - 13; Toca da Boa Vista II - 14; Caldeirão do Rodrigues - 15; Sítio do Meio -16; Toca dos Coqueiros - 17; Toca Baixão da Pedra Furada - 18; Toca do Zé Luis - 19; Toca de Cima do Pilão - 20; Toca Baixo do Cipó - 21; Toca do Caldeirão do Elias - 22; Toca da Lagoa de Cima - 23; Toca da Roça do Dalton - 24; Toca Gordo do Garrincho - 25; Toca do Vento - 26; Toca do João Leite - 27; Abrigo do Pilão - 28; Morro Furado - 29; Lapa do Dragão - 30; Lapa do Boquete - 31; Lapa do Cabloco - 32; Lapa dos Bichos - 33; Abrigo do Malhador - 34; Boqueirão Soberbo - 35; Barreirinho - 36; Lapa Pequena - 37; Lapa da Chica - 38; Bibocas II - 39; Caixa D'agua - 40; Lapa do Peixe Gordo - 41; AS4 - 42; AS12 - 43; GO-JA-03 - 44; GO-JA-14 - 45; GO-JA-26 - 46; GO-JA-01 - 47; GO-JA-02 - 48; Morro da Janela - 49; Morro do Solteiro - 50; Santa Elina - 51; Abrigo do Sol - 52; Capivara 5 - 53; Abrigo do Jon - 54; Miracema do Tocantins - 55; Mares 2 - 56.

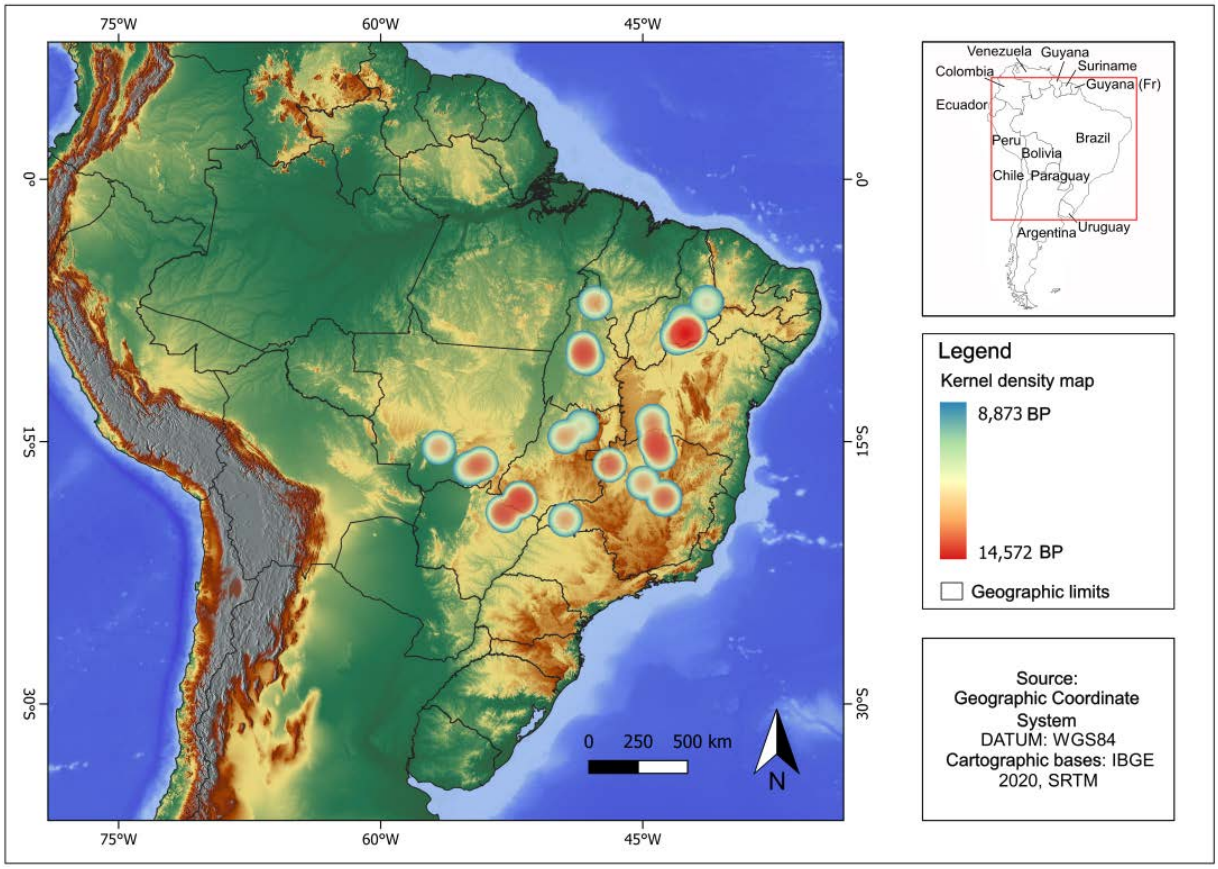

Figure 5. Map of the location of archaeological sites in the Brazilian Central Plateau, based on the temporal depth of the sites. Dating calibrations were based on Calib 4.3.1 (Ramsey 2017) and Int Cal3 calibration curves (Reimer *et al*. 2013).

After this period, the number of records decreases again in two chronological ranges. One established between 9,132 cal BP, at Lapa Pequena site, and 9,010 cal BP, at the Caixa D'Água site, also situated in the southeast region; and the other, towards the end, between 8,984 cal BP, at the Toca do Bojo site, northeast region; and 8,873 cal BP at site AS4, southwestern region of the Central Plateau (Figure 6).

In terms of the temporality of the southwestern region of the Central Plateau, three moments must be highlighted: in the interval between 12,700 cal BP and 12,337 cal BP, are sites GO-JA-14, GO-JA-01, AS12 and Abrigo do Sol. In another, between 11,706 cal BP and 10,393 cal BP, are the sites of Santa Elina, Morro do Solteiro, AS12, AS4, GO-JA-01 and GO-JA-03, that is, in the transition of Pleistocene-Holocene and at the beginning of the Early Holocene. And in the later phase of the Early Holocene, between 11,994 - 9,972 cal BP and 8,873 cal BP, there are records for sites MT-SL-31, Abrigo do Sol, AS12, AS4, GO-JA-26 and GO-JA-01.

As for paleoenvironmental data, for the Pleistocene-Holocene transition and Early Holocene, studies indicate that during the MIS1 isotopic interval, from about 13,000 to 12,000 BP, a diachronic and oscillatory return of the humidity conditions and a gradual increase in temperature took place. Still within this time frame, in the regions of the Meia Ponte river Basin (Portuguese acronym: MPHB), Palestina de Goiás and Serranópolis, a new set of vegetation started to occur, marked by the predominance of typical elements of the *Cerrado* biome. Initially, open vegetation appeared, evidencing a warmer and more humid climate when compared to the previous phase relative to the Last Glacial Maximum (LGM) in the MIS2 isotopic interval (Barberi 2001: 84; Barberi & Lima-Ribeiro 2008; De Oliveira 1992: 280; Rubin *et al*. 2011).

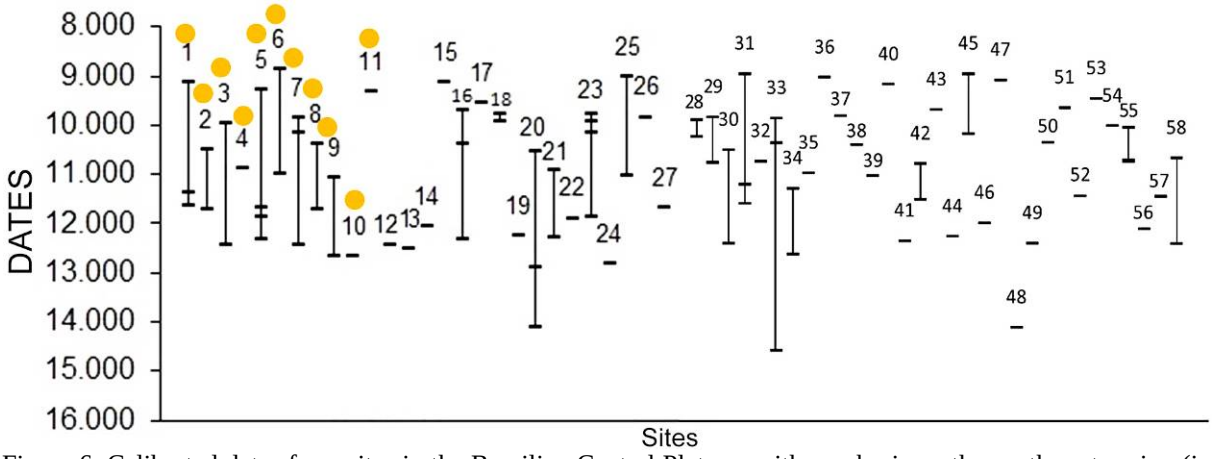

Figure 6. Calibrated dates from sites in the Brazilian Central Plateau, with emphasis on the southwest region (in yellow). State of Mato Grosso: MT-SL-31 (1); Santa Elina (2); Abrigo do Sol (3); Morro do Solteiro (4); state of Mato Grosso do Sul: AS12 (5) AS4 (6); state of Goiás: GO-JA-01 (7), GO-JA-02 (8), GO-JA-03 (9), GO-JA-14 (10), GO-JA-26 (11), GO-NI-08 (12), GO-NI-49 (13), GO-NI-148 (14); state of Minas Gerais: Lapa Pequena (15), Lapa dos Bichos (16), Abrigo do Malhador (17), Boqueirão Soberbo (18), Lapa do Caboclo (19), Lapa do Boquete (20), Bibocas II (21), Lapa do Peixe Gordo (22), Gruta do Gentio II (23), Lapa do Dragão (24), Caixa d'água (25), Lapa da Chica (26), Lapa do Varal (27); Bahia: BA-RC-28 (28), Abrigo do Pilão (29); state of Piauí: Baixão do Perna I (30), Boqueirão da Pedra Furada (31), Caldeirão Rodrigues (32), Sítio do Meio (33), Toca dos Coqueiros (34), Toca da J. B. Antonião (35), Toca B. das Cabeceiras (36), Toca da B. do Cipó (37), Toca da B. Vista I (38), Toca da B. Vista II (39), Toca da L. de Cima (41), Toca da Pena (42), Toca da R. do Dalton (43), Toca de C. do Pilão (44), Toca do Bojo (45), Toca do C. do Elias (46), Toca F. B. P. Furada (47), Toca G. do Garrincho (48), Toca do João Leite (49), Toca do Morcego (50), Toca do Paraguaio (51), Toca do Zé Luís (52), Toca do Vento (53); Tocantins: Abrigo do Jon (54), Capivara 5 (55), Lajeado 18 (56), Mares 2 (57) and Miracema do Tocantins 1 (58).

The earliest paleoclimatic records in Brazil's *Cerrado* biome are dated at between about 44,000 and 39,000 BP (Würm or Wisconsin glaciation and MIS 3) and come from the MPHB (Barberi & Lima-Ribeiro 2008; Rubin *et al*. 2011) and the Serra Negra Lagoon (De Oliveira 1992:280). As for the MPHB region, data points at more humid climate conditions than the current one, with mild temperatures that enabled the occurrence of Mauritia palm swamp vegetation, associated to forest formations and savannas type vegetation (Barberi 2001:84; Barberi & Lima-Ribeiro 2008; Rubin *et al*. 2011; Rubin 2003:258; Salgado-Labouriau *et al*. 1997). From about 29,000 BP (MIS 2), the trend pointed at a sharp decline in temperature, followed by a gradual decline in humidity, peaking at between 21,000 and 18,000 BP, which marked the Last Glacial Maximum (LGM) (Barberi 2001:84; Barberi & Lima-Ribeiro 2008); Rubin *et al*. (2011). These conditions led to a retraction of vegetation in the MPHB region and in the areas of Palestina de Goiás and Serranópolis.

In the areas under study here, from the beginning of the Holocene, the increase in temperature is gradual and the humidity oscillating, with longer or shorter dry seasons. In the final phase of the Early Holocene, in the transition to the Middle Holocene, the landscape was more open than today's, with a predominance of elements of the *Cerrado* biome, and the absence of Mauritia flexuosa until around 7,000 BP. This would suggest that the veredas (palm swamp forest) remained restricted, attesting to climatic conditions with temperatures showing a constant tendency to increase, but with dry seasons still prolonged (Barberi 2001:84; Barberi & Lima-Ribeiro 2008; Ledru 2002; Rubin *et al*. 2011).

4. Cultural diversities in sites of southwestern Central Plateau region

In the southwestern Central Plateau region, the (re)occupations are evidenced in rock shelters that generally present deep stratigraphic levels in a good state of preservation and

denote the continued presence of human groups at these sites, with traces of diverse cultural practices.

At the Serranópolis sites, the materials present good levels of preservation, for instance, the refitting of lithic assemblages (site GO-JA-01) and the low rate of flake fragments (Oliveira 2019) stand out. At Santa Elina (Bachelet 2014; Vialou 2005) and MT-SL-31 (Wüst & Vaz 1998), there is a diversity of plant and bone remains, which also validate the good preservation of the contexts.

In relation to cultural practices, at some of these sites, they are striking and diversified. At sites GO-JA-01, GO-JA-02, GO-JA-03, GO-JA-26, AS12, AS4 and MT-SL-31, the presence of lithic tools associated with an expressive number of debris of shaping and retouching, represents intermediate and final phases of operative chains, as mentioned by Schmitz *et al*. (2004), Oliveira (2014), Rodet *et al*. (2019) and E. Kashimoto (oral comm., April, 2018). For site GO-JA-01, the recurrence of lithic tool management strategies is noteworthy, there being reconfigurations of the volumetric structures of certain objects or resharpening of edges (Lourdeau 2017). Also noteworthy for the Serranópolis (Schmitz *et al*. 2004) and the MT-SL-31 (Wüst & Vaz 1998) sites is the production of polished bone tools and, in the Santa Elina site (Vialou & Vialou 2019) and MT-SL-31 (Wüst & Vaz 1998), polishing for the production of ornaments.

While rock drawings are present in the great majority of the Early Holocene sites' walls, including sites GO-JA-01 and MT-SL-31, it was not possible to associate them with ancient occupations.

4.1. Peculiarities in the acquisition of rock raw materials

The raw materials for the production of lithic objects at the sites under analysis correspond to locally available rocks, whether they are constituents of the occupied rock shelters themselves or in the form of pebbles and cobbles present in the surrounding areas. At site GO-JA-01, for instance, the silicified sandstone was acquired from within the rock shelters, available in stripped blocks, which served as natural exploitation surfaces. Some of these blocks were knapped in situ, classified as stationary cores, showing striking platforms and debitage surfaces. Due to silicification by contact metamorphism these sandstones present average quality for knapping.

An expressive variety of sandstones are to be found in the vicinity of these sites, especially in watercourses and on slopes, some distinct from those present in the stationary core in GO-JA-01. Also present in these areas are fragile rocks (in the conception of archaeology) of good flaking quality such as flint, chalcedony, basalt and diabase. Especially in the Bela Vista stream, about 500 m from GO-JA-01, there is a significant availability of basalt in outcrops and in the form of granules, pebbles and blocks with weights, shapes (resulting from spheroidal exfoliation) and characteristics suitable for use as hammers.

Taking sites GO-JA-01 and GO-JA-02 as a reference, people's access to these raw materials presents different degrees of difficulty, as they are found on the slopes, on land with pronounced slopes, or on the banks of streams, where the slope is gentle, and they outcrop in the form of blocks, cobbles and rubble (Araujo 2018) (Figure 7).

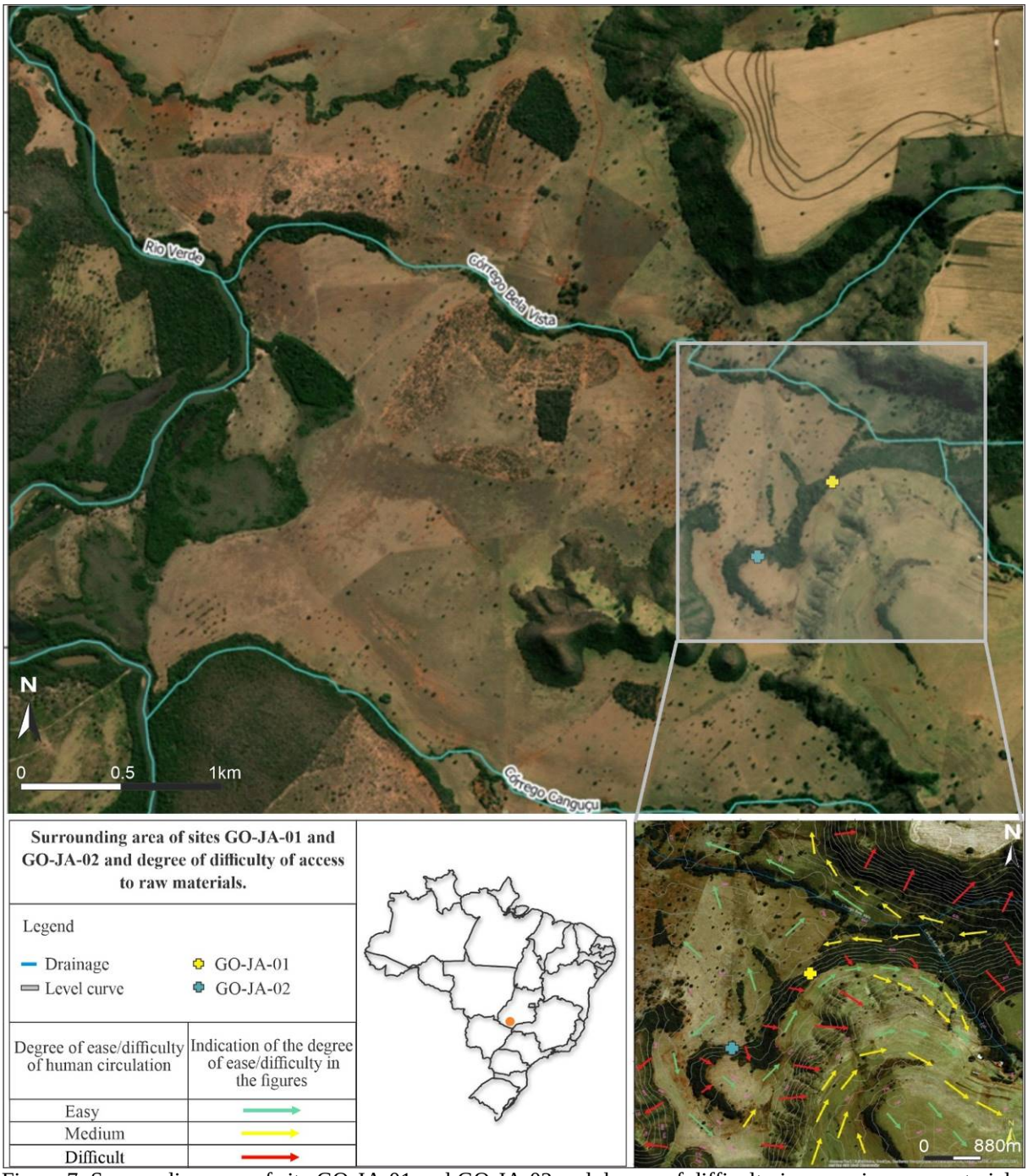

Figure 7. Surrounding area of site GO-JA-01 and GO-JA-02 and degree of difficulty in accessing raw materials. Source: Araujo (2018), modified from Rubin (2017).

It is also worth noting that there are other Central Plateau Early Holocene sites where the practice of utilizing the walls of the shelter as a way of obtaining raw material for the production of artefacts has been verified.

At sites AS12 and AS4, quartzites were used (Martins & Kashimoto 2012), and at the Santa Elina site, limestones (Vialou 2005), both of which were present inside the rock shelters. As with the others, occurs a selection of raw materials found in the surrounding areas of site MT-SL-31.

4.2. Modes of production and functional intentionality of the flaked lithic tools from sites GO-JA-01 and MT-SL-31

The diversity of production modes and functional potential of the flaked tools from sites GO-JA-01 and MT-SL-31 was systematized based on the principles of affordance, debitage and shaping integrated with the technical operations linked to production (instrumentalization) and the potential functional schemes (instrumentation).

In terms of production modes, we considered the disposition and diachrony of the scars (negatives) applied in the construction of the volumetric structure of the tool's blank-flake or of the structural configuration of the natural blank (*i.e*., pebbles with concave, convex or flat sections); the functioning schemes were investigated from the configuration of the tool's techno-transformative units (UTF-t) (morphology, delineation, edge angulation, and strike surface). The possible techno-prehensile units (UTF-p) were defined based on their nature: confectioned after the production of the flake, selected by affordance criteria or predicted in the debitage.

The cross-referencing of information regarding the modes of production and the structural differences between transformative units (edges) and possible prehensile units led us to group the tools from these pieces into five techno-functional categories (Table 1), considering the structural ordering in relation to the transformative and possible prehensile portions. Within this articulated set of potential production and functional schemes, constituents of the tools' structures, the presence of blanks of regularized, non-regularized, normalized and highly normalized tools were identified in the studied collection.

In the regularized blanks, the positioning of possible prehensile units in relation to the transformative units (edges) is variable, which leads to a non-rigid relationship between the productive and functional parts of the tool. In non-regularized blanks, the tool blanks are made up of undifferentiated structures, and the relationship between the incisive edges and the possible prehensile techno-transformative units is low, with scarcely any synergy between the tool's parts. Some of these artefacts were grouped, given that their technical transformative or possible prehensile units presented restricted modification of the blank. This set of pieces has been named "low visibility tools."

In normalized blanks, there is a greater incorporation of technical criteria - by flaking (debitage or shaping or retouching) or by affordance - in the structure of the tool blank, making the relationship between the transformative and the possible prehensile portions more integrated, in turn leading to a greater synergy between the parts during the operationalization of the tool. Such normalization may intensify (highly normalized) to the extent that greater integration occurs between the artefact, the utilization scheme and the energy applied.

Table 1. Categories of tools from sites GO-JA-01 and MT-SL-31 and percentage of their main aspects and MT-SL-31 and percentage of their main aspects. Raw material: Ss = Silicified sandstone, Ba= Basalt, Fl= Flint, Qzte= Quartzite. Rm location= Raw material location: In= interior of the shelter, Out= outside the shelter. Conservation state: En= Entire, Bro= Broken, Rt= Reshaped tool. 1, 2, 3, Fe (fragmented edg)= Quantity of transformative techno-functional units for artefact

Site	Category		Total tool	Length (avg./cm)	Width (avg./cm)	Thickness (avg./cm)	Raw material (%)				Rm location (%)		Cortex (%)	Conservation state (%)			Shaping (%)	Quantity UTF-t (%)			
							Ss	Ba	Fl	Qzte	In	Out		Ent	Bro	Rt		1	2	3	Fe
GO-JA-01	Unifacial shaped tools from normalized and highly normalized blanks		33	5.1	3.3	2	94	6			6	94	0	30	49	21	100	30	52	12	6
	Unifacial shaped tools on regularized blanks		2	9.1	4.4	2.1	100				50	50	0	100			100	100			
	Tools shaped on blanks of cobble		1	8.6	5.8	4.0	100					100	100	100			100	100			
	Tools with restricted blanks modification: regularized and non-regularized blanks	Medium-sized tools of low visibility	13	5.9	4.6	1.8	92	8			54	46	0	92	8		0	31	61	8	
		Small tools of low visibility	26	2.7	2.4	0.8	77	7.6	15.4		23	77	0	85	15		0	73	27		
MT-SL-31	Unifacial shaped tools from normalized and highly normalized blanks		5	7.5	3.1	2.5	40		60			100	20	80	20		100	40	20	40	
	Unifacial shaped tools on regularized blanks		3	9.9	7.6	4.4	34		33	33		100	67	100			100	67	33		
	Tools shaped on blanks of cobble		3	10.7	7.9	5.1	70			30		100	100	100			100	100			
	Tools with restricted blanks modification: regularized and non-regularized blanks	Medium-sized tools of low visibility	8	5.6	4.7	2.1	12.5		25	62.5		100	75	92	8		0	25	63	12	
		Small tools of low visibility	4	2.8	2.2	0.7	25		50	25	25	75	0	100			0	25	75		

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4.2.1. Unifacial shaped tools from normalized blanks (*limaces*)

This category is represented by tools produced from blanks that maintain a certain techno-morphological normalization. According to Fogaça and Lourdeau (2008) and Lourdeau (2010), such pieces present a stable technical structure that is characterized by a blank, with one flat face and another that is more voluminous, predominantly in flake format. There is also normalization observed from the blank's longitudinal axis, generally elongated and symmetrical on the sides, obtained by shaping and finished with the confection or retouch of edges. Highly normalized pieces were designated to tools that presented a transformative unit (edge), recurrently located in the apical portion. In these cases, the possible prehensile portion was strongly linked to the schemes of use and energy employed to operationalize the tool. Lourdeau (2010: 118) called them an *pieces outils*.

In the collections being studied at sites GO-JA-01 and MT-SL-31 (Lourdeau 2010: 59; Oliveira 2014), the pieces normatized and highly normalized present blanks of techno-morphological characteristics compatible with the previously listed information. As for the raw material, silicified sandstone is common at both sites, while flint and quartzite occur only in objects from site MT-SL-31. At site GO-JA-01, the preference for silicified sandstone from the surrounding areas places these tools in prominence over the others (Figure 8).

The shaping of these objects is not global (Lourdeau 2010: 59; Oliveira 2014), as the underside remains unaltered. The upper face can be either totally or partially shaped; when partially shaped, the anterior negatives from the debitage act as technical criteria, integrating to the structure of the tool and usually acting as part of the possible prehensile portion. There are no traces of cortex on these pieces.

The absence of cores related to such tools is noteworthy, and there is a good representation of the flakes resulting from the processes of shaping and edge confection (or retouch) in both sites' collections.

In terms of the techno-functional aspects, for site GO-JA-01, Lourdeau (2010: 59), and for site MT-SL-31, Oliveira (2014) observed varieties of patterning of the active and possible prehensile portion(s), articulated in strong relationships between the schemes of use and the energy employed to operationalize the tool. Among these variables, the authors distinguish the recurrence of a transformative techno-functional unit (UTF-t), located in the apical portion, with a convex or pointed outline, at around 60º to 75º. The operationalization of tools would have been directly by hand or hafting.

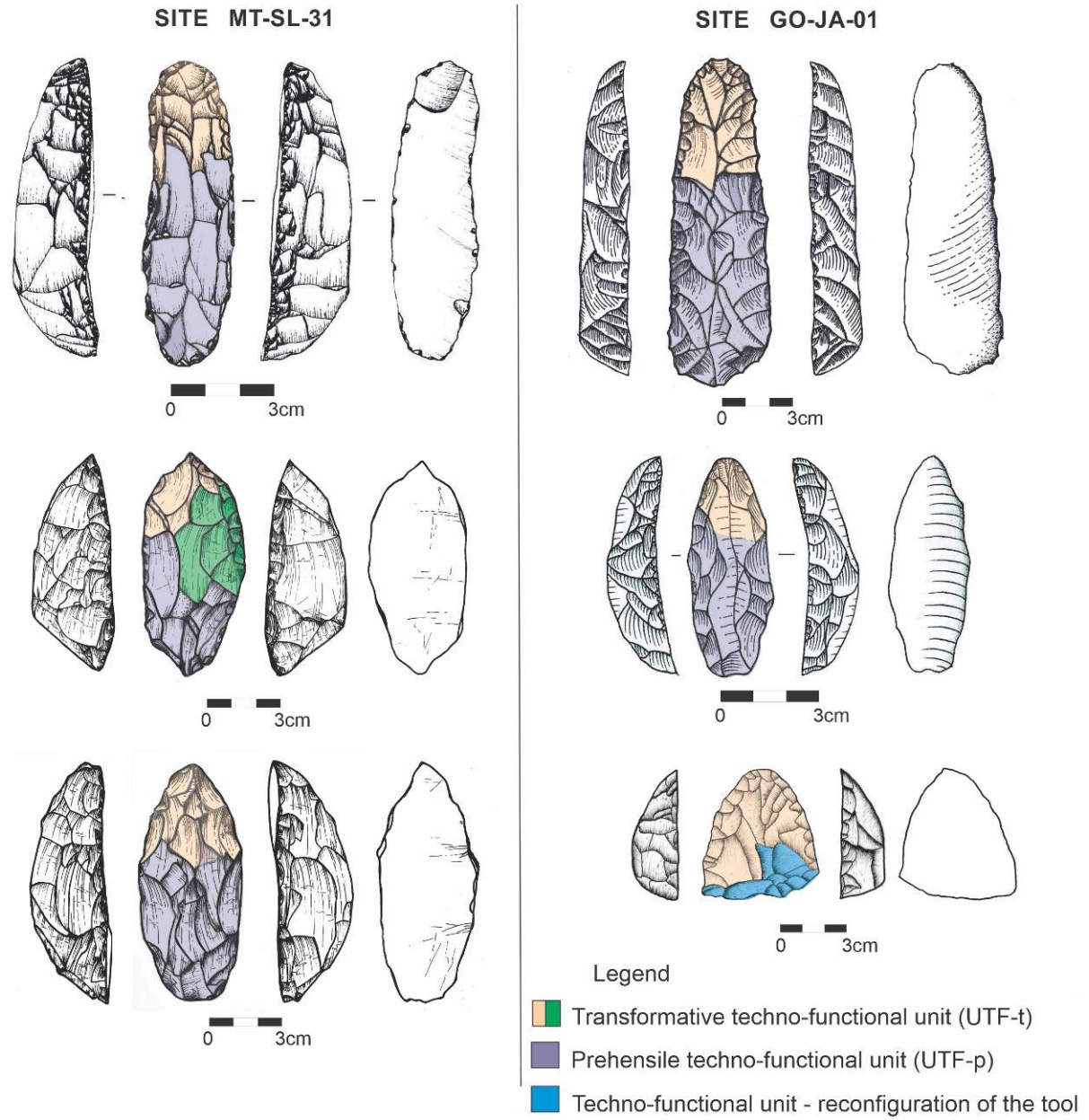

Figure 8. Unifacial shaped tools from normalized and highly normalized blanks from a flat surface. Site MT-SL-31 (a, b, c): modified from Oliveira (2014). Site GO-JA-01 (d, e, f): unpublished Jose Lucas Couto and Edilson Souza.

4.2.2. Unifacial shaped tools on regularized blanks

In this category, the blanks are regularized, coming from debitage that required simple technical organization (type C) (*sensu* Boëda 2013).

The characteristics of the volumetric structure and the presence of cortex in the pieces from site MT-SL-31, indicate that the principle of affordance is marked by the selection of voluminous pebbles of silicified sandstone, quartzite, and flint, of significant dimensions and accentuated convexities. Robust, poorly normalized blank flakes with asymmetrical profiles were produced from these cobbles, with the maintenance of cortical parts that were integrated into the possible prehensile part. Unifacial shaping partially modifying the blank is observed in these tools with the intention of thinning their volume.

As regards their techno-functional properties, they are made up of one to two transformative units, located on the distal or lateral parts, with irregularly shaped, pointed

edges and angles of around 80º. These differentiated units are in association with a possible prehensile portion located adjacent to or opposite the edge (Oliveira 2014) (Figure 9: a, b).

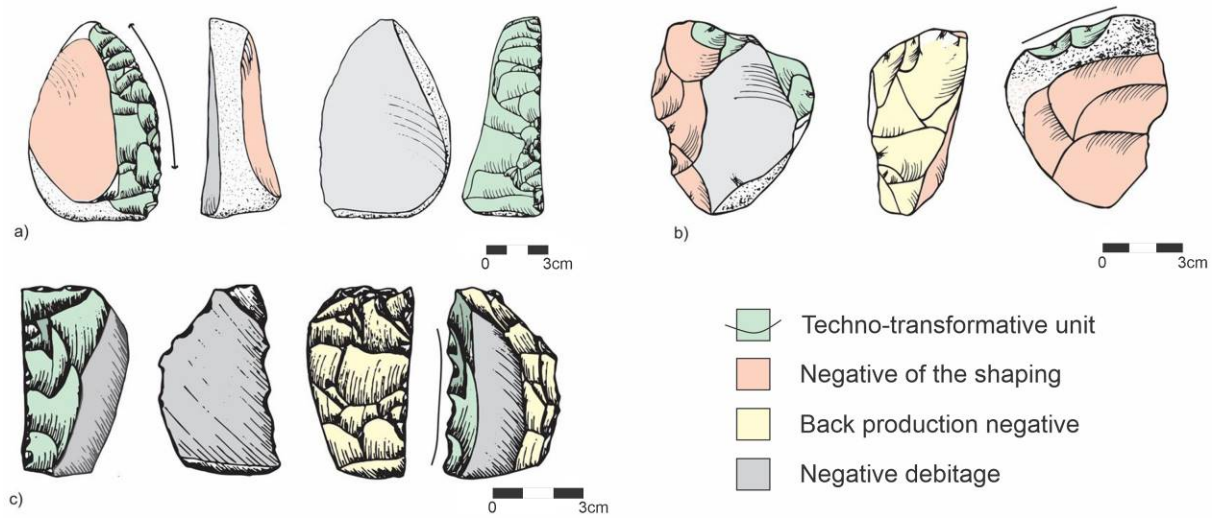

Figure 9. Unifacial shaped tools on regularized blanks. Site MT-SL-31 (a, b); Site GO-JA-01 (c) Source: modified from F. Oliveira (2014) and K. Oliveira (2019).

At site GO-JA-01, the blanks for these tools are of bulky flakes whose raw material is from within the rock shelter. The shaping produced the possible prehensive unit, characterized by an abrupt back that was clearly produced to be integrated into the tool's operation. Their intention was to diminish the volume of the blank.

There is only one techno-transformative unit, the edge being formed by one or two knapping sequences, positioned on the side opposite or adjacent to the possible prehensile part, the line of the blade edge is concave and rectilinear, of concave and rectilinear delineation, around 80º (Figure 9: c) (Oliveira 2019).

4.2.3. Tools with restricted blanks modification: regularized and non-regularized blanks

At varying volumes and dimensions, these tools present restricted technical modification. At site GO-JA-01, they are from silicified sandstone, flint, and basalt (Oliveira 2019), and at site MT-SL-31, silicified sandstone, flint, and quartz (Oliveira 2014).

The blanks result from C debitage or from debris (shaping flakes), and their modification takes place only by the retouch of transformative units or by edges marked by use. Part of these tools have supports of varied structures, with a weak connection between the transformative and possible prehensive units.

In tools from type D debitage, even if there was no modification in the blank, its structure is considered normalized, given that the technical criteria coming from the debitage methods guaranteed the techno-morphological normalization of the flake, foreseeing a connection between its parts (incisive and possible prehensive). They are described here because they correspond to low-visibility instruments. This category was divided into tool dimension subcategories, medium-sized and small.

a) Medium-sized, low visibility tools

When retouched, the edge presents a sequence of short scars, concave, convex or rectilinear outlines and angles of 50º to 80º for the MT-SL-31 site and 50º to 75º for the GO-JA-01 site. The average of dimensions for site GO-JA-01 and MT-SL-31 doesn't exceed is 5.9 cm in length, 4.7 cm width, and 2.1 cm thickness.

b) Small, low visibility tools

The pieces in this subcategory show volumetric structure and diminutive dimensions, as well as subtle evidence of retouching (or of usage) of the edge or the prehensile areas (Oliveira 2019; Viana & Oliveira 2017). At the GO-JA-01 site, the analysis of the tool edges was carried out using a Digital Microscope (Microscope, magnification: 1~800X). Average dimensions for site GO-JA-01 and MT-SL-31 doesn't exceed 2.8 cm length, 2.4 cm in height, and 0.8 cm width.

The following representation showcases the different categories of tools presented, as well as their respective dimensions (Figure 10). We would highlight the abundance of *limaces* and small, low-visibility tools.

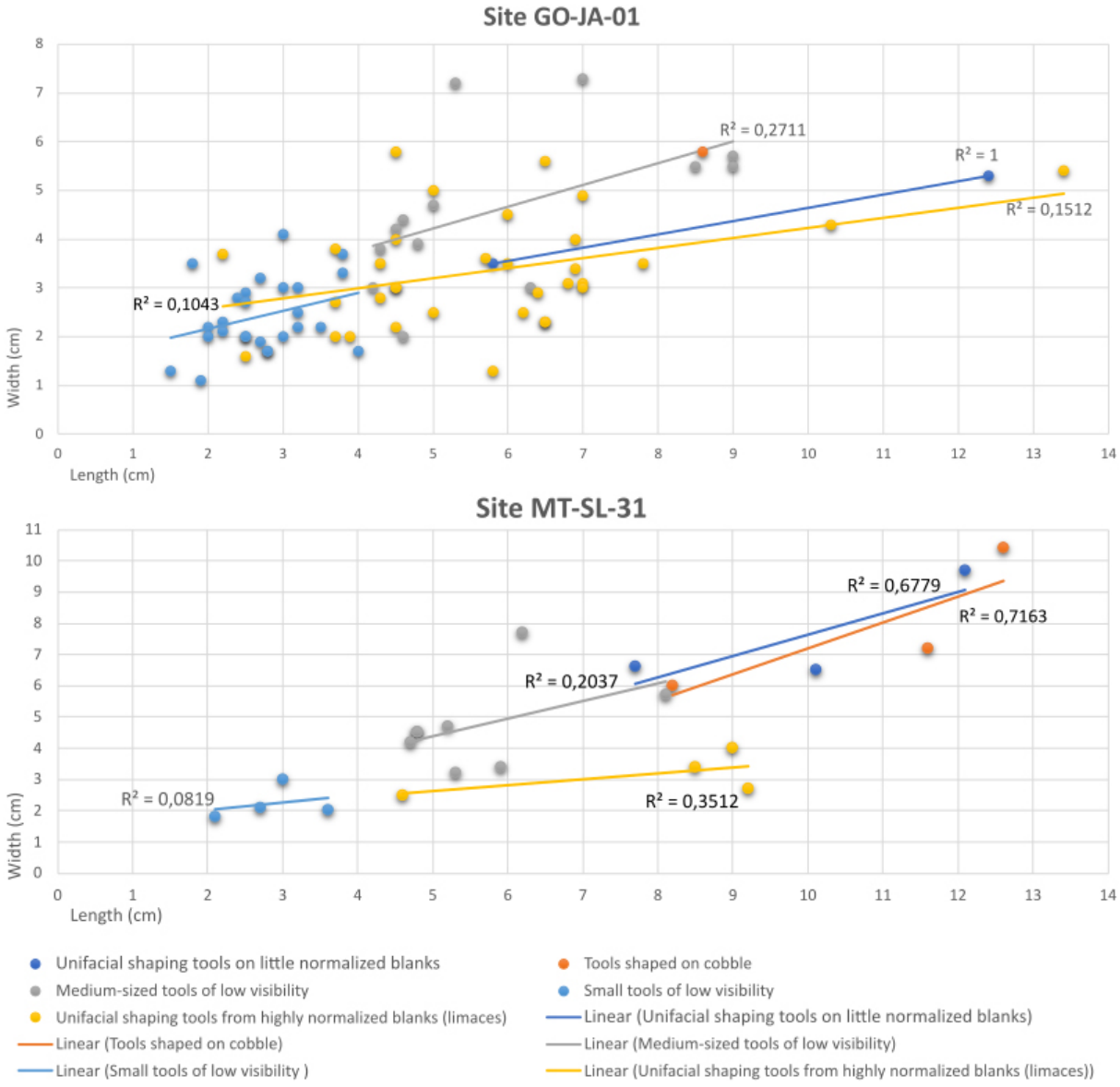

Figure 10. Dimensions of low visibility tools at sites MT-SL-31 and GO-JA-01.

At site GO-JA-01, some blanks display a certain normalization, they are elongated with longitudinal arrises, a rectilinear lateral part on a narrow back and the other convex and sharp, forming pointed ends (Figure 11: b, c). They derive from a well-controlled debitage type C, which showcases control of technical acts. Others present a morphology of quadrangular tendency, with a butt angle with an internal face under 90º, suggesting type D debitage

provenance (Figure 11: e). In both situations, the debitage negatives were incorporated into the techno-functional units, which means that therefore they were flake-tools.

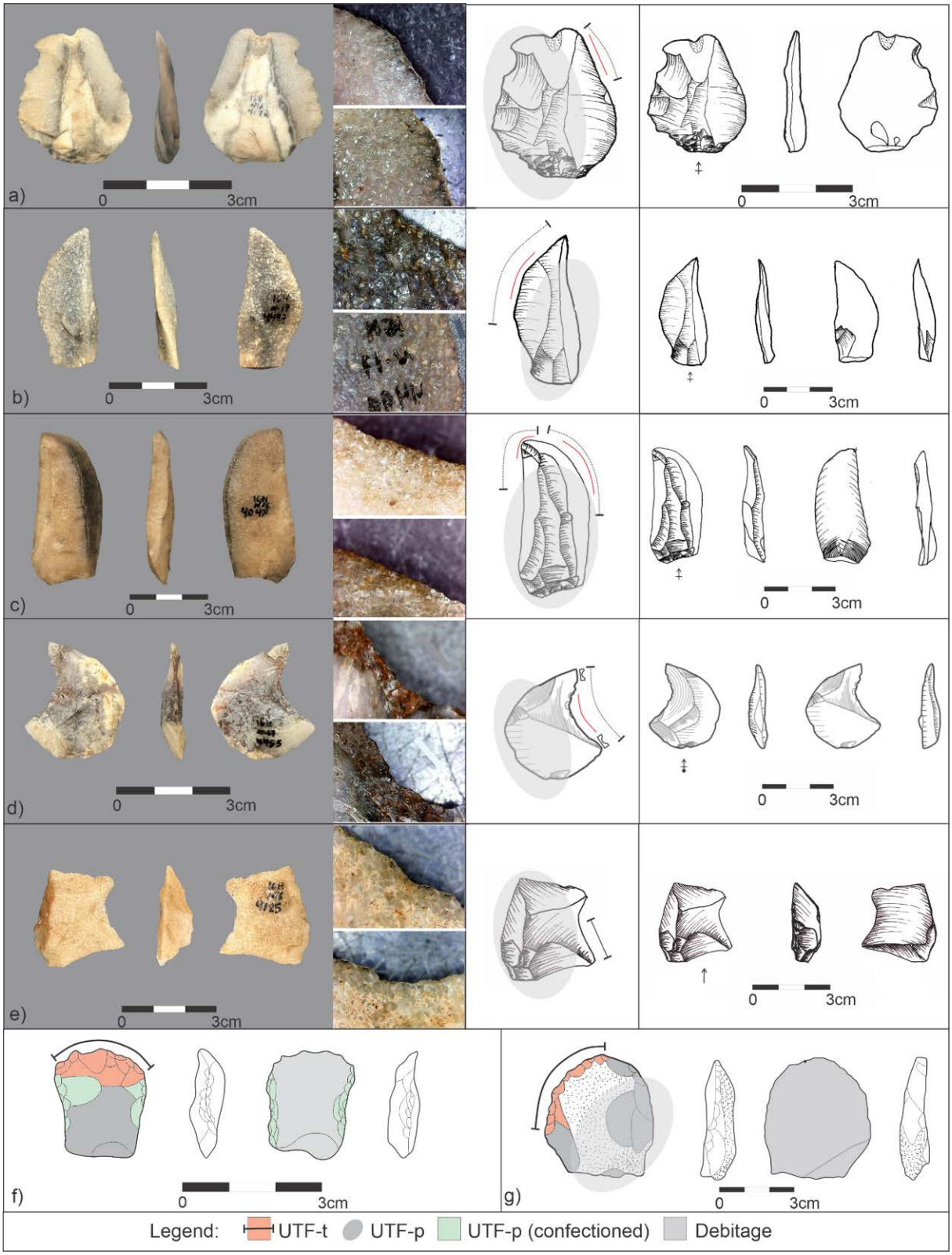

Figure 11. Low visibility small tools: Site GO-JA-01 (a, b, c, d, e); Site MT-SL-31 (f, g). Source: modified from F. Oliveira (2014) and modified. K. Oliveira (2019).

There are also poorly defined blanks in techno-morphometric terms (Figure 11: a, d), whose tools received subtle scars for the sharpening of edges or possible prehensile areas (Oliveira 2019). Blanks originating from "ramified operative chains" (Bourguignon *et al*. 2004) selected on the basis of technical criteria sufficient for the formation of edges, namely shaping flakes, were also identified.

At site MT-SL-31, pieces of this category are also in found blank flakes from debitage C, with no evidence of normalization. The recurrent presence of cortex indicates selection by affordance criteria (Oliveira 2014) (Figure 11: f, g).

At both sites, the pieces mostly show a single UTF-t, of diverse delineation, with more acute angles at the GO-JA-01 site and more abrupt angles at the MT-SL-31 site. There is evidence of hafting on some pieces (Figure11: f).

4.2.4. Tools shaped on blanks of cobble

At both sites (GO-JA-01 and MT-SL-31), these tools are made of silicified sandstone and quartzite. Their blanks were selected based on affordance criteria, represented by cobbles of large volume and recurrence in the association between convex and flat surfaces. These were modified by partial shaping, followed by the retouching of the edge (Oliveira 2014; Oliveira 2019). These are instruments on normalized blanks; in this case, the technical criteria that guaranteed the normalization were the carefully selected natural surfaces (cortical pebbles) as possible prehensile parts and the making of the transformative units.

As to techno-functional aspects, each piece presents a transformative unit comprising cortical or produced transformative surfaces and edges with different outlines, bifacial edges, around 80º to 90º, arranged in the distal or lateral portion. The cortical surfaces also integrate with the possible prehensile part (Oliveira 2014; Oliveira 2019) (Figure 12: a, b, c).

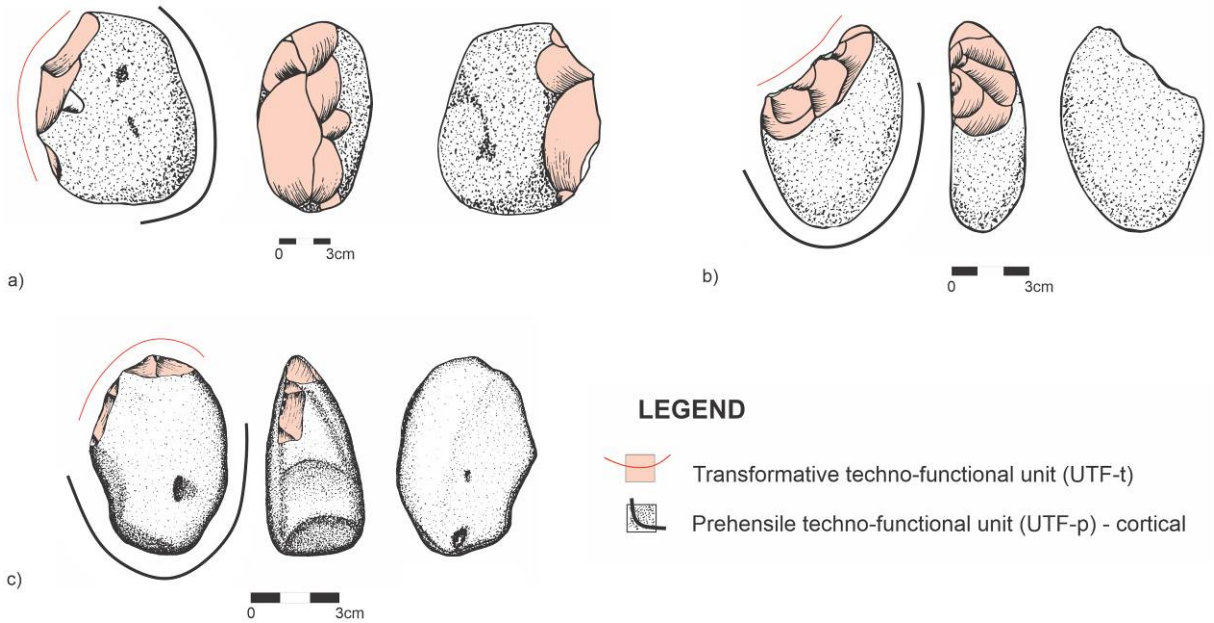

Figure 12. Tools shaped on blanks of cobble. Site MT-SL-31 (a, c); GO-JA-01 (b). Source: modified from F. Oliveira (2014) and K. Oliveira (2019).

4.3. Cores of diminutive dimensions - site GO-JA-01

The presence of cores was evidenced only at site GO-JA-01 (Lourdeau 2010: 289; Oliveira 2019; Schmitz *et al*. 2004), and in the collection under study, they are all correlated to the category of low visibility tools (Table 2).

Table 2. General characteristics of the cores guided by the concept of debitage Type C and discoid D at site GO-JA-01

Concept of debitage	Cat.	Length (avg./cm)	Width (avg./cm)	Thickness (avg./cm)	Conservation condition	Raw material
Type C	3936	4.8	7.0	3.8	Entire	Silicified Sandstone
	4067	2.2	3.0	2.3	Entire	Silicified Sandstone
	4516	3.4	2.8	3.5	Entire	Chalcedony
	4475	1.7	1.9	2.0	Entire	Silicified Sandstone
	4444	1.9	1.5	2.0	Entire	Flint
	5114	6.0	4.7	3.4	Entire	Basalt
	4616	4.0	3.3	1.0	Entire	Friable sandstone
	3957	7.5	7.5	5.6	Entire	Basalt
	4722	1.8	1.7	1.0	Fragmented	Quartzite
	4580	3.3	2.2	0.9	Fragmented	Chalcedony
	3682	1.0	1.6	1.4	Fragmented	Flint
Type D	5111	8.0	6.2	3.5	Entire	Silicified Sandstone

They are found in a number of raw materials, silicified sandstone, chalcedony, flint and basalt. With the exception of one piece, these cores were correlated to debitage C, that is, their structure is not integrated, and they were exploited by taking advantage of the angulation and natural convexities of the blocks. In particular, the smaller cores and those in an advanced state of utilization, present more than one hammering plane, which showcases a maximization of the use of the raw material's volume.

With regard to the category of low visibility tools from site GO-JA-01, the presence of cores made from silicified sandstone, flint and basalt and correlated to debitage C must be highlighted. Most of them present even smaller dimensions than the blanking flakes of the low visibility tools presented (Figure 13: a, b, c) (Lourdeau 2010: 289; Oliveira 2019; Schmitz *et al*. 2004). Such cores reiterate the high percentage of pieces belonging to this category in the collection.

At site GO-JA-01, the presence of a single medium-sized core of silicified sandstone exploited by the concept of debitage discoid D-type stands out. The same presents convex faces, delimited by an imaginary line from which sequences of centripetal scars with semi-abrupt angles depart (Figure 13: d). The flaking surface shows centripetal fractioning (negatives), which would have produced flakes with a certain techno-morphological normalization, resulting in the production of tool-flakes. Negatives of this core are compatible with some pieces found in the low visibility tools category. It should be noted that the core volume was subsequently taken up as a tool.

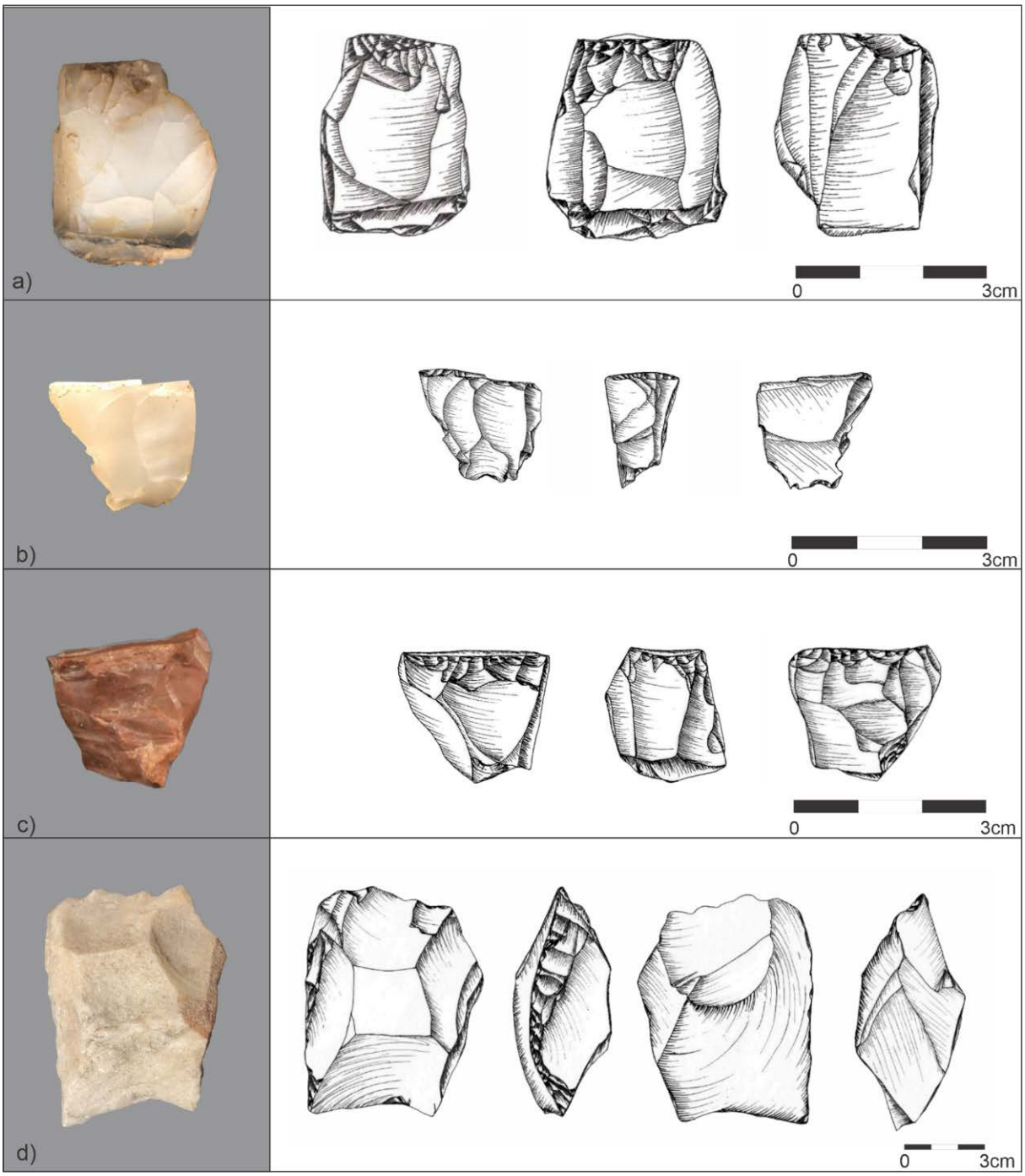

Figure 13. Debitage C cores: site GO-JA-01 (a, b, c); Debitage discoid D-type (d). Source: modified from K. Oliveira (2019), drawings Edilson Souza.

5. Discussion and final considerations

Archaeological research on Brazil's Central Plateau, some of which has been systematized in summaries on the flows of ancient settlements on the Brazilian Central Plateau (Bueno *et al.* 2013; 2020; Lourdeau 2019; Vialou *et al.* 2017), has increasingly broadened the panorama of human occupation during the Pleistocene-Holocene and Early Holocene transition period, especially with regard to the techno-cultural diversity of lithic materiality expressed in tools which show highly perceptible production stigmas. Nevertheless, low visibility artefacts are generally absent or poorly evidenced in research.

By presenting the techno-cultural particularities of part of the tools from sites GO-JA-01 and MT-SL-31, linked to chronological and spatial data from other sites on the Plateau, we seek to shed light on the "micro", that is, to contextualize singularities in a broader area. This paper has been able to showcase that while the aforementioned sites are located in a small area of the Central Plateau, they are representative, not only due to their archaeological records, but also due to their broad chronology. The dates of these sites represent different times of the Pleistocene-Holocene and Early Holocene, with the oldest Serranópolis sites dating to around 12,700 and 11,000 (cal) BP, when archaeological records are most numerous and scattered throughout the Central Plateau, and MT-SL-31 representing the later Early Holocene, up until around 9,000 (cal) BP.

The relationship between humans and the environment may be considered a 'window into' understanding technologies and the interaction of sites embedded in their landscapes. Especially in the *Cerrado* biome, where the vegetation changes with the rhythm of the seasons, which are well marked, the visibilization of the sites in the landscape is not static. At site GO-JA-01, for instance, where the vegetation canopy is dense in rainy seasons and the slope of the escarpment is evenly accommodated to the local topography, the site presents low visibilization during this period. However, this lesser visibilization contrasts with the monumentality of the sandstone structure of the site itself, which bestows it a striking grandeur. In contrast, the visibilization of site MT-SL-31 is invariably good, regardless of the season, as it is located on a group of high residual mounds of tabular forms that stand out in the landscape.

Such elements suggest that these geological structures, where sites GO-JA-01 and MT-SL-31 are located, may be treated as geosymbols markers of externalization of collective memories. Settlements in such striking locations also suggests the establishment of affective and aesthetic relationships between people and real and imagined entities (Bonnemaison 2012; Radel 2022; Tuan 1983). It is worth noting that such geoenvironmental cartography is also present in other archaeological areas of the Central Plateau dated to the Pleistocene-Holocene and Early Holocene transition (Isnardis 2019).

With regard to the toolbox from sites GO-JA-01 and MT-SL-31, we are certain that the tools in the collection do not represent the totality of the panoply of artefacts from the greater Central Plateau area. Nevertheless, the tools categories evidenced in this paper, added to the techno-cultural particularities found in other Central Plateau sites, for instance, the laminar debitage present at site Toca do Cerco do Elias (Pagli *et al.* 2016), the bipolar percussion on an anvil at site João Leite (Lucas 2020: 115), tools shaped of cobble at sites in the northeastern region (Lucas 2020: 338; Pagli *et al.* 2016), the production of robust bifacial pieces in the Peruaçu river valley (Rodet 2009), in Serranópolis (Schmitz *et al.* 2004) and at sites AS2 and AS4 (Martins & Kashimoto 2012), and the smaller volume bifacial pieces (points bifaciais), present at several sites (but always in a restricted form), expand the Itaparica toolbox. They bring about a greater understanding of the techno-cultural diversity of the technical memories of the human groups that occupied the extensive area of the Central Plateau, enabling a better understanding of the connections of technical knowledge between regions.

As for ubiquity of tools commonly referred to as *limaces*, present in the majority of Central Plateau sites, and also on the GO-JA-01 and MT-SL-31 sites, brings us back to reflections based on the Itaparica techno-complex (Lourdeau 2010: 361). The recurrence of such tools, this leads us to consider sharing between different human groups over the course of at least 4,000 years, supported by knowledge, technical memories, and objects. The proposition about the dispersion and possible connections of this technical culture is better aligned with an interactive perspective than with a technical convergence (Chevrier 2012). The techno-functional variability of these pieces may be associated with their distinct

temporalities, as recorded in Piauí (Lucas 2020: 344). This reinforces the idea of movement and potential for change in cultural traditions (Sahlins 1997). Nevertheless, such heterogeneities are also made possible by the fact that these pieces possess a "structural metastability" (Simondon 2020), which allows for production and functional variability.

The other tool categories presented reveal the set of techno-cultural peculiarities of the tools from sites GO-JA-01 and MT-SL-31 in relation to the wider archaeological context of the Central Plateau. Worthy of mention, firstly, is the marked presence of the principle of affordance among the tools from the MT-SL-31 site, different from what occurs with the pieces from GO-JA-01, where the natural vestiges (cortical or de-laminated) are scarcely represented. Therefore, a pebble blank tool not transformed by the debitage phase and devoid of the structural modifications of shaping, expresses a specific technical option with ergonomic and structural consequences. The absence of debitage does not shorten the operative chain timeframe of such tools, since in this case, there is a longer delay in the selection of the module to be transformed into the future tool. Far from representing fortuitous behavior, the time taken to select the pebble and the permanence of natural characteristics (cortex, volume, etc.) following the criteria of affordance, expresses techno-functional intentions, aimed at the selection of ergonomic characteristics of the piece that may favor its handling. Structural characteristics of the block are also imbued in this selection, in order to make possible the installation of the cutting edge, positioned adjacent to a flat surface that functions as the transformative surface when operating the tool. In this movement, it is our understanding that the natural and cultural categories are not antagonistic, but complementary. They also unveil the entanglement of human groups with their surroundings, making us consider not only the site, but also the surrounding areas as participants in the cultural project.

We will now highlight the category of *tools presented a restricted modification of the original blank.* Initially, tools of this category could be similar to collections already described from other regions of the Plateau, like the Peruaçu Valley (Fogaça 2001: 336) and understood by means of the concept of expedient technology (Binford 1979). However, the pieces from the southwestern Central Plateau differ with regard to the control of flake-predetermined scars, evidencing, in certain cases, the intentionality in the production of flake-tools, as is the case of the D-discoid flakes. The low visibility of the pieces in this category is not necessarily due to their reduced dimensions, despite this being one of their characteristics, but mainly due to the fact that their technical structure has scarcely been modified, making them tools of difficult to identify with only the "shape" criterion, without the development of technological analyses.

Incorporating and elevating these technographic categories (instruments with shaping on pebble supports, selected by affordance criteria, and scarcely modified tools) to the context of the present discussion, pairing these categories with the others present in the Itaparica techno-complex, means giving visibility to a set of objects still hardly considered in the technological analyses of the southwestern region of the Central Plateau. This in turn instigates studies to go beyond the 'formal', the normalized, following the challenge of archaeology applied to deep time in terms of moving away from the preconception that equates a greater amount of negatives with a greater level of technological complexity (Maigrot & Plisson 2006).

Expanding the toolbox of southwestern Central Plateau sites in Brazil and their modes of production and operation collaborates in the expansion and (re)signifying of the technical alterities present in human occupations of the Early Holocene, as well as in the understanding of settlement flows in the region. From a broader perspective, it contributes to accentuating the techno-cultural diversity present in Brazil's deep history.

The intention is that the data presented herein will contribute to the understanding of the magnitude, originality, and diversity of the Itaparica technical system, and stimulate studies

aimed at matching it with other, older or more recent technical contexts in different research regions of South America.

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Data accessibility statement

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Singularidades tecno-culturais na região sudoeste do Planalto Central brasileiro no Holoceno Inicial

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Resumo:

Este artigo visa contribuir para a ampliação do conhecimento sobre as panóplias de ferramentas líticas presentes em sítios arqueológicos do Holoceno Inferior localizados no Planalto Central brasileiro. Esses sítios têm sido tradicionalmente interpretados dentro do contexto da Tradição Itaparica, cujos artefatos denominados de "lesmas" ou "plano-convexos" foram identificados como marcadores culturais. Os avanços nas pesquisas nos últimos vinte anos sobre as características técnicas, tecnológicas e tecno-funcionais de materiais líticos tipologicamente atribuídos à Tradição Itaparica permitiram uma melhor definição daquele que veio a ser denominado de complexo tecno-cultural Itaparica Lourdeau (2010:59). A partir da coleção lítica de dois sítios, pesquisados inicialmente por Oliveira (2014) e Oliveira (2019), provenientes da região sudoeste do Planalto Central, o sítio GO-JA-01 (Diogo Lemes), com datação mais antiga de 12.717 - 12.143 cal. (Beta-3699), e o sítio MT-SL-31 (Morro da Janela), de 11.994 - 11.316 cal (Beta-78053), buscamos criar condições heurísticas para que desses contextos antigos pudessem emergir um aporte de expressões culturais de baixa visibilidade técnica. Tais expressões são usualmente preteridas por estarem associadas a materiais cuja estrutura artefatual é caracterizada pela alta normalização e/ou pela padronização. Objetivamos, assim, olharmos com mais detalhamento para as ferramentas incisivas sutis que estão associadas às estruturas artefatuais “plano-convexas”.

Nossa pesquisa fundamentou-se na abordagem Tecno-funcional (Boëda 2013:39), a qual permite identificar as coerências que se estabelecem no interior de uma estrutura volumétrica (um espécimen) nos termos de seus subconjuntos estruturantes - minimamente, o(s) gume(s) transformativo(s) e a(s) unidade(s) preensiva(s) - à luz de seu potencial funcional. Ademais, ela permite pensar o sentido técnico das estruturas artefatuais ao reinseri-las no conjunto do qual fazem parte (uma população), fornecendo dados sobre a consistência tecno-funcional das coleções. Em termos metodológicos, a identificação dos esquemas operatórios foi realizada a partir da análise diacrítica dos negativos presentes nos artefatos e dos modos de produção evidenciados com base nos princípios técnicos de afordância, debitage e façonagem.

O ordenamento estrutural entre as porções transformativas e possíveis porções preensivas, nos possibilitou agrupar as seguintes categorias tecno-funcionais:

1) "**Instrumentos com façonagem unifacial a partir de suportes normalizados (*limaces*)" -** apresentam estrutura técnica estável, caracterizada por um suporte alongado e volumoso em uma de suas faces. A simetria das laterais e o plano de seção foram obtidos por façonagem, o(s) gume(s) delineados por confecção e podem compor de uma ou mais unidades transformativas. Algumas peças são altamente normalizadas apresentando recorrentemente uma unidade tecno-transformativa, localizada na porção apical. Outras são menos normalizadas, sua estrutura funciona como um suporte onde se instalam mais de uma unidade transformativa. São peças de arenito silicificado e sílex.

2) "**Instrumentos com façonagem unifacial com suportes regularizados" -** o suporte não é normalizado, os perfis e as laterais são assimétricos. Os princípios da afordância, façonagem e debitage atuaram na estrutura da ferramenta, podendo compor uma ou duas unidades transformativas. São peças de arenito silicificado, quartzito e sílex,

3) "**Instrumentos produzidos sobre suportes de seixos**" - os seixos foram selecionados por critérios técnicos de afordância, seguidos de façonagem e confecção de gumes, em contornos diversos. São peças de arenito silicificado e quartzito.

4) I**nstrumentos com modificação restrita**" - foram identificados três tipos de estruturas de suportes: algumas pouco regularizadas, provenientes da debitagem tipo C; outras normalizadas, provenientes da debitagem tipo D-discöide; e ainda as de "cadeias operacionais ramificadas" (Bourguignon *et al.* 2004), derivadas de lascas de façonagem. Os gumes são definidos por retoques ou traços de uso. São peças de arenito silicificado, sílex, basalto e quartzo.

Também pudemos identificar na coleção a ocorrência representativa de núcleos pequenos, não esgotados com presença de negativos de pequenas dimensões, o que nos levou a inferir a possibilidade de produção de suportes ainda menores, contudo, estes não foram detectados na coleção.

Compreendemos que a onipresença dos instrumentos comumente denominados de *limaces*, presentes na maioria dos sítios do Planalto Central, nos leva a considerar o compartilhamento da estrutura técnica dessa ferramenta, entre diferentes grupos humanos ao longo de pelo menos 4.000 anos. A proposição sobre a dispersão e possíveis conexões desta cultura técnica está mais alinhada com uma perspectiva interativa do que com uma convergência técnica (Chevrier 2012). A variabilidade técnico-funcional dessas peças está associada à temporalidades distintas, isto reforça a ideia de movimento e potencial de mudança nas tradições culturais (Sahlins 1997).

Também destacamos a presença marcante do princípio da afordância (Boëda & Ramos 2017) entre as ferramentas do sítio MT-SL-31, possibilitando a supressão da fase de debitagem. Compreendemos que isso não encurta o tempo da cadeia operatória, neste caso o maior investimento estaria no critério técnico de seleção dos suportes (seixos) visando produzir a futura ferramenta. Neste movimento, entendemos que as categorias natural e cultural são complementares. Desvelam também o enredamento dos grupos humanos com suas cercanias, fazendo-nos considerar não apenas o sítio, mas também o entorno como participantes do projeto cultural.

Os instrumentos de baixa visibilidade foram caracterizados, não necessariamente pelas suas dimensões reduzidas, mas principalmente por sua estrutura técnica ter sido pouco modificada, tornando-as ferramentas de difícil identificação se utilizarmos somente o critério "forma", sem o desenvolvimento de análises tecnológicas. Incorporar e elevar essa categoria tecnográfica ao contexto da presente discussão, as emparelhando às demais presentes no tecno-complexo de Itaparica, significa dar visibilidade a um conjunto de objetos ainda pouco considerados nas análises tecnológicas da região sudoeste do Planalto Central. Isto, por sua

vez, instiga os estudos a irem além do 'formal', do normalizado, seguindo o desafio da arqueologia aplicada ao tempo profundo em termos de se afastar do preconceito que equipara uma maior quantidade de negativos a um maior nível de complexidade tecnológica complexity (Maigrot & Plisson 2006).

As minúcias tecnológicas obtidas com a investigação dos sítios arqueológicos supramencionados, quando consideradas à luz de informações espaciais, cronológicas e paleoambientais, permitem ponderar sobre os cenários concernentes às dinâmicas populacionais desse período. As categorias de ferramentas evidenciadas neste artigo, somadas às particularidades tecno-culturais encontradas em outros locais do Planalto Central, ampliam o conjunto de ferramentas de Itaparica. Proporcionam uma maior compreensão da diversidade técnico-cultural das memórias técnicas dos povos que habitaram a extensa área do Planalto Central brasileiro, possibilitando investigações mais aprofundadas sobre as conexões entre os conhecimentos técnicos presentes em diferentes regiões da América do Sul.

Palavras-chave: sudoeste do Planalto Central Brasileiro; Holoceno Inferior; tecno-funcional Itaparica; ferramentas de baixa visibilidade